# NOISE IMPACT ANALYSIS

# WOODROW WILSON HIGH SCHOOL AQUATIC CENTER PROJECT

# CITY OF LONG BEACH

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# ACRONYMS AND ABBREVIATIONS

| | |
|---|---|
| ANSI | American National Standards Institute |
| Caltrans | California Department of Transportation |
| CEQA | California Environmental Quality Act |
| City | City of Long Beach |
| CMU | Concrete Masonry Unit |
| CNEL | Community Noise Equivalent Level |
| dB | Decibel |
| dBA | A-weighted decibels |
| DOT | Department of Transportation |
| FHWA | Federal Highway Administration |
| FTA | Federal Transit Administration |
| EPA | Environmental Protection Agency |
| FTES | Full Time Equivalent Students |
| Hz | Hertz |
| Ldn | Day-night average noise level |
| Leq | Equivalent sound level |
| Lmax | Maximum noise level |
| ONAC | Federal Office of Noise Abatement and Control |
| OSHA | Occupational Safety and Health Administration |
| PPV | Peak particle velocity |
| RMS | Root mean square |
| SEL | Single Event Level or Sound Exposure Level |
| STC | Sound Transmission Class |
| VdB | Vibration velocity level in decibels |

# 1.0 INTRODUCTION

## *1.1 Purpose of Analysis and Study Objectives*

This Noise Impact Analysis has been prepared to determine the noise impacts associated with the proposed Woodrow Wilson High School Aquatic Center project (proposed project). The following is provided in this report:

- A description of the study area and the proposed project;
- Information regarding the fundamentals of noise;
- Information regarding the fundamentals of vibration;
- A description of the local noise guidelines and standards;
- An evaluation of the current noise environment;
- An analysis of the potential short-term construction-related noise impacts from the proposed project; and,
- An analysis of long-term operations-related noise impacts from the proposed project.

## *1.2 Site Location and Study Area*

The project site is located in the southeastern portion of the City of Long Beach (City) on the west portion of the Woodrow Wilson High School (Wilson HS) campus. The approximately 1.6-acre project site is currently paved and contains six basketball courts and four volleyball courts and on the northeastern corner of the project site there is a generator and electrical boxes that are within a fenced in area. The project site is bounded by tennis courts to the north, Ximeno Avenue and school structures to the east, portable classrooms to the south, and Bennett Avenue and multi-family homes to the west. The project study area is shown in Figure 1.

**Sensitive Receptors in Project Vicinity**

The nearest sensitive receptors to the project site are residents at the multi-family homes on the west side of Bennett Avenue that are located as near as 50 feet west of the project site.

## *1.3 Proposed Project Description*

The proposed project includes the construction of a new aquatics facility that would include the following main facilities:

- An outdoor, Myrtha Brand, swimming pool that is 51.5 meters long by 25 yards wide, with a 1.5 meter-wide bulkhead. The plan is to have an approximately 30 foot deck surrounding the pool. The size of deck may become slightly smaller depending on final size of the buildings.
- Bleachers with a capacity for 500 spectators and shade coverings over the bleachers.
- Stadium lights
- LED scoreboard with integrated sound system throughout the complex
- Parking with 20 to 25 stalls including ADA stalls

- A 10-foot tall concrete masonry unit (CMU) wall enclosure where needed.
- Surveillance cameras for security purposes.
- Equipment storage enclosure/room.

The aquatic center itself will also include:

- A snack bar/ticket booth
- Inclusive ADA complaint changing/locker rooms to accommodate 150 students with ADA compliant restrooms and showers.
- Two team rooms.
- Inclusive Restrooms will be accessible from both the pool area and the locker room.
- Coaches'/Physical Education (PE) teacher office with a restroom and a shower.
- Laundry room.
- Two chemical storage rooms, which should be easily accessible by truck for deliveries.
- A mechanical room and an electrical room.
- A pool attendant office including a restroom and shower.
- An equipment storage enclosure/room.
- Outdoor shower heads.

A layout of the proposed project is shown in Figure 2, Proposed Site Plan. In addition, the pool temperature shall be maintained at 78-82 F degrees for the competitive users, but the heating system shall be capable of 86 F for all other pool users. Basis of design for the heater is Lochinvar Aquas indirect gas fired pool boilers.

### *1.4 Standard Noise Regulatory Conditions*

The proposed project will be required to comply with the following regulatory conditions from the City of Glendale and State of California.

**City of Glendale Municipal Code**

The following lists the noise and vibration regulations from the Municipal Code that are applicable, but not limited to the proposed project.

- Section 8.36.040 Exterior Noise Standards at Nearby Residential Uses
- Section 8.36.080 Construction Noise
- Section 8.36.090 Construction Equipment
- Section 8.36.210 Vibration

**State of California Rules**

The following lists the State of California noise regulations that are applicable, but not limited to the proposed project.

- California Vehicle Code Section 2700-27207 – On Road Vehicle Noise Limits
- California Vehicle Code Section 38365-38350 – Off-Road Vehicle Noise Limits

### *1.5 Summary of Analysis Results*

The following is a summary of the proposed project's impacts with regard to the State CEQA Guidelines noise checklist questions.

**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?**

Potentially significant impact. Implementation of Mitigation Measure 1 would reduce the impact to less than significant levels.

**Generation of excessive groundborne vibration or groundborne noise levels?**

Less than significant impact.

**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?**

Less than significant impact.

### *1.6 Project Design Features Incorporated into the Proposed Project*

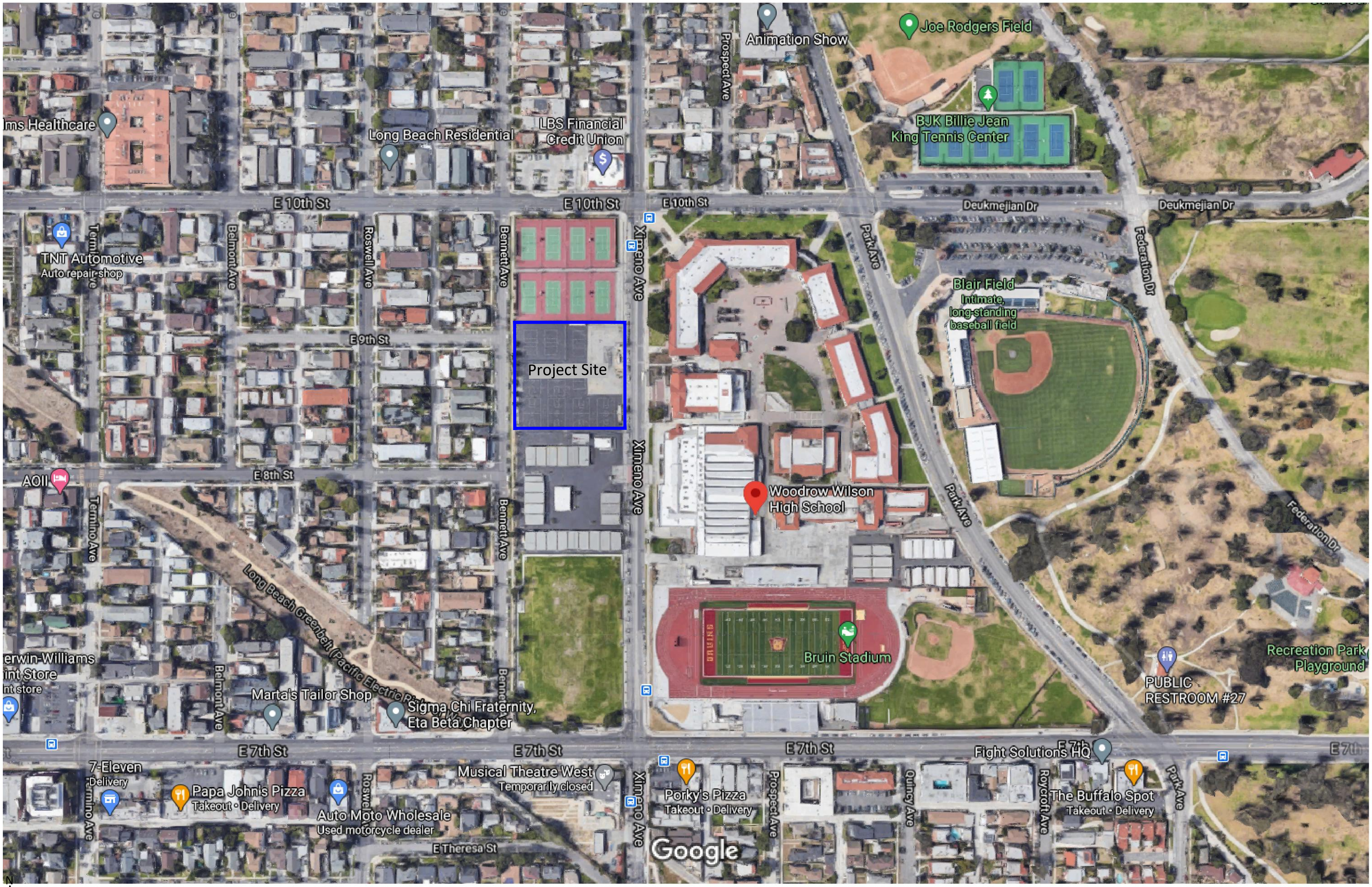
This analysis was based on implementation of the following project design features that are either already depicted on the proposed project site plan and architectural plans or are required from City and State Regulations.

**Project Design Feature 1:**
The project applicant shall construct a 10-foot high concrete masonry unit (CMU) wall along the west property line of the project site that is adjacent to Bennett Avenue. Other than the two entry gates that shall be constructed of a solid material, such as minimum 24 gauge sheet metal or another solid material that provides a minimum sound transmission class (STC) rating of 25 STC, the wall shall be free of any cut-outs or openings.

### *1.7 Mitigation Measures for the Proposed Project*

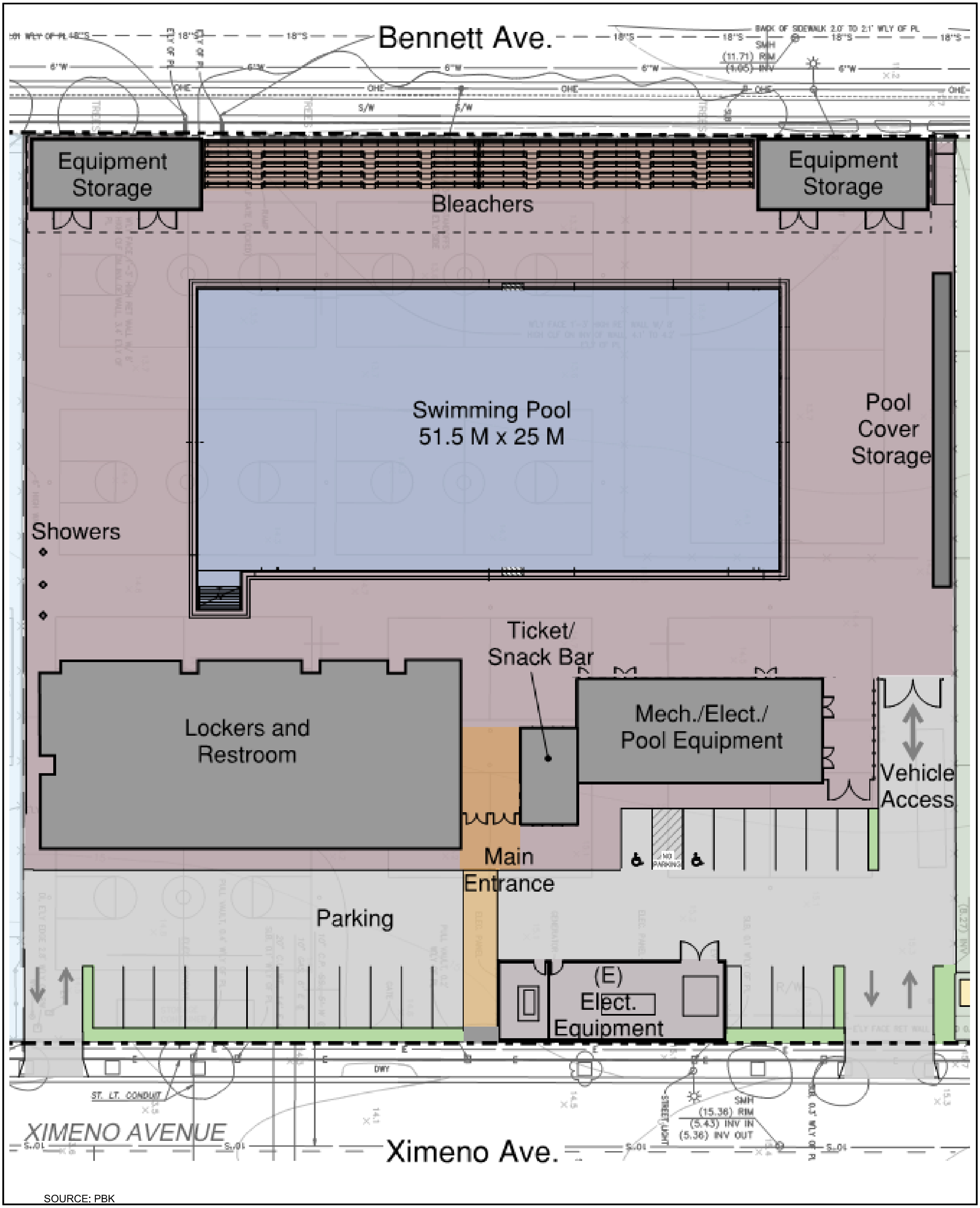
This analysis found that through adherence to the noise and vibration regulations detailed in Section 1.4 above, through implementation of Project Design Feature 1 detailed in Section 1.6 above, and through implementation of the following mitigation all noise and vibration impacts would be reduced to less than significant levels.

**Mitigation Measure 1:**
The LBUSD shall restrict any swimming or water polo competitions from occurring in the Aquatics Facility between the hours of 10:00 p.m. and 7:00 a.m. This restriction shall not apply to swim and water polo practices and other non-intensive uses of the Aquatics Facility.




SOURCE: Google Maps.

Figure 1
Project Location Map




VISTA ENVIRONMENTAL

Figure 2
Proposed Site Plan

# 2.0 NOISE FUNDAMENTALS

Noise is defined as unwanted sound. Sound becomes unwanted when it interferes with normal activities, when it causes actual physical harm or when it has adverse effects on health. Sound is produced by the vibration of sound pressure waves in the air. Sound pressure levels are used to measure the intensity of sound and are described in terms of decibels. The decibel (dB) is a logarithmic unit which expresses the ratio of the sound pressure level being measured to a standard reference level. A-weighted decibels (dBA) approximate the subjective response of the human ear to a broad frequency noise source by discriminating against very low and very high frequencies of the audible spectrum. They are adjusted to reflect only those frequencies which are audible to the human ear.

