

Health Infrastructure NSW
Westmead PSB and MSCP
Construction Noise Monitoring

Noise monitoring report
2022-10-01 to 2022-10-31

AC11

v1 | 3 November 2022

This report takes into account the particular instructions and requirements of our client.

It is not intended for and should not be relied upon by any third party and no responsibility is undertaken to any third party.

Job number 271985

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Appendix A

Noise Monitoring Daily Results

1 Introduction

Arup has been commissioned by PricewaterhouseCoopers (PwC) on behalf of Health Infrastructure NSW to install noise monitors within the Central Acute Services Building (CASB), Children's Hospital Westmead (CHW) and Kids Research (KR) and Ronald McDonald House (RMH) buildings to monitor construction noise from the Paediatric Service Building (PSB) and Multi Storey Car Park (MSCP) development sites in the Westmead Precinct.

The noise loggers have been setup to send email and SMS notifications to stakeholders when construction Noise Management Levels (NMLs) are exceeded.

This report details noise measurement results from **1 October 2022 to 31 October 2022** inclusive.

2 Noise logger locations

Acoustic Research Labs Ngara noise loggers have been installed in the locations shown in Figure 1 and Figure 2 below.

The noise loggers were calibrated by Acoustic Research Labs (NATA-accredited calibration) in November 2021.

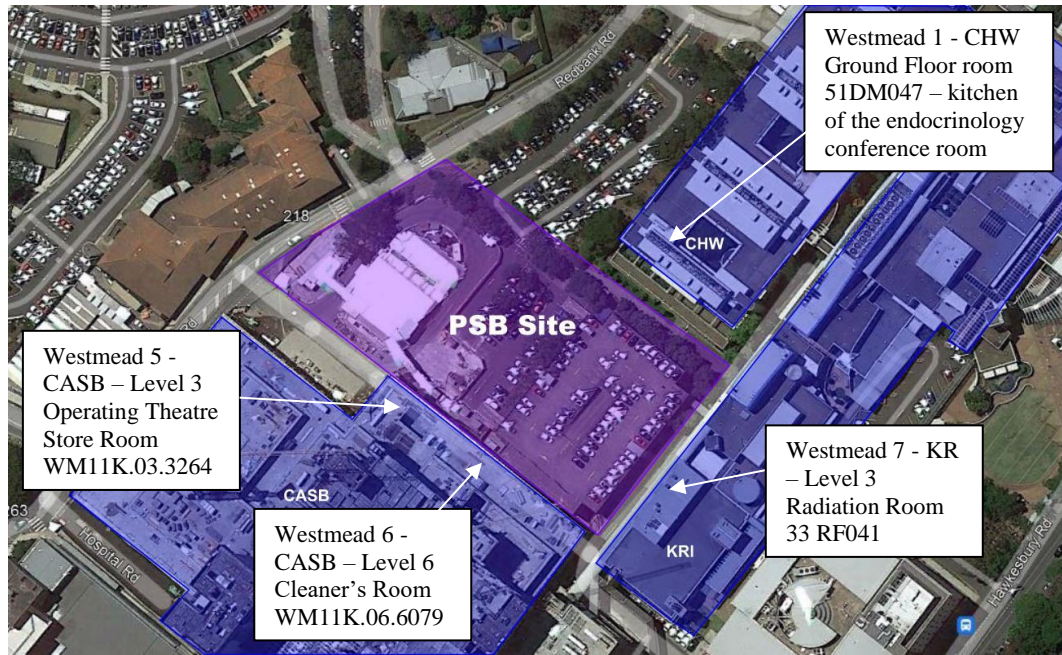


Figure 1: PSB noise monitoring locations.



Figure 2: MSCP noise monitoring locations.

2.1 Noise Logger relocation

The following table provides a record of the noise loggers which have been relocated during the project.

Table 1: Noise logger relocation records

Logger ID	Original location	Current location	
	Location	Date moved	Location
Westmead 2	CHW Level 2 Consult Room 92BW025	14/04/22	CHW Level 2 Parent Kitchen 92BW028

3 Noise Management Levels

The current construction Noise Management Levels for each internal monitoring location are set out in Table 2.

Measurement data taken from ‘standard’ construction work hours for the project only are assessed against the Noise Management Level criteria, being:

- 7am-6pm Mon-Fri
- 8am-1pm Sat
- No work on Sundays and Public Holidays.

As part of the previous installation works a baseline noise study was conducted to determine appropriate noise management level. Refer to Arup’s *Baseline noise measurements* report¹ for details regarding how these Management Levels were nominated.

Table 2: Baseline noise measurement results.

Logger ID	Location	Noise Management Level (upper limit), dB L _{Aeq,15min}
Westmead 1	CHW Ground Floor room 51DM047 – kitchen of the endocrinology conference room (facing PSB site)	60
Westmead 5	CASB Level 3 Operating Theatre Store Room WM11K.03.3264 (facing PSB site)	50
Westmead 6	CASB Level 6 Cleaner’s Room WM11K.06.6079 (facing PSB site)	52
Westmead 7	KR Level 3 Radiation Room 33 RF041 (facing PSB site)	58
Westmead 2	CHW Level 2 Parent Kitchen 92BW025 (facing MSCP site)	64
Westmead 3	RMH Level 1 Store Room 101 (facing MSCP site)	47

3.1 Management Level updates

The following provides a progressive record of management level updates:

- None to-date.

¹ Arup report reference 271985-AC02.

4 Noise monitoring results

4.1 Outages

Noise monitoring outages are shown below. This excludes outages related to logger data collection and calibration.

Table 3: Noise logger outages during monitoring period.

Logger Id	Noise logger location	Outages
Westmead 1	CHW Ground Floor room 51DM047 – kitchen of the endocrinology conference room (facing PSB site)	-
Westmead 5	CASB Level 3 Operating Theatre Store Room WM11K.03.3264 (facing PSB site)	-
Westmead 6	CASB Level 6 Cleaner’s Room WM11K.06.6079 (facing PSB site)	-
Westmead 7	KR Level 3 Radiation Room 33 RF041(facing PSB site)	-
Westmead 2	CHW Level 2 Parent Kitchen 92BW025 (facing MSCP site)	11/10/22-11/10/22
Westmead 3	RMH Level 1 Store Room 101 (facing MSCP site)	11/10/22-11/10/22

4.2 Exceedances

The number of Management Level exceedances recorded at each noise monitoring location during the assessment period are shown below.

Table 4: Recorded Management Level exceedances.

Logger Id	Noise logger location	Noise Management Level exceedance instances
Westmead 1	CHW Ground Floor room 51DM047 – kitchen of the endocrinology conference room (facing PSB site)	23
Westmead 5	CASB Level 3 Operating Theatre Store Room WM11K.03.3264 (facing PSB site)	11
Westmead 6	CASB Level 6 Cleaner’s Room WM11K.06.6079 (facing PSB site)	26
Westmead 7	KR Level 3 Radiation Room 33 RF041(facing PSB site)	1
Westmead 2	CHW Level 2 Parent Kitchen 92BW025 (facing MSCP site)	18
Westmead 3	RMH Level 1 Store Room 101 (facing MSCP site)	43

It is the responsibility of Ford Civils (the Head Contractor) to respond to each Noise Management Level exceedance when it occurs and record the outcome of the exceedance investigation (cause of NML exceedance, any noise mitigation measures implemented to address the exceedance, etc.).

4.3 Daily noise monitoring results

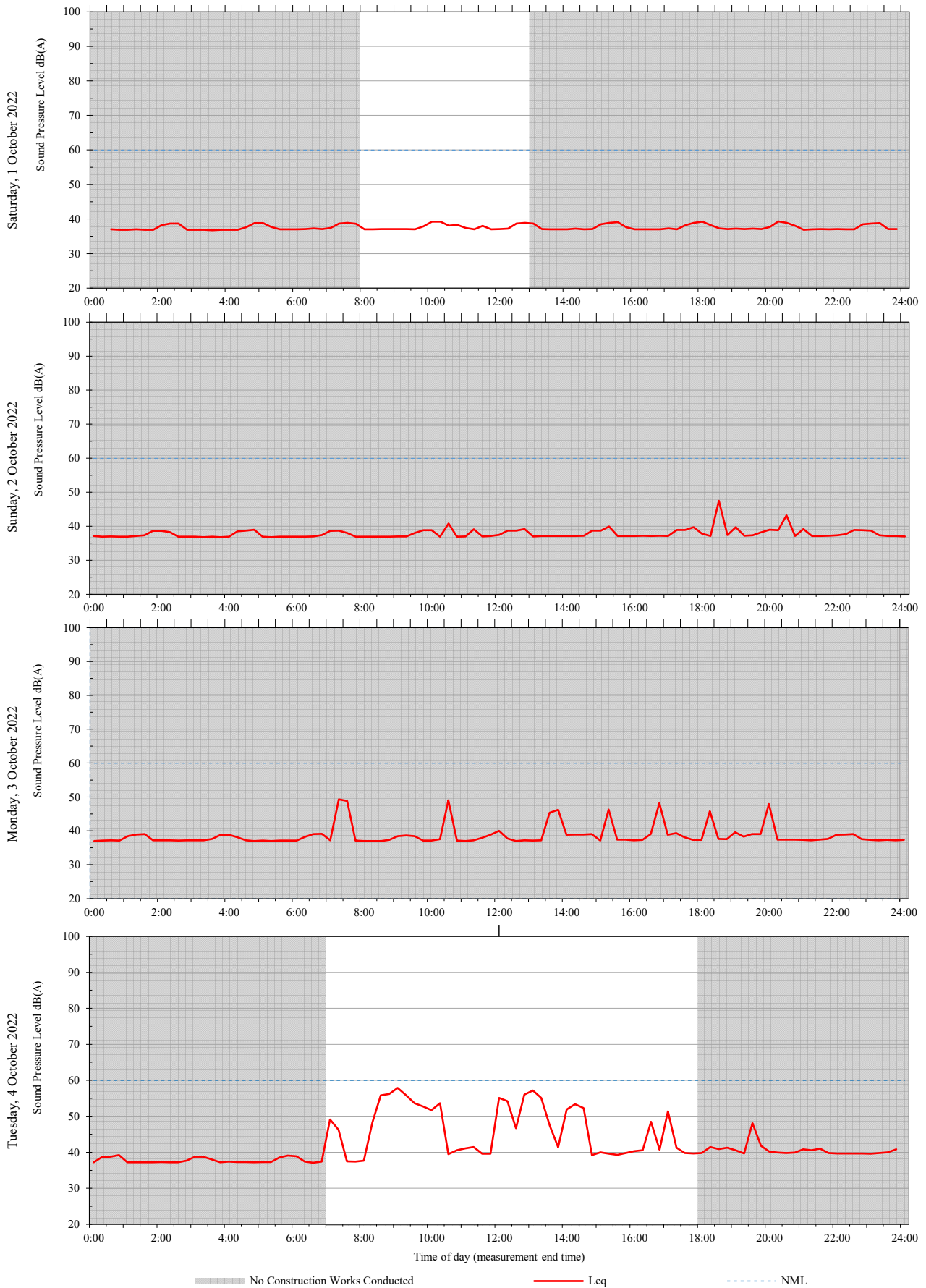
Daily noise monitoring results are showing for each location in Appendix A.

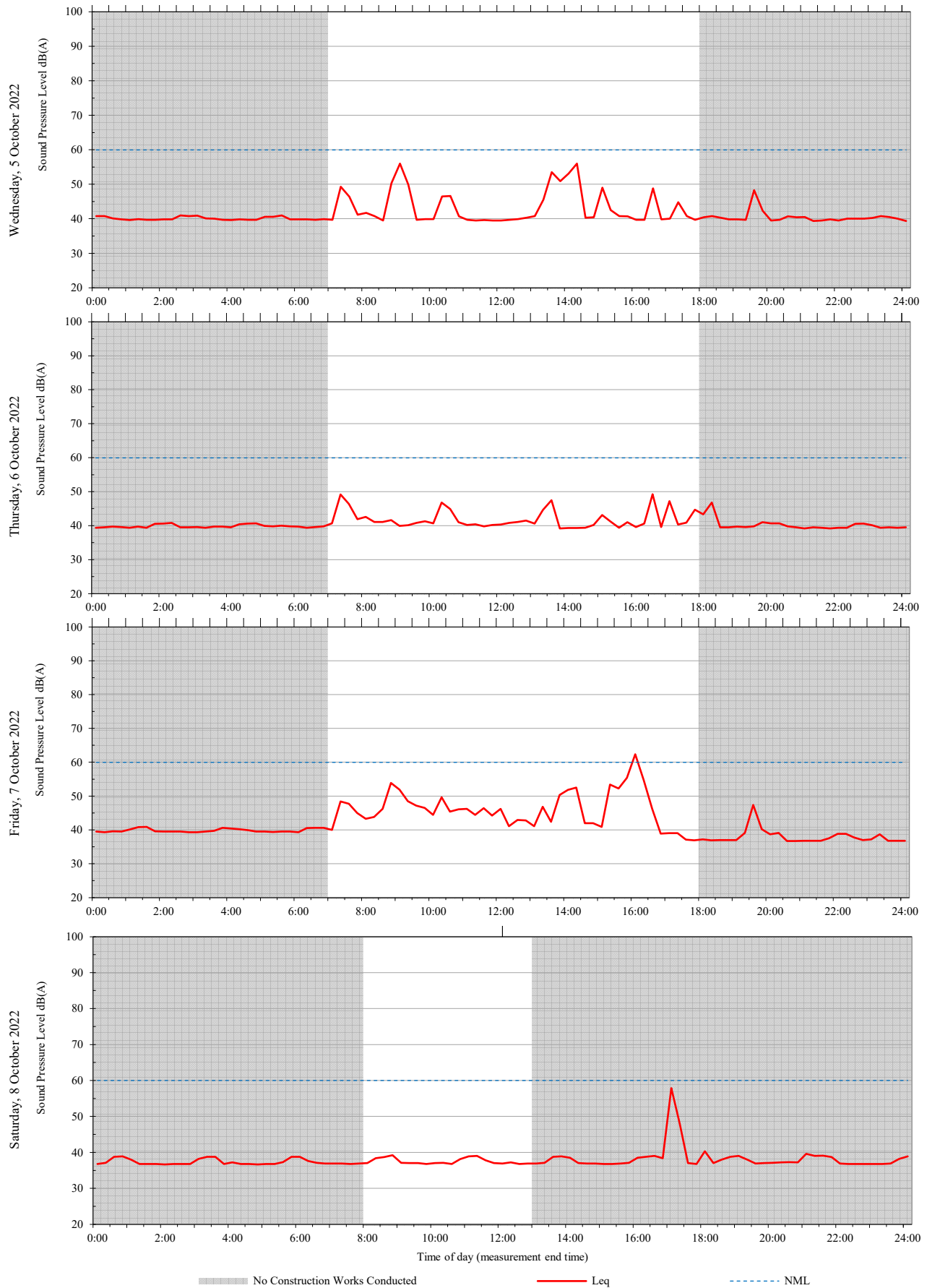
Appendix A

Noise Monitoring Daily Results

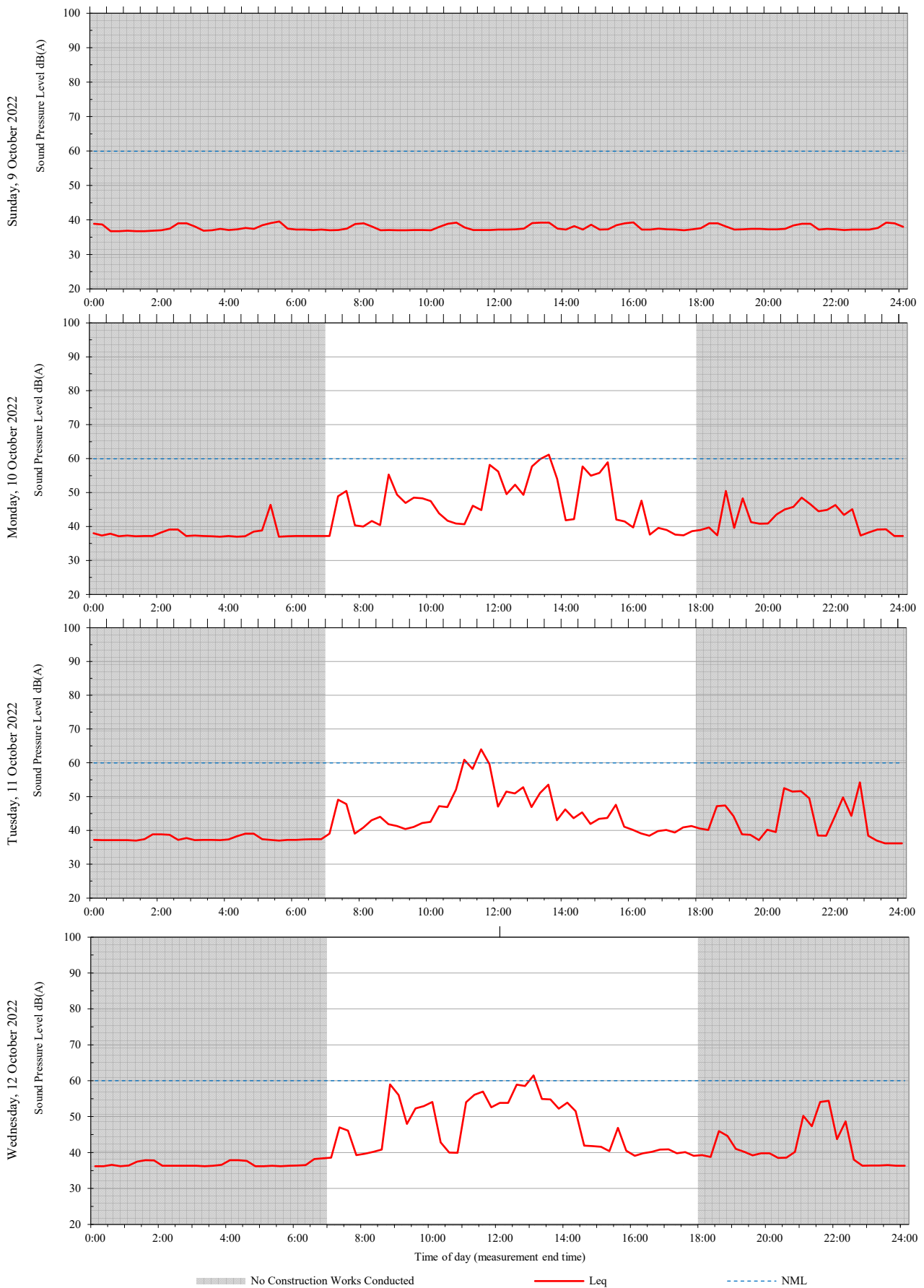
A1 CHW Ground Floor room 51DM047 (Westmead 1)

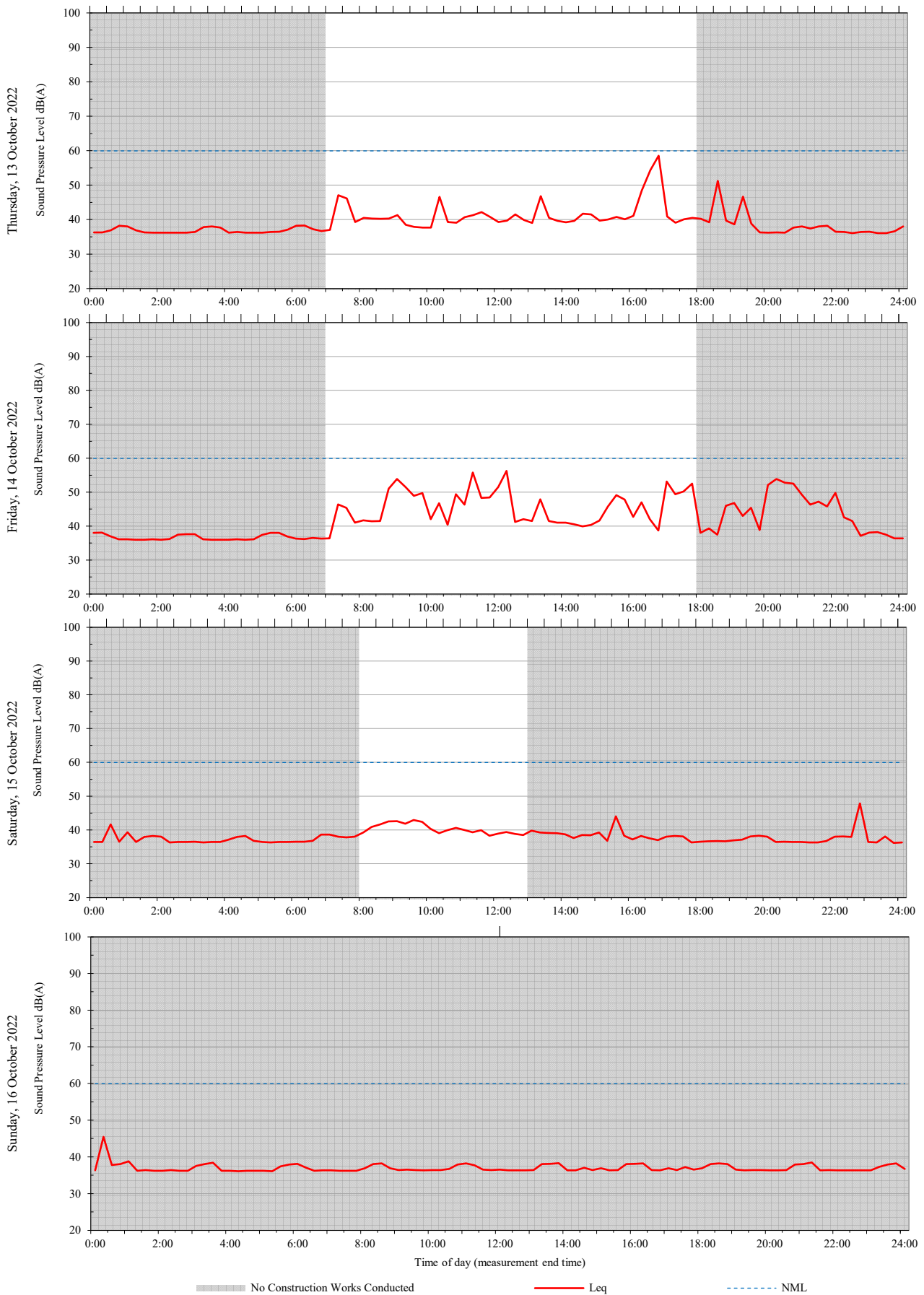
Unattended monitoring: CHW Ground Floor room 51DM047 (Westmead 1) (Internal)



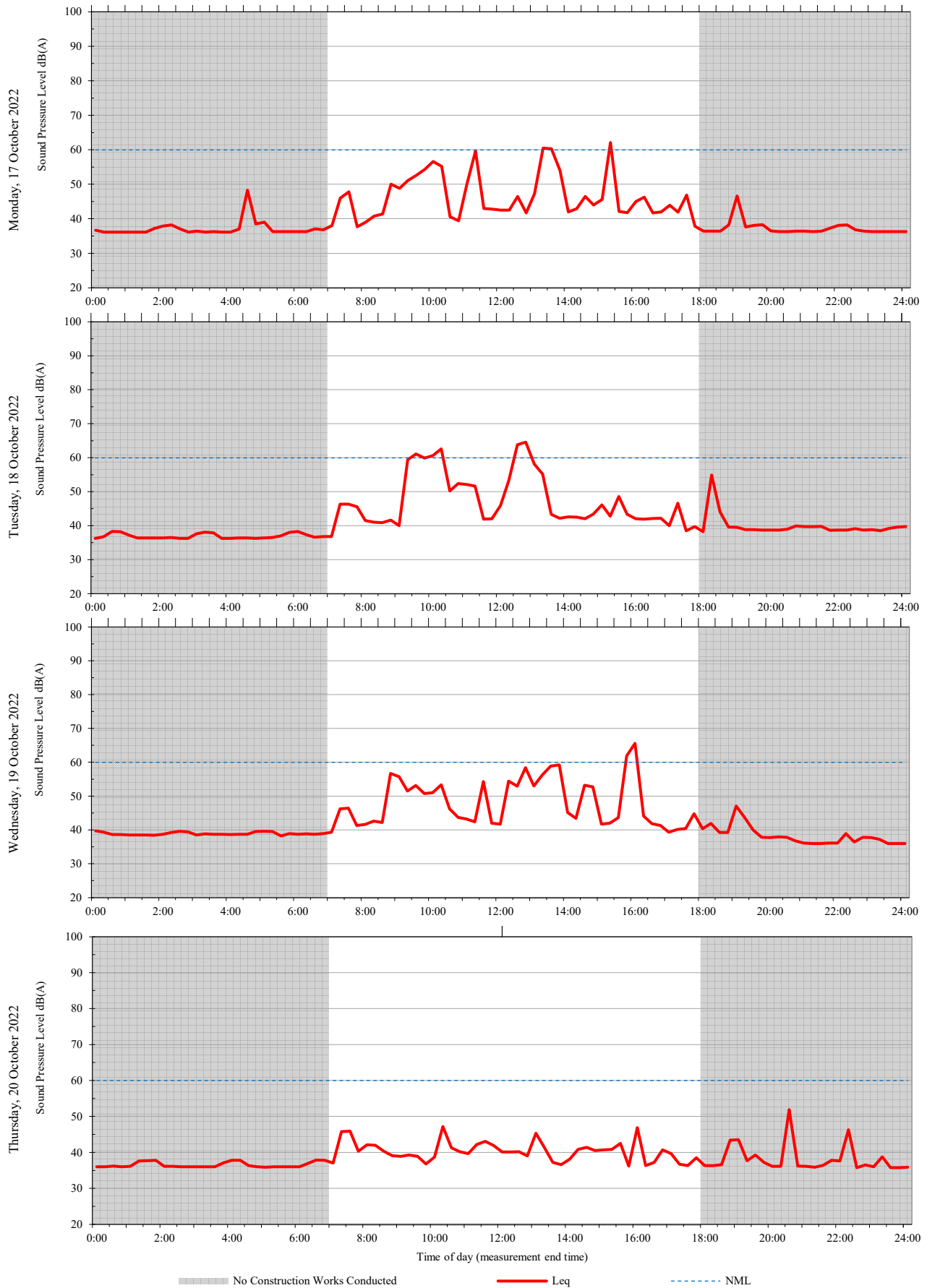


Unattended monitoring: CHW Ground Floor room 51DM047 (Westmead 1) (Internal)

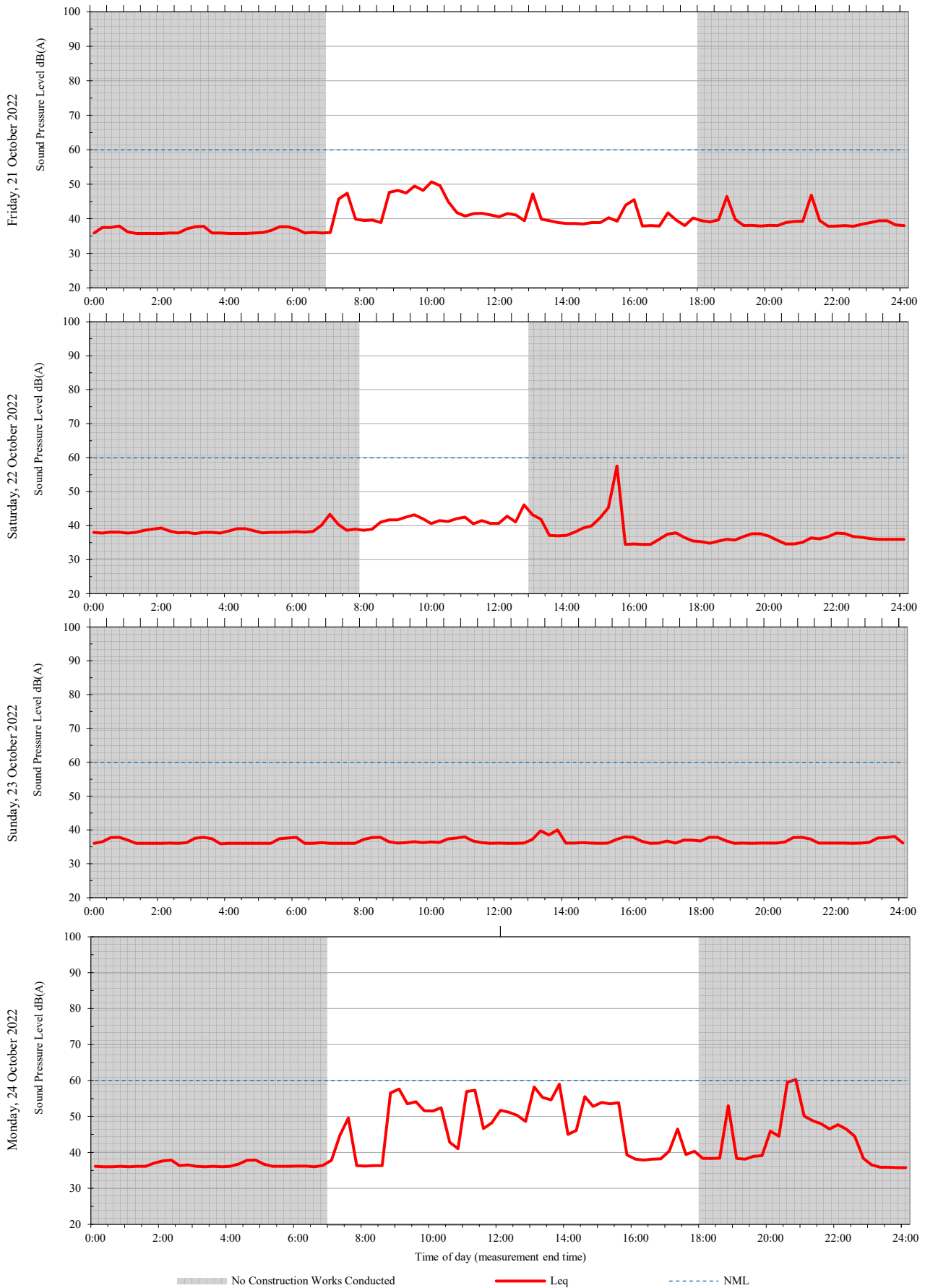




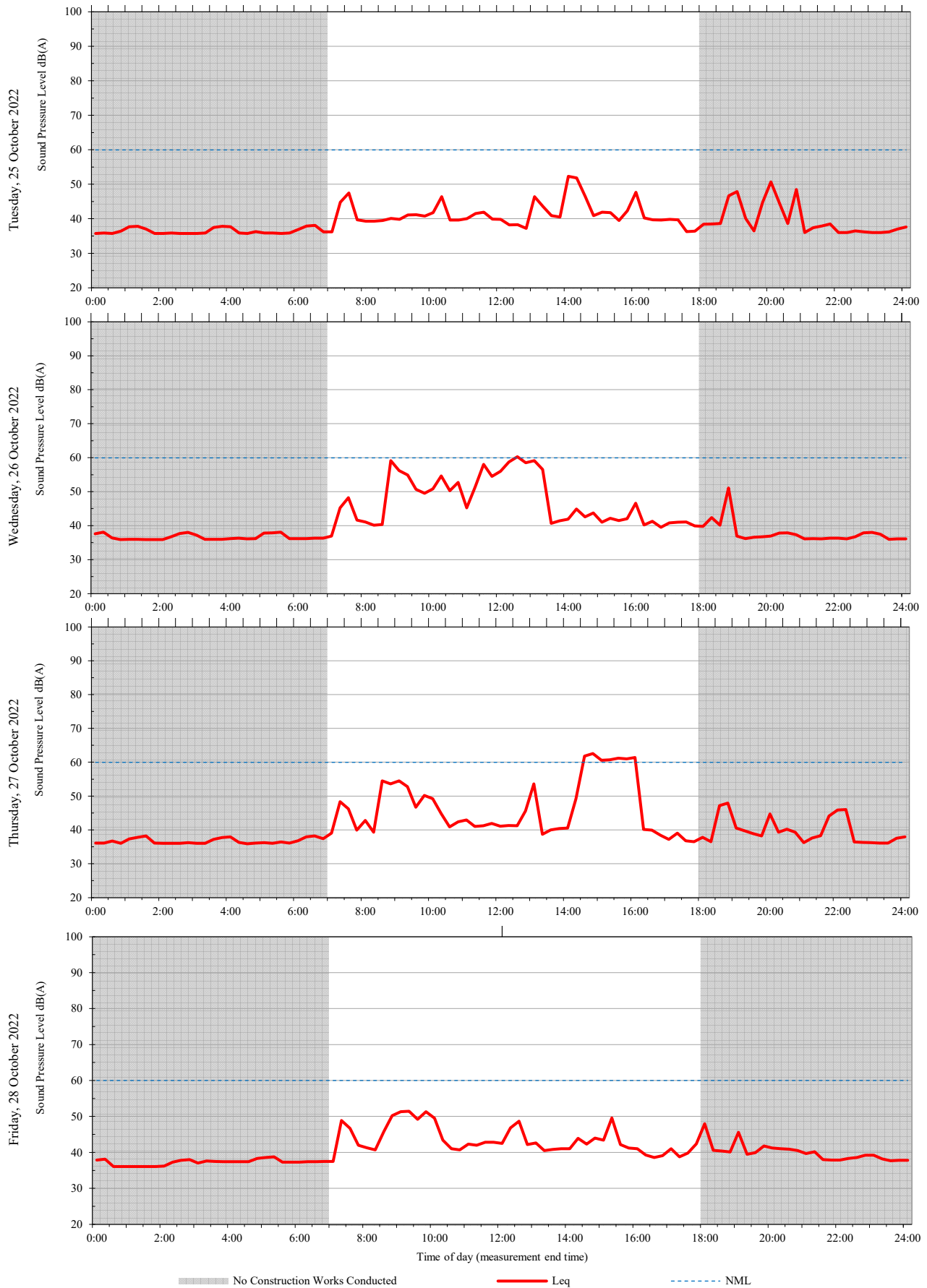
Unattended monitoring: CHW Ground Floor room 51DM047 (Westmead 1) (Internal)



