APPENDIX F

Noise and Vibration Technical Report

Technical Study

TO: Long Beach Development Services, Planning Bureau
c/o Amy Harbin, Planner
411 West Ocean Boulevard, 3rd Floor
Long Beach, CA 90802

FROM: Terry A. Hayes Associates Inc.
3535 Hayden Avenue, Suite 350
Culver City, CA 90232

DATE: April 12, 2023

RE: **Shoreline Village Renovation Project – Noise and Vibration Assessment**

Introduction

Terry A. Hayes Associates Inc. (TAHA) has completed a Noise and Vibration Assessment for the Shoreline Village Renovation Project (proposed project) in accordance with provisions of California Environmental Quality Act (CEQA) Statutes and Guidelines. It is anticipated that this Assessment will be used to support an Initial Study/Mitigated Negative Declaration for the proposed project. This Assessment is organized as follows:

- Project Description
- Noise and Vibration Topical Information
- Regulatory Framework
- Significance Thresholds and Local Standards
- Methodology
- Existing Setting
- Impact Assessment
- References

Project Description

The project site is located at 401-435 Shoreline Village Drive in the City of Long Beach on a 313,739-square-foot lot. The proposed project is located in an urban area surrounded by commercial and recreational uses. The project site is bounded by Shoreline Drive to the north, the Marina Green recreational park to the east, Long Beach Shoreline Marina to the southeast, Long Beach Harbor to the south, and Rainbow Harbor and Shoreline Aquatic Park to the west. The existing project site is comprised of a series of commercial buildings, ancillary structures, and surface parking lots.

The proposed project includes a combination of renovations, demolitions, and new construction. Building 419 would be renovated to accommodate 169 square feet of converted interior retail space, 551 square feet of new retail space, and 720 square feet of interior restroom facilities. Additional improvements include the replacement or repair of exterior cladding, new windows/doors/storefronts, and new signage, as well as the expansion of the roof and awnings.

Demolition activities would include Buildings 421 (179 square feet) and 425 (859 square feet), which are two kiosk structures located along the northwest boundary of the project site adjacent to Rainbow Harbor. Building 411, a 4,481 square foot circular tower structure currently occupied by an arcade, would be demolished to accommodate the construction of two new buildings. After demolition of Building 411, the proposed project would construct two new semi-circular buildings totaling 1,270 square feet of retail uses. The two buildings would be oriented in a circular pattern around 1,200 square feet of new outdoor public seating areas.

The proposed project would also construct a two-level, 227-stall parking deck over the existing surface parking area along Shoreline Village Drive, resulting in a net gain of 80 parking stalls compared to existing conditions. The parking garage footprint would be 35,268 square feet. The overall parking area (deck and surface parking lot) would accommodate 395 standard-sized parking stalls, including 24 electric vehicle charging stalls. On the ground floor, the new parking deck would also accommodate 650 square feet of retail space as well as 1,871 square feet for 28 bicycle storage spaces. Mural artworks and green landscaping walls would be installed on the façade of the parking garage. Additional site improvements would also include the following newly remodeled public areas: the Hub Plaza, the boardwalk along the northern boundary of the project site fronting Rainbow Harbor, two view corridors within the pedestrian circulation network, Harborside Plaza, and a 700 square foot public viewing deck located on the southern boundary of the project site. Remodeled public areas would be enhanced with new paving, seating and other site furnishings.

Regarding transportation improvements, the surface parking lots on the southern and northern ends of the project site would be repaved, restriped, and landscaped. New parking gates/pay stations would be installed at the access entry points to the project site along Shoreline Village Drive, as well as new stalls with electric vehicle chargers for electric vehicles. The proposed project would not construct new ingress or egress access points to the surface parking lots. The proposed project would also construct a new bike path connection between the existing path along Rainbow Harbor and the Marina Green bike path.

The overall components of the proposed project would result in no net change in the commercial area of 82,368 square feet per the original entitlement. All buildings constructed for the proposed project would be designed to achieve Leadership in Energy and Environmental Design (LEED) Certification. The proposed project would incorporate high efficiency lighting fixtures and water conservation strategies into the newly renovated and constructed buildings.

Construction of the proposed project is anticipated to start in November 2024 and would take approximately 18 months to complete with operations estimated to start in May 2026. Construction activities would generally occur five days per week from Monday through Friday between the hours of 7:00 am to 7:00 pm during the weekdays and 9:00 am to 6:00 pm on Saturdays pursuant to Section 8.80.202 of the Long Beach Municipal Code (LBMC). Construction activities would require approximately 30 workers per day. Approximately 75 cubic yards of soil would be exported related to the parking deck foundation.

Noise and Vibration Topical Information

The standard unit of measurement for noise is the decibel (dB). The human ear is not equally sensitive to sound at all frequencies. The A-weighted scale, abbreviated dBA, reflects the normal hearing sensitivity range of the human ear. On this scale, the range of human hearing extends from approximately 3 to 140 dBA. The noise analysis discusses sound levels in terms of Equivalent Noise Level (L_{eq}), L_{50} and Community Noise Equivalent Level (CNEL). L_{eq} is the average noise level on an energy basis for any specific time period. The L_{eq} for one hour is the energy average noise level during the hour. The average noise level is based on the energy content (acoustic energy) of the sound. L_{eq} can be thought of as the level of a continuous noise which has the same

energy content as the fluctuating noise level. L_{50}, is the noise level for 30 minutes within any hour. The L_{eq} and L_{50} are expressed in units of dBA.

CNEL is an average sound level during a 24-hour period. CNEL is a noise measurement scale, which accounts for noise source, distance, single event duration, single event occurrence, frequency, and time of day. Human reaction to sound between 7:00 pm and 10:00 pm is as if the sound were actually 5 dBA higher than if it occurred from 7:00 am to 7:00 pm. From 10:00 pm to 7:00 am, humans perceive sound as if it were 10 dBA higher due to the lower background level. Hence, the CNEL is obtained by adding an additional 5 dBA to sound levels in the evening from 7:00 pm to 10:00 pm and 10 dBA to sound levels in the night from 10:00 pm to 7:00 am. Because CNEL accounts for human sensitivity to sound, the CNEL is always a higher number than the actual 24-hour average.

Noise levels decrease as the distance from the noise source to the receiver increases. Noise generated by a stationary noise source, or "point source," decreases by approximately 6 dBA over hard surfaces (e.g., reflective surfaces such as parking lots or smooth bodies of water) and 7.5 dBA over soft surfaces (e.g., absorptive surfaces such as soft dirt, grass, or scattered bushes and trees) for each doubling of the distance. For example, if a noise source produces a noise level of 89 dBA at a reference distance of 50 feet, then the noise level is 83 dBA at a distance of 100 feet from the noise source, 77 dBA at a distance of 200 feet over a hard surface.

Noise generated by a mobile source decreases by approximately 3 dBA over hard surfaces and 4.8 dBA over soft surfaces for each doubling of the distance. Generally, noise is most audible when the source is in a direct line-of-sight of the receiver. Barriers, such as walls, berms, or buildings that break the line-of-sight between the source and the receiver greatly reduce noise levels from the source since sound can only reach the receiver by bending over the top of the barrier. However, if a barrier is not sufficiently high or long to break the line-of-sight from the source to the receiver, its effectiveness is greatly reduced.

Studies have shown that the smallest perceptible change in sound level for a person with normal hearing sensitivity is approximately 3 dBA. A change of at least 5 dBA would be noticeable and may evoke a community reaction. A 10-dBA increase is subjectively heard as a doubling in loudness and would likely cause a negative community reaction.

Vibration is an oscillatory motion through a solid medium in which the motion's amplitude can be described in terms of displacement, velocity, or acceleration. Vibration can be a serious concern, causing buildings to shake and rumbling sounds to be heard. In contrast to noise, vibration is not a common environmental problem. It is unusual for vibration from sources such as buses and trucks to be perceptible, even in locations close to major roads. Some common sources of vibration are trains, buses on rough roads, and construction activities, such as rock blasting, pile driving, and heavy earth-moving equipment. High levels of vibration may cause physical personal injury or damage to buildings. However, vibration levels rarely affect human health. Instead, most people consider vibration to be an annoyance that may affect concentration or disturb sleep. In addition, high levels of vibration may damage fragile buildings or interfere with equipment that is highly sensitive to vibration (e.g., electron microscopes).

