Hindmarsh

Lindfield Learning Village, Stage 2

Noise Monitoring Results Report No 3 – December 2020

White Noise Acoustics
303, 74 Pitt Street,
Sydney NSW 2000

ABN: 35 632 449 122

Document Control

Project Name	**Lindfield Learning Village, Stage 2**
Project Number	20197
Document Type	Noise Monitoring Results – Report No 3 – December 2020
Reference Number	20197_210104_Construction Noise Monitoring Report 3__December_BW_R0
Attention	Reg Struwig

Revision	Date	Reference Number	Drafted By	Approved By
0	4/01/2020	20197_210104_Construction Noise Monitoring Report 3__December_BW_R0	BW	BW

Table of Contents

1 Introduction

White Noise Acoustics has been engaged to undertake long term noise and vibration monitoring on the Lindfield Learning Village, Stage 2 project.

Monitoring at the site includes potential noise levels generated from construction works conducted as part of project including noise monitoring.

Noise monitoring commenced on the site on the 16th October, 2020.

This report includes the noise monitoring for the period of the month of December 2020.

2 Development Description

The proposed development includes the demolition of existing building elements and construction of stage 2 of the Lindfield Learning Village school project.

The site is located within the existing structure on the site and is located to the south of Dunstan Grove, Lindfield.

The site location and indicative location of monitors and the residential receiver locations is detailed in the Figure below.

The site location is detailed in Figure 1 below.

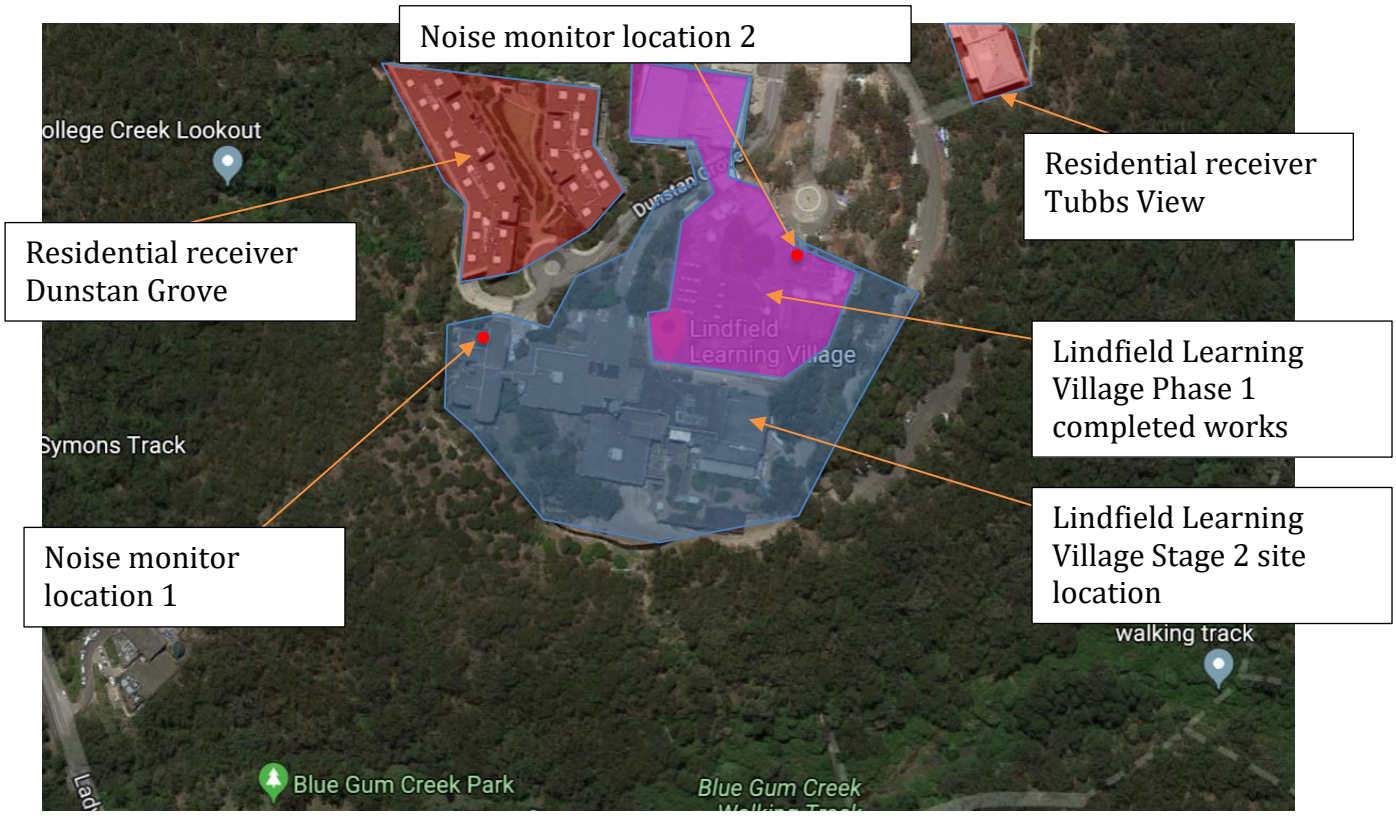


Figure 1 – Site Location, noise monitor locations and Surrounding Receivers

3 Monitor Locations.

As part of the construction period noise monitoring at the site includes the following:

1. Noise Monitor Location 1 - Noise monitoring to the west of the site as detailed in Figure 1 above. This location has been selected to be representative of the residence on Dunstan Grove.
2. Noise Monitor Location 2 - Noise monitoring to the north of the site as detailed in Figure 1 above. This location has been selected to be representative of the residence on Tubbs View.

The results of the monitoring undertaken at this location is included in Appendix B and C.

4 Project Requirements

This section of the report details the projects construction noise criteria of the project.

4.1 Construction Noise Objectives

This section of the report details the relevant construction noise criteria which is applicable to the site including the EPA's *Interim Construction Noise Guideline* (ICNG) and the projects Conditions of Consent.

A detailed construction noise assessment is detailed within the projects *Construction Noise and Vibration Management Plan.*

4.1.1 Interim Construction Noise Guideline

Noise criteria for construction and demolition activities are discussed in the *Interim Construction Noise Guideline* (ICNG). The ICNG also recommends procedures to address potential impacts of construction noise on residences and other sensitive land uses. The main objectives of the ICNG are summarised as follows:

- Promote a clear understanding of ways to identify and minimise noise from construction works;
- Focus on applying all "feasible" and "reasonable" work practices to minimise construction noise impacts;
- Encourage construction to be undertaken only during the recommended standard hours unless approval is given for works that cannot be undertaken during these hours;
- Streamline the assessment and approval stages and reduce time spent dealing with complaints at the project implementation stage; and
- Provide flexibility in selecting site-specific feasible and reasonable work practices in order to minimise noise impacts.

The ICNG contains a quantitative assessment method which is applicable to this project. Guidance levels are given for airborne noise at residences and other sensitive land uses.

The quantitative assessment method involves predicting noise levels at sensitive receivers and comparing them with the Noise Management Levels (NMLs). The NML affectation categories for receivers have been reproduced from the guideline and are listed in the table below.

