Appendix I

Noise Report

DUDEK

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MEMORANDUM

To:	Greg L. Waite, Sunrise Specific Plan Project Owner, LLC
From:	Christopher Barnobi, Environmental Acoustician Jonathan Leech, Acoustics and Air Resources Manager
Subject:	Noise Analysis for Sunrise Specific Plan Project, San Marcos
Date:	August 26, 2019
Attachments:	Figure 1, Project Location Figure 2, Site Plan Figure 3, Noise Measurement Locations Figure 4, Noise Modeling Locations Attachment 1, Acronyms and Definitions Attachment 2, Field Noise Measurement Data Sheets Attachment 3, RCNM Model Input and Output Sheets Attachment 4, Rock Crusher Noise Calculations

Dudek has completed this acoustical assessment for the Sunrise Project (project) located in San Marcos, California. The assessment addresses potential noise / vibration impacts from construction, traffic noise impacts and stationary sources. Traffic noise modeling is based upon the data from the Traffic Impact Analysis prepared by Linscott, Law & Greenspan (LLG 2019), available under separate cover.

Residential land uses are located immediately north and west of the project site. Per CEQA significance criteria, these land uses could be impacted by noise from project construction and project-related traffic. Additionally, and for purposes of information as it does not represent an impact under the same CEQA criteria, proposed future residences could be adversely effected by existing and future traffic noise as well as from nearby off-site commercial and light industrial operations.

Future residential lots on the project site have modeled traffic noise levels within the acceptable range of up to 65 dBA CNEL(A-weighted decibels, using the Community Noise Equivalent Level metric)[1] for multifamily residences in the future traffic scenarios (Year 2035 with and without the project). Similarly, interior noise levels would be in compliance with the City and state of California noise standard of 45 dBA CNEL with standard building construction. Modeled future

[1] A list of acronyms and definitions are provided in Attachment 1

noise levels for the existing residential areas in the project vicinity would remain unchanged due to the addition of project traffic.

INTRODUCTION

This memo describes the existing noise setting on and near the project site based on short term noise measurements and traffic noise modeling. The memo further evaluates future noise exposure levels at the proposed project and analyzes whether these would exceed applicable standards. The noise analysis also includes impacts resulting from off-site traffic noise.

Project Description

The proposed project is located at the southeastern limits of the City of San Marcos (City), approximately 0.3 miles south of State Route-78 and 1.4 miles west of Interstate-15 (Figure 1). The project site is currently within portions of two jurisdictions: the City (APN 228-312-09-00, approximately 3.6 acres) and the County of San Diego (APN 228-312-10-00, approximately 10.8 acres); however the entirety of the project resides within the City's General Plan Sphere of Influence. As part of the proposed project, the project site would be annexed from the County of San Diego by the City.

The project site is bounded by low density residential manufactured homes to the north and west. To the east and south of the project site is a light industrial business park with a variety of businesses located within the City of Escondido. An existing vacant lot is located within the City of Escondido (zoned as Planned Development – Industrial) adjacent the proposed project site access driveways, east/northeast of the project site. The proposed driveway providing project site access from Meyers Avenue is located off-site within the City of Escondido. To the southwest, within the County of San Diego are semi-rural residential lands with associated agricultural and equestrian uses.

The proposed project would allow for the development of approximately 192 multi-family residential dwelling units, resulting in a gross density of approximately 13.3 dwelling units per acre. The proposed residential units would be comprised of 100 two-story townhomes and 92 three-story townhomes. The proposed project also includes open space, active recreational areas, bio-retention areas, circulation improvements, and a public services and facilities plan. The proposed project would require several off-site improvements including storm drainage facilities, roadway network construction, and sewer improvements.

Discretionary actions (described in detail in Section 2.0, Project Description) would include the previously mentioned annexation, a rezone, General Plan Amendment, Multi-Family Site Development Plan, Tentative Subdivision Map, Specific Plan, Conditional Use Permit, and grading variance.

ENVIRONMENTAL SETTING

Existing Noise Receptors

Residential land uses exist to the west, southwest, and south. To the north and east the site is bounded by commercial land uses including a storage facility and offices and light industrial facilities (Figure 2).

Existing Ambient Noise Levels

Dudek visited the proposed project site on June 19, 2018 to measure ambient sound levels in the vicinity. Figure 3 shows the measurement locations marked on a site map.

Short-term (ST#) measurements were conducted with a calibrated Rion NL-52 sound level meter placed on a tripod with the microphone positioned approximately 5 feet above the ground. The short-term measurements were 8 to 25 minutes in duration. Table 1 presents the results of the short-term noise measurements. Additional measurement details can be found in Attachment 2, Field Noise Measurement Data Sheets.

Table 1
Short-Term Sound Level Measurements

Site / Land Use	Description/ Noise Sources Observed	Date/Time	L_{eq}[1]	L_{max}	L_{min}	L_{90}	L_{50}	L_{10}	Cars	MT[2]	HT[3]	Motor-cycles	B/M[4]
ST1	Commercial land uses (zoned as General Industrial M-2) north of project site within City of Escondido / Traffic, Birds, distant Aircraft, distant Traffic, 15 feet from the edge of the road	2018-06-19, 11:30 AM to 11:40 AM	71	87	53	55	65	74	110	2	1	1	1
ST2	Residential land uses (zoned as Mobile Home Park, R-MHP) west of project site within City of San Marcos / Distant traffic, Birds, distant Aircraft, distant Conversations Yelling, distant Traffic	2018-06-19, 11:18 AM to 11:33 AM	48	61	43	44	45	49	0	0	0	0	0

Table 1
Short-Term Sound Level Measurements

Site / Land Use	Description/ Noise Sources Observed	Date/Time	L_{eq}[1]	L_{max}	L_{min}	L_{90}	L_{50}	L_{10}	Cars	MT[2]	HT[3]	Motor-cycles	B/M[4]
ST3	Commercial land uses (zoned as General Industrial M-2) east of project site within City of Escondido / Traffic, Birds, distant Aircraft, distant Conversations Yelling, distant Traffic, rustling Leaves, 15 feet from the edge of the road	2018-06-19, 11:50 AM to 12:15 PM	62	77	50	52	54	67	92	6	6	3	3
ST4	Residential land uses (zoned as Residential Low (Planned Residential Development), R-1-10 (PRD)) northwest of project site within City of San Marcos / Traffic, 100 feet from the edge of the road	2018-06-19, 11:01 AM to 11:09 AM	71	79	66	68	70	73	866	28	22	0	0

Notes:
1 Equivalent Continuous Sound Level (Time-Average Sound Level)
2 Medium Trucks
3 Heavy Trucks
4 Buses/Motorcycles
* Conditions: Temperature: 70° Fahrenheit, clear sky, 5 miles-per-hour light/gusty southwest wind
Source: Attachment 2

The noise levels identified in Table 1 indicate the general noise exposure in the project area; noise levels at specific locations vary depending on proximity to roads and other noise sources.

REGULATORY CONTEXT

Federal

The United States Environmental Protection Agency (EPA) has set forth guidelines regarding noise levels identified as "requisite to protect public health and welfare related to noise" in its document entitled *Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety*. This document provides 24-hour exposure limits to protect against hearing loss as 70 dB $L_{eq\ (24\ hrs)}$, and also specifies indoor residential activity not be exposed to greater than a day-night noise level (L_{dn}) of 45 dBA (EPA 1974).

In order to determine a significant increase in noise exposure from the existing conditions to existing plus project condition or cumulative to cumulative plus project, the values in Table 2 are used as recommendations based on studies by the Federal Interagency Committee on Noise (FICON 2000). The FICON studies assessed the annoyance effects of changes in ambient noise levels resulting from aircraft operations. The FICON findings provide some guidance as to the significance of changes in ambient noise levels due to transportation noise sources. The FICON recommendations are based on studies that relate aircraft and traffic noise levels to the percentage of persons highly annoyed by the noise. Annoyance is a summary measure of the general adverse reaction of people to noise that interferes with speech and conversation, sleep, or the desire for a tranquil environment.

The rationale for the FICON recommendations is that it is possible to consistently describe the annoyance of people exposed to transportation noise in terms of L_{dn}. The changes in noise exposure relative to existing noise levels, as shown in Table 2, are considered to be changes that are sufficient to cause annoyance and potentially to interfere with normal activities at sensitive land uses. Although the FICON recommendations were specifically developed to address aircraft noise impacts, they are used in this analysis for traffic noise described in terms of L_{dn}. The FICON recommendations are not applicable to temporary increases in noise such as from construction activities; noise from construction are regulated by local municipal code standards, as detailed below. Similarly, noise from onsite stationary sources is regulated by local municipal code standards.

As shown in Table 2, an increase in noise from similar sources of 5 dBA or more would be noticeable where the ambient level is less than 60 dBA. Where the ambient level is between 60 and 65 dBA, an increase in noise of 3 dBA or more would be noticeable, and an increase of 1.5 dBA or more would be noticeable where the ambient noise level exceeds 65 dBA L_{dn}. The rationale for the criteria shown in Table 2 is that, as ambient noise levels increase, a smaller increase in noise resulting from a project would be noticeable.

Table 2
Significance of Changes in Noise Exposure

Ambient Noise Level without Project	Increase Required for Significant Impact
< 60 dB	+5.0 dB or more
60–65 dB	+3.0 dB or more
> 65 dB	+1.5 dB or more

Source: FICON 2000

Federal Transit Administration (FTA) and Federal Railroad Administration (FRA) Standards

Although the FTA standards are intended for federally funded mass transit projects, the impact assessment procedures and criteria included in the Federal Transit Administration (FTA) Transit Noise and Vibration Impact Assessment Manual (FTA 2018) are routinely used for projects evaluated by local jurisdictions. The FTA and Federal Railroad Administration (FRA) have published guidelines for assessing the impacts of groundborne vibration associated with rail projects, which have been applied by other jurisdictions to other types of projects as shown above. Table 3 includes the FTA construction vibration damage criteria.

Table 3
FTA Construction Vibration Damage Criteria

Building Category	Peak Particle Velocity (PPV) (in/sec)	Approximate L_v *
I. Reinforced-concrete, steel or timber (no plaster)	0.5	102
II. Engineered concrete and masonry (no plaster)	0.3	98
III. Non-engineered timber and masonry buildings	0.2	94
IV. Buildings extremely susceptible to vibration damage	0.12	90
*Root mean square (RMS) velocity in decibels (VdB) re 1 micro-inch/second		

Source: FTA 2018

State

Sections 46000 through 46080 of the California Health and Safety Code, known as the California Noise Control Act of 1973, declares that excessive noise is a serious hazard to the public health and welfare and that exposure to certain levels of noise can result in physiological, psychological, and economic damage. It also identifies a continuous and increasing bombardment of noise in the urban, suburban, and rural areas. The California Noise Control Act declares that the State of California has a responsibility to protect the health and welfare of its citizens by the control, prevention, and abatement of noise. It is the policy of the State to provide an environment for all Californians free from noise that jeopardizes their health or welfare.

In 1974, the California Commission on Housing and Community Development adopted noise insulation standards for hotels, motels, dormitories, and multi-family residential buildings (Title 24, Part 2, California Code of Regulations). Title 24 establishes standards for interior room noise (attributable to outside noise sources). The regulations also specify that acoustical studies must be prepared whenever a multi-family residential building or structure is proposed to be located near an existing or adopted freeway route, expressway, parkway, major street, thoroughfare, rail line, rapid transit line, or industrial noise source, and where such noise source or sources create an

exterior CNEL (or L_{dn}) of 60 dBA or greater. Such acoustical analysis must demonstrate that the residence has been designed to limit intruding noise to an interior CNEL (or L_{dn}) of at least 45 dBA [California's Title 24 Noise Standards, Chap. 2-35].

Because blasting would be used to fracture rock on-site for further size reductions, State blasting standards would apply. These standards are found in the California Code of Regulations, Title 8, Subchapter 7 (General Industry Safety Orders), Group 18 (Explosives and Pyrotechnics), Article 116 (Handling and prohibitions, and procedures for safe handling of explosives, setting of charges, and other blasting activities). Anyone conducting blasting must obtain a blaster's license from the Department of Industrial Relations (DIR), Division of Occupational Safety and Health "in order to ensure that blasters possess an adequate level of knowledge about blasting safety, to restrict the use of explosives by blasters to those categories about which they have knowledge and experience, and to establish and maintain a list of licensed blasters."

The California Department of Transportation (Caltrans) also provides vibration criteria in the Transportation and Construction Vibration Guidance Manual (Caltrans 2013). Maximum PPV levels for different types of receiving building structures are listed in their manual. Table 4 shows the structure and condition of buildings along with recommended maximum PPV for transient and continuous sources.