There are several different methods that are used to quantify vibration. The peak particle velocity (PPV) is defined as the maximum instantaneous peak of the vibration signal. The PPV is most frequently used to describe vibration impacts to buildings and is usually measured in inches per second. The root mean square (RMS) amplitude is most frequently used to describe the effect of vibration on the human body. The RMS

amplitude is defined as the average of the squared amplitude of the signal. Decibel notation (VdB) is commonly used to measure RMS. The VdB acts to compress the range of numbers required to describe vibration.[1]

Regulatory Framework

The following discussion includes relevant regulations, policies, and programs that have been adopted by federal, state, regional, and local agencies to protect the public from noise and vibration.

Noise

Federal. The Noise Control Act of 1972 established programs and guidelines to identify and address the effects of noise on public health, welfare, and the environment. In 1981, the United States Environmental Protection Agency (USEPA) determined that subjective issues such as noise would be better addressed at local levels of government, thereby allowing more individualized control for specific issues by designated federal, state, and local government agencies. Consequently, in 1982, responsibilities for regulating noise control policies were transferred to specific federal agencies, and state and local governments. However, noise control guidelines and regulations contained in the USEPA rulings in prior years remain in place.

State. The State of California has adopted noise standards in areas of regulation not preempted by the federal government. State standards regulate noise levels of motor vehicles, sound transmission through buildings, occupational noise control, and noise insulation. State regulations governing noise levels generated by individual motor vehicles and occupational noise control are not applicable to planning efforts, nor are these areas typically subject to CEQA analysis.

Local. The City of Long Beach has established policies and regulations concerning the generation and control of noise that could adversely affect its citizens and noise-sensitive land uses. Chapter 8.80 of the LBMC sets forth all noise regulations controlling unnecessary, excessive, and annoying noise and vibration in the City. The LBMC has not established a quantitative standard for construction noise, which is instead regulated by allowable hours of construction. LBMC Section 8.80.202 (Construction Activity – Noise Regulations) states that no construction or repair work shall be performed between the hours of 7:00 pm and 7:00 am on Monday through Friday and federal holidays occurring on weekdays, since such activities would generate loud noises and disturb persons occupying sleeping quarters in any adjacent dwelling, hotel, apartment, or other place of residence. Further, no person shall operate or permit the operation of any tools or equipment which produce loud or unusual noise between the hours of 7:00 pm on Friday and 9:00 am on Saturday and after 6:00 pm on Saturday. No person shall conduct construction work on Sunday. A Sunday work permit may be issued by the Noise Control Officer, but only for the hours between 9:00 am and 6:00 pm.

Section 8.80.150 of the LBMC states that exterior noise standards are based on various land use districts and are presented in Section 8.80.160. Land uses near the project site are located in Noise Districts One and Two. **Table 1** summarizes the applicable standards for Noise District One and Two. LBMC Section 8.80.160(C) states that if the measured ambient noise level exceeds the permissible noise limit categories, then the allowable noise exposure standard shall be increased by increments of 5 dB. **Table 2** summarizes the LBMC interior noise standards for various land use districts and types.

[1]FTA, *Transit Noise and Vibration Impact Assessment*, September 2018.

TABLE 1: CITY OF LONG BEACH EXTERIOR NOISE LIMITS (DISTRICT ONE AND TWO)				
	Daytime (7:00 am to 10:00 pm)		Nighttime (10:00 pm to 7:00 am)	
Allowable Noise Exposure Duration	District One	District Two	District One	District Two
30 Minutes (L_{50})	50 dBA	60 dBA	45 dBA	55 dBA
15 Minutes	55 dBA	65 dBA	50 dBA	60 dBA
5 Minutes	60 dBA	70 dBA	55 dBA	65 dBA
1 Minute	65 dBA	75 dBA	60 dBA	70 dBA
Any period of time	70 dBA	80 dBA	65 dBA	75 dBA
SOURCE: LBMC *Section 8.80.160, Exterior Noise Limits – Correction for Character of Sound*.				

TABLE 2: CITY OF LONG BEACH INTERIOR NOISE LIMITS			
Receiving Land Use District	Type of Land Use	Time Interval	Allowable Interior Noise Level (dBA)
All	Residential	10:00 pm to 7:00 am 7:00 am to 10:00 pm	35 45
All	School	7:00 am to 10:00 pm (While school is in session)	45
Hospital, designated quiet zones and noise sensitive zones	Quiet Zones	Any time	40
SOURCE: LBMC *Section 8.80.170, Interior Noise Limits – Maximum Sound Levels*.			

LBMC Section 8.20.200 (N) (Noise Disturbances – Acts Specific) states that air-conditioning or refrigerating equipment shall not exceed 55 dBA at the nearest property line, 50 dBA at a neighboring patio, or 50 dBA outside the neighboring living area window nearest the equipment location.

LBMC Section 8.80.340 (A) (Variance – Exemption from regulations.) states that a variance may be obtained from a noise control officer to grant an exemption from any provision of Chapter 8.80 of the LBMC.

The City of Long Beach also includes noise regulations within the Noise Element of the General Plan. The Noise Element, adopted in 1975, serves as a comprehensive program for noise control and abatement in Long Beach and includes an action program consisting of various measures that the City may implement in pursuing its noise control plan.

Vibration

Federal. The Federal Transit Administration (FTA) guidance may be used to assess the potential for vibration-related damage and annoyance.[2] For damage, the impact criteria are established based on the structural foundation of the potentially impacted building. Site visits indicate that the buildings near the project site are constructed with non-engineered timber and masonry. Vibration levels that exceed a PPV of 0.2 inches per second could potentially damage these types of buildings.

State. The California Department of Transportation (Caltrans) Transportation and Construction Vibration Guidance Manual published April 2020 includes guidance to address vibration issues associated with the construction, operation, and maintenance of Caltrans projects. This manual provides guidelines for assessing vibration damage potential to various types of buildings, ranging from 0.08 to 0.12 inches per second for extremely fragile historic buildings, ruins, and ancient monuments, to 0.50 to 2.0 inches per second for modern

[2] FTA, *Transit Noise and Vibration Impact Assessment*, September 2018.

industrial and commercial buildings. The guidance and procedures provided in the Caltrans manual are suitable for use as screening tools for assessing the potential for adverse effects related to human perception and structural damage.

Local. The City has established regulations related to vibration. Section 8.80.200 (G) of the LBMC states that it is a violation to operate or permit the operation of a device that creates vibration which is above the vibration threshold at or beyond the property boundary of the source if on private property or at 150 feet from the source if on public space. The vibration perception threshold is defined as the minimum groundborne vibration necessary to cause a normal person to be aware of the vibration by means such as feeling the vibration or observing vibration-induced motion of other objects. The vibration regulation is approximately 0.001 g's (acceleration from gravity)[3] in the 0 to 30 hertz frequency range and 0.003 g's in the frequency range of 30 to 100 hertz.

Significance Thresholds

This assessment was undertaken to determine whether construction or operation of the proposed project would have the potential to result in significant environmental impacts related to noise or vibration in the context of the Appendix G Environmental Checklist criteria of the CEQA Guidelines. Implementation of the proposed project may result in a significant environmental impact related to noise and vibration if the proposed project would result in:

a) Generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies;
b) Generation of excessive ground-borne vibration or ground-borne noise levels; and/or
c) For a project located within the vicinity of a private airstrip or an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project expose people residing or working in the project area to excessive noise levels.

