Appendix H

Acoustical Analysis

I-15 Logistics Project

Draft Environmental Impact Report

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Michael Baker INTERNATIONAL

We Make a Difference

Acoustical Technical Memorandum

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From: Danielle Regimbal, Michael Baker International
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Date: March 25, 2020

Subject: I-15 Logistics Center Alternative – Acoustical Technical Memorandum

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PURPOSE

The purpose of this technical memorandum is to evaluate potential short- and long-term term noise and groundborne vibration impacts as a result of the proposed I-15 Logistics Center Alternative (project), located in the City of Fontana (City), San Bernardino County (County), California. As discussed below, the project proposes development of a warehouse facility, realignment of Lytle Creek Road, and the SB 330 Compliance Alternative. Noise impacts associated with development of the warehouse facility and realignment of Lytle Creek Road were previously analyzed in the *I-15 Draft Environmental Impact Report* (DEIR), prepared by Michael Baker International (dated August 2019). As such, this Acoustical Technical Memorandum will address acoustical impacts associated with the SB 330 Compliance Alternative, as well as summarize the noise impacts identified in the DEIR.

PROJECT DESCRIPTION

The proposed project involves the development of a new warehouse facility, the realignment of Lytle Creek road, and the annexation of these and additional areas into the City. Additionally, the project proposes a Senate Bill 330 (SB 330) Compliance Alternative in order to offset the proposed project's lost dwelling unit potential of 65 units.

Sphere of Influence and Annexation

The City's designated sphere of influence includes most, but not all of the project site. Therefore, expansion of the City's sphere of influence is proposed to include the entire project area. The project would be pre-zone, consistent with the City land use and zoning designations. The proposed annexation would include approximately 22 parcels, including the warehouse site and portions of road right-of-way (ROW) for Lytle Creek Road, Sierra Avenue, and I-15.

Warehouse Project

The proposed CapRock Warehouse project consists of a concrete tilt-up logistics warehouse of approximately 1,175,720 square-feet located on approximately 76 acres. The warehouse building would feature two office spaces that would total approximately 30,000 square-feet and would be located on the northeast and southeast corners of the building. The building would feature 199 dock

doors. The site would feature 309 trailer stalls, and 406 automobile stalls for employee parking. Other associated facilities and improvements would include a guard booth, parking, landscaping, and drainage facilities. Parking and site paving would be concrete and asphalt, and would represent approximately 77 percent of the site coverage.

Lytle Creek Road Realignment

The project would include the construction of a new Lytle Creek Road to Sierra Avenue extension from the property's northern boundary and continuing northeast for approximately 0.42 miles.

"SB 330 Compliance" Alternative

Pursuant to SB 330, also known as the Housing Accountability Act, a local agency is prohibited from disapproving, or conditioning approving in a manner that renders infeasible, a housing development project for very low, low-, or moderate-income households or an emergency shelter unless the local agency makes specified written findings based on a preponderance of the evidence in the record. Further, Government Code Section 66300(b)(1)(A) stipulates that agencies shall not "chang[e] the general plan land use designation, specific plan land use designation, or zoning…to a less intensive use… below what was allowed under the land use designation and zoning ordinances in effect on January 1, 2018". For purposes of Government Code Section 66300(b)(1)(A), a "less intensive use" includes, but is not limited to, reductions to height, density, or floor area ratio, new or increased open space or lot size requirements, or new or increased setback requirements, minimum frontage requirements, or maximum lot coverage limitations, or anything that would lessen the intensity of housing.

Approximately 59.53 acres of the Logistics Site are currently designated by the County as Single Residential (RS), which permits up to 1 dwelling unit per acre (du/acre). In addition, 15.95 acres of the Logistics Site are currently designated Rural Living (RL), which permits residential development at a density of 1 du/2.5 acre. Under these designations, a total of 65 potential dwelling units would be "lost" with implementation of the proposed project; refer to Table 1, *Lost Dwelling Unit Potential*.

Table 1
Lost Dwelling Unit Potential

Assessor's Parcel Number (APN)	Acreage	County Zoning	"Lost" Development Potential
0239-071-08	3.91	RS (1 du/acre)	
0239-071-25	39.79		
0239-071-27	14.76	RS/IN (1 du/acre)	
0239-071-20	1.07		
Total RS	***59.53***		***59 dwelling units***
0239-071-17	0.32	RL (1 du/2.5 acre)	
0239-041-18	2.03		
0239-091-13	13.60		
Total RL	***15.95***		***6 dwelling units***
TOTAL LOGISTICS SITE	**75.48**		**65 dwelling units**

Pursuant to SB 330 requirements, the SB 330 Compliance Alternative was selected for analysis in order to offset the proposed project's lost dwelling unit potential of 65 units. Specifically, the

SB 330 Compliance Alternative considers the "upzone" of an approximately 12.5-acre site comprised of 28 contiguous parcels generally located between Ceres Avenue to the north, Citrus Avenue to the east, Merrill Avenue to the south, and Catawba Avenue to the west. Regional access to the SB 330 Compliance Alternative is provided via the Interstate 10 (I-10; Christopher Columbus Transcontinental Highway) or Interstate 15 (I-15; Ontario Freeway). Local access to the SB 330 Compliance Alternative is provided via Ceres Avenue, Citrus Avenue, Merrill Avenue, and Catawba Avenue.

The site selected for the SB 330 Compliance Alternative is currently zoned by the City as Single Family Residential (R-1), which permits up to 5 du/acre. Under this alternative, the site would be re-zoned as Medium Density Residential (R-2), which permits between 5.1 to 12 du/acre. The R-2 Zone is defined by the Zoning Code as a medium intensity, multiple-family zoning district that permits the development of attached and detached single-family, duplex, and multiple-family dwellings, as well as condominiums.

Applying an R-2 zoning designation on the 12.5-acre site would accommodate the future development of up to 150 units, which is 87 additional units beyond what the current R-1 zoning would allow. Therefore, the proposed R-2 zoning designation would offset the 65 lost dwelling units on the project site, and create an additional 22 dwelling units.

CEQA THRESHOLDS

The environmental analysis in this memorandum is patterned after the Initial Study Checklist (Appendix G) within the California Environmental Quality Act (CEQA) Guidelines. The issues presented in the Initial Study Checklist have been utilized as thresholds of significance in this analysis. Accordingly, a project may have a significant adverse impact related to noise and vibration if it would do any of the following:

:

- Generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies (refer to Impact NOI-1);

- Generation of excessive groundborne vibration or groundborne noise levels (refer to Impact NOI-2); and

- For a project located within the vicinity of a private airstrip or an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project expose people residing or working in the project area to excessive noise levels (refer to Impact NOI-3).

IMPACT ANALYSIS

NOI-1 Generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?

Warehouse Facility/Lytle Creek Road Realignment

As stated in the DEIR, noise levels generated during the Warehouse Facility/Lytle Creek Road Realignment grading phase would range from 61.5 dBA to 45.2 dBA at the nearest sensitive receptors, which is below the highest measured ambient noise level in the project vicinity.

Therefore, noise levels generated during short-term construction activities were determined to be less than significant.

Operational sources of noise analyzed in the DEIR included off-site mobile noise and on-site operational noise (i.e., heating, ventilation, and air conditioning [HVAC] systems, slow-moving trucks, loading bay operations, and parking lot activities). The Warehouse Facility-generated 2,046 daily trips was determined to not result in a perceptible noise level increase. Therefore, the DEIR concluded off-site mobile noise would be less than significant. The DEIR stated that HVAC systems at the Warehouse Facility site would be acoustically engineered with appropriate procurement specifications, sound enclosures, and parapet walls to minimize noise. As a result, HVAC systems were determined to not exceed allowable noise limits. Noise generated from slow-moving trucks and loading bay operations were determined to remain below the applicable noise standards at the nearest sensitive receptors. Additionally, parking lot noise associated with the Warehouse Facility was determined to not exceed the applicable noise standards. Therefore, the DEIR concluded that on-site operational noise (i.e., HVAC systems, slow-moving trucks, loading bay operations, and parking lot activities) would be less than significant.

SB 330 Compliance Alternative

Short-term Construction

Construction activities generally are temporary and have a short duration, resulting in periodic increases in the ambient noise environment. Ground-borne noise and other types of construction-related noise impacts would typically occur during the demolition and site grading phases. Generally, these phases have the shortest duration of all construction phases. High groundborne noise levels and other miscellaneous noise levels can be created during this phase due to the operation of graders, tractors, and backhoes. Typical noise levels generated by construction equipment are shown in Table 2, *Maximum Noise Levels Generated by Construction Equipment*.

Table 2
Maximum Noise Levels Generated by Construction Equipment

Type of Equipment	Acoustical Use Factor[1]	L_{max} at 40 Feet (dBA)
Concrete Saw	20	92
Crane	16	81
Concrete Mixer Truck	40	81
Backhoe	40	80
Dozer	40	84
Excavator	40	83
Forklift	40	80
Paver	50	79
Roller	20	82
Tractor	40	86
Water Truck	40	82
Grader	40	87

Note:
1. Acoustical Use Factor (percent): Estimates the fraction of time each piece of construction equipment is operating at full power (i.e., its loudest condition) during a construction operation.

Source: Federal Highway Administration, *Roadway Construction Noise Model (FHWA-HEP-05-054)*, January 2006.

It should be noted that the noise levels identified in Table 2 are maximum sound levels (L_{max}), which are the highest individual sound occurring at an individual time period. Operating cycles for these types of construction equipment may involve one or two minutes of full power operation followed by three to four minutes at lower power settings. Other primary sources of acoustical disturbance would be due to random incidents, which would last less than one minute (such as dropping large pieces of equipment or the hydraulic movement of machinery lifts).

The nearest sensitive receptors are residential uses located approximately 40 feet to the north and west of the project site. At this distance, construction noise levels could range between approximately 79 dBA and 92 dBA; refer to Table 2. Although sensitive receptors may be exposed to increased noise levels during project construction, the City of Fontana's Municipal Code Section 18-63(b)(7) permits construction activities between the hours of 7:00 a.m. and 6:00 p.m. on weekdays and between the hours of 8:00 a.m. and 6:00 p.m. on Saturdays. In addition, construction equipment would be used throughout the project site and would not be concentrated at the point closest to the sensitive receptors. As such, construction noise impacts would be less than significant.

Long-Term Operational Impacts

Mobile Noise

Future development generated by the proposed project would result in additional traffic on adjacent roadways, thereby increasing vehicular noise in the vicinity of existing and proposed land uses. According to the *Highway Traffic Noise Analysis and Abatement Policy and Guidance*, a doubling of traffic volumes would result in a 3 dB increase in traffic noise levels, which is barely detectable by the human ear.[1] The SB 330 Compliance Alternative would create an additional 87 units, which would result in approximately 915 daily trips.[2]

Table 3, *Existing and Project Traffic Volumes*, depicts existing and project generated peak hour intersection turning movement volumes in the project vicinity. As shown in Table 3, the project generated peak hour traffic volumes would not double existing peak hour traffic volumes at the Merrill Avenue/Catawba Avenue and Merrill Avenue/Citrus Avenue intersections. Therefore, any increase in traffic noise along local roadways would be imperceptible and impacts would be less than significant.

Mechanical Noise

The only audible mechanical noise from the project would result from the use of mechanical equipment (i.e., from heating, ventilation and air conditioning [HVAC] units). Typically, HVAC noise is 50 dBA at 50 feet from the source.[3] At the time of this analysis, the location of the HVAC units is unknown. However, to provide a conservative analysis, the closest distance of 40 feet from the project boundary line to the residential uses to the north and west will be utilized. At this distance, HVAC noise levels would be approximately 52 dBA. Therefore, the City's exterior noise

[1] U.S. Department of Transportation, *Highway Traffic Noise Analysis and Abatement Policy and Guidance*, updated August 24, 2017, https://www.fhwa.dot.gov/environMent/noise/regulations_and_guidance/polguide/polguide02.cfm, accessed on March 23, 2020.

[2] Michael Baker International, *CapRock I-15 Logistics Center – SB 330 Compliance Alternative Analysis*, March 19, 2020.

[3] U.S. Environmental Protection Agency, *Noise From Construction Equipment and Operations, Building Equipment, and Home Appliances*, December 1971.

standard (65 dBA) would not be exceeded as a result of HVAC units at the project site. Impacts would be less than significant in this regard.

Table 3
Existing and Project Traffic Volumes

Segment	Existing	Project	Doubling of Traffic Volumes?
Peak Hour Intersection Turning Movement Volumes			
Merrill Avenue/Catawba Avenue	869 a.m.	67 a.m.	No
	977 p.m.	89 p.m.	No
Merrill Avenue/Citrus Avenue	2,293 a.m.	40 a.m.	No
	2,893 p.m.	54 p.m.	No

Source: Michael Baker International, *CapRock I-15 Logistics Center – SB 330 Compliance Alternative Analysis*, March 19, 2020.

Mitigation Measures: No mitigation is required.

NOI-2 Generation of excessive groundborne vibration or groundborne noise levels?

Warehouse Facility/Lytle Creek Road Realignment

The DEIR analyzed groundborne vibration associated with construction of the Warehouse Facility/ Lytle Creek Road Realignment and determined operation of the Warehouse Facility would not generate substantial levels of groundborne vibration. As stated in the DEIR, operation of construction equipment associated with development of the Warehouse Facility/ Lytle Creek Road Realignment would not result in a groundborne vibration velocity level above 0.20 inch-per-second at the nearest off-site structures. Therefore, the DEIR concluded construction and operational vibration impacts to be less than significant.

SB 330 Compliance Alternative

Short-Term Construction

Project construction can generate varying degrees of groundborne vibration, depending on the construction procedure and the construction equipment used. Operation of construction equipment generates vibrations that spread through the ground and diminish in amplitude with distance from the source. The effect on buildings located in the vicinity of the construction site often varies depending on soil type, ground strata, and construction characteristics of the receiver building(s). The results from vibration can range from no perceptible effects at the lowest vibration levels, to low rumbling sounds and perceptible vibration at moderate levels, to slight damage at the highest levels. Groundborne vibrations from construction activities rarely reach levels that damage structures.

The Federal Transit Administration (FTA) has published standard vibration velocities for construction equipment operations. In general, the FTA architectural damage criterion for continuous vibrations (i.e., 0.20 inch-per-second) appears to be conservative. The types of construction vibration impact include human annoyance and building damage. Human annoyance occurs when construction vibration rises significantly above the threshold of human perception for extended periods of time. Building damage can be cosmetic or structural. Typical

vibration produced by construction equipment is illustrated in Table 4, *Typical Vibration Levels for Construction Equipment*.

The highest degree of groundborne vibration would be generated during the grading and paving construction phases due to the operation of a vibratory roller. The nearest structure would be the residential uses located approximately 40 feet north and west of the project boundary line. As indicated in Table 4, based on the FTA data, vibration velocities from typical heavy construction equipment operation that would be used during project construction range from 0.001 to 0.104 inch-per-second peak particle velocity (PPV) at 40 feet from the source of activity. Therefore, vibration from construction activities experienced at the closest structure would be below the 0.20 inch-per-second PPV significance threshold and impacts would be less than significant.

Table 4
Typical Vibration Levels for Construction Equipment

Equipment	Approximate peak particle velocity at 40 feet (inch-per-second)
Large bulldozer	0.044
Loaded trucks	0.038
Small bulldozer	0.001
Jackhammer	0.017
Vibratory Roller	0.104

Notes:
1. Federal Transit Administration, *Transit Noise and Vibration Impact Assessment Guidelines*, May 2006. Table 12-2.
2. Calculated using the following formula:

$$PPV_{equip} = PPV_{ref} \times (25/D)^{1.5}$$

where: PPV (equip) = the peak particle velocity in inch-per-second of the equipment adjusted for the distance
PPV (ref) = the reference vibration level in inch-per-second from Table 12-2 of the FTA *Transit Noise and Vibration Impact Assessment Guidelines*
D = the distance from the equipment to the receiver

Source: Federal Transit Administration, *Transit Noise and Vibration Impact Assessment Guidelines*, May 2006.

Long-Term Operational Impacts

The project proposes a residential development that would not generate ground-borne vibration. The proposed project would not involve rail traffic or heavy truck operations, and therefore would not result in vibration impacts at surrounding uses. A less than significant impact would occur is this regard.

Mitigation Measures: No mitigation is required.

NOI-3 For a project located within the vicinity of a private airstrip or an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project expose people residing or working in the project area to excessive noise levels?

Warehouse Facility/Lytle Creek Road Realignment

The DEIR stated that the Warehouse Facility is not located within two miles of a public or private airport. Therefore, the DEIR concluded a less than significant impact would result as the Warehouse Facility would not expose people residing or working in the project area to excessive noise levels associated with aircraft.

SB 330 Compliance Alternative

The proposed project is not located within an airport land use plan. Further, there is no public airport, public use airport, or private airstrip located within two miles of the project site. The nearest airport to the project site is the Municipal Rialto Airport, located approximately 3.7 miles to the northeast of the project site. Therefore, no impacts would occur in this regard.

Mitigation Measures: No mitigation is required.

REFERENCES

California Department of Transportation, *Technical Noise Supplement to the Traffic Noise Analysis Protocol*, 2013.

City of Fontana, *City of Fontana Municipal Code*, codified through February 27, 2020.

Federal Highway Administration, *Roadway Construction Noise Model (FHWA-HEP-05-054)*, dated January 2006.

Federal Highway Administration, *Roadway Construction Noise Model User's Guide*, June 2006.

Federal Transit Administration, *Transit Noise and Vibration Impact Assessment Guidelines*, May 2006. Table 12-2.

Google Earth, 2019.

Michael Baker International, *CapRock I-15 Logistics Center – SB 330 Compliance Alternative Analysis*, dated March 19, 2020.

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ACOUSTICAL ANALYSIS

for the

I-15 LOGISTICS CENTER

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July, 2018

JN 161657

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TABLES

EXHIBITS

APPENDICES

1.0 INTRODUCTION

This report includes a description of existing noise conditions, a summary of applicable regulations, and an analysis of potential noise impacts associated with the proposed CapRock Warehouse project. The purpose of this report is to estimate and evaluate the potential noise and vibration impacts associated with construction and operation of the proposed project relative to the significance thresholds and noise/vibration standards of the City of Fontana.

1.1 PROJECT LOCATION

The project site is located within the unincorporated San Bernardino County just north of Interstate 15 (I-15) Freeway, south of Sierra Avenue, east of Lytle Creek Road and within the northern portion of the Sphere of Influence of the City of Fontana. More specifically, the project site is located at the base of lower slopes of the San Gabriel Mountains and the San Bernardino National Forest located to the northwest. Regional access to the site is from I-15 via the Sierra Avenue interchange, and Interstate 210 (I-210) via the Citrus or Sierra Avenue interchanges. Local access to the project site would be provided via Lytle Creek Road. Refer to **Exhibit 1**, *Regional Vicinity Map* and **Exhibit 2**, *Project Vicinity Map*.

The existing County land use designation for proposed project consists of Single Residential (RS) 1-acre minimum, Institutional (IN), Rural Living (RL), and Special Development (SD). Currently, the site has been pre-zoned as Residential Estates (R-E) under the City's land use plan. Surrounding land uses include RL to the north, RS to the south, Regional Mixed Use (R-MU) to the east and SD and Resource Conservation (RC) to the west.

1.2 PROJECT DESCRIPTION

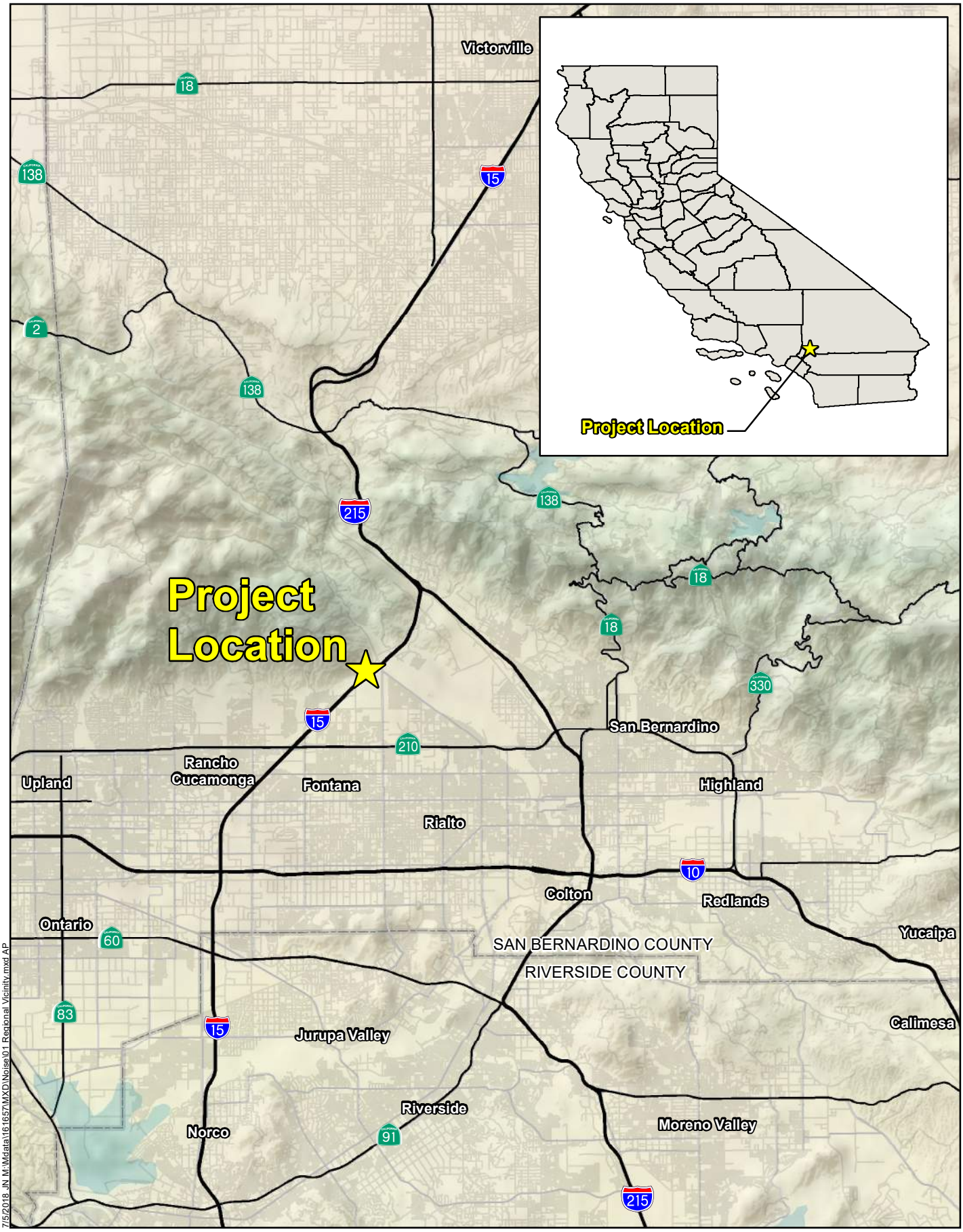
The proposed project involves the development of a new warehouse facility, the realignment of Lytle Creek road, and the annexation of these and additional areas into the City of Fontana.

