3.10 NOISE

This section describes the existing physical and regulatory setting related to noise and vibration and discusses the potential effects of the EIS Alternatives related to noise and vibration.

3.10.1 Affected Environment

Noise Properties, Effects, and Sources

Noise is generally defined as unwanted or objectionable sound. The effects of noise on people can include general annoyance, interference with speech communication, sleep disturbance, and in the extreme, hearing impairment. Noise effects can be caused by its pitch or loudness. Pitch is the height of a tone; higher pitched sounds are louder to humans than lower pitched sounds. Loudness is intensity or amplitude of sound.

Noise levels are measured as decibels (dB) on a logarithmic scale that quantifies sound intensity in a manner similar to the Richter scale used for earthquake magnitudes. Thus, a doubling of the energy of a noise source, such as doubling of traffic volume, would increase the noise level by 3 dB; a halving of the energy would result in a 3-dB decrease.

The human ear is not equally sensitive to all frequencies within the sound spectrum. Therefore, sound can be characterized by several methods. The most common method is the “A-weighted” sound level (dBA), which gives greater weight to the frequencies audible to the human ear by filtering out noise frequencies not audible to the human ear. Human judgments of the relative loudness or annoyance of a sound correlate well with the dBA levels of those sounds. Therefore, the dBA scale is used for measurements and standards involving the human perception of noise. Noise levels from aircraft and small arms firing are measured in dBA.

Impulse noise (high-amplitude noise resulting from armor, artillery, and demolition activities) is measured in C-weighted decibels (dBC). The C-weighting scale measures more of the low-frequency components of noise than the A-weighting scale. The dBC scale is considered to better represent community response to impulse noise. The low-frequency sound components can cause buildings and windows to rattle and shake.

Human perception of noise has no simple correlation with acoustical energy. The perception of noise is not linear in terms of dBA or in terms of acoustical energy. Two noise sources do not sound twice as loud as one source. It is widely accepted that the average healthy ear can barely perceive changes of 3 dBA, increase or decrease; that a change of 5 dBA is readily perceptible; and that an increase (decrease) of 10 dBA sounds twice (half) as loud (Caltrans, 1998). Table 3.10-1 provides common indoor and outdoor activities and the corresponding sound levels to demonstrate human perception of the correlation of noise with acoustical energy.

In addition to instantaneous noise levels, the duration or magnitude of noise over time is also important for the assessment of potential noise disturbance. Average noise levels over a period of time are usually expressed as dBA L_{eq}, or the equivalent noise level for that period. For example, $L_{eq(3)}$ would be a 3-hour average; when no period is specified, a 1-hour average is assumed.

The time of day is also an important factor for noise assessment, as noise levels that may be acceptable during the day may interfere with the ability to sleep during evening or nighttime hours. Therefore, there are 24-hour noise

Table 3.10-1: Representative Environmental Noise Levels

Common Outdoor Activities	Noise Level (dBA)	Common Indoor Activities
Power Saw	—110—	Rock Band
Jet Fly-over at 100 feet		Crying Baby
Subway	—100—	
Gas Lawn Mower at 3 feet		
Tractor	—90—	
		Food Blender at 3 feet
Diesel Truck going 50 mph at 50 feet	—80—	Garbage Disposal at 3 feet
Noisy Urban Area during Daytime		
Gas Lawn Mower at 100 feet	—70—	Vacuum Cleaner at 10 feet
Commercial Area		Normal Speech at 3 feet
Heavy Traffic at 300 feet	—60—	Sewing Machine
Air Conditioner		Large Business Office
Quiet Urban Area during Daytime	—50—	Dishwasher in Next Room
		Refrigerator
Quiet Urban Area during Nighttime	—40—	Theater, Large Conference Room (background)
Quiet Suburban Area during Nighttime		
	—30—	Library
Quiet Rural Area during Nighttime		Bedroom at Night, Concert Hall (background)
	—20—	
		Broadcast/Recording Studio
	—10—	
Lowest Threshold of Human Hearing	—0—	Lowest Threshold of Human Hearing

Source: Data Compiled by AECOM in 2012

level descriptors that incorporate noise penalties (in decibels) for evening and night periods. The community noise equivalent level (CNEL) is the cumulative noise exposure in a community during a 24-hour period, with a 5-dBA penalty added to evening sound levels (between 7 p.m. and 10 p.m.), and a 10-dBA penalty added to the night sound levels (between 10 p.m. and 7 a.m.). The day/night average sound level (L_{dn}) is similar to CNEL, except that the 3-hour evening period is considered with the daytime period.

The construction and operation of new facilities generate noise. Construction noise is generated by the operation of construction equipment and vehicles, and the transport of material and workers to and from the site. Construction noise levels are a function of the type of equipment used and the timing and duration of the noise-generating activities. Table 3.10-2 provides a list of noise generation levels for various types of equipment that could be used for the construction of site facilities.

Table 3.10-2: Noise Levels of Typical Construction Equipment

Equipment Type	Typical Noise Level (dB) @ 50 feet	Usage Factor (%)
Air compressor	80	40
Backhoe	80	40
Concrete pump truck	82	20
Crane, mobile	85	16
Dozer	85	40
Drill rig truck	84	20
Excavator	85	40
Front-end loader	80	40
Generator	82	50
Jackhammer	85	20
Lift	85	20
Mounted impact hammer (hoe ram)	90	20
Pneumatic tools	85	50
Pumps	77	50
Roller	85	20
Soil mix drill rig	80	50
Welder	73	40
Trucks	74–81	

Notes:
dB = (A-weighted) decibels; usage factor = the percent per hour equipment is in use.
All equipment is fitted with a properly maintained and operational noise control device, per manufacturer specifications. Noise levels listed are manufacturer-specified noise levels for each piece of heavy construction equipment.
Source: FTA 2006:12-6 and 12-7

As shown in Table 3.10-2, maximum noise levels from construction equipment range from approximately 70 to 90 dBA at 50 feet from the equipment. These noise levels vary for individual pieces of equipment, as equipment may come in different sizes and with different engines. Equipment noise levels also vary as a function of the activity level, or duty cycle. In a typical construction project, the loudest short-term noise generators tend to be earth-moving equipment under full load at approximately 85 to 90 dBA at a distance of 50 feet from the source. In addition to these maximum instantaneous noise levels, the magnitude of construction noise can be defined by the type of construction activity, the various pieces of equipment operating, and the duration of the activity. Typically, construction noise is averaged over time and expressed as dBA L_{eq}.

Noise levels from construction activities are typically considered as point sources and attenuate with distance at a rate of 6 dBA per doubling of distance over hard site surfaces, such as streets and parking lots, and a rate of 7.5 dBA per doubling of distance for soft site surfaces, such as grass fields and open terrain with vegetation (FTA, 2006).

Operational noise from constructed facilities includes equipment operation (e.g., pumps, generators, fans), and vehicle trips to and from the facilities for operation and maintenance and facility worker trips.

Vibration Properties, Effects, and Sources

Vibration is the periodic oscillation of a medium or object. The rumbling sound caused by the vibration of room surfaces is called structureborne noise. Both natural phenomena (e.g., earthquakes, volcanic eruptions, sea waves, landslides) and human-made causes (e.g., explosions, machinery, traffic, trains, construction equipment) can result in groundborne vibration. Some vibration sources, such as factory machinery, are continuous; others, such as explosions, are transient. As is the case with airborne sound, groundborne vibration may be described by amplitude and frequency.

Vibration amplitude is typically expressed in peak particle velocity (PPV) or root mean square (RMS), as in RMS vibration velocity. The PPV and RMS velocity are normally described in inches per second (in/sec). PPV is defined as the maximum instantaneous positive or negative peak of a vibration signal. PPV is the metric often used to describe blasting vibration and other vibration sources that result in structural stresses in buildings (FTA 2006:7-3). Although PPV is appropriate for evaluating the potential for building damage, it is not always suitable for evaluating human response. It takes some time for the human body to respond to vibration signals. In a sense, the human body responds to average vibration amplitude. The RMS of a signal is the average of the squared amplitude of the signal, typically calculated over a period of 1 second. As with airborne sound, the RMS velocity is often expressed in decibel notation as vibration decibels (VdB), which serves to compress the range of numbers required to describe vibration (FTA 2006:7-4). This vibration-decibel scale is based on a reference value of 1 microinch per second (in/sec). The background vibration-velocity level typical of residential areas is approximately 50 VdB.

Groundborne vibration is normally perceptible to humans at approximately 65 VdB. For most people, a vibration-velocity level of 75 VdB is the approximate dividing line between barely perceptible and distinctly perceptible levels. Table 3.10-3 summarizes the general human response to different levels of groundborne vibration.