The proposed project would exceed the local standards and substantially increase temporary construction noise levels if construction activities would occur within 500 feet of a noise-sensitive use and outside the hours allowed in the LBMC. LBMC Section 8.80.202 states that the allowable hours of construction are Monday through Friday 7:00 am to 7:00 pm, Saturday from 9:00 am to 6:00 pm, and no construction on Sundays unless a Sunday work permit was granted by the City's Noise Control Officer. For permanent operational noise, a significant impact would result if the proposed project would exceed the exterior noise standards set forth in LBMC Section 8.80.160. A vibration impact would occur if vibration levels generated by the proposed project would exceed the 0.2 inches per second vibration damage criterion.

Methodology

Noise

The noise and vibration analysis consider construction and operational sources. Noise levels associated with typical construction equipment were obtained from the Federal Highway Administration (FHWA) Roadway Construction Noise Model (RCNM).[4] This model predicts noise from construction based on a compilation of empirical data and the application of acoustical propagation formulas. Maximum equipment noise levels were adjusted based on

[3]One "g" is the acceleration due to gravity at the Earth's surface, approximately 9.8 meters per second squared.
[4]FHWA, *Roadway Construction Noise Model*, Version 1.1, August 2008.

anticipated percent of use. Combined construction activity noise levels were estimated by combining anticipated equipment for each activity using RCNM. The projected noise level during the construction period at receptors was calculated by making a distance adjustment to the construction source sound level.

According to Caltrans guidance, air temperature and humidity affect molecular absorption differently depending on the frequency spectrum and can vary significantly over long distances in a complex manner. Molecular absorption in air also reduces noise levels with distance. According to Caltrans, this process only accounts for about 1 dBA per 1,000 feet, which is an inaudible and negligible difference in noise levels. Noise levels have been estimated using a decrease of 6 dBA over hard surfaces for each doubling of the distance. The methodology and formulas obtained from the Caltrans Technical Noise Supplement can be viewed below.

$$\textit{Noise Distance Attenuation Formula: } dBA_2 = dBA_1 + 20 \times LOG_{10} (D_1/D_2)$$

Where:

dBA_1 *= Noise level at the reference distance of 50 feet*

dBA_2 *= Noise level at the receptor*

D_1 *= Reference distance (50 feet)*

D_2 *= Distance from source to receptor (measured distance)*

Stationary noise was assessed for operation of the proposed project and would include noise typically associated with commercial uses. The primary new source of noise associated with proposed project is the parking deck. Other sources of noise include mechanical ventilation equipment and outdoor spaces, both of which would generate similar noise levels as existing conditions.

Vibration

Vibration levels generated by construction equipment were estimated using example vibration levels and propagation formulas provided by FTA.[5] The following formula was used to assess potential vibration damage at nearby structures.

$$\textit{Vibration Damage Attenuation Formula: } PPV_{equip} = PPV_{ref} \times (25/D)^{1.5}$$

Where:

PPV_{equip} *= Peak particles velocity in inches per second of the equipment adjusted for distance*

PPV_{ref} *= Reference vibration level in inches per second at 25 feet*

D *= Distance from the equipment to the receptor in feet*

Existing Setting

[5]FTA, *Transit Noise and Vibration Impact Assessment*, September 2018.

The project site is zoned for commercial uses (Zone PD-6) and has a General Plan Land Use Designation of Land Use District (LUD) No. 7 (Mixed Uses). The location of the project site, which is located in an urban area of the City surrounded by commercial and recreational uses. The project site is bounded by Shoreline Drive to the north, the Marina Green recreational park to the east, Long Beach Shoreline Marina to the southeast, Long Beach Harbor to the south, and Rainbow Harbor and Shoreline Aquatic Park to the west. The project site and surrounding areas to the north, east, and west, as well as commercial and recreational uses located across Long Beach Harbor to the south, are located within the Downtown Shoreline Planned Development District (PD-6, Subarea 6).

Sensitive receptors are locations where people reside or where the presence of unwanted sound could adversely affect the use of the land. They typically include residences, schools, hospitals, guest lodging, and libraries. A complete list of sensitive receptors located within 500 feet of the project site are shown in **Table 3**. To characterize the existing noise environment around the project site, short-term noise measurements were taken using a SoundPro DL Sound Level Meter. Short-term noise measurements were conducted on Monday, January 23, 2023, from 12:00 pm to 3:00 pm, in 15-minute increments. This time of day represents a typical construction time without the added noise source of peak hour traffic. Short-term monitored noise levels ranged from 53.1 to 58.6 dBA L_{eq}. Traffic noise along nearby roadways were the primary sources of noise in the project area. Monitoring locations are shown in **Figure 1** and monitored noise levels are shown in **Table 4**.

TABLE 3: SENSITIVE RECEPTORS

Sensitive Receptor	Noise District	Distance from Project Site (Feet)
Marina Green	1	50
Long Beach Shoreline Marina Live Aboard Boats	1	115
Rainbow Lagoon Park	2	115
Hyatt Regency Long Beach	2	300
Shoreline Aquatic Park	1	425
Dockside Boat & Bed	1	550

SOURCE: TAHA, 2023.

TABLE 4: EXISTING AMBIENT NOISE LEVELS

Noise Measurement Site (Figure 1)	Noise Monitoring Location	Noise District	Noise Level (dBA, L_{eq})
1	Long Beach Shoreline Marina Live Aboard Boats	1	57.9
2	Marina Green	1	55.1
3	Rainbow Lagoon Park	2	58.6
4	Hyatt Regency Long Beach	2	57.4
5	Shoreline Aquatic Park	1	56.9
6	Dockside Boat & Bed	1	53.1

SOURCE: TAHA, 2023.

Source: TAHA 2023.

taha environmental planners

TAHA 2022-088

Shoreline Village Renovation Project
Noise and Vibration Assessment

CITY OF LONG BEACH

FIGURE 1

NOISE MONITORING LOCATIONS AND SENSITIVE RECEPTORS

The noise measurement results in **Table 4** show that the existing ambient noise levels near the project site are higher than the City's daytime exterior noise standards listed in **Table 1**. In accordance with LBMC Section 8.80.150 (C), if the measured ambient level exceeds the exterior noise standards for its land use district, the allowable noise exposure standard shall be increased by five decibel increments to encompass the ambient noise level. **Table 5** lists the adjusted exterior noise standards for the proposed project.

TABLE 5: CITY OF LONG BEACH ADJUSTED EXTERIOR NOISE STANDARDS

Sensitive Receptors	Original Threshold for Noise District (dBA, L_{eq})	Monitored Noise Levels (dBA, L_{eq})	Adjusted Standard (dBA, L_{50})
Long Beach Shoreline Marina Live Aboard Boats	50.0	57.9	60
Marina Green	50.0	55.1	60
Rainbow Lagoon Park	60.0	58.6	60
Hyatt Regency Long Beach	60.0	57.4	60
Shoreline Aquatic Park	50.0	56.9	60
Dockside Boat & Bed	50.0	53.1	55

SOURCE: TAHA, 2023.

Impact Assessment

a) Would the proposed project result in generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies? (Less-than-Significant Impact with Mitigation Incorporated)

Construction

Construction activity would result in temporary increases in ambient noise levels in the area surrounding the project site on an intermittent basis. Noise levels from the construction of the proposed project would fluctuate depending on the construction phase, equipment type and duration of use, distance between the noise source and receptor, and presence or absence of noise attenuation barriers. Construction activities typically require the use of numerous pieces of noise-generating equipment. Typical noise levels from various types of equipment that would be used during construction are listed in **Table 6**. Due to the small size of the project site, it is anticipated that only one or two pieces of equipment would be operated at a time. The combined noise levels shown in **Table 6** consider the likelihood that up to two of the loudest pieces of construction equipment in that phase would be operating simultaneously. Noise levels would typically range from 74.7 to 83.1 dBA L_{eq} during the construction process. When considered as an entire process with multiple pieces of equipment, paving would generate the loudest noise level at approximately 83.1 dBA L_{eq} at 50 feet.

