4.10 NOISE

This section evaluates the potential short-term construction and long-term operational noise impacts of the proposed Belmont Pool Revitalization Project (proposed Project). This analysis is intended to satisfy the City of Long Beach's (City) requirement for a Project noise impact analysis by examining the short-term construction and long-term operational impacts on on-site and off-site land uses involving sensitive receptors and evaluating the effectiveness of proposed mitigation measures. Noise calculation sheets developed during preparation of the following noise analysis are included in Appendix G of this Draft Environmental Impact Report (EIR).

Scoping Process

The City of Long Beach distributed the first Notice of Preparation (NOP) for the Draft EIR from April 18 to May 17, 2013. The City received three comment letters in response to the original NOP. No comment letter associated with noise was received in response to the original NOP circulated for the proposed Project. Due to revisions in the Project Description, the City re-issued the NOP for the Draft EIR between April 9, 2014, and May 8, 2014. The City received five comment letters in response to the re-issued NOP during the public review period. No noise-related issues were raised in those comment letters.

4.10.1 Methodology

The evaluation of noise impacts associated with the proposed Project includes the following:

- Determination of the short-term construction noise impacts on on-site and off-site noise-sensitive uses with industry-recognized noise emission levels for construction equipment;
- Determination of the long-term operational noise impacts, including vehicular traffic and aircraft activities, on on-site and off-site noise-sensitive uses; and
- Determination of the required mitigation measures to reduce short-term and long-term noise impacts from all sources.

Fundamentals of Noise.

Noise Definition. Noise impacts can be described in three categories. The first category includes audible impacts, which refer to increases in noise levels noticeable to humans. Audible increases in noise levels generally refer to a change of 3 decibels (dB) or greater, because this level has been found to be barely perceptible in exterior environments. The second category, potentially audible, refers to a change in the noise level between 1 and 3 dB. This range of noise levels has been found to be noticeable only in carefully controlled laboratory environments. The last category includes changes in noise levels of less than 1 dB, which are inaudible to the human ear. Only audible changes in existing ambient or background noise levels are considered potentially significant and adverse.

Characteristics of Sound. Sound is increasing in the environment and can affect quality of life. Noise is usually defined as unwanted sound. Noise consists of any sound that may produce physiological or psychological damage and/or interfere with communication, work, rest, recreation, and sleep. To the human ear, sound has two specific characteristics: pitch and loudness. Pitch is generally an annoyance, while loudness can affect the ability to hear. Pitch is the number of complete vibrations (or cycles per second) of a wave, resulting in the tone's range from high to low. Loudness is the strength of a sound and describes a noisy or quiet environment; it is measured by the amplitude of the sound wave. Loudness is determined by the intensity of the sound waves, combined with the reception characteristics of the human ear. Sound intensity refers to how hard the sound wave strikes an object, which in turn produces the sound's effect. This characteristic of sound can be precisely measured with instruments. The analysis of a project defines the noise environment of the project area in terms of sound intensity and its effect on adjacent noise-sensitive land uses.

Measurement of Sound. Sound intensity is measured through the A-weighted scale to correct for the relative frequency response of the human ear. That is, an A-weighted noise level de-emphasizes low and very high frequencies of sound similar to the human ear's de-emphasis of these frequencies. Unlike linear units, such as inches or pounds, decibels are measured on a logarithmic scale, representing points on a sharply rising curve.

For example, 10 dB are 10 times more intense than 1 dB, 20 dB are 100 times more intense, and 30 dB are 1,000 times more intense. Thirty decibels (30 dB) represent 1,000 times as much acoustic energy as 1 dB. The decibel scale increases as the square of the change, representing the sound pressure energy. A sound as soft as human breathing is about 10 times greater than 0 dB. The decibel system of measuring sound gives a rough connection between the physical intensity of sound and its perceived loudness to the human ear. A 10 dB increase in sound level is perceived by the human ear as only a doubling of the loudness of the sound. Ambient sounds generally range from 30 A-weighted decibels (dBA) (very quiet) to 100 dBA (very loud).

Sound levels are generated from a source, and their decibel level decreases as the distance from that source increases. Sound dissipates exponentially with distance from the noise source. For a single point source, sound levels decrease approximately 6 dB for each doubling of distance from the source. This drop-off rate is appropriate for noise generated by stationary equipment. If noise is produced by a line source, such as highway traffic or railroad operations, the sound decreases 3 dB for each doubling of distance in a hard-site environment. Line source noise in a relatively flat environment with absorptive vegetation decreases 4.5 dB for each doubling of distance.

There are many ways to rate noise for various time periods, but an appropriate rating of ambient noise affecting humans also accounts for the annoying effects of sound. Equivalent continuous sound level (L_{eq}) is the total sound energy of time-varying noise over a sample period. The predominant rating scales for human communities in the State of California are the L_{eq} and community noise equivalent level (CNEL) or the day-night average level (L_{dn}) based on dBA. CNEL is the time-varying noise over a 24-hour period, with a 5 dBA weighting factor applied to the hourly L_{eq} for noises occurring from 7:00 p.m. to 10:00 p.m. (defined as relaxation hours) and a 10 dBA weighting factor applied to noise occurring from 10:00 p.m. to 7:00 a.m. (defined as sleeping hours). L_{dn} is similar to the CNEL scale but without the adjustment for events occurring

during the evening hours. CNEL and L_{dn} are within 1 dBA of each other and are normally exchangeable. The noise adjustments are added to the noise events occurring during the more sensitive hours.

Other noise rating scales of importance when assessing the annoyance factor include the maximum noise level (L_{max}), which is the highest exponential time-averaged sound level that occurs during a stated time period. The noise environments discussed in this analysis are specified in terms of maximum levels, denoted by L_{max} for short-term noise impacts. L_{max} reflects peak-operating conditions and addresses the annoying aspects of intermittent noise.

Another noise scale often used together with the L_{max} in noise ordinances for enforcement purposes is noise standards in terms of percentile exceedance in noise levels. For example, the L_{10} noise level represents the noise level exceeded 10 percent of the time during a stated period. The L_{50} noise level represents the median noise level. Half the time, the noise level exceeds this level, and half the time, it is less than this level. The L_{90} noise level represents the noise level exceeded 90 percent of the time and is considered the background noise level during a monitoring period. For a relatively constant noise source, the L_{eq} and L_{50} are approximately the same.

Physiological Effects of Noise. Physical damage to human hearing begins at prolonged exposure to noise levels higher than 85 dBA. Exposure to high noise levels affects the entire system, with prolonged noise exposure in excess of 75 dBA increasing body tensions and thereby affecting blood pressure and functions of the heart and the nervous system. In comparison, extended periods of noise exposure above 90 dBA would result in permanent cell damage. When the noise level reaches 120 dBA, a tickling sensation occurs in the human ear even with short-term exposure. This level of noise is called the threshold of feeling. As the sound reaches 140 dBA, the tickling sensation is replaced by the feeling of pain in the ear. This is called the threshold of pain. A sound level of 160–165 dBA will result in dizziness or loss of equilibrium. The ambient or background noise problem is widespread and generally more concentrated in urban areas than in less-developed areas.

Vibration. Vibration refers to groundborne noise and perceptible motion. Groundborne vibration is almost exclusively a concern inside buildings and is rarely perceived as a problem outdoors where the motion may be discernible; however, without the effects associated with the shaking of a building, there is less of an adverse reaction. Vibration energy propagates from a source through intervening soil and rock layers to the foundations of nearby buildings. The vibration then propagates from the foundation throughout the remainder of the structure. Building vibration may be perceived by the occupants as motion of building surfaces, rattling of items on shelves or hanging on walls, or as a low-frequency rumbling noise. The rumble noise is caused by the vibrating walls, floors, and ceilings that radiate sound waves. Annoyance from vibration often occurs when the vibration exceeds the threshold of perception by 10 dB or less. This is an order of magnitude below the damage threshold for normal buildings.

