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5.12 NOISE

Would the project:		Potentially Significant Impact	Potentially Significant Unless APMs Incorporated	Less than Significant Impact	No Impact
a.	Exposure of persons to or generation of noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?	☐	☑	☐	☐
b.	Exposure of persons to or generation of excessive ground-borne vibration or ground-borne noise levels?	☐	☐	☑	☐
c.	A substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project?	☐	☐	☑	☐
d.	A substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project?	☐	☐	☑	☐
e.	For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project expose people residing or working in the project area to excessive noise levels?	☐	☐	☐	☑
f.	For a project within the vicinity of a private airstrip, would the project expose people residing or working in the project area to excessive noise levels?	☐	☐	☐	☑

5.12.1 Introduction

This section of the PEA describes existing conditions and the potential effects of the Proposed Project on noise and vibration. Potential impacts relating to noise and vibration would generally be less than significant and implementation of APMs will ensure that any potential noise impacts would be less than significant.

5.12.2 Methodology

A review of local, regional, state, and federal literature was conducted to establish the noise standards for the Proposed Project area. Measurements were made to establish the baseline environment at key segments within the Proposed Project area, including in the vicinity of the transmission line corridor. Evaluating potential noise impacts from the Proposed Project involves examining typical noise and vibration levels that are expected from demolition and construction activities, primarily at the Artesian Substation and at discrete pole locations along the transmission and power line alignments. It also involves calculating future noise environments associated with the operation and maintenance of the expanded Artesian Substation.

Common noise terms used are defined below.

L_{eq} — The equivalent noise level over a specified period of time (i.e., 1-hour). It is a single value of sound that includes all of the varying sound energy in a given duration.

L_{dn} — The day-night noise level is the A-weighted sound level over a 24-hour period with an additional 10 decibels (db) penalty imposed on sounds that occur between 10 p.m. and 7 a.m.

Community Noise Equivalent Level (CNEL) — The CNEL is a time-weighted descriptor that applies penalties of 5 A-weighted sound level (dBA) to the evening hours and 10 dBA to the nighttime hours

Statistical Sound Levels —The A-weighted sound level exceeded a certain percentage of the time. The L_{90} is the sound level exceeded 90 percent of the time and is often considered the background or residual noise level. The L_{10} is the sound level exceeded 10 percent of the time and is a measurement of intrusive sounds, such as aircraft overflight.

5.12.3 Existing Conditions

5.12.3.1 Regulatory Background

The following subsections describe federal, state, and local regulations regarding noise that are relevant to the Proposed Project.

Federal

There are no federal noise standards that directly regulate the noise from construction or operation of electrical power lines or substation facilities. However, in 1974 the USEPA established guidelines for noise levels in order to protect the general population from any identified effects of noise. These guidelines are summarized in the Table 5.12-1, USEPA Guidelines.

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Table 5.12-1: USEPA Guidelines

Sound Level Evaluation	Limit	Purpose of Guideline
L_{eq} (24)	70 dBA	Protect against hearing loss
L_{dn}	55 dBA	Protect against activity interference and annoyance in residential areas, farms, and other outdoors areas where quiet is a basis for use
L_{eq} (24)	55 dBA	Protect against outdoor activity interference where limited time is spent (e.g. school yards, playgrounds)
L_{dn}	45 dBA	Protect against indoor activity interference and annoyance in residences
L_{eq} (24)	45 dBA	Protect against indoor activity interference in school yards

Source: *USEPA, 1978*

These levels are not enforceable standards or regulations. They are provided in order to protect the public health and welfare, and to provide guidelines for the creation and implementation of local noise standards.

The following federal laws have been passed in order to regulate and limit noise levels.

Noise Control Act of 1972

The Noise Control Act of 1972 initiated a federal program of regulating noise pollution, in order to protect human health and minimize the annoyance of noise to the general public. It set noise emission standards for virtually every source of noise, and informed local governments of their responsibilities in land use planning in order to address noise.

Quiet Communities Act of 1978

The Quiet Communities Act of 1978 amended the Noise Control Act. It promoted the development of effective state and local noise control programs, and provided funds for research. It also produced educational materials on the harmful effects of noise, and potential mitigation measures. Other departments including the Federal Aviation Administration (FAA) and Department of Transportation have since developed their own noise control programs. Each agency has set its own criteria for unacceptable noise.

Federal Aviation Administration

The FAA has established 65 dB CNEL as the noise standard associated with aircraft noise. The CNEL is a time-weighted descriptor that applies penalties of 5 A-weighted sound level (dBA) to the evening hours and 10 dBA to the nighttime hours to account for the increased sensitivity to

noise during the periods. The penalty values are added to the hourly equivalent sound levels (L_{eq}) prior to computing the weighted 24-hour CNEL level.

Federal Transit Administration

The Federal Transit Administration (FTA), under the Department of Transportation, has created a noise and vibration impact assessment manual that provides guidance for evaluating roadway, railway, and construction sources. The manual presents practical techniques for screening, predicting, and assessing potential noise and vibration impacts, primarily based on receptor land use.

State

California Noise Control Act

The California Noise Control Act states that excessive noise is a serious hazard to public health and welfare. It declares that exposure to certain levels of noise can result in damage, whether it be psychological, physiological, or even economic. This Act declares that the State of California is responsible for protecting the health and welfare of its citizens, and must control, prevent, and abate hazardous noise.

California Department of Transportation- and Construction-Induced Vibration Guidance

This guidance provides practical methodologies for addressing vibration issues associated with the construction, operation, and maintenance of California Department of Transportation projects. Continuous/frequent intermittent vibration sources are significant when their peak particle velocity (PPV) exceeds 0.1 inch per second. Table 5.12-2, Human Response to Transient Vibration outlines some more specific criteria for human annoyance due to vibration. Though the guidance is non-enforceable, it provides the basis for evaluating potential vibration from the Proposed Project.