Table 1 – Noise Management Levels from Construction – Quantitative Assessment

Receiver Type	Time of Day	Noise Management Level LAeq(15minute)[1,2]	How to Apply
Residential	Recommended standard hours: Monday to Friday 7 am to 6 pm Saturday 8 am to 3.30 pm No work on Sundays or public holidays	Noise affected RBL + 10 dB	The noise affected level represents the point above which there may be some community reaction to noise. • Where the predicted or measured LAeq(15minute) 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 dBA	The highly noise affected level represents the point above which there may be strong community reaction to noise. • Where noise is above this level, the relevant authority (consent, determining or regulatory) may require respite periods by restricting the hours that the very noisy activities can occur, taking into account: 1. Times identified by the community when they are less sensitive to noise (such as before and after school for works near schools, or mid-morning or mid-afternoon for works near residences. 2. 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 RBL + 5 dB	• 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 above the noise affected level, the proponent should negotiate with the community.

Table 1 – Continued

Receiver Type	Time of Day	Noise Management Level LAeq(15minute)1,2	How to Apply
Office, retail outlets	When is use	Highly noise affected 70 dBA	The external noise levels should be assessed at the most-affected occupied point of the premises

Note 1 *Noise levels apply at the property boundary that is most exposed to construction noise, and at a height of 1.5 m above ground level. If the property boundary is more than 30 m from the residence, the location for measuring or predicting noise levels is at the most noise-affected point within 30 m of the residence. Noise levels may be higher at upper floors of the noise affected residence.*

Note 2 *The RBL is the overall single-figure background noise level measured in each relevant assessment period (during or outside the recommended standard hours). The term RBL is described in detail in the NSW Industrial Noise Policy (EPA 2000).*

Based on the table above the suitable construction noise management levels for works undertaken on the site is detailed in the table below.

Table 2 – Site Construction Noise Management Levels

Noise Source	Time Period	Receiver Type	Construction Noise Management Level	'High Noise Affected' Level
Construction Noise	Recommended standard hours: Monday to Friday 7 am to 6 pm Saturday 8 am to 1pm No work on Sundays or public holidays	Residential Receivers	52 dB(A) LAeq (15min)	75 dB(A) LAeq (15min)

Note 1: Construction noise management levels based on the Interim Construction Noise Guideline

In addition to the normal working hours above, a period of extended working hours has been approved for the site.

The approved construction noise management levels for the extended working hour periods are detailed in the table below.

Table 3 – Site Construction Noise Management Levels

Noise Source	Time Period	Receiver Type	Extended Hours Construction Noise Management Level
Construction Noise	Proposed extended hours period including: (6pm to 12am during weekdays and 7:30am to 8:00am and 1pm to 5:30pm on Saturday & Sunday)	Residential receivers on Tubbs View	49 dB(A) LAeq (15min)
		Residential receivers on Dunstan Grove	47 dB(A) LAeq (15min)

Note: Background noise levels based on the previously obtained noise levels as detailed in the projects Noise Impact Assessment

5 Monitoring Results

This section of the report details the results of noise monitoring undertaken at the site.

6 Noise Monitoring

The recorded noise levels of monitors located on the site are included in Appendix B.

The results of the noise monitoring conclude the following:

1. Noise levels during the approved extended working hours periods are compliant with the relevant noise levels, including those detailed in table 3 above.
1. During normal working hours noise levels were generally within the maximum affected noise levels to the adjacent receivers. Works undertaken on the site includes noise mitigation controls as detailed by the projects Construction Noise and Vibration Management Sub Plan.

7 Conclusion

This report details the construction noise monitoring being undertaken at the Lindfield Learning Village, Stage 2 project.

This report includes the results of monitoring conducted for the month of December 2020.

For any additional information please do not hesitate to contact the person below.

