



EDWARD DUGGER + ASSOCIATES, P.A.  
Consultants in Architectural Acoustics

## **Acoustic Study – ED+A 181044**

**September 6, 2018**

**Project:**

**Plymouth Hotel Miami**  
336 21<sup>st</sup> Street  
Miami Beach, Florida 33139

**Applicant:**

**Plymouth Hotel LLC**  
PO Box 398007  
Miami Beach, Florida 33239

Prepared for:

Thomas R. Mooney – Director  
City of Miami Beach Planning Department  
1700 Convention Center Drive, Second Floor  
Miami Beach, Florida 33139

Prepared by:

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A handwritten signature in black ink that reads 'Sam Shroyer'.

Sam Shroyer, ASA  
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A handwritten signature in black ink that reads 'Edward Dugger'.

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## ACOUSTIC STUDY

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Date: 6 September 2018

To: Thomas R. Mooney, Director  
City of Miami Beach Planning Department  
1700 Convention Center Drive, 2<sup>nd</sup> Floor  
Miami Beach, Florida 33139

From: Sam Shroyer, ASA  
Edward Dugger, FAIA ASA NCAC INCE

Re: **Acoustic Study – City of Miami Beach**  
**Plymouth Hotel Miami**  
**336 21<sup>st</sup> Street**  
**Miami Beach, Florida 33139**  
**ED+A 181044**

Mr. Mooney,

This report has been prepared by Edward Dugger + Associates, P.A. (ED+A) to document the existing sound environment at 336 21<sup>st</sup> Street in conjunction with Plymouth Hotel LLC's request for an Outdoor Entertainment License. To prepare this study, ED+A has discussed the purpose of this application with our client, performed long-term acoustical measurements, and analyzed the resulting data for comparison with applicable community noise standards. The existing audio system and its signal processing components and attenuation capabilities were also evaluated. Recommendations have been made to ensure that the existing sound levels—which have been found to be appropriate—are maintained under Plymouth Hotel Miami's proposed operations.

ED+A welcome further discussion with the City of Miami Beach Planning Department concerning this report and application. Please contact ED+A with any questions, comments, or concerns regarding this report or its contents.



## **Project Information**

### Introduction

Plymouth Hotel LLC (“the Applicant”) is seeking a Conditional Use Permit for an Open Air/Outdoor Entertainment Establishment at 336 21<sup>st</sup> Street. The Applicant—doing business as “Plymouth Hotel Miami”—has been operating as a hotel at this location since 2015. The building also includes restaurant spaces.

A courtyard / pool deck area (“Pool Deck”) makes up roughly one-third of the property along its south and east boundaries. There is currently an audio system in place throughout this area which provides background music at ambient sound levels to create an ambiance for guests using the pool and associated amenities. The area is not currently used for entertainment or dining. The Applicant is proposing to allow live musicians and DJ’s in this area as an alternative to pre-recorded music to create the same background sound conditions.

### Project Location

Plymouth Hotel Miami is located on the southeast corner of the Park Avenue and 21<sup>st</sup> Street intersection. Pursuant to the City’s Land Use and Zoning Maps, the property’s land use and zoning designations are both “Residential Multifamily, Medium Intensity District” (RM-2). The property is located within the “Museum Historic District.” All surrounding properties south of 21<sup>st</sup> Street share these land use and zoning designations. Properties north of 21<sup>st</sup> Street on the west side of Park Avenue also share these land use and zoning designations, but Collins Park—located on the east side of Park Avenue, directly across the street from Plymouth Hotel Miami—has a “Public Facility, Governmental” land use designation (PF) and “Civic and Government” (GU) zoning. All properties immediately adjacent to the Pool Deck are currently operating as hotels.

### Operations

The Pool Deck opens at 11:00 a.m. daily and closes at 12:00 a.m. Sunday through Thursday. Closing time changes to 2:00 a.m. the following morning Thursday through Sunday. Background music is currently provided at all times, but output sound levels are decreased significantly outside of these hours. Hours during which Outdoor Entertainment will be provided will vary depending on the event or clientele occupying the Pool Deck but will never extend beyond the aforementioned hours. The Applicant has informed ED+A of their intention to allow for the hotel to provide DJ or live music in the form of strings or small ensembles at background/ambient sound levels for events for which the Pool Deck may be reserved (e.g., weddings) but does not intend to

increase these levels beyond those at which are currently produced during operating hours.

