APPENDIX B

Noise & Vibration Technical Report

City of Los Angeles
Oil and Gas Drilling Ordinance
Noise and Vibration
Technical Report

September 2022

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TABLE OF CONTENTS

Section		Page
1.0	Introduction	1
	1.1 Project Location	1
	1.2 Project Description	2
2.0	Environmental Setting	6
	2.1 Fundamentals of Noise & Vibration	6
	2.2 Noise Sensitive Receptors	11
	2.3 Existing Conditions	12
3.0	Regulatory Framework	14
	3.1 Regulatory Framework	14
4.0	Noise Analysis	22
	4.1 Thresholds of Significance	22
	4.2 Methodology	22
	4.3 Impact Analysis	23
5.0	References	28

Appendix

A Sensitive Receptors
B Noise & Vibration Data

LIST OF TABLES

Table		Page
1	A-Weighted Decibel Scale	7
2	Building Noise Reduction Factors	8
3	Noise Levels Associated With Oil & Gas Operations	13
4	Construction Vibration Damage Criteria	15
5	Groundborne Vibration and Groundborne Noise Impact Criteria for General Assesment	16
6	Guideline Vibration Damage Potential Threshold Criteria	17
7	City of Los Angeles Presumed Ambient Noise Levels	18
8	Guidelines for Noise Compatible Land Use (CNEL)	21
9	Temporary Noise Levels During Well Abandonment - Unmitigated	24
10	Temporary Noise Levels During Well Abandonment - Mitigated	26
11	Temporary Vibration Levels During Well Abandonment	27

1.0 INTRODUCTION

This Noise and Vibration Technical Report describes the potential for noise and groundborne vibration impacts resulting from implementation of the proposed Oil and Gas Drilling Ordinance (Ordinance or Project) to prohibit new oil and gas extraction and make existing extraction activities a nonconforming use in all zones within the City of Los Angeles (City). This report includes an evaluation of potential impacts associated with substantial temporary and permanent changes in ambient noise levels in the vicinity of oil and gas wells; exposure of people in the vicinity of oil and gas wells to excessive noise or groundborne vibration levels; and whether exposure is in excess of standards established in the City's General Plan or Noise Ordinance. This report has been prepared by Impact Sciences, Inc., in support of the environmental documentation being prepared pursuant to the California Environmental Quality Act (CEQA).

1.1 PROJECT LOCATION

The Project is a citywide code amendment applicable within the boundaries of the City. The City has an approximate land area of 465 square miles (297,600 acres) with an estimated population of nearly 4.0 million residents in 2020 (3,898,747), according to the 2020 Census. The City lies within Los Angeles County which encompasses 4,000 square miles, 88 incorporated cities, and more than 10 million residents (10,014,009), according to the 2020 Census. The City is divided into 15 Council Districts and 35 Community Plan Areas. More than 87 percent of the City is developed with urban uses.

According to August 2022 data from the California Geologic Energy Management division (CalGEM), the City has 26 oil and gas fields that intersect city boundaries and 5,273 oil and gas wells. There are approximately 641 active, 1,350 idle, 35 canceled, and 3,247 plugged wells.[1] Of the City's idle wells, as of July 2022, 56 are orphan wells likely to have no responsible solvent operator. There are oil and gas facilities in nearly every section of the City.[2] While some wells are situated in heavy industrial areas, others are located within residential neighborhoods and amongst community parks and schools. Much of the existing oil drilling and extraction is within underserved communities throughout the City.

Wells are found in nearly all parts of the City including but not limited to the communities of Wilmington, Harbor Gateway, Downtown, West Los Angeles, South Los Angeles, and the Northeast San Fernando

1 An active well is an oil well that has been drilled and completed, an idle well is inactive and not producing, but capable of being reactivated, a canceled well is one where a well permit was canceled prior to drilling, and a plugged well has been plugged and sealed to current standards.

2 There are two gas storage fields within the City, the Aliso Canyon and the Playa Del Rey Fields, which are both operated by the Southern California Gas Company (SoCalGas). SoCalGas is the primary operator of underground natural gas fields, natural gas storage wells, and natural gas transmission facilities within the City. No natural gas wells operated by public utilities would be impacted by the Ordinance.

Valley. While some wells are situated in heavy industrial areas, others are located in neighborhoods within close proximity to residences, schools, and other sensitive uses. For a list of sensitive receptors located in proximity to wells throughout the City, please refer to **Appendix A** to this report.

1.2 PROJECT DESCRIPTION

The Project is a proposed ordinance amending Sections 12.03, 12.20, 12.23, 12.24, and 13.01 of the Los Angeles Municipal Code (LAMC) to (1) eliminate the provisions of the LAMC that allow for the creation of new "O" Oil Drilling Supplemental Use Districts; (2) end by-right oil and gas extraction in the M3-Heavy Industrial Zones; (3) declare existing oil and gas extraction within the City a nonconforming use to terminate within 20 years; and (4) prohibit new or expanded oil and gas extraction activities (such as the drilling of new wells or the redrilling or deepening of existing wells). The Ordinance permits maintenance of the wells that the Zoning Administrator determines is necessary to protect public health and safety or the environment. Twenty years from the effective date of the Ordinance, all nonconforming oil and gas extraction uses will terminate.

This Ordinance is not applicable to (1) common carrier oil pipelines intended for regionally-coordinated transport of hydrocarbons; (2) service stations or like uses; (3) refineries; and (4) oil and injection wells that are verified to be plugged and abandoned in accordance with all applicable local, state, and federal laws, rules and regulations, including the California Statutes and Regulations overseen by the California Geologic Energy Management division (CalGEM), and LAFD and for which the well pad has been restored suitably for its subsequent use, and (5) any well operated by a public utility regulated by the California Public Utilities Commission, including those operating at the Aliso Canyon and Playa Del Rey Gas Storage Fields.

The Ordinance does not set a specific timetable for the closure and abandonment of wells, regulate the abandonment of oil wells that have permanently ceased operation, or mandate or regulate the remediation of well sites where extraction has terminated permanently.[3]

The Ordinance will make existing oil and gas drilling operations legally nonconforming uses in the City, subject to a 20-year amortization period. Existing oil and gas extraction activities may continue to operate until the end of the amortization period after which time all drilling-related activities must cease. After a well ceases operation, current regulations require that the well be abandoned and plugged. However, the

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3 Public Resources Code Section 21000 requires that a lead agency identify all feasible mitigation measures that will avoid or substantially lessen the significant environmental effects of the project. This MND identifies areas of potentially significant impacts that would occur as a result of abandonment activities (See Noise, Geology and Soils). In accordance with CEQA, mitigation measures are proposed where such impacts could be reduced by their imposition.

current regulations do not establish a set time period by which the abandonment process must be completed after a well ceases operation. As stated above, the Ordinance does not regulate abandonment when well operations permanently cease.

Currently it is unknown as to how many oil wells will permanently cease operations prior to the 20 year expiration date. This is because the time period that each of the City's approximately 1,991 active and idle wells will permanently cease extraction and undergo abandonment depends on a number of individual factors. For example, upon the Ordinance becoming effective, some operators may choose to conclude operations immediately, while others may have contractual obligations to the landowners of the drilling sites and operate for a few years before the site is abandoned. Others may continue to operate until the end of the 20-year amortization period. However, once a well permanently ceases operation, there is a financial and economic incentive for the oil well operator to complete the abandonment process to reduce the costs of maintaining the well site. Therefore, because there is no reasonable way to accurately predict the timeline for cessation and abandonment at the individual level, this analysis instead assumes all oil drilling will cease 20 years from the effective date of the Ordinance as required. Abandonment of individual wells may occur at any time during the 20-year timeframe, and potentially beyond the 20-year timeframe.

Although not regulated by the Ordinance, well abandonment is a reasonably foreseeable outcome for many of the wells currently operating in the City, although as stated above, no specific timeline for abandonment currently exists and the Ordinance does not include any regulations related to the timing of the abandonment of oil wells. When a well is shut down, termination and abandonment activities will generally include (1) the cessation of production and drilling operations; (2) the closure and plugging of all oil and gas wells, including water flooding injection wells, except injection wells as permitted and demonstrated to be active and necessary by CalGEM; and (3) the plugging/capping of subsurface pipelines. Neither implementation of the Ordinance nor the oil well abandonment process should require excavation of previously undisturbed land and no new permanent structures would be constructed as part of the Project.

