Noise Technical Report
Ashwood Street Corridor Improvements Project
San Diego County, California

Prepared for
County of San Diego
Department of Public Works
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TABLE OF CONTENTS

TABLE OF CONTENTS (cont.)

FIGURES

TABLES

TABLE OF CONTENTS (cont.)

TABLES (cont.)

ATTACHMENTS

Acronyms and Abbreviations

Caltrans	California Department of Transportation
CNEL	community noise equivalent level
County	County of San Diego
dB	decibel
dB(A)	A-weighted decibel
FHWA	Federal Highway Administration
FTA	Federal Transit authority
GPU	General Plan Update
in/sec	inch per second
L_{eq}	average noise level
L_{max}	maximum sound level
L_{pw}	sound power level
mph	miles per hour
NSLU	noise sensitive land uses
PPV	peak particle velocity
RMS	root mean square
SANDAG	San Diego Association of Governments

Executive Summary

The Ashwood Street Corridor Improvements Project (project) is located within the unincorporated community of Lakeside in San Diego County. Improvements would occur on Ashwood Street between Mapleview Street and approximately 1,400 feet north of the intersection with Willow Road (where Ashwood Street transitions into Wildcat Canyon Road). The goals of the project are to improve traffic movement and sight distance at various locations including El Capitan High School, Cactus County Park, and the intersections of Ashwood Street with Mapleview Street and Willow Road. The project would also enhance pedestrian access with the continuation of sidewalk along the west side of Ashwood Street.

This report analyzes the noise impacts from both construction and operation of the project. Construction activities are anticipated to begin in 2021 and last for approximately two years. This report was prepared in accordance with the County of San Diego (County) Guidelines for Determining Significance and Report Format and Content Requirements, Noise (County's Noise Guidelines; County of San Diego 2009a). A summary of the findings is provided below.

Noise-sensitive Lands Uses Affected by Airborne Noise

The project site does not include any Noise Sensitive Land Uses (NSLU). The project would not construct any new NSLU. Therefore, the project would have no impact on on-site NSLU.

The nearest off-site NSLU are located on surrounding properties adjacent to the project site. At most locations along the corridor, there would be little to no change in vehicle traffic noise levels. Noise levels at some receivers would slightly increase due to the alignment being shifted towards the receivers, and noise levels at other receivers would slightly decrease due to the alignment being shifted away from the receivers. Based on traffic noise modeling of the improvements, the project would result in noise level changes from the existing condition at adjacent residences that are less than 3 A-weighted decibels [dB(A)]; which is the threshold used to determine off-site impacts within the County. Therefore, it is concluded that noise impacts to off-site NSLU would be less than significant.

Project-generated Airborne Noise

Operation

The project does not include any on-site stationary sources, such as heating, ventilation, and air conditioning units and other venting, electrical generators, parking lots, or loading docks. Thus, operation related airborne noise levels would not be subject to the County property line limits and no impacts would occur.

Construction

Average hourly noise levels would not exceed the County's limit of 75 dB(A) one-hour equivalent noise level (L_{eq}) at the adjacent residential uses. However, as construction activities have the potential to generate sporadic short-term (less than one hour) maximum noise levels during peak construction activity in excess of 75 dB(A) L_{max} at adjacent property lines, the County has included the following design considerations in the project design.

DC-1: All construction equipment shall be properly maintained and equipped with noise-reduction intake and exhaust mufflers and engine shrouds, in accordance with manufacturers' recommendations. Equipment engine shrouds shall be closed during equipment operation.

DC-2: Whenever feasible, electrical power shall be used to run air compressors and similar power tools.

DC-3: Equipment staging areas should be located as far as feasible from occupied residences.

Based on noise modeling of construction noise, construction activity would comply with the County's construction noise level limits at the adjacent property lines. Therefore, construction noise levels would be less than significant.

Impulsive Noise

No operational impulsive noise sources are proposed as part of the project. It is not anticipated that any impact hammering or pile driving would be required for project construction. Therefore, impulsive noise impacts would be less than significant.

Groundborne Vibration and Noise

There would be no new vibration sources associated with project operation. Therefore, vibration impacts associated with project operation would be less than significant. Construction activities associated with the proposed project would not expose vibration-sensitive land uses to groundborne vibration levels in excess of the County thresholds. Therefore, it is concluded that groundborne vibration impacts would be less than significant.

1.0 Introduction

This report analyzes the potential noise impacts from both construction and operation of the Ashwood Street Corridor Improvements Project (project). The purpose of this analysis is to characterize the existing noise conditions, identify applicable regulations (i.e., County of San Diego [County] General Plan Noise Element [County of San Diego 2011] and the County Noise Ordinance [County of San Diego 2009b]), assess any potential noise impacts from construction and operation of the project, and identify mitigation measures and/or design considerations to reduce potential impacts, if needed. This report was prepared in accordance with the County's Guidelines for Determining Significance and Report Format and Content Requirements, Noise (County's Noise Guidelines; County of San Diego 2009a).

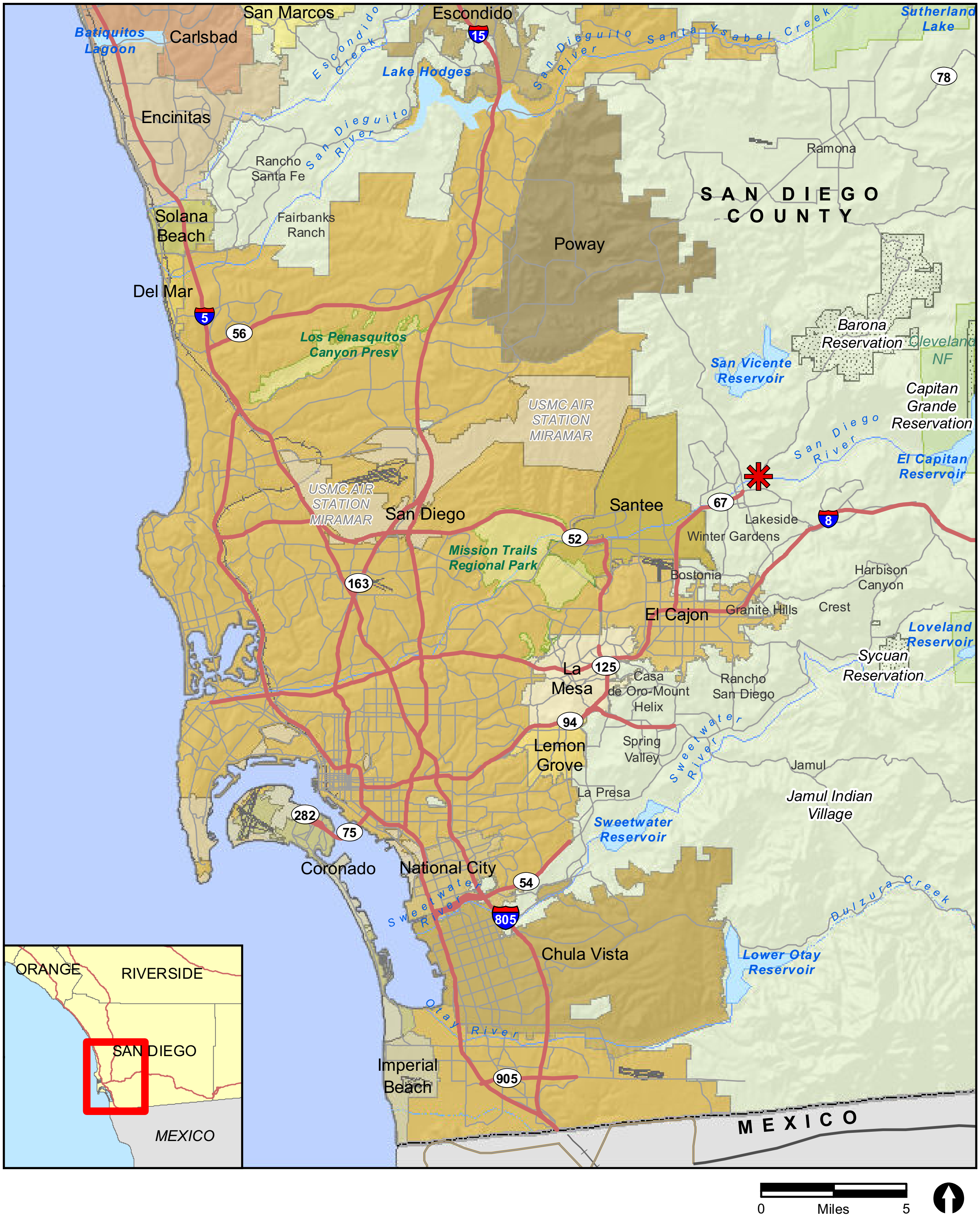
1.1 Project Description

1.1.1 Project Location

The project is located in the unincorporated community of Lakeside in San Diego County (Figures 1 and 2). The project site is situated along Ashwood Street and Wildcat Canyon Road, extending onto portions of Mapleview Street and Willow Road. The southern portion of the project site extends approximately 900 feet west and 275 feet east along Mapleview Street from the intersection with Ashwood Street. The southern portion continues north along Ashwood Street for approximately 3,000 feet, including an adjacent hillside east of Ashwood Street (Figure 3). The northern portion of the project site is centered on the intersection of Ashwood Street, Wildcat Canyon Road, and Willow Road. It extends approximately 1,000 feet north along Wildcat Canyon Road, 550 feet east and 300 feet west along Willow Road, and approximately 550 feet south along Ashwood Street (see Figure 3). The portion located over the San Diego River channel only includes repaving of the existing road width.

1.1.2 Project Description

The County Department of Public Works proposes to improve a 1.3-mile segment of the Ashwood Street corridor. Specifically, Mapleview Street would be improved by installing an additional left-turn lane for vehicles traveling eastbound turning north onto Ashwood Street. As motorists travel north, Ashwood Street would be widened to include an additional travel lane only for vehicles entering El Capitan High School. To enhance turning movements into and out of El Capitan High School, a traffic signal system would be installed at the school's entrance; however, the primary northbound travel lane on Ashwood Street would remain unsignalized. A raised median would be installed to separate through-traffic from vehicles entering the school. To accommodate the roadway widening near El Capitan High School, a soil nail retaining wall and a soldier pile wall would be installed along the east and west sides of Ashwood Street, respectively, due to the proximity of steep slopes.



Project Location

FIGURE 1
Regional Location
Ashwood Street Corridor Improvements Project

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Image Source: NearMap (flown September 2019)

Project Boundary

FIGURE 2
Project Location on Aerial Photograph
Ashwood Street Corridor Improvements Project

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Image Source: NearMap (flown September 2019)

FIGURE 3
Noise Measurement Locations
Ashwood Street Corridor Improvements Project

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To improve pedestrian access, a sidewalk would be installed on the west side of Ashwood Street between El Capitan High School and Cactus County Park. A dedicated left-turn lane would also be installed for vehicles entering Cactus County Park's western property. At the intersection of Ashwood Street and Willow Road, the existing all-way stop would be signalized with Americans with Disabilities Act–compliant pedestrian ramps and crosswalk pavement markings, and a dedicated left-turn lane would be added in each direction.

Regarding drainage improvements, the project includes the relocation of existing storm drain facilities as well as the installation of concrete brow ditches to adequately convey and capture storm water runoff along Ashwood Street. Storm water runoff would either be conveyed to proposed biofiltration basins for treatment or be directed to curb inlets to reduce the volume of runoff discharged from the site. The project would not alter or modify the existing culvert system that conveys flows from the San Diego River underneath Ashwood Street.

Following approval of the project, the County would proceed with acquiring right-of-way necessary to construct the road improvements, including areas for slopes, drainages, or other facilities. In addition, temporary easements would be required during construction activities. No structure demolitions are proposed. Construction is anticipated to take approximately 24 months to complete. No nighttime construction is anticipated to be required.

1.2 Environmental Settings and Existing Conditions

1.2.1 Noise Terminology

Sound is a vibratory disturbance created by a moving or vibrating source, which is capable of being detected by the hearing organs. Noise is generally defined as unwanted or objectionable sound. The effects of noise on people can include general annoyance, interference with speech communication, sleep disturbance, and in the extreme, hearing impairment.

The unit of measurement used to describe a sound, or noise, level is the decibel (dB). Decibels are measured on a logarithmic scale that quantifies sound intensity in a manner similar to the Richter scale used for earthquake magnitudes. A 10 dB increase represents a 10-fold increase in sound intensity, a 20 dB change is a 100-fold difference, 30 dB is a 1,000-fold increase, etc. Thus, a doubling of the energy of a noise source, such as doubling of traffic volume, would increase the noise level by 3 dB; a halving of the energy would result in a 3 dB decrease.

Additionally, in technical terms sound levels are described as either a "sound power level" or a "sound pressure level," which while commonly confused are two distinct characteristics of sound. Both share the same unit of measure, the dB. However, sound power is the energy converted into sound by the source. The sound power level of the source is expressed as L_{pw}. Equipment sound power ratings are determined in an acoustics laboratory, usually by the manufacturer or an independent test lab. Testing facilities utilize specific standards and methods to promote data uniformity and allow objective comparisons across industries. The L_{pw} is used to estimate how far a noise will travel and to predict the sound levels at various distances from the source. As sound energy travels through the air, it creates a sound wave that exerts pressure on receivers such as an eardrum or microphone and is the sound pressure level. Noise measurement instruments only measure sound pressure.

The human ear is not equally sensitive to all frequencies within the sound spectrum. Therefore, a method called "A-weighting" is used to filter noise frequencies that are not audible to the human ear. A-weighting approximates the frequency response of the average young ear when listening to most ordinary everyday sounds. When people make relative judgments of the loudness or annoyance of a sound, their judgments correlate well with the "A-weighted" levels of those sounds. Therefore, the A-weighted noise scale is used for measurements and standards involving the human perception of noise. In this report, all noise levels are A-weighted and dB(A) is understood to identify the A-weighted decibel.

In addition to noise levels, the duration or exceedance of noise over time is also important for the assessment of potential noise disturbance. Average noise levels over a period of minutes or hours are usually expressed as dB(A) L_{eq}, or the equivalent noise level for that period. The period of time averaged may be specified; $L_{eq(3)}$ would be a 3-hour average; when no period is specified, a 1-hour average is assumed.

The timing of noise is also an important factor to consider in assessing potential noise impacts as noise levels that may be acceptable during the day may create disturbance during evening or nighttime hours. Community noise equivalent level (CNEL) is the energy average of the A-weighted sound levels occurring during a 24-hour period, with a 5 dB(A) penalty added to the sound levels occurring between 7:00 p.m. and 10:00 p.m. and 10 dB(A) added to the sound levels occurring between 10:00 p.m. and 7:00 a.m.

The perception of noise is not linear in terms of dB(A) or in terms of acoustical energy. Two equivalent noise sources do not sound twice as loud as one source. It is widely accepted that the average healthy ear can barely perceive changes of 3 dB(A), increase or decrease; that a change of 5 dB(A) is readily perceptible; and that an increase (decrease) of 10 dB(A) sounds twice (half) as loud (California Department of Transportation [Caltrans] 2013a). Table 1 provides examples of common activities and the sound pressure levels associated with those activities.

Table 1
Typical Noise Levels

Common Outdoor Activities	Noise Level dB(A)	Common Indoor Activities
	110	Rock Band
Jet Fly-over at 300 meters (1,000 feet)	100	
Gas Lawn Mower at 1 meter (3 feet)	90	
Diesel Truck at 15 meters (50 feet), at 80 kilometer per hour (50 miles per hour)	80	Food Blender at 1 meter (3 feet) Garbage Disposal at 1 meter (3 feet)
Noisy Urban Area, Daytime Gas Lawn Mower, 30 meters (100 feet)	70	Vacuum Cleaner at 3 meters (10 feet)
Commercial Area Heavy Traffic at 90 meters (300 feet)	60	Normal Speech at 1 meter (3 feet)
Quiet Urban Daytime	50	Large Business Office Dishwasher in Next Room
Quiet Urban Nighttime	40	Theater, Large Conference Room (Background)
Quiet Suburban Nighttime	30	Library
Quiet Rural Nighttime	20	Bedroom at Night, Concert Hall (Background)
	10	Broadcast/Recording Studio
	0	Lowest Threshold of Human Hearing

SOURCE: Caltrans 2013a.

