2018-2019 Transmission Planning Process (TPP) – Alliance Draft Study Plan Comments and Economic Study Request

Submitted by	Company	Date Submitted
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The Alliance (PG&E and TC) appreciates the CAISO's efforts on the 2018-19 Transmission Planning Process (TPP) study plan and is generally supportive of the draft study plan. We agree with the CAISO plans to study the benefits of reducing LCR requirements in LCR areas over the next two cycles. Additionally the Alliance requests the CAISO to conduct an economic study of the transmission project described below.

Economic Study Request: New Alberhill – Sycamore 500 kV Transmission Line, new Sycamore 500/230 kV transformer, new 500/230 kV transformer at Suncrest and a new double circuit 230 kV transmission line that loops the existing Miguel – Sycamore 230 kV line into Suncrest (Proposed Transmission Project).

The Alliance has independently studied the various benefits of the Proposed Transmission Project as outlined in the following report and requests the CAISO to conduct an economic study of the Proposed Transmission Project by determining the following:

1. Reduced LCR and associated contract costs in LA Basin and SDG&E/Imperial Valley areas
2. Reduction in production costs
3. Reduction in curtailment of renewable resources
4. Avoided cost associated with deferral or displacement of alternative reliability projects
5. Ability to internally build and deliver increased renewable energy supporting future Policy initiatives

The total qualifying capacity in the LA Basin Area in 2022 is projected to be 8,138 MW, with a margin of 2,181 MW above the 5,957 MW LCR category B need. The total qualifying capacity in the San Diego/Imperial Valley Area in 2022 is projected to be 4,572 MW, with a margin deficiency of 71 MW below the 4,643 MW LCR category B need. It can be expected that the margins in these regions will reduce over time as future generation retirements and closure of the Aliso Canyon gas storage facility are considered.

A Multi-Value Project: The Proposed Transmission Project, in addition to the tightening LCR margin, also provides reliability benefits as detailed in the Alliance's request window project submission in October 2017 as a part of the 2017-18 CAISO Transmission Planning Process. Further, the Proposed Transmission Project may provide production cost and other strategic policy based benefits in support of increasing California Renewable Portfolio Standards and carbon free energy delivery to the major load centers of Los Angeles and San Diego. For these reasons, the Alliance team believes it would be prudent for the CAISO to perform an economic study of the Proposed Transmission Project.

Transmission Project Economic Assessment Summary

The Alliance of Pacific Gas & Electric Company and TransCanyon, LLC

2018-19 CAISO TPP Economic Study Request Window

March 2018

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LIST OF ABBREVIATIONS

Abbreviation	Term/Phrase/Name
Alliance	Alliance of Pacific Gas & Electric Company and TransCanyon, LLC
CAISO	California Independent System Operator
LCR	Local capacity requirement
PCM	Production Cost Model
PG&E	Pacific Gas & Electric Company.
RPS	Renewable Portfolio Standard
TEAM	Transmission Economic Assessment Methodology
TPP	Transmission Planning Process
TransCanyon	TransCanyon, LLC

1.0 PROJECT BACKGROUND

1.1 Overview

In October of 2017, the Alliance of Pacific Gas & Electric Company (PG&E) and TransCanyon, LLC (TransCanyon) (Alliance) submitted the "San Diego / LA Basin Transmission Interconnection" (Project) Project information in accordance with Section 4.4.3.1 of the California Independent System Operator (CAISO) Transmission Planning Process Business Practice Manual. The October submittal was provided to CAISO during Phase 2 response window and detailed the reliability analysis and results associated with the Project. CAISO's reliability analysis indicated thermal loading issues to the Suncrest to Sycamore Canyon 230-kV path in every case model except the 2019 Spring Light Load and 2022 Spring Off-Peak cases. The Alliance proposed a project to address the reliability needs and to mitigate the thermal overload violations identified by CAISO. The Attachment A technical information and results of the reliability analysis as presented to CAISO as part of the request window is included in this report.

Subsequent to the response window, the Alliance analyzed a variety of economic benefits associated with the Project as well as other variations or individual components of the Project including production cost, environmental, and local capacity requirement (LCR) benefits. High level benefit/cost ratio results of this analysis are shown in Table 1-1 and discussed in the following sections of this document. The primary projects considered in this economic evaluation include the following:

- Project One – Alberhill to Sycamore 500 kV
- Project Two – Devers to Suncrest 500 kV
- Project Three – Loop Miguel to Sycamore into Suncrest 230 kV
- Project Four – Alberhill to Sycamore 500 kV and loop Miguel to Sycamore into Suncrest 230 kV
- Project Five – Devers to Suncrest 500 kV and loop Miguel to Sycamore into Suncrest 230 kV

Table 1-1: Benefit Cost Ratios

		Benefit/Cost Ratio Low				Benefit/Cost Ratio High			
		Benefit ($M)	Cost ($M)	Benefit-Cost	BCR	Benefit ($M)	Cost ($M)	Benefit-Cost	BCR
P1	Alberhill – Sycamore 500kV	$264	$593	($329)	0.45	$525	$593	($67)	0.89
P2	Devers – Suncrest 500kV	$417	$690	($274)	0.60	$574	$690	($117)	0.83
P3	Miguel – Sycamore loop into Suncrest 230kV	$114	$133	($19)	0.86	$114	$133	($19)	0.86
P4	Alberhill – Sycamore 500kV + Miguel – Sycamore loop into Suncrest 230kV	$428	$725	($298)	0.59	$689	$725	($37)	0.95
P5	Devers – Suncrest 500kV + Miguel – Sycamore loop into Suncrest 230kV	$485	$823	($338)	0.59	$642	$823	($181)	0.78

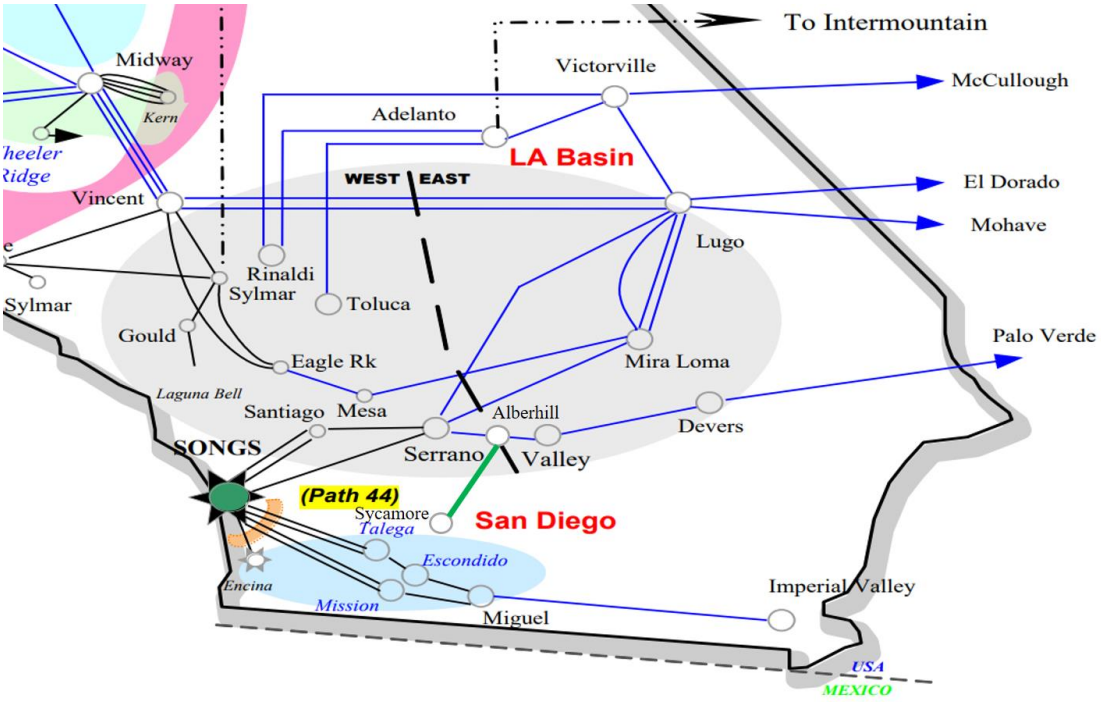
1.2 Project One: Alberhill – Sycamore 500kV

Project One (P1) is a new 500 kV transmission line from the proposed Alberhill 500 kV substation to a new 500 kV addition to the existing 230 kV Sycamore Canyon substation with a new 500/230 kV transformer. Estimated costs for Project One are shown below in Table 1-2. A project diagram representing the interconnection of Project One can be seen in Figure 1-1.

Table 1-2: Project One Cost Breakdown

Components	Estimated Cost ($MM)
500-kV Substation Modifications (Alberhill and Sycamore Canyon)	$40.40
500-kV Single Circuit Transmission Line	$275.90
AFUDC/Overhead Costs	$55.35
Environmental/Permitting and Land Acquisition Costs	$37.17
GRAND TOTAL (2017 dollars)	**$408.80**

Figure 1-1: Project One Diagram



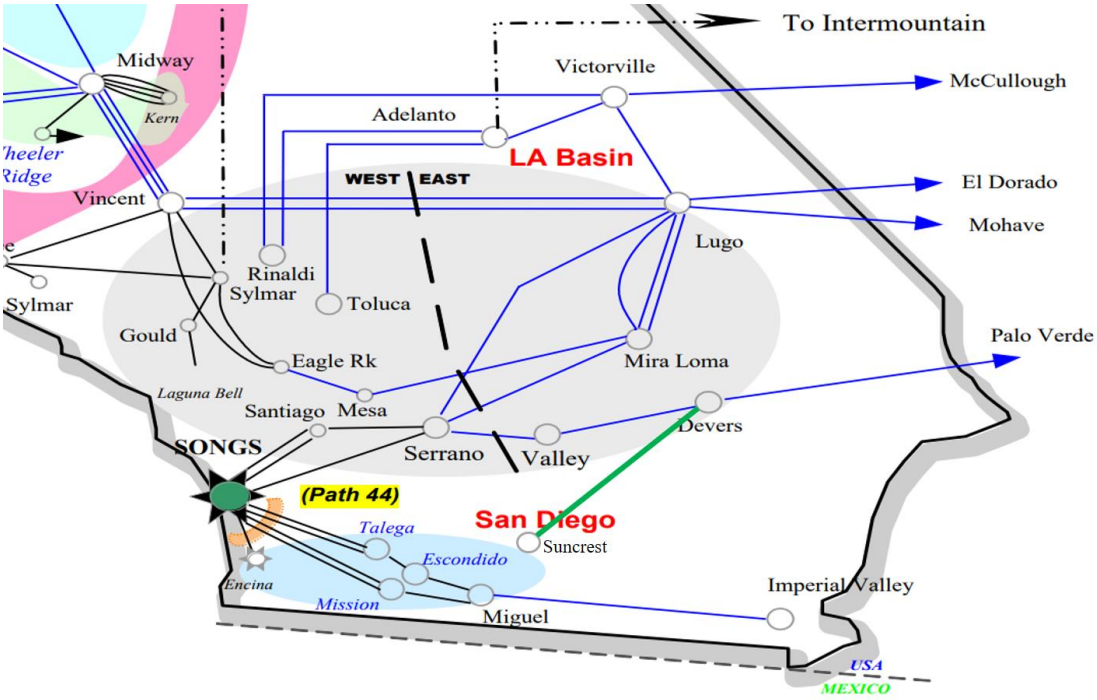
1.3 Project Two: Devers – Suncrest 500kV

Project Two (P2) is a new 500 kV transmission line from the existing Suncrest 500 kV substation to the existing Devers 500 kV substation. This is the same project that the Alliance submitted as an economic study in March of 2017. Estimated costs for Project Two are shown below in Table 1-3. A project diagram representing the interconnection of Project Two can be seen in Figure 1-2.

