

Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading % (Baseline Scenarios)					Loading % (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2024 Summer Peak	2027 Summer Peak	2032 Summer Peak	2024 Spring Off-Peak	2027 Spring Off-Peak	2024 SP Heavy Renewable & Min Gas Gen	2024 Spring OP Sensitivity	2027 SP High CEC Forecast	2035 ATE	
AMFOR_SW-MARTELL 60kV	WEST PNT 11.50KV GEN UNIT 2 & VALLEY SPRINGS-CLAY 60KV [8264]	P3	N-G-1	<100	128	130	<100	<100	<100	<100	129	129	Existing operating procedure
AMFOR_SW-MARTELL 60kV	SALT SPS 11.00KV GEN UNIT 1 & VALLEY SPRINGS-CLAY 60KV [8264]	P3	N-G-1	127	<100	<100	<100	<100	<100	<100	<100	<100	Existing operating procedure
Bellota - Cotte 230 kV Line	WARNERVILLE 230KV BUS (FAILURE OF NON-REDUNDANT RELAY)	P5-5	Non-Redundant Relay	17	4	28	37	23	103	25	11	11	Sensitivity Only
Bellota - Riverbank 115 kV Line	TESLA 115KV - SECTION 2D & 1D	P2-4	Bus Tie Breaker Fault	<100	<100	<100	13	133	NConv	12	NConv	NConv	Tesla 115 kV Bus Upgrade
Bellota - Riverbank 115 kV Line	TESLA 115KV BUS (FAILURE OF NON-REDUNDANT RELAY)	P5-5	Non-Redundant Relay	NConv	NConv	NConv	28	108	NConv	28	NConv	NConv	Tesla 115 kV Bus Upgrade
BELLOTA 230kV/13.2-BLLTA_1M transformer	TESLA 115KV - SECTION 2D & 1D	P2-4	Bus Tie Breaker Fault	84	NConv	NConv	12	75	NConv	11	NConv	NConv	Tesla 115 kV Bus Upgrade
Bellota-Riverbank-Melones 115 kV Line	BELLOTA 230KV - SECTION 1E & 2E	P2-4	Bus Tie Breaker Fault	104	NConv	NConv	68	38	46	68	118	118	SPS recommended in 2019-2020 TPP
Bellota-Riverbank-Melones 115 kV Line	TESLA 115KV - SECTION 2D & 1D	P2-4	Bus Tie Breaker Fault	59	NConv	NConv	25	219	NConv	25	NConv	NConv	Tesla 115 kV Bus Upgrade
Bellota-Riverbank-Melones 115 kV Line	TESLA 115KV BUS (FAILURE OF NON-REDUNDANT RELAY)	P5-5	Non-Redundant Relay	NConv	NConv	NConv	56	179	NConv	56	NConv	NConv	Tesla 115 kV Bus Upgrade
Bellota-Riverbank-Melones 115 kV Line	KASSON 115KV BUS (FAILURE OF NON-REDUNDANT RELAY)	P5-5	Non-Redundant Relay	115	37	60	26	22	43	24	40	40	Install redundant relay
Bellota-Riverbank-Melones 115 kV Line	SCHULTE SW STA-LAMMERS 115KV [3993] & SCHULTE SW STA-KASSON-MANTECA 115KV [7472]	P6	N-1-1	185	<100	<100	<100	<100	<100	<100	<100	<100	Project: Vierra Looping in Project. Short term: Action Plan
Bellota-Riverbank-Melones 115 kV Line	BELLOTA 230/115KV TB 2 & BELLOTA 230/115KV TB 1	P6	N-1-1	112	116	144	<100	<100	<100	<100	118	118	SPS recommended in 2019-2020 TPP
Bellota 230/115 kV Transformer No. 2	TESLA 115KV - SECTION 2D & 1D	P2-4	Bus Tie Breaker Fault	18	19	48	12	74	NConv	11	NConv	NConv	Tesla 115 kV Bus Upgrade
BNTA CRB-WESTLEY 60 kV Line No 1	P1-1:A11:31.. GWFTRCY3 18.00KV & GWFTRCY1 13.80KV & GWFTRCY2 13.80KV GEN UNITS & P1-3:A11:7.. TESLA D 230/115KV TB 3	P1-1	N-1	<100	<100	<100	<100	<100	<100	<100	<100	153	Continue to monitor future forecast
BNTA CRB- MNTCA_JT 60 kV Line	Base Case	P0	N-0	66	67	103	47	N/A	53	47	67	67	Continue to monitor future forecast
BNTA CRB- MNTCA_JT 60 kV Line	KASSON 115KV BUS (FAILURE OF NON-REDUNDANT RELAY)	P5-5	Non-Redundant Relay	92	64	128	42	N/A	57	42	64	64	Continue to monitor future forecast
BNTA CRB- MNTCA_JT 60 kV Line	SCHULTE SW STA-LAMMERS 115KV [3993] & SCHULTE SW STA-KASSON-MANTECA 115KV [7472]	P6	N-1-1	<100	<100	108	<100	<100	<100	<100	<100	<100	Continue to monitor future forecast
BRIGHTN-HOWARDJCT3 115 kV Line No 1	P2-2:A4:20..W.SCRMNO 115KV SECTION DE	P2-2	Bus	<100	<100	<100	<100	<100	<100	<100	<100	111	Continue to monitor future forecast
BRIGHTN-HOWARDJCT3 115 kV Line No 1	P2-3:A4:26..W.SCRMNO - DE 115KV & BRIGHTN-W.SCRMNO LINE	P2-3	Non-Bus-Tie Breaker	<100	<100	<100	<100	<100	<100	<100	<100	147	Continue to monitor future forecast
BRIGHTN-HOWARDJCT3 115 kV Line No 1	P5-5a:A5:5..RIO OSO 115 KV BUS (FAILURE OF NON-REDUNDANT RELAY)	P5-5	Non-Redundant Relay	<100	<100	<100	<100	<100	<100	<100	<100	127	Continue to monitor future forecast
BRIGHTN-HOWARDJCT3 115 kV Line No 1	P5-5d:A5:1..No BF Relay Rio Oso 115KV CB 402 412 422 432 442 462 or 472	P5-5	Non-Redundant Relay	<100	<100	<100	<100	<100	<100	<100	<100	155	Continue to monitor future forecast
BRIGHTN-HOWARDJCT3 115 kV Line No 1	P7-1:A4:17..Rio Oso-West Sacramento 115 kV Line & West Sacramento-Brighton 115 kV Line	P7-1	DTCL	<100	<100	<100	<100	<100	<100	<100	<100	121	Continue to monitor future forecast
BRIGHTN-HOWARDJCT3 115kV	W.SCRMNO - DE 115KV & BRIGHTN-W.SCRMNO LINE	P2-3	Non-Bus-Tie Breaker Fault	66	67	103	N/A	25	N/A	N/A	90	90	Continue to monitor future forecast
BRIGHTN-HOWARDJCT3 115kV	RIO OSO 115KV - SECTION 2D & 1D	P2-4	Bus Tie Breaker Fault	N/A	98	118	79	N/A	53	80	N/A	N/A	Continue to monitor future forecast
BRIGHTN-HOWARDJCT3 115kV	WOODLANDBIOM 13.80KV GEN UNIT 1 & BRIGHTN-W.SCRMNO 115KV [0]	P3	N-G-1	<100	<100	102	<100	<100	<100	<100	<100	<100	Continue to monitor future forecast
BRIGHTN-HOWARDJCT3 115kV	RIO OSO 115 KV BUS (FAILURE OF NON-REDUNDANT RELAY)	P5-5	Non-Redundant Relay	126	128	105	73	9	48	74	123	123	SPS recommended in 2017-2018 TPP
BRIGHTN-HOWARDJCT3 115kV	WEST SACRAMENTO-DAVIS 115KV [4120] & WOODLAND-DAVIS 115KV [4210]	P6	N-1-1	141	143	172	<100	<100	<100	90	124	124	SPS recommended in 2017-2018 TPP
BRIGHTN-HOWARDJCT3 115kV	Rio Oso-Woodland No. 1 115 kV Line & Rio Oso-Woodland No. 2 115 kV Line	P7	DTCL	104	106	110	62	9	37	60	103	103	SPS recommended in 2017-2018 TPP
Brighton - Davis 115 kV Line	P2-3:A4:26..W.SCRMNO - DE 115KV & BRIGHTN-W.SCRMNO LINE	P2-3	Non-Bus-Tie Breaker	<100	<100	<100	<100	<100	<100	<100	<100	124	Continue to monitor future forecast
Brighton - Davis 115 kV Line	P2-3:A4:26..W.SCRMNO - DE 115KV & BRIGHTN-W.SCRMNO LINE	P2-3	Non-Bus-Tie Breaker	<100	<100	<100	<100	<100	<100	<100	<100	100	Continue to monitor future forecast
Brighton - Davis 115 kV Line	RIO OSO 115KV - SECTION 2D & 1D	P2-4	Bus Tie Breaker Fault	136	N/A	N/A	66	N/A	44	66	N/A	N/A	SPS recommended in 2017-2018 TPP
Brighton - Davis 115 kV Line	RIO OSO 115 KV BUS (FAILURE OF NON-REDUNDANT RELAY)	P5-5	Non-Redundant Relay	106	107	88	61	9	40	62	104	104	SPS recommended in 2017-2018 TPP
Brighton - Davis 115 kV Line	No BF Relay Rio Oso 115KV CB 402 412 422 432 442 462 or 472	P5-5	Non-Redundant Relay	115	117	102	66	11	44	66	111	111	Install redundant relay
Brighton - Davis 115 kV Line	P5-5a:A5:5..RIO OSO 115 KV BUS (FAILURE OF NON-REDUNDANT RELAY)	P5-5	Non-Redundant Relay	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	107	Continue to monitor future forecast
Brighton - Davis 115 kV Line	P5-5d:A5:1..No BF Relay Rio Oso 115KV CB 402 412 422 432 442 462 or 472	P5-5	Non-Redundant Relay	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	130	Continue to monitor future forecast
Brighton - Davis 115 kV Line	P5-5d:A5:1..No BF Relay Rio Oso 115KV CB 402 412 422 432 442 462 or 472	P5-5	Non-Redundant Relay	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	105	Continue to monitor future forecast
Brighton - Davis 115 kV Line	WEST SACRAMENTO-DAVIS 115KV [4120] & WOODLAND-DAVIS 115KV [4210]	P6	N-1-1	119	121	146	<100	<100	<100	<100	105	105	SPS recommended in 2017-2018 TPP
Brighton - Davis 115 kV Line	P7-1:A4:17..Rio Oso-West Sacramento 115 kV Line & West Sacramento-Brighton 115 kV Line	P7-1	DTCL	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	102	Continue to monitor future forecast
Brighton 230/115 kV Transformer No. 9	WOODLAND-DAVIS 115KV [4210] & BRIGHTON 230/115KV TB 10	P6	N-1-1	<100	<100	101	<100	<100	<100	<100	<100	<100	Continue to monitor future forecast
BRKRUJCT-UCD_TP2 115 kV Line No 1	P1-2:A4:31..RIO OSO-WOODLAND #2 115KV [3470] & P1-2:A4:32..BRIGHTN-W.SCRMNO 115KV [0]	P1-2	N-1	<100	<100	<100	<100	<100	<100	<100	<100	117	Continue to monitor future forecast
BRKRUJCT-UCD_TP2 115kV	WOODLAND-DAVIS 115KV [4210] & WEST SACRAMENTO-DAVIS 115KV [4120]	P6	N-1-1	119	121	147	<100	<100	<100	<100	106	106	SPS recommended in 2017-2018 TPP
CARBONA-CRBNA_JC 60 kV Line	KASSON 115KV BUS (FAILURE OF NON-REDUNDANT RELAY)	P5-5	Non-Redundant Relay	86	65	112	26	N/A	39	26	64	64	Continue to monitor future forecast
CHCGO PK-HIGGINS 115 kV Line No 1	P1-2:A5:17..PLACER-GOLD HILL #1 115KV [3340] & P1-2:A5:18..PLACER-GOLD HILL #2 115KV [4290]	P1-2	N-1	<100	<100	<100	<100	<100	<100	<100	<100	159	Continue to monitor future forecast
COLGATE-NRRWS2TP 60 kV Line No 2	P1-1:A5:14..NARROWSPH2 13.80KV GEN UNIT 1 & P1-2:A5:52..COLGATE-SMARTVILLE #1 60KV [6510] MOAS OPENED ON COLGATE_NRRWS1TP	P1-1	N-1	<100	<100	<100	<100	<100	<100	<100	<100	101	Continue to monitor future forecast
Cortina 230/115/60 kV Transformer No. 1	CORTINA 230/115KV TB 4	P1	N-1	105	N/A	N/A	85	N/A	22	103	N/A	N/A	Project: Cortina 230/115/60 kV Transformer Bank No. 1 Replacement Project
Cortina 230/115/60 kV Transformer No. 1	CORTINA 230/115KV TB 4 & WADHAM 13.80KV GEN UNIT 1	P3	N-G-1	126	<100	<100	<100	<100	<100	<100	<100	<100	Project: Cortina 230/115/60 kV Transformer Bank No. 1 Replacement Project
Cortina 230/115/60 kV Transformer No. 1	WADHAM 13.80KV GEN UNIT 1 & P1-3:A4:22..CORTINA 115/60KV TB 5	P3	N-G-1	101	<100	<100	<100	<100	<100	<100	<100	<100	Project: Cortina 230/115/60 kV Transformer Bank No. 1 Replacement Project
Cortina 230/115/60 kV Transformer No. 1	CORTINA 230/115KV TB 4 & TULUCA-VACA 230KV [5800]	P6	N-1-1	116	<100	<100	97	<100	<100	99	<100	<100	Project: Cortina 230/115/60 kV Transformer Bank No. 1 Replacement Project
Cortina 60 kV Line No. 2	Base Case	P0	N-0	<100	<100	<100	<100	<100	<100	<100	<100	103	Continue to monitor future forecast
Cortina 60 kV Line No. 2	Base Case	P0	N-0	<100	<100	<100	<100	<100	<100	<100	<100	103	Continue to monitor future forecast
Cortina 60 kV Line No. 2	Base Case	P0	N-0	<100	<100	<100	<100	<100	<100	<100	<100	103	Continue to monitor future forecast
Cortina 60 kV Line No. 2	Base Case	P0	N-0	<100	<100	<100	<100	<100	<100	<100	<100	103	Continue to monitor future forecast
CRWS_LDJ-GUSTN_JT 60 kV Line No 1	P1-1:A12:4..Q1103SPV 34.50KV GEN UNIT 1 & P1-2:A12:17..SALADO-CROW CREEK SW STA 60KV [7858]	P1-1	N-1	<100	<100	<100	<100	<100	<100	<100	<100	104	Continue to monitor future forecast
CRWS_LDJ-GUSTN_JT 60 kV Line No 1	P1-2:A12:19..CROW CREEK SW STA-FRONTIER SOLAR PV 60KV [7859]	P1-2	N-1	<100	<100	<100	<100	<100	<100	<100	<100	116	Continue to monitor future forecast
CRWS_LDJ-GUSTN_JT 60 kV Line No 1	P1-2:A12:17..SALADO-CROW CREEK SW STA 60KV [7858]	P1-2	N-1	<100	<100	<100	<100	<100	<100	<100	<100	102	Continue to monitor future forecast
CRWS_LDJ-GUSTN_JT 60kV	GWFTRCY3 18.00KV & GWFTRCY1 13.80KV & GWFTRCY2 13.80KV GEN UNITS & CROW CREEK SW STA-FRONTIER SOLAR PV 60KV [7859]	P3	N-G-1	<100	<100	102	<100	<100	<100	<100	<100	<100	Continue to monitor future forecast
CURTISS-MI-WUK 115 kV	BELLOTA 230/115KV TB 2 & BELLOTA 230/115KV TB 1	P6	N-1-1	<100	<100	107	<100	<100	<100	<100	<100	<100	SPS recommended in 2019-2020 TPP
Del Mar - Atlantic 115 kV Line No. 2	Base Case	P0	N-0	83	86	110	40	6	52	40	82	82	Continue to monitor future forecast

Study Area: **PG&E Central Valley**
Thermal Overloads

Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading % (Baseline Scenarios)					Loading % (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2024 Summer Peak	2027 Summer Peak	2032 Summer Peak	2024 Spring Off-Peak	2027 Spring Off-Peak	2024 SP Heavy Renewable & Min Gas Gen	2024 Spring OP Sensitivity	2027 SP High CEC Forecast	2035 ATE	
Del Mar - Atlantic 115 kV Line No. 2	P1-2A5:10- ATLANTIC-GOLD HILL 230KV [4330]	P1-2	N-1	<100	<100	<100	<100	<100	<100	<100	<100	120	Continue to monitor future forecast
Del Mar - Atlantic 115 kV Line No. 2	P1-2A5:11- MIDDLE FORK-GOLD HILL 230KV [5140]	P1-2	N-1	<100	<100	<100	<100	<100	<100	<100	<100	119	Continue to monitor future forecast
Del Mar - Atlantic 115 kV Line No. 2	P1-2A5:2- POE-RIO OSO 230KV [5540]	P1-2	N-1	<100	<100	<100	<100	<100	<100	<100	<100	119	Continue to monitor future forecast
Del Mar - Atlantic 115 kV Line No. 2	P1-2A5:33- RIO OSO-LINCLN-SPL-LINC 115KV [0]	P1-2	N-1	<100	<100	<100	<100	<100	<100	<100	<100	119	Continue to monitor future forecast
Del Mar - Atlantic 115 kV Line No. 2	P1-4A5:1- GOLDHILL SVD=V	P1-4	N-1	<100	<100	<100	<100	<100	<100	<100	<100	119	Continue to monitor future forecast
Del Mar - Atlantic 115 kV Line No. 2	P2-2A5:3- GOLDHILL 230KV SECTION 2D	P2-2	Bus	<100	<100	<100	<100	<100	<100	<100	<100	123	Continue to monitor future forecast
Del Mar - Atlantic 115 kV Line No. 2	P2-2A5:4- GOLDHILL 230KV SECTION 1D	P2-2	Bus	<100	<100	<100	<100	<100	<100	<100	<100	122	Continue to monitor future forecast
Del Mar - Atlantic 115 kV Line No. 2	P2-3A5:10- GOLDHILL - 2D 230KV & MIDDLE FORK-GOLD HILL LINE	P2-3	Non-Bus-Tie Breaker	<100	<100	<100	<100	<100	<100	<100	<100	123	Continue to monitor future forecast
Del Mar - Atlantic 115 kV Line No. 2	P2-3A5:5- RIO OSO 230KV - MIDDLE BREAKER BAY 1	P2-3	Non-Bus-Tie Breaker	<100	<100	<100	<100	<100	<100	<100	<100	122	Continue to monitor future forecast
Del Mar - Atlantic 115 kV Line No. 2	P2-4A11:1- BELLOTA 230KV - SECTION 1E & 2E	P2-4	Bus-Tie-Breaker	<100	<100	<100	<100	<100	<100	<100	<100	123	Continue to monitor future forecast
Del Mar - Atlantic 115 kV Line No. 2	P2-4A11:7- TESLA E 230KV - SECTION 2E & 1E	P2-4	Bus-Tie-Breaker	<100	<100	<100	<100	<100	<100	<100	<100	123	Continue to monitor future forecast
Del Mar - Atlantic 115 kV Line No. 2	P5-5aA11:6- TESLA 230KV BUS E (FAILURE OF NON-REDUNDANT RELAY)	P5-5	Non-Redundant Relay	<100	<100	<100	<100	<100	<100	<100	<100	123	Continue to monitor future forecast
Del Mar - Atlantic 115 kV Line No. 2	P5-5aA4:7- BRIGHTON 230KV BUS (FAILURE OF NON-REDUNDANT RELAY)	P5-5	Non-Redundant Relay	<100	<100	<100	<100	<100	<100	<100	<100	121	Continue to monitor future forecast
Del Mar - Atlantic 115 kV Line No. 2	P5-5aA5:2- RIO OSO 230 KV BUS (FAILURE OF NON-REDUNDANT RELAY)	P5-5	Non-Redundant Relay	<100	<100	<100	<100	<100	<100	<100	<100	123	Continue to monitor future forecast
Del Mar - Atlantic 115 kV Line No. 2	P5-5c(DC)A4:2- Station	P5-5	Non-Redundant Relay	<100	<100	<100	<100	<100	<100	<100	<100	121	Continue to monitor future forecast
Del Mar - Atlantic 115 kV Line No. 2	ATLANTIC-GOLD HILL 230KV [4330] & RIO OSO-ATLANTIC 230KV [5590]	P6	N-1-1	NConv	NConv	119	<100	<100	<100	<100	<100	<100	Continue to monitor future forecast
Del Mar - Atlantic 115 kV Line No. 2	P7-1A11:17- GOLD HILL-EIGHT MILE ROAD 230KV [4800] & GOLD HILL-LODI STIG 230KV [4810]	P7-1	DTCL	<100	<100	<100	<100	<100	<100	<100	<100	122	Continue to monitor future forecast
Del Mar - Atlantic 115 kV Line No. 2	P7-1A11:37- LOCKEFORD-BELLOTA 230KV #1 [4990] & LOCKEFORD-BELLOTA 230KV #2 [4990]	P7-1	DTCL	<100	<100	<100	<100	<100	<100	<100	<100	123	Continue to monitor future forecast
Del Mar - Atlantic 115 kV Line No. 2	P7-1A11:9- EIGHT MILE ROAD-TESLA 230KV [4660] & STAGG-TESLA 230KV [5680]	P7-1	DTCL	<100	<100	<100	<100	<100	<100	<100	<100	121	Continue to monitor future forecast
Del Mar - Atlantic 115 kV Line No. 2	P7-1A4:23- GOLD HILL-EIGHT MILE ROAD 230KV [4800] & GOLD HILL-LODI STIG 230KV [4810]	P7-1	DTCL	<100	<100	<100	<100	<100	<100	<100	<100	122	Continue to monitor future forecast
Del Mar - Atlantic 115 kV Line No. 2	P7-1A5:7- Atlantic-Gold Hill 230 KV Line & Rio Oso-Gold Hill 230 KV Line	P7-1	DTCL	<100	<100	<100	<100	<100	<100	<100	<100	121	Continue to monitor future forecast
Delevan-Cortina 230 kV Line	VACA-DIX 230KV - SECTION 2F & 2E	P2-4	Bus Tie Breaker Fault	86	87	109	70	41	61	104	83	83	Continue to monitor future forecast
Delevan-Cortina 230 kV Line	P5-5c(DC)A4:1- Station	P5-5	Non-Redundant Relay	60	99	36	69	30	62	102	79	79	Sensitivity Only
Delevan-Cortina 230 kV Line	Delevan-Vaca Dixon No.2 230 KV Line & Delevan-Vaca Dixon No.3 230 KV Line	P7	DTCL	53	108	34	69	41	61	103	82	82	Project: Reconnector Delevan-Cortina 230KV line
Delta Switching Yard - Tesla 230 kV Line	TESLA E 230KV SECTION 2E	P2-2	Bus Fault	54	109	34	102	94	78	91	30	30	Generation Redispatch
Delta Switching Yard - Tesla 230 kV Line	VACA-DIX 230KV SECTION NA	P2-2	Bus Fault	28	25	24	117	80	86	106	33	33	Generation Redispatch
Delta Switching Yard - Tesla 230 kV Line	TESLA E - 2E 230KV & STAGG-TESLA line	P2-3	Non-Bus Tie Breaker Fault	36	27	25	102	N/A	78	91	N/A	N/A	Generation Redispatch
Delta Switching Yard - Tesla 230 kV Line	DLWSWSTA 230KV - MIDDLE BREAKER BAY 2	P2-3	Non-Bus Tie Breaker Fault	28	N/A	N/A	106	N/A	105	108	N/A	N/A	Generation Redispatch
Delta Switching Yard - Tesla 230 kV Line	P5-5aA4:6- VACA-DIXON 230KV BUS (FAILURE OF NON-REDUNDANT RELAY)	P5-5	Non-Redundant Relay	27	34	17	128	102	103	131	32	32	Generation Redispatch
Delta Switching Yard - Tesla 230 kV Line	P5-5c(DC)A4:1- Station	P5-5	Non-Redundant Relay	33	24	26	116	82	84	103	30	30	Install redundant relay
Delta Switching Yard - Tesla 230 kV Line	TESLA 230KV BUS C (FAILURE OF NON-REDUNDANT RELAY)	P5-5	Non-Redundant Relay	17	16	7	105	89	70	92	18	18	Generation Redispatch
Delta Switching Yard - Tesla 230 kV Line	VACA-DIXON 230KV BUS (FAILURE OF NON-REDUNDANT RELAY)	P5-5	Non-Redundant Relay	15	27	2	129	97	91	129	21	21	Install redundant relay
Delta Switching Yard - Tesla 230 kV Line	Vaca-Peabody 230 KV Line & Vaca-Lambie Sw Sta 230 KV Line	P7	DTCL	11	10	13	102	85	76	96	13	13	Generation Redispatch
Delta Switching Yard - Tesla 230 kV Line	P7-1A11:27- TESLA-NEWMARK #1 230KV [5720] & TESLA-RAVENSWOOD 230KV [5730]	P7	DTCL	28	26	25	103	94	79	92	30	30	Generation Redispatch
Delta Switching Yard - Tesla 230 kV Line	BRENTWOOD-KELSO 230KV [4410] & KELSO-TESLA 230KV [4930]	P7	DTCL	14	8	9	100	87	69	86	15	15	Generation Redispatch
Delta Switching Yard - Tesla 230 kV Line	Lambie Sw Sta-Birds Landing Sw Sta 230 KV Line & Peabody-Birds Landing Sw Sta 230 KV Line	P7	DTCL	12	12	13	98	85	74	100	14	14	Sensitivity Only
Delta Switching Yard - Tesla 230 kV Line	Birds Landing-CC Sub 230KV Line & Birds Landing-Contra Costa PP 230KV Line	P7	DTCL	35	15	19	106	79	105	108	20	20	Generation Redispatch
DIXONPGE-DIXON-J1 60 kV Line No. 1	P1-1A11:31- GWFTRCY3 18.00KV & GWFTRCY1 13.80KV & GWFTRCY2 13.80KV GEN UNITS & P1-2A4:53- DIXON-VACA #2 60KV [6740]	P1-1	N-1	<100	<100	<100	<100	<100	<100	<100	<100	146	Continue to monitor future forecast
Dixon-Vaca #1 & #2 60 kV	DIXON-VACA #2 60KV [6740]	P1	N-1	113	<100	<100	62	23	39	61	111	111	Project: Vaca Davis Area Reinforcement Project - Short term: Action Plan
Dixon-Vaca #1 & #2 60 kV	VACA-DXN-DIXON-J1-TRAVIS 60KV [0] MOAS OPENED ON TRAVIS_TRAVISJT	P1	N-1	122	<100	<100	73	N/A	51	72	N/A	N/A	Project: Vaca Davis Area Reinforcement Project - Short term: Action Plan
Dixon-Vaca #1 & #2 60 kV	GWFTRCY3 18.00KV & GWFTRCY1 13.80KV & GWFTRCY2 13.80KV GEN UNITS & DIXON-VACA #2 60KV [6740]	P3	N-G-1	<100	<100	<100	<100	<100	<100	<100	111	111	Project: Vaca Davis Area Reinforcement Project - Short term: Action Plan
Dixon-Vaca #1 & #2 60 kV	GWFTRCY3 18.00KV & GWFTRCY1 13.80KV & GWFTRCY2 13.80KV GEN UNITS & VACA-DXN-DIXON-J1-TRAVIS 60KV [0] MOAS OPENED ON TRAVIS_TRAVISJT	P3	N-G-1	122	<100	<100	<100	<100	<100	<100	<100	<100	Project: Vaca Davis Area Reinforcement Project - Short term: Action Plan
Dixon-Vaca #1 60 kV	P1-2A4:53- DIXON-VACA #2 60KV [6740]	P1-2	N-1	<100	<100	<100	<100	<100	<100	<100	<100	146	Continue to monitor future forecast
DPWTR_TP-DAVIS 115KV	BRIGHTON-DAVIS 115KV [1140] MOAS OPENED ON HOWARDJCT3_BRKRJCT & WOODLAND-DAVIS 115KV [4210]	P6	N-1-1	90	92	107	<100	<100	<100	<100	<100	<100	Continue to monitor future forecast
Drum - Higgins 115 kV Line	GOLDHILL 230KV - SECTION 2D & 1D	P2-4	Bus Tie Breaker Fault	11	N/A	<100	195	146	99	195	NConv	NConv	Project: Gold Hill 230/115 kV Transformer Additoin Project. Short term: Action Plan
Drum - Higgins 115 kV Line	GOLD HILL 230 KV BUS (FAILURE OF NON-REDUNDANT RELAY)	P5-5	Non-Redundant Relay	NConv	NConv	<100	187	176	83	187	NConv	NConv	Project: Gold Hill 230/115 kV Transformer Additoin Project. Short term: Action Plan
Drum - Higgins 115 kV Line	GOLD HILL 115 KV BUS (FAILURE OF NON-REDUNDANT RELAY)	P5-5	Non-Redundant Relay	119	114	<100	41	64	35	41	137	137	Project: Gold Hill 230/115 kV Transformer Additoin Project. Short term: Action Plan
Drum - Higgins 115 kV Line	No BF Relay Gold Hill 115KV CB 172 or 392	P5-5	Non-Redundant Relay	119	114	<100	41	64	35	41	137	137	Project: Gold Hill 230/115 kV Transformer Additoin Project. Short term: Action Plan
Drum - Higgins 115 kV Line	GOLD HILL 115 KV BUS (FAILURE OF NON-REDUNDANT RELAY)	P5-5	Non-Redundant Relay	105	98	99	24	89	21	24	123	123	Project: Gold Hill 230/115 kV Transformer Additoin Project. Short term: Action Plan
Drum - Higgins 115 kV Line	P5-5aA5:6- GOLD HILL 115 KV BUS (FAILURE OF NON-REDUNDANT RELAY)	P5-5	Non-Redundant Relay	<100	<100	<100	<100	<100	<100	<100	<100	218	Continue to monitor future forecast
Drum - Higgins 115 kV Line	P5-5dA5:2- No BF Relay Gold Hill 115KV CB 172 or 392	P5-5	Non-Redundant Relay	<100	<100	<100	<100	<100	<100	<100	<100	218	Continue to monitor future forecast
Drum - Higgins 115 kV Line	P5-5aA5:6- GOLD HILL 115 KV BUS (FAILURE OF NON-REDUNDANT RELAY)	P5-5	Non-Redundant Relay	<100	<100	<100	<100	<100	<100	<100	<100	181	Continue to monitor future forecast
Drum - Higgins 115 kV Line	P5-5dA5:2- No BF Relay Gold Hill 115KV CB 172 or 392	P5-5	Non-Redundant Relay	<100	<100	<100	<100	<100	<100	<100	<100	181	Continue to monitor future forecast
Drum - Higgins 115 kV Line	P5-5aA5:6- GOLD HILL 115 KV BUS (FAILURE OF NON-REDUNDANT RELAY)	P5-5	Non-Redundant Relay	<100	<100	<100	<100	<100	<100	<100	<100	160	Continue to monitor future forecast
Drum - Higgins 115 kV Line	P5-5dA5:2- No BF Relay Gold Hill 115KV CB 172 or 392	P5-5	Non-Redundant Relay	<100	<100	<100	<100	<100	<100	<100	<100	160	Continue to monitor future forecast
Drum - Higgins 115 kV Line	Placer-Gold Hill No. 1 115 KV Line and Placer-Gold Hill No. 2 115 KV Line	P7	DTCL	119	114	115	41	64	34	41	137	137	System Upgrade/Preferred resources/operating solution as needed
Drum - Higgins 115 kV Line	P7-1A5:19- Placer-Gold Hill No. 1 115 KV Line and Placer-Gold Hill No. 2 115 KV Line	P7-1	DTCL	<100	<100	<100	<100	<100	<100	<100	<100	217	Continue to monitor future forecast
Drum - Higgins 115 kV Line	P7-1A5:19- Placer-Gold Hill No. 1 115 KV Line and Placer-Gold Hill No. 2 115 KV Line	P7-1	DTCL	<100	<100	<100	<100	<100	<100	<100	<100	180	Continue to monitor future forecast
Drum - Higgins 115 kV Line	P7-1A5:19- Placer-Gold Hill No. 1 115 KV Line and Placer-Gold Hill No. 2 115 KV Line	P7-1	DTCL	<100	<100	<100	<100	<100	<100	<100	<100	159	Continue to monitor future forecast

