Campo Road Sewer Replacement Project

Acoustical Analysis Report

July 2015

Prepared for:
Otay Water District
2254 Sweetwater Springs Boulevard
Spring Valley, CA 91978

Prepared by:
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7578 El Cajon Boulevard
La Mesa, CA 91942

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GLOSSARY OF TERMS AND ACRONYMS

A-Weighted Sound Levels	Decibels (referenced to 20 micro-Pascals) as measured with an A-weighting network of standard sound level meter, abbreviated dB(A)
ANSI	American National Standards Institute
CAD	Computer Aided (engineering and architectural) Design
CadnaA	Computer Aided Noise Abatement
Caltrans	California Department of Transportation
County	County of San Diego
CNEL	Community Noise Equivalent Level: A 24-hour average, where sound levels during the evening hours of 7:00 p.m. to 10:00 p.m. have an added 5 dB weighting, and sound levels during the nighttime hours of 10:00 p.m. to 7:00 a.m. have an added 10 dB weighting.
dB	Decibel
dBA	A-weighted decibels
District	Otay Water District
Evening	The period from 7:00 p.m. to 10:00 p.m.
Hz	Hertz
kHz	kilohertz
L_{EQ}	The equivalent sound level, or the continuous sound level, that represents the same sound energy as the varying sound levels, over a specified monitoring period.
mPa	micro-Pascals
mph	miles per hour
Noise	Any audible sound that has the potential to annoy or disturb humans, or to cause an adverse psychological or physiological effect in humans.

GLOSSARY OF TERMS AND ACRONYMS (cont.)

Noise Level Measurements	Unless otherwise indicated, measurements that include the use of A-weighting and "slow" response of instrument that complies with at least Type 2 requirements of latest revision of American National Standard Institute (ANSI) S1.4. Specification for Sound Level Meters.
Noise-sensitive land use (NSLU)	A location where particular sensitivities to noise exist, such as residential areas, institutions, hospitals, parks, or other environmentally sensitive areas.
PPV	peak particle velocity
Project	Campo Road Sewer Replacement Project
RCNM	Roadway Construction Noise Model
SANDAG	San Diego Association of Governments
Sound pressure level (SPL)	The observable effect of acoustic energy radiation, quantifying sound level as perceivable by the receiver. When Sound Pressure is used to describe a noise source, the distance between source and receiver must be known in order to yield useful information about the power rating of the source.
Sound power level (S_{WL})	A specialized analytical metric that is used to fully quantify the acoustic energy emitted by a source and is complete without accompanying information on the position of measurement relative to the source. It may be used to calculate the sound pressure level at any desired distance.
SR	State Route
TNM	Traffic Noise Model
USFWS	U.S. Fish and Wildlife Service

EXECUTIVE SUMMARY

This report presents an assessment of potential construction and operational noise impacts associated with the proposed Otay Water District (District) Campo Road Sewer Replacement Project (Proposed Project or Project). The Proposed Project includes replacement of an existing 10-inch sewer main with a proposed 8- to 15-inch sewer main within an unincorporated portion of the County of San Diego (County) in the communities of Rancho San Diego and Casa De Oro-Mount Helix. The majority of the pipeline replacement would be conducted through open trenching; two areas that cross State Route (SR) 94 (also known as Campo Road) would use tunneling to install the pipeline. The proposed pipeline alignment would follow SR 94 between Via Mercado and Jamacha Road, whereas the existing pipeline travels within an open space area. In this open space area, the existing manholes would be demolished, capped, and plugged and a 210-foot stretch of elevated pipeline would be removed.

The Project's loudest construction activities would include excavators and dump trucks for open trenching; an excavator, a dump truck, and a generator for tunneling; a jackhammer, skid steer, and air compressor for the manhole removal; and a crane for the elevated pipeline removal.

Noise-sensitive land uses (NSLUs) near proposed construction activities include single- and multi-family residential, a daycare center, Skyline Church, and sensitive species habitat (coastal California gnatcatcher and least Bell's vireo). Construction activities would not exceed the 75 dBA L_{EQ} construction noise threshold for single- and multi-family residential areas, for Skyline Church, and for the daycare center. In addition, construction would not exceed the 50 dBA L_{EQ} nighttime noise limit for multi-family residential areas.

Open trenching construction activities would occur as close as 10 feet to habitat for nesting sensitive birds (coastal California gnatcatcher and least Bell's vireo). Construction activities for trenching and tunneling would exceed the baseline noise level of 65.6 dBA L_{EQ} by at least 3 dBA if operated within 210 feet of habitat for nesting sensitive birds. If construction activities would occur within this distance during the breeding seasons of coastal California gnatcatcher (February 15 to August 31) or least Bell's vireo (March 15 to September 15), an 8-foot-high temporary noise barrier shall be used between the construction equipment and the habitat to reduce noise impacts to baseline noise levels of 65.6 dBA L_{EQ}.

Construction activities for storage piles in the staging location adjacent to Skyline Church would exceed the baseline noise level of 67.8 dBA L_{EQ} if operated within 145 feet of coastal California gnatcatcher habitat. As mitigation, dump trucks and front-end loaders shall not operate within 145 feet of the edge of occupied gnatcatcher habitat during the breeding season.

Construction activities would exceed the 60 dBA L_{EQ} construction noise limit for sensitive species habitat near the elevated pipeline and manhole removal construction activities. Due to the proximity to sensitive species habitat, use of a barrier for noise mitigation is infeasible. Therefore, as mitigation, removal activities shall only be performed outside of the breeding seasons for coastal California gnatcatcher and least Bell's vireo.

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1.0 INTRODUCTION

1.1 Project Location

The Otay Water District's (District) proposed Campo Road Sewer Replacement Project (Proposed Project or Project) consists of the current and proposed alignments of a gravity sewer main within an unincorporated portion of the County of San Diego in the communities of Rancho San Diego and Casa De Oro-Mount Helix. The proposed pipeline alignment would be primarily located within and along State Route (SR) 94 (also known as Campo Road), between Avocado Boulevard and Singer Lane (Figure 1, *Regional Location Map*, and Figure 2, *Project Location*).

1.2 Project Description

The existing 10-inch main is comprised of polyvinyl chloride (PVC) pipe that transitions to metal piping with a tee at each manhole. From Avocado Boulevard, the existing sewer main traverses east through the Rancho San Diego Village shopping center to SR 94. The existing pipeline then diverts from SR 94 and traverses east through an undeveloped area to the south of SR 94. East of Jamacha Boulevard, the existing pipeline continues east and south within SR 94 and ends at Singer Lane, where the Steele Canyon Lift Station is located. The existing pipeline would be abandoned in place (as discussed in detail below). The proposed pipeline alignment would completely avoid the open space containing sensitive habitat and species by traversing along SR 94.

1.2.1 Proposed Pipeline Alignment

The western terminus of the proposed pipeline would be located at the intersection of Avocado Boulevard/Rancho San Diego Village shopping center driveway (Figure 3, *Proposed Project Alignment and Noise Measurement Locations*). The pipeline would traverse southeast through the shopping center parallel to the existing pipe. At the southeastern end of the Rancho San Diego Village shopping center, the proposed alignment would proceed east across Via Mercado. East of Via Mercado, the alignment would continue south and cross under the right-of-way of SR 94 via auger boring. The alignment would then continue along the southern side of SR 94 in a southeasterly direction until the intersection of SR 94/Jamacha Boulevard. At this intersection, the alignment would cross under this intersection to the northern side of SR 94 via auger boring. On the northern side, it would continue east along SR 94 to Jamacha Road, and then follow Jamacha Road for approximately 300 feet. The alignment would turn south and cross Jamacha Road into the Rancho San Diego Towne Center, where it would connect to the existing 27-inch sewer main within the shopping center's parking lot. The 27-inch sewer main connects to additional pipelines at the intersection of SR 94/Singer Lane near the Steele Canyon Lift Station. Existing sewer laterals stemming from the existing pipe would be reconnected to the proposed pipeline. All proposed pipelines would be made of PVC.

1.2.2 Pipeline Installation

The proposed 8- to 15-inch gravity sewer main would be installed by open trench excavation and horizontal auger boring (i.e., tunneling). Horizontal auger boring is a trenchless technique to

install new pipe (as outlined below). Horizontal auger boring would be conducted in the locations where the pipeline would cross under SR 94 (at Jamacha Boulevard and near Via Mercado). Open trench excavation would be performed in all other sections.

Open trench excavation consists of excavating down to the appropriate depth, installing a new pipe or repairing/replacing an existing pipe, and then backfilling the trench. If the trench is located under pavement, the existing pavement would be saw-cut and removed, the excavation filled with granular backfill, and the cut pavement replaced. Excess soil and cut pavement would be hauled from the site and disposed of at locations approved for such use. The proposed pipeline would be placed underground at approximate depths between 15 and 29 feet. The District anticipates that the proposed pipeline would be located within trenches with shoring approximately 5 to 7 feet wide.

Horizontal auger boring is a method that simultaneously 'jacks' the steel casing while rotating augers or cutting heads at the face of the tunnel remove the spoil through the steel casing. The jacking shafts would be approximately 45 feet long by 12 feet wide and the receiving shafts would be approximately 10 feet by 10 feet in area. Following installation of this portion of pipeline, the jacking and receiving pits would be filled in and re-compacted to their existing contours. Spoil material from tunnel construction would be hauled to an approved off-site location.

1.2.3 Abandonment of Existing Pipeline

The existing 10-inch sewer pipeline would be abandoned in place, except for a 21-foot long section of aboveground pipeline and seven supporting pillars that would be removed. The sewer main pillars would be cut at the ground surface, with the exception of the second northernmost pillar, which would be cut above the existing ground level in order to avoid potential impacts to jurisdictional areas. The foundations of the pillars would be abandoned in place to avoid disturbing the existing vegetation. In locations where the new alignment departs from the 10-inch pipe alignment, the abandoned manholes on the existing alignment would be abandoned per the Water Agencies' Standards (WAS) Standard Drawings for Sewer Facilities (Drawing No. SM-08). This would include removal of the manhole and cone, plugging the sewer pipe, and backfilling the manhole with sand. Pipe removal and manhole capping would be completed by hand or with small equipment so as not to impact the surrounding sensitive habitat.

1.3 Noise Reduction Construction Best Management Practices

The following Best Management Practices would be implemented to minimize noise generated during construction of the Proposed Project:

- Staging areas for construction equipment would be located as far as practicable from residences.
- Internal combustion engines would be equipped with a muffler of a type recommended by the manufacturer. No internal combustion engine would be operated without said muffler.

