

NOISE TECHNICAL REPORT

RIVERSIDE TRANSMISSION RELIABILITY PROJECT (RTRP) RIVERSIDE, CALIFORNIA

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GLOSSARY OF TERMS AND ACRONYMS

α	included angle
AN	audible noise
APM	applicant proposed measure
Caltrans	California Department of Transportation
CEQA	California Environmental Quality Act
City	City of Riverside
CNEL	Community Noise Equivalent Level
County	County of Riverside
CPUC	California Public Utilities Commission
dB	decibel
dBA	A-weighted decibel
EIR	Environmental Impact Report
EITP	Eldorado-Ivanpah Transmission Project
EPRI	Electric Power Research Institute
FHWA	Federal Highway Administration
FTA	Federal Transit Administration
I-15	Interstate 15
in/sec or ips	inches per second
ISO	International Organization for Standardization
kV	kilovolt
LB	long barrier
L_{dn}	day/night average sound level
L_{max}	maximum noise level
LD	Larson-Davis, Inc.
L_{eq}	equivalent noise level over a period of time
LT	long-term
MB	medium barrier
mph	miles per hour
NSA	Noise Study Area
ppv	peak particle velocity
RI	Radio Interference
RN	Radio Noise
RPU	Riverside Public Utilities
RTRP	Riverside Transmission Reliability Project
S	designed barrier performance

SB	short barrier
SCE	Southern California Edison
SLM	sound level meter
SR	State Route
ST	short-term
TL	transmission loss
TVI	Television Interference
USEPA	U.S. Environmental Protection Agency

1.0 INTRODUCTION

1.1 PURPOSE OF STUDY

The purpose of this Noise Technical Report (Report) is to update the current noise analysis contained in *Final Environmental Impact Report Riverside Transmission Reliability Project* SCH#2007011113 (“EIR”), dated October 23, 2012, and as provided on the California Public Utilities Commission (CPUC) website.¹

Applicable information in the noise section of the EIR was utilized or referenced in the preparation of this Report. With scope limited to the proposed “I-15” 230 kV double-circuit transmission line (one of the Riverside Transmission Reliability Project [RTRP] features as described in the EIR, to be herein referred to as the “Project”), this Report presents the results of a new outdoor ambient noise level survey completed in its vicinity; analyzes potential impacts to noise-sensitive receptors resulting from the construction and operation (i.e., audible corona noise) of the Project, and identifies avoidance, minimization, and mitigation measures to reduce potential significant noise impacts to noise-sensitive receptors.

The Report studies two potential routes of the proposed 230 kV transmission line, which are designated as follows for purposes of this noise impact assessment:

- Project Alignment (PA) – the entirety of the proposed route between its two endpoints is above-ground; and,
- Hybrid Alignment (HA) – with the exception of an underground portion, this route largely mimics the PA.

1.2 PROJECT BACKGROUND

Background on the proposed Project is provided from the Project description from the EIR, as follows:

Pursuant to Southern California Edison’s (SCE) Federal Energy Regulatory Commission (FERC)-approved Transmission Owner Tariff, Riverside Public Utilities (RPU) submitted a request in 2004 for SCE to provide additional transmission capacity to meet

¹ http://www.cpuc.ca.gov/Environment/info/panoramaenv/RTRP/PDF/Application/FEIR%20Vol%202/3_DEIR_ENVIRONMENTAL_ANALYSIS.pdf

projected load growth and to provide for system reliability. SCE performed a series of interconnection studies that determined it could not expand Vista Substation, located in Riverside County, due to site and environmental constraints but could expand the regional electrical system to provide RPU a second source of transmission capacity to import bulk electric power. This would be accomplished by creation of a new SCE 230 kilovolts (kV) transmission connection, the construction of a new SCE substation, the construction of a new RPU substation, and the expansion of the RPU 69 kV subtransmission system. The RTRP would provide RPU with long-term system capacity for load growth, and needed system reliability and flexibility. Project components for the RTRP include construction of the new 230 kV structures and some new 69 kV structures, development of temporary construction and permanent access roads, and temporary pulling sites.

The additional transmission capacity to RPU would be available through the new SCE Wildlife Substation at 230 kV and then transformed to 69 kV for integration into the RPU electrical system serving the City of Riverside (City). The transformation or “stepping down” of power from 230 kV to 69 kV would take place at a new substation, named Wilderness Substation, which would be a 230/69 kV substation, owned and operated by RPU. Wilderness and Wildlife Substations would be located adjacent to each other on property that is presently owned by and within the City.

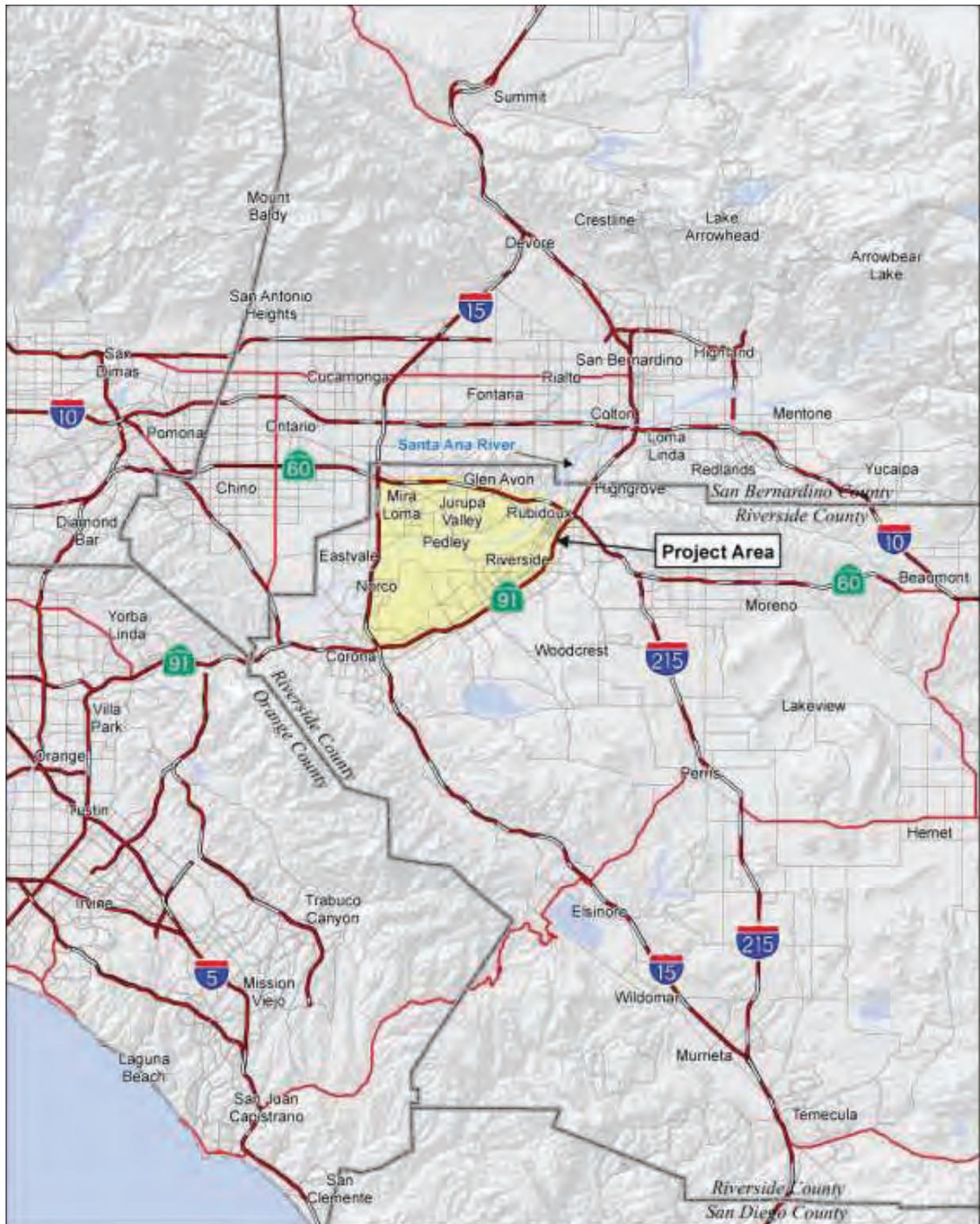
In order to integrate the additional transmission capacity into RPU’s electrical system, RPU’s 69 kV system would be expanded and divided into eastern and western systems. The existing source of energy from Vista Substation would continue to supply the eastern system, while the western system would be supplied through the proposed Wilderness Substation. Creating two separate 69 kV subsystems is necessary for prudent electric utility operation and would also help provide the required level of emergency back-up service, particularly in the event of an interruption to either 230/69 kV substation source.

Several new double-circuit 69 kV subtransmission lines would need to be constructed between 69 kV substations within the City. To accommodate these new subtransmission lines, upgrades would be required at four existing RPU 69 kV substations. The upgrades would take place within the existing boundaries of each substation.

New fiber optic communications would also be required for system control of Wilderness and Wildlife Substations and associated 69 kV and 230 kV transmission lines. The 69 kV communications would meet SCE’s reliability standards.

1.3 PROJECT LOCATION

The Project area is located in the northwest portion of Riverside County (County), California, with portions of the Project area within the Cities of Riverside and Jurupa Valley (Figure 1). The Project area is bordered on the north by State Route (SR) 60 and the existing Mira Loma to Vista SCE Transmission Lines, on the west by Interstate 15 (I-15), and on the southeast by SR-91 (Figure 1). Land use within the Project area and immediate vicinity includes single-family residential, agricultural, and commercial development, as well as undeveloped open space.



Source: City of Riverside

Figure 1
Regional Map



No Scale

1.4 PROJECT DESCRIPTION

SCE proposes to construct a new SCE 230-kilovolt (kV) transmission line, which is currently contemplated as following a PA or HA route as depicted in Figures 2 and 3. As shown, the proposed transmission line alignment (moving west to east) would be located from Cantu-Galleano Road south along Wineville Avenue where the transmission line parallels I-15 to Limonite Ave. The 230kV line will then, for the HA route, be undergrounded along Pats Ranch Road south to 68th St where the line travels east to Goose Creek Golf Course. The line then then travels overhead across the Santa Ana River and east along the southern bluffs of the Santa Ana River through the Hidden Valley Nature Preserve to Wilderness Ave. Project components to be installed along its alignment would thus include towers or lattices, new conductors, and interconnections to existing SCE infrastructure.

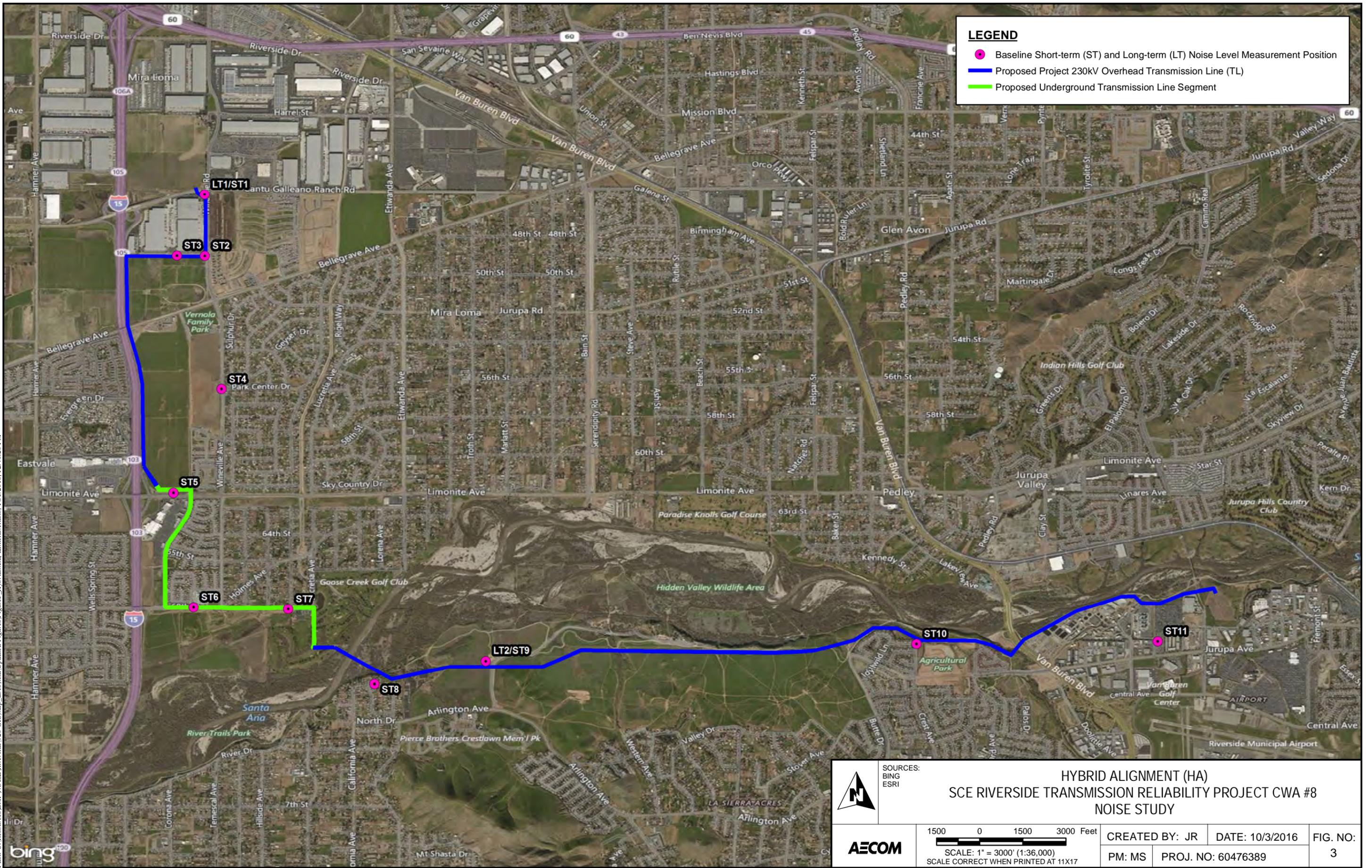
For purposes of this noise study, the above-ground portions of both potential routes of the proposed 230-kV transmission line (maximum operating voltage of 242 kV) are assumed to be double-circuit design, with each of three phases comprising two subconductors separated by 18 inches with the height of the conductor an average of 25 meters above grade.

1.5 ACOUSTICAL TERMINOLOGY

To help frame the discussion of noise level prediction and assessment in this report, the reader is invited to review and refer to Appendix A - Noise and Vibration Terminology.

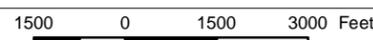
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LEGEND

- Baseline Short-term (ST) and Long-term (LT) Noise Level Measurement Position
- Proposed Project 230kV Overhead Transmission Line (TL)
- Proposed Underground Transmission Line Segment

 SOURCES: BING ESRI	HYBRID ALIGNMENT (HA) SCE RIVERSIDE TRANSMISSION RELIABILITY PROJECT CWA #8 NOISE STUDY		
	 SCALE: 1" = 3000' (1:36,000) SCALE CORRECT WHEN PRINTED AT 11X17	CREATED BY: JR PM: MS	DATE: 10/3/2016 PROJ. NO: 60476389



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2.0 EXISTING CONDITIONS

2.1 LAND USES

The Project area is characterized by rural, urban, and suburban development intermixed with agriculture and undeveloped lands. Extensive areas in the central portion of the Project area (Santa Ana River floodplain) are preserved open space, set aside for recreation, wildlife, and protected species. Rapid population growth in the Project area has resulted in increased development with accompanying changes in land use. The Project area is almost entirely developed.

The natural topography of the Project area is valley lowland intersected by a sinuous river corridor, with isolated bluffs and rolling hills, surrounded by mountain ranges. Elevations range from 680 to above 1,900 feet above mean sea level; however, the Project transmission alignment would be located in relatively flat areas.

2.2 EXISTING NOISE ENVIRONMENT

Noise Sources

The noise environment in the proposed Project area is typical of a rural setting, except at locations more directly affected by noise sources from transportation, recreation, industrial, cattle and horse facilities, and commercial and residential development (both existing communities and those in various stages of construction completion). Motor vehicles traveling on I-15, SR-60, and several other arterial roadways contribute to transportation-related noise along with occasional aircraft overflights. Intermittent noise from outdoor activities at the surrounding residences (e.g., people talking, operation of landscaping equipment, car doors slamming, and dogs barking), although minor, also influences the ambient noise environment.

The primary noise source on and surrounding the Project site is traffic noise including vehicular traffic on I-15, SR-60, SR-91, Van Buren Boulevard, and other secondary roads along the alignment. Secondary noise sources are activities at the surrounding industrial, agricultural, commercial, office, and residential areas, and distant train activity and aircraft flyovers. The existing noise environment surrounding the Project site (non-event) is primarily influenced by noise from vehicle traffic on the roadways adjacent to and in proximity to the Project site. The predominant traffic noise at the Project site and surrounding areas is from I-15 and SR-60. The

Project site is also adjacent to major truck transport facilities off of I-15 at the northern extent of the Project transmission alignment.

Traffic noise level on roadways is dependent upon traffic volume, speed, flow, vehicle mix, pavement type, and condition. At higher speeds, typically on freeways, highways, and primary arterials, the noise from tire/pavement interaction can be greater than from vehicle exhaust and engine noise. Generally, traffic noise is increased by heavier traffic volumes, higher speeds, and large trucks. Free-flowing traffic just before or just after peak traffic periods is often the noisiest. Peak traffic periods generally result in lower noise levels due to traffic congestion, which lowers traffic speeds (Caltrans 2011).

Railroad activity occurs in the vicinity of the Project site along two transcontinental rail lines, the Burlington Northern & Santa Fe Railroad, and the Union Pacific Railroad. Metrolink commuter trains also occur in the Project area, operated by the Riverside County Transportation Commission.

Random aircraft flyovers occur in the vicinity of the Project site from high altitude commercial and military jets; low elevation traffic and news helicopters; and low elevation, single-engine, fixed-wing aircraft. The closest airports to the Project site are Riverside Municipal Airport and Flabob Airport (approximately 1 mile south and 2.5 miles northeast, respectively, of the eastern extent of the Project transmission line alignment), Los Angeles/Ontario International Airport (approximately 4 miles northwest of the northern extent of the Project transmission line alignment), and Chino Airport (approximately 5 miles west of the western extent of the Project transmission line alignment).

2.3 NOISE-SENSITIVE RECEPTORS

As shown in either Figure 2 or 3, in some areas, the proposed alignment is adjacent to existing residential, commercial, and industrial development; and adjacent to and/or transecting entitled and under-construction development (from the alignment's northern end to the river crossing). As shown in Figures 5A-D and 6A-D, the entitled and under-construction developments (i.e., residential, commercial, and/or industrial type as of February 2016) considered for this noise analysis include:

1. D.R. Horton Homes (residential; approved construction)
2. Lennar Homes/Rancho Del Sol (residential; under construction)
3. Lyon Homes (residential; approved construction)
4. Stratham Homes (residential; approved construction)

-
5. Thoroughbred Farms Business Park (light industrial, business park, commercial; approved construction)
 6. APV 1 (residential; apparently constructed) and APV 2 Homes (residential; under construction)
 7. Vernola Marketplace Apartments (residential; approved construction)
 8. Riverbend Development (residential; currently under construction)

Noise Measurements and Observations

To characterize the existing ambient noise environment, noise measurements and observations were performed on the Project site and at nearby noise-sensitive receptors in proximity to the Project site. Noise measurement locations are shown in Figures 2 and 3. A combination of eleven (11) short-term (“ST”, 15-minute duration) during the day and night periods (twenty-two [22] total ST measurements), and two (2) long-term (“LT”, twenty-four [24] continuous hours duration) noise level measurements were performed over a thirty-six (36) hour period on November 11 and 12, 2015. The noise measurements were generally performed along the proposed Project transmission line route, on roadways near single-family residences nearest to the alignment, as well as representative commercial, industrial, and open space areas.

Noise measurements were taken by AECOM noise specialists using sound level meters (SLMs) manufactured by Larson-Davis, Inc. (LD). ST noise measurements were made with one LD Model LxT SLM, and LT measurements with two LD Model 820 SLMs. The SLMs were programmed in “slow” response mode, and to save A-weighted noise levels at regular intervals to onboard instrument memory. All noise measurements were taken approximately five (5) feet above grade using stationary tripods. SLM calibration status was field-checked before and after each measurement using LD Model CAL 200 calibrators. During the measurements, the weather was generally clear and dry, with winds ranging from 0 to 9 miles per hour, and temperatures ranging between 52 and 81 degrees Fahrenheit.

Noise measurement locations and observations are summarized in Table 1 and detailed in Appendices B and C. For purposes of this noise analysis, the ST locations will be considered representative locations of the baseline outdoor ambient sound environment associated with existing or future (based on current or proposed development) residential land uses for which corresponding noise impact assessment criteria (based on land use or zoning) would apply.

**Table 1
Noise Measurement Locations**

Site ID*	Location	Approximate Distance/ Direction from Project Alignment (PA)	Approximate Distance/ Direction from Hybrid Alignment (HA)	Land Use	Dominant Noise Source
LT-1	Wineville Avenue /Canto-Galeano Ranch Road	110 feet/northeast	110 feet/northeast	Commercial, trucking	Vehicle/truck traffic
LT-2	Hidden Valley County Park	212 feet/north	212 feet/north	County park, open space	Vehicle traffic, off-road motorcycles
ST-1	Wineville Avenue /Canto Galeano	110 feet/northeast	110 feet/northeast	Commercial, trucking	Vehicle/truck traffic
ST-2	Landon Drive @ Wineville Avenue	< 25 feet/north	< 25 feet/north	Commercial, trucking	Vehicle/truck traffic
ST-3	Landon Drive	28 feet/north	28/north	Commercial, trucking	Vehicle/truck traffic
ST-4	Wineville Avenue @ Park Center	2,293 feet/east	2,293 feet/east	Existing and proposed residential	Agricultural noise and vehicle traffic
ST-5	Park and Ride on Limonite Avenue @ I-15	490 feet/east	100 feet**/south	Commercial and open space	Vehicle/truck traffic
ST-6	68 th Street @ Carnellian Street	214 feet/north	< 25 feet**/north	Existing and proposed residential	Vehicle traffic
ST-7	68 th Street @ Dana Avenue	430 feet/northeast	< 25 feet**/north	Existing residential and golf course	Vehicle traffic and aircraft flyovers
ST-8	Gruela Court @ Pinto Lane	425 feet/south	425 feet/south	Existing residential and open space	Vehicle traffic and aircraft flyovers
ST-9	Hidden Valley Wildlife Area Access Road	212 feet/north	212 feet/north	County park, open space	Strong winds, park goers voices
ST-10	Julian Drive @ Crest Avenue	168 feet/south	168 feet/south	Existing residential, open space	Vehicle traffic and aircraft flyovers
ST-11	Payton Street	1,330 feet/south	1,330 feet/south	Industrial and open space	Vehicle traffic and aircraft flyovers

* The Site ID corresponds to noise measurement locations shown in Figures 2 and 3.

** Distances to underground portions of the HA.

As shown in Table 1 and Figures 2 and 3, the current land uses at the measurement locations along the alignment from west to east (ST-1 to ST-11) include a commercial warehouse trucking district near I-15 including existing residential development; a golf course, Santa Ana River

crossing and floodplain area, open park space and existing residential development; and an industrialized area.

Also shown in Figures 2 and 3 are the aforementioned entitled and under-construction developments, for which the baseline outdoor ambient sound levels will (for purposes of this analysis) be represented by the measured sound levels from the field survey as follows:

1. D.R. Horton Homes (ST-4, due to its distance from I-15 and its position on the same northwest perimeter [Wineville Avenue and Bellegrave Avenue] of the currently built-out residential community that adjoins the southern edge of this development).
2. Lennar Homes/Rancho Del Sol (ST-4, for the same reasons as #1 above).
3. Lyon Homes (the average of ST-2 and ST-4, due to the former adjoining the development on its western edge, and the latter for the same reasons as #1 and #2 above).
4. Stratham Homes (the average of ST-1 and ST-2, since they both adjoin the development on its western edge).
5. Thoroughbred Farms Business Park (the average of ST-2 and ST-3, since they both adjoin the development on its northern edge).
6. APV 1 and 2 Homes (ST-4, since it adjoins the northeast corner of APV 2 and is north of APV 1 [but adjoins the same Wineville Avenue perimeter of the existing residential community immediately east]).
7. Vernola Marketplace Apartments (ST-5, since it shares the same distance to I-15 as does the eastern edge of the development [Pat's Ranch Road]).
8. Riverbend Development (the average of ST-6 and ST-7, since these survey positions adjoin the northern edge of the development).

For purposes of this noise analysis, the existing residential community bounded by Pat's Ranch Road to the east, Wineville Avenue to the west, Limonite Avenue to the north and 68th Street to the south will, like Vernola Marketplace Apartments noted above, also have its baseline ambient sound level represented by the measured noise level at ST-5 on the basis of its Pat's Ranch Road edge having a comparable distance to generally dominant traffic noise from I-15.

Ambient noise level measurements are summarized in Table 2 and detailed in Appendices B and C.

As shown in Table 2, ST ambient noise level measurements ranged from 47 to 68 dBA L_{eq} during the day and 36 to 71 dBA L_{eq} at night. LT ambient noise level measurements ranged from 70 dBA CNEL at LT-1 to 52 dBA CNEL at LT-2. Dominant noise sources were primarily from vehicle traffic on adjacent roadways and I-15 (including heavy trucks) and aircraft flyovers.

2.4 MEASUREMENT OF CORONA AUDIBLE NOISE

Outdoor ambient noise level measurements and documented observations of field conditions were performed at a non-Project site near an existing SCE 230kV

Table 2
Measured Existing Outdoor Ambient Noise Levels

Site ID*	Date (mm/dd/yy)	Start/Stop Time (hh:mm)	CNEL (dBA)	L_{eq} (dBA)	L_{max} (dBA)	L_{min} (dBA)	L_{10} (dBA)	L_{50} (dBA)	L_{90} (dBA)
LT-1	11/11/15 11/12/15	12:05/ 13:25	70	64	91	48	66	61	57
LT-2	11/11/15 11/12/15	14:40/ 15:45	52	45	67	29	46	41	39
ST-1D	11/12/15	13:10/13:25	68	63	72	52	66	61	57
ST-1N	11/12/15	14:35/14:50		61	73	48	63	56	51
ST-2D	11/12/15	12:45/13:00	77	66	81	51	70	60	53
ST-2N	11/12/15	02:10/02:25		71	81	46	57	50	49
ST-3D	11/12/15	12:25/12:40	65	62	84	42	62	49	44
ST-3N	11/12/15	01:50/02:05		57	79	44	55	51	49
ST-4D	11/12/15	12:00/12:15	68	68	96	43	61	54	49
ST-4N	11/12/15	01:25/01:40		47	60	41	49	45	43
ST-5D	11/12/15	11:20/11:35	64	60	73	48	63	58	53
ST-5N	11/12/15	01:00/01:15		56	68	45	60	52	48
ST-6D	11/12/15	15:10/15:25	67	67	84	48	68	60	55
ST-6N	11/12/15	00:35/00:50		50	66	36	52	43	40
ST-7D	11/12/15	13:55/14:10	48	47	66	34	49	40	37
ST-7N	11/12/15	00:10/00:25		36	43	34	38	36	35
ST-8D	11/12/15	14:35/14:50	54	53	71	33	54	39	36
ST-8N	11/11/15	23:30/23:45		43	51	39	45	43	41
ST-9D	11/11/15	15:05/15:20	61	47	61	33	48	42	38
ST-10D	11/11/15	16:55/17:10	57	52	68	41	55	45	43
ST-10N	11/11/15	22:55/23:10		49	59	44	51	48	46
ST-11D	11/11/15	16:25/16:40	58	55	72	44	57	48	46
ST-11N	11/11/15	22:30/22:45		50	69	45	51	47	46

* The Site ID corresponds to noise measurement locations shown in Figure 3.

** For short-term (ST) locations, CNEL values calculated from day and night measurement data, applying daytime measured value as the estimated evening noise level. For ST-9, daytime measurement value used day, evening and nighttime periods.

transmission line (location provided by SCE) that is currently in operation. A brief technical memorandum prepared by RCH Group, provided to AECOM by SCE and can be found in Appendix E, describes the conditions and measured corona audible noise (AN) of the sample existing transmission line, which could not readily be distinguished from background noise sources. The sound pressure level (SPL) measurements were conducted within the 6 p.m. to 7 p.m. hour on June 7, 2017. During the SPL measurements, the weather was generally clear and dry (38% relative humidity [RH]), with intermittent wind gusts up to 10 miles per hour, and an ambient outdoor temperature of 88 degrees Fahrenheit. Summarized SPL data are presented in Table 3.

Table 3
Measurements of Corona Audible Noise (AN) from an Existing 230 kV Line

Interval ID	Start Time (hh:mm)	Stop Time (hh:mm)	One-minute L_{eq} (dBA)	L_{min} (dBA)	L_{max} (dBA)	L_{50} (dBA)	L_{90} (dBA)	Notes
1	19:27	19:28	40.2	38.4	42.6	40.2	39.3	Distant traffic noise
2	19:28	19:29	39.8	38.4	41.6	39.6	38.8	Wind event > 41 dB
3	19:29	19:30	39.8	38.3	41.6	39.7	38.9	Wind event > 43 dB
4	19:30	19:31	41.1	39.9	43.4	40.7	40.1	Distant traffic / helo
5	19:31	19:32	41.7	38.6	44.6	41.5	39.2	Loud truck ~ 45 dB
6	19:32	19:33	40.6	38.8	43.0	40.2	39.2	Distant traffic noise
7	19:33	19:34	39.5	37.8	40.8	39.5	38.6	Distant traffic noise
8	19:34	19:35	40.8	39.2	42.5	40.7	39.9	Loud motorcycle
9	19:35	19:36	40.9	40.0	42.0	40.8	40.3	Wind event > 41 dB
10	19:36	19:37	40.5	39.9	42.8	40.4	39.3	Distant traffic noise

Source: RCH Group (2017)

As shown in Table 3, the one-minute interval SPL measurements of the existing 230 kV transmission line, at a distance of 50 feet below the conductors, ranged between 39 and 42 dBA L_{eq} . RCH Group reported that corona AN was inaudible during the field survey under observed and measured conditions, and concluded that corona AN from a proposed similar 230 kV line would not likely be perceived at a distance of 50 feet.

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3.0 REGULATORY FRAMEWORK

This section provides a summary of the applicable federal, state, and local noise regulations.

3.1 FEDERAL REGULATIONS

The federal government actively advocates that local jurisdictions use their land use regulatory authority to arrange new development in such a way that “noise-sensitive” uses are prohibited from being sited adjacent to a highway or, alternately, that the developments are planned and constructed in such a manner that potential noise impacts are minimized. Federal noise policies and programs are developed by federal agencies of the U.S. Department of Transportation through its various operating agencies, i.e., the Federal Aviation Administration, the Federal Transit Administration (FTA), and the Federal Highway Administration (FHWA).

Currently, there are no AN control regulations that are specifically concerned with AN from power facilities. The U.S. Environmental Protection Agency has published guidelines relating to AN in general, which recommend that the L_{dn} be limited to 55 dBA outdoors and 45 dBA indoors (USEPA 1974).

3.2 STATE REGULATIONS

California Government Code, General Plan Noise Elements

California does not promulgate statewide standards for environmental noise, but California State Government Code Section 65302(f) requires each local jurisdiction to draft a Noise Element for their General Plan to establish acceptable noise limits for various land uses. The California Administrative Code provides guidelines for evaluating the compatibility of various land uses as a function of community noise exposure.

California Department of Transportation

The California Department of Transportation (Caltrans) provides vibration level thresholds for architectural and structural damage and human perception thresholds. The Project is not subject to Caltrans requirements; however, Caltrans provides vibration thresholds for reference. To assess the potential for structural damage associated with vibration from construction activities, the vibratory ground motion in the vicinity of an affected structure is measured in terms of ppv,

typically in units of in/sec. Table 4 presents the vibration level thresholds for architectural and structural damage and human perception and annoyance.

Table 4
Human and Structural Response to Vibration

Effects on Structures and People	Peak Vibration Threshold (ppv) (in/sec)
Structural damage to commercial structures	6
Structural damage to residential buildings	2
Architectural damage	1.0
General threshold of human annoyance	0.1
General threshold of human perception	0.01

Source: Caltrans 2002

As shown in Table 4, structural damage occurs to various structures when vibration levels reach 2 to 6 in/sec ppv at the respective structures. One-half of the minimum of this threshold range (i.e., 1 in/sec ppv) is considered a safe criterion that would protect against structural damage. For its construction projects, Caltrans uses a vibration criterion of 0.2 in/sec ppv, except for pile driving and blasting activities.

California Environmental Quality Act of 1970

The California Environmental Quality Act (CEQA), Public Resources Code 21100 et seq., requires lead agencies to evaluate the environmental impact associated with a proposed project. CEQA requires that a local agency prepare an EIR on any project it proposes to approve that may have a significant effect on the environment. Technical reports such as this Report are used to develop noise sections of EIRs. CEQA Guidelines (California Code of Regulations, Title 14, Division 6, Chapter 3, Section 15064.7) provide thresholds of significance for noise.

California Public Utilities Commission

CPUC has sole and exclusive state jurisdiction over the siting and design of the proposed Project. Pursuant to CPUC General Order 131-D, Section XIV.B, “Local jurisdictions acting pursuant to local authority are preempted from regulating electric power line projects, distribution lines, substations, or electric facilities constructed by public utilities subject to the CPUC’s jurisdiction. However, in locating such projects, the public utilities shall consult with local agencies regarding land use matters.” Consequently, public utilities are directed to consider local regulations and consult with local agencies, but the county and cities’ regulations are not applicable as the county

and cities do not have jurisdiction over the proposed Project. Accordingly, the following discussion of local regulations is provided for informational purposes only.

3.3 LOCAL REGULATIONS

The proposed Project alignment is located within four jurisdictions: Riverside County, and the cities of Riverside, Jurupa Valley, and Norco. Municipal policies, ordinances, and significance thresholds with respect to noise, applicable to the proposed Project, are included in the:

- County’s General Plan Noise Element (Riverside County 2008),
- County’s Municipal Code Noise Ordinance (Riverside County 2006),
- City of Riverside Municipal Code Noise Ordinance (City of Riverside 1996),
- City of Riverside General Plan Noise Element (City of Riverside 2007),
- City of Jurupa Valley Municipal Code Noise Ordinance (City of Jurupa Valley 2012),
and
- City of Norco Municipal Code Noise Ordinance (City of Norco 2015).

County of Riverside

General Plan, Noise Element

The Noise Element of the Riverside County General Plan contains specific goals and policies for evaluating a project’s compatibility with surrounding land uses (Riverside County 2008). The following goals and policies related to noise are relevant to the proposed Project:

Policy N 4.1: Prohibit facility-related noise, received by any sensitive use, from exceeding
45 dB-10-minute L_{eq} between 10:00 p.m. and 7:00 a.m. (nighttime)
65 dB-10-minute L_{eq} between 7:00 a.m. and 10:00 p.m. (daytime)

Policy N 4.2: Develop measures to control non-transportation noise impacts.