TABLE 6: PHASED CONSTRUCTION NOISE LEVELS	
Construction Equipment	**Noise Level at 50 feet (dBA)**
DEMOLITION	
Concrete Saw	82.6
Dozer	77.7
Front End Loader	75.1
Combined Demolition	**79.6**
GRADING/SITE PREPARATION FOR NEW CONSTRUCTION	
Backhoe	73.6
Dozer	77.7
Front End Loader	75.1
Grader	81.0
Combined Grading/Site Preparation	**82.7**
NEW BUILDING CONSTRUCTION	
Generator Set	77.6
Forklift	79.4
Front End Loader	75.1
Welder	70.0
Combined Building Construction	**81.6**
RENOVATIONS	
Aerial Lift	67.7
Forklift	79.4
Front End Loader	75.1
Combined Building Construction	**80.8**
PAVING	
Paver	74.2
Paving Equipment	82.5
Roller	73.0
Combined Paving	**83.1**
ARCHITECTURAL COATING	
Air Compressor	73.7
Aerial Lift	67.7
Combined Architectural Coating	**74.7**
SOURCE: FHWA, *Roadway Construction Noise Model*, 2008	

Construction activities would occur Monday through Friday, and workers would typically be onsite from 7:00 am to 5:00 pm. Construction on Saturdays from 8:00 am to 4:00 pm would occur as needed through key milestones throughout the proposed project. The LBMC has not established a quantitative standard for construction noise specifically, which is instead regulated by allowable hours of construction set forth in LBMC Section 8.80.202. Construction activity would therefore comply with the allowable hours of construction in the LBMC, which are 7:00 am to 7:00 pm Monday through Friday, 9:00 am to 6:00 pm on Saturday, and no construction activity on Sundays.

For informational purposes, construction noise has been assessed at offsite uses and are shown in **Table 7**. Paving activity will likely be the loudest phase of construction, which would utilize a paver, paving equipment, and a roller. The simultaneous operation of the paver and paving equipment would more accurately characterize paving activity. A paver and paving equipment would generate a noise level of approximately 83.1 dBA L_{eq} at 50 feet and is used as the reference construction noise level for this analysis. The proposed project is located near an approximately 345-acre estuarine and marine deepwater habitat. The Golden Shore Biological Reserve in particular is located approximately 3,300 feet away from construction activity and construction equipment would not be audible above existing noise sources at this distance. Construction noise would be temporary, would not permanently change the noise environment in a way that would be detrimental to wildlife, and would be indistinguishable from existing noise sources such as roadway and boat traffic.

TABLE 7: CONSTRUCTION NOISE LEVELS AT SENSITIVE RECEPTORS

Sensitive Receptors	Distance (feet)	Max Construction Noise Level (dBA, L_{eq})
Marina Green	50	83.1
Long Beach Shoreline Marina Live Aboard Boats	115	75.9
Rainbow Lagoon Park	115	75.9
Hyatt Regency Long Beach	300	67.5
Shoreline Aquatic Park	425	64.5
Dockside Boat & Bed	550	62.3

SOURCE: TAHA, 2023.

Construction of the proposed project would not result in a violation of the construction noise regulations set forth by LBMC Section 8.80.2020 which establishes allowable hours of construction in the City. Nonetheless, to reduce construction noise levels at nearby sensitive receptors the proposed project would implement Mitigation Measures **N1**, which are standard best management practices to control noise at offsite uses. These include requiring the construction contractor to use engine mufflers consistent with manufacturers' standards, which would reduce noise by at least 5 dBA, and requiring all equipment to be properly maintained to assure that no additional noise due to worn or improperly maintained parts would be generated at the project site. Additionally, noise would be further reduced by locating equipment staging areas away from sensitive receptors, limiting equipment idling noise, and establishing a noise disturbance coordinator.

Construction activity would comply with the allowable hours of construction set forth in LBMC Section 8.80.202 which is how the City regulates construction noise. Construction noise would be temporary and intermittent and noise levels typically lower than the maximum levels presented above. The proposed project would result in a less-than-significant impact without mitigation. However, the following mitigation measures are recommended to minimize construction noise at sensitive receptors. With mitigation, the proposed project would still result in a less-than-significant impact.

Operations

Operational sources of noise include mechanical equipment (e.g., heating, ventilation, and air conditioning, outdoor spaces, on-road vehicles, and the parking structure. Mechanical equipment would not be a significant source of new noise as the proposed project. The overall components of the proposed project would result in no net change in the commercial area of 82,368 square feet per the original entitlement, and there would not be substantial changes to the amount of new mechanical equipment. In addition, older equipment would be replaced with new equipment, which would be more efficient and generate less noise. Similarly for outdoor

spaces, the redevelopment is not anticipated to result in a significant increase in patrons and outdoor activity would generally be similar to existing conditions. The proposed project is primarily a renovation project and would not generate a significant number of new on-road vehicle trips and would not increase existing roadway noise.

The proposed project would also construct a two-level, 227-stall parking deck over the existing surface parking area along Shoreline Village Drive. Sources of noise would include engines accelerating, doors slamming, car alarms, and people talking. It is anticipated that vehicle speeds on the project site would not exceed 10 miles per hour. Parking activity noise was calculated based upon a reference noise level of 56.4 dBA L_{eq} at 50 feet for a 1,000-parking space parking garage.[6] The noise level was adjusted using guidance provided by the FTA, *Transit Noise and Vibration Impact Assessment* guidance and a maximum volume of 227 trips per hour, as estimated based on the number of new dedicated parking spaces for the project. The resultant noise level of parking activity at a distance of 115 feet at the nearest sensitive receptor (Long Beach Shoreline Marina Live Aboard Boats) would approximately be 42.8 dBA L_{eq}, which would be lower than the existing noise level of 57.9 dBA L_{eq} and the exterior noise standard of 60 dBA. Operational noise related to parking activity would not exceed LBMC noise standards. Therefore, the proposed project would result in a less-than-significant impact related to operational noise.

Mitigation Measures

N1 The construction contractor shall ensure that: Power construction equipment (including combustion or electric engines), fixed or mobile, shall be equipped with noise shielding and muffling devices (consistent with manufacturers' standards) during the entirety of construction of the proposed project. The combination of muffling devices and noise shielding shall be capable of reducing noise by at least 5 dBA from non-muffled and shielded noise levels. Prior to initiation of construction the contractor shall demonstrate to the city that equipment is properly muffled, shielded and maintained. All equipment shall be properly maintained to assure that no additional noise, due to worn or improperly maintained parts, would be generated.

Equipment shall be turned off when not in use for an excess of five minutes, except for equipment that requires idling to maintain performance.

A public liaison shall be appointed for project construction and be responsible for addressing public concerns about construction activities, including excessive noise. As needed, the liaison shall determine the cause of the concern (e.g., starting too early, bad muffler) and implement measures to address the concern.

The public shall be notified in advance of the location and dates of construction hours and activities.

b) Would the proposed project result in generation of excessive ground-borne vibration or ground-borne noise levels? (Less-than-Significant Impact)

Construction

Construction activity can generate varying degrees of vibration, depending on the procedure and equipment. Operation of construction equipment generates vibrations that spread through the ground and diminish in amplitude with distance from the source. The effect on buildings located in the vicinity of a construction site often varies depending on soil type, ground strata, and construction characteristics of the receiver building(s).

[6]FTA, *Transit Noise and Vibration Impact Assessment*, September 2018.

The results from vibration can range from no perceptible effects at the lowest vibration levels, to low rumbling sounds and perceptible vibration at moderate levels, and to slight damage at the highest levels. In most cases, the primary concern regarding construction vibration relates to damage.

Equipment that would be utilized would be most similar to a small bulldozer, which generates a PPV of 0.003 inches per second at 25 feet. Equipment with the largest potential for vibration impacts would be similar to a large bulldozer, which generates a PPV of 0.089 inches per second at 25 feet. The nearest off-site structures would be located more than 25 feet away and would be below the 0.2 inches per second vibration damage criterion (PPV) set by the FTA. Therefore, the proposed project would result in a less-than-significant impact related to on-site construction vibration.

