

# ***CENTERPOINT INDUSTRIAL PROJECT NOISE AND VIBRATION ASSESSMENT***

***Hayward, California***

**August 22, 2023**

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**I&R Job No.: 23-031**

## INTRODUCTION

The Centerpoint Industrial project proposes to construct a two-story, 103,406 square foot industrial building containing approximately 97,646 square feet of warehouse and 5,760 square feet of office space. The building would have a flat roof with a maximum height of 45 feet to the top of the roofline. While a designated end user for the project has not yet been determined, the project site is zoned for light Industrial use. The Light Industrial zoning designation allows for a variety of uses including, but not limited to, automobile repair, commercial testing laboratories, contractor services, manufacturing, research and development, warehouse and distribution (less than 150,000 square feet floor area), retail, office, industrial or vocational trade schools, and animal hospital uses. For the purposes of this Initial Study, it is conservatively assumed that the project would be used as a warehouse facility.

This report evaluates the project's potential to result in significant impacts with respect to applicable California Environmental Quality Act (CEQA) guidelines. The report is divided into two sections: 1) the Setting Section provides a brief description of the fundamentals of environmental noise and groundborne vibration, summarizes applicable regulatory criteria, and discusses ambient noise conditions in the project vicinity; and 2) the Impacts and Mitigation Measures Section describes the significance criteria used to evaluate project impacts, provides a discussion of each project impact, and presents mitigation measures, where necessary, to mitigate project impacts to a less-than-significant level.

## SETTING

### Fundamentals of Environmental Noise

Noise may be defined as unwanted sound. Noise is usually objectionable because it is disturbing or annoying. The objectionable nature of sound could be caused by its *pitch* or its *loudness*. *Pitch* is the height or depth of a tone or sound, depending on the relative rapidity (*frequency*) of the vibrations by which it is produced. Higher pitched signals sound louder to humans than sounds with a lower pitch. *Loudness* is the intensity of sound waves combined with the reception characteristics of the ear. Intensity may be compared with the height of an ocean wave in that it is a measure of the amplitude of the sound wave.

In addition to the concepts of pitch and loudness, there are several noise measurement scales which are used to describe noise in a particular location. A *decibel (dB)* is a unit of measurement which indicates the relative amplitude of a sound. The zero on the decibel scale is based on the lowest sound level that the healthy, unimpaired human ear can detect. Sound levels in decibels are calculated on a logarithmic basis. An increase of 10 decibels represents a ten-fold increase in acoustic energy, while 20 decibels is 100 times more intense, 30 decibels is 1,000 times more intense, etc. There is a relationship between the subjective noisiness or loudness of a sound and its intensity. Each 10 decibel increase in sound level is perceived as approximately a doubling of loudness over a fairly wide range of intensities. Technical terms are defined in Table 1.

There are several methods of characterizing sound. The most common in California is the *A-weighted sound level (dBA)*. This scale gives greater weight to the frequencies of sound to which

the human ear is most sensitive. Representative outdoor and indoor noise levels in units of dBA are shown in Table 2. Because sound levels can vary markedly over a short period of time, a method for describing either the average character of the sound or the statistical behavior of the variations must be utilized. Most commonly, environmental sounds are described in terms of an average level that has the same acoustical energy as the summation of all the time-varying events. This *energy-equivalent sound/noise descriptor* is called  $L_{eq}$ . The most common averaging period is hourly, but  $L_{eq}$  can describe any series of noise events of arbitrary duration.

The scientific instrument used to measure noise is the sound level meter. Sound level meters can accurately measure environmental noise levels to within plus or minus 1 dBA. Various computer models are used to predict environmental noise levels from sources, such as roadways and airports. The accuracy of the predicted models depends upon the distance the receptor is from the noise source. Close to the noise source, the models are accurate to within about plus or minus 1 to 2 dBA.

Since the sensitivity to noise increases during the evening and at night -- because excessive noise interferes with the ability to sleep -- 24-hour descriptors have been developed that incorporate artificial noise penalties added to quiet-time noise events. The *Community Noise Equivalent Level (CNEL)* is a measure of the cumulative noise exposure in a community, with a 5 dB penalty added to evening (7:00 pm - 10:00 pm) and a 10 dB addition to nocturnal (10:00 pm - 7:00 am) noise levels. The *Day/Night Average Sound Level (DNL or  $L_{dn}$ )* is essentially the same as CNEL, with the exception that the evening time period is dropped and all occurrences during this three-hour period are grouped into the daytime period.

## **Effects of Noise**

### *Sleep and Speech Interference*

The thresholds for speech interference indoors are about 45 dBA if the noise is steady and above 55 dBA if the noise is fluctuating. Outdoors the thresholds are about 15 dBA higher. Steady noises of sufficient intensity (above 35 dBA) and fluctuating noise levels above about 45 dBA have been shown to affect sleep. Interior residential standards for multi-family dwellings are set by the State of California at 45 dBA  $L_{dn}$ . Typically, the highest steady traffic noise level during the daytime is about equal to the  $L_{dn}$  and nighttime levels are 10 dBA lower. The standard is designed for sleep and speech protection and most jurisdictions apply the same criterion for all residential uses. Typical structural attenuation is 12 to 17 dBA with open windows. With closed windows in good condition, the noise attenuation factor is around 20 dBA for an older structure and 25 dBA for a newer dwelling. Sleep and speech interference is therefore possible when exterior noise levels are about 57 to 62 dBA  $L_{dn}$  with open windows and 65 to 70 dBA  $L_{dn}$  if the windows are closed. Levels of 55 to 60 dBA are common along collector streets and secondary arterials, while 65 to 70 dBA is a typical value for a primary/major arterial. Levels of 75 to 80 dBA are normal noise levels at the first row of development outside a freeway right-of-way. In order to achieve an acceptable interior noise environment, bedrooms facing secondary roadways need to be able to have their windows closed, those facing major roadways and freeways typically need special glass windows.

## *Annoyance*

Attitude surveys are used for measuring the annoyance felt in a community for noises intruding into homes or affecting outdoor activity areas. In these surveys, it was determined that the causes for annoyance include interference with speech, radio and television, house vibrations, and interference with sleep and rest. The  $L_{dn}$  as a measure of noise has been found to provide a valid correlation of noise level and the percentage of people annoyed. People have been asked to judge the annoyance caused by aircraft noise and ground transportation noise. There continues to be disagreement about the relative annoyance of these different sources. When measuring the percentage of the population highly annoyed, the threshold for ground vehicle noise is about 50 dBA  $L_{dn}$ . At a  $L_{dn}$  of about 60 dBA, approximately 12 percent of the population is highly annoyed. When the  $L_{dn}$  increases to 70 dBA, the percentage of the population highly annoyed increases to about 25 to 30 percent of the population. There is, therefore, an increase of about 2 percent per dBA between a  $L_{dn}$  of 60 to 70 dBA. Between a  $L_{dn}$  of 70 to 80 dBA, each decibel increase increases by about 3 percent the percentage of the population highly annoyed. People appear to respond more adversely to aircraft noise. When the  $L_{dn}$  is 60 dBA, approximately 30 to 35 percent of the population is believed to be highly annoyed. Each decibel increase to 70 dBA adds about 3 percentage points to the number of people highly annoyed. Above 70 dBA, each decibel increase results in about a 4 percent increase in the percentage of the population highly annoyed.

**TABLE 1      Definition of Acoustical Terms Used in this Report**

| <b>Term</b>                               | <b>Definition</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|-------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Decibel, dB                               | A unit describing the amplitude of sound, equal to 20 times the logarithm to the base 10 of the ratio of the pressure of the sound measured to the reference pressure. The reference pressure for air is 20 micro Pascals.                                                                                                                                                                                                                                                                                                               |
| Sound Pressure Level                      | Sound pressure is the sound force per unit area, usually expressed in micro Pascals (or 20 micro Newtons per square meter), where 1 Pascal is the pressure resulting from a force of 1 Newton exerted over an area of 1 square meter. The sound pressure level is expressed in decibels as 20 times the logarithm to the base 10 of the ratio between the pressures exerted by the sound to a reference sound pressure (e. g., 20 micro Pascals). Sound pressure level is the quantity that is directly measured by a sound level meter. |
| Frequency, Hz                             | The number of complete pressure fluctuations per second above and below atmospheric pressure. Normal human hearing is between 20 Hz and 20,000 Hz. Infrasonic sound are below 20 Hz and Ultrasonic sounds are above 20,000 Hz.                                                                                                                                                                                                                                                                                                           |
| A-Weighted Sound Level, dBA               | The sound pressure level in decibels as measured on a sound level meter using the A-weighting filter network. The A-weighting filter de-emphasizes the very low and very high frequency components of the sound in a manner similar to the frequency response of the human ear and correlates well with subjective reactions to noise.                                                                                                                                                                                                   |
| Equivalent Noise Level, $L_{eq}$          | The average A-weighted noise level during the measurement period.                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| $L_{max}$ , $L_{min}$                     | The maximum and minimum A-weighted noise level during the measurement period.                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| $L_{01}$ , $L_{10}$ , $L_{50}$ , $L_{90}$ | The A-weighted noise levels that are exceeded 1%, 10%, 50%, and 90% of the time during the measurement period.                                                                                                                                                                                                                                                                                                                                                                                                                           |
| Day/Night Noise Level, $L_{dn}$ or DNL    | The average A-weighted noise level during a 24-hour day, obtained after addition of 10 decibels to levels measured in the night between 10:00 pm and 7:00 am.                                                                                                                                                                                                                                                                                                                                                                            |
| Community Noise Equivalent Level, CNEL    | The average A-weighted noise level during a 24-hour day, obtained after addition of 5 decibels in the evening from 7:00 pm to 10:00 pm and after addition of 10 decibels to sound levels measured in the night between 10:00 pm and 7:00 am.                                                                                                                                                                                                                                                                                             |
| Ambient Noise Level                       | The composite of noise from all sources near and far. The normal or existing level of environmental noise at a given location.                                                                                                                                                                                                                                                                                                                                                                                                           |
| Intrusive                                 | That noise which intrudes over and above the existing ambient noise at a given location. The relative intrusiveness of a sound depends upon its amplitude, duration, frequency, and time of occurrence and tonal or informational content as well as the prevailing ambient noise level.                                                                                                                                                                                                                                                 |

Source: Handbook of Acoustical Measurements and Noise Control, Harris, 1998.

**TABLE 2     Typical Noise Levels in the Environment**

| Common Outdoor Activities         | Noise Level (dBA) | Common Indoor Activities                    |
|-----------------------------------|-------------------|---------------------------------------------|
|                                   | 110 dBA           | Rock band                                   |
| Jet fly-over at 1,000 feet        |                   |                                             |
|                                   | 100 dBA           |                                             |
| Gas lawn mower at 3 feet          |                   |                                             |
|                                   | 90 dBA            |                                             |
| Diesel truck at 50 feet at 50 mph |                   | Food blender at 3 feet                      |
|                                   | 80 dBA            | Garbage disposal at 3 feet                  |
| Noisy urban area, daytime         |                   |                                             |
| Gas lawn mower, 100 feet          | 70 dBA            | Vacuum cleaner at 10 feet                   |
| Commercial area                   |                   | Normal speech at 3 feet                     |
| Heavy traffic at 300 feet         | 60 dBA            |                                             |
|                                   |                   | Large business office                       |
| Quiet urban daytime               | 50 dBA            | Dishwasher in next room                     |
| Quiet urban nighttime             | 40 dBA            | Theater, large conference room              |
| Quiet suburban nighttime          | 30 dBA            |                                             |
|                                   |                   | Library                                     |
| Quiet rural nighttime             |                   | Bedroom at night, concert hall (background) |
|                                   | 20 dBA            |                                             |
|                                   |                   | Broadcast/recording studio                  |
|                                   | 10 dBA            |                                             |
|                                   | 0 dBA             |                                             |

Source: Technical Noise Supplement (TeNS), California Department of Transportation, September 2013.