Regards

Ben White
Director
White Noise Acoustics

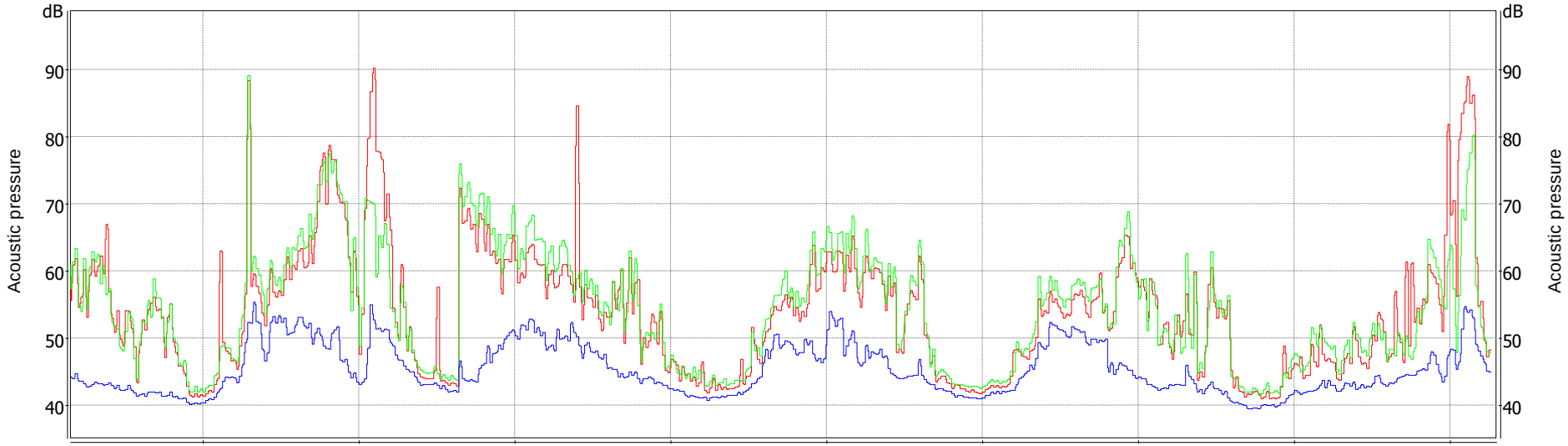
8 Appendix A – Glossary of Terms

Ambient Sound	The totally encompassing sound in a given situation at a given time, usually composed of sound from all sources near and far.
Audible Range	The limits of frequency which are audible or heard as sound. The normal ear in young adults detects sound having frequencies in the region 20 Hz to 20 kHz, although it is possible for some people to detect frequencies outside these limits.
Character, acoustic	The total of the qualities making up the individuality of the noise. The pitch or shape of a sound's frequency content (spectrum) dictate a sound's character.
Decibel [dB]	The level of noise is measured objectively using a Sound Level Meter. The following are examples of the decibel readings of every day sounds; 0dB the faintest sound we can hear 30dB a quiet library or in a quiet location in the country 45dB typical office space. Ambience in the city at night 60dB Martin Place at lunch time 70dB the sound of a car passing on the street 80dB loud music played at home 90dB the sound of a truck passing on the street 100dB the sound of a rock band 115dB limit of sound permitted in industry 120dB deafening
dB(A)	*A-weighted decibels* The ear is not as effective in hearing low frequency sounds as it is hearing high frequency sounds. That is, low frequency sounds of the same dB level are not heard as loud as high frequency sounds. The sound level meter replicates the human response of the ear by using an electronic filter which is called the "A" filter. A sound level measured with this filter switched on is denoted as dB(A). Practically all noise is measured using the A filter. The sound pressure level in dB(A) gives a close indication of the subjective loudness of the noise.
Frequency	Frequency is synonymous to *pitch*. Sounds have a pitch which is peculiar to the nature of the sound generator. For example, the sound of a tiny bell has a high pitch and the sound of a bass drum has a low pitch. Frequency or pitch can be measured on a scale in units of Hertz or Hz.
Loudness	A rise of 10 dB in sound level corresponds approximately to a doubling of subjective loudness. That is, a sound of 85 dB is twice as loud as a sound of 75 dB which is twice as loud as a sound of 65 dB and so on
L_{Max}	The maximum sound pressure level measured over a given period.
L_{Min}	The minimum sound pressure level measured over a given period.
L_1	The sound pressure level that is exceeded for 1% of the time for which the given sound is measured.
L_{10}	The sound pressure level that is exceeded for 10% of the time for which the given sound is measured.
L_{90}	The level of noise exceeded for 90% of the time. The bottom 10% of the sample is the L_{90} noise level expressed in units of dB(A).
L_{eq}	The "equivalent noise level" is the summation of noise events and integrated over a selected period of time.
Background Sound Low	The average of the lowest levels of the sound levels measured in an affected area in the absence of noise from occupants and from unwanted, external ambient noise sources. Usually taken to mean the L_{A90} value
Ctr	A frequency adaptation term applied in accordance with the procedures described in ISO 717.
dB (A)	'A' Weighted overall sound pressure level

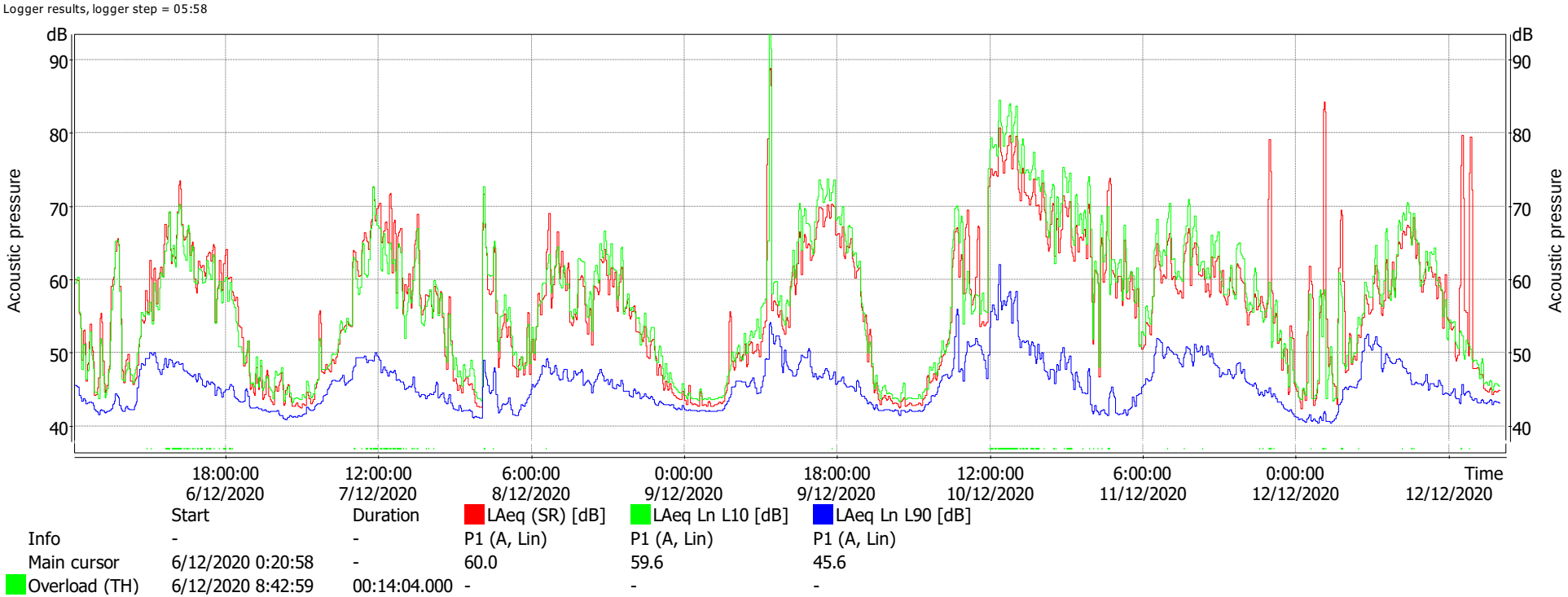
Noise Reduction	The difference in sound pressure level between any two areas. The term “noise reduction” does not specify any grade or performance quality unless accompanied by a specification of the units and conditions under which the units shall apply
NR Noise Rating	Single number evaluation of the background noise level. The NR level is normally around 5 to 6 dB below the “A” weighted noise level. The NR curve describes a spectrum of noise levels and is categorised by the level at 1000 Hz ie the NR 50 curve has a value of 50 dB at 1000 Hz. The NR rating is a tangential system where a noise spectrum is classified by the NR curve that just encompasses the entire noise spectrum consideration.
R_w	Weighted Sound Reduction Index - Laboratory test measurement procedure that provides a single number indication of the acoustic performance of a partition or single element. Calculation procedures for Rw are defined in ISO 140-2:1991 “Measurement of Sound Insulation in Buildings and of Building Elements Part 2: Determination, verification and application of precision data”.
R'_w	Field obtained Weighted Sound Reduction Index - this figure is generally up to 3-5 lower than the laboratory test determined level data due to flanked sound transmission and imperfect site construction.
Sound Isolation	A reference to the degree of acoustical separation between any two areas. Sound isolation may refer to sound transmission loss of a partition or to noise reduction from any unwanted noise source. The term “sound isolation” does not specify any grade or performance quality and requires the units to be specified for any contractual condition
Sound Pressure Level, L_P dB	A measurement obtained directly using a microphone and sound level meter. Sound pressure level varies with distance from a source and with changes to the measuring environment. Sound pressure level equals 20 times the logarithm to the base 10 of the ratio of the rms sound pressure to the reference sound pressure of 20 micro Pascals.
Sound Power Level, L_W dB	Sound power level is a measure of the sound energy emitted by a source, does not change with distance, and cannot be directly measured. Sound power level of a machine may vary depending on the actual operating load and is calculated from sound pressure level measurements with appropriate corrections for distance and/or environmental conditions. Sound power levels is equal to 10 times the logarithm to the base 10 of the ratio of the sound power of the source to the reference sound power of 1 picoWatt
Speech Privacy	A non-technical term but one of common usage. Speech privacy and speech intelligibility are opposites and a high level of speech privacy means a low level of speech intelligibility. It should be recognised that acceptable levels of speech privacy do not require that speech from an adjacent room is inaudible.
Transmission Loss	Equivalent to Sound Transmission Loss and to Sound Reduction Index in terminology used in countries other than Australia. A formal test rating of sound transmission properties of any construction, by usually a wall, floor, roof etc. The transmission loss of all materials varies with frequency and may be determined by either laboratory or field tests. Australian Standards apply to test methods for both situations.