Table 3.10-3: Human Response to Different Levels of Groundborne Vibration

Vibration-Velocity Level (VdB)	Human Reaction
65	Approximate threshold of perception.
75	Approximate dividing line between barely perceptible and distinctly perceptible. Many people find that transportation-related vibration at this level is unacceptable.
85	Vibration acceptable only if there is an infrequent number of events per day.

Note:
VdB = vibration decibels referenced to 1 microinch per second and based on the root mean square vibration velocity.
Source: FTA 2006:7-8

Existing Noise and Vibration Sources

Existing SFVAMC Fort Miley Campus

The predominant noise sources at the existing SFVAMC Fort Miley Campus include mobile sources, such as personal-occupancy and delivery vehicles, and stationary equipment, such as heating, ventilation, and air conditioning (HVAC). Vehicle traffic on the Campus includes personal-occupancy vehicle and bus traffic along the main Campus driveway, which is accessed via the intersection of Clement Street and 42nd Avenue. In addition, secondary traffic on-Campus traffic occurs on Veterans Drive, which is accessed via the intersection of Clement Street and 43rd Avenue. The majority of the perceivable stationary-source equipment noise is located immediately east of the northwestern surface parking lot on the Campus. The existing equipment is shielded. Other stationary source noise on-Campus is largely located on the rooftops of existing structures and shielded from view by the existing structures.

Mission Bay Area

The predominant noise sources within the Mission Bay area are related to mobile-source noise along local streets. Portions of Interstate 80, Interstate 280, and U.S. Highway 101 traverse this area and are considered to represent a substantial portion of the overall ambient noise in the area. Other noise generators in this area include AT&T Park during special events (e.g., baseball games) and various commercial and industrial activities, including marine activities.

Noise Measurements

To identify representative noise levels in the vicinity of the existing SFVAMC Fort Miley Campus, existing daytime noise levels were monitored by AECOM staff at four locations around the Campus, as depicted in Figure 3.10-1.[1] Noise levels were measured using a Larson-Davis Model 821 precision sound level meter, which satisfies the American National Standards Institute for general environmental noise measurement instrumentation. The average noise levels and sources of noise measured at each location are identified in Table 3.10-4. These daytime noise levels are characteristic of a typical urban area.

Existing Sensitive Receptors

Land uses that are sensitive to noise and vibration are those uses where exposure would result in adverse effects (i.e., injury or annoyance) and uses where lack of noise and vibration is an essential element of their intended purpose. In San Francisco, residences of all types are of primary concern because of the potential for increased, prolonged exposure of individuals to both interior and exterior noise and vibration. Other noise-sensitive land uses include schools, preschools, hospitals, convalescent facilities, hotels, motels, churches, libraries, and other uses where low interior noise levels are essential. Public parks are also typically considered sensitive receptors.

1 Measurements were not taken in the Mission Bay area, because of (1) the uncertainty about where SFVAMC facilities might be located to within this approximately 2.5-square-mile area and (2) the variability of noise levels.

Source: Data Compiled by AECOM in 2012.

Figure 3.10-1: Noise Monitoring Locations

Table 3.10-4: Existing Ambient Noise Levels within the SFVAMC Fort Miley Campus Area

Site	Location	Date/Time	Audible Noise Sources	A-Weighted Sound Level (dBA)			
				L_{eq}	L_{max}	L_{50}	L_{90}
1	43rd Avenue and Point Lobos Avenue	12:20 p.m.–12:35 p.m.	Birds, construction (distant), vehicles (buses and personal-occupancy vehicles)	62.2	74.5	60.3	56.3
2	42nd Avenue and Clement Street	10:15 a.m.–10:30 a.m.	Birds, pedestrian traffic, vehicles (buses and personal-occupancy vehicles)	61.8	82.4	56.5	51.1
3	Front lawn area southeast of main medical center structure	11:10 a.m.–11:25 a.m.	Birds, pedestrian traffic, vehicles (buses and personal-occupancy vehicles)	62.1	76.7	55.0	51.3
4	Northwest on-site surface parking lot	11:10 a.m.–11:25 a.m.	HVAC, birds, construction (distant)	51.8	61.3	51.5	50.7

Notes:
dBA = A-weighted decibels; HVAC = heating, ventilation, and air conditioning; L_{eq} = equivalent noise level; L_{max} = maximum noise level; L_n = noise level exceeded n% of a specific period of time
Monitoring locations correspond to those depicted in Figure 3.10-1.
Source: Data collected by AECOM on March 22, 2011, and March 25, 2011

Residences, education buildings, and places of worship are also vibration-sensitive receptors because people can experience annoyance and fragile buildings may experience damage from groundborne vibration. People typically experience annoyance when exposed to vibration that exceeds certain thresholds. These thresholds are generally lower than threshold levels for vibration-related building damage. Buildings that are normally occupied by people are considered sensitive to groundborne vibration. Historic or lightweight buildings are considered most vulnerable to vibration damage; thus, more stringent vibration-damage thresholds are recommended for these building types. Buildings used for research, manufacturing, or healthcare operations that are sensitive to very low thresholds of vibration to function effectively (e.g., magnetic resonance imaging [MRI] or microelectronics manufacturing facilities) are also considered vibration sensitive; groundborne vibration can result in structural damage and/or interfere with such buildings intended functions (FTA, 2006).

Existing SFVAMC Fort Miley Campus

The area south of the existing SFVAMC Fort Miley Campus is largely residential, with a mix of single-family and multifamily buildings extending south toward Point Lobos Avenue. Some commercial uses also exist close by along Clement Street, Geary Boulevard, and Point Lobos Avenue. The areas north, east, and west of the Campus include GGNRA open space and trails as well as Lincoln Park, a 112-acre facility owned and maintained by the San Francisco Recreation and Park Department, which includes the Lincoln Park Golf Course and the California Palace of the Legion of Honor museum.

Mission Bay Area

Sensitive receptors in the Mission Bay Area are largely residential. However, several places of worship and primary and secondary schools are located in the area. In addition, the University of California Medical Center at

Mission Bay is located within this area, and certain structures associated with its operation would be considered sensitive receptors.

3.10.2 Regulatory Framework

Noise Control Act

The U.S. Environmental Protection Agency (EPA) Office of Noise Abatement and Control was originally established to coordinate federal noise control activities. After inception, EPA's Office of Noise Abatement and Control issued the Federal Noise Control Act of 1972, establishing programs and guidelines to identify and address the effects of noise on public health and welfare and the environment. A summary of recommended guidelines for noise levels considered safe for community exposure without the risk of adverse health or welfare effects are presented in Table 3.10-5 (EPA, 1974). To prevent hearing loss over the lifetime of a receptor, the yearly average L_{eq} should not exceed 70 dBA, and the L_{dn} should not exceed 55 dBA in outdoor activity areas or 45 dBA indoors to prevent interference and annoyance.

Table 3.10-5: Summary of EPA-Recommended Noise Level Standards

Effect	Level	Area
Hearing loss	$L_{eq(24)} \leq 70$ dB	All areas
Outdoor activity interference and annoyance	$L_{dn} \leq 55$ dB	Outdoor in residential areas and farms and other outdoor areas where people spend widely varying amounts of time and other places in which quiet is a basis for use.
	$L_{eq(24)} \leq 55$ dB	Outdoor areas where people spend limited amounts of time, such as school yards, playgrounds, etc.
Indoor activity interference and annoyance	$L_{eq} \leq 45$ dB	Indoor residential areas
	$L_{eq(24)} \leq 45$ dB	Other indoor areas with human activities such as schools, etc.

Notes:
dB = decibels; EPA = U.S. Environmental Protection Agency; L_{dn} = day-night noise level (L_{eq} with a 10-dB nighttime weighting); $L_{eq(24)}$ = equivalent noise level (the sound energy averaged over a 24-hour period)
Source: EPA 1974:3

EPA administrators determined in 1981 that subjective issues such as noise would be better addressed at lower levels of government. Consequently, in 1982 responsibilities for regulating noise control policies were transferred to state and local governments. However, noise control guidelines and regulations contained in the rulings by EPA in prior years are still upheld by designated federal agencies, allowing more individualized control for specific issues by designated federal, state, and local government agencies. The Noise Control Act is applicable to the project insofar as it establishes general guidelines related to what would be considered acceptable noise levels generated by a project alternative and perceived by adjacent or on-site receptors.

Federal Transit Authority Groundborne Vibration Guidelines

To address the human response to groundborne vibration, FTA has guidelines for maximum-acceptable vibration criteria for different types of land uses. Maximum-acceptable vibration criteria based on the frequency of an event are applied to different types of land uses to address the human response to groundborne vibration (FTA, 2006).

These guidelines recommend 65 VdB, referenced to 1 μin/sec and based on the velocity amplitude for land uses where low ambient vibration is essential for interior operations (e.g., hospitals, high-tech manufacturing, laboratory facilities); 80 VdB for residential uses and buildings where people normally sleep; and 83 VdB for institutional land uses with primarily daytime operations (e.g., schools, churches, clinics, offices) (FTA, 2006). Table 3.10-6 shows the allowable project contribution noise level increases determined to be acceptable.