Typical sources of groundborne vibration are construction activities (e.g., blasting, pile driving, and operating heavy-duty earth-moving equipment), steel-wheeled trains, and occasional traffic on rough roads. Problems with groundborne vibration and noise from these sources are usually localized to areas within about 100 feet (ft) from the vibration source, although there are examples of groundborne vibration causing interference out to distances greater than 200 ft (Federal Transit Administration [FTA] May 2006). When roadways are smooth, vibration from traffic, even heavy trucks, is rarely perceptible. It is assumed for most projects that the roadway surface will be smooth enough that groundborne vibration from street traffic will not exceed the impact criteria; however, construction of a project could result in groundborne vibration that could be perceptible and annoying. Groundborne noise is not likely to be a problem because noise arriving via the normal airborne path usually will be greater than groundborne noise.

Groundborne vibration has the potential to disturb people as well as to damage buildings. It is not uncommon for construction processes such as blasting and pile driving to cause vibration of sufficient amplitudes to damage nearby buildings (FTA 2006). Groundborne vibration is usually measured in terms of vibration velocity, either the root-mean-square (RMS) velocity or the peak particle velocity (PPV). RMS is best for characterizing human response to building vibration, and PPV is used to characterize potential for building or structural damage. Ground vibrations from construction activities do not often reach the levels that can damage structures, but they can achieve the audible and sensate ranges in buildings very close to the site. Problems with groundborne vibration from construction sources are usually localized to areas within approximately 100 ft from the vibration source.

Factors that influence groundborne vibration and noise include the following:

- **Vibration Source:** Vehicle suspension, wheel types and condition, track/roadway surface, track support system, speed, transit structure, and depth of vibration source
- **Vibration Path:** Soil type, rock layers, soil layering, depth to water table, and frost depth
- **Vibration Receiver:** Foundation type, building construction, and acoustical absorption

Among the factors listed above, there are significant differences in the vibration characteristics when the source is underground compared to at the ground surface. In addition, soil conditions are known to have a strong influence on the levels of groundborne vibration. Among the most important factors are the stiffness and internal damping of the soil and the depth to bedrock.

Table 4.10.A illustrates human response to various vibration levels, as described in the FTA *Transit Noise and Vibration Impact Assessment* (FTA 2006).

Table 4.10.A: Human Response to Different Levels of Groundborne Noise and Vibration

Vibration Velocity Level	Noise Level		Human Response
	Low Frequency[1]	Mid Frequency[2]	
65 VdB	25 dBA	40 dBA	Approximate threshold of perception for many humans. Low-frequency sound usually inaudible; mid-frequency sound excessive for quiet sleeping areas.
75 VdB	35 dBA	50 dBA	Approximate dividing line between barely perceptible and distinctly perceptible. Many people find transit vibration at this level unacceptable. Low-frequency noise acceptable for sleeping areas; mid-frequency noise annoying in most quiet occupied areas.
85 VdB	45 dBA	60 dBA	Vibration acceptable only if there are an infrequent number of events per day. Low-frequency noise unacceptable for sleeping areas; mid-frequency noise unacceptable even for infrequent events with institutional land uses such as schools and churches.

Source: Federal Transit Administration *Transit Noise and Vibration Impact Assessment* (2006).
[1] Approximate noise level when vibration spectrum peak is near 30 Hz.
[2] Approximate noise level when vibration spectrum peak is near 60 Hz.
dBA = A-weighted decibels VdB = velocity in decibels

4.10.2 Existing Environmental Setting

The approximately 5.8 acres (ac) Project site is located in Belmont Shore Beach Park in the southeastern portion of the City. The Project site is bounded by the Pacific Ocean to the south and the City's Beach Maintenance Yard, a large parking lot that provides parking for visitors to the beach, the former Belmont Pool, beach volleyball, Rosie's Dog Beach, and a boat launch to the southeast. Adjacent land uses to the north include a variety of one-story commercial businesses, the Belmont Shores Children's Center, and residences located across Ocean Boulevard. Adjacent land uses to the west include Belmont Veterans Memorial Pier and parking lot, as well as the Surf Terrace apartment complex and Belmont Shore Condominiums (see Figure 3.2). The residences located across Ocean Boulevard are approximately 100 ft from the Project construction boundary. Residences at the Surf Terrace apartment complex to the west are approximately 80 ft from the Project construction boundary. The playground associated with the Children's Center is located approximately 25 ft from the Project construction boundary. An existing passive park is located north of the former pool building and south of Olympic Plaza.[1] Primary access for parking to the Project site is provided to the east of the site at the Beach Parking Lot from Ocean Boulevard via Bennett Avenue. Secondary parking is from the Pier Parking Lot to the west of the site and is accessed from Ocean Boulevard via Termino Avenue.

The former pool complex located on the Project site consisted of an enclosed swimming pool, two outdoor pools (swimming and wading), a passive park on the north side of the pool building, locker rooms at the east end of the structure, and a restaurant at the west end of the structure. The former indoor pool was closed to the public on January 13, 2013, as a result of substandard seismic and structural conditions, and was demolished in February 2015 because of an imminent threat to public safety. The demolition of the structure was conducted under an emergency permit and, therefore, this Draft Environmental Impact Report (EIR) does not include analysis of the demolition of the Belmont Pool structure. The outdoor swimming pool and passive park remain open on the Project site. In

[1] This passive park was part of the 1968 Belmont Pool project and does not have a separate name.

addition, a temporary pool was constructed in the Beach Parking lot and opened in December 2013 to provide swimming facilities while the permanent facility was under construction.

Sensitive Land Uses in the Project Vicinity. Certain land uses are considered more sensitive to noise than others. Examples of these include residential uses, educational facilities, hospitals, childcare facilities, outdoor recreation areas, and senior housing. The sensitive land uses within the vicinity of the proposed Project include the existing Belmont Shores Children's Center (Preschool/Child Care) facility located approximately 25 ft from the northern Project construction boundary, residences across East Ocean Boulevard to the northeast located approximately 100 ft from the northern Project construction boundary, and residences across Termino Avenue to the northwest located approximately 80 ft from the western Project construction boundary.

Overview of the Existing Noise Environment. The primary existing noise sources in the Project area are from vehicle traffic on Project area roadways. Other existing noise sources in the vicinity of the Project include activity associated with the temporary outdoor pool, which is used by clubs, local high schools, and the general public. Noise from motor vehicles is generated by engine vibrations, the interaction between the tires and the road, and the exhaust system. Traffic on Ocean Boulevard, Termino Avenue, and Bennett Avenue contribute to area ambient noise levels. Tables 4.10.B and 4.10.C provide the traffic noise levels along the roadways adjacent to the Project site under the existing conditions. These noise levels are representative of the worst-case scenario, which assumes no shielding exists between the traffic and the locations from which the noise contours are drawn.

4.10.3 Regulatory Setting

Federal Regulations and Policies.

Federal Transit Administration. The Federal Transit Administration (FTA) establishes acceptable levels of groundborne vibration for building types that are sensitive to vibration. These levels are based on the maximum levels for a single event. Additionally, in the *Transit Noise and Vibration Impact Assessment* (FTA 2006), the FTA provided groundborne vibration and noise impact criteria guidance. The criteria established by the FTA account for variation in project types, as well as the frequency of events, which differ widely among projects. Although the criteria are provided for community response to groundborne vibration from rapid rail transit systems, they also provide good guidelines for human response to vibration in general. Table 4.10.D lists the groundborne vibration and noise impact criteria for human annoyance. Vibration Category 1 land uses include vibration-sensitive research and manufacturing, hospitals with vibration-sensitive equipment, and university research operations. Vibration Category 2 land uses include all residential land uses and any buildings in which people sleep, such as hotels and hospitals. Vibration Category 3 land uses include schools, churches, other such institutions, and quiet offices.

