



Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading % (Baseline Scenarios)					Loading % (Sensitivity Scenarios)				ISO Approved Projects & Potential Mitigation Solutions
				2021 Summer Peak	2024 Summer Peak	2029 Summer Peak	2021 Spring Off-Peak	2024 Spring Off-Peak	2024 SP High CEC Forecast	2024 SpOP Hi Renew & Min Gas Gen	2021 SP Heavy Renewable & Min Gas Gen	2029 Retirement of QF Generations	
30105 COTWD_E 230 30245 ROUND MT 230 3	P1-3:A3:61:_ROUND MT 500/230kV TB 1 & P1-2:A3:115:_ROUND MTN-COTTONWOOD #2 230kV	P6	N-1/N-1	<100	<100	<100	<100	<100	<100	100	<100	<100	Sensitivity only
31459 OREGNTRL 115 31469 SPI_AND 115 1	P1-3:A3:22:_COTWD_E2 230/60kV TB 2 & P1-3:A3:20:_COTWD_E 230/60kV TB 3	P6	N-1/N-1	111	122	133	<100	<100	126	<100	<100	133	Project: RAS Identified in 2017-2018 TPP In-service date: TBD Short term: Action plan
31464 COTWDPGE 115 31466 JESSUPJ1 115 1	P1-3:A3:22:_COTWD_E2 230/60kV TB 2 & P1-3:A3:20:_COTWD_E 230/60kV TB 3	P6	N-1/N-1	118	<100	<100	<100	<100	<100	<100	<100	<100	Project: RAS Identified in 2017-2018 TPP In-service date: TBD Short term: Action plan
31466 JESSUPJ1 115 31469 SPI_AND 115 1	P1-3:A3:22:_COTWD_E2 230/60kV TB 2 & P1-3:A3:20:_COTWD_E 230/60kV TB 3	P6	N-1/N-1	<100	108	114	<100	<100	112	<100	<100	114	Project: RAS Identified in 2017-2018 TPP In-service date: TBD Short term: Action plan
31468 CASCADE 115 31459 OREGNTRL 115 1	P1-3:A3:22:_COTWD_E2 230/60kV TB 2 & P1-3:A3:20:_COTWD_E 230/60kV TB 3	P6	N-1/N-1	<100	108	120	<100	<100	112	<100	<100	120	Project: RAS Identified in 2017-2018 TPP In-service date: TBD Short term: Action plan
31468 CASCADE 115 31797 CSCDE M 13.5 1	P1-3:A3:22:_COTWD_E2 230/60kV TB 2 & P1-3:A3:20:_COTWD_E 230/60kV TB 3	P6	N-1/N-1	105	<100	<100	<100	<100	<100	<100	<100	<100	Project: Cascade 115/60 kV No. 2 Transformer Project ISD: Jan. 2022 Short term: Action Plan
31478 TBLM JCT 115 31494 BIGBENTP 115 1	P2-2:A3:81:_TBLE MTN 115kV Section 1D	P2	Bus	93	99	109	12	13	101	64	13	109	Continue to monitor future load forecast
	P2-3:A3:134:_TBLE MTN - 1D 115kV & BUTTE-CHICO B-TBLE MTN line	P2	Non-Bus-Tie Breaker	93	98	108	12	12	100	64	12	108	Continue to monitor future load forecast
	P1-2:A3:6:_BUTTE-CHICO B-TBLE MTN 115kV & P1-2:A3:117:_SYCAMORE CREEK-NOTRE DAME-TABLE MTN 115kV	P6	N-1/N-1	<100	<100	103	<100	<100	<100	<100	<100	103	Continue to monitor future load forecast
31480 WYANDTTE 115 31516 WYANDJT2 115 1	P2-3:A3:98:_PALERMO - 1D 115kV & PALERMO-WYANDOTTE line	P2	Non-Bus-Tie Breaker	0	0	129	0	6	0	0	8	129	Existing SPS is under review