SPHERE OF INFLUENCE AND ANNEXATION

The City's designated sphere of influence includes most, but not all of the project site. Therefore, expansion of the City's sphere of influence is proposed to include the entire project area. The project would be pre-zone, consistent with the City of Fontana land use and zoning designations. The proposed annexation would include approximately 22 parcels, including the warehouse site and portions of road right-of-way (ROW) for Lytle Creek Road, Sierra Avenue, and I-15.

WAREHOUSE PROJECT

The proposed CapRock Warehouse project consists of a concrete tilt-up logistics warehouse of approximately 1,175,720 square-feet located on approximately 76 acres. The warehouse building would feature two office spaces that would total approximately 30,000 square-feet and would be located on the northeast and southeast corners of the building. The building would feature



7/5/2018 JN M:\Mdata\161657\MXD\Noise\01 Regional Vicinity.mxd AP

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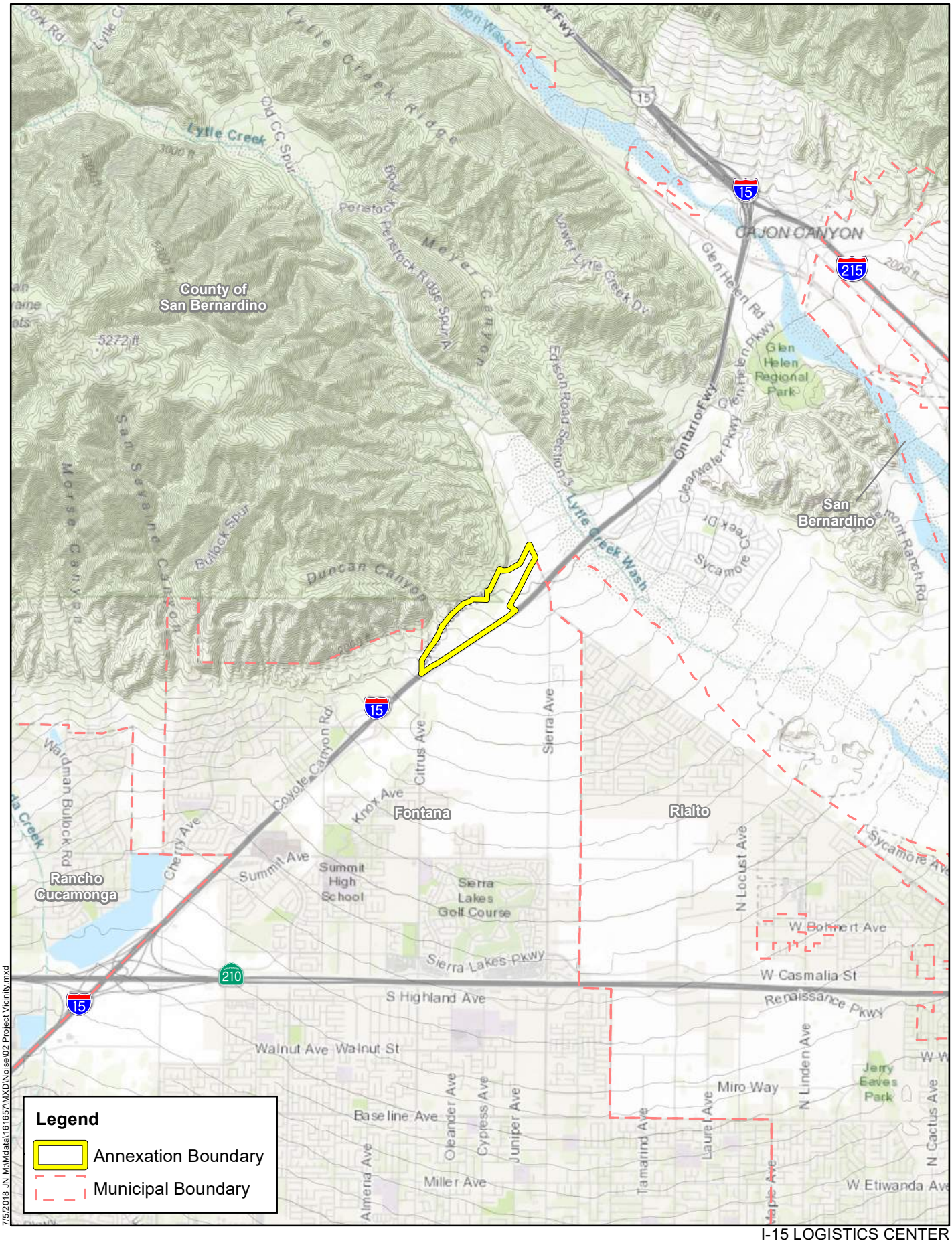
0 2.5 5 Miles

Source: ESRI Relief Map, National Highway Planning Network

I-15 LOGISTICS CENTER
ACOUSTICAL ANALYSIS

Regional Vicinity

Exhibit 1



7/5/2018 JN M:\Mdata\161657\MXD\Noise\02 Project Vicinity.mxd

Source: ESRI USA Topographic Basemap, San Bernardino County, United States Geological Survey

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I-15 LOGISTICS CENTER
ACOUSTICAL ANALYSIS

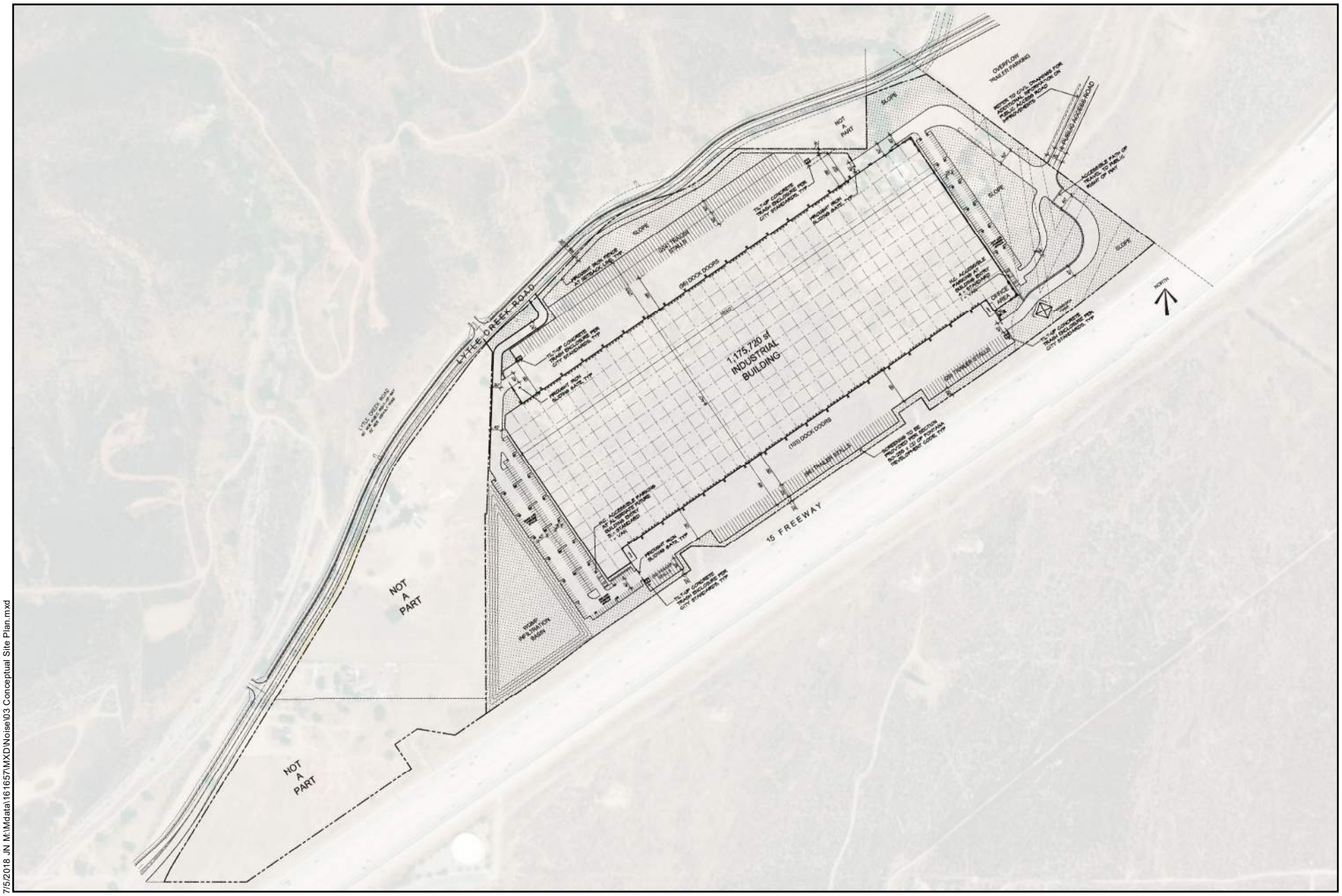
Project Vicinity

Exhibit 2

199 dock doors. The site would feature 309 trailer stalls, and 406 automobile stalls for employee parking. Other associated facilities and improvements would include a guard booth, parking, landscaping, and drainage facilities. Parking and site paving would be concrete and asphalt, and would represent approximately 77 percent of the site coverage. Refer to **Exhibit 3**, *Conceptual Site Plan*.

LYTLE CREEK ROAD REALIGNMENT

The project would include the construction of a new Lytle Creek Road to Sierra Avenue extension from the property's northern boundary and continuing northeast for approximately 0.42 miles. See **Exhibit 4**, *Lytle Creek Road Realignment*.



7/5/2018 JN M:\Data\161657\MXD\Noise\03 Conceptual Site Plan.mxd

I-15 LOGISTICS CENTER
ACOUSTICAL ANALYSIS

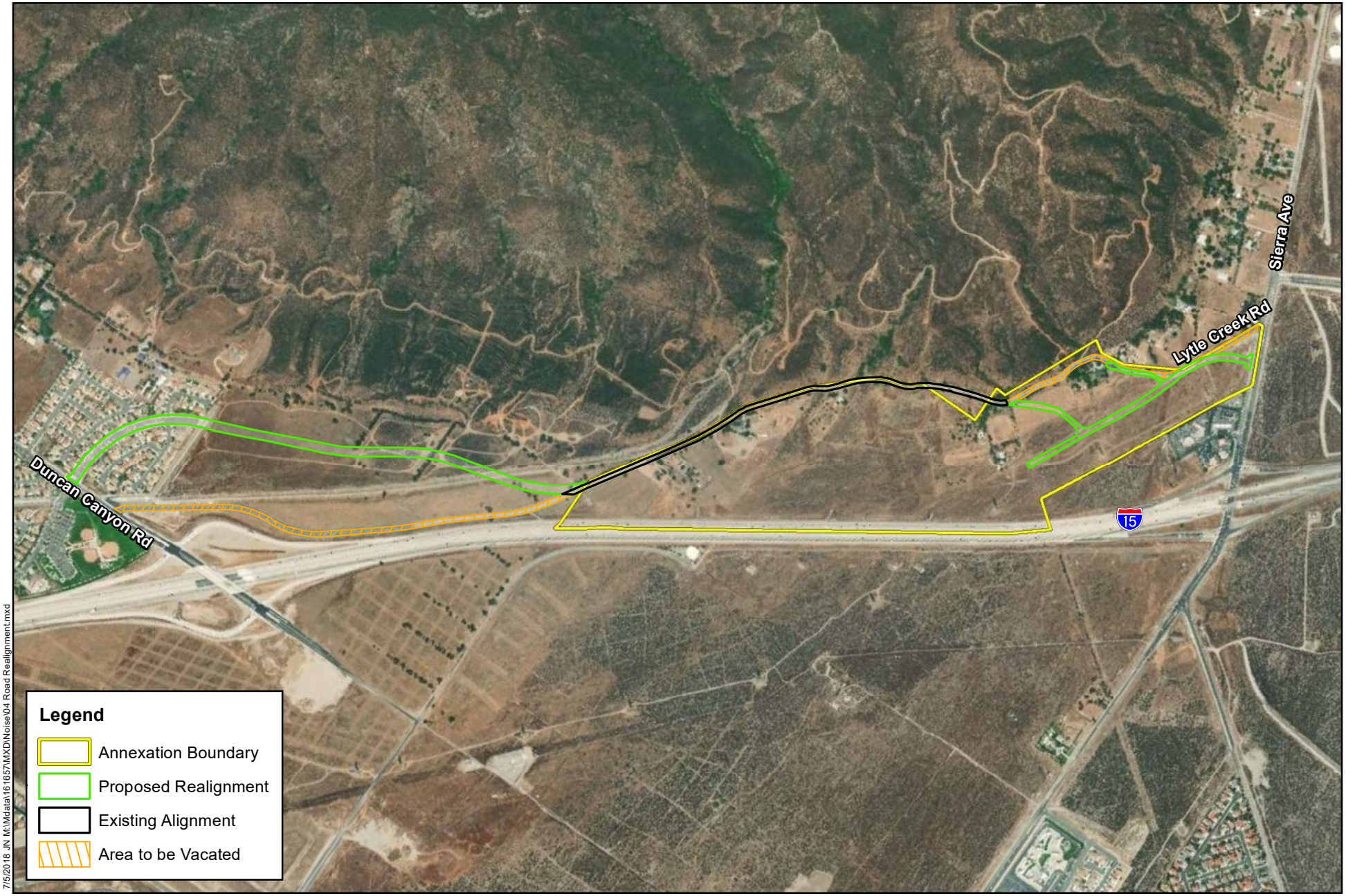
Conceptual Site Plan

Michael Baker INTERNATIONAL

Not to Scale

Source: Douglas Franz Architects Inc.

Exhibit 3



7/5/2018 JN M:\Mdata\16165\MXD\Noise\04 Road Realignment.mxd

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0 0.25 0.5 Miles

Source: Esri imagery, Urban Crossroads

I-15 LOGISTICS CENTER
ACOUSTICAL ANALYSIS

Proposed Road Realignment

Exhibit 4

2.0 NOISE

Noise is a subjective reaction to different types of sounds. Noise is typically defined as airborne sound that is loud, unpleasant, unexpected, or undesired and may therefore be classified as a more specific group of sounds. A typical noise environment consists of a base of steady "background" noise that is the sum of many distant and indistinguishable noise sources. Superimposed on this background noise is the sound from individual local sources. These sources can vary from an occasional aircraft or train passing by to virtually continuous noise from, for example, traffic on a major highway. Perceptions of sound and noise are highly subjective from person to person.

2.1 FUNDAMENTALS OF ACOUSTICS

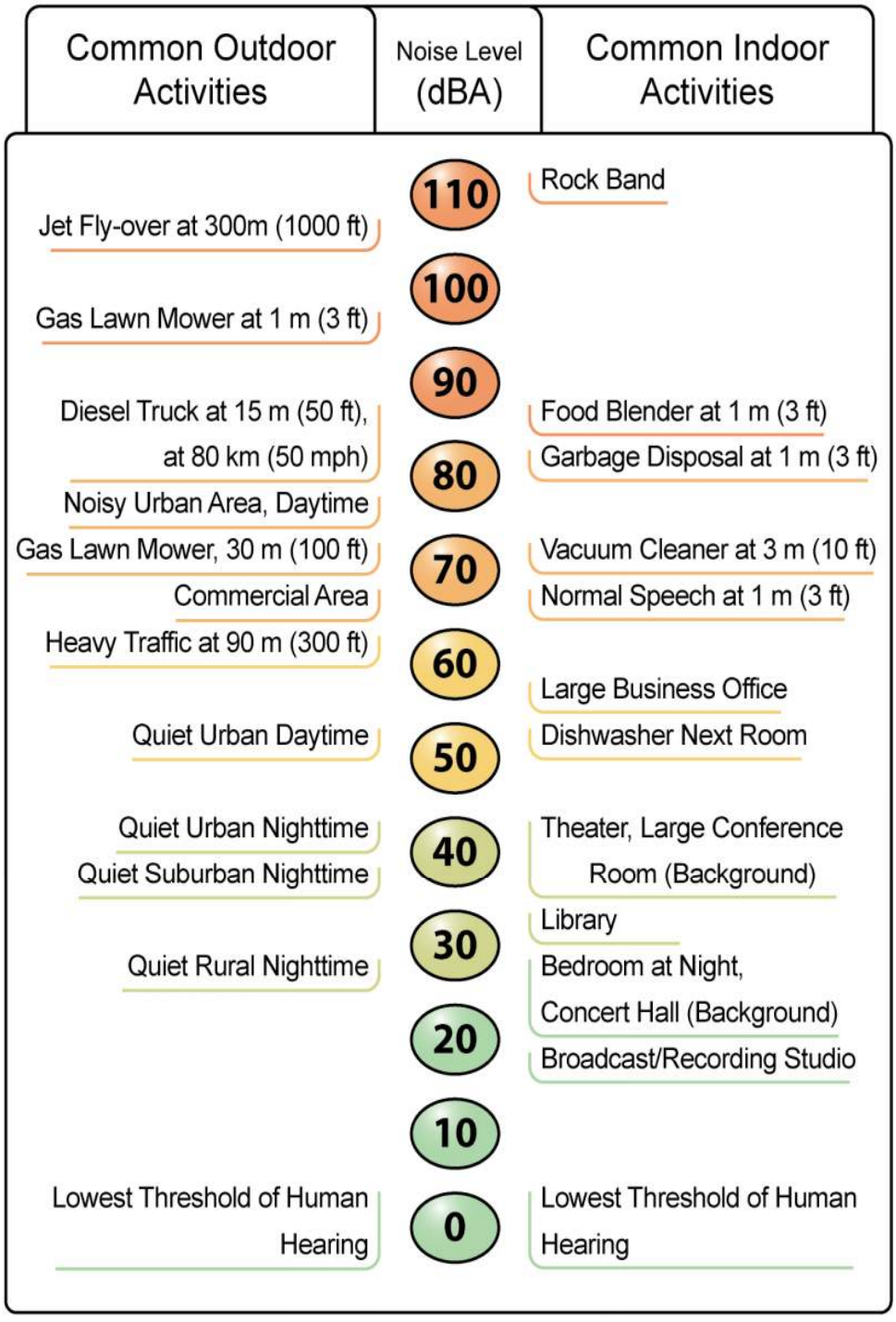
Acoustics is the science of sound. Sound may be thought of as mechanical energy of a vibrating object transmitted by pressure waves through a medium to human (or animal) ears. If the pressure variations occur frequently enough (at least 20 times per second), they can be heard and are called sound. The number of pressure variations per second is called the frequency of sound and is expressed as cycles per second, or hertz (Hz).

Standard Unit of Measurement

Sound is described in terms of the loudness (amplitude) of the sound and frequency (pitch) of the sound. The standard unit of measurement of the loudness of sound is the decibel (dB). Since the human ear is not equally sensitive to sound at all frequencies, a special frequency-dependent rating scale has been devised to relate noise to human sensitivity. The A-weighted decibel scale (dBA) performs this compensation by differentiating among frequencies in a manner approximating the sensitivity of the human ear.

Decibels are based on the logarithmic scale. The logarithmic scale compresses the wide range in sound pressure levels to a more usable range of numbers in a manner similar to the Richter scale used to measure earthquakes. In terms of human response to noise, a sound 10 dBA higher than another is perceived to be twice as loud and 20 dBA higher is perceived to be four times as loud, and so forth. Everyday sounds normally range from 30 dBA (very quiet) to 100 dBA (very loud). Examples of various sound levels in different environments are illustrated in **Exhibit 5**, *Typical Community Noise Levels*.

EXHIBIT 5 TYPICAL COMMUNITY NOISE LEVELS



Source: Caltrans 2013b

Table 1, *Noise Descriptors*, lists various methods to measure sound over a period of time.

TABLE 1 NOISE DESCRIPTORS

Term	Definition
Decibel (dB)	The unit for measuring the volume of sound equal to 10 times the logarithm (base 10) of the ratio of the pressure of a measured sound to a reference pressure (20 micropascals).
A-Weighted Decibel (dBA)	A sound measurement scale that adjusts the pressure of individual frequencies according to human sensitivities. The scale accounts for the fact that the region of highest sensitivity for the human ear is between 2,000 and 4,000 cycles per second (hertz).
Equivalent Sound Level (L_{eq})	The sound level containing the same total energy as a time varying signal over a given time period. The L_{eq} is the value that expresses the time averaged total energy of a fluctuating sound level.
Maximum Sound Level (L_{max})	The highest individual sound level (dBA) occurring over a given time period.
Minimum Sound Level (L_{min})	The lowest individual sound level (dBA) occurring over a given time period.
Community Noise Equivalent Level (CNEL)	A rating of community noise exposure to all sources of sound that differentiates between daytime, evening, and nighttime noise exposure. These adjustments are +5 dBA for the evening, 7:00 PM to 10:00 PM, and +10 dBA for the night, 10:00 PM to 7:00 AM.
Day/Night Average (L_{dn})	The L_{dn} is a measure of the 24-hour average noise level at a given location. It was adopted by the US Environmental Protection Agency for developing criteria for the evaluation of community noise exposure. It is based on a measure of the average noise level over a given time period called the L_{eq}. The L_{dn} is calculated by averaging the L_{eqs} for each hour of the day at a given location after penalizing the "sleeping hours" (defined as 10:00 PM to 7:00 AM) by 10 dBA to account for the increased sensitivity of people to noises that occur at night.
Exceedance Level (L_n)	The A-weighted noise levels that are exceeded 1%, 10%, 50%, and 90% (L_{01}, L_{10}, L_{50}, L_{90}, respectively) of the time during the measurement period.

Source: Harris 1979

Addition of Decibels

The decibel scale is logarithmic, not linear, and therefore sound levels cannot be added or subtracted through ordinary arithmetic. Two sound levels 10 dB apart differ in acoustic energy by a factor of 10. When the standard logarithmic decibel is A-weighted, an increase of 10 dBA is generally perceived as a doubling in loudness. For example, a 70 dBA sound is half as loud as an 80 dBA sound and twice as loud as a 60 dBA sound. When two identical sources are each producing sound of the same loudness, the resulting sound level at a given distance would be

3 dB higher than one source under the same conditions[1]. Under the decibel scale, three sources of equal loudness together would produce an increase of 5 dB[2].

