



**REPORT**

FAULT HAZARD INVESTIGATION  
STRUCTURE EP257  
SDG&E SUNRISE POWERLINK PROJECT  
IMPERIAL COUNTY, CALIFORNIA

PREPARED FOR:

**BURNS & McDONNELL**

URS PROJECT No. 27661032.04001

**AUGUST 29, 2011**

**R E P O R T**

**FAULT HAZARD INVESTIGATION  
STRUCTURE EP257  
SDG&E SUNRISE POWERLINK PROJECT  
SAN DIEGO COUNTY, CALIFORNIA**

Prepared for

Mr. Kenneth Gerling  
Burns & McDonnell  
1010 Tavern Road, Bldg. 1  
Alpine, California 91901

URS Project No. 27661032

August 29, 2011

**URS**

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August 29, 2011

Mr. Kenneth Gerling  
Project Manager  
Burns & McDonnell  
1010 Tavern Road, Bldg. 1  
Alpine, CA 91901

Subject: Fault Hazard Investigation – Structures EP257  
SDG&E Sunrise Powerlink Project  
Imperial County, California  
URS Project No. 27661032

Dear Mr. Gerling:

URS Corporation Americas (URS) is pleased to present this report for the above-referenced project. This report provides the findings from our fault hazard investigation including conclusions and recommendations pertaining to potential fault rupture hazards at the site.

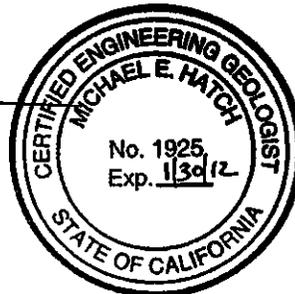
URS prepared this report exclusively for Burns & McDonnell and San Diego Gas & Electric (SDG&E) and their consultants for use in project design and construction. Mr. Michael Hatch, C.E.G. was the principal investigator for the project.

If you have any questions regarding this report, or if we can be of further service, please contact us.

Sincerely,

URS CORPORATION

Michael E. Hatch, C.E.G. 1925  
Principal Engineering Geologist  
MEH:mv



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**SECTION 1 INTRODUCTION**

URS Corporation Americas (URS) is pleased to provide this revised report presenting the results of our fault hazard investigation for Structure EP257 of the Sunrise Powerlink Project in San Diego County, California. The site vicinity is shown on Figure 1. URS has prepared this report for Burns & McDonnell and SDG&E and their consultants for use in design and construction.

The study site is the proposed location for a steel lattice tower that is part of the Sunrise Powerlink 500kV electrical transmission line project. The towers will be supported on deep drilled shaft foundations.

**SECTION 2 BACKGROUND INFORMATION**

Structure EP257 in Link 1 of the Sunrise Powerlink Project was characterized in the Geologic Hazards and Geotechnical Investigation Report (URS, 2010) as being located near the projection of a suspected potentially active fault near In Koh Pah Gorge in the eastern portion of San Diego County. Figure 1 presents a strip geologic map based on regional geologic mapping.

The Jacume fault is an informally named fault located in the area based on regional mapping efforts and specific investigations performed for SDG&E. This fault is not currently considered an active or potentially active fault in the State or Federal fault hazard data base (California Geological Survey or United States Geological Survey Quaternary fault and fold data base). However, following a sequence of numerous small earthquakes (less than magnitude 4) in the 1998 to 2002 time frame, SDG&E commissioned a preliminary study to evaluate the potential hazard of this microseismicity. URS reviewed the microseismic data and performed a terrain analysis and reconnaissance level field work in 2002. That report concluded that the fault did not represent a significant fault hazard to the existing 500 kV line but that additional studies should be considered in the future if new information came to light.

Given the proposed location of Sunrise Powerlink structure EP257 across a minor break in slope associated with a bedrock spur, it was considered prudent to trench the location and to firmly establish the presence or absence of a fault in this location.

**SECTION 3 PURPOSE AND SCOPE OF INVESTIGATION**

The purpose of the trench was to evaluate the possible presence or absence of fault rupture hazard within the foundation of proposed structure EP257. A trench was excavated across and beyond the footprint of the proposed tower. The trench was excavated with a rubber tire backhoe to a depth of approximately 5 to 12 feet. The trench was stabilized with hydraulic shoring and the sidewalls of the trench were scraped to provide clean exposures for geologic logging. The trench was logged by an engineering geologist and backfilled after completion of the logging.