Termination activities of nonconforming oil and gas extraction must adhere to all applicable local, state, and federal laws, regulations, rules and standards, including the California Statutes and Regulations and all other requirements overseen by CalGEM as the principal regulatory authority for the closure of oil and gas extraction and production sites. Termination and abandonment activities will occur within previously disturbed and developed areas of the properties that encompass oil and gas extraction activities. In some cases, new access points may be necessary to allow for ingress/egress of equipment necessary to complete the abandonment of wells. However, no new permanent roads or permanent changes to existing roads would be necessary as part of the Project.

The closure of oil and gas wells entails plugging the wells in place in accordance with California Statutes and Regulations and all other applicable requirements as overseen by CalGEM. The process of well abandonment will be determined on a case-by-case basis under the regulatory supervision of CalGEM and the LAFD and will depend on individual site conditions such as type and depth of well. However, for the purposes of this environmental analysis, several generalized assumptions have been made based upon standard industry practice, existing regulations governing well abandonment, and case studies. While plugging and abandonment varies by well, there is a consistent set of procedures that are followed. Generally, the drill site's existing drilling or maintenance rig will be used to abandon the well and remove equipment from the well.[4] Well equipment will be removed from the site by truck. Cement trucks will also arrive onsite to fill the well at various depths over a span of several days. An operator may use in excess of 2,500 cubic feet of cement for one abandonment. The process entails removing equipment and filling the well with cement at different phases in order to ensure that it is safe to abandon the well at varying depths. At the end of each work day, the well site is closed and the rig is shut down in order to resume operations the following work day. CalGEM conducts inspections at certain milestones for this scope of work, including the following:

- Operators conduct a series of pressure tests on the wells to identify that there are no leaks or that the pressure is unsafe to work on the well. A test to measure any levels of hydrogen sulfide is common.

- Operators use a drilling or maintenance rig to work on the well and prepare blowout prevention equipment for the well that will be plugged.

- CalGEM inspects the blowout prevention equipment to ensure that it is safe for the operator to continue with plugging and abandonment work.

- Operators use the rig to pull out various cables, tubing, and other connections from the well casing.

- Operators may require the use of brine water to clean out different segments of the well. If no debris or sand is observed, then the operators continue using the rig to remove cables, tubing, and more connections from the well.

- After the operator has removed the sufficient amount of tubings, casing, and connections and there are minimal amounts of debris observed, then the operator will bring a cement truck to begin pouring fresh water and cement mix down the well. CalGEM is required to observe this first segment of pouring

4 When a drilling or maintenance rig is not on the well site, a rig will need to be brought to the site to complete the abandonment process.

as the inspector is looking to observe that the bottom hole is filled with the appropriate amount of cement.

- The operator continues to remove casings and tubings with support of the rig while also pouring cement down the well at depths deemed safe and clear enough to pour cement. Pressure testing of the well is frequently conducted to identify any safety risks.

- As the work nears the top segment of the well, the operator continues to use the rig and cement trucks are brought to the drill site to fill the well with cement. The ending segment can include up to 600 cubic feet of cement into the well's casings in order to displace any well fluids or debris. The operator will fill the well casing to the near very top and this process is observed by CalGEM and by the Los Angeles Fire Department.

- At the conclusion, the operator removes any blowout prevention equipment from the rig and the well is closed and steel welded with the API Number and the LAFD Well Number identified on the top cover.

Given the varied timeline of individual well abandonment and the fact the Ordinance does not establish any regulations related to well site remediation or redevelopment (except where mitigation measures are required to reduce identified potentially significant impacts), it would be speculative to contemplate when site remediation would occur after the wells are abandoned and the types of redevelopment and future land uses that may occur on former drill sites. What might get built and at what intensity or scale is not possible to identify or analyze at this time. Therefore, the scope of analysis in this Initial Study is limited to (1) cessation of oil and gas extraction in the city and (2) abandonment activities that are reasonably foreseeable. The analysis does not examine impacts from remediation and/or future development. Those impacts would be analyzed in subsequent environmental analyses at either the programmatic or project level.

2.0 ENVIRONMENTAL SETTING

2.1 FUNDAMENTALS OF NOISE & VIBRATION

Noise

Noise is usually defined as unwanted sound that is an undesirable byproduct of society's normal day-to-day activities. Sound becomes unwanted when it interferes with normal activities, when it causes actual physical harm, and/or when it has adverse effects on health. Noise is measured on a logarithmic scale of sound pressure level known as a decibel (dB). The human ear does not respond uniformly to sounds at all frequencies. For example, the human ear is less sensitive to low and high frequencies than medium frequencies, which more closely correspond with human speech. In response to the sensitivity of the human ear to different frequencies, the A-weighted noise level (or scale), which corresponds better with people's subjective judgment of sound levels, has been developed. This A-weighted sound level, referenced in units of dB(A), is measured on a logarithmic scale such that a doubling of sound energy results in a 3 dB(A) increase in noise level. Typically, changes in a community noise level of less than 3 dB(A) are not noticed by the human ear.[5] Changes from 3 to 5 dB(A) may be noticed by some individuals who are sensitive to changes in noise. A greater than 5 dB(A) increase is readily noticeable, while the human ear perceives a 10 dB(A) increase in sound level to be a doubling of sound.

On the A-weighted scale, the range of human hearing extends from approximately 3 to 140 dB(A). **Table 1, A-Weighted Decibel Scale**, provides examples of A-weighted noise levels from common sources. Noise sources occur in two forms: (1) point sources, such as stationary equipment or individual motor vehicles; and (2) line sources, such as a roadway with a large number of point sources (motor vehicles). Sound generated by a point source typically diminishes (attenuates) at a rate of 6 dB(A) for each doubling of distance from the source to the receptor at acoustically "hard" sites and 7.5 dB(A) at acoustically "soft" sites.[6] For example, if a noise source produces a noise level of 89 dB(A) at a reference distance of 50 feet, the noise level would be 83 dB(A) at a distance of 100 feet from the noise source, 77 dB(A) at a distance of 200 feet, and so on. Noise generated by a mobile source will decrease by approximately 3 dB(A) over hard surfaces and 4.5 dB(A) over soft surfaces for each doubling of distance.

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5 California Department of Transportation (Caltrans). 2013. Technical Noise Supplement to the Traffic Noise Analysis Protocol. Available at: https://dot.ca.gov/-/media/dot-media/programs/environmental-analysis/documents/env/tens-sep2013-a11y.pdf

6 Federal Highway Administration, *Highway Noise Fundamentals*, (1980) 97. Examples of "hard" or reflective sites include asphalt, concrete, and hard and sparsely vegetated soils. Examples of acoustically "soft" or absorptive sites include soft, sand, plowed farmland, grass, crops, heavy ground cover, etc.

Table 1
A-Weighted Decibel Scale

Typical A-Weighted Sound Levels	Sound Level (dB(A), Leq)
Threshold of Pain	140
Jet Takeoff at 100 Meters	125
Jackhammer at 15 Meters	95
Heavy Diesel Truck at 15 Meters	85
Conversation at 1 Meter	60
Soft Whisper at 2 Meters	35

Source: United States Occupational Safety & Health Administration, Noise and Hearing Conservation Technical Manual, 1999.

Sound levels also can be attenuated by man-made or natural barriers (e.g., sound walls, berms, and ridges), as well as elevational differences. Noise is most audible when traveling by direct line-of-sight, an interrupted visual path between the noise source and noise receptor. Barriers, such as walls or buildings that break the line-of-sight between the source and the receiver, can greatly reduce noise levels from the source since sound can only reach the receiver by diffraction. However, if a barrier is not high or long enough to break the line-of-sight from the source to the receiver, its effectiveness is greatly reduced.

Solid walls and berms may reduce noise levels by 5 to 10 dB(A) depending on their height and distance relative to the noise source and the noise receptor.[7] Sound levels may also be attenuated 3 dB(A) by a first row of houses and 1.5 dB(A) for each additional row of houses.[8] The minimum noise attenuation provided by typical structures in California is provided in **Table 2, Building Noise Reduction Factors**.

7 Federal Highway Administration, *Highway Noise Mitigation*, (1980) 18.

8 California Department of Transportation (Caltrans). 2013. Technical Noise Supplement to the Traffic Noise Analysis Protocol. Available at: https://dot.ca.gov/-/media/dot-media/programs/environmental-analysis/documents/env/tens-sep2013-a11y.pdf

Table 2
Building Noise Reduction Factors

Building Type	Window Condition	Noise Reduction Due to Exterior of the Structure (dB(A))
All	Open	10
Light Frame	Ordinary Sash (closed)	20
	Storm Windows	25
Masonry	Single Glazed	25
	Double Glazed	35

Source: Federal Highway Administration, Highway Traffic Noise: Analysis and Abatement Guidance. December 2011.