Table 4
Caltrans 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

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
Source: Caltrans 2013.

For fragile historic buildings, the maximum PPV for transient sources is 0.12 inches/second, which is consistent with the FTA guidance. Older residences have a maximum recommended PPV of 0.5 inches/second for transient sources such as blasting, which corresponds to approximately 102 VdB.

With respect to human annoyance, Caltrans guidance indicates that 0.1 inches per second PPV represents a "begins to annoy" threshold, and due to lack of local regulation or guidance would be considered for purposes of this analysis to be the impact criteria for occupants of nearby residences. This annoyance assessment for occupants of residences is separately addressed from the building damage risk for the structures they occupy that are evaluated with respect to appropriate Caltrans thresholds appearing in Table 4.

Local

As part of the proposed project, the project site, which is partially within the City of San Marcos, would be annexed in full by the City, located to the north and west. The City of Escondido is located to the east and south of the project site, and the County of San Diego is located to the southwest. The regulatory background relating to noise for each of these jurisdictions is summarized below.

San Marcos

City of San Marcos Municipal Code

The City of San Marcos Municipal Code Chapter 10.24: Noise (San Marcos 2017) addresses construction noise. Erection and demolition of buildings is exempt between 7:00 a.m. and 6:00 p.m. Monday through Friday and on Saturdays from 8:00 a.m. to 5:00 p.m. The Municipal Codes does not set noise limits on construction activities. Commonly, the City has utilized the County of San Diego's Noise Ordinance noise limit of 75 dBA (8-hour average) for construction activities.

Chapter 20.300 (Site Planning and General Development Standards) of the City's Municipal Code includes noise regulations in the form of noise standards by zone (Section 20.300.070, Performance Standards). It should be noted that Municipal Code noise standards typically pertain to stationary (i.e., non-transportation-related) noise sources. The relevant portions of these noise standards are provided below:

1. Noise shall be measured with a sound-level meter that meets the standards of the American National Standards Institute (ANSI) (Section S1.4-1979, Type 1 or Type 2). Noise levels shall be measured in decibels at the property line of the receptor property, and at least five (5) feet above the ground and ten (10) feet from the nearest structure or wall. The unit of measure shall be designated as an A-weighted decibel (dBA) Leq standard. A calibration check shall be made of the instrument at the time any noise measurement is made (Ord. No. 2017-1446, 7-25-2017)

2. No person shall create or allow the creation of exterior noise that causes the noise level to exceed the noise standards established by Table 20.300-4 [shown in this report as Table 5].

Increases in allowable noise levels listed in Table 20.300-4 may be permitted in accordance with the standards outlined in Table 20.300-5 6 [shown in this report as Table 6].

Table 5
Exterior Noise Standards by Zone

Zone	Allowable Noise Level (dBA L_{eq}) Measured from the Property Line
Single-Family Residential (A, R-1, R-2) [1, 2]	
7 a.m. to 10 p.m. (daytime)	60
10 p.m. to 7 a.m. (overnight)	50
Multifamily Residential (R-3) 1, 2	
7 a.m. to 10 p.m. (daytime)	65
10 p.m. to 7 a.m. (overnight)	55
Commercial (C, O-P, SR) [3]	
7 a.m. to 10 p.m. (daytime)	65
10 p.m. to 7 a.m. (overnight)	55
Industrial	
7 a.m. to 10 p.m. (daytime)	65
10 p.m. to 7 a.m. (overnight)	60

Notes:
1 For single-family detached dwelling units, the "exterior noise level" is defined as the noise level measured at an outdoor living area which adjoins and is on the same lot as the dwelling, and which contains at least the following minimum net lot area: (i) for lots less than 4,000 square feet in area, the exterior area shall include 400 square feet, (ii) for lots between 4,000 square feet to 10 acres in area, the exterior area shall include 10 percent of the lot area; (iii) for lots over 10 acres in area, the exterior area shall include 1 acre.
2 For all other residential land uses, "exterior noise level" is defined as noise measured at exterior areas which are provided for private or group usable open space purposes. "Private Usable Open Space" is defined as usable open space intended for use of occupants of one dwelling unit, normally including yards, decks, and balconies. When the noise limit for Private Usable Open Space cannot be met, then a Group Usable Open Space that meets the exterior noise level standard shall be provided. "Group Usable Open Space" is defined as usable open space intended for common use by occupants of a development, either privately owned and maintained or dedicated to a public agency, normally including swimming pools, recreation courts, patios, open landscaped areas, and greenbelts with pedestrian walkways and equestrian and bicycle trails, but not including off-street parking and loading areas or driveways.
3 For non-residential noise sensitive land uses, exterior noise level is defined as noise measured at the exterior area provided for public use.
Source: City of San Marcos 2017 (Table 20.300-4)

3. No person shall create nor allow the creation of noise that causes the interior noise level when measured within a dwelling unit to exceed forty-five (45) dBA at any time, except as permitted by Table 20.300-6 [shown in this report as Table 7].

4. Use of compressors or other equipment, including vents, ducts, and conduits, but excluding window or wall-mounted air conditioners, that are located outside of the exterior walls of any building, shall be enclosed within a permanent, non-combustible, view-obscuring enclosure to ensure that the equipment does not emit noise in excess of the ANSI standards.

Table 6
Permitted Increase in Noise Levels

Permitted Increase (dBA)	Duration (cumulative minutes per hour)
5	15
10	5
15	1
20	Less than 1 minute

Source: City of San Marcos 2017 (Table 20.300-5)

Table 7
Permitted Increase in Interior Noise Levels

Permitted Increase (dBA)	Duration (cumulative minutes per hour)
5	1
10	Less than 1 minute

Source: City of San Marcos 2017 (Table 20.300-6)

City of San Marcos General Plan

To control transportation related noise sources such as arterial roads, freeways, airports, and railroads, the City of San Marcos has established guidelines for acceptable community noise levels in the Noise Element of the General Plan (City of San Marcos 2012). For noise sensitive rural and single family residential uses, schools libraries, parks and recreational areas the City Noise Element requires an exterior noise levels of less than 60 dBA CNEL for outdoor usable area. For multi-family developments the standard is 65 dBA CNEL and a standard of 70 dBA CNEL is typically applied to commercial uses. The City has also established an interior noise limit of 45 dBA CNEL for all residential uses.

Escondido

City of Escondido Municipal Code

The City's Noise Ordinance (Municipal Code Article 12, Noise Abatement and Control; City of Escondido 1990) contains regulations restricting land use related noise-generating activities and operations, so as to avoid a noise nuisance in the community. Section 17-228 establishes the methods for which any sound or noise measurement shall be measured within the City. These methods apply to both indoor and outdoor measurements. Section 17-229 establishes the maximum allowable exterior noise limits, based upon the classification of the receiving land use.

These standards typically apply to stationary sources such as noise from mechanical equipment (including mechanical ventilation and air condition noise, pool pump noise) or event noise, as opposed to traffic noise. For instance, a school, commercial enterprise, or industrial operation must not generate noise that exceeds a certain specified noise level at any property boundary where an adjacent residential use exists. The City's exterior property-line noise standards are presented in Table 8. The pertinent portions of Section 17-229 are listed below:

- **Section 17-229c (5a):** If the noise is continuous, the Leq for any hour will be represented by any lesser time period within that hour. Noise measurements of a few minutes only will thus suffice to define the noise level.
- **Section 17-229 (5b):** If the noise is intermittent, the Leq for any hour may be represented by a time period typical of the operating cycle. Measurement should be made of a representative number of noisy/quiet periods. A measurement period of not less than 15 minutes is, however, strongly recommended when dealing with intermittent noise.
- **Section 17-229c (5c):** In the event the alleged offensive noise, as judged by the enforcement officer, contains a steady, audible sound such as a whine, screech or hum, or contains a repetitive impulsive noise such as hammering or riveting, the standard limits set forth in Table 2.6-2, City of Escondido Exterior Sound Limit Levels, shall be reduced by 10 dB or to the ambient noise level when such noises are not occurring.
- **Section 17-229c (5d):** If the measured ambient level exceeds that permissible in Table 2.6-2, the allowable noise exposure standard shall be the ambient noise level. The ambient level shall be measured when the alleged noise violations source is not operating.
- **Section 17-229c (5e):** The sound level limit at a location on a boundary between two land use classifications is the limit applicable to the receiving land use; provided, however, that the one-hour average sound level limit applicable to extractive industries including, but not limited to, borrow pits and mines, shall be 75 dB at the property line regardless of the zone where the extractive industry is actually located. Fixed-location public utility distribution or transmission facilities located on or adjacent to a property line shall be subject to the noise level limits of this section, measured at or beyond six feet from the boundary of the easement upon which the equipment is located (City of Escondido 1990).

Section 17-234 regulates construction noise in the City. The pertinent portions of Section 17-234 are summarized below:

- **Section 17-234(a):** It shall be unlawful for any person, including the City of Escondido, to operate construction equipment at any construction site, except on Monday through Friday during a week between the hours of seven (7) a.m. and six (6) p.m. and on Saturdays between

the hours of nine (9) a.m. and five (5) p.m., and provided that the operation of such construction equipment complies with the requirements of subsection (d) of this section.

- **Section 17-234(b):** It shall be unlawful for any person, including the City of Escondido, to operate construction equipment at any construction site on Sundays and on days designated by the president, governor or city council as public holidays.
- **Section 17-234(d):** No construction equipment or combination of equipment, regardless of age or date of acquisition, shall be operated so as to cause noise in excess of a one hour average sound level limit of seventy-five (75) dB at any time, unless a variance has been obtained in advance from the city manager.
- **Section 17-234(e):** Persons engaged in construction for profit or as a business shall post signs at conspicuous places on a construction site, indicating hours of work as prescribed by this article or authorized by permit and the applicable noise level limits (City of Escondido 1990).

City of Escondido General Plan

The *City of Escondido General Plan* (General Plan) Community Protection Element (Section 5, Noise) indicates that the maximum normally acceptable noise level for new single-family and duplex residential development is a community noise equivalent level (CNEL) of 60 dBA[2] (Escondido 2012). The range considered by the City to be conditionally acceptable for single family and duplex residential development is 60 to 70 dBA CNEL[3]. The City typically applies the noise criterion of 60 dBA CNEL within the backyards of residential parcels. The City of Escondido also requires that the interior noise level not exceed 45 dBA CNEL for new residences (Escondido 2012).

5. Noise

Goal 5: Protection of the community from excessive noise exposure.

Noise Policy 5.1: Require development to meet acceptable exterior noise level standards as established in Figure VI-2 [of the General Plan], and use the future noise contour map

[2] The City classifies a "normally acceptable" noise exposure as follows: "Specified land use is satisfactory, based upon the assumption that buildings involved are of normal conventional construction, without any special requirements."

[3] The City classifies a "conditionally acceptable" noise exposure as follows: "New construction or development should be undertaken only after a detailed analysis of the noise reduction requirements is made and needed noise insulation features included in the design. Conventional construction, but with closed windows and fresh air supply systems or air conditioning will usually suffice."

(Figure VI-17 [of the General Plan]) as a guide for evaluating the compatibility of new noise sensitive uses with projected noise levels.

Noise Policy 5.2: Apply a CNEL of 60 dB or less for single family and 65 dB or less for multi-family as goals where outdoor use is a major consideration (back yards and single family housing developments, and recreation areas in multifamily housing developments) as discussed in Figure VI-13 [of the General Plan], and recognize that such levels may not necessarily be achievable in all residential areas.

Noise Policy 5.3: Require noise attenuation for outdoor spaces in all developments where projected incremental exterior noise levels exceed those shown in Figure VI-14 [of the General Plan].

Noise Policy 5.4: Require noise attenuation for new noise-sensitive uses which include residential, daycare facilities, schools, churches, transient lodging, hotels, motels, hospitals, health care facilities, and libraries if the projected interior noise standard of 45 dBA CNEL is exceeded.

Noise Policy 5.5: Require construction projects and new development to ensure acceptable vibration levels at nearby noise-sensitive uses based on Federal Transit Administrator criteria.

Noise Policy 5.6: Require the preparation of noise studies, as deemed necessary by the Planning Department, to analyze potential noise impacts associated with new development which could significantly alter existing noise levels in accordance with provisions outlined in Figure VI-14 [of the General Plan].

Noise Policy 5.7: Encourage use of site and building design, noise barriers, and construction methods as outlined in Figure VI-15 [of the General Plan] to minimize impacts on and from new development.

