



Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading % (Baseline Scenarios)					Loading % (Sensitivity Scenarios)			Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	
Pardee - Sylmar 230 kV #1 or #2	Pardee - Sylmar 230 kV #2 or #1 & Victorville - Lugo 500 kV	P6	L-1/L-1	116	<100	<100	<100	<100	<100	<100	102	System adjustment per OP 7680 after initial contingency
Serrano 500/230 kV Transformers	Two Serrano 500/230 kV Transformers	P6	T-1/T-1	123	109	100	<100	<100	103	<100	124	System adjustment per OP 7590 after initial or second contingency
Mira Loma 500/230 kV Transformer #4	Lugo - Rancho Vista & Mira Loma - Serrano 500 kV lines	P6	L-1/L-1	125	<100	<100	<100	<100	<100	<100	133	System adjustment per OP 7580 after initial or second contingency
Mira Loma 500/230 kV Transformer #1 or #2	Mira Loma - Serrano 500 kV & Mira Loma 500/230 kV Transformer #2 or #1	P6	L-1/T-1	113	<100	<100	<100	<100	<100	<100	118	System adjustment per OP 7580 after initial or second contingency
Vincent 500/230 kV Transformer #2 or #3	Vincent – Mira Loma or PDCI Monopole & Vincent 500/230 kV Transformer #3 or #2	P6	L-1/T-1	103	<100	<100	<100	<100	<100	<100	107	System adjustment per OP 7550 and OP 6410 after initial or second contingency
Rancho Vista 500/230 kV Transformer #3 or #4	Mira Loma 500/230 kV Transformer #4 & Rancho Vista 500/230 kV Transformer #4 or #3	P6	T-1/T-1	<100	<100	<100	<100	<100	<100	<100	106	Redisptach resources after initial or second contingency
Pardee – Moorpark 230 kV #2 or #3	Pardee – Moorpark #1 and Pardee – Moorpark #3 or #2 230 kV lines	P6	L-1/L-1	102	<100	<100	<100	<100	<100	<100	<100	Redispatch resources after initial contingency (short term); approved Pardee – Moorpark #4 230 kV project (longterm)
Mesa - Laguna Bell 230 kV #1	Mesa - Lighthipe & Mesa - Redondo 230 kV lines	P6	L-1/L-1	<100	106	103	<100	<100	106	<100	<100	Redispatch resources after initial contingency
	Mesa - Lighthipe & Mesa - Laguna Bell #2 230 kV lines	P7	L-2	<100	105	101	<100	<100	105	<100	<100	Redispatch resources pre-contingency; monitor economic impact in production simulation

Study Area: SCE Metro

High/Low Voltages



Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)					Voltage PU (Sensitivity Scenarios)			Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	
Goleta	All elements in service	P0	N-0	>0.95	0.93	0.94	>0.95	>0.95	0.91	>0.95	>0.95	Pre-2021: Continued operation of Ellwood and Ormond Beach (Note: The owner of these facilities has recently withdrawn its notice to retire the facilities); Post-2020: SCE LCR RFO resources and, if needed, shunt capacitors @ Goleta
	Santa Clara–Goleta #1 or #2 230 kV	P1	L-1	0.89	0.84	0.84	>0.90	>0.90	0.80	>0.90	>0.90	
	Santa Clara 230 kV Shunt Capacitor	P1	N-1	>0.90	>0.90	>0.90	>0.90	>0.90	0.89	>0.90	>0.90	
	Ellwood & Santa Clara–Goleta #1 or #2 230 kV (assuming Ellwood is not retired until 2021)	P3	G-1/L-1	0.89	N/A	N/A	>0.90	N/A	N/A	N/A	>0.90	
	Santa Clara–Goleta #1 or #2 230 kV & Santa Clara 230 kV Shunt Capacitor	P6	N-1/L-1	0.86	0.80	0.80	>0.90	>0.90	0.77	>0.90	0.87	