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Regional Location Map

CAMPO ROAD SEWER MAIN REPLACEMENT

HELIX Environmental Planning

N 0 8 Miles

Figure 1

I:\PROJECTS\R\RIC\RIC-11_CampoRoadSewer\Map\Noise\Fig2_Location.mxd RIC-11 04/16/15 -EV

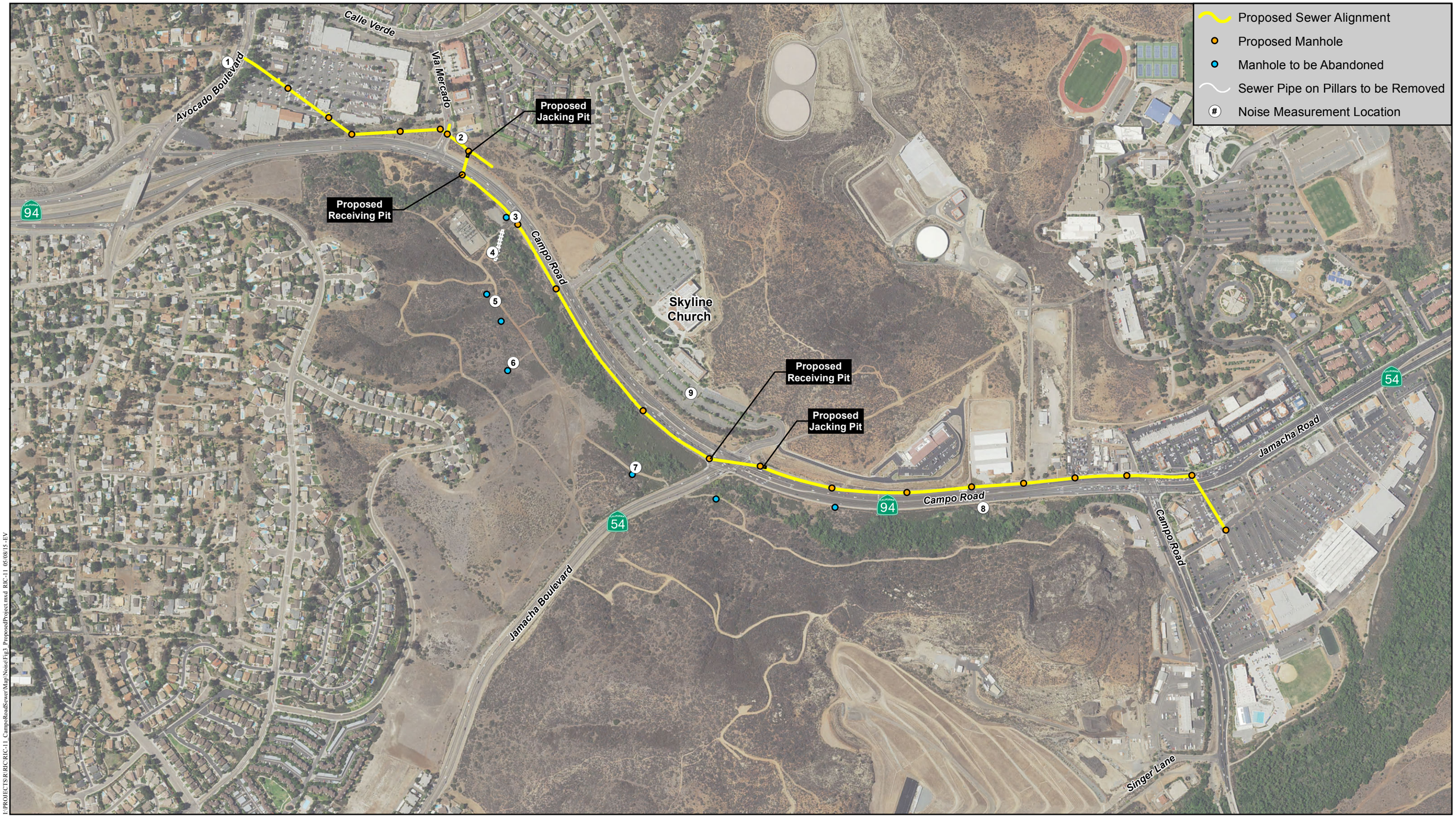
Project Location

CAMPO ROAD SEWER MAIN REPLACEMENT

HELIX Environmental Planning

0 2,000 Feet

Figure 2



Proposed Project Alignment and Noise Measurement Locations

CAMPO ROAD SEWER MAIN REPLACEMENT

HELIX Environmental Planning

N 0 600 Feet

Figure 3

I:\PROJECTS\R\RIC\RIC-11_CampoRoadSewer\Map\Noise\Fig3_ProposedProject.mxd RIC-11 05/08/15 -EV

- Unnecessary idling of internal combustion engines within 100 feet of residences would be prohibited.

1.4 Noise and Sound Level Descriptors and Terminology

1.4.1 Descriptors

All noise level or sound level values presented herein are expressed in terms of decibels (dB), with A-weighting (dBA) to approximate the hearing sensitivity of humans. Time-averaged noise levels are expressed by the symbol L_{EQ}, with a specified duration. The Community Noise Equivalent Level (CNEL) is a 24-hour average, where noise levels during the evening hours of 7:00 p.m. to 10:00 p.m. have an added 5 dB weighting, and sound levels during the nighttime hours of 10:00 p.m. to 7:00 a.m. have an added 10 dB weighting. Sound levels expressed in CNEL are always based on dBA. These metrics are used to express noise levels for both measurement and municipal regulations, as well as for land use guidelines and enforcement of noise ordinances.

1.4.2 Terminology

Sound can be described as the mechanical energy of a vibrating object transmitted by pressure waves through a liquid or gaseous medium (e.g., air) to a hearing organ, such as a human ear. Noise is defined as loud, unexpected, or annoying sound.

In the science of acoustics, the fundamental model consists of a sound (or noise) source, a receiver, and the propagation path between the two. The loudness of the noise source and obstructions or atmospheric factors affecting the propagation path to the receiver determines the sound level and characteristics of the noise perceived by the receiver. The field of acoustics deals primarily with the propagation and control of sound.

Because decibels are logarithmic units, sound levels cannot be added or subtracted through ordinary arithmetic. Under the decibel scale, a doubling of sound energy corresponds to a 3 dB increase. In other words, when two identical sources are each producing sound of the same loudness, the resulting sound level at a given distance would be 3 dB higher than from one source under the same conditions. For example, if one automobile produces 70 dB when it passes an observer, two cars passing simultaneously would not produce 140 dB—rather, they would combine to produce 73 dB. Under the decibel scale, three sources of equal loudness together produce a sound level 5 dB louder than one source.

Under controlled conditions in an acoustical laboratory, the trained, healthy human ear is able to discern 1-dB changes in sound levels, when exposed to steady, single-frequency ("pure-tone") signals in the mid-frequency (1,000 to 8,000 Hz) range. In typical noisy environments, changes in noise of 1 to 2 dB are generally not perceptible. It is widely accepted, however, that people begin to detect sound level increases of 3 dB in typical noisy environments. Further, a 5 dB increase is generally perceived as a distinctly noticeable increase, and a 10-dB increase is generally perceived as a doubling of loudness.

No known studies have directly correlated the ability of a healthy human ear to discern specific levels of change in traffic noise over a 24-hour period. Many ordinances, however, specify a

change of 3 CNEL as the significant impact threshold. This is based on the concept of a doubling in noise energy resulting in a 3-dBA change in noise (which is the amount of change in noise necessary for the increase to be perceptible to the average healthy human ear).

1.4.3 Noise-Sensitive Land Uses

Noise-sensitive land uses (NSLUs) are land uses that may be subject to stress and/or interference from excessive noise, including residences, daycare centers, schools, churches, hotels, resorts, libraries, sensitive wildlife habitat, or similar facilities where quiet is an important attribute of the environment. Noise receptors are individual locations that may be affected by noise. NSLUs in the Project vicinity include a church and a daycare center to the north of the Project alignment and sensitive habitat the south of the Project alignment. The sensitive habitat includes southern riparian forest and Diegan coastal sage scrub. These types of habitats may be used by federally listed avian species for nesting, such as least Bell's vireo in southern riparian forest and coastal California gnatcatcher in Diegan coastal sage scrub.

1.5 Regulatory Framework

The District is not subject to local regulations or ordinances; however, the following is provided for informational purposes.

1.5.1 County of San Diego Municipal Code - Noise Ordinance

Sections 36.401 through 36.423 of the San Diego County Municipal Code discusses County noise requirements. The Noise Ordinance sets limits pertaining to the generation of exterior noise. It is unlawful for any person to cause or allow the creation of any noise to the extent that the one-hour average sound level at any point on or beyond the boundaries of the property.

County of San Diego zoning designations within and immediately adjacent to the Proposed Project include General Commercial (C36), Heavy Commercial (C37), Holding Area (S90), Limited Industrial (M52), Open Space (S80), Specific Plan (S88), Village Residential (VR24), and Transportation and Utility Corridor (S94).

Non-construction nighttime sound level limits are established for the property lines of various land uses in Section 36.404 of the County Noise Ordinance. The applicable hourly sound limit for sensitive receptors (multi-family residences) adjacent to the construction activities is 50 dBA L_{EQ} during nighttime hours (10:00 p.m. to 7:00 a.m.).

Sections 36.408 through 36.411 of the Noise Ordinance establish noise limitations for construction activities. Except for emergency work, it is unlawful for any person to operate or cause to be operated, construction equipment between 7:00 p.m. and 7:00 a.m., or that exceeds an average sound level of 75 dB for an 8-hour period, 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.

1.5.2 Federally Listed Biological Species

Some studies, such as that completed by the Bioacoustics Research Team (1997), have concluded that 60 dBA is a single, simple criterion to use as a starting point for passerine impacts until more specific research is done. Associated guidelines produced by the U.S. Fish and Wildlife Service (USFWS) require that project noise be limited to a level not to exceed 60 dBA L_{EQ} or, if the existing ambient noise level is above 60 dBA, increase the ambient noise level by 3 dBA at the edge of occupied habitat during the avian species breeding season.

2.0 ENVIRONMENTAL SETTING

2.1 Surrounding Land Uses

Most of the Project is located in the unincorporated community of Rancho San Diego in the County, with the westernmost portion of the Project area located in the unincorporated community of Casa de Oro-Mount Helix. The proposed sewer main would be primarily located within existing roads. The beginning and end of the Project site are within two shopping centers: Rancho San Diego Village and Rancho San Diego Towne Center. Open space is located to the south of the Project alignment (where the existing sewer main alignment traverses), and a church, open space, and industrial and commercial uses are located to the north of the Project alignment. The removal of the 210-foot-long elevated sewer main and associated pillars and the capping and plugging of abandoned manholes would take place in the open space area to the south of SR 94.

2.2 Existing Noise Environment

The dominant noise source in the vicinity of the Project alignment is the traffic noise from SR 94.

2.2.1 Ambient Noise Survey

Nine locations were measured for fifteen minutes during the ambient noise survey, as can be seen in Table 2-1, *Noise Measurement Results*. Noise measurement locations are shown on Figure 3. These sites were chosen as they represent where construction would occur within the vicinity of NSLUs (residential, daycare, sensitive habitat, and a church). Six of the nine measurements were taken adjacent to or within sensitive habitat. The highest measurements (Measurements 1, 3, and 8) were taken adjacent to SR 94. For additional information, see Appendix A, *Noise Measurement Sheets*.