Operations

The proposed project would not include significant sources of vibration. Mechanical equipment and vehicle trips would not generate perceptible vibration beyond the project site. Therefore, the proposed project would result in a less-than-significant impact related to operational vibration. No mitigation measures would be necessary.

Mitigation Measures

No mitigation measures are required.

c) For a project located within the vicinity of a private airstrip or an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the proposed project expose people residing or working in the project area to excessive noise levels? (No Impact)

The proposed project is located outside of the 60 dB CNEL contours of the Long Beach Airport and would not expose people residing or working in the project area to excessive noise levels.[7] Therefore, no impact related to airport or airstrip noise would occur.

Mitigation Measures

No mitigation measures are required.

References

California Department of Transportation, *Technical Noise Supplement*, September 2013.

City of Long Beach Municipal Code, *Chapter 8.80 Noise*.

City of Long Beach Municipal Code, *Section 8.80.150 Exterior Noise Limits—Sound Levels by Receiving Land Use District.*

City of Long Beach Municipal Code, *Section 8.80.160 Exterior Noise Limits – Correction for Character of Sound*.

[7]Long Beach Airport, *Year 2004 CNEL Contours*, http://www.longbeach.gov/globalassets/lgb/community-information/noise-abatement/eir-noise-contour, 2005.

City of Long Beach Municipal Code, *Section 8.80.200 Noise Disturbances—Acts Specified.*

City of Long Beach Municipal Code, *Section 8.80.202 Construction Activity—Noise Regulations.*

City of Long Beach Municipal Code, *Section 8.80.340 Variance—Exemption from regulations.*

Federal Highway Administration (FHWA), *Roadway Construction Noise Model*, Version 1.1, 2008.

Federal Highway Administration (FHWA), *Traffic Noise Model Version 3.1* (TNM 3.1), March 2022.

Federal Highway Administration (FHWA), *Highway Traffic Noise Analysis and Abatement Guidance*, *Table 6: Building Noise Reduction Factors*, December 2011.

Federal Transit Administration (FTA), *Transit Noise and Vibration Impact Assessment*, September 2018.

Long Beach Airport, *Year 2004 CNEL Contours*, http://www.longbeach.gov/globalassets/lgb/community-information/noise-abatement/eir-noise-contour, 2005

APPENDIX A

Noise and Vibration Calculations

Noise Formulas

Noise Distance Attenuation

Hard Site

Ni = No - 20 * LOG(Di/Do)

Ni = attenuated noise level of interest
No = reference noise level
Di = distance to receptor (Di>Do)
Do = reference distance

Source: (Bolt, Beranek, and Newman, 1971)

Summation of Noise Levels

Equation: Ns=10 x LOG10((10^(N1/10))+(10^(N2/10))+(10^(N3/10))+(10^(N4/10)))

Ns = Noise Level Sum
N1 = Noise Level 1
N2 = Noise Level 2
N3 = Noise Level 3
N4 = Noise Level 4

Source: California Department of Transportation, Technical Noise Supplement, 2013

Phased Construction Noise Levels	
Construction Equipment	**Noise Level at 50 feet (dBA)**
Demolition	
Concrete Saw	82.6
Dozer	77.7
Front End Loader	75.1
Combined Demolition	**79.6**
Grading/Site Preparation	
Backhoe	73.6
Dozer	77.7
Front End Loader	75.1
Grader	81.0
Combined Grading/Site Preparation	**82.7**
New Building Construction	
Generator Set	77.6
Forklift	79.4
Front End Loader	75.1
Welder	70.0
Combined Building Construction	**81.6**
Rennovations	
Aerial Lift	67.7
Forklift	79.4
Front End Loader	75.1
Combined Building Construction	**80.8**
Paving	
Paver	74.2
Paving Equipment	82.5
Roller	73.0
Combined Paving	**83.1**
Architectural Coating	
Air Compressor	73.7
Aerial Lift	67.7
Combined Architectural Coating	**74.7**
Source: Federal Highway Administration, Roadway Construction Noise Model, 2008	

SENSITIVE RECEPTORS		
Sensitive Receptor	**Noise District**	**Distance from Project Site (Feet)**
Marina Green	1	50
Long Beach Shoreline Marina Live Aboard Boats	1	115
Rainbow Lagoon Park	2	115
Hyatt Regency Long Beach	2	300
Shoreline Aquatic Park	1	425
Dockside Boat & Bed	1	550
SOURCE: TAHA, 2023.		

EXISTING AMBIENT NOISE LEVELS			
Noise Measurement Site (Figure 2)	**Noise Monitoring Location**	**Noise District**	**Noise Level (dBA, Leq)**
1	Long Beach Shoreline Marina Live Aboard Boats	1	57.9
2	Marina Green	1	55.1
3	Rainbow Lagoon Park	2	58.6
4	Hyatt Regency Long Beach	2	57.4
5	Shoreline Aquatic Park	1	56.9
6	Dockside Boat & Bed	1	53.1
SOURCE: TAHA, 2023.			

CITY OF LONG BEACH ADJUSTED EXTERIOR NOISE STANDARDS			
Sensitive Receptors	**Original Threshold for Noise District (dBA, L_{eq})**	**Monitored Noise Levels (dBA, L_{eq})**	**Adjusted Standard (dBA, L_{50})**
Long Beach Shoreline Marina Live Aboard Boats	50	57.9	60
Marina Green	50	55.1	60
Rainbow Lagoon Park	60	58.6	60
Hyatt Regency Long Beach	60	57.4	60
Shoreline Aquatic Park	50	56.9	60
Dockside Boat & Bed	50	53.1	55
SOURCE: TAHA, 2023.			

CONSTRUCTION NOISE LEVELS AT SENSITIVE RECEPTORS					
Sensitive Receptors	**Distance (feet)**	**Intervening Building /a/**	**Existing Ambient (dBA, Leq)**	**Reference Noise Level (dBA)**	**Max Construction Noise Level (dBA, Leq)**
Marina Green	50	0	55.1	83.1	83.1
Long Beach Shoreline Marina Live Aboard Boats	115	0	57.9	83.1	75.9
Rainbow Lagoon Park	115	0	58.6	83.1	75.9
Hyatt Regency Long Beach	300	0	57.4	83.1	67.5
Shoreline Aquatic Park	425	0	56.9	83.1	64.5
Dockside Boat & Bed	550	0	53.1	83.1	62.3
/a/ -4.5 dB for on intervening row of buildings and -1.5 dB for each subsequent row.					
SOURCE: TAHA, 2023.					

PARKING ACTIVITY NOISE ANALYSIS	
Parking Lot Noise = Reference Noise Level + 10 x LOG (Number of Average Peak Hour Trips/1000)	
Reference Noise Level at 50 feet (dBA, Leq)	**Reference Parking Lot Capacity (parking spaces)**
56.4	1,000
Proposed Project Parking Noise Level at 50 feet (dBA, Leq)	**Maximum Trips**
50.0	227

OPERATIONAL NOISE - PARKING ACTIVITY NOISE LEVEL								
Sensitive Receptors	**Distance (feet) /a/**	**Intervening Building**	**Reference Noise Level (dBA)**	**Parking Activity Noise Level (dBA, Leq)**	**Interior Parking Activity Noise (dBA, Leq) /b/**	**Exterior Threshold**	**Interior Threshold**	**Exceed Threshold? Yes or No**
Long Beach Shoreline Marina Live Aboard Boats	115	0	50.0	42.8	17.8	60	45	No
Marina Green	135	0	50.0	41.4	16.4	60	45	No
Rainbow Lagoon Park	560	0	50.0	29.0	4.0	60	45	No
Hyatt Regency Long Beach	800	0	50.0	25.9	0.9	60	45	No
Shoreline Aquatic Park	846	0	50.0	25.4	0.4	60	45	No
Dockside Boat & Bed	965	0	50.0	24.3	-0.7	55	45	No
/a/ Distance of the center of parking lot to property line of sensitive receptor.								
/b/ A 20 dB exterior to interior noise reduction has been applied.								
SOURCE: TAHA, 2023, FTA, *Transit Noise and Vibration Impact Assessment* , September 2018.								