Sound Rating Scales

Various rating scales approximate the human subjective assessment to the "loudness" or "noisiness" of a sound. Noise metrics have been developed to account for additional parameters, such as duration and cumulative effect of multiple events. Noise metrics are categorized as single event metrics and cumulative metrics, as summarized below.

In order to simplify the measurement and computation of sound loudness levels, frequency weighted networks have obtained wide acceptance. The A-weighted scale, discussed above, has become the most prominent of these scales and is widely used in community noise analysis. Its advantages are that it has shown good correlation with community response and is easily measured. The metrics used in this analysis are all based upon the dB(A) scale.

Equivalent Noise Level

Equivalent Noise Level (Leq) is the sound level corresponding to a steady-state A-weighted sound level containing the same total energy as several single event noise exposure level events during a given sample period. Leq is the "acoustic energy" average noise level during the period of the sample. It is based on the observation that the potential for noise annoyance is dependent on the total acoustical energy content of the noise. The equivalent noise level is expressed in units of dB(A). Leq can be measured for any period, but is typically measured for 15 minutes, 1 hour, or 24 hours. Leq for a 1-hour period is used by the Federal Highway Administration (FHWA) for assessing highway noise impacts. Leq for 1 hour is referred to as the Hourly Noise Level (HNL) in the California Airport Noise Regulations and is used to develop Community

Noise Equivalent Level values for aircraft operations. Construction noise levels and ambient noise measurements in this section use the Leq scale.

Community Noise Equivalent Level

Community Noise Equivalent Level (CNEL) is a 24-hour, time-weighted energy average noise level based on the A-weighted decibel. It is a measure of the overall noise experienced during an entire day. The term "time-weighted" refers to the penalties attached to noise events occurring during certain sensitive periods. In the CNEL scale, 5 decibels (dB) are added to measured noise levels occurring between the hours of 7 P.M. and 10 P.M. For measured noise levels occurring between the hours of 10 P.M. and 7 A.M., 10 dB are added. These decibel adjustments are an attempt to account for the higher sensitivity to noise in the evening and nighttime hours and the expected lower ambient noise levels during these periods. Existing and projected future traffic noise levels in this section use the CNEL scale.

Day-Night Average Noise Level

The day-night average sound level (Ldn) is another average noise level over a 24-hour period. Noise levels occurring between the hours of 10 P.M. and 7 A.M. are increased by 10 dB. This noise is weighted to take into account the decrease in community background noise of 10 dB(A) during this period. Noise levels measured using the Ldn scale are typically similar to CNEL measurements.

Adverse Effects of Noise Exposure

Noise is known to have several adverse effects on humans, which has led to laws and standards being set to protect public health and safety, and to ensure compatibility between land uses and activities. Adverse effects of noise on people include hearing loss, communication interference, sleep interference, physiological responses, and annoyance. Each of these potential noise impacts on people is briefly discussed in the following narrative.

Hearing Loss

Hearing loss is generally not a community noise concern, even near a major airport or a major freeway. The potential for noise-induced hearing loss is more commonly associated with occupational noise exposures in heavy industry, very noisy work environments with long-term exposure, or certain very loud recreational activities (e.g., target shooting and motorcycle or car racing). The Occupational Safety and Health Administration (OSHA) identifies a noise exposure limit of 90 dB(A) for 8 hours per day to protect from hearing loss (higher limits are allowed for shorter duration exposures). Noise levels in neighborhoods, even in very noisy neighborhoods, are not sufficiently loud enough to cause hearing loss.

Communication Interference

Communication interference is one of the primary concerns in environmental noise. Communication interference includes speech disturbance and intrusion with activities such as watching television. Noise can also interfere with communications such as within school classrooms. Normal conversational speech is in the range of 60 to 65 dB(A) and any noise in this range or louder may interfere with speech.

Sleep Interference

Noise can make it difficult to fall asleep, create momentary disturbances of natural sleep patterns by causing shifts from deep to lighter stages, and cause awakening. Noise may even cause awakening that a person may or may not be able to recall.

Physiological Responses

Physiological responses are those measurable effects of noise on people that are realized as changes in pulse rate, blood pressure, and other physical changes. Studies to determine whether exposure to high noise levels can adversely affect human health have concluded that, while a relationship between noise and health effects seems plausible, there is no empirical evidence of the relationship.

Annoyance

Annoyance is an individual characteristic and can vary widely from person to person. Noise that one person considers tolerable can be unbearable to another of equal hearing capability. The level of annoyance depends both on the characteristics of the noise (including loudness, frequency, time, and duration), and how much activity interference (such as speech interference and sleep interference) results from the noise. However, the level of annoyance is also a function of the attitude of the receiver. Attitudes may also be affected by the relationship between the person affected and the source of noise, and whether attempts have been made to abate the noise.

Vibration

Vibration consists of waves transmitted through solid material. Groundborne vibration propagates from a source through the ground to adjacent buildings by surface waves. Vibration may comprise a single pulse, a series of pulses, or a continuous oscillatory motion. The frequency of a vibrating object describes how rapidly it is oscillating and is measured in hertz (Hz). Most environmental vibrations consist of a composite, or "spectrum" of many frequencies, and are generally classified as broadband or random vibrations. The normal frequency range of most groundborne vibration that can be felt generally starts from a low frequency of less than one Hz to a high of about 200 Hz. Vibration is often measured in terms of the peak

particle velocity (PPV) in inches per second (in/sec) when considering impacts on buildings or other structures, as PPV represents the maximum instantaneous peak of vibration that can stress buildings. Because it is a representation of acute vibration, PPV is often used to measure the temporary impacts of short-term construction activities that could instantaneously damage-built structures. Vibration is often also measured by the root mean squared (RMS) because it best correlates with human perception and response. Specifically, RMS represents "smoothed" vibration levels over an extended period of time and is often used to gauge the long-term chronic impact of a project's operation on the adjacent environment. RMS amplitude is the average of a signal's squared amplitude. It is most commonly measured in decibel notation (VdB).

Vibration energy attenuates as it travels through the ground, causing the vibration amplitude to decrease with distance away from the source. High frequency vibrations reduce much more rapidly than low frequencies, so that in the far-field from a source, the low frequencies tend to dominate. Soil properties also affect the propagation of vibration. When groundborne vibration interacts with a building, there is usually a ground-to-foundation coupling loss (i.e., the foundation of the structure does not move in sync with the ground vibration), but the vibration can also be amplified by the structural resonances of the walls and floors. Vibration in buildings is typically perceived as rattling of windows or items on shelves, or the motion of building surfaces. At high levels, vibration can result in damage to structures.

Manmade groundborne vibration is generally limited to areas within a few hundred feet of certain types of construction activities, especially pile driving. Road vehicles rarely create enough groundborne vibration to be perceptible to humans unless the road surface is poorly maintained and there are potholes or bumps. If traffic induces perceptible vibration in buildings, such as window rattling or shaking of small loose items (typically caused by heavy trucks in passing), then it is most likely an effect of low-frequency airborne noise or ground characteristics. Human annoyance by vibration is related to the number and duration of events. The more events or the greater the duration, the more annoying it will be to humans.

2.2 NOISE SENSITIVE RECEPTORS

Noise-sensitive land uses are generally considered to include those uses where noise exposure could result in health-related risks to individuals, as well as places where quiet is an essential element of their intended purpose. Residential dwellings are of primary concern because of the potential for increased and prolonged exposure of individuals to both interior and exterior noise levels. In addition to the numerous parcels zoned for residential uses in proximity to oil wells throughout the City, there are approximately 766 noise-

sensitive uses within 100 feet of oil wells.[9] These noise sensitive land uses consist of schools, day cares, elder care facilities, adult residential facilities, parks, and hospitals. Please refer to **Appendix A** to this report for more information related to noise sensitive receptors located in proximity to oil wells.

2.3 EXISTING CONDITIONS

The City is affected by a variety of noise sources, including mobile and stationary sources. Mobile noise in the City is primarily generated by automobiles, trucks, and aircraft such as airplane and helicopter overflight. Motor vehicle noise generally affects numerous receptors along lengths of roadways. Stationary source noise is primarily generated by industrial and commercial land uses; however, all land uses can generate some type of noise.

