Appendix D:

Noise Assessment

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NOISE ASSESSMENT TECHNICAL REPORT
for the
Henry Mayo Newhall Hospital Expansion Project
City of Santa Clarita, California

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TABLE OF CONTENTS

TABLE OF CONTENTS (CONTINUED)

Section **Page No.**

FIGURES

APPENDICES

ACRONYMS AND ABBREVIATIONS

CFR	Code of Federal Regulation
CNEL	community noise equivalent level
dB	decibel
dBA	A-weighted decibel
DOT	U.S. Department of Transportation
FAA	Federal Aviation Administration
FHWA	Federal Highway Administration
Hz	hertz
L_{DN}	day-night sound level
L_{EQ}	equivalent sound level
L_{MIN}	minimum sound level
L_{MAX}	maximum sound level
L_{XX}	percentile exceeded sound level
PPV	peak particle velocity
SR	State Route

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1.0 INTRODUCTION

1.1 Purpose

This technical noise report evaluates noise effects of the project including noise generation potential associated with construction and operation of the proposed hospital expansion and expanded parking structure. Noise generation sources from future implementation of the project include traffic, parking structure vehicle activities, mechanical equipment, and short-term construction operations.

1.2 Project Location and Description

1.2.1 Location

The existing Henry Mayo Newhall Hospital campus is located along the northwest side of McBean Parkway, approximately 5 miles east of Interstate 5 (I-5), in the City of Santa Clarita. Please refer to Figure 1 for an illustration of the regional setting of the project. Orchard Village Road intersects with McBean Parkway at the main entrance to the campus. Vehicular access to the project site would be provided from three existing driveways connecting to McBean Parkway. Please refer to Figure 2 for an illustration of the Local Setting of the project site, including roadways.

The approximate 2-acre area of the proposed hospital and parking structure expansion is located within the existing 22-acre Henry Mayo Newhall Hospital campus. The hospital expansion area currently has a series of offices housed in portable structures and a surface parking lot. The parking structure expansion is proposed to add 292 parking spaces in multiple levels above the existing PS-4 parking structure. The PS-4 parking structure site is currently occupied by a surface parking lot, and is immediately adjacent to the Main Hospital Building and medical office buildings. The hospital campus is adjacent to single family residences to the north, west and south. To the east of the hospital campus are medical office buildings and multi-family residences. The Henry Mayo Master Plan (City of Santa Clarita 2008) land use designation for the hospital campus is Public Institutional (PI).

1.2.2 Project Description

The project would add approximately 200,000 square feet of floor area and up to 292 new parking stalls to the existing hospital campus. The 200,000 square feet of new building floor area would include a new Diagnostic and Treatment Building (84,300 square feet) and an Inpatient Building No. 2 (115,700 square feet). Approximately 92 beds currently provided at the existing Main Hospital Building would be relocated to the project. The project does not propose to modify the permitted maximum number of beds within the hospital campus (368 beds). The uses within the existing Main Hospital Building that are proposed to be relocated to the project currently occupy approximately 138,000 square feet of building floor area. This existing floor area would be reconfigured for administrative office uses, procedure rooms, imaging and MRI space, Physical/Occupational/Speech Therapy space, and storage space. The new space would be built out in two buildings: a three-story, 84,300 square foot Diagnostic and Treatment Building and; a five-story, 115,700 square foot Inpatient Building No. 2. Each building would also include a below-ground basement. Mechanical equipment necessary to support the new buildings would be located either in the basement area or on the building roof-tops.. In addition, the project would add three aboveground parking levels to the existing PS-4 parking structure.

The proposed project is anticipated to begin construction in 2021 and end in 2022. The construction cycle would include removal and/or demolition of existing structures and grading, building construction, paving, and painting of the proposed 200,000 square feet of new structural space and the addition of three aboveground parking levels with up to 292 new parking stalls to the existing PS-4 parking structure. Details of the construction equipment assumptions are discussed in Section 4.3. Construction traffic levels would vary by construction phase, with a peak of 114 daily round-trips for construction workers and 52 daily round-trips for medium and heavy trucks occurring during the building construction phase. The peak number of heavy trucks trips daily would occur during grading, with 60 round-trips for hauling soil export.

The proposed project would also include the installation and operation of several stationary sources including package heating ventilation and air conditioning (HVAC) systems and emergency electrical generators. For independent zone control, it is assumed that the new structures would include one package HVAC unit for each floor, with all equipment mounted on the roof of the buildings. Based on the floor area, it is anticipated that a 10-ton capacity unit would be required to provide climate control for each individual floor. This report uses the sound rating for a Lennox SGC240H4M 10-ton capacity HVAC package unit to evaluate operational sound levels for this equipment.

The hospital expansion would also be served by two new 1,500 kW diesel generators for back-up emergency power needs. The proposed location for the two new back-up generators is on the roof of the Diagnostic and Treatment Building. This report uses the sound rating for a Caterpillar CAT 3512C 1,500 kW diesel generator to evaluate operational sound levels for this equipment. It is assumed the generators would be installed with the available factory sound attenuating enclosures from Caterpillar. Please refer to Figure 3 for a site plan that indicates the proposed locations for the Diagnostic and Treatment Building, Inpatient Building No. 2, and PS-4 parking structure.

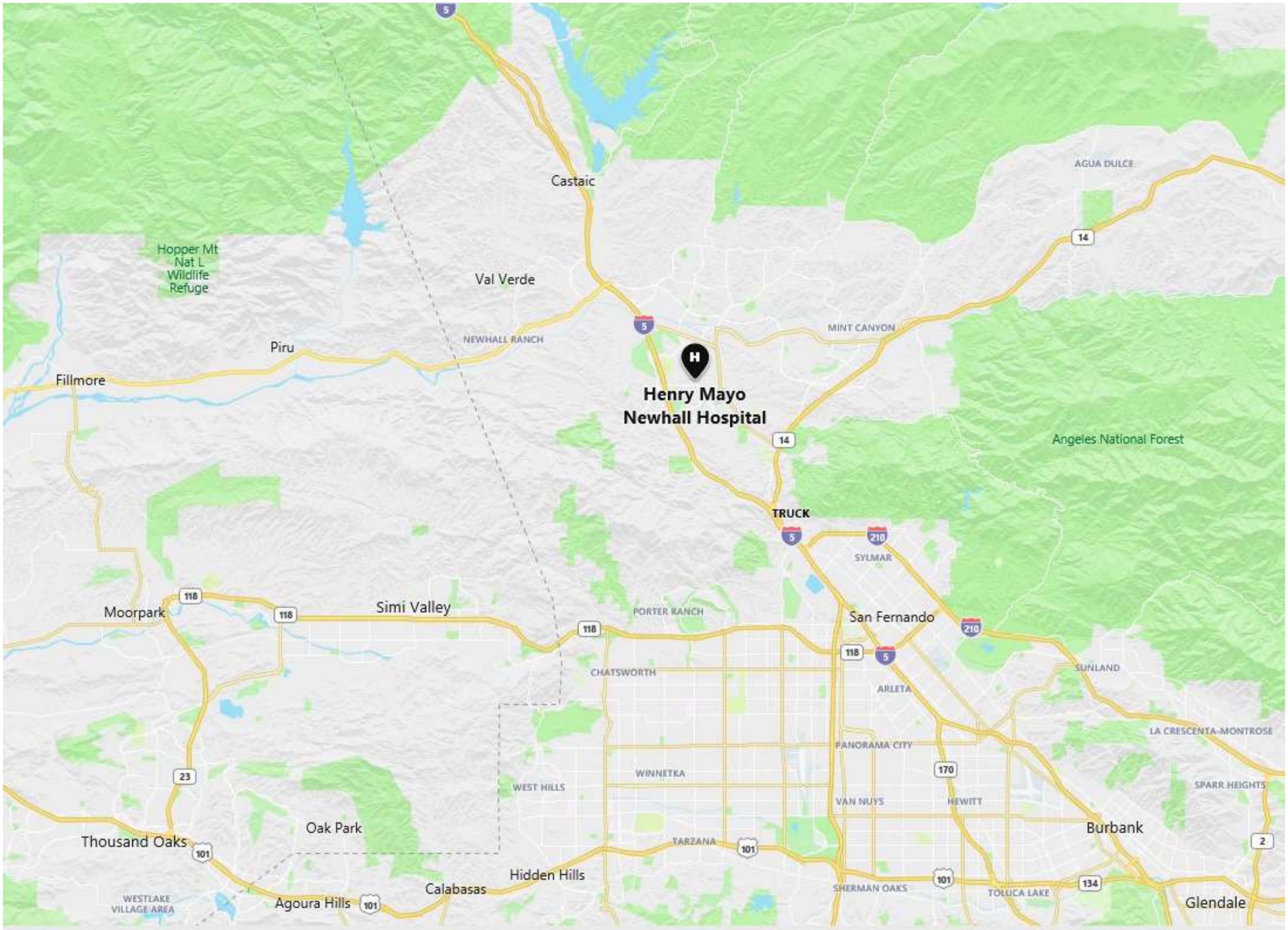

FIGURE 1
REGIONAL SETTING
HENRY MAYO NEWHALL HOSPITAL PROJECT - NOISE TECHNICAL REPORT

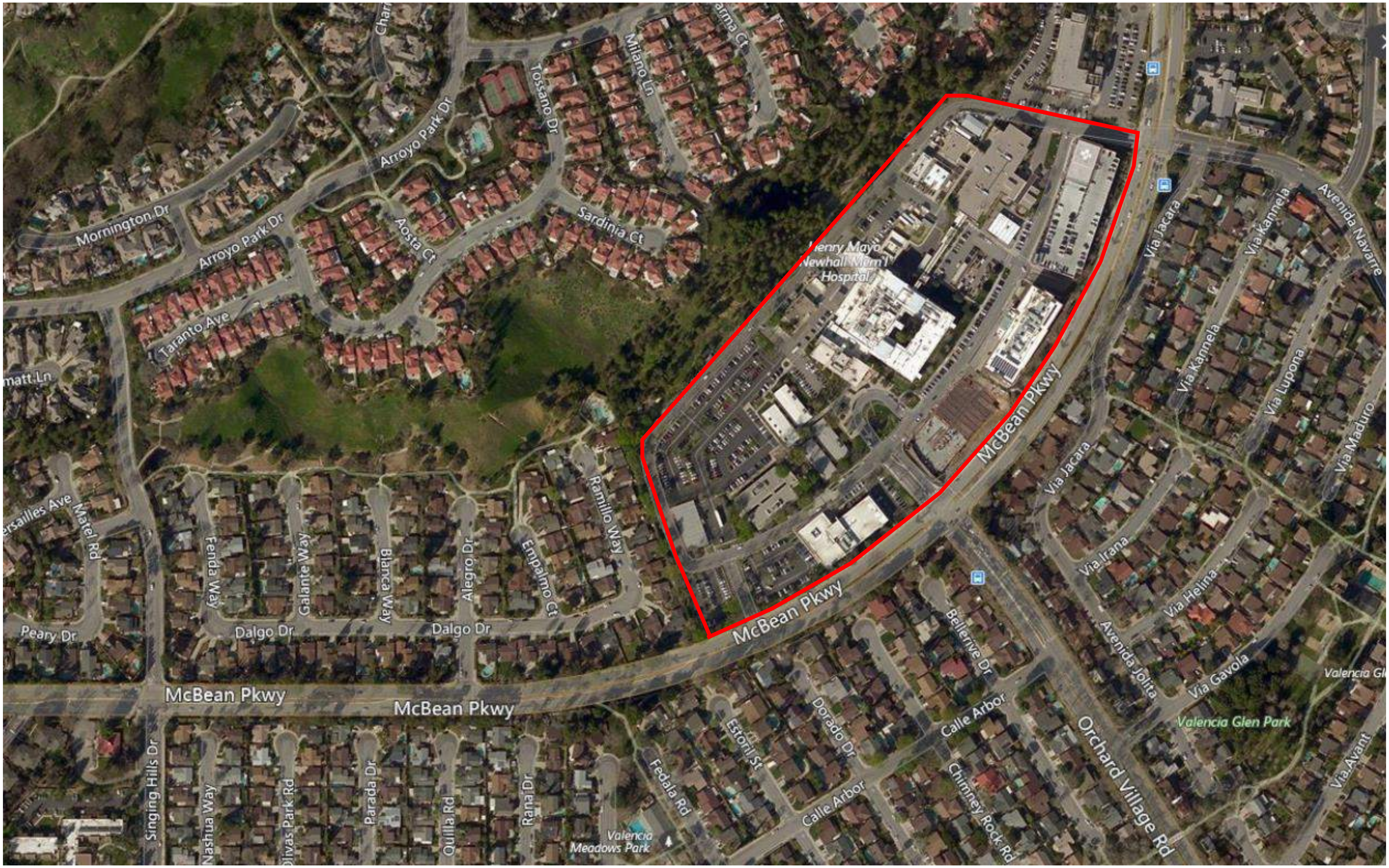

FIGURE 2

LOCAL SETTING

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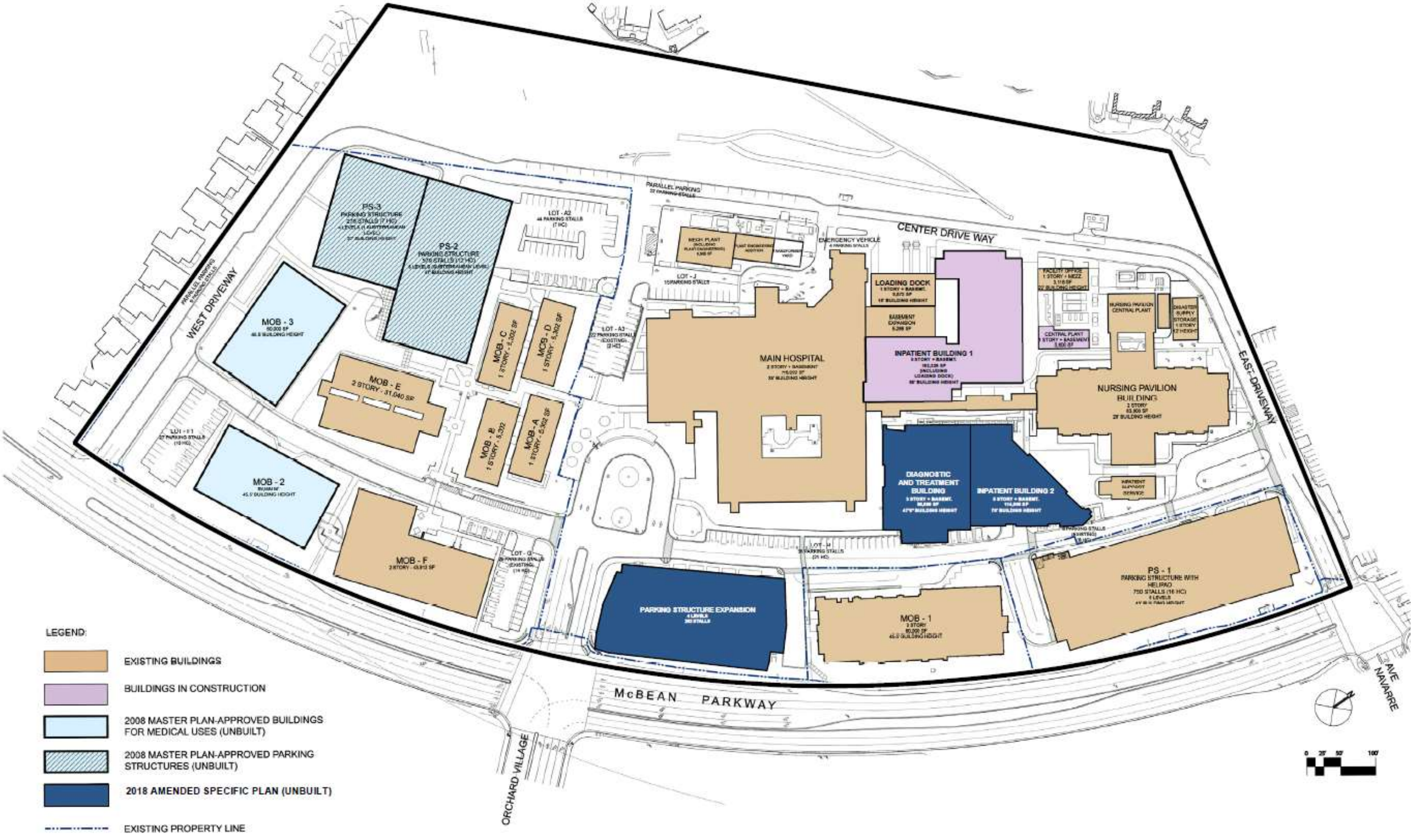