Policy N 4.3: Ensure any use determined to be a potential generator of significant stationary noise impacts be properly analyzed, and ensure that the recommended mitigation measures are implemented.

Policy N 12.1: Minimize the impacts of construction noise on adjacent uses within acceptable practices.

Policy N 12.2: Ensure that construction activities are regulated to establish hours of operation in order to prevent and/or mitigate the generation of excessive or adverse noise impacts on surrounding areas.

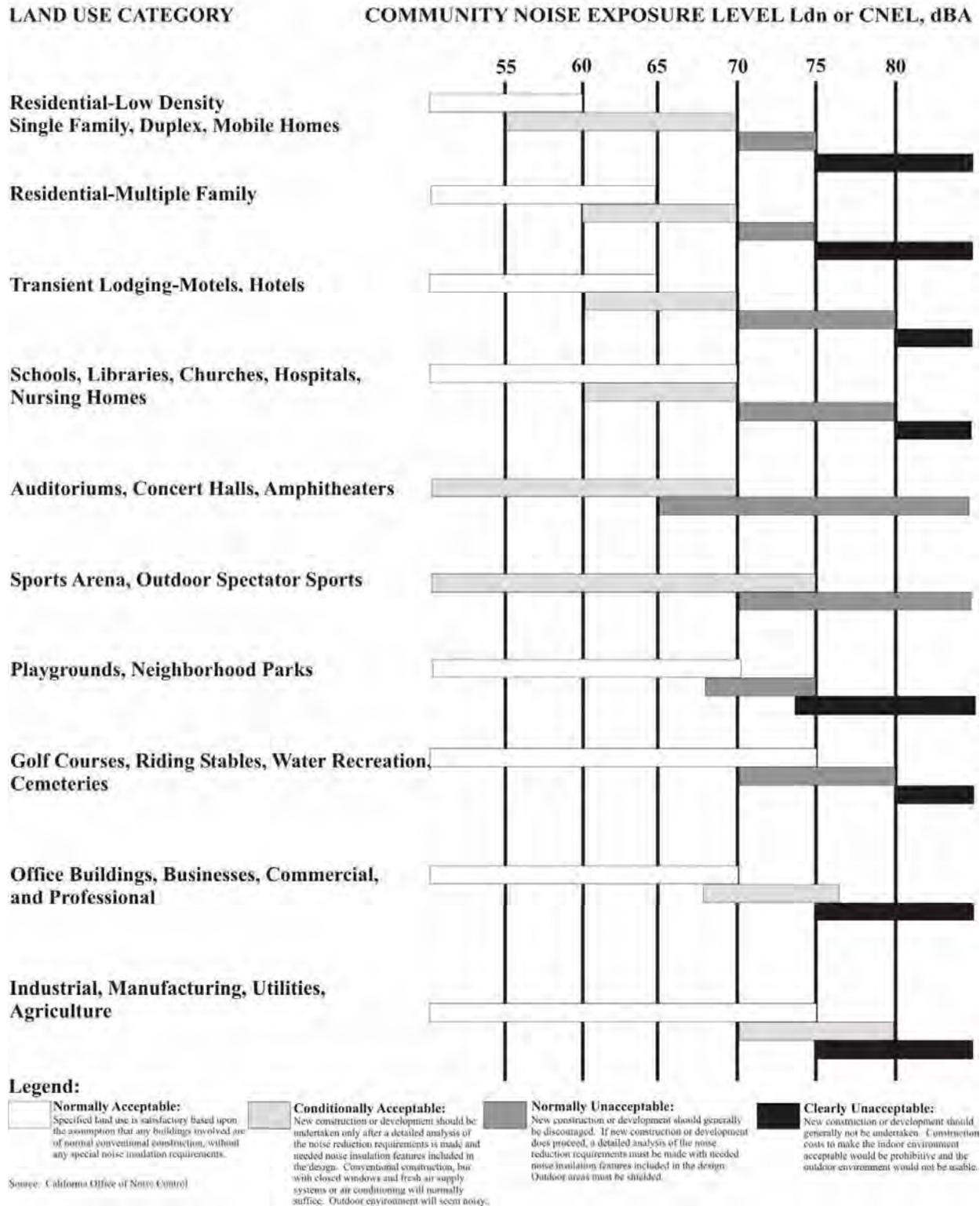
Policy N 12.4: Require that all construction equipment utilize noise reduction features (e.g., mufflers and engine shrouds) that are no less effective than those originally installed by the manufacturer.

Riverside County adheres to California state laws with regard to noise levels (i.e., the County of Riverside General Plan, Chapter 7 Noise Element. Table N-1 "Land Use Compatibility for Community Noise Exposure" (Table 5) is the same as the State's Community Noise Exposure chart). Single-family residential land uses are considered acceptable for noise levels up to 60 dBA CNEL.

Noise Ordinance

Riverside County regulates noise in accordance with Chapter 9.52, Noise Regulations of the Riverside County Municipal Code (Noise Ordinance 847) (Riverside County 2006). Section 9.52.030 of the Municipal Code defines a sensitive receptor as a land use that is sensitive to noise including, but not limited to, residences, schools, hospitals, churches, rest homes, cemeteries, or public libraries. Section 9.52.040 of the Municipal Code states that maximum noise levels from stationary noise sources at the property line of a sensitive receptor (medium density residential and low density residential in the proposed Project area) are to remain below 45 dB during nighttime hours (10:00 p.m. to 7:00 a.m.) and are not to exceed 55 dB during daytime hours (7:00 a.m. to 10:00 p.m.). Section 9.52.020[I] states that sound emanating from private construction projects located within one-quarter mile from an inhabited dwelling is exempt from the provisions of Chapter 9.52, if construction occurs between the hours of 6:00 a.m. and 6:00 p.m. during the months of June through September, and between the hours of 7:00 a.m. and 6:00 p.m. during the months of October through May.

**Table 5
Riverside County Land Use Compatibility for Community Noise Exposure**



Under Ordinance No. 847, the County could consider providing a construction-related exception to the county sound level standards, if an application for a construction-related exception has been filed and approved by the County's Director of Building and Safety. According to Ordinance 847, an exception application shall not be approved unless: *the applicant demonstrates that the activities described in the application would not be detrimental to the health, safety or general welfare of the community. In determining whether activities are detrimental to the health, safety or general welfare of the community, the appropriate decision making body or officer shall consider such factors as the proposed duration of the activities and their location in relation to sensitive receptors. If an exception application is approved, reasonable conditions may be imposed to minimize the public detriment, including, but not limited to, restrictions on sound level, sound duration and operating hours.* Ordinance 847 exempts facilities and capital improvement projects of a governmental agency.

City of Riverside

General Plan, Noise Element

The City noise/land use compatibility guidelines are outlined in the City's General Plan Noise Element Figure N-10 Noise/Land Use Compatibility Criteria (Table 6), which show a range of noise standards for various land use categories in terms of dBA CNEL. Depending on the ambient environment of a particular community, these basic guidelines may be tailored to reflect existing noise and land use characteristics. Noise levels occurring during nighttime hours are weighted more heavily than during the daytime. Single-family residential land uses are considered acceptable for noise levels up to 60 dBA CNEL.

Noise Ordinance

The City of Riverside's Noise Ordinance Chapter 7.35 (City of Riverside 1996) prohibits any disturbing, excessive or offensive noise which causes discomfort or annoyance to reasonable persons of normal sensitivity including permitting any noise disturbance that is:

- a. Plainly audible across property boundaries;
- b. Plainly audible through partitions common to two residences within a building;
- c. Plainly audible at a distance of 50 feet in any direction from the source of music or sound between the hours of 7:00 a.m. and 10:00 p.m.; or

Table 6
City of Riverside Noise/Land Use Compatibility Criteria

Land Use Category	Community Noise Equivalent Level (CNEL) or Day-Night Level (Ldn), dB						Nature of the noise environment where the CNEL or Ldn level is:
	55	60	65	70	75	80	
Single Family Residential*							Below 55 dB Relatively quiet suburban or urban areas, no arterial streets within 1 block, no freeways within 1/4 mile.
Infill Single Family Residential*							
Commercial: Motels, Hotels, Transient Lodging							55-65 dB Most somewhat noisy urban areas, near but not directly adjacent to high volumes of traffic.
Schools, Libraries, Churches, Hospitals, Nursing Homes							
Amphitheatres, Concert Hall, Auditorium, Meeting Hall							65-75 dB Very noisy urban areas near arterials, freeways or airports.
Sports Arenas, Outdoor Spectator Sports							
Playgrounds, Neighborhood Parks							75+ dB Extremely noisy urban areas adjacent to freeways or under airport traffic patterns. Hearing damage with constant exposure outdoors.
Golf Courses, Riding Stables, Water Rec., Cemeteries							
Office Buildings, Business, Commercial, Professional							
Industrial, Manufacturing							
Utilities, Agriculture							
Freeway Adjacent Commercial, Office, and Industrial Uses.							

 Normally Acceptable	 Conditionally Acceptable	 Normally Unacceptable	 Conditionally Unacceptable
--------------------------------------------------------------------------------------------------------------	-------------------------------------------------------------------------------------------------------------------	----------------------------------------------------------------------------------------------------------------	----------------------------------------------------------------------------------------------------------------------

Specific land use is satisfactory, based on the assumption that any building is of normal conventional construction, without any special noise insulation requirements.

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

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

New construction or development should generally not be undertaken, unless it can be demonstrated that noise reduction requirements can be employed to reduce noise impacts to an acceptable level. If new construction or development does proceed, a detailed analysis of noise reduction requirements must be made and needed noise insulation features included in the design.

The Community Noise Equivalent Level (CNEL) and Day-Night Noise Level (Ldn) are measures of the 24-hour noise environment. They represent the constant A-weighted noise level that would be measured if all the sound energy received over the day were averaged. In order to account for the greater sensitivity of people to noise at night, the CNEL weighting includes a 5-decibel penalty on noise between 7:00 p.m. and 10:00 p.m. and a 10-decibel penalty on noise between 10:00 p.m. and 7:00 a.m. of the next day. The Ldn includes only the 10-decibel weighting for late-night noise events. For practical purposes, the two measures are equivalent for typical urban noise environments.

* For properties located within airport influence areas, acceptable noise limits for single family residential uses are established by the Riverside County Airport Land Use Compatibility Plan.

SOURCE: STATE DEPARTMENT OF HEALTH
AS MODIFIED BY THE CITY OF RIVERSIDE

- d. Plainly audible at a distance of 25 feet in any direction from the source of music or sound between the hours of 10:00 p.m. and 7:00 a.m.

The City's noise ordinance does not provide noise level limits.

The City's noise ordinance limits construction activities to the hours of 7 a.m. to 7 p.m. on weekdays, and to 8 a.m. to 5 p.m. on Saturdays. Construction is not allowed on Sundays and Federal Holidays. Provisions of this noise ordinance do not apply to construction, maintenance

and repair operations, which are deemed necessary to serve the best interest of the public and which are conducted by public agencies and/or utilities or their contractors (City of Riverside 1996).

City of Jurupa Valley

The City of Jurupa Valley regulates noise in accordance with the Jurupa Valley Municipal Code Noise Ordinance, Chapter 11.10 Noise Regulations (City of Jurupa Valley 2012), which is intended to establish city-wide standards regulating noise. This chapter is not intended to establish thresholds of significance for the purpose of any analysis required by the California Environmental Quality Act and no such thresholds are established. Sound emanating from the following sources applicable to the proposed Project is exempt from the provisions of this chapter:

- Facilities owned or operated by of/for a governmental agency;
- Capital improvement projects of a governmental agency.
- Private construction projects located one-quarter of a mile or more from an inhabited dwelling;
- Private construction projects located within one-quarter of a mile from an inhabited dwelling, provided that:
 - Construction does not occur between the hours of six p.m. and six a.m. during the months of June through September, and
 - Construction does not occur between the hours of six p.m. and seven a.m. during the months of October through May;

The City's noise ordinance provides noise level limits; the listed exterior sound level limits for residential classifications 55 dBA (daytime)/45 dBA (night time) respectively (City of Jurupa Valley 2012).

City of Norco

The City of Norco regulates noise in accordance with the City of Norco Municipal Code, Chapter 9.07 Noise Regulations (City of Norco 2015). Private construction projects involving no more than one unit located within one-quarter of a mile from an inhabited dwelling is exempt provided, that construction does not occur between the hours of 7:00 p.m. and 6:30 a.m.,

Monday through Friday and 7:00 p.m. and 8:00 a.m., on Saturday and Sunday, unless specified by permit.

Section 15.30.020 provides hours of construction activity. Construction activity, including equipment start-up and use, and the loading, unloading and handling of materials, shall not commence before 6:30 a.m., or continue beyond 7 p.m., on weekdays. No construction activity for residential development projects that consist of more than one unit is permitted on Saturdays, Sundays, or national holidays unless otherwise permitted with conditions on entitlements.

The City's noise ordinance provides noise level limits; the listed exterior sound level limits for residential classifications 55 dBA (daytime)/45 dBA (night time) respectively (City of Norco 2015).

3.4 SIGNIFICANCE THRESHOLD CRITERIA

Noise levels attributed to Project construction and operation, or their acoustical contribution to a future outdoor ambient sound environment, must comply with relevant applicable federal, state, or local standards or regulations. However, consideration is given to the applicability of local ordinances, where the project is governed by a CPUC license, as discussed in Section 3.2 State Regulations, California Public Utilities Commission.

The increase in noise levels above the existing ambient level as a result of the Project also needs to be considered. A change in noise level due to a new noise source can create an impact on people. Outside controlled laboratory conditions, noise level changes below 3 dBA are not detectable by the human ear. Although individuals' reactions to changes in noise vary, empirical studies have shown people begin to notice changes in environmental noise levels of around 5 dBA (USEPA 1974). Thus, average changes in noise levels less than 5 dBA cannot be considered as producing a potentially significant adverse impact because changes of that magnitude are imperceptible by the vast majority of persons. For changes in noise levels above 5 dBA, it is difficult to quantify the impact beyond the determination that, the greater the noise level change, the greater the impact. A judgment commonly used in community noise impact analyses associates long-term noise increases of 5 to 10 dBA with "some impact."

Noise level increases of more than 10 dBA are generally considered significant (USEPA 1974). In the case of short-term noise increases, such as those from construction, the 10 dBA threshold between "less significant" and "significant" impact is often replaced with a criterion of 15 dBA (USEPA 1974). These noise-averaged thresholds are to be lowered when the noise level fluctuates, or the noise has an irritating character with considerable high frequency energy, or if

it is accompanied by subsonic vibration. In these cases, the impact must be individually estimated (USEPA 1974).

The assessment of significant noise impacts is weighed in consideration of CEQA requirements. For this discussion, CEQA describes a significant effect as one that would create a substantial, or potentially substantial, adverse change in the noise conditions of the environment in the area. Appendix G of the CEQA guidelines defines the criteria and areas of concern regarding a project's potential impact on noise-sensitive receptors by considering if a project 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.

The County and City of Riverside General Plan Noise Elements provide that single-family residential land uses are considered acceptable for noise levels up to 60 dBA CNEL.

The City of Riverside noise ordinance limits construction activities to the hours of 7 a.m. to 7 p.m. on weekdays, and to 8 a.m. to 5 p.m. on Saturdays. The City of Norco noise ordinance limits construction activities to the hours of 6:30 a.m. to 7 p.m. on weekdays. The County and the City of Jurupa Valley noise ordinances exempt construction noise from private construction projects located within one-quarter mile from an inhabited dwelling, and within one-quarter mile from an inhabited dwelling, provided construction occurs between the hours of 6 a.m. to 6 p.m. during the months of June through September, and 7 a.m. to 6 p.m. during the months of October through May.

Riverside County and the Cities of Jurupa Valley and Norco noise ordinances limit maximum noise levels from stationary noise sources at the property line of a sensitive receptor (medium density residential and low density residential in the proposed Project area) are to remain below 45 dB during nighttime hours (10:00 p.m. to 7:00 a.m.) and are not to exceed 55 dB during daytime hours (7:00 a.m. to 10:00 p.m.). The City of Riverside's noise ordinance prohibits any disturbing, excessive or offensive noise which causes discomfort or annoyance to reasonable persons of normal sensitivity including permitting any noise disturbance that is: plainly audible across property boundaries; plainly audible through partitions common to two residences within a building; plainly audible at a distance of 50 feet in any direction from the source of music or sound between the hours of 7:00 a.m. and 10:00 p.m.; or plainly audible at a distance of 25 feet in any direction from the source of music or sound between the hours of 10:00 p.m. and 7:00 a.m.

-
- b) Exposure of persons to or generation of excessive groundborne vibration or groundborne noise levels.

Excessive vibration levels are defined as exceeding vibration standards provided by FTA and Caltrans (Table 2). Typically, a vibration level of 0.1 in/sec ppv is the threshold of human annoyance, and 0.2 ppv is the threshold of risk of structural damage. At 50 feet, construction equipment is typically below the thresholds of human annoyance and structural damage (FTA 2006), except for rock blasting and impact pile driving activities which generate the highest vibration levels.

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

Operational noise is typically considered permanent, i.e., for the duration of the operation of the constructed facility. A significant permanent increase is defined as a direct Project-related permanent ambient increase of 5 dBA or greater. An increase of 3 dBA is a barely perceptible increase, and an increase of less than 5 dBA cannot be considered as producing a potentially significant adverse impact because changes of that magnitude are imperceptible by the vast majority of persons.

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

Construction noise is typically considered temporary and short term (i.e., its effect on the environment ceases upon conclusion of construction activities). A substantial temporary increase in ambient noise levels is defined as a direct Project-related increase of 10 dBA L_{eq} or greater, based on the noise standard that a 10 dBA increase is perceived by the human ear as twice as loud (FTA 2006).

- 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?

There are public airports within 2 miles of the Project area, the closest major airport is Riverside Municipal Airport. The airport noise is 65 dBA CNEL for a distance of approximately 10,000 feet along and away from the runway and 55 dBA to a distance of approximately 20,000 feet from the center of the airport towards the northwest (approximately 15,000 feet towards the southeast) (City of Riverside 2007), and surrounding area ambient noise levels are 55 to 60 dBA

for distances of several thousand feet from the centerline references of these transportation areas. Therefore, noise from the proposed transmission line would not be higher than existing airport and highway noise. Construction workers would not be exposed to excessive noise from the airport. The long-term operational noise from the transmission line would not be higher than existing ambient noise sources surrounding the airport and roads. The noise may be higher due to short-term construction work activities.

Being a power line project, the proposed Project would not result in the construction of occupied structures that would result in an increase in the number of people residing or working in proximity to the Riverside Municipal Airport. Therefore, the proposed Project would not result in people residing or working in the area being exposed 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?

There are no private airstrips in the Project area; therefore, this would be no impact.

3.5 EIR AND REPORT IMPACT CRITERIA CONSISTENCY

As stated in Section 1.1, the purpose of this Report is to update the current noise analysis contained in the EIR, dated October 23, 2012, and as provided on the CPUC website. For applicable noise regulations and standards with respect to impact assessment and significance determination, the EIR considered:

- U.S. Environmental Protection Agency guidelines relating to AN, which recommend that the L_{dn} be limited to 55 dBA outdoors and 45 dBA indoors.
- California Administrative Code guidelines for evaluating the compatibility of various land uses as a function of community noise exposure.
- Riverside County General Plan, Noise Element, Land Use Compatibility for Community Noise Exposure Table. Single-family residential land uses are considered “normally acceptable” for noise levels up to 60 dBA CNEL.
- County Ordinance No. 847 providing a construction-related exception to the county sound level standards, if an application for a construction-related exception has been filed and approved by the County's Director of Building and Safety. Ordinance 847 exempts facilities and capital improvement projects of a governmental agency.

-
- City noise/land use compatibility guidelines, outlined in the City's General Plan Noise Element Noise/Land Use Compatibility Criteria. Single-family residential land uses are considered acceptable for noise levels up to 60 dBA CNEL.
 - The City of Riverside's Noise Ordinance limiting construction activities to the hours of 7 a.m. to 7 p.m. on weekdays, and to 8 a.m. to 5 p.m. on Saturdays.
 - The CEQA Guidelines provide thresholds of significance for noise.
 - A significant permanent increase is defined as a direct Project-related permanent ambient increase of 5 dBA CNEL or greater.
 - A substantial temporary increase in ambient noise levels is defined as a direct Project-related increase of 10 dBA L_{eq} or greater.

To update the applicable noise regulations of the EIR noise section, the Report considered the regulations above contained in the EIR, and also considered:

- Caltrans vibration level thresholds for architectural and structural damage and human perception thresholds.
- CPUC sole and exclusive state jurisdiction over the siting and design of the proposed Project, pursuant to CPUC General Order 131-D, Section XIV.B.
- The City of Norco noise ordinance limits construction activities to the hours of 6:30 a.m. to 7 p.m. on weekdays, and exterior sound level limits for residential classifications 55 dBA (daytime)/45 dBA (night time).
- The County and the City of Jurupa Valley noise ordinances exempting construction noise from private construction projects located within one-quarter mile from an inhabited dwelling, and within one-quarter mile from an inhabited dwelling, provided construction occurs exemption from otherwise applicable daytime and nighttime thresholds to between the hours of 6 a.m. to 6 p.m. during the months of June through September, and 7 a.m. to 6 p.m. during the months of October through May.
- County and the Cities of Jurupa Valley and Norco noise ordinances limiting maximum noise levels from stationary noise sources at the property line of a sensitive receptor to below 45 dB during nighttime hours (10:00 p.m. to 7:00 a.m.) and are not to exceed 55 dB during daytime hours (7:00 a.m. to 10:00 p.m.).

In summary, and as the subsequent Impact Analysis section illustrates, this Report assesses potential noise impacts in a manner that emulates what is presented in the EIR, with

consideration of additional regulations and standards reflecting what are relevant and applicable to the Project as of this writing.

4.0 IMPACT ANALYSIS

This section addresses Project-related noise and vibration impacts that would occur during Project construction and operation.

4.1 CONSTRUCTION NOISE

Methodology

Construction noise is considered temporary and short term in duration. Construction noise at its source varies depending on construction activities and duration, and the type and usage of equipment involved. Noise impacts from construction are dependent on the construction noise levels generated, the timing and duration of the construction activities, proximity to sensitive receptors, and noise regulations and standards. Construction equipment can be stationary or mobile. Stationary equipment operates in one location for various periods of time with fixed-power operation, such as pumps, generators, and compressors, or a variable noise operation, such as pile drivers, rock drills, and pavement breakers. Mobile equipment moves around the construction site such as bulldozers, graders, and loaders (FTA 2006).

Heavy construction equipment typically operates for short periods at full power followed by extended periods of operation at lower power, idling, or powered-off conditions. Typically, site preparation involves demolition, grading, compacting, and excavating, which would include the use of backhoes, bulldozers, loaders, excavation equipment (e.g., graders and scrapers), pile drivers, and compaction equipment. Finishing activities may include the use of pneumatic hand tools, scrapers, concrete trucks, vibrators, and haul trucks. Typical maximum noise levels generated by typical pieces of construction equipment are listed in Table 7.

As shown in Table 7, maximum noise levels range from 70 to 95 dBA L_{max} , depending upon the piece of equipment operating (FTA 2006). In typical construction projects, grading and impact activities typically generate the highest noise levels. Grading involves the largest heaviest equipment and typically includes bulldozers, excavators, dump trucks, front-end loaders, and graders with maximum noise levels range from 80 to 85 dBA L_{max} . Impact equipment includes pile drivers, rock drills, pavement breakers, concrete crushers, and industrial/concrete saws with maximum noise levels range from 90 to 95 dBA L_{max} . Each phase of construction has a specific equipment mix, depending on the work to be accomplished during that phase. Each phase also has its own noise characteristics; some phases would have higher continuous noise levels than others, and some have high-impact noise levels.

**Table 7
Construction Equipment Noise Levels**

Equipment	Noise Level (dBA L _{max}) at 50 Feet
Auger Drill Rig	85
Backhoe	80
Blasting	94
Chain Saw	85
Clam Shovel	93
Compactor (ground)	80
Compressor (air)	80
Concrete Batch Plant*	80
Concrete Mixer Truck	85
Concrete Pump	82
Concrete Saw	90
Crane (mobile or stationary)	85
Dozer	85
Dump Truck	84
Excavator	85
Front End Loader	80
Generator (25 KVA or less)	70
Generator (more than 25 KVA)	82
Grader	85
Hydra Break Ram	90
Impact Pile Driver (diesel or drop)	95
Insitu Soil Sampling Rig	84
Jackhammer	85
Mounted Impact Hammer (hoe ram)	90
Paver	85
4x4 Pickup Truck **	55
Pneumatic Tools	85
Puller ***	84
Pumps	77
Rock Drill	85
Roller (compaction) **	80
Scraper	85
Tractor	84
Vacuum Excavator (vac-truck)	85
Vibratory Concrete Mixer	80
Vibratory Pile Driver	95

Source: Thalheimer 2000, *FTA 2006, **FHWA 2006, ***SCE, 2017, KVA = kilovolt amps

Typical construction projects, with equipment moving from one point to another, work breaks, and idle time, have hourly average noise levels (L_{eq}) that are lower than loud short-term, or instantaneous, peak noise events shown in Table 7. The L_{eq} of each phase is determined by combining the L_{eq} contributions from each piece of equipment used in that phase (FTA 2006). Therefore, typically, hourly average noise levels would be approximately 75 to 80 dBA L_{eq} at

50 feet from the center of the non-impact construction activities area, with 90 dBA L_{eq} at 50 feet for impact equipment. Noise levels of other activities would be less. Noise levels from construction activities would attenuate with distance at a rate of 6 dBA per doubling of distance over acoustically hard sites, such as streets and parking lots. Intervening structures and/or topography would further attenuate noise levels. These factors generally limit the distance construction noise travels and ensure noise impacts from construction are localized.

Anticipated Project Construction Activities

In general, construction of the transmission line for either PA or HA route would follow a sequence of operations including right-of-way acquisition, access road identification, site clearing, construction staging, foundation installation, assembly and erection of structures, clearing areas, grounding installation (including ground rods and tying grounding between poles), and cleanup and site reclamation. Various phases of construction may occur at the same time at different locations throughout the construction process, requiring several construction crews operating simultaneously in different locations.

The construction, operation, and maintenance of the proposed transmission line would require that heavy vehicles access structure sites along the right-of-way. Access would be acquired through the proposed line route. In addition, spur roads may be utilized to minimize disturbances. Staging areas and pole construction will be sited inside the right-of-way.

Installation of tower foundations (drilled shafts, drilled piers, caissons and/or direct embedment) would require appropriate drilling equipment. Trucks with augers, cranes, bucket trucks, material trucks, and ready mix trucks are some typical equipment that would be used for construction of foundations. Foundations will be excavated with an auger. Various types of foundations would be used depending on structure type and soil conditions.

The HA route would entail extensive trenching parallel with Limonite Avenue to install underground conductors; and, trenching and pavement replacement for the underground portions intended beneath Pat's Ranch Road and 68th Street.

After the structures are erected, new insulators and hardware would be installed to each structure. The structures would be rigged with insulator strings at each ground wire and position conductor. Installation of all required structure grounding would be completed promptly following structure erection.

Modeling

Because several construction activities are expected and could occur at multiple locations along the PA or HA proposed route, Project construction noise was predicted at the representative nearby noise-sensitive receivers with a technique based on the “general assessment” methodology as appearing in Chapter 12 of the FTA’s *Transit Noise and Vibration Impact Assessment* (FTA 2006) guidance report. In summary, this technique presumes the two loudest pieces of equipment associated with an activity are operating at full power and located at the geographic center of a construction area or zone. These geographic centers would be collinear with the Project alignment. Consistent with the high end of value ranges for reference construction noise levels at a distance of fifty feet as appearing in the EIR, 83 dBA L_{eq} was estimated as an average reference sound pressure level for all construction activities during daytime hours. Sound propagation between construction noise sources associated with this reference sound level and the representative receivers was estimated with an Excel spreadsheet model that incorporates algorithms and data based on International Organization for Standardization (ISO) 9613-2 standards, accounting for geometric divergence and acoustical absorption from air and ground effects.

While the Project anticipates coordinating construction activities to occur during daytime hours so as to avoid noise impacts, some specific construction activities or processes (e.g., concrete pours and/or curing) may need to continue into or otherwise occur during nighttime periods. For such a potential nighttime construction noise scenario, this analysis assumes that the two loudest equipment would be an operating light tower with a 20 kW generator, rated at 71 dBA at 23 feet (4-way rentals 2015) and equipment conducting a concrete pour process: 70 dBA at 82 feet (NSW 2009). Estimation of sound propagation to representative receivers would use the same aforementioned algorithms and data based on ISO 9613-2 information.

Impact Analysis

Project noise analysis is based on Project construction activities occurring separately (and not concurrently) at a given location. Project construction activities for either the proposed PA or HA route would be closest to existing and proposed residences represented by locations ST-1, ST-2, ST-3, ST-5, ST-6, and ST-7, as shown on Figures 2 and 3, with distance identified in Table 1. In addition, construction noise would be generated off-site by Project construction-related vehicle traffic trips to and from the job site on local roadways, including daily worker commute vehicle trips, and by heavy truck trips from construction equipment and materials deliveries.

Construction Impact Summary

Noise Standards

Project construction noise impacts would be significant if the Project would exceed the County's/Cities' applicable noise ordinance construction standards. The City of Riverside noise ordinance limits construction activities to the hours of 7 a.m. to 7 p.m. on weekdays, and to 8 a.m. to 5 p.m. on Saturdays.

The County and the City of Jurupa Valley noise ordinances exempt construction between the hours of 6 a.m. to 6 p.m. during the months of June through September, and 7 a.m. to 6 p.m. during the months of October through May. External to these time periods, noise limits with respect to non-transportation noise sources would apply and are described in Section 3.3.

Project construction noise would be localized at the specific areas of construction activity and generally anticipated to occur from 7 a.m. to 7 p.m. Monday through Saturday, during either the allowable construction hours (i.e., within 7 a.m. to 7 p.m.) or similar time periods when construction activity noise is exempted per the applicable County's/Cities noise ordinances. In addition, the County's/Cities noise ordinances do not provide a construction noise level limit. Therefore, if Project construction activity occurs during these allowable times, or generates noise within the allowable exemption timeframes, this would be a less than significant impact.

However, in the event construction activities are necessary on days or hours outside of what is specified by local ordinance (for example, if existing lines must be taken out of service for the work to be performed safely and the line outage must be taken at night for system reliability reasons, or if construction needs require continuous work), then this would be a potentially significant impact and applicable noise reduction measures discussed in Section 5 would be considered for feasibility during the time of Project construction. With respect to identified representative receivers, Table 8 shows, for the PA, where these potentially significant impacts may occur on the basis of the assumed nighttime construction noise emission of a light tower and concrete pour process. Table 9 presents the results of a similar assessment of nighttime construction noise for the HA.

Ambient Noise Levels

As shown in Tables 10 and 11, the estimated daytime Project construction noise level calculated at each of the representative receptors for the PA and HA alignments, respectively, was logarithmically added to the measured existing daytime ambient noise level that is either co-

located with or considered representative of, as described in Section 2.3, the baseline sound environments at those representative receptors. These log-summed ambient-plus-construction noise levels (aka, “future ambient”) were then arithmetically compared to the measured existing ambient noise levels to determine the net ambient noise level increment at each representative receptor due to construction noise. This net increase in dBA was then compared to the relative threshold for a substantial temporary ambient noise level increment of 10 dBA L_{eq} or greater, also shown in Tables 10 and 11.

