Appendix H:
Noise Impact Analysis

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Noise Impact Analysis
Barton Road Logistics Center
City of Colton, San Bernardino County, California

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Date: October 2, 2020

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ACRONYMS AND ABBREVIATIONS

ADT	Average Daily Traffic
CEQA	California Environmental Quality Act
CNEL	Community Noise Equivalent Level
dB	decibel
dBA	A-weighted decibel
FCS	FirstCarbon Solutions
FHWA	Federal Highway Administration
FTA	Federal Transit Administration
in/sec	inch per second
L_{dn}	day-night average sound level
L_{eq}	equivalent continuous sound level
L_{max}	maximum noise/sound level
OSHA	Occupational Safety and Health Administration
PPV	peak particle velocity
rms	root mean square
VdB	vibration in decibels

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SECTION 1: INTRODUCTION

1.1 - Purpose of Analysis and Study Objectives

This Noise Impact Analysis has been prepared by FirstCarbon Solutions (FCS) to identify, evaluate, and disclose the off-site and on-site noise impacts associated with the proposed Barton Road Logistics Center (proposed project). The following is provided in this report:

- A description of the study area, project site, and proposed project
- Information regarding the fundamentals of noise and vibration
- A description of the local noise guidelines and standards
- A description of the existing noise environment
- An analysis of the potential short-term, construction-related noise and vibration impacts from the proposed project
- An analysis of long-term, operations-related noise and vibration impacts from the proposed project

1.2 - Project Summary

1.2.1 - Project Location

The approximately 54.82-acre Barton Road Logistics Center project site is located in the City of Colton, in San Bernardino County, California (Exhibit 1). The project site is located partially north of Barton Road (21700 Barton Road), south of Barton Road (275 De Berry Street, 375 De Berry Street, and 280 De Berry Street), and bounded by Interstate 215 (I-215) and La Crosse Avenue on the east, South La Cadena Drive to the west, and Walnut Street on the north. The project site includes a large, vacant 6.3-acre lot (APNs 1167-051-18, -19, and -20) located southeast of the intersection of South Terrace Avenue and Barton Road. The vacant lot contains dry brush and several trees along the north property line. At the southeast corner of Barton Road and South Terrace Avenue on the northwest corner of the vacant lot is a small 0.173-acre “not-a-part” (NAP) parcel which supports an existing water well and is owned by the Elsinore Valley Municipal Water District.

The project site is the former location of the Stater Bros. Markets headquarters and warehousing/distribution campus and includes six industrial buildings and one office building situated on 13 legal lots. Surrounding the project site is commercial and residential development to the north and northeast, industrial development to the south and southeast, and residential development to the west. Regional access to the project site is provided via the Riverside Freeway (I-215) via the Barton Road interchange, which intersects the northern and southern halves of the project site. Local access to the project site is provided via Barton Road, as well as Walnut Avenue on the northern boundary of the project site and De Berry Avenue on the southern boundary of the project site (Exhibit 2). The site is designated as Light Industrial within the City’s Light Industrial (M-1) District

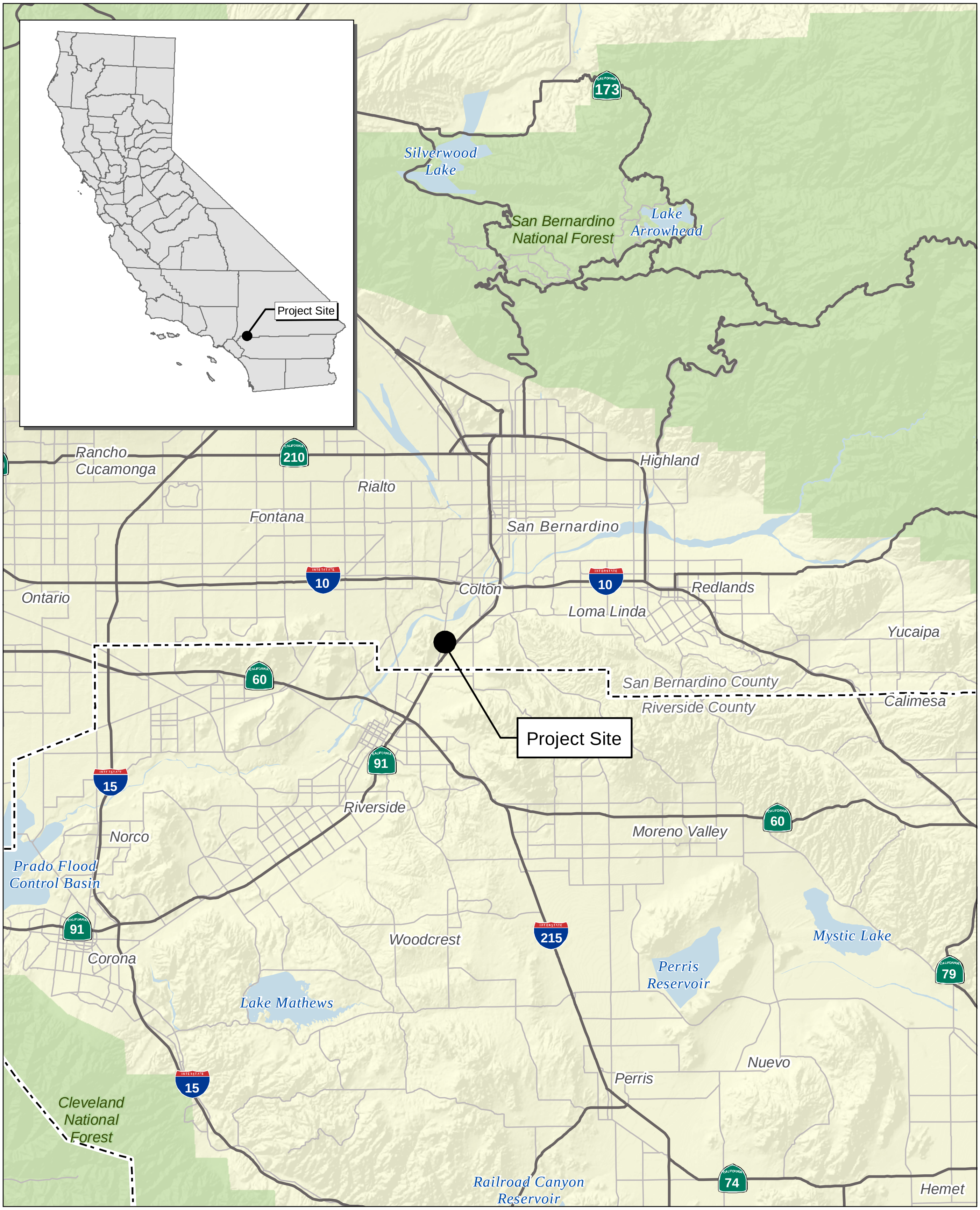
1.2.2 - Project Description

The project applicant, EBS Realty Partners, proposes to redevelop the northerly 45.52 acres of the 54.82-acre site. The proposed project includes the demolition of four existing industrial buildings totaling 612,515 square feet and an existing 46,920-square-foot office building. A total of 659,435 square feet of building area would be demolished. The total amount of hardscape to be demolished or removed, including asphalt concrete, concrete pavement, and concrete building slab, would be 1,603,931 square feet.

The proposed project would involve the construction of two state-of-the-art speculative concrete tilt-up industrial warehouse logistics facilities with a total square footage of 960,040 square feet (Exhibit 3). The project thus results in a net increase of 300,605 square feet of building space when compared to existing conditions. The buildings are proposed as speculative ambient temperature dry warehouse facilities. However, the applicant would potentially develop a refrigerated warehouse facility if a qualified build-to-suit tenant or user-buyer proposes such a project during the entitlement preconstruction timeframe. The total import volume would be 1,238 cubic yards, which would apply to Building 1. There would be no export volume for Building 1 or Building 2. Demolition and site preparation are expected to last approximately 24 to 30 weeks, while building construction and paving is expected to last approximately 30 to 35 weeks. The facility is anticipated to operate 24-hours a day.

One existing building at 280 De Berry Street would remain. Proposed improvements to this site would be limited to improvements to the entrance and drive aisle and relocation of the guard shack to allow for increased vehicle queueing on that site. No building improvements are proposed.

No General Plan Amendment or zone changes are proposed or required. However, the proposed project would require a 10-foot height variance to allow for the development of structures higher than the current standards allowed by the City’s Municipal Code.