Table 1-3: Project Two Cost Breakdown

Components	Estimated Cost ($MM)
500-kV Substation Modifications (Devers and Suncrest)	$25.20
500-kV Single Circuit Transmission Line	$343.20
AFUDC/Overhead Costs	$64.47
Environmental/Permitting and Land Acquisition Costs	$43.29
GRAND TOTAL (2017 dollars)	**$476.20**

Figure 1-2: Project Two Diagram



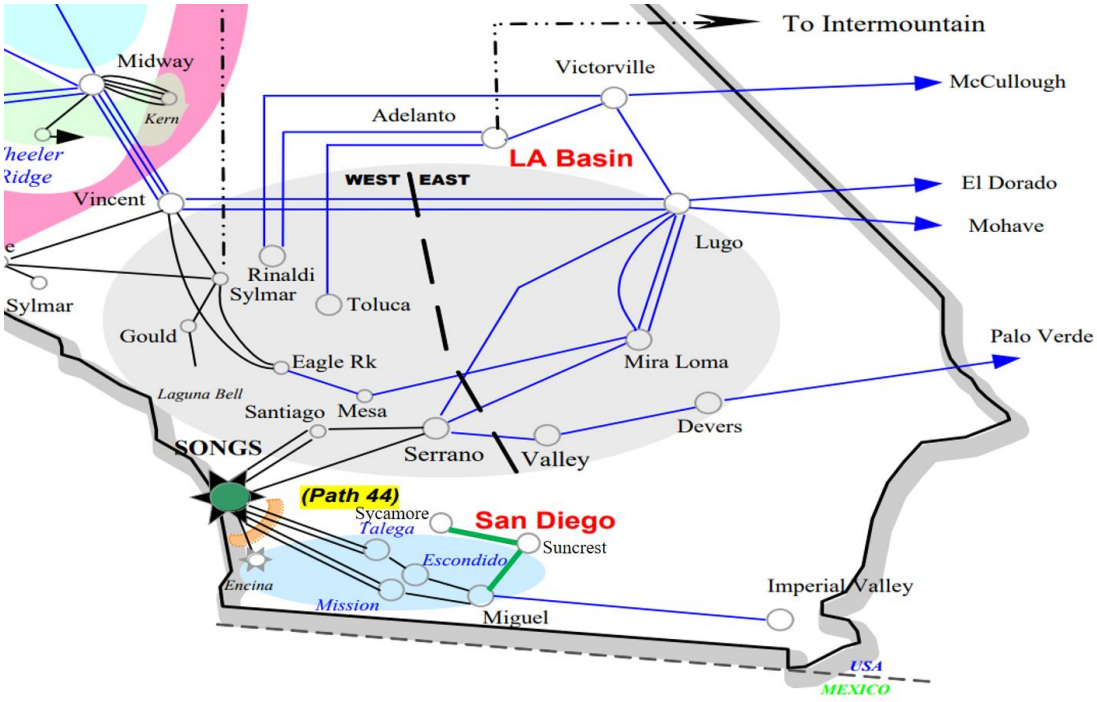
1.4 Project Three: Miguel – Sycamore Loop into Suncrest 230kV

Project Three (P3) is the installation of a third transformer at the Suncrest 230 kV substation and a new double circuit 230 kV transmission line that will loop the existing Miguel – Sycamore Canyon 230 kV transmission line to the Suncrest substation. Estimated costs for Project Three are shown below in Table 1-4. A project diagram representing the interconnection of Project Three can be seen in Figure 1-3.

Table 1-4: Project Three Cost Breakdown

Components	Estimated Cost ($MM)
230kV Substation Modifications (Suncrest, Miguel, and Sycamore Canyon)	$25.90
230-kV Double Circuit Transmission Line	$44.90
AFUDC/Overhead Costs	$12.39
Environmental/Permitting and Land Acquisition Costs	$8.32
GRAND TOTAL (2017 dollars)	**$91.50**

Figure 1-3: Project Three Diagram



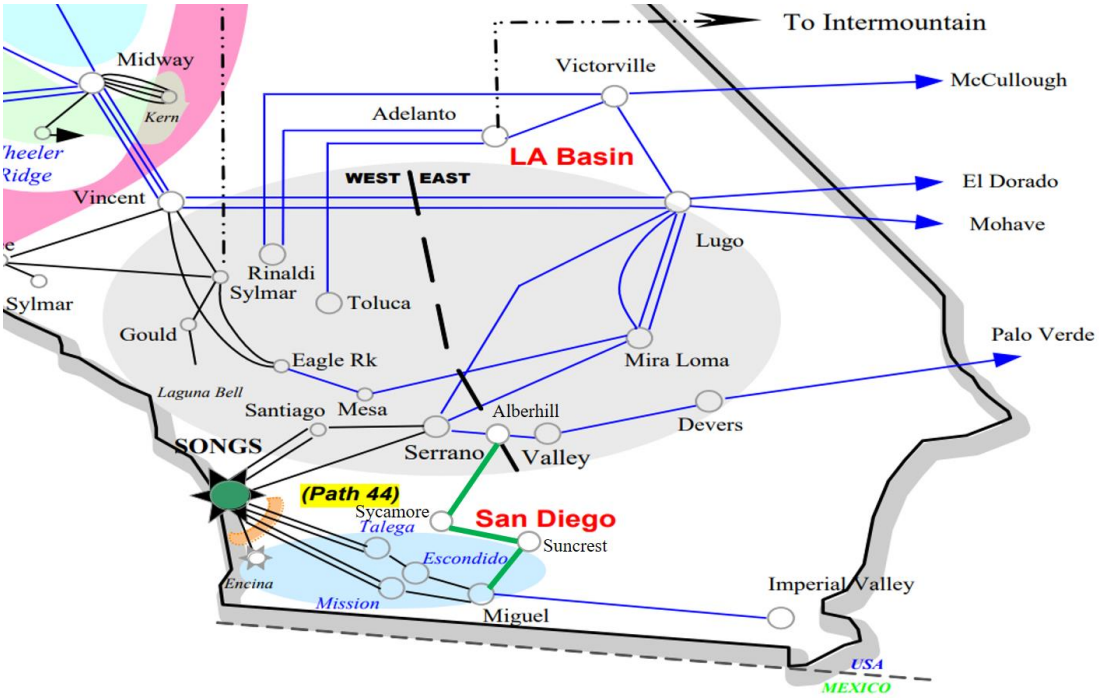
1.5 Project Four: Alberhill – Sycamore 500kV + Miguel – Sycamore Loop into Suncrest 230kV

Project Four (P4) is a combination of Project Three and Project One. Project Four is the inclusion of a new 500 kV transmission line from the proposed Alberhill 500 kV substation to a new 500 kV addition to the existing 230 kV Sycamore Canyon substation with a new 500/230 kV transformer, and a third transformer and a new double circuit 230 kV transmission line that will loop the existing Miguel – Sycamore Canyon 230 kV transmission line to the Suncrest substation. Estimated costs for Project Four are shown below in Table 1-5. A project diagram representing the interconnection of Project Four can be seen in Figure 1-4.

Table 1-5: Project Four Cost Breakdown

Components	Estimated Cost ($MM)
500-kV Substation Modifications (Alberhill and Sycamore Canyon)	$40.40
500-kV Single Circuit Transmission Line	$275.90
230kV Substation Modifications (Suncrest, Miguel, and Sycamore Canyon)	$25.90
230-kV Double Circuit Transmission Line	$44.90
AFUDC/Overhead Costs	$67.74
Environmental/Permitting and Land Acquisition Costs	$45.48
GRAND TOTAL (2017 dollars)	**$500.30**

Figure 1-4: Project Four Diagram



1.6 Project Five: Devers – Suncrest 500kV + Miguel – Sycamore Loop into Suncrest 230kV

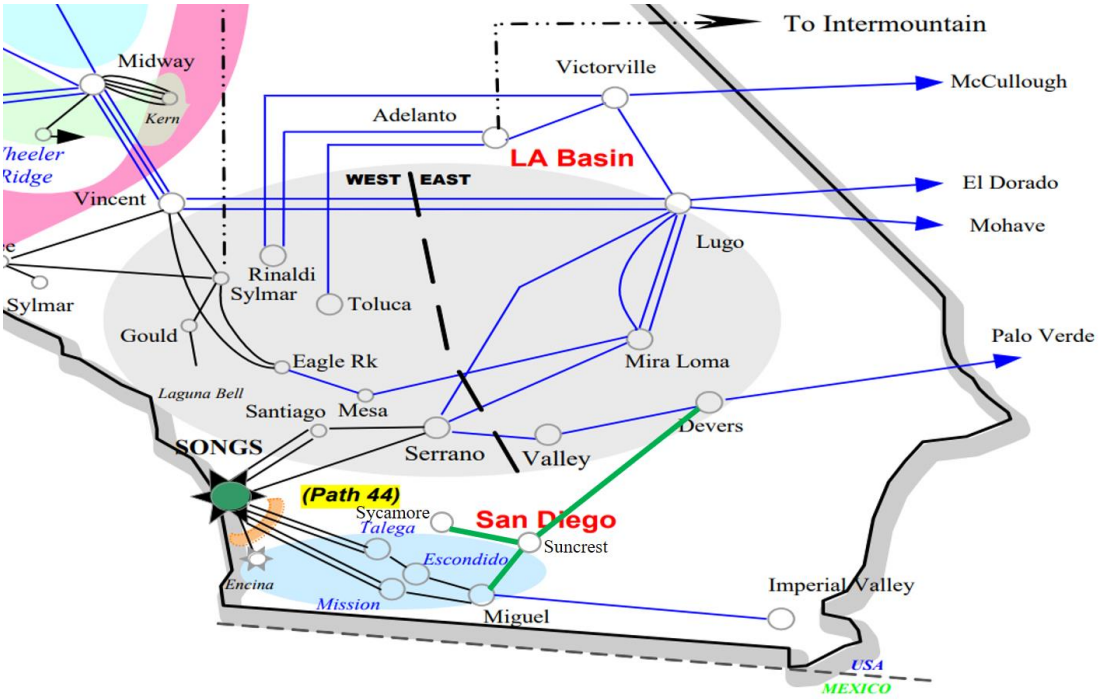
Project Five (P5) is a combination of Project Two and Project Three. Project Five is the inclusion of a new 500 kV transmission line from the existing Suncrest 500 kV substation to the existing Devers 500 kV substation, and a third transformer and a new double circuit 230 kV transmission line that will loop the existing Miguel – Sycamore Canyon 230 kV transmission line to the Suncrest substation. Estimated costs

for Project Five are shown below in Table 1-6. A project diagram representing the interconnection of Project Five can be seen in Figure 1-5.

Table 1-6: Project Five Cost Breakdown

Components	Estimated Cost ($MM)
500-kV Substation Modifications (Alberhill and Sycamore Canyon)	$25.20
500-kV Single Circuit Transmission Line	$343.20
230kV Substation Modifications (Suncrest, Miguel, and Sycamore Canyon)	$25.90
230-kV Double Circuit Transmission Line	$44.90
AFUDC/Overhead Costs	$76.86
Environmental/Permitting and Land Acquisition Costs	$51.61
GRAND TOTAL (2017 dollars)	**$567.70**

Figure 1-5: Project Five Diagram



2.0 ECONOMIC MODELING

2.1 Modeling Overview

GridView (version 9.7.26.20), a production cost modeling software program licensed from ABB, was used to evaluate the production cost and other strategic environmental and economic benefits associated with each proposed transmission project. The CAISO-developed base case economic planning production cost model (PCM) from the 2017/2018 Transmission Planning Process (TPP) was used to model and evaluate new transmission projects.

