Resonate

Americold Prospect Expansion (New Cold Storage Building)

Noise and Vibration Assessment

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Revision Table

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A	14/07/2022	Final issue	Alex Salazar	Raymond Sim
B	23/08/2022	Additions after DPE comments	Alex Salazar	Raymond Sim
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Glossary

AWS	Automatic Weather Station
BOM	Bureau of Meteorology
DA	Development Application
EIS	Environmental Impact Statement
EPA	Environment Protection Authority
ICNG	Interim Construction Noise Guideline
NML	Noise Management Level
NPI	Noise Policy for Industry
NSW	New South Wales
OOHW	Out-of-Hours Work
PPV	Peak Particle Velocity
RBL	The RBL is the overall single figure background level representing each assessment period (day, evening and night) over the whole monitoring period (as opposed to over each 24-hour period used for the ABL). This is the level used for assessment purposes. It is the median value of: • All the day assessment background levels over the monitoring period for the day; • All the evening assessment background levels over the monitoring period for the evening; or • All the night assessment background levels over the monitoring period for the night.
RMS	Roads and Maritime Services
RNP	Road Noise Policy
SPL	Sound Pressure Level
SWL	Sound Power Level
VC	Generic Vibration Criterion
VDV	Vibration Dose Values
VML	Vibration Management Level

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1 Introduction

Americold Logistics Ltd (Americold) operates an existing cold storage warehousing facility at 554-562 Reservoir Road, Prospect (Lot 101 in DP851785). Americold is proposing to expand its refrigerated warehouse distribution facility (the Project).

Resonate Consultants (Resonate) has been engaged by Beca Consultants Pty Ltd (Beca) on behalf of Americold to undertake an Environmental Impact Statement (EIS) noise and vibration assessment for the construction and operation of the proposed distribution facility expansion. This noise and vibration assessment report is to form part of the Project's EIS documentation for submission to the NSW Department of Planning and Environment (DPE).

1.1 Objectives

The DPE issued the Planning Secretary's Environmental Assessment Requirements (SEARS) for the proposed development on 23 December 2021. As part of the SEARS, the following Noise & Vibration requirements are to be addressed:

- A quantitative noise and vibration impact assessment undertaken by a suitably qualified person in accordance with the relevant Environment Protection Authority (EPA) guidelines and including an assessment of nearby sensitive receivers
- Cumulative impacts of proposed onsite operations combined with other existing and proposed developments in the locality; and
- Details of proposed mitigation, management and monitoring measures

The objectives of this report are to address the SEARs requirements above by providing an assessment of potential noise and vibration impacts associated with the construction and operations of the Project and to recommend in-principle feasible and reasonable noise reducing mitigation, management and safeguards measures. These recommendations would be designed to ensure that the construction and operations of the Project are carried out within the noise and vibration limits established in this report.

Noise and vibration assessments would be undertaken based on the concept design information, site and layout plans and equipment lists and maunfacturers' specifications provided by Beca and the project team.

1.2 Scope of works

The scope of the assessment incorporated the following tasks which are detailed in this report:

- Noise survey of the existing ambient noise environment and identification of potentially most affected residential locations in the vicinity of the Project. (Section 3)
- Establishment of project specific noise and vibration criteria at the receiver locations for compliance with relevant noise policy and guidelines. (Section 5)
- Determining the extent of construction noise and vibration, and operational noise impacts (if any) associated with Project. (Sections 6 & 7 respectively)
- Recommendation of in-principle mitigation measures to be implemented to ensure compliance with the noise criteria. (Section 8)

The operational noise assessment in this report would focus on the operational activities external of the facility building, as production activities and equipment used within the buildings are fairly quiet and would be attenuated by the external facades of the buildings. The dominant operational noise sources from the Project would be due to external activities and external plant and equipment, which would include refrigeration plant, cooling towers, forklifts, delivery trucks and loading/unloading activities. Noise impacts from vehicle movement external of the Project site, i.e. on public roads, associated with the construction and operation of the facility would also be assessed.

2 The Project

Americold proposes to extend its existing temperature-controlled warehouse facility at 554-562 Reservoir Road, Prospect NSW. The purpose of the development is to provide additional cold storage capacity to meet existing and future predicted demand. The proposed development comprises of the following:

- A new 5,140m² freezer building extension and annexe to the east of the existing southern warehouse. The extension is intended to provide capacity for approximately 13,450 frozen pallets and will include upgrades to the refrigeration system to service the new freezer building extension and annexe.
- A new battery storage room to enable the charging, storage and changeover of batteries used for materials handling equipment.
- Alterations to the site access, parking and loading arrangements including:
  - Construction of a new staff and visitor site access, to eliminate traffic conflicts between heavy and passenger vehicles.
  - Construction of 93 new staff/visitor vehicle carparks (including three accessible spaces) to the north and east of the existing northern warehouse.
  - Construction of two new accessible carparks adjacent to the existing office building.
  - Upgrade of the existing site access road, including:
    - Sealing of the southern and eastern portions of the site access road with heavy duty pavement;
    - Construction of new Armco barriers protecting the power poles to the east of the site;
    - Repaving of the existing car parking access.
    - Minor corner modifications to enhance truck turning and manoeuvrability.
  - New boom gates.
  - Construction of new loading docks.
  - Construction of a new heavy vehicle turnaround and 12 new trailer parking spots to the east of the existing northern warehouse.
- A new pump house and two new firewater tanks.
- A new timber pallet storage area with 3m high masonry walls.
- A new staff outdoor seating area with awning.
- A new security office with boom gates
- A new weighbridge
- A new satellite plant area for the southern building expansion, which will include compressors, suction accumulators and water pumps.
- Internal refurbishment of the existing staff amenities, lunchroom/outdoor eating area and locker room, located in an existing building to the immediate west of the southern warehouse.
- Additional site landscaping

Once the project is complete, the expanded facility would continue as a warehouse facility with increased storage capacity. The proposed hours of operation for the expanded facility are to be 24 hours a day for 7 days a week.

The facility is bounded by industrial premises to the north, south and east, the Prospect Highway along the western boundary and the M4 Western Motorway further to the north.

The nearest sensitive receivers have been identified to be the following:

- One storey residence at 568 Reservoir Road, Prospect located adjacent to the northern site boundary.
- One storey residence at 566 Reservoir Road, Prospect located adjacent to the northern site boundary.
- Two storey residence at 533 Reservoir Road, Prospect located to the west of the site, approximately 100 m from the northwest site boundary.
- One storey residence at 525 Reservoir Road, Prospect located to the west of the site, approximately 280 m from the northwest site boundary.

- One storey residence at 544 Reservoir Road, Prospect located to the west of the site, approximately 250 m from the northwest site boundary.
- One storey residence at 517 Reservoir Road, Prospect located to the west of the site, approximately 330 m from the northwest site boundary.
- One storey residence at 24 Watch House Road, Prospect located to the northwest of the site, approximately 530 m from the northwest site boundary.
- Two storey residences approximately 500 m from east boundary located along Muttong Street, Pemulwuy
- Child care centre known as Berry Patch Preschool and Long Day Care Centre at unit 38/2-4 Picrite Close located to the southwest of the site, approximately 80 m from the western boundary.

We note that for the residences along Muttong Street their backyards face the direction of the project site and Clunies Ross Road. The east side of Clunies Ross Road has a noise barrier wall which will attenuates noise from the operation of the adjacent industrial facilities (including the project site) at these residences.

The nearest sensitive receivers in relation to the Project site are shown in Figure 1 below.

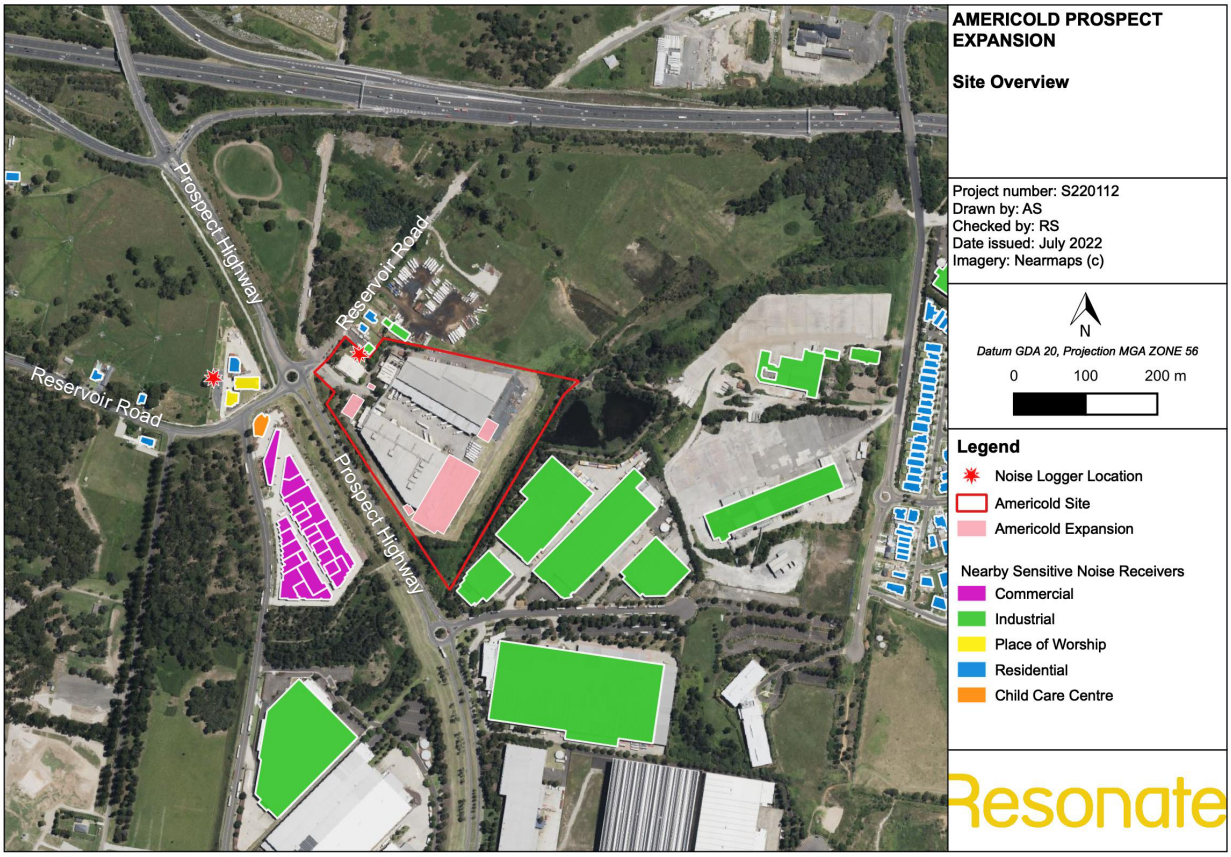

Figure 1 Site location and surrounding environment

3 Baseline Noise Survey

3.1 Unattended noise monitoring

In order to characterise the existing acoustical environment of the area unattended noise monitoring was conducted between the dates of 30 March 2022 and 12 April 2022 in accordance with Fact Sheet A and B of the NSW Environmental Protection Agency's (EPA) *Noise Policy for Industry* (NPI), 2017.

The noise monitors were set on A-weighted fast response mode. Noise monitors were field calibrated before and after the measurements using a Rion Type NC-73 calibrator. No significant drift was recorded. Noise monitoring was conducted at the following locations as shown in Figure 1 to determine the existing acoustic environment at the reasonably most-affected residences:

- Location 1 – a Rion NL-52 (Serial Number: 820994) was installed on site at the rear of the Australian Support Centre Building within the Americold facility. This monitor location is approximately aligned with the nearest residential receiver on Reservoir Road located at 566 Reservoir Road, Prospect and will be used to determine the existing acoustic environment at this receiver.
- Location 2 – a Rion NL-21 (Serial Number: 409176) was installed 130 m west of the project site at the rear boundary of the residence located at 533 Reservoir Road, Prospect to determine the existing acoustic environment at this receiver.

The noise monitoring determines L_{A1}, L_{A10}, L_{A90} and L_{Aeq} levels of the ambient noise. L_{A1}, L_{A10}, L_{A90} are the levels exceeded for 1%, 10% and 90% of the sample time respectively (see acoustic terminology for definitions in Appendix A). The graphs show measured values of L_{A1}, L_{A10}, L_{A90} and L_{Aeq} for each 15-minute monitoring period and are presented in Appendix B.

3.1.1 Noise from existing premises

In accordance with Fact Sheet A of the NPI for the assessment of existing premises, the noise from the existing premises should be excluded from background noise measurements. However, Fact Sheet A also notes that there is an exception where the premises has been operating for a significant period of time and is considered a normal part of the acoustic environment it may then be included in the background noise assessment under the following circumstances:

- The development must have been operating for a period in excess of 10 years in the assessment period/s being considered and is considered a normal part of the acoustic environment; and,
- The development must be operating in accordance with noise limits and requirements imposed in a consent or license and/or be applying best practice.

We note that the facility has been in operation for a period in excess of 10 years and is operating in accordance with the noise requirements imposed by the Council of the City of Holroyd's (superseded by Cumberland City Council) Development Consent (DA) 95/114 dated 11 May 1995, specifically conditions 6 & 7 presented below:

> 6. HOURS OF OPERATION: The use shall operate between the core hours of 5.00am to 6.00pm Monday to Friday.
>
> However, it is acknowledged that truck movements will occur outside of these hours. Council reserves the right to review these hours of operation in the event that noise nuisance complaints are lodged with Council.
>
> 7. UNREASONABLE NOISE: The industry shall be conducted so as to avoid unreasonable noise and cause no interference to adjoining industrial occupations. Special precautions must be taken to avoid nuisance in neighbouring residential areas, particularly from warning sirens, public address systems, heavy-duty compressors and the like.

Based on the above and in accordance with Fact Sheet A the noise from the existing premises will note need to be excluded from the background noise measurements.

3.2 Weather conditions

It is a requirement that noise data is captured during periods of favourable weather conditions avoiding adverse impacts of wind and rain on background noise levels. To assess weather conditions for the measurement period, half-hourly weather data was obtained from the Bureau of Meteorology (BOM) weather observation station ID 66195 at Sydney Olympic Park, located approximately 13 kilometres south-east of the facility, were used to perform this filtering.

Noise data has been excluded from the processed results if:

- Rain was observed during a measurement period, and/or
- Wind speed exceeded 5 m/s (18 km/h) at the measurement height of 1.5 m above ground. Wind data obtained from the BOM is presented as the value at 10 m above ground.

The BOM wind speed data obtained for this report was measured at a height of 10 m above ground level. It is therefore necessary to apply a correction factor in order to estimate the wind speed at the height of the logger (1.5 m).

The methodology to formulate a correction factor has been derived[1]. The correction multiplier for the measured wind speed at 10 m is derived by the following formula:

$$W_{1.5} = W_{10} \times \left(\frac{M_{1.5,cat}}{M_{10,cat}} \right)$$

where:

$W_{1.5}$ = Wind speed at height of 1.5 m
W_{10} = Wind speed at height of 10 m
$M_{1.5,cat}$ = AS 1170 multiplier for receiver height of 1.5 m and terrain category
$W_{10,cat}$ = AS 1170 multiplier for receiver height of 10 m and terrain category

Noise monitoring data that has been excluded due to adverse weather conditions is identified in the overall summary and daily noise monitoring graphs presented in Appendix B.

3.3 Results of unattended noise monitoring

A representative noise level for each day, evening and night of the monitoring period for the L_{A90} background noise levels and the L_{Aeq} ambient noise levels are presented in Table 1 and Table 2 respectively in accordance with the methods described in the NPI. The NPI notes that the representative noise level (for the background noise levels) is known as the assessment background level (ABL).

Noise data affected by excessive wind or rain (as noted on the attached graphs in Appendix B) have been excluded from the calculation in accordance with the NPI. Where no level is indicated in Table 1 and Table 2 these periods were either incomplete or the period was weather affected and invalid. It is noted that the Sydney Olympic Park weather station was used to obtain weather information.

[1] Gowen, T., Karantonis, P. & Rofail, T. (2004), *Converting Bureau of Meteorology wind speed data to local wind speeds at 1.5m above ground level*, Proceedings of ACOUSTICS 2004

Table 1 Assessment Background Level (ABL) from noise monitoring data

Logger Location	Date	Assessment Background Level (ABL) – L_{90} dB(A)[1][2]		
		Day 7:00 am - 6:00 pm	Evening 6:00 pm - 10:00 pm	Night 10:00 pm - 7:00 am
Location 1 – Northern boundary of the Project site	Wednesday 30 March, 2022	-	-	-
	Thursday 31 March, 2022	-	-	-
	Friday 01 April, 2022	-	53	48
	Saturday 02 April, 2022	53	52	51
	Sunday 03 April, 2022	53	54	50
	Monday 04 April, 2022	54	53	52
	Tuesday 05 April, 2022	54	53	51
	Wednesday 06 April, 2022	-	-	-
	Thursday 07 April, 2022	-	-	-
	Friday 08 April, 2022	-	-	-
	Saturday 09 April, 2022	-	55	-
	Sunday 10 April, 2022	52	52	51
	Monday 11 April, 2022	54	53	50
	Tuesday 12 April, 2022	54	53	-
Location 2 – rear boundary of 533 Reservoir Road, Prospect	Wednesday 30 March, 2022	-	-	-
	Thursday 31 March, 2022	-	-	-
	Friday 01 April, 2022	-	50	46
	Saturday 02 April, 2022	50	52	49
	Sunday 03 April, 2022	52	54	50
	Monday 04 April, 2022	50	52	50

Logger Location	Date	Assessment Background Level (ABL) – L_{90} dB(A)(1)(2)		
		Day 7:00 am - 6:00 pm	Evening 6:00 pm - 10:00 pm	Night 10:00 pm - 7:00 am
	Tuesday 05 April, 2022	50	47	45
	Wednesday 06 April, 2022	-	-	-
	Thursday 07 April, 2022	-	-	-
	Friday 08 April, 2022	-	-	-
	Saturday 09 April, 2022	-	54	-
	Sunday 10 April, 2022	47	52	48
	Monday 11 April, 2022	51	47	46
	Tuesday 12 April, 2022	50	47	

(1) LA90 – Noise level present for 90% of time (background level). The average minimum background sound level (in the absence of the source under consideration).

(2) All values expressed as dB(A) and rounded off to nearest 1 dB(A).

Table 2 Daily ambient noise levels from noise monitoring data

Logger Location	Date	Daily Ambient Noise Level (ABL) – L_{eq} dB(A)(1)(2)		
		Day 7:00 am - 6:00 pm	Evening 6:00 pm - 10:00 pm	Night 10:00 pm - 7:00 am
Location 1 – Northern boundary of the Project site	Wednesday 30 March, 2022	-	-	-
	Thursday 31 March, 2022	-	-	-
	Friday 01 April, 2022	-	56	54
	Saturday 02 April, 2022	57	58	55
	Sunday 03 April, 2022	58	59	55
	Monday 04 April, 2022	58	59	56
	Tuesday 05 April, 2022	63	58	57
	Wednesday 06 April, 2022	-	-	-

Logger Location	Date	Daily Ambient Noise Level (ABL) – L_{eq} dB(A)[1][2]		
		Day 7:00 am - 6:00 pm	Evening 6:00 pm - 10:00 pm	Night 10:00 pm - 7:00 am
	Thursday 07 April, 2022	-	-	-
	Friday 08 April, 2022	-	-	-
	Saturday 09 April, 2022	-	60	-
	Sunday 10 April, 2022	55	60	55
	Monday 11 April, 2022	58	59	55
	Tuesday 12 April, 2022	68	58	-
Location 2 – rear boundary of 533 Reservoir Road, Prospect	Wednesday 30 March, 2022	-	-	-
	Thursday 31 March, 2022	-	-	-
	Friday 01 April, 2022	-	55	53
	Saturday 02 April, 2022	56	57	55
	Sunday 03 April, 2022	58	58	57
	Monday 04 April, 2022	58	57	57
	Tuesday 05 April, 2022	57	55	53
	Wednesday 06 April, 2022	-	-	-
	Thursday 07 April, 2022	-	-	-
	Friday 08 April, 2022	-	-	-
	Saturday 09 April, 2022	-	60	
	Sunday 10 April, 2022	69	56	55
	Monday 11 April, 2022	57	54	54
	Tuesday 12 April, 2022	56	54	-

(1) LAeq – Equivalent continuous (energy average) A-weighted sound pressure level. It is defined as the steady sound level that contains the same amount of acoustic energy as the corresponding time-varying sound.

(2) All values expressed as dB(A) and rounded off to nearest 1 dB(A).

The Rating Background Noise Levels (RBL) and overall ambient noise levels representing the day, evening and night assessment periods over the entire monitoring period have been determined with the methods described in the NPI and using the results presented in Table 1 and Table 2. A summary of the overall L_{A90} RBL and L_{Aeq} ambient noise level results from the unattended noise monitoring are presented in Table 3.

Table 3 Unattended noise monitoring results

Logger Location	Measurement Descriptor	Measured Noise Level – dB(A)(3)		
		Day 7:00 am - 6:00 pm	Evening 6:00 pm - 10:00 pm	Night 10:00 pm - 7:00 am
Location 1 – Northern boundary of the Project site	Ambient noise level L_{Aeq}(1)	62	57	55
	RBL (L_{A90})(2)	50	52	48
Location 2 – rear boundary of 533 Reservoir Road, Prospect	Ambient noise level L_{Aeq}(1)	62	59	55
	RBL (L_{A90})(2)	54	53	51

(1) The overall ambient noise level was determined by taking the logarithmic average value of the corresponding day/evening/night daily ambient noise levels.

(2) The RBL was determined by taking the median value of the corresponding day/evening/night ABLs.

(3) All values expressed as dB(A) and rounded off to nearest 1 dB(A).

3.4 Operator attended noise measurements

Operator attended noise measurements were conducted at the noise logging locations and other on-site locations on 30 March and 21 April 2022. Instrumentation for the surveys comprised of a Brüel and Kjaer sound level meter (serial number 3028219) fitted with microphone windshield.

Pre and post calibration measurement reference signals were applied with no shift recorded. The instrument set is within manufacturers' calibration (calibration certification can be provided upon request). Meteorological conditions during the attended noise measurements were observed to be satisfactory, with calm conditions determined to not have an adverse effect or influence on measured noise levels.

3.4.1 Logger location noise measurements

Attended noise measurement at the logger location was conducted to understand the broader acoustical environment better and to ensure that the unattended noise logging device was not under the influence of the extraneous noise sources. The off-site attended noise measurement locations are indicated in Figure 1.

Each measurement was of 15 minutes duration and time synchronised to the noise logging device to allow for comparison of measured values.

The sound level meter was set to show instantaneous noise levels throughout each measurement, with noise events noted by the operator. Overall 15-minute acoustical and statistical parameters were recorded by the device in dB(A) with L_{max}, L_{min}, L_{eq}, L_1, L_{10} and L_{90} values captured as a minimum. The results of operator attended noise measurements are presented in Table 4 below.

Table 4 Operator attended off-site noise measurements

Location	Date	Start and end time	Measured Existing Noise Levels, dB(A)(1) (Operator Attended Measurements)			
			L_{max}	L_{eq}	L_{10}	L_{90}
Location 1 – Northern boundary of the Project site	30/03/2022	02:45 pm to 03:00 pm	72	59	61	56
Location 2 – rear boundary of 533 Reservoir Road, Prospect	30/03/2022	04:15 pm to 04:30 pm	71	57	59	53

(1) All values expressed as dB(A) and rounded off to nearest 1 dB(A).

The results of the logger location attended noise measurements show that the L_{90} noise level at the location 1 (logger location) is fairly similar to the L_{90} noise level at location 2. It is noted that the operational noise of the existing facility had influenced the attended noise levels measured at Location 1 which can be seen in the L_{90} results. Observations made at Location 2 were that operational noise from the existing facility was not audible and the noise environment was dominated by road traffic noise on Prospect Highway.

3.4.2 On-site noise measurements

The on-site operator attended noise measurements were conducted to determine existing operational noise sources. The results of these measurements and their primary noise sources are presented Table 5 below. These measurements were used to predict future cumulative (existing and new) operational noise as outline in Section 7.

Noise measurements were conducted in general accordance with AS 1055:2018 *Acoustics-Description and measurement of environmental noise*. Near-field noise measurements of the existing plant and equipment were conducted outdoor of the existing northern and southern facility buildings away from Reservoir Road. During the noise measurements, there were no extraneous noise sources and only the plant / equipment being measured was operational. It is our understanding that during the measurements, the plant items were generally in typical operation mode and the most noise sources, with the exception of a few sources, were observed to be generally broadband in nature and were not perceived to have any annoying characteristics. Noise characteristics of sources were analysed in Section 3.5.

During the on-site noise measurements, there were no drivers using engine compression braking to slow or stop. Therefore, truck engine compression braking noise could not be measured. Resonate has also been advised by Americold's on-site personnel that engine compression braking in the existing Prospect facility is very uncommon.

The results from the measured near-field source noise measurements are presented Table 5. The 1/3 octave band frequency noise level results are presented in Appendix C and have been used in the model.

Table 5 Near-filed source noise measurements

ID	Description of noise source	Measurement distance – m	Measured noise levels – dB(A)(1)		
			L_{A90}	L_{Aeq}	L_{Amax}
1	Forklift reversing with alarm	2	65	72	80
2	Forklift driving forward	2	59	64	70
3	Forklift loading & unloading	1	55	68	87
4	Forklift horn	2	64	84	97
5	Truck 1 trailer freezer motor only	1.5	83	83	84
6	Truck 2 trailer freezer motor only	1.5	81	81	82
7	Truck idling no trailer freezer motor	1.5	84	85	88
8	Truck idling with trailer freezer motor	1.5	86	87	89
9	Truck driving at approx. 10 km/hr	1	77	80	85
10	Truck reversing with alarm	1.5	78	83	87
11	Truck reversing no alarm	1	67	71	75
12	Truck passby - accelerating	3	76	83	87
13	Existing southern plant room and pump	1	66	67	71
14	Existing northern warehouse plant room (louvres)	6	70	71	76
15	Existing northern warehouse rooftop plant	3	72	73	74

(1) All values expressed as dB(A) and rounded off to nearest 1 dB(A).

3.5 Source noise characteristic analysis

3.5.1 Tonal noise and low frequency noise analysis

The measured near-field source noise profile has been analysed, adopting guidance from the NPI for the determination of potential tonal noise and low frequency noise characteristics. The 1/3 octave band frequencies noise levels of each plant are presented in the Appendix C.

Analysis of the noise profiles show that all plant measured have no low frequency characteristic. Most of the measured plant were found to have no tonal characteristics expect for the following plant:

- Forklift Reversing with Alarm – tonal at 2.5 kHz
- Forklift Loading & Unloading – tonal at 2.5 kHz
- Forklift Horn – tonal at 400 Hz and 800 Hz
- Plant Room – tonal at 400 Hz and 630 Hz

Therefore, where the predicted operational noise levels at the most affected residences are to have any of the above tonal characteristics, the modifying correction factor in accordance with the NPI will be applied.

3.5.2 Intermittent noise analysis

The measured near-field source noise have been analysed, adopting guidance from the NPI for the determination of potential intermittent noise characteristic. The noise levels of each plant have been analysed to determine if the levels vary by more than 5 dB, and where levels are found to vary by more than 5 dB the plant is deem to have intermittent characteristic. The intermittent noise analysis is presented in Table 6.

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Table 6 Intermittent noise analysis

ID	Description of noise source	Measured noise levels – dB(A)(1)			Observation	Intermittent noise
		L_{A90}	L_{Aeq}	L_{Amax}		
1	Forklift reversing with alarm	65	72	80	Intermittent	Yes
2	Forklift driving forward	59	64	70	Intermittent	Yes
3	Forklift loading & unloading	55	68	87	Intermittent	Yes
4	Forklift horn	64	84	97	Intermittent	Yes
5	Truck 1 trailer freezer motor only	83	83	84	Steady noise source	No
6	Truck 2 trailer freezer motor only	81	81	82	Steady noise source	No
7	Truck idling no trailer freezer motor	84	85	88	Steady noise source	No
8	Truck idling with trailer freezer motor	86	87	89	Steady noise source	No
9	Truck driving at approx. 10 km/hr	77	80	85	Intermittent	Yes
10	Truck reversing with alarm	78	83	87	Intermittent	Yes
11	Truck reversing no alarm	67	71	75	Intermittent	Yes
12	Truck passby - accelerating	76	83	87	Intermittent	Yes
13	Existing southern plant room and pump	66	67	71	Steady noise source	No
14	Existing northern warehouse plant room (louvres)	70	71	76	Steady noise source	No
15	Existing northern warehouse rooftop plant	72	73	74	Steady noise source	No

(1) All values expressed as dB(A) and rounded off to nearest 1 dB(A).

4 Noise and Vibration Policies, Guidelines and Standards

The construction and operational assessments presented in this report have been conducted with due regard to and in general accordance with the following policy, guidelines and standards.