## *2.1 Noise Descriptors*

Noise Equivalent sound levels are not measured directly, but are calculated from sound pressure levels typically measured in A-weighted decibels (dBA). The equivalent sound level (Leq) represents a steady state sound level containing the same total energy as a time varying signal over a given sample period. The peak traffic hour Leq is the noise metric used by California Department of Transportation (Caltrans) for all traffic noise impact analyses.

The Day-Night Average Level (Ldn) is the weighted average of the intensity of a sound, with corrections for time of day, and averaged over 24 hours. The time of day corrections require the addition of ten decibels to sound levels at night between 10 p.m. and 7 a.m. While the Community Noise Equivalent Level (CNEL) is similar to the Ldn, except that it has another addition of 4.77 decibels to sound levels during the evening hours between 7 p.m. and 10 p.m. These additions are made to the sound levels at these time periods because during the evening and nighttime hours, when compared to daytime hours, there is a decrease in the ambient noise levels, which creates an increased sensitivity to sounds. For this reason, the sound appears louder in the evening and nighttime hours and is weighted accordingly. The City of Long Beach relies on the CNEL noise standard to assess transportation-related impacts on noise sensitive land uses.

## *2.2 Tone Noise*

A pure tone noise is a noise produced at a single frequency and laboratory tests have shown that humans are more perceptible to changes in noise levels of a pure tone. For a noise source to contain a "pure tone," there must be a significantly higher A-weighted sound energy in a given frequency band than in the neighboring bands, thereby causing the noise source to "stand out" against other noise sources. A pure tone occurs if the sound pressure level in the one-third octave band with the tone exceeds the average of the sound pressure levels of the two contiguous one-third octave bands by:

- 5 dB for center frequencies of 500 hertz (Hz) and above
- 8 dB for center frequencies between 160 and 400 Hz
- 15 dB for center frequencies of 125 Hz or less

## *2.3 Noise Propagation*

From the noise source to the receiver, noise changes both in level and frequency spectrum. The most obvious is the decrease in noise as the distance from the source increases. The manner in which noise reduces with distance depends on whether the source is a point or line source as well as ground absorption, atmospheric effects and refraction, and shielding by natural and manmade features. Sound from point sources, such as air conditioning condensers, radiate uniformly outward as it travels away from the source in a spherical pattern. The noise drop-off rate associated with this geometric spreading is 6 dBA per each doubling of the distance (dBA/DD). Transportation noise sources such as roadways are typically analyzed as line sources, since at any given moment the receiver may be impacted by noise from multiple vehicles at various locations along the roadway. Because of the geometry of a line source, the noise drop-off rate associated with the geometric spreading of a line source is 3 dBA/DD.

### *2.4 Ground Absorption*

The sound drop-off rate is highly dependent on the conditions of the land between the noise source and receiver. To account for this ground-effect attenuation (absorption), two types of site conditions are commonly used in traffic noise models, soft-site and hard-site conditions. Soft-site conditions account for the sound propagation loss over natural surfaces such as normal earth and ground vegetation. For point sources, a drop-off rate of 7.5 dBA/DD is typically observed over soft ground with landscaping, as compared with a 6.0 dBA/DD drop-off rate over hard ground such as asphalt, concrete, stone and very hard packed earth. For line sources a 4.5 dBA/DD is typically observed for soft-site conditions compared to the 3.0 dBA/DD drop-off rate for hard-site conditions. Caltrans research has shown that the use of soft-site conditions is more appropriate for the application of the Federal Highway Administration (FHWA) traffic noise prediction model used in this analysis.

# 3.0 GROUND-BORNE VIBRATION FUNDAMENTALS

Ground-borne vibrations consist of rapidly fluctuating motions within the ground that have an average motion of zero. The effects of ground-borne vibrations typically only cause a nuisance to people, but at extreme vibration levels damage to buildings may occur. Although ground-borne vibration can be felt outdoors, it is typically only an annoyance to people indoors where the associated effects of the shaking of a building can be notable. Ground-borne noise is an effect of ground-borne vibration and only exists indoors, since it is produced from noise radiated from the motion of the walls and floors of a room and may also consist of the rattling of windows or dishes on shelves.

### *3.1 Vibration Descriptors*

There are several different methods that are used to quantify vibration amplitude such as the maximum instantaneous peak in the vibrations velocity, which is known as the peak particle velocity (PPV) or the root mean square (rms) amplitude of the vibration velocity. Due to the typically small amplitudes of vibrations, vibration velocity is often expressed in decibels and is denoted as ($L_v$) and is based on the rms velocity amplitude. A commonly used abbreviation is "VdB", which in this text, is when $L_v$ is based on the reference quantity of 1 micro inch per second.

### *3.2 Vibration Perception*

Typically, developed areas are continuously affected by vibration velocities of 50 VdB or lower. These continuous vibrations are not noticeable to humans whose threshold of perception is around 65 VdB. Off-site sources that may produce perceptible vibrations are usually caused by construction equipment, steel-wheeled trains, and traffic on rough roads, while smooth roads rarely produce perceptible ground-borne noise or vibration.

### *3.3 Vibration Propagation*

The propagation of ground-borne vibration is not as simple to model as airborne noise. This is due to the fact that noise in the air travels through a relatively uniform median, while ground-borne vibrations travel through the earth which may contain significant geological differences. There are three main types of vibration propagation; surface, compression, and shear waves. Surface waves, or Rayleigh waves, travel along the ground's surface. These waves carry most of their energy along an expanding circular wave front, similar to ripples produced by throwing a rock into a pool of water. P-waves, or compression waves, are body waves that carry their energy along an expanding spherical wave front. The particle motion in these waves is longitudinal (i.e., in a "push-pull" fashion). P-waves are analogous to airborne sound waves. S-waves, or shear waves, are also body waves that carry energy along an expanding spherical wave front. However, unlike P-waves, the particle motion is transverse or "side-to-side and perpendicular to the direction of propagation."

As vibration waves propagate from a source, the vibration energy decreases in a logarithmic nature and the vibration levels typically decrease by 6 VdB per doubling of the distance from the vibration source. As stated above, this drop-off rate can vary greatly depending on the soil but has been shown to be effective enough for screening purposes, in order to identify potential vibration impacts that may need to be studied through actual field tests.

# 4.0 REGULATORY SETTING

The project site is located in the City of Long Beach. Noise regulations are addressed through the efforts of various federal, state, and local government agencies. The agencies responsible for regulating noise are discussed below.

### *4.1 Federal Regulations*

The adverse impact of noise was officially recognized by the federal government in the Noise Control Act of 1972, which serves three purposes:

- Promulgating noise emission standards for interstate commerce
- Assisting state and local abatement efforts
- Promoting noise education and research

The Federal Office of Noise Abatement and Control (ONAC) was initially tasked with implementing the Noise Control Act. However, the ONAC has since been eliminated, leaving the development of federal noise policies and programs to other federal agencies and interagency committees. For example, the Occupational Safety and Health Administration (OSHA) agency prohibits exposure of workers to excessive sound levels. The Department of Transportation (DOT) assumed a significant role in noise control through its various operating agencies. The Federal Aviation Administration (FAA) regulates noise of aircraft and airports. Surface transportation system noise is regulated by a host of agencies, including the Federal Transit Administration (FTA). Transit noise is regulated by the FTA, while freeways that are part of the interstate highway system are regulated by the Federal Highway Administration (FHWA). Finally, the federal government actively advocates that local jurisdictions use their land use regulatory authority to arrange new development in such a way that "noise sensitive" uses are either prohibited from being sited adjacent to a highway or, alternately that the developments are planned and constructed in such a manner that potential noise impacts are minimized.

Although the proposed project is not under the jurisdiction of the FTA, the FTA is the only agency that provides specific guidance for construction noise. The FTA recommends developing construction noise criteria on a project-specific basis that utilizes local noise ordinances if possible. However, local noise ordinances usually relates to nuisance and hours of allowed activity and sometimes specify limits in terms of maximum levels, but are generally not practical for assessing the noise impacts of a construction project. Project construction noise criteria should take into account the existing noise environment, the absolute noise levels during construction activities, the duration of the construction, and the adjacent land uses. The FTA standards are based on extensive studies by the FTA and other governmental agencies on the human effects and reaction to noise and a summary of the FTA findings for a general construction noise assessment are provided below in Table A.

**Table A – FTA General Assessment Construction Noise Criteria**

| Land Use | Day (dBA $Leq_{(1\text{-hour})}$) | Night (dBA $Leq_{(1\text{-hour})}$) |
|---|---|---|
| Residential | 90 | 80 |
| Commercial | 100 | 100 |
| Industrial | 100 | 100 |

Source: Federal Transit Administration, 2018.

Since the federal government has preempted the setting of standards for noise levels that can be emitted by the transportation sources, the City is restricted to regulating the noise generated by the transportation system through nuisance abatement ordinances and land use planning.

### *4.2 State Regulations*

**Noise Standards**

California Department of Health Services Office of Noise Control

Established in 1973, the California Department of Health Services Office of Noise Control (ONC) was instrumental in developing regularity tools to control and abate noise for use by local agencies. One significant model is the "Land Use Compatibility for Community Noise Environments Matrix," which allows the local jurisdiction to clearly delineate compatibility of sensitive uses with various incremental levels of noise.

California Noise Insulation Standards

Title 24, Chapter 1, Article 4 of the California Administrative Code (California Noise Insulation Standards) requires noise insulation in new hotels, motels, apartment houses, and dwellings (other than single-family detached housing) that provides an annual average noise level of no more than 45 dBA CNEL. When such structures are located within a 60-dBA CNEL (or greater) noise contour, an acoustical analysis is required to ensure that interior levels do not exceed the 45-dBA CNEL annual threshold. In addition, Title 21, Chapter 6, Article 1 of the California Administrative Code requires that all habitable rooms, hospitals, convalescent homes, and places of worship shall have an interior CNEL of 45 dB or less due to aircraft noise.

Government Code Section 65302

Government Code Section 65302 mandates that the legislative body of each county and city in California adopt a noise element as part of its comprehensive general plan. The local noise element must recognize the land use compatibility guidelines published by the State Department of Health Services. The guidelines rank noise land use compatibility in terms of normally acceptable, conditionally acceptable, normally unacceptable, and clearly unacceptable.

California Vehicle Code Section 27200-27207 – On-Road Vehicle Noise

California Vehicle Code Section 27200-27207 provides noise limits for vehicles operated in California. For vehicles over 10,000 pounds noise is limited to 88 dB for vehicles manufactured before 1973, 86 dB for vehicles manufactured before 1975, 83 dB for vehicles manufactured before 1988, and 80 dB for vehicles manufactured after 1987. All measurements are based at 50 feet from the vehicle.

California Vehicle Section 38365-38380 – Off-Road Vehicle Noise

California Vehicle Code Section 38365-38380 provides noise limits for off-highway motor vehicles operated in California. 92 dBA for vehicles manufactured before 1973, 88 dBA for vehicles manufactured before 1975, 86 dBA for vehicles manufactured before 1986, and 82 dBA for vehicles manufactured after December 31, 1985. All measurements are based at 50 feet from the vehicle.

### Vibration Standards

Title 14 of the California Administrative Code Section 15000 requires that all state and local agencies implement the California Environmental Quality Act (CEQA) Guidelines, which requires the analysis of exposure of persons to excessive groundborne vibration. However, no statute has been adopted by the state that quantifies the level at which excessive groundborne vibration occurs.

Caltrans issued the *Transportation and Construction Vibration Guidance Manual*, April 2020. The Manual provides practical guidance to Caltrans engineers, planners, and consultants who must address vibration issues associated with the construction, operation, and maintenance of Caltrans projects. However, this manual is also used as a reference point by many lead agencies and CEQA practitioners throughout California, as it provides numeric thresholds for vibration impacts. Thresholds are established for continuous (construction-related) and transient (transportation-related) sources of vibration, which found that the human response becomes distinctly perceptible at 0.25 inch per second PPV for transient sources and 0.04 inch per second PPV for continuous sources.

## *4.3 Local Regulations*

The City of Long Beach General Plan and Municipal Code establishes the following applicable policies related to noise and vibration.

### City of Long Beach General Plan

The City of Long Beach General Plan establishes the following applicable policies related to noise and vibration s. The City's Noise Element Standards are presented in Table B.

**Table B – City of Long Beach General Plan Noise Element Standards**

| Major Land Use Type | Exterior | | | Interior |
|---|---|---|---|---|
| | Maximum Single Hourly Peak | L10[a] | L50[b] | $L_{dn}$ |
| All noise-sensitive land-uses (residential, school, hospital, etc.) 7:00 a.m. – 10:00 p.m. | 70 dB(A) | 55 dB(A) | 45 dB(A) | 45 dB(A) |
| All noise-sensitive land uses (residential, school, hospital, etc.) 10:00 p.m. – 7:00 a.m. | 60 dB(A) | 45 dB(A) | 35 dB(A) | 35 dB(A) |
| Commercial (anytime) | 75 dB(A) | 65 dB(A) | 55 dB(A) | N/A |
| Industrial (anytime) | 85 dB(A) | 70 dB(A) | 60 dB(A) | N/A |

Notes:
a) Noise levels exceeded 10% of the time
b) Noise levels exceeded 50% of the time
Source: City of Long Beach General Plan Noise Element.

### City of Long Beach Municipal Code

The City's Municipal Code identifies standards for noise intrusion from non-transportation sources within various Noise Districts. The proposed project is located in District One. Table C summarizes the applicable standards in Noise District One.

**Table C – City of Long Beach Municipal Code Exterior Noise Standards**

| Noise level that may not be exceeded for more than… | Daytime[a] 7 a.m. – 10 p.m. | Nighttime[a] 10 p.m. – 7 a.m. |
|---|---|---|
| 30 minutes in any hour | 50 dB(A) | 45 dB(A) |
| 15 minutes in any hour | 55 dB(A) | 50 dB(A) |
| 5 minutes in any hour | 60 dB(A) | 55 dB(A) |
| 1 minute in any hour | 65 dB(A) | 60 dB(A) |
| Any time | 70 dB(A) | 65 dB(A) |

Notes:

a) In the event that the alleged offensive noise contains a steady audible tone such as a whine, screech, or hum, or is a repetitive noise such as hammering or riveting or contains music or speech conveying informational content, the specified noise limits are reduced by 5 dB(A).

Source: City of Long Beach Municipal Code Chapter 8.80.160.

Section 8.80.202 of the City's Noise Ordinance regulates noise from construction activities. These regulations limit the permissible hours of construction to between 7:00 a.m. and 7:00 p.m. on weekdays or federal holidays and between 9:00 a.m. and 6:00 p.m. on Saturdays. Construction is generally prohibited on Sundays. The Noise Ordinance also limits hours of operation for mechanically powered tools (e.g., saws, sanders, drills, grinders, lawnmowers, and garden tools) from 7:00 a.m. to 10:00 p.m. Leaf blowers have more stringent standards and can only be used between 8:00 a.m. and 8:00 p.m. on weekdays, 9:00 a.m. and 5:00 p.m. on Saturdays, and 11:00 a.m. and 5:00 p.m. on Sundays.

