Appendix G
Noise Impact Study

Great Scott Tree Service Facility
Noise Impact Study
City of Lake Forest, CA

Prepared for:

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Date: 6/6/2024

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1.0 Introduction

1.1 Purpose of Analysis and Study Objectives

This noise assessment was prepared to evaluate the potential noise impacts for the project study area and to recommend noise mitigation measures, if necessary, to minimize the potential noise impacts. The assessment was conducted and compared to the noise standards set forth by the Federal, State and Local agencies. Consistent with the City's Noise Guidelines, the project must demonstrate compliance to the applicable noise criterion as outlined within the City's Noise Element and Municipal Code.

The following is provided in this report:

- A description of the study area and the proposed project
- Information regarding the fundamentals of noise
- A description of the local noise guidelines and standards
- An evaluation of the existing ambient noise environment
- An analysis of stationary noise impacts from the project site to adjacent land uses
- Construction noise and vibration evaluation

1.2 Site Location and Study Area

The project site is located at the west of Liner Lane, north of Canada Road, with Serrano Creek bordering the project site to the south and east in Lake Forest, California, as shown in Exhibit A. The site's current land use designation is M1-Light Industrial. Land uses surrounding the site are zoned M1-Light Industrial. A multifamily residential community is further to the south east along Canada Road.

1.3 Proposed Project Description

The Project proposes to develop 6.71 acres, with 26 parking spaces, a 2,621 square foot office, and approximately 3,800 square foot storage building that is currently existing. Exhibit B demonstrates the site plan for the project.

Exhibit A

Location Map

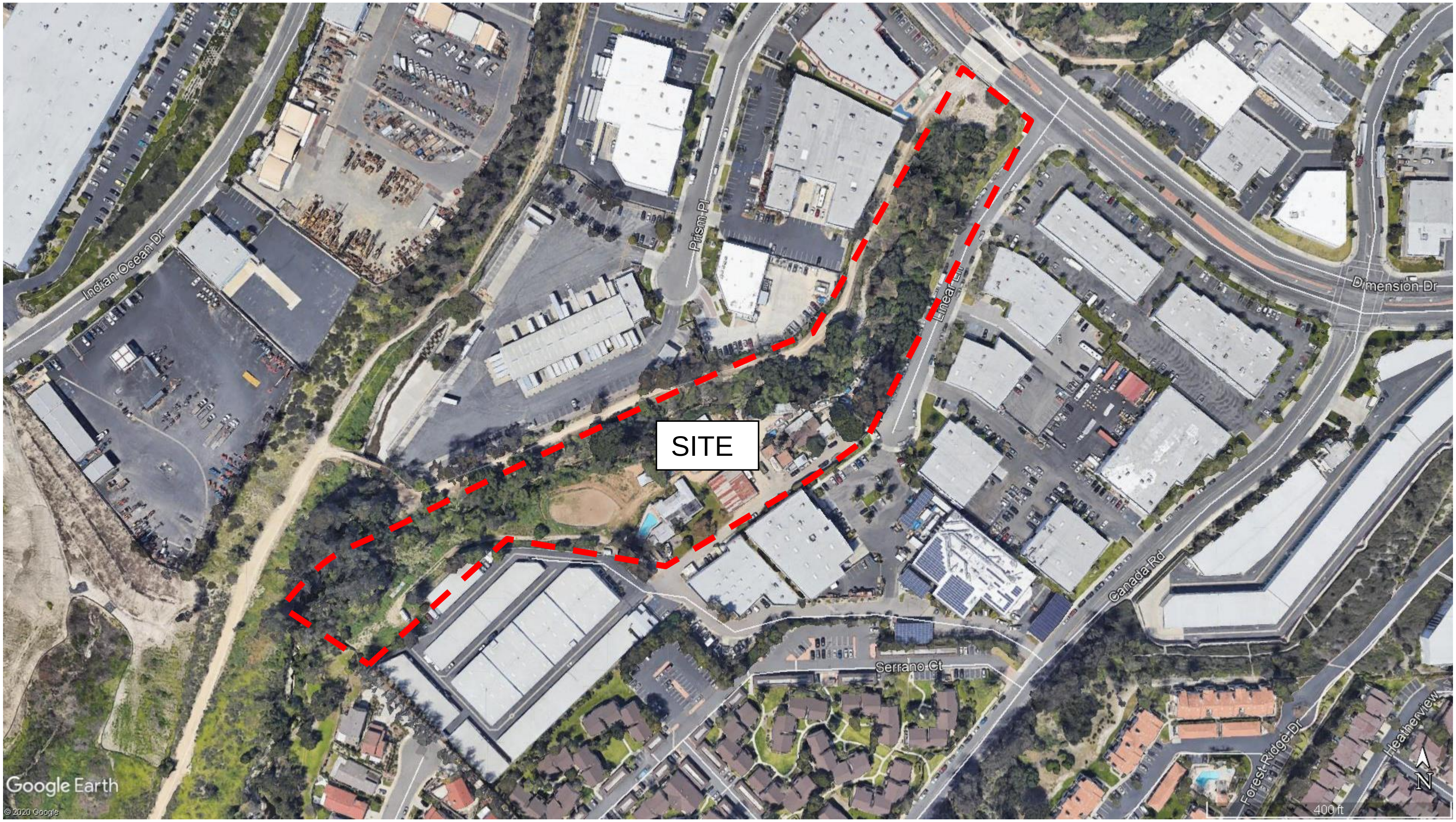
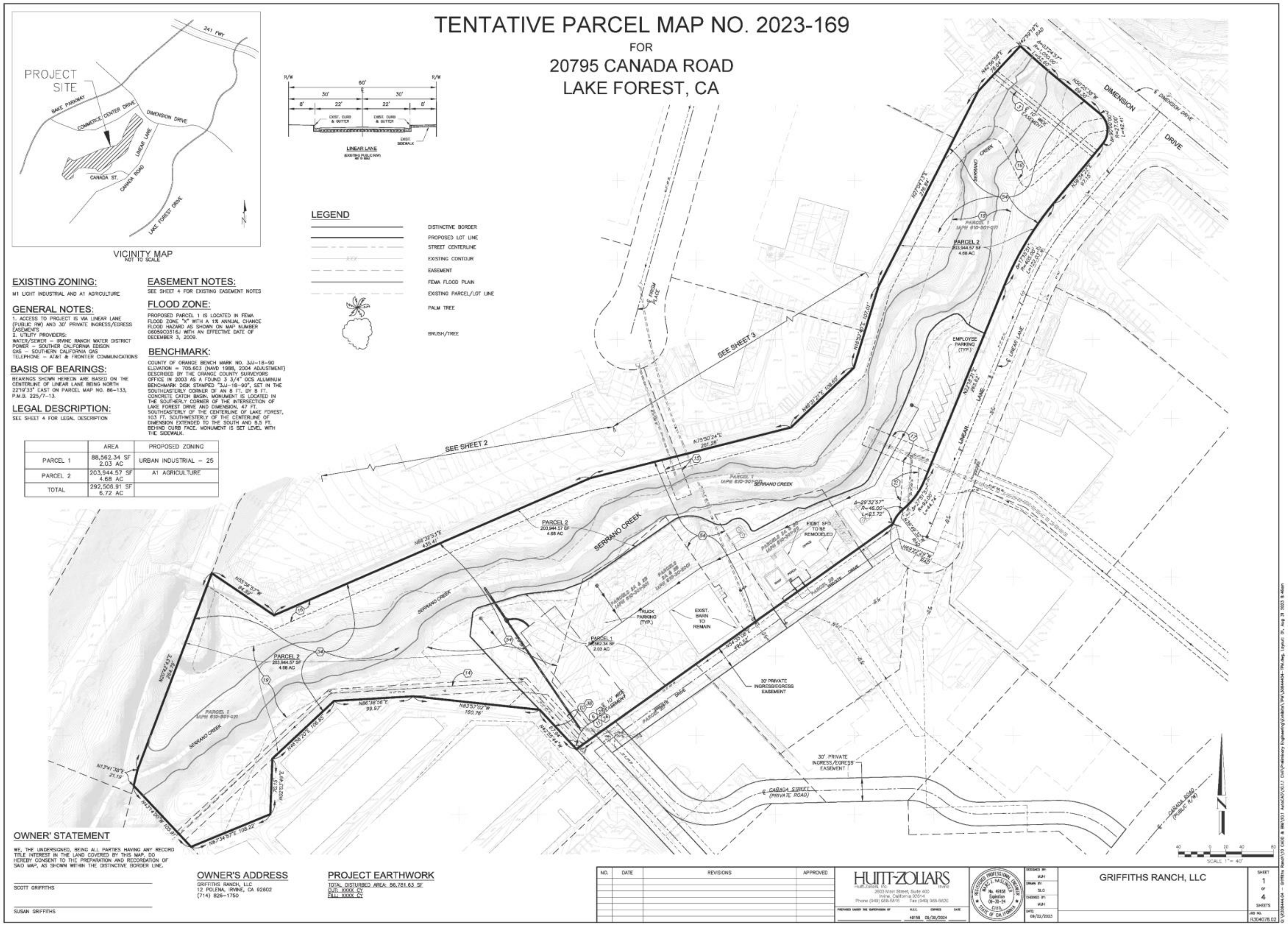


Exhibit B

Site Plan



EXISTING ZONING:

M1 LIGHT INDUSTRIAL AND A1 AGRICULTURE

GENERAL NOTES:

1. ACCESS TO PROJECT IS VIA LINEAR LANE (PUBLIC RW) AND 30' PRIVATE INGRESS/EGRESS EASEMENTS
2. UTILITY PROVIDERS:
WATER/SEWER – IRVINE RANCH WATER DISTRICT
POWER – SOUTHER CALIFORNIA EDISON
GAS – SOUTHERN CALIFORNIA GAS
TELEPHONE – AT&T & FRONTIER COMMUNICATIONS

BASIS OF BEARINGS:

BEARINGS SHOWN HEREON ARE BASED ON THE CENTERLINE OF LINEAR LANE BEING NORTH 22°19'33" EAST ON PARCEL MAP NO. 86–133, P.M.B. 225/7–13.

LEGAL DESCRIPTION:

SEE SHEET 4 FOR LEGAL DESCRIPTION

EASEMENT NOTES:

SEE SHEET 4 FOR EXISTING EASEMENT NOTES

FLOOD ZONE:

PROPOSED PARCEL 1 IS LOCATED IN FEMA FLOOD ZONE "X" WITH A 1% ANNUAL CHANCE FLOOD HAZARD AS SHOWN ON MAP NUMBER 06059C0316J WITH AN EFFECTIVE DATE OF DECEMBER 3, 2009.

BENCHMARK:

COUNTY OF ORANGE BENCH MARK NO. 3JJ–18–90 ELEVATION = 705.603 (NAVD 1988, 2004 ADJUSTMENT) DESCRIBED BY THE ORANGE COUNTY SURVEYORS OFFICE IN 2003 AS A FOUND 3 3/4" OCS ALUMINUM BENCHMARK DISK STAMPED "3JJ–18–90", SET IN THE SOUTHEASTERLY CORNER OF AN 8 FT. BY 8 FT. CONCRETE CATCH BASIN. MONUMENT IS LOCATED IN THE SOUTHERLY CORNER OF THE INTERSECTION OF LAKE FOREST DRIVE AND DIMENSION, 47 FT. SOUTHEASTERLY OF THE CENTERLINE OF LAKE FOREST, 103 FT. SOUTHWESTERLY OF THE CENTERLINE OF DIMENSION EXTENDED TO THE SOUTH AND 8.5 FT. BEHIND CURB FACE. MONUMENT IS SET LEVEL WITH THE SIDEWALK.

	AREA	PROPOSED ZONING
PARCEL 1	88,562.34 SF 2.03 AC	URBAN INDUSTRIAL – 25
PARCEL 2	203,944.57 SF 4.68 AC	A1 AGRICULTURE
TOTAL	292,506.91 SF 6.72 AC	

OWNER' STATEMENT

WE, THE UNDERSIGNED, BEING ALL PARTIES HAVING ANY RECORD TITLE INTEREST IN THE LAND COVERED BY THIS MAP, DO HEREBY CONSENT TO THE PREPARATION AND RECORDATION OF SAID MAP, AS SHOWN WITHIN THE DISTINCTIVE BORDER LINE.

SCOTT GRIFFITHS

SUSAN GRIFFITHS

OWNER'S ADDRESS

GRIFFITHS RANCH, LLC
12 POLENA, IRVINE, CA 92602
(714) 826–1750

PROJECT EARTHWORK

TOTAL DISTURBED AREA: 86,781.63 SF
CUT: XXXX CY
FILL: XXXX CY

NO.	DATE	REVISIONS	APPROVED

HUITT-ZOLLARS
Huitt-Zollars, Inc. Irvine
2603 Main Street, Suite 400
Irvine, California 92614
Phone (949) 988-5815 Fax (949) 988-5820

PREPARED UNDER THE SUPERVISION OF R.C.E. 49158 EXPIRES 09/30/2024 DATE

MARC J. NASLINGER No. 49158 Expiration 09-30-24

DESIGNED BY: MJH
DRAWN BY: SLG
CHECKED BY: MJH
DATE: 08/22/2023

GRIFFITHS RANCH, LLC

SHEET 1 OF 4 SHEETS
JOB NO. R304078.02

2.0 Fundamentals of Noise

This section of the report provides basic information about noise and presents some of the terms used in the report.

2.1 Sound, Noise and Acoustics

Sound is a disturbance created by a moving or vibrating source and is capable of being detected by the hearing organs. Sound may be thought of as mechanical energy of a moving object transmitted by pressure waves through a medium to a human ear. For traffic or stationary noise, the medium of concern is air. *Noise* is defined as sound that is loud, unpleasant, unexpected, or unwanted.

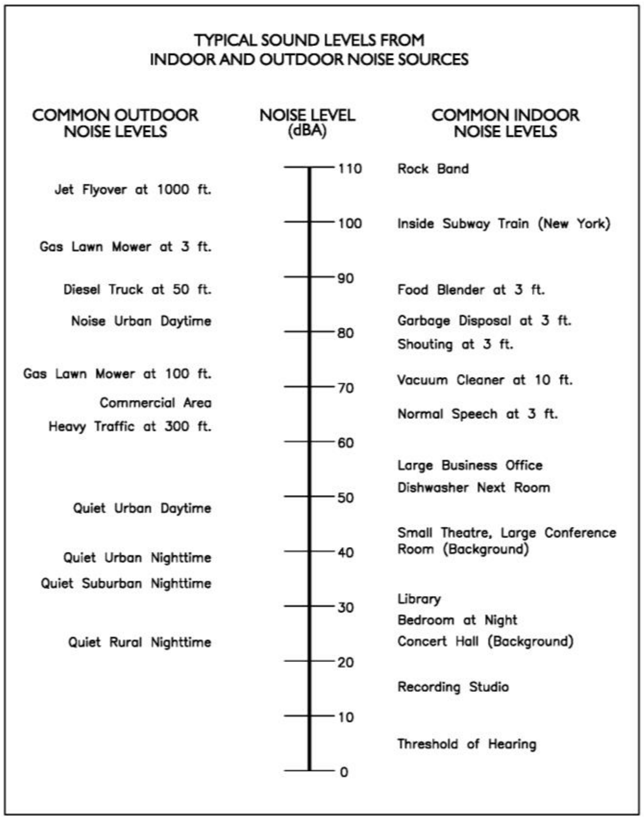
2.2 Frequency and Hertz

A continuous sound is described by its *frequency* (pitch) and its *amplitude* (loudness). Frequency relates to the number of pressure oscillations per second. Low-frequency sounds are low in pitch (bass sounding) and high-frequency sounds are high in pitch (squeak). These oscillations per second (cycles) are commonly referred to as Hertz (Hz). The human ear can hear from the bass pitch starting out at 20 Hz all the way to the high pitch of 20,000 Hz.

2.3 Sound Pressure Levels and Decibels

The *amplitude* of a sound determines its loudness. The loudness of sound increases or decreases as the amplitude increases or decreases. Sound pressure amplitude is measured in units of micro-Newton per square inch meter ($\mu N/m^2$), also called micro-Pascal (μPa). One μPa is approximately one hundred billionths (0.00000000001) of normal atmospheric pressure. Sound pressure level (SPL or L_p) is used to describe in logarithmic units the ratio of actual sound pressures to a reference pressure squared. These units are called decibels, abbreviated dB. Exhibit C illustrates references sound levels for different noise sources.

Exhibit C: Typical A-Weighted Noise Levels



2.4 Addition of Decibels

Because decibels are on a logarithmic scale, sound pressure levels cannot be added or subtracted by simple plus or minus addition. When two sounds or equal SPL are combined, they will produce an SPL 3 dB greater than the original single SPL. In other words, sound energy must be doubled to produce a 3 dB increase. If two sounds differ by approximately 10 dB, the higher sound level is the predominant sound.