## **Fundamentals of Groundborne Vibration**

Ground vibration consists of rapidly fluctuating motions or waves with an average motion of zero. Several different methods are typically used to quantify vibration amplitude. One method is the Peak Particle Velocity (PPV). The PPV is defined as the maximum instantaneous positive or negative peak of the vibration wave. In this report, a PPV descriptor with units of mm/sec or in/sec is used to evaluate construction generated vibration for building damage and human complaints. Table 3 displays the reactions of people and the effects on buildings that continuous or frequent intermittent vibration levels produce. The guidelines in Table 3 represent syntheses of vibration criteria for human response and potential damage to buildings resulting from construction vibration.

Construction activities can cause vibration that varies in intensity depending on several factors. The use of pile driving and vibratory compaction equipment typically generates the highest construction related groundborne vibration levels. Because of the impulsive nature of such activities, the use of the PPV descriptor has been routinely used to measure and assess groundborne vibration and almost exclusively to assess the potential of vibration to cause damage and the degree of annoyance for humans.

The two primary concerns with construction-induced vibration, the potential to damage a structure and the potential to interfere with the enjoyment of life, are evaluated against different vibration limits. Human perception of vibration varies with the individual and is a function of physical setting and the type of vibration. Persons exposed to elevated ambient vibration levels, such as people in an urban environment, may tolerate a higher vibration level.

Structural damage can be classified as cosmetic only, such as paint flaking or minimal extension of cracks in building surfaces; minor, including limited surface cracking; or major, that may threaten the structural integrity of the building. Safe vibration limits that can be applied to assess the potential for damaging a structure vary by researcher. The damage criteria presented in Table 3 include several categories for ancient, fragile, and historic structures, the types of structures most at risk to damage. Most buildings are included within the categories ranging from “Historic and some old buildings” to “Modern industrial/commercial buildings.” Construction-induced vibration that can be detrimental to the building is very rare and has only been observed in instances where the structure is at a high state of disrepair and the construction activity occurs immediately adjacent to the structure.

The annoyance levels shown in Table 3 should be interpreted with care since vibration may be found to be annoying at lower levels than those shown, depending on the level of activity or the sensitivity of the individual. To sensitive individuals, vibrations approaching the threshold of perception can be annoying. Low-level vibrations frequently cause irritating secondary vibration, such as a slight rattling of windows, doors, or stacked dishes. The rattling sound can give rise to exaggerated vibration complaints, even though there is very little risk of actual structural damage.

**TABLE 3      Reaction of People and Damage to Buildings from Continuous or Frequent Intermittent Vibration Levels**

| <b>Velocity Level, PPV (in/sec)</b> | <b>Human Reaction</b>                          | <b>Effect on Buildings</b>                                                                                  |
|-------------------------------------|------------------------------------------------|-------------------------------------------------------------------------------------------------------------|
| 0.01                                | Barely perceptible                             | No effect                                                                                                   |
| 0.04                                | Distinctly perceptible                         | Vibration unlikely to cause damage of any type to any structure                                             |
| 0.08                                | Distinctly perceptible to strongly perceptible | Recommended upper level of the vibration to which ruins and ancient monuments should be subjected           |
| 0.1                                 | Strongly perceptible                           | Threshold at which there is a risk of damage to fragile buildings with no risk of damage to most buildings  |
| 0.25                                | Strongly perceptible to severe                 | Threshold at which there is a risk of damage to historic and some old buildings.                            |
| 0.3                                 | Strongly perceptible to severe                 | Threshold at which there is a risk of damage to older residential structures                                |
| 0.5                                 | Severe - Vibrations considered unpleasant      | Threshold at which there is a risk of damage to new residential and modern commercial/industrial structures |

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

## **Regulatory Background**

This section describes the relevant guidelines, policies, and standards established by State Agencies and the City of Hayward. The State CEQA Guidelines, Appendix G, are used to assess the potential significance of impacts pursuant to local General Plan policies, Municipal Code standards, or the applicable standards of other agencies. A summary of the applicable regulatory criteria is provided below.

### **State of California**

***State CEQA Guidelines.*** The California Environmental Quality Act (CEQA) contains guidelines to evaluate the significance of effects of environmental noise attributable to a proposed project. Under CEQA, noise impacts would be considered significant if the project would result in:

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

## **City of Hayward**

***City of Hayward 2040 General Plan.*** The City of Hayward 2040 General Plan Hazards Element establishes policies to control noise within the community. Applicable goals and policies presented in the General Plan are as follows:

**GOAL HAZ-8.** Minimize human exposure to excessive noise and ground vibration.

**Policy HAZ-8.3: Incremental Noise Impacts of Commercial and Industrial Development.** The City shall consider the potential noise impacts of commercial and industrial developments that are located near residences and shall require noise mitigation measures as a condition of project approval.

**Policy HAZ-8.17: Community Noise Control Ordinance.** The City shall maintain, implement, and enforce a community noise control ordinance to regulate noise levels from public and private properties, vehicles, construction sites, and landscaping activities.

**Policy HAZ-8.20: Construction Noise Study.** The City may require development projects subject to discretionary approval to assess potential construction noise impacts on nearby sensitive uses and to minimize impacts on those uses, to the extent feasible.

**Policy HAZ-8.21: Construction and Maintenance Noise Limits.** The City shall limit the hours of construction and maintenance activities to the less sensitive hours of the day (7:00 a.m. to 7:00 p.m. Monday through Saturday and 10:00 a.m. to 6:00 p.m. on Sundays and holidays).

**Policy HAZ-8.22: Vibration Impact Assessment.** The City shall require a vibration impact assessment for proposed projects in which heavy-duty construction equipment would be used (e.g. pile driving, bulldozing) within 200 feet of an existing structure or sensitive receptor. If applicable, the City shall require all feasible mitigation measures to be implemented to ensure that no damage or disturbance to structures or sensitive receptors would occur.

***City of Hayward Municipal Code.*** The City's Municipal Code contains a Noise Ordinance that limits noise levels at adjacent properties. Section 4-1.03.1 of the Municipal Code outlines residential and commercial property noise limits and Section 4-1.03.4 outlines construction noise limits. The applicable Municipal Code sections are presented below:

### **Section 4-1.03.1 Noise Restriction by Decibel**

#### **(a) Residential Property Noise Limits.**

1. No person shall produce or allow to be produced by human voice, machine, device, or any combination of same, on residential property, a noise level at any point outside of the property plane that exceeds seventy (70) dBA between the hours of 7:00 a.m. and 9:00 p.m. or sixty (60) dBA between the hours of 9:00 p.m. and 7:00 a.m.

2. No person shall produce or allow to be produced by human voice, machine, device, or any combinations of same, on multifamily residential property, a noise level more than sixty (60) dBA three feet from any wall, floor, or ceiling inside any dwelling unit on the same property, when windows and doors of the dwelling unit are closed, except within the dwelling unit in which the noise source or sources may be located.
- (b) Commercial and Industrial Property Noise Limits. Except for commercial and industrial property abutting residential property, no person shall produce or allow to be produced by human voice, machine, device, or any other combination of same, on commercial or industrial property, a noise level at any point outside of the property plane that exceeds seventy (70) dBA. Commercial and industrial property that abuts residential property shall be subject to the residential property noise limits set forth in sections (a)(1) and (2) above.

#### **Section 4-1.03.4 Construction and Alteration of Structures; Landscaping Activities**

Unless otherwise provided pursuant to a duly issued permit or a condition of approval of a land use entitlement, the construction, alteration, or repair of structures and any landscaping activities, occurring between the hours of 10:00 a.m. and 6:00 p.m. on Sundays and holidays, and 7:00 a.m. and 7:00 p.m. on other days, shall be subject to the following:

- (a) No individual device or piece of equipment shall produce a noise level exceeding eighty-three (83) dBA at a distance of twenty-five (25) feet from the source. If the device or equipment is housed within a structure on the property, the measurement shall be made outside the structure at a distance as close as possible to twenty-five (25) feet from the equipment.
- (b) The noise level at any point outside the property plane shall not exceed eighty-six (86) dBA.
- (c) During all other times, the decibel levels set forth in Section 4-1.03.1 shall control.

#### **Existing Noise Environment**

The approximately 7.44-acre project site consists of three separate, contiguous parcels located at 29469 Ruus Road, 1571 – 1593 Industrial Parkway West, and 1601 – 1617 Industrial Parkway West in the City of Hayward. The site is currently developed with five one-story industrial buildings totaling approximately 72,082 square feet, pavement, and landscaping. A nine-foot-tall masonry wall is currently located along the western project boundary where the site borders residential uses. The site is bounded by industrial uses to the north, Industrial Parkway West to the south, existing commercial and residential uses to the west, and existing industrial and residential uses and Ruus Road to the east.

An ambient noise monitoring survey, consisting of two long-term (LT-1 and LT-2) and three short-term (ST-1, ST-2, and ST-3) noise measurements, was made in the site vicinity between Wednesday, April 19, 2023, and Friday, April 21, 2023. All measurement locations are shown in Figure 1.

Long-term noise measurement LT-1 was positioned approximately 35 feet from the centerline of Ruus Road to represent the existing noise environment at residential receptors north and east of the site opposite Ruus Road. The predominant source of noise at this location was traffic along Ruus Road. Background noise levels were primarily the result of distant Industrial Parkway West traffic noise and activities at nearby industrial land uses. Hourly average noise levels typically ranged from 62 to 73 dBA  $L_{eq}$  during daytime hours (7:00 a.m. and 10:00 p.m.) and from 53 to 66 dBA  $L_{eq}$  during nighttime hours (10:00 p.m. and 7:00 a.m.). The day-night average noise level on Thursday, April 20, 2023 was 69 dBA  $L_{dn}$ . The daily trend in noise levels at LT-1 is shown in Figures 2-4.

LT-2 was made at the south terminus of Bowhill Road to represent the existing noise environment at the residential development west of the project site. Background noise levels were also primarily the result of distant Industrial Parkway West traffic noise. Hourly average noise levels at LT-2 typically ranged from 52 to 63 dBA  $L_{eq}$  during daytime hours and from 40 to 61 dBA  $L_{eq}$  during nighttime hours. The day-night average noise level on Thursday, April 20, 2023 was 58 dBA  $L_{dn}$ . The daily trend in noise levels at LT-2 is shown in Figures 5-7.

Short-term noise measurements were made on Wednesday, April 19, 2023, between 10:20 a.m. and 11:10 a.m. in 10-minute intervals. Results of the measurements are summarized in Table 4. ST-1 was made approximately 35 feet north of the centerline of Ruus Lane to represent the noise environment at Buckingham Way residences north of the site. Traffic along Ruus Lane was the primary noise source at this location, generating noise levels ranging from 57 to 73 dBA. Aircraft produced noise levels ranging from 51 to 61 dBA. The 10-minute average noise level measured at ST-1 was 58 dBA  $L_{eq}$ . ST-2 was made to represent the noise environment at Sandburg Way residences northeast of the site. Traffic along Ruus Lane and Industrial Parkway West contributed to background noise levels measured at this location which ranged from 45 to 51 dBA. No local traffic was observed during the measurement. The 10-minute average noise level was 46 dBA  $L_{eq}$ . ST-3 was made near 1609 Welford Circle, just west of the project site. Ambient background noise levels produced by distant traffic ranged from 46 to 54 dBA at ST-3. Background traffic noise levels were punctuated by noise sources including aircraft and horns, which produced noise levels ranging from 58 to 64 dBA. The 10-minute average noise level at ST-3 was 51 dBA  $L_{eq}$ .

