2026-2027 ISO Reliability Assessment - Preliminary Study Results
Study Area: SCE Main, covering SCE 500 kV Bulk and its Metro, EOP, and Ventura Areas
Thermal Overloads

California ISO

Overloaded Facility	Contingency (All and Critical P6*)	Category	Category Description	Loading % (Baseline Scenarios)								Loading % (Sensitivity Scenarios)			Project & Potential Mitigation Solutions
				B1 2028 Summer Peak	B2 2031 Summer Peak	B3 2036 Summer Peak	B4 2041 Summer Peak	B5 2036 Summer-Off Peak	B6 2041 Winter Peak	B7 2028 Spring Off-Peak	B8 2031 Spring Off-Peak	S1 2031 SP High CEC Load	S2 2028 SP High Renewable	S3 2028 SprOP ES-Charging	
30060 MIDWAY 500 24591 MW_VINCNT_11 500 1 1	P1L26_2_Line MIDWAY 500.0 to VINCENT 500.0 Circuit 2	P1	Single Contingency	135.2	< 100	< 100	134.3	< 100	< 100	< 100	< 100	< 100	< 100	< 100	1. Coordinate with Policy and Economic Studies to evaluate capital projects and operational mitigation measures including a new RAS, to address the severe P1 and P6 overloads under high Path 26 north-to-south flows (up to the 4,000 MW limit in B1/B4). The 4-hour ratings, rather than the 30-minute ratings, of the Midway–Vincent #1 and #2 500 kV lines were applied in the assessment, to comply with FAC-014 and maintain consistency with ISO Operating Procedure OP6410. 2. Credible N-2 overloads under high Path 26 north-to-south flows in B1/B4 can be mitigated through the PG&E Path 26 RAS curtailing generation and the SCE Path 26 RAS shedding load; 3. P6 overloads under high Path 26 flows at the -3,000 MW S2N limit (B2/B3) can be mitigated through post-contingency operational actions that reduce Path 26 flow S2N after the 1st contingency.
	P1L26_2_Line MIDWAY 500.0 to VINCENT 500.0 Circuit 2 AND P1L26_3_Line MIDWAY 500.0 to WIRLWIND 500.0 Circuit 3	P6	overlapping singles	176.4	126.6	124.8	170.9	< 100	124.8	< 100	124.5	< 100	< 100	< 100	
24592 MW_VINCNT_22 500 24156 VINCENT 500 2 1	P1L26_1_Line MIDWAY 500.0 to VINCENT 500.0 Circuit 1	P1	Single Contingency	135.2	< 100	< 100	134.5	< 100	< 100	< 100	< 100	< 100	< 100	< 100	
	P1L26_1_Line MIDWAY 500.0 to VINCENT 500.0 Circuit 1 AND P1L26_3_Line MIDWAY 500.0 to WIRLWIND 500.0 Circuit 3	P6	overlapping singles	175.2	127.2	125.1	169.9	< 100	125.6	< 100	125.1	< 100	< 100	< 100	
30060 MIDWAY 500 24595 MW_WRLWND_31 500 3 1	P1L26_1_Line MIDWAY 500.0 to VINCENT 500.0 Circuit 1 AND P1L26_2_Line MIDWAY 500.0 to VINCENT 500.0 Circuit 2	P6	overlapping singles	114.0	< 100	< 100	106.2	< 100	< 100	< 100	< 100	< 100	< 100	< 100	
24594 MW_WRLWND_32 500 29402 WIRLWIND 500 3 1	N2_1P26_N2S_NoRAS_MIDWAY-Vincent 500kV N-2 W/O Path26 RAS or OP	N2	Credible Common Corridor	140.0	< 100	< 100	105.8	< 100	< 100	< 100	< 100	< 100	< 100	< 100	
	N2_2P26_N2S_PGE-RAS_MIDWAY-Vincent 500kV N-2 WITH Path26 PGE N2S RAS	N2	Credible Common Corridor	116.2	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	
	N2_3P26_N2S_SCE-RAS_MIDWAY-Vincent 500kV N-2 WITH Path26 SCE N2S RAS	N2	Credible Common Corridor	113.5	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	
	N2_4P26_N2S_RAS1_MIDWAY-Vincent 500kV N-2 WITH Path26 N2S RAS	N2	Credible Common Corridor	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	
	N2_6P26_S2N_OP_MIDWAY-Vincent 500kV N-2 WITH Path26 S2N OP	N2	Credible Common Corridor	132.0	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	
24156 VINCENT 500 29402 WIRLWIND 500 3 1	P1L_156_P1.2 Loss of Antelope-Windhub No.1 500 kV line AND P1L_157_P1.2 Loss of Antelope-Wirlwind No.1 500 kV line	P6	overlapping singles	115.2	< 100	< 100	109.2	< 100	< 100	< 100	< 100	< 100	126.7	< 100	Rely on operational mitigation measures to eliminate P1, P2, P4, and P6 overloads, such as operational mitigation actions including Tehachapi CRAS and congestion management curtaining generation in the Northern area prior to or after the first contingency. The P4 overload of the Antelope-Whirlwind 500 kV T/L in the high renewable sensitivity scenario could be mitigated by relocating the 500 kV lines at Whirlwind 500 kV substation
29402 WIRLWIND 500 29401 WINDHUB 500 1 1	P1L_156_P1.2 Loss of Antelope-Windhub No.1 500 kV line	P1	Single Contingency	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	134.6	< 100	
29400 ANTELOPE 500 24156 VINCENT 500 1 1	P1L_155_P1.2 Loss of Antelope-Vincent No.2 500 kV line	P1	Single Contingency	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	101.0	< 100	
	P1L_104_P1.2 Loss of Vincent-Wirlwind No.3 500 kV line AND P1L_155_P1.2 Loss of Antelope-Vincent No.2 500 kV line	P6	overlapping singles	123.7	< 100	< 100	126.6	< 100	< 100	< 100	< 100	< 100	144.7	< 100	
29400 ANTELOPE 500 24156 VINCENT 500 2 1	P1L_154_P1.2 Loss of Antelope-Vincent No.1 500 kV line	P1	Single Contingency	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	101.0	< 100	
	P1L_104_P1.2 Loss of Vincent-Wirlwind No.3 500 kV line AND P1L_154_P1.2 Loss of Antelope-Vincent No.1 500 kV line	P6	overlapping singles	123.7	< 100	< 100	126.6	< 100	< 100	< 100	< 100	< 100	144.7	< 100	
29400 ANTELOPE 500 29401 WINDHUB 500 1 1	P1L_158_P1.2 Loss of Wirlwind-Windhub No.1 500 kV line	P1	Single Contingency	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	136.2	< 100	
	line_T_P4_11_Windhub 1AA bank and Windhub-Whirlwind 500 kV line	P2/P4	Internal Breaker Fault /stuck breaker	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	141.3	< 100	
	P1L_104_P1.2 Loss of Vincent-Wirlwind No.3 500 kV line AND P1L_157_P1.2 Loss of Antelope-Wirlwind No.1 500 kV line	P6	overlapping singles	109.8	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	123.1	< 100	
29400 ANTELOPE 500 29402 WIRLWIND 500 1 1	line_T_P4_8_Whirlwind - Vincent 500 kV line and Whirlwind - Midway 500 kV line	P2/P4	Internal Breaker Fault /stuck breaker	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	110.4	< 100	
	P1L_156_P1.2 Loss of Antelope-Windhub No.1 500 kV line AND P1L_104_P1.2 Loss of Vincent-Wirlwind No.3 500 kV line	P6	overlapping singles	126.8	< 100	< 100	119.4	< 100	< 100	< 100	< 100	< 100	137.3	< 100	
24042 ELDORDO 500 26048 MCCULLGH 500 1 1	P1L_181_P1.2 Loss of Moen-Eld Sc3-Eldordo No.1 500 kV line AND P1L_318_P1.2 Loss of H Allen-Mead No.1 500 kV line	P6	overlapping singles	< 100	< 100	< 100	110.5	< 100	< 100	< 100	< 100	< 100	< 100	< 100	With the completion of the Trout Canyon - Lugo 500 kV project, the P6 overloads of Eldorado-McCullough 500 kV tie with LADWP would be significantly reduced (e.g. from 160% in the last TPP to less than 120%) , which could be eliminated by modifying the Lugo-Victorville RAS. Further evaluation is needed while interconnecting additional out-of-state wind resources as they are materialized.
	P1L_181_P1.2 Loss of Moen-Eld Sc3-Eldordo No.1 500 kV line AND P1L_5_P1.2 Loss of Lugo-Mohave No.1 500 kV line	P6	overlapping singles	< 100	< 100	< 100	108.0	< 100	< 100	< 100	< 100	< 100	< 100	< 100	
	P1L_186_P1.2 Loss of Lugo-Trout Canyon No.1 500 kV line AND P1L_318_P1.2 Loss of H Allen-Mead No.1 500 kV line	P6	overlapping singles	< 100	< 100	< 100	106.5	< 100	< 100	< 100	< 100	< 100	< 100	< 100	
	P1L_186_P1.2 Loss of Lugo-Trout Canyon No.1 500 kV line AND P1L_5_P1.2 Loss of Lugo-Mohave No.1 500 kV line	P6	overlapping singles	< 100	< 100	< 100	106.7	104.7	< 100	< 100	< 100	< 100	< 100	< 100	
	P1L_186_P1.2 Loss of Lugo-Trout Canyon No.1 500 kV line AND P1L_6_P1.2 Loss of Eldordo-Lugo No.1 500 kV line	P6	overlapping singles	< 100	< 100	< 100	103.8	115.2	< 100	< 100	< 100	< 100	< 100	< 100	
	P1L_6_P1.2 Loss of Eldordo-Lugo No.1 500 kV line AND P1L_5_P1.2 Loss of Lugo-Mohave No.1 500 kV line	P6	overlapping singles	< 100	< 100	104.5	117.3	119.0	< 100	< 100	< 100	< 100	< 100	< 100	

