62 Elder Road
Birkenhead SA 5015

PO Box 77
Port Adelaide SA 5015

Telephone (08) 8300 0300
International +618 8300 0300
Facsimile (08) 8300 0597
www.adbri.com.au

Adelaide Brighton Cement Ltd

ABN 96 007 870 199

ANNUAL NOISE MANAGEMENT REPORT FOR BIRKENHEAD WORKS

COMPLIANCE DATE: 15/02/25 – Annual Report – 2024

EPA Licence 1126: Noise Management Plan (U-787)

Licensed site: **Adelaide Brighton Cement, Birkenhead Works**

62 Elder Road, Birkenhead, SA 5015

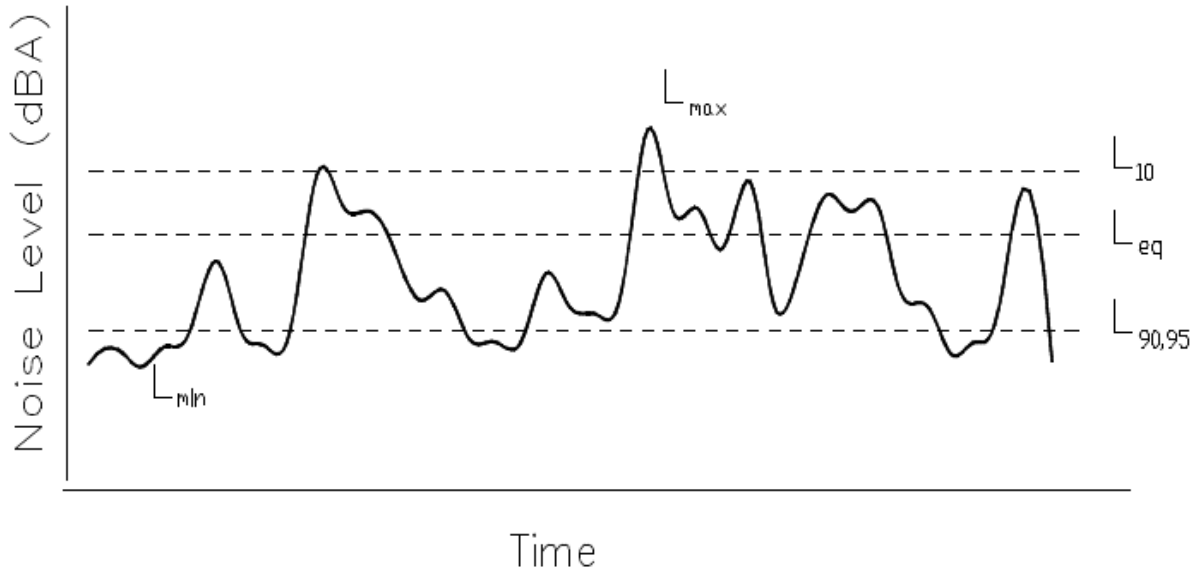
Date of Submission: **20 February 2025**

Version Number: **2**

Report Submitted by: Business Partner Environment C&L (SA/NSW/NT)

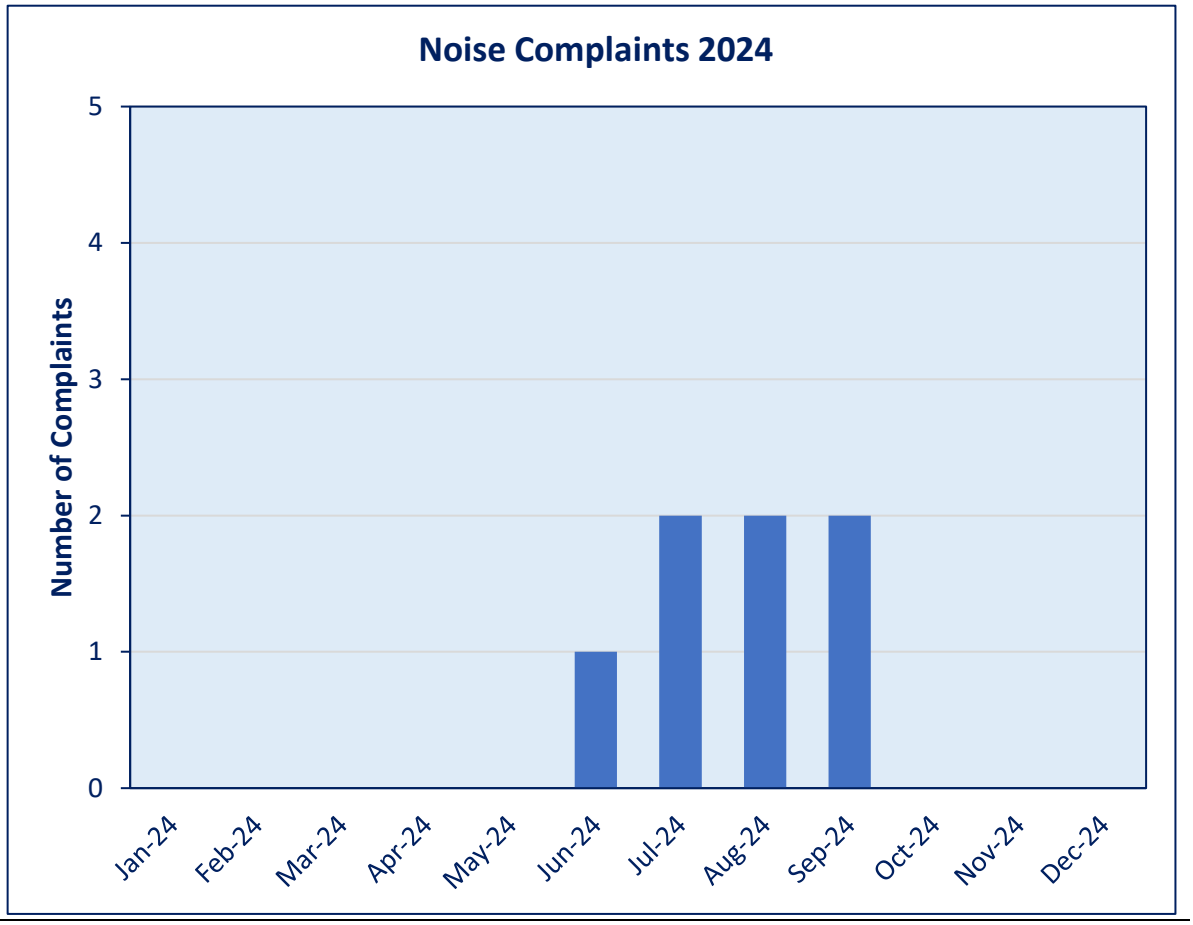
Glossary of acoustic terminology

dB(A)	A unit of measurement, decibels(A), of sound pressure level which has its frequency characteristics modified by a filter ("A-weighted") so as to more closely approximate the frequency response of the human ear.
L_1	The noise level which is equalled or exceeded for 1% of the measurement period. L_1 is an indicator of the impulse noise level, and is used in Australia as the descriptor for intrusive noise (usually in dBA).
L_{10}	The noise level which is equalled or exceeded for 10% of the measurement period. L_{10} is an indicator of the mean maximum noise level, and is used in Australia as the descriptor for intrusive noise (usually in dBA).
L_{90}	The noise level which is equalled or exceeded for 90% of the measurement period. L_{90} is an indicator of the mean minimum noise level, and is used in Australia as the descriptor for background or ambient noise (usually in dBA).
L_{eq}	The equivalent continuous noise level for the measurement period. L_{eq} is an indicator of the average noise level (usually in dBA).
L_{max}	The maximum noise level for the measurement period (usually in dBA).

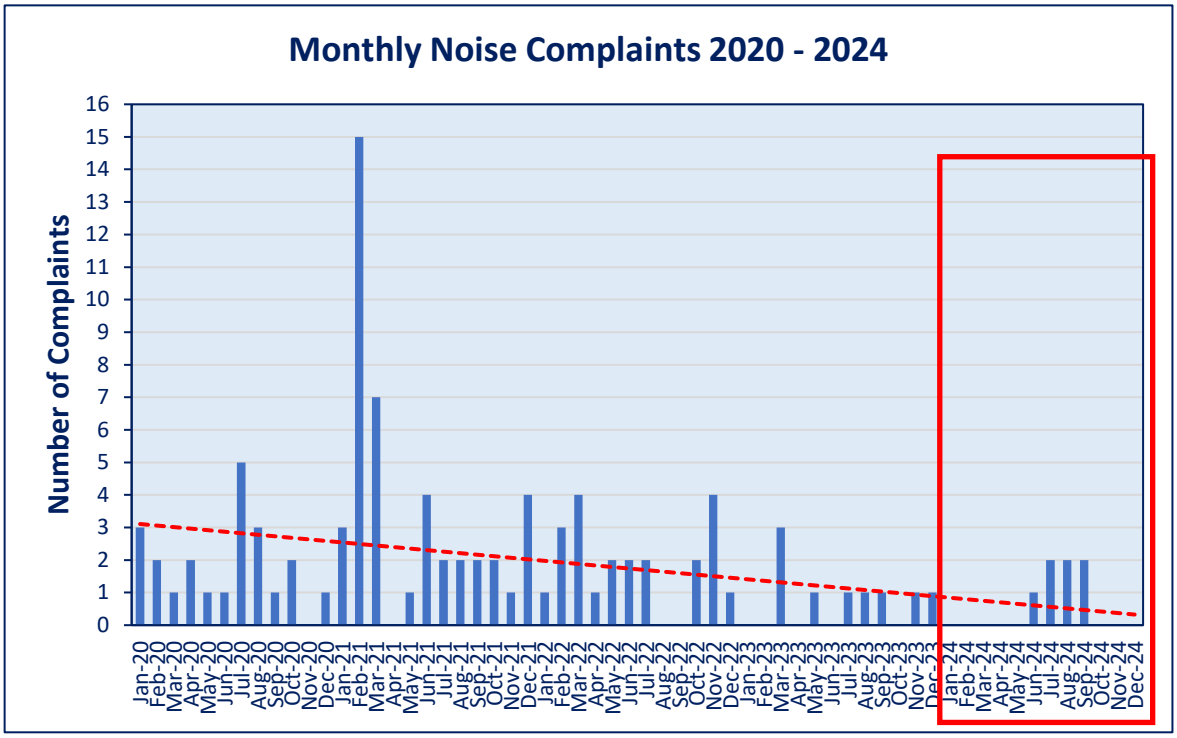


Note: *The subjective reaction or response to changes in noise levels can be summarised as follows*:

A 3 dB(A) increase in sound pressure level is required for the average human ear to notice a change; a 5 dB(A) increase is quite noticeable and a 10 dB(A) increase is typically perceived as a doubling in loudness

Monitoring Objective	The annual report will include where applicable: • Graph of noise complaints received for the year and trend report in noise complaints compared with the previous year • Summary of noise monitoring in the local community and an assessment of results against previous monitoring results to identify trends in noise levels. • Summary of noise minimisation actions and overall effectiveness • Details of other noise minimisation activities • Assessment of the effectiveness of this noise management plan
Monitoring Plan	This monitoring report complies with the Noise Management Plan approved on 2 August 2023 by the SA EPA. The Plan is available on the ABC Birkenhead Community Website: https://adelaidebrightoncommunity.com.au/
Noise complaints	2024 Complaints summary • 7 complaints (total) – (includes 3 not related to site activity). • 4 complaints received from two residents (2 each) – (represents 57% of all complaints). • Source was not able to be identified for 5 of the 7 complaints investigated. • No complaints related to plant shutdown maintenance activities. Details of noise complaints and actions taken are reported in the 2024 quarterly noise reports. 

There was small decrease in the number of complaints received in 2024, compared with 2023. There has been a steady decline in noise complaints in recent years, as shown in the graph below.



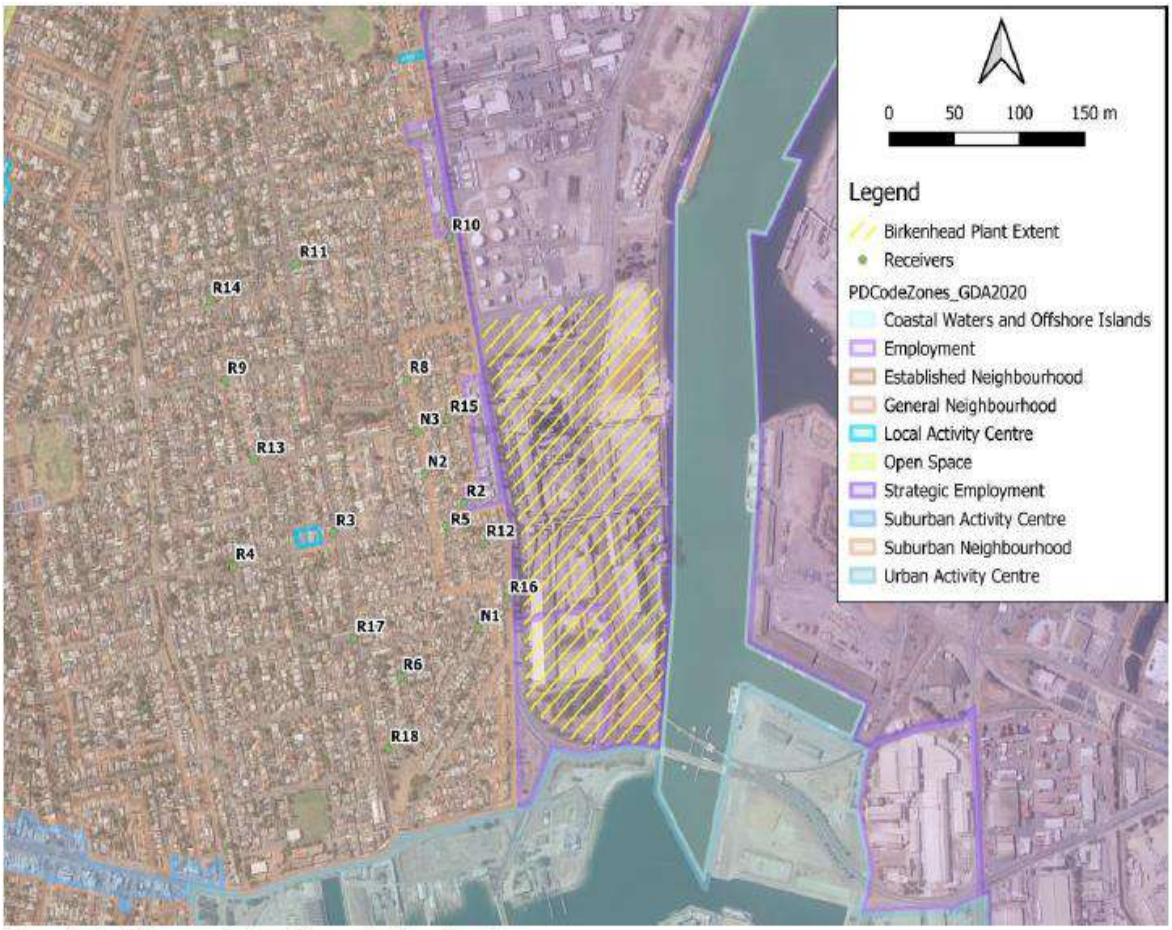
Community based noise monitoring & assessment against previous year	ABC engaged Resonate Consultants to undertake an annual noise survey in September/October 2024. The noise report A230951RP3A 12 November 2024 is in attached. ABC has undertaken regular attended daytime and nighttime noise monitoring surveys in the community to gain an understanding of how noise from the site impacts the community. Noise Measurements have been conducted in accordance with the Environment Protection Noise Policy, at defined measurement positions allowing for trends in noise levels at each location to be established over time. Table 1 provides details of the measurement locations, and their position relative to the Birkenhead site is shown in Figure 1.  Figure 1 Aerial image of site, adjacent land, and zoning

Table 1 Noise sensitive receiver locations

Receiver ID	Zone	Survey Location
R2	Suburban neighbourhood zone (SN)	Corner of Alfred St and Hargrave St, Peterhead
R3	General Neighbourhood zone (GN)	Adjacent to 145 Hargrave St, Peterhead
R4	General Neighbourhood zone (GN)	Corner of Roberts St and Hargrave St, Birkenhead
R5	Suburban neighbourhood zone (SN)	Adjacent to 23 Levi St, Birkenhead
R6	General Neighbourhood zone (GN)	Adjacent to 19 Craigie St, Birkenhead
R8	General Neighbourhood zone (GN)	Adjacent to 39 Mary St, Peterhead
R9	General Neighbourhood zone (GN)	Corner of Wills St and Whyte St, Peterhead
R10	General Neighbourhood zone (GN)	Corner of Olive St and Victoria Rd, Largs Bay
R11	General Neighbourhood zone (GN)	Adjacent to 158 Fletcher Road, Largs Bay
R12	Suburban neighbourhood zone (SN)	Adjacent to 33 Hilton St, Birkenhead
R13	General Neighbourhood zone (GN)	Adjacent to 28 Whyte St, Peterhead
R14	General Neighbourhood zone (GN)	Adjacent to 15 Waverly St, Largs Bay
R15	Suburban neighbourhood zone (SN)	Adjacent to 9 Walton St, Peterhead
R16	Suburban neighbourhood zone (SN)	Adjacent to 77 Victoria Rd, Birkenhead
R17	General Neighbourhood zone (GN)	Corner of Fletcher Rd and Rose St, Birkenhead (adjacent to 53 Fletcher Rd)
R18	General Neighbourhood zone (GN)	Adjacent to 20 Fletcher Rd, Birkenhead (in the park)
N1	General Neighbourhood zone (GN)	Corner of Gunn and Well St, Birkenhead (adjacent to 39 Wells St)
N2	General Neighbourhood zone (GN)	Adjacent to 9 Mary St, Peterhead
N3	General Neighbourhood zone (GN)	Corner of Walton & Mary St, Peterhead (adjacent to 23 Mary St)

Noise Criteria

The daytime and night time noise criteria is in the table below .

Location	Zone	Criteria	
		Day (7 am to 10 pm)	Night (10 pm to 7 am)
ABC Birkenhead Plant	Employment & Strategic Employment	N/A	N/A
R2, R5, R12, R15, R16	Suburban Neighbourhood zone	57	49
N1, N2, N3, R3, R4, R6, R8, R9, R10, R11, R13, R14, R17, R18	General Neighbourhood zone	57	49

Results of Attended Noise Measurements

Attended Day time noise results

Location	Measured noise level dB(A)		Day time criteria dB(A)	Compliance	Notes/Comments
	L_{eq}	L_{90}			
R2	60	**58**	57	×	2
R3	**57**	51	57	✓	1
R4	**49**	45	57	✓	1
R5	**56**	53	57	✓	1
R6	**46**	43	57	✓	1
R8	**48**	42	57	✓	1
R9	**43**	40	57	✓	1
R10	73	**59**	57	×	3
R11	**47**	39	57	✓	1
R12	54	**52**	57	✓	1
R13	**50**	46	57	✓	1
R14	**45**	42	57	✓	1
R15	56	**54**	57	✓	1
R16	75	**61**	57	×	3
R17	**61**	40	57	×	4
R18	**50**	47	57	✓	1
N1	53	**51**	57	✓	1
N2	**47**	42	57	✓	1
N3	**47**	44	57	✓	1

Day time survey notes/comments:

1. Environmental noise criterion compliance is achieved at each location.
2. Exceedance of criterion by 1 dBA is observed at this location. The plant was clearly audible at this location, however, the measurements were influenced by traffic noise from nearby roads and birds noise.
3. Exceedance of noise criterion is observed at receivers R10 and R16. The exceedance at these locations is consistent with previous noise surveys (refer Section 5.2.2), as the background noise is inherently influenced by traffic noise from Victoria Road (designated Type A road providing major thoroughfare for heavy vehicles). It should also be noted that the plant is usually inaudible at these locations due to dominant traffic noise.
4. Exceedance of criterion by 4 dBA is observed at this location. The noise levels measured at this location were dominated by traffic noise and construction noise close to the measurement location. Considering the L_{90} levels of 40 dB(A), we consider the measured levels to be acceptable.

Attended Night time noise results

Location	Measured noise level dB(A)		Night time criteria dB(A)	Compliance	Notes/Comments
	L_{eq}	L_{90}			
R2	54	**53**	49	×	3
R3	**45**	40	49	✓	1
R4	**39**	36	49	✓	1
R5	**51**	51	49	×	2
R6	**45**	44	49	✓	1
R8	**46**	45	49	✓	1
R9	**38**	36	49	✓	1
R10	46	**44**	49	✓	1
R11	**37**	36	49	✓	1
R12	54	**53**	49	×	3
R13	**38**	36	49	✓	1
R14	**37**	33	49	✓	1
R15	54	**52**	49	×	3
R16	54	**54**	49	×	4
R17	**42**	39	49	✓	1
R18	**42**	39	49	✓	1
N1	49	**48**	49	✓	1
N2	**46**	45	49	✓	1
N3	**48**	46	49	✓	1

Nighttime survey notes/comments:

1. Environmental noise criterion compliance is achieved at each location.
2. Minor (2-3 dB(A)) exceedance was observed at this location. However, the measured levels are considered acceptable due to following reasons:
   - The levels are consistent with results from last 2 surveys (± 2 dB(A))
   - Even though the plant was audible at this location, the measured noise levels were influenced by traffic noise from Victoria Road and noise from the OTR operations.
3. The noise levels measured at this location were affected by traffic noise from Victoria Road. During the survey, however, plant noise was observed to be the dominant source. It should be noted that the measured noise levels are within ± 1 dB(A) in comparison to historical data (previous 2 years).
4. The measured noise levels at this location are inherently dominated by traffic noise from Victoria Road, with noise from the plant barely audible.

Comparison of attended noise results over the last three years

A comparison of noise survey results (L_{90} levels) with historical data is shown in the table below for both day time and night time periods.

Table of Historical Day Time Period Monitoring Data

Location	Day time criteria dB(A)	Measured day time levels, L_{90} dB(A)			Difference (2023/2024)
		2022	2023	2024	
R2	57	54	54	58	4
R3	57	43	51	51	0
R4	57	34	43	45	2
R5	57	48	49	53	4
R6	57	37	38	43	5
R8	57	44	45	42	-3
R9	57	34	38	40	2
R10	57	61	60	59	-1
R11	57	38	37	39	2
R12	57	53	53	52	-1
R13	57	36	40	46	6
R14	57	32	45	42	-3
R15	57	52	50	54	4
R16	57	64	63	61	-2
R17	57	37	46	40	-6
R18	57	48	46	47	1
N1	57	46	49	51	2
N2	57	42	46	42	-4
N3	57	46	46	44	-2

Comments , with reference to the table above:

- Measured noise levels at R3, R8, R10, R12, R14, R16, R17, N2 and N3 are similar to or lower than the levels measured during 2023 survey.
- Measured noise levels at R4, R9, R11, R18 and N1 are similar to or within +/- 3 dB(A) of the 2023 measured levels. Therefore, the measured levels are considered acceptable and do not indicate any significant change in noise conditions.
- Noise levels measured at R5, R6, R13 and R15 show significant change in comparison to 2022 and 2023 results. However, the measured levels do not exceed the environmental noise criterion (refer Table 6). Therefore, the measured levels are considered acceptable.
- Noise levels at R2 show significant change in comparison to 2022 and 2023 results and exceed the environmental noise criterion by 1 dB(A). The measurements at this location were influenced by traffic noise and noise from birds/dogs.

Table of Historical Night Time Period Monitoring Data

Location	Night time criteria dB(A)	Measured night time levels, L_{90} dB(A)			Difference (2023/2024)
		2022	2023	2024	
R2	49	52	51	53	2
R3	49	47	43	40	-3
R4	49	41	38	36	-2
R5	49	48	51	51	0
R6	49	39	39	44	5
R8	49	47	50	45	-5
R9	49	40	38	36	-2
R10	49	50	47	44	-3
R11	49	36	37	36	-1
R12	49	52	53	53	0
R13	49	42	43	36	-7
R14	49	39	39	33	-6
R15	49	52	51	52	1
R16	49	47	53	54	1
R17	49	40	38	39	1
R18	49	38	36	39	3
N1	49	43	44	48	4
N2	49	42	45	45	0
N3	49	52	51	53	2

With reference to the results presented above, the following is noted:

- Measured noise levels at R6 and N1 exceed the 2022 and 2023 measured levels by 4-5 dB(A). Location N1 has historically been dominated by traffic noise from Victoria Road. The levels at R6 were observed to be unusually higher, but the plant was barely audible at this location. Since the measured levels show compliance with the environmental noise criteria, the measured levels are considered acceptable.
- Measured noise levels at all other locations are similar to or lower or within +/- 3 dB(A) of the noise survey data from 2022 and 2023. Therefore, the measured levels are considered acceptable and do not indicate any significant change in noise conditions.

Discussion of 2024 survey results

Based on the survey results presented, the following is noted:

Day time results:

- noise levels exceed the noise criterion at four locations, R2, R10, R16 and R17.
- Locations R10 and R16 are on Victoria Road, where noise levels are inherently dominated by traffic noise.
- At location R2 the noise criterion is exceeded by 1dB(A), which is acceptable and should not result in change in existing conditions.
- At location R17 a 4dB(A) exceedance was noted, which was a result of dominant external noise sources from construction works and traffic movements.

Nighttime results:

- Noise levels exceed the noise criterion at five locations, R2, R5, R12, R15 and R16.
- The measured noise levels at R2, R5, R12 and R15 are similar to levels measured in the 2022 and 2023 survey (within +/- 2 dB(A)). Typically, in terms of human perception to noise, a 2dB(A) change is barely if at all perceptible in field conditions.
- At location R16, there is a major influence in traffic noise from Victoria Road, and similar to 2023 result.

Community Complaints

Resonate were engaged to undertake noise measurements at two locations in the community where ABC has received recent noise complaints (Accolade wharf activities) or a comment from a community member (Limestone Reclaimer).

Noise associated with ABC limestone ship (Accolade)

Resident located in Lincoln Street Largs Bay made a complaint about noise impact, they believed was associated with the Accolade's movements (Wharf area). To investigate this further, Resonate Consultants were engaged to undertake simultaneous noise measurements at both locations. The results are shown in the table below:

Measurement day/time	Measured levels, L_{eq} dB(A)		Criterion, dB(A)
	At Accolade area (Wharf)	At 21 Lincoln Street	
1:45AM, 19 September 2024	76	39	49

Based on the results presented above and our observation on site, the following is noted:

- The plant was inaudible at 21 Lincoln Street (receiver/ complainant).
- The measured levels at the receiver were well below the applicable environmental noise criteria. This was expected as Lincoln Street is away from all major traffic routes (Victoria Road, Fletcher Road, etc.) and is approximately 550 m away from the plant.
- The noise level measured at the Accolade wharf area was not high enough to result in a significant noise impact at the receiver.
- Additionally, based on the noise model, an incident noise level of 39 dB(A) is predicted at the resident location, which calibrates well with the measured noise level.

The results indicate that ABC was not the source of the noise which the resident was concerned about.

Reclaimer Shed

The consultants findings are noted below:

Resident on Whyte Street, Peterhead (vicinity of monitoring locations R9, R13 and R14) has identified noise issues associated with the reclaimer shed. As such, a noise survey was conducted at the reclaimer shed to update the model and assess any increment in noise impact at these receivers.

The site measurements indicated that the existing model considers noise levels higher than the levels measured within the shed. It should be noted that the noise levels in the shed vary depending on the capacity of the shed. With more material in the shed, the reverberant levels are generally lower due to sound absorption provided by the material mounds inside the shed.

Based on our observations on Whyte Street and noise model predictions, we believe that the slightly audible plant noise on Whyte Street is possibly not associated with the reclaimer shed. Note that the plant noise is expected to be audible on Whyte Street, however, not expected to exceed the environmental noise criterion.

Other matters

An intermittent screeching noise was noted during part of the noise survey. ABC has investigated this and has identified that it is related to the operation of the TAD auger which was found to be rubbing on its casing. The TAD auger has been taken out of service and will be redesigned for better performance. When the new auger is placed back into service, checks will be undertaken to confirm its effectiveness.

2024 Annual Plant Shutdown

During the annual plant shutdown, the following controls were put in place to reduce the noise associated with kiln refractory demolition:

- Remote controlled pneumatic breaker (Brokk) – allows for better control of the activity,
- A 14m high noise barrier was installed,
- Nighttime Jack hammering curfew (between 10pm – 7 am)
- Noisiest activities scheduled during the daytime period
- Site inductions and daily team briefings included community impact awareness.

There were no noise complaints during the shutdown

Pneumatic Breaker – inside kiln	Noise Barrier
	

Photo of pneumatic breaker in the kiln and noise attenuation barrier

A noise survey was undertaken during the shutdown and the Annual Plant Shutdown Noise Monitoring Report A230951RP1B 15 March 2024 is attached.

Based on the results presented in the report, the following is noted:

- Day time results—compliance achieved at all survey locations.
- Nighttime results—minor criterion exceedance (~1 dB(A)) at D6 is noted. Due to proximity to Victoria Road, the noise levels at these locations are inherently dominated by traffic noise from Victoria Road. As such, considering this and the fact that the measured noise levels are lower than the 2023 noise survey, we consider the levels at D6 acceptable.
- Subjectively, the demolition works were not observed to be the dominant source at each location. Traffic noise from nearby roads (specifically Victoria Road) was observed to be dominant, with plant being faintly audible during periods with no traffic in the vicinity.
- The continuous noise monitoring results provided no clear indication of noise impact due to demolition works activities. The results indicate that the background noise levels in the immediate vicinity of Victoria Road are dominated by traffic noise and noise from nearby commercial activities (petrol station, etc.)

Noise Abatement Projects and Minimisation Activities	Adbri has developed a new Environment Improvement Programme (EIP), that included transparent consultation with the community in its development. The EIP projects are grouped into themes about communication, dust management and monitoring, noise, odour and amenity. The EIP has been approved by the SA EPA and is available on our birkenhead community website https://adelaidebrightoncommunity.com.au/sustainability/environmental-improvement-plan/ **EIP Project 21: Complete implementation of noise reduction options for kiln shell cooling fans**, aims to reduce noise levels from these fans which have a significant contribution to off site noise emissions from the site.
Plan Effectiveness	In general, noise levels comply with the day-time criterion applicable under the Noise EPP. For most noise sensitive receivers, night-time noise levels also meet the criterion applicable under the Noise EPP. Where noise levels exceed the 49 dB(A) night-time criterion, the exceedance is generally less than 3 dB(A) which subjectively, is a 'just perceptible change'. ABC has been proactive in implementing noise abatement measures and practices associated with shutdown activities, and other noise sources. The number of noise complaints in 2024 were similar to /slightly lower than 2023. Attended daytime and night-time offsite noise surveys confirms that where new plant and equipment has been installed, it has not resulted in any significant changes in noise levels. These results also confirm the effectiveness of the noise studies undertaken as part of project development assessment and approval process, which did not predict any significant change in noise levels. This report demonstrates the continuous improvement approach to managing noise emissions embodied in the Noise Management Plan is effective.
Appendix	Annual Plant Shutdown Noise Monitoring Report A230951RP1B 15 March 2024 Annual Noise Survey Report A230951RP3A 12 November 2024

ABC Birkenhead Plant 2024

Annual Shutdown Period Noise Monitoring Report

A230951RP1 Revision B

Tuesday, 19 March 2024

Document Information

Project	ABC Birkenhead Plant 2024
Client	Adelaide Brighton Cement
Report title	Annual Shutdown Period Noise Monitoring Report
Project Number	A230951

Revision Table

Report revision	Date	Description	Author	Reviewer
0	5 February 2024	First Issue	Saksham Garg	Darren Jurevicius
A	5 March 2024	Revised Issue – ABC comments addressed	Saksham Garg	Darren Jurevicius
B	19 March 2024	Revised Issue – Weather data & barrier added	Saksham Garg	Darren Jurevicius

Glossary

A-weighting	A spectrum adaption that is applied to measured noise levels to represent human hearing. A-weighted levels are used as human hearing does not respond equally at all frequencies.
Characteristic	Associated with a noise source, means a tonal, impulsive, low frequency or modulating characteristic of the noise that is determined in accordance with the Guidelines for the use of the Environment Protection (Noise) Policy (Noise Policy) to be fundamental to the nature and impact of the noise.
Continuous noise level	A-weighted noise level of a continuous steady sound that, for the period over which the measurement is taken using fast time weighting, has the same mean square sound pressure as the noise level which varies over time when measured in relation to a noise source and noise-affected premises in accordance with the Noise Policy
Day	Between 7 am and 10 pm as defined in the Noise Policy
dB	Decibel—a unit of measurement used to express sound level. It is based on a logarithmic scale which means a sound that is 3 dB higher has twice as much energy. We typically perceive a 10 dB increase in sound as a doubling of loudness.
dB(A)	Units of the A-weighted sound level.
Frequency (Hz)	The number of times a vibrating object oscillates (moves back and forth) in one second. Fast movements produce high frequency sound (high pitch/tone), but slow movements mean the frequency (pitch/tone) is low. 1 Hz is equal to 1 cycle per second.
Indicative noise level	Indicative noise level determined under clause 5 of the Noise Policy.
L_{90}	Noise level exceeded for 90 % of the measurement time. The L_{90} level is commonly referred to as the background noise level.
L_{eq}	Equivalent Noise Level—Energy averaged noise level over the measurement time.
L_{max}	The maximum instantaneous noise level.
Night	Between 10.00 p.m. on one day and 7.00 a.m. on the following day as defined in the Noise Policy
Noise source	Premises or a place at which an activity is undertaken, or a machine or device is operated, resulting in the emission of noise
Quiet locality	A locality is a quiet locality if the Planning & Design Code provisions that make land use rules for the locality principally promote land uses that all fall within either or both of the following land use categories: (a) Residential; (b) Rural Living;

Table of Contents

1 Introduction

Resonate Consultants have been engaged by Adelaide Brighton Cement (ABC) to conduct an environmental noise survey at their Birkenhead plant as a part of their annual plant shutdown period (January 2024—February 2024). The plant operates under the Environment Protection Authority (EPA) license number 1126.

As a part of their EPA licence condition (U-1551—Site Noise Minimisation) the plant operators are required to implement a noise management plan, which warrants the following minimum to ensure compliance with the EPA licence requirements:

- Annual Noise Survey—conduct an attended noise survey in the community area close to the plant on annual basis.
- Computer Noise Model—Develop and update the computer noise model on a regular basis to include new noise sources, remove redundant sources and update noise levels for existing sources.
- Noise Abatement—continuous identification of noise generating equipment and implementation of abatement solutions to control emissions from the plant.

However, this assessment focuses on the annual noise survey conducted during the shutdown period of the plant. It includes attended noise survey in the community area (at 6 locations primarily identified by ABC[1] and continuous unattended noise survey at 2 locations. The survey was conducted during both day time (7 am - 10 pm) and night time (10 pm—7 am) periods while the demolition and maintenance works were being conducted on site. In addition to this a temporary noise barrier is installed on site (specification provided in Section 5.3).

This report summarises the results of the survey, compared against the applicable environmental noise criteria and the historical noise survey data, and highlights any significant noise source where applicable.

The following guidelines, reports and standards were used in preparation of this report:

- Planning & Design Code
- *Environment Protection (Commercial & Industrial Noise) Policy* 2023 (Noise Policy)
- ViPAC report 50B-22-0210-TRP-47641-0 *Demolition works Noise Report*, dated 24 February 2023
- Environment Protection Authority Licence Number 1126 *Adelaide Brighton Cement*
- AS 1055.1-1997 *Acoustics—Description and measurement of environmental noise—Part 1: General procedures*, Standard Australian (1997).

[1] *The locations were selected by ABC, as representative of potential noise impact, informed by historical community complaints associated with the kiln refractory demolition activities undertaken during plant shutdown periods.*

2 Plant details

2.1 Plant operation

The Birkenhead plant operates 24 hours, 7 days a week, with scheduled shut down at the beginning of the year (January) for maintenance works.

Maintenance works within the plant varies year-to-year depending on the plant requirements. However, typical shutdown period works include the following:

- Maintenance works for fans, extractors, etc.
- Structural works
- Kiln refractory demolition works (limited to only day-time period).

2.2 Location

The subject site is located at 62 Elder Road, Birkenhead SA 5015. The closest residential receptors along the western boundary of the plant, across Victoria Road.

Figure 1 shows an aerial image of the locality in relation to site location, attended survey locations and unattended survey locations.

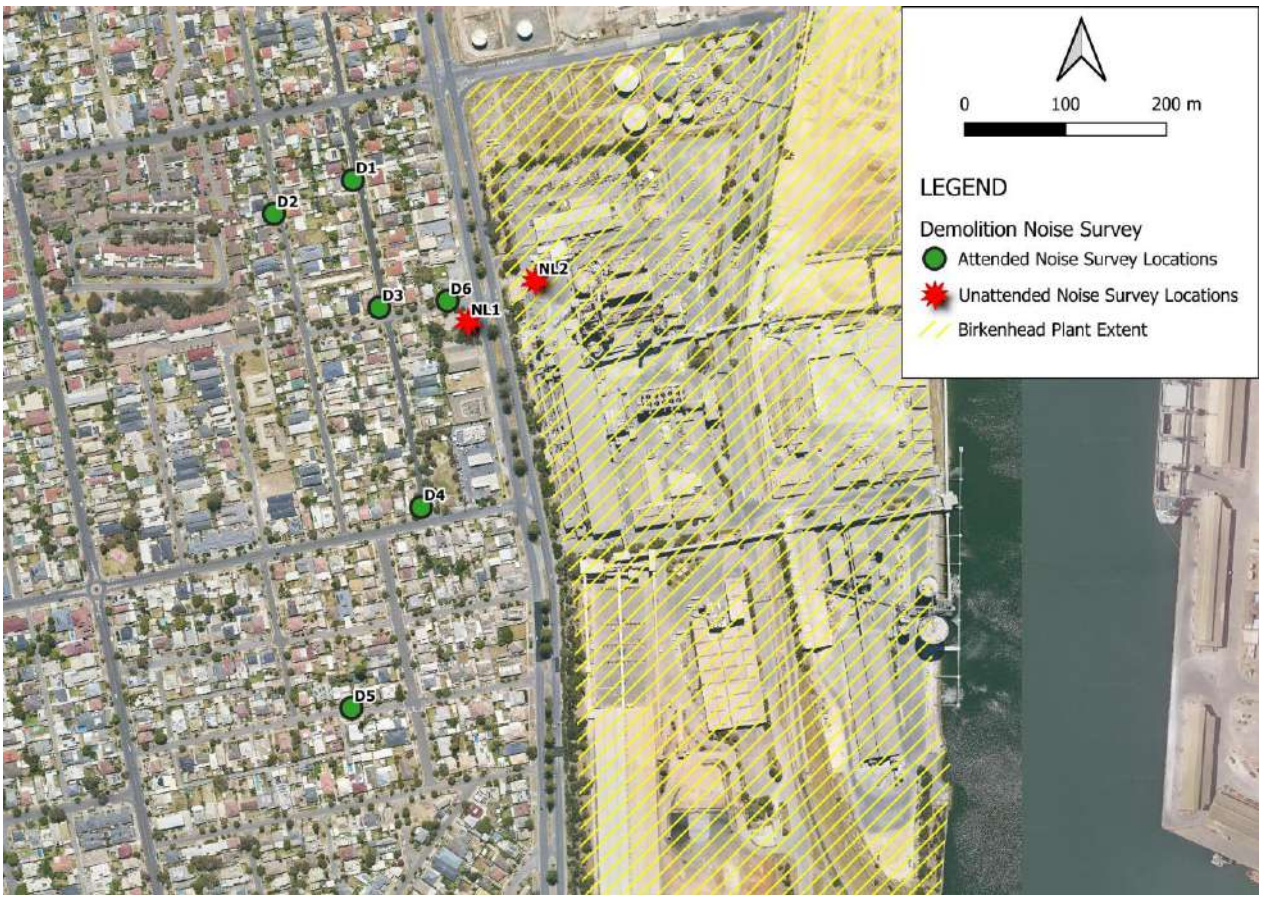


Figure 1 Aerial image of site, adjacent land, and zoning

2.3 Noise survey locations

ABC have advised six primary attended survey locations in the community and 2 unattended survey locations. The locations are provided in Table 1 and Figure 1.

Table 1 Noise sensitive receiver locations

Location ID	Type	Survey Location
D1	Attended survey location	Adjacent to 33 Alfred St, Birkenhead
D2	Attended survey location	Adjacent to 39 Mary St, Peterhead
D3	Attended survey location	Adjacent to 9 Walton St, Peterhead
D4	Attended survey location	Corner of Alfred St and Hargrave St, Peterhead
D5	Attended survey location	27 Baker Street, Birkenhead
D6	Attended survey location	17 Walton Street, Peterhead
NL1	Unattended survey location	Roof of Adelaide Brighton Social Club
NL2	Unattended survey location	Western boundary of the plant

3 Planning & Design Code

3.1 Zoning

3.1.1 Subject site

The subject site is located within Strategic Employment and Employment zone. The relevant Assessment Provisions and Desired Outcomes are outlined in Table 2.