The Alliance considered use of sensitivity cases such as the 50% RPS energy only/full capacity cases provided in the 2016/2017 TPP and other sensitivity cases affecting generation capacity within constrained LCR areas, however, in an effort to report only results using up to date information, only the base case models provided by CAISO as of February 13, 2018 are reported here.

2.2 Metrics

The benefits of transmission expansion can be analyzed across a wide range of metrics. CAISO's Transmission Economic Assessment Methodology (TEAM) framework was used to quantify economic production cost and LCR reduction benefits associated with transmission expansion. In addition to these benefits, the impacts of transmission expansion on renewables integration and greenhouse gas emissions reduction were also quantified.

Production cost benefits are benefits associated with the change in net ratepayer payment based on production cost before and after the transmission upgrade. Capacity benefits are benefits associated with increased importing capabilities into the CAISO BAA or into an LCR area.

2.2.1 Production Cost Benefit

In accordance with the TEAM framework, production cost benefits were analyzed from a CAISO ratepayer perspective, focusing on the benefits that would accrue to the entities within CAISO that would be funding the upgrade. This production cost benefit is quantified as the difference in net load payment before and after the transmission upgrade. This calculation is described in Figure 2-1.

Figure 2-1: CAISO Ratepayer Production Cost Benefit Calculation

$$\textbf{Net load payment} = \text{ISO's Gross load payment} - \text{ISO's Generator profit} - \text{ISO's Transmission revenue}$$

$$\textbf{Gross load payment} = \sum(\text{Load X LMP})$$

$$\textbf{Generator profit} = \sum(\text{Generator revenue} - \text{Generator cost})$$

$$\textbf{Transmission revenue} = \sum(\text{Congestion cost} + \text{Export wheeling cost})$$

2.2.2 LCR Benefit

By increasing import capabilities into an LCR area, a transmission upgrade can provide reliability benefits that otherwise would have to be purchased through LCR contracts. This LCR benefit is quantified as the difference between the LCR requirement before and after the transmission upgrade. This benefit is analyzed outside of the production cost model, using reliability models instead.

2.2.3 Additional Benefits

2.2.3.1 Public-Policy Benefit

By increasing the import capability of renewables into the CAISO controlled grid and into LCR areas, a transmission upgrade can facilitate the integration of renewables and reduction in renewable energy curtailment to meet increasing renewable portfolio standard (RPS) goals. In quantifying the public-policy benefit of increased renewables, the breakdown of California generation by type was analyzed to calculate the percentage of renewable energy generated to serve CAISO load. Table 2-1 shows the scope of regions in the GridView model used in the RPS calculation, as well as the generation types classified as renewables to contribute towards meeting the RPS.

Table 2-1: RPS Calculation Assumptions

Regions	Generation Types Contributing Towards RPS Goal
CA_CFE	Geo-BinaryCycle
CA_IID	Geo-DoubleFlash
CA_CISO	Bio-ST
CA_LDWP	Bio-ICE
CA_BANC	ST-WasteHeat
CA_TIDC	Bio-CT
	Geo-SingleFlash
	Bio-CCWhole
	Geo-ST
	HydroRPS
	SolarPV-NonTracking
	WT-Onshore
	SolarThermal-CSP0
	SolarThermal-CSP6
	SolarPV-Tracking
	PS-HydroRPS

2.2.3.2 Environmental Benefit

By improving the importing capability of renewables and other efficient sources of generation into the CAISO controlled grid, another benefit of transmission expansion is the potential to reduce greenhouse gas emissions. In quantifying the environmental benefits of transmission expansion, change in California carbon emissions was analyzed. The scope of regions in the GridView model used in the emissions analysis includes all California subregions and is identical to the scope in Table 2-1.

3.0 MODELING RESULTS

3.1 Production Cost Benefit

As previously discussed, production cost benefits were assessed for each project using GridView. Cases were simulated with and without each individual transmission upgrade, and benefits were quantified as change in net load payment before and after the transmission upgrade. Table 3-1 shows the production cost benefit and benefit/cost ratio for each individual project over 50 years.

Table 3-1: Production Cost Benefit Results

		CAISO Load Payment ($M)			CAISO Generation Profits ($M)			CAISO Transmission Revenue ($M)			CAISO Net Payment ($M)			Production Cost Benefit		
		Total	Delta	% Diff	Total	Delta	% Diff	Total	Delta	% Diff	Total	Delta	% Diff	Benefit ($M)	Cost ($M)	BCR
	Base Case	$8,862			$3,993			$88			$4,781					
P1	Alberhill – Sycamore 500kV	$8,854	($8)	-0.09%	$3,985	($9)	-0.22%	$89	$1	1.15%	$4,781	($0)	0.00%	$3	$593	0.00
P2	Devers – Suncrest 500kV	$8,861	($1)	-0.02%	$4,008	$14	0.36%	$91	$3	3.66%	$4,762	($19)	-0.39%	$260	$690	0.38
P3	Miguel – Sycamore loop into Suncrest 230kV	$8,855	($7)	-0.08%	$3,990	($3)	-0.08%	$92	$4	4.50%	$4,772	($8)	-0.17%	$114	$133	0.86
P4	Alberhill – Sycamore 500kV + Miguel – Sycamore loop into Suncrest 230kV	$8,853	($9)	-0.10%	$3,991	($3)	-0.07%	$94	$6	6.75%	$4,769	($12)	-0.25%	$166	$725	0.23
P5	Devers – Suncrest 500kV + Miguel – Sycamore loop into Suncrest 230kV	$8,853	($9)	-0.10%	$4,003	$9	0.23%	$93	$5	6.13%	$4,757	($24)	-0.50%	$328	$823	0.40

3.2 LCR Benefit

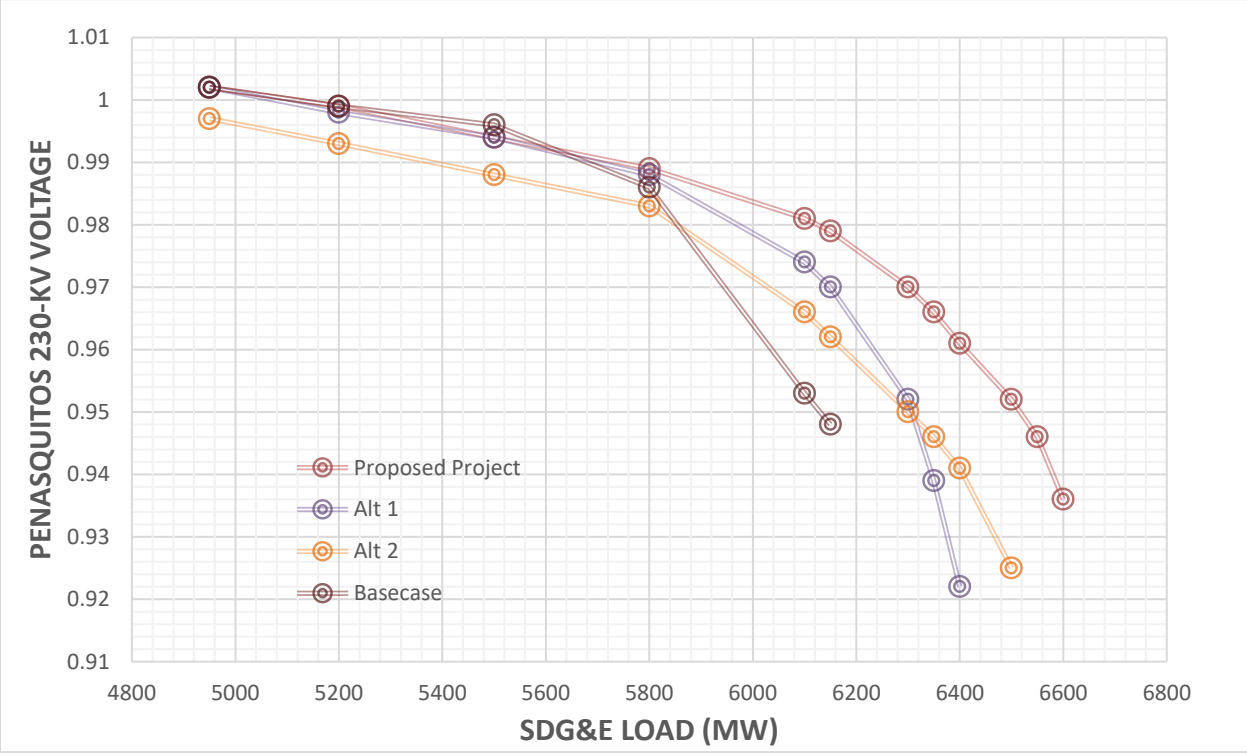
LCR benefits were assessed by performing PV analysis with and without the proposed projects. The LCR benefit was determined from the additional load serving capability provided by the transmission upgrade. Figure 3-1 shows the PV curves modeled on a case with each transmission upgrade considered and with North Gila to Imperial Valley 500 kV modeled out of service.

The $ per megawatt benefit to reduced local capacity requirement was based on the values used by CAISO in its local capacity benefit evaluation of the S-line upgrade as part of the 2017/18 TPP. The high capacity benefit is valued at $75,720/MW-year and the low is half that at $37,860/MW-year. Table 3-2 shows the LCR benefit associated with each individual project.

Table 3-2: LCR Benefit Results

		Capacity Benefit Low			Capacity Benefit High		
		MW	Benefit ($M)	NPV ($M)	MW	Benefit ($M)	NPV ($M)
P1	Alberhill – Sycamore 500kV	500	$19	$261	500	$38	$522
P2	Devers – Suncrest 500kV	300	$11	$157	300	$23	$313
P3	Miguel – Sycamore loop into Suncrest 230kV	0	$0	$0	0	$0	$0
P4	Alberhill – Sycamore 500kV + Miguel – Sycamore loop into Suncrest 230kV	500	$19	$261	500	$38	$522
P5	Devers – Suncrest 500kV + Miguel – Sycamore loop into Suncrest 230kV	300	$11	$157	300	$23	$313

Figure 3-1: Project PV Performance Comparison



Alt 1: 230-kV line from Alberhill to Sycamore Canyon
Alt 2: 500-kV line from Devers to Suncrest

3.3 Total Benefits

A summary of benefits, costs, net benefits, and benefit/cost ratio for each project evaluated is shown in Table 3-3 using 7% discount rate, consistent with CAISO's evaluation of economic projects in the

2017/18 TPP. The information presented under the 'Low' heading is the sum of production cost benefit and the low valued LCR benefit. The information presented under the 'High' heading is the sum of production cost benefit and the high valued LCR benefit. Benefit minus cost, or net benefit, is also included.

As noted, the benefit/cost ratios presented are based on a discount rate of 7%. If the 5% sensitivity discount rate is assumed, project benefit/cost ratios increase to levels above 1.0. Further, the reduction in the federal income tax rate from 35% to 21% may have an impact to the cost-to-capital ratio of 1.45 applied to estimate the present value total project cost. To the extent that this reduces the cost factor, it would reduce the 50-year cost and increase the benefit/cost ratios as well.