Table 8
Predicted Project Alignment (PA) Nighttime Project Construction Noise Levels

Ambient Survey Position (ASP) ID (and Representative Receptor Location*)	Apparent City Jurisdiction	Distance (ft) between PA and Identified Community or Location	Predicted Noise from Light Tower and Concrete Pour (dBA, L_{eq})	Potential Impact? (>45 dBA L_{eq})
ST-1N (Stratham ¹)	Jurupa Valley	50	74	Yes
ST-2N (Stratham ² , Lyon ¹)	Jurupa Valley	50	74	Yes
ST-3N (Thoroughbred ³)	Jurupa Valley	50	74	Yes
ST-4N (DR Horton ⁴)	Jurupa Valley	3,500	29	No
ST-4N (Lennar ⁵ , Lyon ⁸)	Jurupa Valley	2,000	35	No
ST-4N (APV1 ⁶ , APV2 ⁶)	Jurupa Valley	1,750	37	No
ST-5N (APV2 ⁷)	Jurupa Valley	1,500	38	No
ST-5N (Vernola ^{1,2})	Jurupa Valley	50	74	Yes
ST-6N (Riverbend ⁹)	Jurupa Valley	50	74	Yes
ST-7N (Riverbend ⁹)	Jurupa Valley	50	74	Yes
ST-8N ¹⁰	Norco	425	50	Yes
ST-9N ¹¹	Jurupa Valley	212	57	Yes
ST-10N ¹²	Riverside	168	59	No**
ST-11N ¹³	Riverside	1,330	40	No**

N = daytime

Exceedances shown in **bold**

* Represented Entitled or Under-construction Development

** City of Riverside, Section 7.35.020.F of the noise ordinance exempts construction activity “conducted by public agencies and/or utility companies or their contractors which are deemed necessary to serve the best interests of the public”

¹ northern end of westernmost row of homes, 50 feet from the PA

² southern end of westernmost row of homes, 50 feet from the PA

³ southwestern portion of business park development, 50 feet from the PA

⁴ westernmost row of homes, as close as approximately 3,500 feet from the PA

⁵ westernmost row of homes, as close as approximately 2,000 feet from the PA

⁶ westernmost row of homes, as close as approximately 1,750 feet from the PA

⁷ westernmost row of homes, as close as approximately 1,500 feet from the PA

⁸ easternmost row of homes, as close as approximately 2,000 feet from the PA

⁹ as close as approximately 50 feet from the PA, assuming 100-foot-wide Project right-of-way

¹⁰ approximately 425 feet from the PA

¹¹ approximately 212 feet from the PA

¹² approximately 168 feet from the PA

¹³ approximately 1,330 feet from the PA

Table 9
Predicted Hybrid Alignment (HA) Nighttime Project Construction Noise Levels

Ambient Survey Position (ASP) ID (and Representative Receptor Location*)	Apparent City Jurisdiction	Distance (ft) between PA and Identified Community or Location	Predicted Noise from Light Tower and Concrete Pour (dBA, L_{eq})	Potential Impact? (>45 dBA L_{eq})
ST-1N (Stratham ¹)	Jurupa Valley	150	60	Yes
ST-2N (Stratham ² , Lyon ¹)	Jurupa Valley	150	60	Yes
ST-3N (Thoroughbred ³)	Jurupa Valley	50	74	Yes
ST-4N (DR Horton ⁴)	Jurupa Valley	3,500	29	No
ST-4N (Lennar ⁵ , Lyon ⁸)	Jurupa Valley	2,000	35	No
ST-4N (APV1 ⁶ , APV2 ⁶)	Jurupa Valley	1,750	37	No
ST-5N (APV2 ⁷)	Jurupa Valley	1,500	38	No
ST-5N (Vernola ⁹)	Jurupa Valley	50	74	Yes
ST-6N (Riverbend ⁹)	Jurupa Valley	50	74	Yes
ST-7N (Riverbend ⁹)	Jurupa Valley	50	74	Yes
ST-8N ¹⁰	Norco	425	50	Yes
ST-9N ¹¹	Jurupa Valley	212	57	Yes
ST-10N ¹²	Riverside	168	59	No**
ST-11N ¹³	Riverside	1,330	40	No**

N = daytime

Exceedances shown in **bold**

* Represented Entitled or Under-construction Development

** City of Riverside, Section 7.35.020.F of the noise ordinance exempts construction activity “conducted by public agencies and/or utility companies or their contractors which are deemed necessary to serve the best interests of the public”

¹ northern end of westernmost row of homes, 150 feet from the HA

² southern end of westernmost row of homes, 150 feet from the HA

³ southwestern portion of business park development, 50 feet from the HA

⁴ westernmost row of homes, as close as approximately 3,500 feet from the HA

⁵ westernmost row of homes, as close as approximately 2,000 feet from the HA

⁶ westernmost row of homes, as close as approximately 1,750 feet from the HA

⁷ westernmost row of homes, as close as approximately 1,500 feet from the HA

⁸ easternmost row of homes, as close as approximately 2,000 feet from the HA

⁹ as close as approximately 50 feet from the underground portion of the HA

¹⁰ approximately 425 feet from the HA

¹¹ approximately 212 feet from the HA

¹² approximately 168 feet from the HA

¹³ approximately 1,330 feet from the HA

Table 10
Daytime Project Alignment (PA) Construction Noise, Ambient Increase

Ambient Survey Position (ASP) ID (and Representative Receptor Location*)	Measured Existing Daytime Ambient Sound Level at ASP (dBA, L_{eq})	Predicted Construction Noise at Representative Receptor Location (dBA, L_{eq})	Future Ambient (Log-sum of Existing Ambient and Predicted Construction Noise; dBA, L_{eq})	Increase over Existing Ambient due to Construction Noise Contribution (dBA, L_{eq})	Impact? (>10 dBA L_{eq} ambient increment)
ST-1D (Stratham ¹)	63	83	83	20	Yes
ST-2D (Stratham ² , Lyon ¹)	66	83	83	17	Yes
ST-3D (Thoroughbred ³)	62	83	83	21	Yes
ST-4D (DR Horton ⁴)	68	38	68	0	No
ST-4D (Lennar ⁵ , Lyon ⁸)	68	44	68	0	No
ST-4D (APV1 ⁶ , APV2 ⁶)	68	45	68	0	No
ST-5D (APV2 ⁷)	60	47	60	0	No
ST-5D (Vernola ^{1,2})	60	83	83	23	Yes
ST-6D (Riverbend ⁹)	67	83	83	16	Yes
ST-7D (Riverbend ⁹)	47	83	83	36	Yes
ST-8D ¹⁰	53	59	60	7	No
ST-9D ¹¹	47	65	65	18	Yes
ST-10D ¹²	52	67	67	15	Yes
ST-11D ¹³	55	48	56	1	No

D = daytime

Exceedances shown in **bold**

* Represented Entitled or Under-construction Development

¹ northern end of westernmost row of homes, 50 feet from the PA

² southern end of westernmost row of homes, 50 feet from the PA

³ southwestern portion of business park development, 50 feet from the PA

⁴ westernmost row of homes, as close as approximately 3,500 feet from the PA

⁵ westernmost row of homes, as close as approximately 2,000 feet from the PA

⁶ westernmost row of homes, as close as approximately 1,750 feet from the PA

⁷ westernmost row of homes, as close as approximately 1,500 feet from the PA

⁸ easternmost row of homes, as close as approximately 2,000 feet from the PA

⁹ as close as approximately 50 feet from the PA, assuming 100-foot-wide Project right-of-way

¹⁰ approximately 425 feet from the PA

¹¹ approximately 212 feet from the PA

¹² approximately 168 feet from the PA

¹³ approximately 1,330 feet from the PA

Table 11
Daytime Hybrid Alignment (HA) Construction Noise, Ambient Increase

Ambient Survey Position (ASP) ID (and Representative Receptor Location*)	Measured Existing Daytime Ambient Sound Level at ASP (dBA, L_{eq})	Predicted Construction Noise at Representative Receptor Location (dBA, L_{eq})	Future Ambient (Log-sum of Existing Ambient and Predicted Construction Noise; dBA, L_{eq})	Increase over Existing Ambient due to Construction Noise Contribution (dBA, L_{eq})	Impact? (>10 dBA L_{eq} ambient increment)
ST-1D (Stratham ¹)	63	68	69	6	No
ST-2D (Stratham ² , Lyon ¹)	66	68	70	4	No
ST-3D (Thoroughbred ³)	62	83	83	21	Yes
ST-4D (DR Horton ⁴)	68	38	68	0	No
ST-4D (Lennar ⁵ , Lyon ⁸)	68	44	68	0	No
ST-4D (APV1 ⁶ , APV2 ⁶)	68	45	68	0	No
ST-5D (APV2 ⁷)	60	47	60	0	No
ST-5D (Vernola ⁹)	60	83	83	23	Yes
ST-6D (Riverbend ⁹)	67	83	83	16	Yes
ST-7D (Riverbend ⁹)	47	83	83	36	Yes
ST-8D ¹⁰	53	59	60	7	No
ST-9D ¹¹	47	65	65	18	Yes
ST-10D ¹²	52	67	67	15	Yes
ST-11D ¹³	55	48	56	1	No

N = daytime

Exceedances shown in **bold**

* Represented Entitled or Under-construction Development

¹ northern end of westernmost row of homes, 150 feet from the HA

² southern end of westernmost row of homes, 150 feet from the HA

³ southwestern portion of business park development, 50 feet from the HA

⁴ westernmost row of homes, as close as approximately 3,500 feet from the HA

⁵ westernmost row of homes, as close as approximately 2,000 feet from the HA

⁶ westernmost row of homes, as close as approximately 1,750 feet from the HA

⁷ westernmost row of homes, as close as approximately 1,500 feet from the HA

⁸ easternmost row of homes, as close as approximately 2,000 feet from the HA

⁹ as close as approximately 50 feet from the underground portion of the HA

¹⁰ approximately 425 feet from the HA

¹¹ approximately 212 feet from the HA

¹² approximately 168 feet from the HA

¹³ approximately 1,330 feet from the HA

As shown in Table 10, estimated daytime Project construction noise levels for the PA route would result in substantial predicted increases in ambient noise levels during the daytime at locations ST-1D, ST-2D, ST-3D, ST-5D (Vernola), ST-6D, ST-7D, ST-9D, and ST-10D. Therefore, this would be a potentially significant impact. At these locations, applicable noise reduction measures would be considered for feasibility during the time of Project construction, as discussed in Section 5.

As shown in Table 11, estimated daytime Project construction noise levels for the HA route would result in substantial predicted increases in ambient noise levels during the daytime at locations ST-1D, ST-3D, ST-5D (Vernola), ST-6D, ST-7D, ST-9D, and ST-10D. Therefore, this would be a potentially significant impact. At these locations, applicable noise reduction measures would be considered for feasibility during the time of Project construction, as discussed in Section 5.

According to the EIR, and as assumed by this noise analysis, in order to minimize ground disturbance, SCE plans to use light duty helicopters (i.e., Hughes 500-E) to efficiently and rapidly pull light-weight sock lines from structure to structure during conductor stringing. This is a helicopter commonly used for aerial tours in parks and other scenic areas. During stringing activities, helicopters would generate intermittent noise levels of approximately 80 dBA at 200 feet. Helicopters would operate for a short time at any given location. Because the Proposed Project area is in proximity to approaches to the Riverside Municipal Airport, construction helicopter flights would enter the Project area immediately and not pass over residential areas during Project ingress and egress.

The proposed 230 kV transmission line would also traverse the City of Riverside's undeveloped Hole Lake and Savi Ranch park sites, various trails including the Santa Ana River Trail, and the Hidden Valley Wildlife Area. Construction activities would result in noise that may disrupt recreational and/or open space areas. During construction, ground work would be required at each structure location as well as along select roadways between the locations. These impacts would be temporary and of short duration, lasting only as long as required to complete the activity in a given location. Depending on the activity (structure erection, transmission line stringing, etc.), the duration of construction activities at any one location along the right-of-way would generally range from a few minutes to a few days and would not result in a significant impact to recreationists.

As shown in Table 12, estimated nighttime Project construction noise levels for the PA route would result in substantial predicted increases in ambient noise levels at representative locations ST-1N, ST-3N, ST-5N (Vernola), ST-6N, ST-7N, and ST-9N. Therefore, this would be a

potentially significant impact. At these locations, applicable noise reduction measures would be considered for feasibility during the time of Project construction, as discussed in Section 5.

As shown in Table 13, estimated nighttime Project construction noise levels for the HA route would result in substantial predicted increases in ambient noise levels at representative locations ST-3N, ST-5N (Vernola), ST-6N, ST-7N, and ST-9N. Therefore, this would be a potentially significant impact. At these locations, applicable noise reduction measures would be considered for feasibility during the time of Project construction, as discussed in Section 5.

Construction Noise Level Contours

Figures 5A through G display predicted daytime Project construction noise levels as isopleths (a.k.a., noise contours) radiating out from the Project alignment, superimposed on aerial imagery of the Project vicinity. Figure 4 provides a guide for each Figure 5A-G location along the entire alignment, and includes the construction contours, as well as the operation noise level contours (to be discussed after construction). These contours represent daytime Project construction noise, which allow the reader to see where the extent of construction noise (at a certain L_{eq}) is expected to occur; hence, the contours do not represent a single moment in time but the aggregate of potential noise levels as the construction activity occurs with its acoustical “center” located on the Project transmission line alignment. Figures 6A through 6G depict the Hybrid Alignment and anticipated construction noise contours.

Table 12
Nighttime Project Alignment (PA) Construction Noise, Ambient Increase

Ambient Survey Position (ASP) ID (and Representative Receptor Location*)	Measured Existing Nighttime Ambient Sound Level at ASP (dBA, L_{eq})	Predicted Nighttime Construction Noise (Light Tower and Concrete Pour; dBA, L_{eq})	Future Ambient (Log-sum of Existing Ambient and Predicted Nighttime Construction Noise; dBA, L_{eq})	Increase over Existing Ambient due to Nighttime Construction Noise Contribution (dBA, L_{eq})	Impact? (>10 dBA L_{eq} ambient increment)
ST-1N (Stratham ¹)	61	74	75	14	Yes
ST-2N (Stratham ² , Lyon ¹)	71	74	76	5	No
ST-3N (Thoroughbred ³)	57	74	74	17	Yes
ST-4N (DR Horton ⁴)	47	29	47	0	No
ST-4N (Lennar ⁵ , Lyon ⁸)	47	35	47	0	No
ST-4N (APV1 ⁶ , APV2 ⁶)	47	37	47	0	No
ST-5N (APV2 ⁷)	56	38	56	0	No

Ambient Survey Position (ASP) ID (and Representative Receptor Location*)	Measured Existing Nighttime Ambient Sound Level at ASP (dBA, L _{eq})	Predicted Nighttime Construction Noise (Light Tower and Concrete Pour; dBA, L _{eq})	Future Ambient (Log-sum of Existing Ambient and Predicted Nighttime Construction Noise; dBA, L _{eq})	Increase over Existing Ambient due to Nighttime Construction Noise Contribution (dBA, L _{eq})	Impact? (>10 dBA L _{eq} ambient increment)
ST-5N (Vernola ^{1,2})	56	74	74	18	Yes
ST-6N (Riverbend ⁹)	50	74	74	24	Yes
ST-7N (Riverbend ⁹)	36	74	74	38	Yes
ST-8N ¹⁰	43	50	51	8	No
ST-9N ¹¹	42**	57	57	15	Yes
ST-10N ¹²	49	59	59	10	No
ST-11N ¹³	50	40	50	0	No

N = daytime

Exceedances shown in **bold**

* Represented Entitled or Under-construction Development

** assumed to be 5 dBA less than daytime measurement

¹ northern end of westernmost row of homes, 50 feet from the PA

² southern end of westernmost row of homes, 50 feet from the PA

³ southwestern portion of business park development, 50 feet from the PA

⁴ westernmost row of homes, as close as approximately 3,500 feet from the PA

⁵ westernmost row of homes, as close as approximately 2,000 feet from the PA

⁶ westernmost row of homes, as close as approximately 1,750 feet from the PA

⁷ westernmost row of homes, as close as approximately 1,500 feet from the PA

⁸ easternmost row of homes, as close as approximately 2,000 feet from the PA

⁹ as close as approximately 50 feet from the PA, assuming 100-foot-wide Project right-of-way

¹⁰ approximately 425 feet from the PA

¹¹ approximately 212 feet from the PA

¹² approximately 168 feet from the PA

¹³ approximately 1,330 feet from the PA

Table 13
Nighttime Hybrid Alignment (HA) Construction Noise, Ambient Increase

Ambient Survey Position (ASP) ID (and Representative Receptor Location*)	Measured Existing Nighttime Ambient Sound Level at ASP (dBA, L _{eq})	Predicted Nighttime Construction Noise (Light Tower and Concrete Pour; dBA, L _{eq})	Future Ambient (Log-sum of Existing Ambient and Predicted Nighttime Construction Noise; dBA, L _{eq})	Increase over Existing Ambient due to Nighttime Construction Noise Contribution (dBA, L _{eq})	Impact? (>10 dBA L _{eq} ambient increment)
ST-1N (Stratham ¹)	61	60	64	3	No
ST-2N (Stratham ² , Lyon ¹)	71	60	71	0	No
ST-3N (Thoroughbred ³)	57	74	74	17	Yes
ST-4N (DR Horton ⁴)	47	29	47	0	No
ST-4N (Lennar ⁵ , Lyon ⁸)	47	35	47	0	No
ST-4N (APV1 ⁶ , APV2 ⁶)	47	37	47	0	No
ST-5N (APV2 ⁷)	56	38	56	0	No

Ambient Survey Position (ASP) ID (and Representative Receptor Location*)	Measured Existing Nighttime Ambient Sound Level at ASP (dBA, L _{eq})	Predicted Nighttime Construction Noise (Light Tower and Concrete Pour; dBA, L _{eq})	Future Ambient (Log-sum of Existing Ambient and Predicted Nighttime Construction Noise; dBA, L _{eq})	Increase over Existing Ambient due to Nighttime Construction Noise Contribution (dBA, L _{eq})	Impact? (>10 dBA L _{eq} ambient increment)
ST-5N (Vernola ⁹)	56	74	74	18	Yes
ST-6N (Riverbend ⁹)	50	74	74	24	Yes
ST-7N (Riverbend ⁹)	36	74	74	38	Yes
ST-8N ¹⁰	43	50	51	8	No
ST-9N ¹¹	42**	57	57	15	Yes
ST-10N ¹²	49	59	59	10	No
ST-11N ¹³	50	40	50	0	No

N = daytime

Exceedances shown in **bold**

* Represented Entitled or Under-construction Development

** assumed to be 5 dBA less than daytime measurement

¹ northern end of westernmost row of homes, 150 feet from the HA

² southern end of westernmost row of homes, 150 feet from the HA

³ southwestern portion of business park development, 50 feet from the HA

⁴ westernmost row of homes, as close as approximately 3,500 feet from the HA

⁵ westernmost row of homes, as close as approximately 2,000 feet from the HA

⁶ westernmost row of homes, as close as approximately 1,750 feet from the HA

⁷ westernmost row of homes, as close as approximately 1,500 feet from the HA

⁸ easternmost row of homes, as close as approximately 2,000 feet from the HA

⁹ as close as approximately 50 feet from the underground portion of the HA

¹⁰ approximately 425 feet from the HA

¹¹ approximately 212 feet from the HA

¹² approximately 168 feet from the HA

¹³ approximately 1,330 feet from the HA

4.2 VIBRATION

Potential vibration impacts may occur from Project construction activities, including pavement demolition, site excavation and surface grading, erection of poles and trenching. Although it is possible for vibrations from construction projects to cause building damage, the vibrations from construction activities are almost never of sufficient amplitude to cause more than minor cosmetic damage to buildings (FTA 2006). Groundborne vibration generated by construction projects is usually highest during pile driving, soil compacting, jackhammering, and demolition-related activities. Table 14 shows typical vibration levels for various pieces of construction equipment that generate high vibration levels (FTA 2006).

Table 14
Construction Equipment Vibration Levels

Equipment		PPV at 25 Feet (in/sec)
Pile Driver (impact)	Upper range	1.518
	Typical	0.644
Pile Driver (sonic)	Upper range	0.734
	Typical	0.170
Hydromill (slurry wall)	Soil	0.008
	Rock	0.017
Clam Shovel Drop (slurry wall)		0.202
Vibratory Roller		0.210
Hoe Ram		0.089
Large Bulldozer		0.089
Caisson Drilling		0.089
Loaded Trucks		0.076
Jackhammer		0.035
Small Bulldozer		0.003

Source: FTA 2006

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LEGEND

- Baseline Short-term (ST) and Long-term (LT) Noise Level Measurement Position
- Proposed 230kV Project Overhead Transmission Line (TL)

Planning Distance Contour (from TL centerline) and Predicted Project Daytime Construction Noise Level

- 50 feet = 80 dBA CNEL
- 100 feet = 74 dBA CNEL
- 200 feet = 68 dBA CNEL



SOURCES:
BING
ESRI

**PLANNING DISTANCE BUFFER NOISE CONTOURS
SCE RIVERSIDE TRANSMISSION RELIABILITY PROJECT
CWA #8 – NOISE STUDY PROJECT ALIGNMENT**

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SCALE: 1" = 600' (1:7,200)
SCALE CORRECT WHEN PRINTED AT 11X17

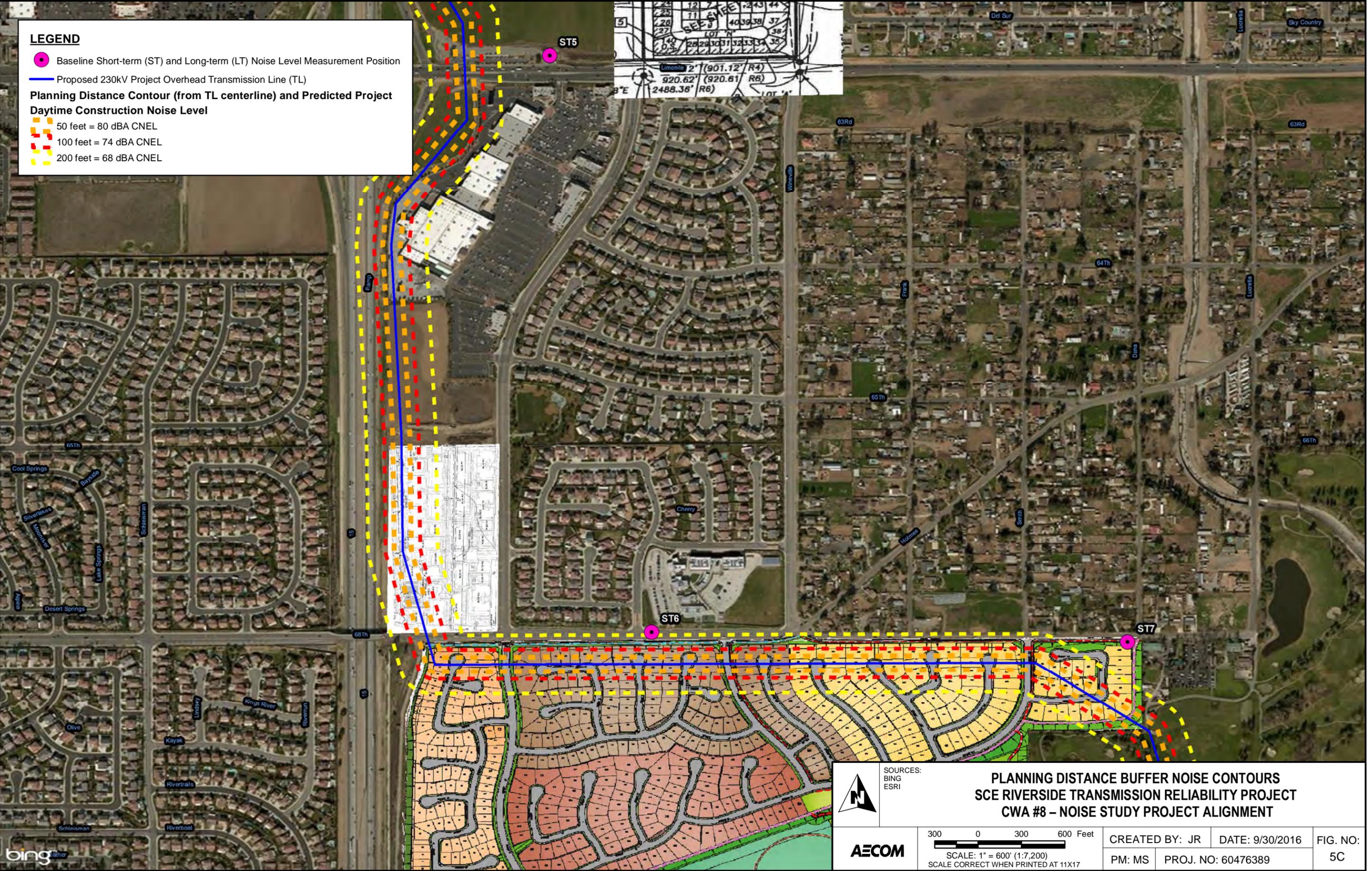
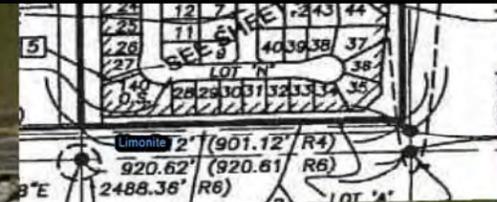
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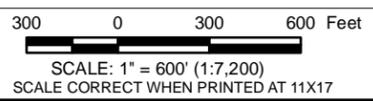
LEGEND

- Baseline Short-term (ST) and Long-term (LT) Noise Level Measurement Position
- Proposed 230kV Project Overhead Transmission Line (TL)
- Planning Distance Contour (from TL centerline) and Predicted Project Daytime Construction Noise Level**
- 50 feet = 80 dBA CNEL
- 100 feet = 74 dBA CNEL
- 200 feet = 68 dBA CNEL



SOURCES:
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ESRI

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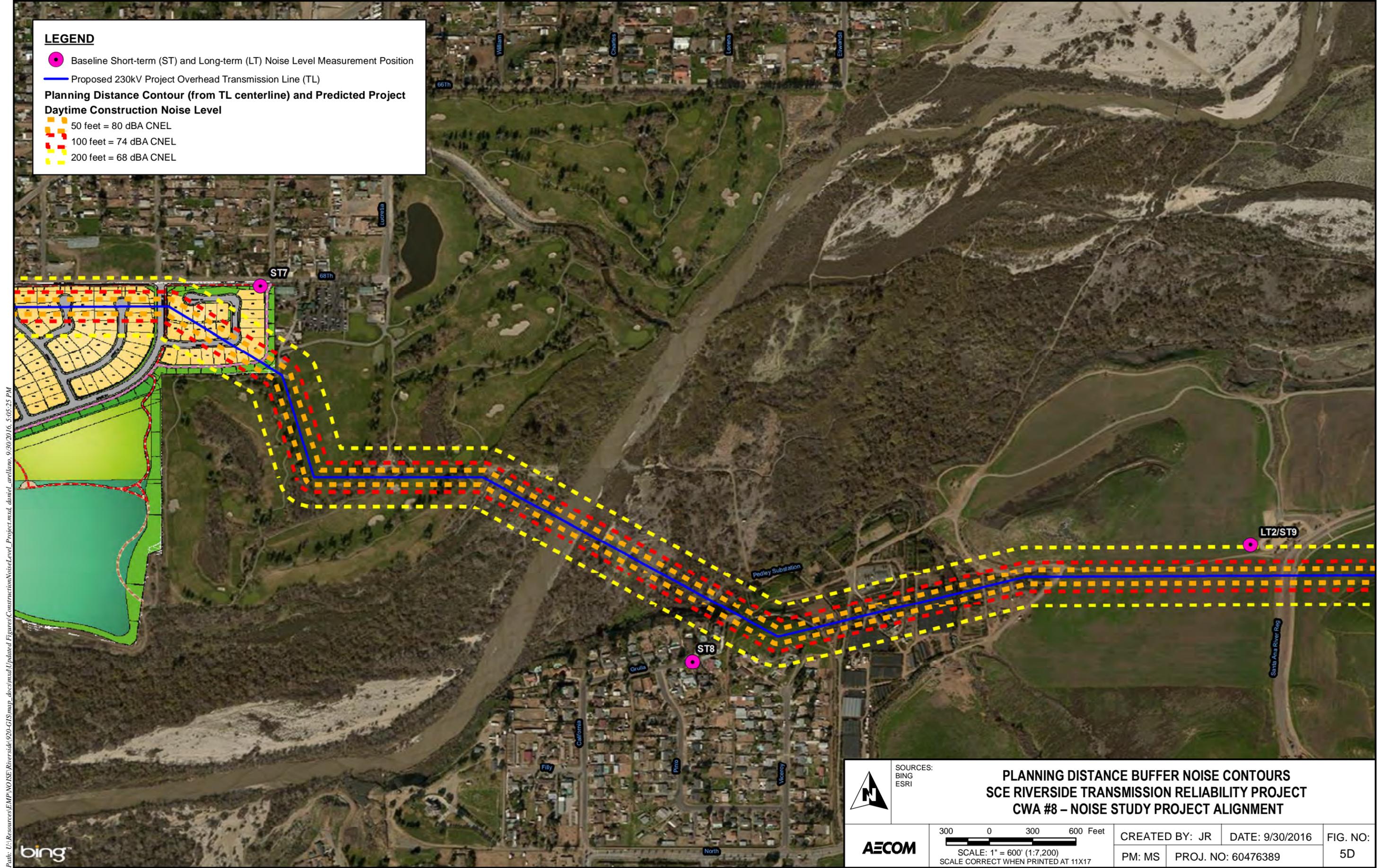
**PLANNING DISTANCE BUFFER NOISE CONTOURS
SCE RIVERSIDE TRANSMISSION RELIABILITY PROJECT
CWA #8 – NOISE STUDY PROJECT ALIGNMENT**

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LEGEND

- Baseline Short-term (ST) and Long-term (LT) Noise Level Measurement Position
- Proposed 230kV Project Overhead Transmission Line (TL)
- Planning Distance Contour (from TL centerline) and Predicted Project Daytime Construction Noise Level**
 - 50 feet = 80 dBA CNEL
 - 100 feet = 74 dBA CNEL
 - 200 feet = 68 dBA CNEL

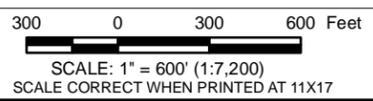


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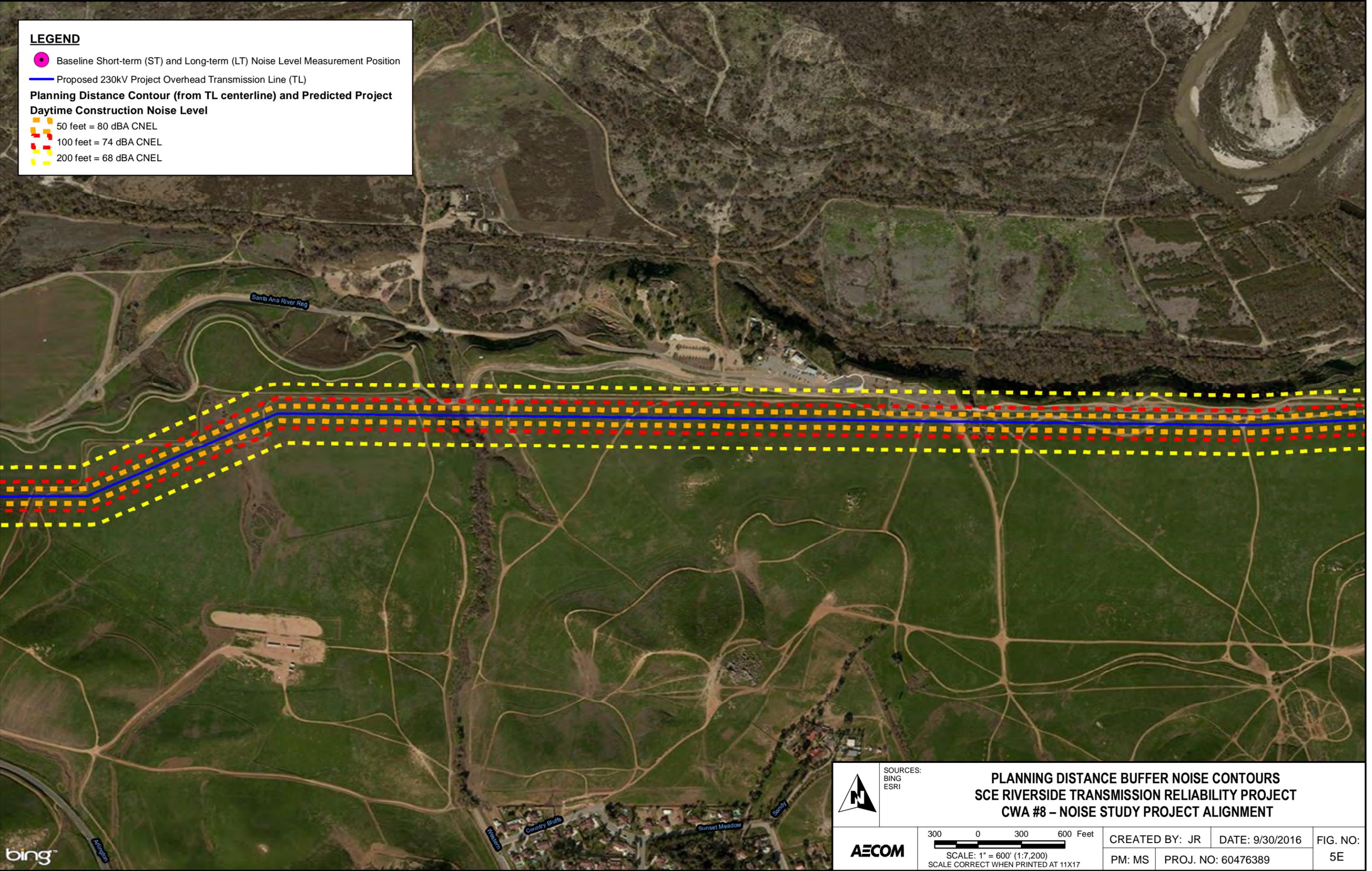
**PLANNING DISTANCE BUFFER NOISE CONTOURS
SCE RIVERSIDE TRANSMISSION RELIABILITY PROJECT
CWA #8 – NOISE STUDY PROJECT ALIGNMENT**

CREATED BY: JR	DATE: 9/30/2016	FIG. NO:
PM: MS	PROJ. NO: 60476389	5D

LEGEND

- Baseline Short-term (ST) and Long-term (LT) Noise Level Measurement Position
- Proposed 230kV Project Overhead Transmission Line (TL)
- Planning Distance Contour (from TL centerline) and Predicted Project Daytime Construction Noise Level**
 - 50 feet = 80 dBA CNEL
 - 100 feet = 74 dBA CNEL
 - 200 feet = 68 dBA CNEL

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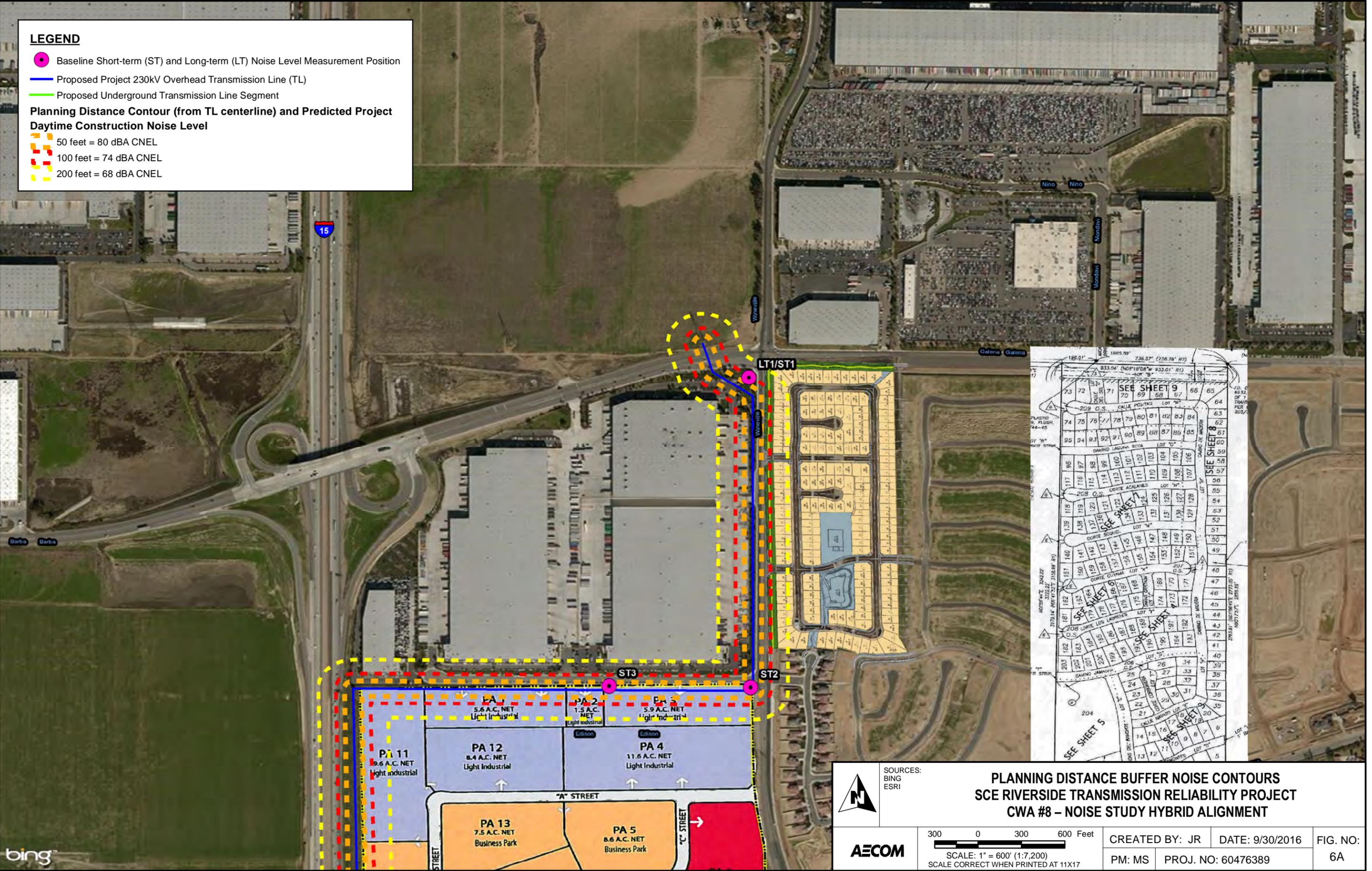


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				300 0 300 600 Feet
	SCALE: 1" = 600' (1:7,200) SCALE CORRECT WHEN PRINTED AT 11X17	PM: MS	PROJ. NO: 60476389	FIG. NO: 5E