Table 2 Relevant Desired Outcome—Strategic Employment and Employment zones

Desired Outcome	
Employment zone	
DO1	A diverse range of low-impact light industrial, commercial and business activities that complement the role of other zones accommodating significant industrial, shopping and business activities.
DO2	Distinctive building, landscape and streetscape design to achieve high visual and environmental amenity particularly along arterial roads, zone boundaries and public open spaces.
Strategic Employment zone	
DO 1	A range of industrial, logistical, warehousing, storage, research and training land uses together with compatible business activities generating wealth and employment for the state.
DO 2	Employment-generating uses are arranged to: (a) support the efficient movement of goods and materials on land in the vicinity of major transport infrastructure such as ports and intermodal freight facilities (b) maintain access to waterfront areas for uses that benefit from direct water access including harbour facilities, port related industry and warehousing, ship building and related support industries (c) create new and enhance existing business clusters (d) support opportunities for the convenient co-location of rural related industries and allied businesses that may detract from scenic rural landscapes (e) be compatible with its location and setting to manage adverse impacts on the amenity of land in adjacent zones.
DO 3	A pleasant visual amenity from adjacent arterial roads, adjoining zones and entrance ways to cities, towns and settlements.

3.1.2 Adjacent land

The closest noise-affected premises are located in Suburban Neighbourhood zone and General Neighbourhood zone. The location details of each receiver are provided in Table 1, and the relevant Desired Outcomes are provided in Table 3.

Table 3 Relevant Desired Outcomes

Desired Outcome	
Suburban Neighbourhood zone	
DO1	Low density housing is consistent with the existing local context and development pattern. Services and community facilities contribute to making the neighbourhood a convenient place to live without compromising residential amenity and character.
General Neighbourhood zone	
DO1	Low-rise, low and medium-density housing that supports a range of needs and lifestyles located within easy reach of services and facilities. Employment and community service uses contribute to making the neighbourhood a convenient place to live without compromising residential amenity.

3.2 Interface between land uses

Interface between Land Uses is a General Development Policy that is relevant to the subject site. The relevant Assessment Provisions relating to noise are outlined in Table 4.

Table 4 Relevant Assessment Provisions—Activities generating noise or vibration

Relevant Assessment Provisions	
Desired Outcome	
DO1	Development is located and designed to mitigate adverse effects on or from neighbouring and proximate land uses.
Performance Outcome	**Deemed-to-Satisfy Criteria / Designated Performance Feature**
PO 4.1 Development that emits noise (other than music) does not unreasonably impact the amenity of sensitive receivers (or lawfully approved sensitive receivers).	DTS/DPF 4.1 Noise that affects sensitive receivers achieves the relevant Environment Protection (Noise) Policy criteria.

Relevant Assessment Provisions	
PO 4.2 Areas for the on-site manoeuvring of service and delivery vehicles, plant and equipment, outdoor work spaces (and the like) are designed and sited to not unreasonably impact the amenity of adjacent sensitive receivers (or lawfully approved sensitive receivers) and zones primarily intended to accommodate sensitive receivers due to noise and vibration by adopting techniques including: a) locating openings of buildings and associated services away from the interface with the adjacent sensitive receivers and zones primarily intended to accommodate sensitive receivers b) when sited outdoors, locating such areas as far as practicable from adjacent sensitive receivers and zones primarily intended to accommodate sensitive receivers c) housing plant and equipment within an enclosed structure or acoustic enclosure d) providing a suitable acoustic barrier between the plant and / or equipment and the adjacent sensitive receiver boundary or zone.	DTS/DPF 4.2 None are applicable.

4 Noise criteria

4.1 Environmental noise policy

As noted in DTS/DPF 4.1, environmental noise emissions from the subject site should comply with the *Environment Protection (Noise) Policy* 2007. This policy has been superseded on 31 October 2023 by the *Environment Protection (Commercial & Industrial Noise) Policy* 2023 (Noise Policy). As such, noise emissions from the site should be assessed under the 2023 Noise Policy.

However, in consultation with EPA, the following criteria (Table 5) has been agreed upon for noise emanating from ABC's Birkenhead Plant.

Table 5 Summary of EPA recommended environmental noise criteria

Location	Zone	Criteria	
		Day (7 am to 10 pm)	Night (10 pm to 7 am)
ABC Birkenhead Plant	Employment & Strategic Employment	N/A	N/A
D1, D3, D4	Suburban Neighbourhood zone	57	49
D2, D5	General Neighbourhood zone	57	49

NOTE: The Environment Protection Authority (EPA) has advised that comparison of the L_{90} noise level descriptor measured within 100 metres of the centre line of Victoria Road is an acceptable method for eliminating the influence of short-term/transient noise level events (such as intermittent passing road traffic, for example) on the results. This includes measurement positions D1, D4, and D6. At distances greater than 100 metres, the use of the L_{eq} descriptor is required. As such, for measurement positions D1, D4, and D6, L_{90} descriptor has been used.

Penalties can also be applied to a noise source for a variety of characteristics, such as impulsive, low frequency, modulating or tonal characters. For a characteristic penalty to be applied to a noise source it must be fundamental to the impact of the noise and dominate the overall noise impact. The application of the characteristic penalty is discussed in the noise emission assessment.

We note that under Part 5, Clause 20(6) of the Noise Policy, exceedance of the recommended criterion does not necessarily mean action is required under the Noise Policy. Some of the following matters should be considered when considering action:

- the amount by which the criterion is exceeded (in dB(A))
- the frequency and duration for which the criterion is exceeded
- the ambient noise that has a noise level similar to the predicted noise level
- the times of occurrence of the noise source
- the number of persons likely to be adversely affected by the noise source and whether there is any special need for quiet.

5 Noise survey

5.1 Unattended noise survey

5.1.1 Location details

The unattended noise survey was conducted during day time and night time period at all receiver locations highlighted in Table 1 and Figure 1.

5.1.2 Instrumentation

Continuous noise survey measurements were conducted using the following equipment:

- Location NL1
  - Model—NTi XL2 Analyser
  - Serial Number—A2A-18354-E0
- Location NL2
  - Model—NTi XL2 Analyser
  - Serial Number—A2A-18365-E0

The units are National Association of Testing Authorities (NATA) calibrated in conformance with Australia Standard 1259 *Acoustics – Sound level meters* (AS 1259). Copies of the calibration certificates are available on request.

5.1.3 Procedure

Noise measurements were conducted in accordance with following:

- Measurements were conducted continuous 24 hours, 7 days a week between 21 January 2024 and 02 February 2024.
- The microphone of the sound level meter was at a height of approximately 1.2 metres above the ground and at least 1.5 metres away from any wall or facade.
- The axis of maximum sensitivity of the microphone of the sound level meter was directed towards the noise source.
- The noise data with wind speeds exceeding 5 m/s and rainfall were excluded from the data presented in this report.
- During the entire monitoring period, the audio files were also captured.
- Spot calibration was conducted on both units before and after installation with no drift noted.

5.1.4 Survey results

The results of the unattended noise survey results are presented below:

Table 6 Location NL1—Unattended noise survey results

Day/Date	Measured noise levels, dB(A)							
	Day time				Night time			
	L_{eq}	L_{max}	L_{10}	L_{90}	L_{eq}	L_{max}	L_{10}	L_{90}
Friday, 12 January 2024	71	84	74	62	66	82	69	54
Saturday, 13 January 2024	70	84	73	61	66	82	70	54
Sunday, 14 January 2024	70	83	73	60	66	82	69	55
Monday, 15 January 2024	72	86	75	62	67	83	70	55
Tuesday, 16 January 2024	73	87	76	63	69	84	72	56

Day/Date	Measured noise levels, dB(A)							
	Day time				Night time			
	L_{eq}	L_{max}	L_{10}	L_{90}	L_{eq}	L_{max}	L_{10}	L_{90}
Wednesday, 17 January 2024	73	86	76	64	68	84	71	56
Thursday, 18 January 2024	73	86	76	64	68	84	71	56
Friday, 19 January 2024	73	86	76	64	66	82	70	54
Saturday, 20 January 2024	71	84	74	60	65	80	68	53
Sunday, 21 January 2024	70	83	73	59	67	83	70	53
Monday, 22 January 2024	73	85	76	63	67	82	70	53
Tuesday, 23 January 2024	72	85	75	62	67	83	70	53
Wednesday, 24 January 2024	73	85	76	64	67	83	70	53
Thursday, 25 January 2024	75	87	78	66	65	82	69	51
Friday, 26 January 2024	70	83	74	60	65	81	69	51
Saturday, 27 January 2024	71	84	74	60	65	81	69	50
Sunday, 28 January 2024	70	84	73	59	67	83	70	53
Monday, 29 January 2024	73	86	76	63	67	83	70	53
Tuesday, 30 January 2024	73	86	76	64	67	83	70	55
Wednesday, 31 January 2024	73	86	76	64	68	83	71	57
Thursday, 01 February 2024	73	86	76	64	68	84	71	55

Table 7 Location NL2—Unattended noise survey results

Day/Date	Measured noise levels, dB(A)							
	Day time				Night time			
	L_{eq}	L_{max}	L_{10}	L_{90}	L_{eq}	L_{max}	L_{10}	L_{90}
Friday, 12 January 2024	63	77	65	59	59	72	60	57
Saturday, 13 January 2024	61	76	63	58	59	70	60	57
Sunday, 14 January 2024	65	79	66	61	60	72	61	58
Monday, 15 January 2024	64	78	66	61	61	72	62	59
Tuesday, 16 January 2024	68	80	69	65	63	76	64	60
Wednesday, 17 January 2024	65	80	67	61	60	75	61	57
Thursday, 18 January 2024	66	80	68	63	59	74	61	56
Friday, 19 January 2024	62	78	65	58	59	73	60	56
Saturday, 20 January 2024	64	78	66	61	59	72	60	57
Sunday, 21 January 2024	62	77	63	58	58	73	59	55
Monday, 22 January 2024	62	76	64	58	57	72	59	54
Tuesday, 23 January 2024	61	76	63	56	56	71	58	53
Wednesday, 24 January 2024	62	76	64	58	58	72	60	54
Thursday, 25 January 2024	64	79	66	59	57	73	58	53
Friday, 26 January 2024	63	74	65	60	57	70	59	54
Saturday, 27 January 2024	65	78	66	61	56	70	58	53
Sunday, 28 January 2024	62	76	64	58	58	72	59	55

Day/Date	Measured noise levels, dB(A)							
	Day time				Night time			
	L_{eq}	L_{max}	L_{10}	L_{90}	L_{eq}	L_{max}	L_{10}	L_{90}
Monday, 29 January 2024	62	78	64	58	59	73	61	55
Tuesday, 30 January 2024	64	78	66	60	61	74	62	58
Wednesday, 31 January 2024	66	79	67	62	60	73	62	58
Thursday, 01 February 2024	67	81	69	64	60	73	61	57

Detailed data has been presented in Appendix B—Unattended noise survey data.

5.1.5 Results comparison

Figure 2 provides a comparison of L_{eq} and L_{90} levels for day time survey period for each day.

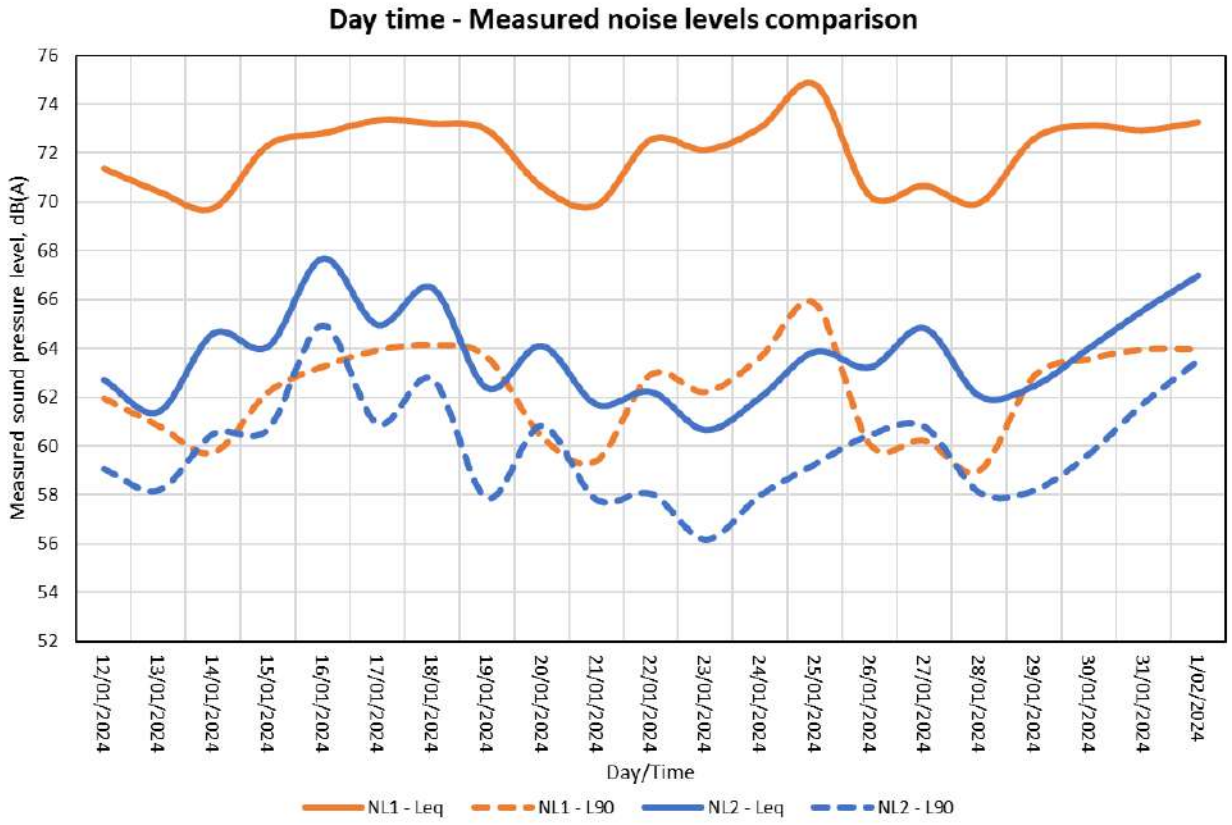


Figure 2 Day time—unattended noise survey results comparison

Based on the above, the following is noted:

- L_{eq} levels—the measured L_{eq} levels at position NL1 (ABC Social Club) are consistently higher than the levels measured at NL2 (ABC western boundary) location.
- L_{90} levels—the measured L_{90} levels at NL1 location are mostly higher than or similar to levels measured at NL2 location.

- Since location NL2 is closer to the demolition works activity area and NL1 is closer to the sensitive receiver's location, the results show that the measured levels, including L_{90} levels, at NL1 (receiver location) are dominated by traffic noise.

Figure 3 provides a comparison of L_{eq} and L_{90} levels for night time survey period for each day.

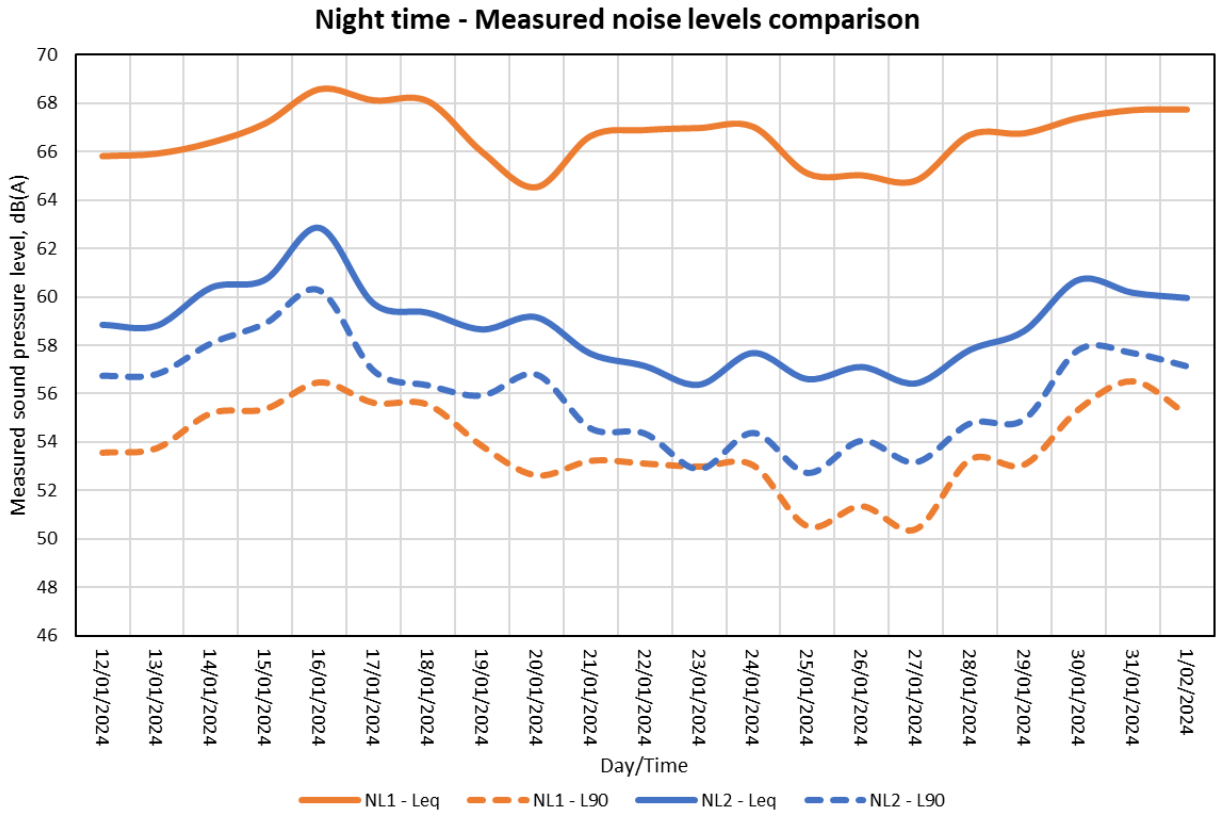


Figure 3 Night time—unattended noise survey results comparison

Based on the above, the following is noted:

- L_{eq} levels—the measured L_{eq} levels at position NL1 (ABC Social Club) are consistently higher than the levels measured at NL2 (ABC western boundary) location.
- L_{90} levels—the measured L_{90} levels at NL1 location are mostly lower than or similar to levels measured at NL2 location.
- Since location NL2 is closer to the demolition works activity area and NL1 is closer to the sensitive receiver's location, the results show that the measured L_{eq} levels at NL1 (receiver location) are dominated by traffic noise. However, L_{90} descriptor may represent noise levels associated with the plant activities. Note that since the measurements were conducted continuously, the measured L_{90} levels may still be influenced by extraneous noise sources (traffic, etc.).

5.2 Attended noise survey

5.2.1 Location details

The attended noise survey was conducted during day time and night time period at all receiver locations highlighted in Table 1 and Figure 1.

5.2.2 Instrumentation

Noise level measurements were conducted using a Brüel & Kjær Type 2250 sound level meter (B&K 2250 SLM) calibrated with a Brüel & Kjær Type 4231 calibrator. The B&K 2250 SLM is a National Association of Testing Authorities (NATA) calibrated Class 1 SLM in conformance with Australia Standard 1259 *Acoustics – Sound level meters* (AS 1259). Copies of the calibration certificates are available on request.

5.2.3 Procedure

Noise measurements were undertaken in accordance with the following:

- The survey was conducted for both daytime and night time period (as defined in the Noise Policy).
- Noise measurements were undertaken for a period of up to 15 minutes.
- The microphone of the sound level meter was at a height of approximately 1.2 metres above the ground and at least 3.5 metres away from any wall or facade.
- The axis of maximum sensitivity of the microphone of the sound level meter was directed towards the noise source.
- A windshield was used during all measurements, and the measurements were undertaken during a calm, still night (for which the wind velocity did not exceed 5 m/s). The weather data for the survey period has been attached in Appendix C—Weather data (attended survey).
- Care was taken to avoid any effect on the measurement of extraneous noise, acoustic vibration or electrical interference. To ensure this, where possible, the measurement was paused, and the 'back-erase' function of the B&K was used to remove any influence from extraneous noise sources during the measurements. Note that at locations with high traffic volumes (such as locations in proximity to Victoria Road and Fletcher Road), avoiding the influence of extraneous noise was not possible. In such cases, comments have been provided to reflect possible extraneous noise influence.

5.2.4 Survey results

The results of the community noise survey conducted at the locations indicated in Table 1, during day and night time periods, have been presented in Table 8 and Table 9. Note that the appropriate noise descriptor used for comparison against the criterion has been highlighted in grey.

Further to below, a full set of survey noise data, including survey notes, is provided in Appendix A—Noise survey data & notes. As such, the results and discussion provided below should be read in conjunction with the survey notes.

Table 8 Community noise survey results—day time

Location	Measured noise level dB(A)		Day time criteria dB(A)	Compliance	Notes/Comments
	L_{eq}	L_{90}			
D1	51	49	57	✓	1
D2	49	45	57	✓	1
D3	54	51	57	✓	1
D4	53	50	57	✓	1

Location	Measured noise level dB(A)		Day time criteria dB(A)	Compliance	Notes/Comments
	L_{eq}	L_{90}			
D5	50	47	57	✓	1
D6	59	52	57	✓	1

Day time survey notes/comments:

1. Environmental noise criterion compliance is achieved at each location.

Table 9 Community noise survey results——night time

Location	Measured noise level dB(A)		Night time criteria dB(A)	Compliance	Notes/Comments
	L_{eq}	L_{90}			
D1	45	42	49	✓	1
D2	41	40	49	✓	1
D3	49	46	49	✓	1
D4	48	46	49	✓	1
D5	44	42	49	✓	1
D6	51	50	49	×	2

Nighttime survey notes/comments:

1. Environmental noise criterion compliance is achieved.
2. A minor exceedance of ~1dB(A) measured at D6. The background noise levels at this location are inherently influenced by traffic noise from Victoria Road (a designated Type A road, providing a major thoroughfare for heavy vehicles). It should be noted that the plant noise was intermittently audible at this location, however, traffic noise was observed to be the dominant source. Additionally, ~1 dB(A) change in noise levels is imperceptible to human hearing and therefore, is considered insignificant.

5.2.5 Results comparison

A comparison of the noise survey results with the 2023 noise survey data has been presented in Table 10 and Table 11 below. Note that the historical data has been sourced from Vipac's Report *50B-22-0210-TRP-47641-0*.

Table 10 Community noise survey results comparison—Day time

Location	2024 Survey Measured noise level, dB(A)		2023 Survey Measured noise level, dB(A)		Day time criteria dB(A)
	L_{eq}	L_{90}	L_{eq}	L_{90}	
D1	51	49	49	47	57
D2	49	45	49	48	57
D3	54	51	51	48	57
D4	53	50	61	51	57
D5	50	47	47	44	57

Location	2024 Survey Measured noise level, dB(A)		2023 Survey Measured noise level, dB(A)		Day time criteria dB(A)
	L_{eq}	L_{90}	L_{eq}	L_{90}	
D6	59	52	59	51	57

With reference to the results presented above, the following is noted:

- At all survey locations, the plant was faintly audible during no traffic movements (infrequent).
- Measured noise levels at D1, D3, D5 and D6 are marginally higher in comparison to 2023 survey (~3dB(A)). However, the levels are considered acceptable as the environmental noise criterion was not exceeded at any locations.
- Measured noise levels at D2 were same as the levels measured during 2023 survey.
- At location D4, the measured levels were lower than the 2023 survey results.

Table 11 Community noise survey results comparison—Night time

Location	2024 Survey Measured noise level, dB(A)		2023 Survey Measured noise level, dB(A)		Night time criteria dB(A)
	L_{eq}	L_{90}	L_{eq}	L_{90}	
D1	45	42	51	48	49
D2	41	40	46	44	49
D3	49	46	52	48	49
D4	48	46	55	46	49
D5	44	42	52	42	49
D6	51	50	56	52	49

With reference to the results presented above, the following is noted:

- Measured levels are each location were either same as or lower than the 2023 survey.

5.3 Discussion

Based on the results presented in this report, the following is noted:

- Day time results—compliance achieved at all survey locations.
- Night time results—minor criterion exceedance (~1 dB(A)) at D6 is noted. Due to proximity to Victoria Road, the noise levels at these locations are inherently dominated by traffic noise from Victoria Road. As such, considering this and the fact that the measured noise levels are lower than the 2023 noise survey, we consider the levels at D6 acceptable.
- Subjectively, the demolition works were not observed to be the dominant source at each location. Traffic noise from nearby roads (specifically Victoria Road) was observed to be dominant, with plant being faintly audible during periods with no traffic in the vicinity.
- During the scheduled 2024 demolition works, no community noise complaints were received by ABC.
- Historically, jack hammering noise from the kiln refractory demolition has been the most dominant source and subject to community noise complaints during nighttime periods. To address the community complaints, the jack hammering works have now been limited to only day-time periods, with curfew imposed post 10pm.
- The continuous noise monitoring results provided no clear indication of noise impact due to demolition works activities. The results indicate that the background noise levels in the immediate vicinity of Victoria Road are dominated by traffic noise and noise from nearby commercial activities (petrol station, etc.). However, we

recommend conducting continuous noise monitoring during the shut down period to record continuous audio and measure noise levels which can be referenced in situations where noise complaints are received. This would assist Adelaide Brighton Cement in investigating further mitigation options.

In addition to above, ABC have implemented the following as part of their Noise Management Plan to improve noise conditions and minimise impact to the community:

- Continuous community engagement to resolve noise complaints.
- Implementation of several Environment Improvement Plans (EIP Projects) to mitigate/reduce noise from major plant by undertaking comprehensive noise abatement projects.
- Undertaking annual noise survey to monitor noise conditions in the community.
- Undertaking noise survey during shut down period to monitor noise impact during maintenance works.
- Installation of a temporary noise barrier to reduce the noise impact to the nearby residences during the demolition works.
    - The barrier spans between the blending silo and 4B Tower, with an overall height of 12 m.
    - The barrier was constructed from Heavy Duty Noise Block XR Series Acoustic Sound Curtains, attached to a temporary scaffolding (as shown in Figure 4).
    - Due to the size of the barrier the sheets were not sealed to each other, this allows transmission of wind and reduce wind load on the structure. This is likely to impact the potential performance of the noise barrier but is necessary from a structural perspective.

Figure 4 Temporary noise barrier installation during shut down period

Overall, we understand that Adelaide Brighton Cement has implemented all practicable and reasonable measures to reduce noise emissions from the demolition activities during their annual shutdown period and aims to maintain these efforts in the future.

6 Conclusion

Resonate Consultants have been engaged by Adelaide Brighton Cement (ABC) to conduct an environmental noise survey at their Birkenhead plant as a part of their ongoing annual noise survey. The plant operates under the Environment Protection Authority (EPA) license number 1126.

As a part of their EPA licence condition (U-1551—Site Noise Minimisation) the plant operators are required to implement a noise management plan, which warrants a noise survey during the shutdown period of the plant. The assessment includes attended noise survey in the community area (at 6 locations primarily identified by ABC and agreed upon by EPA) and an unattended continuous noise survey at two locations.

The survey indicated compliance against both daytime and nighttime environmental noise criteria.

Appendix A—Noise survey data & notes

Table 12 Day time noise survey results and notes

Location ID	Day/Time	Duration	L_{eq} dB(A)	L_{max} dB(A)	L_{90} dB(A)	Survey notes
D1	12/01/2024 19:16	15:01	51	63	49	Continuous traffic noise from Victoria Road and nearby streets. Plant inaudible.
D2	12/01/2024 19:36	15:00	49	71	45	Continuous traffic noise. Plant faintly audible during periods of no traffic. Intermittent music noise from nearby residents
D3	12/01/2024 19:52	15:00	54	70	51	Continuous traffic noise. Plant faintly audible during periods of no traffic. Intermittent music noise from nearby residents
D4	12/01/2024 20:49	15:01	53	64	50	Continuous traffic noise. Plant faintly audible during periods of no traffic.
D5	12/01/2024 20:32	14:10	50	61	47	Plant inaudible. Traffic noise from nearby streets dominant source
D6	12/01/2024 20:11	15:02	59	78	52	Intermittent plant noise during no traffic periods. Traffic noise generally dominant. L_{90} descriptor considered more appropriate.

Table 13 Night time survey results and notes

Location ID	Day/Time	Duration	L_{eq} dB(A)	L_{max} dB(A)	L_{90} dB(A)	Survey notes
D1	18/01/2024 22:19	15:20	45	59	42	Plant inaudible mostly. Plant faintly audible during no traffic periods.
D2	18/01/2024 22:38	15:01	41	52	40	Plant faintly audible. Continuous condenser noise from a nearby resident
D3	18/01/2024 22:05	12:10	49	62	46	Plant inaudible with traffic noise being the dominant source
D4	18/01/2024 23:16	12:10	48	54	46	Intermittent noise from the plant with traffic noise from Victoria Road being dominant.
D5	18/01/2024 22:58	14:10	44	57	42	No plant noise.
D6	18/01/2024 23:30	15:05	51	63	50	Plant intermittently audible including activities such as hammering, metal parts falling and hitting ground, and intermittent fan noise. Traffic noise was observed to be dominant source.

Please note that at some locations conducting a full 15-minute measurement was not possible due to the following factors:

- Locations in proximity to Victoria Road—Due continuous traffic movements on Victoria Road, it was difficult to pause/stop measurements to avoid traffic noise influence. The site engineer however, measured the levels for period deemed practical and representative of the noise emissions from the plant.

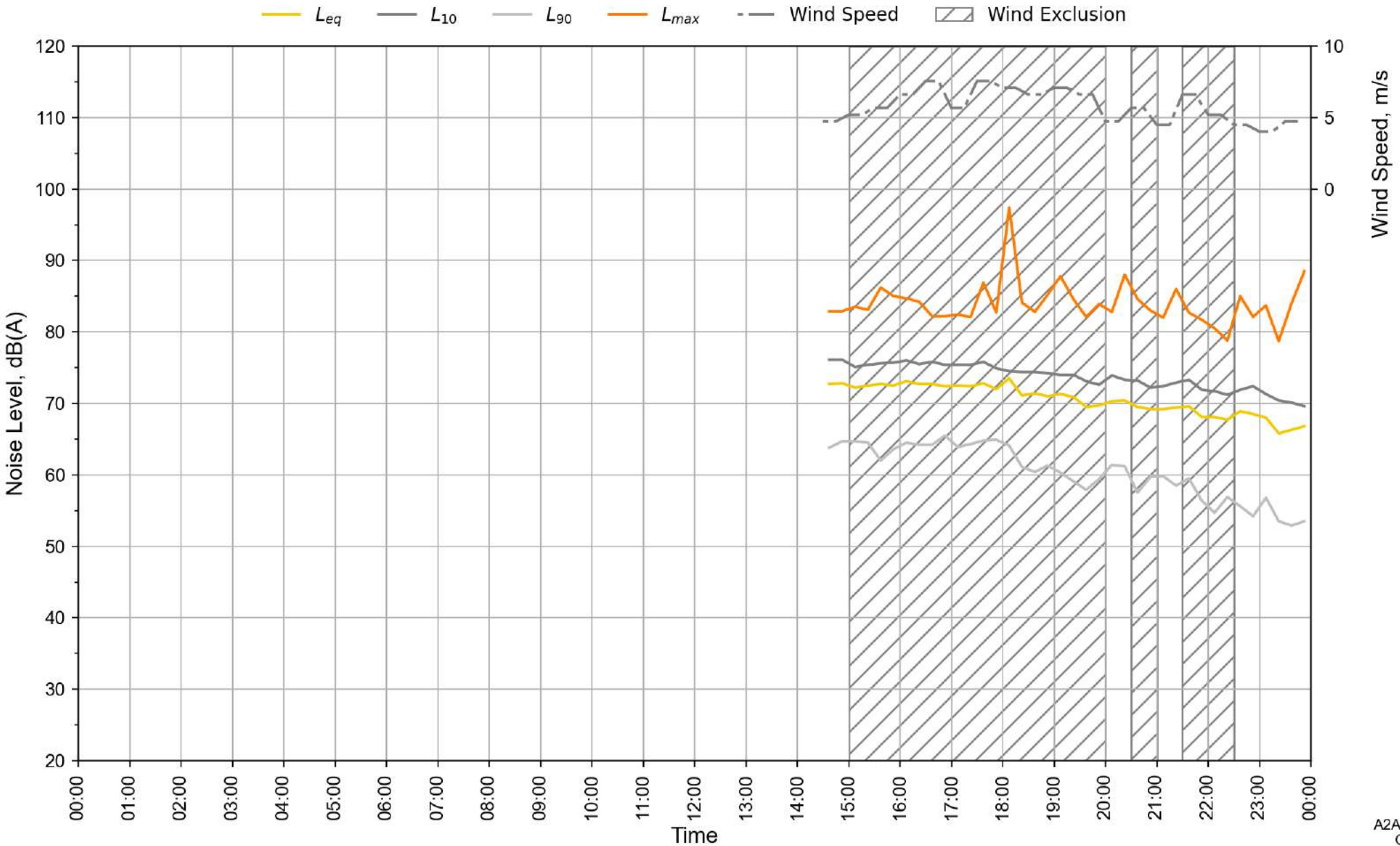
- Dog barking and tool noise during day time survey
- Music noise from residents during night time survey
- Higher traffic volumes on internal roads during day time survey

As a practical approach, the measurement was conducted to ensure it represents the noise emissions from the plant, while considering the factors above.

Appendix B—Unattended noise survey data

Resonate

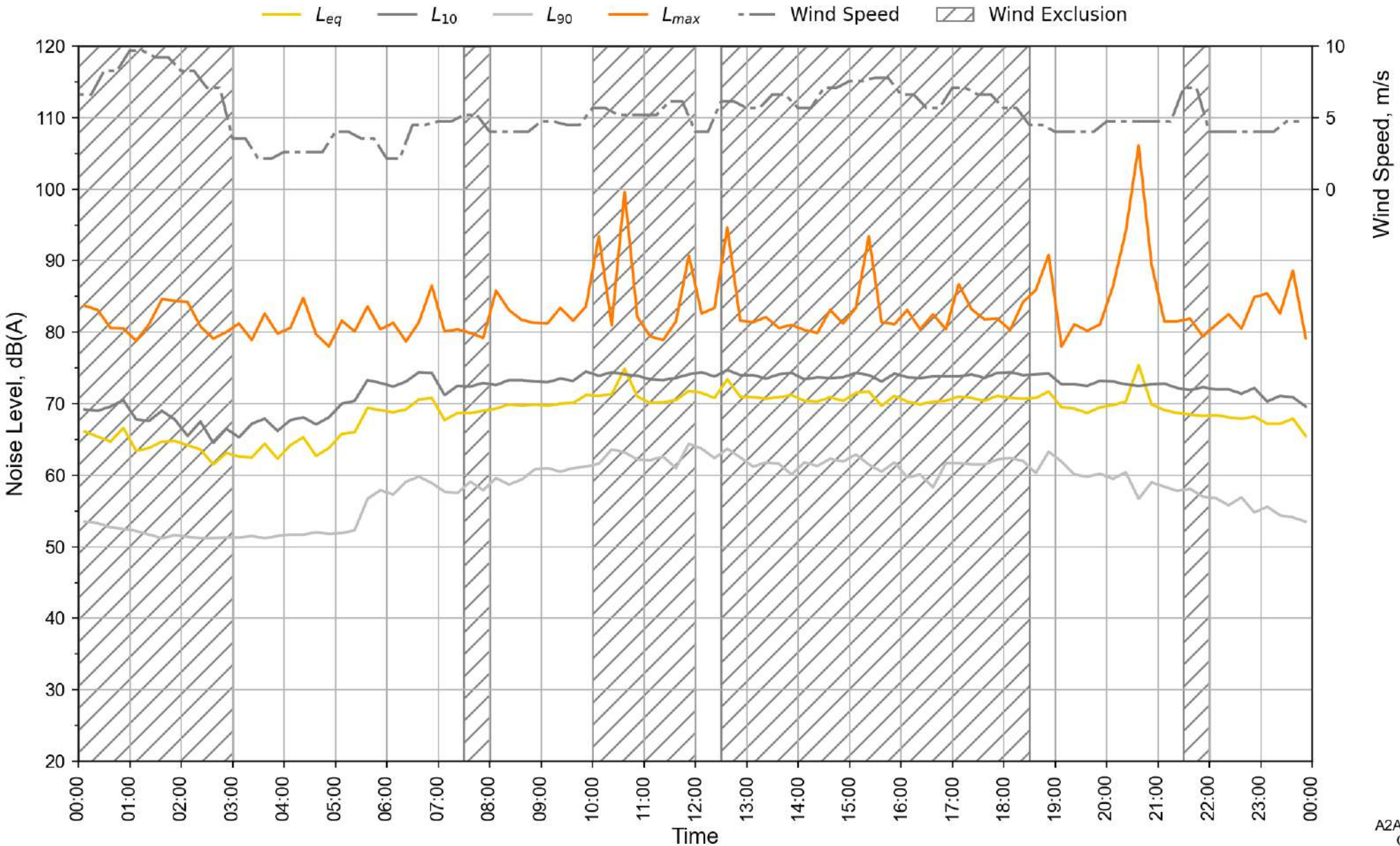
NL1 - ABC Social Club - Friday, 12 January 2024



A2A-18354-E0
Calibration:
2023-11-10

Resonate

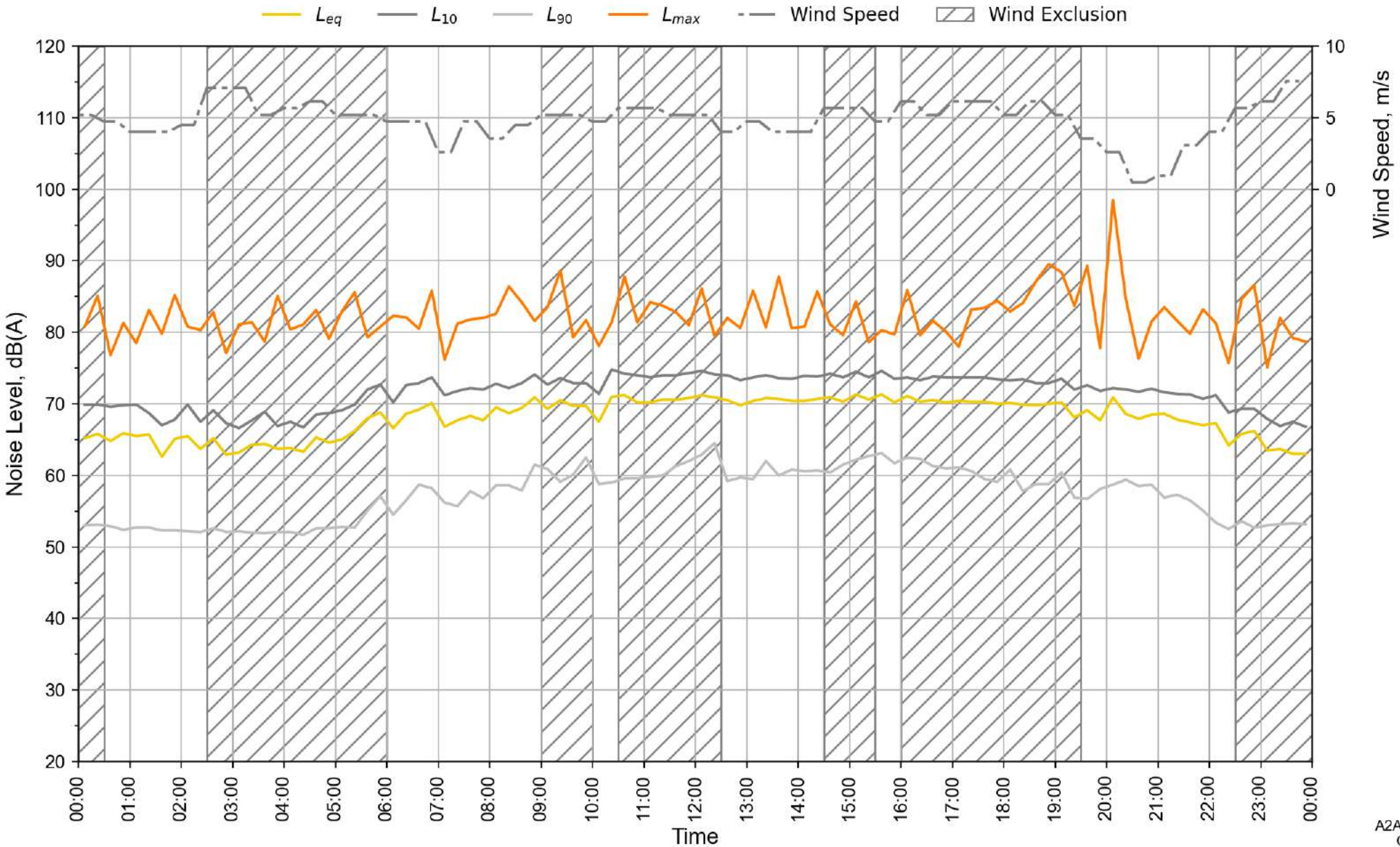
NL1 - ABC Social Club - Saturday, 13 January 2024