Table 3-3: Production Cost & LCR Benefit / Cost Ratios

		Benefit/Cost Ratio Low				Benefit/Cost Ratio High			
		Benefit ($M)	Cost ($M)	Benefit-Cost	BCR	Benefit ($M)	Cost ($M)	Benefit-Cost	BCR
P1	Alberhill – Sycamore 500kV	$264	$593	($329)	0.45	$525	$593	($67)	0.89
P2	Devers – Suncrest 500kV	$417	$690	($274)	0.60	$574	$690	($117)	0.83
P3	Miguel – Sycamore loop into Suncrest 230kV	$114	$133	($19)	0.86	$114	$133	($19)	0.86
P4	Alberhill – Sycamore 500kV + Miguel – Sycamore loop into Suncrest 230kV	$428	$725	($298)	0.59	$689	$725	($37)	0.95
P5	Devers – Suncrest 500kV + Miguel – Sycamore loop into Suncrest 230kV	$485	$823	($338)	0.59	$642	$823	($181)	0.78

3.4 Public-Policy Benefit

Impacts to generation and curtailment of renewables were analyzed for each project using GridView. The total percentage of California's annual energy generation from renewables was calculated for each case. These results are shown in Table 3-4.

Table 3-4: Public-Policy Benefit Results

		CA Renewable Generation (MWh)			CA Renewable Curtailments			CA Generation (MWh)			CA Renewable Generation	
		Total	Delta	% Diff	Total	Delta	% Diff	Total	Delta	% Diff	Total	% Diff
	Base Case	84,255,229			5,340,313			312,510,136			27.0%	
P1	Alberhill – Sycamore 500kV	84,277,871	22,642	*0.03%*	5,308,046	(32,267)	*-0.60%*	312,447,025	(63,110)	*-0.02%*	27.0%	*0.05%*
P2	Devers – Suncrest 500kV	84,274,844	19,615	*0.02%*	5,318,045	(22,269)	*-0.42%*	312,402,204	(107,932)	*-0.03%*	27.0%	*0.06%*
P3	Miguel – Sycamore loop into Suncrest 230kV	84,239,546	(15,683)	*-0.02%*	5,347,861	7,548	*0.14%*	312,348,303	(161,832)	*-0.05%*	27.0%	*0.03%*
P4	Alberhill – Sycamore 500kV + Miguel – Sycamore loop into Suncrest 230kV	84,270,023	14,793	*0.02%*	5,318,885	(21,428)	*-0.40%*	312,582,935	72,800	*0.02%*	27.0%	*-0.01%*
P5	Devers – Suncrest 500kV + Miguel – Sycamore loop into Suncrest 230kV	84,295,361	40,131	*0.05%*	5,291,840	(48,474)	*-0.91%*	312,682,581	172,446	*0.06%*	27.0%	*-0.01%*

3.5 Environmental Benefit

Impacts to carbon emissions were analyzed for each project using GridView. Total carbon emissions for California was calculated and categorized by unit type. These results are shown in Table 3-5.

Table 3-5: Environmental Benefit Results

		CA Carbon Emissions (short tons)			CA Carbon Emissions by Unit Type (short tons)				
		Total	Delta	% Diff	Coal	Gas CCGT	Gas Peaking	Biomass	Other
	Base Case	42,201,093			95,279	25,776,113	5,991,157	8,084,458	2,254,085
P1	Alberhill – Sycamore 500kV	42,148,343	(52,751)	*-0.12%*	95,270	25,719,546	6,007,805	8,077,258	2,248,463
P2	Devers – Suncrest 500kV	42,141,058	(60,035)	*-0.14%*	95,259	25,699,021	6,007,175	8,079,511	2,260,092
P3	Miguel – Sycamore loop into Suncrest 230kV	42,146,677	(54,417)	*-0.13%*	95,330	25,736,463	5,980,374	8,078,475	2,256,034
P4	Alberhill – Sycamore 500kV + Miguel – Sycamore loop into Suncrest 230kV	42,222,314	21,221	*0.05%*	95,400	25,788,375	6,004,979	8,078,226	2,255,334
P5	Devers – Suncrest 500kV + Miguel – Sycamore loop into Suncrest 230kV	42,248,344	47,251	*0.11%*	95,200	25,839,016	5,981,673	8,076,144	2,256,311

4.0 CONCLUSIONS

The Alliance has further investigated the economic benefits associated with the transmission project submitted as part of the Non-PTO Phase 2 Request Window of the CAISO 2017/2018 TPP cycle. In addition to the submitted project, other projects were evaluated.

The results of this assessment show promising benefits associated with the Alberhill to Sycamore 500 kV plus Miguel to Sycamore loop into Suncrest 230 kV project. This project provides superior reduction in required LCR capacity in the LA Basin and SDG&E/Imperial Valley areas, provides reliability benefits resolving thermal overloads along the Suncrest to Sycamore Canyon 230 kV path, and shows production cost and other strategic environmental benefits. Other sensitivity considerations such as the 5% discount rate, lowered federal income tax rate, and higher RPS requirements all may prove to show additional benefits realized with the inclusion of the project within the CAISO transmission portfolio.

ATTACHMENT A - 2017/18 TPP PHASE 2 REQUEST WINDOW SUBMISSION

California ISO 2017-18 Transmission Planning Process

The Alliance of
Pacific Gas & Electric Company and TransCanyon, LLC

Attachment A: Required Technical Data for Request Window Submissions

10/13/2017

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1.0 TRANSMISSION PROJECTS

The Alliance of Pacific Gas & Electric Company and TransCanyon, LLC (Alliance) submits the following "San Diego / LA Basin Transmission Interconnection" (Project) reliability Project information in accordance with Section 4.4.3.1 of the CAISO Transmission Planning Process BPM.

1.a General Data

Description

CAISO has performed reliability analysis in the SDG&E Main area that identified thermal loading reliability issues to the Suncrest to Sycamore Canyon 230-kV path in every case model except the 2019 Spring Light Load and 2022 Spring Off-Peak cases. Additionally, as California moves to reduce greenhouse gas emissions into the future, meet RPS goals, natural gas-fired generator retirements due to OTC retirements, possible closure of the Aliso Canyon Natural Gas Storage facility, and other economic pressures will reduce the marginal existing LCR margin within the LA Basin / San Diego / Imperial Valley LCR region.

The inclusion of the Project's 500-kV connection into SDG&E's 230-kV system will:

- ✓ Provide additional import capacity into the region
- ✓ Enhance reliability through a new delivery source between the LA Basin / Imperial Valley and San Diego regions
- ✓ Reduce LCR requirements and the need to build additional generation in a highly populated region

The 3rd transformer at Suncrest and the new 230-kV transmission line to connect into the existing Sycamore Canyon to Miguel 230-kV circuit will:

- ✓ Enhance the reliability of the 230-kV system under multiple contingencies
- ✓ Prevent overloads on the existing Sycamore Canyon-Suncrest 230-kV circuits

The Alliance is proposing that the CAISO consider inclusion of a new 500-kV transmission line from the proposed Alberhill 500-kV substation to a new 500-kV Sycamore Canyon substation with a new 500/230-kV transformer and a 3rd transformer and a new double circuit 230-kV transmission line that will loop the existing Miguel – Sycamore Canyon 230-kV transmission line to Suncrest substation. The Alliance recommends CAISO consider all elements of the proposed Project based on the combined benefits observed.

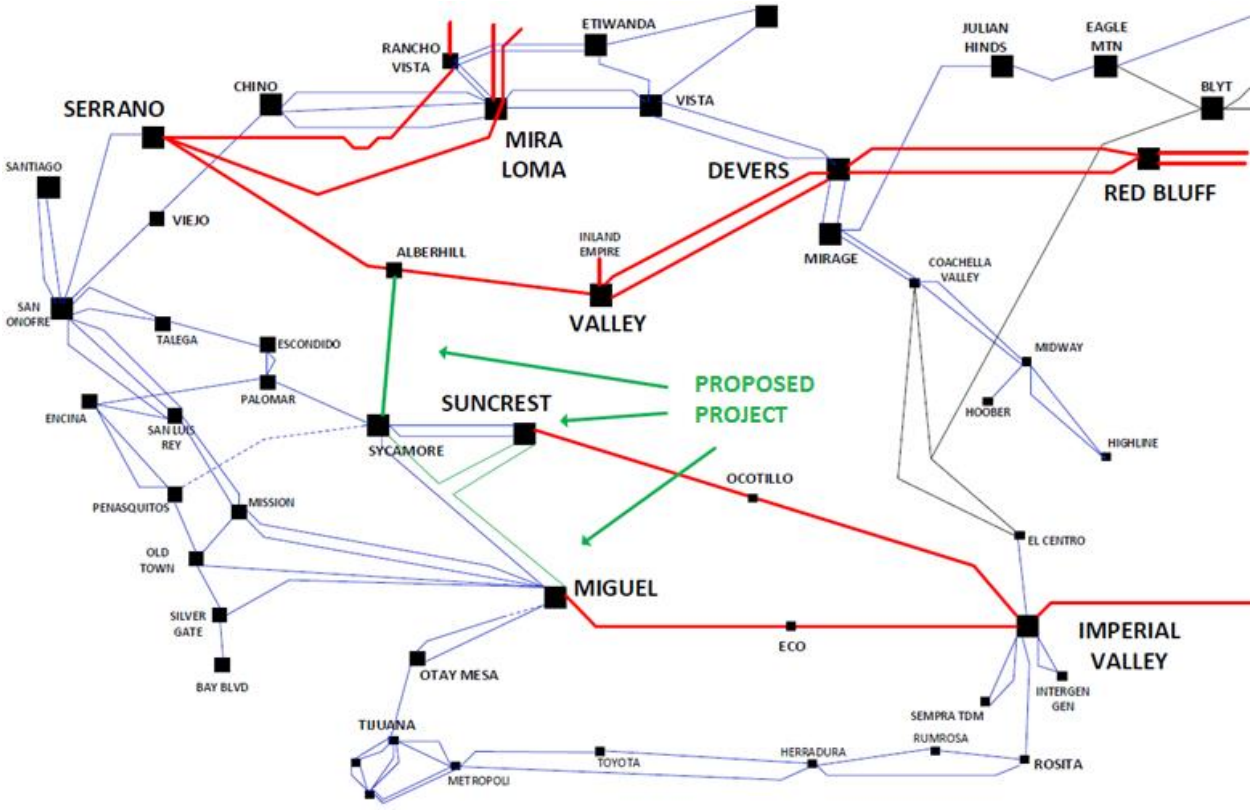
The high-level Project end point attributes are provided in Table 1-1.

Table 1-1: Project Attributes

Attribute	Existing Substation	Proposed Substation	Existing Substation
Station Name	Alberhill	Sycamore Canyon	Suncrest
Owner	SCE	Alliance	SDG&E
Voltage	500-kV	500-kV	230-kV
State	California	California	California
County	Riverside	San Diego	San Diego

Figure 1-1 shows the supporting one-line diagram for the proposed Project.

Figure 1-1: One-Line Diagram



Preliminary engineering data has been developed for the Project and is provided in the sections below.

Needs Identification

Power flow simulations were performed using the posted reliability models with the addition of the Project to determine the effect of addressing the reliability needs. Any facility with criteria violations in the base case whose loadings were below 100% of the thermal rating or voltages within the acceptable bandwidth with the addition of the Project was considered mitigated in accordance with NERC Standards

and WECC/ISO reliability criteria. The Project was shown to relieve the thermal overload violations as shown in Table 1-2 through Table 1-2.