**TABLE 4 Summary of Short-Term Noise Measurements**

| Noise Measurement Location | Date, Time             | Measured Noise Level, dBA |           |            |            |            |          |
|----------------------------|------------------------|---------------------------|-----------|------------|------------|------------|----------|
|                            |                        | $L_{max}$                 | $L_{(1)}$ | $L_{(10)}$ | $L_{(50)}$ | $L_{(90)}$ | $L_{eq}$ |
| ST-1: 1366 Buckingham Way  | 4/19/2023, 10:20-10:30 | 73                        | 70        | 62         | 49         | 45         | 58       |
| ST-2: 29482 Sandburg Way   | 4/19/2023, 10:40-10:50 | 52                        | 49        | 47         | 46         | 44         | 46       |
| ST-3: 1609 Welford Circle  | 4/19/2023, 11:00-11:10 | 64                        | 61        | 54         | 47         | 45         | 51       |

**FIGURE 1 Aerial Image of the Project Area Showing Long- and Short-Term Measurement Locations**



Source: Google Earth, 2023.

**Noise Levels at Noise Measurement Site LT-1  
~35 feet Northeast of Centerline of Ruus Road  
Wednesday, April 19, 2023**

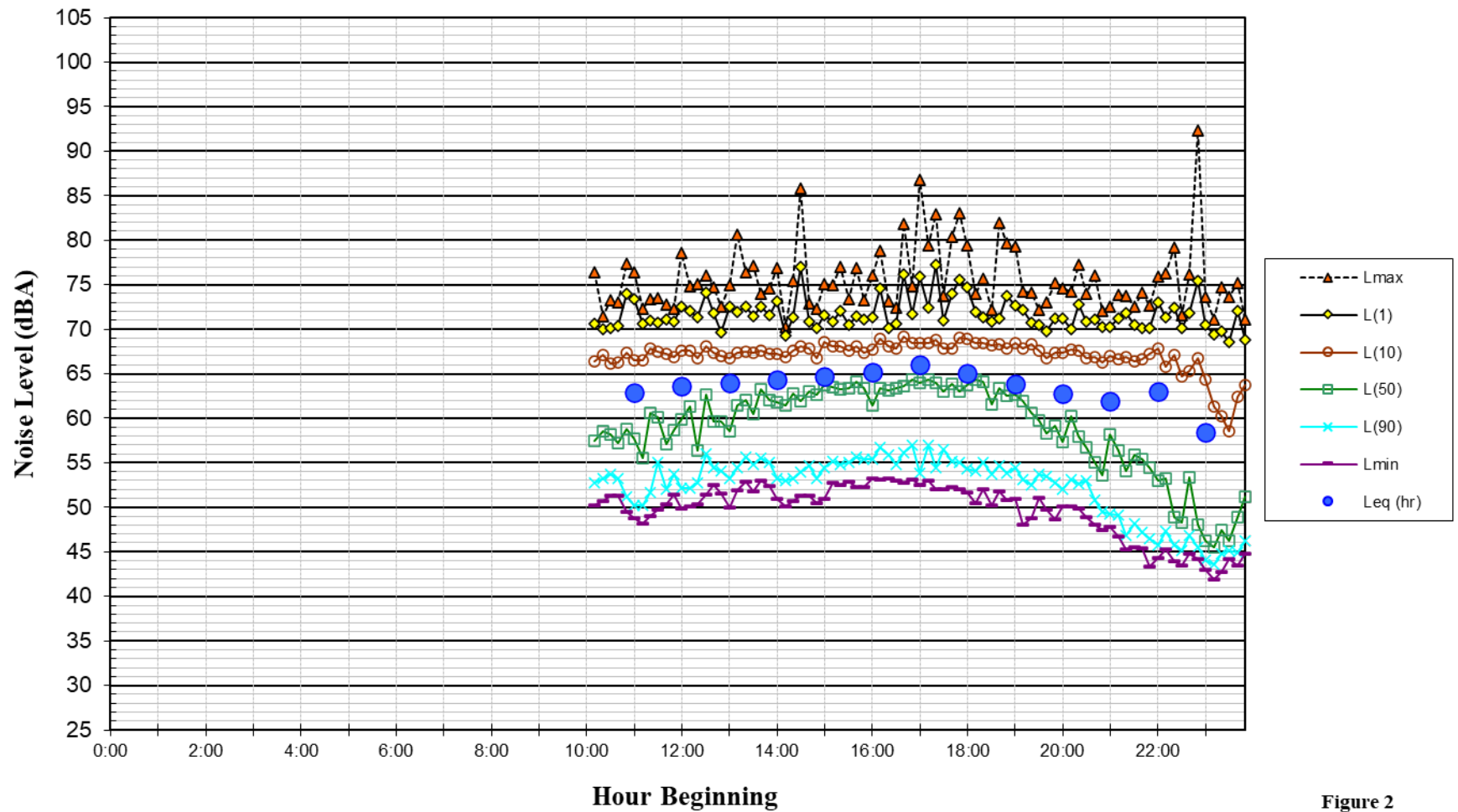


**Figure 2**

**Noise Levels at Noise Measurement Site LT-1  
~35 feet Northeast of Centerline of Ruus Road  
Thursday, April 20, 2023**