4.1 NSW Interim Construction Noise Guideline

The NSW Department of Environment and Climate Change – *Interim Construction Noise Guideline* (ICNG), presents an accepted method by which construction noise impacts may be assessed for a range of receptor types for works completed in NSW. It provides a set of recommended standard hours of construction, as reproduced below:

- Monday to Friday: 7 am to 6 pm.
- Saturday: 8 am to 1 pm.
- No work on Sundays or public holidays.

The ICNG encourages works to occur within the recommended standard hours of construction unless justification is provided. It focuses on minimising construction noise impacts, rather than only on achieving numeric noise levels, and recognises that some noise from construction sites is inevitable.

The ICNG encourages organisations involved with construction, maintenance or upgrading works (e.g. large scale contractors or Government agencies) to develop their best-practice techniques for managing construction noise and vibration, and implementing feasible and reasonable mitigation measures.

In this case, the ICNG is the suitable guideline document to quantitatively assess potential noise emissions and impacts associated with project construction. The ICNG assessment methodology has been adopted to develop project-specific construction noise management levels (refer Section 5), assess potential impacts (refer Section 6) and recommend any necessary mitigation, management measures or provisions for monitoring (refer Section 8).

Table 7 details the construction noise management levels guidance for residential noise sensitive receptors developed in accordance with ICNG.

Table 7 Construction airborne noise management levels for residential receivers

Time of Day	Noise Management Level, $L_{Aeq,\ 15\ minute}$ – dB(A)	How to Apply
Recommended standard sours: Monday to Friday 7 am to 6 pm Saturday 8 am to 1 pm No work on Sundays or Public Holidays	Noise affected Rating Background Level (RBL) + 10 dB(A)	The noise affected level represents the point above which there may be some community reaction to noise. Where the predicted or measured $L_{eq,\ 15\ minute}$ is greater than the noise affected level, the proponent should apply all feasible and reasonable work practices to meet the noise affected level. The proponent should also inform all potentially impacted residents of the nature of works to be carried out, the expected noise levels and duration, as well as contact details.
	Highly noise affected 75 dB(A)	The highly noise affected level represents the point above which there may be a strong community reaction to noise.

Time of Day	Noise Management Level, $L_{Aeq,\ 15\ minute}$ – dB(A)	How to Apply
		Where noise is above this level, the relevant authority (consent, determining or regulatory) may require respite periods by restricting the hours that the very noisy activities can occur, taking into account: times identified by the community when they are less sensitive to noise (such as before and after school for works near schools, or mid-morning or mid-afternoon for works near residences if the community is prepared to accept a longer period of construction in exchange for restrictions on construction times.
Outside recommended standard hours	Noise affected Rating Background Level (RBL) + 5 dB(A)	A strong justification would typically be required for works outside the recommended standard hours. The proponent should apply all feasible and reasonable work practices to meet the noise affected level. Where all feasible and reasonable practices have been applied and noise is more than 5 dB(A) above the noise affected level, the proponent should negotiate with the community. For guidance on negotiating agreements see section 7.2.2 of the ICNG.

4.2 Noise Policy for Industry

Responsibility for the control of noise emissions in NSW is typically vested in Local Government and the NSW Environment Protection Authority (EPA). The *Noise Policy for Industry* (NPI) and relevant application notes provide a framework and methodology for deriving limit conditions for project consent and environment protection licence conditions.

The NPI is designed for large and complex industrial sources and outlines processes designed to strike a feasible and reasonable balance between the operations of industrial activities and the protection of the community from noise levels that are intrusive or unpleasant.

The NPI measurement and evaluation methodology to quantify existing ambient and background noise levels has been adopted for this assessment, with the baseline values utilised to derive construction noise criteria.

4.3 NSW Road Noise Policy

The *NSW Road Noise Policy* (RNP) outlines the range of measures needed to minimise road traffic noise and its impacts. It is intended for use by acoustics specialists as well as:

- Road project proponents.
- Determining authorities and regulators involved in the approval and construction of road projects and land use developments that generate additional traffic on existing roads.

- City and transport planners and policymakers dealing with issues such as route corridors, heavy vehicle transport and building codes.

The RNP aims to identify the strategies that address the issue of road traffic noise from existing roads, new road projects, road redevelopment projects and new traffic-generating developments. In this case, the RNP is considered the suitable document to qualitatively assess potential noise emissions and impacts associated with construction traffic using public roads.

The RNP target noise criteria vary based on road type and are dependent on the development being assessed. The criteria values from the RNP were considered in the assessment of potential construction noise impacts. They are used to provide guidance on potential short-term and temporary impacts associated with heavy vehicle haulage and/or other like vehicles that may be required as part of the construction.

4.4 Potential sleep disturbance issues

As stated in the NPI the potential for sleep disturbance from maximum noise level events generated by premises during the night-time period needs to be considered. The term “sleep disturbance” is considered to be both awakenings and disturbance to sleep stages.

To evaluate potential sleep disturbance or awakening issues associated with the construction of the Project the NPI screening method has been adapted as follows. There is limited potential for sleep disturbance or awakening issues to occur, where:

- The predicted project night-time noise level ($L_{eq,\ 15\ minute}$ in dB(A)) at any residential receptor remains below 40 dB(A) (or the prevailing night-time background noise level plus 5 dB(A)), whichever is the greater.
- The predicted project night-time noise level (L_{max} in dB(A)) at any residential receptor remains below 52 dB(A) (or the prevailing night-time background noise level plus 15 dB(A)), whichever is the greater.

These screening method features have been adopted for likely maximum noise level events from construction vehicles associated with the Project.

4.5 Vibration guidelines and standards

The effects of vibration on buildings can be divided into three main categories: human comfort (annoyance), building damage (cosmetic/structural) and sensitive equipment (scientific/medical). An overview of the applicable standards and guidelines is provided below.

- **Human Comfort (annoyance)**: The NSW Vibration Guideline provides guidance for assessing human exposure (comfort or annoyance issues) to vibration. The publication is based on British Standard (BS 6472–1992) – Evaluation of Human Exposure to Vibration in Buildings (1 Hz to 80 Hz), dated 1992.

- **Cosmetic and Structural Damage**: There is currently no Australian policy or guideline for assessing the potential for building damage (cosmetic and structural) from vibration. The British Standard BS 7385 Part 2-1993 ‘Evaluation and measurement for vibration in buildings Part 2’ has been considered for project works where applicable. BS 7385 provides safe limit guideline values, below which vibration is considered insufficient to cause structural or cosmetic damage to buildings. If a heritage building or structure is found to be structurally unsound a more conservative standard has been adopted i.e. German Standard DIN4150 Part 3-1999 (DIN4150-3) – Structural Vibration - Effects of Vibration on Structures, dated 1999. DIN4150-3 presents a set of safe limit values below which cosmetic or structural damage is unlikely to occur.

  The NSW Vibration Guideline, BS7385 and DIN 4150-3 criteria vary based on vibration type, receptor type and are dependent on the component frequency of the vibration event (refer Section 5). The criteria values from the NSW Vibration Guideline, BS7385 and DIN 4150-3 were considered in the assessment of potential impacts but are not reproduced here.

- **Sensitive Scientific and Medical Equipment**: Some scientific equipment (e.g. electron microscopes and microelectronics manufacturing equipment) can require more stringent objectives than those applicable to human comfort.

  Where manufacturer's data for the identified vibration sensitive scientific and/or medical instruments are not available, generic vibration criterion (VC) curves will be adopted as vibration goals.

  However, as there is no sensitive scientific and medical equipment housed in nearby buildings, the assessment of vibration impacts on sensitive scientific and medical equipment is not relevant and will not be conducted in this study.

Given the distance between the proposed works and the nearest residential noise sensitive receiver, the potential vibration impacts during construction are more concerned with the impact on Human Comfort.

5 Project Specific Management Levels and Criteria

5.1 Construction noise management levels

Construction works for this project would be undertaken in accordance with the ICNG and would typically occur during standard working hours between:

- 0700 to 1800 hours Monday to Friday
- 0800 to 1300 hours on Saturday

There will be no construction works on Sundays or public holidays. Where Out-of-Hours Works (OOHWs) are required (for emergency works, oversized equipment delivery, etc) they would be subject to separate approval on a case-by-case basis.

The project-specific construction "Noise Management Levels" (NML), for works within and outside the recommended standard hours for construction, are presented in Table 8 below. These NML have been established with due regard to the requirements of the ICNG for all identified residential (dwelling) and other sensitive (non-residential) receptors. NML for all periods are provided for completeness despite construction works limited to the recommended standard hours for construction presented in the ICNG. For residential (dwelling) receptors the NML are based on the RBL values and the attended measurements presented in Section 3.

As per Section 4.4 of this report, two thresholds have been considered to establish sleep disturbance criteria based on which impacts to residential receptors can be evaluated.

Table 8 Project specific construction noise management levels (NML)

Receiver Type	Noise Management Levels, $L_{eq,\ 15\ minute}$, dB(A)				High Noise Affected Management Levels, $L_{eq,\ 15\ minute}$, dB(A)	Sleep Disturbance, dB(A)	
	Standard Hours	Out-of-Hours			Daytime (Standard Hours)	Night-time only	
	Day	Day	Evening	Night		$L_{eq,\ 15\ minute}$	L_{max}
Residence at 566 and 568 Reservoir Road, Prospect	60	55	57	53	75	53	63
Residences at 517, 525, 533 and 544 Reservoir Road, Prospect, and 24 Watch House Road, Prospect	64	59	58	56	75	56	66
Residences along Muttong Street	45	40	35	35	75	40	52

Receiver Type	Noise Management Levels, $L_{eq,\ 15\ minute}$, dB(A)				High Noise Affected Management Levels, $L_{eq,\ 15\ minute}$, dB(A)	Sleep Disturbance, dB(A)	
	Standard Hours	Out-of-Hours			Daytime (Standard Hours)	Night-time only	
	Day	Day	Evening	Night		$L_{eq,\ 15\ minute}$	L_{max}
Child care centre	55(1)	55(1)	55(1)	55(1)	-(2)	-(2)	-(2)
Places of worship	55(3)	55(3)	55(3)	55(3)	-(2)	-(2)	-(2)
Commercial	70	70	70	70	-(2)	-(2)	-(2)
Industrial	75	75	75	75	-(2)	-(2)	-(2)

(1) In accordance with the ICNG, the Australian Standard AS 2107:2016 has been used to determine an appropriate internal NML for a child care centre. It is our recommendation that an internal NML of 45 dB(A) be adopted which aligns with the maximum internal design sound level for a teaching space or classroom. A 10 dB(A) difference between inside and outside noise levels has been assumed to determine the external NML for this receiver.

(2) Dash "-" indicates that these criteria do not apply to that receiver type.

(3) The ICNG applies a 45 dB(A) internal noise level as a NML for this receiver. A 10 dB(A) difference between inside and outside noise levels has been assumed to determine the external NML for this receiver.

5.2 Construction vibration management levels

Impacts from vibration can be considered both in terms of effects on building occupants (human comfort) and the effects on the building structure (building damage). Of these considerations, the human comfort limits are the most stringent. Therefore, for occupied buildings, if compliance with human comfort limits are achieved, it will follow that compliance will be achieved with the building damage objectives.

5.2.1 Human comfort

The NSW Vibration Guideline provides guidance for assessing human exposure to vibration. These documents are based on *British Standard (BS 6472–1992) – Evaluation of Human Exposure to Vibration in Buildings (1 Hz to 80 Hz) dated 1992*. The vibration dose values recommended in BS 6472-1992 for which various levels of adverse comment from occupants may be expected are presented in Table 9.

Table 9 Human comfort – vibration dose values (BS 6472)

Location	Assessment Period	Preferred Values		Maximum Values	
		z axis	x and y axes	z axis	x and y axes
Continuous Vibration (m/s²)					
Critical Areas	Daytime or Night-time	0.005	0.0036	0.010	0.0072
Residences	Daytime	0.010	0.0071	0.020	0.014
	Night-time	0.007	0.005	0.014	0.010
Offices, schools, educational institutions and places of worship	Daytime or Night-time	0.020	0.014	0.040	0.028
Workshops	Daytime or Night-time	0.040	0.029	0.080	0.058
Impulsive Vibration (m/s²)					
Critical Areas	Daytime or Night-time	0.005	0.0036	0.010	0.0072
Residences	Daytime	0.30	0.21	0.60	0.42
	Night-time	0.10	0.071	0.20	0.14
Offices, schools, educational institutions and places of worship	Daytime or Night-time	0.64	0.46	1.28	0.92
Workshops	Daytime or Night-time	0.64	0.46	1.28	0.92
Intermittent Vibration (m/s$^{1.75}$)					
Critical Areas	Daytime or Night-time	0.10		0.20	
Residences	Daytime	0.20		0.40	
	Night-time	0.13		0.26	
Offices, schools, educational institutions and places of worship	Daytime or Night-time	0.40		0.80	
Workshops	Daytime or Night-time	0.80		1.60	

(1) Daytime is 7am-10pm and Night-time is 10pm-7am.

(2) For continuous and impulsive vibration, the preferred and maximum values are weighted acceleration values (Wg for z-axis and Wd for x and y-axis)

(3) For intermittent vibration, the preferred and maximum values are Vibration Dose Values (VDVs), based on the weighted acceleration values

5.2.2 Building damage

German Standard DIN 4150-3-1999 Structural Vibration – Part 3 Effects of vibration on structures provides methods for evaluating the effects of vibration on structures in the absence of an Australian Standard.

The recommended limits (guide values) from DIN 4150 for transient vibration to ensure minimal risk of cosmetic damage to residential and industrial buildings are presented in Table 10.

Table 10 Guideline vibration values for short term vibration on structures (mm/s)

Type of Building	Guideline values for velocity (mm/s)			
	1 to 10 Hz	10 to 50 Hz	50 to 100 Hz	Vibration at horizontal plane of highest floor at all frequencies
Commercial and Industrial Building	20	20-40	40-50	40
Dwellings and buildings of similar occupancy or design	5	5-15	15-20	15
Structures that, because of their particular sensitivity to vibration cannot be classified under lines 1 and 2 and are of great intrinsic value	3	3-8	8-10	8

5.3 Road noise criteria

The RNP provides guidance, criteria and procedures for assessing noise impacts from existing, new and redeveloped roads and traffic generating developments. The assessment of road traffic noise impacts on public roads is assessed under the RNP.

The RNP details a number of noise assessment criteria for various road categories and land uses. Road access to the facility will be via Reservoir Road from Prospect Highway. Reservoir Road would be classified as a local road and Prospect Highway would be classified as a sub-arterial road. Road traffic noise assessment in this report will focus on traffic noise impacts from Reservoir Road on residences along Reservoir Road.

The Application Notes for the RNP state that;

> *'for existing residences and other sensitive land uses affected by additional traffic on existing roads generated by land use developments, any increase in the total traffic noise level as a result of the development should be limited to 2 dB above that of the noise level without the development. This limit applies wherever the noise level without the development is within 2 dB of, or exceeds, the relevant day or night noise assessment criterion.'*

If road traffic noise during the Project construction or operation is within 2 dB(A) of current levels then the objectives of the RNP are met and no specific mitigation measures are required. Where the road traffic noise during the Project construction or operation levels exceed 2 dB(A) of current levels than the consideration should be given to the actual noise levels associated with the Projects construction or operation road traffic and whether or not these levels comply with the RNP criteria as presented in Table 11.

Table 11 RNP residential road traffic noise criteria

Road Category	Type of Project/Land Use	Assessment Criteria – dB(A)	
		Day 7am to 10pm	Night 10pm to 7am
Freeway/arterial/ sub-arterial roads	Existing residences affected by additional traffic on existing freeways/arterial/sub-arterial roads generated by land use developments.	$L_{Aeq,15hr}$ 60 (external)[1]	$L_{Aeq,9hr}$ 55 (external)[1]

(1) The assessment criteria for external noise levels apply at 1 metre from the facade of any affected residential receiver

5.4 Operational noise criteria

The project-specific intrusiveness and amenity noise levels are presented in Table 12 and Table 13 respectively below. These criteria represent the operational noise criteria used to assess potential impacts, with the most stringent of these values adopted as the “Project Noise Trigger Level” (PNTL).

The term PNTL is defined in Section 2.1 of the NPI and considers the lowest of the intrusive or amenity residential receptor criterion so that the most stringent threshold is set concerning existing industrial noise in the area. The PNTL have been established with due regard to the requirements of the NPI for all identified residential (dwelling) and other sensitive (industrial) receptors. PNTL for all times of day and associated assessment periods are provided as operational activities will occur during the daytime, evening and night-time.

5.4.1 Project intrusiveness noise levels

A noise source will be deemed to be non-intrusive if the monitored $L_{eq,\ 15minute}$ noise level of the development does not exceed the RBL by more than 5 dB(A). The RBL is the median of the measured L_{90} noise level during the day, evening and night periods during periods when the development is not in operation.

Based on the project RBL presented in Table 3, the project intrusive noise criteria have been determined and presented in Table 12 below.

Table 12 Project intrusiveness noise criteria

Receiver Type	Intrusive Noise Criteria, $L_{eq,\ 15\ minute}$ dB(A)		
	Day (7 am to 6 pm)	Evening (6 pm to 10 pm)	Night (10 pm to 7 am)
Residence at 566 and 568 Reservoir Road, Prospect	55	57	53
Residences at 517, 525, 533 and 544 Reservoir Road, Prospect, and 24 Watch House Road, Prospect	59	58	56
Residences along Muttong Street	40(1)	35(1)	35(1)

(1) The minimum project intrusiveness noise levels in accordance with the NPI has been adopted for these receivers.

5.4.2 Project amenity noise levels

The project amenity noise levels applicable to the surrounding receivers can be determined with the recommended receiver amenity noise levels listed in Table 2.2 of the NPI by subtracting 5 dB(A). Table 2.2 of the NPI provides guidance on assigning residential receiver noise categories (e.g. rural, suburban, urban). It was noted

Based on the above, the following receiver categories have been determined for surrounding receivers:

- Residences at 566 and 568 Reservoir Road are have been identified to be in an urban industrial interface noise amenity area as they are in close proximity to existing industrial premises known as Americold and are dominated by through-traffic on Prospect Highway and Reservoir Road with characteristically heavy and continuous traffic flows.
- Residences at 517, ,525, 533 and 544 Reservoir Road to the west of the site have been identified to be in an urban noise amenity area as they are dominated by through-traffic on Prospect Highway and Reservoir Road with characteristically heavy and continuous traffic flows during peak period and is near commercial/industrial districts.
- Residence at 24 Watch House Road to the north west of the site has been identified to be in an urban noise amenity area as they are dominated by through traffic on the M4 Motorway (especially the on ramp) and Prospect Highway with characteristically heavy and continuous traffic flows during peak period. As well as being in close proximity to the commercial premises being a water theme park known as Raging Waters Sydney.
- Residences along Muttong Street east of the site are located in planning zone R3 and have been identified to be in a suburban noise amenity area as they primarily have local traffic with characteristically intermittent traffic flows and are near an industrial district.
- St. Mark's Coptic Catholic Church Prospect to the west of the site located at 533 Reservoir Rd, Prospect has been identified as a place of worship.
- Berry Patch Preschool and Long Day Care Centre to the west of the site located at unit 38/2-4 Picrite Close, Pemulwuy
- Furthermore, the existing L_{Aeq} noise levels for each noise logger location are higher than the Amenity Noise Levels defining Urban Residential areas within the NPI which are 60 dB(A), 50 dB(A) and 45 dB(A) during the daytime, evening and night-time respectively.

The above classifications are based on the description of noise environments in the NPI. The project amenity noise criteria are presented in Table 13 below.

Table 13 Project amenity noise criteria

Receiver Type	Noise Amenity	NPI Project Amenity Noise Levels, $L_{eq,\ 15minute}$ dB(A)(1)		
		Day (7 am to 6 pm)	Evening (6 pm to 10 pm)	Night (10 pm to 7 am)
Residence at 566 and 568 Reservoir Road, Prospect	Industrial interface	(65-5+3) = 63	(55-5+3) = 53	(50-5+3) = 48
Residences at 517, 525, 533 and 544 Reservoir Road, Prospect	Urban	(60-5+3) = 58	(50-5+3) = 48	(45-5+3) = 43

Receiver Type	Noise Amenity	NPI Project Amenity Noise Levels, $L_{eq, 15minute}$ dB(A)(1)		
		Day (7 am to 6 pm)	Evening (6 pm to 10 pm)	Night (10 pm to 7 am)
24 Watch House Road, Prospect	Urban	(60-5+3) = 58	(50-5+3) = 48	(45-5+3) = 43
Residences along Muttong Street	Suburban	(55-5+3) = 53	(45-5+3) = 43	(40-5+3) = 38
St. Mark's Coptic Catholic Church Prospect(2)	Place of Worship (When in use)	(60-5+3) = 58	(60-5+3) = 58	(60-5+3) = 58
Berry Patch Preschool and Long Day Care Centre	Classroom (When in use)	(55-5+3) = 53	(55-5+3) = 53	(55-5+3) = 53

(1) In accordance with the NPI a 3 dB(A) is added to the amenity noise level to approximately represent a 15-minute period known as the project amenity noise level, for direct comparison to the intrusiveness criterion.

(2) Internal amenity noise levels have been converted to an external noise level. An inside to outside noise level difference of 20 dB has been assumed as there are no openable windows on the façade facing the Project.

5.4.3 Project Specific NPI Noise Criteria

The PNTL is the lower (or the more stringent) value of the project intrusiveness noise level and project amenity noise level determined in Sections 5.4.1 and (1). The PNTLs are presented in Table 14 below.

Table 14 NPI noise criteria

Receiver	Period	Noise level – dB(A)			
		Recommended amenity noise level L_{eq}	Measured RBL	Project noise trigger level $L_{eq(15minute)}$	
			RBL (1)	Intrusiveness	Amenity (2),(3)
Residence at 566 and 568 Reservoir Road, Prospect	Daytime	65	50	**55**	63
	Evening	55	52	57	**53**
	Night	50	48	52	**48**
Residences at 517, 525, 533 and 544	Daytime	60	54	59	**58**

Receiver	Period	Noise level – dB(A)			
		Recommended amenity noise level L_{eq}	Measured RBL	Project noise trigger level $L_{eq(15minute)}$	
			RBL [1]	Intrusiveness	Amenity [2],[3]
Reservoir Road, Prospect, and 24 Watch House Road, Prospect	Evening	50	53	58	**48**
	Night	45	51	56	**43**
Residences along Muttong Street	Daytime	60	35	**40**	58
	Evening	50	30	**35**	48
	Night	45	30	**35**	43
St. Mark's Coptic Catholic Church Prospect[4]	When in use	60	-[5]	-[5]	**58**
Berry Patch Preschool and Long Day Care Centre[4]	When in use	55	-[5]	-[5]	**53**

(1) RBL = Rating Background Level.

(2) The recommended amenity noise level has been used to determine the project amenity noise level as there are no other industries present or likely to be introduced.

(3) The project amenity noise level is the urban amenity noise level minus 5 dB(A) plus 3 dB(A) to convert from a period to a 15-minute level.

(4) Internal amenity noise levels have been converted to an external noise level. An inside to outside noise level difference of 20 dB has been assumed.

(5) Dash "-" indicates that these criteria do not apply to that receiver type.

5.4.4 Sleep disturbance noise criteria

In addition to the above, the NPI provides an assessment procedure for assessing the potential for sleep disturbances from maximum noise level events generated at the development during the night time period (i.e. between 10:00 pm and 7:00 am). The term "sleep disturbance" is considered to be both awakenings and disturbance to sleep stages.

As recommended in Section 2.5 of the NPI, to assess the potential for sleep disturbances two-stages are recommended to be carried out:

- Step 1 – Where the subject development/premises night-time noise levels at a residential location do not exceed the following then no mitigation is required to prevent sleep disturbances from the project:
  - $L_{Aeq,15min}$ 40 dB(A) or the prevailing RBL plus 5 dB, whichever is the greater, and/or
  - L_{AFmax} 52 dB(A) or the prevailing RBL plus 15 dB, whichever is greater,

From the above the average/maximum noise trigger levels have been determined for the Project and are presented in Table 15. If the noise trigger levels are exceeded, then 'Step 2' which involves a detailed maximum noise level event assessment would be required.

Table 15 Sleep disturbance noise criteria

Receiver Type	$L_{eq,\ 15minute}$ dB(A)	L_{max} dB(A)
Residence at 566 and 568 Reservoir Road, Prospect	53	63
Residences at 517, 525, 533 and 544 Reservoir Road, Prospect, and 24 Watch House Road, Prospect	56	66
Residences along Muttong Street	40	52

- Step 2 – A detailed maximum noise level event assessment is to be undertaken when the average/maximum noise trigger levels are exceeded and should cover the maximum noise level, the extent the maximum noise levels exceeds the RBL, and the number of occurrences during the night time period. As is recommended in the explanatory notes of the NPI, this more detailed sleep disturbance assessment is conducted using the current sleep disturbance research detailed in the EPA Road Noise Policy (RNP). The RNP sleep disturbance research concludes that:
  - Maximum internal noise levels below 50-55dB(A) are unlikely to awaken people from sleep
  - One to two noise events per night with maximum internal noise levels of 60-75dB(A) are not likely to affect health and wellbeing significantly.

6 Construction Noise and Vibration Assessment

This section details the assessment of the construction impacts from the expanded cold storage facility. A preliminary quantitative assessment of potential noise impacts associated with the construction of the proposal has been carried out in accordance with the ICNG. The potential construction noise impacts have been assessed against the project specific construction noise and vibration management levels presented in Section 5.

At the time of the assessment the full construction program had not been finalised. As such, the associated impacts for the different stages of construction and there different noise profiles and impacts are not able to be completely assessed at this stage and should be reassessed at a later stage when confirmed. Instead a high level assessment of the assumed worse case construction noise and vibration impacts from the main construction works associated with the project have been assessed. Where deemed necessary, experience and knowledge of construction practises and standard construction techniques and plant have been applied to the modelled scenarios.

It is understood that construction of the proposal will only be conducted during standard hours. Therefore, noise and vibration impacts will only be assessed against the criteria related to standard hours of construction and the management levels as per the ICNG.

6.1 Construction noise impact

6.1.1 Plant and equipment sound power levels

Plant and equipment sound power levels (SWL) adopted for the construction noise impact assessment of the proposal have been detailed in Table 16 below.

Table 16 Adopted construction source sound power levels

Source	SWL L_{eq} dB(A)	Source	SWL L_{eq} dB(A)
20 tonne Truck	115	20 tonne Excavator	108
Mobile Crane	104	Jackhammer	107[1]
Bobcat	104	Elevated Work Platform	94
Power Tools	95	Backhoe	109
Vibratory Roller	102[1]	Concrete Pump	98
Agitator	96	Generator	99
Air Compressor	105	Vacuum Truck	107

(1) +5 dB correction included in the sound power level to account for ‘annoying’ characteristic.

(2) rounded to nearest 1 dB(A), source; Resonate noise database and UK DEFRA noise database.

The ICNG lists a number of construction activities which have been proven to be “annoying” and which require to have a 5 dB penalty applied to them. Annoying characteristics may include tones, impulses, low frequency noise and intermittent noise. The ICNG identifies the following proposed activities as being particularly annoying and as such, a +5 dB correction has been incorporated into the noise modelling process for the following activities:

- Rock Breaking / Cutting.
- Rolling / Compacting.

6.1.2 Predicted construction noise impacts

Prediction of potential construction noise impacts has been undertaken assuming all noise generating plant are in continuous operation. The predictions represent the worst-case scenario, as the predicted noise levels assumes all plant and equipment occurring concurrently in the same location and for the full assessment period.

It should be noted that in reality, the works would not be likely to be continuous for extended periods of time, and not in the same location, therefore, noise levels would be expected to be lower than the predicted levels.

Given the nature of the local environment and distances between noise source and receiver it has been determined that predicative noise impact assessment can be undertaken through the application of the following noise propagation relationship:

$$SPLreceived = SWLsource - 20\log(r) - 8$$

Where; *SPLreceived* is the noise level from construction works likely to be experienced at the receiver, *SWLsource* is the source noise level and 8 dB is a constant, applied for hemispherical noise propagation in neutral atmospheric attenuation.

The predicted construction noise levels at various distances from the assumed construction works are presented in Table 17. This table can be used as an initial screening test for construction works being undertaken across the site. If the assumed construction works are undertaken within a distance to a receiver that would exceed their NMLs than the appropriate feasible and reasonable noise management and mitigation measures in accordance with the ICNG should be addressed and included in the project's Construction Noise and Vibration Management Plan. It is noted that if the noise profile of the construction activities is known than the assumed *SWLsource* should be corrected for in the calculation.

Table 17 Predicted construction noise levels at various distances

Receiver	Noise impact at distance from the works $L_{eq,15\ minute}$ dB(A)									
	20 m	50 m	60 m	80 m	100 m	150 m	200 m	240 m	300 m	600 m
Surrounding receivers	84	76	75	72	70	67	64	62	61	55

(1) All noise levels rounded to the nearest 1 dB(A)

(2) L_{Aeq} = Equivalent continuous (energy average) A-weighted sound pressure level. It is defined as the steady sound level that contains the same amount of acoustic energy as the corresponding time-varying sound.