Table 5.12-2: Human Response to Transient Vibration

Human Response	PPV (inches/second)
Severe	1.0-2.0
Strongly Perceptible	0.25-0.9
Distinctly Perceptible	0.036-0.24
Barely Perceptible	Less than 0.035
Source: *Caltrans, 2004*	

Local

Because the California Public Utilities Commission has exclusive jurisdiction over the siting, design, and construction of the Proposed Project, the Proposed Project is not subject to local discretionary land-use regulations. The following discussion of the local regulations relating to noise is provided for informational purposes. As outlined in the following subsections, the construction and operation of the Proposed Project will not conflict with any environmental plans, policies, or regulations related to noise.

City of San Diego

The City of San Diego Noise ordinance contains sound level limits and other noise regulations. Normal operation of the power lines and any associated equipment is limited to the noise limits summarized in Table 5.12-3, City of San Diego Sound Level Limits.

Table 5.12-3: City of San Diego Sound Level Limits

Location	Time	One-Hour Average Sound Level Limits (dBA)
Single Family Residential	7 a.m. to 7 p.m.	50
	7 p.m. to 10 p.m.	45
	10 p.m. to 7 a.m.	40
Multi-Family Residential	7 a.m. to 7 p.m.	55
	7 p.m. to 10 p.m.	50
	10 p.m. to 7 a.m.	45
All Other Residential	7 a.m. to 7 p.m.	60
	7 p.m. to 10 p.m.	55
	10 p.m. to 7 a.m.	50
Commercial	7 a.m. to 7 p.m.	65
	7 p.m. to 10 p.m.	60
	10 p.m. to 7 a.m.	60
Industrial Zones	Anytime	75

Source: *City of San Diego Municipal Code Section 59.5.0401, 2010*

The San Diego Municipal Code Section 59.5.0404 provides separate limitations on construction noise, which is not subject to the limits in Table 5.12-3. Construction noise is prohibited outside the hours of 7 a.m. to 7 p.m., and is prohibited on Sundays and holidays. Construction noise is further limited to an average of 75 dBA over an eight-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.

In the event certain projects cannot conform to the requirements of the noise ordinance, the San Diego Municipal Code expressly authorizes the City to grant a permit to allow temporary deviations from those requirements. The permit process is outlined in Section 59.5.0404(a) of the Municipal Code. An application for a permit may be made to the city noise abatement and control administrator, who evaluates the request and determines if a permit will be issued by reviewing the potential impact the noise may have on each property that would be affected, the value to the community of the work being done, and other factors.

County of San Diego

The County of San Diego Noise ordinance contains sound level limits and other noise regulations, as summarized in Table 5.12-4, County of San Diego Sound Level Limits.

Table 5.12-4: County of San Diego Sound Level Limits

Location	Time	One-Hour Average Sound Level Limits (dBA)
Residential, Agriculture, and Semi-Rural Zones with a General Plan Land Use Designation density of less than 10.9 dwelling units per acre	7 a.m. to 10 p.m.	50
	10 p.m. to 7 a.m.	45
Residential, Agriculture, and Semi-Rural Zones with a General Plan Land Use Designation density of 10.9 or more dwelling units per acre	7 a.m. to 10 p.m.	55
	10 p.m. to 7 a.m.	50
Commercial Zones	7 a.m. to 10 p.m.	60
	10 p.m. to 7 a.m.	55
Industrial Zones	Anytime	70-75*
* Varies based on exact designation of zone		
Source: San Diego County Code of Regulatory Ordinances Section 36.404, 2009		

The San Diego County Code provides separate limitations on construction noise, which is not subject to the limits in Table 5.12-4. Construction noise is prohibited outside the hours of 7 a.m. to 7 p.m., and is prohibited on Sundays and holidays. Construction noise is further limited to an average of 75 dB over an eight-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.

In the event certain projects cannot conform to the requirements of the County noise ordinance, the County of San Diego Code expressly authorizes the County noise control officer to grant a variance to allow temporary deviations from those requirements. The variance process is outlined in County Code Section 36.423 and expressly applies to non-emergency work on a public utility facility. An application for a variance may be made to the county noise control officer, who evaluates the request and determines if a variance will be issued, based on the

potential impact the noise may have on each property that would be affected, the value to the community of the work being done, and other factors.

San Diego County Noise Element

The San Diego County Noise Element addresses the County's need to enforce California noise standards, the need for a land use and transportation planning program, and includes recommendations for reducing unnecessary noise in the acoustical environment. The majority of the element focuses on transportation noise. It also gives guidance on acceptable sound levels for new development. The noise element does not specifically address construction-related noise.

5.12.3.2 Noise Setting

Summary of Noise-Sensitive Receptors

Sensitive receptors around the Proposed Project area are primarily residential land uses. There are also other types of sensitive receptors, including houses of worship, schools, day-care facilities, and parks. Existing noise sources in the Proposed Project area are discussed in Section 5.12.2.3

In the vicinity of the Artesian Substation, the nearest residential receptors are approximately 150 feet south of the property line. Other residential areas surround the site on the north and west sides, with proposed office/commercial buildings planned for development to the east. The Maranatha Christian School property is approximately 900 feet northwest of the center of the substation area.

For the transmission and power line portions of the Proposed Project, residences were identified within varying distances, as close as 50 feet to the existing SDGE ROW. The Maranatha Christian School property is approximately 200 feet to the west of Pole No. P03, the Del Norte High School is located 1,700 feet to the south of Pole No. P09, and Kinderhouse Montessori School is 1,600 feet to the southeast of Pole No. P21. Houses of worship include the Maranatha Chapel located 400 feet north of existing Pole No. E21 and the City Church of San Diego located 1,200 feet south of existing Pole No. E23. The Kids' Care Club day care center is located within 500 feet of Pole No. P12.