FIGURE 3
PROJECT SITE PLAN
HENRY MAYO NEWHALL HOSPITAL PROJECT - NOISE TECHNICAL REPORT

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1.3 Noise Background and Terminology

Fundamentals of Environmental Noise

Vibrations, traveling as waves through air from a source, exert a force perceived by the human ear as sound. Sound pressure level (referred to as sound level) is measured on a logarithmic scale in decibels (dB) that represent the fluctuation of air pressure above and below atmospheric pressure. Frequency, or pitch, is a physical characteristic of sound and is expressed in units of cycles per second or hertz (Hz). The normal frequency range of hearing for most people extends from about 20 to 20,000 Hz. The human ear is more sensitive to middle and high frequencies, especially when the noise levels are quieter. As noise levels get louder, the human ear starts to hear the frequency spectrum more evenly. To accommodate for this phenomenon, a weighting system to evaluate how loud a noise level is to a human was developed. The frequency weighting called “A” weighting is typically used for quieter noise levels which de-emphasizes the low frequency components of the sound in a manner similar to the response of a human ear. This A-weighted sound level is called the “noise level” and is referenced in units of dBA.

Since sound is measured on a logarithmic scale, a doubling of sound energy results in a 3 dBA increase in the noise level. Changes in a community noise level of less than 3 dBA are not typically noticed by the human ear (Caltrans 1998). Changes from 3 to 5 dBA may be noticed by some individuals who are extremely sensitive to changes in noise. A 5 dBA increase is readily noticeable (EPA 1973). The human ear perceives a 10 dBA increase in sound level as a doubling of the sound level (i.e., 65 dBA sounds twice as loud as 55 dBA to a human ear).

An individual’s noise exposure occurs over a period of time; however, noise level is a measure of noise at a given instant in time. Community noise sources vary continuously, being the product of many noise sources at various distances, all of which constitute a relatively stable background or ambient noise environment. The background, or ambient, noise level gradually changes throughout a typical day, corresponding to distant noise sources, such as traffic volume, as well as changes in atmospheric conditions.

Noise levels are generally higher during the daytime and early evening when traffic (including airplanes), commercial, and industrial activity is the greatest. However, noise sources experienced during nighttime hours when background levels are generally lower can be potentially more conspicuous and irritating to the receiver. In order to evaluate noise in a way that considers periodic fluctuations experienced throughout the day and night, a concept termed “community noise equivalent level” (CNEL) was developed, wherein noise measurements are weighted, added, and averaged over a 24-hour period to reflect magnitude, duration, frequency, and time of occurrence. A complete definition of CNEL is provided below.

Different types of measurements are used to characterize the time-varying nature of sound. These measurements include the equivalent sound level (L_{EQ}), the minimum and maximum sound levels (L_{MIN} and L_{MAX}), percentile-exceeded sound levels (L_{XX}), the day–night sound level (L_{DN}), and the CNEL. Below are brief definitions of these measurements and other terminology used in this report.

- *Decibel* (dB) is a unitless measure of sound on a logarithmic scale which indicates the squared ratio of sound pressure amplitude to a reference sound pressure amplitude. The reference pressure is 20 micropascals.
- *A-weighted decibel* (dBA) is an overall frequency-weighted sound level in decibels that approximates the frequency response of the human ear.
- *Equivalent sound level* (L_{EQ}) is the constant level that, over a given time period, transmits the same amount of acoustic energy as the actual time-varying sound. Equivalent sound levels are the basis for both the day–night average sound levels (L_{DN}) and community noise equivalent level (CNEL) scales.
- *Maximum sound level* (L_{MAX}) is the maximum sound level measured during the measurement period.
- *Minimum sound level* (L_{MIN}) is the minimum sound level measured during the measurement period.
- *Percentile-exceeded sound level* (L_{XX}) is the sound level exceeded x percent of a specific time period. L_{10} is the sound level exceeded 10% of the time.
- *Day–night average sound level* (L_{DN}). The L_{DN} is a 24-hour average A-weighted sound level with a 10 dB penalty added to the nighttime hours from 10:00 p.m. to 7:00 a.m. The 10 dB penalty is applied to account for increased noise sensitivity during the nighttime hours. This metric is similar to CNEL (see definition below); resulting values from application of L_{DN} versus CNEL rarely differ by more than 1 dB, and therefore these two methods of describing average noise levels are often considered interchangeable.
- *Community noise equivalent level* (CNEL). The CNEL is the average equivalent A-weighted sound level during a 24-hour day. CNEL accounts for the increased noise sensitivity during the evening hours (7 p.m. to 10 p.m.) and nighttime hours (10 p.m. to 7 a.m.) by adding 5 dB to the sound levels in the evening and 10 dB to the sound levels at night. CNEL and L_{DN} are often considered equivalent descriptors.

Exterior Noise Distance Attenuation

Noise sources are classified in two forms: (1) point sources, such as stationary equipment or a group of construction vehicles and equipment working within a spatially limited area at a given time, and (2) line sources, such as a roadway with a large number of pass-by sources (motor vehicles). Sound generated by a point source typically diminishes (attenuates) at a rate of 6.0 dBA for each doubling of distance from the source to the receptor at acoustically "hard" sites and at a rate of 7.5 dBA for each doubling of distance from source to receptor at acoustically "soft" sites. Sound generated by a line source (i.e., a roadway) typically attenuates at a rate of 3 dBA and 4.5 dBA per doubling distance, for hard and soft sites, respectively. Sound levels can also be attenuated by man-made or natural barriers.

For the purpose of sound attenuation discussion, a "hard" or reflective site does not provide any excess ground-effect attenuation and is characteristic of asphalt or concrete ground surfaces, as well as very hard-packed soils. An acoustically "soft" or absorptive site is characteristic of unpaved loose soil or vegetated ground.

Structural Noise Attenuation

Sound levels can also be attenuated by man-made or natural barriers. Solid walls or slopes associated with elevation differences typically reduce noise levels by 5 to 10 dBA (Caltrans 1998). Structures can also provide noise reduction by insulating interior spaces from outdoor noise. The outside-to-inside noise attenuation provided by typical structures in California ranges between 17 to 30 dBA with open and closed windows, respectively, as shown in *Table 1*.

Table 1

Outside-to-Inside Noise Attenuation (dBA)

Building Type	Open Windows	Closed Windows[a]
Residences	17	25
Schools	17	25
Churches	20	30
Hospitals/Offices/Hotels	17	25
Theaters	17	25

Source: Caltrans 1998.

[a] As shown, structures with closed windows can attenuate exterior noise by a minimum of 25 to 30 dBA.

Fundamentals of Vibration

Vibration is an oscillatory motion that can be described in terms of displacement, velocity, or acceleration. The response of humans to vibration is very complex. However, it is generally accepted that human response is best approximated by the vibration velocity level associated with the vibration occurrence.

Heavy equipment operation, including stationary equipment that produces substantial oscillation or construction equipment that causes percussive action against the ground surface, may be perceived by building occupants as perceptible vibration. It is also common for ground-borne vibration to cause windows, pictures on walls, or items on shelves to rattle. Although the perceived vibration from such equipment operation can be intrusive to building occupants, the vibration is seldom of sufficient magnitude to cause even minor cosmetic damage to buildings.

Peak particle velocity (PPV) that describes particle movement over time (in terms of physical displacement of mass, expressed as inches/second or in/sec) is generally employed for the discussion of vibration impacts on people and structures. Groundborne vibration generated by construction projects is usually highest during pile driving, rock blasting, soil compacting, jack hammering, and demolition-related activities. Next to pile driving and soil compacting, grading activity has the greatest potential for vibration impacts when earthwork involves large bulldozers, large trucks, or other heavy equipment. Caltrans uses a threshold of 0.2 in/sec PPV for annoyance to persons, where a continuous vibration source is involved; for transient sources (represented by construction activities), Caltrans uses a threshold of 0.24 in/sec PPV (which equates to a distinctly perceptible level). For commercial buildings constructed of concrete and steel, Caltrans identifies a damage threshold of 0.5 in/sec PPV. For residential structures employing concrete foundation and wood frame construction, Caltrans identifies a conservative maximum vibration level standard is 0.3 in/sec PPV (Caltrans 2013).

Health Effects of Noise

Noise is known to have a number of different adverse effects on humans. Based upon these recognized adverse effects of noise, criteria have been established to help protect the public health and safety and prevent disruption of certain human activities. These criteria are based on effects of noise on people such as hearing loss (not generally associated with community noise), communication interference, sleep interference, physiological responses, and annoyance.

1.4 Noise Regulation and Management

1.4.1 State

California Noise Control Act of 1973

Sections 46000 through 46080 of the California Health and Safety Code, known as the California Noise Control Act of 1973, declares that excessive noise is a serious hazard to the public health and welfare and that exposure to certain levels of noise can result in physiological, psychological, and economic damage. It also identifies a continuous and increasing bombardment of noise in the urban, suburban, and rural areas. The California Noise Control Act declares that the State of

California has a responsibility to protect the health and welfare of its citizens by the control, prevention, and abatement of noise. It is the policy of the State to provide an environment for all Californians free from noise that jeopardizes their health or welfare.

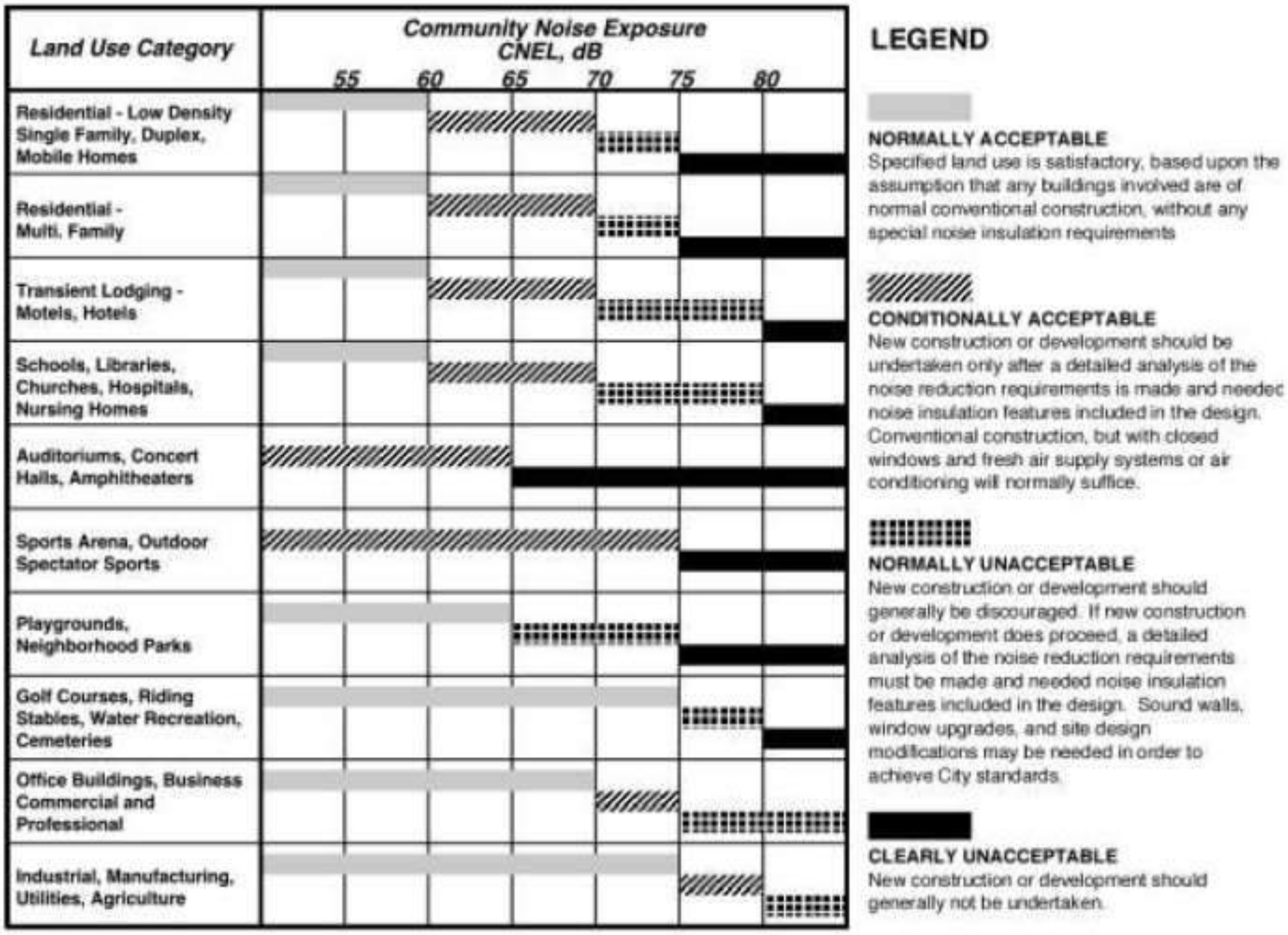
California Noise Insulation Standards (CCR Title 24)

In 1974, the California Commission on Housing and Community Development adopted noise insulation standards for hotels, motels, dormitories, and multi-family residential buildings (CCR Title 24, Part 2). Title 24 establishes standards for interior room noise (attributable to outside noise sources). The City of Santa Clarita applies the interior noise criterion of CNEL 45 dBA for single family residences, in addition to multi-family residential structures.