Sound Propagation and Attenuation

Sound spreads (propagates) uniformly outward in a spherical pattern, and the sound level decreases (attenuates) at a rate of approximately 6 dB for each doubling of distance from a stationary or point source. Sound from a line source, such as a highway, propagates outward in a cylindrical pattern, often referred to as cylindrical spreading. Sound levels attenuate at a rate of approximately 3 dB for each doubling of distance from a line source, such as a roadway, depending on ground surface characteristics[3]. No excess attenuation is assumed for hard surfaces like a parking lot or a body of water. Soft surfaces, such as soft dirt or grass, can absorb sound, so an excess ground-attenuation value of 1.5 dB per doubling of distance is normally assumed.

Sound levels may also be reduced by intervening structures; generally, a single row of buildings between the receptor and the noise source reduces the noise level by about 5 dBA, while a solid wall or berm reduces noise levels by 5 to 10 dBA[4]. The manner in which older homes in California were constructed generally provides a reduction of exterior-to-interior noise levels of about 20 to 25 dBA with closed windows. The exterior-to-interior reduction of newer residential units is generally 30 dBA or more.

2.2 HEALTH EFFECTS OF NOISE

Human response to sound is highly individualized. Annoyance is the most common issue regarding community noise. The percentage of people claiming to be annoyed by noise generally increases with the environmental sound level. However, many factors also influence people's response to noise. The factors can include the character of the noise, the variability of the sound level, the presence of tones or impulses, and the time of day of the occurrence. Additionally, nonacoustical factors, such as the person's opinion of the noise source, the ability to adapt to the noise, the attitude toward the source and those associated with it, and the predictability of the noise, all influence response. As such, response to noise varies widely from one person to another and with any particular noise, individual responses would range from "not annoyed" to "highly annoyed."

When the noise level of an activity rises above 70 dBA, the chance of receiving a complaint is better, and as the noise level rises, dissatisfaction among the public steadily increases. However, an individual's reaction to a particular noise depends on many factors, as described above. The

[1] FTA. 2006. Transit Noise and Vibration Impact Assessment.

[2] Caltrans. 2013. Technical Noise Supplement to the Traffic Noise Analysis Protocol.

[3] Caltrans. 2011. Traffic Noise Analysis Protocol.

[4] FTA. 2006. Transit Noise and Vibration Impact Assessment

reaction to noise can also be highly subjective; the perceived effect of a particular noise can vary widely among individuals in a community.

The effects of noise are often only transitory, but adverse effects can be cumulative with prolonged or repeated exposure. The effects of noise on the community can be organized into six broad categories:

- Noise-induced hearing loss
- Interference with communication
- Effects of noise on sleep
- Effects on performance and behavior
- Extra-auditory health effects
- Annoyance

Although it often causes discomfort and sometimes pain, noise-induced hearing loss usually takes years to develop. Noise-induced hearing loss can impair the quality of life through a reduction in the ability to hear important sounds and to communicate with family and friends. Hearing loss is one of the most obvious and easily quantified effects of excessive exposure to noise. While the loss may be temporary at first, it could become permanent after continued exposure. When combined with hearing loss associated with aging, the amount of hearing loss directly caused by the environment is difficult to quantify. Although the major cause of noise-induced hearing loss is occupational, substantial damage can be caused by nonoccupational sources.

According to the US Public Health Service, nearly 10 million of the estimated 21 million Americans with hearing impairments owe their losses to noise exposure. Noise can mask important sounds and disrupt communication between individuals in a variety of settings. This process can cause anything from a slight irritation to a serious safety hazard, depending on the circumstance. Noise can disrupt face-to-face communication and telephone communication, and the enjoyment of music and television in the home. It can also disrupt effective communication between teachers and pupils in schools, and can cause fatigue and vocal strain in those who need to communicate in spite of the noise. Interference with communication has proven to be one of the most important components of noise-related annoyance.

Noise-induced sleep interference is another critical component of community annoyance. Sound level, frequency distribution, duration, repetition, and variability can make it difficult to fall asleep and may cause momentary shifts in the natural sleep pattern, or level of sleep. It can produce short-term adverse effects on mood changes and job performance, with the possibility of more serious effects on health if it continues over long periods. Noise can cause adverse effects on task performance and behavior at work, and nonoccupational and social settings. These effects are the subject of some controversy, since the presence and degree of effects depends

on a variety of intervening variables. Most research in this area has focused mainly on occupational settings, where noise levels must be sufficiently high and the task sufficiently complex for effects on performance to occur.

Recent research indicates that more moderate noise levels can produce disruptive after-effects, commonly manifested as a reduced tolerance for frustration, increased anxiety, decreased incidence of "helping" behavior, and increased incidence of "hostile" behavior. Noise has been implicated in the development or exacerbation of a variety of health problems, ranging from hypertension to psychosis. As with other categories, quantifying these effects is difficult due to the variables that need to be considered in each situation. As a biological stressor, noise can influence the entire physiological system. Most effects seem to be transitory, but continued exposure in laboratory animals has revealed some effects to be chronic.

Annoyance can be viewed as the expression of negative feelings resulting from interference with activities, as well as the disruption of one's peace of mind and the enjoyment of one's environment. Field evaluations of community annoyance are useful for predicting the consequences of planned actions involving highways, airports, road traffic, railroads, or other noise sources. The consequences of noise-induced annoyance are privately held dissatisfaction, publicly expressed complaints to authorities, and potential adverse health effects, as discussed above. In a study conducted by the US Department of Transportation, the relationship between the effects of annoyance and the community were quantified. In areas where exterior noise levels were consistently above 60 dBA community noise equivalent level (CNEL), approximately 9 percent of the community is highly annoyed. When levels exceed 65 dBA CNEL, that percentage rises to 15 percent. Although evidence for the various effects of noise have differing levels of certainty, it is clear that noise can affect human health. Most of the effects are, to a varying degree, stress related.

2.3 GROUNDBORNE VIBRATION

Sources of earthborne vibrations include natural phenomena (earthquakes, volcanic eruptions, sea waves, landslides, etc.) or man-made causes (explosions, machinery, traffic, trains, construction equipment, etc.). Vibration sources may be continuous (e.g., factory machinery) or transient (e.g., explosions).

Ground vibration consists of rapidly fluctuating motions or waves with an average motion of zero. Several different methods are typically used to quantify vibration amplitude. One is the peak particle velocity (PPV); another is the root mean square (RMS) velocity. The PPV is defined as the maximum instantaneous positive or negative peak of the vibration wave. The RMS velocity is defined as the average of the squared amplitude of the signal. The PPV and RMS vibration velocity amplitudes are used to evaluate human response to vibration. For the purposes of this analysis, a PPV descriptor with units of inches per section (in/sec) is used to evaluate construction-generated vibration for building damage and human complaints. **Table 2**, *Human Reaction and Damage to Buildings for Continuous or Frequent Intermittent Vibration Levels*, displays the reactions of people and the effects on buildings produced by continuous vibration levels. The

annoyance levels shown in **Table 2** should be interpreted with care since vibration may be found to be annoying at much lower levels than those shown, depending on the level of activity or the sensitivity of the individual. To sensitive individuals, vibrations approaching the threshold of perception can be annoying. Low-level vibrations frequently cause irritating secondary vibration, such as a slight rattling of windows, doors, or stacked dishes. The rattling sound can give rise to exaggerated vibration complaints, even though there is very little risk of actual structural damage. In high noise environments, which are more prevalent where groundborne vibration approaches perceptible levels, this rattling phenomenon may also be produced by loud airborne environmental noise causing induced vibration in exterior doors and windows.

TABLE 2 HUMAN REACTION AND DAMAGE TO BUILDINGS FOR CONTINUOUS OR FREQUENT INTERMITTENT VIBRATION LEVELS

Peak Particle Velocity (inches/second)	Human Reaction	Effect on Buildings
0.4–0.6	Vibrations considered unpleasant by people subjected to continuous vibrations and unacceptable to some people walking on bridges	Architectural damage and possibly minor structural damage
0.2	Vibrations may begin to annoy people in buildings	Threshold at which there is a risk of architectural damage to normal dwellings
0.1	Level at which continuous vibrations may begin to annoy people, particularly those involved in vibration sensitive activities	Virtually no risk of architectural damage to normal buildings
0.08	Vibrations readily perceptible	Recommended upper level to which ruins and ancient monuments should be subjected
0.006–0.019	Range of threshold of perception	Vibrations unlikely to cause damage of any type

Source: Caltrans. 2013. Transportation and Construction Vibration Guidance Manual

3.0 LAWS, ORDINANCES, REGULATIONS, AND STANDARDS

Land uses deemed sensitive by the state of California within the vicinity of the project site include schools. Many jurisdictions also consider single- and multifamily residential uses particularly noise-sensitive because families and individuals expect to use time in the home for rest and relaxation, and noise can interfere with those activities. Some jurisdictions may also identify other noise-sensitive uses such as churches. Land uses that are relatively insensitive to noise include office, commercial, and retail developments. There are a variety of other insensitive noise receptors that include uses which generate significant noise levels and typically have a low level of human occupancy.

This noise analysis was conducted in accordance with federal, state, and local criteria described in the following sections.

3.1 FEDERAL

The US Environmental Protection Agency (EPA) offers guidelines for community noise exposure in *Noise Effects Handbook – A Desk Reference to Health and Welfare Effects of Noise*. These guidelines consider occupational noise exposure as well as noise exposure in homes. The EPA recognizes an exterior noise level of 55 decibels day-night level (dB L_{dn}) as a general goal to protect the public from hearing loss, activity interference, sleep disturbance, and annoyance. The EPA and other federal agencies have adopted suggested land use compatibility guidelines that indicate that residential noise exposures of 55 to 65 dB L_{dn} are acceptable. However, the EPA notes that these levels are not regulatory goals, but are levels defined by a negotiated scientific consensus, without concern for economic and technological feasibility or the needs and desires of any particular community.

3.2 STATE

The state Office of Planning and Research's Noise Element Guidelines include recommended exterior and interior noise level standards for local jurisdictions to identify and prevent the creation of incompatible land uses due to noise. The Noise Element Guidelines contain a land use compatibility table that describes the compatibility of various land uses with a range of environmental noise levels in terms of the CNEL. **Table 3**, *Land Use Compatibility for Community Noise Environments*, presents guidelines for determining acceptable and unacceptable community noise exposure limits for various land use categories. The guidelines also present adjustment factors that may be used to arrive at noise acceptability standards that reflect the noise control goals of the community, the particular community's sensitivity to noise, and the community's assessment of the relative importance of noise pollution.

TABLE 3 LAND USE COMPATIBILITY FOR COMMUNITY NOISE ENVIRONMENTS

Land Use Category	Community Noise Exposure (Ldn or CNEL, dBA)			
	Normally Acceptable	Conditionally Acceptable	Normally Unacceptable	Clearly Unacceptable
Residential - Low Density, Single-Family, Duplex, Mobile Homes	50 – 60	55 – 70	70 – 75	75 – 85
Residential - Multiple Family	50 – 65	60 – 70	70 – 75	70 – 85
Transient Lodging - Motel, Hotels	50 – 65	60 – 70	70 – 80	80 – 85
Schools, Libraries, Churches, Hospitals, Nursing Homes	50 – 70	60 – 70	70 – 80	80 – 85
Auditoriums, Concert Halls, Amphitheaters	NA	50 – 70	NA	65 – 85
Sports Arenas, Outdoor Spectator Sports	NA	50 – 75	NA	70 – 85
Playgrounds, Neighborhood Parks	50 – 70	NA	67.5 – 75	72.5 – 85
Golf Courses, Riding Stables, Water Recreation, Cemeteries	50 – 70	NA	70 – 80	80 – 85
Office Buildings, Business Commercial and Professional	50 – 70	67.5 – 77.5	75 – 85	NA
Industrial, Manufacturing, Utilities, Agriculture	50 – 75	70 – 80	75 – 85	NA

NA: Not applicable; L_{dn}: average day/night sound level; CNEL: community noise equivalent level

Notes:

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

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

Normally Unacceptable - New construction or development should be discouraged. If new construction or development does proceed, a detailed analysis of the noise reduction requirements must be made and needed noise insulation features included in the design.

Clearly Unacceptable – New construction or development should generally not be undertaken.

Source: Office of Planning and Research 2017 General Plan Guidelines, Appendix D: Noise Element Guidelines

3.3 LOCAL

City of Fontana General Plan

The purpose of the City of Fontana General Plan Noise Element is to provide a systematic approach to identifying and appraising noise problems in the community, quantifying existing and projected noise levels, addressing excessive noise exposure, and community planning for the regulation of noise. The Noise Element includes policies, standards, criteria, programs, diagrams, a reference to action items, and maps related to protecting public health and welfare from noise. The General Plan goals and policies most applicable to the proposed project are included below.

Goal 1: Our City protects its sensitive land uses from excessive noise through diligent planning.

Policy 3: The following uses shall be considered noise-sensitive and discouraged in areas of 65 dBA CNEL.

- Schools
- Libraries
- Places of Worship, and
- Passive Recreational Uses

Policy 6: The State of California Office of Planning and Research General Plan Guidelines shall be followed with respect to acoustical study requirements.

Policy 7: Noise spillover or encroachment from commercial, industrial and educational land uses shall be minimized into adjoining residential neighborhoods or noise-sensitive uses.

Goal 2: Our City has a diverse and efficiently operated ground transportation system that generates the minimum feasible noise on its residents.

Policy 2: On-road trucking activities shall be regulated in the City to ensure noise impacts are minimized.

Policy 5: Development that generates increased traffic and subsequent increases in the ambient noise level adjacent to noise-sensitive land uses shall provide appropriate mitigation measures.

Goal 3: Our City's residents are protected from the negative effects of "spill over" noise in our community.

Policy 2: Projects located in commercial areas shall not exceed stationary-source noise standards at the property line of proximate residential or commercial uses, as appropriate.

Policy 5: Construction shall be performed as quietly as feasible when performed in proximity to residential or other noise sensitive land uses.

City of Fontana Municipal Code

Chapter 18, Article II. Section 18-63. – Prohibited Noises

(b) The following acts, which create loud, excessive, impulsive or intrusive sound or noise that annoys or disturbs persons of ordinary sensibilities from a distance of 50 feet or more from the edge of the property, structure or unit in which the source is located, are declared to be in violation of this article.

Section 18-63(b)(6) Loading, unloading or opening boxes. The creation of load, excessive or intrusive and excessive noise in connection with loading or unloading of any vehicle or the opening and destruction of bales, boxes, crates and containers.

Section 18-63(b)(7) Construction or repairing of buildings or structures. The erection (including excavating), demolition, alteration or repair of any building or structure other than between the hours of 7:00 a.m. and 6:00 p.m. on weekdays and between the hours of 8:00 a.m. and 5:00 p.m. on Saturdays, except in case of urgent necessity in the interest of public health and safety, and then only with a permit from the building inspector, which permit may be granted for a period not to exceed three days or less while the emergency continues and which permit may be renewed for periods of three days or less while the emergency continues. If the building inspector should determine that the public health and safety will not be impaired by the erection, demolition, alteration or repair of any building or structure or the excavation of streets and highways within the hours of 6:00 p.m. and 7:00 a.m., and if he shall further determine that loss or inconvenience would result to any party in interest, he may grant permission for such work to be done on weekdays within the hours of 6:00 p.m. and 7:00 a.m., upon application being made at the time the permit for the work is awarded or during the progress of the work.

Section 18-63(b)(8) Noise near schools, courts, place of worship or hospitals. The creation of any loud, excessive, impulsive or intrusive noise on any street adjacent to any school, institution of learning, places of worship or court while the premises are in use, or adjacent to any hospital which unreasonably interferes with the workings of such institution or which disturbs or unduly annoys patients in the hospital; provided conspicuous signs are displayed in such streets indicating that the street is a school, hospital or court street.

Chapter 30, Article V. Division 6, Sec. 30-182. - Noise

(a) No use shall create or cause to be created any sound that exceeds the ambient noise standards outlined in Table 30-182.A **(Table 4,** *Noise Standards***)**.

(b) No use shall create or cause creation of noise from a portable electronic device such as a car stereo, portable radio and/or cassette/compact disc player or similar device which exceeds the ambient noise standards outlined in Table 30-182.A **(Table 4)**.

Table 4 Noise Standards

Location of Measurement	Maximum Allowable	
All Zoning Districts	7:00 a.m. to 10:00 p.m.	10:00 p.m. to 7:00 a.m.
Interior	45 db	45 db
Exterior	65 db	65 db

Source: Fontana Municipal Code, Chapter 30, Article V. Division 6, Sec. 30-182. - Noise

Chapter 30, Article V. Division 6, Sec. 30-183. - Vibration

No use shall create or cause to be created any activity that causes a vibration that can be felt beyond the property line with or without the aid of an instrument.

Chapter 30, Article VII. Division 6, Sec. 30-259. - Vibration

(a) Noise levels. No person shall create or cause to be created any sound which exceeds the noise levels in this section as measured at the property line of any residentially zoned property: (1) The noise level between 7:00 a.m. and 10:00 p.m. shall not exceed 70 db(A). (2) The noise level between 10:00 p.m. and 7:00 a.m. shall not exceed 65 db(A).

(b) Noise measurements. Noise shall be measured with a sound level meter that meets the standards of the American National Standards Institute (ANSI) Section SI4-1979, Type 1 or Type 2. Noise levels shall be measured using the "A" weighted sound pressure level scale in decibels (reference pressure = 20 micronewtons per meter squared).

(c) Vibration. No person shall create or cause to be created any activity which causes a vibration which can be felt beyond the property line of any residentially zoned property with or without the aid of an instrument.

4.0 EXISTING CONDITIONS

4.1 NOISE MEASUREMENTS

Regional noise sources include traffic-related noise on roadways and highways, airplanes flying overhead, and noise associated with typical residential development (e.g., people talking, dogs barking, children playing, yard maintenance equipment). Sound is affected by distance from the source, surrounding obstacles, and atmospheric properties.

In order to quantify existing ambient noise levels in the project area, noise measurements were taken at four locations on May 3, 2018; refer to **Exhibit 6**, *Noise Measurement and Modeling Locations*. The noise measurement sites were representative of typical existing noise exposure within and immediately adjacent to the project site. Ten-minute measurements were taken, between 10:00 a.m. and 11:00 a.m., at each site during the day. Short-term (L_{eq}) measurements are considered representative of the noise levels in the project vicinity. The average noise levels and sources of noise measured at each location are shown in **Table 5**, *Noise Measurements.* The existing daytime noise levels ranged from 53.6 to 62.0 dBA L_{eq}.

TABLE 5: NOISE MEASUREMENTS

Map #	Location	Run Time	Primary Noise Sources	L_{eq} (dBA)	L_{min} (dBA)	L_{max} (dBA)	Peak (dBA)
1	Off Lytle Creek Road and Sierra Avenue, in a lot adjacent to the Valero gas Station	5/3/2018 10:02 a.m.	I-15 traffic	55.1	51.0	74.0	95.6
2	Off Lytle Creek Road, across from address 3920 Lytle Creek Road, across from the 25-mph sign	5/3/2018 10:17 a.m.	I-15 traffic, traffic on Lytle Creek Road, neighbors working on cars	57.4	51.6	72.8	92.2
3	Off Lytle Creek Road, by address 4489 Lytle Creek Road, and by entrance to canyon	5/3/2018 10:36 a.m.	I-15 traffic, traffic on Lytle Creek Road, tractor on neighbor's property	62.0	55.3	82.8	99.2
4	At the end of Hawk Ridge Avenue cul-de-sac, next to fire hydrant	5/3/2018 10:54 a.m.	I-15 traffic and dogs barking	53.6	47.3	73.3	95.2

Source: ***Appendix A***.

The project area is subject to typical suburban and semi-rural noises, such as noise generated by traffic and day-to-day outdoor activities. Noise around the project site is the cumulative effect of noise from transportation activities and stationary sources. "Transportation noise" typically refers to noise from automobile use, trucking, airport operations, and rail operations. "Stationary noise" typically refers to noise from sources such as heating, ventilation, and air conditioning (HVAC) systems, compressors, landscape maintenance equipment, or machinery associated with

local industrial or commercial activities. The main sources of noise for the project site were the constant traffic along I-15 and the occasional traffic on Lytle Creek Road.

4.2 EXISTING ROADWAY NOISE LEVELS

Existing roadway noise levels were calculated for the roadway segments in the project vicinity using the Federal Highway Administration (FHWA) Highway Traffic Noise Prediction Model (FHWA-RD-77-108) and traffic volumes from the project traffic impact analysis. The model calculates the average noise level at specific locations based on traffic volumes, average speeds, roadway geometry, and site environmental conditions. The average noise rates used in the FHWA model have been modified to reflect average vehicle noise rates identified for California by the California Department of Transportation (Caltrans). The Caltrans data shows that California automobile noise is 0.8 to 1.0 dBA higher than national levels and that medium and heavy truck noise is 0.3 to 3.0 dBA lower than national levels.