The Noise Ordinance also provides standards for vibration (Section 8.80.200(G)). It is a violation to operate or permit the operation of any device that creates vibration that is above the vibration perception threshold of an individual at or beyond the property boundary of the source. The Noise Ordinance defines the perception threshold as 0.001 g's in the frequency range of 0-30 hertz and 0.003 g's in the frequency range between 30 and 100 hertz. It should be noted that this perception threshold is only applicable to vibration caused during the operation of the proposed project.

# 5.0 EXISTING NOISE CONDITIONS

To determine the existing noise levels, noise measurements have been taken in the vicinity of the project site. The field survey noted that noise within the proposed project area is generally characterized by vehicle traffic on Bennett Avenue and Ximeno Avenue and from school activities. Due to COVID-19, the campus had very limited activities occurring on the project site. As such, the existing noise levels are shown by taking noise measurements in the project vicinity as well as utilizing the City's noise modeling of existing (year 2019) conditions.

## *5.1 Noise Measurements taken in Project Vicinity*

The following describes the measurement procedures, measurement locations, and noise measurement results of the noise measurements taken in the project vicinity.

**Noise Measurement Equipment**

The noise measurements were taken using a Larson-Davis Model 831 Type 1 precision sound level meter programmed in "slow" mode to record noise levels in "A" weighted form as well as the frequency spectrum of the noise broken down into 1/3 octaves. The sound level meter and microphone were mounted on a tripod five feet above the ground and were equipped with a windscreen during all measurements. The sound level meter was calibrated before and after the monitoring using a Larson-Davis calibrator, Model CAL 200. The accuracy of the calibrator is maintained through a program established through the manufacturer and is traceable to the National Bureau of Standards. The unit meets the requirements of ANSI Standard S1.4-1984 and IEC Standard 942: 1988 for Class 1 equipment. All noise level measurement equipment meets American National Standards Institute (ANSI) specifications for sound level meters (S1.4-1983 identified in Chapter 19.68.020.AA).

**Noise Measurement Locations**

The noise monitoring locations were selected in order to obtain noise levels at the nearest residential uses to the project site. Descriptions of the noise monitoring sites are provided below in Table D. Appendix A includes a photo index of the study area and noise level measurement locations.

**Noise Measurement Timing and Climate**

The noise measurements were recorded between 3:29 p.m. and 3:56 p.m. on Thursday, November 12, 2020. During the noise measurements, the sky was partly cloudy, the temperature was 70 degrees Fahrenheit, the humidity was 48 percent, barometric pressure was 29.94 inches of mercury, and the wind was blowing at an average rate of three miles per hour.

**Noise Measurement Results**

The results of the noise level measurements are presented in Table D and the noise monitoring data printouts are included in Appendix B.

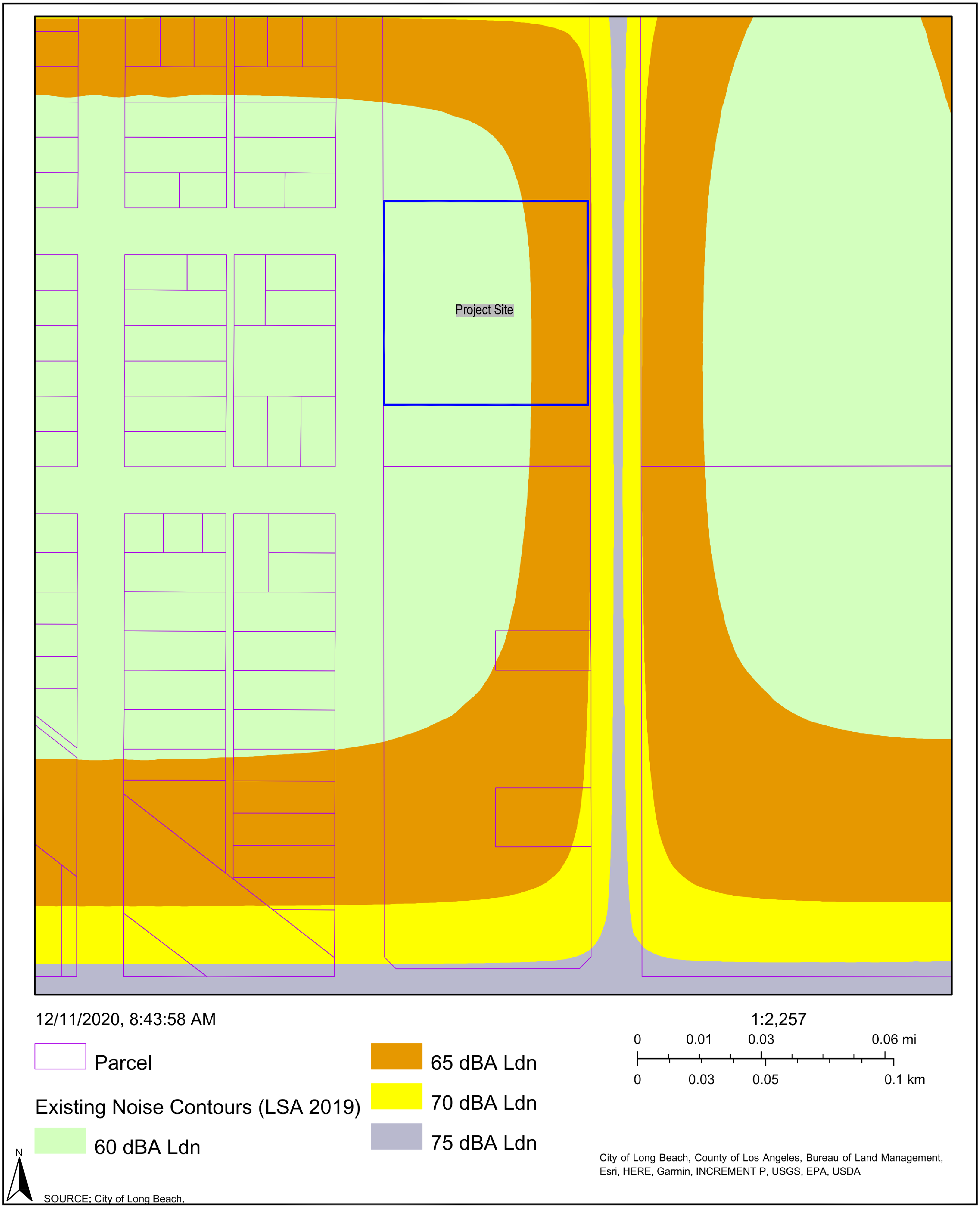
**Table D – Existing (Ambient) Noise Level Measurements**

| Site No. | Description | Primary Noise Sources | Start Time of Measurement | Measured Noise Level | |
|---|---|---|---|---|---|
| | | | | dBA Leq | dBA Lmax |
| 1 | Located northwest of the project site, in front of 901 Bennett Avenue | Vehicles on Bennett Avenue | 3:29 p.m. | 57.7 | 73.6 |
| 2 | Located southwest of the project site, in front of 815 Bennett Avenue | Vehicles on Bennett Avenue | 3:46 p.m. | 51.7 | 71.3 |

Source: Noise measurements taken on November 12, 2020.

### *5.2 City of Long Beach Noise Modeling of Existing Conditions*

The City maintains the "DataLB", which can be accessed at: http://www.longbeach.gov/ti/gis-maps---data/. DataLB is a GeoSpatial and Open Data Portal that uses the Geographic Information System (GIS) that allows users to download maps with information of specific areas of the City. One of the layers within DataLB is for existing noise contours that was compiled by LSA in 2019 and the existing noise contours for the vicinity of the project site is shown in Figure 3. Figure 3 shows that the west side of the project site is located within the 60 dBA Ldn noise contour and the east side of the project site is located within the 65 dBA Ldn noise contour. For reference, the Ldn metric is a weighted noise level (i.e. a 10 dB penalty is added to the nighttime noise sensitive hours of 10 p.m. to 7 a.m.).




VISTA ENVIRONMENTAL

Figure 3

Existing Noise Contours of the Project Site

# 6.0 MODELING PARAMETERS AND ASSUMPTIONS

## *6.1 Construction Noise*

The noise impacts from construction of the proposed project have been analyzed through use of the FHWA's Roadway Construction Noise Model (RCNM). The FHWA compiled noise measurement data regarding the noise generating characteristics of several different types of construction equipment used during the Central Artery/Tunnel project in Boston. Table E below provides a list of the construction equipment anticipated to be used for each phase of construction as detailed in *Air Quality, Energy, and Greenhouse Gas Emissions Impact Analysis Woodrow Wilson High School Project* (Air Quality Analysis), prepared by Vista Environmental, January 23, 2021.

**Table E – Construction Equipment Noise Emissions and Usage Factors**

| Equipment Description | Number of Equipment | Acoustical Use Factor[1] (percent) | Spec 721.560 Lmax at 50 feet[2] (dBA, slow[3]) | Actual Measured Lmax at 50 feet4 (dBA, slow3) |
|---|---|---|---|---|
| **Demolition** | | | | |
| Concrete/Industrial Saws | 1 | 20 | 90 | 90 |
| Rubber Tired Dozers | 1 | 40 | 85 | 82 |
| Tractors/Loaders/Backhoes | 3 | 40 | 84 | N/A |
| **Grading** | | | | |
| Grader | 1 | 40 | 85 | 83 |
| Rubber Tired Dozer | 1 | 40 | 85 | 82 |
| Tractor, Loader or Backhoe[5] | 1 | 40 | 84 | N/A |
| **Building Construction** | | | | |
| Crane | 1 | 16 | 85 | 81 |
| Forklift (Gradall) | 1 | 40 | 85 | 83 |
| Generator | 1 | 50 | 82 | 81 |
| Tractor, Loader or Backhoe[5] | 1 | 40 | 84 | N/A |
| Welders | 3 | 40 | 73 | 74 |
| **Paving** | | | | |
| Cement & Mortar Mixer[6] | 1 | 50 | 80 | 80 |
| Paver | 1 | 50 | 85 | 77 |
| Paving Equipment | 1 | 50 | 85 | 77 |
| Roller | 1 | 20 | 85 | 80 |
| Tractor, Loader or Backhoe[5] | 1 | 40 | 84 | N/A |
| **Architectural Coating** | | | | |
| Air Compressor | 1 | 40 | 80 | 78 |

Notes:
[1] Acoustical use factor is the percentage of time each piece of equipment is operational during a typical workday.
[2] Spec 721.560 is the equipment noise level utilized by the RCNM program.
[3] The "slow" response averages sound levels over 1-second increments. A "fast" response averages sound levels over 0.125-second increments.
[4] Actual Measured is the average noise level measured of each piece of equipment during the Central Artery/Tunnel project in Boston, Massachusetts primarily during the 1990s.
[5] For the tractor/loader/backhoe, the tractor noise level was utilized first, since it is the loudest of the three types of equipment.
[6] For the cement & mortar mixer, the concrete mixer truck noise level was utilized.
Source: Federal Highway Administration, 2006 and CalEEMod default equipment mix.

Table E also shows the associated measured noise emissions for each piece of equipment from the RCNM model and measured percentage of typical equipment use per day. Construction noise impacts to the nearby sensitive receptors have been calculated according to the equipment noise levels and usage factors listed in Table E and through use of the RCNM. For each phase of construction, the nearest piece of equipment was placed at the shortest distance of the proposed activity to the nearest home to the west and each subsequent piece of equipment was placed an additional 50 feet away. The RCNM printouts are provided in Appendix A.

### *6.2 Vibration*

Construction activity can result in varying degrees of ground vibration, depending on the equipment used on the site. Operation of construction equipment causes ground vibrations that spread through the ground and diminish in strength with distance. Buildings in the vicinity of the construction site respond to these vibrations with varying results ranging from no perceptible effects at the low levels to slight damage at the highest levels. Table F gives approximate vibration levels for particular construction activities. The data in Table F provides a reasonable estimate for a wide range of soil conditions.

**Table F – Vibration Source Levels for Construction Equipment**

| Equipment | | Peak Particle Velocity (inches/second) | Approximate Vibration Level ($L_v$)at 25 feet |
|---|---|---|---|
| Pile driver (impact) | Upper range | 1.518 | 112 |
| | typical | 0.644 | 104 |
| Pile driver (sonic) | Upper range | 0.734 | 105 |
| | typical | 0.170 | 93 |
| Clam shovel drop (slurry wall) | | 0.202 | 94 |
| Vibratory Roller | | 0.210 | 94 |
| Hoe Ram | | 0.089 | 87 |
| Large bulldozer | | 0.089 | 87 |
| Caisson drill | | 0.089 | 87 |
| Loaded trucks | | 0.076 | 86 |
| Jackhammer | | 0.035 | 79 |
| Small bulldozer | | 0.003 | 58 |

Source: Federal Transit Administration, 2020.

The construction-related vibration impacts have been calculated through the vibration levels shown above in Table F and through typical vibration propagation rates. The equipment assumptions were based on the equipment lists provided above in Table E.

# 7.0 IMPACT ANALYSIS

## *7.1 CEQA Thresholds of Significance*

Consistent with the California Environmental Quality Act (CEQA) and the State CEQA Guidelines, a significant impact related to noise would occur if a proposed project is determined to 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;
- Generation of excessive groundborne vibration or groundborne noise levels; or
- 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.

## *7.2 Generation of Noise Levels in Excess of Standards*

The proposed project would not generate 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. The following section calculates the potential noise emissions associated with the temporary construction activities and long-term operations of the proposed project and compares the noise levels to the City standards.

**Construction-Related Noise**

The construction activities for the proposed project are anticipated to include demolition of the existing pavement on the project site, grading of the 1.6-acre project site, building construction of a new aquatics facility, paving of a new parking lot with up to 25 stalls, and application of architectural coatings. Noise impacts from construction activities associated with the proposed project would be a function of the noise generated by construction equipment, equipment location, sensitivity of nearby land uses, and the timing and duration of the construction activities.

Section 8.80.202 of the City's Noise Ordinance restricts construction activities from occurring between the hours of 7:00 p.m. and 7:00 a.m. on weekdays, between 6:00 p.m. and 9:00 a.m. on Saturdays, or anytime on Sundays or federal holidays. Through adherence to the construction-related noise requirements provided in the City's Noise Ordinance, construction-related noise levels would not exceed any noise standards established in the general plan or noise ordinance. However, the City construction noise standards do not provide any limits to the noise levels that may be created from construction activities; and, even with adherence to the City standards, the resultant construction noise levels may result in a significant substantial temporary noise increase to the nearby sensitive receptors.

Construction noise impacts to the nearby sensitive receptors have been calculated through use of the RCNM and the parameters and assumptions detailed in Section 6.1 of this report including Table E. The results are shown below in Table G and the RCNM printouts are provided in Appendix A.