Using the prediction method stipulated above the construction noise levels to the sensitive receivers surrounding the project site have been predicted from the main construction works at the south east of the site and are presented in Table 18. This location was chosen as it represents a majority of the proposed construction works including the construction of the southern building extension, satellite plant room, new carpark area and includes external works.

Table 18 Predicted construction noise levels from main construction works

Receiver	Noise management levels $L_{eq,\ 15\ minute}$, dB(A)	Distance (m)	Predicted noise levels $L_{eq,15\ minute}$ dB(A)
566 Reservoir Road, Prospect	Affected - 60 Highly Affected - 75	200	54(1)
568 Reservoir Road, Prospect	Affected - 60 Highly Affected - 75	200	54(1)
517 Reservoir Road, Prospect	Affected - 64 Highly Affected - 75	460	47(1)
525 Reservoir Road, Prospect	Affected - 64 Highly Affected - 75	390	49(1)
533 Reservoir Road, Prospect	Affected - 64 Highly Affected - 75	300	51(1)
544 Reservoir Road, Prospect	Noise affected - 64 Highly noise affected - 75	350	49(1)
24 Watch House Road, Prospect	Noise affected - 64 Highly noise affected - 75	700	43(1)
Residences along Muttong Street	Noise affected - 45 Highly noise affected - 75	530	46(1)
St. Mark's Coptic Catholic Church Prospect (Place of worship)	55	280	61(2)
Berry Patch Preschool and Long Day Care Centre (Child care centre)	55	220	63(2)
2-4 Picrite Close, Pemulwuy (Commercial)	70	100	70
1 Foundation Place, Pemulwuy (Industrial)	75	60	75

(1) The predicted construction noise level has been further reduced by 10 dB(A) due to the shielding from existing buildings and structures.

(2) The predicted noise levels are from the source location at the west boundary (as a worse case) for the main construction works at this receiver which meant that the shielding from existing buildings and structures did not screen the construction activities. At other source locations where the building envelope blocks the line of sight between receiver and the main construction works a further noise reduction of at least 10 dB would be expected at this receiver.

The distance between the main construction works and the nearest residential receiver at 566 Reservoir Road is approximately 200 m. The predicted construction noise level would be further reduced by at least 10 dB(A) due to the shielding from the existing building envelope at the project site. The construction noise level has been predicted to be 54 dB(A) at this receiver which is compliant with the 60 dB(A) NML for standard hours and the 75 dB(A) Highly Noise Affected NML.

The distance between the main construction works and the nearest residential receivers beyond the nearest receiver along Reservoir Road (to the west of the project site) located at 533 Reservoir Road is approximately 300 m. The predicted construction noise level would be further reduced by at least 10 dB(A) due to the shielding from the existing surrounding intervening buildings. The construction noise level at the representative residential receivers has been

predicted to be up to 51 dB(A) which is compliant with the 64 dB(A) NML for standard hours and the 75 dB(A) Highly Noise Affected NML.

The distance between the main construction works and the St. Mark's Coptic Catholic Church Prospect is approximately 280 m. The construction noise level has been predicted to be 61 dB(A) at this receiver which is non-compliant with the external NML of 55 dB(A) $L_{Aeq,15minute}$. It is noted that at other source locations where the building envelope provides attenuation between receiver and the main construction works a further reduction of at least 10 dB would be expected at this receiver.

The distance between the main construction works and the Berry Patch Preschool and Long Day Care Centre is approximately 220 m. The construction noise level has been predicted to be 63 dB(A) at these two child care facilities which is non-compliant with the external NML of 55 dB(A) $L_{Aeq,15minute}$. It is noted that at other source locations where the building envelope provides attenuation between the receivers and the main construction works a further reduction of at least 10 dB would be expected at these receivers.

The distance between the main construction works and the adjoining nearest industrial premises is approximately 60 m. The construction noise levels at these distances are predicted to be up to 75 dB(A). This predicted level is compliant with the industrial NML of 75 dB(A) $L_{Aeq,15minute}$.

For any outside hour works and/or exceedances, feasible and reasonable noise management and mitigation measures in accordance with the ICNG should be addressed in the project's Construction Noise and Vibration Management Plan.

6.2 Construction vibration impacts

It is understood that the vibration-intensive equipment that may be used during the proposal includes compaction equipment such as, a vibratory roller and rock breaking/cutting equipment such as, a jackhammer. Relevant recommended safe setback distances to maintain building cosmetic and human comfort criteria for these types of plant are reproduced below in Table 19.

Table 19 Recommended safe setback distances from relevant vibration generating plant

Plant	Rating / description	Safe working distance (meters)	
		Cosmetic damage (BS7385-2: 1993)	Human response (NSW Vibration Guideline-DECC, 2006)
Vibratory Roller	<50 kN (typically 1-2 t) <100 kN (typically 2-4 t) <200 kN (typically 4-6 t) <300 kN (typically 7-13 t) >300 kN (typically 13-18 t) >300 kN (> 18 t)	5 metres 6 metres 12 metres 15 metres 20 metres 25 metres	15 metres to 20 metres 20 metres 40 metres 100 metres 100 metres 100 metres
Jackhammer	Handheld	1 metre (nominal)	2 metres

The safe working distances presented in Table 19 are indicative only and will vary depending on the particular item of plant and local geotechnical conditions. They apply to typical buildings under typical geotechnical conditions.

The separation distances between the proposed works and the nearest residential buildings and industrial buildings not part of the project site would likely be at least approximately 200 metres and 50 metres respectively.

6.2.1 Cosmetic damage assessment

The separation distance(s) between the proposed works and the nearest receivers will typically be sufficient to ensure that the nearby buildings are unlikely to fall within the safe working distances with regard to 'Cosmetic Damage' for most of the proposed construction equipment.

Any potential construction works to be done within or close to the safe working distances described in Table 19 for cosmetic damage are to be addressed in the project's construction noise and vibration management plan.

6.2.2 Human comfort vibration assessment

In relation to human comfort (response), the safe working distances in Table 19 relate to continuous vibration and apply to residential receivers. For most construction activities, vibration emissions are intermittent in nature and for this reason, higher vibration levels, occurring over shorter periods are permitted (refer British Standard BS 6472 1).

Vibration from the use of small vibratory roller and jackhammer at the nearest receivers is unlikely to be perceptible at times during the works.

Any potential construction works to be done within or close to the safe working distances described Table 19 for human comfort are to be addressed in the project's construction noise and vibration management plan.

6.3 Construction road traffic noise

This section assesses noise impacts from additional traffic generated noise during project construction. An assessment of road noise impact was completed at the Prospect Highway / Reservoir Road intersection. It has been assumed that approximately 20 heavy vehicle trips and up to 50 light vehicle trips may be required each day during the construction of the Project.

In accordance with the RNP (as outlined in Section 5), construction traffic noise criterion is set at not more 2 dB(A) above the existing road traffic noise levels during the daytime and night-time periods, and are considered appropriate to identify the onset of potential noise impacts. Where the road traffic noise levels are predicted to increase by more than 2 dB(A) as a result of construction traffic, consideration would be given to applying feasible and reasonable noise mitigation measures to reduce the potential noise impacts and preserve acoustic amenity.

Traffic noise modelling was completed using measured traffic volume data presented in the *Traffic Impact Assessment Report*, prepared by Beca Pty Ltd, revision no. 002, dated 28 September 2022. This traffic report was prepared for the Americold Prospect South Expansion. Table 5.2 of the traffic report provides figures for the existing traffic volumes at the Prospect Highway / Reservoir Road intersection. The following peak hour traffic volume have been obtained from the traffic report:

- AM Peak – 2,316 vehicles, which includes 501 heavy vehicles (22%)
- PM Peak – 2,088 vehicles, which includes 248 heavy vehicles (11%)

The current posted speed on Prospect Highway and Reservoir Road is 60 km/h. It has been assumed this speed limit will remain unchanged during the construction of the Project.

The following assumptions were used in the construction road traffic noise assessment:

- Additional Project construction traffic:
  - Light: 50 movements per day or 25 movements during peak hour
  - Heavy: 20 movements per day or 10 movements during peak hour

Table 20 below presents the increase in noise levels due to additional vehicles on Prospect Highway and Reservoir Road from the construction of the Project. The increase in noise levels are less than 1 dB which well within the not more than 2 dB(A) increase allowance. Due to the high volume of traffic movement on Prospect Highway and Reservoir Road, it is anticipated that construction road traffic noise associated with the Project would very likely

achieve compliance with the not more than 2 dB(A) increase allowance. Residential receivers along the Reservoir Road are therefore unlikely to be adversely affected by the Project's construction road traffic noise levels.

Table 20 Construction road traffic noise assessment

Location	AM Peak			PM Peak		
	Existing	Existing + construction traffic	Increase in noise level – dB(A)	Existing	Existing + construction traffic	Increase in noise level – dB(A)
Prospect Highway and Reservoir Road intersection	2,316	2,351	< 1	2,088	2,123	< 1

7 Operational Noise Assessment

Activities carried out at the facility may generate noise impacts at nearby sensitive receivers. This section details the assessment of the operational impacts from the existing and new southern expansion of the Americold facility. Operational noise impacts predicted at nearest residential receivers have been assessed against the adopted NPI noise criteria.

7.1 Noise assessment methodology

Potential operational noise impacts from the maintenance facility at surrounding receptors have been modelled using the CONCAWE algorithm within SoundPLAN v8.2. This method is commonly used and accepted by regulatory agencies in NSW.

Terrain has been based on 1 metres LIDAR scans of the area sourced from NSW Spatial Services. Noise sources and receivers have been based on aerial imagery sourced from Google Maps. Building footprints and heights have been based on a combination of aerial imagery, street level photography and site inspections.

The parameters adopted in the noise modelling are presented in Table 21 below.

Table 21 Operational noise modelling parameters

Parameter	Input data
Buildings	• Footprints taken from aerial photography • Typical building heights have been estimated from Google Street-view and site inspections as follows: per floor 3 m, pitched roof 3 metre • Number of floors taken from Google Street-view and site inspections • Developments existing and proposed buildings have been incorporated from development plans
Terrain	1 metre ground contours from NSW Spatial Services.
Noise wall	The existing noise wall at northern boundary of the project site (at the southern boundary nearest residences located at 566 Reservoir Road) has been included in the noise model.
Ground surface / absorption	Ground coverage in the study area has been assumed to be hard (0 ground absorption) in the Cold Storage Facility and soft (0.6 ground absorption) in the off-site environment.
Receivers	Surrounding buildings have been digitised into the model. Ground floor receivers have been placed at an elevation of 1.5 m and first floor receivers at an elevation of 4.5 m.
Sources	• Noise emission scenarios and sources associated with the maintenance facility as detailed in Section 7.2 • The buildings within the project site and the building services plant have been digitised into the model. • All noise emitting equipment in each operational scenario has been modelled to operate simultaneously.
SoundPLAN module	CONCAWE industrial module
Noise contours	The noise contours height has been set at 1.5 metres.
Meteorological condition	Neutral meteorological conditions for all periods. • Pasquill category D • No wind • 70% relative humidity

Parameter	Input data
	• 20°C temperature • 1013 mbar air pressure
	Adverse meteorological conditions for day and evening periods. • Pasquill category D • 3 m/s • 70% relative humidity • 20ºC temperature • 1013 mbar air pressure
	Adverse (temperature inversion) meteorological conditions for the night period. • Pasquill category D • 3 m/s • 70% relative humidity • 20ºC temperature • 1013 mbar air pressure
Assessment	The assessment has been broken into two components: • L_{Aeq} assessment against NPI criteria to consider long term noise sources such as idling trucks and cars, refrigeration plant etc, and intermittent noise peaks from loading and unloading activities, as well as vehicle reversing alarm. • L_{Amax} assessment to consider potential sleep disturbance impacts associated with short term noise sources including horns, loading and unloading activities.

7.2 Operational noise scenario and sources

The Americold existing and new southern expansion facility is expected to have a number of activities take place that generate noise which has the potential to impact the surrounding receivers. Operational noise sources based on information provided by the project team, as well as previous project experiences, have been presented in Table 22 below. The assumed typical operational scenario where the noise sources listed in Table 22 would be operating concurrently have been modelled.

Table 22 Operational noise sources used in noise predictions

ID	Operational Source	Source type	Individual sound power levels, L_{Aeq} dB(A)	Comments
1	Forklift reversing with alarm	Line	86	Sound power levels derived from the measured L_{eq} noise levels of a forklift reversing with alarm.
2	Forklift driving forward	Line	78	Sound power levels derived from the measured L_{eq} noise levels of a forklift driving forward.
3	Forklift loading & unloading	Line	76	Sound power levels derived from the measured L_{eq} noise levels of a forklift loading & unloading.

ID	Operational Source	Source type	Individual sound power levels, L_{Aeq} dB(A)	Comments
4	Forklift horn	Point	98	Sound power level derived from the measured L_{eq} noise level of a forklift horn.
5	Truck horn	Point	107	Sound power level derived from Resonate noise database. The measured 1/3 octave band frequencies noise levels of a forklift horn have been used as the noise profile for the truck horn.
6	Truck 1 trailer freezer motor only	Point	95	Sound power level derived from the measured L_{eq} noise level of a trailer freezer motor.
7	Truck 2 trailer freezer motor only	Point	93	Sound power level derived from the measured L_{eq} noise level of a trailer freezer motor.
8	Truck idling no trailer freezer motor running	Point	97	Sound power level derived from the measured L_{eq} noise level of a truck idling only.
9	Truck idling with trailer freezer motor running	Point	98	Sound power level derived from the measured L_{eq} noise level of a truck idling with trailer freezer motor.
10	Truck driving at approx. 10 km/hr	Line	88	Sound power levels derived from the measured L_{eq} noise levels of a truck driving at 5 to 10 km/hr.
11	Truck reversing with alarm	Line	95	Sound power levels derived from the measured L_{eq} noise levels of a truck reversing with alarm.
12	Truck reversing no alarm	Line	79	Sound power levels derived from the measured L_{eq} noise levels of a truck reversing with no alarm.
13	Truck passby - accelerating	Line	100	Sound power level derived from the measured L_{max} noise level of a truck passby – accelerating.
14	Existing southern plant room and pump	Point	75	Sound power level derived from the measured L_{eq} noise level of existing southern plant room and pump.

ID	Operational Source	Source type	Individual sound power levels, L_{Aeq} dB(A)	Comments
15	Existing northern warehouse plant room (louvres)	Point	95	Sound power level derived from the measured L_{eq} noise level of existing northern warehouse plant room.
16	Existing northern warehouse rooftop plant	Point	91	Sound power level derived from the measured L_{eq} noise level of existing northern warehouse rooftop plant.
17	Truck air brakes	Point	115	Sound power level derived from Resonate noise database. The measured 1/3 octave band frequencies noise levels of truck accelerating have been used as the noise profile for air brakes.
18	Truck engine compression braking	Point	120	Sound power level derived from Resonate noise database of Lmax 92 dB(A) at 10 m of a truck using compression braking. The measured 1/3 octave band frequencies noise levels of truck accelerating have been used as the noise profile for compression braking.
19	New satellite southern plant room and pump (Louvre)	Point	92	Sound power level derived from the manufacturers L_{eq} sound data of the proposed equipment

The proposed development is expected to operate 24 hours a day, 7 days a week across three shifts. The anticipated warehouse staffing profile for the new development as advised by Americold is presented in Table 23.

Table 23 Future warehouse staffing profile

Shift	05:00 - 11:00	11:00 – 13:20	13:30 – 17:15	17:15 – 21:50	21:50 – 23:30	23:30 – 05:00
No. active Staff working for the shift	96	88	66	53	35	5

There are 27 existing loading docks situated in the centre of the site abutting the north and south warehouses. In the future the proposed southern expansion will include a further 7 loading docks. The existing and new facilities will have a total of 34 loading docks for Americold once the southern expansion is completed.

The number of trucks input into the noise model have been based on feedback from Americold on typical truck numbers in the day (7am-6pm), evening (6pm-10pm) and night (10pm-7am) periods.

Trucks parked in the loading bays typically always have their engines turned off and will only have their chillers turned on. Truck engines will not be idling in the loading bays for lengthy periods. Americold also manage their bookings to prevent all docks being filled with trailers simultaneously.

The number of activities input into the noise model have been based on the worst-case operational scenarios provided by Americold for the combined existing and new facilities at Americold. The assumed worst-case 15-minute operational scenarios are presented in Table 24 and have been input into the noise model.

Table 24 worst case 15-minute operational scenarios

Activities	Duration of activities in one 15-minute	Number of activities / plants in each scenario		
		Day scenario	Evening scenario	Night scenario
Truck moving at 10km/hr around the facility	15 mins	4	4	2
Truck moving and accelerating (leaving the dock)	5 mins	2	1	1
Truck engine compression braking	1 min	0(2)	0(2)	0(2)
Truck air braking	1 second	0(2)	0(2)	0(2)
Truck reversing onto dock	1 min	4	4	1
Truck on dock idling with freezer motor running	15 mins	4	3	1
Truck on dock with engine off but freezer motor running	15 mins	18	9	4
Forklift loading and unloading	15 mins	4	2	0(1)
Forklift moving forward	15 mins	4	2	0(1)
Forklift reversing	15 mins	2	1	0(1)
Truck horn	1 second	1	1	0
Forklift horn	1 second	2	1	0(1)
Plant area (3 in existing facility and 1 in new facility)	15 mins	4	4	4

(1) The use of forklifts externally will be for replenishment of pallets which is only done during daytime and evening periods. Forklifts will not be permitted to be used externally at the facility during the night-time periods.

(2) Truck engine compression braking, and air braking will be restricted within the facility.

7.3 Analysis of predicted noise spectrum levels at receivers

The predicted operational noise profile during the night-time scenario in neutral and adverse temperature inversion weather conditions at each residential receiver have been analysed. The analysis has been based on the guidance from the NPI for the determination of potential annoying noise characteristics. The predicted 1/3 octave band frequencies noise levels of at each receiver are presented in the Appendix D.

Analysis of the noise profiles show that the operational noise at the residential receivers have no low frequency, tonal or intermittent characteristics.

Therefore, the modifying correction factor in accordance with the NPI will be not applied to the predicted operational noise levels at the residential receivers.

7.4 Predicted operational noise levels

Operational L_{Aeq} noise levels of the existing and new south expansion facility have been predicted to the nearest residential receivers along Reservoir Road and a representative residential receiver located to the east along Muttong Street. The representative residential receiver is located at 21 Muttong Street. The operational noise impacts were predicted based on the assumptions that all operational noise sources listed in Table 22 would be operating concurrently during regular operations.

The predicted operational L_{Aeq} noise levels are presented in Table 25 and Table 26 for neutral and adverse weather condition scenarios respectively. The operational noise contours of the combined new and existing facilities are presented in Appendix E.

Table 25 Predicted operational noise levels from the existing and new facilities (neutral weather)

Receiver (Address)	Predicted L_{Aeq} operational noise level[1] – dB(A) Day/Evening/Night	Noise criteria – dB(A) Day/Evening/Night	Exceedance – dB(A) Day/Evening/Night	Compliance (Yes/No) Day/Evening/Night
568 Reservoir Road, Prospect	51 / 51 / 50	55 / 53 / 48	- / - / 2	Yes / Yes / No
566 Reservoir Road, Prospect	52 / 52 / 51	55 / 53 / 48	- / - / 3	Yes / Yes / No
544 Reservoir Road, Prospect	39 / 37 / 30	58 / 48 / 43	- / - / -	Yes / Yes / Yes
533 Reservoir Road, Prospect	48 / 46 / 41	58 / 48 / 43	- / - / -	Yes / Yes / Yes
525 Reservoir Road, Prospect	38 / 34 / 30	58 / 48 / 43	- / - / -	Yes / Yes / Yes
517 Reservoir Road, Prospect	37 / 35 / 33	58 / 48 / 43	- / - / -	Yes / Yes / Yes
24 Watch House Road, Prospect	39 / 38 / 33	58 / 48 / 43	- / - / -	Yes / Yes / Yes
21 Muttong Street, Pemulwuy	26 / 23 / 20	40 / 35 / 35	- / - / -	Yes / Yes / Yes
St. Mark's Coptic Catholic Church Prospect	49 / 46 / 43	58 / 58 / 58	- / - / -	Yes / Yes / Yes
Berry Patch Preschool and Long Day Care Centre	50 / 50 / 42	53 / 53 / 53	- / - / -	Yes / Yes / Yes

(1) Predicted noise levels have been rounded off to the nearest 1 dB(A)

Table 26 Predicted operational noise levels from the existing and new facilities (adverse weather)

Receiver (Address)	Predicted L_{Aeq} operational noise level[1] – dB(A) Day/Evening/Night	Noise criteria – dB(A) Day/Evening/Night	Exceedance – dB(A) Day/Evening/Night	Compliance (Yes/No) Day/Evening/Night
568 Reservoir Road, Prospect	52 / 51 / 51	55 / 53 / 48	- / - / 3	Yes / Yes / No
566 Reservoir Road, Prospect	52 / 52 / 52	55 / 53 / 48	- / - / 4	Yes / Yes / No
544 Reservoir Road, Prospect	42 / 41 / 32	58 / 48 / 43	- / - / -	Yes / Yes / Yes
533 Reservoir Road, Prospect	50 / 48 / 43	58 / 48 / 43	- / - / -	Yes / Yes / Yes
525 Reservoir Road, Prospect	40 / 37 / 33	58 / 48 / 43	- / - / -	Yes / Yes / Yes
517 Reservoir Road, Prospect	40 / 38 / 35	58 / 48 / 43	- / - / -	Yes / Yes / Yes
24 Watch House Road, Prospect	42 / 41 / 36	58 / 48 / 43	- / - / -	Yes / Yes / Yes
21 Muttong Street, Pemulwuy	28 / 26 / 23	40 / 35 / 35	- / - / -	Yes / Yes / Yes
St. Mark's Coptic Catholic Church Prospect	51 / 49 / 45	58 / 58 / 58	- / - / -	Yes / Yes / Yes
Berry Patch Preschool and Long Day Care Centre	53 / 52 / 44	53 / 53 / 53	- / - / -	Yes / Yes / Yes

(1) Predicted noise levels have been rounded off to the nearest 1 dB(A)

Based on the predicted operational noise levels presented in Table 25 and Table 26 the following have been assessed:

- During neutral weather condition:
  - Daytime operational scenario – operational noise levels comply with the daytime noise limit at all most affected residential receivers.
  - Evening operational scenario – operational noise levels comply with the evening noise limit at all most affected residential receivers.
  - Night-time operational scenario – operational noise levels exceed the NPI PNTL for the residences at 568 and 566 Reservoir Road by up to 3 dB(A) but achieve compliance at all other residences.
  - St Mark's Coptic Catholic Church - operational noise levels comply with the NPI PNTL at all periods.
  - Berry Patch Preschool and Long Day Care Centre - - operational noise levels comply with the NPI PNTL at all periods.
  - Based on a review of the SoundPLAN detailed source contribution results from the combined existing and proposed future operations, the exceedances for all receivers noted above are mainly due to the noise levels emanating from the existing northern plant room louvres.

- During adverse weather condition:
  - Daytime operational scenario – operational noise levels comply with the daytime noise limit at all most affected residential receivers.
  - Evening operational scenario – operational noise levels comply with the evening noise limit at all most affected residential receivers.
  - Night-time operational scenario – operational noise levels exceed the NPI PNTL for the residences at 568 and 566 Reservoir Road by up to 4 dB(A) but achieve compliance at all other residences.
  - St Mark's Coptic Catholic Church - operational noise levels comply with the NPI PNTL at all periods.
  - Berry Patch Preschool and Long Day Care Centre - operational noise levels comply with the NPI PNTL at all periods.
  - Based on a review of the SoundPLAN detailed source contribution results from the combined existing and proposed future operations, the exceedances for all receivers noted above are mainly due to the noise levels emanating from the existing northern plant room louvres.

7.5 Operational sleep disturbance impacts

The potential for sleep disturbances during the night-time period (i.e. between 10:00 pm and 7:00 am) from the operational noise level events generated at the development have been assessed in this section. The maximum noise level events from the proposed development are due to worst-case operational scenarios (see Table 24) occurring during the night-time period and are presented in Table 27. The operational L_{Amax} noise levels are based on the measured L_{Amax} noise levels and Resonate's database. It was observed on site that maximum levels for sources that would operate during the night-time period were generally within 5 dB of the L_{Aeq} noise levels. Resonate's experience on similar noise sources has shown maximum noise levels to be up to 8 dB higher than the $L_{Aeq.}$ An 8 dB difference between L_{Amax} and L_{Aeq} has been assumed where the measured difference was less than or equal to 8 dB.

Table 27 Operational noise sources used in noise predictions

ID	Operational Source	Source type	Individual sound power levels, L_{Amax} dB(A)
5	Truck 1 trailer freezer motor only	Point	103
6	Truck 2 trailer freezer motor only	Point	101
7	Truck idling no trailer freezer motor	Point	105
8	Truck idling with trailer freezer motor	Point	106
9	Truck driving at approx. 10 km/hr	Line	96
10	Truck reversing with alarm[1]	Line	103
11	Truck reversing no alarm	Line	87
12	Truck passby - accelerating	Line	108
13	Existing southern plant room and pump	Point	83
14	Existing northern warehouse plant room (louvres)	Point	103
15	Existing northern warehouse rooftop plant	Point	99

ID	Operational Source	Source type	Individual sound power levels, L_{Amax} dB(A)
16	New satellite southern plant room and pump (Louvre)	Point	100

In accordance with the NPI the predicted night time noise levels have been first assessed against the average/maximum noise trigger levels to determine whether a detailed maximum noise level event assessment would be required. The results of this first assessment are presented in Table 28.

Table 28 Predicted operational noise levels from the existing and new facilities (sleep disturbance assessment)

Receiver	Predicted operational noise level, dB(A)(1) $L_{eq,\ 15\ minute}$ / L_{Fmax}		Sleep disturbance noise trigger levels, dB(A) $L_{eq,\ 15\ minute}$ / L_{Fmax}	Above Screening Level (Yes/No) $L_{eq,\ 15\ minute}$ / L_{Fmax}
	Neutral weather	Adverse weather		
568 Reservoir Road, Prospect	50 / 58	51 / 59	53 / 63	No / Yes
566 Reservoir Road, Prospect	51 / 59	52 / 60	53 / 63	No / Yes
544 Reservoir Road, Prospect	30 / 38	32 / 40	56 / 66	No / Yes
533 Reservoir Road, Prospect	41 / 49	43 / 51	56 / 66	No / Yes
525 Reservoir Road, Prospect	30 / 38	33 / 41	56 / 66	No / Yes
517 Reservoir Road, Prospect	33 / 41	35 / 43	56 / 66	No / Yes
24 Watch House Road, Prospect	33 / 41	36 / 44	56 / 66	No / Yes
21 Muttong Street, Pemulwuy	20 / 28	23 / 31	40 / 52	No / Yes

(1) Predicted noise levels have been rounded off to the nearest 1 dB(A)

The night-time operational L_{Amax} noise levels at the nearest residential receivers are predicted to be compliant with the sleep disturbance L_{Amax} criterion as shown in Table 28.

The predicted operational noise levels from the existing and new facilities are expected to comply with the NPI sleep disturbance screening criteria. It is noted that even at the nearest residences there is a further 3 dB(A) required before the screening test is exceeded.

7.6 Operational road traffic noise

This section assesses noise impacts from additional traffic generated noise during the operation of the Project. An assessment of road noise impact was completed at the Prospect Highway / Reservoir Road intersection. It has been noted that the anticipated future truck movements provided are 300-350 heavy vehicles per day, compared to 160-200 in the existing situation during the operation of the Project.

In accordance with the RNP (as outlined in Section 5), operational traffic criteria are set at not more than 2 dB(A) above the existing road traffic noise levels during the daytime and night-time periods, and are considered appropriate to identify the onset of potential noise impacts. Where the road traffic noise levels are predicted to increase by more than 2 dB(A) as a result of operational traffic, consideration would be given to applying feasible and reasonable noise mitigation measures to reduce the potential noise impacts and preserve acoustic amenity.

Traffic noise modelling was completed using measured traffic volume data presented in the *Traffic Impact Assessment Report*, prepared by Beca Pty Ltd, revision no. 002, dated 28 September 2022. This traffic report was prepared for the Americold Prospect South Expansion. Table 5.2 of the traffic report provides figures for the existing traffic volumes at the Prospect Highway / Reservoir Road intersection. The following peak hour traffic volume have been obtained from the traffic report:

- AM Peak – 2,316 vehicles, which includes 501 heavy vehicles (22%)
- PM Peak – 2,088 vehicles, which includes 248 heavy vehicles (11%)

The current posted speed on Prospect Highway and Reservoir Road is 60 km/h. It has been assumed this speed limit will remain unchanged during the construction of the Project.

Table 29 presents the expected traffic generation based on Table 5.5 of the traffic report were used in the operational road traffic noise assessment.