Study Area: **PG&E Central Valley**
Thermal Overloads

Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading % (Baseline Scenarios)					Loading % (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2024 Summer Peak	2027 Summer Peak	2032 Summer Peak	2024 Spring Off-Peak	2027 Spring Off-Peak	2024 SP Heavy Renewable & Min Gas Gen	2024 Spring OP Sensitivity	2027 SP High CEC Forecast	2035 ATE	
Drum - Rio Oso 115 kV No. 1 Line	GOLDHILL 230KV - SECTION 2D & 1D	P2-4	Bus Tie Breaker Fault	176	178	82	43	197	19	45	NConv	NConv	Project: Gold Hill 230/115 kV Transformer Additoin Project. Short term: Action Plan
Drum - Rio Oso 115 kV No. 1 Line	GOLDHILL 230KV - SECTION 2D & 1D	P2-4	Bus Tie Breaker Fault	NConv	NConv	NConv	47	121	41	47	NConv	NConv	Project: Gold Hill 230/115 kV Transformer Additoin Project. Short term: Action Plan
Drum - Rio Oso 115 kV No. 1 Line	GOLD HILL 230 KV BUS (FAILURE OF NON-REDUNDENT RELAY)	P5-5	Non-Redundant Relay	NConv	NConv	<100	43	197	19	45	NConv	NConv	Project: Gold Hill 230/115 kV Transformer Additoin Project. Short term: Action Plan
Drum - Rio Oso 115 kV No. 1 Line	GOLD HILL 230 KV BUS (FAILURE OF NON-REDUNDENT RELAY)	P5-5	Non-Redundant Relay	NConv	NConv	<100	47	121	41	47	NConv	NConv	Project: Gold Hill 230/115 kV Transformer Additoin Project. Short term: Action Plan
Drum - Rio Oso 115 kV No. 1 Line	P5-5a:A5:6_ GOLD HILL 115 KV BUS (FAILURE OF NON-REDUNDENT RELAY)	P5-5	Non-Redundant Relay	<100	<100	<100	<100	<100	<100	<100	<100	103	Continue to monitor future forecast
Drum - Rio Oso 115 kV No. 1 Line	P5-5d:A5:2_ No BF Relay Gold Hill 115KV CB 172 or 392	P5-5	Non-Redundant Relay	<100	<100	<100	<100	<100	<100	<100	<100	103	Continue to monitor future forecast
Drum - Rio Oso 115 kV No. 1 Line	GOLDHILL 230/115KV TB 2 & GOLDHILL 230/115KV TB 1	P6	N-1-1	NConv	NConv	<100	<100	120	<100	<100	<100	<100	Project: Gold Hill 230/115 kV Transformer Additoin Project. Short term: Action Plan
Drum - Rio Oso 115 kV No. 1 Line	P7-1:A5:19_ Placer-Gold Hill No. 1 115 kV Line and Placer-Gold Hill No. 2 115 kV Line	P7-1	DTCL	<100	<100	<100	<100	<100	<100	<100	<100	102	Continue to monitor future forecast
Drum - Rio Oso 115 kV No. 2 Line	P5-5a:A5:6_ GOLD HILL 115 KV BUS (FAILURE OF NON-REDUNDENT RELAY)	P5-5	Non-Redundant Relay	<100	<100	<100	<100	<100	<100	<100	<100	112	Continue to monitor future forecast
Drum - Rio Oso 115 kV No. 2 Line	P5-5d:A5:2_ No BF Relay Gold Hill 115KV CB 172 or 392	P5-5	Non-Redundant Relay	<100	<100	<100	<100	<100	<100	<100	<100	112	Continue to monitor future forecast
Drum - Rio Oso 115 kV No. 2 Line	P7-1:A5:19_ Placer-Gold Hill No. 1 115 kV Line and Placer-Gold Hill No. 2 115 kV Line	P7-1	DTCL	<100	<100	<100	<100	<100	<100	<100	<100	112	Continue to monitor future forecast
DRUM-DUTCHFLAT1JT 115 kV Line No 1	P1-2:A5:17_ PLACER-GOLD HILL #1 115KV [3340] & P1-2:A5:18_ PLACER-GOLD HILL #2 115KV [4290]	P1-2	N-1	<100	<100	<100	<100	<100	<100	<100	<100	217	Continue to monitor future forecast
DUTCHFLAT1JT-CHCGO PK 115 kV Line No 1	P1-2:A5:17_ PLACER-GOLD HILL #1 115KV [3340] & P1-2:A5:18_ PLACER-GOLD HILL #2 115KV [4290]	P1-2	N-1	<100	<100	<100	<100	<100	<100	<100	<100	180	Continue to monitor future forecast
Eagle Rock - Corina 115 kV (Highland to Highland Jct)	VACA-DIXON 230KV BUS (FAILURE OF NON-REDUNDENT RELAY)	P5-5	Non-Redundant Relay	50	95	37	68	28	52	104	73	73	Sensitivity Only
Eight Mile - Stagg 230 kV Line	EIGHT MILE ROAD-TESLA 230KV [4660]	P1	N-1	76	N/A	N/A	95	N/A	64	101	N/A	N/A	Sensitivity Only
Eight Mile - Stagg 230 kV Line	TESLA E 230KV SECTION 1E	P2-2	Bus Fault	NConv	NConv	NConv	98	85	66	105	78	78	Sensitivity Only
Eight Mile Road - Tesla 230 kV Line	EIGHT MILE ROAD-STAGG 230KV [5002] (EIGHT MI-STAGG-J1)	P2-1	Line Section w/o Fault	76	77	59	99	81	63	106	71	71	Sensitivity Only
Eight Mile Road - Tesla 230 kV Line	STAGG-H-1H 230KV & EIGHT MILE ROAD-STAGG line	P2-3	Non-Bus Tie Breaker Fault	69	68	48	99	N/A	63	106	N/A	N/A	Sensitivity Only
Eight Mile Road - Tesla 230 kV Line	EIGHT MILE ROAD-STAGG 230KV [5002] & STAGG-TESLA 230KV [5680]	P7	DTCL	66	64	45	97	79	62	104	67	67	Sensitivity Only
Eldorado - Missouri Flat 115 kV No. 1 Line	P2-1:A5:12_ MISSOURI FLAT-GOLD HILL #1 115KV [2660] (GOLDHILL-CPM TAP)	P2-1	Line Section w/o Fault	<100	<100	<100	<100	<100	<100	<100	<100	132	Continue to monitor future forecast
Eldorado - Missouri Flat 115 kV No. 1 Line	P2-1:A5:50_ MISSOURI FLAT-GOLD HILL #1 115KV [2660] (SHPRING1-CLRKSVLT)	P2-1	Line Section w/o Fault	<100	<100	<100	<100	<100	<100	<100	<100	132	Continue to monitor future forecast
Eldorado - Missouri Flat 115 kV No. 1 Line	P2-1:A5:11_ MISSOURI FLAT-GOLD HILL #2 115KV [2670] (GOLDHILL-SHPRING2)	P2-1	Line Section w/o Fault	<100	<100	<100	<100	<100	<100	<100	<100	113	Continue to monitor future forecast
Eldorado - Missouri Flat 115 kV No. 1 Line	P2-2:A5:8_ GOLDHILL 115KV SECTION 2F	P2-2	Bus	<100	<100	<100	<100	<100	<100	<100	<100	130	Continue to monitor future forecast
Eldorado - Missouri Flat 115 kV No. 1 Line	P2-2:A5:7_ GOLDHILL 115KV SECTION 1E	P2-2	Bus	<100	<100	<100	<100	<100	<100	<100	<100	113	Continue to monitor future forecast
Eldorado - Missouri Flat 115 kV No. 1 Line	P2-3:A5:13_ GOLDHILL - 1E 115KV & PLACER-GOLD HILL #2 LINE	P2-3	Non-Bus Tie Breaker	<100	<100	<100	<100	<100	<100	<100	<100	113	Continue to monitor future forecast
Eldorado - Missouri Flat 115 kV No. 1 Line	P2-4:A5:3_ GOLDHILL 115KV - SECTION 1F & 2F	P2-4	Bus-Tie-Breaker	<100	<100	<100	<100	<100	<100	<100	<100	131	Continue to monitor future forecast
Eldorado - Missouri Flat 115 kV No. 2 Line	P2-1:A5:12_ MISSOURI FLAT-GOLD HILL #1 115KV [2660] (GOLDHILL-CPM TAP)	P2-1	Line Section w/o Fault	<100	<100	<100	<100	<100	<100	<100	<100	143	Continue to monitor future forecast
Eldorado - Missouri Flat 115 kV No. 2 Line	P2-1:A5:50_ MISSOURI FLAT-GOLD HILL #1 115KV [2660] (SHPRING1-CLRKSVLT)	P2-1	Line Section w/o Fault	<100	<100	<100	<100	<100	<100	<100	<100	143	Continue to monitor future forecast
Eldorado - Missouri Flat 115 kV No. 2 Line	P2-1:A5:12_ MISSOURI FLAT-GOLD HILL #1 115KV [2660] (GOLDHILL-CPM TAP)	P2-1	Line Section w/o Fault	<100	<100	<100	<100	<100	<100	<100	<100	143	Continue to monitor future forecast
Eldorado - Missouri Flat 115 kV No. 2 Line	P2-1:A5:50_ MISSOURI FLAT-GOLD HILL #1 115KV [2660] (SHPRING1-CLRKSVLT)	P2-1	Line Section w/o Fault	<100	<100	<100	<100	<100	<100	<100	<100	143	Continue to monitor future forecast
Eldorado - Missouri Flat 115 kV No. 2 Line	P2-2:A5:8_ GOLDHILL 115KV SECTION 2F	P2-2	Bus	<100	<100	<100	<100	<100	<100	<100	<100	141	Continue to monitor future forecast
Eldorado - Missouri Flat 115 kV No. 2 Line	P2-2:A5:8_ GOLDHILL 115KV SECTION 2F	P2-2	Bus	<100	<100	<100	<100	<100	<100	<100	<100	141	Continue to monitor future forecast
Eldorado - Missouri Flat 115 kV No. 2 Line	P2-3:A5:13_ GOLDHILL - 1E 115KV & PLACER-GOLD HILL #2 LINE	P2-3	Non-Bus Tie Breaker	<100	<100	<100	<100	<100	<100	<100	<100	102	Continue to monitor future forecast
Eldorado - Missouri Flat 115 kV No. 2 Line	P2-3:A5:13_ GOLDHILL - 1E 115KV & PLACER-GOLD HILL #2 LINE	P2-3	Non-Bus Tie Breaker	<100	<100	<100	<100	<100	<100	<100	<100	102	Continue to monitor future forecast
Eldorado - Missouri Flat 115 kV No. 2 Line	P2-4:A5:3_ GOLDHILL 115KV - SECTION 1F & 2F	P2-4	Bus-Tie-Breaker	<100	<100	<100	<100	<100	<100	<100	<100	142	Continue to monitor future forecast
Eldorado - Missouri Flat 115 kV No. 2 Line	P2-4:A5:3_ GOLDHILL 115KV - SECTION 1F & 2F	P2-4	Bus-Tie-Breaker	<100	<100	<100	<100	<100	<100	<100	<100	142	Continue to monitor future forecast
Gold Hill 230/115 kV Transformer No. 1	P2-2:A5:8_ GOLDHILL 115KV SECTION 2F	P2-2	Bus	<100	<100	<100	<100	<100	<100	<100	<100	108	Continue to monitor future forecast
GOLDHILL-HORSHEI 115 kV Line No 1	P1-2:A5:34_ DRUM-HIGGINS 115KV [4393] MOAS OPENED ON CHCGO PK_HIGGINS & P1-2:A5:18_ PLACER-GOLD HILL #2 115KV [4290]	P1-2	N-1	<100	<100	<100	<100	<100	<100	<100	<100	136	Continue to monitor future forecast
GUSTN JT-NEWMAN 60 kV	P1-2:A12:19_ CROW CREEK SW STA-FRONTIER SOLAR PV 60KV [7859]	P1-2	N-1	<100	<100	<100	<100	<100	<100	<100	<100	116	Continue to monitor future forecast
GUSTN JT-NEWMAN 60 kV	P1-2:A12:17_ SALADO-CROW CREEK SW STA 60KV [7858]	P1-2	N-1	<100	<100	<100	<100	<100	<100	<100	<100	102	Continue to monitor future forecast
GUSTN JT-NEWMAN 60 kV	GWFTRCY3 18.0KV & GWFTRCY1 13.80KV & GWFTRCY2 13.80KV GEN UNITS & CROW CREEK SW STA-FRONTIER SOLAR PV 60KV [7859]	P3	N-G-1	<100	<100	102	<100	<100	<100	<100	<100	<100	Continue to monitor future forecast
GUSTN JT-NEWMAN 60 kV Line No 1	P1-1:A12:4_ Q1103SPV 34.50KV GEN UNIT 1 & P1-2:A12:17_ SALADO-CROW CREEK SW STA 60KV [7858]	P1-1	N-1	<100	<100	<100	<100	<100	<100	<100	<100	104	Continue to monitor future forecast
Hammer - County Club 60 kV	STAGG 230KV BUS (FAILURE OF NON-REDUNDENT RELAY)	P5-5	Non-Redundant Relay	0	0	123	0	0	0	0	0	0	Continue to monitor future forecast
Higgins - Bell 115 kV Line	OLDHILL 230KV - SECTION 2D & 1D	P2-4	Bus Tie Breaker Fault	N/A	0	179	142	80	77	142	NConv	NConv	Continue to monitor future forecast
Higgins - Bell 115 kV Line	GOLD HILL 230 KV BUS (FAILURE OF NON-REDUNDENT RELAY)	P5-5	Non-Redundant Relay	NConv	NConv	<100	142	80	77	142	NConv	NConv	Project: Gold Hill 230/115 kV Transformer Additoin Project. Short term: Action Plan
Higgins - Bell 115 kV Line	P5-5a:A5:6_ GOLD HILL 115 KV BUS (FAILURE OF NON-REDUNDENT RELAY)	P5-5	Non-Redundant Relay	<100	<100	<100	<100	<100	<100	<100	<100	148	Continue to monitor future forecast
Higgins - Bell 115 kV Line	P5-5d:A5:2_ No BF Relay Gold Hill 115KV CB 172 or 392	P5-5	Non-Redundant Relay	<100	<100	<100	<100	<100	<100	<100	<100	148	Continue to monitor future forecast
Higgins - Bell 115 kV Line	P7-1:A5:19_ Placer-Gold Hill No. 1 115 kV Line and Placer-Gold Hill No. 2 115 kV Line	P7-1	DTCL	<100	<100	<100	<100	<100	<100	<100	<100	146	Continue to monitor future forecast
HIGGINS-BELL PGE 115 kV Line No 1	P1-2:A5:17_ PLACER-GOLD HILL #1 115KV [3340] & P1-2:A5:18_ PLACER-GOLD HILL #2 115KV [4290]	P1-2	N-1	<100	<100	<100	<100	<100	<100	<100	<100	147	Continue to monitor future forecast
HOWARDJCT3-BRKRJCT 115 kV Line No 1	P2-2:A4:20_ W.SCRMNO 115KV SECTION DE	P2-2	Bus	<100	<100	<100	<100	<100	<100	<100	<100	111	Continue to monitor future forecast
HOWARDJCT3-BRKRJCT 115 kV Line No 1	P2-3:A4:26_ W.SCRMNO - DE 115KV & BRIGHTN-W.SCRMNO LINE	P2-3	Non-Bus Tie Breaker	<100	<100	<100	<100	<100	<100	<100	<100	148	Continue to monitor future forecast
HOWARDJCT3-BRKRJCT 115 kV Line No 1	P5-5a:A5:5_ RIO OSO 115 KV BUS (FAILURE OF NON-REDUNDENT RELAY)	P5-5	Non-Redundant Relay	<100	<100	<100	<100	<100	<100	<100	<100	127	Continue to monitor future forecast
HOWARDJCT3-BRKRJCT 115 kV Line No 1	P5-5d:A5:1_ No BF Relay Rio Oso 115KV CB 402 412 422 432 442 462 or 472	P5-5	Non-Redundant Relay	<100	<100	<100	<100	<100	<100	<100	<100	155	Continue to monitor future forecast
HOWARDJCT3-BRKRJCT 115 kV Line No 1	P7-1:A4:17_ Rio Oso-West Sacramento 115 kV Line & West Sacramento-Brighton 115 kV Line	P7-1	DTCL	<100	<100	<100	<100	<100	<100	<100	<100	121	Continue to monitor future forecast
HOWARDJCT3-BRKRJCT 115kV	W.SCRMNO - DE 115KV & BRIGHTN-W.SCRMNO LINE	P2-3	Non-Bus Tie Breaker Fault	118	127	69	N/A	26	N/A	N/A	90	90	Operating solution
HOWARDJCT3-BRKRJCT 115kV	RIO OSO 115KV - SECTION 2D & 1D	P2-4	Bus Tie Breaker Fault	N/A	98	118	79	N/A	53	80	N/A	N/A	Continue to monitor future forecast
HOWARDJCT3-BRKRJCT 115kV	RIO OSO 115 KV BUS (FAILURE OF NON-REDUNDENT RELAY)	P5-5	Non-Redundant Relay	126	128	105	73	9	49	74	123	123	SPS recommended in 2017-2018 TPP
HOWARDJCT3-BRKRJCT 115kV	P5-5d(DC):A4:12_ Station	P5-5	Non-Redundant Relay	104	106	110	62	10	37	60	103	103	Install redundant relay

Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading % (Baseline Scenarios)					Loading % (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2024 Summer Peak	2027 Summer Peak	2032 Summer Peak	2024 Spring Off-Peak	2027 Spring Off-Peak	2024 SP Heavy Renewable & Min Gas Gen	2024 Spring OP Sensitivity	2027 SP High CEC Forecast	2035 ATE	
HOWARDJCT3-BRKRJCT 115kV	P5-5dA5:1_ No BF Relay Rio Oso 115KV CB 402 412 422 432 442 462 or 472	P5-5	Non-Redundant Relay	137	139	122	79	11	53	80	132	132	Install redundant relay
HOWARDJCT3-BRKRJCT 115kV	WEST SACRAMENTO-DAVIS 115KV [4120] & WOODLAND-DAVIS 115KV [4210]	P6	N-1-1	141	143	172	<100	<100	<100	90	125	125	SPS recommended in 2017-2018 TPP
HOWARDJCT3-BRKRJCT 115kV	Rio Oso-Woodland #1 115 KV Line & Rio Oso-Woodland #2 115 KV Line	P7	DCTL	104	106	110	62	10	37	60	103	103	SPS Recommended on Briton
HOWARDJCT3-BRKRJCT 115kV	Rio Oso-West Sacramento 115 KV Line & West Sacramento-Brighton 115 KV Line	P7	DCTL	97	98	117	67	24	36	57	90	90	Continue to monitor future forecast
Industrial 60 kV Tap Line	LODI25_2_UNIT 1 & LOCKEFORD-INDUSTRIAL 60KV [7420]	P3	N-G-1	<100	102	<100	<100	<100	<100	<100	<100	<100	Project: Lockeford-Lodi Project
Kasson - Carbons 60 kV Line	KASSON 115KV BUS (FAILURE OF NON-REDUNDENT RELAY)	P5-5	Non-Redundant Relay	101	75	130	35	0	46	35	75	75	Project: Vierra Looping in Project. Short term: Action Plan
Kasson - Louise 60 kV Line	P5-5aA11:17_ KASSON 115KV BUS (FAILURE OF NON-REDUNDENT RELAY)	P5-5	Non-Redundant Relay	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	385	Continue to monitor future forecast
Kasson - Louise 60 kV Line	SCHULTE SW STA-LAMMERS 115KV [3993] & SCHULTE SW STA-KASSON-MANTECA 115KV [7472]	P6	N-1-1	122	<100	119	<100	<100	<100	<100	<100	<100	Project: Vierra Looping in Project. Short term: Action Plan
Kasson 115/60 kV Transformer No. 1	KASSON-LOUISE 60KV [7250]	P1	N-1	N/A	80	107	N/A	47	N/A	N/A	80	80	Continue to monitor future forecast
Kasson 115/60 kV Transformer No. 1	MANTECA 115/60KV TB 3	P1	N-1	80	85	112	49	66	59	49	86	86	Continue to monitor future forecast
Kasson 115/60 kV Transformer No. 1	P1-2A11:92_ MANTECA-LOUISE 60KV [7470]	P1-2	N-1	<100	<100	<100	<100	<100	<100	<100	<100	137	Continue to monitor future forecast
Kasson 115/60 kV Transformer No. 1	P1-2A11:103_ KASSON-LOUISE 60KV [7250]	P1-2	N-1	<100	<100	<100	<100	<100	<100	<100	<100	135	Continue to monitor future forecast
Kasson 115/60 kV Transformer No. 1	P1-2A11:55_ MANTECA-VIERRA 115KV [2190]	P1-2	N-1	<100	<100	<100	<100	<100	<100	<100	<100	121	Continue to monitor future forecast
Kasson 115/60 kV Transformer No. 1	P1-2A11:46_ VIERRA-TESLA 115KV [0]	P1-2	N-1	<100	<100	<100	<100	<100	<100	<100	<100	107	Continue to monitor future forecast
Kasson 115/60 kV Transformer No. 1	P1-3A11:29_ MANTECA 115/60KV TB 3	P1-3	N-1	<100	<100	<100	<100	<100	<100	<100	<100	140	Continue to monitor future forecast
Kasson 115/60 kV Transformer No. 1	P2-1A11:36_ SCHULTE SW STA-KASSON-MANTECA 115KV [7472] (MANTECA-LID JCT)	P2-1	Line Section w/o Fault	<100	<100	<100	<100	<100	<100	<100	<100	122	Continue to monitor future forecast
Kasson 115/60 kV Transformer No. 1	MANTECA 115KV - RING R2 & R3	P2-3	Non-Bus Tie Breaker Fault	136	N/A	N/A	N/A	66	N/A	N/A	86	86	Project: Vierra Looping in Project. Short term: Action Plan
Kasson 115/60 kV Transformer No. 1	P2-3A11:105_ MANTECA 115KV - RING R2 & R3	P2-3	Non-Bus Tie Breaker	<100	<100	<100	<100	<100	<100	<100	<100	140	Continue to monitor future forecast
Kasson 115/60 kV Transformer No. 1	P2-3A11:108_ MANTECA 115KV - RING R4 & R3	P2-3	Non-Bus Tie Breaker	<100	<100	<100	<100	<100	<100	<100	<100	140	Continue to monitor future forecast
Kasson 115/60 kV Transformer No. 1	P2-3A11:20_ VIERRA 115KV - MIDDLE BREAKER BAY 1	P2-3	Non-Bus Tie Breaker	<100	<100	<100	<100	<100	<100	<100	<100	121	Continue to monitor future forecast
Kasson 115/60 kV Transformer No. 1	P2-4A11:1_ BELLOTA 230KV - SECTION 1E & 2E	P2-4	Bus Tie Breaker	<100	<100	<100	<100	<100	<100	<100	<100	115	Continue to monitor future forecast
Kasson 115/60 kV Transformer No. 1	P5-2dA11:2_ No BF Relay Rio Oso 115KV CB 162	P5-2	Non-Redundant Relay	<100	<100	<100	<100	<100	<100	<100	<100	119	Continue to monitor future forecast
Kasson 115/60 kV Transformer No. 1	P5-2dA5:1_ No BF Relay Stanislaus 115KV CB 112 122 or 132	P5-2	Non-Redundant Relay	<100	<100	<100	<100	<100	<100	<100	<100	117	Continue to monitor future forecast
Kasson 115/60 kV Transformer No. 1	P5-5aA11:13_ TRACY 115KV BUS (FAILURE OF NON-REDUNDENT RELAY)	P5-5	Non-Redundant Relay	<100	<100	<100	<100	<100	<100	<100	<100	120	Continue to monitor future forecast
Kasson 115/60 kV Transformer No. 1	VIERRA-TRACY-KASSON 115KV [4310] & SCHULTE SW STA-KASSON-MANTECA 115KV [7472]	P6	N-1-1	106	<100	102	<100	<100	<100	<100	<100	<100	Project: Vierra Looping in Project. Short term: Action Plan
Kasson 115/60 kV Transformer No. 1	SCHULTE SW STA-KASSON-MANTECA 115KV [7472] & KASSON-LOUISE 60KV [7250]	P7	DCTL	75	80	107	44	47	54	44	80	80	Continue to monitor future forecast
Kasson 115/60 kV Transformer No. 1	P7-1A11:15_ SCHULTE SW STA-KASSON-MANTECA 115KV [7472] & KASSON-LOUISE 60KV [7250]	P7-1	DTCL	<100	<100	<100	<100	<100	<100	<100	<100	135	Continue to monitor future forecast
Kasson 115/60 kV Transformer No. 1	P7-1A11:26_ TESLA-STOCKTON COGEN JCT 115KV [4010] & KASSON-LOUISE 60KV [7250]	P7-1	DTCL	<100	<100	<100	<100	<100	<100	<100	<100	136	Continue to monitor future forecast
Kasson 115/60 kV Transformer No. 1	P7-1A11:30_ SCHULTE SW STA-KASSON-MANTECA 115KV [7472] & TESLA-SALADO-MANTECA 115KV [4000]	P7-1	DTCL	<100	<100	<100	<100	<100	<100	<100	<100	120	Continue to monitor future forecast
KASSON 60/115 Transformer	GWFTRCY3 18.00KV & GWFTRCY1 13.80KV & GWFTRCY2 13.80KV GEN UNITS & P1-3A11:29_ MANTECA 115/60KV TB 3	P3	N-G-1	<100	<100	112	<100	<100	<100	<100	<100	<100	Continue to monitor future forecast
KNIGHT2-WOODLANDJ2 115 kV Line No 2	P1-2A11:6_ LOCKFORD-BRIGHTON 230KV [0] & P1-2A4:9_ RIO OSO-BRIGHTON 230KV [5600]	P1-2	N-1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	109	Continue to monitor future forecast
Lammers - Kasson 115 kV Line	SCHULTE SW STA-KASSON-MANTECA 115KV [7472] & TESLA-TRACY 115KV [4020] MOAS OPENED ON LEPRINO_ TRACY JC	P6	N-1-1	114	<100	96	<100	<100	<100	<100	<100	<100	Project: Vierra Looping in Project. Short term: Action Plan
Lawrence Lab 115 kV Tap #1	TESLA D 230KV - SECTION 1D & 2D	P2-4	Bus Tie Breaker Fault	N/A	85	111	42	144	41	40	62	62	Generation Redispatch
LINCLN-RBROCKLINJCT 115kV	ATLANTIC-GOLD HILL 230KV [4330] & RIO OSO-ATLANTIC 230KV [5590]	P6	N-1-1	NConv	104	137	<100	<100	<100	<100	98	98	System Upgrade/Preferred resources/operating solution as needed
LINCLN-SP JCT 115kV	ATLANTIC-GOLD HILL 230KV [4330] & RIO OSO-ATLANTIC 230KV [5590]	P6	N-1-1	NConv	131	109	<100	<100	<100	<100	124	124	System Upgrade/Preferred resources/operating solution as needed
Lincoln - Pleasant Grove 115 kV Line	RIO OSO-ATLANTIC 230KV [5590] & ATLANTIC-GOLD HILL 230KV [4330]	P6	N-1-1	122	<100	<100	<100	<100	<100	<100	<100	<100	Project: Reconductor Rio Oso- SPI Jct-Lincoln 115KV line
LLNLU450-LLNL TAP 115kV	TESLA D 230KV - SECTION 1D & 2D	P2-4	Bus Tie Breaker Fault	53	60	121	42	202	97	34	135	135	Generation Redispatch
LLNLU450-LLNL TAP 115kV	TESLA D 230/115KV TB 1 & GWFTRCY GEN UNITS	P3	N-G-1	<100	<100	118	118	<100	<100	<100	<100	<100	Generation Redispatch
LLNLU450-LLNL TAP 115kV	GWFTRCY3 18.00KV & GWFTRCY1 13.80KV & GWFTRCY2 13.80KV GEN UNITS & TESLA D 230/115KV TB 1	P3	N-G-1	<100	<100	125	<100	<100	<100	<100	<100	<100	Continue to monitor future forecast
LLNLU450-LLNL TAP 115kV	TESLA 230KV BUS D (FAILURE OF NON-REDUNDENT RELAY)	P5-5	Non-Redundant Relay	119	130	232	42	202	96	34	135	135	Generation Redispatch
LLNLU450-LLNL TAP 115kV	TESLA D 230/115KV TB 1 & TESLA D 230/115KV TB 3	P6	N-1-1	107	125	176	<100	100	<100	<100	127	127	Generation Redispatch
Lockeford - Industrial 60 kV	LODI25_2_UNIT 1 & LOCKEFORD-LODI #2 60KV [7440] (LOCKEFORD-VICTOR)	P3	N-G-1	<100	105	<100	<100	<100	<100	<100	<100	<100	Project: Lockeford-Lodi Project
Lockeford No. 1 60 kV Line	STAGG-D SECTION 1D & STAGG-E SECTION 1E 230KV	P2-4	Bus Tie Breaker Fault	121	131	232	N/A	1	N/A	N/A	1	1	Existing operating procedure
Lockeford No. 1 60 kV Line	STAGG 230KV BUS (FAILURE OF NON-REDUNDENT RELAY)	P5-5	Non-Redundant Relay	1	1	292	1	1	1	1	1	1	Continue to monitor future forecast
Lockeford No. 1 60 kV Line	EIGHT MILE ROAD-STAGG 230KV [5002] & STAGG-TESLA 230KV [5680]	P7	DCTL	1	1	300	1	1	1	1	1	1	Continue to monitor future forecast
Madison - Vaca 115 kV Lin	P2-1A4:46_ FULTON JCT-VACA 115KV [1590] (VACA-DIX-AMEGTAP)	P2-1	Line Section w/o Fault	<100	<100	<100	<100	<100	<100	<100	<100	104	Continue to monitor future forecast
Madison - Vaca 115 kV Lin	P2-1A4:46_ FULTON JCT-VACA 115KV [1590] (VACA-DIX-AMEGTAP)	P2-1	Line Section w/o Fault	<100	<100	<100	<100	<100	<100	<100	<100	104	Continue to monitor future forecast
Manteca - Louise 60 kV Line	KASSON 115KV SECTION 1D	P2-2	Bus Fault	103	N/A	N/A	73	N/A	82	71	N/A	N/A	Project: Vierra Looping in Project. Short term: Action Plan
Manteca - Louise 60 kV Line	KASSON - 1D 115KV & LAMMERS-KASSON line	P2-3	Non-Bus Tie Breaker Fault	112	N/A	N/A	73	N/A	82	72	N/A	N/A	Project: Vierra Looping in Project. Short term: Action Plan
Manteca - Louise 60 kV Line	BELLOTA 230KV - SECTION 1E & 2E	P2-4	Bus Tie Breaker Fault	56	NConv	NConv	12	50	41	13	119	119	SPS recommended in 2019-2020 TPP
Manteca - Louise 60 kV Line	TESLA 115KV - SECTION 2D & 1D	P2-4	Bus Tie Breaker Fault	103	N/A	N/A	22	117	NConv	22	NConv	NConv	Tesla 115 kV Bus Upgrade
Manteca - Louise 60 kV Line	KASSON 115KV BUS (FAILURE OF NON-REDUNDENT RELAY)	P5-5	Non-Redundant Relay	175	124	232	67	73	96	67	124	124	Install redundant relay
Manteca - Louise 60 kV Line	TESLA 115KV BUS (FAILURE OF NON-REDUNDENT RELAY)	P5-5	Non-Redundant Relay	NConv	NConv	NConv	34	90	NConv	34	NConv	NConv	Tesla 115 kV Bus Upgrade
Manteca - Louise 60 kV Line	KASSON 115KV BUS (FAILURE OF NON-REDUNDENT RELAY)	P5-5	Non-Redundant Relay	132	113	151	59	46	67	59	116	116	Install redundant relay
Manteca - Louise 60 kV Line	SCHULTE SW STA-LAMMERS 115KV [3993] & SCHULTE SW STA-KASSON-MANTECA 115KV [7472]	P6	N-1-1	362	<100	<100	158	<100	223	159	<100	<100	Project: Vierra Looping in Project. Short term: Action Plan
Manteca - Louise 60 kV Line	VIERRA-TESLA 115KV [0] & VIERRA-TRACY-KASSON 115KV [4310]	P6	N-1-1	<100	121	142	<100	<100	<100	<100	121	121	Tesla 115 kV Bus Upgrade
Manteca - Louise 60 kV Line	TESLA-SCHULTE SW STA #2 115KV [3970] & TESLA-SCHULTE SW STA #1 115KV [3982]	P7	DCTL	19	51	50	4	53	140	6	53	53	Sensitivity Only
Manteca - Louise 60 kV Line	SCHULTE SW STA-KASSON-MANTECA 115KV [7472] & TESLA-SALADO-MANTECA 115KV [40	P7	DCTL	85	120	137	7	74	29	13	125	125	System Upgrade/Preferred resources/operating solution as needed
Manteca 115/60 kV Transformer No. 3	KASSON 115KV BUS (FAILURE OF NON-REDUNDENT RELAY)	P5-5	Non-Redundant Relay	92	84	139	45	63	59	45	84	84	Continue to monitor future forecast
Manteca 60 kV Line No. 1	Base Case	Base	P0	<100	<100	<100	<100	<100	<100	<100	<100	166	Continue to monitor future forecast
Manteca 60 kV Line No. 1	Base Case	Base	P0	<100	<100	<100	<100	<100	<100	<100	<100	166	Continue to monitor future forecast
Manteca 60 kV Line No. 1	Base Case	Base	P0	<100	<100	<100	<100	<100	<100	<100	<100	166	Continue to monitor future forecast
Manteca 60 kV Line No. 1	Base Case	Base	P0	<100	<100	<100	<100	<100	<100	<100	<100	166	Continue to monitor future forecast