Vibration Formulas

Vibration PPV Attenuation

Equation: PPVequip = PPVref x (25/D)^1.5
PPV (equip) is the peak particle velocity in in/sec of the equipment adjusted for distance
PPV (ref) is the reference vibration level in in/sec at 25 feet from Table 12-2
D is the distance from the equipment to the receiver.

Source: Federal Transit Administration, Transit Noise and Vibration Impact Assessment, September 2018.

Vibration Damage and Annoyance Analysis

Construction Vibration Damage Criteria	
Building/Structural Category	**PPV, in/sec**
Reinforced-concrete, steel or timber	0.5
Non-engineered timber and masonry buildings	0.2
Buildings extremely susceptible to vibration damage	0.1

Vibration Velocities for Construction Equipment	
Equipment	**PPV at 25 Feet (Inches/Second)**
Large Bulldozer	0.089

Source: FTA, Transit Noise and Vibration Impact Assessment, September 2018.

APPENDIX B

Noise Monitoring Reports

Site 1: Long Beach Shoreline Marina Live Aboard Boats

Session Report

1/24/2023

Information Panel

Name	Shoreline Village_S1
Start Time	1/23/2023 12:03:27 PM
Stop Time	1/23/2023 12:18:27 PM
Device Name	BGS100001
Model Type	SoundPro DL
Device Firmware Rev	R.13J
Comments	

Summary Data Panel

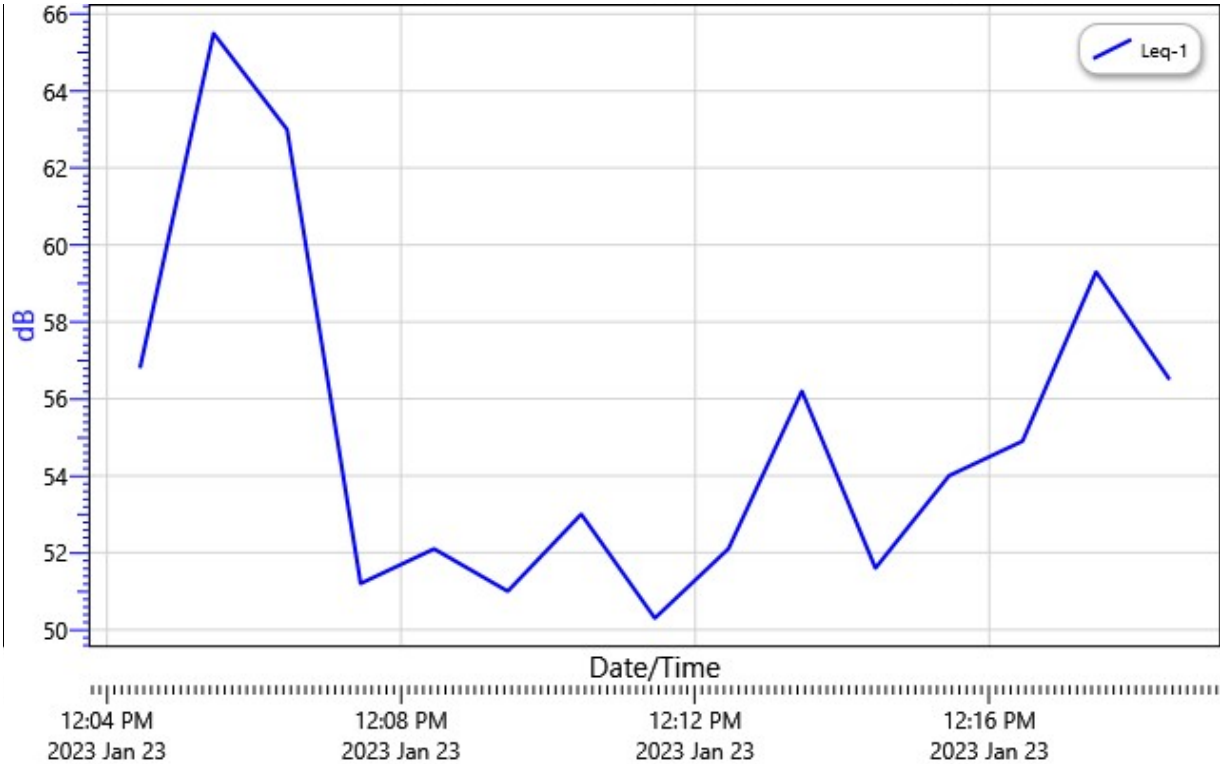
Description	Meter	Value	Description	Meter	Value
Leq	1	57.9 dB			
Exchange Rate	1	3 dB	Weighting	1	A
Response	1	SLOW	Bandwidth	1	OFF
Exchange Rate	2	3 dB	Weighting	2	A
Response	2	SLOW			

Logged Data Table

Date/Time	Leq-1
1/23/2023 12:04:27 PM	56.8
12:05:27 PM	65.5
12:06:27 PM	63
12:07:27 PM	51.2
12:08:27 PM	52.1
12:09:27 PM	51
12:10:27 PM	53
12:11:27 PM	50.3
12:12:27 PM	52.1
12:13:27 PM	56.2
12:14:27 PM	51.6
12:15:27 PM	54
12:16:27 PM	54.9
12:17:27 PM	59.3
12:18:27 PM	56.5

Logged Data Chart

Shoreline Village_S1: Logged Data Chart



Site 2: Marina Green

Session Report

1/24/2023

Information Panel

Name	Shoreline Village_S2
Start Time	1/23/2023 12:25:33 PM
Stop Time	1/23/2023 12:40:33 PM
Device Name	BGS100001
Model Type	SoundPro DL
Device Firmware Rev	R.13J
Comments	

Summary Data Panel

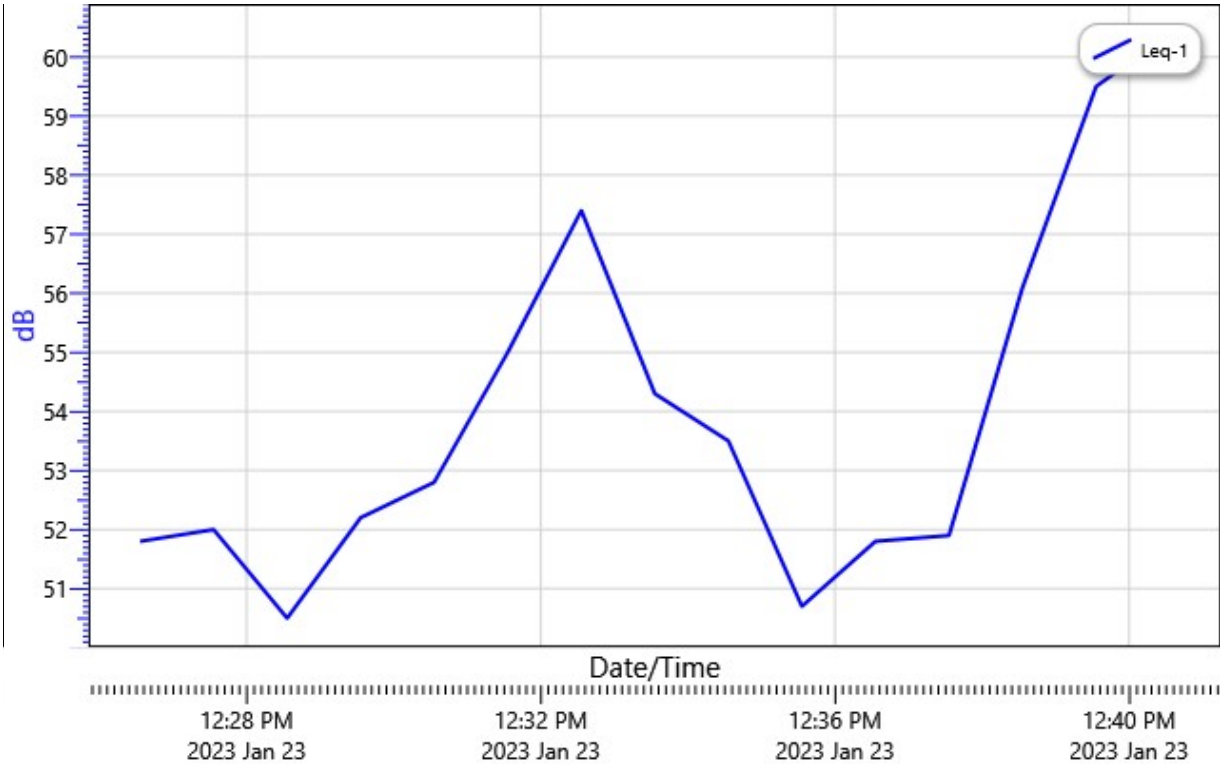
Description	Meter	Value	Description	Meter	Value
Leq	1	55.1 dB			
Exchange Rate	1	3 dB	Weighting	1	A
Response	1	SLOW	Bandwidth	1	OFF
Exchange Rate	2	3 dB	Weighting	2	A
Response	2	SLOW			