2.5 Human Response to Changes in Noise Levels

In general, the healthy human ear is most sensitive to sounds between 1,000 Hz and 5,000 Hz, and it perceives a sound within that range as being more intense than a sound with a higher or lower frequency with the same magnitude. For purposes of this report as well as with most environmental documents, the A-scale weighting is typically reported in terms of A-weighted decibel (dBA), a scale designed to account for the frequency-dependent sensitivity of the ear. Typically, the human ear can barely perceive a change in noise level of 3 dB. A change in 5 dB is readily perceptible, and a change in 10 dB is perceived as being twice or half as loud. As previously discussed, a doubling of sound energy results in a 3 dB increase in sound, which means that a doubling of sound energy (e.g. doubling the volume of traffic on a highway) would result in a barely perceptible change in sound level.

2.6 Noise Descriptors

Noise in our daily environment fluctuates over time. Some noise levels occur in regular patterns, others are random. Some noise levels are constant while others are sporadic. Noise descriptors were created to describe the different time-varying noise levels.

A-Weighted Sound Level: The sound pressure level in decibels as measured on a sound level meter using the A-weighted filter network. The A-weighting filter de-emphasizes the very low and very high-frequency components of the sound in a manner similar to the response of the human ear. A numerical method of rating human judgment of loudness.

Ambient Noise Level: The composite of noise from all sources, near and far. In this context, the ambient noise level constitutes the normal or existing level of environmental noise at a given location.

Community Noise Equivalent Level (CNEL): The average equivalent A-weighted sound level during a 24-hour day, obtained after addition of five (5) decibels to sound levels in the evening from 7:00 to 10:00 PM and after addition of ten (10) decibels to sound levels in the night before 7:00 AM and after 10:00 PM.

Decibel (dB): A unit for measuring the amplitude of a sound, equal to 20 times the logarithm to the base 10 of the ratio of the pressure of the sound measured to the reference pressure, which is 20 micro-pascals.

dB(A): A-weighted sound level (see definition above).

Equivalent Sound Level (LEQ): The sound level corresponding to a steady noise level over a given sample period with the same amount of acoustic energy as the actual time-varying noise level. The energy average noise level during the sample period.

Habitable Room: Any room meeting the requirements of the Uniform Building Code, or other applicable regulations, which is intended to be used for sleeping, living, cooking or dining purposes, excluding such enclosed spaces as closets, pantries, bath or toilet rooms, service rooms, connecting corridors, laundries, unfinished attics, foyers, storage spaces, cellars, utility rooms and similar spaces.

L(n): The A-weighted sound level exceeded during a certain percentage of the sample time. For example, L10 in the sound level exceeded 10 percent of the sample time. Similarly L50, L90, and L99, etc.

Noise: *A*ny unwanted sound or sound which is undesirable because it interferes with speech and hearing, or is intense enough to damage hearing, or is otherwise annoying. The State Noise Control Act defines noise as "...excessive undesirable sound...".

Outdoor Living Area: Outdoor spaces that are associated with residential land uses typically used for passive recreational activities or other noise-sensitive uses. Such spaces include patio areas, barbecue areas, jacuzzi areas, etc. associated with residential uses; outdoor patient recovery or resting areas associated with hospitals, convalescent hospitals, or rest homes; outdoor areas associated with places of worship which have a significant role in services or other noise-sensitive activities; and outdoor school facilities routinely used for educational purposes which may be adversely impacted by noise. Outdoor areas usually not included in this definition are: front yard areas, driveways, greenbelts, maintenance areas and storage areas associated with residential land uses; exterior areas at hospitals that are not used for patient activities; outdoor areas associated with places of worship and principally used for short-term social gatherings; and, outdoor areas associated with school facilities that are not typically associated with educational uses prone to adverse noise impacts (for example, school play yard areas).

Percent Noise Levels: See L(n).

Sound Level (Noise Level): The weighted sound pressure level obtained by use of a sound level meter having a standard frequency filter for attenuating part of the sound spectrum.

Sound Level Meter: An instrument, including a microphone, an amplifier, an output meter, and frequency weighting networks for the measurement and determination of noise and sound levels.

Single Event Noise Exposure Level (SENEL): The dB(A) level which, if it lasted for one second, would produce the same A-weighted sound energy as the actual event.

2.7 Traffic Noise Prediction

Noise levels associated with traffic depends on a variety of factors: (1) volume of traffic, (2) speed of traffic, (3) auto, medium truck (2–3 axle) and heavy truck percentage (4 axle and greater), and sound propagation. The greater the volume of traffic, higher speeds and truck percentages equate to a louder volume in noise. A doubling of the Average Daily Traffic (ADT) along a roadway will increase noise levels by approximately 3 dB; reasons for this are discussed in the sections above.

2.8 Sound Propagation

As sound propagates from a source it spreads geometrically. Sound from a small, localized source (i.e., a point source) radiates uniformly outward as it travels away from the source in a spherical pattern. The sound level attenuates at a rate of 6 dB per doubling of distance. The movement of vehicles down a roadway makes the source of the sound appear to propagate from a line (i.e., line source) rather than a point source. This line source results in the noise propagating from a roadway in a cylindrical spreading versus a spherical spreading that results from a point source. The sound level attenuates for a line source at a rate of 3 dB per doubling of distance.

As noise propagates from the source, it is affected by the ground and atmosphere. Noise models use hard site (reflective surfaces) and soft site (absorptive surfaces) to help calculate predicted noise levels. Hard site conditions assume no excessive ground absorption between the noise source and the receiver. Soft site conditions such as grass, soft dirt or landscaping attenuate noise at a rate of 1.5 dB per doubling of distance. When added to the geometric spreading, the excess ground attenuation results in an overall noise attenuation of 4.5 dB per doubling of distance for a line source and 7.5 dB per doubling of distance for a point source.

Research has demonstrated that atmospheric conditions can have a significant effect on noise levels when noise receivers are located 200 feet from a noise source. Wind, temperature, air humidity, and turbulence can further impact have far sound can travel.

3.0 Ground-Borne Vibration Fundamentals

3.1 Vibration Descriptors

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

Several different methods are used to quantify vibration amplitude.

PPV – Known as the peak particle velocity (PPV) which is the maximum instantaneous peak in vibration velocity, typically given in inches per second.

RMS – Known as root mean squared (RMS) can be used to denote vibration amplitude

VdB – A commonly used abbreviation to describe the vibration level (VdB) for a vibration source.

3.2 Vibration Perception

Typically, developed areas are continuously affected by vibration velocities of 50 VdB or lower. These continuous vibrations are not noticeable to humans whose threshold of perception is around 65 VdB. Outdoor sources that may produce perceptible vibrations are usually caused by construction equipment, steel-wheeled trains, and traffic on rough roads, while smooth roads rarely produce perceptible ground-borne noise or vibration. To counter the effects of ground-borne vibration, the Federal Transit Administration (FTA) has published guidance relative to vibration impacts. According to the FTA, fragile buildings can be exposed to ground-borne vibration levels of 0.3 inches per second without experiencing structural damage.

3.3 Vibration Propagation

There are three main types of vibration propagation: surface, compression, and shear waves. Surface waves, or Rayleigh waves, travel along the ground's surface. These waves carry most of their energy along an expanding circular wavefront, similar to ripples produced by throwing a rock into a pool of water. P-waves, or compression waves, are body waves that carry their energy along an expanding spherical wavefront. The particle motion in these waves is longitudinal (i.e., in a "push-pull" fashion). P-waves are analogous to airborne sound waves. S-waves, or shear waves, are also body waves that carry energy along an expanding spherical wavefront. However, unlike P-waves, the particle motion is transverse, or side-to-side and perpendicular to the direction of propagation.

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

4.0 Regulatory Setting

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

4.1 Federal Regulations

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

- Publicize noise emission standards for interstate commerce
- Assist state and local abatement efforts
- Promote noise education and research

The Federal Office of Noise Abatement and Control (ONAC) originally was tasked with implementing the Noise Control Act. However, it was eventually eliminated leaving other federal agencies and committees to develop noise policies and programs. Some examples of these agencies are as follows: The Department of Transportation (DOT) assumed a significant role in noise control through its various agencies. The Federal Aviation Agency (FAA) is responsible for regulating noise from aircraft and airports. The Federal Highway Administration (FHWA) is responsible for regulating noise from the interstate highway system. The Occupational Safety and Health Administration (OSHA) is responsible for the prohibition of excessive noise exposure to workers. The Housing and Urban Development (HUD) is responsible for establishing noise regulations as it relates to exterior/interior noise levels for new HUD-assisted housing developments near high noise areas.

The federal government advocates that local jurisdictions use their land use regulatory authority to arrange new development in such a way that “noise sensitive” uses are either prohibited from being constructed adjacent to a highway or, or alternatively that the developments are planned and constructed in such a manner that potential noise impacts are minimized.

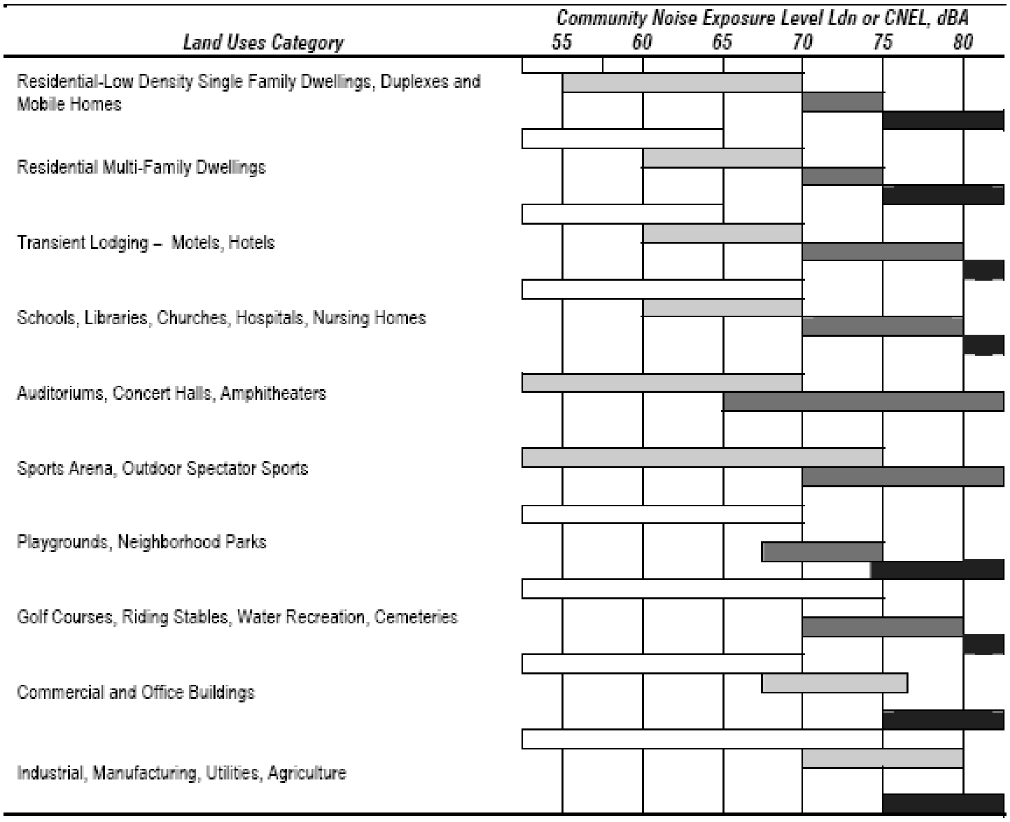
Since the federal government has preempted the setting of standards for noise levels that can be emitted by the transportation source, the City is restricted to regulating the noise generated by the transportation system through nuisance abatement ordinances and land use planning.

4.2 State Regulations

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

The State of California has established noise insulation standards as outlined in Title 24 and the Uniform Building Code (UBC) which in some cases requires acoustical analyses to outline exterior noise levels and to ensure interior noise levels do not exceed the interior threshold. The State mandates that the legislative body of each county and city adopt a noise element as part of its comprehensive general plan. The local noise element must recognize the land use compatibility guidelines published by the State Department of Health Services. The guidelines rank noise land use compatibility in terms of normally acceptable, conditionally acceptable, normally unacceptable, and clearly unacceptable as illustrated in Exhibit D.

Exhibit D: Land Use Compatibility Guidelines



Explanatory Notes

□ **Normally Acceptable:**
Specified land use is satisfactory based upon the assumption that any buildings involved are of normal conventional construction without any special noise insulation requirements.

▓ **Normally Unacceptable:**
New construction or development should generally be discouraged. If new construction or development does proceed, a detailed analysis of the noise reduction requirements must be made with needed noise insulation features included in the design. Outdoor areas must be shielded.

▒ **Conditionally Acceptable:**
New construction or development should be undertaken only after a detailed analysis of the noise reduction requirements is made and needed noise insulation features included in the design. Conventional construction, but with closed windows and fresh air supply system or air conditioning will normally suffice. Outdoor environment will seem noisy.

■ **Clearly Unacceptable:**
New construction or development should generally not be undertaken. Construction cost to make the indoor environment acceptable would be prohibitive and the outdoor environment would not be usable.

Source: California Office of Noise Control

4.3 City of Lake Forest Regulations

The City of Lake Forest outlines their noise regulations and standards within the Noise Element from the General Plan and the Noise Ordinance from the Municipal Code.

City of Lake Forest Municipal Code

Chapter 11.16 from the City's municipal code outlines the noise ordinance. MD's provided excerpts of the ordinance that relates to this project.

Section 11.16.030 – Designated Noise Zone

The entire territory of the City of Lake Forest is herby designated as "Noise Zone 1".

Section 11.16.040 – Exterior Noise Standards

The following noise standards, unless otherwise specifically indicated, shall apply to all residential property within a designated zone:

Table 1: Allowable Exterior Noise Level[1]

Sound Level Standards (dBA Leq)*

Noise Zone	Time Period	
	7 a.m. - 10 p.m.	**10 p.m. - 7 a.m.**
1	55	50

Sec. 11.16.060. – Exemptions

The following activities shall be exempted from the provisions of this chapter.

A. Activities not constituting "special events" conducted on the grounds of any public or private nursery, elementary, intermediate or secondary school or college.

B. "Special events" as defined in Section 5.05.020 provided said events are conducted pursuant to a special event permit issued as described in Chapter 5.05. However, this exemption shall not preclude use of the standards set forth in Section 11.16.040 (Exterior noise standards) or Section 11.16.050 (Interior noise standards) as a guide for the application, review, or issuance of a special event permit.

C. Any mechanical device, apparatus or equipment used, related to or connected with emergency machinery, vehicle, or work.

D. Noise sources associated with construction, repair, remodeling, or grading of any real property, provided said activities do not take place between the hours of 8:00 pm and 7:00 am on weekdays, including Saturday, or any time Sunday or a legal City of Lake Forest Holiday.

E. All mechanical devices, apparatus or equipment which are utilized for the protection or salvage of agricultural crops during periods of potential or actual frost damage or other adverse weather conditions.

F. Mobile noise sources associated with agricultural operations, provided such operations do not take place between the hours of 8:00 pm and 7:00 am on weekdays, including Saturday, or any time Sunday or a legal City of Lake Forest Holiday.

G. Mobile noise sources associated with agricultural pest control through pesticide application, provided that the application is made in accordance with restricted material permits issued by or regulations enforced by the Agricultural Commission.

H. Noise sources associated with the maintenance of real property, provided said activities take place between 7:00 am and 8:00 pm on any day except Sunday or a legal City of Lake Forest Holiday, or between 9:00 am and 8:00 pm on Sunday or a legal City of Lake Forest Holiday.

I. Any activity to the extent regulation thereof has been preempted by State or Federal Law.

J. Noise sources associated with solid waste collection or removal, provided such activities take place between 6:00 am and 6:00 pm Monday through Friday where audible in residential areas or between 7:00 am and 6:00 pm on Saturday where audible in residential areas or between 5:00 am and 9:00 pm and day where such activity is not audible in residential areas; or as otherwise provided in an approved franchise agreement between a waste hauler and the City.

City of Lake Forest – Noise Element

Goals, Policies, and Implementation Measures

Policies, goals and implementation program measures from the Noise Element that would mitigate potential impacts on noise include the following.

PS-6.1 Land Use Planning. Require development and infrastructure projects to be consistent with the maximum allowable noise exposure standards identified in Table PS-1 to ensure acceptable noise levels for existing and future development..

PS-6.2 Sensitive Facilities. Ensure appropriate mitigation is incorporated into the design of noise-sensitive facilities to minimize noise impacts.

PS-6.3 Site Design. Require site planning and project design techniques to minimize noise impacts adjacent to sensitive uses

PS-6.4 Noise Control. Ensure that noise levels do not exceed the limits established in Table PS-2 by incorporating sound-reduction design in new construction or revitalization projects impacted by non-transportation-related noise sources.