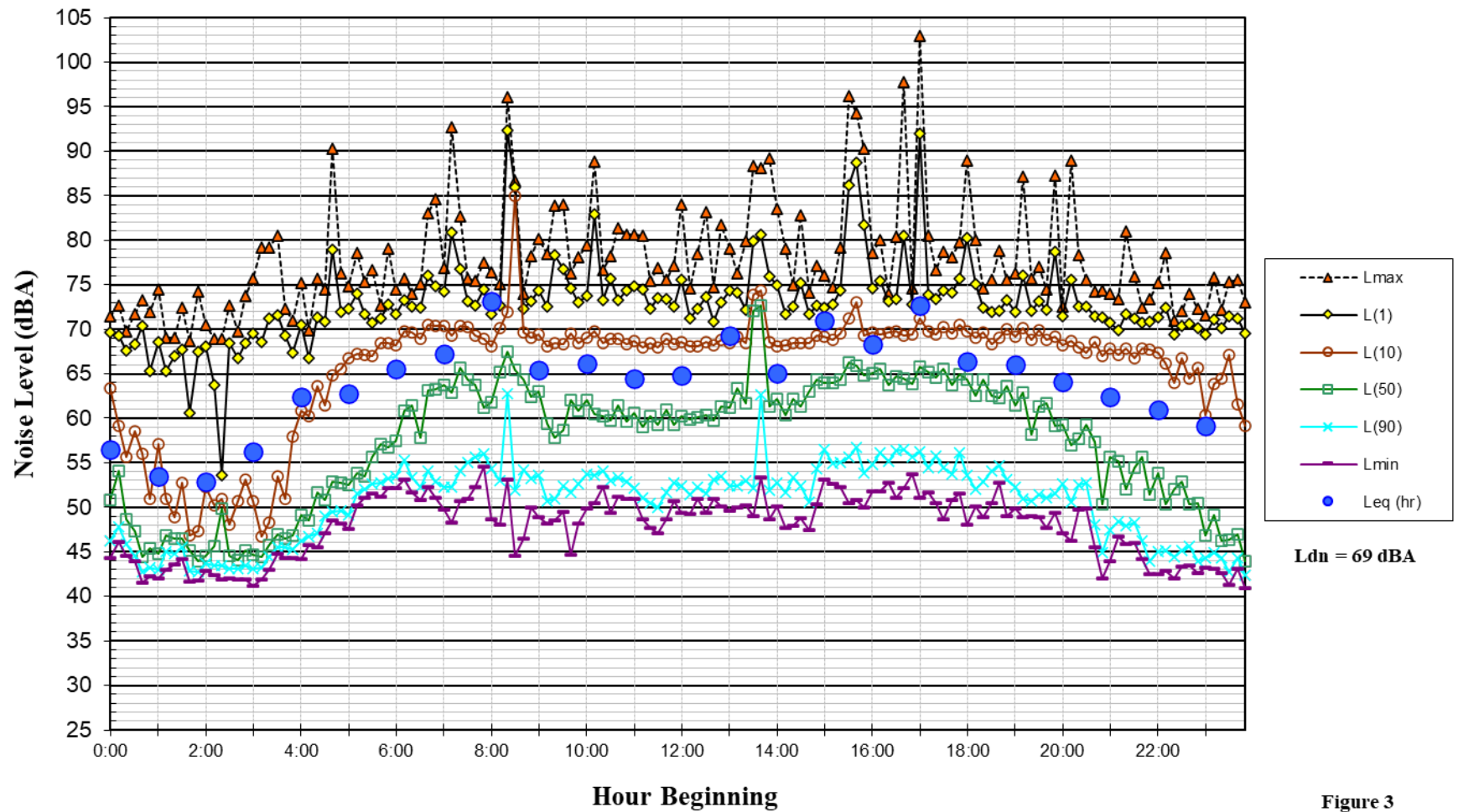


**Figure 3**

**Noise Levels at Noise Measurement Site LT-1  
~35 feet Northeast of Centerline of Ruus Road  
Friday, April 21, 2023**

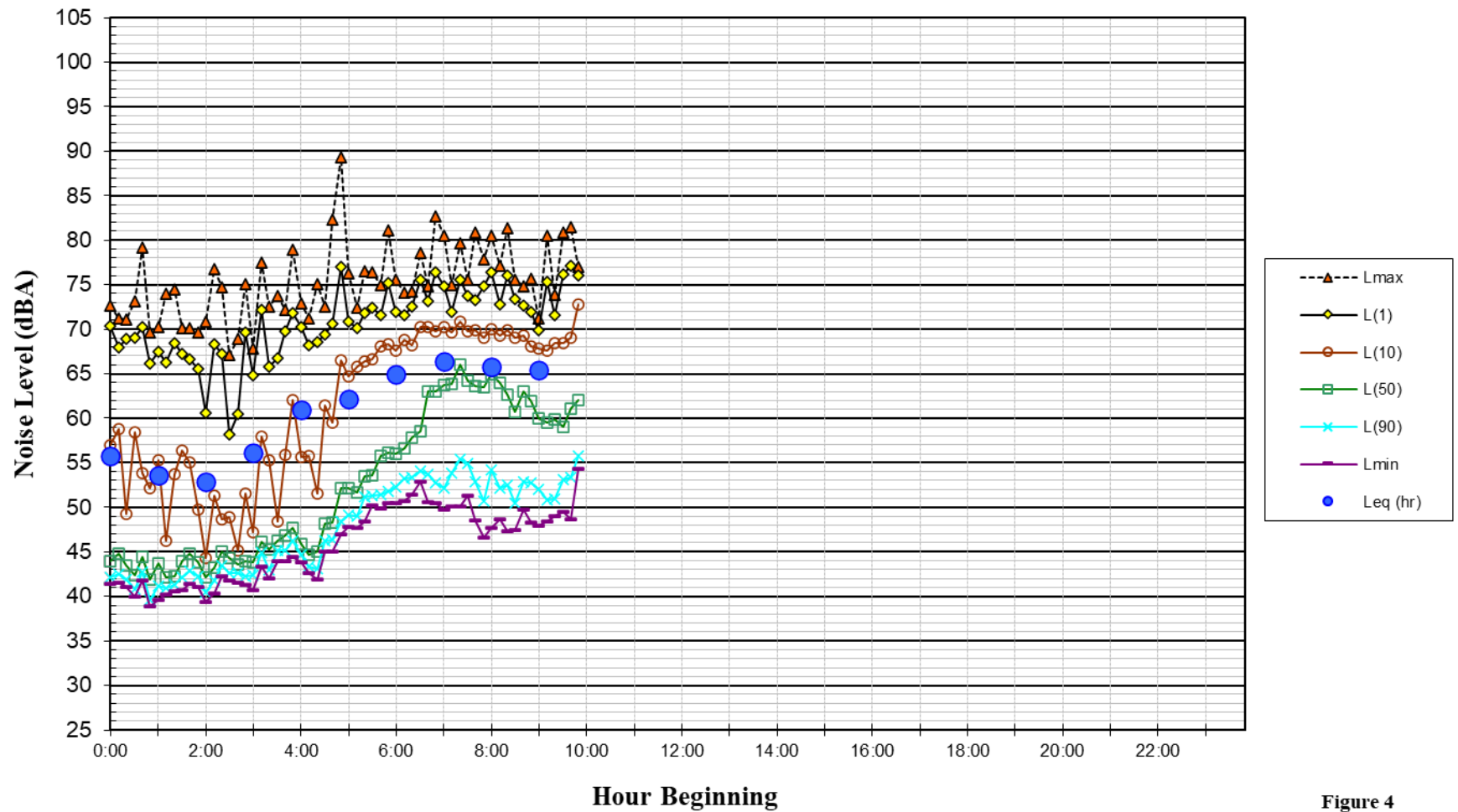


**Figure 4**

**Noise Levels at Noise Measurement Site LT-2  
South Terminus of Bowhill Road  
Wednesday, April 19, 2023**

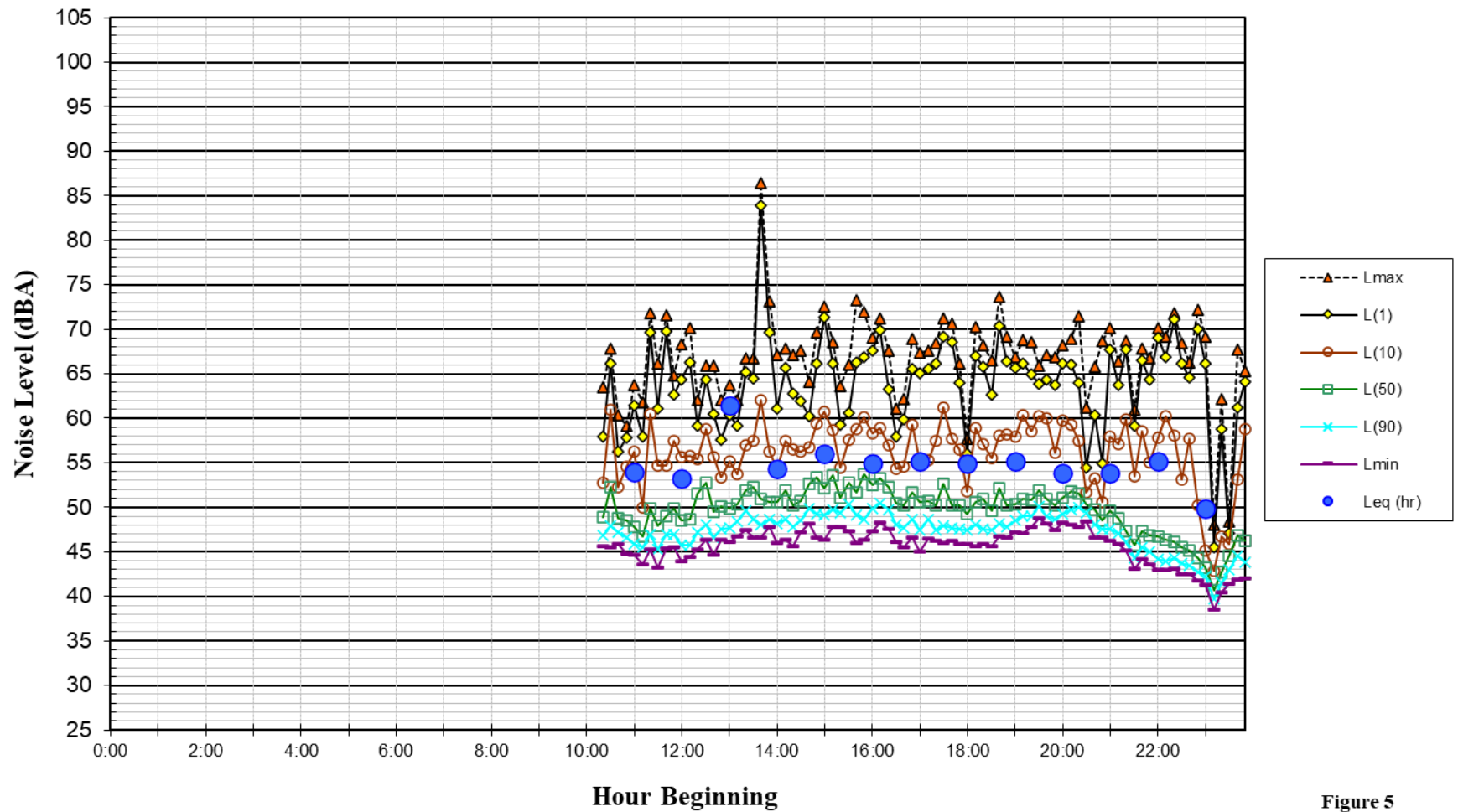


**Figure 5**

**Noise Levels at Noise Measurement Site LT-2  
South Terminus of Bowhill Road  
Thursday, April 20, 2023**

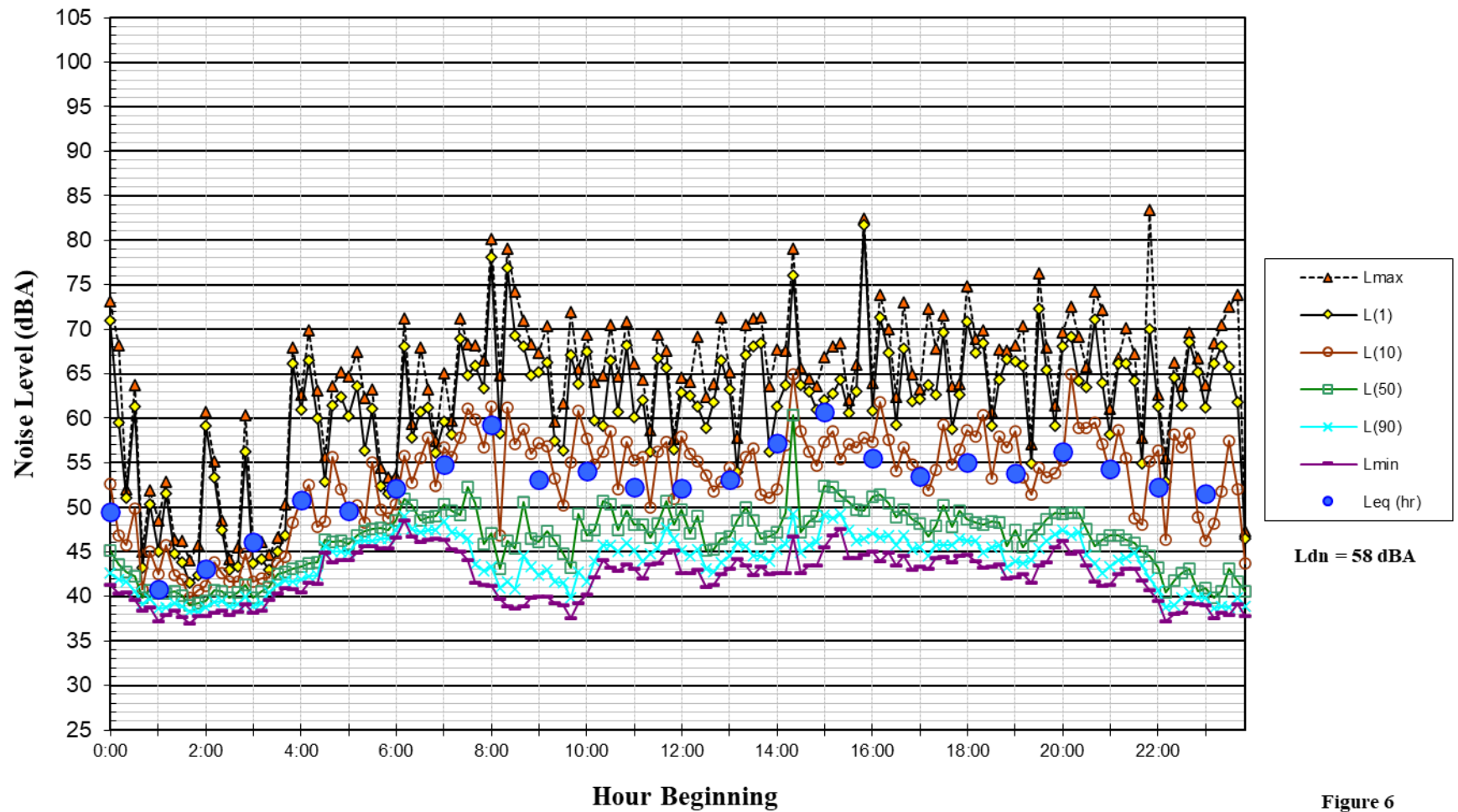


**Figure 6**

**Noise Levels at Noise Measurement Site LT-2  
South Terminus of Bowhill Road  
Friday, April 21, 2023**

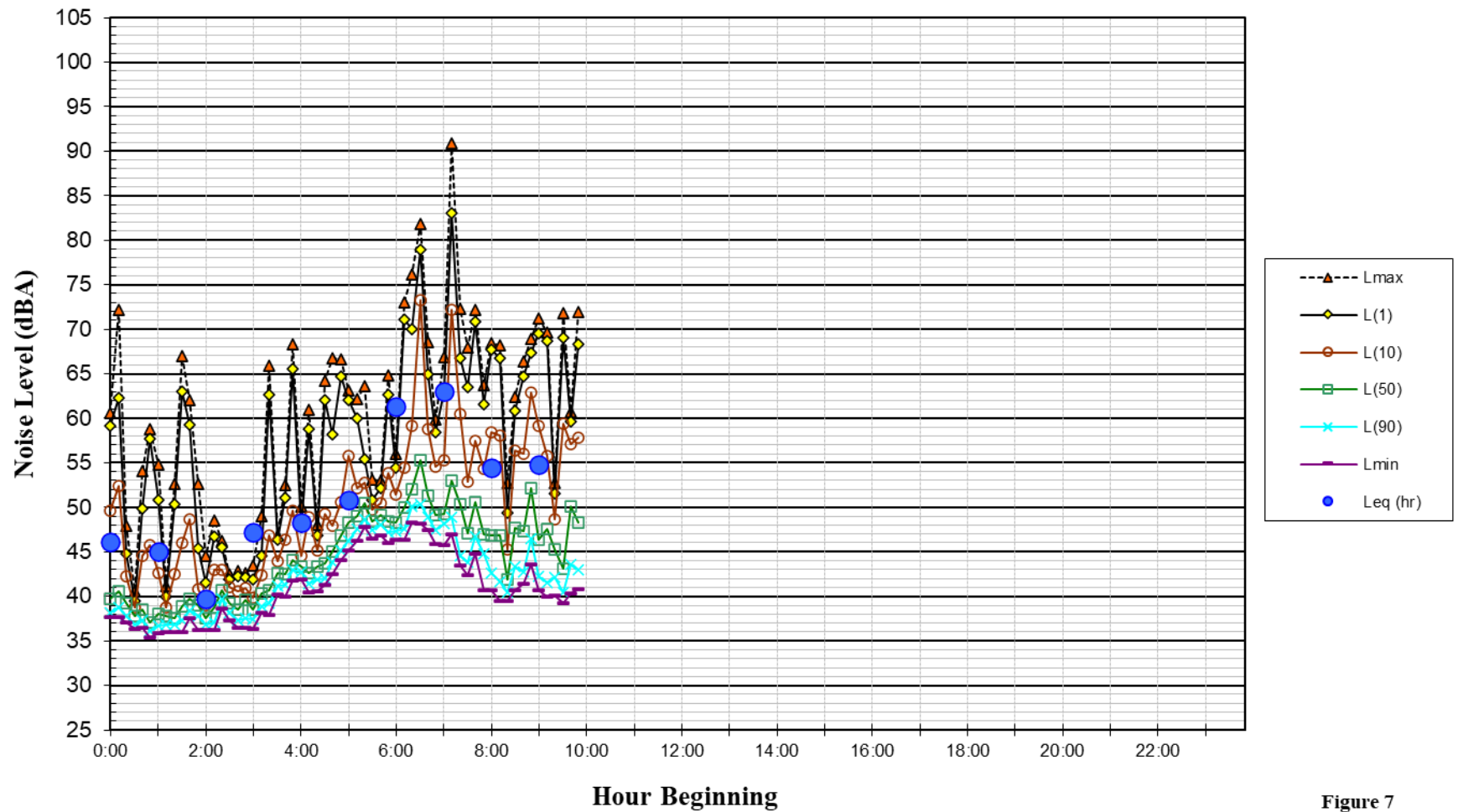


**Figure 7**

## NOISE IMPACTS AND MITIGATION MEASURES

This section presents the significance criteria used to evaluate project impacts under CEQA, provides a discussion of each project impact, and presents mitigation measures, where necessary, to reduce project impacts to less-than-significant levels.

### Significance Criteria

The following criteria were used to evaluate the significance of environmental noise resulting from the project:

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

**Impact 1a: Temporary Construction Noise.** Existing noise-sensitive land uses would be exposed to a temporary increase in ambient noise levels in excess of standards established in the local general plan or noise ordinance due to project construction activities. **This is a significant impact.**

Construction of the project would be completed in one phase over a period of less than 12 months. During this time, construction activities would occur between 7:00 AM and 7:00 PM Monday through Friday. During project construction, the existing buildings, pavement, landscaping, and improvements onsite would be removed. The existing driveway would be retained during project construction to provide access to the site.

To prepare the site for project construction, existing fill onsite would be removed, requiring excavation to a depth of approximately six feet below ground surface (bgs). Once existing fill is removed, approximately 0.5 to 4.5 feet of fill would be laid where the proposed building would be located to elevate the site to the base flood elevation of 13 feet above mean sea level (amsl). The soil would then be scarified to a depth of approximately eight inches for the proposed building foundation. The project would require excavation to a maximum depth of three feet bgs for the parking lot, four feet bgs for the bioretention areas, and 20 feet bgs for relocation of the existing sanitary sewer line. During construction of the proposed project, approximately 14,987 cubic yards of soil would be exported and 15,700 cubic yards of soil would be imported to the site. No pile driving is proposed to be used during construction.

Noise impacts resulting from construction depend upon the noise generated by various pieces of construction equipment, the timing and duration of noise-generating activities, and the distance between construction noise sources and noise-sensitive areas. Construction noise impacts

primarily result when construction activities occur during noise-sensitive times of the day (e.g., early morning, evening, or nighttime hours), the construction occurs in areas immediately adjoining noise-sensitive land uses, or when construction lasts over extended periods of time.

Policy HAZ-8.21 of the City's General Plan and Section 4-1.03.4 of the City's Municipal Code limits construction operations to between 7:00 a.m. and 7:00 p.m. Monday through Saturday and between 10:00 a.m. and 6:00 p.m. on Sundays and holidays unless otherwise provided pursuant to a duly issued permit or condition of approval of a land use entitlement. Assuming construction would be limited to these allowable hours, noise levels produced by individual devices or piece of construction equipment shall not exceed 83 dBA at a distance of 25 feet from the equipment or from the housing in which the equipment is located. Noise levels shall not exceed 86 dBA at any point outside the property plane.

Construction activities generate considerable amounts of noise, especially during earth-moving activities when heavy equipment is used. Construction activities for individual projects are typically carried out in phases. During each phase of construction, there would be a different mix of equipment operating, and noise levels would vary by phase and vary within phases, based on the amount of equipment in operation and the location at which the equipment is operating. The typical range of maximum instantaneous noise levels for the proposed project would be 70 to 90 dBA  $L_{max}$  at a distance of 50 feet (see Table 5) from the equipment.

Table 6 shows the hourly average noise level ranges, by construction phase, typical for various types of projects. Hourly average noise levels generated by construction are about 71 to 89 dBA  $L_{eq}$  for industrial developments, measured at a distance of 50 feet from the center of a busy construction site. Construction-generated noise levels drop off at a rate of about 6 dBA per doubling of the distance between the source and receptor. Shielding by buildings or terrain often result in lower construction noise levels at distant receptors.

A detailed list of equipment expected to be used during each phase of project construction was provided for this analysis and is summarized in Table 7. Federal Highway Administration's (FHWA's) Roadway Construction Noise Model (RCNM) was used to calculate the hourly average noise levels for each phase of construction, assuming every piece of equipment would operate simultaneously, which would represent the worst-case scenario. This construction noise model includes representative sound levels for the most common types of construction equipment and the approximate usage factors of such equipment that were developed based on an extensive database of information gathered during the construction of the Central Artery/Tunnel Project in Boston, Massachusetts (CA/T Project or "Big Dig"). The usage factors represent the percentage of time that the equipment would be operating at full power.

**TABLE 5 Construction Equipment 50-Foot Noise Emission Limits**

| <b>Equipment Category</b>                         | <b>L<sub>max</sub> Level (dBA)<sup>1,2</sup></b> | <b>Impact/Continuous</b> |
|---------------------------------------------------|--------------------------------------------------|--------------------------|
| Arc Welder                                        | 73                                               | Continuous               |
| Auger Drill Rig                                   | 85                                               | Continuous               |
| Backhoe                                           | 80                                               | Continuous               |
| Bar Bender                                        | 80                                               | Continuous               |
| Boring Jack Power Unit                            | 80                                               | Continuous               |
| Chain Saw                                         | 85                                               | Continuous               |
| Compressor <sup>3</sup>                           | 70                                               | Continuous               |
| Compressor (other)                                | 80                                               | Continuous               |
| Concrete Mixer                                    | 85                                               | Continuous               |
