October 13, 2026

Eric R Wells
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TradePort Hanover Land, LLC
WestDulles Properties, Inc.
1984 Isaac Newton Sq. W
Suite 102
Reston, VA 20190

Subject: **Iron Horse Development**
Hanover County, Virginia
Ambient Sound Level Measurement Report

Dear Mr. Wells:

Soundscape Consulting LLC has measured ambient sound levels within the proposed Iron Horse project site. The results of the measurements are presented in this report.

1.0 Background

WestDulles Properties is seeking approval from Hanover County for rezoning 78 acres of land near the intersection of Patrick Henry Road (Route 54) and I-95 for data center use (see Figure 1). This parcel would be combined with 102 acres already zoned for data-center use by the Town of Ashland.



Figure 1: Iron Horse Buildable Area Plan as of 6/1/2026

2.0 Terminology

A glossary of acoustical terminology is appended to this report in case you wish to refer to it while reading the report.

3.0 Instrumentation

NTi Audio model XL2-TA acoustic analyzers with model MC230 microphones and model MA220 preamps were used for all measurements reported here. This system is Class 1 Type Approved, meeting the requirements of IEC 61672 and ANSI S1.4. This equipment has been calibrated within the past two years, to a reference traceable to the National Institute of Standards and Technology (NIST), by the equipment manufacturer or a laboratory in the business of providing calibration services. Sensitivity was checked in the field using a handheld sound level calibrator conforming to the Class 1 requirements of IEC 60942 and ANSI S1.40. Tables 1-4 present the documentation for the sound level meters used for these measurements.

Table 1: Meter Documentation - Chicago Meter

Instrument	Make	Model No.	Serial No.	Cal Date
Sound Level Meter (SLM)	NTi	XL2-TA [1]	A2A-09678-E0	01/14/2026
SLM Microphone	NTi	MC230	8381	01/14/2026
SLM Preamp	NTi	MA220	5299	01/14/2026

1. *Class 1 Type Approved per IEC 61672 Type 1 and ANSI S1.4.*

Table 2: Meter Documentation - Ludington Meter

Instrument	Make	Model No.	Serial No.	Cal Date
Sound Level Meter (SLM)	NTi	XL2-TA [1]	A2A-20589-E0	03/19/2026
SLM Microphone	NTi	MC230	A21875	03/19/2026
SLM Preamp	NTi	MA220	10625	03/19/2026
Sound Level Calibrator	LD	CAL200	12159	03/19/2026

1. *Class 1 Type Approved per IEC 61672 Type 1 and ANSI S1.4.*

Table 3: Meter Documentation – Plymouth 1 Meter

Instrument	Make	Model No.	Serial No.	Cal Date
Sound Level Meter (SLM)	NTi	XL2-TA [1]	A2A-11159-E0	08/25/2025
SLM Microphone	NTi	MC230	7358	08/25/2025
SLM Preamp	NTi	MA220	2923	08/25/2025
Sound Level Calibrator	B&K	4230	781846	08/25/2025

1. *Class 1 Type Approved per IEC 61672 Type 1 and ANSI S1.4.*

Table 3: Meter Documentation – Plymouth 2 Meter

Instrument	Make	Model No.	Serial No.	Cal Date
Sound Level Meter (SLM)	NTi	XL2-TA [1]	A2A-18243-E0	04/03/2025
SLM Microphone	NTi	MC230	A19828	04/03/2025
SLM Preamp	NTi	MA220	9538	04/03/2025
Sound Level Calibrator	LD	CAL200	10152	04/03/2025

1. *Class 1 Type Approved per IEC 61672 Type 1 and ANSI S1.4.*

4.0 Measurement Procedure

Ambient sound levels were measured in third-octave bands at four locations within the Project area from August 25th through September 1st, 2026. Figure 1 shows the locations of noise monitoring equipment and Figure 2 shows a photo of the meter installed at Location 2.

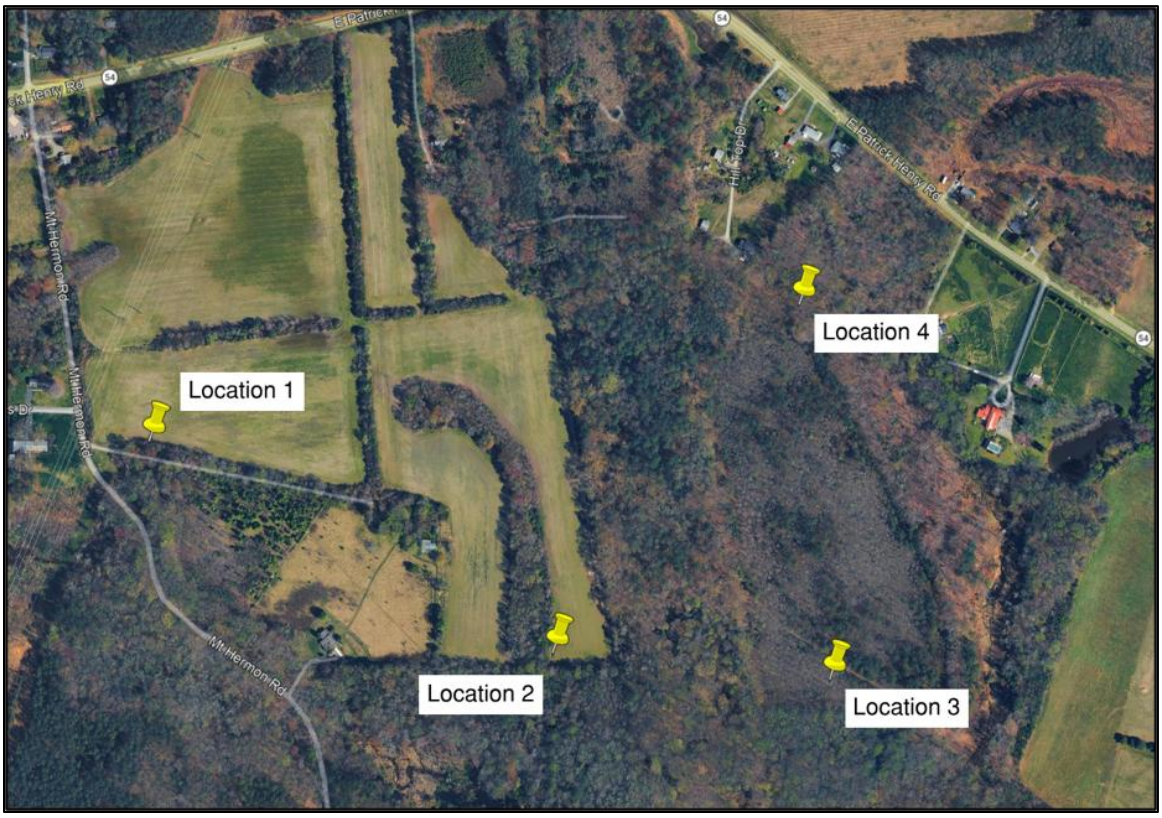


Figure 1: Sound Level Meter Locations



Figure 2: Sound Level Meter – Location 2

5.0 Observations and Results

Table 3 contains the range of hourly sound levels measured during daytime and nighttime at each measurement location for the entire 7-day measurement period. All measurements have been filtered to exclude insect noise (2.5-8kHz) to provide an accurate picture of the quietest ambient levels (winter). See Figure 3 for a visual of the filter applied to insect noise.

Table 3: Overall Measured Levels for Daytime/Nighttime

Locations	Hourly LA_{eq}		Hourly LA_{90}		Hourly LC_{eq}	
	Daytime	Nighttime	Daytime	Nighttime	Daytime	Nighttime
Location 1	44-58 dBA	47-58 dBA	41-56 dBA	43-56 dBA	59-76 dBC	59-69 dBC
Location 2	36-58 dBA	42-57 dBA	33-54 dBA	38-54 dBA	53-66 dBC	54-66 dBC
Location 3	36-55 dBA	38-52 dBA	32-50 dBA	34-50 dBA	51-65 dBC	53-65 dBC
Location 4	43-52 dBA	38-53 dBA	35-50 dBA	34-51 dBA	54-65 dBC	51-64 dBC