## **Acoustical Measurements and Results**

### Methodology

Long-term acoustical measurements were performed at a relatively central location in the eastern portion of the Pool Deck. Care was taken to ensure that the measurement microphone was not located directly in front of any existing loudspeakers, but at a distance and height which would be comparable to a typical guest location.

The measurement system was deployed on Tuesday, August 28 and was retrieved on Friday, August 31. The system measured sound levels continuously without interruption and was calibrated immediately before and after the measurement period. The microphone was oriented vertically roughly 5-ft. to 6-ft. above the ground and was positioned at a sufficient distance from building façades to ensure that the measured sound levels were not significantly affected by acoustical reflections. The equipment utilized for these measurements is listed in Table 1.

### Acoustical Quantities

The system calculated A-weighted equivalent-continuous sound pressure levels ( $L_{Aeq}$ )—a time-average metric—in one-minute intervals. ED+A calculated one-hour  $L_{Aeq}$  from the measured data to demonstrate temporal patterns over the measurement period. A-weighted percentile-exceeded sound pressure levels ( $L_{A10}$ ,  $L_{A50}$ ,  $L_{A90}$ ) were also logged for each one-minute increment of the measurement period. The A frequency weighting was applied to the measured sound levels as it corresponds with human sensitivity to sound and is most applicable to community noise studies.

It is common in community noise assessments to subdivide each day of a measurement period into two observation periods: daytime (7:00 a.m. to 10:00 p.m.) and nighttime (12:00 a.m. to 7:00 a.m., 10:00 p.m. to 12:00 a.m.). Day-average sound levels ( $L_{Ad}$ ) and night-average sound levels ( $L_{An}$ ) were calculated for each day.  $L_{Aeq}$  and day-night average sound pressure level (DNL or  $L_{dn}$ ) were also calculated from the data which are representative of each individual day of the measurement period. Like  $L_{Aeq}$ , DNL is also a time-average value, but a 10 dBA penalty is applied to sound pressure levels measured during nighttime periods to account for the general public's increased sensitivity to noise during these hours.

The measurement system also calculated overall  $L_{Aeq}$ ,  $L_{A10}$ ,  $L_{A50}$ ,  $L_{A90}$  for the entirety of the measurement period. The overall DNL of the measurement period was calculated by ED+A.

### Measurement Results

The measured one-minute  $L_{Aeq}$  have been graphed in Figures 2, 3, 4, and 5 and can be provided in numerical form, if requested. One-hour  $L_{Aeq}$  are presented in Figure 6 and Table 2 while the daily and overall quantities are included in Tables 3 and 4, respectively.

Measured sound levels were mostly constant throughout the duration of the monitoring period. As illustrated by the aforementioned Figures, the one-minute  $L_{Aeq}$  at the Pool Deck did not drop below 53 dBA. The time-history plots of the one-minute  $L_{Aeq}$  also demonstrate increased sound levels during daytime periods which can be attributed to background music generated by the audio system. These sound levels were mostly constant, ranging from roughly 60 dBA to 65 dBA with occasional one-minute increments exceeding these levels. Music at this level appears to have continued until 11:00 p.m. on each night of the measurement, at which point the audio system's output sound level automatically adjusted to remain between roughly 53 dBA and 55 dBA.

During the overnight periods, the measured one-minute  $L_{Aeq}$  increased to roughly 60 dBA every 10 to 15 minutes; the Applicant has confirmed to ED+A the source of this increase to be pool equipment that was being serviced at the time. Therefore, the daily and overall acoustical quantities that included nighttime sound levels in their calculation (e.g. DNL,  $L_{An}$ ,  $L_{Aeq}$ ) would be expected to decrease from those presented in this report once this equipment issue is resolved.

The average  $L_{Aeq}$  and  $L_{Ad}$  for the two days of the measurement period during which sound levels were measured for a full twenty-four-hours (Wednesday, August 29 and Thursday, August 30) were 61 dBA and 62 dBA, respectively. The average  $L_{An}$  and DNL calculated for these days were identical from one day to the next at 59 dBA and 66 dBA, respectively.