**SECTION 4 GEOLOGIC SETTING**

The site is located in the eastern portion of San Diego County, east of Jacumba Valley, near an area known as In Koh Pah Gorge. The site lies along the toe of the northwesterly facing slopes of Carries Mountain, part of the Peninsular Ranges. Carries Mountain is composed of Cretaceous age granitic rock and has very steep northwesterly and westerly facing slopes. EP257 is located near the toe of the slope and situated on and adjacent to an eroded bedrock spur.

The most significant findings that elevated this relatively, short weakly expressed fault into consideration as a potentially active or active fault are the relatively high levels of microseismicity and associated seismic lineation that may coincide with the expressed surface fault. The microseismicity suggests this fault may be a left lateral cross fault. Figure 2 presents a regional fault and epicenter map.

**SECTION 5 EVALUATION OF TRENCH GEOLOGIC CONDITIONS**

The trench was excavated across the proposed pad area for Structure EP257 as shown on Figure 3. The exposure revealed alluvial and colluvial deposits overlying granitic bedrock. The Quaternary age alluvial deposits thicken to the north as presented on the trench log of the exposure (Figure 4).

The surficial alluvial deposits include a very coarse-grained channel fill that included boulder sized clasts. The granitic rock exposed is completely weathered and includes a clayey residual soil. This paleosol is overlain by topsoil (A horizon material) at the southern end of the trench and deepens and is buried by an increasing thickness of alluvium to the north.

The alluvium deepens to the north and includes a series of subunits that vary from silty fine to coarse sand, to sandy gravel, and includes the sandy cobble and boulder channel deposit. Weathered granitic rock underlies the alluvial deposits. A well-developed argillic (clay-rich, Bt) soil horizon has formed on the bedrock as exposed in the southern portions of the trench. In the central and northern portions of the trench the argillic horizon has been eroded away by the incising, high-energy channel deposits. Evidence for the ancient weathering profile is still evident in the central and northern portion of the trench. A continuous exposure of unfaulted Cretaceous age bedrock was observed and is presented on the trench log. No faults or shears were exposed in the trench or inferred from the trench stratigraphy.