Source: Census 2000 Data, The CaSIL

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Exhibit 1
Regional Location Map

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CITY OF COLTON
BARTON ROAD LOGISTICS CENTER
NOISE IMPACT ANALYSIS

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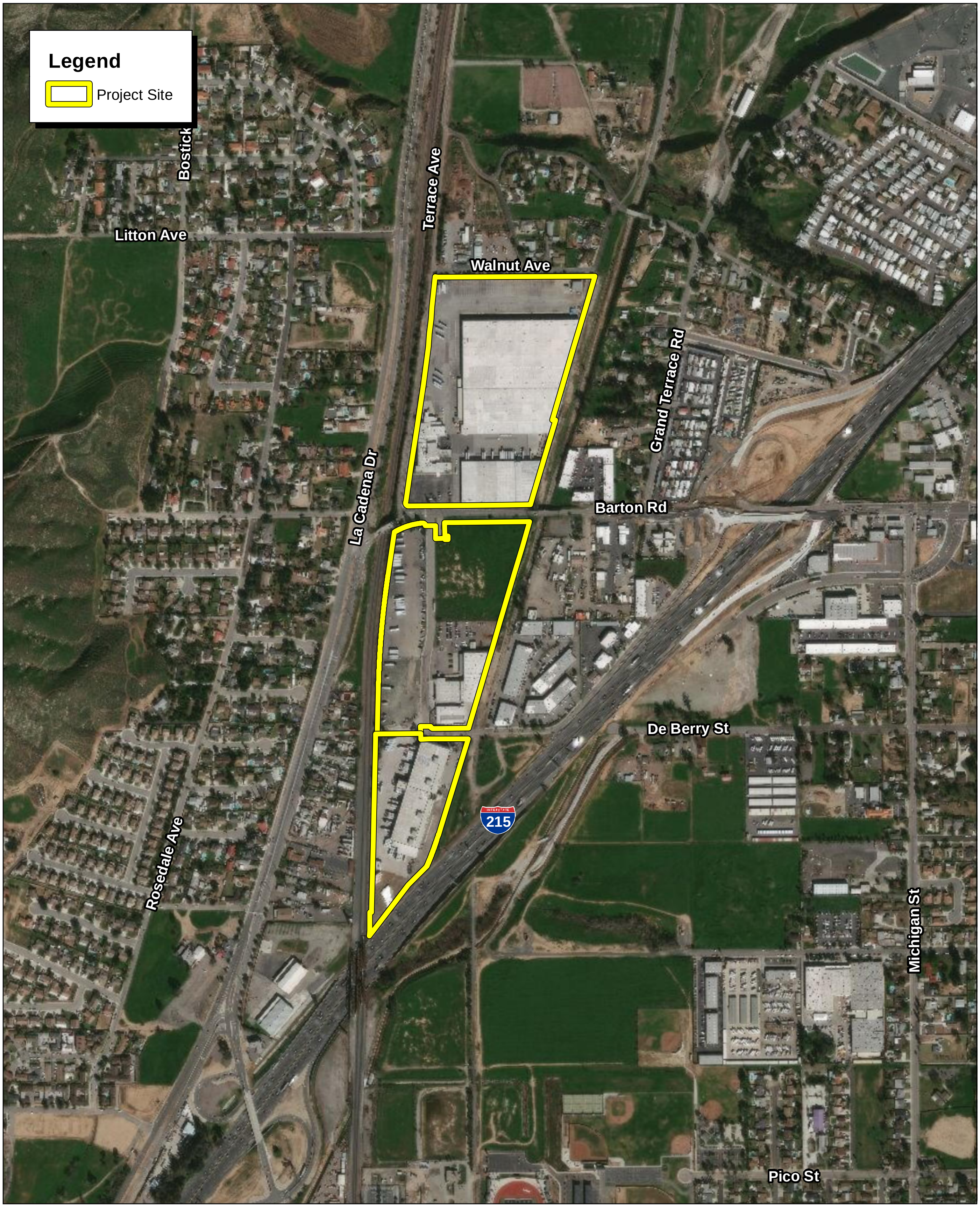

Source: ESRI Aerial Imagery.

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800 400 0 800
Feet

Exhibit 2
Local Vicinity Map
Aerial Base

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CITY OF COLTON
BARTON ROAD LOGISTICS CENTER
NOISE IMPACT ANALYSIS

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Source: HPA, Inc. Architecture, 7/3/2019.

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Exhibit 3
Overall Site Plan

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SECTION 2: NOISE AND VIBRATION FUNDAMENTALS

2.1 - Characteristics of Noise

Noise is generally defined as unwanted or objectionable sound. Sound becomes unwanted when it interferes with normal activities, when it causes actual physical harm, or when it has adverse effects on health. The effects of noise on people can include general annoyance, interference with speech communication, sleep disturbance, and in the extreme, hearing impairment. Noise effects can be caused by pitch or loudness. *Pitch* is the number of complete vibrations or cycles per second of a wave that result in the range of tone from high to low; higher-pitched sounds are louder to humans than lower-pitched sounds. *Loudness* is the intensity or amplitude of sound.

Sound is produced by the vibration of sound pressure waves in the air. Sound pressure levels are used to measure the intensity of sound and are described in terms of decibels. The decibel (dB) is a logarithmic unit, which expresses the ratio of the sound pressure level being measured to a standard reference level. The 0 point on the dB scale is based on the lowest sound level that the healthy, unimpaired human ear can detect. Changes of 3 dB or less are only perceptible in laboratory environments. Audible increases in noise levels generally refer to a change of 3 dB or more, as this level has been found to be barely perceptible to the human ear in outdoor environments. Only audible changes in existing ambient or background noise levels are considered potentially significant.

The human ear is not equally sensitive to all frequencies within the audible sound spectrum, so sound pressure level measurements can be weighted to better represent frequency-based sensitivity of average healthy human hearing. One such specific "filtering" of sound is called "A-weighting." A-weighted decibels (dBA) approximate the subjective response of the human ear to a broad frequency noise source by discriminating against very low and very high frequencies of the audible spectrum. They are adjusted to reflect only those frequencies that are audible to the human ear. Because decibels are logarithmic units, they cannot be added or subtracted by ordinary arithmetic means. For example, if one noise source produces a noise level of 70 dB, the addition of another noise source with the same noise level would not produce 140 dB; rather, they would combine to produce a noise level of 73 dB.

As noise spreads from a source, it loses energy so that the farther away the noise receiver is from the noise source, the lower the perceived noise level. Noise levels diminish or attenuate as distance from the source increases based on an inverse square rule, depending on how the noise source is physically configured. Noise levels from a single-point source, such as a single piece of construction equipment at ground level, attenuate at a rate of 6 dB for each doubling of distance (between the single-point source of noise and the noise-sensitive receptor of concern). Heavily traveled roads with few gaps in traffic behave as continuous line sources and attenuate roughly at a rate of 3 dB per doubling of distance.

2.1.1 - Noise Descriptors

There are many ways to rate noise for various time periods, but an appropriate rating of ambient noise affecting humans also accounts for the annoying effects of sound. Equivalent continuous sound level (L_{eq}) is the total sound energy of time-varying noise over a sample period. However, the predominant rating scales for human communities in the State of California are the L_{eq} and community noise equivalent level (CNEL) or the day-night average level (L_{dn}) based on dBA. CNEL is the time-varying noise over a 24-hour period, with a 5 dBA weighting factor applied to the hourly L_{eq} for noises occurring from 7:00 p.m. to 10:00 p.m. (defined as relaxation hours) and a 10 dBA weighting factor applied to noise occurring from 10:00 p.m. to 7:00 a.m. (defined as sleeping hours). L_{dn} is similar to the CNEL scale but without the adjustment for events occurring during the evening hours. CNEL and L_{dn} are within 1 dBA of each other and are normally exchangeable. The noise adjustments are added to the noise events occurring during the more sensitive hours.

Other noise rating scales of importance when assessing the annoyance factor include the maximum noise level (L_{max}), which is the highest exponential time-averaged sound level that occurs during a stated time period. The noise environments discussed in this analysis are specified in terms of maximum levels denoted by L_{max} for short-term noise impacts. L_{max} reflects peak operating conditions and addresses the annoying aspects of intermittent noise.

2.1.2 - Noise Propagation

From the noise source to the receiver, noise changes both in level and frequency spectrum. The most obvious is the decrease in noise as the distance from the source increases. The manner in which noise reduces with distance depends on whether the source is a point or line source, as well as ground absorption, atmospheric conditions (wind, temperature gradients, and humidity) and refraction, and shielding by natural and manmade features. Sound from point sources, such as an air conditioning condenser, a piece of construction equipment, or an idling truck, radiates uniformly outward as it travels away from the source in a spherical pattern.

The attenuation or sound drop-off rate is dependent on the conditions of the land between the noise source and receiver. To account for this ground-effect attenuation (absorption), two types of site conditions are commonly used in noise models: soft-site and hard-site conditions. Soft-site conditions account for the sound propagation loss over natural surfaces such as normal earth and ground vegetation. For point sources, a drop-off rate of 7.5 dBA per each doubling of the distance (dBA/DD) is typically observed over soft ground with landscaping, as compared with a 6 dBA/DD drop-off rate over hard ground such as asphalt, concrete, stone and very hard packed earth. For line sources, such as traffic noise on a roadway, a 4.5 dBA/DD is typically observed for soft-site conditions compared to the 3 dBA/DD drop-off rate for hard-site conditions. Table 2 briefly defines these measurement descriptors and other sound terminology used in this section.

Table 2: Sound Terminology

Term	Definition
Sound	A vibratory disturbance created by a vibrating object which, when transmitted by pressure waves through a medium such as air, can be detected by a receiving mechanism such as the human ear or a microphone.
Noise	Sound that is loud, unpleasant, unexpected, or otherwise undesirable.
Ambient Noise	The composite of noise from all sources near and far in a given environment.
Decibel (dB)	A unitless measure of sound on a logarithmic scale, which represents the squared ratio of sound-pressure amplitude to a reference sound pressure. The reference pressure is 20 micropascals, representing the threshold of human hearing (0 dB).
A-Weighted Decibel (dBA)	An overall frequency-weighted sound level that approximates the frequency response of the human ear.
Equivalent Noise Level (L_{eq})	The average sound energy occurring over a specified time period. In effect, L_{eq} is the steady-state sound level that in a stated period would contain the same acoustical energy as the time-varying sound that actually occurs during the same period.
Maximum and Minimum Noise Levels (L_{max} and L_{min})	The maximum or minimum instantaneous sound level measured during a measurement period.
Day-Night Level (DNL or L_{dn})	The energy average of the A-weighted sound levels occurring during a 24-hour period, with 10 dB added to the A-weighted sound levels occurring between 10:00 p.m. and 7:00 a.m. (nighttime).
Community Noise Equivalent Level (CNEL)	The energy average of the A-weighted sound levels occurring during a 24-hour period, with 5 dB added to the A-weighted sound levels occurring between 7:00 p.m. and 10:00 p.m. and 10 dB added to the A-weighted sound levels occurring between 10:00 p.m. and 7:00 a.m.
Source: Data compiled by FCS 2020.	