Table 2-1 NOISE MEASUREMENT RESULTS						
Measurement	**Location**	**Nearest NSLU**	**Conditions**	**Time**	**dBA L_{EQ}**	**Notes**
1	Near 3754 Avocado Boulevard	Residential	75°F, 2-3 miles per hour (mph) wind, 9 percent humidity	9:56-10:11 a.m.	71.1	Medium traffic
2	90 feet east from Via Mercado centerline, south of daycare center	Daycare/ Habitat	76°F, 2-3 mph wind, 9 percent humidity	10:24-10:39 a.m.	64.8	Medium traffic, but slow due to intersection; noise from children playing at daycare
3	50 feet southwest from SR 94 centerline, near driveway to SDG&E substation	Habitat	79°F, 4-5 mph wind, 6 percent humidity	11:08-11:23 a.m.	76.1	Medium traffic
4	Near elevated pipeline, south of creek	Habitat	80°F, 5-6 mph wind, 5 percent humidity	11:28-11:43 a.m.	53.6	Birds chirping
5	Manhole south of Measurement 4	Habitat	80°F, 4-5 mph wind, 7 percent humidity	12:36-12:52 p.m.	48.7	Birds chirping; airplane overhead at 14th minute for 15 seconds
6	Sewer manhole off trail	Habitat	81°F, 5-6 mph wind, 7 percent humidity	12:10-12:25 p.m.	45.7	Birds chirping
7	Manhole 200 foot west of Jamacha Boulevard	Habitat	80°F, 8 mph wind, 8 percent humidity	1:07-1:22 p.m.	50.8	Birds chirping
8	60 feet from SR 94 centerline, approximately 1,000 feet west of the Campo Road and Jamacha Road intersection	Habitat	82°F, 10-13 mph wind, 9 percent humidity	2:16-2:31 p.m.	76.2	Medium to high traffic
9	Skyline Church parking lot, approximately 275 feet northeast of SR 94 centerline	Church	81°F, 12 mph wind, 9 percent humidity	2:46-3:01 p.m.	53.3	Leaves rustling; vehicle noise from Jamacha Boulevard

3.0 ANALYSIS METHODOLOGY AND ASSUMPTIONS

3.1 Methodology

3.1.1 Ambient Noise Survey

The following equipment was used to measure existing noise levels at the Project site:

- Larson Davis System LxT Integrating Sound Level Meters
- Larson Davis Model CA250 Calibrator
- Windscreen and tripod for the sound level meter
- Digital camera

The sound level meters were field-calibrated immediately prior to the noise measurements to ensure accuracy. All sound level measurements conducted and presented in this report were made with a sound level meter that conforms to the American National Standards Institute (ANSI) specifications for sound level meters (ANSI SI.4-1983 R2001). All instruments were maintained with National Bureau of Standards traceable calibration per the manufacturers' standards.

3.1.2 Noise Modeling Software

Project construction noise was modeled using the Roadway Construction Noise Model (RCNM; U.S. Department of Transportation 2008), which utilizes estimates of sound levels from standard construction equipment. Modeling of the noise barriers was accomplished using Computer Aided Noise Abatement (CadnaA) version 4.4.145 and modeling of the ambient noise was accomplished with Traffic Noise Model (TNM) version 2.5. CadnaA is a model-based computer program developed by DataKustik for predicting noise impacts in a wide variety of conditions. CadnaA assists in the calculation, presentation, assessment, and mitigation of noise exposure. It allows for the input of project-related information, such as noise source data, barriers, structures, and topography to create a detailed CadnaA model, and uses the most up-to-date calculation standards to predict outdoor noise impacts. CadnaA traffic noise prediction is based on the data and methodology used in TNM. TNM was last updated in February 2004 by the U.S. Department of Transportation, and calculates the daytime average hourly L_{EQ} from three-dimensional model inputs and traffic data (Caltrans 2004). Modeling in this analysis was based on Computer Aided Design (CAD) plans provided by the Project Applicant.

3.2 Assumptions

3.2.1 Construction Equipment, Staging, and Schedule

In this report, construction is analyzed in three main phases: pipeline trenching, pipeline tunneling, and pipeline abandonment.

3.2.1.1 *Construction Equipment*

The District anticipates that a construction crew of approximately 8 to 10 workers would typically be present on-site during active construction. The types of construction equipment projected to be required for the construction activities include the following:

- Pipeline Trenching
- Pavement cutter
- Excavators (2)
- Crane
- Front end loader
- Skid Steer
- Water truck (for dust control and compaction)
- Street sweeper
- Various hand-operated soil compaction equipment
- Pipe delivery truck
- Sand delivery truck
- Concrete truck
- Portable generator (diesel or gas driven)
- Horizontal auger
- Jackhammer
- Air compressor

3.2.1.2 *Construction Staging*

Construction-related equipment and materials storage and worker parking would occur in disturbed and developed areas along the Project alignment that are approved by the Caltrans and the County. Possible staging locations include the flat area adjacent to Skyline Church's western driveway and the parking lots at the Rancho San Diego Shopping Center and the Rancho San Diego Towne Center.

3.2.1.3 *Construction Schedule*

Construction activities are expected to begin in fall 2016 and be completed by early 2018. In order to minimize disruptions to the local community, construction and equipment maintenance are anticipated to be limited to weekdays (excluding holidays) from 7:00 a.m. through 7:00 p.m.; however, if multiple lanes needed to be closed on SR 94 or Jamacha Road for pipeline installation, Caltrans could require that such work occur only at night.

As mentioned earlier, the breeding season for federally listed avian species located in sensitive habitat near the construction would be February 15 to August 31 for coastal California gnatcatcher and March 15 to September 15 for least Bell's vireo. Therefore, construction may occur within the breeding seasons; for the purposes of a conservative analysis, it is assumed that construction would coincide with the breeding seasons.

3.2.2 Site Conditions

The Project site includes topographical conditions that may affect noise generation or control planning. South of the proposed pipeline alignment along SR 94, the elevation drops approximately 10 feet within the adjacent creek (which contains least Bell's vireo habitat). Further south, the elevation increases above the proposed pipeline alignment elevation. Where appropriate, the noise-control planning described in this report is based on site topography.

For the purposes of this analysis, it was assumed that the southern riparian forest was occupied with least Bell's vireos and the Diegan coastal sage scrub was occupied by coastal California gnatcatchers.

To estimate the ambient noise levels from existing traffic near the sensitive habitat areas, traffic data was obtained from San Diego Association of Governments' (SANDAG's) 2020 traffic forecasts for SR 94 between Via Mercado and Jamacha Boulevard, which forecasts 49,200 average daily trips (ADT) for this section of roadway (SANDAG 2011). Ambient noise through the adjacent creek was then modeled using TNM assuming 9 percent of trips for peak hour, with 95 percent of peak hour trips being automobiles (4,162 trips), 4 percent of peak hour trips being medium trucks (177 trips), and 1 percent of peak hour trips being heavy trucks (89 trips). The speed limit in this section of SR 94 is 55 mph. The depths of the adjacent creek and the associated distances from the SR 94 centerline were estimated based upon elevations in Google Earth. Results of the modeling are shown in Table 3-1, *Modeled Existing Traffic Ambient Noise Levels – South of Proposed Pipeline*.

Table 3-1
MODELED EXISTING TRAFFIC AMBIENT NOISE LEVELS – SOUTH OF PROPOSED PIPELINE

Distance from SR 94 Centerline (feet)	Height Relative to SR 94 Centerline (feet)	Existing Traffic Noise Level (dBA L_{EQ})
50	0	79.0
70	-2.5	73.7
90	-5	71.2
110	0	65.6
130	-5	70.2
150	-2.5	73.2
170	0	72.9
190	2.5	71.6
210	5	67.8

The topography north of SR 94 near the proposed staging area is different than south of the roadway; the ground in this area slopes steadily upwards (based on Google Earth). Modeling results near this area are shown in Table 3-2, *Modeled Existing Traffic Ambient Noise Levels – Near Construction Staging Area*. The sensitive habitat for the coastal California gnatcatcher begins at approximately 400 feet north of the SR 94 centerline in this area.

Table 3-2 MODELED EXISTING TRAFFIC AMBIENT NOISE LEVELS – NEAR CONSTRUCTION STAGING AREA		
Distance from SR 94 centerline (feet)	**Height Relative to SR 94 centerline (feet)**	**Ambient Noise Level (dBA L_{EQ})**
50	0	79.0
100	0	75.7
150	1	73.6
200	3	71.9
250	9	70.7
300	12	69.6
350	15	68.7
400	17	67.8
450	22	67.0
500	22	66.3

The results in Table 3-1 and Table 3-2 generally correlate with the measured ambient noise levels in Table 2-1. However, at the farther distances south of the pipeline alignment, measured field ambient noise levels are lower than the modeled noise levels. This is likely due to the sound attenuation provided by the ground, which acts as a natural berm; the thick vegetation within the creek, which blocks the line of sight from SR 94 in most locations; and the soft groundcover, which attenuates the sound at a faster rate than a hard surface.

For the purposes of noise impact analysis, the modeled ambient noise levels south of the proposed Project area were used for the area within 300 feet of the SR 94 centerline, which generally encompasses least Bell's vireo habitat and some coastal California gnatcatcher habitat. The lowest modeled ambient existing traffic noise level, 65.6 dBA L_{EQ}, is assumed to be the baseline for assessing construction noise impacts in sensitive habitat. In locations further than 300 feet from the SR 94 centerline, baseline noise levels are assumed not to exceed 60 dBA $L_{EQ.}$ Therefore, a 60 dBA L_{EQ} threshold is assumed beyond 300 feet. The limits used for sensitive habitat construction noise are shown on Figure 4, *Sensitive Species Construction Noise Limits*.

3.2.3 Vibration

Construction vibration for the Project may be caused by excavators working on open trenching or jacking and receiving pits and the use of a horizontal auger for tunnel boring. Caltrans provides a vibration level of 0.089 peak particle velocity (PPV) in inches per second (in/s) for a large dozer or caisson drill and 0.035 PPV in/s for a jackhammer (Caltrans 2013). It is assumed that an excavator or a horizontal auger would produce a lower PPV than a large dozer or caisson drill. Therefore, as a conservative measure, dozer and caisson drill vibration levels are used as a proxy for excavator and horizontal auger levels.

4.0 IMPACTS

4.1 Guidelines for the Determination of Significance

The District is not subject to County regulations or ordinances. However, for the purposes of this analysis, County guidelines are used to assess impacts. Therefore, construction noise impacts are considered significant if:

- Construction equipment noise exceeds an average sound level of 75 decibels for an 8-hour period (75 dBA L_{EQ} [8-hour]), between 7:00 a.m. and 7:00 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.

- Construction equipment is operated between 7:00 p.m. and 7:00 a.m. and exceeds the County's property line (non-construction) sound level standards.

- Construction traffic noise would exceed 60 CNEL if existing conditions are below 60 CNEL, or would increase noise by 3 CNEL if existing conditions are over 60 CNEL.

- Generate construction noise that exceeds 60 dBA L_{EQ} or, if the existing ambient noise level is above 60 dBA, increase the ambient noise level by 3 dBA at the edge of sensitive biological habitat during the breeding season (February 15 to August 31 for coastal California gnatcatcher and March 15 to September 15 for least Bell's vireo).