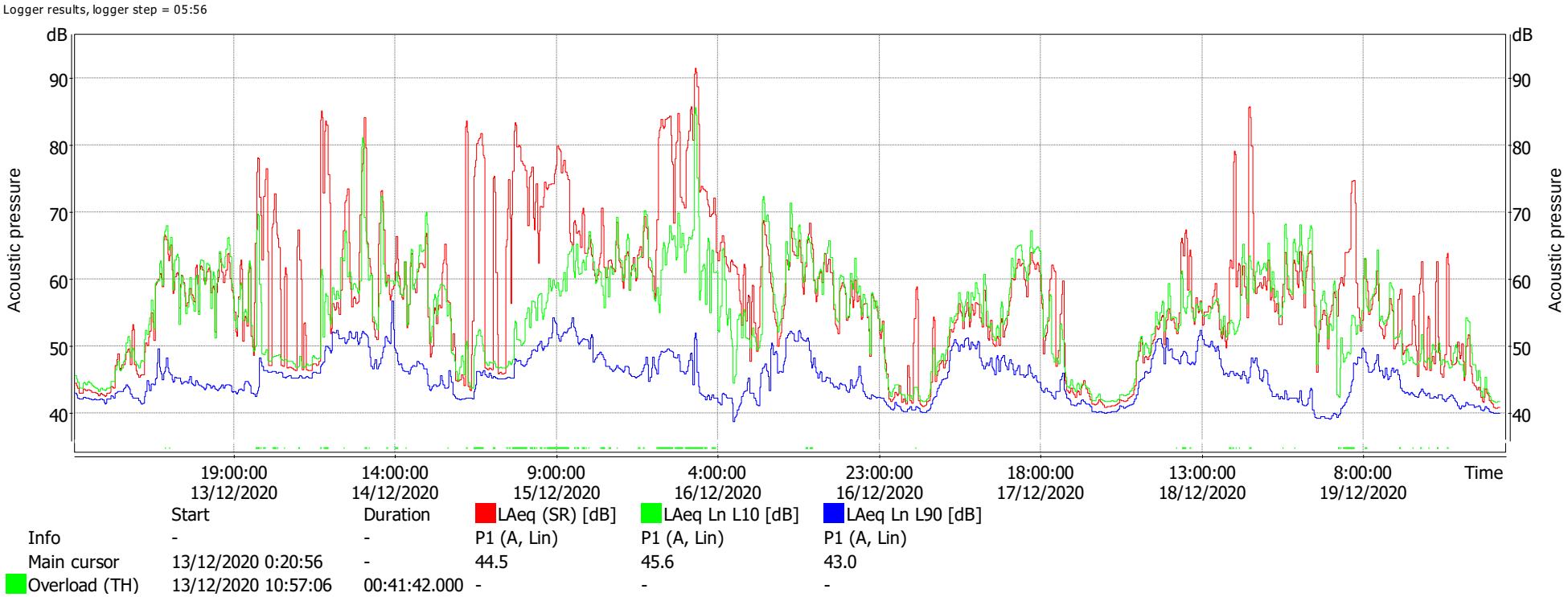
9 Appendix B – Noise Logger Results – Location 1