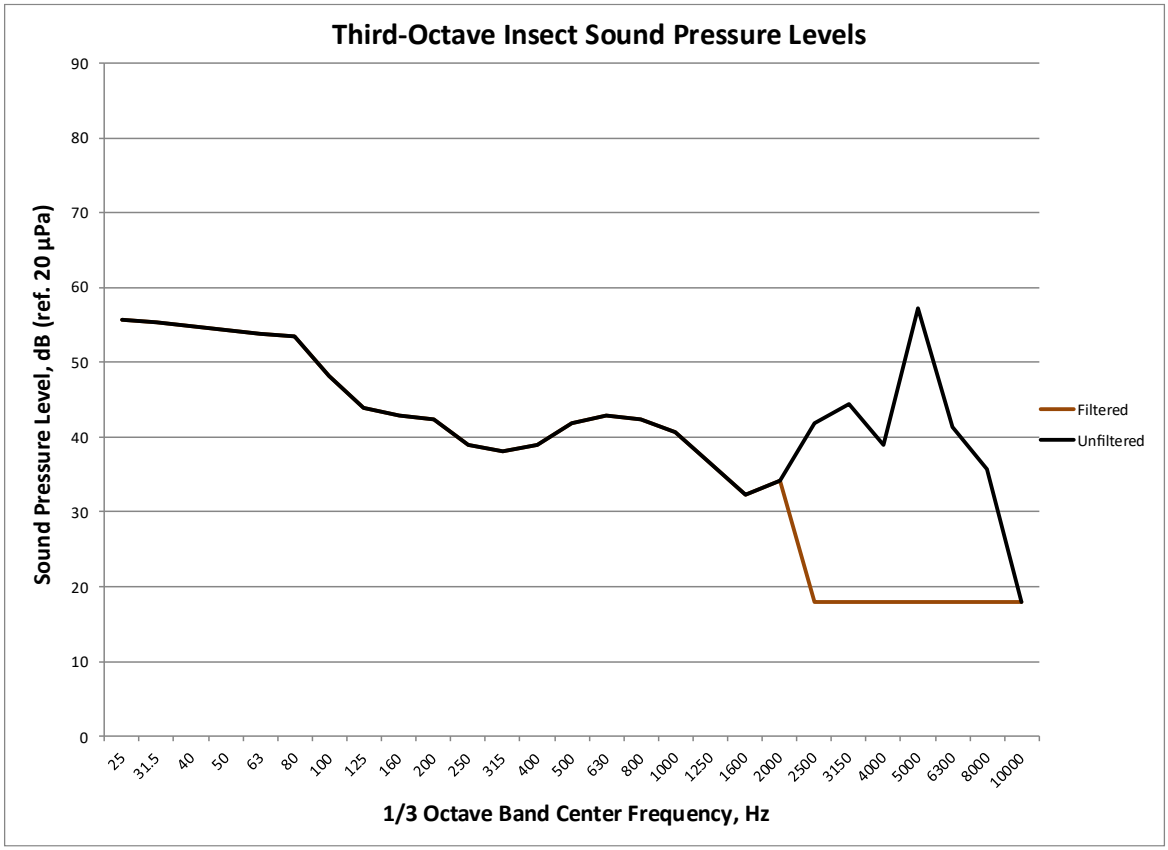


Figure 3: Insect Noise Filter Comparison

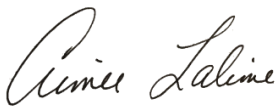
Hourly sound levels (LA_{eq} and LA_{90}) for the 7-day measurement period at each location are included in Appendix B and photographs of each measurement location are located in Appendix C.

6.0 Conclusion

This concludes our measurement report. We will be happy to elaborate on anything contained within this report.

Sincerely,

Soundscape Engineering
Per:



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7.0 Appendix A: Acoustic Terminology

Sound level is measured in units called decibels (abbreviated dB). Decibels are logarithmic rather than linear quantities and thus a doubling of the sound level does not translate to a mathematical doubling of decibels. Also, the human ear does not interpret a doubling of sound energy (two sources instead of one) as a doubling of loudness. The logarithmic nature of dB and the human subjective perception of relative sound levels result in the following approximate rules for judging increases in sound.

- 3 dB sound level increase or decrease - just noticeable
  (the addition of one identical sound source to an existing source)
- 5 dB sound level increase or decrease - clearly perceptible and is often considered significant
  (the addition of two identical sound sources to an existing source)
- 10 dB sound level increase or decrease - perceived as twice as loud/half as loud
  (the addition of nine identical sound sources to an existing source)

These perceived changes in the sound level are mostly independent of the absolute sound level. That is, a 35 dB sound will be perceived as twice as loud as a 25 dB sound, and a 60 dB sound will be perceived as twice as loud as a 50 dB sound.

Octave bands - Audible sound occurs over a wide frequency range, from low pitched sounds at approximately 20 hertz (Hz) to high pitched sounds at 20,000 Hz. These frequencies are commonly grouped into octave bands or 1/3 octave bands. Building mechanical systems generally produce noise in the 63 Hz to 1000 Hz octave bands, with the lower frequency noise generated by large fans. Speech is predominantly contained in the 250 Hz to 2000 Hz octave bands.

A-weighted sound level - Humans do not hear equally well at all frequencies. We are especially poor at hearing low frequency sound and are best at hearing sound in the frequency range of speech. A microphone does not have these same characteristics. Therefore, when sound is being measured to determine how well people will be able to hear it, a "weighting" or microphone-to-human correction factor is applied to the sound level measured using a microphone. The most common weighting is the "A-weighting" and the resulting sound level is expressed in A-weighted decibels (dBA). This weighting reduces the low frequency sound, slightly increases the sound at the dominant frequencies of speech, and slightly lowers the sound level at high frequencies.

C-weighted sound level – This weighting scheme does not discount the low-frequency energy contribution to the overall sound level. It is useful for describing sounds that contain a substantial amount of low-frequency energy, such as sound from mechanical equipment and music.

Sound Power and Sound Pressure Levels - Sound pressure can be directly measured by a microphone. Outdoor sound pressure levels are influenced by the distance and orientation of the receiver, obstructions, and ground absorption between the source and receiver, the temperature, and wind gradients. Sound power is a physical property of the source alone and is not influenced by the external environment. It is an important parameter which is used for rating and comparing sound sources. The sound power is calculated by taking sound pressure or sound intensity measurements according to strict standards and calculation procedures. Conversely, the sound pressure level at a particular location can be calculated from the sound power level for a given source and the environmental factors affecting the sound propagation path between the source and receiver.

Decibel addition is not on an arithmetic basis but on a logarithmic basis. This means that the level produced from two sound sources of 60 dBA is 63 dBA and not 120 dBA. While acoustics consultants use this mathematical formula for this calculation, the table below provides a shorthand method of estimation. Only two numbers can be added at a time using this method. For three or more numbers, the process below must be repeated multiple times.

When two dB values differ by…	…add the following dB to the higher value.
0 or 1	3
2 or 3	2
4 to 9	1
10 or more	0

Examples:

43 dB + 44 dB = 47 dB (difference between numbers is 1, so add 3 to the highest value)
43 dB + 48 dB = 49 dB (difference between numbers is 5, so add 1 to the highest value)
43 dB + 53 dB = 53 dB (difference between numbers is 10 dB, so add 0 to the highest value)

Equivalent sound level (L_{eq}) is essentially the average sound level in an environment. However, the L_{eq} is not a simple arithmetic average of the sound level over time, but is a logarithmic average of the sound energy level over a period of time. L_{eq} can be measured for any time period, but is typically measured for some increment or fraction of an hour such as 15 minutes, 1 hour, or 24 hours. Steady sounds, such as fan noise, can be accurately measured for much shorter periods of time, such as 30 to 60 seconds.

Average sound level (L_{av}) is used in the Hanover County noise ordinance to indicate the equivalent sound level over a 4-hour period, which can also be noted as the $L_{eq,4\text{-}hr}$.

Statistical sound levels, as they are most often called, quantify the sound level exceeded during a period of time for the measurement period. For example, the L_{90} sound level is the sound level exceeded during 90% of the measurement period. If the measurement period is 60 minutes long, then the L_{90} is the sound level exceeded during 54 minutes. It is most often lower than the L_{eq}. The L_{90} is generally considered to be the "background" sound level, which is the baseline level that is present most of the time. Another commonly used statistical level is the L_{10}. The L_{10} is the sound level exceeded during 10% of the measurement period. If the measurement period is 60 minutes long, then L_{10} is the sound level exceeded during 6 minutes of the measurement period. L_{10} can be used to quantify the fluctuating sound levels in an environment. L_{01} is often used as the maximum sound level for perceptibility and analysis in the design of interior spaces where music and amplified speech could disturb need to be sound isolated.

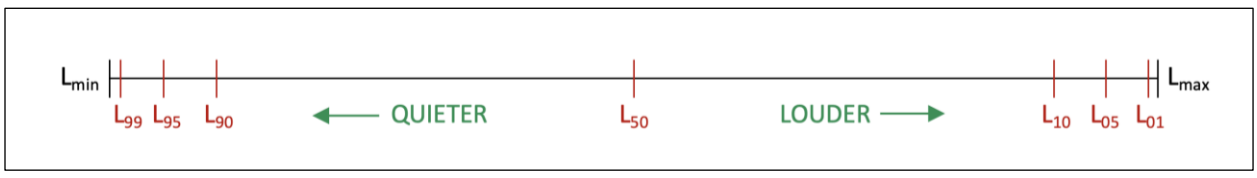

Figure 4: Relative scaling of statistical sound levels

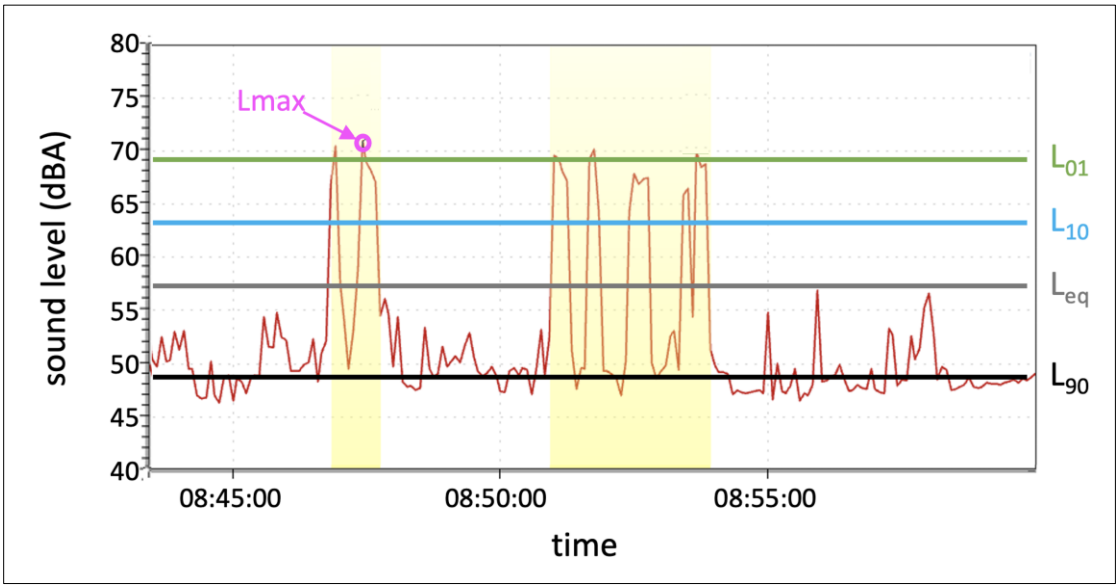

Figure 5: Statistical sound levels, Lmax, and Leq applied to a sound signal

The **ambient or background sound level** often refers to the indoor or outdoor sound level without the sound source of interest but with other sounds that contribute to the level. For example, if the sound level of an outdoor condensing unit is being assessed, the extraneous sound of traffic and other mechanical equipment should also be measured to determine if it affects the measurement of the condensing unit. If it does, then a correction factor can be applied.