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29253 DVRS_RB_12 500 24374 REDBLUFF 500 1 1	P1L_9_P1.2 Loss of Devers-Redbluff No.2 500 kV line	P1	Single Contingency	119.0	< 100	107.8	< 100	< 100	< 100	< 100	< 100	< 100	156.6	< 100	
	P1G_253_P1.1 Loss of Mountainview Block 1 AND P1L_9_P1.2 Loss of Devers-Redbluff No.2 500 kV line	P3	G-1/L-1	122.7	< 100	109.7	< 100	< 100	< 100	< 100	< 100	< 100	160.5	< 100	
	P1L_1_P1.2 Loss of Palovrde-Colriver No.1 500 kV line AND P1L_9_P1.2 Loss of Devers-Redbluff No.2 500 kV line	P6	overlapping singles	129.7	< 100	106.3	< 100	< 100	< 100	< 100	< 100	< 100	173.2	< 100	
	P1L_342_P1.2 Loss of Delaney-Cielo Azul No.1 500 kV line AND P1L_9_P1.2 Loss of Devers-Redbluff No.2 500 kV line	P6	overlapping singles	144.3	103.6	118.9	< 100	< 100	< 100	< 100	< 100	103.1	NotConv	< 100	
	P1L_9_P1.2 Loss of Devers-Redbluff No.2 500 kV line AND P1L_170_P1.2 Loss of N.Gila-Imprlvly No.1 500 kV line	P6	overlapping singles	131.5	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	174.6	< 100	
	P1L_314_P1.2 Loss of Delaney-Snvly No.1 500 kV line AND P1L_9_P1.2 Loss of Devers-Redbluff No.2 500 kV line	P7	common structure	125.3	< 100	113.3	< 100	< 100	< 100	< 100	< 100	< 100	165.2	< 100	
29255 DVRS_RB_22 500 24374 REDBLUFF 500 2 1	P1L_8_P1.2 Loss of Devers-Redbluff No.1 500 kV line	P1	Single Contingency	116.8	< 100	107.8	< 100	< 100	< 100	< 100	< 100	< 100	153.5	< 100	
	P1L_342_P1.2 Loss of Delaney-Cielo Azul No.1 500 kV line AND P1L_8_P1.2 Loss of Devers-Redbluff No.1 500 kV line	P6	overlapping singles	141.4	103.4	118.9	< 100	< 100	< 100	< 100	< 100	102.9	NotConv	< 100	
	P1L_8_P1.2 Loss of Devers-Redbluff No.1 500 kV line AND P1L_170_P1.2 Loss of N.Gila-Imprlvly No.1 500 kV line	P6	overlapping singles	129.0	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	170.8	< 100	The P1, P3, P6, and P7 overloads could be mitigated by existing RAS and operational mitigation actions, such as curtailing generation in the SCE Eastern, MWD, IID, and the DCRT systems
24801 DEVERS 500 29252 DVRS_RB_11 500 1 1	P1L_9_P1.2 Loss of Devers-Redbluff No.2 500 kV line	P1	Single Contingency	120.3	< 100	107.9	< 100	< 100	< 100	< 100	< 100	< 100	158.2	< 100	
	P1L_170_P1.2 Loss of N.Gila-Imprlvly No.1 500 kV line AND P1L_9_P1.2 Loss of Devers-Redbluff No.2 500 kV line	P6	overlapping singles	133.1	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	177.0	< 100	
	P1L_342_P1.2 Loss of Delaney-Cielo Azul No.1 500 kV line AND P1L_9_P1.2 Loss of Devers-Redbluff No.2 500 kV line	P6	overlapping singles	145.9	104.6	119.1	< 100	< 100	< 100	< 100	< 100	104.2	NotConv	< 100	
	P1L_9_P1.2 Loss of Devers-Redbluff No.2 500 kV line AND P1L_314_P1.2 Loss of Delaney-Snvly No.1 500 kV line	P6	overlapping singles	126.2	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	166.1	< 100	
	P1L_9_P1.2 Loss of Devers-Redbluff No.2 500 kV line AND P1L_1_P1.2 Loss of Palovrde-Colriver No.1 500 kV line	P6	overlapping singles	130.8	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	174.2	< 100	
	P1L_8_P1.2 Loss of Devers-Redbluff No.1 500 kV line AND P1L_342_P1.2 Loss of Delaney-Cielo Azul No.1 500 kV line	P6	overlapping singles	141.3	103.2	119.0	< 100	< 100	< 100	< 100	< 100	102.9	NotConv	< 100	
24801 DEVERS 500 24151 VALLEYSC 500 1 1	P1L_126_P1.2 Loss of Devers-Valleysc No.2 500 kV line	P1	Single Contingency	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	105.9	< 100	
	P1L_126_P1.2 Loss of Devers-Valleysc No.2 500 kV line AND P1L_342_P1.2 Loss of Delaney-Cielo Azul No.1 500 kV line	P6	overlapping singles	102.8	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	127.9	< 100	
24086 LUGO 500 24092 MIRALOMA 500 2 1	P1L_71_P1.2 Loss of Lugo-Miraloma No.3 500 kV line AND P1L_74_P1.2 Loss of Lugo-Ranchvst No.1 500 kV line	P6	overlapping singles	< 100	< 100	< 100	102.9	120.2	< 100	< 100	< 100	< 100	< 100	< 100	
24086 LUGO 500 24092 MIRALOMA 500 3 1	P1L_70_P1.2 Loss of Lugo-Miraloma No.2 500 kV line AND P1L_74_P1.2 Loss of Lugo-Ranchvst No.1 500 kV line	P6	overlapping singles	< 100	< 100	< 100	101.8	119.0	< 100	< 100	< 100	< 100	< 100	< 100	
24086 LUGO 500 24236 RANCHVST 500 1 1	line_M_P7_49_Line LUGO 500.0 to MIRALOMA 500.0 Circuit 2 Line LUGO 500.0 to MIRALOMA 500.0 Circuit 3	P7	common structure	< 100	< 100	< 100	< 100	111.3	< 100	< 100	< 100	< 100	< 100	< 100	
24086 LUGO 500 24156 VINCENT 500 1 1	P1L_103_P1.2 Loss of Vincent-Mesa Cal No.1 500 kV line AND P1L_73_P1.2 Loss of Lugo-Vincent No.2 500 kV line	P6	overlapping singles	135.5	< 100	< 100	130.1	< 100	< 100	< 100	< 100	< 100	101.3	< 100	The use of energy storage is subject to verification that it has sufficient MWh capability and can be fully charged in order address the P6 and P7 overloads. If the energy storage resources in the Western LA Basin are insufficient or limited to be charged, the need for the following mitigation will be evaluate as alternative and the need date with and without planned storage will be evaluated: 1. Convert the Vincent - Riohondo-Mesa 230 kV line that was built to 500 kV specification to a new Vincent - Mesa 500 kV line
24086 LUGO 500 24156 VINCENT 500 2 1	P1L_72_P1.2 Loss of Lugo-Vincent No.1 500 kV line AND P1L_103_P1.2 Loss of Vincent-Mesa Cal No.1 500 kV line	P6	overlapping singles	135.7	< 100	< 100	130.6	< 100	< 100	< 100	< 100	< 100	101.4	< 100	
	P1L_71_P1.2 Loss of Lugo-Miraloma No.3 500 kV line AND P1L_70_P1.2 Loss of Lugo-Miraloma No.2 500 kV line	P6	overlapping singles	< 100	< 100	< 100	107.3	< 100	< 100	< 100	< 100	< 100	< 100	< 100	