California Noise Exposures Standards by Land Use

The State of California has adopted guidelines for acceptable noise levels in various land use categories (California Office of Planning and Research, General Plan Guidelines 2003, Appendix C). The City of Santa Clarita and the County of Los Angeles have adopted these guidelines in a modified form as a basis for planning decisions based on noise considerations. The modified guidelines are shown in Table 2. Modifications were made to eliminate overlap between categories in the table, in order to make the guidelines easier for applicants and decision makers to interpret and apply to planning decisions. A conditionally acceptable designation implies new construction or development should be undertaken only after a detailed analysis of the noise reduction requirements for each land use is made and the needed noise insulation features are incorporated in the design. By comparison, a normally acceptable designation indicates that standard construction can occur with no special noise reduction requirements.

Table 2 - Land Use/Noise Compatibility Guidelines



LEGEND

NORMALLY ACCEPTABLE
Specified land use is satisfactory, based upon the assumption that any buildings involved are of normal conventional construction, without any special noise insulation requirements

CONDITIONALLY ACCEPTABLE
New construction or development should be undertaken only after a detailed analysis of the noise reduction requirements is made and needed noise insulation features included in the design. Conventional construction, but with closed windows and fresh air supply systems or air conditioning will normally suffice.

NORMALLY UNACCEPTABLE
New construction or development should generally be discouraged. If new construction or development does proceed, a detailed analysis of the noise reduction requirements must be made and needed noise insulation features included in the design. Sound walls, window upgrades, and site design modifications may be needed in order to achieve City standards.

CLEARLY UNACCEPTABLE
New construction or development should generally not be undertaken.

Source: City of Santa Clarita General Plan Noise Element

California Department of Transportation (Caltrans) Standards

Although the Caltrans standards are intended for application to transportation construction projects sponsored by Caltrans, the impact assessment procedures and criteria included in the Transportation-Related Earthborne Vibrations and Construction Vibration Guidance Manual (September 2013) are routinely used for evaluation of various types of construction projects proposed or reviewed by local jurisdictions. The Caltrans damage threshold for commercial buildings with concrete and steel construction is 0.5 in/sec PPV; for residential buildings, the damage threshold is 0.3 in/sec PPV. With respect to vibration impacts to persons, Caltrans uses a threshold of 0,2 in/sec PPV for long-term, continuous vibration sources (such as traffic), and a slightly higher annoyance threshold of 0,24 in/sec PPV for transient sources, such as construction.

1.4.2 City of Santa Clarita

City of Santa Clarita General Plan

The City of Santa Clarita adopted the current General Plan Noise Element in 2011.

The following Noise Element policies are applicable to the Project.

Policy N 1.1.1 Use the Noise and Land Use Compatibility Guidelines contained on Exhibit N-8 [reproduced as Table 2], which are consistent with State guidelines, as a policy basis for decisions on land use and development proposals related to noise.

The State Noise/Land Use Compatibility Criteria are presented in Table 2 (above). The project would fall into the Hospital category, with *Normally Acceptable* exterior noise levels ranging up to 60 dBA CNEL, and *Conditionally Acceptable* exterior noise levels ranging up to 70 dBA CNEL.

Policy N 1.1.2: Continue to implement the adopted Noise Ordinance and other applicable code provisions, consistent with state and federal standards, which establish noise impact thresholds for noise abatement and attenuation, in order to reduce potential health hazards associated with high noise levels.

Operation of the project would be required to comply with the Noise Element exterior noise exposure guidelines (Table 2) and the adopted Noise Ordinance (Municipal Code Chapter 11.44, discussed below). Construction of the project would be required to adhere to the construction noise limitations contained in Section 11.44.080 of the Municipal Code (discussed below).

Policy N 1.1.3: Include consideration of potential noise impacts in land use planning and development review decisions.

Policy N 1.1.4: Control noise sources adjacent to residential, recreational, and community facilities, and those land uses classified as noise sensitive**.**

This assessment evaluates project related noise levels at the property boundary of the closest noise sensitive land uses, which are residences located on the opposite side of McBean Parkway, residences along the western boundary of the hospital campus, residences northward of the hospital campus, and apartments to the east/northeast.

City of Santa Clarita Municipal Code

11.44.040 Noise Limits

Chapter 11.44.040 establishes noise standards in various land use zones during daytime (7:00 AM–10:00 PM) and nighttime (10:00 PM–7:00 AM) periods. For residential zones, the base noise levels are 65 dBA during the daytime period and 55 dBA during the nighttime period. For commercial and manufacturing zones, the base noise levels are 80 dBA during the daytime period and 70 dBA during the nighttime period.

For repetitive impulsive noise or steady, whine, screech, or hum noise, the base noise levels noted above are reduced by 5 dBA. If the noise occurs more than 5 but less than 15 minutes per hour during the daytime period, the above base noise levels are raised by 5 dBA. If the noise occurs more than 1 but less than 5 minutes per hour during the daytime period, the above base noise levels are raised by 10 dBA. If the noise occurs less than 1 minute per hour during daytime period, the above base noise levels are raised by 20 dBA.

11.44.070 Special Noise Sources - Machinery

Any noise level from the use or operation of any machinery, equipment, pump, fan, air conditioning apparatus, refrigerating equipment, motor vehicle, or other mechanical or electrical device, or in repairing or rebuilding any motor vehicle, which exceeds the noise limits as set forth in Section 11.44.040 at any property line, or, if a condominium or rental units, within any condominium unit or rental unit within the complex, shall be a violation of this chapter.

11.44.080 Special Noise Sources – Construction and Building

Pursuant to the City’s Municipal Code Section 11.44.080, no person may engage in any construction work that requires a building permit from the City on sites within 300 feet of a residentially zoned property, except between the hours of 7:00 AM and 7:00 PM, Monday through Friday, and 8:00 AM and 6:00 PM on Saturday. No work may be performed on the following public holidays: New Year’s Day, Independence Day, Thanksgiving, Christmas Day, Memorial Day, and Labor Day. The City of Santa Clarita Public Works Department may issue a permit for work to be done “after hours” provided that containment of construction noises is provided.

2.0 EXISTING NOISE CONDITIONS

2.1 Ambient Hospital Campus Noise

Ambient Noise Monitoring

Sound level measurements are typically completed as part of a noise assessment study in order to establish ambient or baseline noise levels in the immediate vicinity of the proposed development. The proposed project includes two new buildings and the expansion of the PS-4 parking structure to accommodate up to 292 new parking spaces. Immediately adjacent to the north side of the Main Hospital Building site there is a hospital "tower" addition that is nearing completion. The construction process is a temporary activity and does not properly constitute the baseline noise condition at the project site. Therefore, sound level measurements were conducted at the southeastern façade of the Main Hospital Building, with the hospital providing shielding from the construction activity noise. Sound level measurements at the site of the parking structure addition were conducted at the southwest corner of the parking structure site, at a location also largely shielded from construction noise by the Main Hospital Building.

The measurements were made using a calibrated Larson Davis Model 820 (S.N. 1534) integrating sound level meter equipped with a Type 2551 ½-inch pre-polarized condenser microphone with pre-amplifier. When equipped with this microphone, the sound level meter meets the current American National Standards Institute standard for a Type 1 precision sound level meter. The sound level meter was positioned at a height of approximately five feet above the ground.

The noise measurement locations are depicted as ST1 and ST2 on *Figure 4*. ST1 was approximately 20 feet south of southern façade of the Main Hospital Building, and 20 feet back from the eastern façade of this building. ST2 was approximately 20 feet north of the south end of the existing surface parking lot, and 10 feet west of the landscape wall along the west side of the parking lot. The measured average noise level was 55 dBA L_{EQ} at ST1 and 61 dBA L_{EQ} an ST2. The slightly higher average noise level recorded at ST2 resulted from traffic noise contributions along McBean Parkway.

Table 3 shows the measured noise levels at ST1 and ST2, along with statistics related to the measurements. The field data measurement forms are included in Appendix A.

Table 3
Measured Average Sound Levels

Site	Description	Date/Time	L_{EQ}[1]	L_{MAX}	L_{MIN}
ST1	Approximately 20 feet from south façade of Main Hospital Building	6/14/2017 11:00 a.m. to 11:15 a.m	55 dB	63 dB	48 dB
ST2	Approximately 20 feet north of the southern end of surface parking lot on north side of Orchid Avenue entrance	6/140/2017 11:20 a.m. to 11:35 a.m	61 dB	78 dB	49 dB

Table Notes: [1] Equivalent Continuous Sound Level (Time-Average Sound Level)
[2] Maximum sound level recorded over the measurement duration
[3] Minimum sound level recorded over the measurement duration
General Notes: Temperature 78 degrees, sunny, calm wind.
Source: Dudek (Appendix A)

From the data in Table 3, on-site noise levels generally fall well below the allowable daytime limit of 80 dBA L_{eq} for commercial land uses and would also be compliant with the daytime limit of 65 dBA L_{eq} for residential land uses. It should be noted that neither the new hospital space nor expanded parking structure would include outdoor use areas.

Existing ambient noise conditions for adjacent residences along McBean Parkway were determined via traffic noise modeling, which is discussed in further detail in Section 4.1. Generally, residences along McBean Parkway to the north and east of the project site are exposed to traffic noise level ranging from 70 to 71 dBA L_{eq} during peak transportation hours, which equates to 70 to 71 dBA CNEL. The off-site residence to the south, which is the closest to the PS-4 structure, is located approximately 100 feet from the edge of McBean Parkway, where the anticipated noise level from traffic is 65 L_{eq} during peak transportation hours, which equates to 65 dBA CNEL. Residences within 100 feet of the edge of McBean Parkway are within the *conditionally acceptable* exterior noise exposure range identified in the Santa Clarita Noise Element.

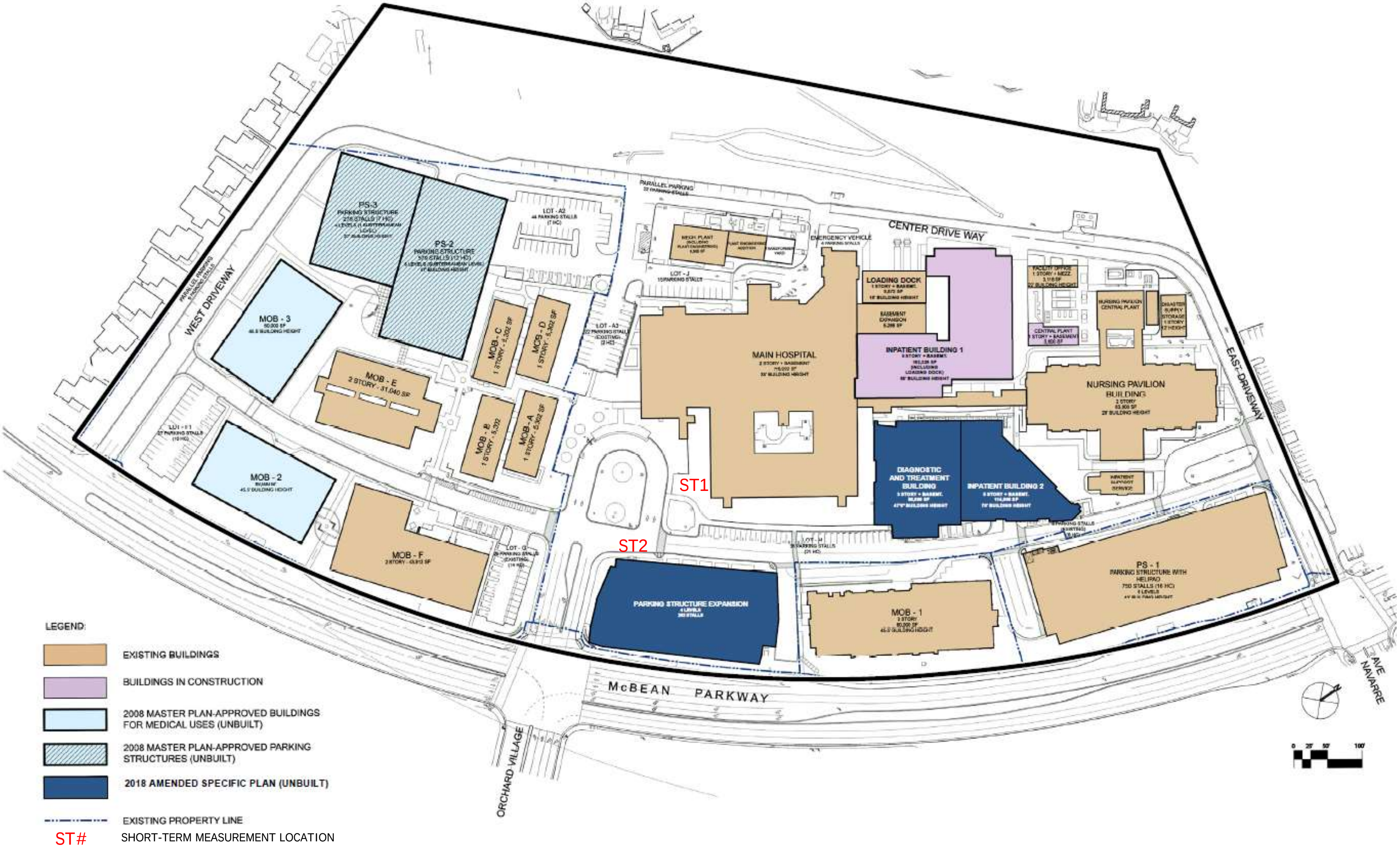


FIGURE 4

NOISE MEASUREMENT LOCATIONS

HENRY MAYO NEWHALL HOSPITAL PROJECT - NOISE TECHNICAL REPORT

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3.0 SIGNIFICANCE CRITERIA

Based on the criteria identified in Appendix G of the CEQA Guidelines, the proposed project would have a significant impact on noise if it would result in:

1. 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.
2. Generation of excessive groundborne vibration or groundborne noise levels.

3.1 City of Santa Clarita Noise Significance Criteria

Based on the City of Santa Clarita General Plan Noise Element and Noise Ordinance, the proposed project would have a significant impact on noise if it would result in:

1. Generation of noise in excess of 65 dBA L_{eq} during the day (7:00 a.m. to 7:00 p.m), or in excess of 55 dBA L_{eq} during the night-time (7:00 p.m. to 7:00 a.m), at the property line for any existing residential properties in the project vicinity or within dedicated exterior use areas of the hospital campus.
2. Between the hours of 7:00 AM and 7:00 PM, Monday through Friday, and 8:00 AM and 6:00 PM on Saturday, or on a legal holiday or Sunday, erection, construction, demolition, or excavation activities.
3. An increase of 3 dBA CNEL or more in existing roadway traffic noise levels, as a result of the addition of project generated traffic on vicinity roadways.
4. A temporary increase of more than 10 dBA above ambient noise levels for construction activities (perceived as a doubling of the background noise level).

3.2 Vibration Significance Criteria

Impacts related to excessive ground-borne vibration would be significant if the project results in generation of excessive ground-borne vibration equal to or in excess of 0.2 inches/second PPV in spaces intended for sleeping (therefore creating annoyance for persons), or the exposure of conventionally built residential structures to greater than 0.3 inches/second PPV. Construction activities within 200 feet and pile driving within 600 feet would be potentially disruptive to vibration-sensitive operations (Caltrans 2013).