A2A-18354-E0
Calibration:
2023-11-10

Resonate

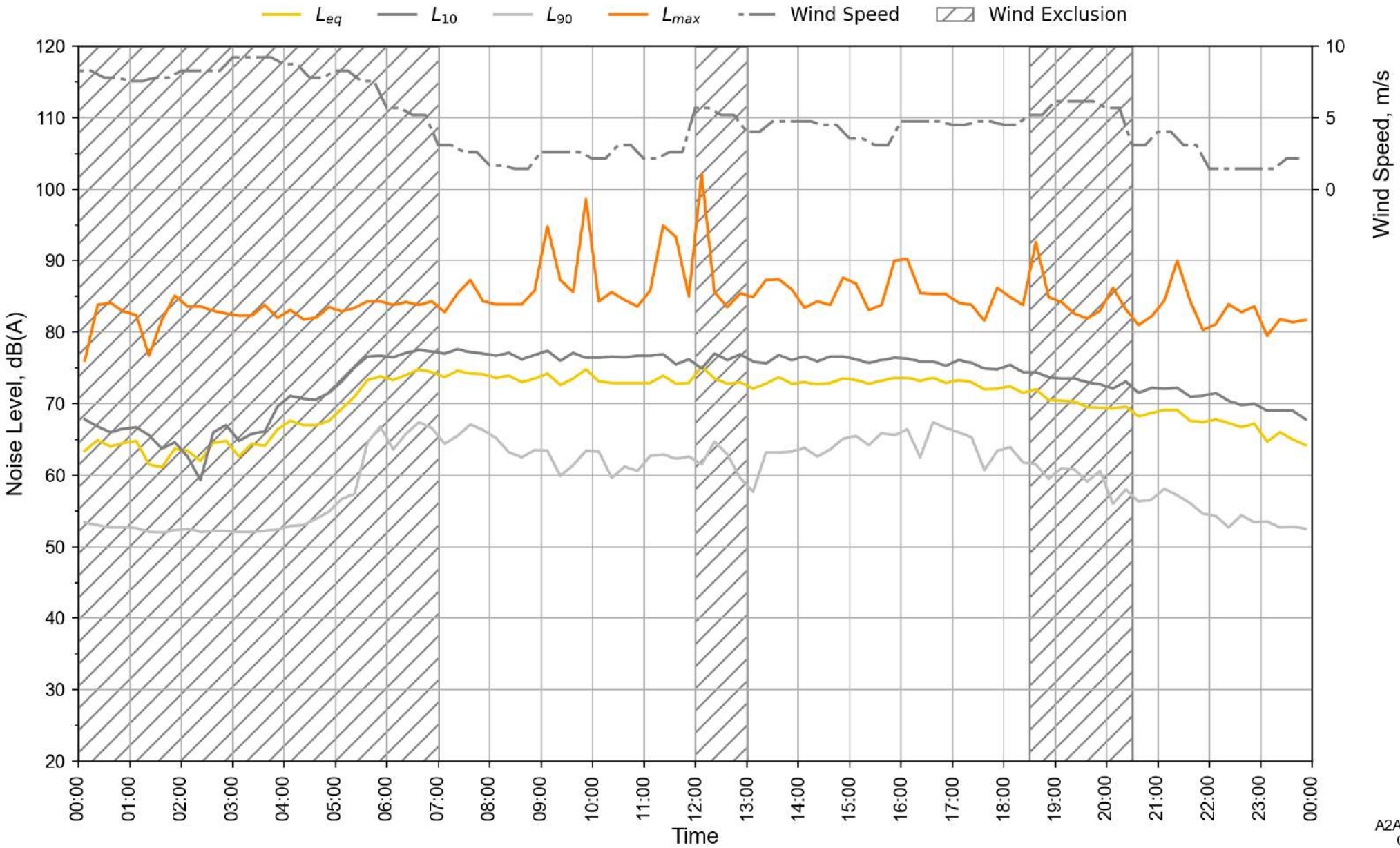
NL1 - ABC Social Club - Sunday, 14 January 2024



A2A-18354-E0
Calibration:
2023-11-10

Resonate

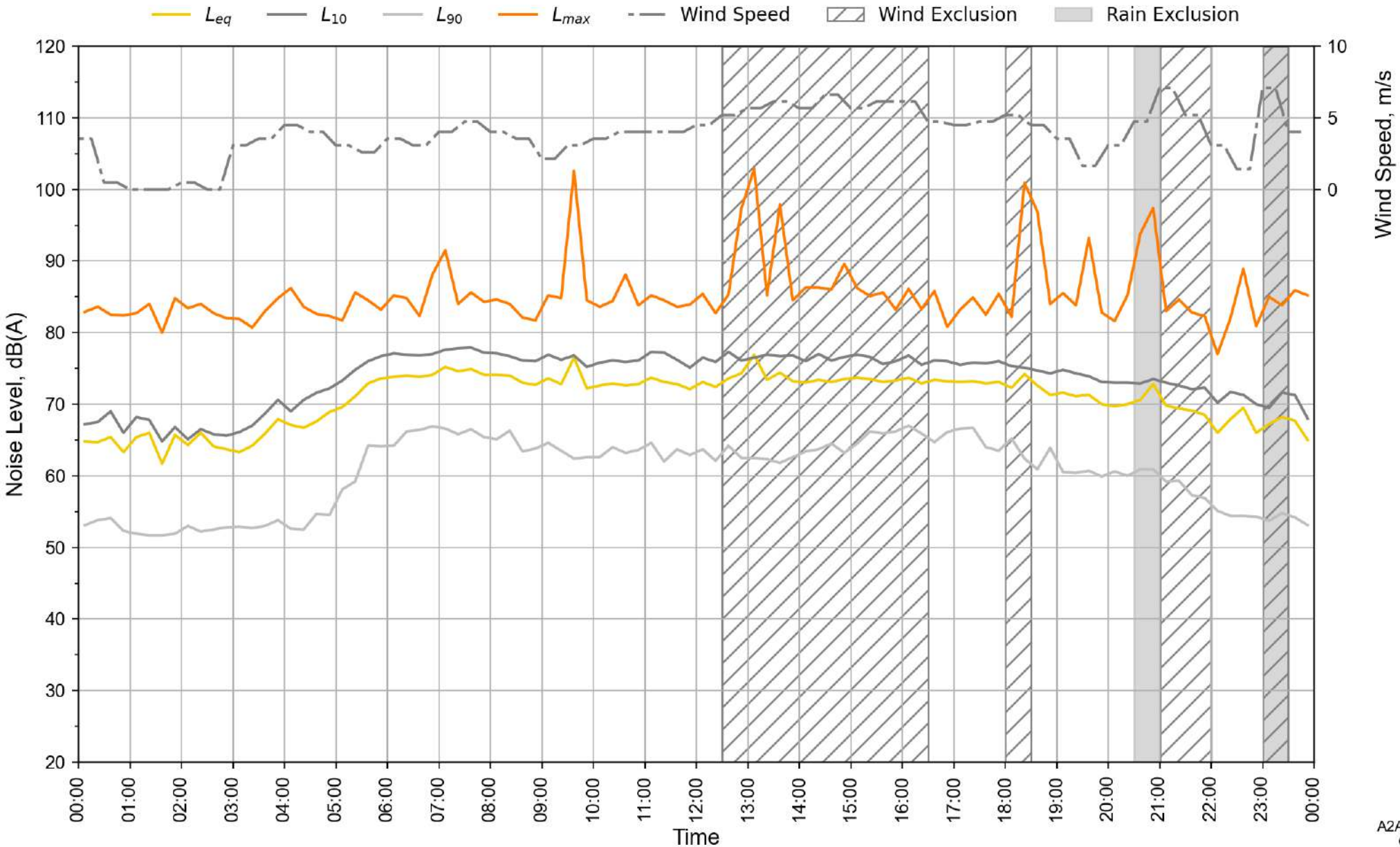
NL1 - ABC Social Club - Monday, 15 January 2024



A2A-18354-E0
Calibration:
2023-11-10

Resonate

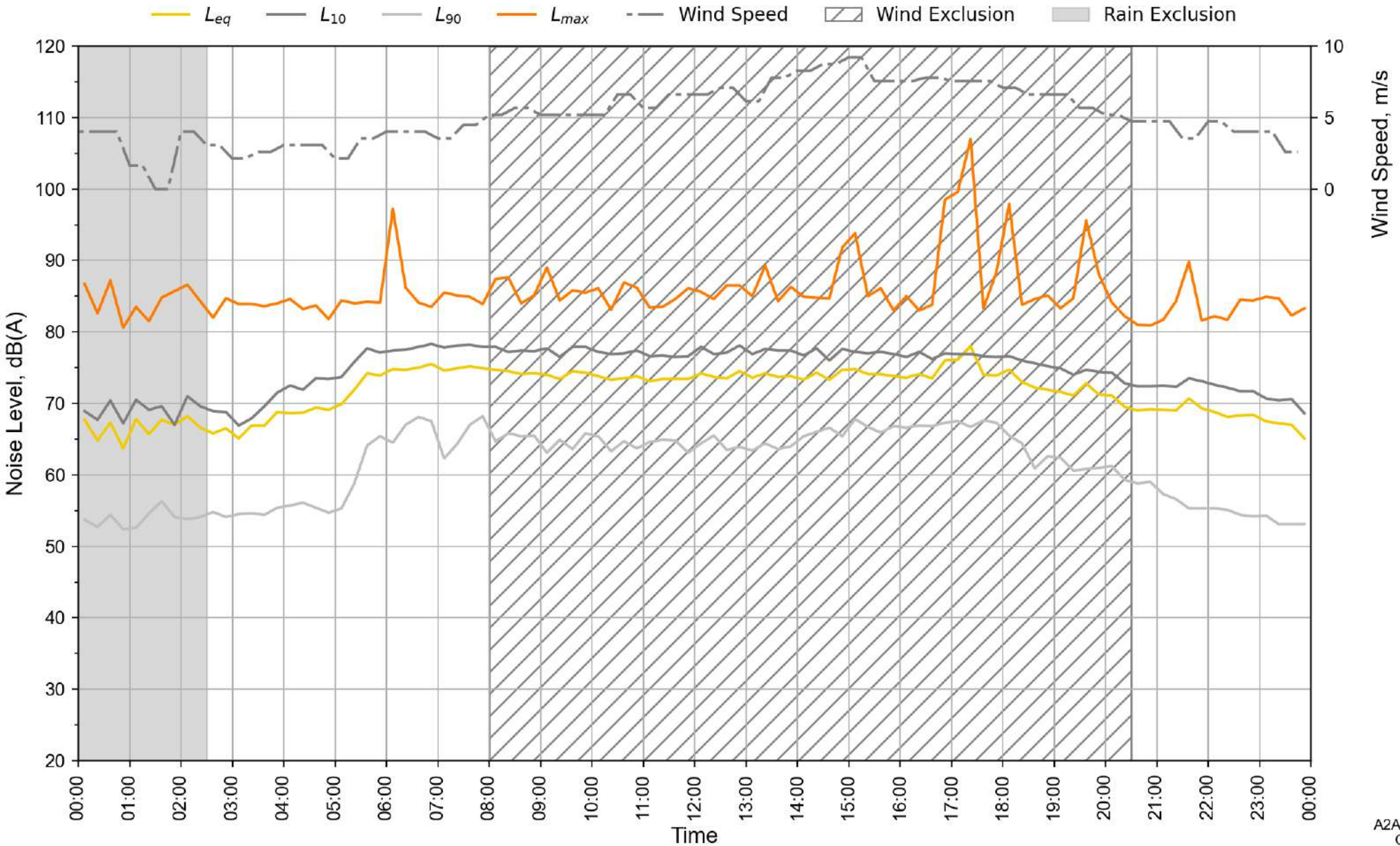
NL1 - ABC Social Club - Tuesday, 16 January 2024



A2A-18354-E0
Calibration:
2023-11-10

Resonate

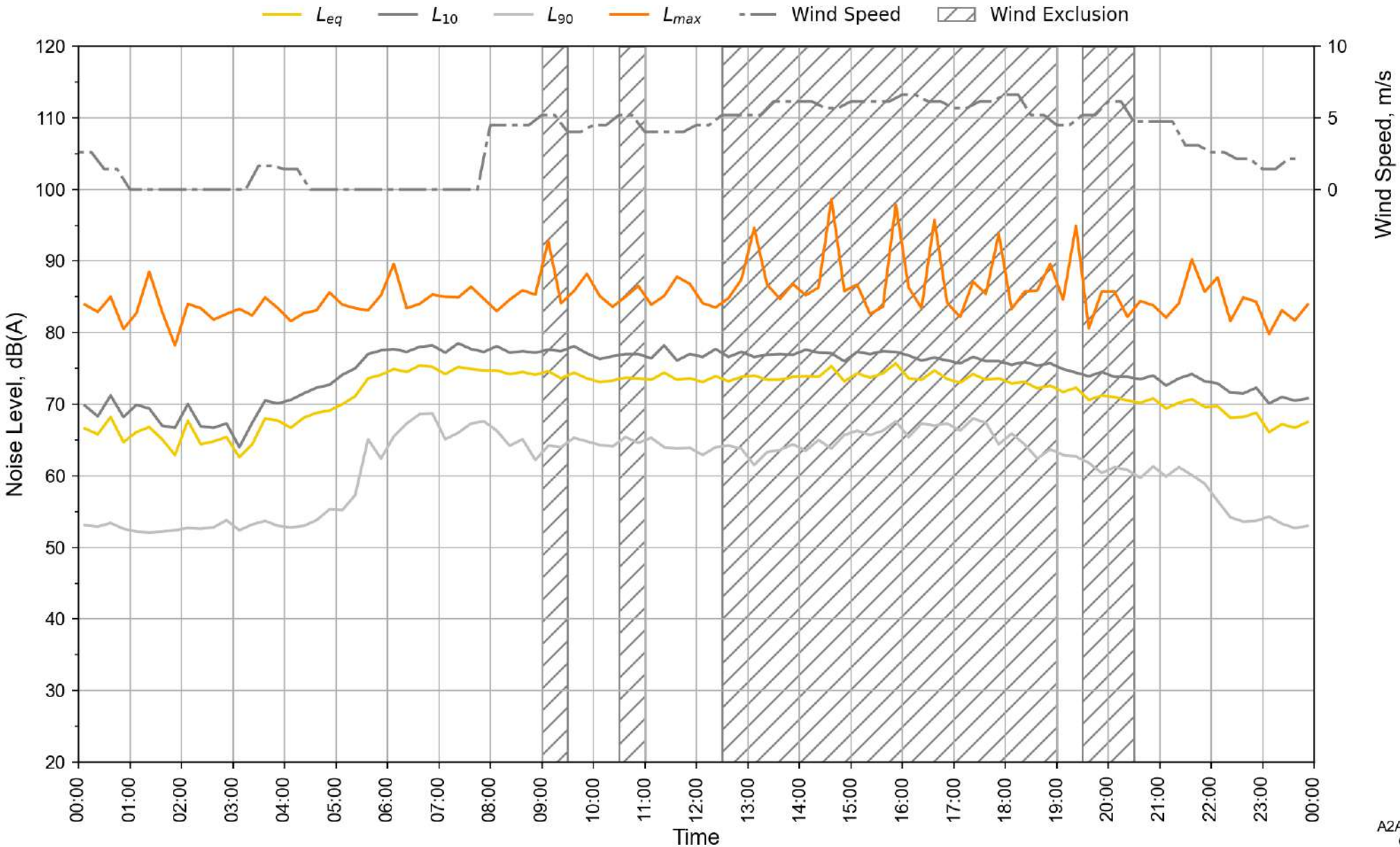
NL1 - ABC Social Club - Wednesday, 17 January 2024



A2A-18354-E0
Calibration:
2023-11-10

Resonate

NL1 - ABC Social Club - Thursday, 18 January 2024



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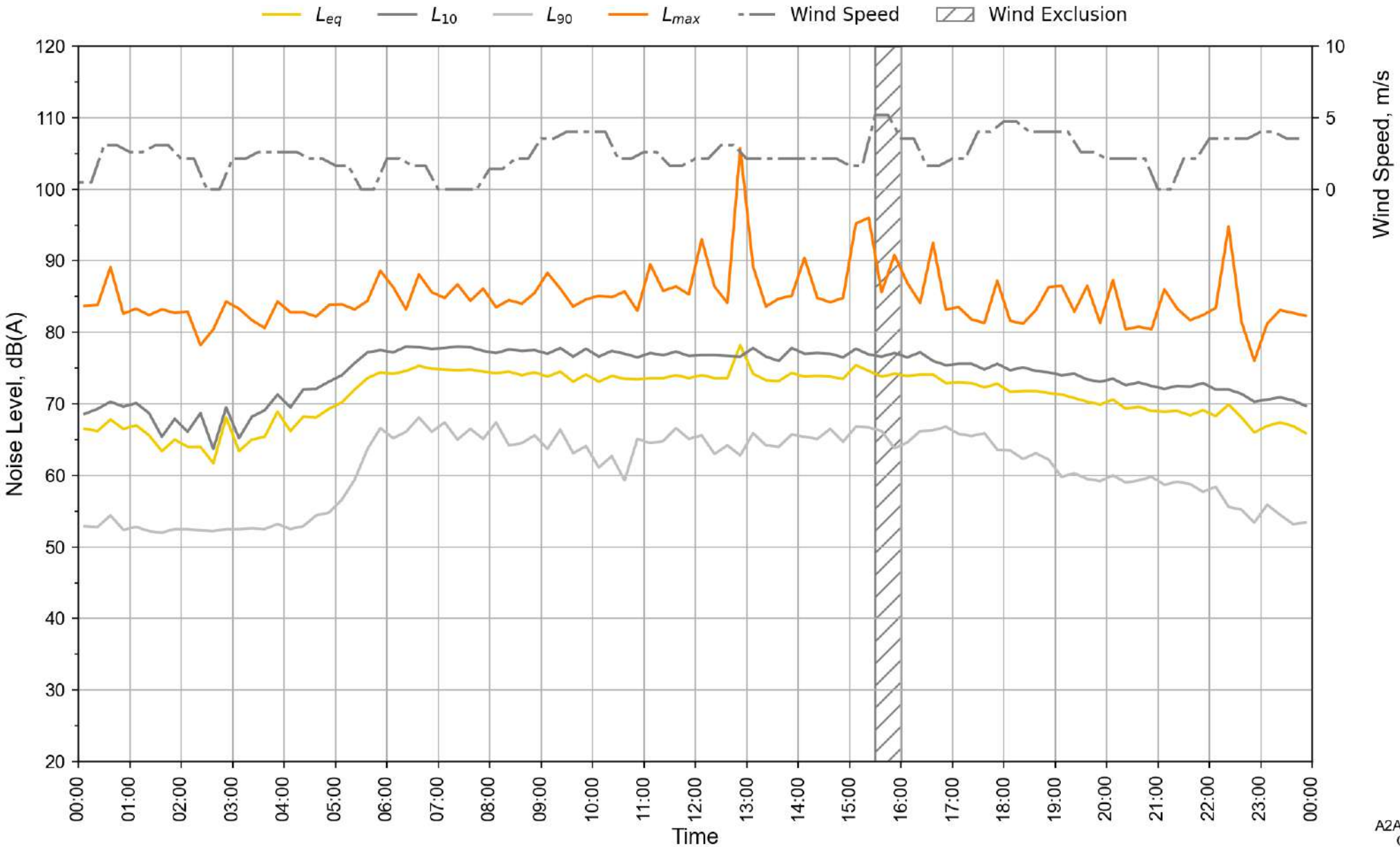

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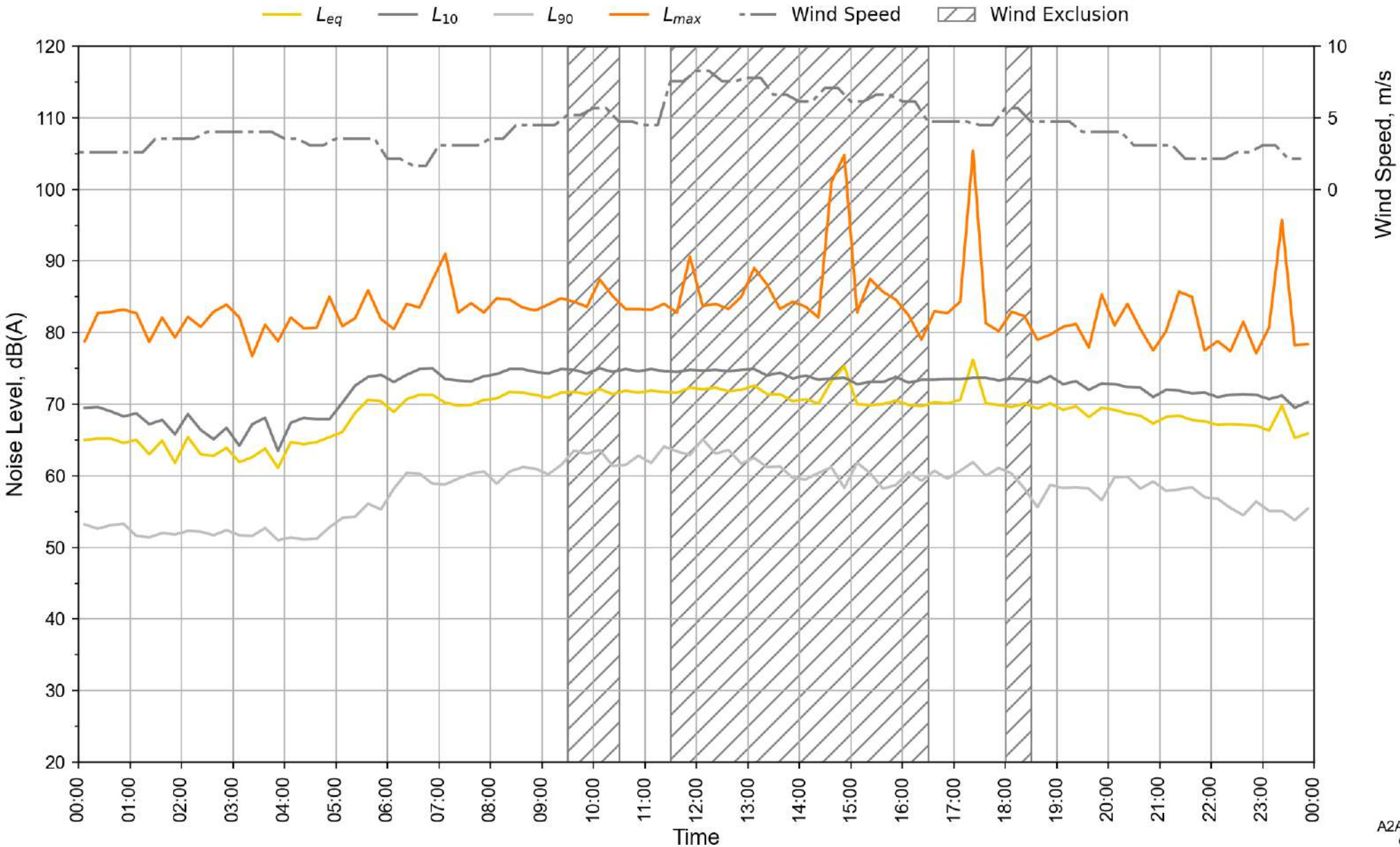

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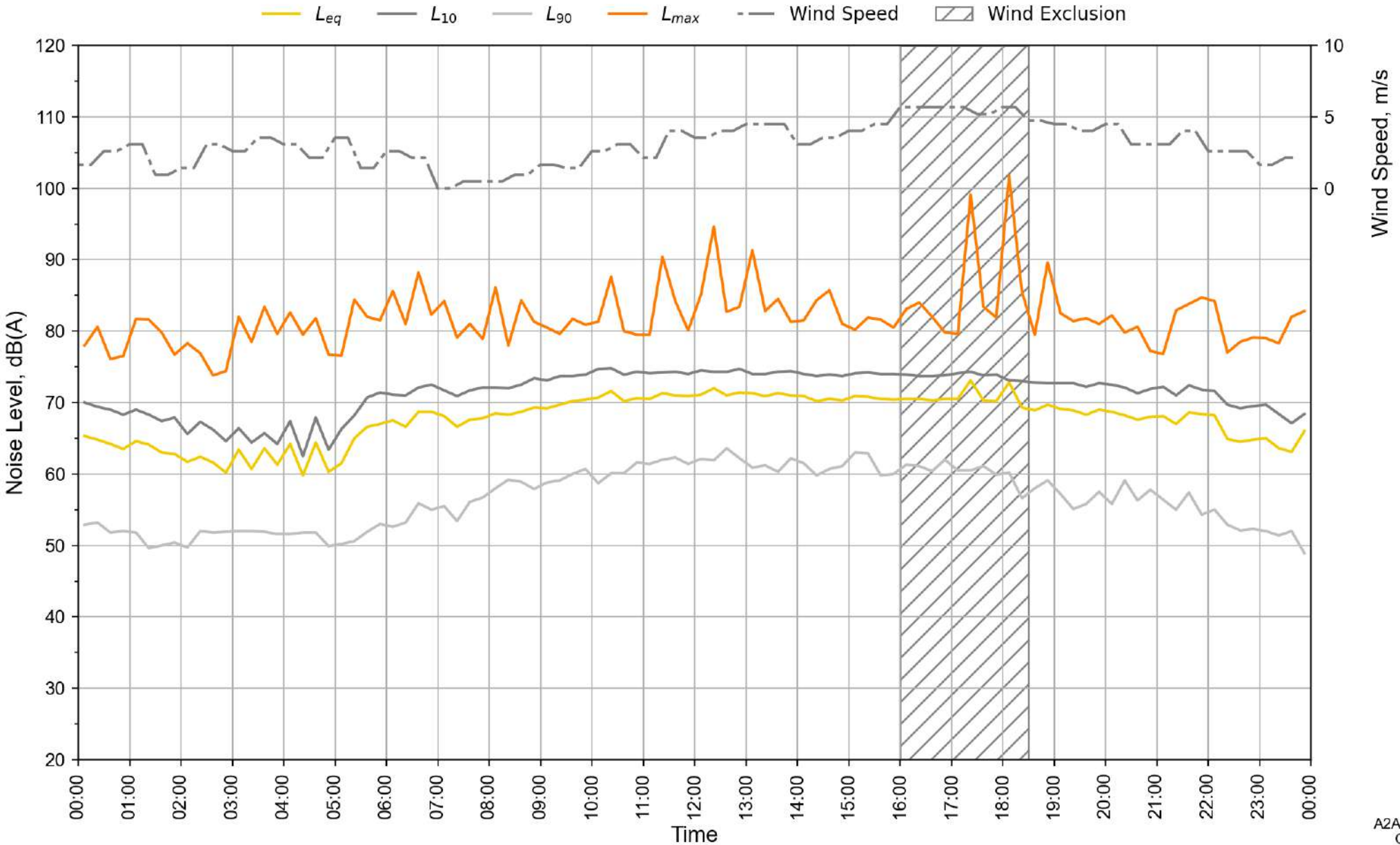

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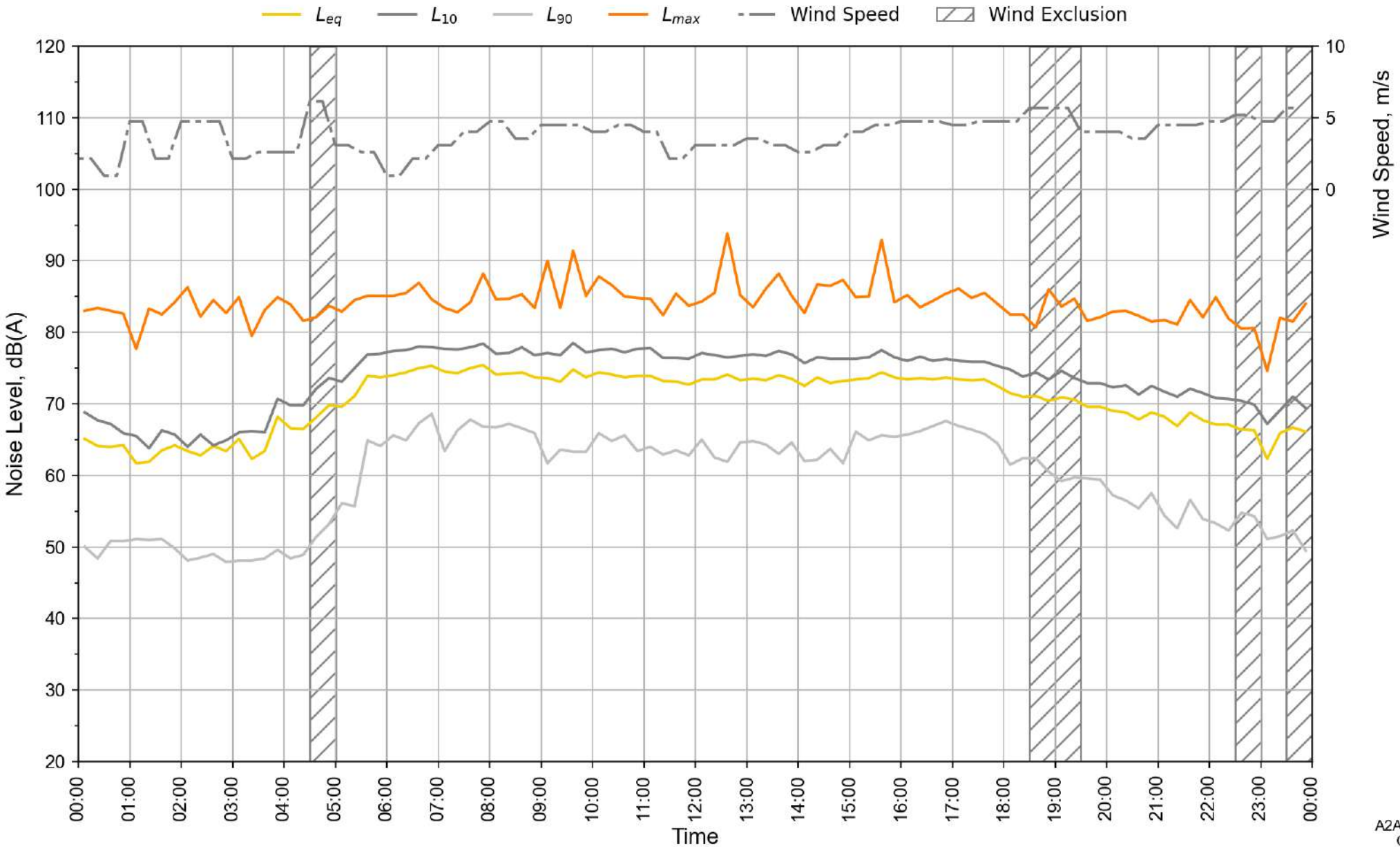

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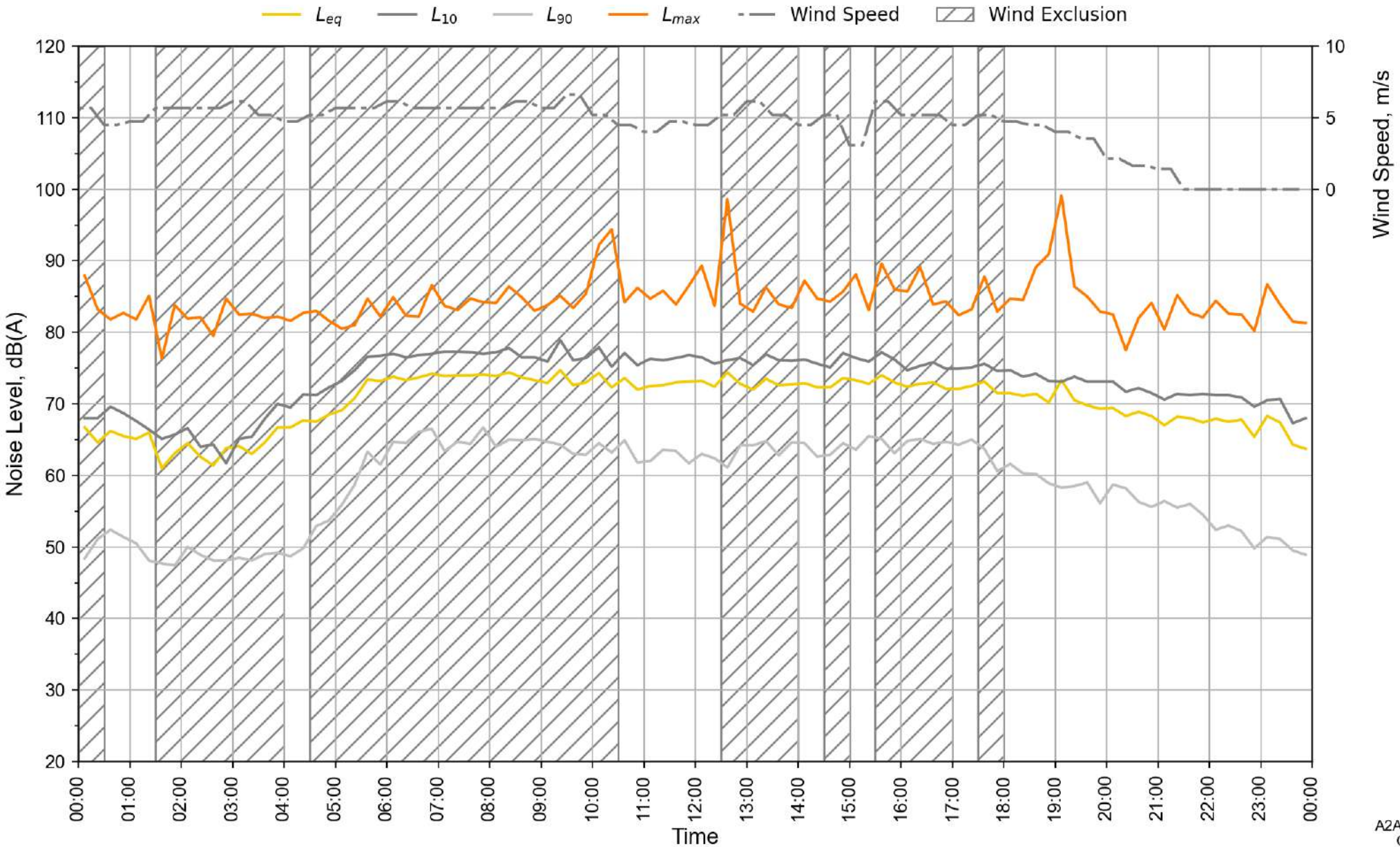

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Resonate

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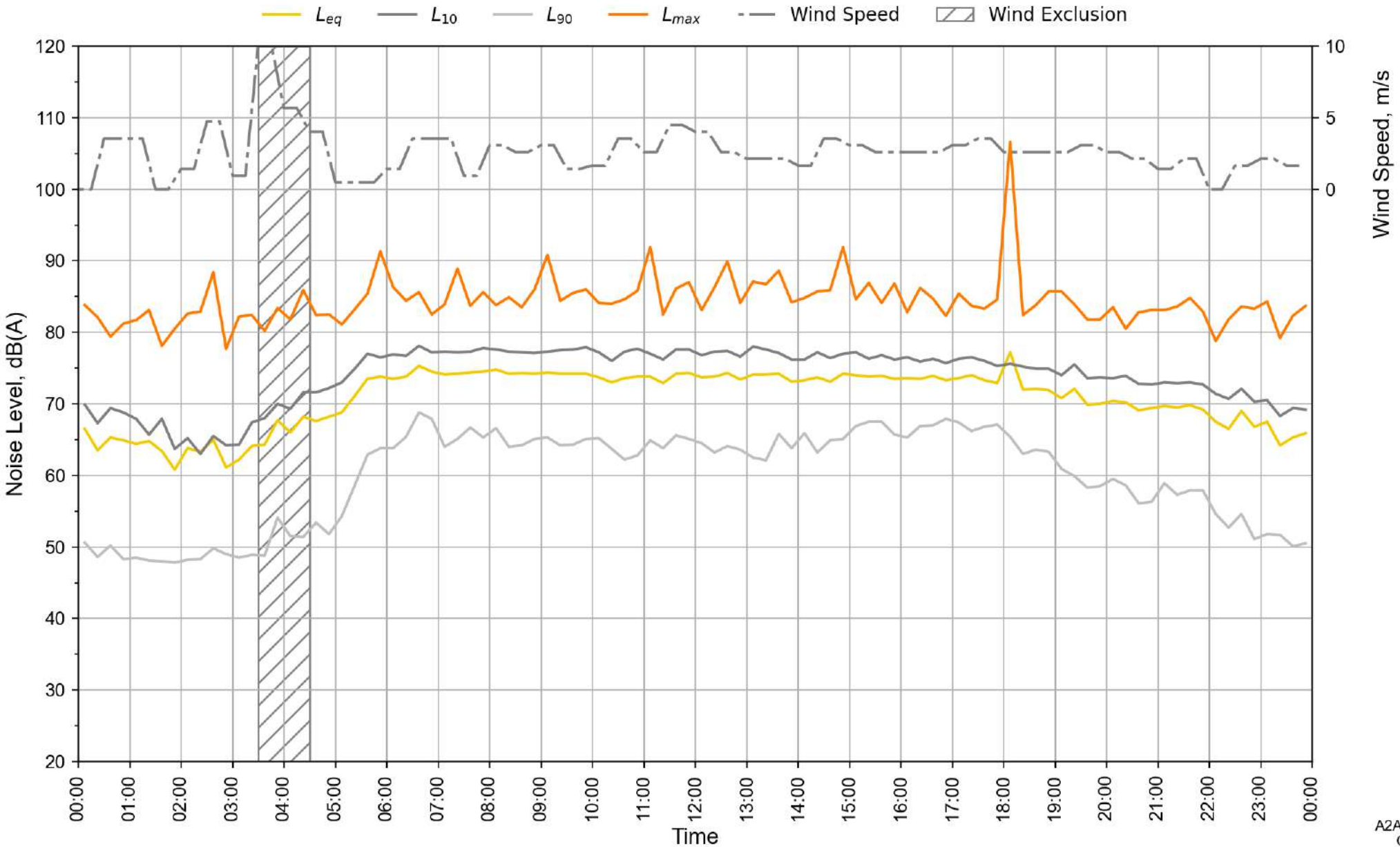

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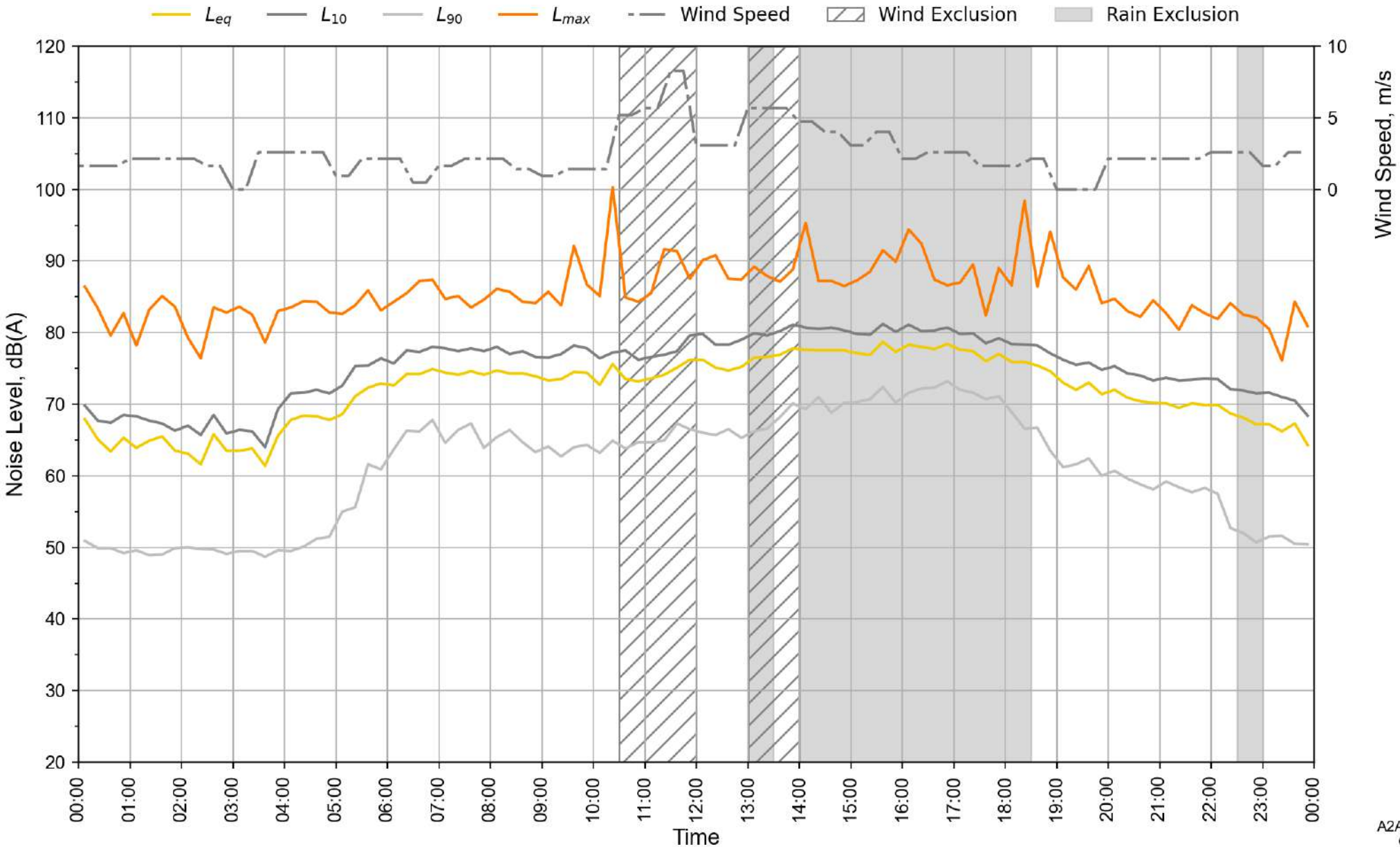