Table 4.10.B: Existing Weekday Baseline Traffic Noise Levels

Roadway Segment	ADT	Centerline to 70 CNEL (ft)	Centerline to 65 CNEL (ft)	Centerline to 60 CNEL (ft)	CNEL (dBA) 50 Ft from Centerline of Outermost Lane
Ocean Boulevard west of Redondo Avenue	25,230	< 50	75	155	65.1
Ocean Boulevard between Redondo Avenue and Loma Avenue	27,195	< 50	78	163	65.4
Ocean Boulevard between Loma Avenue and Mira-Mar Avenue	27,855	< 50	80	165	65.5
Ocean Boulevard between Mira-Mar Avenue and Termino Avenue	9,240	< 50	< 50	82	60.7
Ocean Boulevard between Termino Avenue and Bennett Avenue	9,575	< 50	< 50	84	60.9
Ocean Boulevard between Bennett Avenue and Granada Avenue	8,500	< 50	< 50	78	60.4
Ocean Boulevard east of Granada Avenue	7,730	< 50	< 50	74	60.0
Livingston Avenue between Mira-Mar Avenue and Termino Avenue	19,405	< 50	80	166	65.6
Livingston Avenue between Termino Avenue and 2nd Street	20,155	< 50	82	170	65.7
Livingston Avenue east of 2nd Street	3,190	< 50	< 50	< 50	55.8
2nd Street south of Livingston Avenue	20,860	< 50	< 50	104	62.4
Termino Avenue south of Ocean Boulevard	3,110	< 50	< 50	< 50	58.0
Termino Avenue between Ocean Boulevard and Livingston Avenue	3,495	< 50	< 50	56	58.6
Termino Avenue north of Livingston Avenue	830	< 50	< 50	< 50	49.9
Bennett Avenue south of Ocean Boulevard	1,120	< 50	< 50	< 50	51.2
Bennett Avenue north of Ocean Boulevard	740	< 50	< 50	< 50	49.4
Granada Avenue south of Ocean Boulevard	710	< 50	< 50	< 50	49.2
Granada Avenue north of Ocean Boulevard	1,500	< 50	< 50	< 50	52.5

Source. Compiled by LSA Associates, Inc. (March 2016).
Note: Traffic noise within 50 ft of the roadway centerline should be evaluated with site-specific information.
ADT = average daily traffic
CNEL = Community Noise Equivalent Level
dBA = A-weighted decibels
ft = feet

Table 4.10.C: Existing Saturday Baseline Traffic Noise Levels

Roadway Segment	ADT	Centerline to 70 CNEL (ft)	Centerline to 65 CNEL (ft)	Centerline to 60 CNEL (ft)	CNEL (dBA) 50 Ft from Centerline of Outermost Lane
Ocean Boulevard west of Redondo Avenue	18,050	< 50	62	125	63.6
Ocean Boulevard between Redondo Avenue and Loma Avenue	19,720	< 50	65	132	64.0
Ocean Boulevard between Loma Avenue and Mira-Mar Avenue	20,655	< 50	67	136	64.2
Ocean Boulevard between Mira-Mar Avenue and Termino Avenue	8,540	< 50	< 50	78	60.4
Ocean Boulevard between Termino Avenue and Bennett Avenue	8,900	< 50	< 50	80	60.6
Ocean Boulevard between Bennett Avenue and Granada Avenue	7,705	< 50	< 50	73	59.9
Ocean Boulevard east of Granada Avenue	7,240	< 50	< 50	71	59.7
Livingston Avenue between Mira-Mar Avenue and Termino Avenue	12,785	< 50	63	127	63.8
Livingston Avenue between Termino Avenue and 2nd Street	14,490	< 50	67	137	64.3
Livingston Avenue east of 2nd Street	3,050	< 50	< 50	< 50	55.6
2nd Street south of Livingston Avenue	16,370	< 50	< 50	90	61.4
Termino Avenue south of Ocean Boulevard	2,990	< 50	< 50	< 50	57.9
Termino Avenue between Ocean Boulevard and Livingston Avenue	3,440	< 50	< 50	55	58.5
Termino Avenue north of Livingston Avenue	600	< 50	< 50	< 50	48.5
Bennett Avenue south of Ocean Boulevard	1,560	< 50	< 50	< 50	52.7
Bennett Avenue north of Ocean Boulevard	700	< 50	< 50	< 50	49.2
Granada Avenue south of Ocean Boulevard	1,150	< 50	< 50	< 50	51.3
Granada Avenue north of Ocean Boulevard	1,420	< 50	< 50	< 50	52.2

Source. Compiled by LSA Associates, Inc. (March 2016).
Note. Traffic noise within 50 ft of the roadway centerline should be evaluated with site-specific information.
ADT = average daily traffic
CNEL = Community Noise Equivalent Level
dBA = A-weighted decibels
ft = feet

Table 4.10.D: Groundborne Vibration and Noise Impact Criteria

Land Use Category	Groundborne Vibration Impact Levels (VdB re 1 micro inch/sec)			Groundborne Noise Impact Levels (dB re 20 micro Pascals)		
	Frequent Events[1]	Occasional Events[2]	Infrequent Events[3]	Frequent Events[1]	Occasional Events[2]	Infrequent Events[3]
Category 1: Buildings where vibration would interfere with interior operations.	65 VdB[4]	65 VdB[4]	65 VdB[4]	N/A[5]	N/A[5]	N/A[5]
Category 2: Residences and buildings where people normally sleep.	72 VdB	75 VdB	80 VdB	35 dBA	38 dBA	43 dBA
Category 3: Institutional land uses with primarily daytime use.	75 VdB	78 VdB	83 VdB	40 dBA	43 dBA	48 dBA

Source: Federal Transit Administration *Transit Noise and Vibration Impact Assessment* (2006).

[1] Frequent Events is defined as more than 70 events per day.

[2] Occasional Events is defined as between 30 and 70 vibration events of the same source per day.

[3] Infrequent Events is defined as fewer than 70 events per day.

[4] This criterion limit is based on levels that are acceptable for most moderately sensitive equipment, such as optical microscopes. Vibration-sensitive manufacturing or research will require detailed evaluation to define the acceptable vibration levels. Ensuring lower vibration levels in a building often requires special design of the HVAC systems and stiffened floors.

[5] Vibration-sensitive equipment is not sensitive to groundborne noise.

dB = decibels
dBA = A-weighted decibels
HVAC = heating, ventilation, and air conditioning
inch/sec = inches per second
N/A = Not Applicable
VdB = vibration velocity decibel

Based on the *Transit Noise and Vibration Impact Assessment* (FTA 2006), the potential construction vibration damage criteria vary. For example, as shown in Table 4.10.E, for a building that is constructed with reinforced concrete with no plaster, the FTA guidelines show that a vibration level of up to 102 velocity decibels (VdB) (equivalent to 0.5 inch per second [inch/sec] in RMS) (FTA 2006) is considered safe and would not result in any construction vibration damage. For a non-engineered timber and masonry building, the construction vibration damage criterion is 94 VdB (0.2 inches/sec in RMS). No specific thresholds have been adopted or recommended for commercial and office uses.

Table 4.10.E: Construction Vibration Damage Criteria

Building Category	PPV (inch/sec)	Approximate Lv[1]
Reinforced-concrete, steel or timber (no plaster)	0.5	102
Engineered concrete and masonry (no plaster)	0.3	98
Non-engineered timber and masonry buildings	0.2	94
Buildings extremely susceptible to vibration damage	0.12	90

Source: Federal Transit Administration, Transit Noise and Vibration Impact Assessment (May 2006).

[1] RMS VdB regarding 1 micro-inch/sec.

inch/sec = inches per second
$Lv = 20 \log_{10} (V/V_{ref})$
PPV = peak particle velocity
RMS = root-mean-square
VdB = velocity in decibels

United States Environmental Protection Agency. In 1972, Congress enacted the United States Noise Control Act. This act authorized the Environmental Protection Agency (EPA) to publish descriptive data on the effects of noise and establish levels of sound "requisite to protect the public welfare with an adequate margin of safety." These levels are separated into health (hearing loss levels) and welfare (annoyance levels). For protection against hearing loss, 96 percent of the population would be protected if sound levels are less than or equal to 70 dBA during a 24-hour period of time. At 55 dBA L_{dn}, 95 percent sentence clarity (intelligibility) may be expected at 11 ft, and no community reaction would occur. However, 1 percent of the population may complain about noise at this level, and 17 percent may indicate annoyance. The EPA cautions that these identified levels are not standards because they do not take into account the cost or feasibility of the levels.

State Regulations and Policies. The State of California has established regulations that help prevent adverse impacts to occupants of buildings located near noise sources. Referred to as the "State Noise Insulation Standard," it requires buildings to meet performance standards through design and/or building materials that would offset any noise source in the vicinity of the receptor. State regulations include requirements for the construction of new hotels, motels, apartment houses, and dwellings other than detached single-family dwellings that are intended to limit the extent of noise transmitted into habitable spaces. These requirements are found in California Code of Regulations (CCR) Title 24 (known as the California Building Standards Code), Part 2 (known as the California Building Code [CBC]), Appendix Chapter 12.