LEGEND

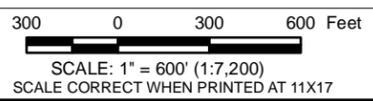
-  Baseline Short-term (ST) and Long-term (LT) Noise Level Measurement Position
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 -  Proposed Underground Transmission Line Segment
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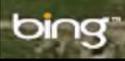
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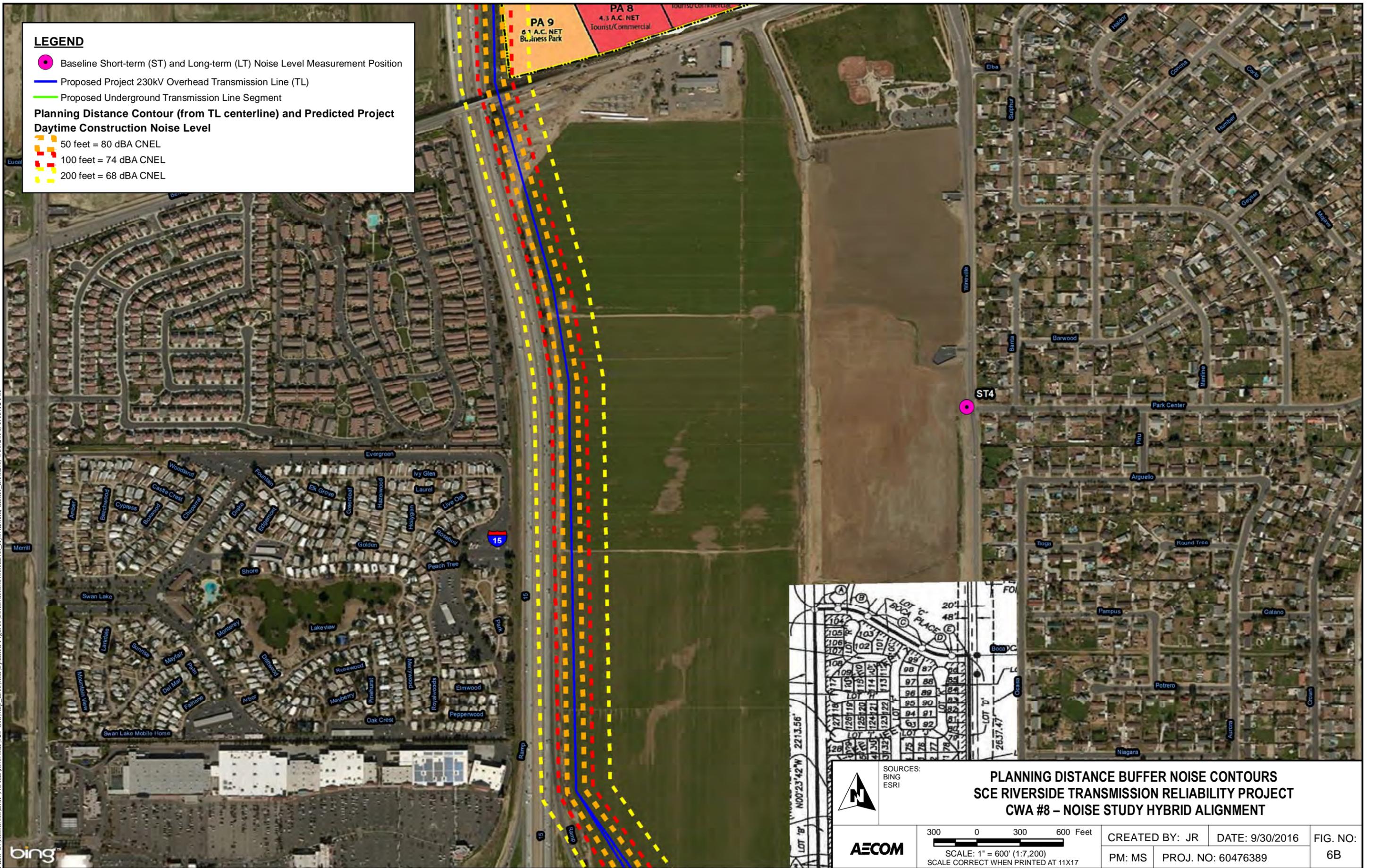


**PLANNING DISTANCE BUFFER NOISE CONTOURS
SCE RIVERSIDE TRANSMISSION RELIABILITY PROJECT
CWA #8 – NOISE STUDY HYBRID ALIGNMENT**

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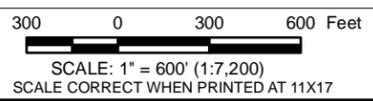
LEGEND

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 - Proposed Project 230kV Overhead Transmission Line (TL)
 - Proposed Underground Transmission Line Segment
- Planning Distance Contour (from TL centerline) and Predicted Project Daytime Construction Noise Level**
- 50 feet = 80 dBA CNEL
 - 100 feet = 74 dBA CNEL
 - 200 feet = 68 dBA CNEL



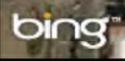
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PLANNING DISTANCE BUFFER NOISE CONTOURS
SCE RIVERSIDE TRANSMISSION RELIABILITY PROJECT
CWA #8 – NOISE STUDY HYBRID ALIGNMENT

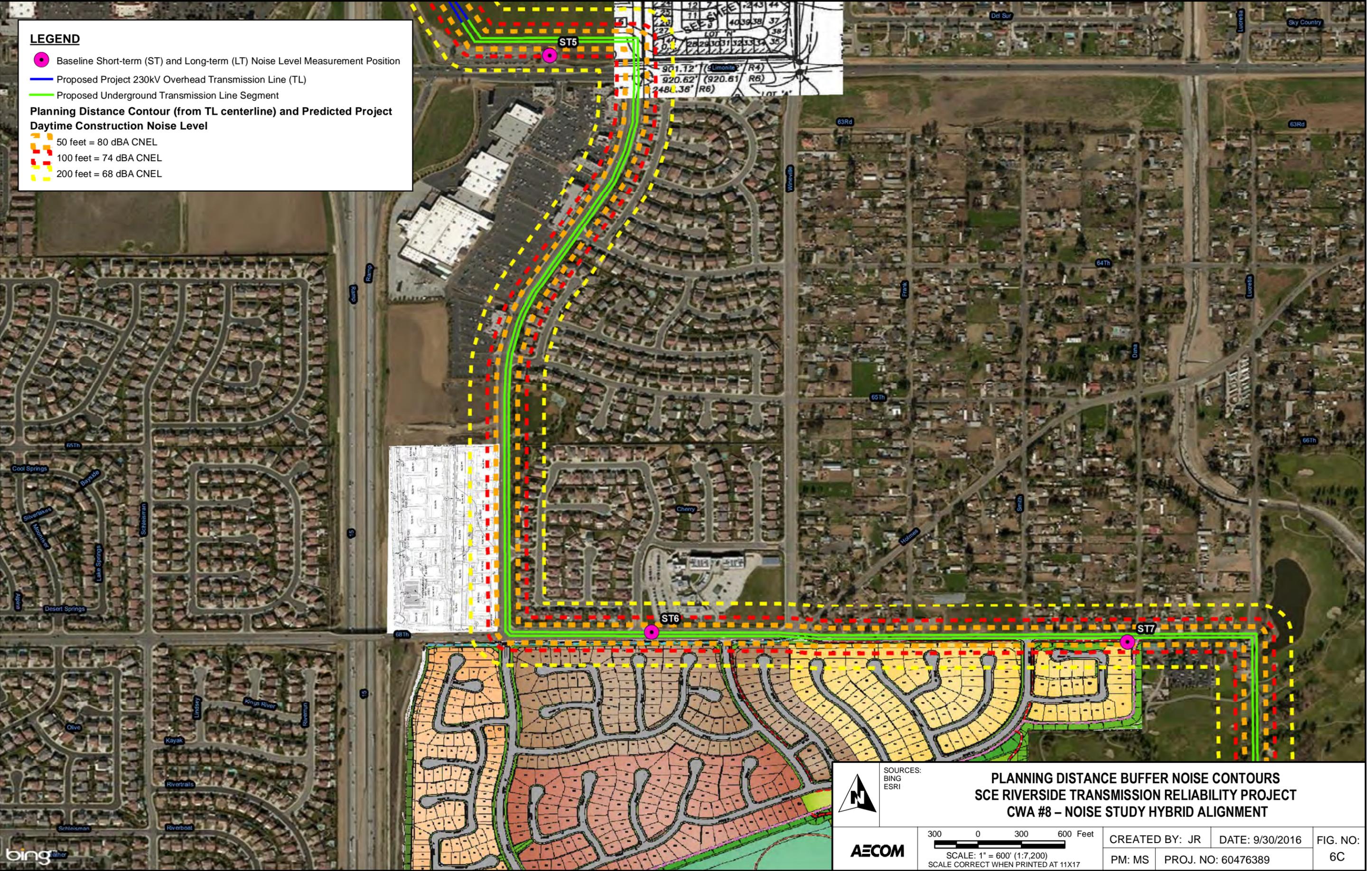
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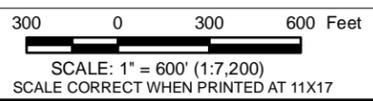
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LEGEND

-  Baseline Short-term (ST) and Long-term (LT) Noise Level Measurement Position
 -  Proposed Project 230kV Overhead Transmission Line (TL)
 -  Proposed Underground Transmission Line Segment
- Planning Distance Contour (from TL centerline) and Predicted Project Daytime Construction Noise Level**
-  50 feet = 80 dBA CNEL
 -  100 feet = 74 dBA CNEL
 -  200 feet = 68 dBA CNEL



SOURCES:
BING
ESRI



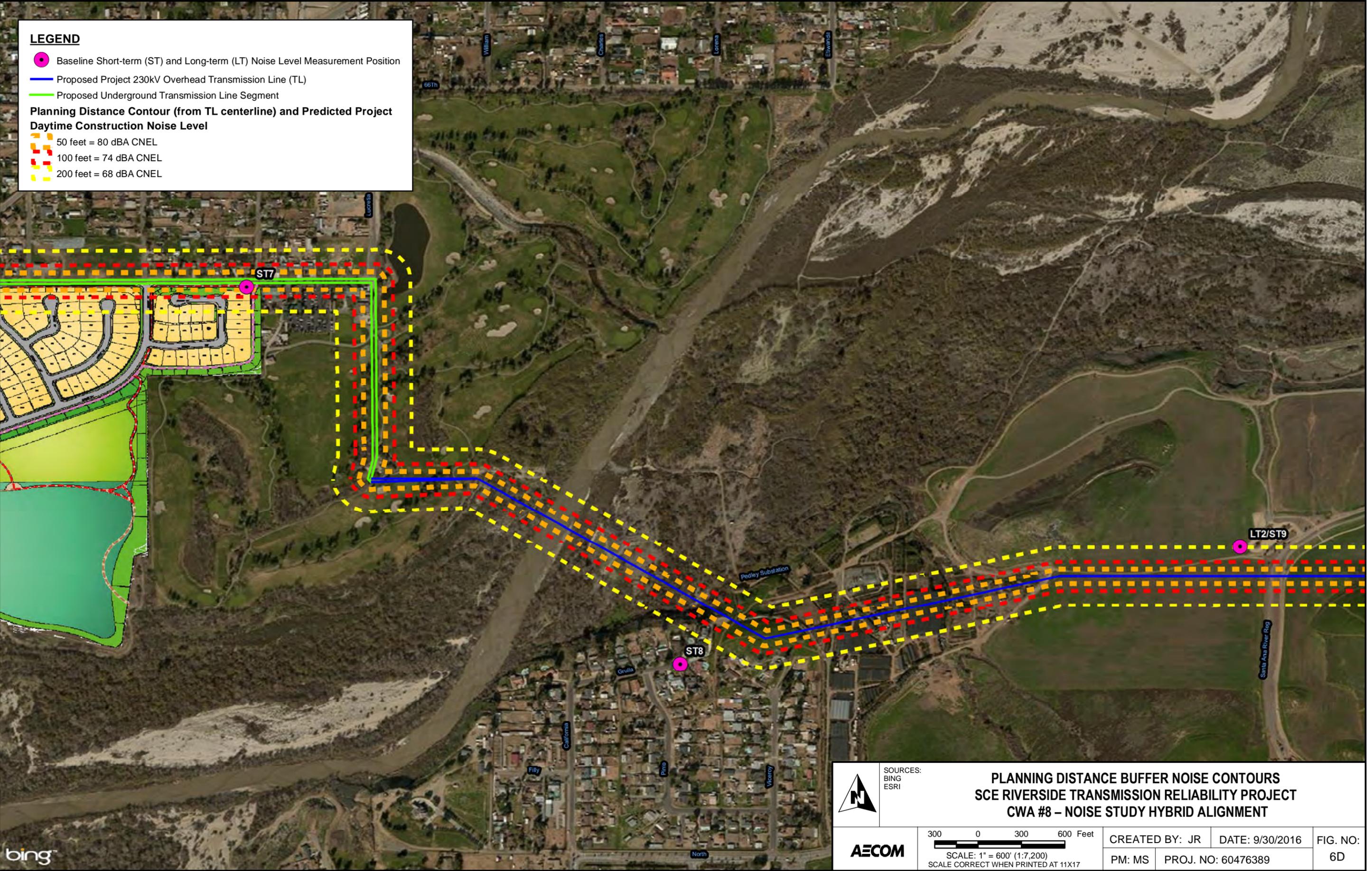
**PLANNING DISTANCE BUFFER NOISE CONTOURS
SCE RIVERSIDE TRANSMISSION RELIABILITY PROJECT
CWA #8 – NOISE STUDY HYBRID ALIGNMENT**

CREATED BY: JR	DATE: 9/30/2016	FIG. NO:
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LEGEND

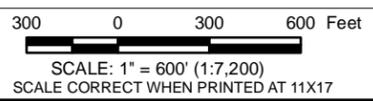
- Baseline Short-term (ST) and Long-term (LT) Noise Level Measurement Position
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 - 100 feet = 74 dBA CNEL
 - 200 feet = 68 dBA CNEL

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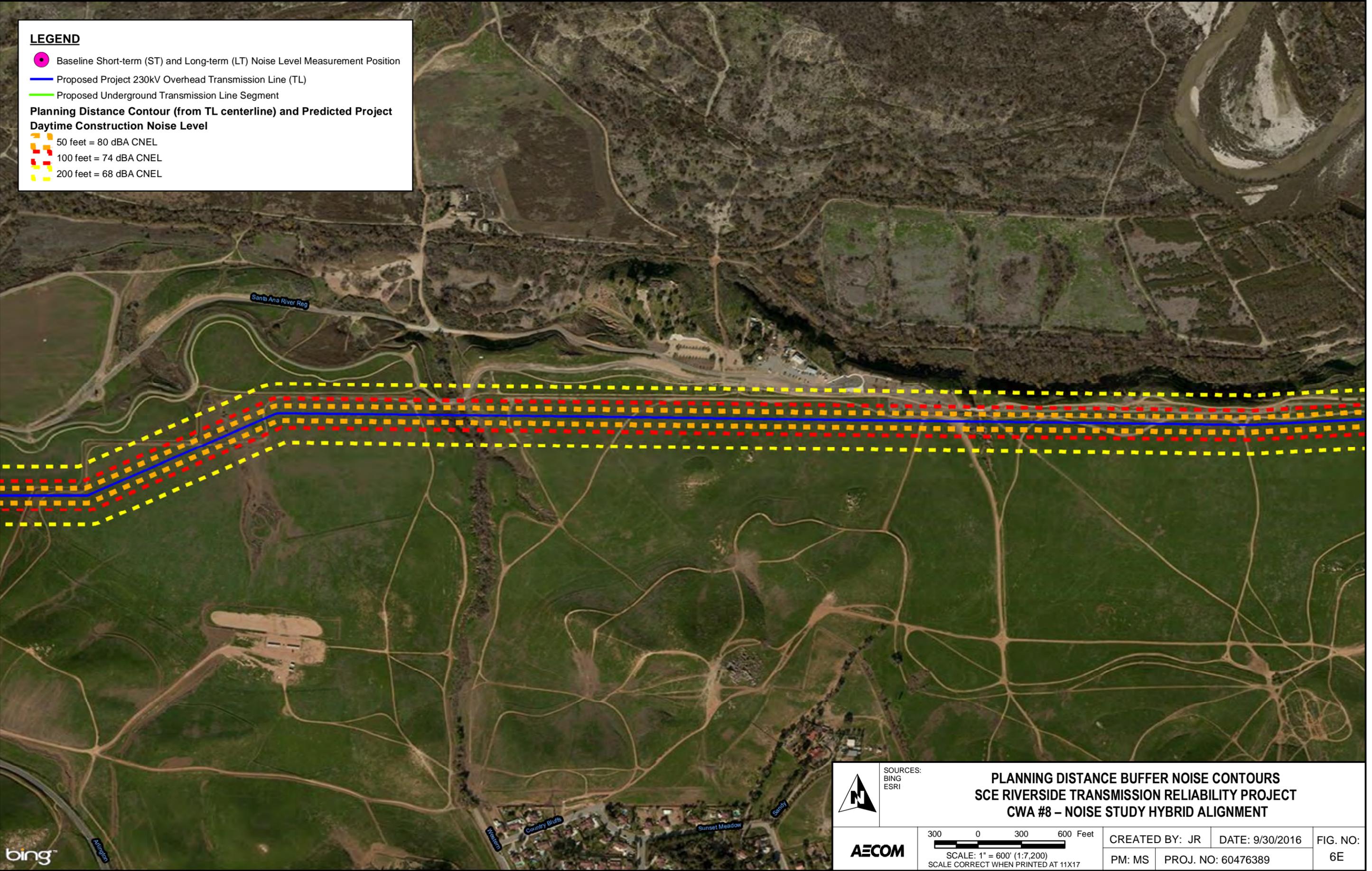
**PLANNING DISTANCE BUFFER NOISE CONTOURS
SCE RIVERSIDE TRANSMISSION RELIABILITY PROJECT
CWA #8 – NOISE STUDY HYBRID ALIGNMENT**

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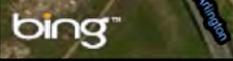
LEGEND

- Baseline Short-term (ST) and Long-term (LT) Noise Level Measurement Position
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 - Proposed Underground Transmission Line Segment
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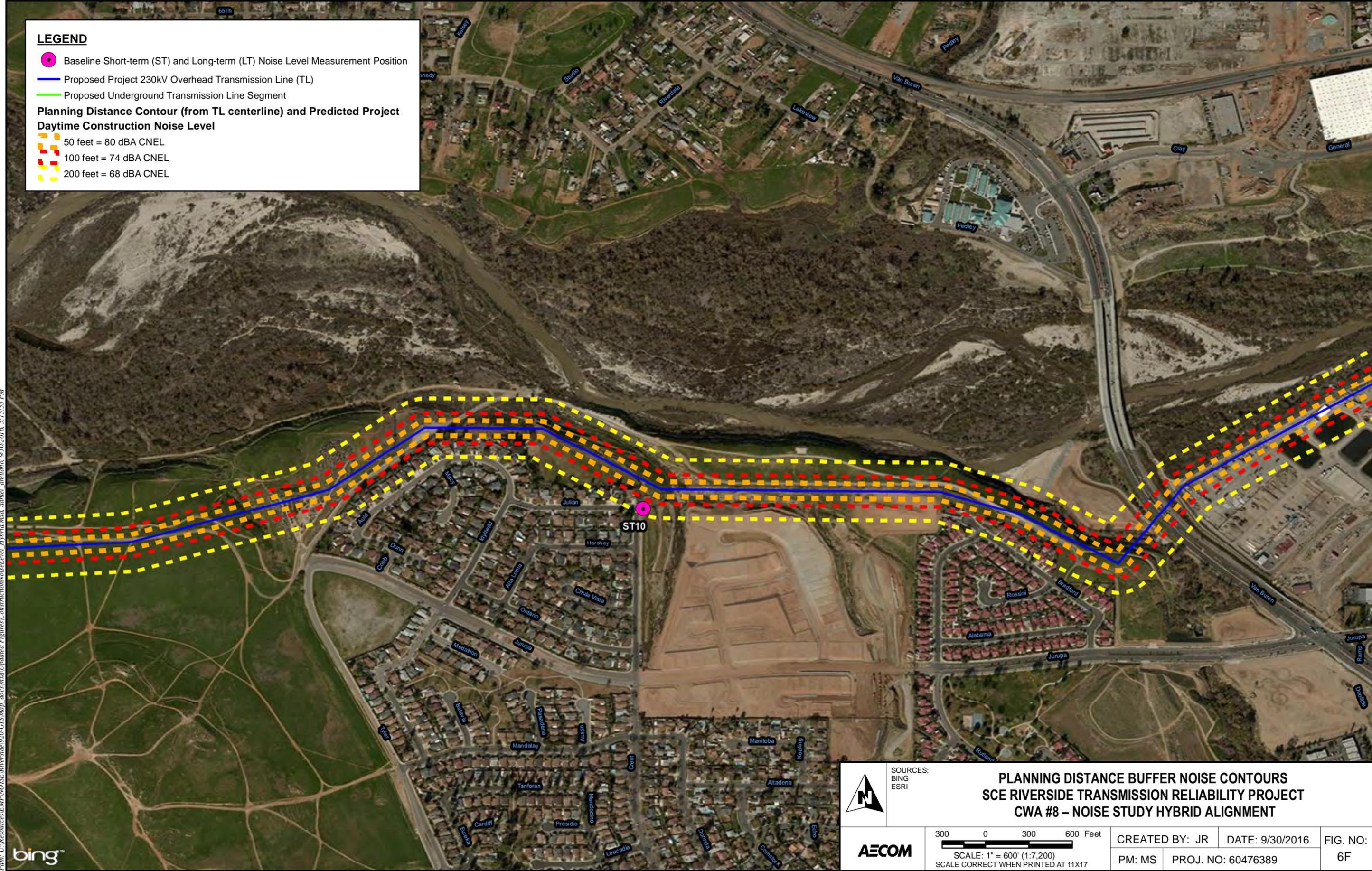


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	 SCALE: 1" = 600' (1:7,200) SCALE CORRECT WHEN PRINTED AT 11X17	CREATED BY: JR	DATE: 9/30/2016
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LEGEND

- Baseline Short-term (ST) and Long-term (LT) Noise Level Measurement Position
 - Proposed Project 230kV Overhead Transmission Line (TL)
 - Proposed Underground Transmission Line Segment
- Planning Distance Contour (from TL centerline) and Predicted Project Daytime Construction Noise Level**
- 50 feet = 80 dBA CNEL
 - 100 feet = 74 dBA CNEL
 - 200 feet = 68 dBA CNEL



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SOURCES:
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ESRI

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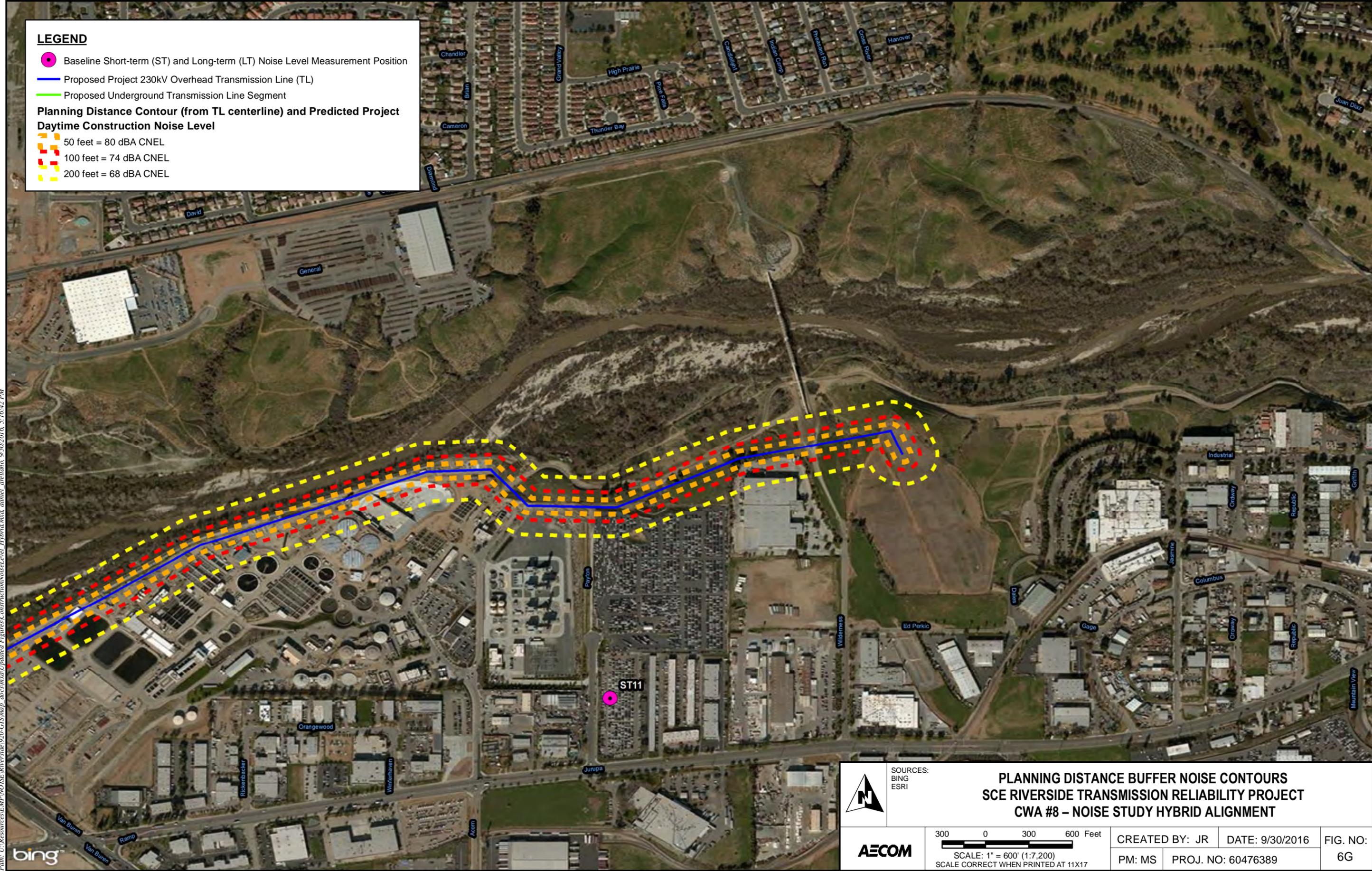
**PLANNING DISTANCE BUFFER NOISE CONTOURS
SCE RIVERSIDE TRANSMISSION RELIABILITY PROJECT
CWA #8 – NOISE STUDY HYBRID ALIGNMENT**

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LEGEND

- Baseline Short-term (ST) and Long-term (LT) Noise Level Measurement Position
 - Proposed Project 230kV Overhead Transmission Line (TL)
 - Proposed Underground Transmission Line Segment
- Planning Distance Contour (from TL centerline) and Predicted Project Daytime Construction Noise Level**
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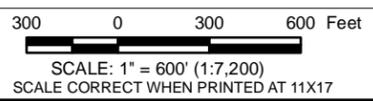


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**PLANNING DISTANCE BUFFER NOISE CONTOURS
SCE RIVERSIDE TRANSMISSION RELIABILITY PROJECT
CWA #8 – NOISE STUDY HYBRID ALIGNMENT**

CREATED BY: JR	DATE: 9/30/2016	FIG. NO:
PM: MS	PROJ. NO: 60476389	6G

As shown in Table 14, vibration levels at 25 feet from most of the list construction equipment examples, with the exception of pile drivers, are at or below the threshold of risk of structural damage (0.2 ppv in/sec).

Existing structures in proximity to the Project are located at least 25 feet from where major construction activities would occur. At this distance, vibration velocity levels from Project construction activities would generally be expected to fall below the vibration threshold of 0.2 in/sec ppv for structural damage (FTA 2006). For instance, were a hoe ram to work on Pat's Ranch Road as part of installing the underground segment of the proposed HA route, the ppv per Table 14 would be 0.089 ips, which is less than both the 0.1 ips human annoyance threshold and the 0.2 ips structural damage risk threshold. Therefore, anticipated groundborne vibration generated by construction of the Project would not result in cosmetic or structural damage to nearby structures. Anticipated vibration from Project construction would not expose people or structures to excessive vibration levels that would result in structural damage or human annoyance; hence, this is a less than significant impact.

Transport of materials by heavy trucks to and from construction sites has the potential to generate higher levels of groundborne vibration than mechanical equipment. However, heavy trucks generally operate at very low speeds on-site. Therefore, the groundborne vibration induced by heavy truck traffic is not anticipated to be perceptible at distances greater than 25 feet, and would be a less than significant impact.

4.3 TRAFFIC NOISE

Project construction would generate construction traffic from daily construction worker trips, construction equipment and materials delivery truck trips, and demolition materials truck hauling. However, construction vehicles would access the Project site using I-15, where Project construction trips would be a minor contribution to the average daily traffic volumes of I-15, which include a high percentage of truck volumes. Therefore, the increase in traffic volume due to Project construction-related traffic would result in a less than 1 dBA L_{eq} increase in noise levels along adjacent roadways, which is not considered a perceptible change in noise level. This is a less than significant impact.

Aside from occasional maintenance activities, the Project would not generate significant additional volumes of operational traffic and, therefore, would not expose people to current or future transportation noise levels that exceed applicable standards. This is a less than significant impact.

4.4 OPERATIONAL NOISE

Methodology and Modeling

The predicted AN levels from Project conductor corona were calculated using the same mathematical expressions that form the basis of the Bonneville Power Administration (BPA) Corona and Field Effects Program—the industry standard for these types of calculations. Appendix D presents a view of an Excel spreadsheet that contains these model parameters and equations used to estimate corona AN at the representative noise-sensitive receivers shown in Tables 15 through 22 and as appearing in Figures 7A through 7G for the Project Alignment and Figures 8A through 8G for the Hybrid Alignment. For example, the calculated L_{50} foul weather (i.e., rainy conditions) AN at a position approximately 50 horizontal feet from the 230 kV conductors is approximately 21 dBA. Under fair or dry weather conditions, according to the original BPA Technical Report ERJ-77-167 *Description of Equations and Computer Program for Predicting Audible Noise, Radio Interference, Television Interference, and Ozone from A-C Transmission Lines* contained in a BPA response to a public request for information (BPA 2015), the estimated AN level would be 25 dBA less than this foul weather value and thus an insignificant quantity. For purposes of impact assessment, the L_{50} statistical value and L_{eq} metric will be considered comparable.

After accounting for environmental conditions and other factors such as differences in tower design and conductor arrangement, the predicted corona AN sound levels from this BPA-based technique appear to be generally consistent with field measurements of corona AN from an existing operating 230 kV transmission line as described in Section 2.4. Corona AN from this existing 230 kV line under fair weather conditions was inaudible. The estimated results are also comparable to predicted corona AN for a 230 kV double-circuit tower structure as described in the Eldorado-Ivanpah Transmission Project (EITP) Final EIR/EIS (CPUC, 2010).

Impact Analysis

Tables 15 through 22 present an assessment of Project operational corona AN levels compared to applicable daytime and nighttime L_{eq} and CNEL standards, and whether it would result in substantial permanent increase in CNEL ambient levels, during fair and foul weather conditions, respectively, at the same locations studied for Project construction in Section 4.1.

Noise Standards

Tables 15 and 16 present the assessment of Project operational corona AN impact for the PA route, during fair and foul weather conditions, with respect to allowable daytime and nighttime noise standard of 55 and 45 dBA L_{eq} , respectively.

Table 15
Project Alignment (PA) Operation Corona AN, Foul Weather, L_{eq} Standard

Ambient Survey Position (ASP) ID (and Representative Receptor Location*)	Predicted Project Alignment 230 kV Transmission Line Corona Audible Noise (AN) (dBA, L_{eq})	Corona AN Exceeds Daytime Standard (55 dBA L_{eq})?	Corona AN Exceeds Nighttime Standard (45 dBA L_{eq})?
ST-1 (Stratham ¹)	21	No	No
ST-2 (Stratham ² , Lyon ¹)	21	No	No
ST-3 (Thoroughbred ³)	21	No	No
ST-4 (DR Horton ⁴)	3	No	No
ST-4 (Lennar ⁵ , Lyon ⁸)	6	No	No
ST-4 (APV1 ⁶ , APV2 ⁶)	7	No	No
ST-5 (APV2 ⁷)	8	No	No
ST-5 (Vernola ^{1,2})	21	No	No
ST-6 (Riverbend ⁹)	21	No	No
ST-7 (Riverbend ⁹)	21	No	No
ST-8 ¹⁰	14	No	No
ST-9 ¹¹	17	No	No
ST-10 ¹²	18	No	No
ST-11 ¹³	8	No	No

Exceedances shown in **bold**

* Represented Entitled or Under-construction Development

¹ northern end of westernmost row of homes, 50 feet from the PA

² southern end of westernmost row of homes, 50 feet from the PA

³ southwestern portion of business park development, 50 feet from the PA

⁴ westernmost row of homes, as close as approximately 3,500 feet from the PA

⁵ westernmost row of homes, as close as approximately 2,000 feet from the PA

⁶ westernmost row of homes, as close as approximately 1,750 feet from the PA

⁷ westernmost row of homes, as close as approximately 1,500 feet from the PA

⁸ easternmost row of homes, as close as approximately 2,000 feet from the PA

⁹ as close as approximately 50 feet from the PA, assuming 100-foot-wide Project right-of-way

¹⁰ approximately 425 feet from the PA

¹¹ approximately 212 feet from the PA

¹² approximately 168 feet from the PA

¹³ approximately 1,330 feet from the PA

Table 16
Project Alignment (PA) Operation Corona AN, Fair Weather, L_{eq} Standard

Ambient Survey Position (ASP) ID (and Representative Receptor Location*)	Predicted Project Alignment 230 kV Transmission Line Corona Audible Noise (AN) (dBA, L_{eq})	Corona AN Exceeds Daytime Standard (55 dBA L_{eq})?	Corona AN Exceeds Nighttime Standard (45 dBA L_{eq})?
ST-1 (Stratham ¹)	0	No	No
ST-2 (Stratham ² , Lyon ¹)	0	No	No
ST-3 (Thoroughbred ³)	0	No	No
ST-4 (DR Horton ⁴)	0	No	No
ST-4 (Lennar ⁵ , Lyon ⁸)	0	No	No
ST-4 (APV1 ⁶ , APV2 ⁶)	0	No	No
ST-5 (APV2 ⁷)	0	No	No
ST-5 (Vernola ^{1,2})	0	No	No
ST-6 (Riverbend ⁹)	0	No	No
ST-7 (Riverbend ⁹)	0	No	No
ST-8 ¹⁰	0	No	No
ST-9 ¹¹	0	No	No
ST-10 ¹²	0	No	No
ST-11 ¹³	0	No	No

Exceedances shown in **bold**

* Represented Entitled or Under-construction Development

¹ northern end of westernmost row of homes, 50 feet from the PA

² southern end of westernmost row of homes, 50 feet from the PA

³ southwestern portion of business park development, 50 feet from the PA

⁴ westernmost row of homes, as close as approximately 3,500 feet from the PA

⁵ westernmost row of homes, as close as approximately 2,000 feet from the PA

⁶ westernmost row of homes, as close as approximately 1,750 feet from the PA

⁷ westernmost row of homes, as close as approximately 1,500 feet from the PA

⁸ easternmost row of homes, as close as approximately 2,000 feet from the PA

⁹ as close as approximately 50 feet from the PA, assuming 100-foot-wide Project right-of-way

¹⁰ approximately 425 feet from the PA

¹¹ approximately 212 feet from the PA

¹² approximately 168 feet from the PA

¹³ approximately 1,330 feet from the PA

As shown in Tables 15 and 16, the proposed Project operation AN would not expose persons to noise levels in excess of standards established in applicable general plans or noise ordinances anytime the facilities are in operation. Therefore, impacts would be less than significant.