Unattended monitoring: CHW Ground Floor room 51DM047 (Westmead 1) (Internal)

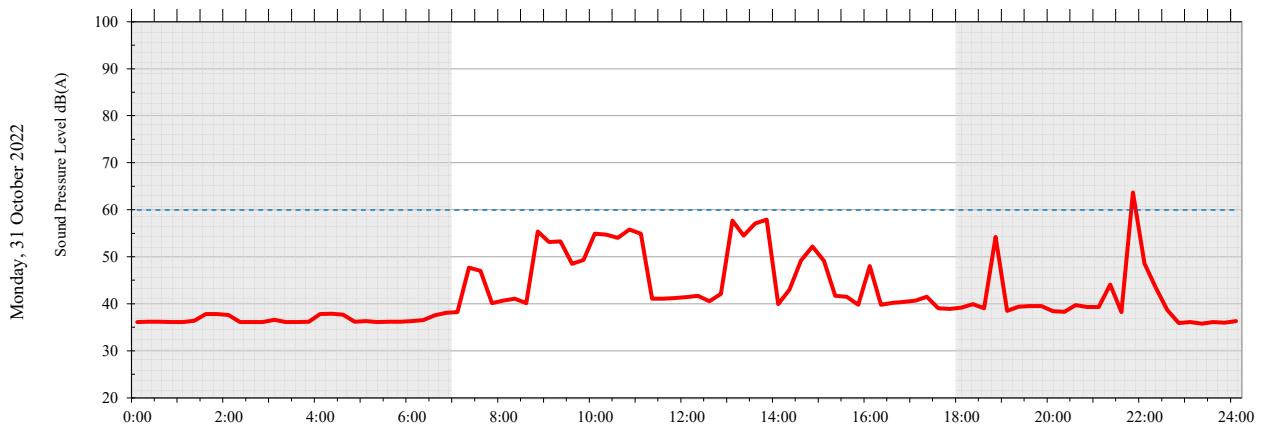
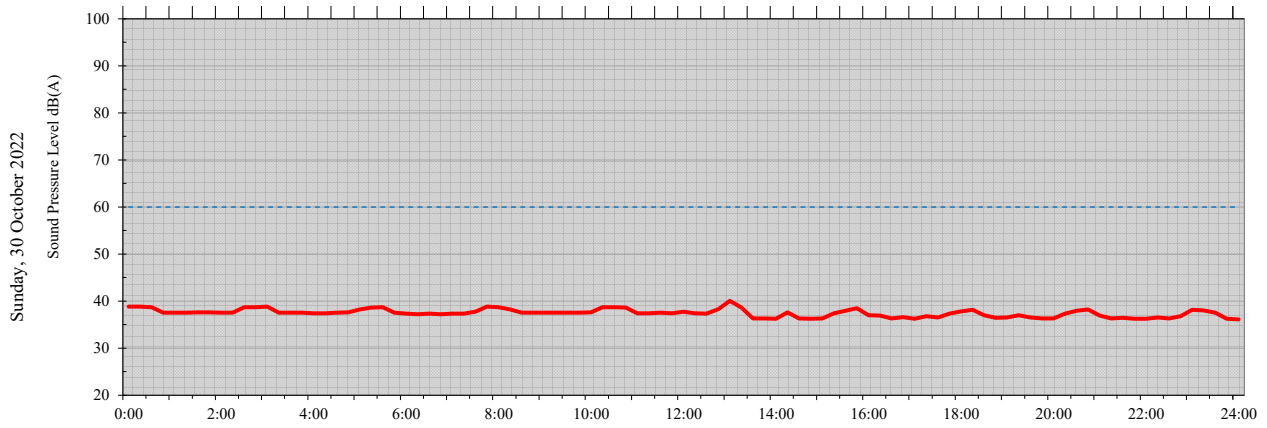
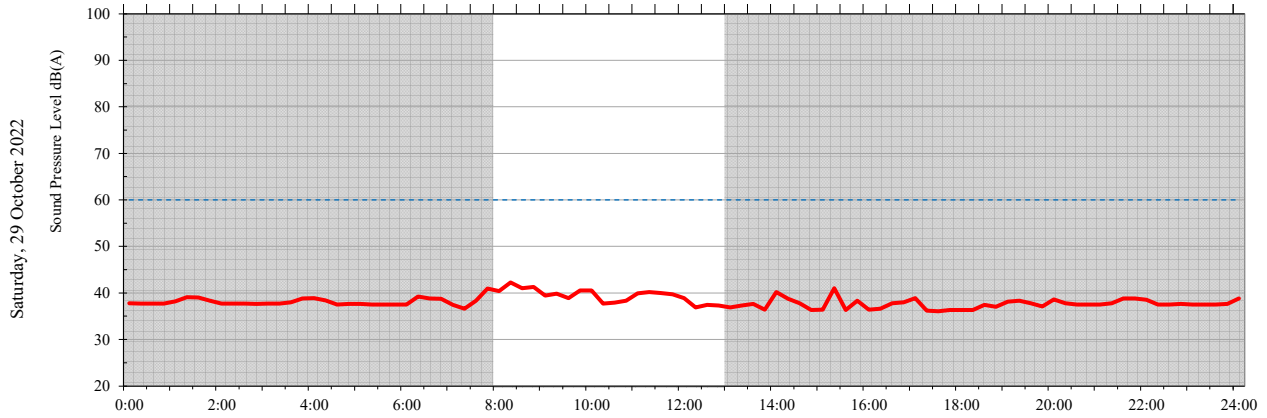


Unattended monitoring: CHW Ground Floor room 51DM047 (Westmead 1) (Internal)



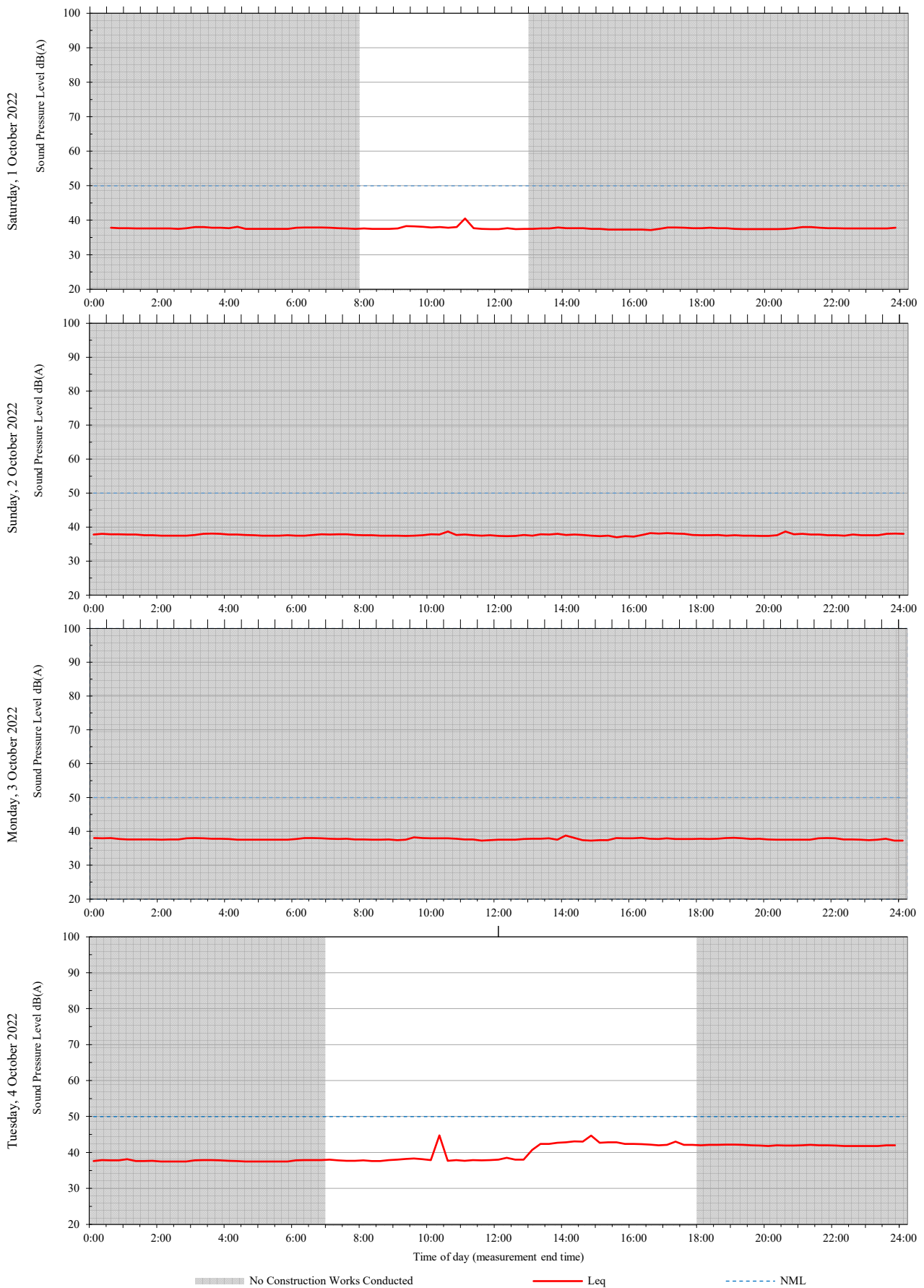
Unattended monitoring: CHW Ground Floor room 51DM047 (Westmead 1) (Internal)

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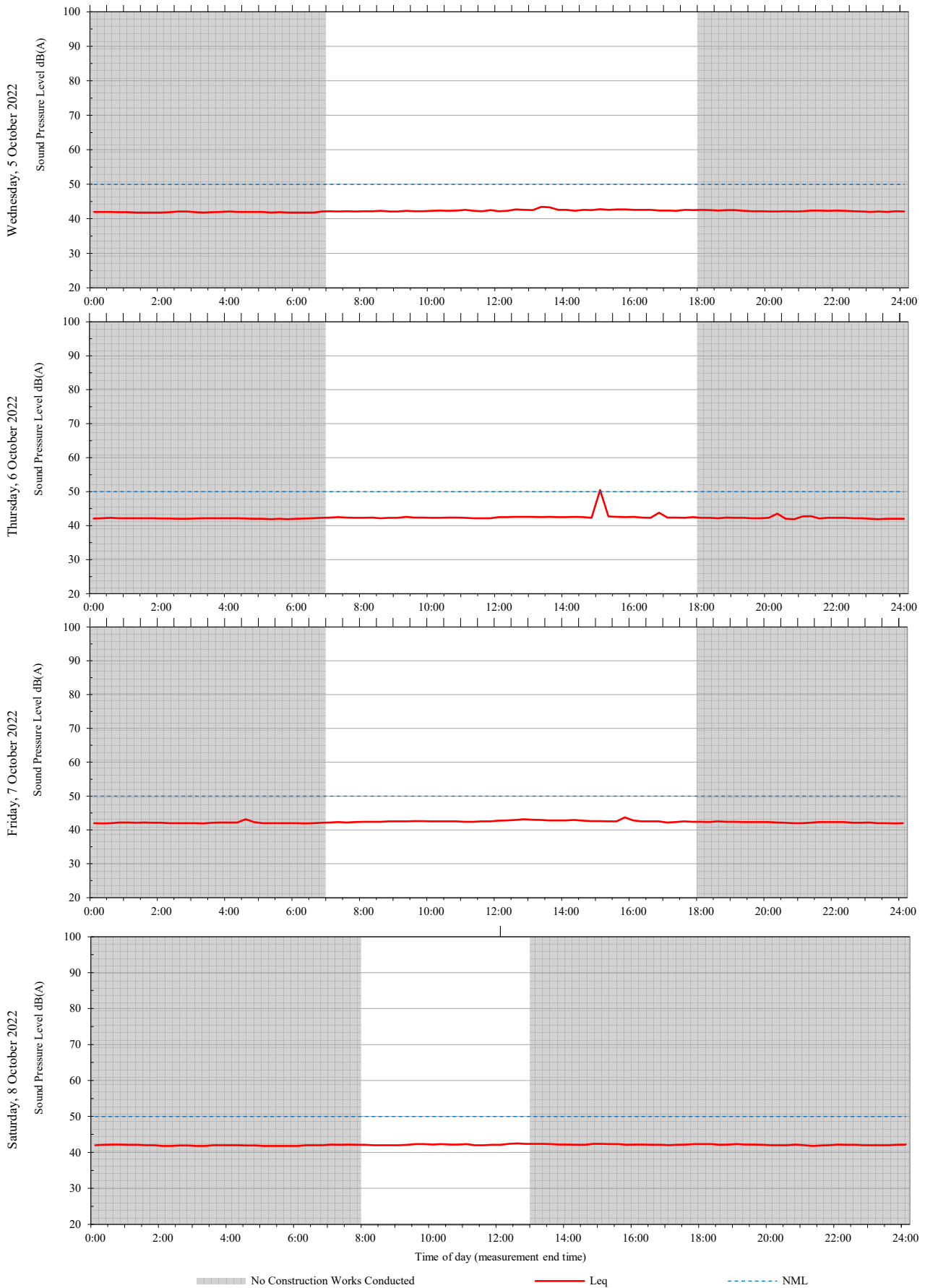


A2 CASB Level 3 Operating Theatre Store Room WM11K.03.3264 (Westmead 5)

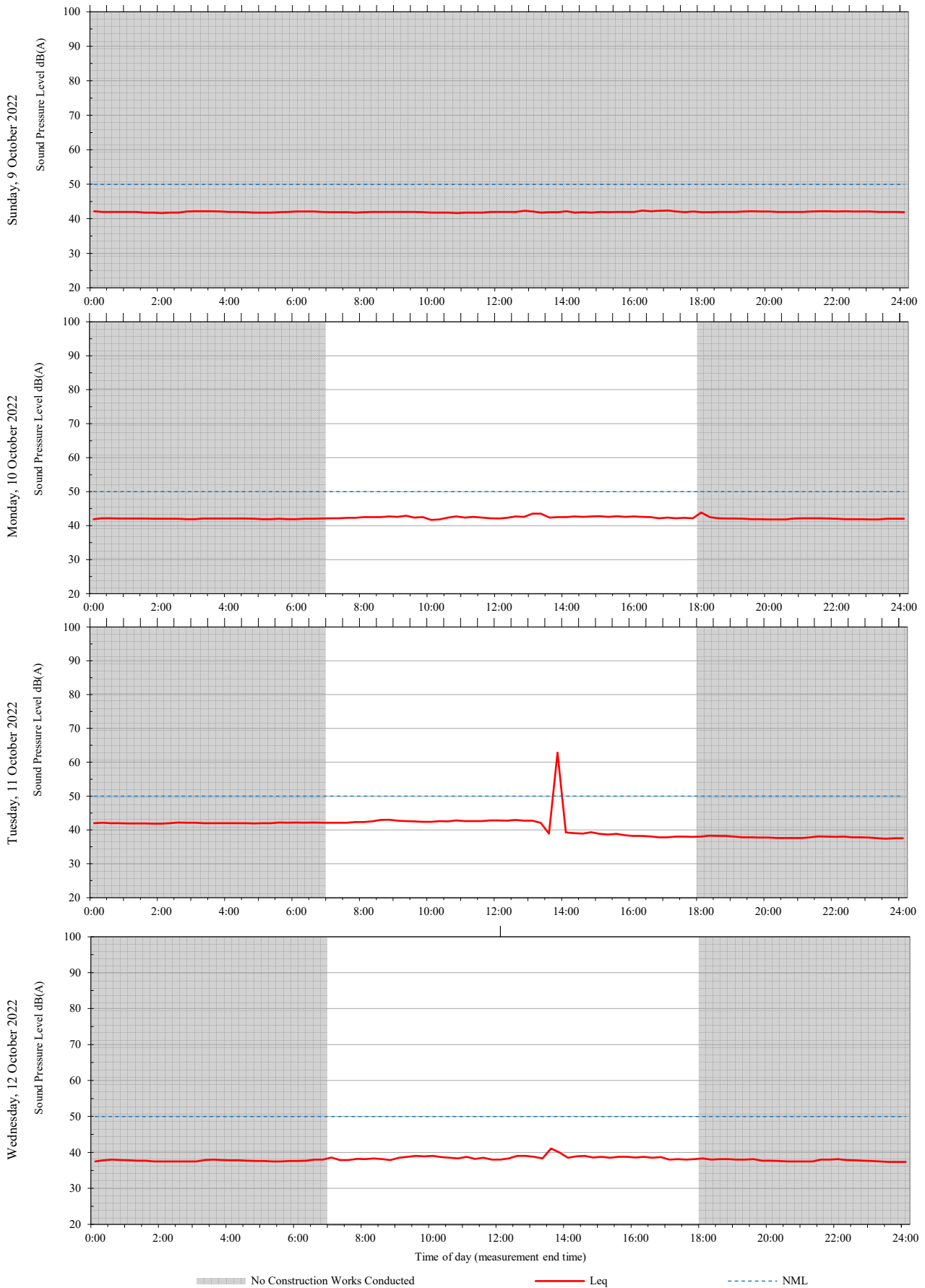
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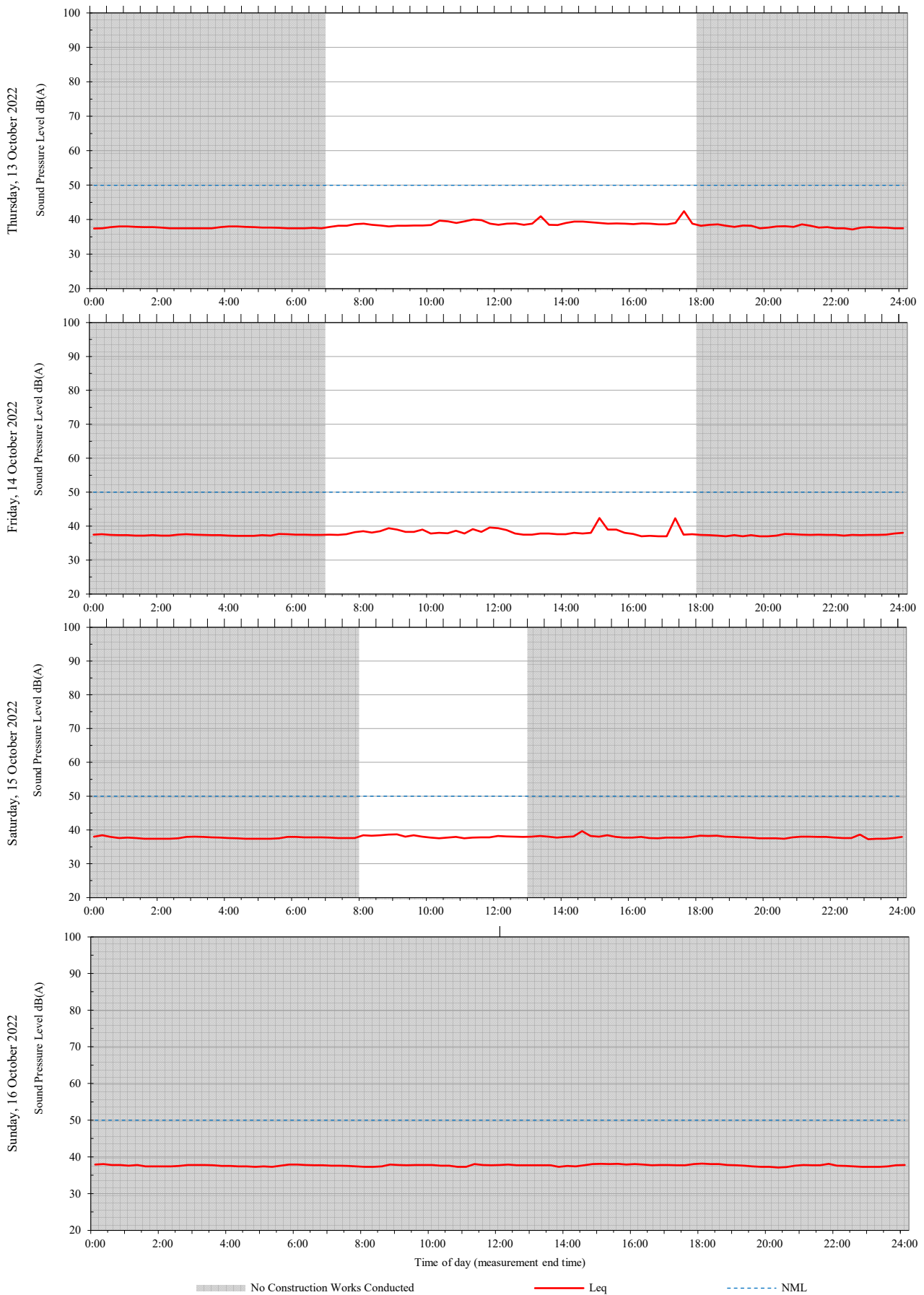
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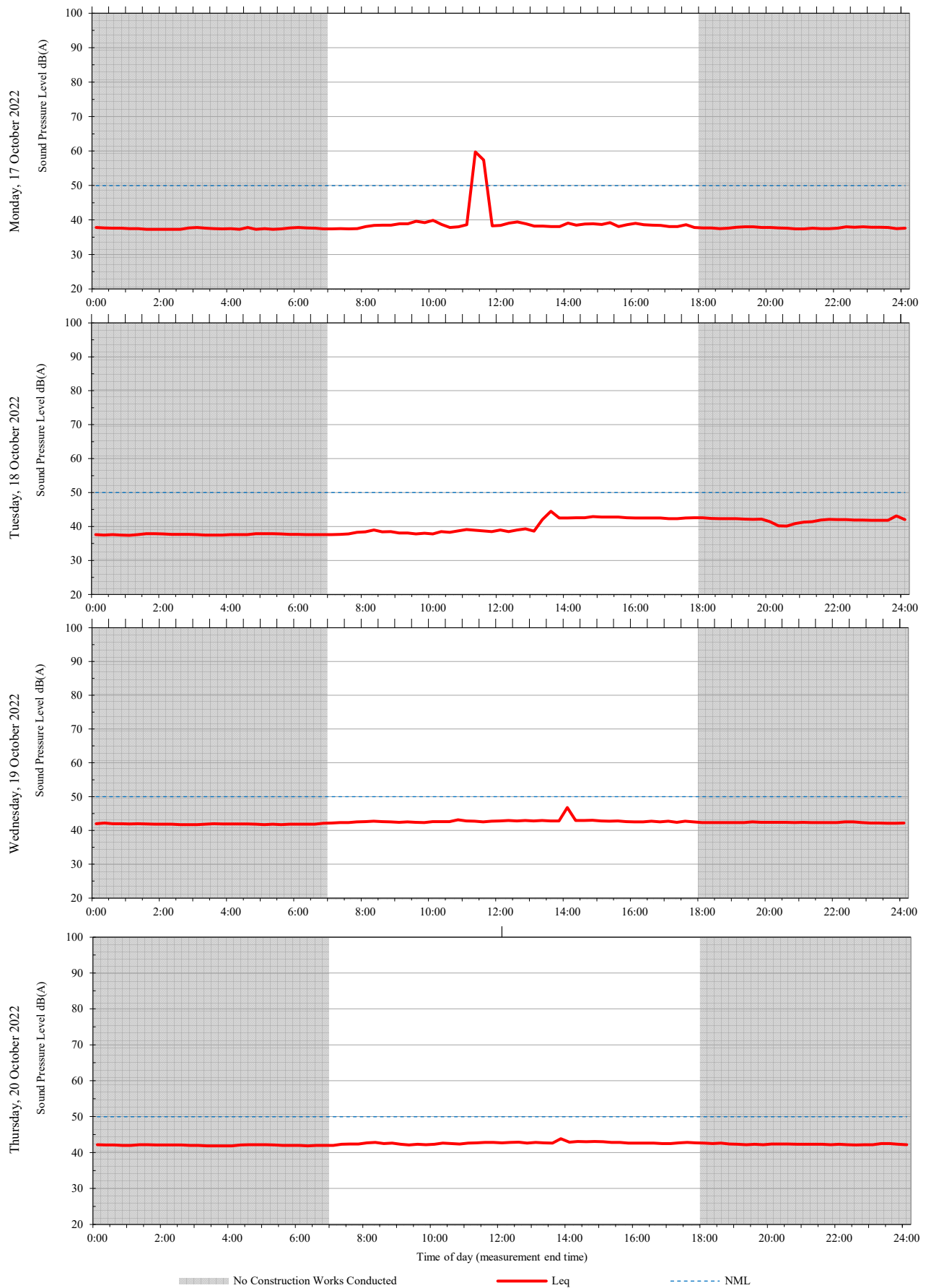
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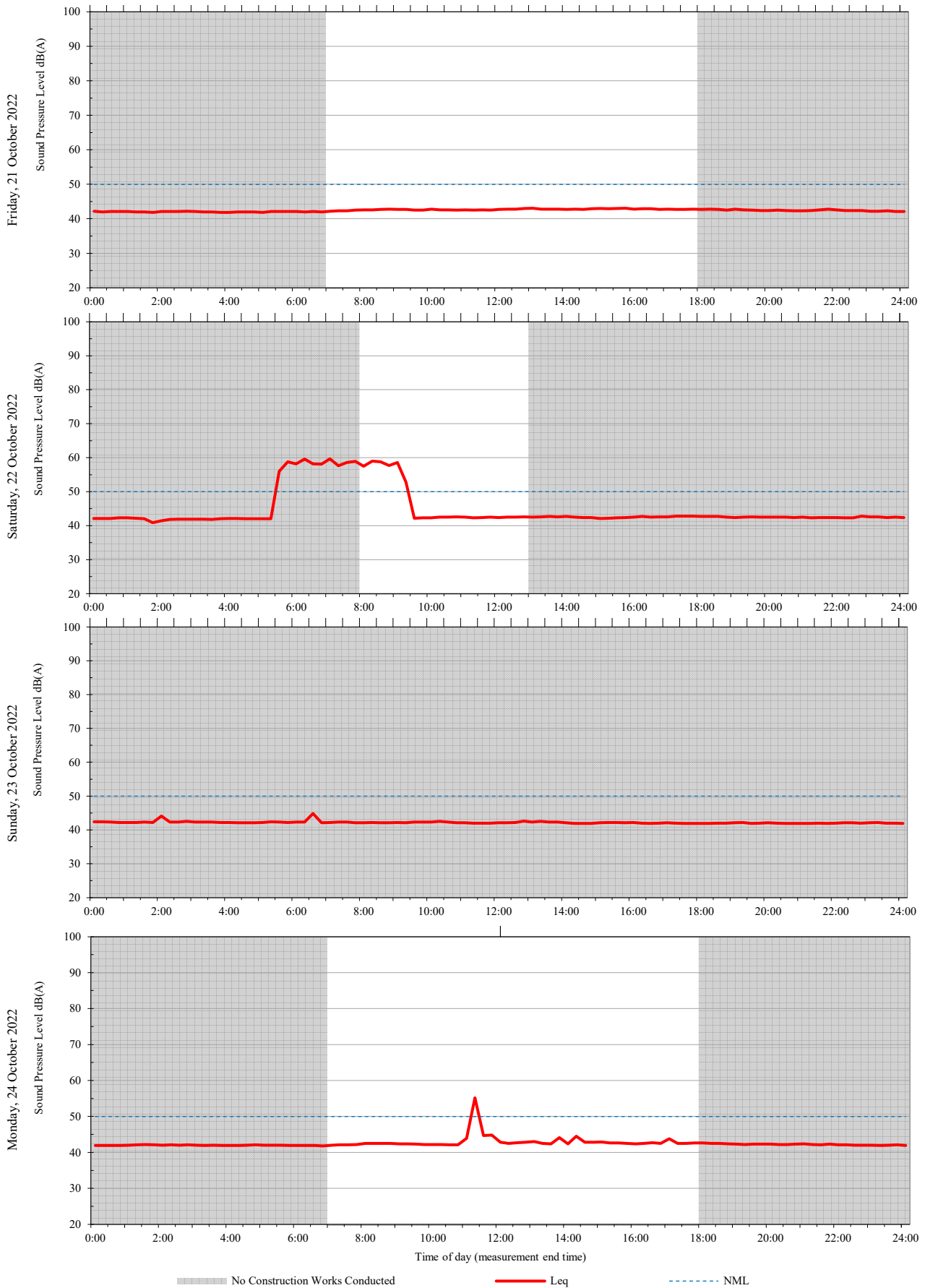
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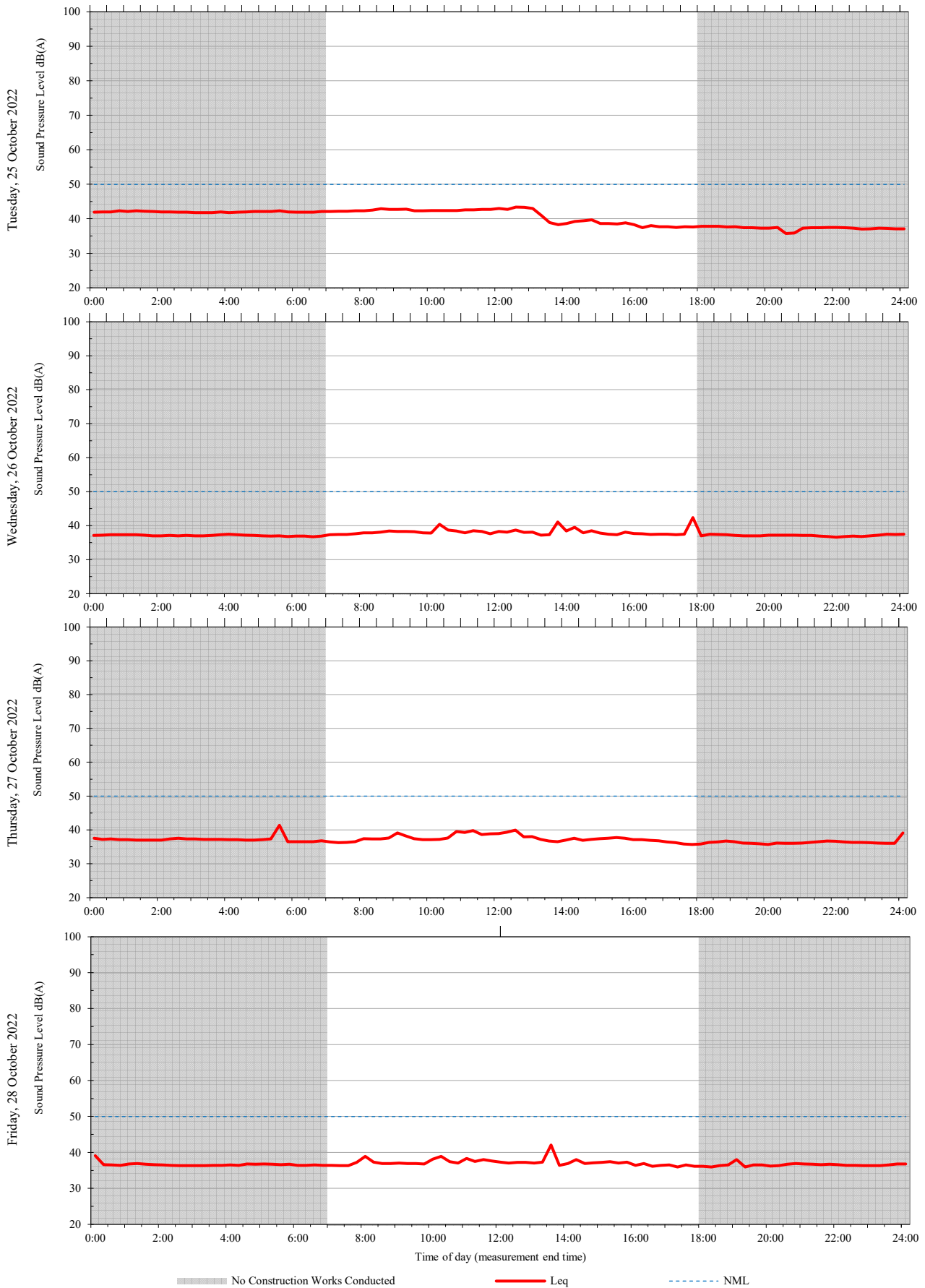
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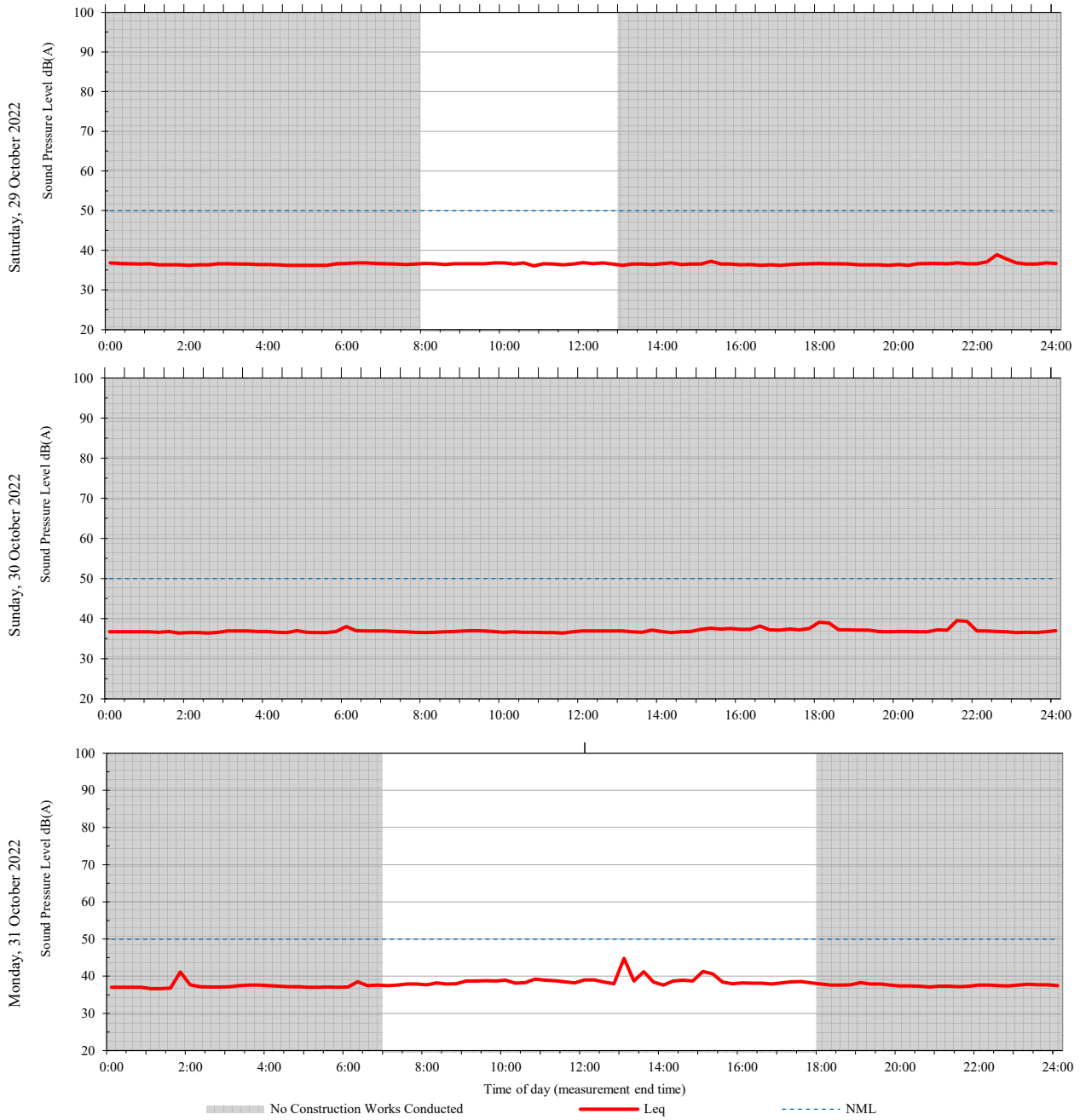
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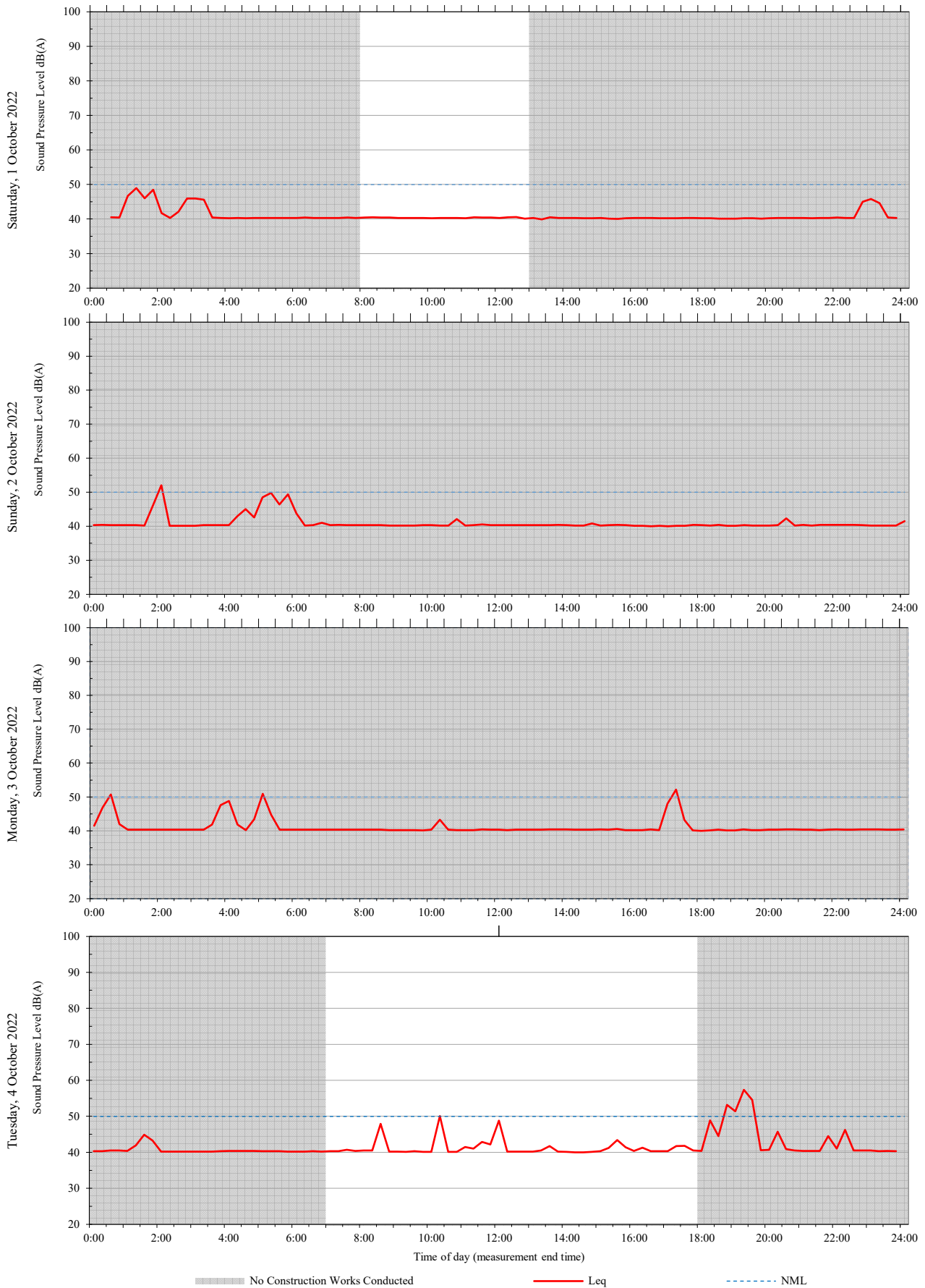
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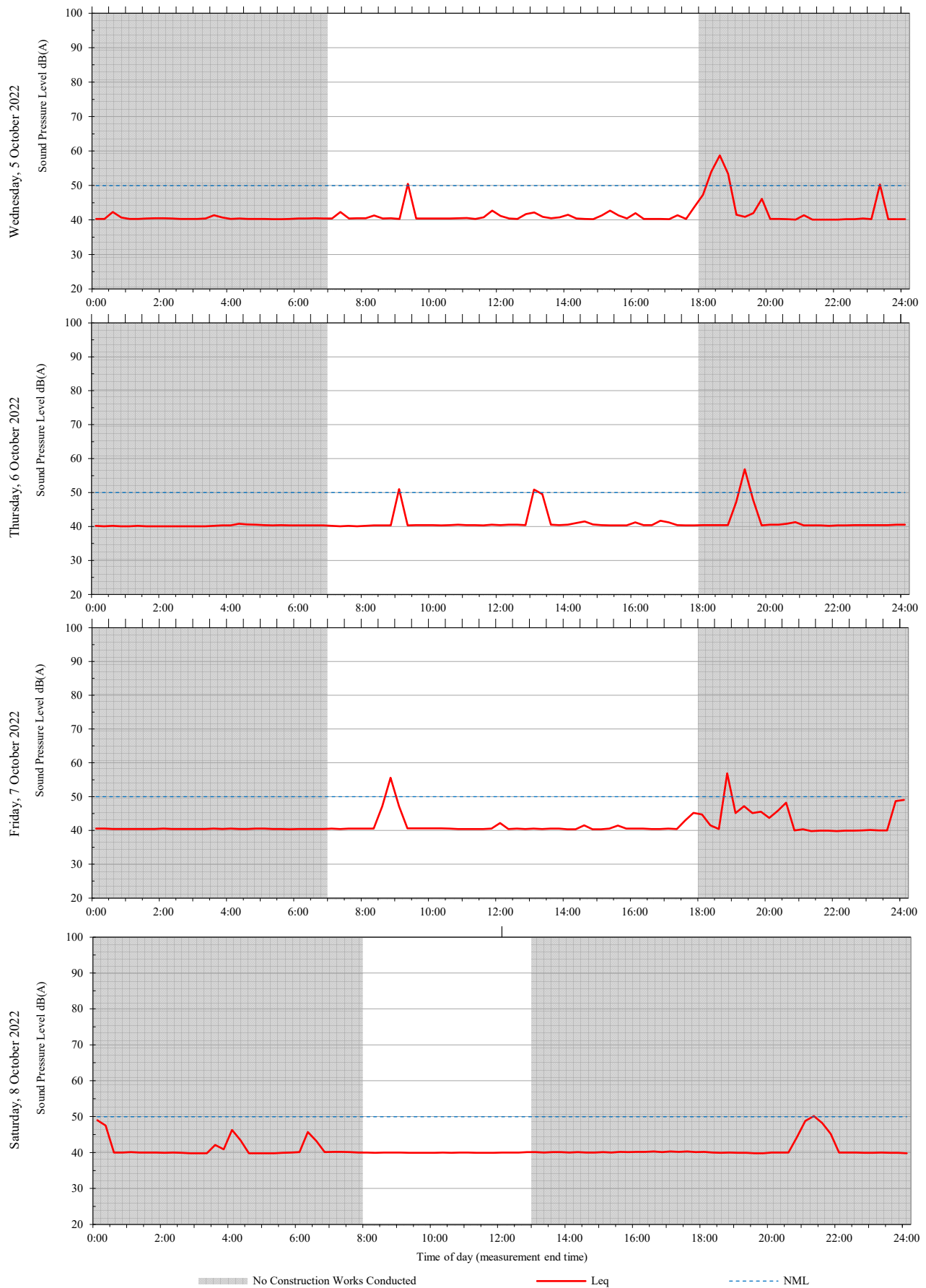


