

CONSULTANT REPORT

SECOND ADDENDUM TO TRANSMISSION OPTIONS AND POTENTIAL CORRIDOR DESIGNATIONS IN SOUTHERN CALIFORNIA IN RESPONSE TO CLOSURE OF SAN ONOFRE NUCLEAR GENERATING STATION (SONGS)

ENVIRONMENTAL FEASIBILITY ANALYSIS

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ABSTRACT

After the May 2014 publication of the report *Transmission Options and Potential Corridor Designations in Southern California in Response to Closure of San Onofre Nuclear Generating Station*, the California Independent System Operator found that the closure of the nuclear plant caused a significant reduction in the capability of the transmission system to deliver future renewable generation from the Imperial Irrigation District to the bulk transmission system due to changes in flow patterns over the electric transmission system. The changes also affect the ability of the electrical transmission system to maintain deliverability of import capability from the Imperial Irrigation District at the intended level of 1,400 megawatts (MW). In response to this previously unrecognized consequence of closure of the nuclear plant, two addenda to the May 2014 reports have been prepared. The first addendum (September 2014) provided a high-level environmental assessment of two additional transmission alternatives that would restore the 1,400 MW transfer capability for the Imperial Irrigation District. This second addendum evaluates three additional transmission alternatives that were suggested for analysis based on the October 2014 California ISO meeting.

As with the original report, the alternatives evaluated in both addenda may be considered by California Energy Commission staff for potential electric transmission corridor designation. While the alternatives may provide electrical solutions for addressing challenges arising from the closure of the San Onofre Nuclear Generating Station, this report presents and examines the likely siting constraints that may have to be considered during the environmental permitting process for each potential alternative.

The alternatives were ranked on a qualitative four-step scale that ranges from possible, possible but challenging, challenging, to very challenging. In Chapter 5 this addendum presents a ranking of all alternative routes and segments in the May, September, and December analyses, and the alternatives with fewest and most permitting constraints.

Keywords: California Energy Commission, San Onofre Nuclear Generating Station, Imperial Valley, environmental assessment, electrical transmission, onshore transmission alternatives, siting constraints, AC, deliverability

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EXECUTIVE SUMMARY

Background

This report is the second addendum to the May 2014 report *Transmission Options and Potential Corridor Designations in Southern California in Response to Closure of San Onofre Nuclear Generating Stations (SONGS): Environmental Feasibility Analysis*. Aspen Environmental Group (Aspen) prepared the May 2014 feasibility analysis under contract with the California Energy Commission to inform Energy Commission staff and the California Independent System Operator (California ISO) about the environmental feasibility of potential electric transmission options under consideration by the California ISO in response to the closure of the San Onofre Nuclear Generating Station (SONGS). The first addendum to that report was published by the Energy Commission in September 2014. The options evaluated may be considered by the Energy Commission staff for potential transmission corridor designations.

Under the direction of Energy Commission staff, Aspen worked with an external team that included representatives of Southern California utilities in the study area; state, federal, and county agencies with permitting authority in the study area; and the California ISO.

In its May 2014 report, Aspen studied potential corridors for two basic types of transmission options. First, the report described and evaluated seven potential onshore transmission alternatives, including both alternating current (AC) and direct current (DC) systems and substation upgrades. Second, the report described and evaluated the technology, viability, and potential to develop offshore corridors for a high-voltage direct current submarine cable between the Southern California Edison (SCE) and San Diego Gas & Electric (SDG&E) territories. The specific routes for these alternatives were defined by the consultant team, based on land-use constraints and the authors' experience in the region.

Since the May 2014 publication of the report, the California ISO found that the closure significantly reduced the capability of the transmission system to deliver future renewable generation from the Imperial Irrigation District (IID) due to changes in electricity flow patterns over the electric transmission system. The change in flow patterns also affects the ability of the electrical transmission system to maintain deliverability of import capability from the IID at the intended level of 1,400 megawatts (MW). As with the original report, Energy Commission staff may consider these alternatives for potential electric transmission corridor designation.

In July 2014, the California ISO held a workshop titled "Imperial County Transmission Consultation Stakeholder Meeting" (July 14, 2014, Folsom, California) to discuss the issues regarding delivering renewable generation out of the Imperial Valley to the rest of the electrical transmission system. Aspen authors presented a summary of the findings of the May 2014 report, and stakeholders were invited to provide comments. Some of the comments, due on July 28, 2014, suggested that the Aspen work be expanded to include several additional transmission alternatives. As a result, the September addendum included consideration of two additional routes:

- Proposed Hooper Substation to SONGS (proposed by the IID).
- Midway Substation to Devers Substation (proposed by SCE).

Additional stakeholder comment led to the evaluation of three additional transmission line routes that are presented in this second addendum:

- Duke American Transmission Company’s (DATC) Orange County Upgrade
- SDG&E’s Imperial Valley-to-Inland Route
- The Nevada Hydro Company’s Talega-Escondido/Valley-Serrano (TE/VS) Project

This addendum is organized as follows:

- Chapter 1: Overview of Alternative Corridors and Segments Addressed in This Addendum
- Chapter 2: Alternative 11, DATC’s Orange County Upgrade
- Chapter 3: Alternative 12, SDG&E’s Imperial Valley-to-Inland Route
- Chapter 4: Alternative 13, The Nevada Hydro Company (TNHC)’s TE/VS Project
- Chapter 5: Environmental Feasibility Ranking of Alternative Segments

Overview of Results

This report presents an early stage evaluation of three potential transmission routes and corridors in the Southern California study area. Developing any of the transmission options would require viable project sponsors with experience and access to sufficient resources to establish an optimum route and design. The considerations identified here provide an overview of requirements stemming from regulatory agency oversight, environmental issues, and technical or construction engineering concerns. Comprehensive environmental and technical studies would still need to occur before any agency could approve a project within any of the corridors.

Table 1 defines the range of permitting likelihood defined for the previous report and in this addendum. Table 2 (Transmission Alternatives – Descriptions and Major Constraints) summarizes the results of this addendum. This analysis finds that permitting Alternative 11, the DATC Orange County line, would be challenging, primarily due to the large county parks and rugged terrain of the eastern Orange County area. Alternative 12, SDG&E’s suggested Imperial Valley-to-Inland route, would likely be very challenging to permit because of the overlapping and very sensitive land uses north of Anza-Borrego Desert State Park and the need to cross tribal lands of at least three Native American groups. Alternative 13, proposed by TNHC, would be challenging in the 500 kilovolt (kV) segment across the Cleveland National Forest (CNF) but more feasible in the areas where upgrades to the 230 kV lines are needed.

Table 1: Key to Summary Table: Likelihood of Successful Permitting and Construction

Green: Possible	No major obstacles to permitting or construction
Yellow: Possible but Challenging	Siting constraints but likely can be overcome
Orange: Challenging	Serious siting challenges that may not be resolvable
Red: Very Challenging	Very serious siting challenges that may make routes infeasible

Source: Aspen, 2014

Table 2: Transmission Alternatives – Descriptions and Major Constraints

Alternative Name	Description	Constraints	Likelihood of Successful Permitting
Alternative 11, Duke Orange County	Baker Canyon to Santiago (230 kV Overhead & Underground)	<ul style="list-style-type: none"> Expanding existing ROW through Irvine Ranch Open Space and parks Developing the Baker Canyon Substation Engineering considerations for underground 230 kV line Existing utilities within the road ROW EMF Concerns 	Challenging
	Baker Canyon to Santiago (HVDC Overhead & Underground)	<ul style="list-style-type: none"> New ROW through Irvine Ranch Open Space and Parks Developing the Baker Canyon Converter Station Engineering considerations for the underground DC line Existing utilities within the road ROW EMF concerns 	Challenging
Alternative 12, SDG&E Imperial Valley to Inland	Imperial Valley Substation to SR 371 Split	<ul style="list-style-type: none"> Military height limitations Tribal lands (Torres-Martinez) Santa Rosa-San Jacinto National Monument Residential areas USFS roadless areas Tribal lands (Santa Rosa) 	Very Challenging
	SR 371 Split to Inland (HVDC)	<ul style="list-style-type: none"> Existing underground utilities EMF concerns Tribal lands (Pechanga) 	Challenging
	SR 371 Split to Inland (500 kV)	<ul style="list-style-type: none"> USFS roadless areas Tribal lands (Pauma-Yuima) 	Challenging
Alternative 13, TNHC Talega/Escondido–Valley/Serrano	Valley-Serrano to Case Springs	<ul style="list-style-type: none"> Define Case Springs Substation location Outdated environmental studies High fire risk in National Forest 	Challenging
	Case Springs to Talega	<ul style="list-style-type: none"> Upgrades at Talega Substation 	Possible but Challenging
	Case Springs to Escondido	<ul style="list-style-type: none"> Santa Margarita Ecological Preserve 	Possible but Challenging

Source: Aspen, 2014

CHAPTER 1: Overview of the Alternative Corridors and Segments Addressed in This Addendum

Three alternatives are evaluated in this addendum. Alternative 11 is DATC’s Orange County system upgrade; Alternative 12 is SDG&E’s Imperial Valley to Inland route; and Alternative 13 TNHC’s Talega-Escondido/Valley-Serrano route. Figure 1 shows the general locations of each of the three alternatives.

Alternatives 11, 12, and 13 are located in different areas, with almost no overlapping geographic areas covered. Table 3 shows the segments analyzed for each of the three alternatives included in this addendum. As indicated in the table, the transmission segments of these three alternatives do not overlap.

Table 3: Overview of Transmission Segments in Alternatives 11, 12, and 13

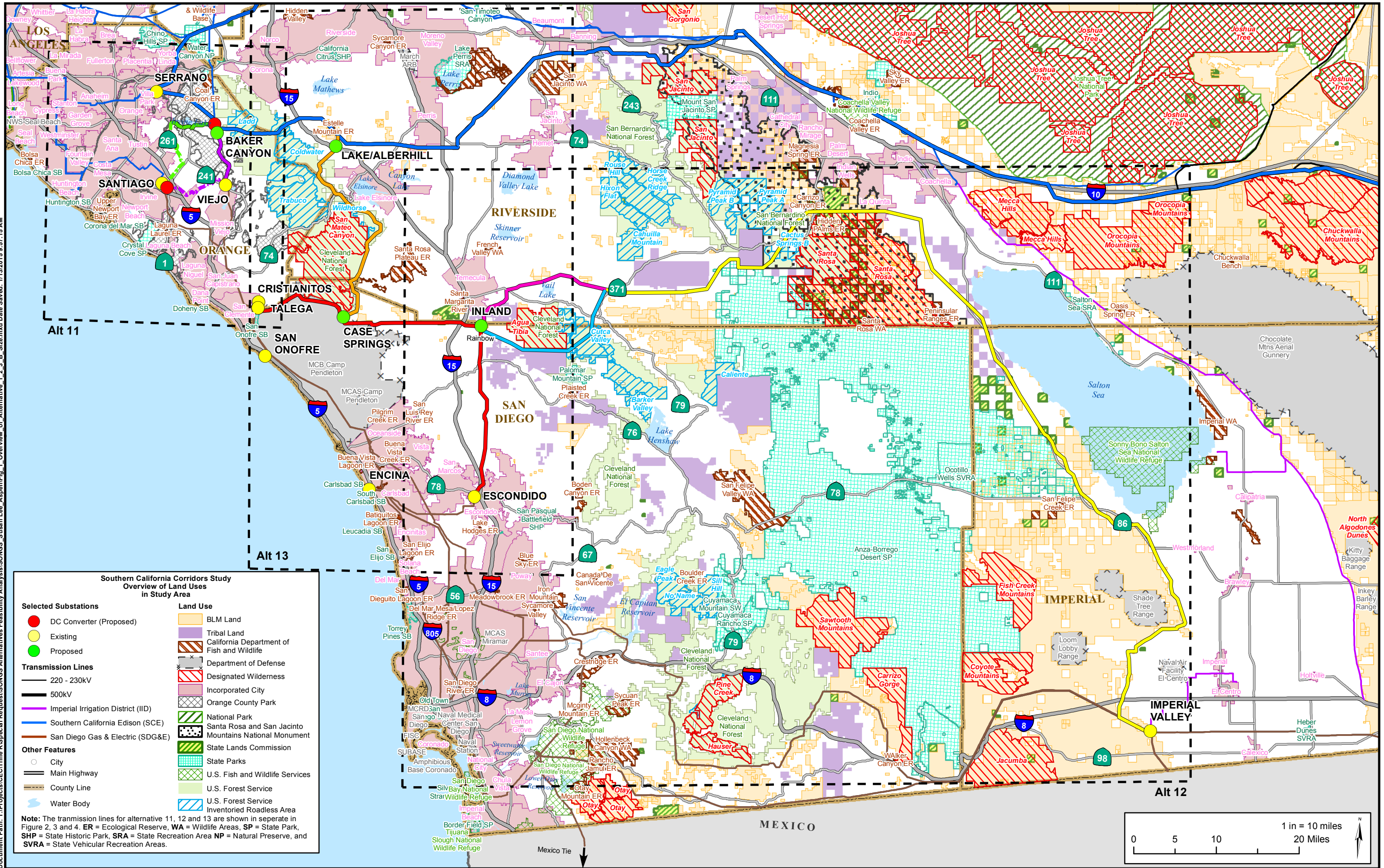
	Alternative 11 Duke Orange County	Alternative 12 Imp. Valley- Inland	Alternative 13 TE/VS
Imperial Valley – Salton Sea Segment		x	
Underground HVDC to Inland Substation		x	
Overhead 500 kV AC to Inland Substation		x	
Option A, Baker Canyon to Viejo and Viejo to Santiago (230 kV AC)	x		
Option B, Baker Canyon to Santiago (HVDC)	x		
Valley-Serrano to Case Springs			x
Case Springs to Talega			x
Case Springs to Escondido			x

Source: Aspen, 2014

Similar to the original report published in May 2014 and the September 2014 addendum, the discussions of Alternatives 11 through 13 are presented in three sections:

- Routing Summary
- Land Uses
- Constraints

Figure 1 Overview of Alternatives 11, 12 and 13



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CHAPTER 2: Alternative 11, DATC Orange County

Project Description Provided by Developer

This project proposed by Duke American Transmission Company (DATC) would require construction of a line between the Baker Canyon area of Orange County and the existing SCE Santiago Substation.

Baker Canyon to Santiago—Option A – AC transmission line from proposed Baker Canyon Substation to the Santiago Substation.

The components are:

- a. Loop the Alberhill (Valley¹) – Serrano 500 kV line into a new Baker Canyon substation. (See map below.)
- b. Construct a new 500/230 kV Baker Canyon substation.
- c. Construct a new 15 mi from Baker Canyon to Santiago 230 kV (double-circuit, mix of overhead [OVHD] and cable) along the 500 kV right-of-way (ROW) south of Serrano.
- d. Connection with Chino-Viejo 230 kV (optional).