California Health and Safety Code, Division 28, Noise Control Act. The California Noise Control Act states that excessive noise is a serious hazard to public health and welfare and that it is the policy of the State to provide an environment for all Californians that is free from noise that jeopardizes their health or welfare. The goal is to minimize the number of people that would be exposed to excessive noise but not to create an environment completely free from any noise.

California Government Code Section 65302. Section 65302(f) of the California Government Code and the Guidelines for the Preparation and Content of the Noise Element of the General Plan prepared by the California Department of Health Services and included in the 1990 State of California General Plan Guidelines published by the State Office of Planning and Research provides requirements and guidance to local agencies in the preparation of their Noise Elements.

The Guidelines require that major noise sources and areas containing noise-sensitive land uses be identified and quantified by preparing generalized noise exposure contours for current and projected conditions. Contours may be prepared in terms of either the CNEL or the Day-Night Average Level (L_{dn}), which are descriptors of total noise exposure at a given location for an annual average day. The CNEL and L_{dn} are generally considered to be equivalent descriptors of the community noise environment within plus or minus 1 dB.

The Noise Element (1975) contained in the City of Long Beach General Plan is in compliance with the Guidelines and is further discussed below.

Local Regulations and Policies.

City of Long Beach General Plan Noise Element. The Noise Element of the General Plan contains noise standards for mobile noise sources. These standards address the impacts of noise from adjacent roadways and airports. The City specifies outdoor and indoor noise limits for residential uses, places of worship, educational facilities, hospitals, hotels/motels, and commercial and other land uses. The noise standard for exterior living areas is 65 dBA CNEL. The indoor noise standard is 45 dBA CNEL, which is consistent with the standard in the California Noise Insulation Standard.

City of Long Beach Municipal Code. The City has adopted a quantitative Noise Control Ordinance, No. C-5371, Long Beach 1977 (Municipal Code, Chapter 8.80). The ordinance establishes maximum permissible hourly noise levels generated from operations for different districts throughout the City. Tables 4.10.F and 4.10.G list exterior noise and interior noise limits for various land uses.

Table 4.10.F: Exterior Noise Limits, L_N (dBA)

Receiving Land Use	Time Period	L_{50}	L_{25}	L_8	L_2	L_{max}
Residential (District One)	Night: 10:00 PM–7:00 AM	45	50	55	60	65
	Day: 7:00 AM–10:00 PM	50	55	60	65	70
Commercial (District Two)	Night: 10:00 PM–7:00 AM	55	60	65	70	75
	Day: 7:00 AM–10:00 PM	60	65	70	75	80
Industrial (District Three)	Anytime[1]	65	70	75	80	85
Industrial (District Four)	Anytime[1]	70	75	80	85	90

Source: City of Long Beach Municipal Code.
[1] For use at boundaries rather than for noise control within industrial districts.
dBA = A-weighted decibels
L_{max} = maximum sound level
L_N = percentile noise exceedance level
L_{50} = noise level representing the median noise level; half the time, the noise level exceeds this level, and half the time, it is less than this level
L_{25} = the noise level exceeded 25 percent of the time during a stated period
L_8 = the noise level exceeded 8 percent of the time during a stated period
L_2 = the noise level exceeded 2 percent of the time during a stated period

Table 4.10.G: Maximum Interior Sound Levels, L_N (dBA)

Receiving Land Use	Time Interval	L_8	L_2	L_{max}
Residential	10:00 PM–7:00 AM	35	40	45
	7:00 AM–10:00 PM	45	50	55
School	7:00 AM–10:00 PM (while school is in session)	45	50	55
Hospital and other noise-sensitive zones	Anytime	40	45	50

Source: City of Long Beach Municipal Code.
dBA = A-weighted decibels
L_{max} = maximum sound level
L_N = percentile noise exceedance level
L_8 = the noise level exceeded 8 percent of the time during a stated period
L_2 = the noise level exceeded 2 percent of the time during a stated period

The City's Noise Control Ordinance (Section 8.80.202) governs the time of day that construction work can be performed. The Noise Ordinance prohibits construction, drilling, repair, remodeling, alteration, or demolition work between the hours of 7:00 p.m. and 7:00 a.m. on weekdays or federal holidays (considered a weekday) if the noise would create a disturbance across a residential or commercial property line or violate the quantitative provisions of the ordinance, except for emergency work authorized by the building official. The Noise Ordinance also prohibits construction, drilling, repair, remodeling, alteration, or demolition work between the hours of 7:00 p.m. on Friday and 9:00 a.m. on Saturday and after 6:00 p.m. on Saturday, except for emergency work authorized by the building official. No construction, drilling, repair, remodeling, alteration, or demolition work shall occur at any time on Sundays, except for emergency work authorized by the building official.

4.10.4 Impact Significance Criteria

The thresholds for impacts related to noise used in this analysis are consistent with Appendix G of the *State California Environmental Quality Act (CEQA) Guidelines*. The proposed Project may be deemed to have a significant impact with respect to noise if it would cause:

Threshold 4.10.1: **Exposure of persons to or generation of noise levels in excess of standards established in the local General Plan or Noise Ordinance, or applicable standards of other agencies;**

Threshold 4.10.2: **Exposure of persons to or generation of excessive groundborne vibration or groundborne noise levels;**

Threshold 4.10.3: **A substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project;**

Threshold 4.10.4: **A substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project;**

Threshold 4.10.5: **For a project located within 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, if the project would expose people residing or working in the project area to excessive noise levels; or**

Threshold 4.10.6: **For a project within the vicinity of a private airstrip, if the project would expose people residing or working in the project area to excessive noise levels.**

During the scoping process, it was determined that no noise impacts associated with private airstrips would occur upon implementation of the proposed Project because the proposed Project is not located within 2 miles (mi) of a public airport, within the vicinity of a private airstrip, or within an airport land use plan (Thresholds 4.10.5 and 4.10.6). Therefore, these issues are not discussed further in this Draft EIR. Refer to Appendix A, Initial Study (IS)/NOP, for additional discussion.

4.10.5 Project Impacts

The proposed Project would replace the former Belmont Pool and provide the City with a new, modern pool complex. The proposed Project includes the construction and operation of a replacement

pool complex that includes indoor and outdoor pool components. Typical daily operation of the proposed Project would include daily use by local high school swimming and water polo teams for training; swimming, diving, and water polo clubs; and the general public, including recreational swimming, lap swimming for fitness, and swim lessons. Occasionally throughout the year, the proposed Project is anticipated to facilitate special events such as high school and collegiate swimming and water polo competitions. Both daily operations and special events have the potential to occur at either the indoor pools or the outdoor pools. The proposed Project includes a Public Address (PA) system with approximately seven outdoor speakers aimed down at the pool and six temporary speakers that could be installed for outdoor special events. Special events are anticipated to be from 2–4 hours in length and would occur at various times during the day, with the possibility of them also being held at night and lasting until the close of the facility at 10:00 p.m. The following impacts of the proposed Project have been identified based on Project characteristics and the significance thresholds defined above.

CEQA Baseline. At the time the NOP was issued, the Project site contained both the Belmont Pool facilities and the outdoor temporary pool (opened in December 2013 to provide swimming facilities while the permanent facility was under construction). Although the site contained the former Belmont Pool building at the time of the NOP, the facility was subsequently demolished in February 2015 to alleviate an imminent public safety threat due to the seismically unsafe condition of the building.

Although the former facility was present on the site for approximately 45 years and represents the historic use of the site, the activities associated with the temporary outdoor pool represent a more accurate portrayal of the existing noise conditions for the site. The temporary outdoor pool is currently used by clubs, local high schools, and the general public, and creates noise associated with spectators, whistles and recreational activities. In addition, the temporary outdoor pool is part of the baseline condition because it was opened prior to the release of the second NOP issued by the City for the proposed Project.

Threshold 4.10.1: Would the project cause exposure of persons to or generation of noise levels in excess of standards established in the local General Plan or Noise Ordinance, or applicable standards of other agencies?

Less than Significant After Mitigation.