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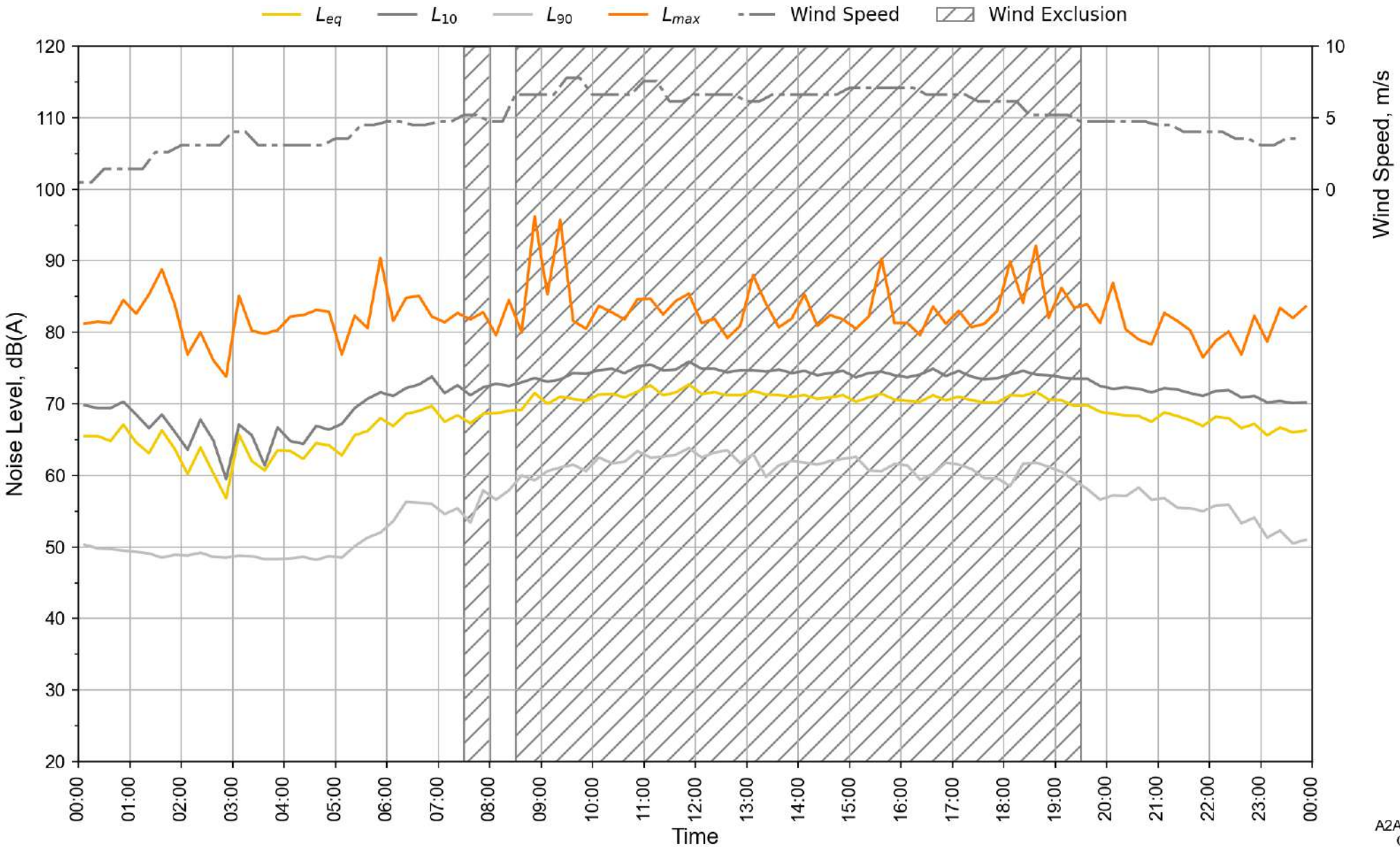

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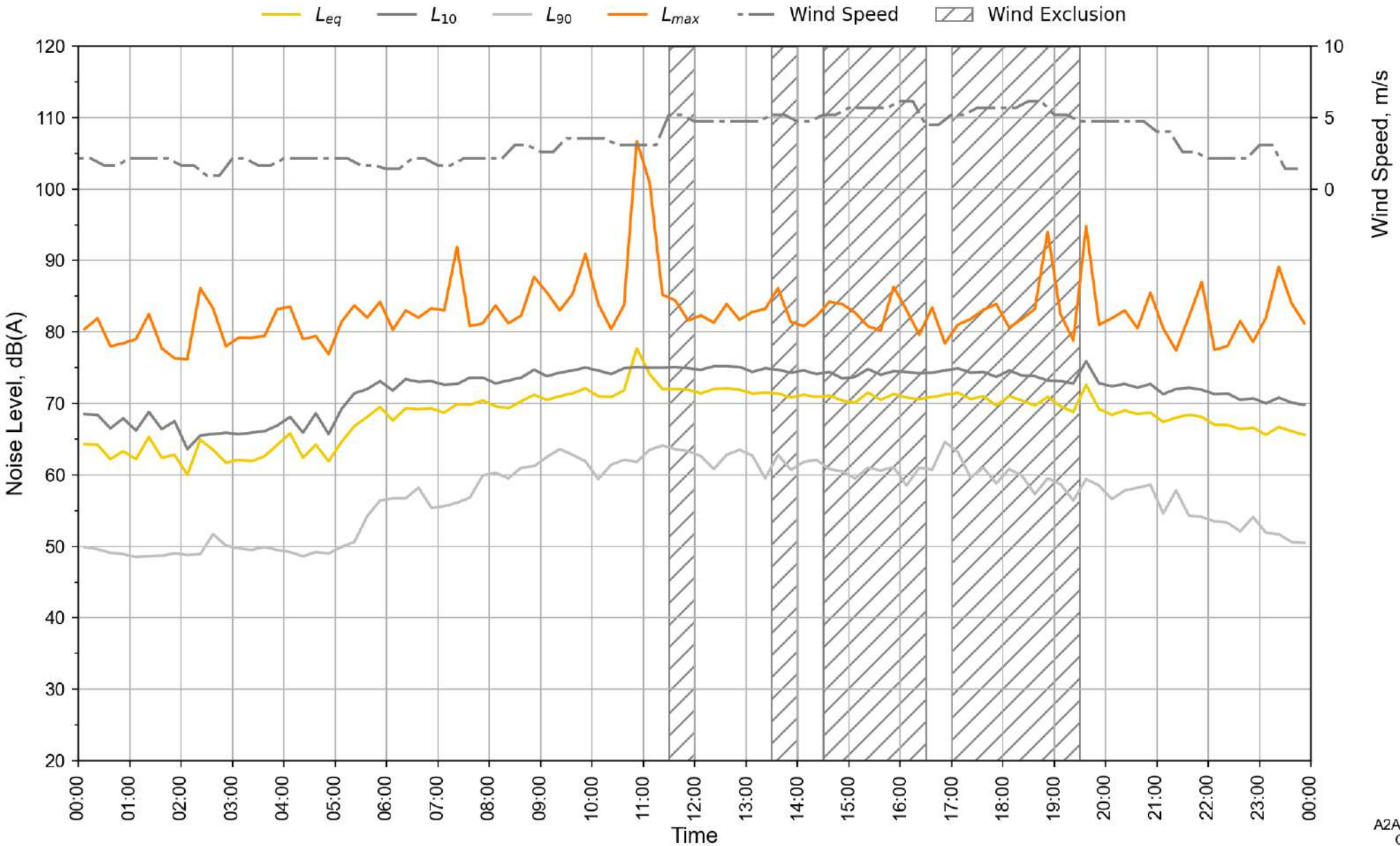

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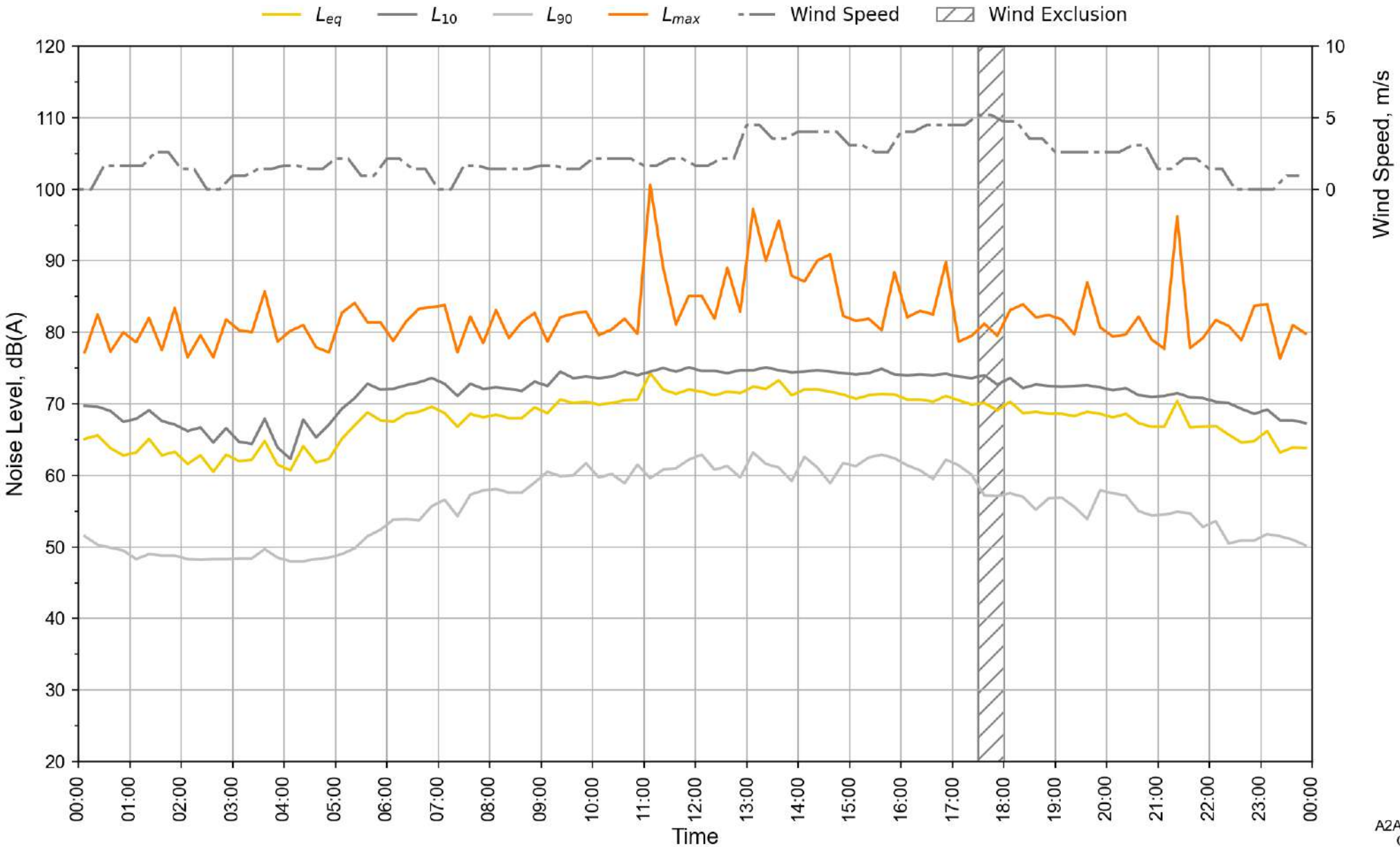

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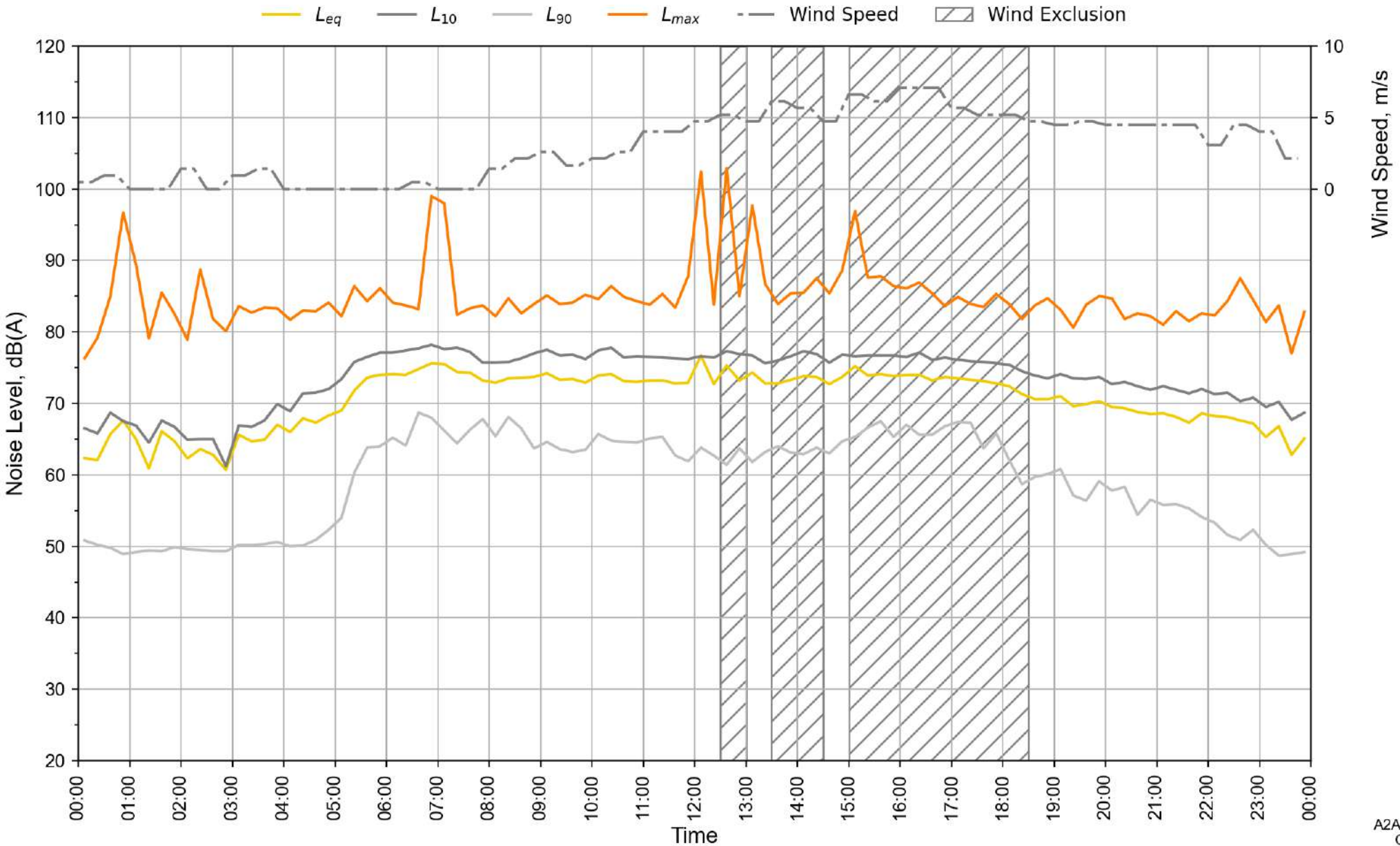

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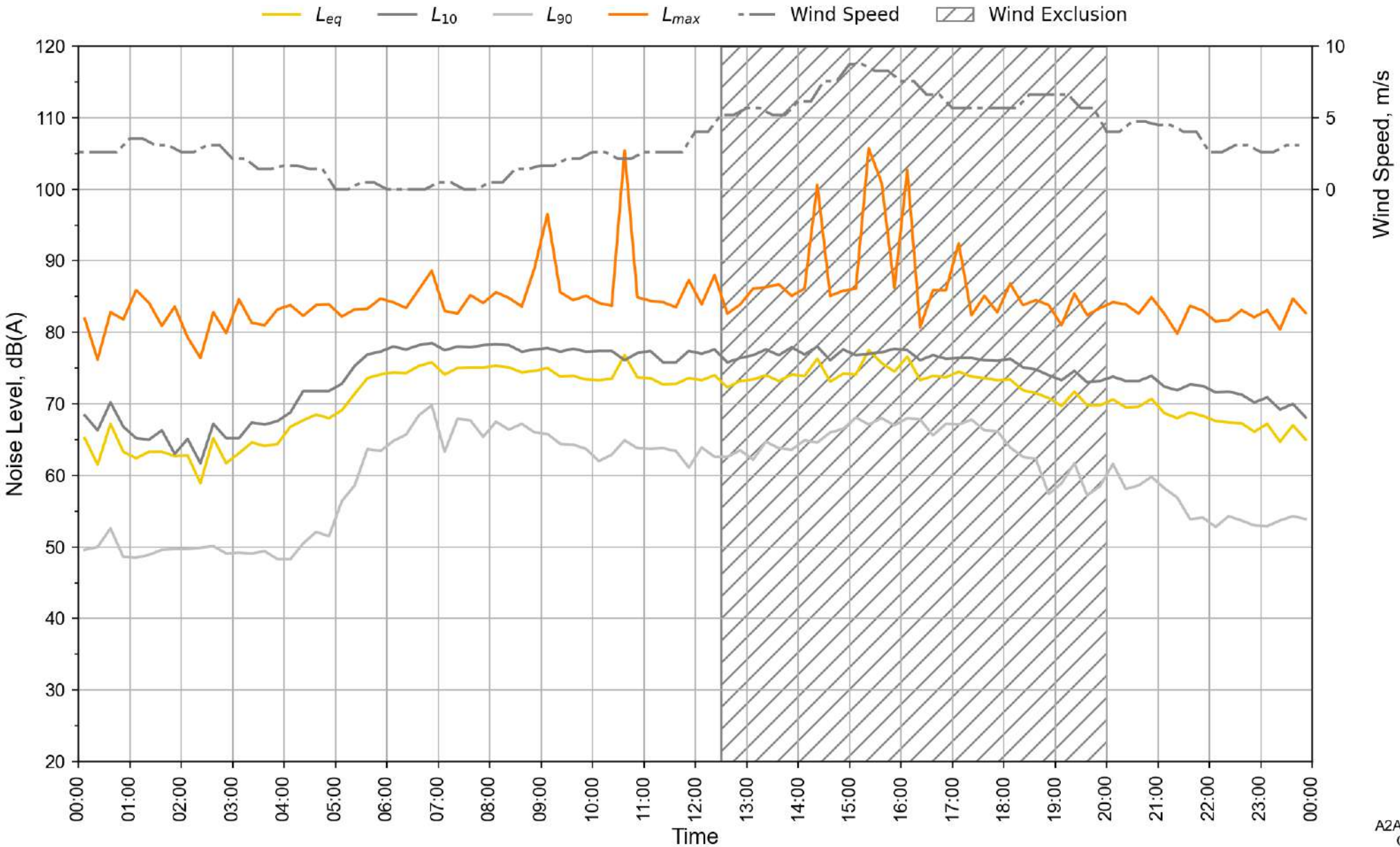

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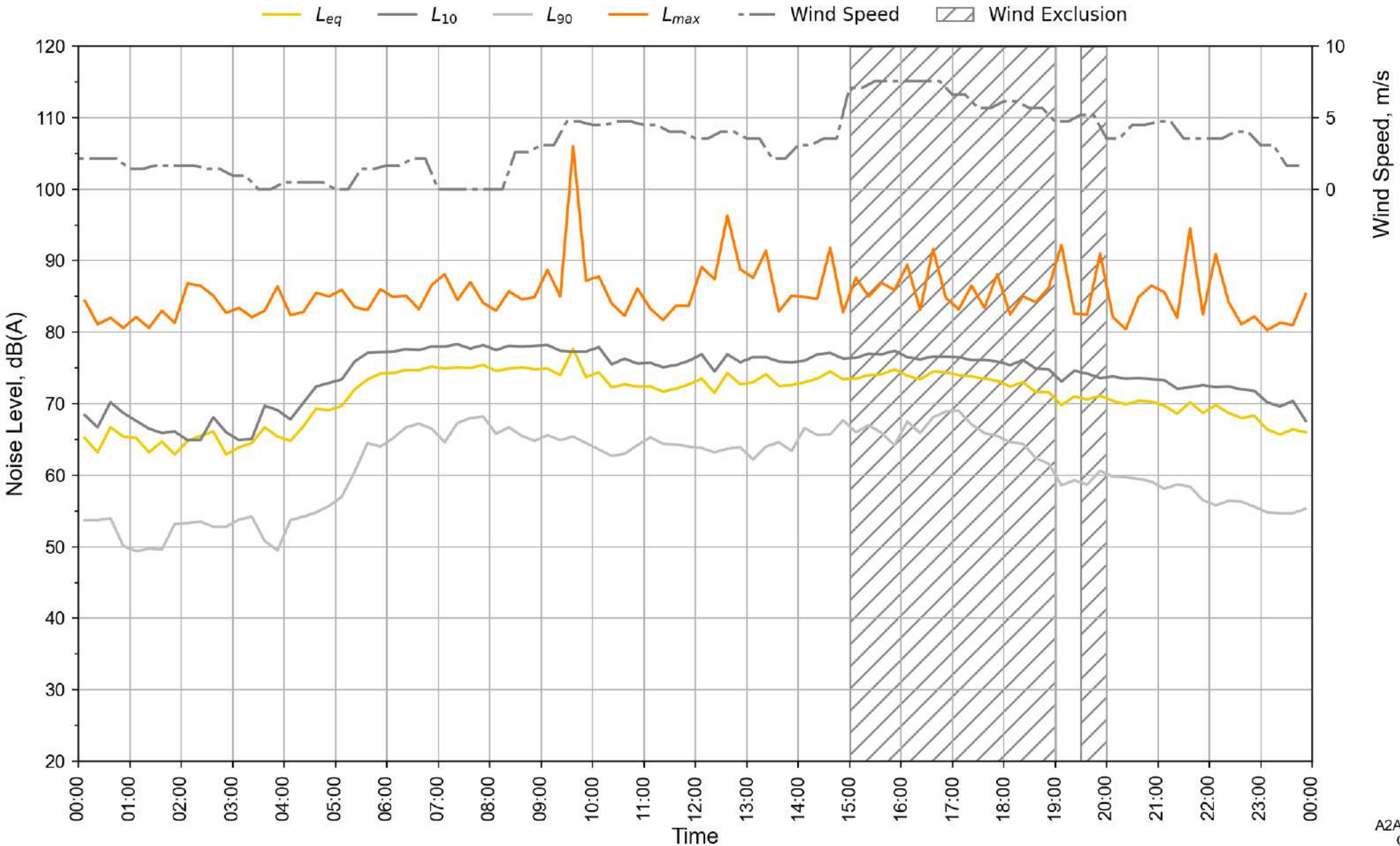

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2023-11-10

Resonate

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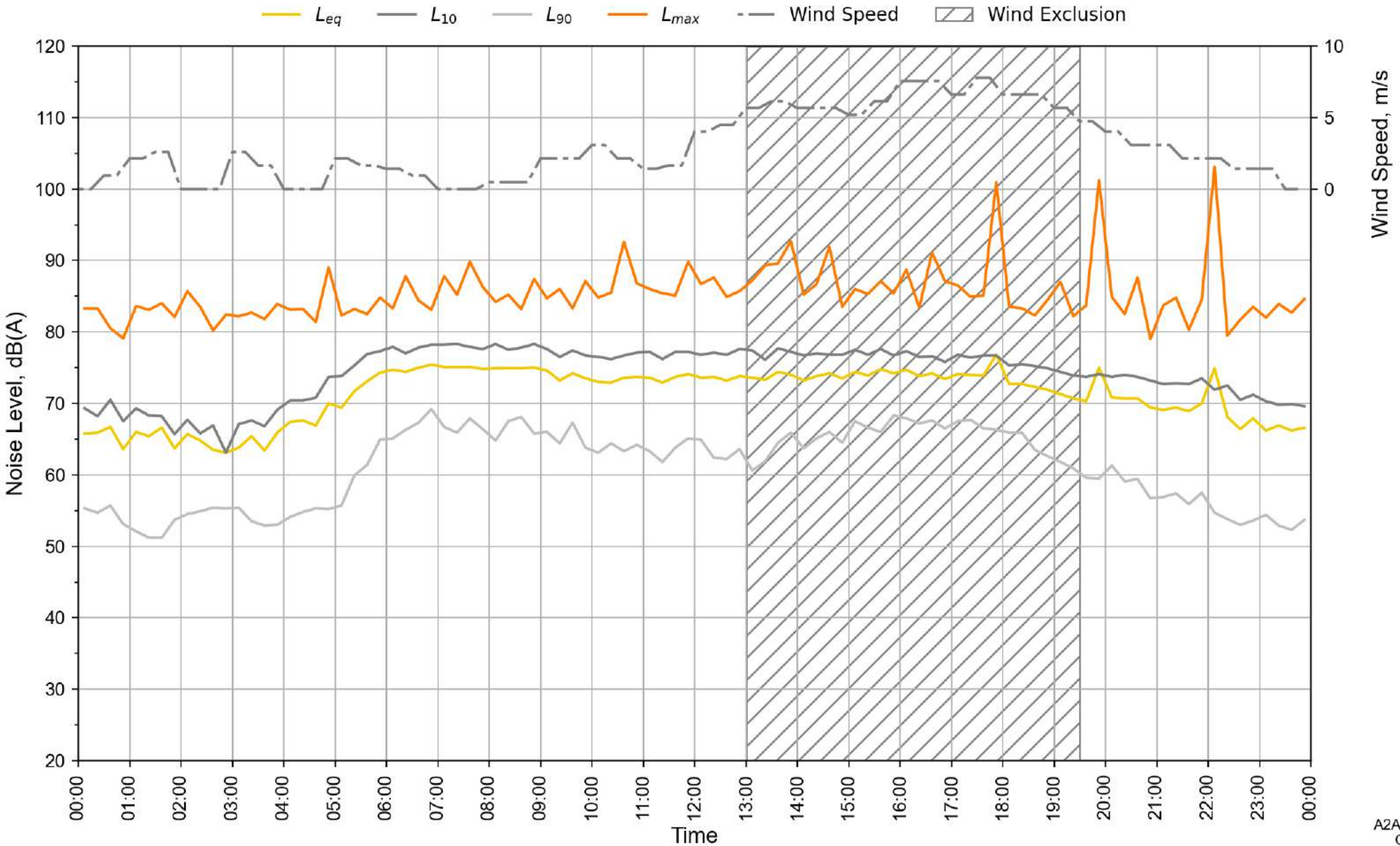

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Calibration:
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Resonate

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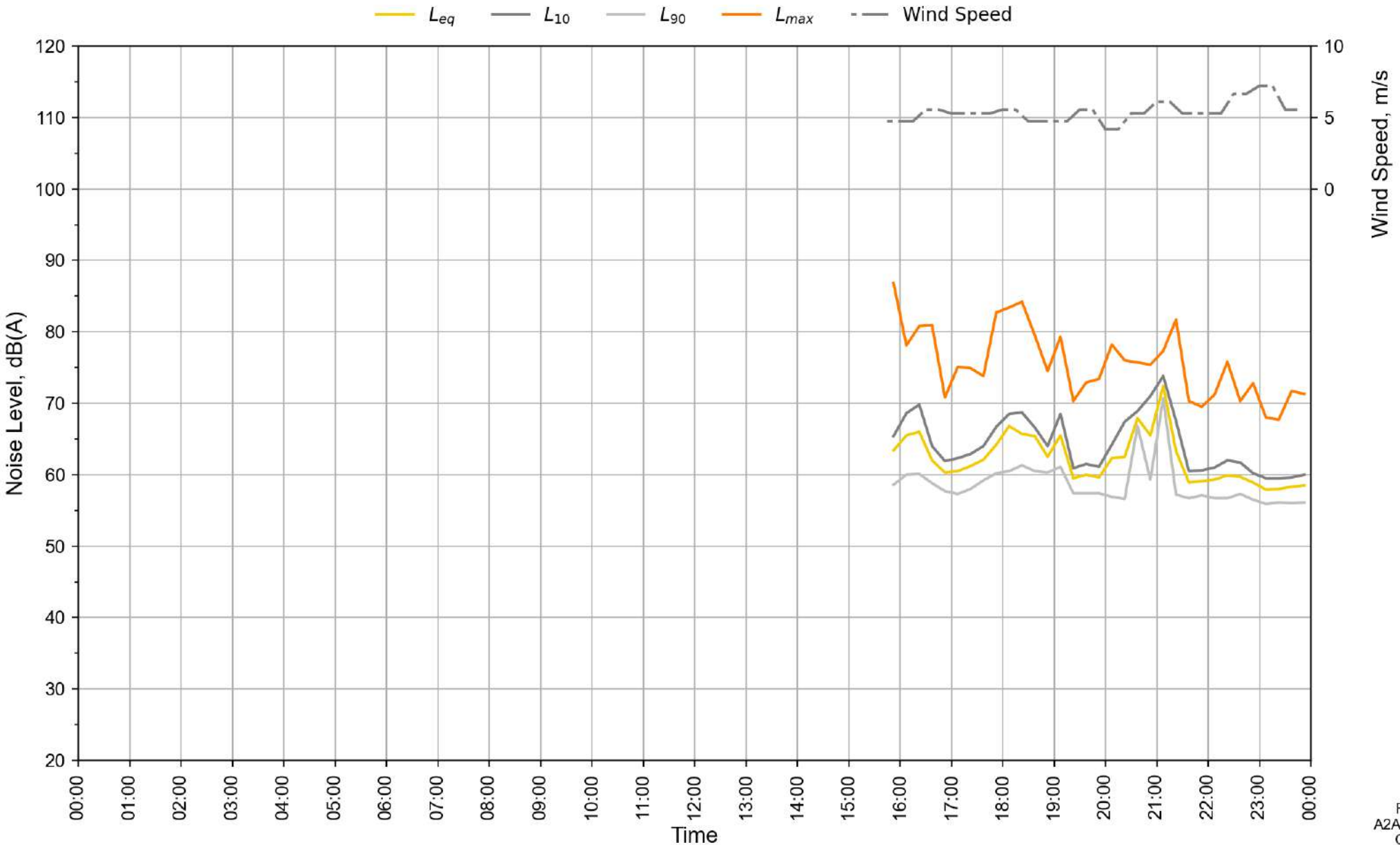

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Calibration:
2023-11-10

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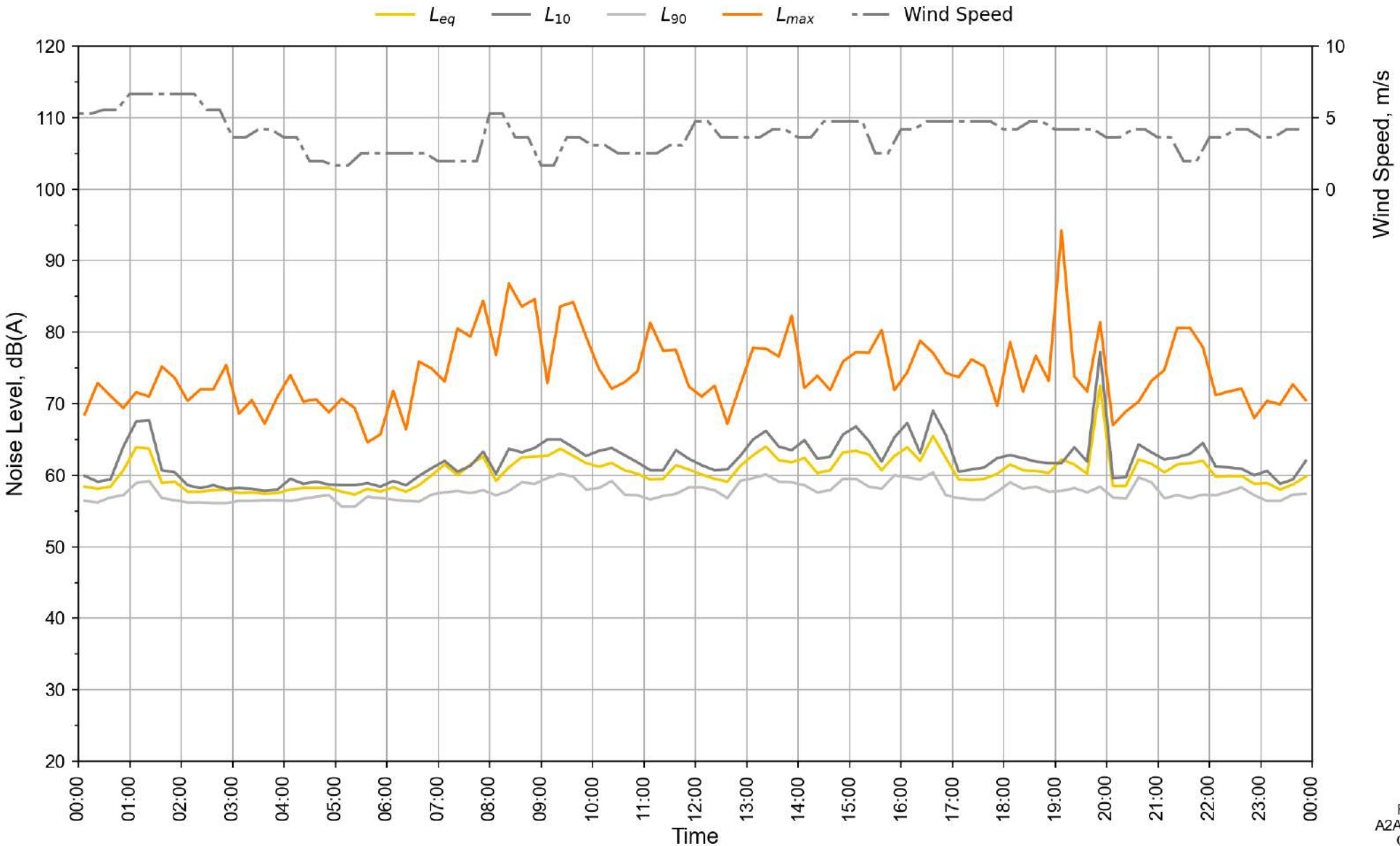

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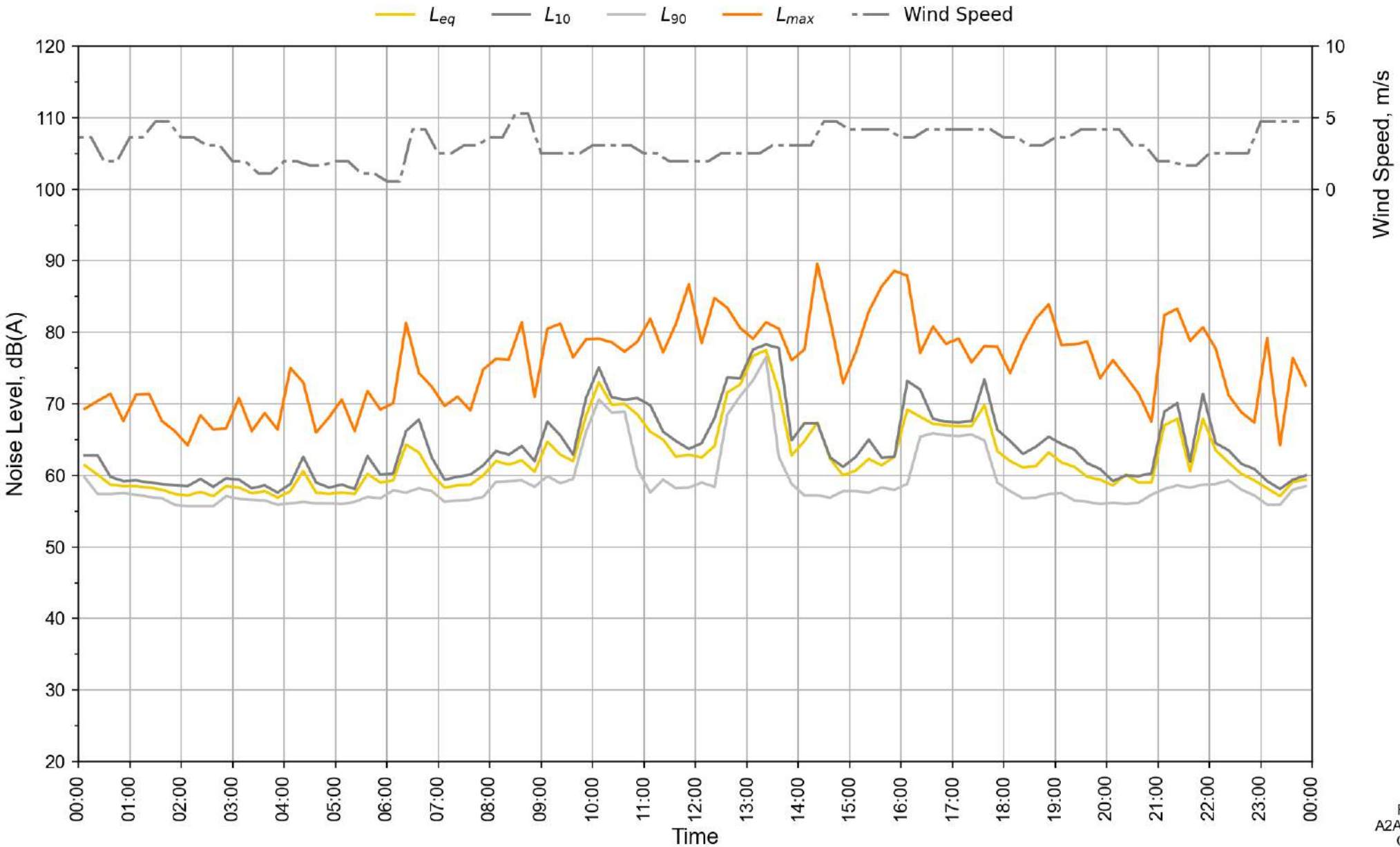

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Resonate

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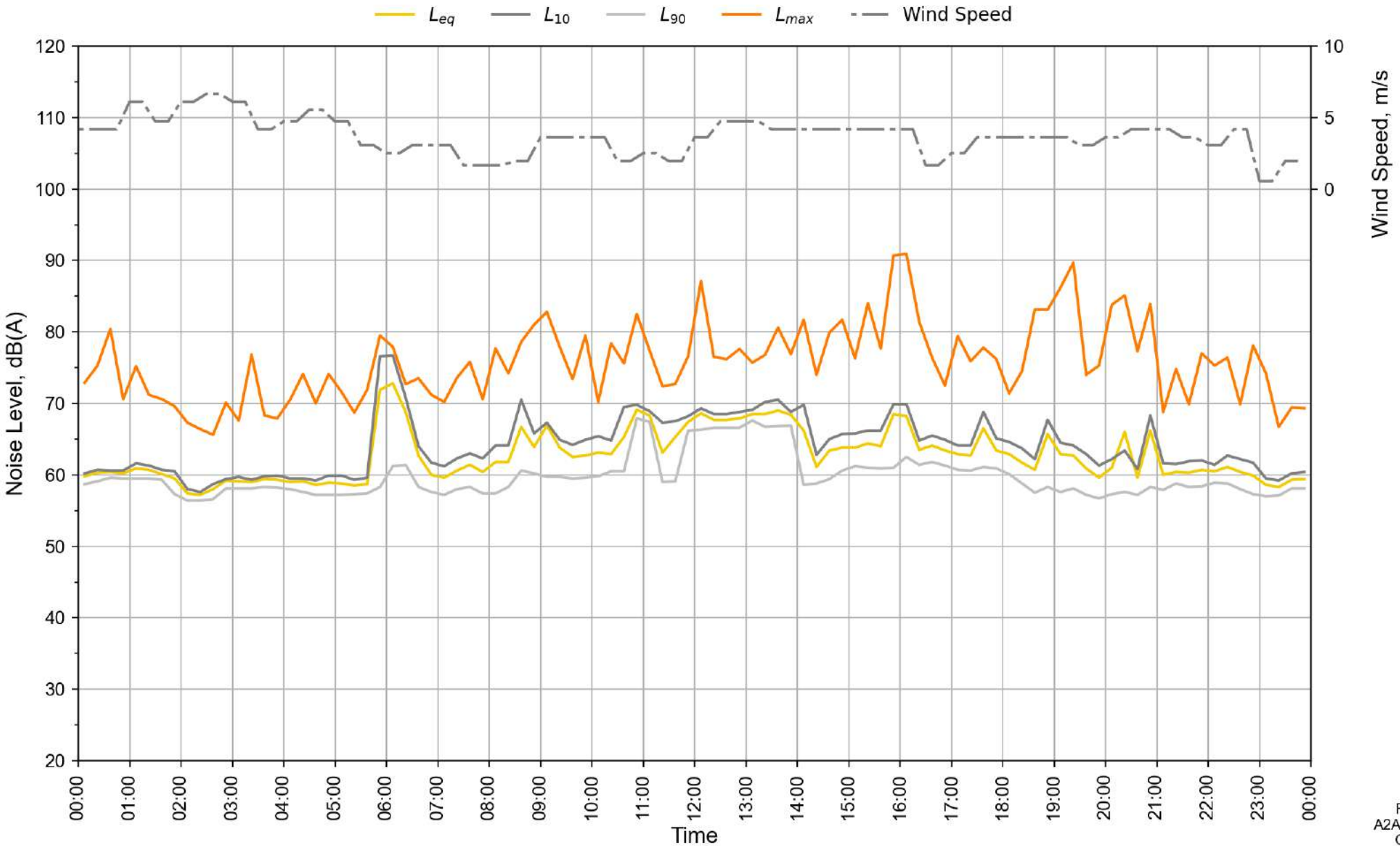