- Construction vibration shall not exceed the "severe" criterion, as specified by Caltrans (2013), for residences of 0.4 in/s PPV.

4.2 Construction Noise Impacts

Construction of the Project would generate elevated noise levels that may disrupt nearby noise sensitive receptors. The magnitude of the impact would depend on the type of construction activity, equipment, duration of each construction phase, distance between the noise source and receiver, and any intervening structures.

4.2.1 Trenched Pipeline

4.2.1.1 *Residential, Daycare, and Church Impacts*

Trenching would be performed along the entire Project alignment, except for the two tunneling sections under SR 94 (described below under 4.2.2, Tunneling). NSLUs would be located along much of the alignment, including:

- Single-family residences, off Avocado Boulevard, approximately 130 feet to the west of the westernmost extent of the Project alignment;

- A daycare center, off Via Mercado, approximately 50 feet to the east;

- Single-family residences, off Via Mercado, approximately 190 feet to the northeast;

- Skyline Church, off SR 94, approximately 385 feet north; and
- Multi-family residences approximately 1,000 feet to the northeast from the easternmost extent of the Project alignment (where nighttime construction may occur).

The loudest noise from trenching would be generated from an excavator digging the trench and a dump truck loading and hauling the dug material. As a reasonable worst-case scenario, the two pieces of equipment were assumed to operate simultaneously and to be operating for 40 percent of an 8-hour construction day. The modeled 75 dBA L_{EQ} noise contour for a dump truck and excavator operating under these conditions is approximately 75 feet. Therefore, as open trenching construction activities would not operate within 75 feet of single-family residences and Skyline Church, impacts to the NSLUs would be less than significant.

Although trenching construction activities would be conducted within 75 feet of the daycare center, noise levels would not exceed the 75 dBA L_{EQ} threshold. Site-specific modeling was conducted that accounted for the daycare center's higher elevation than construction activities and the center's 3- to 5-foot retaining wall. When accounting for these noise attenuating factors, the operation of a dump truck and an excavator would be reduced to 73 dBA L_{EQ}. Therefore, trenching noise impacts to the daycare center would be less than significant.

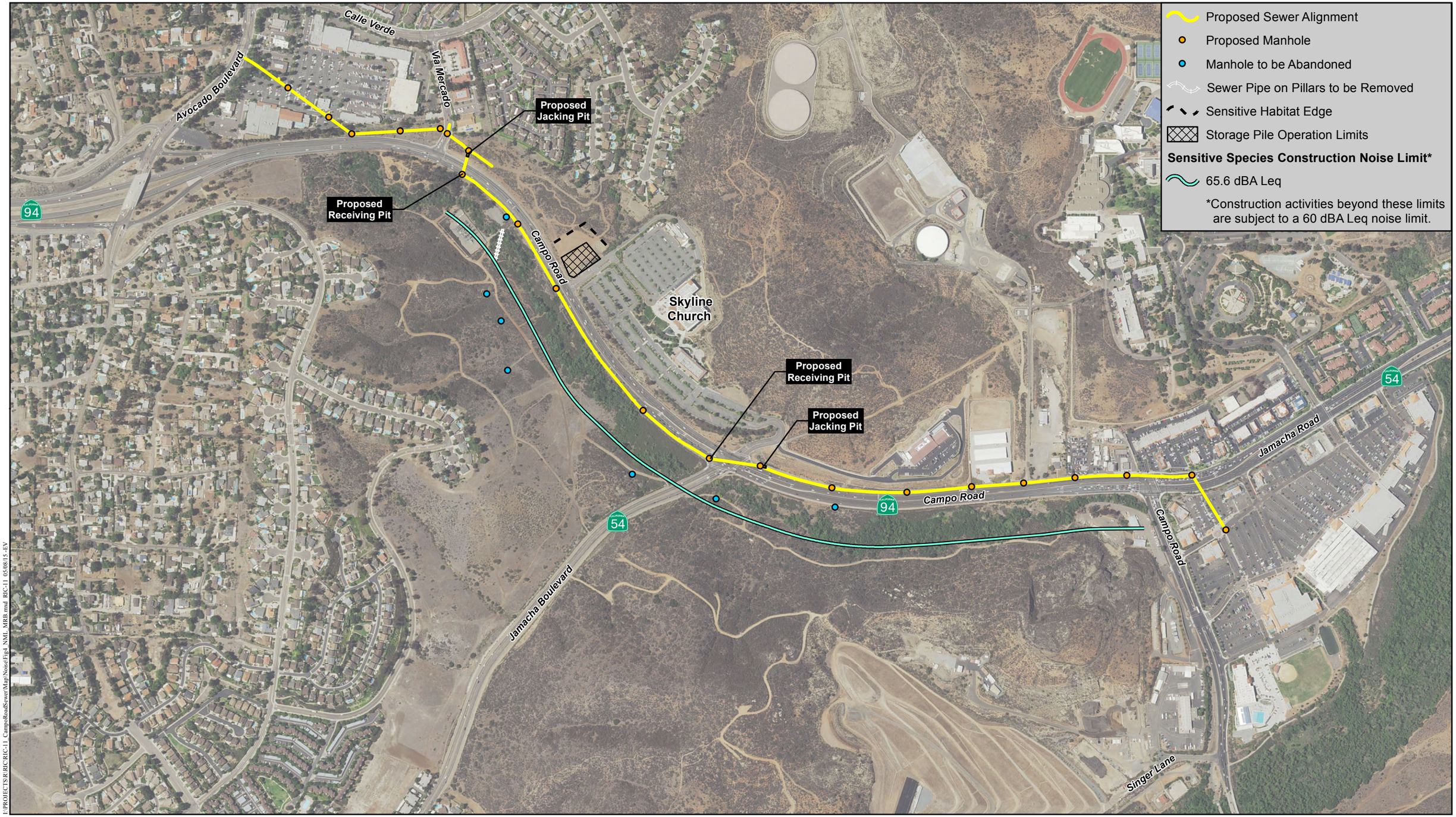
At the easternmost extent of the Project alignment, open trenching across Jamacha Road would possibly require nighttime construction. At 1,000 feet to the multi-family apartments off Cuyamaca College Drive and assuming no intervening structures, an excavator and dump truck would generate a noise level of 52.1 dBA L_{EQ}. However, multiple structures would block the line of sight between the trenching construction activities and the apartments that would attenuate the noise level by at least 5 dBA L_{EQ}. Therefore, trenching would not exceed the nighttime property boundary noise limits in a multi-family zone of 50 dBA, and impacts would be less than significant.

4.2.1.2 *Sensitive Habitat Impacts*

Sensitive habitat for nesting birds would be located along much of the planned trenching areas, from where the alignment crosses SR 94 east of Via Mercado to just before where the alignment enters Jamacha Road. All southern riparian forest in the area is assumed to have least Bell's vireo present and all Diegan coastal sage scrub is assumed to have coastal California gnatcatcher present during the breeding seasons.

Based upon the modeled ambient noise levels within the sensitive habitat area from Table 3-1, the existing ambient noise level was assumed to be 65.6 dBA L_{EQ}. Open trenching construction activities would occur as close as 10 feet to sensitive habitat. As noted earlier, impacts would be significant if construction noise exceeds this level by 3 dBA.

The loudest noise from trenching would be generated from an excavator digging the trench and a dump truck loading and hauling the dug material. As a reasonable worst-case scenario, the two pieces of equipment were assumed to operate simultaneously and to be operating for 40 percent of an 8-hour construction day. The modeled 65.6 dBA L_{EQ} noise contour for a dump truck and excavator is approximately 210 feet (in other words, noise levels within 210 feet would exceed



Sensitive Species Construction Noise Limits

CAMPO ROAD SEWER MAIN REPLACEMENT

HELIX Environmental Planning

0 600 Feet

Figure 4

I:\PROJECTS\R\RIC\RIC-11_CampoRoadSewerMap\NoiseFig4_NML_MRB.mxd RIC-11 05/08/15 -EV

this volume). Therefore, as open trenching construction activities would occur within 210 feet of sensitive habitat, impacts to sensitive habitat would be potentially significant. With the possibility of working as close as 10 feet from sensitive habitat, noise levels could be as high as 92.1 dBA L_{EQ}. With implementation of Mitigation Measure M-Noi-1, impacts would be less than significant.

4.2.1.3 *Mitigation*

M-Noi-1 **Temporary Noise Barriers for Trenching Construction Activities.** Trenching construction activities involving a dump truck and an excavator may generate significant noise impacts to sensitive habitat if operated within 210 feet of the habitat. If a dump truck and an excavator are operated within this distance during the breeding seasons of coastal California gnatcatcher (February 15 to August 31) or least Bell's vireo (March 15 to September 15), a temporary noise barrier between the construction equipment and the sensitive habitat shall be used to reduce noise impacts to baseline noise levels of 65.6 dBA L_{EQ}.

An 8-foot high temporary noise barrier meeting the specifications listed below (or of a STC 19 rating or better) would attenuate noise at the sensitive habitat to less than baseline noise levels of 65.6 dBA L_{EQ}. The sound attenuation fence or wall must be solid. It can be constructed of masonry, wood, plastic, fiberglass, steel, or a combination of those materials, as long as there are no cracks or gaps, through or below the wall. Any seams or cracks must be filled or caulked. If wood is used, it can be tongue and groove and must be at least 3/4-inch total thickness or have a density of at least 3½ pounds per square foot.

4.2.1.4 *Significance After Mitigation*

With implementation of Mitigation Measure M-Noi-1, noise impacts to sensitive habitat from trenching construction activities would be reduced to less than significant levels.

4.2.2 Tunneling

Tunneling activities would result in noise impacts at the locations of the jacking and receiving pits and at the tunnel boring locations, as described below.

4.2.2.1 *Residential and Daycare Impacts*

There would be two jacking pits: one located just east of Via Mercado (western jacking pit) and one located near the southern driveway for Skyline Church (eastern jacking pit). The NSLUs near the western jacking pit would be the daycare center, at an approximate distance of 125 feet to the north, single-family residences, at an approximate distance of 190 feet to the north, and coastal California gnatcatcher habitat at an approximate distance of 10 feet. The closest NSLU to the eastern jacking pit would be sensitive habitat at an approximate distance of 150 feet to the south.

Prior to work within the pit, an excavator with a drill attached would install soldier pilings to reinforce the pit. The jacking pits would then be dug with an excavator and a dump truck. As a

reasonable worst-case scenario, the two pieces of equipment were assumed to operate simultaneously and to be operating for 40 percent of an 8-hour construction day. The modeled 75 dBA L_{EQ} noise contour for a dump truck and excavator operating under these conditions is approximately 75 feet. Therefore, as the jacking and receiving pits construction activities would not operate within 75 feet of single-family residences and the daycare center, impacts to the NSLUs would be less than significant.

Tunnel boring would occur in the same location as the jacking pits. The horizontal auger would be run with either a diesel-powered motor or an electric-powered motor. The diesel-powered motor would be operated fully within the jacking pit; therefore, it would not generate significant noise outside of the pit. The electric-powered motor would require a generator outside of the pit that would generate noise.