Appendix B: Hourly Sound Level Graphs

Location 1

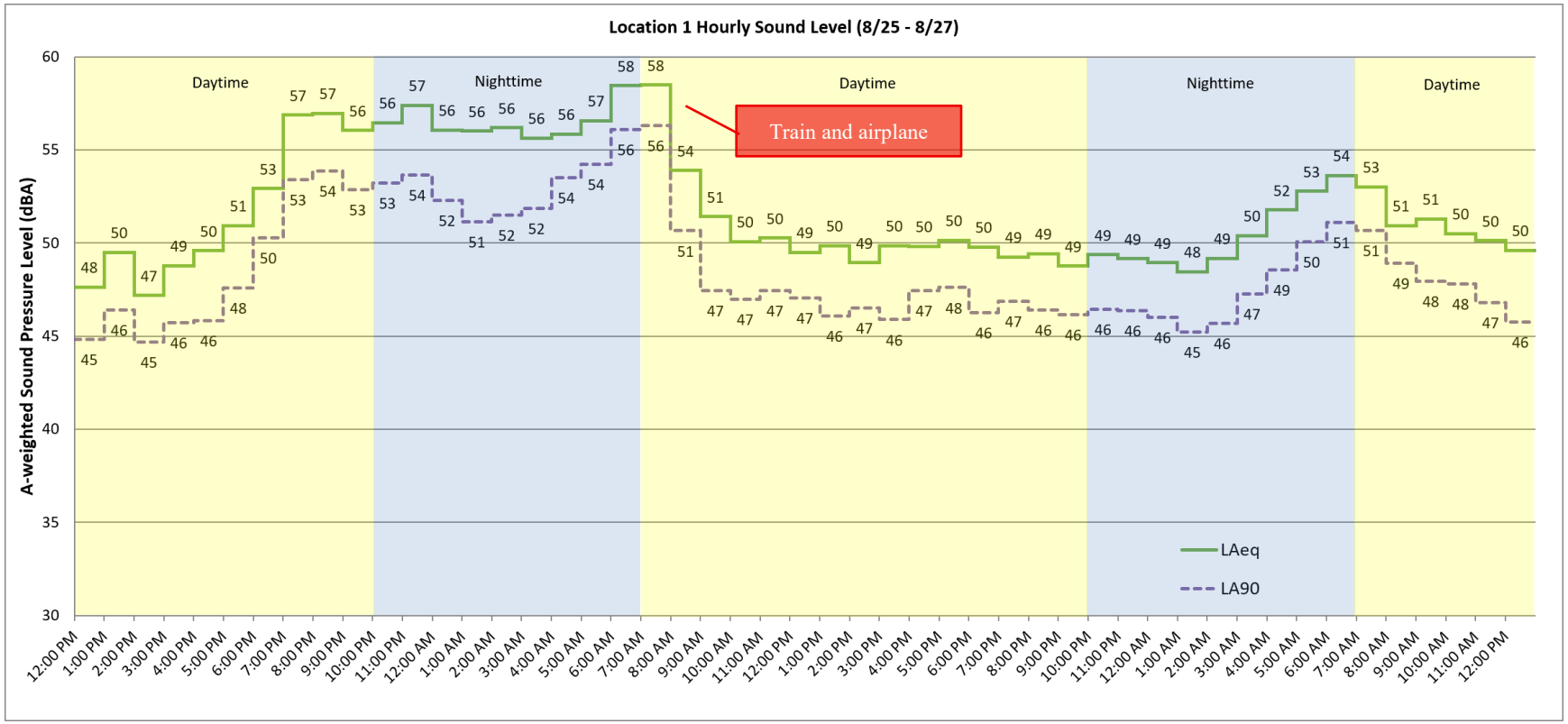

Figure 6: Location 1 Hourly Sound Level (8/25 – 8/27)

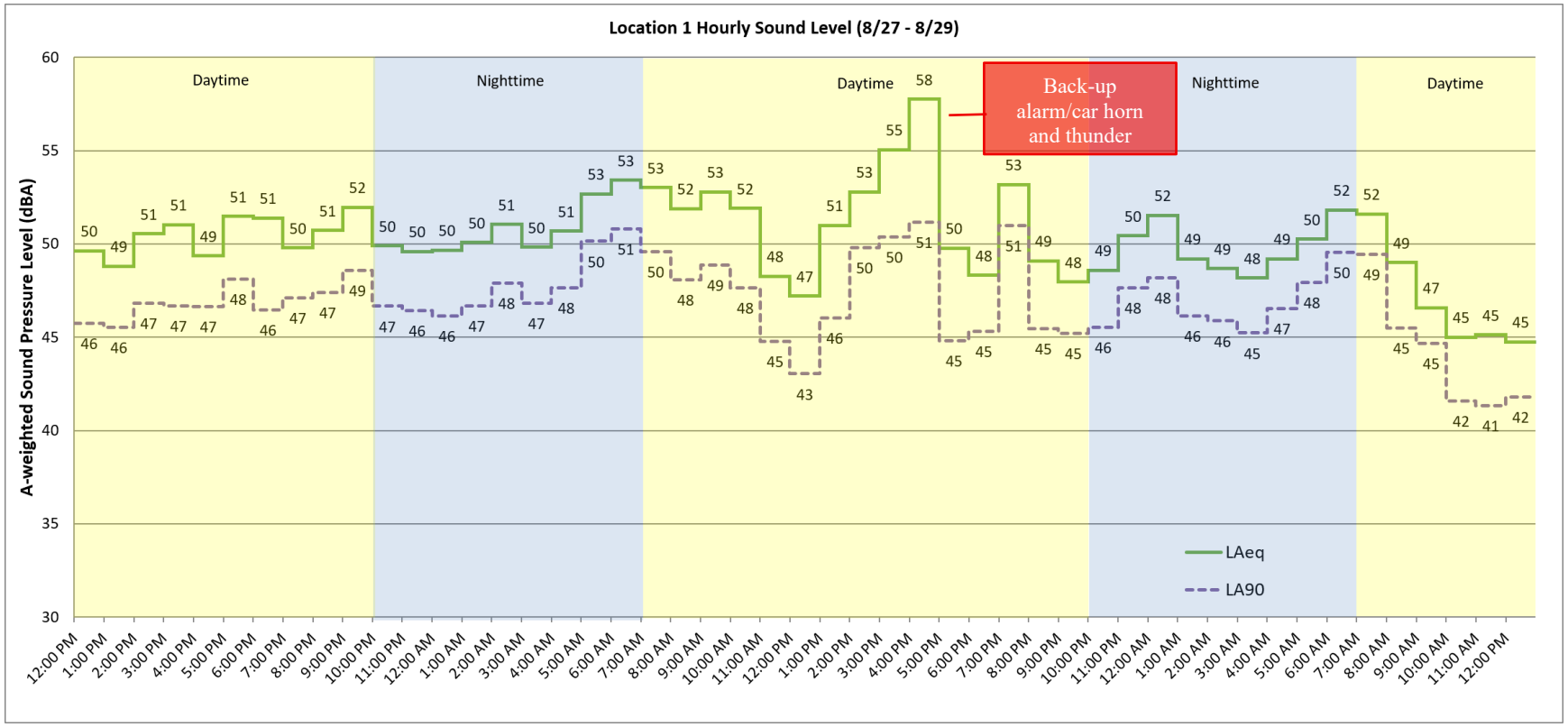

Figure 7: Location 1 Hourly Sound Level (8/27 – 8/29)