4.0 IMPACTS AND MITIGATION

4.1 Transportation Noise Exposure

4.1.1 Impact Analysis

Roadway Noise

The primary noise-related effect that most commercial projects produce is a potential for off-site increases in traffic, which is the main source of noise in most urban areas. Acoustical calculations were performed for each of the scenarios evaluated in the project traffic impact assessment (i.e., existing and existing plus project, opening day and opening day plus project, and future [Year 2035] and future plus project traffic levels) to determine the potential for roadway traffic noise level increases from project implementation.

Acoustical calculations were performed for roadway segments identified in the traffic impact assessment (Linscott Law & Greenspan, 2019) as those which could be affected by implementation of the project, using standard noise modeling equations adapted from the FHWA noise prediction model. The modeling calculations take into account the posted vehicle speed, average daily traffic volume, and the estimated vehicle mix. The model assumed standard exterior attenuation rates for "hard sites" (i.e, areas of pavement or compacted dirt adjacent to the roadway). Table 4, *Existing and Future Roadway Traffic Noise Levels (CNEL)*, presents the noise level results for each scenario.

Noise levels are indicated at 50 feet from the centerline of the outermost lane for each roadway segment. Noise levels at distances greater than 50 feet from the centerline would be lower due to attenuation provided by increased distance from the noise source. Generally, noise from heavily traveled roadways would experience a decrease of approximately 3 dBA for every doubling of distance from the roadway where hard site conditions exist adjacent to the roadway. The noise model does not take into account the sound-attenuating effect of intervening structures, barriers, vegetation, or topography. Therefore, the noise levels predicted by the model are conservative.

The proposed project, along with future regional growth and other projects to be developed within the project vicinity, would result in the addition of vehicle trips that would increase traffic noise. A potentially significant project impact would occur where an increase of 3 dB CNEL or more is predicted, as this is the threshold for the noise increase to be clearly perceptible to the average person. As illustrated in Table 4, the proposed project would result in traffic noise increases of well below 1 dB CNEL on each of the examined roadway segments, when comparing existing to existing plus project noise levels. As such, the project would result in less than significant project-specific traffic noise impacts.

Table 4

Noise Levels for Vicinity Roadways

(dBA CNEL at 50 feet from centerline of Outermost Lane)

Street Segment	Existing	Existing + Project	Difference	2022	2022 + Project	Difference	2035	2035 + P	Difference
McBean north of Magic Mtn.	74.5	74.5	**0**	74.9	74.9	**0**	75.6	75.6	**0**
McBean, Magic Mtn. to Valencia	72.5	72.5	**0**	72.9	72.9	**0**	73.6	73.6	**0**
McBean,Valencia to Orchard Village	71.8	71.8	**0**	72.2	72.2	**0**	72.9	73.0	**0**
McBean, Orchard Village to Rockwell Cyn	70.6	70.7	**0.1**	71.0	71.1	**0.1**	71.7	71.8	**0.1**
McBean west of Rockwell Cyn	72.1	72.2	**0.1**	72.5	72.6	**0.1**	73.2	73.2	**0**
Magic Mtn west of McBean	70.4	70.4	**0**	70.8	70.8	**0**	71.5	71.5	**0**
Magic Mtn,, McBean to Valencia	69.4	69.4	**0**	69.8	69.8	**0**	70.5	70.5	**0**
Magic Mtn east of Valencia	68.1	68.1	**0**	68.5	68.5	**0**	69.2	69.2	**0**
Valencia west of McBean	72.9	72.9	**0**	73.3	73.3	**0**	74.0	74.0	**0**
Valencia, McBean to Magic Mtn.	72.4	72.4	**0**	72.8	72.8	**0**	73.5	73.5	**0**
Valencia east of Magic Mtn.	73.5	73.5	**0**	73.9	73.9	**0**	74.6	74.6	**0**
Orchard Village, McBean to Wiley Cyn.	70.4	70.5	**0.1**	70.8	70.9	**0.1**	71.5	71.5	**0**
Orchard Village, Wiley Cyn. to Lyons	69.2	69.2	**0**	69.6	69.6	**0**	70.3	70.3	**0**
Wiley Cyn, Lyons to Tournament	68.4	68.4	**0**	68.8	68.8	**0**	69.5	69.5	**0**
Wiley Cyn, Tournament to Orchard Village	67.6	67.6	**0**	68.0	68.0	**0**	68.7	68.7	**0**
Wiley Cyn east of Orchard Village	66.2	66.3	**0.1**	66.6	66.7	**0.1**	67.3	67.4	**0.1**
Lyons west of Wiley Cyn	71.6	71.6	**0**	72.0	72.0	**0**	72.7	72.7	**0**
Lyons, Wiley Cyn to Orchard Village	71.0	71.0	**0**	71.4	71.4	**0**	72.1	72.1	**0**
Lyons, Orchard Village to Newhall	71.1	71.1	**0**	71.5	71.5	**0**	72.2	72.2	**0**

Sources: Henry Mayo Newhall Hospital Amended Specific Plan Traffic Study (LLG 2019) and FHWA TNM 2.5.

Cumulative Roadway Noise

The LLG traffic impact assessment (LLG 2019) included the evaluation of project traffic in addition to anticipated or predicted traffic contributions from all projects in the area through Year 2035 (the cumulative traffic scenario). As summarized in Table 4, the project contribution for every evaluated roadway segment in the Year 2035 scenario would be 0.1 dBA or less. Because the project's individual contribution to traffic noise would be less than 1 dB CNEL as compared to the "without project" traffic noise levels under the cumulative traffic scenario (Year 2035), the project would not contribute substantially to any cumulatively significant traffic noise impacts.

4.1.2 Mitigation Measures

The Project would not result in a significant traffic noise impact; therefore, no mitigation is required.

Significance After Mitigation

Mitigation is not required because impacts would be less than significant.

4.2 Operations Noise Generation

4.2.1 Impact Analysis

The implementation of the project would also result in changes to existing noise levels on the project site by developing new stationary sources of noise, including introduction of HVAC equipment, a parking structure capacity increase, and emergency electrical generators. These sources may affect noise-sensitive vicinity land uses off the project site. The following analysis evaluates noise from exterior mechanical equipment and activities associated with the parking structure capacity expansion.

As identified in Section 3.1 (Significance Criteria), project operations that would exceed 65 dBA L_{eq} during the day (7:00 a.m. to 7:00 p.m), or exceed 55 dBA L_{eq} during the night-time (7:00 p.m. to 7:00 a.m), at the property line for any existing residential properties in the project vicinity would constitute a significant impact. With respect to on-site uses, the residential exposure limits identified immediately above would be applicable for dedicated outdoor use areas of the hospital campus, similar to their application to outdoor living areas of residential properties.

4.2.1.1 Parking Structure Vehicle Movement

To determine the noise level impacts associated with parking structure vehicle movement, Dudek relied upon a noise measurement program conducted by Urban Crossroads (Urban Crossroads 2017). Urban Crossroads conducted sound level measurements for a three-level parking structure associated with Canyon Springs Healthcare Campus. The noise levels recorded in the Urban Crossroads study were used to represent parking structure operational noise levels for this component of the Henry Mayo Newhall Hospital project. The measurements were performed adjacent to the parking lot vehicle entrance, which captured noise both from entering and exiting vehicles and movements within the lower floors of the structure. Higher levels (beyond the second level) have a much lower contribution to noise levels measured at the ground level, and therefore measured noise levels would be representative of parking structures that are 2 levels or higher (including the expanded PS-4). The parking structure short-term noise level measurements indicate that the parking structure vehicle movement generates a noise level of 60 dBA L_{eq} at a uniform reference distance of 50 feet. To be conservative in the analysis, parking structure vehicle movement within the project site is expected to operate for 60 minutes during typical hourly daytime and nighttime conditions, thereby resulting in an hourly noise level of 60 dBA L_{eq} at 50 feet from the entrance, during each hour of the day and night.

4.2.1.2 Roof-Top HVAC Equipment

The two proposed buildings would require installation and use of HVAC equipment. For independent zone control, it is assumed that the new buildings would each include one package HVAC unit for each floor (a total of 10), including the basement, with all equipment mounted on the roof of each building. Based on the floor area, it is anticipated that a 10-ton capacity unit would be required to provide climate control for each individual floor of each of the two buildings; consequently it is anticipated that 6, 10-ton HVAC package units would be installed on the roof-top of Inpatient Building No. 2 and 4 10-ton units would be installed on the roof-top of the Diagnostic and Treatment Building. This report uses the sound rating for a Lennox SGC240H4M 10-ton capacity HVAC package unit as the sound level reference.

Noise level data provided by the manufacturer were used to determine the noise levels which would be generated by each of the HVAC package units. The Lennox SGC240H4M 10-ton package HVAC unit has a sound power rating of 90 dBA (Lennox 2017). It is assumed a minimum 3.5-foot high parapet would extend along the perimeter of the roof, but acoustical calculations do not include sound level reductions associated with the noise barrier effect of the parapet.

4.2.1.3 Emergency Backup Generators

The hospital expansion would also be served by two new 1,500 kW diesel generators for back-up emergency power needs. These two generators would be installed on the roof of the Diagnostic and Treatment Building. This report uses the sound rating for a Caterpillar CAT 3512C 1,500 kW diesel generator to evaluate operational sound levels for this equipment. It is assumed because of the noise-sensitive nature of the hospital campus, the generators would be installed with the available factory sound attenuating enclosures from Caterpillar.

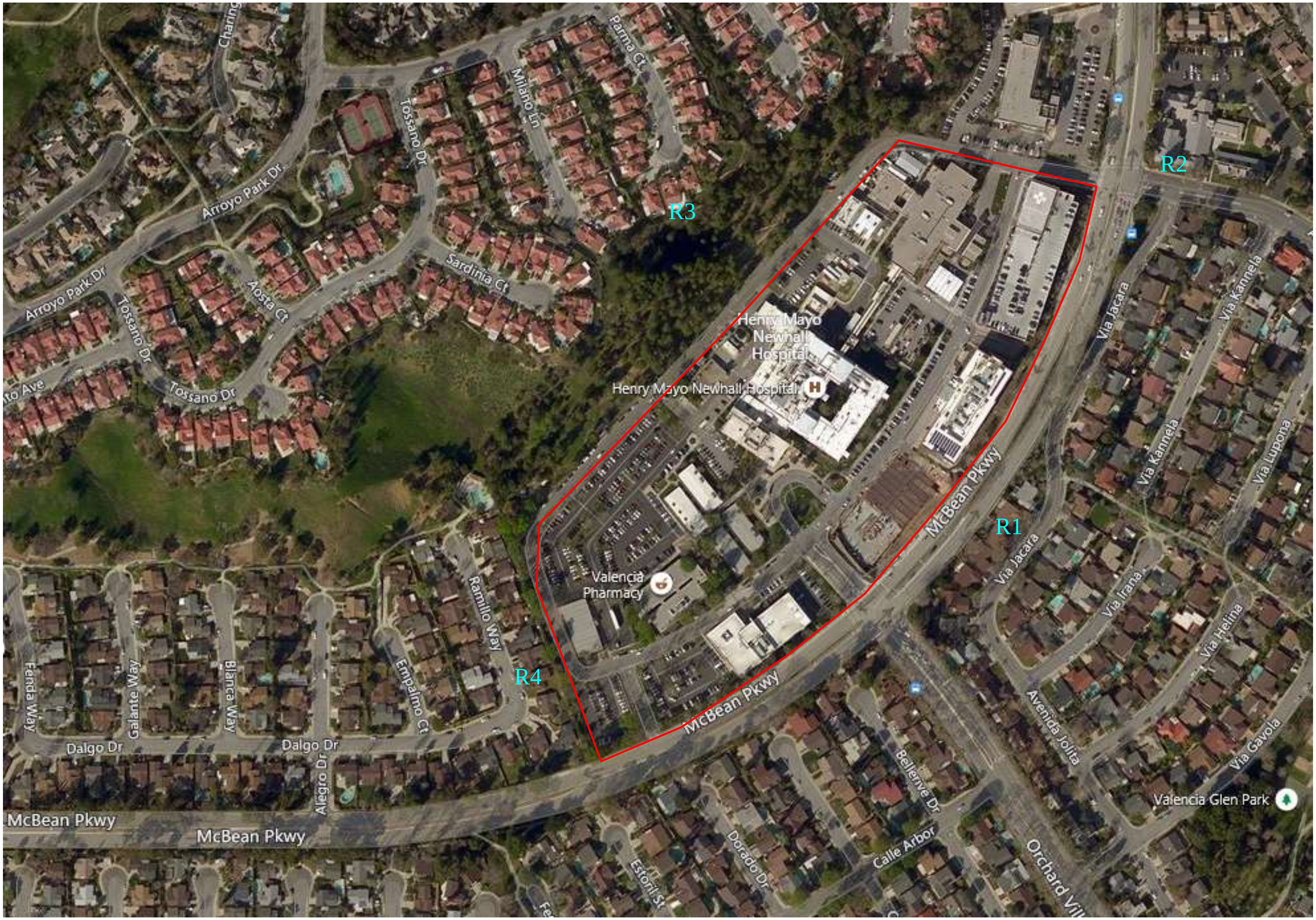
Caterpillar, Inc. provides the noise level in L_{eq} for a CAT 3512C generator, installed in a factory-available sound attenuating and weather-proof enclosure; at a reference distance of 21 feet this generator in the factory-provided enclosure produces a sound level of 67.0 dBA L_{eq} and a noise source height of 10 feet.

4.2.1.4 Sound Levels From Combined On-Site Noise Sources

Using the reference noise levels to represent the proposed operations that include parking structure vehicle movements, mechanical ventilation (roof-top air conditioning) units, and emergency backup generators Dudek calculated the operational source noise levels that are expected to be generated by the project, as experienced at the closest sensitive receiver location on each of the four sides of the hospital campus. The distance from each noise source to the closest receiver on each side of the campus was determined using the measurement tools available in Google Earth Pro. Figure 5 illustrates the location of the modelled closest residential receiver on each side of the hospital campus.

The operational noise level calculations account for the distance attenuation provided due to geometric spreading when sound from a localized stationary source (i.e., a point source) propagates uniformly outward in a spherical pattern. With geometric spreading, sound levels attenuate (or decrease) at a rate of 6 dB for each doubling of distance from a point source.

The noise level contribution from each source at each of the closest four off-site receivers was calculated separately, and then the individual sound level contributions at each receiver were summed using appropriate logarithmic calculations. Assuming all the equipment is operating simultaneously for a minimum period of one hour, and with steady vehicle movement activity for that same hour in the parking structure, the worst-case calculated noise level at the closest receiver on each side of the campus is presented in Table 5. The noise level calculations are included in Appendix B.



LEGEND

R# Modeled Receiver Location

FIGURE 5

MODELLED SENSITIVE RECEIVERS IN PROJECT VICINITY

HENRY MAYO NEWHALL HOSPITAL PROJECT - NOISE TECHNICAL REPORT

Table 5

Mechanical and Parking Structure Operations Noise Level Analysis

Summary of Results - Average Noise Levels (dBA L_{eq})

	Operational Noise From Individual Noise Sources and Combined at Closest Residences					
Receiver	HVAC	Generator	Parking	Combined	Existing Ambient	Operations + Ambient
R1	48	52	34	54	70	70
R2	47	48	34	51	70	70
R3	38	40	33	43	50	51
R4	47	48	51	54	65	65

Sources: Ambient noise levels from traffic noise assessment using calculations based on TNM 2.5; mechanical equipment assessment using exterior attenuation rates and manufacturer sound level data. Refer to Appendix C for worksheets.