Baker Canyon to Santiago – Option B—High-voltage direct current (HVDC) transmission line from a proposed Baker Canyon Substation to the Santiago Substation.

The components of this option are:

- a. Loop the Alberhill (Valley) – Serrano 500 kV line into a new Baker Canyon substation (see map below).
- b. Construct a new 500 kV Baker Canyon substation.
- c. Install alternating current/direct current (AC/DC) converter at Baker Canyon substation.
- d. Construct 1000 MW, +/-320 kV HVDC line from Baker Canyon to Santiago substation along the 500 kV ROW south of the Serrano Substation.
- e. DC line is a 15-mile line from Baker Canyon to Santiago 230 kV (mix of overhead and underground cable).

Routing Summary

This alternative has two potential routes. The first, Option A, would use two 230 kV AC transmission lines, and the second, Option B, would be a high-voltage direct current (HVDC) transmission line. Either route would involve a mix of overhead conductors and underground cables over a distance of about 15 to 16 miles within Orange County. Each would have an eastern endpoint in the Baker Canyon area of the Santa Ana Mountain foothills, along the existing SCE Alberhill (Valley) – Serrano 500 kV transmission line corridor, and the western endpoint would be about 9.5 miles west of the

1. The Alberhill Substation has been proposed by SCE but it has not yet been constructed. The 500 kV endpoints to this segment are the Valley and Serrano Substations.

500 kV line, as the crow flies, at the SCE Santiago Substation in Irvine. Figure 2 illustrates two route options and the area of the potential future Baker Canyon Substation site or converter station, the existing Viejo Substation, and existing Santiago Substation.

The two options for the Baker Canyon to Santiago routes are described in the following two segment descriptions.

Segment 1: Option A, Baker Canyon to Santiago (Overhead and Underground 230 kV AC)

Option A, Baker Canyon Substation Site (500/230 kV)

The Baker Canyon Substation site would be south of the existing SCE Serrano Substation along the existing 500 kV Valley-Serrano right-of-way (ROW). The existing 500 kV Valley-Serrano line has a 0.6 mile segment that is collocated with the existing 230 kV Chino-Viejo line. Siting a new Baker Canyon Substation along this 0.6 mile segment would provide some flexibility in electrical service by providing access to SCE's 500 kV and 230 kV systems. The new 500/230 kV Baker Canyon Substation site in Option A would be near the southern end of the 0.6 mile segment of collocated 500 kV and 230 kV lines. This substation location would be in undeveloped hills about 0.5 miles east of Santiago Canyon Road. Potential access roads include Black Star Canyon Road from Silverado Canyon Road to Baker Canyon Road and Ladd Overlook Scenic Road.

Baker Canyon to Viejo: Overhead ROW Adjacent to Chino-Viejo ROW

This portion of Option A starts in the existing SCE Valley – Serrano 500 kV transmission line corridor, then follows the alignment of the existing SCE 230 kV Chino-Viejo line. This route heads south for 7.3 miles, west of the Cleveland National Forest (CNF), adjacent to the existing 230 kV corridor. The transmission corridor crosses Silverado Canyon Road about 1 mile west of the unincorporated community of Silverado. The route travels along the western slope of the Santa Ana Mountains, roughly parallel to two crossings of Santiago Canyon Road (Orange County Highway S18), and terminates near Highway 241 (Foothill/Eastern Transportation Corridor) at the existing Viejo Substation in the city of Lake Forest.

New Underground ROW: Viejo to Santiago

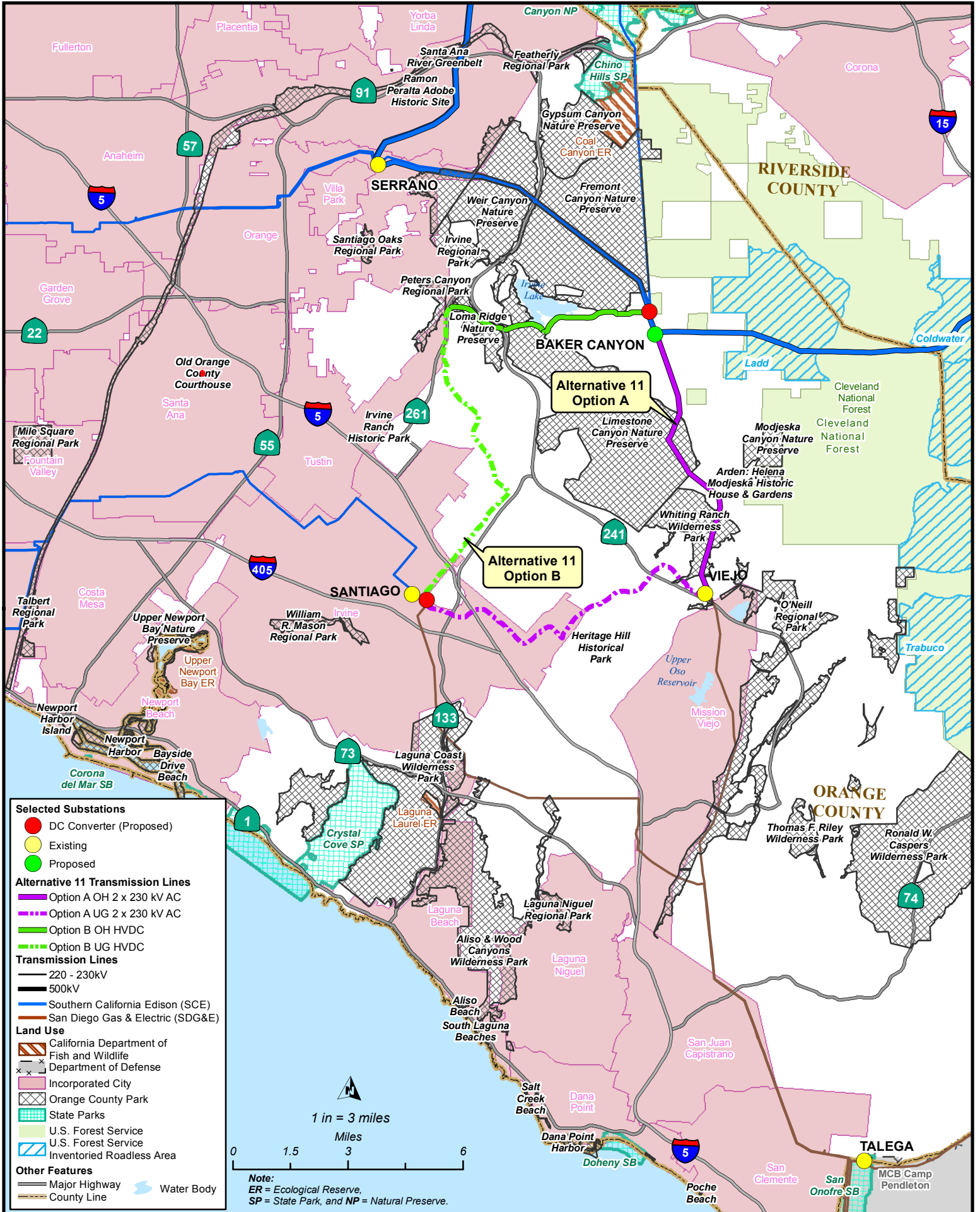
This portion of Option A heads westward from the Viejo Substation entirely underground city streets for 9.1 miles to the existing Santiago Substation in Irvine. The route follows Portola Parkway and Bake Parkway, crosses under Highway 241, and then turns onto Toledo Way, Alton Parkway, and Barranca Parkway to arrive at the Santiago Substation on Sand Canyon Avenue.

Segment 2: Option B, Baker Canyon to Santiago (HVDC)

Option B, Baker Canyon Converter Station Site (HVDC)

The new AC/DC converter station for Baker Canyon in Option B would be located along the existing 500 kV Valley-Serrano line near the northern end of the 0.6 mile segment of collocated 500 kV and 230 kV lines. Potential access roads include private drives and existing SCE access roads accessible from Black Star Canyon Road.

FIGURE 2 Alternative 11



Source: California Energy Commission - Siting, Transmission and Environmental Protection Division, 2014

Option B, HVDC Route

Baker Canyon to Tustin: New Overhead ROW. Route Option B travels westward and southward for 14.7 miles from Baker Canyon via Tustin before arriving at the Santiago Substation in Irvine. Between Baker Canyon and Tustin, the east-west portion of route Option B travels from the existing SCE Valley – Serrano 500 kV transmission line corridor for about 5 miles by passing along the south shore of Irvine Lake. South of Irvine Lake, the route crosses Santiago Canyon Road (Orange County Highway S18), and west of Irvine Lake, the route crosses Highway 241 (Foothill/Eastern Transportation Corridor) to skirt north of Loma Ridge before turning south.

Tustin to Santiago: New Underground ROW. The north-south portion of route Option B travels underneath city streets for about 9.7 miles after crossing Highway 241. For the route to pass between Peters Canyon Regional Park and Loma Ridge, the north-south portion of the route would parallel Highway 261 along Jamboree Road in Tustin from the vicinity of the junction of Highway 241 and Highway 261 to the Irvine urban limits. The southernmost portions of the route would pass under Highway 261 along Portola Parkway to Sand Canyon Avenue, remaining beneath Irvine streets, to arrive at the Santiago Substation near the intersection of Sand Canyon Avenue and Barranca Parkway.

Land Uses

Table 4 defines the land ownership for the Baker Canyon to Santiago transmission line for each of the analysis segments. As indicated, the route would be roughly 15 to 16 miles long.

Table 4: Land Jurisdiction – Baker Canyon to Santiago (miles)

Line Segment	Tribal	BLM	Private Land		Total
			Incorporated	Unincorporated	
Option A, Baker Canyon to Viejo (Overhead Segment)	0	0	2.2	5.1	7.3
Option A, Viejo to Santiago (Underground Segment)	0	0	9.1	0	9.1
TOTAL 230 kV, Option A	0	0	11.3	5.1	16.4
Option B, Baker Canyon to Santiago	0	0	2.2	12.5	14.7
TOTAL HVDC, Option B	0	0	2.2	12.5	14.7

Source: Aspen, 2014

The land uses along the Baker Canyon-to-Santiago transmission route are described for the two options for each segment below.

Segment 1: Option A, Baker Canyon to Santiago (Overhead and Underground 230 kV AC)
Overhead Segment: Baker Canyon to Viejo Substation

Baker Canyon is within the Orange County Silverado-Modjeska Recreation and Park District (SMRPD) and near the western boundary of the CNF. The Baker Canyon Substation site would be located along the existing 500 kV transmission line that travels across the steep terrain and canyons of

the Santa Ana Mountains in the unincorporated Orange County backcountry. The existing 500 kV and 230 kV transmission lines cross rugged terrain elevations between 1,400 and 1,800 feet above sea level.

The Baker Canyon Substation site in Option A would be east of Black Star Canyon Road and north of Baker Canyon Road, within private property that lies north of the unincorporated community of Silverado. The site would be along the westernmost edges of the congressional boundary for the CNF but outside national forest lands. If a private site cannot be found, the substation site could be located within the county-owned Irvine Ranch Open Space. This open space is operated by the Irvine Ranch Conservancy under contract with Orange County Parks. (OC Parks, 2014) This area is designated by Orange County for a mix of open space and rural residential land use. (OC, 2005)

The Irvine Ranch Open Space was created in 2010 when Orange County accepted a donation of 20,000 acres from the Irvine Company. The land includes 1,988 acres designated for the Black Star Canyon Wilderness Park north of the Limestone Canyon Nature Preserve and the Whiting Ranch Wilderness Park. The Irvine Ranch Conservancy operates recreational and research programs on the land, and the Irvine Ranch Open Space is managed for preservation and guided recreation. (OC Parks, 2014)

The county-owned Irvine Ranch Open Space encompasses a large portion of the historic Irvine Ranch. The Irvine Ranch was designated as a National Natural Landmark by the U.S. Department of Interior, National Park Service, in 2006 and added to the California Register of Natural Landmarks in 2008. This National Natural Landmark designation recognizes the geological and ecological significance and the exceptional value of these lands. (OC Parks, 2014) The program seeks to identify, recognize, and encourage the preservation of the full range of geological and biological features determined to be examples of California's natural heritage that are deemed to be of statewide significance. Classification as a California Natural Landmark does not alter the ownership or dictate the activities or use of the land, but to maintain the designation as a Natural Landmark, the natural values of the property must not be significantly degraded or destroyed. (CDPR, 2014)

The California Register of Natural Landmarks describes the Irvine Ranch Open Space as containing "a remarkably complete stratigraphic succession ranging in age from late Cretaceous (80 million years ago) to the present. The primary biological features include coastal sage scrub and chaparral communities, including rare Tecate cypress woodlands." (CDPR, 2014)

The service area of the SMRPD includes the Baker Canyon area and most of existing transmission line segment between Baker Canyon and the Viejo Substation. The scope of services provided by the SMRPD is limited, including two community centers, two community parks, and a children's center serving primarily the residents of the Silverado, Modjeska, and neighboring canyon areas. Although the SMRPD also maintains hiking and riding trails within its boundary, including the Baker Canyon area, the SMRPD has no full-time paid staff. (OC LAFCO, 2005)

The portion of route Option A that travels from Baker Canyon to the Viejo Substation would include 5.1 miles within unincorporated Orange County and 2.2 miles in the city of Lake Forest. No federal lands would be crossed. The route for Option A occurs entirely along the existing SCE 230 kV line for 7.3 miles; however, the surrounding lands are either private or owned by the local jurisdictions. To accommodate the new overhead transmission line along the existing 230 kV ROW, the existing ROW

would need to be widened through the Irvine Ranch Open Space, the Limestone Canyon Nature Preserve, and the Whiting Ranch Wilderness Park.

Underground Segment: Viejo to Santiago

The portion of route Option A that travels from Viejo to Santiago would include 9.1 miles underground through city streets and within Lake Forest and Irvine. This segment of the route would be in Lake Forest until crossing into Irvine near the intersection of Bake Parkway and Toledo Way. In Irvine, the underground transmission line would need to cross under the Metrolink railway, Interstate Highway 5 (I-5), and Highway 133. Multilane parkways or boulevards would be followed for this route through suburban land uses generally involving commercial or light industrial development.

The existing Santiago Substation is in Irvine, south of Sand Canyon Avenue and east of Barranca Parkway. The area is built out with research offices, light industrial, and commercial uses, with a community park across Sand Canyon Avenue and along the San Diego Creek.

Segment 2: Option B, Baker Canyon to Santiago (HVDC)

The Baker Canyon AC/DC converter station site in Option B would be along Black Star Canyon Road, within private property near the point where the alignment of the existing 500 kV line joins those of the Chino-Serrano and Chino-Viejo 230 kV lines. If the converter station site is not located near the crossing of the existing 500 kV line with Black Star Canyon Road, the converter station may need to be located on steep terrain on either side of Black Star Canyon, and the new transmission line would need to drop from the steep terrain to Black Star Canyon Road before crossing the Irvine Ranch Open Space to reach the level of the southern shore of Irvine Lake (around 800 feet above sea level).