Oil and gas well operations also contribute to the ambient noise levels at receptors in proximity to active wells. The types of noise associated with oil and gas operations can be complex in nature, due to a wide variety of sources. Some of these noises are intermittent, some are continuous, and many vary in their intensity. Certain sources, such as compressor stations, produce low frequency noise (LFN), which is typically heard as a low rumble. There are also numerous source-dependent and subjective factors that may influence health outcomes, such as noise sensitivity and noise reduction technologies employed at specific locations. While data on noise levels associated with oil and gas development is limited, **Table 3, Noise Levels Associated With Oil and Gas Operations**, identifies estimated noise levels associated with various oil and gas production activities.

9 Due to the programmatic nature of this analysis, it is acknowledged that not every noise sensitive receptor will be identified. However, a good-faith effort at identifying the known sensitive receptors has been included in Appendix A to this report. Sensitive receptors within 100 feet of oil wells were selected to conservatively identify a range of noise and vibration levels at locations in proximity to oil wells. As shown in the analysis herein, sensitive receptors located more than 50 feet from oil wells would not experience potentially significant noise and vibration levels during potential abandonment activities.

Table 3
Noise Levels Associated With Oil & Gas Operations

Production/Activity Source	Distance (feet)	Average Noise Levels [dB(A)]
Horizontal Drilling	50	76
Vertical Drilling	100	75-87
Hydraulic Fracturing	250	85-90
Hydraulic Fracturing/Flowback	625	58
Compressor Stations	On-Site	69-86

Source: Science of the Total Environment, Public health implications of environmental noise associated with unconventional oil and gas development, December 9, 2016.

3.0 REGULATORY FRAMEWORK

3.1 REGULATORY FRAMEWORK

There are several plans, regulations, and programs that include policies, requirements, and guidelines regarding noise and vibration at the federal, state, regional, and local levels. As described below, these plans, guidelines, and laws include the following:

- Occupational Safety and Health Act of 1970
- Noise Control Act of 1972
- Federal Transit Administration Vibration Standards
- Office of Planning and Research Guidelines for Noise Compatible Land Use
- Caltrans Vibration/Groundborne Noise Standards
- Los Angeles County Airport Land Use Commission Comprehensive Land Use Plan
- Los Angeles Municipal Code
- City of Los Angeles General Plan Noise Element

Federal

Occupational Safety and Health Act of 1970. Under the Occupational Safety and Health Act of 1970 (29 U.S.C. §1919 et seq.), the Occupational Safety and Health Administration (OSHA) has adopted regulations designed to protect workers against the effects of occupational noise exposure. These regulations list permissible noise level exposure as a function of the amount of time during which the worker is exposed. The regulations further specify a hearing conservation program that involves monitoring noise to which workers are exposed, ensuring that workers are made aware of overexposure to noise, and periodically testing the workers' hearing to detect any degradation.[10]

Noise Control Act of 1972. Under the authority of the Noise Control Act of 1972, the United States Environmental Protection Agency (U.S. EPA) established noise emission criteria and testing methods published in Parts 201 through 205 of Title 40 of the Code of Federal Regulations (CFR) that apply to some transportation equipment (e.g., interstate rail carriers, medium trucks, and heavy trucks) and construction equipment. In 1974, U.S. EPA issued guidance levels for the protection of public health and welfare in

[10] United States Department of Labor. OSH Act of 1970. https://www.osha.gov/laws-regs/oshact/completeoshact. Accessed May, 2021.

residential areas of an outdoor L_{dn} of 55 dBA and an indoor L_{dn} of 45 dBA. These guidance levels are not standards or regulations and were developed without consideration of technical or economic feasibility. There are no federal noise standards that directly regulate environmental noise related to the construction or operation of the Project. Moreover, the federal noise standards are not reflective of urban environments that range by land use, density, proximity to commercial or industrial centers, etc. As such, for purposes of determining acceptable sound levels to determine and evaluate intrusive noise sources and increases, this document utilizes the City of Los Angeles Noise Regulations, discussed below.

Federal Transit Administration Vibration Standards. There are no federal vibration standards or regulations adopted by any agency that are applicable to evaluating vibration impacts from activities associated with the Project. However, the Federal Transit Administration (FTA) has adopted vibration criteria for use in evaluating vibration impacts from construction activities. The vibration damage criteria adopted by the FTA are shown in **Table 4, Construction Vibration Damage Criteria.**

Table 4
Construction Vibration Damage Criteria

Building Category	PPV (in/sec)
I. Reinforced-concrete, steel, or timber (no plaster)	0.5
II. Engineered concrete and masonry (no plaster)	0.3
III. Non-engineered timber and masonry buildings	0.2
IV. Buildings extremely susceptible to vibration damage	0.12

Source: FTA, Transit Noise and Vibration Impact Assessment Manual, 2018.

The FTA has also adopted standards associated with human annoyance for determining the groundborne vibration and noise impacts from ground-borne noise on the following three off-site land-use categories: Vibration Category 1 – High Sensitivity, Vibration Category 2 – Residential, and Vibration Category 3 – Institutional.[11] The FTA defines Category 1 as buildings where vibration would interfere with operations within the building, including vibration-sensitive research and manufacturing facilities, hospitals with vibration-sensitive equipment, and university research operations. Vibration-sensitive equipment includes, but is not limited to, electron microscopes, high-resolution lithographic equipment, and normal optical microscopes. Category 2 refers to all residential land uses and any buildings where people sleep, such as hotels and hospitals. Category 3 refers to institutional land uses such as schools, churches, other

11 Federal Transit Administration, Transit Noise and Vibration Impact Assessment Manual, Table 6-1, page 124, 2018.

institutions, and quiet offices that do not have vibration-sensitive equipment but that still potentially involve activities that could be disturbed by vibration. The vibration thresholds associated with human annoyance for these three land-use categories are shown in **Table 5, Groundborne Vibration and Groundborne Noise Impact Criteria for General Assessment**. No thresholds have been adopted or recommended for commercial or office uses.

Table 5
Groundborne Vibration and Groundborne Noise Impact Criteria for General Assessment

Land Use Category	Frequent Events[a]	Occasional Events[b]	Infrequent Events[c]
Category 1: Buildings where vibration would interfere with interior operations.	65 VdB[d]	65 VdB[d]	65 VdB[d]
Category 2: Residences and buildings where people normally sleep.	72 VdB	75 VdB	80 VdB
Category 3: Institutional land uses with primarily daytime use.	75 VdB	78 VdB	83 VdB

a "Frequent Events" is defined as more than 70 vibration events of the same source per day.
b "Occasional Events" is defined as between 30 and 70 vibration events of the same source per day.
c "Infrequent Events" is defined as fewer than 30 vibration events of the same kind per day.
d This criterion is based on levels that are acceptable for most moderately sensitive equipment such as optical microscopes.
Source: FTA, Transit Noise and Vibration Impact Assessment Manual, 2018.

State

Office of Planning and Research Guidelines for Noise Compatible Land Use. The State of California has not adopted statewide standards for environmental noise, but the Governor's Office of Planning and Research (OPR) has established guidelines for evaluating the compatibility of various land uses as a function of community noise exposure. The City has developed its own compatibility guidelines in the Noise Element of the General Plan based in part on OPR Guidelines, see **Table 7, Guidelines for Noise Compatible Land Use (CNEL)** later in this report. California Government Code Section 65302 requires each county and city in the State to prepare and adopt a comprehensive long-range general plan for its physical development, with Section 65302(f) requiring a noise element to be included in the general plan. The noise element must: (1) identify and appraise noise problems in the community; (2) recognize Office of Noise Control guidelines; and (3) analyze and quantify current and projected noise levels.

Caltrans Vibration/Groundborne Noise Standards. The State of California has not adopted Statewide standards or regulations for evaluating vibration or groundborne noise impacts from land use

development projects. Although the State has not adopted any vibration standard, Caltrans recommends the following vibration thresholds that are more practical than those provided by the FTA.[12]

The state noise and vibration guidelines are to be used as guidance with respect to planning for noise, not standards and/or regulations to which the City of Los Angeles must adhere.

Table 6
Guideline Vibration Damage Potential Threshold Criteria

Structure and Condition	Maximum PPV (inch/sec)	
	Transient Sources[1]	Continuous/Frequent Intermittent Sources[2]
Extremely fragile historic buildings, ruins, ancient monuments	0.12	0.08
Fragile buildings	0.20	0.10
Historic and some old buildings	0.50	0.25
Older residential structures	0.50	0.30
New residential structures	1.00	0.50
Modern industrial/commercial buildings	2.00	0.50

Source: Table 19, Transportation and Construction Vibration Guidance Manual (Caltrans 2020).
1 Transient sources create a single, isolated vibration event, such as blasting or drop balls.
2 Continuous/frequent intermittent sources include impact pile drivers, pogo-stick compactors, crack-and-seat equipment, vibratory pile drivers, and vibratory compaction equipment.