Table 3.10-6: Summary of FTA-Recommended Groundborne Vibration Impact Criteria

Land Use Category	Impact Levels (VdB; relative to 1 microinch per second)		
	Frequent Events[1]	Occasional Events[2]	Infrequent Events[3]
Category 1: Buildings where vibration would interfere with interior operations	65[4]	65[4]	65[4]
Category 2: Residences and buildings where people normally sleep	72	75	80
Category 3: Institutional land uses with primarily daytime uses	75	78	83

Notes:
FTA = Federal Transit Administration; VdB = vibration decibels
1 Defined as more than 70 vibration events of the same source per day. Most rapid transit projects fall into this category.
2 Defined as between 30 and 70 vibration events of the same source per day. Most commuter trunk lines have this many operations.
3 Defined as fewer than 30 vibration events of the same kind per day. This category includes most commuter rail branch lines.
4 This criterion limit is based on levels that are acceptable for most moderately sensitive equipment such as optical microscopes. Vibration-sensitive manufacturing or research will require detailed evaluation to define the acceptable vibration levels. Ensuring lower vibration levels in a building often requires special design of the heating, ventilation, and air conditioning systems and stiffened floors.
Source: FTA 2006:8-3

Standards have also been established to address the potential for construction-caused vibration annoyance or interference. The primary concern related to construction vibration is the potential to cause structural damage to buildings by the operation of heavy-duty construction equipment. Varying criteria have been developed to address the appropriate level of vibration considered acceptable before it may result in damage to structures or varying building types (FTA, 2006). Table 3.10-7 shows the allowable project contribution vibration level thresholds determined to be acceptable for different building types.

Table 3.10-7: Summary of FTA-Recommended Vibration Damage Criteria

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

Notes:
FTA = Federal Transit Administration; in/sec = inches per second; PPV = peak particle velocity
1 Root mean square velocity in decibels (VdB) referenced to 1 microinch per second.
Source: FTA 2006:12-13

The criteria established by FTA and noted above are applicable to the project because they provide the basis for what would be considered acceptable noise levels generated by a project alternative and perceived by adjacent or on-site receptors.

Department of Veterans Affairs Environmental Protection Specifications

Section 01568, EP-5 (F) of VA's environmental protection specifications includes specific mitigating actions that would be required of any development on VA property to reduce construction-related noise. In particular, construction activities would mainly be limited to between the hours of 7:30 a.m. and 6:00 p.m. and would abide by City of San Francisco noise ordinances, unless otherwise permitted. In addition, all equipment is required to be properly maintained and muffled such that noise levels of specific equipment would not exceed those shown below in Table 3.10-8. VA also requires monitoring of noise levels at least once every 5 days during high-noise-generating construction activities.

Table 3.10-8: Maximum Permissible Construction Equipment Noise Levels

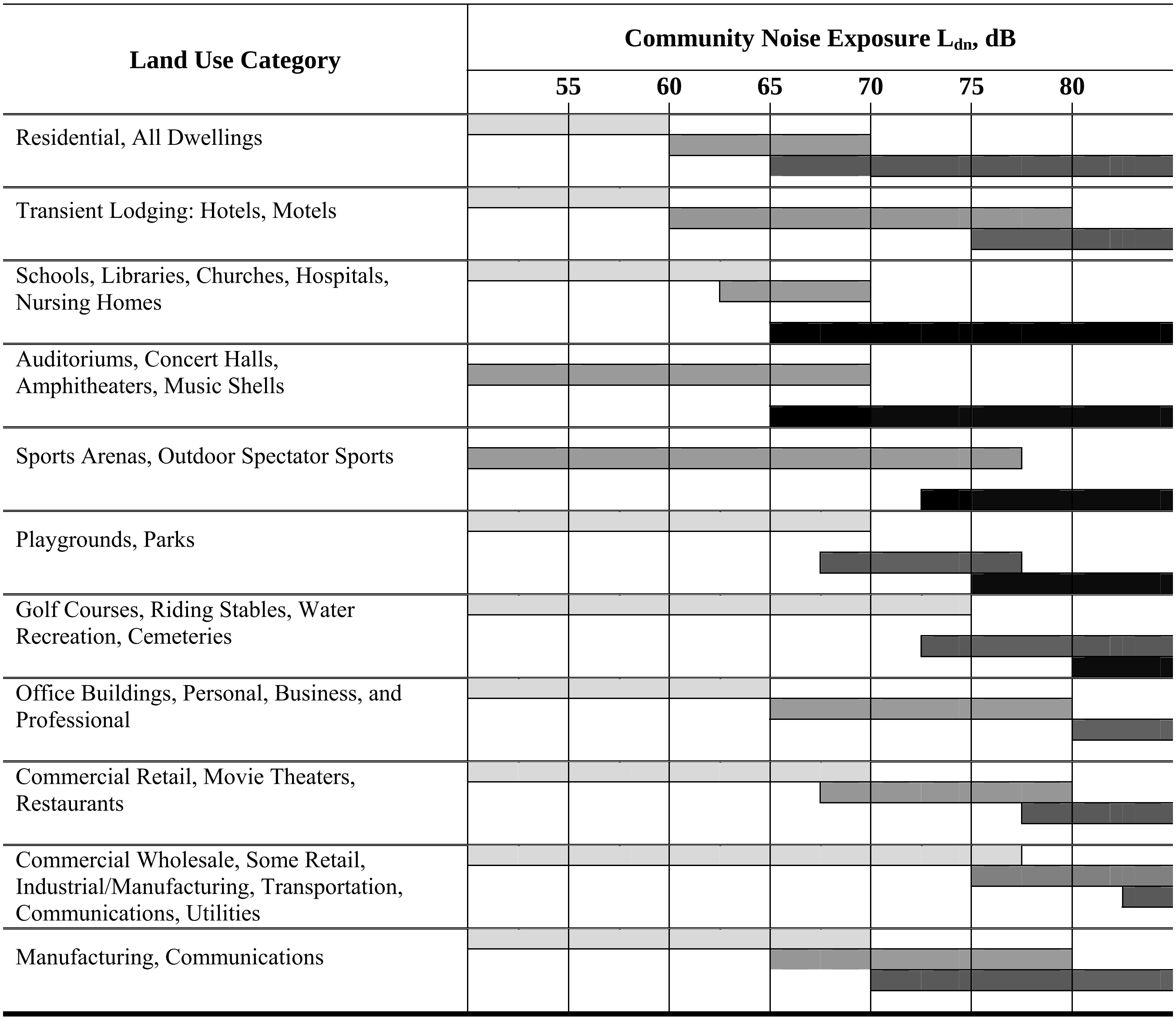
Earthmoving Equipment	Maximum Permissible Noise Level (L_{max})	Materials Handling Equipment	Maximum Permissible Noise Level (L_{max})
Front-end loader	75	Concrete mixer	75
Backhoe	75	Concrete pump truck	75
Dozer	75	Crane	75
Tractor	75	Derrick, impact	75
Scraper	80	Pile driver	95
Grader	75	Jackhammer	75
Truck	75	Rock drill	80
Paver, stationary	80	Pneumatic tools	80
Pumps	75	Concrete Saw	75
Generator	75	Vibrator	75
Air compressor	75		

Source: VA Environmental Protection Specifications. Section 01568, EP-5 (F)

San Francisco General Plan

The *San Francisco General Plan* focuses on the effect that noise from ground-transportation noise sources has on the community and includes a land use compatibility chart for community noise. This chart, presented in Table 3.10-9, identifies a range of noise levels considered generally compatible or incompatible with various land uses and indicates when special noise reduction requirements should be considered or analyzed, such as providing sound insulation for affected properties. Residential and hotel uses are considered compatible in areas where the noise level is 60 dBA L_{dn} or less; schools, classrooms, libraries, churches, and hospitals are compatible in areas where the noise level is 65 dBA L_{dn} or less; and playgrounds, parks, offices, retail commercial uses, and noise-sensitive manufacturing and communication uses are considered compatible in areas where the noise level is 70 dBA L_{dn} or less. Because the project would generate noise levels that would be perceivable off-site and within the

Table 3.10-9: City and County of San Francisco Land Use Compatibility Chart for Community Noise



(Light gray) Satisfactory, with no special noise insulation requirements.

(Medium gray) 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.

(Dark gray) New construction or development should generally be discouraged. If new construction or development does proceed, a detailed analysis of the noise reduction requirement must be made and needed noise insulation features included in the design.

(Black) New construction or development should generally not be undertaken.

Notes: dB = decibels; L_{dn} = day-night noise level
Source: CCSF Planning, 1996

jurisdiction of the City and County of San Francisco, the noise criteria established in the *San Francisco General Plan* are appropriate to consider when assessing effects of the Proposed Action and Alternatives.