Table 29 Expected traffic generation

Vehicle type	AM Peak			PM Peak		
	Existing	Additional	Total AM	Existing	Additional	Total PM
Light vehicles	16	+1	17	35	+5	40
Heavy Vehicles	6	+5	11	10	+8	18
Large trucks	15	+12	27	9	+7	16
Total	37	+18	55	54	+20	74

Table 30 below presents the increase in noise levels due to additional vehicles on Prospect Highway and Reservoir Road from the construction of the Project. The increase in noise levels is less than 1 dB(A) which is within the not more than 2 dB(A) increase allowance. Due to the high volume of traffic movement on Prospect Highway and Reservoir Road, it is anticipated that operational road traffic noise associated with the Project would very likely achieve compliance with the not more than 2 dB(A) increase allowance. Residential receivers along the Reservoir Road are therefore unlikely to be adversely affected by the Project's operational road traffic noise levels.

Table 30 Construction road traffic noise assessment

Location	AM Peak			PM Peak		
	Existing	Existing + operational traffic	Increase in noise level – dB(A)	Existing	Existing + operational traffic	Increase in noise level – dB(A)
Prospect Highway and Reservoir Road intersection	2,316	2,351	< 1	2,088	2,123	< 1

8 Recommended Noise Control

Based on the predicted exceedances at the nearby residential receivers to the Project site, the following are recommended to ensure that Americold's existing and new south expansion facility would be constructed and operated in a noise compliant manner:

8.1 Construction noise and vibration

Undertake a detailed construction noise and vibration detailed assessment during the detailed design stage of the project which would form part of the Construction Noise and Vibration Management Plan (CNVMP). Once the detailed construction noise and vibration assessment is complete, determine appropriate feasible and reasonable management and mitigation for implementation on the project.

Viable management and mitigation measures that would be expected to be deployed by the construction contractor once the final construction sequencing and scheduling is known may include:

- Selecting quieter plant and equipment.
- Erecting temporary acoustic hoarding to reduce noise from works that would be carried out near the boundaries of the site.
- Maximising offset distances between receivers and noisy plant or activities.
- Orientating plant and processes away from receivers.
- Optionally scheduling respite periods for noise-intensive processes carried out near receivers.
- Regularly maintaining and monitoring plant and equipment to ensure that their noise emissions are not excessive.
- Minimising the annoyance from reversing alarms by either fitting closed circuit monitors or non-tonal reversing alarms ("quackers") on vehicles or deploying 'spotters' to oversee reversing movements. Sites should be designed to minimise or remove the need for plant to undertake reversing manoeuvres.
- Reducing throttle settings and switching off equipment when it's not being used.
- If possible, restrict the use of vibratory roller to not more than 4 tonnes, especially when working near buildings on adjoining properties.
- If heavier vibratory rollers; i.e. more than 18 tonnes, are required to be used, the safe working distances recommended in Table 19 should be adhered to.

The feasibility of applying these measures would be assessed as part of the CNVMP once the detailed construction program is known.

8.2 Operational noise

Based on the assessment of predicted operational noise criteria exceedances at the nearby residential receivers and child care centre in Section 7, the following reasonable and feasible noise management and control measures are recommended to be implemented to the operation of the expanded Americold facility:

- It is recommended that a new acoustic louvre system be installed replacing the existing louvres for the northern plant room. The new acoustic louvres are to reduce the existing SWL through the louvres (both louvres measured at 71 dB(A) at 6 m distance) by at least 5 dB(A). The louvre is to have a minimum insertion loss according to the spectrum in Table 31. An example of a louvre that can achieve the required performance is the NAP Flowline 300 S-Line. The suitability of the louvre chosen to be installed is to be confirmed with the mechanical services engineer.

Table 31 Insertion loss for louvre

Insertion loss (dB) at each octave band centre frequency, Hz							
63	125	250	500	1000	2000	4000	8000
1	3	5	10	13	17	18	15

- It is our understanding that truck engine compression and air braking if allowed to occur in the facility will adversely impact the surrounding nearby residential receivers. Therefore, it is recommended that truck engine compression braking, and air braking not be permitted in the facility at all times and signages are to be installed to inform drivers of this restriction when driving inside the facility as well as procedures to inform drivers entering site of these requirements.
- Traffic speed should be signposted within the facility. Expect all drivers to comply with the speed limit and to implement responsible driving within the facility to minimise noise associated with unnecessary acceleration and braking within the facility.
- When trucks are parked at the parking bays ensure that truck engines are turned off and not idling. Install signposts within the bays to advise drivers to turn off truck engine when parked in the bays.
- Trucks parked within the facility should have engines turned off and not left idling.
- Horns of trucks, cars and forklifts should not be used during evening and night-time periods of operations.
- Proposed plant equipment for the project will need to be assessed at the next stages of the development (once detailed mechanical information is known) to ensure compliance with the project noise emission requirements presented in Table 14 are achieved, at which point appropriate acoustic treatment where required will be recommended.

If the above recommended operational management control is implemented in the new facility, it is likely that the operational noise of the expanded facility would comply with the NPI criteria at all nearby residential receivers.

A summary of the effectiveness of each type of noise mitigation measure is provided in Table 32.

Table 32 Summary of effectiveness of noise mitigation measures

Mitigation Class	Description	Approximate Additional Noise Level Reduction (dB)
Source	Reduce noise source levels by eliminating truck engine compression braking and air braking on site and eliminating the outdoor use of forklifts during the night-time period.	At least 5-10 dB.
Path	The site includes existing boundary noise barriers.	At least 5 dB compared to if the noise barriers were not in place.
	Provision of acoustic louvres to reduce internal to external noise breakout.	At least 5 dB.
Receiver	At-property acoustic treatments.	Not required due to predicted noise levels being less than project noise trigger levels.

8.2.1 Predicted night time operational noise levels with noise control

Recommendations have been made in Section 8.2 to such that the operational L_{Aeq} noise levels of the existing and new south expansion facility would comply with the noise emission criteria. The predicted night time operational L_{Aeq} noise levels with the recommended noise control in place are presented in Table 33 and Table 34 for neutral and adverse weather condition scenarios respectively.

Table 33 Predicted operational noise levels from the existing and new facilities with recommendations (neutral weather)

Receiver	Predicted night-time L_{Aeq} operational noise level[1] – dB(A)	Noise criteria – dB(A)	Exceedance – dB(A)	Compliance (Yes/No)
568 Reservoir Road, Prospect	46	48	-	Yes
566 Reservoir Road, Prospect	47	48	-	Yes
544 Reservoir Road, Prospect	30	43	-	Yes
533 Reservoir Road, Prospect	41	43	-	Yes
525 Reservoir Road, Prospect	30	43	-	Yes
517 Reservoir Road, Prospect	33	43	-	Yes
24 Watch House Road, Prospect	33	43	-	Yes
21 Muttong Street, Pemulwuy	20	35	-	Yes
St. Mark's Coptic Catholic Church Prospect	43	58	-	Yes
Berry Patch Preschool and Long Day Care Centre	42	53	-	Yes

(1) Predicted noise levels have been rounded off to the nearest 1 dB(A).

Table 34 Predicted operational noise levels from the existing and new facilities with recommendations (adverse weather)

Receiver	Predicted night-time L_{Aeq} operational noise level[1] – dB(A)	Noise criteria – dB(A)	Exceedance – dB(A)	Compliance (Yes/No)
568 Reservoir Road, Prospect	47	48	-	Yes
566 Reservoir Road, Prospect	47	48	-	Yes
544 Reservoir Road, Prospect	32	43	-	Yes
533 Reservoir Road, Prospect	43	43	-	Yes
525 Reservoir Road, Prospect	33	43	-	Yes
517 Reservoir Road, Prospect	35	43	-	Yes
24 Watch House Road, Prospect	36	43	-	Yes
21 Muttong Street, Pemulwuy	23	35	-	Yes
St. Mark's Coptic Catholic Church Prospect	45	58	-	Yes
Berry Patch Preschool and Long Day Care Centre	44	53	-	Yes

(2) Predicted noise levels have been rounded off to the nearest 1 dB(A).

The results of the predicted operational noise levels presented in Table 33 and Table 34 show that the NPI PNTL criteria is complied with at all nearby sensitive receivers once the recommendations in Section 8.2 are adopted.

9 Concluding Remarks

Resonate Consultants has conducted a noise and vibration assessment of the proposed south expansion to the existing Americold cold storage warehouse facility at 554-562 Reservoir Road.

This assessment has been carried out in accordance with the NSW EPA's *Interim Construction Noise Guideline* and *Noise Policy for Industry*, and this report is to form part of the Project's approval submission to the NSW Department of Planning, Industry and Environment. Noise and vibration impact assessments have been conducted in relation to the construction and operation of the Project.

Construction noise and vibration assessment

The construction noise and vibration assessment undertaken is preliminary as there are currently no detailed information at this stage of the proposal, although the assessment is based on experienced and reasonable assumptions.

Based on the assumed works the NMs are predicted to be complied with at all surrounding sensitive receivers as shown in Table 18 with the exception of the following receivers:

- Residences along Muttong Street are predicted to exceed noise affected NMLs by 1 dB(A).
- St Marks Coptic Catholic Church Prospect is predicted to exceed NMLs for a place of worship by up to 6dB(A)
- Berry Patch Preschool and Long Day Care Centre is predict4ed to exceed NMLs for a place of worship by up to 8 dB(A)

It is noted that the above assessment has been based on assumed construction activities from the main construction works location however different construction works with different noise profiles are proposed across the site. Once the construction activities and related plant equipment is known that construction noise impacts should be re-assessed to the surrounding receivers.

For any outside hour works and/or exceedances, feasible and reasonable noise management and mitigation measures in accordance with the ICNG should be addressed in the project's Construction Noise and Vibration Management Plan.

Vibration levels are considered to be unlikely to exceed cosmetic damage and human comfort vibration limits at the nearest residential receivers.

Due the close proximity of the Project site to adjoining industrial buildings, lighter construction equipment are recommended to be used to ensure that the vibration management levels for cosmetic damage and human comfort are met.

Construction road traffic impacts are not expected to result in an increase in ambient road traffic noise influence within the surrounding environment.

Operational noise assessment

The operational noise assessment has found that the Project during typical regular operations would comply with the NPI day and evening criteria at all surrounding nearest residential receivers. However, during the night period there would be exceedances expected at the residences of 568 and 566 Reservoir Road due to the noise levels emanating from the existing northern plant room louvres.

The management and control measures in Section 8.2 are to be adopted to mitigate operational noise impacts and are summarised below:

- It is recommended that a new acoustic louvre system be installed replacing the existing louvres for the northern plant room.
- It is our understanding that truck engine compression and air braking if allowed to occur in the facility will adversely impact the surrounding nearby residential receivers. Therefore, it is recommended that truck engine compression braking, and air braking not be permitted in the facility at all times and signages are to be installed to inform drivers of this restriction when driving inside the facility as well as procedures to inform drivers entering site of these requirements.
- Traffic speed should be signposted within the facility. Expect all drivers to comply with the speed limit and to implement responsible driving within the facility.
- When trucks are parked at the parking bays ensure that truck engines are turned off and not idling.
- Trucks parked within the facility should have engines turned off and not left idling.
- Horns of trucks, cars and forklifts should not be used during evening and night-time periods of operations.
- Proposed plant equipment for the project will need to be assessed at the next stages of the development (once detailed mechanical information is known) to ensure compliance with the project noise emission requirements presented in Table 14 are achieved, at which point appropriate acoustic treatment where required will be recommended.

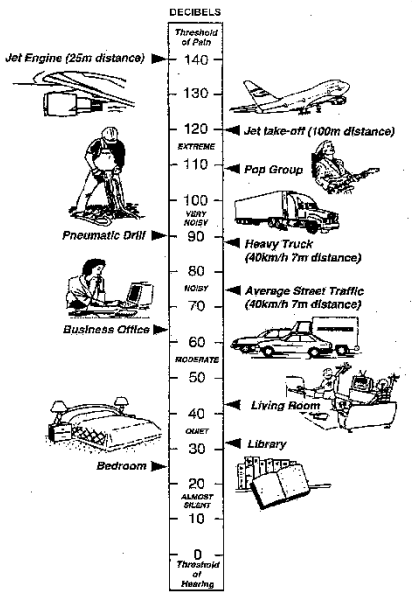
Operational road traffic impacts are not expected to result in an increase in ambient road traffic noise influence within the surrounding environment.

Based on our assessment, the existing and new south expansion facility for Americold at 554-562 Reservoir Road is deemed to not cause “Offensive Noise” to neighbouring residences provided that the noise control measures recommended in Section 8 of this report are implemented. It is therefore recommended that planning approval be granted for the proposed development on the basis of acoustics.

Appendix A – Acoustic Terminology

A-weighted sound pressure	The human ear is not equally sensitive to sound at different frequencies. People are more sensitive to sound in the range of 1 to 4 kHz (1000 – 4000 vibrations per second) and less sensitive to lower and higher frequency sound. During noise measurement an electronic '*A-weighting*' frequency filter is applied to the measured sound level *dB(A)* to account for these sensitivities. Other frequency weightings (B, C and D) are less commonly used. Sound measured without a filter is denoted as linear weighted dB(linear).
Ambient noise	The total noise in a given situation, inclusive of all noise source contributions in the near and far field.
Community annoyance	Includes noise annoyance due to: • character of the noise (e.g. sound pressure level, tonality, impulsiveness, low-frequency content) • character of the environment (e.g. very quiet suburban, suburban, urban, near industry) • miscellaneous circumstances (e.g. noise avoidance possibilities, cognitive noise, unpleasant associations) • human activity being interrupted (e.g. sleep, communicating, reading, working, listening to radio/TV, recreation).
Compliance	The process of checking that source noise levels meet with the noise limits in a statutory context.
Cumulative noise level	The total level of noise from all sources.
dB(A)	dB(A) denotes a single number sound pressure level that includes a frequency weighting ("A-weighting") to reflect the subjective loudness of the sound level. The frequency of a sound affects its perceived loudness. Human hearing is less sensitive at low and very high frequencies, and so the A-weighting is used to account for this effect. An A-weighted decibel level is written as dB(A).
Extraneous noise	Noise resulting from activities that are not typical to the area. Atypical activities may include construction, and traffic generated by holiday periods and by special events such as concerts or sporting events. Normal daily traffic is not considered to be extraneous.
Feasible and reasonable measures	Feasibility relates to engineering considerations and what is practical to build; reasonableness relates to the application of judgement in arriving at a decision, taking into account the following factors: • Noise mitigation benefits (amount of noise reduction provided, number of people protected). • Cost of mitigation (cost of mitigation versus benefit provided). • Community views (aesthetic impacts and community wishes). • Noise levels for affected land uses (existing and future levels, and changes in noise levels).

Impulsiveness	Impulsive noise is noise with a high peak of short duration or a sequence of these peaks. Impulsive noise is also considered annoying.
Low frequency	Noise containing major components in the low-frequency range (20 to 250 Hz) of the frequency spectrum.
Noise criteria	The general set of non-mandatory noise levels for protecting against intrusive noise (for example, background noise plus 5 dB) and loss of amenity (e.g. noise levels for various land use).
Noise level (goal)	A noise level that should be adopted for planning purposes as the highest acceptable noise level for the specific area, land use and time of day.
Noise limits	Enforceable noise levels that appear in conditions on consents and licences. The noise limits are based on achievable noise levels, which the proponent has predicted can be met during the environmental assessment. Exceedance of the noise limits can result in the requirement for either the development of noise management plans or legal action.
Performance-based goals	Goals specified in terms of the outcomes/performance to be achieved, but not in terms of the means of achieving them.
Rating Background Level (RBL)	The rating background level is the overall single figure background level representing each day, evening and night time period. The rating background level is the 10th percentile min L_{A90} noise level measured over all day, evening and night time monitoring periods.
Receptor	The noise-sensitive land use at which noise from a development can be heard.
Sleep disturbance	Awakenings and disturbance of sleep stages.
Sound and decibels (dB)	Sound (or noise) is caused by minute changes in atmospheric pressure that are detected by the human ear. The ratio between the quietest noise audible and that which should cause permanent hearing damage is a million times the change in sound pressure. To simplify this range the sound pressures are logarithmically converted to decibels from a reference level of 2 x 10-5 Pa. The picture below indicates typical noise levels from common noise sources.



dB is the abbreviation for decibel – a unit of sound measurement. It is equivalent to 10 times the logarithm (to base 10) of the ratio of a given sound pressure to a reference pressure.

Sound power Level (SWL)

The sound power level of a noise source is the sound energy emitted by the source. Notated as SWL, sound power levels are typically presented in *dB(A)*.

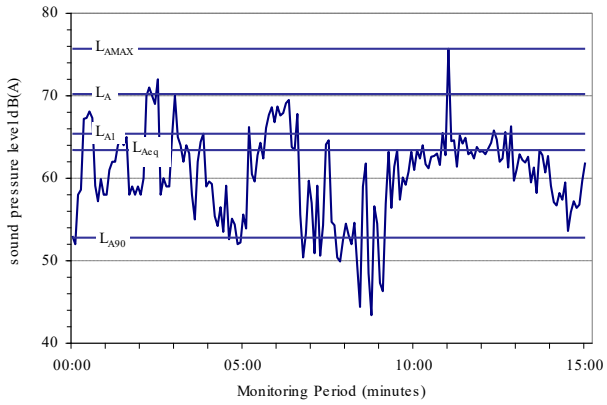
Sound Pressure Level (SPL)

The level of noise, usually expressed as SPL in *dB(A)*, as measured by a standard sound level meter with a pressure microphone. The sound pressure level in *dB(A)* gives a close indication of the subjective loudness of the noise.

Statistic noise levels

Noise levels varying over time (e.g. community noise, traffic noise, construction noise) are described in terms of the statistical exceedance level.

A hypothetical example of A weighted noise levels over a 15 minute measurement period is indicated in the following figure:

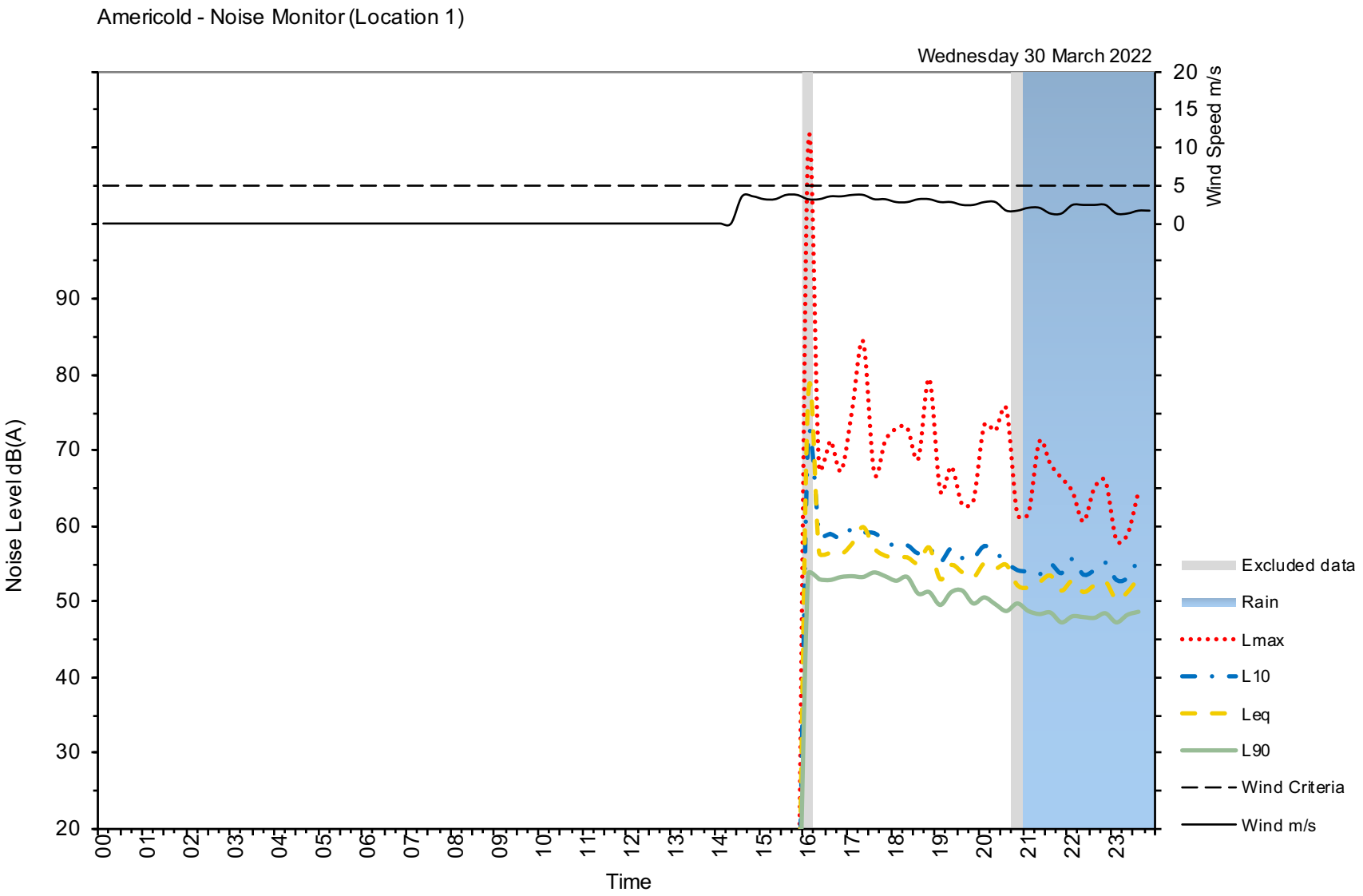


Key descriptors:

- L_{Amax}: Maximum recorded noise level.
- L_{A1}: The noise level exceeded for 1% of the 15 minute interval.

	• L_{A10}: Noise level present for 10% of the 15 minute interval. Commonly referred to the average maximum noise level. • L_{Aeq}: Equivalent continuous (energy average) A-weighted sound pressure level. It is defined as the steady sound level that contains the same amount of acoustic energy as the corresponding time-varying sound. • L_{A90}: Noise level exceeded for 90% of time (background level). The average minimum background sound level (in the absence of the source under consideration).
Threshold	The lowest sound pressure level that produces a detectable response (in an instrument/person).
Tonality	Tonal noise contains one or more prominent tones (and characterised by a distinct frequency components) and is considered more annoying. A 2 to 5 dB(A) penalty is typically applied to noise sources with tonal characteristics