31480 WYANDTTE 115 31518 WYANDJT1 115 1	Base Case	P0	Base Case	97	97	102	14	7	99	67	9	102	Continue to monitor future load forecast
31482 PALERMO 115 31516 WYANDJT2 115 2	P2-2:A3:76:_TBL MT D 230kV Section 1D	P2	Bus	Diverge	Diverge	Diverge	Diverge	3	Diverge	Diverge	17	Diverge	Project: RAS Identified in 2017-2018 TPP In-service date: TBD Short term: Action plan
	P2-4:A3:27:_TBL MT D Section 1D & TBL MT E Section 1E 230kV	P2	Bus-Tie Breaker	Diverge	Diverge	Diverge	Diverge	2	Diverge	Diverge	Diverge	Diverge	Project: RAS Identified in 2017-2018 TPP In-service date: TBD Short term: Action plan
31486 CARIBOU 115 30255 CARBOU M 230 11	P1-2:A3:119:_TABLE MTN-PALERMO 230kV MOAS OPENED on TBL MT D_PALERMO	P1	N-1	94	41	34	71	102	41	94	102	34	Generation redispatch
	P2-1:A3:151:_TABLE MTN-PALERMO 230kV (TBL MT D-PALERMO)	P2	Line Section w/o Fault	94	41	34	71	102	41	94	102	34	Generation redispatch
	P2-3:A3:101:_PALERMO 230kV - Ring R2 & R1	P2	Non-Bus-Tie Breaker	94	41	34	71	102	41	94	102	34	Generation redispatch
	P1-1:A3:17:_CRBU 4-5 13.80kV Gen Unit 1 & P1-2:A3:119:_TABLE MTN-PALERMO 230kV MOAS OPENED on TBL MT D_PALERMO	P6	N-1/N-1	<100	<100	<100	<100	100	<100	<100	100	<100	Generation redispatch



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	P7-1:A3:18_Table Mountain(D)-Rio Oso 230 kV Line and Table Mountain(D)-Palermo 230 kV Line	P7	DCTL	94	28	20	71	115	28	94	116	20	Generation redispatch
31486 CARIBOU 115 31488 GRIZ JCT 115 1	P2-4:A3:27:_TBL MT D Section 1D & TBL MT E Section 1E 230kV	P2	Bus-Tie Breaker	Diverge	Diverge	Diverge	Diverge	23	Diverge	Diverge	Diverge	Diverge	Project: RAS Identified in 2017-2018 TPP In-service date: TBD Short term: Action plan
31488 GRIZ JCT 115 31512 BIG BEND 115 1	P2-3:A3:98:_PALERMO - 1D 115kV & PALERMO-WYANDOTTE line	P2	Non-Bus-Tie Breaker	0	0	129	0	10	0	0	12	129	Existing SPS is under review
	P2-4:A3:27:_TBL MT D Section 1D & TBL MT E Section 1E 230kV	P2	Bus-Tie Breaker	Diverge	Diverge	Diverge	Diverge	5	Diverge	Diverge	Diverge	Diverge	Project: RAS Identified in 2017-2018 TPP In-service date: TBD Short term: Action plan
31497 NDAME J 115 31498 SYCAMORE 115 1	P1-2:A3:8:_BUTTE-SYCAMORE CREEK 115kV MOAS OPENED on NORD 1_CHICOTP2	P1	N-1	102	109	115	13	19	111	71	20	115	Load, contingency and line rating are under review
	P2-1:A3:14:_BUTTE-SYCAMORE CREEK 115kV (NORD 1-CHICOTP2)	P2	Line Section w/o Fault	102	109	115	13	19	111	71	20	115	Load and line rating are under review
	P2-2:A3:4:_BUTTE 115kV Section MD	P2	Bus	102	110	115	14	20	112	71	22	115	Load and line rating are under review