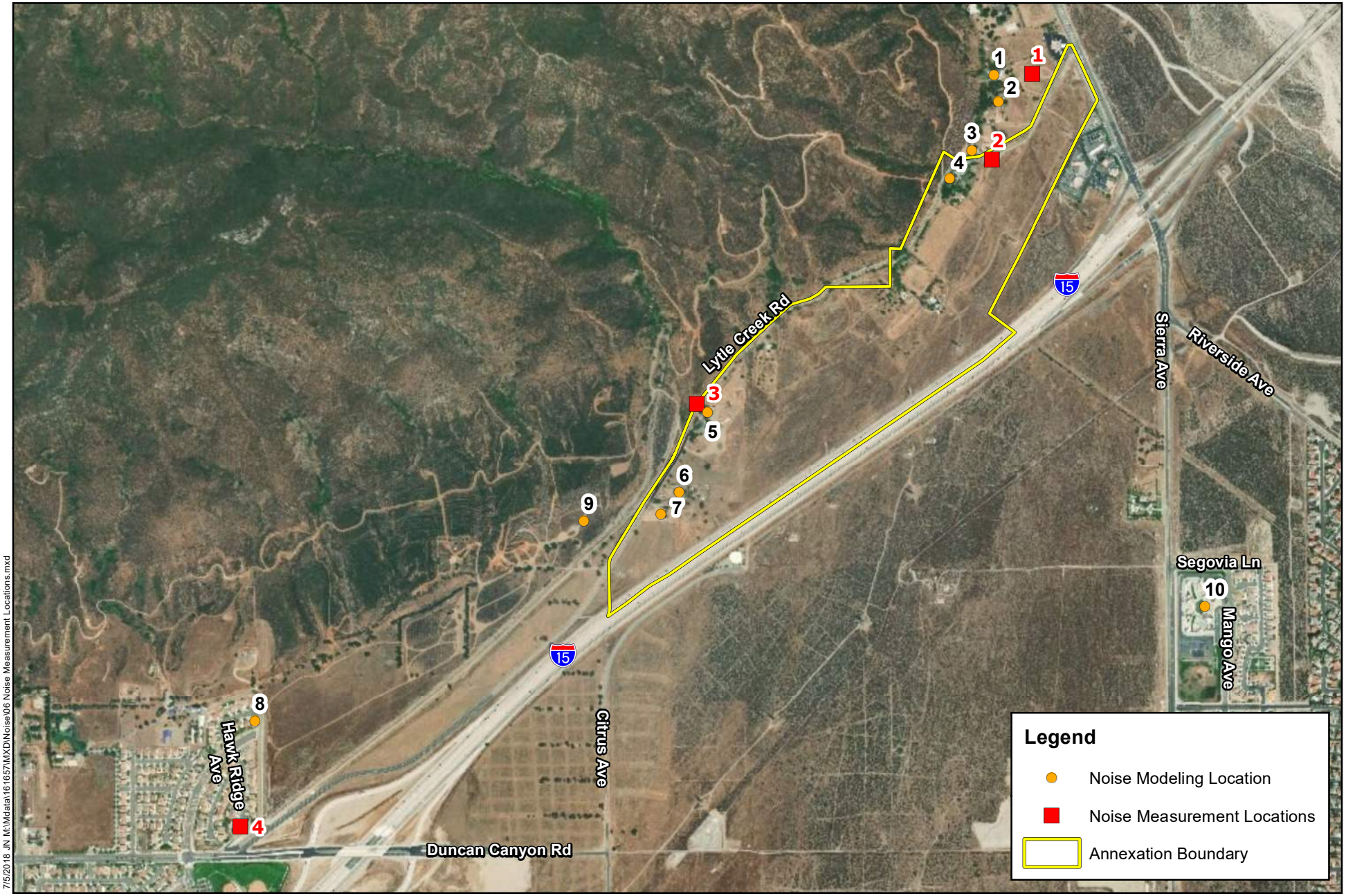
Table 6, *Existing Traffic Noise Levels* summarizes the modeled existing traffic noise at 75 feet from the centerline of each project roadway and lists distances from the roadway centerline to the 65 dB, 60 dB, and 55 dB CNEL traffic noise contours.

TABLE 6 EXISTING TRAFFIC NOISE LEVELS

Roadway Segment	Existing Conditions				
	ADT	dBA @ 75 Feet from Roadway Segment (CNEL)	Distance from Roadway Centerline to CNEL		
			65 CNEL Noise Contour	60 CNEL Noise Contour	55 CNEL Noise Contour
Lytle Creek Road					
Duncan Canyon Road to Existing Lytle Creek Road	180	50.2	—	—	—
Existing Lytle Creek Road to Proposed Project Driveway	400	53.7	—	—	55’
Proposed Project Driveway to Public Access Road	400	53.7	—	—	55’
Public Access Road to Sierra Avenue	610	55.5	—	—	84’

Notes: ADT = average daily traffic; dBA = A-weighted decibels; CNEL = community noise equivalent level,
“—” = contour is located within roadway right-of-way

Source: Michael Baker International. 2018. I-15 Logistics Center



7/5/2018 JN M:\Mdata\16165?\MXD\Noise\06 Noise Measurement Locations.mxd

Source: Esri imagery, Urban Crossroads

I-15 LOGISTICS CENTER
ACOUSTICAL ANALYSIS

Noise Measurement and Modeling Locations

Exhibit 6

4.3 NOISE-SENSITIVE RECEPTORS

Noise-sensitive land uses are those that may be subject to stress and/or interference from excessive noise. Typically, residential uses are considered noise-sensitive receptors. Other noise-sensitive land uses include public schools, hospitals, and institutional uses such as churches, museums, and private schools. Industrial and commercial land uses are generally not considered sensitive to noise. The nearest sensitive receptors include residential uses located to the west and northeast of the project site.

Distances were measured from the center of the project site to the nearest outdoor living area. The nearest existing residential land use is located approximately 1,538 feet west of the project site. In addition, Monarch Hills is an approved future residential community that will be constructed west of the project site. At the time this study was prepared, the Monarch Hills has not begun construction. However, since the residential community has been approved the nearest residential property (based on site plans) within Monarch Hills was included in the analysis. The nearest school, Kordyak Elementary School is located 4,000 feet to the southeast, on the opposite side of I-15. Sensitive receptors within 1 mile of the project site are listed in **Table 7***, Sensitive Receptors*.

TABLE 7: SENSITIVE RECEPTORS

ID	Type	Name	Distance from Project Site[1]	Direction from Project Site	Address[2]
1	Residential	Existing Residential Uses	2,948 feet	Northeast	3788 Lytle Creek Road
2			2,743 feet	Northeast	3870 Lytle Creek Road
3			2,219 feet	Northeast	3920 Lytle Creek Road
4			1,885 feet	Northeast	3945 Lytle Creek Road
5			1,538 feet	West	4329 Lytle Creek Road
6			2,128 feet	West	4489 Lytle Creek Road
7			2,385 feet	West	4385 Lytle Creek Road
8			6,500 feet	Southwest	4721 Hawke Ridge Avenue
9		Future Residential Use	3,025 feet	West	Eastern most Future Monarch Hills Residence
10	School	Kordyak Elementary School	4,000 feet	Southeast	4580 Mango Avenue

Note:

1. *Distances are measured from the center of the project site to the nearest outdoor living area.*
2. *Residential addresses based on County parcel data*

Source: Google Earth, ESRI.

5.0 POTENTIAL IMPACTS

5.1 THRESHOLDS OF SIGNIFICANCE

Criteria for determining the significance of noise impacts were developed based on information contained in the Fontana General Plan, Fontana Municipal Code, and the impact statements of CEQA Guidelines Appendix G. According to Appendix G, a significant impact related to noise would occur if the project would:

- Expose persons to or generate of noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies.
- Result in exposure of persons to or generation of excessive groundborne vibration or groundborne noise levels.
- Result in a substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project.
- Result in a substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project.
- Be located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, and if so, the project would expose people residing or working in the project area to excessive noise levels.
- Be located within the vicinity of a private airstrip and would expose people residing or working in the project area to excessive noise levels.

Based on these standards and thresholds, the effects of the proposed project have been categorized as either "no impact," "less than significant impact," or "potentially significant impact." Mitigation measures are provided for all potentially significant impacts.

Significance of Construction Noise

The City of Fontana has set restrictions to control noise impacts associated with construction. Fontana Municipal Code, Section 18-63(7) limits construction to the hours between 7:00 a.m. and 6:00 p.m. on weekdays and between the hours of 8:00 a.m. and 5:00 p.m. on Saturdays. While the City has established a times where construction can occur, the City does not identify specific noise level limits for construction activity.

Although construction noise may not pose a health risk or damage human hearing, it has the potential to adversely affect people's quality of life. Noise annoys, awakens, angers and frustrates noise-sensitive individuals. It disrupts communication and affects performance capabilities. Noise is one of the biological stressors associated with everyday life. Thus, the numerous effects of noise combine to detract from the quality of people's lives and the environment. In addition,

acceptance of temporary construction noise varies with the individual. For this reason, and to present a conservative evaluation of construction noise effects in this report, the numerical noise standard of 65 dBA L_{eq} (with higher noise level allowances for short bursts of louder noise) established in the City of Fontana Municipal Code, Section 30-182 (refer to **Table 4**) for stationary-source (operational) noise, is used in this analysis to determine the significance of construction noise on noise-sensitive receivers. While not specifically identified by the City of Fontana as a construction noise level limit, the stationary source noise level threshold of 65 dBA L_{eq} is used in the construction noise analysis of this report to evaluate potential impacts under CEQA.

The reference construction noise limit of 65 dBA L_{eq} provides an acceptable numerical threshold for determining the relative significance of project construction noise levels at nearby residential receivers. For the purposes of this analysis, the 65 dBA L_{eq} numerical threshold is used to assess the potential construction noise level impacts at nearby sensitive receivers. Further, this threshold is consistent with other jurisdictions within the County of San Bernardino that identify specific construction noise level limits, including but not limited to: Rancho Cucamonga (Development Code, Section 17.66.050(D)(4)(a) Noise Standards); Adelanto (Code of Ordinances, Section 17.90.020(d)(2).

Significance of Changes in Traffic Noise Levels

An off-site traffic noise impact typically occurs when there is a discernable increase in traffic and the resulting noise level exceeds an established noise standard. In community noise considerations, changes in noise levels greater than 3 dB are often identified as substantial, while changes less than 1 dB will not be discernible to local residents. In the range of 1 to 3 dB, residents who are very sensitive to noise may perceive a slight change. In laboratory testing situations, humans are able to detect noise level changes of slightly less than 1 dB. However, this is based on a direct, immediate comparison of two sound levels. Community noise exposures occur over a long period of time and changes in noise levels occur over years (rather than the immediate comparison made in a laboratory situation). A 5dB change is generally recognized as a clearly discernable difference.

Because traffic noise levels at sensitive uses likely approach or exceed the applicable land use compatibility standard, a 3 dB increase as a result of a project is used as the noise threshold for that project. Thus, a project would result in a significant noise impact when a permanent increase in ambient noise levels of 3 dB occur upon project implementation and the resulting noise level exceeds the applicable exterior standard at a noise-sensitive use.

5.2 IMPACT ASSESSMENT

NOI-1

- **Expose persons to or generate noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies.**
- **Result in a substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project.**
- **Result in a substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project.**

Short-Term Construction

Construction activities for the warehouse project and Lytle Creek Road realignment would occur in a single phase and would include demolition, site preparation, grading, paving, building construction, and the application of architectural coatings. Groundborne noise and other types of construction-related noise impacts would typically occur during excavation activities of the grading phase. This phase of construction has the potential to create the highest levels of noise. Typical noise levels generated by construction equipment are shown in **Table 8**, *Maximum Noise Levels Generated by Construction Equipment*. It should be noted that the noise levels identified in **Table 8** are maximum sound levels (L_{max}), which are the highest individual sound occurring at an individual time period. Operating cycles for these types of construction equipment may involve one or two minutes of full power operation followed by three to four minutes at lower power settings. Other primary sources of acoustical disturbance would be due to random incidents, which would last less than one minute (such as dropping large pieces of equipment or the hydraulic movement of machinery lifts).

Table 8 Maximum Noise Levels Generated by Construction Equipment

Type of Equipment	Acoustical Use Factor[1]	L_{max} at 50 Feet (dBA)
Concrete Saw	20	90
Crane	16	81
Concrete Mixer Truck	40	79
Backhoe	40	78
Dozer	40	82
Excavator	40	81
Forklift	40	78
Paver	50	77
Roller	20	80
Tractor	40	84
Water Truck	40	80
Grader	40	85
General Industrial Equipment	50	85

Note:

1. *Acoustical Use Factor (percent): Estimates the fraction of time each piece of construction equipment is operating at full power (i.e., its loudest condition) during a construction operation.*

Source: FHWA. 2006. Construction Noise Handbook

Using the FHWA's Roadway Construction Noise Model and construction information, the estimated noise levels from construction were calculated for a number of modeling points as shown in **Exhibit 6**. These points were selected based on outdoor living areas such as residential patios and outdoor recreation areas. **Table 9**, *Construction Noise Model Results Summary*, shows estimated noise levels for construction activities at a range of sites if all equipment were operated at the same time. The FHWA model inputs and outputs for all of the receptor sites are provided in Appendix B.

TABLE 9: WAREHOUSE CONSTRUCTION NOISE MODEL RESULTS SUMMARY

ID #	Distance from Receptor Site to Center of Project Area in Feet	Land Use	Demolition (dBA)	Site Preparation (dBA)	Grading (dBA)	Construction (dBA)	Paving (dBA)
1	2,948	Residential	51.0	52.2	53.4	52.3	50.7
2	2,743	Residential	51.7	52.8	54.0	53.0	51.3
3	2,219	Residential	53.5	54.7	55.9	54.8	53.2
4	1,885	Residential	54.9	56.1	57.3	56.2	54.6
5	1,538	Residential	59.7	60.9	61.5	60.1	59.4
6	2,128	Residential	53.9	55.0	56.2	55.2	53.5
7	2,385	Residential	52.9	54.1	55.3	54.2	52.5
8	6,500	Residential	42.2	43.3	45.2	44.3	41.8
9	3,025	Vacant (Future Residential)*	50.8	52.0	53.2	52.1	50.5
10	4,000	School	46.4	47.6	49.4	48.5	46.1

Notes: * Monarch Hills Residential Community will be constructed after the project is completed
Source: Appendix B

As shown in **Table 9**, the highest noise levels are expected to occur during grading activities. Noise levels during grading would range from 61.5 dBA at the nearest residential property to 45.2 dBA at the most distant residential property. Temporary construction noise generated by the project would not exceed the 65 dBA exterior noise threshold identified in **Table 4**. In addition all construction activities would comply with Fontana's Municipal Code which limits construction to between the hours of 7:00 a.m. and 6:00 p.m. on weekdays and between the hours of 8:00 a.m. and 6:00 p.m. on Saturdays, except in cases of emergency. Therefore, noise impact from short-term construction activities would be less than significant.

Mitigation Measures: No mitigation measures are required.

Level of Significance: Less than significant impact.

Long-Term Operational Impacts

Off-Site Mobile Noise

The project would generate traffic along Lytle Creek Road. Traffic noise modeling was conducted for the proposed project using the traffic volumes from the project's traffic impact analysis report and the FHWA's RD-77-108 traffic noise model. The noise model calculates the average noise level at specific locations based on traffic volumes, average speeds, roadway geometry, and site environmental conditions. The noise modeling input and output files are included in Appendix C.

Future development generated by the proposed project would result in additional traffic on adjacent roadways, thereby increasing vehicular noise in the vicinity of existing and proposed land uses. Based on the Traffic Impact Study, the proposed project would result in approximately 2,046 new daily trips. The opening year "Future Without Project" and "Future With Project" scenarios are compared in **Table 10***, Future - 2018 (Opening Year) Traffic Noise Levels*. The traffic noise levels in 2040 for "Future Without Project" and "Future With Project" scenarios are compared in **Table 11**, *Future - Horizon Year 2040 Project Traffic Noise Levels*. As depicted in **Table 10**, under the "Future Without Project" scenario, noise levels would range from approximately 63.0 to 66.2 dBA CNEL, with the highest noise levels (66.2 dBA CNEL) occurring on portion of Lytle Creek Road between Duncan Canyon Road and the annexation boundary.

The "Future With Project" scenario noise levels would range from approximately 64.8 to 66.4 dBA CNEL. The highest noise levels would occur on the re-aligned Lytle Creek Road between Duncan Canyon Road and the existing Lytle Creek Road, noise levels at this location would increase by 0.2 dBA CNL as a result of the proposed project. The greatest change in noise levels would occur on Lytle Creek Road between the public access road and Sierra Avenue, where noise would increase by 1.8 dBA CNL, from 63.0 dBA CNL to 64.8 dBA CNL. Therefore, the project would not increase traffic noise by 3.0 dBA or more, and operational traffic volumes would not significantly contribute to existing traffic noise in the area. Project-related future traffic noise would be less than significant.

TABLE 10 FUTURE - 2020 (OPENING YEAR) TRAFFIC NOISE LEVELS

Roadway Segment	Future 2020 (Opening Year) Without Project					Future 2020 (Opening Year) With Project					Difference In dBA @ 75 Feet from Roadway
	ADT	dBA @ 75 Feet from Roadway Centerline	Distance from Roadway Centerline			ADT	dBA @ 75 Feet from Roadway Centerline	Distance from Roadway Centerline			
			65 CNEL Noise Contour	60 CNEL Noise Contour	55 CNEL Noise Contour			65 CNEL Noise Contour	60 CNEL Noise Contour	55 CNEL Noise Contour	
Lytle Creek Road											
Duncan Canyon Road to the Annexation Boundary (Existing Lytle Creek Road)	7,840	66.7	111'	352'	1,114'	8,090	66.9	115'	364'	1,050'	0.2
Existing Lytle Creek Road to Proposed Project Driveway	6,440	65.8	89'	282'	891'	6,690	65.9	93'	293'	926'	0.1
Proposed Project Driveway to Public Access Road	3,700	63.3	51'	162'	512'	4,380	64.1	61'	192'	606'	0.8
Public Access Road to Sierra Avenue	3,910	63.6	54'	171'	541'	6,777	66.0	94'	297'	938'	2.6

Notes: ADT = average daily traffic; dBA = A-weighted decibels; CNEL = community noise equivalent level,
"—" = contour is located within roadway right-of-way

Source: Appendix C

TABLE 11 FUTURE - HORIZON YEAR 2040 PROJECT TRAFFIC NOISE LEVELS

Roadway Segment	Without Project - Horizon Year 2040					With Project - Horizon Year 2040					Difference In dBA @ 75 Feet from Roadway
	ADT	dBA @ 75 Feet from Roadway Centerline	Distance from Roadway Centerline (Feet)			ADT	dBA @ 75 Feet from Roadway Centerline	Distance from Roadway Centerline (Feet)			
			65 CNEL Noise Contour	60 CNEL Noise Contour	55 CNEL Noise Contour			65 CNEL Noise Contour	60 CNEL Noise Contour	55 CNEL Noise Contour	
Lytle Creek Road											
Duncan Canyon Road to Existing Lytle Creek Road	8,430	67.0	120’	379’	1,198’	8,680	67.2	123’	390’	1,234’	0.2
Existing Lytle Creek Road to Proposed Project Driveway	6,740	65.9	93’	295’	933’	6,990	66.1	97’	306’	968’	0.2
Proposed Project Driveway to Public Access Road	6,740	65.9	93’	295’	933’	7,420	66.4	103’	325’	1,027’	0.1
Public Access Road to Sierra Avenue	5,050	64.7	70’	221’	699’	6,790	66.0	94’	297’	940’	1.3

Notes: ADT = average daily traffic; dBA = A-weighted decibels; CNEL = community noise equivalent level,
“—” = contour is located within roadway right-of-way

Source: Appendix C

On-Site Operations Noise

Trucks, passenger vehicles, and ancillary equipment such as forklifts and HVAC equipment would create noise during on-site operations. The operations will be typical of warehouse/distribution center use. The nearest residence in the vicinity of the proposed project site are located approximately 1,500 feet from the center and approximately 500 feet from the nearest side of the proposed warehouse building, to the east. Refrigerated trucks (which have an additional auxiliary cooling system which could result in higher individual truck noise levels) are not anticipated as part of this project.

Project Mechanical Equipment

Typically, mechanical equipment noise is 55 dBA at 50 feet from the source. This level of stationary source noise is acceptable per the noise standards influencing the project. Furthermore, project HVAC units would be included on the roof of the structure, likely located toward the center of the structure, making the nearest homes to the HVAC units greater than 50 feet away. On-site HVAC units and associated equipment attached to project structures would be acoustically engineered with appropriate procurement specifications, sound enclosures, and parapet walls to minimize noise—all in accordance with the County of San Bernardino noise emissions requirements—to ensure that such equipment does not exceed allowable noise limits. Thus, through compliance with pertinent local noise regulations, noise levels from project mechanical equipment would be less than significant.

Loading Bay Operations

On-site truck operations would be considered a stationary noise source subject to the City's noise regulation limitations. The project anticipates 24-hour operation, most operations would be conducted during daytime business hours (here assumed to be 7:00 a.m. to 6:00 p.m.) however some degree of operation will take place on site between 6:00 p.m. and 7 a.m.

Noise measurements at a variety of similar projects (e.g., Home Depot loading bays, Consolidated Volume Transport truck scales, Macy's truck transfer yard) have demonstrated that the noise produced by idling/maneuvering semi-trucks is typically on the order of 70 to 73 dBA at a distance of 50 feet[5].

Based on the *Traffic Impact Analysis*, the proposed project is projected to receive up to 317 trucks per day with 69 of them arriving during peak hour traffic. By state law, diesel trucks are prohibited from idling for more than 5 minutes at any one location. Additionally, it is assumed for this assessment that the maneuvering operation for any given truck would take no more than 3 to 5

[5] *Wilder. 2000. Noise Survey of Commercial Loading Dock Operations*

minutes. Thus, the combination of maneuvering and parking and idling near or in the project's loading bays would take a maximum of 10 minutes per truck trip.

For the purposes of this analysis, distances to receptors were measured from the center of the project site to represent the approximate location of the loading bay operations. The nearest noise-sensitive receptors (single-family residences) are approximately 1,538 feet from the center of the project site. This residence would experience approximately 30 dB of sound reduction due to distance attenuation (considering an attenuation rate of 6 dB per doubling distance) Therefore, the noise levels experienced at the nearest sensitive receptors from on-site loading bay activities would be 43 dBA (73 dBA–30 dBA). As described in **Table 4**, the Fontana Municipal Code states that the standard for stationary noise sources is 65 dBA, therefore the noise generated by loading bay activities would be less than significant.

Mitigation Measures: No mitigation measures are required.

Level of Significance: Less than significant impact.

NOI-2

- **Result in exposure of persons to or generation of excessive groundborne vibration or groundborne noise levels.**

Short-Term Construction

Project construction can generate varying degrees of groundborne vibration, depending on the construction procedure and the construction equipment used. Operation of construction equipment generates vibrations that spread through the ground and diminish in amplitude with distance from the source. The effect on buildings in the vicinity of a construction site often varies depending on soil type, ground strata, and construction characteristics of the receiver building(s). This impact discussion utilizes Caltrans's recommended standard of 0.2 in/sec PPV with respect to the prevention of structural damage for normal buildings. **Table 12** displays vibration levels for typical construction equipment.