**Table G – Worst-Case Construction Noise Levels at the Nearest Homes**

| Construction Phase | Nearest Homes to West | |
|---|---|---|
| | Minimum Distance from Equipment (feet) | Noise Level at Nearest Homes (dBA Leq) |
| Demolition | 60 | 82 |
| Grading | 60 | 80 |
| Building Construction | 60 | 76 |
| Paving | 260 | 75 |
| Painting | 60 | 72 |
| | **Construction Noise Threshold (OSHA)** | **90** |
| | **Exceed Threshold?** | **No** |

Source: RCNM, Federal Highway Administration, 2006

Table G shows that the greatest noise impacts would occur during the demolition phase of construction, with a noise level as high as 82 dBA Leq at the nearest homes to the west. Table G also shows that none of the construction phases would exceed the OSHA noise standard of 90 dB at the nearby homes. Therefore, through adherence to allowable construction times provided in Section 8.80.202 of the Municipal Code, the construction activities for the proposed project would not create a substantial temporary increase in ambient noise levels that are in excess of applicable noise standards. Impacts would be less than significant.

**Operational-Related Noise**

The proposed project would consist of the development of an aquatics center. Since the proposed project consists of the relocation of an existing aquatic center on campus that would not result in an increase in student enrollment nor would it result in a new use on campus, the proposed project is not anticipated to generate any new vehicle trips to the School. As such, no roadway noise impacts are anticipated to be created from operation of the proposed project. Potential noise impacts associated with the operations of the proposed project would limited to onsite activities associated with the operation of the aquatics center.

The operation of the proposed project may create an increase in onsite noise levels from the operation of pool area, rooftop mechanical equipment, and parking lot. Section 8.80.160 of the Municipal Code limits onsite noise sources at the property lines of the nearby homes to 50 dBA between 7 a.m. and 10 p.m. and 45 dBA between 10 p.m. and 7 a.m..

In order to determine the noise impacts from the operation of pool activities, rooftop mechanical equipment, and the parking lot, reference noise measurements for similar operations are shown in Table H. In order to account for the noise reduction provided by the proposed 10-foot high sound wall on the west property line that is detailed in Project Design Feature 1, the wall attenuation algorithm from the *Technical Noise Supplement to the Traffic Noise Analysis Protocol* (TeNS), prepared by Caltrans, September 2013, were utilized and the unmitigated noise calculation spreadsheet along with the reference noise measurements are provided in Appendix D.

**Table H – Operational Noise Levels at the Nearest Homes Prior to Mitigation**

| Noise Source | Reference Noise Measurements[1] | | Calculated Noise Levels at Nearest Homes to West | |
|---|---|---|---|---|
| | Distance Receptor to Source (feet) | Reference Noise Level (dBA Leq) | Distance to Homes (feet) | Noise Level[2] (dBA Leq) |
| Pool Activities | 30 | 71.8 | 100 | 49 |
| Rooftop Equipment | 6 | 65.1 | 200 | 29 |
| Parking Lot | 5 | 63.1 | 245 | 20 |
| | | | **Noise Level from All Sources Combined** | **49** |
| | | | **City Noise Standards (day/night)** | **50/45** |
| | | | **Exceed City Noise Standards (day/night)?** | **No/Yes** |

Notes:
[1] The reference noise measurements printouts are provided in Appendix D.
[2] The calculated noise levels account for the proposed 10-foot high wall on the west property line.
[3] The pool activities was based on a noise measurement 30 feet from Long Beach Community College Liberal Arts Campus pool hosting a swim meet.
Source: Noise calculation methodology from Caltrans, 2013 (see Appendix D).

Table H shows that the proposed project's worst-case (i.e., during a swim meet) operational noise from the simultaneous operation of all noise sources on the project site would create a noise level of 49 dBA at the multi-family homes to the west, which would be within the City's daytime noise standards of 50 dBA between 7 a.m. and 10 p.m. However, the worst-case combined operational noise would exceed the City's nighttime noise standard of 45 dBA between 10 p.m. and 7 a.m.. This would be considered a significant impact.

The worst-case unmitigated operational noise, shown above in Table H, is created from a swim meet at the aquatics center, which is a much more intensive use than a typical swim or water polo practice. As such Mitigation Measure 1 is provided which prohibits swim or water polo competitions from occurring between the hours of 10:00 p.m. and 7:00 a.m..

The operational noise levels at the nearby homes were recalculated based on a pool practice at a high school, instead of a swim meet and the results are shown in Table I and the mitigated noise calculation spreadsheet along with the reference noise measurements are provided in Appendix E.

**Table I – Mitigated Operational Noise Levels at the Nearest Homes**

| Noise Source | Reference Noise Measurements[1] | | Calculated Noise Levels at Nearest Homes to West | |
|---|---|---|---|---|
| | Distance Receptor to Source (feet) | Reference Noise Level (dBA Leq) | Distance to Homes (feet) | Noise Level[2] (dBA Leq) |
| Pool Activities | 15 | 66.6 | 100 | 37 |
| Rooftop Equipment | 6 | 65.1 | 200 | 29 |
| Parking Lot | 5 | 63.1 | 245 | 20 |
| | | | **Noise Level from All Sources Combined** | **38** |
| | | | **City Noise Standards (day/night)** | **50/45** |
| | | | **Exceed City Noise Standards (day/night)?** | **No/No** |

Notes:
[1] The reference noise measurements printouts are provided in Appendix E.
[2] The calculated noise levels account for the proposed 10-foot high wall on the west property line.

[3] The pool activities was based on a noise measurement 15 feet from Laguna Beach High School pool during a swim practice
Source: Noise calculation methodology from Caltrans, 2013 (see Appendix E).

Table I shows through implementation of Mitigation Measure 1, the project's worst-case operational noise from the simultaneous operation of all noise sources on the project site would create a noise level of 38 dBA at the multi-family homes to the west, which would be within both the City's daytime noise standard of 50 dBA between 7 a.m. and 10 p.m. and nighttime noise standard of 45 dBA between 10 p.m. and 7 a.m.. Therefore, with implementation of Mitigation Measure 1, the proposed project would not result in a substantial permanent increase in ambient noise levels from onsite noise sources. Impacts would be less than significant.

**Level of Significance Before Mitigation**

Potentially significant impact.

**Mitigation Measures**

**Mitigation Measure 1:**

The LBUSD shall restrict any swimming or water polo competitions from occurring in the Aquatics Facility between the hours of 10:00 p.m. and 7:00 a.m. This restriction shall not apply to swim and water polo practices and other non-intensive uses of the Aquatics Facility.

**Level of Significance After Mitigation**

Less than significant impact.

## *7.3 Generation of Excessive Groundborne Vibration*

The proposed project would not expose persons to or generation of excessive groundborne vibration or groundborne noise levels. The following section analyzes the potential vibration impacts associated with the construction and operations of the proposed project.

**Construction-Related Vibration Impacts**

The construction activities for the proposed project are anticipated to include demolition of the existing pavement on the project site, grading of the 1.6-acre project site, building construction of a new aquatics facility, paving of a new parking lot with up to 25 stalls, and application of architectural coatings. Vibration impacts from construction activities associated with the proposed project would typically be created from the operation of heavy off-road equipment. The nearest sensitive receptors to the project site are residents at the multi-family homes on the west side of Bennett Avenue that are located as near as 60 feet west of the proposed construction activities on the project site.

Section 8.80.200(G) of the City's Municipal Code limits vibration impacts to the nearby single-family homes to 0.001 g's in the frequency range of 0 to 30 hertz and 0.003 g's in the frequency range of 30 to 100 hertz. The acceleration of gravity (g), which is 32.2 feet per second can be converted into peak particle velocity by multiplying 0.001 g's by 32.2 and then converting to inch per second, which results in a threshold of 0.386 inch per second PPV.

The primary source of vibration during construction would be from the operation of a bulldozer. From Table F above a large bulldozer would create a vibration level of 0.089 inch per second PPV at 25 feet. Based on typical propagation rates, the vibration level at the nearest homes (60 feet away) would be 0.034

inch per second PPV. The vibration level at the nearest homes to the west would be below the 0.386 inch per second PPV threshold detailed above. Impacts would be less than significant.

**Operations-Related Vibration Impacts**

The proposed project would consist of the development and operation of an aquatics center. The on-going operation of the proposed project would not include the operation of any known vibration sources. Therefore, a less than significant vibration impact is anticipated from the operation of the proposed project.

**Level of Significance**

Less than significant impact.

## *7.4 Aircraft Noise*

The proposed project would not expose people residing or working in the project area to excessive noise levels from aircraft. The nearest airport is Long Beach Airport that is located approximately two miles north of the project site. The project site is located outside of the 60 dBA CNEL noise contours of Long Beach Airport. A less than significant impact would occur from aircraft noise.

**Level of Significance**

Less than significant impact.

# 8.0 REFERENCES

California Department of Transportation, *2016 Annual Average Daily Truck Traffic on the California State Highway System*, 2018.

California Department of Transportation (Caltrans), *Technical Noise Supplement to the Traffic Noise Analytics Protocol*, September 2013.

California Department of Transportation, *Transportation and Construction Vibration Guidance Manual*, April 2020.

City of Long Beach, *City of Long Beach General Plan*, July, 2013.

City of Long Beach, *2014 Citywide Traffic Flow*, 2014.

City of Long Beach, *A Codification of the General Ordinances of Long Beach, California*, 2020.

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

U.S. Department of Transportation, *FHWA Roadway Construction Noise Model User's Guide,* January, 2006.

Vista Environmental, *Air Quality, Energy, and Greenhouse Gas Emissions Impact Analysis Woodrow Wilson High School Aquatic Center Project,* January 23, 2021.

## APPENDIX A

Field Noise Measurements Photo Index

Noise Measurement Site 1 - looking north

Noise Measurement Site 1 - looking northeast

Noise Measurement Site 1 - looking east

Noise Measurement Site 1 - looking southeast

Noise Measurement Site 1 - looking south

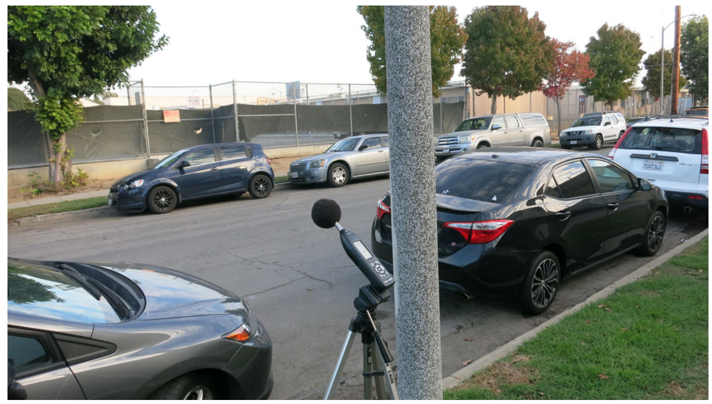
Noise Measurement Site 1 - looking southwest

Noise Measurement Site 1 - looking west

Noise Measurement Site 2 - looking north

Noise Measurement Site 2 - looking northeast

Noise Measurement Site 2 - looking east



Noise Measurement Site 2 - looking southeast


Noise Measurement Site 2 - looking south


Noise Measurement Site 2 - looking southwest


Noise Measurement Site 2 - looking west


Noise Measurement Site 2 - looking northwest

**APPENDIX B**

Field Noise Measurements Printouts

# Measurement Report

## Report Summary

| | | | |
|---|---|---|---|
| Meter's File Name | 831_Data.006 | Computer's File Name | SLM_0002509_831_Data_006.00.ldbin |
| Meter | 831 | | |
| Firmware | 2.314 | | |
| User | GT | Location | |
| Description | Woodrow Wilson High School Aquatic Center Project | | |
| Note | Located NW of Project site in front of homes at 901 Bennett Ave | | |

| | | | | | |
|---|---|---|---|---|---|
| Start Time | 2020-11-12 16:29:49 | Duration | 0:09:11.1 | | |
| End Time | 2020-11-12 16:39:00 | Run Time | 0:09:11.1 | Pause Time | 0:00:00.0 |

## Results

### Overall Metrics

| | | | |
|---|---|---|---|
| $LA_{eq}$ | 57.7 dB | | |
| LAE | 85.1 dB | SEA | --- dB |
| EA | 35.9 µPa²h | | |
| $LZ_{peak}$ | 103.7 dB | 2020-11-12 16:29:49 | |
| $LAS_{max}$ | 73.6 dB | 2020-11-12 16:29:49 | |
| $LAS_{min}$ | 43.4 dB | 2020-11-12 16:37:55 | |
| $LA_{eq}$ | 57.7 dB | | |
| $LC_{eq}$ | 68.3 dB | $LC_{eq}$ - $LA_{eq}$ | 10.6 dB |
| $LAI_{eq}$ | 67.0 dB | $LAI_{eq}$ - $LA_{eq}$ | 9.3 dB |

### Exceedances

| Exceedances | Count | Duration |
|---|---|---|
| LAS > 65.0 dB | 8 | 0:00:39.3 |
| LAS > 85.0 dB | 0 | 0:00:00.0 |
| LZpeak > 135.0 dB | 0 | 0:00:00.0 |
| LZpeak > 137.0 dB | 0 | 0:00:00.0 |
| LZpeak > 140.0 dB | 0 | 0:00:00.0 |

### Community Noise

| LDN | LDay | LNight | |
|---|---|---|---|
| 57.7 dB | 57.7 dB | 0.0 dB | |
| **LDEN** | **LDay** | **LEve** | **LNight** |
| 57.7 dB | 57.7 dB | --- dB | --- dB |

### Any Data

| | A | | C | | Z | |
|---|---|---|---|---|---|---|
| | Level | Time Stamp | Level | Time Stamp | Level | Time Stamp |
| $L_{eq}$ | 57.7 dB | | 68.3 dB | | 71.6 dB | |
| $Ls_{(max)}$ | 73.6 dB | 2020-11-12 16:29:49 | 87.4 dB | 2020-11-12 16:29:49 | 96.5 dB | 2020-11-12 16:29:49 |
| $LF_{(max)}$ | 76.3 dB | 2020-11-12 16:38:27 | 83.5 dB | 2020-11-12 16:30:03 | 99.2 dB | 2020-11-12 16:29:49 |
| $LI_{(max)}$ | 91.6 dB | 2020-11-12 16:29:49 | 105.1 dB | 2020-11-12 16:29:49 | 110.1 dB | 2020-11-12 16:29:49 |
| $LS_{(min)}$ | 43.4 dB | 2020-11-12 16:37:55 | 58.8 dB | 2020-11-12 16:32:15 | 61.2 dB | 2020-11-12 16:32:15 |
| $LF_{(min)}$ | 42.1 dB | 2020-11-12 16:37:55 | 57.3 dB | 2020-11-12 16:32:13 | 59.8 dB | 2020-11-12 16:32:15 |
| $LI_{(min)}$ | 42.8 dB | 2020-11-12 16:37:55 | 59.6 dB | 2020-11-12 16:31:43 | 62.0 dB | 2020-11-12 16:32:14 |
| $L_{Peak(max)}$ | 90.5 dB | 2020-11-12 16:38:27 | 96.7 dB | 2020-11-12 16:38:41 | 103.7 dB | 2020-11-12 16:29:49 |