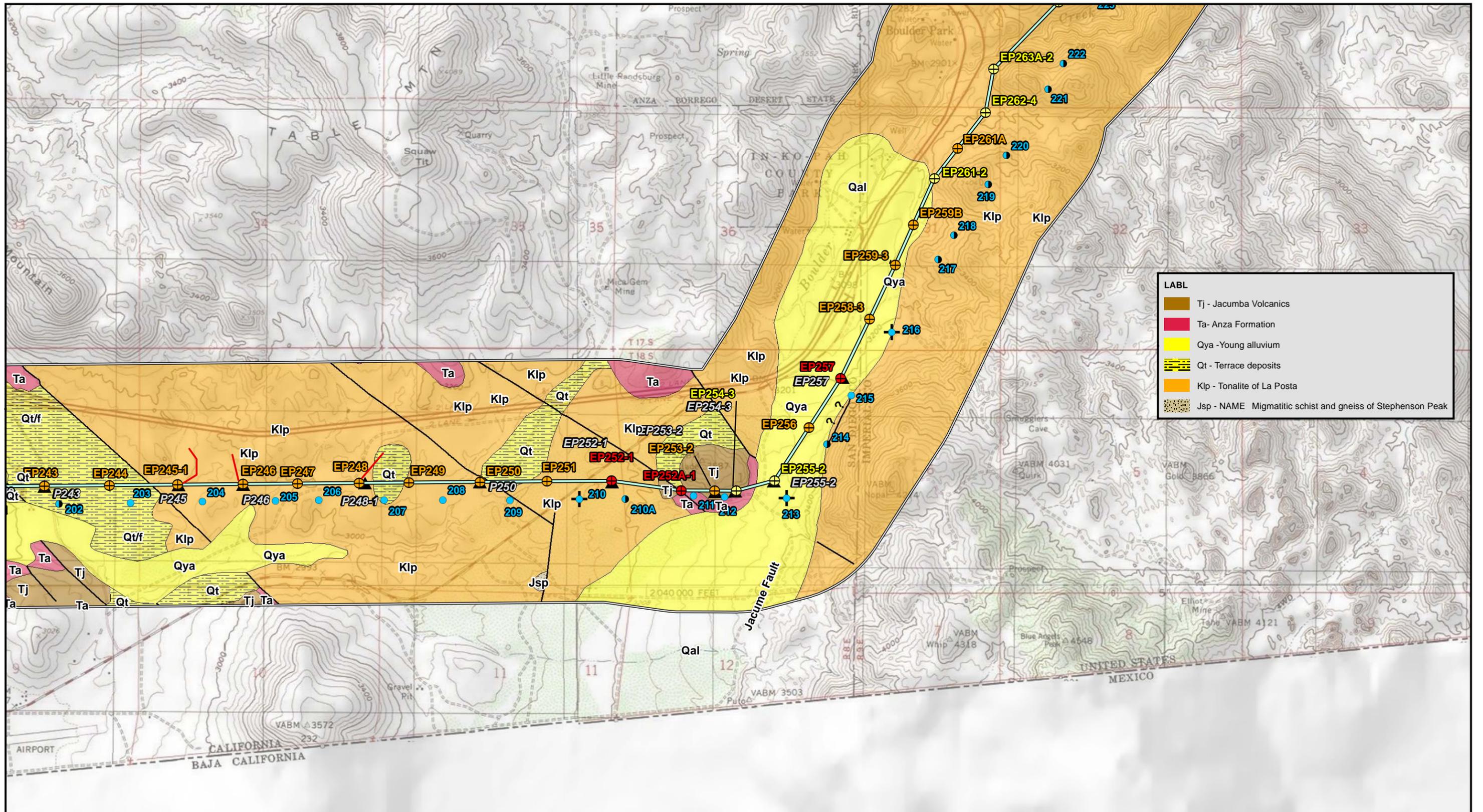
**SECTION 6 CONCLUSIONS**

Fault trenching was performed at EP257 because of the possible presence of a fault identified by microseismicity that has some moderate geomorphic expression to the south of the project area. The geomorphic expression of faulting weakens to the north and the possible eroded scarp noted in the EP257 area is an eroded channel margin and not a tectonic feature indicative of fault rupture in the geologic past. Based on the absence of fault features in the bedrock exposures in the trench, it is apparent that the eroded spur previously identified as a possible scarp is the result of the high energy alluvial paleochannel that was exposed in the trench. Figure 5 presents the location of the possible eroded scarp south of the project area and the location of the lineament previously considered a possible projection of a fault scarp. This feature is interpreted as an eroded channel margin based on the findings of the exploratory trench at Structure EP257.

Following fault trenching and geomorphic evaluations in the area of EP257, it is our conclusion that there are no faults within the footprint of EP257. The fault rupture hazard at this structure is considered to be low and no fault hazard mitigations are warranted for the transmission line in this area.

## SECTION 7 REFERENCES

- Jennings, Charles W., 1994. Fault Activity Map of California and Adjacent Areas with Location and Ages of Recent Volcanic Eruptions. California Geologic Data Map Series, Map No. 6. California Division of Mines and Geology.
- URS, 2002, Jacumba Area Fault Hazard Investigation, Miguel – Imperial Valley 500 kV Transmission Line, San Diego, California. Prepared for San Diego Gas & Electric Company.
- URS, 2010, Geologic Hazards and Geotechnical Investigation Report, Sunrise Powerlink Project. Prepared for San Diego Gas & Electric Company.
- U.S. Geological Survey and California Geological Survey, 2006, Quaternary fault and fold database for the United States, accessed 2011, from USGS web site: <http://earthquakes.usgs.gov/regional/qfaults/>.
- USGS, 2000. Digital database of faults from the Fault Activity Map of California and Adjacent Areas.



**LABL**

- Tj - Jacumba Volcanics
- Ta - Anza Formation
- Qya - Young alluvium
- Qt - Terrace deposits
- Klp - Tonalite of La Posta
- Jsp - NAME Migmatitic schist and gneiss of Stephenson Peak

**Proposed Centerline**  
 Overhead Alignment

- Structure Type**
- Angle
  - Dead End
  - Strain
  - Tangent
  - Miscellaneous
  - Structure Designation

- On-Going URS Geotechnical Investigation (2009)**
- Seismic Refraction Test Location
  - Seismic Refraction Test Designation
  - Electrical Resistivity Test Location

- Previous Geotechnical Investigation**
- Existing SWPL TL Structure
  - Existing SWPL Tower with Seismic Line
  - Existing SWPL Tower with Boring