Noise Policy 5.8: Require that mixed use and multi-family residential developments demonstrate that the design of the structure will adequately isolate noise between adjacent uses (orientation, window insulation, separation of common walls, floors, and ceilings, etc.).

Noise Policy 5.9: Require new mixed use developments to locate loading areas, parking lots, driveways, trash enclosures, mechanical equipment, and other noise sources away from the residential portion of the development, when physically feasible. Use construction standards to reduce noise between uses.

Noise Policy 5.10: Require development projects that are subject to discretionary approval to assess potential construction noise impacts on nearby sensitive uses and to minimize impacts on these uses, to the extent feasible.

Noise Policy 5.11: Limit direct access from individual properties along Major Roads and Prime Arterials in residential areas in order to minimize gaps in noise barrier sound walls.

Noise Policy 5.12: Limit "through truck traffic" to designated routes to minimize noise impacts to residential neighborhoods and other noise-sensitive uses.

Noise Policy 5.13: Limit the hours of operation for parks and active recreation uses in residential areas to minimize disturbance to residents (City of Escondido 2012).

Table 8
City of Escondido Exterior Property-Line Noise Limits

Receiving Land Use Category	Noise Level (dBA)	
	10 p.m. to 7 a.m. (Weekdays)	*7 a.m. to 10 p.m. (Weekdays)*
	10 p.m. to 8 a.m. (Weekends)	*8 a.m. to 10 p.m. (Weekends)*
All residential (except multiple dwelling)	45	50
Multiple dwelling residential	50	55
Commercial	55	60
Light industrial/industrial park zones	70	70
General industrial	75	75

dBA = A-weighted decibels.
Source: City of Escondido 1990

County of San Diego

The County of San Diego has adopted various noise policies and standards contained within the County's General Plan Noise Element and the County Noise Ordinance. The County's noise policies and standards are summarized below.

Guidelines for the Determination of Significance

Guidelines for the determination of significance of environmental noise impacts for this and other impact sections were promulgated by the County in January 2009 in the County's Noise Guidelines (County of San Diego 2009).

A proposed project would result in a significant impact if the implementation would result in the exposure of any on-site or off-site existing or reasonably foreseeable future Noise-Sensitive Land Uses (NSLUs) to exterior or interior noise (including noise generated from a project combined with noise from roads, railroads, airports, heliports, and all other noise sources) greater than any of the following:

A. Exterior Locations
   i. 60 dB (CNEL)
   ii. An increase of 10 dB (CNEL) over preexisting noise

In the case of single-family residential detached NSLUs, exterior noise shall be measured at an outdoor living area that adjoins and is on the same lot as the dwelling and that contains at least the following minimum area:

i. Net lot area up to 4,000 square feet: 400 square feet

ii. Net lot area 4,000 square feet to 10 acres: 10% of net lot area

iii. Net lot area over 10 acres: 1 acre

For all projects, exterior noise shall be measured at all exterior areas provided for group or private usable open space.

B. Interior Locations

45 dB (CNEL) except for the following cases:

i. Rooms that are usually occupied only part of the day (i.e., schools, libraries, or similar facilities) in which the interior 1-hour average sound level due to noise outside should not exceed 50 dBA

ii. Corridors, hallways, stairwells, closets, bathrooms, or any room with a volume less than 490 cubic feet

County General Plan

The County's General Plan Noise Element (Noise Element) establishes noise and land use compatibility standards and outlines goals and policies to achieve these standards. The Noise Element characterizes the noise environment in the County and provides the context for the County's noise/land use compatibility guidelines and standards. The Noise Element also describes the County's goals for achieving the standards and introduces policies designed to implement the goals. Under implementation of the General Plan, the County would use the Noise Compatibility Guidelines to determine the compatibility of land uses when evaluating proposed development projects. The Noise Compatibility Guidelines indicate ranges of compatibility and are intended to be flexible enough to apply to a range of projects and environments.

A land use located in an area identified as "acceptable" indicates that standard construction methods would attenuate exterior noise to an acceptable indoor noise level and that people can carry out outdoor activities with minimal noise interference. Land uses that fall into the "conditionally acceptable" noise environment should have an acoustical study that considers the type of noise source, the sensitivity of the noise receptor, and the degree to which the noise source has the potential to interfere with sleep, speech, or other activities characteristic of the land use.

For land uses indicated as "conditionally acceptable," structures must be able to attenuate the exterior noise to the indoor noise level as indicated in the Noise Compatibility Guidelines. For land uses where the exterior noise levels fall within the "unacceptable" range, new construction generally should not be undertaken (County of San Diego 2009).

County General Plan Update

The General Plan Update was adopted by the County on August 3, 2011 (County of San Diego 2011a). Revisions to the General Plan Noise Element have not been updated in the County's Noise Guidelines at this time; however, the new General Plan Update noise compatibility guidelines and standards as contained in the General Plan Update are applicable to the proposed project. Table 9 provides the County's current noise compatibility guidelines, and Table 10 provides the County's noise standards.

Table 9
Noise Compatibility Guidelines

Land Use Category		Exterior Noise Levels					
		55	*60*	*65*	*70*	*75*	*80*
A	Residential—single-family residences, mobile homes, senior housing, convalescent homes						
B	Residential—multifamily residences, mixed-use (commercial/residential)						
C	Transient lodging—motels, hotels, resorts						
D*	Schools, churches, hospitals, nursing homes, childcare facilities						
E*	Passive recreational parks, nature preserves, contemplative spaces, cemeteries						
F*	Active parks, golf courses, athletic fields, outdoor spectator sports, water recreation						
G*	Office/professional, government, medical/dental, commercial, retail, laboratories						
H*	Industrial, manufacturing, utilities, agriculture, mining, stables, warehouse, maintenance/repair						
	ACCEPTABLE—Specified land use is satisfactory based on the assumption that any buildings involved are of normal construction, without any special noise insulation requirements.						
	CONDITIONALLY ACCEPTABLE—New construction or development should be undertaken only after a detailed noise analysis is conducted to determine if noise reduction measures are necessary to achieve acceptable levels for land use. Criteria for determining exterior and interior noise levels are listed in Table 7, Noise Standards. If a project cannot mitigate noise to a level deemed acceptable, the appropriate County decision maker must determine that mitigation has been provided to the greatest extent practicable or that extraordinary circumstances exist.						
	UNACCEPTABLE—New construction or development shall not be undertaken.						

* Denotes facilities used for part of the day; therefore, an hourly standard would be used rather than CNEL.
Source: County of San Diego 2011a.

Table 10
Noise Standards

1.	The exterior noise level (as defined in Item 3) standard for Category A shall be 60 CNEL, and the interior noise level standard for indoor habitable rooms shall be 45 CNEL.
2.	The exterior noise level standard for Categories B and C shall be 65 CNEL, and the interior noise level standard for indoor habitable rooms shall be 45 CNEL.
3.	The exterior noise level standard for Categories D and G shall be 65 CNEL and the interior noise level standard shall be 50 dBA L_{eq} (one hour average).
4.	For single-family detached dwelling units, "exterior noise level" is defined as the noise level measured at an outdoor living area which adjoins and is on the same lot as the dwelling, and which contains at least the following minimum net lot area: • for lots less than 4,000 square feet in area, the exterior area shall include 400 square feet; • for lots between 4,000 square feet to 10 acres in area, the exterior area shall include 10% of the lot area; • for lots over 10 acres in area, the exterior area shall include 1 acre.
5.	For all other residential land uses, "exterior noise level" is defined as noise measured at exterior areas which are provided for private or group usable open space purposes. "Private Usable Open Space" is defined as usable open space intended for use of occupants of one dwelling unit, normally including yards, decks, and balconies. When the noise limit for Private Usable Open Space cannot be met, then a Group Usable Open Space that meets the exterior noise level standard shall be provided. "Group Usable Open Space" is defined as usable open space intended for common use by occupants of a development, either privately owned and maintained or dedicated to a public agency, normally including swimming pools, recreation courts, patios, open landscaped areas, and greenbelts with pedestrian walkways and equestrian and bicycle trails, but not including off-street parking and loading areas or driveways.
6.	For non-residential noise sensitive land uses, exterior noise level is defined as noise measured at the exterior area provided for public use.
7.	For noise sensitive land uses where people normally do not sleep at night, the exterior and interior noise standard may be measured using either CNEL or the one-hour average noise level determined at the loudest hour during the period when the facility is normally occupied.
8.	The exterior noise standard does not apply for land uses where no exterior use area is proposed or necessary, such as a library.
9.	For Categories E and F the exterior noise level standard shall not exceed the limit defined as "Acceptable" in Table N-1 or an equivalent one-hour noise standard.

Exterior Noise Level compatibility guidelines for Land Use Categories A-H are identified in Table 11.
Source: County of San Diego 2011a.

San Diego County Code of Regulatory Ordinances Title 3, Division 6, Chapter 4, Sections 36.401–36.435, Noise Ordinance

The Noise Ordinance (County of San Diego 2011b) establishes prohibitions for disturbing, excessive, or offensive noise as well as provisions such as sound level limits for the purpose of securing and promoting the public health, comfort, safety, peace, and quiet for its citizens. Planned compliance with sound level limits and other specific parts of the ordinance allows presumption that the noise is not disturbing, excessive, or offensive. Limits are specified depending on the zoning placed on a property (e.g., varying densities and intensities of residential, industrial, and commercial zones). Where two adjacent properties have different zones, the sound level limit at a

location on a boundary between two properties is the arithmetic mean of the respective limits for the two zones, except for extractive industries. It is unlawful for any person to cause or allow the creation of any noise that exceeds the applicable limits of the Noise Ordinance at any point on or beyond the boundaries of the property on which the sound is produced.

Section 36.404 of the Noise Ordinance contains sound level limits specific to receiving land uses. Sound level limits are in terms of a 1-hour average sound level. The allowable noise limits depend upon the County's zoning district and time of day. The Proposed Project would be located within Specific Plan Area and Open Space zones. Table 11 lists the sound level limits for the County.

Table 112
San Diego County Noise Ordinance Sound Level Limits

Zone	Applicable Limit 1-Hour Average Sound Level (dB)		
	7 a.m. to 7 p.m.	*7 p.m. to 10 p.m.*	*10 p.m. to 7 a.m.*
(1) RS, RD, RR, RMH, A70, A72, S80, S81, S87, S90, S92, RV, and RU with a density of less than 11 dwelling units per acre	50	50	45
(2) RRO, RC, RM, S86, V5, and RV and RU with a density of 11 or more dwelling units per acre	55	55	50
(3) S94, V4, and all other commercial zones	60	60	55
(4) V1 and V2	60	55	see below
V1	60	55	55
V2	60	55	50
V3	70	70	65
(5) M50, M52, and M54	70	70	70
(6) S82, M56, and M58	75	75	75
(7) S88 (see note 4)			

Notes:
RS, RD, RM, RR, RU, RV, RRO, RMH, RU = Residential uses; A70, A72 = Agricultural uses; S80, S81, S82, S87, S90 = Open space uses, ecological resource areas, or holding area uses; S92 = General rural uses; RC = Residential/commercial uses; S86 = parking uses; V1, V2, V3, V4, V5 = Village uses; M50, M52, M54, M56, M58 = Manufacturing and industrial uses; S88 = Special planning area uses.

1 If the measured ambient level exceeds the applicable limit noted in the table, the allowable 1-hour average sound level will be the ambient noise level. The ambient noise level will be measured when the alleged noise violation source is not operating.

2 The sound-level limit at a location on a boundary between two zoning districts is the arithmetic mean of the respective limits for the two districts; provided, however, that the 1-hour average sound-level limit applicable to extractive industries, including but not limited to borrow pits and mines, will be 75 dB at the property line, regardless of the zone where the extractive industry is actually located.

3 Fixed-location, public utility distribution or transmission facilities located on or adjacent to a property line shall be subject to the noise-level limits of this section, measured at or beyond 6 feet from the boundary of the easement upon which the equipment is located.

4 S88 zones are Specific Planning Areas, which allow different uses. The sound level limits that apply in an S88 zone depend on the use being made of the property. The limits in the table, subsection (1) apply to a property with a residential, agricultural, or civic use. The limits in subsection (3) apply to a property with a commercial use. The limits in subsection (5) apply to a property with an industrial use that would only be allowed in an M50, M52, or M54 zone. The limits in subsection (6) apply to all property with an extractive use or a use that would only be allowed in an M56 or M58 zone.

Source: County of San Diego 2011b.