From the source to the receiver, noise changes both in level and frequency spectrum. The most obvious change is the decrease in noise as the distance from the source increases. The manner in which noise reduces with distance depends on the following important factors: ground absorption, atmospheric effects and refraction, shielding by natural and man-made features, noise barriers, diffraction, and reflection. For a point or stationary noise source, such as construction equipment, the attenuation or drop-off in noise level would be at least -6 dB(A) for each doubling of unobstructed distance between source and the receiver and could increase to -7.5 dB(A) depending on the acoustic characteristics of the intervening ground. For a linear noise source, such as vehicles traveling on a roadway, the attenuation or drop-off in noise level would be approximately -3 dB(A) for each doubling of unobstructed distance between source and the receiver and could increase to -4.5 dB(A) depending on the acoustic characteristics of the intervening ground.

A large object in the path between a noise source and a receiver can significantly attenuate noise levels at that receiver. The amount of attenuation provided by this "shielding" depends on the size of the object and the frequencies of the noise levels. Natural terrain features, such as hills and dense woods, as well as man-made features, such as buildings and walls, can significantly alter noise levels. Walls or berms are often specifically used to reduce or attenuate noise.

Noise-sensitive receptors are generally considered humans engaged in activities, or occupying land uses, that may be subject to the stress of significant interference from noise. Human activities usually associated with sensitive receptors include, but are not limited to, talking, reading, and sleeping. Land uses associated with noise sensitive human receptors include residential dwellings including mobile homes, hotels/motels, hospitals, nursing homes, educational facilities, and libraries. In addition to human receptors, protected animal species and their habitats may be considered sensitive noise receptors, especially during their breeding season.

1.2.2 Existing Noise Conditions

The primary existing continuous noise source at the project site and within the vicinity is vehicle traffic on area roadways including Mapleview Street, Ashwood Street, and Wildcat Canyon Road. Secondary sources include pedestrian, occasional distant aircraft, and baseball and equestrian activities. Noise measurements were taken to obtain typical ambient noise levels at the project site and in the vicinity. Noise measurements were taken on a weekday afternoon during normal work and school hours and, therefore, represent a typical traffic noise environment. Two 15-minute and one 30-minute measurements were taken on March 8, 2019, and one 15-minute measurement was taken on March 14, 2019, as described below. The measurement locations are shown on Figure 3, and detailed data is contained in Attachment 1.

Measurement 1 was located southwest of the intersection of Mapleview Street and Ashwood Street, approximately 25 feet south of the edge of Mapleview Street. Multi-family residential uses are located in the vicinity of the measurement location. The main source of noise at this location was vehicle traffic on Mapleview Street, and secondary sources included pedestrians and distant aircraft. During the 15-minute measurement period, vehicle traffic on Mapleview Street was counted. The average measured noise level was 68.0 dB(A) L_{eq}.

Measurement 2 was located approximately 15 feet southeast of the edge of Ashwood Street, in a driveway across the street from the El Capitan High School baseball field. The main source of noise at this location was vehicle traffic on Ashwood Street, and secondary source of noise included pedestrians and activities at the baseball field. During the 30-minute measurement period, vehicle traffic on Ashwood Street was counted. The average measured noise level was 73.3 dB(A) L_{eq}.

Measurement 3 was located approximately 50 feet east of Ashwood Street, across the street from several recreational ballfields, and north of the main campus of El Capitan High School. The main source of noise at this location was vehicle traffic on Ashwood Street, and secondary source of noise included activities at the ballfields. During the 15-minute measurement period, vehicle traffic on Ashwood Street was counted. The average measured noise level was 68.0 dB(A) L_{eq}.

Measurement 4 was located approximately 20 feet east of Wildcat Canyon Road, north of the intersection of Wildcat Canyon Road/Ashwood Street and Willow Road. Single-family residential uses are located in the vicinity of the measurement location. The main source of noise at this location was vehicle traffic on Wildcat Canyon Road, and secondary source included horses at nearby equestrian uses. During the 15-minute measurement period, vehicle traffic on Wildcat Canyon Road was counted. The average measured noise level was 68.3 dB(A) L_{eq}.

Table 2 summarizes the traffic counts taken on Mapleview Street, Ashwood Street, and Wildcat Canyon Road during the March 8 and 14, 2019 survey, and Table 3 summarizes the noise measurements. Table 3 also summarizes the measured noise level that was exceeded 90 percent of the time (i.e., L_{90}). L_{90} commonly represents the background noise environment, and is provided for informational purposes.

Table 2
Traffic Counts

Measurement	Roadway	Direction	Automobiles	Medium Trucks	Heavy Trucks	Motorcycles	Buses
1	Mapleview Street	Westbound	145	6	4	0	3
		Eastbound	167	5	0	1	1
2	Ashwood Street	Northbound	249	5	1	0	3
		Southbound	356	5	0	1	7
3	Ashwood Street	Northbound	115	0	0	0	1
		Southbound	94	1	0	0	1
4	Wildcat Canyon Road	Northbound	127	0	0	0	1
		Southbound	87	1	2	1	0

Table 3
Noise Measurements

Measurement	Location	Date/Time/Duration	Primary Noise Sources	L_{eq}	L_{90}
1	25 south of Mapleview Street, adjacent to multi-family residential uses	March 14, 2019 2:21 p.m.– 2:36 p.m. 15 minutes	Vehicle traffic on Mapleview Street	68.0	57.8
2	15 feet southeast of Ashwood Street, in a driveway across the street from the El Capitan High School baseball field	March 8, 2019 2:16 p.m.– 2:46 p.m. 30 minutes	Vehicle traffic on Ashwood Street	73.3	62.7
3	50 feet east of Ashwood Street, north of El Capitan High School	March 8, 2019 1:37 p.m.– 1:52 p.m. 15 minutes	Vehicle traffic on Ashwood Street	68.0	53.1
4	20 feet east of Wildcat Canyon Road, north of the intersection of Wildcat Canyon Road/Ashwood Street and Willow Road	March 8, 2019 1:02 p.m.– 1:17 p.m. 15 minutes	Vehicle traffic on Wildcat Canyon Road	68.3	56.2

NOTE: Noise measurement data is contained in Attachment 1.
L_{eq} = average noise level; L_{90} = noise level exceed 90 percent of the time

1.3 Methodology and Equipment

1.3.1 Noise Measuring Methodology and Procedures

Existing noise levels in the vicinity of the project site were measured on March 8 and 14, 2019, using one Larson-Davis Model LxT, Type 1 Integrating Sound Level Meter, serial number 3828. The following parameters were used:

Filter:	A-weighted
Response:	Slow
Interval Period	1 minute
Time History Period:	5 seconds

The meters were calibrated before and after each measurement period. The meters were set 5 feet above the ground level for each measurement. The weather was clear with a temperature ranging from 61 to 71 degrees Fahrenheit and a slight breeze ranging from 0.9 to 6.0 miles per hour during the measurement period.

1.3.2 Noise Modeling Software

Noise level predictions and contour mapping for construction and vehicle traffic were developed using noise modeling software, SoundPlan Essential, version 3.0 (Navcon Engineering 2015). SoundPLAN calculates noise propagation based on the International Organization for Standardization method (ISO 9613-2–Acoustics, Attenuation of Sound during Propagation Outdoors). The model calculates noise levels at selected receiver locations using input parameter estimates such as total noise generated by each noise source; distances between sources, barriers, and receivers; and shielding provided by intervening terrain, barriers, and structures. The model outputs can be developed as noise level contour maps or noise levels at specific receivers. In all cases, receivers were modeled at 5 feet above ground elevation, which represents the average height of the human ear.

1.3.3 Noise Formulas and Calculations

1.3.3.1 Construction

Noise impacts from construction are a function of the noise generated by equipment, the distance to and sensitivity of nearby land uses, and the timing and duration of the noise-generating activities. Noise levels from construction activities are typically considered point sources and would drop off at a rate of -6 dB(A) per doubling of distance over hard site surfaces, such as streets and parking lots. The drop-off rate would be approximately -7.5 dB(A) per doubling of distance for soft site surfaces, such as grass fields and open terrain with vegetation (Federal Transit Authority [FTA] 2006).

The magnitude of construction noise impacts depends on the type of construction activity, the noise level generated by various pieces of construction equipment, the duration of the activity, and the distance between the activity and noise sensitive receivers. Table 4 provides a list of the potential noise-generating construction equipment that is anticipated for project construction. As shown in Table 4, maximum noise levels from construction equipment range from approximately 74 dB(A) to 85 dB(A) at 50 feet from the source (FTA 2006). The noise levels vary for each type of equipment, as equipment may come in different sizes and with different engines. Construction equipment noise levels also vary as a function of the activity level or duty cycle. The duty cycle is the amount of time that equipment generates the reported noise level during typical, standard equipment operation. The noise levels and duty cycles summarized in Table 4 are based on measurements and studies conducted by the Federal Highway Administration (FHWA). In a typical construction project, the loudest short-term noise levels are those of earth-moving equipment under full load, which are on the order of 85 to 90 dB(A) at a distance of 50 feet from the source.

Typical construction projects, with equipment moving from one point to another, work breaks, and idle time, have long-term noise averages that are lower than louder short-term noise events. Additionally, due to the dynamic nature of a construction site, noise levels are calculated from the center of the activity.

Table 4
Construction Equipment Noise Levels

Equipment	Noise Level at 50 Feet [dB(A) L_{eq}]	Typical Duty Cycle
Air Compressors	80	40%
Cement and Mortar Mixers	80	20%
Crane	81	16%
Excavators	85	40%
Graders	85	40%
Plate Compactors	80	20%
Pumps	77	50%
Rollers	74	40%
Rubber Tired Dozers	85	40%
Rubber Tired Loaders	80	40%
Scraper	84	40%
Skid Steer Loader	80	40%
Surfacing Equipment	80	40%
Sweepers/Scrubbers	80	40%
Tractors/Loaders/Backhoes	80	40%
Welders	74	40%

SOURCE: Federal Highway Administration 2006; Federal Transit Authority 2006.
dB(A) L_{eq} = A-weighted decibels average noise level

1.3.3.2 Vehicle Traffic

The project would not result in a change in existing or future traffic volumes on Ashwood Street, Mapleview Street, Wildcat Canyon Road, Willow Road, or other nearby roadways. However, the improvements include a slight realignment of Ashwood Street that would shift the location of the centerline and the roadway elevation, and would therefore shift vehicle traffic towards or away from adjacent receivers, resulting in slight changes to vehicle traffic noise levels at adjacent receivers. The change in vehicle traffic noise levels due to the realignment were modeled using SoundPLAN.

The SoundPLAN program uses the Federal Highway Administration Traffic Noise Model algorithms and reference levels to calculate traffic noise levels at selected receiver locations. The model uses various input parameters, such as projected hourly average traffic rates; vehicle mix, distribution, and speed; roadway lengths and gradients; distances between sources, barriers, and receivers; and shielding provided by intervening terrain, barriers, and structures. The model also takes into account ground conditions such as pavement, field grass, vegetation, etc. Receivers, roadways, and barriers were input into the model using three-dimensional coordinates.

The San Diego Association of Governments (SANDAG) Transportation Forecast Information Center provides traffic projections for year 2020, 2035, and 2050. The anticipated project complete date is 2022, so the nearest traffic projection date of 2020 was used in this analysis. Year 2020 traffic volumes on the affected segment of Ashwood Street, Mapleview Street, Wildcat Canyon Road, and Willow Road and are summarized in Table 5. Although the posted speed limit on the affected segment of Ashwood Street ranges from 25 to 50 miles per hour as shown in Table 5, a speed of 50 mph was modeled for the impact analysis to determine the most conservative noise levels. A vehicle classification mix of 96.4 percent automobiles, 1.7 percent medium trucks, 0.5 percent heavy trucks, 1.2 percent buses, and 0.2 percent motorcycles was modeled and was based on field traffic counts. Table 5 summarizes the traffic parameters used in this analysis.

Table 5
Traffic Parameters

Roadway Segment	Year 2020 Traffic Volume	Speed (mph)	Vehicle Mix (percent)				
			Autos	Medium Trucks	Heavy Trucks	Buses	Motor-cycles
Ashwood Street							
Mapleview Street to El Capitan High School	18,000	40	96.4	1.7	0.5	1.2	0.2
El Capitan High School to Willow Road	15,700	40	96.4	1.7	0.5	1.2	0.2
Wildcat Canyon Road							
North of Willow Road	19,300	40	96.4	1.7	0.5	1.2	0.2
Mapleview Street							
West of Ashwood Street	32,700	40	96.4	1.7	0.5	1.2	0.2
East of Ashwood Street	22,600	50	96.4	1.7	0.5	1.2	0.2
Willow Road							
East and West of Ashwood Street	6,100	45	96.4	1.7	0.5	1.2	0.2

SOURCE: SANDAG 2019.
mph = miles per hour

2.0 Noise Sensitive Land Uses Affected By Airborne Noise

2.1 Guidelines for the Determination of Significance

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

A project would result in a significant impact if the implementation would result in the exposure of any on-site or off-site existing or reasonably foreseeable future noise sensitive land uses (NSLUs) to exterior or interior noise (including noise generated from a project, together with noise from roads, railroads, airports, heliports, and all other noise sources) in excess of any of the following:

A. Exterior Locations:

i. 60 dB (CNEL); or

ii. An increase of 10 dB CNEL over preexisting noise.

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

(1) Net lot area up to 4,000 square feet: 400 square feet
(2) Net lot area 4,000 square feet to 10 acres: 10 percent of net lot area
(3) Net lot area over 10 acres: 1 acre

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

B. Interior Locations:

45 dB (CNEL) except for the following cases:

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

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

<u>County General Plan</u>

The General Plan Update (GPU) was adopted by the County on August 3, 2011. Revisions to the General Plan Noise Element have not been updated in the County's Noise Guidelines at this time; however, the new GPU noise compatibility guidelines and standards as contained in the GPU are applicable to the project. Table 6 provides County's current noise compatibility guidelines and Table 7 provides the County's noise standards. The project would not include any structural land development and would therefore not include any on-site NSLUs. However, the project would result in slight changes in noise levels at single family residential off-site NSLUs. As shown, single-family residential uses are "acceptable" with noise levels up to 60 CNEL.

Table 6
Noise Compatibility Guidelines

Land Use Category		Exterior Noise Levels (CNEL)					
		55	60	65	70	75	80
A	Residential—single-family residences, mobile homes, senior housing, convalescent homes						
B	Residential—multi-family residences, mixed-use (commercial/residential)						
C	Transient lodging—motels, hotels, resorts						
D	Schools*, churches*, hospitals, nursing homes, child care facilities*						
E	Passive recreational parks, nature preserves, contemplative spaces, cemeteries						
F	Active parks, golf courses, athletic fields, outdoor spectator sports, water recreation						
G	Office/professional, government, medical/dental, commercial, retail, laboratories						
H	Industrial, manufacturing, utilities, agriculture, mining, stables, ranching, warehouse, maintenance/repair						

	ACCEPTABLE—Specified land use is satisfactory, based upon the assumption that any buildings involved are of normal construction, without any special noise insulation requirements.
	CONDITIONALLY ACCEPTABLE—New construction or development should be undertaken only after a detailed noise analysis is conducted to determine if noise reduction measures are necessary to achieve acceptable levels for land use. Criteria for determining exterior and interior noise levels are listed in Table 7, Noise Standards. If a project cannot mitigate noise to a level deemed Acceptable, the appropriate county decision-maker must determine that mitigation has been provided to the greatest extent practicable or that extraordinary circumstances exist.
	UNACCEPTABLE—New construction or development shall not be undertaken.

*Denotes facilities used for part of the day; therefore, an hourly standard would be used rather than CNEL, refer to Table 7.

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

2.2 Potential Noise Impacts

2.2.1 Potential Build-out Noise Conditions and Impacts

The project includes roadway improvements of existing public roadways and construction of retaining walls. No NSLU currently exist on-site and none are proposed to be developed as part of the proposed project. Thus, no impacts would occur to on-site NSLU.

2.2.2 Design Considerations and Mitigation Measures

The project does not include on-site NSLUs; therefore, no design considerations or mitigation measures are required.