San Francisco Noise Control Ordinance

The San Francisco Noise Control Ordinance regulates both construction noise and stationary-source noise within the city, such as transportation, construction, mechanical equipment, entertainment, and human or animal behavior. Found in Article 29, "Regulation of Noise," of the San Francisco Police Code, the ordinance addresses noise from construction equipment, nighttime construction work, and noise from stationary mechanical equipment and waste processing activities. The following is the purpose of the San Francisco Noise Control Ordinance:

> **Sec. 2900, "Declaration of Policy"**
>
> (a) Building on decades of scientific research, the World Health Organization and the U.S. Environmental Protection Agency have determined that persistent exposure to elevated levels of community noise is responsible for public health problems including, but not limited to: compromised speech, persistent annoyance, sleep disturbance, physiological and psychological stress, heart disease, high blood pressure, colitis, ulcers, depression, and feelings of helplessness.
>
> (b) The General Plan for San Francisco identifies noise as a serious environmental pollutant that must be managed and mitigated through the planning and development process. But given our dense urban environment, San Francisco has a significant challenge in protecting public health from the adverse effects of community noise arising from diverse sources such as transportation, construction, mechanical equipment, entertainment, and human and animal behavior.
>
> (c) In order to protect public health, it is hereby declared to be the policy of San Francisco to prohibit unwanted, excessive, and avoidable noise. It shall be the policy of San Francisco to maintain noise levels in areas with existing healthful and acceptable levels of noise and to reduce noise levels, through all practicable means, in those areas of San Francisco where noise levels are above acceptable levels as defined by the World Health Organization's Guidelines on Community Noise.
>
> (d) It shall be the goal of the noise task force described in this Article to determine if there are additional adverse and avoidable noise sources not covered in this statute that warrant regulation and to report to the Board of Supervisors and recommend amendments to this Article over the next three years. In addition, the noise task force shall develop interdepartmental mechanisms for the efficient disposition and any enforcement required in response to noise complaints.
>
> (Added by Ord. 274-72, App. 9/20/72; Ord. 278-08, File No. 081119, App. 11/25/2008)

Section 2907, "Construction Equipment," and Section 2908, "Construction Work at Night"

These sections of the ordinance establish noise levels for construction equipment. Section 2907(a) limits noise levels from construction equipment as specified under the ordinance to 80 dB L_{eq} at 100 feet (or other equivalent noise level at another distance) from construction equipment between 7 a.m. and 8 p.m. According to Section 2908, construction work at night (from 8 p.m. to 7 a.m.) may not exceed the ambient level by 5 dB at the nearest property plane unless a special permit is granted before such work by the Director of Public Works or the Director of Building Inspection. The provisions of Section 2907(a) do not apply to impact tools and equipment if the impact tools and equipment have intake and exhaust mufflers as recommended by the manufacturers and are approved by the Director of Public Works or the Director of Building Inspection as accomplishing maximum noise attenuation. The noise exemption also does not apply to pavement breakers and jackhammers, which also must be equipped with acoustically attenuating shields or shrouds as recommended by the manufacturers and approved by the Director of Public Works or the Director of Building Inspection as accomplishing maximum noise attenuation.

Section 2909, "Noise Limits"

This section of the ordinance regulates noise from mechanical equipment. (As defined by the ordinance: "No person shall produce or allow to be produced by any machine or device, music or entertainment, or any combination of same.") This would include all equipment—e.g., electrical equipment (transformers, emergency generators) as well as mechanical equipment—that is installed on commercial/industrial and residential properties. Mechanical equipment operating on commercial or industrial property must not produce a noise level more than 8 dB above the ambient noise level at the property plane. Equipment operating on residential property must not produce a noise level more than 5 dB above the ambient noise level at the property boundary.

Section 2909 also states that no fixed (permanent) noise source (as defined by the ordinance) may cause the noise level inside any sleeping or living room in a dwelling unit on residential property to exceed 45 dB between 10 p.m. and 7 a.m. or 55 dB between 7 a.m. and 10 p.m. when windows are open, except where building ventilation is achieved through mechanical systems that allow windows to remain closed.

Because the project would generate noise levels that would be perceivable off-site and within the jurisdiction of the City and County of San Francisco, the noise limits established in the San Francisco Noise Control Ordinance are appropriate to consider when assessing potential effects of the Proposed Action and Alternatives.

3.10.3 Environmental Consequences

Significance Criteria

A NEPA evaluation must consider the context and intensity of the environmental effects that would be caused by, or result from, the EIS Alternatives. There are no standard federal policies applicable to noise. Therefore, other environmental assessment documents were reviewed and the following criteria were selected for the evaluation.

An alternative would be considered to result in an adverse impact related to noise if it would:

- result in the temporary exposure of on-site receptors to construction noise levels in excess of EPA standards, as stated in Table 3.10-5 above;
- result in the temporary exposure of off-site sensitive receptors to construction noise levels in excess of the standards established in the San Francisco Noise Control Ordinance, as outlined above;
- result in a substantial permanent increase in ambient noise levels on- and off-site, with the following increases in 24-hour ambient noise levels considered substantial (FICON, 1992):

  - 5 dB if preproject conditions are determined to be less than 60 dBA L_{dn},
  - 3 dB if preproject conditions are greater than 60 dBA L_{dn} but less than 65 dBA L_{dn}, or
  - 1.5 dB if preproject conditions are greater than 65 dBA L_{dn};
- result in exposure of persons or structures to excessive groundborne vibration or groundborne noise levels in excess of FTA standards, as stated in Tables 3.10-6 and 3.10-7 above; or
- be substantially affected by existing noise levels.

Assessment Methods

Noise-sensitive land uses and major noise sources were identified based on existing documentation (e.g., equipment noise levels and attenuation rates) and site reconnaissance data. Baseline ambient noise levels to which alternative-generated noise was compared were generated from a combination of sources:

- the existing-noise survey conducted for this project,
- data from previous noise measurements,
- predictions from traffic noise modeling,
- stationary-source noise levels based on manufacturers' specifications, and
- noise surveys for other types of stationary noise sources.

To assess the potential short-term noise impacts from construction, sensitive receptors and their relative levels of exposure were identified. Construction noise generated by the proposed near-term and long-term projects was predicted using the *Transit Noise and Vibration Impact Assessment* methodology for construction noise prediction (FTA, 2006). The noise emission levels and usage factors are based on FHWA's Roadway Construction Noise Model (FHWA, 2006). Noise levels of specific construction equipment and resultant noise levels at the locations of sensitive receptors were calculated.

The FHWA Traffic Noise Prediction Model (FHWA RD 77-108) was used to model traffic noise levels along affected local roadways, based on daily volumes and their distribution, from the traffic analysis prepared for the near-term and long-term projects in 2015 and 2023, respectively. The contribution of traffic noise levels along area roadways was determined by comparing the modeled noise levels at 50 feet from the centerline of the roadway under existing, near-term without project, near-term with project, long-term without project, and long-term with project conditions.

Potential long-term (operational) noise impacts from stationary sources (e.g., HVAC) were assessed based on existing documentation (equipment noise levels) and site reconnaissance data. This analysis also evaluates the proposed noise-generating uses that could affect noise-sensitive receptors near SFVAMC facilities.

Groundborne vibration impacts were quantitatively assessed based on existing documentation (e.g., vibration levels produced by specific construction equipment operations) and the distance of sensitive receptors from the given source. Near-term and long-term vibration sources and levels were calculated using the FTA methodology for construction and transportation vibration sources, and evaluating impacts against the established thresholds in Tables 3.10-6 and 3.10-7 above (FTA, 2006).

Alternative 1: SFVAMC Fort Miley Campus Buildout Alternative

Near-Term Projects

<u>Construction</u>

Noise

During construction activities associated with Alternative 1 near-term projects, construction-related noise would be perceivable at multiple locations on- and off-site, depending on the phase currently under construction. Due to space restrictions at the existing SFVAMC Fort Miley Campus, the amount of construction that could occur simultaneously would be limited. Therefore, for this analysis, it was assumed that no more than one loader and one dozer would operate simultaneously on-site during any phase.

Any construction activities conducted as part of the Proposed Action and Alternatives would adhere to the requirements for noise control outlined in VA Specification Section 01568, "Environmental Protection." These controls include such requirements as providing sound-deadening devices on equipment, using shields or other physical barriers to restrict noise transmission, providing soundproof housings or enclosures for noise-producing machinery, and monitoring construction noise levels once a week while work is being performed such that construction noise may exceed 55 dBA. Construction activities would mainly be limited to between the hours of 7:30 a.m. and 6:00 p.m. and would abide by City of San Francisco noise ordinances, unless otherwise permitted.