Section 36.408 of the Noise Ordinance sets limits on the time of day and days of the week that construction can occur, as well as setting noise limits for construction activities. In summary, the Noise Ordinance prohibits operating construction equipment on the following days and times:

- Mondays through Saturdays except between 7 a.m. and 7 p.m.
- Sundays or a holiday. A holiday means January 1, the last Monday in May, July 4, the first Monday in September, December 25, and any day appointed by the president as a special national holiday or the governor of the state as a special state holiday.

In addition, Section 36.409 requires that between 7 a.m. and 7 p.m., no equipment shall be operated so as to cause an 8-hour average construction noise level in excess of 75 dBA when measured at the boundary line of the property where the noise source is located, or on any occupied property where the noise is being received.

Additional sound level limitations are provided in Section 36.410:

> In addition to the general limitations on sound levels in Section 36.404 and the limitations on construction equipment in Section 36.409, the following additional sound level limitations shall apply:
>
> (a) Except for emergency work or work on a public road project, no person shall produce or cause to be produced an impulsive noise that exceeds the maximum sound level shown in Table 12, when measured at the boundary line of the property where the noise source is located or on any occupied property where the noise is received, for 25% of the minutes in the measurement period, as described in Section 36.410(c) of the County's Noise Ordinance. The maximum sound level depends on the use being made of the occupied property. The uses in Table 12 are as described in the County Zoning Ordinance.

Table 12
County of San Diego Noise Ordinance, Section 36.410, Maximum Sound Level (Impulsive) Measured at Occupied Property in Decibels

Occupied Property Use	dBA
Residential, village zoning, or civic use	82
Agricultural, commercial, or industrial use	85

Source: County of San Diego 2011b.

> (b) Except for emergency work, no person working on a public road project shall produce or cause to be produced an impulsive noise that exceeds the maximum

sound level shown in Table 13, when measured at the boundary line of the property where the noise source is located or on any occupied property where the noise is received, for 25% of the minutes in the measurement period, as described in Section 36.410 (c) of the County's Noise Ordinance. The maximum sound level depends on the use being made of the occupied property. The uses in Table 13 are as described in the County Zoning Ordinance.

Table 13
County of San Diego Noise Ordinance, Section 36.410, Maximum Sound Level (Impulsive) Measured at Occupied Property in Decibels for Public Road Projects

Occupied Property Use	dBA
Residential, village zoning, or civic use	85
Agricultural, commercial, or industrial use	90

Source: County of San Diego 2011b.

(c) The minimum measurement period for any measurements conducted under this section shall be one hour. During the measurement period a measurement shall be conducted every minute from a fixed location on an occupied property. The measurements shall measure the maximum sound level during each minute of the measurement period. If the sound level caused by construction equipment or the producer of the impulsive noise, exceeds the maximum sound level for any portion of any minute it will be deemed that the maximum sound level was exceeded during that minute.

The proposed project would result in a significant impact if it results in a substantial permanent increase in ambient noise levels in the vicinity. A substantial noise increase is defined as an increase of 10 dBA CNEL above existing conditions, as stated in the *County of San Diego Noise Report Guidelines*, Section 4.1-A (ii).

METHODOLOGY

The exterior noise analysis follows the same general procedure outlined in HUD *Noise Assessment Guidebook*. Traffic data for the local roads was input in a computer model along with site plan information. CadnaA (Computer Aided Noise Abatement) (DataKustik 2016) is the software utilized for calculation, presentation, assessment, and prediction of environmental noise. This program was used to model traffic noise for vicinity roadways. The software includes traffic noise modeling algorithms based on the Federal Highway Administration's Traffic Noise Model (TNM), Version 2.5 (FHWA 2004) software. The sound level measurements and manual traffic counts were used to calibrate the model to ensure vehicle speed was approximate to expected speeds based on speed limits.

EXTERIOR TRAFFIC NOISE ANALYSIS

The Project would generate a net traffic increase over existing volumes. Data input into the traffic noise model was based on the Draft Transportation Impact Analysis prepared for the project (LLG 2019). The Transportation Impact Assessment analyzed Existing, Near Term (opening year of the project with no roadway network improvements assumed), and 2035 traffic scenarios with and without project. Table 14 shows the Average Daily Traffic (ADT) volumes for those scenarios.

Table 14
Average Daily Traffic Volumes

Street Segment	Traffic Scenarios (Average Daily Traffic)			
	Existing	*Existing + Project*	*2035*	*2035 + Project*
Rancheros Drive, SR-78 Ramps to Woodland Parkway	21,140	21,371	22,200	22,431
E. Barham Drive, Woodland Parkway to SR-78 Eastbound Ramp	17,500	18,176	18,380	19,056
E. Barham Drive, Meyers Avenue to Mission Road	8,610	9,125	15,800	16,638
Meyers Avenue	4,740	6,253	4,980	6,493
E Barham Drive, San Marcos/Escondido City Boundary to Meyers Ave	12,990	13,989	15,600	16,276
W. Mission Road, Barham Drive to Nordahl Road	29,960	30,452	38,200	39,015

Source: LLG, 2019.

In order to analyze future conditions along SR-78, the San Diego Association of Governments (SANDAG) Series 12 traffic model data was analyzed to obtain 2035 traffic volumes. Freeway segments were divided between standard travel lanes and High-Occupancy Vehicle (HOV) lanes. Table 15 shows the SANDAG Series 12 traffic data for SR-78 by lane for year 2020 and year 2035.

Table 15
SANDAG Street Segment ADT Series 12 Forecast Year 2035 SR-78

Freeway Segment	Year 2020 / Year 2035 (1,000 ADT)
SR-78 Eastbound 1 of 4	88.1 / 93.8
SR-78 HOV Eastbound 2 of 4	12.6 / 22.3
SR-78 HOV Westbound 3 of 4	11.8 / 20.6
SR-78 Westbound 4 of 4	88.8 / 94.4

Source: SANDAG Series 12 Traffic Model

The ADT values in Table 15 were summed for each direction of SR-78 in order to provide usable inputs for the CadnaA traffic noise model. In total, 201,300 ADT is used for existing conditions (from the 2020 Forecasted Year) and 231,100 ADT is taken as the future 2035 case for SR-78.

The ADT values shown in Table 15 were used with the calibrated CadnaA traffic noise model to calculate existing and expected 24-hour weighted average (CNEL) traffic noise levels at existing and proposed building facades.

A default local road traffic hourly distribution was used for these scenarios. Average peak hour traffic is calculated to be approximately 10% of Average Daily Traffic. The percentage of heavier vehicles (medium trucks, heavy trucks, and buses) is assumed to be local for all of the roads except SR-78. For SR-78, the mix of trucks was assumed to be 10% of the ADT during the daytime, but evening and nighttime had higher percentages of trucks at 15% and 25%, respectively.

Table 16 shows the results of the model runs for worst case residential receivers for off-site traffic noise impacts. The locations of the modeled (M#) receivers are shown on Figure 4.

Table 16
Traffic Noise Model Results at Off-site Representative Receivers

Receiver Location/Description	Traffic Noise Community Noise Level CNEL (dBA)		Increase in Traffic Noise Level Due to the Project (dB)	Significant Impact?
	Existing	*Existing Plus Project*		
M1: Lagos Marcos, Existing Residence	69	69	0	No
M2: Sierra Vista, Existing Residence	74	74	0	No
M7: Alta Vista, Existing Residence	60	60	0	No
M8: CI Vista, Existing Residence	72	72	0	No

Source: Dudek Traffic Noise Modeling using CadnaA (DataKustik 2016)

Modeling locations near SR-78 have higher noise levels than areas located further away. Some existing residential land uses have existing traffic noise levels as high as 74 dBA CNEL. Other residences along East Barham Drive have lower traffic noise levels as shown by M1. Locations M7 represents the residential row adjacent to the north boundary of the project site near where the proposed multifamily residential buildings would be constructed. These single family residential receivers have existing traffic noise levels of 60 dBA CNEL. The project would increase noise levels by less than 1 dB at off-site locations. Thus, the project would not create a substantial increase in the ambient noise levels in the project vicinity. Additionally, all off-site receivers would not experience increases from one category (acceptable, conditionally acceptable, unacceptable) to another category, and thus noise levels would remain in their existing or expected land use compatibility category under the City's standards.

Table 17 shows calculated traffic noise levels in CNEL for on-site areas. As shown in Figure 4, receivers M3, M4, M5, and M6 are located at the 4 northern-most building sites proposed for the project. As shown in Table 17, traffic noise levels for the proposed on-site residences would remain below 65 dBA CNEL. Since the proposed structures are multifamily dwellings, CNEL levels up to 65 dBA are "acceptable." No exterior noise mitigation is required for the project.

Table 17
Traffic Noise Model Results at Representative Proposed Residences

Receiver Location/Description	Traffic Noise CNEL (dBA)		Traffic Noise Increase (dB)	Significant Impact?
	2035	*2035 PP*		
M3: North East Building, Ground Floor, Proposed	55	55	0	No
M3: North East Building, Upper Floors, Proposed	60	60	0	No
M4: North East Building, Ground Floor, Proposed	56	56	0	No
M4: North East Building, Upper Floors Proposed	60	60	0	No
M5: North West Inner Building, Ground Floor, Proposed	56	56	0	No
M5: North West Inner Building, Upper Floors, Proposed	60	60	0	No
M6: North West Building, Ground Floor, Proposed	56	56	0	No
M6: North West Building, Upper Floors, Proposed	60	60	0	No

Source: Dudek Traffic Noise Modeling using CadnaA (DataKustik 2016)

The City requires that interior noise levels not exceed 45 dBA CNEL. Interior noise levels are controlled by the noise reduction characteristics of the building shell. The interior noise level is a function of the sound transmission loss qualities of the construction material and surface area of each element (wall, window, door, etc.). Typical wood frame construction with standard windows and doors generally provides a reduction of exterior-to-interior noise levels of 20 dBA or greater. Based on a noise reduction of 20 dBA provided by standard construction techniques, interior noise levels within the proposed project would range from approximately 35 to 41 dBA CNEL. Thus, interior noise levels would be lower than 45 dBA CNEL. No mitigation measures are required.

CONSTRUCTION NOISE

Construction noise and vibration are temporary phenomena. Construction noise and vibration levels vary from hour-to-hour and day-to-day, depending on the equipment in use, the operations being performed, and the distance between the source and receptor.

Residential land uses are directly adjacent to the northern project boundary. The structures are approximately 20 feet from where grading efforts would be necessary. Residences exist approximately 50 feet from western edge of the construction area. Typical distances between the

geographic center of the construction site and these residential uses are over 360 feet. Commercial and light industrial land uses also exist in the project vicinity.

Despite these noise-sensitive land uses in the immediate proximity of the project sites, the City noise ordinance provides an exemption for construction work provided the activities do not take place between 6:00 p.m. and 7:00 a.m. Monday through Friday and on Saturdays from 5:00 p.m. to 8:00 a.m. Hence, the following construction noise analysis is provided for informational purposes. For the occupied residential land use adjoining the southwest corner of the proposed project site, however, which is located within County of San Diego jurisdiction, construction noise is allowed between 7:00 a.m. and 7:00 p.m. but must comply with a 75 dBA 8-hour L_{eq} threshold.

Construction – Equipment Data and Description

Equipment operates in alternating cycles of full power and low power, thus producing noise levels less than the maximum level. The typical noise levels for various pieces of construction equipment at a distance of 50 feet are presented in Table 18. For example, measured backhoe maximum sound levels are 78 dBA at a distance of 50 feet.

Table 18
Typical Construction Equipment Noise Emission Levels and Usage Factors

Equipment Description	Impact Device?	FHWA RCNM Acoustical Use Factor (%)	Lmax @ 50ft (dBA)
All Other Equipment > 5 HP	No	50	85
Backhoe	No	40	78
Blasting	Yes	n/a	94
Compressor (air)	No	40	78
Dozer	No	40	82
Drill Rig Truck	No	20	79
Excavator	No	40	81
Flat Bed Truck	No	40	74
Front End Loader	No	40	79
Man Lift	No	20	75
Paver	No	50	77
Roller	No	20	80

Source: FTA 2018.

The proposed project's construction activities would include different equipment uses based on the phases of construction. Table 19 summarizes the expected equipment that would be used during

the different phases of construction based on the Air Quality analysis (Dudek 2019) and assumptions developed using CalEEMod[4].