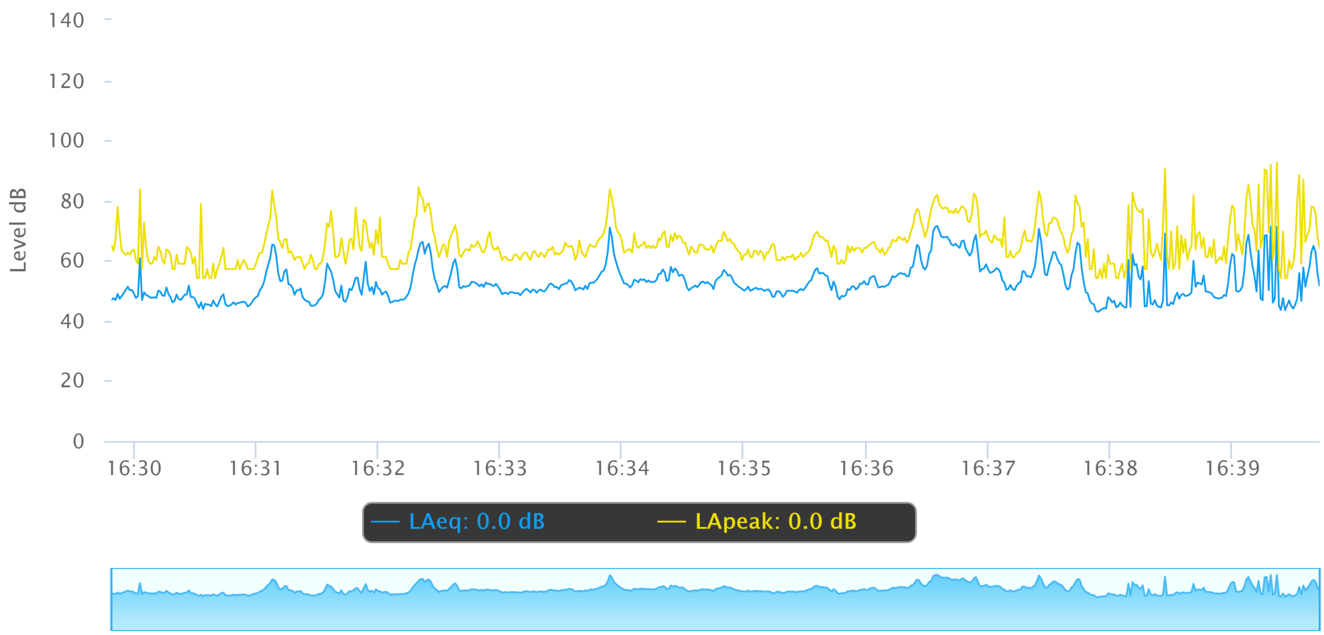
### Overloads

| Count | Duration | OBA Count | OBA Duration |
|---|---|---|---|
| 0 | 0:00:00.0 | 0 | 0:00:00.0 |

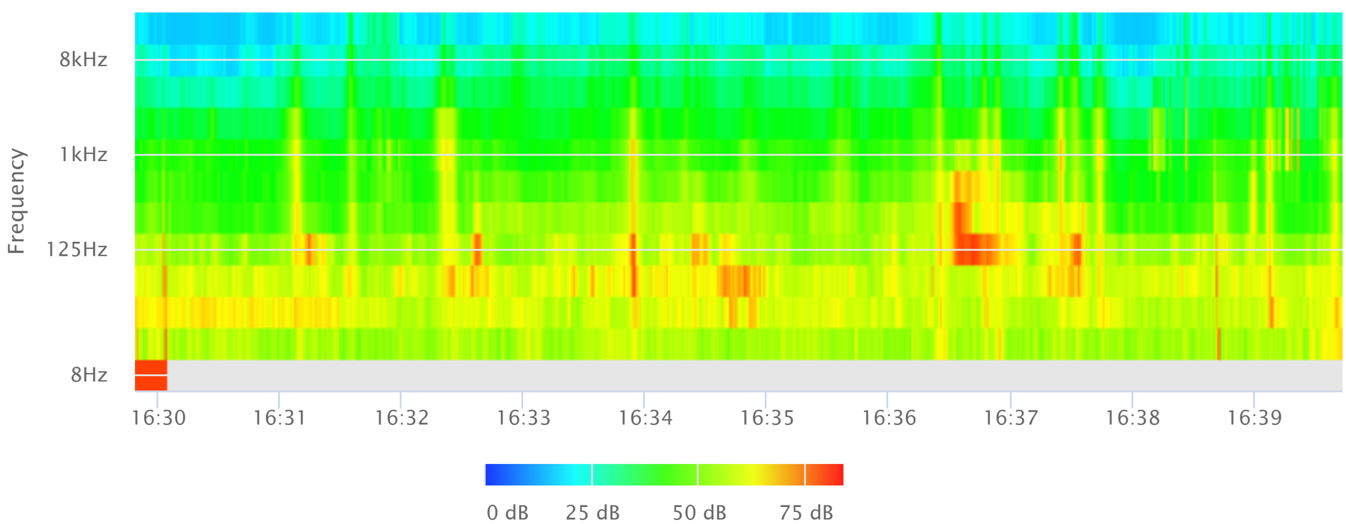
### Statistics

| | |
|---|---|
| LAS 5.0 | 65.1 dB |
| LAS 10.0 | 61.7 dB |
| LAS 33.3 | 54.1 dB |
| LAS 50.0 | 51.8 dB |
| LAS 66.6 | 50.2 dB |
| LAS 90.0 | 46.8 dB |

## Time History




## OBA 1/1 Leq



# Measurement Report

## Report Summary

| | | | |
|---|---|---|---|
| Meter's File Name | 831_Data.007 | Computer's File Name | SLM_0002509_831_Data_007.00.ldbin |
| Meter | 831 | | |
| Firmware | 2.314 | | |
| User | GT | Location | |
| Description | Woodrow Wilson High School Aquatic Center Project | | |
| Note | Located SW of Project in front of homes at 815 Bennett Ave | | |

| | | | | | |
|---|---|---|---|---|---|
| Start Time | 2020-11-12 16:46:56 | Duration | 0:10:00.0 | | |
| End Time | 2020-11-12 16:56:56 | Run Time | 0:10:00.0 | Pause Time | 0:00:00.0 |

## Results

### Overall Metrics

| | | | |
|---|---|---|---|
| $LA_{eq}$ | 51.7 dB | | |
| LAE | 79.4 dB | SEA | --- dB |
| EA | 9.8 µPa²h | | |
| $LZ_{peak}$ | 103.5 dB | 2020-11-12 16:46:56 | |
| $LAS_{max}$ | 71.3 dB | 2020-11-12 16:51:20 | |
| $LAS_{min}$ | 41.0 dB | 2020-11-12 16:49:15 | |
| $LA_{eq}$ | 51.7 dB | | |
| $LC_{eq}$ | 64.8 dB | $LC_{eq}$ - $LA_{eq}$ | 13.2 dB |
| $LAI_{eq}$ | 58.9 dB | $LAI_{eq}$ - $LA_{eq}$ | 7.3 dB |

### Exceedances

| Exceedances | Count | Duration |
|---|---|---|
| LAS > 65.0 dB | 1 | 0:00:02.4 |
| LAS > 85.0 dB | 0 | 0:00:00.0 |
| LZpeak > 135.0 dB | 0 | 0:00:00.0 |
| LZpeak > 137.0 dB | 0 | 0:00:00.0 |
| LZpeak > 140.0 dB | 0 | 0:00:00.0 |

### Community Noise

| LDN | LDay | LNight | |
|---|---|---|---|
| 51.7 dB | 51.7 dB | 0.0 dB | |
| **LDEN** | **LDay** | **LEve** | **LNight** |
| 51.7 dB | 51.7 dB | --- dB | --- dB |

### Any Data

| | A | | C | | Z | |
|---|---|---|---|---|---|---|
| | Level | Time Stamp | Level | Time Stamp | Level | Time Stamp |
| $L_{eq}$ | 51.7 dB | | 64.8 dB | | 70.3 dB | |
| $Ls_{(max)}$ | 71.3 dB | 2020-11-12 16:51:20 | 79.6 dB | 2020-11-12 16:46:56 | 95.7 dB | 2020-11-12 16:46:57 |
| $LF_{(max)}$ | 77.5 dB | 2020-11-12 16:51:20 | 86.1 dB | 2020-11-12 16:55:06 | 99.5 dB | 2020-11-12 16:46:56 |
| $LI_{(max)}$ | 81.2 dB | 2020-11-12 16:51:20 | 89.7 dB | 2020-11-12 16:55:06 | 101.8 dB | 2020-11-12 16:46:56 |
| $LS_{(min)}$ | 41.0 dB | 2020-11-12 16:49:15 | 57.9 dB | 2020-11-12 16:50:45 | 60.5 dB | 2020-11-12 16:52:49 |
| $LF_{(min)}$ | 39.6 dB | 2020-11-12 16:52:40 | 55.8 dB | 2020-11-12 16:51:02 | 58.4 dB | 2020-11-12 16:53:00 |
| $LI_{(min)}$ | 40.6 dB | 2020-11-12 16:49:15 | 58.5 dB | 2020-11-12 16:52:51 | 61.5 dB | 2020-11-12 16:52:51 |
| $L_{Peak(max)}$ | 94.0 dB | 2020-11-12 16:51:20 | 98.2 dB | 2020-11-12 16:55:06 | 103.5 dB | 2020-11-12 16:46:56 |

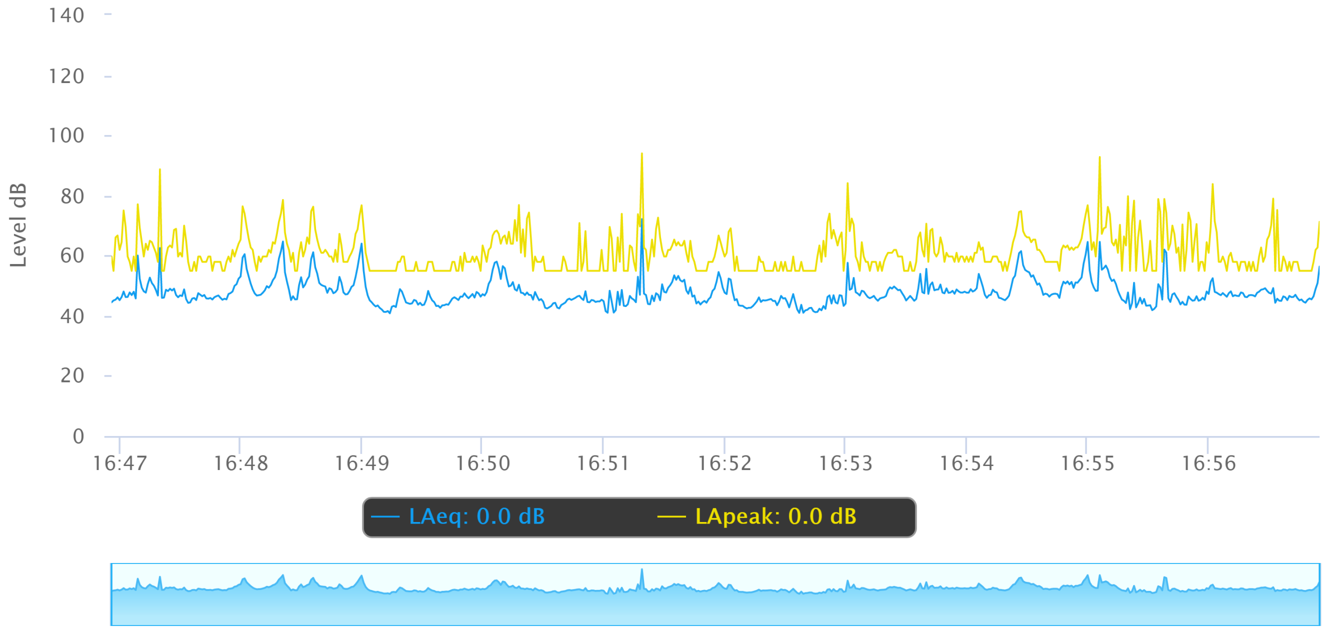
### Overloads

| Count | Duration | OBA Count | OBA Duration |
|---|---|---|---|
| 0 | 0:00:00.0 | 0 | 0:00:00.0 |

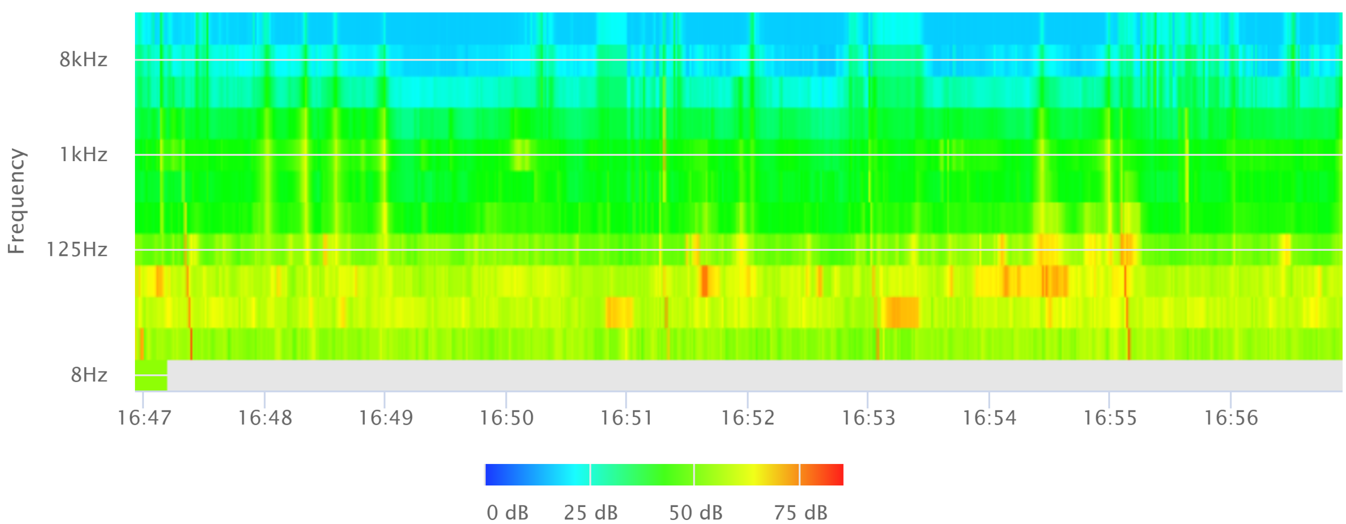
### Statistics

| | |
|---|---|
| LAS 5.0 | 57.2 dB |
| LAS 10.0 | 53.8 dB |
| LAS 33.3 | 48.7 dB |
| LAS 50.0 | 47.1 dB |
| LAS 66.6 | 45.9 dB |
| LAS 90.0 | 43.9 dB |

## Time History




## OBA 1/1 Leq



## APPENDIX C

RCNM Model Construction Noise Calculations

**Roadway Construction Noise Model (RCNM),Version 1.1**

Report date: 12/11/2020
Case Description: Woodrow Wilson High School Aquatics Center - Demolition

**---- Receptor #1 ----**

| Description | Land Use | Baselines (dBA) Daytime | Evening | Night |
|---|---|---|---|---|
| Nearest Homes to West | Residential | 58 | 52 | 52 |

| Description | Impact Device | Usage(%) | Equipment Spec Lmax (dBA) | Actual Lmax (dBA) | Receptor Distance (feet) | Estimated Shielding (dBA) |
|---|---|---|---|---|---|---|
| Concrete Saw | No | 20 | | 89.6 | 60 | 0 |
| Dozer | No | 40 | | 81.7 | 110 | 0 |
| Tractor | No | 40 | 84 | | 160 | 0 |
| Front End Loader | No | 40 | | 79.1 | 210 | 0 |
| Backhoe | No | 40 | | 77.6 | 260 | 0 |

Results

| | | Calculated (dBA) | | Noise Limits (dBA) | | | |
|---|---|---|---|---|---|---|---|
| | | | | Day | | Evening | |
| Equipment | | *Lmax | Leq | Lmax | Leq | Lmax | Leq |
| Concrete Saw | | 88.0 | 81.0 | N/A | N/A | N/A | N/A |
| Dozer | | 74.8 | 70.8 | N/A | N/A | N/A | N/A |
| Tractor | | 73.9 | 69.9 | N/A | N/A | N/A | N/A |
| Front End Loader | | 66.6 | 62.7 | N/A | N/A | N/A | N/A |
| Backhoe | | 63.2 | 59.3 | N/A | N/A | N/A | N/A |
| | Total | **88** | **82** | N/A | N/A | N/A | N/A |

*Calculated Lmax is the Loudest value.