Traffic Noise. The Federal Highway Administration (FHWA) highway traffic noise prediction model (FHWA RD-77-108) was used to evaluate traffic-related noise conditions in the vicinity of the Project site. The resultant noise levels were weighted and summed over a 24-hour period in order to determine the CNEL values. The existing traffic volumes presented in Section 4.12, Transportation and Traffic, of this Draft EIR were used to evaluate existing traffic noise on roadway segments in the Project vicinity for the noise analysis. Tables 4.10.B and 4.10.H show the existing weekday traffic noise levels without and with the Project, respectively. Tables 4.10.C and 4.10.I show the existing Saturday traffic noise levels without and with the Project, respectively. As previously stated, these noise levels represent the worst-case scenarios, which assume that no shielding is provided between the traffic and the locations where the noise contours are drawn.

Table 4.10.H: Existing Weekday With Project Traffic Noise Levels

Roadway Segment	ADT	Centerline to 70 CNEL (ft)	Centerline to 65 CNEL (ft)	Centerline to 60 CNEL (ft)	CNEL (dBA) 50 Ft from Centerline of Outermost Lane	Increase from Baseline Conditions (dBA)
Ocean Boulevard west of Redondo Avenue	26,110	< 50	77	158	65.2	0.1
Ocean Boulevard between Redondo Avenue and Loma Avenue	28,505	< 50	81	168	65.6	0.2
Ocean Boulevard between Loma Avenue and Mira-Mar Avenue	29,095	< 50	82	170	65.7	0.2
Ocean Boulevard between Mira-Mar Avenue and Termino Avenue	10,435	< 50	< 50	88	61.3	0.6
Ocean Boulevard between Termino Avenue and Bennett Avenue	10,815	< 50	< 50	90	61.4	0.5
Ocean Boulevard between Bennett Avenue and Granada Avenue	9,590	< 50	< 50	84	60.9	0.5
Ocean Boulevard east of Granada Avenue	8,360	< 50	< 50	77	60.3	0.3
Livingston Avenue between Mira-Mar Avenue and Termino Avenue	19,555	< 50	80	167	65.6	0.0
Livingston Avenue between Termino Avenue and 2nd Street	20,420	< 50	83	172	65.8	0.1
Livingston Avenue east of 2nd Street	3,190	< 50	< 50	< 50	55.8	0.0
2nd Street South of Livingston Avenue	21,110	< 50	< 50	105	62.5	0.1
Termino Avenue south of Ocean Boulevard	3,930	< 50	< 50	60	59.1	1.1
Termino Avenue between Ocean Boulevard and Livingston Avenue	3,955	< 50	< 50	60	59.1	0.5
Termino Avenue north of Livingston Avenue	910	< 50	< 50	< 50	50.3	0.4
Bennett Avenue south of Ocean Boulevard	3,600	< 50	< 50	< 50	56.3	5.1
Bennett Avenue north of Ocean Boulevard	740	< 50	< 50	< 50	49.4	0.0
Granada Avenue south of Ocean Boulevard	710	< 50	< 50	< 50	49.2	0.0
Granada Avenue north of Ocean Boulevard	1,810	< 50	< 50	< 50	53.3	0.8

Source. Compiled by LSA Associates, Inc., (March 2016).
Note. Traffic noise within 50 ft of the roadway centerline should be evaluated with site-specific information.
ADT = average daily traffic
CNEL = Community Noise Equivalent Level
dBA = A-weighted decibels
ft = feet

Table 4.10.I: Existing Saturday With Project Traffic Noise Levels

Roadway Segment	ADT	Centerline to 70 CNEL (ft)	Centerline to 65 CNEL (ft)	Centerline to 60 CNEL (ft)	CNEL (dBA) 50 Ft from Centerline of Outermost Lane	Increase from Baseline Conditions (dBA)
Ocean Boulevard west of Redondo Avenue	20,210	< 50	66	134	64.1	0.5
Ocean Boulevard between Redondo Avenue and Loma Avenue	23,050	< 50	71	146	64.7	0.7
Ocean Boulevard between Loma Avenue and Mira-Mar Avenue	23,655	< 50	72	149	64.8	0.6
Ocean Boulevard between Mira-Mar Avenue and Termino Avenue	11,540	< 50	< 50	94	61.7	1.3
Ocean Boulevard between Termino Avenue and Bennett Avenue	12,280	< 50	< 50	98	62.0	1.4
Ocean Boulevard between Bennett Avenue and Granada Avenue	10,665	< 50	< 50	90	61.4	1.5
Ocean Boulevard east of Granada Avenue	8,940	< 50	< 50	80	60.6	0.9
Livingston Avenue between Mira-Mar Avenue and Termino Avenue	12,895	< 50	63	128	63.8	0.0
Livingston Avenue between Termino Avenue and 2nd Street	15,215	< 50	69	142	64.5	0.2
Livingston Avenue east of 2nd Street	3,050	< 50	< 50	< 50	55.6	0.0
2nd Street south of Livingston Avenue	17,060	< 50	< 50	92	61.5	0.1
Termino Avenue south of Ocean Boulevard	5,230	< 50	< 50	71	60.3	2.4
Termino Avenue between Ocean Boulevard and Livingston Avenue	4,560	< 50	< 50	65	59.7	1.2
Termino Avenue north of Livingston Avenue	850	< 50	< 50	< 50	50.0	1.5
Bennett Avenue south of Ocean Boulevard	8,320	< 50	< 50	55	59.9	7.2
Bennett Avenue north of Ocean Boulevard	700	< 50	< 50	< 50	49.2	0.0
Granada Avenue south of Ocean Boulevard	1,150	< 50	< 50	< 50	51.3	0.0
Granada Avenue north of Ocean Boulevard	2,260	< 50	< 50	< 50	54.3	2.1

Source. Compiled by LSA Associates, Inc., (March 2016).
Note. Traffic noise within 50 ft of the roadway centerline should be evaluated with site-specific information.
ADT = average daily traffic
CNEL = Community Noise Equivalent Level
dBA = A-weighted decibels
ft = feet

As shown in Tables 4.10.H and 4.10.I, project-related traffic noise levels would have a traffic noise increase of up to 2.4 dBA, except for Bennett Avenue south of Ocean Boulevard. Although traffic noise levels along Bennett Avenue south of Ocean Boulevard would increase by up to 7.2 dBA, this roadway segment is the entrance to the proposed Project, and there are no off-site noise-sensitive land uses adjacent to this segment of the road. The traffic noise increases of up to 2.4 dBA along other roadway segments in the vicinity of the Project are less than the 3 dBA threshold normally perceptible by the human ear in an outdoor environment. Therefore, no significant traffic noise