<u>On-Site Receptors</u>

On-site sensitive receptors at the existing SFVAMC Fort Miley Campus would include occupied patient rooms, the Community Living Center (nursing home), and the Cheryl Andersen-Sorensen Childcare Center. The childcare center is currently located along the eastern Campus boundary, near Building 11. Based on the anticipated phasing and locations of the Phase 1 components of Alternative 1, construction activities on the Campus may be located as close as 50 feet to a sensitive receptor. At a distance of 50 feet, exterior construction noise could reach as high as 84.6 dBA L_{eq}, approximately 20 dBA in excess of existing L_{eq} noise levels (see Table 3.10-4, above). As a result, impacts would be short term but noticeable. Although VA Specification Section 01568, "Environmental Protection," would be implemented as part of the project, the potential exists for on-site receptors to be exposed to 24-hour (L_{dn}) noise levels in excess of the noise standards established by EPA and identified above in Table 3.10-5. Therefore, impacts would be potentially adverse.

Mitigation Measure NOI-1: Monitor Construction Noise Levels and Implement Additional Noise Attenuating Features

> *VA will monitor exterior noise levels at on-site receptors located closest to a particular construction site for a 24-hour period at the onset of each major phase of construction (e.g., demolition, trenching, structure erection). If noise levels are found to exceed 55 dBA L_{dn}, VA will implement additional measures to reduce noise levels at affected on-site receptors as a result of construction noise. These may include but are not limited to relocating occupied patient beds to other areas of the SFVAMC Fort Miley Campus, installing temporary acoustic attenuating features, preventing the line of sight between the*

receptor in question and noise source, and providing in-room noise-cancelling equipment (e.g., white noise).

Mitigation Measure NOI-2: Employ a Noise Disturbance Coordinator

VA will manage and monitor noise disturbance during construction activities conducted on-site. The project engineer will be responsible for responding to and addressing complaints received by hospital or clinic staff with respect to construction noise. Contact information will be available in the Engineering Office.

With implementation of Mitigation Measures NOI-1 and NOI-2, VA would continually monitor and make provisions for those receptors that may be exposed to construction noise levels in excess of EPA standards. Therefore, with implementation of Mitigation Measures NOI-1 and NOI-2, the project's temporary construction-related noise impact on on-site receptors would be reduced to a minor level. No indirect impacts would occur.

Off-Site Receptors

With respect to off-site receptors, the construction of the Patient Welcome Center and drop-off area represents the greatest potential increase in ambient noise levels as a result of the operation of construction equipment near residences located along the southern boundary of the existing SFVAMC Fort Miley Campus. Existing residential structures are located approximately 175 feet south of the anticipated limits of construction. Noise levels at the nearby receptors are estimated to be 73.8 dBA L_{eq}, which would be less than the threshold established by the City and County of San Francisco for construction noise. All other construction activities that would occur as part of Alternative 1 would be conducted at locations farther away from nearby off-site sensitive receptors, including park visitors, and anticipated noise levels would be less than those identified above for Phase 1.4 (Patient Welcome Center and Drop-off Area). Therefore, potential impacts at off-site sensitive receptors resulting from construction of Alternative 1 near-term projects would be noticeable, but would be short term and would represent a minor direct impact. No indirect impacts would occur.

Vibration

Construction activities associated with Phase 1 of Alternative 1 would include vibration-producing construction activities (e.g., demolition, excavation, grading, basement excavation, and clearing). No pile driving or rock blasting is anticipated. Depending on the specific construction equipment used and operations involved, near-term demolition and construction activities at the existing SFVAMC Fort Miley Campus may temporarily increase ground vibration. It is anticipated that the highest levels of construction-related groundborne noise and vibration would be generated during the demolition phase of construction, because the equipment used during that phase generates the highest ground vibration levels.

On-Site Receptors

Construction of Phase 1 of Alternative 1 would result in construction activities immediately adjacent to existing medical facilities and overnight patient rooms. As noted in Section 3.4, "Cultural Resources," several of the existing structures on the existing SFVAMC Fort Miley Campus are older than 50 years. Because of their age and the potential for degradation of building integrity over time, these structures would be considered susceptible to damage from construction-related vibration. Based on the equipment listed in Table 3.10-10, the potential exists for construction-related vibration to exceed 0.12 in/sec PPV (the threshold established by FTA for potential damage to older structures) as the anticipated vibration levels from a vibratory roller (used for compaction) could generate up to 0.21 in/sec PPV at adjacent structures. In addition, because of the sensitivity of medical equipment used on-site, the potential exists for construction-related vibration to interfere with the operation of sensitive medical equipment. As noted by FTA, a standard of 65 VdB is recommended for facilities where vibration could interfere with operations. Based on the data shown in Table 3.10-10, construction under Phase 1 of Alternative 1 could result in interference with the use of sensitive medical equipment at the Campus.

Table 3.10-10: Representative Vibration Source Levels for Construction Equipment

Equipment	PPV at 25 feet (in/sec)[1]	Approximate L_v (VdB) at 25 feet[2]
Vibratory Roller	0.210	94
Large bulldozer	0.089	87
Hoe Ram	0.089	87
Caisson drilling	0.089	87
Trucks	0.076	86
Concrete breaker	0.059	83
Jackhammer	0.035	79
Small bulldozer	0.003	58

Notes:
in/sec = inches per second; VdB = vibration decibels
1 Where PPV is the peak particle velocity.
2 Where Lv is the root mean square velocity expressed in vibration decibels (VdB), assuming a crest factor of 4.
Source: FTA, 2006:12-2

Furthermore, in terms of potential human annoyance as a result of construction vibration, on-site sensitive receptors (i.e., patients) could experience vibration levels up to 94 VdB at a distance of 25 feet, which would be considered noticeable.[2] However, construction activities would be limited to daytime hours and would not be anticipated to disturb sleeping patients. As a result, this impact would be short-term, noticeable, and potentially adverse.

Mitigation Measure NOI-3: Conduct a Preconstruction Survey of Buildings in the Vicinity of Proposed Construction

> *The preexisting condition of all buildings within a 50-foot radius will be recorded in the form of a preconstruction survey. The preconstruction survey will determine conditions that exist before construction begins and will be used to evaluate damage caused by construction activities. Fixtures and finishes within a 50-foot radius of construction activities susceptible to damage will be documented (photographically and in writing) before construction. All buildings damaged will be repaired to their preexisting condition.*

2 As noted above in Table 3.10-3, 75 VdB is considered distinctly perceptible/noticeable.

Mitigation Measure NOI-4: Monitor Vibration-Sensitive Equipment during Construction

> *Vibration levels will be monitored at the nearest interior location of adjacent medical structures containing vibration-sensitive equipment to monitor potential impacts from construction related to this alternative. In the event that measured vibration levels exceed 65 VdB and would disturb the operation of sensitive medical equipment, additional measures will be implemented to the extent necessary and feasible. These measures include providing notice to equipment operators to coordinate regarding timing of construction activities showing vibration levels above 65 VdB, possibly temporarily relocating the sensitive equipment, and/or installing isolation equipment (i.e., vibration-dampening mounts).*

Implementation of Mitigation Measures NOI-3 and NOI-4 would ensure that any potential damage to existing on-site structures or interference with on-site equipment caused by the construction of Phase 1 would be documented and repaired, and that construction activities would be limited to daytime hours, which would minimize the potential for sleep disturbance. Therefore, with implementation of Mitigation Measures NOI-3 and NOI-4, the potential impact on on-site receptors, including structures, would be limited, and impacts would be noticeable (i.e., above 75 VdB), but would be short term and would represent a minor direct impact. No indirect impacts would occur.

<u>Off-Site Receptors</u>

To evaluate vibration impacts at sensitive receptors near the existing SFVAMC Fort Miley Campus, the use of the construction equipment generating the highest PPV and VdB levels (vibratory roller or hoe ram) was analyzed. As noted above, the residences located across Clement Street represent the closest off-site sensitive receptors to any of the proposed components of Phases 1 and 2, and are located approximately 175 feet from the limits of construction of Phase 1. Visitors traversing the adjacent recreational trails, depending on the location, may also be temporary sensitive receptors.

Predicted groundborne noise and vibration levels at these residences could be as high as 69 VdB (0.011 PPV) during Phase 1 construction. All other off-site residences would be located farther from the limits of construction of Phase 1, and construction-related vibration would be less than 69 VdB (0.011 PPV). As a result, attenuated vibration-inducing construction activities at off-site locations would not exceed FTA’s threshold for building damage nor FTA’s standard (80 VdB) for human response at off-site vibration-sensitive uses. Further, because construction activities would mainly be limited to weekday daytime hours (7:30 a.m. to 6:00 p.m.) and would avoid typical sleeping periods (nighttime) periods, the potential for construction-related vibration at the existing SFVAMC Fort Miley Campus to result in human annoyance would be minimal. Therefore, based on established criteria, this would represent a minor direct impact. No indirect impacts would occur.