For the Hybrid Alignment, a substantial extent of the conductors will be installed underground and thus not create AN above the surface. This physical condition creates considerably more distance between the above-surface portion of the Hybrid alignment and some of the representative receiver locations, and thus alters the corona AN impact assessment as shown in Tables 17 and 18.

Table 17
Hybrid Alignment (HA) Operation Corona AN, Foul Weather, L_{eq} Standard

Ambient Survey Position (ASP) ID (and Representative Receptor Location*)	Predicted Project Alignment 230 kV Transmission Line Corona Audible Noise (AN) (dBA, L_{eq})	Corona AN Exceeds Daytime Standard (55 dBA L_{eq})?	Corona AN Exceeds Nighttime Standard (45 dBA L_{eq})?
ST-1 (Stratham ¹)	18	No	No
ST-2 (Stratham ² , Lyon ¹)	18	No	No
ST-3 (Thoroughbred ³)	18	No	No
ST-4 (DR Horton ⁴)	3	No	No
ST-4 (Lennar ⁵ , Lyon ⁸)	6	No	No
ST-4 (APV2 ⁶)	7	No	No
ST-5 (APV1 ⁷)	10	No	No
ST-5 (Vernola ¹⁴)	4	No	No
ST-6 (Riverbend ⁹)	3	No	No
ST-7 (Riverbend ¹⁵)	10	No	No
ST-8 ¹⁰	14	No	No
ST-9 ¹¹	17	No	No
ST-10 ¹²	18	No	No
ST-11 ¹³	8	No	No

Exceedances shown in **bold**

* Represented Entitled or Under-construction Development

¹ northern end of westernmost row of homes, 150 feet from the HA

² southern end of westernmost row of homes, 150 feet from the HA

³ southwestern portion of business park development, 50 feet from the HA

⁴ westernmost row of homes, as close as approximately 3,500 feet from the HA

⁵ westernmost row of homes, as close as approximately 2,000 feet from the HA

⁶ westernmost row of homes, as close as approximately 1,750 feet from the HA

⁷ southwestern-most row of homes, as close as approximately 1,000 feet from the nearest above-ground HA point

⁸ easternmost row of homes, as close as approximately 2,000 feet from the HA

⁹ approximately 3,700 feet from nearest above-ground HA point

¹⁰ approximately 425 feet from nearest above-ground HA point

¹¹ approximately 212 feet from the HA

¹² approximately 168 feet from the HA

¹³ approximately 1,330 feet from the HA

¹⁴ approximately 2,900 feet from the nearest above-ground HA point

¹⁵ approximately 1,000 feet from the nearest above-ground HA point

Table 18
Hybrid Alignment (HA) Operation Corona AN, Fair Weather, L_{eq} Standard

Ambient Survey Position (ASP) ID (and Representative Receptor Location*)	Predicted Project Alignment 230 kV Transmission Line Corona Audible Noise (AN) (dBA, L _{eq})	Corona AN Exceeds Daytime Standard (55 dBA L _{eq})?	Corona AN Exceeds Nighttime Standard (45 dBA L _{eq})?
ST-1 (Stratham ¹)	0	No	No
ST-2 (Stratham ² , Lyon ¹)	0	No	No
ST-3 (Thoroughbred ³)	0	No	No
ST-4 (DR Horton ⁴)	0	No	No
ST-4 (Lennar ⁵ , Lyon ⁸)	0	No	No
ST-4 (APV2 ⁶)	0	No	No
ST-5 (APV1 ⁷)	0	No	No
ST-5 (Vernola ¹⁴)	0	No	No
ST-6 (Riverbend ⁹)	0	No	No
ST-7 (Riverbend ¹⁵)	0	No	No
ST-8 ¹⁰	0	No	No
ST-9 ¹¹	0	No	No
ST-10 ¹²	0	No	No
ST-11 ¹³	0	No	No

Exceedances shown in **bold**

* Represented Entitled or Under-construction Development

¹ northern end of westernmost row of homes, 150 feet from the HA

² southern end of westernmost row of homes, 150 feet from the HA

³ southwestern portion of business park development, 50 feet from the HA

⁴ westernmost row of homes, as close as approximately 3,500 feet from the HA

⁵ westernmost row of homes, as close as approximately 2,000 feet from the HA

⁶ westernmost row of homes, as close as approximately 1,750 feet from the HA

⁷ southwestern-most row of homes, as close as approximately 1,000 feet from the nearest above-ground HA point

⁸ easternmost row of homes, as close as approximately 2,000 feet from the HA

⁹ approximately 3,700 feet from nearest above-ground HA point

¹⁰ approximately 425 feet from nearest above-ground HA point

¹¹ approximately 212 feet from the HA

¹² approximately 168 feet from the HA

¹³ approximately 1,330 feet from the HA

¹⁴ approximately 2,900 feet from the nearest above-ground HA point

¹⁵ approximately 1,000 feet from the nearest above-ground HA point

Ambient Noise Levels

Tables 19 and 20 present the assessment of PA operational corona AN impact, during “fair” and “foul” weather conditions, with respect to allowable permanent outdoor ambient noise increment of and a residential land use compatibility noise standard of 60 dBA CNEL.

Table 19
Project Alignment Operation Corona AN, Foul Weather, CNEL Standard/Increase

Ambient Survey Position (ASP) ID (and Representative Receptor Location*)	Measured Existing Outdoor Ambient Sound Level (dBA, CNEL)	Predicted Project 230 kV Transmission Line Corona Audible Noise** (AN) (dBA, CNEL)	Future Ambient (Log-sum of Existing Ambient and Predicted Corona AN) (dBA, CNEL)	Increase over Existing Ambient due to Corona AN Contribution (dBA, CNEL)	Impact? (>60 dBA CNEL from Corona AN or >5 dBA, CNEL ambient increment)
ST-1 (Stratham ¹)	68	27	68	0	No
ST-2 (Stratham ² , Lyon ¹)	77	27	77	0	No
ST-3 (Thoroughbred ³)	65	27	65	0	No
ST-4 (DR Horton ⁴)	68	9	68	0	No
ST-4 (Lennar ⁵ , Lyon ⁸)	68	12	68	0	No
ST-4 (APV1 ⁶ , APV2 ⁶)	68	13	68	0	No
ST-5 (APV2 ⁷)	64	14	64	0	No
ST-5 (Vernola ^{1,2})	64	27	64	0	No
ST-6 (Riverbend ⁹)	67	27	67	0	No
ST-7 (Riverbend ⁹)	48	27	48	0	No
ST-8 ¹⁰	54	20	54	0	No
ST-9 ¹¹	61	23	61	0	No
ST-10 ¹²	57	24	57	0	No
ST-11 ¹³	58	14	58	0	No

Exceedances shown in **bold**

* Represented Entitled or Under-construction Development

** assumes foul weather conditions only at night (10 p.m. to 7 a.m.)

¹ northern end of westernmost row of homes, 50 feet from the PA

² southern end of westernmost row of homes, 50 feet from the PA

³ southwestern portion of business park development, 50 feet from the PA

⁴ westernmost row of homes, as close as approximately 3,500 feet from the PA

⁵ westernmost row of homes, as close as approximately 2,000 feet from the PA

⁶ westernmost row of homes, as close as approximately 1,750 feet from the PA

⁷ westernmost row of homes, as close as approximately 1,500 feet from the PA

⁸ easternmost row of homes, as close as approximately 2,000 feet from the PA

⁹ as close as approximately 50 feet from the PA, assuming 100-foot-wide Project right-of-way

¹⁰ approximately 425 feet from the PA

¹¹ approximately 212 feet from the PA

¹² approximately 168 feet from the PA

¹³ approximately 1,330 feet from the PA

Table 19 exhibits that at all representative receptor locations, predicted corona AN under “foul” weather conditions is not expected to exceed 60 dBA CNEL, and no studied locations would experience an increase in ambient sound greater than 5 dBA.

Table 20
Project Alignment Operation Corona AN,
Fair Weather, CNEL Standard/Increase

Ambient Survey Position (ASP) ID (and Representative Receptor Location*)	Measured Existing Outdoor Ambient Sound Level (dBA, CNEL)	Predicted Project 230 kV Transmission Line Corona Audible Noise** (AN) (dBA, CNEL)	Future Ambient (Log-sum of Existing Ambient and Predicted Corona AN) (dBA, CNEL)	Increase over Existing Ambient due to Corona AN Contribution (dBA, CNEL)	Impact? (>60 dBA CNEL from Corona AN or >5 dBA, CNEL ambient increment)
ST-1 (Stratham ¹)	68	0	68	0	No
ST-2 (Stratham ² , Lyon ¹)	77	0	77	0	No
ST-3 (Thoroughbred ³)	65	0	65	0	No
ST-4 (DR Horton ⁴)	68	0	68	0	No
ST-4 (Lennar ⁵ , Lyon ⁸)	68	0	68	0	No
ST-4 (APV1 ⁶ , APV2 ⁶)	68	0	68	0	No
ST-5 (APV2 ⁷)	64	0	64	0	No
ST-5 (Vernola ^{1,2})	64	0	64	0	No
ST-6 (Riverbend ⁹)	67	0	67	0	No
ST-7 (Riverbend ⁹)	48	0	48	0	No
ST-8 ¹⁰	54	0	54	0	No
ST-9 ¹¹	61	0	61	0	No
ST-10 ¹²	57	0	57	0	No
ST-11 ¹³	58	0	58	0	No

Exceedances shown in **bold**

* Represented Entitled or Under-construction Development

** assumes fair weather conditions all day, evening, and night

¹ northern end of westernmost row of homes, 50 feet from the PA

² southern end of westernmost row of homes, 50 feet from the PA

³ southwestern portion of business park development, 50 feet from the PA

⁴ westernmost row of homes, as close as approximately 3,500 feet from the PA

⁵ westernmost row of homes, as close as approximately 2,000 feet from the PA

⁶ westernmost row of homes, as close as approximately 1,750 feet from the PA

⁷ westernmost row of homes, as close as approximately 1,500 feet from the PA

⁸ easternmost row of homes, as close as approximately 2,000 feet from the PA

⁹ as close as approximately 50 feet from the PA, assuming 100-foot-wide Project right-of-way

¹⁰ approximately 425 feet from the PA

¹¹ approximately 212 feet from the PA

¹² approximately 168 feet from the PA

¹³ approximately 1,330 feet from the PA

As shown in Table 20 and under “fair” weather conditions, the proposed Project would be in compliance with the allowable outdoor permanent ambient noise CNEL standard and increment; therefore, impacts would be less than significant.

For the HA, Tables 21 and 22 show that for both “foul” and “fair” conditions, compliance with the allowable outdoor permanent ambient noise CNEL standard and increment is expected at all studied representative receiver locations; therefore, impacts would be less than significant.

Table 21
Hybrid Alignment Operation Corona AN,
Foul Weather, CNEL Standard/Increase

Ambient Survey Position (ASP) ID (and Representative Receptor Location*)	Measured Existing Outdoor Ambient Sound Level (dBA, CNEL)	Predicted Project 230 kV Transmission Line Corona Audible Noise** (AN) (dBA, CNEL)	Future Ambient (Log-sum of Existing Ambient and Predicted Corona AN) (dBA, CNEL)	Increase over Existing Ambient due to Corona AN Contribution (dBA, CNEL)	Impact? (>60 dBA CNEL from Corona AN or >5 dBA, CNEL ambient increment)
ST-1 (Stratham ¹)	68	24	68	0	No
ST-2 (Stratham ² , Lyon ¹)	77	24	77	0	No
ST-3 (Thoroughbred ³)	65	24	65	0	No
ST-4 (DR Horton ⁴)	68	9	68	0	No
ST-4 (Lennar ⁵ , Lyon ⁸)	68	12	68	0	No
ST-4 (APV2 ⁶)	68	13	68	0	No
ST-5 (APV1 ⁷)	64	16	64	0	No
ST-5 (Vernola ¹⁴)	64	10	64	0	No
ST-6 (Riverbend ⁹)	67	9	67	0	No
ST-7 (Riverbend ¹⁵)	48	16	48	0	No
ST-8 ¹⁰	54	20	54	0	No
ST-9 ¹¹	61	23	61	0	No
ST-10 ¹²	57	24	57	0	No
ST-11 ¹³	58	14	58	0	No

Exceedances shown in **bold**

* Represented Entitled or Under-construction Development

** assumes foul weather conditions only at night (10 p.m. to 7 a.m.)

¹ northern end of westernmost row of homes, 150 feet from the HA

² southern end of westernmost row of homes, 150 feet from the HA

³ southwestern portion of business park development, 50 feet from the HA

⁴ westernmost row of homes, as close as approximately 3,500 feet from the HA

⁵ westernmost row of homes, as close as approximately 2,000 feet from the HA

⁶ westernmost row of homes, as close as approximately 1,750 feet from the HA

⁷ southwestern-most row of homes, as close as approximately 1,000 feet from the nearest above-ground HA point

⁸ easternmost row of homes, as close as approximately 2,000 feet from the HA

⁹ approximately 3,700 feet from nearest above-ground HA point

¹⁰ approximately 425 feet from nearest above-ground HA point

¹¹ approximately 212 feet from the HA

¹² approximately 168 feet from the HA

¹³ approximately 1,330 feet from the HA

¹⁴ approximately 2,900 feet from the nearest above-ground HA point

¹⁵ approximately 1,000 feet from the nearest above-ground HA point

Table 22
Hybrid Alignment Operation Corona AN,
Fair Weather, CNEL Standard/Increase

Ambient Survey Position (ASP) ID (and Representative Receptor Location*)	Measured Existing Outdoor Ambient Sound Level (dBA, CNEL)	Predicted Project 230 kV Transmission Line Corona Audible Noise** (AN) (dBA, CNEL)	Future Ambient (Log-sum of Existing Ambient and Predicted Corona AN) (dBA, CNEL)	Increase over Existing Ambient due to Corona AN Contribution (dBA, CNEL)	Impact? (>60 dBA CNEL from Corona AN or >5 dBA, CNEL ambient increment)
ST-1 (Stratham ¹)	68	0	68	0	No
ST-2 (Stratham ² , Lyon ¹)	77	0	77	0	No
ST-3 (Thoroughbred ³)	65	0	65	0	No
ST-4 (DR Horton ⁴)	68	0	68	0	No
ST-4 (Lennar ⁵ , Lyon ⁸)	68	0	68	0	No
ST-4 (APV2 ⁶)	68	0	68	0	No
ST-5 (APV1 ⁷)	64	0	64	0	No
ST-5 (Vernola ¹⁴)	64	0	64	0	No
ST-6 (Riverbend ⁹)	67	0	67	0	No
ST-7 (Riverbend ¹⁵)	48	0	48	0	No
ST-8 ¹⁰	54	0	54	0	No
ST-9 ¹¹	61	0	61	0	No
ST-10 ¹²	57	0	57	0	No
ST-11 ¹³	58	0	58	0	No

Exceedances shown in **bold**

* Represented Entitled or Under-construction Development

** assumes fair weather conditions all day, evening, and night

¹ northern end of westernmost row of homes, 150 feet from the HA

² southern end of westernmost row of homes, 150 feet from the HA

³ southwestern portion of business park development, 50 feet from the HA

⁴ westernmost row of homes, as close as approximately 3,500 feet from the HA

⁵ westernmost row of homes, as close as approximately 2,000 feet from the HA

⁶ westernmost row of homes, as close as approximately 1,750 feet from the HA

⁷ southwestern-most row of homes, as close as approximately 1,000 feet from the nearest above-ground HA point

⁸ easternmost row of homes, as close as approximately 2,000 feet from the HA

⁹ approximately 3,700 feet from nearest above-ground HA point

¹⁰ approximately 425 feet from nearest above-ground HA point

¹¹ approximately 212 feet from the HA

¹² approximately 168 feet from the HA

¹³ approximately 1,330 feet from the HA

¹⁴ approximately 2,900 feet from the nearest above-ground HA point

¹⁵ approximately 1,000 feet from the nearest above-ground HA point

Corona Noise Level Contours

Figures 7A through 7G display predicted Project corona AN as isopleths (a.k.a., noise contours), radiating out from the PA, superimposed on aerial imagery of the Project vicinity. While these contours only represent Project corona AN and not the future ambient levels as presented in Tables 19 and 20, the reader can see in Figures 7A through 7G, where corona AN during foul weather conditions at certain dBA CNEL is expected. During fair weather conditions, these predicted contours would be at the same distances, but would be characterized by AN values that

are 25 dBA less than those shown. In like manner, Figures 8A through 8G display predicted AN contours for the HA.

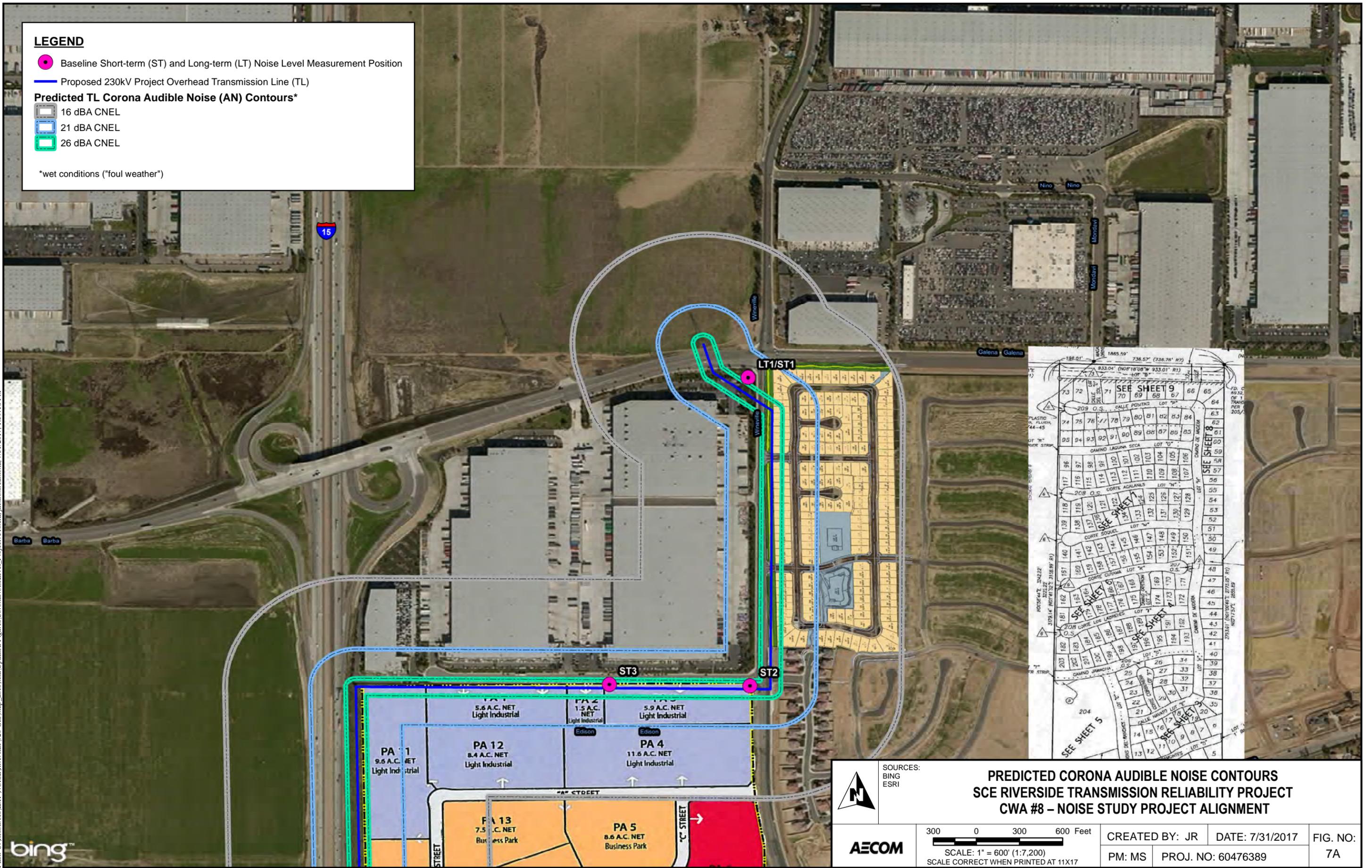
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LEGEND

- Baseline Short-term (ST) and Long-term (LT) Noise Level Measurement Position
- Proposed 230kV Project Overhead Transmission Line (TL)
- Predicted TL Corona Audible Noise (AN) Contours***
- 16 dBA CNEL
- 21 dBA CNEL
- 26 dBA CNEL

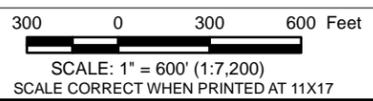
*wet conditions ("foul weather")

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**PREDICTED CORONA AUDIBLE NOISE CONTOURS
SCE RIVERSIDE TRANSMISSION RELIABILITY PROJECT
CWA #8 – NOISE STUDY PROJECT ALIGNMENT**

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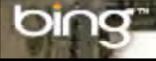
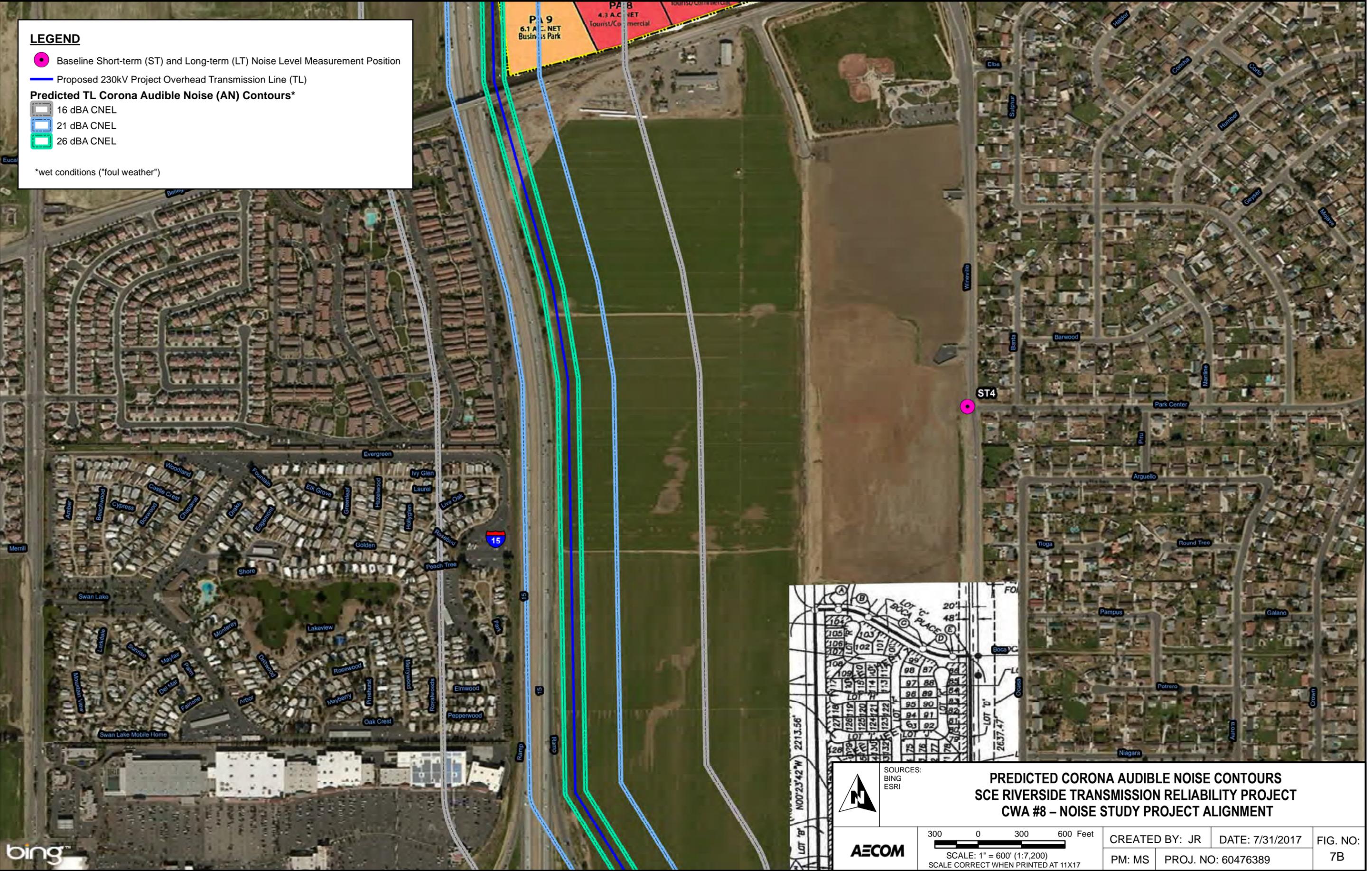
LEGEND

- Baseline Short-term (ST) and Long-term (LT) Noise Level Measurement Position
- Proposed 230kV Project Overhead Transmission Line (TL)

Predicted TL Corona Audible Noise (AN) Contours*

- 16 dBA CNEL
- 21 dBA CNEL
- 26 dBA CNEL

*wet conditions ("foul weather")



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**PREDICTED CORONA AUDIBLE NOISE CONTOURS
SCE RIVERSIDE TRANSMISSION RELIABILITY PROJECT
CWA #8 – NOISE STUDY PROJECT ALIGNMENT**

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SCALE: 1" = 600' (1:7,200)
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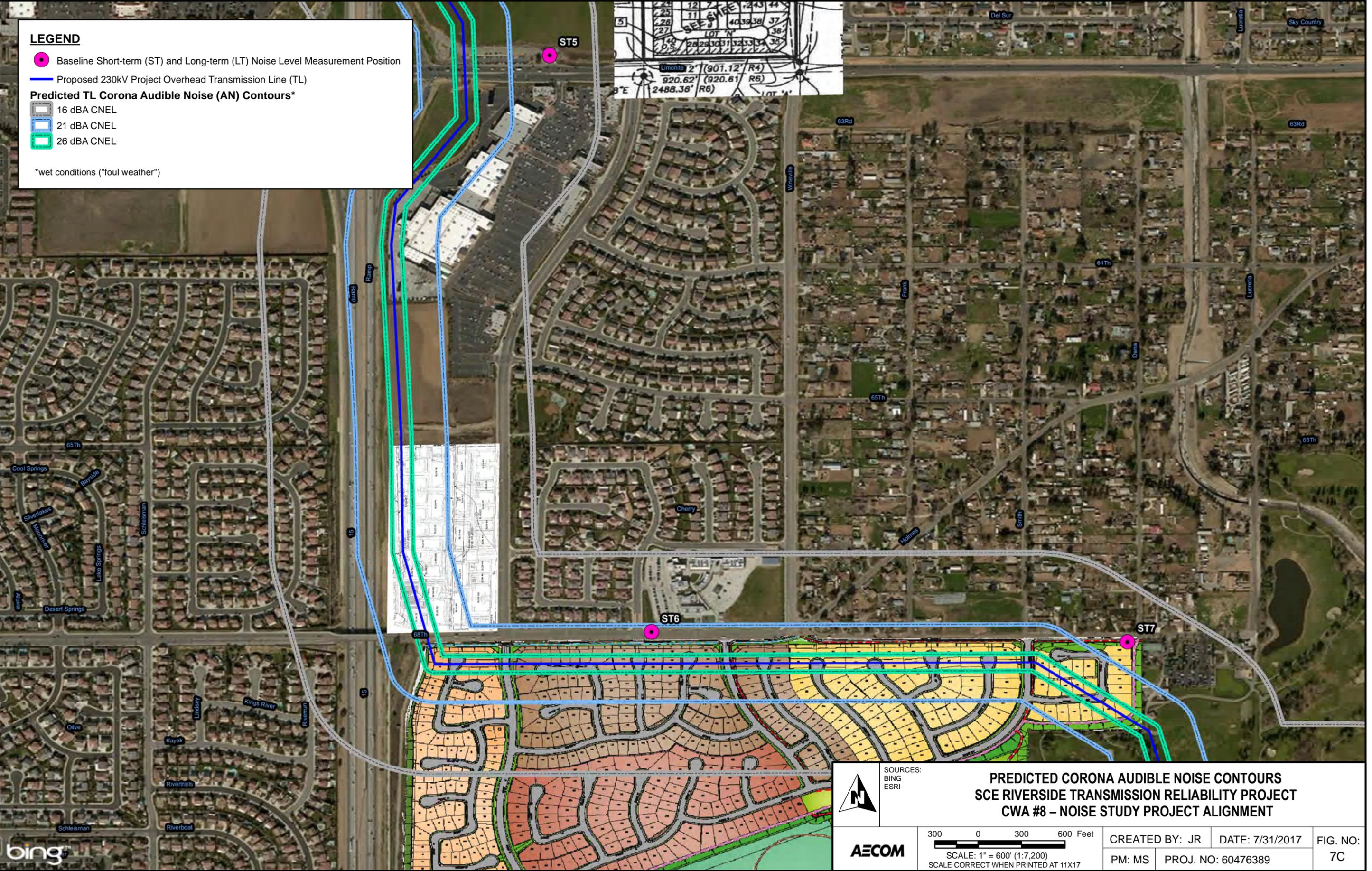
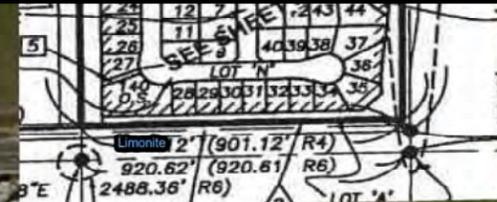
LEGEND

- Baseline Short-term (ST) and Long-term (LT) Noise Level Measurement Position
- Proposed 230kV Project Overhead Transmission Line (TL)

Predicted TL Corona Audible Noise (AN) Contours*

- 16 dBA CNEL
- 21 dBA CNEL
- 26 dBA CNEL

*wet conditions ("foul weather")



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	 SCALE: 1" = 600' (1:7,200) SCALE CORRECT WHEN PRINTED AT 11X17	CREATED BY: JR PM: MS	DATE: 7/31/2017 PROJ. NO: 60476389

LEGEND

● Baseline Short-term (ST) and Long-term (LT) Noise Level Measurement Position

— Proposed 230kV Project Overhead Transmission Line (TL)

Predicted TL Corona Audible Noise (AN) Contours*

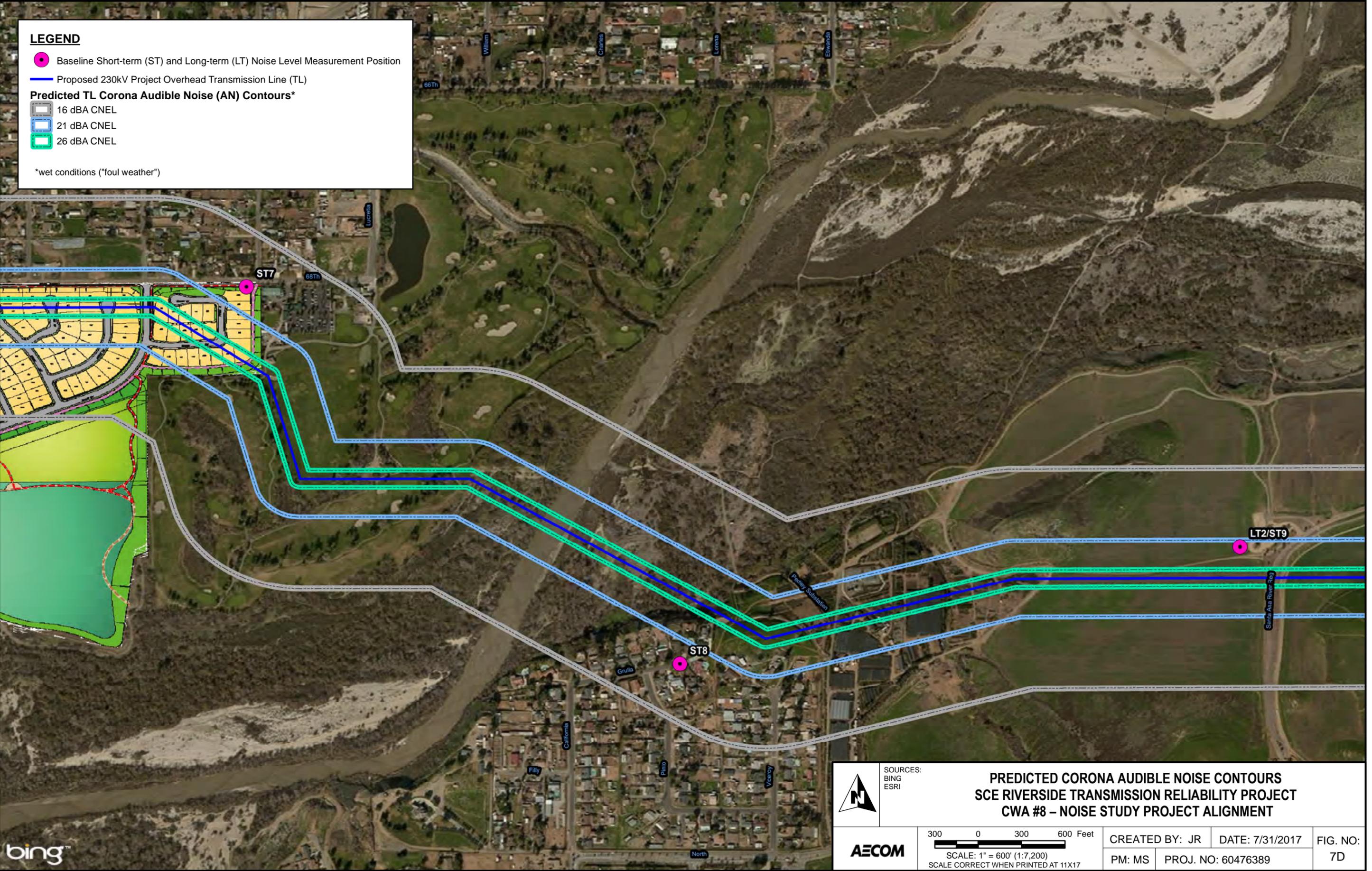
16 dBA CNEL

21 dBA CNEL

26 dBA CNEL

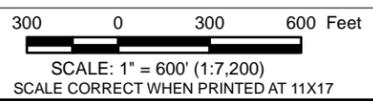
*wet conditions ("foul weather")

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SCE RIVERSIDE TRANSMISSION RELIABILITY PROJECT
CWA #8 – NOISE STUDY PROJECT ALIGNMENT**