5.12.3.3 Noise Surveys

Artesian Substation Survey Overview

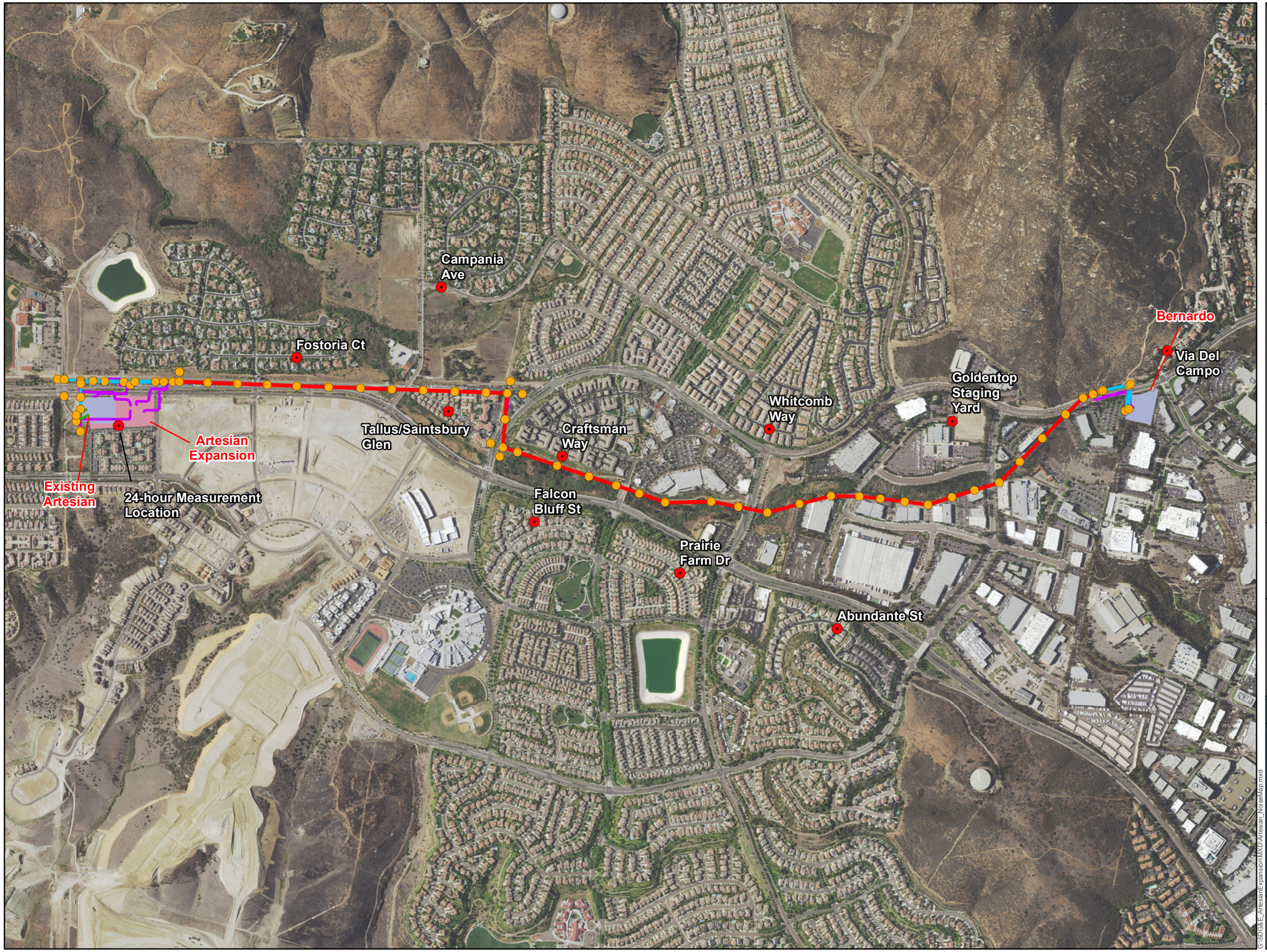
The Artesian Substation site and surroundings were visited May 18-19, 2015. Long-term ambient noise levels were measured to capture sound levels over a 24-hour period. The sampling location was chosen south of the substation, near the closest noise-sensitive receptors (residences). The long-term measurement location at the Artesian Substation is shown in Figure 5.12-1, Ambient Noise Measurement Locations.

A RION NL-21 integrating sound level meter was utilized for continuous 24-hour monitoring. The meter meets the requirements for ANSI S1.4-1983 Type 2 or better sound level meters. The meter microphone was fitted with a windscreen in order to reduce wind generated noise,

and was programmed to measure and store data in 10-minute increments during the period. The data set was tabulated into hourly averages and is presented in Table 5.12-5: Summary of Hourly Background Measured Ambient Noise Levels (dBA). Existing noise sources in the area included vehicular traffic noise and natural sounds such as insects, wind, and birds. No existing substation and transmission line noise was noted.

Table 5.12-5: Summary of Hourly Background Measured Ambient Noise Levels (dBA)

Date	Hour Ending	L_{eq}	L_{90}	L_{10}
May 18, 2015	12	50.3	42.4	53.5
	13	49.8	43.3	51.6
	14	48.9	42.8	50.7
	15	54.2	44.4	54.4
	16	55.3	45.2	57.2
	17	50.7	44.6	53.3
	18	51.1	45.1	53.7
	19	52.3	43.8	53.7
	20	51.1	42.3	51.9
	21	46.9	38.5	49.5
	22	56.8	56.0	57.4
	23	53.1	52.2	54.3
	24	50.1	49.0	49.9
May 19, 2015	1	47.5	46.8	47.5
	2	45.1	44.7	45.4
	3	43.1	42.5	43.0
	4	42.5	40.7	41.2
	5	40.5	38.7	42.5
	6	44.4	38.4	47.5
	7	48.2	42.2	50.2
	8	50.0	45.0	52.5
	9	53.3	44.8	55.6
	10	55.8	42.1	56.4
	11	49.4	41.6	51.4
	Maximum	56.8	56.0	57.4
	Minimum	40.5	38.4	41.2