The majority (12.5 miles) of the 14.7 miles of route Option B would be within unincorporated Orange County, and the southernmost 2.2 miles would be within the Irvine and a small portion in Tustin.

From the Baker Canyon Option B converter station site, the route would skirt the southern shore of Irvine Lake (formerly the Santiago Reservoir, co-owned by Serrano Water District and Irvine Ranch Water District) and private recreational facilities, to the south, while avoiding steep slopes. The area west of Black Star Canyon Road to near the junction of Highway 241 and Highway 261, including Irvine Lake and Santiago Creek, is a mix of private land and the Irvine Ranch Open Space, and this area falls within the city of Orange sphere of influence.

This portion of the route would be parallel to and would cross overhead the scenic Santiago Canyon Road (Orange County Highway S18). The route would also span Highway 241 (Foothill/Eastern Transportation Corridor) near Loma Ridge Jeep Trail and remain roughly parallel Highway 241 to pass around northern boundary of the Loma Ridge open space before spanning Highway 261. Loma Ridge is within the county-owned Irvine Ranch Open Space and the Irvine Ranch Natural Landmark. This county open space is publicly accessible and maintained by the Irvine Ranch Conservancy.

The transition point of overhead transmission line to underground cable would occur as the route turns south near the junction of Highway 241 and Highway 261. In Tustin, the underground transmission line would need to cross under Highway 261, and in Irvine, the line would cross under the Metrolink railway and I-5. Land uses along the underground route of the cable within Tustin and

Irvine are mostly low-density and medium-density residential, with research offices, light industrial, and commercial uses near the Santiago Substation.

Constraints

For the transmission line routes of Alternative 11, the environmental constraints potentially affecting development are diverse because of the varied land uses that would be affected. Constraints are addressed by segment.

Segment 1: Option A, Baker Canyon to Santiago (Overhead and Underground 230 kV AC)

The five constraints for Segment 1 are described separately for the overhead segment (two constraints) and the underground segment (three constraints).

Overhead Segment. The major constraints for the segment south of Baker Canyon to Viejo Substation include constraints identified in the May 2014 report for Alternative 4, the Talega-Serrano route. These are described in more detail below to show how they apply within this segment of Alternative 11. In addition, the existing land uses in the Baker Canyon area are highly constrained due to the protected nature of most of the land. The overhead 230 kV segment of Alternative 11 Option A has two constraints:

1. Expanding the existing ROW through Irvine Ranch Open Space and parks
2. Developing the Baker Canyon Substation

Constraint 1: Expanding the Existing ROW Through Irvine Ranch Open Space and Parks

The new overhead double-circuit 230 kV transmission line between Baker Canyon and Viejo Substation would require 7.3 miles of widening the existing Talega-Serrano corridor, which is described in Alternative 4 of the May 2014 report. The transmission structures through this area are a line of single-lattice steel towers in a double-circuit configuration carrying the SCE Serrano-Viejo and Chino-Viejo 230 kV circuits. One additional set of double-circuit towers would need to be placed alongside the existing towers in this area to complete new overhead 230 kV line in Alternative 11 Option A. SCE owns the existing ROW and would either add the additional towers within its existing ROW, or the additional towers would require an expansion of or addition to the ROW.

Almost all the 7.3 miles between Baker Canyon and SCE's existing Viejo Substation falls within the Irvine Ranch Open Space. While Orange County owns a large portion of the land, the existing transmission line ROW predates the designation. Although the designation as a Natural Landmark does not dictate whether the existing 230 kV structures may be upgraded or the ROW expanded, to maintain the designation as a Natural Landmark requires, the geological and biological features of the property must not be significantly degraded. (CDPR, 2014)

As reported in the analysis of Alternative 4 in the May 2014 report (p.44), SCE conducted a preliminary rights analysis of the existing Talega-Serrano ROW, including this area, and concluded, "The northern portion of this corridor passes through both the Irvine Ranch as well as the Cleveland National Forest. The results of a preliminary rights analysis highlighted several places along the corridor where the existing rights would be insufficient as they contain language which does not

allow additional towers or circuits. These areas would require newly negotiated agreements to install or upgrade facilities.”

The challenges in expanding this ROW, therefore, include negotiating new rights to add towers on primarily county-owned land within the Irvine Ranch Open Space, including the Black Star Canyon Wilderness Park, and within the Limestone Canyon Nature Preserve and the Whiting Ranch Wilderness Park. This would require demonstrating that the additional transmission line would not substantially alter the natural values within the designated Natural Landmark and that the additional facilities would not substantially disrupt the conservation and preservation goals or recreational functions of the parklands and open space.

Constraint 2: Developing the Baker Canyon Substation

Alternative 11 Option A would require a new 500/230 kV Baker Canyon Substation site along the existing 500 kV line that travels across the steep terrain and canyons east of Black Star Canyon Road and north of Baker Canyon Road. Developing a new substation in this area would occur either on private property, although most parcels appear to be surrounded by public land, or within the county-owned Irvine Ranch Open Space. The county designates these areas for a mix of open space and rural residential land use (OC, 2005), although the existing 500 kV line and 230 kV lines span the area.

Permitting challenges would be similar to those of the transmission line ROW, discussed above. These challenges include demonstrating that the additional electrical infrastructure would not substantially alter the natural values within the designated Natural Landmark and that the additional facilities would not substantially disrupt the conservation and preservation goals or recreational functions of the parklands and open space of the Black Star Canyon Wilderness Park.

Construction of a major substation in this vicinity would be challenging as well. Depending on location, construction of the Baker Canyon Substation would be constrained by terrain and access road requirements. The Black Star Canyon and Baker Canyon backcountry territories are areas of known archaeological and paleontological sites, fire hazards, and geologic hazards (including landslides) due to steep hillsides and narrow ridgelines. (OC, 1977) The challenges due to topography are compounded by limited access, and existing access roads may require reconstruction to support transportation of substation transformers and other switchgear. To avoid large amounts of site grading and excessive land disturbance, the size of the site would likely need to be compact and minimized through the use of gas-insulated rather than air-insulated equipment. Low-profile and low-noise designs may be appropriate.

Underground Segment. The underground 230 kV segment of Alternative 11 Option A has three constraints:

1. Engineering considerations
2. Existing utilities in the road ROW
3. Electric and magnetic fields

Constraint 3: Engineering Considerations

The underground transmission line route follows multilane parkways or boulevards wherever possible as this would ease the construction-related road closures where trenching is required. The bending radius for underground cables and vaults along the route would need to be carefully engineered, in particular in locations where the road width is limited. Special construction methods (horizontal boring and/or directional drilling) may be required for crossings of highways and the railroad.

Constraint 4: Existing Utilities Within the Road ROW

The subsurface of the city streets through Lake Forest and Irvine may be crowded with existing underground utilities. Much of the area is likely to have underground electrical distribution facilities, and other typical underground utilities that must be avoided by the trench, duct bank, and vaults include water lines, sewer pipes, and natural gas pipelines. Separation from existing utilities would be required to ensure safety of all utilities during both construction and operation.

Constraint 5: Electric and Magnetic Fields

Electric and magnetic field (EMF) concerns typically arise with proposals for underground high-voltage transmission lines. Some portions of the Option A route would be located near homes, and in these areas the primary concern tends to be regarding potential health effects from exposure to EMFs. Generally, providing information and educational materials on these fields can resolve many concerns.

Segment 2: Option B, Baker Canyon to Santiago (HVDC)

The major constraints on the Segment 2 route are those listed below. Because the HVDC underground route would follow existing roads in Tustin and Irvine to arrive at the Santiago endpoint, it would be less constrained by adjacent land uses or natural resources than would the overhead portions between Baker Canyon and the transition to underground. Each constraint is described in more detail in the following paragraphs.

1. New ROW through Irvine Ranch Open Space and Parks
2. Developing the Baker Canyon Converter Station
3. Engineering considerations
4. Existing utilities in the road ROW
5. Electric and magnetic fields

Constraint 1: New ROW Through Irvine Ranch Open Space and Parks

The HVDC transmission line in Alternative 11 Option B would require new ROW through protected open space and parklands. The majority, 12.5 miles, of the 14.7 miles of route Option B would be within unincorporated Orange County, and the southernmost 2.2 miles would be within Irvine with a small portion in Tustin. The overhead segments would require securing new ROW and negotiating new rights to add towers on primarily county-owned land within the Irvine Ranch Open Space, including the Black Star Canyon Wilderness Park, other public or private land surrounding Irvine Lake, the Limestone Canyon Nature Preserve, and Loma Ridge.

The Option B overhead HVDC line from the converter station site across unincorporated Orange County would need to avoid ridge-tops and steep slopes which could create a new skyline of towers while also avoiding riparian areas upstream of Irvine Lake and the recreational facilities at the lake. Irvine Lake (formerly Santiago Reservoir) is managed by Serrano Water District for recreational use and provides drinking water to Villa Park and Orange. The Serrano Water District and Irvine Ranch Water Districts are co-owners of Irvine Lake, and securing new ROW along the southern shore of Irvine Lake may require establishing new agreements with the water districts. A very short segment north of Loma Ridge would cross another portion of the Irvine Ranch Open Space.

Permitting the new overhead ROW of Option B would require demonstrating that the new transmission line would not substantially alter the natural values within the designated Natural Landmark and that the new facilities would not substantially disrupt the conservation and preservation goals or recreational functions of the parklands, reservoir, and open space.

The new underground components of Option B would face permitting constraints by requiring installation of the cable within Tustin and Irvine city streets through areas of mostly low-density and medium-density residential, with research offices, light industrial, and commercial uses near the Santiago Substation; technical constraints are described below.

Constraint 2: Developing the Baker Canyon Converter Station

Alternative 11 Option B would require a new Baker Canyon AC/DC converter station site along the existing 500 kV line that travels across the steep terrain and canyons east of Black Star Canyon Road and north of Baker Canyon Road. The converter station would require about 5 acres of land on a level site. Normally, the converter station would be housed within a structure with height between 40 and 80 feet; the footprint of the building would be from 400 to 600 feet on each side. Developing a new converter station in this area would occur either on private property although most parcels appear to be surrounded by public land, or within the county-owned Irvine Ranch Open Space. The county designates this area for a mix of open space and rural residential land use (OC, 2005), although the existing 500 kV line and 230 kV lines span the area.

Permitting challenges for the converter station in Option B would be similar to those of the transmission line ROW discussed above, and constraints comparable to those identified for the substation in Option A. However, the converter station would require a greater level of accessibility because it is likely to involve construction of a complete building, rather than an open yard, and it could require a greater level of staffing for operations and maintenance than a substation. Depending on location, construction of the Baker Canyon converter station would be constrained by terrain and access road requirements. As with the substation site in Option A, development of the converter station would need to address the known challenges of the Black Star Canyon and Baker Canyon backcountry, including archaeological and paleontological sites, fire hazards, and geologic hazards (including landslides) due to steep hillsides and narrow ridgelines. (OC, 1977)

Constraint 3: Engineering Considerations

The underground HVDC transmission line route follows multilane parkways or boulevards wherever possible as this would ease the construction-related road closures where trenching is required. Special construction methods (horizontal boring and/or directional drilling) may be required for crossings of highways and the railroad. Because the HVDC underground route would follow existing roads, it would be less constrained by adjacent land uses or natural resources that would be affected by the need for the new ROW for overhead portions of Option B. (See Constraint 1 above.)

Constraint 4: Existing Utilities Within the Road ROW

The subsurface of the city streets through Tustin and Irvine may be crowded with existing underground utilities. Much of the area is likely to have underground electrical distribution facilities and other typical underground utilities that must be avoided by the trench, duct bank, and vaults including water lines, sewer pipes, and natural gas pipelines. Separation from existing utilities would be required to ensure safety of all utilities during both construction and operation.

Constraint 5: Electric and Magnetic Fields

Concerns regarding EMF would be similar to those anticipated with the underground high-voltage transmission line in Alternative 11, Option A, although the magnetic field for an HVDC line is a static field in contrast with the field that cycles around a typical alternating-current line. Some portions of the Option B route would be located near homes, where potential health effects would be a concern. Additional detail is provided in Appendix B of the May 2014 report, *Electric and Magnetic Fields From HVDC Transmission Lines and Potential Health Concerns*.

CHAPTER 3: Alternative 12, SDG&E Imperial Valley to Inland

Project Description

This SDG&E alternative would be a new transmission line from the Imperial Valley Substation to the proposed Inland Substation. The line could be either 500 kV AC or HVDC, with overhead and underground options.

The transmission line route would head north through Imperial County via the west side of the Salton Sea. It would turn west just north of Anza-Borrego Desert State Park (ABDSP). The transmission route would terminate at the proposed Inland Substation. The route would require Corridor A, plus either Corridor B or Corridor C.