| Concrete Pump                                     | 82                                               | Continuous               |
| Concrete Saw                                      | 90                                               | Continuous               |
| Concrete Vibrator                                 | 80                                               | Continuous               |
| Crane                                             | 85                                               | Continuous               |
| Dozer                                             | 85                                               | Continuous               |
| Excavator                                         | 85                                               | Continuous               |
| Front End Loader                                  | 80                                               | Continuous               |
| Generator                                         | 82                                               | Continuous               |
| Generator (25 KVA or less)                        | 70                                               | Continuous               |
| Gradall                                           | 85                                               | Continuous               |
| Grader                                            | 85                                               | Continuous               |
| Grinder Saw                                       | 85                                               | Continuous               |
| Horizontal Boring Hydro Jack                      | 80                                               | Continuous               |
| Hydra Break Ram                                   | 90                                               | Impact                   |
| Impact Pile Driver                                | 105                                              | Impact                   |
| Insitu Soil Sampling Rig                          | 84                                               | Continuous               |
| Jackhammer                                        | 85                                               | Impact                   |
| Mounted Impact Hammer (hoe ram)                   | 90                                               | Impact                   |
| Paver                                             | 85                                               | Continuous               |
| Pneumatic Tools                                   | 85                                               | Continuous               |
| Pumps                                             | 77                                               | Continuous               |
| Rock Drill                                        | 85                                               | Continuous               |
| Scraper                                           | 85                                               | Continuous               |
| Slurry Trenching Machine                          | 82                                               | Continuous               |
| Soil Mix Drill Rig                                | 80                                               | Continuous               |
| Street Sweeper                                    | 80                                               | Continuous               |
| Tractor                                           | 84                                               | Continuous               |
| Truck (dump, delivery)                            | 84                                               | Continuous               |
| Vacuum Excavator Truck (vac-truck)                | 85                                               | Continuous               |
| Vibratory Compactor                               | 80                                               | Continuous               |
| Vibratory Pile Driver                             | 95                                               | Continuous               |
| All other equipment with engines larger than 5 HP | 85                                               | Continuous               |

Notes:

<sup>1</sup> Measured at 50 feet from the construction equipment, with a “slow” (1 sec.) time constant.<sup>2</sup> Noise limits apply to total noise emitted from equipment and associated components operating at full power while engaged in its intended operation.<sup>3</sup> Portable Air Compressor rated at 75 cfm or greater and that operates at greater than 50 psi.

**TABLE 6 Typical Ranges of Construction Noise Levels at 50 Feet,  $L_{eq}$  (dBA)**

|                                                  | Domestic Housing |    | Office Building, Hotel, Hospital, School, Public Works |    | Industrial Parking Garage, Religious Amusement & Recreations, Store, Service Station |    | Public Works Roads & Highways, Sewers, and Trenches |    |
|--------------------------------------------------|------------------|----|--------------------------------------------------------|----|--------------------------------------------------------------------------------------|----|-----------------------------------------------------|----|
|                                                  | I                | II | I                                                      | II | I                                                                                    | II | I                                                   | II |
| Ground Clearing                                  | 83               | 83 | 84                                                     | 84 | 84                                                                                   | 83 | 84                                                  | 84 |
| Excavation                                       | 88               | 75 | 89                                                     | 79 | 89                                                                                   | 71 | 88                                                  | 78 |
| Foundations                                      | 81               | 81 | 78                                                     | 78 | 77                                                                                   | 77 | 88                                                  | 88 |
| Erection                                         | 81               | 65 | 87                                                     | 75 | 84                                                                                   | 72 | 79                                                  | 78 |
| Finishing                                        | 88               | 72 | 89                                                     | 75 | 89                                                                                   | 74 | 84                                                  | 84 |
| I - All pertinent equipment present at site.     |                  |    |                                                        |    |                                                                                      |    |                                                     |    |
| II - Minimum required equipment present at site. |                  |    |                                                        |    |                                                                                      |    |                                                     |    |

Source: U.S.E.P.A., Legal Compilation on Noise, Vol. 1, p. 2-104, 1973.