Artesian 230kV Substation Expansion Project

Ambient Noise Measurement Locations

Figure 5.12-1

Project Features

- Project Structure
- 69kV Reconductor
- New 230kV Loop-in
- Remove from Service
- New 69kV Underground Getaway
- Artesian Expansion Area
- Other Project Areas

Noise Data

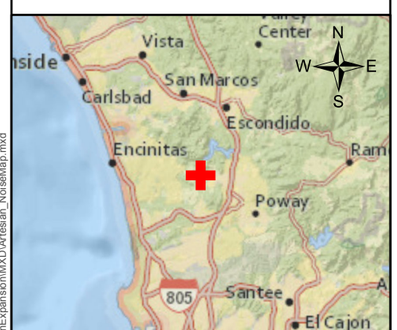
- Noise Sampling Location

TRC

SDGE A Sempra Energy utility

7/30/2016

0 630 1,260 1,890 Feet



Sources: SDG&E,2015;SanGIS/SANDAG Data Warehouse; FEMA Mapping Service Center (https://hazards.fema.gov/femaportal/wps/portal/NFHLWMS) Esri,DigitalGlobe, GeoEye, i-cubed, USDA, USGS, AEX,Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community; National Geographic DeLorme, NAVTEQ,UNEP-WCMC, USGS, NASA, ESA, METI, NRCAN, GEBCO NOAA, iPC

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BACK OF FIGURE 5.12-1

Measured L_{eq} sound levels generally ranged from 48 dBA to 56 dBA during the day, dropping to the lowest measured hourly sound level of 40.5 dBA during the early morning hours. The measured levels are typical of suburban areas.

Power Line and Work Area Survey Overview

A survey to collect ambient noise level data was conducted on May 1st and 14th, 2015. One additional location was measured on August 11, 2015 due to changes in the reconductor plans. Short-term sampling in 15 minute increments captured overall sound levels, statistical sound levels, and frequency-band data at the various measurement locations. Ten measurement locations were selected as representative sound monitoring locations (see Figure 5.12-1, Ambient Noise Measurement Locations). These locations were chosen to focus on residential areas in proximity of the Proposed Project alignment and temporary construction staging yards. Table 5.12-6, Summary of Measured Ambient Noise Levels, provides the measured L_{eq}, L_{10}, and L_{90} sound levels for each of the ten locations.

Table 5.12-6: Summary of Measured Ambient Noise Levels (dBA)

Location	Date / Time of Measurement	L_{eq}	L_{10}	L_{90}	Audible Noise Sources
Fostoria Court	5/1/2015 1430-1445	54.9	57.7	48.9	Local traffic, landscaping work, natural sounds (birds, leaves, etc.)
Campania	5/1/2015 1456-1511	57.8	63	44.6	Local traffic, natural sounds
Tallus/Saintsbury Glen	5/1/2015 1518-1533	48.5	50.6	44.4	Local traffic, natural sounds
Craftsman Way	5/1/2015 1538-1553	53.9	57.5	48.5	Local traffic, residential occupants, natural sounds
Falcon Bluff	5/14/2015 1001-1016	55.9	55.9	39.4	Local traffic, aircraft, landscaping work, natural sounds
Prairie Farm	5/14/2015 1021-1036	49.7	53.5	41.7	Local traffic, residential occupants, natural sounds
Abundante St	5/14/2015 1047-1102	45.4	48.1	41.3	Local traffic, aircraft, natural sounds
Whitcomb Way	8/11/2015 0033-0048	45.5	44.5	37	Local traffic, natural sounds
Goldentop Staging Yard	5/14/2015 1109-1124	57.1	61.7	47.9	Local traffic, news helicopter, natural sounds
Via Del Campo	5/14/2015 1131-1146	56.7	59.1	49.2	Local traffic, natural sounds
Via Firul	5/14/2015 1158-1213	69	57.4	48.7	Local traffic, loud aircraft, natural sounds

Source: TRC, 2015

Measured L_{eq} sound levels generally ranged from 45 dBA to 58 dBA. The measured levels are typical of suburban daytime sound levels, and are similar to the data from the long-term sampling location at the Artesian Substation.

5.12.4 Potential Impacts

5.12.4.1 Significance Criteria

Standards of impact significance were derived from Appendix G of the *CEQA Guidelines*. Under these guidelines, the Proposed Project could have a potentially significant noise impact if it would result in:

a) Exposure of persons to or generation of noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies;

b) Exposure of persons to or generation of excessive ground-borne vibration or ground-borne noise levels;

c) A substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project;

d) A substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project;

e) Exposure of people residing or working in the project area to excessive noise levels for a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public-use airport; or

f) Exposure of people residing or working in the project area to excessive noise levels for a project within the vicinity of a private airstrip.

5.12.4.2 Question 12a – Exposure of persons to or generation of noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies.

Construction – Less than Significant Impact with Implementation of APMs

Artesian Substation Construction

Construction of the Artesian Substation would occur over a period of approximately 30 months. The construction process for a substation installation typically includes the following phases/activities:

- Grading and excavation
- Foundations
- Steel structures
- Wiring
- Transformer vacuum/oil filling

- Electrical equipment (transformers, breakers, disconnects) installation and connections
- Energize and cleanup

In general, heavy equipment (bulldozers, dump trucks, cement mixers) will be used during excavation and concrete pouring activities. Noise is generated during construction primarily from diesel engines which power the equipment. Exhaust noise usually is the predominant source of diesel engine noise, which is the reason that maintaining functional mufflers on all equipment will be a requirement of the Proposed Project.

Noise levels of construction equipment likely to be used for substation construction were obtained from references which have documented construction noise levels, both for equipment and construction phases, for many types of projects. Typical site average sound levels for each phase of construction are provided in Table 5.12-7, Range of Typical Average Noise Levels by Construction Phase. Noise levels in the tables are provided for a reference distance of 50 feet and distances to noise sensitive locations near the site. The nearest residential location is approximately 275 feet south of the center of the proposed project site.