- a. Corridor A from the Imperial Valley Substation along the west side of the Salton Sea, turning west (southwest of Thermal) to cross the mountains in a roughly 40-mile westerly route into the Temecula area. To reach the Inland Substation, Corridor A would require one of two options:
- b. Corridor B: Underground HVDC (route passing north of the Agua Tibia Wilderness and through the Pechanga Reservation).
- c. Corridor C: Overhead 500 kV AC (route passing south of the Agua Tibia Wilderness and through the Pauma-Yuima Reservation)

Routing Summary

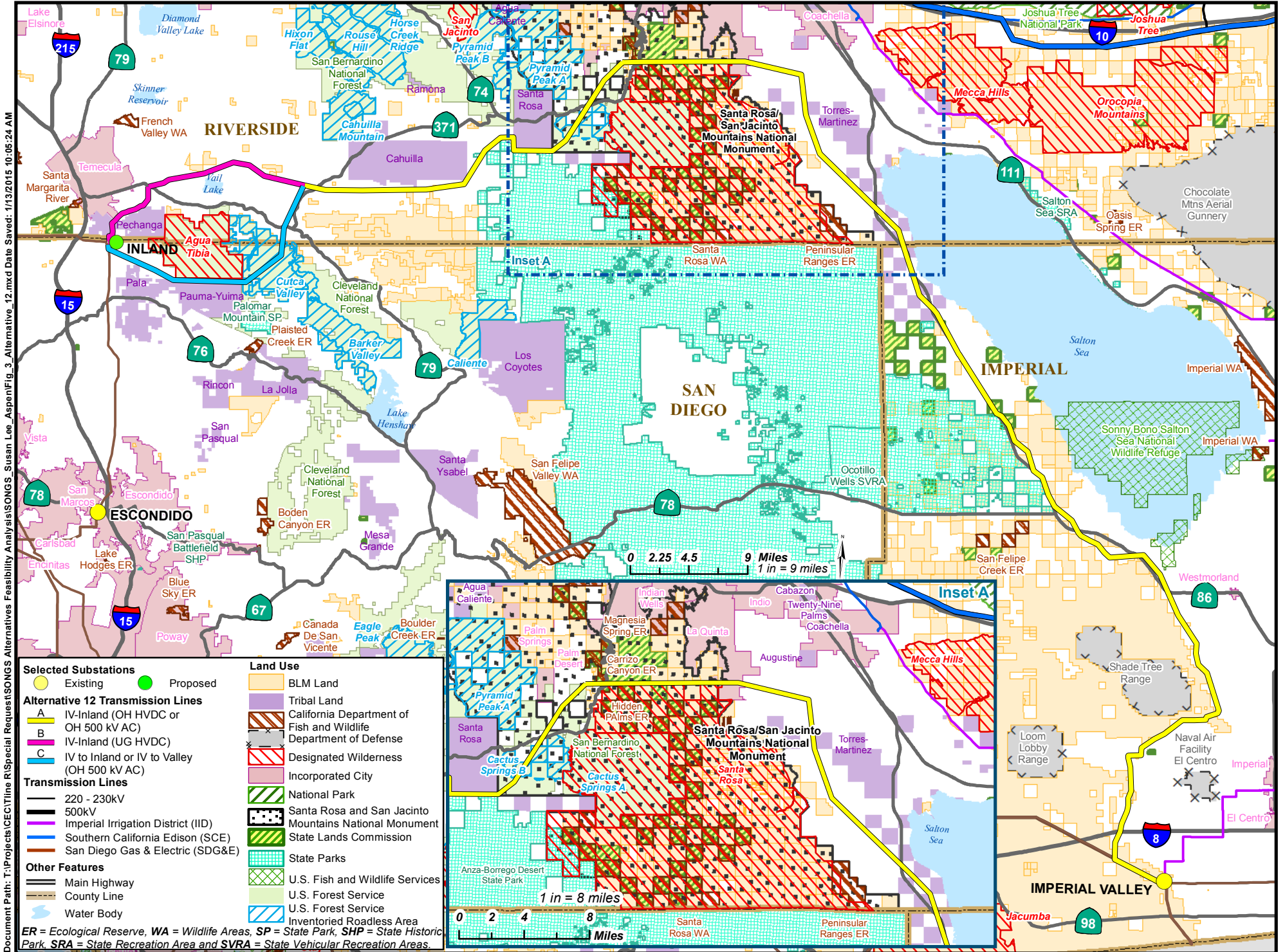
Alternative 12 would be either a new overhead/underground HVDC route from the existing Imperial Valley Substation to a new SDG&E Inland Substation or a new overhead 500 kV AC route from the existing Imperial Valley Substation to a new SDG&E Inland Substation. It is described in three segments: (1) from the existing Imperial Valley Substation to the State Route (SR) 371 split, (2) from SR 371 to the new SDG&E Inland Substation using underground HVDC technology, and (3) from SR 371 split to the new SDG&E Inland Substation using overhead 500 kV AC technology. The route from the existing Imperial Valley Substation to the SR 371 split would be the same for either the overhead HVDC route or the overhead 500 kV AC route. From the SR 371 split, SDG&E would build either the underground HVDC or overhead 500 kV from the SR 371 to the Inland Substation. Each route segment is described below and shown in Figure 3.

This route was roughly defined by SDG&E but without field verification. The evaluation presented in this section is based on the SDG&E route but generalized somewhat.

Segment 1: Route A – Imperial Valley Substation to SR 371 Split

This route segment is roughly 137 miles long, starting from the existing Imperial Valley Substation (about 10 miles southwest of El Centro) and ending just west of SR 371. This portion of the project would be either a new 500 kV overhead line or a new HVDC overhead line. In general, the route would be located in two geographic areas, the valley region and the mountain region.

Figure 3 Alternative 12



Source: California Energy Commission - Siting, Transmission and Environmental Protection Division, 2014

The route through the valley region would generally head north northwest from the Imperial Valley Substation, following the western boundary of the Imperial Valley at the edge of the agricultural area for about 45 miles. It would then head north northwest, paralleling the western boundary of the Salton Sea about 3 miles west of the sea for 25 miles. The route would then head northwest for 12 miles and west for 5 miles through the southern portion of the Coachella Valley.

The route through the mountainous region would head west from the Coachella Valley for about 9 miles, then southwest for about 9 miles, west for 3 miles, and jog north for 1 mile. The route would head southwest for 5.5 miles, through the community of Anza, then west for 12 miles. This segment would end west of the intersection of SR 371 and Wilson Valley Road, about 1.4 miles west of Lake Riverside Estates.

Segment 2: Route B – SR 371 Split to Inland Substation Overhead and Underground HVDC

Route B is defined by SDG&E as an underground HVDC line from the SR 371 split to the Inland Substation. However, this analysis assumes that the first 13 miles would be overhead HVDC, since the route defined by SDG&E is cross-country through hilly terrain and not following any roadways. Underground construction through that terrain would be expensive and would cause substantial ground disturbance.

From the SR 371 split, the overhead portion of Route B would head generally west for 12.7 miles, transitioning to underground about 2 miles west of Vail Lake and just east of Pauba Road. It would then turn south for 1 mile, then head southwest for an estimated 3.4 miles, skirting about the edge of Temecula before heading south for 1 mile, then west for 0.25 miles, then south for almost 0.5 miles to arrive at the Inland Substation.

Segment 3: Route C – SR 371 Split to Inland Substation Overhead 500 kV AC

Route C would be an alternate route segment to Route B that would be built entirely as an overhead 500 kV AC line. The route would head southwest for 9 miles past Aguanga and through the Cleveland National Forest. It would then head due west for 5.5 miles, then northwest for 5.5 miles. At this point it would head due north for 0.4 miles to arrive at the Inland Substation.

Land Uses

Table 5 defines the land ownership for the transmission line for each of the three analysis segments. As indicated, the route would be either 156.2 (Segments A+B) or 157.6 (Segments A+C) miles long. The monument includes both BLM and USFS lands, including lands of the San Bernardino National Forest (SBNF). The route would cross a total of 13.4 miles of U.S. Bureau of Land Management (BLM)/U.S. Forest Service (USFS) within the monument boundaries.

Table 5: Land Jurisdiction – SDG&E Alternative 12 (miles)

Line Segment	Tribal Land	BLM	US Forest Service	Private Land		State	Total
				Incorporated	Unincorporated		
A	4.1	11	5 (SBNF)	10.4	97.8	6.6	137.4
B	1.5	0	0	0.4	17	0	18.8
C	5.6	0	4.4 (CNF)	0	10	0	20.4

Line Segment	Tribal Land	BLM	US Forest Service	Private Land		State	Total
				Incorporated	Unincorporated		
TOTAL A+B	5.6	11	5	10.8	114.8	6.6	156.2
TOTAL A+C	9.7	11	9.4	10.4	107.8	6.6	157.8

Source: Aspen, 2014

The land uses along the SDG&E transmission route are described for each of the three segments that SDG&E defined. Segments B and C are options, so only one of the two segments would ultimately be proposed.

Segment 1: Route A – Imperial Valley Substation to SR 371 Split

Valley Region

The Valley Region would be about 87 miles long and would have three parts: the Imperial Valley, Salton Sea, and Coachella Valley segments. The southern portion would be in Imperial County, and the northern portion would be in Riverside County.

Imperial Valley. The first part of the Valley Region would be 45 miles long and would follow the border between the agricultural lands of the Imperial Valley (to the east) and federal land managed by the BLM (to the west). The BLM land is part of the California Desert Conservation Area and crosses the Yuha Basin Area of Critical Environmental Concern (ACEC). ACECs are areas that contain significant natural, archeological, or historical resources. The Yuha Basin contains several unique attractions: the Juan Bautista de Anza National Historic Trail, geoglyphs (large motifs etched into the landscape, created by Native Americans), an area of rare crucifixion thorns, oyster shell beds, and the Yuha Well. (BLM, 2008)

The first 4.1 miles within the Yuha ACEC would be located parallel to the existing SDG&E Sunrise Powerlink 500 kV line and the existing SDG&E Southwest Powerlink 500 kV line in a BLM utility corridor. The route would then turn north for 1 mile, still within the BLM utility corridor. Because this portion of the line would be located within an existing BLM corridor, it would not require a BLM land use plan amendment. (LUPA)

For the next 14 miles, the route would head generally north and be located on private, primarily agricultural land in the Imperial Valley, adjacent to BLM and DOD land along much of the route. The line would also cross the IID Westside Canal twice. This route segment would be located near the Naval Air Force El Centro Parachute Drop Range and Shade Tree Range and would cross the Military Height Limitation Area, where transmission lines must be between 20 and 200 feet. (California Public Utilities Commission [CPUC], 2008) The route would then cross BLM land for 1 mile in an area that does not have a designated utility corridor and would require a LUPA. The majority of this segment would be on agricultural land, but the line would cross open desert near the southern border of the Salton Sea.

Salton Sea. Along the west side of the Salton Sea, the route would be adjacent to the BLM San Sebastian Marsh/San Felipe Creek ACEC. A small portion of the route, about 2.75 miles, would then cross the Ocotillo Wells State Vehicular Recreation Area (SVRA) where state recreational land is in a

checkerboard pattern with BLM land. Ocotillo Wells SVRA contains more than 85,000 acres of land open for off-highway exploration and recreation.

North of Ocotillo Wells, the route would head northwest for 24 miles primarily through private, unincorporated land. The private land sections are in a checkerboard pattern with Torres-Martinez Reservation land. Because of the land ownership pattern, a transmission right-of-way would likely have to cross tribal land. Also in this route segment, the route would pass into Riverside County.

Coachella Valley. Within the Coachella Valley, the route would remain primarily on private, incorporated land in La Quinta. The route as defined by SDG&E would cross directly over some industrial facilities, a golf course, and several residential developments. If the route were actually being proposed, the route would be modified to avoid these sensitive land uses.

Mountain Region

At the western border of La Quinta, the route would enter into the mountain region, entering the USFS and BLM Santa Rosa-San Jacinto Mountains National Monument. The monument was established by an act of Congress on October 24, 2000, to preserve the nationally significant biological, cultural, recreational, geological, educational, and scientific values found in the Santa Rosa and San Jacinto Mountains. (BLM, 2014) BLM and the USFS jointly manage the monument, and the boundaries include lands under the jurisdiction of both agencies.

While crossing the monument, the route would run parallel to and just north of the northern boundary of the BLM Santa Rosa Wilderness. Just north of the wilderness area, the route would turn west for 9.3 miles. The route would continue to cross the monument for almost 14 miles.

Immediately west of La Quinta, the route would travel between the California Department of Fish and Wildlife (CDFW) Santa Rosa Wildlife Area and unincorporated private land. Part of the wildlife area is designated wilderness and also part of the national monument. As a result, the route is assumed in this segment is assumed to be on private land. The Santa Rosa Wildlife Area is habitat for the largest herd of protected peninsular bighorn sheep in the United States. (CDFW, No Date)

The route would then cross the CDFW Carrizo Canyon Ecological Reserve for a short distance. The ecological reserve system is designed to conserve areas for the protection of rare plants, animals, and habitats.

Portions of the route through the Monument would also be within the San Bernardino National Forest (SBNF), including the Cactus Springs-B Inventoried Roadless Area. This portion of the route would cross State Route 74, a USFS Scenic Byway and the Palms to Pines Scenic Byway. The route would turn west and pass along the border of the Santa Rosa Indian Reservation and the ABDSP. This portion of the ABDSP is state-designated wilderness and would be north of the Coyote Canyon Cultural Preserve. (State Parks, 2012) In this route segment, this analysis assumes that the transmission line would be located on the Santa Rosa Reservation because the wilderness designation of the ABDSP prohibits transmission lines.

West of the Santa Rosa Reservation, the route would turn north for 1 mile, following the northern boundary of ABDSP. In this segment, this analysis again assumes the transmission line would be on

the reservation. The transmission line would also cross the Pacific Crest Trail. Fine-tuned routing would be required to avoid direct effects on residential properties through the area south of Anza.

The route would then head southwest to the SR 371 split. This segment, which is on private, unincorporated land, then heads west just south of the Cahuilla Indian Reservation. The route would continue west, crossing south of Lake Riverside Estates, a private gated community, through rural residences.

Segment 2: Route B – HVDC Underground/Overhead From SR 371 Split to Inland Substation

Route B is an option to Route C; only one of the two routes would be used to reach the Inland Substation. Route B is described by SDG&E as an underground HVDC line from the SR 371 split to a future Inland Substation. The first 14 miles would cross primarily unincorporated private land of which the first 10 miles would cross primarily open space, with some interspersed rural homes.

The route would pass about 0.5 miles north of Vail Lake at the closest point. As stated in the routing summary, this analysis assumes that the easternmost 10 miles of this segment would be overhead.

Where the route enters the outskirts of Temecula, it would transition to underground in existing roadways, including Los Caballos Road, Anza Road, and Deer Hollow Way. West of the intersection of Deer Hollow Way and Pala Road, the route would turn south, crossing about 1.7 miles of the Pechanga Reservation, then crossing about 0.4 miles of private land to reach the proposed Inland Substation.

Segment 3: Route C – 500 kV AC Overhead From SR 371 Split to Inland Substation

This route segment would be an overhead 500 kV AC transmission line. The first 4.5 miles of Route C would cross through primarily unincorporated, private land. It would cross open space and rural residential land, including passing through the unincorporated town of Aguanga, before crossing from Riverside County to San Diego County. The line would then enter the CNF through the Cutca Valley Inventoried Roadless Area. It would then head west, within the Pauma-Yuima Reservation along its northern boundary, just north of the Agua Tibia Wilderness Area and before turning northwest through unincorporated private land to reach the proposed Inland Substation. The unincorporated region would be primarily open space with some rural homes.

Constraints

For the SDG&E transmission line route, the environmental constraints potentially affecting development are diverse because of the length of the route and the varied land uses that could be affected. Constraints are addressed by segment.

Segment 1: Route A – Imperial Valley Substation to SR 371 Split

This segment has the potential for six constraints:

1. Department of Defense Height Limitation Area
2. Tribal land: Torres-Martinez Reservation
3. Santa Rosa-San Jacinto National Monument
4. Residential areas around La Quinta and south of Anza

5. USFS San Bernardino National Forest, inventoried roadless areas
6. Santa Rosa Indian Reservation and Anza Borrego Desert State Park

Constraint 1: Military Height Limitation Area

The proposed route would cross the U.S. Department of Defense's (DOD) Military Height Limitation Area – 20 to 200 feet near the El Centro Parachute Drop Range and Shade Tree Range. SDG&E would need to coordinate with the DOD to ensure that the transmission towers do not conflict with the height limitation and do not conflict with military operations in this area.