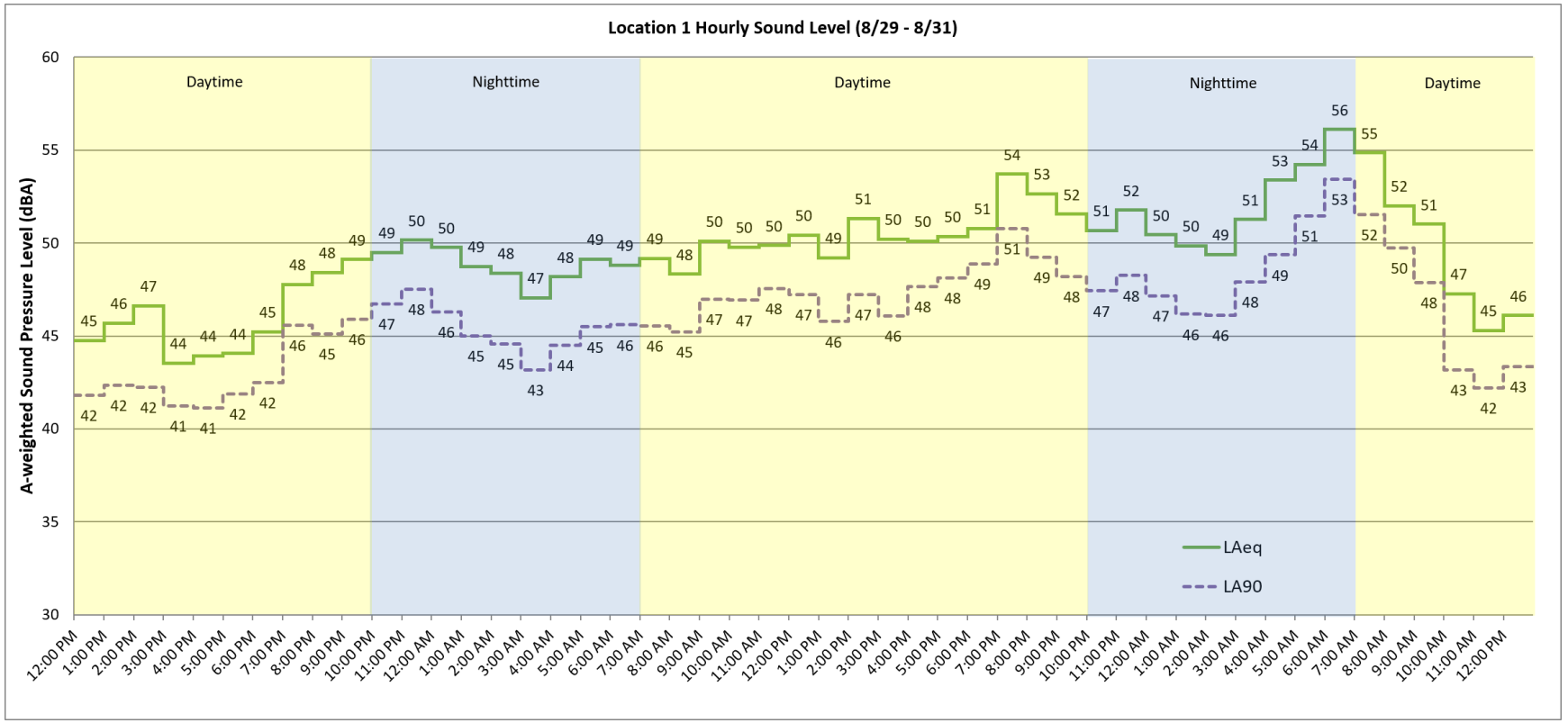

Figure 8: Location 1 Hourly Sound Level (8/29 – 8/31)

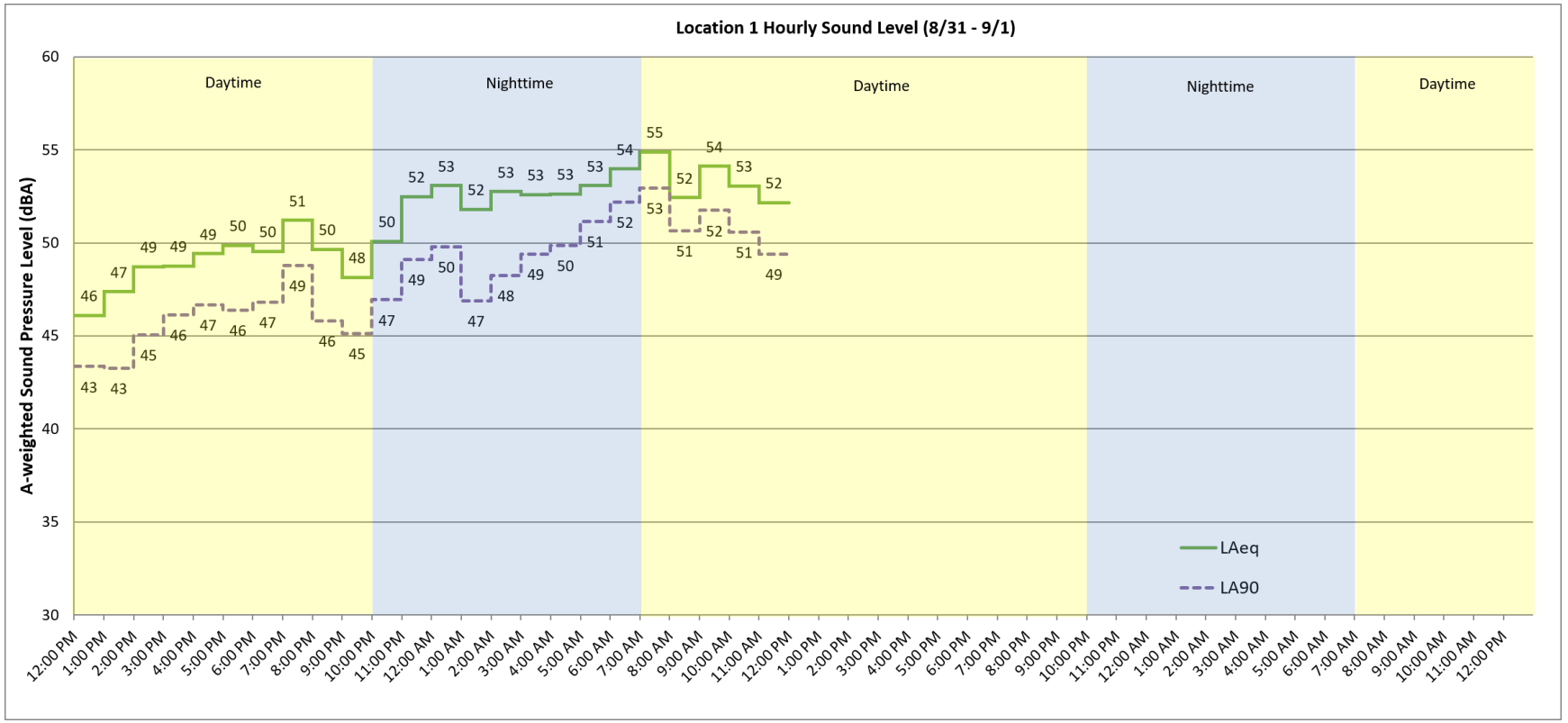

Figure 9: Location 1 Hourly Sound Level (8/31 – 9/1)

Location 2

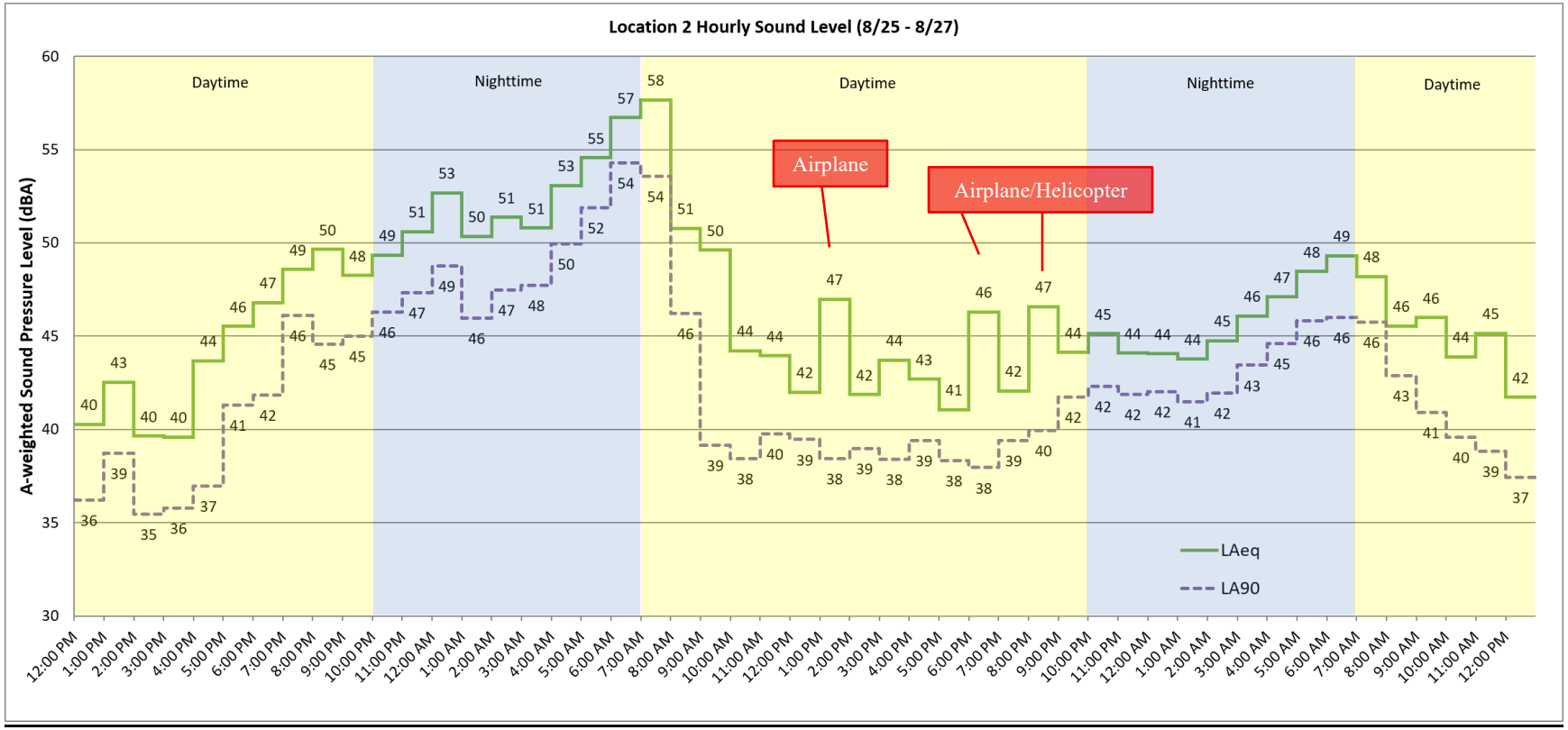

Figure 10: Location 2 Hourly Sound Level (8/25 – 8/27)