Groundborne vibration decreases rapidly with distance. The nearest structure is approximately 330 feet from the boundary of proposed warehouse footprint. However, it is acknowledged that construction activities would occur throughout the project site and would not be concentrated at the point closest to the nearest structure. Based on the vibration levels presented in **Table 12**, ground vibration generated by heavy-duty equipment would range from approximately 0.0019 to 0.0001 in/sec PPV at 330 feet from the source of activity. As such, the residence located 330 feet west of the project site would not be exposed to vibration levels exceeding the FTA's 0.2 in/sec PPV significance threshold for vibration. Additionally, groundborne vibration during construction would be a temporary impact and would cease completely when construction ends. Once operational, the project would not be a source of groundborne vibration. Impacts would be less than significant.

TABLE 12: TYPICAL VIBRATION LEVELS FOR CONSTRUCTION EQUIPMENT

Equipment	Approximate peak particle velocity at 25 feet (inches/second) [2]	Approximate peak particle velocity at 50 feet (inches/second) [2]	Approximate peak particle velocity at 120 feet (inches/second) [2]	Approximate peak particle velocity at 330 feet (inches/second) [2]
Large bulldozer	0.089	0.031	0.008	0.0019
Loaded trucks	0.076	0.027	0.007	0.0016
Small bulldozer	0.003	0.001	0.0003	0.0001

Notes:

1 – FTA 2006

2 – Calculated using the following formula:

$PPV_{equip} = PPV_{ref} \times (25/D)^{1.5}$

where: PPV (equip) = the peak particle velocity in in/sec of the equipment adjusted for the distance

PPV (ref) = the reference vibration level in in/sec at 25 feet from Table 12-2 of the FTA Transit Noise and Vibration Impact Assessment Guidelines

D = the distance from the equipment to the receiver

Source: FTA. 2006. Transit Noise and Vibration Impact Assessment Guidelines

Mitigation Measures: No mitigation measures are required.

Level of Significance*:* Less than significant.

NOI-3

- **Be located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, expose people residing or working in the project area to excessive noise levels.**
- **Be located within the vicinity of a private airstrip and would expose people residing or working in the project area to excessive noise levels.**

The nearest major commercial airport is the Ontario International Airport. The project is located approximately 12 miles northeast of the airport and is not within the Airport Influence Area or Noise Impact Zones[6]. The project site is not located within the vicinity of a private airstrip; however, the Fontana Police Heliport is located 5 miles south of the project site. This project would not expose people working in the project area to excessive noise levels associated with aircraft. No impacts would occur in this regard.

Mitigation Measures: No mitigation measures are required.

Level of Significance: No impact.

[6] *Ontario. 2011. Ontario International Airport Land Use Compatibility Plan*

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APPENDIX A: NOISE MEASUREMENTS

Site Number: CapRock Warehouse Site #1			
Recorded By: Alex Pohlman and Pierre Glaize			
Job Number: 161657			
Date: 05/03/2018			
Time: 10:02 AM			
Location: Off Lytle Creek Road and Sierra Avenue, In a lot adjacent to the Valero gas station.			
Source of Peak Noise: I-15 traffic			
Noise Data			
Leq (dB)	**Lmin (dB)**	**Lmax (dB)**	**Peak (dB)**
55.1	51.0	74.0	95.6

Equipment						
Category	**Type**	**Vendor**	**Model**	**Serial No.**	**Cert. Date**	**Note**
Sound	Sound Level Meter	**Brüel & Kjær**	**2250**	**3011133**	**3/29/2018**	
	Microphone	**Brüel & Kjær**	**4189**	**3086765**	**3/26/2018**	
	Preamp	**Brüel & Kjær**	**ZC 0032**	**25380**	**3/29/2018**	
	Calibrator	**Brüel & Kjær**	**4231**	**2545667**	**3/28/2018**	

Weather Data			
Est.	**Duration:** 10 minutes		**Sky: Sunny**
	Note: dBA Offset = -0.03		**Sensor Height (ft):** 5 ft
	Wind Ave Speed (mph / m/s)	**Temperature (degrees Fahrenheit)**	**Barometer Pressure (inches)**
	<5 MPH	60	30.15

Photo of Measurement Location

Site Number: CapRock Warehouse Site #2			
Recorded By: Alex Pohlman and Pierre Glaize			
Job Number: 161657			
Date: 05/03/2018			
Time: 10:17 AM			
Location: Off Lytle Creek Road, across from 3920 Lytle Creek Road, Across the 25 mph sign.			
Source of Peak Noise: I-15 traffic, traffic on Lytle Creek Road, neighbor working on cars.			
Noise Data			
Leq (dB)	**Lmin (dB)**	**Lmax (dB)**	**Peak (dB)**
57.4	51.6	72.8	92.2

Equipment						
Category	**Type**	**Vendor**	**Model**	**Serial No.**	**Cert. Date**	**Note**
Sound	Sound Level Meter	**Brüel & Kjær**	**2250**	**3011133**	**3/29/2018**	
	Microphone	**Brüel & Kjær**	**4189**	**3086765**	**3/26/2018**	
	Preamp	**Brüel & Kjær**	**ZC 0032**	**25380**	**3/29/2018**	
	Calibrator	**Brüel & Kjær**	**4231**	**2545667**	**3/28/2018**	

Weather Data			
Est.	**Duration:** 10 minutes		**Sky:** Sunny
	Note: dBA Offset = -0.03		**Sensor Height (ft):** 5 ft
	Wind Ave Speed (mph / m/s)	**Temperature (degrees Fahrenheit)**	**Barometer Pressure (inches)**
	<5 mph	60	30.15

Photo of Measurement Location

Site Number: CapRock Warehouse Site #3			
Recorded By: Alex Pohlman and Pierre Glaize			
Job Number: 161657			
Date: 05/03/2018			
Time: 10:36 AM			
Location: Off Lytle Creek Road, by 4489 Lytle Creek Rd, and by entrance to canyon.			
Source of Peak Noise: I-15 traffic, traffic on Lytle Creek Road, Tractor on neighbor property.			
Noise Data			
Leq (dB)	**Lmin (dB)**	**Lmax (dB)**	**Peak (dB)**
62.0	55.3	82.8	99.2

Equipment						
Category	**Type**	**Vendor**	**Model**	**Serial No.**	**Cert. Date**	**Note**
Sound	Sound Level Meter	**Brüel & Kjær**	**2250**	**3011133**	**3/29/2018**	
	Microphone	**Brüel & Kjær**	**4189**	**3086765**	**3/26/2018**	
	Preamp	**Brüel & Kjær**	**ZC 0032**	**25380**	**3/29/2018**	
	Calibrator	**Brüel & Kjær**	**4231**	**2545667**	**3/28/2018**	

Weather Data			
Est.	**Duration:** 10 minutes		**Sky:** Sunny
	Note: dBA Offset = -0.03		**Sensor Height (ft):** 5 ft
	Wind Ave Speed (mph / m/s)	**Temperature (degrees Fahrenheit)**	**Barometer Pressure (inches)**
	<5 mph	60	30.15

Photo of Measurement Location

Site Number: CapRock Warehouse Site #4			
Recorded By: Alex Pohlman and Pierre Glaize			
Job Number: 161657			
Date: 05/03/2018			
Time: 10:54 AM			
Location: At the end of the Haw Ridge Avenue Cul-de-sac, next to the fire hydrant.			
Source of Peak Noise: Dogs barking and I-15 traffic.			
Noise Data			
Leq (dB)	**Lmin (dB)**	**Lmax (dB)**	**Peak (dB)**
53.6	47.3	73.3	95.2

Equipment						
Category	**Type**	**Vendor**	**Model**	**Serial No.**	**Cert. Date**	**Note**
Sound	Sound Level Meter	**Brüel & Kjær**	**2250**	**3011133**	**3/29/2018**	
	Microphone	**Brüel & Kjær**	**4189**	**3086765**	**3/26/2018**	
	Preamp	**Brüel & Kjær**	**ZC 0032**	**25380**	**3/29/2018**	
	Calibrator	**Brüel & Kjær**	**4231**	**2545667**	**3/28/2018**	

Weather Data			
Est.	**Duration:** 10 minutes		**Sky:** Sunny
	Note: dBA Offset = -0.03		**Sensor Height (ft):** 5 ft
	Wind Ave Speed (mph / m/s)	**Temperature (degrees Fahrenheit)**	**Barometer Pressure (inches)**
	<5 mph	60	30.15

Photo of Measurement Location

APPENDIX B: CONSTRUCTION NOISE

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 06/21/2018
Case Description: CapRock - Demolition

**** Receptor #1 ****

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
1 Residential	Residential	1.0	1.0	1.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Concrete Saw	No	20		89.6	2948.0	3.0
Excavator	No	40		80.7	2948.0	3.0
Dozer	No	40		81.7	2948.0	3.0
Excavator	No	40		80.7	2948.0	3.0
Excavator	No	40		80.7	2948.0	3.0
Dozer	No	40		81.7	2948.0	3.0

Results

	Calculated (dBA)		Noise Limits (dBA) Day		Evening		Night		Noise Limit Exceedance (dBA) Day		Evening		Night	
Equipment	Lmax	L10	Lmax	L10	Lmax	L10	Lmax	L10	Lmax	L10	Lmax	L10	Lmax	L10
Concrete Saw	51.2	47.2	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Excavator	42.3	41.3	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Dozer	43.3	42.3	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Excavator	42.3	41.3	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Excavator	42.3	41.3	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Dozer	43.3	42.3	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Total	51.2	51.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

**** Receptor #2 ****

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
2 Residential	Residential	1.0	1.0	1.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Concrete Saw	No	20		89.6	2743.0	3.0
Excavator	No	40		80.7	2743.0	3.0
Dozer	No	40		81.7	2743.0	3.0
Excavator	No	40		80.7	2743.0	3.0
Excavator	No	40		80.7	2743.0	3.0
Dozer	No	40		81.7	2743.0	3.0

Results

Noise Limits (dBA)	Noise Limit Exceedance (dBA)							
	Calculated (dBA)				Day		Evening	
Night	Day		Evening		Night			
	Lmax	L10	Lmax	L10	Lmax	L10	Lmax	L10
Equipment								
Lmax L10	Lmax	L10	Lmax	L10	Lmax	L10		
Concrete Saw	51.8	47.8	N/A	N/A	N/A	N/A		
N/A N/A	N/A	N/A	N/A	N/A	N/A	N/A		
Excavator	42.9	41.9	N/A	N/A	N/A	N/A		
N/A N/A	N/A	N/A	N/A	N/A	N/A	N/A		
Dozer	43.9	42.9	N/A	N/A	N/A	N/A		
N/A N/A	N/A	N/A	N/A	N/A	N/A	N/A		
Excavator	42.9	41.9	N/A	N/A	N/A	N/A		
N/A N/A	N/A	N/A	N/A	N/A	N/A	N/A		
Excavator	42.9	41.9	N/A	N/A	N/A	N/A		
N/A N/A	N/A	N/A	N/A	N/A	N/A	N/A		
Dozer	43.9	42.9	N/A	N/A	N/A	N/A		
N/A N/A	N/A	N/A	N/A	N/A	N/A	N/A		
Total	51.8	51.7	N/A	N/A	N/A	N/A		
N/A N/A	N/A	N/A	N/A	N/A	N/A	N/A		

**** Receptor #3 ****

Description	Land Use	Baselines (dBA) Daytime	Evening	Night

3 Residential	Residential	1.0	1.0	1.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Concrete Saw	No	20		89.6	2219.0	3.0
Excavator	No	40		80.7	2219.0	3.0
Dozer	No	40		81.7	2219.0	3.0
Excavator	No	40		80.7	2219.0	3.0
Excavator	No	40		80.7	2219.0	3.0
Dozer	No	40		81.7	2219.0	3.0

Results

Noise Limits (dBA)

Noise Limit Exceedance (dBA)							
Calculated (dBA)				Day		Evening	
Night		Day		Evening		Night	
Equipment		Lmax	L10	Lmax	L10	Lmax	L10
Lmax	L10	Lmax	L10	Lmax	L10	Lmax	L10
Concrete Saw		53.6	49.6	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Excavator		44.8	43.8	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Dozer		45.7	44.7	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Excavator		44.8	43.8	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Excavator		44.8	43.8	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Dozer		45.7	44.7	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Total		53.6	53.5	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

**** Receptor #4 ****

		Baselines (dBA)		
Description	Land Use	Daytime	Evening	Night
4 Residential	Residential	1.0	1.0	1.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Concrete Saw	No	20		89.6	1885.0	3.0
Excavator	No	40		80.7	1885.0	3.0
Dozer	No	40		81.7	1885.0	3.0
Excavator	No	40		80.7	1885.0	3.0
Excavator	No	40		80.7	1885.0	3.0
Dozer	No	40		81.7	1885.0	3.0

Results

Noise Limits (dBA)

Noise Limit Exceedance (dBA)

Equipment	Calculated (dBA) Day Lmax	Day L10	Evening Lmax	Evening L10	Night Lmax	Night L10	Day Lmax	Day L10	Evening Lmax	Evening L10	Night Lmax	Night L10
Concrete Saw	55.1	51.1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Excavator	46.2	45.2	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Dozer	47.1	46.2	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Excavator	46.2	45.2	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Excavator	46.2	45.2	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Dozer	47.1	46.2	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Total	55.1	54.9	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

**** Receptor #5 ****

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
5 Residential	Residential	1.0	1.0	1.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Concrete Saw	No	20		89.6	1538.0	0.0

Excavator	No	40	80.7	1538.0	0.0
Dozer	No	40	81.7	1538.0	0.0
Excavator	No	40	80.7	1538.0	0.0
Excavator	No	40	80.7	1538.0	0.0
Dozer	No	40	81.7	1538.0	0.0

Results

Equipment	Noise Limit Exceedance (dBA) Calculated (dBA) Day Lmax	Day L10	Evening Lmax	Evening L10	Night Lmax	Night L10	Noise Limits (dBA) Evening Lmax	Evening L10	Night Lmax	Night L10
Concrete Saw	59.8	55.8	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Excavator	51.0	50.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Dozer	51.9	50.9	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Excavator	51.0	50.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Excavator	51.0	50.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Dozer	51.9	50.9	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Total	59.8	59.7	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

**** Receptor #6 ****

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
6 Residential	Residential	1.0	1.0	1.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Concrete Saw	No	20		89.6	2128.0	3.0
Excavator	No	40		80.7	2128.0	3.0
Dozer	No	40		81.7	2128.0	3.0
Excavator	No	40		80.7	2128.0	3.0
Excavator	No	40		80.7	2128.0	3.0
Dozer	No	40		81.7	2128.0	3.0

Results

Noise Limits (dBA)

Equipment	Calculated (dBA) Day Lmax	Day L10	Evening Lmax	Evening L10	Night Lmax	Night L10	Noise Limit Exceedance (dBA) Day Lmax	Day L10	Evening Lmax	Evening L10	Night Lmax	Night L10
Concrete Saw	54.0	50.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Excavator	45.1	44.2	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Dozer	46.1	45.1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Excavator	45.1	44.2	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Excavator	45.1	44.2	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Dozer	46.1	45.1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Total	54.0	53.9	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

**** Receptor #7 ****

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
7 Residential	Residential	1.0	1.0	1.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Concrete Saw	No	20		89.6	2385.0	3.0
Excavator	No	40		80.7	2385.0	3.0
Dozer	No	40		81.7	2385.0	3.0
Excavator	No	40		80.7	2385.0	3.0
Excavator	No	40		80.7	2385.0	3.0
Dozer	No	40		81.7	2385.0	3.0

Results

Noise Limits (dBA)

Noise Limit Exceedance (dBA)

	Calculated (dBA)				Day		Evening	
Night	Day		Evening		Night			
	Lmax	L10	Lmax	L10	Lmax	L10	Lmax	L10
Equipment								
Lmax L10	Lmax	L10	Lmax	L10	Lmax	L10		
Concrete Saw	53.0	49.0	N/A	N/A	N/A	N/A		
N/A N/A	N/A	N/A	N/A	N/A	N/A	N/A		
Excavator	44.1	43.2	N/A	N/A	N/A	N/A		
N/A N/A	N/A	N/A	N/A	N/A	N/A	N/A		
Dozer	45.1	44.1	N/A	N/A	N/A	N/A		
N/A N/A	N/A	N/A	N/A	N/A	N/A	N/A		
Excavator	44.1	43.2	N/A	N/A	N/A	N/A		
N/A N/A	N/A	N/A	N/A	N/A	N/A	N/A		
Excavator	44.1	43.2	N/A	N/A	N/A	N/A		
N/A N/A	N/A	N/A	N/A	N/A	N/A	N/A		
Dozer	45.1	44.1	N/A	N/A	N/A	N/A		
N/A N/A	N/A	N/A	N/A	N/A	N/A	N/A		
Total	53.0	52.9	N/A	N/A	N/A	N/A		
N/A N/A	N/A	N/A	N/A	N/A	N/A	N/A		

**** Receptor #8 ****

		Baselines (dBA)		
Description	Land Use	Daytime	Evening	Night
8 Residential	Residential	1.0	1.0	1.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Concrete Saw	No	20		89.6	6500.0	5.0
Excavator	No	40		80.7	6500.0	5.0
Dozer	No	40		81.7	6500.0	5.0
Excavator	No	40		80.7	6500.0	5.0
Excavator	No	40		80.7	6500.0	5.0
Dozer	No	40		81.7	6500.0	5.0

Results

					Noise Limits	
(dBA)	Noise Limit Exceedance (dBA)					
	Calculated (dBA)				Day	Evening
Night	Day		Evening		Night	

Equipment	Lmax	L10	Lmax	L10	Lmax	L10	Lmax	L10
Concrete Saw	42.3	38.3	N/A	N/A	N/A	N/A	N/A	N/A
Excavator	33.4	32.5	N/A	N/A	N/A	N/A	N/A	N/A
Dozer	34.4	33.4	N/A	N/A	N/A	N/A	N/A	N/A
Excavator	33.4	32.5	N/A	N/A	N/A	N/A	N/A	N/A
Excavator	33.4	32.5	N/A	N/A	N/A	N/A	N/A	N/A
Dozer	34.4	33.4	N/A	N/A	N/A	N/A	N/A	N/A
Total	42.3	42.2	N/A	N/A	N/A	N/A	N/A	N/A

**** Receptor #9 ****

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
9 Vacant - Future Residential	Residential	1.0	1.0	1.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Concrete Saw	No	20		89.6	3025.0	3.0
Excavator	No	40		80.7	3025.0	3.0
Dozer	No	40		81.7	3025.0	3.0
Excavator	No	40		80.7	3025.0	3.0
Excavator	No	40		80.7	3025.0	3.0
Dozer	No	40		81.7	3025.0	3.0

Results

Calculated (dBA)			Noise Limits (dBA) Noise Limit Exceedance (dBA)			
			Day		Evening	
Day	Evening	Night	Day	Night	Evening	Night

Equipment	Lmax	L10	Lmax	L10	Lmax	L10	Lmax	L10
Concrete Saw	50.9	47.0	N/A	N/A	N/A	N/A	N/A	N/A
Excavator	42.1	41.1	N/A	N/A	N/A	N/A	N/A	N/A
Dozer	43.0	42.1	N/A	N/A	N/A	N/A	N/A	N/A
Excavator	42.1	41.1	N/A	N/A	N/A	N/A	N/A	N/A
Excavator	42.1	41.1	N/A	N/A	N/A	N/A	N/A	N/A
Dozer	43.0	42.1	N/A	N/A	N/A	N/A	N/A	N/A
Total	50.9	50.8	N/A	N/A	N/A	N/A	N/A	N/A

**** Receptor #10 ****

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
10 School	Residential	1.0	1.0	1.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Concrete Saw	No	20		89.6	4000.0	5.0
Excavator	No	40		80.7	4000.0	5.0
Dozer	No	40		81.7	4000.0	5.0
Excavator	No	40		80.7	4000.0	5.0
Excavator	No	40		80.7	4000.0	5.0
Dozer	No	40		81.7	4000.0	5.0

Results

Noise Limits (dBA)	Noise Limit Exceedance (dBA)			
	Calculated (dBA)		Day	Evening
Night	Day	Evening	Night	

Equipment	Lmax	L10	Lmax	L10	Lmax	L10	Lmax	L10

Concrete Saw			46.5	42.5		N/A		N/A		N/A		N/A		N/A	
N/A	N/A		N/A	N/A	N/A		N/A		N/A						
Excavator			37.6	36.7		N/A		N/A		N/A		N/A		N/A	
N/A	N/A		N/A	N/A	N/A		N/A		N/A						
Dozer			38.6	37.6		N/A		N/A		N/A		N/A		N/A	
N/A	N/A		N/A	N/A	N/A		N/A		N/A						
Excavator			37.6	36.7		N/A		N/A		N/A		N/A		N/A	
N/A	N/A		N/A	N/A	N/A		N/A		N/A						
Excavator			37.6	36.7		N/A		N/A		N/A		N/A		N/A	
N/A	N/A		N/A	N/A	N/A		N/A		N/A						
Dozer			38.6	37.6		N/A		N/A		N/A		N/A		N/A	
N/A	N/A		N/A	N/A	N/A		N/A		N/A						
		Total	46.5	46.4		N/A		N/A		N/A		N/A		N/A	
N/A	N/A		N/A	N/A	N/A		N/A		N/A						

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 06/21/2018
Case Description: CapRock -Site Prep

**** Receptor #1 ****

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
1 Residential	Residential	1.0	1.0	1.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Dozer	No	40		81.7	2948.0	3.0
Dozer	No	40		81.7	2948.0	3.0
Dozer	No	40		81.7	2948.0	3.0
Tractor	No	40	84.0		2948.0	3.0
Tractor	No	40	84.0		2948.0	3.0
Tractor	No	40	84.0		2948.0	3.0
Tractor	No	40	84.0		2948.0	3.0

Results

Noise Limits (dBA)		Noise Limit Exceedance (dBA)					
		Calculated (dBA)		Day		Evening	
Night		Day		Evening		Night	
Equipment		Lmax	L10	Lmax	L10	Lmax	L10
Lmax	L10	Lmax	L10	Lmax	L10	Lmax	L10
Dozer		43.3	42.3	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A	
Dozer		43.3	42.3	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A	
Dozer		43.3	42.3	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A	
Tractor		45.6	44.6	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A	
Tractor		45.6	44.6	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A	
Tractor		45.6	44.6	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A	

Tractor			45.6	44.6		N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		
	Total		45.6	52.2		N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		

**** Receptor #2 ****

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
2 Residential	Residential	1.0	1.0	1.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Dozer	No	40		81.7	2743.0	3.0
Dozer	No	40		81.7	2743.0	3.0
Dozer	No	40		81.7	2743.0	3.0
Tractor	No	40	84.0		2743.0	3.0
Tractor	No	40	84.0		2743.0	3.0
Tractor	No	40	84.0		2743.0	3.0
Tractor	No	40	84.0		2743.0	3.0