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24156 VINCENT 500 24386 MESA CAL 500 1 1	P1L_73_P1.2 Loss of Lugo-Vincent No.2 500 kV line AND P1L_72_P1.2 Loss of Lugo-Vincent No.1 500 kV line	P6	overlapping singles	112.7	< 100	< 100	NotConv	< 100	< 100	< 100	< 100	< 100	< 100	< 100	
	P1L_74_P1.2 Loss of Lugo-Ranchvst No.1 500 kV line AND P1L_70_P1.2 Loss of Lugo-Miraloma No.2 500 kV line	P6	overlapping singles	< 100	< 100	< 100	106.2	< 100	< 100	< 100	< 100	< 100	< 100	< 100	
	line_M_P7_49_Line LUGO 500.0 to MIRALOMA 500.0 Circuit 2 Line LUGO 500.0 to MIRALOMA 500.0 Circuit 3	P7	common structure	< 100	< 100	< 100	107.3	< 100	< 100	< 100	< 100	< 100	< 100	< 100	
24236 RANCHVST 500 24226 rchvst3i 13.8 3 1	P1G_253_P1.1 Loss of Mountainview Block 1 AND P1T_204_P1.3 Loss of Ranchvst No.4 500/230 kV transformer	P3	G-1/L-1	< 100	< 100	< 100	114.3	113.9	< 100	< 100	< 100	< 100	< 100	< 100	2. The P3 and P6 overloads could be eliminated by operational mitigation actions as system adjustment dispatching available resources including energy storage and demand response in Eastern LA Basin after the 1st contingency.
	P1G_253_P1.1 Loss of Mountainview Block 1 AND P1T_204_P1.3 Loss of Ranchvst No.4 500/230 kV transformer	P3	G-1/L-1	< 100	< 100	< 100	114.4	114.0	< 100	< 100	< 100	< 100	< 100	< 100	
24236 RANCHVST 500 24231 rchvst4i 13.8 4 1	P1G_253_P1.1 Loss of Mountainview Block 1 AND P1T_203_P1.3 Loss of Ranchvst No.3 500/230 kV transformer	P3	G-1/L-1	< 100	< 100	< 100	114.3	113.9	< 100	< 100	< 100	< 100	< 100	< 100	
24092 MIRALOMA 500 24178 mirlom1i 13.8 1 1	Bus_P5_ab_BD_1_P5.2.13ab: Serrano 500 kV East Bus	P5	non-redundant component	< 100	< 100	< 100	< 100	105.5	< 100	< 100	< 100	< 100	< 100	< 100	
	P1L_35_P1.2 Loss of Chino-Serrano No.1 230 kV line AND P1T_192_P1.3 Loss of Miraloma No.2 500/230 kV transformer	P6	overlapping singles	< 100	< 100	< 100	NotConv	125.6	< 100	< 100	< 100	< 100	< 100	< 100	
	P1L_36_P1.2 Loss of Chino-Miralome No.3 230 kV line AND P1T_192_P1.3 Loss of Miraloma No.2 500/230 kV transformer	P6	overlapping singles	< 100	< 100	< 100	113.3	130.1	< 100	< 100	< 100	101.0	< 100	< 100	
	P1T_194_P1.3 Loss of Miraloma No.4 500/230 kV transformer AND P1T_192_P1.3 Loss of Miraloma No.2 500/230 kV transformer	P6	overlapping singles	< 100	< 100	109.3	120.4	149.0	100.8	< 100	< 100	109.1	< 100	< 100	
24092 MIRALOMA 500 24228 mirlom2i 13.8 2 1	P1L_36_P1.2 Loss of Chino-Miralome No.3 230 kV line AND P1T_191_P1.3 Loss of Miraloma No.1 500/230 kV transformer	P6	overlapping singles	< 100	< 100	< 100	107.6	123.6	< 100	< 100	< 100	< 100	< 100	< 100	
	P1T_191_P1.3 Loss of Miraloma No.1 500/230 kV transformer AND P1T_194_P1.3 Loss of Miraloma No.4 500/230 kV transformer	P6	overlapping singles	< 100	< 100	103.7	114.2	141.4	< 100	< 100	< 100	103.8	< 100	< 100	
24092 MIRALOMA 500 24182 mirlom4i 13.8 4 1	P1T_191_P1.3 Loss of Miraloma No.1 500/230 kV transformer AND P1T_192_P1.3 Loss of Miraloma No.2 500/230 kV transformer	P6	overlapping singles	< 100	< 100	< 100	< 100	119.5	< 100	< 100	< 100	< 100	< 100	< 100	
24156 VINCENT 500 29518 vincen1i 13.8 1 1	P1L_103_P1.2 Loss of Vincent-Mesa Cal No.1 500 kV line AND P1T_202_P1.3 Loss of Vincent No.4 500/230 kV transformer	P6	overlapping singles	121.7	< 100	< 100	153.5	128.9	< 100	< 100	< 100	< 100	< 100	< 100	The use of energy storage is subject to verification that it has sufficient MWh capability and can be fully charged in order address the P6 and P7 overloads. If the energy storage resources in the Western LA Basin and Ventura area are insufficient or limited to be charged, then the need date with and without planned storage, for the following mitigations will be evaluated: 1. Following the first contingency, reverse Path 26 flow direction from N2S to S2N by redispatching generation between the north and south sides of Path 26 and deploy available resources, including energy storage and demand response. This could address the P6 overloads in the near-term (B1) and the long-term (B5 and B4). This would require significant generation redispatch, involving increases in generation south of Path 26 and corresponding reductions in generation north of Path 26, subject to operational feasibility. 2. Convert the Vincent - Riohondo-Mesa 230 kV line that was built to 500 kV specfication to a new Vincent - Mesa 500 kV line 3. Add a new Pardee 500 kV switchyard and convert the Vincent - Pardee and the Antelope - Pardee 230 kV lines that were built to 500 kV specfication to new Vincent - Pardee and Antelope - Pardee 500 kV lines 4. Add a fifth AA bank, subject to feasibility and cost assessment 5. Eliminate the 230 kV split bus configuration by upgrading circuit breakers at the Vincent 230 kV substation, subject to feasibility and cost assessment
	P1L_112_P1.2 Loss of Mesacals-Lagubell No.2 230 kV line AND P1T_202_P1.3 Loss of Vincent No.4 500/230 kV transformer	P6	overlapping singles	< 100	< 100	< 100	124.2	106.9	< 100	< 100	< 100	< 100	< 100	< 100	
	P1L_73_P1.2 Loss of Lugo-Vincent No.2 500 kV line AND P1T_202_P1.3 Loss of Vincent No.4 500/230 kV transformer	P6	overlapping singles	103.0	< 100	< 100	125.6	100.8	< 100	< 100	< 100	< 100	< 100	< 100	
	P1L_88_P1.2 Loss of Pardee-Vincent No.2 230 kV line AND P1T_202_P1.3 Loss of Vincent No.4 500/230 kV transformer	P6	overlapping singles	< 100	< 100	< 100	121.9	102.7	< 100	< 100	< 100	< 100	< 100	< 100	
	P1T_238_P1.3 Loss of Vincent No.3 500/230 kV transformer AND P1T_202_P1.3 Loss of Vincent No.4 500/230 kV transformer	P6	overlapping singles	< 100	< 100	< 100	NotConv (<100)	102.8	< 100	< 100	< 100	< 100	< 100	< 100	
24156 VINCENT 500 24190 vincen2i 13.8 2 1	P1L_103_P1.2 Loss of Vincent-Mesa Cal No.1 500 kV line AND P1T_238_P1.3 Loss of Vincent No.3 500/230 kV transformer	P6	overlapping singles	114.9	< 100	< 100	< 100	101.0	< 100	< 100	< 100	< 100	101.9	< 100	
24156 VINCENT 500 241551 vincen3i 13.8 3 1	P1L_103_P1.2 Loss of Vincent-Mesa Cal No.1 500 kV line AND P1T_200_P1.3 Loss of Vincent No.2 500/230 kV transformer	P6	overlapping singles	112.7	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	
24156 VINCENT 500 29520 vincen4i 13.8 4 1	P1L_103_P1.2 Loss of Vincent-Mesa Cal No.1 500 kV line AND P1T_201_P1.3 Loss of Vincent No.1 500/230 kV transformer	P6	overlapping singles	121.2	< 100	< 100	152.9	128.4	< 100	< 100	< 100	< 100	< 100	< 100	
	P1L_116_P1.2 Loss of Antelope-Pardee No.1 230 kV line AND P1T_201_P1.3 Loss of Vincent No.1 500/230 kV transformer	P6	overlapping singles	103.3	< 100	< 100	129.9	109.0	< 100	< 100	< 100	< 100	< 100	< 100	