Study Area: PG&E Central Valley
Thermal Overloads

Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading % (Baseline Scenarios)					Loading % (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2024 Summer Peak	2027 Summer Peak	2032 Summer Peak	2024 Spring Off-Peak	2027 Spring Off-Peak	2024 SP Heavy Renewable & Min Gas Gen	2024 Spring OP Sensitivity	2027 SP High CEC Forecast	2035 ATE	
Manteca 60 kV Line No. 1	P1-2A11:46_ VIERRA-TESLA 115KV [0]	P1-2	N-1	<100	<100	<100	<100	<100	<100	<100	<100	146	Continue to monitor future forecast
Manteca 60 kV Line No. 1	P1-2A11:56_ LAMMERS-KASSON 115KV [3972]	P1-2	N-1	<100	<100	<100	<100	<100	<100	<100	<100	146	Continue to monitor future forecast
Manteca 60 kV Line No. 1	P1-2A11:59_ TESLA-TRACY 115KV [4020] MOAS OPENED ON LEPRINO_TRACY JC	P1-2	N-1	<100	<100	<100	<100	<100	<100	<100	<100	146	Continue to monitor future forecast
Manteca 60 kV Line No. 1	P1-2A11:65_ 115KV [1]	P1-2	N-1	<100	<100	<100	<100	<100	<100	<100	<100	148	Continue to monitor future forecast
Manteca 60 kV Line No. 1	P1-2A11:64_ SCHULTE SW STA-LAMMERS 115KV [3993]	P1-2	N-1	<100	<100	<100	<100	<100	<100	<100	<100	149	Continue to monitor future forecast
Manteca 60 kV Line No. 1	P2-2A11:29_ TESLA 115KV SECTION 1D	P2-2	Bus	<100	<100	<100	<100	<100	<100	<100	<100	149	Continue to monitor future forecast
Manteca 60 kV Line No. 1	P2-3A11:25_ TESLA - 2D 115KV & VIERRA-TESLA LINE	P2-3	Non-Bus-Tie Breaker	<100	<100	<100	<100	<100	<100	<100	<100	151	Continue to monitor future forecast
Manteca 60 kV Line No. 1	P2-3A11:32_ TESLA - 1D 115KV & TESLA-SALADO-Q1103 LINE	P2-3	Non-Bus-Tie Breaker	<100	<100	<100	<100	<100	<100	<100	<100	149	Continue to monitor future forecast
Manteca 60 kV Line No. 1	P2-3A11:36_ SCHULTE 115KV - MIDDLE BREAKER BAY 2	P2-3	Non-Bus-Tie Breaker	<100	<100	<100	<100	<100	<100	<100	<100	149	Continue to monitor future forecast
Manteca 60 kV Line No. 1	P2-4A11:1_ BELLOTA 230KV - SECTION 1E & 2E	P2-4	Bus-Tie-Breaker	<100	<100	<100	<100	<100	<100	<100	<100	166	Continue to monitor future forecast
Manteca 60 kV Line No. 1	P2-4A11:8_ TESLA D 230KV - SECTION 1D & 2D	P2-4	Bus-Tie-Breaker	<100	<100	<100	<100	<100	<100	<100	<100	152	Continue to monitor future forecast
Manteca 60 kV Line No. 1	KASSON 115KV BUS (FAILURE OF NON-REDUNDANT RELAY)	P5-5	Non-Redundant Relay	86	61	131	38	41	52	39	60	60	Continue to monitor future forecast
Manteca 60 kV Line No. 1	P5-5aA11:17_ KASSON 115KV BUS (FAILURE OF NON-REDUNDANT RELAY)	P5-5	Non-Redundant Relay	<100	<100	<100	<100	<100	<100	<100	<100	158	Continue to monitor future forecast
Manteca 60 kV Line No. 1	P5-5aA11:5_ TESLA 230KV BUS D (FAILURE OF NON-REDUNDANT RELAY)	P5-5	Non-Redundant Relay	<100	<100	<100	<100	<100	<100	<100	<100	152	Continue to monitor future forecast
Manteca 60 kV Line No. 1	SCHULTE SW STA-LAMMERS 115KV [3993] & SCHULTE SW STA-KASSON-MANTECA 115KV [7472]	P6	N-1-1	<100	<100	113	<100	<100	<100	<100	<100	<100	Continue to monitor future forecast
Manteca 60 kV Line No. 1	P7-1A11:26_ TESLA-STOCKTON COGEN JCT 115KV [4010] & KASSON-LOUISE 60KV [7250]	P7-1	DTCL	<100	<100	<100	<100	<100	<100	<100	<100	146	Continue to monitor future forecast
Manteca 60 kV Line No. 1	P7-1A11:30_ SCHULTE SW STA-KASSON-MANTECA 115KV [7472] & TESLA-SALADO-MANTECA 115KV [4000]	P7-1	DTCL	<100	<100	<100	<100	<100	<100	<100	<100	145	Continue to monitor future forecast
MANTECA-INGRM C. 115KV	SCHULTE SW STA-LAMMERS 115KV [3993] & SCHULTE SW STA-KASSON-MANTECA 115KV [7472]	P6	N-1-1	277	<100	<100	<100	<100	124	<100	<100	<100	Project: Vierra Looping in Project. Short term: Action Plan
Marysville - Plumas 60 kV	EMRYSVE-MRYSVILLE #1 60KV [0]	P1	N-1	N/A	N/A	130	N/A	N/A	N/A	N/A	N/A	N/A	Continue to monitor future forecast
Marysville - Plumas 60 kV	PEASE-MARYSVILLE-HARTER 60KV [7770]	P1	N-1	102	108	N/A	N/A	16	N/A	N/A	105	105	Project: East Marysville 115/60 kV
MEDLIN J-NWMN JCT 60 kV	SALADO-NEWMAN #2 60KV [7870] MOAS OPENED ON CRWS LDG_CRWS LDJ	P1	N-1	88	93	104	50	56	27	50	94	94	Continue to monitor future forecast
MEDLIN J-NWMN JCT 60 kV	P1-2A12:16_ SALADO-NEWMAN #2 60KV [7870] MOAS OPENED ON CRWS LDG_CRWS LDJ	P1-2	N-1	<100	<100	<100	<100	<100	<100	<100	<100	117	Continue to monitor future forecast
MEDLIN J-NWMN JCT 60 kV	COVANTASTLS 13.80KV GEN UNIT 1 & SALADO-NEWMAN #2 60KV [7870] MOAS OPENED ON CRWS LDG_CRWS LDJ	P3	N-G-1	<100	<100	104	<100	<100	<100	<100	<100	<100	Continue to monitor future forecast
MELNS JB-RIVRBJKT 115KV	GWFTRCY3 18.00KV & GWFTRCY1 13.80KV & GWFTRCY2 13.80KV GEN UNITS & MANTECA-MELONES 115KV [0] MOAS OPENED ON STANISLS_FRGNTNP1	P3	N-G-1	107	<100	<100	<100	<100	<100	<100	<100	<100	Project: Manteca-Ripon-Riverbank-Melones Area 115 kV Line Reconducting Project
MELNS JB-RIVRBJKT 115KV	MANTECA-MELONES 115KV [0] MOAS OPENED ON STANISLS_FRGNTNP1 & STANISLAUS-MANTECA #2 115KV [3820]	P6	N-1-1	<100	100	<100	<100	105	<100	<100	97	97	Genration Redispatch
MELONES-MELNS JA 115KV	BELLOTA 230V115KV TB 2 & BELLOTA 230V115KV TB 1	P6	N-1-1	<100	<100	101	<100	<100	<100	<100	<100	<100	SPS recommended in 2019-2020 TPP
Missouri Flat - Gold Hill 115 kV No. 2 Line	P2-1A5:12_ MISSOURI FLAT-GOLD HILL #1 115KV [2660] [GOLDHILL-CPM TAP]	P2-1	Line Section w/o Fault	<100	<100	<100	<100	<100	<100	<100	<100	103	Continue to monitor future forecast
Missouri Flat - Gold Hill 115 kV No. 2 Line	P2-1A5:50_ MISSOURI FLAT-GOLD HILL #1 115KV [2660] [SHPRING1-CLRKSVLT]	P2-1	Line Section w/o Fault	<100	<100	<100	<100	<100	<100	<100	<100	103	Continue to monitor future forecast
Missouri Flat - Gold Hill 115 kV No. 2 Line	P2-2A5:8_ GOLDHILL 115KV SECTION 2F	P2-2	Bus	<100	<100	<100	<100	<100	<100	<100	<100	102	Continue to monitor future forecast
Missouri Flat - Gold Hill 115 kV No. 2 Line	P2-4A5:3_ GOLDHILL 115KV - SECTION 1F & 2F	P2-4	Bus-Tie-Breaker	<100	<100	<100	<100	<100	<100	<100	<100	103	Continue to monitor future forecast
MI-WUK-FBERBORD 115 kV	BELLOTA 230KV - SECTION 1E & 2E	P2-4	Bus Tie Breaker Fault	62	64	108	92	91	91	92	80	80	SPS recommended in 2019-2020 TPP
MI-WUK-FBERBORD 115 kV	BELLOTA 230V115KV TB 1 & BELLOTA 230V115KV TB 2	P6	N-1-1	<100	<100	104	<100	<100	<100	<100	<100	<100	SPS recommended in 2019-2020 TPP
MRYSVILLE-PLUMAS 60 kV Line No 1	P1-2A5:156_ EMRYSVE-MRYSVILLE #1 60KV [0]	P1-2	N-1	<100	<100	<100	<100	<100	<100	<100	<100	143	Continue to monitor future forecast
MRYSVILLE-PLUMS 60kv	GWFTRCY3 18.00KV & GWFTRCY1 13.80KV & GWFTRCY2 13.80KV GEN UNITS & E.MRYSVE-MRYSVILLE #1 60KV [0]	P3	N-G-1	<100	<100	131	<100	<100	<100	<100	<100	<100	Continue to monitor future forecast
MRYSVILLE-PLUMS 60kv	GRNLEAF2 13.80KV GEN UNIT 1 & PEASE-MARYSVILLE-HARTER 60KV [7770]	P3	N-G-1	102	108	<100	<100	<100	<100	<100	105	105	Project: East Marysville 115/60 kV
Nicolaus - Catlett 60 kV Line	Base Case	Base	P0	<100	<100	<100	<100	<100	<100	<100	<100	142	Continue to monitor future forecast
Nicolaus - Catlett 60 kV Line	Base Case	Base	P0	<100	<100	<100	<100	<100	<100	<100	<100	142	Continue to monitor future forecast
Nicolaus - Catlett 60 kV Line	Base Case	Base	P0	<100	<100	<100	<100	<100	<100	<100	<100	142	Continue to monitor future forecast
Nicolaus - Catlett 60 kV Line	Base Case	Base	P0	<100	<100	<100	<100	<100	<100	<100	<100	142	Continue to monitor future forecast
Nicolaus - Catlett 60 kV Line	P1-2A5:27_ RIO OSO-NICOLAUS 115KV [3440]	P1-2	N-1	<100	<100	<100	<100	<100	<100	<100	<100	131	Continue to monitor future forecast
Nicolaus - Catlett 60 kV Line	P2-3A5:22_ RIO OSO 115KV - MIDDLE BREAKER BAY 6	P2-3	Non-Bus-Tie Breaker	<100	<100	<100	<100	<100	<100	<100	<100	131	Continue to monitor future forecast
Nicolaus - Catlett 60 kV Line	P2-3A5:5_ RIO OSO 230KV - MIDDLE BREAKER BAY 1	P2-3	Non-Bus-Tie Breaker	<100	<100	<100	<100	<100	<100	<100	<100	125	Continue to monitor future forecast
Nicolaus - Catlett 60 kV Line	P2-3A5:87_ E-NICOLS 115KV - RING R1 & R2	P2-3	Non-Bus-Tie Breaker	<100	<100	<100	<100	<100	<100	<100	<100	132	Continue to monitor future forecast
Nicolaus - Catlett 60 kV Line	P2-4A11:1_ BELLOTA 230KV - SECTION 1E & 2E	P2-4	Bus-Tie-Breaker	<100	<100	<100	<100	<100	<100	<100	<100	128	Continue to monitor future forecast
Nicolaus - Catlett 60 kV Line	P2-4A11:7_ TESLA E 230KV - SECTION 2E & 1E	P2-4	Bus-Tie-Breaker	<100	<100	<100	<100	<100	<100	<100	<100	125	Continue to monitor future forecast
Nicolaus - Catlett 60 kV Line	P5-5aA11:6_ TESLA 230KV BUS E (FAILURE OF NON-REDUNDANT RELAY)	P5-5	Non-Redundant Relay	<100	<100	<100	<100	<100	<100	<100	<100	125	Continue to monitor future forecast
Nicolaus - Catlett 60 kV Line	P5-5aA5:2_ RIO OSO 230 KV BUS (FAILURE OF NON-REDUNDANT RELAY)	P5-5	Non-Redundant Relay	<100	<100	<100	<100	<100	<100	<100	<100	126	Continue to monitor future forecast
Nicolaus - Catlett 60 kV Line	P5-5aA5:5_ RIO OSO 115 KV BUS (FAILURE OF NON-REDUNDANT RELAY)	P5-5	Non-Redundant Relay	<100	<100	<100	<100	<100	<100	<100	<100	130	Continue to monitor future forecast
Nicolaus - Catlett 60 kV Line	P5-5d(DC)A4:12_ Station	P5-5	Non-Redundant Relay	<100	<100	<100	<100	<100	<100	<100	<100	121	Continue to monitor future forecast
Nicolaus - Catlett 60 kV Line	P5-5dA5:1_ No BF Relay Rio Oso 115KV CB 402 412 422 432 442 462 or 472	P5-5	Non-Redundant Relay	<100	<100	<100	<100	<100	<100	<100	<100	130	Continue to monitor future forecast
Nicolaus - Catlett 60 kV Line	P7-1A11:37_ LOCKEFORD-BELLOTA 230KV #1 [4990] & LOCKEFORD-BELLOTA 230KV #2 [4990]	P7-1	DTCL	<100	<100	<100	<100	<100	<100	<100	<100	127	Continue to monitor future forecast
Nicolaus - Catlett 60 kV Line	P7-1A4:16_ Rio Oso-Woodland #1 115 KV Line & Rio Oso-Woodland #2 115 KV Line	P7-1	DTCL	<100	<100	<100	<100	<100	<100	<100	<100	121	Continue to monitor future forecast
Nicolaus - Catlett 60 kV Line	P7-1A5:12_ Rio Oso-Nicolaus 115 KV Line & Bogue-Rio Oso 115 KV Line	P7-1	DTCL	<100	<100	<100	<100	<100	<100	<100	<100	132	Continue to monitor future forecast
Nicolaus - Catlett 60 kV Line	P7-1A5:15_ Rio Oso-Woodland No. 1 115 KV Line & Rio Oso-Woodland No. 2 115 KV Line	P7-1	DTCL	<100	<100	<100	<100	<100	<100	<100	<100	121	Continue to monitor future forecast
Nicolaus - Catlett 60 kV Line	P7-1A5:4_ Poe-Rio Oso 230 KV Line & Cresta-Rio Oso 230 KV Line	P7-1	DTCL	<100	<100	<100	<100	<100	<100	<100	<100	125	Continue to monitor future forecast
Nicolaus - Marysville 60 kV Line (Plumas-East Nicolaus)	PEASE-MARYSVILLE-HARTER 60KV [7770]	P1	N-1	153	163	202	107	27	75	107	157	157	Project: East Marysville 115/60 kV
Nicolaus - Marysville 60 kV Line (Plumas-East Nicolaus)	P1-2A5:156_ EMRYSVE-MRYSVILLE #1 60KV [0]	P1-2	N-1	<100	<100	<100	<100	<100	<100	<100	<100	220	Continue to monitor future forecast
Nicolaus - Marysville 60 kV Line (Plumas-East Nicolaus)	GWFTRCY3 18.00KV & GWFTRCY1 13.80KV & GWFTRCY2 13.80KV GEN UNITS & E.MRYSVE-MRYSVILLE #1 60KV [0]	P3	N-G-1	<100	<100	204	<100	<100	<100	<100	<100	<100	Continue to monitor future forecast
Nicolaus - Marysville 60 kV Line (Plumas-East Nicolaus)	GRNLEAF2 13.80KV GEN UNIT 1 & PEASE-MARYSVILLE-HARTER 60KV [7770]	P3	N-G-1	154	163	<100	107	<100	<100	107	157	157	Project: East Marysville 115/60 kV
Nicolaus - Marysville 60 kV Line (Plumas-East Nicolaus)	PALERMO-NICOLAUS 115KV [3210] MOAS OPENED ON PALERMO_EMRY J2 & RIO OSO-NICOLAUS 115KV [3440]	P6	N-1-1	<100	<100	106	<100	<100	<100	<100	<100	<100	Continue to monitor future forecast
Palermo-Nicolaus 115 kV Line	P5-5aA5:2_ RIO OSO 230 KV BUS (FAILURE OF NON-REDUNDANT RELAY)	P5-5	Non-Redundant Relay	<100	<100	<100	<100	<100	<100	<100	<100	101	Continue to monitor future forecast

Study Area: **PG&E Central Valley**
Thermal Overloads

Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading % (Baseline Scenarios)					Loading % (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2024 Summer Peak	2027 Summer Peak	2032 Summer Peak	2024 Spring Off-Peak	2027 Spring Off-Peak	2024 SP Heavy Renewable & Min Gas Gen	2024 Spring OP Sensitivity	2027 SP High CEC Forecast	2035 ATE	
PATTERN-CRWS LDJ 60 kV	CROW CREEK SW STA-FRONTIER SOLAR PV 60KV [7859]	P1	N-1	87	94	106	51	57	27	52	95	95	Continue to monitor future forecast
PATTERN-CRWS LDJ 60 kV	P1-2:A12:19_ CROW CREEK SW STA-FRONTIER SOLAR PV 60KV [7859]	P1-2	N-1	<100	<100	<100	<100	<100	<100	<100	<100	126	Continue to monitor future forecast
PATTERN-CRWS LDJ 60 kV	P1-2:A12:17_ SALADO-CROW CREEK SW STA 60KV [7858]	P1-2	N-1	<100	<100	<100	<100	<100	<100	<100	<100	112	Continue to monitor future forecast
PATTERN-CRWS LDJ 60 kV	P1-1:A11:31_ GWFTRCY3 18.00KV & GWFTRCY1 13.80KV & GWFTRCY2 13.80KV GEN UNITS & CROW CREEK SW STA-FRONTIER SOLAR PV 60KV [7859]	P3	N-G-1	<100	<100	109	<100	<100	<100	<100	<100	<100	Continue to monitor future forecast
PATTERNS-CRWS LDJ 60 kV Line No 1	P1-1:A12:4_ Q1103SPV 34.50KV GEN UNIT 1 & P1-2:A12:17_ SALADO-CROW CREEK SW STA 60KV [7858]	P1-1	N-1	<100	<100	<100	<100	<100	<100	<100	<100	113	Continue to monitor future forecast
Pease - Marysville - Harter 60 kV Line	PALERMO-NICOLAUS 115KV [3210] MOAS OPENED ON PALERMO_E.MRY J2 & RIO OSO-NICOLAUS 115KV [340]	P6	N-1-1	<100	<100	213	<100	<100	<100	<100	<100	<100	Continue to monitor future forecast
PEASETP-E.MRY SVE 60 kV Line No 1	P1-2:A5:16_ PALERMO-NICOLAUS 115KV [3210] MOAS OPENED ON PALERMO_E.MRY J2	P1-2	N-1	<100	<100	<100	<100	<100	<100	<100	<100	106	Continue to monitor future forecast
PEASETP-E.MRY SVE 60 kV Line No 1	P2-1:A5:7_ PALERMO-NICOLAUS 115KV [3210] (PALERMO-E.MRY J2)	P2-1	Line Section w/o Fault	<100	<100	<100	<100	<100	<100	<100	<100	106	Continue to monitor future forecast
PEASETP-E.MRY SVE 60 kV Line No 1	P5-5a:A5:4_ PEASE 115 KV BUS (FAILURE OF NON-REDUNDANT RELAY)	P5-5	Non-Redundant Relay	<100	<100	<100	<100	<100	<100	<100	<100	105	Continue to monitor future forecast
Placer - Bell 115 kV Line	GOLDHILL 230KV - SECTION 2D & 1D	P2-4	Bus Tie Breaker Fault	84	84	<100	160	94	83	160	NConv	NConv	Project: Gold Hill 230/115 kV Transformer Additoin Project. Short term: Action Plan
Placer - Bell 115 kV Line	GOLD HILL 230 KV BUS (FAILURE OF NON-REDUNDENT RELAY)	P5-5	Non-Redundant Relay	NConv	NConv	<100	160	94	83	160	NConv	NConv	Project: Gold Hill 230/115 kV Transformer Additoin Project. Short term: Action Plan
Placer - Bell 115 kV Line	P5-5a:A5:6_ GOLD HILL 115 KV BUS (FAILURE OF NON-REDUNDENT RELAY)	P5-5	Non-Redundant Relay	<100	<100	<100	<100	<100	<100	<100	<100	134	Continue to monitor future forecast
Placer - Bell 115 kV Line	P5-5d:A5:2_ No BF Relay Gold Hill 115KV CB 172 or 392	P5-5	Non-Redundant Relay	<100	<100	<100	<100	<100	<100	<100	<100	134	Continue to monitor future forecast
Placer - Bell 115 kV Line	P7-1:A5:19_ Placer-Gold Hill No. 1 115 KV Line and Placer-Gold Hill No. 2 115 KV Line	P7-1	DTCL	<100	<100	<100	<100	<100	<100	<100	<100	132	Continue to monitor future forecast
Placer 115/60 kV Transformer No. 1	Base Case	Base	P0	<100	<100	<100	<100	<100	<100	<100	<100	113	Continue to monitor future forecast
Placer 115/60 kV Transformer No. 1	Base Case	Base	P0	<100	<100	<100	<100	<100	<100	<100	<100	113	Continue to monitor future forecast
Placer 115/60 kV Transformer No. 1	Base Case	Base	P0	<100	<100	<100	<100	<100	<100	<100	<100	113	Continue to monitor future forecast
Placer 115/60 kV Transformer No. 1	Base Case	Base	P0	<100	<100	<100	<100	<100	<100	<100	<100	113	Continue to monitor future forecast
Placer 115/60 kV Transformer No. 1	P1-3:A5:34_ HALSEY 606.6KV TB 1	P1-3	N-1	<100	<100	<100	<100	<100	<100	<100	<100	114	Continue to monitor future forecast
Placer 115/60 kV Transformer No. 1 & 2	HALSEY 606.6KV TB 1	P1	N-1	81	84	101	42	15	37	42	81	81	Continue to monitor future forecast
Placer 115/60 kV Transformer No. 1 & 2	WISE 12.00KV GEN UNIT 1 & HALSEY 606.6KV TB 1	P3	N-G-1	<100	<100	101	<100	<100	<100	<100	<100	<100	Continue to monitor future forecast
PLACER-BELL PGE 115 kV Line No 1	P1-2:A5:17_ PLACER-GOLD HILL #1 115KV [3340] & P1-2:A5:18_ PLACER-GOLD HILL #2 115KV [4290]	P1-2	N-1	<100	<100	<100	<100	<100	<100	<100	<100	132	Continue to monitor future forecast
Q539SS-MEDLIN J 60 kV	SALADO-NEWMAN #2 60KV [7870] MOAS OPENED ON CRWS LDG_CRWS LDJ	P1	N-1	104	111	123	59	66	32	60	111	111	Existing operating procedure
Q539SS-MEDLIN J 60 kV	P1-2:A12:16_ SALADO-NEWMAN #2 60KV [7870] MOAS OPENED ON CRWS LDG_CRWS LDJ	P1-2	N-1	<100	<100	<100	<100	<100	<100	<100	<100	138	Continue to monitor future forecast
Q539SS-MEDLIN J 60 kV	COVANTASTLS 13.80KV GEN UNIT 1 & SALADO-NEWMAN #2 60KV [7870] MOAS OPENED ON CRWS LDG_CRWS LDJ	P3	N-G-1	104	112	123	<100	<100	<100	<100	112	112	Existing operating procedure
Q653FJCT-DAVIS 115 kV Line No 1	P1-2:A4:9_ RIO OSO-BRIGHTON 230KV [5600] & P1-2:A4:1_ BRIGHTON-LOCKFORD 230KV [0]	P1-2	N-1	<100	<100	<100	<100	<100	<100	<100	<100	123	Continue to monitor future forecast
Q653FJCT-DAVIS 115 kV Line No 1	P5-5a:A4:7_ BRIGHTON 230KV BUS (FAILURE OF NON-REDUNDENT RELAY)	P5-5	Non-Redundant Relay	<100	<100	<100	<100	<100	<100	<100	<100	124	Continue to monitor future forecast
Q653FJCT-DAVIS 115 kV Line No 1	P5-5c(DC):A4:2_ Station	P5-5	Non-Redundant Relay	<100	<100	<100	<100	<100	<100	<100	<100	124	Continue to monitor future forecast
Q653FJCT-DAVIS 115 kV Line No 1	P7-1:A4:17_ Rio Oso-West Sacramento 115 kV Line & West Sacramento-Brighton 115 kV Line	P7-1	DTCL	<100	<100	<100	<100	<100	<100	<100	<100	100	Continue to monitor future forecast
RBRCKLINJCT-PLSNT GR 115kV	ATLANTIC-GOLD HILL 230KV [4330] & RIO OSO-ATLANTIC 230KV [5590]	P6	N-1-1	<100	116	152	<100	<100	<100	<100	111	111	System Upgrade/Preferred resources/operating solution as needed
Rio Oso - Brighton 230 kV Line	P5-5d:A5:1_ No BF Relay Rio Oso 115KV CB 402 412 422 432 442 462 or 472	P5-5	Non-Redundant Relay	<100	<100	<100	<100	<100	<100	<100	<100	102	Continue to monitor future forecast
Rio Oso - West Sacramento 115 kV Line	P2-2:A4:18_ BRIGHTN 115KV SECTION ME	P2-2	Bus	<100	<100	<100	<100	<100	<100	<100	<100	116	Continue to monitor future forecast
Rio Oso - West Sacramento 115 kV Line	P2-3:A4:23_ BRIGHTN - ME 115KV & BRIGHTON-GRAND ISLAND #1 LINE	P2-3	Non-Bus Tie Breaker	<100	<100	<100	<100	<100	<100	<100	<100	116	Continue to monitor future forecast
Rio Oso - West Sacramento 115 kV Line	P2-3:A4:24_ BRIGHTN - ME 115KV & BRIGHTON-GRAND ISLAND #2 LINE	P2-3	Non-Bus Tie Breaker	<100	<100	<100	<100	<100	<100	<100	<100	116	Continue to monitor future forecast
Rio Oso - West Sacramento 115 kV Line	P2-3:A4:25_ BRIGHTN - ME 115KV & BRIGHTON-DAVIS LINE	P2-3	Non-Bus Tie Breaker	<100	<100	<100	<100	<100	<100	<100	<100	116	Continue to monitor future forecast
Rio Oso - West Sacramento 115 kV Line	P2-4:A4:10_ BRIGHTN 115KV - SECTION ME & MD	P2-4	Bus Tie Breaker	<100	<100	<100	<100	<100	<100	<100	<100	116	Continue to monitor future forecast
Rio Oso - West Sacramento 115 kV Line	BRIGHTON 230KV BUS (FAILURE OF NON-REDUNDENT RELAY)	P5-5	Non-Redundant Relay	94	90	110	74	11	54	74	85	85	Continue to monitor future forecast
Rio Oso - West Sacramento 115 kV Line	P5-5c(DC):A4:2_ Station	P5-5	Non-Redundant Relay	94	90	110	74	11	54	74	85	85	Continue to monitor future forecast
Rio Oso - West Sacramento 115 kV Line	P5-5a:A4:7_ BRIGHTON 230KV BUS (FAILURE OF NON-REDUNDENT RELAY)	P5-5	Non-Redundant Relay	<100	<100	<100	<100	<100	<100	<100	<100	146	Continue to monitor future forecast
Rio Oso - West Sacramento 115 kV Line	P5-5c(DC):A4:16_ Station	P5-5	Non-Redundant Relay	<100	<100	<100	<100	<100	<100	<100	<100	116	Continue to monitor future forecast
Rio Oso - West Sacramento 115 kV Line	P5-5c(DC):A4:2_ Station	P5-5	Non-Redundant Relay	<100	<100	<100	<100	<100	<100	<100	<100	146	Continue to monitor future forecast
Rio Oso - West Sacramento 115 kV Line	RIO OSO-BRIGHTON 230KV [5600] & WOODLAND-DAVIS 115KV [4210]	P6	N-1-1	100	89	109	<100	<100	<100	99	96	96	Continue to monitor future forecast
Rio Oso - West Sacramento 115 kV Line	RIO OSO-BRIGHTON 230KV [5600] & RIO OSO-WOODLAND #2 115KV [3470]	P6	N-1-1	<100	<100	101	<100	<100	<100	<100	<100	<100	Continue to monitor future forecast
Rio Oso - Woodland 115 kV No. 1	P5-5a:A4:7_ BRIGHTON 230KV BUS (FAILURE OF NON-REDUNDENT RELAY)	P5-5	Non-Redundant Relay	<100	<100	<100	<100	<100	<100	<100	<100	102	Continue to monitor future forecast
Rio Oso - Woodland 115 kV No. 1	P5-5c(DC):A4:2_ Station	P5-5	Non-Redundant Relay	<100	<100	<100	<100	<100	<100	<100	<100	102	Continue to monitor future forecast
Rio Oso - Woodland 115 kV No. 1	P5-5a:A4:7_ BRIGHTON 230KV BUS (FAILURE OF NON-REDUNDENT RELAY)	P5-5	Non-Redundant Relay	<100	<100	<100	<100	<100	<100	<100	<100	108	Continue to monitor future forecast
Rio Oso - Woodland 115 kV No. 1	P5-5c(DC):A4:2_ Station	P5-5	Non-Redundant Relay	<100	<100	<100	<100	<100	<100	<100	<100	108	Continue to monitor future forecast
Rio Oso - Woodland 115 kV No. 2	P5-5a:A4:7_ BRIGHTON 230KV BUS (FAILURE OF NON-REDUNDENT RELAY)	P5-5	Non-Redundant Relay	<100	<100	<100	<100	<100	<100	<100	<100	112	Continue to monitor future forecast
Rio Oso - Woodland 115 kV No. 2	P5-5c(DC):A4:2_ Station	P5-5	Non-Redundant Relay	<100	<100	<100	<100	<100	<100	<100	<100	112	Continue to monitor future forecast
Rio Oso - Woodland 115 kV No. 2	P5-5a:A4:7_ BRIGHTON 230KV BUS (FAILURE OF NON-REDUNDENT RELAY)	P5-5	Non-Redundant Relay	<100	<100	<100	<100	<100	<100	<100	<100	112	Continue to monitor future forecast
Rio Oso - Woodland 115 kV No. 2	P5-5c(DC):A4:2_ Station	P5-5	Non-Redundant Relay	<100	<100	<100	<100	<100	<100	<100	<100	112	Continue to monitor future forecast
RIO OSO-KNIGHT1 115 kV Line No 1	P1-2:A11:6_ LOCKFORD-BRIGHTON 230KV [0] & P1-2:A4:9_ RIO OSO-BRIGHTON 230KV [5600]	P1-2	N-1	<100	<100	<100	<100	<100	<100	<100	<100	105	Continue to monitor future forecast
RIO OSO-KNIGHT2 115 kV Line No 2	P1-2:A11:6_ LOCKFORD-BRIGHTON 230KV [0] & P1-2:A4:9_ RIO OSO-BRIGHTON 230KV [5600]	P1-2	N-1	<100	<100	<100	<100	<100	<100	<100	<100	109	Continue to monitor future forecast
RIO OSO-SPI_JCT 115 kV	ATLANTIC-GOLD HILL 230KV [4330] & RIO OSO-ATLANTIC 230KV [5590]	P6	N-1-1	116	124	105	<100	<100	<100	<100	118	118	System Upgrade/Preferred resources/operating solution as needed
RIO OSO-W.SCRMNO 115 kV Line No 1	P1-2:A4:42_ BRIGHTON-DAVIS 115KV [1140] MOAS OPENED ON BRKJCT_UCD_TP2 & P1-2:A4:32_ BRIGHTN-W.SCRMNO 115KV [0]	P1-2	N-1	<100	<100	<100	<100	<100	<100	<100	<100	116	Continue to monitor future forecast
RIO OSO-W.SCRMNO 115KV	RIO OSO-BRIGHTON 230KV [5600] & WOODLAND-DAVIS 115KV [4210]	P6	N-1-1	92	88	108	<100	<100	91	99	94	94	Continue to monitor future forecast
RIPONCOGENJT-VIERRAJCT1 115 kV	SCHULTE SW STA-KASSON-MANTECA 115KV [7472] & SCHULTE SW STA-LAMMERS 115KV [3993]	P6	N-1-1	<100	<100	101	<100	<100	<100	<100	<100	<100	Continue to monitor future forecast
Riverbank Jct - Manteca 115 kV Line	TESLA 115KV - SECTION 2D & 1D	P2-4	Bus Tie Breaker Fault	113	122	55	44	128	NConv	43	NConv	NConv	Tesla 115 kV Bus Upgrade
Riverbank Jct - Manteca 115 kV Line	GWFTRCY3 18.00KV & GWFTRCY1 13.80KV & GWFTRCY2 13.80KV GEN UNITS & MANTECA-MELONES 115KV [0] MOAS OPENED ON STANISLS_FRGNTNTP1	P3	N-G-1	102	<100	<100	<100	<100	<100	<100	<100	<100	Project: Manteca-Ripon-Riverbank-Melones Area 115 kV Line Reconducting Project
Riverbank Jct - Manteca 115 kV Line	P5-5a:A11:14_ TESLA 115KV BUS (FAILURE OF NON-REDUNDENT RELAY)	P5-5	Non-Redundant Relay	NConv	NConv	NConv	15	93	NConv	15	NConv	NConv	Tesla 115 kV Bus Upgrade

Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading % (Baseline Scenarios)					Loading % (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2024 Summer Peak	2027 Summer Peak	2032 Summer Peak	2024 Spring Off-Peak	2027 Spring Off-Peak	2024 SP Heavy Renewable & Min Gas Gen	2024 Spring OP Sensitivity	2027 SP High CEC Forecast	2035 ATE	
Riverbank Jct - Manteca 115 kV Line	KASSON 115KV BUS (FAILURE OF NON-REDUNDENT RELAY)	P5-5	Non-Redundant Relay	132	65	43	79	57	75	77	63	63	Project: Manteca-Ripon-Riverbank-Melones Area 115 kV Line Reconductoring Project
Riverbank Jct - Manteca 115 kV Line	SCHULTE SW STA-LAMMERS 115KV [3993] & SCHULTE SW STA-KASSON-MANTECA 115KV [7472]	P6	N-1-1	163	<100	<100	91	<100	100	90	<100	<100	Project: Manteca-Ripon-Riverbank-Melones Area 115 kV Line Reconductoring Project
Riverbank Jct - Manteca 115 kV Line	MANTECA-MELONES 115KV [0] MOAS OPENED ON STANISLS_FRGNTNP1 & STANISLAUS-MANTECA #2 115KV [3820]	P6	N-1-1	108	<100	<100	113	105	108	101	<100	<100	Project: Manteca-Ripon-Riverbank-Melones Area 115 kV Line Reconductoring Project
RPN_JNCN-RPNJ2 115 kV Line	BELLOTA 230KV - SECTION 1E & 2E	P2-4	Bus Tie Breaker Fault	131	NConv	NConv	23	64	45	24	48	48	SPS recommended in 2019-2020 TPP
RPN_JNCN-RPNJ2 115 kV Line	TESLA 115KV - SECTION 2D & 1D	P2-4	Bus Tie Breaker Fault	126	NConv	NConv	36	143	NConv	37	NConv	NConv	Tesla 115 kV Bus Upgrade
RPN_JNCN-RPNJ2 115 kV Line	TESLA 115KV BUS (FAILURE OF NON-REDUNDENT RELAY)	P5-5	Non-Redundant Relay	NConv	NConv	NConv	16	108	NConv	17	NConv	NConv	Tesla 115 kV Bus Upgrade
RPN_JNCN-RPNJ2 115 kV Line	KASSON 115KV BUS (FAILURE OF NON-REDUNDENT RELAY)	P5-5	Non-Redundant Relay	114	49	75	70	61	77	69	47	47	Project: Manteca-Ripon-Riverbank-Melones Area 115 kV Line Reconductoring Project
RPN_JNCN-RPNJ2 115 kV Line	SCHULTE SW STA-KASSON-MANTECA 115KV [7472] & SCHULTE SW STA-LAMMERS 115KV [3993]	P6	N-1-1	147	<100	<100	<100	<100	101	<100	<100	<100	Project: Manteca-Ripon-Riverbank-Melones Area 115 kV Line Reconductoring Project
RPN_JNCN-RPNJ2 115 kV Line	MANTECA-MELONES 115KV [0] MOAS OPENED ON STANISLS_FRGNTNP1 & STANISLAUS-MANTECA #2 115KV [3820]	P6	N-1-1	<100	<100	<100	104	95	113	92	<100	<100	Project: Manteca-Ripon-Riverbank-Melones Area 115 kV Line Reconductoring Project
RPN_JNCN-RPNJ2 115 kV Line	TESLA-SCHULTE SW STA #2 115KV [3970] & TESLA-SCHULTE SW STA #1 115KV [3982]	P7	DCTL	48	38	43	44	42	100	42	36	36	Sensitivity Only
RPNJ2-MANTECA 115 kv	BELLOTA 230KV - SECTION 1E & 2E	P2-4	Bus Tie Breaker Fault	77	NConv	NConv	16	67	39	15	113	113	SPS recommended in 2019-2020 TPP
RPNJ2-MANTECA 115 kv	TESLA 115KV - SECTION 2D & 1D	P2-4	Bus Tie Breaker Fault	31	41	100	7	142	NConv	8	NConv	NConv	Tesla 115 kV Bus Upgrade
RPNJ2-MANTECA 115 kv	TESLA 115KV BUS (FAILURE OF NON-REDUNDENT RELAY)	P5-5	Non-Redundant Relay	NConv	NConv	NConv	34	107	NConv	34	NConv	NConv	Tesla 115 kV Bus Upgrade
RPNJ2-MANTECA 115 kv	BELLOTA 230/115KV TB 1 & BELLOTA 230/115KV TB 2	P6	N-1-1	<100	107	<100	<100	<100	<100	<100	113	113	SPS recommended in 2019-2020 TPP
RVRBK TP-TULLOCH 115KV	BELLOTA 230/115KV TB 2 & BELLOTA 230/115KV TB 1	P6	N-1-1	<100	145	190	<100	<100	<100	<100	147	147	SPS recommended in 2019-2020 TPP
SALADO-PATTERSN 60 kV Line No 1	P1-1:A11:31- GWFTRCY3 18.00KV & GWFTRCY1 13.80KV & GWFTRCY2 13.80KV GEN UNITS & P1-2A12:19-_CROW CREEK SW STA-FRONTIER SOLAR PV 60KV [7859]	P1-1	N-1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	109	Continue to monitor future forecast
SALADO-PATTERSN 60 kV Line No 1	P1-2A12:19-_CROW CREEK SW STA-FRONTIER SOLAR PV 60KV [7859]	P1-2	N-1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	108	Continue to monitor future forecast
SALADO-STNLSRSP 60KV	Base Case	P0	N-0	95	107	68	26	101	93	24	32	32	Existing operating procedure
SALADO-STNLSRSP 60KV	SALADO-NEWMAN #2 60KV [7870] MOAS OPENED ON CRWS LDG_CRWS LDJ	P1	N-1	66	64	64	32	104	85	31	65	65	Existing operating procedure
SALADO-STNLSRSP 60KV	SALADO-NEWMAN #2 60KV [7870] MOAS OPENED ON CRWS LDG_CRWS LDJ & COVANTASTLS 13.80KV GEN UNIT 1	P3	N-G-1	<100	<100	107	107	<100	<100	<100	100	100	Existing operating procedure
SALADO-STNLSRSP 60KV	COVANTASTLS 13.80KV GEN UNIT 1 & SALADO-NEWMAN #2 60KV [7870] MOAS OPENED ON CRWS LDG_CRWS LDJ	P3	N-G-1	<100	<100	107	<100	<100	<100	<100	100	100	Existing operating procedure
Schulte - Kasson - Manteca 115 kV Line	SCHULTE SW STA-LAMMERS 115KV [3993]	P1	N-1	112	N/A	N/A	54	N/A	51	55	N/A	N/A	Project: Vierra Looping in Project. Short term: Action Plan
Schulte - Kasson - Manteca 115 kV Line	P1-2A11:64- SCHULTE SW STA-LAMMERS 115KV [3993]	P1-2	N-1	<100	<100	<100	<100	<100	<100	<100	<100	111	Continue to monitor future forecast
Schulte - Kasson - Manteca 115 kV Line	SCHULTE 115KV - Middle Breaker Bay 2	P2-3	Non-Bus Tie Breaker Fault	101	N/A	N/A	61	N/A	47	62	N/A	N/A	Project: Vierra Looping in Project. Short term: Action Plan
Schulte - Kasson - Manteca 115 kV Line	P2-3A11:36- SCHULTE 115KV - MIDDLE BREAKER BAY 2	P2-3	Non-Bus Tie Breaker	<100	<100	<100	<100	<100	<100	<100	<100	110	Continue to monitor future forecast
Schulte - Kasson - Manteca 115 kV Line	STANISLS 13.80KV GEN UNIT 1 & SCHULTE SW STA-LAMMERS 115KV [3993]	P3	N-G-1	103	<100	<100	<100	<100	<100	<100	<100	<100	Project: Vierra Looping in Project. Short term: Action Plan
Schulte - Kasson - Manteca 115 kV Line	SCHULTE SW STA-LAMMERS 115KV [3993] & TESLA-TRACY 115KV [4020] MOAS OPENED ON LEPRINO_TRACY JC	P6	N-1-1	148	115	129	<100	<100	<100	<100	116	116	System Upgrade/Preferred resources/operating solution as needed
Schulte - Kasson - Manteca 115 kV Line	VIERRA-TESLA 115KV [0] & SCHULTE SW STA-LAMMERS 115KV [3993]	P6	N-1-1	<100	120	138	<100	<100	<100	<100	122	122	Tesla 115 kV Bus Upgrade
SCHULTE-OWENSTP 2 115kv	STANISLS 13.80KV GEN UNIT 1 & P1-2A11:58-_SCHULTE SW STA-LAMMERS 115KV [3993]	P3	N-G-1	121	<100	<100	<100	<100	<100	<100	<100	<100	Project: Vierra Looping in Project. Short term: Action Plan
Spring Gap-MI-WUK 115 kV Line	BELLOTA 230KV - SECTION 1E & 2E	P2-4	Bus Tie Breaker Fault	N/A	89	105	96	97	85	96	86	86	SPS recommended in 2019-2020 TPP
Spring Gap-MI-WUK 115 kV Line	SCHULTE SW STA-LAMMERS 115KV [3993] & SCHULTE SW STA-KASSON-MANTECA 115KV [7472]	P6	N-1-1	104	<100	<100	<100	<100	<100	<100	<100	<100	Project: Vierra Looping in Project. Short term: Action Plan
Spring Gap-MI-WUK 115 kV Line	BELLOTA 230/115KV TB 2 & BELLOTA 230/115KV TB 1	P6	N-1-1	<100	<100	117	<100	<100	<100	<100	<100	<100	SPS recommended in 2019-2020 TPP
SPRNG GJ-MI-WUK 115KV	BELLOTA 230/115KV TB 2 & BELLOTA 230/115KV TB 1	P6	N-1-1	<100	90	114	<100	<100	<100	<100	<100	<100	SPS recommended in 2019-2020 TPP
Stanislaus - Manteca 115 kV Line No. 2	TESLA 115KV - SECTION 2D & 1D	P2-4	Bus Tie Breaker Fault	90	90	117	34	59	NConv	34	NConv	NConv	Tesla 115 kV Bus Upgrade
Stanislaus - Manteca 115 kV Line No. 2	BELLOTA 230KV - SECTION 1E & 2E	P2-4	Bus Tie Breaker Fault	142	NConv	NConv	9	43	25	11	76	76	SPS recommended in 2019-2020 TPP
Stanislaus - Manteca 115 kV Line No. 2	TESLA 115KV - SECTION 2D & 1D	P2-4	Bus Tie Breaker Fault	87	NConv	NConv	16	216	NConv	16	NConv	NConv	Tesla 115 kV Bus Upgrade
Stanislaus - Manteca 115 kV Line No. 2	TESLA 115KV BUS (FAILURE OF NON-REDUNDENT RELAY)	P5-5	Non-Redundant Relay	NConv	NConv	NConv	23	167	NConv	23	NConv	NConv	Tesla 115 kV Bus Upgrade
Stanislaus - Manteca 115 kV Line No. 2	P5-5aA11:17-_KASSON 115KV BUS (FAILURE OF NON-REDUNDENT RELAY)	P5-5	Non-Redundant Relay	123	47	74	63	29	59	60	44	44	Project: Vierra Looping in Project. Short term: Action Plan
Stanislaus - Manteca 115 kV Line No. 2	SCHULTE SW STA-LAMMERS 115KV [3993] & SCHULTE SW STA-KASSON-MANTECA 115KV [7472]	P6	N-1-1	170	<100	<100	95	<100	104	94	<100	<100	Project: Vierra Looping in Project. Short term: Action Plan
Stanislaus - Manteca 115 kV Line No. 2	TESLA-SCHULTE SW STA #2 115KV [3970] & TESLA-SCHULTE SW STA #1 115KV [3982]	P7	DCTL	65	58	31	57	51	103	54	55	55	Sensitivity Only
Stanislaus-Melones-Manteca 115 kV Line No. 1	BELLOTA 230KV - SECTION 1E & 2E	P2-4	Bus Tie Breaker Fault	144	NConv	NConv	8	40	28	10	67	67	SPS recommended in 2019-2020 TPP
Stanislaus-Melones-Manteca 115 kV Line No. 1	TESLA 115KV - SECTION 2D & 1D	P2-4	Bus Tie Breaker Fault	148	NConv	NConv	18	208	NConv	18	NConv	NConv	Tesla 115 kV Bus Upgrade
Stanislaus-Melones-Manteca 115 kV Line No. 1	STANISLS 13.80KV GEN UNIT 1 & STANISLS-MELONES-RIVRBKJT 115KV [0]	P3	N-G-1	104	<100	<100	<100	<100	<100	<100	<100	<100	Project: Manteca-Ripon-Riverbank-Melones Area 115 kV Line Reconductoring Project
Stanislaus-Melones-Manteca 115 kV Line No. 1	TESLA 115KV BUS (FAILURE OF NON-REDUNDENT RELAY)	P5-5	Non-Redundant Relay	NConv	NConv	NConv	19	162	NConv	19	NConv	NConv	Tesla 115 kV Bus Upgrade
Stanislaus-Melones-Manteca 115 kV Line No. 1	KASSON 115KV BUS (FAILURE OF NON-REDUNDENT RELAY)	P5-5	Non-Redundant Relay	122	51	69	63	25	62	61	49	49	Project: Vierra Looping in Project. Short term: Action Plan
Stanislaus-Melones-Manteca 115 kV Line No. 1	SCHULTE SW STA-LAMMERS 115KV [3993] & SCHULTE SW STA-KASSON-MANTECA 115KV [7472]	P6	N-1-1	178	<100	<100	<100	<100	92	<100	<100	<100	Project: Vierra Looping in Project. Short term: Action Plan
Stanislaus-Melones-Manteca 115 kV Line No. 1	STANISLS-MELONES-RIVRBKJT 115KV [0] & STANISLAUS-MANTECA #2 115KV [3820]	P6	N-1-1	<100	<100	<100	106	104	104	94	<100	<100	Generation Redispatch
STNLSRSP-CROWCREEK_SS 60kv	SANDBAR 13.80KV GEN UNIT 1 & SALADO-NEWMAN #2 60KV [7870] MOAS OPENED ON CRWS LDG_CRWS LDJ	P3	N-G-1	<100	<100	103	<100	<100	<100	<100	<100	<100	Existing operating procedure
STNLSRSP-Q539SS 60 kV	SALADO-NEWMAN #2 60KV [7870] MOAS OPENED ON CRWS LDG_CRWS LDJ	P1	N-1	90	92	103	49	95	51	49	93	93	Existing operating procedure
STNLSRSP-Q539SS 60 kV	P1-2A12:16-_SALADO-NEWMAN #2 60KV [7870] MOAS OPENED ON CRWS LDG_CRWS LDJ	P1-2	N-1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	110	Continue to monitor future forecast
Stockton 'A' - Lockeford - Bellota 115 kV Line No. 2	BELLOTA - 1D 115KV & GOLD HILL-BELLOTA-LOCKEFORD LINE	P2-3	Non-Bus Tie Breaker Fault	N/A	86	104	N/A	15	N/A	N/A	100	100	Continue to monitor future forecast
Stockton 'A' - Lockeford - Bellota 115 kV Line No. 2	BELLOTA - 1D 115KV & BELLOTA-RIVERBANK LINE	P2-3	Non-Bus Tie Breaker Fault	N/A	99	112	N/A	10	N/A	N/A	87	87	SPS recommended in 2019-2020 TPP

Study Area: PG&E Central Valley
Thermal Overloads

Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading % (Baseline Scenarios)					Loading % (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2024 Summer Peak	2027 Summer Peak	2032 Summer Peak	2024 Spring Off-Peak	2027 Spring Off-Peak	2024 SP Heavy Renewable & Min Gas Gen	2024 Spring OP Sensitivity	2027 SP High CEC Forecast	2035 ATE	
Table Mountain-Pease 60 kV Line (Peachton-Gridley)	PEASE 115 KV BUS (FAILURE OF NON-REDUNDENT RELAY)	P5-5	Non-Redundant Relay	111	104	40	165	79	88	165	107	107	Project: East Marysville 115/60 kV
Table Mountain-Pease 60 kV Line (Peachton-Gridley)	PEASE-RIO OSO 115KV [3270] MOAS OPENED on PEASE_E.MRY J1 & PALERMO-PEASE 115KV [3220] MOAS OPENED on PEASE_HONG JT1	P6	N-1-1	<100	<100	<100	100	<100	<100	100	<100	<100	Genration Redispatch
Table Mountain-Pease 60 kV Line (Peachton-Gridley)	Palermo-Pease 115 KV Line amd Pease-Rio Oso 115 KV Line	P7	DCTL	57	48	24	130	82	75	130	53	53	Genration Redispatch
TCHRT_T2-NGRM C. 115 kV Line No 1	P1-2-A11-52_ SCHULTE SW STA-KASSON-MANTECA 115KV [7472] & P1-2-A11-64_ SCHULTE SW STA-LAMMERS 115KV [3993]	P1-2	N-1	<100	<100	<100	<100	<100	<100	<100	<100	119	Continue to monitor future forecast
Tesla - Salado - Manteca 115 kV Line	KASSON - 1D 115KV & SCHULTE SW STA-KASSON-MANTECA line	P2-3	Non-Bus Tie Breaker Fault	N/A	86	104	18	<100	42	18	<100	<100	Continue to monitor future forecast
Tesla - Salado - Manteca 115 kV Line	KASSON - 1D 115KV & SCHULTE SW STA-KASSON-MANTECA line	P2-3	Non-Bus Tie Breaker Fault	106	<100	<100	18	N/A	42	18	N/A	N/A	Project: Vierra Looping in Project. Short term: Action Plan
Tesla - Salado - Manteca 115 kV Line	KASSON 115KV BUS (FAILURE OF NON-REDUNDENT RELAY)	P5-5	Non-Redundant Relay	187	60	97	46	11	74	48	62	62	Project: Vierra Looping in Project. Short term: Action Plan
Tesla - Salado - Manteca 115 kV Line	SCHULTE SW STA-KASSON-MANTECA 115KV [7472] & SCHULTE SW STA-LAMMERS 115KV [3993]	P6	N-1-1	279	<100	<100	<100	<100	124	<100	<100	<100	Project: Vierra Looping in Project. Short term: Action Plan
Tesla - Salado - Manteca 115 kV Line	TESLA-SCHULTE SW STA #2 115KV [3970] & TESLA-SCHULTE SW STA #1 115KV [3982]	P7	DCTL	45	20	40	26	36	121	23	21	21	Sensitivity Only
Tesla - Salado - Manteca 115 kV Line	TESLA-SCHULTE SW STA #2 115KV [3970] & TESLA-SCHULTE SW STA #1 115KV [3982]	P7	DCTL	45	20	40	26	36	121	23	21	21	Sensitivity Only
Tesla - Salado 115 kV Line No. 1	TESLA 115KV SECTION 1D	P2-2	Bus Fault	106	N/A	N/A	N/A	106	N/A	N/A	38	38	Tesla 115 kV Bus Upgrade
Tesla - Salado 115 kV Line No. 1	TESLA - 1D 115KV & TESLA-SCHULTE SW STA #1 line	P2-3	Non-Bus Tie Breaker Fault	80	N/A	N/A	39	N/A	110	36	N/A	N/A	Tesla 115 kV Bus Upgrade
Tesla - Salado 115 kV Line No. 1	TESLA - 1D 115KV & TESLA-LAWRENCE LAB LINE	P2-3	Non-Bus Tie Breaker Fault	N/A	35	73	N/A	106	N/A	N/A	38	38	Tesla 115 kV Bus Upgrade
Tesla - Salado 115 kV Line No. 1	SCHULTE 115KV - MIDDLE BREAKER BAY 1	P2-3	Non-Bus Tie Breaker Fault	N/A	35	74	N/A	106	N/A	N/A	35	35	Genration Redispatch
Tesla - Salado 115 kV Line No. 1	GWFTRCY3 18.00KV & GWFTRCY1 13.80KV & GWFTRCY2 13.80KV GEN UNITS & TESLA-SCHULTE SW STA #1 115KV [3980]	P3	N-G-1	113	<100	<100	<100	<100	<100	<100	<100	<100	Project: Vierra Looping in Project. Short term: Action Plan
Tesla - Salado 115 kV Line No. 1	KASSON 115KV BUS (FAILURE OF NON-REDUNDENT RELAY)	P5-5	Non-Redundant Relay	106	47	65	28	33	34	28	48	48	Project: Vierra Looping in Project. Short term: Action Plan
Tesla - Salado 115 kV Line No. 1	KASSON 115KV BUS (FAILURE OF NON-REDUNDENT RELAY)	P5-5	Non-Redundant Relay	106	47	65	28	33	34	28	48	48	Project: Vierra Looping in Project. Short term: Action Plan
Tesla - Salado 115 kV Line No. 1	SCHULTE SW STA-KASSON-MANTECA 115KV [7472] & SCHULTE SW STA-LAMMERS 115KV [3993]	P6	N-1-1	148	<100	<100	<100	<100	<100	<100	<100	<100	Project: Vierra Looping in Project. Short term: Action Plan
Tesla - Salado 115 kV Line No. 1	SCHULTE SW STA-LAMMERS 115KV [3993] & SCHULTE SW STA-KASSON-MANTECA 115KV [7472]	P6	N-1-1	147	<100	<100	<100	<100	<100	<100	<100	<100	Project: Vierra Looping in Project. Short term: Action Plan
Tesla-AEC TP2 115kV	TESLA 115KV SECTION 2D	P2-2	Bus Fault	N/A	28	19	N/A	114	N/A	N/A	26	26	Tesla 115 kV Bus Upgrade
Tesla-AEC TP2 115kV	TESLA - 2D 115KV & TESLA-SALADO-MANTECA LINE	P2-3	Non-Bus Tie Breaker Fault	N/A	19	71	N/A	114	N/A	N/A	28	28	Tesla 115 kV Bus Upgrade
Tesla-AEC TP2 115kV	TESLA - 2D 115KV & TESLA-SCHULTE SW STA #2 LINE	P2-3	Non-Bus Tie Breaker Fault	N/A	21	80	N/A	115	N/A	N/A	26	26	Tesla 115 kV Bus Upgrade
Tesla-AEC TP2 115kV	TESLA - 2D 115KV & TESLA-MDWWYND #1 LINE	P2-3	Non-Bus Tie Breaker Fault	N/A	19	70	N/A	114	N/A	N/A	26	26	Tesla 115 kV Bus Upgrade
Tesla-AEC TP2 115kV	SCHULTE 115KV - MIDDLE BREAKER BAY 2	P2-3	Non-Bus Tie Breaker Fault	N/A	19	71	N/A	108	N/A	N/A	38	38	Genration Redispatch
Tesla-RIPONCOHENJT 115 kV	SCHULTE SW STA-LAMMERS 115KV [3993] & SCHULTE SW STA-KASSON-MANTECA 115KV [7472]	P6	N-1-1	<100	19	116	<100	<100	<100	<100	<100	<100	Continue to monitor future forecast
UCD_TP2-DAVIS 115 kV Line No 1	P1-2-A4-24_ WOODLAND-DAVIS 115KV [4210] & P1-2-A4-32_ BRIGHTN-W.SCRMNO 115KV [0]	P1-2	N-1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	115	Continue to monitor future forecast
Vaca - Suisun - Jameson 115 kV Line	VACA-VACAVILLE-JAMESON-NORTH TOWER 115KV [4100] MOAS OPENED ON HALE J1_HALE & VACA-SUISUN 115KV [4070] MOAS OPENED ON VACA-DIX_WEC (2)	P6	N-1-1	88	90	108	<100	<100	<100	<100	87	87	Continue to monitor future forecast
Vaca-Plainfield 60 kV line	Base Case	P0	N-0	94	93	101	56	27	28	56	80	80	Continue to monitor future forecast
Vaca-Plainfield 60 kV line	P1-4-A4.3: PLAINFLD SVD=V	P1-4	N-1	<100	<100	<100	<100	<100	<100	<100	<100	106	Continue to monitor future forecast
Vaca-Plainfield 60 kV line	P1-4-A4.3: PLAINFLD SVD=V	P1-4	N-1	<100	<100	<100	<100	<100	<100	<100	<100	106	Continue to monitor future forecast
Vaca-Plainfield 60 kV line	P1-4-A4.3: PLAINFLD SVD=V	P1-4	N-1	<100	<100	<100	<100	<100	<100	<100	<100	103	Continue to monitor future forecast
Valley Springs - Martell 60 kV Line No. 1	VALLEY SPRINGS-CLAY 60KV [8264]	P1	N-1	147	N/A	N/A	83	N/A	85	82	N/A	N/A	Existing operating procedure
Valley Springs - Martell 60 kV Line No. 1	PRDE 1-3 7.20KV GEN UNIT 2 & VALLEY SPRINGS-MARTELL #1 60KV [8240]	P3	N-G-1	<100	<100	<100	<100	<100	<100	<100	100	100	Existing operating procedure
Vierra - Tracy - Kasson 115 kV Line	TESLA-TRACY 115KV [4020] MOAS OPENED ON LEPRINO_TRACY JC (2)	P1	N-1	108	103	112	N/A	16	N/A	N/A	103	103	Tesla 115 kV Bus Upgrade
Vierra - Tracy - Kasson 115 kV Line	P1-2-A11-59_ TESLA-TRACY 115KV [4020] MOAS OPENED ON LEPRINO_TRACY JC	P1-2	N-1	<100	<100	<100	<100	<100	<100	<100	<100	127	Continue to monitor future forecast
Vierra - Tracy - Kasson 115 kV Line	P1-2-A11-63_ TESLA-TRACY 115KV [4020] MOAS OPENED ON LEPRINO_TRACY JC (2)	P1-2	N-1	<100	<100	<100	<100	<100	<100	<100	<100	119	Continue to monitor future forecast
Vierra - Tracy - Kasson 115 kV Line	TESLA-TRACY 115KV [4020] (TESLA-ELLS GTY)	P2-1	Line Section w/o Fault	N/A	37	17	N/A	23	N/A	N/A	110	110	Sensitivity Only
Vierra - Tracy - Kasson 115 kV Line	TESLA 115KV SECTION 1D	P2-2	Bus Fault	N/A	110	121	N/A	24	N/A	N/A	112	112	Tesla 115 kV Bus Upgrade
Vierra - Tracy - Kasson 115 kV Line	P2-2-A11-29_ TESLA 115KV SECTION 1D	P2-2	Bus	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	130	Continue to monitor future forecast
Vierra - Tracy - Kasson 115 kV Line	TESLA - 1D 115KV & TESLA-SCHULTE SW STA #1 line	P2-3	Non-Bus Tie Breaker Fault	111	N/A	N/A	62	N/A	92	62	N/A	N/A	Tesla 115 kV Bus Upgrade
Vierra - Tracy - Kasson 115 kV Line	TESLA - 1D 115KV & TESLA-TRACY LINE	P2-3	Non-Bus Tie Breaker Fault	N/A	112	124	N/A	22	N/A	N/A	110	110	Tesla 115 kV Bus Upgrade
Vierra - Tracy - Kasson 115 kV Line	P2-3-A11-29_ TESLA - 1D 115KV & TESLA-SCHULTE SW STA #1 LINE	P2-3	Non-Bus Tie Breaker	<100	<100	<100	<100	<100	<100	<100	<100	130	Continue to monitor future forecast
Vierra - Tracy - Kasson 115 kV Line	P2-3-A11-30_ TESLA - 1D 115KV & TESLA-TRACY LINE	P2-3	Non-Bus Tie Breaker	<100	<100	<100	<100	<100	<100	<100	<100	129	Continue to monitor future forecast
Vierra - Tracy - Kasson 115 kV Line	P2-3-A11-31_ TESLA - 1D 115KV & TESLA-LAWRENCE LAB LINE	P2-3	Non-Bus Tie Breaker	<100	<100	<100	<100	<100	<100	<100	<100	130	Continue to monitor future forecast
Vierra - Tracy - Kasson 115 kV Line	P2-3-A11-32_ TESLA - 1D 115KV & TESLA-SALADO-Q1103 LINE	P2-3	Non-Bus Tie Breaker	<100	<100	<100	<100	<100	<100	<100	<100	130	Continue to monitor future forecast
Vierra - Tracy - Kasson 115 kV Line	RIPONCOGEN 13.80KV GEN UNIT 1 & TESLA-TRACY 115KV [4020] MOAS OPENED ON LEPRINO_TRACY JC	P3	N-G-1	<100	109	<100	<100	<100	<100	<100	<100	<100	Project: Vierra Looping in Project. Short term: Action Plan
Vierra - Tracy - Kasson 115 kV Line	TESLA 115KV BUS (FAILURE OF NON-REDUNDENT RELAY)	P5-5	Non-Redundant Relay	NConv	NConv	NConv	51	16	NConv	51	NConv	NConv	Tesla 115 kV Bus Upgrade
Vierra - Tracy - Kasson 115 kV Line	TESLA-SCHULTE SW STA #2 115KV [3970] & TESLA-SCHULTE SW STA #1 115KV [3982]	P7	DCTL	0	34	0	81	121	0	78	33	33	Tesla 115 kV Bus Upgrade
VIERRA-MANTECA 115kv	GWFTRCY3 18.00KV & GWFTRCY1 13.80KV & GWFTRCY2 13.80KV GEN UNITS & VIERRA-TRACY-KASSON 115KV [4310]	P3	N-G-1	101	<100	<100	<100	<100	<100	<100	<100	<100	Project: Vierra Looping in Project. Short term: Action Plan
VLLY_SPS-AMFOR_SW 60kv	WEST PNT 11.50KV GEN UNIT 2 & VALLEY SPRINGS-CLAY 60KV [8264]	P3	N-G-1	<100	148	147	<100	<100	<100	<100	149	149	Existing operating procedure
VLLY_SPS-AMFOR_SW 60kv	SALT SPS 11.00KV GEN UNIT 1 & VALLEY SPRINGS-CLAY 60KV [8264]	P3	N-G-1	148	<100	<100	<100	<100	<100	<100	<100	<100	Existing operating procedure
Weimar No. 1 60 kV Line	P1-3-A5.36_ OXBOW 60.9 11KV TB 1	P1-3	N-1	<100	<100	<100	<100	<100	<100	<100	<100	104	Continue to monitor future forecast
WEMR-SWS-FORST HL 60 kV Line No 1	P1-1-A5.23_ OXBOW F 9.11KV GEN UNIT 1 & Base Case	P1-1	N-1	<100	<100	<100	<100	<100	<100	<100	<100	120	Continue to monitor future forecast
West Sacramento - Brighton 115 kV Line	P5-5a/A5.5_ RIO OSO 115 KV BUS (FAILURE OF NON-REDUNDENT RELAY)	P5-5	Non-Redundant Relay	<100	<100	<100	<100	<100	<100	<100	<100	106	Continue to monitor future forecast
West Sacramento - Brighton 115 kV Line	P5-5d/A5.1_ No BF Relay Rio Oso 115KV CB 402 412 422 432 442 462 or 472	P5-5	Non-Redundant Relay	<100	<100	<100	<100	<100	<100	<100	<100	123	Continue to monitor future forecast
West Sacramento - Davis 115 kV Line	BRIGHTON-DAVIS 115KV [1140] MOAS OPENED ON HOWARDJCT3_BRKRJCT & WOODLAND-DAVIS 115KV [4210]	P6	N-1-1	92	93	109	<100	<100	<100	<100	<100	<100	Continue to monitor future forecast
West Sacramento - Davis 115 kV Line	WOODLAND-DAVIS 115KV [4210] & BRIGHTON-DAVIS 115KV [1140] MOAS OPENED ON HOWARDJCT3_BRKRJCT	P6	N-1-1	90	92	107	<100	<100	<100	<100	<100	<100	Continue to monitor future forecast
West Sacramento - Davis 115 kV Line	BRIGHTON-DAVIS 115KV [1140] MOAS OPENED ON HOWARDJCT3_BRKRJCT & WOODLAND-DAVIS 115KV [4210]	P6	N-1-1	<100	<100	109	<100	<100	<100	<100	<100	<100	Continue to monitor future forecast
Woodland - Davis 115 kV Line	RIO OSO 115KV - SECTION 2D & 1D	P2-4	Bus Tie Breaker Fault	N/A	109	119	57	<100	50	58	<100	<100	SPS recommended in 2017-2018 TPP
Woodland - Davis 115 kV Line	No BF Relay Rio Oso 115KV CB 402 412 422 432 442 462 or 472	P5-5	Non-Redundant Relay	103	72	36	57	7	50	58	76	76	SPS recommended in 2017-2018 TPP

Study Area: **PG&E Central Valley**
Thermal Overloads

Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading % (Baseline Scenarios)					Loading % (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2024 Summer Peak	2027 Summer Peak	2032 Summer Peak	2024 Spring Off-Peak	2027 Spring Off-Peak	2024 SP Heavy Renewable & Min Gas Gen	2024 Spring OP Sensitivity	2027 SP High CEC Forecast	2035 ATE	
Woodland - Davis 115 kV Line	P5-5a:A4:7;_BRIGHTON 230KV BUS (FAILURE OF NON-REDUNDENT RELAY)	P5-5	Non-Redundant Relay	<100	<100	<100	<100	<100	<100	<100	<100	111	Continue to monitor future forecast
Woodland - Davis 115 kV Line	P5-5c(DC);A4:2;_Station	P5-5	Non-Redundant Relay	<100	<100	<100	<100	<100	<100	<100	<100	111	Continue to monitor future forecast
WOODLANDBMJT-Q653FJCT 115 kV Line No 1	P1-2:A4:9;_RIO OSO-BRIGHTON 230KV [5600] & P1-2:A4:1;_BRIGHTON-LOCKFORD 230KV [0]	P1-2	N-1	<100	<100	<100	<100	<100	<100	<100	<100	123	Continue to monitor future forecast
WOODLANDBMJT-Q653FJCT 115 kV Line No 1	P5-5a:A4:7;_BRIGHTON 230KV BUS (FAILURE OF NON-REDUNDENT RELAY)	P5-5	Non-Redundant Relay	<100	<100	<100	<100	<100	<100	<100	<100	123	Continue to monitor future forecast
WOODLANDBMJT-Q653FJCT 115 kV Line No 1	P5-5c(DC);A4:2;_Station	P5-5	Non-Redundant Relay	<100	<100	<100	<100	<100	<100	<100	<100	123	Continue to monitor future forecast
WOODLANDBMJT-Q653FJCT 115KV	BRIGHTON 230KV BUS (FAILURE OF NON-REDUNDENT RELAY)	P5-5	Non-Redundant Relay	109	76	92	89	7	61	89	67	67	Operating solution
WOODLANDBMJT-Q653FJCT 115KV	P5-5c(DC);A4:2;_Station	P5-5	Non-Redundant Relay	109	76	92	89	7	61	89	67	67	Operating solution
WOODLANDBMJT-Q653FJCT 115KV	BRIGHTON-DAVIS 115KV [1140] MOAS OPENED ON HOWARDJCT3_BRKRJCT & WEST SACRAMENTO-DAVIS 115KV [4120]	P6	N-1-1	112	<100	91	<100	<100	<100	<100	<100	<100	SPS recommended in 2017-2018 TPP
WOODLANDBMJT-Q653FJCT 115KV	BRIGHTON-DAVIS 115KV [1140] MOAS OPENED ON HOWARDJCT3_BRKRJCT & WEST SACRAMENTO-DAVIS 115KV [4120]	P6	N-1-1	112	<100	<100	<100	<100	<100	<100	<100	<100	SPS recommended in 2017-2018 TPP
WOODLANDBMJT-Q653FJCT 115KV	Rio Oso-Brighton 230 KV Line & Rio Oso-Lockeford 230 KV Line	P7	DCTL	88	62	75	75	17	81	102	57	57	Sensitivity Only
WOODLANDBMJT-WOODLD 115 kV Line No 1	P1-2:A4:9;_RIO OSO-BRIGHTON 230KV [5600] & P1-2:A4:1;_BRIGHTON-LOCKFORD 230KV [0]	P1-2	N-1	<100	<100	<100	<100	<100	<100	<100	<100	111	Continue to monitor future forecast
#N/A	P2-4:A11:8;_TESLA D 230KV - SECTION 1D & 2D	P2-4	Bus-Tie-Breaker	<100	<100	<100	<100	<100	<100	<100	<100	225	Continue to monitor future forecast
#N/A	P5-5a:A11:5;_TESLA 230KV BUS D (FAILURE OF NON-REDUNDENT RELAY)	P5-5	Non-Redundant Relay	<100	<100	<100	<100	<100	<100	<100	<100	224	Continue to monitor future forecast