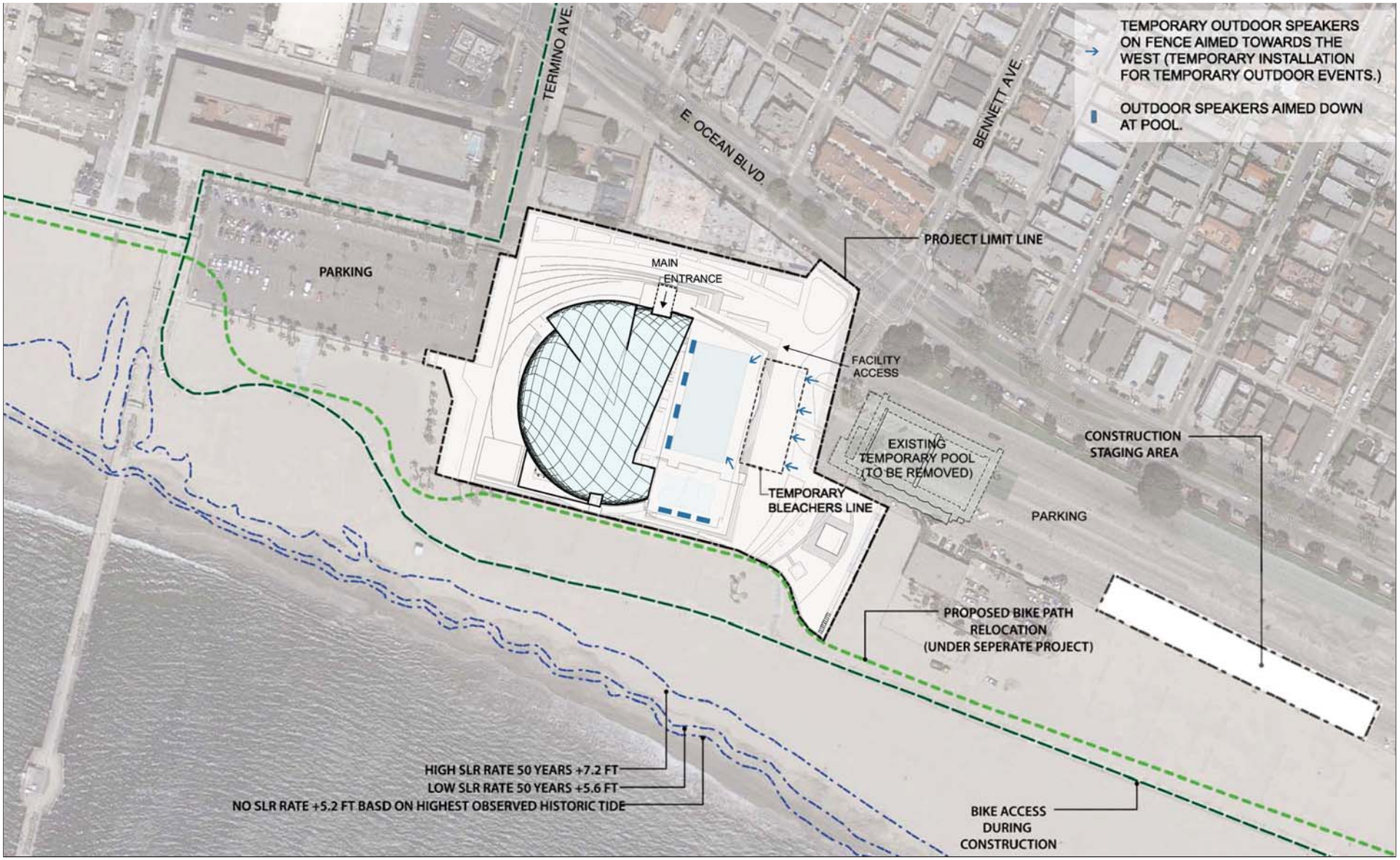
impacts would occur on off-site noise-sensitive land uses. No mitigation measures for off-site uses would be required. Also, on-site traffic noise impacts would not occur because the Project is not considered to be noise sensitive, and mitigation measures for on-site uses are not required.

Long-Term Operation. A reference noise level from a PA sound system was obtained from a noise level measurement conducted by RECON Environmental, Inc., at a high school championship football game (RECON 2003). Each loudspeaker was estimated to generate an hourly equivalent (L_{eq}) noise level of 71.3 dBA at a distance of 50 ft. Crowd noise was measured to be 65 dBA L_{eq} at 75 ft. It is anticipated that reference noise level measurements obtained from RECON at the high school championship football game would be similar to typical daily events or special events at the proposed Project.

Activities from the outdoor pool during practices and regular events would not involve a substantial number of spectators, whistles from officiating water polo games, starting horns, or the use of a PA sound system. Without a substantial number of spectators or without the use of a PA sound system, noise levels generated from the outdoor pool under normal operations would be less than 50 dBA L_{eq} at the perimeter of the facility. Therefore, noise generated from the outdoor pool during practices and regular events would not have the potential to impact nearby noise-sensitive uses. However, noise levels generated from the outdoor pool during special events would have the potential to impact nearby noise-sensitive uses because these events would involve a substantial number of spectators, whistles from officiating water polo games, starting horns, and the use of a PA sound system. The conceptual configuration showing how the speakers would be installed is presented in Figure 4.10.1 (as well as in Figure 3.8 in Chapter 3.0, Project Description). Noise levels generated from the indoor pool would not impact the closest residences at the Belmont Shore Condominiums, which is located approximately 180 ft from the building edge of the proposed Project because the combination of building attenuation and distance attenuation would be 46 dBA. A conservative building interior-to-exterior attenuation was assumed to be 15 dBA (measured at 5 ft from the building edge), and the distance attenuation was calculated to be 31 dBA based on 5 ft from the building edge to 180 ft at the closest residences.

Crowd/Spectator Noise.

Exterior Noise. The proposed temporary outdoor seating is located approximately 190 ft from the Belmont Shores Children's Center to the north, 325 ft from the existing residences to the northeast (across from Ocean Boulevard), and 320 ft from existing residences to the northwest (across from Termino Avenue). A noise level reduction of 8 dBA was estimated for the Belmont Shores Children's Center due to the partial shielding provided by the proposed building structures on the west side of the Project and the existing block wall surrounding the Children's Center outdoor uses. A noise level reduction of 5 dBA was estimated for the two residential locations because there is partial shielding provided by the existing building to the north and the proposed building structures on the west side of the Project. The playground associated with the Belmont Shores Children's Center, the residences to the northeast, and the residences to the northwest may be subject to exterior noise levels from crowd noise reaching 48.9, 47.3, and 47.4 dBA L_{eq} (1-hour), respectively. Spectator noise levels from the temporary outdoor seating would not



LSA

FIGURE 4.10.1

N

Belmont Pool Revitalization Project

Conceptual Speaker Configuration Design

SOURCE: Hastings+Chivetta

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exceed any of the City's daytime exterior L_{50}, L_{25}, L_8, L_2, and L_{max} standards of 50, 55, 60, 65, and 70 dBA, respectively, at the Belmont Shores Children's Center or the closest residences.

Interior Noise. Based on the typical sound level reductions of buildings identified in Protective Noise Levels, Condensed Version of EPA Levels Document (November 1978, EPA-550/9-79-100), standard building construction in Southern California would provide 24 dBA (the national average is 25 dBA) or more in noise reduction from exterior to interior with windows and doors closed. With windows and doors open, the exterior-to-interior noise reduction drops to 12 dBA (the national average is 15 dBA) or more. Classrooms associated with the Belmont Shores Children's Center, the residences to the northeast, and the residences to the northwest may be subject to interior noise levels from crowd noise reaching up to 24.9 dBA L_{eq}, 23.3 dBA L_{eq}, and 23.4 dBA L_{eq} (1-hour), respectively, with windows and doors closed. Classrooms associated with the Belmont Shores Children's Center, the residences to the northeast, and the residences to the northwest may be subject to interior noise levels from crowd noise reaching up to 36.9 dBA L_{eq}, 35.3 dBA L_{eq}, and 35.4 dBA L_{eq} (1 hour), respectively, with windows and doors open. Therefore, spectator noise levels at the outdoor seating area would not exceed any of the City's daytime interior L_8, L_2, and L_{max} standards of 45 dBA, 50 dBA, and 55 dBA, respectively, at either the Belmont Shores Children's Center or the two residential locations. Since the proposed Project is not expected to be used after 10:00 p.m., no nighttime operational noise would occur and, therefore, no violation of the City's nighttime noise standards would occur.

Public Address System Noise. The proposed outdoor pool would have four different outdoor speaker locations with a total of thirteen speakers (Figure 4.10.1). Of the thirteen speakers, seven speakers are permanently installed, and would be aimed down at the pool. The remaining six are temporary speakers that would be installed for outdoor special events. Four permanent outdoor overhead speakers are located on the west side of the pool. The centerpoint of this group of speakers is located approximately 412 ft from the Belmont Shores Children's Center, 328 ft from the residences to the northeast (across from Ocean Boulevard), and 589 ft from the residences to the northwest (across from Termino Avenue). Three permanent outdoor overhead speakers are located near the recreation pool. The centerpoint of this group of speakers is located approximately 444 ft from the Belmont Shores Children's Center, 527 ft from the residences to the northeast (across from Ocean Boulevard), and 538 ft from the residences to the northwest (across from Termino Avenue). Four outdoor temporary speakers are to be located on the east side of the temporary outdoor seating. The centerpoint of this group of speakers is located approximately 307 ft from the Belmont Shores Children's Center, 440 ft from the residences to the northeast (across from Ocean Boulevard), and 426 ft from the residences to the northwest (across from Termino Avenue). The remaining two temporary outdoor speakers are to be located on the east side of the pool, one speaker at each end of the pool facing each other. The centerpoint of this group of speakers is located approximately 349 ft from the Belmont Shores Children's Center, 363 ft from the residences to the northeast (across from Ocean Boulevard), and 509 ft from the residences to the northwest (across from Termino Avenue).