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Overloaded Facility	Contingency (All and Critical P6*)	Category	Category Description	Loading % (Baseline Scenarios)								Loading % (Sensitivity Scenarios)			Project & Potential Mitigation Solutions
				B1 2028 Summer Peak	B2 2031 Summer Peak	B3 2036 Summer Peak	B4 2041 Summer Peak	B5 2036 Summer-Off Peak	B6 2041 Winter Peak	B7 2028 Spring Off-Peak	B8 2031 Spring Off-Peak	S1 2031 SP High CEC Load	S2 2028 SP High Renewable	S3 2028 SprOP ES-Charging	
	P1T_238_P1.3 Loss of Vincent No.3 500/230 kV transformer AND P1T_201_P1.3 Loss of Vincent No.1 500/230 kV transformer	P6	overlapping singles	< 100	< 100	< 100	NotConv (<100)	102.3	< 100	< 100	< 100	< 100	< 100	< 100	
24386 MESA CAL 500 24390 mesa4i 13.8 4 1	P1T_208_P1.3 Loss of Mesa Cal No.3 500/230 kV transformer	P1	Single Contingency	< 100	< 100	< 100	101.7	113.4	< 100	< 100	< 100	< 100	< 100	< 100	The use of energy storage as reliability capacity requirement is subject to verification that their MWh charging and MW discharging capacities are adequate to mitigate the Mesa Banks reliability and storage charging constraints for P1, P3, P6, and P7 contingencies. The P1 and P3 Mesa Bank overloads observed in the 2036 summer off-peak case indicate significant transmission congestion affecting the charging of energy storage resources in the Western LA Basin LCR pocket, despite most of the generic energy storage resources within of the LCR pocket, about 3500 MW out of the 4000 MW BESS, having been turned off. If the energy storage resources in the Western LA Basin are insufficient or limited to be charged, then the need date with and without planned storage, for the following mitigations will be evaluated to eliminate the Mesa Banks reliability constraint identified in the 2036 summer peak scenario within the 10-year planning horizon: 1. Add a new 500/230 kV AA bank at Mesa to reduce transmission congestion affecting the charging of energy storage resources in the LA basin 2. Introduce a 2000 MW HVDC transmission source to Western LA Basin (e.g., Redondo, La Fresa, or Lighthipe) via submarine routes along the Pacific coast (e.g., from Ormond Beach) or underground cable along existing railroad corridors (e.g., from Pardee). This comprehensive strategy is all-inclusive solution and could address nearly all reliability concerns identified in the SCE main transmission system serving the Western LA Basin and Ventura areas, including both thermal and voltage-related issues, subject to feasibility, environmental, permitting, and cost assessments. 3.Other potential innovative mitigation solutions that may be proposed by stakeholders.
	P1L_101_P1.2 Loss of Vincent-Riohondo No.2 230 kV line AND P1T_208_P1.3 Loss of Mesa Cal No.3 500/230 kV transformer	P6	overlapping singles	< 100	< 100	105.8	116.3	126.6	< 100	< 100	< 100	< 100	< 100	< 100	
	P1L_65_P1.2 Loss of Lagubell-Mesa Cal No.1 230 kV line AND P1T_208_P1.3 Loss of Mesa Cal No.3 500/230 kV transformer	P6	overlapping singles	< 100	< 100	114.0	123.0	140.0	104.2	< 100	< 100	105.2	< 100	< 100	
	P1T_207_P1.3 Loss of Mesa Cal No.2 500/230 kV transformer AND P1T_208_P1.3 Loss of Mesa Cal No.3 500/230 kV transformer	P6	overlapping singles	< 100	< 100	120.6	129.7	138.8	113.3	< 100	< 100	104.8	< 100	< 100	
	P1T_208_P1.3 Loss of Mesa Cal No.3 500/230 kV transformer AND P1L_65_P1.2 Loss of Lagubell-Mesa Cal No.1 230 kV line	P6	overlapping singles	< 100	< 100	114.0	122.9	140.0	104.2	< 100	< 100	105.2	< 100	< 100	
24386 MESA CAL 500 24392 mesa3i 13.8 3 1	P1T_209_P1.3 Loss of Mesa Cal No.4 500/230 kV transformer	P1	Single Contingency	< 100	< 100	< 100	101.3	112.9	< 100	< 100	< 100	< 100	< 100	< 100	
	P1G_245_P1.1 Loss of Alamitos Repower AND P1T_209_P1.3 Loss of Mesa Cal No.4 500/230 kV transformer	P3	G-1/L-1	< 100	< 100	100.6	106.4	118.1	< 100	< 100	< 100	< 100	< 100	< 100	
	P1L_100_P1.2 Loss of Vincent-Riohondo No.1 230 kV line AND P1T_209_P1.3 Loss of Mesa Cal No.4 500/230 kV transformer	P6	overlapping singles	< 100	< 100	105.4	115.8	126.1	< 100	< 100	< 100	< 100	< 100	< 100	
	P1L_101_P1.2 Loss of Vincent-Riohondo No.2 230 kV line AND P1T_209_P1.3 Loss of Mesa Cal No.4 500/230 kV transformer	P6	overlapping singles	< 100	< 100	105.4	115.8	126.0	< 100	< 100	< 100	< 100	< 100	< 100	
	P1L_140_P1.2 Loss of Goodrich-Mesa Cal No.1 230 kV line AND P1T_209_P1.3 Loss of Mesa Cal No.4 500/230 kV transformer	P6	overlapping singles	< 100	< 100	< 100	NotConv	113.9	< 100	< 100	< 100	< 100	< 100	< 100	
	P1L_65_P1.2 Loss of Lagubell-Mesa Cal No.1 230 kV line AND P1T_209_P1.3 Loss of Mesa Cal No.4 500/230 kV transformer	P6	overlapping singles	< 100	< 100	113.5	122.5	139.5	103.8	< 100	< 100	104.8	< 100	< 100	
	P1T_209_P1.3 Loss of Mesa Cal No.4 500/230 kV transformer AND P1T_207_P1.3 Loss of Mesa Cal No.2 500/230 kV transformer	P6	overlapping singles	< 100	< 100	120.1	129.2	138.2	112.9	< 100	< 100	104.4	< 100	< 100	
24386 MESA CAL 500 24391 mesa2i 13.8 2 1	P1T_208_P1.3 Loss of Mesa Cal No.3 500/230 kV transformer AND P1T_209_P1.3 Loss of Mesa Cal No.4 500/230 kV transformer	P6	overlapping singles	< 100	< 100	109.9	121.2	118.6	104.6	< 100	< 100	< 100	< 100	< 100	
24155 VINCENT 230 24126 RIOHONDO 230 1 1	P1L_101_P1.2 Loss of Vincent-Riohondo No.2 230 kV line AND P1L_103_P1.2 Loss of Vincent-Mesa Cal No.1 500 kV line	P6	overlapping singles	< 100	< 100	< 100	114.6	< 100	< 100	< 100	< 100	< 100	< 100	< 100	If the energy storage resources in the Western LA Basin are insufficient or limited to be charged, the needs for the following mitigations will be evaluate as alternatives: 1. Reconductor Vincent - Riohondo 230 kV #1 and #2 lines using advanced conductor technology 2. Reconductor Vincent - Riohondo 230 kV #1 if the Vincent - Riohondo-Mesa 230 kV line that was built to 500 kV spec is convert to a new Vincent - Mesa 500 kV line, to avoid the P7 overload 3. Other potential innovative mitigation solutions that may be proposed by stakeholders.
	line_M_P7_48_Line MESA CAL 500.0 to VINCENT 500.0 Circuit 1 Line RIOHONDO 230.0 to VINCENT 230.0 Circuit 2 (Rating 2)	P7	common structure	< 100	< 100	< 100	114.4	< 100	< 100	< 100	< 100	< 100	< 100	< 100	
	line_M_P7_48_Line MESA CAL 500.0 to VINCENT 500.0 Circuit 1 Line RIOHONDO 230.0 to VINCENT 230.0 Circuit 2 (Rating 1)	P7	common structure	< 100	< 100	89.4	154.6	< 100	< 100	< 100	< 100	< 100	< 100	< 100	
24155 VINCENT 230 24126 RIOHONDO 230 2 1	P1L_100_P1.2 Loss of Vincent-Riohondo No.1 230 kV line AND P1L_103_P1.2 Loss of Vincent-Mesa Cal No.1 500 kV line	P6	overlapping singles	< 100	< 100	< 100	113.6	< 100	< 100	< 100	< 100	< 100	< 100	< 100	
	line_M_P7_48_Line MESA CAL 500.0 to VINCENT 500.0 Circuit 1 Line RIOHONDO 230.0 to VINCENT 230.0 Circuit 2 (Rating 1)	P7	overlapping singles	< 100	< 100	< 100	113.6	< 100	< 100	< 100	< 100	< 100	< 100	< 100	
24091 LAGUBELL 230 24091 MESA CAL 230 1 1	line_M_P7_13_Line LITEHIPE 230.0 to MESA CAL 230.0 Circuit 1 Line LAGUBELL 230.0 to MESACALS 230.0 Circuit 2 (Rating 2)	P7	common structure	< 100	< 100	89.7	108.7	118.2	< 100	< 100	< 100	< 100	< 100	< 100	
	line_M_P7_13_Line LITEHIPE 230.0 to MESA CAL 230.0 Circuit 1 Line LAGUBELL 230.0 to MESACALS 230.0 Circuit 2 (Rating 1)	P7	common structure	< 100	< 100	118.2	143.3	155.9	< 100	< 100	< 100	< 100	< 100	< 100	