PS-6.5 Roadway Noise. Encourage nonmotorized transportation alternatives for local trips and the implementation of noise sensitivity measures in the public realm, including traffic-calming road design, lateral separation, natural buffers, and setbacks to decrease excessive motor vehicle noise.

PS-6.6 Highway Noise. Continue to coordinate with the California Department of Transportation (Caltrans) and the Transportation Corridor Agency (TCA) to achieve maximum noise abatement in the design of new highway projects or improvements along I-5.

PS-6.7 Vehicles and Trucks. Monitor and enforce existing speed limits and motor vehicle codes requiring adequate mufflers on all types of vehicles traveling through the city.

PS-6.8 Commercial Noise. Require the use of noise attenuation measures, including screening and buffering techniques, for all new commercial development expected to produce excessive noise; in existing cases where the City's noise standards are exceeded, work with Code Enforcement to require compliance.

PS-6.9 Interjurisdictional Coordination. Coordinate with neighboring cities to minimize noise conflicts between land uses along the City's boundaries.

PS-6.10 Airplane Noise. Maintain communication with John Wayne Airport and other relevant air transportation agencies to ensure that all future plans have limited impacts to the community of Lake Forest.

PS-6 Actions

PS-6a Update Chapter 11.16 of the Lake Forest Municipal Code to ensure that the noise standards are consistent with this General Plan, including Tables PS-1 and PS-2, and to require new residential, mixed-use with a residential component, and other noise-sensitive development to be designed to minimize noise exposure to noise sensitive uses through incorporation of site planning and architectural techniques. The update shall also include noise standards for residential uses within a mixed-use development, which may differ from other adopted residential noise standards**.**

PS-6b Review new development projects for compliance with the noise requirements established in this General Plan, including the standards established in Tables PS-1 and PS-2. Where necessary, require new development to mitigate excessive noise through best practices, including building location and orientation, building design features, placement of noise-generating equipment away from sensitive receptors, shielding of noise-generating equipment, placement of noise-tolerant features between noise sources and sensitive receptors, and use of noise-minimizing materials such as rubberized asphalt.

PS-6c Require acoustical studies for all new discretionary projects, including those related to development and transportation, which have the potential to generate noise impacts which exceed the standards identified in this General Plan. The studies shall include representative noise measurements, estimates of existing and projected noise levels, and mitigation measures necessary to ensure compliance with this element.

PS-6d In making a determination of impact under the California Environmental Quality Act (CEQA), a substantial increase will occur if ambient noise levels have a substantial increase. Generally, a 3 dB increase in noise levels is barely perceptible, and a 5 dB increase in noise levels is clearly perceptible. Therefore, increases in noise levels shall be considered to be substantial when the following occurs:

- When existing noise levels are less than 60 dB, a 5 dB increase in noise will be considered substantial;
- When existing noise levels are between 60 dB and 65 dB, a 3 dB increase in noise will be considered substantial;
- When existing noise levels exceed 65 dB, a 1.5 dB increase in noise will be considered substantial.

PS-6e Update the City's Noise Ordinance (Chapter 11.16) to reflect the noise standards established in this General Plan and proactively enforce the City's Noise Ordinance, including requiring the following measures for construction:

- Restrict construction activities to the hours of 7:00 a.m. to 7:00 p.m. on Monday through Friday, and 8:00 a.m. to 6:00 p.m. on Saturdays. No construction shall be permitted outside of these hours or on Sundays or federal holidays, without a specific exemption issued by the City.
- A Construction Noise Management Plan shall be submitted by the applicant for construction projects, when determined necessary by the City. The Construction Noise Management Plan shall include proper posting of construction schedules, appointment of a noise disturbance coordinator, and methods for assisting in noise reduction measures.
- Noise reduction measures may include, but are not limited to, the following:
  - Equipment and trucks used for project construction shall utilize the best available noise control techniques (e.g., improved mufflers, equipment redesign, use of intake silencers, ducts, engine enclosures and acoustically attenuating shields or shrouds) wherever feasible.
  - Except as provided herein, impact tools (e.g., jack hammers, pavement breakers, and rock drills) used for project construction shall be hydraulically or electrically powered to avoid noise associated with compressed air exhaust from pneumatically powered tools. However, where use of pneumatic tools is unavoidable, an exhaust muffler on the compressed air exhaust shall be used. This muffler can lower noise levels from the exhaust by up to about 10 dBA. External jackets on the tools themselves shall be used, if such jackets are commercially available. this could achieve a reduction of 5 dBA. Quieter procedures shall be used, such as drills rather than impact equipment, whenever such procedures are available and consistent with construction procedures.
  - Temporary power poles shall be used instead of generators where feasible.
  - Stationary noise sources shall be located as far from adjacent properties as possible, and they shall be muffled and enclosed within temporary sheds, incorporate insulation barriers, or use other measures as determined by the City of provide equivalent noise reduction.
  - The noisiest phases of construction shall be limited to less than 10 days at a time. Exceptions may be allowed if the City determines an extension is necessary and all available noise reduction controls are implemented.
  - Delivery of materials shall observe the hours of operation described above. Truck traffic should avoid residential areas to the extent possible.
- Require new development to minimize vibration impacts to adjacent uses during demolition and construction. For sensitive historic structures, a vibration limit of 0.08 in/sec PPV (peak

particle velocity) will be used to minimize the potential for cosmetic damage to the building. A vibration limit of 0.30 in/sec PPV will be used to minimize the potential for cosmetic damage at buildings of normal conventional construction.

PS-6f The City shall require new residential projects located adjacent to major freeways, hard rail lines, or light rail lines to follow the FTA vibration screening distance criteria to ensure that residential uses are not exposed to vibrations exceeding 72 VdB for frequent events (more than 70 events per day), 75 VdB for occasional events (30-70 events per day), or 80 VdB for infrequent events (less than 30 events per day).

5.0 Study Method and Procedure

The following section describes the noise modeling procedures and assumptions used for this assessment.

5.1 Noise Measurement Procedure and Criteria

Noise measurements are taken to determine the existing noise levels. A noise receiver or receptor is any location in the noise analysis in which noise might produce an impact. The following criteria are used to select measurement locations and receptors:

- Locations expected to receive the highest noise impacts, such as the first row of houses
- Locations that are acoustically representative and equivalent of the area of concern
- Human land usage
- Sites clear of major obstruction and contamination

MD conducted the sound level measurements in accordance to City's noise ordinance, the Federal Highway Transportation (FHWA) and Caltrans (TeNS) technical noise specifications. All measurement equipment meets American National Standards Institute (ANSI) specifications for sound level meters (S1.4-1983 identified in Chapter 19.68.020.AA). The following gives a brief description of the Caltrans Technical Noise Supplement procedures for sound level measurements:

- Microphones for sound level meters were placed 5-feet above the ground for all measurements
- Sound level meters were calibrated (Larson Davis CAL 200) before and after each measurement
- Following the calibration of equipment, a windscreen was placed over the microphone
- Frequency weighting was set on "A" and slow response
- Results of the long-term noise measurements were recorded on field data sheets
- During any short-term noise measurements, any noise contaminations such as barking dogs, local traffic, lawn mowers, or aircraft fly-overs were noted
- Temperature and sky conditions were observed and documented

5.2 Noise Measurement Locations

Noise monitoring locations were selected based on the project site's boundary. three (3) short-term 10-min noise measurements were conducted at the site's property line and are illustrated in Exhibit E. Appendix A includes photos, field sheet, and measured noise data.

5.3 Stationary Noise Modeling

SoundPLAN (SP) acoustical modeling software was utilized to model future worst-case stationary noise impacts to the adjacent land uses. SP is capable of evaluating multiple stationary noise source impacts at various receiver locations. SP's software utilizes algorithms (based on the inverse square law and reference equipment noise level data) to calculate noise level projections. The software allows the user to input specific noise sources, spectral content, sound barriers, building placement, topography, and sensitive receptor locations.

The future worst-case noise level projections were modeled using referenced sound level data for the various stationary on-site sources (parking spaces). The model assumes that the project site has approximately 26 total parking spaces.

The 26 parking spots were modeled using SoundPlans employee parking input parameter function and assumes 1 parking movements per hour. This assumption is conservative as typically employees would arrive in the morning and then depart in the evening.

The SP model assumes that all noise sources are operating simultaneously (worst-case scenario), when in actuality the noise will be intermittent and lower in noise level.

Finally, the model is able to evaluate the noise attenuating effects of any existing or proposed property line walls. Input and output calculations are provided in Appendix C.

5.4 FHWA Traffic Noise Prediction Model

Traffic noise from vehicular traffic was projected using a computer program that replicates the FHWA Traffic Noise Prediction Model (FHWA-RD-77-108). The FHWA model predicts a noise level increment of 3 dB per doubling the traffic volume. Roadway volumes and percentages correspond to the project's traffic scoping agreement as prepared by Environment, Planning, Development Solutions, Inc.

The project trip generation study indicates that the project use would generate 142 daily trips. The referenced traffic data was screened out of VMT analysis, and no further analysis is required. The traffic data is included in Appendix D.

Table 2 indicates the roadway parameters and vehicle distribution utilized for this study.

Table 2: Roadway Parameters and Vehicle Distribution

Roadway	Segment	Existing ADT[1]	Existing Plus Project ADT	Speed (MPH)	Site Conditions
Dimension Drive	South of Commercentre Drive	12,021	12,163	45	Hard
Vehicle Distribution (Truck Mix)[2]					
Motor-Vehicle Type		**Daytime % (7AM to 7 PM)**	**Evening % (7 PM to 10 PM)**	**Night % (10 PM to 7 AM)**	**Total % of Traffic Flow**
Automobiles		77.5	12.9	9.6	97.42
Medium Trucks		84.8	4.9	10.3	1.84
Heavy Trucks		86.5	2.7	10.8	0.74

Notes:
[1] Traffic counts provided by EPD Solutions, Inc and The City of Lake Forest.

5.5 FHWA Roadway Construction Noise Model

The construction noise analysis utilizes the Federal Highway Administration (FHWA) Roadway Construction Noise Model (RNCM), together with several key construction parameters. Key inputs include distance to the sensitive receiver, equipment usage, % usage factor, and baseline parameters for the project site.

The project was analyzed based on the different construction phases. Construction noise is expected to be loudest during the grading, concrete and building phases of construction. The construction noise calculation output worksheet is located in Appendix D. The following assumptions relevant to short-term construction noise impacts were used:

- It is estimated that construction will occur over a 3-month time period. Construction noise is expected to be the loudest during the grading, concrete, and building phases.

Exhibit E

Measurement Locations

6.0 Existing Noise Environment

Three ten-minute (10) ambient noise measurement were conducted at the project site. Noise measurements were taken to determine the existing ambient noise levels. This assessment will utilize the ambient noise data as a basis and compare levels to said data.

6.1 Short-Term Noise Measurement Results

The results of the short-term noise data are presented in Table 3.

Table 3: Short-Term Noise Measurement Data[1]

Location	Time	10-Min dB(A) Leq							
		L_{EQ}	L_{MAX}	L_{MIN}	L_2	L_8	L_{25}	L_{50}	L_{90}
1	3:44PM-3:54PM	46.0	57.6	42.4	51.2	47.3	46.1	45.2	43.8
2	3:57PM-4:07PM	47.8	61.0	40.7	58.8	48.6	46.1	43.9	41.7
3	4:15PM-4:25PM	47.6	61.9	39.4	58.1	51.1	44.5	42.1	40.5

Notes:
1. Short-term noise monitoring location (ST1-3) is illustrated in Exhibit E.

Noise data indicates the ambient noise level ranges between 48 dBA Leq to 46 dBA Leq depending on location. Additional field notes and photographs are provided in Appendix A.

7.0 Future Noise Environment Impacts and Mitigation

This assessment analyzes future noise impacts as a result of the project. The analysis details the estimated exterior noise levels. Stationary noise impacts are analyzed from the on-site noise sources such as trucks loading and unloading.

7.1 Future Exterior Noise

The following outlines the exterior noise levels associated with the proposed project.

7.1.1 Noise Impacts to Off-Site Receptors Due to Stationary Sources

Adjacent uses that may be affected by project operational noise include light industrial to the north, south, east, and west. The worst-case stationary noise was modeled using SoundPLAN acoustical modeling software. Worst-case assumes that all project activities (dump truck running, cars coming and going) are always operational when in reality the noise will be intermittent and cycle on/off depending on usage. Project operations are anticipated to occur between 6AM to 4PM.

A total of six (6) receptors were modeled to evaluate the proposed project’s operational impact. A receptor is denoted by a yellow dot. All yellow dots represent a property line.

This study compares the Project’s operational noise levels to two (2) different noise assessment scenarios: 1) Project Only operational noise level projections, 2) Project plus ambient noise level projections.

Nighttime Project Operational Noise Levels

Exhibit F shows the “project only” operational noise levels at the property lines and adjacent areas. Exhibit F shows the noise contours at the project site and illustrates how the noise will propagate at the site. Operational noise levels at the adjacent uses are anticipated to range between 23 dBA to 50 dBA Leq (depending on the location).

The “project only” noise projections to the adjacent uses are below the City’s nighttime 50 dBA noise limit, as outlined within the City’s noise ordinance (see Section 4.3).

Nighttime Project Plus Ambient Operational Noise Levels

Table 4 demonstrates the project plus the ambient noise levels. Project plus ambient noise level projections are anticipated to range between 46 to 52 dBA Leq at receptors (R1 – R6).

<Table 4 Next Page>

Table 4: Worst-case Predicted Nighttime Operational Leq Noise Level

Receptor[1]	Floor	Existing Ambient Noise Level (dBA, Leq)[2]	Project Noise Level (dBA, Leq)[3]	Total Combined Noise Level (dBA, Leq)	Daytime (7AM – 10PM) Noise Limit (dBA, Leq)	Change in Noise Level as Result of Project
1	1	46	23	46	**50**	0
2	1		35	46		0
3	1		29	46		0
4	1		35	46		0
5	1	48	50	52		4
6	1		35	48		0

Notes:
[1] Receptors 1-6 represents the adjacent property lines.
[3] See Exhibit f for the nighttime operational noise level projections at said receptors.

As shown in Table 4, the project will increase the worst-case noise level by approximately 0 to 4 dBA Leq at receptors (R1 – R6). It takes a change of 3 dBA to hear a noticeable difference.

Table 5 provides the characteristics associated with changes in noise levels.

Table 5: Change in Noise Level Characteristics[1]

Changes in Intensity Level, dBA	Changes in Apparent Loudness
1	Not perceptible
3	Just perceptible
5	Clearly noticeable
10	Twice (or half) as loud

https://www.fhwa.dot.gov/environMent/noise/regulations_and_guidance/polguide/polguide02.cfm

The change in noise level would fall within the “Not Perceptible” acoustic characteristic depending on location.

Daytime Project Operational Noise Levels

Exhibit G shows the “project only” operational noise levels at the property lines and adjacent areas. Exhibit G shows the noise contours at the project site and illustrates how the noise will propagate at the site. Operational noise levels at the adjacent uses are anticipated to range between 26 dBA to 53 dBA Leq (depending on the location).

The “project only” noise projections to the adjacent uses are below the City’s daytime 55 dBA noise limit, as outlined within the City’s noise ordinance (see Section 4.3).

Daytime Project Plus Ambient Operational Noise Levels

Table 6 demonstrates the project plus the ambient noise levels. Project plus ambient noise level projections are anticipated to range between 46 to 54 dBA Leq at receptors (R1 – R6). The project plus ambient noise condition is below the City's 55 dBA noise limit without mitigation and therefore is less than significant.

Table 6: Worst-case Predicted Daytime Operational Leq Noise Level

Receptor[1]	Floor	Existing Ambient Noise Level (dBA, Leq)[2]	Project Noise Level (dBA, Leq)[3]	Total Combined Noise Level (dBA, Leq)	Daytime (7AM – 10PM) Noise Limit (dBA, Leq)	Change in Noise Level as Result of Project
1	1	46	26	46	55	0
2	1		38	47		1
3	1		32	46		0
4	1		38	47		1
5	1	48	53	54		6
6	1		38	48		0

Notes:
[1] Receptors 1-6 represents the adjacent property lines.
[3] See Exhibit f for the operational noise level projections at said receptors.

As shown in Table 6, the project will increase the worst-case noise level by approximately 0 to 6 dBA Leq at receptors (R1 – R6). It takes a change of 3 dBA to hear a noticeable difference.

Table 7 provides the characteristics associated with changes in noise levels.

Table 7: Change in Noise Level Characteristics[1]

Changes in Intensity Level, dBA	Changes in Apparent Loudness
1	Not perceptible
3	Just perceptible
5	Clearly noticeable
10	Twice (or half) as loud

https://www.fhwa.dot.gov/environMent/noise/regulations_and_guidance/polguide/polguide02.cfm

The change in noise level would fall within the "Not Perceptible" to "Clearly Noticeable" acoustic characteristic depending on location.