Conflict 2: Tribal Land: Torres-Martinez Reservation

Portions of the route cross a checkerboard pattern of private, unincorporated land and tribal land. While the route attempts to avoid most of the Torres-Martinez Reservation, because of the checkerboard nature of the land ownership in this area, portions of the ROW would have to cross the reservation. Therefore, the Torres-Martinez Desert Cahuilla Indians would need to provide SDG&E with an easement to cross the reservation. It is uncertain whether the tribe would be willing to give SDG&E such an easement.

Conflict 3: Santa Rosa – San Jacinto National Monument

The route would cross the Santa Rosa – San Jacinto National Monument. The management plan for the national monument (BLM 2004) is silent on utility use (but defers to BLM or USFS land use restrictions as appropriate), but Public Law 106-351 addressed potential use of national monument lands for utilities as follows:

(e) UTILITIES. – [...] The management plan prepared for the National Monument shall address the need for and, as necessary, establish plans for the installation, construction, and maintenance of public utility rights-of-way within the National Monument outside of designated wilderness areas.

There has not yet been a proposal to construct a transmission line through the monument, but given its purpose and scenic value, such a proposal would likely be met with public opposition. In addition, it is unclear how the USFS and BLM would evaluate a proposed high-voltage line through the monument.

Furthermore, in this route segment, the route would be located immediately north of the federally designated Santa Rosa Wilderness Area. The proximity to the wilderness area would likely increase the public and agency concern regarding a new overhead transmission line in this location.

Conflict 4: Residential Areas Around La Quinta and South of Anza

As the route turns west to approach the mountains, it would have to pass through residential areas of La Quinta. The line defined by SDG&E would cross several residential areas and golf courses in the area. In addition, in the 15-mile segment west of ABDSP, the route would pass through areas with scattered rural homes. Final routing would have to be adjusted to avoid direct effects on these homes.

Conflict 5: USFS Cactus Springs-B Inventoried Roadless Areas

The route would cross the SBNF Cactus Springs-B Inventoried Roadless Area. As described in the May 2014 report, the USFS is redesignating this land with a proposed use of “Backcountry Non-Motorized.” This new designation would prohibit utility use.

Conflict 6: Tribal Land – Santa Rosa Indian Reservation

West of the Cactus Springs-B Inventoried Roadless Areas, the route would be located on the Santa Rosa Indian Reservation, immediately north of the ABDSP for about 3 miles. To cross the Santa Rosa Indian Reservation, the Santa Rosa Band of Cahuilla Indians would need to provide SDG&E with an easement. It is uncertain whether the tribe would be willing to give SDG&E such an easement. The route could not be located within the ABDSP because two sections of the park adjacent to the Santa Rosa Indian Reservation are state-designated wilderness.

Segment 2: Route B – SR 371 Split to Inland Substation

Four major constraints within Segment 2 are described below. Because the HVDC underground route would follow existing roads in the Temecula region, it would be less constrained by adjacent land uses or natural resources that would be affected by an overhead line in undisturbed areas. Each constraint is described in more detail in the following paragraphs.

1. Existing utilities in the road ROW
2. Electric and magnetic fields
3. Tribal land: Agua Caliente Band of Cahuilla Indians

Constraint 1: Existing Utilities Within the Road ROW

The route would have to be evaluated for potential conflict with existing underground utilities. An underground HVDC construction ROW would require up to 13 feet of construction space parallel to the trench, but the trench itself would be only about 3 to 6 feet wide. Some roadways, in particular older roadways, may be congested with existing buried utilities. While much of the underground route has distribution facilities aboveground, some of the newer development may require distribution lines to be underground. Typical underground utilities include water lines, sewer pipes, and natural gas pipelines. Separation from existing utilities would be required to ensure safety of all utilities during both construction and operation.

Constraint 2: Electric and Magnetic Fields

Section 2.3.9 in the May 2014 report describes EMFs as a potential concern about underground transmission lines. In some projects that undergo substantial public scrutiny, especially where the lines would be located near homes, a major issue of concern is the potential health effects from exposure to electric and magnetic fields (EMFs). Generally, providing information and educational materials on these fields can resolve many concerns. Section 3.6.2.2 of the May report provides additional details regarding EMFs as a constraint.

Constraint 3: Tribal Land – Pechanga Reservation

The route would cross the tribal land of the Pechanga reservation, with its western boundary just east of I-15, and extends about six miles to the east. As described for the other tribal land crossings, an

easement across tribal land requires tribal consent. This is expected to be a serious constraint because this tribe's land acquisition more than 10 years ago effectively prevented the development of a valid Valley-Rainbow transmission line route that SDG&E had proposed. During the CPUC's initial CEQA assessment of SDG&E's proposed Valley-Rainbow 500 kV Interconnect Project, the Pechanga Band of Luiseño Mission Indians stated that consent must be given to have access to their lands for any environmental study or for any proposed route through the reservation (CPUC 2001), and the Nation of the Pechanga Band of Luiseño Mission Indians did not give its consent for a route through the Pechanga Indian reservation (CPUC 2001). There is no evidence that the Pechanga Band would currently consider accepting a high-voltage line across its land, whether overhead or underground.

Segment 3: Route C – SR 371 Split to Inland Substation

This segment has the potential for two constraints:

1. USFS Cutca Valley Inventoried Roadless Area
2. Route across the Pauma-Yuima Reservation (adjacent to Agua Tibia Wilderness Area)

Constraint 1: USFS Cutca Valley Inventoried Roadless Area

The route would cross the CNF Cutca Valley Inventoried Roadless Area. In 2011, U.S. Senate Bill 1574 (Beauty Mountain and Agua Tibia Wilderness Act of 2011) proposed to designate this land as wilderness, but the bill was not enacted (GovTrack, 2011). While this designation was not enacted, it does indicate that there would likely be public concern over a proposed transmission line in the region.

Constraint 2: Tribal Land – Pauma-Yuima Reservation (adjacent to Agua Tibia Wilderness Area)

The Agua Tibia Wilderness Area and the Pauma-Yuima Reservation are immediately adjacent to each other. Because the route is shown along the border between the two lands and federal law prohibits transmission lines within the CNF Agua Tibia Wilderness, it would have to be located on tribal land. To cross the Pauma-Yuima Reservation, the Luiseño Band of Pauma-Yuima Mission Indians would need to provide SDG&E with an easement to cross the reservation. It is uncertain at this time whether the tribe would be willing to give SDG&E such an easement.

CHAPTER 4:

Alternative 13, TNHC Talega-Escondido/Valley-Serrano

Project Description Provided by Developer

TNHC's transmission alternative, identified herein as the Talega-Escondido/Valley-Serrano 500 kV Interconnect (TE/VS Interconnect), is defined as it was proposed to the California Public Utilities Commission in 2010. The components are:

- (1) A new single-circuit 500 kV transmission line about 32 miles long (including up to 1.8 miles underground), linking SCE's existing 500 kV Valley-Serrano transmission system in western Riverside County with SDG&E's 230 kV Talega-Escondido transmission line in northern San Diego County.
- (2) A new 500 kV switchyard (Lake Switchyard) at Corona (Lee) Lake with a 2.7-mile, 500 kV loop between the switchyard and SCE's Valley-Serrano line.
- (3) A new 500/230 kV Case Springs Substation with phase-shifting transformers to interconnect the new 500 kV line with the 230 kV Talega-Escondido line.
- (4) A second 230 kV circuit added to all 51 miles of SDG&E's existing 230 kV Talega-Escondido transmission line (currently carrying only one 230 kV circuit on double-circuit towers) and reconductoring the existing 230 kV circuit.
- (5) Upgrades to SDG&E's existing Talega and Escondido Substations, including new 230 kV terminal positions.
- (6) Rebuilding about 8 miles of existing 69 kV transmission line on new steel poles within SDG&E's existing Talega-Escondido right-of-way.

A new 500/115/20 kV Santa Rosa Substation was identified by the developer as part of the interconnect project. It would be built at the base of the Elsinore Mountains and looped into the 500 kV line located at the top of the ridge. The Santa Rosa Substation is required for connecting the 500 kV line to the developer's proposed Lake Elsinore Advanced Pumped Storage (LEAPS) project but is not needed to interconnect the SCE and SDG&E systems, so it is omitted here.

Preliminary Assessment

Prior to assembling the routing, land use, and constraints discussions that are presented in the following sections, the Energy Commission assessed how the TE/VS Interconnect Project had been addressed in the May 2014 report. The assessment concluded that all components of the TE/VS Interconnect Project were evaluated as parts of Aspen's May 2014 analysis. Table ES-2 of that report (Transmission Alternatives – Descriptions and Major Constraints) summarized the results as applicable to the TE/VS Interconnect Project. The largest portion of that project, the 32-mile new 500 kV transmission corridor, was defined as "Challenging" in the summary table presenting "Likelihood of Successful Permitting."

Background

The California ISO held the first Imperial County Transmission Consultation Stakeholder meeting on July 14, 2014. Stakeholder comments after that meeting were due on July 28, 2014. TNHC submitted comments requesting that Aspen “incorporate an assessment of the TE/VS Interconnect as it has been described by Aspen in the Sunrise FEIS/FEIR and by the Forest [sic] and FERC in their FEIS.”² In those comments TNHC also stated, “The project is precisely defined... See Nevada Hydro’s Application and Proponents Environmental Assessment filed with the California Public Utilities Commission (“CPUC”) at

http://www.cpuc.ca.gov/Environment/info/aspennevadahydro/Talega_escondido_valley_serrano.htm”³

The CPUC website mentioned just above provides the following chronological background on the TE/VS Interconnect Project:

- In October 2007, TNHC filed an application (A.07-10-005; A.09-02-12) for a Certificate of Public Convenience and Necessity (CPCN) and Proponent’s Environmental Assessment (PEA) with the CPUC.
- On April 16, 2009, the CPUC’s administrative law judge (ALJ) issued a decision dismissing the application without prejudice as a result of several deficiencies in the PEA.
- On July 6, 2010, TNHC filed a new application (A.10-07-001) for a CPCN and a new PEA with the CPUC to construct the TE/VS 500 kV Interconnect Project.
- On February 25, 2011, TNHC filed a revised Chapter 3 to replace the original Chapter 3 submitted in the July 2010 PEA. This revised chapter and the associated figures superseded the earlier version of Chapter 3.

Aspen’s work in this series of reports for the Energy Commission presents a high-level assessment of the likelihood of successful permitting rather than a detailed, site-specific environmental impact report (EIR), which would be required of any project in a permitting process. The two approaches (this report versus an EIR) differ in a number of respects. An EIR presents a greater level of detail and site-specific information, and it serves a permitting and public information function. This report assesses only the likelihood of successful permitting by evaluating factors that can make permitting more challenging.

Therefore, Aspen reviewed the proposed transmission project elements laid out in the PEA, specifically referring to the revised Chapter 3 for the project description. ⁴ Aspen applied the same method to the TE/VS 500 kV Interconnect Project as for the other projects evaluated and provided its assessment of the likelihood of successful permitting using the four-step scale it developed for the May 2014 report.

2. See 7/28/2014 letter from TNHC, pp. 4.

3. See 7/28/2014 letter from TNHC, pp. 2-3.

4. http://www.cpuc.ca.gov/Environment/info/aspennevadahydro/pea5/rev_ch3/ch3_proj_desc_REV0211.pdf.

The assessment in this document does not include the elements shown in Figure 3.1.1-3 (on page 3-9) that run between the “Upper Reservoir” and the TE/VS Interconnect nor between the Santa Rosa Powerhouse on the edge of Lake Elsinore and the TE/VS Interconnect. These segments were specifically part of the pumped storage portion of the proposal, known as LEAPS, an advanced pumped storage hydropower facility, rather than the 500 kV interconnect project between SCE and SDG&E.

Aspen assessed the environmental feasibility of a number of electric transmission alternatives in the May 2014 report⁵ and the September 2014 addendum.⁶ The work described in this addendum is consistent with the approach taken in the two prior documents: describing the potential transmission route, the high-level environmental constraints of that potential route, and the likelihood of successful permitting on a four-step scale that ranges from possible, possible but challenging, challenging, to very challenging.

Review of the TE/VS Interconnect

Tables 2 and 3 from the May 2014 Aspen report are presented below as Tables 6 and 7, respectively. These tables show the transmission segments and substations that were analyzed in that report. The cells highlighted in yellow in each table show where the May 2014 analysis covered the components of the TE/VS Interconnect Project. Within each yellow cell, the components analyzed in the May report are identified by number, corresponding to the project description above.

Table 6: Transmission Segments for Onshore Alternatives (Table 2 From May 2014 Report)

	Alt 2 Alberhill to Suncrest	Alt 3 TE/VS (Forest)	Alt 4 TE/VS (Talega– Serrano)	Alt 5 Imperial Valley– Inland	Alt 6 Valley– Inland
500 kV – Alberhill to Warner	x				
500 kV – Alberhill to Case Springs		TNHC's 1, 2, 3			
500 kV – Talega to Case Springs to Inland		x			
500 kV – Inland to Warner		x	X		
500 kV – Warner to Suncrest	x	x	X		
500 kV – Serrano to Talega			X		
500 kV – Talega to Inland			x		
500 kV – Imperial Valley to Inland				x	

5. <http://www.energy.ca.gov/2014publications/CEC-700-2014-002/index.html>.

6. <http://www.energy.ca.gov/2014publications/CEC-700-2014-002/CEC-700-2014-002-AD.pdf>.

	Alt 2 Alberhill to Suncrest	Alt 3 TE/VS (Forest)	Alt 4 TE/VS (Talega- Serrano)	Alt 5 Imperial Valley- Inland	Alt 6 Valley- Inland
HVDC Option – Imperial Valley to Inland				x	
500 kV – Valley to Inland					x
HVDC Option – Valley to Inland					x
2 x 230 kV–Inland to Escondido (reconductor; add 2nd circuit)		x	x		
230 kV – Talega to Escondido (reconductor; add 2nd circuit; loop into Inland Sub.)				TNHC's 4, 5 (w/o Inland)	4, 5

Source: Aspen, 2014

Compared with the multiple transmission segments included in Alternative 3 in Table 7 (formerly Table 2 from the May 2014 report), TNHC's TE/VS Interconnect would include only the 500 kV between Alberhill and Case Springs. The TE/VS Interconnect would further reduce the scope of Alternative 3 by avoiding 500 kV components from Case Springs to Talega and from Case Springs to Inland, Warner, and Suncrest. Instead of 500 kV service south of Case Springs, TNHC's TE/VS Interconnect would add the second 230 kV circuit between Talega and Escondido, which was shown in Alternatives 5 and 6 (from the May 2014 report), and would loop these two Talega-Escondido 230 kV circuits into the new Case Springs transformers.