Local

Los Angeles Municipal Code. The City of Los Angeles Noise Regulations are provided in Chapter XI of the Los Angeles Municipal Code (LAMC). LAMC Section 111.02 provides procedures and criteria for the measurement of the sound level of "offending" noise sources. In accordance with the LAMC, a noise source that causes a noise level increase of 5 dBA over the existing average ambient noise level as measured at an adjacent property line creates a noise violation. This standard applies to radios, television sets, air conditioning, refrigeration, heating, pumping and filtering equipment, powered equipment intended for repetitive use in residential areas, and motor vehicles driven on-site. To account for people's increased tolerance for short-duration noise events, the Noise Regulations provide a 5 dBA allowance for a noise

12 Caltrans, Transportation and Construction Vibration Guidance Manual, 2020.

source that causes noise lasting more than 5 but less than 15 minutes in any one-hour period, and an additional 5 dBA allowance (for a total of 10 dBA) for a noise source that causes noise lasting 5 minutes or less in any one-hour period.[13]

The LAMC provides that in cases where the actual ambient conditions are not known, the City's presumed daytime (7:00 a.m. to 10:00 p.m.) and nighttime (10:00 p.m. to 7:00 a.m.) minimum ambient noise levels as defined in LAMC Section 111.03 should be used. The presumed ambient noise levels for these areas where the actual ambient conditions are not known as set forth in the LAMC Sections 111.03 are provided in **Table 7, City of Los Angeles Presumed Ambient Noise Levels**. For example, for residential-zoned areas, the presumed ambient noise level is 50 dBA during the daytime and 40 dBA during the nighttime.

Table 7
City of Los Angeles Presumed Ambient Noise Levels

Zone	Daytime Hours (7 A.M. to 10 P.M.) dBA (L_{eq})	Nighttime Hours (10 P.M. to 7 A.M.) dBA (L_{eq})
Residential (A1, A2, RA, RE, RS, RD, RW1, RW2, R1, R2, R3, R4, and R5)	50	40
Commercial (P, PB, CR, C1, C1.5, C2, C4, C5, and CM)	60	55
Manufacturing (M1, MR1 and MR2)	60	55
Heavy Manufacturing (M2 and M3)	65	65

Source: LAMC Section 111.03.

LAMC Section 112.02 limits increases in noise levels from air conditioning, refrigeration, heating, pumping and filtering equipment. Such equipment may not be operated in such manner as to create any noise which would cause the noise level on the premises of any other occupied property, or, if a condominium, apartment house, duplex, or attached business, within any adjoining unit, to exceed the ambient noise level by more than 5 dB.

LAMC Section 112.04 prohibits the operation of any lawn mower, backpack blower, lawn edger, riding tractor, or any other machinery equipment, or other mechanical or electrical device, or any hand tool that creates a loud, raucous or impulsive sound, within any residential zone or within 500 feet of any residence between 10:00 PM and 7:00 AM. Section 113.01 prohibits rubbish and garbage collection within 200 feet of any residence between 9:00 PM and 6:00 AM.

13 Los Angeles Municipal Code, Chapter XI, Article I, Section 111.02-(b).

LAMC Section 112.05 sets a maximum noise level for construction equipment of 75 dBA at a distance of 50 feet when operated within 500 feet of a residential zone. Compliance with this standard shall not apply where compliance therewith is technically infeasible. Specifically, such activities may be allowed when it is demonstrated that compliance is not possible "despite the use of mufflers, shields, sound barriers, and/or other noise reduction device or techniques during the operation of the equipment."[14]

LAMC Section 41.40 prohibits construction between the hours of 9:00 p.m. and 7:00 a.m. Monday through Friday, 6:00 p.m. and 8:00 a.m. on Saturday, and at any time on Sunday (i.e., construction is allowed Monday through Friday between 7:00 a.m. to 9:00 p.m.; and Saturdays and National Holidays between 8:00 a.m. to 6:00 p.m.). In general, the City's Department of Building and Safety enforces Noise Ordinance provisions relative to equipment and the Los Angeles Police Department (LAPD) enforces provisions relative to noise generated by people.

LAMC Section 113.01 prohibits collecting or disposing of rubbish or garbage, operating any refuse disposal truck, or collecting, loading, picking up, transferring, unloading, dumping, discarding, or disposing of any rubbish or garbage, as such terms are defined in LAMC Section 66.00, within 200 feet of any residential building between the hours of 9:00 p.m. and 6:00 a.m. of the following day, unless a permit therefore has been duly obtained beforehand from the Board of Police Commissioners.

LAMC Section 114.03 prohibits the loading or unloading of any vehicle, operation of any dollies, carts, forklifts, or other wheeled equipment, which causes any impulsive sound, raucous or unnecessary noise within 200 feet of any residence between 10:00 PM and 7:00 AM.

LAMC Section 91.1206 establishes noise insulation performance standards to protect persons within new hotels, motels, dormitories, residential care facilities, apartment houses, dwellings, private schools, and places of worship from the effects of excessive noise, including but not limited to, hearing loss or impairment and interference with speech and sleep. According to Subsection 91.1206.14.1, these structures shall be designed to prevent the intrusion of exterior noise beyond prescribed levels when located in noise critical areas, such as proximity to highways, country roads, city streets, railroads, airports, and commercial or industrial areas. Proper design shall include, but shall not be limited to, orientation of the structure, setbacks, shielding, and sound insulation of the building itself. Specifically, Subsection 91.1206.14.2 limits interior noise levels attributable to exterior sources to 45 dBA L_{dn} or CNEL in any habitable room. Worst-case noise levels, either existing or future, are to be used as the basis for determining compliance with this requirement. Future noise levels are to be predicted for a period of at least ten years from the time of building permit application. Furthermore, according to Subsection 91.1206.14.3, structures identified under

14 Los Angeles Municipal Code Chapter XI-Noise Regulation (Section 112.05).

Subsection 91.1206.1 that are exposed to airport noise greater than 60 dBA L_{dn} or CNEL, shall require an acoustical analysis showing that the proposed design will achieve the allowable interior noise level.

Section 91.1207.14.2 prohibits interior noise levels attributable to exterior sources from exceeding 45 dBA in any habitable room. The noise metric shall be either the day-night average sound level (L_{dn}) or the CNEL, consistent with the noise element of the local general plan.

City of Los Angeles General Plan Noise Element. The Noise Element of the City's General Plan policies include the CNEL guidelines for land use compatibility as shown in **Table 8, Guidelines for Noise Compatible Land Use (CNEL),** and includes a number of goals, objectives, and policies for land use planning purposes. The overall purpose of the Noise Element is to guide policymakers in making land use determinations and in preparing noise ordinances that would limit exposure of citizens to excessive noise levels.[15] The following policies and objectives from the Noise Element apply to the Project.

Objective 2: **Non-Airport.** Reduce or eliminate non-airport related intrusive noise, especially relative to noise sensitive uses.

Policy 2.2: Enforce and/or implement applicable city, state, and federal regulations intended to mitigate proposed noise producing activities, reduce intrusive noise and alleviate noise that is deemed a public nuisance.

The Noise Element of the City's General Plan policies include the CNEL guidelines for land use compatibility, as shown in **Table 8**. The Noise Element also addresses noise mitigation regulations, strategies, and programs, and delineates the authority of federal, State, and City bodies in regulating automotive, rail, aircraft, and nuisance noise. The Noise Element does not include any mandatory standards for land use planning or quantitative thresholds for construction or operational groundborne vibration.

[15] City of Los Angeles. General Plan, Noise Element adopted February 3, 1999. Pages 1.1-2.4. https://planning.lacity.org/odocument/b49a8631-19b2-4477-8c7f-08b48093cddd/Noise_Element.pdf. Accessed May, 2021.