Study Area: SCE Metro

Voltage Deviation



Substation	Contingency (All and Worst P6)	Category	Category Description	Post Cont. Voltage Deviation % (Baseline Scenarios)					Post Cont. Voltage Deviation % (Sensitivity Scenarios)			Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	
Goleta	Santa Clara–Goleta #1 or #2 230 kV	P1	L-1	<8%	9.1%	9.2%	<8%	<8%	11.5%	<8%	<8%	SCE LCR RFO resources and, if needed, shunt capacitors @ Goleta

Study Area: SCE Metro

Transient Stability



Contingency	Category	Category Description	Transient Stability Performance								Potential Mitigation Solutions
			2020 Summer Peak	2028 Summer Peak	2023 Spring Off-Peak	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	Select..	Select..	Select..	
Chino-Viejo 230 kV & Chino-Serrano 230 kV, 3-PH Fault @ Chino 230 kV, Delayed Clearing	P4.2	Stuck Breaker	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met				No violation
Goodrich-Laguna Bell 230 kV & Goodrich-Gould 230 kV, 3-PH Fault @ Goodrich 230 kV, Delayed Clearing	P4.2	Stuck Breaker	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met				No violation
Lugo-Vincent No.1 500 kV & Lugo-Rancho Vista 500 kV , 1-PH Fault @ Lugo 500 kV, Delayed Clearing	P4.2	Stuck Breaker	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met				No violation
Lugo-Mira Loma No.3 500 kV & Mira Loma 4AA Bank, 3-PH Fault @ Mira Loma 500 kV, Delayed Clearing	P4.2	Stuck Breaker	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met				No violation
Chino-Mira Loma No.2 230 kV & Mira Loma 4AA Bank, 3-PH Fault @ Mira Loma 230 kV, Delayed Clearing	P4.2	Stuck Breaker	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met				No violation
Lugo-Rancho Vista 500 kV & Rancho Vista 4AA Bank, 3-PH Fault @ Rancho Vista 500 kV, Delayed Clearing	P4.2	Stuck Breaker	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met				No violation
Padua-Rancho Vista No.2 230 kV & Rancho Vista 4AA Bank, 1-PH Fault @ Rancho Vista 230 kV, Delayed Clearing	P4.2	Stuck Breaker	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met				No violation
Rancho Vista-Serrano 500 kV & Serrano 1AA Bank, 3-PH Fault @ Serrano 500 kV, Delayed Clearing	P4.2	Stuck Breaker	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met				No violation
Mira Loma-Serrano No.2 500 kV & Serrano 2AA Bank, 3-PH Fault @ Serrano 500 kV, Delayed Clearing	P4.2	Stuck Breaker	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met				No violation
Serrano-Valley 500 kV & Serrano 3AA Bank, 3-PH Fault @ Serrano 500 kV, Delayed Clearing	P4.2	Stuck Breaker	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met				No violation
Chino-Serrano 230 kV & Serrano-Lewis No.1 230 kV, 3-PH Fault @ Serrano 230 kV, Delayed Clearing	P4.2	Stuck Breaker	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met				No violation
Ellis-Santiago 230 kV & San Onofre-Santiago No.2 230 kV , 3-PH Fault @ Santiago 230 kV, Delayed Clearing	P4.2	Stuck Breaker	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met				No violation
Mesa-Vincent No.1 230 kV & Pardee-Vincent No.1 230 kV, 3-PH Fault @ Vincent 230 kV, Delayed Clearing	P4.2	Stuck Breaker	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met				No violation