Table 7: Substations by Alternative (Table 3 From May 2014 Report)

	Alt 2 Alberhill to Suncrest	Alt 3 TE/VS (Forest)	Alt 4 TE/VS (Talega- Serrano)	Alt 5 Imperial Valley- Inland	Alt 6 Valley- Inland
Alberhill (New 500/115 kV)	TNHC's 2	TNHC's 2			
Case Springs (New 500 kV)		TNHC's 3 (w/230kV)			
Inland (New 500 kV)		x	x	x	x
Suncrest (Existing 500/230 kV)	x	x	x		
Talega (Add 500 kV to 230/138 kV)		x	x		
Talega (Existing 230 kV)				TNHC's 4, 5	4, 5

	Alt 2 Alberhill to Suncrest	Alt 3 TE/VS (Forest)	Alt 4 TE/VS (Talega- Serrano)	Alt 5 Imperial Valley- Inland	Alt 6 Valley- Inland
Serrano (Existing 500/230 kV)			x		
Escondido (Existing 230 kV)		TNHC's 4, 5	4, 5	4, 5	4, 5
Imperial Valley (Add 500 kV or HVDC)				x	
Valley (Add 500 kV or HVDC)					x
San Onofre and Huntington Beach		x	x		
Japanese Mesa (SDG&E SONGS Mesa 69 kV)				x	x

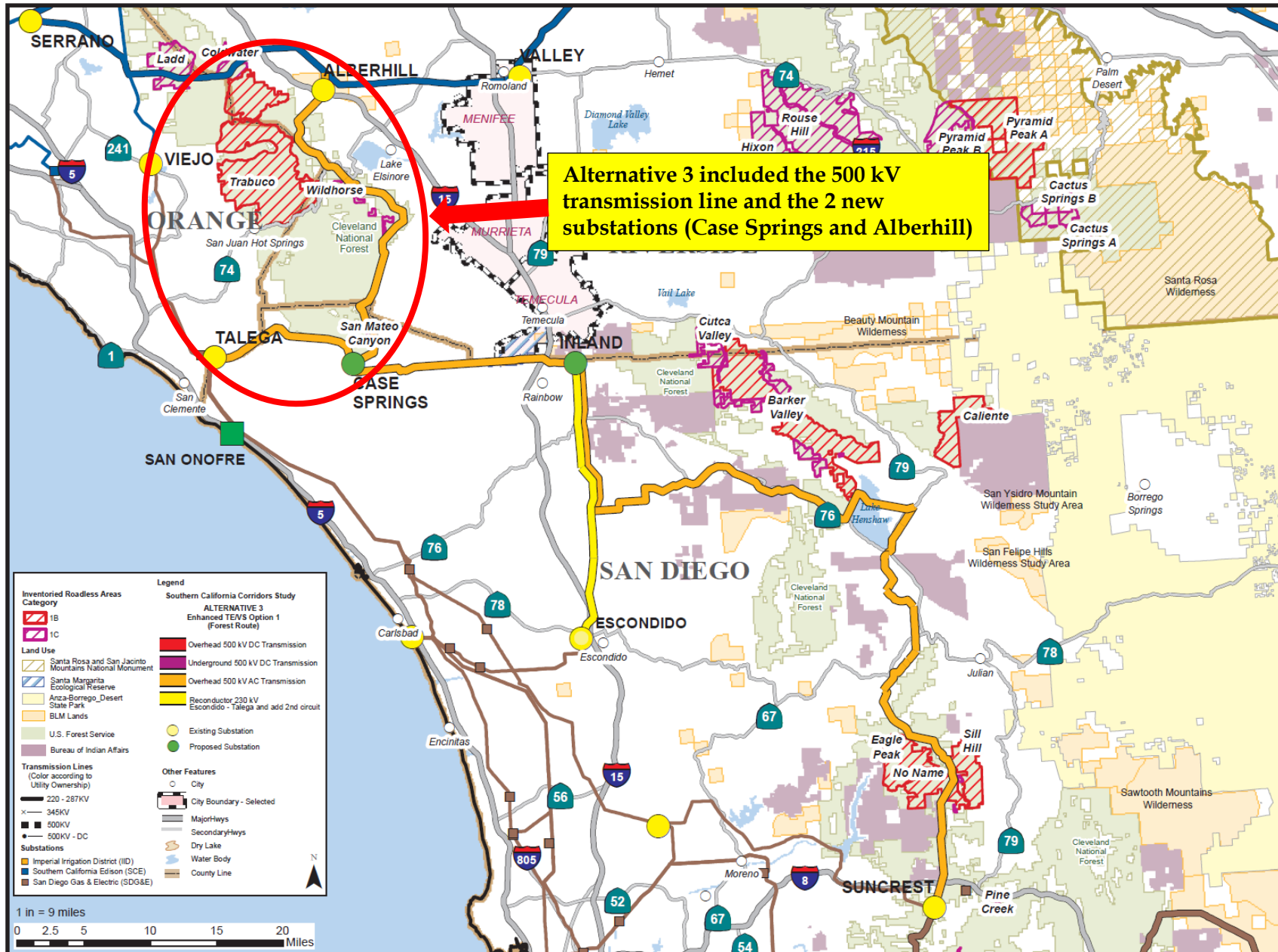
Source: Aspen, 2014

Compared with the additional or modified substations that were included in Alternative 3 in Table 7 (Table 3 from the May 2014 report), TNHC's TE/VS Interconnect would include only the 500 kV switchyard at Alberhill, and it would include the step-down 500/230 kV phase-shifting transformers at Case Springs. The TE/VS Interconnect would further reduce the scope of Alternative 3 by avoiding additional 500 kV switchgear or transformers at Talega, Inland, and Suncrest. Instead of 500 kV service south of Case Springs, TNHC's TE/VS Interconnect would involve substation modifications at Talega and Escondido to create the new terminal positions.

Although the TE/VS Interconnect Project would not include various aspects of Alternative 3 from the May 2014 report, it would include some upgrades addressed in Alternatives 5 and 6. In conclusion, all the components of the TE/VS Interconnect Project were evaluated as parts of Aspen's May 2014 analysis.

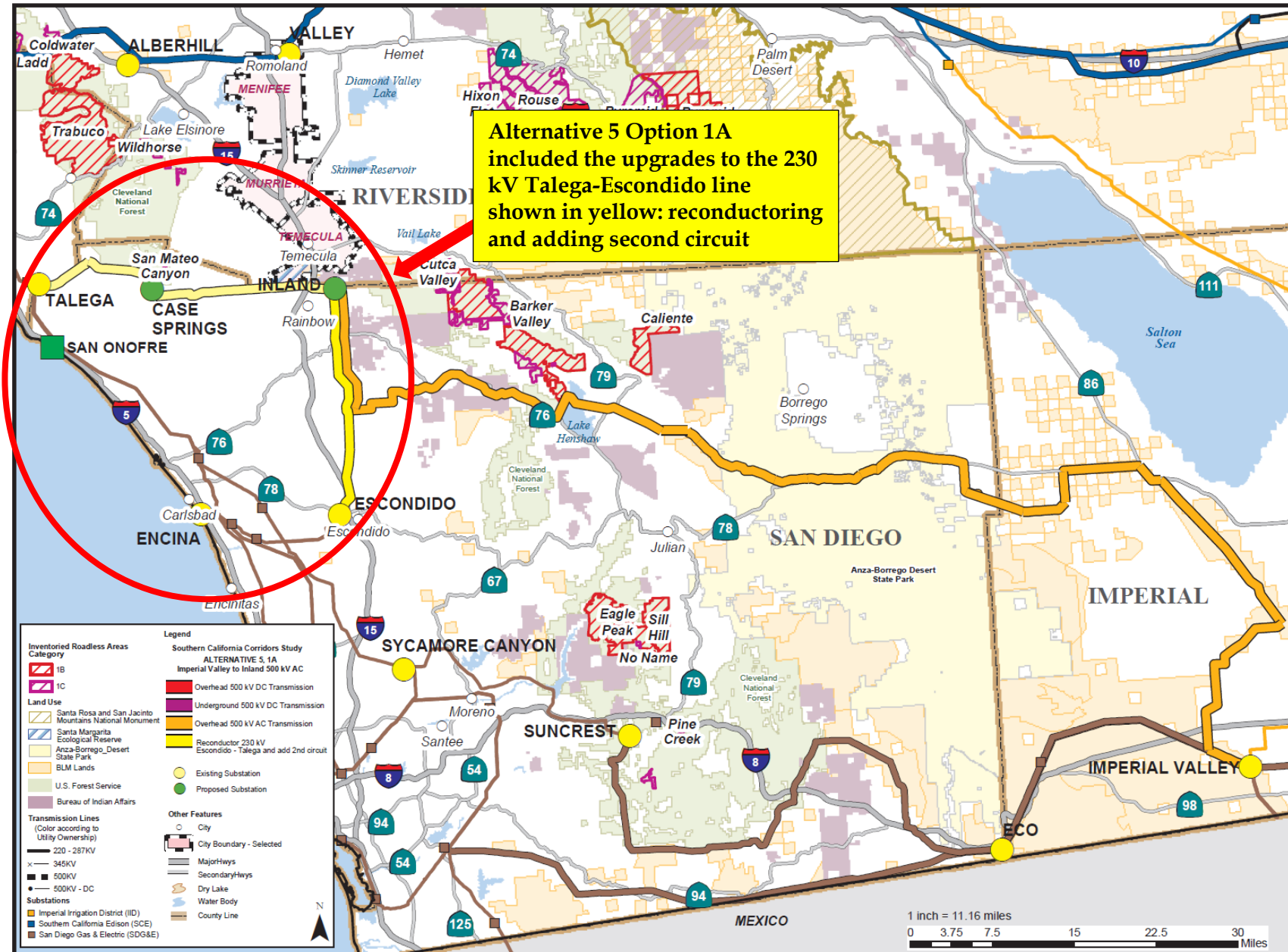
Figures 4 and 5 illustrate the components of the TE/VS Interconnect that were analyzed in the May 2014 report.

Figure 4: Alternative 3 (Enhanced TE/VS, Forest Route) from May 2014 Report



Source: California Energy Commission, 2014

Figure 5: Alternative 5, Option 1A from May 2014 Report



Source: California Energy Commission, 2014

The assessment described above concluded that the TE/VS Interconnect Project was fully considered in the May 2014 report. However, because that report included the TE/VS components as parts of two different and much larger transmission projects, the project is presented in this second addendum as Alternative 13, in the same format used for all other alternatives.

Routing Summary

Segment 1: Valley-Serrano Transmission Line to Case Springs Substation

As shown in Figure 6, from the existing SCE Valley-Serrano line in Riverside County, two parallel 500 kV lines about 2.7-mile long on separate towers would loop into and out of a new switchyard (Lake Switchyard) located adjacent to the north side of Interstate 10 at Corona (Lee) Lake. (The switchyard location is about 2 miles northwest of SCE's planned Alberhill Substation site. An alternative would be to locate the switchyard adjacent to Alberhill Substation and rely on the 500 kV interconnect at Alberhill to interconnect with the Valley-Serrano line. However, the description here assumes the switchyard remains at its proposed location.)

From Lake Switchyard, a single-circuit 500 kV line would be constructed south across Interstate 10 (I-10) and then across nearly 0.6 miles of private land before entering the CNF, Trabuco Ranger District. The single-circuit 500 kV line would continue through CNF for about 28.5 miles to a new 500/230 kV Case Springs Substation. At milepost 11.5 of the 500 kV alignment, the line would be installed underground for about 1.8 miles through a popular hang gliding launch area. The new Case Springs Substation would be located on CNF land adjacent to SDG&E's Talega-Escondido 230 kV transmission line ROW, which is on Camp Pendleton. The power would be stepped down to 230 kV at Case Springs Substation, and the 230 kV Talega-Escondido transmission line would be looped into the substation.

Segment 2: Case Springs Substation to Talega Substation

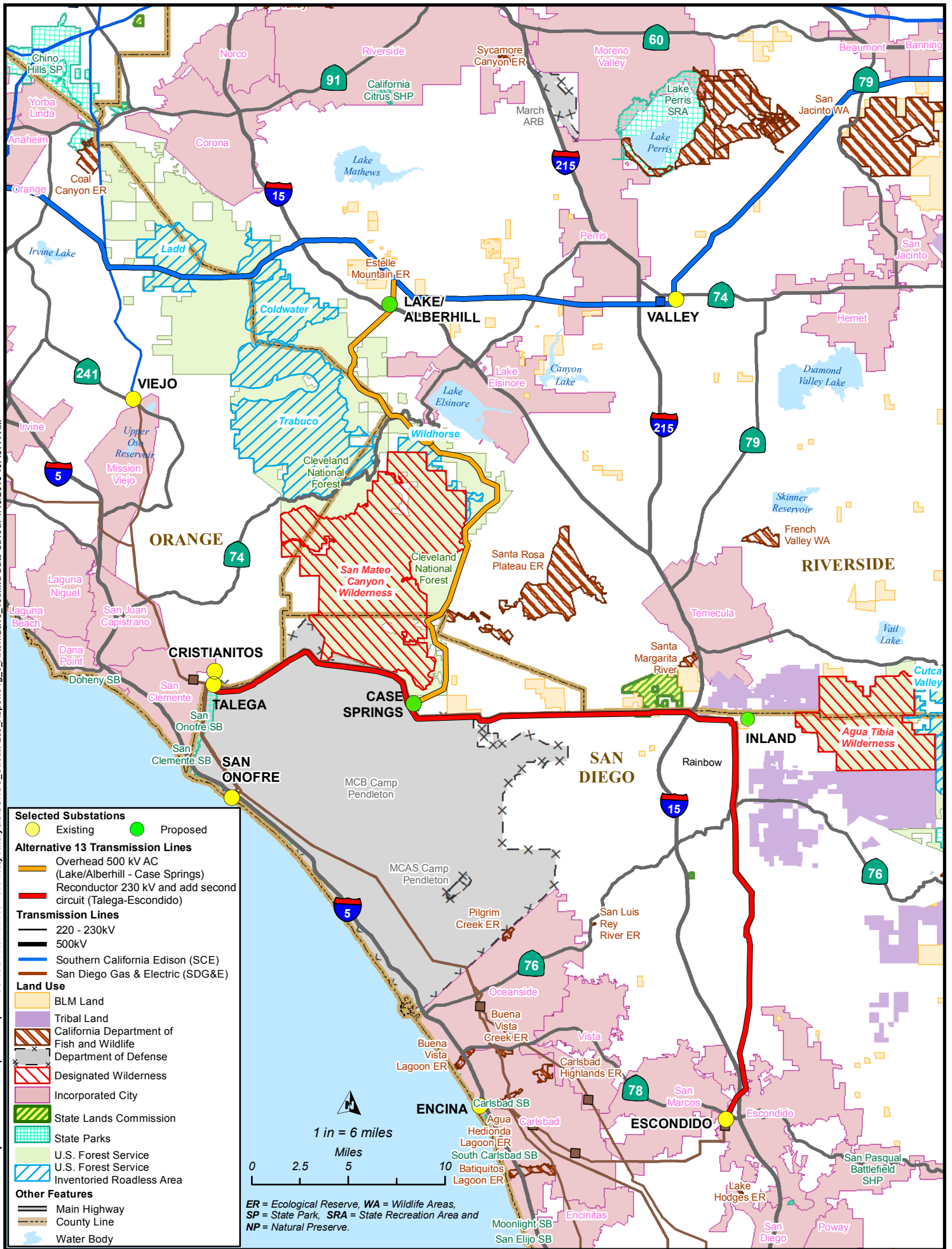
From Case Springs Substation, a new 230 kV circuit about 13 miles long would be installed heading west to Talega Substation on SDG&E's existing double-circuit towers, which currently carry a single-circuit 230 kV line. This existing circuit would be reconducted. The Case Springs to Talega ROW is on Camp Pendleton, along or near to the northern boundary of the base. Upgrades would be required at Talega Substation to accommodate the new 230 kV circuit.