Table 1-2: Reliability Analysis Summary - Thermal (2022 Summer Peak SDG&E main system)

Limiting Element / Overloaded Facility							Worst Contingency	Rating 2	Pre-Project Case	Post-Project Case
From No.	From Name	From kV	To No.	To Name	To kV	Ckt ID			22-sumpk-SDGE	22-sumpk-SDGE
228321	SYCAMORE TP2	230	22832	SYCAMORE	230	2	P4-23	912	107.8	61.7
228861	SUNCREST TP2	230	228321	SYCAMORE TP2	230	1	P4-23	456	108.9	63.4
228861	SUNCREST TP2	230	228321	SYCAMORE TP2	230	2	P4-23	456	108.9	63.4
22886	SUNCREST	230	228861	SUNCREST TP2	230	2	P4-23	912	108.9	63.4
228320	SYCAMORE TP1	230	22832	SYCAMORE	230	1	P1L-23055	912	168.1	72.4
228860	SUNCREST TP1	230	228320	SYCAMORE TP1	230	2	P1L-23055	456	168.1	73.6
22886	SUNCREST	230	228860	SUNCREST TP1	230	1	P1L-23055	912	168	73.7
22356	IMPRLVLY	230	21025	ELCENTSW	230	1	P1G_TDM	407	118.9	83.5

Table 1-3: Reliability Analysis Summary - Thermal (2027 Summer Peak SDG&E main system)

Limiting Element / Overloaded Facility							Worst Contingency	Rating 2	Pre-Project Case	Post-Project Case
From No.	From Name	From kV	To No.	To Name	To kV	Ckt ID			27-sumpk-SDGE	27-sumpk-SDGE
228321	SYCAMORE TP2	230	22832	SYCAMORE	230	2	P4-22	912	108	63.1
228861	SUNCREST TP2	230	228321	SYCAMORE TP2	230	1	P4-22	456	109	64.9
228861	SUNCREST TP2	230	228321	SYCAMORE TP2	230	2	P4-22	456	109	64.9
22886	SUNCREST	230	228861	SUNCREST TP2	230	2	P4-22	912	109	64.9
228320	SYCAMORE TP1	230	22832	SYCAMORE	230	1	P1L-23055	912	165.8	73.7
228860	SUNCREST TP1	230	228320	SYCAMORE TP1	230	1	P1L-23055	456	166	75.1
228860	SUNCREST TP1	230	228320	SYCAMORE TP1	230	2	P1L-23055	456	166	75.1
22886	SUNCREST	230	228860	SUNCREST TP1	230	1	P1L-23055	912	166	75.1
21072	YUCCA161	161	84846	YUCCA W	69	1	P1G_TDM	73	100.2	89.8
24138	SERRANO	500	24137	SERRANO	230	3	tran_100103	1344	100.6	93.4
21072	YUCCA161	161	21059	PILOTKNB	161	1	line_100100	150	101	94.7
21072	YUCCA161	161	21059	PILOTKNB	161	1	P1G_TDM	150	107.5	96.8
21355	NEW_MECCA	92	21457	D-1TAP	92	1	line_100142A	145	100.9	98.9

Table 1-4: Reliability Analysis Summary - Thermal (2022 LCR case for Southern California)

Limiting Element / Overloaded Facility							Worst Contingency	Rating 2	Pre-Project Case	Post-Project Case
From No.	From Name	From kV	To No.	To Name	To kV	Ckt ID			22-LCR-SOCAL	22-LCR-SOCAL
22886	SUNCREST	230	228861	SUNCREST TP2	230	2	P4-23	1183	80.7	49.6
24016	BARRE	230	24044	ELLIS	230	1	P1L-50001RAS2	665	75.9	55.3
24016	BARRE	230	24044	ELLIS	230	2	P1L-50001RAS2	665	75.9	55.3
24016	BARRE	230	24044	ELLIS	230	3	P1L-50001RAS2	665	75.9	55.3
24016	BARRE	230	24044	ELLIS	230	4	P1L-50001RAS2	665	75.9	55.3
22844	TALEGA	230	24131	S.ONOFRE	230	1	P1L-50001RAS2	577	85.4	56.6
22886	SUNCREST	230	228860	SUNCREST TP1	230	1	P1L-23055	1183	**123.4**	58.9
24076	LAGUBELL	230	24091	MESA CAL	230	1	line_100049	1335	75.4	75.1
22430	SILVERGT	230	22597	OLDTWNTP	230	1	P1L-23011	650	83.5	88.1
22536	N.GILA	500	22360	IMPRLVLY	500	1	line_100142A	2572	81.7	89
22609	OTAYMESA	230	20149	TJI-230	230	1	P1L-50001RAS2	850	**112.5**	89.9
22356	IMPRLVLY	230	21025	ELCENTSW	230	1	line_100100	407	**122.3**	90.9

In addition to the transmission facilities listed in the table above whose overloads were mitigated by the project, there are many other transmission facilities whose overloads are reduced or partially mitigated.

The following describes some of the issues/needs identified by CAISO as a part of the reliability analysis of the SDG&E System along with a description of how the Project proposed by the Alliance helps alleviate some of these reliability concerns.

- ***Reliability Concern:*** Otay Mesa to Tijuana 230-kV line overload is recorded following N-1-1 that involves loss of Oco-Suncrest and Eco-Miguel 500-kV lines in the 2017 and 2022 Summer peak cases and High renewables and heavy north bound flow sensitivity cases.

  Proposed CAISO Mitigation: CAISO proposes to reduce SDIT import levels and adjust the IV PST after the first N-1 contingency.

  Mitigation by Proposed Project: By including the proposed Project within the system, the ISO does not need to trip all the generators connected to Imperial Valley 230-kV (based on current RAS) and the inclusion of the 500-kV line from Alberhill to Sycamore Canyon would provide better IV Phase Shifter regulation capability and further reduces the flow on the IV PST's and on the Otay Mesa - Tijuana 230-kV line.

- ***Reliability Concern:*** Miguel 500/230-kV transformer gets overloaded for the loss of the Miguel 500/230-kV transformer and many other N-1-1 outages that include sections of the SWPL and Sunrise 500-kV lines in the cases that model peak loads.

  Proposed CAISO Mitigation: CAISO proposes to modify existing SPS along with system adjustments to limit San Diego Imports and use the IV PST to control flows after the first N-1. As an alternative, the ISO also wants to procure preferred resources and storage of ~200-300 MW or upgrade Miguel 500/230-kV transformer to minimize impact for loss of SWPL.

  Mitigation by Proposed Project: After inclusion of proposed Project, the loading on Miguel 500/230-kV transformer gets reduced by over 20%.

- ***Reliability Concern:*** Suncrest 500/230-kV bank gets overloaded following multiple N-1-1 outages that include the loss of SWPL and Sunrise PL in the cases that model peak loads.

  Proposed CAISO Mitigation: The ISO proposes to mitigate this by having an overload rating on bank along with an ability to reduce San Diego Imports and adjust IV PST after initial outage.

  Mitigation by Proposed Project: The proposed Project includes a third 500/230-kV transformer at Suncrest that would mitigate this overload.

- ***Reliability Concern:*** Sycamore Canyon to Suncrest 230-kV line gets overloaded following multiple contingencies in the peak load cases that involve the loss of one of the circuits of Suncrest - Sycamore Canyon 230-kV and N-1-1 involving SWPL and a Suncrest -Sycamore Canyon 230-kV line. The overloads are close to 180% in some of the peak load base cases.

  Proposed CAISO Mitigation: The ISO proposes to use existing operating procedures, RAS and in addition is looking for enhanced capability to reduce San Diego imports and ability to operate IV PST following an N-1. The ISO also wants to procure preferred resources and have ~ 500 MW of additional storage and/or upgrade Suncrest to Sycamore Canyon to reduce overloads to an extent.

  Mitigation by Proposed Project: After inclusion of the proposed Project, the 2022 loading on "Sycamore Canyon to Suncrest 230-kV line" and "Suncrest to Suncrest Tap 230kV line" reduced

from 168.1% to 73.6%. In 2027 summer report, the loading on the same lines reduced from 166% to 75.1%.

- ***Reliability Concern:*** Imperial Valley to El Centro 230-kV gets overloaded with many N-1-1 outages.

  Proposed CAISO Mitigation: The CAISO plans to implement congestion management and operating procedures as the mitigation.

  Mitigation by Proposed Project: After inclusion of proposed project as an example, the 2022 summer peak case loading on Imperial Valley to El Centro 230-kV reduced from 130.8% to 91.9%.

- ***Reliability Concern:*** Ellis - Johanna and Ellis - Santiago 230-kV lines are overloaded following N-1-1 that involve Sunrise PL/SWPL and another parallel 230-kV outage.

  Proposed CAISO Mitigation: The ISO plans to use existing operating procedures to turn on resources with in San Diego to reduce overloads and in addition has indicated a need of ~ 250 MW of storage in addition to upgrading some of the 230-kV line ratings in Ellis corridor.

  Mitigation by Proposed Project: The proposed Project relieves overloads on the Ellis-Johanna and Ellis-Santiago to well under 80% of their normal rating as the new 500-kV connection to Sycamore Canyon helps off load the parallel 230-kV lines from Southern LA into SDG&E system.

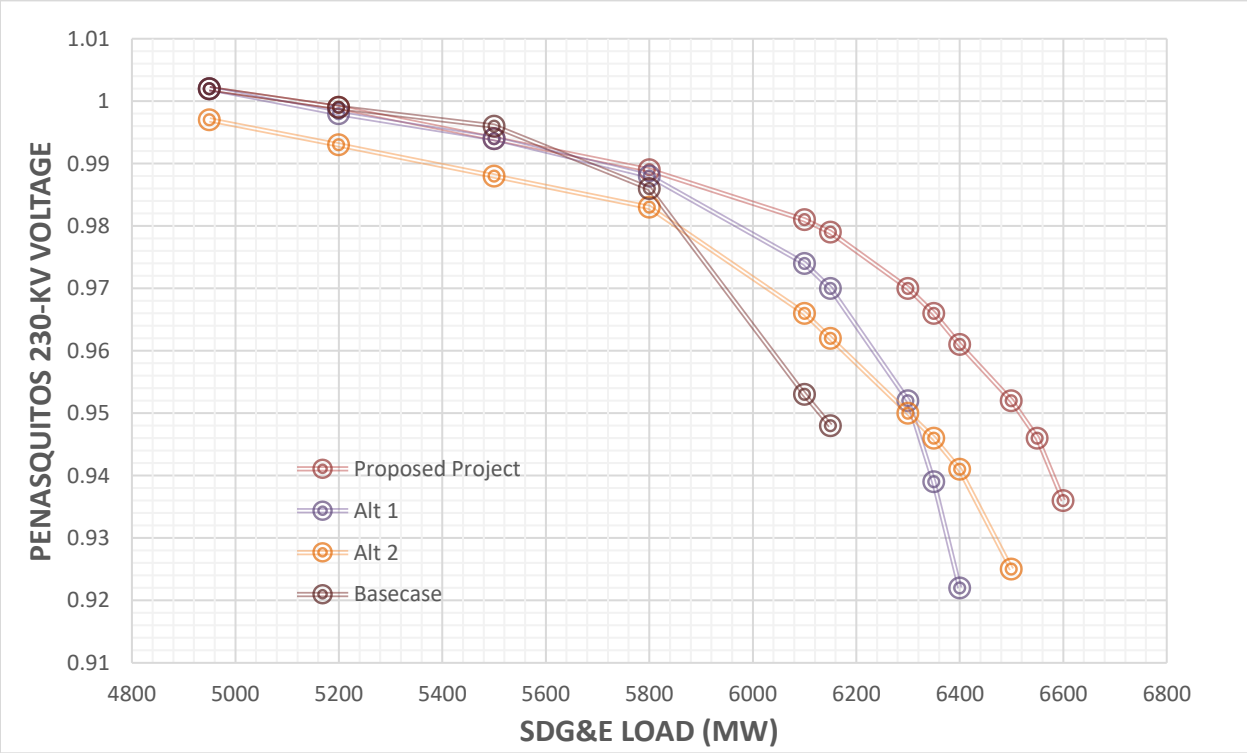
- ***Reliability Concern:*** San Luis Rey - San Onofre 230-kV lines and Encina to San Luis Rey 230-kV lines get overloaded following a few N-1-1 and N-2 outages. These loadings get worse with the inclusion of Sycamore Canyon - Penasquitos 230-kV.