As a reasonable worst-case scenario, the generator was assumed to operate for 50 percent of an 8-hour construction day. The modeled 75 dBA L_{EQ} noise contour for a generator operating under these conditions is approximately 30 feet and the 60 dBA L_{EQ} noise contour is approximately 155 feet. Therefore, as the tunnel boring construction activities would not operate within 30 feet of single-family residences and the daycare center impacts to those NSLUs would be less than significant.

4.2.2.2 *Sensitive Habitat Impacts*

Based upon the modeled ambient noise levels within the sensitive habitat area from Table 3-1, the ambient noise level is conservatively assumed to be 65.6 dBA L_{EQ}. The closest sensitive habitat to the western jacking pit would be coastal California gnatcatcher habitat, which would surround the pit at an approximate distance of 10 feet. The closest sensitive habitat to the eastern jacking pit would be coastal California gnatcatcher and least Bell's vireo habitat at an approximate distance of 150 feet to the south.

The loudest noise from jacking and receiving pits construction activities would be generated from an excavator and a dump truck. As a reasonable worst-case scenario, the two pieces of equipment were assumed to operate simultaneously and to be operating for 40 percent of an 8-hour construction day. The modeled 65.6 dBA L_{EQ} noise contour for a dump truck and excavator is approximately 210 feet. For the western jacking pit, with the possibility of working as close as 10 feet from coastal California gnatcatcher habitat, noise levels could be as high as 92.1 dBA L_{EQ}. The habitat in this area is disturbed, surrounded by development, and next to a high traffic roadway (SR 94). In addition, no coastal California gnatcatcher surveys have identified a gnatcatcher in this area. However, the possibility of a nesting coastal California gnatcatcher still exists. Therefore, as jacking and receiving pits construction activities would occur within 210 feet of sensitive habitat, impacts would be potentially significant.

For the eastern jacking pit, with the possibility of working as close as 150 feet from sensitive habitat, noise levels could be as high as 68.6 dBA L_{EQ}. Therefore, as jacking and receiving pits construction activities would occur within 210 feet of sensitive habitat, impacts would be potentially significant.

At the tunnel boring location, the modeled 65.6 dBA L_{EQ} noise contour is approximately 80 feet. Impacts from tunnel boring at the eastern jacking pit would not occur within 80 feet of sensitive habitat and would be less than significant. However, tunnel boring would occur at an approximate distance of 10 feet from coastal California gnatcatcher habitat at the western jacking pit. At a distance of 10 feet, noise levels could be as high as 83.8 dBA L_{EQ}. The habitat in this area is disturbed, surrounded by development, and next to a high traffic roadway (SR 94). In addition, no coastal California gnatcatcher surveys have identified presence of the species in this area. However, the possibility of a nesting coastal California gnatcatcher still exists. Therefore, as tunnel boring construction activities would occur within 80 feet of sensitive habitat, impacts would be potentially significant.

4.2.2.3 *Mitigation*

M-Noi-2 **Preconstruction Survey for Western Jacking Pit Construction Activities.** Construction activities for the western jacking pit involving a dump truck and an excavator may generate significant noise impacts to coastal California gnatcatcher habitat if operated within 210 feet of the sensitive habitat. Due to the close distance to sensitive habitat that a dump truck and excavator would have to operate for the western jacking pit, barrier mitigation to reduce noise impacts to sensitive habitat to less than significant levels would be infeasible. Therefore, if western jacking pit activities would occur during the breeding season for the coastal California gnatcatcher (February 15 to August 31), a qualified biologist shall conduct a study confirming the absence of coastal California gnatcatchers within 250 feet of the construction activities prior to start of work or, if work has already begun, prior to the breeding season. If coastal California gnatcatchers are found to be present, construction activities shall cease until the close of the breeding season.

M-Noi-3 **Temporary Noise Barriers for Eastern Jacking Pit Construction Activities.** Eastern jacking pit construction activities involving a dump truck and an excavator may generate significant noise impacts to sensitive habitat if operated within 210 feet of the habitat. If a dump truck and an excavator are operated within this distance during the breeding seasons of coastal California gnatcatcher (February 15 to August 31) or least Bell's vireo (March 15 to September 15), a temporary noise barrier between the construction equipment and the sensitive habitat shall be used to reduce noise impacts to baseline noise levels (65.6 dBA L_{EQ}).

An 8-foot high barrier meeting a STC 19 rating or better would attenuate noise at the sensitive habitat to less than baseline noise levels of 65.6 dBA L_{EQ}. The sound attenuation fence or wall must be solid. It can be constructed of masonry, wood, plastic, fiberglass, steel, or a combination of those materials, as long as there are no cracks or gaps, through or below the wall. Any seams or cracks must be filled or caulked. If wood is used, it can be tongue and groove and must be at least 3/4-inch total thickness or have a density of at least 3½ pounds per square foot.

M-Noi-4 **Preconstruction Survey for Western Tunnel Boring Construction Activities.** Tunnel boring activities at the western jacking pit involving a generator may create significant noise impacts to coastal California gnatcatcher habitat if operated within 80 feet of the sensitive habitat. Due to the close distance that a generator would have to operate for tunnel boring construction activities, barrier mitigation to reduce noise impacts to sensitive habitat to less than significant levels would be infeasible. Therefore, if tunnel boring at the western jacking pit would occur during the breeding season for the coastal California gnatcatcher (February 15 to August 31), a qualified biologist shall conduct a study confirming the absence of coastal California gnatcatchers within 250 feet of tunneling construction work prior to start of work or, if work has already begun, prior to the breeding season. If coastal California gnatcatchers are found to be present, construction activities shall cease until the close of the breeding season.

4.2.2.4 *Significance After Mitigation*

With implementation of Mitigation Measures M-Noi-2, M-Noi-3, and M-Noi-4, noise impacts to sensitive habitat from the jacking pits and tunnel boring construction activities would be reduced to less than significant levels.

4.2.3 Storage Piles

4.2.3.1 *Residential and Church Impacts*

Storage piles would potentially be located at the staging locations and would be used as temporary placement for soil and other material. The two staging locations within the shopping centers would not be located near any NSLUs and no impacts from these locations would occur. The staging location next to the Skyline Church's western driveway would be located approximately 500 feet from church buildings. The loudest noise from storage pile-related construction activities would be a dump truck and front-end loader loading and unloading materials. These pieces of equipment operating simultaneously for 40 percent of an 8-hour construction day would generate a noise level of 57.0 dBA L_{EQ} at 500 feet. Impacts to the church from storage piles would be less than significant.

4.2.3.2 *Sensitive Habitat Impacts*

The staging location next to Skyline Church would be adjacent to Diegan coastal sage scrub, which is assumed to be occupied by coastal California gnatcatchers. The staging location would be located in a flat area that begins approximately 70 foot north of the SR 94 centerline and extends approximately 400 feet north of the SR 94 centerline and 300 feet west of the church's driveway.

Based upon the modeled ambient noise levels within the Diegan coastal sage scrub from Table 3-2, the baseline ambient noise level is assumed to be 67.8 dBA L_{EQ} at 400 feet from the SR 94 centerline.

A dump truck and front-end loader operating simultaneously for 40 percent of an 8-hour construction day would generate a noise level of 67.8 dBA L_{EQ} at a distance of 145 feet.

Therefore, if these pieces of equipment were operated within 145 feet of coastal California gnatcatcher habitat, impacts would be potentially significant.

4.2.3.3 *Mitigation*

M-Noi-5 **Storage Pile Operation Setbacks During Breeding Season.** Dump trucks and front-end loaders shall not operate within 145 feet of the edge of occupied coastal California gnatcatcher habitat (as shown on Figure 4) during the breeding season (February 15 to August 31).

4.2.3.4 *Significance After Mitigation*

With implementation of Mitigation Measure M-Noi-5, noise impacts to sensitive habitat from the storage piles at the staging location near Skyline Church would be reduced to less than significant levels through storage pile setbacks from the coastal California gnatcatcher habitat.

4.2.4 Pipeline Abandonment

Activities that may generate noise during pipeline abandonment include manhole capping/ plugging and removal of the elevated pipeline, as described below.

4.2.4.1 *Residential Impacts*

Pipeline abandonment activities would be located at a minimum of 450 feet from the nearest residential land uses. At this distance, noise levels would not exceed 63.1 dBA L_{EQ} and impacts would not be significant.

4.2.4.2 *Sensitive Habitat Impacts*

The seven manholes to be capped and plugged would first have their concrete dome demolished using a jackhammer, an air compressor, and a skid steer. Based upon the modeled ambient noise levels within the sensitive habitat area from Table 3-1, the ambient noise level where manhole construction activities would take place within 300 feet of the SR 94 centerline is conservatively assumed to be 65.6 dBA L_{EQ}. The northernmost manhole and the two easternmost manholes to be capped and plugged would be within this distance. As discussed in Section 3.2.2, for distances beyond 300 feet from SR 94, the noise limit is assumed to be 60 dBA $L_{EQ.}$ These construction activities would occur as close as 5 feet to coastal California gnatcatcher habitat.

As a reasonable worst-case scenario, a jackhammer, air compressor, and skid steer were assumed to operate simultaneously and to be operating for 20 percent of an 8-hour construction day. For the three manholes within 300 feet of the SR 94 centerline, the modeled 65.6 dBA L_{EQ} noise contour for a jackhammer, air compressor, and skid steer is approximately 340 feet. Manhole construction activities at a distance of 5 feet from sensitive habitat would expose sensitive habitat to a noise level as high as 102.2 dBA L_{EQ}. Therefore, as the aforementioned manhole construction activities would occur within 340 feet of sensitive habitat, impacts would be potentially significant.

For the four manholes further than 300 feet of the SR 94 centerline, the 60 dBA L_{EQ} noise contour is approximately 650 feet. Therefore, as manhole removal activities would occur within 650 feet of sensitive habitat, impacts to sensitive habitat would be potentially significant.

The 210-foot long section of elevated pipeline would be removed with hand tools and a crane. The hand tools would cut the pipeline and the crane would lift the pipeline out of the creek area.

The elevated pipeline is located approximately 190 feet from the SR 94 centerline; the modeled ambient noise for this location was approximately 71.6 dBA L_{EQ}. However, the ambient noise measured in this location was 53.6 dBA L_{EQ}. The measured noise is likely attenuated to a greater degree than modeled as in the area the ground acts as a natural berm, the thick vegetation within the creek blocks the line of sight from SR 94 in most locations, and the soft groundcover attenuates the sound at a faster rate than a hard surface. Therefore, a significant noise impact to sensitive habitat would occur if elevated pipeline construction activities exceed 60 dBA L_{EQ}.

A crane was assumed to be operated on the dirt road to the west of the elevated pipeline, at a distance of approximately 10 feet from least Bell's vireo and coastal California gnatcatcher habitat. The crane was assumed to be operating for 16 percent of an 8-hour construction day. The modeled 60 dBA L_{EQ} noise contour for a crane is approximately 215 feet. Elevated pipeline removal activities at a distance of 10 feet from sensitive habitat would expose the habitat to a noise level as high as 86.6 dBA L_{EQ}. Therefore, as the elevated pipeline removal activities would occur within 215 feet of sensitive habitat, impacts would be potentially significant.