Study Area: SCE Metro

Transient Stability



Contingency	Category	Category Description	Transient Stability Performance								Potential Mitigation Solutions
			2020 Summer Peak	2028 Summer Peak	2023 Spring Off-Peak	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	Select..	Select..	Select..	
Pardee-Vincent No.2 230 kV & Vincent 2AA Bank, 1-PH Fault @ Vincent 230 kV, Delayed Clearing	P4.2	Stuck Breaker	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met				No violation
Rio Hondo-Vincent No.2 230 kV & Vincent 3AA Bank, 1-PH Fault @ Vincent 230 kV, Delayed Clearing	P4.2	Stuck Breaker	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met				No violation
Goodrich-Gould 230 kV & Eagle Rock-Gould 230 kV, 3-PH Fault @ Gould 230 kV, Normal Clearing	P6.1	Stuck Breaker	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met				No violation
Mesa-Vincent 500 kV & Mesa-Mira Loma 500 kV , 3-PH Fault @ Mesa 500 kV, Normal Clearing	P6.1	Stuck Breaker	N/A	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	N/A				No violation
Litehipe-Mesa 230 kV & Laguna Bell-Rio Hondo 230 kV , 3-PH Fault @ Mesa 230 kV, Normal Clearing	P6.1	Stuck Breaker	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met				No violation
Vincent-Redondo 230 kV & Laguna Bell-Rio Hondo 230 kV , 3-PH Fault @ Mesa 230 kV, Normal Clearing	P6.1	Stuck Breaker	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met				No violation
Litehipe-Mesa 230 kV & Redondo-Vincent 230 kV , 3-PH Fault @ Mesa 230 kV, Normal Clearing	P6.1	Stuck Breaker	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met				No violation
Mira Loma-Vincent 500 kV & Mira Loma 4AA bank, 3-PH Fault @ Mira Loma 500 kV, Normal Clearing	P6.1	Stuck Breaker	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met				No violation
Mira Loma-Serrano No.2 500 kV & Mira Loma 4AA bank, 3-PH Fault @ Mira Loma 500 kV, Normal Clearing	P6.1	Stuck Breaker	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met				No violation
Rancho Vista-Serrano 500 kV & Lugo-Rancho Vista 500 kV, 3-PH Fault @ Rancho Vista 500 kV, Normal Clearing	P6.1	Stuck Breaker	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met				No violation
Rancho Vista 3AA & 4AA bank, 3-PH Fault @ Rancho Vista 500 kV, Normal Clearing	P6.1	Stuck Breaker	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met				No violation
Serrano-Valley 500 kV & Rancho Vista-Serrano 500 kV, 3-PH Fault @ Serrano 500 kV, Normal Clearing	P6.1	Stuck Breaker	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met				No violation
Serrano-Valley 500 kV & Mira Loma-Serrano No. 2 500 kV, 3-PH Fault @ Serrano 500 kV, Normal Clearing	P6.1	Stuck Breaker	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met				No violation
Serrano 2AA bank & Serrano 3AA bank, 3-PH Fault @ Serrano 500 kV, Normal Clearing	P6.1	Stuck Breaker	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met				No violation

Study Area: SCE Metro

Transient Stability



Contingency	Category	Category Description	Transient Stability Performance								Potential Mitigation Solutions
			2020 Summer Peak	2028 Summer Peak	2023 Spring Off-Peak	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	Select..	Select..	Select..	
Alamitos-Center 230 kV & Center-Del Amo 230 kV, 3-PH Fault @ Center 230 kV, Normal Clearing	P7.1	DCTL	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met				No violation
Center-Mesa 230 kV & Center-Olinda 230 kV, 3-PH Fault @ Center 230 kV, Normal Clearing	P7.1	DCTL	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met				No violation
Ellis-Santiago 230 kV & Ellis-Johanna 230 kV , 3-PH Fault @ Johanna 230 kV, Normal Clearing	P7.1	DCTL	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met				No violation
Center-Mesa 230 kV & Mesa-Walnut 230 kV Line, 3-PH Fault @ Mesa 230 kV, Normal Clearing	P7.1	DCTL	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met				No violation
Goodrich-Laguna Bell 230 kV & Mesa-Vincent No. 1 230 kV Lines, 3-PH Fault @ Mesa 230 kV, Normal Clearing	P7.1	DCTL	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met				No violation
Center-Olinda 230 kV & Mesa-Walnut 230 kV , 3-PH Fault @ Mesa 230 kV, Normal Clearing	P7.1	DCTL	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met				No violation
Redondo-Vincent 230 kV & Lighthipe-Petrol 230 kV, 3-PH Fault @ Mesa 230 kV, Normal Clearing	P7.1	DCTL	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met				No violation
Redondo-Vincent 230 kV & Petrol-Redondo 230 kV, 3-PH Fault @ Mesa 230 kV, Normal Clearing	P7.1	DCTL	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met				No violation
Redondo-Vincent 230 kV & La Fresa-Laguna Bell 230 kV , 3-PH Fault @ Redondo 230 kV, Normal Clearing	P7.1	DCTL	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met				No violation
La Fresa-Laguna Bell 230 kV & Lighthipe-Mesa 230 kV, 3-PH Fault @ Mesa 230 kV, Normal Clearing	P7.1	DCTL	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met				No violation
Lighthipe-Mesa 230 kV & Del Amo-Laguna Bell 230 kV , 3-PH Fault @ Mesa 230 kV, Normal Clearing	P7.1	DCTL	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met				No violation
Redondo-Vincent 230 kV & Goodrich-Laguna Bell 230 kV , 3-PH Fault @ Laguna Bell 230 kV, Normal Clearing	P7.1	DCTL	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met				No violation
Lighthipe-Mesa 230 kV & Laguna Bell-Rio Hondo 230 kV , 3-PH Fault @ Mesa 230 kV, Normal Clearing	P7.1	DCTL	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met				No violation
Mesa-Rio Hondo No.1 230 kV & Laguna Bell-RioHondo 230 kV , 3-PH Fault @ Mesa 230 kV, Normal Clearing	P7.1	DCTL	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met				No violation