2.1.3 - Traffic Noise

The level of traffic noise depends on three primary factors: (1) the volume of the traffic, (2) the speed of the traffic, and (3) the number of trucks in the flow of traffic. Generally, the loudness of traffic noise is increased by heavier traffic volumes, higher speeds, and greater number of trucks. Vehicle noise is a combination of the noise produced by the engine, exhaust, and tires. Because of the logarithmic nature of noise levels, a doubling of the traffic volume (assuming that the speed and truck mix do not change) results in a noise level increase of 3 dBA. Based on the Federal Highway

Administration (FHWA) community noise assessment criteria, this change is “barely perceptible.” For reference, a doubling of perceived noise levels would require an increase of approximately 10 dBA. The truck mix on a given roadway also has an effect on community noise levels. As the number of heavy trucks increases and becomes a larger percentage of the vehicle mix, adjacent noise levels increase.

2.1.4 - Stationary Noise

A stationary noise producer is any entity in a fixed location that emits noise. Examples of stationary noise sources include machinery, engines, energy production, and other mechanical or powered equipment and activities such as loading and unloading or public assembly that may occur at commercial, industrial, manufacturing, or institutional facilities. Furthermore, while noise generated by the use of motor vehicles over public roads is preempted from local regulation, the use of these vehicles is considered a stationary noise source when operated on private property such as at a construction site, a truck terminal, or warehousing facility.

The effects of stationary noise depend on factors such as characteristics of the equipment and operations, distance and pathway between the generator and receptor, and weather. Stationary noise sources may be regulated at the point of manufacture (e.g., equipment or engines), with limitations on the hours of operation, or with provision of intervening structures, barriers or topography.

Construction activities are a common source of stationary noise. Construction-period noise levels are higher than background ambient noise levels but eventually cease once construction is complete. Construction is performed in discrete steps, each of which has its own mix of equipment and, consequently, its own noise characteristics. These various sequential phases would change the character of the noise generated on each construction site and, therefore, would change the noise levels as construction progresses. Despite the variety in the type and size of construction equipment, similarities in the dominant noise sources and patterns of operation allow construction related noise ranges to be categorized by work phase. Table 3 shows typical noise levels of construction equipment as measured at a distance of 50 feet from the operating equipment.

Table 3: Typical Construction Equipment Maximum Noise Levels, L_{max}

Type of Equipment	Impact Device? (Yes/No)	Specification Maximum Sound Levels for Analysis (dBA at 50 feet)
Impact Pile Driver	Yes	95
Auger Drill Rig	No	85
Vibratory Pile Driver	No	95
Jackhammers	Yes	85
Pneumatic Tools	No	85
Pumps	No	77
Scrapers	No	85
Cranes	No	85
Portable Generators	No	82

Type of Equipment	Impact Device? (Yes/No)	Specification Maximum Sound Levels for Analysis (dBA at 50 feet)
Rollers	No	85
Dozers	No	85
Tractors	No	84
Front-End Loaders	No	80
Backhoe	No	80
Excavators	No	85
Graders	No	85
Air Compressors	No	80
Dump Truck	No	84
Concrete Mixer Truck	No	85
Pickup Truck	No	55
Source: Federal Highway Administration (FHWA). 2006. Highway Construction Noise Handbook. August.		

2.1.5 - Noise from Multiple Sources

Because sound pressure levels in decibels are based on a logarithmic scale, they cannot be added or subtracted in the usual arithmetical way. Therefore, sound pressure levels in decibels are logarithmically added on an energy summation basis. In other words, adding a new noise source to an existing noise source, both producing noise at the same level, will not double the noise level. Instead, if the difference between two noise sources is 10 dBA or more, the louder noise source will dominate, and the resultant noise level will be equal to the noise level of the louder source. In general, if the difference between two noise sources is 0–1 dBA, the resultant noise level will be 3 dBA higher than the louder noise source, or both sources if they are equal. If the difference between two noise sources is 2–3 dBA, the resultant noise level will be 2 dBA above the louder noise source. If the difference between two noise sources is 4–10 dBA, the resultant noise level will be 1 dBA higher than the louder noise source.

2.2 - Characteristics of Groundborne Vibration and Noise

Groundborne vibration consists of rapidly fluctuating motion through a solid medium, specifically the ground, that has an average motion of zero and in which the motion's amplitude can be described in terms of displacement, velocity, or acceleration. The effects of groundborne vibration typically only causes a nuisance to people, but in extreme cases, excessive groundborne vibration has the potential to cause structural damage to buildings. Although groundborne vibration can be felt outdoors, it is typically only an annoyance to people indoors where the associated effects of the shaking of a building can be notable. Groundborne noise is an effect of groundborne vibration and only exists indoors, since it is produced from noise radiated from the motion of the walls and floors of a room, and may also consist of the rattling of windows or dishes on shelves.

Several different methods are used to quantify vibration amplitude such as the maximum instantaneous peak in the vibrations velocity, which is known as the peak particle velocity (PPV) or the root mean square (rms) amplitude of the vibration velocity. Because of the typically small amplitudes of vibrations, vibration velocity is often expressed in decibels—denoted as LV—and is based on the reference quantity of 1 micro inch per second. To distinguish these vibration levels referenced in decibels from noise levels referenced in decibels, the unit is written as "VdB."

Although groundborne vibration can be felt outdoors, it is typically only an annoyance to people indoors where the associated effects of the shaking of a building can be notable. When assessing annoyance from groundborne vibration, vibration is typically expressed as rms velocity in units of decibels of 1 micro-inch per second, with the unit written in VdB. Typically, developed areas are continuously affected by vibration velocities of 50 VdB or lower. Human perception to vibration starts at levels as low as 67 VdB. Annoyance due to vibration in residential settings starts at approximately 70 VdB.

Off-site sources that may produce perceptible vibrations are usually caused by construction equipment, steel-wheeled trains, and traffic on rough roads, while smooth roads rarely produce perceptible groundborne noise or vibration. Construction activities, such as blasting, pile driving and operating heavy earthmoving equipment, are common sources of groundborne vibration. Construction vibration impacts on building structures are generally assessed in terms of PPV. Typical vibration source levels from construction equipment are shown in Table 4.

Table 4: Vibration Levels of Construction Equipment

Construction Equipment	PPV at 25 Feet (inches/second)	rms Velocity in Decibels (VdB) at 25 Feet
Water Trucks	0.001	57
Scraper	0.002	58
Bulldozer—small	0.003	58
Jackhammer	0.035	79
Concrete Mixer	0.046	81
Concrete Pump	0.046	81
Paver	0.046	81
Pickup Truck	0.046	81
Auger Drill Rig	0.051	82
Backhoe	0.051	82
Crane (Mobile)	0.051	82
Excavator	0.051	82
Grader	0.051	82
Loader	0.051	82
Loaded Trucks	0.076	86

Construction Equipment	PPV at 25 Feet (inches/second)	rms Velocity in Decibels (VdB) at 25 Feet
Bulldozer—Large	0.089	87
Caisson drilling	0.089	87
Vibratory Roller (small)	0.101	88
Compactor	0.138	90
Clam shovel drop	0.202	94
Vibratory Roller (large)	0.210	94
Pile Driver (impact-typical)	0.644	104
Pile Driver (impact-upper range)	1.518	112
Source: Compilation of scientific and academic literature, generated by the Federal Transit Administration (FTA) and FHWA.		

The propagation of groundborne vibration is not as simple to model as airborne noise. This is because noise in the air travels through a relatively uniform medium, while groundborne vibrations travel through the earth, which may contain significant geological differences. Factors that influence groundborne vibration include:

- **Vibration source:** Type of activity or equipment, such as impact or mobile, and depth of vibration source;
- **Vibration path:** Soil type, rock layers, soil layering, depth to water table, and frost depth; and
- **Vibration receiver:** Foundation type, building construction, and acoustical absorption.

Among these factors that influence groundborne vibration, there are significant differences in the vibration characteristics when the source is underground compared to at the ground surface. In addition, soil conditions are known to have a strong influence on the levels of groundborne vibration. Among the most important factors are the stiffness and internal damping of the soil and the depth to bedrock. Vibration propagation is more efficient in stiff clay soils than in loose sandy soils, and shallow rock seems to concentrate the vibration energy close to the surface and can result in groundborne vibration problems at large distance from the source. Factors such as layering of the soil and depth to the water table can have significant effects on the propagation of groundborne vibration. Soft, loose, sandy soils tend to attenuate more vibration energy than hard, rocky materials. Vibration propagation through groundwater is more efficient than through sandy soils. There are three main types of vibration propagation: surface, compression, and shear waves. Surface waves, or Rayleigh waves, travel along the ground's surface. These waves carry most of their energy along an expanding circular wave front, similar to ripples produced by throwing a rock into a pool of water. P-waves, or compression waves, are body waves that carry their energy along an expanding spherical wave front. The particle motion in these waves is longitudinal (i.e., in a "push-pull" fashion). P-waves are analogous to airborne sound waves. S-waves, or shear waves, are also body waves that carry energy along an expanding spherical wave front. However, unlike P-waves, the particle motion is transverse, or side-to-side and perpendicular to the direction of propagation.