2.3 Off-site Direct and Cumulative Noise Impacts

The project would not increase traffic volumes on local roadways. However, changes in noise levels could occur due to the realignment of the roadway segment.

Traffic noise is primarily a function of volume, vehicle mix, speed, and proximity. For purposes of this evaluation, the vehicle volume, mix, and speed are assumed to remain constant in the future. Thus, the primary factor affecting noise levels would be roadway realignment and change in elevation, which would shift the centerline, and therefore the noise source, towards or away from adjacent off-site NSLUs.

Direct impacts were determined by comparing the existing condition to the project after completion of the improvements. As the project would not include a traffic generating land use and would not increase the capacity of roadways, the project would not result in a cumulative impact.

2.3.1 Direct Noise Impacts

Table 5 presents the traffic volumes for the roadway's existing alignment, which are the same traffic volumes for the post-construction condition of the project. Impacts have been evaluated based on the calculated change in noise levels from the existing condition compared to the post-construction condition.

A substantial noise increase is defined as an increase of 10 dB(A) above existing conditions as stated in the County Noise Report Guidelines Section 4.1-A (ii). However, the Report Format and Content Requirements include a statement that a "doubling of sound energy" is considered a significant impact at a "documented noisy site." A doubling of sound energy is equivalent to a 3 dB(A) increase. A documented noisy site is assumed to be a location with NSLU that currently exceeds 60 CNEL. Thus, a substantial increase is defined as a 10 dB(A) increase, or greater over existing noise levels when existing and future noise levels are below the County's 60 CNEL standard, or a 3 dB(A) increase when existing or future noise levels equal or exceed the County's 60 CNEL standard.

Using the SANDAG-projected traffic volumes for 2020, traffic noise levels were modeled as shown in Table 8. These 28 modeled locations were chosen because they are located at the off-site NSLUs located closest to the project site. Modeled receiver locations and existing condition noise contours are shown in Figure 4a, and proposed project noise contours are shown in Figure 4b. Calculations are contained in Attachment 2.

Table 8 Off-site Vehicle Traffic Noise Levels at Specific Local Receiver Locations				
Receiver	Land Use/ Acceptable CNEL	Existing Noise Level (CNEL)	Future Noise Level (CNEL)	Change
1	Multi-Family Residential/65	64.2	64.2	0.0
2	Multi-Family Residential/65	64.4	64.4	0.0
3	Multi-Family Residential/65	67.7	67.8	0.1
4	Multi-Family Residential/65	63.5	64.9	1.4
5	El Capitan High School/65	62.5	58.9	-3.6
6	Single Family Residential/60	57.6	58.1	0.5
7	Single Family Residential/60	54.1	55.0	0.9
8	El Capitan High School/65	59.5	53.9	-5.6
9	El Capitan High School/65	58.5	51.3	-7.2
10	Single Family Residential/60	40.7	40.6	-0.1
11	Single Family Residential/60	51.1	50.2	-0.9
12	Single Family Residential/60	63.2	63.9	0.7
13	Single Family Residential/60	59.8	60.0	0.2
14	El Capital High School Caretaker/60*	67.9	64.4	-3.5
15	Cactus County Park/70	61.5	60.1	-1.4
16	Equestrian/70	54.9	54.8	-0.1
17	Single Family Residential/60	55.4	56.7	1.3
18	Single Family Residential/60	55.5	56.4	0.9
19	Single Family Residential/60	60.7	60.7	0.0
20	Single Family Residential/60	57.7	57.9	0.2
21	Single Family Residential/60	59.0	59.3	0.3
22	Single Family Residential/60	59.5	59.5	0.0
23	Single Family Residential/60	63.6	62.4	-1.2
24	Single Family Residential/60	63.1	60.4	-2.7
25	Single Family Residential/60	59.5	55.7	-3.8
26	Single Family Residential/60	60.8	63.7	2.9
27	Single Family Residential/60	58.6	61.2	2.6
28	Single Family Residential/60	53.8	56.6	2.8
*The residence located at 10480 Ashwood Street is on the El Capitan High School property and is used as housing for the school caretaker. The single-family residential limit of 60 CNEL is conservatively applied for this analysis.				

Noise levels at some receivers would slightly increase due to the alignment being shifted towards the receivers, and noise levels at other receivers would slightly decrease due to the alignment being shifted away from the receivers. As shown, upon completion of the improvements, the project would result in a decrease of noise levels at 11 of the modeled receivers, no change in noise levels at 4 of the modeled receivers, and a noise level increase at 13 of the modeled receivers. However, the increases in noise levels at these receivers would be less than 3 dB(A), which is not a perceptible increase in noise. As the project would result in a less than 3 dB(A) increase, the predicted noise level changes would be less than significant.

Image Source: NearMap (flown September 2019)

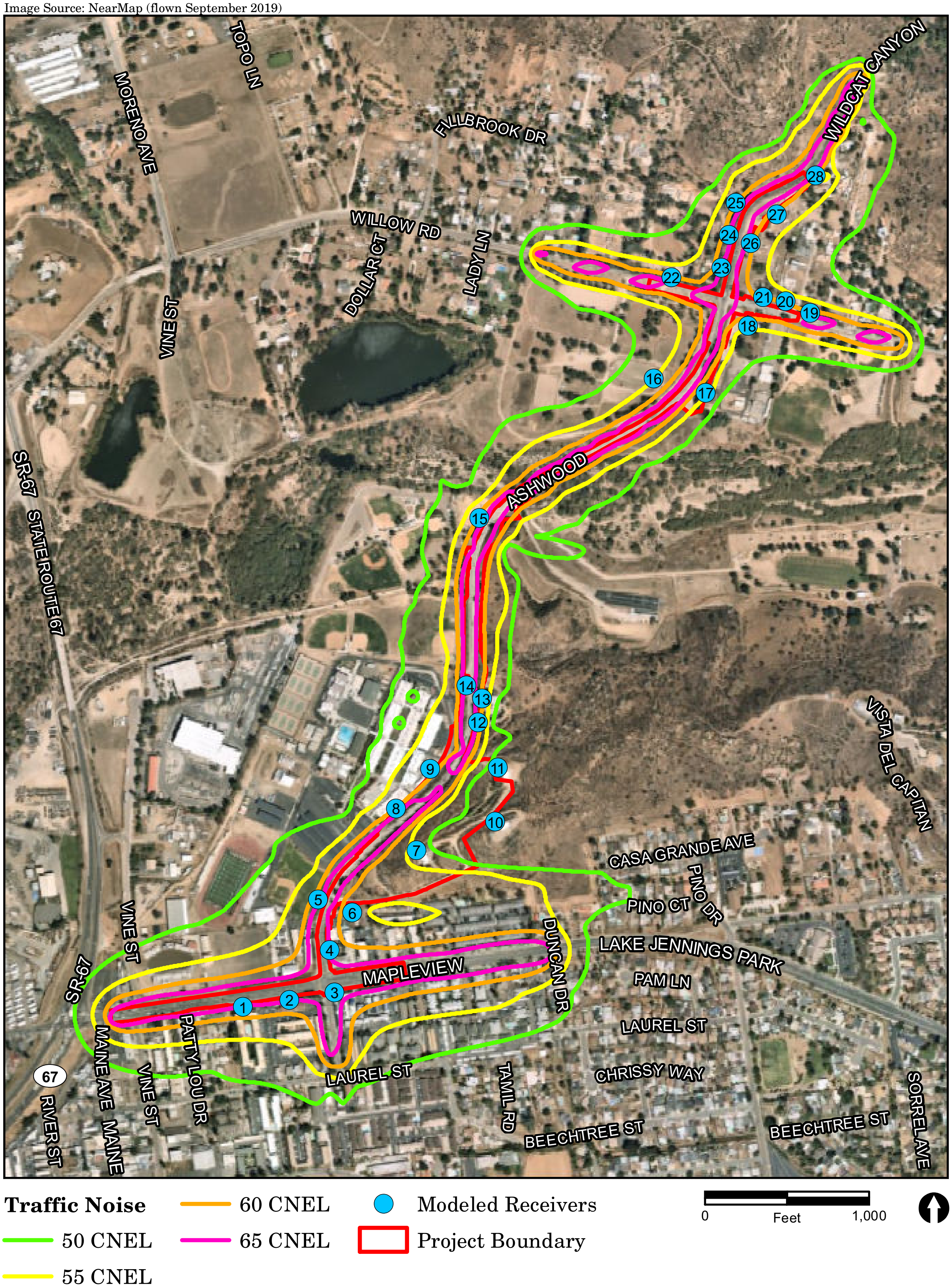

FIGURE 4a

Traffic Noise Contours - Existing Alignment

Ashwood Street Corridor Improvements Project

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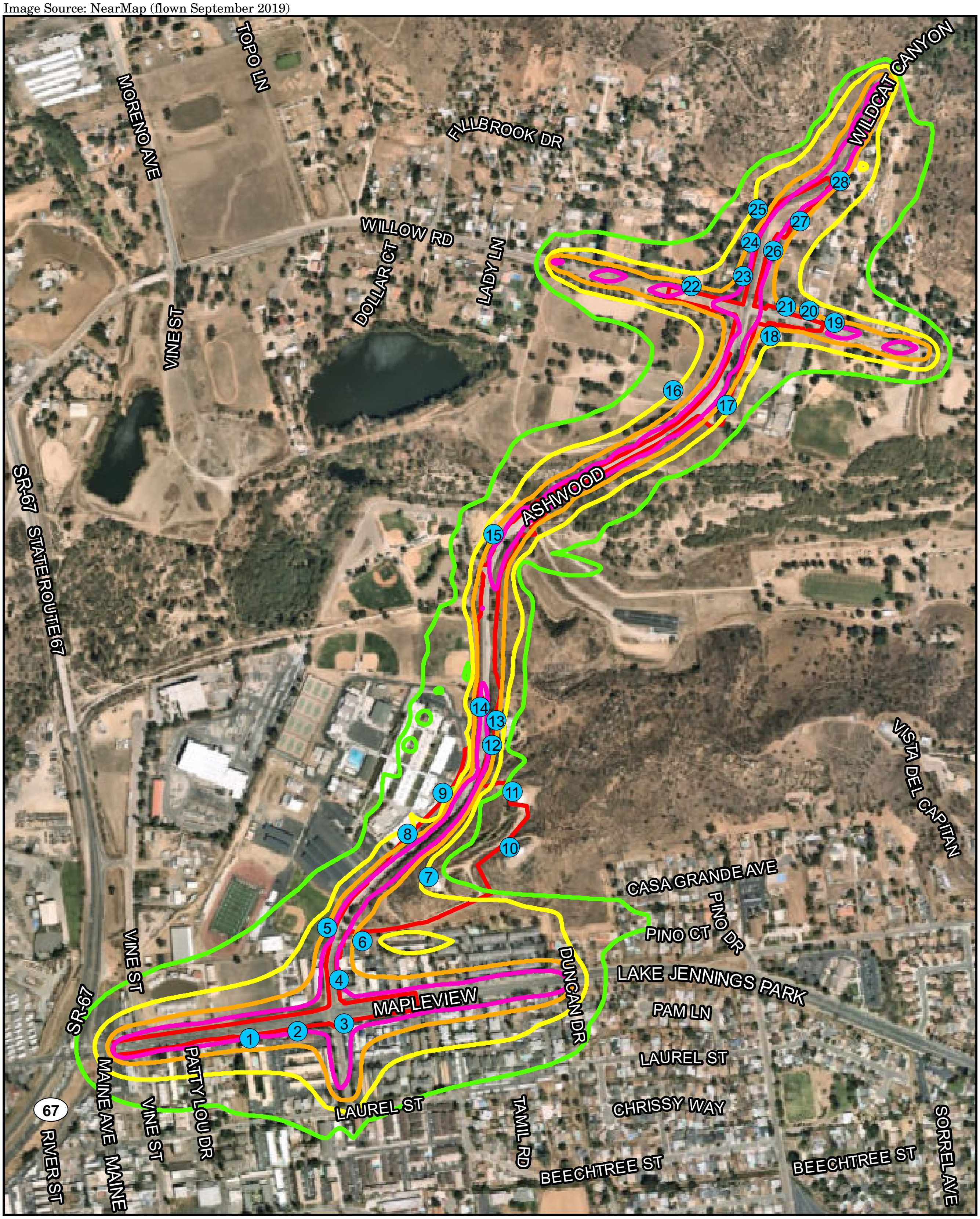
Image Source: NearMap (flown September 2019)



Traffic Noise

50 CNEL

55 CNEL

60 CNEL

65 CNEL

Modeled Receivers

Project Boundary

0 Feet 1,000

FIGURE 4b

Traffic Noise Contours - Proposed Alignment

Ashwood Street Corridor Improvements Project

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2.3.2 Cumulatively Significant Noise Impacts

Similar to direct traffic noise impacts, a cumulative traffic noise impact occurs when the noise level would exceed the applicable standard and a substantial noise level increase over existing noise occurs. The difference is the impacts are caused by project traffic in combination with traffic from other closely related past, present, and reasonably foreseeable projects rather than only project traffic. The project's contribution to the future noise level is determined by comparing the future with project and no project conditions, and a determination is made whether the project's contribution is "cumulatively considerable."

The cumulative assessment area for noise differs by the noise source. While stationary noise sources are generally limited to a definable area, traffic noise would affect land uses along all roadways experiencing an increase in traffic. For roadways, this is generally limited to roadways experiencing an increase of 12 percent or greater as this would result in a measurable change in noise levels (i.e., an increase greater than 0.5 CNEL).

With respect to off-site NSLU beyond the project limits, the project would not alter traffic volumes and noise levels would not change. Therefore, off-site cumulative traffic noise impacts would not be cumulatively considerable.

2.3.3 Design Considerations and Mitigation Measure Calculations

Direct and cumulative off-site noise impacts would less than significant; therefore, no mitigation would be required.

3.0 Project-generated Airborne Noise

3.1 Guidelines for the Determination of Significance

The County Noise Ordinance, Section 36.404, sets limits on the noise levels generated from one property to another, such as from mechanical equipment. Unless a variance has been applied for by an applicant and granted by the County, it is unlawful for a person to cause or allow noise generated on a particular property to exceed the 1-hour average sound level, at any point on or beyond the boundaries of the property, as shown in Table 9 for non-construction noise.

Table 9 County of San Diego Noise Ordinance Sound Level Limits		
Zone	Applicable Hours	Sound Level Limit [dB(A) L_{eq}]
(1) RS, RD, RR, RMH, A70, A72, S80, S81, S90, S92, RV, and RU with a General Plan Land Use Designation density of less than 10.9 dwelling units per acre.	7 a.m. to 10 p.m. 10 p.m. to 7 a.m.	50 45
(2) RRO, RC, RM, S86, V5, RV, and RU with a General Plan Land Use Designation density of 10.9 or more dwelling units per acre.	7 a.m. to 10 p.m. 10 p.m. to 7 a.m.	55 50
(3) S-94, V4 and all other commercial zones.	7 a.m. to 10 p.m. 10 p.m. to 7 a.m.	60 55
(4) V1 V2 V1 V2 V3	7 a.m. to 10 p.m. 10 p.m. to 7 a.m. 10 p.m. to 7 a.m. 7 a.m. to 10 p.m. 10 p.m. to 7 a.m.	55 55 50 70 65
(5) M-50, M-52, and M-54	Anytime	70
(6) S82, M56 and M58	Anytime	75
(7) S88 (see subsection (c) below)		

SOURCE: County Noise Ordinance, Section 36.404.
dB(A) L_{eq} = A-weighted decibels one-hour equivalent sound level.
Notes:
(a) Except as provided in section 36.409, it shall be unlawful for any person to cause or allow the creation of any noise, which exceeds the one-hour average sound level limits in Table 36.404, when the L_{eq} is measured at the property line of the property on which the noise is produced or at any location on a property that is receiving the noise
(b) Where a noise study has been conducted and the noise mitigation measures recommended by that study have been made conditions of approval of a Major Use Permit, which authorizes the noise-generating use or activity and the decision making body approving the Major Use Permit determined that those mitigation measures reduce potential noise impacts to a level below significance, implementation and compliance with those noise mitigation measures shall constitute compliance with subsection (a) above.
(c) S88 zones are Specific Planning Areas which allow for different uses. The sound level limits in Table 9 above that apply in an S88 zone depend on the use being made of the property. The limits in Table 9, subsection (1) apply to property with a residential, agricultural, or civic use. The limits in subsection (3) apply to property with a commercial use. The limits in subsection (5) apply to property with an industrial use that would only be allowed in an M50, M52, or M54 zone. The limits in subsection (6) apply to all property with an extractive use or a use that would only be allowed in an M56 or M58 zone.
(d) If the measured ambient noise level exceeds the applicable limit in Table 36.404, the allowable one-hour average sound level shall be the one-hour average ambient noise level, plus three decibels. The ambient noise level shall be measured when the alleged noise violation source is not operating.
(e) The sound level limit at a location on a boundary between two zones is the arithmetic mean of the respective limits for the two zones. The L_{eq} limit applicable to extractive industries, however, including but not limited to borrow pits and mines, shall be 75 decibels at the property line regardless of the zone in which the extractive industry is located.
(f) A fixed-location public utility distribution or transmission facility located on or adjacent to a property line shall be subject to the sound level limits of this section, measured at or beyond 6 feet from the boundary of the easement upon which the facility is located.