Table 5.12-7: Range of Typical Average Noise Levels by Construction Phase with Minimum to Maximum Required Equipment in Operation (dBA)

Construction Phase	50 Feet (Reference Distance)	250 Feet (Nearest Residence)	500 Feet (Residential to North)	800 Feet (Residential to West)	1,400 Feet (School to Northwest)
Excavation	79 to 89	63-73	58-68	53-63	47-57
Foundations	78	62	57	52	46
Installation and Connections	76 to 85	60-69	55-64	50-59	44-53
Restoration/Finishing	76 to 89	60-73	55-68	50-63	44-57
Source: BBN, 1971					

Some aspects of substation construction require work at night. The first is the filling of the new transformers with insulating oil, just prior to being energized. This process involves establishing a vacuum on the top of the transformer tanks, while pumping oil into bottom. The continuous filling process can take between 48 and 96 hours (per transformer), depending on the size of the transformer (larger voltage transformer require more insulating oil and a corresponding longer filling process), the dew point of the transformer, and the specific transformer manufacturer's specifications. This would be done either with a pump connected directly to the existing 480 Volt (V) power in the substation or the installation crew would use an oil pump connected to a generator. The generator would be a "Whisper Watt" (or equivalent) generator which keeps the total noise level for the pump and generator to below 60 dBA at 23 feet[1]. Since this process would take from two to four days of continuous pumping, overnight work would be needed. This overnight portion of the effort, since it is outside the exempt daytime hours for construction, would be subject to the standard requirements of the City of San Diego noise ordinance (Table 5.12-3). Using the worst case scenario (generator use), nighttime noise emission levels are calculated to be 52 dBA at 50 feet, and 40 dBA at the southern property line (approximately 200 feet south of

[1] Manufacturer specification data sheet (Associated Power, Inc. 2010)

the 230kV transformer location). Per the City of San Diego Noise Code (refer to Table 5.12-3), noise emission cannot exceed 45 dBA at the southern property line (45 dBA is the nighttime noise limit for multi-family residential). Therefore, while filling of the transformers will require work at night, the noise emission will not exceed the local established threshold and no impacts will occur.

Overhead Line Construction

Construction of the Proposed Project would require the temporary use of various types of noise-generating equipment, including graders, backhoes, augers, flatbed boom trucks, rigging and mechanic trucks, air compressors and generators, mobile cranes, concrete trucks, and man lifts. Wire stringing operations would require pullers, tensioners, and cable reel trailers.

The construction equipment to be used is similar to that used during typical public works projects. Typical noise levels from these construction sources are provided in Table 5.12-8, Typical Overhead Transmission Line Construction Sound Levels, for a reference distance of 50 feet, out to 1,000 feet. The equipment presented could potentially be utilized at any location along the corridor.

Table 5.12-8: Typical Overhead Transmission Line Construction Sound Levels

Equipment [1]	Maximum Noise Level (dBA)				
	50 feet	100 feet	200 feet	500 feet	1,000 feet
Air Compressor[(a)]	80	74	68	60	53
Aerial Bucket Truck[(b)]	75	69	63	55	48
Backhoe[(b)]	80	74	68	60	53
Crane[(b)]	81	75	69	61	54
Bulldozer[(b)]	82	76	70	62	55
Drill Rig/Truck-mounted augur[(b)]	85	79	73	65	58
Grader[(a)]	85	79	73	65	58
Mower[(a)]	88	82	76	68	61
Portable Generator[(b)]	73)	67	61	53	46
Rock Drill/rock drilling equipment[(b)]	81	75	69	61	54
Truck (Dump Truck, Flatbed Truck) [(b)]	84)	78	72	64	57
Wire Pulling Machine (pulling rig) [(c)]	80	74	68	60	53

Notes:
[1] Noise levels listed are for typical equipment used during construction, and not all potential equipment used for the Proposed Project is listed herein. The equipment used is considered to be representative of the equipment that will be used during construction of the Proposed Project.
Sources: *(a) BBN 1971, 1977; (b) Federal Highway Administration, 2006; (c) Ebasco, 1989.*

It is important to note that the equipment presented would not generally be operated continuously, nor would the equipment always operate simultaneously. There would therefore be times when no equipment is operating and noise would be at ambient levels. Typical usage factors for this type of construction equipment were applied to the above sound levels in order to arrive at the average sound level that may occur during a typical workday. Usage factors are applied irrespective of workday duration. The usage factors account for the fact that equipment are not always operated at full throttle conditions, and are not used for an entire workday. Table 5.12-9, Construction Sound Levels Adjusted for Workday, provides the construction sound levels, adjusted to reflect a typical workday, expected at various distances from a pole site, from 50 feet out to 1,000 feet, covering the range of distances to nearby residences.

Table 5.12-9: Overhead Line Construction Sound Levels Adjusted for Workday

Equipment	Adjusted Noise Level for Workday (dBA)				
	50 feet	100 feet	200 feet	500 feet	1,000 feet
Air Compressor	73	67	61	53	46
Aerial Bucket Truck	73	67	61	53	46
Backhoe	76	70	64	56	49
Crane	76	70	64	56	49
Bulldozer	81	75	69	61	54
Drill Rig/Truck-mounted Augur	78	72	66	58	51
Grader	75	69	63	55	48
Mower	75	69	63	55	48
Portable Generator	70	64	58	50	43
Rock Drill/Rock Drilling Equipment	74	68	62	54	47
Truck (Dump Truck, Flatbed Truck)	81	75	69	61	54
Wire Pulling Machine (Pulling Rig)	74	68	62	54	47

Underground Line Construction

Two short underground 69 kV power lines are proposed at the termination points of the power lines; namely at the Artesian and Bernardo Substations (i.e. substation getaways). Minor distribution line underground construction will also occur at the Artesian Substation and near structures P07 and P08. Installation of the underground lines involve installing vaults, trenching and duct banks, cable pulling and splicing, and site cleanup. The construction equipment for underground trenching operations differs from the overhead pole installation. Typical noise levels from representative construction sources are provided in Table 5.12-10, Typical Underground Construction Sound Levels, for a reference distance of 50 feet, out to 1,000 feet.