Substation	Contingency (All and Worst P6)	Category	Category Description	High/Low Voltage	Voltage PU (Baseline Scenarios)					Voltage PU (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
					2024 Summer Peak	2027 Summer Peak	2032 Summer Peak	2024 Spring Off-Peak	2027 Spring Off-Peak	2024 SP Heavy Renewable & Min Gas Gen	2024 Spring OP Sensitivity	2027 SP High CEC Forecast	2035 ATE	
ALLEGHNY 60 KV	Basecase	P0	N-0	H	1.03	1.03	1.01	1.04	1.08	1.02	1.04	1.04	N/A	System adjustments or voltage support if needed
ALTA-CGE 60 KV	Base Case	P0	N-0	H	1.03	1.02	1.04	1.05	1.07	1.04	1.04	1.03	N/A	System adjustments or voltage support if needed
APPLE HL 115 KV	Basecase	P0	N-0	H	1.03	1.03	1.02	1.05	1.06	1.03	1.05	1.04	N/A	System adjustments or voltage support if needed
ATLANTC 230 KV	Basecase	P0	N-0	H	0.98	0.99	0.98	1.03	1.08	0.97	1.02	1.00	N/A	System adjustments or voltage support if needed
ATLANTI 60 KV	Basecase	P0	N-0	H	1.00	1.02	1.00	1.08	1.04	0.99	1.07	1.04	N/A	Project: Atlantic 230/60 kV Transformer Voltage Regulator Project. Short term: Action Plan
ATLANTIC 115 KV	Basecase	P0	N-0	H	1.01	1.02	1.00	1.05	1.10	0.99	1.05	1.02	N/A	System adjustments or voltage support if needed
B.BTHNY- 60 KV	Base Case	P0	N-0	H	1.03	1.02	1.04	1.05	1.07	1.04	1.04	1.03	N/A	System adjustments or voltage support if needed
BANGOR 60 KV	Basecase	P0	N-0	H	1.03	1.02	1.01	1.06	1.04	1.02	1.06	1.03	N/A	System adjustments or voltage support if needed
BEARDSLY 115 KV	Basecase	P0	N-0	H	1.04	1.04	1.04	1.05	1.06	1.05	1.05	1.04	N/A	System adjustments or voltage support if needed
BELL PGE 115 KV	Basecase	P0	N-0	H	1.01	1.02	1.01	1.04	1.06	1.03	1.04	1.02	N/A	System adjustments or voltage support if needed
BOGUE 115 KV	Basecase	P0	N-0	H	1.03	1.03	1.03	1.04	1.06	1.04	1.04	1.03	N/A	System adjustments or voltage support if needed
BRIGHTN 115 KV	Basecase	P0	N-0	H	1.04	1.05	1.02	1.07	1.12	1.03	1.06	1.05	N/A	System adjustments or voltage support if needed
BRIGHTON 230 KV	Basecase	P0	N-0	H	0.98	0.99	0.97	1.01	1.07	0.98	1.01	0.99	N/A	System adjustments or voltage support if needed
BRKR SLG 115 KV	Basecase	P0	N-0	H	1.01	1.02	1.00	1.05	1.11	1.02	1.05	1.02	N/A	System adjustments or voltage support if needed
BRNSWALT 115 KV	Basecase	P0	N-0	H	1.04	1.04	1.04	1.06	1.06	1.05	1.06	1.04	N/A	System adjustments or voltage support if needed
BRUNSWCK 115 KV	Basecase	P0	N-0	H	1.03	1.04	1.03	1.04	1.06	1.04	1.04	1.04	N/A	System adjustments or voltage support if needed
BRWNS VY 60 KV	Basecase	P0	N-0	H	1.02	1.02	1.02	1.04	1.05	1.02	1.03	1.03	N/A	System adjustments or voltage support if needed
CAL CMNT 60 KV	Base Case	P0	N-0	H	1.03	1.04	1.04	1.04	1.05	1.03	1.05	1.04	N/A	System adjustments or voltage support if needed
CAMANCH 230 KV	Base Case	P0	N-0	H	1.01	1.01	1.00	1.02	1.06	1.00	1.03	1.01	N/A	System adjustments or voltage support if needed
CAMPUS 115 KV	Basecase	P0	N-0	H	1.01	1.02	0.99	1.04	1.10	1.02	1.04	1.01	N/A	System adjustments or voltage support if needed
CATARACT 115 KV	Base Case	P0	N-0	H	1.03	1.03	1.01	1.05	1.06	1.02	1.05	1.03	N/A	System adjustments or voltage support if needed
CHCGO PK 115 KV	Basecase	P0	N-0	H	1.04	1.04	1.04	1.05	1.06	1.05	1.05	1.04	N/A	System adjustments or voltage support if needed
CHINESESTA 115 KV	Basecase	P0	N-0	H	1.02	1.02	1.01	1.04	1.06	1.02	1.04	1.02	N/A	System adjustments or voltage support if needed
CLMBA HL 60 KV	Basecase	P0	N-0	H	1.04	1.04	1.03	1.05	1.09	1.03	1.05	1.05	N/A	System adjustments or voltage support if needed
CLRKSVLE 115 KV	Basecase	P0	N-0	H	1.03	1.04	1.03	1.05	1.05	1.04	1.05	1.04	N/A	System adjustments or voltage support if needed
CNTRY CB 60 KV	Base Case	P0	N-0	H	1.03	1.04	1.04	1.05	1.05	1.04	1.05	1.04	N/A	System adjustments or voltage support if needed
COLGATE 230 KV	Basecase	P0	N-0	H	1.01	1.01	1.01	1.03	1.06	1.00	1.02	1.02	N/A	System adjustments or voltage support if needed
COLGATE 60 KV	Basecase	P0	N-0	H	1.05	1.04	1.04	1.06	1.09	1.03	1.05	1.05	N/A	System adjustments or voltage support if needed
CORRAL 60 KV	Base Case	P0	N-0	H	0.98	0.99	0.99	1.04	1.06	1.01	1.04	0.99	N/A	System adjustments or voltage support if needed
CPM 115 KV	Basecase	P0	N-0	H	1.04	1.04	1.04	1.05	1.05	1.04	1.05	1.05	N/A	System adjustments or voltage support if needed
CROWCREEK SS 60 KV	Basecase	P0	N-0	H	1.02	1.03	1.02	1.05	1.02	1.05	1.04	1.03	N/A	System adjustments or voltage support if needed
CURTISS 115 KV	Basecase	P0	N-0	H	1.02	1.02	1.00	1.04	1.06	1.02	1.04	1.02	N/A	System adjustments or voltage support if needed
DAVIS 115 KV	Basecase	P0	N-0	H	1.01	1.02	0.99	1.04	1.10	1.02	1.04	1.02	N/A	System adjustments or voltage support if needed
DEEPPWATR 115 KV	Basecase	P0	N-0	H	1.02	1.03	1.01	1.05	1.11	1.03	1.05	1.02	N/A	System adjustments or voltage support if needed
DEL MAR 60 KV	Basecase	P0	N-0	H	0.99	1.00	0.98	1.08	1.05	0.97	1.07	1.02	N/A	System adjustments or voltage support if needed
DIXONCAN 60 KV	Basecase	P0	N-0	H	1.02	1.03	1.04	1.04	1.05	1.04	1.06	1.02	N/A	System adjustments or voltage support if needed
DIXONPGE 60 KV	Basecase	P0	N-0	H	1.02	1.03	1.04	1.04	1.05	1.04	1.06	1.02	N/A	System adjustments or voltage support if needed
DMND SPR 115 KV	Basecase	P0	N-0	H	1.03	1.03	1.02	1.05	1.06	1.03	1.05	1.04	N/A	System adjustments or voltage support if needed
DOBBINS 60 KV	Basecase	P0	N-0	H	1.05	1.04	1.04	1.06	1.09	1.03	1.05	1.05	N/A	System adjustments or voltage support if needed
DONNELLS 115 KV	Basecase	P0	N-0	H	1.04	1.04	1.05	1.05	1.06	1.05	1.05	1.04	N/A	System adjustments or voltage support if needed
DRAKE 60 KV	Basecase	P0	N-0	L	1.00	0.96	0.93	1.02	1.01	1.01	1.01	0.94	N/A	System adjustments or voltage support if needed
DRUM 115 KV	Basecase	P0	N-0	H	1.04	1.05	1.05	1.05	1.05	1.06	1.05	1.05	N/A	System adjustments or voltage support if needed
DITCH FL2 115 KV	Basecase	P0	N-0	H	1.04	1.05	1.05	1.05	1.05	1.05	1.05	1.05	N/A	System adjustments or voltage support if needed
DUNNIGAN 60 KV	Basecase	P0	N-0	L	0.98	0.93	0.89	1.00	1.00	1.00	1.00	0.91	N/A	System adjustments or voltage support if needed
DUTCHFLAT1PH 115 KV	Basecase	P0	N-0	H	1.04	1.04	1.05	1.05	1.05	1.05	1.05	1.04	N/A	System adjustments or voltage support if needed
E.MRYSVE 115 KV	Basecase	P0	N-0	H	1.04	1.05	1.04	1.05	1.06	1.05	1.06	1.05	N/A	System adjustments or voltage support if needed
E.NICOLS 115 KV	Basecase	P0	N-0	H	1.03	1.05	1.04	1.05	1.06	1.04	1.05	1.05	N/A	System adjustments or voltage support if needed
EIGHT MI 230 KV	Base Case	P0	N-0	H	1.00	0.99	0.99	1.03	1.06	0.98	1.02	1.00	N/A	System adjustments or voltage support if needed
ELDORAD 115 KV	Basecase	P0	N-0	H	1.03	1.03	1.02	1.05	1.06	1.03	1.05	1.04	N/A	System adjustments or voltage support if needed
FLINT 115 KV	Basecase	P0	N-0	H	1.02	1.02	1.01	1.04	1.06	1.03	1.04	1.02	N/A	System adjustments or voltage support if needed
FROGTOWN 115 KV	Base Case	P0	N-0	H	1.02	1.02	1.00	1.05	1.06	1.01	1.05	1.02	N/A	System adjustments or voltage support if needed
GOLDHILL 115 KV	Basecase	P0	N-0	H	1.04	1.05	1.04	1.04	1.05	1.04	1.04	1.05	N/A	System adjustments or voltage support if needed
GOLDHILL 230 KV	Basecase	P0	N-0	H	0.99	0.99	0.98	1.03	1.08	0.97	1.03	1.00	N/A	System adjustments or voltage support if needed
GRAND IS 115 KV	Basecase	P0	N-0	H	1.03	1.04	1.01	1.06	1.13	1.02	1.06	1.04	N/A	System adjustments or voltage support if needed
GREENLEAF1 115 KV	Basecase	P0	N-0	H	1.03	1.04	1.03	1.04	1.06	1.04	1.04	1.04	N/A	System adjustments or voltage support if needed
GRSS VLY 60 KV	Basecase	P0	N-0	H	1.03	1.02	1.00	1.05	1.09	1.01	1.05	1.03	N/A	System adjustments or voltage support if needed
GUSTINE 60 KV	Basecase	P0	N-0	L	0.96	0.97	0.94	1.01	0.98	1.02	1.00	0.97	N/A	System adjustments or voltage support if needed
HAMMER 60 KV	Base Case	P0	N-0	H	1.02	1.03	1.03	1.05	1.06	1.03	1.06	1.03	N/A	System adjustments or voltage support if needed
HARINTON 60 KV	Basecase	P0	N-0	L	1.00	0.96	0.93	1.02	1.01	1.01	1.02	0.95	N/A	System adjustments or voltage support if needed
HERDLYN 60 KV	Base Case	P0	N-0	H	1.03	1.02	1.04	1.05	1.07	1.04	1.04	1.03	N/A	System adjustments or voltage support if needed
HIGGINS 115 KV	Basecase	P0	N-0	H	1.02	1.02	1.01	1.04	1.06	1.03	1.04	1.02	N/A	System adjustments or voltage support if needed
HORSESHE 115 KV	Basecase	P0	N-0	H	1.03	1.03	1.02	1.04	1.05	1.03	1.04	1.04	N/A	System adjustments or voltage support if needed
KNIGHTLD 115 KV	Basecase	P0	N-0	H	1.02	1.03	1.01	1.05	1.07	1.03	1.04	1.03	N/A	System adjustments or voltage support if needed
LIMESTNE 60 KV	Basecase	P0	N-0	H	1.04	1.06	1.03	1.03	1.04	1.03	1.04	1.05	N/A	System adjustments or voltage support if needed
LINCLN 115 KV	Basecase	P0	N-0	H	1.02	1.03	1.01	1.06	1.07	1.02	1.05	1.03	N/A	System adjustments or voltage support if needed
LINDEN 60 KV	Base Case	P0	N-0	H	1.00	1.03	1.01	1.04	1.10	1.02	1.04	1.02	N/A	System adjustments or voltage support if needed

Substation	Contingency (All and Worst P6)	Category	Category Description	High/Low Voltage	Voltage PU (Baseline Scenarios)					Voltage PU (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
					2024 Summer Peak	2027 Summer Peak	2032 Summer Peak	2024 Spring Off-Peak	2027 Spring Off-Peak	2024 SP Heavy Renewable & Min Gas Gen	2024 Spring OP Sensitivity	2027 SP High CEC Forecast	2035 ATE	
MAINE-PR 60 kV	Basecase	P0	N-0	H	1.03	1.04	1.05	1.04	1.05	1.05	1.06	1.03	N/A	System adjustments or voltage support if needed
MDL_RIVR 60 kV	Base Case	P0	N-0	H	0.98	0.97	1.00	1.03	1.05	1.01	1.02	0.98	N/A	System adjustments or voltage support if needed
MELONES 115 kV	Basecase	P0	N-0	H	1.02	1.02	1.01	1.05	1.06	1.02	1.05	1.03	N/A	System adjustments or voltage support if needed
MIDLFORK 230 kV	Basecase	P0	N-0	H	1.01	1.01	1.01	1.04	1.06	1.00	1.03	1.02	N/A	System adjustments or voltage support if needed
MI-WUK 115 kV	Basecase	P0	N-0	H	1.03	1.03	1.02	1.04	1.06	1.03	1.04	1.03	N/A	System adjustments or voltage support if needed
MOBILCHE 115 kV	Basecase	P0	N-0	H	1.01	1.02	1.00	1.04	1.08	1.02	1.04	1.02	N/A	System adjustments or voltage support if needed
MORMON 60 kV	Base Case	P0	N-0	H	1.01	1.03	1.02	1.03	1.08	1.02	1.04	1.03	N/A	System adjustments or voltage support if needed
MRYSVILLE 60 kV	Basecase	P0	N-0	H	1.04	1.05	1.01	1.05	1.04	1.02	1.05	1.06	N/A	System adjustments or voltage support if needed
MSHR 60V 60 kV	Base Case	P0	N-0	H	0.99	1.00	1.01	1.07	1.09	1.00	1.08	1.00	N/A	System adjustments or voltage support if needed
N.HOGAN 60 kV	Base Case	P0	N-0	H	1.02	1.03	1.03	1.04	1.05	1.03	1.05	1.02	N/A	System adjustments or voltage support if needed
NARRWS 1 60 kV	Basecase	P0	N-0	H	1.02	1.01	1.01	1.04	1.06	1.02	1.04	1.03	N/A	System adjustments or voltage support if needed
NARRWS 2 60 kV	Basecase	P0	N-0	H	1.02	1.02	1.02	1.04	1.06	1.02	1.04	1.03	N/A	System adjustments or voltage support if needed
NEWCASTLE 115 kV	Basecase	P0	N-0	H	1.02	1.03	1.01	1.04	1.06	1.03	1.04	1.03	N/A	System adjustments or voltage support if needed
NRRWS1TP 60 kV	Basecase	P0	N-0	H	1.02	1.02	1.02	1.04	1.06	1.02	1.03	1.03	N/A	System adjustments or voltage support if needed
OLETA 60 kV	Base Case	P0	N-0	H	1.04	1.05	0.99	1.01	1.03	1.02	1.02	1.05	N/A	System adjustments or voltage support if needed
OLIVHRST 115 kV	Basecase	P0	N-0	H	1.05	1.06	1.01	1.06	1.06	1.02	1.06	1.06	N/A	System adjustments or voltage support if needed
PARDEE A 60 kV	Base Case	P0	N-0	H	1.05	1.06	1.06	1.05	1.05	1.05	1.05	1.06	N/A	System adjustments or voltage support if needed
PEASE 115 kV	Basecase	P0	N-0	H	1.05	1.05	1.01	1.06	1.06	1.01	1.06	1.05	N/A	System adjustments or voltage support if needed
PEORIA 115 kV	Basecase	P0	N-0	H	1.02	1.02	1.01	1.04	1.06	1.02	1.04	1.02	N/A	System adjustments or voltage support if needed
PIKE CTY 60 kV	Basecase	P0	N-0	H	1.04	1.03	1.02	1.05	1.09	1.02	1.04	1.04	N/A	System adjustments or voltage support if needed
PLACER 115 kV	Basecase	P0	N-0	H	1.02	1.02	1.01	1.04	1.06	1.03	1.04	1.02	N/A	System adjustments or voltage support if needed
PLAINFIDE 60 kV	Basecase	P0	N-0	H	0.91	1.00	0.96	1.01	1.09	1.00	1.03	1.01	N/A	System adjustments or voltage support if needed
PLSNT GR 115 kV	Basecase	P0	N-0	H	1.01	1.02	1.00	1.05	1.09	1.00	1.05	1.02	N/A	System adjustments or voltage support if needed
PNE GRVE 60 kV	Base Case	P0	N-0	H	1.03	1.04	1.02	1.05	1.06	1.02	1.05	1.04	N/A	System adjustments or voltage support if needed
POST 115 kV	Basecase	P0	N-0	H	1.02	1.03	1.01	1.05	1.10	Not Found	1.04	1.03	N/A	System adjustments or voltage support if needed
PRDEJCT 60 kV	Base Case	P0	N-0	H	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	N/A	System adjustments or voltage support if needed
Q653F 115 kV	Basecase	P0	N-0	H	1.01	1.02	0.99	1.04	1.09	1.02	1.04	1.02	N/A	System adjustments or voltage support if needed
R.TRACK 115 kV	Basecase	P0	N-0	H	1.02	1.02	1.01	1.05	1.06	1.02	1.05	1.03	N/A	System adjustments or voltage support if needed
RALSTON 230 kV	Basecase	P0	N-0	H	1.01	1.01	1.00	1.03	1.06	1.00	1.03	1.01	N/A	System adjustments or voltage support if needed
RBROCKLIN 115 kV	Basecase	P0	N-0	H	1.01	1.02	1.00	1.05	1.09	1.00	1.05	1.02	N/A	System adjustments or voltage support if needed
RIO OSO 115 kV	Basecase	P0	N-0	H	1.04	1.05	1.04	1.05	1.05	1.05	1.05	1.05	N/A	System adjustments or voltage support if needed
RIO OSO 230 kV	Basecase	P0	N-0	H	0.98	1.00	0.98	1.03	1.09	0.97	1.02	1.01	N/A	System adjustments or voltage support if needed
ROCKLIN 60 kV	Basecase	P0	N-0	H	1.00	1.02	1.00	1.08	1.04	0.99	1.07	1.03	N/A	System adjustments or voltage support if needed
RVRBANK 115 kV	Basecase	P0	N-0	H	1.04	1.04	1.03	1.05	1.06	1.04	1.05	1.04	N/A	System adjustments or voltage support if needed
SALADO 60 kV	Basecase	P0	N-0	H	1.04	1.04	1.03	1.05	1.04	1.05	1.05	1.04	N/A	System adjustments or voltage support if needed
SANDBAR 115 kV	Basecase	P0	N-0	H	1.04	1.04	1.04	1.05	1.06	1.04	1.05	1.04	N/A	System adjustments or voltage support if needed
SHPRING 115 kV	Basecase	P0	N-0	H	1.03	1.04	1.02	1.05	1.05	1.03	1.05	1.04	N/A	System adjustments or voltage support if needed
SIERRAPI 60 kV	Basecase	P0	N-0	H	0.99	1.00	0.98	1.08	1.05	0.97	1.07	1.02	N/A	System adjustments or voltage support if needed
SMRTSVLE 60 kV	Basecase	P0	N-0	H	1.02	1.02	1.02	1.04	1.06	1.02	1.03	1.03	N/A	System adjustments or voltage support if needed
SOUTH BY 60 kV	Base Case	P0	N-0	H	1.04	1.02	1.04	1.05	1.07	1.04	1.04	1.03	N/A	System adjustments or voltage support if needed
SPIJCT 115 kV	Basecase	P0	N-0	H	1.02	1.03	1.01	1.06	1.07	1.02	1.05	1.03	N/A	System adjustments or voltage support if needed
SPICAMIN 115 kV	Basecase	P0	N-0	H	1.03	1.03	1.02	1.05	1.06	1.03	1.05	1.04	N/A	System adjustments or voltage support if needed
SPI.LINC 115 kV	Basecase	P0	N-0	H	1.02	1.03	1.01	1.06	1.07	1.02	1.05	1.03	N/A	System adjustments or voltage support if needed
SPISONORA 115 kV	Basecase	P0	N-0	H	1.02	1.02	1.01	1.04	1.06	1.02	1.04	1.02	N/A	System adjustments or voltage support if needed
SPRNG GP 115 kV	Basecase	P0	N-0	H	1.04	1.04	1.04	1.05	1.06	1.04	1.05	1.04	N/A	System adjustments or voltage support if needed
STAGG 60 kV	Base Case	P0	N-0	H	1.04	1.05	1.05	1.05	1.05	1.05	1.05	1.05	N/A	System adjustments or voltage support if needed
STAGG-D 230 kV	Base Case	P0	N-0	H	0.99	0.99	0.99	1.03	1.05	0.98	1.02	0.99	N/A	System adjustments or voltage support if needed
STANISLS 115 kV	Base Case	P0	N-0	H	1.03	1.03	1.02	1.05	1.06	1.02	1.05	1.03	N/A	System adjustments or voltage support if needed
STNSLSRP 60 kV	Basecase	P0	N-0	H	1.02	1.03	1.02	1.05	1.03	1.05	1.04	1.03	N/A	System adjustments or voltage support if needed
TAYLOR 60 kV	Basecase	P0	N-0	H	1.00	1.02	1.00	1.08	1.04	0.99	1.07	1.04	N/A	System adjustments or voltage support if needed
TIGR CRK 115 kV	Base Case	P0	N-0	L	0.95	0.95	0.95	0.96	0.98	0.95	0.96	0.95	N/A	System adjustments or voltage support if needed
TOSCO-PP 60 kV	Base Case	P0	N-0	H	1.04	1.02	1.04	1.05	1.07	1.04	1.04	1.03	N/A	System adjustments or voltage support if needed
TULLOCH 115 kV	Basecase	P0	N-0	H	1.03	1.03	1.02	1.05	1.06	1.03	1.05	1.03	N/A	System adjustments or voltage support if needed
UOP 60 kV	Base Case	P0	N-0	H	1.03	1.04	1.04	1.05	1.05	1.04	1.05	1.04	N/A	System adjustments or voltage support if needed
VACA-DXN 60 kV	Basecase	P0	N-0	H	1.04	1.06	1.07	1.05	1.05	1.05	1.06	1.04	N/A	System adjustments or voltage support if needed
VLLY SPS 60 kV	Base Case	P0	N-0	H	1.04	1.05	1.05	1.04	1.05	1.04	1.05	1.05	N/A	System adjustments or voltage support if needed
VSLDSW87 60 kV	Base Case	P0	N-0	H	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	N/A	System adjustments or voltage support if needed
W.SCRMNO 115 kV	Basecase	P0	N-0	H	1.03	1.04	1.01	1.05	1.10	1.03	1.05	1.03	N/A	System adjustments or voltage support if needed
WEST PNT 60 kV	Base Case	P0	N-0	H	1.04	1.04	1.03	1.05	1.06	1.03	1.06	1.04	N/A	System adjustments or voltage support if needed
WEST SDE 60 kV	Base Case	P0	N-0	H	1.03	1.01	1.04	1.05	1.07	1.04	1.04	1.02	N/A	System adjustments or voltage support if needed
WILLIAMS 60 kV	Basecase	P0	N-0	H	1.04	1.01	0.99	1.05	1.03	1.04	1.05	1.01	N/A	System adjustments or voltage support if needed
WINTERS 60 kV	Basecase	P0	N-0	H	1.00	1.04	1.03	1.03	1.06	1.04	1.05	1.03	N/A	System adjustments or voltage support if needed
WOODLD 115 kV	Basecase	P0	N-0	H	1.01	1.02	1.00	1.04	1.08	1.02	1.04	1.02	N/A	System adjustments or voltage support if needed
YUBAGOLD 60 kV	Basecase	P0	N-0	H	1.02	1.02	1.02	1.04	1.05	1.02	1.03	1.03	N/A	System adjustments or voltage support if needed
ZAMORA 115 kV	Basecase	P0	N-0	H	1.03	1.04	1.00	1.05	1.07	1.03	1.05	1.04	N/A	System adjustments or voltage support if needed
APPLE HL 115 kV	P2-1:A5:50_ MISSOURI FLAT-GOLD HILL #1 115KV [2660] (SHPRING1-CLRKSVLT)	P2	Line Section w/o Fault	L	0.98	0.99	0.90	1.06	1.07	1.00	1.06	0.99	0.86	Continue to monitor future load forecast

Substation	Contingency (All and Worst P6)	Category	Category Description	High/Low Voltage	Voltage PU (Baseline Scenarios)					Voltage PU (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
					2024 Summer Peak	2027 Summer Peak	2032 Summer Peak	2024 Spring Off-Peak	2027 Spring Off-Peak	2024 SP Heavy Renewable & Min Gas Gen	2024 Spring OP Sensitivity	2027 SP High CEC Forecast	2035 ATE	
ARBUCKLE 60 kV	P2-3:A4:60:_CORTINA 230KV - RING R1 & R4	P2	Non-Bus Tie Breaker Fault	L	>0.9	0.97	0.90	>0.9	1.02	>0.9	>0.9	0.96	N/A	Continue to monitor future load forecast
AUBURN 60 kV	P2-4:A5:2:_GOLDHILL 115KV - SECTION 1F & 1E	P2	Bus Tie Breaker Fault	L	>0.9	1.02	0.56	>0.9	1.03	>0.9	>0.9	1.02	N/A	Continue to monitor future load forecast
AVENA 115 kV	P1-2:A11:58:_SCHULTE SW STA-LAMMERS 115KV [3993] & P1-2:A11:45:_SCHULTE SW STA-KASSON-MANTECA 115KV [7472]	P6	N-1-1	L	0.59	>0.9	>0.9	>0.9	>0.9	0.82	>0.9	>0.9	N/A	Project: Vierra Looping in Project. Short term: Action Plan
AVENA 115 kV	P7-1:A11:28:_TESLA-SCHULTE SW STA #2 115KV [3970] & TESLA-SCHULTE SW STA #1 115KV [3982]	P7	DCTL	L	0.98	1.00	0.98	1.03	1.04	0.83	1.03	1.00	N/A	Sensitivity only
BANTA 60 kV	P1-2:A11:58:_SCHULTE SW STA-LAMMERS 115KV [3993] & P1-2:A11:45:_SCHULTE SW STA-KASSON-MANTECA 115KV [7472]	P6	N-1-1	L	0.55	>0.9	>0.9	>0.9	>0.9	0.82	>0.9	>0.9	N/A	Project: Vierra Looping in Project. Short term: Action Plan
BANTA 60 kV	P5-5a:A11:17:_KASSON 115KV BUS (FAILURE OF NON-REDUNDANT RELAY)	P5	Non-Redundant Relay	L	0.62	0.95	0.64	0.99	0.95	0.84	0.99	0.95	N/A	Project: Vierra Looping in Project. Short term: Action Plan - Continue to monitor future load forecast for the long term issue
BANTA 60 kV	P7-1:A11:28:_TESLA-SCHULTE SW STA #2 115KV [3970] & TESLA-SCHULTE SW STA #1 115KV [3982]	P7	DCTL	L	1.02	1.03	1.03	1.03	1.03	0.84	1.04	1.04	N/A	Sensitivity only
BARRY 60 kV	P1-2:A5:16:_PALERMO-NICOLAUS 115KV [3210] MOAS OPENED ON PALERMO_E.MRY J2 & P1-2:A5:27:_RIO OSO-NICOLAUS 115KV [3440]	P6	N-1-1	L	>0.9	>0.9	0.63	>0.9	>0.9	>0.9	>0.9	>0.9	N/A	Continue to monitor future load forecast
BARRY 60 kV	P1-2:A5:16:_PALERMO-NICOLAUS 115KV [3210] MOAS OPENED ON PALERMO_E.MRY J2 & P1-2:A5:27:_RIO OSO-NICOLAUS 115KV [3440]	P6	N-1-1	L	>0.9	>0.9	0.63	>0.9	>0.9	>0.9	>0.9	>0.9	N/A	Continue to monitor future load forecast
BEARDSLY 115 kV	P2-4:A11:1:_BELLOTA 230KV - SECTION 1E & 2E	P2	Bus Tie Breaker Fault	L	1.02	1.01	0.78	1.05	1.09	1.03	1.05	1.01	1.04	SPS Recommended in 2019-2020 TPP
BELL PGE 115 kV	P2-4:A5:2:_GOLDHILL 115KV - SECTION 1F & 1E	P2	Bus Tie Breaker Fault	L	>0.9	1.00	0.58	>0.9	1.06	>0.9	>0.9	0.99	N/A	Continue to monitor future load forecast
BELLOTA 115 kV	P1-3:A11:9:_BELLOTA 230/115KV TB 2 & P1-3:A11:8:_BELLOTA 230/115KV TB 1	P6	N-1-1	L	0.86	0.87	0.51	>0.9	>0.9	>0.9	>0.9	0.86	N/A	SPS Recommended in 2019-2020 TPP
BELLOTA 115 kV	P2-4:A11:1:_BELLOTA 230KV - SECTION 1E & 2E	P2	Bus Tie Breaker Fault	L	0.88	0.87	0.51	1.13	1.17	0.90	1.13	0.86	N/A	SPS Recommended in 2019-2020 TPP
BNTA CRB 60 kV	P1-2:A11:52:_TESLA-SCHULTE SW STA #2 115KV [3970] & P1-2:A11:51:_TESLA-SCHULTE SW STA #1 115KV [3980]	P6	N-1-1	L	>0.9	>0.9	>0.9	>0.9	>0.9	0.83	>0.9	>0.9	N/A	Sensitivity only
BNTA CRB 60 kV	P5-5a:A11:17:_KASSON 115KV BUS (FAILURE OF NON-REDUNDANT RELAY)	P5	Non-Redundant Relay	L	0.61	0.94	0.62	0.98	1.00	0.83	0.98	0.95	N/A	Project: Vierra Looping in Project. Short term: Action Plan - Continue to monitor future load forecast for the long term issue
BNTA CRB 60 kV	P7-1:A11:28:_TESLA-SCHULTE SW STA #2 115KV [3970] & TESLA-SCHULTE SW STA #1 115KV [3982]	P7	DCTL	L	1.02	1.03	1.01	1.03	1.01	0.83	1.03	1.03	N/A	Sensitivity only
BONNIE N 60 kV	P1-2:A4:30:_RIO OSO-WOODLAND #1 115KV [3460] & P1-2:A5:35:_BELL-PLACER 115KV [4395] MOAS OPENED ON PLACER_BELL PGE	P6	N-1-1	L	>0.9	>0.9	0.89	>0.9	>0.9	>0.9	>0.9	>0.9	N/A	Continue to monitor future load forecast
BRKR SLG 115 kV	P1-2:A4:33:_WEST SACRAMENTO-DAVIS 115KV [4120] & P1-2:A4:24:_WOODLAND-DAVIS 115KV [4210]	P6	N-1-1	L	>0.9	>0.9	0.86	>0.9	>0.9	>0.9	>0.9	>0.9	N/A	Continue to monitor future load forecast
CALVO 60 kV	P1-2:A11:52:_TESLA-SCHULTE SW STA #2 115KV [3970] & P1-2:A11:51:_TESLA-SCHULTE SW STA #1 115KV [3980]	P6	N-1-1	L	0.55	>0.9	>0.9	>0.9	>0.9	0.82	>0.9	>0.9	N/A	Project: Vierra Looping in Project. Short term: Action Plan
CALVO 60 kV	P5-5a:A11:17:_KASSON 115KV BUS (FAILURE OF NON-REDUNDANT RELAY)	P5	Non-Redundant Relay	L	0.64	0.96	0.67	1.00	0.96	0.85	0.99	0.96	N/A	Project: Vierra Looping in Project. Short term: Action Plan - Continue to monitor future load forecast for the long term issue
CALVO 60 kV	P7-1:A11:28:_TESLA-SCHULTE SW STA #2 115KV [3970] & TESLA-SCHULTE SW STA #1 115KV [3982]	P7	DCTL	L	1.02	1.03	1.03	1.04	1.03	0.84	1.04	1.04	N/A	Sensitivity only
CAMANCHE 115 kV	P1-3:A11:9:_BELLOTA 230/115KV TB 2 & P1-3:A11:8:_BELLOTA 230/115KV TB 1	P6	N-1-1	L	0.86	0.87	0.50	>0.9	>0.9	>0.9	>0.9	0.87	N/A	SPS Recommended in 2019-2020 TPP
CAMANCHE 115 kV	P2-4:A11:1:_BELLOTA 230KV - SECTION 1E & 2E	P2	Bus Tie Breaker Fault	L	0.88	0.87	0.50	1.14	1.18	0.90	1.14	0.86	N/A	SPS Recommended in 2019-2020 TPP
CAMPUS 115 kV	P1-2:A4:24:_WOODLAND-DAVIS 115KV [4210] & P1-2:A4:33:_WEST SACRAMENTO-DAVIS 115KV [4120]	P6	N-1-1	L	0.89	0.89	0.82	>0.9	>0.9	>0.9	>0.9	>0.9	N/A	SPS Recommended in 2019-2020 TPP
CAPEHORN 60 kV	P2-4:A5:2:_GOLDHILL 115KV - SECTION 1F & 1E	P2	Bus Tie Breaker Fault	L	>0.9	1.01	0.89	>0.9	1.02	>0.9	>0.9	1.01	N/A	Continue to monitor future load forecast
CAPEHORN 60 kV	P1-2:A4:30:_RIO OSO-WOODLAND #1 115KV [3460] & P1-2:A5:35:_BELL-PLACER 115KV [4395] MOAS OPENED ON PLACER_BELL PGE	P6	N-1-1	L	>0.9	>0.9	0.85	>0.9	>0.9	>0.9	>0.9	>0.9	N/A	Continue to monitor future load forecast
CARBONA 60 kV	P5-5a:A11:17:_KASSON 115KV BUS (FAILURE OF NON-REDUNDANT RELAY)	P5	Non-Redundant Relay	L	0.59	0.93	0.59	0.99	0.90	0.82	0.98	0.93	N/A	Project: Vierra Looping in Project. Short term: Action Plan - Continue to monitor future load forecast for the long term issue
CARBONA 60 kV	P7-1:A11:28:_TESLA-SCHULTE SW STA #2 115KV [3970] & TESLA-SCHULTE SW STA #1 115KV [3982]	P7	DCTL	L	1.01	1.02	1.00	1.03	0.99	0.82	1.03	1.02	N/A	Sensitivity only
CATARACT 115 kV	P1-2:A11:45:_SCHULTE SW STA-KASSON-MANTECA 115KV [7472] & P1-2:A11:58:_SCHULTE SW STA-LAMMERS 115KV [3993]	P6	N-1-1	L	0.74	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	N/A	Project: Vierra Looping in Project. Short term: Action Plan