Study Area: SCE Metro

Transient Stability



Contingency	Category	Category Description	Transient Stability Performance								Potential Mitigation Solutions
			2020 Summer Peak	2028 Summer Peak	2023 Spring Off-Peak	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	Select..	Select..	Select..	
Goodrich-Gould 230 kV & Mesa-Vincent No.2 230 kV , 3-PH Fault @ Mesa 230 kV, Normal Clearing	P7.1	DCTL	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met				No violation
Redondo-Vincent 230 kV & Goodrich-Laguna Bell 230 kV , 3-PH Fault @ Laguna Bell 230 kV, Normal Clearing	P7.1	DCTL	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met				No violation
Mira Loma-Vincent 500 kV & Chino-Mira Loma No.3 230 kV, 3-PH Fault @ Mira Loma 500 kV, Normal Clearing	P7.1	DCTL	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met				No violation
Mira Loma-Walnut 230 kV & Mira Loma-Olinda 230 kV , 3-PH Fault @ Mira Loma 230 kV, Normal Clearing	P7.1	DCTL	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met				No violation
Mira Loma-Rancho Vista No.1 & No.2 230 kV, 3-PH Fault @ Rancho Vista 230 kV, Normal Clearing	P7.1	DCTL	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met				No violation
Ellis-Santiago 230 kV & Johanna-Santiago 230 kV , 3-PH Fault @ Santiago 230 kV, Normal Clearing	P7.1	DCTL	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met				No violation
Mira Loma Serrano No.2 500 kV & Rancho Vista-Serrano 500 kV, 3-PH Fault @ Serrano 500 kV, Normal Clearing	P7.1	DCTL	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met				No violation
Serrano-Villa Park No.1 & No.2 230 kV, 3-PH Fault @ Serrano 230 kV, Normal Clearing	P7.1	DCTL	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met				No violation
San Onofre-Serrano 230 kV & Chino-Viejo 230 kV, 3-PH Fault @ Viejo 230 kV, Normal Clearing	P7.1	DCTL	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met				No violation
Rio Hondo-Vincent No.1 & No.2 230 kV, 3-PH Fault @ Vincent 230 kV, Normal Clearing	P7.1	DCTL	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met				No violation
PDCI Bipole, 3-PH Fault @ Sylmar 230 kV, Normal Clearing	P7.2	Bipolar DC	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met				No violation

Study Area: SCE Metro



Single Contingency Load Drop

Worst Contingency	Category	Category Description	Amount of Load Drop (MW)								Potential Mitigation Solutions
			Select..	Select..	Select..	Select..	Select..	Select..	Select..	Select..	

No single contingency resulted in total load drop of more than 250 MW

Study Area: SCE Metro



Single Source Substation with more than 100 MW Load

Substation	Load Served (MW)								Potential Mitigation Solutions
	Select..	Select..	Select..	Select..	Select..	Select..	Select..	Select..	

No single source substation with more than 100 MW