	P2-3:A3:134:_TBLE MTN - 1D 115kV & BUTTE-CHICO B-TBLE MTN line	P2	Non-Bus-Tie Breaker	89	95	103	12	17	96	62	18	103	Continue to monitor future load forecast
	P2-3:A3:5:_BUTTE - MD 115kV & BUTTE-CHICO B-TBLE MTN line	P2	Non-Bus-Tie Breaker	132	139	144	20	29	142	89	31	144	Load and line rating are under review
	P2-3:A3:6:_BUTTE - MD 115kV & BUTTE-SYCAMORE CREEK line	P2	Non-Bus-Tie Breaker	102	109	116	13	19	112	71	21	116	Load and line rating are under review
	P2-4:A3:1:_BUTTE 115kV - Section ME & MD	P2	Bus-Tie Breaker	103	110	120	14	20	112	71	21	120	Load and line rating are under review
	P1-2:A3:6:_BUTTE-CHICO B-TBLE MTN 115kV & P1-2:A3:118:_TABLE MTN-BUTTE #2 115kV	P6	N-1/N-1	<100	<100	103	<100	<100	<100	<100	<100	103	Load and line rating are under review
31500 BUTTE 115 31501 CHICOTP1 115 1	P1-2:A3:118:_TABLE MTN-BUTTE #2 115kV & P1-2:A3:117:_SYCAMORE CREEK-NOTRE DAME-TABLE MTN 115kV	P6	N-1/N-1	106	114	126	<100	<100	117	<100	<100	126	Project: RAS Identified in 2017-2018 TPP In-service date: TBD Short term: Action plan
	P7-1:A3:4_Sycamore Creek-Notre Dame-Table Mountain and Table Mountain-Butte No.2 115 kV Lines	P7	DCTL	106	114	126	10	12	117	68	13	126	Project: RAS Identified in 2017-2018 TPP In-service date: TBD Short term: Action plan
31500 BUTTE 115 31504 TBLE MTN 115 2	P1-2:A3:6:_BUTTE-CHICO B-TBLE MTN 115kV & P1-2:A3:117:_SYCAMORE CREEK-NOTRE DAME-TABLE MTN 115kV	P6	N-1/N-1	121	129	144	<100	<100	132	<100	<100	144	Project: RAS Identified in 2017-2018 TPP In-service date: TBD Short term: Action plan
31501 CHICOTP1 115 31504 TBLE MTN 115 1	P2-2:A3:82:_TBLE MTN 115kV Section 2D	P2	Bus	89	94	100	12	14	96	60	16	100	Continue to monitor future load forecast
	P2-3:A3:135:_TBLE MTN - 2D 115kV & PARADISE-TABLE MTN line	P2	Non-Bus-Tie Breaker	89	94	101	12	14	96	60	16	101	Continue to monitor future load forecast
	P2-3:A3:136:_TBLE MTN - 2D 115kV & SYCAMORE CREEK-NOTRE DAME-TABLE MTN line	P2	Non-Bus-Tie Breaker	90	95	102	12	14	97	60	16	102	Continue to monitor future load forecast



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31501 CHICOT1 115 31504 TBLE MTN 115 1	P1-2:A3:118:_TABLE MTN-BUTTE #2 115kV & P1-2:A3:103:_PARADISE-TABLE MTN 115kV	P6	N-1/N-1	<100	<100	103	<100	<100	<100	<100	<100	103	Project: RAS Identified in 2017-2018 TPP In-service date: TBD Short term: Action plan
	P7-1:A3:4_ Sycamore Creek-Notre Dame-Table Mountain and Table Mountain-Butte No.2 115 kV Lines	P7	DCTL	123	130	144	14	18	134	81	20	144	Project: RAS Identified in 2017-2018 TPP In-service date: TBD Short term: Action plan