Table 19
Construction Scenario Assumptions

Construction Phase	Equipment	
	Equipment Type	*Quantity*
Site Preparation	Rubber-tired dozers	2
	Tractors/loaders/backhoes	2
Grading	Excavators	1
	Graders	1
	Rubber-tired dozers	1
	Tractors/loaders/backhoes	3
Building Construction	Forklifts	3
	Tractors/loaders/backhoes	12
Paving	Pavers	2
	Paving equipment	2
	Rollers	2
Architectural Coating	Air compressors	1

Source: Dudek 2019

Using the equipment quantities by type from Table 19, and reference L_{max} data and AUF values from the Federal Highway Administration (FHWA) Roadway Construction Noise Model (RCNM) (FHWA 2008) as appearing in Table 18, aggregate per-phase construction noise levels at the nearest noise-sensitive receivers were predicted with a sound propagation model for two operation scenarios: 1) all the construction equipment for a phase are considered active over a typical work-shift (i.e., 8 hours duration), but individual equipment locations may vary and thus on average would be considered at the geographic center of the proposed project site; and 2) a limited subset (or in some situations, just one) of the indicated equipment for a phase is operating as close to the noise-sensitive receiver as the proposed project grading extent. The first scenario replicates the "general assessment" approach per Federal Transit Administration (FTA) guidance on construction noise (FTA 2018). The second scenario, in contrast, predicts noise in a more "detailed assessment" manner that acknowledges some equipment may be as close as possible to the receiver of interest but for only a portion of the full eight-hour duration. For purposes of this analysis, the second technique assumes only one piece of each type of equipment for each phase would be as close as 50 feet to the nearest

[4] California Emissions Estimator Model® (CalEEMod) is a statewide land use emissions computer model designed to provide a uniform platform for government agencies, land use planners, and environmental professionals to quantify potential criteria pollutant and greenhouse gas (GHG) emissions associated with both construction and operations from a variety of land use projects

noise-sensitive receptor, and—on average—for only up to two (2) hours of duration. This does not mean that equipment will only be operating onsite for two hours; rather, it assumes that the equipment may be operating for all eight hours of a shift, but not at such a close distance to the studied receptor. Over the course of the 8-hour shift, the noise-producing equipment may be as close as 50 feet to the receptor for a limited time, then would be needed elsewhere and move, thus increasing its distance away from the receptor and causing less noise exposure.

Results of these construction noise modeling scenarios are presented in Table 20, Construction Noise Model Results Summary. The sound propagation model inputs and outputs are provided in Attachment 3.

Table 20
Construction Noise Modeling Summary Results

Construction Phase	Predicted 8-hour L_{eq} (dBA) at Indicated Distance from Noise Source	
	Nearest Noise-Sensitive Receiver 50'	*Nearest Noise-Sensitive Receiver 360' from Geographic Center of Project Site*
Site Preparation	75	67
Grading	**79**	68
Building Construction	69	68
Paving	**77**	69
Architectural Coating	68	57

Source: Attachment 3

As presented in Table 20, the highest predicted construction noise levels are expected to occur during grading and paving phases, and would exceed the County's 8-hour threshold of 75 dBA L_{eq} at the noise-sensitive receptor to the southwest of the proposed project. During other phases of construction work, predicted noise levels would range from approximately 57 to 75 dBA L_{eq}.

Average noise levels from construction activities may be annoying since levels are expected to be higher than the ambient noise level in the site vicinity. This is particularly true for the residential locations immediately adjacent to the project site. However, restricting construction activities to the daytime period will avoid disruption of evening relaxation and overnight sleep periods.

Construction Vibration

Conventional construction equipment anticipated to be onsite and producing noise as estimated in the preceding paragraphs would also be generating groundborne vibration that can, using FTA-based reference data and methodology, also be predicted and compared with applicable aforementioned FTA and Caltrans guidance criteria.

Aside from special construction activities such as blasting, which is considered separately herein, the expected conventional construction equipment from among those listed in Table 19 with the likely greatest magnitude of vibration would be a vibratory roller that FTA indicates exhibits 0.21 inches per second PPV at a distance of 25 feet. At a distance of 50 feet, representing how close a roller might be during paving activities, the vibration level at the receiver would be 0.07 inches per second PPV, which would be less than the 0.3 inches per second PPV threshold for continuous (i.e., not transient) sources of vibration per Caltrans guidance as shown in Table 3 for older residential structures. With respect to human annoyance, 0.07 inches per second would be less than 0.1 inches per second PPV per Caltrans guidance. On these bases, vibration impact from onsite conventional construction equipment and processes is expected to be less than significant.

Construction Truck Traffic

As specified by the applicant, 78,800 cubic yards of cut and fill would be balanced on site; however, it was conservatively assumed that 10,000 cubic yards of soil would be exported off site in trucks with a capacity of 16 cubic yards, thus, 625 trips were assumed. It was estimated that 1,000 cubic yards of vegetation and soil from site clearing would be exported in trucks with a capacity of 8 cubic yards; therefore, 125 trips were assumed.

Referring back to the tables of traffic data in the site vicinity, most roads have daily traffic trips exceeding 10,000 trips. The two exceptions are E Barham Drive from Meyers Avenue to Mission Road and Meyers Avenue. These two roads have existing traffic trips of 4,740 (for Meyers Avenue) and 8,610 trips for that segment of E Barham Drive. If the total construction trips were all added to these roads on a single day, the increase in traffic would be less than 50%. Typically a doubling in traffic trips (a 100% increase) is necessary to increase traffic noise levels by 3 dB. The construction haul trips are expected to be spread out over multiple days reducing the percentage increase in traffic on a daily basis. Resulting roadway traffic noise increase would be less than 3 dB over existing traffic noise levels. With less than a 3 dB in existing traffic noise expected from the construction efforts, this impact is expected to be less than significant.

Onsite Blasting and Rock Crushing

Blasting operations would be required for site preparation. Rock blasting is the controlled use of explosives to excavate, break down, or remove rock. The result of rock blasting is often known as a rock cut. A maximum of 2 blasts per day and 10 total blasts for the project are expected.

Construction Blasting Noise

According to the FHWA RCNM, and as listed in Table 18, blasting is expected to cause a reference noise level of 94 dBA at a distance of 50 feet. Due to the impulsive nature of this sound, Section 36.410 of the County of San Diego's noise ordinance would provide a threshold of 82 dBA L_{max}, as shown in Table 12, at the nearest residential receptor to the southwest of the project. With blasting activity of this magnitude assumed to occur no closer than 150 feet from existing residences in order to fracture onsite rock, and using the 94 dBA L_{max} reference value, the predicted impulse noise level at the receiver would be approximately 84 dBA L_{max}, and thus slightly higher than the allowable limit. For this reason, application of mitigation measure **MM-NOI-3** would be expected in order to reduce blast noise by at least 2 dB (a feasible quantity of airborne noise reduction in this context) and thus render onsite blasting noise a less than significant impact.

Construction Blasting Vibration

Blasting for construction projects typically results in an RMS vibration velocity of about 100 VdB at 50 feet from the source (FRA 2005). This is equivalent to a peak particle velocity of about 0.4 inches per second. Typical background vibration level in a residential area is usually below 50 VdB, which is below the threshold for human perception (FTA 2018).

With blasting activity assumed to occur no closer than 150 feet from existing residences in order to fracture onsite rock, and applying distance-related attenuation per FTA guidance (FTA 2018), expected transient vibration from a blast would be 0.08 inches per second. This estimation assumes that the blast vibration source level is comparable to the above-stated value of 100 VdB at 50 feet (per Federal Railroad Administration guidance), and that the conversion of PPV to VdB involves a crest factor value of 4 as recommended by the FTA (FTA 2018).

Because the existing residences near the proposed project could conservatively be described as older residential structures, the Caltrans-recommended risk threshold for transient vibrations like blasting would be 0.5 inches per second PPV for such receiving structures as shown in Table 3. Therefore, the estimated vibration level of 0.08 inches per second PPV at the nearest residential receptors would be less and result in an anticipated less than significant impact under these conditions.

However, since groundborne vibration level from a blast is not only dependent on distance between the source and receptor, but on other factors such as charge weight, the delay between charge detonations associated with a "single" blast event, and the degree of charge confinement, it is recommended that mitigation measure **MM-NOI-4** be implemented to help ensure blasting events associated with proposed project construction are properly designed and implemented, so that resulting transient vibration levels they generate do not exceed appropriate Caltrans guidance criteria.

Rock Crushing

In addition to blasting noise, noise associated with rock crushing is also predictively quantified herein as a separate evaluation. Emissions factors were obtained from previous noise studies for the City of San Marcos. Based on data provided by the applicant, 30,000 tons of rock would be processed; the rock processing rate would be 750 tons of rock per day; and the total operating days would be 40 days. Table 21 presents results of rock crusher activities from measured data.

Table 21
Representative Rock Crusher Noise Levels

Type of Equipment	Distance From Source (Feet)	Measured Noise Level (dBA Leq)	Calculated Noise Level at 50 Feet (dBA Leq)
Portable Crusher and Conveyor	100	79	86.5
	330	70	90.5
	500	59	84.0
Permanent Heavy Rock Crusher	250	73	90.5
	500	56	84.0
Portable Crusher and Conveyor	160	73	85.6
	250	69	86.5
Portable Crusher and Conveyor	835	60	90.6
Large Portable Unit	20	94.2	84.3
Jaw Crusher	50	86.5	86.5
Concrete Crusher	120	77.3	86.8
	100	78	85.5

Source: University Business Park Specific Plan, City of San Marcos, 2006

The rock-crushing equipment was assumed to consist of a crusher, screen, and conveyor, and the crushed rock would be stockpiled for future use. Although a single primary crusher and screen may be all that is required, use of a secondary crusher and additional screen would expedite this process. To generate a conservative emissions estimate, it was assumed that a feed hopper, primary and secondary crushers, two screens, and several conveyors for transfers would be used. The crushers, screens, and conveyors would have controlled particulate emissions with water sprays.

It is expected that the rock-crushing equipment would be powered by a diesel-engine generator. It was assumed that the engine generator would be rated at 350 horsepower. The engine generator would operate up to 4 hours per day.

Measurement distances between the rock crushers and sound level meters varied from study to study. The measurement results are normalized to a distance of 50 feet, assuming a "soft" surface along the

transmission pathway. The mean and 95th percentile values for this data set were 87.4 and 88.9 dBA respectively. For the noise analysis described below the 88.9 dBA value (at 50 feet) was used.

The rock crushing facility was estimated to be approximately 560 feet from the nearest residential receptors (west of the project site). The noise levels at the residential land uses from the rock crusher was estimated using the standard noise attenuation rate for a point source[6] of 6 dB per doubling of distance. At a distance of 560 feet, the estimated noise exposure at the residential land uses would be approximately 68 dBA L_{eq}.

Table 22 provides the combined noise levels from the estimated rock crusher noise and the other construction equipment during the phases when the rock crusher may be used (grading, paving, and site preparation). As shown in Table 25, the combined noise levels (rock crusher plus grading, paving and site preparation, respectively) would range from approximately 71 to 72 dBA L_{eq} at the nearest residences. Although the rock crusher activity is estimated to cause an overall per-phase construction noise increase of 3 dB, the resulting level is still compliant with the 75 dBA L_{eq} threshold and thus expected to result in a less than significant impact.

Table 22
Estimated Combined Rock Crusher and Construction Phase Noise

	L_{eq} (dBA)		
Construction Phase	*Construction Phase Noise* [1]	*Rock Crusher Noise*	*Combined Construction Phase plus Rock Crusher Noise Levels*
Grading	68	68	71
Paving	69	68	72
Site Preparation	67	68	71

1 From Table 20. The residences closest to the rock crushing activities would be located approximately 360 feet from the geographic center of other construction phase operating equipment and associated activities

Source: Attachment 4

Offsite Improvements - Barham Drive (Sewer Line Option #2)

Proposed project construction that would include installation of a new sewer line under Barham Drive represents a potential offsite improvement that would introduce noise and vibration-producing activities proximate to existing City of San Marcos residential receivers along the south side of this roadway segment between the SR-78 entrance ramp and the proposed entry to the proposed project east of Bennett Court. Because the location of this offsite improvement is different from the onsite construction area discussed in the preceding paragraphs, the following is

6 As is the standard of the practice, singular pieces of construction equipment are idealized as "point sources", as opposed to "line sources" such as a busy arterial roadways or freeways, or "pseudo line sources" such as rail lines.

a separate study of anticipated construction equipment noise and vibration with respect to the proposed Sewer Line Option #2 (Barham Drive) and its nearest residential receptors.