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				B1 2028 Summer Peak	B2 2031 Summer Peak	B3 2036 Summer Peak	B4 2041 Summer Peak	B5 2036 Summer-Off Peak	B6 2041 Winter Peak	B7 2028 Spring Off-Peak	B8 2031 Spring Off-Peak	S1 2031 SP High CEC Load	S2 2028 SP High Renewable	S3 2028 SprOP ES-Charging	
24393 MESACALS 230 24076 LAGUBELL 230 2 1	P1L_65_P1.2 Loss of Lagubell-Mesa Cal No.1 230 kV line AND P1L_32_P1.2 Loss of Center-Mesacals No.1 230 kV line (Rating 2)	P6	overlapping singles	< 100	< 100	86.1	104.2	96.9	< 100	< 100	< 100	< 100	< 100	< 100	
	P1L_65_P1.2 Loss of Lagubell-Mesa Cal No.1 230 kV line AND P1L_32_P1.2 Loss of Center-Mesacals No.1 230 kV line (Rating 1)	P6	overlapping singles	< 100	< 100	113.5	137.3	127.7	< 100	< 100	< 100	< 100	< 100	< 100	
	P1L_65_P1.2 Loss of Lagubell-Mesa Cal No.1 230 kV line AND P1L_68_P1.2 Loss of Litehipe-Mesa Cal No.1 230 kV line (Rating 2)	P6	overlapping singles	< 100	< 100	86.9	103.6	100.3	< 100	< 100	< 100	101.5	< 100	< 100	
	P1L_65_P1.2 Loss of Lagubell-Mesa Cal No.1 230 kV line AND P1L_68_P1.2 Loss of Litehipe-Mesa Cal No.1 230 kV line (Rating 1)	P6	overlapping singles	< 100	< 100	114.6	136.6	132.3	< 100	< 100	< 100	101.5	< 100	< 100	
	P1T_207_P1.3 Loss of Mesa Cal No.2 500/230 kV transformer AND P1L_32_P1.2 Loss of Center-Mesacals No.1 230 kV line	P6	overlapping singles	< 100	< 100	< 100	103.7	< 100	< 100	< 100	< 100	< 100	< 100	< 100	
	line_M_P7_11_Line LAGUBELL 230.0 to MESACAL 230.0 Circuit 1 Line LA FRESA 230.0 to MESA CAL 230.0 Circuit 1	P7	common structure	< 100	< 100	< 100	100.7	< 100	< 100	< 100	< 100	< 100	< 100	< 100	
24084 LITEHIPE 230 24091 MESA CAL 230 1 1	P1G_251_P1.1 Loss of Huntington Beach Repower AND P1L_65_P1.2 Loss of Lagubell-Mesa Cal No.1 230 kV line	P3	G-1/L-1	< 100	< 100	< 100	< 100	101.7	< 100	< 100	< 100	< 100	< 100	< 100	
	P1L_112_P1.2 Loss of Mesacals-Lagubell No.2 230 kV line AND P1L_65_P1.2 Loss of Lagubell-Mesa Cal No.1 230 kV line	P6	overlapping singles	< 100	< 100	< 100	107.6	114.9	< 100	< 100	< 100	< 100	< 100	< 100	
	P1L_62_P1.2 Loss of La Fresa-Lagubell No.1 230 kV line AND P1L_64_P1.2 Loss of La Fresa-Mesa Cal No.1 230 kV line (Rating 2)	P6	overlapping singles	< 100	< 100	87.4	107.8	103.6	< 100	< 100	< 100	< 100	< 100	< 100	
	P1L_62_P1.2 Loss of La Fresa-Lagubell No.1 230 kV line AND P1L_64_P1.2 Loss of La Fresa-Mesa Cal No.1 230 kV line (Rating 1)	P6	overlapping singles	< 100	< 100	121.7	149.9	144.3	< 100	< 100	< 100	< 100	< 100	< 100	
	P1L_64_P1.2 Loss of La Fresa-Mesa Cal No.1 230 kV line AND P1L_65_P1.2 Loss of Lagubell-Mesa Cal No.1 230 kV line (Rating 2)	P6	overlapping singles	< 100	< 100	89.1	111.5	120.2	< 100	< 100	< 100	< 100	< 100	< 100	
	P1L_64_P1.2 Loss of La Fresa-Mesa Cal No.1 230 kV line AND P1L_65_P1.2 Loss of Lagubell-Mesa Cal No.1 230 kV line (Rating 1)	P6	overlapping singles	< 100	< 100	124.1	155.3	167.3	< 100	< 100	< 100	< 100	< 100	< 100	
	line_M_P7_10_Line LA FRESA 230.0 to LAGUBELL 230.0 Circuit 1 Line LA FRESA 230.0 to MESA CAL 230.0 Circuit 1	P7	common structure	< 100	< 100	< 100	107.7	103.6	< 100	< 100	< 100	< 100	< 100	< 100	
	line_M_P7_11_Line LAGUBELL 230.0 to MESACAL 230.0 Circuit 1 Line LA FRESA 230.0 to MESA CAL 230.0 Circuit 1	P7	common structure	< 100	< 100	< 100	111.5	120.2	< 100	< 100	< 100	< 100	< 100	< 100	
24084 LITEHIPE 230 24065 HINSON 230 1 1	P1L_57_P1.2 Loss of Harbor-Hinson No.1 230 kV line AND P1L_59_P1.2 Loss of Hinson-Delamo No.1 230 kV line (Rating 2)	P6	overlapping singles	< 100	< 100	105.1	106.0	112.6	< 100	< 100	< 100	< 100	< 100	< 100	
	P1L_57_P1.2 Loss of Harbor-Hinson No.1 230 kV line AND P1L_59_P1.2 Loss of Hinson-Delamo No.1 230 kV line (Rating 1)	P6	overlapping singles	< 100	< 100	141.8	143.0	151.9	< 100	< 100	< 100	< 100	< 100	< 100	
24061 HARBOR 230 24084 LITEHIPE 230 1 1	P1L_59_P1.2 Loss of Hinson-Delamo No.1 230 kV line AND P1L_67_P1.2 Loss of Litehipe-Hinson No.1 230 kV line	P6	overlapping singles	< 100	< 100	< 100	< 100	106.6	< 100	< 100	< 100	< 100	< 100	< 100	
	P1G_245_P1.1 Loss of Alamitos Repower AND P1L_112_P1.2 Loss of Mesacals-Lagubell No.2 230 kV line	P3	G-1/L-1	< 100	< 100	< 100	114.1	< 100	< 100	< 100	< 100	< 100	< 100	< 100	
	P1L_112_P1.2 Loss of Mesacals-Lagubell No.2 230 kV line AND P1L_115_P1.2 Loss of Mesacals-Walnut No.1 230 kV line	P6	overlapping singles	< 100	< 100	< 100	115.1	105.6	< 100	< 100	< 100	< 100	< 100	< 100	
	P1L_65_P1.2 Loss of Lagubell-Mesa Cal No.1 230 kV line AND P1L_112_P1.2 Loss of Mesacals-Lagubell No.2 230 kV line (Rating 2)	P6	overlapping singles	< 100	< 100	97.6	126.6	111.4	< 100	< 100	< 100	< 100	< 100	< 100	
	P1L_65_P1.2 Loss of Lagubell-Mesa Cal No.1 230 kV line AND P1L_112_P1.2 Loss of Mesacals-Lagubell No.2 230 kV line (Rating 1)	P6	overlapping singles	< 100	< 100	97.6	126.6	111.4	< 100	< 100	< 100	< 100	< 100	< 100	

The use of energy storage as a Local Capacity Requirement (LCR) resource is subject to verification that it has sufficient MWh capability and can be fully charged when needed. If the transmission load serving capacity including all available gas-fired generation constrain the charging of energy storage resources within the Western LA Basin, then the need date with and without planned storage, for the following mitigation alternatives will be evaluated to address overloads for the worst P6 and P7 contingencies:

Alternative A by 2036 and 2041, as a piecemeal strategy:
1. Add a new 230 kV line from Mesa to Laguna Bell or Lighthipe
2. Rebuild Mesa–Laguna Bell #1 and #2, Mesa–Lighthipe, Mesa - Center, and Center–Del Amo 230 kV transmission lines, and upgrade associated substation equipment to ratings exceeding 4,000 amps, as required
3. Re-configure the Western LA Basin 230 KV network to better distribute power flows. including loop-in, re-route, and re-arrangement

Alternative B by 2036 , as a comprehensive strategy:
1. Introducing a 2000 MW HVDC transmission source to Western LA Basin (e.g., Redondo, La Fresa) via submarine route along the Pacific coast (e.g., from Ormond Beach), or
2. Introducing a 2000 MW HVDC transmission source to Western LA Basin (e.g., La Fresa, Lighthipe) via underground route along existing corridors (e.g., from Pardee)