31503 CHICOTP2 115 31500 BUTTE 115 1	P1-2:A3:6:_BUTTE-CHICO B-TBLE MTN 115kV & P1-2:A3:117:_SYCAMORE CREEK-NOTRE DAME-TABLE MTN 115kV	P6	N-1/N-1	<100	<100	108	<100	<100	101	<100	<100	108	Project: RAS Identified in 2017-2018 TPP In-service date: TBD Short term: Action plan
31504 TBLE MTN 115 31497 NDAME J 115 1	P2-2:A3:81:_TBLE MTN 115kV Section 1D	P2	Bus	90	96	106	10	13	97	58	14	106	Continue to monitor future load forecast
	P2-3:A3:134:_TBLE MTN - 1D 115kV & BUTTE-CHICO B-TBLE MTN line	P2	Non-Bus-Tie Breaker	90	96	106	10	12	97	58	14	106	Continue to monitor future load forecast
	P1-2:A3:6:_BUTTE-CHICO B-TBLE MTN 115kV & P1-2:A3:118:_TABLE MTN-BUTTE #2 115kV	P6	N-1/N-1	<100	<100	105	<100	<100	<100	<100	<100	105	Project: RAS Identified in 2017-2018 TPP In-service date: TBD Short term: Action plan
31516 WYANDJT2 115 31512 BIG BEND 115 2	P2-3:A3:98:_PALERMO - 1D 115kV & PALERMO-WYANDOTTE line	P2	Non-Bus-Tie Breaker	0	0	130	0	7	0	0	9	130	Existing SPS is under review
	P2-4:A3:27:_TBL MT D Section 1D & TBL MT E Section 1E 230kV	P2	Bus-Tie Breaker	Diverge	Diverge	Diverge	Diverge	3	Diverge	Diverge	Diverge	Diverge	Project: RAS Identified in 2017-2018 TPP In-service date: TBD Short term: Action plan
31522 COTWD_2D 115 31466 JESSUPJ1 115 1	P1-3:A3:22:_COTWD_E2 230/60kV TB 2 & P1-3:A3:20:_COTWD_E 230/60kV TB 3	P6	N-1/N-1	<100	132	142	<100	<100	136	<100	<100	142	Project: RAS Identified in 2017-2018 TPP In-service date: TBD Short term: Action plan
31570 BENTON 60.0 31572 GIRVAN 60.0 1	P2-2:A3:18:_COTTONWD 60kV Section 1D	P2	Bus	NA	92	101	NA	11	93	NA	10	101	Continue to monitor future load forecast
	P2-3:A3:31:_COTTONWD - 1D 60kV & COTTONWOOD #1 line	P2	Non-Bus-Tie Breaker	NA	91	100	NA	11	93	NA	10	100	Continue to monitor future load forecast
	P2-3:A3:37:_COTTONWD - 1D 60kV & COTTONWOOD-RED BLUFF line COPY-21	P2	Non-Bus-Tie Breaker	NA	NA	101	NA	NA	NA	NA	NA	101	Continue to monitor future load forecast
	P2-3:A3:38:_COTTONWD - 1D 60kV & COTTONWOOD-RED BLUFF line COPY-22	P2	Non-Bus-Tie Breaker	NA	NA	100	NA	NA	NA	NA	NA	100	Continue to monitor future load forecast
	P1-3:A3:22:_COTWD_E2 230/60kV TB 2 & P1-3:A3:20:_COTWD_E 230/60kV TB 3	P6	N-1/N-1	103	101	123	<100	<100	105	<100	<100	123	Project: RAS Identified in 2017-2018 TPP In-service date: TBD Short term: Action plan
31576 WNTU PMS 60.0 31570 BENTON 60.0 1	P2-2:A3:27:_COTWD_2E 115kV Section 2E	P2	Bus	NA	54	54	NA	94	58	NA	104	54	Sensitivity only
	P2-4:A3:12:_COTWD_F2 Section 2F & COTWD_E2 Section 2E 230kV	P2	Bus-Tie Breaker	24	34	42	100	7	29	118	34	42	Sensitivity only
	P2-4:A3:6:_COTWD_1E Section 1E & COTWD_2E Section 2E 115kV	P2	Bus-Tie Breaker	NA	54	54	NA	94	58	NA	104	54	Sensitivity only