As vibration waves propagate from a source, the vibration energy decreases in a logarithmic nature and the vibration levels typically decrease by 6 VdB per doubling of the distance from the vibration source. As stated above, this drop-off rate can vary greatly depending on the soil type, but it has been shown to be effective enough for screening purposes, in order to identify potential vibration impacts that may need to be studied through actual field tests. The vibration level (calculated below as PPV) at a distance from a point source can generally be calculated using the vibration reference equation:

$$PPV=PPV_{ref} * (25/D)^n \text{ (in/sec)}$$

Where:

> PPV_{ref}=reference measurement at 25 feet from vibration source
> D=distance from equipment to property line
> N=vibration attenuation rate through ground

According to Section 7 of the Federal Transit Administration (FTA) Transit Noise and Vibration Impact Assessment Manual, an "n" value of 1.5 is recommended to calculate vibration propagation through typical soil conditions.[1]

[1] Federal Transit Administration (FTA). 2018. Transit Noise and Vibration Impact Assessment Manual. September.

SECTION 3: REGULATORY SETTING

3.1 - Federal Regulations

3.1.1 - United States Environmental Protection Agency

In 1972, Congress enacted the Noise Control Act. This act authorized the United States Environmental Protection Agency (EPA) to publish descriptive data on the effects of noise and establish levels of sound "requisite to protect the public welfare with an adequate margin of safety." These levels are separated into health (hearing loss levels) and welfare (annoyance levels) categories, as shown in Table 5. The EPA cautions that these identified levels are not standards because they do not take into account the cost or feasibility of the levels.

For protection against hearing loss, 96 percent of the population would be protected if sound levels are less than or equal to an $L_{eq(24)}$ of 70 dBA. The EPA activity and interference guidelines are designed to ensure reliable speech communication at about 5 feet in the outdoor environment. For outdoor and indoor environments, interference with activity and annoyance should not occur if levels are below 55 dBA and 45 dBA, respectively.

Table 5: Summary of EPA Recommended Noise Levels to Protect Public Welfare

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

Note:
(24) signifies an L_{eq} duration of 24 hours.
Source: United States Environmental Protection Agency. 1978. Protective Noise Levels, EPA 550/9-79-100. November.

3.1.2 - Federal Transit Administration

The FTA has established industry accepted standards for vibration impact criteria and impact assessment. These guidelines are published in its Transit Noise and Vibration Impact Assessment

Manual.[2] The FTA guidelines include thresholds for construction vibration impacts for various structural categories as shown in Table 6.

Table 6: Federal Transit Administration Construction Vibration Impact Criteria

Building Category	PPV (in/sec)	Approximate VdB
I. Reinforced—Concrete, Steel or Timber (no plaster)	0.5	102
II. Engineered Concrete and Masonry (no plaster)	0.3	98
III. Non Engineer Timber and Masonry Buildings	0.2	94
IV. Buildings Extremely Susceptible to Vibration Damage	0.12	90

Note:
VdB=vibration measured as rms velocity in decibels of 1 micro-inch per second
Source: Federal Transit Administration (FTA). 2018. Transit Noise and Vibration Impact Assessment Manual. September.

3.2 - State Regulations

The State of California has established regulations that help prevent adverse impacts to occupants of buildings located near noise sources. Referred to as the "State Noise Insulation Standard," it requires buildings to meet performance standards through design and/or building materials that would offset any noise source in the vicinity of the receptor. State regulations include requirements for the construction of new hotels, motels, apartment houses, and dwellings other than detached single-family dwellings that are intended to limit the extent of noise transmitted into habitable spaces. These requirements are found in the California Code of Regulations, Title 24 (known as the Building Standards Administrative Code), Part 2 (known as the California Building Code), Appendix Chapters 12 and 12A. For limiting noise transmitted between adjacent dwelling units, the noise insulation standards specify the extent to which walls, doors, and floor-ceiling assemblies must block or absorb sound. For limiting noise from exterior noise sources, the noise insulation standards set an interior standard of 45 dBA CNEL in any habitable room with all doors and windows closed. In addition, the standards require preparation of an acoustical analysis demonstrating the manner in which dwelling units have been designed to meet this interior standard, where such units are proposed in an area with exterior noise levels greater than 60 dBA CNEL.

The proposed project does not include any type of residential development. Therefore, these standards are not applicable to the proposed project. However, the State has established land use compatibility guidelines for determining acceptable noise levels for specified land uses, including industrial type land uses such as the proposed project, which the City of Colton has adopted as described below.

[2] Federal Transit Administration (FTA). 2018. Transit Noise and Vibration Impact Assessment Manual. September.

3.3 - Local Regulations

The City of Colton addresses noise in the Noise Element of the City of Colton General Plan[3] and in the City's Municipal Code[4], as discussed below.

City of Colton General Plan

The City of Colton General Plan, Noise Element, establishes land use compatibility standards for the City of Colton. The General Plan Land Use Compatibility Standards for Community Noise Environments are shown in Table 7. Of these, the land use category that most closely applies to the proposed project is industrial, manufacturing, utilities, and agriculture. For this designation, 75 dBA CNEL is considered to be the "normally acceptable" noise level for this type of land use t.

Table 7: Land Use Compatibility Standards for Community Noise Environments

Land Use Category	Community Noise Exposure in Decibels (CNEL) Day/Night Average Noise Level in Decibels (L_{dn})						
		55	60	65	70	75	80
Residential—Low Density Single-Family, Duplex, Mobile Homes							
Residential—Multi-Family							
Transient Lodging—Motels, Hotels							
Schools, Libraries, Churches, Hospitals, Nursing Homes							
Sports Arena, Outdoor Spectator Sports							
Playgrounds, Neighborhood Parks							

3 City of Colton. 1987. City of Colton General Plan Noise Element.
4 City of Colton. 2020. City of Colton Municipal Code. April 27.

Land Use Category	Community Noise Exposure in Decibels (CNEL) Day/Night Average Noise Level in Decibels (L_{dn})						
		55	60	65	70	75	80
Golf Courses, Riding Stables, Water Recreation, Cemeteries							
Office Buildings							
Industrial, Manufacturing, Utilities, Agriculture							

NORMALLY ACCEPTABLE Specified land use is satisfactory, based upon the assumption that any buildings involved are of normal conventional construction, without any special noise insulation requirements.	NORMALLY UNACCEPTABLE New construction or development should 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.
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.	CLEARLY UNACCEPTABLE New construction or development clearly should not be undertaken.

Source: City of Colton General Plan 1987.

City of Colton Municipal Code

The City of Colton establishes its noise performance standards in the City's Municipal Code. The noise ordinance (§ 18.42.040) establishes a threshold of 65 dBA as the maximum operational sound level permitted to be generated, when measured at the boundary line of the property on which the sound is generated. While the City does not indicate the noise metric for this performance threshold, for purposes of this analysis it is assumed the applicable noise metric is an hourly average noise exposure level (65 dBA $L_{eq(h)}$) applicable to all daytime and nighttime hours.

The City also addresses vibration impacts by restricting a project's operations so as not to generate ground vibration by equipment (other than motor vehicles, trains, or by temporary construction or demolition) which is perceptible without instruments by the average person at or beyond any lot line of the lot containing the activities.

SECTION 4: EXISTING NOISE CONDITIONS

Existing noise sources in the project area include noise from traffic on the I-215 Freeway to the south and southeast, Walnut Avenue to the north, and South Terrace Avenue to the west. Other noise sources in the project vicinity include industrial and commercial operations to the east of the project site. Occasional train operations on the railroad tracks adjacent to the proposed project's western boundary also contribute to the ambient noise environment. The existing ambient noise levels in the project vicinity were documented through traffic noise modeling of existing traffic conditions and through ambient noise monitoring.

4.1 - Existing Traffic Noise Levels

Existing traffic noise levels along selected roadway segments in the project vicinity were modeled using the FHWA Traffic Noise Prediction Model (FHWA-RD-77-108). The daily traffic volumes were obtained from the traffic analysis prepared for the proposed project by Urban Crossroads.[5] The traffic volumes described here correspond to the existing without project conditions traffic scenario as described in the transportation analysis. The model inputs and outputs—including the 60 dBA, 65 dBA, and 70 dBA CNEL noise contour distances—are provided in the Appendix of this document. A summary of the modeling results is shown in Table 8.

As is shown in Table 8, traffic noise levels range up to approximately 74 dBA CNEL at 50-feet from the outermost travel lane on roadway segments near the project site. The proposed project consists of industrial uses that have no sensitive areas related to noise; therefore, exterior noise levels experienced due to traffic or train noise in the area would not exceed the City's land use compatibility standards for the proposed land use.

Table 8: Existing Traffic Noise Levels

Roadway Segment	Approximate ADT	Centerline to 70 CNEL (feet)	Centerline to 65 CNEL (feet)	Centerline to 60 CNEL (feet)	CNEL (dBA) 50 feet from Centerline of Outermost Lane
Barton Road-Project Driveway 5 to Grand Terrace Road	18,100	<50	82	177	67.5
Barton Road-Grand Terrace Road to I-215 Southbound Ramps	26,400	<50	106	228	69.2
La Cadena Drive-Rancho Avenue to Barton Road	31,400	103	217	466	72.3
La Cadena Drive-Barton Road to Iowa Avenue	44,600	129	274	588	73.9

Notes:
1 Modeling results do not take into account mitigating features such as topography, vegetative screening, fencing, building design, or structure screening. Rather, they assume a worst-case scenario of having a direct line of site on flat terrain.
ADT=Average Daily Traffic
Source: FCS 2020.