The results of the mechanical equipment and parking structure operations noise analysis indicate that the proposed project would comply with the City of Santa Clarita municipal code noise limits (Chapter 11.44.040). Operational noise from the project would comply with even the night-time limit of 55 dBA L_{EQ} applicable to residential land uses, at the property boundary of the closest existing residence in each direction from the hospital property. In addition, project operational noise levels would increase existing ambient noise levels at the closest adjacent residences by no more than 1 dBA L_{eq} which is an imperceptible change. As such, the project would not generate noise at the closest neighboring residential properties that exceeds the residential zone noise limits. Consequently, operational noise impacts would be less than significant.

The closest dedicated outdoor use area on the hospital campus is a set of benches within the driveway loop at the entrance to the hospital. These benches are at a distance of approximately 125 feet from the PS-4 structure and on the opposite side of the Main Hospital Building from the location for the Diagnostic and Treatment Building and Inpatient Building No. 2. At this distance, operational noise from PS-4 would be no greater than 54 dBA $L_{eq,}$ thereby remaining in compliance with the nighttime exposure standard of 55 dBA L_{eq} that is conservatively applied to exterior use areas of the hospital. On-site operational noise levels are therefore deemed less than significant.

4.2.2 Mitigation Measures

The Project would not result in a significant operational noise impact; therefore, no mitigation is required.

Significance After Mitigation

Mitigation is not required because impacts would be less than significant.

4.3 Construction Noise

Construction of the development proposed in the project would generate noise that could expose nearby receptors to elevated noise levels that may disrupt communication and routine activities. The magnitude of the impact would depend on the type of construction activity, equipment, duration of the construction, distance between the noise source and receiver, and intervening structures. This section of the report discusses the noise levels calculated to result from construction of the project at nearby sensitive receptors (i.e., residences).

As identified in Section 3.1 (Significance Criteria), project construction activities occurring outside of the hours between 7:00 AM and 7:00 PM, Monday through Friday, or outside the hours between 8:00 AM and 6:00 PM on Saturday, or on a legal holiday or Sunday, would constitute a significant impact. During allowed daytime construction hours, construction noise levels more than 10 dBA above ambient noise levels for construction activities (perceived as a doubling of the background noise level) would also constitute a significant short-term noise impact.

4.3.1 Construction - Equipment Inventory

The California Air Resources Board CalEEMod (California Emissions Evaluation Model) was used to identify the construction equipment anticipated for development of a hospital and parking structure of the proposed size. Based upon a hospital with total floor area of 200,000 square feet, 292 parking stalls in a parking structure, and with construction area of approximately 2 acres, CalEEMod (Version: CalEEMod.2016.3.1) identified the following anticipated equipment for each phase of the project construction.

Table 6
Construction Equipment Per Phase

Construction Activity	Demolition	
Equipment Needed	Dozer Front End Loader Tractor	Concrete Saw Backhoe Flat-Bed Truck
Construction Activity	Site Preparation	
Equipment Needed	Grader Backhoe	Scraper Flat-Bed Truck
Construction Activity	Grading	
Equipment Needed	Grader Backhoe Flat-Bed Truck	Dozer Front-End Loader
Construction Activity	Building Construction	
Equipment Needed	Crane Tractor Generator Man-Lift	Welder/Torch Flat-Bed Truck Compressor Fork Lift
Construction Activity	Paving	
Equipment Needed	Paver Tractor Concrete Truck	Roller Flat-Bed Truck Pavement Scarifier

Source: CalEEMod default construction fleet for size and description of construction effort.

4.3.2 Construction Noise Assessment

On-Site Construction Activities

With the noise sources identified above, a noise analysis was performed using a model developed under the auspices of the Federal Highway Administration (FHWA) called the Roadway Construction Noise Model (RCNM) (FHWA 2008). Input variables for RCNM consist of the receiver / land use types, the equipment type (i.e., backhoe, crane, truck, etc.), the number of equipment pieces, the duty cycle for each piece of equipment (i.e., percentage of hours the equipment typically works per day), and the distance from the construction noise source to a noise-sensitive land use or receiver. The reader is referred to Appendix C for the inputs used in the RCNM model, as well as results.

The various construction equipment types and quantities (as described above) were used for this analysis. The RCNM has default duty cycle values for the various pieces of equipment, which were derived from an extensive study of typical construction activity patterns. Those default duty cycle values were utilized for this analysis.

Noise-sensitive land uses in the vicinity of the project include residences on properties adjacent to the south, west, and east sides of the campus, as well as an apartment building several parcels away on the north. The closest off-site residence is located approximately 380 feet from the closest boundary of the Diagnostic and Treatment Building/Inpatient Building No. 2 construction site, to the east. This receiver is identified as R1 on Figure 5. The construction noise assessment is focused on noise levels that would occur at the distance of the closest off-site residence (i.e., at 380 feet), construction noise levels at greater distances from the site would be less. Construction noise levels were also assessed at the on-site Main Hospital Building, which is the closest noise-sensitive use to the construction site; the closest distance from the construction site boundary to the Main Hospital Building is 45 feet. This is comparable to the distance from the edge of the project construction zone to the Inpatient Building No. 1 (now under construction), which is 50 feet from the construction zone. Thus, the Main Hospital Building and Inpatient Building No .1 can be considered to be affected by the same construction noise levels.

Lastly, the PS-4 structure is closer to the eastern off-site residences than the construction zone for the Diagnostic and Treatment Building/Inpatient Building No. 2. The distance from the closest point of the PS-4 construction zone to the residence to the east (R1) is 150 feet. Noise from the PS-4 construction activities is also separately assessed at this closest residence.

However, the above distance separation assumption would not be representative of more typical construction noise, because in general the construction activities would not take place either at the nearest or at the farthest portions of the project site, but somewhere in between. Thus, in order to provide information on typical construction noise levels, the distance from the nearest receiver to the project's "acoustic center" was also analyzed. The acoustic center represents the idealized point from which the energy sum of all construction activity noise, near and far, would be centered. The acoustic center is derived by taking the square root of the product of the nearest and the farthest distances. For this project, the acoustic center for construction activities at the Diagnostic and Treatment Building/Inpatient Building No. 2 was found to be approximately 540 feet from the nearest off-site noise sensitive receiver located to the east (R1 on Figure 5). The acoustic center for construction activities at the Diagnostic and Treatment Building/Inpatient Building No. 2 was found to be 105 feet from the Main Hospital Building or Inpatient Building No. 1 to the construction area. Given the overall size of the project site, and the relatively equal distribution of proposed development across project site boundaries, noise levels derived from the acoustic center of construction activity would provide a better representation of average noise level exposure across the entire construction process for a given adjacent on-site or off-site receiver, than using the minimum distance worst-case method.

It should also be noted that parking structure construction noise was evaluated in the Henry Mayo Newhall Memorial Hospital Master Plan Environmental Impact Report (2008). The proposed addition of 292 parking stalls to PS-4 parking structure would extend the duration of the construction activities, but would not involve additional or different construction equipment than assumed in the 2008 EIR. Since the 2008 EIR determined that existing residences located east of the project site adjacent to PS-4 may be subject to short-term noise reaching 86 dBA L_{max} generated by construction activities near the project boundary, construction of PS-4 could result in temporary increases in noise levels of 10 dBA intermittently at these adjacent residences; the 2008 EIR considered construction of PS-4 to generate a significant short-term noise impact. Please refer to 4.3 Mitigation Measures for the 2008 EIR required construction noise mitigations (to which PS-4 construction must adhere).

It should be noted the construction description used for CalEEMod for the air quality and greenhouse gas emissions analyses included the 200,000 square feet of new medical facility floor space, and 292 parking stalls in an expanded parking structure. Therefore, while the conclusions of the 2008 EIR regarding construction noise impacts of the PS-4 structure are summarized above, the following construction noise discussion includes all construction activities, including the 292 parking stalls in PS-4.

Using the provided construction information, the RCNM construction noise model was used to predict noise from on-site construction activities. The results are summarized in Table 7 (see Appendix C for compete results). As shown, the highest average noise levels at the closest off-site residence from construction of the Diagnostic and Treatment Building/Inpatient Building No. 2 are predicted to range from approximately 66 dBA L_{EQ} (during Phase 3) to 70 dBA L_{EQ} (during Phase 4); while the maximum instantaneous noise level (Lmax) would range from 67 dBA Lmax to 72 dBA Lmax. The identified highest average noise level is considered to be a peak exposure, applicable not more than 10-15% of the total construction period, only while the construction activity is taking place along the eastern construction site boundary (i.e., closest to the nearest off-site receiver). The average construction noise levels at the closest off-site receiver (for Diagnostic and Treatment Building/Inpatient Building No. 2 construction taking place at a range of locations on-site and modeled at the acoustical center for analysis purposes) range from approximately 63 dBA L_{EQ} (during Phase 3) to approximately 67 dBA L_{EQ} (during Phase 4), and are also shown in Table 7. The average noise levels (based upon the acoustic center) are considered a better representation of the overall noise exposure experience for adjacent receivers over the duration of each construction phase. The maximum noise levels at the adjacent closest residence based on the acoustic center would range from 64 dBA Lmax to 69 dBA Lmax.

The PS-4 construction site is much closer to the nearest off-site residence (R1 in Figure 5) than the Diagnostic and Treatment Building/Inpatient Building No. 2 site. PS-4 is located within 150 feet of the closest residences across McBean Parkway. RCNM was used to predict PS-4 construction noise levels at this closest residence. As shown, the highest average noise levels at the closest off-site residence from construction PS-4 are predicted to range from approximately 75 dBA L_{EQ} (during Phase 3) to 78 dBA L_{EQ} (during Phase 4), while the maximum instantaneous noise level (Lmax) would range from 76 dBA Lmax to 80 dBA Lmax.

RCNM was also used to predict construction noise levels for the closest on-site noise-sensitive use, the adjacent Main Hospital Building and Inpatient Building No. 1. The results for on-site construction noise levels are also summarized in Table 7 (see Appendix C for complete results). As shown, the highest average noise levels at the Main Hospital Building/Inpatient Building No. 1 from construction are predicted to range from approximately 85 dBA L_{EQ} (during Phase 3) to 88 dBA L_{EQ} (during Phase 4), while maximum noise level values would range from 86 dBA Lmax to 91 dBA Lmax. The identified highest average noise level is considered to be a peak exposure, applicable not more than 10-15% of the total construction period, only while the construction activity is taking place along the western construction site boundary (i.e., closest to the Main Hospital Building/Inpatient Building No. 1). The average construction noise levels at the Main Hospital Building/Inpatient Building No. 1 (for construction taking place at a range of locations on-site and modeled at the acoustical center for analysis purposes) range from approximately 78 dBA L_{EQ} (during Phase 3) to approximately 81 dBA L_{EQ} (during Phase 4), and are also shown in Table 7. The average noise levels (based upon the acoustic center) are considered a better representation of the overall noise exposure levels at the Main Hospital Building/Inpatient Building No. 1 southeastern facade over the duration of each construction phase. The maximum noise levels at the Main Hospital Building/Inpatient Building No. 1 based on the acoustic center would range from 79 dBA Lmax to 83 dBA Lmax.

Table 7

Construction Noise Summary of Results

Receiver Location/ Description	Land Use	Construction Noise Level by Construction Phase				
		Phase 1: Demolition dBA Leq (dBA Lmax)	Phase 2: Site Preparation dBA Leq (dBA Lmax)	Phase 3: Grading dBA Leq (dBA Lmax)	Phase 4: Building Construction dBA Leq (dBA Lmax)	Phase 5: Paving dBA Leq (dBA Lmax)
Nearest Off-Site Receivers to DT/IB site	Residential	69 (72)	66 (67)	66 (67)	70 (67)	68 (72)
Nearest Off-Site Receivers DT/IB Acoustic Center (540')	Residential	65 (69)	63 (64)	63 (64)	67 (64)	65 (69)
Nearest Off-Site Receivers to PS-4 site	Residential	77 (80)	74 (75)	75 (76)	78 (76)	76 (80)
Nearest On-site Receivers to DT/IB site	Hospital	87 (91)	85 (86)	85 (86)	88 (86)	87 (90)
Nearest On-Site Receivers DT/IB Acoustic Center (105')	Hospital	80 (83)	78 (79)	78 (79)	81 (79)	79 (83)

Source: FHWA RCNM. Refer to Appendix C.

The project would be required to comply with the City of Santa Clarita noise ordinance (Municipal Code Section 11.44.080 Special Noise Sources – Construction and Building) by adhering to the following construction schedule:

> Construction activity for site preparation and for future development shall be consistent with City Noise Ordinance requirements, which limits construction to the hours between 7:00 AM and 7:00 PM, Monday through Friday, and 8:00 AM and 6:00 PM on Saturday, prohibiting construction on Sunday and the following public holidays: New Year's Day, Independence Day, Thanksgiving, Christmas Day, Memorial Day, and Labor Day.

In reviewing the results in Table 7, it can be seen that the average construction noise levels at the closest residence (on the southern side of McBean Parkway) from construction of the Diagnostic and Treatment Building/Inpatient Building No. 2 would remain slightly below the ambient noise level of 70 dBA Leq at this residence. Consequently, construction of the Diagnostic and Treatment Building/Inpatient Building No. 2 would result not result in significant noise impacts on the closest off-site residences.

Construction of PS-4 would result in average noise levels ranging up to 78 dBA Leq, with maximum noise levels up to 80 dBA Lmax. This maximum construction noise level would exceed the ambient noise level at the residence of 70 dBA Leq by 10 dBA. In addition, the 2008 EIR identified noise levels up to 84 dBA Lmax at the closest residences during construction of PS-4. Consequently, this analysis concurs that construction of PS-4 would result in a significant short-term impact upon the closest off-site residences. Please refer to Section 4.3.2 for mitigations addressing this impact.

Again with reference to Table 7, the construction noise levels at the adjacent southeastern facades of the Main Hospital Building and Inpatient Building No. 1 would range from approximately 85 dBA L_{EQ} (during Phase 3) to 88 dBA L_{EQ} (during Phase 4), with maximum noise levels up to 90 dBA Lmax.. The Main Hospital Building and Inpatient Building No. 1 exterior shells should achieve an approximately 25 dBA attenuation, from exterior to interior noise levels. So patients would generally be exposed to construction noise levels approximating 65 dBA L_{EQ} which would not typically interfere with conversation, but may disrupt daytime recovery patterns relying upon quiet rest. However, more importantly, these short-term construction noise levels would exceed the measured ambient noise level of 55 dBA L_{EQ} near the southeastern corner of the Main Hospital Building by up to 35 dBA. Consequently, short-term construction noise is considered a **significant impact** upon patients receiving in-patient care in the Main Hospital Building and in Inpatient Building No. 1.