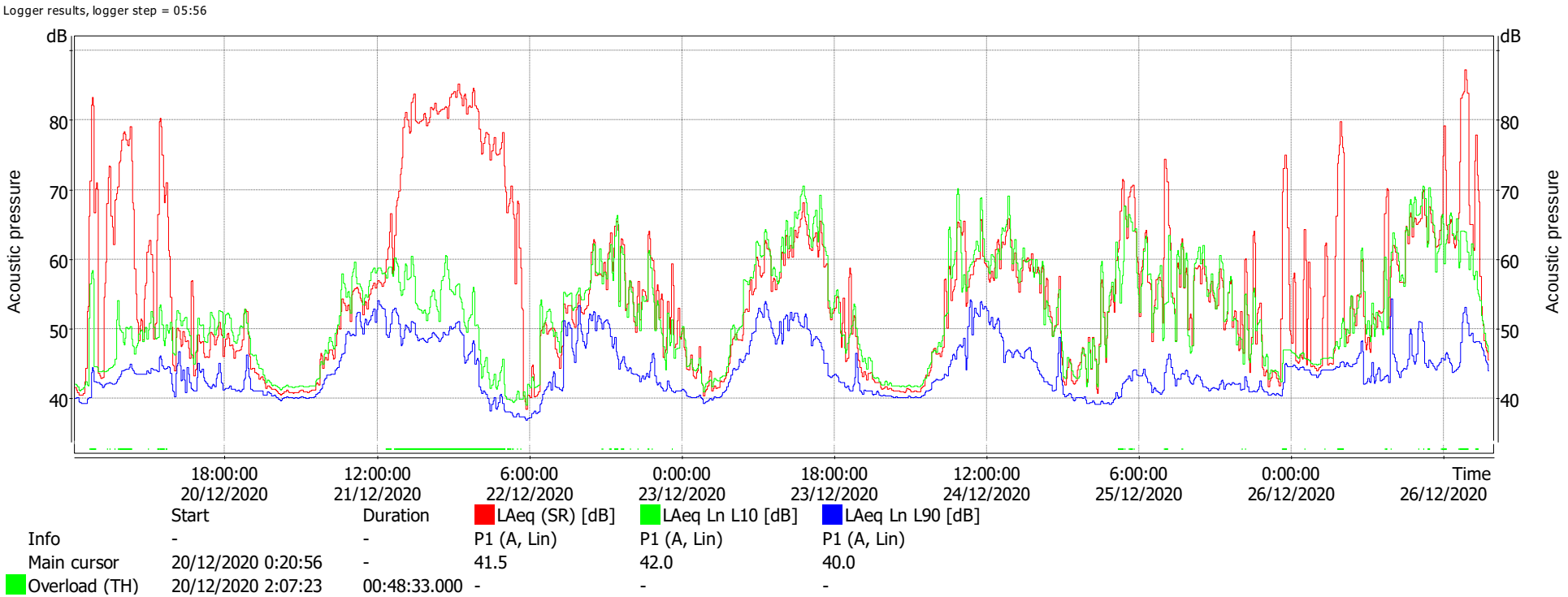
Logger results, logger step = 04:31



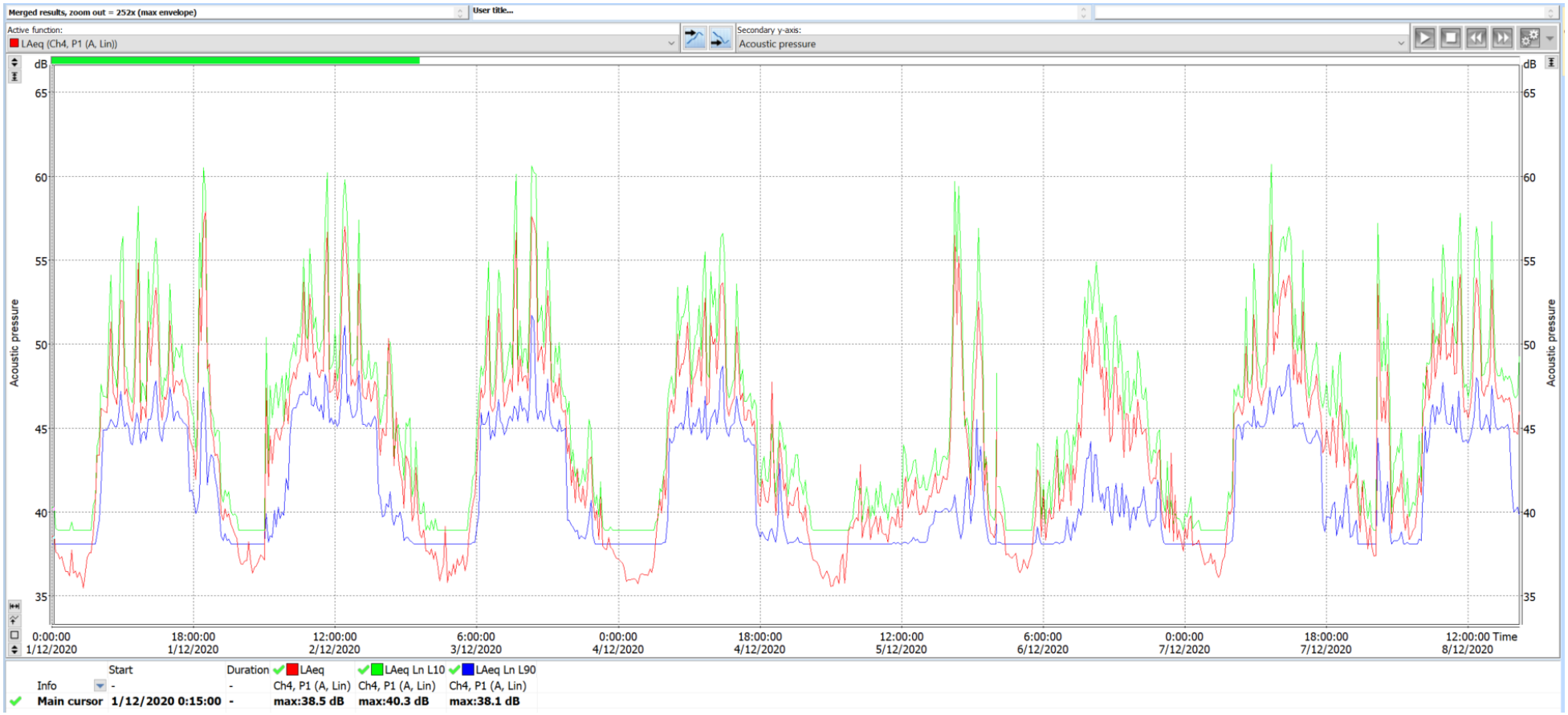
	Start	Duration	LAeq (SR) [dB]	LAeq Ln L10 [dB]	LAeq Ln L90 [dB]
Info	-	-	P1 (A, Lin)	P1 (A, Lin)	P1 (A, Lin)
Main cursor	30/11/2020 15:49:31	-	62.2	64.4	44.3

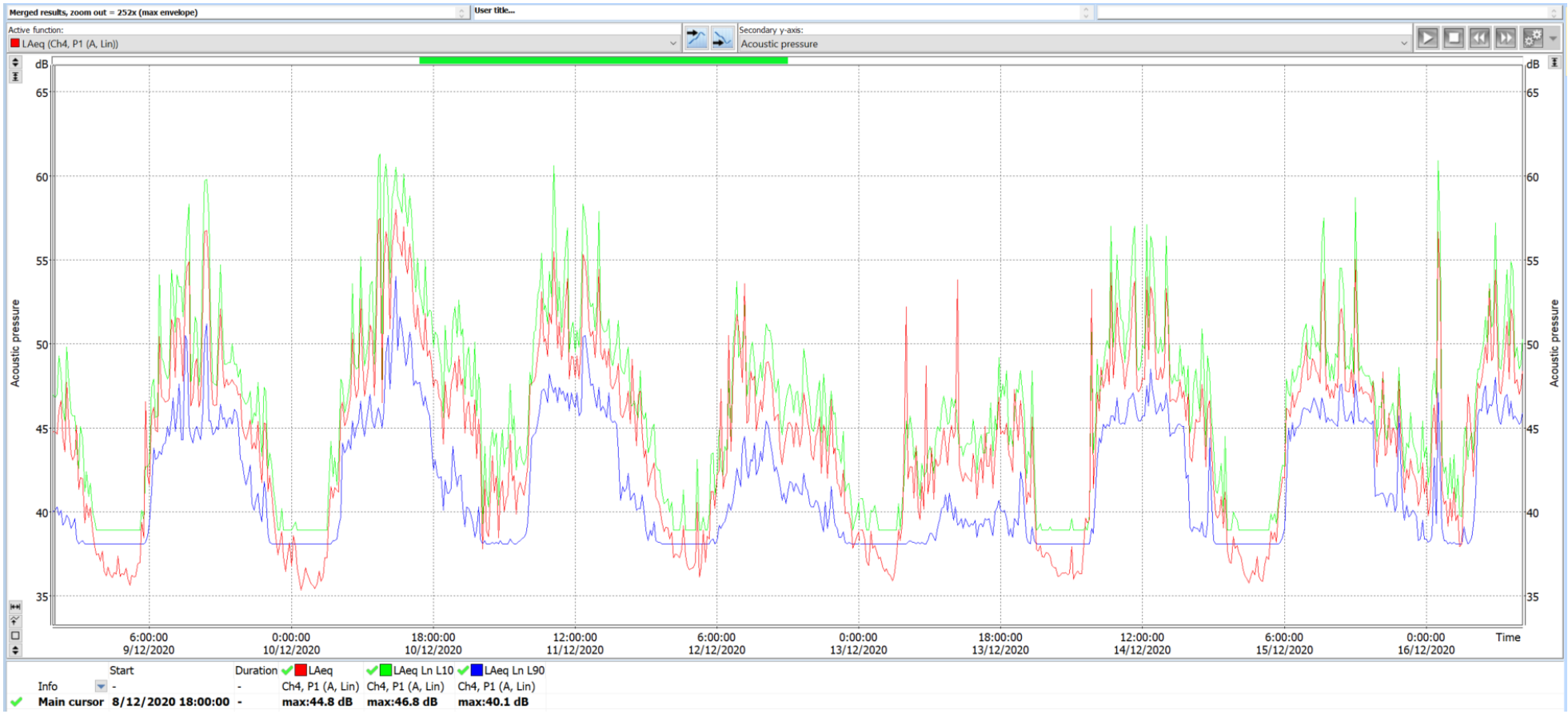

Logger results, logger step = 05:58
dB
90
80
70
60
50
40
Acoustic pressure
18:00:00
6/12/2020
12:00:00
7/12/2020
6:00:00
8/12/2020
0:00:00
9/12/2020
18:00:00
9/12/2020
12:00:00
10/12/2020
6:00:00
11/12/2020
0:00:00
12/12/2020
Time
12/12/2020
Start
Duration
LAeq (SR) [dB]
LAeq Ln L10 [dB]
LAeq Ln L90 [dB]
Info
-
-
P1 (A, Lin)
P1 (A, Lin)
P1 (A, Lin)
Main cursor
6/12/2020 0:20:58
-
60.0
59.6
45.6
Overload (TH)
6/12/2020 8:42:59
00:14:04.000
-
-
-