**TABLE 7 Calculated Construction Noise Levels**

| Phase of Construction                     | Start Date/End Date | Construction Equipment (Quantity)                                                   | Construction Equipment Noise Level at 25 feet (dBA) |                                 | Setback to Meet 86 dBA Limit at Property Plane (feet) |
|-------------------------------------------|---------------------|-------------------------------------------------------------------------------------|-----------------------------------------------------|---------------------------------|-------------------------------------------------------|
|                                           |                     |                                                                                     | Individual Equipment ( $L_{max}$ )                  | Construction Phase ( $L_{eq}$ ) |                                                       |
| Demolition                                | 5/1/2025-7/1/2025   | Concrete/Industrial Saw (1)<br>Excavator (2)<br>Rubber-Tired Dozer (2)              | 96<br>87<br>88                                      | 92                              | 50                                                    |
| Grading/Excavation                        | 7/2/2025-8/1/2025   | Excavator (1)<br>Grader (1)<br>Rubber-Tired Dozer (1)<br>Tractor/Loader/Backhoe (2) | 87<br>91<br>88<br>85-90                             | 92                              | 50                                                    |
| Trenching/Foundation                      | 8/2/2025-8/23/2025  | Tractor/Loader/Backhoe (1)                                                          | 90                                                  | 86                              | None                                                  |
| Building – Exterior                       | 8/26/2025-12/1/2025 | Crane (1)<br>Forklift (2)<br>Tractor/Loader/Backhoe (3)<br>Welder (1)               | 87<br>81<br>84-90<br>80                             | 89                              | 35                                                    |
| Building – Interior/Architectural Coating | 12/2/2025-3/1/2026  | Air Compressor (1)                                                                  | 84                                                  | 80                              | None                                                  |
| Paving                                    | 3/2/2026-4/1/2026   | Paver (2)<br>Paving Equipment (2)<br>Roller (2)                                     | 83<br>83-86<br>86                                   | 88                              | 30                                                    |

As shown in Table 7, individual pieces of construction equipment having the potential to exceed the City's 83 dBA noise limit include concrete/industrial saws, excavators, dozers, graders, tractors, loaders, and backhoes, cranes, air compressors, paving equipment, and rollers. The 86 dBA noise limit would be exceeded at the residential property plane to the west during demolition, grading, and excavation (only when activities within 50 feet of the property plane), and paving (only when activities within 30 feet of the property plane) when visible from the second story windows of nearby residences. Neither the building exterior phase or the building interior phase would produce noise levels exceeding the 86 dBA noise limit as the exterior façade of the building is proposed approximately 55 feet from the property plane. Since individual pieces of equipment would potentially exceed the City's 83 dBA limit at a distance of 25 feet, and the City's 86 dBA limit at the property plane, the temporary construction noise impact would be considered significant.

#### **Mitigation Measure 1a:**

Construction activities shall be conducted in accordance with the provisions of the City's General Plan and the Municipal Code, which limits temporary construction work to between the hours of 7:00 a.m. and 7:00 p.m. Monday through Saturday and between 10:00 a.m. to 6:00 p.m. on Sundays and holidays. Further, the City shall require the construction contractor to adhere to the following construction noise control practices to reduce construction noise levels emanating from the site and minimize disruption and annoyance at existing noise-sensitive receptors in the project vicinity.

- The construction contractor shall develop a construction noise control plan, including, but not limited to, the following available construction noise controls:
  - Selection of quieter concrete/industrial saws, excavators, dozers, graders, tractors, loaders, and backhoes, cranes, air compressors, paving equipment, and rollers. No individual device or piece of equipment shall produce a noise level exceeding eighty-three (83) dBA at a distance of twenty-five (25) feet from the source.
  - Equipment and trucks used for construction shall use the best available noise control techniques (e.g., improved mufflers, equipment redesign, use of intake silencers, ducts, engine enclosures, and acoustically attenuating shields or shrouds);
  - Impact tools (e.g., jackhammers, pavement breakers, and rock drills) used for construction shall be hydraulically or electrically powered wherever possible to avoid noise associated with compressed air exhaust from pneumatically powered tools;
  - Stationary noise sources shall be located as far from adjacent receptors as possible, and they shall be muffled and enclosed within temporary sheds, incorporate insulation barriers, or include other measures.
  - Construct a 12-foot temporary noise barrier to screen second story windows of Welford Circle residences from noise-generating equipment or activities along the westernmost site boundary. A 12-foot temporary noise barrier would provide a 5 dBA noise reduction at second story windows if the noise barrier interrupts the line-of-sight between the noise source and receptor. The 12-foot temporary noise barrier would provide 9-12 dBA of noise

reduction at fully shielded ground level private outdoor activity areas of Welford Circle residences.

- Unnecessary idling of internal combustion engines should be strictly prohibited.
- Construction staging areas shall be established at locations that will create the greatest distance between the construction-related noise sources and noise-sensitive receptors nearest the project site during all project construction. Locate material stockpiles, as well as maintenance/equipment staging and parking areas, as far as feasible from residential receptors.
- Control noise from construction workers' radios to a point where they are not audible at existing residences bordering the project site.
- Where feasible, temporary power service from local utility companies should be used instead of portable generators.
- Locate cranes as far from adjoining noise-sensitive receptors as possible.
- Substitute nail guns for manual hammering, where feasible.
- Avoid the use of saws near the adjoining noise-sensitive receptors. Where feasible, shield saws with a solid screen with material having a minimum surface density of 2 lbs/ft<sup>2</sup> (e.g., such as 3/4" plywood).
- Trucks shall access the construction site from Industrial Parkway West. Construction trucks shall avoid Ruus Road and local residential neighborhoods.
- Maintain smooth vehicle pathways for trucks and equipment accessing the site and avoid local residential neighborhoods as much as possible.
- The contractor shall prepare a detailed construction schedule for major noise-generating construction activities and this schedule shall be shared with residents along the westernmost site boundary.
- Designate a "disturbance coordinator" who would be responsible for responding to any complaints about construction noise. The disturbance coordinator will determine the cause of the noise complaint (e.g., bad muffler, etc.) and will require that reasonable measures be implemented to correct the problem. Conspicuously post a telephone number for the disturbance coordinator at the construction site and include in it the notice sent to neighbors regarding the construction schedule.

The implementation of the reasonable and feasible controls outlined above would reduce construction noise levels emanating from the site, minimizing disruption and annoyance. With the implementation of these controls, as well as the General Plan and Municipal Code limits on allowable construction hours, and considering that construction is temporary, the impact would be reduced to a less-than-significant level.

**Impact 1b: Permanent Noise Level Increase/Exceed Applicable Standards.** The proposed project would result in a substantial permanent noise level increase at Welford Circle residential uses located west of the site. The proposed project would also produce noise levels exceeding the City’s Municipal Code at Welford Circle and Sandburg Way residential uses. **This is a significant impact.**

A significant permanent noise increase would occur if the project would increase noise levels at noise-sensitive receptors by 3 dBA  $L_{dn}$  or more where ambient noise levels exceed the “normally acceptable” noise level standard. Where ambient noise levels are at or below the “normally acceptable” noise level standard, noise level increases of 5 dBA  $L_{dn}$  or more would be considered significant. The City’s General Plan defines the “normally acceptable” outdoor noise level standard for the nearby residential land uses to be 60 dBA  $L_{dn}$ .

Further, a significant permanent noise increase would occur if the project would produce a noise level at any point outside of the property plane that exceeds seventy (70) dBA between the hours of 7:00 a.m. and 9:00 p.m. or sixty (60) dBA between the hours of 9:00 p.m. and 7:00 a.m.

#### *Offsite Traffic Noise Increase*

The project site would be accessed via three full-access driveways, including one on Ruus Road and two on Industrial Parkway West, with passenger vehicles primarily using the western exit on Industrial Parkway West and future trucks using the driveway on Ruus Road or the eastern driveway on Industrial Parkway West. The project traffic study estimates that there would be 396 daily passenger vehicle trips and 233 daily truck trips generated from operating the proposed project.<sup>1</sup> Due to the access limitations for passenger vehicles and based on the trip distribution pattern included in the transportation analysis for the proposed project, it is assumed that passenger vehicles would primarily travel on Industrial Parkway West. Industrial Parkway West has approximately 19,366 daily trips.<sup>2</sup> Project-generated passenger vehicle trips represent a 2 percent increase compared to existing conditions on Industrial Parkway West. Therefore, the proposed project would result in a less than 1 dBA increase in noise levels on Industrial Parkway West.<sup>3</sup> This noise level increase would not be perceptible. Furthermore, for the purposes of providing a credible worst-case assessment of project-generated traffic noise, this analysis assumed that all truck traffic associated with the project would access the site via the Ruus Road driveway and that approximately 10 truck trips would occur per hour along Ruus Road over a 24-hour period. The assumed truck mix was 15% 2-axel trucks (or 36 medium duty trucks) and 85% 3+ axel trucks (or 204 heavy-duty trucks).

The Federal Highways Administration’s Traffic Noise Model (FHWA TNM) was used to calculate traffic noise levels expected at 35 feet from the centerline of Ruus Road assuming the truck trips and truck mix detailed above. The predicted noise level from the hourly truck trips would be 56

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1 Hexagon Transportation Consultants. 2023. *Memorandum: Assumptions Memorandum for LTA for the Proposed CenterPoint Warehouse Development in Hayward, California (Planning Application #202206056)*. March 3.

2 Ollie Zhou, Vice President & Principal Associate, Hexagon Transportation Consultants. Personal Communications with Carolyn Mogollon. May 23, 2023.

3 A doubling of traffic volumes along a roadway would result in a three decibel increase in traffic noise levels.

dBA  $L_{eq}$ . Assuming that this worst-case traffic noise level resulting from the project were to persist 24 hours per day, the calculated day-night average noise level would be 63 dBA  $L_{dn}$ .

To calculate the actual noise increase expected with the project, one must consider the increase in truck trips as well as the ambient noise levels in the area. Based on the ambient noise measurements made at LT-1, which was positioned approximately 35 feet from the centerline of Ruus Road, the existing day-night average noise level is 69 dBA  $L_{dn}$ . Adding the project  $L_{dn}$  (63 dBA) to the existing  $L_{dn}$  (69 dBA) would yield an existing plus project noise level of 70 dBA  $L_{dn}$ <sup>4</sup>. The existing plus project traffic noise level would be 1 dBA  $L_{dn}$  higher than existing conditions, therefore, the increased truck traffic along Ruus Road would not result in a substantial permanent increase in noise levels (i.e., 3 dBA  $L_{dn}$  or more at noise-sensitive receptors in the project vicinity). This is a less-than-significant impact.

### *Onsite Operational Noise Increase*

Onsite noise sources would primarily include truck circulation and maneuvering activities, loading dock activities, parking lot activities, and roof-top mechanical equipment.

Truck-related noise would be produced during maneuvering activities occurring at trailer parking spaces at the northern end of the site, the loading docks, and from truck circulation activities occurring between the Ruus Road and Industrial Parkway West driveways located along the east boundary of the site. Truck noise results from a combination of sounds produced by the engine, exhaust, and tires, as well as the intermittent sounds of back-up alarms and releases of compressed air associated with truck/trailer air brakes. Heavy trucks typically generate maximum instantaneous noise levels of 70 to 75 dBA  $L_{max}$  at a distance of 50 feet. The noise level of backup alarms can vary depending on the type and directivity of the sound, but maximum noise levels are typically in the range of 65 to 75 dBA  $L_{max}$  at a distance of 50 feet. Under worst-case conditions, maximum noise levels produced by these activities could exceed the City's 70 dBA daytime noise standard (between the hours of 7:00 a.m. and 9:00 p.m.) within 90 feet of residential properties or the 60 dBA nighttime noise standard (between the hours of 9:00 p.m. and 7:00 a.m.) within 280 feet of residential properties.