Table 8
Guidelines for Noise Compatible Land Use (CNEL)

Land Use Category	Normally Acceptable[1]	Conditionally Acceptable[2]	Normally Unacceptable[3]	Clearly Unacceptable[4]
Residential Single-Family, Duplex, Mobile Homes	50-55	55-70	70-75	Above 75
Residential Multi-Family Homes	50-60	60-70	70-75	Above 75
Transient Loading – Motels, Hotels	50-60	60-70	70-80	Above 75
Schools, Libraries, Churches, Hospitals, Nursing Homes	50-60	60-70	70-80	Above 80
Auditoriums, Concert Halls, Amphitheaters	--	50-65	--	Above 65
Sports Arenas, Outdoor Spectator Sports	--	50-70	--	Above 70
Playgrounds, Neighborhood Parks	50-65	--	65-75	Above 75
Golf Courses, Riding Stables, Water Recreation, Cemeteries	50-70	--	70-80	Above 80
Office Buildings, Business and Professional Commercial	50-65	65-75	Above 75	--
Agriculture, Industrial, Manufacturing, Utilities	50-70	70-75	Above 75	--

[1] Specified land use is satisfactory, based upon the assumption that any buildings involved are of normal conventional construction without any special noise insulation requirements.
[2] 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.
[3] 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.
[4] New construction or development should generally not be undertaken.
Source: Los Angeles 1999

4.0 NOISE & VIBRATION ANALYSIS

4.1 THRESHOLDS OF SIGNIFICANCE

The impacts of the Ordinance related to noise and vibration would be considered significant if they would exceed any of the following Thresholds of Significance, in accordance with Appendix G of the *California Environmental Quality Act (CEQA) Guidelines*:

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

4.2 METHODOLOGY

Although not regulated by the Ordinance, well abandonment is a reasonably foreseeable outcome for many of the wells currently operating in the City, although as stated previously, no specific timeline for abandonment currently exists and the Ordinance does not include any regulations related to the timing of the abandonment of oil wells. As such, for purposes of this analysis, there are two distinct phases that would have the potential to change ambient noise levels at locations in proximity to oil and gas wells throughout the City: 1) Short-term and temporary abandonment related activities, and 2) Long-term changes to noise levels attributable to the cessation of oil and gas production and operations.

Noise levels associated with short-term and temporary abandonment related activities were calculated using the FHWA Roadway Construction Noise Model (RCNM). Because these noise levels would be short-term and temporary and most closely resemble construction activities, they have been compared to the construction noise level standards identified in the City's Noise Ordinance (see LAMC Sections 112.05 and 41.40). Long-term changes to noise levels attributable to the cessation of oil and gas production and operations have been characterized quantitatively and qualitatively and have been compared to the City's Noise Ordinance and Noise Element as appropriate.

4.3 IMPACT ANALYSIS

Impact NOI-1 **Would the project result in generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies? *(Less than Significant With Mitigation).***

Short-Term and Temporary Noise

The closure of oil and gas wells entails plugging the wells in place in accordance with California Statutes and Regulations and all other applicable requirements as overseen by CalGEM. The process of well abandonment will be determined on a case-by-case basis under the regulatory supervision of CalGEM and the LAFD and will depend on individual site conditions such as type and depth of well. However, for the purposes of this environmental analysis, several generalized assumptions have been made based upon standard industry practice, existing regulations governing well abandonment, and case studies. While plugging and abandonment varies by well, there is a consistent set of procedures that are followed. Generally, the drill site's existing drilling or maintenance rig will be used to abandon the well and remove equipment from the well.[16] Well equipment will be removed from the site by truck. Cement trucks will also arrive onsite to fill the well at various depths over a span of several days. An operator may use in excess of 2,500 cubic feet of cement for one abandonment. The process entails removing equipment and filling the well with cement at different phases in order to ensure that it is safe to abandon the well at varying depths. At the end of each work day, the well site is closed and the rig is shut down in order to resume operations the following work day. See **Section 1.2, Project Description**, for the anticipated steps of well abandonment.

For purposes of estimating potential noise and vibration levels associated with abandonment activities, it is assumed each well abandonment would last approximately two weeks (i.e., 10 workdays), and on-site equipment would include one workover rig, one cement pump truck, one welder, and one tractor/loader/backhoe. This analysis conservatively assumes that all pieces of equipment would operate concurrently, presenting a worst-case impact scenario.

FHWA's RCNM has compiled data regarding the noise-generating characteristics of specific types of construction equipment and typical construction activities. With the use of the RCNM, as detailed in **Appendix B** to this report, the short-term and temporary noise levels associated with abandonment activities are presented in **Table 9, Temporary Noise Levels During Well Abandonment - Unmitigated.**

16 When a drilling or maintenance rig is not on the well site, a rig will need to be brought to the site to complete the abandonment process.

As shown in **Table 9**, noise levels were estimated at distances of up to 50 feet, 75 feet and 100 feet to characterize potential noise levels that may be experienced at sensitive receptors located in proximity to oil and gas wells throughout the City. Noise levels would diminish notably with distance from the site at a rate of 6 dB(A) per doubling of distance (noise from stationary or point sources is reduced by about 6 dB(A) for every doubling of distance at acoustically hard locations). For example, a noise level of 86 dB(A) Leq measured at 50 feet from the noise source to the receptor would decline to 80 dB(A) Leq at 100 feet from the source to the receptor and fall by another 6 dB(A) Leq to 74 dB(A) Leq at 200 feet from the source to the receptor. These noise attenuation rates assume a flat and unobstructed distance between the noise generator and the receptor. Intervening structures and vegetation would further attenuate (reduce) the noise. Furthermore, it should be noted that increases in noise levels at sensitive receptors during abandonment would be intermittent and temporary and would not generate continuously high noise levels.

Table 9
Temporary Noise Levels During Well Abandonment - Unmitigated

Sensitive Receptor Location	Distance to Well (feet)	Estimated Temporary Noise Levels [dB(A)]	Exceed LAMC Standards?
1. Sensitive Receptors at 50 Feet	50	79	Yes
2. Sensitive Receptors at 75 Feet	75	75	No
3. Sensitive Receptors at 100 Feet	100	73	No

*Source: Impact Sciences, Inc., September 2022. See **Appendix B** to this report.*

Short-term and temporary impacts would be potentially significant if, as indicated in LAMC Section 112.05, noise from construction equipment within 500 feet of a residential zone exceeds 75 A-weighted decibels (dBA) at a distance of 50 feet from the noise source. Although not required in the LAMC, this analysis also applies this LAMC standard for non-residentially zoned sensitive receptors located in proximity to oil and gas wells throughout the City. It should also be noted that the LAMC noise limitation does not apply where compliance is technically infeasible. Technically infeasible means that the above noise limitation cannot be complied with despite the use of mufflers, shields, sound barriers and/or any other noise reduction device or techniques during the operation of the equipment. As shown in **Table 9**, the estimated unmitigated temporary noise levels could exceed the 75 dBA noise standard at distances of up to 50 feet from the source, and unmitigated noise levels would not exceed the 75 dBA noise standard at distances of up to 75 feet and 100 feet from the source. As noise levels would diminish with distance from the source, unmitigated noise levels at distances beyond 100 feet from the source would not have the potential to exceed the noise

standard. Nevertheless, as the estimated unmitigated temporary noise levels could exceed the 75 dBA noise standard at distances of up to 50 feet from the source, this impact is considered potentially significant.

Mitigation Measures

MM NOI-1: Where well abandonment activities occur within 50 feet of the following sensitive receptors: schools, day cares, elder care facilities, adult residential facilities, parks, hospitals, or residences, flexible sound control curtains shall be erected between the noise-producing equipment and the sensitive receptors, blocking the line-of-sight between the sources and receptors. The sound control curtain materials shall meet a minimum Sound Transmission Class (STC) 20 rating, capable of reducing equipment noise by at least 5 dBA.

Level of Significance After Mitigation

The use of flexible sound control curtains, as required in **Mitigation Measure NOI-1**, would be feasible and effective at reducing short-term and temporary noise levels at sensitive receptors located within 50 feet of well abandonment activities. The STC-20 rating identified in **Mitigation Measure NOI-1** requires the sound control curtain material to have a transmission loss (TL) value of 20 dB. TL is defined as the loss in sound energy, expressed in decibels, as sound passes through a barrier or a wall.[17] According to FHWA Noise Barrier Design Handbook, the design feasibility of a sound barrier that reduces noise by 5 dBA is considered "simple" and a reduction of up to 10 dBA as "attainable."[18] Thus, the data suggests that **Mitigation Measure NOI-1** could reduce noise levels by up to 10 to 20 dBA. However, this analysis conservatively assumes that a 5 dBA reduction would be achieved with the implementation of **Mitigation Measure NOI-1.** As shown in **Table 10, Temporary Noise Levels During Well Abandonment - Mitigated**, **Mitigation Measure NOI-1** would ensure temporary noise levels would not exceed the LAMC standard of 75 dBA at 50 feet from the source.