For Construction Noise, Section 36.409 states:

> Except for emergency work, it shall be unlawful for any person to operate construction equipment or cause the construction equipment to be operated, exceeding an average sound level of 75 dB(A) for an 8-hour period, between 7 a.m. and 7 p.m., when measured at the boundary line of the property where the noise source is located or on any occupied property where the noise is being received.

For Impulsive Noise, Section 36.410 states:

In addition to the general limitations on sound levels in Section 36.404 and the limitations on construction equipment in Section 36.409, the following additional sound level limitations shall apply:

(a) Except for emergency work or work on a public road project, no person shall produce or cause to be produced an impulsive noise that exceeds the maximum sound level shown in Table 10, when measured at the boundary line of the property where the noise source is located or on any occupied property where the noise is received, for 25 percent of the minutes in the measurement period, as described in subsection (c) below. The maximum sound level depends on the use being made of the occupied property. The uses in Table 10 are as described in the County Zoning Ordinance.

Table 10
[County Noise Ordinance Table 3.6410A]
Maximum Sound Level (Impulsive) Measured at Occupied Properties for Public Road Projects

Occupied Property Use	Noise Level (dB[A])
Residential, village zoning or civic use	82
Agricultural, commercial or industrial use	85

(b) Except for emergency work, no person working on a public road project shall produce or cause to be produced an impulsive noise that exceeds the maximum sound level shown in Table 11, when measured at the boundary line of the property where the noise source is located or on any occupied property where the noise is received, for 25 percent of the minutes in the measurement period, as described in subsection (c) below. The maximum sound level depends on the use being made of the occupied property. The uses in Table 11 are as described in the County Zoning Ordinance.

Table 11
[County Noise Ordinance Table 3.6410B]
Maximum Sound Level (Impulsive)
Measured at Occupied Properties

Occupied Property Use	Noise Level (dB[A])
Residential, village zoning or civic use	85
Agricultural, commercial or industrial use	90

(c) The minimum measurement period for any measurements conducted under this section shall be 1 hour. During the measurement period a measurement shall be conducted every minute from a fixed location on an occupied property. The measurements shall measure the maximum sound level during each minute of the measurement period. If the sound level caused by construction equipment or the producer of the impulsive noise exceeds the maximum sound level for any portion of any minute, it will be deemed that the maximum sound level was exceeded during that minute.

3.2 Potential Operational Noise Impacts (Non-construction Noise)

The project does not include the construction of any structures or stationary noise sources. Thus, no violation of Section 36.409 would occur and the project would have no impact relative to local property line limits.

3.3 Potential General Construction Noise Impacts

3.3.1 Potential Temporary Construction Noise Impacts without Mitigation

Noise impacts from construction are a function of the noise generated by equipment, the location and sensitivity of nearby land uses, and the timing and duration of the noise-generating activities. Table 4, above, presents a list of noise generation levels for various types of equipment anticipated to be used on construction of the project. The list's noise levels, compiled by the FTA, were used in this analysis to estimate construction noise (FTA 2006).

The proposed project would include a variety of construction activities, including: grading and clearing, demolition of the existing roadway surface, trenching, saw cutting for culverts, placement of subgrade material, construction of retaining walls, and paving. No building demolition is proposed as part of the project. Typical construction equipment would include cranes, excavators, graders, dozers, loaders, backhoes, haul trucks, and other similar equipment.

Construction equipment may be either stationary or mobile. Equipment that operates in one location for one or more days at a time, with either a fixed-power operation, such as pumps, generators, or compressors, or a variable noise operation, such as pile drivers, rock drills, and pavement breakers, is considered a stationary noise source. Equipment such as bulldozers, graders, and loaders that move around the construction site, is considered a mobile noise source. Due to the complex nature of construction sites, construction noise from a linear project, such as roadway improvements, is assessed from the centerline of the alignment and work area. Maximum noise levels would occur when the loudest construction equipment is nearest to a noise sensitive receiver. Although construction equipment may temporarily be located at the point on the alignment nearest to a receiver, over time equipment would move along the alignment. Therefore, the distance from a receiver to the centerline of the alignment is not the same as the average distance during a given day from the receiver to construction equipment. Thus, average noise levels correlate to the area of active construction.

Based on an average working distance of 350 feet per day, when the active work area is directly adjacent to a given receiver, construction activities throughout the day would be an average distance of 175 feet along an active portion of the alignment from the receiver. For a receiver that is set back 50 feet from the active work area alignment, using the Pythagorean theorem ($a^2 + b^2 = c^2$), it is calculated that the receiver is at an average distance of 182 feet from the construction equipment ($\sqrt{(50^2 + 175^2)} = 182$). The closest receiver (10480 Ashwood Street; Figure 5a, Receiver 14) is located approximately 25 feet from the centerline of the alignment and construction activity. Thus, the average distance between this receiver and the active construction equipment would be 177 feet.

As shown in Table 4, maximum noise levels may be 74 to 85 dB(A) at a distance of 50 feet. Sporadic short-term maximum noise levels could exceed 75 dB(A) maximum sound level (L_{max}) at the adjacent residential uses. However, construction equipment goes through varying load cycles, and there are breaks for the operators and for non-equipment tasks, such as measurement. Hourly average noise levels from the operation of up to three large pieces of equipment (e.g., dozers, loaders, and dump trucks) would be 84 dB(A) L_{eq} at 50 feet from the equipment when assessing the loudest pieces of equipment working simultaneously. For the closest receiver that is at an average distance of 177 feet from the construction equipment, noise levels would attenuate to 73 dB(A) L_{eq}. Hourly noise levels from typical roadway construction would not exceed 75 dB(A) L_{eq} at the residence. All other residential property lines are located at greater distances from the project area, so hourly noise levels would not exceed 75 dB(A) L_{eq} at the adjacent property lines. Therefore, noise levels from typical roadway construction would not exceed the County threshold of significance for construction. Construction noise calculations are contained in Attachment 3.

There are certain areas along the alignment of Ashwood Street that would require the construction of retaining walls or soldier pile walls or would require more extensive grading activities. Construction equipment would be located in these areas for a more extended period of time throughout the day, resulting in a smaller active work area and more stationary construction noise adjacent to residential receivers. To provide a more detailed analysis, construction noise levels were calculated using SoundPLAN for these five specific construction areas:

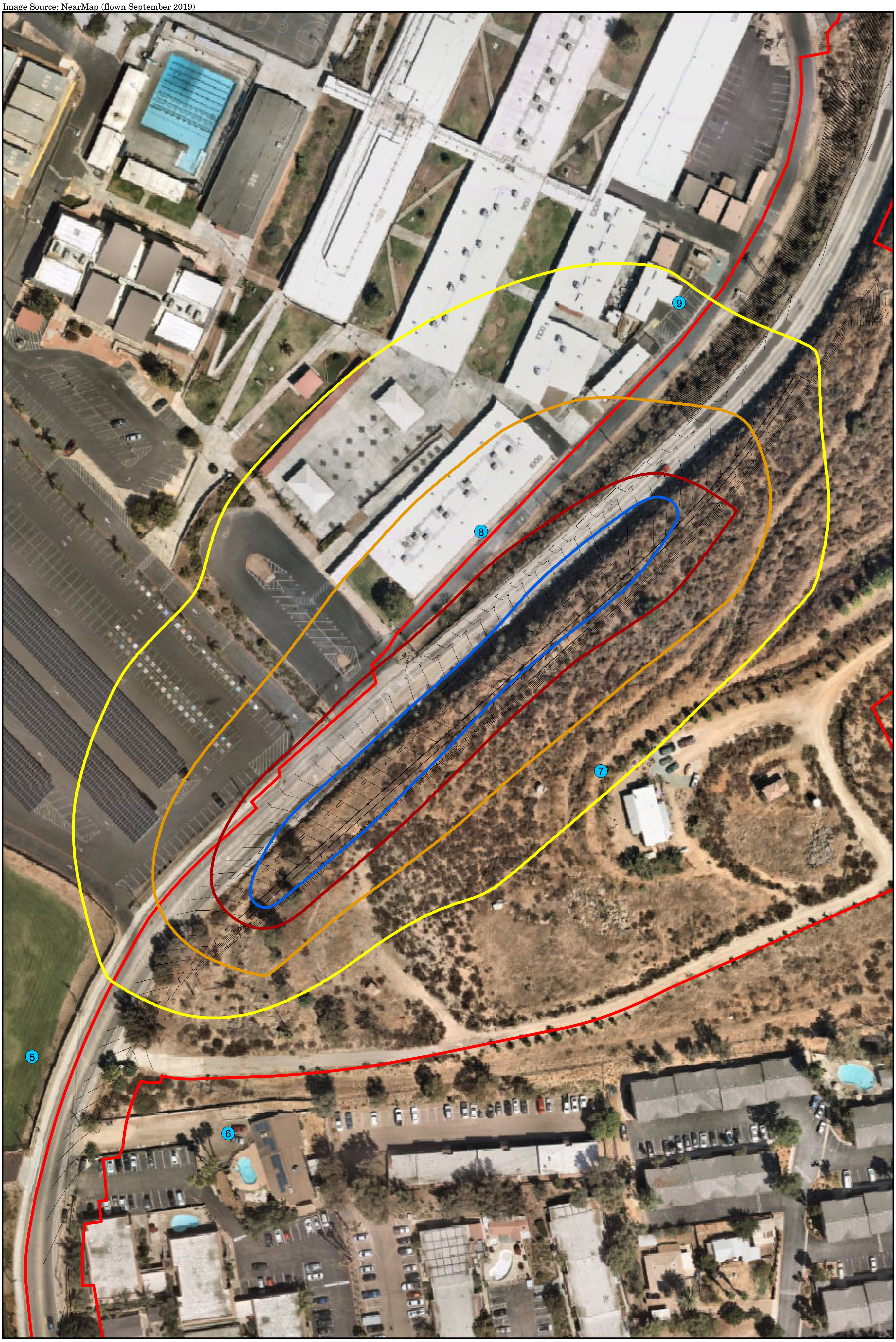
1. Soil nail retaining wall east of Ashwood Street across from El Capitan High School
2. Soldier pile retaining wall west of Ashwood Street at El Capitan High School
3. Grading of steep slopes east of Ashwood Street across from 10480 Ashwood Street
4. Grading of steep slopes east of Ashwood Street across from Cactus County Park entrance
5. Grading south of curve in Wildcat Canyon Road north of Ashwood Street

Noise levels were modeled assuming equipment would be active within each of these areas continuously through the day. Noise levels were modeled at the same 28 adjacent receivers discussed previously. Table 12 summarizes the construction noise levels. Figures 5a through 5e show the construction noise contours for areas 1 through 5 identified above, respectively. SoundPLAN data is provided in Attachment 4.

Table 12 Construction Noise Levels [dB(A) L_{eq}]					
	Construction Area				
Receiver	1. Soil nail wall east of Ashwood Street across from El Capitan High School	2. Soldier pile wall at El Capitan High School	3. Grading of steep slopes across from 10480 Ashwood Street	4. Grading of steep slopes across from Cactus County Park	5. Grading south of curve of Wildcat Canyon Road
1	46	43	41	38	31
2	46	41	41	38	32
3	46	32	37	37	30
4	51	38	43	39	32
5	56	48	45	40	32
6	54	34	36	33	27
7	62	55	50	44	35
8	68	59	51	45	35
9	61	72	55	47	35
10	40	41	43	43	35
11	53	56	56	48	37
12	52	70	67	47	36
13	51	66	75	44	33
14	51	64	75	52	35
15	43	47	51	70	40
16	36	36	39	46	47
17	36	37	38	44	48
18	34	36	37	42	52
19	34	35	36	40	53
20	34	36	37	41	54
21	34	36	37	41	55
22	36	37	39	43	52
23	34	36	38	42	56
24	35	36	38	41	60
25	35	36	37	40	65
26	33	36	37	41	61
27	33	35	37	40	74
28	32	35	36	38	65
Maximum Noise Level	68	72	75	70	74

As shown in Table 12 and Figures 5a through 5e, construction noise levels are not anticipated to exceed 75 dB(A) L_{eq}. Therefore, noise levels from construction activities would not exceed the County threshold of significance for construction.

Image Source: NearMap (flown September 2019)



Construction Noise
60 dB(A) Leq
65 dB(A) Leq
70 dB(A) Leq
75 dB(A) Leq

Modeled Receivers
Grading
Project Boundary

0 Feet 100

FIGURE 5a
Construction Contours - Soil Nail Wall
Ashwood Street Corridor Improvements Project

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Image Source: NearMap (flown September 2019)