7.1.2 Noise Impacts to On/Off-Site Receptors Due to Project Generated Traffic

A worst-case project generated traffic noise level was modeled utilizing the FHWA Traffic Noise Prediction Model - FHWA-RD-77-108. Traffic noise levels were calculated 50 feet from the centerline of the analyzed roadway. The modeling is theoretical and does not take into account any existing barriers, structures, and/or topographical features that may further reduce noise levels. Therefore, the levels are shown for comparative purposes only to show the difference in with and without project conditions. In addition, the noise contours for 60, 65 and 70 dBA CNEL were calculated. The potential off-site noise impacts caused by an increase of traffic from operation of the proposed project on the nearby roadways were calculated for the following scenarios:

Existing Year (without Project): This scenario refers to existing year traffic noise conditions.

Existing Year (Plus Project): This scenario refers to existing year + project traffic noise conditions.

Table 8 compares the without and with project scenario and shows the change in traffic noise levels as a result of the proposed project. It takes a change of 3 dB or more to hear a perceptible difference. As demonstrated in Table 8, the project is anticipated to have no change as a result of the project and is therefore less than significant.

Table 8: Existing Scenario - Noise Levels Along Roadways (dBA CNEL)

Existing Without Project Exterior Noise Levels

Roadway	Segment	CNEL at 122 Ft (dBA)	Distance to Contour (Ft)			
			70 dBA CNEL	65 dBA CNEL	60 dBA CNEL	55 dBA CNEL
Dimension Drive	South of Commercentre Drive	61.6	33	72	155	335

Existing With Project Exterior Noise Levels

Roadway	Segment	CNEL at 122 Ft (dBA)	Distance to Contour (Ft)			
			70 dBA CNEL	65 dBA CNEL	60 dBA CNEL	55 dBA CNEL
Dimension Drive	South of Commercentre Drive	61.6	34	73	157	338

Change in Existing Noise Levels as a Result of Project

Roadway[1]	Segment	CNEL at 50 Feet dBA[2]			
		Existing Without Project	Existing With Project	Change in Noise Level	Potential Significant Impact
Dimension Drive	South of Commercentre Drive	61.6	61.6	0.0	No

Notes:
[1] Exterior noise levels calculated at 5 feet above ground level.
[2] Noise levels calculated from centerline of subject roadway.

7.2 Vibration Impacts to Off-Site Receptors Due to Project Operation

Adjacent uses that may be affected by project operational vibration includes light industrial to the south. The project will consist of cars coming and going with the occasional dump truck. A dump truck has a vibration impact of 0.076 inches per second peak particle velocity (PPV) at 25 feet which is perceptible but below any risk to architectural damage. The nearest commercial structure is approximately 25 feet away from the trucks path. Therefore, the impact the adjacent uses would be less than significant.

7.3 Mitigation Measures

The project complies with the City’s noise regulations as designed and therefore no mitigation measures are required.

Exhibit F

Future Nighttime Operational Noise Levels

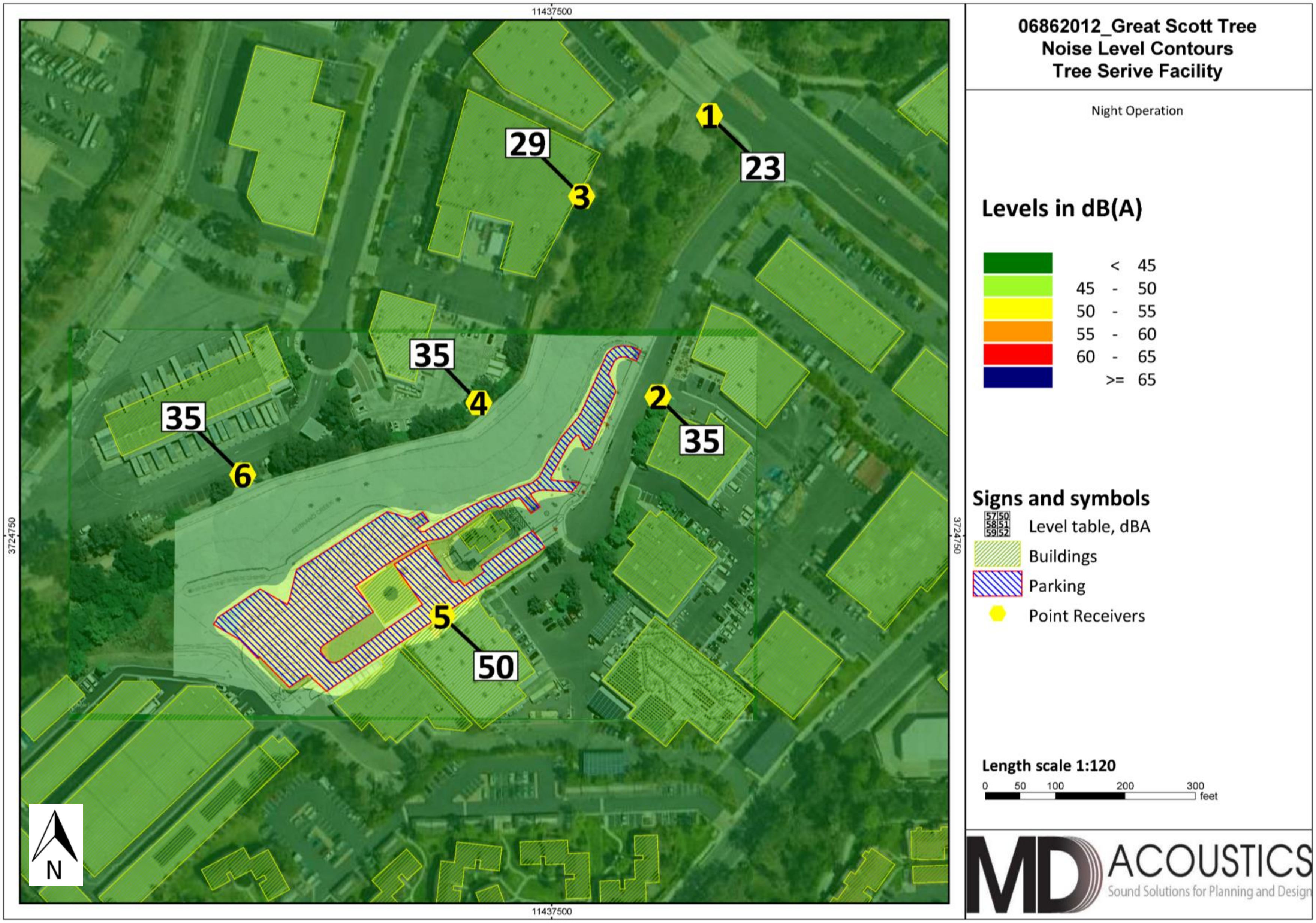
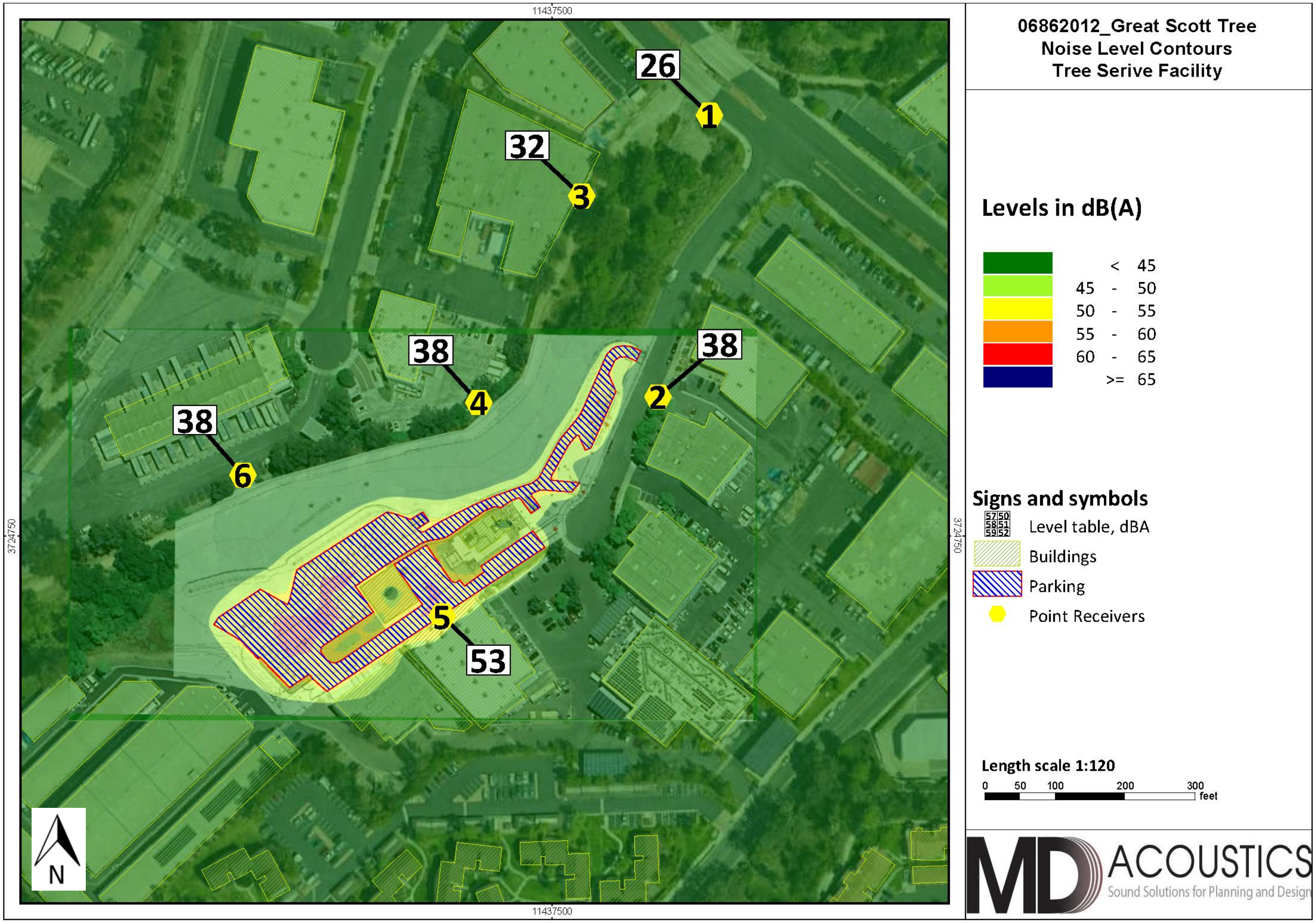


Exhibit G

Future Daytime Operational Noise Levels



8.0 Construction Noise Impact

The degree of construction noise may vary for different areas of the project site and also vary depending on the construction activities. Noise levels associated with the construction will vary with the different phases of construction.

8.1 Construction Noise

The Environmental Protection Agency (EPA) has compiled data regarding the noise generated characteristics of typical construction activities. The data is presented in Table 9.

Table 9: Typical Construction Equipment Noise Levels[1]

Type	Lmax (dBA) at 50 Feet
Backhoe	80
Truck	88
Concrete Mixer	85
Pneumatic Tool	85
Pump	76
Saw, Electric	76
Air Compressor	81
Generator	81
Paver	89
Roller	74

Notes:
[1] Referenced Noise Levels from FTA noise and vibration manual.

Construction is anticipated to occur during the permissible hours according to the City's General Plan. Construction noise will have a temporary or periodic increase in the ambient noise level above the existing within the project vicinity. Furthermore, noise reduction measures are provided to further reduce construction noise. The impact is considered less than significant however construction noise level projections are provided.

Typical operating cycles for these types of construction equipment may involve one or two minutes of full power operation followed by three to four minutes at lower power settings. Noise levels will be loudest during grading phase. A likely worst-case construction noise scenario during grading assumes the use of 1-grader, 1-dozer, 2-excavators, and 2-backhoes operating at 260 feet from the property boundary.

Assuming a usage factor of 40 percent for each piece of equipment, unmitigated noise levels at 123 feet have the potential to reach 77 dBA L_{eq} at the property boundary during building construction.

8.2 Construction Vibration

Construction activities can produce vibration that may be felt by adjacent land uses. The construction of the proposed project would not require the use of equipment such as pile drivers, which are known to generate substantial construction vibration levels. The primary vibration source during construction may be from a bulldozer. A large bulldozer has a vibration impact of 0.089 inches per second peak particle velocity (PPV) at 25 feet which is perceptible but below any risk to architectural damage.

The fundamental equation used to calculate vibration propagation through average soil conditions and distance is as follows:

$$PPV_{equipment} = PPV_{ref}\ (100/D_{rec})^{n}$$

Where: PPV_{ref} *= reference PPV at 100ft.*
D_{rec} *= distance from equipment to receiver in ft.*
n = 1.1 (the value related to the attenuation rate through ground)

The thresholds from the Caltrans Transportation and Construction Induced Vibration Guidance Manual in Table 10 (below) provides general thresholds and guidelines as to the vibration damage potential from vibratory impacts.

Table 10: Guideline Vibration Damage Potential Threshold Criteria

Structure and Condition	Maximum PPV (in/sec)	
	Transient Sources	Continuous/Frequent Intermittent Sources
Extremely fragile historic buildings, ruins, ancient monuments	0.12	0.08
Fragile buildings	0.2	0.1
Historic and some old buildings	0.5	0.25
Older residential structures	0.5	0.3
New residential structures	1.0	0.5
Modern industrial/commercial buildings	2.0	0.5

Source: Table 19, Transportation and Construction Vibration Guidance Manual, Caltrans, Sept. 2013.
Note: Transient sources create a single isolated vibration event, such as blasting or drop balls. Continuous/frequent intermittent sources include impact pile drivers, pogo-stick compactors, crack-and-seat equipment, vibratory pile drivers, and vibratory compaction equipment.

Table 11 gives approximate vibration levels for particular construction activities. This data provides a reasonable estimate for a wide range of soil conditions.

<Table 11, next page>

Table 11: Vibration Source Levels for Construction Equipment[1]

Equipment	Peak Particle Velocity (inches/second) at 25 feet	Approximate Vibration Level LV (dVB) at 25 feet
Pile driver (impact)	1.518 (upper range)	112
	0.644 (typical)	104
Pile driver (sonic)	0.734 upper range	105
	0.170 typical	93
Clam shovel drop (slurry wall)	0.202	94
Hydromill	0.008 in soil	66
(slurry wall)	0.017 in rock	75
Vibratory Roller	0.21	94
Hoe Ram	0.089	87
Large bulldozer	0.089	87
Caisson drill	0.089	87
Loaded trucks	0.076	86
Jackhammer	0.035	79
Small bulldozer	0.003	58

[1] Source: Transit Noise and Vibration Impact Assessment, Federal Transit Administration, May 2006.

At a distance of 33 feet (distance of nearest structure from the site's south east boundary), a large bulldozer would yield a worst-case 0.066 PPV (in/sec) which may be perceptible for short periods of time during grading along the property line of the project site, but is below any threshold of damage. The impact is less than significant and no mitigation is required.

8.3 Construction Noise Reduction Measures

Construction operations must follow the City's General Plan and the Noise Ordinance, which states that construction, repair or excavation work performed must occur within the permissible hours. To further ensure that construction activities do not disrupt the adjacent land uses, the following measures should be taken:

1. During construction, the contractor shall ensure all construction equipment is equipped with appropriate noise attenuating devices that will reduce noise levels 3 to 10 dBA.

2. The contractor should locate equipment staging areas that will create the greatest distance between construction-related noise/vibration sources and sensitive receptors nearest the project site during all project construction. At all times the staging area should be approximately 123 feet from the nearest sensitive receptor.

3. Idling equipment should be turned off when not in use.

4. Equipment shall be maintained so that vehicles and their loads are secured from rattling and banging.

9.0 References

State of California General Plan Guidelines: 1998. Governor's Office of Planning and Research

City of Lake Forest: General Plan Noise Element.

City of Lake Forest: Municipal Code. Chapter 11.16 Noise Control

Environment Planning Development Solutions (EPD) – Great Scott Tree Service Lake Forest Facility Project Trip Generation – 9/13/2023

Appendix A:

Photographs and Field Measurement Data

MD ACOUSTICS
Sound Solutions for Planning and Design
www.mdacoustics.com

AZ Office
4960 S. Gilbert Rd, Ste 1-461
Chandler, AZ 85249

CA Office
1197 E Los Angeles Ave, C-256
Simi Valley, CA 93065

10-Minute Continuous Noise Measurement Datasheet

Project: Great Scott
Site Address/Location: Linear Lane, north of Canada Road
Date: 8/10/2020
Field Tech/Engineer: Jason Schuyler

Site Observations: Clear Sky, Three locations taken, General traffic from cars passing depending on location.