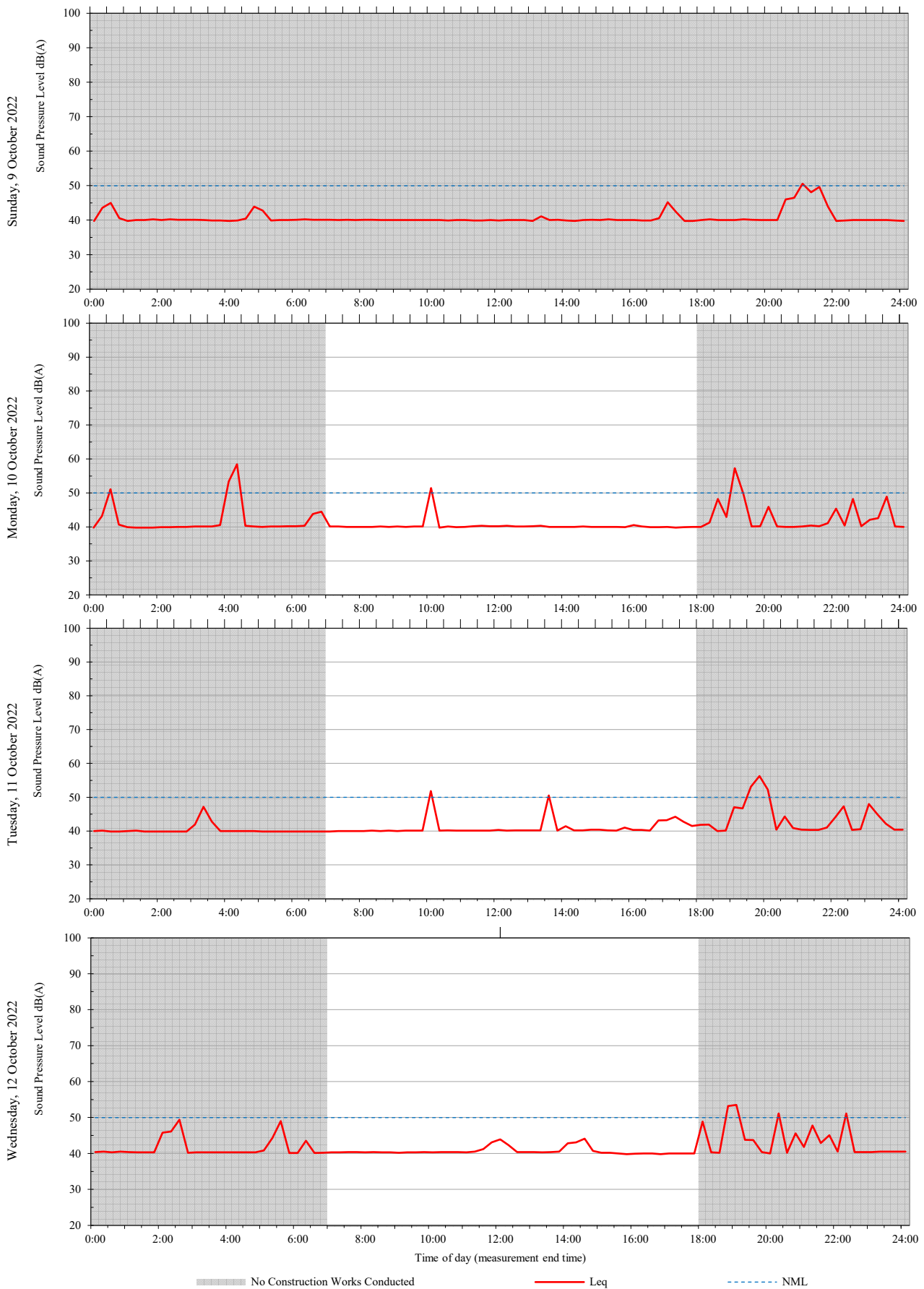
Unattended monitoring: Westmead 5 - CASB Level 3 Operating Theatre Store Room WM11K.03.3264 (Int) ARUP

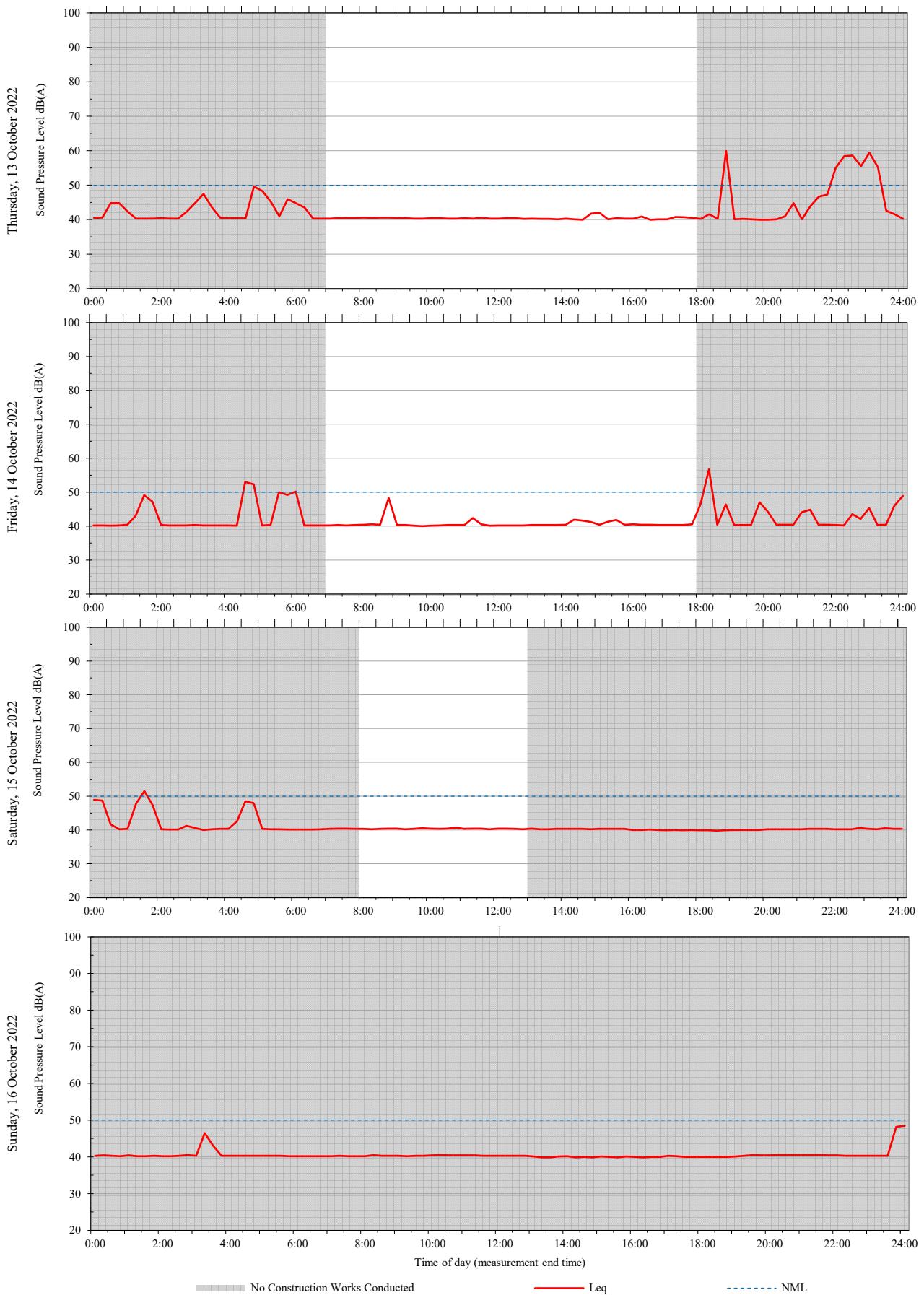


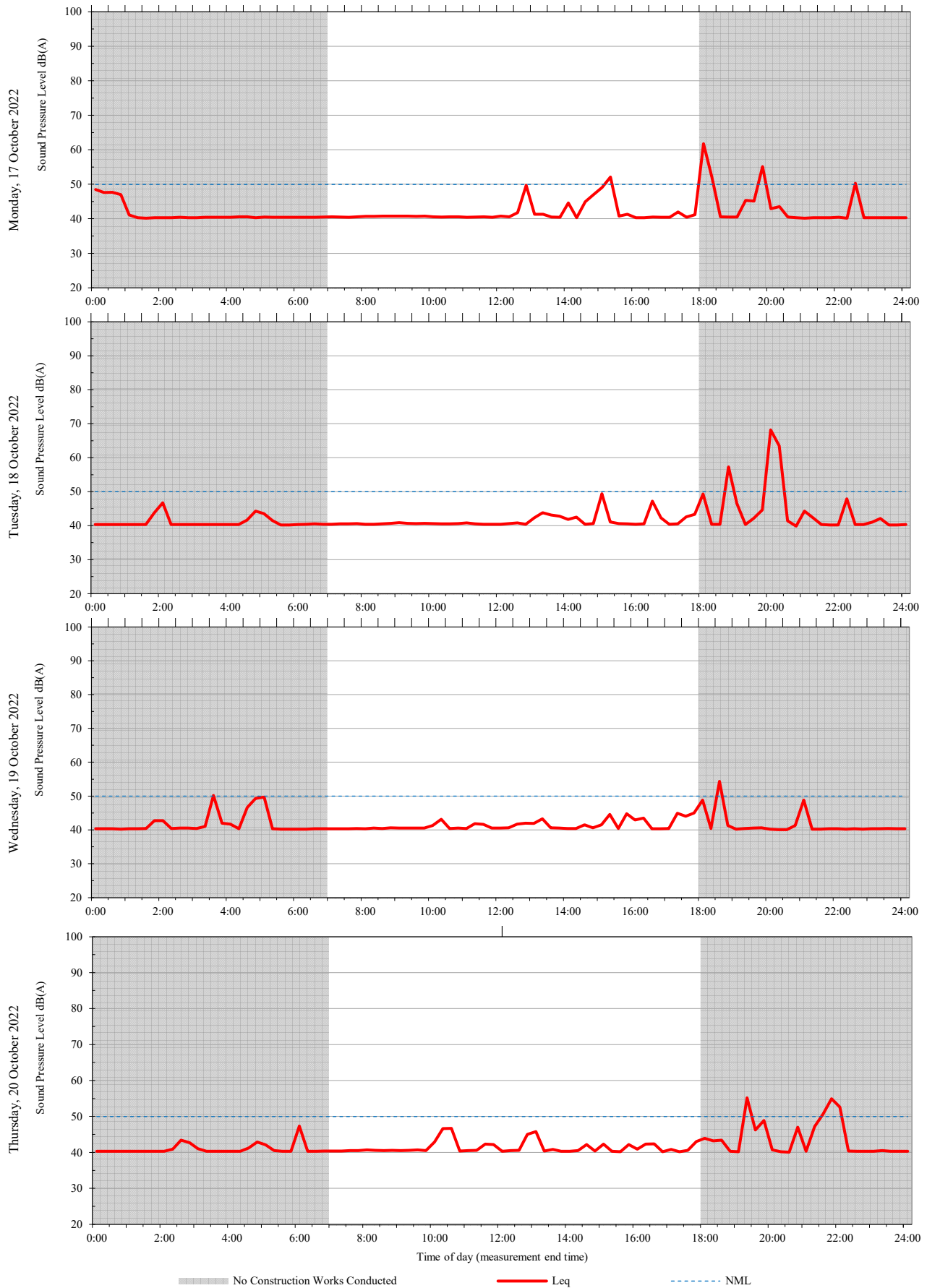
A3 CASB Level 6 Cleaner's Room WM11K.06.6079 (Westmead 6)