	P1-3:A3:22:_COTWD_E2 230/60kV TB 2 & P1-3:A3:20:_COTWD_E 230/60kV TB 3	P6	N-1/N-1	163	156	200	<100	<100	163	100	<100	200	Project: RAS Identified in 2017-2018 TPP In-service date: TBD Short term: Action plan
	P1-2:A3:28:_CASCADE-COTTONWOOD 115kV	P1	N-1	48	54	52	90	100	56	72	102	52	Sensitivity only



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31576 WNTU PMS 60.0 31578 LOMS JCT 60.0 1	P2-1:A3:39:_CASCADE-COTTONWOOD 115kV (CASCADE-OREGNTRL)	P2	Line Section w/o Fault	48	55	53	90	100	56	72	102	53	Sensitivity only
	P2-1:A3:42:_CASCADE-COTTONWOOD 115kV (OREGNTRL-SPI_AND)	P2	Line Section w/o Fault	33	44	42	91	101	43	65	105	42	Generation redispatch
	P2-2:A3:27:_COTWD_2E 115kV Section 2E	P2	Bus	NA	48	47	NA	100	51	NA	110	47	Sensitivity only
	P2-3:A3:55:_COTWD_2D - 2D 115kV & CASCADE-COTTONWOOD line	P2	Non-Bus-Tie Breaker	NA	55	52	NA	100	56	NA	102	52	Generation redispatch
	P2-4:A3:12:_COTWD_F2 Section 2F & COTWD_E2 Section 2E 230kV	P2	Bus-Tie Breaker	18	39	36	106	13	34	124	40	36	Project: Cottonwood 115 kV Bus Sectionalizing Breaker ISD: Dec 2022 Short term: Action Plan
	P2-4:A3:6:_COTWD_1E Section 1E & COTWD_2E Section 2E 115kV	P2	Bus-Tie Breaker	NA	48	47	NA	100	51	NA	110	47	Sensitivity only
	P1-2:A3:35:_COLEMAN-SOUTH 60kV & P1-2:A3:28:_CASCADE-COTTONWOOD 115kV	P6	N-1/N-1	<100	<100	<100	101	<100	<100	<100	103	<100	Generation redispatch
31580 CASCADE 60.0 31581 OREGNTRL 60.0 1	P2-2:A3:20:_COTTONWD 60kV Section MA	P2	Bus	Diverge	NA	NA	66	NA	NA	143	NA	NA	Sensitivity only
	P2-2:A3:27:_COTWD_2E 115kV Section 2E	P2	Bus	NA	30	27	NA	86	33	NA	104	27	Sensitivity only
	P2-3:A3:43:_COTTONWD - MA 60kV & COLEMAN-COTTONWOOD line	P2	Non-Bus-Tie Breaker	Diverge	NA	NA	78	NA	NA	123	NA	NA	Sensitivity only
	P2-3:A3:45:_COTTONWD - MA 60kV & COTTONWOOD #2 line	P2	Non-Bus-Tie Breaker	Diverge	NA	NA	66	NA	NA	141	NA	NA	Sensitivity only
	P2-3:A3:46:_COTTONWD - MA 60kV & COTTONWOOD-RED BLUFF line COPY-13	P2	Non-Bus-Tie Breaker	Diverge	NA	NA	66	NA	NA	143	NA	NA	Sensitivity only
	P2-4:A3:12:_COTWD_F2 Section 2F & COTWD_E2 Section 2E 230kV	P2	Bus-Tie Breaker	12	86	13	100	34	81	156	9	13	Sensitivity only
	P2-4:A3:2:_COTTONWD 60kV - Section 1D & 1E	P2	Bus-Tie Breaker	NA	Diverge	Diverge	NA	80	Diverge	NA	51	Diverge	Project: RAS Identified in 2017-2018 TPP In-service date: TBD Short term: Action plan
	P2-4:A3:6:_COTWD_1E Section 1E & COTWD_2E Section 2E 115kV	P2	Bus-Tie Breaker	NA	30	27	NA	86	33	NA	104	27	Sensitivity only