Appendix B – Unattended Noise Monitoring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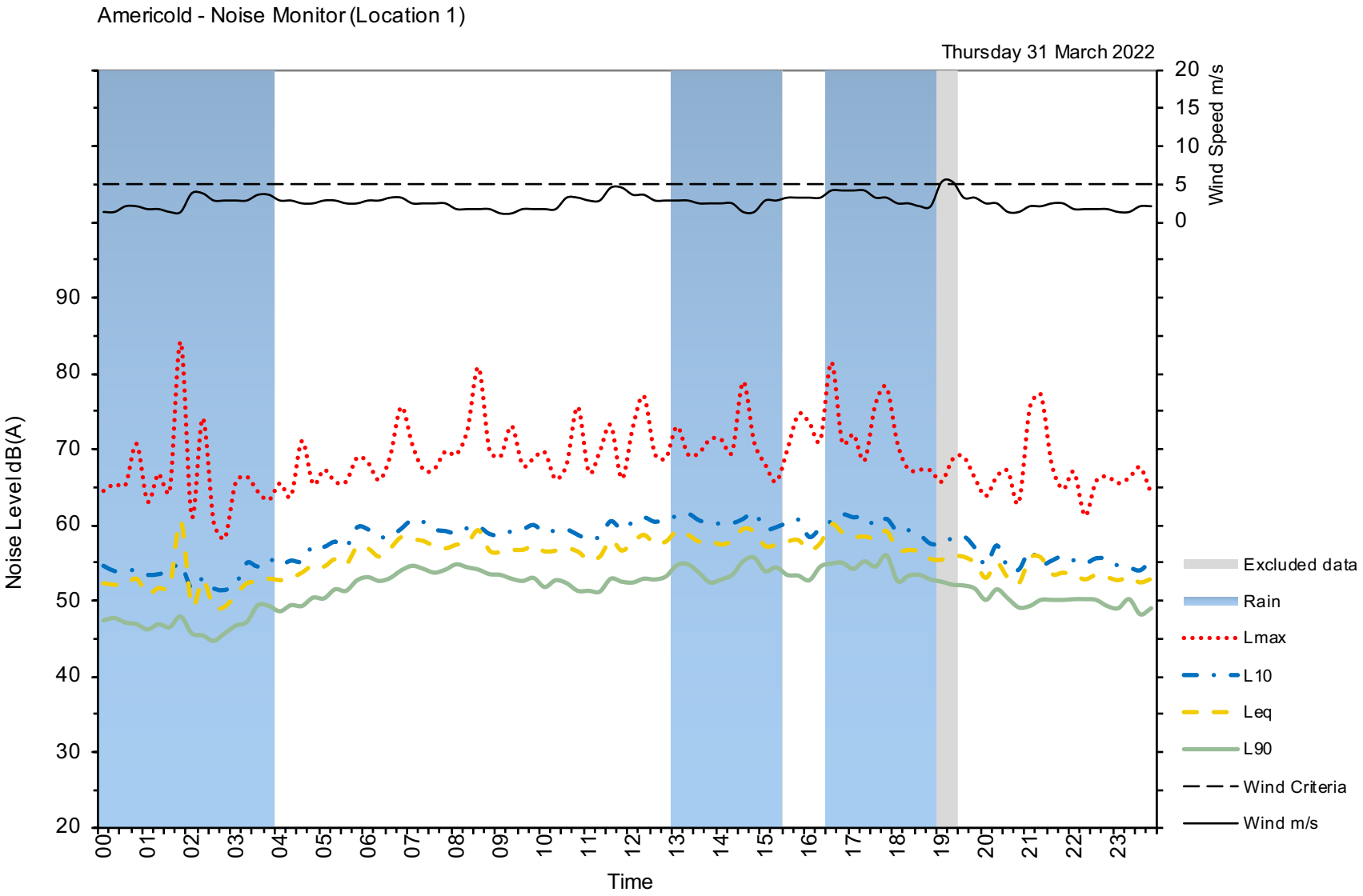
Wind Speed m/s
Time
Excluded data
Rain
Lmax
L10
Leq
L90
Wind Criteria
Wind m/s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Time
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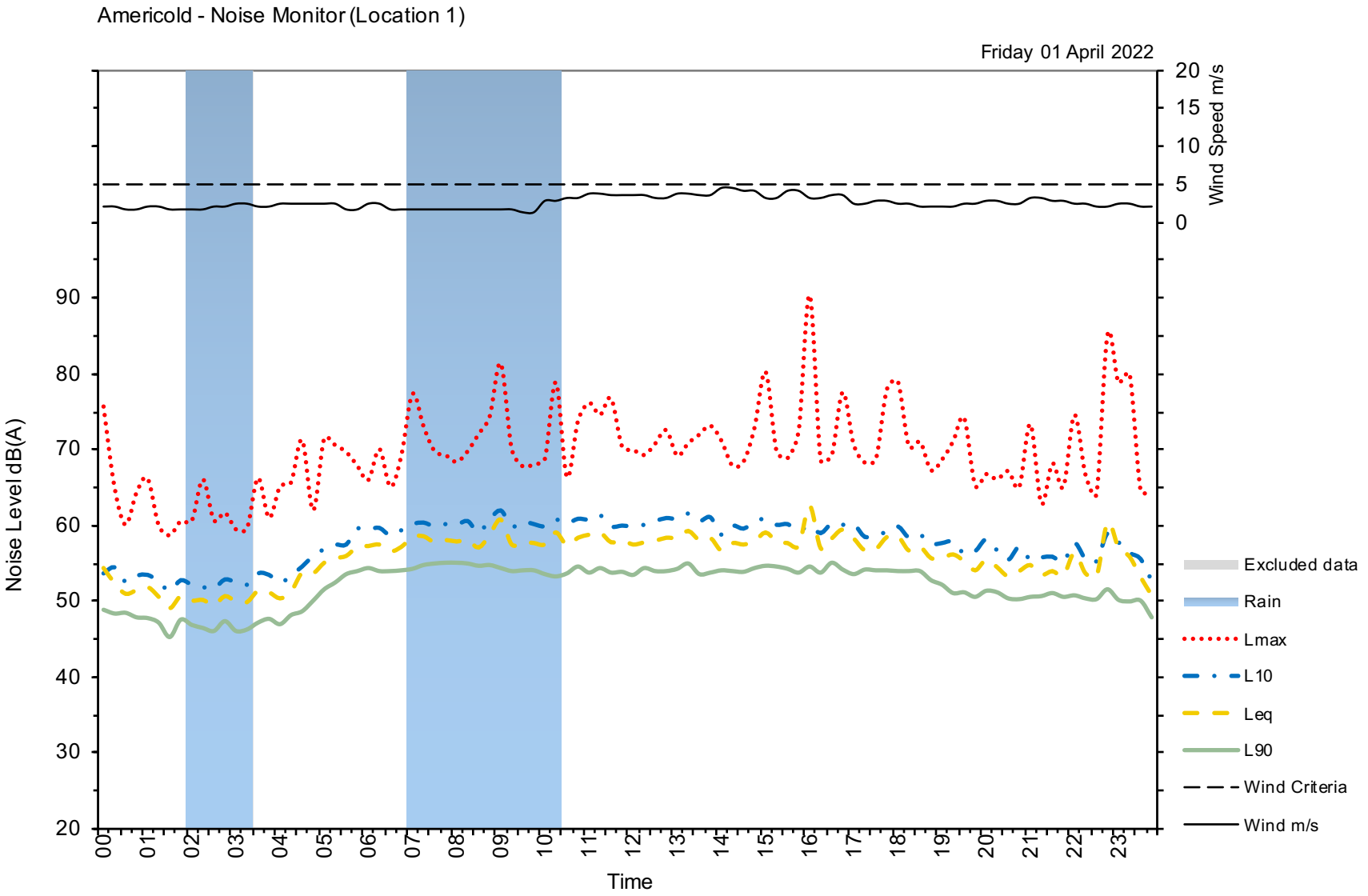
Leq
L90
Wind Criteria
Wind m/s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Time
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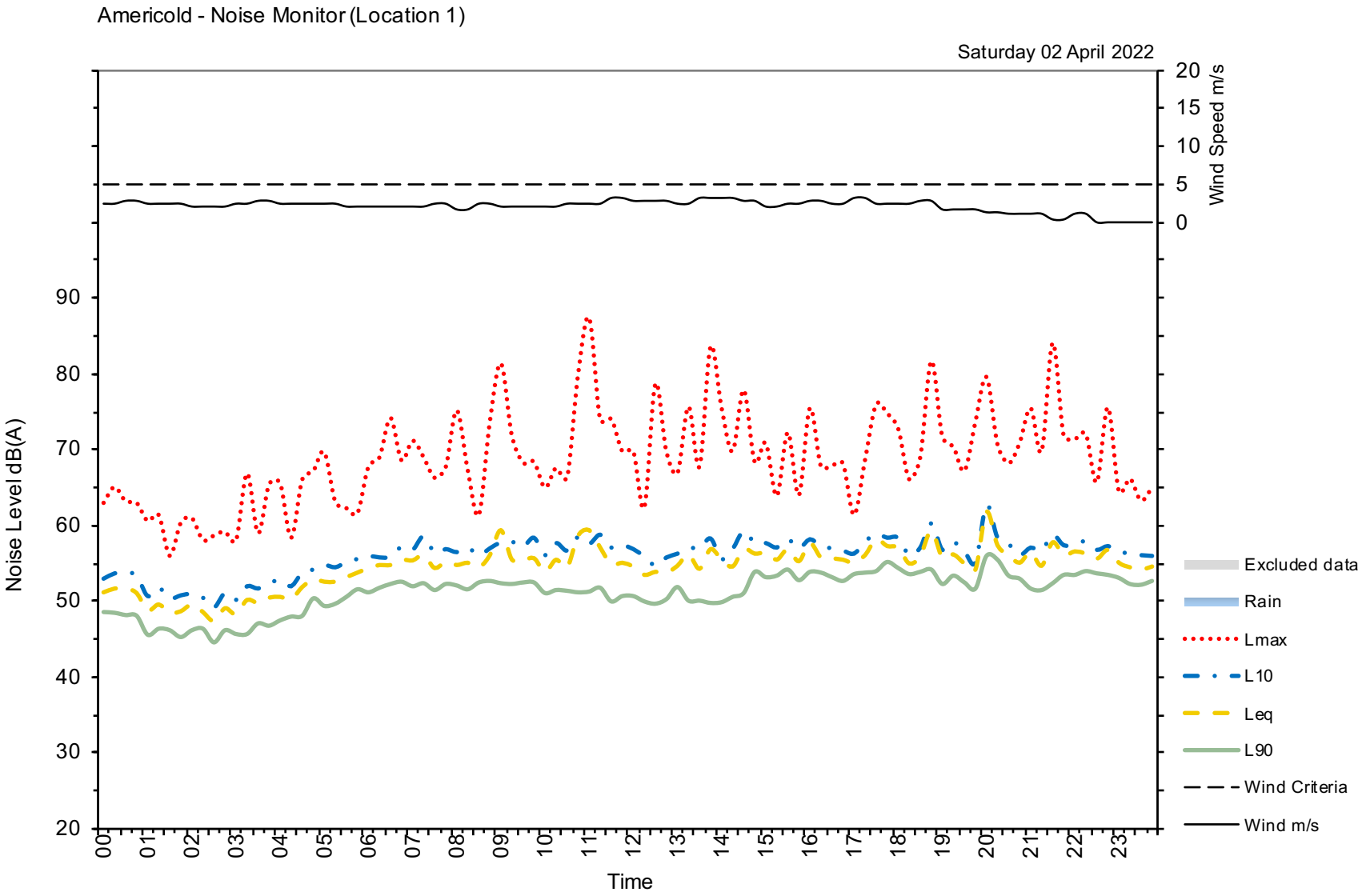
Rain
Lmax
L10
Leq
L90
Wind Criteria
Wind m/s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Leq
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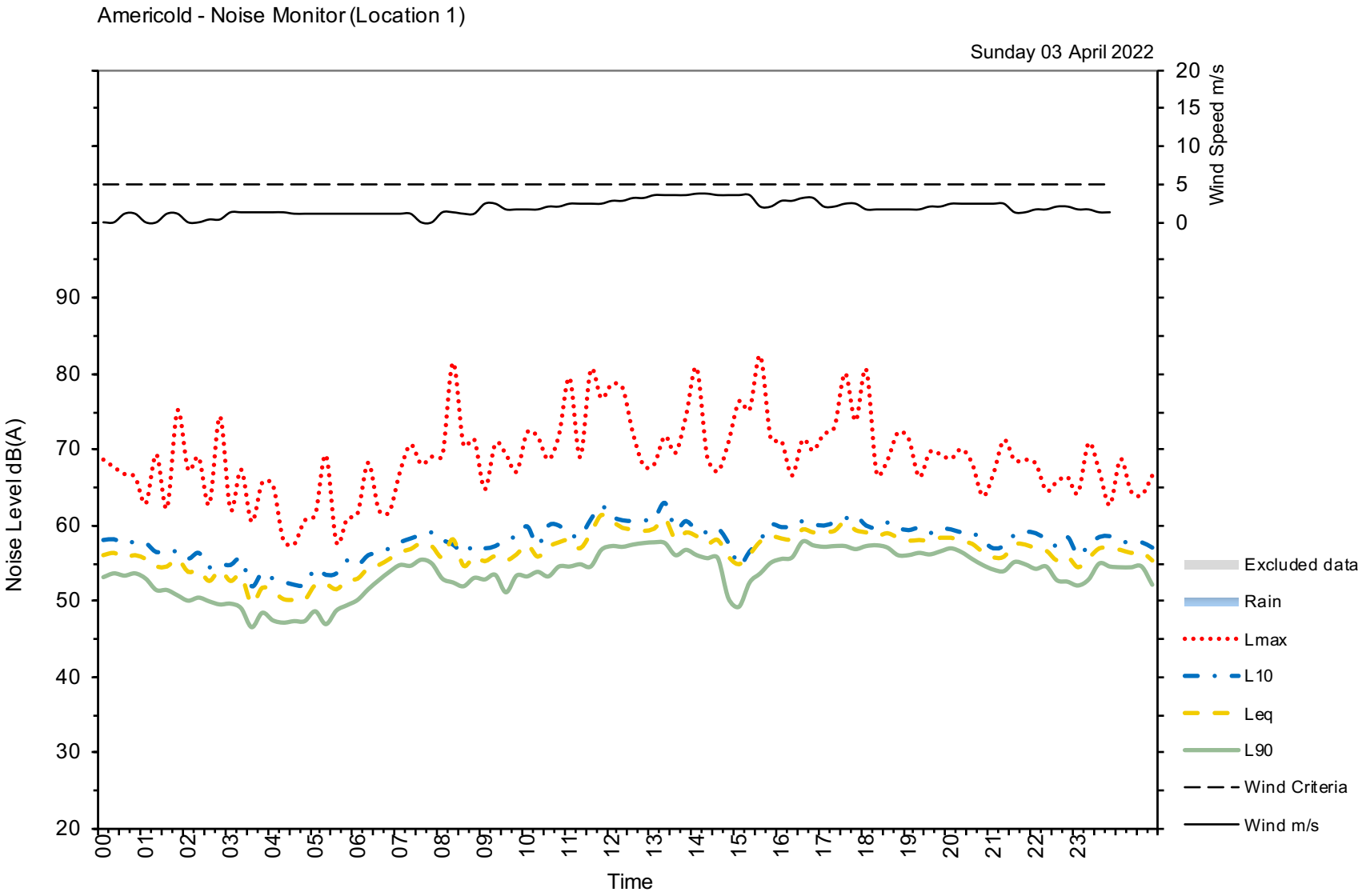
Wind Criteria
Wind m/s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Time
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Rain
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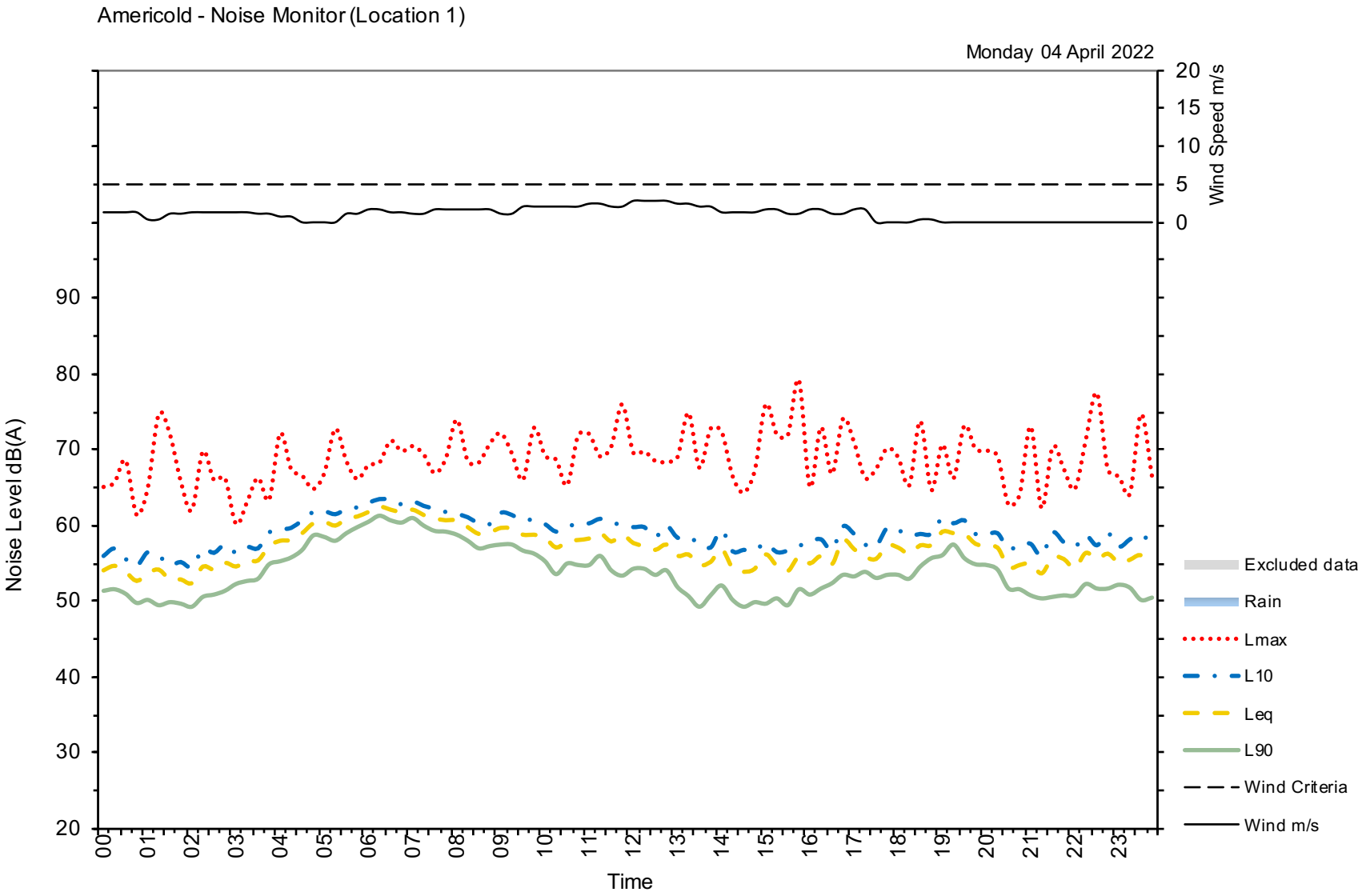
L10
Leq
L90
Wind Criteria
Wind m/s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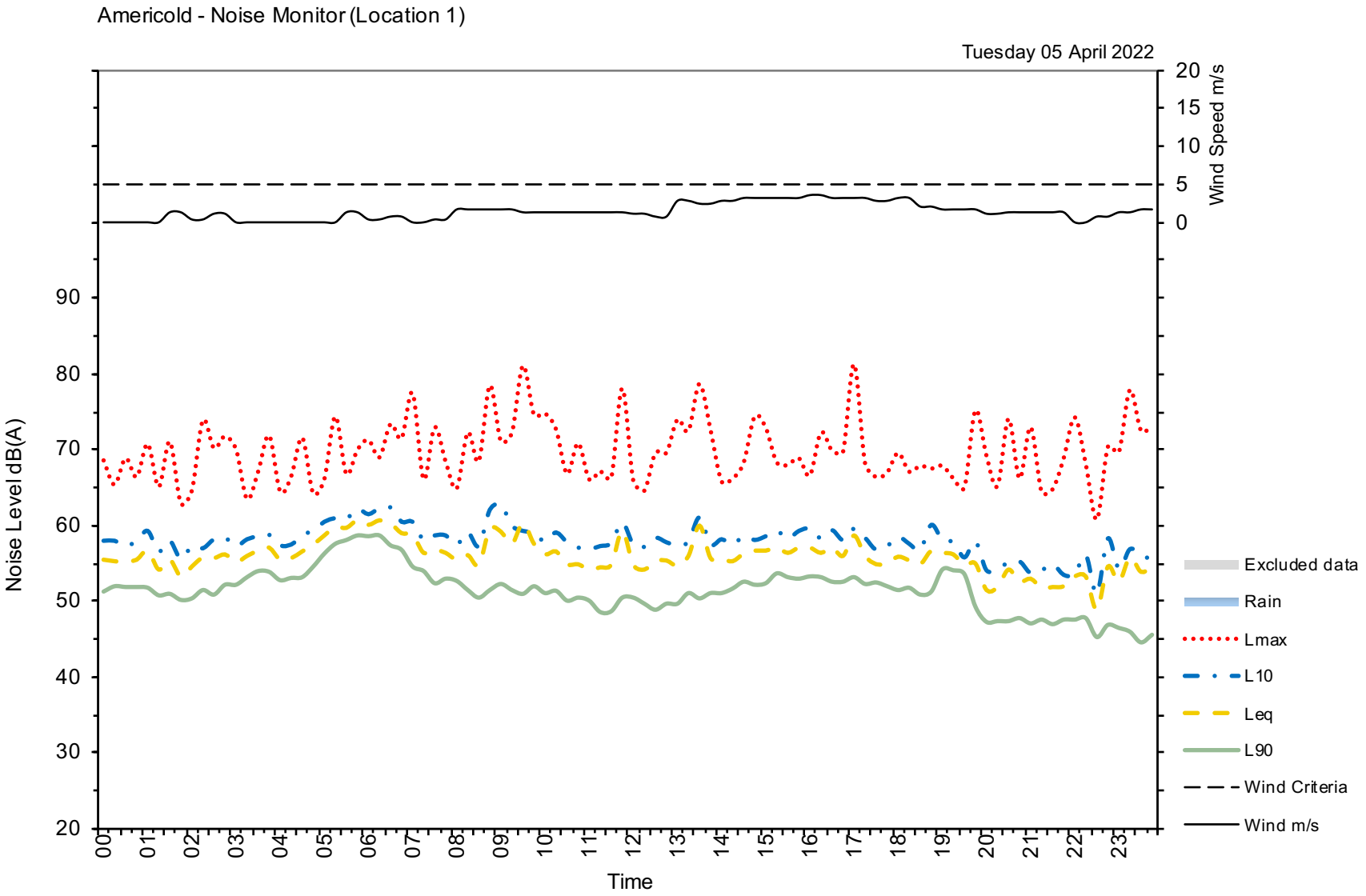
Wind Criteria
Wind m/s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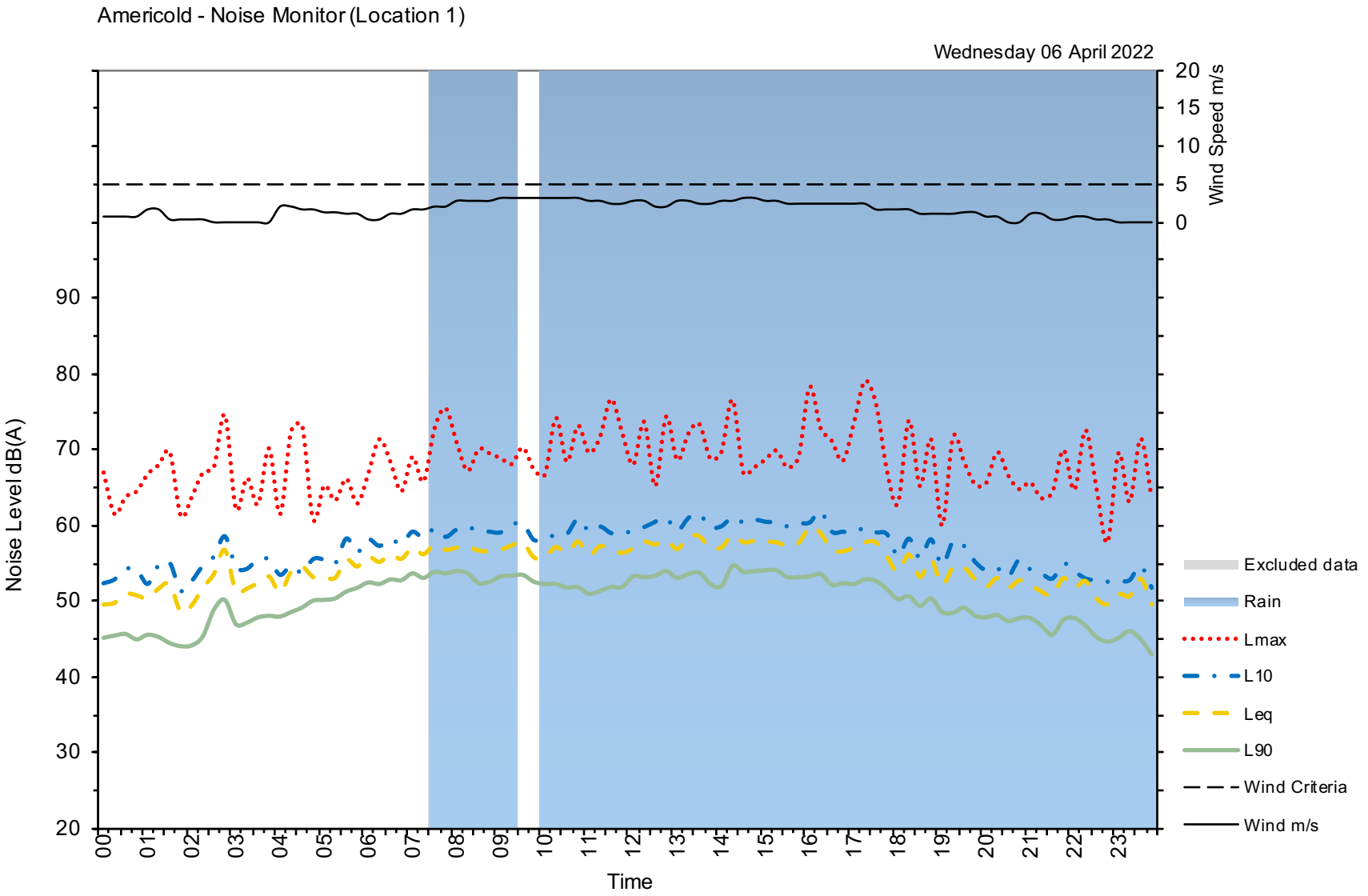
Wind m/s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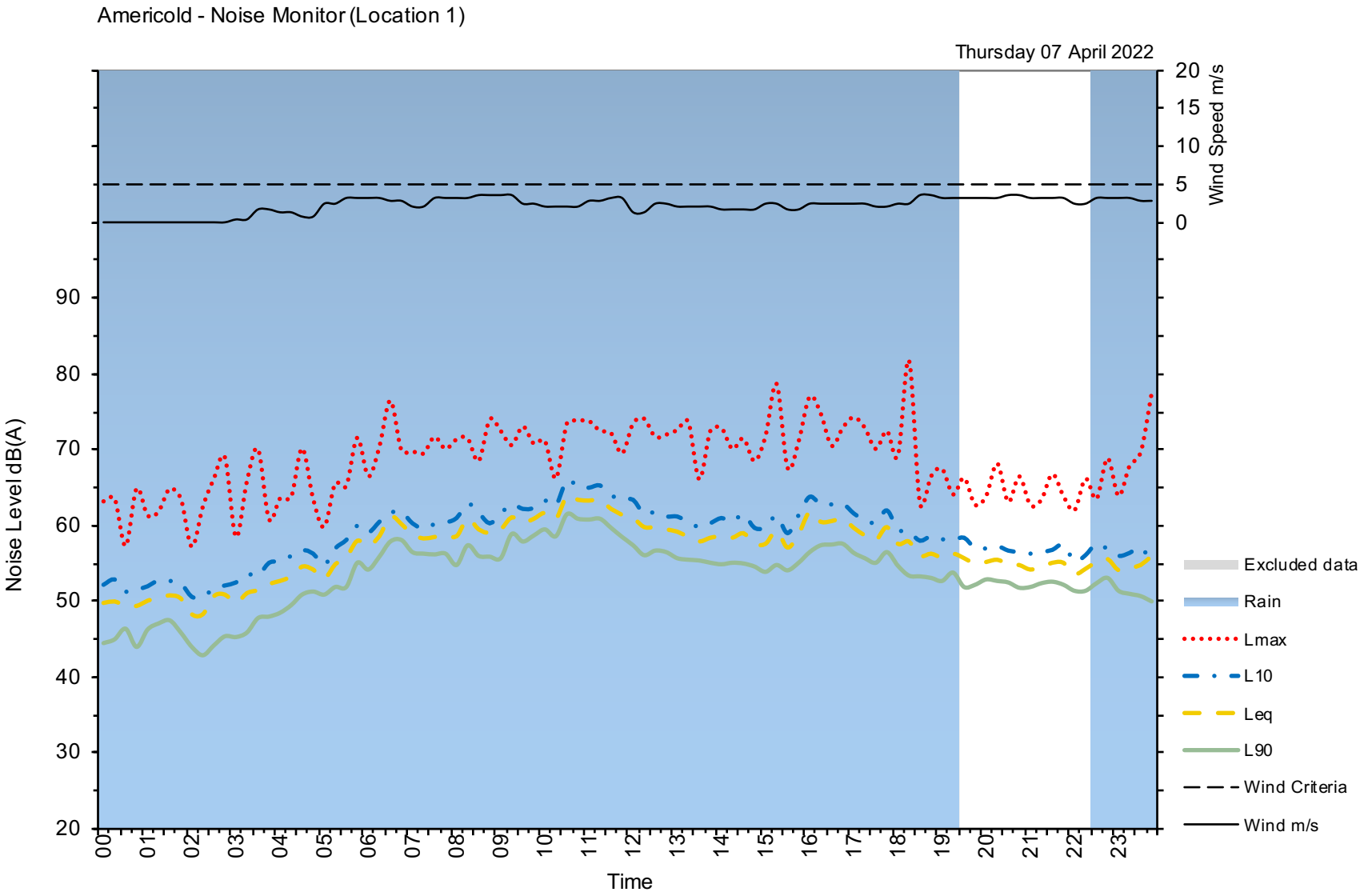
Wind Criteria
Wind m/s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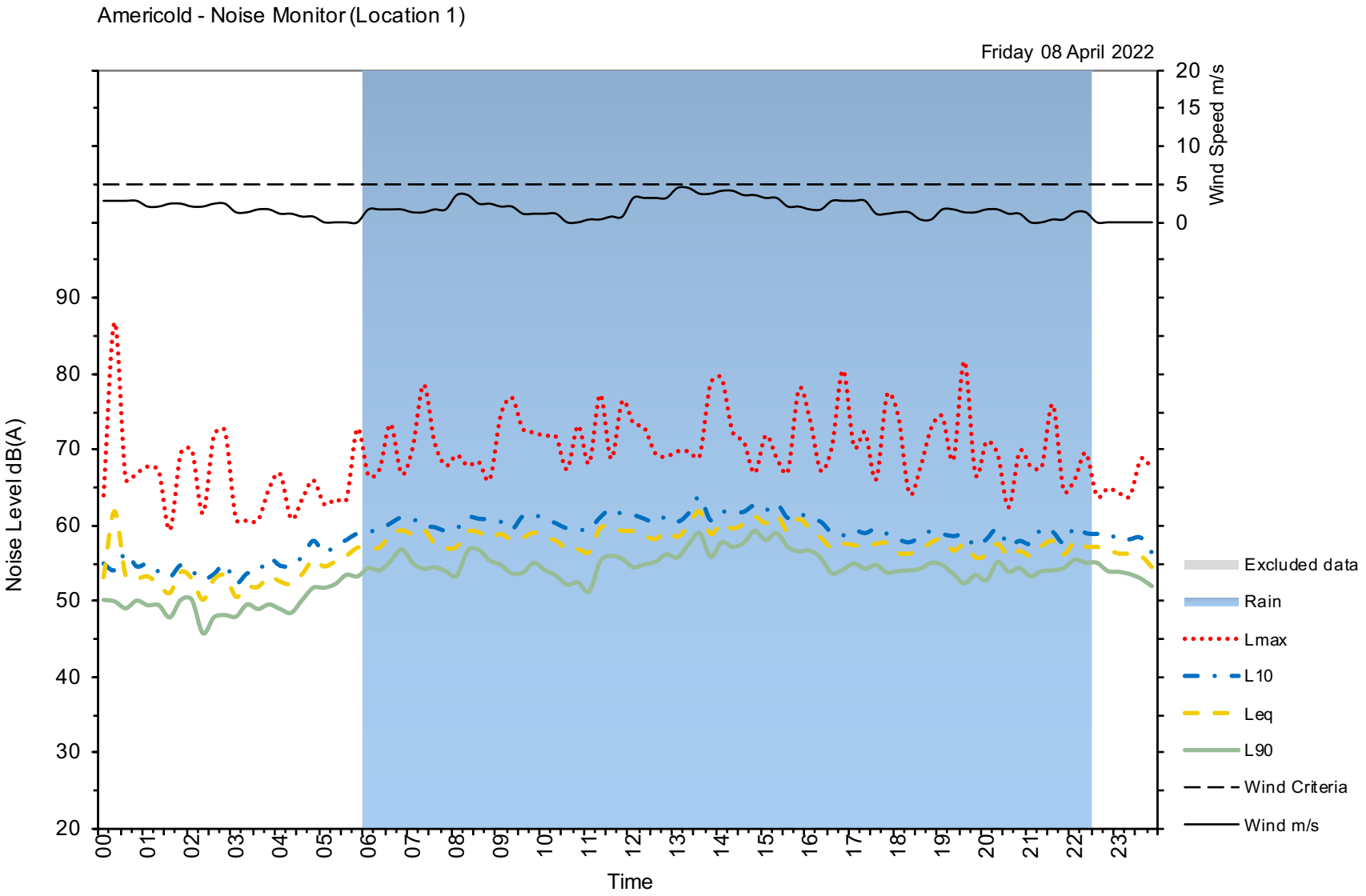
Wind Criteria
Wind m/s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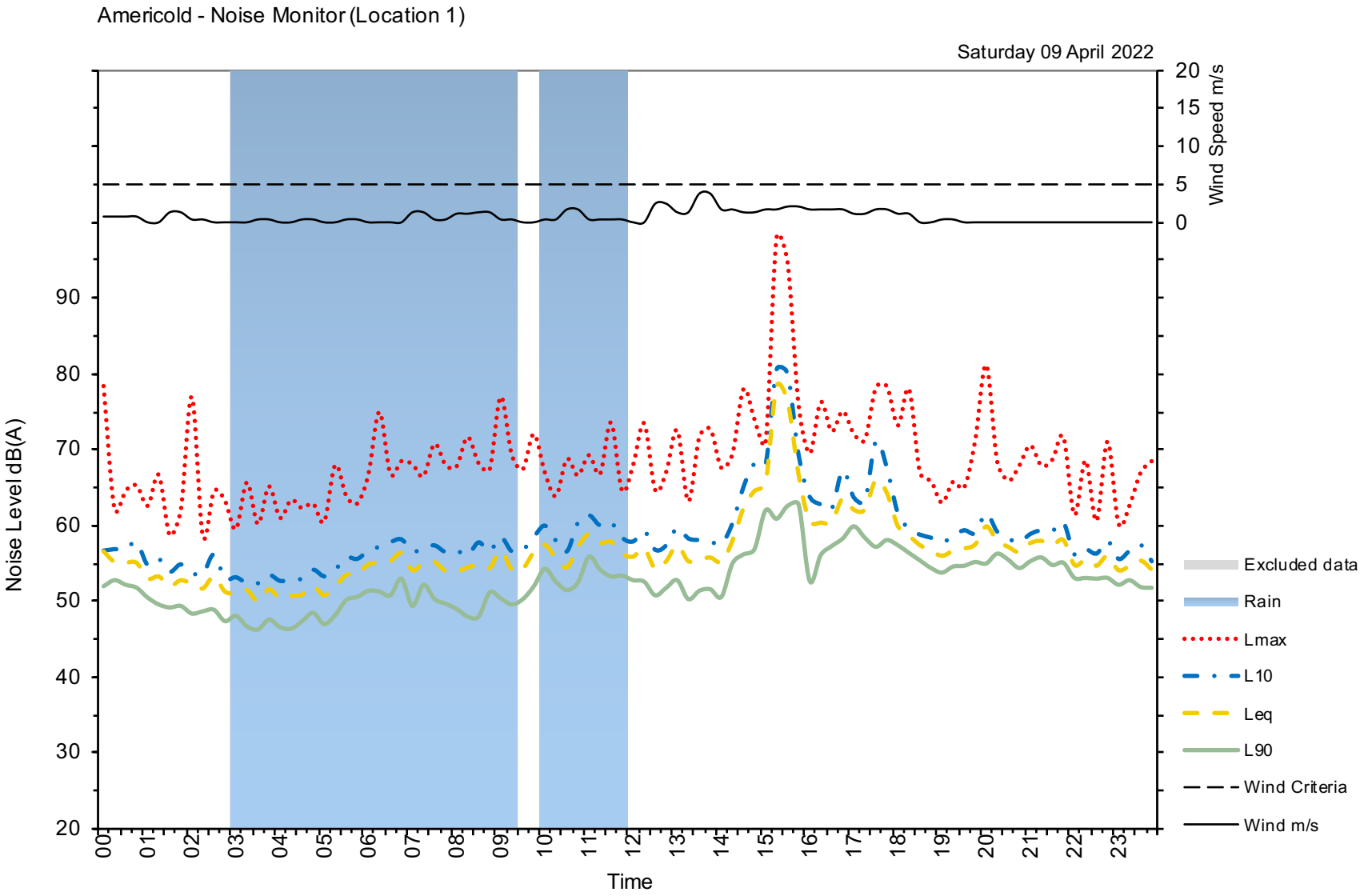
Wind Criteria