Substation	Contingency (All and Worst P6)	Category	Category Description	High/Low Voltage	Voltage PU (Baseline Scenarios)					Voltage PU (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
					2024 Summer Peak	2027 Summer Peak	2032 Summer Peak	2024 Spring Off-Peak	2027 Spring Off-Peak	2024 SP Heavy Renewable & Min Gas Gen	2024 Spring OP Sensitivity	2027 SP High CEC Forecast	2035 ATE	
CATARACT 115 kV	P2-4:A11:1:_BELLOTA 230KV - SECTION 1E & 2E	P2	Bus Tie Breaker Fault	L	0.98	0.97	0.79	1.06	1.08	0.99	1.06	0.97	N/A	SPS Recommended in 2019-2020 TPP
CATARACT 115 kV	P5-5a:A11:17:_KASSON 115KV BUS (FAILURE OF NON-REDUNDENT RELAY)	P5	Non-Redundant Relay	L	0.88	1.02	0.95	1.04	1.05	0.97	1.04	1.02	N/A	Project: Vierra Looping in Project. Short term: Action Plan
CATLETT 60 kV	P1-2:A5:16:_PALERMO-NICOLAUS 115KV [3210] MOAS OPENED ON PALERMO_E.MRY J2 & P1-2:A5:27:_RIO OSO-NICOLAUS 115KV [3440]	P6	N-1-1	L	>0.9	>0.9	0.62	>0.9	>0.9	>0.9	>0.9	>0.9	N/A	Continue to monitor future load forecast
CDCRSTN 115 kV	P1-3:A11:8:_BELLOTA 230/115KV TB 1 & P1-3:A11:9:_BELLOTA 230/115KV TB 2	P6	N-1-1	L	0.85	0.85	0.48	>0.9	>0.9	0.88	>0.9	0.85	N/A	SPS Recommended in 2019-2020 TPP
CDCRSTN 115 kV	P1-3:A11:9:_BELLOTA 230/115KV TB 2 & P1-3:A11:8:_BELLOTA 230/115KV TB 1	P6	N-1-1	L	0.85	0.85	0.48	>0.9	>0.9	0.88	>0.9	0.85	N/A	SPS Recommended in 2019-2020 TPP
CDCRSTN 115 kV	P2-4:A11:1:_BELLOTA 230KV - SECTION 1E & 2E	P2	Bus Tie Breaker Fault	L	0.86	0.85	0.48	1.14	1.17	0.88	1.13	0.85	N/A	SPS Recommended in 2019-2020 TPP
CHCGO PK 115 kV	P2-4:A5:2:_GOLDHILL 115KV - SECTION 1F & 1E	P2	Bus Tie Breaker Fault	L	>0.9	1.03	0.81	>0.9	1.06	>0.9	>0.9	1.03	N/A	Continue to monitor future load forecast
CHINESESTA 115 kV	P2-4:A11:1:_BELLOTA 230KV - SECTION 1E & 2E	P2	Bus Tie Breaker Fault	L	0.95	0.95	0.72	1.05	1.09	0.98	1.05	0.95	0.99	SPS Recommended in 2019-2020 TPP
CHINESESTA 115 kV	P1-3:A11:9:_BELLOTA 230/115KV TB 2 & P1-3:A11:8:_BELLOTA 230/115KV TB 1	P6	N-1-1	L	>0.9	>0.9	0.74	>0.9	>0.9	>0.9	>0.9	>0.9	N/A	SPS Recommended in 2019-2020 TPP
CL AMMNA 115 kV	P1-2:A11:45:_SCHULTE SW STA-KASSON-MANTECA 115KV [7472] & P1-2:A11:58:_SCHULTE SW STA-LAMMERS 115KV [3993]	P6	N-1-1	L	0.53	>0.9	>0.9	>0.9	>0.9	0.77	>0.9	>0.9	N/A	Project: Vierra Looping in Project. Short term: Action Plan
CL AMMNA 115 kV	P7-1:A11:28:_TESLA-SCHULTE SW STA #2 115KV [3970] & TESLA-SCHULTE SW STA #1 115KV [3982]	P7	DCTL	L	0.98	1.00	0.98	1.03	1.03	0.78	1.02	1.01	N/A	Sensitivity only
CNTRY CB 60 kV	P1-2:A11:14:_STAGG-TESLA 230KV [5680] & P1-2:A11:16:_EIGHT MILE ROAD-STAGG 230KV [5002]	P6	N-1-1	L	>0.9	>0.9	0.36	>0.9	>0.9	>0.9	>0.9	>0.9	N/A	Continue to monitor future load forecast
CNTRY CB 60 kV	P2-4:A11:23:_STAGG-D SECTION 1D & STAGG-E SECTION 1E 230KV	P2	Bus Tie Breaker Fault	L	N/A	N/A	0.41	N/A	N/A	N/A	N/A	N/A	N/A	Continue to monitor future load forecast
CNTRY CB 60 kV	P5-5a:A11:3:_STAGG 230KV BUS (FAILURE OF NON-REDUNDENT RELAY)	P5	Non-Redundant Relay	L	N/A	N/A	0.46	N/A	N/A	N/A	N/A	N/A	N/A	Continue to monitor future load forecast
CNTRY CB 60 kV	P5-5d:A11:1:_No BF Relay STAGG 230 KV CB252	P5	Non-Redundant Relay	L	N/A	N/A	0.46	N/A	N/A	N/A	N/A	N/A	N/A	Continue to monitor future load forecast
CNTRY CB 60 kV	P7-1:A11:33:_EIGHT MILE ROAD-STAGG 230KV [5002] & STAGG-TESLA 230KV [5680]	P7	DCTL	L	N/A	N/A	0.36	N/A	N/A	N/A	N/A	N/A	N/A	Continue to monitor future load forecast
CORTINA 230 kV	P2-3:A4:57:_CORTINA 230KV - RING R2 & R3	P2	Non-Bus Tie Breaker Fault	L	>0.9	0.92	0.87	>0.9	1.06	>0.9	>0.9	0.93	0.88	Continue to monitor future load forecast
CPM 115 kV	P2-1:A5:12:_MISSOURI FLAT-GOLD HILL #1 115KV [2660] (GOLDHILL-CPM TAP)	P2	Line Section w/o Fault	L	0.97	0.98	0.87	1.07	1.08	0.99	1.07	0.98	0.83	Continue to monitor future load forecast
CURTISS 115 kV	P2-4:A11:1:_BELLOTA 230KV - SECTION 1E & 2E	P2	Bus Tie Breaker Fault	L	0.96	0.96	0.73	1.05	1.09	0.98	1.05	0.96	1.00	SPS Recommended in 2019-2020 TPP
CURTISS 115 kV	P1-3:A11:9:_BELLOTA 230/115KV TB 2 & P1-3:A11:8:_BELLOTA 230/115KV TB 1	P6	N-1-1	L	>0.9	>0.9	0.74	>0.9	>0.9	>0.9	>0.9	>0.9	N/A	SPS Recommended in 2019-2020 TPP
DAVIS 115 kV	P1-2:A4:24:_WOODLAND-DAVIS 115KV [4210] & P1-2:A4:33:_WEST SACRAMENTO-DAVIS 115KV [4120]	P6	N-1-1	L	0.89	0.90	0.82	>0.9	>0.9	>0.9	>0.9	>0.9	N/A	SPS Recommended in 2019-2020 TPP
DEEPWATR 115 kV	P1-2:A4:32:_BRIGHTN-W.SCRMNO 115KV [0] & P1-4:A4:13:_W.SCRMNO S/D=V	P6	N-1-1	L	>0.9	>0.9	0.89	>0.9	>0.9	>0.9	>0.9	>0.9	N/A	Continue to monitor future load forecast
DEL MAR 60 kV	P1-2:A5:6:_RIO OSO-ATLANTIC 230KV [5590] & P1-2:A5:10:_ATLANTIC-GOLD HILL 230KV [4330]	P6	N-1-1	L	>0.9	>0.9	0.77	>0.9	>0.9	>0.9	>0.9	>0.9	N/A	Continue to monitor future load forecast
DIMOND_1 115 kV	P2-1:A5:50:_MISSOURI FLAT-GOLD HILL #1 115KV [2660] (SHPRING1-CLRKSVLT)	P2	Line Section w/o Fault	L	0.97	0.98	0.87	1.06	1.08	0.99	1.06	0.98	0.83	Continue to monitor future load forecast
DONNELLS 115 kV	P2-4:A11:1:_BELLOTA 230KV - SECTION 1E & 2E	P2	Bus Tie Breaker Fault	L	1.02	1.02	0.79	1.05	1.09	1.04	1.05	1.02	1.05	SPS Recommended in 2019-2020 TPP
DRAKE 60 kV	P2-3:A4:60:_CORTINA 230KV - RING R1 & R4	P2	Non-Bus Tie Breaker Fault	L	>0.9	0.95	0.88	>0.9	1.01	>0.9	>0.9	0.94	0.92	Continue to monitor future load forecast
DRAKE 60 kV	P1-3:A4:21:_CORTINA 230/115KV TB 6 & P1-3:A4:4:_CORTINA 230/115KV TB 4	P6	N-1-1	L	>0.9	>0.9	0.88	>0.9	>0.9	>0.9	>0.9	>0.9	N/A	Continue to monitor future load forecast
DUNNIGAN 60 kV	P1-2:A4:10:_CORTINA-VACA 230KV [4540]	P1	N-1	L	0.98	0.93	0.89	1.00	1.00	1.00	1.00	0.91	0.88	Continue to monitor future load forecast
DUNNIGAN 60 kV	P2-3:A4:60:_CORTINA 230KV - RING R1 & R4	P2	Non-Bus Tie Breaker Fault	L	>0.9	0.92	0.84	>0.9	1.00	>0.9	>0.9	0.91	0.88	Continue to monitor future load forecast
DUNNIGAN 60 kV	P5-5a:A4:6:_VACA-DIXON 230KV BUS (FAILURE OF NON-REDUNDENT RELAY)	P5	Non-Redundant Relay	L	0.97	0.92	0.88	0.99	1.01	1.00	0.99	0.90	N/A	Continue to monitor future load forecast
DUNNIGAN 60 kV	P5-5c(DC):A4:4:_Station	P5	Non-Redundant Relay	L	0.97	0.92	0.88	0.99	1.01	1.00	0.99	0.90	N/A	Continue to monitor future load forecast
DUNNIGAN 60 kV	P1-3:A4:4:_CORTINA 230/115KV TB 4 & P1-3:A4:21:_CORTINA 230/115KV TB 6	P6	N-1-1	L	>0.9	>0.9	0.84	>0.9	>0.9	>0.9	>0.9	0.90	N/A	Continue to monitor future load forecast
DUNNIGAN 60 kV	P7-1:A4:18 CORTINA-VACA and DELEVAN-VACA 1	P7	DCTL	L	0.98	0.93	0.89	1.00	1.00	1.00	1.00	0.91	0.88	Continue to monitor future load forecast
DUNNIGAN 60 kV	P7-1:A4:5_Logan Creek-Delevan 230 KV Line & Delevan-Cortina 230 KV Line	P7	DCTL	L	0.98	0.92	0.90	1.01	1.00	0.99	1.00	0.90	N/A	Continue to monitor future load forecast
DUTCHFLAT1PH 115 kV	P2-4:A5:2:_GOLDHILL 115KV - SECTION 1F & 1E	P2	Bus Tie Breaker Fault	L	>0.9	1.04	0.87	>0.9	1.05	>0.9	>0.9	1.04	N/A	Continue to monitor future load forecast

Substation	Contingency (All and Worst P6)	Category	Category Description	High/Low Voltage	Voltage PU (Baseline Scenarios)					Voltage PU (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
					2024 Summer Peak	2027 Summer Peak	2032 Summer Peak	2024 Spring Off-Peak	2027 Spring Off-Peak	2024 SP Heavy Renewable & Min Gas Gen	2024 Spring OP Sensitivity	2027 SP High CEC Forecast	2035 ATE	
E.MRYSVE 115 kV	P2-1:A5:15:_PALERMO-NICOLAUS 115KV [3210] (E.MRYSVE-E.MRY J2)	P2	Line Section w/o Fault	L	>0.9	>0.9	0.88	>0.9	>0.9	>0.9	>0.9	>0.9	0.87	Continue to monitor future load forecast
E.MRYSVE 115 kV	P1-2:A5:16:_PALERMO-NICOLAUS 115KV [3210] MOAS OPENED ON PALERMO_E.MRY J2 & P1-2:A5:27:_RIO OSO-NICOLAUS 115KV [3440]	P6	N-1-1	L	>0.9	>0.9	0.66	>0.9	>0.9	>0.9	>0.9	>0.9	N/A	Continue to monitor future load forecast
E.NICOLS 60 kV	P1-2:A5:16:_PALERMO-NICOLAUS 115KV [3210] MOAS OPENED ON PALERMO_E.MRY J2 & P1-2:A5:27:_RIO OSO-NICOLAUS 115KV [3440]	P6	N-1-1	L	>0.9	>0.9	0.66	>0.9	>0.9	>0.9	>0.9	>0.9	N/A	Continue to monitor future load forecast
EIGHT MI 230 kV	P7-1:A11:9:_EIGHT MILE ROAD-TESLA 230KV [4660] & STAGG-TESLA 230KV [5680]	P7	DCTL	L	0.97	0.98	0.96	1.04	1.14	0.90	1.03	0.98	N/A	System adjustments or voltage support if needed
ELLS GTY 115 kV	P2-2:A11:31:_TESLA 115KV SECTION 1D	P2	Bus Fault	L	0.96	N/A	N/A	0.99	N/A	0.89	0.99	N/A	N/A	Tesla 115 kV Bus Upgrade
ELLS GTY 115 kV	P2-3:A11:26:_TESLA - 1D 115KV & TESLA-SCHULTE SW STA #1 line	P2	Non-Bus Tie Breaker Fault	L	0.96	N/A	N/A	0.99	N/A	0.89	0.99	N/A	N/A	Tesla 115 kV Bus Upgrade
FLINT 115 kV	P2-4:A5:2:_GOLDHILL 115KV - SECTION 1F & 1E	P2	Bus Tie Breaker Fault	L	>0.9	1.00	0.57	>0.9	1.06	>0.9	>0.9	1.00	N/A	Continue to monitor future load forecast
FORST HL 60 kV	P2-4:A5:2:_GOLDHILL 115KV - SECTION 1F & 1E	P2	Bus Tie Breaker Fault	L	>0.9	1.00	0.86	>0.9	1.04	>0.9	>0.9	1.00	N/A	Continue to monitor future load forecast
FORST HL 60 kV	P1-1:A5:23:_OXBOW F 9.11KV GEN UNIT 1 & P1-2:A5:74:_DRUM-SPAULDING 60KV [6770]	P3	N-G-1	L	>0.9	>0.9	0.88	>0.9	>0.9	>0.9	>0.9	>0.9	N/A	Continue to monitor future load forecast
FORST HL 60 kV	P1-2:A4:30:_RIO OSO-WOODLAND #1 115KV [3460] & P1-2:A5:35:_BELL-PLACER 115KV [4395] MOAS OPENED ON PLACER_BELL PGE	P6	N-1-1	L	>0.9	>0.9	0.77	>0.9	>0.9	>0.9	>0.9	>0.9	N/A	Continue to monitor future load forecast
FROGTOWN 115 kV	P1-2:A11:45:_SCHULTE SW STA-KASSON-MANTECA 115KV [7472] & P1-2:A11:58:_SCHULTE SW STA-LAMMERS 115KV [3993]	P6	N-1-1	L	0.74	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	N/A	Project: Vierra Looping in Project. Short term: Action Plan
FROGTOWN 115 kV	P1-3:A11:9:_BELLOTA 230/115KV TB 2 & P1-3:A11:8:_BELLOTA 230/115KV TB 1	P6	N-1-1	L	>0.9	>0.9	0.76	>0.9	>0.9	>0.9	>0.9	>0.9	N/A	SPS Recommended in 2019-2020 TPP
FROGTOWN 115 kV	P2-4:A11:1:_BELLOTA 230KV - SECTION 1E & 2E	P2	Bus Tie Breaker Fault	L	0.96	0.96	0.77	1.06	1.09	0.98	1.06	0.96	N/A	SPS Recommended in 2019-2020 TPP
FROGTOWN 115 kV	P5-5a:A11:17:_KASSON 115KV BUS (FAILURE OF NON-REDUNDANT RELAY)	P5	Non-Redundant Relay	L	0.88	1.01	0.94	1.03	1.05	0.96	1.03	1.01	N/A	Project: Vierra Looping in Project. Short term: Action Plan
GRONMYER 60 kV	P1-2:A11:45:_SCHULTE SW STA-KASSON-MANTECA 115KV [7472] & P1-2:A11:58:_SCHULTE SW STA-LAMMERS 115KV [3993]	P6	N-1-1	L	0.58	>0.9	>0.9	>0.9	>0.9	0.84	>0.9	>0.9	N/A	Project: Vierra Looping in Project. Short term: Action Plan
GRONMYER 60 kV	P1-2:A11:58:_SCHULTE SW STA-LAMMERS 115KV [3993] & P1-2:A11:45:_SCHULTE SW STA-KASSON-MANTECA 115KV [7472]	P6	N-1-1	L	0.57	>0.9	>0.9	>0.9	>0.9	0.84	>0.9	>0.9	N/A	Project: Vierra Looping in Project. Short term: Action Plan
GRONMYER 60 kV	P5-5a:A11:17:_KASSON 115KV BUS (FAILURE OF NON-REDUNDANT RELAY)	P5	Non-Redundant Relay	L	0.72	1.00	0.81	1.02	1.01	0.91	1.02	1.01	N/A	Project: Vierra Looping in Project. Short term: Action Plan - Continue to monitor future load forecast for the long term issue
GRONMYER 60 kV	P7-1:A11:28:_TESLA-SCHULTE SW STA #2 115KV [3970] & TESLA-SCHULTE SW STA #1 115KV [3982]	P7	DCTL	L	1.02	1.03	1.03	1.04	1.03	0.86	1.04	1.04	N/A	Sensitivity only
GUSTINE 60 kV	P1-2:A12:16:_SALADO-NEWMAN #2 60KV [7870] MOAS OPENED ON CRWS LDG. CRWS LDJ	P1	N-1	L	0.91	0.90	0.89	0.98	0.94	1.01	0.97	0.90	0.87	Continue to monitor future load forecast
GUSTINE 60 kV	P1-1:A11:31:_GWFTRCY3 13.00KV & GWFTRCY1 13.80KV & GWFTRCY2 13.80KV GEN UNITS & P1-2:A12:19:_CROW CREEK SW STA-FRONTIER SOLAR PV 60KV [7859]	P3	N-G-1	L	0.88	0.85	0.83	>0.9	>0.9	>0.9	>0.9	0.85	N/A	Project: Vierra Looping in Project. Short term: Action Plan
GWFTRACY 115 kV	P1-2:A11:51:_TESLA-SCHULTE SW STA #1 115KV [3980] & P1-2:A11:52:_TESLA-SCHULTE SW STA #2 115KV [3970]	P6	N-1-1	L	>0.9	>0.9	>0.9	>0.9	>0.9	0.77	>0.9	>0.9	N/A	Sensitivity only
GWFTRACY 115 kV	P7-1:A11:28:_TESLA-SCHULTE SW STA #2 115KV [3970] & TESLA-SCHULTE SW STA #1 115KV [3982]	P7	DCTL	L	1.00	1.01	1.00	1.03	1.03	0.77	1.02	1.02	N/A	Sensitivity only
HALSEY 60 kV	P2-4:A5:2:_GOLDHILL 115KV - SECTION 1F & 1E	P2	Bus Tie Breaker Fault	L	>0.9	1.02	0.56	>0.9	1.03	>0.9	>0.9	1.02	N/A	Continue to monitor future load forecast
HAMMER 60 kV	P1-2:A11:14:_STAGG-TESLA 230KV [5680] & P1-2:A11:16:_EIGHT MILE ROAD-STAGG 230KV [5002]	P6	N-1-1	L	>0.9	>0.9	0.37	>0.9	>0.9	>0.9	>0.9	>0.9	N/A	Continue to monitor future load forecast
HAMMER 60 kV	P2-4:A11:23:_STAGG-D SECTION 1D & STAGG-E SECTION 1E 230KV	P2	Bus Tie Breaker Fault	L	N/A	N/A	0.42	N/A	N/A	N/A	N/A	N/A	N/A	Continue to monitor future load forecast
HAMMER 60 kV	P5-5a:A11:3:_STAGG 230KV BUS (FAILURE OF NON-REDUNDANT RELAY)	P5	Non-Redundant Relay	L	N/A	N/A	0.47	N/A	N/A	N/A	N/A	N/A	N/A	Continue to monitor future load forecast
HAMMER 60 kV	P7-1:A11:33:_EIGHT MILE ROAD-STAGG 230KV [5002] & STAGG-TESLA 230KV [5680]	P7	DCTL	L	N/A	N/A	0.38	N/A	N/A	N/A	N/A	N/A	N/A	Continue to monitor future load forecast
HARINTON 60 kV	P2-3:A4:60:_CORTINA 230KV - RING R1 & R4	P2	Non-Bus Tie Breaker Fault	L	>0.9	0.96	0.89	>0.9	1.01	>0.9	>0.9	0.95	0.93	Continue to monitor future load forecast
HARINTON 60 kV	P1-3:A4:21:_CORTINA 230/115KV TB 6 & P1-3:A4:4:_CORTINA 230/115KV TB 4	P6	N-1-1	L	>0.9	>0.9	0.89	>0.9	>0.9	>0.9	>0.9	>0.9	N/A	Continue to monitor future load forecast
HIGGINS 115 kV	P2-4:A5:2:_GOLDHILL 115KV - SECTION 1F & 1E	P2	Bus Tie Breaker Fault	L	>0.9	1.01	0.65	>0.9	1.06	>0.9	>0.9	1.00	N/A	Continue to monitor future load forecast
HJ HEINZ 115 kV	P1-2:A11:45:_SCHULTE SW STA-KASSON-MANTECA 115KV [7472] & P1-2:A11:58:_SCHULTE SW STA-LAMMERS 115KV [3993]	P6	N-1-1	L	0.52	>0.9	>0.9	>0.9	>0.9	0.76	>0.9	>0.9	N/A	Project: Vierra Looping in Project. Short term: Action Plan
HJ HEINZ 115 kV	P1-2:A11:46:_VIERRA-TESLA 115KV [0] & P1-2:A11:64:_SCHULTE SW STA-LAMMERS 115KV [3993]	P6	N-1-1	L	>0.9	>0.9	0.89	>0.9	>0.9	>0.9	>0.9	>0.9	N/A	System Upgrade/ Preferred Resources/Operating Solution as needed
HORSESHE 115 kV	P2-4:A5:2:_GOLDHILL 115KV - SECTION 1F & 1E	P2	Bus Tie Breaker Fault	L	>0.9	0.99	0.54	>0.9	1.07	>0.9	>0.9	0.99	N/A	Continue to monitor future load forecast

Substation	Contingency (All and Worst P6)	Category	Category Description	High/Low Voltage	Voltage PU (Baseline Scenarios)					Voltage PU (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
					2024 Summer Peak	2027 Summer Peak	2032 Summer Peak	2024 Spring Off-Peak	2027 Spring Off-Peak	2024 SP Heavy Renewable & Min Gas Gen	2024 Spring OP Sensitivity	2027 SP High CEC Forecast	2035 ATE	
HOWLANDRD 115 kV	P1-2:A11:46:_VIERRA-TESLA 115KV [0] & P1-2:A11:64:_SCHULTE SW STA-LAMMERS 115KV [3993]	P6	N-1-1	L	>0.9	>0.9	0.88	>0.9	>0.9	>0.9	>0.9	>0.9	N/A	Continue to monitor future load forecast
HOWLANDRD 115 kV	P5-5a:A11:17:_KASSON 115KV BUS (FAILURE OF NON-REDUNDENT RELAY)	P5	Non-Redundant Relay	L	N/A	0.96	0.88	N/A	1.02	N/A	N/A	0.97	N/A	Continue to monitor future load forecast
INE PRSN 60 kV	P1-1:A11:25:_PRDE 1-3 7.20KV GEN UNIT 1 & P1-2:A11:75:_VALLEY SPRINGS-MARTELL #1 60KV [8240]	P3	N-G-1	L	0.89	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	N/A	Project: Vierra Looping in Project. Short term: Action Plan
INGRM C. 115 kV	P5-5a:A11:17:_KASSON 115KV BUS (FAILURE OF NON-REDUNDENT RELAY)	P5	Non-Redundant Relay	L	0.89	0.98	0.94	1.01	1.02	0.96	1.01	0.99	N/A	Project: Vierra Looping in Project. Short term: Action Plan
INGRM C. 115 kV	P1-2:A11:58:_SCHULTE SW STA-LAMMERS 115KV [3993] & P1-2:A11:45:_SCHULTE SW STA-KASSON-MANTECA 115KV [7472]	P6	N-1-1	L	0.79	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	N/A	Project: Vierra Looping in Project. Short term: Action Plan
KASSON 115 kV	P1-2:A11:45:_SCHULTE SW STA-KASSON-MANTECA 115KV [7472] & P1-2:A11:50:_LAMMERS-KASSON 115KV [3972]	P6	N-1-1	L	0.82	>0.9	>0.9	>0.9	>0.9	0.87	>0.9	>0.9	N/A	Project: Vierra Looping in Project. Short term: Action Plan
KASSON 115 kV	P1-2:A11:45:_SCHULTE SW STA-KASSON-MANTECA 115KV [7472] & P1-2:A11:58:_SCHULTE SW STA-LAMMERS 115KV [3993]	P6	N-1-1	L	0.52	>0.9	>0.9	>0.9	>0.9	0.76	>0.9	>0.9	N/A	Project: Vierra Looping in Project. Short term: Action Plan
KASSON 115 kV	P2-4:A11:8:_TESLA D 230KV - SECTION 1D & 2D	P2	Bus Tie Breaker Fault	L	0.98	0.98	0.94	1.01	1.02	0.90	1.01	0.98	N/A	Sensitivity only
KASSON 115 kV	P5-5a:A11:17:_KASSON 115KV BUS (FAILURE OF NON-REDUNDENT RELAY)	P5	Non-Redundant Relay	L	0.60	0.91	0.60	0.98	0.92	0.79	0.97	0.92	N/A	Project: Vierra Looping in Project. Short term: Action Plan - Continue to monitor future load forecast for the long term issue
KASSON 115 kV	P5-5a:A11:5:_TESLA 230KV BUS D (FAILURE OF NON-REDUNDENT RELAY)	P5	Non-Redundant Relay	L	0.97	0.98	0.94	1.01	1.02	0.90	1.01	0.98	N/A	Sensitivity only
KASSON 115 kV	P7-1:A11:28:_TESLA-SCHULTE SW STA #2 115KV [3970] & TESLA-SCHULTE SW STA #1 115KV [3982]	P7	DCTL	L	0.99	1.01	0.98	1.02	1.03	0.78	1.02	1.01	N/A	Sensitivity only
KASSON 60 kV	P5-5a:A11:17:_KASSON 115KV BUS (FAILURE OF NON-REDUNDENT RELAY)	P5	Non-Redundant Relay	L	0.62	0.95	0.64	0.99	0.95	0.84	0.99	0.95	N/A	Project: Vierra Looping in Project. Short term: Action Plan - Continue to monitor future load forecast for the long term issue
KASSON 60 kV	P7-1:A11:28:_TESLA-SCHULTE SW STA #2 115KV [3970] & TESLA-SCHULTE SW STA #1 115KV [3982]	P7	DCTL	L	1.02	1.03	1.03	1.03	1.03	0.84	1.04	1.04	N/A	Sensitivity only
KMPUDGREEN 115 kV	P1-2:A4:32:_BRIGHTN-W.SCRMNO 115KV [0] & P1-2:A11:15:_VALLEY SPRINGS-BELLOTA 230KV [5860]	P6	N-1-1	L	>0.9	0.90	0.87	>0.9	>0.9	>0.9	>0.9	>0.9	N/A	System Upgrade/ Preferred Resources/Operating Solution as needed
LAMMERS 115 kV	P1-2:A11:52:_SCHULTE SW STA-KASSON-MANTECA 115KV [7472] & P1-2:A11:64:_SCHULTE SW STA-LAMMERS 115KV [3993]	P6	N-1-1	L	>0.9	0.90	0.80	>0.9	>0.9	>0.9	>0.9	>0.9	N/A	System Upgrade/ Preferred Resources/Operating Solution as needed
LAMMERS 115 kV	P1-2:A11:45:_SCHULTE SW STA-KASSON-MANTECA 115KV [7472] & P1-2:A11:58:_SCHULTE SW STA-LAMMERS 115KV [3993]	P6	N-1-1	L	0.50	>0.9	>0.9	>0.9	>0.9	0.74	>0.9	>0.9	N/A	Project: Vierra Looping in Project. Short term: Action Plan
LAMMERS 115 kV	P7-1:A11:28:_TESLA-SCHULTE SW STA #2 115KV [3970] & TESLA-SCHULTE SW STA #1 115KV [3982]	P7	DCTL	L	1.00	1.01	1.00	1.02	1.03	0.77	1.02	1.01	N/A	Sensitivity only
LEPRINO 115 kV	P1-2:A11:59:_TESLA-TRACY 115KV [4020] MOAS OPENED ON LEPRINO_TRACY JC & P1-2:A11:64:_SCHULTE SW STA-LAMMERS 115KV [3993]	P6	N-1-1	L	>0.9	>0.9	0.90	>0.9	>0.9	>0.9	>0.9	>0.9	N/A	Continue to monitor future load forecast
LEPRINO 115 kV	P2-2:A11:31:_TESLA 115KV SECTION 1D	P2	Bus Fault	L	0.96	N/A	N/A	0.99	N/A	0.89	0.99	N/A	N/A	Tesla 115 kV Bus Upgrade
LEPRINO 115 kV	P2-4:A11:8:_TESLA D 230KV - SECTION 1D & 2D	P2	Bus Tie Breaker Fault	L	0.97	0.97	0.91	1.00	1.02	0.90	1.00	0.98	N/A	Sensitivity only
LEPRINO 115 kV	P5-5a:A11:5:_TESLA 230KV BUS D (FAILURE OF NON-REDUNDENT RELAY)	P5	Non-Redundant Relay	L	0.97	0.97	0.91	1.00	1.02	0.90	1.00	0.98	N/A	Sensitivity only
LID 115 kV	P1-2:A11:46:_VIERRA-TESLA 115KV [0] & P1-2:A11:64:_SCHULTE SW STA-LAMMERS 115KV [3993]	P6	N-1-1	L	>0.9	>0.9	0.89	>0.9	>0.9	>0.9	>0.9	>0.9	N/A	Continue to monitor future load forecast
LINDEN 60 kV	P1-2:A11:20:_BELLOTA-WARNERVILLE 230KV [4380]	P1	N-1	L	N/A	1.03	1.01	N/A	1.10	N/A	N/A	1.02	N/A	System adjustments or voltage support if needed
LINDEN 60 kV	P5-5a:A11:11:_WARNERVILLE 230KV BUS (FAILURE OF NON-REDUNDENT RELAY)	P5	Non-Redundant Relay	L	1.00	1.03	1.01	1.04	1.10	1.02	1.04	1.02	N/A	System adjustments or voltage support if needed
LINDEN 60 kV	P7-1:A11:27:_TESLA-NEWARK #1 230KV [5720] & TESLA-RAVENSWOOD 230KV [5730]	P7	DCTL	L	1.00	1.02	1.01	1.04	1.10	1.02	1.04	1.02	N/A	System adjustments or voltage support if needed
LINDEN 60 kV	P7-1:A12:7:_COTTLE-MELONES 230KV [4530] & BELLOTA-WARNERVILLE 230KV [4380]	P7	DCTL	L	NConv	1.03	1.01	1.04	1.10	1.02	1.04	1.02	N/A	System adjustments or voltage support if needed
LOCKFORD 115 kV	P1-3:A11:8:_BELLOTA 230/115KV TB 1 & P1-3:A11:9:_BELLOTA 230/115KV TB 2	P6	N-1-1	L	0.86	0.86	0.50	>0.9	>0.9	0.90	>0.9	0.86	N/A	SPS Recommended in 2019-2020 TPP
LOCKFORD 115 kV	P1-3:A11:9:_BELLOTA 230/115KV TB 2 & P1-3:A11:8:_BELLOTA 230/115KV TB 1	P6	N-1-1	L	0.86	0.86	0.50	>0.9	>0.9	0.90	>0.9	0.86	N/A	SPS Recommended in 2019-2020 TPP
LOCKFORD 230 kV	P1-1:A11:1:_Q1109 0.48KV GEN UNIT 1 & P1-2:A11:4:_LOCKEFORD-BELLOTA 230KV [4990]	P3	N-G-1	L	0.90	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	N/A	Project: Lockeford - Lodi Area 230 kV Project. Short term: Action Plan
LOCKFORD 115 kV	P2-4:A11:1:_BELLOTA 230KV - SECTION 1E & 2E	P2	Bus Tie Breaker Fault	L	0.87	0.86	0.49	1.14	1.18	0.89	1.14	0.86	N/A	SPS Recommended in 2019-2020 TPP
LOCKFORD 230 kV	P1-2:A11:4:_LOCKEFORD-BELLOTA 230KV [4990]	P1	N-1	L	0.90	N/A	N/A	0.97	N/A	0.89	0.95	N/A	N/A	Project: Lockeford - Lodi Area 230 kV Project. Short term: Action Plan
LOCKFORD 230 kV	P2-2:A11:8:_BELLOTA 230KV SECTION 2E	P2	Bus Fault	L	0.90	0.91	0.97	0.97	1.01	0.89	0.95	0.92	N/A	SPS Recommended in 2019-2020 TPP
LOCKFORD 230 kV	P2-3:A11:89:_LOCKFORD 230KV - Ring R3 & R4	P2	Non-Bus Tie Breaker Fault	L	0.89	N/A	N/A	0.96	N/A	0.87	0.95	N/A	N/A	Project: Lockeford - Lodi Area 230 kV Project. Short term: Action Plan
LOCKFORD 230 kV	P2-3:A11:90:_LOCKFORD 230KV - Ring R3 & R2	P2	Non-Bus Tie Breaker Fault	L	0.90	N/A	N/A	0.96	N/A	0.87	0.95	N/A	N/A	Project: Lockeford - Lodi Area 230 kV Project. Short term: Action Plan