Results

Noise Limits (dBA)				Noise Limit Exceedance (dBA)					
		Calculated (dBA)				Day		Evening	
Night		Day		Evening		Night			
Equipment		Lmax	L10	Lmax	L10	Lmax	L10	Lmax	L10
Lmax	L10	Lmax	L10	Lmax	L10	Lmax	L10		
Dozer		43.9	42.9		N/A	N/A	N/A	N/A	
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		
Dozer		43.9	42.9		N/A	N/A	N/A	N/A	
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		
Dozer		43.9	42.9		N/A	N/A	N/A	N/A	
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		
Tractor		46.2	45.2		N/A	N/A	N/A	N/A	
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		
Tractor		46.2	45.2		N/A	N/A	N/A	N/A	
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		
Tractor		46.2	45.2		N/A	N/A	N/A	N/A	
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		
Tractor		46.2	45.2		N/A	N/A	N/A	N/A	
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		

	Total	46.2	52.8	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		

**** Receptor #3 ****

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
3 Residential	Residential	1.0	1.0	1.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Dozer	No	40		81.7	2219.0	3.0
Dozer	No	40		81.7	2219.0	3.0
Dozer	No	40		81.7	2219.0	3.0
Tractor	No	40	84.0		2219.0	3.0
Tractor	No	40	84.0		2219.0	3.0
Tractor	No	40	84.0		2219.0	3.0
Tractor	No	40	84.0		2219.0	3.0

Results

(dBA)	Noise Limits	Noise Limit Exceedance (dBA)							
		Calculated (dBA)				Day		Evening	
Night		Day		Evening		Night			
Equipment		Lmax	L10	Lmax	L10	Lmax	L10	Lmax	L10
Lmax	L10	Lmax	L10	Lmax	L10	Lmax	L10		
Dozer		45.7	44.7			N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		
Dozer		45.7	44.7			N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		
Dozer		45.7	44.7			N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		
Tractor		48.1	47.1			N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		
Tractor		48.1	47.1			N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		
Tractor		48.1	47.1			N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		
Tractor		48.1	47.1			N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		
	Total	48.1	54.7			N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		

**** Receptor #4 ****

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
4 Residential	Residential	1.0	1.0	1.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Dozer	No	40		81.7	1885.0	3.0
Dozer	No	40		81.7	1885.0	3.0
Dozer	No	40		81.7	1885.0	3.0
Tractor	No	40	84.0		1885.0	3.0
Tractor	No	40	84.0		1885.0	3.0
Tractor	No	40	84.0		1885.0	3.0
Tractor	No	40	84.0		1885.0	3.0

Results

Noise Limits (dBA)	Noise Limit Exceedance (dBA)							
	Calculated (dBA)				Day		Evening	
Night	Day	Evening		Night				
Equipment	Lmax	L10	Lmax	L10	Lmax	L10	Lmax	L10
Lmax L10	Lmax	L10	Lmax	L10	Lmax	L10		
Dozer	47.1	46.2			N/A	N/A	N/A	N/A
N/A N/A	N/A	N/A	N/A	N/A	N/A	N/A		
Dozer	47.1	46.2			N/A	N/A	N/A	N/A
N/A N/A	N/A	N/A	N/A	N/A	N/A	N/A		
Dozer	47.1	46.2			N/A	N/A	N/A	N/A
N/A N/A	N/A	N/A	N/A	N/A	N/A	N/A		
Tractor	49.5	48.5			N/A	N/A	N/A	N/A
N/A N/A	N/A	N/A	N/A	N/A	N/A	N/A		
Tractor	49.5	48.5			N/A	N/A	N/A	N/A
N/A N/A	N/A	N/A	N/A	N/A	N/A	N/A		
Tractor	49.5	48.5			N/A	N/A	N/A	N/A
N/A N/A	N/A	N/A	N/A	N/A	N/A	N/A		
Tractor	49.5	48.5			N/A	N/A	N/A	N/A
N/A N/A	N/A	N/A	N/A	N/A	N/A	N/A		
Total	49.5	56.1			N/A	N/A	N/A	N/A
N/A N/A	N/A	N/A	N/A	N/A	N/A	N/A		

**** Receptor #5 ****

		Baselines (dBA)		
Description	Land Use	Daytime	Evening	Night
5 Residential	Residential	1.0	1.0	1.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Dozer	No	40		81.7	1538.0	0.0
Dozer	No	40		81.7	1538.0	0.0
Dozer	No	40		81.7	1538.0	0.0
Tractor	No	40	84.0		1538.0	0.0
Tractor	No	40	84.0		1538.0	0.0
Tractor	No	40	84.0		1538.0	0.0
Tractor	No	40	84.0		1538.0	0.0

Results

Noise Limits (dBA)	Noise Limit Exceedance (dBA)							
	Calculated (dBA)				Day		Evening	
Night	Day		Evening		Night			
Equipment	Lmax	L10	Lmax	L10	Lmax	L10	Lmax	L10
Dozer	51.9	50.9	N/A	N/A	N/A	N/A		
Dozer	51.9	50.9	N/A	N/A	N/A	N/A		
Dozer	51.9	50.9	N/A	N/A	N/A	N/A		
Tractor	54.2	53.3	N/A	N/A	N/A	N/A		
Tractor	54.2	53.3	N/A	N/A	N/A	N/A		
Tractor	54.2	53.3	N/A	N/A	N/A	N/A		
Tractor	54.2	53.3	N/A	N/A	N/A	N/A		
Total	54.2	60.9	N/A	N/A	N/A	N/A		

**** Receptor #6 ****

Baselines (dBA)

Description	Land Use	Daytime	Evening	Night
6 Residential	Residential	1.0	1.0	1.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Dozer	No	40		81.7	2128.0	3.0
Dozer	No	40		81.7	2128.0	3.0
Dozer	No	40		81.7	2128.0	3.0
Tractor	No	40	84.0		2128.0	3.0
Tractor	No	40	84.0		2128.0	3.0
Tractor	No	40	84.0		2128.0	3.0
Tractor	No	40	84.0		2128.0	3.0

Results

Noise Limits (dBA)

Noise Limit Exceedance (dBA)

Calculated (dBA)				Day		Evening	
Night		Day		Evening		Night	
Equipment		Lmax	L10	Lmax	L10	Lmax	L10
Lmax	L10	Lmax	L10	Lmax	L10	Lmax	L10
Dozer		46.1	45.1	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Dozer		46.1	45.1	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Dozer		46.1	45.1	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Tractor		48.4	47.4	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Tractor		48.4	47.4	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Tractor		48.4	47.4	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Tractor		48.4	47.4	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Total	48.4	55.0	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

**** Receptor #7 ****

Baselines (dBA)

Description	Land Use	Daytime	Evening	Night

7 Residential	Residential	1.0	1.0	1.0	

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Dozer	No	40		81.7	2385.0	3.0
Dozer	No	40		81.7	2385.0	3.0
Dozer	No	40		81.7	2385.0	3.0
Tractor	No	40	84.0		2385.0	3.0
Tractor	No	40	84.0		2385.0	3.0
Tractor	No	40	84.0		2385.0	3.0
Tractor	No	40	84.0		2385.0	3.0

Results

(dBA)	Calculated (dBA)				Noise Limits			
	Noise Limit Exceedance (dBA)							
	Day		Evening		Night			
Equipment	Lmax	L10	Lmax	L10	Lmax	L10	Lmax	L10
Dozer	45.1	44.1	N/A	N/A	N/A	N/A	N/A	N/A
Dozer	45.1	44.1	N/A	N/A	N/A	N/A	N/A	N/A
Dozer	45.1	44.1	N/A	N/A	N/A	N/A	N/A	N/A
Tractor	47.4	46.5	N/A	N/A	N/A	N/A	N/A	N/A
Tractor	47.4	46.5	N/A	N/A	N/A	N/A	N/A	N/A
Tractor	47.4	46.5	N/A	N/A	N/A	N/A	N/A	N/A
Tractor	47.4	46.5	N/A	N/A	N/A	N/A	N/A	N/A
Total	47.4	54.1	N/A	N/A	N/A	N/A	N/A	N/A

**** Receptor #8 ****

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
8 Residential	Residential	1.0	1.0	1.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Dozer	No	40		81.7	6500.0	5.0
Dozer	No	40		81.7	6500.0	5.0
Dozer	No	40		81.7	6500.0	5.0
Tractor	No	40	84.0		6500.0	5.0
Tractor	No	40	84.0		6500.0	5.0
Tractor	No	40	84.0		6500.0	5.0
Tractor	No	40	84.0		6500.0	5.0

Results

	Calculated (dBA)		Noise Limits (dBA)						Noise Limit Exceedance (dBA)					
			Day		Evening		Night		Day		Evening		Night	
Equipment	Lmax	L10	Lmax	L10	Lmax	L10	Lmax	L10	Lmax	L10	Lmax	L10	Lmax	L10
Dozer	34.4	33.4	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Dozer	34.4	33.4	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Dozer	34.4	33.4	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Tractor	36.7	35.7	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Tractor	36.7	35.7	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Tractor	36.7	35.7	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Tractor	36.7	35.7	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Total	36.7	43.3	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

**** Receptor #9 ****

		Baselines (dBA)		
Description	Land Use	Daytime	Evening	Night
9 Vacant - Future Residential	Residential	1.0	1.0	1.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Dozer	No	40		81.7	3025.0	3.0
Dozer	No	40		81.7	3025.0	3.0
Dozer	No	40		81.7	3025.0	3.0
Tractor	No	40	84.0		3025.0	3.0
Tractor	No	40	84.0		3025.0	3.0
Tractor	No	40	84.0		3025.0	3.0
Tractor	No	40	84.0		3025.0	3.0

Results

Equipment	Noise Limits (dBA) Calculated (dBA) Day Lmax	Day L10	Evening Lmax	Evening L10	Night Lmax	Night L10	Noise Limit Exceedance (dBA) Day Lmax	Day L10	Evening Lmax	Evening L10	Night Lmax	Night L10
Dozer			43.0	42.1			N/A	N/A	N/A	N/A	N/A	N/A
Dozer			43.0	42.1			N/A	N/A	N/A	N/A	N/A	N/A
Dozer			43.0	42.1			N/A	N/A	N/A	N/A	N/A	N/A
Tractor			45.4	44.4			N/A	N/A	N/A	N/A	N/A	N/A
Tractor			45.4	44.4			N/A	N/A	N/A	N/A	N/A	N/A
Tractor			45.4	44.4			N/A	N/A	N/A	N/A	N/A	N/A
Tractor			45.4	44.4			N/A	N/A	N/A	N/A	N/A	N/A
Total			45.4	52.0			N/A	N/A	N/A	N/A	N/A	N/A

**** Receptor #10 ****

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
10 School	Residential	1.0	1.0	1.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Dozer	No	40		81.7	4000.0	5.0
Dozer	No	40		81.7	4000.0	5.0
Dozer	No	40		81.7	4000.0	5.0
Tractor	No	40	84.0		4000.0	5.0
Tractor	No	40	84.0		4000.0	5.0
Tractor	No	40	84.0		4000.0	5.0
Tractor	No	40	84.0		4000.0	5.0

Results

Equipment	Noise Limits (dBA) Calculated (dBA) Day Lmax	Day L10	Evening Lmax	Evening L10	Night Lmax	Night L10	Noise Limit Exceedance (dBA) Day Lmax	Day L10	Evening Lmax	Evening L10	Night Lmax	Night L10
Dozer	38.6	37.6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Dozer	38.6	37.6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Dozer	38.6	37.6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Tractor	40.9	40.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Tractor	40.9	40.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Tractor	40.9	40.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Tractor	40.9	40.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Total	40.9	47.6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 06/21/2018
Case Description: CapRock -Grading

**** Receptor #1 ****

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
1 Residential	Residential	1.0	1.0	1.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Excavator	No	40		80.7	2948.0	3.0
Excavator	No	40		80.7	2948.0	3.0
Grader	No	40	85.0		2948.0	3.0
Dozer	No	40		81.7	2948.0	3.0
Scraper	No	40		83.6	2948.0	3.0
Scraper	No	40		83.6	2948.0	3.0
Tractor	No	40	84.0		2948.0	3.0
Tractor	No	40	84.0		2948.0	0.0

Results

(dBA)	Calculated (dBA)				Noise Limits (dBA)			
	Day		Evening		Night			
Equipment	Lmax	L10	Lmax	L10	Lmax	L10	Lmax	L10
Excavator	42.3	41.3	N/A	N/A	N/A	N/A	N/A	N/A
Excavator	42.3	41.3	N/A	N/A	N/A	N/A	N/A	N/A
Grader	46.6	45.6	N/A	N/A	N/A	N/A	N/A	N/A
Dozer	43.3	42.3	N/A	N/A	N/A	N/A	N/A	N/A
Scraper	45.2	44.2	N/A	N/A	N/A	N/A	N/A	N/A
Scraper	45.2	44.2	N/A	N/A	N/A	N/A	N/A	N/A

Noise Limit Exceedance (dBA)							
Day		Evening		Night			
Lmax	L10	Lmax	L10	Lmax	L10	Lmax	L10
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Tractor			45.6	44.6		N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		
Tractor			48.6	47.6		N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		
	Total		48.6	53.4		N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		

**** Receptor #2 ****

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
2 Residential	Residential	1.0	1.0	1.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Excavator	No	40		80.7	2743.0	3.0
Excavator	No	40		80.7	2743.0	3.0
Grader	No	40	85.0		2743.0	3.0
Dozer	No	40		81.7	2743.0	3.0
Scraper	No	40		83.6	2743.0	3.0
Scraper	No	40		83.6	2743.0	3.0
Tractor	No	40	84.0		2743.0	3.0
Tractor	No	40	84.0		2743.0	0.0

Results

(dBA)	Noise Limit Exceedance (dBA)				Noise Limits			
	Calculated (dBA)				Day		Evening	
Night	Day		Evening		Night			
Equipment	Lmax	L10	Lmax	L10	Lmax	L10	Lmax	L10
Lmax	L10	Lmax	L10	Lmax	L10	Lmax	L10		
Excavator		42.9	41.9		N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		
Excavator		42.9	41.9		N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		
Grader		47.2	46.2		N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		
Dozer		43.9	42.9		N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		
Scraper		45.8	44.8		N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		

Scraper		45.8	44.8	N/A	N/A	N/A	N/A	
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
Tractor		46.2	45.2	N/A	N/A	N/A	N/A	
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
Tractor		49.2	48.2	N/A	N/A	N/A	N/A	
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
Total		49.2	54.0	N/A	N/A	N/A	N/A	
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	

**** Receptor #3 ****

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
3 Residential	Residential	1.0	1.0	1.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Excavator	No	40		80.7	2219.0	3.0
Excavator	No	40		80.7	2219.0	3.0
Grader	No	40	85.0		2219.0	3.0
Dozer	No	40		81.7	2219.0	3.0
Scraper	No	40		83.6	2219.0	3.0
Scraper	No	40		83.6	2219.0	3.0
Tractor	No	40	84.0		2219.0	3.0
Tractor	No	40	84.0		2219.0	0.0

Results

Equipment	Calculated (dBA) Day Lmax	Day L10	Evening Lmax	Evening L10	Night Lmax	Night L10	Noise Limits (dBA) Day Lmax	Day L10
Excavator	44.8	43.8	N/A	N/A	N/A	N/A		
N/A	N/A	N/A	N/A	N/A	N/A	N/A		
Excavator	44.8	43.8	N/A	N/A	N/A	N/A		
N/A	N/A	N/A	N/A	N/A	N/A	N/A		
Grader	49.1	48.1	N/A	N/A	N/A	N/A		
N/A	N/A	N/A	N/A	N/A	N/A	N/A		
Dozer	45.7	44.7	N/A	N/A	N/A	N/A		
N/A	N/A	N/A	N/A	N/A	N/A	N/A		

Equipment	Noise Limits (dBA) Evening Lmax	Evening L10	Night Lmax	Night L10	Noise Limit Exceedance (dBA) Day Lmax	Day L10	Evening Lmax	Evening L10
Excavator					N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A		
Excavator					N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A		
Grader					N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A		
Dozer					N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A		

Scraper			47.6	46.7		N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		
Scraper			47.6	46.7		N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		
Tractor			48.1	47.1		N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		
Tractor			51.1	50.1		N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		
		Total	51.1	55.9		N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		

**** Receptor #4 ****

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
4 Residential	Residential	1.0	1.0	1.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Excavator	No	40		80.7	1885.0	3.0
Excavator	No	40		80.7	1885.0	3.0
Grader	No	40	85.0		1885.0	3.0
Dozer	No	40		81.7	1885.0	3.0
Scraper	No	40		83.6	1885.0	3.0
Scraper	No	40		83.6	1885.0	3.0
Tractor	No	40	84.0		1885.0	3.0
Tractor	No	40	84.0		1885.0	0.0

Results

Noise Limits (dBA)	Noise Limit Exceedance (dBA)							
	Calculated (dBA)				Day		Evening	
Night	Day		Evening		Night			
Equipment	Lmax	L10	Lmax	L10	Lmax	L10	Lmax	L10
Lmax L10	Lmax	L10	Lmax	L10	Lmax	L10		
Excavator		46.2	45.2		N/A	N/A	N/A	N/A
N/A N/A	N/A	N/A	N/A	N/A	N/A	N/A		
Excavator		46.2	45.2		N/A	N/A	N/A	N/A
N/A N/A	N/A	N/A	N/A	N/A	N/A	N/A		
Grader		50.5	49.5		N/A	N/A	N/A	N/A
N/A N/A	N/A	N/A	N/A	N/A	N/A	N/A		

Dozer		47.1	46.2	N/A	N/A	N/A	N/A	
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
Scraper		49.1	48.1	N/A	N/A	N/A	N/A	
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
Scraper		49.1	48.1	N/A	N/A	N/A	N/A	
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
Tractor		49.5	48.5	N/A	N/A	N/A	N/A	
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
Tractor		52.5	51.5	N/A	N/A	N/A	N/A	
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
	Total	52.5	57.3	N/A	N/A	N/A	N/A	
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	

**** Receptor #5 ****

		Baselines (dBA)		
Description	Land Use	Daytime	Evening	Night
5 Residential	Residential	1.0	1.0	1.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Excavator	No	40		80.7	1538.0	0.0
Excavator	No	40		80.7	1538.0	0.0
Grader	No	40	85.0		1538.0	0.0
Dozer	No	40		81.7	1538.0	0.0
Scraper	No	40		83.6	1538.0	0.0
Scraper	No	40		83.6	1538.0	0.0
Tractor	No	40	84.0		1538.0	0.0
Tractor	No	40	84.0		1538.0	0.0

Results

						Noise Limits (dBA)			
		Noise Limit Exceedance (dBA)							
		Calculated (dBA)				Day		Evening	
Night		Day		Evening		Night			
Equipment		Lmax	L10	Lmax	L10	Lmax	L10	Lmax	L10
Lmax	L10	Lmax	L10	Lmax	L10	Lmax	L10		
Excavator		51.0	50.0	N/A	N/A	N/A	N/A		
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		
Excavator		51.0	50.0	N/A	N/A	N/A	N/A		
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		

Grader			55.2	54.3	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
Dozer			51.9	50.9	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
Scraper			53.8	52.8	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
Scraper			53.8	52.8	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
Tractor			54.2	53.3	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
Tractor			54.2	53.3	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
		Total	55.2	61.5	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	

**** Receptor #6 ****

		Baselines (dBA)		
Description	Land Use	Daytime	Evening	Night
6 Residential	Residential	1.0	1.0	1.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Excavator	No	40		80.7	2128.0	3.0
Excavator	No	40		80.7	2128.0	3.0
Grader	No	40	85.0		2128.0	3.0
Dozer	No	40		81.7	2128.0	3.0
Scraper	No	40		83.6	2128.0	3.0
Scraper	No	40		83.6	2128.0	3.0
Tractor	No	40	84.0		2128.0	3.0
Tractor	No	40	84.0		2128.0	0.0

Results

						Noise Limits (dBA)			
		Noise Limit Exceedance (dBA)							
		Calculated (dBA)				Day		Evening	
Equipment	Day		Evening		Night				
	Lmax	L10	Lmax	L10	Lmax	L10	Lmax	L10	Lmax	L10
Excavator			45.1	44.2	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A			

Excavator			45.1	44.2		N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		
Grader			49.4	48.4		N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		
Dozer			46.1	45.1		N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		
Scraper			48.0	47.0		N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		
Scraper			48.0	47.0		N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		
Tractor			48.4	47.4		N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		
Tractor			51.4	50.4		N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		
		Total	51.4	56.2		N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		

**** Receptor #7 ****

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
7 Residential	Residential	1.0	1.0	1.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Excavator	No	40		80.7	2385.0	3.0
Excavator	No	40		80.7	2385.0	3.0
Grader	No	40	85.0		2385.0	3.0
Dozer	No	40		81.7	2385.0	3.0
Scraper	No	40		83.6	2385.0	3.0
Scraper	No	40		83.6	2385.0	3.0
Tractor	No	40	84.0		2385.0	3.0
Tractor	No	40	84.0		2385.0	0.0

Results

Noise Limits (dBA)	Noise Limit Exceedance (dBA)							
	Calculated (dBA)				Day		Evening	
Night	Day		Evening		Night			
Equipment	Lmax	L10	Lmax	L10	Lmax	L10	Lmax	L10
Lmax L10	Lmax	L10	Lmax	L10	Lmax	L10		

Excavator			44.1	43.2		N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		
Excavator			44.1	43.2		N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		
Grader			48.4	47.5		N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		
Dozer			45.1	44.1		N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		
Scraper			47.0	46.0		N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		
Scraper			47.0	46.0		N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		
Tractor			47.4	46.5		N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		
Tractor			50.4	49.5		N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		
		Total	50.4	55.3		N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		

**** Receptor #8 ****

		Baselines (dBA)		
Description	Land Use	Daytime	Evening	Night
8 Residential	Residential	1.0	1.0	1.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Excavator	No	40		80.7	6500.0	5.0
Excavator	No	40		80.7	6500.0	5.0
Grader	No	40	85.0		6500.0	5.0
Dozer	No	40		81.7	6500.0	5.0
Scraper	No	40		83.6	6500.0	5.0
Scraper	No	40		83.6	6500.0	5.0
Tractor	No	40	84.0		6500.0	5.0
Tractor	No	40	84.0		6500.0	0.0