Table 5.12-10: Typical Underground Line Construction Sound Levels

Equipment *	Maximum Noise Level (dBA)				
	50 feet	100 feet	200 feet	500 feet	1,000 feet
Backhoe[(a)]	80	74	68	60	53
Concrete Saw[(a)]	90	84	78	70	63
Crane[(a)] [(a)]	81	75	69	61	54
Excavator	81	75	69	61	54
Jackhammer[(a)]	85	79	73	65	58
Paver[(a)]	77	71	65	57	50
Truck (Dump Truck, Flatbed Truck) [(a)]	84	78	72	64	57
Vacuum Truck[(a)]	85	79	73	65	58
Wire Pulling Machine (pulling rig) [(b)]	80	74	68	60	53

Notes:
* Noise levels listed are for typical equipment used during construction, and not all potential equipment used for the Proposed Project is listed herein. The equipment used is considered to be representative of the equipment that will be used during construction of the Proposed Project.
Sources: *(a) Federal Highway Administration, 2006; (b) Ebasco, 1989.*

As is the case with the overhead construction, the equipment presented would not generally be operated continuously, nor would the equipment always operate simultaneously. Typical usage factors for this type of construction equipment were applied to the above sound levels in order to arrive at the average sound level that may occur during a typical workday. Table 5.12-11, Underground Line Construction Sound Levels Adjusted for Workday, provides representative construction sound levels, adjusted to reflect a typical workday expected at various distances from any construction equipment, from 50 feet out to 1,000 feet.

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Table 5.12-11: Underground Line Construction Sound Levels Adjusted for Workday

Equipment	Adjusted Noise Level for Workday (dBA)				
	50 feet	100 feet	200 feet	500 feet	1,000 feet
Backhoe	74	68	62	54	47
Concrete Saw	83	77	71	63	56
Crane	73	67	61	53	46
Excavator	77	71	65	57	50
Jackhammer	78	72	66	58	51
Loader	75	69	63	55	48
Paver	74	68	62	54	47
Truck (Dump Truck, Flatbed Truck)	76	70	64	56	49
Vacuum Truck	81	75	69	61	54
Wire Pulling Machine	74	68	62	54	47

Staging Yards

There will be three potential staging yards in use during the Proposed Project in the immediate vicinity of the Proposed Project alignment (refer to Appendix 3-B). Staging yards could be used for refueling construction vehicles, pole assemblage, open storage of material and equipment, trailers, portable restrooms, and parking. Noise generated at these sites will be intermittent, and typically associated with periodic movement of equipment in and out of the staging yard. It is anticipated that the Carmel Valley Road Yard would primarily be used for storage of equipment and materials and active construction activities are not expected to occur at this site. It is anticipated that the Carmel Valley property will act as the main staging yard including employee parking, construction trailers and offices, and equipment maintenance. The staging yards and the distance to the nearest noise sensitive area (NSA) for each are listed in Table 5.12-12, Proposed Project Staging Yards.

Table 5.12-12: Proposed Project Staging Yards

Staging Yard[a]	Distance/Direction to Nearest NSA
Carmel Valley Road	500 feet south (across Carmel Valley Road)
Kearny Mesa Yard	1,300 feet southwest
Northeast Storage Facility	300 feet north (across Ronald Packard Parkway)

[a] Note that the two identified storage yards at Kearny Mesa and Northeast are not located near sensitive receptors. Kearny Mesa is located in a commercial area and Northeast is located in an industrial area.

Sound levels associated with staging yard use are anticipated to be below the City and County noise limits at nearby NSAs. Active construction activities (e.g. excavation, structure

installation, grading, etc.) would not occur in the staging areas and therefore, the construction noise levels presented (refer to Tables 5.12-8 through 5.12-11) would not be generated. No noise impacts are anticipated to be associated with staging area use.

Analysis

The City and County of San Diego noise codes both exempt construction noise from the limits in Tables 5.12-3 and 5.12-4, provided that construction occurs between the hours of 7 a.m. to 7 p.m., and, when measured over a workday, to less than 75 dBA at an adjoining property line. Although daily construction activities cannot be predicted and would vary depending on conditions in the field, the data in Table 5.12-8 above reveals that it is possible that construction sound levels may exceed the 75 dBA limit at the few NSA locations where construction would occur less than 100 feet of a residential property line. NSAs along a majority of the route are much further away from where construction would occur, and construction noise levels in these areas would be much lower. Nonetheless, in the event construction noise is anticipated to exceed 75 dBA at adjacent properties with NSAs located within less than 100 feet of construction activities, SDG&E would implement APM Noise-1 (Meet and Confer). Under APM Noise-1, SDG&E would meet and confer with the City or County (as applicable) to discuss temporarily deviating from the requirements of the applicable Noise Code as necessary. Functional mufflers will be maintained on all equipment to minimize noise levels during construction.

The noise levels presented in Tables 5.12-8 through 5.12-11 are those that would be experienced by people outdoors. A building will provide significant attenuation of associated construction noise impacts. For instance, sound levels can be expected to be up to 27 dBA lower indoors with windows closed than they are outdoors. Even in homes with the windows open, indoor sound levels can be reduced by up to 17 dBA relative to outdoor levels.

It is unanticipated, but hydraulic rock drilling or rock blasting may be used to minimize the drilling time. If used, rock blasting would substantially reduce construction time at any one location as extensive digging in hard rock would not be required. Blasting would therefore have the effect of reducing potential long-term noise impacts. Noise associated with these activities would occur intermittently, over short periods of time. In addition, should blasting be required, a noise and vibration calculation would be prepared and submitted to SDG&E Environmental Programs for review before blasting at each site. The construction contractor would be required to comply with all relevant local, state, and federal regulations relating to blasting activities.