Wind m/s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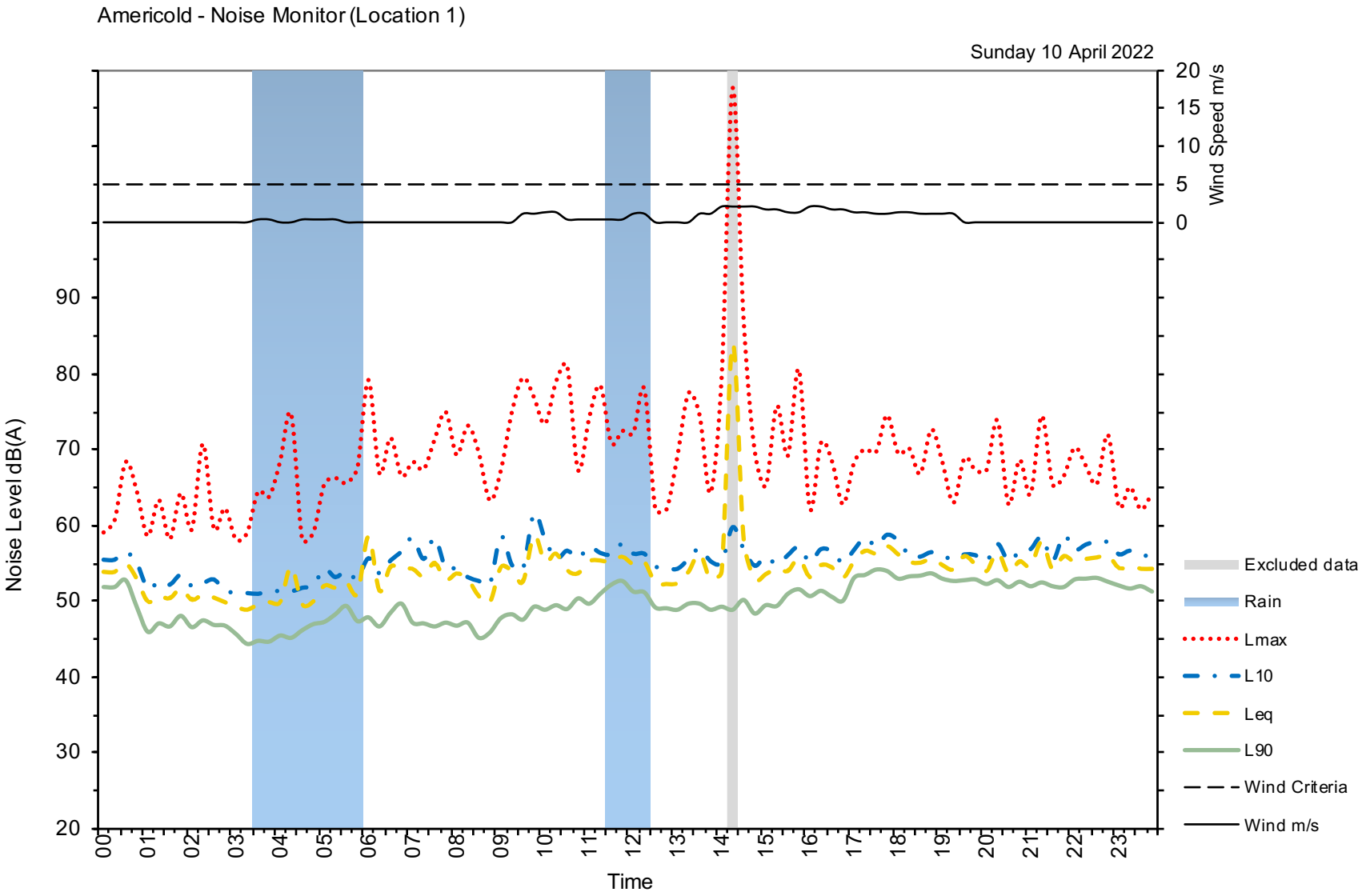
Wind Criteria
Wind m/s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Time
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Lmax
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Leq
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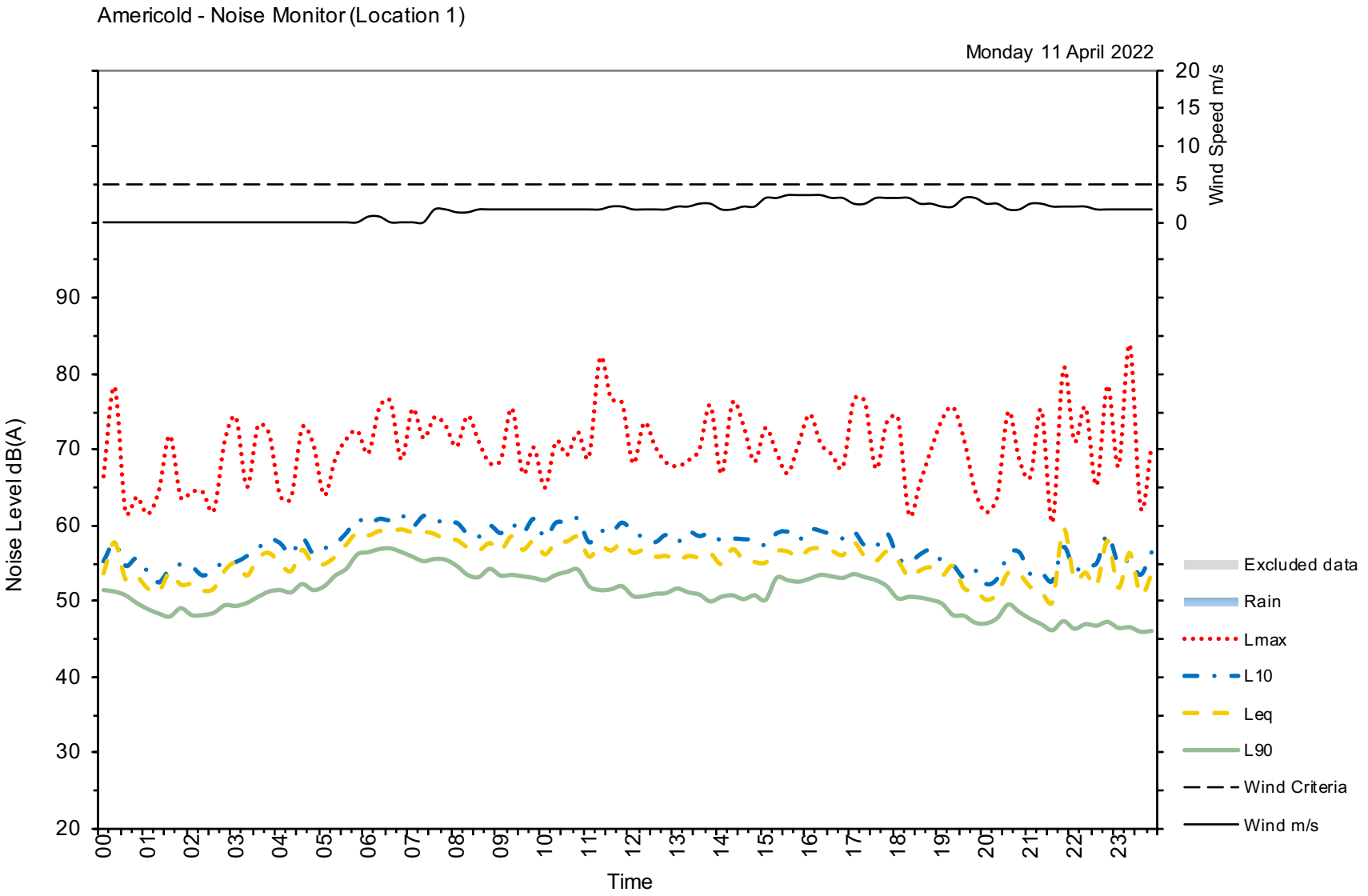
Wind Criteria
Wind m/s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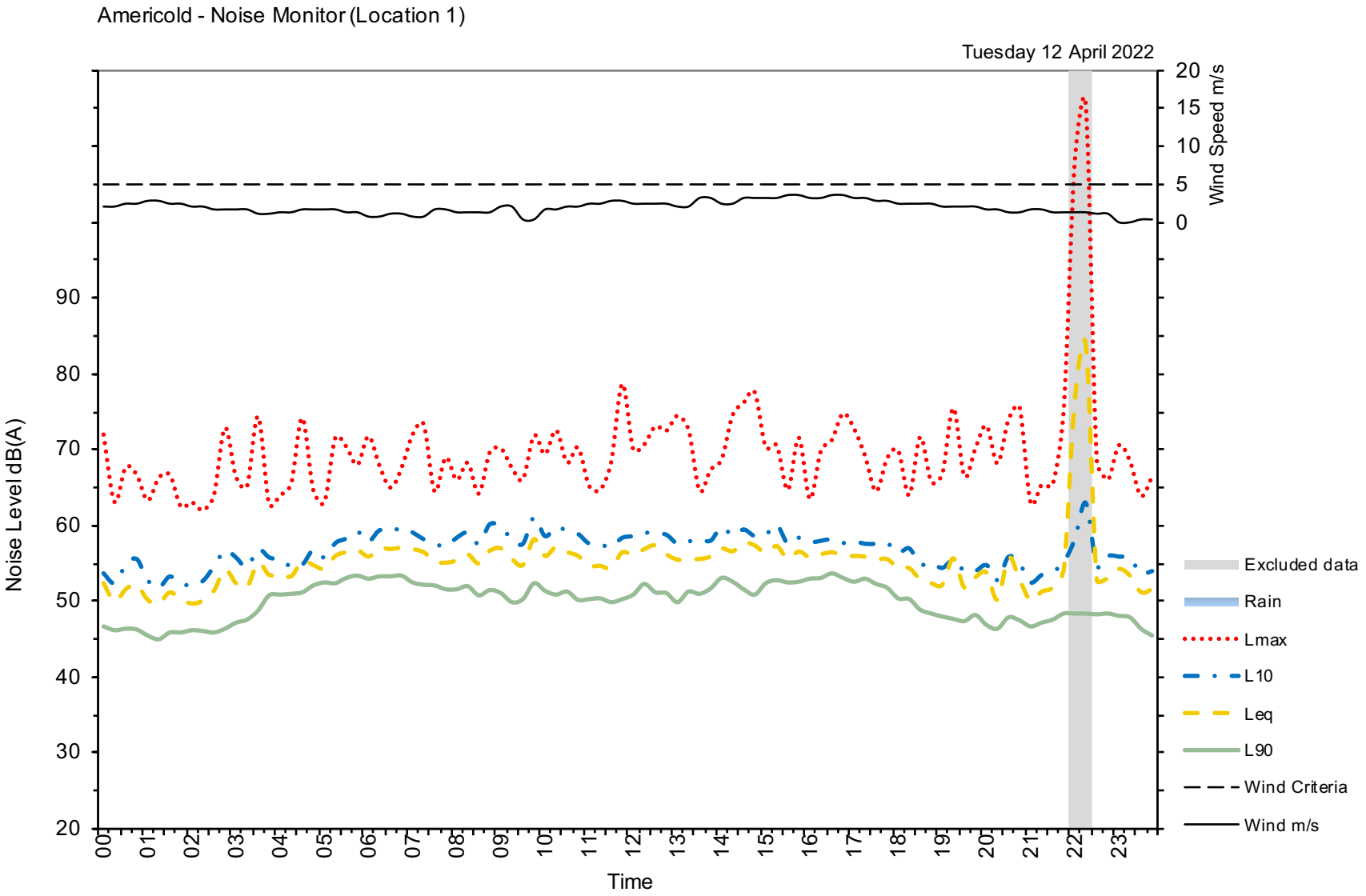
Wind Criteria
Wind m/s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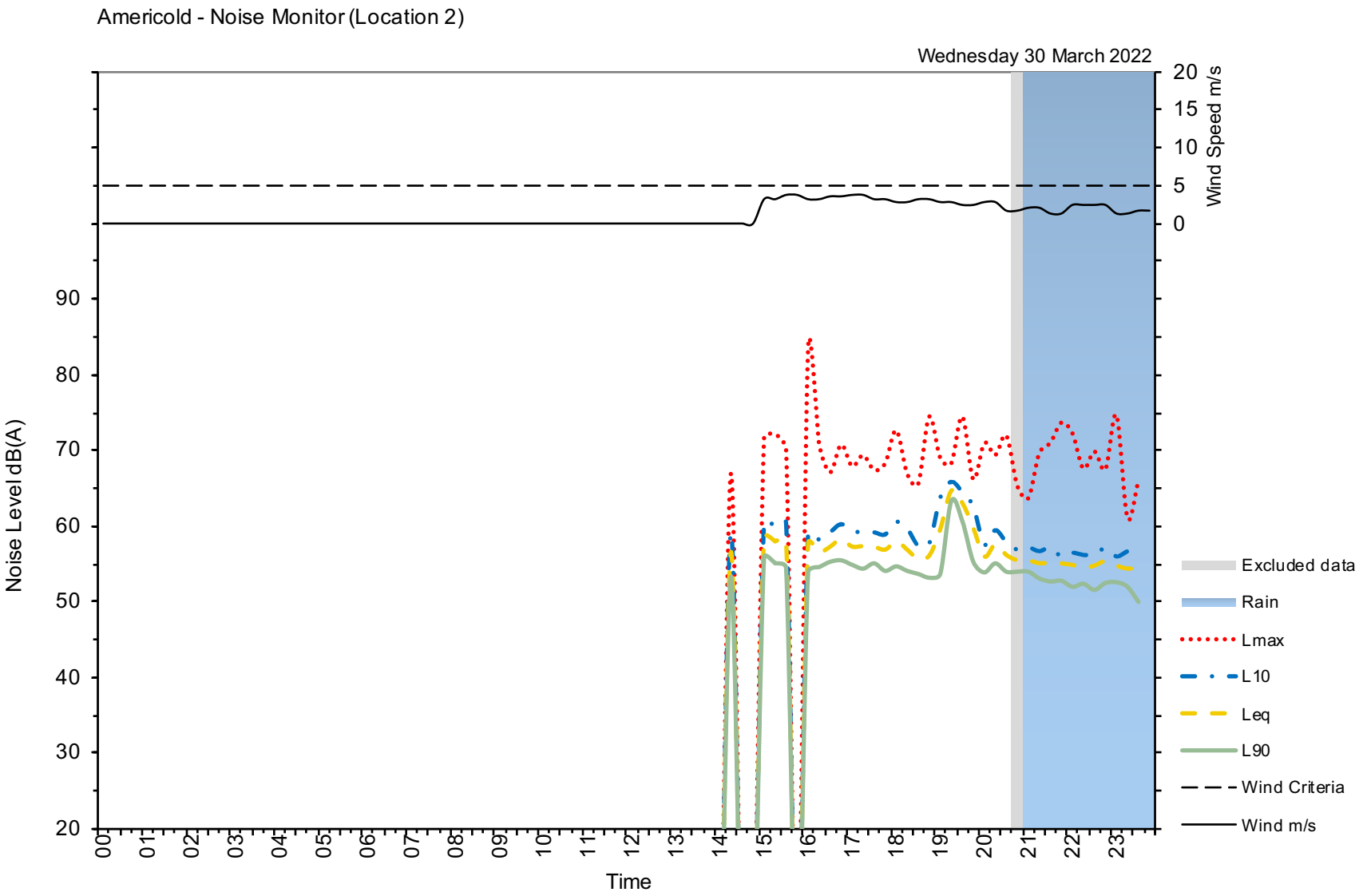
Wind Criteria
Wind m/s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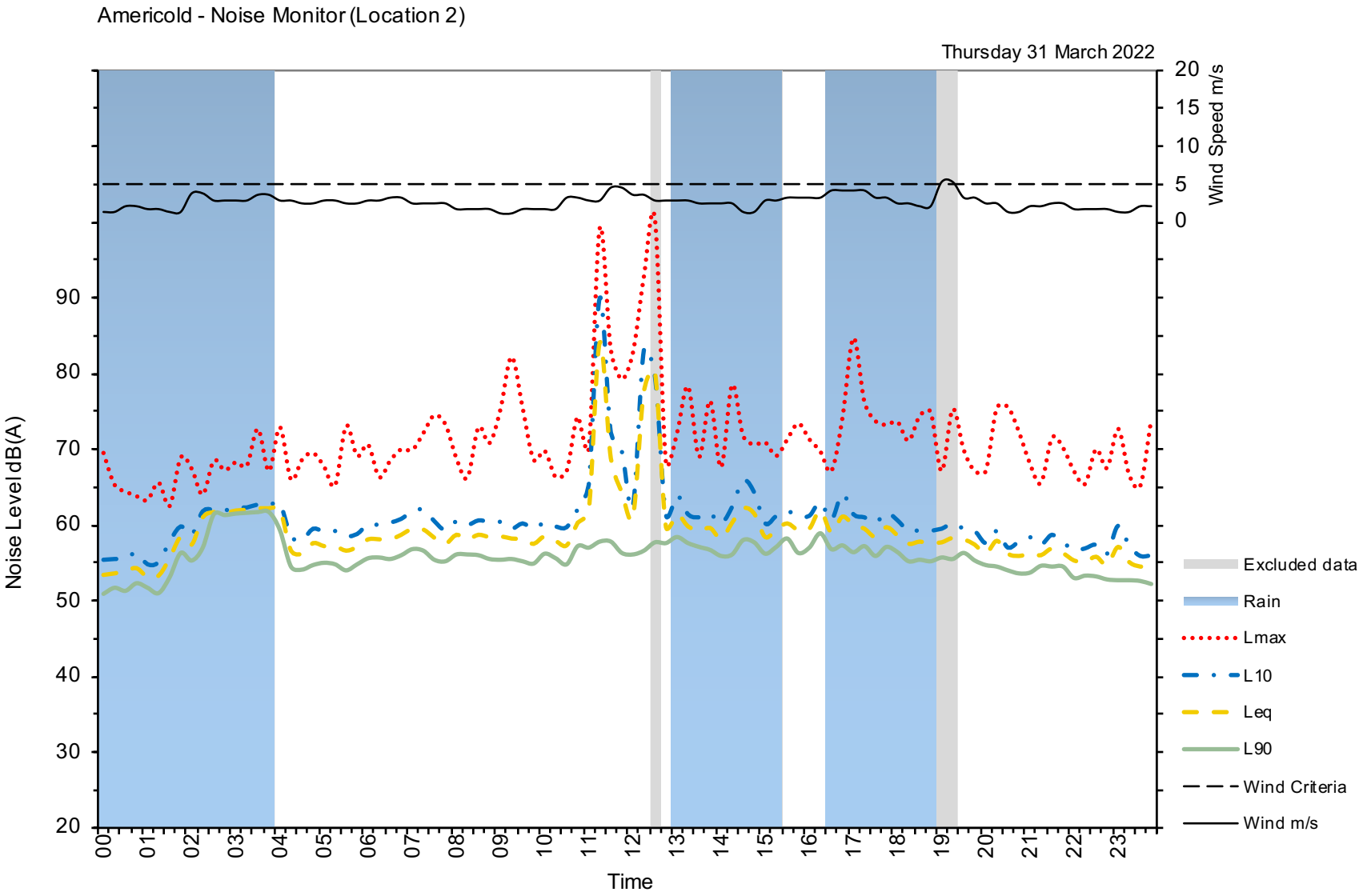
Wind Criteria
Wind m/s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Lmax
L10
Leq
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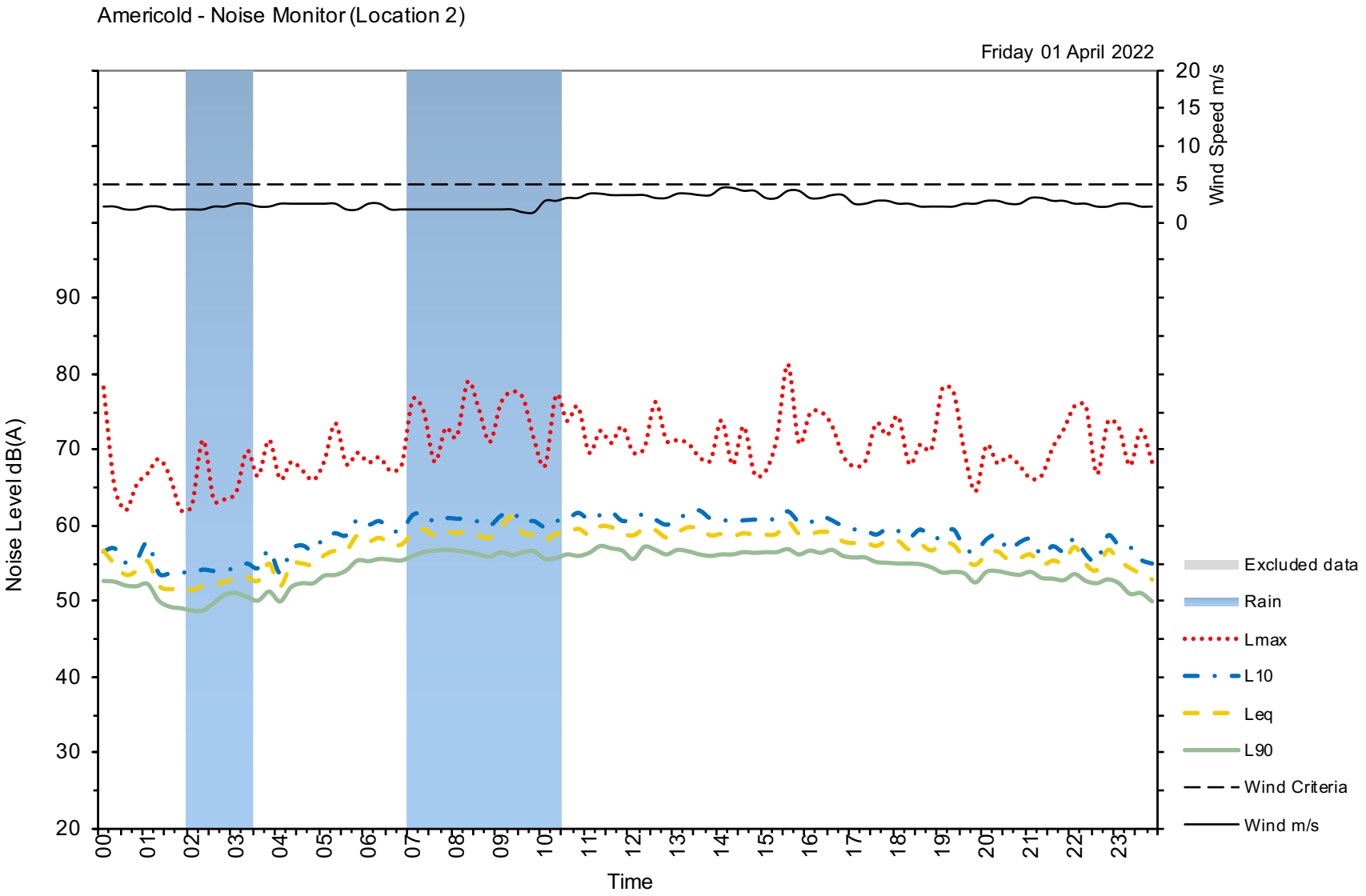
Wind Criteria
Wind m/s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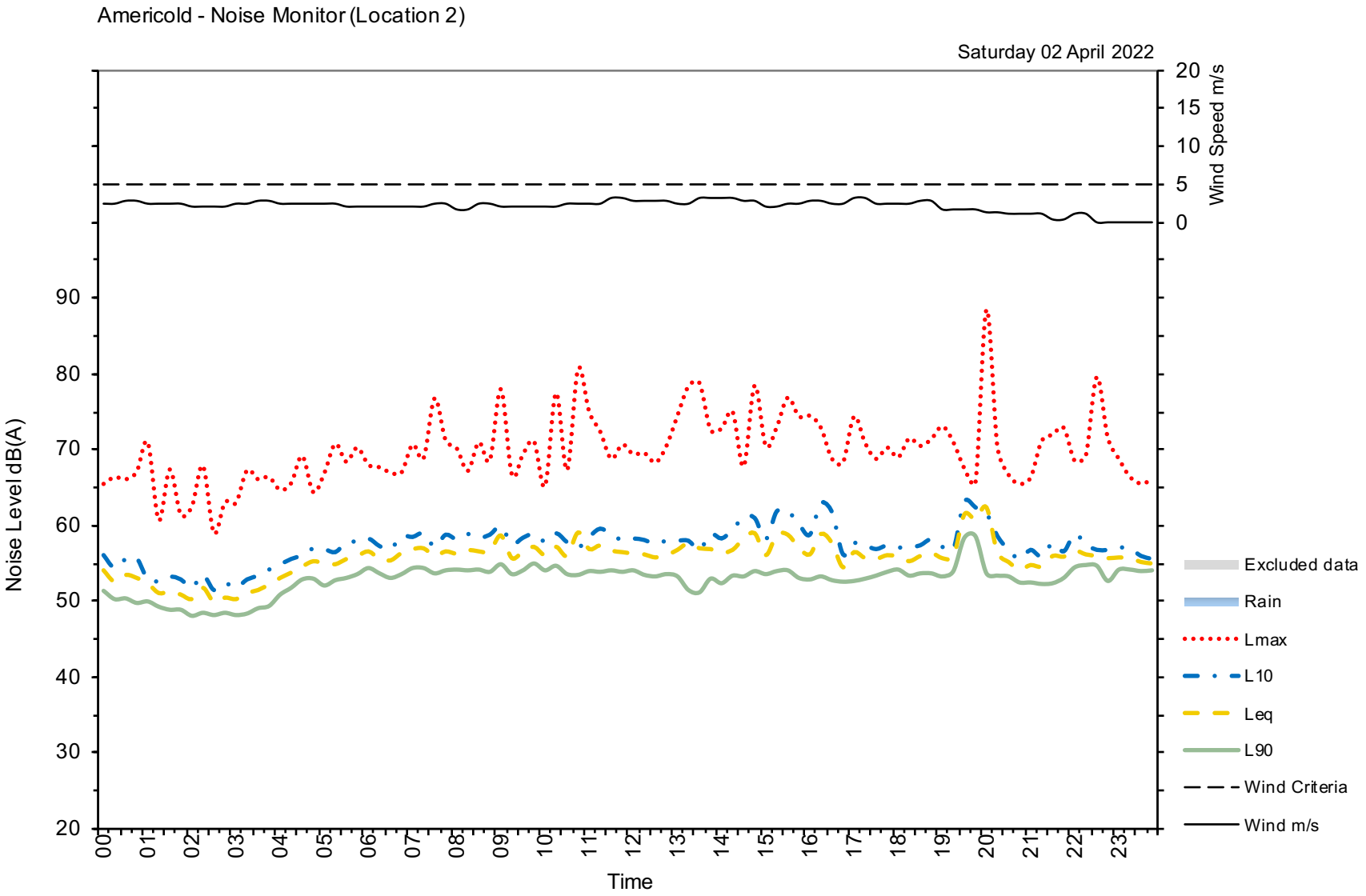
Lmax
L10
Leq
L90
Wind Criteria
Wind m/s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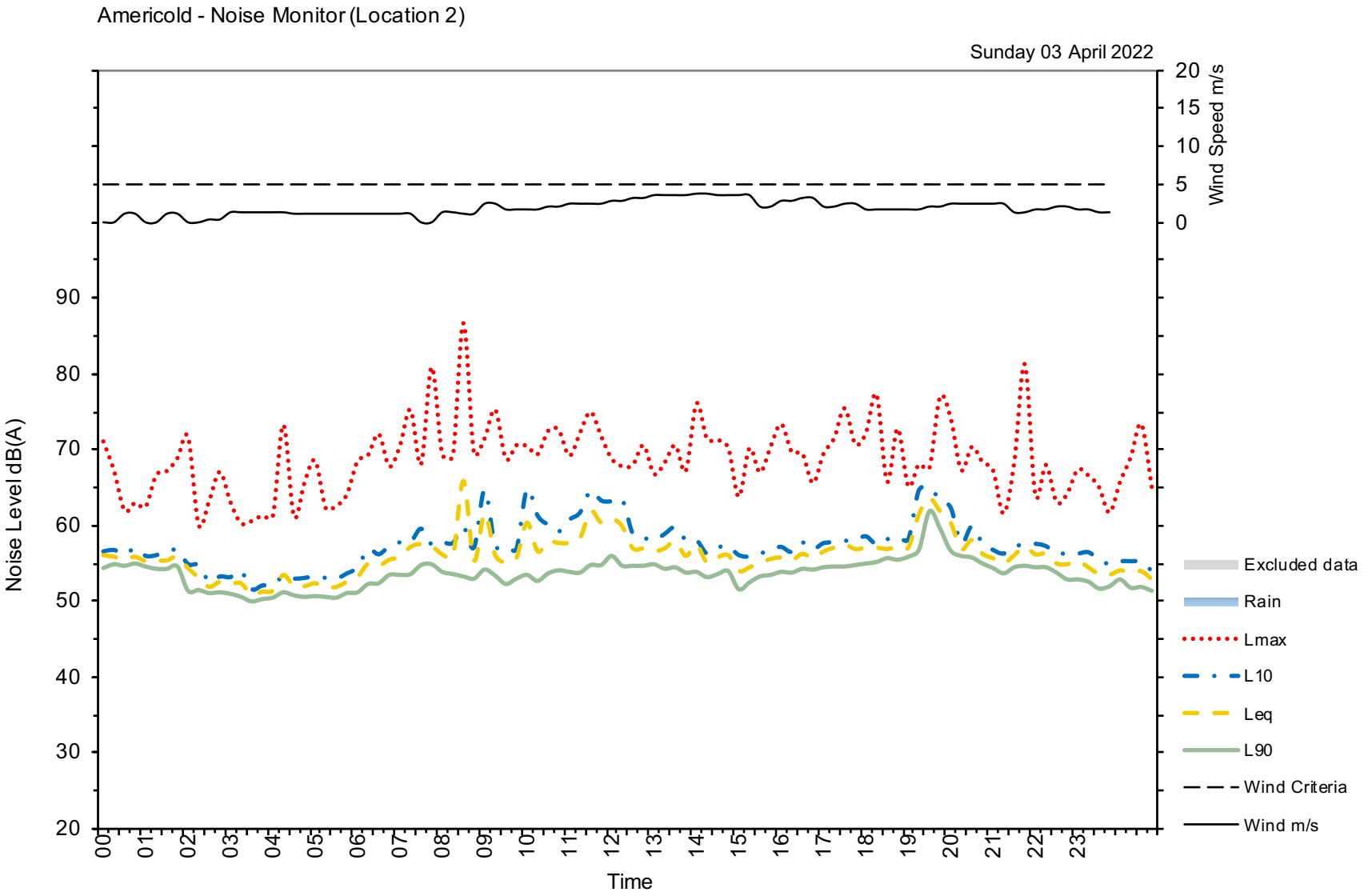
Wind Criteria
Wind m/s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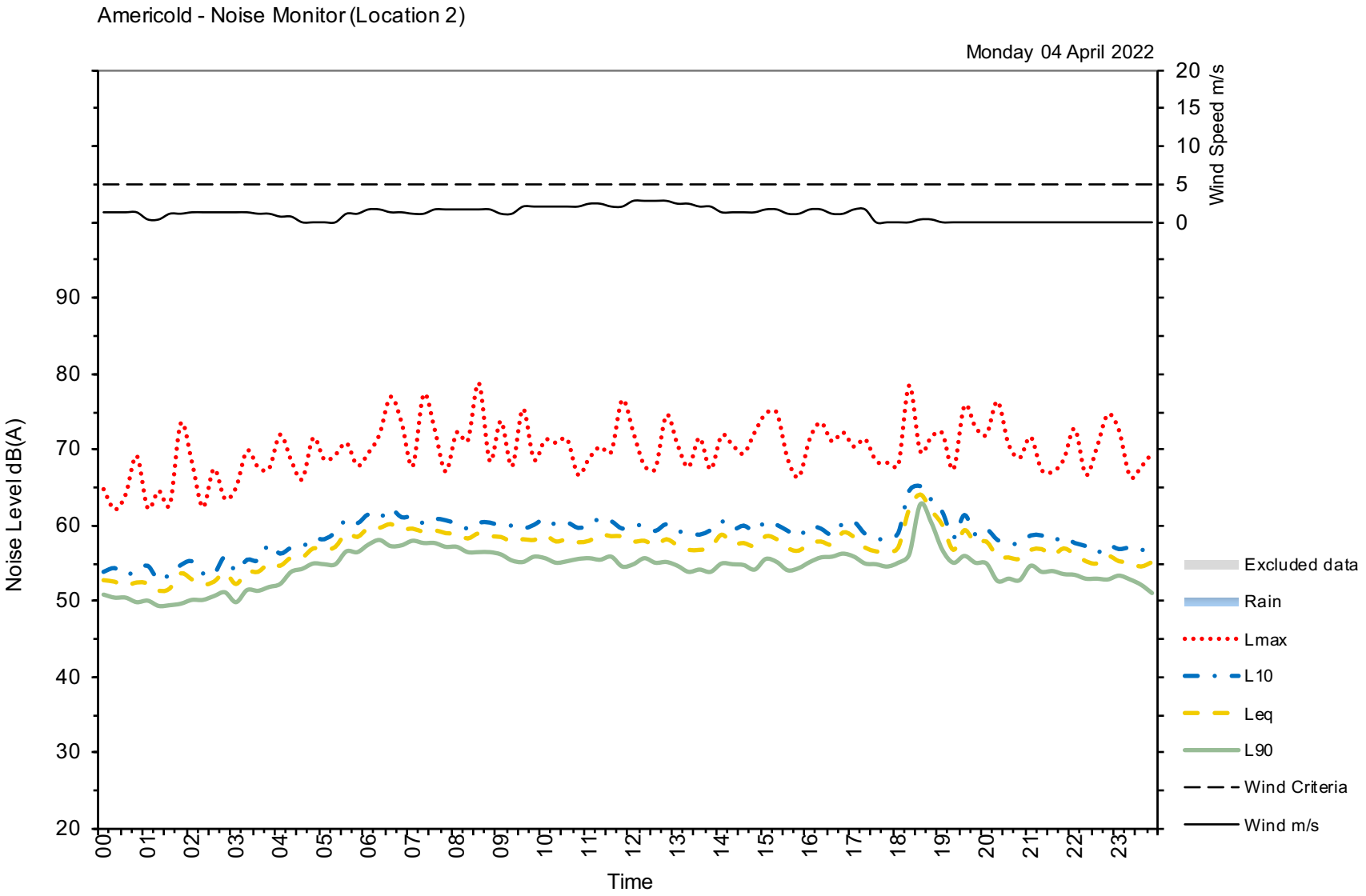
Wind Criteria
Wind m/s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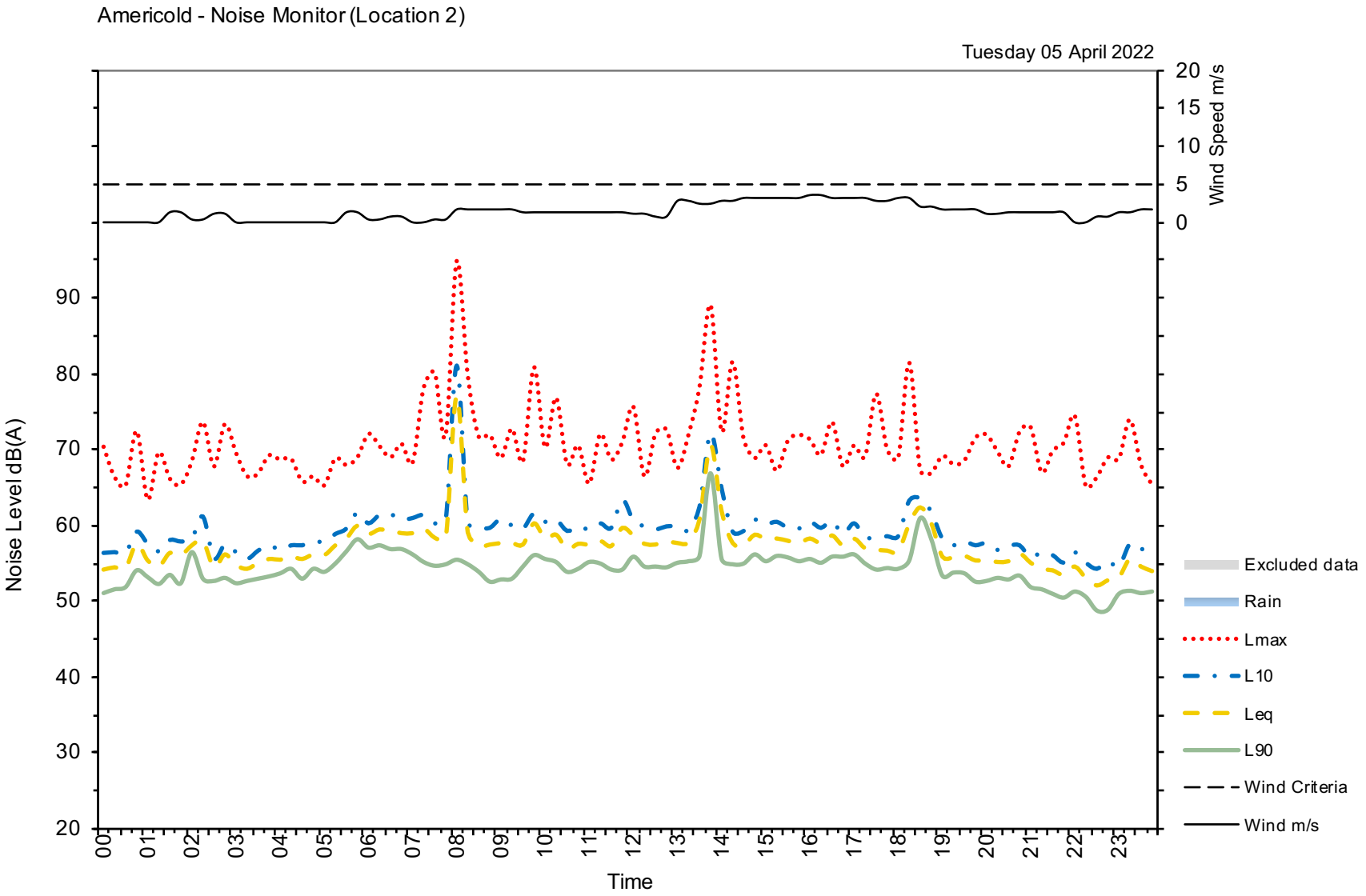
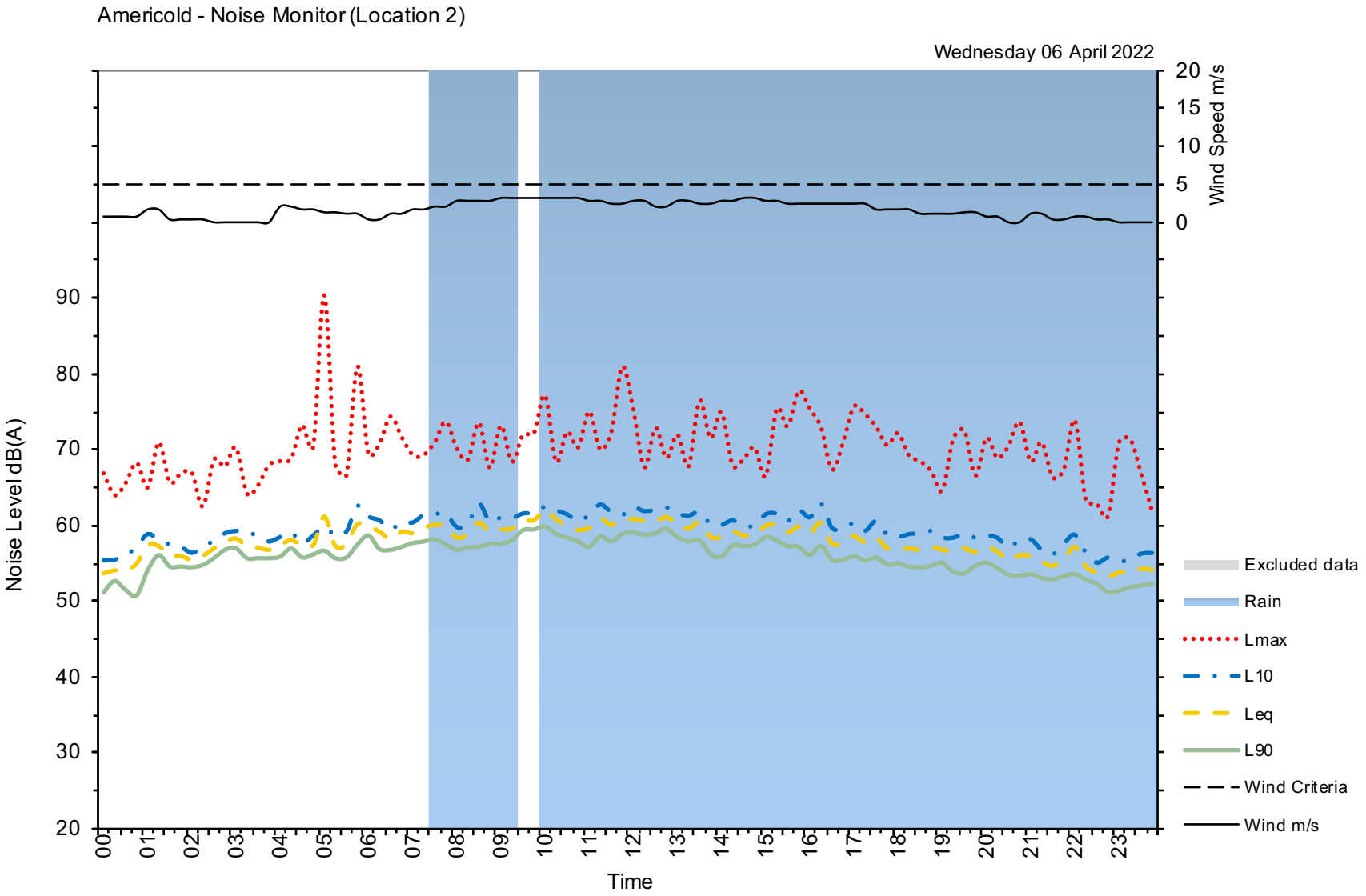
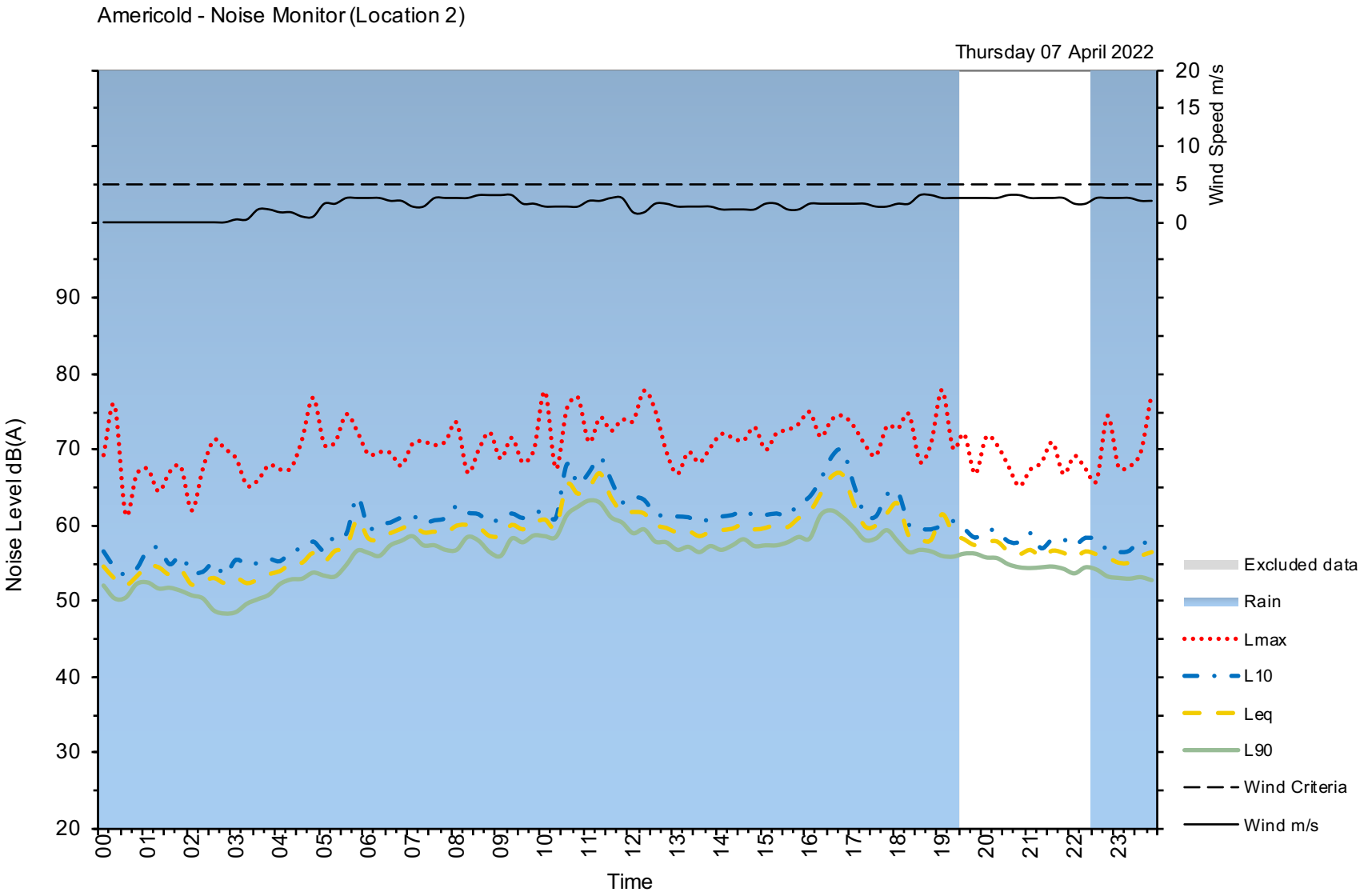
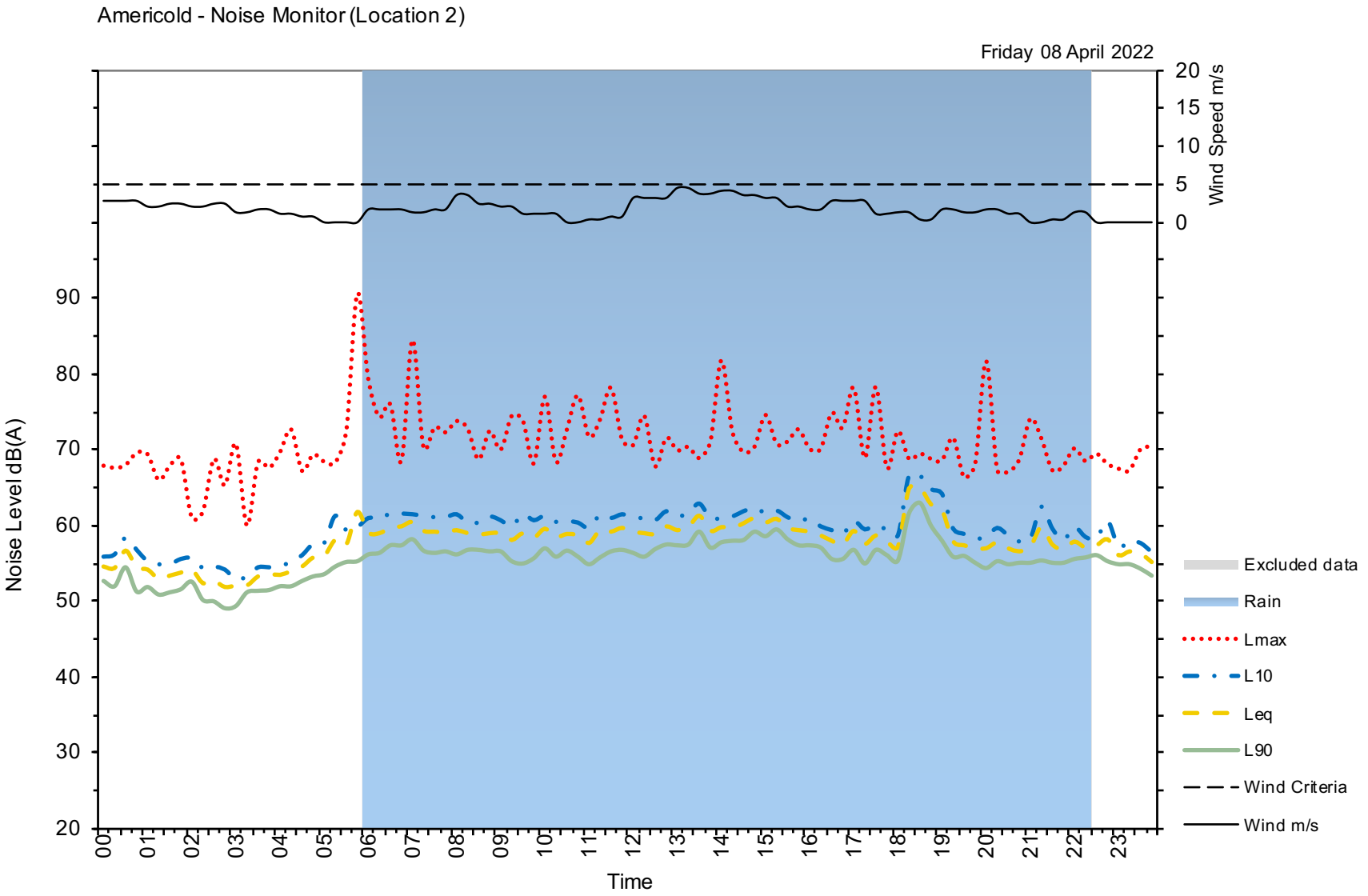
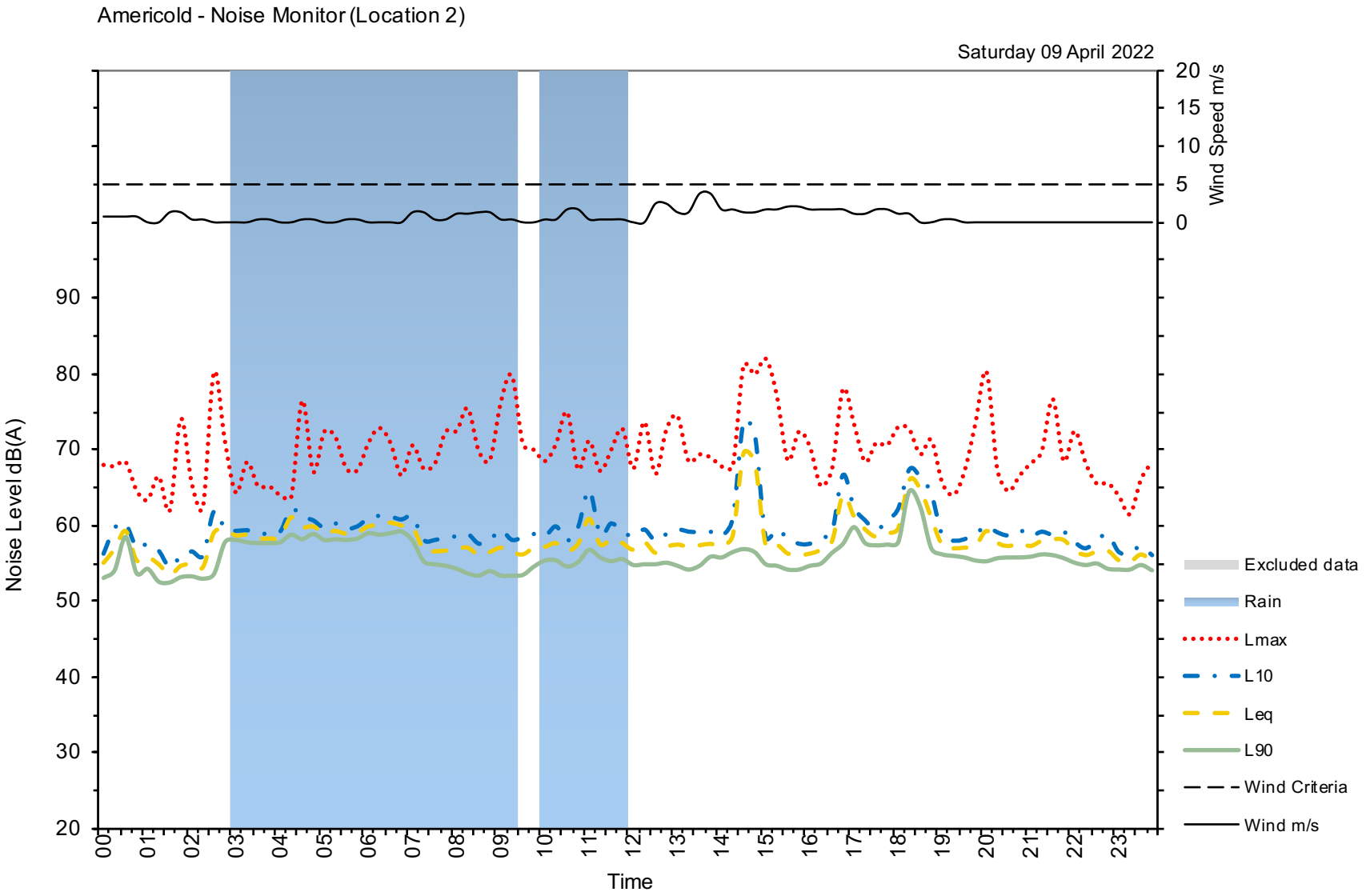
Noise Level dB(A)
Wind Speed m/s
Time
Excluded data
Rain
Lmax
L10
Leq
L90
Wind Criteria
Wind m/s