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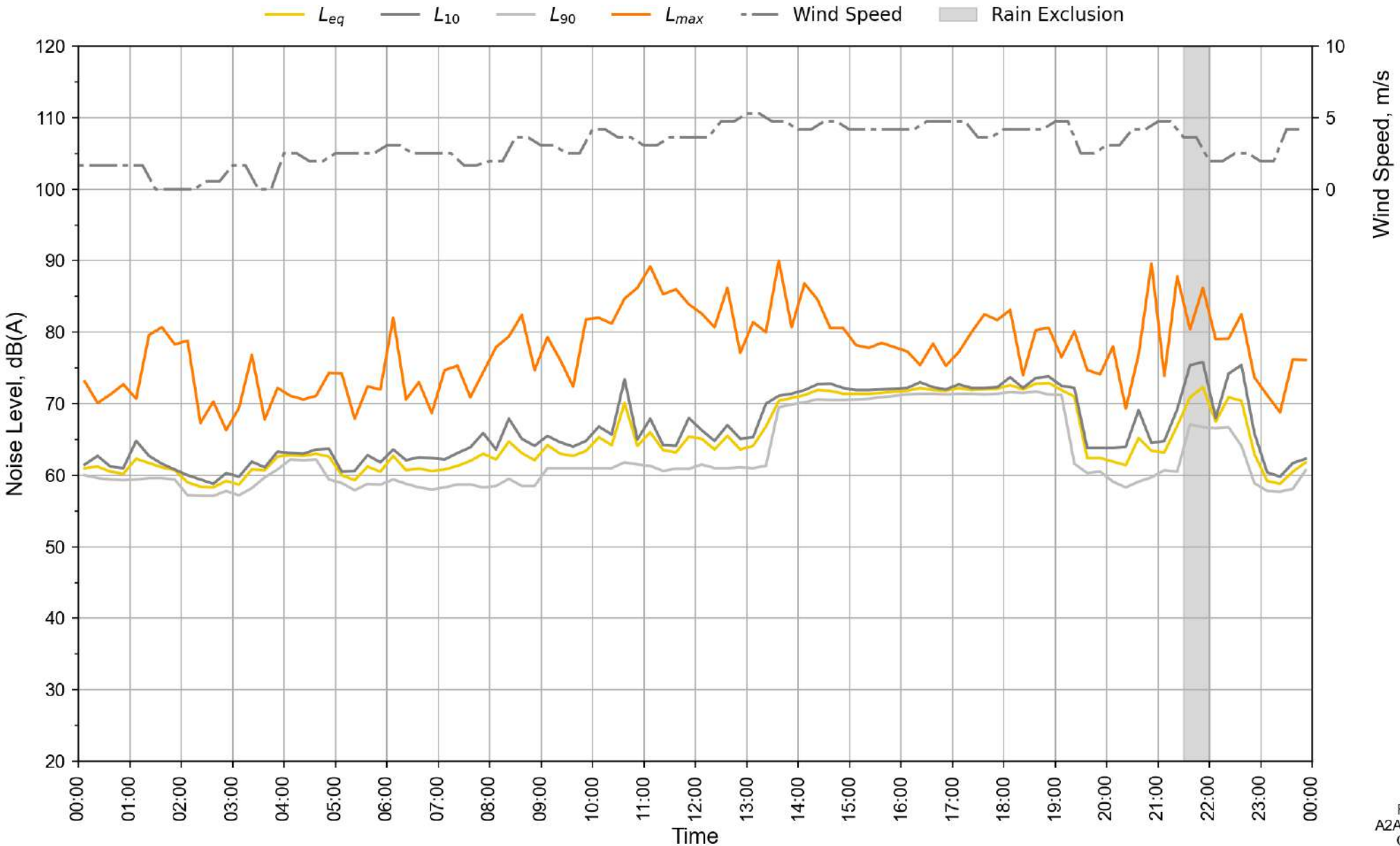

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Resonate

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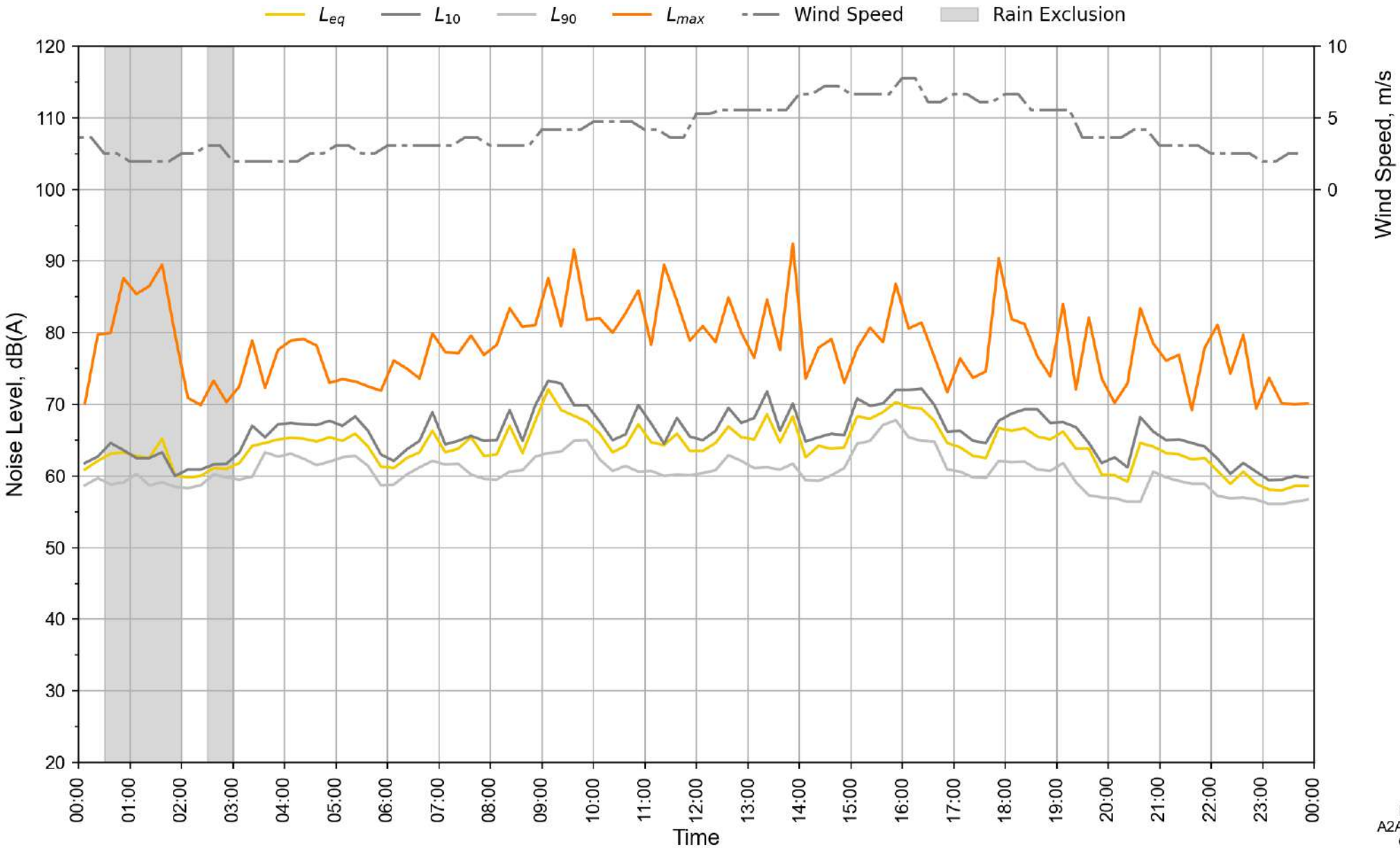

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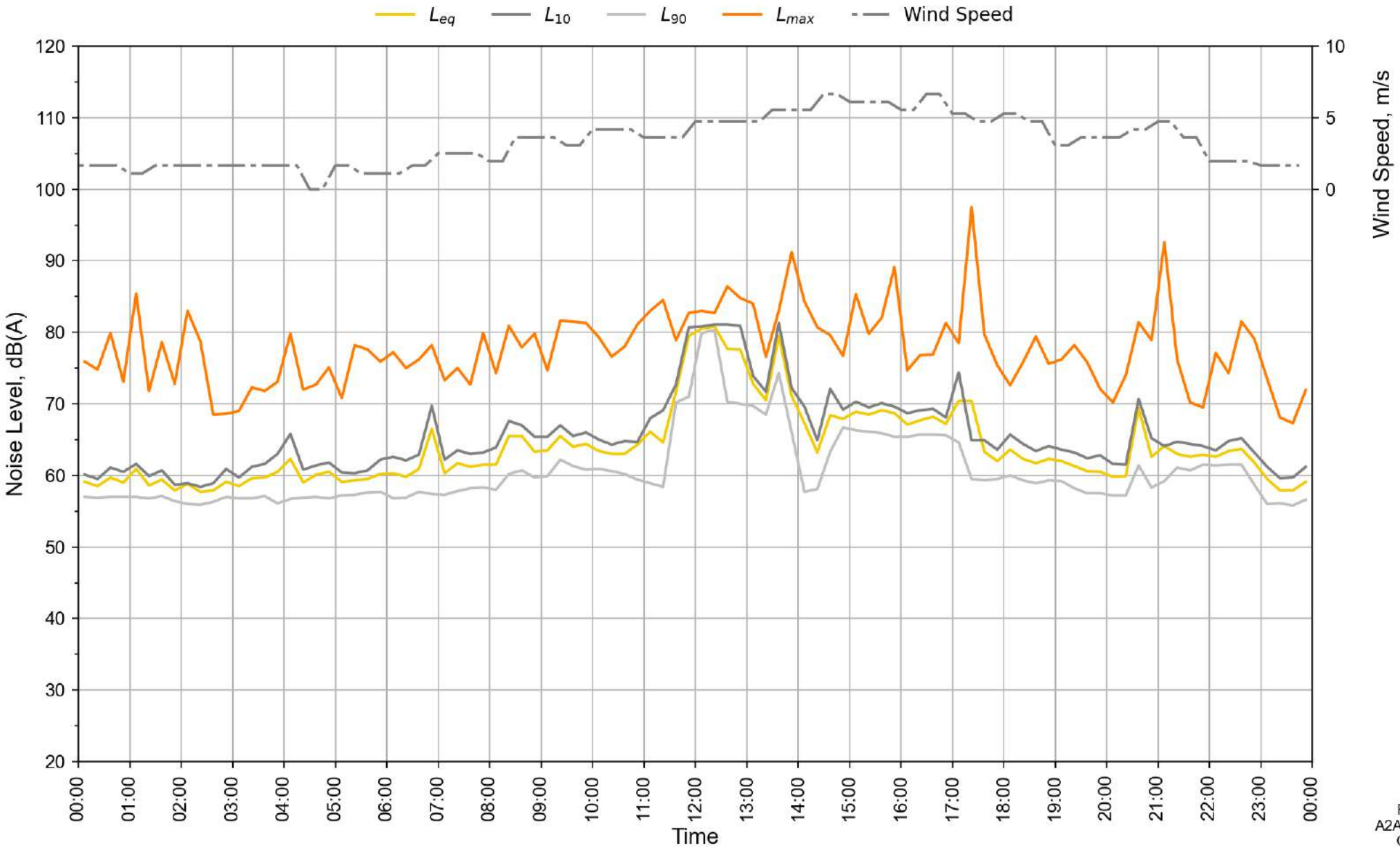

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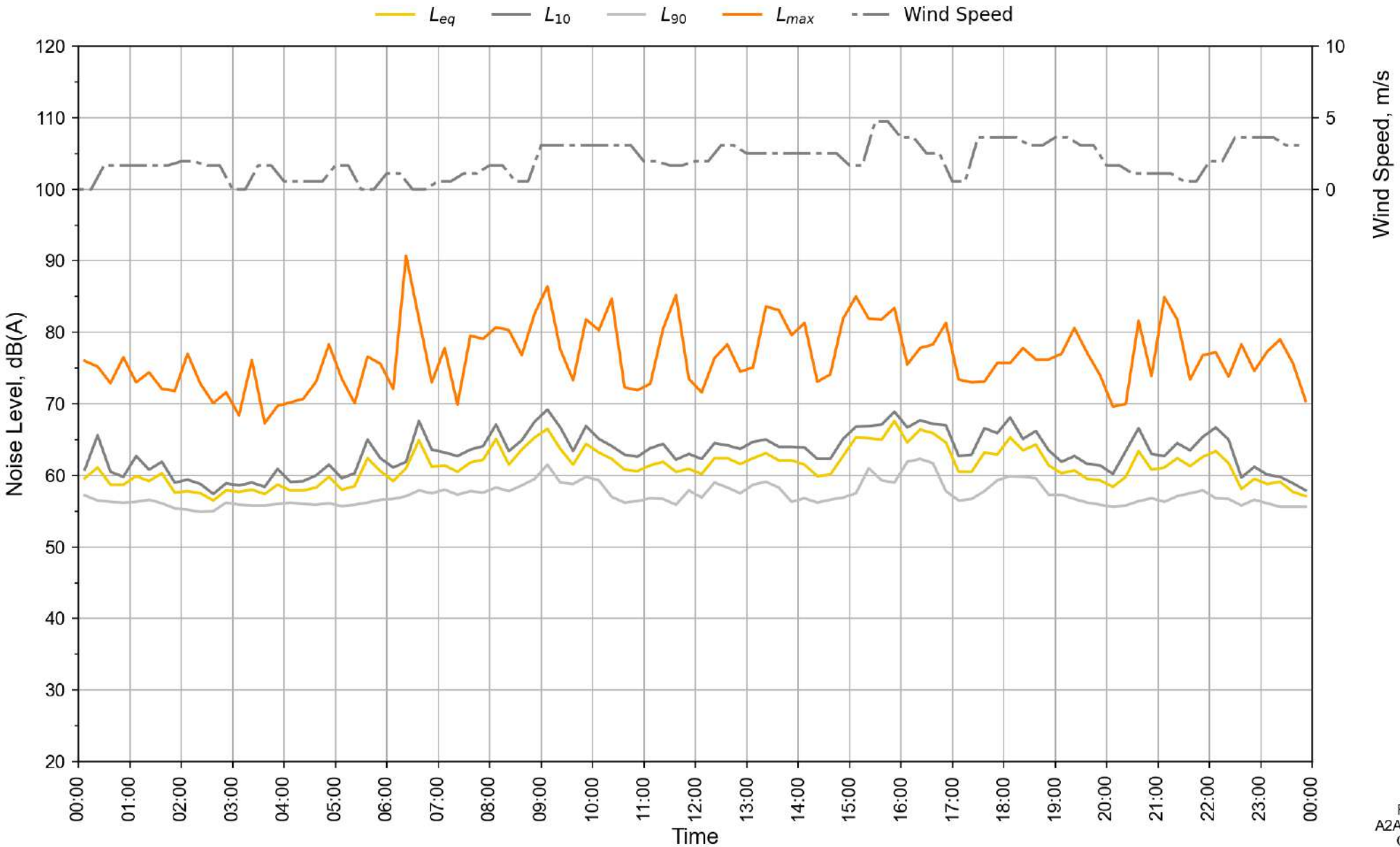

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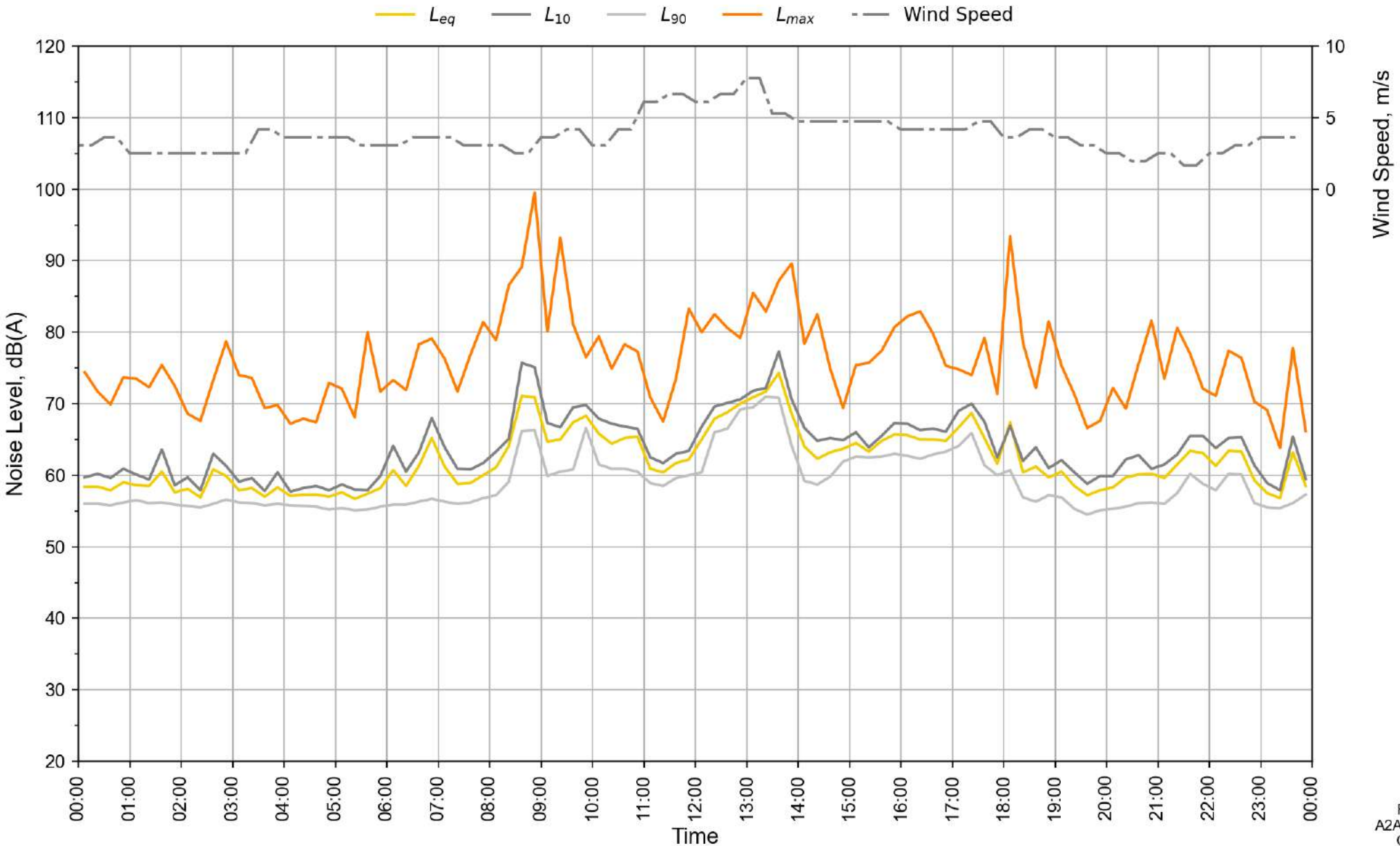

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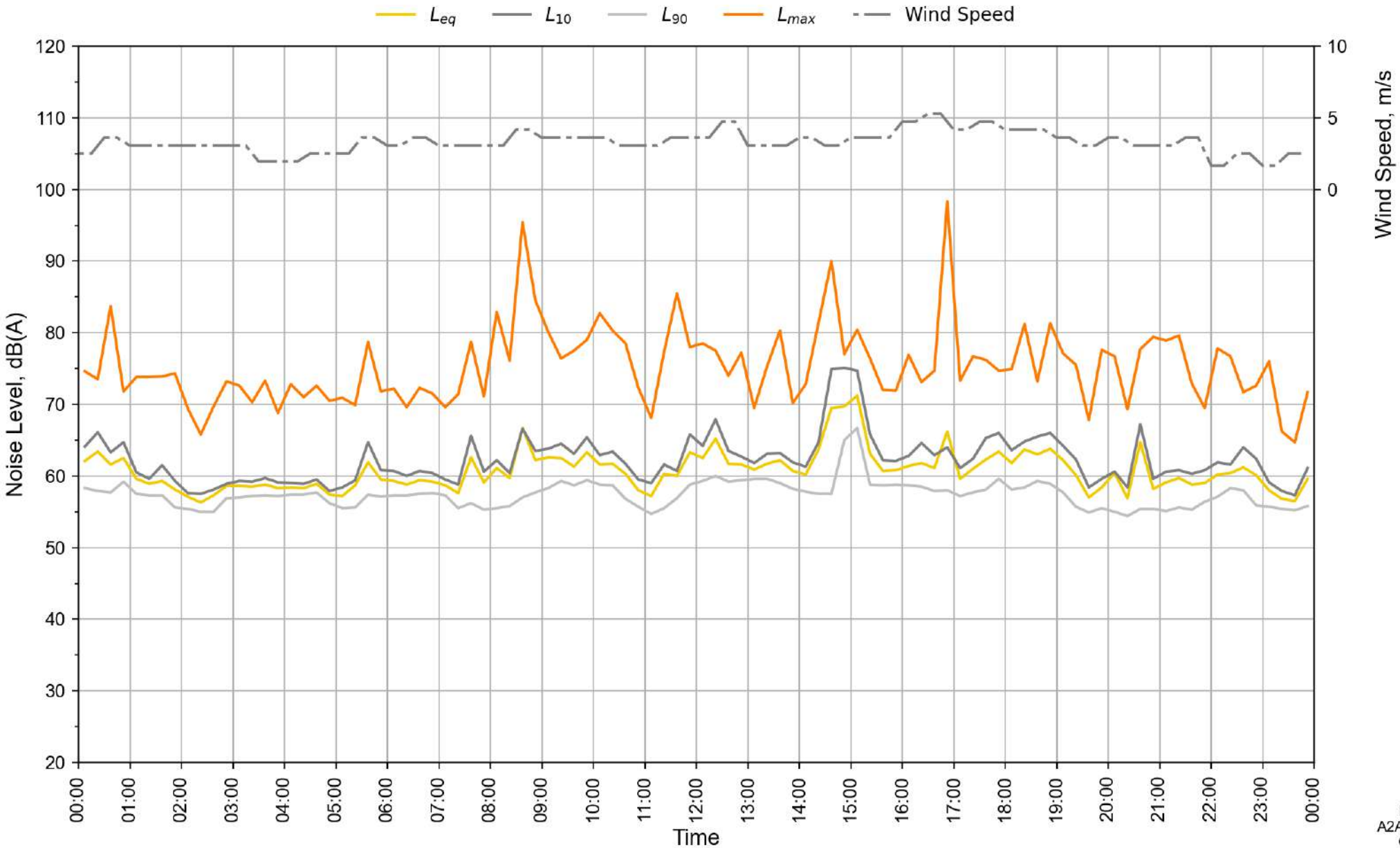

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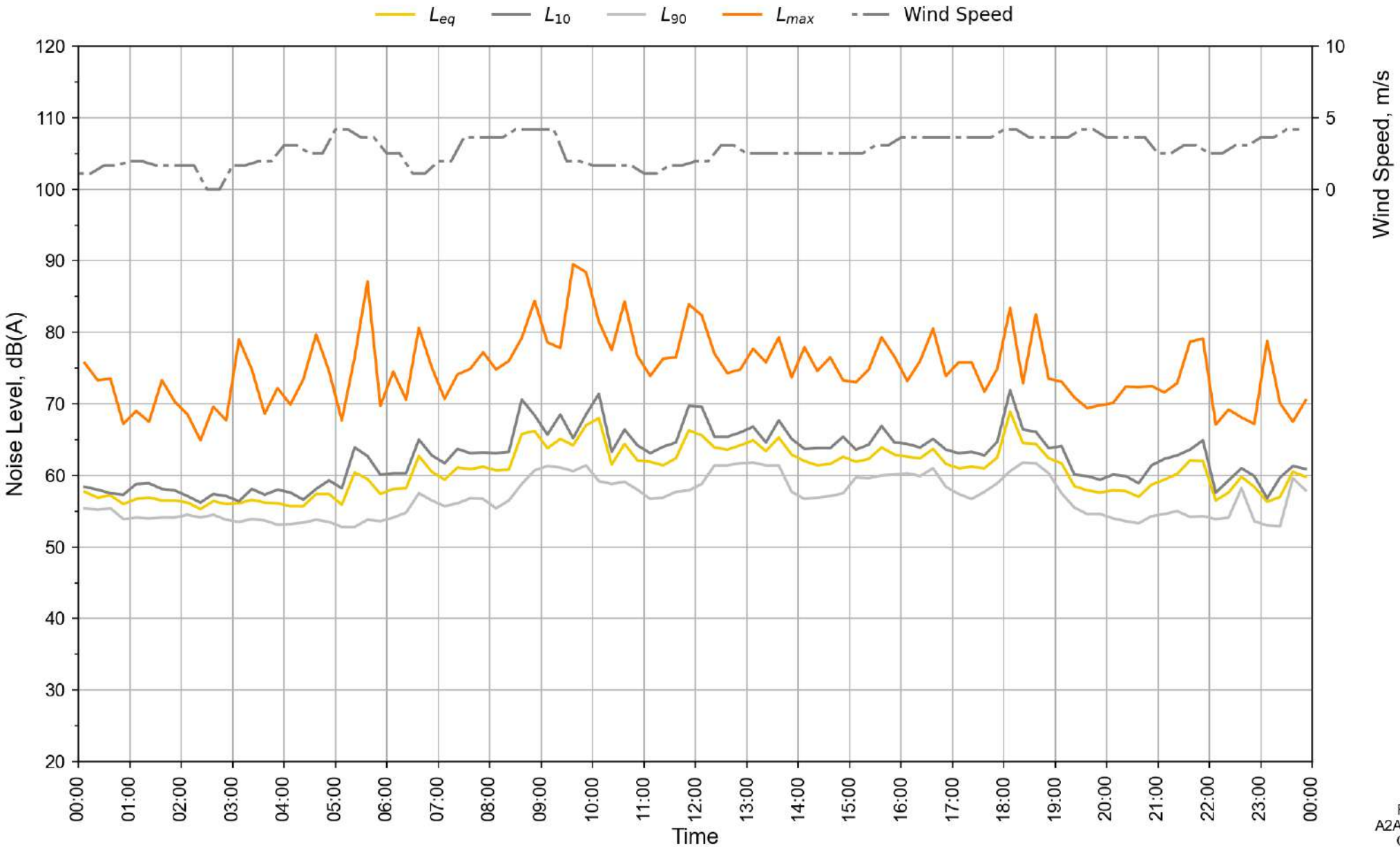

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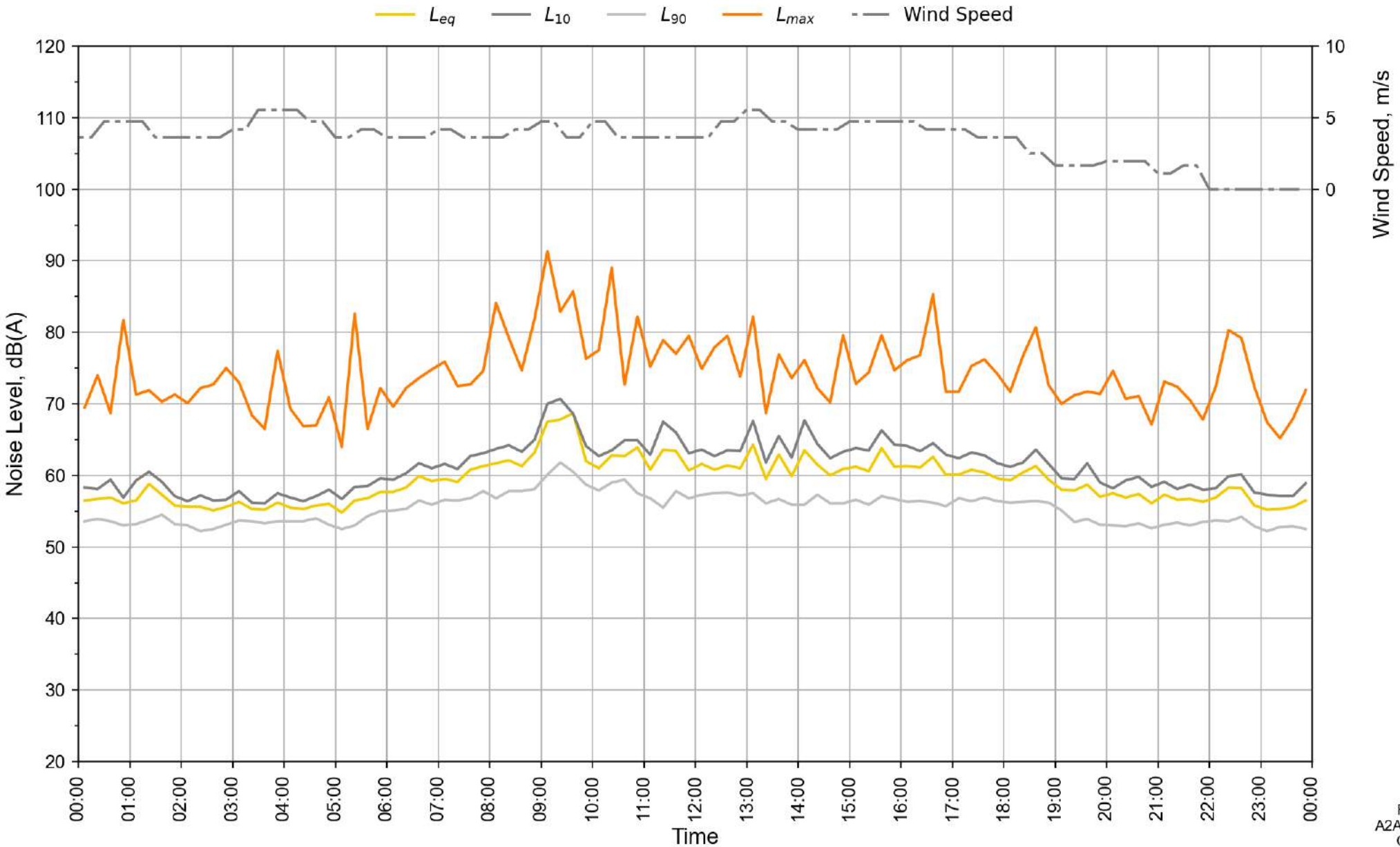

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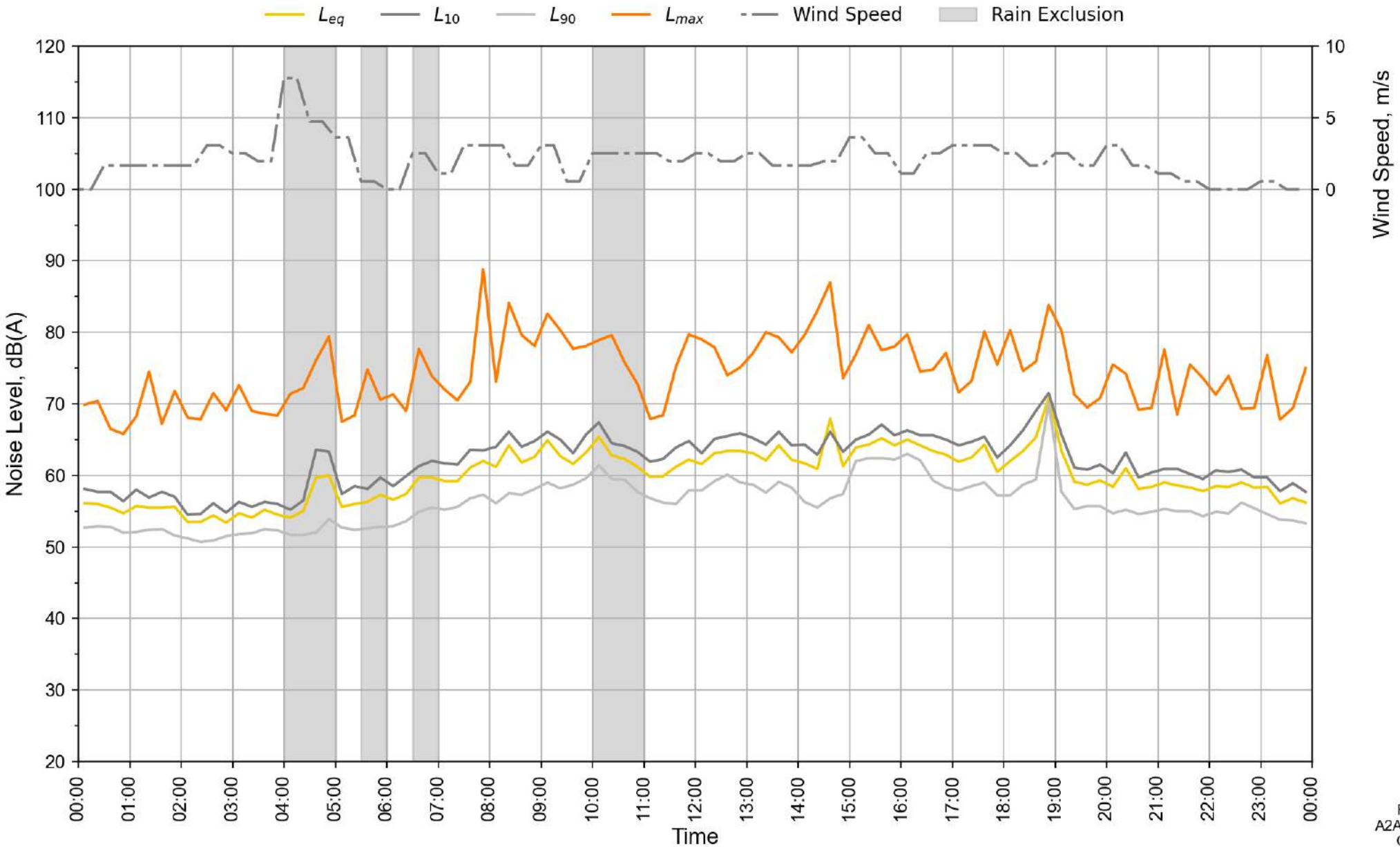

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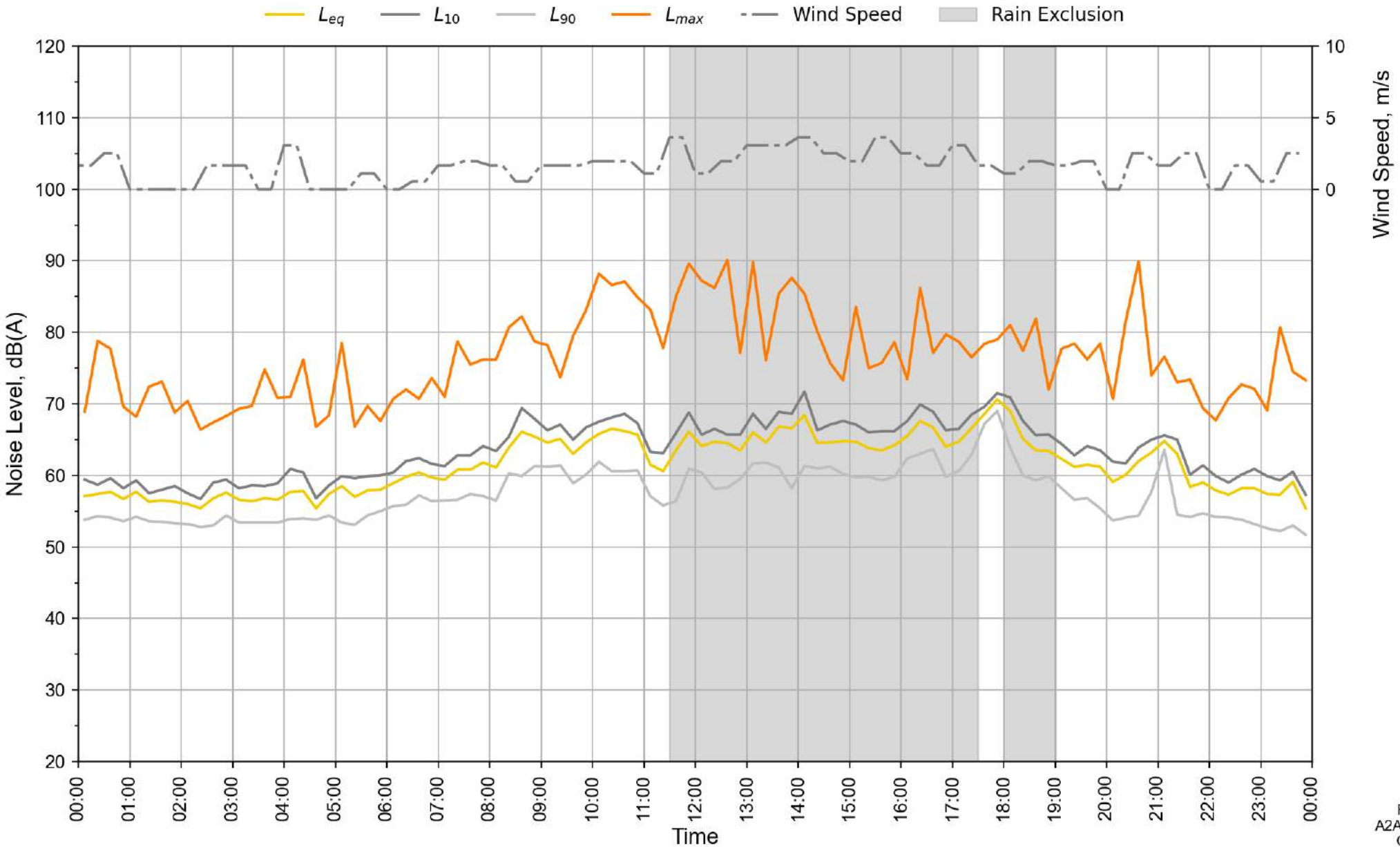

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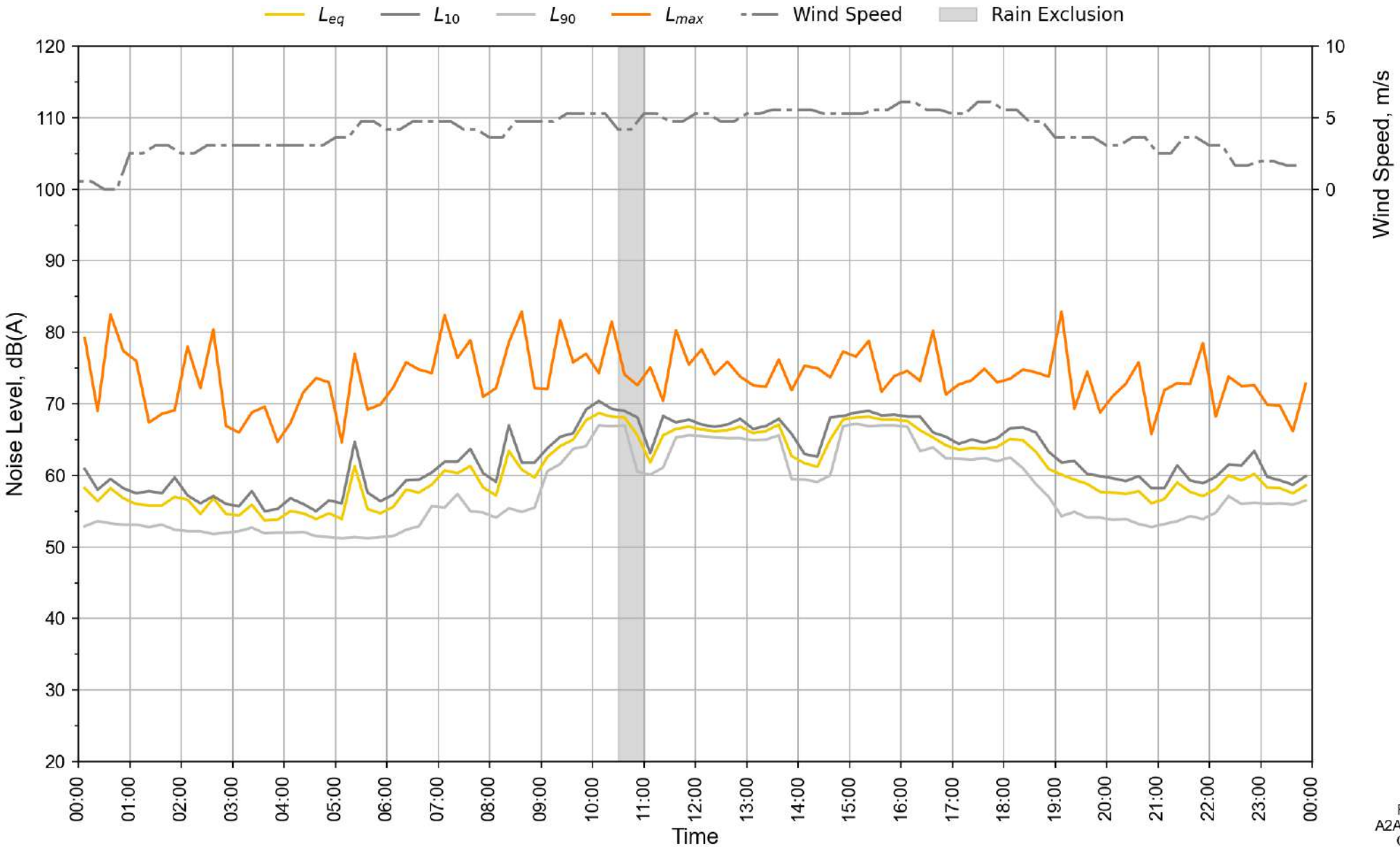