  Mitigation by Proposed Project: The Alliance's proposed Project creates a parallel path from SDG&E to LA Basin and helps mitigate overloads by more than 15% in Off-peak cases where power flows from South to North such as on the San Luis Rey - San Onofre 230-kV lines. The proposed Project also provides a reduction in loading on the parallel 230-kV transmission within SDG&E.

To arrive at this proposed Project, the Alliance evaluated multiple transmission options that included varied connections into the SDG&E system from LA Basin. Of these studied options, a 500-kV line from Devers to Suncrest and a 230-kV line from Alberhill to Sycamore Canyon were evaluated instead of the Alberhill to Sycamore Canyon 500-kV line portion of the proposed Project. These alternatives also performed similar to the proposed Project but did not have adequate LCR benefits that the Alliance believes is needed to support the 500-kV portion of the proposed Project.

In order to assess the LCR benefits of the proposed Project, the generation within the SDG&E LCR region was increased to up to 800 MW to mimic the benefits of the proposed Project. Additionally, a PV analysis also indicated that the addition of the proposed Project would provide the SDG&E system an additional 500-550 MW of load serving capability when compared to the Base case. Figure 1-2 shows the PV curves modeled on a case with various transmission alternatives considered and with North Gila to Imperial Valley 500-kV modeled out of service. The proposed Project performs better than the other alternatives considered.

Figure 1-2: Project PV Performance Comparison



Alt 1: 230-kV line from Alberhill to Sycamore Canyon
Alt 2: 500-kV line from Devers to Suncrest

The Alliance also thoroughly evaluated other alternatives for the Project, in whole and individual components, prior to arriving at the preferred Project included for submission. The following are options studied in addition to the ones described above:

Option 1: Alberhill - Escondido 230-kV transmission line.

- This option did not provide the reliability or the LCR relief within the SDG&E system that the Alliance wants to achieve as a part of this analysis.

Option 2: Alberhill - Sycamore Canyon 500-kV transmission line.

- This option indicated a lot of reliability and LCR benefits and is included as a part of the proposed Project.

Option 3: New transformer (3rd) at Suncrest and a new 230-kV line from Suncrest to Miguel.

- This option provided adequate reliability benefits within San Diego and especially mitigated the loading on the existing Sycamore to Suncrest 230-kV lines. A sensitivity of this option described below was deemed adequate to address the reliability issues this option had addressed.

Option 4: New transformer (3rd) at Suncrest and a new double circuit 230-kV line from Suncrest to connect into existing Sycamore Canyon to Miguel line.

- This option is considered less expensive than Option 3 and is considered as a part of the proposed Project.

Preliminary Routing

The Alliance conducted a preliminary route assessment for several potential project options in addition to the proposed Project in order to consider possible environmental and/or routing concerns. The specific elements considered for the proposed Project include:

- Greenfield single circuit 500-kV transmission line between Alberhill and Sycamore Canyon substations
- Greenfield double circuit 230-kV transmission line between Suncrest to a point cutting into the existing Miguel to Sycamore Canyon transmission line

A preliminary desktop assessment was performed using publicly available geo-spatial data. Various factors were reviewed such as, but not limited to, government lands, conservation lands, other infrastructure (roads, railroads, airports), and USFWS Critical Habitat data. Routing considerations include the following:

- minimize total length
- minimize angles
- utilize existing utility corridors
- avoid areas which would create construction problems (e.g. mountainous terrain)
- follow roadways
- avoid federally-owned or tribal lands
- avoid residential and constrained urban developed areas
- avoid endangered species habitat
- avoid environmentally-sensitive sites (e.g. conservation lands)
- avoid airports and landing strips
- follow property and field lines
- minimize cropland impacts

The Alliance identified high priority constraints specifically in the area between the designated endpoints, considering spatial constraints for development of a potentially feasible 500-kV transmission route (up to 250 feet average ROW width) or a 230-kV transmission route (up to 125 feet average ROW width).

For the 500-kV route between Alberhill and Sycamore Canyon Substations, a feasible route would encounter constraints such as Cleveland National Forest land, and some areas of commercial/ residential development. A feasible route may intentionally avoid the Camp Pendleton Marine Base and Pechanga Reservation and utilize routing opportunities such as existing transmission and linear roadway infrastructure to avoid entirely greenfield development.

Preliminary routing for the new double circuit 230-kV transmission from the cut point of the existing Miguel to Sycamore Canyon line also considered a variety of route alternatives. A feasible route could generally follow an existing transmission corridor (the Descanso to Loveland 69-kV line) which would limit the amount of new greenfield construction, and is the most direct path to the cut in point with the existing Miguel to Sycamore Canyon 230-kV line. A feasible route following this existing transmission corridor would likely pass through National Forest lands, critical habitat, and some residential/developed

areas, which would require judicious siting and routing efforts. However, tribal lands could be avoided and may involve less greenfield development than other possible route options.

Preliminary Engineering

The proposed Project requires the expansion of the proposed Alberhill, Sycamore Canyon, and Suncrest substations.

The project also includes terminating the new double circuit 230-kV line from Suncrest to connect into the existing Miguel to Sycamore Canyon 230-kV transmission line. The assumed scope of work required at the new station is shown below; however, the final scope of work is subject to change and would be determined as per CAISO system planning needs and based on reliability, economic and policy benefits.

The following station one line diagrams indicate conceptually the layout of the proposed Project and required modifications to connect into existing substations.

Figure 1-3: Proposed Project One-Line Diagram

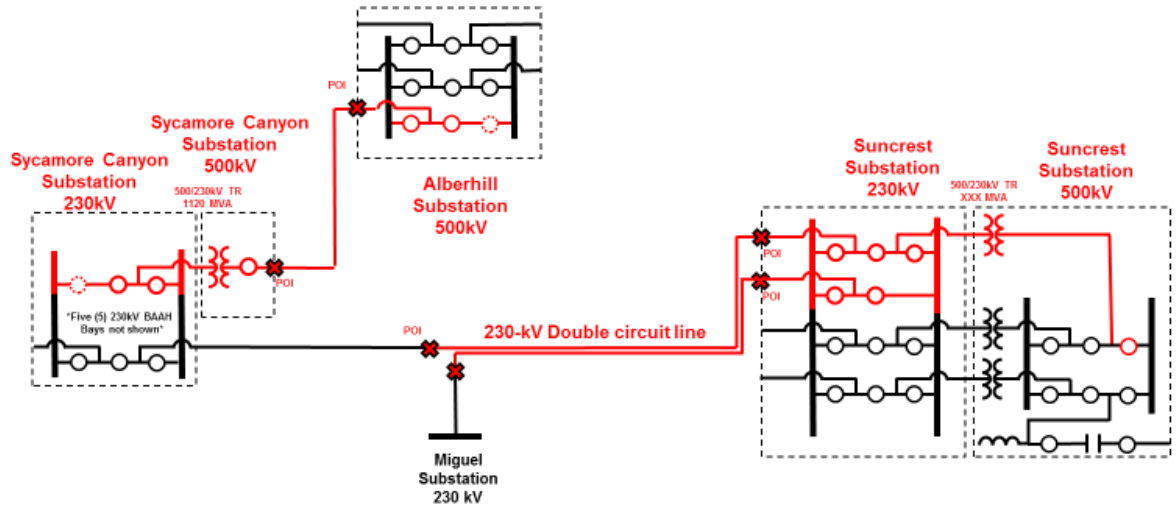
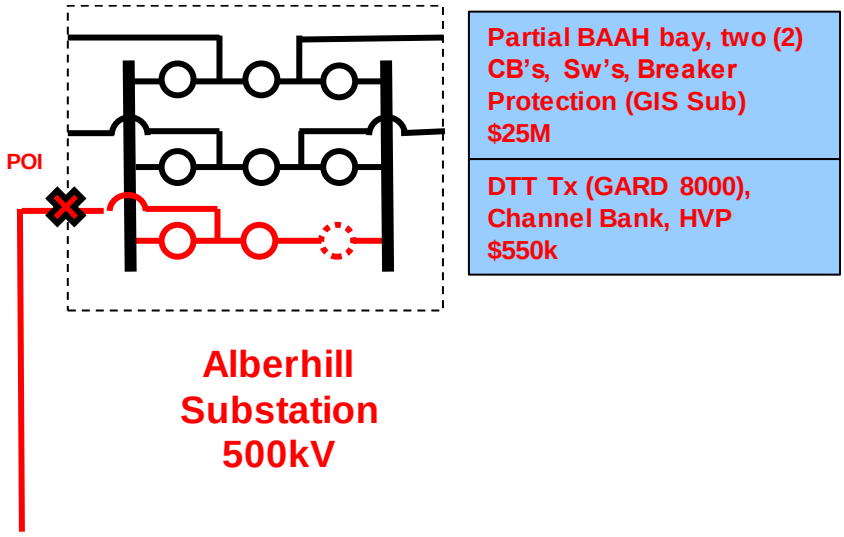


Figure 1-4: Alberhill Station Upgrades



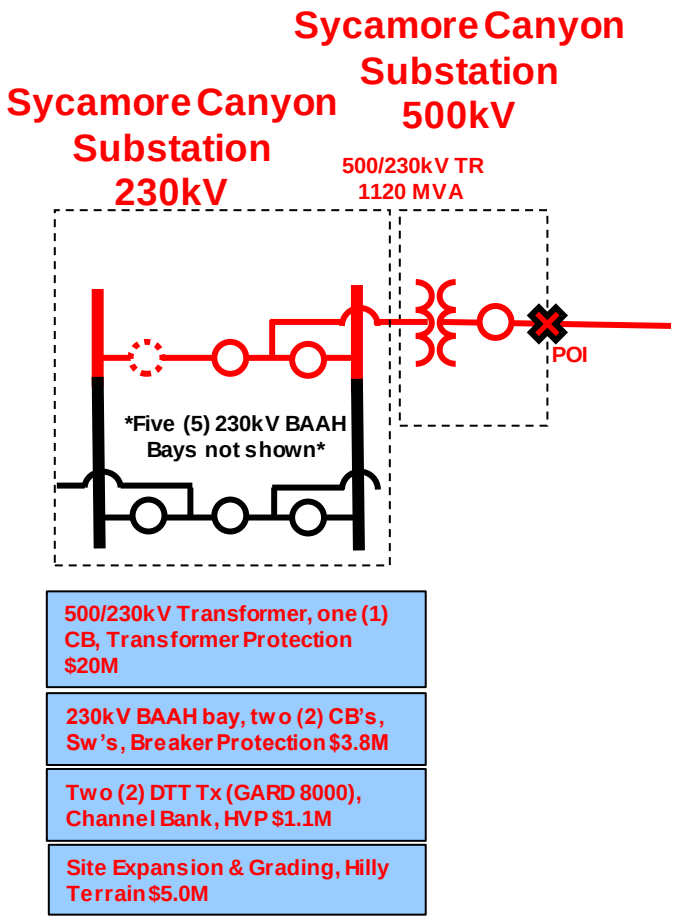
Alberhill Substation

- Add two (2) 500-kV GIS circuit breakers, associated switches, bus, and equipment to expand existing GIS into a 3-bay breaker-and-a-half (BAAH) configuration.
- Expand existing building and facilities to accommodate new GIS and associated equipment.
- Add a new line termination structure (A-frame or H-frame) for the 500-kV connection.
- Conceptually, the arrangement of the 500-kV line exit will be on the Southeast side of the station.
- The demarcation points for the Alberhill - Sycamore Canyon Substation line will be at the termination point of the 500-kV overheard line at the Alberhill and Sycamore Canyon dead-end structures.
- Install line and breaker relays to protect the proposed line.
- Install metering CTs and metering equipment for the proposed Alberhill - Sycamore Canyon line.