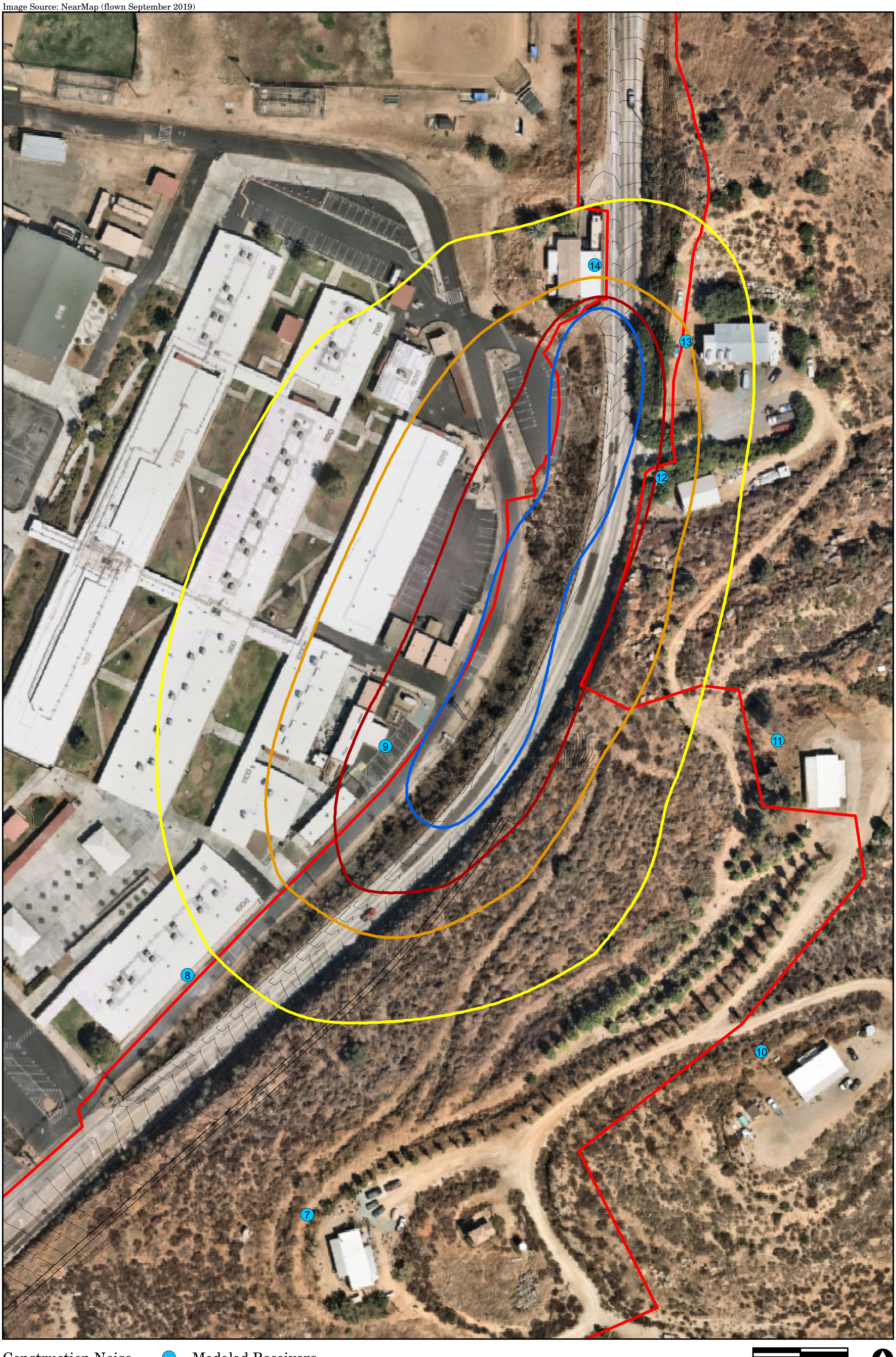

FIGURE 5b

Construction Contours - Soldier Pile Wall

Ashwood Street Corridor Improvements Project

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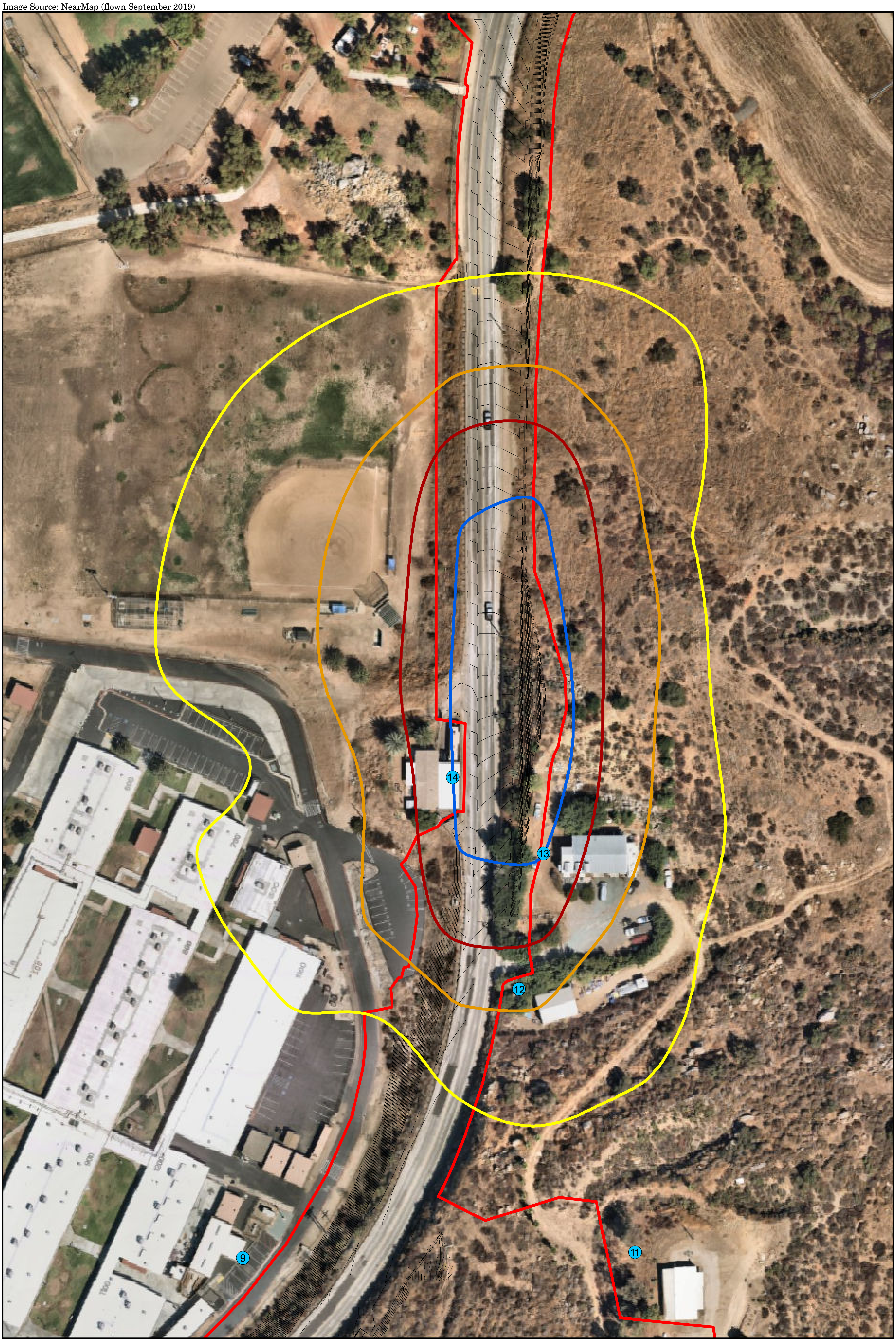
Image Source: NearMap (flown September 2019)



Construction Noise
- 60 dB(A) Leq
- 65 dB(A) Leq
- 70 dB(A) Leq
- 75 dB(A) Leq

Modeled Receivers
Grading
Project Boundary

0 Feet 100

FIGURE 5c

Construction Contours - Grading
Across from 10480 Ashwood Street
Ashwood Street Corridor Improvements Project

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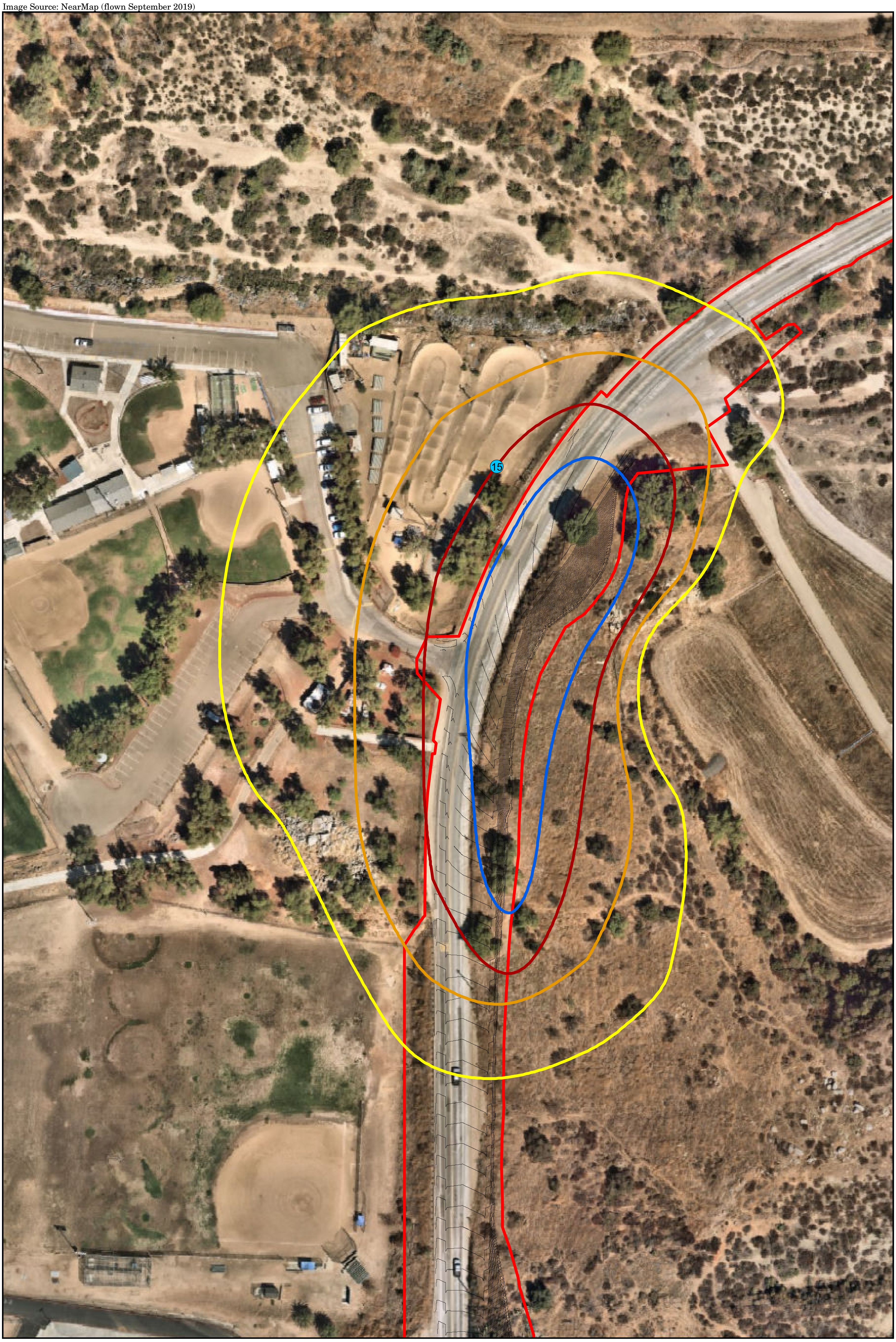
Image Source: NearMap (flown September 2019)



Construction Noise
60 dB(A) Leq
65 dB(A) Leq
70 dB(A) Leq
75 dB(A) Leq

Modeled Receivers
Grading
Project Boundary

0 Feet 100

FIGURE 5d

Construction Contours - Grading
Across from Cactus County Park
Ashwood Street Corridor Improvements Project

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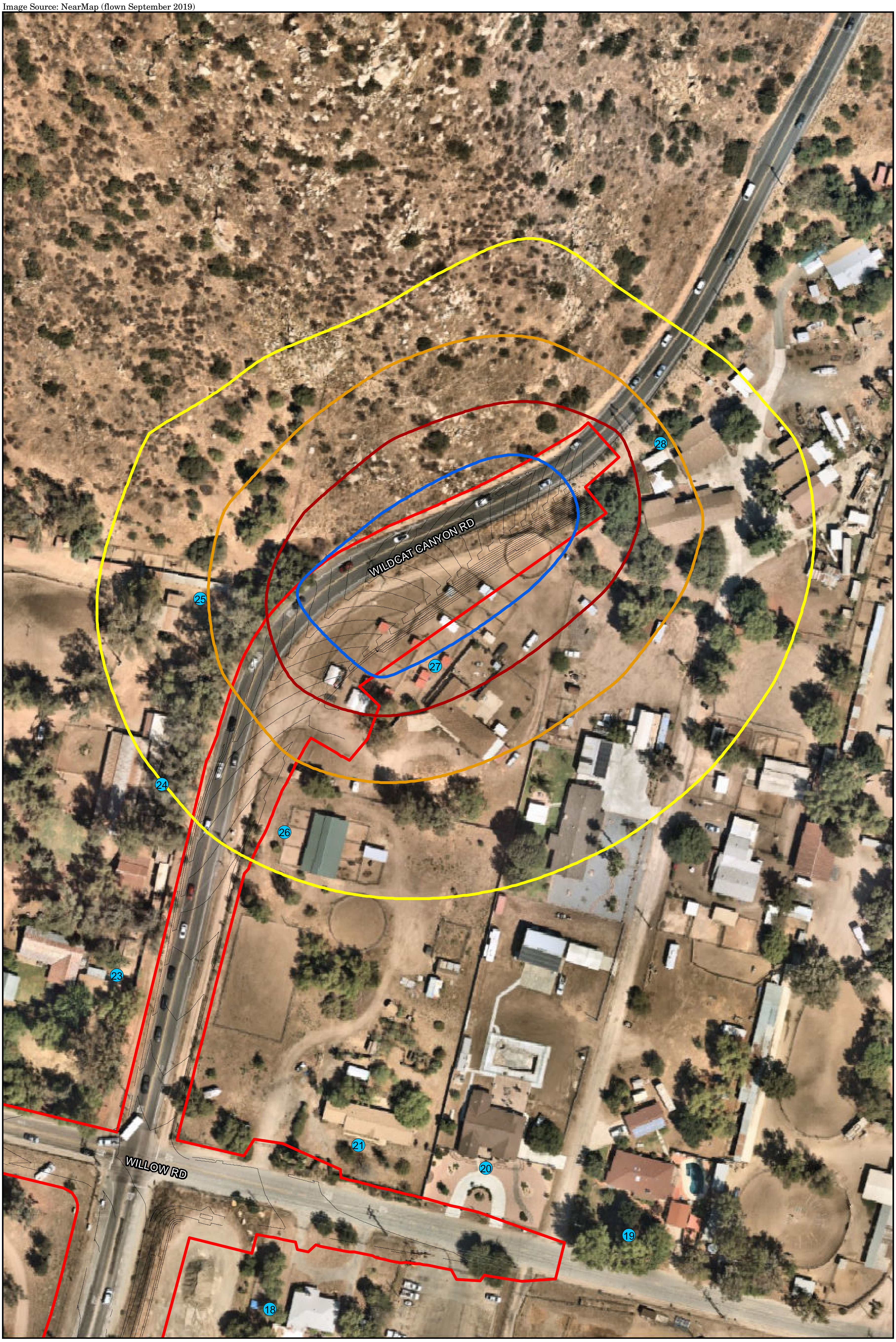
Image Source: NearMap (flown September 2019)



Construction Noise
- 60 dB(A) Leq
- 65 dB(A) Leq
- 70 dB(A) Leq
- 75 dB(A) Leq

- Modeled Receivers
- Grading
- Project Boundary

0 Feet 100

FIGURE 5e

Construction Contours - Grading at Wildcat Canyon Road Curve
Ashwood Street Corridor Improvements Project

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3.3.2 Design Considerations and Temporary Mitigation Measures

3.3.2.1 Design Considerations

Average hourly noise levels would not exceed 75 dB(A) L_{eq} at the adjacent residential uses. However, as construction activities have the potential to generate sporadic short-term (less than one hour) maximum noise levels during peak construction activity in excess of 75 dB(A) L_{max} at adjacent property lines, the County has included the following design considerations in the project design.

DC-1: All construction equipment shall be properly maintained and equipped with noise-reduction intake and exhaust mufflers and engine shrouds, in accordance with manufacturers' recommendations. Equipment engine shrouds shall be closed during equipment operation.

DC-2: Whenever feasible, electrical power shall be used to run air compressors and similar power tools.

DC-3: Equipment staging areas should be located as far as feasible from occupied residences.

3.3.2.2 Mitigation Measures

As identified in the preceding analysis, construction-related noise impacts are considered less than significant; therefore, no mitigation would be required for construction activities.

3.4 Potential Impulsive Noise Impacts

3.4.1 Potential Impulsive Noise Impacts without Mitigation

The project would not include pile driving or impact hammering as a part of construction. No operational impulsive noise sources are proposed as part of the project. Impulsive noise impacts would less than significant.

3.4.2 Design Considerations and Mitigation Measures

Impulsive noise impacts would be less than significant; therefore, no mitigation would be required.

3.5 Cumulative or Combined Noise Impacts

3.5.1 Potential Combined Noise Impacts

Noise is a localized occurrence and attenuates rapidly with distance. Therefore, only future development projects in the direct vicinity of the project site could add to construction noise generated by the project and result in a cumulative noise impact. Upon the review of cumulative projects in the vicinity of the County's proposed project, none were identified that would contribute to a significant noise impact in combination with the proposed project. Therefore, it is concluded that this cumulative impact would be less than significant.

3.5.2 Design Considerations and Mitigation Measures

As no other construction would occur in the direct vicinity of the project, cumulative or combined noise impacts would be less than significant, and no mitigation would be required.

4.0 Groundborne Vibration and Noise Impacts

4.1 Guidelines for the Determination of Significance

Implementation of a project could expose the uses listed in Tables 13 and 14 to groundborne vibration and noise levels if equal to or in excess of the levels shown.

As stated in note 6 of Table 13, Caltrans criteria shall be used for hydraulic hammers and transient sources such as those associated with construction of a linear roadway improvement, such as the proposed project. Therefore, for the purposes of this vibration analysis, impacts would occur if vibration levels exceed 0.1 inches per second (in/sec) peak particle velocity (PPV) (County of San Diego 2009b).