Segment 3: Case Springs Substation to Escondido Substation

From Case Springs Substation east and south to Escondido Substation, a new 230 kV circuit about 38 miles long would be installed on SDG&E's existing double-circuit 230 kV towers, and the existing 230 kV circuit would be reconducted. From Case Springs Substation, the new 230 kV line would extend east in SDG&E's Talega-Escondido ROW for about 17 miles, crossing Interstate 15 and turning south for another 21 miles to Escondido Substation. Nearly 8 miles of 69 kV line would be removed from the 230 kV towers and located on new poles in the ROW. Upgrades at Escondido Substation would be needed to accommodate the new 230 kV circuit.

Figure 6 Alternative 13

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Source: California Energy Commission - Siting, Transmission and Environmental Protection Division, 2014

Land Uses

Table 8 identifies the land ownership for the TE/VS transmission line for each of the three segments analyzed in this report. As indicated, the overall project would be roughly 83 miles long, composed of 32 miles of new single-circuit 500 kV line and 51 miles of new single-circuit 230 kV circuit (plus reconductoring of the existing 51 miles of 230 kV line and moving 8 miles of 69 kV line to new poles).

Table 8: Land Jurisdiction – TE/VS (miles)

Line Segment	USFS (CNF)	Private Land		DOD (Camp Pendleton)	Total
		Incorporated	Unincorporated		
Segment 1: Valley-Serrano to Case Springs Substation (500 kV)	28.5	0	3.5	0	32
Segment 2: Case Springs to Talega Substation (230 kV)	0	0	0	13	13
Segment 3: Case Springs to Escondido Substation (230 kV)	0	3	29	6	38
TOTAL	28.5	3	32.5	19	83

Source: Aspen, 2014

The land uses along the TE/VS transmission route are described in three segments.

Segment 1: Valley-Serrano Transmission Line to Case Springs Substation

From the existing SCE Valley-Serrano line, about 2.7 miles of 500 kV line looping into and out of Lake Switchyard as well as the switchyard would be on private land in unincorporated Riverside County. Exiting Lake Switchyard, the 500 kV line would cross I-10, under the California Department of Transportation (Caltrans) jurisdiction, and through about 0.6 miles of private land before entering the CNF, Trabuco Ranger District. The Trabuco Ranger District covers portions of Riverside, Orange, and San Diego Counties. The 500 kV line would traverse CNF for about 27.6 miles to a new 500/230 kV Case Springs Substation that would be located on CNF land adjacent to SDG&E's Talega-Escondido 230 kV transmission line ROW located at Camp Pendleton. The route through CNF's Trabuco Ranger District would climb in elevation, from 1,100 feet at Lake Switchyard to 2,600 feet or higher in CNF.

The alignment would cross into Orange County for about 2 miles before returning to Riverside County and crossing SR 74 (Ortega Highway). Continuing south and southeast within CNF, the alignment would roughly parallel South Main Divide Road (Killen Trail) in the Elsinore Mountains west of Lake Elsinore, located at the foot of the mountains. Above Lake Elsinore, about 1.8 miles of the 500 kV line would be underground to accommodate hang gliders who launch from designated locations on the plateau above the lake. The transmission line route would be north of the San Mateo Canyon Wilderness. Near Elsinore Peak the route would turn south and southwest, roughly following Wildomar Road, skirting the eastern edge of the wilderness before crossing into San Diego County and reaching the Case Springs Substation site at the southern edge of CNF. Recreational

activities near the route include camping, hiking, equestrian trail riding, and hang gliding. The 500 kV route also would pass near some residential properties on private holdings within the CNF.

Segment 2: Case Springs Substation to Talega Substation

The new 230 kV line between Case Springs and Talega Substation would be in SDG&E's ROW on Camp Pendleton. The land along the route is unoccupied open space in which military training and exercises occur. Talega Substation is primarily on Camp Pendleton, with access from Avenida Pico in San Clemente, Orange County. The substation is nearly 1,200 feet from the nearest homes, a cluster of multifamily units in San Clemente. Immediately south of the substation is San Onofre State Park, on land leased from Camp Pendleton through 2021.

Segment 3: Case Springs Substation to Escondido Substation

The initial roughly 6 miles of SDG&E ROW from Case Springs to Escondido Substation is on Camp Pendleton. From Case Springs Substation, the route trends southeast for 2 miles then due east for 4 miles on Camp Pendleton. The ROW on Camp Pendleton is bounded on the north by the 1,200-acre Margarita Peak Preserve, administered by the Fallbrook Conservancy. This area is closed to the public and represents a sensitive habitat area. On the south side is mountainous open terrain of Camp Pendleton. The ROW leaves Camp Pendleton 1 mile west of De Luz Road north of Fallbrook, San Diego County, and enters private land. The ROW loops south of an extensive nursery operation on De Luz Road and then continues due east.

For about 5 miles after leaving the base, the ROW passes through hilly terrain with open land, agriculture, and low-density rural residential uses. East of Rock Mountain Drive for about 0.4 mile, the ROW is bordered on the south by eight large residential lots, some of which include agricultural and equestrian activities. For the next 5 miles to I-15, the ROW passes through hilly terrain characterized by unoccupied open space with occasional residential and agricultural parcels. Some of this land falls within the southern limits of the Santa Margarita Ecological Reserve, a collaboration of BLM, CDFW, and The Nature Conservancy that is managed by San Diego State University. The ROW follows the county line, crossing over I-15 just north of the Rainbow Valley Boulevard interchange. The ROW passes south of a boat and recreational vehicle (RV) storage area and north of an industrial facility before continuing across open land and turning south at the Inland Substation location. The Inland Substation is not required under the TE/VS proposal and is identified only for reference. From Camp Pendleton to the Inland Substation turning point, the ROW is on land under San Diego County jurisdiction, except the I-15 crossing, which is Caltrans' jurisdiction.

From where the ROW turns south, for about 14 miles to south of Lilac Substation, the ROW is in rolling terrain with a mix of open space, agricultural, and rural residential uses on both sides. From about 4 miles after the ROW turns south, about 8 miles of the second position on the towers between Pala and Lilac Substations is occupied by a 69 kV circuit. This 69 kV circuit would be relocated to new poles in the ROW to allow the new 230 kV circuit that would be installed on the existing 230 kV towers. As the alignment approaches Escondido, the last 7 miles of the ROW enters a more developed landscape. At a point nearly 2.4 miles northeast of the Mountain Meadow Road interchange with I-15, the 250-foot ROW is across the street from single-family homes backing onto a golf course. To the east is open land and agricultural land. Past this point for about 2.3 miles, the ROW is on a ridge with

open land on both sides. For the next 1.4 miles, the ROW passes through an area of rural residential properties. Entering Escondido near Wildflower Place, the ROW traverses a suburban residential area for about 0.5 mile before crossing Center City Parkway and entering a mixed-use area of low-density residential and commercial uses for about 0.8 mile.

The ROW then turns southwest just east of Escondido RV Resort on Seven Oaks Road, near West El Norte Parkway. At West El Norte Parkway, parking lots are located in the ROW both north and south of the parkway. The ROW crosses I-15 south of its interchange with West El Norte Parkway and continues southwest, passing through an area of low-density, single-family, and multifamily dwellings to the north and south and a large church to the south. At Montiel Road, San Marcos' Montiel Park and an associated parking lot are located in the ROW. A pipe storage yard is in the ROW on the south side of the street. Crossing SR 78 (Ronald Packard Parkway), the ROW enters an industrial area. Here the ROW is used for storage and parking. The ROW ends at Escondido Substation south of West Mission Road, off Don Lee Place. From the Inland Substation location near the county boundary to Escondido Substation, the line passes through lands under the jurisdiction of San Diego County, the City of Escondido, and Caltrans. A two-block section of the ROW near the Escondido Substation is in San Marcos.

Constraints

For the TE/VS 500 kV and 230 kV line routes, the environmental constraints potentially affecting development are diverse because of the length of the route and the varied land uses that would be affected. Constraints are addressed by segment.

Segment 1: Valley-Serrano Transmission Line to Case Springs Substation

This segment of the TE/VS route has three constraints:

1. Defining appropriate location for Case Springs Substation
2. Previous environmental studies and evaluations are outdated.
3. CNF Trabuco Ranger District is a high-fire-risk landscape.

Constraint 1: Defining Appropriate Location for Case Springs Substation

The exact location of the proposed Case Springs Substation has not been identified, except to say it is at the southern edge of CNF. Depending on location, construction of the Case Springs Substation would be constrained by terrain and by access road requirements, potentially affecting Camp Pendleton or an ecological reserve managed by the Fallbrook Conservancy.

Constraint 2: Previous Environmental Studies and Evaluations Are Outdated

The Federal Energy Regulatory Commission (FERC) published an FEIS in 2007 for the LEAPS pumped storage project known. The FEIS evaluated the TE/VS route through CNF as part of the proposed project, and the CNF issued a record of decision approving the project, based on the FERC FEIS. However, this decision and the FEIS are now more than 7 years old, and the supporting studies are even older. The USFS would have to evaluate whether these older approvals and conditions are still viable. The studies and the FEIS may need to be updated. If a new impact analysis were required for the route through CNF, the new assessment likely would be much more rigorous than the past

one, given Forest Service procedures implemented since 2007. It is unknown whether approval for the same route would be granted in 2014. In addition, this segment provides habitat for a number of biological species of concern.

Constraint 3: CNF Is a High-Fire-Risk Area

The USFS, in recent assessments of other transmission lines, has indicated serious concerns about fire risks. CNF's Trabuco Ranger District has a history of serious wildfires. Fires can be ignited during construction from sparks and accidents, and, once in operation, high-voltage lines can pose hazards to firefighters and fire-fighting aircraft, limiting the ability to attack a fire under or adjacent to the energized line. There are developed residential communities on private holdings within the CNF with very limited ingress/egress.

Segment 2: Case Springs Substation to Talega Substation

This segment has one potential constraint:

- Upgrades at Talega Substation to accommodate a new 230 kV line from Case Springs and a reconducted 230 kV line.

Constraint 1: Upgrades at Talega Substation

The existing Talega-Escondido 230 kV line towers have a vacant position suitable for a second 230 kV circuit between the proposed Case Springs Substation and Talega Substation. No environmental or permitting constraints have been identified for this potential upgrade given that the towers already exist and only the conductors and insulators would need to be added. However, separately SDG&E has proposed a the South Orange County Reliability Enhancement (SOCRE)⁷ project to upgrade and reconfigure lines into Talega Substation from the north and south to improve reliability in the Orange County area it serves.

Currently, three 230 kV transmission lines, four 138 kV transmission lines, and one 69 kV transmission line connect to the 230/138/69 kV Talega Substation. Talega Substation may need to be expanded to accommodate the equipment changes and line reconfigurations of the SOCRE project in addition to the new 230 kV line from Case Springs Substation. The Talega Substation upgrades to accommodate additional circuits and equipment may require enlarging the substation. Substation expansion would be on either private property or at Camp Pendleton. A large portion of the substation is on Camp Pendleton property, with the rest extending north into Orange County. The

7. The SOCRE project was included in the California ISO 2010-2011 *Transmission Plan* and is being evaluated by CPUC. This project would require equipment changes and line reconfigurations within and around Talega Substation, which has limited space. One potential alternative identified for the SOCRE project was Alternative H, which would be a new 230 kV circuit installed in the ROW from Escondido that would bypass Talega Substation and connect directly to a proposed rebuilt San Juan Capistrano Substation. From Escondido to Talega, this would use the open position on the 230 kV towers. In an October 2014 *CEQA Alternatives Screening Report* by CPUC, it was determined that, while feasible in meeting basic project objectives, this alternative would not reduce any potentially significant effects of the proposed SOCRE project and would not be considered further. (CPUC, 2014) The CPUC's website for the project provides a link to the Alternatives Screening Report as well. The environmental review of the SOCRE proposal is ongoing, and no decision has been made by the CPUC as of this writing.

substation is located on top of a graded hill, with downward slopes to the east, west, and south. Expansion of the substation boundaries does not appear to be feasible without major grading and earth moving.

Use of additional Camp Pendleton land would require an agreement with the U.S. Department of the Navy. Immediately north of the substation is San Clemente and unincorporated Orange County. San Onofre State Park is south of the substation on land leased by the state from Camp Pendleton through 2021. The park extends from the substation south along the county line to Interstate Highway 5 (I-5).

Segment 3: Case Springs Substation to Escondido Substation

One constraint has been identified for this segment:

- Disruption in Santa Margarita Ecological Reserve.

Constraint 1: Disruption in ROW Through Santa Margarita Ecological Reserve

This 230 kV segment passes through the nearly 50-year-old Santa Margarita Ecological Reserve, most of which is in Riverside County and north of the ROW. However, along the county line, sections of the existing Talega-Escondido ROW near the Santa Margarita River fall within the reserve boundary. Construction in the ROW likely would require mitigation for affected special status species.

CHAPTER 5: Environmental Feasibility Ranking of Alternative Segments

The Energy Commission requested that the Aspen Team rank the 13 alternatives evaluated to date. This chapter identifies the most environmentally feasible projects encompassed by the alternatives. This ranking includes consideration of assembling alternative transmission segments in a different manner than the alternatives were initially presented by the proponents. The alternatives have been considered in three reports, as described below.