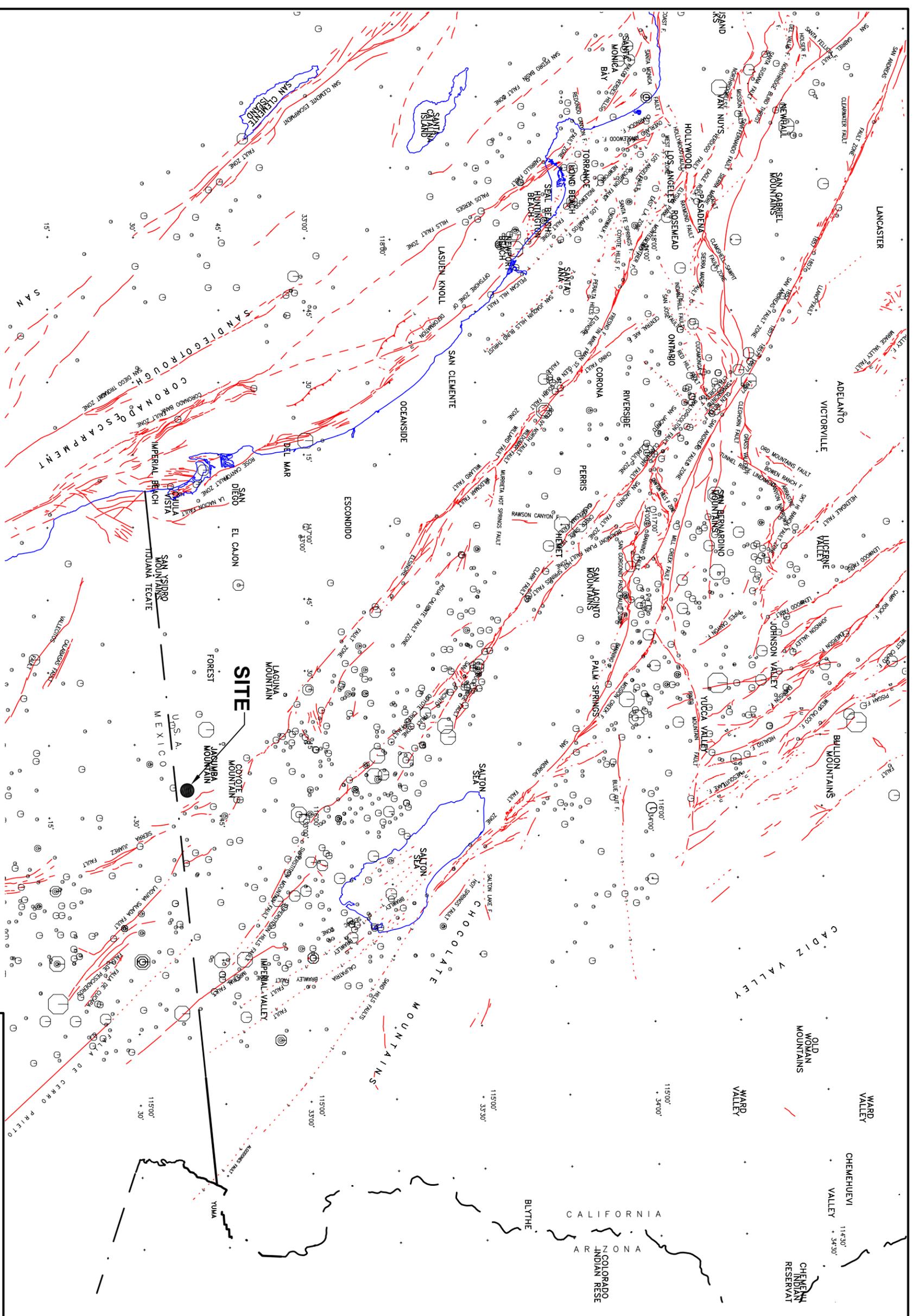
**SOURCES:**  
 Geologic Strata (CA Dept. of Conservation, 2005).  
 Proposed Alignment (SDG&E, 2009).  
 Alignment Buffer (URS, 2009).  
 7.5' Quadrangle Base (USGS, Various Dates)