Logged Data Table

Date/Time	Leq-1
1/23/2023 12:26:33 PM	51.8
12:27:33 PM	52
12:28:33 PM	50.5
12:29:33 PM	52.2
12:30:33 PM	52.8
12:31:33 PM	55
12:32:33 PM	57.4
12:33:33 PM	54.3
12:34:33 PM	53.5
12:35:33 PM	50.7
12:36:33 PM	51.8
12:37:33 PM	51.9
12:38:33 PM	56.1
12:39:33 PM	59.5
12:40:33 PM	60.4

Logged Data Chart

Shoreline Village_S2: Logged Data Chart



Site 3: Rainbow Lagoon Park

Session Report

1/24/2023

Information Panel

Name	Shoreline Village_S3
Start Time	1/23/2023 12:48:27 PM
Stop Time	1/23/2023 1:03:27 PM
Device Name	BGS100001
Model Type	SoundPro DL
Device Firmware Rev	R.13J
Comments	

Summary Data Panel

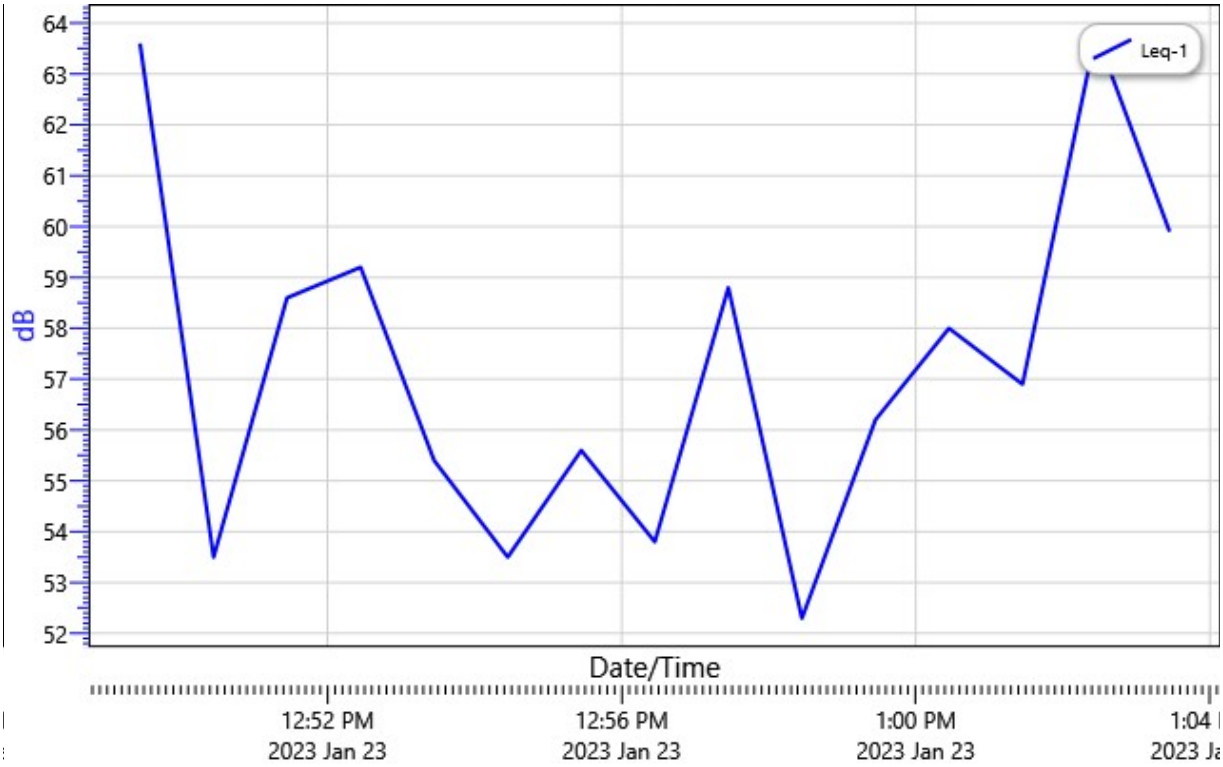
Description	Meter	Value	Description	Meter	Value
Leq	1	58.6 dB			
Exchange Rate	1	3 dB	Weighting	1	A
Response	1	SLOW	Bandwidth	1	OFF
Exchange Rate	2	3 dB	Weighting	2	A
Response	2	SLOW			

Logged Data Table

Date/Time	Leq-1
1/23/2023 12:49:27 PM	63.6
12:50:27 PM	53.5
12:51:27 PM	58.6
12:52:27 PM	59.2
12:53:27 PM	55.4
12:54:27 PM	53.5
12:55:27 PM	55.6
12:56:27 PM	53.8
12:57:27 PM	58.8
12:58:27 PM	52.3
12:59:27 PM	56.2
1:00:27 PM	58
1:01:27 PM	56.9
1:02:27 PM	63.8
1:03:27 PM	59.9

Logged Data Chart

Shoreline Village_S3: Logged Data Chart



Site 4: Hyatt Regency Long Beach

Session Report

1/24/2023

Information Panel

Name	Shoreline Village_S4
Start Time	1/23/2023 1:16:34 PM
Stop Time	1/23/2023 1:31:34 PM
Device Name	BGS100001
Model Type	SoundPro DL
Device Firmware Rev	R.13J
Comments	