Noise levels generated from the speakers located near the temporary seating and the recreation pool are directed downward and would have a 5 dBA noise attenuation due to directivity at the Belmont Shores Children's Center, for the residences to the northeast (across from Ocean Boulevard), and for the residences to the northwest (across from Termino Avenue). Noise levels generated from the

speakers located across the pool from the temporary seating are directed west towards the temporary seating and would have a 5 dBA noise attenuation due to directivity for the residences to the northeast (across from Ocean Boulevard) and a 1 dBA noise attenuation for the Belmont Shores Children's Center and residences to the northwest (across from Termino Avenue). Also, as mentioned above, a noise level reduction of 8 dBA was estimated for the Belmont Shores Children's Center due to the partial shielding provided by the proposed building structures on the west side of the Project and the existing block wall surrounding the Children's Center outdoor uses. A noise level reduction of 5 dBA was estimated for the residences to the northeast (across from Ocean Boulevard) and residences to the northwest (across from Termino Avenue) because there is partial shielding provided by the existing building to the north and the proposed building structure on the west side of the Project.

Exterior Noise. The playground associated with the Belmont Shores Children's Center, outdoor living areas associated with residences to the northeast (across from Ocean Boulevard), and residences to the northwest (across from Termino Avenue) may be subject to exterior noise levels from speaker noise reaching up to 54.2, 54.5, and 54.3 dBA L_{eq} (1-hour), respectively. Therefore, speaker noise levels would potentially exceed the City's daytime exterior L_{50} standard of 50 dBA at the playground of the Belmont Shores Children's Center, at the outdoor living areas of the residences to the northeast (across from Ocean Boulevard) and the residences to the northwest (across from Termino Avenue); mitigation is discussed below.

Interior Noise. Based on standard building attenuation with windows and doors closed as mentioned above, classrooms associated with the Belmont Shores Children's Center, indoor areas at the residences to the northeast (across from Ocean Boulevard) and the residences to the northwest (across from Termino Avenue) may be subject to interior noise levels reaching up to 30.2, 30.5, and 30.3 dBA L_{eq} (1-hour), respectively, with windows and doors closed. Classrooms associated with the Belmont Shores Children's Center, the residences to the northeast, and the residences to the northwest may be subject to interior noise levels from crowd noise reaching up to 42.2, 42.5, and 42.3 dBA L_{eq} (1 hour), respectively, with windows and doors open. Therefore, speaker noise levels would not exceed the City's daytime interior noise standard at Belmont Shores Children's Center and the two residential locations. Since the proposed Project is not expected to be used after 10:00 p.m., no nighttime operational noise would occur and, therefore, no violation of the City's nighttime noise standards would occur.

Combined Noise Levels.

Exterior Noise. The combined noise levels from the crowd and speaker noise would result in an exterior noise level of 55.3 dBA L_{eq} (1-hour) at the playground associated with the Belmont Shores Children's Center, 55.3 dBA L_{eq} (1-hour) at the outdoor living areas of the residences to the northeast (across from Ocean Boulevard), and 55.1 dBA L_{eq} (1-hour) at the outdoor living areas of the residences to the northwest (across from Termino Avenue). The combined noise levels at the Belmont Shores Children's Center and the two residential locations would potentially exceed the City's daytime exterior L_{50} and L_{25} standard of 50 and 55 dBA, respectively. Implementation of Mitigation Measure 4.10.1, which requires measures to reduce

noise levels from the speakers, would reduce the combined noise level to less than the City's exterior noise standards. Therefore, this impact would be less than significant after mitigation.

Interior Noise. The combined interior noise level with windows and doors closed would be 31.3 dBA L_{eq} (1-hour) in the classroom associated with the Belmont Shores Children's Center, 31.3 dBA L_{eq} (1-hour) at the residences to the northeast (across from Ocean Boulevard), and 31.1 dBA L_{eq} (1-hour) at the residences to the northwest (across from Termino Avenue). The combined interior noise level with windows and doors open would be 43.3 dBA L_{eq} (1 hour) in the classroom associated with the Belmont Shores Children's Center, 43.3 dBA L_{eq} (1 hour) at the residences to the northeast (across from Ocean Boulevard), and 43.1 dBA L_{eq} (1 hour) at the residences to the northwest (across from Termino Avenue). The combined noise levels at the Belmont Shores Children's Center and the two residential locations would not exceed the City's daytime interior standard. Since the proposed Project is not expected to be used after 10:00 p.m., no nighttime operational noise would occur, and no violation of the City's nighttime noise standards would occur.

Threshold 4.10.2: Would the project cause exposure of persons to or generation of excessive groundborne vibration or groundborne noise levels?

Less than Significant Impact. The primary source of vibration during construction would be generated by front-end loaders, small bulldozers, dump trucks, hydraulic hammer, and pile drivers. The closest heavy construction activities to receptors would be located approximately 25 ft from the Belmont Shore Children's Center and other commercial buildings. The nearest residences to the northeast and northwest are located approximately 100 ft and 80 ft, respectively, from heavy construction activities. The estimated vibration level at the closest residence to the northeast and northwest would be 0.049 inch/sec and 0.097 inch/sec, respectively. The estimated vibration levels at the Belmont Shores Children's Center and other commercial buildings would be 0.101 inch/sec. These construction vibration levels are below the damage threshold of 0.3 inch/sec for older residential buildings and 0.5 inch/sec for modern industrial commercial buildings. Therefore, the proposed Project would result in a less than significant impact, and no mitigation is required.

Threshold 4.10.3: Would the project cause a substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project?

Less than Significant Impact. As mentioned above, Tables 4.10.H and 4.10.I show that the Project-related traffic noise levels would have a traffic noise increase of up to 2.4 dBA, except for Bennett Avenue south of Ocean Boulevard. Although traffic noise levels along Bennett Avenue south of Ocean Boulevard would increase by up to 7.2 dBA, this roadway segment is the entrance to the proposed Project and there are no off-site noise-sensitive land uses adjacent to it. The traffic noise increases of up to 2.4 dBA along other roadway segments in the Project area are less than the 3 dBA threshold normally perceptible by the human ear in an outdoor environment. Therefore, no significant traffic noise impacts or permanent increase in ambient noise levels would occur in the Project vicinity or to off-site noise-sensitive land uses. No mitigation measures are required.

Threshold 4.10.4: Would the project cause a substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project?

Less than Significant Impact. Two types of short-term noise impacts would occur during Project construction. The first type would be from construction crew commutes and the transport of construction equipment and materials to the Project site. The pieces of heavy equipment for grading and construction activities will be moved on site, will remain for the duration of each construction phase, and will not add to the daily traffic volume in the Project vicinity. A high single-event noise exposure potential at a maximum level of 84 dBA L_{max} from trucks passing at 50 ft will exist. However, the projected construction traffic will be minimal when compared to existing traffic volumes on Ocean Boulevard and other affected streets, and its associated long-term noise level change will not be perceptible. Therefore, short-term construction-related worker commutes and equipment transport noise impacts would be less than significant.

The second type of short-term noise impacts is related to the noise generated by heavy construction equipment operating at the Project site. Construction is performed in discrete steps, each of which has its own mix of equipment and consequently its own noise characteristics. These various sequential phases would change the character of the noise generated and the noise levels within the Project area as construction progresses. Despite the variety in the type and size of construction equipment, similarities in the dominant noise sources and patterns of operation allow construction-related noise ranges to be categorized by work phase. Table 4.10.J lists typical construction equipment noise levels (L_{max}) recommended for noise impact assessments, based on a distance of 50 ft between the equipment and a noise receiver.

Typical noise levels at 50 ft from an active construction area can range up to 91 dBA L_{max} during the noisiest construction phases. The site preparation phase, which includes grading and paving, tends to generate the highest noise levels because the noisiest construction equipment is earthmoving equipment. Earthmoving equipment includes excavating machinery such as backfillers, bulldozers, and front-end loaders. Earthmoving and compacting equipment includes compactors, scrapers, and graders. Typical operating cycles for these types of construction equipment may involve 1 or 2 minutes of full power operation followed by 3 or 4 minutes at lower power settings.