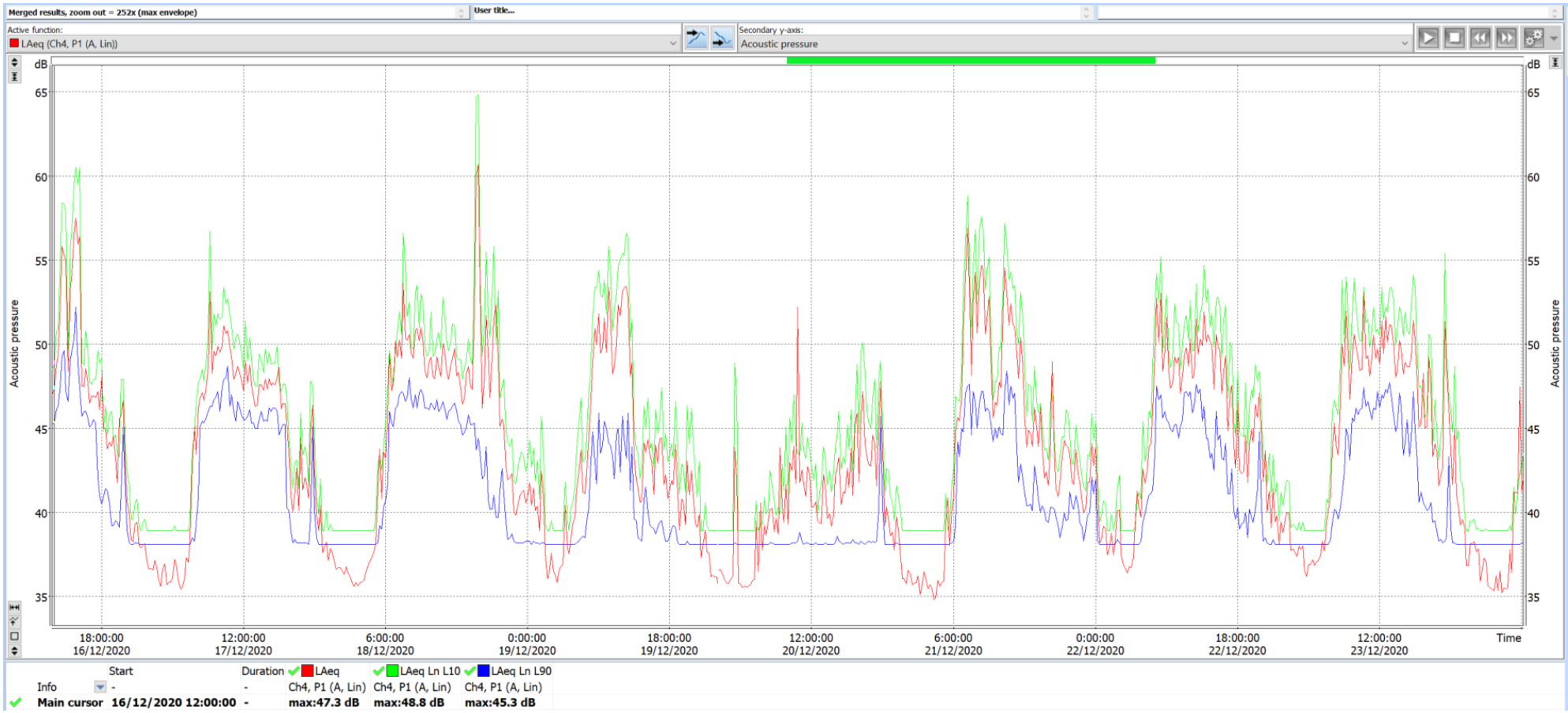

Logger results, logger step = 05:56
dB
90
80
70
60
50
40
Acoustic pressure
19:00:00
13/12/2020
14:00:00
14/12/2020
9:00:00
15/12/2020
4:00:00
16/12/2020
23:00:00
16/12/2020
18:00:00
17/12/2020
13:00:00
18/12/2020
8:00:00
19/12/2020
Time
Start
Duration
LAeq (SR) [dB]
LAeq Ln L10 [dB]
LAeq Ln L90 [dB]
Info
-
-
P1 (A, Lin)
P1 (A, Lin)
P1 (A, Lin)
Main cursor
13/12/2020 0:20:56
-
44.5
45.6
43.0
Overload (TH)
13/12/2020 10:57:06
00:41:42.000
-
-
-