5 Urban Crossroads. 2020. Barton Road Logistics Traffic Analysis. August 24.

4.2 - Existing Ambient Noise Levels

The existing noise environment in the project vicinity was documented through ambient noise monitoring. Noise monitoring was conducted at the locations shown in Exhibit 4, and the noise measurement data sheets are included in Appendix A. Four short-term noise measurements (15-minutes each) were taken on Tuesday, October 13, 2020, and one long term (24-hour) noise measurement was taken from 6:20 p.m. on Tuesday, October 13, 2020, to 6:20 p.m. on Wednesday, October 14, 2020. The short-term noise measurements were taken between 4:30 p.m. and 6:00 p.m., during the afternoon peak noise hour. These measurements provide a baseline for existing noise conditions in the project vicinity.

The noise measurement locations were taken in compliance with the methodology and site selection guidance of the California Department of Transportation (Caltrans) Technical Noise Supplement. The short-term measurements were taken at the nearest appropriate point to roadway segments adjacent to residential receptors surrounding the project boundaries.

Short-term Noise Measurements

The short-term noise measurements taken at the project site are summarized in Table 9: .The noise measurements indicate that daytime ambient noise levels range from 50.8 dBA to 74.5 dBA L_{eq} at nearby residential land uses in the project vicinity. The noise technician observed that the dominant noise sources in the project vicinity are traffic noise on local roadways and railroad noise.

Long-term Noise Measurement

The long-term noise measurement (LT-1) was conducted along the northern boundary of the project site, adjacent to Walnut Avenue(Exhibit 4). The 24-hour average ambient noise levels at this location averaged 61.3 dBA CNEL, with daytime average noise levels of 55.7 dBA L_{eq}, and nighttime average noise levels of 54.4 dBA L_{eq}. Documented maximum noise levels at this location ranged up to 83.2 dBA L_{max}. Measured ambient noise levels at this location exceeded 65 dBA for fewer than 10-minutes total of the 24-hour period measured. The noise technician observed that the dominant noise sources in the project vicinity during the 24-hour noise measurement were vehicle traffic on local roadways, train noise, and industrial activity on the project site.

Table 9: Existing Ambient Noise Levels in the Project Vicinity

Site Location	Location Description	dBA	Primary Noise Sources
ST-1	Residential property line at corner of Walnut Avenue northeast of the project site	50.8 L_{eq}	Train passing, traffic on local roadways
ST-2	Residential property line at northeast corner of Walnut Avenue and Maple Avenue	60.2 L_{eq}	Traffic on local roadways, barking dog
ST-3	15-feet west of La Cadena Drive at fence-line of new residential property, 430-feet north of Palm Avenue	74.5 L_{eq}	Train passing and traffic on La Cadena Drive

Site Location	Location Description	dBA	Primary Noise Sources
ST-4	20-feet west of La Cadena Drive, 20-feet north of Palm Avenue, at adjacent residential property line	67.1 L_{eq}	Train passing and traffic on La Cadena Drive and Palm Avenue
LT-1	Northern project property line, south of Walnut Avenue and Maple Avenue intersection	61.3 CNEL	Train passing, traffic on local roadways, activity on project site
Source: FCS 2020.			

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Source: ESRI Aerial Imagery.

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Exhibit 4
Noise Monitoring Locations

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CITY OF COLTON
BARTON ROAD LOGISTICS CENTER
NOISE IMPACT ANALYSIS

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SECTION 5: THRESHOLDS OF SIGNIFICANCE AND IMPACT ANALYSIS

5.1 - Thresholds of Significance

According to the California Environmental Quality Act (CEQA) Guidelines Appendix G, to determine whether impacts related to noise and vibration are significant environmental effects, the following questions should be considered and evaluated.

Would the proposed project:

a) Generate 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?

b) Generate excessive groundborne vibration or groundborne noise levels?

c) 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?

5.2 - Impact Analysis

5.2.1 - Substantial Noise Increase in Excess of Standards

Construction Noise Impacts

For the purposes of this analysis, a significant impact would occur if construction activities would result in a substantial temporary increase in ambient noise levels in the vicinity of the proposed project in excess of standards established in the local general plan, noise ordinance, or applicable standards of other agencies that would result in annoyance or sleep disturbance of nearby sensitive receptors.

The City of Colton's noise ordinance has not established noise performance standards for construction activities. Therefore, this noise study uses the construction noise performance standards found in the County of San Bernardino Development Code which restricts such noise producing construction activity to daytime hours.[6] Specifically, the County of San Bernardino Development Code, Section 83.01.080, indicates that noise producing construction activities are restricted to between the hours of 7:00 a.m. and 7:00 p.m. Mondays to Saturday, with no such activity permitted on Sundays or Federal holidays.

Like the City of Colton, the County of San Bernardino does not establish a numeric maximum acceptable construction source noise level for nearby potentially affected receivers, which would allow for a quantified determination of what CEQA constitutes a substantial temporary or periodic

[6] County of San Bernardino. 2007. 2007 Development Code. March 13. Website: http://www.sbcounty.gov/Uploads/lus/DevelopmentCode/DCWebsite.pdf. Accessed July 29, 2020.

noise increase. Therefore, to evaluate whether the proposed project would generate a substantial periodic increase in short-term noise levels at off-site sensitive receptor locations, the following guidelines from the FTA are applied as reasonable criteria for assessing construction-related noise level impacts. A one-hour L_{eq} of 90 dBA is identified as a noise level threshold for construction noise at nearby sensitive receptors in residential areas.

Therefore, for the purposes of this analysis, a significant impact would occur if noise producing construction activity were to occur outside the County's permitted hours or if the project's construction activity noise levels would exceed the FTA's construction noise threshold of 90 $L_{eq(h)}$ dBA as measured at a sensitive receiving land use in the project vicinity.

Construction-related Traffic Noise

Noise impacts from construction activities associated with the proposed project would be a function of the noise generated by construction equipment, equipment location, sensitivity of nearby land uses, and the timing and duration of the construction activities. One type of short-term noise impacts that could occur during project construction would result from the increase in traffic flow on local streets, associated with the transport of workers, equipment, and materials to and from the project site. The transport of workers and construction equipment and materials to the project site would incrementally increase noise levels on access roads leading to the site. Because workers and construction equipment would use existing routes, noise from passing trucks would be similar to existing vehicle-generated noise on these local roadways. Typically, a doubling of the Average Daily Traffic (ADT) hourly volumes on a roadway segment is required in order to result in an increase of 3 dBA in traffic noise levels; which, as discussed in the characteristics of noise discussion above, is the lowest change that can be perceptible to the human ear in outdoor environments. Based on the project-specific Barton Road Logistics Traffic Analysis,[7] average daily traffic volumes along roadway segments accessing the project site are 18,100 or greater, and AM and PM peak hour traffic volumes average 1,800 or greater trips per hour on these local roadway segments. Therefore, project-related construction trips would not double the hourly or daily traffic volumes along any roadway segment in the project vicinity. For this reason, short-term intermittent noise from construction trips would not be expected to result in a perceptible increase in hourly- or daily-average traffic noise levels in the project vicinity. Therefore, short-term construction-related noise impacts associated with the transportation of workers and equipment to the project site would be less than significant.

Construction Equipment Operational Noise

The second type of short-term noise impact is related to noise generated during construction on the project site. Construction is completed in discrete steps, each of which has its own mix of equipment and, consequently, its own noise characteristics. These various sequential phases would change the character of the noise generated on the site and, therefore, the noise levels surrounding the site as construction progresses. Despite the variety in the type and size of construction equipment, similarities in the dominant noise sources and patterns of operation allow construction related noise ranges to be categorized by work phase. Table 2 lists typical construction equipment noise levels based on a distance of 50 feet between the equipment and a noise receptor. Typical operating cycles for these types of construction equipment may involve 1 or 2 minutes of full-power operation

[7] Urban Crossroads. 2020. Barton Road Logistics Traffic Analysis. August 24.

followed by 3 or 4 minutes at lower power settings. Impact equipment such as pile drivers are not expected to be used during construction of this project.

The site preparation phase, which includes excavation and grading of the site, tends to generate the highest noise levels because the noisiest construction equipment is earthmoving equipment. Earthmoving equipment includes excavating machinery and compacting equipment, such as bulldozers, draglines, backhoes, front loaders, roller compactors, scrapers, and graders. Typical operating cycles for these types of construction equipment may involve 1 or 2 minutes of full power operation followed by 3 or 4 minutes at lower power settings.

Construction of the proposed project is expected to require the use of scrapers, bulldozers, water trucks, haul trucks, and pickup trucks. Based on the information provided in Table 3, the maximum noise level generated by each scraper is assumed to be 85 dBA L_{max} at 50 feet from this equipment. Each bulldozer would also generate 85 dBA L_{max} at 50 feet. The maximum noise level generated by graders is approximately 85 dBA L_{max} at 50 feet. A characteristic of sound is that each doubling of sound sources with equal strength increases a sound level by 3 dBA. Assuming that each piece of construction equipment operates at some distance from the other equipment, a reasonable worst-case combined noise level during this phase of construction would be 90 dBA L_{max} at a distance of 50 feet from the acoustic center of a construction area. This would result in a reasonable worst-case hourly average of 86 dBA $L_{eq(h)}$, at a distance of 50 feet from the acoustic center of a construction area when multiple pieces of heavy equipment operate simultaneously in relatively the same location for an hour period. The acoustic center reference is used because construction equipment must operate at some distance from one another on a project site, and the combined noise level as measured at a point equidistant from the sources (acoustic center) would be the worst-case maximum noise level. The effect on sensitive receptors is evaluated below.