**URS**

1000 0 1000 2000 Feet  
 SCALE: 1" = 2000' (1:24,000)  
 SCALE CORRECT WHEN PRINTED AT 11X17

**SITE AREA AND GENERALIZED GEOLOGIC MAP  
 EP257 - FAULT HAZARD INVESTIGATION  
 SUNRISE POWERLINK PROJECT**

CREATED BY: CL	DATE: 07-12-11	FIG. NO:
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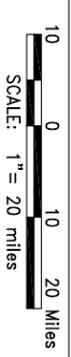
- REPORTED EARTHQUAKE MAGNITUDES.
- 4.0 TO 4.9
- 5.0 TO 5.9
- 6.0 TO 6.9
- 7.0 AND GREATER

SOUTH OF LATITUDE 35°N, EPICENTER AND MAGNITUDE DATA ARE FROM THE CALIFORNIA GEOLOGICAL SURVEY (2000) EARTHQUAKE CATALOG FOR THE PERIOD FROM 1769 TO 2000. ONLY EARTHQUAKES OF MAGNITUDE 4.0 AND LARGER ARE SHOWN. AFTERSHOCKS ARE NOT INCLUDED.

APPROXIMATE LOCATION OF HOLOCENE AND PLEISTOCENE FAULTS, DOTTED WHERE CONCEALED, QUERIED WHERE CONJECTURAL. FAULT LOCATIONS BASED ON: ZIOMY AND JONES, 1989; CDMG GEOLOGIC MAP SERIES OF CALIFORNIA, 1977-1986 (1:250,000 SCALE); CDMG GEOLOGIC MAP SERIES, CALIFORNIA CONTINENTAL MARGIN, 1987 (1:250,000 SCALE); HAUKSSON, 1990; SHAW AND SHEARER, 1999; WRIGHT, 1991; GRANT ET AL. 1999.