2022-2023 ISO Reliability Assessment - Study Results

Study Area: PG&E Central Valley
High/Low Voltages



Substation	Contingency (All and Worst P6)	Category	Category Description	High/Low Voltage	Voltage PU (Baseline Scenarios)					Voltage PU (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
					2024 Summer Peak	2027 Summer Peak	2032 Summer Peak	2024 Spring Off-Peak	2027 Spring Off-Peak	2024 SP Heavy Renewable & Min Gas Gen	2024 Spring OP Sensitivity	2027 SP High CEC Forecast	2035 ATE	
LOCKFORD 230 kV	P2-4:A11:1:_BELLOTA 230KV - SECTION 1E & 2E	P2	Bus Tie Breaker Fault	L	0.89	0.91	0.90	0.96	1.02	0.88	0.95	0.92	N/A	SPS Recommended in 2019-2020 TPP
LOCKFORD 230 kV	P2-4:A11:3:_BELLOTA 230KV - SECTION 2E & 2D	P2	Bus Tie Breaker Fault	L	0.90	0.91	0.97	0.96	1.01	0.89	0.95	0.92	N/A	Project: Lockeford - Lodi Area 230 kV Project. Short term: Action Plan
LOCKFORD 230 kV	P7-1:A11:11:_BRIGHTON-BELLOTA 230KV [4420] & LOCKFORD-BELLOTA 230KV [4990]	P7	DCTL	L	0.89	0.91	Contingency Invalid	0.96	1.02	0.88	0.95	0.92	N/A	Project: Lockeford - Lodi Area 230 kV Project. Short term: Action Plan
LOUISE 60 kV	P1-2:A11:45:_SCHULTE SW STA-KASSON-MANTECA 115KV [7472] & P1-2:A11:58:_SCHULTE SW STA-LAMMERS 115KV [3993]	P6	N-1-1	L	0.57	>0.9	>0.9	>0.9	>0.9	0.84	>0.9	>0.9	N/A	Project: Vierra Looping in Project. Short term: Action Plan
LOUISE 60 kV	P5-5a:A11:17:_KASSON 115KV BUS (FAILURE OF NON-REDUNDANT RELAY)	P5	Non-Redundant Relay	L	0.70	0.99	0.76	1.01	0.99	0.89	1.01	1.00	N/A	Project: Vierra Looping in Project. Short term: Action Plan - Continue to monitor future load forecast for the long term issue
LOUISE 60 kV	P7-1:A11:28:_TESLA-SCHULTE SW STA #2 115KV [3970] & TESLA-SCHULTE SW STA #1 115KV [3982]	P7	DCTL	L	1.03	1.04	1.03	1.04	1.03	0.86	1.04	1.04	N/A	Sensitivity only
LYOTH-SP 60 kV	P1-2:A11:45:_SCHULTE SW STA-KASSON-MANTECA 115KV [7472] & P1-2:A11:50:_LAMMERS-KASSON 115KV [3972]	P6	N-1-1	L	0.88	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	N/A	Project: Vierra Looping in Project. Short term: Action Plan
LYOTH-SP 60 kV	P1-2:A11:45:_SCHULTE SW STA-KASSON-MANTECA 115KV [7472] & P1-2:A11:58:_SCHULTE SW STA-LAMMERS 115KV [3993]	P6	N-1-1	L	0.54	>0.9	>0.9	>0.9	>0.9	0.81	>0.9	>0.9	N/A	Project: Vierra Looping in Project. Short term: Action Plan
LYOTH-SP 60 kV	P5-5a:A11:17:_KASSON 115KV BUS (FAILURE OF NON-REDUNDANT RELAY)	P5	Non-Redundant Relay	L	0.61	0.94	0.62	0.99	0.95	0.83	0.99	0.94	N/A	Project: Vierra Looping in Project. Short term: Action Plan - Continue to monitor future load forecast for the long term issue
LYOTH-SP 60 kV	P7-1:A11:28:_TESLA-SCHULTE SW STA #2 115KV [3970] & TESLA-SCHULTE SW STA #1 115KV [3982]	P7	DCTL	L	1.01	1.03	1.01	1.03	1.03	0.83	1.03	1.03	N/A	Sensitivity only
MANTECA 115 kV	P1-2:A11:45:_SCHULTE SW STA-KASSON-MANTECA 115KV [7472] & P1-2:A11:50:_LAMMERS-KASSON 115KV [3972]	P6	N-1-1	L	0.83	>0.9	>0.9	>0.9	>0.9	0.88	>0.9	>0.9	N/A	Project: Vierra Looping in Project. Short term: Action Plan
MANTECA 115 kV	P1-2:A11:45:_SCHULTE SW STA-KASSON-MANTECA 115KV [7472] & P1-2:A11:58:_SCHULTE SW STA-LAMMERS 115KV [3993]	P6	N-1-1	L	0.55	>0.9	>0.9	>0.9	>0.9	0.79	>0.9	>0.9	N/A	Project: Vierra Looping in Project. Short term: Action Plan
MANTECA 115 kV	P2-4:A11:8:_TESLA D 230KV - SECTION 1D & 2D	P2	Bus Tie Breaker Fault	L	0.97	0.97	0.93	1.01	1.02	0.90	1.01	0.97	N/A	Sensitivity only
MANTECA 115 kV	P5-5a:A11:17:_KASSON 115KV BUS (FAILURE OF NON-REDUNDANT RELAY)	P5	Non-Redundant Relay	L	0.74	0.95	0.87	0.99	1.02	0.87	0.99	0.96	N/A	Project: Vierra Looping in Project. Short term: Action Plan - Continue to monitor future load forecast for the long term issue
MANTECA 115 kV	P5-5a:A11:5:_TESLA 230KV BUS D (FAILURE OF NON-REDUNDANT RELAY)	P5	Non-Redundant Relay	L	0.96	0.97	0.93	1.01	1.02	0.89	1.01	0.97	N/A	Sensitivity only
MANTECA 115 kV	P7-1:A11:28:_TESLA-SCHULTE SW STA #2 115KV [3970] & TESLA-SCHULTE SW STA #1 115KV [3982]	P7	DCTL	L	0.98	1.00	0.98	1.02	1.03	0.80	1.02	1.00	N/A	Sensitivity only
MANTECA 60 kV	P5-5a:A11:17:_KASSON 115KV BUS (FAILURE OF NON-REDUNDANT RELAY)	P5	Non-Redundant Relay	L	0.74	1.02	0.84	1.02	1.02	0.92	1.02	1.02	N/A	Project: Vierra Looping in Project. Short term: Action Plan - Continue to monitor future load forecast for the long term issue
MANTECA 60 kV	P7-1:A11:28:_TESLA-SCHULTE SW STA #2 115KV [3970] & TESLA-SCHULTE SW STA #1 115KV [3982]	P7	DCTL	L	1.03	1.03	1.03	1.04	1.03	0.86	1.04	1.04	N/A	Sensitivity only
MARTELL 60 kV	P1-1:A11:15:_STCKNBIOMASS 13.80KV GEN UNIT 1 & P1-2:A11:75:_VALLEY SPRINGS-MARTELL #1 60KV [8240]	P3	N-G-1	L	0.88	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	N/A	Existing Operating Procedure
MARTELL 60 kV	P1-1:A11:16:_WEST PNT 11.50KV GEN UNIT 1 & P1-2:A11:82:_VALLEY SPRINGS-MARTELL #1 60KV [8240]	P3	N-G-1	L	>0.9	0.89	>0.9	>0.9	>0.9	>0.9	>0.9	0.89	N/A	Existing Operating Procedure
MARTELL 60 kV	P1-1:A11:25:_PRDE 1-3 7.20KV GEN UNIT 1 & P1-2:A11:75:_VALLEY SPRINGS-MARTELL #1 60KV [8240]	P3	N-G-1	L	0.86	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	N/A	Existing Operating Procedure
MARTELL 60 kV	P1-2:A11:75:_VALLEY SPRINGS-MARTELL #1 60KV [8240]	P1	N-1	L	0.88	0.89	N/A	1.02	N/A	0.98	1.02	0.89	N/A	Existing Operating Procedure
MCSP 60 kV	P1-1:A11:25:_PRDE 1-3 7.20KV GEN UNIT 1 & P1-2:A11:75:_VALLEY SPRINGS-MARTELL #1 60KV [8240]	P3	N-G-1	L	0.89	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	N/A	Existing Operating Procedure
MCSP 60 kV	P1-1:A11:26:_PRDE 1-3 7.20KV GEN UNIT 2 & P1-2:A11:75:_VALLEY SPRINGS-MARTELL #1 60KV [8240]	P3	N-G-1	L	0.90	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	N/A	Existing Operating Procedure
MI-WUK 115 kV	P2-4:A11:1:_BELLOTA 230KV - SECTION 1E & 2E	P2	Bus Tie Breaker Fault	L	0.98	0.98	0.75	1.05	1.09	1.00	1.04	0.98	1.01	SPS Recommended in 2019-2020 TPP
MI-WUK 115 kV	P1-3:A11:9:_BELLOTA 230/115KV TB 2 & P1-3:A11:8:_BELLOTA 230/115KV TB 1	P6	N-1-1	L	>0.9	>0.9	0.76	>0.9	>0.9	>0.9	>0.9	>0.9	N/A	SPS Recommended in 2019-2020 TPP
MRYSVLLE 60 kV	P1-2:A5:156:_E.MRYSVE-MRYSVLLE #1 60KV [0]	P1	N-1	L	>0.9	>0.9	0.87	>0.9	>0.9	>0.9	>0.9	>0.9	0.84	Continue to monitor future load forecast
MRYSVLLE 60 kV	P1-1:A4:16:_WOODLANDBIOM 13.80KV GEN UNIT 1 & P1-2:A5:156:_E.MRYSVE-MRYSVLLE #1 60KV [0]	P3	N-G-1	L	>0.9	>0.9	0.86	>0.9	>0.9	>0.9	>0.9	>0.9	N/A	Continue to monitor future load forecast
MRYSVLLE 60 kV	P1-2:A5:16:_PALERMO-NICOLAUS 115KV [3210] MOAS OPENED ON PALERMO_E.MRY J2 & P1-2:A5:27:_RIO OSO-NICOLAUS 115KV [3440]	P6	N-1-1	L	>0.9	>0.9	0.78	>0.9	>0.9	>0.9	>0.9	>0.9	N/A	Continue to monitor future load forecast
MSHR 60V 60 kV	P1-2:A11:14:_STAGG-TESLA 230KV [5680] & P1-2:A11:16:_EIGHT MILE ROAD-STAGG 230KV [5002]	P6	N-1-1	L	>0.9	>0.9	0.52	>0.9	>0.9	>0.9	>0.9	>0.9	N/A	Continue to monitor future load forecast
MSHR 60V 60 kV	P1-2:A11:16:_EIGHT MILE ROAD-STAGG 230KV [5002] & P1-2:A11:14:_STAGG-TESLA 230KV [5680]	P6	N-1-1	L	>0.9	>0.9	0.53	>0.9	>0.9	>0.9	>0.9	>0.9	N/A	Continue to monitor future load forecast
MSHR 60V 60 kV	P1-3:A11:16:_STAGG-E 230/60KV TB 4	P1	N-1	L	0.99	0.99	1.00	1.07	1.10	0.99	1.08	0.99	N/A	System adjustments or voltage support if needed

Substation	Contingency (All and Worst P6)	Category	Category Description	High/Low Voltage	Voltage PU (Baseline Scenarios)					Voltage PU (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
					2024 Summer Peak	2027 Summer Peak	2032 Summer Peak	2024 Spring Off-Peak	2027 Spring Off-Peak	2024 SP Heavy Renewable & Min Gas Gen	2024 Spring OP Sensitivity	2027 SP High CEC Forecast	2035 ATE	
MSHR 60V 60 kV	P1-2:A11:9S:_STAGG-HAMMER 60KV [8100]	P1	N-1	L	N/A	0.98	1.00	N/A	1.11	N/A	N/A	0.97	N/A	System adjustments or voltage support if needed
MSHR 60V 60 kV	P2-4:A11:23:_STAGG-D SECTION 1D & STAGG-E SECTION 1E 230KV	P2	Bus Tie Breaker Fault	L	N/A	N/A	0.55	N/A	N/A	N/A	N/A	N/A	N/A	Continue to monitor future load forecast
MSHR 60V 60 kV	P5-5a:A11:3:_STAGG 230KV BUS (FAILURE OF NON-REDUNDENT RELAY)	P5	Non-Redundant Relay	L	N/A	N/A	0.58	N/A	N/A	N/A	N/A	N/A	N/A	Continue to monitor future load forecast
MSHR 60V 60 kV	P5-5d:A11:1:_No BF Relay STAGG 230 KV CB252	P5	Non-Redundant Relay	L	N/A	N/A	0.58	N/A	N/A	N/A	N/A	N/A	N/A	Continue to monitor future load forecast
MSHR 60V 60 kV	P7-1:A11:33:_EIGHT MILE ROAD-STAGG 230KV [5002] & STAGG-TESLA 230KV [5680]	P7	DCTL	L	N/A	N/A	0.53	N/A	N/A	N/A	N/A	N/A	N/A	Continue to monitor future load forecast
MSSDLESW 60 kV	P1-2:A11:45:_SCHULTE SW STA-KASSON-MANTECA 115KV [7472] & P1-2:A11:50:_LAMMERS-KASSON 115KV [3972]	P6	N-1-1	L	0.90	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	N/A	Project: Vierra Looping in Project. Short term: Action Plan
MSSDLESW 60 kV	P5-5a:A11:17:_KASSON 115KV BUS (FAILURE OF NON-REDUNDENT RELAY)	P5	Non-Redundant Relay	L	0.69	0.99	0.75	1.01	0.99	0.89	1.01	1.00	N/A	Project: Vierra Looping in Project. Short term: Action Plan - Continue to monitor future load forecast for the long term issue
MSSDLESW 60 kV	P7-1:A11:28:_TESLA-SCHULTE SW STA #2 115KV [3970] & TESLA-SCHULTE SW STA #1 115KV [3982]	P7	DCTL	L	1.03	1.04	1.03	1.04	1.03	0.85	1.04	1.04	N/A	Sensitivity only
MTN_QUAR 60 kV	P2-4:A5:2:_GOLDHILL 115KV - SECTION 1F & 1E	P2	Bus Tie Breaker Fault	L	>0.9	1.02	0.55	>0.9	1.03	>0.9	>0.9	1.02	N/A	Continue to monitor future load forecast
NEWCASTLE 115 kV	P2-4:A5:2:_GOLDHILL 115KV - SECTION 1F & 1E	P2	Bus Tie Breaker Fault	L	>0.9	1.00	0.56	>0.9	1.06	>0.9	>0.9	0.99	N/A	Continue to monitor future load forecast
NEWMAN 60 kV	P1-2:A12:16:_SALADO-NEWMAN #2 60KV [7870] MOAS OPENED ON CRWS LDG_CRWS LDJ	P1	N-1	L	0.91	0.90	0.90	0.98	0.93	1.01	0.98	0.90	0.89	Existing Operating Procedure
NEWMAN 60 kV	P1-2:A12:19:_CROW CREEK SW STA-FRONTIER SOLAR PV 60KV [7859]	P1	N-1	L	0.91	0.89	0.89	0.97	0.93	1.00	0.97	0.89	0.84	Existing Operating Procedure
NEWMAN 60 kV	P1-1:A11:31:_GWFTRCY3 18.00KV & GWFTRCY1 13.80KV & GWFTRCY2 13.80KV GEN UNITS & P1-2:A12:19:_CROW CREEK SW STA-FRONTIER SOLAR PV 60KV [7859]	P3	N-G-1	L	>0.9	0.88	0.87	>0.9	>0.9	>0.9	>0.9	0.88	N/A	Existing Operating Procedure
OI GLASS 115 kV	P1-2:A11:52:_SCHULTE SW STA-KASSON-MANTECA 115KV [7472] & P1-2:A11:64:_SCHULTE SW STA-LAMMERS 115KV [3993]	P6	N-1-1	L	>0.9	0.90	0.80	>0.9	>0.9	>0.9	>0.9	>0.9	N/A	System Upgrade/ Preferred Resources/Operating Solution as needed
OI GLASS 115 kV	P1-2:A11:45:_SCHULTE SW STA-KASSON-MANTECA 115KV [7472] & P1-2:A11:58:_SCHULTE SW STA-LAMMERS 115KV [3993]	P6	N-1-1	L	0.50	>0.9	>0.9	>0.9	>0.9	0.74	>0.9	>0.9	N/A	Project: Vierra Looping in Project. Short term: Action Plan
OI GLASS 115 kV	P7-1:A11:28:_TESLA-SCHULTE SW STA #2 115KV [3970] & TESLA-SCHULTE SW STA #1 115KV [3982]	P7	DCTL	L	1.00	1.01	0.99	1.02	1.03	0.77	1.02	1.01	N/A	Sensitivity only
OXBOW 60 kV	P2-4:A5:2:_GOLDHILL 115KV - SECTION 1F & 1E	P2	Bus Tie Breaker Fault	L	>0.9	1.00	0.87	>0.9	1.05	>0.9	>0.9	1.01	N/A	Continue to monitor future load forecast
PEASE 115 kV	P1-2:A5:22:_PALERMO-PEASE 115KV [3220] MOAS OPENED ON PEASE_HONC JT1 & P1-2:A5:23:_PEASE-RIO OSO 115KV [3270] MOAS OPENED ON PEASE_E_MRY J1	P6	N-1-1	L	>0.9	>0.9	>0.9	>0.9	>0.9	0.90	>0.9	>0.9	N/A	Sensitivity only
PEASE 115 kV	P7-1:A5:20_Palermo-Pease 115 KV Line amd Pease-Rio Oso 115 KV Line	P7	DCTL	L	0.97	0.97	0.96	0.97	1.06	0.90	0.97	0.97	N/A	System adjustments or voltage support if needed
PENRYN 60 kV	P2-4:A5:2:_GOLDHILL 115KV - SECTION 1F & 1E	P2	Bus Tie Breaker Fault	L	>0.9	1.01	0.53	>0.9	1.03	>0.9	>0.9	1.01	N/A	Continue to monitor future load forecast
PEORIA 115 kV	P2-4:A11:1:_BELLOTA 230KV - SECTION 1E & 2E	P2	Bus Tie Breaker Fault	L	0.95	0.94	0.72	1.05	1.09	0.97	1.05	0.94	0.99	SPS Recommended in 2019-2020 TPP
PEORIA 115 kV	P1-3:A11:9:_BELLOTA 230/115KV TB 2 & P1-3:A11:8:_BELLOTA 230/115KV TB 1	P6	N-1-1	L	>0.9	>0.9	0.74	>0.9	>0.9	>0.9	>0.9	>0.9	N/A	SPS Recommended in 2019-2020 TPP
PLACER 115 kV	P2-4:A5:2:_GOLDHILL 115KV - SECTION 1F & 1E	P2	Bus Tie Breaker Fault	L	>0.9	1.00	0.57	>0.9	1.06	>0.9	>0.9	0.99	N/A	Continue to monitor future load forecast
PLACER 115 kV	P5-5a:A5:6:_GOLD HILL 115 KV BUS (FAILURE OF NON-REDUNDENT RELAY)	P5	Non-Redundant Relay	L	0.90	0.90	0.90	1.02	1.08	0.99	1.02	0.88	N/A	Project: Vierra Looping in Project. Short term: Action Plan - Continue to monitor future load forecast for the long term issue
PLACER 115 kV	P5-5d:A5:2:_No BF Relay Gold Hill 115KV CB 172 or 392	P5	Non-Redundant Relay	L	0.90	0.90	>0.9	1.02	1.08	0.99	1.02	0.88	N/A	Project: Gold Hill 230/115 kV Transformer Addition Project. Short term: Action Plan
PLACER 115 kV	P1-2:A5:18:_PLACER-GOLD HILL #2 115KV [4290] & P1-2:A5:17:_PLACER-GOLD HILL #1 115KV [3340]	P6	N-1-1	L	>0.9	0.90	0.90	>0.9	>0.9	>0.9	>0.9	>0.9	N/A	System Upgrade/ Preferred Resources/Operating Solution as needed
PLACER 115 kV	P7-1:A5:19_Placer-Gold Hill No. 1 115 KV Line and Placer-Gold Hill No. 2 115 KV Line	P7	DCTL	L	0.90	0.90	0.89	1.02	1.08	0.99	1.02	0.88	0.53	System Upgrade/ Preferred Resources/Operating Solution as needed
PLACER 60 kV	P2-4:A5:2:_GOLDHILL 115KV - SECTION 1F & 1E	P2	Bus Tie Breaker Fault	L	>0.9	1.02	0.57	>0.9	1.03	>0.9	>0.9	1.02	N/A	Continue to monitor future load forecast
PLSNT GR 115 kV	P1-2:A5:6:_RIO OSO-ATLANTIC 230KV [5590] & P1-2:A5:10:_ATLANTIC-GOLD HILL 230KV [4330]	P6	N-1-1	L	>0.9	>0.9	0.85	>0.9	>0.9	>0.9	>0.9	>0.9	N/A	Continue to monitor future load forecast
PLUMAS 60 kV	P1-2:A5:16:_PALERMO-NICOLAUS 115KV [3210] MOAS OPENED ON PALERMO_E_MRY J2 & P1-2:A5:27:_RIO OSO-NICOLAUS 115KV [3440]	P6	N-1-1	L	>0.9	>0.9	0.61	>0.9	>0.9	>0.9	>0.9	>0.9	N/A	Continue to monitor future load forecast
POST 115 kV	P1-2:A4:32:_BRIGHTN-W.SCRMNO 115KV [0] & P1-4:A4:13:_W.SCRMNO 5VD=V	P6	N-1-1	L	>0.9	>0.9	0.90	>0.9	>0.9	>0.9	>0.9	>0.9	N/A	Continue to monitor future load forecast
Q1109 115 kV	P1-3:A11:9:_BELLOTA 230/115KV TB 2 & P1-3:A11:8:_BELLOTA 230/115KV TB 1	P6	N-1-1	L	0.86	0.87	0.51	>0.9	>0.9	>0.9	>0.9	0.86	N/A	SPS Recommended in 2019-2020 TPP

Substation	Contingency (All and Worst P6)	Category	Category Description	High/Low Voltage	Voltage PU (Baseline Scenarios)					Voltage PU (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
					2024 Summer Peak	2027 Summer Peak	2032 Summer Peak	2024 Spring Off-Peak	2027 Spring Off-Peak	2024 SP Heavy Renewable & Min Gas Gen	2024 Spring OP Sensitivity	2027 SP High CEC Forecast	2035 ATE	
Q1109 115 kV	P1-3:A11:8:_BELLOTA 230/115KV TB 1 & P1-3:A11:9:_BELLOTA 230/115KV TB 2	P6	N-1-1	L	0.86	0.87	0.51	>0.9	>0.9	>0.9	>0.9	0.86	N/A	SPS Recommended in 2019-2020 TPP
Q1109 115 kV	P2-4:A11:1:_BELLOTA 230KV - SECTION 1E & 2E	P2	Bus Tie Breaker Fault	L	0.88	0.87	0.51	1.13	1.17	0.90	1.13	0.86	N/A	SPS Recommended in 2019-2020 TPP
R.TRACK 115 kV	P2-4:A11:1:_BELLOTA 230KV - SECTION 1E & 2E	P2	Bus Tie Breaker Fault	L	0.94	0.94	0.72	1.06	1.10	0.97	1.06	0.94	0.99	SPS Recommended in 2019-2020 TPP
R.TRACK 115 kV	P1-3:A11:9:_BELLOTA 230/115KV TB 2 & P1-3:A11:8:_BELLOTA 230/115KV TB 1	P6	N-1-1	L	>0.9	>0.9	0.73	>0.9	>0.9	>0.9	>0.9	>0.9	N/A	SPS Recommended in 2019-2020 TPP
RIO OSO 230 kV	P5-5a:A5:2:_RIO OSO 230 KV BUS (FAILURE OF NON-REDUNDENT RELAY)	P5	Non-Redundant Relay	L	0.93	1.02	0.87	1.03	1.20	0.90	1.01	1.03	N/A	Continue to monitor future load forecast
RIPON 115 kV	P1-2:A11:45:_SCHULTE SW STA-KASSON-MANTECA 115KV [7472] & P1-2:A11:50:_LAMMERS-KASSON 115KV [3972]	P6	N-1-1	L	0.82	>0.9	>0.9	>0.9	>0.9	0.88	>0.9	>0.9	N/A	Project: Vierra Looping in Project. Short term: Action Plan
RIPON 115 kV	P1-2:A11:45:_SCHULTE SW STA-KASSON-MANTECA 115KV [7472] & P1-2:A11:58:_SCHULTE SW STA-LAMMERS 115KV [3993]	P6	N-1-1	L	0.55	>0.9	>0.9	>0.9	>0.9	0.79	>0.9	>0.9	N/A	Project: Vierra Looping in Project. Short term: Action Plan
RIPON 115 kV	P2-3:A11:19:_KASSON - 1D 115KV & SCHULTE SW STA-KASSON-MANTECA line	P2	Non-Bus Tie Breaker Fault	L	0.90	N/A	N/A	1.01	N/A	0.93	1.01	N/A	N/A	Project: Vierra Looping in Project. Short term: Action Plan
RIPON 115 kV	P2-4:A11:1:_BELLOTA 230KV - SECTION 1E & 2E	P2	Bus Tie Breaker Fault	L	0.97	0.97	0.88	1.03	1.05	0.96	1.03	0.98	N/A	SPS Recommended in 2019-2020 TPP
RIPON 115 kV	P2-4:A11:8:_TESLA D 230KV - SECTION 1D & 2D	P2	Bus Tie Breaker Fault	L	0.96	0.96	0.92	1.01	1.03	0.89	1.00	0.96	N/A	Sensitivity only
RIPON 115 kV	P5-5a:A11:17:_KASSON 115KV BUS (FAILURE OF NON-REDUNDENT RELAY)	P5	Non-Redundant Relay	L	0.73	0.95	0.86	0.99	1.02	0.87	0.99	0.95	N/A	Project: Vierra Looping in Project. Short term: Action Plan - Continue to monitor future load forecast for the long term issue
RIPON 115 kV	P5-5a:A11:5:_TESLA 230KV BUS D (FAILURE OF NON-REDUNDENT RELAY)	P5	Non-Redundant Relay	L	0.96	0.96	0.92	1.01	1.03	0.89	1.00	0.96	N/A	Sensitivity only
RIPON 115 kV	P7-1:A11:28:_TESLA-SCHULTE SW STA #2 115KV [3970] & TESLA-SCHULTE SW STA #1 115KV [3982]	P7	DCTL	L	0.97	0.99	0.97	1.02	1.04	0.80	1.02	0.99	N/A	Sensitivity only
ROCKLIN 60 kV	P1-2:A5:6:_RIO OSO-ATLANTIC 230KV [5590] & P1-2:A5:10:_ATLANTIC-GOLD HILL 230KV [4330]	P6	N-1-1	L	>0.9	>0.9	0.79	>0.9	>0.9	>0.9	>0.9	>0.9	N/A	Continue to monitor future load forecast
ROLLINS 60 kV	P2-4:A5:2:_GOLDHILL 115KV - SECTION 1F & 1E	P2	Bus Tie Breaker Fault	L	>0.9	1.02	0.90	>0.9	1.02	>0.9	>0.9	1.02	N/A	Continue to monitor future load forecast
RVRBANK 115 kV	P2-4:A11:1:_BELLOTA 230KV - SECTION 1E & 2E	P2	Bus Tie Breaker Fault	L	0.89	0.88	0.53	1.13	1.18	0.91	1.13	0.87	0.99	SPS Recommended in 2019-2020 TPP
RVRBANK 115 kV	P1-3:A11:8:_BELLOTA 230/115KV TB 1 & P1-3:A11:9:_BELLOTA 230/115KV TB 2	P6	N-1-1	L	0.89	0.88	0.54	>0.9	>0.9	>0.9	>0.9	0.88	N/A	SPS Recommended in 2019-2020 TPP
SANDBAR 115 kV	P2-4:A11:1:_BELLOTA 230KV - SECTION 1E & 2E	P2	Bus Tie Breaker Fault	L	1.01	1.01	0.78	1.05	1.09	1.03	1.05	1.01	1.04	SPS Recommended in 2019-2020 TPP
SCHULTE 115 kV	P1-2:A11:51:_TESLA-SCHULTE SW STA #1 115KV [3980] & P1-2:A11:52:_TESLA-SCHULTE SW STA #2 115KV [3970]	P6	N-1-1	L	>0.9	>0.9	>0.9	>0.9	>0.9	0.77	>0.9	>0.9	N/A	Sensitivity only
SCHULTE 115 kV	P1-2:A11:52:_TESLA-SCHULTE SW STA #2 115KV [3970] & P1-2:A11:51:_TESLA-SCHULTE SW STA #1 115KV [3980]	P6	N-1-1	L	>0.9	>0.9	>0.9	>0.9	>0.9	0.77	>0.9	>0.9	N/A	Sensitivity only
SCHULTE 115 kV	P7-1:A11:28:_TESLA-SCHULTE SW STA #2 115KV [3970] & TESLA-SCHULTE SW STA #1 115KV [3982]	P7	DCTL	L	1.00	1.01	1.00	1.03	1.03	0.77	1.02	1.02	N/A	Sensitivity only
SEBASTIA 60 kV	P1-2:A11:14:_STAGG-TESLA 230KV [5680] & P1-2:A11:16:_EIGHT MILE ROAD-STAGG 230KV [5002]	P6	N-1-1	L	>0.9	>0.9	0.33	>0.9	>0.9	>0.9	>0.9	>0.9	N/A	Continue to monitor future load forecast
SEBASTIA 60 kV	P1-2:A11:16:_EIGHT MILE ROAD-STAGG 230KV [5002] & P1-2:A11:14:_STAGG-TESLA 230KV [5680]	P6	N-1-1	L	>0.9	>0.9	0.33	>0.9	>0.9	>0.9	>0.9	>0.9	N/A	Continue to monitor future load forecast
SEBASTIA 60 kV	P2-4:A11:23:_STAGG-D SECTION 1D & STAGG-E SECTION 1E 230KV	P2	Bus Tie Breaker Fault	L	N/A	N/A	0.38	N/A	N/A	N/A	N/A	N/A	N/A	Continue to monitor future load forecast
SEBASTIA 60 kV	P5-5a:A11:3:_STAGG 230KV BUS (FAILURE OF NON-REDUNDENT RELAY)	P5	Non-Redundant Relay	L	N/A	N/A	0.43	N/A	N/A	N/A	N/A	N/A	N/A	Continue to monitor future load forecast
SEBASTIA 60 kV	P5-5d:A11:1:_No BF Relay STAGG 230 KV CB252	P5	Non-Redundant Relay	L	N/A	N/A	0.43	N/A	N/A	N/A	N/A	N/A	N/A	Continue to monitor future load forecast
SEBASTIA 60 kV	P7-1:A11:33:_EIGHT MILE ROAD-STAGG 230KV [5002] & STAGG-TESLA 230KV [5680]	P7	DCTL	L	N/A	N/A	0.33	N/A	N/A	N/A	N/A	N/A	N/A	Continue to monitor future load forecast
SHADYGLN 60 kV	P2-4:A5:2:_GOLDHILL 115KV - SECTION 1F & 1E	P2	Bus Tie Breaker Fault	L	>0.9	1.01	0.89	>0.9	1.02	>0.9	>0.9	1.01	N/A	Continue to monitor future load forecast
SHADYGLN 60 kV	P1-2:A4:30:_RIO OSO-WOODLAND #1 115KV [3460] & P1-2:A5:35:_BELL-PLACER 115KV [4395] MOAS OPENED ON PLACER_BELL PGE	P6	N-1-1	L	>0.9	>0.9	0.85	>0.9	>0.9	>0.9	>0.9	>0.9	N/A	Continue to monitor future load forecast
SHPRING 115 kV	P2-1:A5:50:_MISSOURI FLAT-GOLD HILL #1 115KV [2660] (SHPRING1-CLRKSVLT)	P2	Line Section w/o Fault	L	0.97	0.97	0.87	1.06	1.08	0.99	1.06	0.98	0.83	Continue to monitor future load forecast
SHPRING1 115 kV	P2-1:A5:50:_MISSOURI FLAT-GOLD HILL #1 115KV [2660] (SHPRING1-CLRKSVLT)	P2	Line Section w/o Fault	L	0.97	0.97	0.87	1.06	1.08	0.99	1.06	0.98	0.83	Continue to monitor future load forecast
SHW 60 kV	P1-2:A11:14:_STAGG-TESLA 230KV [5680] & P1-2:A11:16:_EIGHT MILE ROAD-STAGG 230KV [5002]	P6	N-1-1	L	>0.9	>0.9	0.33	>0.9	>0.9	>0.9	>0.9	>0.9	N/A	Continue to monitor future load forecast
SHW 60 kV	P1-2:A11:16:_EIGHT MILE ROAD-STAGG 230KV [5002] & P1-2:A11:14:_STAGG-TESLA 230KV [5680]	P6	N-1-1	L	>0.9	>0.9	0.33	>0.9	>0.9	>0.9	>0.9	>0.9	N/A	Continue to monitor future load forecast

2022-2023 ISO Reliability Assessment - Study Results

Study Area: PG&E Central Valley
High/Low Voltages



Substation	Contingency (All and Worst P6)	Category	Category Description	High/Low Voltage	Voltage PU (Baseline Scenarios)					Voltage PU (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
					2024 Summer Peak	2027 Summer Peak	2032 Summer Peak	2024 Spring Off-Peak	2027 Spring Off-Peak	2024 SP Heavy Renewable & Min Gas Gen	2024 Spring OP Sensitivity	2027 SP High CEC Forecast	2035 ATE	
SHW 60 kV	P2-4:A11:23:_STAGG-D SECTION 1D & STAGG-E SECTION 1E 230KV	P2	Bus Tie Breaker Fault	L	N/A	N/A	0.37	N/A	N/A	N/A	N/A	N/A	N/A	Continue to monitor future load forecast
SHW 60 kV	P5-5a:A11:3:_STAGG 230KV BUS (FAILURE OF NON-REDUNDENT RELAY)	P5	Non-Redundant Relay	L	N/A	N/A	0.43	N/A	N/A	N/A	N/A	N/A	N/A	Continue to monitor future load forecast
SHW 60 kV	P5-5d:A11:1:_No BF Relay STAGG 230 KV CB252	P5	Non-Redundant Relay	L	N/A	N/A	0.43	N/A	N/A	N/A	N/A	N/A	N/A	Continue to monitor future load forecast
SHW 60 kV	P7-1:A11:33:_EIGHT MILE ROAD-STAGG 230KV [5002] & STAGG-TESLA 230KV [5680]	P7	DCTL	L	N/A	N/A	0.33	N/A	N/A	N/A	N/A	N/A	N/A	Continue to monitor future load forecast
SIERRAP 60 kV	P1-2:A5:6:_RIO OSO-ATLANTIC 230KV [5590] & P1-2:A5:10:_ATLANTIC-GOLD HILL 230KV [4330]	P6	N-1-1	L	>0.9	>0.9	0.77	>0.9	>0.9	>0.9	>0.9	>0.9	N/A	Continue to monitor future load forecast
SI COGEN 115 kV	P2-4:A11:1:_BELLOTA 230KV - SECTION 1E & 2E	P2	Bus Tie Breaker Fault	L	0.86	0.85	0.47	1.14	1.18	0.88	1.13	0.84	0.98	SPS Recommended in 2019-2020 TPP
SLT SPRG 115 kV	P1-2:A4:32:_BRIGHTN-W.SCRMNO 115KV [0] & P1-2:A11:15:_VALLEY SPRINGS-BELLOTA 230KV [5860]	P6	N-1-1	L	>0.9	0.90	0.87	>0.9	>0.9	>0.9	>0.9	>0.9	N/A	SPS Recommended in 2019-2020 TPP
SLT SPRG 115 kV	P1-3:A5:3:_RIO OSO 230/115KV TB 1 & P1-2:A11:15:_VALLEY SPRINGS-BELLOTA 230KV [5860]	P6	N-1-1	L	>0.9	>0.9	0.87	>0.9	>0.9	>0.9	>0.9	>0.9	N/A	Continue to monitor future load forecast
SLT SPRG 115 kV	P1-3:A5:4:_RIO OSO 230/115KV TB 2 & P1-2:A11:15:_VALLEY SPRINGS-BELLOTA 230KV [5860]	P6	N-1-1	L	>0.9	>0.9	0.87	>0.9	>0.9	>0.9	>0.9	>0.9	N/A	Continue to monitor future load forecast
SNDBR JT 115 kV	P2-4:A11:1:_BELLOTA 230KV - SECTION 1E & 2E	P2	Bus Tie Breaker Fault	L	1.01	1.01	0.78	1.05	1.09	1.03	1.05	1.01	1.04	SPS Recommended in 2019-2020 TPP
SPICAMIN 115 kV	P2-1:A5:50:_MISSOURI FLAT-GOLD HILL #1 115KV [2660] (SHPRING1-CLRKSVLT)	P2	Line Section w/o Fault	L	0.98	0.99	0.90	1.06	1.07	1.00	1.06	1.00	0.86	Continue to monitor future load forecast
SPISONORA 115 kV	P2-4:A11:1:_BELLOTA 230KV - SECTION 1E & 2E	P2	Bus Tie Breaker Fault	L	0.96	0.96	0.73	1.05	1.09	0.98	1.05	0.96	1.00	SPS Recommended in 2019-2020 TPP
SPRNG GP 115 kV	P2-4:A11:1:_BELLOTA 230KV - SECTION 1E & 2E	P2	Bus Tie Breaker Fault	L	1.01	1.01	0.78	1.05	1.09	1.03	1.05	1.01	1.04	SPS Recommended in 2019-2020 TPP
SPRNG GP 115 kV	P1-3:A11:9:_BELLOTA 230/115KV TB 2 & P1-3:A11:8:_BELLOTA 230/115KV TB 1	P6	N-1-1	L	>0.9	>0.9	0.80	>0.9	>0.9	>0.9	>0.9	>0.9	N/A	SPS Recommended in 2019-2020 TPP
STAGG 60 kV	P1-2:A11:14:_STAGG-TESLA 230KV [5680] & P1-2:A11:16:_EIGHT MILE ROAD-STAGG 230KV [5002]	P6	N-1-1	L	>0.9	>0.9	0.36	>0.9	>0.9	>0.9	>0.9	>0.9	N/A	Continue to monitor future load forecast
STAGG 60 kV	P1-2:A11:16:_EIGHT MILE ROAD-STAGG 230KV [5002] & P1-2:A11:14:_STAGG-TESLA 230KV [5680]	P6	N-1-1	L	>0.9	>0.9	0.36	>0.9	>0.9	>0.9	>0.9	>0.9	N/A	Continue to monitor future load forecast
STAGG 60 kV	P2-4:A11:23:_STAGG-D SECTION 1D & STAGG-E SECTION 1E 230KV	P2	Bus Tie Breaker Fault	L	N/A	N/A	0.41	N/A	N/A	N/A	N/A	N/A	N/A	Continue to monitor future load forecast
STAGG 60 kV	P5-5a:A11:3:_STAGG 230KV BUS (FAILURE OF NON-REDUNDENT RELAY)	P5	Non-Redundant Relay	L	N/A	N/A	0.46	N/A	N/A	N/A	N/A	N/A	N/A	Continue to monitor future load forecast
STAGG 60 kV	P5-5d:A11:1:_No BF Relay STAGG 230 KV CB252	P5	Non-Redundant Relay	L	N/A	N/A	0.46	N/A	N/A	N/A	N/A	N/A	N/A	Continue to monitor future load forecast
STAGG 60 kV	P7-1:A11:33:_EIGHT MILE ROAD-STAGG 230KV [5002] & STAGG-TESLA 230KV [5680]	P7	DCTL	L	N/A	N/A	0.36	N/A	N/A	N/A	N/A	N/A	N/A	Continue to monitor future load forecast
STAGG-D 230 kV	P1-2:A11:14:_STAGG-TESLA 230KV [5680] & P1-2:A11:16:_EIGHT MILE ROAD-STAGG 230KV [5002]	P6	N-1-1	L	>0.9	>0.9	0.32	>0.9	>0.9	>0.9	>0.9	>0.9	N/A	Continue to monitor future load forecast
STAGG-D 230 kV	P1-2:A11:16:_EIGHT MILE ROAD-STAGG 230KV [5002] & P1-2:A11:14:_STAGG-TESLA 230KV [5680]	P6	N-1-1	L	>0.9	>0.9	0.32	>0.9	>0.9	>0.9	>0.9	>0.9	N/A	Continue to monitor future load forecast
STAGG-D 230 kV	P2-4:A11:7:_TESLA E 230KV - SECTION 2E & 1E	P2	Bus Tie Breaker Fault	L	0.96	0.97	0.94	1.04	1.15	0.89	1.04	0.97	N/A	System Upgrade/ Preferred Resources/Operating Solution as needed
STAGG-D 230 kV	P5-5a:A11:6:_TESLA 230KV BUS E (FAILURE OF NON-REDUNDENT RELAY)	P5	Non-Redundant Relay	L	0.96	0.97	0.94	1.04	1.15	0.89	1.04	0.97	N/A	Sensitivity only
STAGG-D 230 kV	P7-1:A11:33:_EIGHT MILE ROAD-STAGG 230KV [5002] & STAGG-TESLA 230KV [5680]	P7	DCTL	L	N/A	N/A	0.32	N/A	N/A	N/A	N/A	N/A	N/A	Continue to monitor future load forecast
STAGG-D 230 kV	P7-1:A11:9:_EIGHT MILE ROAD-TESLA 230KV [4660] & STAGG-TESLA 230KV [5680]	P7	DCTL	L	0.96	0.97	0.95	1.04	1.14	0.89	1.03	0.97	N/A	Sensitivity only
STAGG-E 230 kV	P1-2:A11:14:_STAGG-TESLA 230KV [5680] & P1-2:A11:16:_EIGHT MILE ROAD-STAGG 230KV [5002]	P6	N-1-1	L	>0.9	>0.9	0.32	>0.9	>0.9	>0.9	>0.9	>0.9	N/A	Continue to monitor future load forecast
STAGG-E 230 kV	P1-2:A11:16:_EIGHT MILE ROAD-STAGG 230KV [5002] & P1-2:A11:14:_STAGG-TESLA 230KV [5680]	P6	N-1-1	L	>0.9	>0.9	0.32	>0.9	>0.9	>0.9	>0.9	>0.9	N/A	Continue to monitor future load forecast
STAGG-E 230 kV	P1-2:A11:26:_EIGHT MILE ROAD-TESLA 230KV [4660] & P1-2:A11:8:_STAGG-TESLA 230KV [5680]	P6	N-1-1	L	>0.9	>0.9	>0.9	>0.9	>0.9	0.89	>0.9	>0.9	N/A	Sensitivity only
STAGG-E 230 kV	P1-2:A11:8:_STAGG-TESLA 230KV [5680] & P1-2:A11:26:_EIGHT MILE ROAD-TESLA 230KV [4660]	P6	N-1-1	L	>0.9	>0.9	>0.9	>0.9	>0.9	0.89	>0.9	>0.9	N/A	Sensitivity only
STAGG-E 230 kV	P2-4:A11:7:_TESLA E 230KV - SECTION 2E & 1E	P2	Bus Tie Breaker Fault	L	0.96	0.97	0.94	1.04	1.15	0.89	1.04	0.97	N/A	System adjustments or voltage support if needed
STAGG-E 230 kV	P5-5a:A11:6:_TESLA 230KV BUS E (FAILURE OF NON-REDUNDENT RELAY)	P5	Non-Redundant Relay	L	0.96	0.97	0.94	1.04	1.15	0.89	1.04	0.97	N/A	Sensitivity only
STAGG-E 230 kV	P7-1:A11:33:_EIGHT MILE ROAD-STAGG 230KV [5002] & STAGG-TESLA 230KV [5680]	P7	DCTL	L	N/A	N/A	0.32	N/A	N/A	N/A	N/A	N/A	N/A	Continue to monitor future load forecast
STAGG-E 230 kV	P7-1:A11:9:_EIGHT MILE ROAD-TESLA 230KV [4660] & STAGG-TESLA 230KV [5680]	P7	DCTL	L	0.96	0.97	0.95	1.04	1.14	0.89	1.03	0.97	N/A	Sensitivity only
STAGG-F 230 kV	P1-2:A11:14:_STAGG-TESLA 230KV [5680] & P1-2:A11:16:_EIGHT MILE ROAD-STAGG 230KV [5002]	P6	N-1-1	L	>0.9	>0.9	0.32	>0.9	>0.9	>0.9	>0.9	>0.9	N/A	Continue to monitor future load forecast
STAGG-F 230 kV	P1-2:A11:16:_EIGHT MILE ROAD-STAGG 230KV [5002] & P1-2:A11:14:_STAGG-TESLA 230KV [5680]	P6	N-1-1	L	>0.9	>0.9	0.32	>0.9	>0.9	>0.9	>0.9	>0.9	N/A	Continue to monitor future load forecast