## **Discussion and Analysis**

### Audio System

The distributed audio system installed in the Pool Deck consists of several surface-mounted loudspeakers located roughly 8-ft. to 10-ft. above ground on the east and north wall surfaces only. This system will not be replaced or altered by the Applicant in the

future, with the exception of the introduction of components to allow for performers to “plug in” to the system if necessary. The system components on the Pool Deck are separated into their own “zone,” meaning they are controlled separately from components in other areas of the hotel. The audio system and its output are configured with and processed through an Atlas Digital BlueBridge BB-816 Digital Signal Processor (DSP), which allows for the control of the various components through filters, equalization, and limiting functions. The DSP was programmed by DCI Sound at the time of its installation to incorporate an output sound level limit.

The sound output levels in different zones are able to be adjusted—but never above the pre-programmed limit—via a secure IT-dedicated room in the hotel which can only be accessed by hotel management and the hotel’s full-time employee whom is responsible for maintaining these systems. The limiting functions are crucial in maintaining appropriate levels during events and ED+A recommends that they continue to be utilized moving forward. It should be noted that additional level and frequency output adjustments may be necessary when some instruments are being amplified through the system. Thus, it is recommended that an employee familiar with the audio system be on-site to adjust the system if needed, particularly during nighttime hours. However, many instruments which may be utilized for some events (e.g. weddings) may not require amplification, depending on a variety of factors.

ED+A recommends that the low-frequency output of the system be maintained in a fashion as to not generate excessive sound levels at low frequencies during nighttime hours. Though there may not be any residential properties in the immediate vicinity of the property, hotel guests may be averse to perceivably loud music for an extended period of time or during late-night or early-morning hours. The average person is typically more sensitive to sound at low-frequencies (bass noise), and as these sounds are more effective in propagating distances and transmitting through solid structures (particularly windows), ED+A recommends that they be limited to an appropriate level. The Applicant has informed ED+A that precautions have already been taken in configuring the audio system’s output so as not to disturb guests at the hotel and that they have not received any complaints regarding music on the Pool Deck since they’ve been operating. It should be noted that the hotel windows in the guest rooms are impact-grade, which typically serve to decrease sound transmission into a building’s interior more effectively than non-impact-grade window assemblies.

The location of the speakers relative to the hotel windows, the use of a distributed speaker system, and the directional characteristics of the speakers and the intended areas of coverage will also reduce the likelihood of noise disturbances in guest rooms. It is worth noting that there are only windows on the third-story of the Riviera Hotel

façade which overlooks the Pool Deck and that there is existing landscaping along the boundary shared by these two properties.

### Potential for Impact

Though the nighttime observation period is typically defined as the hours between 10:00 p.m. and 7:00 a.m. the following day, the Miami Beach Code of Ordinances includes specific noise regulations for the hours between 11:00 p.m. and 7:00 a.m. Thus, ED+A believe it appropriate that background music in the Pool Deck is discontinued at 11:00 p.m. As previously indicated, however, there may be events in the future where background music may extend beyond 11:00 p.m.

*American National Standard Quantities and Procedures for Description and Measurement of Environmental Sound – Part 5: Sound Level Descriptors for Determination of Compatible Land Use (ANSI/ASA S12.9-2007/Part 5)* provides measures of land use compatibility based on average DNL for various types of land uses (see Figure 7). The “hotels, motels, transient lodging” category is deemed “marginally compatible” where DNL are less than 65 dB and “compatible with sound insulation” where DNL are less than 75 dB. Thus, the sound levels measured at the site are believed to be appropriate for the existing and proposed uses of the property. However, care should be taken to minimize the impact of background music during nighttime operating hours, specifically between 11:00 p.m. and 2:00 a.m., to ensure that appropriate levels are maintained so as not to disturb guests at Plymouth Hotel Miami or other hotels adjacent to the Pool Deck.

### **Conclusion**

Through ED+A’s long-term acoustical measurements and subsequent analysis, it has been determined that the existing sound levels on the Pool Deck are appropriate for hotel uses and that the existing audio system and staff controls are sufficient to maintain these levels. Should the existing sound level limit remain in the system, the use of live instruments should not prove bothersome to hotel guests or neighboring properties. ED+A have recommended additional controls which should be considered as the Applicant pursues alternate forms of entertainment.



## Figures and Tables



Figure 1. Plymouth Hotel Miami and measurement locations.