General Location:
Sound Meter: NTi Audio **SN:** A2A-05967-E0
Settings: A-weighted, slow, 1-sec, 10-minute interval
Meteorological Con.: 92 degrees F, 2 to 5 mph wind, eastern direction
Site ID: ST-1 thru ST-3

Site Topo: Flat
Ground Type: Hard site conditions, reflective

Noise Source(s) w/ Distance:
NM1- Taken middle of the property
NM2-Property line of the multi family residential
NM3- Southern Most property ine

Figure 1: Monitoring Locations

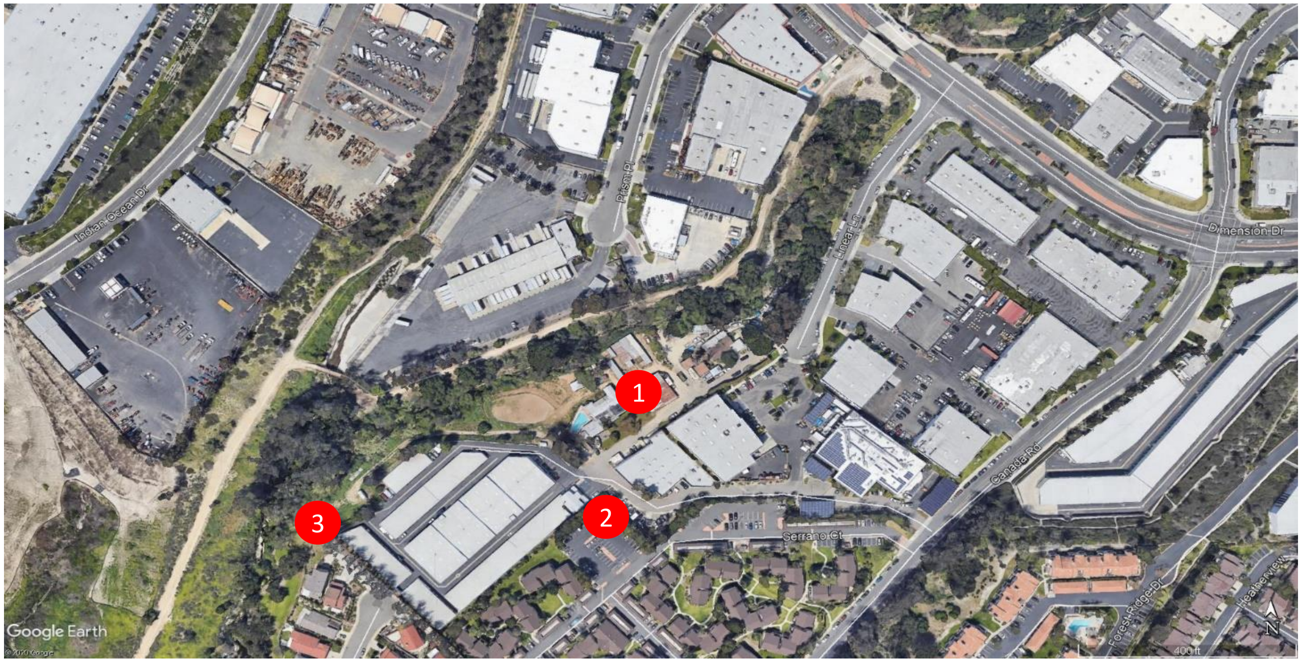


Figure 2: ST-1 Photo

Figure 3: ST-2 Photo

10-Minute Continuous Noise Measurement Datasheet - Cont.

Project: Great Scott
Site Address/Location: Linear Lane, north of Canada Road
Site ID: ST-1 thru ST-3

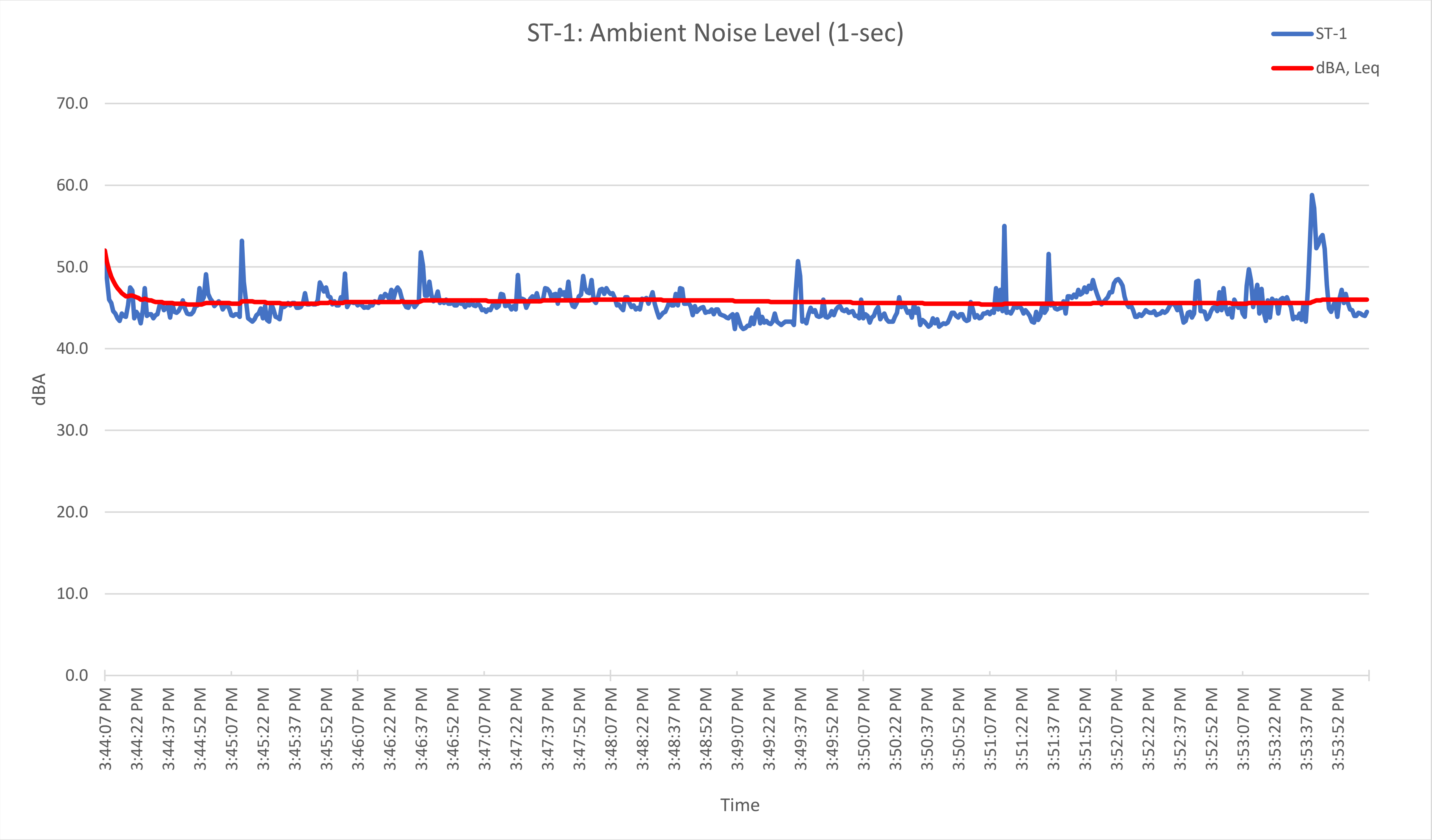
Figure 4: ST-3 Photo

Table 1: Morning - Baseline Noise Measurement Summary

Location	Start	Stop	Leq	Lmax	Lmin	L2	L8	L25	L50	L90
1	3:44 PM	3:54 PM	46.0	57.6	42.4	51.2	47.3	46.1	45.2	43.8
2	3:57 PM	4:07 PM	47.8	61.0	40.7	58.8	48.6	46.1	43.9	41.7
3	4:15 PM	4:25 PM	47.6	61.9	39.4	58.1	51.1	44.5	42.1	40.5

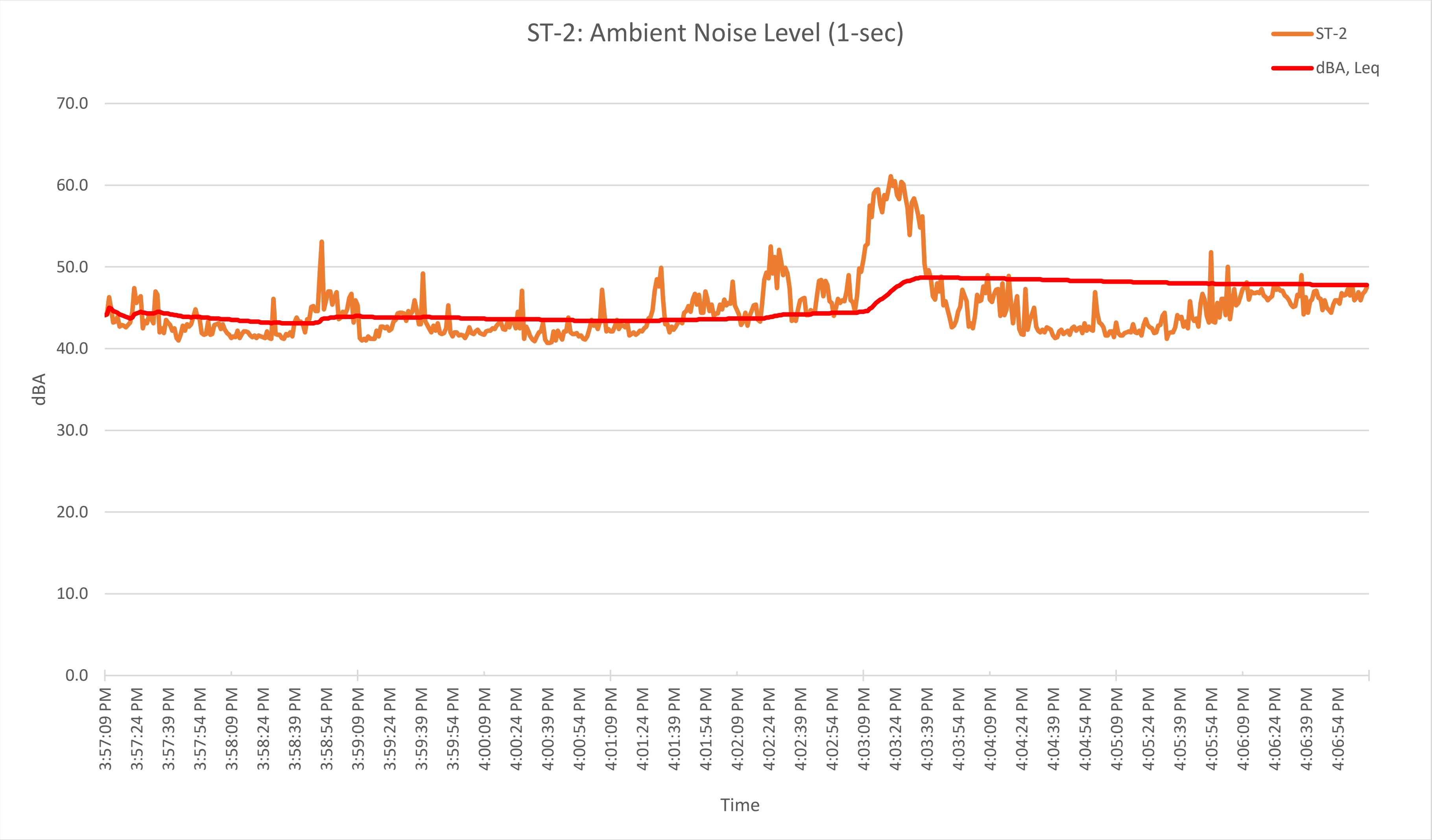
10-Minute Continuous Noise Measurement Datasheet - Cont.

Project: Great Scott
Site Address/Location: Linear Lane, north of Canada Road
Site ID: ST-1



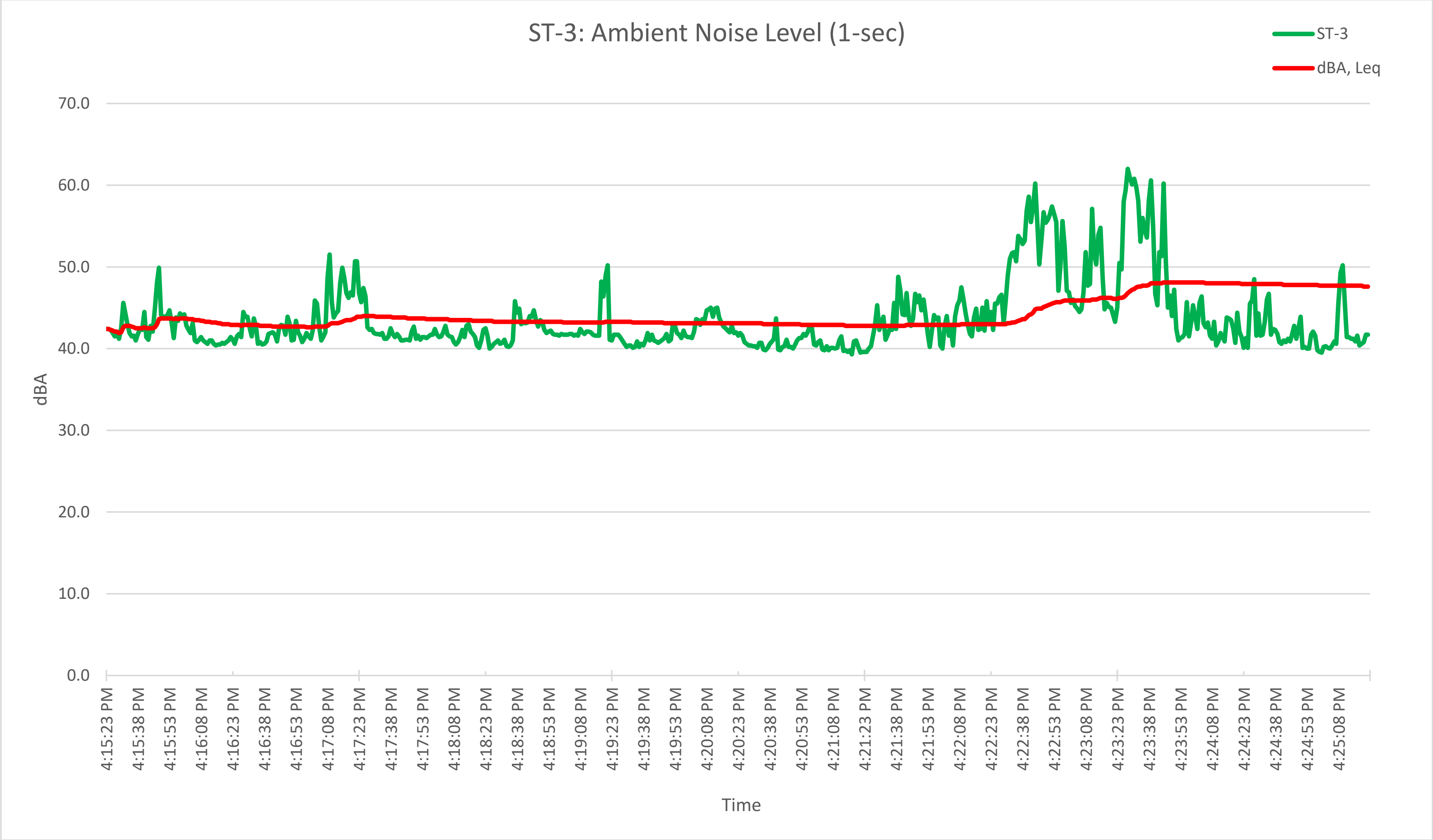
10-Minute Continuous Noise Measurement Datasheet - Cont.

Project: Great Scott
Site Address/Location: Linear Lane, north of Canada Road
Site ID: ST-2



10-Minute Continuous Noise Measurement Datasheet - Cont.

Project: Great Scott
Site Address/Location: Linear Lane, north of Canada Road
Site ID: ST-3



Appendix B:

EPD Solutions Inc Memo

ENVIRONMENT | PLANNING | DEVELOPMENT
SOLUTIONS, INC.

Date: October 20, 2020

Prepared by: Meghan Macias, TE

To: Norah Jaffan

Site: Great Scott Tree Service Lake Forest Facility

Subject: Project Trip Generation

This memorandum provides a preliminary estimate of the potential vehicle trips that would be generated by the proposed Great Scott Tree Service Facility and a vehicle miles traveled (VMT) screening analysis. The project site is in the city of Lake Forest, west of Linear Lane, north of Canada Road, with Serrano Creek bordering the project site to the south and east. The project includes the rehabilitation of the existing home to be used as an office for the Great Scott Tree Service (GSTS) administrative functions, removal of the structures related to animal keeping, creation of parking areas for the tree service vehicles and equipment and creation of a concrete pad for drying the wood chips generated during the day's work of cutting trees. The site would have 49 parking spaces (10 spaces designated for Boom Trucks, 15 spaces designated for Dump Trucks, 7 Equipment stalls, and 15 automobile spaces for office/staff/vendor parking).