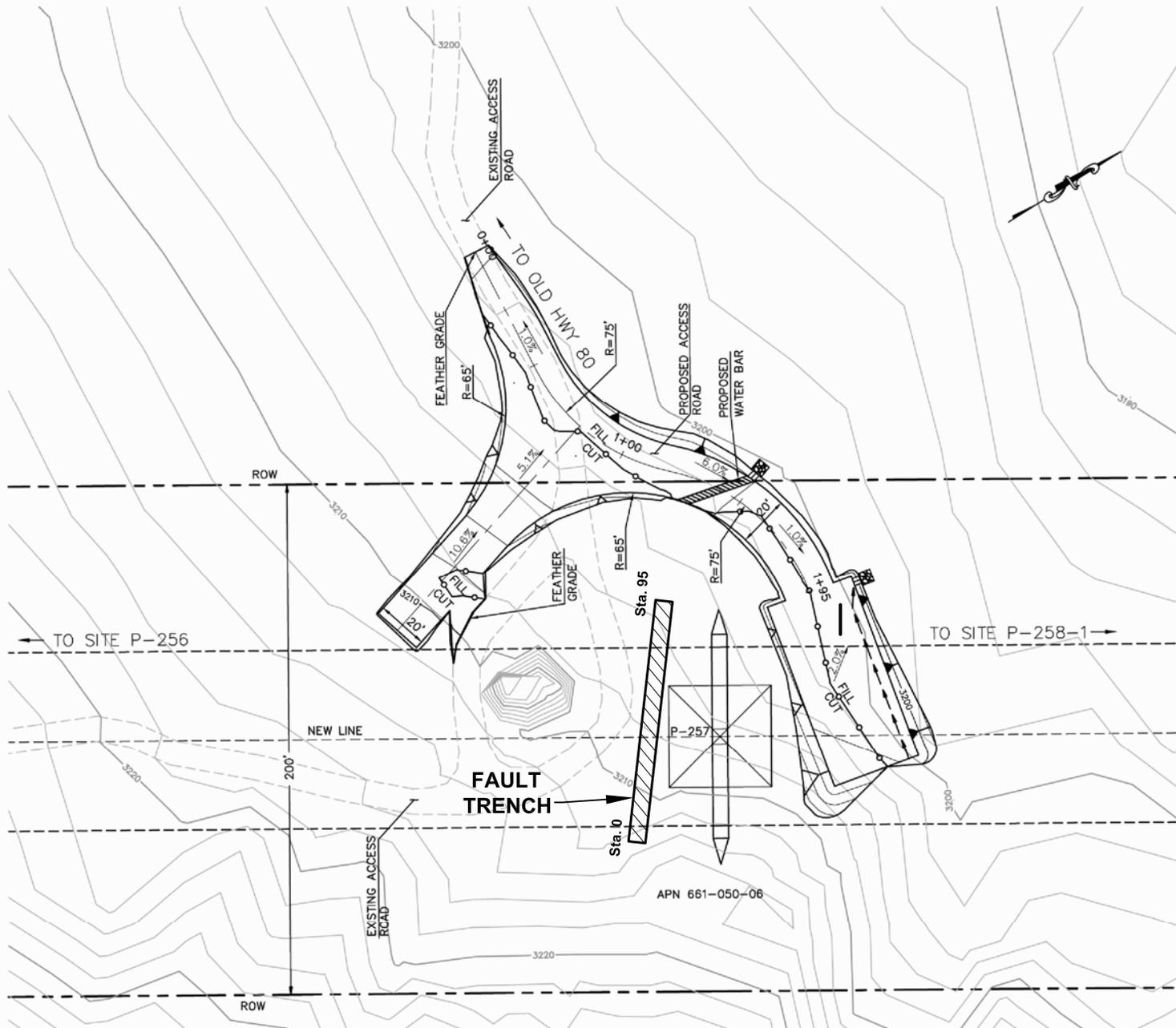


**REGIONAL FAULT AND EPICENTER MAP  
EP257 FAULT HAZARD INVESTIGATION  
SUNRISE POWER LINK PROJECT**

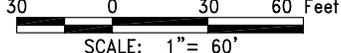


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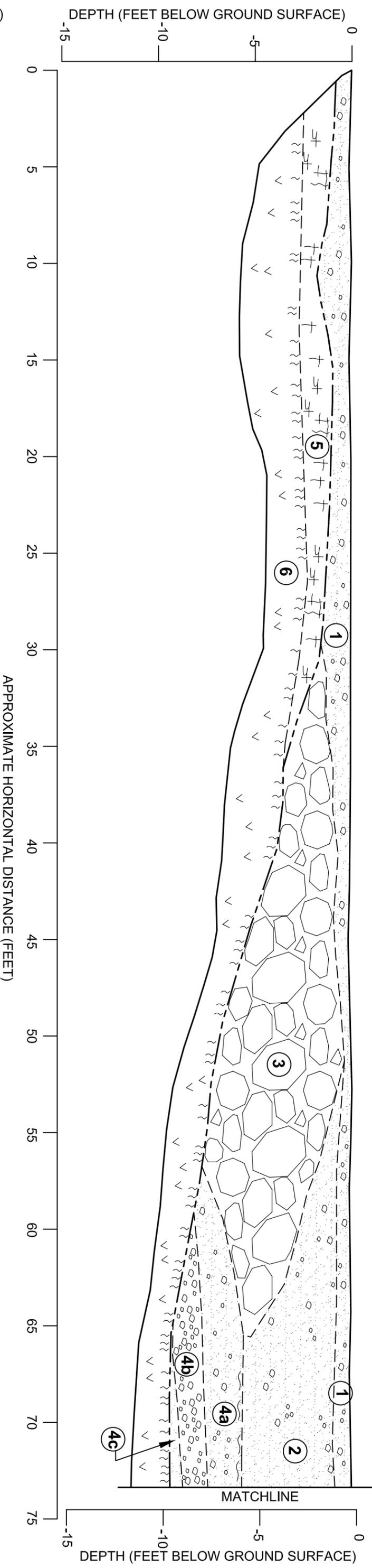
FIG. NO: 2



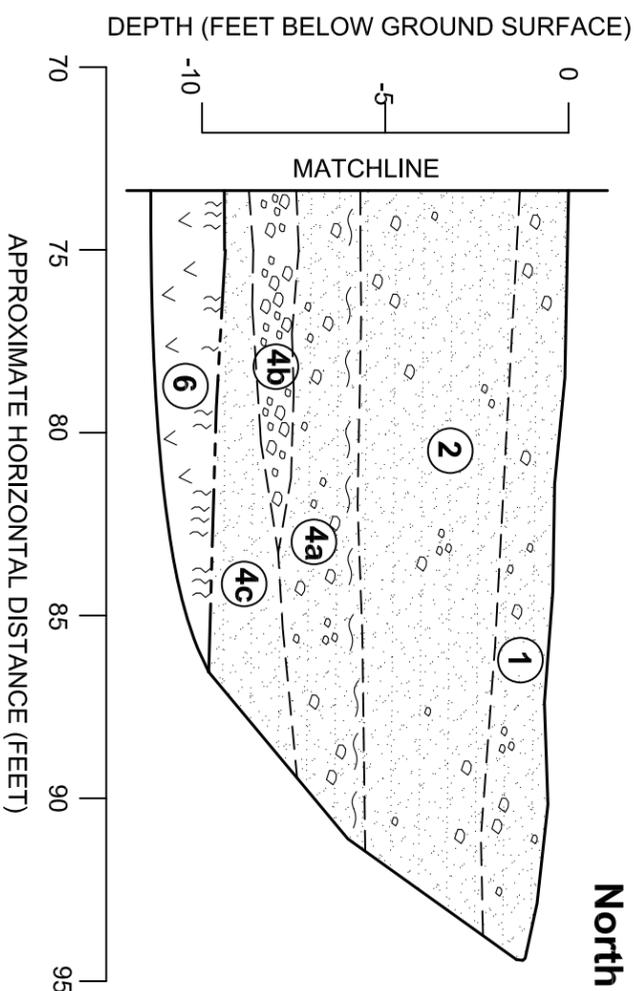
REFERENCE: "SPL C9, Site P-257", San Diego, Gas and Electric