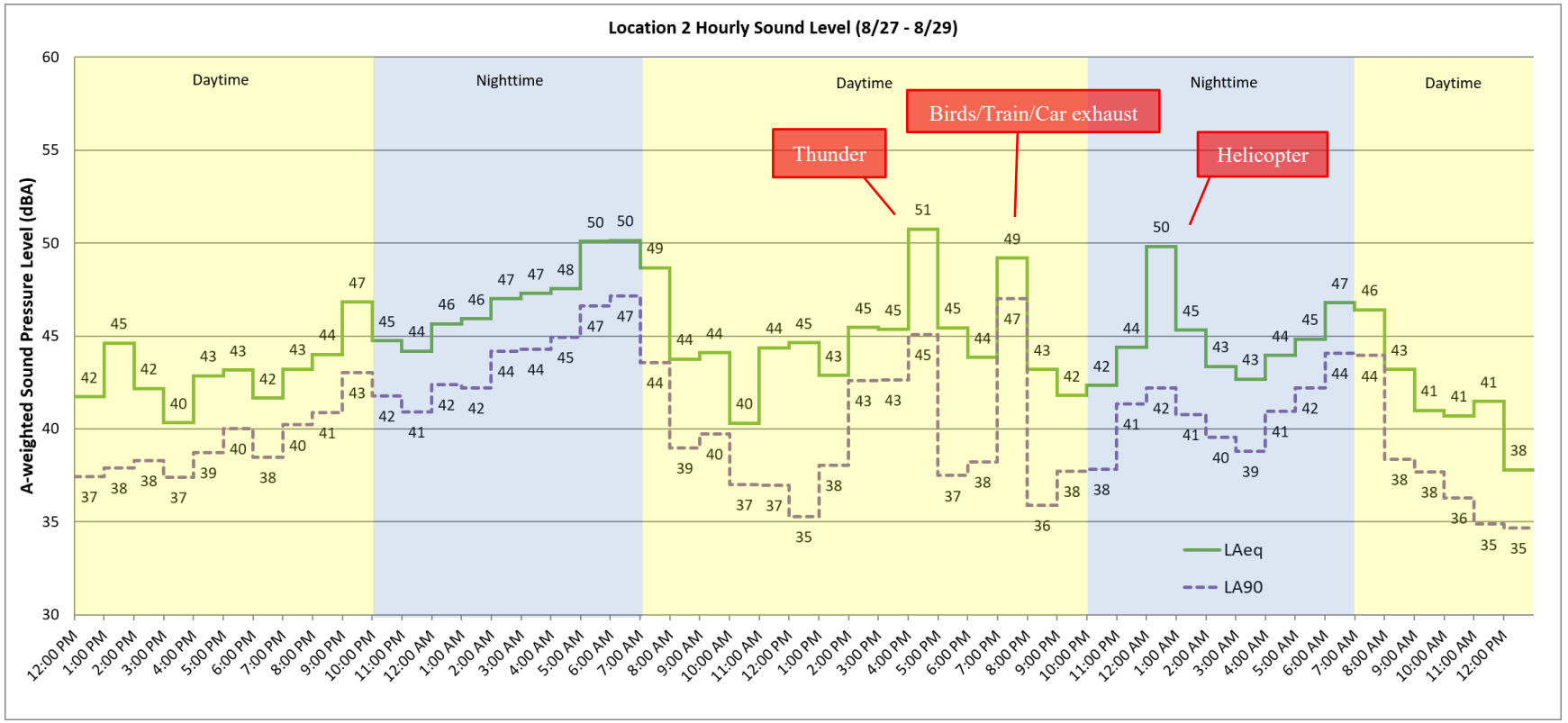

Figure 11: Location 2 Hourly Sound Level (8/27 – 8/29)

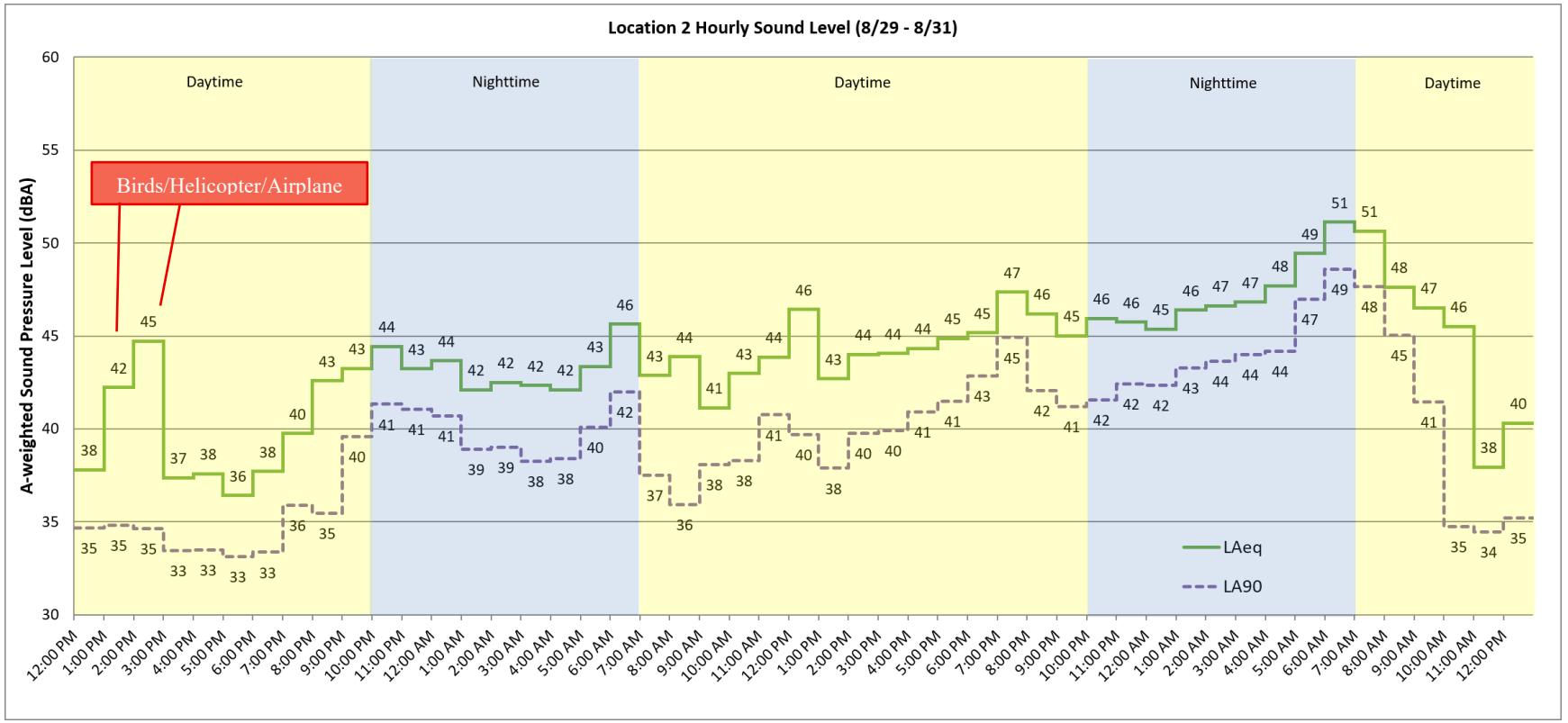

Figure 12: Location 2 Hourly Sound Level (8/29 – 8/31)

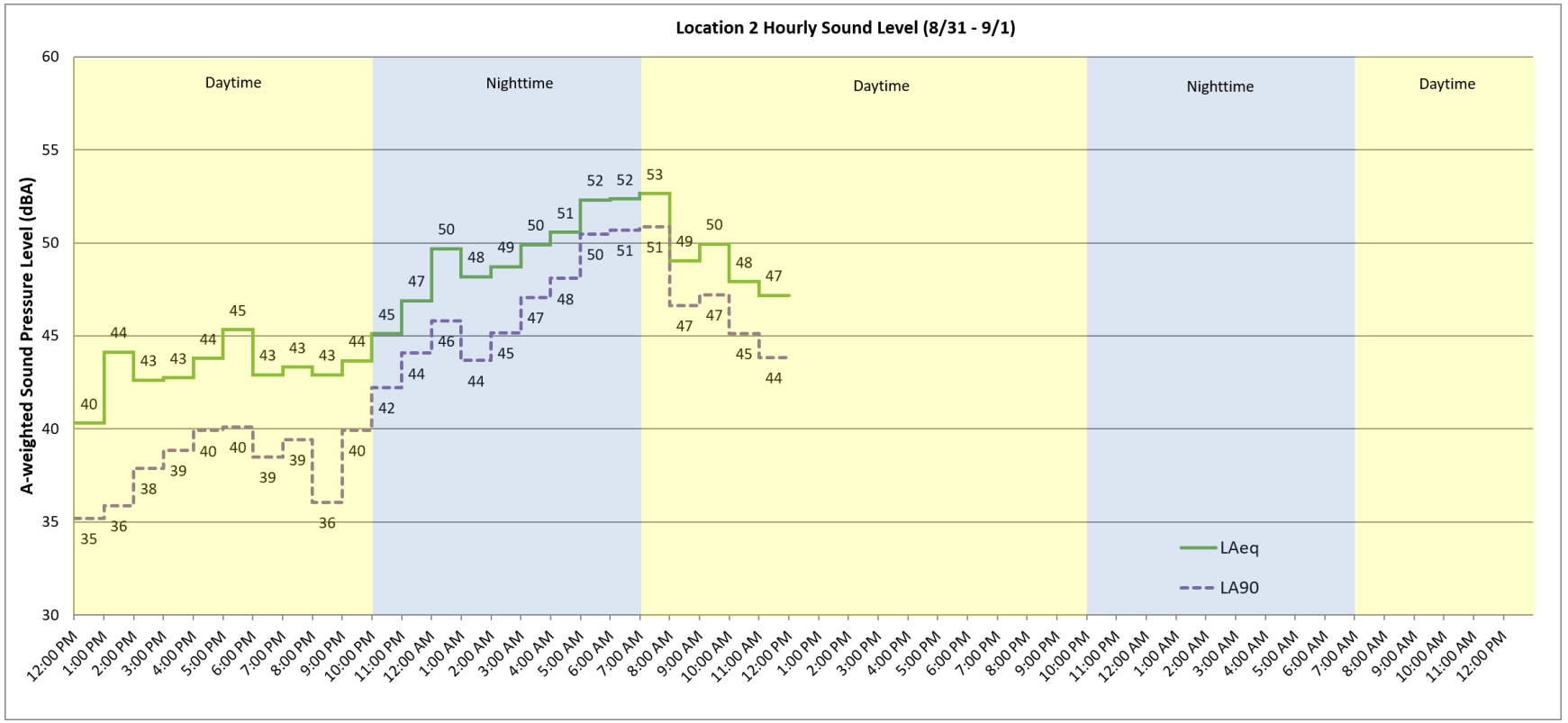

Figure 13: Location 2 Hourly Sound Level (8/31 – 9/1)