**Roadway Construction Noise Model (RCNM),Version 1.1**

Report date: 12/11/2020
Case Description: Woodrow Wilson High School Aquatics Center - Grading

**---- Receptor #1 ----**

| Description | Land Use | Baselines (dBA) Daytime | Evening | Night |
|---|---|---|---|---|
| Nearest Homes to West | Residential | 58 | 52 | 52 |

| Description | Impact Device | Usage(%) | Equipment Spec Lmax (dBA) | Actual Lmax (dBA) | Receptor Distance (feet) | Estimated Shielding (dBA) |
|---|---|---|---|---|---|---|
| Grader | No | 40 | 85 | | 60 | 0 |
| Dozer | No | 40 | | 81.7 | 110 | 0 |
| Tractor | No | 40 | 84 | | 160 | 0 |

Results

| | | Calculated (dBA) | | Noise Limits (dBA) | | | |
|---|---|---|---|---|---|---|---|
| | | | | Day | | Evening | |
| Equipment | | *Lmax | Leq | Lmax | Leq | Lmax | Leq |
| Grader | | 83.4 | 79.4 | N/A | N/A | N/A | N/A |
| Dozer | | 74.8 | 70.8 | N/A | N/A | N/A | N/A |
| Tractor | | 73.9 | 69.9 | N/A | N/A | N/A | N/A |
| | Total | **83** | **80** | N/A | N/A | N/A | N/A |

*Calculated Lmax is the Loudest value.

**Roadway Construction Noise Model (RCNM),Version 1.1**

Report date: 12/11/2020
Case Description: Woodrow Wilson High School Aquatics Center - Building Construction

**---- Receptor #1 ----**

| Description | Land Use | Baselines (dBA) Daytime | Evening | Night |
|---|---|---|---|---|
| Nearest Homes to West | Residential | 58 | 52 | 52 |

| Description | Impact Device | Usage(%) | Equipment Spec Lmax (dBA) | Actual Lmax (dBA) | Receptor Distance (feet) | Estimated Shielding (dBA) |
|---|---|---|---|---|---|---|
| Crane | No | 16 | | 80.6 | 60 | 0 |
| Gradall | No | 40 | | 83.4 | 110 | 0 |
| Generator | No | 50 | | 80.6 | 160 | 0 |
| Tractor | No | 40 | 84 | | 210 | 0 |
| Welder / Torch | No | 40 | | 74 | 260 | 0 |
| Welder / Torch | No | 40 | | 74 | 310 | 0 |
| Welder / Torch | No | 40 | | 74 | 360 | 0 |

Results

| | | Calculated (dBA) | | Noise Limits (dBA) | | | |
|---|---|---|---|---|---|---|---|
| | | | | Day | | Evening | |
| Equipment | | *Lmax | Leq | Lmax | Leq | Lmax | Leq |
| Crane | | 79.0 | 71.0 | N/A | N/A | N/A | N/A |
| Gradall | | 76.6 | 72.6 | N/A | N/A | N/A | N/A |
| Generator | | 70.5 | 67.5 | N/A | N/A | N/A | N/A |
| Tractor | | 71.5 | 67.6 | N/A | N/A | N/A | N/A |
| Welder / Torch | | 59.7 | 55.7 | N/A | N/A | N/A | N/A |
| Welder / Torch | | 58.2 | 54.2 | N/A | N/A | N/A | N/A |
| Welder / Torch | | 56.9 | 52.9 | N/A | N/A | N/A | N/A |
| | Total | **79** | **76** | N/A | N/A | N/A | N/A |

*Calculated Lmax is the Loudest value.

**Roadway Construction Noise Model (RCNM),Version 1.1**

Report date: 12/11/2020
Case Description: Woodrow Wilson High School Aquatics Center - Paving

**---- Receptor #1 ----**

| Description | Land Use | Baselines (dBA) Daytime | Evening | Night |
|---|---|---|---|---|
| Nearest Homes to West | Residential | 58 | 52 | 52.0 |

| Description | Impact Device | Usage(%) | Equipment Spec Lmax (dBA) | Actual Lmax (dBA) | Receptor Distance (feet) | Estimated Shielding (dBA) |
|---|---|---|---|---|---|---|
| Concrete Mixer Truck | No | 40 | | 78.8 | 60 | 0 |
| Paver | No | 50 | | 77.2 | 110 | 0 |
| Paver | No | 50 | | 77.2 | 160 | 0 |
| Roller | No | 20 | | 80 | 210 | 0 |
| Tractor | No | 40 | 84 | | 260 | 0 |

Results

| Equipment | | Calculated (dBA) *Lmax | Leq | Noise Limits (dBA) Day Lmax | Leq | Evening Lmax | Leq |
|---|---|---|---|---|---|---|---|
| Concrete Mixer Truck | | 77.2 | 73.2 | N/A | N/A | N/A | N/A |
| Paver | | 70.4 | 67.4 | N/A | N/A | N/A | N/A |
| Paver | | 67.1 | 64.1 | N/A | N/A | N/A | N/A |
| Roller | | 67.5 | 60.5 | N/A | N/A | N/A | N/A |
| Tractor | | 69.7 | 65.7 | N/A | N/A | N/A | N/A |
| | Total | **77** | **75** | N/A | N/A | N/A | N/A |

*Calculated Lmax is the Loudest value.

**Roadway Construction Noise Model (RCNM),Version 1.1**

Report date: 12/11/2020
Case Description: Woodrow Wilson High School Aquatics Center - Painting

**---- Receptor #1 ----**

| Description | Land Use | Baselines (dBA) Daytime | Evening | Night |
|---|---|---|---|---|
| Nearest Homes to West | Residential | 58.0 | 52.0 | 52.0 |

| Description | Impact Device | Usage(%) | Equipment Spec Lmax (dBA) | Actual Lmax (dBA) | Receptor Distance (feet) | Estimated Shielding (dBA) |
|---|---|---|---|---|---|---|
| Compressor (air) | No | 40 | | 77.7 | 60 | 0 |

Results

| Equipment | | Calculated (dBA) *Lmax | Leq | Noise Limits (dBA) Day Lmax | Leq | Evening Lmax | Leq |
|---|---|---|---|---|---|---|---|
| Compressor (air) | | 76.1 | 72.1 | N/A | N/A | N/A | N/A |
| | Total | **76** | **72** | N/A | N/A | N/A | N/A |

*Calculated Lmax is the Loudest value.

# APPENDIX D

Operational Reference Noise Measurements and Unmitigated Noise Calculations

## General Information

| | |
|---|---|
| Serial Number | 02509 |
| Model | 831 |
| Firmware Version | 2.314 |
| Filename | 831_Data.001 |
| User | GT |
| Job Description | LBCC 2041 Facilities Master Plan |
| Location | Approx 30 ft north of pool and 5 ft south of scoreboard |
| | |
| Measurement Description | |
| Start Time | Friday, 2018 March 30 12:24:51 |
| Stop Time | Friday, 2018 March 30 12:34:52 |
| Duration | 00:10:00.5 |
| Run Time | 00:10:00.5 |
| Pause | 00:00:00.0 |
| Pre Calibration | Friday, 2018 March 30 12:23:28 |
| Post Calibration | None |
| Calibration Deviation | --- |

## Note

Noise from swim meet at pool 30 ft from pool and 60 ft from loud speaker
76F, 29.91 in Hg, 51% hu, 2 mph wind, hazy sky

## Overall Data

| | | | |
|---|---|---|---|
| LAeq | | 71.8 | dB |
| LASmax | 2018 Mar 30 12:34:05 | 89.5 | dB |
| LApeak (max) | 2018 Mar 30 12:34:05 | 100.5 | dB |
| LASmin | 2018 Mar 30 12:32:15 | 56.5 | dB |
| LCeq | | 73.2 | dB |
| LAeq | | 71.8 | dB |
| LCeq - LAeq | | 1.4 | dB |
| LAIeq | | 78.1 | dB |
| LAeq | | 71.8 | dB |
| LAIeq - LAeq | | 6.2 | dB |
| Ldn | | 71.8 | dB |
| LDay 07:00-22:00 | | 71.8 | dB |
| LNight 22:00-07:00 | | --- | dB |
| Lden | | 71.8 | dB |
| LDay 07:00-19:00 | | 71.8 | dB |
| LEvening 19:00-22:00 | | --- | dB |
| LNight 22:00-07:00 | | --- | dB |
| LAE | | 99.6 | dB |
| # Overloads | | 0 | |
| Overload Duration | | 0.0 | s |
| # OBA Overloads | | 0 | |
| OBA Overload Duration | | 0.0 | s |

## Statistics

| | | |
|---|---|---|
| LAS5.00 | 77.5 | dBA |
| LAS10.00 | 75.3 | dBA |
| LAS33.30 | 70.1 | dBA |
| LAS50.00 | 67.6 | dBA |
| LAS66.60 | 65.3 | dBA |
| LAS90.00 | 62.4 | dBA |
| | | |
| LAS > 65.0 dB (Exceedence Counts / Duration) | 28 / 489.8 | s |
| LAS > 85.0 dB (Exceedence Counts / Duration) | 2 / 2.8 | s |
| LApeak > 135.0 dB (Exceedence Counts / Duration) | 0 / 0.0 | s |
| LApeak > 137.0 dB (Exceedence Counts / Duration) | 0 / 0.0 | s |
| LApeak > 140.0 dB (Exceedence Counts / Duration) | 0 / 0.0 | s |

## Settings

| | | |
|---|---|---|
| RMS Weight | A Weighting | |
| Peak Weight | A Weighting | |
| Detector | Slow | |
| Preamp | PRM831 | |
| Integration Method | Linear | |
| OBA Range | Low | |
| OBA Bandwidth | 1/1 and 1/3 | |
| OBA Freq. Weighting | Z Weighting | |
| OBA Max Spectrum | Bin Max | |
| Gain | +0 | dB |
| | | |
| Under Range Limit | 26.1 | dB |
| Under Range Peak | 75.8 | dB |
| Noise Floor | 17.0 | dB |
| Overload | 143.4 | dB |

## 1/1 Spectra

| Freq. (Hz): | 8.0 | 16.0 | 31.5 | 63.0 | 125 | 250 | 500 | 1k | 2k | 4k | 8k | 16k |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| LZeq | 58.3 | 61.4 | 64.5 | 63.1 | 61.2 | 59.2 | 64.8 | 69.9 | 62.3 | 60.1 | 43.3 | 34.0 |
| LZSmax | 80.3 | 74.2 | 70.6 | 73.0 | 69.5 | 66.1 | 81.7 | 89.2 | 75.4 | 77.9 | 59.7 | 47.9 |
| LZSmin | 49.2 | 55.8 | 60.8 | 57.2 | 56.6 | 53.6 | 53.7 | 52.4 | 48.0 | 43.0 | 33.5 | 23.8 |

## 1/3 Spectra

| Freq. (Hz): | 6.3 | 8.0 | 10.0 | 12.5 | 16.0 | 20.0 | 25.0 | 31.5 | 40.0 | 50.0 | 63.0 | 80.0 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| LZeq | 52.9 | 54.4 | 53.8 | 56.2 | 57.5 | 56.5 | 60.5 | 61.7 | 53.2 | 53.9 | 55.6 | 61.5 |
| LZSmax | 73.7 | 77.7 | 69.9 | 70.3 | 71.4 | 69.4 | 65.9 | 68.2 | 62.5 | 60.4 | 65.8 | 72.8 |
| LZSmin | 40.5 | 39.9 | 43.6 | 48.1 | 49.2 | 50.1 | 56.1 | 57.5 | 47.9 | 48.5 | 51.3 | 53.5 |

| Freq. (Hz): | 100 | 125 | 160 | 200 | 250 | 315 | 400 | 500 | 630 | 800 | 1k | 1.25k |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| LZeq | 58.9 | 54.3 | 54.5 | 55.6 | 53.2 | 54.3 | 56.5 | 59.5 | 62.3 | 62.9 | 67.9 | 62.4 |
| LZSmax | 67.1 | 68.4 | 64.7 | 63.3 | 60.9 | 63.5 | 68.0 | 75.3 | 80.7 | 77.9 | 88.4 | 82.7 |
| LZSmin | 52.6 | 49.1 | 48.5 | 48.9 | 47.4 | 47.6 | 49.1 | 48.9 | 48.8 | 48.7 | 47.1 | 46.2 |

| Freq. (Hz): | 1.6k | 2k | 2.5k | 3.15k | 4k | 5k | 6.3k | 8k | 10k | 12.5k | 16k | 20k |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| LZeq | 58.7 | 55.5 | 57.7 | 59.7 | 51.6 | 45.6 | 40.6 | 38.0 | 35.1 | 31.8 | 28.4 | 23.6 |
| LZSmax | 70.1 | 68.7 | 75.4 | 78.6 | 67.7 | 60.1 | 52.0 | 58.6 | 48.3 | 45.1 | 43.1 | 38.1 |
| LZSmin | 44.3 | 43.3 | 41.5 | 39.8 | 36.4 | 32.9 | 30.4 | 27.9 | 25.4 | 21.4 | 17.7 | 13.4 |