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24021 CENTER 230 24393 MESACALS 230 1 1	P1L_68_P1.2 Loss of Litehipe-Mesa Cal No.1 230 kV line AND P1L_112_P1.2 Loss of Mesacals-Lagubell No.2 230 kV line	P6	overlapping singles	< 100	< 100	< 100	111.4	< 100	< 100	< 100	< 100	< 100	< 100	< 100	ALternative C: 1. Other potential innovative mitigation solutions that may be proposed by stakeholders.
	P1L_79_P1.2 Loss of Olinda-Walnut No.1 230 kV line AND P1L_112_P1.2 Loss of Mesacals-Lagubell No.2 230 kV line	P6	overlapping singles	< 100	< 100	< 100	118.2	< 100	< 100	< 100	< 100	< 100	< 100	< 100	
	P1T_207_P1.3 Loss of Mesa Cal No.2 500/230 kV transformer AND P1L_112_P1.2 Loss of Mesacals-Lagubell No.2 230 kV line (Rating 2)	P6	overlapping singles	< 100	< 100	99.4	128.3	106.7	< 100	< 100	< 100	< 100	< 100	< 100	
	P1T_207_P1.3 Loss of Mesa Cal No.2 500/230 kV transformer AND P1L_112_P1.2 Loss of Mesacals-Lagubell No.2 230 kV line (Rating 1)	P6	overlapping singles	< 100	< 100	99.4	128.3	106.7	< 100	< 100	< 100	< 100	< 100	< 100	
	line_M_P7_13_Line LITEHIPE 230.0 to MESA CAL 230.0 Circuit 1 Line LAGUBELL 230.0 to MESACALS 230.0 Circuit 2	P7	common structure	< 100	< 100	< 100	111.4	< 100	< 100	< 100	< 100	< 100	< 100	< 100	
24030 DELAMO 230 24021 CENTER 230 1 1	P1L_112_P1.2 Loss of Mesacals-Lagubell No.2 230 kV line AND P1L_65_P1.2 Loss of Lagubell-Mesa Cal No.1 230 kV line (Rating 1)	P6	overlapping singles	< 100	< 100	99.5	105.6	95.2	< 100	< 100	< 100	< 100	< 100	< 100	
	P1L_112_P1.2 Loss of Mesacals-Lagubell No.2 230 kV line AND P1L_65_P1.2 Loss of Lagubell-Mesa Cal No.1 230 kV line(Rating 2)	P6	overlapping singles	< 100	< 100	95.2	105.6	95.2	< 100	< 100	< 100	< 100	< 100	< 100	
24075 LA FRESA 230 24091 MESA CAL 230 1 1	P1L_68_P1.2 Loss of Litehipe-Mesa Cal No.1 230 kV line AND P1L_65_P1.2 Loss of Lagubell-Mesa Cal No.1 230 kV line	P6	overlapping singles	< 100	< 100	< 100	< 100	101.7	< 100	< 100	< 100	< 100	< 100	< 100	
24083 LCIENEGA 230 24074 LA FRESA 230 1 1	line_P5_d_TC_204_P5.2.13d: El Nido - La Cienega 230 kV Line (Non Redundant Trip Coil La Cienega CB# 532)	P5	non-redundant component	< 100	< 100	102.2	109.6	< 100	< 100	< 100	< 100	< 100	< 100	< 100	
	line_M_P7_39_Line LA FRESA 230.0 to EL NIDO 230 .0 Circuit 3 Line LA FRESA 230.0 to EL NIDO 230.0 Circuit 4	P7	common structure	< 100	< 100	111.0	123.8	< 100	< 100	< 100	< 100	102.0	< 100	< 100	
24040 EL NIDO 230 24082 LCIENEGA 230 1 1	P1L_66_P1.2 Loss of Lcienega-La Fresa No.1 230 kV line	P1	Single Contingency	< 100	< 100	100.4	107.1	< 100	< 100	< 100	< 100	< 100	< 100	< 100	
24100 OLINDA 230 24158 WALNUT 230 1 1	P1L_115_P1.2 Loss of Mesacals-Walnut No.1 230 kV line AND P1L_77_P1.2 Loss of Miralomw-Walnut No.1 230 kV line	P6	overlapping singles	< 100	< 100	< 100	< 100	110.7	< 100	< 100	< 100	< 100	< 100	< 100	
24059 ETIWANDA 230 24132 SANBRDNO 230 1 1	P1L_138_P1.2 Loss of Vsta-Sanbrdno No.1 230 kV line AND P1L_134_P1.2 Loss of Alberhil-Valleysc No.1 500 kV line	P6	overlapping singles	< 100	114.7	< 100	< 100	< 100	< 100	< 100	< 100	106.3	< 100	< 100	
24901 VSTA 230 24132 SANBRDNO 230 1 1	P1L_53_P1.2 Loss of Etiwanda-Sanbrdno No.1 230 kV line AND P1L_134_P1.2 Loss of Alberhil-Valleysc No.1 500 kV line	P6	overlapping singles	< 100	106.5	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	
241369 SERRANO_2 230 24154 VILLA PK 230 1 1	Line_M_P4_37_Line SERRANO_2 230.0 to VILLA PK 230.0 Circuit 2 Tran SERRANO 500.0 to SERRANO 230.0 Circuit 1	P2/P4	Internal Breaker Fault /stuck breaker	< 100	< 100	103.8	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	
	P1G_251_P1.1 Loss of Huntington Beach Repower AND P1L_183_P1.2 Loss of Serrano_2-Villa Pk No.2 230 kV line	P3	G-1/L-1	< 100	< 100	102.2	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	
228441 RECON500 500 228451 RECON3i 13.8 3 1	P1T_240_P1.3 Loss of Recon No.1 500/230 kV transformer AND P1T_241_P1.3 Loss of Recon No.2 500/230 kV transformer	P6	overlapping singles	< 100	< 100	104.5	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	
	P1T_240_P1.3 Loss of Recon No.1 500/230 kV transformer AND P1T_241_P1.3 Loss of Recon No.2 500/230 kV transformer	P6	overlapping singles	< 100	< 100	110.0	< 100	100.1	< 100	< 100	< 100	< 100	< 100	< 100	
26095 SYLMAR 230 26098 SYLMAR220 230 F 1	P1T_290_P1.3 Loss of Sylmar Ckt G 230/230 kV transformer	P1	Single Contingency	110.8	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	
26094 SYLMAR 230 26098 SYLMAR220 230 E 1	Line_M_P4_49_Line SYLMAR 230.0 to SYLMAR220 230.0 Circuit G Tran SYLMAR 230.0 to SYLMAR220 230.0 Circuit F	P2/P4	Internal Breaker Fault /stuck breaker	104.3	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	The P2/P4 overloads will be addressed by the completion of three transformer banks upgrade projects by SCE and LADWP
26094 SYLMAR 230 26098 SYLMAR220 230 F 1	Line_M_P4_48_Line SYLMAR 230.0 to SYLMAR220 230.0 Circuit G Tran SYLMAR 230.0 to SYLMAR220 230.0 Circuit E	P2/P4	Internal Breaker Fault /stuck breaker	210.3	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	162.9	< 100	
24401 ANTELOPE 230 24114 PARDEE 230 1 1	P1L_154_P1.2 Loss of Antelope-Vincent No.1 500 kV line AND P1L_155_P1.2 Loss of Antelope-Vincent No.2 500 kV line	P6	overlapping singles	< 100	< 100	< 100	106.7	< 100	< 100	< 100	< 100	< 100	< 100	< 100	

2026-2027 ISO Reliability Assessment - Preliminary Study Results
Study Area: SCE Main, covering SCE 500 kV Bulk and its Metro, EOP, and Ventura Areas
Thermal Overloads