Alberhill Substation Real Estate

The scope of work at Alberhill substation may require minor expansion of the substation fence. It is assumed that the minor expansion will be accomplished on existing PTO property.

Figure 1-5: Sycamore Canyon Station Upgrades



Sycamore Canyon Substation

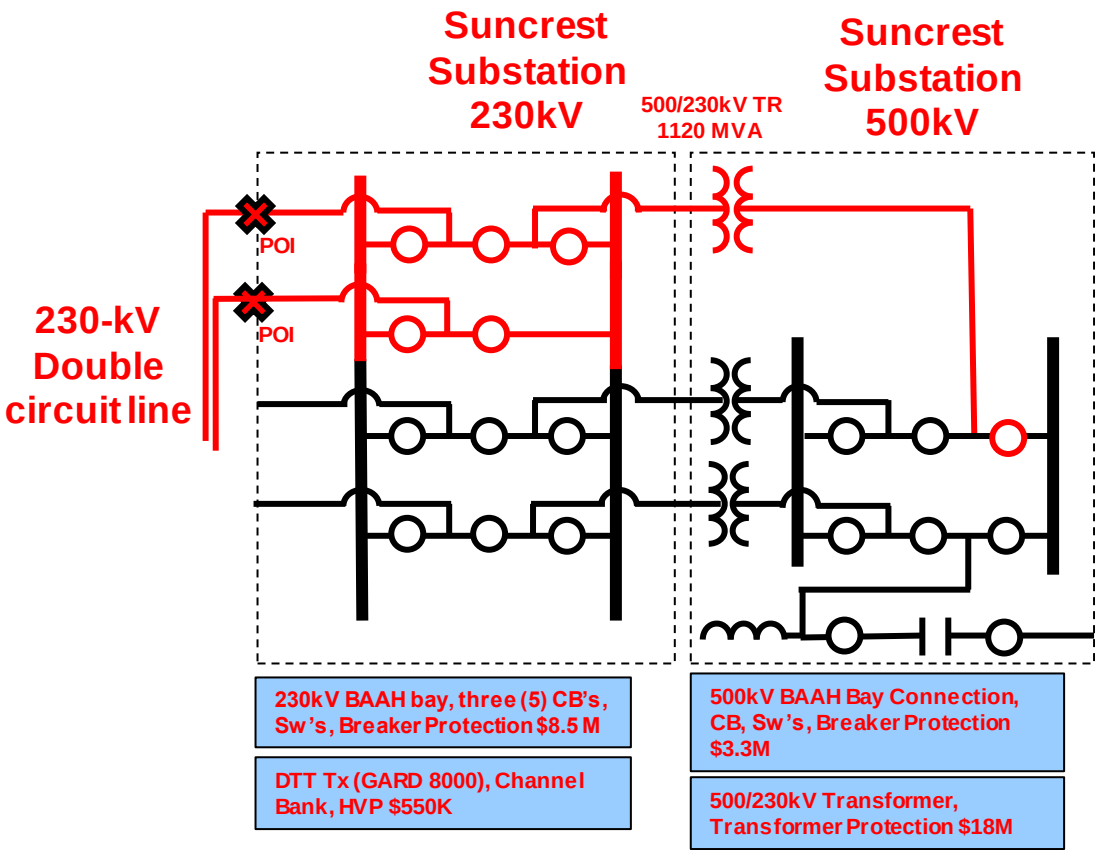
- A 1120MVA 500/230-kV transformer comprising of four (4) single phase transformers to establish 500kV capability and expand existing station.
- Add one (1) 500-kV SF6 gas circuit breaker, associated switches, bus, and equipment.
- Add a new line termination structure (A-frame or H-frame) for the 500-kV connection.
- Add two (2) 230-kV SF6 gas circuit breaker, associated switches, bus, and equipment to expand existing 230-kV yard into a 7-bay breaker-and-a-half (BAAH) configuration.
- Add a new termination structures (A-frame or H-frame) for 230-kV connections.
- The existing fence will need to be expanded to accommodate new substation equipment.
- Conceptually, the arrangement of the new 500 & 230-kV equipment would be on the West side of the existing station. The 500-kV line exit will be on the Northwest side of the station.
- The demarcation points for the Alberhill - Sycamore Canyon Substation line will be at the termination point of the 500-kV overheard line at the Sycamore Canyon dead-end structure.
- Install line, breaker, and transformer relays to protect the proposed lines, buses, and equipment.

- Install metering CTs and metering equipment for the proposed Alberhill - Sycamore Canyon line.

Sycamore Canyon Substation Real Estate

The scope of work at Sycamore Canyon substation would require minor expansion of the substation fence. It is assumed that the minor expansion will be accomplished on existing PTO property.

Figure 1-6: Suncrest Station Upgrades



Suncrest Substation

- Add one (1) 500-kV SF6 gas circuit breaker, associated switches, bus, and equipment to existing BAAH bay.
- Add a 1120 MVA, 500/230-kV transformer comprising of four (4) single phase transformers
- Add a new termination structures (A-frame or H-frame) for the 500-kV connections.
- Add three (5) 230-kV SF6 gas circuit breaker, associated switches, bus, and equipment to expand existing 230-kV yard into a 3-bay breaker-and-a-half (BAAH) configuration.

- Conceptually, the arrangement of the new 500-kV equipment would be on the Southeast side of the existing station. The new 230-kV equipment would be on the Northwest side of the existing station. The 230-kV line exit will be on the Northwest side of the station.
- The demarcation point for the Suncrest – Miguel and Suncrest - Sycamore Canyon lines will be at the termination point of the 230-kV overhead line at the Suncrest dead-end structure.
- Install line and breaker relays to protect the proposed line.
- Install metering CTs and metering equipment for the proposed Suncrest - Miguel and Suncrest - Sycamore Canyon lines.

Suncrest Substation Real Estate

The scope of work at Suncrest substation would require minor expansion of the substation fence. It is assumed that the minor expansion will be accomplished on existing PTO property.

Alberhill to Sycamore Canyon 500-kV transmission line

- Line Terminus 1: Alberhill 500 kV Bus
- Line Terminus 2: Sycamore Canyon 500 kV Bus
- Bus Nominal Phase to Phase Voltage: 500 kV
- Minimum Line Continuous Ampacity - Summer: 2,800 Amps (2400 MVA)
- Minimum Line Continuous Ampacity - Winter: 2,800 Amps (2400 MVA)
- Minimum Line 4 Hour Emergency Ampacity - Summer: 3,800 Amps (3300 MVA)
- Minimum Line 4 Hour Emergency Ampacity - Winter: 3,800 Amps (3300 MVA)
- Surge Impedance Loading: ~250 Ohms OR ~1000 MW
- Approximate Line Length: 70-80 miles

Suncrest to connect into Miguel to Sycamore Canyon 230-kV

- Double circuit line with one circuit connecting into Sycamore Canyon 230-kV and other connecting into Miguel 230-kV
- Line Terminus 1: Suncrest 230 kV Bus
- Line Terminus 2: terminate on existing line from Miguel to Sycamore Canyon 230-kV
- Minimum Line Continuous Ampacity - Summer: 2,290 Amps (912 MVA)
- Minimum Line Continuous Ampacity - Winter: 2,290 Amps (912 MVA)
- Minimum Line 4 Hour Emergency Ampacity - Summer: 2,600 Amps (1035 MVA)
- Minimum Line 4 Hour Emergency Ampacity - Winter: 2,600 Amps (1035 MVA)
- Approximate Line Length: 13-15 miles

1.b Technical Data

The following is the technical information to model the project in the CAISO PSLF power flow cases:

- Delete one of the existing Sycamore to Miguel 230-kV line

```
@ret = -1
@logindx = @ret
@logfrom = number("SYCAMORE     230.00")
@logto = number("MLSXTAP      230.00")
$logck   = "1 "
@logsec  = 1
@logindx = rec_index(0, 1, @logfrom, @logto, $logck, @logsec, -1)
if (@logindx > -1)
        @ret = del("secdd", @logindx, 1)    /*  delete from table secdd  */
        @ret = @logindx
endif
@logindx = @ret
@logfrom = number("TALEGA        69.00")
@logto = number("TALEGATP      69.00")
$logck   = "1 "
@logsec  = 1
@logindx = rec_index(0, 1, @logfrom, @logto, $logck, @logsec, -1)
if (@logindx > -1)
        @ret = del("secdd0", @logindx, 1)    /*  delete from table secdd0  */
        @ret = @logindx
Endif
```