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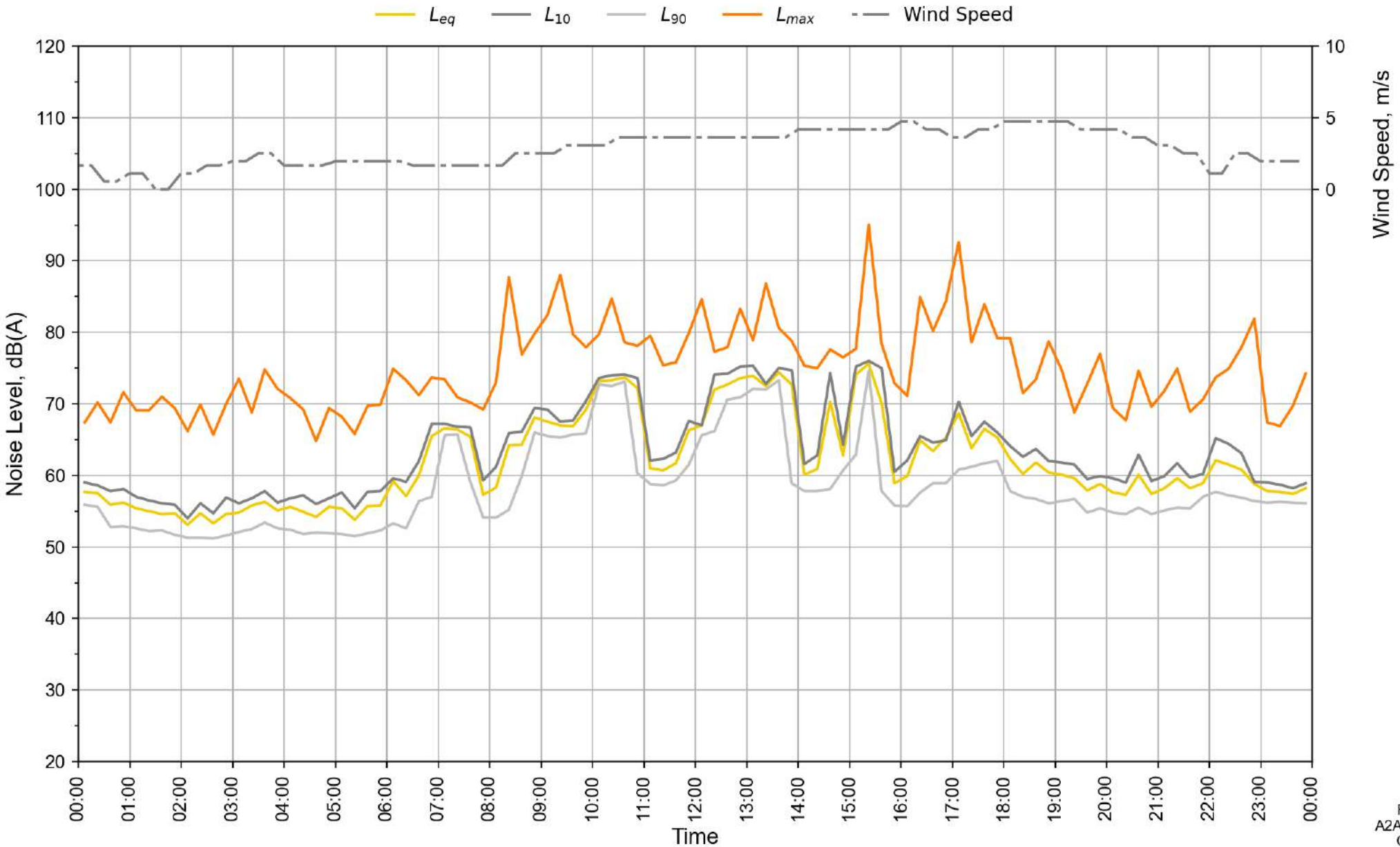

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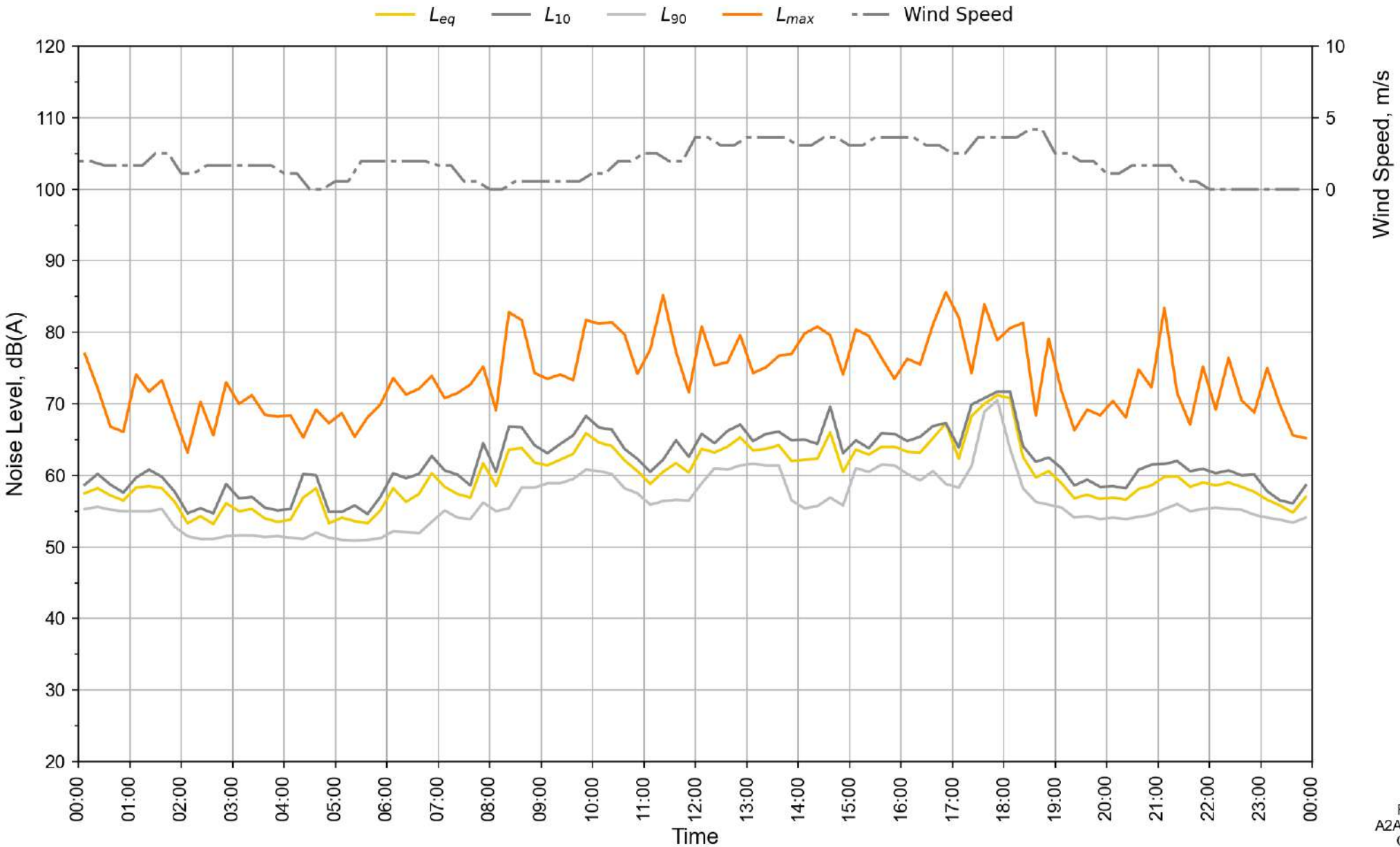

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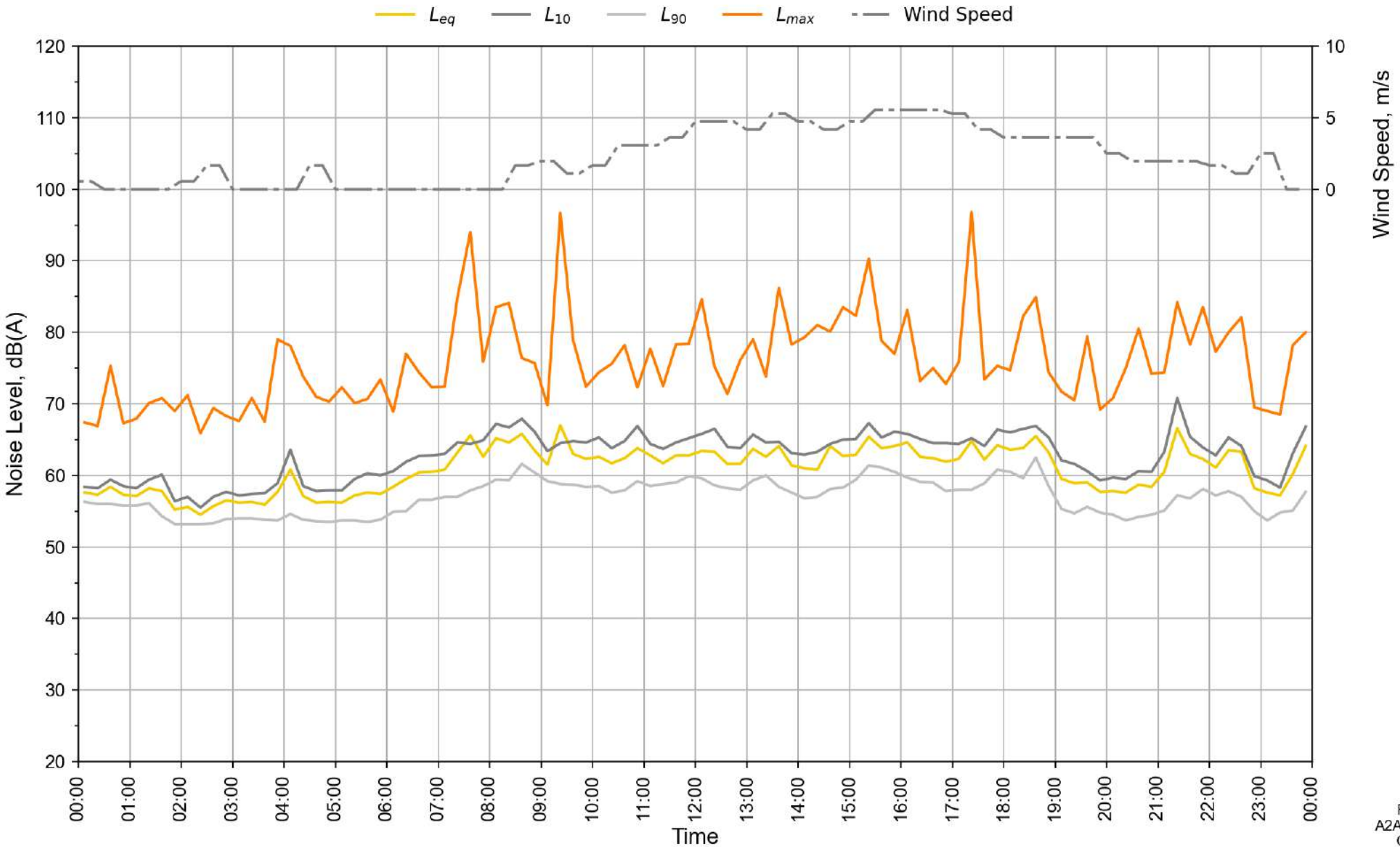

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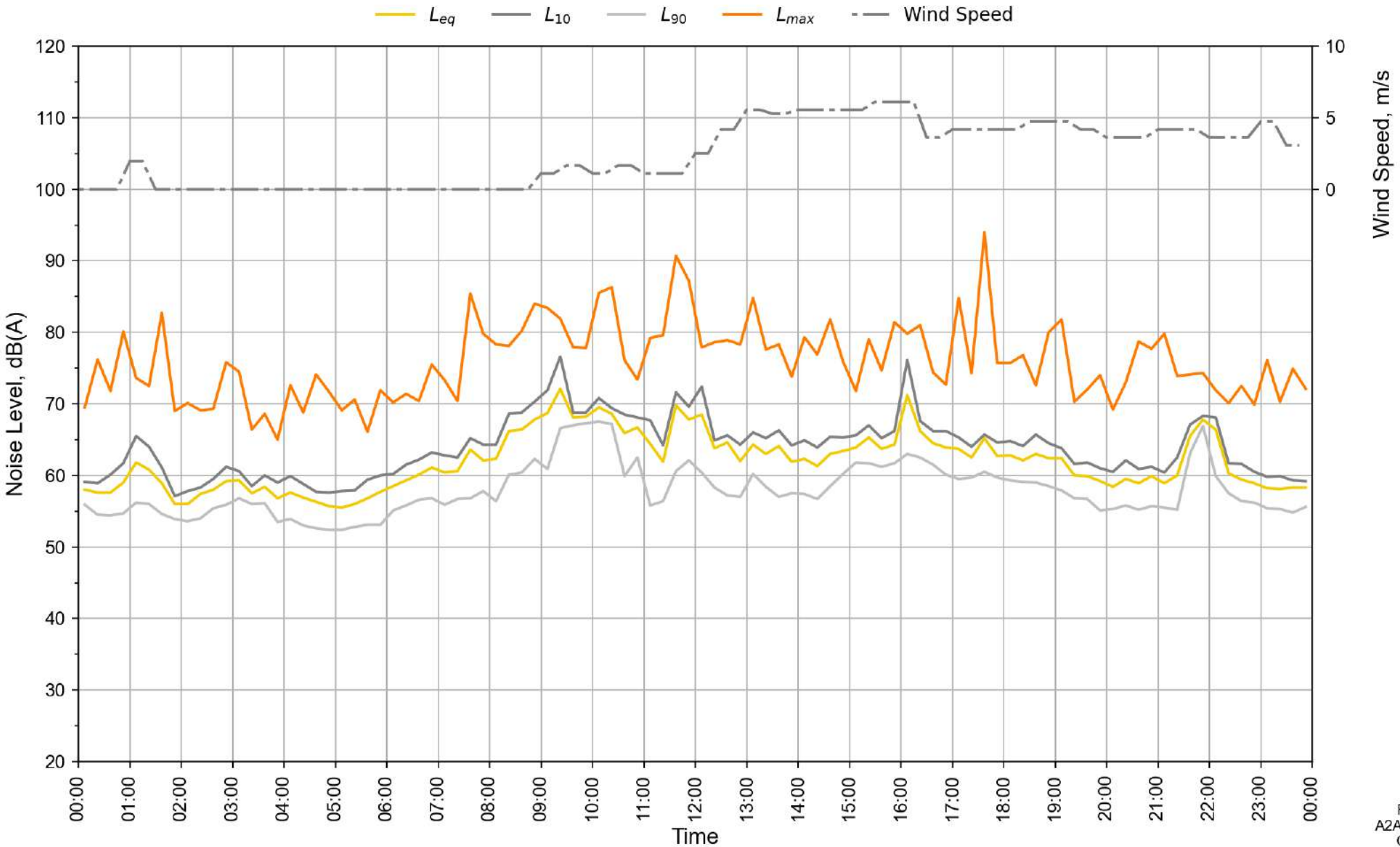

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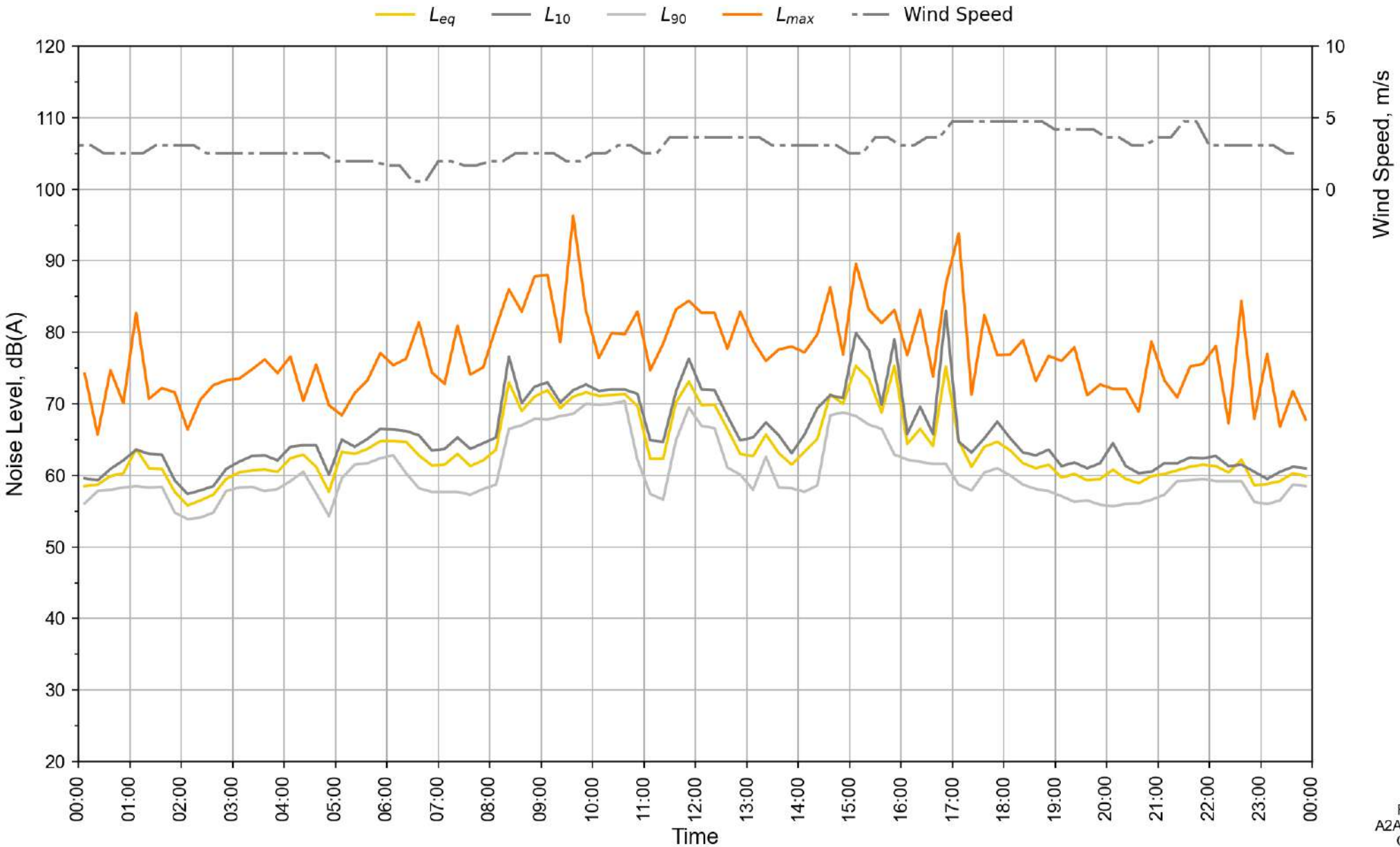

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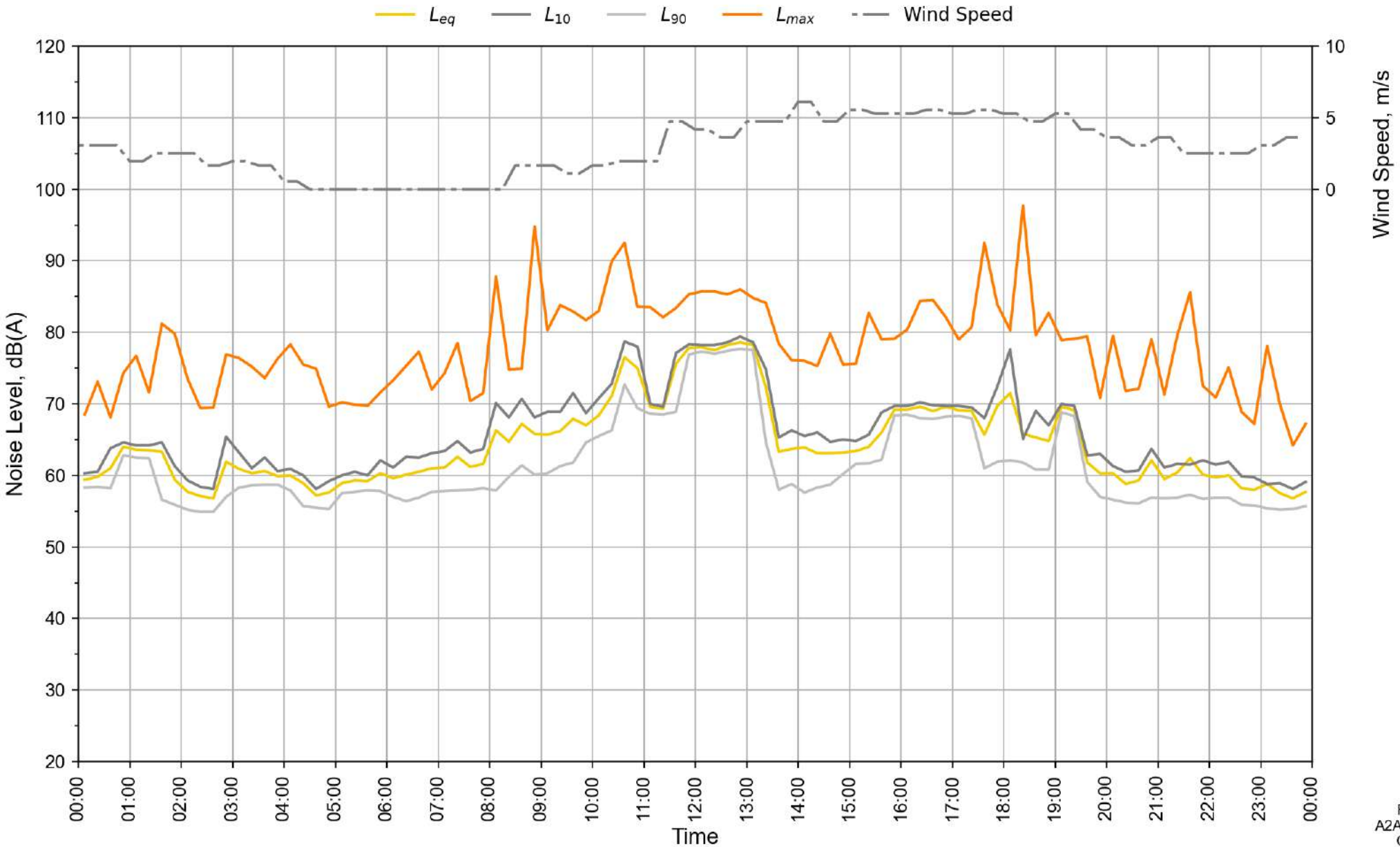

Rion NL-22
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Calibration:
2023-11-10

Appendix C—Weather data (attended survey)

Day/ Time	Cloud cover	Wind gusts (km/h)	Air Temp	Dew point	Rain (mm)	Relative humidity	Wind direction	Wind speed (km/h)
12/10:00pm	-	37	27.4	7.8	0	29	SE	28
12/09:30pm	-	28	27.7	6.5	0	26	SE	19
12/09:00pm	-	35	28.8	2.9	0	19	SE	24
12/08:30pm	-	26	30.2	2.5	0	17	SE	20
12/08:00pm	-	33	31.6	7.3	0	22	SSE	28
12/07:30pm	-	35	32.7	7.5	0	21	SSE	30
12/07:00pm	-	39	33.8	7.7	0	20	SSE	28
12/06:30pm	-	39	34.9	7.1	0	18	SSE	30
12/06:00pm	-	41	35.6	7.6	0	18	SSE	32
19/01:00am	-	17	12.4	8.7	0	78	E	13
19/12:30am	-	7	13.1	9	0	76	ENE	2
19/12:00am	-	13	13	9.1	0	77	ENE	9
18/11:30pm	-	9	13.6	9.3	0	75	ESE	6
18/11:00pm	-	15	13.8	9	0	73	SE	9
18/10:30pm	-	15	14.2	9.2	0	72	SSE	11
18/10:00pm	-	19	14.9	9.3	0	69	SE	13
18/09:30pm	-	28	15.6	9.5	0	67	SE	20

ABC Birkenhead Plant 2024

Annual Noise Survey Report—2024

A230951RP3 Revision A

Tuesday, 12 November 2024

Document Information

Project	ABC Birkenhead Plant 2024
Client	Adelaide Brighton Cement Ltd
Report title	Annual Noise Survey Report—2024
Project Number	A230951

Revision Table

Report revision	Date	Description	Author	Reviewer
0	31 October 2024	First issue	Saksham Garg	Darren Jurevicius
A	12 November 2024	Final issue	Saksham Garg	Darren Jurevicius

Glossary

A-weighting	A spectrum adaption that is applied to measured noise levels to represent human hearing. A-weighted levels are used as human hearing does not respond equally at all frequencies.
Characteristic	Associated with a noise source, means a tonal, impulsive, low frequency, intermittent, or modulating characteristic of the noise that is determined in accordance with the *Guidelines for the use of the Environment Protection (Commercial and Industrial Noise) Policy 2023* to be fundamental to the nature and impact of the noise.
Continuous noise level	A-weighted noise level of a continuous steady sound that, for the period over which the measurement is taken using fast time weighting, has the same mean square sound pressure as the noise level which varies over time when measured in relation to a noise source and noise-affected premises in accordance with the Noise Policy
Day	Between 7 am and 10 pm as defined in the Noise Policy
dB	Decibel—a unit of measurement used to express sound level. It is based on a logarithmic scale which means a sound that is 3 dB higher has twice as much energy. We typically perceive a 10 dB increase in sound as a doubling of loudness.
dB(A)	Units of the A-weighted sound level.
Frequency (Hz)	The number of times a vibrating object oscillates (moves back and forth) in one second. Fast movements produce high frequency sound (high pitch/tone), but slow movements mean the frequency (pitch/tone) is low. 1 Hz is equal to 1 cycle per second.
Indicative noise level	Indicative noise level determined under clause 5 of the Noise Policy.
L_{90}	Noise level exceeded for 90 % of the measurement time. The L_{90} level is commonly referred to as the background noise level.
L_{eq}	Equivalent Noise Level—Energy averaged noise level over the measurement time.
L_{max}	The maximum instantaneous noise level.
Night	Between 10 pm on one day and 7 am on the following day as defined in the Noise Policy
Noise source	Means a commercial or industrial premises at which an activity is undertaken, or a machine or device is operated, resulting in the emission of noise
Quiet noise designated area	A noise designated area is a quiet noise designated area if the land uses under the Planning and Design Code provisions that make land use rules for the noise designated area are principal land uses that all fall within either or both of the following land use categories (a) Residential; (b) Rural Living.

Table of Contents

1 Introduction

Resonate Consultants have been engaged by Adelaide Brighton Cement (ABC) to conduct an environmental noise survey at their Birkenhead plant as a part of their ongoing annual noise survey. The plant operates under the Environment Protection Authority (EPA) license number 1126.

As a part of their EPA licence condition (U-787—Noise) the plant operators require to implement a noise management plan, which warrants the following minimum to ensure compliance with the EPA licence requirements:

- Annual Noise Survey—conduct an attended noise survey in the community area close to the plant on annual basis.
- Computer Noise Model—Develop and update the computer noise model on a regular basis to include new noise sources, remove redundant sources and update noise levels for existing sources.
- Noise Abatement—continuous identification of noise generating equipment and implementation of abatement solutions to control emissions from the plant.

This assessment focuses on the annual noise survey of the plant operations and update of the noise model. The survey included attended noise survey in the community area (at 19 locations primarily identified by ABC and agreed upon by EPA). The survey was conducted during both day time (7 am - 10 pm) and night time (10 pm—7 am) periods.

This report summarises the results of the survey and updated model, compared against the applicable environmental noise criteria and the historical noise survey data for the past 3 surveys, and highlights any significant noise source from the plant where applicable.

The following guidelines, reports and standards were used in preparation of this report:

- Planning & Design Code
- *Environment Protection (Commercial & Industrial Noise) Policy* 2023 (Noise Policy)
- ViPAC report 50B-20-0065-TRP-10950285-3 *Birkenhead Plant Noise Survey—May 2020*, dated 29 May 2020
- ViPAC report 50B-21-0078-TRP-21553-2 *Annual Noise Survey Report 2021*, dated 11 November 2021
- ViPAC report 50B-22-0069-TRP-34608-3 *Noise Survey Report—May 2022*, dated 29 June 2022
- Resonate report A230772RP1B *Environmental Noise Assessment*, dated 19 March 2024
- Resonate report A230951RP2A *Environmental Noise Assessment*, dated 28 May 2024
- Environment Protection Authority Licence Number 1126 *Adelaide Brighton Cement*
- AS 1055.1-1997 *Acoustics—Description and measurement of environmental noise—Part 1: General procedures*, Standard Australian (1997).

2 Plant details

2.1 Plant operation

The Birkenhead plant operates 24 hours, 7 days a week, with scheduled shut down at the beginning of the year (January) for maintenance works. The survey was conducted with the plant operating under normal operational conditions.

2.2 Location

The subject site is located at 62 Elder Road, Birkenhead SA 5015. The closest residential receptors along the western boundary of the plant, across Victoria Road.

Figure 1 shows an aerial image of the locality in relation to site location, sensitive receiver locations and applicable zoning.

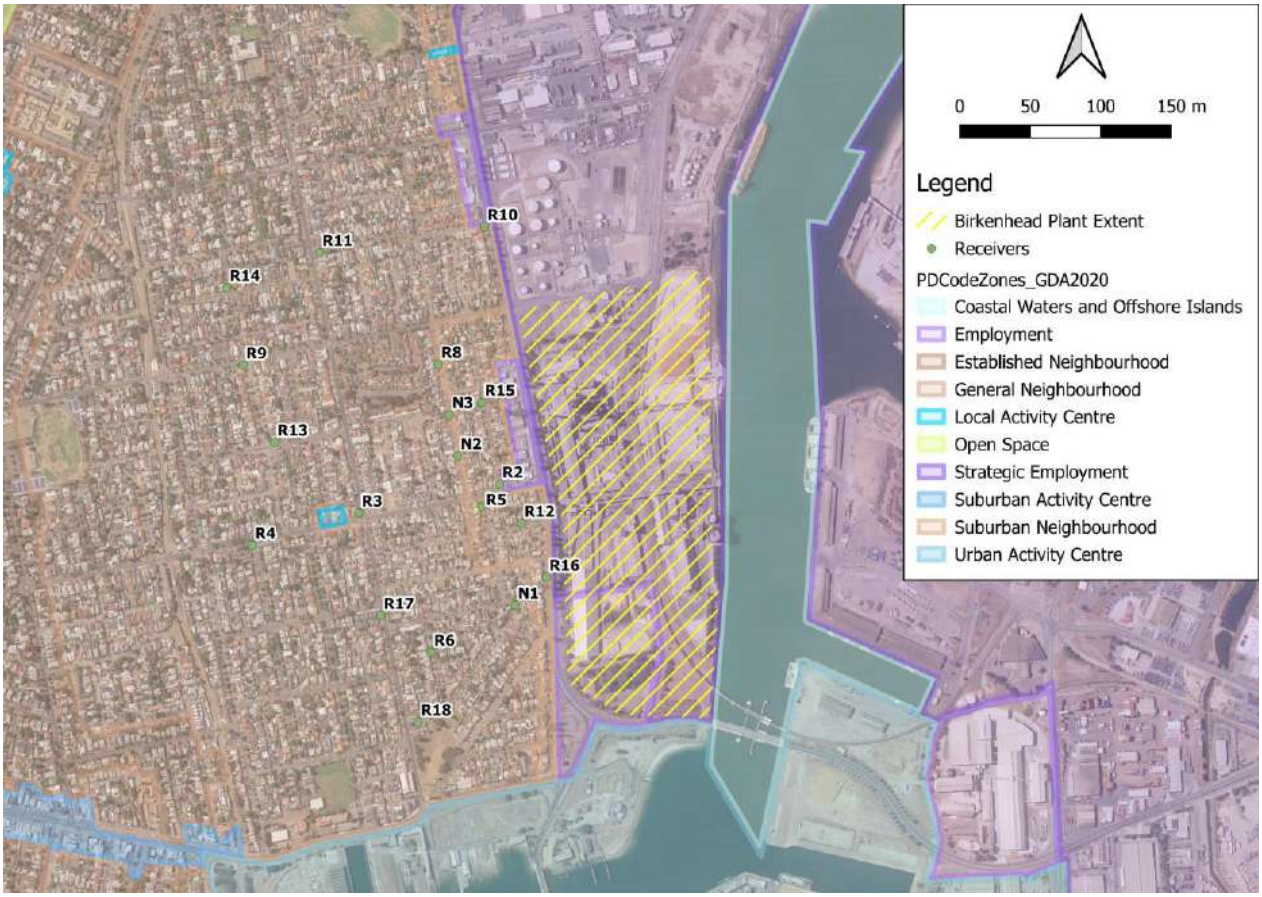


Figure 1 Aerial image of site, adjacent land, and zoning

2.3 Noise sensitive receivers

ABC, in agreement with EPA, have advised seven primary locations in the community for noise surveys. The locations and the applicable zones are provided in Table 1 and Figure 1.

Table 1 Noise sensitive receiver locations

Receiver ID	Zone	Survey Location
R2	Suburban neighbourhood zone (SN)	Corner of Alfred St and Hargrave St, Peterhead
R3	General Neighbourhood zone (GN)	Adjacent to 145 Hargrave St, Peterhead
R4	General Neighbourhood zone (GN)	Corner of Roberts St and Hargrave St, Birkenhead
R5	Suburban neighbourhood zone (SN)	Adjacent to 23 Levi St, Birkenhead
R6	General Neighbourhood zone (GN)	Adjacent to 19 Craigie St, Birkenhead
R8	General Neighbourhood zone (GN)	Adjacent to 39 Mary St, Peterhead
R9	General Neighbourhood zone (GN)	Corner of Wills St and Whyte St, Peterhead
R10	General Neighbourhood zone (GN)	Corner of Olive St and Victoria Rd, Largs Bay
R11	General Neighbourhood zone (GN)	Adjacent to 158 Fletcher Road, Largs Bay
R12	Suburban neighbourhood zone (SN)	Adjacent to 33 Hilton St, Birkenhead
R13	General Neighbourhood zone (GN)	Adjacent to 28 Whyte St, Peterhead
R14	General Neighbourhood zone (GN)	Adjacent to 15 Waverly St, Largs Bay
R15	Suburban neighbourhood zone (SN)	Adjacent to 9 Walton St, Peterhead
R16	Suburban neighbourhood zone (SN)	Adjacent to 77 Victoria Rd, Birkenhead
R17	General Neighbourhood zone (GN)	Corner of Fletcher Rd and Rose St, Birkenhead (adjacent to 53 Fletcher Rd)
R18	General Neighbourhood zone (GN)	Adjacent to 20 Fletcher Rd, Birkenhead (in the park)
N1	General Neighbourhood zone (GN)	Corner of Gunn and Well St, Birkenhead (adjacent to 39 Wells St)
N2	General Neighbourhood zone (GN)	Adjacent to 9 Mary St, Peterhead
N3	General Neighbourhood zone (GN)	Corner of Walton & Mary St, Peterhead (adjacent to 23 Mary St)

3 Planning & Design Code

3.1 Zoning

3.1.1 Subject site

The subject site is located within Strategic Employment and Employment zone. The relevant Assessment Provisions and Desired Outcomes are outlined in Table 2.

Table 2 Relevant Desired Outcome—Strategic Employment and Employment zones

Desired Outcome	
Employment zone	
DO1	A diverse range of low-impact light industrial, commercial and business activities that complement the role of other zones accommodating significant industrial, shopping and business activities.
DO2	Distinctive building, landscape and streetscape design to achieve high visual and environmental amenity particularly along arterial roads, zone boundaries and public open spaces.
Strategic Employment zone	
DO 1	A range of industrial, logistical, warehousing, storage, research and training land uses together with compatible business activities generating wealth and employment for the state.
DO 2	Employment-generating uses are arranged to: (a) support the efficient movement of goods and materials on land in the vicinity of major transport infrastructure such as ports and intermodal freight facilities (b) maintain access to waterfront areas for uses that benefit from direct water access including harbour facilities, port related industry and warehousing, ship building and related support industries (c) create new and enhance existing business clusters (d) support opportunities for the convenient co-location of rural related industries and allied businesses that may detract from scenic rural landscapes (e) be compatible with its location and setting to manage adverse impacts on the amenity of land in adjacent zones.
DO 3	A pleasant visual amenity from adjacent arterial roads, adjoining zones and entrance ways to cities, towns and settlements.

3.1.2 Adjacent land

The closest noise-affected premises are located in Suburban Neighbourhood zone and General Neighbourhood zone. The location details of each receiver (as agreed upon by ABC and EPA) are provided in Table 1, and the relevant Desired Outcomes are provided in Table 3.

Table 3 Relevant Desired Outcomes

Desired Outcome	
Suburban Neighbourhood zone	
DO1	Low density housing is consistent with the existing local context and development pattern. Services and community facilities contribute to making the neighbourhood a convenient place to live without compromising residential amenity and character.
General Neighbourhood zone	
DO1	Low-rise, low and medium-density housing that supports a range of needs and lifestyles located within easy reach of services and facilities. Employment and community service uses contribute to making the neighbourhood a convenient place to live without compromising residential amenity.

3.2 Interface between land uses

Interface between Land Uses is a General Development Policy that is relevant to the subject site. The relevant Assessment Provisions relating to noise are outlined in Table 4.

Table 4 Relevant Assessment Provisions—Activities generating noise or vibration

Relevant Assessment Provisions	
Desired Outcome	
DO1	Development is located and designed to mitigate adverse effects on or from neighbouring and proximate land uses.
Performance Outcome	**Deemed-to-Satisfy Criteria / Designated Performance Feature**
PO 4.1 Development that emits noise (other than music) does not unreasonably impact the amenity of sensitive receivers (or lawfully approved sensitive receivers).	DTS/DPF 4.1 Noise that affects sensitive receivers achieves the relevant Environment Protection (Noise) Policy criteria.

Relevant Assessment Provisions	
PO 4.2 Areas for the on-site manoeuvring of service and delivery vehicles, plant and equipment, outdoor work spaces (and the like) are designed and sited to not unreasonably impact the amenity of adjacent sensitive receivers (or lawfully approved sensitive receivers) and zones primarily intended to accommodate sensitive receivers due to noise and vibration by adopting techniques including: a) locating openings of buildings and associated services away from the interface with the adjacent sensitive receivers and zones primarily intended to accommodate sensitive receivers b) when sited outdoors, locating such areas as far as practicable from adjacent sensitive receivers and zones primarily intended to accommodate sensitive receivers c) housing plant and equipment within an enclosed structure or acoustic enclosure d) providing a suitable acoustic barrier between the plant and / or equipment and the adjacent sensitive receiver boundary or zone.	DTS/DPF 4.2 None are applicable.

4 Noise criteria

4.1 Environmental noise policy

As noted in DTS/DPF 4.1, environmental noise emissions from the subject site should comply with the *Environment Protection (Noise) Policy* 2007. This policy has been superseded on 31 October 2023 by the *Environment Protection (Commercial & Industrial Noise) Policy* 2023 (Noise Policy). As such, noise emissions from the site should be assessed under the 2023 Noise Policy.

However, in consultation with EPA, the following criteria (Table 5) has been agreed upon for noise emanating from ABC's Birkenhead Plant.

Table 5 Summary of EPA recommended environmental noise criteria

Location	Zone	Criteria	
		Day (7 am to 10 pm)	Night (10 pm to 7 am)
ABC Birkenhead Plant	Employment & Strategic Employment	N/A	N/A
R2, R5, R12, R15, R16	Suburban Neighbourhood zone	57	49
N1, N2, N3, R3, R4, R6, R8, R9, R10, R11, R13, R14, R17, R18	General Neighbourhood zone	57	49

Historically it has been observed that measurement positions closer to Victoria Road are inherently dominated by short-term/transient noise level events (such as intermittent passing road traffic), which impacts the L_{eq} noise levels measured at these locations. As such, EPA has advised that a comparison of L_{90} noise level descriptor with the criteria presented above is acceptable for locations within 100 meters of the centre line of Victoria Road.