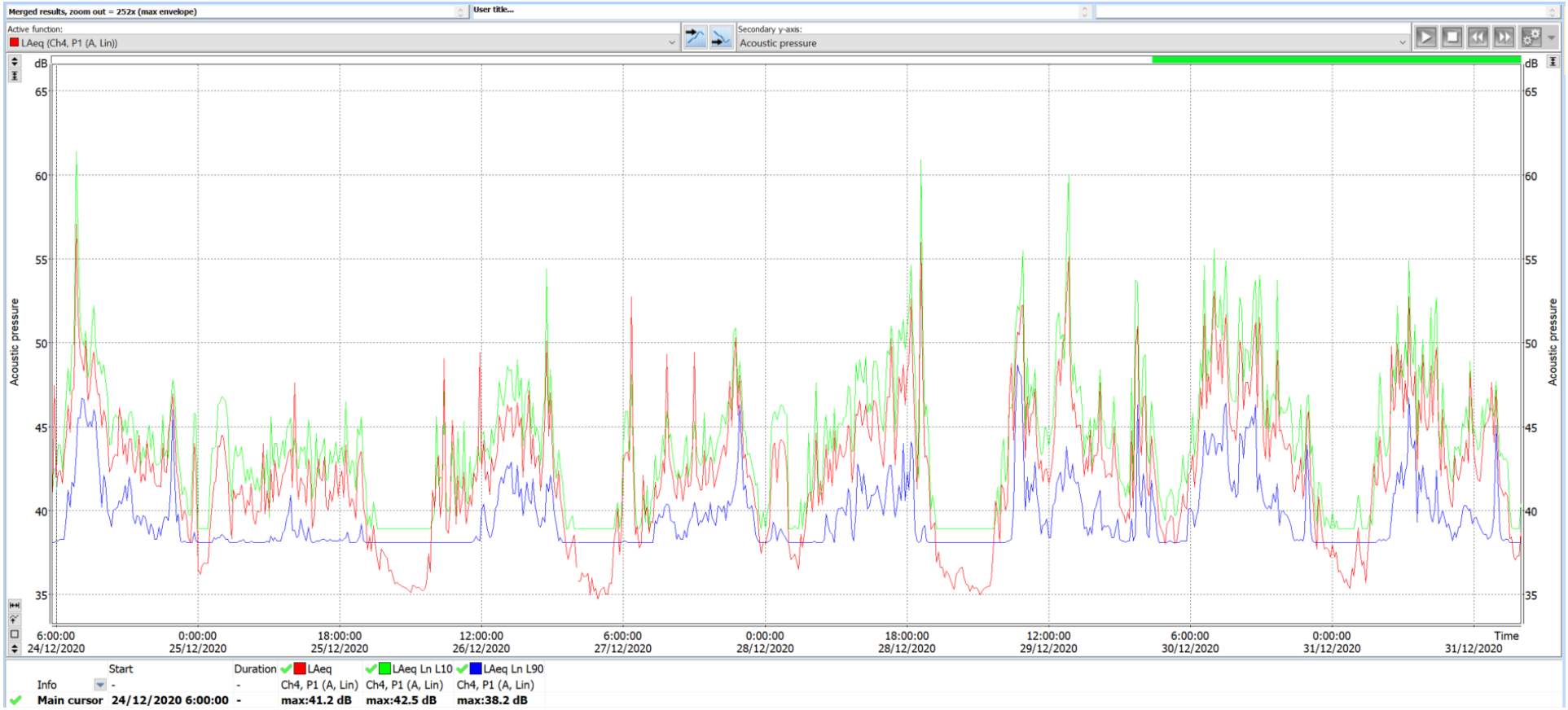

Logger results, logger step = 05:56
dB
80
70
60
50
40
Acoustic pressure
18:00:00
20/12/2020
12:00:00
21/12/2020
6:00:00
22/12/2020
0:00:00
23/12/2020
18:00:00
23/12/2020
12:00:00
24/12/2020
6:00:00
25/12/2020
0:00:00
26/12/2020
Time
26/12/2020
Start
Duration
LAeq (SR) [dB]
LAeq Ln L10 [dB]
LAeq Ln L90 [dB]
Info
-
-
P1 (A, Lin)
P1 (A, Lin)
P1 (A, Lin)
Main cursor
20/12/2020 0:20:56
-
41.5
42.0
40.0
Overload (TH)
20/12/2020 2:07:23
00:48:33.000
-
-
-

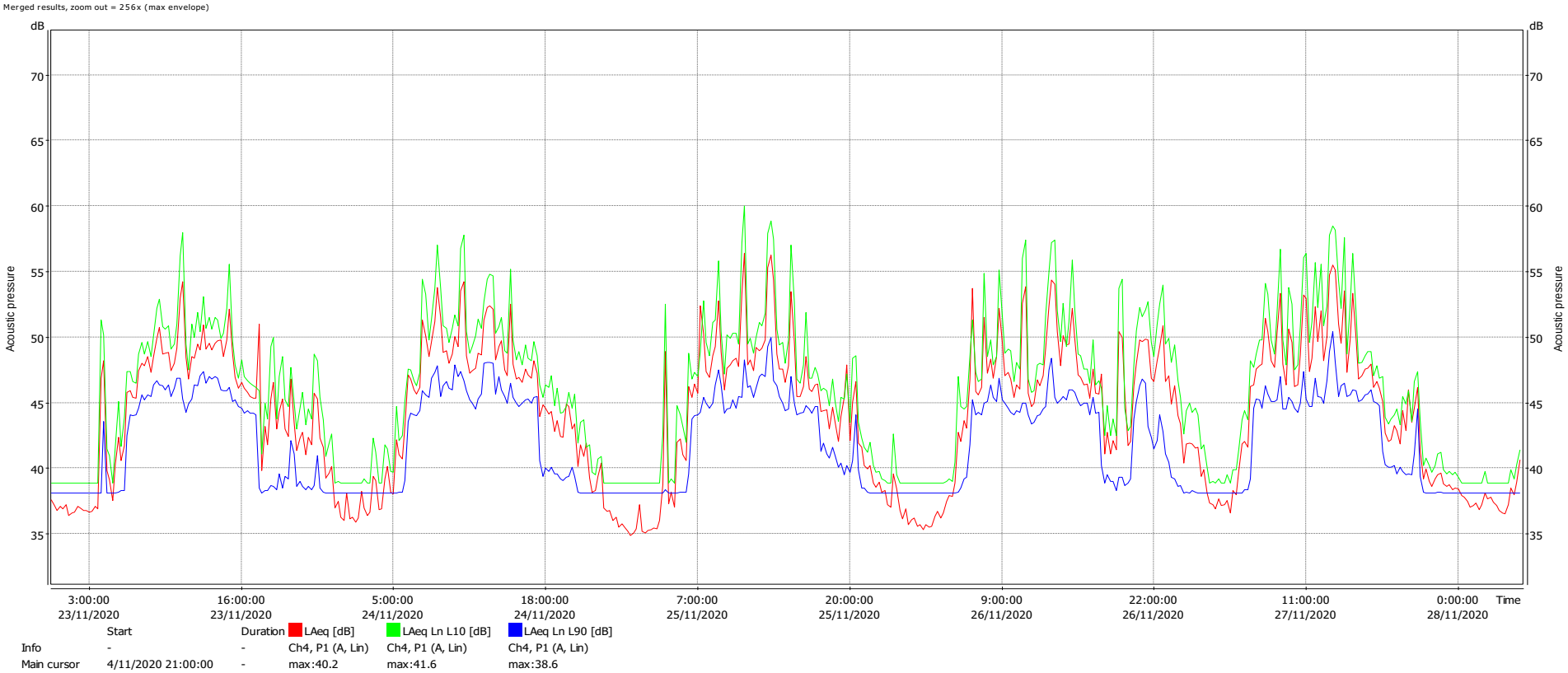
10 Appendix B – Noise Logger Results – Location 2