Table 13
Guidelines for Determining the Significance of Groundborne Vibration and Noise Impacts

Land Use Category	Groundborne Vibration Impact Levels (in/sec RMS)		Groundborne Noise Impact Levels (dB re 20 micro Pascals)	
	Frequent Events[1]	Occasional or Infrequent Events[2]	Frequent Events[1]	Occasional or Infrequent Events[2]
Category 1: Buildings where low ambient vibration is essential for interior operations (research & manufacturing facilities with special vibration constraints)[6]	0.0018[3]	0.0018[3]	Not applicable[4,5]	Not applicable[4,5]
Category 2: Residences and buildings where people normally sleep (hotels, hospitals, residences, & other sleeping facilities)[6]	0.0040	0.010	35 dB(A)	43 dB(A)
Category 3: Institutional land uses with primarily daytime use (schools, churches, libraries, other institutions, & quiet offices)[6]	0.0056	0.014	40 dB(A)	48 dB(A)

SOURCE: Federal Transit Authority 2006.
in/sec = inches per second; RMS = root mean square; dB = decibels; re = relative
[1] "Frequent Events" is defined as more than 70 vibration events per day. Most rapid transit projects fall into this category.
[2] "Infrequent Events" is defined as fewer than 70 vibration events per day. This category includes most commuter rail systems.
[3] This criterion limit is based on levels that are acceptable for most moderately sensitive equipment such as optical microscopes. Vibration-sensitive manufacturing or research will require detailed evaluation to define acceptable vibration levels. Ensuring lower vibration levels in a building often requires special design of the heating, ventilation, and air conditioning systems and stiffened floors.
[4] Vibration-sensitive equipment is not sensitive to groundborne noise.
[5] There are some buildings, such as concert halls, TV and recording studios, and theaters that can be very sensitive to vibration and noise but do not fit into any of the three categories. Table 14 gives criteria for acceptable levels of groundborne vibration and noise for these various types of special uses.
[6] For Categories 2 and 3 with occupied facilities, isolated events such as blasting are significant when the peak particle velocity (PPV) exceeds 1 inch per second. Nontransportation vibration sources such as impact pile drivers or hydraulic breakers are significant when their PPV exceeds 0.1 inch per second. More specific criteria for structures and potential annoyance were developed by Caltrans and will be used to evaluate these continuous or transient sources in the County of San Diego.

Table 14
Guidelines for Determining the Significance of Groundborne Vibration and Noise Impacts for Special Buildings

Type of Building or Room	Groundborne Vibration Impact Levels (in/sec RMS)		Groundborne Noise Impact Levels (dB re 20 micro Pascals)	
	Frequent Events[1]	Occasional or Infrequent Events[2]	Frequent Events[1]	Occasional or Infrequent Events[2]
Concert Halls, TV Studios, and Recording Studios	0.0018	0.0018	25 dB(A)	25 dB(A)
Auditoriums	0.0040	0.010	30 dB(A)	38 dB(A)
Theaters	0.0040	0.010	35 dB(A)	43 dB(A)

SOURCE: Federal Transit Authority 2006.
in/sec = inches per second; RMS = root mean square; dB = decibels; re = relative; dB(A) = A-weighted dB
[1] "Frequent Events" is defined as more than 70 vibration events per day. Most rapid transit projects fall into this category.
[2] "Infrequent Events" is defined as fewer than 70 vibration events per day. This category includes most commuter rail systems.

4.2 Potential and Mitigated Noise Impacts

4.2.1 Potential Groundborne Vibration and Noise Impacts without Mitigation

4.2.1.1 Operations

The project does not include the installation of operational noise sources, including significant groundborne noise or vibration sources. Further, no significant vibrations sources currently exist, or are planned, in the project area. Thus, no groundborne noise or vibration impacts would occur with the operation of the proposed project.

4.2.1.2 Construction

Construction activities produce varying degrees of ground vibration, depending on the equipment and methods employed. While ground vibrations from typical construction activities very rarely reach levels high enough to cause damage to structures, special consideration must be made when sensitive or historic land uses are near the construction site (Caltrans 2013b). The construction activities that typically generate the highest levels of vibration are blasting and impact pile driving. However, the project would not require blasting or pile driving.

On-site construction equipment that would cause the most noise and vibration would be associated with the use of large bulldozers and trucks. According to Caltrans, vibration levels associated with the use of bulldozers range from approximately 0.003 to 0.089 in/sec PPV at 25 feet, as shown in Table 15. The closest structure (residence at 10480 Ashwood Street; see Figure 5b) is located approximately 25 feet from proposed construction activities. Therefore, vibration levels from large bulldozers and trucks would not exceed 0.1 PPV. Thus, groundborne vibration and noise impacts generated during construction would be less than significant.

Table 15
Typical Construction Equipment Vibration Levels

Equipment	PPV at 25 feet (in/sec)
Large Bulldozer	0.089
Loaded Trucks	0.076
Small Bulldozer	0.003

SOURCE: Caltrans 2013b.
PPV = peak particle velocity; in/sec = inch per second.

4.2.2 Design Considerations and Temporary Mitigation Measures

Groundborne vibration and noise impacts during construction would be less than significant; therefore, no mitigation would be required for construction activities. No groundborne noise or vibration impacts would occur with the operation of the proposed project.

5.0 Summary of Project Impacts, Design Considerations, Mitigation, and Conclusion

5.1 Noise-Sensitive Land Uses Affected by Airborne Noise

The project site does not include any NSLU. The project would not construct any new NSLU. Therefore, the project would have no impact on on-site NSLU.

The nearest off-site NSLU (see Figures 4a, 4b, and 5a through 5e) are located on surrounding properties adjacent to the project site. Noise levels at some receivers would slightly increase due to the alignment of Ashwood Street being shifted towards the receivers, and noise levels at other receivers would slightly decrease due to the alignment being shifted away from the receivers. Based on traffic noise modeling of the improvements, the project would result in noise level changes that are less than 3 dB(A) from the existing condition at adjacent residences. This is below the 3-decibel threshold used to determine off-site impacts within the County. Therefore, it is concluded that noise impacts to off-site NSLU would be less than significant.

5.2 Project-Generated Airborne Noise

5.2.1 Operation

The project would not include any on-site stationary sources, such as heating, ventilation, and air conditioning units and other venting, electrical generators, parking lots, or loading docks. Thus, operation related airborne noise levels would not be subject to the County property line limits and no impacts would occur.

5.2.2 Construction

Average hourly noise levels would not exceed 75 dB(A) L_{eq} at the adjacent residential uses during construction of the proposed project. However, as construction activities have the potential to generate sporadic short-term (less than one hour) maximum noise levels during peak construction activity in excess of 75 dB(A) L_{max} at adjacent property lines, the County has included the following design considerations in the project design.

DC-1: All construction equipment shall be properly maintained and equipped with noise-reduction intake and exhaust mufflers and engine shrouds, in accordance with manufacturers' recommendations. Equipment engine shrouds shall be closed during equipment operation.

DC-2: Whenever feasible, electrical power shall be used to run air compressors and similar power tools.

DC-3: Equipment staging areas should be located as far as feasible from occupied residences.

Based on noise modeling of construction noise, construction activity would comply with the County's construction noise level limits at the nearby residences. Therefore, construction noise levels would be less than significant.

5.2.3 Impulsive Noise

No operational impulsive noise sources are proposed as part of the project. Additionally, it is not anticipated that any impact hammering or pile driving would be required for project construction. Therefore, impulsive noise impacts would be less than significant.

5.3 Groundborne Vibration and Noise

5.3.1 Operation

There would be no new vibration sources associated with project operation. Therefore, no vibration impacts will occur with the project operation.

5.3.2 Construction

Construction activities associated with the proposed project would not expose vibration-sensitive land uses to groundborne vibration levels in excess of the County thresholds. Therefore, it is concluded that groundborne vibration impacts would be less than significant.

5.4 Summary

The Ashwood Street Corridor Improvements Project (project) is located within the unincorporated community of Lakeside in San Diego County. The project involves roadway, intersection, and pedestrian improvements. Based on the preceding analysis, the project would result in less than significant noise impacts at adjacent receivers. The project does not include installation or construction of any stationary operation related equipment and would not result in a violation of the County Noise Ordinance Section 36.404. The analysis of proposed construction activity concludes construction noise levels would not exceed 75 dB(A) L_{eq} at an adjacent residential use and would not exceed the maximum noise level limit of County Noise Ordinance Section 36.410. Finally, the nearest NSLUs would not experience substantial vibration associated with project construction activities. Based on these findings, the project would result in less than significant noise and vibration impacts.

6.0 Certification

The following is a list of preparers, persons, and organizations involved with the noise assessment.

RECON Environmental, Inc.
Jessica Fleming, Environmental Specialist, County-approved Noise Consultant
Jennifer Gutierrez, Production Specialist
Stacey Higgins, Production Specialist
Benjamin Arp, GIS Specialist

7.0 References Cited

California Department of Transportation (Caltrans)
2013a Technical Noise Supplement. November.

2013b Transportation and Construction Vibration Guidance Manual. September.

Federal Transit Administration (FTA)
2006 Transit Noise and Vibration Impact Assessment. Washington, DC. May.

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2015 SoundPLAN Essential version 4.1.

San Diego Association of Governments (SANDAG)
2019 Transportation Forecast Information Center. Series 12 traffic projections. Accessed on February 7, 2019. http://tfic.sandag.org/.

San Diego, County of
2009a Guidelines for Determining Significance and Report Format and Content Requirements, Noise. January 27.

2009b Noise Ordinance, Section 36.404 and 36.410. Last amended by ordinance number 9962, January 9.

2011 General Plan, Chapter 8, Noise Element. August 3.

ATTACHMENTS

ATTACHMENT 1

Noise Measurement Data

Summary			
Filename	LxT_Data.001		
Serial Number	3828		
Model	SoundExpert™ LxT		
Firmware Version	2.302		
User	Kevin		
Location	8661.0		
Job Description	Ashwood - Measurement 1		
Note			
Measurement Description			
Start	2019/03/14 14:21:09		
Stop	2019/03/14 14:36:11		
Duration	0:15:01.6		
Run Time	0:15:01.6		
Pause	0:00:00.0		
Pre Calibration	2019/03/14 14:20:23		
Post Calibration	None		
Calibration Deviation	---		
Overall Settings			
RMS Weight	A Weighting		
Peak Weight	A Weighting		
Detector	Slow		
Preamp	PRMLxT1L		
Microphone Correction	Off		
Integration Method	Linear		
OBA Range	Normal		
OBA Bandwidth	1/1 and 1/3		
OBA Freq. Weighting	A Weighting		
OBA Max Spectrum	At Lmax		
Overload	121.8 dB		
	A	**C**	**Z**
Under Range Peak	**78.0**	75.0	80.0 dB
Under Range Limit	**27.0**	25.8	33.0 dB
Noise Floor	16.7	16.7	22.8 dB

Results		
LAeq	68.0 dB	
LAE	97.6 dB	
EA	636.316 µPa²h	
LApeak (max)	2019/03/14 14:29:18	107.5 dB
LASmax	2019/03/14 14:28:18	85.8 dB
LASmin	2019/03/14 14:25:52	51.3 dB
SEA	-99.9 dB	
LAS > 85.0 dB (Exceedence Counts / Duration)	1	1.8 s
LAS > 115.0 dB (Exceedence Counts / Duration)	0	0.0 s
LApeak > 135.0 dB (Exceedence Counts / Duration)	0	0.0 s
LApeak > 137.0 dB (Exceedence Counts / Duration)	0	0.0 s
LApeak > 140.0 dB (Exceedence Counts / Duration)	0	0.0 s

Community Noise	**Ldn**	**LDay 07:00-22:00**	**LNight 22:00-07:00**	**Lden**	**LDay 07:00-19:00**	**LEvening 19:00-22:00**	**LNight 22:00-07:00**
	68.0	68.0	-99.9	68.0	68.0	-99.9	-99.9

LCeq	77.4 dB
LAeq	68.0 dB
LCeq - LAeq	9.4 dB
LAIeq	71.1 dB
LAeq	68.0 dB
LAIeq - LAeq	3.0 dB
# Overloads	0
Overload Duration	0.0 s
# OBA Overloads	0
OBA Overload Duration	0.0 s
Statistics	
LAS5.00	72.8 dB
LAS10.00	70.9 dB
LAS33.30	66.9 dB
LAS50.00	64.8 dB
LAS66.60	62.7 dB
LAS90.00	57.8 dB

Summary			
Filename	LxT_Data.003		
Serial Number	3828		
Model	SoundExpert™ LxT		
Firmware Version	2.302		
User	Kevin		
Location	Ashwood - Measurement 2		
Job Description	8661.0		
Note			
Measurement Description			
Start	2019/03/08 14:16:29		
Stop	2019/03/08 14:46:32		
Duration	0:30:02.5		
Run Time	0:30:02.5		
Pause	0:00:00.0		
Pre Calibration	2019/03/08 14:13:40		
Post Calibration	None		
Calibration Deviation	---		
Overall Settings			
RMS Weight	A Weighting		
Peak Weight	A Weighting		
Detector	Slow		
Preamp	PRMLxT1L		
Microphone Correction	Off		
Integration Method	Linear		
OBA Range	Normal		
OBA Bandwidth	1/1 and 1/3		
OBA Freq. Weighting	A Weighting		
OBA Max Spectrum	At Lmax		
Overload	121.8 dB		
	A	**C**	**Z**
Under Range Peak	**78.1**	75.1	80.1 dB
Under Range Limit	**27.1**	25.8	33.1 dB
Noise Floor	16.8	16.7	22.8 dB

Results		
LAeq	73.3 dB	
LAE	105.9 dB	
EA	4.274 mPa²h	
LApeak (max)	2019/03/08 14:27:20	103.0 dB
LASmax	2019/03/08 14:25:37	87.5 dB
LASmin	2019/03/08 14:17:04	55.4 dB
SEA	-99.9 dB	
LAS > 85.0 dB (Exceedence Counts / Duration)	2	3.7 s
LAS > 115.0 dB (Exceedence Counts / Duration)	0	0.0 s
LApeak > 135.0 dB (Exceedence Counts / Duration)	0	0.0 s
LApeak > 137.0 dB (Exceedence Counts / Duration)	0	0.0 s
LApeak > 140.0 dB (Exceedence Counts / Duration)	0	0.0 s

Community Noise	**Ldn**	**LDay 07:00-22:00**	**LNight 22:00-07:00**	**Lden**	**LDay 07:00-19:00**	**LEvening 19:00-22:00**	**LNight 22:00-07:00**
	73.3	73.3	-99.9	73.3	73.3	-99.9	-99.9
LCeq	81.0 dB						
LAeq	73.3 dB						
LCeq - LAeq	7.7 dB						
LAIeq	75.3 dB						
LAeq	73.3 dB						
LAIeq - LAeq	2.1 dB						
# Overloads	0						
Overload Duration	0.0 s						
# OBA Overloads	0						
OBA Overload Duration	0.0 s						

Statistics	
LAS5.00	78.1 dB
LAS10.00	76.7 dB
LAS33.30	73.4 dB
LAS50.00	71.3 dB
LAS66.60	68.6 dB
LAS90.00	62.7 dB

Summary			
Filename	LxT_Data.002		
Serial Number	3828		
Model	SoundExpert™ LxT		
Firmware Version	2.302		
User	Kevin		
Location	Ashwood - Measurement 3		
Job Description	8661.0		
Note			
Measurement Description			
Start	2019/03/08 13:36:43		
Stop	2019/03/08 13:51:44		
Duration	0:15:00.8		
Run Time	0:15:00.8		
Pause	0:00:00.0		
Pre Calibration	2019/03/08 13:36:03		
Post Calibration	None		
Calibration Deviation	---		
Overall Settings			
RMS Weight	A Weighting		
Peak Weight	A Weighting		
Detector	Slow		
Preamp	PRMLxT1L		
Microphone Correction	Off		
Integration Method	Linear		
OBA Range	Normal		
OBA Bandwidth	1/1 and 1/3		
OBA Freq. Weighting	A Weighting		
OBA Max Spectrum	At Lmax		
Overload	121.8 dB		
	A	**C**	**Z**
Under Range Peak	**78.0**	75.0	80.0 dB
Under Range Limit	**27.0**	25.8	33.0 dB
Noise Floor	16.7	16.7	22.8 dB
Results			
LAeq	68.0 dB		
LAE	97.6 dB		
EA	635.542 µPa²h		
LApeak (max)	2019/03/08 13:50:09	109.8 dB	
LASmax	2019/03/08 13:44:58	78.5 dB	
LASmin	2019/03/08 13:38:54	46.9 dB	
SEA	-99.9 dB		
LAS > 85.0 dB (Exceedence Counts / Duration)	0	0.0 s	
LAS > 115.0 dB (Exceedence Counts / Duration)	0	0.0 s	
LApeak > 135.0 dB (Exceedence Counts / Duration)	0	0.0 s	
LApeak > 137.0 dB (Exceedence Counts / Duration)	0	0.0 s	
LApeak > 140.0 dB (Exceedence Counts / Duration)	0	0.0 s	