<u>Operation</u>

Noise

<u>Mobile Source</u>

Traffic-related noise increases resulting from implementation of Phase 1 of Alternative 1 were evaluated based on whether they would result in a substantial increase in traffic noise at on- and off-site sensitive receptors. The

FHWA Traffic Noise Prediction Model (FHWA-RD-77-108) was used to model traffic noise levels along affected roadways, based on daily traffic volumes and their distribution, from the traffic analysis prepared for the full buildout of Phase 1, as predicted for the year 2015. The contribution of the components of Phase 1 of the LRDP to existing traffic noise levels along area roadways was determined by comparing the modeled noise levels at 50 feet from the roadway centerline under no-project and plus-project conditions. Modeling assumed flat topographical conditions and did not include offsets to account for site-specific roadway conditions. The analyses below only evaluate the permanent change in traffic noise levels because of the increase in daily traffic volumes. The use of emergency sirens, horns, and lights could cause a temporary elevation of ambient noise levels on an intermittent basis at nearby noise-sensitive land uses.

Operation of the components of Phase 1 of Alternative 1 could result in an increase in average daily vehicle trips in the vicinity of the SFVAMC Fort Miley Campus. To examine the effect of project-generated traffic increases, traffic noise levels associated with the Campus were calculated for nearby roadway segments. Traffic volumes for each study segment were derived from p.m. peak intersection turning movements (see Section 3.13, “Transportation and Parking”) using a K Factor (multiplication factor used to compute average daily traffic) of 10 to compute the average daily trips on roadway segments. Vehicle speeds and truck volumes on local roadways were determined based on field observations conducted in and around the Campus. Table 3.10-11 summarizes the modeled traffic noise levels at 50 feet from the centerline of affected roadway segments near the Campus.

Table 3.10-11: Predicted Near-Term Future Traffic Noise Levels (Alternative 1, Phase 1)

Roadway	Segment		L_{dn} at 50 Feet, dBA			
	From	To	Existing	Near-Term (2015) Plus Alt 1	Net Change	Substantial Increase?
Clement Street	43rd Avenue	42nd Avenue	62.0	62.3	0.3	No
Clement Street	42nd Avenue	34th Avenue	63.6	63.9	0.3	No
Clement Street	43rd Avenue	48th Avenue	60.7	60.8	0.1	No
43rd Avenue	Clement Street	Point Lobos Avenue	60.8	61.2	0.3	No
42nd Avenue	Clement Street	Point Lobos Avenue	57.5	58.1	0.6	No

Notes:
dB = (A-weighted) decibels; L_{dn} = day-night average noise level
Traffic noise levels are predicted at a standard distance of 50 feet from the roadway centerline and do not account for shielding from existing noise barriers or intervening structures. Traffic noise levels may vary depending on actual setback distances and localized shielding.
Source: Data modeled by AECOM in 2012

Based on the modeling conducted, the largest potential change in ambient roadway noise levels under near-term (2015) conditions would occur along 42nd Avenue between Clement Street and Point Lobos Avenue, and would be approximately 0.6 dBA L_{dn}, which would be less than the threshold of 5.0 dBA for future roadway noise levels.

The increase in daily vehicle operations at the existing SFVAMC Fort Miley Campus as a result of implementation of Phase 1 of Alternative 1 would not result in a noticeable increase in ambient traffic noise along local roadways. Therefore, this would represent a minor direct impact. No indirect impacts would occur.

Siren Noise

In general, the use of emergency sirens can cause a temporary elevation of ambient noise levels on an intermittent basis at noise-sensitive land uses adjacent to an ambulance's chosen route. Emergency vehicle sirens can generate intermittent L_{max} noise levels up to 106 dB. However, emergency services are prevalent throughout the study under existing conditions, and the use of sirens is a common element of the urban noise environment in San Francisco, including the neighborhoods around the site of the existing SFVAMC Fort Miley Campus. Phase 1 of the LRDP would not alter the manner in which emergency vehicles access the Campus. Furthermore, none of the components of Phase 1 would involve expanding the existing emergency department at the Campus. In addition, the use of emergency medical services is determined on a need basis. Therefore, implementation of Phases 1 and 2 would not be anticipated to increase the potential for siren noise in the study area, because it would not increase capacity for emergency transport acceptance or result in a substantial increase in local population (see Section 3.11, "Socioeconomics and Environmental Justice") that could reasonably be considered to have a secondary effect on the need for emergency services. As such, this would represent a minor impact. No indirect impacts would occur.

Stationary Source

Receptors on and off the SFVAMC Fort Miley Campus could be exposed to stationary-source noise generated by on-site stationary equipment (especially HVAC) that would be installed during Phase 1 of Alternative 1. On-Campus receptors of concern would be the SFVAMC patients, and off-site receptors would include the residences located south of the Campus. Visitors traversing the adjacent recreational trails, depending on their location, may also be temporary sensitive receptors.

With respect to on-site receptors, stationary equipment would be largely located on the rooftops of proposed structures and shielded. Furthermore, any stationary equipment located on-site would be shielded so as to prevent a direct line of sight to any patient rooms or other noise-sensitive areas on Campus. To ensure that exterior-to-interior noise levels within the Campus, including patient rooms, would be maintained at 45 dBA L_{dn}, the following best management practice (BMP) regarding noise levels in relation to patient rooms would be implemented:

- VA will monitor noise levels in SFVAMC patient rooms located closest to stationary equipment installed as part of the LRDP. Should noise levels associated with the operation of the stationary equipment result in interior noise levels within the patient rooms in excess of 45 dBA L_{dn}, VA will implement additional measures to reduce interior noise levels, such as replacing existing windows with double- or triple-paned windows, applying a sound-deadening window film, or installing additional acoustic shielding of the stationary source.

With implementation of this BMP, Alternative 1 operation would result in a minor direct impact. No indirect impacts would occur.

In terms of off-site receptors, stationary equipment must comply with Section 2909, “Noise Limits,” of Article 29 of the San Francisco Noise Control Ordinance for fixed residential interior noise limits (45 dB between 10 p.m. and 7 a.m. and 55 dB between 7 a.m. and 10 p.m.). Based on the noise monitoring conducted at existing HVAC equipment on the project site, noise attributable to exterior equipment would not exceed 55 dB at a distance of 100 feet, which is the shortest distance between the proposed locations of Phase 1 and 2 components and off-site residences. Assuming a conservative exterior-to-interior noise level reduction of 25 dB for modern residential wood construction and accounting for distance to the nearest off-site sensitive receptor façade, off-site sensitive receptors would not be exposed to interior noise levels exceeding 45 dB L_{eq} or experience a substantial increase in interior ambient noise levels with windows closed or open. Impacts would be minor.

Vibration

In general, the potential for operational vibration impacts is limited to areas subject to substantial heavy truck traffic or rail operations, neither of which would occur within the vicinity of the existing SFVAMC Fort Miley Campus. Furthermore, on-site equipment would be appropriately installed, padded, and mounted so as to minimize the potential for perceivable on-site vibration during equipment operation. As such, impacts would be minor. No indirect impacts would occur.

Long-Term Projects

Construction

Noise

Phase 2 of Alternative 1 would involve construction activities within the existing SFVAMC Fort Miley Campus. Based on the distance and intervening structures located between the proposed structures’ locations and off-site receptors, impacts on off-site receptors are not anticipated. However, on-site receptors, including patient rooms and the childcare center, could experience elevated noise levels during construction of Phase 2. As noted in Chapter 2.0, “Alternatives,” the majority of construction under Phases 3 and 4 would occur within the existing northwest parking lot. The limits of construction and construction phasing are not known at this time; however, it is reasonable to assume, based on the physical constraints of the Campus, that construction activities on Campus may be located within 50 feet of a sensitive receptor. As noted above, exterior construction noise could reach as high as 84.6 dBA L_{eq} at a distance of 50 feet, which would be approximately 20 dBA in excess of existing L_{eq} noise levels (see Table 3.10-4, above). As a result, impacts would be short term and noticeable. VA Specification Section 01568, “Environmental Protection,” would be implemented as part of the project, as under the near-term projects, but the potential exists for on-site receptors to be exposed to noise levels in excess of the noise standards established by EPA and identified above in Table 3.10-5. As such, impacts would be potentially adverse.

However, with continued implementation of Mitigation Measures NOI-1 and NOI-2 as discussed above, VA would continually monitor and make provisions for those receptors that may be exposed to construction noise levels in excess of EPA standards. Therefore, with implementation of Mitigation Measures NOI-1 and NOI-2, construction-related noise impacts on on-site receptors from Alternative 1 long-term projects would be noticeable but short term and minor. No indirect impacts would occur.