Off-Site Construction Traffic Noise

Similar to traffic noise from trips associated with operation of the project, noise would also result from construction-related traffic. Construction traffic levels would vary by construction phase, with a peak of 114 daily round-trips for construction workers and 52 daily round-trips for medium and heavy trucks occurring during the building construction phase. The peak number of heavy trucks trips daily would occur during grading, with 60 round-trips for hauling soil export; however, only 10 round-trips for construction worker vehicles would occur during the grading phase.

Using acoustical calculations adapted from the FHWA noise prediction model, traffic noise levels were determined for construction worker and heavy truck trips, when added to the existing traffic volumes. All of the construction trips are expected to travel on McBean Parkway, which currently carries 28,000 ADT (between Orchard Village and Rockwell Canyon). The addition on contrcution-related traffic during the peak construction period would increase traffic volumes along this roadway by 0.3 dBA L_{eq}. Therefore, while the noise from individual truck pass-by events may be discernible to a person nearby, construction traffic would not substantially increase average traffic noise levels above existing (the increase would be well below the 3 dBA significance threshold). Construction-related traffic noise is therefore deemed a less than significant impact.

4.3.3 Mitigation Measures

The 2008 Henry Mayo Newhall Memorial Hospital Master Plan Environmental Impact Report identified the following mitigation measures applicable to short-term significant construction noise impacts to off-site residences from PS-4 construction, they would also be applicable to address on-site impacts from construction of the Diagnostic and Treatment Building/Inpatient Building No. 2:

N1 During all site excavation and grading, the project applicant shall require the project contractor(s) to equip all construction equipment, fixed or mobile, with properly operating and maintained mufflers, consistent with manufacturers' standards.

N2 The project contractor shall place all stationary construction equipment so that emitted noise is directed away from sensitive receptors nearest the project site.

N3 The project applicant shall require the project contractor(s) to locate equipment staging in areas that would create the greatest distance between construction-related noise sources and noise-sensitive receptors nearest the project site during all project construction, to the extent practicable.

Significance After Mitigation

In examining the PS-4 construction noise levels at the closest residences the 2008 EIR concluded that construction noise impacts would remain significant, even after the incorporation of the above mitigation measures. In that case, construction noise was estimated to exceed the threshold by 4 dBA. Noise levels from construction of the Diagnostic and Treatment Building/Inpatient Building No. 2 as experienced in the vicinity of the Main Hospital Building and Inpatient Building No. 1 would exceed the ambient noise level by up to 35 dBA L_{EQ}. Individual noise control methods for construction activities typically achieve a reduction in the range of 5 - 6 dBA apiece. The suite of noise controls contained in mitigations N1 - N3 would likely be able to achieve an overall reduction of not more than 15 dBA L_{EQ} at the facades of the adjacent Main Hospital Building and Inpatient Building No. 1. Feasible mitigation measures do not exist to reduce construction noise levels at the Main Hospital Building and Inpatient No. 1 southeastern façade by 35 dBA to a level of 65 dBA L_{EQ} (which would be 10 dBA above ambient). Consequently, consistent with the 2008 EIR conclusions, short-term construction noise impacts would remain significant and unavoidable; in this instance, PS-4 construction noise at the closest off-site residences and Diagnostic and Treatment Building/Inpatient Building No. 2 construction noise impact upon patients receiving in-patient care in the Main Hospital Building and Inpatient Building No. 1.

4.4 Ground-borne Vibration

4.4.1 Impact Analysis

Construction Vibration

The main concern associated with ground-borne vibration is annoyance; however, in extreme cases, vibration can cause damage to buildings, particularly those that are old or otherwise fragile. Some common sources of ground-borne vibration are trains, and construction activities such as blasting, pile-driving, and heavy earth-moving equipment. The primary source of ground-borne vibration occurring as part of the project is construction activity.

During land clearing and construction activities for the proposed project ground-borne vibration would be produced by the heavy duty construction equipment. The most important equipment relative to generation of vibration, and the vibration levels produced by such equipment, is illustrated in Table 8.

Table 8
Vibration Velocities for Typical Construction Equipment

Equipment	PPV at 25 Feet (Inches Per Second)
Sonic Pile Driver	0.170
Large Bulldozer	0.089
Loaded Trucks	0.076
Drill Rig / Auger	0.089
Jackhammer	0.035
Small Bulldozer	0.003

Source: Caltrans 2013.

As shown in Table 8, a large bulldozer generates vibration levels of 0.089 in/sec PPV at a distance of 25 feet. The nearest off-site residences to the project site would be no closer than 150 feet from the edge of the closest constriction activity (PS-4). At this distance, vibration levels from the use of a large bulldozer would be 0.006 in/sec PPV. Vibration levels at these receptors would not approach even the Caltrans "sensitive person" annoyance level of 0.2 in/sec. They would also be even further below the building damage threshold of 0.5 in/sec PPV. As such, construction-related vibration associated with the proposed project would not be substantial and would not lead to annoyance or structural damage for the existing residences in the project vicinity. Off-site construction-related vibration impacts are would therefore be less than significant.

The closest distance between on-site construction and existing buildings would be 45 feet (construction of Diagnostic and Treatment Building/Inpatient Building No. 2 with respect to either the Main Hospital Building or Inpatient Building No. 1). At this distance, vibration levels from the use of a large bulldozer would be 0.03 in/sec PPV. Vibration levels at the Main Hospital Building or Inpatient Building No. 1 would not approach even the Caltrans "sensitive person" annoyance level of 0.2 in/sec (vibration would be one order of magnitude below this level). Vibration levels would also be even further below the building damage threshold of 0.3 in/sec PPV for conventional construction residential buildings. As such, construction-related vibration associated with the proposed project would not be substantial and would not lead to annoyance or structural damage for the existing structures on the hospital campus closest to the construction zones. Because the construction will be undertaken on behalf of Henry Mayo Hospital, it is reasonable to assume adequate coordination between the construction contractor and hospital administration would occur in order to accommodate activities particularly prone to vibration interference during the construction process. On-site vibration impacts are therefore considered to be less than significant.

Operations Vibration

Long-term sources of vibration include trains, heavy equipment involving rotating components (i.e., industrial compressors, etc.), and equipment involving percussion or impacts between components (i.e., die presses, etc.). While the proposed project does include HVAC equipment with air compressor components, such components are limited in scale and would not be expected to produce substantial vibration. This equipment is proposed to be installed on the roof-top of structures, and would typically be designed with vibration-isolation mounting systems (i.e., employing dampeners or springs). The magnitude of vibration which would be produced by project components is such that vibration would not reach existing habitable portions of existing on-site structures, and would have no potential to affect off-site structures or residents. Long term vibration impacts are therefore considered less than significant.

4.4.2 Mitigation Measures

The project would not result in a significant ground-borne vibration impact; therefore, no mitigation is required.

Significance After Mitigation

Mitigation is not required because impacts would be less than significant.

5.0 REFERENCES

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APPENDIX A

Ambient Noise Measurement Data

FIELD NOISE MEASUREMENT DATA

PROJECT: HENRY MAYO NEWHALL HOSPITAL
PROJECT #: 9310
SITE ID: MAIN HOSPITAL
SITE ADDRESS: HMNH SANTA CLARITA
OBSERVER(S): JVL, NLL
START DATE: 6/14
END DATE: 6/14
START TIME: 11:00
END TIME: 11:15

METEOROLOGICAL CONDITIONS

TEMP: 78 F
HUMIDITY: 41 % R.H.
WIND: [✓ CALM] LIGHT MODERATE VARIABLE STEADY GUSTY
WINDSPD: 1 MPH
DIR.: N [✓ NE] S SE S SW W NW
SKY: [✓ SUNNY] CLEAR OVRCAST PRTLY CLDY FOG RAIN

ACOUSTIC MEASUREMENTS

MEAS. INSTRUMENT: LD 820
TYPE: [✓ 1] 2
SERIAL #: 1534
CALIBRATOR: LD CAL 200
SERIAL #: 4496
CALIBRATION CHECK: PRE-TEST 114 dBA SPL POST-TEST 114 dBA SPL WINDSCRN

SETTINGS: A-WTD SLOW FAST FRONTAL RANDOM ANSI OTHER:

REC. #	BEGIN	END	Leq	Lmax	Lmin	L90	L50	L10	OTHER (SPECIFY METRIC
1	11:00	11:15	54.5	63.0	47.5	–	–	–	

COMMENTS:
CONSTRUCTION NOISE FROM HOSPITAL TOWER SHIELDED BY MAIN HOSPITAL BUILDING.

SOURCE INFO AND TRAFFIC COUNTS

PRIMARY NOISE SOURCE: TRAFFIC AIRCRAFT RAIL INDUSTRIAL OTHER: HOSPITAL GROUNDS
ROADWAY TYPE:
DIST. TO RDWY C/L OR EOP:
TRAFFIC COUNT DURATION: ___ MIN SPEED ___ MIN SPEED

COUNT 1 (OR RDWY 1) DIRECTION	NB/EB	SB/WB	NB/EB	SB/WB	COUNT 2 (OR RDWY 2) NB/EB	SB/WB	NB/EB	SB/WB
AUTOS								
MED TRKS								
HVY TRKS								
BUSES								
MOTRCLS								

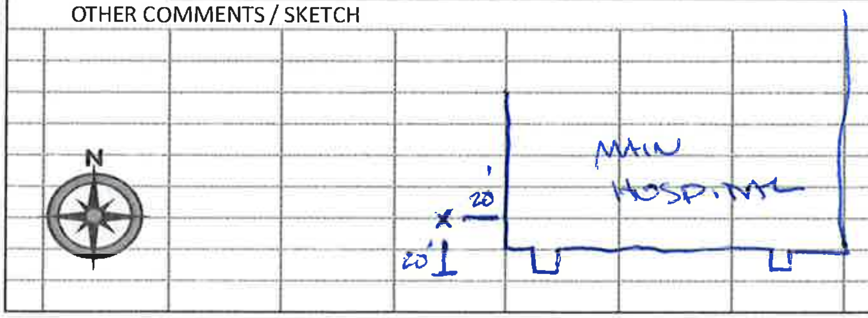
IF COUNTING BOTH DIRECTIONS AS ONE, CHECK HERE ___

SPEEDS ESTIMATED BY: RADAR / DRIVING THE PACE
POSTED SPEED LIMIT SIGNS SAY:

OTHER NOISE SOURCES (BACKGROUND): DIST. AIRCRAFT RUSTLING LEAVES DIST. BARKING DOGS BIRDS DIST. INDUSTRIAL DIST. KIDS PLAYING DIST. CONVRSTNS / YELLING DIST. TRAFFIC (LIST RDWYS BELOW) DISTD GARDENERS/LANDSCAPING NOISE
OTHER:

DESCRIPTION / SKETCH

TERRAIN: HARD [✓ SOFT] MIXED FLAT OTHER: IN LAWN AREA
PHOTOS:
OTHER COMMENTS / SKETCH



DUDEK

FIELD NOISE MEASUREMENT DATA

PROJECT HENRY MAYO NEWHALL HOSPITAL **PROJECT #** 9310
SITE ID ENTRANCE SURFACE PARKING LOT
SITE ADDRESS HMNH SANTA CLARITA **OBSERVER(S)** JVL, NLL
START DATE 6/14 **END DATE** 6/14
START TIME 11:20 AM **END TIME** 11:35 AM

METEOROLOGICAL CONDITIONS
TEMP 78 F **HUMIDITY** 41 % R.H. **WIND** [✓ CALM] LIGHT MODERATE
WINDSPD 1 MPH **DIR.** N [✓ NE] S SE S SW W NW VARIABLE STEADY GUSTY
SKY [✓ SUNNY] CLEAR OVRCAST PRTLY CLDY FOG RAIN

ACOUSTIC MEASUREMENTS
MEAS. INSTRUMENT LD 820 **TYPE** [✓ 1] 2 **SERIAL #** 1534
CALIBRATOR LD CAL 200 **SERIAL #** 4496
CALIBRATION CHECK PRE-MEASUREMENT 114 dBA SPL POST-MEASUREMENT 114 dBA SPL WINDSCRN

SETTINGS A-WTD SLOW FAST FRONTAL RANDOM ANSI OTHER:

REC. #	BEGIN	END	Leq	Lmax	Lmin	L90	L50	L10	OTHER (SPECIFY METRIC
1	11:20	11:35	60.6	78.2	48.5	–	–	–	

COMMENTS
CONSTRUCTION NOISE FROM HOSPITAL TOWER LARGELY SHIELDED BY MAIN HOSPITAL.

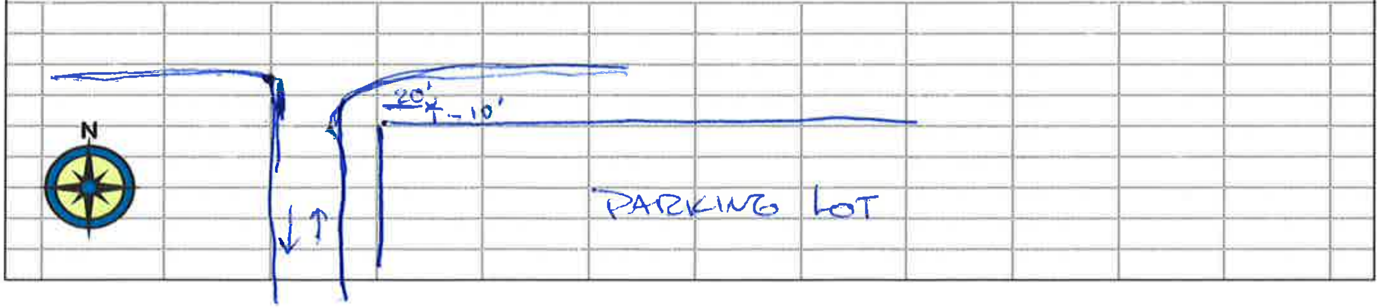
SOURCE INFO AND TRAFFIC COUNTS
PRIMARY NOISE SOURCE TRAFFIC AIRCRAFT RAIL INDUSTRIAL OTHER: PARKING LOT/ HOSPITAL
ROADWAY TYPE: DIST. TO RDWY C/L OR EOP:
TRAFFIC COUNT DURATION: MIN SPEED MIN SPEED

COUNT 1 (OR RDWY 1) DIRECTION	NB/EB	SB/WB	NB/EB	SB/WB	IF COUNTING BOTH DIRECTIONS AS ONE, CHECK HERE	COUNT 2 (OR RDWY 2) NB/EB	SB/WB	NB/EB	SB/WB
AUTOS									
MED TRKS									
HVY TRKS									
BUSES									
MOTRCLS									

SPEEDS ESTIMATED BY: RADAR / DRIVING THE PACE
POSTED SPEED LIMIT SIGNS SAY:

OTHER NOISE SOURCES (BACKGROUND): DIST. AIRCRAFT RUSTLING LEAVES DIST. BARKING DOGS BIRDS DIST. INDUSTRIAL DIST. KIDS PLAYING DIST. CONVRSTNS / YELLING DIST. TRAFFIC (LIST RDWYS BELOW) DISTD GARDENERS/LANDSCAPING NOISE
OTHER:

DESCRIPTION / SKETCH
TERRAIN [✓ HARD] SOFT MIXED FLAT OTHER:
PHOTOS
OTHER COMMENTS / SKETCH



APPENDIX B

Noise Calculation Worksheets for On-Site Equipment & Parking Structure

MECHANICAL EQUIPMENT NOISE LEVEL

R1 CLOSEST RESIDENCE - EAST OF PROJECT

Location:
Easth Res. Rec. 1900 740 0

	Source Coordinates			Receiver Coordinates		Location-Equipment	Leq (h) at 50'	Receiver Elevation	Source Elevation	Source to Receiver	Leq w/o Barrier
Equip Site	X	Y	Z	X	Y		(dBA)	(feet)	(feet)	(feet)	(dBA)
H1	1430	400	50	1900	740	Lennox SGC240	61	5	53.0	580	40
H2	1490	400	50	1900	740	Lennox SGC240	61	5	53.0	533	41
H3	1550	400	50	1900	740	Lennox SGC240	61	5	53.0	488	42
H4	1610	400	50	1900	740	Lennox SGC240	61	5	53.0	447	42
H5	1670	400	50	1900	740	Lennox SGC240	61	5	53.0	410	43
G1	1610	400	50	1900	740	CAT 3512C	67	5	60.0	447	48
G2	1670	400	50	1900	740	CAT 3512C	67	5	60.0	410	49
PG	1100	135	20	1900	740	Parking Garage	60	5	23.0	1,003	34

Total Leq 53

Without
Barrier

Site	X	Y	Elev. At Roof or Ground	Source Height	LwA Single Source	Number of Units	Sound Level at 50 feet Total	Equip. Location Site / Number	
H1	1430	400	50	3	90	2	61	H1	Lennox SGC240
H2	1490	400	50	3	90	2	61	H2	Lennox SGC240
H3	1550	400	50	3	90	2	61	H3	Lennox SGC240
H4	1610	400	50	3	90	2	61	H4	Lennox SGC240
H5	1670	400	50	3	90	2	61	H5	Lennox SGC240
G1	1610	400	50	10	NA	1	67	G1	CAT 3512C
G2	1670	400	50	10	NA	1	67	G2	CAT 3512C
PG	1100	135	20	3	NA	NA	60	PG	Parking Garage

MECHANICAL EQUIPMENT NOISE LEVEL

R2 CLOSEST RESIDENCE - NORTH OF PROJECT

Location:
North Res. Rec. 1550 1000 0

	Source Coordinates			Receiver Coordinates		Location-Equipment	Leq (h) at 50' (dBA)	Receiver Elevation (feet)	Source Elevation (feet)	Source to Receiver (feet)	Leq w/o Barrier (dBA)
Equip Site	X	Y	Z	X	Y						
H1	1430	400	50	1550	1000	Lennox SGC240	61	5	53.0	612	40
H2	1490	400	50	1550	1000	Lennox SGC240	61	5	53.0	603	40
H3	1550	400	50	1550	1000	Lennox SGC240	61	5	53.0	600	40
H4	1610	400	50	1550	1000	Lennox SGC240	61	5	53.0	603	40
H5	1670	400	50	1550	1000	Lennox SGC240	61	5	53.0	612	40
G1	1610	400	50	1550	1000	CAT 3512C	67	5	60.0	603	45
G2	1670	400	50	1550	1000	CAT 3512C	67	5	60.0	612	45
PG	1100	135	20	1550	1000	Parking Garage	60	5	23.0	975	34

Total Leq 51

Without
Barrier

Site	X	Y	Elev. At Roof or Ground	Source Height	LwA Single Source	Number of Units	Sound Level at 50 feet Total	Equip. Location Site / Number	
H1	1430	400	50	3	90	2	61	H1	Lennox SGC240
H2	1490	400	50	3	90	2	61	H2	Lennox SGC240
H3	1550	400	50	3	90	2	61	H3	Lennox SGC240
H4	1610	400	50	3	90	2	61	H4	Lennox SGC240
H5	1670	400	50	3	90	2	61	H5	Lennox SGC240
G1	1610	400	50	10	NA	1	67	G1	CAT 3512C
G2	1670	400	50	10	NA	1	67	G2	CAT 3512C
PG	1100	135	20	3	NA	NA	60	PG	Parking Garage

MECHANICAL EQUIPMENT NOISE LEVEL

R3 CLOSEST RESIDENCE -WEST OF PROJECT

Location:
West Res. Rec. 0 340 0

	Source Coordinates			Receiver Coordinates		Location-Equipment	Leq (h) at 50'	Receiver Elevation	Source Elevation	Source to Receiver	Leq w/o Barrier
Equip Site	X	Y	Z	X	Y		(dBA)	(feet)	(feet)	(feet)	(dBA)
H1	1430	400	50	0	340	Lennox SGC240	61	5	53.0	1,431	32
H2	1490	400	50	0	340	Lennox SGC240	61	5	53.0	1,491	32
H3	1550	400	50	0	340	Lennox SGC240	61	5	53.0	1,551	31
H4	1610	400	50	0	340	Lennox SGC240	61	5	53.0	1,611	31
H5	1670	400	50	0	340	Lennox SGC240	61	5	53.0	1,671	31
G1	1610	400	50	0	340	CAT 3512C	67	5	60.0	1,611	37
G2	1670	400	50	0	340	CAT 3512C	67	5	60.0	1,671	37
PG	1100	135	20	0	340	Parking Garage	60	5	23.0	1,119	33
										Total Leq	43
											Without Barrier

					LwA				
Site	X	Y	Elev. At Roof or Ground	Source Height	Single Source	Number of Units	Sound Level at 50 feet Total	Equip. Location Site / Number	
H1	1430	400	50	3	90	2	61	H1	Lennox SGC240
H2	1490	400	50	3	90	2	61	H2	Lennox SGC240
H3	1550	400	50	3	90	2	61	H3	Lennox SGC240
H4	1610	400	50	3	90	2	61	H4	Lennox SGC240
H5	1670	400	50	3	90	2	61	H5	Lennox SGC240
G1	1610	400	50	10	NA	1	67	G1	CAT 3512C
G2	1670	400	50	10	NA	1	67	G2	CAT 3512C
PG	1100	135	20	3	NA	NA	60	PG	Parking Garage

MECHANICAL EQUIPMENT NOISE LEVEL

R4 CLOSEST RESIDENCE - SOUTH OF PROJECT

Location:
South Res. Rec. 1100 0 0

	Source Coordinates			Receiver Coordinates		Location-Equipment	Leq (h) at 50'	Receiver Elevation	Source Elevation	Source to Receiver	Leq w/o Barrier
Equip Site	X	Y	Z	X	Y		(dBA)	(feet)	(feet)	(feet)	(dBA)
H1	1430	400	50	1100	0	Lennox SGC240	61	5	53.0	519	41
H2	1490	400	50	1100	0	Lennox SGC240	61	5	53.0	559	40
H3	1550	400	50	1100	0	Lennox SGC240	61	5	53.0	602	40
H4	1610	400	50	1100	0	Lennox SGC240	61	5	53.0	648	39
H5	1670	400	50	1100	0	Lennox SGC240	61	5	53.0	696	38
G1	1610	400	50	1100	0	CAT 3512C	67	5	60.0	648	45
G2	1670	400	50	1100	0	CAT 3512C	67	5	60.0	696	44
PG	1100	135	20	1100	0	Parking Garage	60	5	23.0	135	51

Total Leq 54

Without
Barrier

Site	X	Y	Elev. At Roof or Ground	Source Height	LwA Single Source	Number of Units	Sound Level at 50 feet Total	Equip. Location Site / Number	
H1	1430	400	50	3	90	2	61	H1	Lennox SGC240
H2	1490	400	50	3	90	2	61	H2	Lennox SGC240
H3	1550	400	50	3	90	2	61	H3	Lennox SGC240
H4	1610	400	50	3	90	2	61	H4	Lennox SGC240
H5	1670	400	50	3	90	2	61	H5	Lennox SGC240
G1	1610	400	50	10	NA	1	67	G1	CAT 3512C
G2	1670	400	50	10	NA	1	67	G2	CAT 3512C
PG	1100	135	20	3	NA	NA	60	PG	Parking Garage

APPENDIX C

Roadway Noise Construction Model (RNCM)

Input & Results Data Sheets

DEMOLITION

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 7/17/2019
Case Description: Demolition

---- Receptor #1 ----

		Baselines (dBA)		
Description	Land Use	Daytime	Evening	Night
Closest Off-Site Residence to DT / IB	Residential	50	50	45

			Equipment			
Description	Impact Device	Usage(%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Concrete Saw	No	20		89.6	380	0
Dozer	No	40		81.7	380	0
Backhoe	No	40		77.6	380	0
Front End Loader	No	40		79.1	380	0
Tractor	No	40	84		380	0
Flat Bed Truck	No	40		74.3	380	0

	Results	Calculated (dBA)	
Equipment		*Lmax	Leq
Concrete Saw		72	65
Dozer		64.1	60.1
Backhoe		59.9	56
Front End Loader		61.5	57.5
Tractor		66.4	62.4
Flat Bed Truck		56.6	52.7
	Total	72	68.5

*Calculated Lmax is the Loudest value.

---- Receptor #2 ----

		Baselines (dBA)		
Description	Land Use	Daytime	Evening	Night
Off-Site Residence Acoustic Center from DT/IB	Residential	50	50	45

			Equipment			
Description	Impact Device	Usage(%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Concrete Saw	No	20		89.6	540	0
Dozer	No	40		81.7	540	0
Backhoe	No	40		77.6	540	0
Front End Loader	No	40		79.1	540	0
Tractor	No	40	84		540	0
Flat Bed Truck	No	40		74.3	540	0

Results

		Calculated (dBA)	
Equipment		*Lmax	Leq
Concrete Saw		68.9	61.9
Dozer		61	57
Backhoe		56.9	52.9
Front End Loader		58.4	54.5
Tractor		63.3	59.4
Flat Bed Truck		53.6	49.6
	Total	68.9	65.4

*Calculated Lmax is the Loudest value.

---- Receptor #3 ----

		Baselines (dBA)		
Description	Land Use	Daytime	Evening	Night
Main Hospital Building from DT/IB	Commercial	50	50	45

Description	Impact Device	Usage(%)	Equipment Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Concrete Saw	No	20		89.6	45	0
Dozer	No	40		81.7	45	0
Backhoe	No	40		77.6	45	0
Front End Loader	No	40		79.1	45	0
Tractor	No	40	84		45	0
Flat Bed Truck	No	40		74.3	45	0

Results

		Calculated (dBA)	
Equipment		*Lmax	Leq
Concrete Saw		90.5	83.5
Dozer		82.6	78.6
Backhoe		78.5	74.5
Front End Loader		80	76
Tractor		84.9	80.9
Flat Bed Truck		75.2	71.2
	Total	90.5	87

*Calculated Lmax is the Loudest value.

---- Receptor #4 ----

		Baselines (dBA)		
Description	Land Use	Daytime	Evening	Night
Main Hospital	Commercial	50	50	45
Acoustic Center				
from DT/IB				

			Equipment			
			Spec	Actual	Receptor	Estimated
	Impact		Lmax	Lmax	Distance	Shielding
Description	Device	Usage(%)	(dBA)	(dBA)	(feet)	(dBA)
Concrete Saw	No	20		89.6	105	0
Dozer	No	40		81.7	105	0
Backhoe	No	40		77.6	105	0
Front End Loader	No	40		79.1	105	0
Tractor	No	40	84		105	0
Flat Bed Truck	No	40		74.3	105	0

Results

		Calculated (dBA)	
Equipment		*Lmax	Leq
Concrete Saw		83.1	76.1
Dozer		75.2	71.2
Backhoe		71.1	67.1
Front End Loader		72.7	68.7
Tractor		77.6	73.6
Flat Bed Truck		67.8	63.8
	Total	83.1	79.6

*Calculated Lmax is the Loudest value.

---- Receptor #5 ----

		Baselines (dBA)		
Description	Land Use	Daytime	Evening	Night
Closest Res. to PS-4	Residential	50	50	45

			Equipment			
			Spec	Actual	Receptor	Estimated
	Impact		Lmax	Lmax	Distance	Shielding
Description	Device	Usage(%)	(dBA)	(dBA)	(feet)	(dBA)
Concrete Saw	No	20		89.6	150	0
Dozer	No	40		81.7	150	0
Backhoe	No	40		77.6	150	0
Front End Loader	No	40		79.1	150	0
Tractor	No	40	84		150	0
Flat Bed Truck	No	40		74.3	150	0

Results

Calculated (dBA)

Equipment	*Lmax	Leq
Concrete Saw	80	73
Dozer	72.1	68.1
Backhoe	68	64
Front End Loader	69.6	65.6
Tractor	74.5	70.5
Flat Bed Truck	64.7	60.7
Total	80	76.6

*Calculated Lmax is the Loudest value.

SITE PREPARATION

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 7/17/2019
Case Description: Site Preparation

---- Receptor #1 ----

		Baselines (dBA)		
Description	Land Use	Daytime	Evening	Night
Closest Off-Site Residence to DT / IB	Residential	50	50	45

			Equipment			
Description	Impact Device	Usage(%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Grader	No	40	85		380	0
Scraper	No	40		83.6	380	0
Backhoe	No	40		77.6	380	0
Flat Bed Truck	No	40		74.3	380	0

Results

		Calculated (dBA)	
Equipment		*Lmax	Leq
Grader		67.4	63.4
Scraper		66	62
Backhoe		59.9	56
Flat Bed Truck		56.6	52.7
	Total	67.4	66.4

*Calculated Lmax is the Loudest value.

---- Receptor #2 ----

		Baselines (dBA)		
Description	Land Use	Daytime	Evening	Night
Off-Site Residence Acoustic Center from DT/IB	Residential	50	50	45

			Equipment			
Description	Impact Device	Usage(%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Grader	No	40	85		540	0
Scraper	No	40		83.6	540	0
Backhoe	No	40		77.6	540	0
Flat Bed Truck	No	40		74.3	540	0

	Results	Calculated (dBA)	
Equipment		*Lmax	Leq
Grader		64.3	60.4
Scraper		62.9	58.9
Backhoe		56.9	52.9
Flat Bed Truck		53.6	49.6
	Total	64.3	63.3

*Calculated Lmax is the Loudest value.

---- Receptor #3 ----

		Baselines (dBA)		
Description	Land Use	Daytime	Evening	Night
Main Hospital Building from DT/IB	Commercial	50	50	45

Description	Impact Device	Usage(%)	Equipment Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Grader	No	40	85		45	0
Scraper	No	40		83.6	45	0
Backhoe	No	40		77.6	45	0
Flat Bed Truck	No	40		74.3	45	0

	Results	Calculated (dBA)	
Equipment		*Lmax	Leq
Grader		85.9	81.9
Scraper		84.5	80.5
Backhoe		78.5	74.5
Flat Bed Truck		75.2	71.2
	Total	85.9	84.9

*Calculated Lmax is the Loudest value.