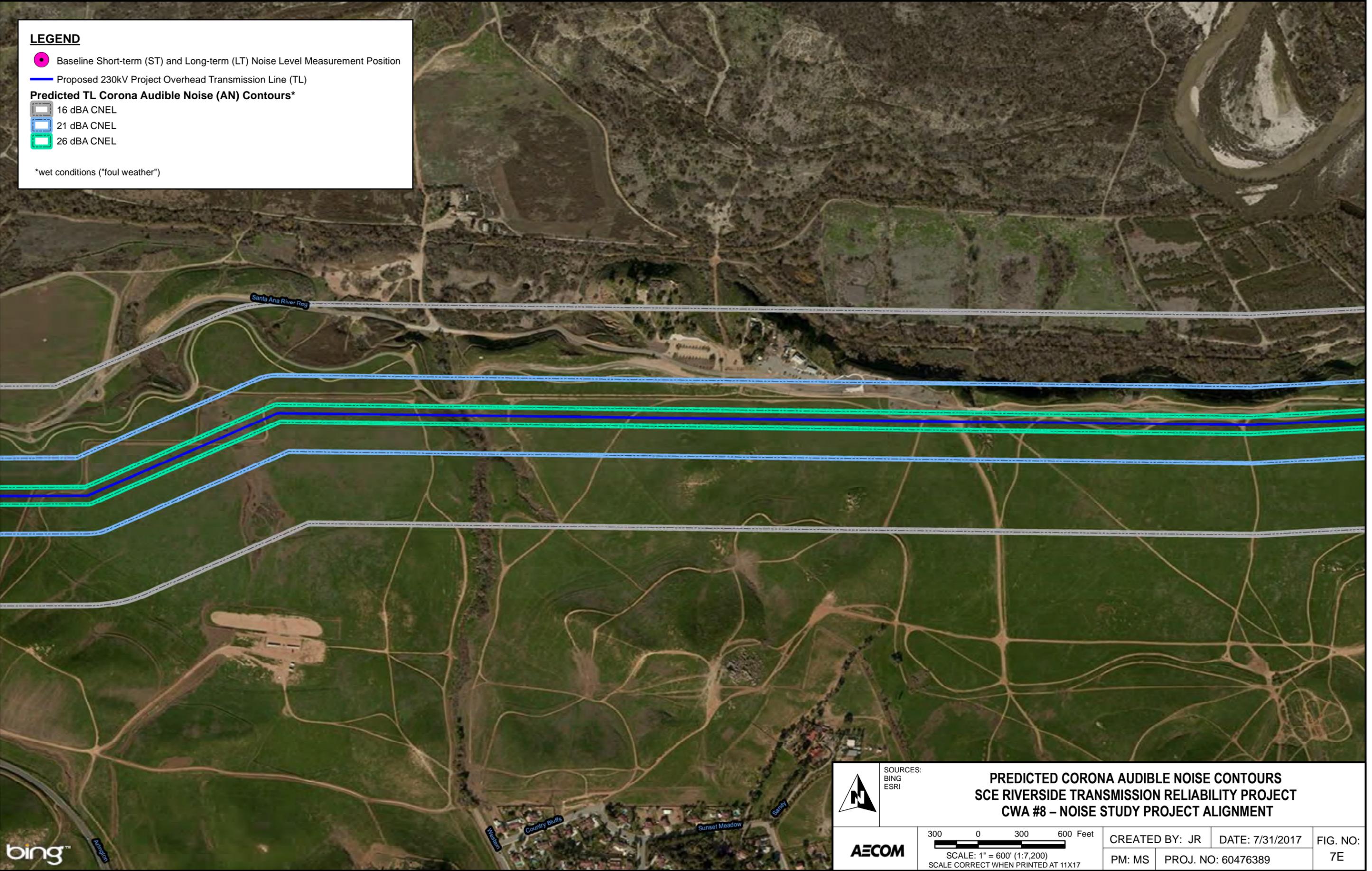
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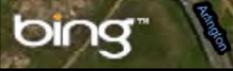
- Baseline Short-term (ST) and Long-term (LT) Noise Level Measurement Position
- Proposed 230kV Project Overhead Transmission Line (TL)
- Predicted TL Corona Audible Noise (AN) Contours***
- 16 dBA CNEL
- 21 dBA CNEL
- 26 dBA CNEL

*wet conditions ("foul weather")

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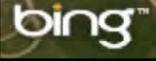
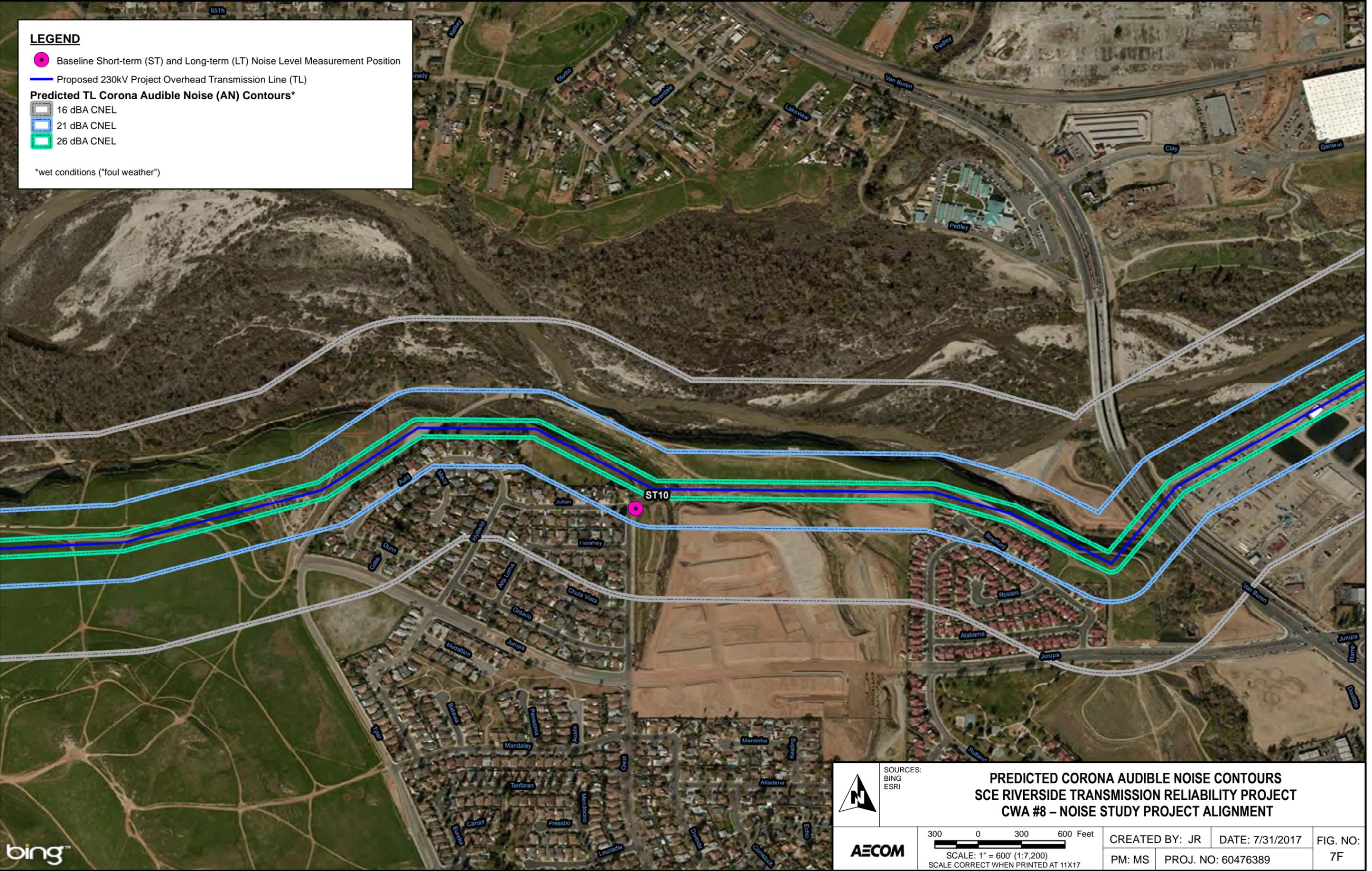


LEGEND

- Baseline Short-term (ST) and Long-term (LT) Noise Level Measurement Position
- Proposed 230kV Project Overhead Transmission Line (TL)
- Predicted TL Corona Audible Noise (AN) Contours***
- 16 dBA CNEL
- 21 dBA CNEL
- 26 dBA CNEL

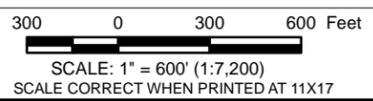
*wet conditions ("foul weather")

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SCE RIVERSIDE TRANSMISSION RELIABILITY PROJECT
CWA #8 – NOISE STUDY PROJECT ALIGNMENT**

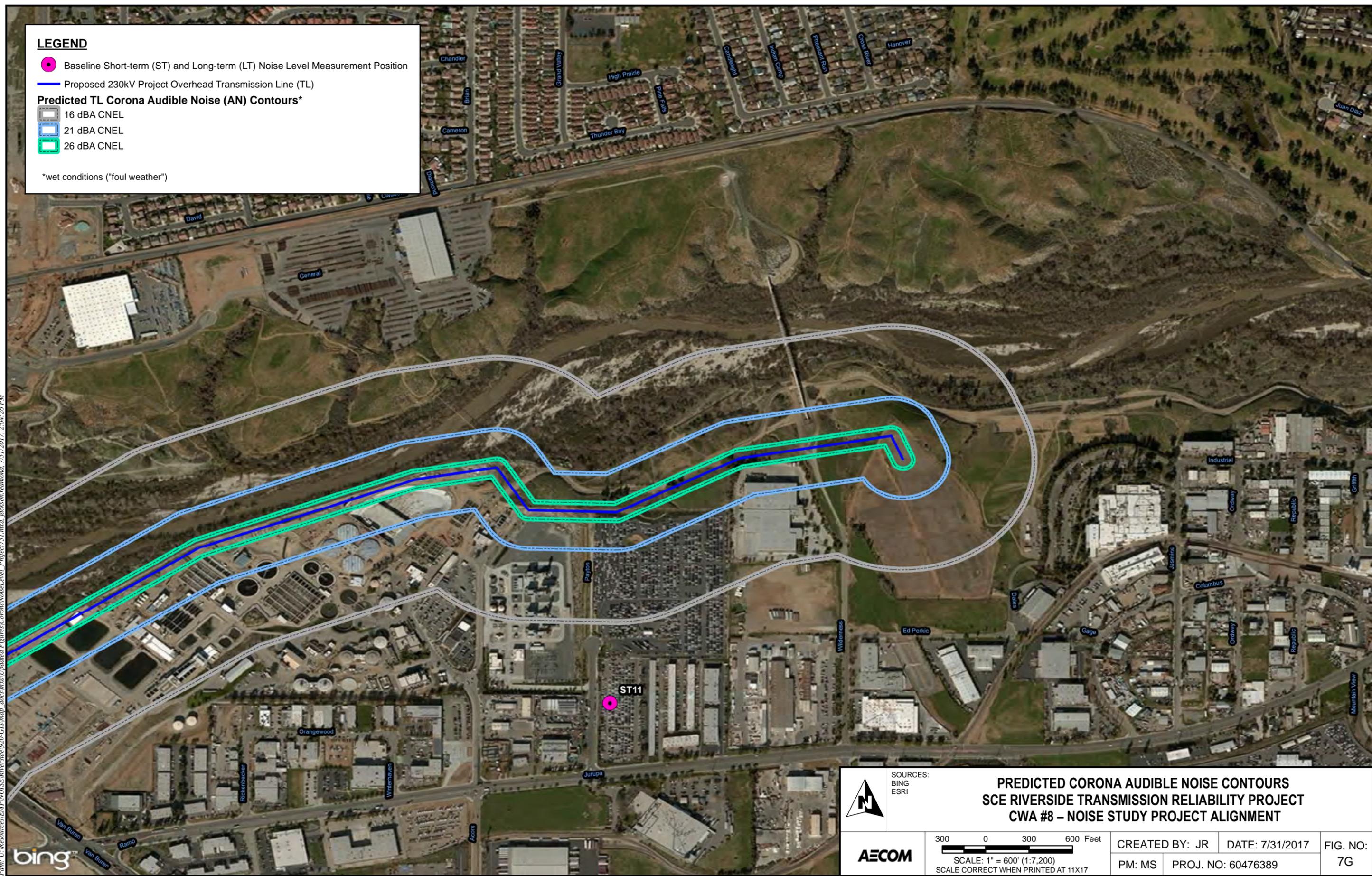
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PM: MS	PROJ. NO: 60476389	7F

LEGEND

- Baseline Short-term (ST) and Long-term (LT) Noise Level Measurement Position
- Proposed 230kV Project Overhead Transmission Line (TL)
- Predicted TL Corona Audible Noise (AN) Contours***
 - 16 dBA CNEL
 - 21 dBA CNEL
 - 26 dBA CNEL

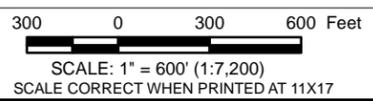
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**PREDICTED CORONA AUDIBLE NOISE CONTOURS
SCE RIVERSIDE TRANSMISSION RELIABILITY PROJECT
CWA #8 – NOISE STUDY PROJECT ALIGNMENT**

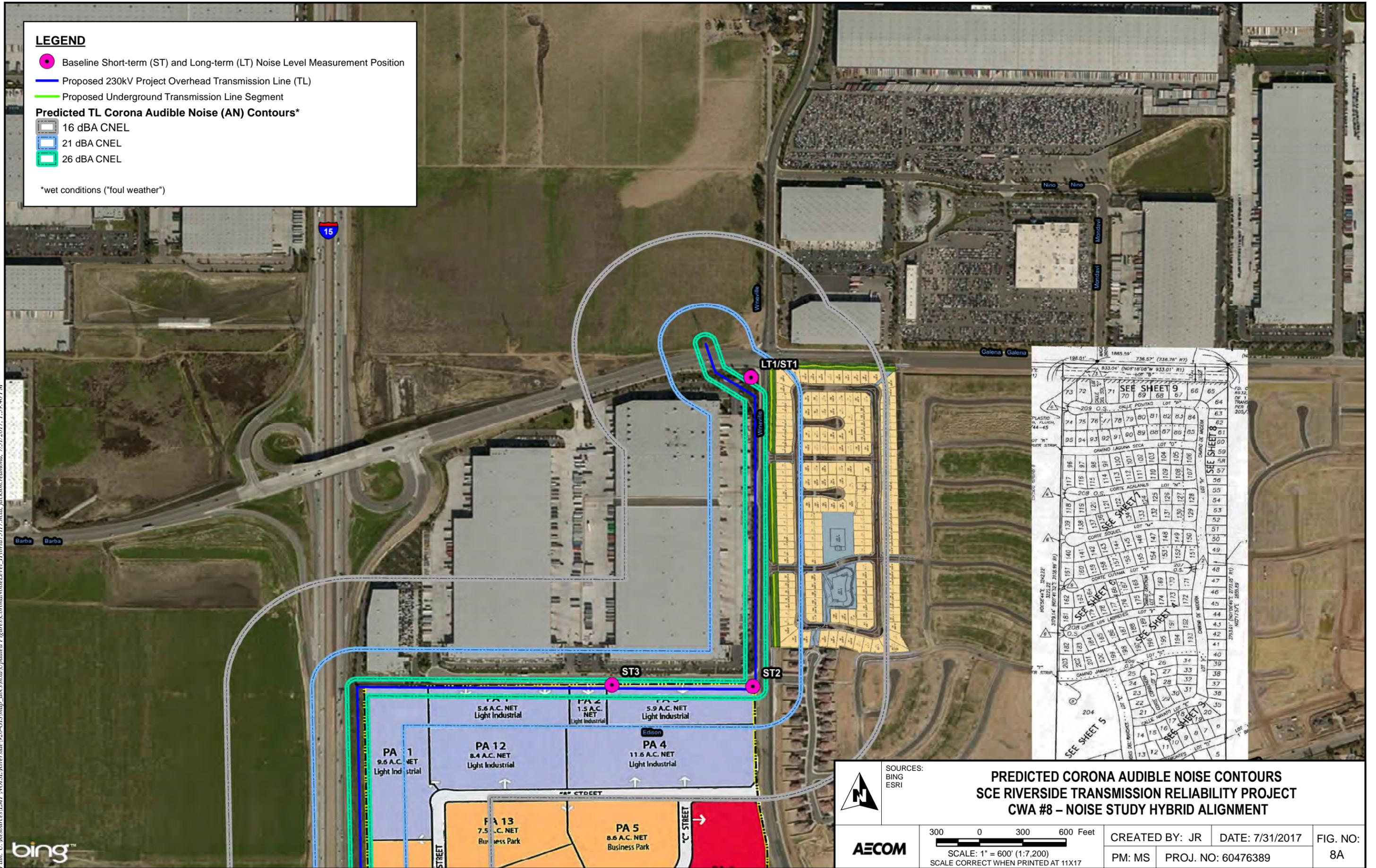
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LEGEND

- Baseline Short-term (ST) and Long-term (LT) Noise Level Measurement Position
 - Proposed 230kV Project Overhead Transmission Line (TL)
 - Proposed Underground Transmission Line Segment
- Predicted TL Corona Audible Noise (AN) Contours***
- 16 dBA CNEL
 - 21 dBA CNEL
 - 26 dBA CNEL

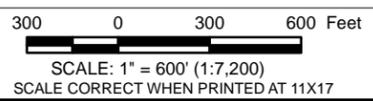
*wet conditions ("foul weather")

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**PREDICTED CORONA AUDIBLE NOISE CONTOURS
SCE RIVERSIDE TRANSMISSION RELIABILITY PROJECT
CWA #8 - NOISE STUDY HYBRID ALIGNMENT**

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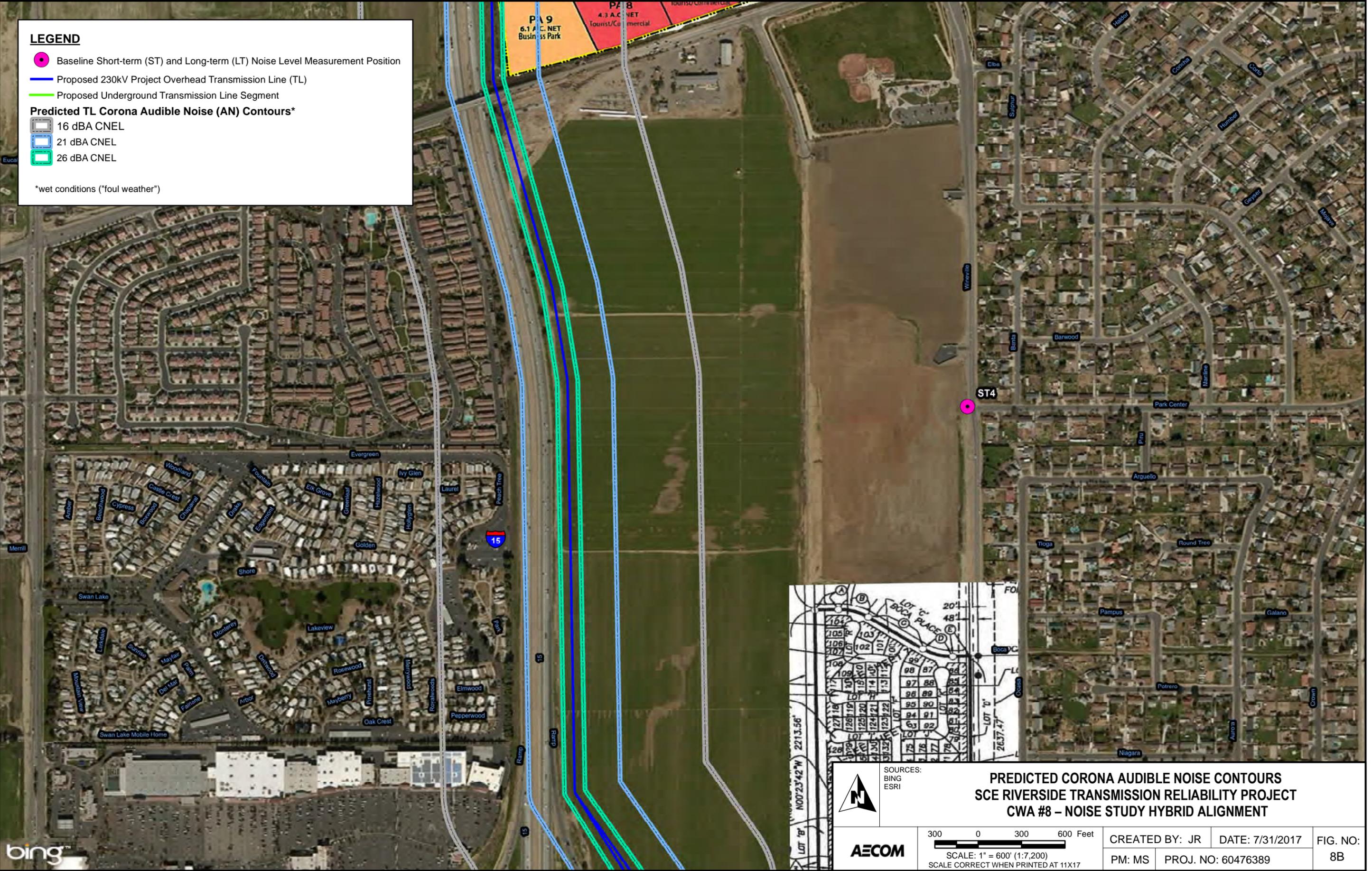
LEGEND

- Baseline Short-term (ST) and Long-term (LT) Noise Level Measurement Position
- Proposed 230kV Project Overhead Transmission Line (TL)
- Proposed Underground Transmission Line Segment

Predicted TL Corona Audible Noise (AN) Contours*

- 16 dBA CNEL
- 21 dBA CNEL
- 26 dBA CNEL

*wet conditions ("foul weather")



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**PREDICTED CORONA AUDIBLE NOISE CONTOURS
SCE RIVERSIDE TRANSMISSION RELIABILITY PROJECT
CWA #8 – NOISE STUDY HYBRID ALIGNMENT**

AECOM

300 0 300 600 Feet
SCALE: 1" = 600' (1:7,200)
SCALE CORRECT WHEN PRINTED AT 11X17

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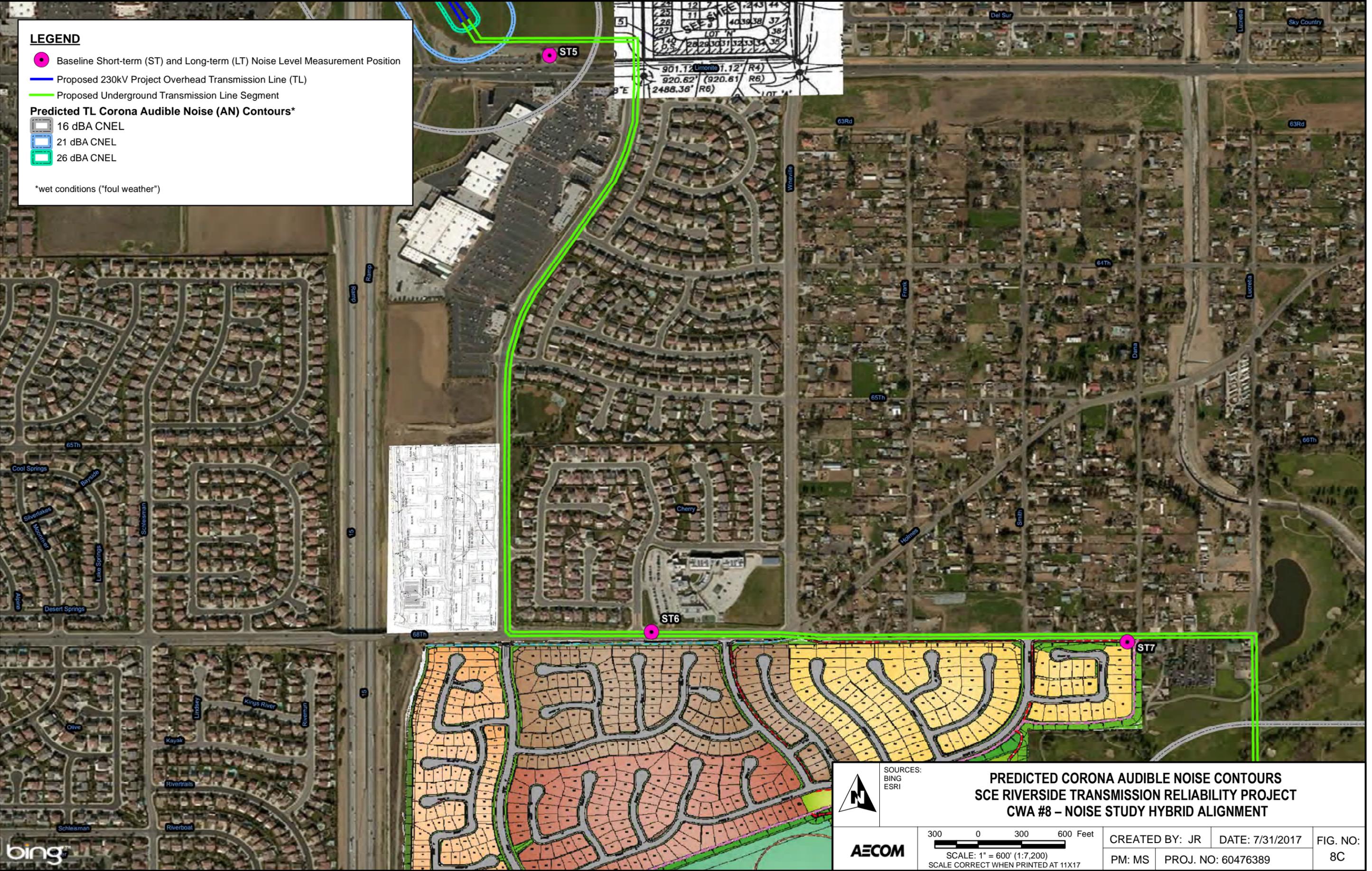
LEGEND

- Baseline Short-term (ST) and Long-term (LT) Noise Level Measurement Position
- Proposed 230kV Project Overhead Transmission Line (TL)
- Proposed Underground Transmission Line Segment

Predicted TL Corona Audible Noise (AN) Contours*

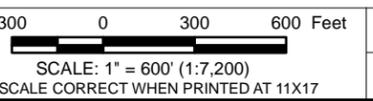
- 16 dBA CNEL
- 21 dBA CNEL
- 26 dBA CNEL

*wet conditions ("foul weather")



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**PREDICTED CORONA AUDIBLE NOISE CONTOURS
SCE RIVERSIDE TRANSMISSION RELIABILITY PROJECT
CWA #8 – NOISE STUDY HYBRID ALIGNMENT**

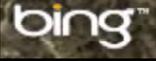
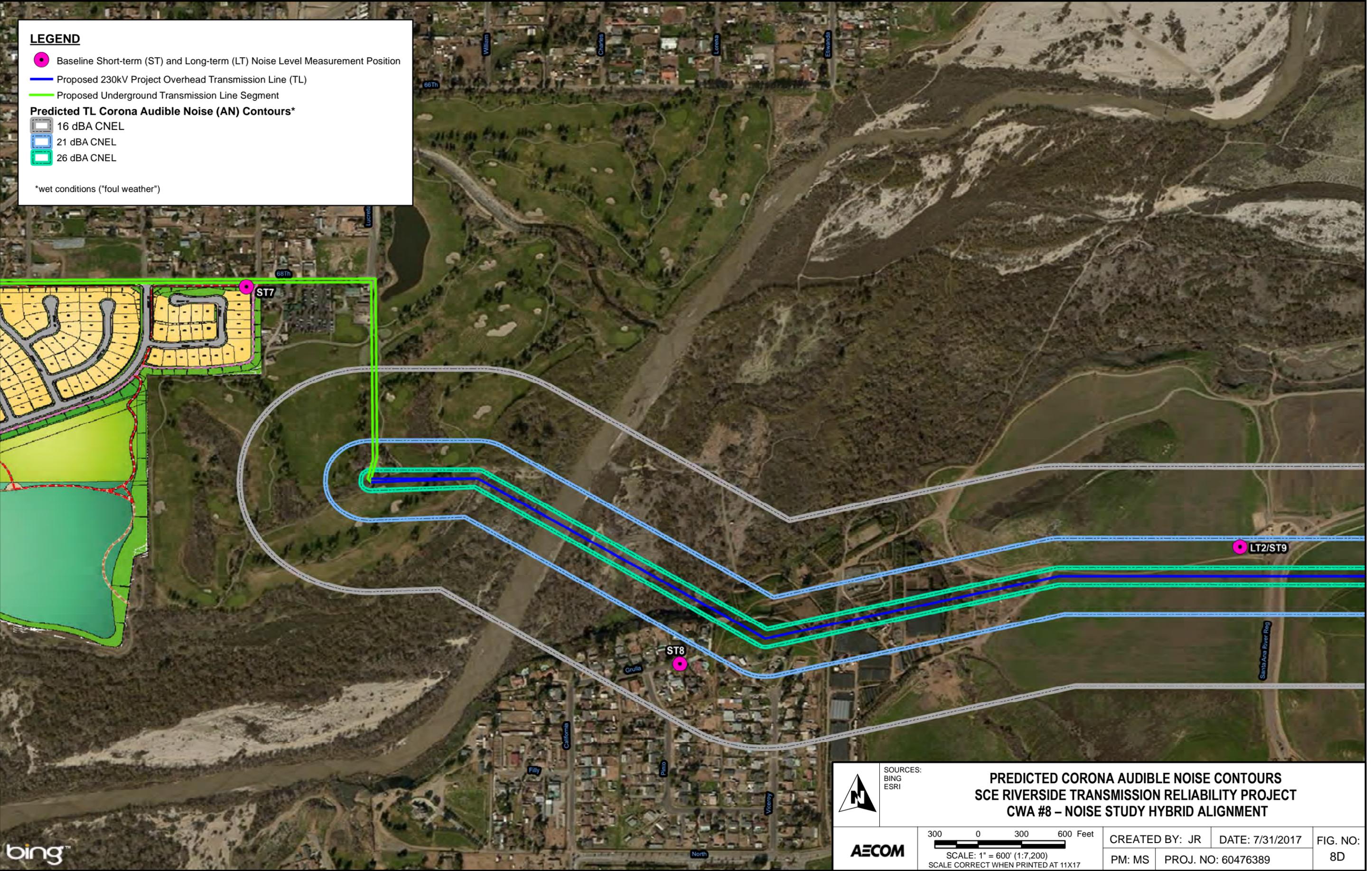
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LEGEND

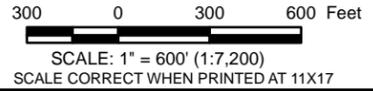
- Baseline Short-term (ST) and Long-term (LT) Noise Level Measurement Position
- Proposed 230kV Project Overhead Transmission Line (TL)
- Proposed Underground Transmission Line Segment
- Predicted TL Corona Audible Noise (AN) Contours***
- 16 dBA CNEL
- 21 dBA CNEL
- 26 dBA CNEL

*wet conditions ("foul weather")

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**PREDICTED CORONA AUDIBLE NOISE CONTOURS
SCE RIVERSIDE TRANSMISSION RELIABILITY PROJECT
CWA #8 - NOISE STUDY HYBRID ALIGNMENT**

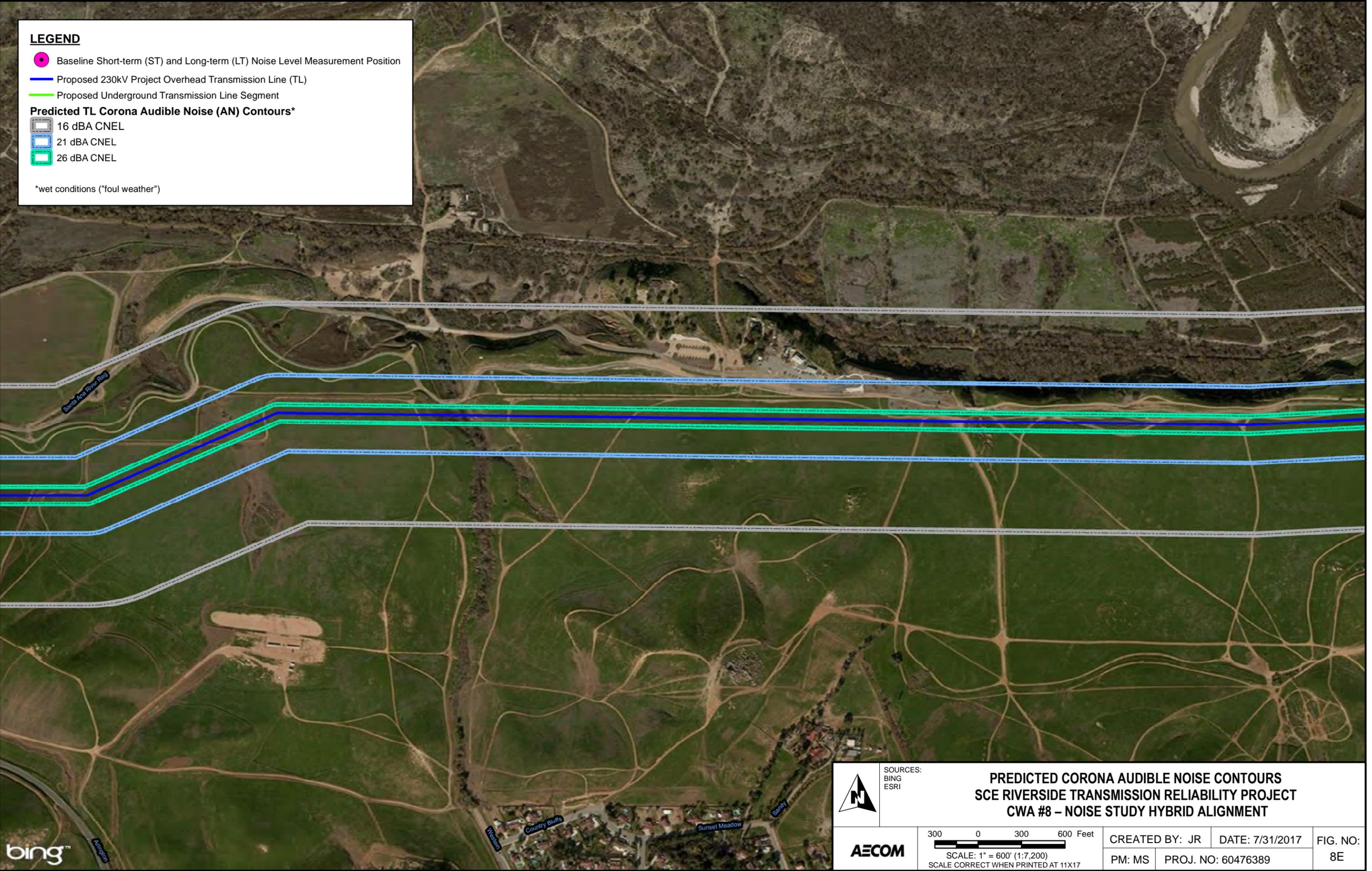
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LEGEND

- Baseline Short-term (ST) and Long-term (LT) Noise Level Measurement Position
 - Proposed 230kV Project Overhead Transmission Line (TL)
 - Proposed Underground Transmission Line Segment
- Predicted TL Corona Audible Noise (AN) Contours***
- 16 dBA CNEL
 - 21 dBA CNEL
 - 26 dBA CNEL