Location 3

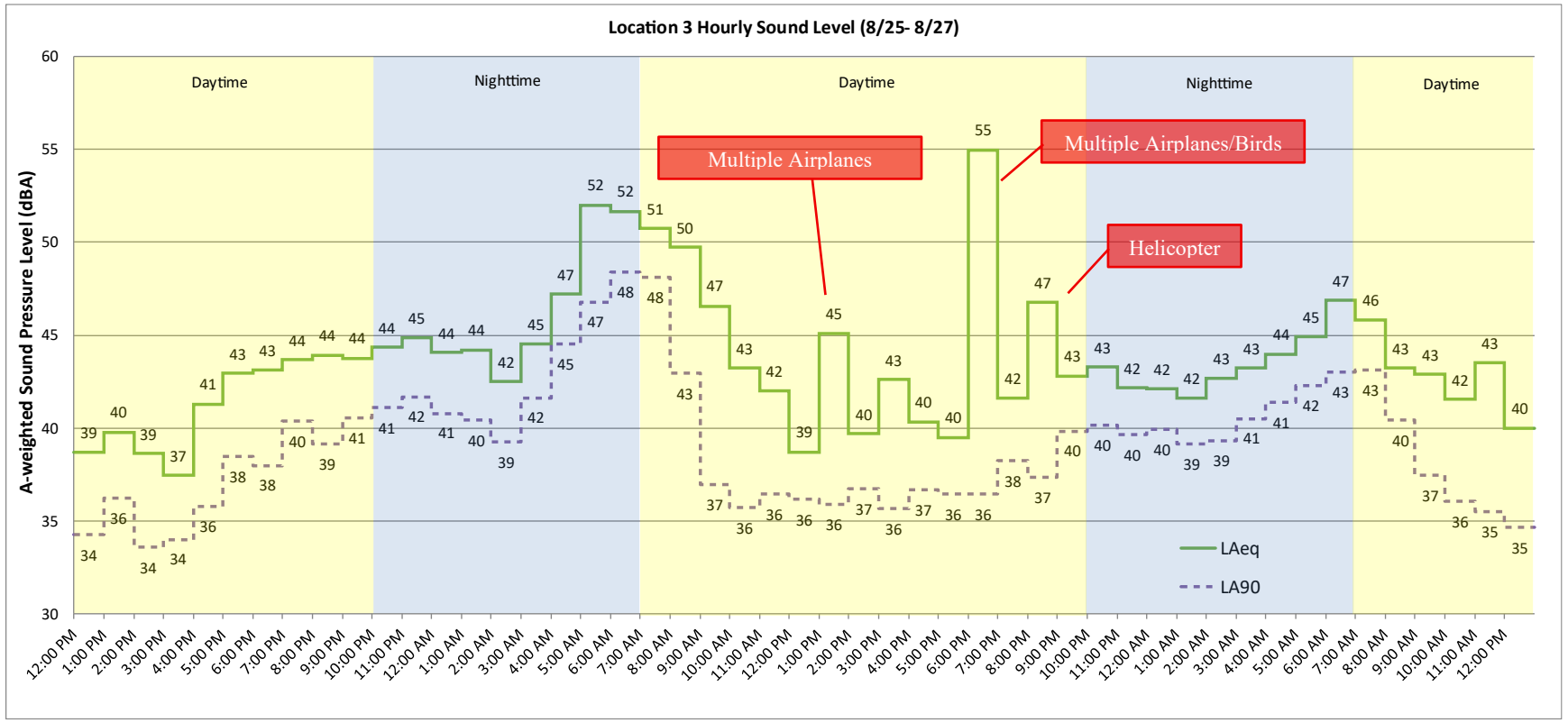

Figure 14: Location 3 Hourly Sound Level (8/25 – 8/27)

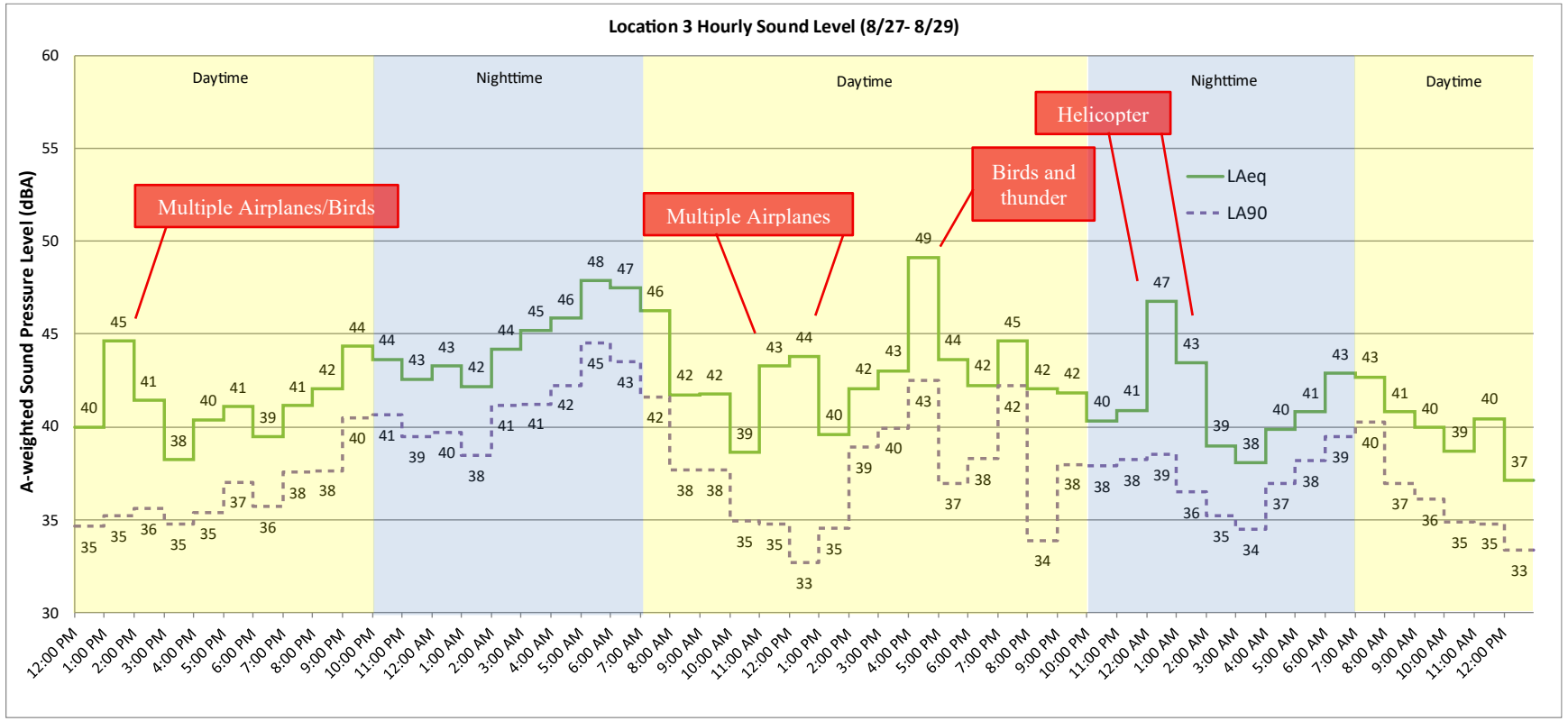

Figure 15: Location 3 Hourly Sound Level (8/27 – 8/29)

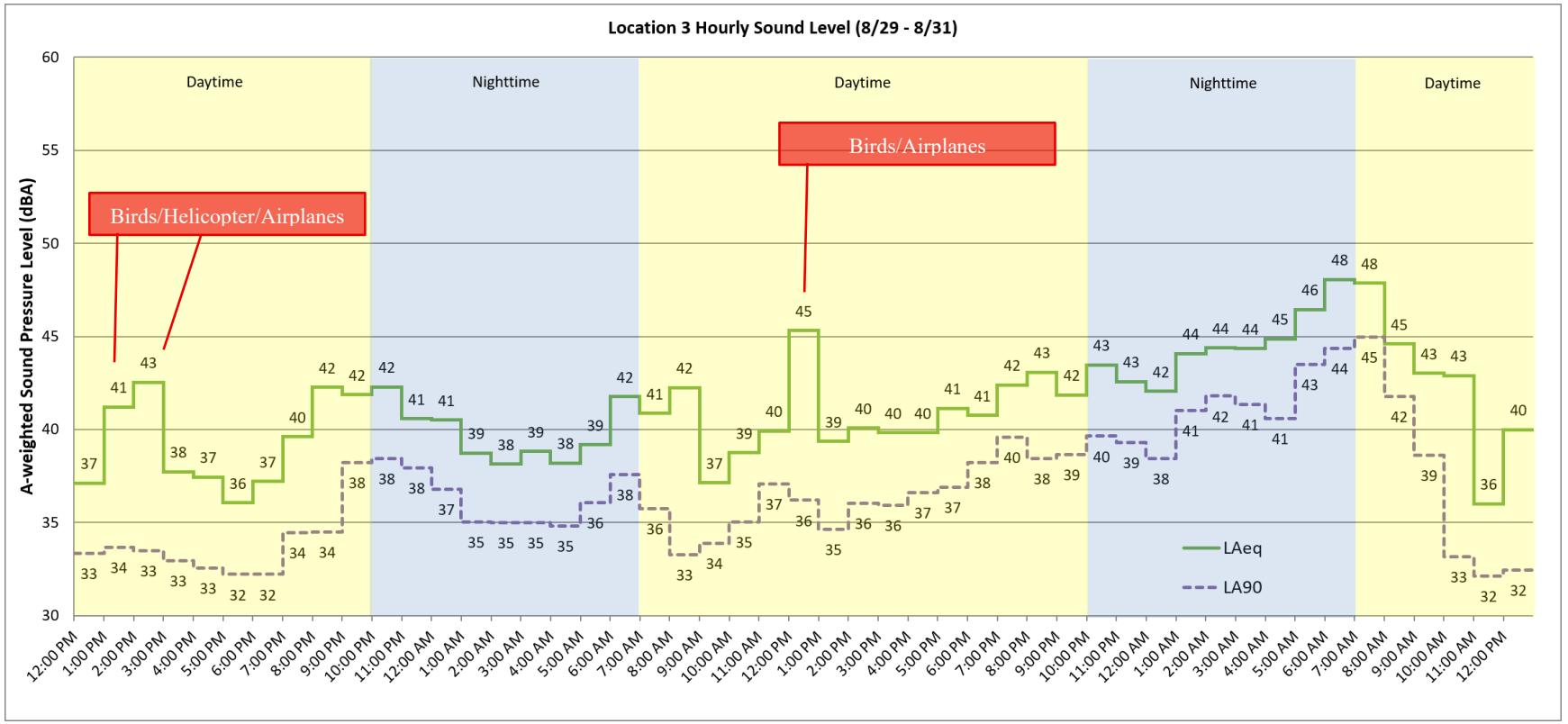

Figure 16: Location 3 Hourly Sound Level (8/29 – 8/31)