The closest noise-sensitive receptor to the project site is the single-family residence located approximately 75 feet north of the project site at the northeast corner of Walnut Avenue and Maple Avenue. The façade of this closest home would be located approximately 125 feet from the acoustic center of construction activity where multiple pieces of heavy construction equipment would operate simultaneously. At this distance, construction noise levels could range up to approximately 82 dBA L_{max}, with a relative worst-case hourly average of 78 dBA $L_{eq(h)}$ at this receptor. These noise levels could occur temporarily under the reasonable worst-case scenario of multiple pieces of heavy construction equipment operating simultaneously in relatively the same locations at the nearest project boundary for an hour period. These noise levels would drop off at a rate of 6 dBA per doubling of distance as the equipment moves over the site and operates at greater distances from off-site receptors.

Again, the significance threshold for construction noise impacts is whether noise producing construction activity would occur outside the City's permitted hours or would exceed the FTA's construction noise threshold of 90 $L_{eq(h)}$ dBA as measured at a sensitive receiving land use in the project vicinity. As shown in this analysis, the reasonable worst-case hourly average construction noise levels are below the FTA's construction noise threshold of 90 dBA $L_{eq(h)}$ for nearby sensitive receptors in residential areas.

These construction activities could result in relatively high single event noise exposure potential causing an intermittent noise nuisance or a temporary increase in ambient noise levels in the project vicinity that could result in annoyance or sleep disturbance of nearby sensitive receptors unless restricted to daytime hours. However, Chapter 7.24.0706 of the San Bernardino County Municipal Code restricts permissible hours of construction to between the hours of 7:00 a.m. and 7:00 p.m. Monday through Saturday, excluding Federal holidays. Compliance with the County's permissible hours of construction and implementation of the best management noise reduction techniques and practices outlined in Mitigation Measure (MM) NOI-1 would ensure that construction noise would not result in a substantial temporary increase in ambient noise levels that would result in annoyance or sleep disturbance of nearby sensitive receptors. Therefore, with implementation of MM NOI-1, temporary construction noise impacts would be reduced to a less than significant level.

Mobile Source Operational Noise Impacts

A significant impact would occur if project-generated traffic would result in a substantial increase in ambient noise levels compared with those that would exist without the proposed project. The City does not define "substantial increase," therefore for purpose of this analysis, a substantial increase is based on the following criteria. A characteristic of noise is that audible increases in noise levels generally refer to a change of 3 dBA or more, as this level has been found to be barely perceptible to the human ear in outdoor environments. A change of 5 dBA is considered the minimum readily perceptible change to the human ear in outdoor environments. Therefore, for purposes of this analysis, a significant impact would occur if the proposed project would cause the CNEL to increase by any of the following:

- 5 dBA or more even if the CNEL would remain below normally acceptable levels for a receiving land use.
- 3 dBA or more, thereby causing the CNEL in the project vicinity to exceed normally acceptable levels and result in noise levels that would be considered conditionally acceptable for a receiving land use.
- 1.5 dBA or more where the CNEL currently exceeds conditionally acceptable levels.

Table 10 shows a summary of the traffic noise levels for existing (2020), existing plus project, year 2040 no project, and year 2040 plus project, as measured at 50 feet from the centerline of the outermost travel lane. These daily traffic volumes were obtained from the traffic analysis prepared for the proposed project by Urban Crossroads.[8]

[8] Urban Crossroads. 2020. Barton Road Logistics Traffic Analysis. August 24.

Table 10: Traffic Noise Increase Summary

Roadway Segment	Existing (dBA) CNEL	Existing Plus Project (dBA) CNEL	Increase over Existing (dBA)	Year 2040 No Project (dBA) CNEL	Year 2040 Plus Project (dBA) CNEL	Increase over Year 2040 No Project (dBA)
Barton Road-Project Driveway 5 to Grand Terrace Road	67.5	68.0	0.5	71.3	71.5	0.2
Barton Road-Grand Terrace Road to I-215 Southbound Ramps	69.2	69.4	0.2	72.2	72.3	0.1
La Cadena Drive-Rancho Avenue to Barton Road	72.3	72.4	0.1	74.2	74.3	0.1
La Cadena Drive-Barton Road to Iowa Avenue	73.9	73.9	0.0	76.1	76.1	0.0
Source: FCS, 2020.						

As shown in Table 10, the highest traffic noise level increase with implementation of the proposed project would occur along Barton Road between Project Driveway 5 and Grand Terrance Road, under existing plus project conditions. Along this roadway segment, the proposed project would result in traffic noise levels ranging up to 68 dBA CNEL as measured at 50 feet from the centerline of the nearest travel lane, representing an increase of 0.5 dBA over existing conditions for this roadway segment. The resulting noise levels are below the normally acceptable threshold for receiving land uses adjacent to this roadway segment. This increase is well below the 5 dBA increase that would be considered a substantial permanent increase in noise levels compared with noise levels that would exist without the proposed project. Therefore, project-related traffic noise levels would not result in a substantial permanent increase in traffic noise levels in excess of applicable standards and this would represent a less than significant impact.

Stationary Source Operational Noise Impacts

A significant impact would occur if operational noise levels generated by stationary noise sources at the proposed project site would result in a substantial permanent increase in ambient noise levels in excess of any of the noise performance thresholds established in the City's Municipal Code. According to these noise performance standards, stationary noise sources are not permitted to exceed 65 dBA L_{eq} when measured at the boundary line of the property on which the sound is generated. While the City does not indicate the noise metric for this performance threshold, for the purposes of this analysis it is assumed the applicable noise metric is an hourly average noise exposure level (65 dBA $L_{eq(h)}$). This threshold applies to any 60-minute period, day or night.

As noted in the characteristics of noise discussion, audible increases in noise levels generally refer to a change of 3 dBA or more, as this level has been found to be barely perceptible to the human ear in outdoor environments. A change of 5 dBA is considered the minimum readily perceptible change to the human ear in outdoor environments. Therefore, for purposes of this analysis, an increase of more than 3 dBA above the applicable noise performance thresholds would be considered a substantial permanent increase in ambient noise levels.

The proposed project would include new stationary noise sources, including parking lot activities, truck loading and unloading activities, and mechanical ventilation equipment.

Parking Lot Activities

Typical parking lot activities include people conversing, doors shutting, and vehicles idling which generate noise levels ranging from approximately 60 dBA to 70 dBA L_{max} at 50 feet. These activities are expected to occur sporadically throughout the day as cars and trucks arrive and leave the project site.

Proposed parking areas are located as close as 25 feet from the project boundaries in some locations. As a reasonable worst-case scenario, this analysis assumed a minimum of one parking movement for every parking stall nearest the project boundary within a single hour. The resulting hourly average noise levels associated with daily parking lot activities would be approximately 63 dBA L_{eq} at the nearest point along any project boundary line. These noise levels would not result in an increase of 3 dBA above the City's daytime and nighttime hourly average noise performance threshold of 65 dBA $L_{eq(h)}$ for stationary noise sources as measured at the nearest project boundary. These noise levels would be even lower as measured at off-site receptors. Therefore, operational parking lot activity noise levels would not result in a substantial permanent increase in ambient noise levels in excess of the City's noise performance threshold, and this impact would be less than significant.

Truck Loading and Unloading Activities

Noise would be generated by loading and unloading activities at the loading zones along the western and eastern sides of the proposed warehouse Building 1 and on the western and eastern side of Building 2 (see Exhibit 3). Typical noise levels from truck loading and unloading activity can range from 70 dBA to 80 dBA L_{max} as measured at 50 feet. These maximum noise levels include noise from associated truck loading/unloading activity, including trucks maneuvering, truck loading, truck unloading, backup alarms or beepers, and truck docking noise sources. Reasonable worst-case hourly average noise levels, assuming a truck loading/unloading activity at every loading dock in a single hour, would result in noise levels of approximately 75 dBA L_{eq} as measured at 100 feet from the nearest loading dock. These activities are expected to occur sporadically throughout the day and night and would not be continuous.

Proposed truck loading docks are located as close as 150 feet from the nearest project boundary. As a reasonable worst-case scenario, this analysis assumed a truck loading event for each loading dock per hour. The resulting hourly average noise levels associated with daily truck loading activities would be approximately 65 dBA $L_{eq(h)}$ at the nearest point along the boundary line of the project site. These noise levels would not result in an increase of 3 dBA above the City's daytime and nighttime hourly average noise performance threshold of 65 dBA $L_{eq(h)}$ for stationary noise sources as measured at the nearest project boundary. These noise levels would be even lower as measured at off-site receptors. Therefore, operational truck loading activity noise levels would not result in a substantial permanent increase in ambient noise levels in excess of the City's noise performance threshold, and this impact would be less than significant.

Mechanical Ventilation Equipment

Implementation of the proposed project could include operation of new rooftop mechanical ventilation equipment on the proposed warehouses, which would be a new stationary noise source in the project vicinity. At the time of preparation of this analysis, specific details of rooftop mechanical ventilation systems were not available; therefore, a reference noise level for typical rooftop mechanical ventilation systems was used. Noise levels from typical commercial-grade mechanical ventilation equipment systems range up to approximately 60 dBA L_{eq} at a distance of 25 feet. The rooftop mechanical ventilation systems could be located as close as 50 feet from the project boundary. At this distance, these mechanical ventilation system operational noise levels would attenuate to below 54 dBA L_{eq}, as measured at the nearest boundary line of the project site. These noise levels would not result in an increase of 3 dBA above the City's daytime and nighttime hourly average noise performance threshold of 65 dBA $L_{eq(h)}$ for stationary noise sources as measured at the nearest project boundary. These noise levels would be even lower as measured at off-site receptors. Therefore, mechanical ventilation equipment noise levels would not result in a substantial permanent increase in ambient noise levels in excess of the City's noise performance threshold, and this impact would be less than significant.