2022-2023 ISO Reliability Assessment - Study Results

Study Area: PG&E Central Valley
High/Low Voltages



Substation	Contingency (All and Worst P6)	Category	Category Description	High/Low Voltage	Voltage PU (Baseline Scenarios)					Voltage PU (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
					2024 Summer Peak	2027 Summer Peak	2032 Summer Peak	2024 Spring Off-Peak	2027 Spring Off-Peak	2024 SP Heavy Renewable & Min Gas Gen	2024 Spring OP Sensitivity	2027 SP High CEC Forecast	2035 ATE	
STAGG-F 230 kV	P1-2:A11:26:_EIGHT MILE ROAD-TESLA 230KV [4660] & P1-2:A11:8:_STAGG-TESLA 230KV [5680]	P6	N-1-1	L	>0.9	>0.9	>0.9	>0.9	>0.9	0.89	>0.9	>0.9	N/A	Sensitivity only
STAGG-F 230 kV	P1-2:A11:8:_STAGG-TESLA 230KV [5680] & P1-2:A11:26:_EIGHT MILE ROAD-TESLA 230KV [4660]	P6	N-1-1	L	>0.9	>0.9	>0.9	>0.9	>0.9	0.89	>0.9	>0.9	N/A	Sensitivity only
STAGG-F 230 kV	P2-4:A11:7:_TESLA E 230KV - SECTION 2E & 1E	P2	Bus Tie Breaker Fault	L	0.96	0.97	0.94	1.04	1.15	0.89	1.04	0.97	N/A	System adjustments or voltage support if needed
STAGG-F 230 kV	P5-5a:A11:6:_TESLA 230KV BUS E (FAILURE OF NON-REDUNDENT RELAY)	P5	Non-Redundant Relay	L	0.96	0.97	0.94	1.04	1.15	0.89	1.04	0.97	N/A	Sensitivity only
STAGG-F 230 kV	P7-1:A11:33:_EIGHT MILE ROAD-STAGG 230KV [5002] & STAGG-TESLA 230KV [5680]	P7	DCTL	L	N/A	N/A	0.32	N/A	N/A	N/A	N/A	N/A	N/A	Continue to monitor future load forecast
STAGG-F 230 kV	P7-1:A11:9:_EIGHT MILE ROAD-TESLA 230KV [4660] & STAGG-TESLA 230KV [5680]	P7	DCTL	L	0.96	0.97	0.95	1.04	1.14	0.89	1.03	0.97	N/A	Sensitivity only
STAGG-H 230 kV	P1-2:A11:14:_STAGG-TESLA 230KV [5680] & P1-2:A11:16:_EIGHT MILE ROAD-STAGG 230KV [5002]	P6	N-1-1	L	>0.9	>0.9	0.32	>0.9	>0.9	>0.9	>0.9	>0.9	N/A	Continue to monitor future load forecast
STAGG-H 230 kV	P1-2:A11:16:_EIGHT MILE ROAD-STAGG 230KV [5002] & P1-2:A11:14:_STAGG-TESLA 230KV [5680]	P6	N-1-1	L	>0.9	>0.9	0.32	>0.9	>0.9	>0.9	>0.9	>0.9	N/A	Continue to monitor future load forecast
STAGG-H 230 kV	P1-2:A11:26:_EIGHT MILE ROAD-TESLA 230KV [4660] & P1-2:A11:8:_STAGG-TESLA 230KV [5680]	P6	N-1-1	L	>0.9	>0.9	>0.9	>0.9	>0.9	0.89	>0.9	>0.9	N/A	Sensitivity only
STAGG-H 230 kV	P1-2:A11:8:_STAGG-TESLA 230KV [5680] & P1-2:A11:26:_EIGHT MILE ROAD-TESLA 230KV [4660]	P6	N-1-1	L	>0.9	>0.9	>0.9	>0.9	>0.9	0.89	>0.9	>0.9	N/A	Sensitivity only
STAGG-H 230 kV	P2-4:A11:7:_TESLA E 230KV - SECTION 2E & 1E	P2	Bus Tie Breaker Fault	L	0.96	0.97	0.95	1.04	1.15	0.89	1.04	0.97	N/A	System adjustments or voltage support if needed
STAGG-H 230 kV	P5-5a:A11:6:_TESLA 230KV BUS E (FAILURE OF NON-REDUNDENT RELAY)	P5	Non-Redundant Relay	L	0.96	0.97	0.95	1.04	1.15	0.89	1.04	0.97	N/A	Sensitivity only
STAGG-H 230 kV	P7-1:A11:33:_EIGHT MILE ROAD-STAGG 230KV [5002] & STAGG-TESLA 230KV [5680]	P7	DCTL	L	N/A	N/A	0.32	N/A	N/A	N/A	N/A	N/A	N/A	Continue to monitor future load forecast
STAGG-H 230 kV	P7-1:A11:9:_EIGHT MILE ROAD-TESLA 230KV [4660] & STAGG-TESLA 230KV [5680]	P7	DCTL	L	0.96	0.97	0.95	1.04	1.14	0.89	1.04	0.97	N/A	Sensitivity only
STANISLS 115 kV	P1-2:A11:45:_SCHULTE SW STA-KASSON-MANTECA 115KV [7472] & P1-2:A11:58:_SCHULTE SW STA-LAMMERS 115KV [3993]	P6	N-1-1	L	0.73	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	N/A	Project: Vierra Looping in Project. Short term: Action Plan
STANISLS 115 kV	P1-2:A11:58:_SCHULTE SW STA-LAMMERS 115KV [3993] & P1-2:A11:45:_SCHULTE SW STA-KASSON-MANTECA 115KV [7472]	P6	N-1-1	L	0.73	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	N/A	Project: Vierra Looping in Project. Short term: Action Plan
STANISLS 115 kV	P1-3:A11:8:_BELLOTA 230/115KV TB 1 & P1-3:A11:9:_BELLOTA 230/115KV TB 2	P6	N-1-1	L	>0.9	>0.9	0.79	>0.9	>0.9	>0.9	>0.9	>0.9	N/A	SPS Recommended in 2019-2020 TPP
STANISLS 115 kV	P1-3:A11:9:_BELLOTA 230/115KV TB 2 & P1-3:A11:8:_BELLOTA 230/115KV TB 1	P6	N-1-1	L	>0.9	>0.9	0.79	>0.9	>0.9	>0.9	>0.9	>0.9	N/A	SPS Recommended in 2019-2020 TPP
STANISLS 115 kV	P2-4:A11:1:_BELLOTA 230KV - SECTION 1E & 2E	P2	Bus Tie Breaker Fault	L	0.98	0.98	0.80	1.06	1.08	0.99	1.06	0.98	N/A	SPS Recommended in 2019-2020 TPP
STANISLS 115 kV	P5-5a:A11:37:_KASSON 115KV BUS (FAILURE OF NON-REDUNDENT RELAY)	P5	Non-Redundant Relay	L	0.88	1.02	0.95	1.04	1.05	0.97	1.04	1.02	N/A	Project: Vierra Looping in Project. Short term: Action Plan
STCKTNJB 115 kV	P1-3:A11:8:_BELLOTA 230/115KV TB 1 & P1-3:A11:9:_BELLOTA 230/115KV TB 2	P6	N-1-1	L	0.85	0.86	0.49	>0.9	>0.9	0.89	>0.9	>0.9	N/A	SPS Recommended in 2019-2020 TPP
STCKTNJB 115 kV	P1-3:A11:9:_BELLOTA 230/115KV TB 2 & P1-3:A11:8:_BELLOTA 230/115KV TB 1	P6	N-1-1	L	0.85	0.86	0.49	>0.9	>0.9	>0.9	>0.9	>0.9	N/A	SPS Recommended in 2019-2020 TPP
STCKTNJB 115 kV	P2-4:A11:1:_BELLOTA 230KV - SECTION 1E & 2E	P2	Bus Tie Breaker Fault	L	0.86	0.85	0.49	1.14	1.18	0.89	1.14	0.85	N/A	SPS Recommended in 2019-2020 TPP
STKTON A 115 kV	P1-3:A11:8:_BELLOTA 230/115KV TB 1 & P1-3:A11:9:_BELLOTA 230/115KV TB 2	P6	N-1-1	L	0.84	0.84	0.47	>0.9	>0.9	0.88	>0.9	0.84	N/A	SPS Recommended in 2019-2020 TPP
STKTON A 115 kV	P1-3:A11:9:_BELLOTA 230/115KV TB 2 & P1-3:A11:8:_BELLOTA 230/115KV TB 1	P6	N-1-1	L	0.84	0.84	0.47	>0.9	>0.9	0.88	>0.9	0.84	N/A	SPS Recommended in 2019-2020 TPP
STKTON A 115 kV	P2-3:A11:41:_BELLOTA - 1D 115KV & GOLD HILL-BELLOTA-LOCKEFORD LINE	P2	Non-Bus Tie Breaker Fault	L	N/A	0.94	0.90	N/A	1.05	N/A	N/A	0.94	N/A	SPS Recommended in 2019-2020 TPP
STKTON A 115 kV	P2-4:A11:1:_BELLOTA 230KV - SECTION 1E & 2E	P2	Bus Tie Breaker Fault	L	0.85	0.84	0.47	1.14	1.18	0.87	1.13	0.84	N/A	SPS Recommended in 2019-2020 TPP
STKTON B 115 kV	P1-3:A11:8:_BELLOTA 230/115KV TB 1 & P1-3:A11:9:_BELLOTA 230/115KV TB 2	P6	N-1-1	L	0.85	0.85	0.49	>0.9	>0.9	0.89	>0.9	0.85	N/A	SPS Recommended in 2019-2020 TPP
STKTON B 115 kV	P1-3:A11:9:_BELLOTA 230/115KV TB 2 & P1-3:A11:8:_BELLOTA 230/115KV TB 1	P6	N-1-1	L	0.85	0.85	0.49	>0.9	>0.9	0.89	>0.9	0.85	N/A	SPS Recommended in 2019-2020 TPP
STKTON B 115 kV	P2-4:A11:1:_BELLOTA 230KV - SECTION 1E & 2E	P2	Bus Tie Breaker Fault	L	0.86	0.85	0.49	1.14	1.18	0.89	1.14	0.85	N/A	SPS Recommended in 2019-2020 TPP
STN COGN 115 kV	P1-3:A11:8:_BELLOTA 230/115KV TB 1 & P1-3:A11:9:_BELLOTA 230/115KV TB 2	P6	N-1-1	L	0.84	0.85	0.48	>0.9	>0.9	0.88	>0.9	0.84	N/A	SPS Recommended in 2019-2020 TPP
STN COGN 115 kV	P1-3:A11:9:_BELLOTA 230/115KV TB 2 & P1-3:A11:8:_BELLOTA 230/115KV TB 1	P6	N-1-1	L	0.84	0.85	0.48	>0.9	>0.9	0.88	>0.9	0.84	N/A	SPS Recommended in 2019-2020 TPP
STN COGN 115 kV	P2-4:A11:1:_BELLOTA 230KV - SECTION 1E & 2E	P2	Bus Tie Breaker Fault	L	0.86	0.85	0.47	1.14	1.18	0.88	1.13	0.84	N/A	SPS Recommended in 2019-2020 TPP
TAYLOR 60 kV	P1-2:A5:6:_RIO OSO-ATLANTIC 230KV [5590] & P1-2:A5:10:_ATLANTIC-GOLD HILL 230KV [4330]	P6	N-1-1	L	>0.9	>0.9	0.80	>0.9	>0.9	>0.9	>0.9	>0.9	N/A	Continue to monitor future load forecast
TERMNOUS 60 kV	P1-2:A11:14:_STAGG-TESLA 230KV [5680] & P1-2:A11:16:_EIGHT MILE ROAD-STAGG 230KV [5002]	P6	N-1-1	L	>0.9	>0.9	0.33	>0.9	>0.9	>0.9	>0.9	>0.9	N/A	Continue to monitor future load forecast
TERMNOUS 60 kV	P2-4:A11:23:_STAGG-D SECTION 1D & STAGG-E SECTION 1E 230KV	P2	Bus Tie Breaker Fault	L	N/A	N/A	0.38	N/A	N/A	N/A	N/A	N/A	N/A	Continue to monitor future load forecast

Substation	Contingency (All and Worst P6)	Category	Category Description	High/Low Voltage	Voltage PU (Baseline Scenarios)					Voltage PU (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
					2024 Summer Peak	2027 Summer Peak	2032 Summer Peak	2024 Spring Off-Peak	2027 Spring Off-Peak	2024 SP Heavy Renewable & Min Gas Gen	2024 Spring OP Sensitivity	2027 SP High CEC Forecast	2035 ATE	
TERMNOUS 60 kV	P5-5a:A11:3:_STAGG 230KV BUS (FAILURE OF NON-REDUNDENT RELAY)	P5	Non-Redundant Relay	L	N/A	N/A	0.43	N/A	N/A	N/A	N/A	N/A	N/A	Continue to monitor future load forecast
TERMNOUS 60 kV	P7-1:A11:33:_EIGHT MILE ROAD-STAGG 230KV [5002] & STAGG-TESLA 230KV [5680]	P7	DCTL	L	N/A	N/A	0.34	N/A	N/A	N/A	N/A	N/A	N/A	Continue to monitor future load forecast
TESLAMTR 115 kV	P1-2:A11:46:_VIERRA-TESLA 115KV [0] & P1-2:A11:64:_SCHULTE SW STA-LAMMERS 115KV [3993]	P6	N-1-1	L	>0.9	>0.9	0.88	>0.9	>0.9	>0.9	>0.9	>0.9	N/A	Continue to monitor future load forecast
TESLAMTR 115 kV	P5-5a:A11:17:_KASSON 115KV BUS (FAILURE OF NON-REDUNDENT RELAY)	P5	Non-Redundant Relay	L	1.03	0.96	0.88	1.03	1.02	1.02	1.03	0.97	N/A	Continue to monitor future load forecast
THURMAN SS 230 kV	P1-2:A11:10:_LOCKEFORD-BELLOTA 230KV [4990] & P1-2:A11:5:_BELLOTA-LOCKFORD 230KV [0]	P6	N-1-1	L	>0.9	>0.9	0.90	>0.9	>0.9	>0.9	>0.9	>0.9	N/A	Continue to monitor future load forecast
THURMAN SS 230 kV	P7-1:A11:37:_LOCKEFORD-BELLOTA 230KV #1 [4990] & LOCKEFORD-BELLOTA 230KV #2 [4990]	P7	DCTL	L	Bus Invalid	Bus Invalid	0.90	Bus Invalid	Bus Invalid	Bus Invalid	Bus Invalid	Bus Invalid	N/A	Continue to monitor future load forecast
TIGR CRK 115 kV	P1-2:A4:32:_BRIGHTN-W.SCRMNO 115KV [0] & P1-2:A11:15:_VALLEY SPRINGS-BELLOTA 230KV [5860]	P6	N-1-1	L	>0.9	0.90	0.87	>0.9	>0.9	>0.9	>0.9	>0.9	N/A	SPS Recommended in 2019-2020 TPP
TRACY 115 kV	P1-2:A11:59:_TESLA-TRACY 115KV [4020] MOAS OPENED ON LEPRINO_TRACY JC & P1-2:A11:64:_SCHULTE SW STA-LAMMERS 115KV [3993]	P6	N-1-1	L	>0.9	>0.9	0.90	>0.9	>0.9	>0.9	>0.9	>0.9	N/A	Continue to monitor future load forecast
TRACY 115 kV	P2-2:A11:31:_TESLA 115KV SECTION 1D	P2	Bus Fault	L	0.96	N/A	N/A	0.99	N/A	0.89	0.99	N/A	N/A	Tesla 115 kV Bus Upgrade
TRACY 115 kV	P2-3:A11:26:_TESLA - 1D 115KV & TESLA-SCHULTE SW STA #1 line	P2	Non-Bus Tie Breaker Fault	L	0.96	N/A	N/A	0.99	N/A	0.89	0.99	N/A	N/A	Tesla 115 kV Bus Upgrade
TRACY 115 kV	P2-3:A11:27:_TESLA - 1D 115KV & TESLA-TRACY line	P2	Non-Bus Tie Breaker Fault	L	0.96	N/A	N/A	1.00	N/A	0.89	0.99	N/A	N/A	Tesla 115 kV Bus Upgrade
TRACY 115 kV	P2-3:A11:28:_TESLA - 1D 115KV & TESLA-LAWRENCE LAB line	P2	Non-Bus Tie Breaker Fault	L	0.96	N/A	N/A	0.99	N/A	0.89	0.99	N/A	N/A	Tesla 115 kV Bus Upgrade
TRACY 115 kV	P2-3:A11:29:_TESLA - 1D 115KV & TESLA-SALADO-Q1103 line	P2	Non-Bus Tie Breaker Fault	L	0.96	N/A	N/A	0.99	N/A	0.89	0.99	N/A	N/A	Tesla 115 kV Bus Upgrade
TRACY 115 kV	P2-4:A11:8:_TESLA D 230KV - SECTION 1D & 2D	P2	Bus Tie Breaker Fault	L	0.96	0.97	0.91	1.00	1.02	0.90	1.00	0.97	N/A	Sensitivity only
TRACY 115 kV	P5-5a:A11:5:_TESLA 230KV BUS D (FAILURE OF NON-REDUNDENT RELAY)	P5	Non-Redundant Relay	L	0.97	0.97	0.91	1.00	1.02	0.89	1.00	0.97	N/A	Sensitivity only
TUDOR 60 kV	P1-2:A5:16:_PALERMO-NICOLAUS 115KV [3210] MOAS OPENED ON PALERMO_E.MRY J2 & P1-2:A5:27:_RIO OSO-NICOLAUS 115KV [3440]	P6	N-1-1	L	>0.9	>0.9	0.64	>0.9	>0.9	>0.9	>0.9	>0.9	N/A	Continue to monitor future load forecast
TULLOCH 115 kV	P2-4:A11:1:_BELLOTA 230KV - SECTION 1E & 2E	P2	Bus Tie Breaker Fault	L	0.92	0.91	0.66	1.07	1.11	0.95	1.07	0.91	1.00	SPS Recommended in 2019-2020 TPP
UOP 60 kV	P1-2:A11:14:_STAGG-TESLA 230KV [5680] & P1-2:A11:16:_EIGHT MILE ROAD-STAGG 230KV [5002]	P6	N-1-1	L	>0.9	>0.9	0.36	>0.9	>0.9	>0.9	>0.9	>0.9	N/A	Continue to monitor future load forecast
UOP 60 kV	P1-2:A11:16:_EIGHT MILE ROAD-STAGG 230KV [5002] & P1-2:A11:14:_STAGG-TESLA 230KV [5680]	P6	N-1-1	L	>0.9	>0.9	0.36	>0.9	>0.9	>0.9	>0.9	>0.9	N/A	Continue to monitor future load forecast
UOP 60 kV	P2-4:A11:23:_STAGG-D SECTION 1D & STAGG-E SECTION 1E 230KV	P2	Bus Tie Breaker Fault	L	N/A	N/A	0.41	N/A	N/A	N/A	N/A	N/A	N/A	Continue to monitor future load forecast
UOP 60 kV	P5-5a:A11:3:_STAGG 230KV BUS (FAILURE OF NON-REDUNDENT RELAY)	P5	Non-Redundant Relay	L	N/A	N/A	0.47	N/A	N/A	N/A	N/A	N/A	N/A	Continue to monitor future load forecast
UOP 60 kV	P5-5d:A11:1:_No BF Relay STAGG 230 KV CB252	P5	Non-Redundant Relay	L	N/A	N/A	0.47	N/A	N/A	N/A	N/A	N/A	N/A	Continue to monitor future load forecast
UOP 60 kV	P7-1:A11:33:_EIGHT MILE ROAD-STAGG 230KV [5002] & STAGG-TESLA 230KV [5680]	P7	DCTL	L	N/A	N/A	0.37	N/A	N/A	N/A	N/A	N/A	N/A	Continue to monitor future load forecast
VALLY HM 115 kV	P2-4:A11:1:_BELLOTA 230KV - SECTION 1E & 2E	P2	Bus Tie Breaker Fault	L	0.96	0.96	0.83	1.04	1.06	0.96	1.04	0.97	0.97	SPS Recommended in 2019-2020 TPP
VALLY HM 115 kV	P5-5a:A11:17:_KASSON 115KV BUS (FAILURE OF NON-REDUNDENT RELAY)	P5	Non-Redundant Relay	L	0.78	0.96	0.90	1.00	1.03	0.90	1.00	0.97	N/A	Project: Vierra Looping in Project. Short term: Action Plan
VALLY HM 115 kV	P1-3:A11:9:_BELLOTA 230/115KV TB 2 & P1-3:A11:8:_BELLOTA 230/115KV TB 1	P6	N-1-1	L	>0.9	>0.9	0.84	>0.9	>0.9	>0.9	>0.9	>0.9	N/A	SPS Recommended in 2019-2020 TPP
VALLY HM 115 kV	P7-1:A11:28:_TESLA-SCHULTE SW STA #2 115KV [3970] & TESLA-SCHULTE SW STA #1 115KV [3982]	P7	DCTL	L	0.98	1.00	0.99	1.03	1.05	0.84	1.03	1.00	N/A	Sensitivity only
VIERRA 115 kV	P1-2:A11:58:_SCHULTE SW STA-LAMMERS 115KV [3993] & P1-2:A11:45:_SCHULTE SW STA-KASSON-MANTECA 115KV [7472]	P6	N-1-1	L	0.53	>0.9		>0.9	>0.9	0.77	>0.9	>0.9	N/A	Project: Vierra Looping in Project. Short term: Action Plan
VIERRA 115 kV	P1-2:A11:64:_SCHULTE SW STA-LAMMERS 115KV [3993] & P1-2:A11:46:_VIERRA-TESLA 115KV [0]	P6	N-1-1	L	>0.9	>0.9	0.87	>0.9	>0.9	>0.9	>0.9	>0.9	N/A	Continue to monitor future load forecast
VIERRA 115 kV	P1-2:A11:64:_SCHULTE SW STA-LAMMERS 115KV [3993] & P1-2:A11:52:_SCHULTE SW STA-KASSON-MANTECA 115KV [7472]	P6	N-1-1	L	>0.9	>0.9	0.86	>0.9	>0.9	>0.9	>0.9	>0.9	N/A	Continue to monitor future load forecast
VIERRA 115 kV	P2-4:A11:8:_TESLA D 230KV - SECTION 1D & 2D	P2	Bus Tie Breaker Fault	L	0.97	0.97	0.94	1.01	1.02	0.89	1.01	0.98	N/A	Continue to monitor future load forecast
VIERRA 115 kV	P5-5a:A11:17:_KASSON 115KV BUS (FAILURE OF NON-REDUNDENT RELAY)	P5	Non-Redundant Relay	L	0.73	0.96	0.88	0.99	1.02	0.87	0.99	0.97	N/A	Project: Vierra Looping in Project. Short term: Action Plan - Continue to monitor future load forecast for the long term issue
VIERRA 115 kV	P5-5a:A11:5:_TESLA 230KV BUS D (FAILURE OF NON-REDUNDENT RELAY)	P5	Non-Redundant Relay	L	0.97	0.97	0.94	1.01	1.02	0.89	1.01	0.98	N/A	Sensitivity only
VIERRA 115 kV	P7-1:A11:28:_TESLA-SCHULTE SW STA #2 115KV [3970] & TESLA-SCHULTE SW STA #1 115KV [3982]	P7	DCTL	L	0.98	1.00	0.98	1.03	1.03	0.79	1.02	1.01	N/A	Sensitivity only

Substation	Contingency (All and Worst P6)	Category	Category Description	High/Low Voltage	Voltage PU (Baseline Scenarios)					Voltage PU (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
					2024 Summer Peak	2027 Summer Peak	2032 Summer Peak	2024 Spring Off-Peak	2027 Spring Off-Peak	2024 SP Heavy Renewable & Min Gas Gen	2024 Spring OP Sensitivity	2027 SP High CEC Forecast	2035 ATE	
W.SCRMNO 115 kV	P1-2:A4:32:_BRIGHTN-W.SCRMNO 115KV [0] & P1-4:A4:13:_W.SCRMNO SVD=V	P6	N-1-1	L	>0.9	>0.9	0.90	>0.9	>0.9	>0.9	>0.9	>0.9	N/A	Continue to monitor future load forecast
WEMR SWS 60 kV	P2-4:A5:2:_GOLDHILL 115KV - SECTION 1F & 1E	P2	Bus Tie Breaker Fault	L	>0.9	1.01	0.88	>0.9	1.02	>0.9	>0.9	1.01	N/A	Continue to monitor future load forecast
WEMR SWS 60 kV	P1-2:A4:30:_RIO OSO-WOODLAND #1 115KV [3460] & P1-2:A5:35:_BELL-PLACER 115KV [4395] MOAS OPENED ON PLACER_BELL PGE	P6	N-1-1	L	>0.9	>0.9	0.83	>0.9	>0.9	>0.9	>0.9	>0.9	N/A	Continue to monitor future load forecast
WESTLEY 60 kV	P5-5a:A11:17:_KASSON 115KV BUS (FAILURE OF NON-REDUNDENT RELAY)	P5	Non-Redundant Relay	L	0.57	0.91	0.53	0.96	0.99	0.79	0.96	0.92	N/A	Project: Vierra Looping in Project. Short term: Action Plan - Continue to monitor future load forecast for the long term issue
WESTLEY 60 kV	P1-2:A11:64:_SCHULTE SW STA-LAMMERS 115KV [3993] & P1-2:A11:52:_SCHULTE SW STA-KASSON-MANTECA 115KV [7472]	P6	N-1-1	L	>0.9	>0.9	0.79	>0.9	>0.9	>0.9	>0.9	>0.9	N/A	Continue to monitor future load forecast
WESTLEY 60 kV	P7-1:A11:28:_TESLA-SCHULTE SW STA #2 115KV [3970] & TESLA-SCHULTE SW STA #1 115KV [3982]	P7	DCTL	L	0.99	1.00	0.95	1.01	0.99	0.79	1.01	1.00	N/A	Sensitivity only
WHEATLND 60 kV	P1-2:A5:16:_PALERMO-NICOLAUS 115KV [3210] MOAS OPENED ON PALERMO_E.MRY J2 & P1-2:A5:27:_RIO OSO-NICOLAUS 115KV [3440]	P6	N-1-1	L	>0.9	>0.9	0.59	>0.9	>0.9	>0.9	>0.9	>0.9	N/A	Continue to monitor future load forecast
WILKINS 60 kV	P2-3:A4:60:_CORTINA 230KV - RING R1 & R4	P2	Non-Bus Tie Breaker Fault	L	>0.9	0.95	0.86	>0.9	0.99	>0.9	>0.9	0.96	0.88	Continue to monitor future load forecast
WILKINS 60 kV	P1-3:A4:21:_CORTINA 230/115KV TB 6 & P1-3:A4:4:_CORTINA 230/115KV TB 4	P6	N-1-1	L	>0.9	>0.9	0.86	>0.9	>0.9	>0.9	>0.9	>0.9	N/A	Continue to monitor future load forecast
WSTLNESW 60 kV	P2-4:A11:23:_STAGG-D SECTION 1D & STAGG-E SECTION 1E 230KV	P2	Bus Tie Breaker Fault	L	N/A	N/A	0.42	N/A	N/A	N/A	N/A	N/A	N/A	Continue to monitor future load forecast
WSTLNESW 60 kV	P5-5a:A11:3:_STAGG 230KV BUS (FAILURE OF NON-REDUNDENT RELAY)	P5	Non-Redundant Relay	L	N/A	N/A	0.47	N/A	N/A	N/A	N/A	N/A	N/A	Continue to monitor future load forecast
WSTLNESW 60 kV	P5-5d:A11:1:_No BF Relay STAGG 230 KV CB252	P5	Non-Redundant Relay	L	N/A	N/A	0.47	N/A	N/A	N/A	N/A	N/A	N/A	Continue to monitor future load forecast
WSTLNESW 60 kV	P7-1:A11:33:_EIGHT MILE ROAD-STAGG 230KV [5002] & STAGG-TESLA 230KV [5680]	P7	DCTL	L	N/A	N/A	0.38	N/A	N/A	N/A	N/A	N/A	N/A	Continue to monitor future load forecast

Study Area: PG&E Central Valley

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
				2024 Summer Peak	2027 Summer Peak	2032 Summer Peak	2024 Spring Off-Peak	2027 Spring Off-Peak	2024 SP Heavy Renewable & Min Gas Gen	2024 Spring OP Sensitivity	2027 SP High CEC Forecast	2035 ATE	
GUSTINE 60 kV	P1-2:A12:19: CROW CREEK SW STA-FRONTIER SOLAR PV 60KV [7859]	P1	N-1	<8	11	10	<8	<8	<8	<8	11	15	Existing Procedure
NEWMAN 60 kV	P1-2:A12:16: SALADO-NEWMAN #2 60KV [7870] MOAS OPENED ON CRWS LDG_CRWS	P1	N-1	<8	8	<8	<8	<8	<8	<8	8	N/A	Existing Procedure
NEWMAN 60 kV	P1-2:A12:19: CROW CREEK SW STA-FRONTIER SOLAR PV 60KV [7859]	P1	N-1	<8	9	9	<8	<8	<8	<8	9	12	Existing Procedure
MRYSVILLE 60 kV	P1-2:A5:156: E.MRYSVE-MRYSVILLE #1 60KV [0]	P1	N-1	<8	<8	14.4	<8	<8	<8	<8	<8	16	Under Review
MARTELL 60kV	P1-2:A11:75: VALLEY SPRINGS-MARTELL #1 60KV [8240]	P1	N-1	13	13	<8	<8	<8	<8	<8	13	N/A	Existing Procedure

Study Area: PG&E Central Valley

Transient Stability



Contingency	Category	Category Description	Transient Stability Performance						Potential Mitigation Solutions
			Baseline Scenarios				Sensitivity Scenarios		
			2024 Spring Off-Peak	2027 Summer Peak	2032 Summer Peak	2032 Spring Off-Peak	2027 SP High CEC Forecast	2024 OP Sensitivity	
In accordance with TPL-001-4- Requirement R2.6, this area relies on the past studies from the 2019-20 Transmission Planning Process for transient stability studies:									
http://www.caiso.com/Documents/AppendixC-BoardApproved2019-2020TransmissionPlan.pdf									

Study Area: PG&E Central Valley



Single Contingency Load Drop

Worst Contingency	Category	Category Description	Amount of Load Drop (MW)													Potential Mitigation Solutions
			2024 Summer Peak	2027 Summer Peak	2032 Summer Peak	2024 Winter Peak	2027 Winter Peak	2032 Winter Peak	2024 Spring Off-Peak	2027 Spring Off-Peak	2032 Spring Off-Peak	2027 SP High CEC Forecast	2024 SP Heavy Renewable & Min Gas Gen	2024 OP Sensitivity	2032 SP with Additional Transportation Electrification	

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

Study Area: PG&E Central Valley



Single Source Substation with more than 100 MW Load

Substation	Load Served (MW)													Potential Mitigation Solutions
	2024 Summer Peak	2027 Summer Peak	2032 Summer Peak	2024 Winter Peak	2027 Winter Peak	2032 Winter Peak	2024 Spring Off-Peak	2027 Spring Off-Peak	2032 Spring Off-Peak	2027 SP High CEC Forecast	2024 SP Heavy Renewable & Min Gas Gen	2024 OP Sensitivity	2032 SP with Additional Transportation Electrification	

No single source substation with more than 100 MW