The estimate of project trip generation is based on information about the anticipated operation of the site provided by GSTS. The project would have approximately 47 employees broken down as follows:

- 4 Office Employees
- 1 Salesperson
- 1 Maintenance Employee
- 3 Supervisors
- 38 Field Employees

According to GSTS, many of their current field employees carpool resulting in a vehicle occupancy of approximately 1.5 persons per vehicle. Field employees would arrive at the project site in their personal vehicle (or by carpool) and would then travel to the daily work site in a field equipment vehicle. Similarly, Supervisors would arrive at the project site in their personal vehicle to pick up a work truck and then depart to the work site. The remaining employees would remain at the project site. Office, Sales, and Supervisors would arrive at the site during the AM and PM peak commute periods (between 7-9 AM and 4-6 PM). Maintenance and Field Employees would arrive at the site at 6:30 AM and would depart by 3:30 PM. Therefore, trips associated with Maintenance and Field Employees occur outside of the peak commute periods.

The project trip generation is shown in Table 1. As shown in the table, the project would generate 151 daily trips including 8 trips during the AM and PM peak hours.

Vehicle Miles Traveled

Background

Senate Bill (SB) 743 was signed by Governor Brown in 2013 and required the Governor's Office of Planning and Research (OPR) to amend the CEQA Guidelines to provide an alternative to LOS for evaluating Transportation impacts. SB743 specified that the new criteria should promote the reduction of greenhouse gas emissions, the development of multimodal transportation networks and a diversity of land uses. The bill also specified that delay-based level of service could no longer be considered an indicator of a significant impact on the environment. In response, Section 15064.3 was added to the CEQA Guidelines beginning January 1, 2019. Section 15064.3 - Determining the Significance of Transportation Impacts states that Vehicle Miles Traveled (VMT) is the most appropriate measure of transportation impacts and provides lead agencies with the discretion to choose the most appropriate methodology and thresholds for evaluating VMT. Section 15064.3(c) states that the provisions of the section shall apply statewide beginning on July 1, 2020.

VMT Screening Analysis

The City of Lake Forest has adopted VMT thresholds and guidelines that provide methodology and impact thresholds for projects that would require a vehicle miles traveled (VMT) analysis. The City of Lake Forest Transportation Analysis Guidelines (July 21, 2020) provide criteria for projects that would be considered to have a less-than significant impact on VMT and therefore could be screened out from further analysis. If a project meets one of the following criteria, then the VMT impact of the project is considered less-than significant and no further analysis of VMT would be required:

- The project serves the local community and thereby has the potential to reduce VMT.
- The project generates less than 110 daily vehicle trips.
- The project is located within a Transit Priority area.
- The project is located in a low VMT generating area.

The project would not be considered a local-serving use, as defined in the guidelines. The project is also not located in either a Transit Priority Area or a low VMT generating area.

The City's Guidelines discuss the type of VMT that should be evaluated for various types of projects. Per the guidelines, VMT is defined as "the amount and distance of automobile travel attributable to a project … the term "automobile" refers to on-road passenger vehicles, specifically cars and light trucks". This is consistent with CEQA Guidelines Section 15064.3(a) which states "For the purpose of this section, "vehicle miles traveled" refers to the amount and distance of automobile travel attributable to a project". Based on both of these guidance documents, truck trips are not included in the VMT analysis.

To determine if the project's trip generation would exceed the 110 daily vehicle trips screening threshold, the passenger vehicle trip generation was utilized. This approach is consistent with both the County and CEQA Guidelines. As shown in Table 1, the project would generate 75 daily passenger vehicle trips. Because the project would generate fewer than 110 daily passenger vehicle trips, the project is presumed to have a less than significant impact on VMT and would not require further VMT analysis.

If you have any questions on this information, please contact me at meghan@epdsolutions or at (949) 794-1186.

Table 1. Great Scott Trip Generation

Land Use	# of Employees	Daily	AM Peak Hour			PM Peak Hour		
			In	Out	Total	In	Out	Total
Office	4	8	4	0	4	0	4	4
Sales	1	2	1	0	1	0	1	1
Maintenance	1	2	0	0	0	0	0	0
Supervisors[1]	3	12	0	3	3	3	0	3
Field Employees[2]	38	51	0	0	0	0	0	0
Total Passenger Trips	**47**	**75**	**5**	**3**	**8**	**3**	**5**	**8**
Field Equipment[3]		76	0	0	0	0	0	0
Total		**151**	**5**	**3**	**8**	**3**	**5**	**8**

[1] Supervisors arrive at the project site, pick up a truck and depart to the job site. Therefore 4 daily trips per supervisor are assumed.

[2] Many field employees carpool, used 1.5/vehicle.

[3] Assume each employee drives one piece of equipment to the job site.

Appendix C:

SoundPlan Input/Output

Great Scott Tree
3rd octave spectra of the sources in dB(A) - Situation 1: Outdoor SP

Name	I or A	Li	R'w	L'w	Lw	50Hz	63Hz	80Hz	100Hz	125Hz	160Hz	200Hz	250Hz	315Hz	400Hz	500Hz	630Hz	800Hz	1kHz	1.25kHz	1.6kHz	2kHz	2.5kHz	3.15kHz	4kHz	5kHz	6.3kHz	8kHz	10kHz	12.5kHz	16kHz	20kHz
	m,m²	dB(A)	dB	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)
Bulldozer	612.75			72.1	100.0	69	68.8	68.8	76.9	76.9	76.9	79.4	79.4	79.4	85.8	85.8	85.8	94.0	94.0	94.0	83.2	83.2	83.2	78.0	78.0	78.0	68.9	68.9	68.9			
Parking 2	103.58			55.9	76.0	55	54.6	54.6	66.2	66.2	66.2	58.7	58.7	58.7	63.2	63.2	63.2	63.3	63.3	63.3	63.7	63.7	63.7	61.0	61.0	61.0	54.8	54.8	54.8	42.0	42.0	42.0
Parking 2	62.85			56.8	74.8	53	53.4	53.4	65.0	65.0	65.0	57.5	57.5	57.5	62.0	62.0	62.0	62.1	62.1	62.1	62.5	62.5	62.5	59.8	59.8	59.8	53.6	53.6	53.6	40.8	40.8	40.8
Truck parking 2	414.62			62.3	88.5	67	67.0	67.0	78.6	78.6	78.6	71.1	71.1	71.1	75.6	75.6	75.6	75.7	75.7	75.7	76.1	76.1	76.1	73.4	73.4	73.4	67.2	67.2	67.2	54.4	54.4	54.4
Truck parking 4	178.37			62.3	84.8	63	63.3	63.3	74.9	74.9	74.9	67.4	67.4	67.4	71.9	71.9	71.9	72.0	72.0	72.0	72.4	72.4	72.4	69.7	69.7	69.7	63.5	63.5	63.5	50.7	50.7	50.7
Truck Parking 1	421.67			61.5	87.8	66	66.4	66.4	78.0	78.0	78.0	70.5	70.5	70.5	75.0	75.0	75.0	75.1	75.1	75.1	75.5	75.5	75.5	72.8	72.8	72.8	66.6	66.6	66.6	53.8	53.8	53.8
Truck Parking 3	188.68			62.0	84.8	63	63.3	63.3	74.9	74.9	74.9	67.4	67.4	67.4	71.9	71.9	71.9	72.0	72.0	72.0	72.4	72.4	72.4	69.7	69.7	69.7	63.5	63.5	63.5	50.7	50.7	50.7
Truck Parking 5	109.60			64.4	84.8	63	63.3	63.3	74.9	74.9	74.9	67.4	67.4	67.4	71.9	71.9	71.9	72.0	72.0	72.0	72.4	72.4	72.4	69.7	69.7	69.7	63.5	63.5	63.5	50.7	50.7	50.7

Great Scott Tree
Contribution level - Situation 1: Outdoor SP

Source	Source group	Source ty	Tr. lane	Leq,d dB(A)	A dB	
Receiver -105,362 Fl G Lr,lim dB(A) Leq,d 39.5 dB(A)						
Bulldozer	Default industrial noise	Area		39.4	0.0	
Parking 2	Default parking lot noise	PLot		-1.4	0.0	
Parking 2	Default parking lot noise	PLot		2.8	0.0	
Truck Parking 1	Default parking lot noise	PLot		13.2	0.0	
Truck Parking 5	Default parking lot noise	PLot		6.7	0.0	
Truck parking 2	Default parking lot noise	PLot		17.5	0.0	
Truck Parking 3	Default parking lot noise	PLot		14.2	0.0	
Truck parking 4	Default parking lot noise	PLot		14.2	0.0	
Receiver -126,242 Fl G Lr,lim dB(A) Leq,d 54.6 dB(A)						
Bulldozer	Default industrial noise	Area		54.6	0.0	
Parking 2	Default parking lot noise	PLot		5.9	0.0	
Parking 2	Default parking lot noise	PLot		7.7	0.0	
Truck Parking 1	Default parking lot noise	PLot		18.4	0.0	
Truck Parking 5	Default parking lot noise	PLot		9.9	0.0	
Truck parking 2	Default parking lot noise	PLot		23.7	0.0	
Truck Parking 3	Default parking lot noise	PLot		21.9	0.0	
Truck parking 4	Default parking lot noise	PLot		23.8	0.0	
Receiver -157,328 Fl G Lr,lim dB(A) Leq,d 45.1 dB(A)						
Bulldozer	Default industrial noise	Area		45.0	0.0	
Parking 2	Default parking lot noise	PLot		5.6	0.0	
Parking 2	Default parking lot noise	PLot		0.2	0.0	
Truck Parking 1	Default parking lot noise	PLot		11.9	0.0	
Truck Parking 5	Default parking lot noise	PLot		9.3	0.0	
Truck parking 2	Default parking lot noise	PLot		18.9	0.0	
Truck Parking 3	Default parking lot noise	PLot		19.1	0.0	
Truck parking 4	Default parking lot noise	PLot		19.9	0.0	
Receiver -201,247 Fl G Lr,lim dB(A) Leq,d 49.7 dB(A)						
Bulldozer	Default industrial noise	Area		49.5	0.0	
Parking 2	Default parking lot noise	PLot		12.8	0.0	
Parking 2	Default parking lot noise	PLot		15.0	0.0	
Truck Parking 1	Default parking lot noise	PLot		25.3	0.0	
Truck Parking 5	Default parking lot noise	PLot		18.2	0.0	
Truck parking 2	Default parking lot noise	PLot		32.0	0.0	
Truck Parking 3	Default parking lot noise	PLot		29.9	0.0	
Truck parking 4	Default parking lot noise	PLot		27.6	0.0	
Receiver -220,157 Fl G Lr,lim dB(A) Leq,d 50.1 dB(A)						
Bulldozer	Default industrial noise	Area		49.5	0.0	
Parking 2	Default parking lot noise	PLot		27.5	0.0	
Parking 2	Default parking lot noise	PLot		12.7	0.0	
Truck Parking 1	Default parking lot noise	PLot		22.0	0.0	
Truck Parking 5	Default parking lot noise	PLot		27.4	0.0	
Truck parking 2	Default parking lot noise	PLot		35.1	0.0	
Truck Parking 3	Default parking lot noise	PLot		35.6	0.0	

Source	Source group	Source ty	Tr. lane	Leq,d dB(A)	A dB	
Truck parking 4	Default parking lot noise	PLot		37.2	0.0	
Receiver -302,213 Fl G Lr,lim dB(A) Leq,d 42.8 dB(A)						
Bulldozer	Default industrial noise	Area		41.7	0.0	
Parking 2	Default parking lot noise	PLot		10.9	0.0	
Parking 2	Default parking lot noise	PLot		21.2	0.0	
Truck Parking 1	Default parking lot noise	PLot		31.7	0.0	
Truck Parking 5	Default parking lot noise	PLot		26.1	0.0	
Truck parking 2	Default parking lot noise	PLot		31.8	0.0	
Truck Parking 3	Default parking lot noise	PLot		24.2	0.0	
Truck parking 4	Default parking lot noise	PLot		23.2	0.0	