Stationary Source Operational Noise Impact Conclusion

As shown in the analysis above, none of the project stationary operational noise sources would result in an increase of 3 dBA or greater above the City's daytime and nighttime hourly average noise performance threshold of 65 dBA $L_{eq(h)}$ for stationary noise sources as measured at the nearest project boundary. Therefore, noise impacts from stationary operational noise sources would be less than significant.

Table 11 provides a summary of the stationary source operation noise impacts.

Table 11: Stationary Operational Noise Impact Summary

Source (Reference Noise Levels)	Approximate Distance from Source to Nearest Project Boundary (feet)	Operational Noise Level as Measured at the Project Boundary	City's Noise Performance Threshold	Exceed Threshold by 3 dBA or greater? (Yes/No)
Parking Lot Activities (60 dBA to 70 dBA L_{max} at 50 feet)	25	63 dBA L_{eq}	65 dBA $L_{eq(h)}$	No
Truck Loading and Unloading Activities (70 dBA to 80 dBA L_{max} as measured at 50 feet)	150	65 dBA $L_{eq(h)}$	65 dBA $L_{eq(h)}$	No
Mechanical Ventilation Equipment (60 dBA L_{eq} at a distance of 25 feet)	50	54 dBA L_{eq}	65 dBA $L_{eq(h)}$	No
Sources: FCS 2020				

Construction Noise Reduction Mitigation Measure

Project construction activity noise impacts, which could result in a temporary increase in ambient noise levels in the project vicinity that could result in annoyance or sleep disturbance of nearby sensitive receptors, would be reduced to a less than significant level with implementation of the following multi-part mitigation measure.

MM NOI-1 Implementation of the following multi-part mitigation measure is required to reduce potential construction period noise impacts:

- The construction contractor shall ensure that all equipment driven by internal combustion engines shall be equipped with mufflers, which are in good condition and appropriate for the equipment.
- The construction contractor shall ensure that unnecessary idling of internal combustion engines (i.e., idling in excess of 5 minutes) is prohibited.
- The construction contractor shall utilize “quiet” models of air compressors and other stationary noise sources where technology exists.
- At all times during project grading and construction, the construction contractor shall ensure that stationary noise-generating equipment shall be located as far as practicable from sensitive receptors and placed so that emitted noise is directed away from adjacent residences.
- The construction contractor shall ensure that the construction staging areas shall be located to create the greatest feasible distance between the staging area and noise-sensitive receptors nearest the project site.
- The construction contractor shall ensure that all on-site construction activities, including the operation of any tools or equipment used in construction, drilling, repair, alteration, grading or demolition work, are limited to between the hours of 7:00 a.m. and 7:00 p.m. Monday through Saturday, Saturday; with no such activity permitted on Sundays or Federal holidays.

5.2.2 - Groundborne Vibration/Noise Levels

This section analyzes both construction and operational groundborne vibration and noise impacts. Groundborne vibrations consist of rapidly fluctuating motions within the ground that have an average motion of zero. Vibrating objects in contact with the ground radiate vibration waves through various soil and rock strata to the foundations of nearby buildings. Groundborne noise is generated when vibrating building components radiate sound, or noise generated by groundborne vibration. In general, if groundborne vibration levels do not exceed levels considered to be perceptible, then groundborne noise levels would not be perceptible in most interior environments. Therefore, this analysis focuses on determining exceedances of groundborne vibration levels.

The City’s Municipal Code regulates vibration by restricting a project’s operations so as not to generate ground vibration by equipment (other than motor vehicles, trains or by temporary construction or demolition) which is perceptible without instruments by the average person at or beyond any lot line of the lot containing the activities. The FTA establishes thresholds for construction vibration impacts for various structural categories as shown in Table 6. As neither the Municipal Code nor the General Plan provide vibration standards for mobile operational activities, the Caltrans threshold for perception for transient sources of 0.04 inch-per-second (in/sec) PPV is used in this analysis.

Short-term Construction Vibration Impacts

A significant impact would occur if construction activities would result in vibration that produces a particle velocity greater than or equal to 0.2 in/sec PPV measured at the nearest structure.

Of the variety of equipment used during construction, the large vibratory rollers that could be used in the site preparation phase of construction would produce the greatest groundborne vibration levels. As shown in Table 3, large vibratory rollers produce groundborne vibration levels ranging up to 0.210 in/sec PPV at 25 feet from the operating equipment.

The closest off-site structure to the project boundaries is the single-family residence located approximately 75 feet north of the project site at the northeast corner of Walnut Avenue and Maple Avenue. Heavy construction equipment could operate at the project boundary nearest this structure during the site preparation and paving phase of construction. At this distance, groundborne vibration levels would range up to 0.04 in/sec PPV from operation of the types of equipment that would produce the highest vibration levels. This vibration level is well below the vibration threshold of 0.2 in/sec PPV as measured at the nearest structure. Therefore, the impact of short-term groundborne vibration associated with construction to off-site receptors would be less than significant.

Operational Vibration Impacts

A significant impact would occur if project operations would generate groundborne vibration which is perceptible without instruments by the average person at or beyond any lot line of the lot containing the activities.

Implementation of the proposed project would not include any permanent stationary sources that would expose persons in the project vicinity to groundborne vibration levels that could be perceptible without instruments at or beyond the lot line. The proposed project would result in tractor-trailer truck deliveries to the project site. Tractor-trailer trucks would travel to the site via La Cadena Drive and access the site via Barton Road and De Berry Street.

It should be noted that according to the FTA Transit Noise and Vibration Impact Assessment Manual,[9] it is unusual for vibration from sources such as trucks traveling on paved roadways to be perceptible, even for receptors located close to major roadways. However, the following quantitative calculation is provided for a conservative analysis.

As shown in Table 3, a loaded truck operating off-road would produce a worst-case vibration level of 0.076 in/sec PPV at 25 feet, which is based on loaded trucks driving on dirt roads or rough off-road

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[9] Federal Transit Administration (FTA). 2018. Transit Noise and Vibration Impact Assessment Manual. September.

conditions. The closest receptors along access roadways to the project site are located over 35 feet from the centerline of the nearest travel lane. Based on typical vibration propagation, this would result in a vibration level of 0.04 in/sec PPV at the nearest receptor. As noted previously, all nearby roads and on-site circulation areas are and would be paved, which would result in even lower vibration levels than this worst-case calculation. Therefore, vibration level from trucks traveling to and within the project site would not exceed the 0.04 in/sec PPV threshold of perception for transient sources as measured at the closest receptors in the project vicinity. Therefore, project operational groundborne vibration level impacts would be considered less than significant.

5.2.3 - Excessive Noise Levels from Airport Activity

A significant impact would occur if the proposed project would expose people residing or working in the project area to excessive noise levels 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 2 miles of a public airport or public use airport.

The project site is not located within the vicinity of a private airstrip. The nearest public airports to the project site are the Flabob Airport, located approximately 5 miles southwest of the project site, and the San Bernardino International Airport, located approximately 5.5 miles northeast of the project site. Because of the distance of the project site from the airport runways, the project site is located outside of the 65 dBA CNEL airport noise contours. While aircraft noise is occasionally audible on the project site from aircraft flyovers, aircraft noise associated with nearby airport activity would not expose people residing or working near the project site to excessive noise levels. Therefore, implementation of the proposed project would not expose persons residing or working in the project vicinity to noise levels from airport activity that would be in excess of normally acceptable standards for the proposed land use development, and no impact would occur.

Appendix A:
Noise Modeling and Measurement Data

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TABLE Existing (2020)-01
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 08/25/2020
ROADWAY SEGMENT: Barton Road - Project Driveway 5 to Grand Terrace Road
NOTES: Barton Road Logistics - Existing (2020)

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* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 18100   SPEED (MPH): 30   GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	73.60	13.60	10.22
M-TRUCKS	0.90	0.04	0.90
H-TRUCKS	0.35	0.04	0.35

ACTIVE HALF-WIDTH (FT): 6   SITE CHARACTERISTICS: SOFT

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* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 67.54

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
0.0	82.4	177.0	381.2

TABLE Existing (2020)-02
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 08/25/2020
ROADWAY SEGMENT: Barton Road - Grand Terrace Road to I-215 Southbound Ramps
NOTES: Barton Road Logistics - Existing (2020)

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* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 26400   SPEED (MPH): 30   GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	73.60	13.60	10.22
M-TRUCKS	0.90	0.04	0.90
H-TRUCKS	0.35	0.04	0.35

ACTIVE HALF-WIDTH (FT): 6   SITE CHARACTERISTICS: SOFT

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* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 69.17

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
0.0	105.8	227.6	490.2

TABLE Existing (2020)-03
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 08/25/2020
ROADWAY SEGMENT: La Cadena Drive - Rancho Avenue to Barton Road
NOTES: Barton Road Logistics - Existing (2020)

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* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 31400   SPEED (MPH): 45   GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	73.60	13.60	10.22
M-TRUCKS	0.90	0.04	0.90
H-TRUCKS	0.35	0.04	0.35

ACTIVE HALF-WIDTH (FT): 24   SITE CHARACTERISTICS: SOFT

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* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 72.34

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
103.0	217.2	465.6	1001.8

TABLE Existing (2020)-04
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 08/25/2020
ROADWAY SEGMENT: La Cadena Drive - Barton Road to Iowa Avenue
NOTES: Barton Road Logistics - Existing (2020)

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* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 44600   SPEED (MPH): 45   GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	73.60	13.60	10.22
M-TRUCKS	0.90	0.04	0.90
H-TRUCKS	0.35	0.04	0.35