With the exception of construction at the Artesian Substation site, work in the proximity of any single general location along the transmission or power line would likely last no more than a few days to one week at a time, as construction activities move along the alignment. Therefore, single receptors would typically not be exposed to significant noise levels for an extended period of time. Impacts are anticipated to be less than significant.

Operation & Maintenance – Less Than Significant Impact

Artesian Substation Operation

The primary noise source associated with the operation of the Artesian Substation would be from the transformers and their associated cooling fans, as well as the HVAC units associated

with the Control Building and the switchgear line-up. The transformer cooling fans typically operate in stages and at different load settings, depending on the temperature of the windings located in the main tank.

Computer modeling was performed in order to calculate noise levels that would be generated by operation of the new transformers at the nearby noise sensitive locations and around the proposed Substation property line. The commercially available CadnaA model developed by Datakustik GmBH was used for the analysis. The software takes into account spreading losses, ground and atmospheric effects, shielding from barriers and buildings, and reflections from surfaces. The software is standard based on, and the ISO 9613 standard was used for, air absorption and other noise propagation calculations (ISO, 1993).

Noise level data for standard (unmitigated) transformers are provided in NEMA Standards Publication No. TR1-1993 (R2000). Sound levels are provided based on the transformer MVA and BIL ratings. Proposed Project layout and architectural drawings, supplied by SDG&E, were used to establish the relevant physical and positional characteristics of the substation equipment and buildings. Modeling was conducted for worst case operation, which includes all transformers operating under second stage cooling and all HVAC systems operating.

Detailed information regarding the modeling analysis is provided in Appendix 5.12-A, *Black & Veatch Project Noise Analysis: Artesian Substation*. The predictive modeling outputs without mitigation measures, in the form of contour lines of constant noise levels, are depicted in Figure 5.12-2, Predicted Noise Level Contours for the Artesian Substation.[2]

As shown in Figure 5.12-2, the predicted substation sound pressure levels without mitigation are anticipated to be 45 dBA at the southern property line, which faces an apartment complex. Substation noise would meet the City of San Diego multi-family residential noise limit of 45 dBA. Therefore, impacts to nearby residences due to substation operation would be less than significant.

Artesian Substation Maintenance

Maintenance activities at the substation are planned to be limited to occasional inspection and repair activities. Noise generated as the result of maintenance activities would be similar to those being performed at the existing Artesian Substation. As a result, there would be no exceedances of established noise standards and there would be no noise impacts associated with substation maintenance.

Transmission and Power Line Operation and Maintenance

Modern transmission and power lines have been designed, and are constructed and maintained, to generate a minimum of corona-related noise. Corona noise varies depending on relative humidity and precipitation, with sound levels increasing as the weather turns more humid. Transmission and power lines that are 230 kV and smaller, like those in the Proposed Project, only generate low levels of corona noise (Burns & McDonnell, Inc., 2010).

[2] The predicted contour maps show the modeled contributions from the future substation configuration, in the absence of background noise levels. The model included the effects of barrier attenuation from the on-site screening walls & retaining walls, the on-site buildings & 230kV fire walls, and key topographical features at the site.

Typical corona noise levels from 230 kV lines are in the range of only 15 dBA at a distance of 100 feet during dry weather (DMD & Associates Ltd., 2005). During periods of high humidity and rain, this noise level can increase from 5 dBA to 20 dBA depending on weather conditions, with the larger increases occurring during rain. These somewhat higher levels are usually masked by the sound of falling rain. Also, in most cases, people are indoors where the sound would be inaudible.

5.12.4.3 Question 12b – Exposure of persons to or generation of excessive ground-borne vibration or ground-borne noise levels.

Construction – Less than Significant Impact

Construction activities have the potential to generate ground-borne vibration and ground-borne noise, depending on the type of construction equipment in use and the distance to the receiver.

The human response thresholds for vibration (refer to Table 5.12-2), indicate that vibration is barely perceptible with a PPV of 0.035. Table 5.12-13, Vibration Source Levels for Construction Equipment at 50 feet, provides vibration source levels for certain representative construction equipment expected to be utilized for the Proposed Project, which have been normalized to a reference distance of 50 feet, which is approximately the closest any one single residence would be to any pole or trenching site.

Table 5.12-13: Vibration Source Levels for Construction Equipment at 50 Feet

Equipment [a]	PPV at 50 Feet
Caisson Drill (drilling rig)	0.031
Loaded Truck (flatbed)	0.027
Bulldozer (small)	0.001

Notes:
[a] Vibration levels listed are for typical equipment used during construction, and not all potential equipment used for the Proposed Project is listed herein. The equipment used is considered to be representative of the equipment that will be used during construction of the Proposed Project.
Source: *FTA, 2006*

Referring to the data in Table 5.12-13, vibration levels would be below the barely perceptible response level. Because the closest residences are 50 feet or more away from where any construction would occur, no impacts are anticipated.

Figure 5.12-2: Predicted Noise Level Contours for the Artesian Substation

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BACK OF FIGURE 5.12-2

Vibration levels associated with rock blasting, if conducted, would be site-specific and depend on soil/rock conditions at the site, the amount of explosive used, and the depth at which the blasting occurs. In the unlikely event that rock blasting is used during construction, SDG&E would ensure that any blasting activities comply with applicable laws, regulations, and ordinances; therefore potential adverse effects from blasting activities located near NSAs would be minimized and impacts would be less than significant.

Operation & Maintenance – No Impact

None of the Proposed Project facilities generate vibration during operation; therefore, no impacts due to vibration would occur during operation. The maintenance activities are not anticipated to include any vibration generating sources. As such, no vibration impacts would occur during operation and maintenance.

5.12.4.4 Question 12c – A substantial permanent increase in ambient noise levels in the project vicinity above levels without the project.

Construction – No Impact

As Proposed Project construction activities would conclude after a scheduled and defined period, these activities would not be permanent. Since no permanent increase in noise would occur during construction activities, there would be no impact.