Vibration

During construction of Phases 3 and 4 of Alternative 1, the proposed facilities would be located within the existing SFVAMC Fort Miley Campus, away from the existing off-site residences. Construction activities at the site, which would be similar to those evaluated under Phases 1 and 2 above, would result in vibration levels of approximately 55 VdB at the nearest residential structures located to the south. This would be well below the FTA-established thresholds for structural damage and human annoyance (80 VdB); therefore, impacts would be minor.

With respect to on-site receptors, construction could occur within 50 feet of existing medical facilities, including patient beds. Similar to the impacts identified for Phase 1, the potential exists for construction-related vibration to exceed 0.12 PPV (the threshold established by FTA for potential damage to older structures) because the anticipated vibration levels from a vibratory roller (used for compaction) could generate up to 0.21 PPV at adjacent structures. In addition, the operation of heavy construction equipment could interfere with the operation of existing medical equipment on-site if vibration levels were to exceed FTA's 65-VdB standard.

Furthermore, in terms of potential human annoyance as a result of construction vibration, on-site sensitive receptors could experience vibration levels up to 94 VdB at a distance of 25 feet, which would be considered noticeable (i.e., above 75 VdB). However, construction activities would be limited to daytime hours and would not be anticipated to disturb sleeping patients. As a result, this impact would be short-term, noticeable, and potentially adverse.

Implementation of Mitigation Measures NOI-3 and NOI-4 would ensure that any potential damage to existing on-site structures or interference with on-site equipment caused by the construction of Phase 1 would be documented and repaired, and that construction activities would be limited to daytime hours, which would minimize the potential for sleep disturbance. As a result, the potential impact on on-site receptors, including structures, would be limited. Therefore, with implementation of Mitigation Measures NOI-3 and NOI-4, direct impacts would be noticeable but would be short term and minor. No indirect impacts would occur.

Operation

Noise

Mobile-Source Noise

Operation of the Phase 2 components of Alternative 1 would result in an increase in average daily vehicle trips in the vicinity of the SFVAMC Fort Miley Campus. Like near-term conditions, long-term (2023) conditions were modeled based on the anticipated average daily traffic on local roadways surrounding the Campus. As shown in Table 3.10-11, the largest potential change in ambient roadway noise levels under long-term (2023) conditions would occur along 42nd Avenue between Clement Street and Point Lobos Avenue and would be approximately 3.2 dBA L_{dn} above existing conditions. This would be less than the 5.0-dBA threshold identified above for future roadway noise levels. As a result, the increase in daily vehicle operations at the Campus caused by implementation of Alternative 1 Phase 2 would not result in a noticeable increase in ambient traffic noise along local roadways. Therefore, this would represent a minor direct operational mobile-source noise impact. No indirect impacts would occur.

Table 3.10-11: Predicted Long-Term Future Traffic Noise Levels (Alternative 1, Phase 2)

Roadway	Segment		L_{dn} at 50 Feet, dBA			
	From	To	Existing	Long-Term (2023) Plus Alt 1	Net Change	Substantial Increase?
Clement Street	43rd Avenue	42nd Avenue	62.0	63.0	1.0	No
Clement Street	42nd Avenue	34th Avenue	63.6	65.0	1.3	No
Clement Street	43rd Avenue	48th Avenue	60.7	61.2	0.5	No
43rd Avenue	Clement Street	Point Lobos Avenue	60.8	62.2	1.4	No
42nd Avenue	Clement Street	Point Lobos Avenue	57.5	60.7	3.2	No

Notes:
dB = (A-weighted) decibels; L_{dn} = day-night average noise level
Traffic noise levels are predicted at a standard distance of 50 feet from the roadway centerline and do not account for shielding from existing noise barriers or intervening structures. Traffic noise levels may vary depending on actual setback distances and localized shielding.
Source: Data modeled by AECOM in 2012

Siren Noise

As noted in the discussion of Alternative 1 near-term projects, Alternative 1 long-term projects would not alter the manner in which emergency vehicles access the existing SFVAMC Fort Miley Campus. Furthermore, none of the Alternative 1 long-term projects would involve expanding the existing SFVAMC emergency department. Therefore, Alternative 1 long-term projects would not be anticipated to increase the potential for siren noise in the study area, because they would not increase capacity for emergency transport acceptance or result in a substantial increase in local population (see Section 3.11, "Socioeconomics and Environmental Justice") that could reasonably be considered to have a secondary effect on the need for emergency services. Therefore, this would represent a minor direct operational siren noise impact. No indirect impacts would occur.

Stationary Source

Similar to near-term conditions under Alternative 1, on- and off-Campus receptors could be exposed to stationary noise generated by on-site stationary equipment (especially HVAC) that would be installed during Phases 3 and 4 of Alternative 1. On-Campus receptors of concern would include SFVAMC patients, and off-site receptors would include the residences located to the south and temporary visitors to recreation land adjacent to the Campus. With respect to on-site receptors, stationary equipment would be largely located on the rooftops of proposed structures and shielded. Furthermore, any stationary equipment located on-site would be shielded so as to prevent a direct line of sight to any patient rooms or other noise-sensitive areas on Campus. To ensure that exterior-to-interior noise levels within the Campus, including patient rooms, would be maintained at 45 dBA L_{dn}, the BMP regarding noise levels in relation to patient rooms would be implemented. Therefore, operation of the long-term components of Alternative 1 would represent a minor direct impact. No indirect impacts would occur.

In terms of off-site receptors, stationary equipment must comply with Section 2909, "Noise Limits," of Article 29 of the San Francisco Noise Control Ordinance for fixed residential interior noise limits (45 dB between 10 p.m. and 7 a.m. and 55 dB between 7 a.m. and 10 p.m.). Based on the noise monitoring conducted at the Campus, noise attributable to exterior equipment would not exceed 55 dB at a distance of 100 feet. Assuming a conservative exterior-to-interior noise-level reduction of 25 dB for modern residential wood construction and accounting for distance to the nearest off-site sensitive receptor façade, off-site sensitive receptors would not be exposed to interior noise levels exceeding 45 dB L_{eq} or experience a substantial increase in interior ambient noise levels with windows closed or open. Operational stationary-source noise impacts would be minor. No indirect impacts would occur.

Vibration

In general, the potential for operational vibration impacts is limited to areas subject to substantial heavy truck traffic or rail operations, neither of which would occur within the existing SFVAMC Fort Miley Campus area. Furthermore, on-site equipment would be appropriately installed, padded, and mounted so as to minimize the potential for perceivable on-site vibration during equipment operation. Therefore, the direct operational vibration impacts of this alternative would be minor. No indirect impacts would occur.

Alternative 2: SFVAMC Fort Miley Campus Plus Mission Bay Campus Alternative

Near-Term Projects

Alternative 2 near-term projects (both construction and operation) would be the same as Alternative 1 near-term projects (see Tables 2-1 and 2-2 and Figures 2-1 and 2-2). Therefore, the impacts of Alternative 2 near-term projects would be the same as the impacts of Alternative 1 near-term projects. These impacts would range in significance from minor to minor with mitigation (Mitigation Measures NOI-1, NOI-2, NOI-3, and NOI-4).

Long-Term Projects

Alternative 2 long-term projects (both construction and operation) at the existing SFVAMC Fort Miley Campus would be the same as Alternative 1 long-term projects, except that the ambulatory care center would be located at the potential new SFVAMC Mission Bay Campus under Alternative 2 (see Tables 2-1 and 2-2 and Figures 2-1 and 2-2). Therefore, the impacts of Alternative 2 long-term projects at the existing Campus would be the same as or less than the impacts of Alternative 1 long-term projects. The impact discussion below focuses primarily on the impacts that may result from construction and operation of the ambulatory care center, research building, and associated parking structures at the potential new Campus, as proposed as part of Alternative 2, Phase 2.

Construction

Noise

Phase 2 of Alternative 2 would involve the construction of facilities at a potential new SFVAMC Mission Bay Campus. The distance between construction activities associated with the potential new Campus and nearby off-site receptors is unknown at this time. The types of construction activities that would be required are also unknown. If, for example, pile-driving were determined to be necessary at the potential new Campus, noise levels would equate to 88 dBA L_{eq} at 100 feet, which would exceed the threshold established by the City and County of San Francisco for construction noise. Implementation of Mitigation Measures NOI-1 and NOI-2 would reduce potential noise impacts on receptors adjacent to the potential new Campus. Project-level analysis would be required once a specific location for potential new Campus is determined. It is anticipated that implementation of Mitigation Measures NOI-1 and NOI-2 would help to ensure this impact would be minor.

Vibration

Phase 2 of Alternative 2 would involve the construction of facilities at a potential new SFVAMC Mission Bay Campus. The distance between construction activities associated with the potential new Campus and nearby off-site receptors is unknown at this time. The types of construction activities that would be required are also unknown. Nonetheless, construction activities would be limited to daytime hours, which would minimize the potential for sleep disturbance and human annoyance. In addition, with implementation of Mitigation Measures NOI-3 and NOI-4, the potential impact on on-site receptors, including structures, would be limited. Impacts would be noticeable but would be short term and would represent a minor direct impact. No indirect impacts would occur.