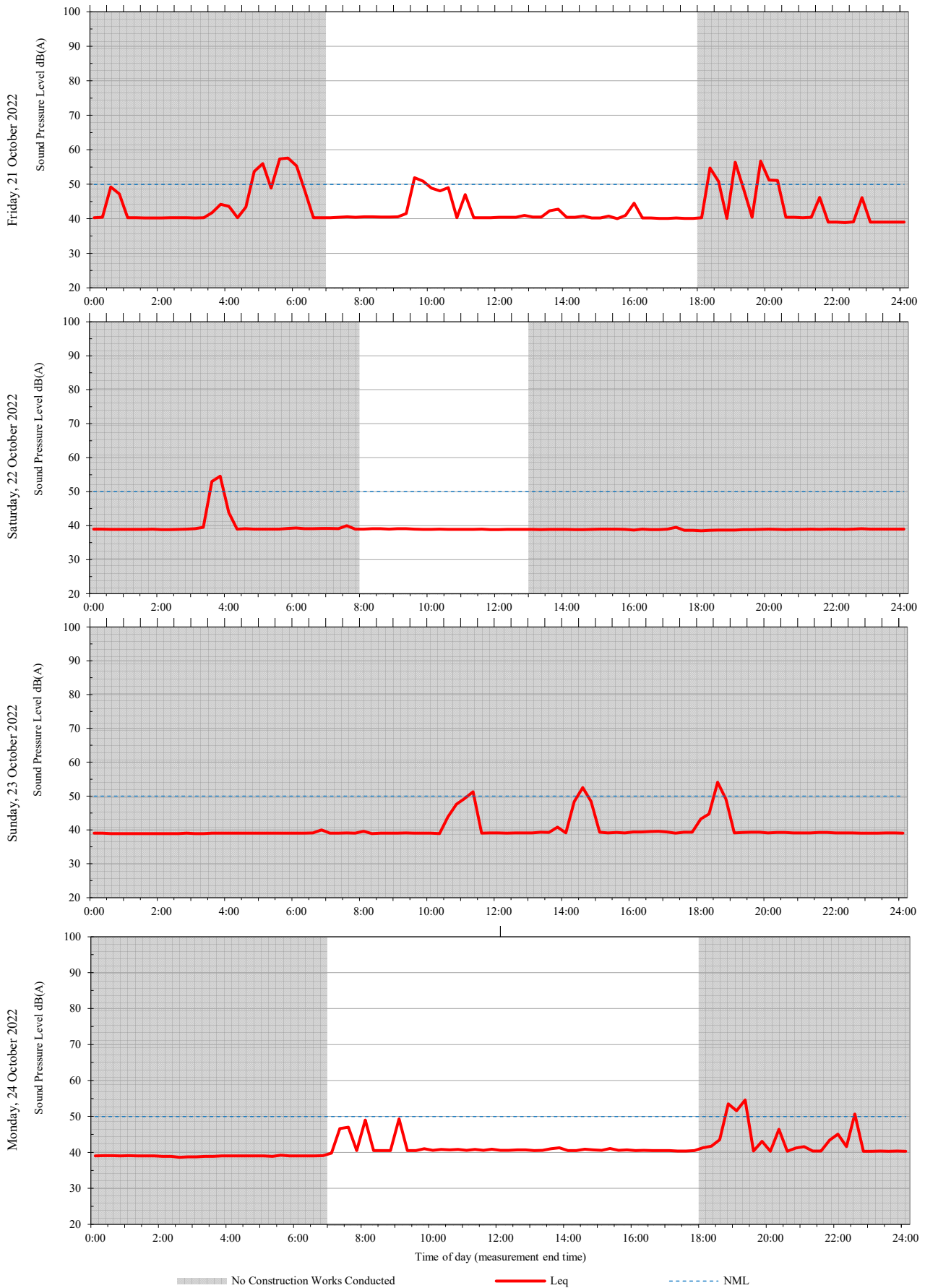


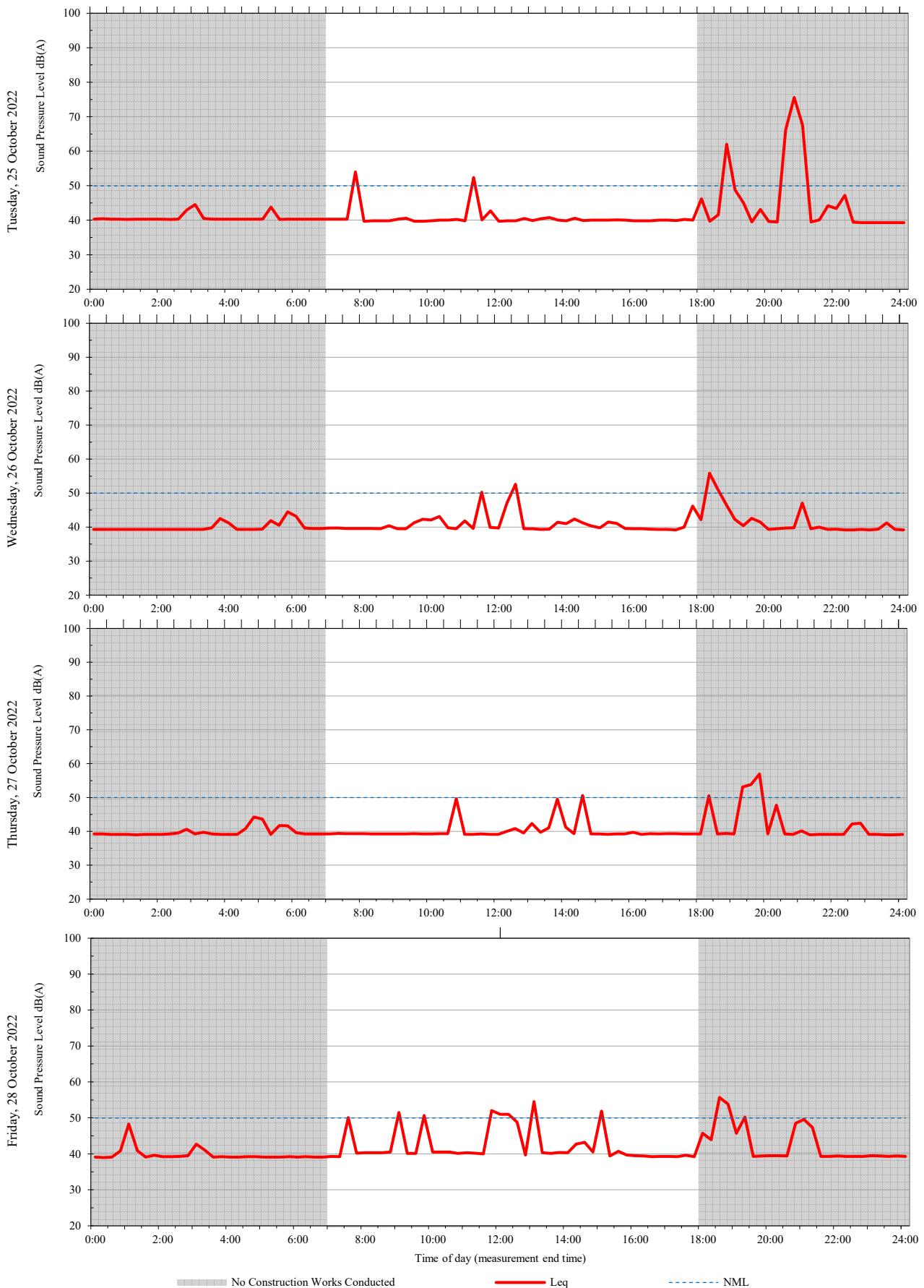




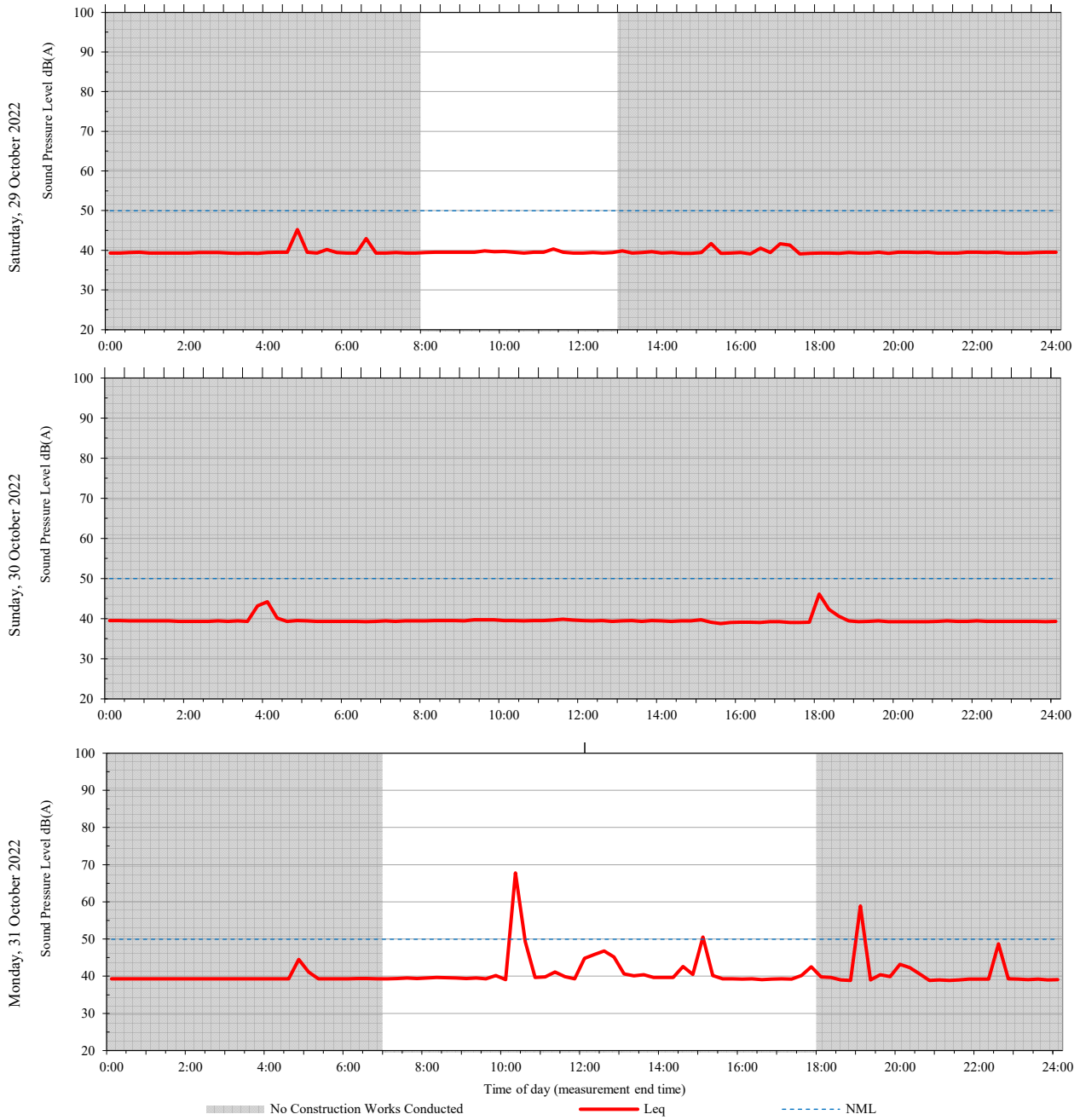






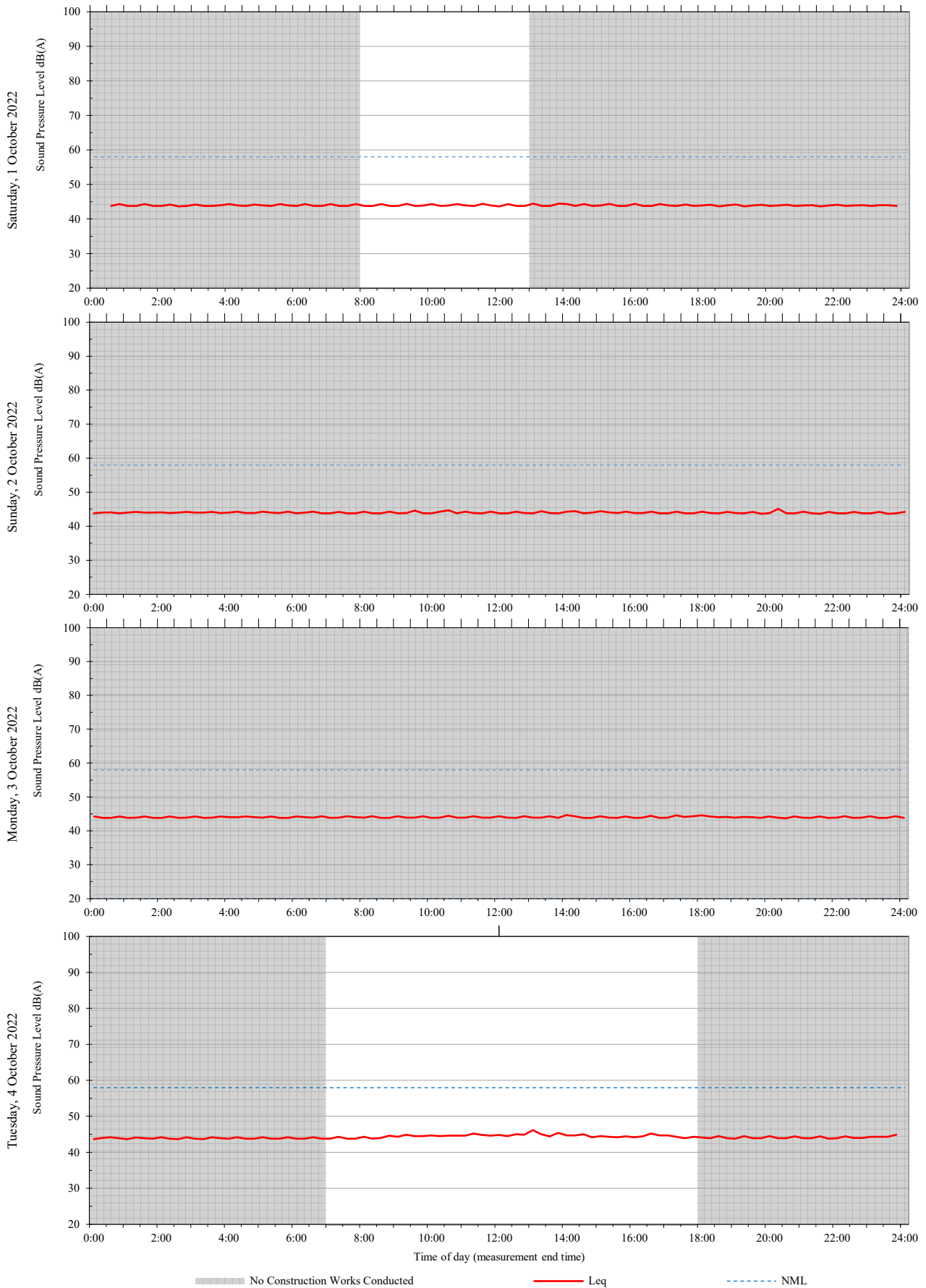


Unattended monitoring: Westmead 6 - CASB Level 6 Cleaner's Room WM11K.06.6079 (Internal)

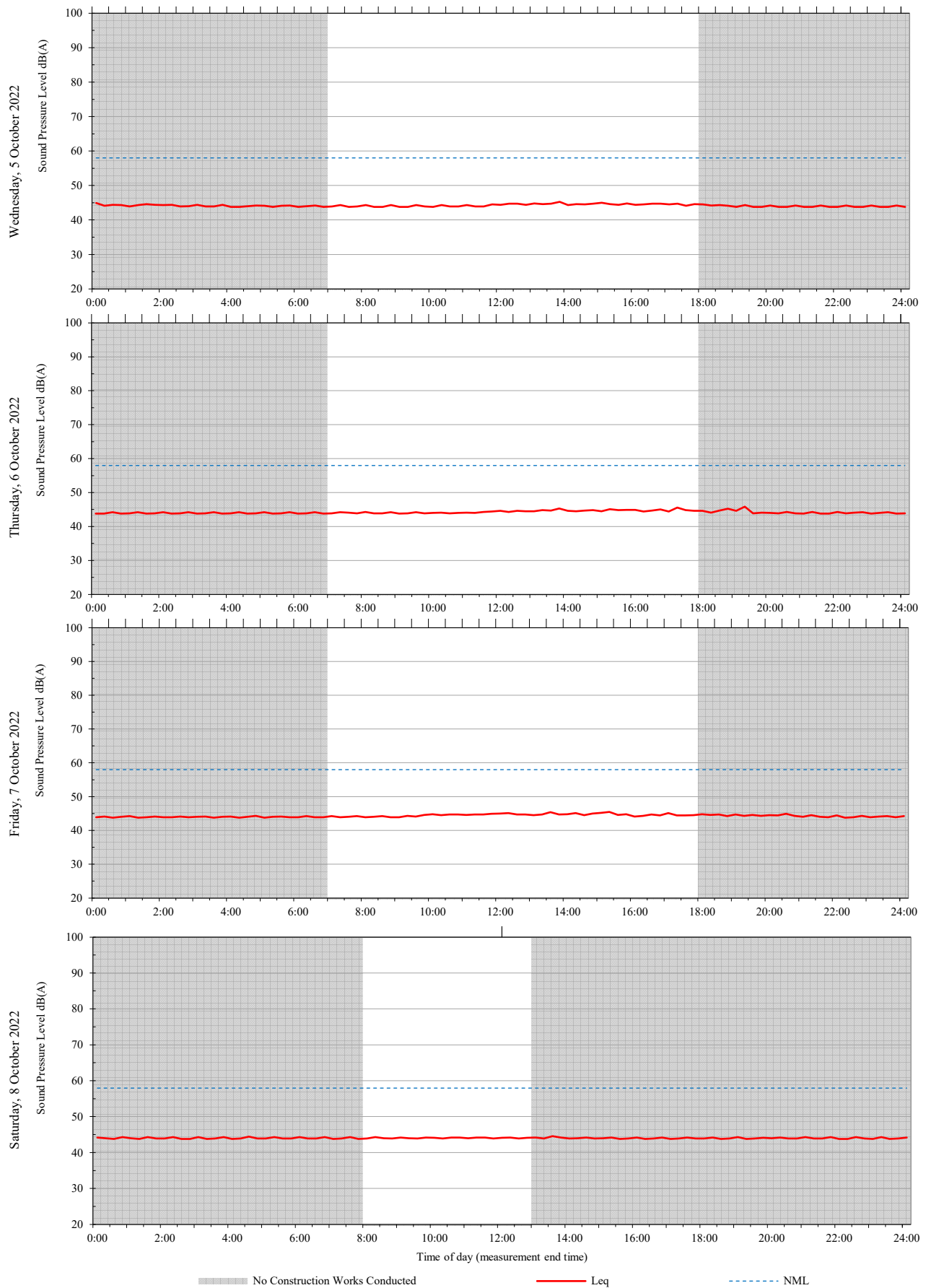


A4 KR Level 3 Radiation Room 33 RF041 (Westmead 7)

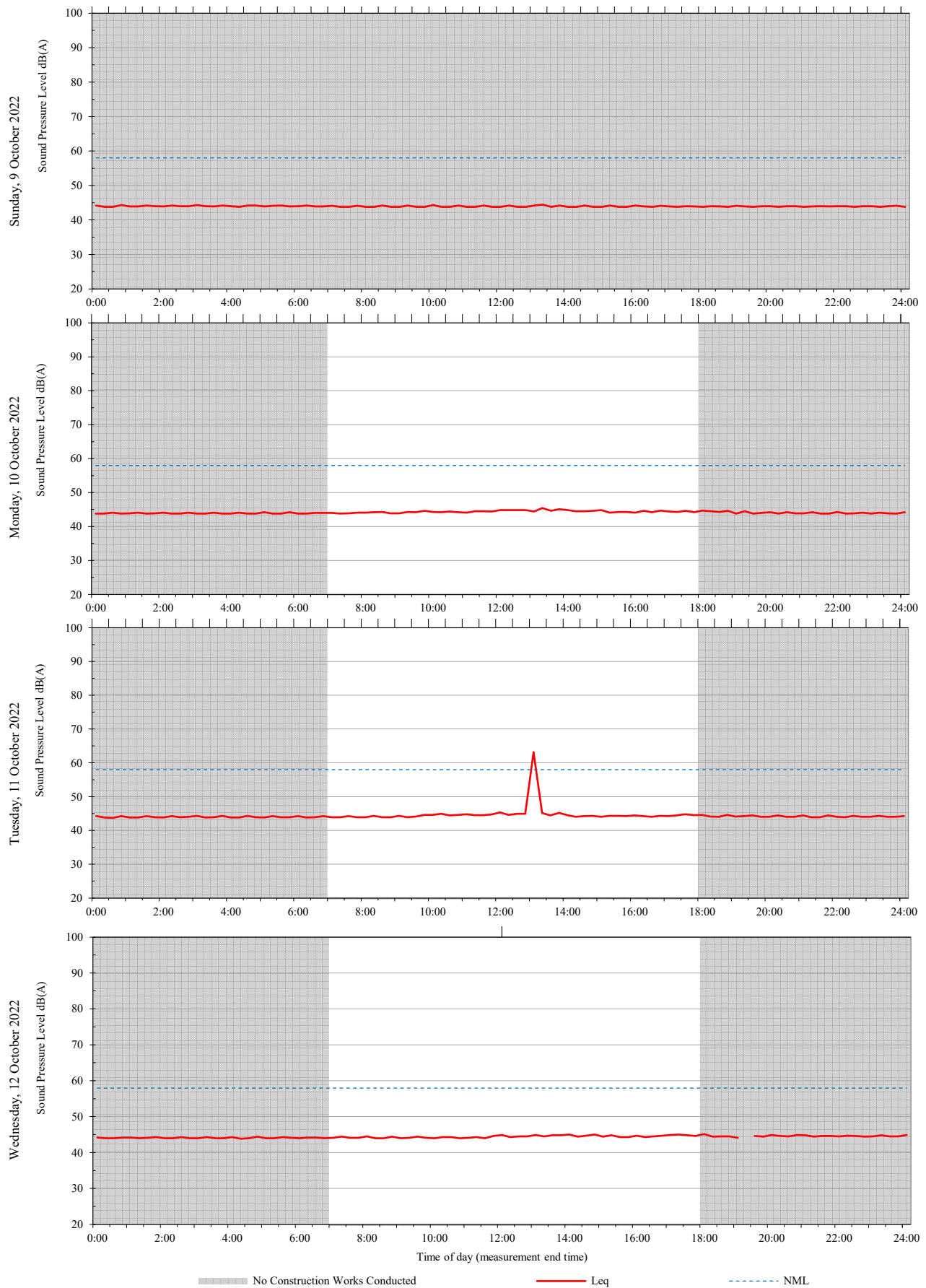
Unattended monitoring: Westmead 7 - KR Level 3 Radiation Room 33 RF041(facing PSB site) (Internal) ARUP



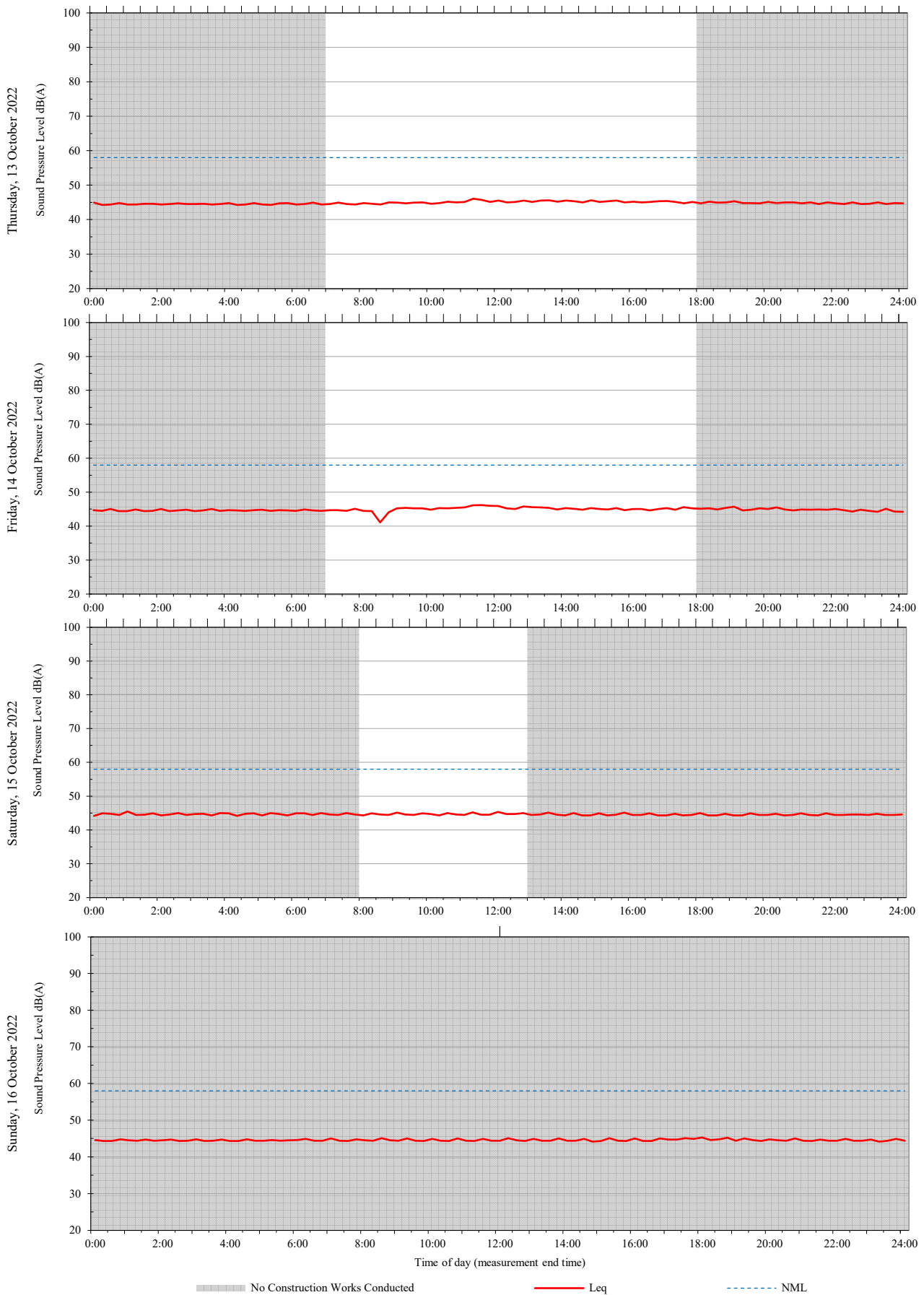
Unattended monitoring: Westmead 7 - KR Level 3 Radiation Room 33 RF041(facing PSB site) (Internal) ARUP



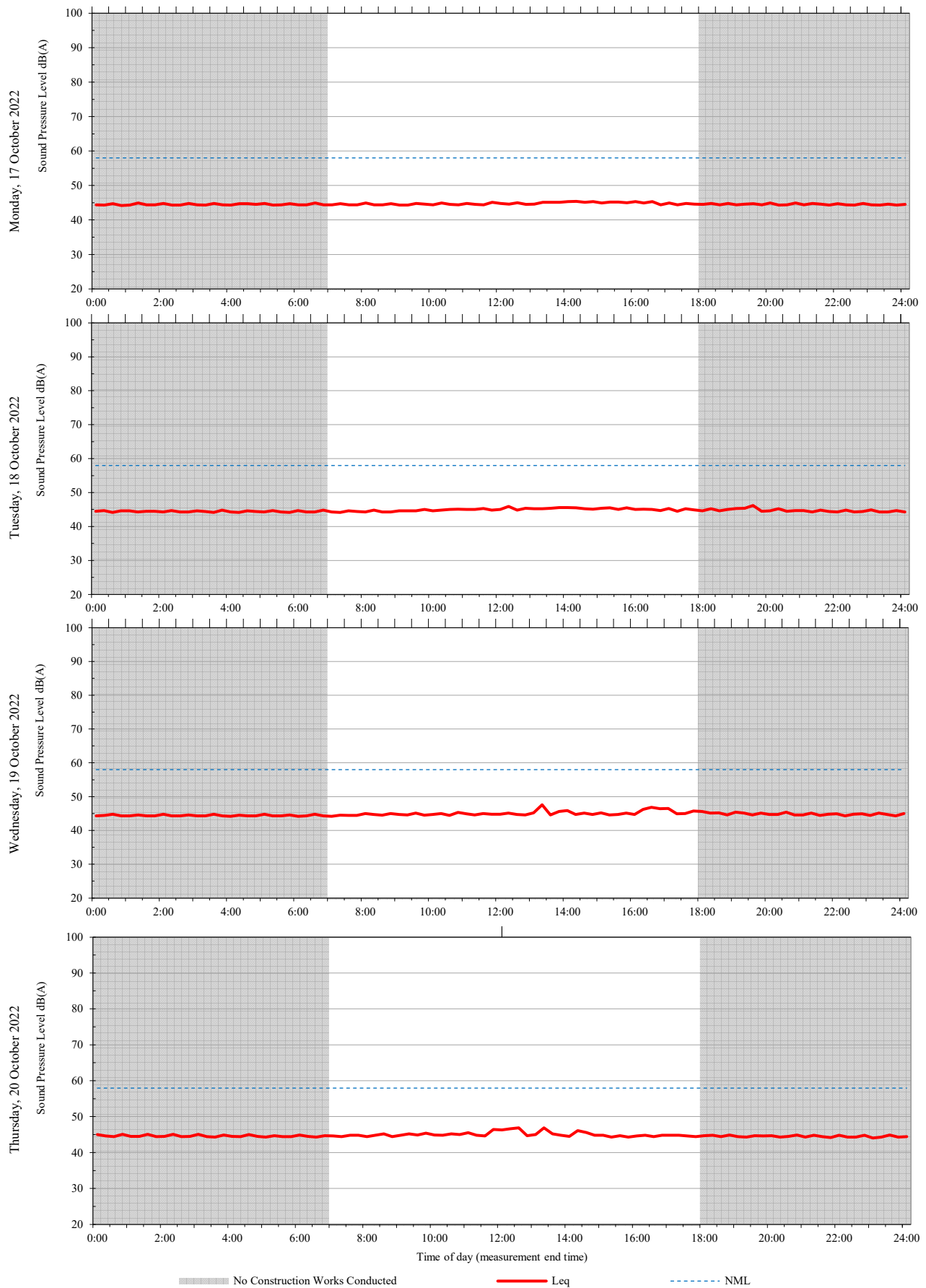
Unattended monitoring: Westmead 7 - KR Level 3 Radiation Room 33 RF041(facing PSB site) (Internal) ARUP



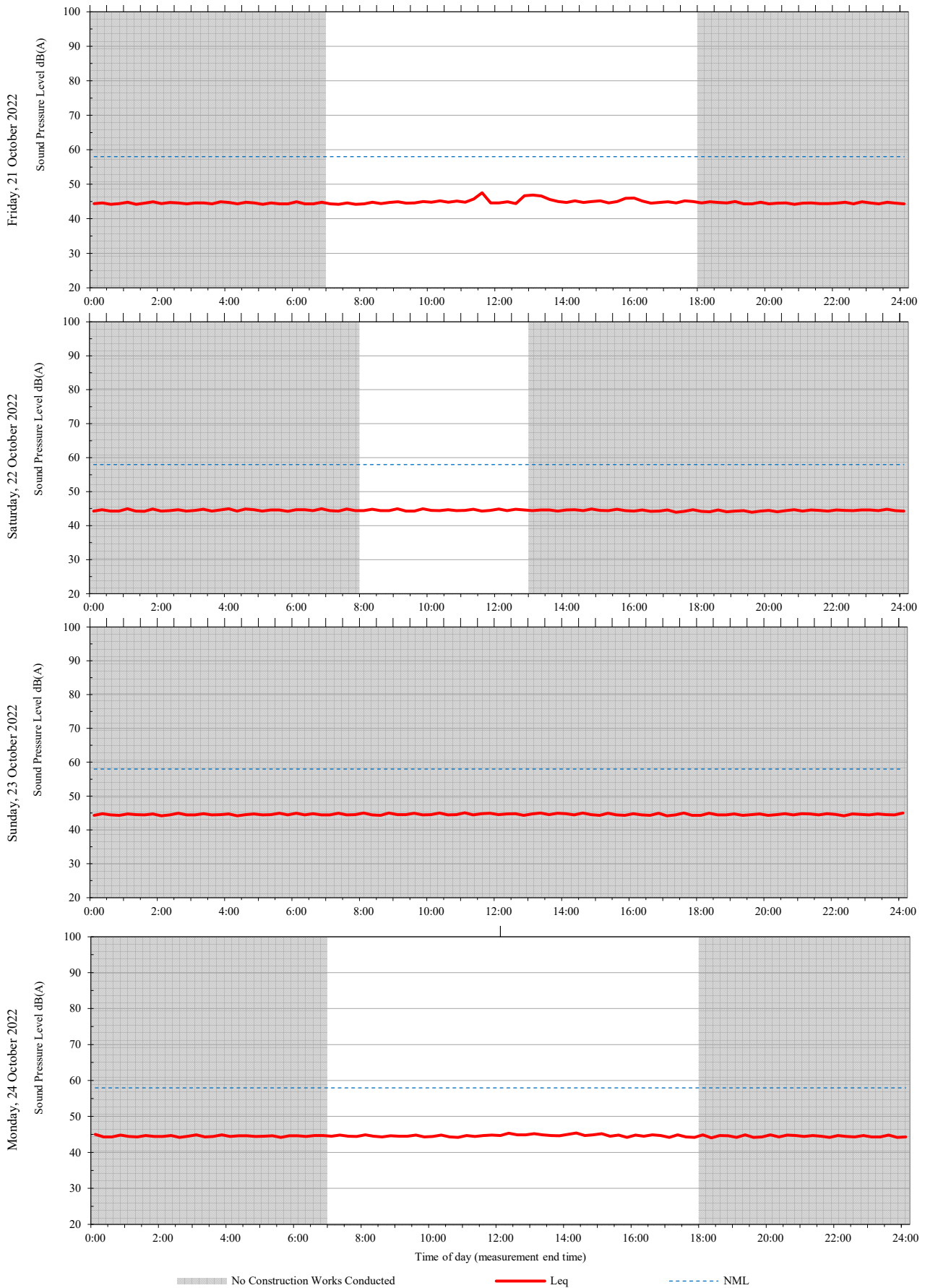
Unattended monitoring: Westmead 7 - KR Level 3 Radiation Room 33 RF041(facing PSB site) (Internal) ARUP