	P1-2:A3:34:_COLEMAN-RED BLUFF 60kV MOAS OPENED on COTTONWD_RED B JT & P1-2:A3:32:_COLEMAN-COTTONWOOD 60kV	P6	N-1/N-1	Diverge	<100	Diverge	<100	<100	<100	<100	<100	Diverge	Project: RAS Identified in 2017-2018 TPP In-service date: TBD Short term: Action plan
	P2-1:A3:42:_CASCADE-COTTONWOOD 115kV (OREGNTRL-SPI_AND)	P2	Line Section w/o Fault	66	78	70	83	90	78	70	100	70	Generation redispatch
	P2-2:A3:20:_COTTONWD 60kV Section MA	P2	Bus	Diverge	NA	NA	64	NA	NA	137	NA	NA	Project: RAS Identified in 2017-2018 TPP In-service date: TBD Short term: Action plan
	P2-2:A3:27:_COTWD_2E 115kV Section 2E	P2	Bus	NA	44	41	NA	89	48	NA	109	41	Generation redispatch
	P2-3:A3:43:_COTTONWD - MA 60kV & COLEMAN-COTTONWOOD line	P2	Non-Bus-Tie Breaker	Diverge	NA	NA	76	NA	NA	116	NA	NA	Project: RAS Identified in 2017-2018 TPP In-service date: TBD Short term: Action plan



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31581 OREGNTRL 60.0 31578 LOMS JCT 60.0 1	P2-3:A3:45:_COTTONWD - MA 60kV & COTTONWOOD #2 line	P2	Non-Bus-Tie Breaker	Diverge	NA	NA	64	NA	NA	137	NA	NA	Project: RAS Identified in 2017-2018 TPP In-service date: TBD Short term: Action plan
	P2-3:A3:46:_COTTONWD - MA 60kV & COTTONWOOD-RED BLUFF line COPY-13	P2	Non-Bus-Tie Breaker	Diverge	NA	NA	64	NA	NA	137	NA	NA	Project: RAS Identified in 2017-2018 TPP In-service date: TBD Short term: Action plan
	P2-4:A3:12:_COTWD_F2 Section 2F & COTWD_E2 Section 2E 230kV	P2	Bus-Tie Breaker	6	71	27	101	31	66	149	14	27	Project: RAS Identified in 2017-2018 TPP In-service date: TBD Short term: Action plan
	P2-4:A3:6:_COTWD_1E Section 1E & COTWD_2E Section 2E 115kV	P2	Bus-Tie Breaker	NA	44	41	NA	89	48	NA	109	41	Sensitivity only
	P1-3:A3:74:_TRINITY 115/60kV TB 1 & P1-2:A3:28:_CASCADE-COTTONWOOD 115kV	P6	N-1/N-1	<100	<100	<100	<100	<100	<100	<100	104	<100	Sensitivity only
31602 COLEMAN 60.0 31606 CLMN JCT 60.0 1	P1-2:A3:34:_COLEMAN-RED BLUFF 60kV MOAS OPENED on COTTONWD_RED B JT	P1	N-1	155	64	70	30	10	65	93	12	70	Project: Coleman - Red Bluff 60 kV Line Upgrade ISD: May 2021 Short term: Action Plan
31606 CLMN JCT 60.0 31608 RED BLFF 60.0 1	P1-2:A3:34:_COLEMAN-RED BLUFF 60kV MOAS OPENED on COTTONWD_RED B JT	P1	N-1	109	45	50	23	8	46	69	9	50	Project: Coleman - Red Bluff 60 kV Line Upgrade ISD: May 2021 Short term: Action Plan
31722 GLENN 60.0 31733 CAPYSWCH 60.0 3	Base Case	P0	Base Case	94	100	92	11	15	100	33	24	92	Sensitivity only
31733 CAPYSWCH 60.0 31731 CAPAYJCT 60.0 3	Base Case	P0	Base Case	94	100	92	11	15	100	33	24	92	Sensitivity only
31735 CHICO JT 60.0 31738 ANITA 60.0 3	Base Case	P0	Base Case	107	114	95	14	19	115	32	28	95	Significant leading power factor in near term