Surface parking lots for passenger vehicles would be located north of the warehouse building (west of the loading docks), along the western boundary of the site adjacent to Welford Circle and Bowhill Road residences, and south of the warehouse building adjacent to Industrial Parkway West. Noise sources associated with the use of the parking lots would include vehicular circulation, loud engines, door slams, and human voices. The maximum noise levels of a passing car at 15 mph typically range from 50 to 60 dBA  $L_{max}$  at a distance of 50 feet. The noise generated during an engine start is similar. Door slams cause slightly lower noise levels. Under worst-case conditions, maximum noise levels produced by these activities could exceed the City's 70 dBA daytime noise standard within 15 feet of residential properties or the 60 dBA nighttime noise standard within 50 feet of residential properties.

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<sup>4</sup> To approximate the combined sound level when two sounds differ by 4 to 9 dB, 1 dB is added to the higher sound level. Examples: 63 dB+69 dB=70 dB, 66 dB+60 dB=67 dB.

Mechanical equipment for heating, ventilation, or air conditioning (HVAC) will not be installed as part of the project, however, future tenants would be able to install HVAC equipment as a tenant improvement for the office space. The specifications and locations of HVAC are unknown at this time, but the likely location for HVAC units would be above the office space on the roof of the building. Typical noise levels from such HVAC equipment would produce noise levels ranging from 50 to 60 dBA at a distance of 50 feet. Under worst-case conditions, maximum noise levels produced by these equipment could exceed the City's 70 dBA daytime noise standard within 15 feet of residential properties or the 60 dBA nighttime noise standard within 50 feet of residential properties.

To account for the time varying characteristics of operational noise attributable to the project, reference noise data from a similar, recent study<sup>5</sup> were reviewed and confirmed. From these data, average noise levels due to loading dock activities are anticipated to reach 66 dBA  $L_{eq}$  at 50 feet, and average noise levels resulting from truck circulation and maneuvering activities are anticipated to range from 58 to 60 dBA  $L_{eq}$  at 50 feet. Parking lot activities are expected to produce noise levels of 56 dBA  $L_{eq}$  at 50 feet. Similarly, noise levels produced by mechanical equipment are expected to reach 57 dBA  $L_{eq}$  at 50 feet.

Table 8 summarizes the results of the calculations made to estimate operational noise levels due to onsite activities at residential receptors nearest the site. Average noise levels were calculated based on adjustments made to the reference noise data to account for varying distances between the noise source and receptor. The  $L_{dn}$  noise level assumes consistent 24-hour operations at the site.  $L_{dn}$  noise level increases account for offsite and onsite noise sources as added to ambient noise levels measured during the noise monitoring survey.

**TABLE 8      Calculated Noise Levels at Receiving Land Uses**

| Receptor            | Noise Source and Distance from Center of Activity, feet | $L_{eq}$ , dBA | $L_{dn}$ , dBA | Noise Level Increase, dBA $L_{dn}$ |
|---------------------|---------------------------------------------------------|----------------|----------------|------------------------------------|
| R1 – Welford Circle | Parking Lot – 120 ft.                                   | 49             | 59             | 4                                  |
|                     | Loading Dock – 400 ft.                                  | 48             |                |                                    |
|                     | Trailer Parking – 500 ft.                               | 40             |                |                                    |
|                     | Truck Circulation – 540 ft.                             | 37             |                |                                    |
|                     | HVAC – 260 ft.                                          | 43             |                |                                    |
| R2 – Bowhill Road   | Parking Lot – 260 ft.                                   | 42             | 56             | 2                                  |
|                     | Loading Dock – 460 ft.                                  | 46             |                |                                    |
|                     | Trailer Parking – 450 ft.                               | 41             |                |                                    |
|                     | Truck Circulation – 570 ft.                             | 37             |                |                                    |
|                     | HVAC – 460 ft.                                          | 38             |                |                                    |
| R3 – Sandburg Way   | Parking Lot – 650 ft.                                   | 34             | 57             | 1                                  |
|                     | Loading Dock – 430 ft.                                  | 47             |                |                                    |
|                     | Trailer Parking – 300 ft.                               | 44             |                |                                    |
|                     | Truck Circulation – 190 ft.                             | 46             |                |                                    |
|                     | HVAC – 810 ft.                                          | 33             |                |                                    |

<sup>5</sup> Cottonwood & Edgemont Warehouses Noise and Vibration Analysis, Urban Crossroads, December 23, 2022.

Based on the results of the calculations, the proposed project would substantially increase ambient noise levels at Welford Circle residences located west of the site, which would result in a significant impact. Noise levels increases at Bowhill Road and Sandburg Way residences would be less than 3 dBA  $L_{dn}$ , and would be considered less-than-significant.

**Mitigation Measure 1b:**

- Construct a 10-foot noise barrier atop the west edge of the concrete ramp west of the loading dock area to shield loading dock activities from Welford Circle residences (See Figure 8). The noise barrier shall be solid over the face and at the base of the barrier and be constructed from materials having a minimum surface weight of 3 lbs./ft<sup>2</sup>.
- Construct an 8-foot noise barrier/gate at the northeast corner of the site to shield truck circulation activities from Sandburg Way residences (See Figure 9). The noise barrier shall be solid over the face and at the base of the barrier and be constructed from materials having a minimum surface weight of 3 lbs./ft<sup>2</sup>. Small openings necessary for proper operation of the gate shall not compromise the effectiveness of the barrier when closed.
- Trucks entering or exiting the warehouse between the hours of 9:00 p.m. and 7:00 a.m. shall only use the Industrial Parkway West driveway. The Ruus Road driveway shall be closed during nighttime hours.
- Parking shall be prohibited between the hours of 9:00 p.m. and 7:00 a.m. within 50 feet of Welford Circle residences.
- Mechanical equipment shall be selected and designed to reduce noise levels to meet City requirements at Welford Circle residences. A qualified acoustical consultant shall be retained to review mechanical noise levels as these systems are selected to determine the specific noise reduction measures necessary to comply with the City's noise level requirements. Noise reduction measures could include, but are not limited to, selection of equipment that emits low noise levels and installation of noise barriers, such as enclosures and parapet walls, to block the line-of-sight between the noise source and the nearest receptors. Other alternate measures may include locating equipment in less noise-sensitive areas, such as locations on the roof farthest from the adjacent neighbors, where feasible.

The implementation of the above measures would reduce the permanent noise level increase at Welford Circle residential uses located west of the site to less than 3 dBA  $L_{dn}$ . The implementation of the above measures would also reduce noise levels sufficiently to meet the City's Municipal Code (70 dBA daytime and 60 dBA nighttime) at Welford Circle and Sandburg Way residential uses. The implementation of mitigation would reduce the impact to a less-than-significant level.

**FIGURE 8 Proposed Noise Barrier Location to Shield Welford Circle Residences**

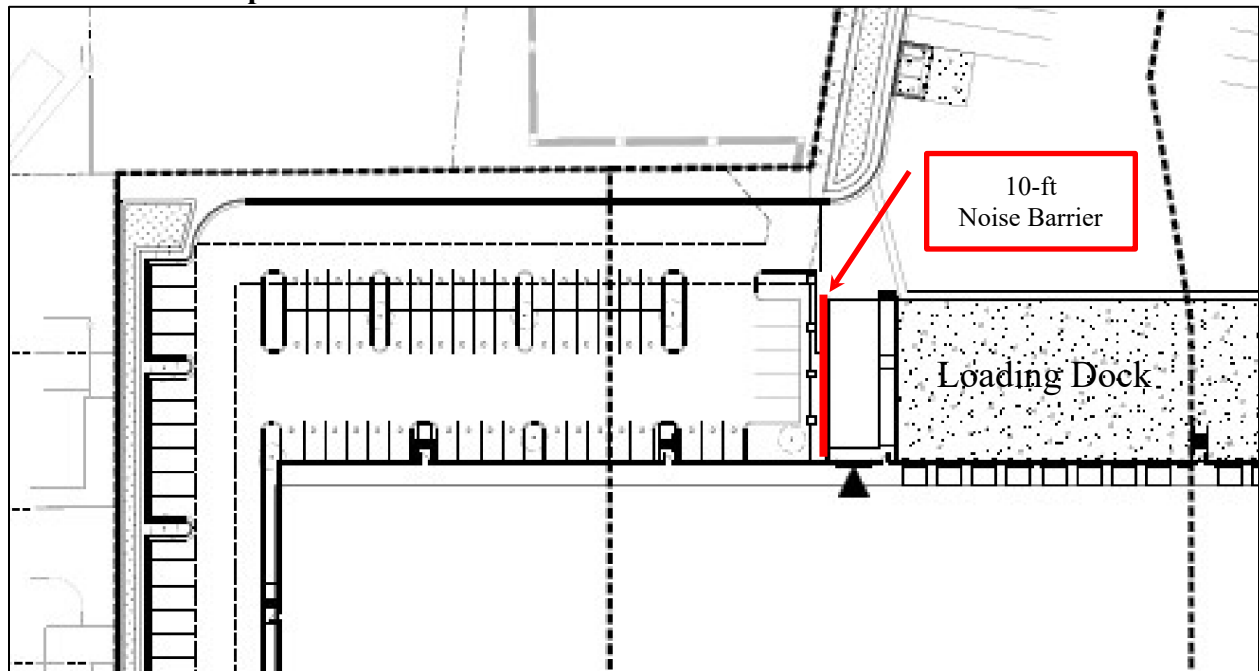
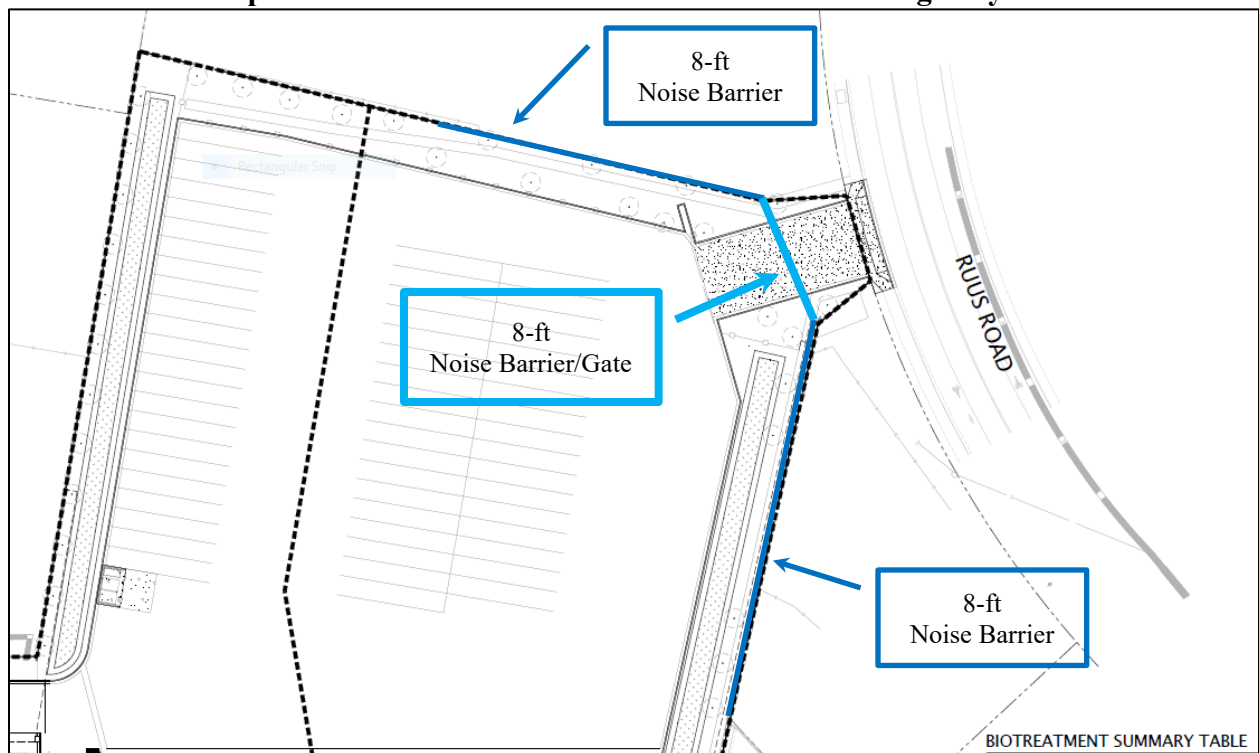