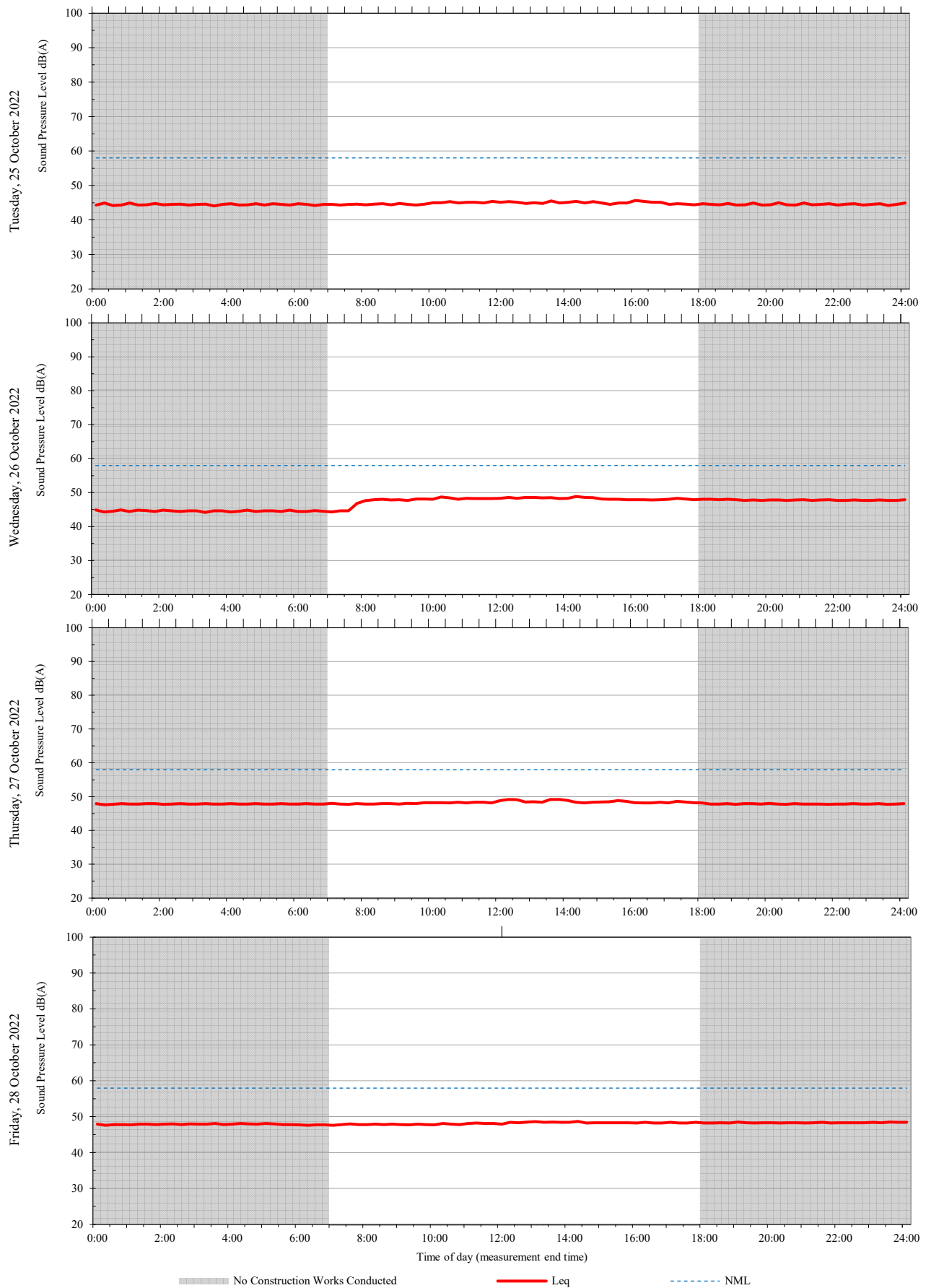
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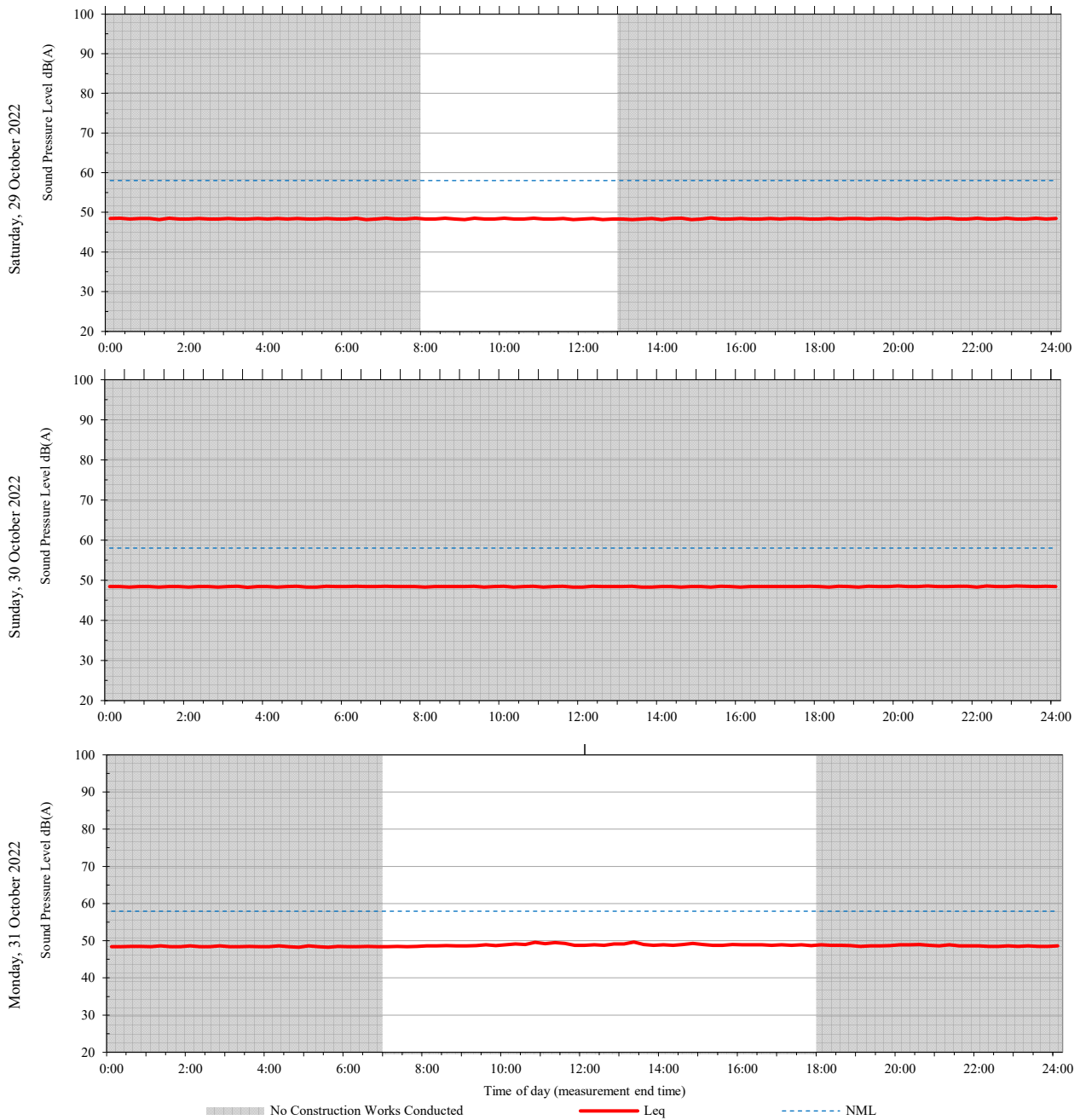
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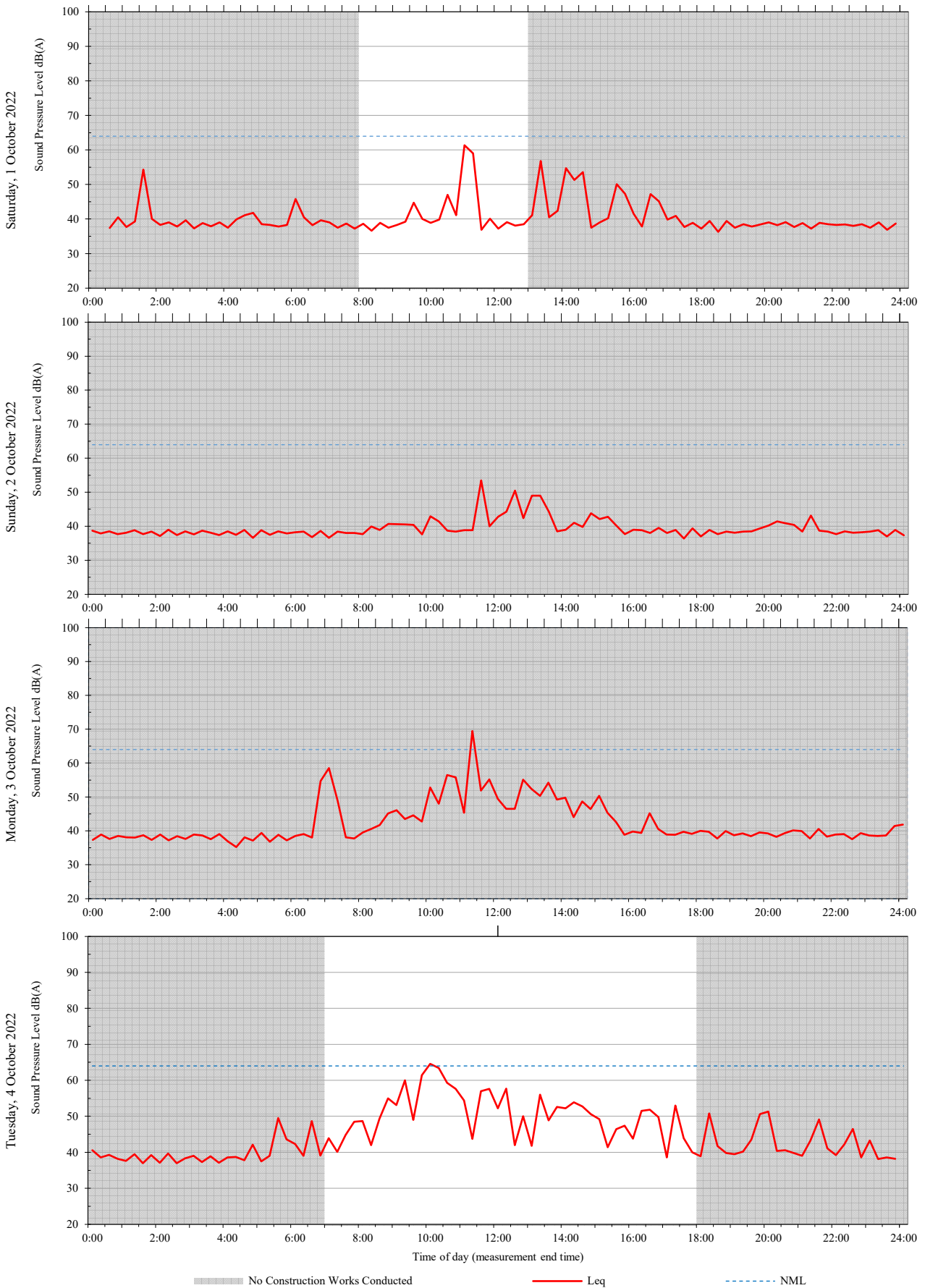


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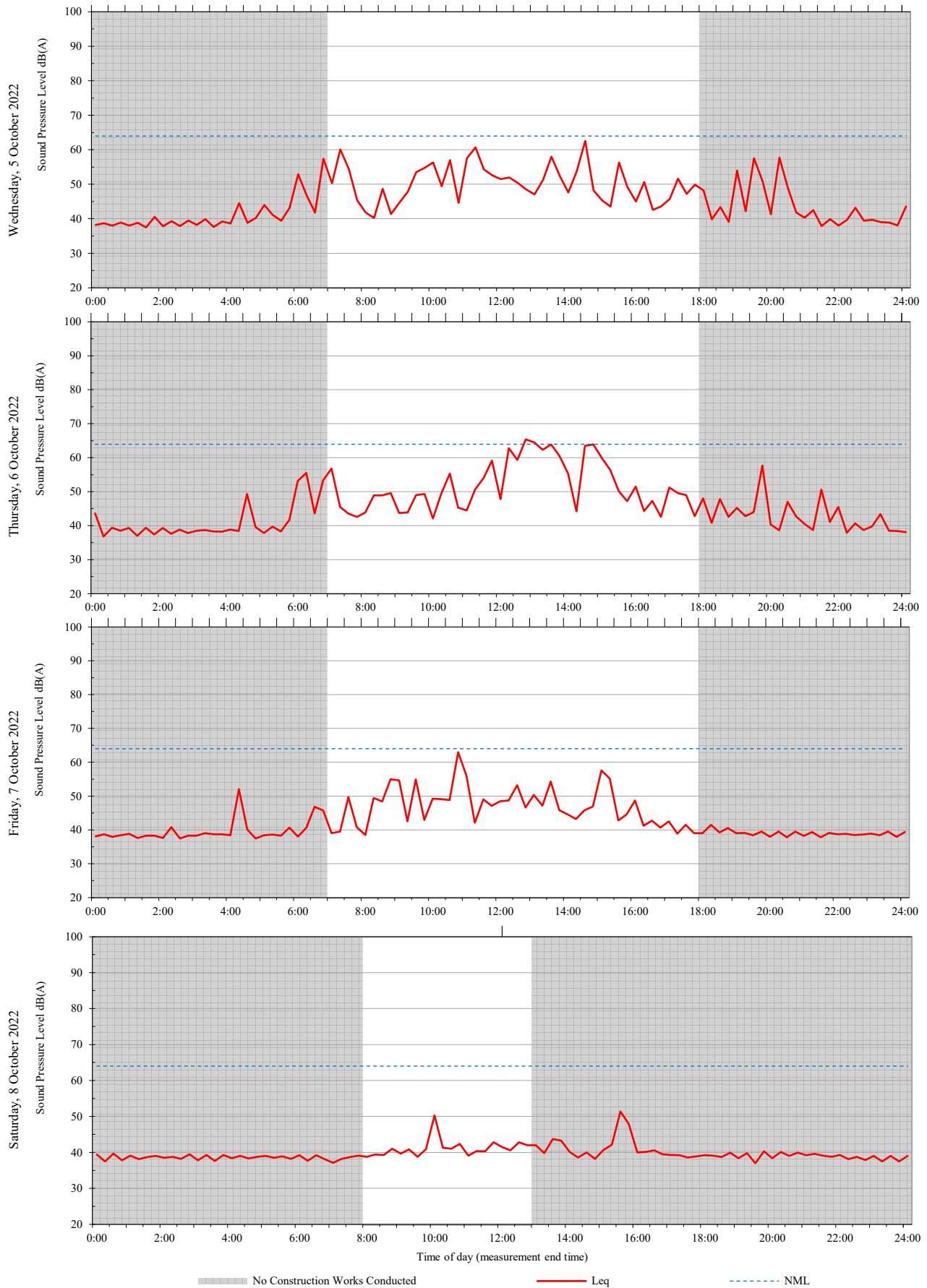


A5 CHW Level 2 Parent Kitchen 92BW025 (facing MSCP site) (Westmead 2)

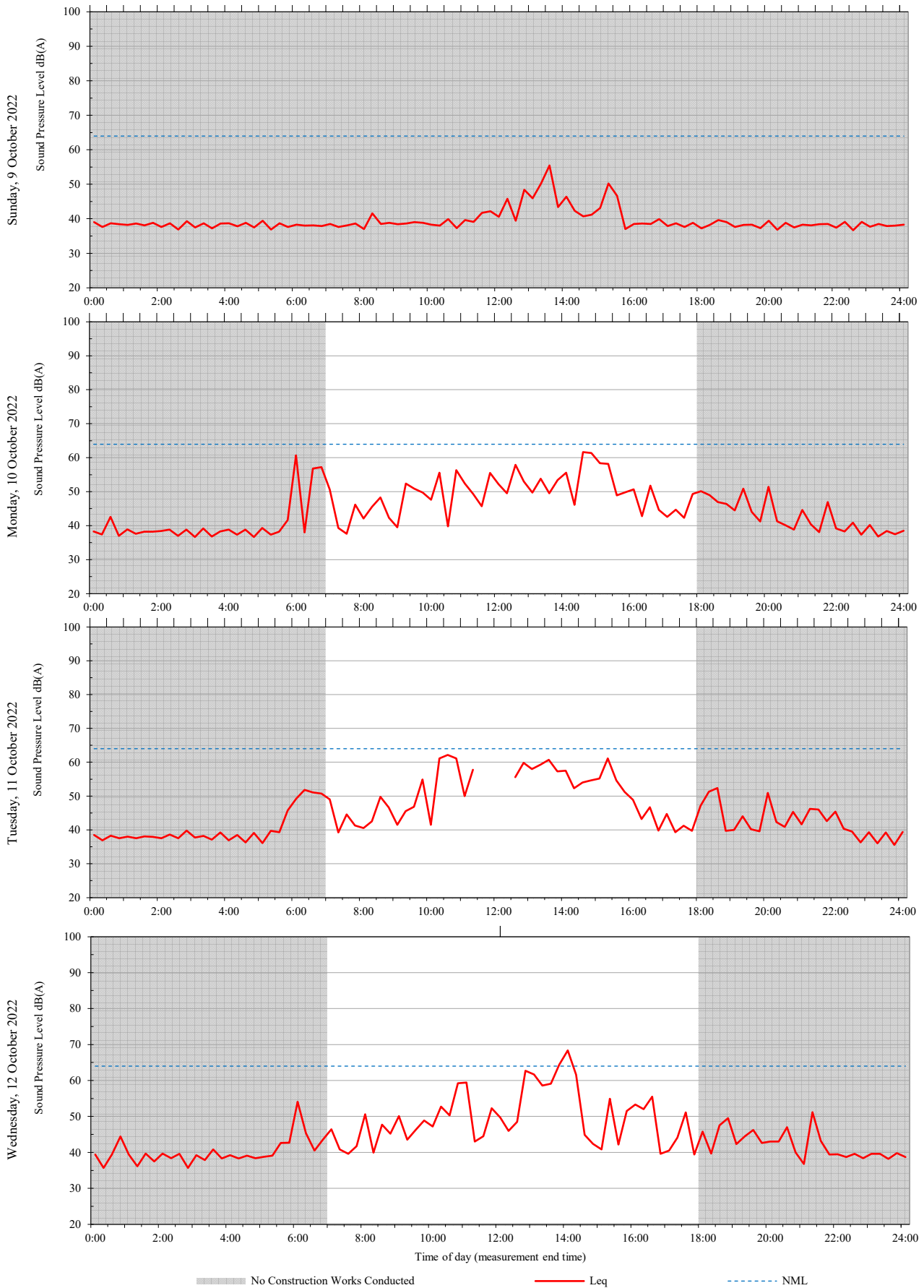
Unattended monitoring: Westmead 2 (CHW L2 Parent Kitchen) (92BW028) (Internal)

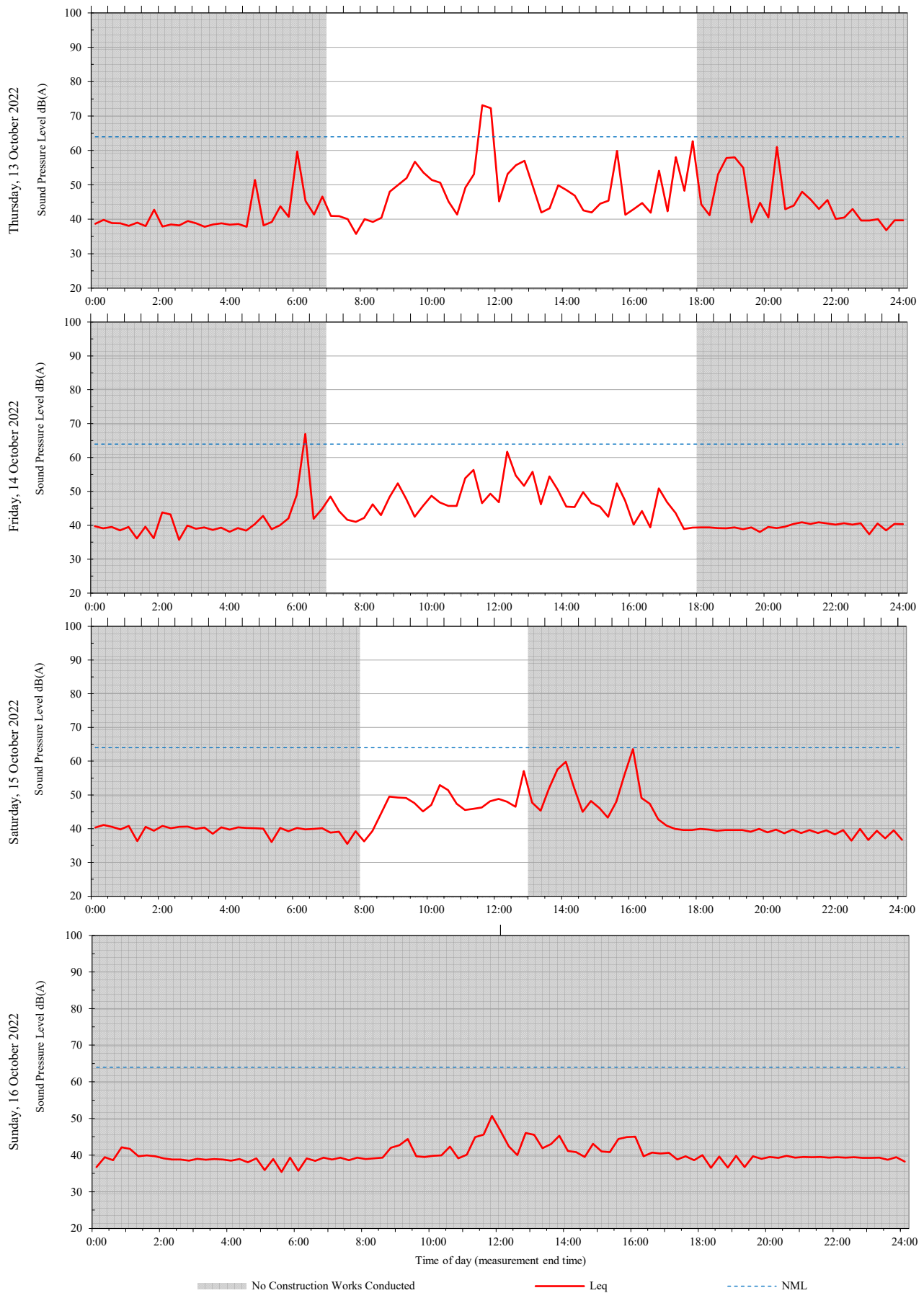


Unattended monitoring: Westmead 2 (CHW L2 Parent Kitchen) (92BW028) (Internal)

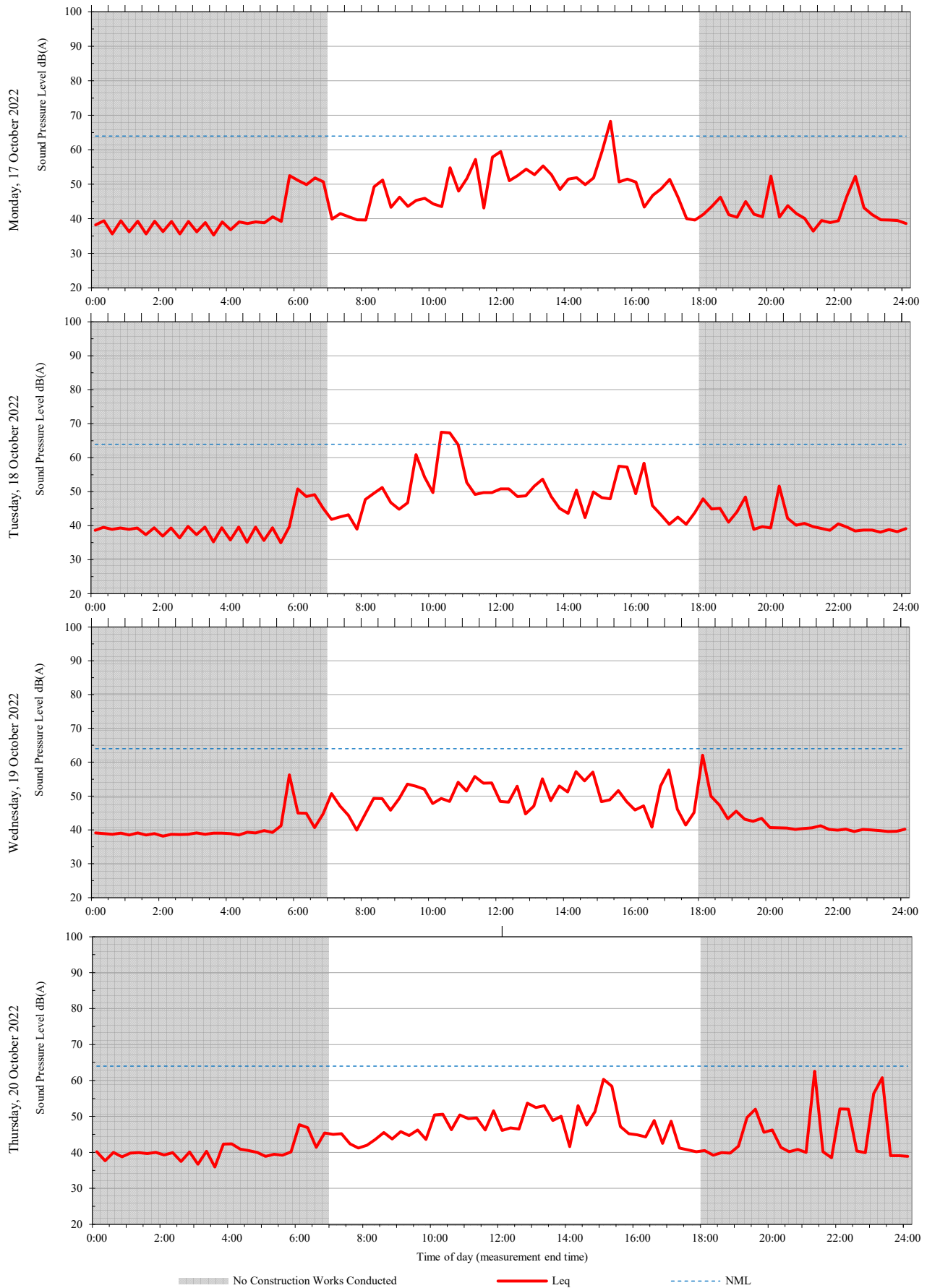


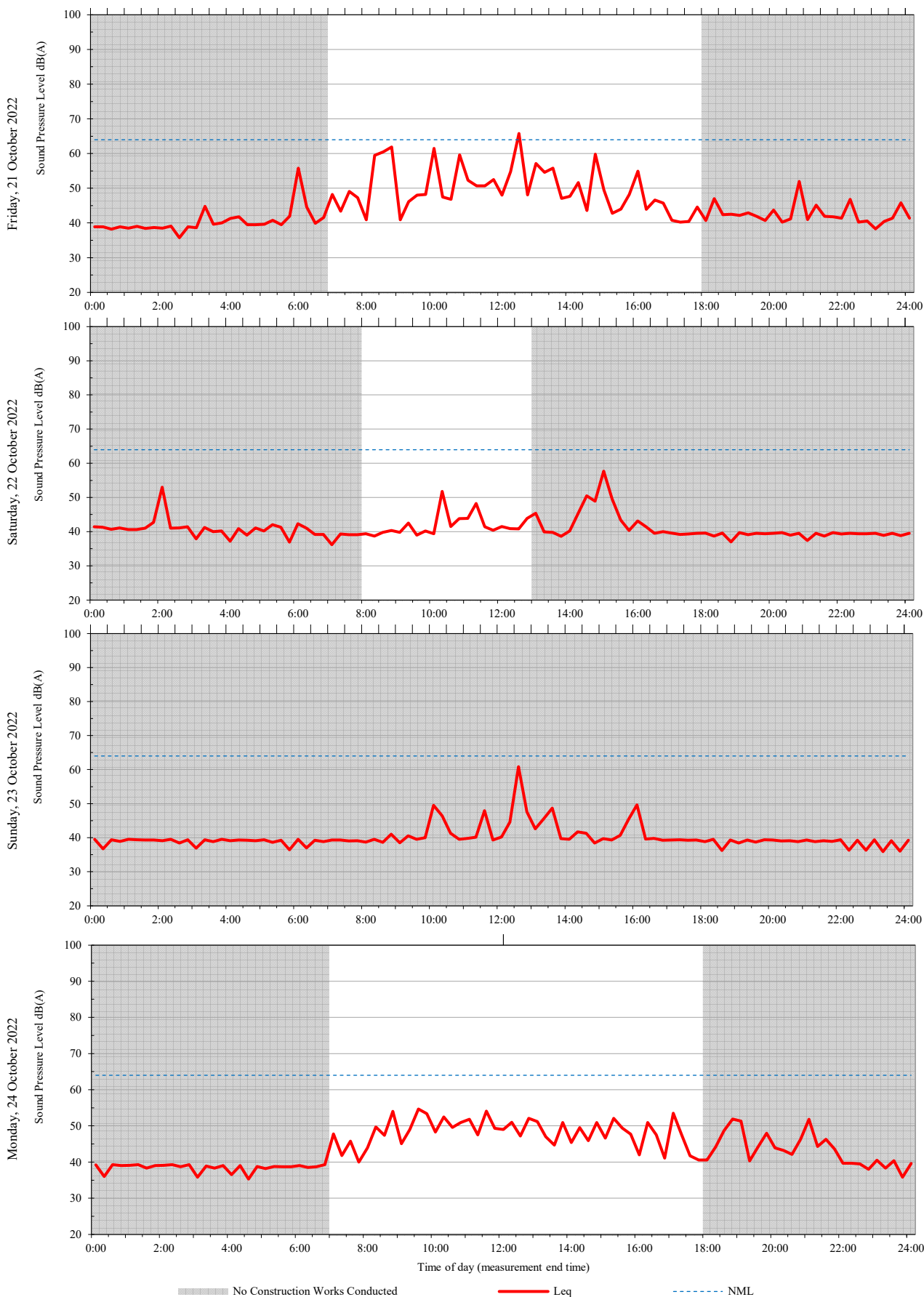
Unattended monitoring: Westmead 2 (CHW L2 Parent Kitchen) (92BW028) (Internal)



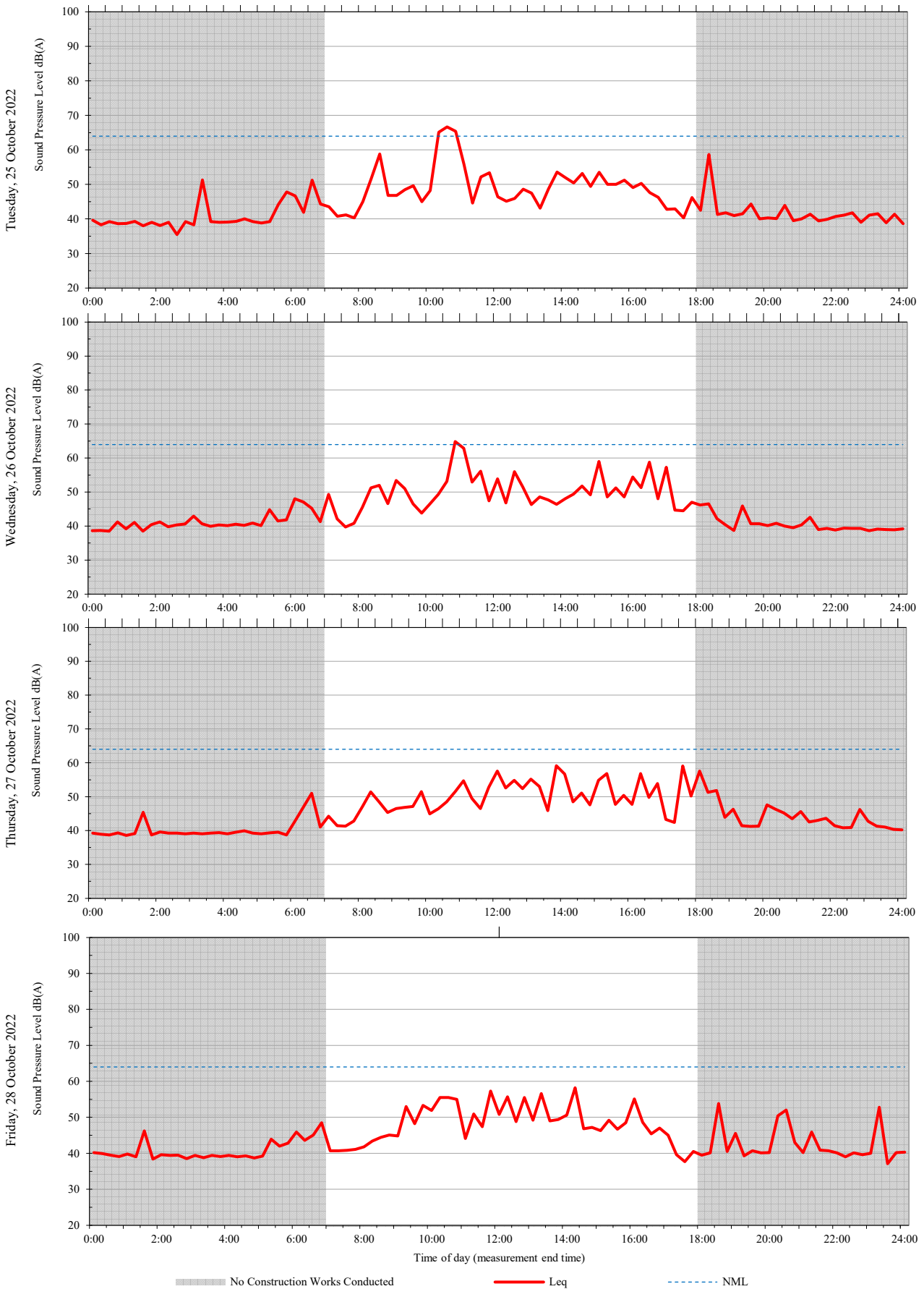


Unattended monitoring: Westmead 2 (CHW L2 Parent Kitchen) (92BW028) (Internal)