Table 1. ED+A Measurement Equipment			
Manufacturer	Model	Serial No.	Laboratory Calibration Date
Brüel and Kjær	Type 2270 Hand-Held Analyzer	2706869	4/20/2018
Brüel and Kjær	Type 4952 Outdoor Microphone	2788753	12/22/2017
Brüel and Kjær	Type 4231 Sound Calibrator	2394124	8/2/2017



Table 2. Measured One-Hour L <sub>Aeq</sub> (dBA)				
Date	Tuesday	Wednesday	Thursday	Friday
	28-Aug-18	29-Aug-18	30-Aug-18	31-Aug-18
L 0000-0100		57	58	57
L 0100-0200		59	55	61
L 0200-0300		56	56	55
L 0300-0400		56	55	55
L 0400-0500		56	55	55
L 0500-0600		56	60	55
L 0600-0700		56	57	55
L 0700-0800		56	56	58
L 0800-0900		58	56	57
L 0900-1000		59	57	58
L 1000-1100		58	59	61
L 1100-1200		58	66	
L 1200-1300	62	58	64	
L 1300-1400	61	57	62	
L 1400-1500	62	61	63	
L 1500-1600	62	62	63	
L 1600-1700	67	63	63	
L 1700-1800	63	63	64	
L 1800-1900	63	62	63	
L 1900-2000	70	62	62	
L 2000-2100	63	62	63	
L 2100-2200	62	62	65	
L 2200-2300	62	62	64	
L 2300-2400	61	63	60	

Table 3. Daily Time-Average Values (dBA)						
Date	Tuesday	Wednesday	Thursday	Friday	Average	
	28-Aug-18	29-Aug-18	30-Aug-18	31-Aug-18	All Days	24-Hour Periods
L <sub>Aeq</sub>	64	60	62	54	60	61
L <sub>Ad</sub>	64	61	63	53	60	62
L <sub>An</sub>	62	59	59	57	59	59
DNL	67	66	66	65	66	66

Table 4. Overall Values (dbA)	
Metric	Sound Level
L <sub>Aeq</sub>	61
L <sub>AF10</sub>	64
L <sub>AF50</sub>	59
L <sub>AF90</sub>	54