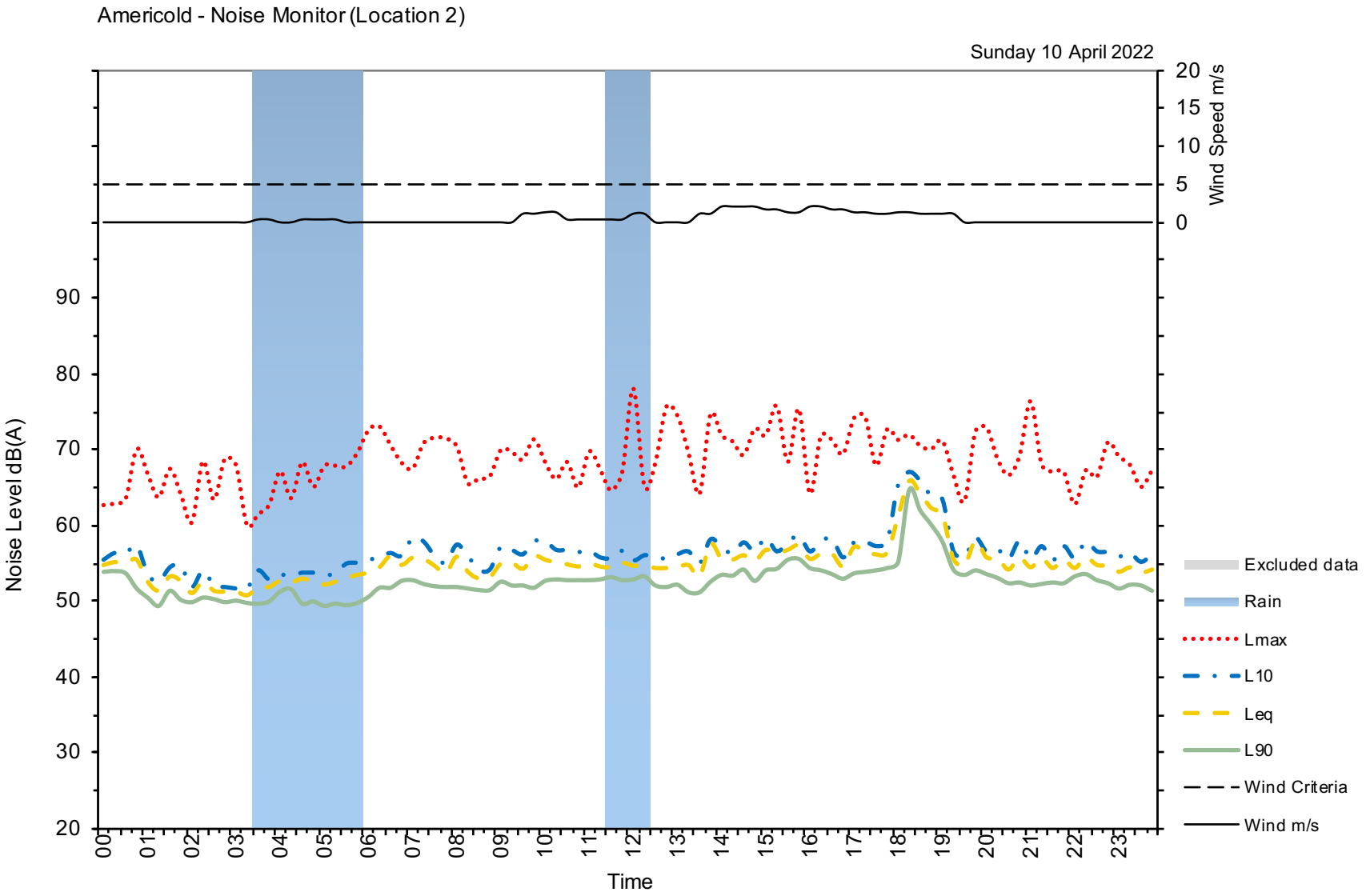

Americold - Noise Monitor (Location 2)
Tuesday 05 April 2022
Noise Level dB(A)
Wind Speed m/s
Time
Excluded data
Rain
Lmax
L10
Leq
L90
Wind Criteria
Wind m/s