Conventional Construction Equipment Noise

For purposes of this analysis, it is assumed this sewer line construction would involve the following phases and equipment: 1) site preparation and exploratory bore sampling with a drill rig truck; 2) excavation with an excavator; 3) pipeline construction and installation with a flatbed truck and welder; and 4) pipeline cover and re-paving of the street surface with a front-end loader, paver, and vibratory roller. Rock fracturing with controlled charge detonations may be required as part of excavation, but like the potential for blasting on the proposed project development site would be a special activity considered separately in a subsequent noise and vibration impact evaluation. Table 23 shows the predicted construction noise levels for each of these conventional construction activities at a distance of 30 feet, which is the perpendicular from the proposed sewer line and the common northern wall that the nearest residential receptors appear to share.

Due to the presence of the existing wall, which appears to be at least 8 feet tall with respect to the Barham Drive pavement, construction noise associated with the sewer line construction would be occluded and therefore reduced by an estimated 8 dBA. This noise reduction from the wall lowers the expected noise exposure at the existing residences as shown in the right-most column of Table 23, and thus yields levels that are compliant with 75 dBA 8-hour L_{eq}.

Table 23
Sewer Line Option #2 – Construction Noise Modeling Summary Results

Construction Phase	Predicted 8-hour L_{eq} (dBA) at Indicated Distance from Noise Source	
	Nearest Noise-Sensitive Receiver 30' (without wall)	*Nearest Noise-Sensitive Receiver 30' (with wall)*
Site Preparation & Exploratory Bore Sampling	**76**	68
Excavation	**81**	73
Pipeline Construction	74	66
Cover and Re-paving	**83**	75

Based on these predictions summarized in Table 23, noise emission from conventional construction equipment associated with construction of the sewer line option #2 would be considered a less than significant noise impact.

Conventional Construction Equipment Vibration

Aside from blasting, which is considered separately herein, the expected conventional construction equipment from among those listed in Table 19 with the likely greatest magnitude of vibration would be a vibratory roller that FTA indicates exhibits 0.21 inches per second PPV at a distance of 25 feet. At a distance of 45 feet, representing how close a roller might be during paving activities to the nearest residential structure (i.e., on the southern side of the common wall that is 30 feet from the construction activity), the vibration level at the receiver would be 0.09 inches per second PPV, which would be less than the 0.3 inches per second PPV threshold for continuous (i.e., not transient) sources of vibration per Caltrans guidance as shown in Table 3 for older residential structures. With respect to human annoyance, 0.09 inches per second would be less than 0.1 inches per second PPV per Caltrans guidance. On these bases, vibration impact from onsite conventional construction equipment and processes that would be needed to construct sewer line option #2 is expected to be less than significant.

Blasting Noise

According to the FHWA RCNM, and as listed in Table 18, blasting is expected to cause a reference noise level of 94 dBA at a distance of 50 feet. If blasting at this magnitude was conducted to fracture rock for facilitating construction of the sewer line (option #2) during the excavation phase, the predicted noise exposure at the common wall (only 30 feet away) shared by the nearest residential receptors would be 98 dBA L_{max}. Adjusted downward by the aforementioned estimated barrier noise reduction effect of 8 dBA provided by the common wall, the resulting blast noise level would be 90 dBA L_{max}. Although these residential receptors along Barham Drive are within the City of San Marcos and thus would not be subject to the County of San Diego's Section 36.410 thresholds for impulsive noise, application of **MM-NOI-3** would be recommended to reduce blast noise by at least 5 dB (a feasible quantity of airborne noise reduction in this context) and thus render blasting noise from this roadway project to a less than significant impact.

Blasting Vibration

Blasting for construction projects typically results in an RMS vibration velocity of about 100 VdB at 50 feet from the source (FRA 2005). This is equivalent to a peak particle velocity of about 0.4 inches per second. With blasting activity at this reference magnitude assumed to occur no closer than 45 feet from existing residences in order to fracture onsite rock, and applying distance-related attenuation per FTA guidance (FTA 2018), expected transient vibration from a blast would be 0.46 inches per second PPV. This estimation assumes that the blast vibration source level is comparable to the above-stated value of 100 VdB at 50 feet (per

Federal Railroad Administration guidance), and that the conversion of PPV to VdB involves a crest factor value of 4 as recommended by the FTA (FTA 2018).

Because the existing residences near the proposed project could conservatively be described as older residential structures, the Caltrans-recommended risk threshold for transient vibrations like blasting would be 0.5 inches per second PPV for such receiving structures as shown in Table 4. Therefore, the estimated vibration level of 0.46 inches per second PPV at the nearest residential receptors would be less and result in an anticipated less than significant impact under these conditions.

However, since groundborne vibration level from a blast is not only dependent on distance between the source and receptor, but on other factors such as charge weight, the delay between charge detonations associated with a "single" blast event, and the degree of charge confinement, it is recommended that mitigation measure **MM-NOI-4** be implemented to help ensure the blasts are properly designed and implemented, so that resulting transient vibration levels they generate do not exceed appropriate Caltrans guidance criteria.

Conclusion

Although nearby off-site residences would be exposed to elevated construction noise levels, the exposure would be short-term, and would cease upon project construction. It is anticipated that construction activities associated with the proposed project would take place during the City of San Marcos exempt hours for construction. Nonetheless, as shown in Table 20, at the residences immediately adjacent to the project boundary the estimated noise levels would exceed the construction noise limits in County of San Diego Noise Ordinance Section 36.409 of 75 dBA L_{eq} (8-hr) which is commonly applied in San Marcos. Therefore, noise impacts from construction are considered potentially significant. The implementation of mitigation measures MM NOI-1 through MM NOI-4 would reduce construction noise and vibration levels. Therefore, temporary construction-related noise impacts would be **less than significant with mitigation incorporated.**

MITIGATION MEASURES

Construction activities would generate short-term noise levels greater than 75 dBA 8-hour L_{eq} at existing NSLU at the western and southern project boundaries, as well as at the occupied residence within County jurisdiction southwest of the proposed project site. The following mitigation measures shall be implemented to reduce noise from construction activities.

MM NOI-1 Prior to the issuance of a Construction Permit, the Applicant/Owner or Construction Contractor shall prepare and submit to the City of San Marcos Planning Division (City Planner) for its review and approval a Construction Noise Management Plan

(CNMP). Prior to the issuance of a Construction Permit, Construction Plans shall also include a note indicating compliance with the CNMP is required. The CNMP shall be prepared or reviewed by a Qualified Acoustician (retained at the Applicant/Owner or Construction Contractor's expense) and feature the following:

a. A detailed construction schedule, at daily (or weekly, if activities during each day of the week are typical) resolution and correlating to areas or zones of onsite project construction activity(ies) and the anticipated equipment types and quantities involved. Information will include expected hours of actual operation per day for each type of equipment per phase; and, indication of anticipated concurrent construction activities on site.

b. Suggested locations of a set of noise level monitors, attended by a Qualified Acoustician or another party under its supervision or direction, at which sample outdoor ambient noise levels will be measured and collected over a sufficient sample period and subsequently analyzed (i.e., compared with applicable time-dependent dBA thresholds) to ascertain compliance with the County of San Diego limit of 75 dBA L_{eq} over a consecutive 8-hour period within daytime hours (7:00 a.m. to 7:00 p.m.). Sampling shall be performed, at a minimum, on the first (or otherwise considered typical construction operations) day of each of five (5) distinct construction phases (see Table 19).

c. If sample collected noise level data indicates that the 8-hour noise threshold has or will be exceeded, construction work shall be suspended (for the activity or phase of concern) and the Applicant/Owner or Construction Contractor shall implement one or more of the following measures as detailed or specified in the CNMP:

    i. Administrative controls (e.g., reduce operating time of equipment and/or prohibit usage of equipment type[s] within certain distances).

    ii. Engineering controls (upgrade noise controls, such as install better engine exhaust mufflers).

    iii. Install noise abatement on the site boundary fencing (or within, as practical and appropriate) in the form of sound blankets or comparable temporary barriers to occlude construction noise emission between the site (or specific equipment operation as the situation may define) and the noise-sensitive receptor(s) of concern.

    The implemented measure(s) will be reviewed or otherwise inspected and approved by the Qualified Acoustician (or another party under its supervision or direction) prior to resumption of the construction activity or process that

caused the measured noise concern or need for noise mitigation. Noise levels shall be re-measured, after installation of said measures, to ascertain post-mitigation compliance with the noise threshold. As needed, this process shall be repeated and refined until noise level compliance is demonstrated and documented. A report of this implemented mitigation and its documented success will be provided to the City Planner.

d. The Applicant/Owner or Construction Contractor shall make available a telephone hot-line so that concerned neighbors in the community may call to report noise complaints. The CNMP shall include a process to investigate these complaints and, if determined to be valid, detail efforts to provide a timely resolution and response to the complainant—with copy of resolution provided to the City Planner.

MM NOI-2 The construction contractor shall implement, to the extent practical, the following site measures:

a. All construction equipment shall be properly maintained and equipped with noise-reducing intake, exhaust mufflers, and engine shrouds, in accordance with manufacturers' recommendations. Equipment engine shrouds shall be closed during equipment operation.

b. Electrical power shall be used to run air compressors and similar power tools when local electrical power is available for such devices.

c. Equipment staging areas should be located as far as feasible from occupied residences, and idling of equipment shall be minimized.

MM NOI-3 Prior to the issuance of permit or other approval to conduct blasting activity, the Applicant/Owner or Construction Contractor shall prepare and submit to the City of San Marcos Planning Division (City Planner) for its review and approval a Blasting Plan. The Blasting Plan shall be prepared or reviewed by a State-licensed blaster and feature the following:

a. Blast design details, including but not limited to charge weight, stemming or confinement, detonator delay, and charge weight.

b. Calculation of air over-pressure and corresponding A-weighted dB equivalent, so that anticipated blast noise can be compared with the reference FHWA RCNM level. If the blast noise estimate is greater than the reference level (L_{max} = 94 dBA at 50 feet), then the Blasting Plan will identify usage of blasting mats

and other means to suppress and reduce airborne noise emission from the blast event so that resultant levels, accounting for distance propagation and any sound path occlusion (due to man-made features or terrain) at the nearest residential receptors are compatible with 82 dBA L_{max}.

Upon issuance of the permit or other approval to conduct blasting activity, proper implementation of the Blasting Plan will be the responsibility of the Applicant/Owner or Construction Contractor and include compliance with all relevant City of San Marcos regulations and standards, including but not limited to Section 17.60 of the Municipal Code.

MM NOI-4 Prior to the issuance of permit or other approval to conduct blasting activity, the Applicant/Owner or Construction Contractor shall prepare and submit to the City of San Marcos Planning Division (City Planner) for its review and approval a Blasting Plan. The Blasting Plan shall be prepared or reviewed by a State-licensed blaster and feature the following:

a. Blast design details, including but not limited to charge weight, stemming or confinement, detonator delay, and charge weight.

b. Calculation of peak particle velocity (PPV) vibration, so that anticipated blast vibration can be compared with the reference FRA level of 0.4 inches per second PPV at 50 feet. If the blast vibration estimate is greater than this reference level, then the Blasting Plan will identify usage of trenches, wave barriers, or other means to reduce groundborne vibration from the blast event so that resultant levels—accounting for distance propagation associated with the soil/strata type(s) through which the vibration travels—at the nearest residential receptors are compatible with 0.5 inches per second PPV per Caltrans guidance.

Upon issuance of the permit or other approval to conduct blasting activity, proper implementation of the Blasting Plan will be the responsibility of the Applicant/Owner or Construction Contractor and include compliance with all relevant City of San Marcos regulations and standards, including but not limited to Section 17.60 of the Municipal Code.

Effectiveness of Mitigation Measures

Effectiveness of noise mitigation measures would vary from several decibels (which in general is a relatively small change) to ten or more decibels (which subjectively would be perceived as a

substantial change), depending upon the specific equipment and the original condition of that equipment, the specific locations of the noise sources and the receivers, etc. Installation of a temporary noise barrier, for example, would vary in effectiveness depending upon the degree to which the line-of-sight between the source and receiver is broken, and typically ranges from 5 to 10 dB. Installation of more effective silencers on equipment engine exhausts could range from several decibels to well over 10 decibels. Reduction of idling equipment could reduce overall noise levels from barely any reduction to several decibels. Cumulatively, however, these measures would result in substantial decreases in the noise from construction. With implementation of these measures, short-term construction impacts associated with exposure of persons to or generation of noise levels in excess of established standards would be **less than significant**.