Construction of the proposed Project is expected to require the use of graders, bulldozers, water trucks, and pickup trucks. Noise associated with the use of construction equipment is estimated to be between 75 and 85 dBA L_{max} at a distance of 50 ft from the active construction area for the grading phase. As seen in Table 4.10.J, the maximum noise level generated by each grader is assumed to be approximately 85 dBA L_{max} at 50 ft from the grader in operation. Each dozer would generate approximately 82 dBA L_{max} at 50 ft. The maximum noise level generated by water trucks/pickup trucks is approximately 75 dBA L_{max} at 50 ft from these vehicles. Each doubling of the sound source with equal strength increases the noise level by 3 dBA. Each piece of construction equipment operates as an individual point source. The worst-case composite noise level at the nearest residence during this phase of construction would be 87 dBA L_{max} (at a distance of 50 ft from an active construction area).

Table 4.10.J. Typical Construction Equipment Noise Levels

Equipment Description	Spec 721.560[1] L_{max} at 50 ft	Actual Measured[2] L_{max} at 50 ft
Backhoes	80	78
Compactor (ground)	80	83
Cranes	85	81
Dozers	85	82
Dump Truck	84	76
Excavators	85	81
Flat Bed Trucks	84	74
Front-End Loaders	80	79
Graders	85	N/A[3]
Jackhammer	85	89
Pickup Truck	55	75
Pneumatic Tools	85	85
Pumps	77	81
Rock Drill	85	81
Roller	85	80
Scrapers	85	84
Tractors	84	N/A
Impact Pile Driver	95	101

Source: Federal Highway Administration Roadway Construction Noise Model (January 2006).
Note: Noise levels reported in this table are rounded to the nearest whole number.

[1] Maximum noise levels were developed based on Spec 721.560 from the Central Artery/Tunnel (CA/T) program to be consistent with the City of Boston's Noise Code for the "Big Dig" project.

[2] The maximum noise level was developed based on the average noise level measured for each piece of equipment during the CA/T program in Boston, Massachusetts.

[3] Since the maximum noise level based on the average noise level measured for this piece of equipment was not available, the maximum noise level developed based on Spec 721.560 was used.

ft = foot/feet
L_{max} = maximum instantaneous sound level
N/A = not applicable

In addition to standard construction equipment, the Project anticipates the use of hydraulic hammer pile drivers. Noise generated by a hydraulic hammer pile driver was evaluated to be similar as a typical pile driver. Table 4.10.J shows that a typical pile driver generates noise levels of approximately 95 dBA L_{max} at 50 ft. If pile driving is conducted concurrently with site preparation, the construction site could potentially generate noise levels of 96 dBA L_{max} at a distance of 50 ft.

The following land uses are located within the vicinity of the proposed construction activities:

- **Residential Uses.** The closest residences to the northeast and northwest are located approximately 100 ft and 80 ft from the Project construction boundary and may be subjected to short-term noise reaching 90 and 92 dBA L_{max}, respectively, generated by the proposed Project construction activities.
- **Belmont Shores Children's Center.** The Belmont Shores Children's Center is located approximately 25 ft from the construction boundary and may be subject to short-term noise reaching 102 dBA L_{max} or higher generated by construction activities at the Project site.

The closest existing sensitive receptors would be subject to short-term noise levels that would be higher than existing ambient noise levels in the Project area but would no longer occur once construction of the Project is completed. In addition, noise generated from construction activities would be intermittent and temporary. Section 8.80.202 of the City's Municipal Code allows elevated construction-related noise levels as long as the construction activities are limited to the hours specified. Adherence to the City's noise regulations and implementation of Mitigation Measures 4.10.2 and 4.10.3, which require standard conditions for construction and conducting a preconstruction community meeting, would reduce construction noise impacts to sensitive receptors. Therefore, temporary increases in ambient noise levels in the proposed Project vicinity associated with Project construction would be reduced to less than significant levels.

4.10.6 Cumulative Impacts

The cumulative study area for construction noise impacts is localized to the Project site and properties immediately adjacent to construction activities. In general, only projects occurring adjacent to or very close to the Project site are considered to be within the cumulative noise study area due to the localized effects of noise. Currently, there are no proposed or approved but not yet fully constructed projects within the cumulative noise study area for the proposed Project. Because construction noise and vibration are localized and rapidly attenuate within an urban environment, other related projects are located too far from the Project site to contribute to cumulative impacts related to noise levels due to construction activities. Construction activity at any related project site would not result in a noticeable increase in noise to sensitive receptors adjacent to the proposed Project site. Furthermore, all related projects would be required to comply with the City Noise Control Ordinance. Therefore, cumulative construction impacts would be less than significant.

As a rule of thumb, it takes a doubling of noise-generating sources, such as vehicles or visitors, to result in an increase of 3 dBA. Operations associated with the proposed Project are not anticipated to lead to a substantial increase in the number of visitors and vehicles to the Project site. Therefore, the long-term ambient noise levels associated with increased traffic are not anticipated to be significant as a result of the proposed Project, would not contribute substantially to cumulative roadway noise impacts, and would have a less than cumulatively considerable impact. Also, since no cumulative projects were identified for the cumulative noise study area, the proposed Project would not contribute to off-site cumulative noise impacts from on-site activities and would have a less than cumulatively considerable impact.

4.10.7 Level of Significance Prior to Mitigation

The proposed Project would not result in any impacts related to excessive noise levels associated with a public or private airport/airstrip. The proposed Project would not contribute substantially to cumulative construction or operational noise levels, and cumulative impacts would be less than significant. However, the proposed Project could result in potentially significant impacts related to on-site construction and operational noise levels related to spectator and PA systems sources. These impacts would be potentially significant prior to mitigation. Potential impacts related to groundborne vibration and noise levels would be less than significant.

4.10.8 Mitigation Measures

The following mitigation measures are incorporated to offset the potentially significant operational and construction-related noise impacts of the proposed Project.

Mitigation Measure 4.10.1: Prior to issuance of the occupancy permit, the City of Long Beach's (City) Development Services Director, or designee, shall verify that a sound engineer has designed the permanent and temporary sound systems such that the City's exterior noise standards (daytime exterior noise level of 50 dBA L_{50}) are not exceeded at the surrounding sensitive land uses. Measures capable of reducing the noise levels include, but are not limited to:

- Reducing the source levels;
- Reducing the speaker elevations;
- Directing the speakers away from adjacent noise-sensitive land uses; and
- Using highly directional speakers.

Mitigation Measure 4.10.2: Prior to issuance of demolition or grading permits, the City of Long Beach's (City) Development Services Director, or designee, shall verify that construction and grading plans include the following conditions to reduce potential construction noise impacts on nearby sensitive receptors:

- During all site excavation and grading, the construction contractors shall equip all construction equipment, fixed or mobile, with properly operating and maintained mufflers consistent with manufacturers' standards;
- The construction contractor shall place all stationary construction equipment so that emitted noise is directed away from sensitive receptors nearest the Project site;
- The construction contractor shall locate equipment staging to create the greatest distance between construction-related noise sources and noise-sensitive receptors nearest the Project site during all Project construction;
- The construction contractor shall ensure that engine idling from construction equipment (i.e., bulldozers and haul trucks) is limited to a maximum of 5 minutes at any given time; and
- The construction contractor shall ensure that all construction activities are scheduled to avoid operating several pieces of heavy equipment simultaneously.
- Construction, drilling, repair, remodeling, alteration, or demolition work shall be limited to the hours of 7:00 a.m. to 7:00 p.m. Monday through Friday, and 9:00 a.m. to 6:00 p.m. on

Saturday. In accordance with City standards, no construction activities are permitted outside of these hours.

Mitigation Measure 4.10.3: Prior to issuance of a grading permit, the City of Long Beach Tidelands Capital Improvement Division shall hold a community preconstruction meeting in concert with the construction contractor to provide information to the public regarding the construction schedule. The construction schedule information shall include the duration of each construction activity and the specific location, days, frequency, and duration of the pile driving that will occur during each phase of the Project construction. Public notification of this meeting shall be undertaken in the same manner as the Notice of Availability mailings for this Draft Environmental Impact Report.

4.10.9 Level of Significance after Mitigation

Implementation of Mitigation Measures 4.10.1, 4.10.2, and 4.10.3 would reduce operational and construction-related noise impacts on off-site noise-sensitive land uses to less than significant levels.