Other noise best practices would be implemented during the abandonment process. These best practices would also help to reduce temporary noise levels in accordance with LAMC Section 112.05. For example, abandonment activities would be scheduled so as to avoid operating several pieces of equipment simultaneously (as feasible), which causes high noise levels. Further, noise and groundborne vibration activities whose specific location on or near the site are flexible (e.g., stationary equipment and truck idling) will be conducted as far as possible from the nearest noise- and vibration-sensitive land uses. However, given the fluid dynamics likely to occur during the abandonment processes, this analysis conservatively does not take any quantified reduction associated with these techniques. Additionally, all abandonment

17 FHWA Noise Barrier Design Handbook, Terminology, July 14, 2011·

18 FHWA Noise Barrier Design Handbook, Table 4, July 14, 2011.

activities that occur as a result of the Ordinance would be conducted in accordance with LAMC Section 41.40, which prohibits construction between the hours of 9:00 p.m. and 7:00 a.m. Monday through Friday, 6:00 p.m. and 8:00 a.m. on Saturday, and at any time on Sunday (i.e., construction is allowed Monday through Friday between 7:00 a.m. to 9:00 p.m.; and Saturdays and National Holidays between 8:00 a.m. to 6:00 p.m.). Thus, all activities generating temporary noise levels would be limited to the less noise-sensitive daytime hours. Based on these reasons, and with the implementation of **Mitigation Measure NOI-1**, the Ordinance would not result in the generation of a substantial temporary increase in ambient noise levels in excess of standards established in the local general plan or noise ordinance. As such, temporary noise impacts would be ***less than significant***.

Table 10
Temporary Noise Levels During Well Abandonment - Mitigated

Sensitive Receptor Location	Distance to Well (feet)	Estimated Temporary Noise Levels [dB(A)]	Exceed LAMC Standards?
1. Sensitive Receptors at 50 Feet	50	74	No
2. Sensitive Receptors at 75 Feet	75	70	No
3. Sensitive Receptors at 100 Feet	100	68	No

*Source: Impact Sciences, Inc., September 2022. See **Appendix B** to this report.*

Long-Term Noise

As discussed previously, existing oil and gas well operations contribute to the ambient noise levels at receptors in proximity to active wells and throughout the City as a whole. The types of noise associated with oil and gas operations can be complex in nature, due to a wide variety of sources. Some of these noises are intermittent, some are continuous, and many vary in their intensity. Certain sources, such as compressor stations, produce low frequency noise (LFN), which is typically heard as a low rumble. There are also numerous source-dependent and subjective factors that may influence health outcomes, such as noise sensitivity and noise reduction technologies employed at specific locations. As shown previously in **Table 3**, average noise levels from oil and gas production activities range from approximately 58 dBA to 90 dBA, depending on the activity and setback distances. In addition to these noise sources, other existing noise sources associated with well operations throughout the City include operator worker trips (i.e., motor vehicle noise) to and from well locations, and well maintenance related activities (i.e., fire clearance per LAFD and operations maintenance/inspections per CalGEM and other agency requirements). Upon full implementation of the Ordinance, noise sources associated with oil and gas production would be removed within the City, and long-term noise levels would likely be decreased compared to existing noise levels

associated with oil and gas production. As such, the Ordinance would not result in the generation of a substantial permanent increase in ambient noise levels in excess of standards established in the local general plan or noise ordinance, and long-term noise impacts would be ***less than significant***.

Impact NOI-2 **Would the project result in the generation of excessive groundborne vibration or groundborne noise levels? *(Less than Significant).***

Similar to the short-term and temporary noise discussion provided above, activities associated with well abandonment also have the potential to generate short-term and temporary groundborne vibration levels at sensitive receptors located in proximity to the wells. Based on the parameters described previously and guidance from the FTA's *Transit Noise and Vibration Impact Assessment Manual,*[19] groundborne vibration levels associated with abandonment activities are presented in **Table 11, Temporary Vibration Levels During Well Abandonment.** As shown in **Table 11**, groundborne vibration levels were estimated at distances of up to 50 feet, 75 feet and 100 feet to characterize potential vibration levels that may be experienced at sensitive receptors located in proximity to oil and gas wells throughout the City. **Table 11** illustrates that short-term and temporary vibration levels would not have the potential to exceed Caltrans' standards for building damage (PPV) or the FTA's standards for human annoyance (VdB). As such, the Ordinance would not result in the generation of excessive groundborne vibration levels, and these impacts would be ***less than significant***.

Table 11
Temporary Vibration Levels During Well Abandonment

Sensitive Receptor Location	Distance to Well (feet)	Vibration Standards PPV/VdB[a]	Estimated Vibration Levels PPV/VdB
1. Sensitive Receptors at 50 Feet	50	0.25/80	0.03/78
2. Sensitive Receptors at 75 Feet	75	0.25/80	0.02/73
3. Sensitive Receptors at 100 Feet	100	0.25/80	0.01/69

[a]*The vibration standards applied are based on the FTA and Caltrans standards provided previously in Tables 5 and 6 herein.*
*Source: Impact Sciences, Inc., September 2022. See **Appendix B** to this report.*

19 Federal Transit Administration. 2018. Transit Noise and Vibration Impact Assessment Manual. Available at: https://www.transit.dot.gov/sites/fta.dot.gov/files/docs/research-innovation/118131/transit-noise-and-vibration-impact-assessment-manual-fta-report-no-0123_0.pdf. See Appendix B to this report for vibration calculations.

Impact NOI-3 **For a project located within the vicinity of a private airstrip or an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the Project expose people residing or working in the Project area to excessive noise levels? (No Impact).**

Three airports are located within the City of Los Angeles: two public and one general aviation. Respectively, they are: Los Angeles International (LAX) and Van Nuys, and Whiteman Airport. There are three inactive plugged wells located within one mile of LAX. As these wells are plugged (i.e., no oil and gas extraction occurring), there would be no changes to the existing conditions at these locations. Thus, the Ordinance would not expose people residing or working in the area of oil wells to excessive noise levels associated with a private airstrip or public use airport. No impact would occur.

5.0 REFERENCES

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FHWA Noise Barrier Design Handbook, Table 4, July 14, 2011.

FHWA Noise Barrier Design Handbook, Terminology, July 14, 2011

Los Angeles County Department of Public Health, *Public Health and Safety Risks of Oil and Gas Facilities in Los Angeles County*, 2018, Available at: http://publichealth.lacounty.gov/eh/docs/PH_OilGasFacilitiesPHSafetyRisks.pdf

Los Angeles Municipal Code Chapter XI-Noise Regulation (Section 112.)