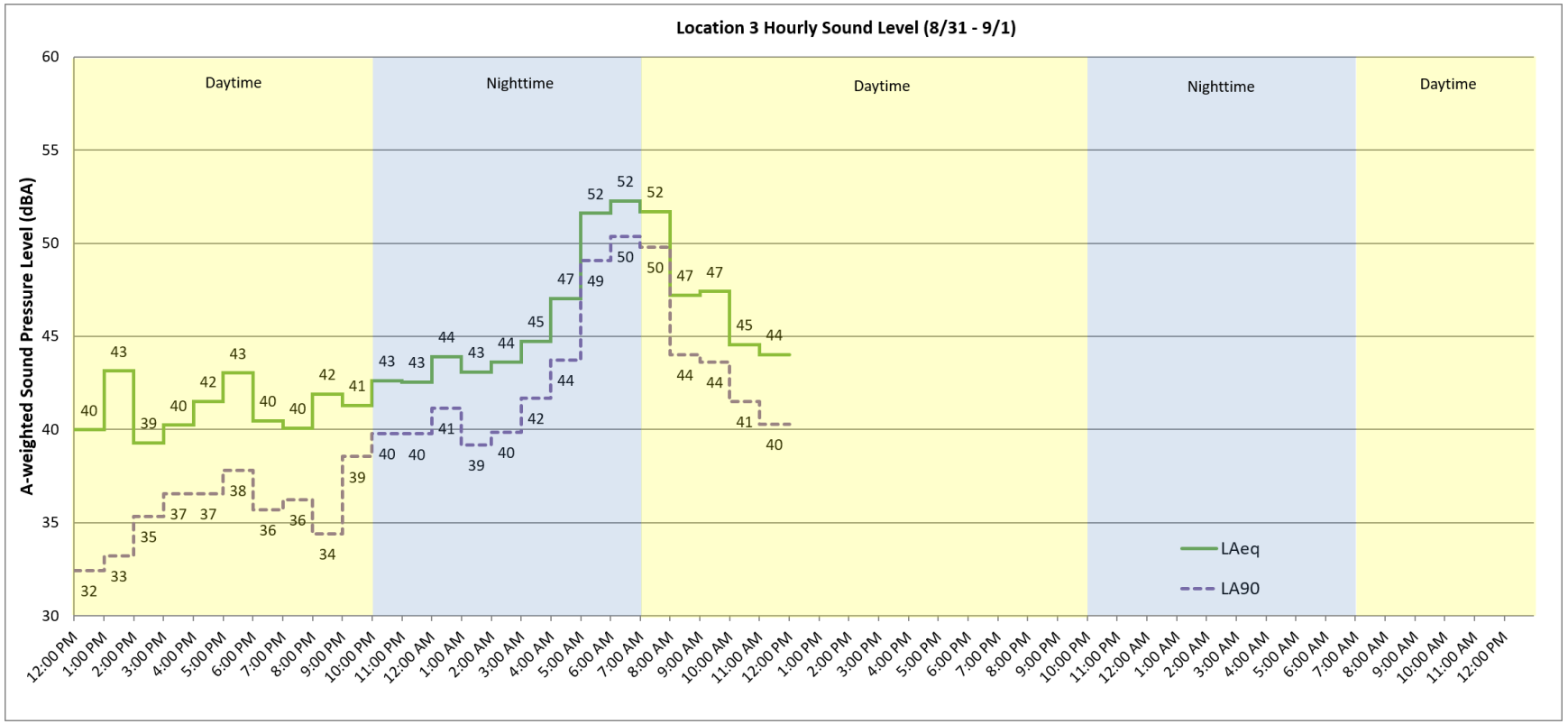

Figure 17: Location 3 Hourly Sound Level (8/31 – 9/1)

Location 4

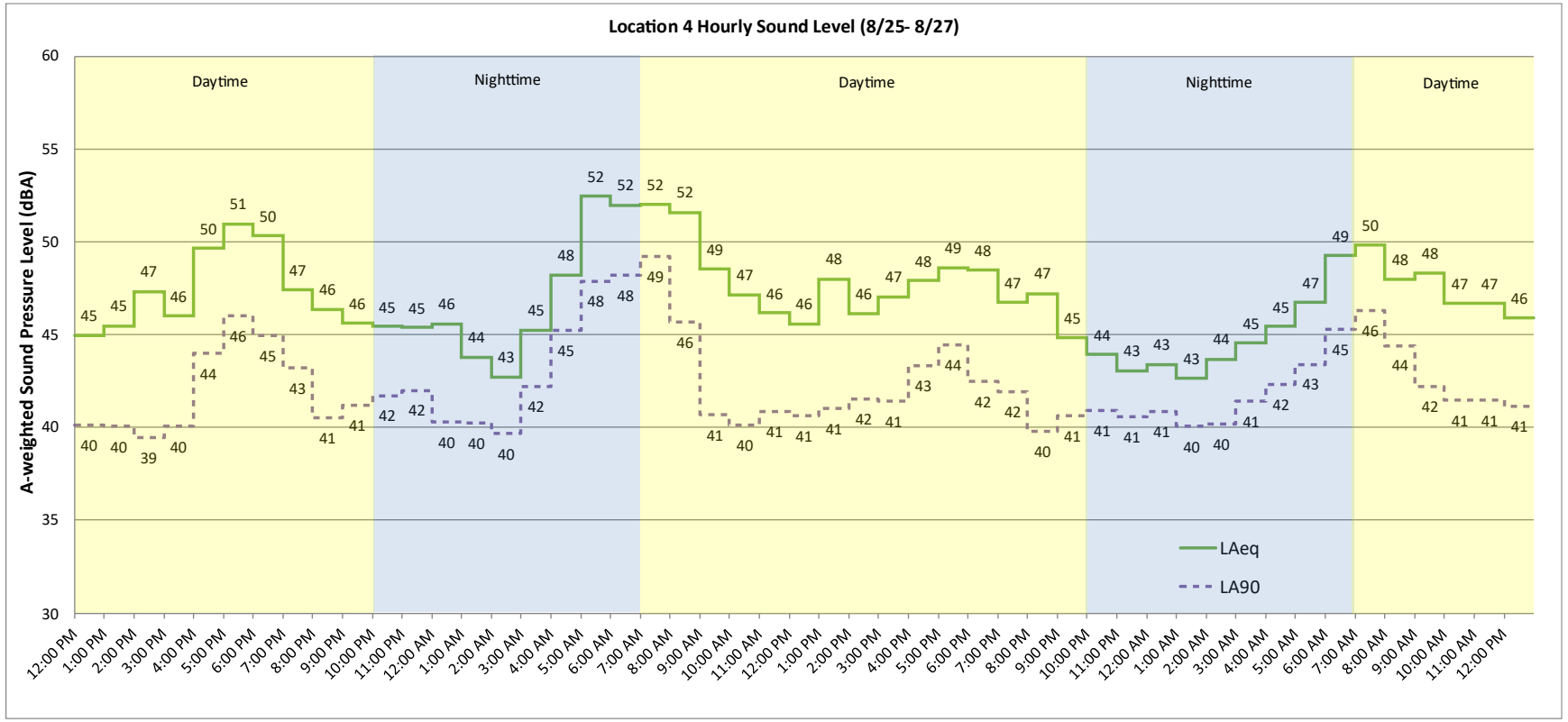

Figure 18: Location 4 Hourly Sound Level (8/25 – 8/27)