4.2.4.3 *Mitigation*

M-Noi-6 **Manhole Removal Activity Restrictions.** Due to the close distance that a jackhammer, an air compressor, and a skid steer would have to operate to remove each manhole's concrete dome, barrier mitigation to reduce noise levels to avoid impacts to sensitive habitat would be infeasible. Therefore, manhole removal activities shall not occur during the breeding seasons for the coastal California gnatcatcher (February 15 to August 31) or least Bell's vireo (March 15 to September 15).

M-Noi-7 **Elevated Pipeline Removal Restrictions.** Due to the close distance to sensitive habitat that a crane would operate to remove the elevated pipeline, barrier mitigation to reduce noise levels to avoid impacts to sensitive habitat would be infeasible. Therefore, operation of a crane to remove the elevated pipeline shall not occur during the breeding seasons for the coastal California gnatcatcher (February 15 to August 31) or least Bell's vireo (March 15 to September 15).

4.2.4.4 *Significance After Mitigation*

With implementation of Mitigation Measures M-Noi-6 and M-Noi-7, noise impacts to sensitive habitat from the manhole and elevated pipeline removal would be reduced to less than significant levels through restricting removal activities to outside of the breeding seasons for coastal California gnatcatcher and least Bell's vireo.

4.2.5 Construction Traffic

As described in Section 3.2.3, the 2020 traffic forecasts for SR 94 in the Project area are for 49,200 ADT. A general rule of thumb is that the doubling of ADT would cause a doubling in noise (a 3 dBA increase), which would be considered a significant increase. As the Project would have 8 to 10 workers that would generate an estimated 16 to 20 ADT, the increase in traffic from the Project would have a negligible impact on noise. Therefore, impacts from construction traffic are less than significant.

4.3 Construction Vibration Impacts

4.3.1 Trenched Pipeline

An excavator would be expected to create the highest vibration levels during trenched pipeline construction. Per Caltrans guidance provided in Section 3.2.3, an excavator is expected to generate vibration levels of 0.089 PPV in/s at 25 feet. The closest vibration-sensitive land use from trenching would be the daycare center, located approximately 50 feet north. Therefore, as the excavator's vibration would be below the criterion of 0.4 PPV in/s at 25 feet, vibration impacts would be less than significant at the daycare center.

4.3.2 Tunneling

An excavator would be expected to create the highest vibration levels during jacking and receiving pits construction. Per Caltrans guidance provided in Section 3.2.3, an excavator is expected to generate vibration levels of 0.089 PPV in/s at 25 feet. The closest vibration-sensitive land use from jacking and receiving pits would be the daycare center, located approximately 125 feet north. Therefore, as the excavator's vibration would be below the criterion of 0.4 PPV in/s at 25 feet, vibration impacts would be less than significant at the daycare center.

A horizontal auger would be expected to create the highest vibration levels during tunnel boring. Per Caltrans guidance provided in Section 3.2.3, a horizontal auger is expected to generate vibration levels of 0.089 PPV in/s at 25 feet. The closest vibration-sensitive land use from tunnel boring would be the daycare center, located approximately 125 feet north. Therefore, as the horizontal auger's vibration would be below the criterion of 0.4 PPV in/s at 25 feet, vibration impacts would be less than significant at the daycare center.

4.3.3 Pipeline Abandonment

Caltrans provides vibration levels for a jackhammer of 0.035 PPV in/s at 25 feet. The closest vibration-sensitive land use from trenching would be single-family residences, located approximately 450 feet south of the manhole where noise measurement M6 was taken. Therefore, as the jackhammer's vibration would be below the criterion of 0.4 PPV in/s at 25 feet, vibration impacts would be less than significant at the single-family residences.

5.0 LIST OF PREPARERS

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6.0 REFERENCES

Bioacoustics Research Team

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Appendix A

NOISE MEASUREMENT SHEETS

Site Survey

Job # RIC-11	Project Name: Campo Road Sewer Main Replace

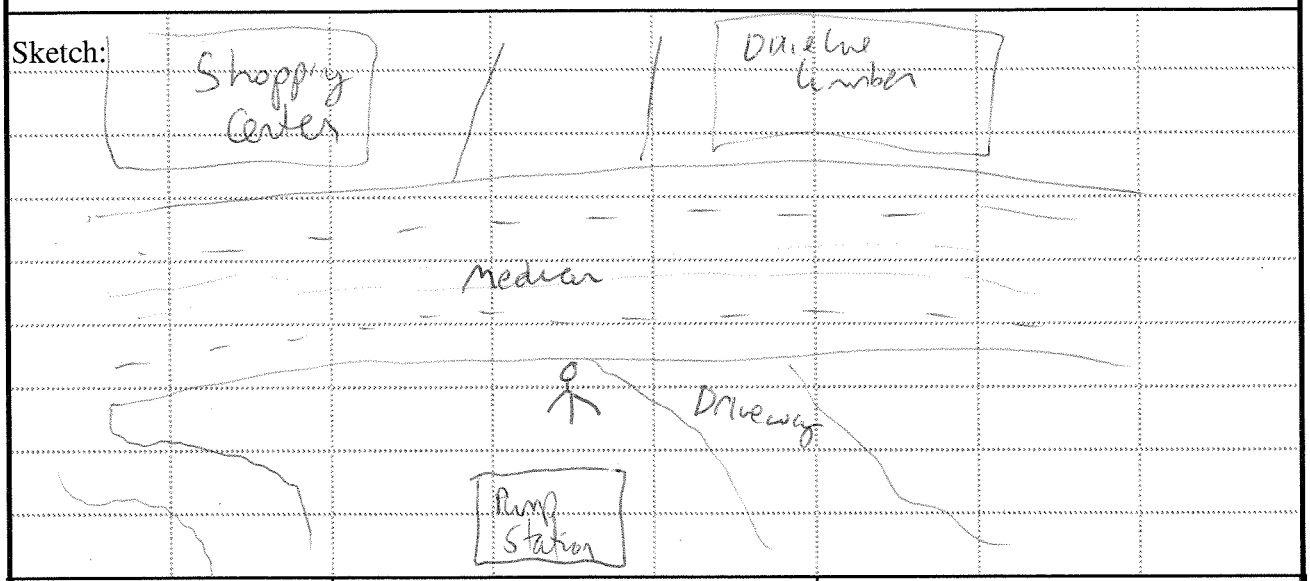
Date: 4/16/2015	Site #: 1	Engineer: Bill Vosti

Address: 3754 Avocado Blvd

Meter: LxT	Serial #: 001390	Calibrator: CAS250	Serial #: 2621

Notes: Medium traffic

Sketch:



Temp: 75°	Wind Spd: 2-3 mph, 5 mph gusts mph	Humidity: 9 %

Start of Measurement: 9:56	End of Measurement: 10:11	71.1 dBA L_{EQ}

Cars (tally per 5 cars)	Medium Trucks (MT)	Heavy Trucks (HT)
Noise Measurement for Information Only		
No Through Roadways		
No Calibration Analysis Will Be Provided		

831_Data_072

Site Survey

Job # RIC-11	Project Name: Campo Road Sewer Main Replace

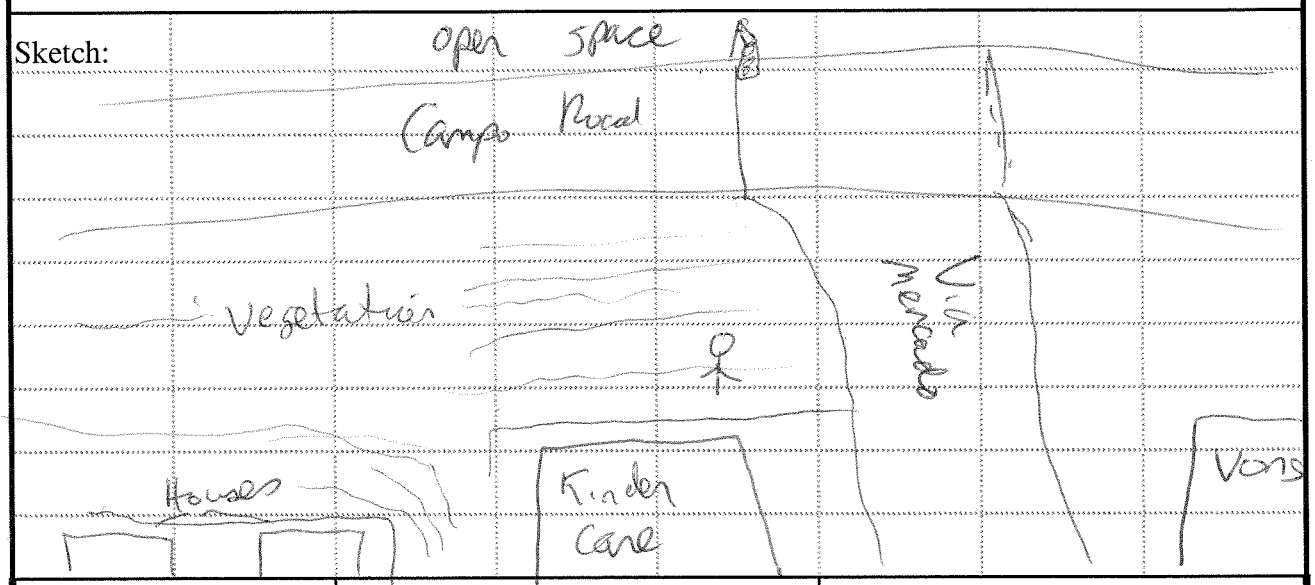
Date: 4/16/2015	Site #: 2	Engineer: Bill Vosti

Address: Via Mercado

Meter: LxT	Serial #: 0001390	Calibrator: CA250	Serial #: 2621

Notes: Medium traffic, but slow due to intersection.
Children playing from daycare

Sketch:



Temp: 76°	Wind Spd: 2-3 mph mph	Humidity: 9 %

Start of Measurement: 10:24	End of Measurement: 10:39	64.8 dBA L_{EQ}

Cars (tally per 5 cars)	Medium Trucks (MT)	Heavy Trucks (HT)
Noise Measurement for Information Only		
No Through Roadways		
No Calibration Analysis Will Be Provided		