*wet conditions ("foul weather")

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SOURCES:
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**PREDICTED CORONA AUDIBLE NOISE CONTOURS
SCE RIVERSIDE TRANSMISSION RELIABILITY PROJECT
CWA #8 – NOISE STUDY HYBRID ALIGNMENT**

AECOM

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SCALE CORRECT WHEN PRINTED AT 11X17

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DATE: 7/31/2017

FIG. NO:

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LEGEND

- Baseline Short-term (ST) and Long-term (LT) Noise Level Measurement Position
- Proposed 230kV Project Overhead Transmission Line (TL)
- Proposed Underground Transmission Line Segment
- Predicted TL Corona Audible Noise (AN) Contours***
- 16 dBA CNEL
- 21 dBA CNEL
- 26 dBA CNEL

*wet conditions ("foul weather")

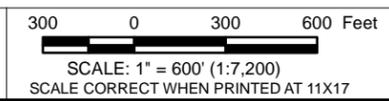
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**PREDICTED CORONA AUDIBLE NOISE CONTOURS
SCE RIVERSIDE TRANSMISSION RELIABILITY PROJECT
CWA #8 - NOISE STUDY HYBRID ALIGNMENT**

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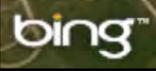


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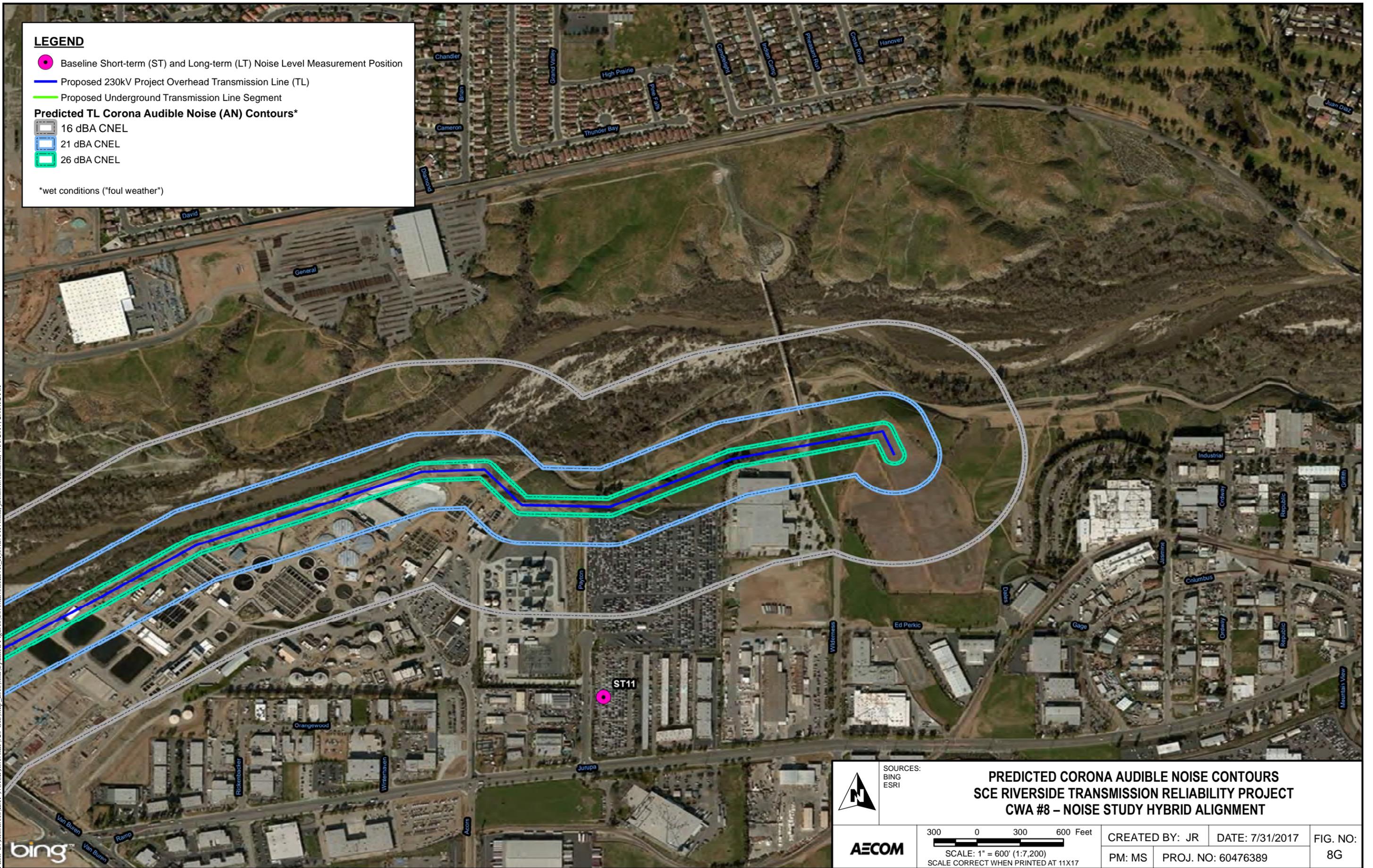


LEGEND

- Baseline Short-term (ST) and Long-term (LT) Noise Level Measurement Position
- Proposed 230kV Project Overhead Transmission Line (TL)
- Proposed Underground Transmission Line Segment
- Predicted TL Corona Audible Noise (AN) Contours***
- 16 dBA CNEL
- 21 dBA CNEL
- 26 dBA CNEL

*wet conditions ("foul weather")

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SOURCES:
BING
ESRI

**PREDICTED CORONA AUDIBLE NOISE CONTOURS
SCE RIVERSIDE TRANSMISSION RELIABILITY PROJECT
CWA #8 - NOISE STUDY HYBRID ALIGNMENT**

AECOM

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SCALE: 1" = 600' (1:7,200)
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5.0 APPLICANT PROPOSED MEASURES

5.1 PREDICTED IMPACT SUMMARY

To help provide context and relevance for the introduction of Applicant Proposed Measures (APM) in Section 5.2, the following is a summary of predicted Project construction and operation (i.e., corona AN) noise impacts as detailed in Section 4.

Project Construction

During daytime hours, the predicted acoustical contribution from Project construction noise for the PA is expected to cause an increase in existing outdoor ambient sound levels by more than 10 dBA L_{eq} (and therefore, a potentially significant impact) at representative noise-sensitive receivers (NSR) ST-1D, 2D, 3D, 5D, 6D, 7D, 9D and 10D. This is due primarily to the proximity of these existing or future NSR to the geographic location of PA construction activities when they will be closest—on the order of only 50 feet distant for most of the potentially affected NSR. Similarly, predictions indicate that daytime HA construction noise would also be expected to cause existing ambient noise level increases of greater than 10 dBA L_{eq} at NSR represented by ST-3D, 5D, 6D, 7D, 9D and 10D.

If PA construction activity were to occur during nighttime hours, and under such conditions this analysis assumes that the set of construction equipment and processes is smaller than that during the day and hence has a lower predicted aggregate source noise level, it is expected that NSR represented by ST-1N, 3N, 5N, 6N, 7N and 9N would experience an increase in outdoor ambient sound level greater than 10 dBA L_{eq} and hence become a potentially significant impact. For the HA, representative NSR ST-3N, 5N, 6N and 7N would experience similar impacts with respect to increases in existing ambient nighttime noise. In addition, both PA and HA nighttime construction noise as predicted by this analysis would be, regardless of the existing outdoor ambient sound level, higher than 45 dBA L_{eq} at NSR represented by ST-1N, 2N, 3N, 5N, 6N, 7N, 8N and 9N. As mentioned above in the summary of daytime construction noise impact assessment, proximity of the construction activity to the NSR seems to be the common parameter for predicted potentially significant impacts.

At representative NSR in this study where potentially significant impacts have not been predicted, Project construction noise levels or their contribution to increases in existing ambient sound are expected to be less than significant impacts and would not require consideration of noise control or sound abatement measures.

Project Operation

Predicted Project operation noise for the PA and HA, which means corona AN for purposes of this analysis, is expected to cause less than significant impacts at all studied representative NSR.

With respect to increasing the existing ambient sound level, corona AN would be expected to cause a negligible increase in existing ambient sound levels at all studied representative NSR and thus (under such conditions) be a less than significant impact.

5.2 APPLICANT PROPOSED MEASURES

The following APMs are provided to reduce Project construction noise levels, and where potentially significant noise impacts have been identified, to attempt to reduce levels below those that indicate significant impacts.

As discussed in Section 4.1, Project construction noise for the PA route may occur during hours outside of those specified by local noise ordinances and daytime construction noise levels would result in a substantial increase in ambient noise levels at representative receptor locations for the Stratham, Thoroughbred, Vernola and Riverbend developments, as well as representative receptor locations ST-9 and ST-10, which would result in potentially significant impacts.

Project construction noise for the HA route may also occur during hours outside of those specified by local noise ordinances and daytime construction noise levels would result in a substantial increase in ambient noise levels at representative receptor locations for the Thoroughbred, Vernola and Riverbend developments, as well as the existing residential community east of Pat's Ranch Road (bounded by Limonite Avenue and 68th Street) and representative receptor locations ST-9 and ST-10, which would result in potentially significant impacts.

Were proposed PA route or HA route construction activity noise to occur at night, involving likely equipment as described in Section 4 and during hours when construction noise is not exempt from local noise ordinance thresholds, potentially significant impacts are predicted for the Stratham, Lyon and Thoroughbred developments, as well as representative receptor locations ST-5 (Vernola), ST-7, ST-8 and ST-9. With respect to an increase in ambient noise levels, potentially significant impacts are predicted for the Stratham and Thoroughbred developments, along with ST-5 (Vernola), ST-6, ST-7 and ST-9.

The following typical construction noise reduction measures are recommended to reduce and minimize noise levels during construction, including, but not limited to:

- NOI-1 (Implement Noise Complaint Reporting) – The Project (via construction contractor) would establish a telephone hot-line for use by the public to report any perceived significant adverse noise conditions associated with the construction of the Project. If the telephone is not staffed 24 hours per day, the contractor would include an automatic answering feature, with date and time stamp recording, to answer calls when the phone is unattended. This hot-line telephone number would be posted at the Project site during construction in a manner visible to passersby. This telephone number would be maintained until the Project has been considered commissioned and ready for operation.
- NOI-2 (Implement Noise Complaint Investigation) – Throughout the construction of the Project, the contractor would document, investigate, evaluate, and attempt to resolve all Project-related noise complaints. The contractor or its authorized agent would:
 - Use a Noise Complaint Resolution Form to document and respond to each noise complaint;
 - Contact the person(s) making the noise complaint within 24 hours;
 - Conduct an investigation to attempt to determine the source of noise related to the complaint; and
 - Take all reasonable measures to reduce the noise at its source.
- NOI-3 (Implement Construction Practices) – The following are typical field techniques for reducing noise from construction activities on a project site, with the purpose of reducing aggregate construction noise levels at nearby NSR:
 - To the extent practical and unless safety provisions require otherwise, adjust all audible back-up alarms downward in sound level, reflecting vicinities that have expected lower background level, while still maintaining adequate signal-to-noise ratio for alarm effectiveness. Consider signal persons, strobe lights, or alternative safety equipment and/or processes as allowed, for reducing reliance on high-amplitude sonic alarms.
 - As practical and observing safety considerations, place stationary construction noise sources that tend to operate continuously and/or for extended periods of time, such as generators and air compressors, as far away as possible from potentially affected NSR. Place non-noise-producing mobile equipment such as

trailers in the direct sound pathways between suspected major noise-producing sources and sensitive receptors.

- Limit mobile construction equipment or vehicle engine idling duration, so that such continuous sources of noise do not unnecessarily contribute to an aggregate construction noise level.
- NOI-4 (Implement Equipment Noise Reduction) – The following are typical practices for construction equipment selection (or preferences) and expected function that can help reduce noise.
 - Pneumatic impact tools and equipment used at the construction site would have intake and exhaust mufflers recommended by the manufacturers thereof, to meet relevant noise limitations.
 - Provide impact noise producing equipment (i.e., jackhammers and pavement breaker[s]) with noise attenuating shields, shrouds or portable barriers or enclosures, to reduce operating noise.
 - Line or cover hoppers, storage bins, and chutes with sound-deadening material (e.g., apply wood or rubber liners to metal bin impact surfaces).
 - Provide upgraded mufflers, acoustical lining, or acoustical paneling for other noisy equipment, including internal combustion engines.
 - Use alternative procedures of construction and select a combination of techniques that generate the least overall noise and vibration.
 - Use construction equipment manufactured or modified to reduce noise and vibration emissions, such as:
 - Electric instead of diesel-powered equipment.
 - Hydraulic tools instead of pneumatic tools.
 - Electric saws instead of air- or gasoline-driven saws.
- NOI-5 (After-Hours Construction) – In the event construction activities are considered necessary on days or hours outside of what is specified by noise ordinance, SCE would provide advanced notification (as required by ordinance or as agreed upon with the local jurisdiction) of such anticipated activity to the CPUC, the local municipality or County where anticipated work is to be performed, and to residents within 300 feet of the anticipated work. This notification would include a general description of the work to be

performed, location, and hours of construction anticipated. Additionally, SCE or its contractors would route all construction traffic and/or helicopter flight(s) away from residences, schools and recreational facilities to the maximum extent feasible.

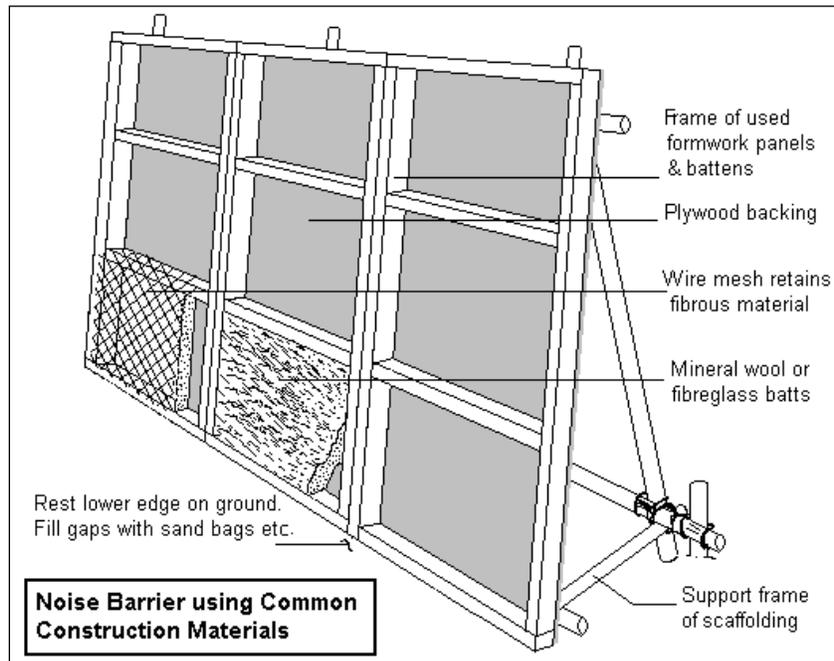
Where potentially significant impacts are anticipated, and if there is insufficient space or lack of available resources (e.g., semi-truck trailers, bulk material containers, moving vans, etc.) already present on-site to create a noise barrier using non-noise-producing equipment in use at an active construction site as suggested in one of the above NOI-3 options, the contractor may consider employing field-erected temporary noise barriers as a means to reduce construction noise exposure at the potentially affected NSR. Options for such on-site barriers could include, but are not necessarily limited to, using appropriately thick wooden panel walls (at least ½-inch thick) that resemble what appears in Figure 9 and are high enough to block the line-of-sight from the dominant construction noise source(s) to the NSR. Such barriers could, depending on factors such as barrier height, barrier length, and distance between the barrier and the noise-producing equipment or activity, reduce construction noise by 5 to 15 dBA at nearby noise-sensitive receptor locations. Alternately, field-erected noise curtain assemblies could be installed around specific equipment sites or zones of anticipated mobile or stationary activity, resembling the sample shown in Figure 10. These techniques are most effective and practical when the construction activity noise source is stationary (e.g., auger or drill operation) and the specific source locations of noise emission are near the ground and can be placed as close to the equipment/activity-facing side of the noise barrier as possible. Although barrier layout and other implementation details would vary by construction site, the following are coarse categories of expected temporary barrier performance:

- *Short barrier (SB)* – provides linear occlusion (expected noise reduction between 3 to 5 dBA) between the noise-generating source and the NSR, and has a total length less than four times the perpendicular distance between the barrier and the geographic center of the set of noise-producing construction equipment.
- *Medium barrier (MB)* – provides linear occlusion (expected noise reduction between 5 to 10 dBA) between noise source and NSR, and has a total length between four to eight times the perpendicular distance between the barrier and the geographic center of the set of noise-producing construction equipment. Alternately, the barrier may be shorter in extent (not height) so long as the included angle (α) between the noise source(s) and the ends of the barrier must be at least 160 degrees—please refer to Figure 11, which shows the end-flanking effect of the included angle on what is otherwise a barrier designed (based on height, etc.) to deliver an indicated “S” value of insertion loss.

-
- *Long barrier* (LB) – provides linear occlusion (expected noise reduction between 10 to 15 dBA) between noise source and NSR, and has a total length of at least eight times the perpendicular distance between the barrier and the geographic center of the set of noise-producing construction equipment. Alternately, the barrier may be shorter in extent (not height) so long as the included angle (α) between the noise source(s) and the ends of the barrier is greater than 180 degrees.

These three predicted noise-reduction performance categories are presented to help the reader grasp what level of effort and materials would likely be expected if temporary barrier deployments (like the samples shown in Figures 9 and 10) were considered for implementation at a construction site. These are options, but are not intended to limit other feasible and reasonable noise control options, sound abatement techniques or other APMs that SCE or its contractor(s) might contemplate and install if and when a construction noise reduction need would be determined.

Figure 9
Temporary Noise Barrier using Common Construction Site Materials



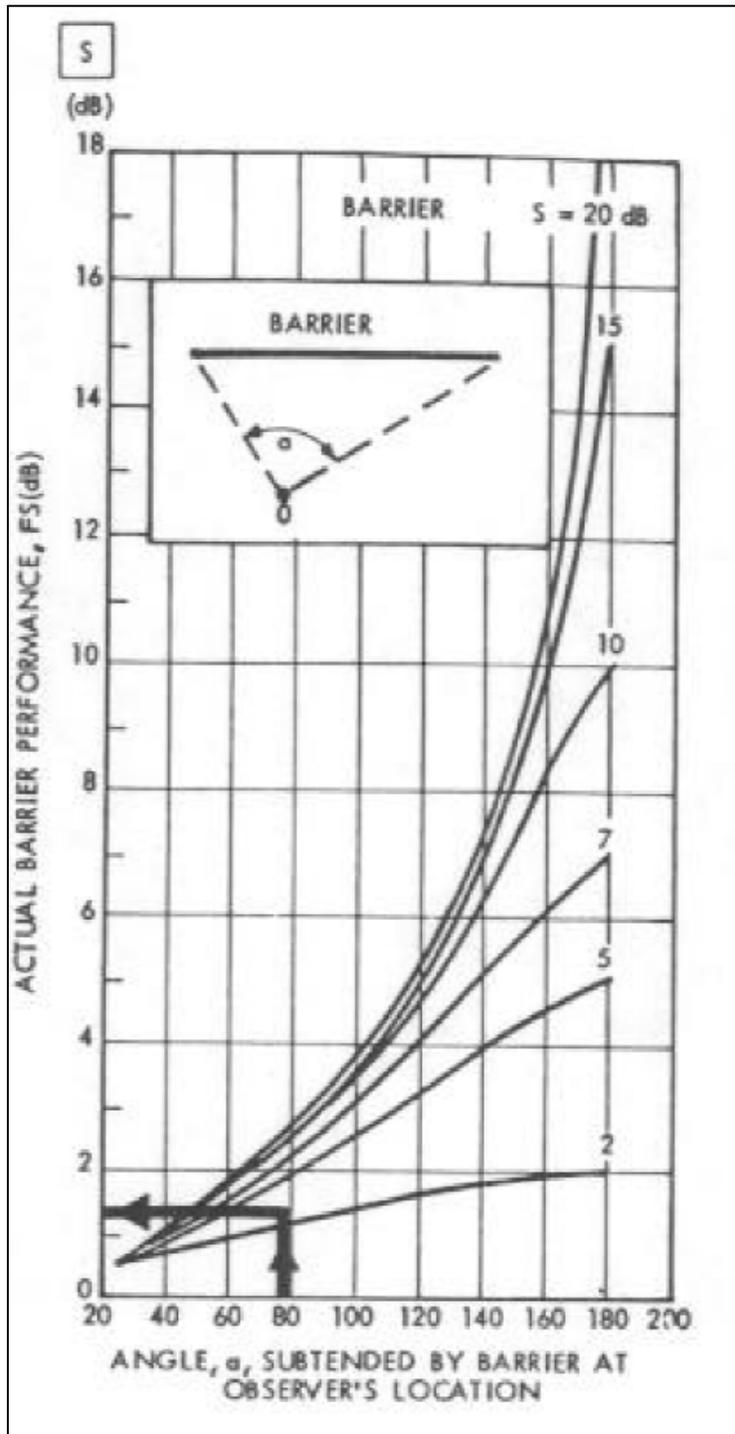
Source: Eaton, Construction Noise, 2000

Figure 10
Sample Site-Erected Curtain-type Noise Barrier



Source: AECOM (2015)

Figure 11
Effect of Included Angle on Noise Barrier Performance



Source: HUD (1991)

In all three barrier types above, the barrier material is assumed to be solid and dense enough to demonstrate acoustical transmission loss (TL) that is at least 10 dBA greater than the estimated noise reduction effect. These suggested barrier types do not represent the only ways to achieve the indicated noise reduction in dBA; rather, they represent examples of how such noise attenuation might be attained by an implemented APM under the right conditions and offer some insight on the level of resources (e.g., barrier extent) likely to be involved. Hence, Tables 23 and 24 present the representative receptor locations that would, on the basis of predicted construction noise impact assessment appearing in Tables 8 through 13, likely need the indicated APM-provided noise reduction in order to result in predicted Project construction noise no greater than 45 dBA (Tables 8 and 9 assessment results for potential nighttime construction) or 10 dBA above the existing ambient sound level (Tables 10 and 12 for daytime and nighttime with respect to the PA route, and Tables 11 and 13 with respect to the HA route).

Table 23
Probable Project Alignment (PA) Construction Noise Reduction Need at Representative Receivers

Ambient Survey Position (ASP) ID (and Representative Receptor [RR] Location*)	Nighttime Construction Noise Reduction, to comply with 45 dBA at RR (dBA)	Daytime Construction Noise Reduction, to comply with <= 10 dBA increase over ambient at RR (dBA)	Nighttime Construction Noise Reduction, to comply with <= 10 dBA increase over ambient at RR (dBA)
ST-1 (Stratham ¹)	29	10	4
ST-2 (Stratham ² , Lyon ¹)	29	7	n/a
ST-3 (Thoroughbred ³)	29	11	7
ST-4 (DR Horton ⁴)	n/a	n/a	n/a
ST-4 (Lennar ⁵ , Lyon ⁸)	n/a	n/a	n/a
ST-4 (APV1 ⁶ , APV2 ⁶)	n/a	n/a	n/a
ST-5 (APV2 ⁷)	n/a	n/a	n/a
ST-5 (Vernola ^{1,2})	29	13	8
ST-6 (Riverbend ⁹)	29	6	14
ST-7 (Riverbend ⁹)	29	26	28
ST-8 ¹⁰	5	n/a	n/a
ST-9 ¹¹	12	8	5
ST-10 ¹²	n/a	5	n/a
ST-11 ¹³	n/a	n/a	n/a

n/a = not applicable, noise mitigation not anticipated for this case/scenario

* Represented Entitled or Under-construction Development

¹ northern end of westernmost row of homes, 50 feet from the PA

² southern end of westernmost row of homes, 50 feet from the PA

³ southwestern portion of business park development, 50 feet from the PA

⁴ westernmost row of homes, as close as approximately 3,500 feet from the PA

⁵ westernmost row of homes, as close as approximately 2,000 feet from the PA

⁶ westernmost row of homes, as close as approximately 1,750 feet from the PA

⁷ westernmost row of homes, as close as approximately 1,500 feet from the PA

⁸ easternmost row of homes, as close as approximately 2,000 feet from the PA

⁹ as close as approximately 50 feet from the PA, assuming 100-foot-wide Project right-of-way

¹⁰ approximately 425 feet from the PA

¹¹ approximately 212 feet from the PA

¹² approximately 168 feet from the PA

¹³ approximately 1,330 feet from the PA ¹² approximately 168 feet from the Project alignment

¹³ approximately 1,330 feet from the Project alignment

Table 24
Probable Hybrid Alignment (HA) Construction Noise Reduction Need at Representative Receivers

Ambient Survey Position (ASP) ID (and Representative Receptor [RR] Location*)	Nighttime Construction Noise Reduction, to comply with 45 dBA at RR (dBA)	Daytime Construction Noise Reduction, to comply with <= 10 dBA increase over ambient at RR (dBA)	Nighttime Construction Noise Reduction, to comply with <= 10 dBA increase over ambient at RR (dBA)
ST-1 (Stratham ¹)	15	n/a	n/a
ST-2 (Stratham ² , Lyon ¹)	15	n/a	n/a
ST-3 (Thoroughbred ³)	29	11	7
ST-4 (DR Horton ⁴)	n/a	n/a	n/a
ST-4 (Lennar ⁵ , Lyon ⁸)	n/a	n/a	n/a
ST-4 (APV1 ⁶ , APV2 ⁶)	n/a	n/a	n/a
ST-5 (APV2 ⁷)	n/a	n/a	n/a
ST-5 (Vernola ⁹)	29	13	8
ST-6 (Riverbend ⁹)	29	6	14
ST-7 (Riverbend ⁹)	29	26	28
ST-8 ¹⁰	5	n/a	n/a
ST-9 ¹¹	12	8	5
ST-10 ¹²	n/a	5	n/a
ST-11 ¹³	n/a	n/a	n/a

n/a = not applicable, noise mitigation not anticipated for this case/scenario

* Represented Entitled or Under-construction Development

¹ northern end of westernmost row of homes, 150 feet from the HA

² southern end of westernmost row of homes, 150 feet from the HA

³ southwestern portion of business park development, 50 feet from the HA

⁴ westernmost row of homes, as close as approximately 3,500 feet from the HA

⁵ westernmost row of homes, as close as approximately 2,000 feet from the HA

⁶ westernmost row of homes, as close as approximately 1,750 feet from the HA

⁷ westernmost row of homes, as close as approximately 1,500 feet from the HA

⁸ easternmost row of homes, as close as approximately 2,000 feet from the HA

⁹ as close as approximately 50 feet from the underground portion of the HA

¹⁰ approximately 425 feet from the HA

¹¹ approximately 212 feet from the HA

¹² approximately 168 feet from the HA

¹³ approximately 1,330 feet from the HA

SCE and its contractor(s) would consider these tabulated predicted construction noise reduction values (at the indicated representative NSR locations) acoustical objectives with respect to rendering predicted construction noise impacts less than significant. On a case-by-case basis, they would need to consider the NSR location(s) of concern and the proximity and intensity of construction activity (which, of course, would likely “move” over time along the elected PA or HA route as a construction process would conclude) then evaluate, develop, and properly implement an appropriate APM that either enables noise control at the noise-producing sources, sound attenuation along the sound pathways, noise abatement at or near the NSR of concern, or

some combination of these three techniques that would yield practical noise reduction and reflect SCE effort to minimize noise impact at the NSR.

5.3 SIGNIFICANCE AFTER APMs

To increase the likelihood of reducing daytime Project construction noise levels below levels of significance, implementation of NOI-3 (Implement Construction Practices) and NOI-4 (Implement Equipment Noise Reduction) would be expected with respect to NSR locations of concern. After the implementation of APMs NOI-1 through NOI-4, daytime Project construction noise levels would be reduced at the source, resulting in reductions of acoustical contribution to the existing outdoor ambient sound environment at NSR that could—under the right conditions—result in less than substantial increases in ambient noise levels during the daytime at these NSR locations; if such conditions were met, this would be a less than significant impact.

At some Riverbend development NSR, represented by ST-7, the construction noise reduction need to attain less than significant impact as shown by Tables 23 and 24 is expected to be over 20 dBA and might thus be a challenge to feasibly and reasonably achieve with APM NOI-1 through NOI-4. For such a potentially impacted future NSR, in an area that is not yet fully constructed and occupied as of this writing, SCE might consider arranging its Project construction schedule so that PA or HA features are first completed in the vicinity of this NSR and therefore avoid potential noise impact (i.e., due to lack of building occupants that might otherwise be exposed to the significant noise levels).

In the event construction activities are necessary on days or hours outside of what is specified by noise ordinance, SCE would implement NOI-5 (after-hours construction) in order to reduce construction noise impacts to the extent feasible. However, despite the implementation of NOI-5, after-hours construction noise impacts would potentially be significant and unavoidable.

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6.0 CONCLUSIONS

Project construction would be expected to occur, depending on specific location and the applicable local municipal or County noise regulations or general plan policies, within the allowable hours of construction activity (and during which time construction noise limits may not be established or specified) or during periods of time that exempt construction activity noise from otherwise applicable noise level thresholds; hence, with respect to relevant noise standards, this would be a less than significant impact. However, in the event construction activities are necessary on days or hours outside of what is specified by noise ordinance, then this would be a potentially significant impact. Project construction noise levels could result in substantial predicted increases of ambient noise levels during the daytime at some locations; therefore, on the basis of temporary ambient noise level increase, this would also be a potentially significant impact. After the implementation of APMs NOI-1 through NOI-4, Project construction noise levels would be reduced, generally resulting in less than substantial increases in ambient noise levels during the daytime at residential locations; thus, after APM implementation, temporary ambient noise increase would become a less than significant impact.

In the event construction activities are necessary on days or hours outside of what is specified by noise ordinance, SCE would implement NOI-5 (After-Hours Construction) in order to reduce construction noise impacts to the extent feasible. However, despite the implementation of NOI-5, after-hours construction noise impacts would potentially be significant and unavoidable.

Anticipated vibration from Project construction activities would not result in vibration velocity levels exceeding vibration guidelines for structural damage risk and human annoyance; hence, this would be a less than significant impact. The proposed Project would not generate significant construction and operational traffic and, therefore, would not expose people to current or future transportation noise levels that exceed applicable standards. This is a less than significant impact.

Project operation could generate above-ground transmission line corona AN, but only under “foul” weather conditions (i.e., rain or related conditions that wet the conductor surface) that would not exceed the local day and night L_{eq} standards, nor create a substantial permanent ambient CNEL increase. Therefore, this is a less than significant impact.

Overall, the proposed Project, with appropriate proposed APMs, would not result in a significant impact if construction activity would be, to the extent practical, limited within the allowable hours of construction activity (and during which time construction noise limits may not be

established or specified) or during periods of time that exempt construction activity noise from otherwise applicable noise level thresholds.

7.0 REFERENCES

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APPENDICES

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- A. Noise and Vibration Terminology
- B. Photographic Log
- C. Field Noise Measurement Data Forms
- D. Corona Audible Noise (AN) Calculation Spreadsheet
- E. Corona Audible Noise (AN) Survey

Appendix A - NOISE AND VIBRATION TERMINOLOGY

A.1 NOISE DESCRIPTORS

Noise is generally defined as unwanted or objectionable sound. The effects of noise on people can include general annoyance, interference with speech communication, sleep disturbance and, in the extreme, hearing impairment. The unit of measurement used to describe a noise level is the decibel (dB); and, decibels are measured on a logarithmic scale that quantifies sound intensity in a manner similar to the Richter scale used for earthquake magnitudes. Thus, a doubling of the energy of a noise source, such as doubling of traffic volume, would increase the noise level by 3 dB; a halving of the energy would result in a 3 dB decrease.

Human Perception of Noise

The human ear is not equally sensitive to all frequencies within the sound spectrum. Therefore, a method called “A-weighting” is used to filter noise frequencies in the lower and upper regions of the audible spectrum, which approximates the frequency response of the average healthy young ear when listening to most ordinary everyday sounds. Therefore, the “A-weighted” noise scale is used for measurements and standards involving the human perception of noise. In this Report, all noise levels are considered A-weighted and “dBA” is understood to identify the A-weighted dB. Table 1 provides typical noise levels associated with common activities.

Human perception of noise has no simple correlation with acoustical energy. The perception of noise is not linear in terms of dBA or in terms of acoustical energy. Two identical noise sources do not sound twice as loud as one such source. It is widely accepted that the average healthy ear can barely perceive changes of 3 dBA (increase or decrease); that a change of 5 dBA is readily perceptible; and, that an increase (or decrease) of 10 dBA sounds twice (or half) as loud (Caltrans 2011).

Averaging Noise Levels

In addition to noise levels at any given moment, the duration and averaging of noise over time is also important for the assessment of potential noise disturbance. Noise levels varying over time can be energy-averaged over a period of time and expressed as dBA L_{eq} . This “equalized sound level” is an A-weighted dB value representing the continuous sound level over a time period that is the energy equivalent of the actual sound that varies in magnitude over that same period. Unless otherwise specified or noted, for purposes of this analysis a 1-hour time period is assumed for describing a L_{eq} value.

Table A-1
Typical Noise Levels

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

Source: Caltrans 2011

Notes: m=meters

ft=feet

km/hr=kilometers per hour

mph=miles per hour

The time of day during which noise may occur is also an important factor to consider when assessing potential community noise impacts, as noise levels that may be acceptable during the daytime hours may create disturbance during evening or nighttime hours when people are typically at home and sleeping. The Community Noise Equivalent Level (CNEL) is a descriptor used to characterize average noise levels over a continuous 24-hour period, calculated from hourly L_{eq} values, with 5 dBA added to the hourly L_{eq} levels occurring between 7:00 p.m. and 10:00 p.m. and 10 dBA added to the hourly L_{eq} levels occurring between 10:00 p.m. and 7:00 a.m. to reflect the greater disturbance potential from evening and nighttime noise, respectively.

Another common acoustical descriptor, the day/night average sound level (L_{dn}), is comparable to CNEL and is calculated in a similar manner, except that the evening period hours (7:00 p.m. to 10:00 p.m.) are included as part of the daytime period and are thus not adjusted by 5 dBA.

General Characteristics of Community Noise

Although such characterizations can depend on the settings of the acoustical environment being studied (i.e., as suggested by Table 1, urban locations tend to have higher background sound levels than those that are more rural), outdoor ambient noise levels are generally considered low when below 45 dBA, moderate in the 45 to 60 dBA range, and high above 60 dBA. Average ambient levels in urban environments at night tend to be about 7 dB lower than the corresponding daytime average ambient levels. The day-to-night difference in rural areas away from roads and other human activity can be considerably less. Although people often accept the higher levels associated with very noisy urban residential and residential-commercial zones, they are still considered adverse levels of noise with respect to public health (USEPA 1974).

Corona Audible Noise (AN)

When a transmission or subtransmission line is in operation, an electric field is generated in the air surrounding the conductors, forming a “corona.” A corona results from the partial breakdown of the electrical insulating properties of the air surrounding the conductors. When the intensity of the electric field at the surface of the conductor exceeds the insulating strength of the surrounding air, a corona discharge occurs at the conductor surface, representing a small dissipation of heat and energy. Some of the energy may dissipate in the form of small local pressure changes that result in audible noise or in radio or television interference. Audible noise generated by corona discharge is characterized as a hissing or crackling sound that may be accompanied by a 120-Hz hum.