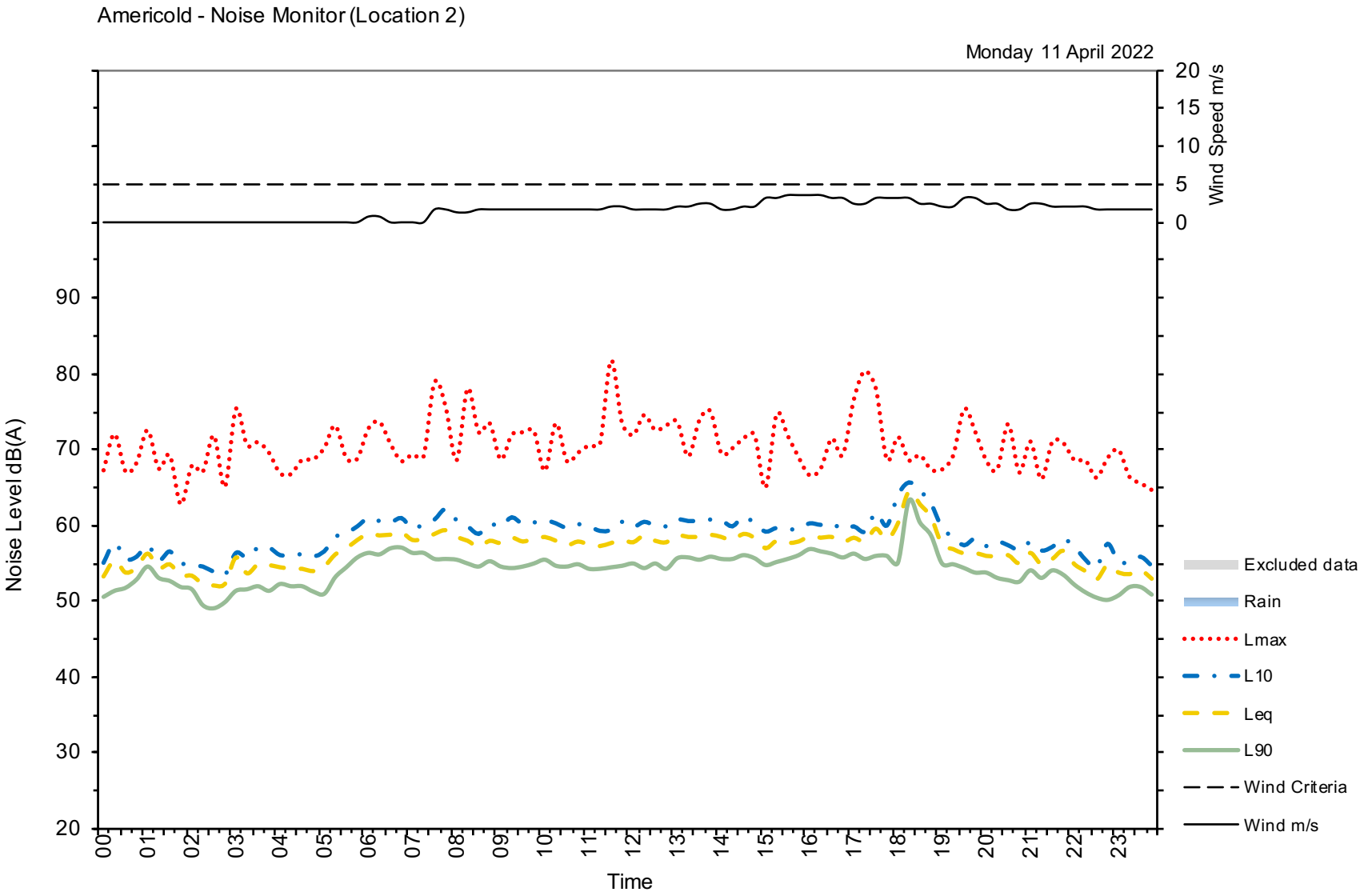

Americold - Noise Monitor (Location 2)
Wednesday 06 April 2022
Noise Level dB(A)
Wind Speed m/s
Time
Excluded data
Rain
Lmax
L10
Leq
L90
Wind Criteria
Wind m/s

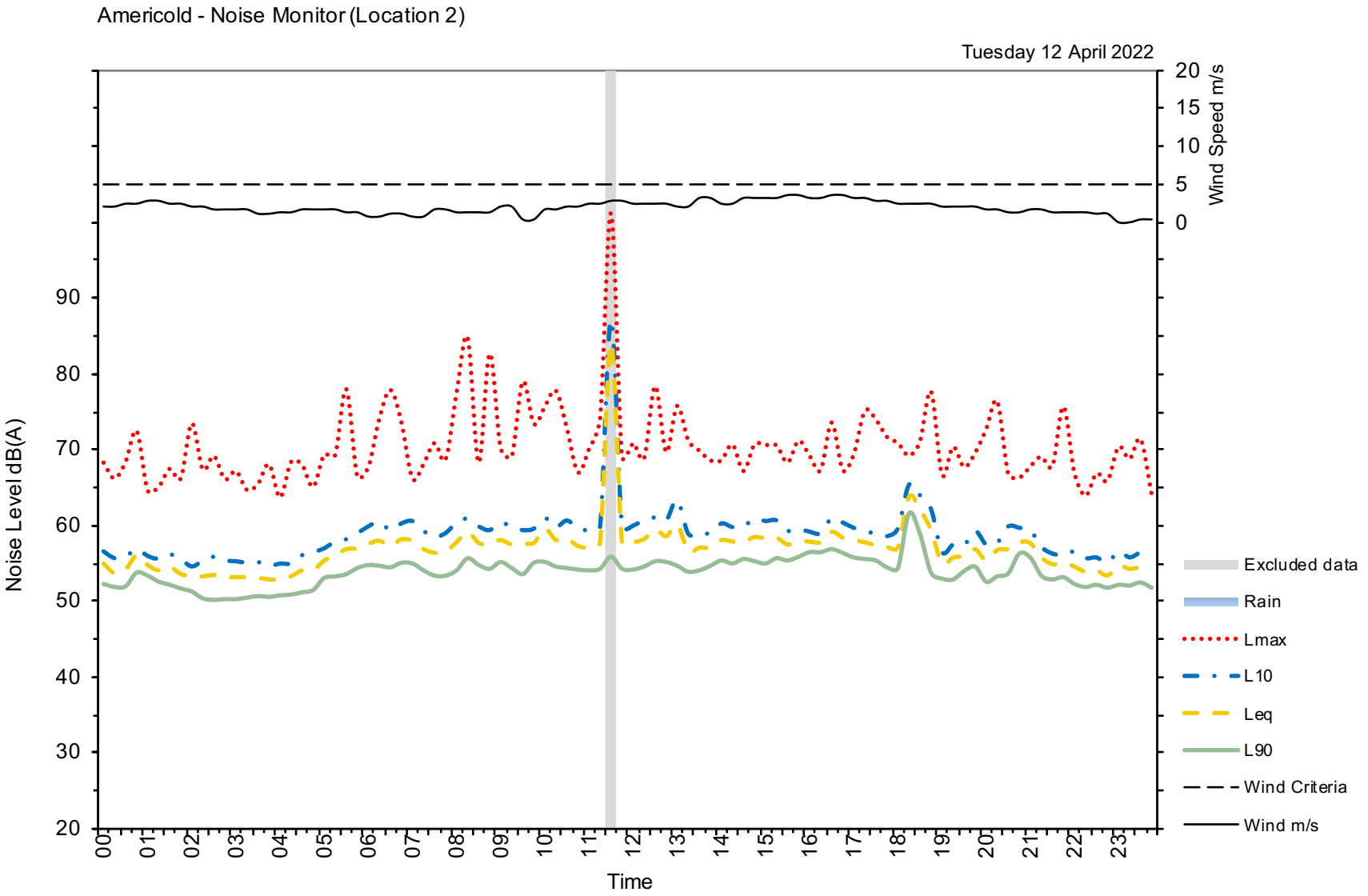

Americold - Noise Monitor (Location 2)
Thursday 07 April 2022
Noise Level dB(A)
Wind Speed m/s
Time
Excluded data
Rain
Lmax
L10
Leq
L90
Wind Criteria
Wind m/s


Americold - Noise Monitor (Location 2)
Friday 08 April 2022
Noise Level dB(A)
Wind Speed m/s
Time
Excluded data
Rain
Lmax
L10
Leq
L90
Wind Criteria
Wind m/s


Americold - Noise Monitor (Location 2)
Saturday 09 April 2022
Noise Level dB(A)
Wind Speed m/s
Time
Excluded data
Rain
Lmax
L10
Leq
L90
Wind Criteria
Wind m/s


Americold - Noise Monitor (Location 2)
Sunday 10 April 2022
Noise Level dB(A)
Wind Speed m/s
Time
Excluded data
Rain
Lmax
L10
Leq
L90
Wind Criteria
Wind m/s


Americold - Noise Monitor (Location 2)
Monday 11 April 2022
Noise Level dB(A)
Wind Speed m/s
Time
Excluded data
Rain
Lmax
L10
Leq
L90
Wind Criteria
Wind m/s


Americold - Noise Monitor (Location 2)
Tuesday 12 April 2022
Noise Level dB(A)
Wind Speed m/s
Time
Excluded data
Rain
Lmax
L10
Leq
L90
Wind Criteria
Wind m/s

Appendix C – Measured 1/3 octave band frequencies noise levels of plant items

ID	Description of noise source	Measured Leq noise level (dB) at each 1/3 octave band frequency (Hz)																																Overall		
		12.5	16	20	25	31.5	40	50	63	80	100	125	160	200	250	315	400	500	630	800	1k	1.25k	1.6k	2k	2.5k	3.15k	4k	5k	6.3k	8k	10k	12.5k	16k	20k	dB(Z)	dB(A)	dB(C)
1	Forklift reversing with alarm	59	61	61	61	61	63	70	73	60	64	63	59	59	57	56	60	62	63	59	56	55	53	55	68	59	46	44	42	40	36	33	29	23	78	72	77
2	Forklift driving forward	64	62	60	59	61	62	69	74	60	60	64	57	56	55	54	59	59	58	54	53	53	52	53	51	46	43	42	39	37	33	30	28	22	77	64	76
3	Forklift loading & unloading	60	64	63	64	59	58	60	58	55	59	55	59	59	55	56	57	59	58	57	57	57	56	56	63	52	50	47	44	42	38	35	30	24	73	68	71
4	Forklift horn	57	58	58	60	61	65	68	70	60	62	63	60	60	63	63	72	66	59	65	63	61	61	60	60	81	76	60	61	61	58	59	56	50	84	84	83
5	Truck 1 trailer freezer motor only	58	59	69	76	77	79	85	90	87	83	85	85	78	77	77	79	74	74	75	72	70	70	70	67	66	64	61	59	56	52	47	45	41	95	83	95
6	Truck 2 trailer freezer motor only	61	61	68	69	77	75	84	91	90	74	83	82	78	74	75	73	72	71	72	74	68	68	69	65	65	62	58	55	53	49	46	43	39	95	81	95
7	Truck idling no trailer freezer motor	65	66	69	72	80	89	85	91	92	76	86	78	76	74	73	75	75	74	75	79	75	76	74	70	66	66	61	62	57	55	50	45	40	97	85	96
8	Truck idling with trailer freezer motor	66	67	72	74	82	89	87	94	94	78	88	83	80	77	77	77	77	76	77	80	76	76	75	71	69	67	63	63	59	56	51	47	42	99	87	98
9	Truck driving at approx. 10 km/hr	62	65	63	68	76	69	79	74	74	78	75	75	76	71	70	72	72	70	73	69	69	68	73	66	62	60	58	54	52	48	44	38	30	87	80	86
10	Truck reversing with alarm	68	69	68	69	75	79	84	87	83	75	82	78	78	82	78	73	73	73	72	73	74	72	71	71	69	65	62	62	58	54	50	44	40	93	83	92
11	Truck revering no alarm	60	58	65	65	64	63	63	58	59	58	57	59	59	57	56	55	59	59	59	61	61	57	57	62	65	51	47	45	46	41	38	35	25	75	71	73
12	Truck passby - accelerating	65	70	67	67	78	82	87	87	83	76	81	77	78	79	73	72	73	73	72	73	74	72	71	70	66	64	64	61	59	55	51	45	39	93	83	92
13	Existing southern plant room and pump	59	55	53	62	66	69	67	64	61	59	59	57	58	52	52	49	49	50	52	54	57	55	54	61	58	54	49	48	50	51	46	44	34	75	67	73
14	Existing northern warehouse plant room (louvres)	59	61	69	73	72	68	66	65	64	67	59	63	69	61	60	72	62	67	55	53	51	49	51	52	50	54	52	47	44	42	36	29	20	80	71	79
15	Existing northern warehouse rooftop plant	59	61	64	67	64	66	71	76	76	70	73	72	72	69	69	68	67	65	62	60	59	58	58	57	57	57	56	55	54	51	48	44	36	83	73	83

Appendix D – Night-time predicted 1/3 octave band frequencies operational noise levels of the existing and new south expansion facility at nearby residential receivers

Weather Conditions	Receiver	Overall		Predicted Leq noise level (dB(Z)) at each 1/3 octave band frequency (Hz)																														
		Leq,dB(A)	Leq,dB(Z)	25	31.5	40	50	63	80	100	125	160	200	250	315	400	500	630	800	1k	1.25k	1.6k	2k	2.5k	3.15k	4k	5k	6.3k	8k	10k	12.5k	16k	20k
Neutral	R1 - 566 Reservior Road	51.3	61.6	54.2	53.8	48.9	50	52.3	51.3	48.1	45.9	45.8	49.1	42.3	41.4	50.3	41.1	47	38.1	36.4	34.3	32.8	34.7	36	34.9	38.4	36.3	30.6	26.6	22.9	14.6	4.3	0
	R2 - 533 Reservior Road, Prospect	41.3	56.7	40	41.3	40.8	43.8	53	51.6	36.3	43.1	41.4	37.2	34.5	33.8	32.3	31.9	29.3	31.6	33.2	28.8	29	29.8	26	24.9	22.8	19.2	14	9.3	1.3	0	0	0
	R3 - 525 Reservior Road, Prospect	30.2	47.5	35.2	35.5	33.8	37	43.5	41.5	27.4	31.5	29.3	26.9	24.3	20.3	28.8	22.3	23.9	17.2	18.6	13.9	12.3	14.4	10.3	7.8	8.8	4.2	0	0	0	0	0	0
	R4 - 517 Reservior Road, Prospect	32.7	48.1	35.3	35.4	33.6	37.2	43.9	42.2	28.7	33.2	31.9	29.9	25.8	24.5	30.4	24	25.3	22	22.8	18.2	17.6	17.9	15.5	13.8	12.3	8.6	1.9	0	0	0	0	0
	R5 - 544 Reservior Road, Prospect	29.5	46.5	36.3	35.8	33.4	35.8	41.9	40.1	28.3	31.1	28.9	27.3	25	21.3	26.3	21.9	20.5	16.1	19.9	15.2	14.2	16.1	12.3	10.8	9.8	5.8	0.8	0	0	0	0	0
	R6 - 21 Muttong Street, Pemulwuy	19.9	41.6	23.3	27.8	29.9	30.3	38.2	36.4	17	25	22	15.6	10.7	10.3	12	8	7.1	7.5	10	3.5	2.3	0.9	0	0	0	0	0	0	0	0	0	0	0
	R7 - 566 Reservior Road, Prospect	40.3	58.2	53.4	52.8	47.7	45.7	47.3	45.3	41.9	39.8	39.2	41.3	34.2	32.3	40.4	30.8	33.9	25.9	26.8	21.4	20.7	23.7	19.2	17.9	20.2	16.6	12	9.7	4.1	0	0	0
	R8 - 24 Watch House Road, Prospect	32.9	49.9	33.2	35.2	36.1	38.7	46.1	44.8	27.9	35.2	33.1	28.5	24.6	24.8	27.6	24.1	23.6	24.2	25.4	19.5	18.3	17.2	11.7	8.8	4.1	0	0	0	0	0	0	0
Adverse	R1 - 566 Reservior Road	51.7	62.0	54.4	54.1	49.2	50.4	53	51.9	48.5	46.3	46.2	49.2	42.4	41.5	50.3	41.2	47	38.2	36.5	34.3	34.6	36.5	37.8	36	39.5	37.4	31.7	27.6	23.9	15.6	5.2	0
	R2 - 533 Reservior Road, Prospect	43.5	58.7	42	43.3	42.9	45.8	55.1	53.6	37.7	44.6	43	38.8	35.7	35.4	34	33.3	31.3	33.6	35.1	30.7	32	32.6	28.9	28.6	26.4	22.9	17.7	12.8	4.8	0	0	0
	R3 - 525 Reservior Road, Prospect	32.5	49.6	37.3	37.6	35.9	39.1	45.7	43.7	29.3	33.3	31.2	29.3	25.6	22.6	31.4	24	26.5	19.4	20.2	16	15.3	17.1	13.3	12	12.9	8.4	0.4	0	0	0	0	0
	R4 - 517 Reservior Road, Prospect	35.4	50.2	37.4	37.5	35.7	39.3	46	44.3	30.6	35.1	34	32.5	27.9	27.1	33.5	26.6	28.4	24.5	25.3	20.6	20.6	20.9	18.5	18.2	16.7	13	6.2	0	0	0	0	0
	R5 - 544 Reservior Road, Prospect	31.7	48.6	38.4	37.9	35.5	37.9	44.1	42.2	29.9	32.7	30.6	29.3	26.1	23.2	28.8	23.2	23	18.2	21.3	17	17	18.7	15	15	13.8	9.9	4.9	0	0	0	0	0
	R6 - 21 Muttong Street, Pemulwuy	22.5	43.6	25.2	29.9	31.9	32.3	40.2	38.4	19.4	27.3	24.3	18.9	13.9	13.6	15.8	11.8	11	10.1	12.7	6.2	5.4	4	0	0	0	0	0	0	0	0	0	0
	R7 - 566 Reservior Road, Prospect	40.6	58.6	53.6	53.1	48.1	46.1	48.1	46.1	42.2	40.6	39.9	41.5	34.4	32.5	40.5	31	34	26.4	27.3	22	22.8	25.5	21.1	19.8	21.8	18	13.2	11	5.1	0	0	0
	R8 - 24 Watch House Road, Prospect	35.6	51.8	35.1	37.1	38	40.6	47.9	46.7	30	37.3	35.3	31.5	27.4	27.7	31.1	27.4	27.1	26.7	27.9	22	21.2	20.1	14.6	13.5	8.7	3.3	0	0	0	0	0	0

Appendix E – Operational Noise Contours

AMERICOLD PROSPECT
Prospect, NSW

Operational Noise Contours of Existing & Future Facility

PROJECT NUMBER	S220112
DRAWN BY	AS
CHECKED BY	RS
DATE ISSUED	January 2023
CLIENT	Beca Pty Ltd
IMAGERY	Bing
PERIOD	Night
WEATHER	Neutral

Legend

Americold Site

Nearby Sensitive Receivers
- Place of Worship
- Residential
- Child Care Centre

Predicted Noise Levels dB(A)
- 35-40
- 40-45
- 45-50
- 50-55
- 55-60
- 60-65
- 65-70
- 70-75
- 75-80
- 80-85
- 85-90

N

0 100 200 300 m

CRS : GDA2020, MGA ZONE 56

Resonate

AMERICOLD PROSPECT
Prospect, NSW

Operational Noise Contours of Existing & Future Facility

PROJECT NUMBER	S220112
DRAWN BY	AS
CHECKED BY	RS
DATE ISSUED	January 2023
CLIENT	Beca Pty Ltd
IMAGERY	Bing
PERIOD	Night
WEATHER	Adverse

Legend

Americold Site

Nearby Sensitive Receivers
- Place of Worship
- Residential
- Child Care Centre

Predicted Noise Levels dB(A)
- 35-40
- 40-45
- 45-50
- 50-55
- 55-60
- 60-65
- 65-70
- 70-75
- 75-80
- 80-85
- 85-90

N

0 100 200 300 m

CRS : GDA2020, MGA ZONE 56

Resonate

AMERICOLD PROSPECT
Prospect, NSW

Operational Noise Contours of Existing & Future Facility

PROJECT NUMBER	S220112
DRAWN BY	AS
CHECKED BY	RS
DATE ISSUED	January 2023
CLIENT	Beca Pty Ltd
IMAGERY	Bing
PERIOD	Evening
WEATHER	Neutral

Legend

Americold Site

Nearby Sensitive Receivers
- Place of Worship
- Residential
- Child Care Centre

Predicted Noise Levels dB(A)
- 35-40
- 40-45
- 45-50
- 50-55
- 55-60
- 60-65
- 65-70
- 70-75
- 75-80
- 80-85
- 85-90

N

0 100 200 300 m

CRS : GDA2020, MGA ZONE 56

Resonate

AMERICOLD PROSPECT
Prospect, NSW

Operational Noise Contours of Existing & Future Facility

PROJECT NUMBER	S220112
DRAWN BY	AS
CHECKED BY	RS
DATE ISSUED	January 2023
CLIENT	Beca Pty Ltd
IMAGERY	Bing
PERIOD	Evening
WEATHER	Adverse

Legend

Americold Site

Nearby Sensitive Receivers
- Place of Worship
- Residential
- Child Care Centre

Predicted Noise Levels dB(A)
- 35-40
- 40-45
- 45-50
- 50-55
- 55-60
- 60-65
- 65-70
- 70-75
- 75-80
- 80-85
- 85-90

N

0 100 200 300 m

CRS : GDA2020, MGA ZONE 56

Resonate

AMERICOLD PROSPECT
Prospect, NSW

Operational Noise Contours of Existing & Future Facility

PROJECT NUMBER	S220112
DRAWN BY	AS
CHECKED BY	RS
DATE ISSUED	January 2023
CLIENT	Beca Pty Ltd
IMAGERY	Bing
PERIOD	Day
WEATHER	Neutral

Legend

Americold Site

Nearby Sensitive Receivers
- Place of Worship
- Residential
- Child Care Centre

Predicted Noise Levels dB(A)
- 35-40
- 40-45
- 45-50
- 50-55
- 55-60
- 60-65
- 65-70
- 70-75
- 75-80
- 80-85
- 85-90

N

0 100 200 300 m

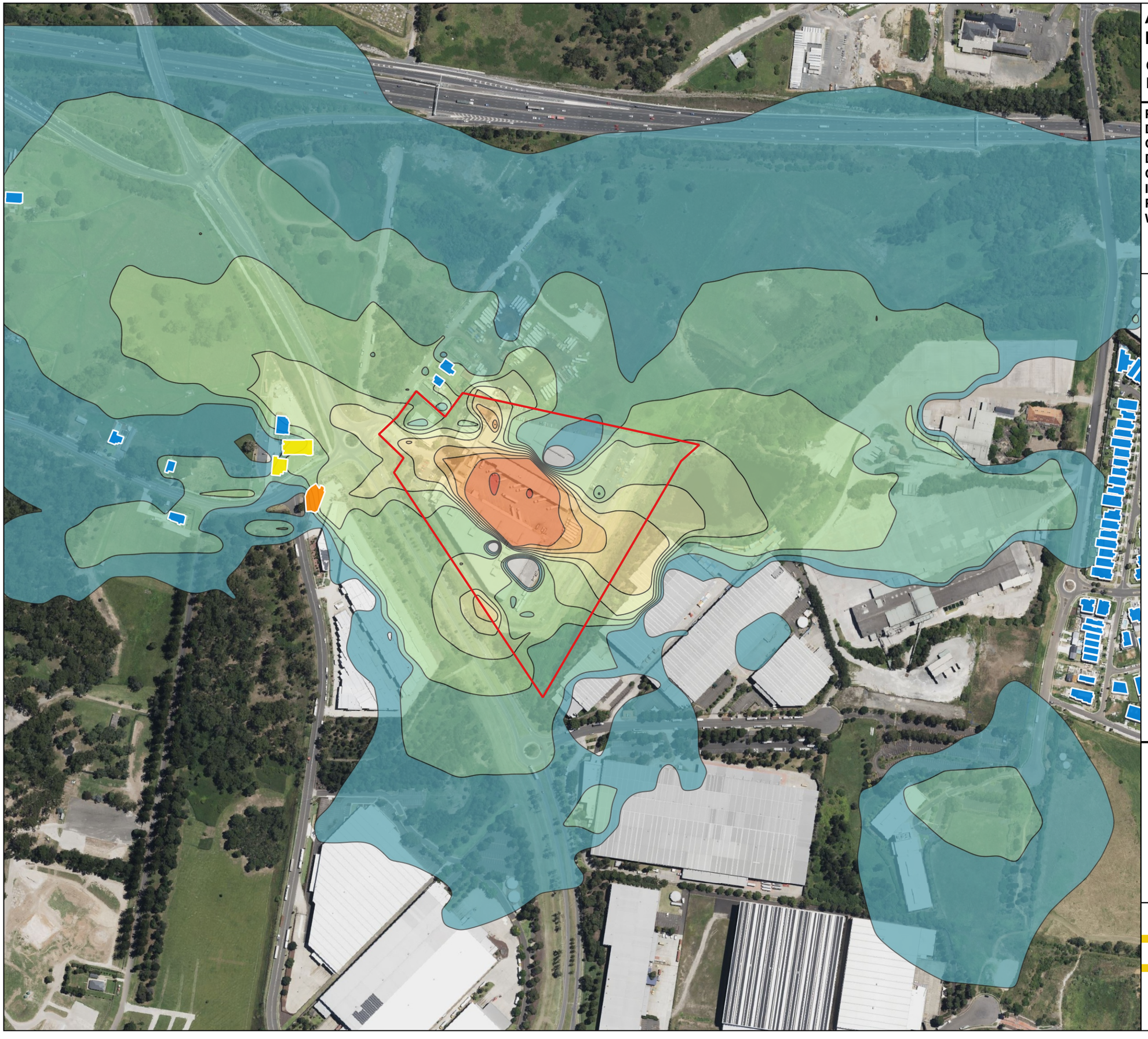
CRS : GDA2020, MGA ZONE 56

Resonate

AMERICOLD PROSPECT
Prospect, NSW

Operational Noise Contours of Existing & Future Facility

PROJECT NUMBER	S220112
DRAWN BY	AS
CHECKED BY	RS
DATE ISSUED	January 2023
CLIENT	Beca Pty Ltd
IMAGERY	Bing
PERIOD	Day
WEATHER	Adverse



Legend

Americold Site

Nearby Sensitive Receivers
- Place of Worship
- Residential
- Child Care Centre

Predicted Noise Levels dB(A)
- 35-40
- 40-45
- 45-50
- 50-55
- 55-60
- 60-65
- 65-70
- 70-75
- 75-80
- 80-85
- 85-90

N

0 100 200 300 m

CRS : GDA2020, MGA ZONE 56

Resonate