- Data to add the project to the powerflow cases:

```
bus data  [    ]               ty  vsched   volt     angle    ar zone  vmax   vmin
date_in date_out pid L own st  latitude  longitude island    sdmon   vmax1      vmin1
dvmax subst
  29991 "SYCAMORE500 " 500.0000 " "  0  :  1  1.045400  0.974851 -160.0000   24  940
0.0000 0.0000   400101   391231   0 0  74 0   0.000000   0.000000     1 0    0.00000
0.00000    0.00000 -1 " "     0 -1 " "  0  " "
  29993 "TEMP1       " 230.0000 " "  0  :  1  1.003000  0.993711 -166.033707   22  221
0.0000 0.0000   971113   391231   0 1 136 0   0.000000   0.000000     1 0    0.00000
0.00000    0.00000 -1 " "     0 -1 " "  0  " "
  29994 "TEMP2       " 230.0000 " "  0  :  1  1.003000  0.993711 -166.033707   22  221
0.0000 0.0000   971113   391231   0 1 136 0   0.000000   0.000000     1 0    0.00000
0.00000    0.00000 -1 " "     0 -1 " "  0  " "
  29992 "SNCRSMP3    " 500.0000 " "  0  :  1  1.000000  1.041914  -150.00000   22  227
0.0000 0.0000   120601   391231   0 1 136 0   0.000000   0.000000     1 0    0.00000
0.00000    0.00000 -1 " "     0 -1 " "  0  " "
transformer data  [   ]                                    ck   ------------long_id_----
--------     st ty --no---    reg_name          zt         int
tert                     ar zone  tbase   ps_r    ps_x    pt_r    pt_x    ts_r    ts_x
  22832 "SYCAMORE    " 230.00   29991 "SYCAMORE500 " 500.00  "1 "   "SYCAMORETR  "    :
1 11   22832 "SYCAMORE    " 230.00  0       0 "             "   0.00       0 "
"   0.00   22  227 100.000000 1.400000e-004 1.210000e-002 0.000000e+000 0.000000e+000
0.000000e+000 0.000000e+000  230.000000 525.000000  0.000000  0.000000 0.000000e+000
0.000000e+000 1120.0 1344.0 1680.0 1680.0 1.000  1.100000  0.900000  1.013000  1.004300
0.006250  1.050000  1.000000  1.000000  1.000000    31201   391231 -69 0  1120.0 1344.0
0.0    0.0  136 1.000   0 0.000   0 0.000   0 0.000   0 0.000   0 0.000   0 0.000   0
0.000  0    0.000000   0.000000  0.000000  0.000000     0.0    0.0    0.0     0.0    0.0
0.0 0.000 0.000  0  0  0 0.0000 0.0000 0  0  0   0.000000   0.000000  0.000000  0.000000
" "
  22885 "SUNCREST    " 500.00   29992 "SNCRSMP3    " 500.00  "3 "   "Suncrest Metering
Point 3"    :   1 11       0 "            "   0.00  0       0 "            "   0.00
0 "            "   0.00   22  227 100.000000 -1.200000e-005 1.367400e-002 0.000000e+000
0.000000e+000 0.000000e+000 0.000000e+000  525.000000 525.000000  0.000000  0.000000
0.000000e+000 0.000000e+000 1120.0 1344.0 1364.0 1364.0 1.000  0.000000  0.000000
0.000000  0.000000  0.000000  1.000000  1.000000  1.000000  1.000000   120601   391231
0 0  1120.0 1344.0 1120.0 1344.0  136 1.000   0 0.000   0 0.000   0 0.000   0 0.000   0
0.000   0 0.000   0 0.000  0    0.000000   0.000000  0.000000  0.000000     0.0    0.0
```

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0.0     0.0     0.0     0.0 0.000 0.000  0  0  0 0.0000 0.0000 0  0  0   0.000000
0.000000  0.000000  0.000000  " "
  22886 "SUNCREST     " 230.00   29992 "SNCRSMP3     " 500.00  "3 "   "3rd Suncrest
Transformer3"    :   1 11   22886 "SUNCREST     " 230.00  0       0 "            "   0.00
0 "            "   0.00   22  227 100.000000 7.999999e-005 -1.300000e-003 0.000000e+000
0.000000e+000 0.000000e+000 0.000000e+000  230.000000 525.000000  0.000000  0.000000
0.000000e+000 0.000000e+000 1120.0 1344.0 1364.0 1364.0 1.000  1.100000  0.900000
1.004300  1.000000  0.006250  1.018750  1.000000  1.000000  1.000000   120601   391231
0 0  1120.0 1344.0 1120.0 1344.0  136 1.000   0 0.000   0 0.000   0 0.000   0 0.000   0
0.000   0 0.000   0 0.000  0    0.000000   0.000000  0.000000  0.000000     0.0    0.0
0.0     0.0     0.0     0.0 0.000 0.000  0  0  0 0.0000 0.0000 0  0  0   0.000000
0.000000  0.000000  0.000000  " "
branch data  [    ]                                          ck  se  ------------
long_id------------    st resist   react   charge   rate1  rate2  rate3  rate4 aloss
lngth
  29991 "SYCAMORE500 " 500.00   24845 "ALBERHIL     " 500.00  "1 "   1 "ALBERHIL-SYCAMORE"
:  1  0.0008  0.018  1.51833  1150.0  1150.0  1150.0  1150.0 1.000    80   22  226
0.000000  0.000000  0.000000   180601    40630   0 0  0    0.0    0.0    0.0    0.0 136
1.000   0 0.000   0 0.000   0 0.000   0 0.000   0 0.000   0 0.000   0 0.000  0 0  0  0  0
90.000   0.000000  0.000000  " "
  29993 "TEMP1        " 230.00   22467 "MLSXTAP      " 230.00  "1 "   1 "MIGUEL_TEMP1"
:  1  0.001480  0.022282  0.076494  912.0  912.0  912.0  912.0 1.000   20.0   22  221
0.000000  0.000000  0.000000    80601   391231 -69 0  0  912.0  912.0  912.0  912.0 136
1.000   0 0.000   0 0.000   0 0.000   0 0.000   0 0.000   0 0.000   0 0.000  0 0  0  0  0
90.000   0.000000  0.000000  " "
  29994 "TEMP2        " 230.00   22832 "SYCAMORE     " 230.00  "1 "   1 "MIGUEL_TEMP2"
:  1  0.000593  0.008913  0.030598  912.0  912.0  912.0  912.0 1.000   8.0    22  221
0.000000  0.000000  0.000000    80601   391231 -69 0  0  912.0  912.0  912.0  912.0 136
1.000   0 0.000   0 0.000   0 0.000   0 0.000   0 0.000   0 0.000   0 0.000  0 0  0  0  0
90.000   0.000000  0.000000  " "
  29993 "TEMP1        " 230.00   22886 "SUNCREST     " 230.00  "1 "   1 "SUNCREST_TEMP1"
:  1  0.001630  0.024510  0.084143  1150.0  1150.0  1150.0  1150.0 1.000   22.0   22  221
0.000000  0.000000  0.000000    80601   391231 -69 0  0  912.0  912.0  912.0  912.0 136
1.000   0 0.000   0 0.000   0 0.000   0 0.000   0 0.000   0 0.000   0 0.000  0 0  0  0  0
90.000   0.000000  0.000000  " "
  29994 "TEMP2        " 230.00   22886 "SUNCREST     " 230.00  "1 "   1 "SUNCREST_TEMP2"
:  1  0.001630  0.024510  0.084143  1150.0  1150.0  1150.0  1150.0 1.000   22.0   22  221
0.000000  0.000000  0.000000    80601   391231 -69 0  0  912.0  912.0  912.0  912.0 136
1.000   0 0.000   0 0.000   0 0.000   0 0.000   0 0.000   0 0.000   0 0.000  0 0  0  0  0
90.000   0.000000  0.000000  " "
```

1.c Planning Level Cost Data

Table 1-5 provides a summary of major component costs for the Project, in 2017 dollars. Note that cost estimates for the transmission line assume entirely overhead routing. Project costs have been estimated using unit price and per mile cost information compiled from the California ISO participating transmission owner cost guides and WECC's TEPPC Transmission Cost Calculator. A high-level routing and feasibility study was completed to determine potential transmission line routes and lengths. Aerial photos and one-line diagrams were used to anticipate the substation modifications or expansions that would be necessary to accommodate the new transmission lines. The large scale of the proposed project introduces a high amount of variability in the project costs. In addition, a substantial portion of the project costs will be used for activities such as routing, permitting, public outreach, and land acquisition which will be on-going for several years. Further, a reduction in the estimated project cost was applied based on experience with competitive transmission projects. While contingency has not been factored into the project cost summary, the level of data used for the cost estimate is consistent with an AACE Class 5 estimate which could justify a - 50%/+100% contingency level.

Table 1-5: Project Costs

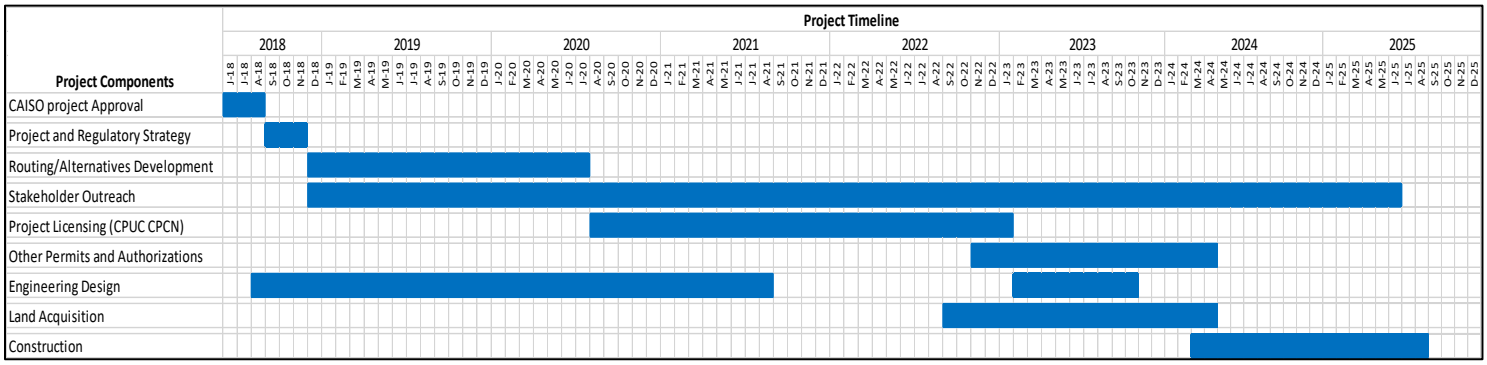
Components	Estimated Cost ($MM)
500-kV Substation Modifications (Alberhill and Sycamore Canyon)	$40.4
500-kV Single Circuit Transmission Line	$275.9
230kV Substation Modifications (Suncrest, Miguel, and Sycamore Canyon)	$25.9
230-kV Double Circuit Transmission Line	$44.9
Environmental/Permitting and Land Acquisition Costs	$38.7
AFUDC/Overhead Costs	$74.5
GRAND TOTAL (2017 dollars)	**$500.3**

A typical Project schedule similar to the scope of the Project is shown in

Table 1-6. A typical schedule includes, at a minimum, timelines for completing regulatory, right-of-way, environmental, engineering, procurement, construction activities, and expected in-service date. Further assessment will need to be conducted to develop a detailed schedule tailored specifically to the Project.

Although the schedule shown herein indicates an in-service date of 2025, the Alliance believes that the CAISO should evaluate the proposed Project as early as possible. Many of the reliability concerns identified by CAISO in its reliability assessment were present in the 2022 cases. Further, routing transmission lines can require lengthy interactions and work between a variety of stakeholders, public and private. The Alliance believes that there are components of the project that provide adequate benefits to the system and could be placed in service earlier than the proposed June 2025 date if so required or desired. The Alliance is willing to discuss varied approaches to pursue the proposed Project as a whole or in phases in a way to mitigate the identified reliability issues in a timely manner.

Table 1-6: Proposed Project Schedule



Transmission Line and Substation Outages

Constructing transmission lines on new or expanded corridors will minimize the required outages of existing lines. Short outages would be required to install new structures splitting the Miguel to Sycamore Canyon 230-kV but the majority of the double circuit line could be built without outages. In addition, short outages may be required for crossing lines during conductor stringing operations. Several brief substation outages would be required to tie in new BAAH bays while a longer outage would be necessary for building out the existing 500-kV bay at Suncrest Substation.

1.d Miscellaneous Data

The Alliance is proposing to construct, own, operate, and finance the proposed Project.

An estimated Project schedule has been provided in

Table 1-6. The necessary approval date is March 2018 to meet an in-service date of June 30, 2025.

2.0 LOCATION CONSTRAINED RESOURCE INTERCONNECTION FACILITIES (LCRIFS)

The proposed Project is not a LCRIF, therefore no additional information is provided in Section 2.0.

3.0 DEMAND RESPONSE ALTERNATIVES

The proposed Project is not a demand response alternative, therefore no additional information is provided in Section 3.0.

4.0 GENERATION ALTERNATIVES

The proposed Project is not being proposed as a generation alternative, therefore no additional information is provided in Section 4.0.