Great Scott Tree
Contribution spectra - Situation 1: Outdoor SP

Source	Time slice	Sum	50Hz	63Hz	80Hz	100Hz	125Hz	160Hz	200Hz	250Hz	315Hz	400Hz	500Hz	630Hz	800Hz	1kHz	1.25kHz	1.6kHz	2kHz	2.5kHz	3.15kHz	4kHz	5kHz	6.3kHz	8kHz	10kHz	12.5kHz	16kHz	20kHz
		dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)
Receiver -105,362 Fl G Lr,lim dB(A) Leq,d 39.5 dB(A)																													
Bulldozer	Leq,d	39.4	14.4	14.4	14.4	16.8	16.8	16.8	9.1	9.1	9.1	12.3	12.3	12.3	34.1	34.1	34.1	23.1	23.1	23.1	13.7	13.7	13.7	-9.2	-9.2	-9.2			
Parking 2	Leq,d	-1.4	-13.6	-13.6	-13.6	-9.9	-9.9	-9.9	-23.1	-23.1	-23.1	-20.7	-20.7	-20.7	-13.6	-13.6	-13.6	-14.6	-14.6	-14.6	-25.4	-25.4	-25.4	-58.8	-58.8	-58.8			
Parking 2	Leq,d	2.8	-10.0	-10.0	-10.0	-5.2	-5.2	-5.2	-22.9	-22.9	-22.9	-20.2	-20.2	-20.2	-9.7	-9.7	-9.7	-10.4	-10.4	-10.4	-18.8	-18.8	-18.8	-45.7	-45.7	-45.7			
Truck parking 2	Leq,d	17.5	4.0	4.0	4.0	9.4	9.4	9.4	-8.2	-8.2	-8.2	-5.4	-5.4	-5.4	5.1	5.1	5.1	5.4	5.4	5.4	-2.8	-2.8	-2.8	-26.8	-26.8	-26.8	-94.2	-94.2	-94.2
Truck parking 4	Leq,d	14.2	0.1	0.1	0.1	5.9	5.9	5.9	-11.2	-11.2	-11.2	-8.4	-8.4	-8.4	2.6	2.6	2.6	2.3	2.3	2.3	-7.1	-7.1	-7.1	-33.4	-33.4	-33.4	-99.9	-99.9	-99.9
Truck Parking 1	Leq,d	13.2	0.6	0.6	0.6	5.6	5.6	5.6	-11.3	-11.3	-11.3	-8.6	-8.6	-8.6	0.2	0.2	0.2	-0.8	-0.8	-0.8	-10.2	-10.2	-10.2	-39.8	-39.8	-39.8			
Truck Parking 3	Leq,d	14.2	-0.7	-0.7	-0.7	5.7	5.7	5.7	-11.4	-11.4	-11.4	-8.6	-8.6	-8.6	2.4	2.4	2.4	2.8	2.8	2.8	-4.2	-4.2	-4.2	-26.6	-26.6	-26.6	-88.9	-88.9	-88.9
Truck Parking 5	Leq,d	6.7	-5.0	-5.0	-5.0	-0.8	-0.8	-0.8	-14.4	-14.4	-14.4	-12.4	-12.4	-12.4	-8.6	-8.6	-8.6	-8.2	-8.2	-8.2	-18.5	-18.5	-18.5	-48.9	-48.9	-48.9			
Receiver -126,242 Fl G Lr,lim dB(A) Leq,d 54.6 dB(A)																													
Bulldozer	Leq,d	54.6	22.3	22.3	22.3	29.3	29.3	29.3	29.6	29.6	29.6	35.5	35.5	35.5	48.8	48.8	48.8	40.2	40.2	40.2	34.5	34.5	34.5	20.8	20.8	20.8			
Parking 2	Leq,d	5.9	-9.6	-9.6	-9.6	-4.8	-4.8	-4.8	-12.9	-12.9	-12.9	-11.7	-11.7	-11.7	-5.0	-5.0	-5.0	-4.4	-4.4	-4.4	-12.1	-12.1	-12.1	-35.3	-35.3	-35.3	-94.4	-94.4	-94.4
Parking 2	Leq,d	7.7	-7.8	-7.8	-7.8	-1.7	-1.7	-1.7	-12.4	-12.4	-12.4	-7.4	-7.4	-7.4	-3.8	-3.8	-3.8	-4.1	-4.1	-4.1	-11.4	-11.4	-11.4	-32.4	-32.4	-32.4	-87.3	-87.3	-87.3
Truck parking 2	Leq,d	23.7	7.6	7.6	7.6	15.0	15.0	15.0	3.4	3.4	3.4	8.4	8.4	8.4	11.6	11.6	11.6	11.4	11.4	11.4	4.8	4.8	4.8	-14.5	-14.5	-14.5	-61.9	-61.9	-61.9
Truck parking 4	Leq,d	23.8	6.3	6.3	6.3	13.2	13.2	13.2	4.0	4.0	4.0	9.2	9.2	9.2	12.5	12.5	12.5	13.1	13.1	13.1	7.2	7.2	7.2	-9.7	-9.7	-9.7	-49.1	-49.1	-49.1
Truck Parking 1	Leq,d	18.4	2.4	2.4	2.4	8.7	8.7	8.7	-1.8	-1.8	-1.8	3.2	3.2	3.2	7.3	7.3	7.3	7.1	7.1	7.1	-0.9	-0.9	-0.9	-24.8	-24.8	-24.8	-87.2	-87.2	-87.2
Truck Parking 3	Leq,d	21.9	5.0	5.0	5.0	12.5	12.5	12.5	2.0	2.0	2.0	7.2	7.2	7.2	10.1	10.1	10.1	10.3	10.3	10.3	3.9	3.9	3.9	-13.7	-13.7	-13.7	-56.1	-56.1	-56.1
Truck Parking 5	Leq,d	9.9	-4.1	-4.1	-4.1	-0.6	-0.6	-0.6	-8.7	-8.7	-8.7	-7.3	-7.3	-7.3	-2.7	-2.7	-2.7	0.1	0.1	0.1	-9.1	-9.1	-9.1	-36.3	-36.3	-36.3	-101.5	-101.5	-101.5
Receiver -157,328 Fl G Lr,lim dB(A) Leq,d 45.1 dB(A)																													
Bulldozer	Leq,d	45.0	17.8	17.8	17.8	21.7	21.7	21.7	19.7	19.7	19.7	25.3	25.3	25.3	39.6	39.6	39.6	29.1	29.1	29.1	20.5	20.5	20.5	1.7	1.7	1.7			
Parking 2	Leq,d	5.6	-11.4	-11.4	-11.4	-7.5	-7.5	-7.5	-20.2	-20.2	-20.2	-18.7	-18.7	-18.7	-4.4	-4.4	-4.4	-2.9	-2.9	-2.9	-11.4	-11.4	-11.4	-37.8	-37.8	-37.8			
Parking 2	Leq,d	0.2	-10.7	-10.7	-10.7	-6.6	-6.6	-6.6	-22.0	-22.0	-22.0	-20.3	-20.3	-20.3	-18.7	-18.7	-18.7	-18.3	-18.3	-18.3	-27.5	-27.5	-27.5	-37.2	-37.2	-37.2	-101.5	-101.5	-101.5
Truck parking 2	Leq,d	18.9	5.6	5.6	5.6	11.1	11.1	11.1	-3.8	-3.8	-3.8	-1.4	-1.4	-1.4	2.5	2.5	2.5	7.5	7.5	7.5	-0.7	-0.7	-0.7	-18.5	-18.5	-18.5	-74.2	-74.2	-74.2
Truck parking 4	Leq,d	19.9	3.2	3.2	3.2	9.4	9.4	9.4	-2.1	-2.1	-2.1	3.6	3.6	3.6	9.0	9.0	9.0	9.7	9.7	9.7	2.1	2.1	2.1	-19.5	-19.5	-19.5	-72.3	-72.3	-72.3
Truck Parking 1	Leq,d	11.9	-1.1	-1.1	-1.1	2.3	2.3	2.3	-12.6	-12.6	-12.6	-11.0	-11.0	-11.0	-2.1	-2.1	-2.1	2.3	2.3	2.3	-7.2	-7.2	-7.2	-30.4	-30.4	-30.4	-101.4	-101.4	-101.4
Truck Parking 3	Leq,d	19.1	1.8	1.8	1.8	8.6	8.6	8.6	-3.1	-3.1	-3.1	1.6	1.6	1.6	6.6	6.6	6.6	9.5	9.5	9.5	4.2	4.2	4.2	-13.0	-13.0	-13.0	-61.8	-61.8	-61.8
Truck Parking 5	Leq,d	9.3	-5.3	-5.3	-5.3	-1.7	-1.7	-1.7	-15.3	-15.3	-15.3	-13.7	-13.7	-13.7	-2.2	-2.2	-2.2	0.2	0.2	0.2	-9.4	-9.4	-9.4	-38.0	-38.0	-38.0			
Receiver -201,247 Fl G Lr,lim dB(A) Leq,d 49.7 dB(A)																													
Bulldozer	Leq,d	49.5	24.3	24.3	24.3	28.4	28.4	28.4	28.5	28.5	28.5	35.3	35.3	35.3	43.6	43.6	43.6	32.0	32.0	32.0	23.2	23.2	23.2	6.3	6.3	6.3			
Parking 2	Leq,d	12.8	-7.5	-7.5	-7.5	-2.3	-2.3	-2.3	-14.6	-14.6	-14.6	-4.5	-4.5	-4.5	3.6	3.6	3.6	3.8	3.8	3.8	-2.4	-2.4	-2.4	-20.9	-20.9	-20.9	-68.5	-68.5	-68.5
Parking 2	Leq,d	15.0	-1.6	-1.6	-1.6	5.5	5.5	5.5	-10.8	-10.8	-10.8	-1.3	-1.3	-1.3	3.5	3.5	3.5	3.9	3.9	3.9	-1.1	-1.1	-1.1	-15.4	-15.4	-15.4	-51.7	-51.7	-51.7
Truck parking 2	Leq,d	32.0	14.6	14.6	14.6	22.1	22.1	22.1	7.2	7.2	7.2	16.0	16.0	16.0	20.5	20.5	20.5	21.0	21.0	21.0	16.7	16.7	16.7	4.6	4.6	4.6	-24.3	-24.3	-24.3
Truck parking 4	Leq,d	27.6	10.0	10.0	10.0	18.0	18.0	18.0	5.6	5.6	5.6	13.6	13.6	13.6	16.0	16.0	16.0	16.1	16.1	16.1	11.3	11.3	11.3	-0.6	-0.6	-0.6	-27.7	-27.7	-27.7
Truck Parking 1	Leq,d	25.3	9.0	9.0	9.0	15.1	15.1	15.1	-1.7	-1.7	-1.7	8.1	8.1	8.1	14.4	14.4	14.4	14.8	14.8	14.8	8.9	8.9	8.9	-9.0	-9.0	-9.0	-53.9	-53.9	-53.9
Truck Parking 3	Leq,d	29.9	9.2	9.2	9.2	18.2	18.2	18.2	6.6	6.6	6.6	14.9	14.9	14.9	19.2	19.2	19.2	19.7	19.7	19.7	15.7	15.7	15.7	4.8	4.8	4.8	-21.0	-21.0	-21.0

Great Scott Tree
Contribution spectra - Situation 1: Outdoor SP

Source	Time slice	Sum	50Hz	63Hz	80Hz	100Hz	125Hz	160Hz	200Hz	250Hz	315Hz	400Hz	500Hz	630Hz	800Hz	1kHz	1.25kHz	1.6kHz	2kHz	2.5kHz	3.15kHz	4kHz	5kHz	6.3kHz	8kHz	10kHz	12.5kHz	16kHz	20kHz
		dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)
Truck Parking 5	Leq,d	18.2	2.8	2.8	2.8	8.3	8.3	8.3	-6.1	-6.1	-6.1	-0.5	-0.5	-0.5	7.5	7.5	7.5	7.4	7.4	7.4	0.9	0.9	0.9	-18.2	-18.2	-18.2	-64.7	-64.7	-64.7
Receiver -220,157 Fl G Lr,lim dB(A) Leq,d 50.1 dB(A)																													
Bulldozer	Leq,d	49.5	22.5	22.5	22.5	26.5	26.5	26.5	27.4	27.4	27.4	32.9	32.9	32.9	43.8	43.8	43.8	33.7	33.7	33.7	25.9	25.9	25.9	9.6	9.6	9.6			
Parking 2	Leq,d	27.5	6.4	6.4	6.4	16.6	16.6	16.6	6.5	6.5	6.5	11.2	11.2	11.2	15.6	15.6	15.6	17.7	17.7	17.7	13.8	13.8	13.8	3.3	3.3	3.3	-21.2	-21.2	-21.2
Parking 2	Leq,d	12.7	-4.3	-4.3	-4.3	2.7	2.7	2.7	-10.2	-10.2	-10.2	-6.1	-6.1	-6.1	0.2	0.2	0.2	2.0	2.0	2.0	0.2	0.2	0.2	-16.3	-16.3	-16.3	-54.4	-54.4	-54.4
Truck parking 2	Leq,d	35.1	16.2	16.2	16.2	26.2	26.2	26.2	12.8	12.8	12.8	17.6	17.6	17.6	21.9	21.9	21.9	23.9	23.9	23.9	21.3	21.3	21.3	10.1	10.1	10.1	-15.3	-15.3	-15.3
Truck parking 4	Leq,d	37.2	16.9	16.9	16.9	27.2	27.2	27.2	15.8	15.8	15.8	20.4	20.4	20.4	24.8	24.8	24.8	26.9	26.9	26.9	23.2	23.2	23.2	13.5	13.5	13.5	-9.1	-9.1	-9.1
Truck Parking 1	Leq,d	22.0	5.4	5.4	5.4	10.4	10.4	10.4	0.5	0.5	0.5	3.3	3.3	3.3	9.8	9.8	9.8	12.8	12.8	12.8	7.7	7.7	7.7	-10.1	-10.1	-10.1	-54.1	-54.1	-54.1
Truck Parking 3	Leq,d	35.6	15.8	15.8	15.8	26.3	26.3	26.3	13.4	13.4	13.4	17.9	17.9	17.9	22.1	22.1	22.1	25.2	25.2	25.2	21.6	21.6	21.6	11.2	11.2	11.2	-12.8	-12.8	-12.8
Truck Parking 5	Leq,d	27.4	8.1	8.1	8.1	15.3	15.3	15.3	4.6	4.6	4.6	10.6	10.6	10.6	15.9	15.9	15.9	18.1	18.1	18.1	13.3	13.3	13.3	-0.1	-0.1	-0.1	-31.6	-31.6	-31.6
Receiver -302,213 Fl G Lr,lim dB(A) Leq,d 42.8 dB(A)																													
Bulldozer	Leq,d	41.7	16.5	16.5	16.5	19.1	19.1	19.1	16.4	16.4	16.4	23.0	23.0	23.0	36.1	36.1	36.1	26.7	26.7	26.7	16.3	16.3	16.3	-8.1	-8.1	-8.1			
Parking 2	Leq,d	10.9	-3.8	-3.8	-3.8	2.1	2.1	2.1	-10.6	-10.6	-10.6	-4.3	-4.3	-4.3	-2.0	-2.0	-2.0	-1.3	-1.3	-1.3	-6.8	-6.8	-6.8	-21.0	-21.0	-21.0	-53.8	-53.8	-53.8
Parking 2	Leq,d	21.2	1.0	1.0	1.0	9.6	9.6	9.6	1.6	1.6	1.6	6.9	6.9	6.9	8.8	8.8	8.8	10.4	10.4	10.4	8.6	8.6	8.6	-0.8	-0.8	-0.8	-24.2	-24.2	-24.2
Truck parking 2	Leq,d	31.8	12.2	12.2	12.2	20.8	20.8	20.8	11.5	11.5	11.5	17.7	17.7	17.7	19.9	19.9	19.9	21.1	21.1	21.1	17.9	17.9	17.9	8.5	8.5	8.5	-17.1	-17.1	-17.1
Truck parking 4	Leq,d	23.2	4.5	4.5	4.5	11.9	11.9	11.9	0.1	0.1	0.1	7.3	7.3	7.3	12.2	12.2	12.2	13.5	13.5	13.5	8.2	8.2	8.2	-7.3	-7.3	-7.3	-45.5	-45.5	-45.5
Truck Parking 1	Leq,d	31.7	12.4	12.4	12.4	21.0	21.0	21.0	12.0	12.0	12.0	17.5	17.5	17.5	19.5	19.5	19.5	20.8	20.8	20.8	18.0	18.0	18.0	8.5	8.5	8.5	-15.4	-15.4	-15.4
Truck Parking 3	Leq,d	24.2	6.0	6.0	6.0	13.9	13.9	13.9	2.9	2.9	2.9	9.3	9.3	9.3	12.6	12.6	12.6	13.5	13.5	13.5	8.9	8.9	8.9	-3.8	-3.8	-3.8	-34.1	-34.1	-34.1
Truck Parking 5	Leq,d	26.1	7.1	7.1	7.1	15.5	15.5	15.5	5.3	5.3	5.3	11.0	11.0	11.0	13.9	13.9	13.9	15.9	15.9	15.9	11.3	11.3	11.3	-0.9	-0.9	-0.9	-28.4	-28.4	-28.4

Great Scott Tree
Contribution spectra - 002 - Great Scott Tree - Night: Outdoor SP

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Time slice	Sum	50Hz	63Hz	80Hz	100Hz	125Hz	160Hz	200Hz	250Hz	315Hz	400Hz	500Hz	630Hz	800Hz	1kHz	1.25kHz	1.6kHz	2kHz	2.5kHz	3.15kHz	4kHz	5kHz	6.3kHz	8kHz	10kHz	12.5kHz	16kHz	20kHz
	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)
Receiver R1 Fl G Lr,lim dB(A) Leq,d 22.8 dB(A)																												
Leq,d Leq,d	22.8	4.9	4.9	4.9	12.1	12.1	12.1	2.5	2.5	2.5	8.5	8.5	8.5	11.4	11.4	11.4	12.4	12.4	12.4	5.9	5.9	5.9	-14.2	-14.2	-14.2	-58.3	-58.3	-58.3
Receiver R2 Fl G Lr,lim dB(A) Leq,d 35.2 dB(A)																												
Leq,d Leq,d	35.2	13.4	13.4	13.4	24.0	24.0	24.0	15.5	15.5	15.5	21.3	21.3	21.3	23.7	23.7	23.7	24.8	24.8	24.8	21.0	21.0	21.0	11.5	11.5	11.5	-8.3	-8.3	-8.3
Receiver R3 Fl G Lr,lim dB(A) Leq,d 29.2 dB(A)																												
Leq,d Leq,d	29.2	10.4	10.4	10.4	19.5	19.5	19.5	6.7	6.7	6.7	13.3	13.3	13.3	17.7	17.7	17.7	18.6	18.6	18.6	13.0	13.0	13.0	-2.5	-2.5	-2.5	-36.2	-36.2	-36.2
Receiver R4 Fl G Lr,lim dB(A) Leq,d 35.1 dB(A)																												
Leq,d Leq,d	35.1	15.9	15.9	15.9	25.1	25.1	25.1	13.4	13.4	13.4	19.7	19.7	19.7	23.5	23.5	23.5	24.4	24.4	24.4	19.9	19.9	19.9	8.2	8.2	8.2	-17.6	-17.6	-17.6
Receiver R5 Fl G Lr,lim dB(A) Leq,d 49.6 dB(A)																												
Leq,d Leq,d	49.6	30.0	30.0	30.0	39.8	39.8	39.8	31.4	31.4	31.4	36.2	36.2	36.2	37.2	37.2	37.2	37.7	37.7	37.7	34.7	34.7	34.7	27.7	27.7	27.7	13.4	13.4	13.4
Receiver R6 Fl G Lr,lim dB(A) Leq,d 35.3 dB(A)																												
Leq,d Leq,d	35.3	16.4	16.4	16.4	25.5	25.5	25.5	13.0	13.0	13.0	19.8	19.8	19.8	23.7	23.7	23.7	24.4	24.4	24.4	19.7	19.7	19.7	7.3	7.3	7.3	-21.4	-21.4	-21.4

Great Scott Tree
Contribution level - 002 - Great Scott Tree - Night: Outdoor SP

Source group	Source ty	Tr. lane	Leq,d dB(A)	A dB	
Receiver R1 Fl G Lr,lim dB(A) Leq,d 22.8 dB(A)					
Default parking lot noise	PLot		22.8	0.0	
Receiver R2 Fl G Lr,lim dB(A) Leq,d 35.2 dB(A)					
Default parking lot noise	PLot		35.2	0.0	
Receiver R3 Fl G Lr,lim dB(A) Leq,d 29.2 dB(A)					
Default parking lot noise	PLot		29.2	0.0	
Receiver R4 Fl G Lr,lim dB(A) Leq,d 35.1 dB(A)					
Default parking lot noise	PLot		35.1	0.0	
Receiver R5 Fl G Lr,lim dB(A) Leq,d 49.6 dB(A)					
Default parking lot noise	PLot		49.6	0.0	
Receiver R6 Fl G Lr,lim dB(A) Leq,d 35.3 dB(A)					
Default parking lot noise	PLot		35.3	0.0	

Great Scott Tree

Octave spectra of the sources in dB(A) - 002 - Great Scott Tree - Night: Outdoor SP

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Name	Source type	I or A m,m²	Li dB(A)	Rw dB	L'w dB(A)	Lw dB(A)	KI dB	KT dB	LwMax dB(A)	DO-Wall dB	Day histogram	Emission spectrum	63Hz dB(A)	125Hz dB(A)	250Hz dB(A)	500Hz dB(A)	1kHz dB(A)	2kHz dB(A)	4kHz dB(A)	8kHz dB(A)	16kHz dB(A)
Auto Parking	PLot	4815.24			50.3	87.2	0.0	0.0		0	50	Typical spectrum	70.5	82.1	74.6	79.1	79.2	79.6	76.9	70.7	57.9

Appendix D:

Construction Input

Activity	L_{eq} at 123 feet dBA	L_{Max} at 123 feet dBA
Grading	77	79
Building Construction	73	74
Paving	74	77

Equipment Summary	Reference (dBA) 50 ft Lmax
Rock Drills	96
Jack Hammers	82
Pneumatic Tools	85
Pavers	80
Dozers	85
Scrappers	87
Haul Trucks	88
Cranes	82
Portable Generators	80
Rollers	80
Tractors	80
Front-End Loaders	86
Hydraulic Excavators	86
Graders	86
Air Compressors	86
Trucks	86

Grading

Noise Level Calculation Prior to Implementation of Noise Attenuation Requirements

No.	Equipment Description	Reference (dBA) 50 ft Lmax	Quantity	Usage Factor^1	Distance to Receptor (ft)	Ground Effect	Shielding (dBA)	Calculated (dBA) Lmax	Calculated (dBA) Leq	Energy
1	Grader	86	1	40	123	0.5	0	76.2	72.2	16777305.9
2	Dozer	85	1	40	123	0.5	0	75.2	71.2	13326687.8
3	Excavator	86	1	40	123	0.5	0	76.2	72.2	16777305.9
4	Tractor/Backhoe	80	1	40	123	0.5	0	70.2	66.2	4214268.71
							Lmax*	**79**	**Leq**	**77**
							Lw	**110**	**Lw**	**109**

Source: MD Acoustics, October 2020.