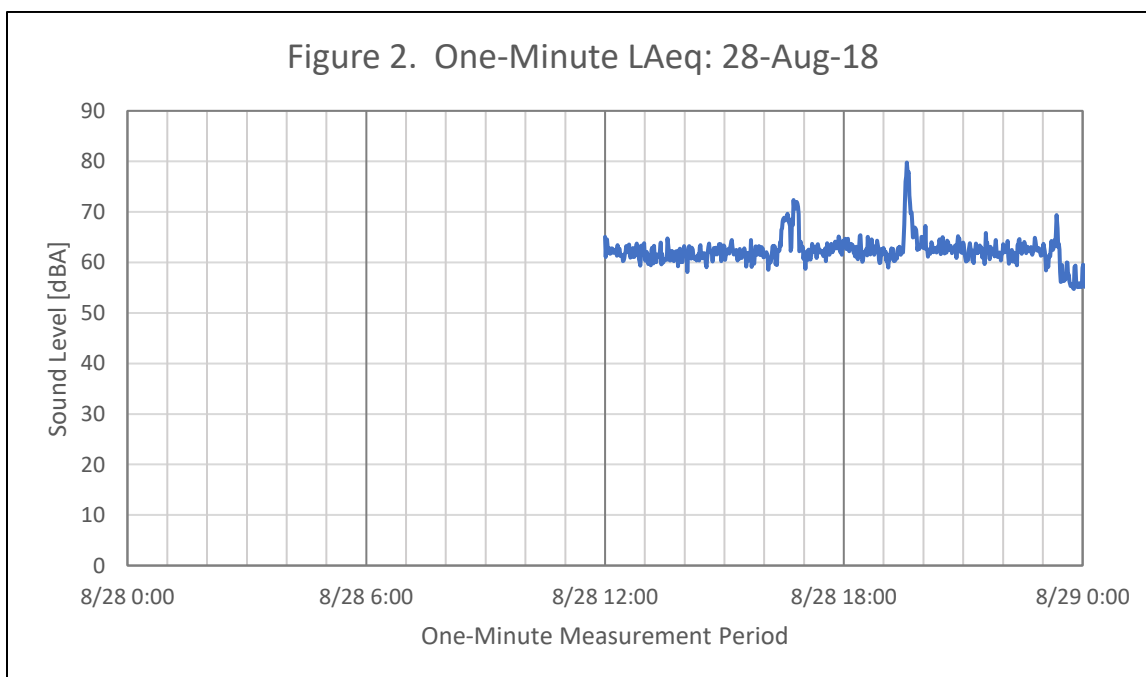


Figure 3. One-Minute LAeq: 29-Aug-18

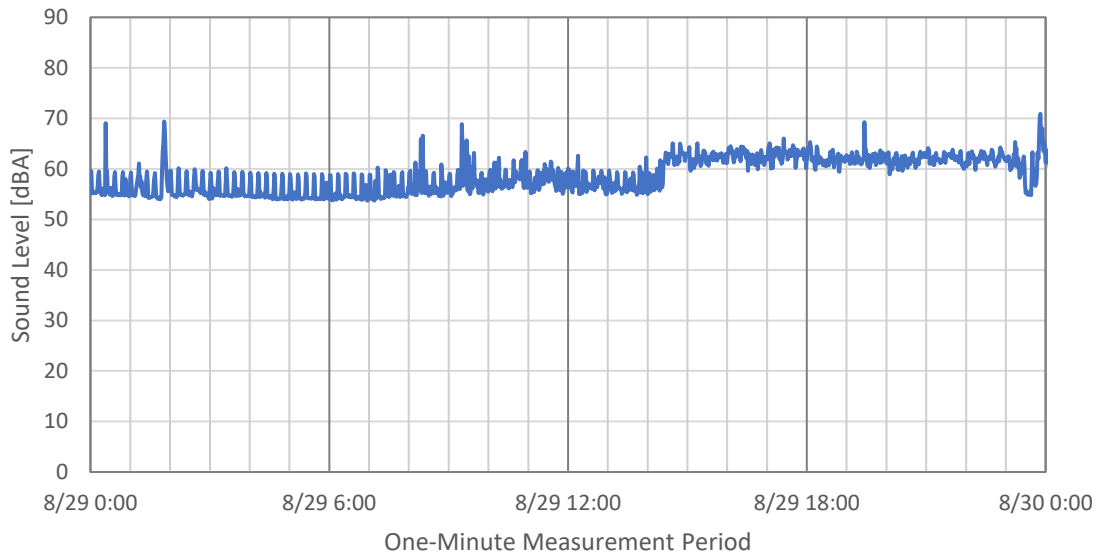


Figure 4. One-Minute LAeq: 30-Aug-18

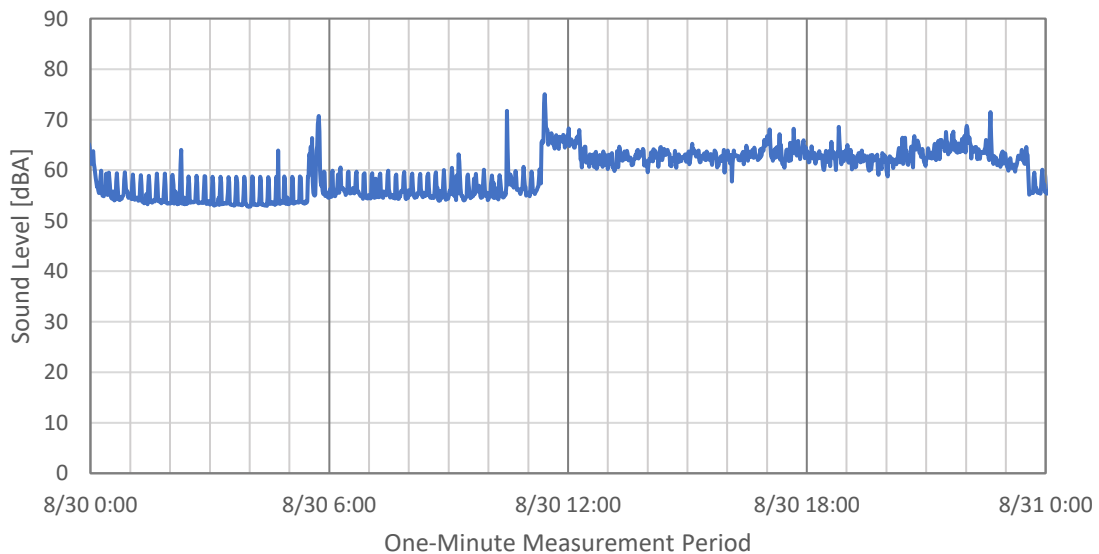