ACTIVE HALF-WIDTH (FT): 24   SITE CHARACTERISTICS: SOFT

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* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 73.86

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
128.9	273.8	588.0	1265.7

TABLE Existing Plus Project-01
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 08/25/2020
ROADWAY SEGMENT: Barton Road - Project Driveway 5 to Grand Terrace Road
NOTES: Barton Road Logistics - Existing Plus Project

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* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 20000   SPEED (MPH): 30   GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	73.60	13.60	10.22
M-TRUCKS	0.90	0.04	0.90
H-TRUCKS	0.35	0.04	0.35

ACTIVE HALF-WIDTH (FT): 6   SITE CHARACTERISTICS: SOFT

---

* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 67.97

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
0.0	88.0	189.2	407.4

TABLE Existing Plus Project-02

FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 08/25/2020
ROADWAY SEGMENT: Barton Road - Grand Terrace Road to I-215 Southbound Ramps
NOTES: Barton Road Logistics - Existing Plus Project

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* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 28000   SPEED (MPH): 30   GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	73.60	13.60	10.22
M-TRUCKS	0.90	0.04	0.90
H-TRUCKS	0.35	0.04	0.35

ACTIVE HALF-WIDTH (FT): 6   SITE CHARACTERISTICS: SOFT

---

* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 69.43

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
51.4	110.0	236.7	509.7

TABLE Existing Plus Project-03
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 08/25/2020
ROADWAY SEGMENT: La Cadena Drive - Rancho Avenue to Barton Road
NOTES: Barton Road Logistics - Existing Plus Project

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* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 31900   SPEED (MPH): 45   GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	73.60	13.60	10.22
M-TRUCKS	0.90	0.04	0.90
H-TRUCKS	0.35	0.04	0.35

ACTIVE HALF-WIDTH (FT): 24   SITE CHARACTERISTICS: SOFT

---

* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 72.41

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
104.1	219.5	470.5	1012.4

TABLE Existing Plus Project-04
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 08/25/2020
ROADWAY SEGMENT: La Cadena Drive - Barton Road to Iowa Avenue
NOTES: Barton Road Logistics - Existing Plus Project

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* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 45200   SPEED (MPH): 45   GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	73.60	13.60	10.22
M-TRUCKS	0.90	0.04	0.90
H-TRUCKS	0.35	0.04	0.35

ACTIVE HALF-WIDTH (FT): 24   SITE CHARACTERISTICS: SOFT

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* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 73.92

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
130.0	276.2	593.3	1277.1

TABLE Year 2040 No Project-01
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 08/25/2020
ROADWAY SEGMENT: Barton Road - Project Driveway 5 to Grand Terrace Road
NOTES: Barton Road Logistics - Year 2040 No Project

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* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 42900 SPEED (MPH): 30 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	73.60	13.60	10.22
M-TRUCKS	0.90	0.04	0.90
H-TRUCKS	0.35	0.04	0.35

ACTIVE HALF-WIDTH (FT): 6 SITE CHARACTERISTICS: SOFT

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* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 71.28

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
68.0	146.1	314.5	677.4

TABLE Year 2040 No Project-02

FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 08/25/2020
ROADWAY SEGMENT: Barton Road - Grand Terrace Road to I-215 Southbound Ramps
NOTES: Barton Road Logistics - Year 2040 No Project

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* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 52400   SPEED (MPH): 30   GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	73.60	13.60	10.22
M-TRUCKS	0.90	0.04	0.90
H-TRUCKS	0.35	0.04	0.35

ACTIVE HALF-WIDTH (FT): 6   SITE CHARACTERISTICS: SOFT

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* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 72.15

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
77.7	166.9	359.4	774.0

TABLE Year 2040 No Project-03

FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 08/25/2020
ROADWAY SEGMENT: La Cadena Drive - Rancho Avenue to Barton Road
NOTES: Barton Road Logistics - Year 2040 No Project

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* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 48400   SPEED (MPH): 45   GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	73.60	13.60	10.22
M-TRUCKS	0.90	0.04	0.90
H-TRUCKS	0.35	0.04	0.35

ACTIVE HALF-WIDTH (FT): 24   SITE CHARACTERISTICS: SOFT

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* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 74.22

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
135.9	289.0	620.9	1336.6

TABLE Year 2040 No Project-04

FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 08/25/2020
ROADWAY SEGMENT: La Cadena Drive - Barton Road to Iowa Avenue
NOTES: Barton Road Logistics - Year 2040 No Project

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* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 74100 SPEED (MPH): 45 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	73.60	13.60	10.22
M-TRUCKS	0.90	0.04	0.90
H-TRUCKS	0.35	0.04	0.35

ACTIVE HALF-WIDTH (FT): 24 SITE CHARACTERISTICS: SOFT

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* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 76.07

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
179.2	383.4	824.5	1775.4

TABLE Year 2040 Plus Project-01
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 08/25/2020
ROADWAY SEGMENT: Barton Road - Project Driveway 5 to Grand Terrace Road
NOTES: Barton Road Logistics - Year 2040 Plus Project

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* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 44700   SPEED (MPH): 30   GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	73.60	13.60	10.22
M-TRUCKS	0.90	0.04	0.90
H-TRUCKS	0.35	0.04	0.35

ACTIVE HALF-WIDTH (FT): 6   SITE CHARACTERISTICS: SOFT

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* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 71.46

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
69.9	150.2	323.3	696.2

TABLE Year 2040 Plus Project-02

FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 08/25/2020
ROADWAY SEGMENT: Barton Road - Grand Terrace Road to I-215 Southbound Ramps
NOTES: Barton Road Logistics - Year 2040 Plus Project

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* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 54000   SPEED (MPH): 30   GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	73.60	13.60	10.22
M-TRUCKS	0.90	0.04	0.90
H-TRUCKS	0.35	0.04	0.35

ACTIVE HALF-WIDTH (FT): 6   SITE CHARACTERISTICS: SOFT

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* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 72.28

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
79.2	170.3	366.7	789.7

TABLE Year 2040 Plus Project-03

FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 08/25/2020

ROADWAY SEGMENT: La Cadena Drive - Rancho Avenue to Barton Road

NOTES: Barton Road Logistics - Year 2040 Plus Project

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* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 48900   SPEED (MPH): 45   GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	73.60	13.60	10.22
M-TRUCKS	0.90	0.04	0.90
H-TRUCKS	0.35	0.04	0.35

ACTIVE HALF-WIDTH (FT): 24   SITE CHARACTERISTICS: SOFT

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* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 74.26

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
136.8	291.0	625.2	1345.8

TABLE Year 2040 Plus Project-04
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 08/25/2020
ROADWAY SEGMENT: La Cadena Drive - Barton Road to Iowa Avenue
NOTES: Barton Road Logistics - Year 2040 Plus Project

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* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 74800 SPEED (MPH): 45 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	73.60	13.60	10.22
M-TRUCKS	0.90	0.04	0.90
H-TRUCKS	0.35	0.04	0.35

ACTIVE HALF-WIDTH (FT): 24 SITE CHARACTERISTICS: SOFT

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* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 76.11

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
180.3	385.8	829.7	1786.5

Parking Lot activity

Reference Noise Level Calculation

No.	Equipment Description	Reference (dBA) 50 ft Lmax	Quantity	Usage factor[1]	Distance to Receptor	Ground Effect[2]	Shielding (dBA)[3]	Calculated (dBA) Lmax	Leq	Energy
1	parking lot activity	70	8	1	55	1	0	69.2	57.8	601051.8407
2	parking lot activity	70	8	1	105	1	0	63.6	49.4	86383.75985
3	parking lot activity	70	8	1	105	1	0	63.6	49.4	86383.75985
4	parking lot activity	70	8	1	125	1	0	62.0	47.1	51200
5	parking lot activity	70	8	1	150	1	0	60.5	44.7	29629.62963
6	parking lot activity	70	8	1	160	1	0	59.9	43.9	24414.0625
7										
8										
9										
10										
							Lmax[4]	69	Leq	59

Notes:

[1] Percentage of time maximum noise levels occur each hour

[2] Soft ground terrain between project site and receptor.

[3] Noise reduction factor due to terrain, landscaping, or structures

[4] Calculated Lmax is the Loudest value.

Loading/Unloading

Reference Noise Level Calculation

Noise Level Calculation Prior to Implementation of Noise Attenuation Requirements

No.	Equipment Description	Reference (dBA) 50 ft Lmax	Quantity	Usage factor[1]	Distance to Receptor	Ground Effect[2]	Shielding (dBA)[3]	Calculated (dBA) Lmax	Calculated (dBA) Leq	Energy
1	Loading/Unloading	80	7	5	230	1	0	66.7	55.6	359579.1896
2	Loading/Unloading	80	7	5	175	1	0	69.1	59.1	816326.5306
3	Loading/Unloading	80	7	5	185	1	0	68.6	58.4	690975.8553
4	Loading/Unloading	80	7	5	245	1	0	66.2	54.7	297495.0913
5	Loading/Unloading	80	7	5	325	1	0	63.7	51.1	127446.518
6	Loading/Unloading	80	7	5	420	1	0	61.5	47.7	59051.39834
7	Loading/Unloading	80	7	5	515	1	0	59.7	45.1	32029.95808
8										
9										
10										
							Lmax[4]	**69**	**Leq**	**64**

Notes:

[1] Percentage of time maximum noise levels occur each hour

[2] Soft ground terrain between project site and receptor.

[3] Noise reduction factor due to terrain, landscaping, or structures

[4] Calculated Lmax is the Loudest value.