1- Percentage of time that a piece of equipment is operating at full power.

dBA – A-weighted Decibels

Lmax- Maximum Level

Leq- Equivalent Level

Feet	Meters	Ground Effect	No Shielding Leq dBA	1 dBA Shielding Leq dBA	2 dBA Shielding Leq dBA	3 dBA Shielding Leq dBA	4 dBA Shielding Leq dBA	5 dBA Shielding Leq dBA	6 dBA Shielding Leq dBA	7 dBA Shielding Leq dBA	8 dBA Shielding Leq dBA	9 dBA Shielding Leq dBA	10 dBA Shielding Leq dBA	11 dBA Shielding LeqdBA	12 dBA Shielding Leq dBA	13 dBA Shielding Leq dBA	14 dBA Shielding Leq dBA	15 dBA Shielding Leq dBA
50	**15.2**	**0.5**	**77**	**76**	**75**	**74**	**73**	**72**	**71**	**70**	**69**	**68**	**67**	**66**	**65**	**64**	**63**	**62**
60	18.3	0.5	75	74	73	72	71	70	69	68	67	66	65	64	63	62	61	60
70	21.3	0.5	73	72	71	70	69	68	67	66	65	64	63	62	61	60	59	58
80	24.4	0.5	72	71	70	69	68	67	66	65	64	63	62	61	60	59	58	57
90	27.4	0.5	71	70	69	68	67	66	65	64	63	62	61	60	59	58	57	56
100	30.5	0.5	70	69	68	67	66	65	64	63	62	61	60	59	58	57	56	55
110	33.5	0.5	69	68	67	66	65	64	63	62	61	60	59	58	57	56	55	54
120	36.6	0.5	68	67	66	65	64	63	62	61	60	59	58	57	56	55	54	53
130	39.6	0.5	67	66	65	64	63	62	61	60	59	58	57	56	55	54	53	52
140	42.7	0.5	66	65	64	63	62	61	60	59	58	57	56	55	54	53	52	51
150	45.7	0.5	65	64	63	62	61	60	59	58	57	56	55	54	53	52	51	50
160	48.8	0.5	64	63	62	61	60	59	58	57	56	55	54	53	52	51	50	49
170	51.8	0.5	64	63	62	61	60	59	58	57	56	55	54	53	52	51	50	49
180	54.9	0.5	63	62	61	60	59	58	57	56	55	54	53	52	51	50	49	48
190	57.9	0.5	63	62	61	60	59	58	57	56	55	54	53	52	51	50	49	48
200	61.0	0.5	62	61	60	59	58	57	56	55	54	53	52	51	50	49	48	47
210	64.0	0.5	62	61	60	59	58	57	56	55	54	53	52	51	50	49	48	47
220	67.1	0.5	61	60	59	58	57	56	55	54	53	52	51	50	49	48	47	46
230	70.1	0.5	61	60	59	58	57	56	55	54	53	52	51	50	49	48	47	46
240	73.1	0.5	60	59	58	57	56	55	54	53	52	51	50	49	48	47	46	45
250	76.2	0.5	60	59	58	57	56	55	54	53	52	51	50	49	48	47	46	45
260	79.2	0.5	59	58	57	56	55	54	53	52	51	50	49	48	47	46	45	44
270	82.3	0.5	59	58	57	56	55	54	53	52	51	50	49	48	47	46	45	44
280	85.3	0.5	58	57	56	55	54	53	52	51	50	49	48	47	46	45	44	43
290	88.4	0.5	58	57	56	55	54	53	52	51	50	49	48	47	46	45	44	43
300	91.4	0.5	58	57	56	55	54	53	52	51	50	49	48	47	46	45	44	43
310	94.5	0.5	57	56	55	54	53	52	51	50	49	48	47	46	45	44	43	42
320	97.5	0.5	57	56	55	54	53	52	51	50	49	48	47	46	45	44	43	42
330	100.6	0.5	57	56	55	54	53	52	51	50	49	48	47	46	45	44	43	42
340	103.6	0.5	56	55	54	53	52	51	50	49	48	47	46	45	44	43	42	41
350	106.7	0.5	56	55	54	53	52	51	50	49	48	47	46	45	44	43	42	41
360	109.7	0.5	56	55	54	53	52	51	50	49	48	47	46	45	44	43	42	41
370	112.8	0.5	55	54	53	52	51	50	49	48	47	46	45	44	43	42	41	40

Building Construction

		Noise Level Calculation Prior to Implementation of Noise Attenuation Requirements								
No.	Equipment Description	Reference (dBA) 50 ft Lmax	Quantity	Usage Factor[1]	Distance to Receptor (ft)	Ground Effect	Shielding (dBA)	Calculated (dBA) Lmax	Leq	Energy
1	Cranes	82	1	40	123	0.5	0	72.2	68.2	6679165.79
2	Forklift/Tractor	80	1	40	123	0.5	0	70.2	66.2	4214268.71
3	Generator	80	1	40	123	0.5	0	70.2	66.2	4214268.71
4	Tractor/Backhoe	80	1	40	123	0.5	0	70.2	66.2	4214268.71
							Lmax*	**74**	**Leq**	**73**
							Lw	**106**	**Lw**	**105**

Source: MD Acoustics, July 2018.

1- Percentage of time that a piece of equipment is operating at full power.

dBA – A-weighted Decibels

Lmax- Maximum Level

Leq- Equivalent Level

Feet	Meters	Ground Effect	No Shielding Leq dBA	1 dBA Shielding Leq dBA	2 dBA Shielding Leq dBA	3 dBA Shielding Leq dBA	4 dBA Shielding Leq dBA	5 dBA Shielding Leq dBA	6 dBA Shielding Leq dBA	7 dBA Shielding Leq dBA	8 dBA Shielding Leq dBA	9 dBA Shielding Leq dBA	10 dBA Shielding Leq dBA	11 dBA Shielding LeqdBA	12 dBA Shielding Leq dBA	13 dBA Shielding Leq dBA	14 dBA Shielding Leq dBA	15 dBA Shielding Leq dBA
50	**15.2**	**0.5**	**73**	**72**	**71**	**70**	**69**	**68**	**67**	**66**	**65**	**64**	**63**	**62**	**61**	**60**	**59**	**58**
60	18.3	0.5	71	70	69	68	67	66	65	64	63	62	61	60	59	58	57	56
70	21.3	0.5	69	68	67	66	65	64	63	62	61	60	59	58	57	56	55	54
80	24.4	0.5	68	67	66	65	64	63	62	61	60	59	58	57	56	55	54	53
90	27.4	0.5	66	65	64	63	62	61	60	59	58	57	56	55	54	53	52	51
100	30.5	0.5	65	64	63	62	61	60	59	58	57	56	55	54	53	52	51	50
110	33.5	0.5	64	63	62	61	60	59	58	57	56	55	54	53	52	51	50	49
120	36.6	0.5	63	62	61	60	59	58	57	56	55	54	53	52	51	50	49	48
130	39.6	0.5	62	61	60	59	58	57	56	55	54	53	52	51	50	49	48	47
140	42.7	0.5	62	61	60	59	58	57	56	55	54	53	52	51	50	49	48	47
150	45.7	0.5	61	60	59	58	57	56	55	54	53	52	51	50	49	48	47	46
160	48.8	0.5	60	59	58	57	56	55	54	53	52	51	50	49	48	47	46	45
170	51.8	0.5	60	59	58	57	56	55	54	53	52	51	50	49	48	47	46	45
180	54.9	0.5	59	58	57	56	55	54	53	52	51	50	49	48	47	46	45	44
190	57.9	0.5	58	57	56	55	54	53	52	51	50	49	48	47	46	45	44	43
200	61.0	0.5	58	57	56	55	54	53	52	51	50	49	48	47	46	45	44	43
210	64.0	0.5	57	56	55	54	53	52	51	50	49	48	47	46	45	44	43	42
220	67.1	0.5	57	56	55	54	53	52	51	50	49	48	47	46	45	44	43	42
230	70.1	0.5	56	55	54	53	52	51	50	49	48	47	46	45	44	43	42	41
240	73.1	0.5	56	55	54	53	52	51	50	49	48	47	46	45	44	43	42	41
250	76.2	0.5	55	54	53	52	51	50	49	48	47	46	45	44	43	42	41	40
260	79.2	0.5	55	54	53	52	51	50	49	48	47	46	45	44	43	42	41	40
270	82.3	0.5	55	54	53	52	51	50	49	48	47	46	45	44	43	42	41	40
280	85.3	0.5	54	53	52	51	50	49	48	47	46	45	44	43	42	41	40	39
290	88.4	0.5	54	53	52	51	50	49	48	47	46	45	44	43	42	41	40	39
300	91.4	0.5	53	52	51	50	49	48	47	46	45	44	43	42	41	40	39	38
310	94.5	0.5	53	52	51	50	49	48	47	46	45	44	43	42	41	40	39	38
320	97.5	0.5	53	52	51	50	49	48	47	46	45	44	43	42	41	40	39	38
330	100.6	0.5	52	51	50	49	48	47	46	45	44	43	42	41	40	39	38	37
340	103.6	0.5	52	51	50	49	48	47	46	45	44	43	42	41	40	39	38	37
350	106.7	0.5	52	51	50	49	48	47	46	45	44	43	42	41	40	39	38	37
360	109.7	0.5	51	50	49	48	47	46	45	44	43	42	41	40	39	38	37	36
370	112.8	0.5	51	50	49	48	47	46	45	44	43	42	41	40	39	38	37	36

Paving

		Noise Level Calculation Prior to Implementation of Noise Attenuation Requirements								
No.	Equipment Description	Reference (dBA) 50 ft Lmax	Quantity	Usage Factor[1]	Distance to Receptor (ft)	Ground Effect	Shielding (dBA)	Calculated (dBA) Lmax	Leq	Energy
1	Pavers	86	1	40	123	0.5	0	76.2	72.2	16777305.9
2	Rollers	80	1	40	123	0.5	0	70.2	66.2	4214268.71
3	Paving Equipment	80	1	40	123	0.5	0	70.2	66.2	4214268.71
							Lmax*	77	Leq	74
							Lw	109	Lw	106

Source: MD Acoustics, July 2018.

1- Percentage of time that a piece of equipment is operating at full power.

dBA – A-weighted Decibels

Lmax- Maximum Level

Leq- Equivalent Level

Feet	Meters	Ground Effect	No Shielding Leq dBA	1 dBA Shielding Leq dBA	2 dBA Shielding Leq dBA	3 dBA Shielding Leq dBA	4 dBA Shielding Leq dBA	5 dBA Shielding Leq dBA	6 dBA Shielding Leq dBA	7 dBA Shielding Leq dBA	8 dBA Shielding Leq dBA	9 dBA Shielding Leq dBA	10 dBA Shielding Leq dBA	11 dBA Shielding LeqdBA	12 dBA Shielding Leq dBA	13 dBA Shielding Leq dBA	14 dBA Shielding Leq dBA	15 dBA Shielding Leq dBA
50	**15.2**	**0.5**	**74**	**73**	**72**	**71**	**70**	**69**	**68**	**67**	**66**	**65**	**64**	**63**	**62**	**61**	**60**	**59**
60	18.3	0.5	72	71	70	69	68	67	66	65	64	63	62	61	60	59	58	57
70	21.3	0.5	70	69	68	67	66	65	64	63	62	61	60	59	58	57	56	55
80	24.4	0.5	69	68	67	66	65	64	63	62	61	60	59	58	57	56	55	54
90	27.4	0.5	68	67	66	65	64	63	62	61	60	59	58	57	56	55	54	53
100	30.5	0.5	66	65	64	63	62	61	60	59	58	57	56	55	54	53	52	51
110	33.5	0.5	65	64	63	62	61	60	59	58	57	56	55	54	53	52	51	50
120	36.6	0.5	65	64	63	62	61	60	59	58	57	56	55	54	53	52	51	50
130	39.6	0.5	64	63	62	61	60	59	58	57	56	55	54	53	52	51	50	49
140	42.7	0.5	63	62	61	60	59	58	57	56	55	54	53	52	51	50	49	48
150	45.7	0.5	62	61	60	59	58	57	56	55	54	53	52	51	50	49	48	47
160	48.8	0.5	61	60	59	58	57	56	55	54	53	52	51	50	49	48	47	46
170	51.8	0.5	61	60	59	58	57	56	55	54	53	52	51	50	49	48	47	46
180	54.9	0.5	60	59	58	57	56	55	54	53	52	51	50	49	48	47	46	45
190	57.9	0.5	60	59	58	57	56	55	54	53	52	51	50	49	48	47	46	45
200	61.0	0.5	59	58	57	56	55	54	53	52	51	50	49	48	47	46	45	44
210	64.0	0.5	58	57	56	55	54	53	52	51	50	49	48	47	46	45	44	43
220	67.1	0.5	58	57	56	55	54	53	52	51	50	49	48	47	46	45	44	43
230	70.1	0.5	57	56	55	54	53	52	51	50	49	48	47	46	45	44	43	42
240	73.1	0.5	57	56	55	54	53	52	51	50	49	48	47	46	45	44	43	42
250	76.2	0.5	57	56	55	54	53	52	51	50	49	48	47	46	45	44	43	42
260	79.2	0.5	56	55	54	53	52	51	50	49	48	47	46	45	44	43	42	41
270	82.3	0.5	56	55	54	53	52	51	50	49	48	47	46	45	44	43	42	41
280	85.3	0.5	55	54	53	52	51	50	49	48	47	46	45	44	43	42	41	40
290	88.4	0.5	55	54	53	52	51	50	49	48	47	46	45	44	43	42	41	40
300	91.4	0.5	55	54	53	52	51	50	49	48	47	46	45	44	43	42	41	40
310	94.5	0.5	54	53	52	51	50	49	48	47	46	45	44	43	42	41	40	39
320	97.5	0.5	54	53	52	51	50	49	48	47	46	45	44	43	42	41	40	39
330	100.6	0.5	54	53	52	51	50	49	48	47	46	45	44	43	42	41	40	39
340	103.6	0.5	53	52	51	50	49	48	47	46	45	44	43	42	41	40	39	38
350	106.7	0.5	53	52	51	50	49	48	47	46	45	44	43	42	41	40	39	38
360	109.7	0.5	53	52	51	50	49	48	47	46	45	44	43	42	41	40	39	38
370	112.8	0.5	52	51	50	49	48	47	46	45	44	43	42	41	40	39	38	37

VIBRATION LEVEL IMPACT

Project: Great Scott Tree Service
Date: 10/30/20
Source: Large Bulldozer
Scenario: Unmitigated
Location: Project Site
Address:
PPV = PPVref(25/D)^n (in/sec)

DATA INPUT

Equipment = Type	2	Large Bulldozer	INPUT SECTION IN BLUE
PPVref =	0.089	Reference PPV (in/sec) at 25 ft.	
D =	33.00	Distance from Equipment to Receiver (ft)	
n =	1.10	Vibration attenuation rate through the ground	

Note: Based on reference equations from Vibration Guidance Manual, California Department of Transportation, 2006, pgs 38-43.

DATA OUT RESULTS

PPV =	**0.066**	IN/SEC	OUTPUT IN RED