Operation & Maintenance – Less Than Significant Impact

Artesian Substation

As described in the response to Question 5.12a, the primary source of operational noise at the Artesian Substation would be its transformers and their associated cooling fans and HVAC units associated with the Control Building and the switchgear line-up. Figure 5.12-2 presents the predicted noise contours for the substation operations.

Existing ambient noise levels at the nearest residences were measured to be in a range of the mid-40's to mid-50's dBA during the day, dropping to the lowest measured hourly sound level of 40.5 dBA in the early morning hours. Calculated Proposed Project sound levels are approximately 45 dBA at the nearest property line, and are reduced to 40 dBA at the nearest residence (refer to Figure 5.12-2). The total future sound level at the nearest residential location would therefore be 43 dBA; a 2.5 dBA increase over the lowest measured nighttime sound level.

The ability of the average person to perceive increases in noise has been documented. In general, an increase of 3 dBA or less is considered to be barely perceptible, while an increase of 5 dBA is considered to be noticeable. A 10 dBA increase is perceived as a doubling of the sound. The Proposed Project will increase nighttime sound levels at the nearest residential location by 2.5 dBA, which would be considered barely perceptible. Lower increases would be experienced at other times of day. Residences located further from the site would experience lesser impacts. No significant impacts are anticipated.

Transmission and Power Lines

As described in the response to Question 5.12a, modern transmission and power lines are designed, constructed, and maintained so that they produce a minimum level of corona noise during dry conditions. During rainy conditions, maximum corona noise would be approximately 35 dBA at 100 feet (for 230kV lines), but these higher sound levels are generally masked by the falling rain. The lowest measured nighttime L_{eq} sound level along the Proposed Project alignment was 45.5 dBA during dry conditions. Corona noise is therefore not expected to increase sound levels along the short segment of new 230kV transmission line.

The 69kV reconductor portion of the Proposed Project will not increase the voltage of the power lines over the existing condition. As such, any minimal corona noise levels along this portion of the Proposed Project alignment would not change from their existing, baseline levels.

SDG&E currently maintains and operates extensive existing electric transmission, power, distribution and substation facilities throughout the Proposed Project area. SDG&E's existing facilities and operations and maintenance activities are included in the baseline for evaluating the impacts of the Proposed Project. Less than significant impacts due to noise from operation and maintenance would occur.

5.12.4.5 Question 12d – A substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project.

Construction – Less than Significant Impact

Artesian Substation Construction

Substation construction noise was also outlined in the response to Question 12a. Construction activities for the Artesian Substation will occur over an approximately 24 month period, and would result in noise impacts at the nearest residences. A review of the calculated construction levels in Table 5.12-11 reveals that construction noise at the nearest residences will range from 60 dBA, when the minimum equipment is in use, up to about 73 dBA when the maximum equipment is in use. Existing daytime ambient L_{eq} noise levels in the area (Table 5.12-5) range from about 50 dBA to 54 dBA. Construction noise will therefore be louder at times than existing daytime ambient noise levels at the most proximate residence. Lower construction noise levels would be experienced at locations further from the Proposed Project site.

It is important to note that the equipment presented is not used in each phase of construction, and is not use continuously throughout the day. Further, the construction noise levels presented are those which would be experienced for people outdoors. A building (house) will provide significant attenuation for those who are indoors. Sound levels can be expected to be up to 27 dBA lower indoors with the windows closed. Even in homes with the windows open, indoor sound levels can be reduced by up to 17 dBA (USEPA, 1978). Construction noise will also be temporary in nature and, as such, no long term or significant noise impacts due to construction are anticipated.

While substation construction will be of a longer duration than pole-specific transmission and power line construction, it will still be of a temporary nature, and, as noted previously, equipment used is not generally operated continuously, nor are the equipment always operated

simultaneously. There will therefore often be times when no equipment is operating and noise will be at ambient levels. The implementation of APM Noise-1 will further act to reduce impacts to the nearest residences. Substation construction would result in short-term impacts, but the impacts would be temporary and intermittent and therefore less than significant.

Transmission and Power Line Construction

Impacts during transmission and power line construction have been outlined in the response to Question 12a. Construction activities along the Proposed Project transmission line route would result in short-term noise impacts. However, such impacts would be temporary, localized, and intermittent. The Proposed Project has also been designed to reduce noise, as further discussed in Section 5.12.4.1. Therefore, construction impacts from the transmission line construction would be less than significant.

Operation & Maintenance – Less than Significant Impact

Impacts during operation and maintenance of the Proposed Project have been outlined in the responses to Questions 12a and 12c. No substantial temporary or periodic increases in ambient noise levels are expected. A slight increase in corona noise would occur, although increases in corona noise would be minimal. Therefore, impacts would be less than significant.

5.12.4.6 Question 12e – For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project expose people residing or working in the project area to excessive noise levels.

Construction, Operation & Maintenance – No Impact

The Proposed Project is not located within two miles of a public airport. The nearest public airports are Montgomery Field and Ramona Field, both located over 10 miles from the Proposed Project. No impacts would occur due to the distance from the Proposed Project to these airports. No impacts are anticipated.

5.12.4.7 Question 12f – For a project within the vicinity of a private airstrip, would the project expose people residing or working in the project area to excessive noise levels.

Construction, Operation & Maintenance – No Impact

The Proposed Project area is not located within the vicinity of any private airstrips. It is not currently anticipated that the Proposed Project would utilize private airstrips for construction, operation or maintenance. If the Proposed Project were to utilize a private airstrip, such utilization would not expose people residing or working in the project area to excessive noise levels. Therefore, no impacts would occur.

5.12.5 Applicant Proposed Measures

The following APMs would be implemented to ensure that potential noise impacts would be less than significant.

APM Noise-1: For the few locations where the Proposed Project could exceed the noise ordinance limits during construction, SDG&E would meet and confer with the City and County to discuss temporarily deviating from the requirements of the Noise Code as necessary.

5.12.6 Detailed Discussion of Significant Impacts

Following implementation of APMs, the Proposed Project would not cause any significant impacts relating to noise and vibration.

5.12.7 References

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