**FIGURE 9 Proposed Noise Barrier Locations to Shield Sandburg Way Residences**



**Impact 2: Exposure to Excessive Groundborne Vibration.** Construction-related vibration levels would not exceed applicable vibration thresholds at nearby sensitive land uses. **This is a less-than-significant impact.**

The construction of the project may generate perceptible vibration when heavy equipment or impact tools (e.g., jackhammers, hoe rams) are used in close proximity to sensitive receptors. Construction activities would include demolition, site preparation work, foundation work, and new building framing and finishing. Pile driving equipment, which can cause excessive vibration, is not expected to be required for the proposed project.

For structural damage, the California Department of Transportation recommends a vibration limit of 0.5 in/sec PPV for buildings structurally sound and designed to modern engineering standards, which typically consist of buildings constructed since the 1990s. This threshold would apply to the commercial and industrial buildings adjoining the site to the west and east, respectively.

A conservative vibration limit of 0.3 in/sec PPV has been used by Caltrans for buildings that are found to be structurally sound but where structural damage is a major concern, which would include older residences built with conventional materials. Vibration levels exceeding 0.3 in/sec PPV would be capable of cosmetically damaging adjacent residential buildings. Cosmetic damage (also known as threshold damage) is defined as hairline cracking in plaster, the opening of old cracks, the loosening of paint or the dislodging of loose objects. Minor damage is defined as hairline cracking in masonry or the loosening of plaster. Major structural damage is defined as wide cracking or the shifting of foundation or bearing walls. Therefore, groundborne vibration levels exceeding the conservative 0.3 in/sec PPV limit would have the potential to result in a significant vibration impact at existing residences adjoining the site to the west.

Table 9 presents typical vibration levels that could be expected from construction equipment at a distance of 25 feet. Project construction activities, such as drilling, the use of jackhammers, rock drills and other high-power or vibratory tools, and rolling stock equipment (tracked vehicles, compactors, etc.), may generate substantial vibration in the immediate vicinity. Jackhammers typically generate vibration levels of 0.035 in/sec PPV, and drilling typically generates vibration levels of 0.09 in/sec PPV at a distance of 25 feet.

Vibration levels would vary depending on soil conditions, construction methods, and equipment used. Table 9 also summarizes the distances to the 0.5 in/sec PPV and 0.3 in/sec PPV thresholds.

Vibration levels are highest close to the source and then attenuate with increasing distance at the rate  $\left(D_{ref}/D\right)^n$ , where  $D$  is the distance from the source in feet and  $D_{ref}$  is the reference distance of 25 feet. The value of “n” in the above equation is generally 1 to 1.5, and the typical value for n is 1.1 where there are hard soils such as dense compacted sand, dry consolidated clay, consolidated glacial till, or some exposed rock. The use of values greater than 1.1 would likely result in overestimation of amplitudes at distances closer than 25 feet and would be slightly conservative at distances beyond 25 feet. While construction noise levels increase based on the cumulative equipment in use simultaneously, construction vibration levels would be dependent on the location of individual pieces of equipment. That is, equipment scattered throughout the site would not

generate a collective vibration level, but a vibratory roller, for instance, operating near the project's site boundary would generate the worst-case vibration levels for the residential receptor sharing that property line.

**TABLE 9      Vibration Source Levels for Construction Equipment**

| Equipment               |         | PPV at 25 ft. (in/sec) | Minimum Distance to Meet 0.5 in/sec PPV (feet) | Minimum Distance to Meet 0.3 in/sec PPV (feet) |
|-------------------------|---------|------------------------|------------------------------------------------|------------------------------------------------|
| Clam shovel drop        |         | 0.202                  | 11                                             | 18                                             |
| Hydromill (slurry wall) | in soil | 0.008                  | <1                                             | 1                                              |
|                         | in rock | 0.017                  | 1                                              | 2                                              |
| Vibratory Roller        |         | 0.210                  | 11                                             | 19                                             |
| Hoe Ram                 |         | 0.089                  | 6                                              | 9                                              |
| Large bulldozer         |         | 0.089                  | 6                                              | 9                                              |
| Caisson drilling        |         | 0.089                  | 6                                              | 9                                              |
| Loaded trucks           |         | 0.076                  | 5                                              | 8                                              |
| Jackhammer              |         | 0.035                  | 3                                              | 4                                              |
| Small bulldozer         |         | 0.003                  | <1                                             | <1                                             |

Source: Transit Noise and Vibration Impact Assessment Manual, Federal Transit Administration, Office of Planning and Environment, U.S. Department of Transportation, September 2018, as modified by Illingworth & Rodkin, Inc., June 2023.

The nearest industrial buildings to the east are a minimum of 15 feet from the site boundary, and at this distance, worst-case vibration levels could reach 0.368 in/sec PPV. The nearest commercial buildings to the west are a minimum of 50 feet from the site boundary, and at this distance, worst-case vibration levels could reach 0.098 in/sec PPV. Vibration levels would not exceed the 0.5 in/sec PPV significance threshold at the nearest buildings to the east or west.

The nearest residential buildings to the west are approximately 30 feet from the site boundary, and at this distance, worst-case vibration levels could reach 0.172 in/sec PPV. Similarly, vibration levels would not exceed the 0.3 in/sec PPV significance threshold at the nearest residential buildings. This would be considered a less-than-significant impact.

**Mitigation Measure 2:      None required.**

**Impact 3:      Excessive Aircraft Noise.** The proposed project would be located in a compatible noise environment with respect to noise generated by Hayward Executive Airport and Oakland International Airport. **This is a less-than-significant impact.**

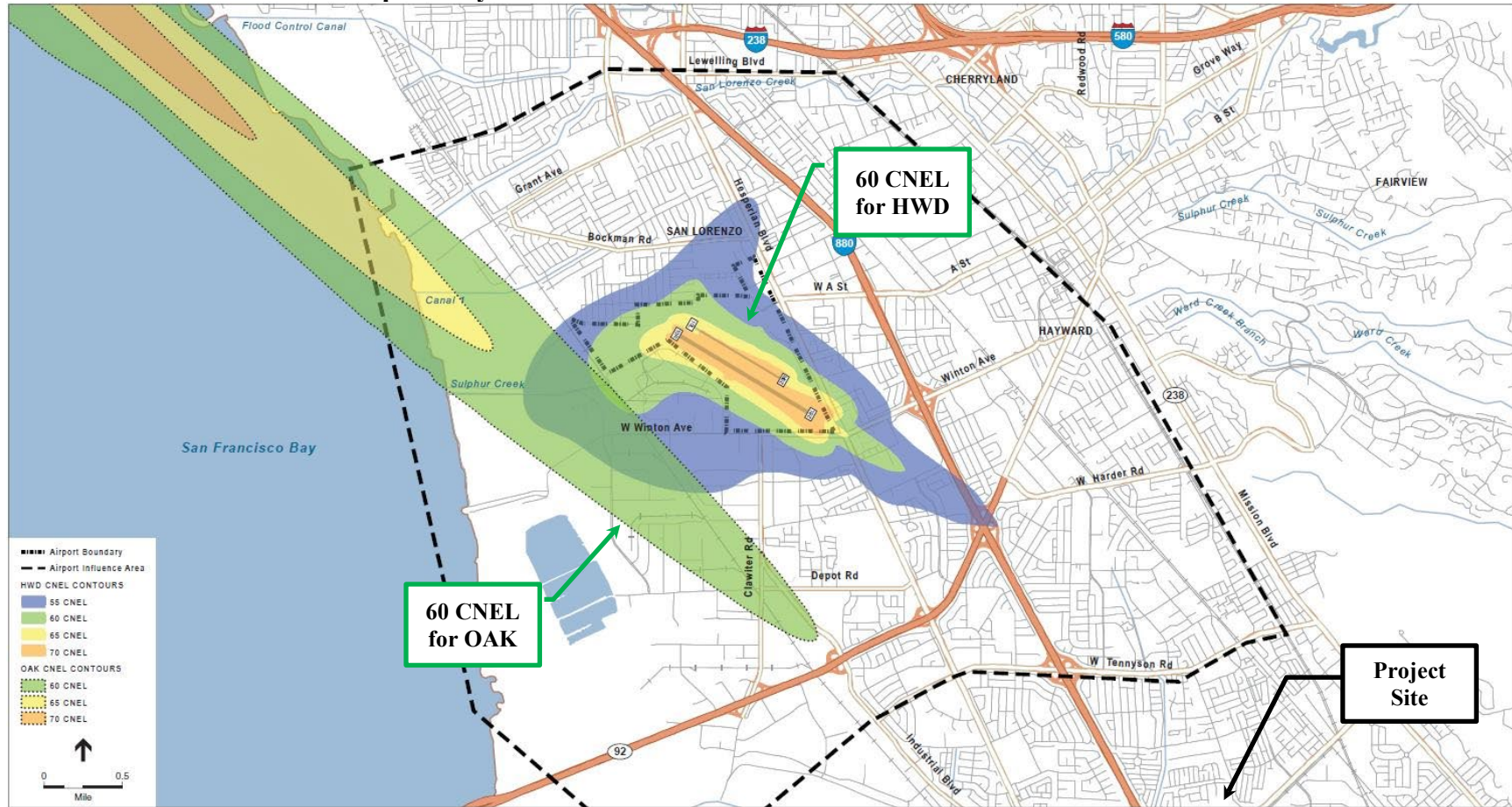
Hayward Executive Airport is a city-owned, public-use airport located approximately 3.5 miles northwest of the project site, and Oakland International Airport is a public-use airport owned by the Port of Oakland that is located approximately 10 miles northwest of the project site. Figure 10 shows the Noise Compatibility Zones for both airports, which can be found in the Hayward Executive Airport: Airport Land Use Compatibility Plan,<sup>6</sup> with the project site identified on the

<sup>6</sup> *Hayward Executive Airport: Airport Land Use Compatibility Plan*, prepared by ESA for the Alameda County ALUC, August 2012.

map. The project site lies outside the 60 dBA CNEL noise contour for both airports. This is a less-than-significant impact.

**Mitigation Measure 3:       None required.**

**FIGURE 10 HWD Noise Compatibility Zones**



SOURCE: ESA Airports, 2010; California Airport Land Use Planning Handbook, 2000; ESRI

Hayward Executive Airport Land Use Compatibility Plan . 202229

**Figure 3-3**  
HWD Noise Compatibility Zones