32200 PEASE 115 31506 HONC JT1 115 1	P1-2:A3:67:_TABLE MT 500/230kV TB1 & P1-2:A3:121:_TABLE MTN-RIO OSO 230kV	P6	N-1/N-1	<100	100	Diverge	<100	<100	100	<100	<100	Diverge	Generation redispatch
	P7-1:A3:13_Colgate - Rio Oso 230kV and Table Mountain(D)-Rio Oso 230 kV Line	P7	DCTL	78	81	101	33	27	81	47	34	101	Continue to monitor future load forecast
	P7-1:A3:14_Palermo-Nicolaus 115 kV Line and Palermo-Bogue 115 kV Line	P7	DCTL	81	79	100	25	18	79	50	28	100	Continue to monitor future load forecast
	P1-2:A3:14:_CARIBOU-TABLE MTN 230kV	P1	N-1	Potential Diverge	NA	NA	Potential Diverge	NA	NA	NA	Potential Diverge	NA	Under review

Study Area: PG&E North Valley

High/Low Voltages



Substation	Contingency (All and Worst P6)	Category	Category Description	VoltagePU (Baseline Scenarios)					VoltagePU (Sensitivity Scenarios)				ISO Approved Projects & Potential Mitigation Solutions
				2021 Summer Peak	2024 Summer Peak	2029 Summer Peak	2021 Spring Off-Peak	2024 Spring Off-Peak	2024 SP High CEC Forecast	2024 SpOP Hi Renew & Min Gas Gen	2021 SP Heavy Renewable & Min Gas Gen	2029 Retirement of QF Generations	
ANITA 60kV	Base Case	P0	Base Case	1.07	1.07	0.99	1.06	1.06	1.07	1.02	1.07	0.99	Load power factor correction and voltage support if needed
BCKS CRK 230kV	Base Case	P0	Base Case	1.03	1.04	1.03	1.05	1.05	1.04	1.03	1.05	1.03	Load power factor correction and voltage support if needed
BELDEN 230kV	Base Case	P0	Base Case	1.03	1.03	1.02	1.05	1.04	1.03	1.03	1.05	1.02	Load power factor correction and voltage support if needed
BIG BAR 60kV	Base Case	P0	Base Case	1.04	1.04	1.03	1.05	1.05	1.04	1.05	1.05	1.03	Load power factor correction and voltage support if needed
BTTE CRK 60kV	Base Case	P0	Base Case	1.04	1.05	1.04	1.06	1.05	1.05	1.04	1.04	1.04	Load power factor correction and voltage support if needed
BUTTE 115kV	Base Case	P0	Base Case	1.03	1.03	1.02	1.06	1.06	1.03	1.04	1.06	1.02	Load power factor correction and voltage support if needed
CANAL TP 60kV	Base Case	P0	Base Case	1.06	1.05	1.04	1.00	1.01	1.04	1.03	1.01	1.04	Load power factor correction and voltage support if needed
CAPAY 60kV	Base Case	P0	Base Case	1.05	1.05	1.04	1.06	1.06	1.05	1.05	1.06	1.04	Load power factor correction and voltage support if needed
CAPYSWCH 60kV	Base Case	P0	Base Case	1.05	1.05	1.05	1.06	1.05	1.05	1.05	1.06	1.05	Load power factor correction and voltage support if needed
CASCADE 60kV	Base Case	P0	Base Case	1.04	1.04	1.02	1.05	1.06	1.04	1.05	1.06	1.02	Load power factor correction and voltage support if needed