California ISO

Overloaded Facility	Contingency (All and Critical P6*)	Category	Category Description	Loading % (Baseline Scenarios)								Loading % (Sensitivity Scenarios)			Project & Potential Mitigation Solutions
				B1 2028 Summer Peak	B2 2031 Summer Peak	B3 2036 Summer Peak	B4 2041 Summer Peak	B5 2036 Summer-Off Peak	B6 2041 Winter Peak	B7 2028 Spring Off-Peak	B8 2031 Spring Off-Peak	S1 2031 SP High CEC Load	S2 2028 SP High Renewable	S3 2028 SprOP ES-Charging	
29516 VINCNT2 230 24128 S.CLARA 230 1 1	line_V_P7_3_line MOORPARK to S.CLARA 230 ck 1 line MOORPARK to S.CLARA 230 ck 2	P7	common structure	< 100	< 100	< 100	102.3	< 100	< 100	< 100	< 100	< 100	< 100	< 100	
24114 PARDEE 230 24155 VINCENT 230 2 1	P1L_116_P1.2 Loss of Antelope-Pardee No.1 230 kV line AND P1L_91_P1.2 Loss of Pardee-Vincnt2 No.1 230 kV line	P6	overlapping singles	< 100	< 100	< 100	106.0	< 100	< 100	< 100	< 100	< 100	< 100	< 100	Operational mitigations incldluing existing Pastoria RAS could address thermal overloads related to the Pardee-Pastoria-Warne 230 kV Line. If the energy storage resources in the Ventura area are insufficient or limited to be charged, the follwoing alternative mitigations, such as reconductoring with HTLS, reconfiguring, and upgrading terminal equipment at Pardee, will be evaluated: 1. Loop-in Santa Clara-Vincent 230 kV Line into Pardee and upgrade terminal equipment at Pardee and Santa Clara 230 kV Substation 2. Reconductor Pardee-Santa Clara 230 kV Line(s) and upgrade terminal equipment at Santa Clara 230 kV Substation 3. Reconducto Pardee-Vincent No.2 230 kV Line to high-temperature low sag (HTLS)
24114 PARDEE 230 24115 PASTORIA 230 1 1	P1L_89_P1.2 Loss of Pardee-Warnetap No.1 230 kV line AND P1L_90_P1.2 Loss of Pardee-Bailey No.1 230 kV line	P6	overlapping singles	119.5	< 100	< 100	132.0	< 100	< 100	< 100	134.1	< 100	124.9	< 100	
24114 PARDEE 230 24403 BAILEY 230 1 1	P1L_86_P1.2 Loss of Pardee-Pastoria No.1 230 kV line AND P1L_89_P1.2 Loss of Pardee-Warnetap No.1 230 kV line	P6	overlapping singles	116.2	< 100	< 100	127.6	< 100	< 100	< 100	133.2	< 100	121.7	< 100	
24114 PARDEE 230 24128 S.CLARA 230 1 1	line_V_P7_3_line MOORPARK to S.CLARA 230 ck 1 line MOORPARK to S.CLARA 230 ck 2	P7	common structure	< 100	< 100	102.8	126.1	103.6	< 100	< 100	< 100	< 100	< 100	< 100	
24128 S.CLARA 230 24099 MOORPARK 230 2 1	P1L_87_P1.2 Loss of Pardee-S.Clara No.1 230 kV line AND P1L_94_P1.2 Loss of S.Clara-Moorpark No.1 230 kV line	P6	overlapping singles	< 100	< 100	< 100	113.7	< 100	< 100	< 100	< 100	< 100	< 100	< 100	
24403 BAILEY 230 24115 PASTORIA 230 1 1	P1L_13_P1.2 Loss of Pardee-Warne-Pstria No.1 230 kV line AND P1L_86_P1.2 Loss of Pardee-Pastoria No.1 230 kV line	P6	overlapping singles	132.2	108.9	113.5	150.1	< 100	< 100	< 100	135.2	108.1	137.1	< 100	
	P1L_86_P1.2 Loss of Pardee-Pastoria No.1 230 kV line AND P1L_89_P1.2 Loss of Pardee-Warnetap No.1 230 kV line	P6	overlapping singles	135.2	111.8	116.5	153.1	100.8	< 100	< 100	138.1	111.0	140.1	< 100	

Note (*): P6 results are reported without System adjustment between the two single P1 events

Substation	Contingency (All and Worst P6)	Category	Category Description	Loading % (Baseline Scenarios)								Loading % (Sensitivity Scenarios)			Project & Potential Mitigation Solutions
				B1 2028 Summer Peak	B2 2031 Summer Peak	B3 2036 Summer Peak	B4 2041 Summer Peak	B5 2036 Summer-Off Peak	B6 2041 Winter Peak	B7 2028 Spring Off-Peak	B8 2031 Spring Off-Peak	S1 2031 SP High CEC Load	S2 2028 SP High Renewable	S3 2028 SprOP ES-Charging	
24058 GOLETA 230 kV	line_V_P7_17_Line S.CLARA 230.0 to MOORPARK 230.0 Circuit 1 Line S.CLARA 230.0 to MOORPARK 230.0 Circuit 2	P7	common structure	0.90<V<1.052	0.90<V<1.052	0.90<V<1.052	**0.8467**	0.90<V<1.052	0.90<V<1.052	0.90<V<1.052	0.90<V<1.052	0.90<V<1.052	0.90<V<1.052	0.90<V<1.052	Add additional reactive power support facility in the Ventura area, such as a Goleta 230 kV capacitor bank, if reactive power support from the energy storage resources are not suffciant
24128 S.CLARA 230 kV	line_V_P7_17_Line S.CLARA 230.0 to MOORPARK 230.0 Circuit 1 Line S.CLARA 230.0 to MOORPARK 230.0 Circuit 2	P7	common structure	0.90<V<1.052	0.90<V<1.052	0.90<V<1.052	**0.8673**	0.90<V<1.052	0.90<V<1.052	0.90<V<1.052	0.90<V<1.052	0.90<V<1.052	0.90<V<1.052	0.90<V<1.052	
24230 WILDLIFE 230 kV	Base Case	P0	Normal System	0.95<V<1.05	0.95<V<1.05	**0.9387**	0.9541	0.95<V<1.05	0.95<V<1.05	0.95<V<1.05	0.95<V<1.05	0.95<V<1.05	0.95<V<1.05	0.95<V<1.05	1. Operational mitigation to address the low voltage violation by dispatching available resources including Riverside gas generation, adjusting of transformer taps, along with the approved Lugo 500 kV Reactive Power Reinforcement Project, or 2. Add reactive power support facility in the Wildlife 230 kV substation
	line_M_P7_XXXX_Line MIRALOME 230.0 to VSTA 230.0 Circuit 1 Line WILDLIFE 230.0 to VSTA 230.0 Circuit 1	P7	common structure	0.90<V<1.052	0.90<V<1.052	**0.8923**	0.90<V<1.052	0.90<V<1.052	0.90<V<1.052	0.90<V<1.052	0.90<V<1.052	0.90<V<1.052	0.90<V<1.052	0.90<V<1.052	
	P1L_106_P1.2 Loss of Wildlife-Vsta No.1 230 kV line	P1	Single Contingency	0.90<V<1.052	0.90<V<1.052	**0.8923**	0.90<V<1.052	0.90<V<1.052	0.90<V<1.052	0.90<V<1.052	0.90<V<1.052	0.90<V<1.052	0.90<V<1.052	0.90<V<1.052	
	P1L_134_P1.2 Loss of Alberhil-Valleysc No.1 500 kV line	P1	Single Contingency	0.90<V<1.052	0.90<V<1.052	0.9029	0.90<V<1.052	0.90<V<1.052	0.90<V<1.052	0.90<V<1.052	0.90<V<1.052	0.90<V<1.052	0.90<V<1.052	0.90<V<1.052	
189161 TROUT CANYON 500 kV	Base Case	P0	Normal System	1.0391	1.0440	1.04<V<1.08	1.04<V<1.08	1.04<V<1.08	1.04<V<1.08	1.04<V<1.08	1.04<V<1.08	1.0406	**1.0337**	1.04<V<1.08	1. Upon completion of the Lugo 500 kV Reactive Power Reinforcement Project which includes a ±300 Mvar STATCOM and three 200 Mvar switchable capacitor banks to provide a total dynamic reactive power support capability of up to 1,200 Mvar, no significant voltage performance concerns were identified in the SCE 500 kV bulk system surrounding the Lugo 500 kV substationin. 2. The policy-driven Trout Canyon–Lugo 500 kV transmission line project is not expected to materially affect the need for the reactive reinforcement. 3. Further evaluations are required to address the identified voltage performance concerns related to low voltage and/or slow voltage recovery in the Harry Allen, Trout Canyon, Vincent, Mesa, Valley, Denver, and/or Red Bluff areas, along with the excessive high voltage condition that was observed at the Mohave 500 kV bus in real time operation.
24138 SERRANO 500 kV	Base Case	P0	Normal System	1.04<V<1.08	1.04<V<1.08	1.04<V<1.08	1.04<V<1.08	1.0420	1.04<V<1.08	1.04<V<1.08	1.04<V<1.08	1.04<V<1.08	1.04<V<1.08	1.04<V<1.08	
24151 VALLEYSC 500 kV	Base Case	P0	Normal System	1.04<V<1.08	1.04<V<1.08	1.0375	1.04<V<1.08	1.04<V<1.08	1.04<V<1.08	1.04<V<1.08	1.04<V<1.08	1.04<V<1.08	1.0365	1.04<V<1.08	
24156 VINCENT 500 kV	Base Case	P0	Normal System	1.04<V<1.08	1.04<V<1.08	1.04<V<1.08	1.0434	1.04<V<1.08	1.04<V<1.08	1.04<V<1.08	1.04<V<1.08	1.04<V<1.08	1.04<V<1.08	1.04<V<1.08	
24236 RANCHVST 500 kV	Base Case	P0	Normal System	1.04<V<1.08	1.04<V<1.08	1.04<V<1.08	1.04<V<1.08	1.04<V<1.08	1.04<V<1.08	1.04<V<1.08	1.04<V<1.08	1.04<V<1.08	1.04<V<1.08	1.04<V<1.08	
24374 REDBLUFF 500 kV	Base Case	P0	Normal System	1.04<V<1.08	1.04<V<1.08	1.0357	1.04<V<1.08	1.04<V<1.08	1.04<V<1.08	1.04<V<1.08	1.04<V<1.08	1.04<V<1.08	1.0318	1.04<V<1.08	
24386 MESA CAL 500 kV	Base Case	P0	Normal System	1.04<V<1.08	1.04<V<1.08	1.04<V<1.08	1.0289	1.0391	1.04<V<1.08	1.04<V<1.08	1.04<V<1.08	1.04<V<1.08	1.04<V<1.08	1.04<V<1.08	
24573 HAE SVCL 500 kV	Base Case	P0	Normal System	**1.0302**	**1.0285**	1.04<V<1.08	1.0425	1.04<V<1.08	1.0256	1.0194	1.0439	1.0357	1.0304	1.0206	
24801 DEVERS 500 kV	Base Case	P0	Normal System	1.04<V<1.08	1.0420	1.0369	1.04<V<1.08	1.04<V<1.08	1.04<V<1.08	1.04<V<1.08	1.04<V<1.08	1.0420	**1.0279**	1.04<V<1.08	
24845 ALBERHIL 500 kV	Base Case	P0	Normal System	1.04<V<1.08	1.04<V<1.08	1.0378	1.04<V<1.08	1.04<V<1.08	1.04<V<1.08	1.04<V<1.08	1.04<V<1.08	1.0448	1.04<V<1.08	1.04<V<1.08	
24900 COLRIVER 500 kV	Base Case	P0	Normal System	1.04<V<1.08	1.04<V<1.08	1.0450	1.04<V<1.08	1.04<V<1.08	1.04<V<1.08	1.04<V<1.08	1.04<V<1.08	1.04<V<1.08	1.0414	1.04<V<1.08	