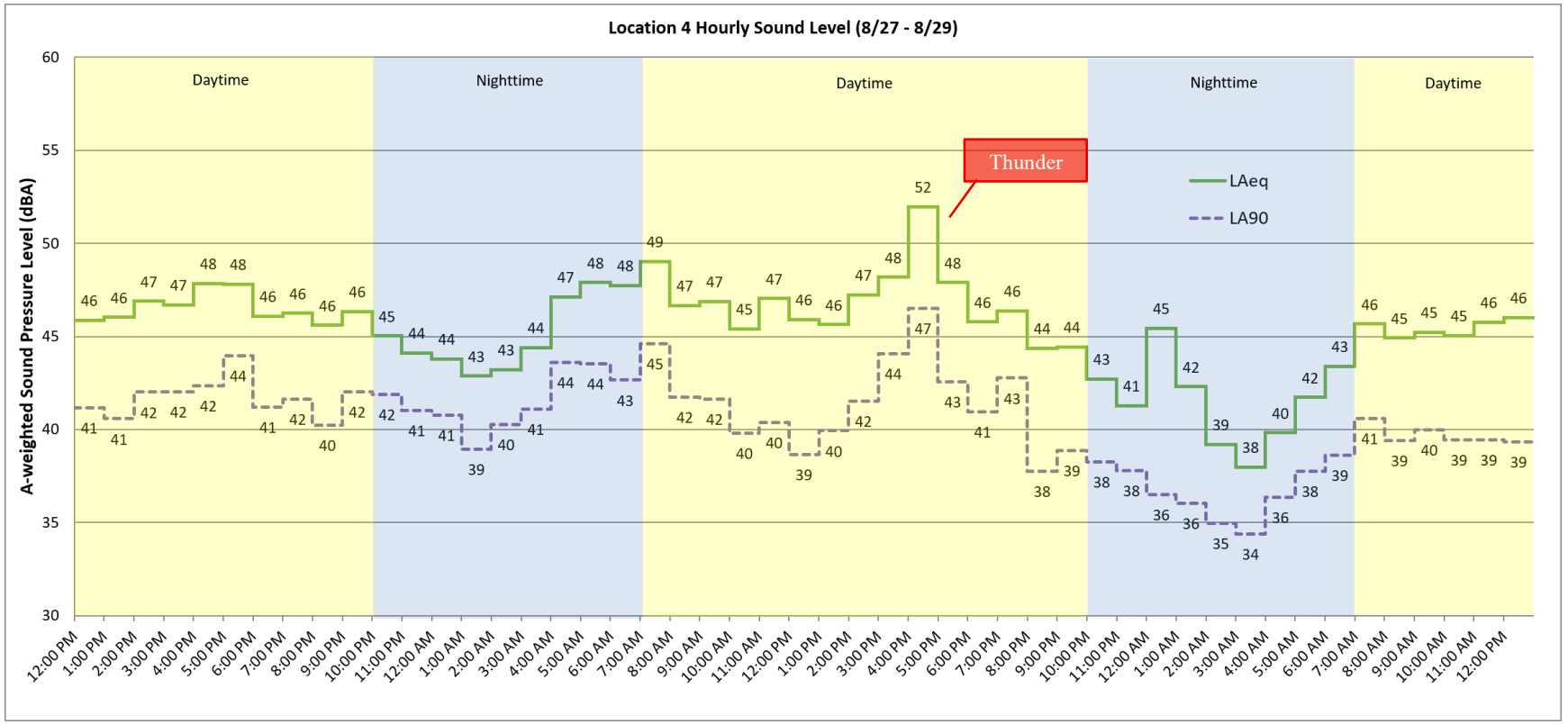

Figure 19: Location 4 Hourly Sound Level (8/27 – 8/29)

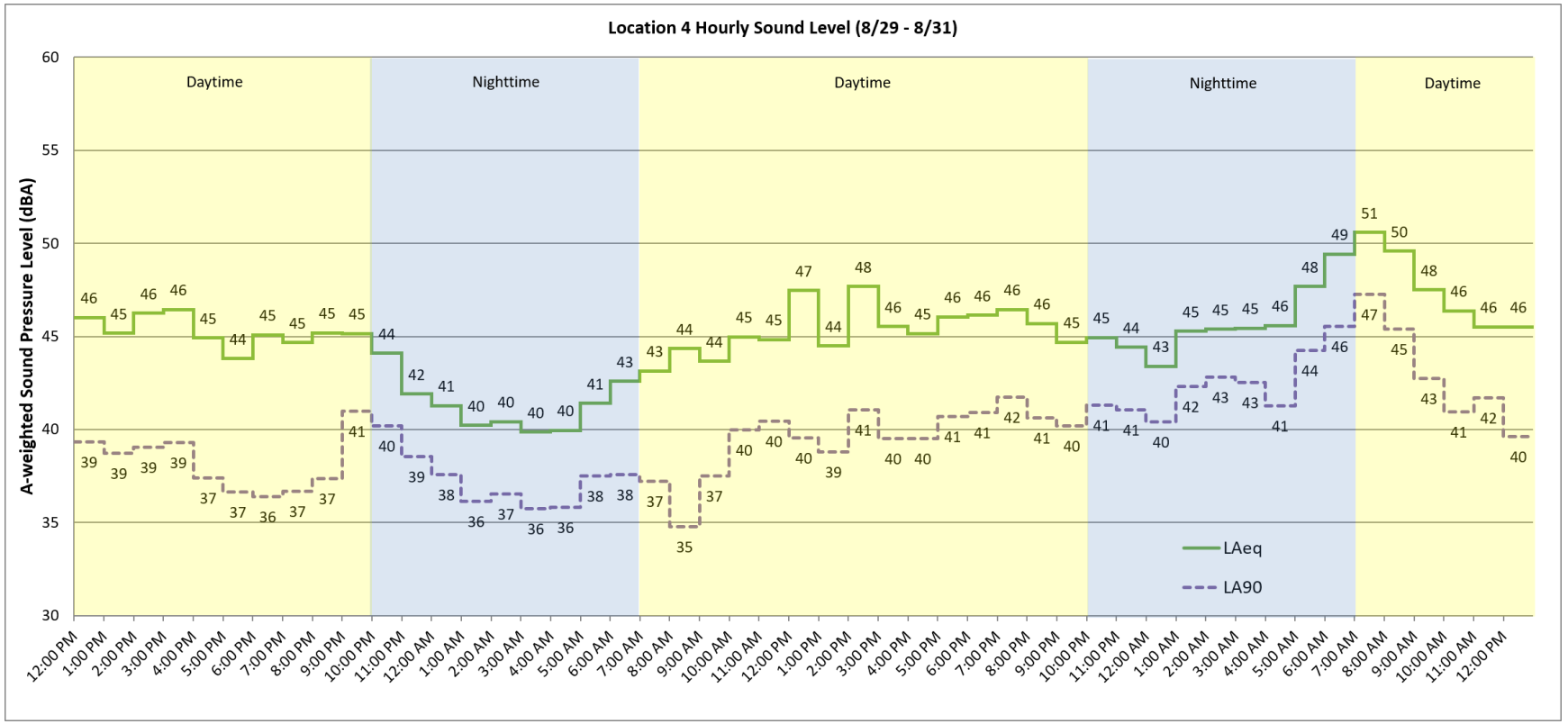

Figure 20: Location 4 Hourly Sound Level (8/29 – 8/31)

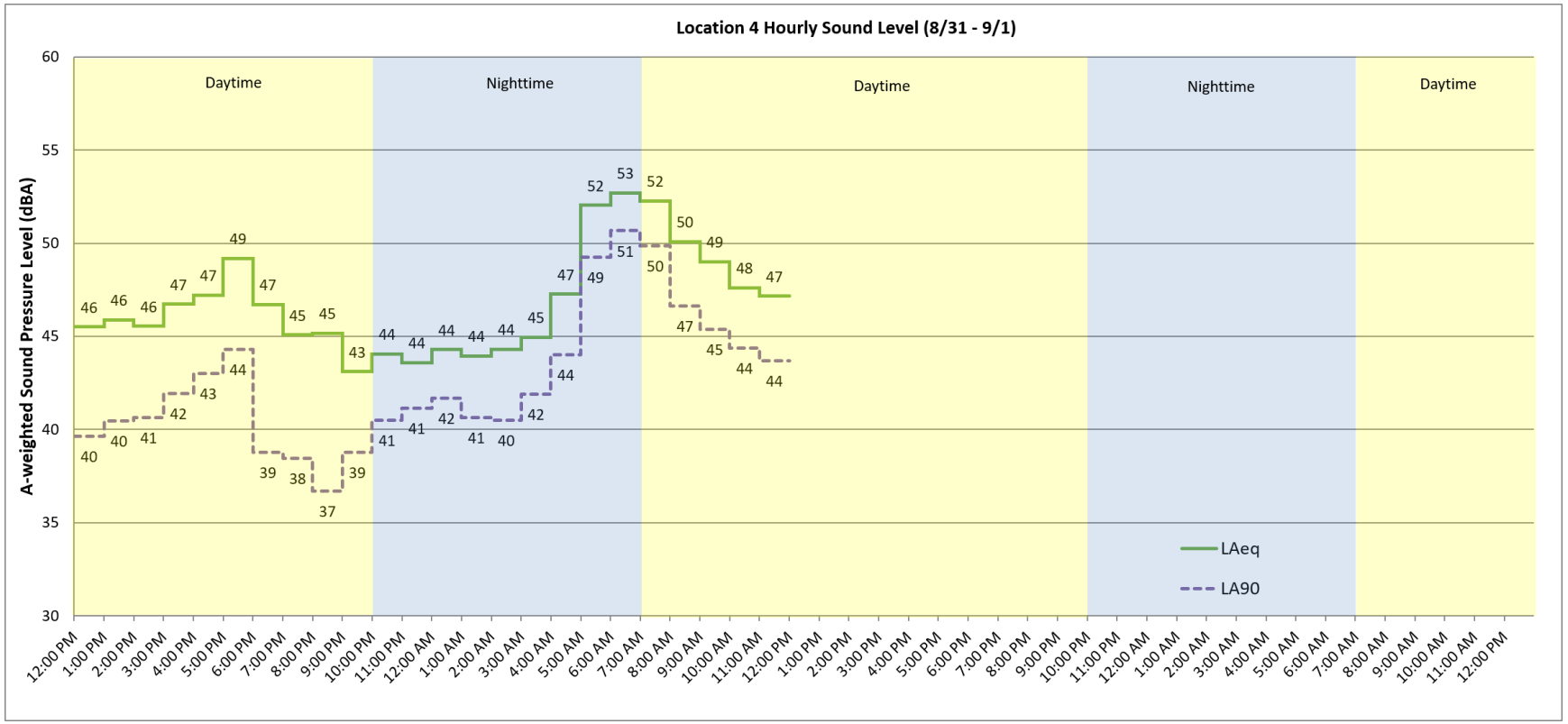

Figure 21: Location 4 Hourly Sound Level (8/31 – 9/1

Appendix C: Measurement Location Photographs

Location 1









Location 2







Location 3









Location 4