---- Receptor #4 ----

		Baselines (dBA)		
Description	Land Use	Daytime	Evening	Night
Main Hospital Acoustic Center from DT/IB	Commercial	50	50	45

Description	Impact Device	Usage(%)	Equipment Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Grader	No	40	85		105	0
Scraper	No	40		83.6	105	0
Backhoe	No	40		77.6	105	0
Flat Bed Truck	No	40		74.3	105	0

Results

Calculated (dBA)

Equipment		*Lmax	Leq
Grader		78.6	74.6
Scraper		77.1	73.2
Backhoe		71.1	67.1
Flat Bed Truck		67.8	63.8
	Total	78.6	77.6

*Calculated Lmax is the Loudest value.

---- Receptor #5 ----

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
Closest Res. to PS-4	Residential	50	50	45

Description	Impact Device	Usage(%)	Equipment Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Grader	No	40	85		150	0
Scraper	No	40		83.6	150	0
Backhoe	No	40		77.6	150	0
Flat Bed Truck	No	40		74.3	150	0

Results

Calculated (dBA)

Equipment		*Lmax	Leq
Grader		75.5	71.5
Scraper		74	70.1
Backhoe		68	64
Flat Bed Truck		64.7	60.7
	Total	75.5	74.5

*Calculated Lmax is the Loudest value.

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 7/17/2019
Case Description: Grading

---- Receptor #1 ----

		Baselines (dBA)		
Description	Land Use	Daytime	Evening	Night
Closest Off-Site Residence to DT / IB	Residential	50	50	45

			Equipment			
Description	Impact Device	Usage(%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Grader	No	40	85		380	0
Dozer	No	40		81.7	380	0
Backhoe	No	40		77.6	380	0
Front End Loader	No	40		79.1	380	0
Flat Bed Truck	No	40		74.3	380	0

Results

		Calculated (dBA)	
Equipment		*Lmax	Leq
Grader		67.4	63.4
Dozer		64.1	60.1
Backhoe		59.9	56
Front End Loader		61.5	57.5
Flat Bed Truck		56.6	52.7
	Total	67.4	66.4

*Calculated Lmax is the Loudest value.

---- Receptor #2 ----

		Baselines (dBA)		
Description	Land Use	Daytime	Evening	Night
Off-Site Residence Acoustic Center from DT/IB	Residential	50	50	45

			Equipment			
Description	Impact Device	Usage(%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Grader	No	40	85		540	0
Dozer	No	40		81.7	540	0
Backhoe	No	40		77.6	540	0
Front End Loader	No	40		79.1	540	0
Flat Bed Truck	No	40		74.3	540	0

Results

Calculated (dBA)

Equipment		*Lmax	Leq
Grader		64.3	60.4
Dozer		61	57
Backhoe		56.9	52.9
Front End Loader		58.4	54.5
Flat Bed Truck		53.6	49.6
	Total	64.3	63.3

*Calculated Lmax is the Loudest value.

---- Receptor #3 ----

Baselines (dBA)

Description	Land Use	Daytime	Evening	Night
Main Hospital Building from DT/IB	Commercial	50	50	45

Description	Impact Device	Usage(%)	Equipment Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Grader	No	40	85		45	0
Dozer	No	40		81.7	45	0
Backhoe	No	40		77.6	45	0
Front End Loader	No	40		79.1	45	0
Flat Bed Truck	No	40		74.3	45	0

Results

Calculated (dBA)

Equipment		*Lmax	Leq
Grader		85.9	81.9
Dozer		82.6	78.6
Backhoe		78.5	74.5
Front End Loader		80	76
Flat Bed Truck		75.2	71.2
	Total	85.9	84.9

*Calculated Lmax is the Loudest value.

---- Receptor #4 ----

		Baselines (dBA)		
Description	Land Use	Daytime	Evening	Night
Main Hospital Acoustic Center from DT/IB	Commercial	50	50	45

			Equipment			
Description	Impact Device	Usage(%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Grader	No	40	85		105	0
Dozer	No	40		81.7	105	0
Backhoe	No	40		77.6	105	0
Front End Loader	No	40		79.1	105	0
Flat Bed Truck	No	40		74.3	105	0

Results

		Calculated (dBA)	
Equipment		*Lmax	Leq
Grader		78.6	74.6
Dozer		75.2	71.2
Backhoe		71.1	67.1
Front End Loader		72.7	68.7
Flat Bed Truck		67.8	63.8
	Total	78.6	77.6

*Calculated Lmax is the Loudest value.

---- Receptor #5 ----

		Baselines (dBA)		
Description	Land Use	Daytime	Evening	Night
Closest Res. to PS-4	Residential	50	50	45

			Equipment			
Description	Impact Device	Usage(%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Grader	No	40	85		150	0
Dozer	No	40		81.7	150	0
Backhoe	No	40		77.6	150	0
Front End Loader	No	40		79.1	150	0
Flat Bed Truck	No	40		74.3	150	0

Results

	Calculated (dBA)	
Equipment	*Lmax	Leq
Grader	75.5	71.5
Dozer	72.1	68.1
Backhoe	68	64
Front End Loader	69.6	65.6
Flat Bed Truck	64.7	60.7
Total	75.5	74.5

*Calculated Lmax is the Loudest value.

BUILDING CONSTRUCTION

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 7/17/2019
Case Description: Building Construction

---- Receptor #1 ----

		Baselines (dBA)		
Description	Land Use	Daytime	Evening	Night
Closest Off-Site Residence to DT / IB	Residential	50	50	45

Description	Impact Device	Usage(%)	Equipment Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Crane	No	16		80.6	380	0
Welder / Torch	No	40		74	380	0
Welder / Torch	No	40		74	380	0
Welder / Torch	No	40		74	380	0
Tractor	No	40	84		380	0
Flat Bed Truck	No	40		74.3	380	0
Generator	No	50		80.6	380	0
All Other Equipment > 5 HP	No	50	85		380	0
All Other Equipment > 5 HP	No	50	85		380	0
Compressor (air)	No	40		77.7	380	0

Results

	Calculated (dBA)	
Equipment	*Lmax	Leq
Crane	62.9	55
Welder / Torch	56.4	52.4
Welder / Torch	56.4	52.4
Welder / Torch	56.4	52.4
Tractor	66.4	62.4
Flat Bed Truck	56.6	52.7
Generator	63	60
All Other Equipment > 5 HP	67.4	64.4
All Other Equipment > 5 HP	67.4	64.4
Compressor (air)	60.1	56.1
Total	67.4	69.8

*Calculated Lmax is the Loudest value.

---- Receptor #2 ----

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
Off-Site Residence	Residential	50	50	45

Acoustic Center
from DT/IB

Description	Impact Device	Usage(%)	Equipment Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Crane	No	16		80.6	540	0
Welder / Torch	No	40		74	540	0
Welder / Torch	No	40		74	540	0
Welder / Torch	No	40		74	540	0
Tractor	No	40	84		540	0
Flat Bed Truck	No	40		74.3	540	0
Generator	No	50		80.6	540	0
All Other Equipment > 5 HP	No	50	85		540	0
All Other Equipment > 5 HP	No	50	85		540	0
Compressor (air)	No	40		77.7	540	0

Results

Equipment	Calculated (dBA) *Lmax	Leq
Crane	59.9	51.9
Welder / Torch	53.3	49.4
Welder / Torch	53.3	49.4
Welder / Torch	53.3	49.4
Tractor	63.3	59.4
Flat Bed Truck	53.6	49.6
Generator	60	57
All Other Equipment > 5 HP	64.3	61.3
All Other Equipment > 5 HP	64.3	61.3
Compressor (air)	57	53
Total	64.3	66.8

*Calculated Lmax is the Loudest value.

---- Receptor #3 ----

		Baselines (dBA)		
Description	Land Use	Daytime	Evening	Night
Main Hospital Building from DT/IB	Commercial	50	50	45

Description	Impact Device	Usage(%)	Equipment Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Crane	No	16		80.6	45	0
Welder / Torch	No	40		74	45	0
Welder / Torch	No	40		74	45	0
Welder / Torch	No	40		74	45	0
Tractor	No	40	84		45	0
Flat Bed Truck	No	40		74.3	45	0
Generator	No	50		80.6	45	0
All Other Equipment > 5 HP	No	50	85		45	0
All Other Equipment > 5 HP	No	50	85		45	0
Compressor (air)	No	40		77.7	45	0

Results

	Calculated (dBA)	
Equipment	*Lmax	Leq
Crane	81.5	73.5
Welder / Torch	74.9	70.9
Welder / Torch	74.9	70.9
Welder / Torch	74.9	70.9
Tractor	84.9	80.9
Flat Bed Truck	75.2	71.2
Generator	81.5	78.5
All Other Equipment > 5 HP	85.9	82.9
All Other Equipment > 5 HP	85.9	82.9
Compressor (air)	78.6	74.6
Total	85.9	88.4

*Calculated Lmax is the Loudest value.

---- Receptor #4 ----

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
Main Hospital Acoustic Center from DT/IB	Commercial	50	50	45

Description	Impact Device	Usage(%)	Equipment Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Crane	No	16		80.6	105	0
Welder / Torch	No	40		74	105	0
Welder / Torch	No	40		74	105	0
Welder / Torch	No	40		74	105	0
Tractor	No	40	84		105	0
Flat Bed Truck	No	40		74.3	105	0
Generator	No	50		80.6	105	0
All Other Equipment > 5 HP	No	50	85		105	0
All Other Equipment > 5 HP	No	50	85		105	0
Compressor (air)	No	40		77.7	105	0

Results

Equipment		Calculated (dBA) *Lmax	Leq
Crane		74.1	66.1
Welder / Torch		67.6	63.6
Welder / Torch		67.6	63.6
Welder / Torch		67.6	63.6
Tractor		77.6	73.6
Flat Bed Truck		67.8	63.8
Generator		74.2	71.2
All Other Equipment > 5 HP		78.6	75.5
All Other Equipment > 5 HP		78.6	75.5
Compressor (air)		71.2	67.2
	Total	78.6	81

*Calculated Lmax is the Loudest value.

---- Receptor #5 ----

		Baselines (dBA)		
Description	Land Use	Daytime	Evening	Night
Closest Res. to PS-4	Residential	50	50	45

Description	Impact Device	Usage(%)	Equipment Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Crane	No	16		80.6	150	0
Welder / Torch	No	40		74	150	0
Welder / Torch	No	40		74	150	0
Welder / Torch	No	40		74	150	0
Tractor	No	40	84		150	0
Flat Bed Truck	No	40		74.3	150	0
Generator	No	50		80.6	150	0
All Other Equipment > 5 HP	No	50	85		150	0
All Other Equipment > 5 HP	No	50	85		150	0
Compressor (air)	No	40		77.7	150	0

Results

		Calculated (dBA)	
Equipment		*Lmax	Leq
Crane		71	63
Welder / Torch		64.5	60.5
Welder / Torch		64.5	60.5
Welder / Torch		64.5	60.5
Tractor		74.5	70.5
Flat Bed Truck		64.7	60.7
Generator		71.1	68.1
All Other Equipment > 5 HP		75.5	72.4
All Other Equipment > 5 HP		75.5	72.4
Compressor (air)		68.1	64.1
	Total	75.5	77.9

*Calculated Lmax is the Loudest value.

PAVING

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 7/17/2019
Case Description: Paving

---- Receptor #1 ----

		Baselines (dBA)		
Description	Land Use	Daytime	Evening	Night
Closest Off-Site Residence to DT / IB	Residential	50	50	45

			Equipment			
Description	Impact Device	Usage(%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Concrete Mixer Truck	No	40		78.8	380	0
Paver	No	50		77.2	380	0
Pavement Scarafier	No	20		89.5	380	0
Roller	No	20		80	380	0
Tractor	No	40	84		380	0
Flat Bed Truck	No	40		74.3	380	0

	Results	Calculated (dBA)	
Equipment		*Lmax	Leq
Concrete Mixer Truck		61.2	57.2
Paver		59.6	56.6
Pavement Scarafier		71.9	64.9
Roller		62.4	55.4
Tractor		66.4	62.4
Flat Bed Truck		56.6	52.7
	Total	71.9	68

*Calculated Lmax is the Loudest value.

---- Receptor #2 ----

		Baselines (dBA)		
Description	Land Use	Daytime	Evening	Night
Off-Site Residence Acoustic Center from DT/IB	Residential	50	50	45

			Equipment			
Description	Impact Device	Usage(%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Concrete Mixer Truck	No	40		78.8	540	0
Paver	No	50		77.2	540	0
Pavement Scarafier	No	20		89.5	540	0
Roller	No	20		80	540	0
Tractor	No	40	84		540	0
Flat Bed Truck	No	40		74.3	540	0

		Results	
		Calculated (dBA)	
Equipment		*Lmax	Leq
Concrete Mixer Truck		58.1	54.2
Paver		56.6	53.5
Pavement Scarafier		68.8	61.8
Roller		59.3	52.3
Tractor		63.3	59.4
Flat Bed Truck		53.6	49.6
	Total	68.8	65

*Calculated Lmax is the Loudest value.

---- Receptor #3 ----

		Baselines (dBA)		
Description	Land Use	Daytime	Evening	Night
Main Hospital Building from DT/IB	Commercial	50	50	45

Description	Impact Device	Usage(%)	Equipment Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Concrete Mixer Truck	No	40		78.8	45	0
Paver	No	50		77.2	45	0
Pavement Scarafier	No	20		89.5	45	0
Roller	No	20		80	45	0
Tractor	No	40	84		45	0
Flat Bed Truck	No	40		74.3	45	0

		Results	
		Calculated (dBA)	
Equipment		*Lmax	Leq
Concrete Mixer Truck		79.7	75.7
Paver		78.1	75.1
Pavement Scarafier		90.4	83.4
Roller		80.9	73.9
Tractor		84.9	80.9
Flat Bed Truck		75.2	71.2
	Total	90.4	86.6

*Calculated Lmax is the Loudest value.

---- Receptor #4 ----

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
Main Hospital Acoustic Center from DT/IB	Commercial	50	50	45

Description	Impact Device	Usage(%)	Equipment Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Concrete Mixer Truck	No	40		78.8	105	0
Paver	No	50		77.2	105	0
Pavement Scarafier	No	20		89.5	105	0
Roller	No	20		80	105	0
Tractor	No	40	84		105	0
Flat Bed Truck	No	40		74.3	105	0

Results

Equipment		Calculated (dBA) *Lmax	Leq
Concrete Mixer Truck		72.4	68.4
Paver		70.8	67.8
Pavement Scarafier		83.1	76.1
Roller		73.6	66.6
Tractor		77.6	73.6
Flat Bed Truck		67.8	63.8
	Total	83.1	79.2

*Calculated Lmax is the Loudest value.

---- Receptor #5 ----

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
Closest Res. to PS-4	Residential	50	50	45

Description	Impact Device	Usage(%)	Equipment Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Concrete Mixer Truck	No	40		78.8	150	0
Paver	No	50		77.2	150	0
Pavement Scarafier	No	20		89.5	150	0
Roller	No	20		80	150	0
Tractor	No	40	84		150	0
Flat Bed Truck	No	40		74.3	150	0

Results

Equipment	Calculated (dBA) *Lmax	Leq
Concrete Mixer Truck	69.3	65.3
Paver	67.7	64.7
Pavement Scarafier	80	73
Roller	70.5	63.5
Tractor	74.5	70.5
Flat Bed Truck	64.7	60.7
Total	80	76.1

*Calculated Lmax is the Loudest value.