32.75 N
-116.96 E

831-Data.073

Site Survey

Job # RIC-11	Project Name: Campo Road Sewer Main Replace

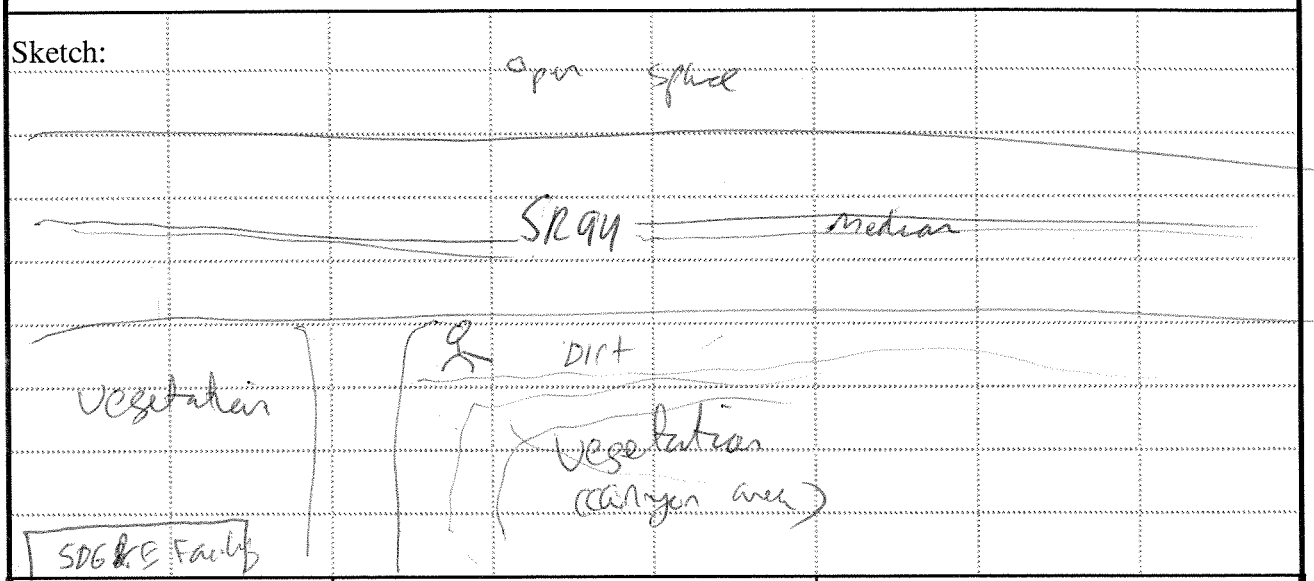
Date: 4/16/2015	Site #: 3	Engineer: Bill Vosti

Address: 32.74298°N, -116.95669° E off SR 94/ Campo Rd

Meter: LxT	Serial #: 001390	Calibrator: CA250	Serial #: 2621

Notes: Medium traffic

Sketch:



Temp: 79°	Wind Spd: 4-5 mph mph	Humidity: 6 %

Start of Measurement: 11:08	End of Measurement: 11:23	76.1 dBA L_{EQ}

Cars (tally per 5 cars)	Medium Trucks (MT)	Heavy Trucks (HT)
Noise Measurement for Information Only		
No Through Roadways		
No Calibration Analysis Will Be Provided		

831_Data.079

Site Survey

Job # RIC-11	Project Name: Campo Road Sewer Main Replace

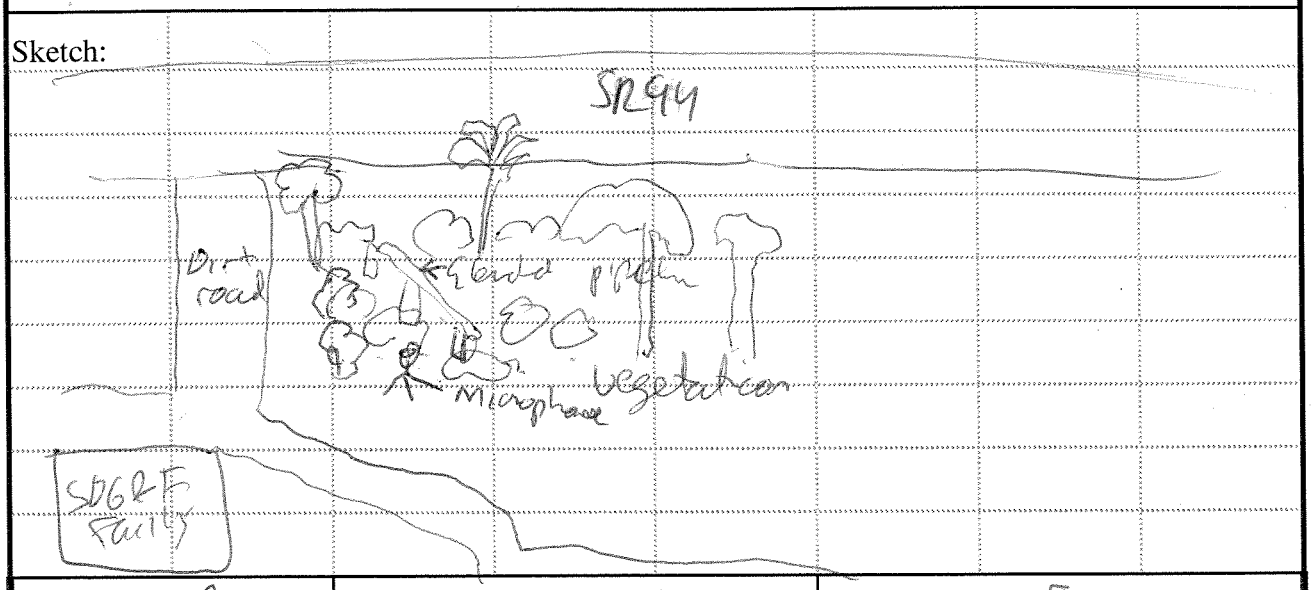
Date: 4/16/2015	Site #: 4	Engineer: Bill Vosti

Address: Near elevated pipeline, 32.749351°N, -116.956605 E

Meter: LxT	Serial #: 001390	Calibrator: CA250	Serial #: 2621

Notes:

Sketch:



Temp: 80°	Wind Spd: 5-6 mph	Humidity: 5 %

Start of Measurement: 11:20	End of Measurement:	53.6 dBA L_{EQ}

Cars (tally per 5 cars)	Medium Trucks (MT)	Heavy Trucks (HT)
Noise Measurement for Information Only		
No Through Roadways		
No Calibration Analysis Will Be Provided		

831-data 075

Site Survey

Job # RIC-11	Project Name: Campo Road Sewer Main Replace

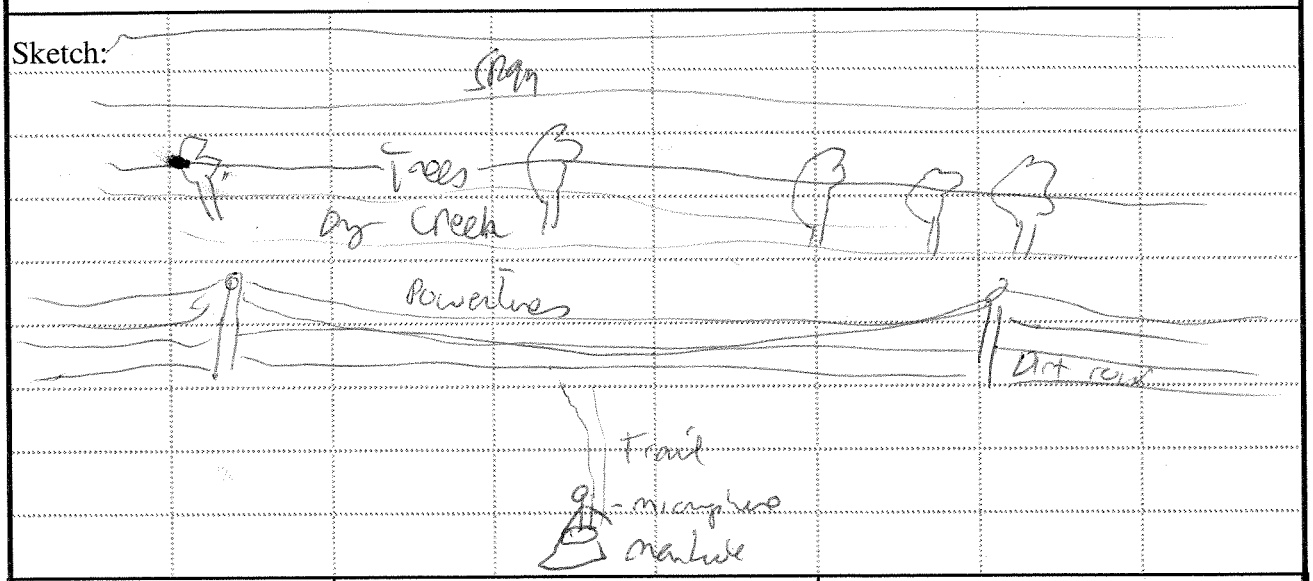
Date: 4/16/2015	Site #: 5	Engineer: Bill Vosti

Address: Sewer manhole, N 32.741665°, E -116.956423

Meter: LxT	Serial #: 001390	Calibrator: CA250	Serial #: 2621

Notes:

Sketch:



Temp: 81°	Wind Spd: 5-6 mph	Humidity: 7 %

Start of Measurement: 12:10	End of Measurement: 12:25	45.7 dBA L_{EQ}

Cars (tally per 5 cars)	Medium Trucks (MT)	Heavy Trucks (HT)
Noise Measurement for Information Only		
No Through Roadways		
No Calibration Analysis Will Be Provided		

.076

Site Survey

Job # RIC-11	Project Name: Campo Road Sewer Main Replace

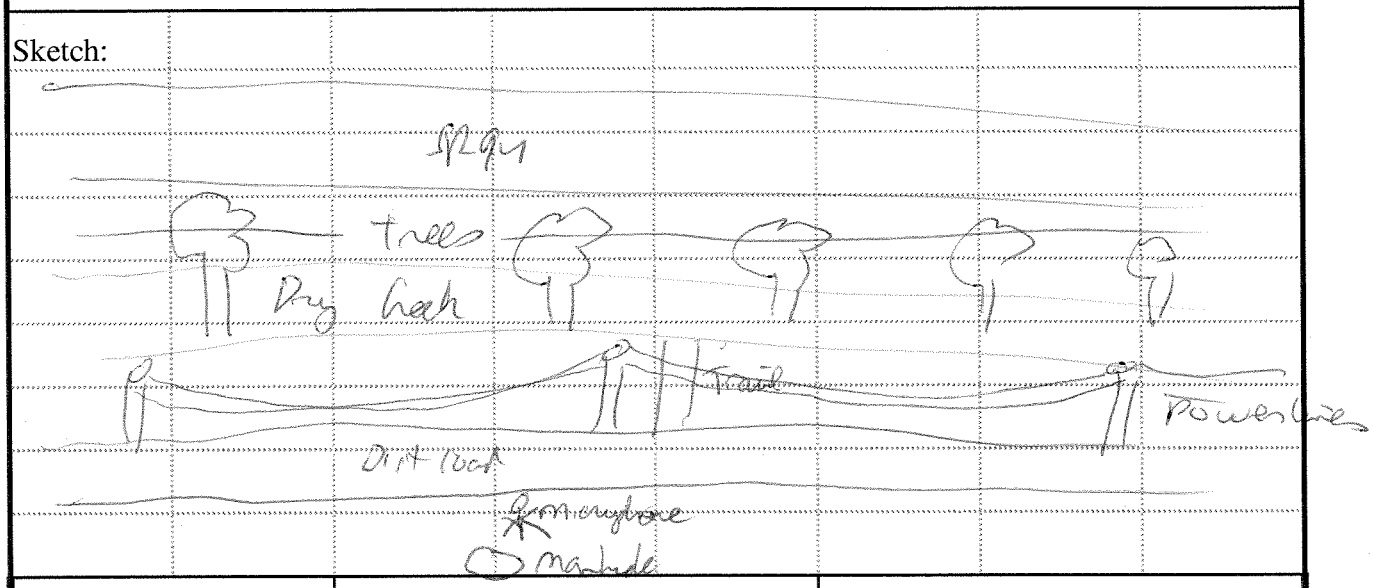
Date: 4/16/2015	Site #: 6	Engineer: Bill Vosti