Substation	Contingency	Category	Category Description	Loading % (Baseline Scenarios)								Loading % (Sensitivity Scenarios)			Project & Potential Mitigation Solutions
				B1 2028 Summer Peak	B2 2031 Summer Peak	B3 2036 Summer Peak	B4 2041 Summer Peak	B5 2036 Summer-Off Peak	B6 2041 Winter Peak	B7 2028 Spring Off-Peak	B8 2031 Spring Off-Peak	S1 2031 SP High CEC Load	S2 2028 SP High Renewable	S3 2028 SprOP ES-Charging	
24058 GOLETA 230 kV	line_V_P7_17_Line S.CLARA 230.0 to MOORPARK 230.0 Circuit 1 Line S.CLARA 230.0 to MOORPARK 230.0 Circuit 2	P7	common structure	< 8	< 8	< 8	11.98	< 8	< 8	< 8	< 8	< 8	< 8	< 8	Not applicable to the 8% voltage deviation criteria for P7 contingency, See potential mitigations proposed to address the low voltage concern for P7
24128 S.CLARA 230 kV	line_V_P7_17_Line S.CLARA 230.0 to MOORPARK 230.0 Circuit 1 Line S.CLARA 230.0 to MOORPARK 230.0 Circuit 2	P7	common structure	< 8	< 8	< 8	11.28	< 8	< 8	< 8	< 8	< 8	< 8	< 8	

Contingency	Category	Category Description	Transient Stability Performance						Potential Mitigation Solutions
			Baseline Scenarios				Sensitivity Scenarios		
			B7 2028 Spring Off-Peak	B2 2031 Summer Peak	B3 2036 Summer Peak	B5 2036 Summer Off-Peak	S1 2031 SP High CEC Load	S3 2028 SprOP ES-Charging	
01P1_Lugo500kV: P1.3: 3PH 4 cycle fault at Lugo 500kV w/ loss of Lugo-Victorville 500kV	P1	3PG+4Cycle Clear Fault	stable	Valley 115 kV load bus voltage remains below 80% for over 20 seconds	Valley 115 kV load bus voltage remains below 80% for over 20 seconds	Diverged	Valley 115 kV load bus voltage remains below 80% for over 20 seconds	stable	Potential TPL-001-WECC-CRT R1.3 criteria concern. Further evaluation
1P1_Devers500kV: P1.2: 3PH 4 cycle fault at Devers 230 kV w/ loss of Devers-Valley No.2 500 kV including loss of Devers SVCs & Cap Bank	P1	3PG+4Cycle Clear Fault	stable	Valley 115 kV load bus voltage remains below 80% for over 20 seconds	Valley 115 kV load bus voltage remains below 80% for over 20 seconds	Valley 115 kV load bus voltage remains below 80% for over 20 seconds	Valley 115 kV load bus voltage remains below 80% for over 20 seconds	stable	Potential TPL-001-WECC-CRT R1.3 criteria concern. Further evaluation
02P1_IV500kV: P1.3: 3PH 4 cycle fault at Imperial Valley 500kV w/ loss of Imperial Valley-North Gila 500kV	P1	3PG+4Cycle Clear Fault	stable	stable	stable	stable	stable	stable	WECC and CAISO criteria met
48P4_Vincent500kV: P4.2: SLG 15 cycle fault on Mesa-Vincent 500 kV w/ stuck breaker at Vincent followed by loss of Midway-Vincent No.2 500 kV	P4	SLG+Stuck Breaker	stable	Valley 115 kV load bus voltage remains below 80% for over 20 seconds	Diverged	Diverged	Valley 115 kV load bus voltage remains below 80% for over 20 seconds	stable	Potential TPL-001-WECC-CRT R1.3 criteria concern. Further evaluation
37P4_Lugo500kV: P4.2: SLG 15 cycle fault on Lugo-Vincent No.2 500 kV w/ stuck breaker at Lugo followed by loss of Lugo-Victorville 500 kV	P4	SLG+Stuck Breaker	stable	stable	stable	Diverged	Valley 115 kV load bus voltage remains below 80% for over 20 seconds	stable	Potential TPL-001-WECC-CRT R1.3 criteria concern. Further evaluation
1P5_ab_BD_017: P5: Laguna Bell 220 kv North Bus	P5	SLG+Delayed Fault Clearing	stable	stable	stable	stable	stable	stable	WECC and CAISO criteria met
72P7_EagleRock230kV: P7.1: SLG 4 cycle fault at Eagle Rock 230 kV w/ loss of Eagle Rock-Mesa & Eagle Rock-Sylmar 230 kV	P7	SLG+4Cycle Clear Fault	stable	stable	stable	stable	stable	stable	WECC and CAISO criteria met
78P7_Mesa500kV: P7.1: SLG 4 cycle fault at Mesa 500 kV w/ loss of Mesa-Vincent 500 kV & Rio Hondo-Vincent No. 2 230 kV	P7	SLG+4Cycle Clear Fault	stable	stable	stable	stable	load bus voltage at Valley 115 KV #24229 remains below 70% for over 30 cycles	stable	Potential TPL-001-WECC-CRT R1.4 criteria violation. Further evaluation
79P7_MiraLoma500kV: P7.1: SLG 4 cycle fault at Mira Loma 500 kV w/ loss of Mesa-Mira Loma 500 kV & Chino-Mira Loma No.3 230kV	P7	SLG+4Cycle Clear Fault	stable	stable	stable	Diverged	stable	stable	Further Evaluation
80P7_MiraLoma500kV: P7.1: SLG 4 cycle fault at Mira Loma 500 kV w/ loss of Mira Loma - Serrano No. 1 & No. 2 500 kV	P7	SLG+4Cycle Clear Fault	stable	stable	stable	Diverged	stable	stable	Further Evaluation
81P7_Moorpark230kV: P7.1: SLG 4 cycle fault at Moorpark 230 kV w/ loss of Moorpark-Santa Clara No.1 & No.2 230 kV	P7	SLG+4Cycle Clear Fault	stable	stable	stable	stable	stable	stable	WECC and CAISO criteria met
83P7_SantaClara230kV: P7.1: SLG 4 cycle fault at Santa Clara 230 kV w/ loss of Pardee-Santa Clara & Santa Clara-Vincent 230 kV	P7	SLG+4Cycle Clear Fault	stable	stable	stable	stable	stable	stable	WECC and CAISO criteria met
87P7_PDCI_bipole_SPS: P7.2: SLG fault at Sylmar SCE followed by loss of PDCI Bipole w/ North-to-South flow	P7	SLG+4Cycle Clear Fault	stable	stable	stable	stable	stable	stable	WECC and CAISO criteria met
89P7_Mohave500kV: P7.1: SLG 4 cycle fault at Mohave 500 kV w/ loss of Eldorado-Mohave 500 kV & Lugo-Mohave 500 kV	P7	SLG+4Cycle Clear Fault	stable	stable	Diverged	Diverged	stable	stable	Further Evaluation

Worst Contingency	Category	Category Description	Amount of Load Drop (MW)											Potential Mitigation Solutions
			B1 2028 Summer Peak	B2 2031 Summer Peak	B3 2036 Summer Peak	B4 2041 Summer Peak	B5 2036 Summer-Off Peak	B6 2041 Winter Peak	B7 2028 Spring Off-Peak	B8 2031 Spring Off-Peak	S1 2031 SP High CEC Load	S2 2028 SP High Renewable	S3 2028 SprOP ES-Charging	

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

Substation	Load Served (MW)											Potential Mitigation Solutions
	B1 2028 Summer Peak	B2 2031 Summer Peak	B3 2036 Summer Peak	B4 2041 Summer Peak	B5 2036 Summer-Off Peak	B6 2041 Winter Peak	B7 2028 Spring Off-Peak	B8 2031 Spring Off-Peak	S1 2031 SP High CEC Load	S2 2028 SP High Renewable	S3 2028 SprOP ES-Charging	

No single source substation with more than 100 MW