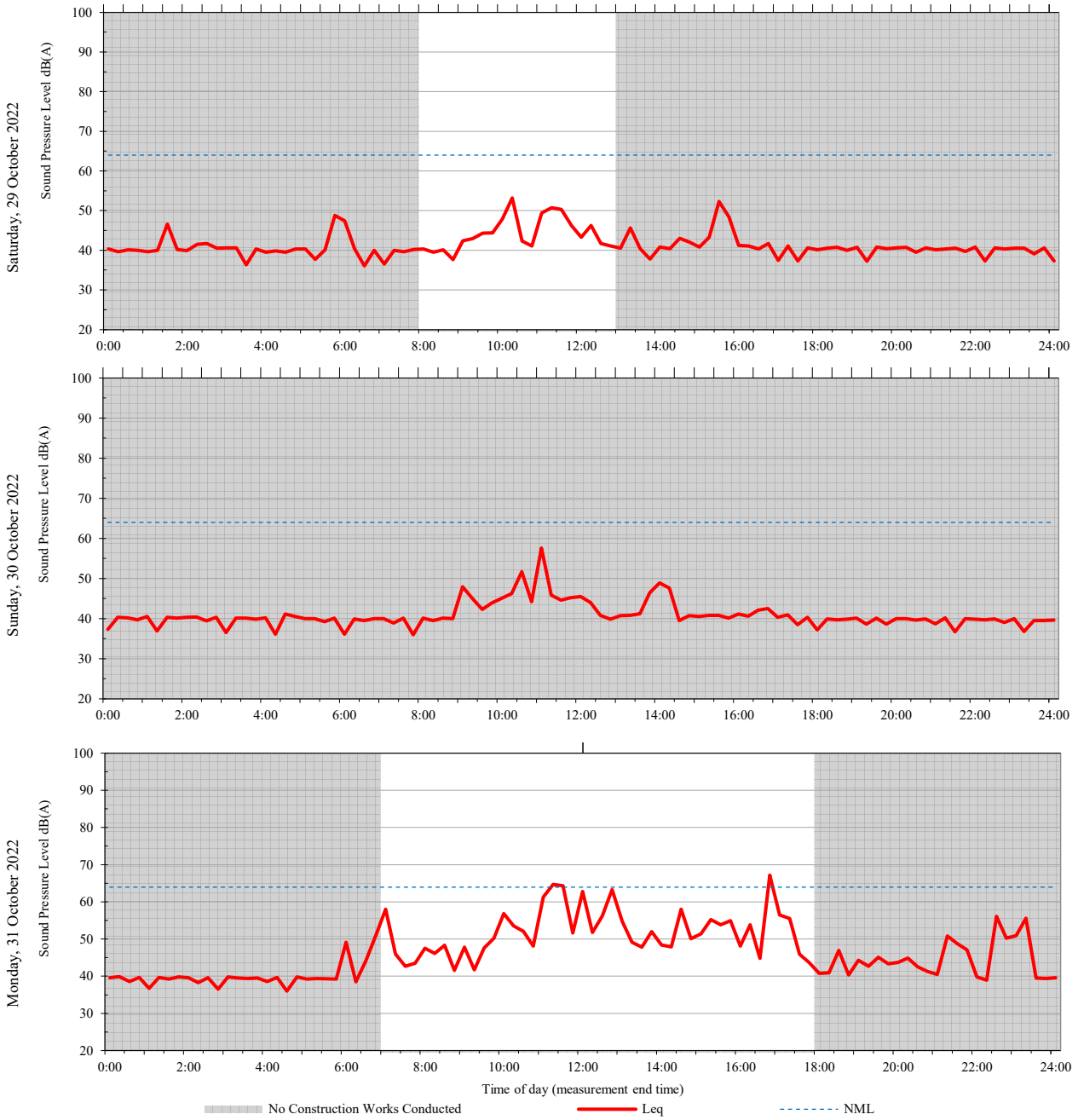




Unattended monitoring: Westmead 2 (CHW L2 Parent Kitchen) (92BW028) (Internal)

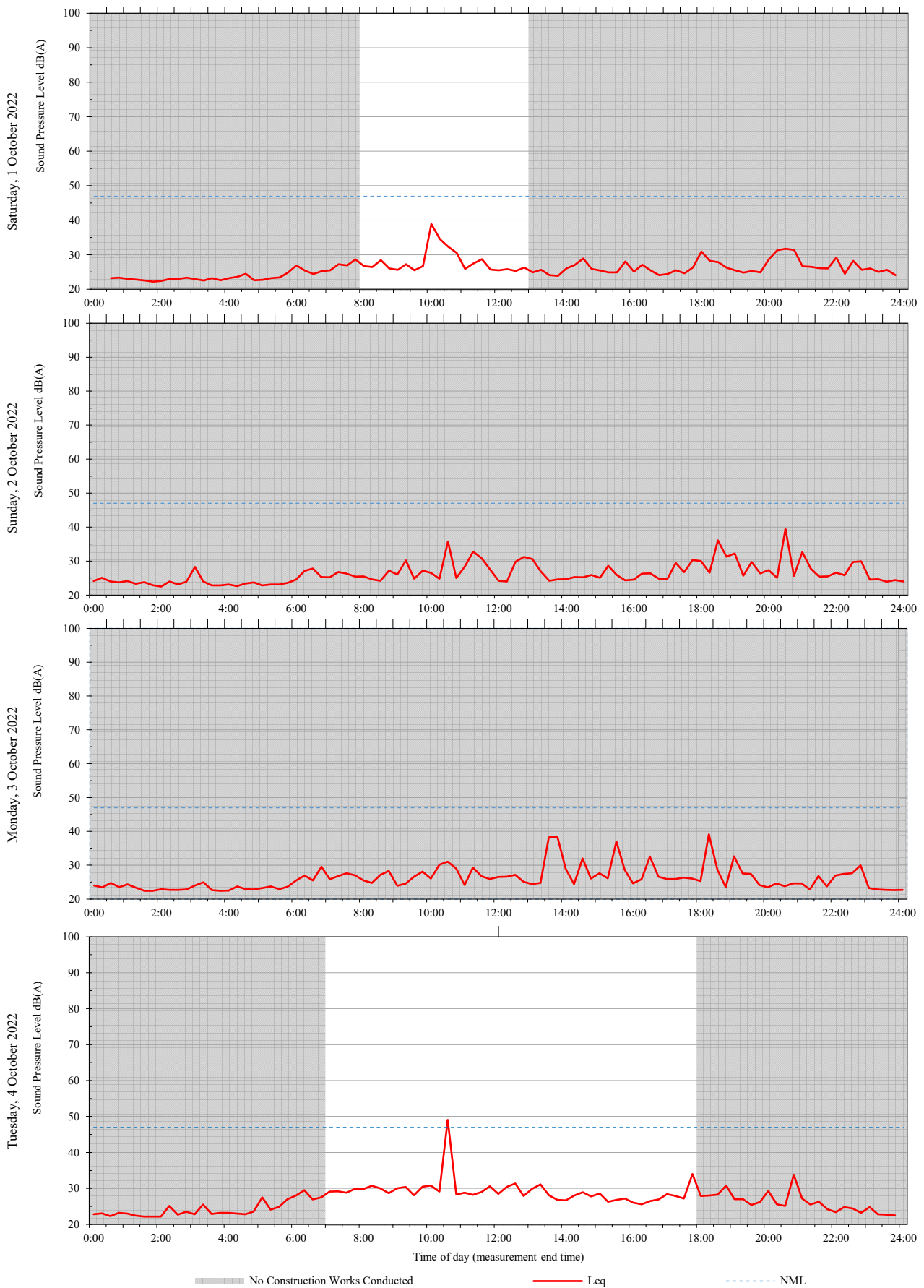


Unattended monitoring: Westmead 2 (CHW L2 Parent Kitchen) (92BW028) (Internal)

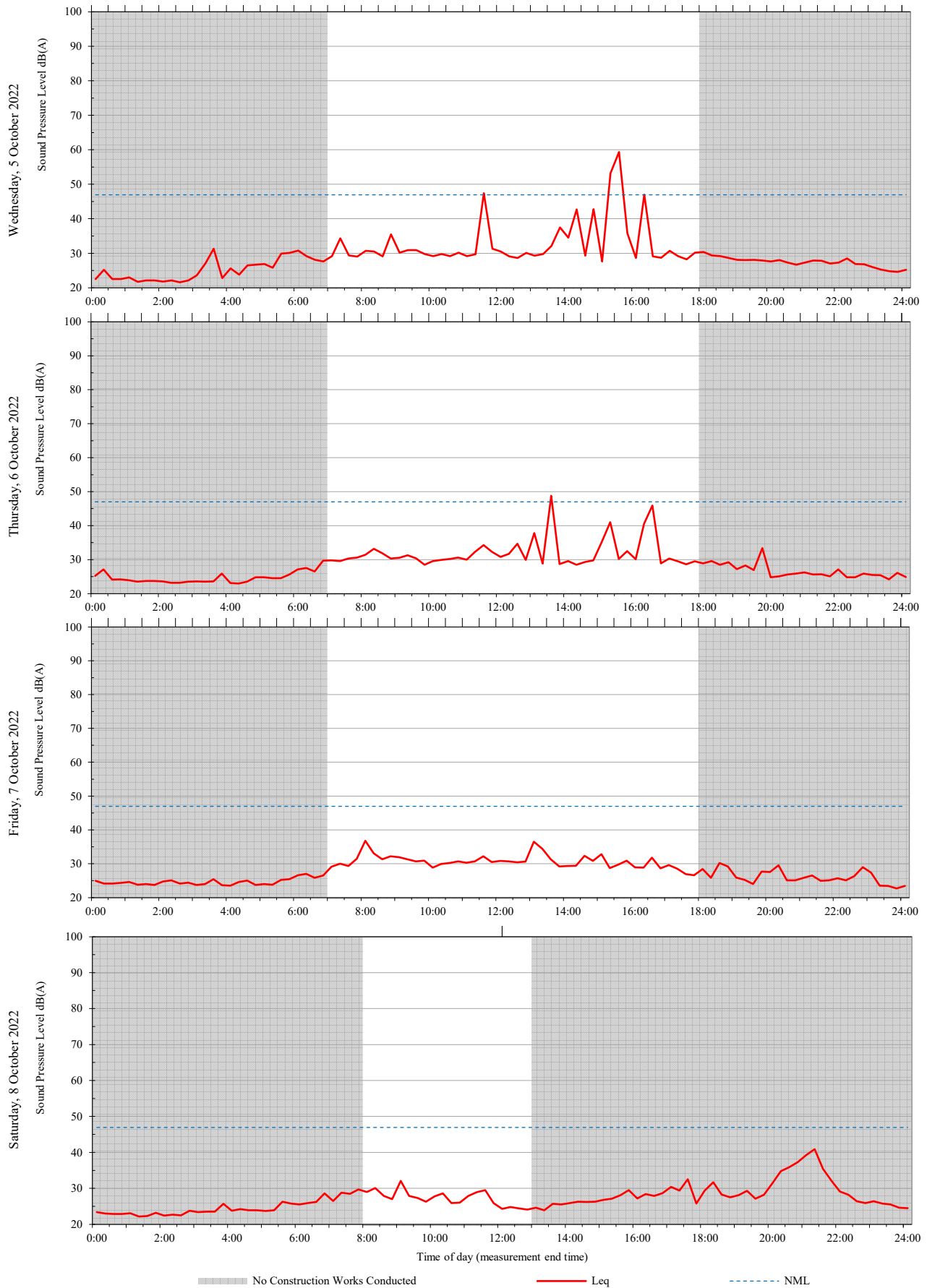


A6 RMH Level 1 Store Room 101 (Westmead 3)

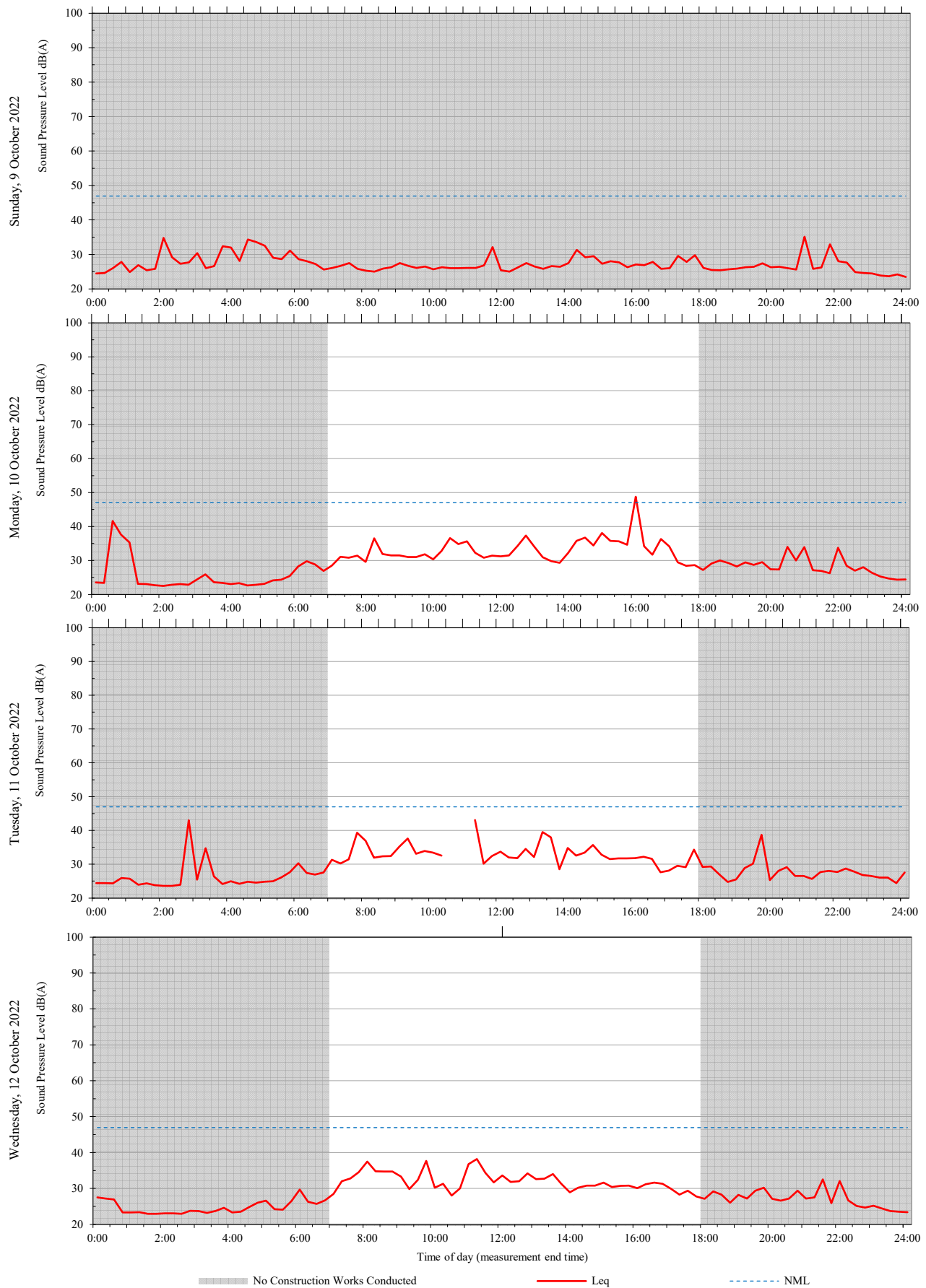
Unattended monitoring: Westmead 3 - (RMH - L1 Store Room 101) (Internal)



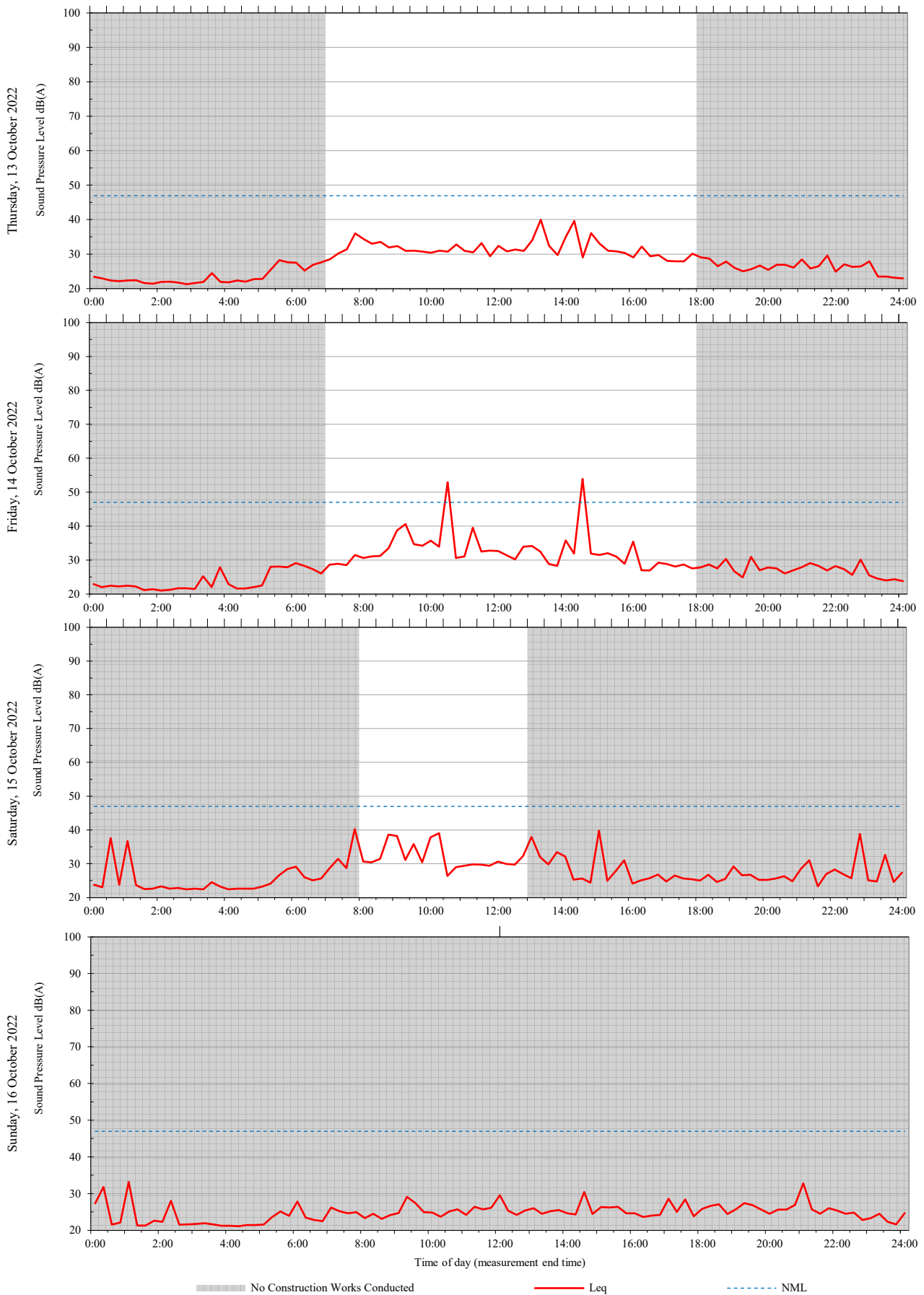
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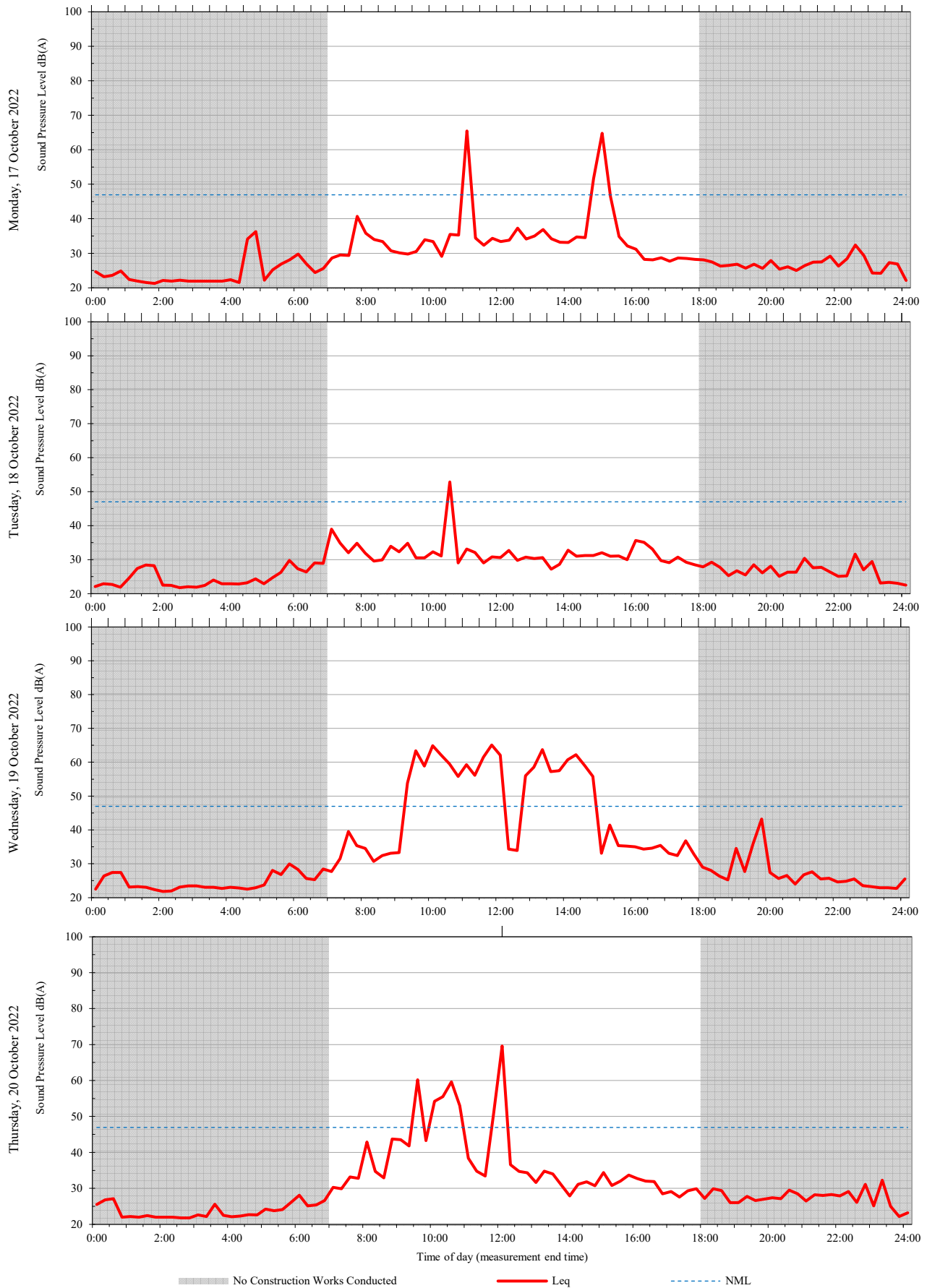
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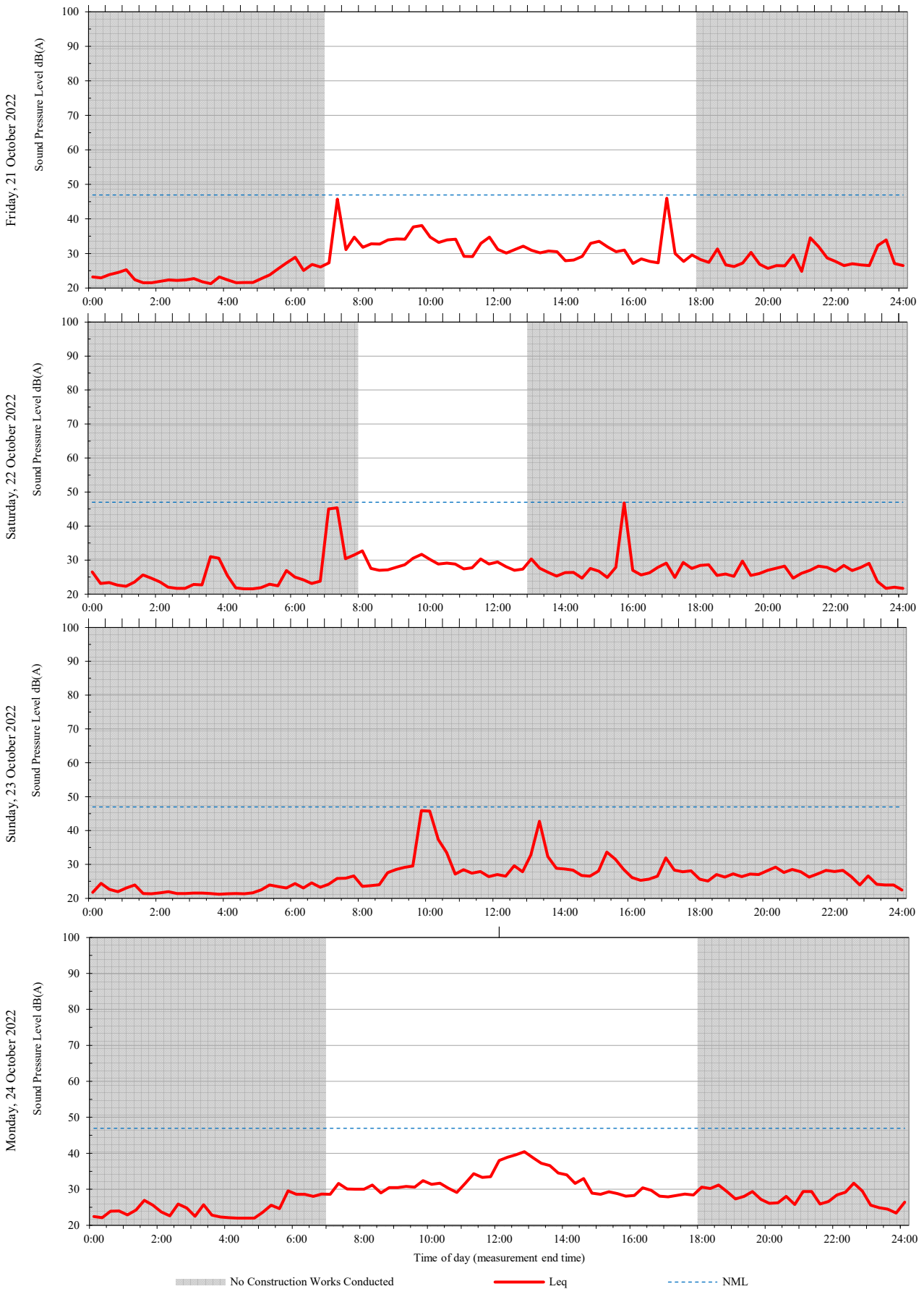
Unattended monitoring: Westmead 3 - (RMH - L1 Store Room 101) (Internal)



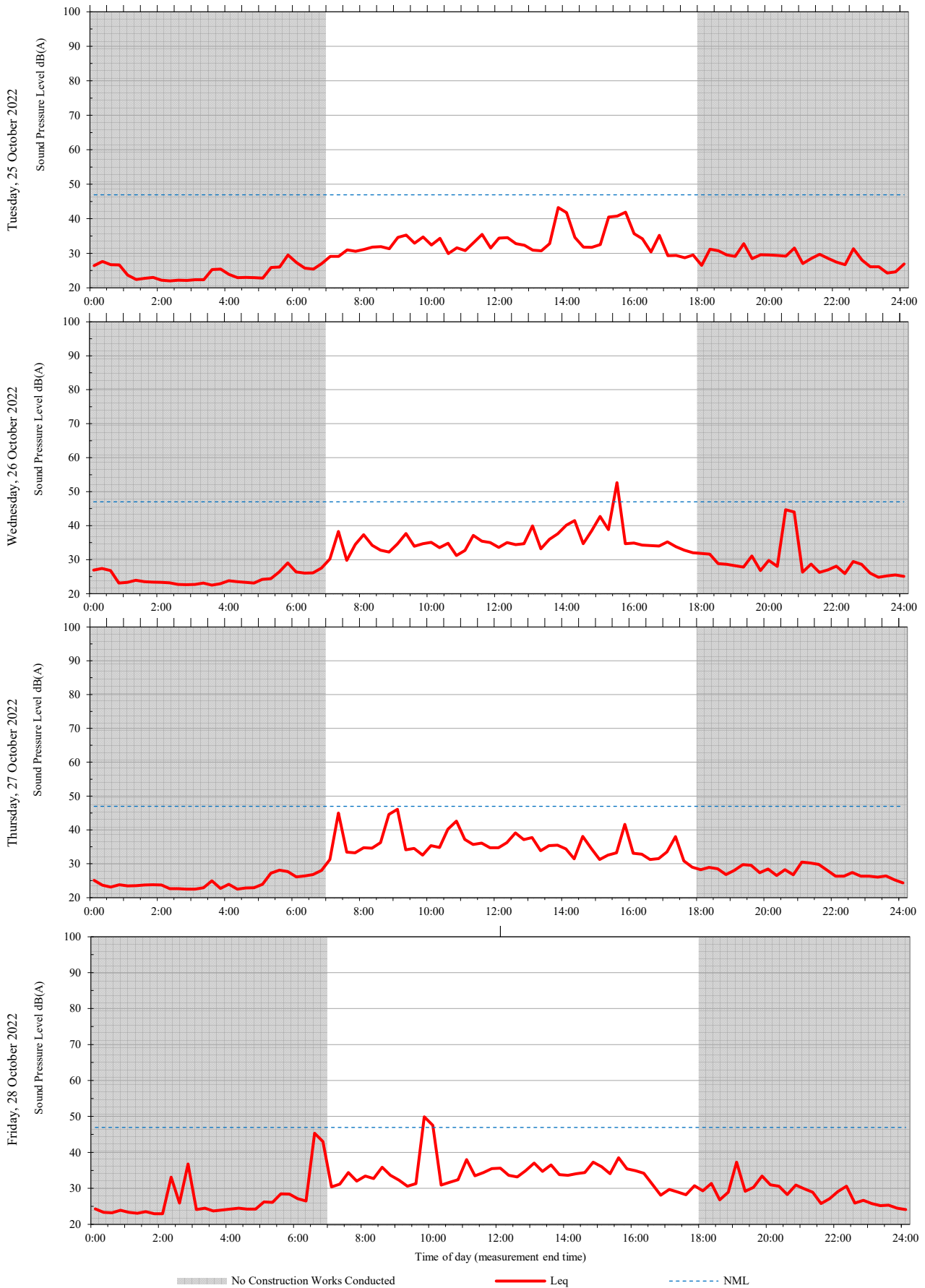
Unattended monitoring: Westmead 3 - (RMH - L1 Store Room 101) (Internal)



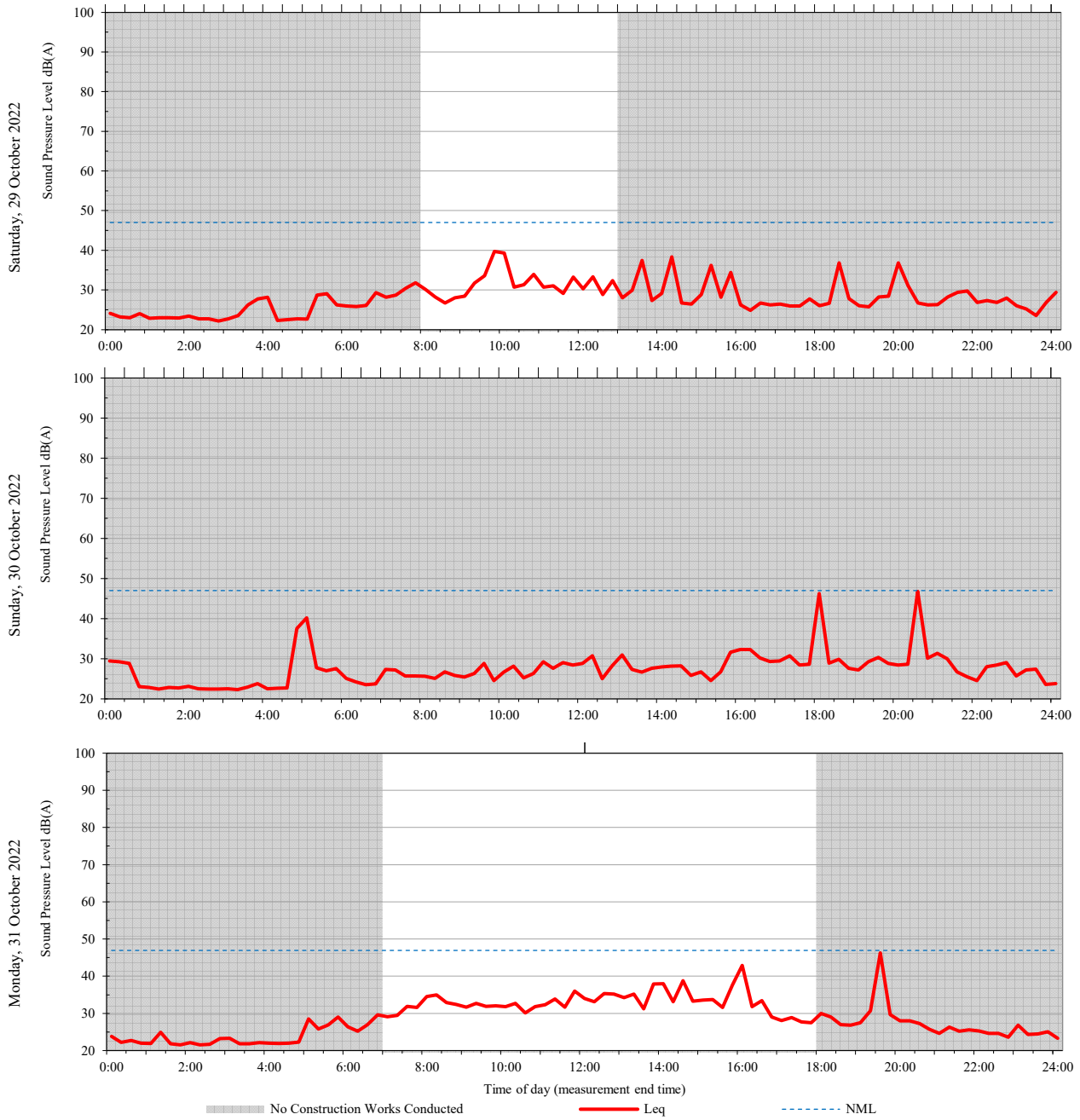
Unattended monitoring: Westmead 3 - (RMH - L1 Store Room 101) (Internal)



Unattended monitoring: Westmead 3 - (RMH - L1 Store Room 101) (Internal)



Unattended monitoring: Westmead 3 - (RMH - L1 Store Room 101) (Internal)





Health Infrastructure

Children's Hospital Westmead

**Vibration Monitoring - KR - Animal
House - October 2022**

CVM/ KR/202210

Issue 1 | 11/11/2022

This report takes into account the particular instructions and requirements of our client.