Address: Manhole ; N 32.742533° E -116.956345°

Meter: Lxt	Serial #: 001390	Calibrator: CA250	Serial #: 2621

Notes: Birds chirping ; airplane overhead @ 14:30

Sketch:



Temp: 80°	Wind Spd: 4-5 mph	Humidity: 7 %

Start of Measurement: 12:36	End of Measurement: 12:52	48.7 dBA L_{EQ}

Cars (tally per 5 cars)	Medium Trucks (MT)	Heavy Trucks (HT)
Noise Measurement for Information Only		
No Through Roadways		
No Calibration Analysis Will Be Provided		

831_Data.77

Site Survey

Job # RIC-11	Project Name: Campo Road Sewer Main Replace

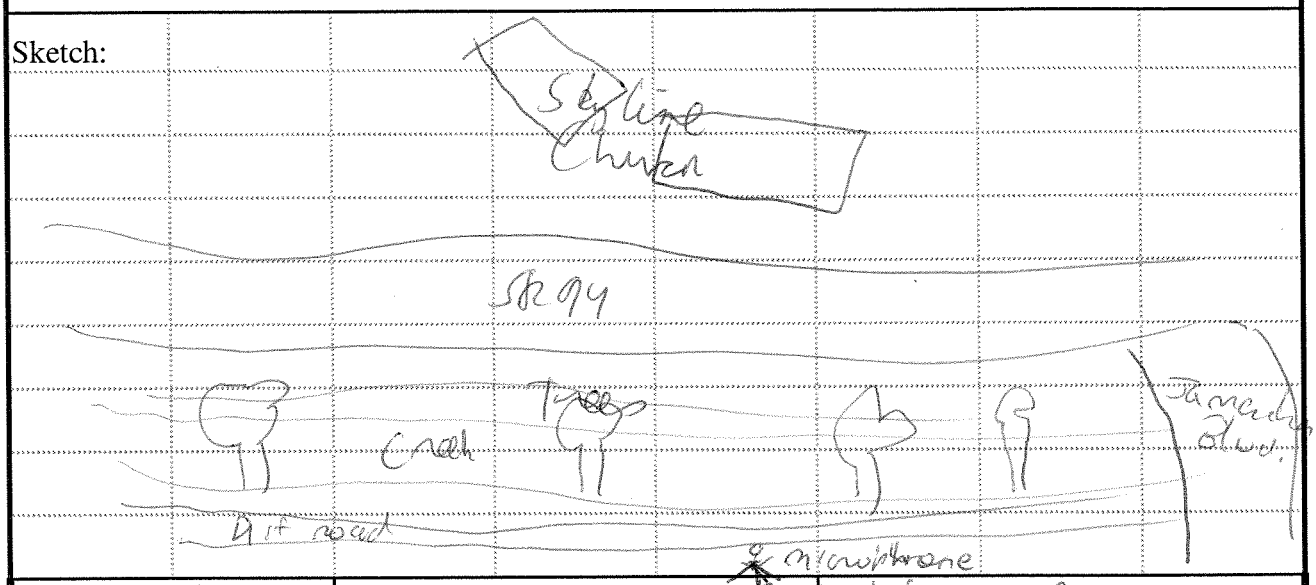
Date: 4/16/2015	Site #: 7	Engineer: Bill Vosti

Address: Manhole west of ~~Ocean~~ Jamacha Blvd; N 32.739912°; E-116.953904

Meter: LxT	Serial #: 001390	Calibrator: CA250	Serial #: 2621

Notes: Birds chirping

Sketch:



Temp: 80	Wind Spd: 8 mph	Humidity: 8 %

Start of Measurement: 1:07	End of Measurement: 1:22	50.8 dBA L_{EQ}

Cars (tally per 5 cars)	Medium Trucks (MT)	Heavy Trucks (HT)

Noise Measurement for Information Only

No Through Roadways

No Calibration Analysis Will Be Provided

831 - Data, 078

Site Survey

Job # RIC-11	Project Name: Campo Road Sewer Main Replace

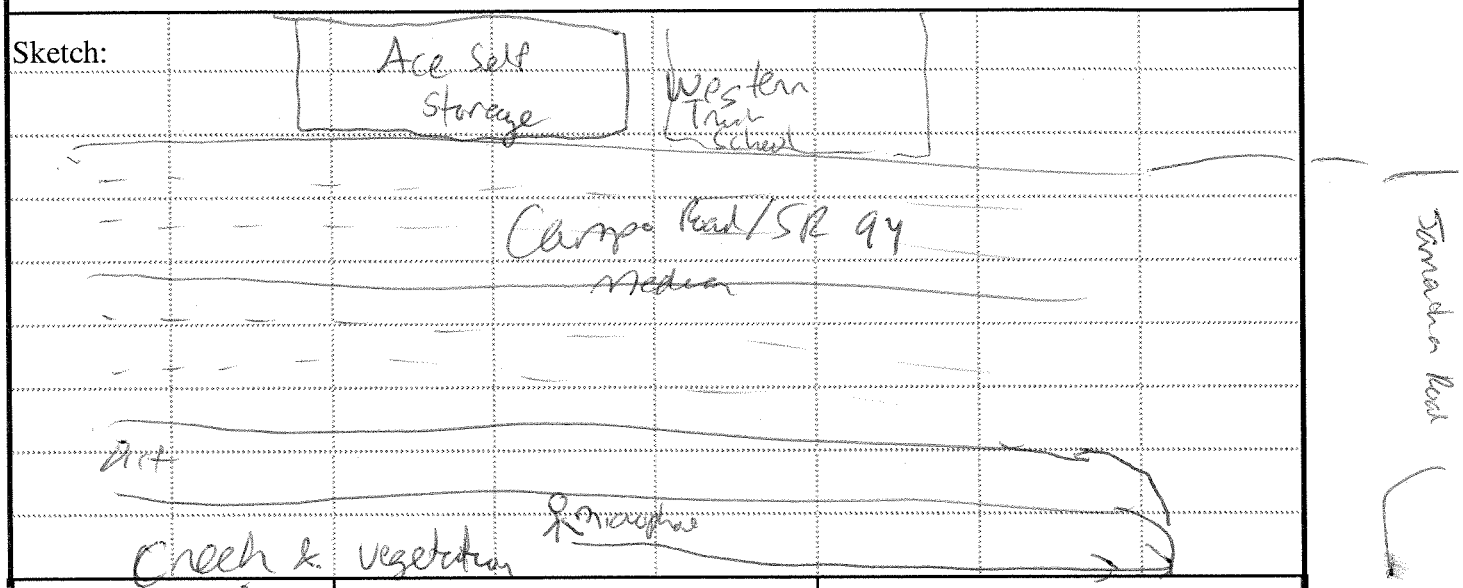
Date: 4/16/2015	Site #: 8	Engineer: Bill Vosti

Address: Near Jamacha Rd & Campo Rd intersection; N 32.73325°, E-116.9 45024

Meter: LxT	Serial #: 001390	Calibrator: CA250	Serial #: 2621

Notes: Medium + traffic

Sketch:



Temp: 82°	Wind Spd: 10 - 13 mph	Humidity: 9 %

Start of Measurement: 2:16	End of Measurement: 2:31	76.2 dBA L_{EQ}

Cars (tally per 5 cars)	Medium Trucks (MT)	Heavy Trucks (HT)

Noise Measurement for Information Only

No Through Roadways

No Calibration Analysis Will Be Provided

Site Survey

Job # RIC-11	Project Name: Campo Road Sewer Main Replace

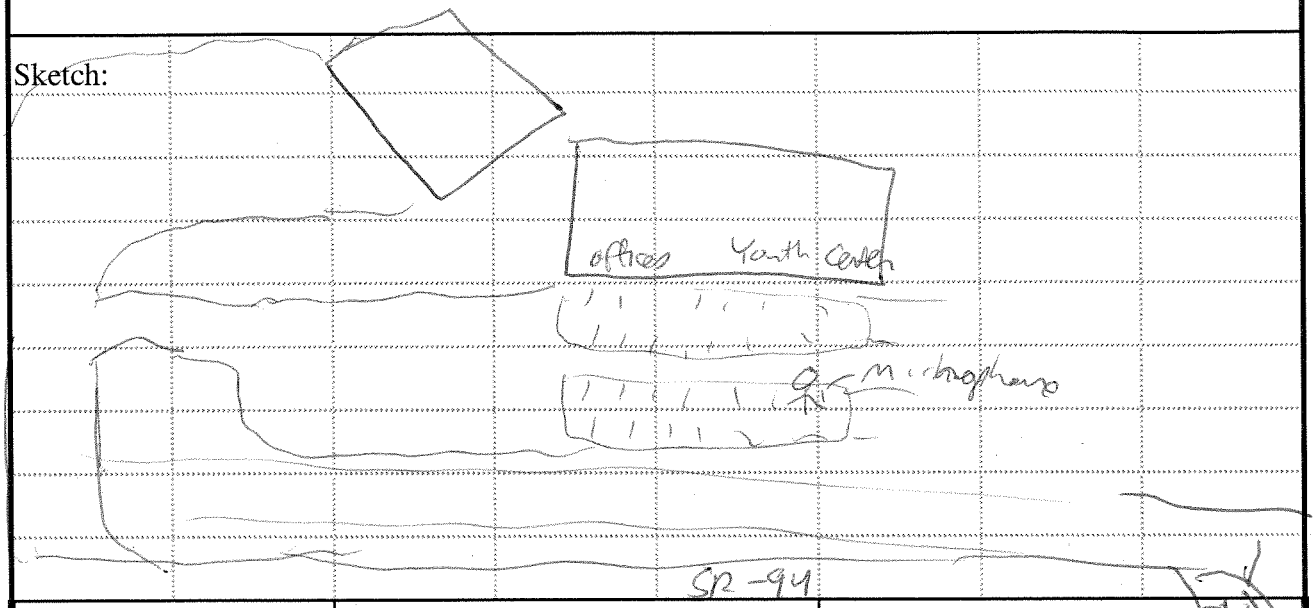
Date: 4/16/2015	Site #: 9	Engineer: Bill Vosti

Address: Skyline Church; N 32.74/312°, E-116.95281°

Meter: LxT	Serial #: 0x390	Calibrator: CA250	Serial #: 2621

Notes: leaves rustling; line of sight w/ Jamacha Blvd, most car noise from there

Sketch:



Temp: 81	Wind Spd: 12 mph	Humidity: 9 %

Start of Measurement: 2:46	End of Measurement: 3:01	53.3 dBA L_{EQ}

Cars (tally per 5 cars)	Medium Trucks (MT)	Heavy Trucks (HT)
Noise Measurement for Information Only		
No Through Roadways		
No Calibration Analysis Will Be Provided		

831_data.080