The May 2014 report⁸ evaluated eight alternatives, including two variants of Alternatives 5 and 6:

- Alternative 1, Submarine Cable HVDC
- Alternative 2, Alberhill to Suncrest
- Alternative 3, Enhanced TE/Vs (Forest Route)
- Alternative 4, Enhanced TE/Vs (Talega-Serrano Route)
- Alternative 5, 1A, Imperial Valley to Inland 500 kV overhead
- Alternative 5, 1B, Imperial Valley to Inland HVDC overhead and underground
- Alternative 6, 2A, Valley to Inland 500 kV overhead
- Alternative 6, 2B, Valley to Inland HVDC all underground
- Alternative 7, Imperial Valley Sub. expansion
- Alternative 8, Mesa Substation loop-in

The September 2014 Addendum⁹ considered two additional alternatives:

- Alternative 9, Proposed Hooper Substation to SONGS (proposed by the IID)
- Alternative 10, Midway Substation to Devers Substation (proposed by SCE)

This addendum evaluates three additional alternatives, including two variants of Alternative 11:

⁸ *Transmission Options and Potential Corridor Designations in Southern California in Response to Closure of San Onofre Nuclear Generating Stations (SONGS): Environmental Feasibility Analysis*. California Energy Commission. Publication Number: CEC-700-2014-002, posted at <http://www.energy.ca.gov/2014publications/CEC-700-2014-002/index.html>.

⁹ *Second Addendum to Transmission Options and Potential Corridor Designations in Southern California in Response to Closure of San Onofre Nuclear Generating Station (SONGS): Environmental Feasibility Analysis*. California Energy Commission. Publication Number: CEC-700-2014-002-AD2, posted at <http://www.energy.ca.gov/2014publications/CEC-700-2014-002/index.html>.

- Alternative 11A, DATC Orange County upgrade, 230 kV
- Alternative 11B, DATC Orange County upgrade, HVDC
- Alternative 12, SDG&E's Imperial Valley to Inland Route
- Alternative 13, TNHC's TE/VS project

Ranking Categories

These alternatives serve three purposes, so they are grouped into three categories for ranking. The feasibility ranking is presented separately for each of the three categories, as shown in Table 9.

Table 9: Transmission Alternatives by Type

Alternative Type	Alternatives
SONGS Area Transmission Options	<ul style="list-style-type: none"> • Alternative 1, Submarine Cable HVDC • Alternative 2, Alberhill to Suncrest • Alternative 3, Enhanced TE/VS (Forest Route) • Alternative 4, Enhanced TE/VS (Talega-Serrano Route) • Alternative 6, 2A, Valley to Inland 500 kV Overhead • Alternative 6, 2B, Valley to Inland HVDC All Underground • Alternative 11A, Duke Orange County Upgrade, 230 kV • Alternative 11B, Duke Orange County Upgrade, HVDC • Alternative 13, The Nevada Hydro Company's TE/VS Project
Imperial Valley Import Lines	<ul style="list-style-type: none"> • Alternative 5, 1A, Imperial Valley to Inland 500 kV Overhead • Alternative 5, 1B, Imperial Valley to Inland HVDC Overhead and Underground • Alternative 9, IID's Proposed Hooper Substation to SONGS • Alternative 10, SCE's Midway Substation to Devers Substation • Alternative 12, SDG&E's Imperial Valley to Inland Route
Local Upgrades	<ul style="list-style-type: none"> • Alternative 7, Imperial Valley Substation Expansion • Alternative 8, Mesa Substation Loop-In

Source: Aspen, 2014

The permitting constraints defined for each category of transmission options below are presented in the four color categories defined below.

Table 10: Key to Summary Table: Likelihood of Successful Permitting and Construction

■ Green: Possible	No major obstacles to permitting or construction
■ Yellow: Possible but Challenging	Siting constraints but likely can be overcome
■ Orange: Challenging	Serious siting challenges that may not be resolvable
■ Red: Very Challenging	Very serious siting challenges that may make routes infeasible

Source: Aspen, 2014

Category 1: SONGS Area Transmission Options

Table 11 shows nine alternative projects that would enhance the transmission system in the immediate area of SONGS. Each of these transmission options would connect the SCE and SDG&E transmission systems. The nine alternatives in this category are listed below, in order from those with the fewest overall environmental constraints to those with the most challenging constraints. The rankings appear in Table 11; they are followed by a brief review of the most severe constraints for each alternative.

Table 11: Ranking SONGS Area Transmission Options

Rank	Alternative Name	Description	Likelihood of Successful Permitting
1.	Alternative 6, 2B. Valley to Inland (HVDC)	All underground DC through Temecula area	Possible but Challenging
2.	Alternative 1. Submarine Cable HVDC	Alamitos or Huntington Beach to San Onofre or Encina	Possible but Challenging
3.	Alternative 11A, Duke Orange County(230 kV)	Baker Canyon to Santiago (230 kV)	Challenging
4.	Alternative 11B, Duke Orange County(HVDC)	Baker Canyon to Santiago (HVDC)	Challenging
5. (tie)	Alternative 13, TNHC Talega/Escondido–Valley/Serrano	Valley-Serrano to Case Springs, Talega and Escondido	Challenging
5. (tie)	Alternative 3. Enhanced TE/VS (Forest Route: North Segment)	500kV Alberhill to Inland	Challenging
6.	Alternative 4. Enhanced TE/VS (Talega-Serrano Route Segment)	500 kV Serrano to Inland	Challenging

Rank	Alternative Name	Description	Likelihood of Successful Permitting
7.	Alternative 6, 2A. Valley to Inland (500 kV Overhead)	All Overhead 500 kV Through Temecula and environs	Very Challenging
8.	Alternative 2. Alberhill to Suncrest	Alberhill to Suncrest I-15 Corridor to SR 79	Very Challenging

Source: Aspen, 2014

Alternatives With Fewest Overall Constraints:

1. **Alternative 6, 2B, Valley to Inland (HVDC Underground).** This all-underground route would avoid federal lands, tribal lands, and areas where siting or visibility of a high-voltage overhead line would be unacceptable. However, the high cost of underground installation and potential challenges related to avoiding other underground utilities were the reasons for the “*Possible but Challenging*” ranking. If it were necessary to add 230 kV components between Talega and Escondido to expand this alternative to improve delivery to coastal areas from the Inland Substation, these 230 kV components were separately analyzed as part of Alternative 13 (Talega/Escondido–Valley/Serrano Interconnect). This segment was also ranked “*Possible but Challenging*” because of the passage through an ecological preserve and the need to upgrade the geographically constrained Talega Substation. As a result, the addition of the 230 kV components would not substantially increase the challenges of permitting.
2. **Alternative 1, Submarine Cable HVDC.** This underwater route avoids challenging onshore land-use constraints and so is ranked “*Possible but Challenging*” due to engineering challenges from seafloor topography and fault crossings and crossing marine preserves.

Alternatives With Equally Challenging Moderate Constraints:

3. **Alternative 11A, Duke Orange County (230 kV).** This overhead and underground 230 kV route was ranked “*Challenging*” as it would require expansion of an existing ROW through the Irvine Ranch Open Space and existing parks as well as developing the Baker Canyon Substation in challenging terrain.
4. **Alternative 11B, Duke Orange County (HVDC).** This overhead and underground HVDC route also was ranked “*Challenging*” but would likely be more difficult to permit than Alternative 11A because it would require a new ROW through the Irvine Ranch Open Space and existing parks as well as a new an AC/DC converter station in challenging terrain near Baker Canyon.
5. **Alternative 13, TNHC Talega/Escondido–Valley/Serrano Interconnect and the identical northern portion of Alternative 3. Enhanced TE/VS (Forest Route: North Segment).** This alternative is ranked “*Challenging*” to permit because, while a 2007 FERC EIS evaluated most of this route, it is nearly all on federal land, and the USFS

review process is more comprehensive than FERC's process. In addition, environmental studies are out of date.

Alternatives With Most Challenging Serious Constraints:

6. **Alternative 4, Enhanced TE/VS (Talega-Serrano Route Segment).** The Inland-to-Serrano segment was ranked "*Challenging*" to permit, requiring substantial corridor re-engineering and passing through residential areas. It would also require expansion of the Talega Substation and expansion of the ROW in Camp Pendleton and Santa Margarita Ecological Reserve. The separate southern segment from Inland to Suncrest was ranked "*Very Challenging*" because it would cross USFS land that has been proposed for wilderness designations and through tribal land (La Jolla). For the same reasons, the southern segment of Alternative 3 (Enhanced TE/VS) from Inland to Suncrest also was ranked "*Very Challenging*."
7. **Alternative 6, 2A, Valley to Inland (500 kV Overhead).** This alternative is ranked "*Very Challenging*" because it would require permitting a 500 kV overhead route through this densely developed area and likely infeasible due to challenges in avoiding residential land uses, routing through central Temecula, wilderness areas, and tribal land.
8. **Alternative 2, Alberhill to Suncrest.** Reaching Suncrest Substation from the north requires use of CNF lands with proposed wilderness designations. Densely populated residential areas of Temecula and untested use of I-15 Caltrans ROW would be required, resulting in an overall ranking of "*Very Challenging*."

This ranking process also considered the potential for assembling segments from the various alternatives in ways different than they were presented by the California ISO or project proponents. For the SONGS area alternatives, 230 kV components between Talega and Escondido were separately analyzed as part of Alternative 13 (Talega/Escondido–Valley/Serrano Interconnect) and as a segment would be ranked "*Possible but Challenging*." Accordingly, adding the 230 kV components between Talega and Escondido would not substantially increase the challenges of permitting. However, southern segments between Inland to Suncrest would be ranked "*Very Challenging*" and would not improve the feasibility of any of the alternatives.

Category 2: Imperial Valley Import Lines

Table 12 shows five alternatives to ease imports from the Imperial Valley to the Los Angeles basin and/or northern San Diego County areas. The five alternatives in this category are listed below, in order of the fewest to most constraints. The rankings appear in Table 12 followed by a brief recap of the most severe constraints for each alternative.

Table 12: Ranking Imperial Valley Import Lines

Rank	Alternative Name	Description	Likelihood of Successful Permitting
1.	Alternative 10, SCE Midway Substation to Devers Substation	IID's Midway Substation to SCE's Devers Substation	Possible but Challenging
2.	Alternative 9, IID Strategic Transmission Expansion Project	Proposed Hooper Substation to SONGS (HVDC)	Challenging
3.	Alternative 5, 1B. Imperial Valley to Inland (HVDC)	HVDC Overhead and Underground	Challenging
4.	Alternative 12, SDG&E's Imperial Valley to Inland Route	500 kV or HVDC via Santa Rosa-San Jacinto National Monument	Very Challenging
5.	Alternative 5, 1A. Imperial Valley to Inland (500 kV)	500 kV Overhead	Very Challenging

Source: Aspen, 2014

Alternatives With Fewest Overall Constraints:

1. **Alternative 10, SCE Midway Substation to Devers Substation.** Due to required acquisition or expansion of ROW across agricultural land, crossing of tribal land (Agua Caliente), and need to route around residential areas near Indio, this alternative is ranked "*Possible but Challenging.*"
2. **Alternative 9, IID Strategic Transmission Expansion Project, Proposed Hooper Substation to SONGS.** Two of four segments are ranked "*Possible but Challenging*" with issues similar to those for Alternative 10; these are the segments from Hooper Substation to Devers Substation and from Valley Substation to Inland. The western segments, including between Devers and Valley and between Inland and SONGS, are ranked "*Challenging*" because of the need to route carefully through tribal land and around residential areas and to widen the ROW through Camp Pendleton.

Alternatives With Most Challenging Serious Constraints:

3. **Alternative 5, 1B, Imperial Valley to Inland (HVDC Overhead and Underground).** The Imperial Valley segment across BLM and agricultural lands is ranked "*Possible but Challenging,*" but the passage through Anza-Borrego Desert State Park and northern San Diego County is ranked "*Challenging.*"
4. **Alternative 12, SDG&E's Imperial Valley to Inland Route.** While the Imperial and Coachella Valley portions of the route would face some permitting challenges, these

could likely be overcome much more easily than the mountainous segment passing through the Santa Rosa-San Jacinto National Monument, USFS roadless areas, and tribal lands, resulting in an overall *“Very Challenging”* ranking. The inland portion of the route would be ranked *“Challenging”* due to the crossing tribal lands and additional areas of USFS roadless areas.

5. **Alternative 5, 1A, Imperial Valley to Inland (500 kV Overhead).** This alternative, like Alternative 5, 1B, includes an Imperial Valley segment across BLM and agricultural lands that is ranked *“Possible but Challenging.”* However, an overhead passage through Anza-Borrego Desert State Park and northern San Diego County would face major permitting hurdles and is ranked *“Very Challenging.”*

This ranking process also considered the potential for assembling segments from the five alternatives in ways different than they were presented by the California ISO or project proponents. With the exception of SCE’s Midway to Devers (Alternative 10), all of these routes would require crossing the Santa Rosa/San Jacinto Mountains or passage north of those mountains through the San Geronio Pass. No segments have been identified that could be assembled in a manner that would result in constraints likely to be less than those of the two top ranked alternatives defined above.

Category 3: Local Upgrades

There are two alternatives that require local upgrades to specific substations. The May 2014 report presents these options, and during the time of analysis, they were approved as part of the *2013-2014 California ISO Transmission Plan*. The local upgrade with the least constraints is listed first below.

Alternatives With Fewest Overall Constraints:

1. **Alternative 8, Mesa Substation Loop-In.** The substation in this urban area could be expanded without any significant constraints, so it was ranked *“Possible.”*
2. **Alternative 7, Imperial Valley Substation Expansion.** Because this substation is located within flat-tailed horned lizard habitat and in BLM’s Yuha Desert Wildlife Management Area, substation expansion was ranked *“Possible but Challenging.”*

ACRONYMS

ABDSP	Anza-Borrego Desert State Park
AC	Alternating current
AC/DC	Alternating current/direct current
ACEC	Area of Critical Environmental Concern
ALJ	administrative law judge
Aspen	Aspen Environmental Group
BLM	U.S. Bureau of Land Management
California ISO	California Independent System Operator
Caltrans	California Department of Transportation
CDFW	California Department of Fish and Wildlife
CNF	Cleveland National Forest
CPCN	Certificate of Public Convenience and Necessity
CPUC	California Public Utilities Commission
DATC	Duke American Transmission Company
DC	direct current
DOD	U.S. Department of Defense
EIR	Environmental impact statement
EIS	Environmental impact statement
EMF	electric and magnetic field
FERC	Federal Energy Regulatory Commission
FEIS	final environmental impact statement
HVDC	high-voltage direct current
I-5	Interstate Highway 5
I-10	Interstate Highway 10
IID	Imperial Irrigation District
kV	kilovolt
LEAPS	Lake Elsinore Advanced Pumped Storage
LUPA	Land Use Planning Amendment
MW	megawatt(s)
ROW	right-of-way
RV	Recreational vehicle
SBNF	San Bernardino National Forest
SCE	Southern California Edison
SDG&E	San Diego Gas & Electric Company
SMRPD	Silverado-Modjeska Recreation and Park District
SOCRE	South Orange County Reliability Enhancement
SONGS	San Onofre Nuclear Generating Station
SR	State Route
TE/VS	Talega-Escondido/Valley-Serrano (transmission route)
SVRA	State Vehicular Recreational Area
TNHC	The Nevada Hydro Company

USFS

U.S. Forest Service

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