It is not intended for and should not be relied upon by any third party and no responsibility is undertaken to any third party.

Job number 271985

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Executive Summary

This report summarises the vibration monitoring data recorded at KR - Animal House, over one month – from 01/10/2022 to 31/10/2022. Graphs in this report show the recorded data in blue, and exceedance trigger levels in red.

RMSV Vibration Levels

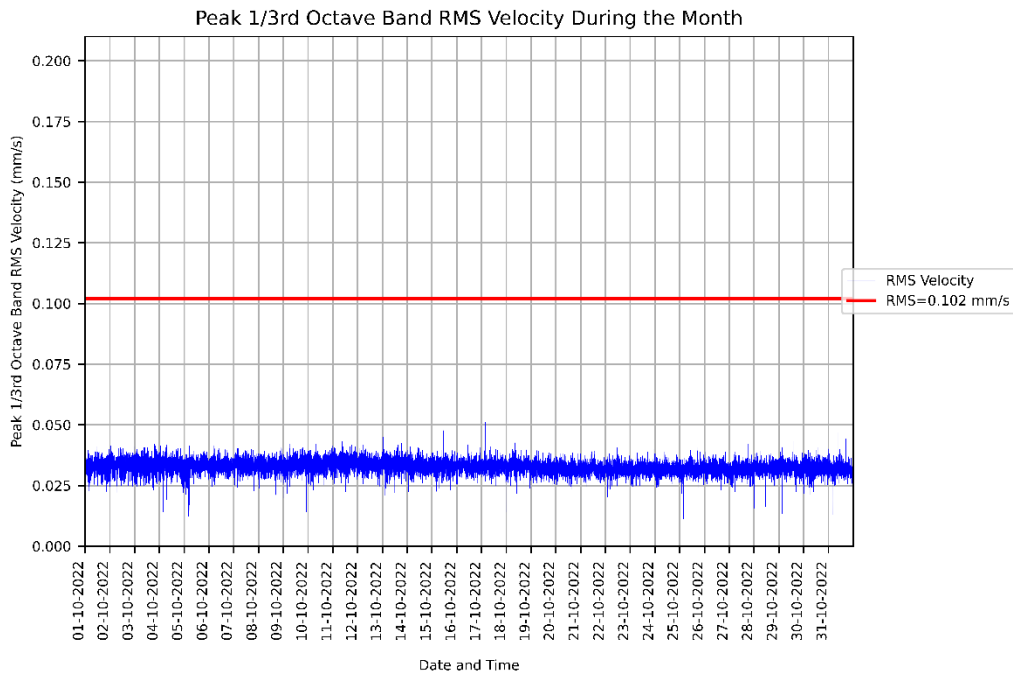


Figure 1: Measured RMSV vibration levels for 01/10/2022 to 31/10/2022 at the KR - Animal House.

The table below summarises the number of Root-Mean-Square Velocity (RMSV) limit exceedances recorded during and outside of construction hours.

During Construction Hours	Outside of Construction Hours
0	0

PPV Vibration Levels

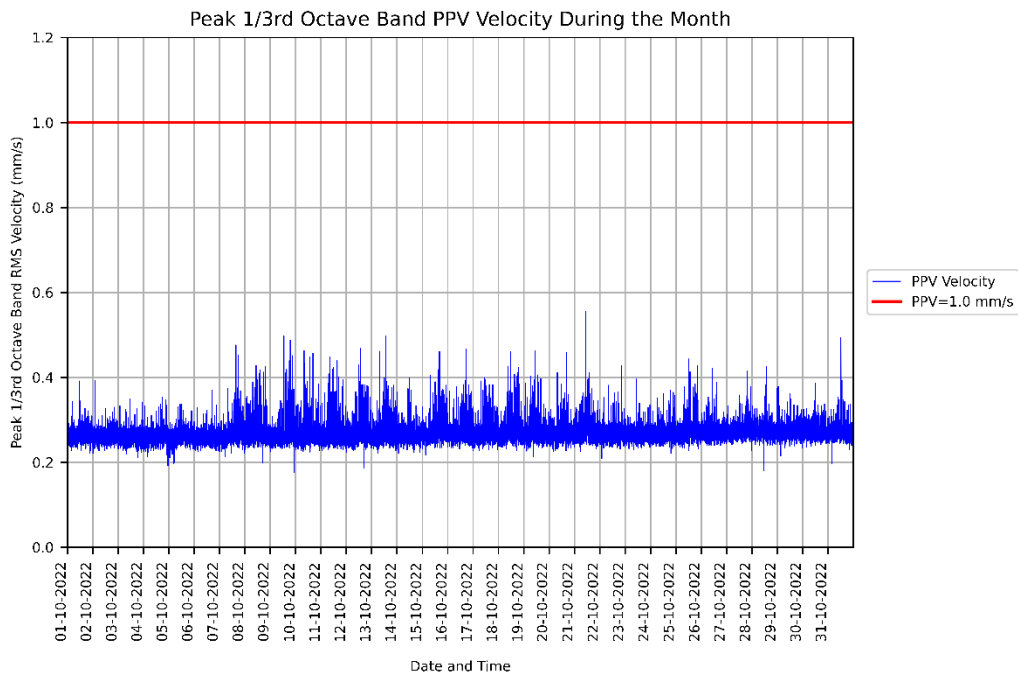


Figure 2: Measured vibration levels for 01/10/2022 to 31/10/2022 at the KR - Animal House.

The table below summarises the number of Peak Particle Velocity (PPV) limit exceedances recorded during and outside of construction hours.

During Construction Hours	Outside of Construction Hours
0	0

1. Introduction

Arup has been commissioned by PricewaterhouseCoopers (PwC) on behalf of NSW Health Infrastructure to monitor vibration levels in facilities adjacent to the Paediatric Services Building and Multi-storey Car Park development sites to ensure facility operations are not excessively impacted by the construction works. This report summarises the vibration monitoring data recorded at KR - Animal House during the period of the 01/10/2022 to 31/10/2022.

For the purposes of reporting, construction works are considered to be occurring at the following times:

Day	Construction Hours
Monday to Friday	7:00am to 6:00pm
Saturday	8:00am to 1:00pm
Sunday	No works
Public Holidays	No works

2. Monitor Location

The location of this monitor is shown below in Figure 3Figure .

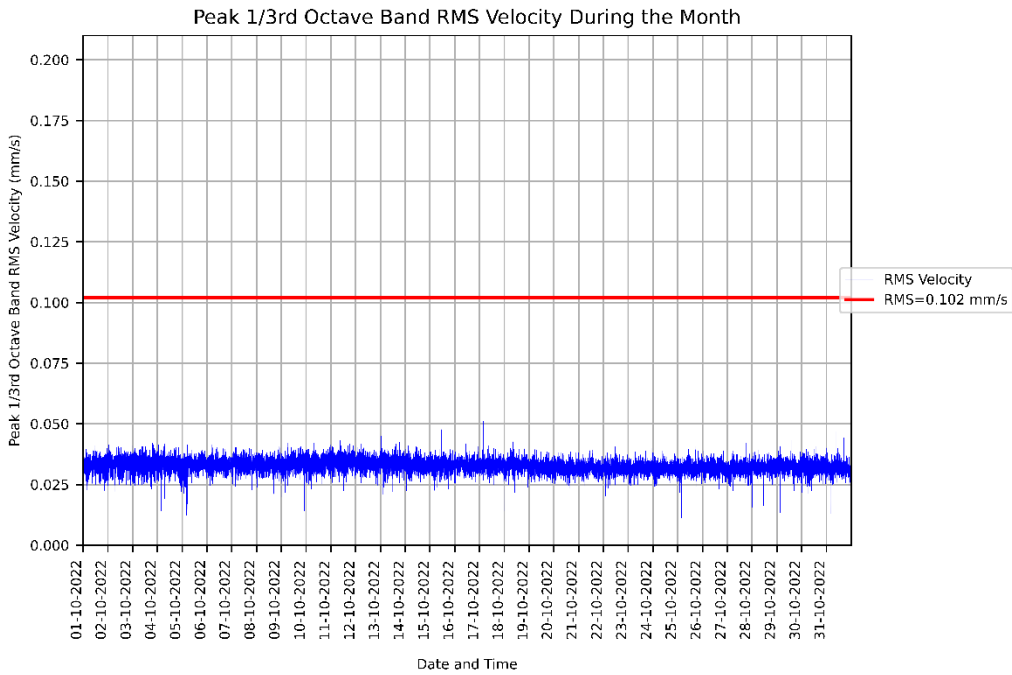


Figure 4: Measured RMSV vibration levels for 01/10/2022 to 31/10/2022 at the KR - Animal House.

The table below summarises the number of RMS Velocity limit exceedances recorded during and outside of construction hours.

During Construction Hours	Outside of Construction Hours
0	0

Figure 5 below shows the peak particle vibration levels (PPV velocity) recorded between 01/10/2022 and 31/10/2022. The recorded data is shown in blue, while the limit of 1.0mm/s (V_{PPV}) is shown in red.

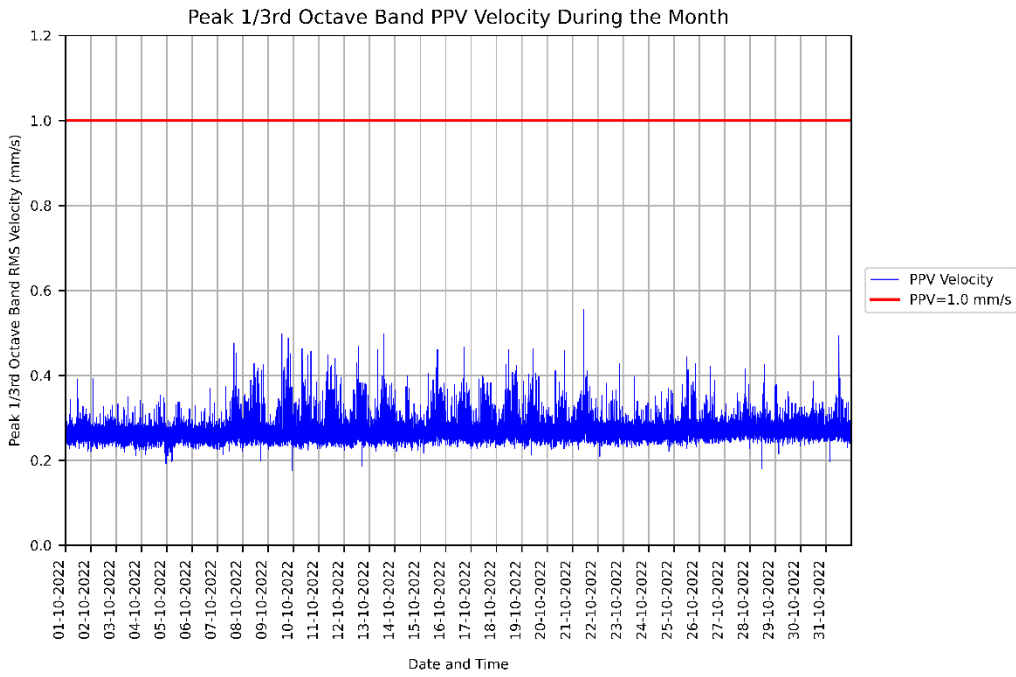


Figure 5: Measured PPV vibration levels for 01/10/2022 to 31/10/2022 at the KR - Animal House.

The table below summarises the number of PPV limit exceedances recorded during and outside of construction hours.

During Construction Hours	Outside of Construction Hours
0	0

Frequency response and linearity characteristics for
GeoSIG Velocity Geophone **VE-11** Serial No. **55908**
Constant velocity of 10 mm/sec Peak applied for response
(Except at 200.0 Hz where applied level limited to 1.0 mm/s peak)
For amplitude linearity applied level varied at 15.92 Hz

12VDC Power Supply

Geophone Orientation.: Vertical

Frequency		Velocity mm/sec Peak	Indicated Sensitivity mV/mm s^{-1}	Expanded uncertainty
Hz	Radians/sec		Vertical Sensitivity	$U_{95} \%$
3.00	18.85	10.0	110.73	1.00%
4.00	25.13	10.0	110.65	0.90%
6.00	37.70	10.0	107.04	0.90%
10.00	62.83	10.0	101.63	0.90%
15.00	94.25	10.0	99.12	0.90%
15.92	94.25	1.0	N/A	0.90%
15.92	94.25	5.0	93.34	0.90%
15.92	94.25	10.0	93.15	0.90%
15.92	94.25	50.0	93.10	0.90%
15.92	94.25	100	N/A	0.50%
30.00	188.50	10.0	97.57	0.50%
60.00	376.99	10.0	98.58	0.50%
120.00	753.98	10.0	110.55	0.50%
150.00	942.48	10.0	125.20	0.50%
Hz	Radians/sec	Velocity mm/sec Peak	Vertical Sensitivity	$U_{95} \%$

Note1:

The laboratory has accreditation under ISO/IEC 17025 from NATA for calibration to ISO 16063-21 at frequencies from 0.5 Hz. Measurements at all frequencies and levels shown in the table above are made using reference equipment traceably calibrated to Australian National Standards.

Note2:

The uncertainties quoted are estimated at a confidence level of 95% and a coverage factor of $k=2$ applies unless otherwise stated.



Health Infrastructure

Children's Hospital Westmead

**Vibration Monitoring - CHW - L1 Lab -
October 2022**

CVM/ CHW/202210

Issue 1 | 11/11/2022

This report takes into account the particular instructions and requirements of our client.

It is not intended for and should not be relied upon by any third party and no responsibility is undertaken to any third party.

Job number 271985

Arup Pty Ltd ABN 18 000 966 165

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Document Verification

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		Westmead Hospital – 103157 CHW - L1 Lab - Summary of Recent Vibration Measurements (01-10 to 31-10).docx	
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Executive Summary

This report summarises the vibration monitoring data recorded at CHW - L1 Lab, over one month – from 01/10/2022 to 31/10/2022. Graphs in this report show the recorded data in blue, and exceedance trigger levels in red.

RMSV Vibration Levels

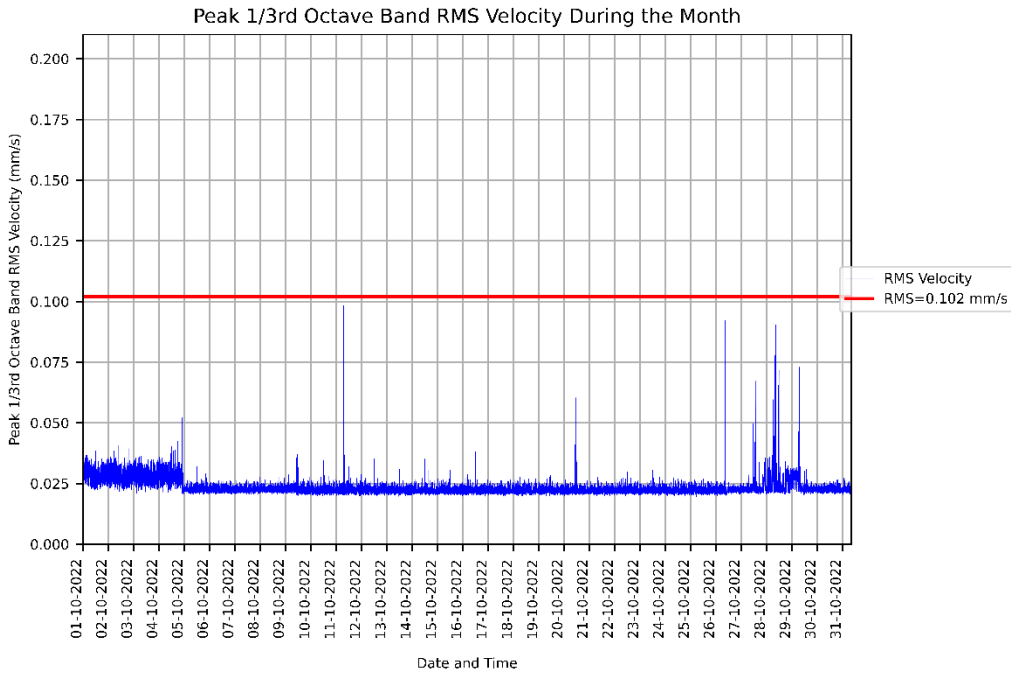


Figure 1: Measured RMSV vibration levels for 01/10/2022 to 31/10/2022 at the CHW - L1 Lab.

The table below summarises the number of Root-Mean-Square Velocity (RMSV) limit exceedances recorded during and outside of construction hours.

During Construction Hours	Outside of Construction Hours
0	0

1. Introduction

Arup has been commissioned by PricewaterhouseCoopers (PwC) on behalf of NSW Health Infrastructure to monitor vibration levels in facilities adjacent to the Paediatric Services Building and Multi-storey Car Park development sites to ensure facility operations are not excessively impacted by the construction works. This report summarises the vibration monitoring data recorded at CHW - L1 Lab during the period of the 01/10/2022 to 31/10/2022.

For the purposes of reporting, construction works are considered to be occurring at the following times:

Day	Construction Hours
Monday to Friday	7:00am to 6:00pm
Saturday	8:00am to 1:00pm
Sunday	No works
Public Holidays	No works

2. Monitor Location

The location of this monitor is shown below in Figure 2.

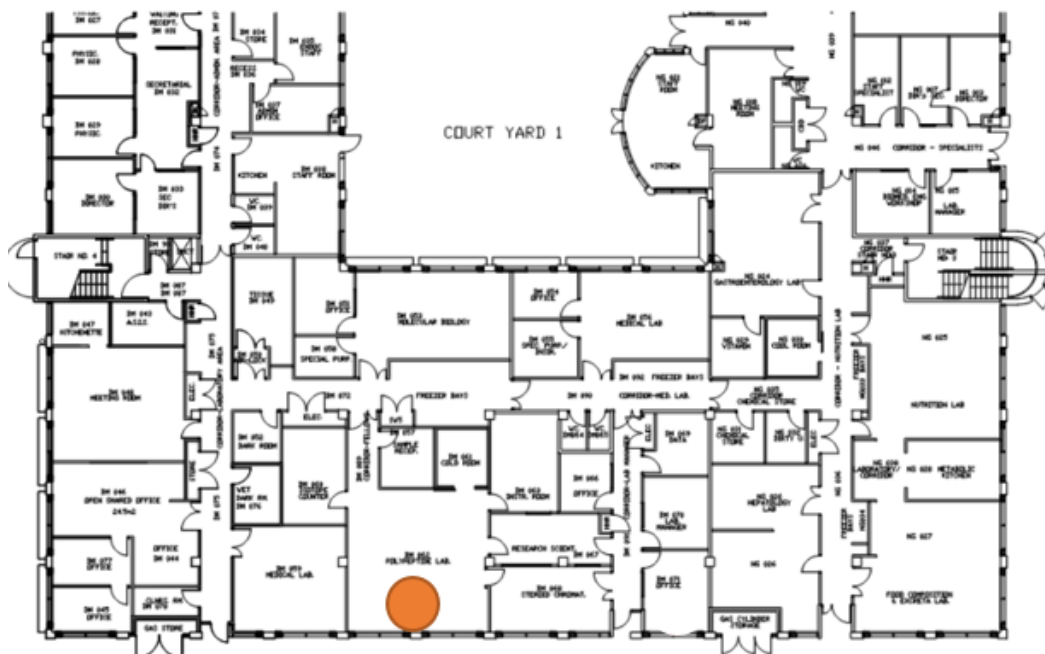


Figure 2: CHW - L1 Lab vibration monitor location shown in orange

Monitoring at this location utilises a GeoSIG GMSplus with a GeoSIG VE-11 geophone. The calibration certificate for the geophone is included in Appendix A.

3. Recorded Data

Figure 3 below shows the vibration levels (RMS velocity) recorded between 01/10/2022 and 31/10/2022. The recorded data is shown in blue, while the limit of 0.102mm/s (V_{RMS}) is shown in red.

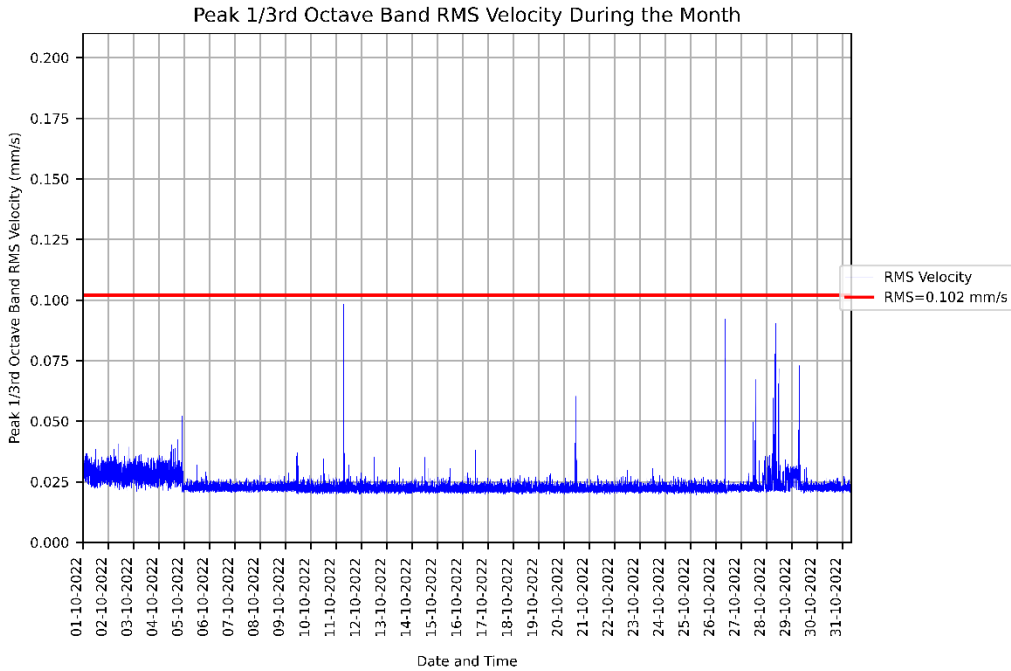


Figure 3: Measured RMSV vibration levels for 01/10/2022 to 31/10/2022 at the CHW - L1 Lab.

The table below summarises the number of RMS Velocity limit exceedances recorded during and outside of construction hours.

During Construction Hours	Outside of Construction Hours
0	0

Frequency response and linearity characteristics for
GeoSIG Velocity Geophone **VE-11** Serial No. **55910**
Constant velocity of 10 mm/sec Peak applied for response
(Except at 200.0 Hz where applied level limited to 1.0 mm/s peak)
For amplitude linearity applied level varied at 15.92 Hz

12VDC Power Supply

Geophone Orientation.: Vertical

Frequency		Velocity mm/sec Peak	Indicated Sensitivity $\text{mV}/\text{mms}^{-1}$	Expanded uncertainty
Hz	Radians/sec		Vertical Sensitivity	U_{95} %
3.00	18.85	10.0	109.76	1.00%
4.00	25.13	10.0	111.50	0.90%
6.00	37.70	10.0	108.98	0.90%
10.00	62.83	10.0	103.80	0.90%
15.00	94.25	10.0	101.12	0.90%
15.92	94.25	1.0	N/A	0.90%
15.92	94.25	5.0	95.09	0.90%
15.92	94.25	10.0	94.96	0.90%
15.92	94.25	50.0	94.83	0.90%
15.92	94.25	100	N/A	0.50%
30.00	188.50	10.0	99.03	0.50%
60.00	376.99	10.0	100.56	0.50%
120.00	753.98	10.0	113.91	0.50%
150.00	942.48	10.0	119.09	0.50%
Hz	Radians/sec	Velocity mm/sec Peak	Vertical Sensitivity	U_{95} %

Note1:

The laboratory has accreditation under ISO/IEC 17025 from NATA for calibration to ISO 16063-21 at frequencies from 0.5 Hz. Measurements at all frequencies and levels shown in the table above are made using reference equipment traceably calibrated to Australian National Standards.

Note2:

The uncertainties quoted are estimated at a confidence level of 95% and a coverage factor of $k=2$ applies unless otherwise stated.



Health Infrastructure

Children's Hospital Westmead

**Vibration Monitoring - CASB Level 2
MRI - October 2022**

CVM/ CASB/202210

Issue 1 | 11/11/2022

This report takes into account the particular instructions and requirements of our client.

It is not intended for and should not be relied upon by any third party and no responsibility is undertaken to any third party.

Job number 271985

Arup Pty Ltd ABN 18 000 966 165




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		Westmead Hospital – 103158 CASB Level 2 MRI - Summary of Recent Vibration Measurements (01-10 to 31-10).docx	
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Executive Summary

This report summarises the vibration monitoring data recorded at CASB Level 2 MRI, over one month – from 01/10/2022 to 31/10/2022. Graphs in this report show the recorded data in blue, and exceedance trigger levels in red.

RMSV Vibration Levels

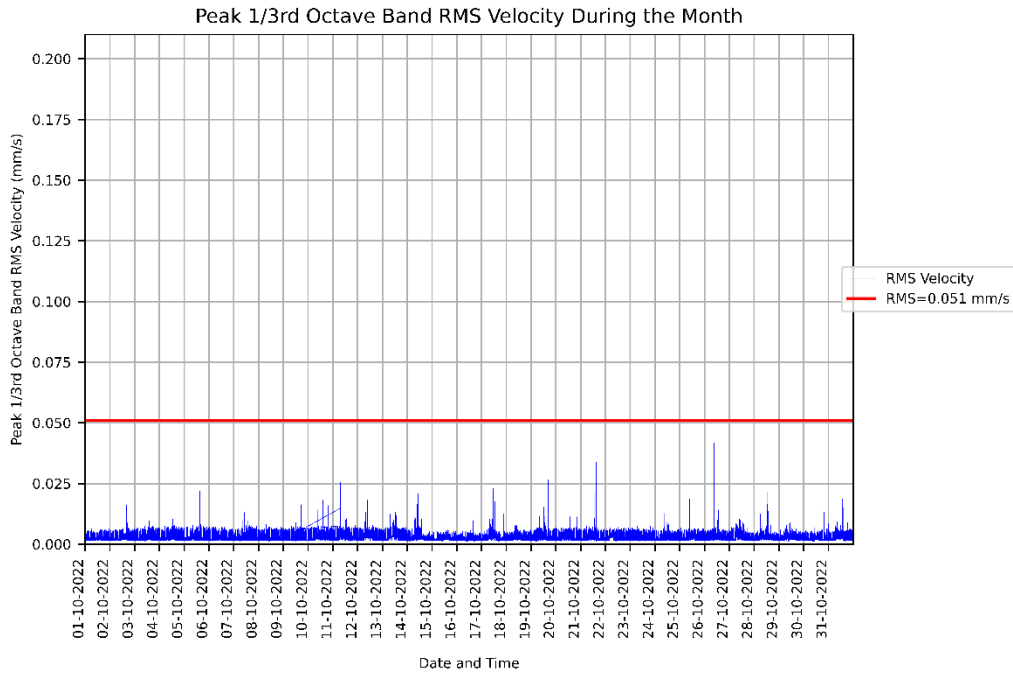


Figure 1: Measured RMSV vibration levels for 01/10/2022 to 31/10/2022 at the CASB Level 2 MRI.

The table below summarises the number of Root-Mean-Square Velocity (RMSV) limit exceedances recorded during and outside of construction hours.