Community Noise	**Ldn**	**LDay 07:00-22:00**	**LNight 22:00-07:00**	**Lden**	**LDay 07:00-19:00**	**LEvening 19:00-22:00**	**LNight 22:00-07:00**
	68.0	68.0	-99.9	68.0	68.0	-99.9	-99.9

LCeq	72.9 dB
LAeq	68.0 dB
LCeq - LAeq	4.9 dB
LAIeq	70.0 dB
LAeq	68.0 dB
LAIeq - LAeq	2.0 dB
# Overloads	0
Overload Duration	0.0 s
# OBA Overloads	0
OBA Overload Duration	0.0 s
Statistics	
LAS5.00	72.4 dB
LAS10.00	71.5 dB
LAS33.30	69.1 dB
LAS50.00	67.0 dB
LAS66.60	63.8 dB
LAS90.00	53.1 dB

Summary			
Filename	LxT_Data.001		
Serial Number	3828		
Model	SoundExpert™ LxT		
Firmware Version	2.302		
User	Kevin		
Location	Ashwood - Measurement 4		
Job Description	8661.0		
Note			
Measurement Description			
Start	2019/03/08 13:02:10		
Stop	2019/03/08 13:17:11		
Duration	0:15:01.1		
Run Time	0:15:01.1		
Pause	0:00:00.0		
Pre Calibration	2019/03/08 13:00:23		
Post Calibration	None		
Calibration Deviation	---		
Overall Settings			
RMS Weight	A Weighting		
Peak Weight	A Weighting		
Detector	Slow		
Preamp	PRMLxT1L		
Microphone Correction	Off		
Integration Method	Linear		
OBA Range	Normal		
OBA Bandwidth	1/1 and 1/3		
OBA Freq. Weighting	A Weighting		
OBA Max Spectrum	At Lmax		
Overload	121.8 dB		
	A	**C**	**Z**
Under Range Peak	**78.0**	75.0	80.0 dB
Under Range Limit	**27.0**	25.8	33.0 dB
Noise Floor	16.7	16.7	22.8 dB

Results		
LAeq	68.3 dB	
LAE	97.8 dB	
EA	675.325 µPa²h	
LApeak (max)	2019/03/08 13:13:03	102.8 dB
LASmax	2019/03/08 13:15:54	86.9 dB
LASmin	2019/03/08 13:07:01	48.1 dB
SEA	-99.9 dB	
LAS > 85.0 dB (Exceedence Counts / Duration)	1	2.2 s
LAS > 115.0 dB (Exceedence Counts / Duration)	0	0.0 s
LApeak > 135.0 dB (Exceedence Counts / Duration)	0	0.0 s
LApeak > 137.0 dB (Exceedence Counts / Duration)	0	0.0 s
LApeak > 140.0 dB (Exceedence Counts / Duration)	0	0.0 s

Community Noise	**Ldn**	**LDay 07:00-22:00**	**LNight 22:00-07:00**	**Lden**	**LDay 07:00-19:00**	**LEvening 19:00-22:00**	**LNight 22:00-07:00**
	68.3	68.3	-99.9	68.3	68.3	-99.9	-99.9
LCeq	77.1 dB						
LAeq	68.3 dB						
LCeq - LAeq	8.8 dB						
LAIeq	70.4 dB						
LAeq	68.3 dB						
LAIeq - LAeq	2.1 dB						
# Overloads	0						
Overload Duration	0.0 s						
# OBA Overloads	0						
OBA Overload Duration	0.0 s						

Statistics	
LAS5.00	71.8 dB
LAS10.00	70.2 dB
LAS33.30	67.5 dB
LAS50.00	65.7 dB
LAS66.60	63.2 dB
LAS90.00	56.2 dB

ATTACHMENT 2

SoundPLAN Data – Vehicle Traffic

Station km	ADT Veh/24h	Traffic values Vehicles type	Vehicle nar	day Veh/h	evening Veh/h	night Veh/h	Speed km/h	Control device	Constr. Speed km/h	Affect. veh. %	Road surface	Gradient Min / Max %
Mapleview Street		Traffic direction:	In entry direction									
0+000	39240	Total	-	3270	-	-	-	none	-	-	Average (of DGAC and PCC)	-3.875
0+000	39240	Automobiles	-	3152	-	-	64	none	-	-	Average (of DGAC and PCC)	-3.875
0+000	39240	Medium trucks	-	56	-	-	64	none	-	-	Average (of DGAC and PCC)	-3.875
0+000	39240	Heavy trucks	-	16	-	-	64	none	-	-	Average (of DGAC and PCC)	-3.875
0+000	39240	Buses	-	39	-	-	64	none	-	-	Average (of DGAC and PCC)	-3.875
0+000	39240	Motorcycles	-	7	-	-	64	none	-	-	Average (of DGAC and PCC)	-3.875
0+000	39240	Auxiliary vehicle	-	-	-	-	-	none	-	-	Average (of DGAC and PCC)	-3.875
0+412	27120	Total	-	2260	-	-	-	none	-	-	Average (of DGAC and PCC)	0.4 / 2.1
0+412	27120	Automobiles	-	2179	-	-	80	none	-	-	Average (of DGAC and PCC)	0.4 / 2.1
0+412	27120	Medium trucks	-	38	-	-	80	none	-	-	Average (of DGAC and PCC)	0.4 / 2.1
0+412	27120	Heavy trucks	-	11	-	-	80	none	-	-	Average (of DGAC and PCC)	0.4 / 2.1
0+412	27120	Buses	-	27	-	-	80	none	-	-	Average (of DGAC and PCC)	0.4 / 2.1
0+412	27120	Motorcycles	-	5	-	-	80	none	-	-	Average (of DGAC and PCC)	0.4 / 2.1
0+412	27120	Auxiliary vehicle	-	-	-	-	-	none	-	-	Average (of DGAC and PCC)	0.4 / 2.1
0+824	-	-	-	-	-	-						
Ashwood Street		Traffic direction:	In entry direction									
0+000	21600	Total	-	1800	-	-	-	none	-	-	Average (of DGAC and PCC)	-0.2593
0+000	21600	Automobiles	-	1735	-	-	64	none	-	-	Average (of DGAC and PCC)	-0.2593
0+000	21600	Medium trucks	-	31	-	-	64	none	-	-	Average (of DGAC and PCC)	-0.2593
0+000	21600	Heavy trucks	-	9	-	-	64	none	-	-	Average (of DGAC and PCC)	-0.2593
0+000	21600	Buses	-	22	-	-	64	none	-	-	Average (of DGAC and PCC)	-0.2593
0+000	21600	Motorcycles	-	4	-	-	64	none	-	-	Average (of DGAC and PCC)	-0.2593
0+000	21600	Auxiliary vehicle	-	-	-	-	-	none	-	-	Average (of DGAC and PCC)	-0.2593
0+472	18840	Total	-	1570	-	-	-	none	-	-	Average (of DGAC and PCC)	-0.9231
0+472	18840	Automobiles	-	1513	-	-	64	none	-	-	Average (of DGAC and PCC)	-0.9231
0+472	18840	Medium trucks	-	27	-	-	64	none	-	-	Average (of DGAC and PCC)	-0.9231
0+472	18840	Heavy trucks	-	8	-	-	64	none	-	-	Average (of DGAC and PCC)	-0.9231
0+472	18840	Buses	-	19	-	-	64	none	-	-	Average (of DGAC and PCC)	-0.9231
0+472	18840	Motorcycles	-	3	-	-	64	none	-	-	Average (of DGAC and PCC)	-0.9231
0+472	18840	Auxiliary vehicle	-	-	-	-	-	none	-	-	Average (of DGAC and PCC)	-0.9231
1+746	-	-	-	-	-	-						
Wildcat Canyon Road		Traffic direction:	In entry direction									
0+000	23160	Total	-	1930	-	-	-	none	-	-	Average (of DGAC and PCC)	1.2 / 8.2
0+000	23160	Automobiles	-	1861	-	-	64	none	-	-	Average (of DGAC and PCC)	1.2 / 8.2
0+000	23160	Medium trucks	-	33	-	-	64	none	-	-	Average (of DGAC and PCC)	1.2 / 8.2
0+000	23160	Heavy trucks	-	10	-	-	64	none	-	-	Average (of DGAC and PCC)	1.2 / 8.2
0+000	23160	Buses	-	23	-	-	64	none	-	-	Average (of DGAC and PCC)	1.2 / 8.2
0+000	23160	Motorcycles	-	4	-	-	64	none	-	-	Average (of DGAC and PCC)	1.2 / 8.2
0+000	23160	Auxiliary vehicle	-	-	-	-	-	none	-	-	Average (of DGAC and PCC)	1.2 / 8.2
0+509	-	-	-	-	-	-						
Willow Road		Traffic direction:	In entry direction									
0+000	7320	Total	-	610	-	-	-	none	-	-	Average (of DGAC and PCC)	-0.2375
0+000	7320	Automobiles	-	588	-	-	72	none	-	-	Average (of DGAC and PCC)	-0.2375
0+000	7320	Medium trucks	-	10	-	-	72	none	-	-	Average (of DGAC and PCC)	-0.2375
0+000	7320	Heavy trucks	-	3	-	-	72	none	-	-	Average (of DGAC and PCC)	-0.2375
0+000	7320	Buses	-	7	-	-	72	none	-	-	Average (of DGAC and PCC)	-0.2375
0+000	7320	Motorcycles	-	1	-	-	72	none	-	-	Average (of DGAC and PCC)	-0.2375
0+000	7320	Auxiliary vehicle	-	-	-	-	-	none	-	-	Average (of DGAC and PCC)	-0.2375
0+702	-	-	-	-	-	-						

		Traffic values						Control	Constr.	Affect.		Gradient
Station	ADT	Vehicles type	Vehicle na	day	evening	night	Speed	device	Speed	veh.	Road surface	Min / Max
km	Veh/24h			Veh/h	Veh/h	Veh/h	km/h		km/h	%		%
Mapleview Street		Traffic direction:	In entry direction									
0+000	39240	Total	-	3270	-	-	-	none	-	-	Average (of DGAC and PCC)	-3.875
0+000	39240	Automobiles	-	3152	-	-	64	none	-	-	Average (of DGAC and PCC)	-3.875
0+000	39240	Medium trucks	-	56	-	-	64	none	-	-	Average (of DGAC and PCC)	-3.875
0+000	39240	Heavy trucks	-	16	-	-	64	none	-	-	Average (of DGAC and PCC)	-3.875
0+000	39240	Buses	-	39	-	-	64	none	-	-	Average (of DGAC and PCC)	-3.875
0+000	39240	Motorcycles	-	7	-	-	64	none	-	-	Average (of DGAC and PCC)	-3.875
0+000	39240	Auxiliary vehicle	-	-	-	-	-	none	-	-	Average (of DGAC and PCC)	-3.875
0+402	27120	Total	-	2260	-	-	-	none	-	-	Average (of DGAC and PCC)	0.0 / 2.2
0+402	27120	Automobiles	-	2179	-	-	80	none	-	-	Average (of DGAC and PCC)	0.0 / 2.2
0+402	27120	Medium trucks	-	38	-	-	80	none	-	-	Average (of DGAC and PCC)	0.0 / 2.2
0+402	27120	Heavy trucks	-	11	-	-	80	none	-	-	Average (of DGAC and PCC)	0.0 / 2.2
0+402	27120	Buses	-	27	-	-	80	none	-	-	Average (of DGAC and PCC)	0.0 / 2.2
0+402	27120	Motorcycles	-	5	-	-	80	none	-	-	Average (of DGAC and PCC)	0.0 / 2.2
0+402	27120	Auxiliary vehicle	-	-	-	-	-	none	-	-	Average (of DGAC and PCC)	0.0 / 2.2
0+824	-	-	-	-	-	-						
Ashwood Street		Traffic direction:	In entry direction									
0+000	21600	Total	-	1800	-	-	-	none	-	-	Average (of DGAC and PCC)	-0.2222
0+000	21600	Automobiles	-	1735	-	-	64	none	-	-	Average (of DGAC and PCC)	-0.2222
0+000	21600	Medium trucks	-	31	-	-	64	none	-	-	Average (of DGAC and PCC)	-0.2222
0+000	21600	Heavy trucks	-	9	-	-	64	none	-	-	Average (of DGAC and PCC)	-0.2222
0+000	21600	Buses	-	22	-	-	64	none	-	-	Average (of DGAC and PCC)	-0.2222
0+000	21600	Motorcycles	-	4	-	-	64	none	-	-	Average (of DGAC and PCC)	-0.2222
0+000	21600	Auxiliary vehicle	-	-	-	-	-	none	-	-	Average (of DGAC and PCC)	-0.2222
0+481	18840	Total	-	1570	-	-	-	none	-	-	Average (of DGAC and PCC)	-0.9231
0+481	18840	Automobiles	-	1513	-	-	64	none	-	-	Average (of DGAC and PCC)	-0.9231
0+481	18840	Medium trucks	-	27	-	-	64	none	-	-	Average (of DGAC and PCC)	-0.9231
0+481	18840	Heavy trucks	-	8	-	-	64	none	-	-	Average (of DGAC and PCC)	-0.9231
0+481	18840	Buses	-	19	-	-	64	none	-	-	Average (of DGAC and PCC)	-0.9231
0+481	18840	Motorcycles	-	3	-	-	64	none	-	-	Average (of DGAC and PCC)	-0.9231
0+481	18840	Auxiliary vehicle	-	-	-	-	-	none	-	-	Average (of DGAC and PCC)	-0.9231
1+743	-	-	-	-	-	-						
Wildcat Canyon Road		Traffic direction:	In entry direction									
0+000	23160	Total	-	1930	-	-	-	none	-	-	Average (of DGAC and PCC)	1.3 / 8.2
0+000	23160	Automobiles	-	1841	-	-	64	none	-	-	Average (of DGAC and PCC)	1.3 / 8.2
0+000	23160	Medium trucks	-	33	-	-	64	none	-	-	Average (of DGAC and PCC)	1.3 / 8.2
0+000	23160	Heavy trucks	-	29	-	-	64	none	-	-	Average (of DGAC and PCC)	1.3 / 8.2
0+000	23160	Buses	-	23	-	-	64	none	-	-	Average (of DGAC and PCC)	1.3 / 8.2
0+000	23160	Motorcycles	-	4	-	-	64	none	-	-	Average (of DGAC and PCC)	1.3 / 8.2
0+000	23160	Auxiliary vehicle	-	-	-	-	-	none	-	-	Average (of DGAC and PCC)	1.3 / 8.2
0+498	-	-	-	-	-	-						
Willow Road		Traffic direction:	In entry direction									
0+000	7320	Total	-	610	-	-	-	none	-	-	Average (of DGAC and PCC)	-0.2250
0+000	7320	Automobiles	-	588	-	-	72	none	-	-	Average (of DGAC and PCC)	-0.2250
0+000	7320	Medium trucks	-	10	-	-	72	none	-	-	Average (of DGAC and PCC)	-0.2250
0+000	7320	Heavy trucks	-	3	-	-	72	none	-	-	Average (of DGAC and PCC)	-0.2250
0+000	7320	Buses	-	7	-	-	72	none	-	-	Average (of DGAC and PCC)	-0.2250
0+000	7320	Motorcycles	-	1	-	-	72	none	-	-	Average (of DGAC and PCC)	-0.2250
0+000	7320	Auxiliary vehicle	-	-	-	-	-	none	-	-	Average (of DGAC and PCC)	-0.2250
0+702	-	-	-	-	-	-						