Slight irregularities or water droplets on the conductor and/or insulator surface accentuate the electric field strength near the conductor surface, thereby making corona discharge and the associated audible noise more likely. Under “foul” weather conditions such as rain and high wind, ambient noise levels generated by the interaction of these conditions with the environment (e.g., rainfall on road pavement or rooftops) would generally be higher (and would thus potentially mask) than those generated by the corona effect from transmission line operation. Therefore, audible noise from transmission lines is generally a phenomenon experienced when high moisture content in the air, or subsequent to a precipitation event, provides opportunities for condensation or other wetting of the transmission line conductor surfaces. However, during “fair” dry weather, insects and dust on the conductors can also serve as sources of corona discharge, making the associated audible noise more likely.

Noise Attenuation

Propagating from a sound-producing source to a distant receiver, noise changes both in level and frequency spectrum. The most obvious change is the decrease in noise as the distance from the source increases. The manner in which noise reduces with distance depends on the following important factors: geometric divergence, ground absorption, atmospheric effects and refraction, shielding by natural and man-made features, noise barriers, diffraction, and reflection.

For a point or stationary noise source, such as construction equipment, the attenuation or drop-off in noise level would, due to geometric divergence, be at least 6 dBA for each doubling of unobstructed distance between source and the receiver. For a linear-type noise source, such as vehicles traveling on a roadway, the attenuation or drop-off in noise level would be approximately -3 dBA for each doubling of unobstructed distance between source and the receiver. While varying with temperature and humidity, atmospheric absorption can reasonably be expected to provide up to 1 dBA of attenuation per thousand feet that sound travels between a source and the receiver. Ground absorption effects, which depend on surface porosity and other characteristics, can be expected to provide up to an additional 4.8 dBA of noise attenuation (ISO 1996).

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

Noise-Sensitive Receptors

Some land uses are considered more sensitive to noise than others due to the types of persons or activities involved, such as sleeping, reading, talking, or convalescing. Noise-sensitive receptors are generally considered those individuals engaged in activities, or occupying land uses, that may be subject to the stress of significant interference from noise, including, but not limited to, talking, reading, and sleeping. Typically, land uses associated with noise-sensitive human receptors include residential dwellings, hotels/motels, hospitals, nursing homes, educational facilities, and libraries.

A.2 VIBRATION

In addition to noise, construction activities generate vibration, which can be interpreted as energy transmitted in waves through the soil mass. These energy waves generally dissipate with distance from the vibration source, due to spreading of the energy and frictional losses. The energy

transmitted through the ground as vibration, if great enough and in proximity to structures, can result in structural damage.

Typical outdoor sources of perceptible groundborne vibration are construction equipment and traffic on rough (i.e., unpaved or uneven) roads. Construction activity can also result in varying degrees of groundborne vibration, depending on the type of equipment, methods employed, distance between source and receptor, duration, number of perceived vibration events, and local geology.

Groundborne vibrations from typical construction activities do not often reach levels that can damage structures in proximity to construction, but their effects may manifest and be noticeable in buildings that are within 25 feet of construction activities. One major concern with regard to construction vibration is potential building damage, which is assessed in terms of peak particle velocity (ppv) and typically in units of inches per second (in/sec or ips). In addition to structural damage risk, the vibration of room surfaces affects people as human annoyance. Human and structural response to different vibration levels is influenced by a number of factors, including ground type, distance between source and receptor, duration, and the number of perceived vibration events. Typically, a vibration level of 0.1 in/sec ppv is the threshold of human annoyance, and 0.2 ppv is the threshold of risk of structural damage.

Construction operations generally include a wide range of activities that can generate various levels of groundborne vibration. In general, blasting, pile driving, and demolition of structures generate the highest vibrations. Heavy truck transport can also generate groundborne vibrations, which vary depending on vehicle type, weight, and pavement conditions. At 25 feet, some construction equipment generates vibration at levels exceeding the threshold of human annoyance (0.1 in/sec ppv), and at levels exceeding the threshold of risk of structural damage (0.2 in/sec ppv). However, at 50 feet, this same equipment is below the thresholds of human annoyance and structural damage (FTA 2006).

Appendix B – PHOTOGRAPHIC LOG

The following is a set of photographs taken during the Project-area baseline sound level survey in November 2015, identified by measurement location tag (e.g., ST-11), summary description and approximate view direction.

Riverside – Noise Survey

Riverside

PHOTOGRAPHIC LOG

11/17/2015



Date: 11/11/15-11/12/15

Photograph 1

Site: Wineville Ave & Cantu-Galena Rd

Measurement: LT-1

(View NE)



Date: 11/11/15-11/12/15

Photograph 2

Site: Wineville Ave & Cantu-Galena Rd

Measurement: LT-1

(View SE)

Riverside – Noise Survey

Riverside

PHOTOGRAPHIC LOG

11/17/2015



Date: 11/11/15-11/12/15

Photograph 3

Site: Hidden Valley Wildlife Area

Measurement: LT-2

(View N)



Date: 11/11/15-11/12/15

Photograph 4

Site: Hidden Valley

Measurement: LT-2

(View W)

Riverside – Noise Survey

Riverside

PHOTOGRAPHIC LOG

11/17/2015



Date: 11/12/15

Photograph 5

Site: Wineville Ave & Cantu-Galena Rd

Measurement: ST-1

(View S)



Date: 11/12/15

Photograph 6

Site: Wineville Ave & Cantu-Galena Rd

Measurement: ST-1

(View E)

Riverside – Noise Survey

Riverside

PHOTOGRAPHIC LOG

11/17/2015



Date: 11/12/15

Photograph 7

Site: Wineville Ave and Landon Dr.

Measurement: ST-2

(View E)



Date: 11/12/15

Photograph 8

Site: Wineville Ave and Landon Dr.

Measurement: ST-2

(View S)

Riverside – Noise Survey

Riverside

PHOTOGRAPHIC LOG

11/17/2015



Date: 11/12/15

Photograph 9

Site: Landon Drive.across from the UPS entrance

Measurement: ST-3

(View S)



Date: 11/12/15

Photograph 10

Site: Landon Drive.across from the UPS entrance

Measurement: ST-3

(View W)

Riverside – Noise Survey

Riverside

PHOTOGRAPHIC LOG

11/17/2015



Date: 11/12/15

Photograph 11

Site: Wineville Ave and Park Center Drive

Measurement: ST-4

(View W)



Date: 11/12/15

Photograph 12

Site: Wineville Ave and Park Center Drive

Measurement: ST-4

(View ENE)

Riverside – Noise Survey

Riverside

PHOTOGRAPHIC LOG

11/17/2015



Date: 11/12/15
Photograph 13

Site: Park and Ride off of Limonite

Measurement: ST-5

(View E)



Date: 11/12/15
Photograph 14

Site: Park and Ride off of Limonite

Measurement: ST-5

(View S)

Riverside – Noise Survey

Riverside

PHOTOGRAPHIC LOG

11/17/2015



Date: 11/12/15

Photograph 15

Site: 68th St. and
Carnelian St.

Measurement: ST-6

(View S)



Date: 11/12/15
Photograph 16

Site: 68th St. and
Carnelian St.

Measurement: ST-6

(View W)

Riverside – Noise Survey

Riverside

PHOTOGRAPHIC LOG

11/17/2015



Date: 11/12/15
Photograph 17

Site: Golf Course on 68th
St. @ Dana Ave

Measurement: ST-7

(View S)



Date: 11/12/15
Photograph 18

Site: Golf Course on 68th
St. @ Dana Ave

Measurement: ST-7

(View E)

Riverside – Noise Survey

Riverside

PHOTOGRAPHIC LOG

11/17/2015



Date: 11/12/15

Photograph 19

Site: Grulia Ct

Measurement: ST-8

(View W)



Date: 11/12/15

Photograph 20

Site: Grulia Ct

Measurement: ST-8

(View S)

Riverside – Noise Survey

Riverside

PHOTOGRAPHIC LOG

11/17/2015



Date: 11/12/15

Photograph 21

Site: Hidden Valley Wildlife Area

(Collocated with LT-2)

Measurement: ST-9

(View E)



Date: 11/12/15

Photograph 22

Site: Hidden Valley Wildlife Area

(Collocated with LT-2)

Measurement: ST-9

(View N)

Riverside – Noise Survey

PHOTOGRAPHIC LOG

Riverside

11/17/2015



Date: 11/11/15

Photograph 23

Site: Crest Ave and Julian St

Measurement: ST-10

(View S)



Date: 11/11/15

Photograph 24

Site: Crest Ave and Julian St

Measurement: ST-10

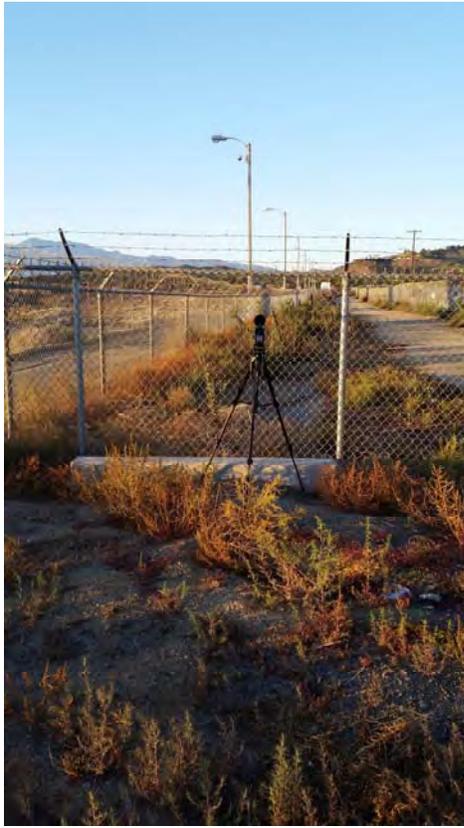
(View E)

Riverside – Noise Survey

Riverside

PHOTOGRAPHIC LOG

11/17/2015



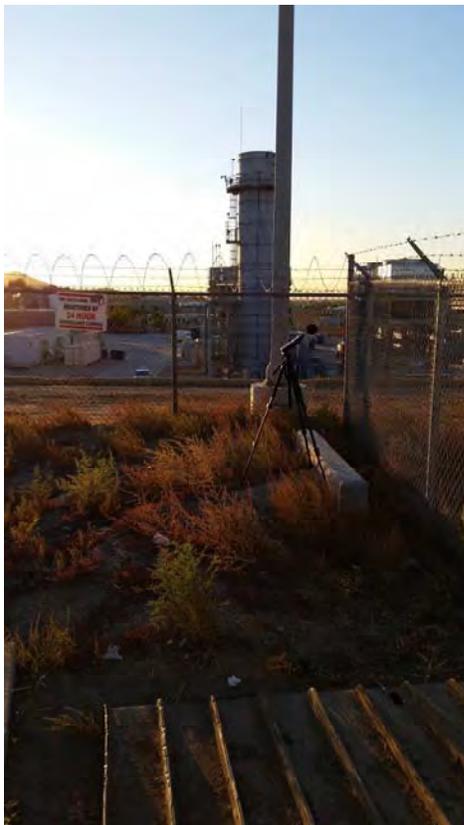
Date: 11/11/15

Photograph 25

Site: The end of Payton St.

Measurement: ST-11

(View N)



Date: 11/11/15

Photograph 26

Site: The end of Payton St.

Measurement: ST-11

(View W)

Appendix C – FIELD NOISE MEASUREMENT DATA FORMS

The following are handwritten notes documenting field observations, conditions of the outdoor surroundings, and measurement information associated with performance of the baseline sound level surveys performed in November 2015.

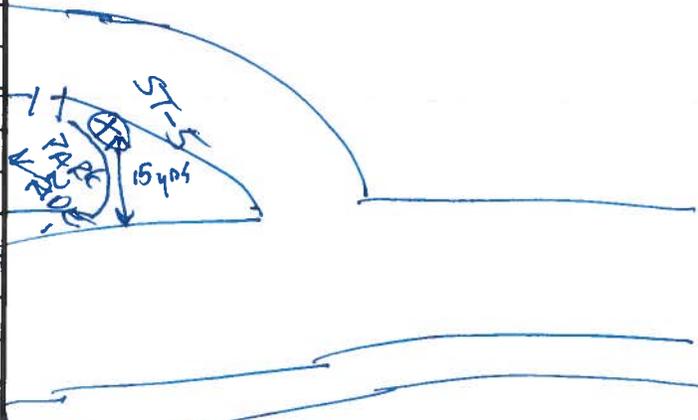
AECOM Acoustics and Noise Control Practice
FIELD NOISE MEASUREMENT DATA FORM

Day

Project Name: RTRP Project #: _____ Date: 11/12/15 Page 1 of 1
 Monitoring Location: ST-5 (Day) Park + Ride Analyst: J. Scottson, J. Redmond

<u>Sound Level Meter</u>	<u>Field Calibration</u>	<u>Weather Data</u>
Model #: <u>LD LXI</u>	Model #: <u>LD 200</u>	Model #: <u>Kestral 3500</u>
Serial #: <u>4885</u>	Serial #: <u>12226</u>	Serial #: <u>2068303</u>
Weighting: <u>A / C / Flat</u>	Calibration Level (dBA): <u>94 / 114</u>	Wind: <u>Steady / Gusty / Calm</u>
Response: <u>Slow / Fast / Impl</u>	Pre-Test: <u>113.9</u> dBA	Precipitation: Yes (explain) / <u>No</u>
Windscreen: <u>Yes / No (explain)</u>	Post-Test: <u>113.9</u> dBA	Avg Wind Speed/Direction: <u>2-3 mph L W</u>
Topo: <u>Flat / Hilly</u>	<u>GPS Coordinates (at SLM location)#</u>	Temp (°F): <u>76</u> RH (%): <u>14.4</u>
Terrain: <u>Hard / Soft / Mixed / Snow</u>		Bar Psr (Hg): <u>29.9</u> / Cloud Cover (%): <u>0</u>

ID	Start Time	Stop Time	L _{eq}	L _{min}	L _{max}	L ₁₀	L ₅₀	L ₉₀	Notes/Events
<u>ST</u>	<u>11:20</u>	<u>11:55</u>							<u>continuous traffic on L/monite</u>

<u>Roadway Name/Dir</u>		<u>compass</u>	<u>Site Diagram:</u>
<u>Speed (post/obs)*</u>			
<u>Number of Lanes</u>			
<u>Width (pave/row)</u>			
<u>1- or 2- way</u>			
<u>Grade</u>			
<u>Bus Stops</u>			
<u>Stoplights</u>			
<u>Motorcycles</u>			
<u>Automobiles</u>			
<u>Medium Trucks</u>			
<u>Heavy Trucks</u>			
<u>Buses</u>			
<u>Count duration</u>			

- note coordinate system * - Speed estimated by Radar / Driving / Observation

Photos Taken? Yes/No

Additional Notes/Comments: SI-15

Other Noise Sources: distant: aircraft/roadway traffic/trains/landscaping/rustling leaves/children playing/dogs barking/birds vocalizing/insects

Additional Notes and Sketches on Reverse

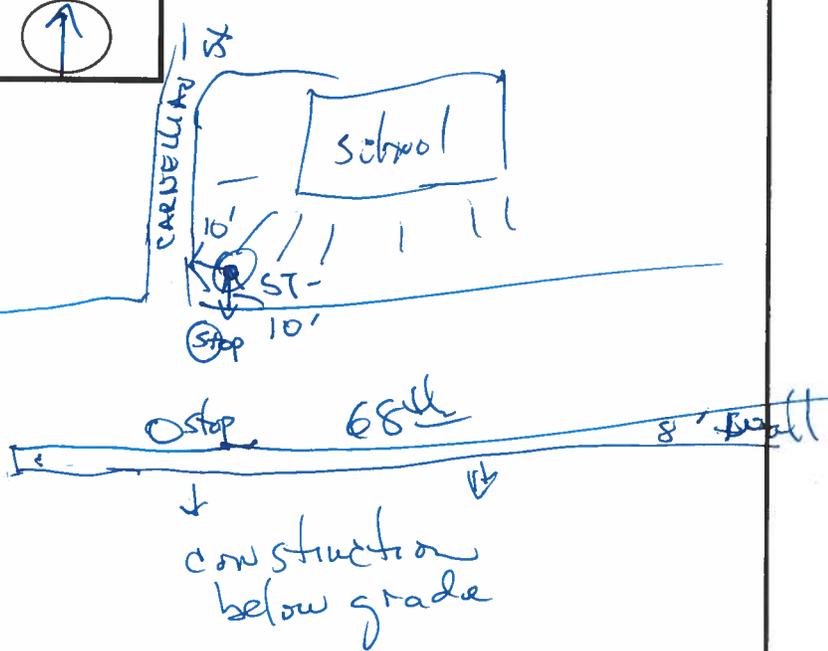
URS Acoustics and Noise Control Practice

FIELD NOISE MEASUREMENT DATA FORM

Project Name: RTRP Project #: _____ Date: 11/12/15 Page 1 of 1
 Monitoring Location: ST-6 @ CARROLL LN ST (school) Analyst: J. EOODMAN / J. ROEMANN

<u>Sound Level Meter</u> Model #: <u>LD LXT</u> Serial #: <u>4685</u> Weighting: <u>A</u> / C / Flat Response: <u>Slow</u> / Fast / Impl Windscreen: <u>Yes</u> / No (explain)	<u>Field Calibration</u> Model #: <u>LD 200</u> Serial #: <u>12224</u> Calibration Level (dBA): <u>94</u> / 114 Pre-Test: <u>113.9</u> dBA Post-Test: <u>114.1</u> dBA	<u>Weather Data</u> Model #: <u>Kestral 3500</u> Serial #: <u>2068303</u> Wind: <u>Steady</u> / Gust / Calm Precipitation: Yes (explain) <u>No</u> Avg Wind Speed/Direction: <u>1 mph N</u> Temp (°F): <u>77</u> RH (%): <u>23</u> Bar Psr (Hg): <u>992.6</u> Cloud Cover (%): <u>0</u>
Topo: <u>Flat</u> / Hilly Terrain: <u>Hard</u> / Soft / Mixed / Snow		GPS Coordinates (at SLM location) [#] <u>33.93727 - 117.57261</u>

ID	Start Time	Stop Time	L _{eq}	L _{min}	L _{max}	L ₁₀	L ₅₀	L ₉₀	Notes/Events
<u>ST-6</u>	<u>15:10</u>	<u>15:25</u>							<u>continuous traffic, come to stop @ 68th / CARROLL LN ST, accident</u>

Roadway Name/Dir Speed (post/obs)* Number of Lanes Width (pave/row) 1- or 2- way Grade Bus Stops Stoplights Motorcycles Automobiles Medium Trucks Heavy Trucks Buses Count duration	<u>compass</u> 	<u>Site Diagram:</u> 
----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	-------------------------------------------------------------------------------------------------------	--------------------------------------------------------------------------------------------------------------

- note coordinate system * - Speed estimated by Radar / Driving / Observation
 Photos Taken? Yes / No
 Additional Notes/Comments:
 Other Noise Sources: distant: aircraft/roadway traffic/trains/landscaping/rustling leaves/children playing/dogs barking/birds vocalizing/Insects
Construction
 Additional Notes and Sketches on Reverse

**AECOM Acoustics and Noise Control Practice
FIELD NOISE MEASUREMENT DATA FORM**

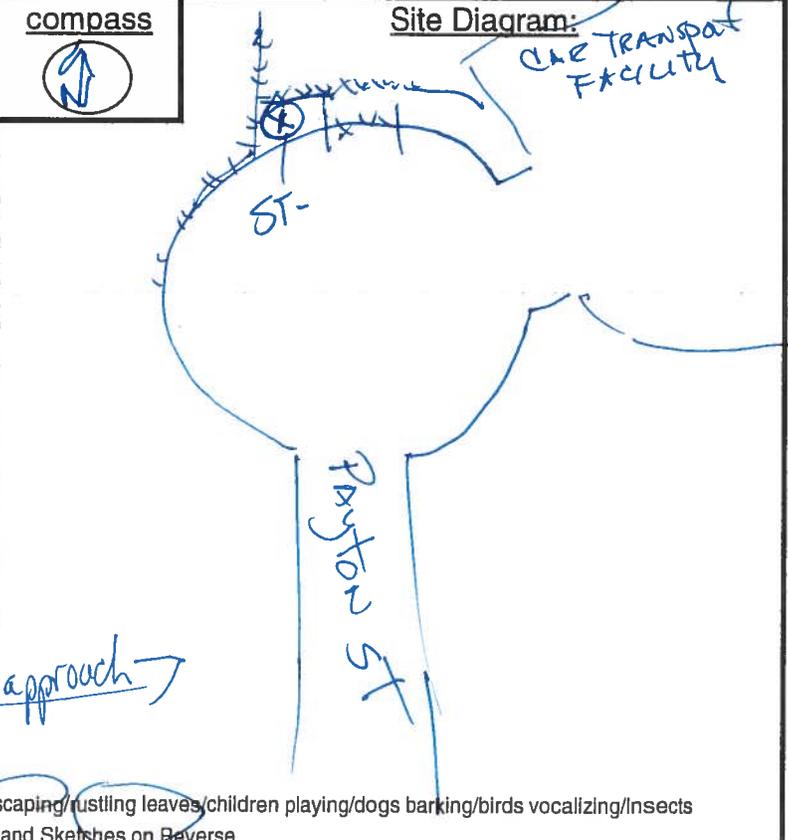
DAY

Project Name: RTRP Project #: _____ Date: 11/11/15 Page 1 of _____
 Monitoring Location: ST- III (DAY) Industrial Peyton St Analyst: J. Goodson / J. Redmond

Sound Level Meter		Field Calibration		Weather Data	
Model #: <u>LD 4xT</u>	Model #: <u>LD 200</u>	Model #: <u>Kestral 3500</u>	Model #: _____	Model #: _____	Model #: _____
Serial #: <u>4885</u>	Serial #: <u>12226</u>	Serial #: <u>2058303</u>	Serial #: _____	Serial #: _____	Serial #: _____
Weighting: <u>A</u> / C / Flat	Calibration Level (dBA): <u>94</u> / <u>114</u>	Wind: <u>Steady</u> / Gusty / Calm	Wind: _____	Precipitation: Yes (explain) <u>No</u>	Precipitation: _____
Response: <u>Slow</u> / Fast / Impl	Pre-Test <u>114.01</u> dBA	Avg Wind Speed/Direction: <u>5-10 mph</u> / <u>NE</u>	Avg Wind Speed/Direction: _____	Temp (°F): <u>71</u>	RH (%): <u>14.5</u>
Windscreen: Yes / No (explain)	Post-Test <u>114.16</u> dBA	Bar Psr (Hg): <u>993.0</u>	Bar Psr (Hg): _____	Cloud Cover (%): <u>0</u>	Cloud Cover (%): _____
Topo: <u>Flat</u> / Hilly	GPS Coordinates (at SLM location) [#]	_____			
Terrain: <u>Hard</u> / Soft / Mixed / Snow	<u>33.96258 -117.45180</u>	_____			

ID	Start Time	Stop Time	L _{eq}	L _{min}	L _{max}	L ₁₀	L ₅₀	L ₉₀	Notes/Events
<u>ST-</u>	<u>16:25</u>	<u>16:40</u>							<u>16:25 - car 16:26 car horn</u>
									<u>16:27 - plane flyover (small) low</u>
									<u>16:28 - plane flyover (small) low</u>
									<u>16:31 - plane flyover (small) low</u>
									<u>16:32 - plane flyover (small) low</u>
									<u>16:38 - truck (car transport)</u>
									<u>16:37 - backup backing truck</u>
									<u>16:38 to the south construction</u>
									<u>16:39 plane flyover (small-low)</u>

Roadway Name/Dir	
Speed (post/obs)*	
Number of Lanes	
Width (pave/row)	
1- or 2- way	
Grade	
Bus Stops	
Stoplights	
Motorcycles	
Automobiles	
Medium Trucks	
Heavy Trucks	
Buses	
Count duration	



- note coordinate system * - Speed estimated by Radar / Driving / Observation
 Photos Taken? Yes / No
 Additional Notes/Comments: aircraft approach

Other Noise Sources: distant: aircraft/roadway traffic/trains/landscaping/rustling leaves/children playing/dogs barking/birds vocalizing/insects
 Additional Notes and Sketches on Reverse

Appendix D – CORONA AUDIBLE NOISE (AN) CALCULATION SPREADSHEET

The below image is a screenshot of an Excel worksheet used to estimate corona audible noise (AN) utilizing proposed 230 kV transmission line design information as disclosed in the EIR Project description (see yellow-highlighted cell entries). Key user inputs also include the horizontal ground distance (see green-highlighted cell) between the conductor(s) and the receiver location for which the L₅₀ value is being calculated.

Corona Audible Noise (AN)					
sources:					
US Dept. of Interior, Bonneville Power Administration, Technical Report No. ERJ-77-168					
Laughton, M.A. and Warne, D.F., ed., 2003, Electrical Engineer's Reference Book, section 30.4.3					
<i>rainy weather, AC line voltage</i>					
term description	term name/symbol	value	units		notes
maximum conductor surface voltage gradient	E	18.2	kVrms/cm		
= 0.589(D)*N ^(0.482) for N >= 4; = D if N < 4	deq	8.98			
diameter of subconductor in the bundle		8.98	mm	1590	Kcmil input from EIR project description
number of conductors in bundle	N	2			input from EIR project description
radial distance from bundle center to calculation point	D	29.3	m	15.2	m input is horizontal ground distance
audible noise per phase	AN _{phase}	16.4	L50, dBA	50	ft
number of phases		3			input from EIR project description
total audible noise	AN _{total}	21.1	L50, dBA		
		24.6	L5, dBA		
<i>fair weather</i>					
		-3.9	L50, dBA		
		-0.4	L5, dBA		
<i>below factors used to help calculate "E" and other terms above...</i>					
rated voltage	V	242	kV		input from EIR project description
factor for multiple conductors	β	0.509816			=(1+(n-1)*r/R)/n
radius of conductor	r	0.45	cm		
outside radius of bundle	R	22.86001	cm		=S/(2*sin(3.14/n))
distance between conductor centers	S	45.72	cm	18	inches input from EIR project description
phase spacing	a	1000	cm		estimate
height of conductor above ground	h	2500	cm		estimate
number of component conductors in bundle	N	2			

Appendix E – CORONA AUDIBLE NOISE (AN) SURVEY

The following memorandum (RCH Group, 2017) details the field noise measurement survey performed by RCH Group personnel on June 7, 2017.

TECHNICAL MEMORANDUM

TO: Rita Wilke
Panorama Environmental Inc.

FROM: Paul Miller and Dan Jones
RCH Group

DATE: July 11, 2017

SUBJECT: Corona Noise Measurements -- Riverside Transmission Reliability Project

Corona Noise Measurements

RCH Group (RCH) conducted noise measurements underneath an existing SCE 230 kV transmission line in Chino Hills, CA. The noise measurement location is shown in **Figure 1** (the white vertical line depicts the transmission line). The noise measurement was conducted on a hilltop accessed via a dirt road off of Park Crest Drive.

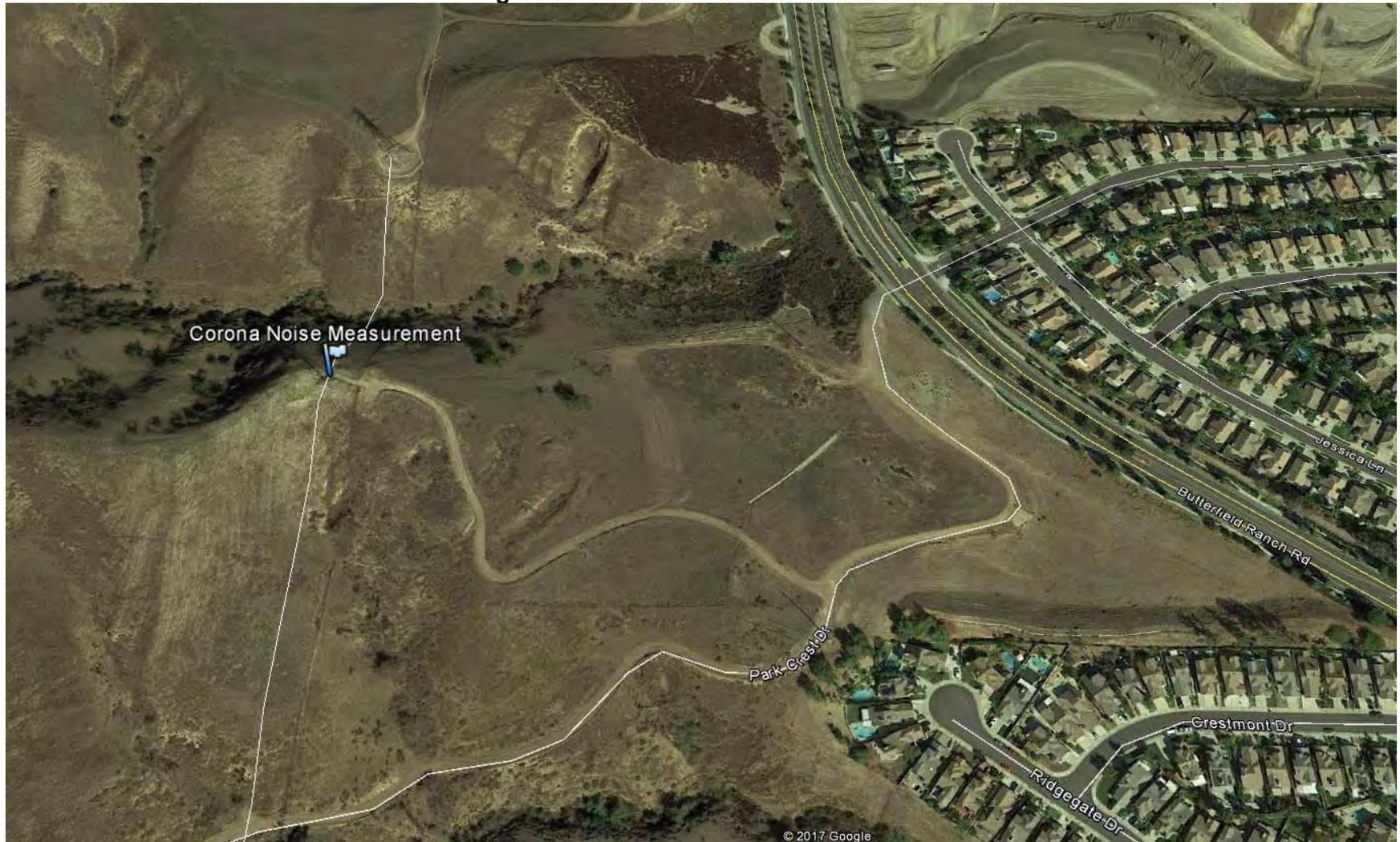
Noise measurements were conducted using a Larson Davis LxT1 (serial #4715) noise meter, calibrated before and after the measurement. Noise measurements were conducted from approximately 6:27 p.m. to 6:37 p.m. on Thursday July 7, 2017. The temperature was 88°F and the humidity was 38%. Wind speeds were intermittent, reaching approximately ten miles per hour at times.

Corona noise was not audible while RCH was present. During a calm period with no winds the Lmin reached 37.8 dB. Even with no wind affecting background noise levels RCH was unable to hear any corona noise. RCH estimates they were approximately 50 feet directly below the transmission line and approximately 10 feet away from the transmission tower. The noise measurement field data sheet is attached.

Conclusion

Corona noise was not audible underneath the 230kV transmission line (approximately 50 feet above the noise meter). It is unlikely residences would hear corona noise from the proposed 230 kV line at a distance of 50 feet.

Figure 1: Noise Measurement Location



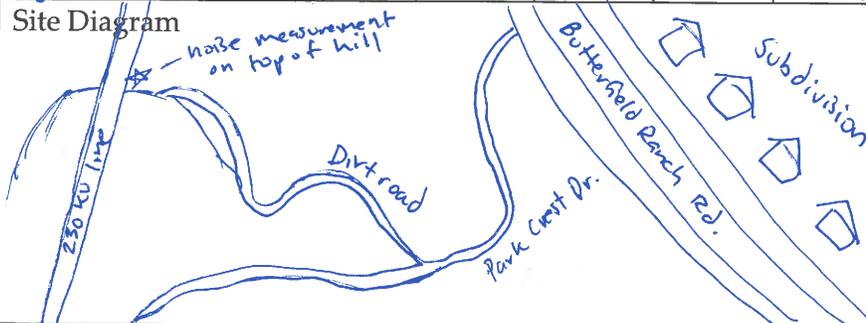
Observers: Paul Miller
Dan Jones

Field Noise Measurement Data Form

Project Name: CPUC Riverside RTRP		Date: 7/6/17	Record: 1 of 1
Location		Weather Data	
Monitoring ID:	Location Description: (cross streets/address) Dirt road off Park Crest Drive	Wind: Steady / <u>Gusty</u> / <u>Calm</u> intermittent gusts (~10mph)	Precipitation: <u>No</u> / Yes Type:
Topography and Terrain: on top of hill / vegetation	GPS Coordinates:	Average Wind Speed:	Temperature: 88°F
			Humidity: 38%
		Other Weather Notes: partly cloudy	
Sound Level Meter		Field Calibration	
Model #: Larson Davis LXT 1	Serial #: 4715	Model #: Larson Davis CAL200	Serial #: 11081
Weighting: <u>A</u> / C / Flat	Response: <u>Slow</u> / Fast / Impl	Calibration Level (dBA): 114	Pre-Test: 114 dBA
Windscreen: <u>Yes</u> / No (explain)		Post-Test: 114 dBA	

ID	Start Time	Stop Time	Leq (2-min.)	Lmin	Lmax	L0290	L50	Notes/Events
1	19:27:03	19:28:03	40.2	38.4	42.6	39.3	40.2	distant traffic noise
2	19:28:03	19:29:03	39.8	38.4	41.6	38.8	39.6	wind event >41dB
3	19:29:03	19:30:03	39.8	38.3	41.6	38.9	39.7	wind event >43dB
4	19:30:03	19:31:03	41.1	39.9	43.4	40.1	40.7	distant traffic/helicopter
5	19:31:03	19:32:03	41.7	38.6	44.6	39.2	41.5	loud truck on Butterfield ~45dB
6	19:32:03	19:33:03	40.6	38.8	43.0	39.2	40.2	distant traffic noise
7	19:33:03	19:34:03	39.5	37.8	40.8	38.6	39.5	distant traffic noise
8	19:34:03	19:35:03	40.8	39.2	42.5	39.9	40.7	loud motorcycle on Butterfield ~43dB
9	19:35:03	19:36:03	40.9	40.0	42.0	40.3	40.8	wind event >41dB
10	19:36:03	19:37:03	40.5	39.9	42.8	39.3	40.4	distant traffic noise

Site Diagram



Noise Sources:

Distant traffic
Wind/moving vegetation
Bnrs and insects

Additional Notes:

- Directly under 230kV line ~ 10 feet from tower
- No corona noise was heard, was not audible
- Intermittent winds were the most prominent noise source