Results

									Noise Limits (dBA)
				Noise Limit Exceedance (dBA)					
		Calculated (dBA)				Day		Evening	
Night		Day		Evening		Night			
Equipment		Lmax	L10	Lmax	L10	Lmax	L10	Lmax	L10
Lmax	L10	Lmax	L10	Lmax	L10	Lmax	L10		

Excavator			33.4	32.5	N/A	N/A	N/A	N/A	
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		
Excavator			33.4	32.5	N/A	N/A	N/A	N/A	
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		
Grader			37.7	36.7	N/A	N/A	N/A	N/A	
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		
Dozer			34.4	33.4	N/A	N/A	N/A	N/A	
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		
Scraper			36.3	35.3	N/A	N/A	N/A	N/A	
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		
Scraper			36.3	35.3	N/A	N/A	N/A	N/A	
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		
Tractor			36.7	35.7	N/A	N/A	N/A	N/A	
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		
Tractor			41.7	40.7	N/A	N/A	N/A	N/A	
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		
	Total		41.7	45.2	N/A	N/A	N/A	N/A	
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		

**** Receptor #9 ****

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
9 Vacant - Future Residential	Residential	1.0	1.0	1.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Excavator	No	40		80.7	3025.0	3.0
Excavator	No	40		80.7	3025.0	3.0
Grader	No	40	85.0		3025.0	3.0
Dozer	No	40		81.7	3025.0	3.0
Scraper	No	40		83.6	3025.0	3.0
Scraper	No	40		83.6	3025.0	3.0
Tractor	No	40	84.0		3025.0	3.0
Tractor	No	40	84.0		3025.0	0.0

Results

Calculated (dBA)			Noise Limits (dBA) Noise Limit Exceedance (dBA)		
			Day	Evening	Night
Day	Evening	Night			

Equipment	Lmax	L10	Lmax	L10	Lmax	L10	Lmax	L10
Excavator	42.1	41.1	N/A	N/A	N/A	N/A	N/A	N/A
Excavator	42.1	41.1	N/A	N/A	N/A	N/A	N/A	N/A
Grader	46.4	45.4	N/A	N/A	N/A	N/A	N/A	N/A
Dozer	43.0	42.1	N/A	N/A	N/A	N/A	N/A	N/A
Scraper	44.9	44.0	N/A	N/A	N/A	N/A	N/A	N/A
Scraper	44.9	44.0	N/A	N/A	N/A	N/A	N/A	N/A
Tractor	45.4	44.4	N/A	N/A	N/A	N/A	N/A	N/A
Tractor	48.4	47.4	N/A	N/A	N/A	N/A	N/A	N/A
Total	48.4	53.2	N/A	N/A	N/A	N/A	N/A	N/A

**** Receptor #10 ****

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
10 School	Residential	1.0	1.0	1.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Excavator	No	40		80.7	4000.0	5.0
Excavator	No	40		80.7	4000.0	5.0
Grader	No	40	85.0		4000.0	5.0
Dozer	No	40		81.7	4000.0	5.0
Scraper	No	40		83.6	4000.0	5.0
Scraper	No	40		83.6	4000.0	5.0
Tractor	No	40	84.0		4000.0	5.0
Tractor	No	40	84.0		4000.0	0.0

Results

(dBA)	Noise Limit Exceedance (dBA)	Noise Limits

	Calculated (dBA)				Day		Evening	
Night	Day		Evening		Night			
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Equipment	Lmax	L10	Lmax	L10	Lmax	L10	Lmax	L10
Lmax L10	Lmax	L10	Lmax	L10	Lmax	L10		
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Excavator	37.6	36.7	N/A	N/A	N/A	N/A		
N/A N/A	N/A	N/A	N/A	N/A	N/A	N/A		
Excavator	37.6	36.7	N/A	N/A	N/A	N/A		
N/A N/A	N/A	N/A	N/A	N/A	N/A	N/A		
Grader	41.9	41.0	N/A	N/A	N/A	N/A		
N/A N/A	N/A	N/A	N/A	N/A	N/A	N/A		
Dozer	38.6	37.6	N/A	N/A	N/A	N/A		
N/A N/A	N/A	N/A	N/A	N/A	N/A	N/A		
Scraper	40.5	39.5	N/A	N/A	N/A	N/A		
N/A N/A	N/A	N/A	N/A	N/A	N/A	N/A		
Scraper	40.5	39.5	N/A	N/A	N/A	N/A		
N/A N/A	N/A	N/A	N/A	N/A	N/A	N/A		
Tractor	40.9	40.0	N/A	N/A	N/A	N/A		
N/A N/A	N/A	N/A	N/A	N/A	N/A	N/A		
Tractor	45.9	45.0	N/A	N/A	N/A	N/A		
N/A N/A	N/A	N/A	N/A	N/A	N/A	N/A		
Total	45.9	49.4	N/A	N/A	N/A	N/A		
N/A N/A	N/A	N/A	N/A	N/A	N/A	N/A		

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 06/21/2018
Case Description: CapRock -Construction

**** Receptor #1 ****

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
1 Residential	Residential	1.0	1.0	1.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Crane	No	16		80.6	2948.0	3.0
Front End Loader	No	40		79.1	2948.0	3.0
Front End Loader	No	40		79.1	2948.0	3.0
Front End Loader	No	40		79.1	2948.0	3.0
Generator	No	50		80.6	2948.0	3.0
Tractor	No	40	84.0		2948.0	3.0
Tractor	No	40	84.0		2948.0	3.0
Tractor	No	40	84.0		2948.0	0.0
Welder / Torch	No	40		74.0	2948.0	0.0

Results

Equipment	Calculated (dBA) Day Lmax	Day L10	Evening Lmax	Evening L10	Night Lmax	Night L10	Noise Limits (dBA) Day Lmax	Day L10	Evening Lmax	Evening L10	Night Lmax	Night L10	Noise Limit Exceedance (dBA) Day Lmax	Day L10	Evening Lmax	Evening L10	Night Lmax	Night L10

Crane			42.1	37.2		N/A	N/A	N/A	N/A	N/A	N/A	N/A	
Front End Loader			40.7	39.7		N/A	N/A	N/A	N/A	N/A	N/A	N/A	
Front End Loader			40.7	39.7		N/A	N/A	N/A	N/A	N/A	N/A	N/A	
Front End Loader			40.7	39.7		N/A	N/A	N/A	N/A	N/A	N/A	N/A	
Generator			42.2	42.2		N/A	N/A	N/A	N/A	N/A	N/A	N/A	
Tractor			45.6	44.6		N/A	N/A	N/A	N/A	N/A	N/A	N/A	
Tractor			45.6	44.6		N/A	N/A	N/A	N/A	N/A	N/A	N/A	
Tractor			48.6	47.6		N/A	N/A	N/A	N/A	N/A	N/A	N/A	
Welder / Torch			38.6	37.6		N/A	N/A	N/A	N/A	N/A	N/A	N/A	
	Total		48.6	52.3		N/A	N/A	N/A	N/A	N/A	N/A	N/A	

**** Receptor #2 ****

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
2 Residential	Residential	1.0	1.0	1.0

			Equipment			
			Spec	Actual	Receptor	Estimated
	Impact	Usage	Lmax	Lmax	Distance	Shielding
Description	Device	(%)	(dBA)	(dBA)	(feet)	(dBA)
Crane	No	16		80.6	2743.0	3.0
Front End Loader	No	40		79.1	2743.0	3.0
Front End Loader	No	40		79.1	2743.0	3.0
Front End Loader	No	40		79.1	2743.0	3.0
Generator	No	50		80.6	2743.0	3.0
Tractor	No	40	84.0		2743.0	3.0
Tractor	No	40	84.0		2743.0	3.0

Tractor	No	40	84.0	2743.0	0.0
Welder / Torch	No	40	74.0	2743.0	0.0

Results

Noise Limits (dBA)

Noise Limit Exceedance (dBA)							
Calculated (dBA)				Day		Evening	
Night		Day		Evening		Night	
Equipment	Lmax	L10	Lmax	L10	Lmax	L10	Lmax	L10	Lmax	L10	Lmax	L10	Lmax	L10
Crane	42.8	37.8	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Front End Loader	41.3	40.3	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Front End Loader	41.3	40.3	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Front End Loader	41.3	40.3	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Generator	42.8	42.8	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Tractor	46.2	45.2	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Tractor	46.2	45.2	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Tractor	49.2	48.2	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Welder / Torch	39.2	38.2	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Total	49.2	53.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

**** Receptor #3 ****

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
3 Residential	Residential	1.0	1.0	1.0

Equipment

Impact	Usage	Spec Lmax	Actual Lmax	Receptor Distance	Estimated Shielding

Description	Device	(%)	(dBA)	(dBA)	(feet)	(dBA)
Crane	No	16		80.6	2219.0	3.0
Front End Loader	No	40		79.1	2219.0	3.0
Front End Loader	No	40		79.1	2219.0	3.0
Front End Loader	No	40		79.1	2219.0	3.0
Generator	No	50		80.6	2219.0	3.0
Tractor	No	40	84.0		2219.0	3.0
Tractor	No	40	84.0		2219.0	3.0
Tractor	No	40	84.0		2219.0	0.0
Welder / Torch	No	40		74.0	2219.0	0.0

Results

Noise Limits (dBA)

Noise Limit Exceedance (dBA)

Calculated (dBA)				Day		Evening		Night	
Equipment	Lmax	L10	Lmax	L10	Lmax	L10	Lmax	L10	Lmax	L10
Crane	44.6	39.6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Front End Loader	43.2	42.2	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Front End Loader	43.2	42.2	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Front End Loader	43.2	42.2	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Generator	44.7	44.7	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Tractor	48.1	47.1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Tractor	48.1	47.1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Tractor	51.1	50.1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Welder / Torch	41.1	40.1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Total	51.1	54.8	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

**** Receptor #4 ****

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
4 Residential	Residential	1.0	1.0	1.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Crane	No	16		80.6	1885.0	3.0
Front End Loader	No	40		79.1	1885.0	3.0
Front End Loader	No	40		79.1	1885.0	3.0
Front End Loader	No	40		79.1	1885.0	3.0
Generator	No	50		80.6	1885.0	3.0
Tractor	No	40	84.0		1885.0	3.0
Tractor	No	40	84.0		1885.0	3.0
Tractor	No	40	84.0		1885.0	0.0
Welder / Torch	No	40		74.0	1885.0	0.0

Results

	Calculated (dBA)		Noise Limits (dBA) Day		Evening		Night		Noise Limit Exceedance (dBA) Day		Evening		Night	
Equipment	Lmax	L10	Lmax	L10	Lmax	L10	Lmax	L10	Lmax	L10	Lmax	L10	Lmax	L10

Crane			46.0	41.1		N/A	N/A	N/A	N/A	N/A	N/A	N/A	
Front End Loader			44.6	43.6		N/A	N/A	N/A	N/A	N/A	N/A	N/A	
Front End Loader			44.6	43.6		N/A	N/A	N/A	N/A	N/A	N/A	N/A	
Front End Loader			44.6	43.6		N/A	N/A	N/A	N/A	N/A	N/A	N/A	
Generator			46.1	46.1		N/A	N/A	N/A	N/A	N/A	N/A	N/A	
Tractor			49.5	48.5		N/A	N/A	N/A	N/A	N/A	N/A	N/A	
Tractor			49.5	48.5		N/A	N/A	N/A	N/A	N/A	N/A	N/A	
Tractor			52.5	51.5		N/A	N/A	N/A	N/A	N/A	N/A	N/A	
Welder / Torch			42.5	41.5		N/A	N/A	N/A	N/A	N/A	N/A	N/A	
	Total		52.5	56.2		N/A	N/A	N/A	N/A	N/A	N/A	N/A	

**** Receptor #5 ****

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
5 Residential	Residential	1.0	1.0	1.0

Description	Impact Device	Usage (%)	Equipment Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Crane	No	16		80.6	1538.0	0.0
Front End Loader	No	40		79.1	1538.0	0.0
Front End Loader	No	40		79.1	1538.0	0.0
Front End Loader	No	40		79.1	1538.0	0.0
Generator	No	50		80.6	1538.0	0.0
Tractor	No	40	84.0		1538.0	0.0
Tractor	No	40	84.0		1538.0	0.0

Tractor	No	40	84.0	1538.0	0.0
Welder / Torch	No	40	74.0	1538.0	0.0

Results

Noise Limits (dBA)

Equipment	Calculated (dBA) Lmax	L10	Noise Limit Exceedance (dBA) Day Lmax	L10	Evening Lmax	L10	Night Lmax	L10
Crane	50.8	45.8	N/A	N/A	N/A	N/A	N/A	N/A
Front End Loader	49.4	48.4	N/A	N/A	N/A	N/A	N/A	N/A
Front End Loader	49.4	48.4	N/A	N/A	N/A	N/A	N/A	N/A
Front End Loader	49.4	48.4	N/A	N/A	N/A	N/A	N/A	N/A
Generator	50.9	50.9	N/A	N/A	N/A	N/A	N/A	N/A
Tractor	54.2	53.3	N/A	N/A	N/A	N/A	N/A	N/A
Tractor	54.2	53.3	N/A	N/A	N/A	N/A	N/A	N/A
Tractor	54.2	53.3	N/A	N/A	N/A	N/A	N/A	N/A
Welder / Torch	44.2	43.3	N/A	N/A	N/A	N/A	N/A	N/A
Total	54.2	60.1	N/A	N/A	N/A	N/A	N/A	N/A

**** Receptor #6 ****

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
6 Residential	Residential	1.0	1.0	1.0

Equipment	Impact	Usage	Spec Lmax	Actual Lmax	Receptor Distance	Estimated Shielding

Description	Device	(%)	(dBA)	(dBA)	(feet)	(dBA)
Crane	No	16		80.6	2128.0	3.0
Front End Loader	No	40		79.1	2128.0	3.0
Front End Loader	No	40		79.1	2128.0	3.0
Front End Loader	No	40		79.1	2128.0	3.0
Generator	No	50		80.6	2128.0	3.0
Tractor	No	40	84.0		2128.0	3.0
Tractor	No	40	84.0		2128.0	3.0
Tractor	No	40	84.0		2128.0	0.0
Welder / Torch	No	40		74.0	2128.0	0.0

Results

Noise Limits (dBA)

Equipment	Noise Limit Exceedance (dBA)							
	Calculated (dBA)		Day		Evening		Night	
	Day		Evening		Night			
	Lmax	L10	Lmax	L10	Lmax	L10	Lmax	L10
Crane	45.0	40.0	N/A	N/A	N/A	N/A	N/A	N/A
Front End Loader	43.5	42.6	N/A	N/A	N/A	N/A	N/A	N/A
Front End Loader	43.5	42.6	N/A	N/A	N/A	N/A	N/A	N/A
Front End Loader	43.5	42.6	N/A	N/A	N/A	N/A	N/A	N/A
Generator	45.0	45.0	N/A	N/A	N/A	N/A	N/A	N/A
Tractor	48.4	47.4	N/A	N/A	N/A	N/A	N/A	N/A
Tractor	48.4	47.4	N/A	N/A	N/A	N/A	N/A	N/A
Tractor	51.4	50.4	N/A	N/A	N/A	N/A	N/A	N/A

Welder / Torch 41.4 40.4 N/A N/A N/A N/A
N/A N/A N/A N/A N/A N/A N/A N/A
Total 51.4 55.2 N/A N/A N/A N/A
N/A N/A N/A N/A N/A N/A N/A N/A

**** Receptor #7 ****

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
7 Residential	Residential	1.0	1.0	1.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Crane	No	16		80.6	2385.0	3.0
Front End Loader	No	40		79.1	2385.0	3.0
Front End Loader	No	40		79.1	2385.0	3.0
Front End Loader	No	40		79.1	2385.0	3.0
Generator	No	50		80.6	2385.0	3.0
Tractor	No	40	84.0		2385.0	3.0
Tractor	No	40	84.0		2385.0	3.0
Tractor	No	40	84.0		2385.0	0.0
Welder / Torch	No	40		74.0	2385.0	0.0

Results

Noise Limits (dBA)	Noise Limit Exceedance (dBA)					
	Calculated (dBA)			Day	Evening	
Night	Day	Evening	Night			
Equipment	Lmax L10	Lmax L10	Lmax L10	Lmax L10	Lmax L10	Lmax L10

Crane			44.0	39.0		N/A		N/A		N/A		N/A	
N/A	N/A		N/A	N/A		N/A		N/A		N/A			
Front End Loader			42.5	41.6		N/A		N/A		N/A		N/A	
N/A	N/A		N/A	N/A		N/A		N/A		N/A			
Front End Loader			42.5	41.6		N/A		N/A		N/A		N/A	
N/A	N/A		N/A	N/A		N/A		N/A		N/A			
Front End Loader			42.5	41.6		N/A		N/A		N/A		N/A	
N/A	N/A		N/A	N/A		N/A		N/A		N/A			
Generator			44.1	44.0		N/A		N/A		N/A		N/A	
N/A	N/A		N/A	N/A		N/A		N/A		N/A			
Tractor			47.4	46.5		N/A		N/A		N/A		N/A	
N/A	N/A		N/A	N/A		N/A		N/A		N/A			
Tractor			47.4	46.5		N/A		N/A		N/A		N/A	
N/A	N/A		N/A	N/A		N/A		N/A		N/A			
Tractor			50.4	49.5		N/A		N/A		N/A		N/A	
N/A	N/A		N/A	N/A		N/A		N/A		N/A			
Welder / Torch			40.4	39.5		N/A		N/A		N/A		N/A	
N/A	N/A		N/A	N/A		N/A		N/A		N/A			
		Total	50.4	54.2		N/A		N/A		N/A		N/A	
N/A	N/A		N/A	N/A		N/A		N/A		N/A			

**** Receptor #8 ****

		Baselines (dBA)		
Description	Land Use	Daytime	Evening	Night
8 Residential	Residential	1.0	1.0	1.0

			Equipment			
			Spec	Actual	Receptor	Estimated
	Impact	Usage	Lmax	Lmax	Distance	Shielding
Description	Device	(%)	(dBA)	(dBA)	(feet)	(dBA)
Crane	No	16		80.6	6500.0	5.0
Front End Loader	No	40		79.1	6500.0	5.0
Front End Loader	No	40		79.1	6500.0	5.0
Front End Loader	No	40		79.1	6500.0	5.0
Generator	No	50		80.6	6500.0	5.0
Tractor	No	40	84.0		6500.0	5.0
Tractor	No	40	84.0		6500.0	5.0

```
Tractor                  No     40     84.0                6500.0
0.0
Welder / Torch           No     40             74.0        6500.0
0.0
```

Results

Noise Limits (dBA)

Calculated (dBA)	Noise Limit Exceedance (dBA)					
	Day		Evening		Night	
Equipment	Lmax	L10	Lmax	L10	Lmax	L10
Crane	33.3	28.3	N/A	N/A	N/A	N/A
Front End Loader	31.8	30.9	N/A	N/A	N/A	N/A
Front End Loader	31.8	30.9	N/A	N/A	N/A	N/A
Front End Loader	31.8	30.9	N/A	N/A	N/A	N/A
Generator	33.4	33.3	N/A	N/A	N/A	N/A
Tractor	36.7	35.7	N/A	N/A	N/A	N/A
Tractor	36.7	35.7	N/A	N/A	N/A	N/A
Tractor	41.7	40.7	N/A	N/A	N/A	N/A
Welder / Torch	31.7	30.7	N/A	N/A	N/A	N/A
Total	41.7	44.3	N/A	N/A	N/A	N/A

**** Receptor #9 ****

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
9 Vacant - Future Residential	Residential	1.0	1.0	1.0

Equipment

Spec	Actual	Receptor Estimated

Equipment Description	Impact Device	Usage (%)	Lmax (dBA)	Lmax (dBA)	Distance (feet)	Shielding (dBA)
Crane	No	16		80.6	3025.0	3.0
Front End Loader	No	40		79.1	3025.0	3.0
Front End Loader	No	40		79.1	3025.0	3.0
Front End Loader	No	40		79.1	3025.0	3.0
Generator	No	50		80.6	3025.0	3.0
Tractor	No	40	84.0		3025.0	3.0
Tractor	No	40	84.0		3025.0	3.0
Tractor	No	40	84.0		3025.0	0.0
Welder / Torch	No	40		74.0	3025.0	0.0

Results

Equipment	Calculated (dBA) Day Lmax	Day L10	Evening Lmax	Evening L10	Night Lmax	Night L10	Noise Limit Exceedance (dBA) Day Lmax	Day L10	Evening Lmax	Evening L10	Night Lmax	Night L10	Noise Limits (dBA)
Crane	41.9	37.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
Front End Loader	40.5	39.5	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
Front End Loader	40.5	39.5	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
Front End Loader	40.5	39.5	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
Generator	42.0	42.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
Tractor	45.4	44.4	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
Tractor	45.4	44.4	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	

Tractor			48.4	47.4		N/A		N/A		N/A		N/A	
N/A	N/A		N/A	N/A		N/A		N/A		N/A			
Welder / Torch			38.4	37.4		N/A		N/A		N/A		N/A	
N/A	N/A		N/A	N/A		N/A		N/A		N/A			
	Total		48.4	52.1		N/A		N/A		N/A		N/A	
N/A	N/A		N/A	N/A		N/A		N/A					

**** Receptor #10 ****

		Baselines (dBA)		
Description	Land Use	Daytime	Evening	Night
10 School	Residential	1.0	1.0	1.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Crane	No	16		80.6	4000.0	5.0
Front End Loader	No	40		79.1	4000.0	5.0
Front End Loader	No	40		79.1	4000.0	5.0
Front End Loader	No	40		79.1	4000.0	5.0
Generator	No	50		80.6	4000.0	5.0
Tractor	No	40	84.0		4000.0	5.0
Tractor	No	40	84.0		4000.0	5.0
Tractor	No	40	84.0		4000.0	0.0
Welder / Torch	No	40		74.0	4000.0	0.0

Results

Calculated (dBA)				Noise Limits (dBA) Noise Limit Exceedance (dBA)			
				Day		Evening	
Day	Evening	Night		Day	Evening	Night	
N/A	N/A	N/A		N/A	N/A	N/A	

Equipment	Lmax	L10	Lmax	L10	Lmax	L10	Lmax	L10
Lmax	L10	Lmax	L10	Lmax	L10	Lmax	L10	
Crane	37.5	32.5	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
Front End Loader	36.0	35.1	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
Front End Loader	36.0	35.1	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
Front End Loader	36.0	35.1	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
Generator	37.6	37.6	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
Tractor	40.9	40.0	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
Tractor	40.9	40.0	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
Tractor	45.9	45.0	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
Welder / Torch	35.9	35.0	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
Total	45.9	48.5	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 06/21/2018
Case Description: CapRock -Paving