Figure 5. One-Minute LAeq: 31-Aug-18

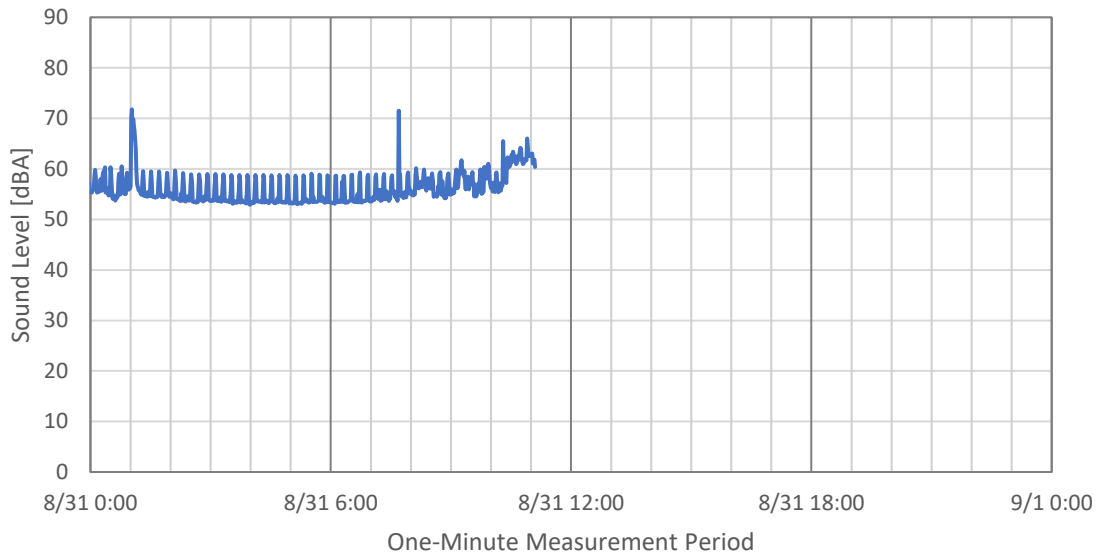
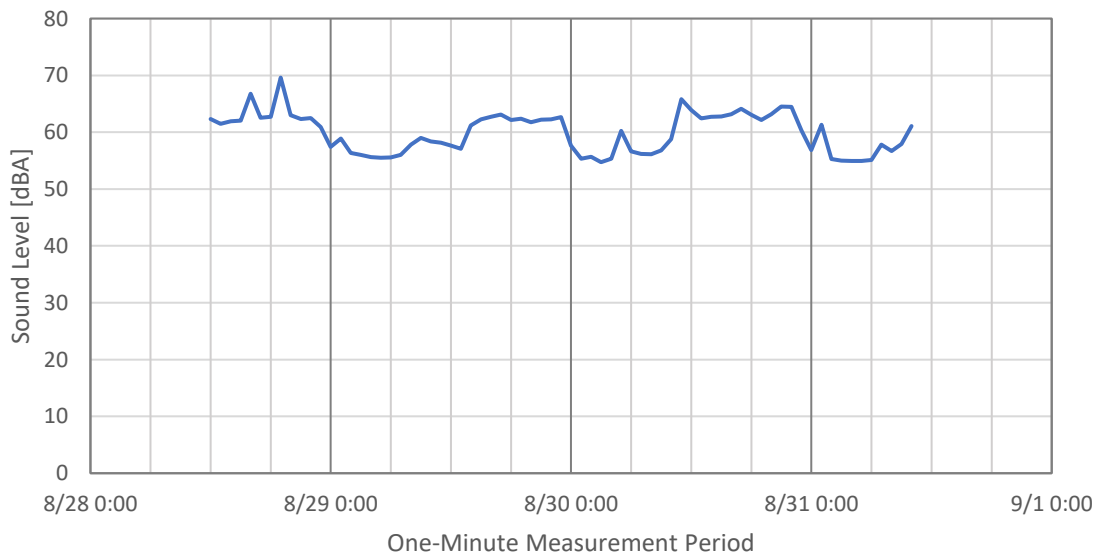


Figure 6. One-Hour LAeq



**Figure 6. ANSI/ASA S12.9/Part 5  
Land Use Compatibility**