		<b>SITE PLAN</b>		FIGURE NO: <b>3</b>
		<b>EP257 FAULT HAZARD INVESTIGATION SUNRISE POWER LINK PROJECT</b>		
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South



North



**LEGEND**

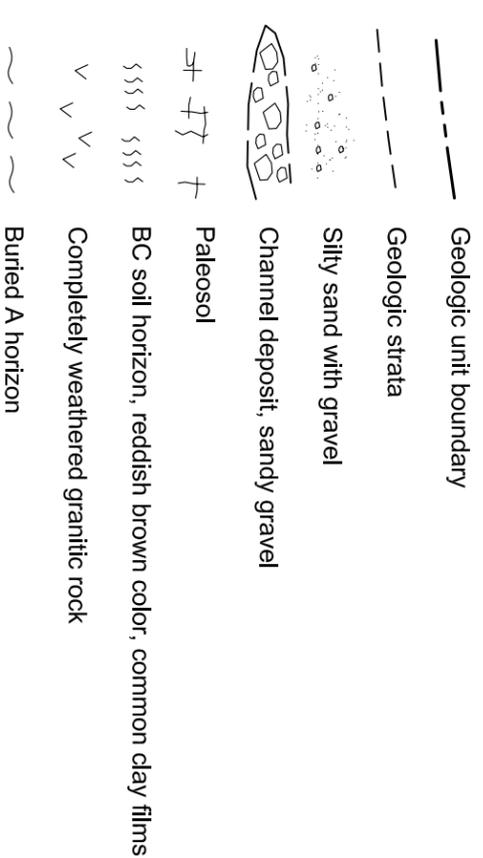
**QUATERNARY ALLUVIUM AND COLLUVIUM**

- ① **COLLUVIUM/TOPSOIL**  
Loose, dark brown, silty sand with clay and organics (A soil horizon).
- ② **QUATERNARY ALLUVIUM AND COLLUVIUM ALLUVIUM**  
Light grayish brown, silty sand with gravel.
- ③ **ALLUVIAL CHANNEL DEPOSITS**  
Light gray, sandy cobbles and boulders.
- ④ **ALLUVIUM**  
Light gray, silty sand with gravel (a), sandy gravel (b) and poorly graded sand with silt (c) with thin buried A horizon (topsoil) at top of unit.