This method is adopted to minimise/eliminate the influence of short-term/transient noise level events (such as intermittent passing road traffic) on the results. As such, the L_{90} descriptor is used for measurement positions N1, R2, R10, R12, R15 and R16. However, for all other locations, the use of L_{eq} descriptor is required.

Penalties can also be applied to a noise source for a variety of characteristics, such as impulsive, low frequency, modulating or tonal characters. For a characteristic penalty to be applied to a noise source it must be fundamental to the impact of the noise and dominate the overall noise impact. The application of the characteristic penalty is discussed in the noise emission assessment.

We note that under Part 5, Clause 20(6) of the Noise Policy, exceedance of the recommended criterion does not necessarily mean action is required under the Noise Policy. Some of the following matters should be considered when considering action:

- the amount by which the criterion is exceeded (in dB(A))
- the frequency and duration for which the criterion is exceeded
- the ambient noise that has a noise level similar to the predicted noise level
- the times of occurrence of the noise source
- the number of persons likely to be adversely affected by the noise source and whether there is any special need for quiet.

5 Attended noise survey

5.1 Survey details

5.1.1 Location details

Community noise survey

The attended noise survey was conducted during day time and night time period at all receiver locations highlighted in Table 1 and Figure 1.

Noise complaints

In addition to the locations highlighted above, a measurement was conducted at 21 Lincoln Street, Largs Bay to measure the noise impact at this receiver. Note the location is added to survey location in response to a noise complaint from the resident, who identified audible characteristic low frequency noise at their property. The noise was believed to be associated the ABC's limestone ship, Accolade, which transports limestone from Yorke Peninsula to the Birkenhead plant (wharf area). As such, a simultaneous noise survey was conducted at the resident location and at the wharf area.

Resident on Whyte Street, Peterhead (vicinity of monitoring locations R9, R13 and R14) has identified noise issues associated with the reclaimer shed. As such, a noise survey was conducted at the reclaimer shed to update the model and assess any increment in noise impact at these receivers. This has been discussed in the following section as a part of the noise model update.

Plant noise survey

A noise survey was conducted within the plant at locations identified to be dominant sources at certain noise sensitive receivers. The locations/plant are presented below:

- Wharf area—Accolade movements, loading/unloading
- Reclaimer shed

5.1.2 Instrumentation

Noise level measurements were conducted using a Brüel & Kjær Type 2250 sound level meter (B&K 2250 SLM) calibrated with a Brüel & Kjær Type 4231 calibrator. The B&K 2250 SLM is a National Association of Testing Authorities (NATA) calibrated Class 1 SLM in conformance with Australia Standard 1259 *Acoustics – Sound level meters* (AS 1259). Copies of the calibration certificates are available on request.

Note two sets of sound level meters were used during the survey, with measurements conducted by two site engineers. The serial numbers for both units used during the survey are presented below:

- Unit 1 serial number—3001247
- Unit 2 serial number—2749881

5.1.3 Procedure

Noise measurements were undertaken in accordance with the following:

- Noise measurements were undertaken for a period of up to 15 minutes (where possible).
- The microphone of the sound level meter was at a height of approximately 1.2 metres above the ground and at least 3.5 metres away from any wall or facade.
- The axis of maximum sensitivity of the microphone of the sound level meter was directed towards the noise source.

- A windshield was used during all measurements, and the measurements were undertaken during a calm, still night (for which the wind velocity did not exceed 5 m/s). The nighttime survey was conducted on 18-19 September 2024, whereas the daytime survey was conducted on 21 October 2024. The weather data for the survey period has been presented in Appendix C—Weather data.
- Care was taken to avoid any effect on the measurement of extraneous noise, acoustic vibration or electrical interference. To ensure this, where possible, the measurement was paused, and the 'back-erase' function of the B&K was used to remove any influence from extraneous noise sources during the measurements. Note that at locations with high traffic volumes (such as locations in proximity to Victoria Road and Fletcher Road), avoiding the influence of extraneous noise was not possible. In such cases, comments have been provided to reflect possible extraneous noise influence.

5.2 Community noise survey results

5.2.1 Results

The results of the community noise survey conducted at the locations indicated in Table 1, during day and night time periods, have been presented in Table 6 and Table 7.

Note that the descriptor used for comparison against the noise criterion are indicated in shaded cells with bold text.

Further to below, a full set of survey noise data, including survey notes, is provided in Appendix A—Noise survey data & notes. As such, the results and discussion provided below should be read in conjunction with the survey notes.

Table 6 Community noise survey results—day time

Location	Measured noise level dB(A)		Day time criteria dB(A)	Compliance	Notes/Comments
	L_{eq}	L_{90}			
R2	60	**58**	57	×	2
R3	**57**	51	57	✓	1
R4	**49**	45	57	✓	1
R5	**56**	53	57	✓	1
R6	**46**	43	57	✓	1
R8	**48**	42	57	✓	1
R9	**43**	40	57	✓	1
R10	73	**59**	57	×	3
R11	**47**	39	57	✓	1
R12	54	**52**	57	✓	1
R13	**50**	46	57	✓	1
R14	**45**	42	57	✓	1
R15	56	**54**	57	✓	1
R16	75	**61**	57	×	3
R17	**61**	40	57	×	4

Location	Measured noise level dB(A)		Day time criteria dB(A)	Compliance	Notes/Comments
	L_{eq}	L_{90}			
R18	**50**	47	57	✓	1
N1	53	**51**	57	✓	1
N2	**47**	42	57	✓	1
N3	**47**	44	57	✓	1

Day time survey notes/comments:

1. Environmental noise criterion compliance is achieved at each location.
2. Exceedance of criterion by 1 dBA is observed at this location. The plant was clearly audible at this location, however, the measurements were influenced by traffic noise from nearby roads and birds noise.
3. Exceedance of noise criterion is observed at receivers R10 and R16. The exceedance at these locations is consistent with previous noise surveys (refer Section 5.2.2), as the background noise is inherently influenced by traffic noise from Victoria Road (designated Type A road providing major thoroughfare for heavy vehicles). It should also be noted that the plant is usually inaudible at these locations due to dominant traffic noise.
4. Exceedance of criterion by 4 dBA is observed at this location. The noise levels measured at this location were dominated by traffic noise and construction noise close to the measurement location. Considering the L_{90} levels of 40 dB(A), we consider the measured levels to be acceptable.

Further comparison of the survey results has been provided in Section 5.2.2 and Appendix B—Results comparison.

Table 7 Community noise survey results——night time

Location	Measured noise level dB(A)		Night time criteria dB(A)	Compliance	Notes/Comments
	L_{eq}	L_{90}			
R2	54	**53**	49	×	3
R3	**45**	40	49	✓	1
R4	**39**	36	49	✓	1
R5	**51**	51	49	×	2
R6	**45**	44	49	✓	1
R8	**46**	45	49	✓	1
R9	**38**	36	49	✓	1
R10	46	**44**	49	✓	1
R11	**37**	36	49	✓	1
R12	54	**53**	49	×	3
R13	**38**	36	49	✓	1
R14	**37**	33	49	✓	1
R15	54	**52**	49	×	3
R16	54	**54**	49	×	4
R17	**42**	39	49	✓	1
R18	**42**	39	49	✓	1
N1	49	**48**	49	✓	1
N2	**46**	45	49	✓	1
N3	**48**	46	49	✓	1

Nighttime survey notes/comments:

1. Environmental noise criterion compliance is achieved at each location.
2. Minor (2-3 dB(A)) exceedance was observed at this location. However, the measured levels are considered acceptable due to following reasons:
   - The levels are consistent with results from last 2 surveys (± 2 dB(A))
   - Even though the plant was audible at this location, the measured noise levels were influenced by traffic noise from Victoria Road and noise from the OTR operations.
3. The noise levels measured at this location were affected by traffic noise from Victoria Road. During the survey, however, plant noise was observed to be the dominant source. It should be noted that the measured noise levels are within ± 1 dB(A) in comparison to historical data (previous 2 years).
4. The measured noise levels at this location are inherently dominated by traffic noise from Victoria Road, with noise from the plant barely audible.

Note that a characteristic screeching noise was observed during the survey, which was intermittent and high frequency noise. The noise stopped around 1am at night was not observed in the subsequent measurements. Resonate has provided the audio clip and further details to Adbri for further investigation.

5.2.2 Results comparison—Historical data

A comparison of the noise survey results (L_{90} levels) with the historical data has been presented in Table 8 and Table 9 below. Note that the historical data has been sourced from Vipac's Report *50B-22-0069-TRP-34608-3*.

Table 8 Community noise survey results comparison—Day time

Location	Day time criteria dB(A)	Measured day time levels, L_{90} dB(A)			Difference (2023/2024)
		2022	2023	2024	
R2	57	54	54	58	4
R3	57	43	51	51	0
R4	57	34	43	45	2
R5	57	48	49	53	4
R6	57	37	38	43	5
R8	57	44	45	42	-3
R9	57	34	38	40	2
R10	57	61	60	59	-1
R11	57	38	37	39	2
R12	57	53	53	52	-1
R13	57	36	40	46	6
R14	57	32	45	42	-3
R15	57	52	50	54	4
R16	57	64	63	61	-2
R17	57	37	46	40	-6
R18	57	48	46	47	1
N1	57	46	49	51	2
N2	57	42	46	42	-4
N3	57	46	46	44	-2

With reference to the results presented above, the following is noted:

- Measured noise levels at R3, R8, R10, R12, R14, R16, R17, N2 and N3 are similar to or lower than the levels measured during 2023 survey.
- Measured noise levels at R4, R9, R11, R18 and N1 are similar to or within +/- 3 dB(A) of the 2023 measured levels. Therefore, the measured levels are considered acceptable and do not indicate any significant change in noise conditions.
- Noise levels measured at R5, R6, R13 and R15 show significant change in comparison to 2022 and 2023 results. However, the measured levels do not exceed the environmental noise criterion (refer Table 6). Therefore, the measured levels are considered acceptable.
- Noise levels at R2 show significant change in comparison to 2022 and 2023 results and exceed the environmental noise criterion by 1 dB(A). The measurements at this location were influenced by traffic noise and noise from birds/dogs.

Table 9 Community noise survey results comparison—Night time

Location	Night time criteria dB(A)	Measured night time levels, L_{90} dB(A)			Difference (2023/2024)
		2022	2023	2024	
R2	49	52	51	53	2
R3	49	47	43	40	-3
R4	49	41	38	36	-2
R5	49	48	51	51	0
R6	49	39	39	44	5
R8	49	47	50	45	-5
R9	49	40	38	36	-2
R10	49	50	47	44	-3
R11	49	36	37	36	-1
R12	49	52	53	53	0
R13	49	42	43	36	-7
R14	49	39	39	33	-6
R15	49	52	51	52	1
R16	49	47	53	54	1
R17	49	40	38	39	1
R18	49	38	36	39	3
N1	49	43	44	48	4
N2	49	42	45	45	0
N3	49	52	51	53	2

With reference to the results presented above, the following is noted:

- Measured noise levels at R6 and N1 exceed the 2022 and 2023 measured levels by 4-5 dB(A). Location N1 has historically been dominated by traffic noise from Victoria Road. The levels at R6 were observed to be unusually higher, but the plant was barely audible at this location. Since the measured levels show compliance with the environmental noise criteria, the measured levels are considered acceptable.
- Measured noise levels at all other locations are similar to or lower or within +/- 3 dB(A) of the noise survey data from 2022 and 2023. Therefore, the measured levels are considered acceptable and do not indicate any significant change in noise conditions.

As mentioned above, the noise measurements at most of the locations during the 2024 night time survey were influenced by a characteristic screeching noise, which stopped around 1am. This may have resulted in unusually higher noise levels at some locations, specifically at R6.

5.3 Noise model

5.3.1 Prediction methodology

Noise emissions from site have been modelled in SoundPLAN Environmental Software v9.0 program, using the Conservation of Clean Air and Water in Europe (CONCAWE) algorithms. The model takes into consideration:

- attenuation of noise source due to distance
- barrier effects from buildings, topography and the like
- air absorption
- ground effects
- weather conditions (wind speed, wind direction, time of day, and cloud cover).

CONCAWE has six difference meteorological categories—CONCAWE meteorological category 1 represents weather conditions that are least conducive to noise propagation (best case situation with the lowest predicted noise levels), CONCAWE meteorological category 4 represents neutral weather conditions, and CONCAWE meteorological category 6 represents weather conditions that are the most conducive to noise propagation (the worst-case situation with the highest predicted noise levels).

The noise model considers impact assessment for both 'neutral' and 'worst-case' meteorological conditions corresponding to the recommended conditions detailed in the *Guidelines for the use of the Environmental Protection (Commercial and Industrial Noise) Policy 2023*.

5.3.2 Modelling assumptions

The following assumptions have been considered in the development of the noise model:

- Mobile noise sources, such as trucks, cars, etc., have not been considered.
- Noise associated with the mechanical services plant serving office building and hand tools within the workshop area have not been considered in the model.
- Ground absorption—the plant area has been considered fully reflective, whereas the residential area (receivers) has been considered to be partially reflective.
- Plant infrastructure—the plant buildings have been modelled based on the information provided by ABC and our observations on site.
- Ground elevation—the ground has been assumed to be flat terrain.
- Operational conditions
  - The entire plant has been assumed to be operational in both neutral and worst-case noise prediction scenarios.
  - Doors to all plant buildings have been assumed to be closed.

5.3.3 Modelling scenarios

Modelling scenarios are presented in Table 10.

Table 10 Modelling scenarios

Scenarios	Activity	Criteria
Neutral Meteorological Conditions	• 100% plant operation	Noise Policy night
Worst-case Meteorological Conditions	• 100% plant operation	Noise Policy night

5.3.4 Model update details

This model update includes the addition of the Accolade noise source to the model in the wharf area. The noise measurements were conducted at 1:44 am on 19 September 2024. The noise data used in the model has been presented in Appendix D—Noise model inventory, with the Accolade noise data highlighted in green.

In addition to this, source noise measurements for the reclaimer shed were conducted. Due to operational capacity during the survey, the measured noise levels were observed to be lower than the levels considered in the existing model. As such, no update to the reclaimer shed was considered at this stage.

5.3.5 Noise predictions & comparison

The predicted levels for the updated model, compared against the most recent model predictions (May 2024) for both neutral (Table 8) and worst-case scenarios (Table 12) are presented below.

Table 11 Model predictions and comparison—Neutral scenario

Location	Predicted noise levels, dB(A)		Difference (May 2024/Oct 2024)	Notes
	October 2024	May 2024		
R2	54	54	0	1
R3	45	45	0	1
R4	39	39	0	1
R5	52	52	0	1
R6	40	40	0	1
R8	47	47	0	1
R9	37	37	0	1
R10	46	46	0	1
R11	36	36	0	1
R12	50	50	0	1
R13	40	40	0	1
R14	41	41	0	1
R15	51	51	0	1
R16	56	56	0	1
R17	42	42	0	1
R18	43	43	0	1
N1	47	47	0	1
N2	49	49	0	1
N3	49	49	0	1

Notes:

1. The results indicate that the inclusion of Accolade noise sources results in no change in noise impact to the sensitive receivers.

Table 12 Model calibration—Worst-case scenario

Location	Predicted noise levels, dB(A)		Difference (May 2024/Oct 2024)	Notes
	October 2024	May 2024		
R2	55	55	0	1
R3	47	47	0	1
R4	41	41	0	1
R5	53	53	0	1
R6	42	42	0	1
R8	49	49	0	1
R9	40	40	0	1
R10	49	49	0	1
R11	39	39	0	1
R12	53	53	0	1
R13	43	43	0	1
R14	44	44	0	1
R15	53	53	0	1
R16	58	58	0	1
R17	44	44	0	1
R18	45	45	0	1
N1	48	48	0	1
N2	51	51	0	1
N3	51	51	0	1

Notes:
1. The results indicate that the inclusion of Accolade noise sources results in no change in noise impact to the sensitive receivers

The associated grid noise maps are presented in Appendix E—Grid Noise Maps.

5.4 Community complaints

As a part of community engagement initiative, ABC requested Resonate to address two community noise complaints, as discussed in Section 5.1.1 and presented below.

5.4.1 Accolade noise

The resident at 21 Lincoln Street, Largs Bay made a noise complaint in regard to noise impact at their property, which was identified as audible low frequency noise. Resident believed the noise was associated with the Accolade's movements (wharf area). As such, a simultaneous noise survey was conducted at the resident location and the wharf area.

The results of survey are presented in Table 13.

Table 13 Accolade noise assessment—results

Measurement day/time	Measured levels, L_{eq} dB(A)		Criterion, dB(A)
	At Accolade area (Wharf)	At 21 Lincoln Street	
1:45AM, 19 September 2024	76	39	49

Based on the results presented above and our observation on site, the following is noted:

- The plant was inaudible at 21 Lincoln Street (receiver/ complainant).
- The measured levels at the receiver were well below the applicable environmental noise criteria. This was expected as Lincoln Street is away from all major traffic routes (Victoria Road, Fletcher Road, etc.) and is approximately 550 m away from the plant.
- The noise level measured at the Accolade wharf area was not high enough to result in a significant noise impact at the receiver.
- Additionally, based on the noise model, an incident noise level of 39 dB(A) is predicted at the resident location, which calibrates well with the measured noise level.

Overall, we believe that the noise observed by the resident may have resulted due to sources other than the ABC infrastructure.

5.4.2 Reclaimer shed

Resident on Whyte Street, Peterhead (vicinity of monitoring locations R9, R13 and R14) has identified noise issues associated with the reclaimer shed. As such, a noise survey was conducted at the reclaimer shed to update the model and assess any increment in noise impact at these receivers.

The site measurements indicated that the existing model considers noise levels higher than the levels measured within the shed. It should be noted that the noise levels in the shed vary depending on the capacity of the shed. With more material in the shed, the reverberant levels are generally lower due to sound absorption provided by the material mounds inside the shed.

Based on our observations on Whyte Street and noise model predictions, we believe that the slightly audible plant noise on Whyte Street is possibly not associated with the reclaimer shed. Note that the plant noise is expected to be audible on Whyte Street, however, not expected to exceed the environmental noise criterion.

5.5 Discussion

Based on the results presented in this report, the following is noted:

Community noise survey

- Day time results—criterion exceedance at four locations, R2, R10, R16 and R17 is noted. R10 and R16 locations are on Victoria Road and the noise levels at these locations are inherently dominated by traffic noise from Victoria Road. R2 exceeded the criterion by only 1 dB(A) which is considered acceptable and should result in no change in existing noise conditions. 4 dB(A) exceedance was observed at R17, which resulted due to dominant extraneous noise sources (construction noise, traffic movements, etc.).
- Night time results—criterion exceedance at 5 locations is noted (locations R2, R5, R12, R15 and R16). The measured noise levels at R2, R5, R12 and R15 are similar to levels measured in 2022 and 2021 survey (with +/- 2 dB(A)). Typically, in terms of human perception to noise, a 2 dB(A) change in noise level is barely if at all perceptible under field conditions.

- At locations R16, major influence by traffic noise from Victoria Road was observed. Since, the measured levels were similar to the levels measured in 2023, the exceedance of the criterion is considered acceptable.

Noise model update

The updated noise model indicates no change in predicted noise levels at each receiver. This was expected as the noise emanating due to Accolade activities are not significant to impact the overall noise conditions in the community area.

Noise complaints

Based on our onsite observations and assessment, we note the following:

- It appears that the noise experienced by the residents may be associated with sources other than ABC infrastructure
- The existing noise conditions at both residents show compliance with the applicable environmental noise criteria
- The residents should be aware that just because plant noise is audible, it does not imply that the noise experienced is non-compliant.

General commentary

Due to the presence and dominance of extraneous noise sources (traffic noise, petrol station noise, etc.) at most of the survey locations (specifically the ones closer to Victoria Road, Fletcher Road and Hargrave Street), it is noted that isolating plant noise from these sources is difficult. As such, the measured noise levels do not represent the actual noise emissions from the plant operation. Additionally, ABC has implemented the following as part of their Noise Management Plan to improve noise conditions and minimise impact to the community:

- Undertaking annual noise survey to monitor noise conditions in the community.
- Undertaking noise survey during shut down period to monitor noise impact during maintenance works.
- Continuous community engagement to resolve noise complaints.
- Implementation of several Environment Improvement Plans (EIP Projects) to mitigate/reduce noise from major plant by undertaking comprehensive noise abatement projects.

With the above, continuous improvement in noise conditions has been observed in the community area (refer Appendix B—Results comparison). Overall, we understand that Adelaide Brighton Cement has implemented all practicable and reasonable measures to reduce noise emissions from the plant operation and aims to maintain these efforts in the future.

6 Conclusion

Resonate Consultants have been engaged by Adelaide Brighton Cement (ABC) to conduct an environmental noise survey, update the noise model and respond to noise complaints at their Birkenhead plant. The plant operates under the Environment Protection Authority (EPA) license number 1126.

As a part of their EPA licence condition (U-787—Noise) the plant operators are required to implement a noise management plan, which warrants an annual noise survey in the community area to meet the minimum EPA licence requirements. The survey included attended noise survey in the community area (at 19 locations primarily identified by ABC and agreed upon by EPA). The survey was conducted during both day time (7 am - 10 pm) and night time (10 pm - 7 am) periods. The results of the survey are presented in Section 5.2.

The model update was completed by adding the Accolade noise source, which resulted in no change in the predicted noise levels at the receivers (refer Section 5.3). Additionally, advice/response to community complaints has been provided in Section 5.4).

Appendix A—Noise survey data & notes

Please note that at some locations conducting a full 15-minute measurement was not possible due to the following factors:

- Locations on Victoria Road (R10, R16) and locations in proximity to Victoria Road—Due continuous traffic movements on Victoria Road, it was difficult to pause/stop measurements to avoid traffic noise influence. The site engineer however, measured the levels for period deemed practical and representative of the noise emissions from the plant.
- Dog barking, construction, road works and lawn mowing noise during day time survey
- Higher traffic volumes on internal roads during day time survey

As a practical approach, the measurement was conducted to ensure it represents the noise emissions from the plant, while considering the factors above.

Table 14 Day time noise survey results and notes

Location ID	Duration	Day/Time	L_{eq} dB(A)	L_{max} dB(A)	L_{90} dB(A)	Survey notes
R2	12:01	21/10/2024 10:08	60	65	58	Plant clearly audible. Measurements influenced by birds noise and far away traffic from Victoria Road
R3	14:40	21/10/2024 10:34	57	77	51	Plant faintly audible. Measurements affected by bird noise
R4	14:02	21/10/2024 11:12	49	66	45	Plant not audible/barely audible at certain time periods. Measurements affected by bird noise
R5	12:30	21/10/2024 11:49	56	75	53	Plant audible but the location dominated by traffic noise. Measurements influenced a little by traffic noise
R6	15:00	21/10/2024 12:18	46	57	43	Plant faintly audible but noise levels decreased around 12:30 pm
R8	15:00	21/10/2024 13:21	48	66	42	Plant faintly audible but measurements dominated by noise from birds
R9	14:57	21/10/2024 13:49	43	56	40	Roadworks noise influence (dominant source)
R10	15:00	23/10/2024 9:22	73	91	59	Plant not audible. Continuous 7 min measurements recorded, with traffic noise
R11	15:03	21/10/2024 13:59	47	64	39	Measurements dominated by bird noise. Plant not audible
R12	15:07	21/10/2024 10:03	54	75	52	Plant faintly audible with traffic noise dominant
R13	15:01	21/10/2024 10:26	50	73	46	Plant faintly audible with traffic noise dominant. Intermittent dogs and birds noise
R14	13:08	21/10/2024 10:55	45	61	42	Plant faintly audible with traffic noise dominant. Intermittent lawn mowing noise
R15	12:01	21/10/2024 11:19	56	78	54	Plant faintly audible with traffic noise dominant
R16	14:28	21/10/2024 14:19	75	89	61	Plant inaudible, traffic noise dominant
R17	09:49	21/10/2024 14:00	61	77	40	Plant inaudible, traffic noise and construction noise dominant
R18	15:02	21/10/2024 12:13	50	62	47	Plant inaudible, traffic noise from Victoria Road and nearby streets dominant
N1	12:24	21/10/2024 11:46	53	71	51	Plant inaudible with traffic noise dominant source
N2	15:01	21/10/2024 13:17	47	68	42	Plant audible with intermittent birds/dogs noise

Location ID	Duration	Day/Time	L_{eq} dB(A)	L_{max} dB(A)	L_{90} dB(A)	Survey notes
N3	15:01	21/10/2024 13:37	47	58	44	Plant audible with intermittent birds/dogs noise

Table 15 Night time survey results and notes

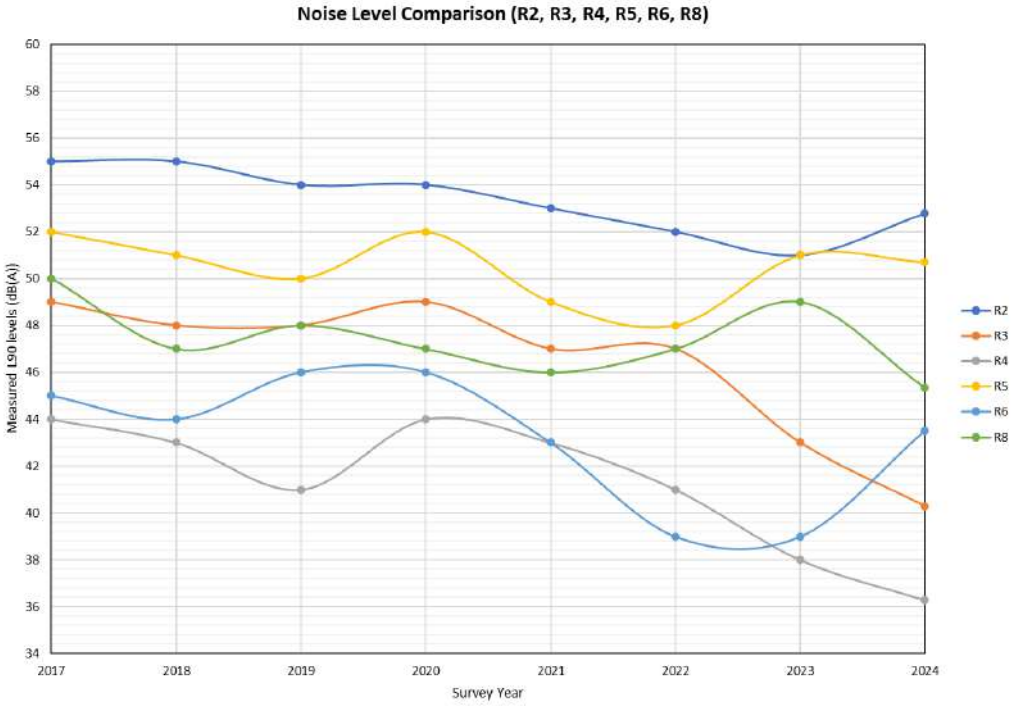
Location ID	Duration	Day/Time	L_{eq} dB(A)	L_{max} dB(A)	L_{90} dB(A)	Survey notes
R2	15:02	18/09/2024 22:11	54	57	53	Plant noise audible, measurements influenced by traffic noise
R3	15:01	18/09/2024 22:45	45	56	40	Plant noise audible, measurements influenced a little by the faint train noise.
R4	12:02	18/09/2024 23:11	39	54	36	Screeching noise audible from the plant. Lulls of traffic noise
R5	15:01	18/09/2024 23:34	51	58	51	Plant noise dominating with lulls of faint traffic noise
R6	10:01	19/09/2024 0:02	45	50	44	Plant noise faintly audible but screeching noise apparent. Traffic noise audible
R8	12:10	19/09/2024 0:37	46	52	45	Plant noise dominating with screeching noise
R9	15:00	19/09/2024 1:04	38	64	36	Typical plant noise with screeching noise dominant with faint lulls of traffic noise. Screeching noise stopped at 01:10.
R10	15:01	19/09/2024 1:28	46	55	44	Plant noise faintly audible with traffic noise dominating
R11	15:01	19/09/2024 1:54	37	49	36	Plant noise faintly audible and dominated by lulls of traffic noise
R12	12:17	18/09/2024 22:06	54	61	53	Plant clearly audible with intermittent traffic noise
R13	15:01	18/09/2024 22:34	38	48	36	Plant audible with intermittent screeching noise
R14	15:01	18/09/2024 22:56	37	48	33	Plant inaudible, however, intermittent screeching noise audible
R15	15:04	18/09/2024 23:18	54	68	52	Plant noise dominant source with intermittent traffic noise
R16	10:07	19/09/2024 1:15	54	57	54	Plant audible clearly, however, traffic noise was dominant
R17	13:47	19/09/2024 0:39	42	65	39	Plant slightly audible, traffic noise dominant
R18	12:01	19/09/2024 0:58	42	49	39	Plant slightly audible, traffic noise dominant with intermittent screeching noise
N1	12:16	19/09/2024 0:20	49	56	48	Plant clearly audible with intermittent traffic noise. Screeching noise clearly audible
N2	15:00	18/09/2024 23:42	46	53	45	Plant noise dominant source with intermittent traffic noise. Screeching noise clearly audible
N3	15:01	19/09/2024 0:00	48	58	46	Plant noise dominant source with intermittent traffic noise. Screeching noise clearly audible

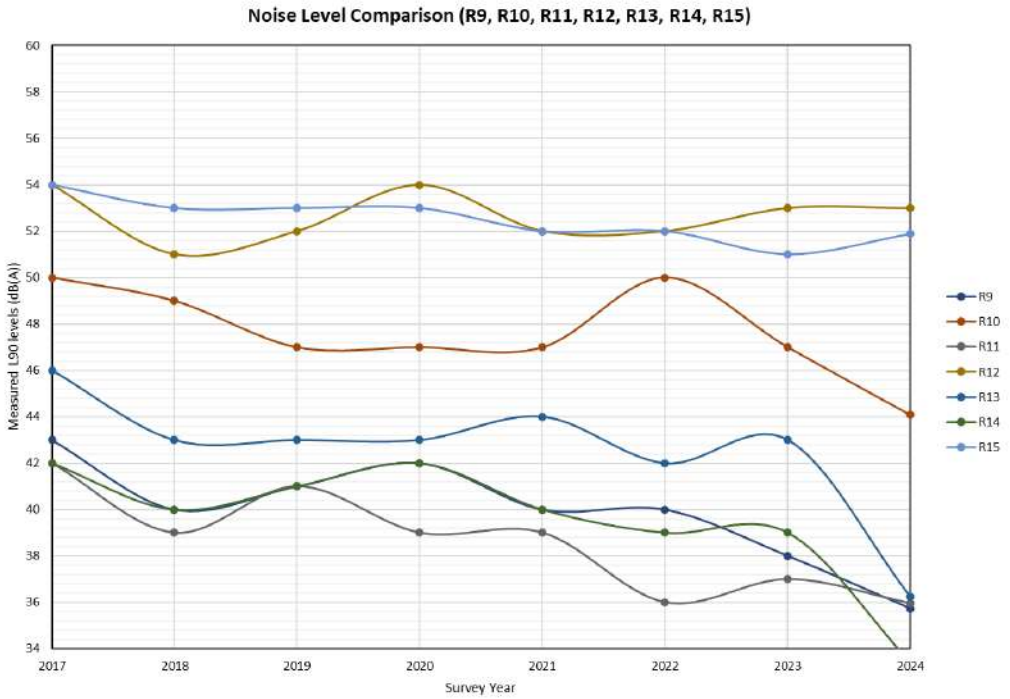
Appendix B—Results comparison

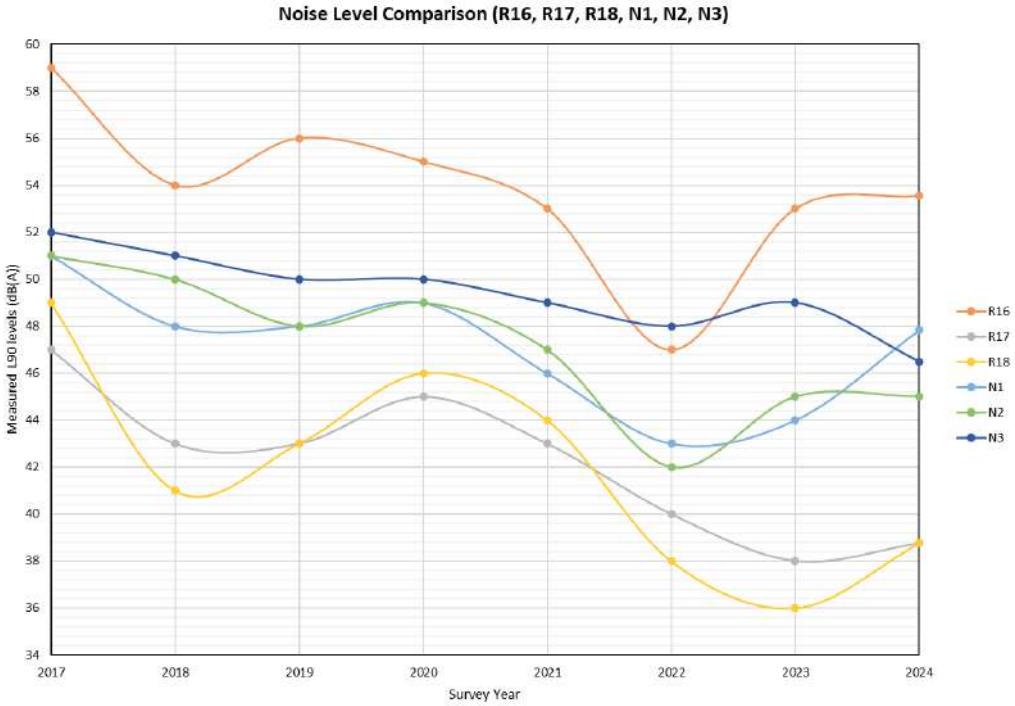
The historical data for environmental noise surveys is presented below.

Table 16 Historical data—Measured L_{90} levels dB(A)

Receiver Location	Measured L_{90} (dB(A)) levels during night-time period (10pm—7am)							
	2017	2018	2019	2020	2021	2022	2023	2024
R2	55	55	54	54	53	52	51	53
R3	49	48	48	49	47	47	43	40
R4	44	43	41	44	43	41	38	36
R5	52	51	50	52	49	48	51	51
R6	45	44	46	46	43	39	39	44
R8	50	47	48	47	46	47	49	45
R9	43	40	41	42	40	40	38	36
R10	50	49	47	47	47	50	47	44
R11	42	39	41	39	39	36	37	36
R12	54	51	52	54	52	52	53	53
R13	46	43	43	43	44	42	43	36
R14	42	40	41	42	40	39	39	33
R15	54	53	53	53	52	52	51	52
R16	59	54	56	55	53	47	53	54
R17	47	43	43	45	43	40	38	39
R18	49	41	43	46	44	38	36	39
N1	51	48	48	49	46	43	44	48
N2	51	50	48	49	47	42	45	45
N3	52	51	50	50	49	48	49	46




Noise Level Comparison (R9, R10, R11, R12, R13, R14, R15)
Measured L90 levels (dB(A))
Survey Year
R9
R10
R11
R12
R13
R14
R15


Noise Level Comparison (R16, R17, R18, N1, N2, N3)
Measured L90 levels (dB(A))
Survey Year
R16
R17
R18
N1
N2
N3

Appendix C—Weather data

Day/ Time	Cloud	Gust (km/h)	Rain (mm)	Wind Direction	Wind Speed (km/h)
18/09/2024 10:00pm	-	6	0	WNW	4
18/09/2024 10:30pm	-	9	0	N	7
18/09/2024 11:00pm	-	4	0	NW	4
18/09/2024 11:30pm	-	7	0	N	6
19/09/2024 12:00am	-	11	0	NE	6
19/09/2024 12:30am	-	15	0	N	13
19/09/2024 01:00am	-	11	0	N	9
19/09/2024 01:30am	-	13	0	N	11
19/09/2024 02:00am	-	17	0	N	15
19/09/2024 02:30am	-	13	0	N	7
21/10/2024 10:00am	-	22	0	NE	20
21/10/2024 10:30am	-	30	0	NE	24
21/10/2024 11:00am	-	20	0	NE	17
21/10/2024 11:30am	-	22	0	NNE	17
21/10/2024 12:00pm	-	13	0	WNW	7
21/10/2024 12:30pm	-	15	0	W	9
21/10/2024 01:00pm	-	13	0	WSW	9
21/10/2024 01:30pm	-	11	0	WSW	9
21/10/2024 02:00pm	-	9	0	SW	7
21/10/2024 02:30pm	-	9	0	SW	9
21/10/2024 03:00pm	-	11	0	S	7