**** Receptor #1 ****

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
1 Residential	Residential	1.0	1.0	1.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Paver	No	50		77.2	2948.0	3.0
Paver	No	50		77.2	2948.0	3.0
All Other Equipment > 5 HP	No	50	85.0		2948.0	3.0
All Other Equipment > 5 HP	No	50	85.0		2948.0	3.0
Roller	No	20		80.0	2948.0	3.0
Roller	No	20		80.0	2948.0	3.0

Results

Limits (dBA)			Noise Limit Exceedance (dBA)					
			Calculated (dBA)			Day		
Evening		Night	Day		Evening		Night	
Equipment	Lmax	L10	Lmax	L10	Lmax	L10	Lmax	L10
Paver	38.8	38.8	N/A	N/A	N/A	N/A	N/A	N/A
Paver	38.8	38.8	N/A	N/A	N/A	N/A	N/A	N/A

All Other Equipment > 5 HP 46.6 46.6 N/A N/A N/A
N/A N/A N/A N/A N/A N/A N/A N/A N/A
All Other Equipment > 5 HP 46.6 46.6 N/A N/A N/A
N/A N/A N/A N/A N/A N/A N/A N/A N/A
Roller 41.6 37.6 N/A N/A N/A
N/A N/A N/A N/A N/A N/A N/A N/A N/A
Roller 41.6 37.6 N/A N/A N/A
N/A N/A N/A N/A N/A N/A N/A N/A N/A
Total 46.6 50.7 N/A N/A N/A
N/A N/A N/A N/A N/A N/A N/A N/A N/A

**** Receptor #2 ****

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
2 Residential	Residential	1.0	1.0	1.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Paver	No	50		77.2	2743.0	3.0
Paver	No	50		77.2	2743.0	3.0
All Other Equipment > 5 HP	No	50	85.0		2743.0	3.0
All Other Equipment > 5 HP	No	50	85.0		2743.0	3.0
Roller	No	20		80.0	2743.0	3.0
Roller	No	20		80.0	2743.0	3.0

Results

Limits (dBA)		Noise Limit Exceedance (dBA)						Noise
		Calculated (dBA)			Day			
Evening	Night	Day		Evening		Night		
Equipment		Lmax	L10	Lmax	L10	Lmax	L10	Lmax
L10	Lmax	L10	Lmax	L10	Lmax	L10	Lmax	L10

Paver				39.4	39.4	N/A	N/A	N/A	
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
Paver				39.4	39.4	N/A	N/A	N/A	
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
All Other Equipment > 5 HP				47.2	47.2	N/A	N/A	N/A	
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
All Other Equipment > 5 HP				47.2	47.2	N/A	N/A	N/A	
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
Roller				42.2	38.2	N/A	N/A	N/A	
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
Roller				42.2	38.2	N/A	N/A	N/A	
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
		Total		47.2	51.3	N/A	N/A	N/A	
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	

**** Receptor #3 ****

		Baselines (dBA)		
Description	Land Use	Daytime	Evening	Night
3 Residential	Residential	1.0	1.0	1.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Paver	No	50		77.2	2219.0	3.0
Paver	No	50		77.2	2219.0	3.0
All Other Equipment > 5 HP	No	50	85.0		2219.0	3.0
All Other Equipment > 5 HP	No	50	85.0		2219.0	3.0
Roller	No	20		80.0	2219.0	3.0
Roller	No	20		80.0	2219.0	3.0

Results

Noise Limits (dBA)	Noise Limit Exceedance (dBA)

Equipment	Calculated (dBA) Day Lmax	L10	Evening Lmax	L10	Night Lmax	L10
Paver	41.3	41.3	N/A	N/A	N/A	N/A
Paver	41.3	41.3	N/A	N/A	N/A	N/A
All Other Equipment > 5 HP	49.1	49.0	N/A	N/A	N/A	N/A
All Other Equipment > 5 HP	49.1	49.0	N/A	N/A	N/A	N/A
Roller	44.1	40.1	N/A	N/A	N/A	N/A
Roller	44.1	40.1	N/A	N/A	N/A	N/A
Total	49.1	53.2	N/A	N/A	N/A	N/A

**** Receptor #4 ****

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
4 Residential	Residential	1.0	1.0	1.0

Description	Impact Device	Equipment Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Paver	No	50		77.2	1885.0	3.0
Paver	No	50		77.2	1885.0	3.0
All Other Equipment > 5 HP	No	50	85.0		1885.0	3.0
All Other Equipment > 5 HP	No	50	85.0		1885.0	3.0
Roller	No	20		80.0	1885.0	3.0
Roller	No	20		80.0	1885.0	3.0

Results

Limits (dBA)			Noise Limit Exceedance (dBA)					
			Calculated (dBA)			Day		
Evening		Night	Day			Evening		Night
Equipment			Lmax	L10		Lmax	L10	Lmax
L10	Lmax	L10	Lmax	L10	Lmax	L10	Lmax	L10
Paver			42.7	42.7		N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Paver			42.7	42.7		N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
All Other Equipment > 5 HP			50.5	50.5		N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
All Other Equipment > 5 HP			50.5	50.5		N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Roller			45.5	41.5		N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Roller			45.5	41.5		N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Total			50.5	54.6		N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

**** Receptor #5 ****

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
5 Residential	Residential	1.0	1.0	1.0

Equipment Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Paver	No	50		77.2	1538.0	0.0
Paver	No	50		77.2	1538.0	0.0
All Other Equipment > 5 HP	No	50	85.0		1538.0	0.0
All Other Equipment > 5 HP	No	50	85.0		1538.0	0.0

Roller	No	20	80.0	1538.0	0.0
Roller	No	20	80.0	1538.0	0.0

Results

Noise Limits (dBA)

Noise Limit Exceedance (dBA)

	Calculated (dBA)				Day				Evening				Night			
Equipment	Lmax	L10	Lmax	L10	Lmax	L10	Lmax	L10	Lmax	L10	Lmax	L10	Lmax	L10	Lmax	L10
Paver	47.5	47.4	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Paver	47.5	47.4	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
All Other Equipment > 5 HP	55.2	55.2	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
All Other Equipment > 5 HP	55.2	55.2	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Roller	50.2	46.3	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Roller	50.2	46.3	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Total	55.2	59.4	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

**** Receptor #6 ****

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
6 Residential	Residential	1.0	1.0	1.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Paver	No	50		77.2	2128.0	3.0

Paver	No	50		77.2	2128.0 3.0
All Other Equipment > 5 HP	No	50	85.0		2128.0 3.0
All Other Equipment > 5 HP	No	50	85.0		2128.0 3.0
Roller	No	20		80.0	2128.0 3.0
Roller	No	20		80.0	2128.0 3.0

Results

Limits (dBA)			Noise Limit Exceedance (dBA)						Noise
			Calculated (dBA)			Day			
Evening	Night		Day			Evening			Night
Equipment			Lmax	L10		Lmax	L10		Lmax
L10	Lmax	L10	Lmax	L10	Lmax	L10	Lmax	L10	
Paver			41.6	41.6		N/A	N/A		N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
Paver			41.6	41.6		N/A	N/A		N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
All Other Equipment > 5 HP			49.4	49.4		N/A	N/A		N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
All Other Equipment > 5 HP			49.4	49.4		N/A	N/A		N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
Roller			44.4	40.4		N/A	N/A		N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
Roller			44.4	40.4		N/A	N/A		N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
Total			49.4	53.5		N/A	N/A		N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	

**** Receptor #7 ****

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
7 Residential	Residential	1.0	1.0	1.0

Equipment

			Spec	Actual	Receptor	Estimated
	Impact	Usage	Lmax	Lmax	Distance	Shielding

Description	Device	(%)	(dBA)	(dBA)	(feet)	(dBA)
Paver	No	50		77.2	2385.0	3.0
Paver	No	50		77.2	2385.0	3.0
All Other Equipment > 5 HP	No	50	85.0		2385.0	3.0
All Other Equipment > 5 HP	No	50	85.0		2385.0	3.0
Roller	No	20		80.0	2385.0	3.0
Roller	No	20		80.0	2385.0	3.0

Results

Limits (dBA)			Noise Limit Exceedance (dBA)					Noise
			Calculated (dBA)		Day			
Evening	Night		Day		Evening		Night	
Equipment			Lmax	L10	Lmax	L10	Lmax	L10
Lmax	L10	Lmax	L10	Lmax	L10	Lmax	L10	Lmax	L10
Paver			40.6	40.6	N/A	N/A	N/A	
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
Paver			40.6	40.6	N/A	N/A	N/A	
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
All Other Equipment > 5 HP			48.4	48.4	N/A	N/A	N/A	
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
All Other Equipment > 5 HP			48.4	48.4	N/A	N/A	N/A	
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
Roller			43.4	39.4	N/A	N/A	N/A	
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
Roller			43.4	39.4	N/A	N/A	N/A	
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
Total			48.4	52.5	N/A	N/A	N/A	
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	

**** Receptor #8 ****

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
8 Residential	Residential	1.0	1.0	1.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Paver	No	50		77.2	6500.0	5.0
Paver	No	50		77.2	6500.0	5.0
All Other Equipment > 5 HP	No	50	85.0		6500.0	5.0
All Other Equipment > 5 HP	No	50	85.0		6500.0	5.0
Roller	No	20		80.0	6500.0	5.0
Roller	No	20		80.0	6500.0	5.0

Results

Equipment	Calculated (dBA) Day Lmax	Day L10	Evening Lmax	Evening L10	Night Lmax	Night L10	Limits (dBA) Noise Limit Exceedance (dBA) Day Lmax	Day L10	Evening Lmax	Evening L10	Night Lmax	Night L10
Paver	29.9	29.9	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Paver	29.9	29.9	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
All Other Equipment > 5 HP	37.7	37.7	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
All Other Equipment > 5 HP	37.7	37.7	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Roller	32.7	28.7	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Roller	32.7	28.7	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Total	37.7	41.8	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

**** Receptor #9 ****

Baselines (dBA)

Description	Land Use	Daytime	Evening	Night
9 Vacant - Future Residential	Residential	1.0	1.0	1.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Paver	No	50		77.2	3025.0	3.0
Paver	No	50		77.2	3025.0	3.0
All Other Equipment > 5 HP	No	50	85.0		3025.0	3.0
All Other Equipment > 5 HP	No	50	85.0		3025.0	3.0
Roller	No	20		80.0	3025.0	3.0
Roller	No	20		80.0	3025.0	3.0

Results

Equipment	Calculated (dBA) Day Lmax	Day L10	Noise Limit Exceedance (dBA) Day Lmax	Day L10	Evening Lmax	Evening L10	Night Lmax	Night L10
Paver	38.6	38.6	N/A	N/A	N/A	N/A	N/A	N/A
Paver	38.6	38.6	N/A	N/A	N/A	N/A	N/A	N/A
All Other Equipment > 5 HP	46.4	46.4	N/A	N/A	N/A	N/A	N/A	N/A
All Other Equipment > 5 HP	46.4	46.4	N/A	N/A	N/A	N/A	N/A	N/A
Roller	41.4	37.4	N/A	N/A	N/A	N/A	N/A	N/A

Roller 41.4 37.4 N/A N/A N/A
N/A N/A N/A N/A N/A N/A N/A N/A N/A
Total 46.4 50.5 N/A N/A N/A
N/A N/A N/A N/A N/A N/A N/A N/A N/A

**** Receptor #10 ****

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
10 School	Residential	1.0	1.0	1.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Paver	No	50		77.2	4000.0	5.0
Paver	No	50		77.2	4000.0	5.0
All Other Equipment > 5 HP	No	50	85.0		4000.0	5.0
All Other Equipment > 5 HP	No	50	85.0		4000.0	5.0
Roller	No	20		80.0	4000.0	5.0
Roller	No	20		80.0	4000.0	5.0

Results

Equipment	Calculated (dBA) Day Lmax	L10	Evening Lmax	L10	Night Lmax	L10	Noise Limits (dBA) Day Lmax	L10	Evening Lmax	L10	Night Lmax	L10	Noise Limit Exceedance (dBA) Day	Evening	Night
Paver	34.2	34.1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A			
Paver	34.2	34.1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A			

All Other Equipment > 5 HP				41.9	41.9		N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
All Other Equipment > 5 HP				41.9	41.9		N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Roller				36.9	32.9		N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Roller				36.9	32.9		N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
		Total		41.9	46.1		N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

APPENDIX C: TRAFFIC NOISE

TRAFFIC NOISE LEVELS AND NOISE CONTOURS

Project Number: 161657
Project Name: CapRock Warehouse Project

Background Information

Model Description: FHWA Highway Noise Prediction Model (FHWA-RD-77-108) with California Vehicle Noise (CALVENO) Emission Levels.
Source of Traffic Volumes: Michael Baker International (2018)
Community Noise Descriptor: L_{dn}: _____ CNEL: x

Assumed 24-Hour Traffic Distribution:	Day	Evening	Night
Total ADT Volumes	77.70%	12.70%	9.60%
Medium-Duty Trucks	87.43%	5.05%	7.52%
Heavy-Duty Trucks	89.10%	2.84%	8.06%

Analysis Condition Roadway, Segment	Lanes	Median Width	ADT Volume	Design Speed (mph)	Alpha Factor	Vehicle Mix: Medium Trucks	Vehicle Mix: Heavy Trucks	CNEL at 75 Feet	Distance in Feet from Centerline of Roadway to Contour: 70 CNEL	65 CNEL	60 CNEL	55 CNEL
Lytle Creek Road												
Duncan Canyon Rd to Existing Lytle Creek Rd	2	0	180	35	0	4.1%	10.9%	50.2	-	-	-	-
Existing Lytle Creek Rd. to Proposed Project Dwy	2	0	400	35	0	4.1%	10.9%	53.7	-	-	-	55
Proposed Project Dwy. To Public Access Road	2	0	400	35	0	4.1%	10.9%	53.7	-	-	-	55
Public Access Rd. to Sierra Ave.	2	0	610	35	0	4.1%	10.9%	55.5	-	-	-	84

[1] Distance is from the centerline of the roadway segment to the receptor location.
"-" = contour is located within the roadway right-of-way.

Existing Conditions With Project

TRAFFIC NOISE LEVELS AND NOISE CONTOURS

Project Number: 161657
Project Name: CapRock Warehouse Project

Background Information

Model Description: FHWA Highway Noise Prediction Model (FHWA-RD-77-108) with California Vehicle Noise (CALVENO) Emission Levels.
Source of Traffic Volumes: Michael Baker International (2018)
Community Noise Descriptor: L_{dn}: CNEL: x

Assumed 24-Hour Traffic Distribution:	Day	Evening	Night
Total ADT Volumes	77.70%	12.70%	9.60%
Medium-Duty Trucks	87.43%	5.05%	7.52%
Heavy-Duty Trucks	89.10%	2.84%	8.06%

Analysis Condition				Design		Vehicle Mix			Distance in Feet from Centerline of Roadway to Contour			
Roadway, Segment	Lanes	Median Width	ADT Volume	Speed (mph)	Alpha Factor	Medium Trucks	Heavy Trucks	CNEL at 75 Feet	70 CNEL	65 CNEL	60 CNEL	55 CNEL
Lytle Creek Road												
Duncan Canyon Rd to Existing Lytle Creek Rd	2	0	430	35	0	4.1%	10.9%	54.0	-	-	-	60
Existing Lytle Creek Rd. to Proposed Project Dwy	2	0	650	35	0	4.1%	10.9%	55.8	-	-	-	90
Proposed Project Dwy. To Public Access Road	2	0	1,080	35	0	4.1%	10.9%	58.0	-	-	47	149
Public Access Rd. to Sierra Ave.	2	0	3,480	35	0	4.1%	10.9%	63.1	-	48	152	482

[1] Distance is from the centerline of the roadway segment to the receptor location.
"-" = contour is located within the roadway right-of-way.

Opening Year Without Project Conditions

TRAFFIC NOISE LEVELS AND NOISE CONTOURS

Project Number: 161657
Project Name: CapRock Warehouse Project

Background Information

Model Description: FHWA Highway Noise Prediction Model (FHWA-RD-77-108) with California Vehicle Noise (CALVENO) Emission Levels.
Source of Traffic Volumes: Michael Baker International (2018)
Community Noise Descriptor: L_{dn}: CNEL: x

Assumed 24-Hour Traffic Distribution:	Day	Evening	Night
Total ADT Volumes	77.70%	12.70%	9.60%
Medium-Duty Trucks	87.43%	5.05%	7.52%
Heavy-Duty Trucks	89.10%	2.84%	8.06%

Analysis Condition Roadway, Segment	Lanes	Median Width	ADT Volume	Design Speed (mph)	Alpha Factor	Vehicle Mix: Medium Trucks	Vehicle Mix: Heavy Trucks	CNEL at 75 Feet	Distance in Feet from Centerline of Roadway to Contour: 70 CNEL	65 CNEL	60 CNEL	55 CNEL
Lytle Creek Road												
Duncan Canyon Rd. to Existing Lytle Creek Rd	4	0	7,840	35	0	4.1%	10.9%	66.7	-	111	352	1,114
Existing Lytle Creek Rd. to Proposed Project Dwy.	2	0	6,440	35	0	4.1%	10.9%	65.8	-	89	282	891
Proposed Project Dwy. to Public Access Road	2	0	3,700	35	0	4.1%	10.9%	63.3	-	51	162	512
Public Access Rd. to Sierra Ave.	2	0	3,910	35	0	4.1%	10.9%	63.6	-	54	171	541

[1] Distance is from the centerline of the roadway segment to the receptor location.
"-" = contour is located within the roadway right-of-way.

Opening Year With Project Conditions

TRAFFIC NOISE LEVELS AND NOISE CONTOURS

Project Number: 161657
Project Name: CapRock Warehouse Project

Background Information

Model Description: FHWA Highway Noise Prediction Model (FHWA-RD-77-108) with California Vehicle Noise (CALVENO) Emission Levels.
Source of Traffic Volumes: Michael Baker International (2018)
Community Noise Descriptor: L_{dn}: CNEL: x

Assumed 24-Hour Traffic Distribution:	Day	Evening	Night
Total ADT Volumes	77.70%	12.70%	9.60%
Medium-Duty Trucks	87.43%	5.05%	7.52%
Heavy-Duty Trucks	89.10%	2.84%	8.06%

Analysis Condition				Design		Vehicle Mix			Distance in Feet from Centerline of Roadway to Contour			
Roadway, Segment	Lanes	Median Width	ADT Volume	Speed (mph)	Alpha Factor	Medium Trucks	Heavy Trucks	CNEL at 75 Feet	70 CNEL	65 CNEL	60 CNEL	55 CNEL
Lytle Creek Road												
Duncan Canyon Rd. to Existing Lytle Creek Rd	4	0	8,090	35	0	4.1%	10.9%	66.9	-	115	364	1,150
Existing Lytle Creek Rd. to Proposed Project Dwy.	2	0	6,690	35	0	4.1%	10.9%	65.9	-	93	293	926
Proposed Project Dwy. to Public Access Road	2	0	4,380	35	0	4.1%	10.9%	64.1	-	61	192	606
Public Access Rd. to Sierra Ave.	2	0	6,777	35	0	4.1%	10.9%	66.0	-	94	297	938

[1] Distance is from the centerline of the roadway segment to the receptor location.
"-" = contour is located within the roadway right-of-way.

Year 2040 Without Project Conditions

TRAFFIC NOISE LEVELS AND NOISE CONTOURS

Project Number: 161657
Project Name: CapRock Warehouse Project

Background Information

Model Description: FHWA Highway Noise Prediction Model (FHWA-RD-77-108) with California Vehicle Noise (CALVENO) Emission Levels.
Source of Traffic Volumes: Michael Baker International (2018)
Community Noise Descriptor: L_{dn}: CNEL: x

Assumed 24-Hour Traffic Distribution:	Day	Evening	Night
Total ADT Volumes	77.70%	12.70%	9.60%
Medium-Duty Trucks	87.43%	5.05%	7.52%
Heavy-Duty Trucks	89.10%	2.84%	8.06%

Analysis Condition				Design		Vehicle Mix			Distance in Feet from Centerline of Roadway to Contour			
Roadway, Segment	Lanes	Median Width	ADT Volume	Speed (mph)	Alpha Factor	Medium Trucks	Heavy Trucks	CNEL at 75 Feet	70 CNEL	65 CNEL	60 CNEL	55 CNEL
Lytle Creek Road												
Duncan Canyon Rd. to Existing Lytle Creek Rd	4	0	8,430	35	0	4.1%	10.9%	67.0	-	120	379	1,198
Existing Lytle Creek Rd. to Proposed Project Dwy.	2	0	6,740	35	0	4.1%	10.9%	65.9	-	93	295	933
Proposed Project Dwy. to Public Access Road	2	0	6,740	35	0	4.1%	10.9%	65.9	-	93	295	933
Public Access Rd. to Sierra Ave.	2	0	5,050	35	0	4.1%	10.9%	64.7	-	70	221	699

[1] Distance is from the centerline of the roadway segment to the receptor location.
"-" = contour is located within the roadway right-of-way.

Year 2040 With Project Conditions

TRAFFIC NOISE LEVELS AND NOISE CONTOURS

Project Number: 161657
Project Name: CapRock Warehouse Project

Background Information

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Medium-Duty Trucks	87.43%	5.05%	7.52%
Heavy-Duty Trucks	89.10%	2.84%	8.06%

Analysis Condition		Median	ADT	Design Speed	Alpha	Vehicle Mix: Medium	Vehicle Mix: Heavy	CNEL at	Distance in Feet from Centerline of Roadway to Contour			
Roadway, Segment	Lanes	Width	Volume	(mph)	Factor	Trucks	Trucks	75 Feet	70 CNEL	65 CNEL	60 CNEL	55 CNEL
Lytle Creek Road												
Duncan Canyon Rd. to Existing Lytle Creek Rd	4	0	8,680	35	0	4.1%	10.9%	67.2	-	123	390	1,234
Existing Lytle Creek Rd. to Proposed Project Dwy.	2	0	6,990	35	0	4.1%	10.9%	66.1	-	97	306	968
Proposed Project Dwy. to Public Access Road	2	0	7,420	35	0	4.1%	10.9%	66.4	32	103	325	1,027
Public Access Rd. to Sierra Ave.	2	0	6,790	35	0	4.1%	10.9%	66.0	-	94	297	940

[1] Distance is from the centerline of the roadway segment to the receptor location.
"-" = contour is located within the roadway right-of-way.

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