**RELICT PALEOSOL AND COMPLETELY WEATHERED GRANITIC ROCK**

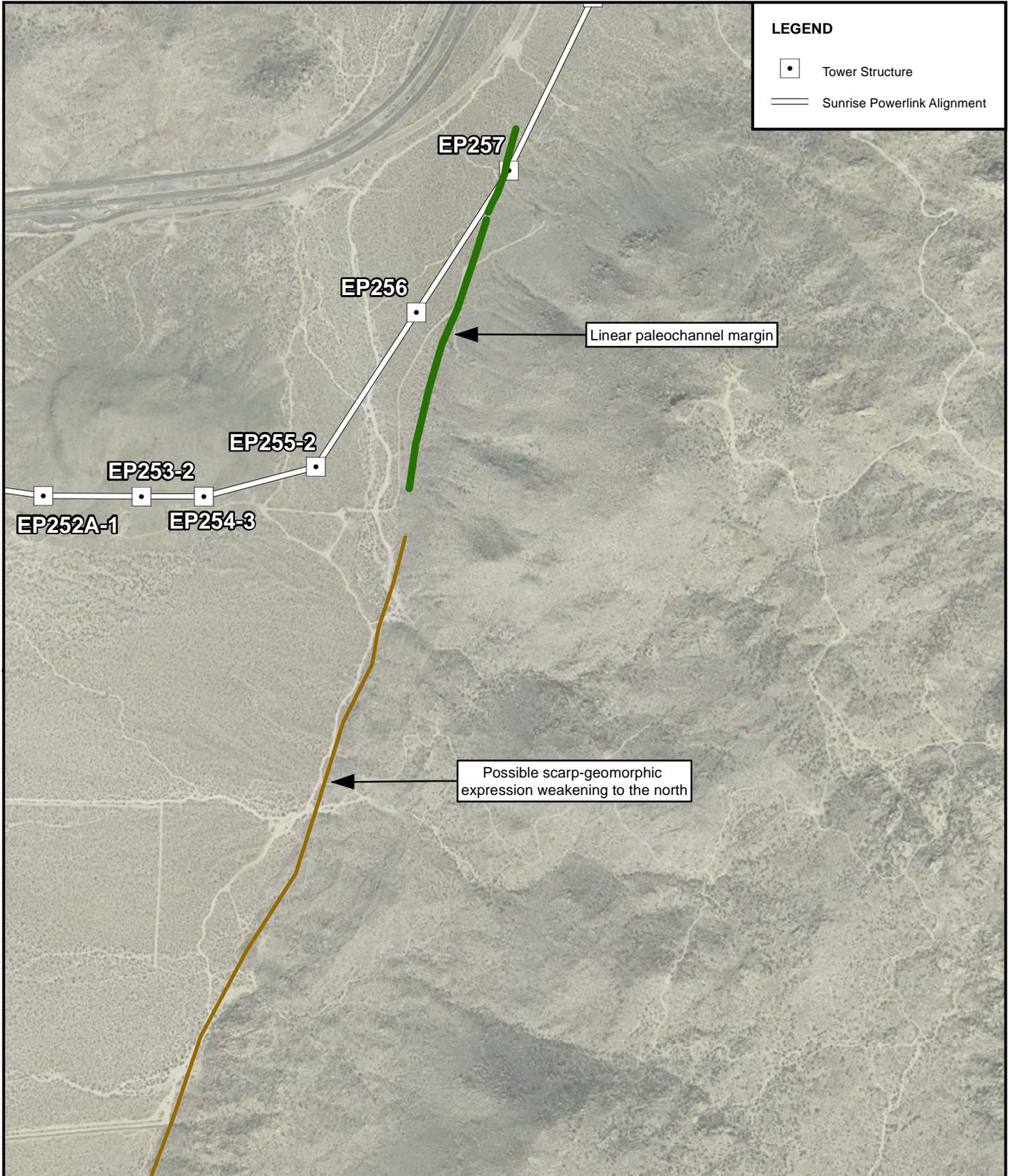
- ⑤ **RELICT PALEOSOL**  
Well developed argillic horizon (Bt soil horizon), dark reddish brown, sandy clay, blocky structure, thick continuous clay films.

- ⑥ **COMPLETELY WEATHERED GRANITIC ROCK**  
Light reddish brown tonalite, extremely weak rock, upper portion contains darker reddish color and common clay films (BC soil horizon).



<b>TRENCH LOG</b>			
<b>EP257 FAULT HAZARD INVESTIGATION</b>			
<b>SUNRISE POWER LINK PROJECT</b>			
<b>URRS</b>			
		<b>2.5</b> <b>0</b> <b>2.5</b> <b>5 Feet</b> SCALE: 1" = 5' (H&V)	
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**LEGEND**

-  Tower Structure
-  Sunrise Powerlink Alignment

	<p>SOURCES: Aerial (USGS, 2008), Sunrise Powerlink Alignment and Tower (SDGE, 2009), Faults (URS 2011).</p>	<p><b>SITE GEOMORPHOLOGY</b> <b>EP 257 - FAULT HAZARD INVESTIGATION</b> <b>SUNRISE POWERLINK PROJECT</b></p>	
		 <p>SCALE: 1" = 1000 feet (1:12,000) SCALE CORRECT WHEN PRINTED AT 8.5x11</p>	<p>CHECKED BY: RC</p>
		<p>PM: JM</p>	<p>PROJ. NO: 27661032.04001</p>