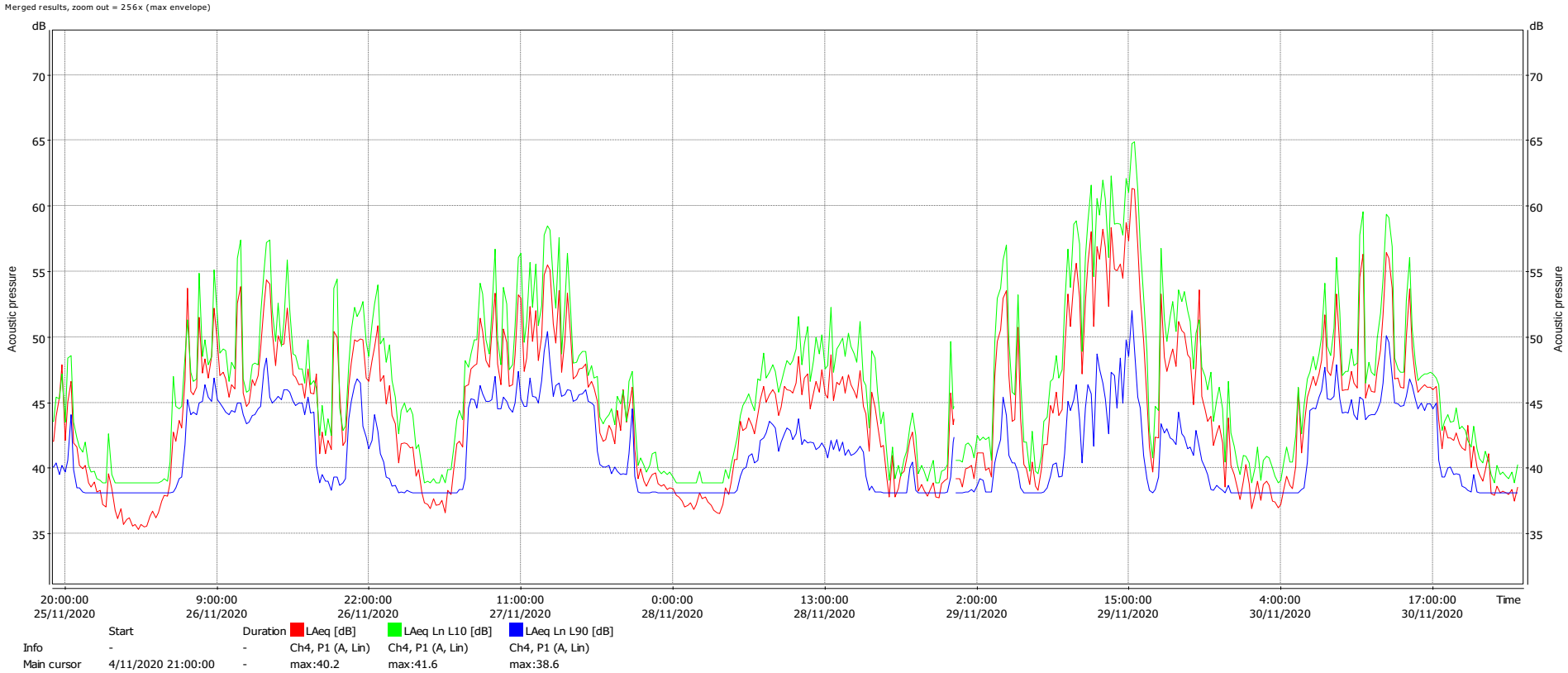

Merged results, zoom out = 252x (max envelope)
User title...
Active function:
LAeq (Ch4, P1 (A, Lin))
Secondary y-axis:
Acoustic pressure
dB
65
60
55
50
45
40
35
Acoustic pressure
0:00:00 1/12/2020
18:00:00 1/12/2020
12:00:00 2/12/2020
6:00:00 3/12/2020
0:00:00 4/12/2020
18:00:00 4/12/2020
12:00:00 5/12/2020
6:00:00 6/12/2020
0:00:00 7/12/2020
18:00:00 7/12/2020
12:00:00 8/12/2020
Time
Start
Duration
LAeq
LAeq Ln L10
LAeq Ln L90
Info
Ch4, P1 (A, Lin)
Main cursor
1/12/2020 0:15:00
max:38.5 dB
max:40.3 dB
max:38.1 dB


Merged results, zoom out = 252x (max envelope)
User title...
Active function:
LAeq (Ch4, P1 (A, Lin))
Secondary y-axis:
Acoustic pressure
dB
65
60
55
50
45
40
35
Acoustic pressure
6:00:00 9/12/2020
0:00:00 10/12/2020
18:00:00 10/12/2020
12:00:00 11/12/2020
6:00:00 12/12/2020
0:00:00 13/12/2020
18:00:00 13/12/2020
12:00:00 14/12/2020
6:00:00 15/12/2020
0:00:00 16/12/2020
Time
Start
Duration
LAeq
LAeq Ln L10
LAeq Ln L90
Info
-
-
Ch4, P1 (A, Lin)
Ch4, P1 (A, Lin)
Ch4, P1 (A, Lin)
Main cursor
8/12/2020 18:00:00
-
max:44.8 dB
max:46.8 dB
max:40.1 dB


Merged results, zoom out = 252x (max envelope)
User title...
Active function:
LAeq (Ch4, P1 (A, Lin))
Secondary y-axis:
Acoustic pressure
dB
65
60
55
50
45
40
35
Acoustic pressure
18:00:00 16/12/2020
12:00:00 17/12/2020
6:00:00 18/12/2020
0:00:00 19/12/2020
18:00:00 19/12/2020
12:00:00 20/12/2020
6:00:00 21/12/2020
0:00:00 22/12/2020
18:00:00 22/12/2020
12:00:00 23/12/2020
Time
Start
Duration
LAeq
LAeq Ln L10
LAeq Ln L90
Info
-
-
Ch4, P1 (A, Lin)
Ch4, P1 (A, Lin)
Ch4, P1 (A, Lin)
Main cursor
16/12/2020 12:00:00
-
max:47.3 dB
max:48.8 dB
max:45.3 dB


Merged results, zoom out = 252x (max envelope)
User title...
Active function:
LAeq (Ch4, P1 (A, Lin))
Secondary y-axis:
Acoustic pressure
dB
65
60
55
50
45
40
35
Acoustic pressure
6:00:00 24/12/2020
0:00:00 25/12/2020
18:00:00 25/12/2020
12:00:00 26/12/2020
6:00:00 27/12/2020
0:00:00 28/12/2020
18:00:00 28/12/2020
12:00:00 29/12/2020
6:00:00 30/12/2020
0:00:00 31/12/2020
Time 31/12/2020
Start
Duration
LAeq
LAeq Ln L10
LAeq Ln L90
Info
-
-
Ch4, P1 (A, Lin)
Ch4, P1 (A, Lin)
Ch4, P1 (A, Lin)
Main cursor
24/12/2020 6:00:00
-
max:41.2 dB
max:42.5 dB
max:38.2 dB


Merged results, zoom out = 256x (max envelope)
dB
70
65
60
55
50
45
40
35
Acoustic pressure
3:00:00 23/11/2020
16:00:00 23/11/2020
5:00:00 24/11/2020
18:00:00 24/11/2020
7:00:00 25/11/2020
20:00:00 25/11/2020
9:00:00 26/11/2020
22:00:00 26/11/2020
11:00:00 27/11/2020
0:00:00 28/11/2020
Time
Start
Duration
LAeq [dB]
LAeq Ln L10 [dB]
LAeq Ln L90 [dB]
Info - - Ch4, P1 (A, Lin) Ch4, P1 (A, Lin) Ch4, P1 (A, Lin)
Main cursor 4/11/2020 21:00:00 - max:40.2 max:41.6 max:38.6


Merged results, zoom out = 256x (max envelope)
dB
70
65
60
55
50
45
40
35
Acoustic pressure
20:00:00 25/11/2020
9:00:00 26/11/2020
22:00:00 26/11/2020
11:00:00 27/11/2020
0:00:00 28/11/2020
13:00:00 28/11/2020
2:00:00 29/11/2020
15:00:00 29/11/2020
4:00:00 30/11/2020
17:00:00 30/11/2020
Time
Start
Duration
LAeq [dB]
LAeq Ln L10 [dB]
LAeq Ln L90 [dB]
Info - - Ch4, P1 (A, Lin) Ch4, P1 (A, Lin) Ch4, P1 (A, Lin)
Main cursor 4/11/2020 21:00:00 - max:40.2 max:41.6 max:38.6