SUMMARY

No exterior noise mitigation is required to address traffic noise because all exterior traffic noise impacts both on-site and off-site would be less than significant. MM NOI-1 through MM NOI-4 would ensure that construction-related noise and vibration levels associated with the proposed project would comply with County noise standards. Therefore, with implementation of these mitigation measures, construction noise impacts would be **less than significant.**

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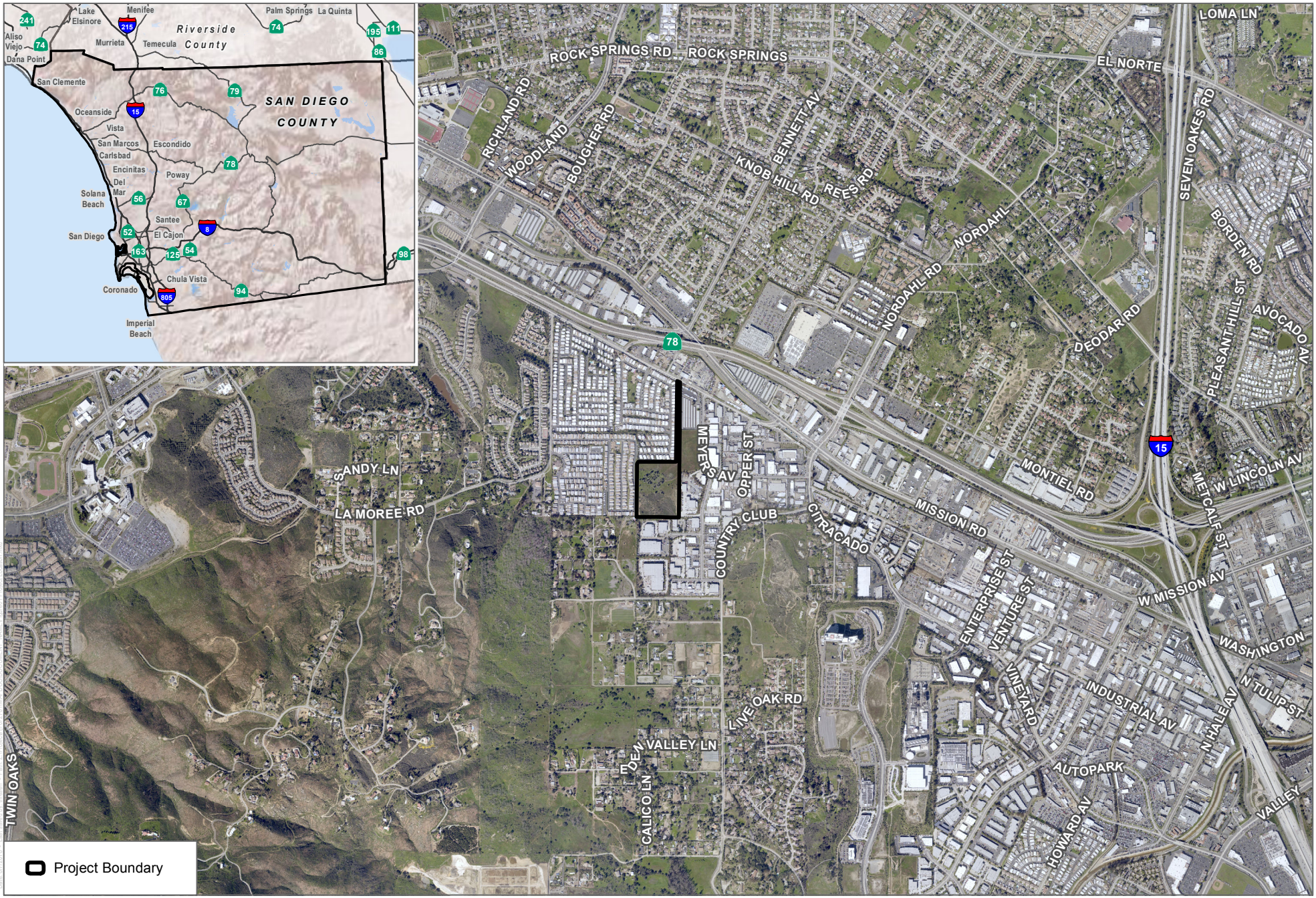


SOURCE: SANDAG 2017

DUDEK

0 1,000 2,000 Feet

FIGURE 1

Project Location

Sunrise San Marcos EIR

SOURCE: SANGIS 2017

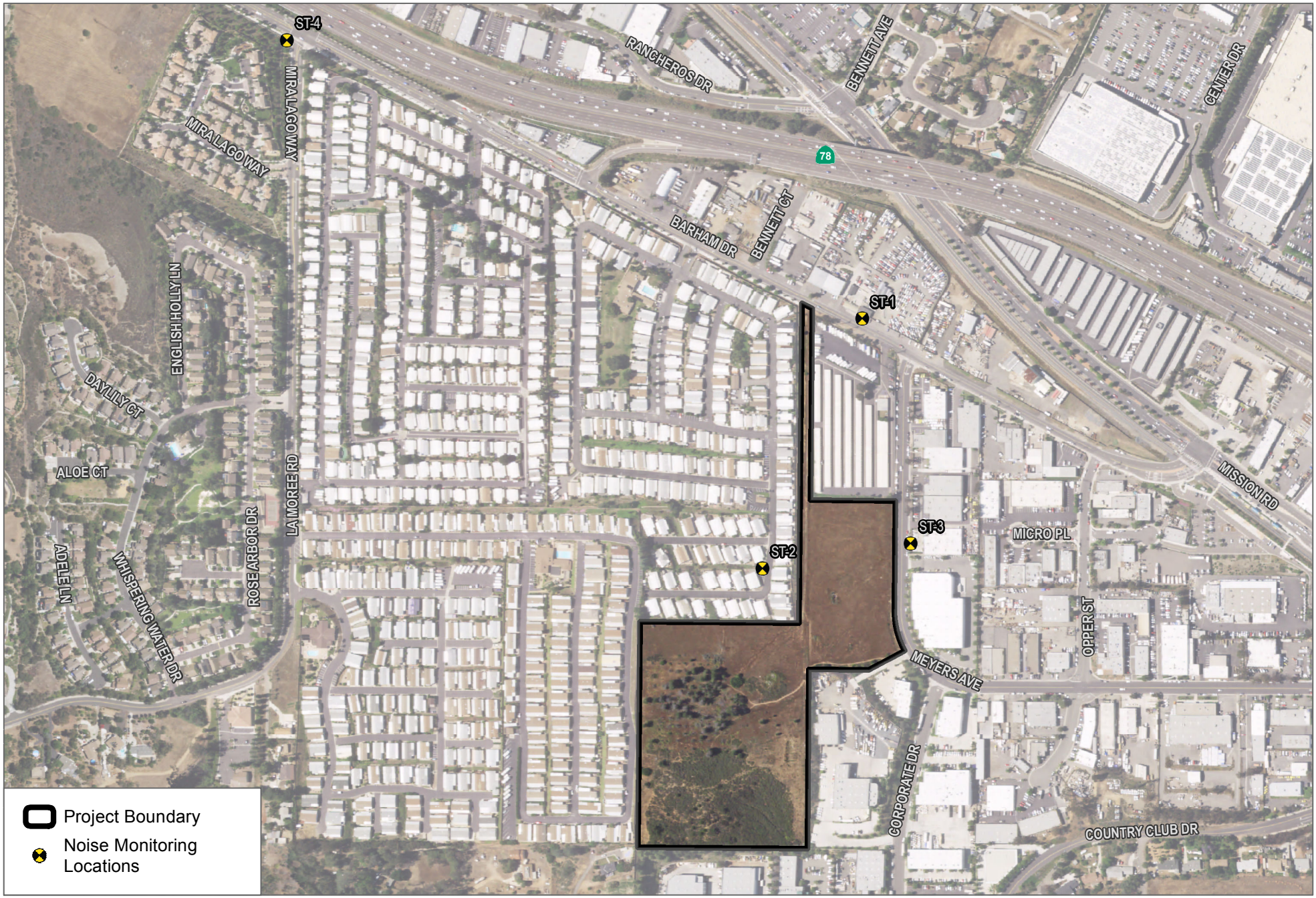
DUDEK

0 100 200 Feet

FIGURE 2

Site Plan

Sunrise San Marcos EIR



SOURCE: USDA 2016

DUDEK

0 250 500 Feet

FIGURE 3

Noise Measurement Locations

Sunrise San Marcos EIR

SOURCE: USDA 2016

DUDEK

0 250 500 Feet

FIGURE 4

Noise Modeling Locations

Sunrise San Marcos EIR

ATTACHMENT 1

Acronyms and Definitions

Attachment 1
Acronyms and Definitions

Term	Definition
ADT	Average Daily Traffic Volume
APN	Assessor's Parcel Number
Ambient Noise Level	The composite of noise from all sources near and far. The normal or existing level of environmental noise at a given location.
ANSI	American National Standards Institute
CadnaA	Computer Aided Noise Abatement – Noise model by DataKustik, GmbH
CalEEMod	California Emissions Estimator Model
Caltrans	California Department of Transportation
CCR	California Code of Regulations
CNEL	Community Noise Equivalent Level - CNEL is the average equivalent A-weighted sound level during a 24-hour day and it is calculated by adding 5 dB to sound levels in the evening (7:00 p.m. to 10:00 p.m.) and adding 10 dB to sound levels in the night (10:00 p.m. to 7:00 a.m.).
dB	Decibel - A unit for measuring sound pressure level and is equal to 10 times the logarithm to the base 10 of the ratio of the measured sound pressure squared to a reference pressure, which is 20 micropascals.
dBA	A-weighted decibel
EPA	United States Environmental Protection Agency
HP	Horsepower
KVA	Kilovolt Amps
LLG	Linscott, Law & Greenspan, Engineers
Ldn	Day-Night Level – Similarly to CNEL, Ldn is the average equivalent A-weighted sound level during a 24-hour day and it is calculated by adding 10 dB to sound levels in the night (10:00 p.m. to 7:00 a.m.).
Leq	Equivalent continuous sound level
Lmax	Maximum sound level during the measurement interval
Lmin	Minimum sound level during the measurement interval
Leq(h)	Hourly Equivalent Noise Level - The sound level corresponding to a steady state sound level containing the same total energy as a time varying signal over an hour period.
L90	Noise level exceeded 90% of the time
L50	Noise level exceeded 50% of the time
L10	Noise level exceeded 10% of the time
L_v	Root mean square (RMS) velocity in decibels (VdB) referenced to 1 micro-inch/second
MM	Mitigation Measure
NSLU	Noise Sensitive Land Use
FHWA	Federal Highway Administration
FICON	Federal Interagency Committee on Noise
FRA	Federal Railroad Administration
FTA	Federal Transit Administration
PPV	Peak Particle Velocity
RCNM	Federal Highway Administration Roadway Construction Noise Model – Version 1.1
RMS	Root Mean Square
SANDAG	San Diego Association of Governments
SR	State Route

Term	Definition
TNM	Federal Highway Administration Traffic Noise Model - TNM 2.5
VdB	Vibration decibels
VMS	Variable Message Sign

ATTACHMENT 2

Field Noise Measurement Data Sheets

DUDEK
CREATOR OF KERATA TECHNOLOGY

FIELD DATA REPORT

Field Noise Measurement Data

Record: 992	
Project Name	*Sunset*
Observer(s)	*Connor Burke*
Date	*2018-06-19*

Instrument and Calibrator Information	
Instrument Name List	*(ENC) Rion NL-52*
Instrument Name	*(ENC) Rion NL-52*
Instrument Name Lookup Key	*(ENC) Rion NL-52*
Manufacturer	*Rion*
Model	*NL-52*
Serial Number	*553896*
Calibrator Name	*(ENC) LD CAL150*
Calibrator Name	*(ENC) LD CAL150*
Calibrator Name Lookup Key	*(ENC) LD CAL150*
Calibrator Manufacturer	*Larson Davis*
Calibrator Model	*LD CAL150*
Calibrator Serial #	*5152*
Pre-Test (dBA SPL)	*94*
Post-Test (dBA SPL)	*94*
Windscreen	*Yes*
Weighting?	*A-WTD*
Slow/Fast?	*Slow*
ANSI?	*Yes*