APPENDIX A

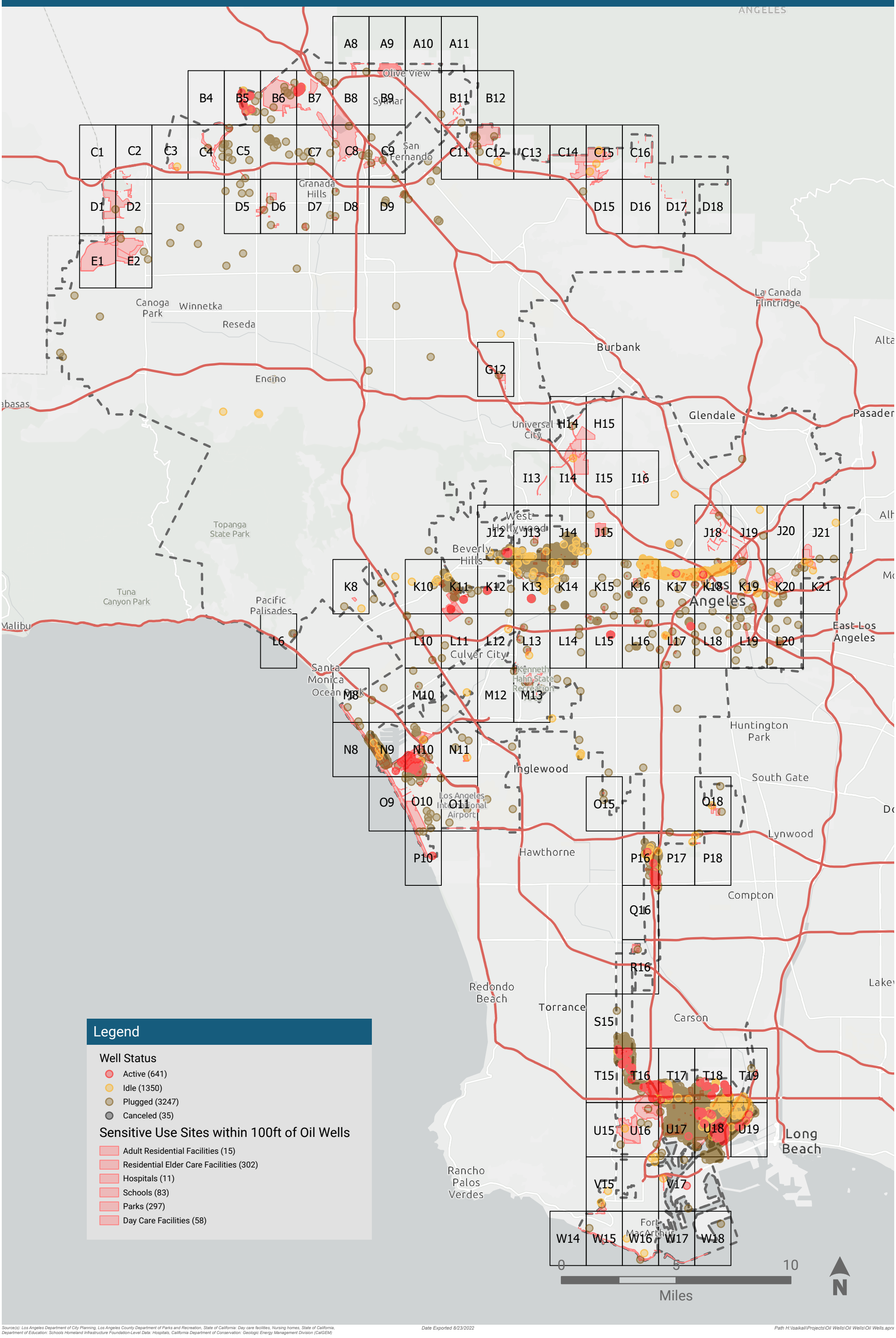
Sensitive Receptors

City of Los Angeles Oil Well Locations

Sensitive Use Sites Within 100 Feet of Oil Wells

DRAFT

LOS ANGELES CITY PLANNING



Legend

Well Status

- Active (641)
- Idle (1350)
- Plugged (3247)
- Canceled (35)

Sensitive Use Sites within 100ft of Oil Wells

- Adult Residential Facilities (15)
- Residential Elder Care Facilities (302)
- Hospitals (11)
- Schools (83)
- Parks (297)
- Day Care Facilities (58)

Source(s): Los Angeles Department of City Planning, Los Angeles County Department of Parks and Recreation, State of California: Day care facilities, Nursing homes, State of California, Department of Education: Schools Homeland Infrastructure Foundation-Level Data: Hospitals, California Department of Conservation: Geologic Energy Management Division (CalGEM)

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APPENDIX B

Noise & Vibration Data

IMPACT SCIENCES

L.A. Oil and Gas Ordinance Construction Noise Summary

Model Run Date: 08/19/2022

Receptor #1 – Reference at 50 feet

Equipment	Quantity	*Noise Level at 50 Feet (dBA L_{max})*	*Estimated Usage Factor (%)*	Distance to Receptor (ft)
Drill Rig Truck	1	79.1	20	50
Concrete Pump Truck	1	81.4	20	50
Welder/Torch	1	74.0	40	50
Backhoe	1	77.6	40	50

1-Hour Leq: 79 dBA

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Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 8/19/2022
Case Description: L.A. Oil & Gas Construction Noise

---- Receptor #1 ----

Description
Reference receptor at 50 feet

Description	Impact Device	Usage(%)	Equipment Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Drill Rig Truck	No	20		79.1	50	0
Concrete Pump Truck	No	20		81.4	50	0
Welder / Torch	No	40		74	50	0
Backhoe	No	40		77.6	50	0

Results

Calculated (dBA)

Equipment	*Lmax	Leq
Drill Rig Truck	79.1	72.2
Concrete Pump Truck	81.4	74.4
Welder / Torch	74	70
Backhoe	77.6	73.6
Total	81.4	78.9

*Calculated Lmax is the Loudest value.

Receptor #2 – Reference at 75 feet

Equipment	Quantity	*Noise Level at 50 Feet (dBA L_{max})*	*Estimated Usage Factor (%)*	Distance to Receptor (ft)
Drill Rig Truck	1	79.1	20	75
Concrete Pump Truck	1	81.4	20	75
Welder/Torch	1	74.0	40	75
Backhoe	1	77.6	40	75

1-Hour Leq: 75 dBA

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 8/19/2022
Case Description L.A. Oil & Gas Construction Noise

---- Receptor #2 ----

Description
Reference receptor at 75 feet

Description	Impact Device	Usage(%)	Equipment Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Drill Rig Truck	No	20		79.1	75	0
Concrete Pump Truck	No	20		81.4	75	0
Welder / Torch	No	40		74	75	0
Backhoe	No	40		77.6	75	0

Results

	Calculated (dBA)	
Equipment	*Lmax	Leq
Drill Rig Truck	75.6	68.6
Concrete Pump Truck	77.9	70.9
Welder / Torch	70.5	66.5
Backhoe	74	70.1
Total	77.9	75.0

*Calculated Lmax is the Loudest value.

Receptor #3 – Reference at 100 feet

Equipment	Quantity	*Noise Level at 50 Feet (dBA L_{max})*	*Estimated Usage Factor (%)*	Distance to Receptor (ft)
Drill Rig Truck	1	79.1	20	100
Concrete Pump Truck	1	81.4	20	100
Welder/Torch	1	74.0	40	100
Backhoe	1	77.6	40	100

1-Hour Leq: 73 dBA

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 8/19/2022
Case Descripti L.A. Oil & Gas Construction Noise

---- Receptor #3 ----

Description
Reference receptor at 100 feet

Description	Impact Device	Usage(%)	Equipment Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Drill Rig Truck	No	20		79.1	100	0
Concrete Pump Truck	No	20		81.4	100	0
Welder / Torch	No	40		74	100	0
Backhoe	No	40		77.6	100	0

Results

Calculated (dBA)

Equipment	*Lmax	Leq
Drill Rig Truck	73.1	66.1
Concrete Pump Truck	75.4	68.4
Welder / Torch	68	64
Backhoe	71.5	67.6
Total	75.4	72.8

*Calculated Lmax is the Loudest value.

Vibration Impact Summary

Receptor	PPV (in./sec.)	VdB
Receptor #1 – Reference at 50 ft.	0.031	78
Receptor #2 – Reference at 75 ft.	0.017	73
Receptor #3 – Reference at 100 ft.	0.011	69

L.A. Oil & Gas Ordinance — Reference at 50 ft.

Ref= Reference vibration level (PPV)

RefD= Reference distance for Reference vibration level (Feet)

Vibration PPV		
Ref=	0.089	Based on type of equipment
RefD=	25	
D=	50	Distance from equipment to sensitive receptor
Equip=	0.031	
Annoyance VdB		
Ref=	87	Based on type of equipment
RefD=	25	
D=	50	Distance from equipment to sensitive receptor
Equip=	78	

Peak demolition vibration based on utilizing a large bulldozer.

Source: FTA Tranist Noise and Vibration Impact Assessment, 2006.

L.A. Oil & Gas Ordinance — Reference at 75 ft.

Ref= Reference vibration level (PPV)

RefD= Reference distance for Reference vibration level (Feet)

Vibration PPV

Ref=	0.089	Based on type of equipment
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Annoyance VdB

Ref=	87	Based on type of equipment
RefD=	25	
D=	75	Distance from equipment to sensitive receptor
Equip=	73	

Peak demolition vibration based on utilizing a large bulldozer.

Source: FTA Tranist Noise and Vibration Impact Assessment, 2006.

L.A. Oil & Gas Ordinance — Reference at 100 ft.

Ref= Reference vibration level (PPV)

RefD= Reference distance for Reference vibration level (Feet)

Vibration PPV		
Ref=	0.089	Based on type of equipment
RefD=	25	
D=	100	Distance from equipment to sensitive receptor
Equip=	0.011	
Annoyance VdB		
Ref=	87	Based on type of equipment
RefD=	25	
D=	100	Distance from equipment to sensitive receptor
Equip=	69	

Peak demolition vibration based on utilizing a large bulldozer.

Source: FTA Tranist Noise and Vibration Impact Assessment, 2006.