Appendix D—Noise model inventory

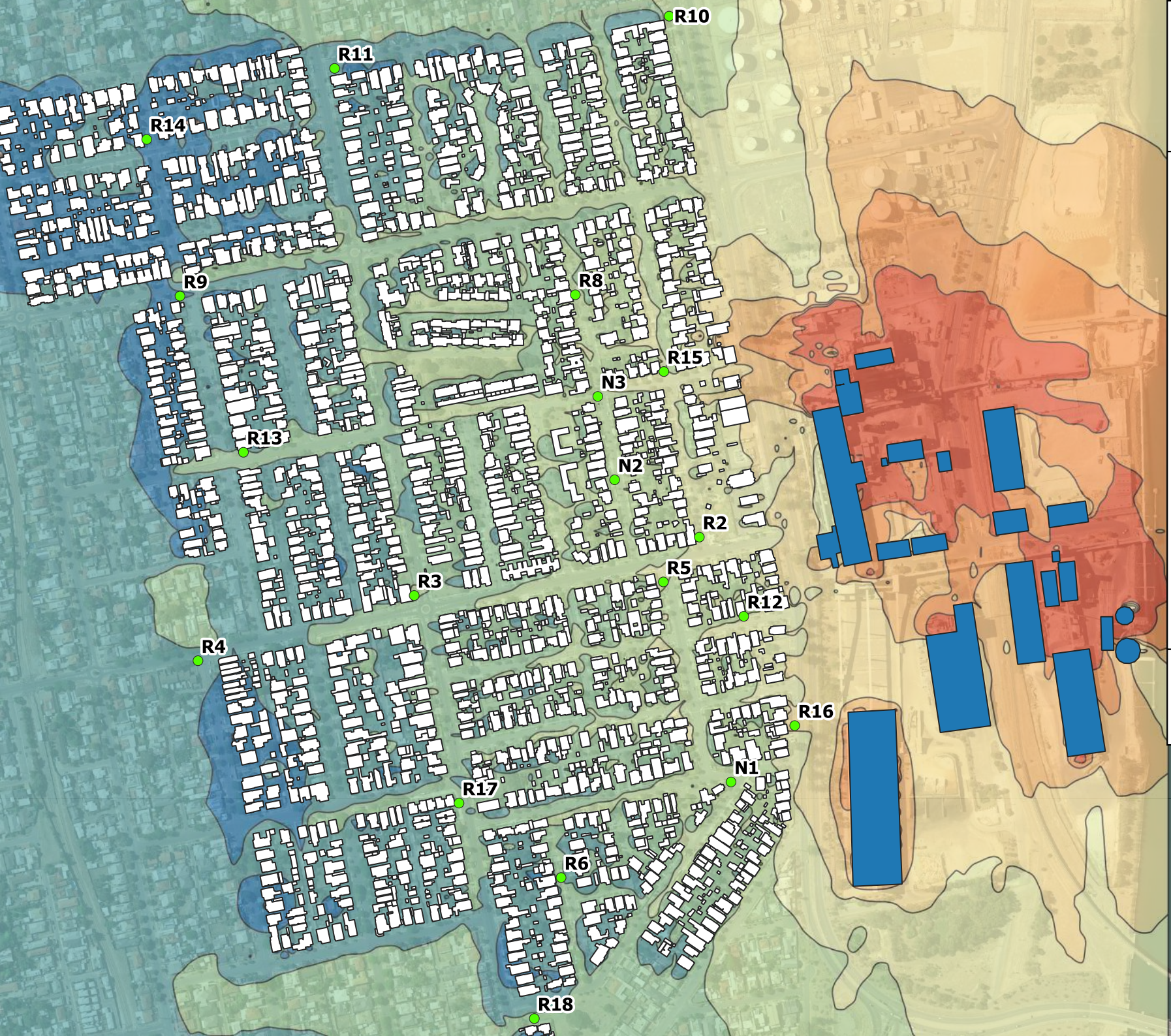
Source Number	Source Name	Location coordinates (m)			Overall Lw dB(A)	One third ocatve band data (dB(A))																											
		X	Y	Z		25Hz	31.5Hz	40Hz	50Hz	63Hz	80Hz	100Hz	125Hz	160Hz	200Hz	250Hz	315Hz	400Hz	500Hz	630Hz	800Hz	1kHz	1.25kHz	1.6kHz	2kHz	2.5kHz	3.15kHz	4kHZ	5kHz	6.3kHz	8kHz	10kHz
1	1000t Silo Outfeed Airslide Fan 1	271605.7	6142880	1.5	85	7	9	12	25	30	42	48	50	52	54	58	63	69	75	83	72	72	72	70	67	62	62	61	59	56	54	50
2	1000t Silo Outfeed Airslide Fan 2	271606.8	6142874.3	1.5	85	7	9	12	25	30	42	48	50	52	54	58	63	69	75	83	72	72	72	70	67	62	62	61	59	56	54	50
3	200t Silo Dust Collector Fan	271623.8	6142712.5	21	85					38			53			62			73			78			81			80			71	
4	4A Airslide East Fan	271602.7	6142846.4	37	96	44	46	49	57	64	59	65	64	74	85	86	84	85	85	91	85	83	82	82	79	78	75	75	74	71	67	65
5	4A Cooling Tower	271614	6142883.9	11	91	50	53	57	69	65	70	74	71	81	75	75	76	77	78	79	81	79	79	80	80	79	79	79	77	74	71	68
6	4A Elevator Discharge Air Slide Fan	271601.8	6142817.3	37.3	85	33	35	38	46	53	48	54	53	63	74	75	73	74	74	80	74	72	71	71	68	67	64	64	63	60	56	54
7	4A Elevator Drive	271592.7	6142844.9	89.5	96	53	55	55	58	61	61	60	63	68	73	79	78	88	87	86	84	87	86	84	83	82	81	76	74	71	67	60
8	4A Stack	271648.1	6142815.4	75.5	100	8	16	23	50	59	71	82	86	96	85	83	79	81	82	83	89	92	89	81	75	71	69	68	62	56	51	44
9	4B Air Slide Blower	271595.8	6142877.6	35	94	43	50	56	71	79	74	72	75	73	78	74	74	78	82	88	77	76	81	82	83	85	83	82	81	79	75	72
10	4B Elevator Drive	271604.9	6142879.5	37	89	41	44	50	57	60	60	62	66	68	79	79	76	76	79	78	82	78	78	75	74	73	71	70	69	67	65	61
11	4B EP Duct-4B EP Duct - Bottom	271607.4	6142882.5	4	99	59	58	62	75	72	73	76	78	97	87	84	87	89	86	86	84	82	84	83	83	80	79	77	76	76	75	73
12	4B EP Duct-4B EP Duct - East	271608.6	6142882.7	5	99	59	58	62	75	72	73	76	78	97	87	84	87	89	86	86	84	82	84	83	83	80	79	77	76	76	75	73
13	4B EP Duct-4B EP Duct - North	271606.4	6142887.5	5	99	59	58	62	75	72	73	76	78	97	87	84	87	89	86	86	84	82	84	83	83	80	79	77	76	76	75	73
14	4B EP Duct-4B EP Duct - South	271608.4	6142877.5	5	99	59	58	62	75	72	73	76	78	97	87	84	87	89	86	86	84	82	84	83	83	80	79	77	76	76	75	73
15	4B EP Duct-4B EP Duct - Top	271607.4	6142882.5	6	96	55	55	58	71	69	69	72	74	93	83	80	83	85	82	82	80	78	80	79	79	77	75	73	72	72	71	69
16	4B EP Duct-4B EP Duct - West	271606.2	6142882.3	5	99	59	58	62	75	72	73	76	78	97	87	84	87	89	86	86	84	82	84	83	83	80	79	77	76	76	75	73
17	4B Stack	271598.6	6142849.6	95.5	98	58	57	60	64	62	69	74	83	79	80	83	87	85	86	86	89	90	86	87	85	84	84	82	80	81	78	71
18	Accolades Activity	271965.8	6142895.4	3	91					68			77			78			85			85			84			80			69	
19	Air Slide SE BDC	271908	6142549.8	26	94	0	0	0	0	0	0	68	70	73	81	82	86	83	73	82	84	85	84	83	80	79	74	69	65	60	60	55
20	Aircooled Screw Conveyor	271610.4	6142838.8	6	96	56	54	59	64	66	69	74	78	80	82	83	84	83	85	85	85	86	86	85	84	86	81	79	77	75	70	65
21	AJ279 1000t Silo Dust Collector	271599.4	6142889.9	35	85					38			53			62			73			78			81			80			71	
22	AJ279 Compressor	271599.4	6142885.4	1	93	5	11	15	20	44	48	61	63	66	70	69	82	79	78	78	79	86	88	80	77	78	77	1	1	0	69	57
23	Bulk Loading Station - South Fan Discharge	271722.8	6142730	26	86	59	67	67	69	71	72	73	73	74	74	75	76	75	77	76	72	71	71	69	67	67	66	69	65	64	62	61
24	Cement Mill 1 & 7- Clinker Gantry 1	271865.3	6142489.5	17.5	93	50	52	58	60	61	62	65	65	68	69	77	80	80	81	84	84	83	85	85	83	76	71	68	64	60	55	49
25	Cement Mill 1 & 7- Clinker Gantry 2	271871	6142450.1	17.5	93	50	52	58	60	61	62	65	65	68	69	77	80	80	81	84	84	83	85	85	83	76	71	68	64	60	55	49
26	Cement Mill 1 & 7- Clinker Gantry 3	271877.4	6142410.8	17.5	93	50	52	58	60	61	62	65	65	68	69	77	80	80	81	84	84	83	85	85	83	76	71	68	64	60	55	49
27	Cement Mill 1 & 7- Clinker Gantry 4	271885	6142426.8	17.5	93	50	52	58	60	61	62	65	65	68	69	77	80	80	81	84	84	83	85	85	83	76	71	68	64	60	55	49
28	Cement Mill 1 & 7- Clinker Gantry 5	271878.8	6142470.6	17.5	93	50	52	58	60	61	62	65	65	68	69	77	80	80	81	84	84	83	85	85	83	76	71	68	64	60	55	49
29	Cement Mill 1 & 7- Clinker Gantry 6	271873.4	6142509	17.5	93	50	52	58	60	61	62	65	65	68	69	77	80	80	81	84	84	83	85	85	83	76	71	68	64	60	55	49
30	Cement Mill 1 Building CM1 - CM1 DC26	271884.7	6142606.5	12	101	55	53	56	65	68	70	73	73	80	83	92	88	89	91	92	93	91	90	90	88	88	85	82	80	75	71	65
31	Cement Mill 1-CM1 - East facade	271871.9	6142606.2	8	96	50	60	65	70	71	75	80	83	86	87	89	88	86	85	83	80	78	77	79	78	77	73	68	65	60	55	50
32	Cement Mill 1-CM1 - North Facade	271860.2	6142628.2	11	94	50	55	60	68	69	73	78	81	84	86	87	86	85	83	82	79	77	75	78	77	75	72	67	63	60	56	52
33	Cement Mill 1-CM1 - North Roof	271862	6142616.6	27	91	50	55	65	71	70	73	73	75	78	78	85	80	80	81	80	76	74	73	76	75	73	71	68	65	65	65	64
34	Cement Mill 1-CM1 - South Facade	271867.6	6142581.7	11	94	50	55	60	68	69	73	78	81	84	86	87	86	85	83	82	79	77	75	78	77	75	72	67	63	60	56	52
35	Cement Mill 1-CM1 - South Roof	271865.7	6142593.4	27	91	50	55	65	71	70	73	73	75	78	78	85	80	80	81	80	76	74	73	76	75	73	71	68	65	65	65	64
36	Cement Mill 1-CM1 - West facade	271855.9	6142603.8	8	96	50	60	65	70	71	75	80	83	86	87	89	88	86	85	83	80	78	77	79	78	77	73	68	65	60	55	50
37	Cement Mill 6-CM6 - East Facade	271631	6142744.3	9	97	50	53	61	63	54	60	68	75	81	72	80	90	80	84	91	84	85	88	84	81	79	79	80	79	77	74	72
38	Cement Mill 6-CM6 - North Facade	271617	6142759.3	9.8	90	48	51	57	59	47	56	67	71	77	68	77	80	76	80	84	79	79	82	77	74	74	73	72	71	69	66	61
39	Cement Mill 6-CM6 - Roof East	271625.7	6142743.3	19.5	85	38	40	47	58	42	48	56	62	66	59	69	81	71	70	79	73	72	76	68	63	61	59	60	55	55	51	44
40	Cement Mill 6-CM6 - Roof West	271615	6142741.2	19.5	85	38	40	47	58	42	48	56	62	66	59	69	81	71	70	79	73	72	76	68	63	61	59	60	55	55	51	44
41	Cement Mill 6-CM6 - South Facade	271623.7	6142725.1	9.8	91	46	48	53	58	48	57	65	72	75	66	73	83	75	79	85	78	80	82	78	76	74	73	73	70	68	67	62
42	Cement Mill 7 - CM7-CM 7 - North Roof	271840.4	6142606.8	27	86	50	55	60	67	68	68	68	72	75	76	78	73	75	73	74	71	70	70	74	74	72	70	68	67	60	55	50
43	Cement Mill 7 - CM7-CM 7 - South Roof	271843.6	6142586.7	27	86	50	55	60	67	68	68	68	72	75	76	78	73	75	73	74	71	70	70	74	74	72	70	68	67	60	55	50
44	Cement Mill 7 - CM7-CM7 - East	271849.2	6142597.8	9.9	98	35	45	55	62	68	74	77	78	82	90	90	92	88	90	88	85	81	80	82	80	76	73	66	62	58	55	52

45	Cement Mill 7 - CM7-CM7 - North facade	271838.8	6142616.9	11	93	45	55	50	57	63	69	72	73	77	84	85	87	83	84	83	80	76	74	77	75	71	68	61	57	52	50	47	
46	Cement Mill 7 - CM7-CM7 - West	271834.7	6142595.7	9.9	98	35	45	55	62	68	74	77	78	82	90	90	92	88	90	88	85	81	80	82	80	76	73	66	62	58	55	52	
47	Cement Mill 7 - CM7-CM7- South facade	271845.1	6142576.6	11	93	45	55	50	57	63	69	72	73	77	84	85	87	83	84	83	80	76	74	77	75	71	68	61	57	52	50	47	
48	Clinker Blend Building CM1 Shed Motor 1	271874.2	6142393.3	1	85	42	49	52	55	57	61	62	65	71	71	71	74	74	77	77	78	75	72	73	70	68	69	65	61	56	52	47	
49	Clinker Blend Building CM1 Shed Motor 2	271880.2	6142394.1	1	85	42	49	52	55	57	61	62	65	71	71	71	74	74	77	77	78	75	72	73	70	68	69	65	61	56	52	47	
50	Clinker Gantry Air Knife Blower 1	271571.7	6142811.6	0.5	96	43	47	46	51	54	62	67	71	75	81	78	83	82	87	85	80	85	86	87	86	85	84	80	77	72	67	62	
51	Clinker Gantry Air Knife Blower 2	271563.4	6142807.4	0.5	92	39	43	42	47	50	58	63	67	71	77	74	79	78	83	81	76	81	82	83	82	81	80	76	73	68	63	58	
52	CM1 Compressor Room - compressor Room 1-Exhaust & Opening	271884.4	6142578.8	2.5	88	35	44	45	51	62	61	62	63	71	74	72	74	73	77	80	79	79	77	76	74	72	71	71	70	71	69	68	
53	CM1 Compressor Room - Point source 02	271891.9	6142576.4	2.5	86	33	43	44	49	60	59	60	61	70	72	70	72	72	75	78	78	77	75	74	72	70	70	69	68	69	67	66	
54	CM1 Dust Collector Discharge	271875.1	6142582.5	19	106	65	70	69	75	79	84	87	90	91	91	95	95	98	99	97	95	94	94	91	90	89	87	85	82	77	77	74	
55	CM6 Compressor Room - North Opening	271620.3	6142764.8	1	100	48	51	55	60	60	62	65	68	72	76	91	85	80	87	84	84	87	88	85	85	91	94	82	84	86	79	72	
56	CM6 Compressor Room - South Opening	271628	6142724.2	1	90	29	32	35	42	44	45	49	52	56	64	88	74	67	72	71	71	73	73	72	71	75	77	70	70	70	65	60	
57	CM6 Drive Motor North	271631.3	6142748.1	9.5	93	43	47	58	64	65	67	71	73	74	76	80	83	80	81	82	80	80	81	80	78	79	81	82	79	77	73	68	
58	CM6 Drive Motor South	271633.3	6142726.4	9.5	98	44	48	56	63	63	70	72	78	78	78	84	85	85	87	89	90	89	88	86	85	84	82	80	77	74	67	68	
59	CM7 Dust Collector Discharge	271852.6	6142580.3	20	100	55	65	55	68	70	75	76	80	87	87	86	91	90	89	89	91	91	89	83	79	78	76	76	71	68	65	63	
60	Cooling Tower North CM 6	271608.8	6142762.4	1.9	94	49	48	48	59	61	66	68	71	77	80	81	81	82	85	86	87	84	82	80	78	76	73	72	69	65	61	54	
61	CR3 Dust Collector	271593.7	6142803.6	17.5	93	60	66	70	75	77	80	81	83	84	84	84	83	83	80	79	77	76	74	73	71	72	70	69	69	66	64	63	
62	CR4 DC	271593.9	6142802.5	17.5	92	51	55	58	60	61	65	66	71	75	80	80	80	84	85	77	78	77	83	79	77	77	75	75	74	70	65	60	
63	CS4/CS5 Dust Collector Fan	271628.4	6142605	8	94	50	53	57	61	65	67	71	74	74	82	83	83	83	82	86	84	85	84	80	80	78	74	70	66	63	57	51	
64	CSC Compressor	271709.5	6142550.5	1	93	0	0	0	0	0	0	61	63	66	70	69	82	79	78	78	79	86	88	80	77	78	77	77	77	77	77	77	
65	D/C - 16000 Silo Top (North)	271927.1	6142567.4	50	82	32	40	47	69	66	59	63	65	68	74	75	71	70	69	72	69	66	67	69	66	66	62	60	59	55	51	48	
66	D/C - 16000 Silo Top (South)	271927.6	6142565.6	50	95	53	59	59	79	78	71	72	69	75	83	87	84	83	84	87	83	83	83	84	80	77	75	73	71	68	65	63	
67	D/C - 19 Wharf 30000T Silo #1	271930	6142537.7	50	94	40	51	54	54	60	66	69	70	71	79	81	89	80	81	84	85	83	80	82	82	79	78	74	72	68	65	61	
68	D/C - 20 Wharf 30000T Silo #2	271923.5	6142525.1	51	85	42	47	51	51	55	61	62	66	70	74	72	74	75	74	75	75	74	76	73	70	69	69	66	64	63	62	56	
69	D/C - 23 CE1 Conveyor	271867.6	6142535.3	6	97	47	54	55	58	65	70	71	79	85	83	82	82	89	85	87	86	88	83	81	81	82	83	83	82	79	75	72	
70	D/C - 36 Bypass Dust Disposal	271584.7	6142821.4	15.5	86	40	43	51	56	53	58	62	68	70	71	71	69	73	73	73	75	77	80	76	75	73	70	64	61	59	55	51	
71	D/C - 38 Blending Silo Top	271595	6142866.9	35	84	35	40	46	54	70	59	66	63	68	70	73	74	78	73	73	72	70	71	69	66	67	67	65	63	66	66	59	
72	D/C - 41 Kiln 4 Feed Surge Bin	271596.7	6142844.2	87	91	41	44	57	57	54	67	70	71	69	74	80	80	82	80	79	82	82	80	82	77	73	72	68	66	62	59	56	
73	D/C - CR1/CR2 Conveyors	271610.2	6142802.1	13	101	50	54	59	67	67	69	73	74	80	85	87	88	89	92	94	92	91	92	89	86	84	83	80	76	74	70	65	
74	D/C - CS 2 Conveyor	271594.3	6142800.7	17.5	91	49	52	55	59	60	66	72	71	76	78	76	77	78	76	78	81	79	81	79	77	76	76	78	81	80	76	72	
75	D/C - CS2/CS3A/CS4 Conveyor	271594.3	6142799.1	17.5	91	51	51	55	66	62	67	67	68	75	76	81	80	80	80	80	80	80	82	78	76	75	76	75	76	78	74	73	71
76	D/C - CSC Bulk	271908.4	6142540	32	91	61	65	67	70	73	75	77	79	81	77	80	79	79	79	80	81	82	79	76	73	71	71	69	69	67	66	62	
77	D/C - North Gantry Exhaust	271599.2	6142796.1	20	101	55	53	56	65	68	70	73	73	80	83	92	88	89	91	92	93	91	90	90	88	88	85	82	80	75	71	65	
78	D/C - Silo Bottom 16000	271929.9	6142582.5	6	91	56	64	69	74	77	77	78	78	78	77	80	79	73	77	77	75	84	83	78	76	74	74	72	72	69	65	61	
79	D/C - Slag Outfeed	271767.3	6142825.4	7	87	39	45	48	53	52	56	59	60	63	69	71	72	72	81	78	78	80	79	73	72	69	68	67	65	59	55	50	
80	D/C - Wood Chip Plant	271586.1	6142903.9	5	93	46	49	52	64	64	67	73	81	80	78	79	82	82	86	82	82	82	80	78	77	76	74	72	71	69	65	60	
81	D/C -18 Ship Loader	271935.3	6142549.3	20	100	46	48	53	58	72	71	73	77	98	85	81	79	91	88	86	83	81	80	81	83	82	78	75	72	69	64	59	
82	D/C- CS1/CS2 Central Tower	271662.3	6142807.3	16	98	39	43	51	64	61	67	69	72	80	81	80	81	88	91	91	89	88	88	85	82	82	80	77	75	71	67	63	
83	Fresh Air Blower	271609	6142838.2	8	92	48	48	53	58	62	66	70	73	72	77	77	78	81	80	80	80	80	81	83	83	82	78	74	72	67	61	58	
84	Gantry Dust Collector Fan Housing	271594	6142802	17.5	93	52	56	56	57	62	73	67	70	77	77	86	82	82	83	83	81	81	82	77	74	74	74	75	79	75	69	70	
85	Gas Train	271564.3	6142623.7	1.5	93	42	48	50	56	60	61	62	64	67	68	68	69	70	72	74	77	82	82	82	80	82	81	79	81	85	83	80	
86	In-Line Screw Conveyor CM6 200t silo	271624.1	6142714.6	4	91	42	40	49	66	65	61	66	69	70	73	73	78	76	75	79	79	80	78	79	85	84	77	72	70	71	69	63	
87	Kiln 4 Airslide Fan (northside of Tower)	271592.2	6142850.7	75	98	52	56	60	66	64	65	66	72	72	74	77	80	85	88	93	89	85	87	87	85	86	84	81	78	73	69	65	
88	Kiln 4 Bag Filter fan	271690.8	6142825.2	1.2	94	50	56	59	62	65	64	67	70	75	76	78	81	85	82	87	85	84	84	80	79	77	81	82	77	72	71	69	
89	Kiln 4 Primary Fan	271660.1	6142840.3	4.5	103	51	55	65	66	71	72	73	76	81	82	84	90	96	94	91	94	93	92	90	87	85	83	82	77	73	73	64	

90	Kiln 4 Shell cooling fans - Mobile	271657	6142844.3	3	104	54	56	63	68	73	74	81	82	83	89	89	90	95	94	94	95	95	95	93	92	90	87	83	79	76	73	69	
91	Kiln building 2 upper - Heat Exchanger Fan 1	271674.1	6142826.1	16	91	41	49	61	60	60	66	67	71	71	83	77	80	83	81	80	81	81	80	77	75	74	72	69	66	66	63	54	
92	Kiln building 2 upper - Heat Exchanger Fan 10	271673.6	6142828.6	21	91	41	49	61	60	60	66	67	71	71	83	77	80	83	81	80	81	81	80	77	75	74	72	69	66	66	63	54	
93	Kiln building 2 upper - Heat Exchanger Fan 11	271673.1	6142831	21	91	41	49	61	60	60	66	67	71	71	83	77	80	83	81	80	81	81	80	77	75	74	72	69	66	66	63	54	
94	Kiln building 2 upper - Heat Exchanger Fan 12	271672.6	6142833.5	21	91	41	49	61	60	60	66	67	71	71	83	77	80	83	81	80	81	81	80	77	75	74	72	69	66	66	63	54	
95	Kiln building 2 upper - Heat Exchanger Fan 13	271674.1	6142826.1	23.5	91	41	49	61	60	60	66	67	71	71	83	77	80	83	81	80	81	81	80	77	75	74	72	69	66	66	63	54	
96	Kiln building 2 upper - Heat Exchanger Fan 14	271673.6	6142828.6	23.5	91	41	49	61	60	60	66	67	71	71	83	77	80	83	81	80	81	81	80	77	75	74	72	69	66	66	63	54	
97	Kiln building 2 upper - Heat Exchanger Fan 15	271673.1	6142831	23.5	91	41	49	61	60	60	66	67	71	71	83	77	80	83	81	80	81	81	80	77	75	74	72	69	66	66	63	54	
98	Kiln building 2 upper - Heat Exchanger Fan 16	271672.6	6142833.5	23.5	91	41	49	61	60	60	66	67	71	71	83	77	80	83	81	80	81	81	80	77	75	74	72	69	66	66	63	54	
99	Kiln building 2 upper - Heat Exchanger Fan 2	271673.6	6142828.6	16	91	41	49	61	60	60	66	67	71	71	83	77	80	83	81	80	81	81	80	77	75	74	72	69	66	66	63	54	
100	Kiln building 2 upper - Heat Exchanger Fan 3	271673.1	6142831	16	91	41	49	61	60	60	66	67	71	71	83	77	80	83	81	80	81	81	80	77	75	74	72	69	66	66	63	54	
101	Kiln building 2 upper - Heat Exchanger Fan 4	271672.6	6142833.5	16	91	41	49	61	60	60	66	67	71	71	83	77	80	83	81	80	81	81	80	77	75	74	72	69	66	66	63	54	
102	Kiln building 2 upper - Heat Exchanger Fan 5	271674.1	6142826.1	18.5	91	41	49	61	60	60	66	67	71	71	83	77	80	83	81	80	81	81	80	77	75	74	72	69	66	66	63	54	
103	Kiln building 2 upper - Heat Exchanger Fan 6	271673.6	6142828.6	18.5	91	41	49	61	60	60	66	67	71	71	83	77	80	83	81	80	81	81	80	77	75	74	72	69	66	66	63	54	
104	Kiln building 2 upper - Heat Exchanger Fan 7	271673.1	6142831	18.5	91	41	49	61	60	60	66	67	71	71	83	77	80	83	81	80	81	81	80	77	75	74	72	69	66	66	63	54	
105	Kiln building 2 upper - Heat Exchanger Fan 8	271672.6	6142833.5	18.5	91	41	49	61	60	60	66	67	71	71	83	77	80	83	81	80	81	81	80	77	75	74	72	69	66	66	63	54	
106	Kiln building 2 upper - Heat Exchanger Fan 9	271674.1	6142826.1	21	91	41	49	61	60	60	66	67	71	71	83	77	80	83	81	80	81	81	80	77	75	74	72	69	66	66	63	54	
107	Kiln Burner	271675.6	6142843.7	12	115	71	69	75	73	76	79	85	89	91	93	95	98	100	100	98	103	100	99	104	100	105	105	103	103	109	97	91	
108	Kiln Cooling Fan 1	271686.2	6142842.8	4	109	55	60	65	66	72	76	82	82	87	91	94	98	99	98	99	100	100	99	98	97	93	90	88	84	80	75	69	
109	Kiln Cooling Fan 2	271663.5	6142840.9	4.5	103	51	55	65	66	71	72	73	76	81	82	84	90	96	94	91	94	93	92	90	87	85	83	82	77	73	73	64	
110	Kiln Cooling Fan 3	271666.9	6142841.5	4.5	103	51	55	65	66	71	72	73	76	81	82	84	90	96	94	91	94	93	92	90	87	85	83	82	77	73	73	64	
111	Kiln Cooling Fan 5	271669.3	6142841.4	5	109	55	60	65	66	72	76	82	82	87	91	94	98	99	98	99	100	100	99	98	97	93	90	88	84	80	75	69	
112	Kiln Cooling Fan 6	271666.3	6142846.1	4	101	54	59	64	68	67	70	75	80	79	88	87	89	92	90	90	90	90	89	89	88	86	84	81	79	77	74	68	
113	Kiln Cooling Fan 7	271665.3	6142841.2	2	100	50	54	64	62	69	68	71	75	79	83	84	91	90	89	90	91	90	91	89	87	86	83	81	79	77	75	69	
114	Kiln No 4 Chloride Dust Loading Building-Kiln No 4 Chloride Dust Loading Building - North Facade	271577.3	6142834.5	5	76	37	44	48	53	58	59	63	56	61	61	66	68	69	67	64	63	62	62	62	59	53	51	50	50	50	48	45	
115	Kiln No 4 Chloride Dust Loading Building-Kiln No 4 Chloride Dust Loading Building - Roof	271577.9	6142830.3	10	76	37	44	48	53	58	59	63	56	61	61	66	68	69	67	64	63	62	62	62	59	53	51	50	50	50	48	45	
116	Kiln No 4 Chloride Dust Loading Building-Kiln No 4 Chloride Dust Loading Building - SouthFacade	271578.6	6142826.1	5	76	37	44	48	53	58	59	63	56	61	61	66	68	69	67	64	63	62	62	62	59	53	51	50	50	50	48	45	
117	Kiln No 4 Chloride Dust Loading Building-Kiln No 4 Chloride Dust Loading Building - West Facade	271570.9	6142829.2	5	76	37	44	48	53	58	59	63	56	61	61	66	68	69	67	64	63	62	62	62	59	53	51	50	50	50	48	45	
118	Kima Water Spray - Blower (6m)	271664.8	6142843.6	4	110					80			97			95			102			107			103			100			93		
119	Kima Water Spray - Blower (6m)	271646.9	6142841.1	4	110					80			97			95			102			107			103			100			93		
120	Kima Water Spray - Kiln Cooler (6m)	271665	6142842.7	4	68					38			55			53			60			65			61			58			51		
121	Kima Water Spray - Kiln Cooler (6m)	271649.4	6142840	4	68					38			55			53			60			65			61			58			51		
122	Limestone Preblend Building-Limeston Preblend - North Facade	271629.6	6142452.8	11.1	81					71			75			69			79			67			68			49			33		
123	Limestone Preblend Building-Limestone Preblend - East Facade	271663.1	6142350.2	3.4	82					71			75			70			80			68			69			52			40		
124	Limestone Preblend Building-Limestone Preblend - Roof East	271648	6142349.3	19.3	90					78			82			77			87			75			76			59			47		
125	Limestone Preblend Building-Limestone Preblend - Roof West	271617.8	6142348.4	19.3	90					78			82			77			87			75			76			59			47		
126	Limestone Preblend Building-Limestone Preblend - South Facade	271636.3	6142244.9	11.1	82					71			75			70			80			67			68			50			36		
127	Limestone Preblend Building-Limestone Preblend - West Facade	271602.7	6142347.5	3.4	83					71			75			71			81			68			69			52			40		
128	Limestone Preblend Building-Louvre	271665.6	6142273.7	1.1	75					51			58			58			73			67			62			49			37		
129	Limestone Preblend Building-Louvre	271664.9	6142293.7	1.1	74					51			59			58			72			66			61			48			30		
130	Limestone Preblend Building-Louvre	271664.3	6142313.7	1.1	75					50			59			59			74			67			62			49			35		
131	Limestone Preblend Building-Louvre	271663.6	6142333.7	1.1	75					52			60			59			74			67			64			50			39		
132	Limestone Preblend Building-Louvre	271663	6142353.7	1.1	77					52			59			62			75			70			67			55			46		
133	Limestone Preblend Building-Louvre	271662.4	6142373.7	1.1	75					51			59			60			74			68			64			53			43		
134	Limestone Preblend Building-Louvre	271661.7	6142393.6	1.1	74					51			59			59			73			66			62			51			35		

135	Limestone Preblend Building-Louvre	271600.3	6142424	1.1	72					50			58			57			71			65			61			47			30	
136	Limestone Preblend Building-Louvre	271600.9	6142404	1.1	73					50			58			57			71			66			62			48			34	
137	Limestone Preblend Building-Louvre	271601.6	6142384	1.1	75					51			59			59			74			67			63			50			36	
138	Limestone Preblend Building-Louvre	271602.2	6142364	1.1	80					54			62			63			80			69			66			57			44	
139	Limestone Preblend Building-Louvre	271602.8	6142344	1.1	80					54			62			63			79			69			65			55			45	
140	Limestone Preblend Building-Louvre	271603.5	6142324	1.1	75					50			59			59			74			67			63			50			37	
141	Limestone Preblend Building-Louvre	271604.1	6142304	1.1	74					51			59			57			72			66			63			48			33	
142	Mill Building 4A-Mill Building 4A - East facade	271621.4	6142815.5	10.3	92	50	55	60	77	70	70	84	85	78	77	77	83	78	76	78	78	76	77	79	79	79	79	77	76	70	70	70
143	Mill Building 4A-Mill Building 4A - North facade	271612.5	6142819	10.3	94	55	65	70	78	71	71	85	86	79	78	79	84	79	77	79	79	77	78	80	80	80	80	79	77	70	70	70
144	Mill Building 4A-Mill Building 4A - Roof	271613.4	6142814	20.5	94	55	60	65	78	72	71	85	87	79	79	79	84	79	78	80	79	77	78	81	81	80	80	79	77	70	70	70
145	Mill Building 4A-Mill Building 4A - South facade	271614.4	6142809	10.3	94	55	65	70	78	71	71	85	86	79	78	79	84	79	77	79	79	77	78	80	80	80	80	79	77	70	70	70
146	Mill Building 4A-Mill Building 4A - West facade	271605.5	6142812.5	10.3	92	50	55	60	77	70	70	84	85	78	77	77	83	78	76	78	78	76	77	79	79	79	79	77	76	70	70	70
147	Raw Mill 4A EP Filter Bank - ESP 4B pneumatic shakers	271633.3	6142819.8	21	95	42	47	52	55	55	60	67	65	68	78	75	76	82	81	82	83	82	82	82	81	81	87	85	86	83	82	75
148	Raw Mill 4B Tier 2-Raw Mill 4B - East facade	271654.6	6142876	13.5	92	50	55	55	71	72	74	73	74	78	78	86	78	77	80	78	77	78	77	81	82	82	81	78	74	60	60	60
149	Raw Mill 4B Tier 2-Raw Mill 4B - North facade	271631.2	6142882.8	13	92	50	50	50	67	68	70	73	78	88	78	81	76	76	77	76	74	74	74	78	79	79	77	75	68	55	55	55
150	Raw Mill 4B Tier 2-Raw Mill 4B - Roof North	271632.3	6142877.3	27	94	32	32	17	42	47	50	55	61	65	67	75	73	74	76	81	78	80	83	85	86	86	85	81	77	72	72	72
151	Raw Mill 4B Tier 2-Raw Mill 4B - Roof South	271634.4	6142866.3	27	94	32	32	17	42	47	50	55	61	65	67	75	73	74	76	81	78	80	83	85	86	86	85	81	77	72	72	72
152	Raw Mill 4B Tier 2-Raw Mill 4B - South facade	271635.5	6142860.8	13	98	50	55	60	76	77	77	79	81	82	82	88	84	83	84	87	83	84	87	88	89	89	88	84	81	75	75	75
153	Raw Mill 4B Tier 2-Raw Mill 4B - West facade	271612.1	6142867.7	13.5	92	50	55	55	71	72	74	73	74	78	78	86	78	77	80	78	77	78	77	81	82	82	81	78	74	60	60	60
154	RM4A Infeed Airslide Fan	271602.1	6142884	35	85	7	9	12	25	30	42	48	50	52	54	58	63	69	75	83	72	72	72	70	67	62	62	61	59	56	54	50
155	RM4B Infeed Airslide Fan	271600	6142883.6	35	85	7	9	12	25	30	42	48	50	52	54	58	63	69	75	83	72	72	72	70	67	62	62	61	59	56	54	50
156	Road Bulk Station DC 30	271719.8	6142729.6	26	94	49	59	50	62	64	69	71	74	82	81	80	85	85	84	83	85	86	83	78	73	72	70	70	65	62	59	57
157	Roller Crusher	271609.5	6142836.8	4	96	55	55	61	64	66	75	73	74	78	81	82	84	85	85	86	87	87	87	85	84	83	79	78	75	73	69	63
158	Slag Dryer	271801.6	6142827	2	92	58	54	56	67	81	70	69	74	72	75	77	77	78	80	81	81	86	83	79	78	77	75	73	72	71	69	62
159	T2 Dust Collector Fan	271853.9	6142637.4	12	108	62	65	68	72	73	77	83	91	96	94	96	94	96	97	99	99	99	96	94	92	91	87	83	78	74	68	63
160	TAD Elevator Drive (Gearbox + Motor)	271610.1	6142841.9	1	94	58	57	59	64	64	72	70	75	77	79	81	81	82	83	86	85	83	86	83	83	80	76	74	71	66	62	58
161	Ventilation Oven Fan 1	271630.3	6142838.3	4	115	65	66	69	73	75	78	83	88	91	102	99	101	105	105	106	106	106	105	105	103	101	97	93	88	85	82	77
162	Ventilation Oven Fan 2	271635.9	6142837.1	4	115	65	66	69	73	75	78	83	88	91	102	99	101	105	105	106	106	106	105	105	103	101	97	93	88	85	82	77
163	Wharf compressor room outlet	271899.3	6142539.5	3	88	35	43	40	47	48	51	56	60	67	65	69	69	72	75	78	78	79	80	78	76	75	75	76	71	73	73	68
164	Woodchip Compressor Dryer	271576.4	6142913.8	0.5	73	5	11	15	20	24	28	31	34	37	65	67	55	60	67	55	62	63	65	57	57	55	49	54	31	35	34	28
165	Woodchip Plant 1-Woodchip Plant 1 - East Facade	271576.8	6142905.9	4	83	32	40	40	46	52	54	68	81	68	70	69	73	65	71	68	66	62	64	53	48	48	44	40	43	43	34	26
166	Woodchip Plant 1-Woodchip Plant 1 - North Facade	271558.7	6142911.3	6.2	89	30	35	40	51	57	59	73	87	73	75	75	78	70	76	74	71	67	69	58	54	53	49	46	48	48	39	32
167	Woodchip Plant 1-Woodchip Plant 1 - Roof East	271568.6	6142904.3	12	93	40	45	50	55	61	63	77	90	77	79	79	82	74	80	78	75	71	73	62	58	57	53	50	52	52	43	36
168	Woodchip Plant 1-Woodchip Plant 1 - Roof West	271552.1	6142901.2	12	93	40	45	50	55	61	63	77	90	77	79	79	82	74	80	78	75	71	73	62	58	57	53	50	52	52	43	36
169	Woodchip Plant 1-Woodchip Plant 1 - South Facade	271561.9	6142894.2	6.2	83	30	35	40	46	52	54	68	81	68	70	69	73	65	71	69	66	62	64	53	49	48	44	41	43	43	34	27
170	Woodchip Plant 1-Woodchip Plant 1 - West Facade	271543.8	6142899.6	4	83	32	40	40	46	52	54	68	81	68	70	69	73	65	71	68	66	62	64	53	48	48	44	40	43	43	34	26
171	Woodchip Plant 2-Woodchip Plant 2 - East Facade	271617.1	6142938.8	7.9	73					57			70			59			60			64			64			52			41	
172	Woodchip Plant 2-Woodchip Plant 2 - North Facade	271577	6142943.4	6	76					60			73			62			63			67			68			56			46	
173	Woodchip Plant 2-Woodchip Plant 2 - Roof North	271578.3	6142937.2	15.5	77					61			74			63			64			68			69			57			47	
174	Woodchip Plant 2-Woodchip Plant 2 - Roof South	271581	6142924.7	15.5	77					61			74			63			64			68			68			57			47	
175	Woodchip Plant 2-Woodchip Plant 2 - South Facade	271582.3	6142918.5	6	76					60			73			62			64			67			68			56			46	
176	Woodchip Plant 2-Woodchip Plant 2 - West Facade	271542.2	6142923	7.9	73					57			70			59			60			64			64			52			41	

Appendix E—Grid Noise Maps



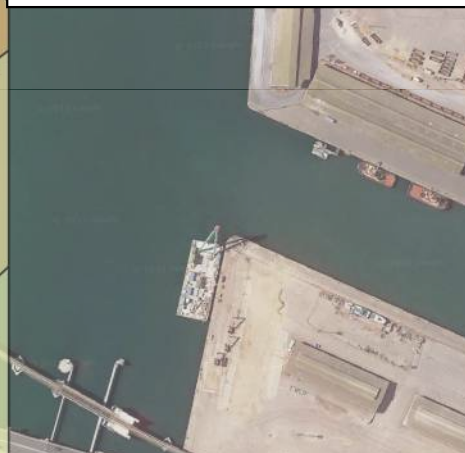
0 100 200 m

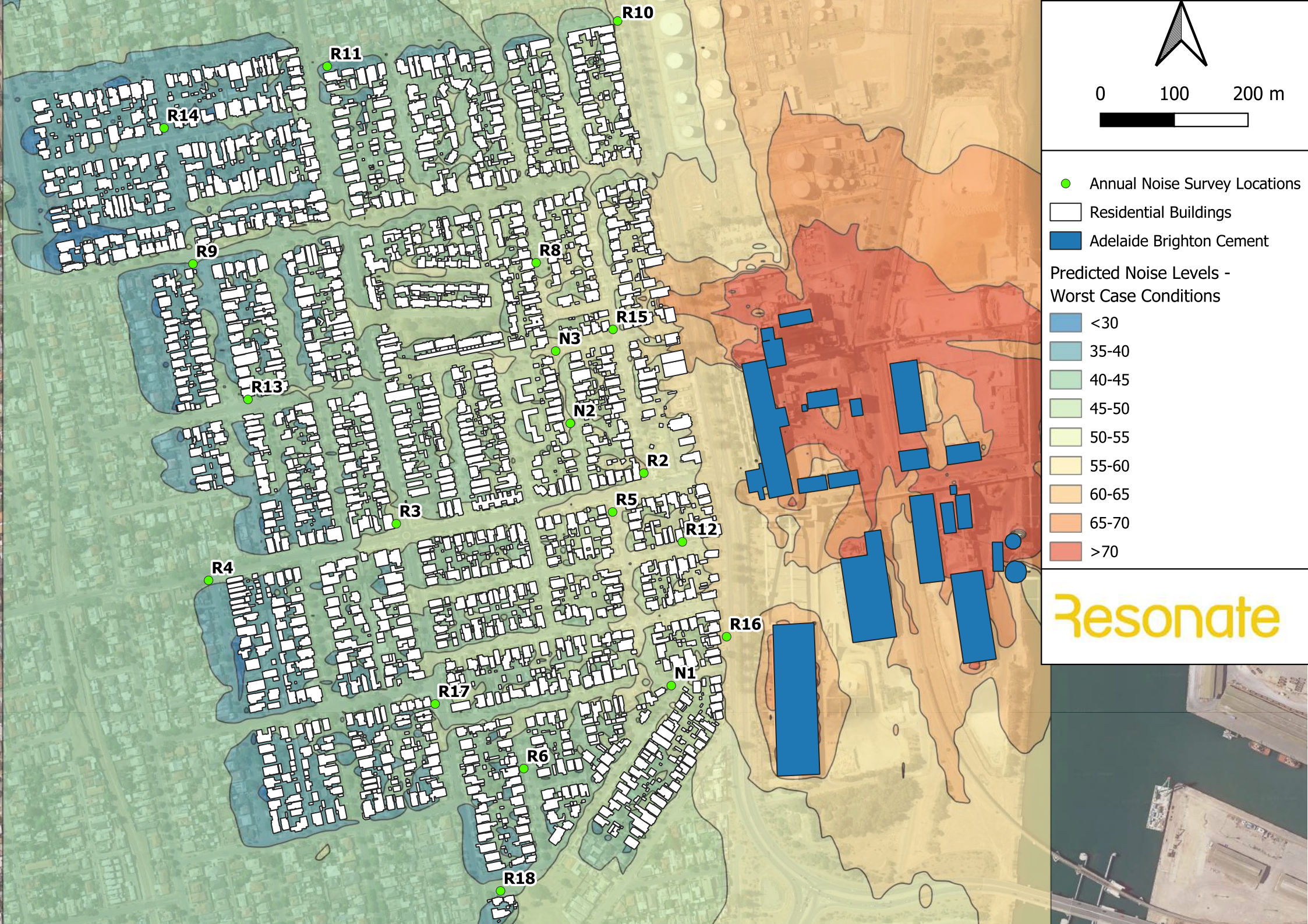
- Annual Noise Survey Locations
- Residential Buildings
- Adelaide Brighton Cement

Predicted Noise Levels - Neutral Conditions

- <30
- 35-40
- 40-45
- 45-50
- 50-55
- 55-60
- 60-65
- 65-70
- >70

Resonate




R10
R11
R14
R9
R8
R15
N3
R13
N2
R2
R3
R5
R12
R4
R16
N1
R17
R6
R18
0
100
200 m
Annual Noise Survey Locations
Residential Buildings
Adelaide Brighton Cement
Predicted Noise Levels -
Worst Case Conditions
<30
35-40
40-45
45-50
50-55
55-60
60-65
65-70
>70
Resonate