## Calibration History

| Preamp | Date | dB re. 1V/Pa |
|---|---|---|
| PRM831 | 30 Mar 2018 12:23:25 | -25.8 |
| PRM831 | 07 Mar 2018 13:40:34 | -25.8 |
| PRM831 | 28 Feb 2018 12:16:10 | -25.9 |
| PRM831 | 30 Jan 2018 23:18:32 | -26.2 |
| PRM831 | 30 Jan 2018 13:42:45 | -26.2 |
| PRM831 | 30 Jan 2018 13:32:25 | -26.0 |
| PRM831 | 30 Jan 2018 10:54:43 | -26.0 |
| PRM831 | 06 Jan 2018 13:07:04 | -26.0 |
| PRM831 | 19 Dec 2017 10:41:35 | -25.5 |
| PRM831 | 25 Oct 2017 08:21:25 | -25.2 |
| PRM831 | 11 Oct 2017 12:05:04 | -25.5 |

# Measurement Report

## Report Summary

| | | | |
|---|---|---|---|
| Meter's File Name | 831_Data.004 | Computer's File Name | SLM_0002509_831_Data_004.02.ldbin |
| Meter | 831 | | |
| Firmware | 2.314 | | |
| User | GT | Location | |
| Description | Riverside - The Motorcycle Company - Phase 3 | | |
| Note | On Roof - Approx 6 feet from HVAC Unit | | |

| | | | | | |
|---|---|---|---|---|---|
| Start Time | 2020-05-09 13:23:15 | Duration | 0:10:00.2 | | |
| End Time | 2020-05-09 13:33:15 | Run Time | 0:10:00.2 | Pause Time | 0:00:00.0 |

## Results

### Overall Metrics

| | | | |
|---|---|---|---|
| $LA_{eq}$ | 65.1 dB | | |
| LAE | 92.9 dB | SEA | --- dB |
| EA | 214.7 µPa²h | | |
| $LZ_{peak}$ | 106.4 dB | 2020-05-09 13:25:40 | |
| $LAS_{max}$ | 80.1 dB | 2020-05-09 13:25:19 | |
| $LAS_{min}$ | 55.1 dB | 2020-05-09 13:30:14 | |
| $LA_{eq}$ | 65.1 dB | | |
| $LC_{eq}$ | 78.1 dB | $LC_{eq}$ - $LA_{eq}$ | 13.0 dB |
| $LAI_{eq}$ | 68.9 dB | $LAI_{eq}$ - $LA_{eq}$ | 3.8 dB |

### Exceedances

| Exceedances | Count | Duration |
|---|---|---|
| LAS > 65.0 dB | 16 | 0:02:46.5 |
| LAS > 85.0 dB | 0 | 0:00:00.0 |
| LZpeak > 135.0 dB | 0 | 0:00:00.0 |
| LZpeak > 137.0 dB | 0 | 0:00:00.0 |
| LZpeak > 140.0 dB | 0 | 0:00:00.0 |

### Community Noise

| LDN | LDay | LNight |
|---|---|---|
| 65.1 dB | 65.1 dB | 0.0 dB |

| LDEN | LDay | LEve | LNight |
|---|---|---|---|
| 65.1 dB | 65.1 dB | --- dB | --- dB |

### Any Data

| | A | | C | | Z | |
|---|---|---|---|---|---|---|
| | Level | Time Stamp | Level | Time Stamp | Level | Time Stamp |
| $L_{eq}$ | 65.1 dB | | 78.1 dB | | 80.9 dB | |
| $Ls_{(max)}$ | 80.1 dB | 2020-05-09 13:25:19 | 91.6 dB | 2020-05-09 13:26:05 | 97.4 dB | 2020-05-09 13:23:15 |
| $LF_{(max)}$ | 84.7 dB | 2020-05-09 13:25:18 | 95.4 dB | 2020-05-09 13:25:40 | 97.5 dB | 2020-05-09 13:23:15 |
| $LI_{(max)}$ | 86.7 dB | 2020-05-09 13:25:18 | 97.5 dB | 2020-05-09 13:25:40 | 99.6 dB | 2020-05-09 13:23:15 |
| $LS_{(min)}$ | 55.1 dB | 2020-05-09 13:30:14 | 64.7 dB | 2020-05-09 13:30:02 | 67.4 dB | 2020-05-09 13:28:06 |
| $LF_{(min)}$ | 54.3 dB | 2020-05-09 13:30:13 | 63.0 dB | 2020-05-09 13:30:12 | 65.8 dB | 2020-05-09 13:27:31 |
| $LI_{(min)}$ | 54.6 dB | 2020-05-09 13:30:13 | 65.0 dB | 2020-05-09 13:30:02 | 68.0 dB | 2020-05-09 13:27:59 |
| $L_{Peak(max)}$ | 98.9 dB | 2020-05-09 13:25:18 | 105.7 dB | 2020-05-09 13:25:40 | 106.4 dB | 2020-05-09 13:25:40 |

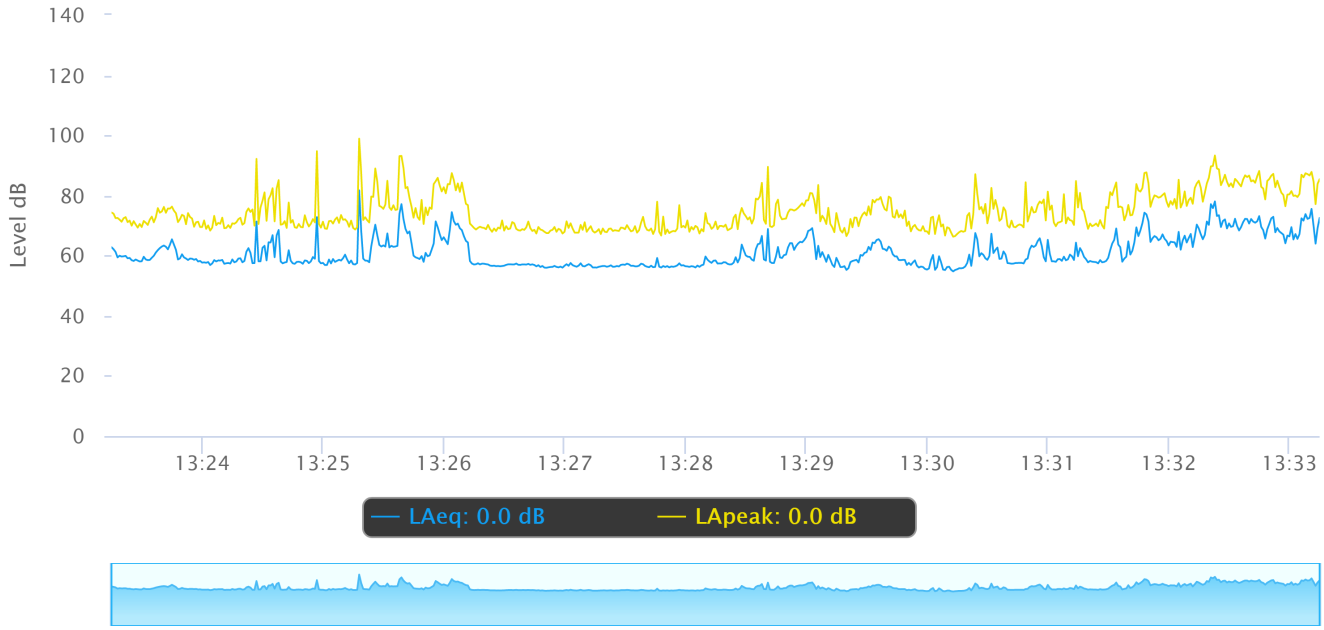
### Overloads

| Count | Duration | OBA Count | OBA Duration |
|---|---|---|---|
| 0 | 0:00:00.0 | 0 | 0:00:00.0 |

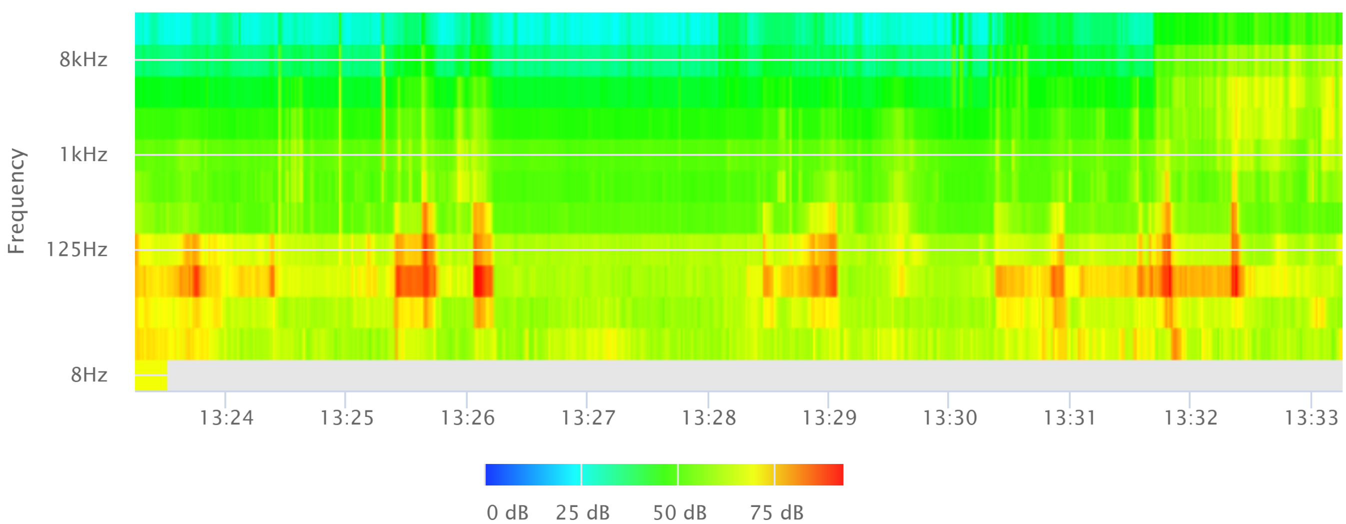
### Statistics

| | |
|---|---|
| LAS 5.0 | 71.5 dB |
| LAS 10.0 | 69.4 dB |
| LAS 33.3 | 62.7 dB |
| LAS 50.0 | 59.5 dB |
| LAS 66.6 | 58.1 dB |
| LAS 90.0 | 56.5 dB |

## Time History




## OBA 1/1 Leq



## General Information

| | |
|---|---|
| Serial Number | 02509 |
| Model | 831 |
| Firmware Version | 2.112 |
| Filename | 831_Data.002 |
| User | GT |
| Job Description | Northwest Fresno Walmart Relocation |
| Location | Northwest Fresno Walmart |
| | |
| Measurement Description | |
| Start Time | Saturday, 2013 July 27 15:49:15 |
| Stop Time | Saturday, 2013 July 27 16:09:15 |
| Duration | 00:20:00.6 |
| Run Time | 00:20:00.6 |
| Pause | 00:00:00.0 |
| Pre Calibration | Saturday, 2013 July 27 13:36:08 |
| Post Calibration | None |
| Calibration Deviation | --- |

## Note

Located at the eastern portion of the southern parking lot and approx 140 feet south of the front door
96 F, 35% Humidity, 29.48 in Hg, 3 mph wind, partly cloudy

## Overall Data

| | | | |
|---|---|---|---|
| LAeq | | 63.1 | dB |
| LASmax | 2013 Jul 27 15:59:44 | 79.2 | dB |
| LApeak (max) | 2013 Jul 27 16:06:25 | 102.2 | dB |
| LASmin | 2013 Jul 27 15:50:20 | 49.6 | dB |
| LCeq | | 74.0 | dB |
| LAeq | | 63.1 | dB |
| LCeq - LAeq | | 10.9 | dB |
| LAIeq | | 67.4 | dB |
| LAeq | | 63.1 | dB |
| LAIeq - LAeq | | 4.3 | dB |
| Ldn | | 63.1 | dB |
| LDay 07:00-23:00 | | 63.1 | dB |
| LNight 23:00-07:00 | | --- | dB |
| Lden | | 63.1 | dB |
| LDay 07:00-19:00 | | 63.1 | dB |
| LEvening 19:00-23:00 | | --- | dB |
| LNight 23:00-07:00 | | --- | dB |
| LAE | | 93.9 | dB |
| # Overloads | | 0 | |
| Overload Duration | | 0.0 | s |
| # OBA Overloads | | 0 | |
| OBA Overload Duration | | 0.0 | s |

## Statistics

| | | |
|---|---|---|
| LAS5.00 | 66.7 | dBA |
| LAS10.00 | 66.3 | dBA |
| LAS33.30 | 62.8 | dBA |
| LAS50.00 | 61.7 | dBA |
| LAS66.60 | 57.7 | dBA |
| LAS90.00 | 52.8 | dBA |
| | | |
| LAS > 65.0 dB (Exceedence Counts / Duration) | 17 / 347.8 | s |
| LAS > 85.0 dB (Exceedence Counts / Duration) | 0 / 0.0 | s |
| LApeak > 135.0 dB (Exceedence Counts / Duration) | 0 / 0.0 | s |
| LApeak > 137.0 dB (Exceedence Counts / Duration) | 0 / 0.0 | s |
| LApeak > 140.0 dB (Exceedence Counts / Duration) | 0 / 0.0 | s |

## Settings

| | | |
|---|---|---|
| RMS Weight | A Weighting | |
| Peak Weight | A Weighting | |
| Detector | Slow | |
| Preamp | PRM831 | |
| Integration Method | Linear | |
| OBA Range | Normal | |
| OBA Bandwidth | 1/1 and 1/3 | |
| OBA Freq. Weighting | Z Weighting | |
| OBA Max Spectrum | Bin Max | |
| Gain | +0 | dB |
| | | |
| Under Range Limit | 26.1 | dB |
| Under Range Peak | 75.6 | dB |
| Noise Floor | 17.0 | dB |
| Overload | 143.1 | dB |

## 1/1 Spectra

| Freq. (Hz): | 8.0 | 16.0 | 31.5 | 63.0 | 125 | 250 | 500 | 1k | 2k | 4k | 8k | 16k |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| LZeq | 66.7 | 66.1 | 71.1 | 71.6 | 64.9 | 59.5 | 59.6 | 58.3 | 56.2 | 51.8 | 46.8 | 44.6 |
| LZSmax | 82.6 | 84.9 | 82.2 | 89.3 | 77.1 | 67.1 | 72.4 | 76.6 | 76.6 | 69.0 | 67.7 | 63.1 |
| LZSmin | 46.5 | 55.4 | 53.6 | 59.0 | 55.2 | 49.9 | 45.5 | 43.6 | 40.9 | 37.7 | 39.6 | 42.8 |