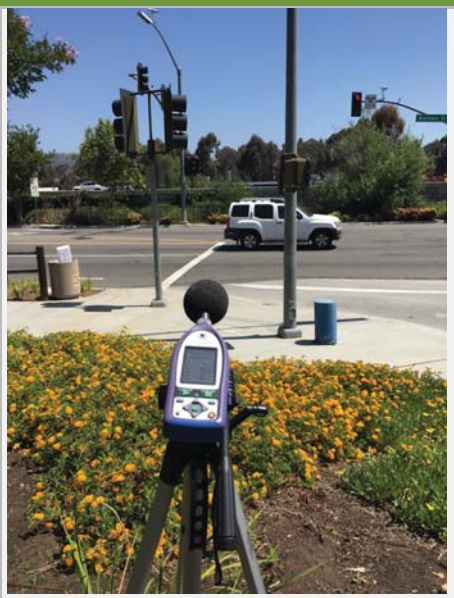
Recordings	
Record #	*1*
Site ID	*ST4*
Site Location Lat/Long	*33.136047, -117.136445*
Begin (Time)	*11:01:00*
End (Time)	*11:09:00*
Leq	*71.2*
Lmax	*78.6*
Lmin	*65.9*
Other Lx?	*L90, L50, L10*
L90	*68.2*
L50	*70.2*
L10	*73.3*
Other Lx (Specify Metric)	*L*
Primary Noise Source	*Traffic*
Is the same instrument and calibrator being used as previously noted?	*Yes*
Are the meteorological conditions the same as previously noted?	*Yes*

DUDEK
CREATOR OF KERATA TECHNOLOGY

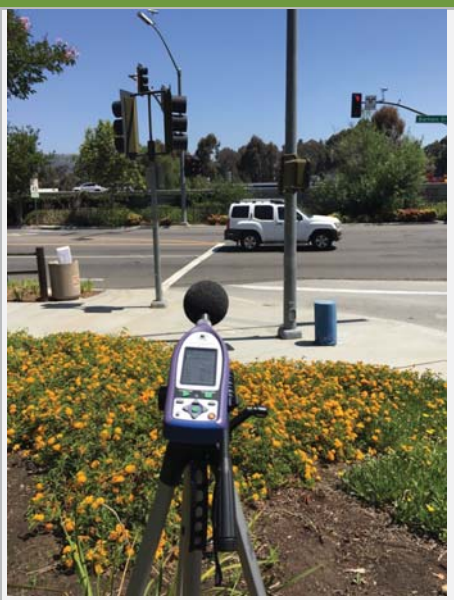
FIELD DATA REPORT

Source Info and Traffic Counts	
Number of Lanes	8
Lane Width (feet)	10
Roadway Width (feet)	80
Roadway Width (m)	24.4
Distance to Roadway (feet)	100
Distance to Roadway (m)	30.5
Estimated Vehicle Speed (MPH)	70

Traffic Counts	
Vehicle Count Summary	A 866, MT 28, HT 22, B 0, MC 0
Counting Both Directions?	Yes
Count Duration (minutes)	0
Vehicle Count Tally	
Select Method for Vehicle Counts	Enter Manually
Number of Vehicles - Autos	866
Number of Vehicles - Medium Trucks	28
Number of Vehicles - Heavy Trucks	22
Number of Vehicles - Buses	0
Number of Vehicles - Motorcyles	0

Description / Photos	
Upload Google Maps Data	

Site Photos

Photo	
	
Comments / Description	*73 cars 3 med*

Recordings

Record #	*2*
Site ID	*ST2*
Site Location Lat/Long	*33.130404, -117.130107*
Begin (Time)	*11:18:00*
End (Time)	*11:33:00*
Leq	*48.1*
Lmax	*60.9*
Lmin	*42.7*
Other Lx?	*L90, L50, L10*
L90	*43.7*
L50	*44.9*
L10	*48.6*
Other Lx (Specify Metric)	*L*
Primary Noise Source	*Distant traffic*
Other Noise Sources (Background)	*Birds, Distant Aircraft, Distant Conversations / Yelling, Distant Traffic*
Is the same instrument and calibrator being used as previously noted?	*Yes*
Are the meteorological conditions the same as previously noted?	*Yes*

Description / Photos

Site Photos

Photo	

Recordings

Record #	*3*
Site ID	*ST1*
Site Location Lat/Long	*33.133155, -117.129074*
Begin (Time)	*11:30:00*
End (Time)	*11:40:00*
Leq	*71*
Lmax	*87.1*
Lmin	*52.9*
Other Lx?	*L90, L50, L10*
L90	*55.1*
L50	*64.9*
L10	*73.9*
Other Lx (Specify Metric)	*L*
Primary Noise Source	*Traffic*
Other Noise Sources (Background)	*Birds, Distant Aircraft, Distant Traffic*
Is the same instrument and calibrator being used as previously noted?	*Yes*
Are the meteorological conditions the same as previously noted?	*Yes*

Source Info and Traffic Counts

Number of Lanes	*2*
Lane Width (feet)	*10*
Roadway Width (feet)	*20*
Roadway Width (m)	*6.1*
Distance to Roadway (feet)	*15*
Distance to Roadway (m)	*4.6*
Estimated Vehicle Speed (MPH)	*35*

Traffic Counts

Vehicle Count Summary	*A 110, MT 2, HT 1, B 0, MC 1*
Counting Both Directions?	*Yes*
Count Duration (minutes)	*0*
Vehicle Count Tally	
Select Method for Vehicle Counts	*Enter Manually*
Number of Vehicles - Autos	*110*
Number of Vehicles - Medium Trucks	*2*
Number of Vehicles - Heavy Trucks	*1*
Number of Vehicles - Buses	*0*
Number of Vehicles - Motorcyles	*1*

Description / Photos

Site Photos

Photo

Recordings

Record #	*4*
Site ID	*ST3*
Site Location Lat/Long	*33.131409, -117.128459*
Begin (Time)	*11:50:00*
End (Time)	*12:15:00*
Leq	*61.7*
Lmax	*76.6*
Lmin	*49.7*
Other Lx?	*L90, L50, L10*
L90	*51.5*
L50	*54.4*
L10	*66.6*
Other Lx (Specify Metric)	*L*
Primary Noise Source	*Traffic*
Other Noise Sources (Background)	*Birds, Distant Aircraft, Distant Conversations / Yelling, Distant Traffic, Rustling Leaves*
Is the same instrument and calibrator being used as previously noted?	*Yes*

Are the meteorological conditions the same as previously noted?	*Yes*

Source Info and Traffic Counts	
Number of Lanes	*2*
Lane Width (feet)	*10*
Roadway Width (feet)	*20*
Roadway Width (m)	*6.1*
Distance to Roadway (feet)	*15*
Distance to Roadway (m)	*4.6*
Estimated Vehicle Speed (MPH)	*35*

Traffic Counts	
Vehicle Count Summary	*A 92, MT 6, HT 6, B 0, MC 3*
Counting Both Directions?	*Yes*
Count Duration (minutes)	*0*
Vehicle Count Tally	
Select Method for Vehicle Counts	*Enter Manually*
Number of Vehicles - Autos	*92*
Number of Vehicles - Medium Trucks	*6*
Number of Vehicles - Heavy Trucks	*6*
Number of Vehicles - Buses	*0*
Number of Vehicles - Motorcyles	*3*

Description / Photos

Site Photos

Photo

ATTACHMENT 3

Construction Noise Model Input and Output Sheets

To User: bordered cells are inputs, unbordered cells have formulae

noise level limit for construction phase, per County of San Diego = 75

allowable hours over which Leq is to be averaged (example: 8 for County of San Diego) = 8

Construction Phase	Federal Highway Administration (FHWA) Roadway Construction Noise Model (RCNM) Equipment Type	Total Equipment Qty	AUF % (from FHWA RCNM)	Reference Lmax @ 50 ft. from FHWA RCNM	Source to Noise-Sensitive Receptor (NSR) Distance (ft.)	Distance-Adjusted Lmax	Allowable Operation Time (hours)	Allowable Operation Time (minutes)	Predicted 8-hour Leq
Exploration	Drill rig truck	1	20	79	30	83.4	8	480	76
							Total for Exploration Phase:		76.4
Excavation	Excavator	1	40	81	30	85.4	8	480	81
							Total for Excavation Phase:		81.5
Pipeline Construction	Flat bed truck	1	40	74	30	78.4	8	480	74
							Total for Pipeline Construction Phase:		74.5
Cover and Re-pave	Paver	1	50	77	30	81.4	8	480	78
	Front end Loader	1	40	79	30	83.4	9	540	80
	Roller	1	20	80	30	84.4	8	480	77
							Total for Cover and Re-pave Phase:		83.5
Excavation	Blasting	1	-- N/A --	94	30	98.4			

To User: bordered cells are inputs, unbordered cells have formulae

noise level limit for construction phase, per County of San Diego = 75

allowable hours over which Leq is to be averaged (example: 8 for County of San Diego) = 8

Construction Phase	Federal Highway Administration (FHWA) Roadway Construction Noise Model (RCNM) Equipment Type	Total Equipment Qty	AUF % (from FHWA RCNM)	Reference Lmax @ 50 ft. from FHWA RCNM	Source to Noise-Sensitive Receptor (NSR) Distance (ft.)	Distance-Adjusted Lmax	Allowable Operation Time (hours)	Allowable Operation Time (minutes)	Predicted 8-hour Leq
Site Preparation	Dozer	1	40	82	50	82.0	2	120	72
	Backhoe	1	40	78	50	78.0	2	120	68
	Front End Loader	1	40	79	50	79.0	2	120	69
						Total for Site Preparation Phase:			**74.8**
Grading	Excavator	1	40	81	50	81.0	2	120	71
	Grader	1	40	85	50	85.0	2	120	75
	Dozer	1	40	82	50	82.0	2	120	72
	Front End Loader	1	40	79	50	79.0	2	120	69
	Backhoe	1	40	78	50	78.0	2	120	68
						Total for Grading Phase:			**78.7**
Building Construction	Man Lift	1	20	75	50	75.0	2	120	62
	Backhoe	1	40	78	50	78.0	2	120	68
						Total for Building Construction Phase:			**69.0**
Paving	Paver	1	50	77	50	77.0	2	120	68
	Roller	1	20	80	50	80.0	2	120	67
	All Other Equipment > 5 HP	1	50	85	50	85.0	2	120	76
						Total for Paving Phase:			**77.1**
Architectural Coating	Compressor (air)	1	40	78	50	78.0	2	120	68
						Total for Architectural Coating Phase:			**68.0**

To User: bordered cells are inputs, unbordered cells have formulae

noise level limit for construction phase, per County of San Diego = 75

allowable hours over which Leq is to be averaged (example: 8 for County of San Diego) = 8

Construction Phase	Federal Highway Administration (FHWA) Roadway Construction Noise Model (RCNM) Equipment Type	Total Equipment Qty	AUF % (from FHWA RCNM)	Reference Lmax @ 50 ft. from FHWA RCNM	Source to Noise-Sensitive Receptor (NSR) Distance (ft.)	Distance-Adjusted Lmax	Allowable Operation Time (hours)	Allowable Operation Time (minutes)	Predicted 8-hour Leq
Site Preparation	Dozer	2	40	82	360	64.9	8	480	64
	Backhoe	2	40	78	360	60.9	8	480	60
	Front End Loader	2	40	79	360	61.9	8	480	61
						Total for Site Preparation Phase:			**66.7**
Grading	Excavator	1	40	81	360	63.9	8	480	60
	Grader	1	40	85	360	67.9	8	480	64
	Dozer	1	40	82	360	64.9	8	480	61
	Front End Loader	1	40	79	360	61.9	8	480	58
	Backhoe	2	40	78	360	60.9	8	480	60
						Total for Grading Phase:			**67.9**
Building Construction	Man Lift	3	20	75	360	57.9	8	480	56
	Backhoe	12	40	78	360	60.9	8	480	68
						Total for Building Construction Phase:			**67.9**
Paving	Paver	2	50	77	360	59.9	8	480	60
	Roller	2	20	80	360	62.9	8	480	59
	All Other Equipment > 5 HP	2	50	85	360	67.9	8	480	68
						Total for Paving Phase:			**68.9**
Architectural Coating	Compressor (air)	1	40	78	360	60.9	8	480	57
						Total for Architectural Coating Phase:			**56.9**

ATTACHMENT 4

Rock Crusher Noise Calculations

Estimated Noise Level from Rock Crusher Activities

Distance to rock crusher	dBA Leq[1]
50	88.9
100	83
200	77
400	71
560	68
800	65
1200	61
1600	59

1 - Based upon 6 dB / doubling of distance

Combined Construction Phase Noise plus Rock Crusher Noise at Nearest Noise-Sensitive Land Uses (Residences to the West)

Construction Phase	L_{eq} (dBA)		
	Construction Phase Noise [1]	*Rock Crusher Noise*	*Combined Construction Phase plus Rock Crusher Noise Levels*
Grading	70	68	72
Paving	73	68	74
Site Preparation	68	68	71

1 - From Table 23. The residences closest to the rock crushing activities would be located approximately 300 feet from construction phase activities