8661 Ashwood Street
SoundPLAN Data - Vehicle Traffic Noise

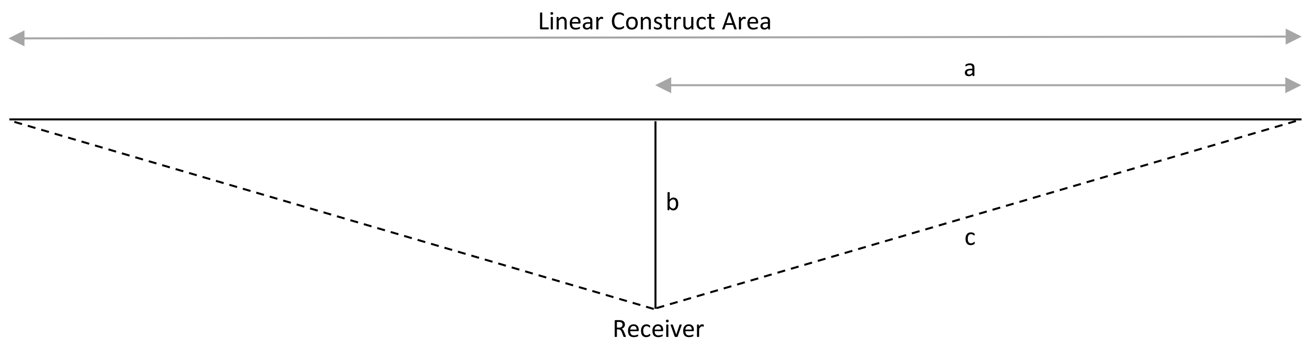
No.	Coordinates X	Y	Height	Existing Alignment Day	Proposed Alignment Day	Difference Day
	in meter		m	dB(A)	dB(A)	dB(A)
1	507537.16	3636122.19	126.03	64.2	64.2	0.0
2	507623.45	3636136.11	124.65	64.4	64.4	0.0
3	507706.74	3636150.58	124.93	67.7	67.8	0.1
4	507697.21	3636229.34	124.94	63.5	64.9	1.4
5	507675.02	3636322.80	125.51	62.5	58.9	-3.6
6	507738.14	3636298.59	128.92	57.6	58.1	0.5
7	507857.20	3636416.00	166.77	54.1	55.0	0.9
8	507818.15	3636492.74	133.48	59.5	53.9	-5.6
9	507881.22	3636566.74	133.52	58.5	51.3	-7.2
10	508003.01	3636469.53	176.26	40.7	40.6	-0.1
11	508007.38	3636569.47	177.42	51.1	50.2	-0.9
12	507969.43	3636653.84	146.38	63.2	63.9	0.7
13	507977.07	3636697.54	146.02	59.8	60.0	0.2
14	507947.58	3636721.84	140.18	67.9	64.4	-3.5
15	507969.70	3637033.13	127.36	61.5	60.1	-1.4
16	508291.37	3637295.00	128.92	54.9	54.8	-0.1
17	508387.49	3637269.06	129.37	55.4	56.7	1.3
18	508465.59	3637394.13	131.04	55.5	56.4	0.9
19	508580.82	3637418.70	132.47	60.7	60.7	0.0
20	508534.67	3637440.00	132.19	57.7	57.9	0.2
21	508493.71	3637447.10	132.01	59.0	59.3	0.3
22	508323.32	3637483.15	129.66	59.5	59.5	0.0
23	508415.61	3637501.17	131.81	63.6	62.4	-1.2
24	508429.54	3637562.61	132.44	63.1	60.4	-2.7
25	508441.56	3637622.41	132.96	59.5	55.7	-3.8
26	508469.14	3637547.59	132.93	60.8	63.7	2.9
27	508517.20	3637601.38	134.18	58.6	61.2	2.6
28	508589.28	3637673.47	137.15	53.8	56.6	2.8

Existing Alignment					Proposed Alignment				
Source name				Day dB(A)	Source name				Day dB(A)
1	1.Fl	64.2	0.0		1	1.Fl	64.2	0.0	
Ashwood Street				46.8	Ashwood Street				46.9
Mapleview Street				64.2	Mapleview Street				64.2
Wildcat Canyon Road				14.3	Wildcat Canyon Road				15.3
Willow Road				9.6	Willow Road				9.7
2	1.Fl	64.4	0.0		2	1.Fl	64.4	0.0	
Ashwood Street				52.8	Ashwood Street				52.8
Mapleview Street				64	Mapleview Street				64.1
Wildcat Canyon Road				9.5	Wildcat Canyon Road				8.9
Willow Road				4.8	Willow Road				6
3	1.Fl	67.7	0.0		3	1.Fl	67.8	0.0	
Ashwood Street				63.2	Ashwood Street				63.2
Mapleview Street				65.9	Mapleview Street				66
Wildcat Canyon Road				6.2	Wildcat Canyon Road				6.3
Willow Road				1.1	Willow Road				5.2
4	1.Fl	63.5	0.0		4	1.Fl	64.9	0.0	
Ashwood Street				62.2	Ashwood Street				64
Mapleview Street				57.7	Mapleview Street				57.7
Wildcat Canyon Road				9.8	Wildcat Canyon Road				7.4
Willow Road				7.1	Willow Road				7.6
5	1.Fl	62.5	0.0		5	1.Fl	58.9	0.0	
Ashwood Street				62.3	Ashwood Street				58.6
Mapleview Street				47.5	Mapleview Street				47.6
Wildcat Canyon Road				10.4	Wildcat Canyon Road				10.5
Willow Road				13.2	Willow Road				13.2
6	1.Fl	57.6	0.0		6	1.Fl	58.1	0.0	
Ashwood Street				55.8	Ashwood Street				56.6
Mapleview Street				52.9	Mapleview Street				53
Wildcat Canyon Road				8.3	Wildcat Canyon Road				4
Willow Road				7.3	Willow Road				6.1
7	1.Fl	54.1	0.0		7	1.Fl	55.0	0.0	
Ashwood Street				52.9	Ashwood Street				54
Mapleview Street				47.6	Mapleview Street				47.6
Wildcat Canyon Road				31.4	Wildcat Canyon Road				31.9
Willow Road				28	Willow Road				27.8
8	1.Fl	59.5	0.0		8	1.Fl	53.9	0.0	
Ashwood Street				59.5	Ashwood Street				53.9
Mapleview Street				34.6	Mapleview Street				31.9
Wildcat Canyon Road				15.4	Wildcat Canyon Road				15
Willow Road				18.7	Willow Road				18.8
9	1.Fl	58.5	0.0		9	1.Fl	51.3	0.0	
Ashwood Street				58.5	Ashwood Street				51.2
Mapleview Street				29.6	Mapleview Street				30.9
Wildcat Canyon Road				16.9	Wildcat Canyon Road				18.8
Willow Road				16.7	Willow Road				16.1
10	1.Fl	40.7	0.0		10	1.Fl	40.6	0.0	
Ashwood Street				36.6	Ashwood Street				36.5
Mapleview Street				38.3	Mapleview Street				38.3
Wildcat Canyon Road				22.9	Wildcat Canyon Road				23.2
Willow Road				20	Willow Road				20
11	1.Fl	51.1	0.0		11	1.Fl	50.2	0.0	
Ashwood Street				50.7	Ashwood Street				49.8
Mapleview Street				38.1	Mapleview Street				38.2
Wildcat Canyon Road				33.4	Wildcat Canyon Road				33.1
Willow Road				33.4	Willow Road				33.4
12	1.Fl	63.2	0.0		12	1.Fl	63.9	0.0	
Ashwood Street				63.2	Ashwood Street				63.9
Mapleview Street				36.7	Mapleview Street				37.1
Wildcat Canyon Road				17	Wildcat Canyon Road				16.3
Willow Road				18.5	Willow Road				18.5
13	1.Fl	59.8	0.0		13	1.Fl	60.0	0.0	
Ashwood Street				59.8	Ashwood Street				60
Mapleview Street				35.8	Mapleview Street				36.3
Wildcat Canyon Road				11.3	Wildcat Canyon Road				11.8
Willow Road				19.5	Willow Road				19.6
14	1.Fl	67.9	0.0		14	1.Fl	64.4	0.0	
Ashwood Street				67.9	Ashwood Street				64.4
Mapleview Street				33.1	Mapleview Street				33.2
Wildcat Canyon Road				15.2	Wildcat Canyon Road				13.6
Willow Road				21.6	Willow Road				23.1
15	1.Fl	61.5	0.0		15	1.Fl	60.1	0.0	
Ashwood Street				61.5	Ashwood Street				60.1
Mapleview Street				23.1	Mapleview Street				22.9
Wildcat Canyon Road				29.4	Wildcat Canyon Road				30.2
Willow Road				28.9	Willow Road				29.2
16	1.Fl	54.9	0.0		16	1.Fl	54.8	0.0	
Ashwood Street				54.6	Ashwood Street				54.4
Mapleview Street				15.4	Mapleview Street				16
Wildcat Canyon Road				39.4	Wildcat Canyon Road				40.4
Willow Road				41	Willow Road				41.1
17	1.Fl	55.4	0.0		17	1.Fl	56.7	0.0	
Ashwood Street				55.1	Ashwood Street				56.5
Mapleview Street				13	Mapleview Street				13.1
Wildcat Canyon Road				40.1	Wildcat Canyon Road				41.2
Willow Road				40.2	Willow Road				40.1
18	1.Fl	55.5	0.0		18	1.Fl	56.4	0.0	
Ashwood Street				48.2	Ashwood Street				49.8
Mapleview Street				9.5	Mapleview Street				11.9
Wildcat Canyon Road				48.8	Wildcat Canyon Road				50.2
Willow Road				53.3	Willow Road				53.6
19	1.Fl	60.7	0.0		19	1.Fl	60.7	0.0	
Ashwood Street				39.1	Ashwood Street				40.5
Mapleview Street				12.1	Mapleview Street				12.2
Wildcat Canyon Road				45.7	Wildcat Canyon Road				46.5
Willow Road				60.5	Willow Road				60.5
20	1.Fl	57.7	0.0		20	1.Fl	57.9	0.0	
Ashwood Street				41.9	Ashwood Street				43.7
Mapleview Street				10.1	Mapleview Street				10.5
Wildcat Canyon Road				48.2	Wildcat Canyon Road				49.5
Willow Road				57.1	Willow Road				57.1
21	1.Fl	59.0	0.0		21	1.Fl	59.3	0.0	
Ashwood Street				45.8	Ashwood Street				47.1
Mapleview Street				14	Mapleview Street				14.9
Wildcat Canyon Road				51.4	Wildcat Canyon Road				52.9
Willow Road				57.9	Willow Road				57.9
22	1.Fl	59.5	0.0		22	1.Fl	59.5	0.0	
Ashwood Street				45.6	Ashwood Street				45.4
Mapleview Street				17	Mapleview Street				17.8
Wildcat Canyon Road				47.7	Wildcat Canyon Road				47.9
Willow Road				59	Willow Road				59
23	1.Fl	63.6	0.0		23	1.Fl	62.4	0.0	
Ashwood Street				47.7	Ashwood Street				47.7
Mapleview Street				14.5	Mapleview Street				14.8
Wildcat Canyon Road				63.2	Wildcat Canyon Road				61.9
Willow Road				50.9	Willow Road				50.9
24	1.Fl	63.1	0.0		24	1.Fl	60.4	0.0	
Ashwood Street				41.9	Ashwood Street				41.9
Mapleview Street				14.6	Mapleview Street				14.7
Wildcat Canyon Road				63	Wildcat Canyon Road				60.2
Willow Road				44.6	Willow Road				44.5
25	1.Fl	59.5	0.0		25	1.Fl	55.7	0.0	
Ashwood Street				38.6	Ashwood Street				38.7
Mapleview Street				13.8	Mapleview Street				13.7
Wildcat Canyon Road				59.4	Wildcat Canyon Road				55.5
Willow Road				40.9	Willow Road				40.4
26	1.Fl	60.8	0.0		26	1.Fl	63.7	0.0	
Ashwood Street				42.1	Ashwood Street				42.4
Mapleview Street				14.6	Mapleview Street				14.3
Wildcat Canyon Road				60.7	Wildcat Canyon Road				63.6
Willow Road				44.9	Willow Road				44.9
27	1.Fl	58.6	0.0		27	1.Fl	61.2	0.0	
Ashwood Street				38.2	Ashwood Street				38.4
Mapleview Street				14.4	Mapleview Street				14.3
Wildcat Canyon Road				58.5	Wildcat Canyon Road				61.2
Willow Road				41	Willow Road				41
28	1.Fl	53.8	0.0		28	1.Fl	56.6	0.0	
Ashwood Street				34.7	Ashwood Street				34.7
Mapleview Street				13.5	Mapleview Street				13.4
Wildcat Canyon Road				53.7	Wildcat Canyon Road				56.6
Willow Road				36.8	Willow Road				36.7

ATTACHMENT 3

Construction Noise Calculations

Equipment	Noise Level at 50 Feet	Typical Duty Cycle		Average Hourly Noise Level at 50 Feet
Dozer	85	40%	316227766	81
Loader	80	40%	100000000	76
Dump Truck	84	40%	251188643.2	80
TOTAL				84



$a^2 + b^2 = c^2$

	Feet
linear construction area	350
a	175
b	25
c	177

Construction Noise Attenuation
Noise Level at Receiver = (Average Hourly Noise Level at 50 Feet) + 20 x LOG (50/Receiver Distance)
= 84 + 20 x LOG (50/176)
= 73

ATTACHMENT 4

SoundPLAN Data – Construction Noise

		Level					Corrections		
Source name	Reference	Construction1	Construction2	Construction3	Construction4	Construction5	Cwall	CI	CT
		dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)
Construction1	Lw/unit	112.6	-	-	-	-	-	-	-
Construction2	Lw/unit	-	112.6	-	-	-	-	-	-
Construction3	Lw/unit	-	-	112.6	-	-	-	-	-
Construction4	Lw/unit	-	-	-	112.6	-	-	-	-
Construction5	Lw/unit	-	-	-	-	112.6	-	-	-

8661 Ashwood Street
SoundPLAN - Construction Noise

	Coordinates					Level w/o NP		
No.	X	Y	Height	Construction1	Construction2	Construction3	Construction4	Construction5
	in meter		m			dB(A)		
1	507537.16	3636122.19	126.26	46	43	41	38	31
2	507623.45	3636136.11	124.65	46	41	41	38	32
3	507706.74	3636150.58	124.93	46	32	37	37	30
4	507688.17	3636241.52	124.94	51	38	43	39	32
5	507675.02	3636322.80	125.51	56	48	45	40	32
6	507738.14	3636298.59	129.01	54	34	36	33	27
7	507857.20	3636416.00	166.77	62	55	50	44	35
8	507818.15	3636492.74	133.48	68	59	51	45	35
9	507881.22	3636566.74	133.52	61	72	55	47	35
10	508003.01	3636469.53	176.27	40	41	43	43	35
11	508007.38	3636569.47	177.42	53	56	56	48	37
12	507969.43	3636653.84	146.38	52	70	67	47	36
13	507977.07	3636697.54	146.02	51	66	75	44	33
14	507947.58	3636721.84	140.16	51	64	75	52	35
15	507969.70	3637033.13	127.36	43	47	51	70	40
16	508291.37	3637295.00	128.92	36	36	39	46	47
17	508387.49	3637269.06	129.36	36	37	38	44	48
18	508465.59	3637394.13	131.04	34	36	37	42	52
19	508580.82	3637418.70	132.47	34	35	36	40	53
20	508534.67	3637440.00	132.19	34	36	37	41	54
21	508493.71	3637447.10	132.01	34	36	37	41	55
22	508323.32	3637483.15	129.66	36	37	39	43	52
23	508415.61	3637501.17	131.81	34	36	38	42	56
24	508429.54	3637562.61	132.45	35	36	38	41	60
25	508441.56	3637622.41	132.96	35	36	37	40	65
26	508469.14	3637547.59	132.93	33	36	37	41	61
27	508517.20	3637601.38	134.13	33	35	37	40	74
28	508589.28	3637673.47	137.15	32	35	36	38	65
			MIN	32	32	36	33	27
			MAX	68	72	75	70	74