## 1/3 Spectra

| Freq. (Hz): | 6.3 | 8.0 | 10.0 | 12.5 | 16.0 | 20.0 | 25.0 | 31.5 | 40.0 | 50.0 | 63.0 | 80.0 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| LZeq | 63.6 | 61.5 | 59.8 | 58.7 | 60.7 | 63.4 | 67.2 | 66.6 | 65.3 | 65.7 | 67.5 | 67.2 |
| LZSmax | 80.9 | 76.9 | 73.6 | 75.5 | 79.8 | 83.7 | 80.9 | 76.8 | 78.9 | 83.8 | 87.4 | 88.8 |
| LZSmin | 37.3 | 40.3 | 43.7 | 45.3 | 48.2 | 51.5 | 55.9 | 60.4 | 54.9 | 53.2 | 57.5 | 47.0 |

| Freq. (Hz): | 100 | 125 | 160 | 200 | 250 | 315 | 400 | 500 | 630 | 800 | 1k | 1.25k |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| LZeq | 61.7 | 61.0 | 54.9 | 52.9 | 57.0 | 53.2 | 57.3 | 54.1 | 52.1 | 54.5 | 53.3 | 52.7 |
| LZSmax | 76.0 | 71.0 | 69.8 | 65.8 | 64.6 | 65.6 | 67.0 | 71.0 | 67.1 | 65.9 | 72.9 | 73.0 |
| LZSmin | 52.1 | 48.8 | 46.7 | 42.4 | 46.2 | 44.6 | 43.2 | 38.5 | 38.6 | 39.0 | 39.4 | 38.2 |

| Freq. (Hz): | 1.6k | 2k | 2.5k | 3.15k | 4k | 5k | 6.3k | 8k | 10k | 12.5k | 16k | 20k |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| LZeq | 52.5 | 50.9 | 50.7 | 49.0 | 46.4 | 44.5 | 43.0 | 41.7 | 41.1 | 40.0 | 39.6 | 40.0 |
| LZSmax | 75.9 | 69.6 | 63.7 | 63.8 | 64.4 | 64.7 | 63.3 | 62.7 | 62.7 | 60.8 | 57.9 | 52.5 |
| LZSmin | 37.2 | 35.4 | 34.6 | 33.1 | 32.6 | 32.8 | 33.6 | 34.7 | 35.9 | 36.7 | 37.7 | 39.4 |

## Calibration History

| Preamp | Date | dB re. 1V/Pa |
|---|---|---|
| PRM831 | 27 Jul 2013 13:36:08 | -25.6 |
| PRM831 | 28 Apr 2013 15:34:24 | -25.9 |
| PRM831 | 23 Apr 2013 10:17:33 | -25.0 |
| PRM831 | 27 Feb 2013 19:15:30 | -25.7 |
| PRM831 | 24 Jan 2013 12:00:16 | -25.6 |
| PRM831 | 15 Jan 2013 07:50:44 | -26.2 |
| PRM831 | 04 Jan 2013 13:47:46 | -26.5 |

# Unmitigated Stationary Noise Calculations at Homes West of Project Site

| Stationary Noise Sources | Reference Distance | Reference Leq | Homes West of Project Site Distance | Leq | |
|---|---|---|---|---|---|
| | | | | | 1 (Line Source: hard=0, soft=.5; Point Source: hard=1, soft=1.5) |
| Pool Activities - Swim Meet | 30 | 71.8 | 100 | 61 | (eq. N-2141.2 of TeNS) |
| Rooftop HVAC | 6 | 65.1 | 200 | 35 | |
| Parking Lot | 5 | 63.1 | 245 | 29 | |

| **Stationary Noise Sources** | **Distance from Receptor to Wall** | **Distance from source to Wall** | **Height of Wall (feet)** | **Without Wall Noise Level at Residence** | **With Wall Noise Level at Residence** | **Source Height (feet)** | **Exterior Observer Height (feet)** | **Source Frequency (hz)** | barrier to receiver - b (all) | source to barrier - a | source to receiver - c | path difference y =a+b-c (auto) | line of sight (slope) | fresnel | Barrier Atten |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Pool Activities - Sw | 60 | 40 | 10 | 61 | **49** | 3 | 5 | 800 | 60.2080 | 40.60788 | 100.02 | 0.7959 | 1 | 2.263768 | -12.638 |
| Rooftop HVAC | 60 | 140 | 10 | 35 | **29** | 25 | 5 | 800 | 60.2080 | 140.8013 | 200.9975 | 0.0117 | 1 | 0.033391 | -5.3 |
| Parking Lot | 60 | 185 | 10 | 29 | **20** | 5 | 5 | 800 | 60.2080 | 185.0676 | 245 | 0.2755 | 1 | 0.783724 | -9.62 |
| | **Combined Noise Levels** | | | **61** | **49** | | | | | | | | | | |

# APPENDIX E

Operational Reference Noise Measurements and Mitigated Noise Calculations

| | |
|---|---|
| File Translated: | Z:\Vista Env\2007\070801 - Orange-SullyMiller\Noise\Noise Measurements\Pool\Pool.slmdl |
| Model/Serial Number: | 824 / A3176 |
| Firmware/Software Revs: | 4.283 / 3.120 |
| Name: | Vista Environmental |
| Descr1: | 1021 Didrikson Way |
| Descr2: | Laguna Beach, CA 92651 |
| Setup/Setup Descr: | slm&rta.ssa / SLM & Real-Time Analyzer |
| Location: | Laguna Beach High School Pool |
| Note1: | 15' southeast of pool approximately 50 people in pool area |
| Note2: | outside of wrought iron fence |

Overall Any Data
Start Time: 29-Jul-2009 14:27:25
Elapsed Time: 00:10:00.6

| | A Weight | C Weight | Flat |
|---|---|---|---|
| Leq: | 66.6 dBA | 68.9 dBC | 69.4 dBF |
| SEL: | 94.4 dBA | 96.7 dBC | 97.2 dBF |
| Peak: | 102.2 dBA | 103.5 dBC | 103.5 dBF |
| | 29-Jul-2009 14:29:27 | 29-Jul-2009 14:29:27 | 29-Jul-2009 14:29:27 |
| Lmax (slow): | 77.3 dBA | 77.1 dBC | 77.1 dBF |
| | 29-Jul-2009 14:35:38 | 29-Jul-2009 14:27:26 | 29-Jul-2009 14:27:26 |
| Lmin (slow): | 60.5 dBA | 65.1 dBC | 65.5 dBF |
| | 29-Jul-2009 14:30:48 | 29-Jul-2009 14:31:59 | 29-Jul-2009 14:31:59 |
| Lmax (fast): | 82.5 dBA | 81.1 dBC | 81.5 dBF |
| | 29-Jul-2009 14:35:38 | 29-Jul-2009 14:35:38 | 29-Jul-2009 14:35:38 |
| Lmin (fast): | 57.9 dBA | 63.7 dBC | 64.3 dBF |
| | 29-Jul-2009 14:31:15 | 29-Jul-2009 14:27:39 | 29-Jul-2009 14:27:39 |
| Lmax (impulse): | 84.0 dBA | 85.1 dBC | 85.1 dBF |
| | 29-Jul-2009 14:29:27 | 29-Jul-2009 14:29:27 | 29-Jul-2009 14:29:27 |
| Lmin (impulse): | 60.8 dBA | 65.1 dBC | 65.5 dBF |
| | 29-Jul-2009 14:30:48 | 29-Jul-2009 14:31:59 | 29-Jul-2009 14:31:59 |

Spectra

| Date | Time | Run Time |
|---|---|---|
| 29-Jul-2009 | 14:27:25 | 00:10:00.6 |

| Hz | Leq1/3 | Leq1/1 | Max1/3 | Max1/1 | Min1/3 | Min1/1 | Hz | Leq1/3 | Leq1/1 | Max1/3 | Max1/1 | Min1/3 | Min1/1 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 12.5 | 53.4 | | 55.1 | | 30.1 | | 630 | 56.9 | | 58.5 | | 46.3 | |
| 16.0 | 53.2 | 58.3 | 55.5 | 62.1 | 34.1 | 38.6 | 800 | 58.6 | | 63.6 | | 48.1 | |
| 20.0 | 53.9 | | 59.7 | | 35.7 | | 1000 | 59.4 | 63.7 | 61.4 | 70.3 | 46.9 | 51.8 |
| 25.0 | 52.0 | | 54.5 | | 36.2 | | 1250 | 58.7 | | 68.5 | | 45.8 | |
| 31.5 | 54.0 | 58.6 | 66.8 | 68.4 | 37.7 | 43.4 | 1600 | 57.2 | | 62.8 | | 47.0 | |
| 40.0 | 55.0 | | 62.6 | | 40.7 | | 2000 | 55.2 | 60.3 | 64.7 | 76.3 | 45.2 | 50.1 |
| 50.0 | 55.4 | | 65.5 | | 43.7 | | 2500 | 53.3 | | 75.8 | | 42.8 | |
| 63.0 | 56.3 | 59.9 | 60.0 | 67.1 | 44.1 | 47.9 | 3150 | 50.2 | | 72.3 | | 41.7 | |
| 80.0 | 53.0 | | 57.8 | | 41.2 | | 4000 | 47.2 | 52.6 | 52.6 | 72.4 | 39.2 | 44.4 |
| 100 | 54.3 | | 54.1 | | 39.3 | | 5000 | 43.8 | | 56.0 | | 36.4 | |
| 125 | 60.9 | 62.0 | 60.7 | 62.2 | 55.1 | 55.3 | 6300 | 39.7 | | 50.4 | | 32.7 | |
| 160 | 49.5 | | 53.6 | | 38.4 | | 8000 | 36.4 | 42.0 | 41.5 | 51.1 | 29.8 | 35.1 |
| 200 | 49.1 | | 56.0 | | 40.8 | | 10000 | 33.3 | | 37.3 | | 26.3 | |
| 250 | 49.9 | 54.7 | 57.2 | 62.0 | 41.8 | 46.5 | 12500 | 30.2 | | 34.6 | | 23.3 | |
| 315 | 50.6 | | 58.1 | | 42.5 | | 16000 | 26.8 | 32.4 | 32.3 | 37.0 | 20.8 | 26.5 |
| 400 | 53.5 | | 61.8 | | 46.5 | | 20000 | 23.4 | | 26.8 | | 20.7 | |
| 500 | 56.1 | 60.5 | 62.6 | 66.1 | 47.0 | 51.4 | | | | | | | |

Ln Start Level: 15 dB

| | | | | | |
|---|---|---|---|---|---|
| L1.00 | 0.0 dBA | L50.00 | 0.0 dBA | L95.00 | 0.0 dBA |
| L5.00 | 0.0 dBA | L90.00 | 0.0 dBA | L99.00 | 0.0 dBA |

Detector: Slow
Weighting: A
SPL Exceedance Level 1: 85.0 dB Exceeded: 0 times
SPL Exceedance level 2: 120 dB Exceeded: 0 times
Peak-1 Exceedance Level: 105 dB Exceeded: 0 times
Peak-2 Exceedance Level: 100 dB Exceeded: 1 times
Hysteresis: 2
Overloaded: 0 time(s)
Paused: 0 times for 00:00:00.0

File Translated: Z:\Vista Env\2007\070801 - Orange-SullyMiller\Noise\Noise Measurements\Pool\Pool.slmdl
Model/Serial Number: 824 / A3176

Current Any Data
Start Time: 29-Jul-2009 14:27:25
Elapsed Time: 00:10:00.6

| | A Weight | C Weight | Flat |
|---|---|---|---|
| Leq: | 66.6 dBA | 68.9 dBC | 69.4 dBF |
| SEL: | 94.4 dBA | 96.7 dBC | 97.2 dBF |
| Peak: | 102.2 dBA | 103.5 dBC | 103.5 dBF |
| | 29-Jul-2009 14:29:27 | 29-Jul-2009 14:29:27 | 29-Jul-2009 14:29:27 |
| Lmax (slow): | 77.3 dBA | 77.1 dBC | 77.1 dBF |
| | 29-Jul-2009 14:35:38 | 29-Jul-2009 14:27:26 | 29-Jul-2009 14:27:26 |
| Lmin (slow): | 60.5 dBA | 65.1 dBC | 65.5 dBF |
| | 29-Jul-2009 14:30:48 | 29-Jul-2009 14:31:59 | 29-Jul-2009 14:31:59 |
| Lmax (fast): | 82.5 dBA | 81.1 dBC | 81.5 dBF |
| | 29-Jul-2009 14:35:38 | 29-Jul-2009 14:35:38 | 29-Jul-2009 14:35:38 |
| Lmin (fast): | 57.9 dBA | 63.7 dBC | 64.3 dBF |
| | 29-Jul-2009 14:31:15 | 29-Jul-2009 14:27:39 | 29-Jul-2009 14:27:39 |
| Lmax (impulse): | 84.0 dBA | 85.1 dBC | 85.1 dBF |
| | 29-Jul-2009 14:29:27 | 29-Jul-2009 14:29:27 | 29-Jul-2009 14:29:27 |
| Lmin (impulse): | 60.8 dBA | 65.1 dBC | 65.5 dBF |
| | 29-Jul-2009 14:30:48 | 29-Jul-2009 14:31:59 | 29-Jul-2009 14:31:59 |

| | | | |
|---|---|---|---|
| Calibrated: | 29-Jul-2009 14:25:33 | Offset: | -48.0 dB |
| Checked: | 29-Jul-2009 14:25:33 | Level: | 94.0 dB |
| Calibrator | not set | Level: | 94.0 dB |
| Cal Records Count: | 1 | | |

| | | | |
|---|---|---|---|
| Interval Records: | Disabled | Number Interval Records: | 0 |
| History Records: | Disabled | Number History Records: | 0 |
| Run/Stop Records: | | Number Run/Stop Records: | 2 |

# Mitigated Stationary Noise Calculations at Homes West of Project Site

| Stationary Noise Sources | Reference Distance | Referenc Leq | Homes West of Project Site Distance | Leq | |
|---|---|---|---|---|---|
| | | | | | 1 (Line Source: hard=0, soft=.5; Point Source: hard=1, soft=1.5) |
| Pool Activities - Practice | 15 | 66.6 | 100 | 50 | (eq. N-2141.2 of TeNS) |
| Rooftop HVAC | 6 | 65.1 | 200 | 35 | |
| Parking Lot | 5 | 63.1 | 245 | 29 | |

| Stationary Noise Sources | Distance from Receptor to Wall | Distance from source to Wall | Height of Wall (feet) | Without Wall Noise Level at Residence | With Wall Noise Level at Residence | Source Height (feet) | Exterior Observer Height (feet) | Source Frequenc y (hz) | barrier to receiver - b (all) | source to barrier - a | source to receiver - c | path difference y =a+b-c (auto) | line of sight (slope) | fresnel | Barrier Atten |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Pool Activities - Pra | 60 | 40 | 10 | 50 | **37** | 3 | 5 | 800 | 60.2080 | 40.60788 | 100.02 | 0.7959 | 1 | 2.263768 | -12.638 |
| Rooftop HVAC | 60 | 140 | 10 | 35 | **29** | 25 | 5 | 800 | 60.2080 | 140.8013 | 200.9975 | 0.0117 | 1 | 0.033391 | -5.3 |
| Parking Lot | 60 | 185 | 10 | 29 | **20** | 5 | 5 | 800 | 60.2080 | 185.0676 | 245 | 0.2755 | 1 | 0.783724 | -9.62 |
| | | **Combined Noise Levels** | | **50** | **38** | | | | | | | | | | |