Operation

Noise

Mobile-Source Noise

Operation of the potential new SFVAMC Mission Bay Campus under Phase 2 of Alternative 2 would result in an increase in average daily vehicle trips in the Mission Bay area. Because the location of the potential new Campus has yet to be determined, a formal determination cannot be made at this time regarding the increase in roadway noise that could result from the potential new Campus's operation. As a result, the off-site medical facility would be subject to separate environmental review, as plans for the facility are developed.

Because the intended level of development at the existing SFVAMC Fort Miley Campus under Phase 2 of Alternative 2 would be less than is contemplated under Phase 2 of Alternative 1, roadway noise generated at this Campus by increased vehicular traffic would be less than evaluated under Alternative 1 (Table 3.10-12). Based on the modeling conducted, the largest potential change in ambient roadway noise levels under long-term (2023) conditions from existing conditions would occur along 42nd Avenue between Clement Street and Point Lobos Avenue. This potential change is estimated to be 0.6 dBA L_{dn}, which would be less than the threshold of 5.0 dBA for future roadway noise levels. Table 3.10-12 summarizes the modeled traffic noise levels at 50 feet from the centerline of affected roadway segments near the Campus.

The increased daily vehicle operations at the existing SFVAMC Fort Miley Campus resulting from operation of Phase 2 of Alternative 2 would not result in a noticeable increase in ambient traffic noise along local roadways. Therefore, this direct impact would be minor. No indirect impacts would occur.

Siren Noise

Similar to Phase 1 under Alternative 1, Phase 2 under Alternative 2 would not alter the manner in which emergency vehicles access SFVAMC facilities. The potential new SFVAMC Mission Bay Campus would not be anticipated to require or receive emergency medical services. Furthermore, none of the components of Phase 2 would involve expanding the existing emergency department at the existing SFVAMC Fort Miley Campus. The use of emergency medical services is determined on a need basis. Therefore, implementation of Phase 2 would

Table 3.10-12: Predicted Long-Term Future Traffic Noise Levels at the Existing SFVMAC Fort Miley Campus (Alternative 2, Phase 2)

Roadway	Segment		L_{dn} at 50 Feet, dBA			
	From	To	Existing	Long-Term (2023) Plus Alt 2	Net Change	Substantial Increase?
Clement Street	43rd Avenue	42nd Avenue	62.0	62.4	0.4	No
Clement Street	42nd Avenue	34th Avenue	63.6	64.0	0.4	No
Clement Street	43rd Avenue	48th Avenue	60.7	61.0	0.3	No
43rd Avenue	Clement Street	Point Lobos Avenue	60.8	61.3	0.4	No
42nd Avenue	Clement Street	Point Lobos Avenue	57.5	58.1	0.6	No

Notes: dB = (A-weighted) decibels; L_{dn} = day-night average noise level
Traffic noise levels are predicted at a standard distance of 50 feet from the roadway centerline and do not account for shielding from existing noise barriers or intervening structures. Traffic noise levels may vary depending on actual setback distances and localized shielding.
Source: Data modeled by AECOM in 2012

not be anticipated to increase the potential for siren noise in the vicinity of either the existing SFVAMC Fort Miley Campus or in the Mission Bay area, because it would not increase capacity for emergency transport acceptance or result in a substantial increase in local population (see Section 3.11, ”Socioeconomics and Environmental Justice”) that could reasonably be considered to have a secondary effect on the need for emergency services. Therefore, this direct impact would be minor. No indirect impacts would occur.

Stationary Source

Phase 2 of Alternative 2 would involve the construction of facilities at a potential new SFVAMC Mission Bay Campus. With respect to off-site receptors in the Mission Bay area, the proposed stationary-source equipment associated with the potential new Campus, which would be largely limited to HVAC and emergency generator equipment, could be located within 50 feet of existing residences, depending on the proposed site location. The exact location of HVAC equipment and emergency generators has yet to be determined. HVAC equipment is typically mounted on rooftops or mechanical rooms, while emergency generators may be located on the rooftop, loading dock area, or mechanical room. The lack of detailed project information precludes a quantitative analysis of proposed new stationary-source equipment at this time. However, it is reasonable to assume that operation of this stationary equipment could result in an exceedance of the City’s noise limit of 8 dB above the ambient noise level at the property line, and in a substantial increase in ambient noise levels above existing levels near the off-site portion of Alternative 2. This is dependent on the need for HVAC equipment to properly filter and control the building climate. In this case, impacts would be potentially adverse.

Mitigation Measure NOI-5: Conduct a Site-Specific Noise Study to Inform Design of Stationary Noise Sources for the Potential New SFVAMC Mission Bay Campus

VA will retain the services of a qualified acoustical consultant to conduct an additional site-specific noise study to evaluate and establish the appropriate ambient noise levels at the proposed off-site medical *research facility for a detailed HVAC and emergency-generator noise reduction analysis. The recommendations of the acoustical consultant will include specific equipment design and operations measures to reduce HVAC and emergency-generator noise to acceptable levels for exterior and interior noise levels as specified in the San Francisco Noise Control Ordinance.*

With implementation of Mitigation Measure NOI-5, the design and installation of stationary-source equipment would include an evaluation and implementation of measures related to controlling noise from these sources to such an extent that noise levels at nearby residence would not exceed EPA or San Francisco Noise Control Ordinance standards. Therefore, with implementation of Mitigation Measure NOI-5, this direct impact would be reduced to a minor level. No indirect impacts would occur.

Vibration

In general, the potential for operational vibration impacts is limited to areas subject to substantial heavy truck traffic or rail operations. However, neither source of vibration would be present at the potential new SFVAMC Mission Bay Campus as a result of implementation of Alternative 2 long-term projects. Furthermore, on-site equipment would be appropriately installed, padded, and mounted so as to minimize the potential for perceivable on-site vibration during equipment operation. Therefore, operational vibration impacts would be minor. No indirect impacts would occur.

Alternative 3: No Action Alternative

Construction

Under Alternative 3, there would be no new construction and no retrofitting of existing buildings at the existing SFVAMC Fort Miley Campus. Thus, no construction-related noise or vibration would result, and no direct or indirect impacts on on- and off-site receptors would occur.

Operation

Noise

Under Alternative 3, no new development would occur at the existing SFVAMC Fort Miley Campus; therefore, no additional noise from stationary sources or emergency transport sirens would be anticipated. With respect to ambient roadway noise levels, traffic to and from the Campus would be anticipated to incrementally increase as regional population increases. This would have a secondary effect of incrementally increasing local roadway volumes. Noise levels would increase by approximately 0.1 dBA L_{dn} under near-term (2015) conditions and 0.5 dBA L_{dn} under long-term (2023) conditions (Table 3.10-13). Also as shown in Table 3.10-13, roadway noise levels along the five segments adjacent to the Campus would increase by no more than 0.5 dBA L_{dn} by 2023, which would not exceed the thresholds identified above for incremental roadway noise-level increases. As a result, direct operational noise impacts associated with mobile and stationary sources and sirens would be minor. No indirect impacts would occur.

Table 3.10-13: Predicted Near-Term Future Traffic Noise Levels (Alternative 3)

Roadway	Segment		L_{dn} at 50 Feet, dBA						
	From	To	Existing	Near-Term (2015) Plus Alt. 2	Net Change	Substantial Increase?	Long-Term (2023) Plus Alt. 2	Net Change	Substantial Increase?
Clement Street	43rd Avenue	42nd Avenue	62.0	62.1	0.1	No	62.3	0.3	No
Clement Street	42nd Avenue	34th Avenue	63.6	63.7	0.1	No	63.9	0.3	No
Clement Street	43rd Avenue	48th Avenue	60.7	60.8	0.1	No	61.0	0.3	No
43rd Avenue	Clement Street	Point Lobos Avenue	60.8	60.9	0.1	No	61.1	0.3	No
42nd Avenue	Clement Street	Point Lobos Avenue	57.5	57.6	0.1	No	57.7	0.3	No

Notes:
dB = (A-weighted) decibels; L_{dn} = day-night average noise level
Traffic noise levels are predicted at a standard distance of 50 feet from the roadway centerline and do not account for shielding from existing noise barriers or intervening structures. Traffic noise levels may vary depending on actual setback distances and localized shielding.
Source: Data modeled by AECOM in 2012

Vibration

In general, under Alternative 3, the potential for operational vibration impacts is limited to areas subject to substantial heavy truck traffic or rail operations. However, neither source of vibration would be present as part of operation of the existing SFVAMC Fort Miley Campus. Furthermore, no additional on-site equipment would be installed under Alternative 3 that could generate vibration during its operation. Therefore, no direct or indirect operational vibration impact would occur.

3.10.4 References

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