During Construction Hours	Outside of Construction Hours
0	0

1. Introduction

Arup has been commissioned by PricewaterhouseCoopers (PwC) on behalf of NSW Health Infrastructure to monitor vibration levels in facilities adjacent to the Paediatric Services Building and Multi-storey Car Park development sites to ensure facility operations are not excessively impacted by the construction works. This report summarises the vibration monitoring data recorded at CASB Level 2 MRI during the period of the 01/10/2022 to 31/10/2022.

For the purposes of reporting, construction works are considered to be occurring at the following times:

Day	Construction Hours
Monday to Friday	7:00am to 6:00pm
Saturday	8:00am to 1:00pm
Sunday	No works
Public Holidays	No works

2. Monitor Location

The location of this monitor is shown below in Figure 2.

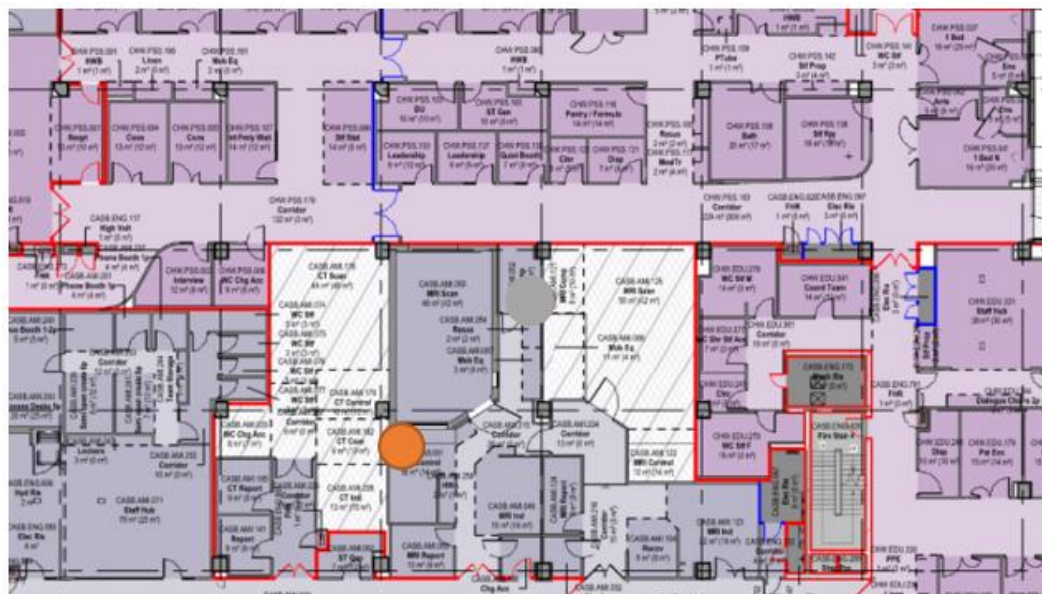


Figure 2: CASB Level 2 MRI vibration monitor location shown in orange

Monitoring at this location utilises a GeoSIG GMSplus with a GeoSIG VE-11 geophone. The calibration certificate for the geophone is included in Appendix A.

3. Recorded Data

Figure 3 below shows the vibration levels (RMS velocity) recorded between 01/10/2022 and 31/10/2022. The recorded data is shown in blue, while the limit of 0.051mm/s (V_{RMS}) is shown in red.

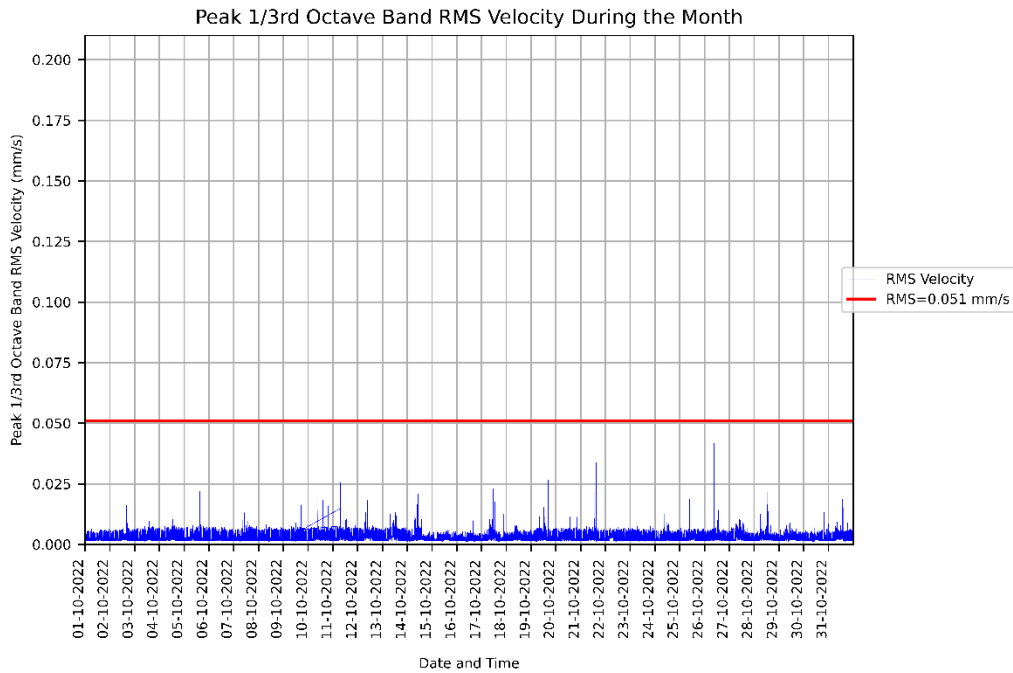


Figure 3: Measured RMSV vibration levels for 01/10/2022 to 31/10/2022 at the CASB Level 2 MRI.

The table below summarises the number of RMS Velocity limit exceedances recorded during and outside of construction hours.

During Construction Hours	Outside of Construction Hours
0	0

Frequency response and linearity characteristics for
GeoSIG Velocity Geophone **VE-11** Serial No. **55911**
Constant velocity of 10 mm/sec Peak applied for response
(Except at 200.0 Hz where applied level limited to 1.0 mm/s peak)
For amplitude linearity applied level varied at 15.92 Hz

12VDC Power Supply

Geophone Orientation.: Vertical

Frequency		Velocity mm/sec Peak	Indicated Sensitivity $\text{mV}/\text{mms}^{-1}$	Expanded uncertainty
Hz	Radians/sec			
3.00	18.85	10.0	112.66	1.00%
4.00	25.13	10.0	112.97	0.90%
6.00	37.70	10.0	108.80	0.90%
10.00	62.83	10.0	101.91	0.90%
15.00	94.25	10.0	98.58	0.90%
15.92	94.25	1.0	N/A	0.90%
15.92	94.25	5.0	92.57	0.90%
15.92	94.25	10.0	92.49	0.90%
15.92	94.25	50.0	92.48	0.90%
15.92	94.25	100	N/A	0.50%
30.00	188.50	10.0	95.98	0.50%
60.00	376.99	10.0	96.13	0.50%
120.00	753.98	10.0	106.11	0.50%
150.00	942.48	10.0	116.46	0.50%
Hz	Radians/sec	Velocity mm/sec Peak	Vertical Sensitivity	U_{95} %

Note1:

The laboratory has accreditation under ISO/IEC 17025 from NATA for calibration to ISO 16063-21 at frequencies from 0.5 Hz. Measurements at all frequencies and levels shown in the table above are made using reference equipment traceably calibrated to Australian National Standards.

Note2: The uncertainties quoted are estimated at a confidence level of 95% and a coverage factor of $k=2$ applies unless otherwise stated.



Health Infrastructure

Children's Hospital Westmead

**Vibration Monitoring - CASB level 3
Surgical Suite - October 2022**

CVM/ CASB/202210

Issue 1 | 11/11/2022

This report takes into account the particular instructions and requirements of our client.

It is not intended for and should not be relied upon by any third party and no responsibility is undertaken to any third party.

Job number 271985

Arup Pty Ltd ABN 18 000 966 165

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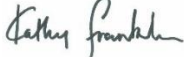



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		Westmead Hospital – 103160 CASB level 3 Surgical Suite - Summary of Recent Vibration Measurements (01-10 to 31-10).docx	

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Issue Document Verification with Document

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Executive Summary

This report summarises the vibration monitoring data recorded at CASB level 3 Surgical Suite, over one month – from 01/10/2022 to 31/10/2022. Graphs in this report show the recorded data in blue, and exceedance trigger levels in red.

RMSV Vibration Levels

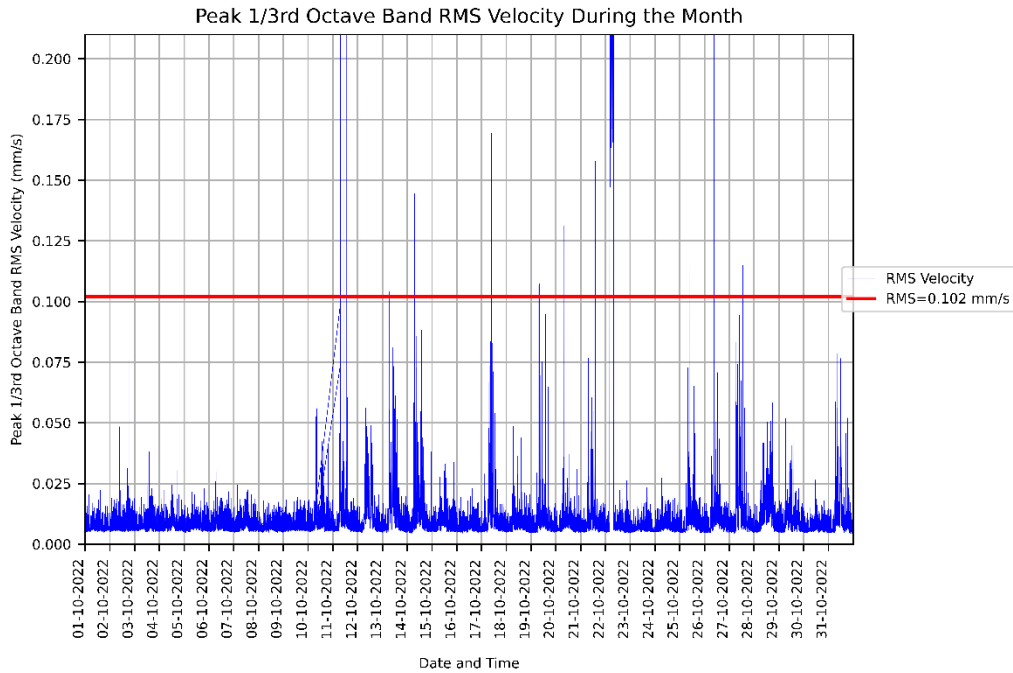


Figure 1: Measured RMSV vibration levels for 01/10/2022 to 31/10/2022 at the CASB level 3 Surgical Suite.

The table below summarises the number of Root-Mean-Square Velocity (RMSV) limit exceedances recorded during and outside of construction hours.

During Construction Hours	Outside of Construction Hours
21	114

1. Introduction

Arup has been commissioned by PricewaterhouseCoopers (PwC) on behalf of NSW Health Infrastructure to monitor vibration levels in facilities adjacent to the Paediatric Services Building and Multi-storey Car Park development sites to ensure facility operations are not excessively impacted by the construction works. This report summarises the vibration monitoring data recorded at CASB level 3 Surgical Suite during the period of the 01/10/2022 to 31/10/2022.

For the purposes of reporting, construction works are considered to be occurring at the following times:

Day	Construction Hours
Monday to Friday	7:00am to 6:00pm
Saturday	8:00am to 1:00pm
Sunday	No works
Public Holidays	No works

2. Monitor Location

The location of this monitor is shown below in Figure 2.

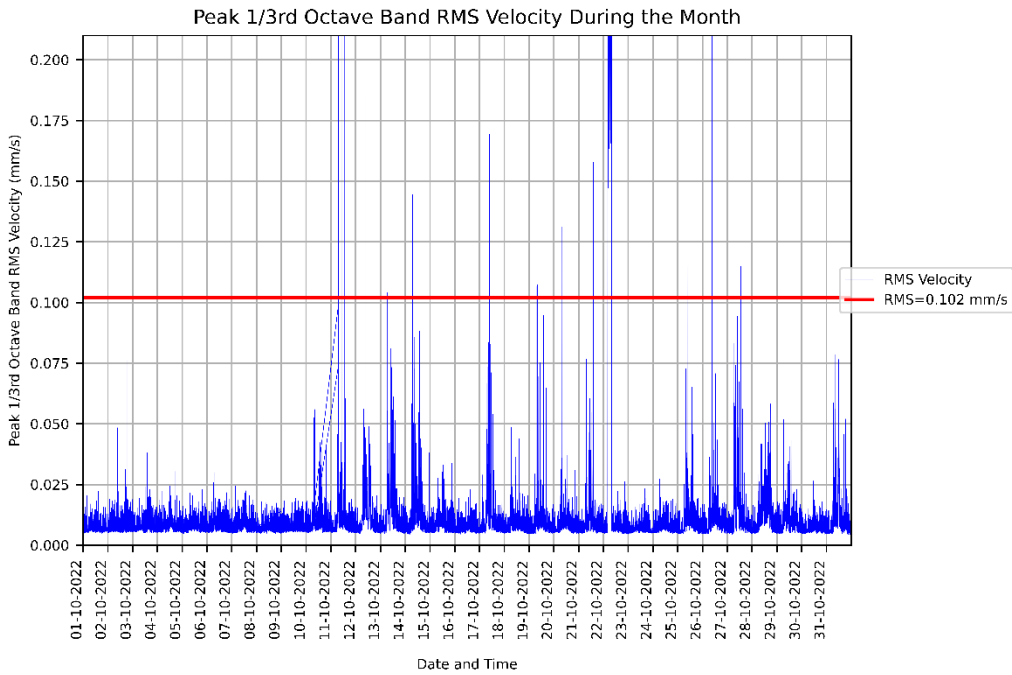


Figure 3: Measured RMSV vibration levels for 01/10/2022 to 31/10/2022 at the CASB level 3 Surgical Suite.

The table below summarises the number of RMS Velocity limit exceedances recorded during and outside of construction hours.

During Construction Hours	Outside of Construction Hours
21	114

Appendix A: Calibration Certificates

Frequency response and linearity characteristics for
 GeoSIG Velocity Geophone **VE-11** Serial No. **55912**
 Constant velocity of 10 mm/sec Peak applied for response
 (Except at 200.0 Hz where applied level limited to 1.0 mm/s peak)
 For amplitude linearity applied level varied at 15.92 Hz

12VDC Power Supply

Geophone Orientation.: Vertical

Frequency		Velocity mm/sec Peak	Indicated Sensitivity mV/mm ^s ⁻¹	Expanded uncertainty
Hz	Radians/sec			
3.00	18.85	10.0	112.74	1.00%
4.00	25.13	10.0	113.82	0.90%
6.00	37.70	10.0	109.59	0.90%
10.00	62.83	10.0	100.79	0.90%
15.00	94.25	10.0	96.12	0.90%
15.92	94.25	1.0	N/A	0.90%
15.92	94.25	5.0	90.09	0.90%
15.92	94.25	10.0	89.99	0.90%
15.92	94.25	50.0	89.89	0.90%
15.92	94.25	100	N/A	0.50%
30.00	188.50	10.0	92.45	0.50%
60.00	376.99	10.0	92.89	0.50%
120.00	753.98	10.0	100.92	0.50%
150.00	942.48	10.0	117.80	0.50%
Hz	Radians/sec	Velocity mm/sec Peak	Vertical Sensitivity	U ₉₅ %

Note1:

The laboratory has accreditation under ISO/IEC 17025 from NATA for calibration to ISO 16063-21 at frequencies from 0.5 Hz. Measurements at all frequencies and levels shown in the table above are made using reference equipment traceably calibrated to Australian National Standards.

Note2:

The uncertainties quoted are estimated at a confidence level of 95% and a coverage factor of k=2 applies unless otherwise stated.

Frequency response and linearity characteristics for
GeoSIG Velocity Geophone **VE-11** Serial No. **55910**
Constant velocity of 10 mm/sec Peak applied for response
(Except at 200.0 Hz where applied level limited to 1.0 mm/s peak)
For amplitude linearity applied level varied at 15.92 Hz

12VDC Power Supply

Geophone Orientation.: Vertical

Frequency		Velocity mm/sec Peak	Indicated Sensitivity $mV/mm\cdot s^{-1}$	Expanded uncertainty
Hz	Radians/sec		Vertical Sensitivity	U_{95} %
3.00	18.85	10.0	109.76	1.00%
4.00	25.13	10.0	111.50	0.90%
6.00	37.70	10.0	108.98	0.90%
10.00	62.83	10.0	103.80	0.90%
15.00	94.25	10.0	101.12	0.90%
15.92	94.25	1.0	N/A	0.90%
15.92	94.25	5.0	95.09	0.90%
15.92	94.25	10.0	94.96	0.90%
15.92	94.25	50.0	94.83	0.90%
15.92	94.25	100	N/A	0.50%
30.00	188.50	10.0	99.03	0.50%
60.00	376.99	10.0	100.56	0.50%
120.00	753.98	10.0	113.91	0.50%
150.00	942.48	10.0	119.09	0.50%
Hz	Radians/sec	Velocity mm/sec Peak	Vertical Sensitivity	U_{95} %

Note1:

The laboratory has accreditation under ISO/IEC 17025 from NATA for calibration to ISO 16063-21 at frequencies from 0.5 Hz. Measurements at all frequencies and levels shown in the table above are made using reference equipment traceably calibrated to Australian National Standards.

Note2:

The uncertainties quoted are estimated at a confidence level of 95% and a coverage factor of $k=2$ applies unless otherwise stated.



Health Infrastructure

Children's Hospital Westmead

**Vibration Monitoring - KR - L4 Lab 9 -
October 2022**

CVM/ KR/202210

Issue 1 | 11/11/2022

This report takes into account the particular instructions and requirements of our client.

It is not intended for and should not be relied upon by any third party and no responsibility is undertaken to any third party.

Job number 271985

Arup Pty Ltd ABN 18 000 966 165

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Signature			

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Executive Summary

This report summarises the vibration monitoring data recorded at KR - L4 Lab 9, over one month – from 01/10/2022 to 31/10/2022. Graphs in this report show the recorded data in blue, and exceedance trigger levels in red.

RMSV Vibration Levels

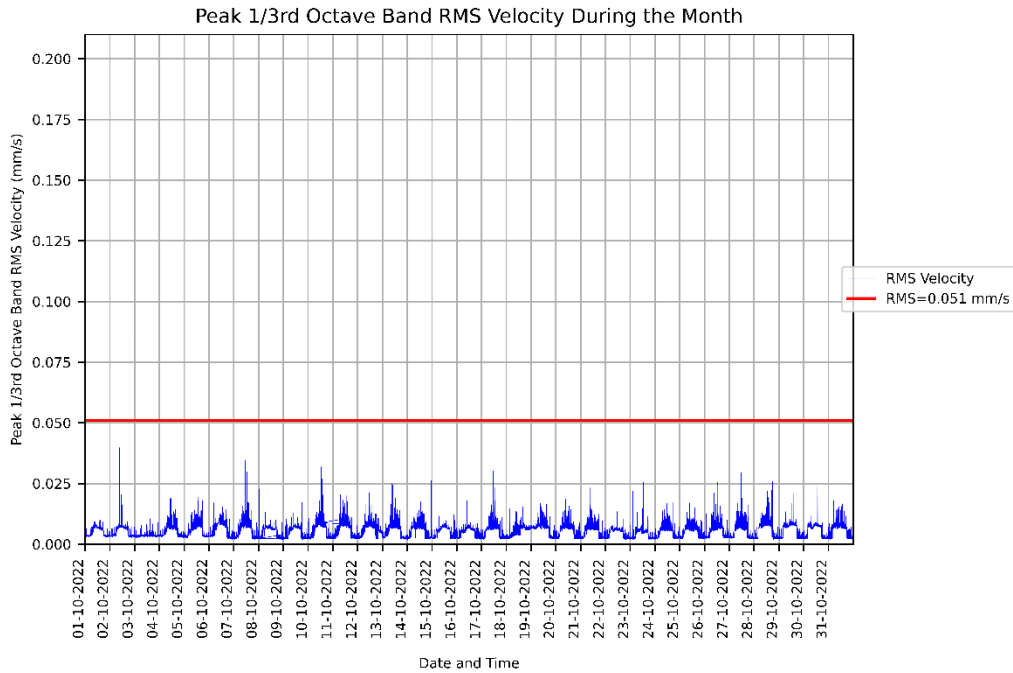


Figure 1: Measured RMSV vibration levels for 01/10/2022 to 31/10/2022 at the KR - L4 Lab 9.

The table below summarises the number of Root-Mean-Square Velocity (RMSV) limit exceedances recorded during and outside of construction hours.

During Construction Hours	Outside of Construction Hours
0	1

1. Introduction

Arup has been commissioned by PricewaterhouseCoopers (PwC) on behalf of NSW Health Infrastructure to monitor vibration levels in facilities adjacent to the Paediatric Services Building and Multi-storey Car Park development sites to ensure facility operations are not excessively impacted by the construction works. This report summarises the vibration monitoring data recorded at KR - L4 Lab 9 during the period of the 01/10/2022 to 31/10/2022.

For the purposes of reporting, construction works are considered to be occurring at the following times:

Day	Construction Hours
Monday to Friday	7:00am to 6:00pm
Saturday	8:00am to 1:00pm
Sunday	No works
Public Holidays	No works

2. Monitor Location

The location of this monitor is shown below in Figure 2.

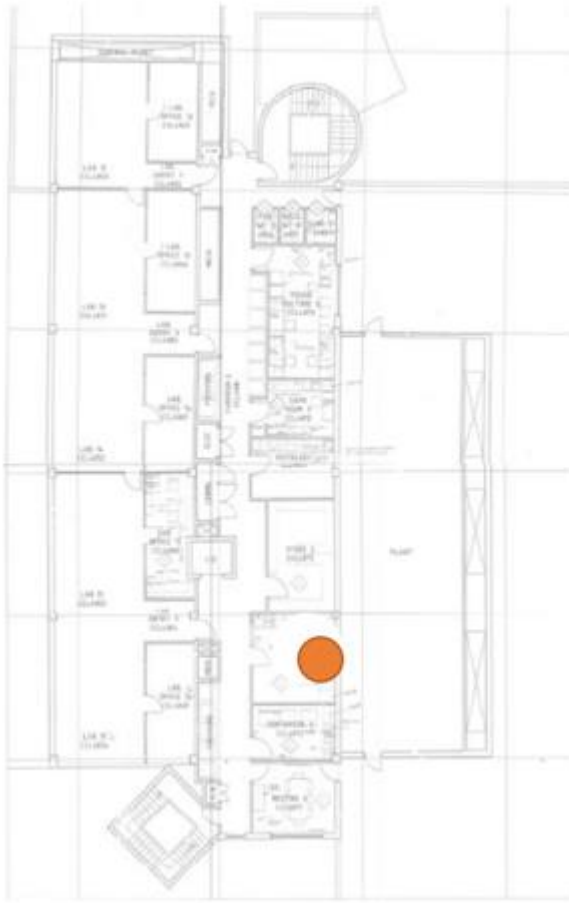


Figure 2: KR - L4 Lab 9 vibration monitor location shown in orange

Monitoring at this location utilises a GeoSIG GMSplus with a GeoSIG VE-11 geophone. The calibration certificate for the geophone is included in Appendix A.

3. Recorded Data

Figure 3 below shows the vibration levels (RMS velocity) recorded between 01/10/2022 and 31/10/2022. The recorded data is shown in blue, while the limit of 0.051mm/s (V_{RMS}) is shown in red.

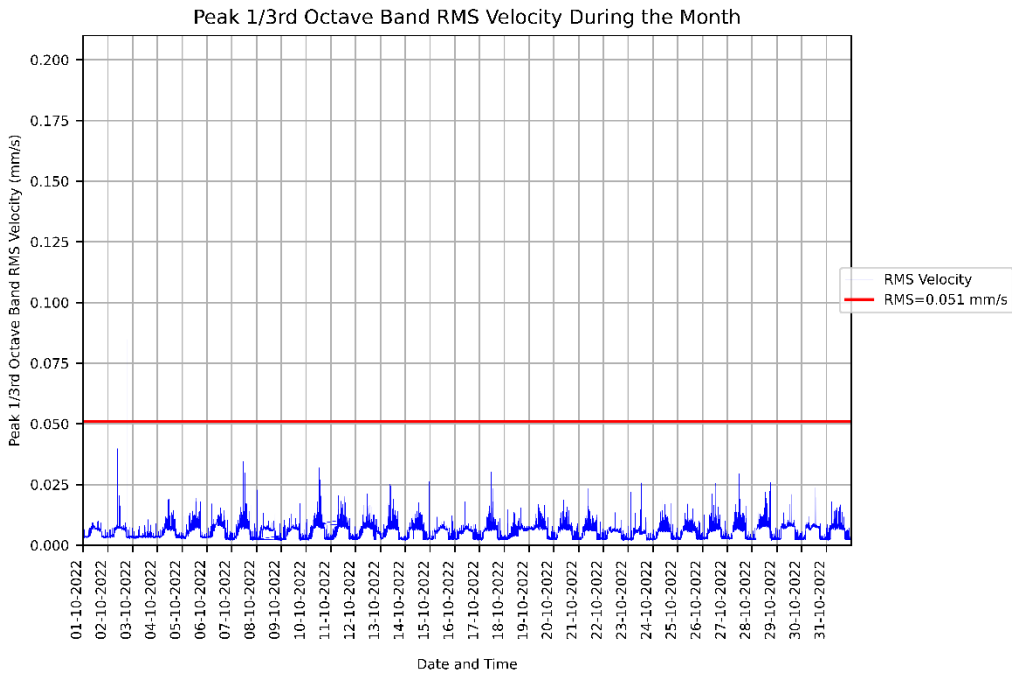
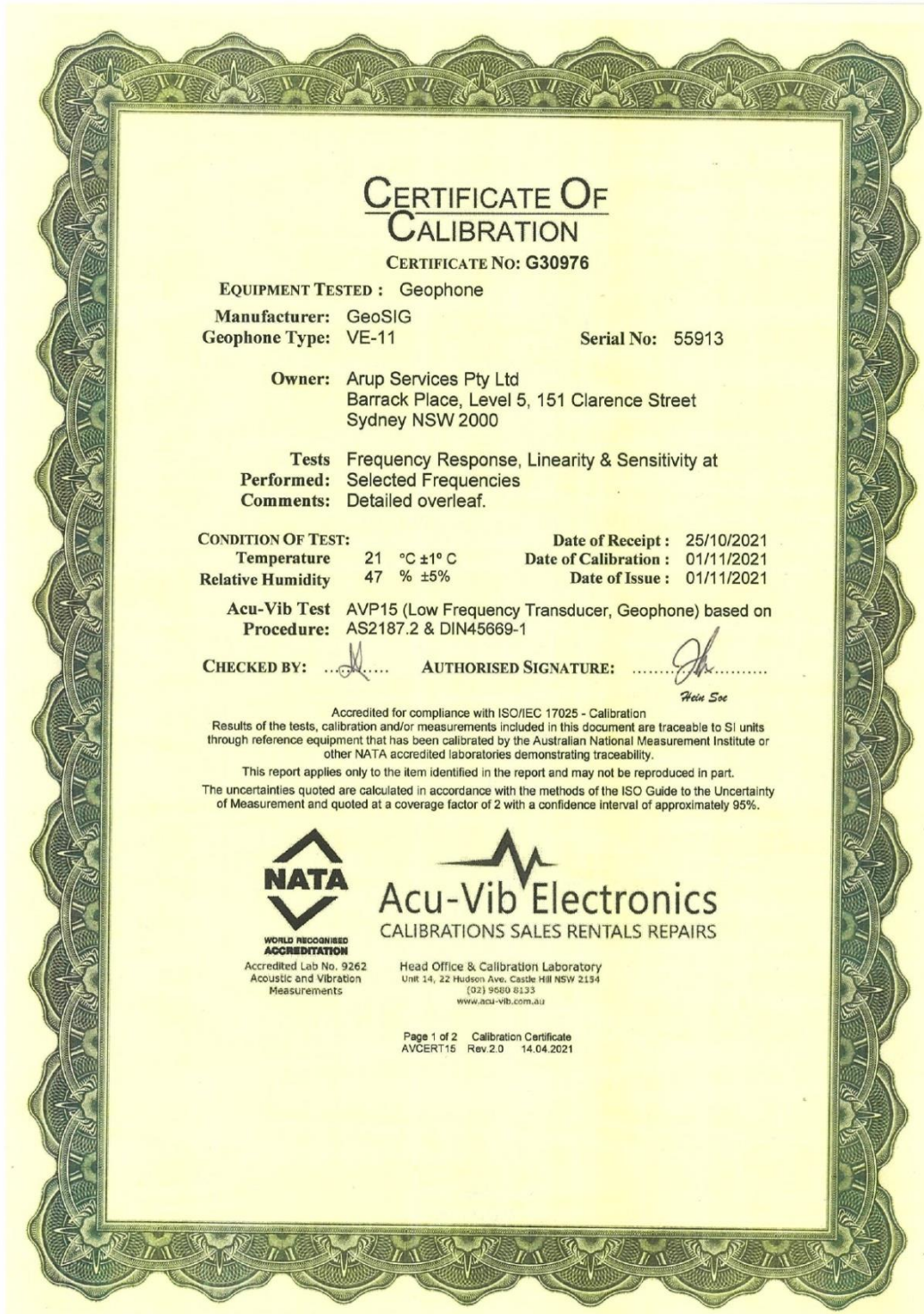


Figure 3: Measured RMSV vibration levels for 01/10/2022 to 31/10/2022 at the KR - L4 Lab 9.

The table below summarises the number of RMS Velocity limit exceedances recorded during and outside of construction hours.

During Construction Hours	Outside of Construction Hours
0	1

Appendix A: Calibration Certificates



Frequency response and linearity characteristics for
GeoSIG Velocity Geophone **VE-11** Serial No. **55913**
Constant velocity of 10 mm/sec Peak applied for response
(Except at 200.0 Hz where applied level limited to 1.0 mm/s peak)
For amplitude linearity applied level varied at 15.92 Hz

12VDC Power Supply

Geophone Orientation.: Vertical

Frequency		Velocity mm/sec Peak	Indicated Sensitivity mV/mms ⁻¹ Vertical Sensitivity	Expanded uncertainty U ₉₅ %
Hz	Radians/sec			
3.00	18.85	10.0	106.24	1.00%
4.00	25.13	10.0	105.59	0.90%
6.00	37.70	10.0	100.69	0.90%
10.00	62.83	10.0	94.25	0.90%
15.00	94.25	10.0	91.31	0.90%
15.92	94.25	1.0	N/A	0.90%
15.92	94.25	5.0	85.93	0.90%
15.92	94.25	10.0	85.77	0.90%
15.92	94.25	50.0	85.76	0.90%
15.92	94.25	100	N/A	0.50%
30.00	188.50	10.0	89.27	0.50%
60.00	376.99	10.0	90.17	0.50%
120.00	753.98	10.0	100.67	0.50%
150.00	942.48	10.0	115.82	0.50%
Hz	Radians/sec	Velocity mm/sec Peak	Vertical Sensitivity	U ₉₅ %

Note1:

The laboratory has accreditation under ISO/IEC 17025 from NATA for calibration to ISO 16063-21 at frequencies from 0.5 Hz. Measurements at all frequencies and levels shown in the table above are made using reference equipment traceably calibrated to Australian National Standards.

Note2:

The uncertainties quoted are estimated at a confidence level of 95% and a coverage factor of k=2 applies unless otherwise stated.