Summary Data Panel

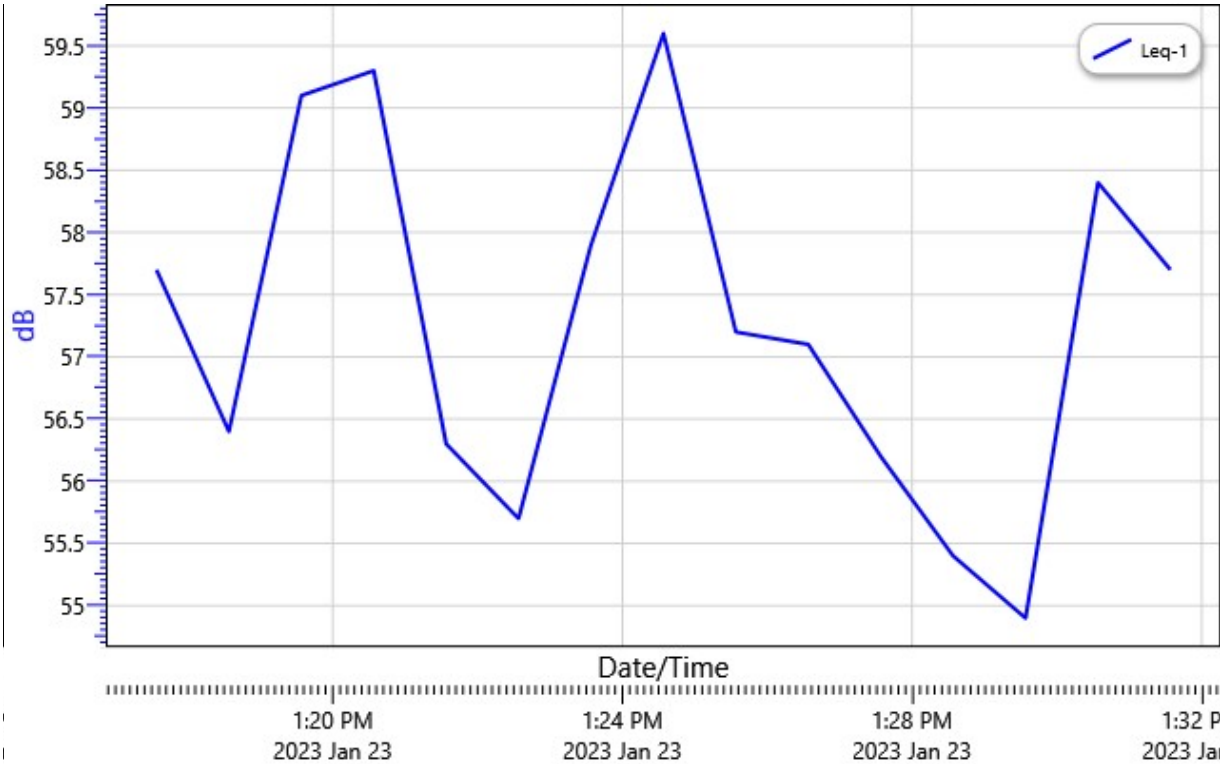
Description	Meter	Value	Description	Meter	Value
Leq	1	57.4 dB			
Exchange Rate	1	3 dB	Weighting	1	A
Response	1	SLOW	Bandwidth	1	OFF
Exchange Rate	2	3 dB	Weighting	2	A
Response	2	SLOW			

Logged Data Table

Date/Time	Leq-1
1/23/2023 1:17:34 PM	57.7
1:18:34 PM	56.4
1:19:34 PM	59.1
1:20:34 PM	59.3
1:21:34 PM	56.3
1:22:34 PM	55.7
1:23:34 PM	57.9
1:24:34 PM	59.6
1:25:34 PM	57.2
1:26:34 PM	57.1
1:27:34 PM	56.2
1:28:34 PM	55.4
1:29:34 PM	54.9
1:30:34 PM	58.4
1:31:34 PM	57.7

Logged Data Chart

Shoreline Village_S4: Logged Data Chart



Site 5: Dockside Boat & Bed

Session Report

1/24/2023

Information Panel

Name	Shoreline Village_S5
Start Time	1/23/2023 1:46:23 PM
Stop Time	1/23/2023 2:01:23 PM
Device Name	BGS100001
Model Type	SoundPro DL
Device Firmware Rev	R.13J
Comments	

Summary Data Panel

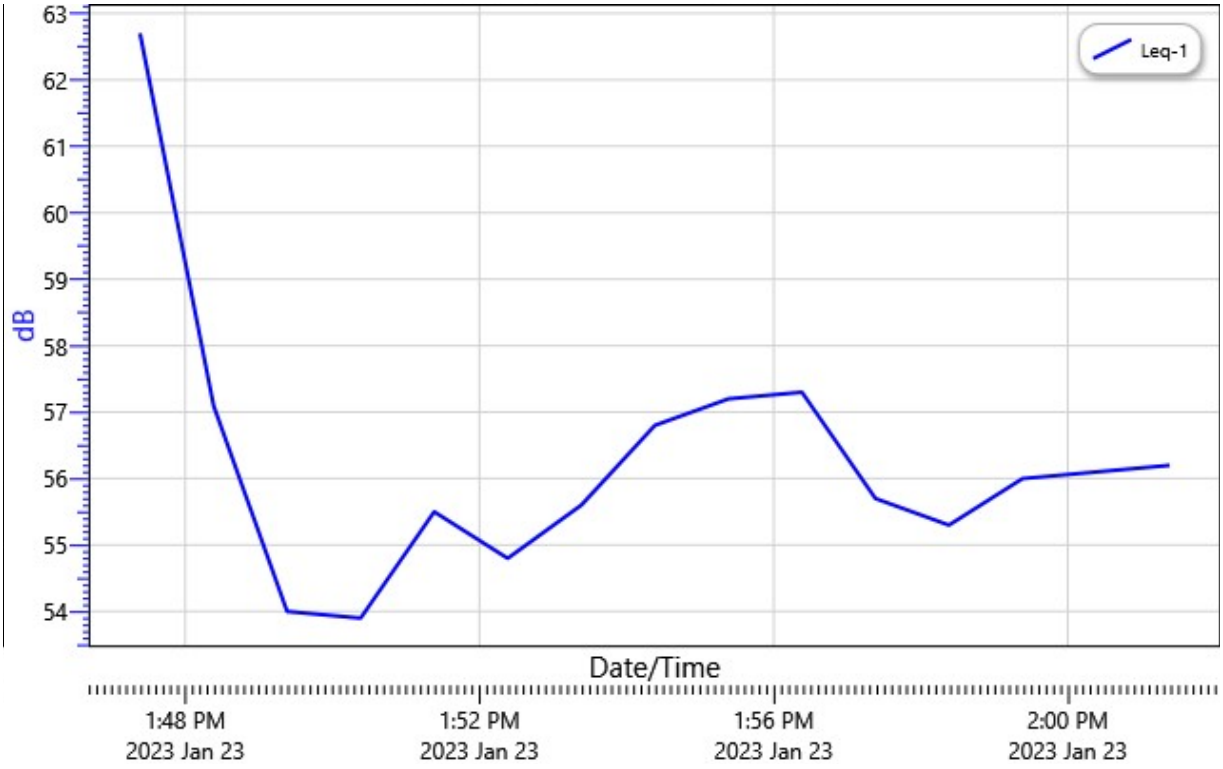
Description	Meter	Value	Description	Meter	Value
Leq	1	56.9 dB			
Exchange Rate	1	3 dB	Weighting	1	A
Response	1	SLOW	Bandwidth	1	OFF
Exchange Rate	2	3 dB	Weighting	2	A
Response	2	SLOW			

Logged Data Table

Date/Time	Leq-1
1/23/2023 1:47:23 PM	62.7
1:48:23 PM	57.1
1:49:23 PM	54
1:50:23 PM	53.9
1:51:23 PM	55.5
1:52:23 PM	54.8
1:53:23 PM	55.6
1:54:23 PM	56.8
1:55:23 PM	57.2
1:56:23 PM	57.3
1:57:23 PM	55.7
1:58:23 PM	55.3
1:59:23 PM	56
2:00:23 PM	56.1
2:01:23 PM	56.2

Logged Data Chart

Shoreline Village_S5: Logged Data Chart



Site 6: Shoreline Aquatic Park

Session Report

1/24/2023

Information Panel

Name	Shoreline Village_S6
Start Time	1/23/2023 2:49:37 PM
Stop Time	1/23/2023 3:04:37 PM
Device Name	BGS100001
Model Type	SoundPro DL
Device Firmware Rev	R.13J
Comments	

Summary Data Panel

Description	Meter	Value	Description	Meter	Value
Leq	1	53.1 dB			
Exchange Rate	1	3 dB	Weighting	1	A
Response	1	SLOW	Bandwidth	1	OFF
Exchange Rate	2	3 dB	Weighting	2	A
Response	2	SLOW			

Logged Data Table

Date/Time	Leq-1
1/23/2023 2:50:37 PM	51.1
2:51:37 PM	51.9
2:52:37 PM	55.8
2:53:37 PM	51.8
2:54:37 PM	54.5
2:55:37 PM	52.3
2:56:37 PM	54
2:57:37 PM	54.4
2:58:37 PM	51.5
2:59:37 PM	51.4
3:00:37 PM	51.3
3:01:37 PM	50.9
3:02:37 PM	54.2
3:03:37 PM	53.8
3:04:37 PM	54.8

Logged Data Chart

Shoreline Village_S6: Logged Data Chart