CASCADE 115kV	Base Case	P0	Base Case	1.04	1.04	1.02	1.05	1.06	1.04	1.05	1.06	1.02	Load power factor correction and voltage support if needed
CEDR CRK 60kV	Base Case	P0	Base Case	1.05	1.05	1.04	1.11	1.11	1.05	1.09	1.12	1.04	Load power factor correction and voltage support if needed
CHALLNGE 60kV	Base Case	P0	Base Case	1.05	1.06	1.03	1.08	1.07	1.06	1.05	1.07	1.03	Load power factor correction and voltage support if needed
CHICO B 115kV	Base Case	P0	Base Case	1.04	1.04	1.04	1.05	1.05	1.04	1.04	1.05	1.04	Load power factor correction and voltage support if needed
CNTRVLE 60kV	Base Case	P0	Base Case	1.04	1.05	1.04	1.05	1.05	1.05	1.04	1.04	1.04	Load power factor correction and voltage support if needed
CORNSWCH 60kV	Base Case	P0	Base Case	1.05	1.05	1.05	1.06	1.05	1.05	1.05	1.06	1.05	Load power factor correction and voltage support if needed
COWCK TP 60kV	Base Case	P0	Base Case	1.05	1.06	1.03	1.09	1.09	1.06	1.07	1.10	1.03	Load power factor correction and voltage support if needed
CR CANAL 60kV	Base Case	P0	Base Case	1.06	1.05	1.04	1.00	1.00	1.04	1.03	1.01	1.04	Load power factor correction and voltage support if needed
CRESTA 230kV	Base Case	P0	Base Case	1.03	1.04	1.02	1.05	1.05	1.04	1.03	1.05	1.02	Load power factor correction and voltage support if needed

Study Area: PG&E North Valley

High/Low Voltages



Substation	Contingency (All and Worst P6)	Category	Category Description	VoltagePU (Baseline Scenarios)					VoltagePU (Sensitivity Scenarios)				ISO Approved Projects & Potential Mitigation Solutions
				2021 Summer Peak	2024 Summer Peak	2029 Summer Peak	2021 Spring Off-Peak	2024 Spring Off-Peak	2024 SP High CEC Forecast	2024 SpOP Hi Renew & Min Gas Gen	2021 SP Heavy Renewable & Min Gas Gen	2029 Retirement of QF Generations	
DE SABLA 60kV	Base Case	P0	Base Case	1.04	1.05	1.04	1.06	1.05	1.05	1.04	1.04	1.04	Load power factor correction and voltage support if needed
DESCHUTS 60kV	Base Case	P0	Base Case	1.04	1.04	1.01	1.06	1.07	1.04	1.05	1.07	1.01	Load power factor correction and voltage support if needed
DIRYVLE 60kV	Base Case	P0	Base Case	1.01	1.02	0.99	1.06	1.06	1.02	1.02	1.07	0.99	Load power factor correction and voltage support if needed
FRNCHGLH 60kV	Base Case	P0	Base Case	1.04	1.05	1.02	1.05	1.06	1.05	1.05	1.06	1.02	Load power factor correction and voltage support if needed
FRSTGLEN 115kV	Base Case	P0	Base Case	1.05	1.06	1.04	1.06	1.06	1.06	1.08	1.06	1.04	Load power factor correction and voltage support if needed
GLENN 60kV	Base Case	P0	Base Case	1.05	1.05	1.05	1.06	1.05	1.05	1.05	1.06	1.05	Load power factor correction and voltage support if needed
HATLOSCK 60kV	Base Case	P0	Base Case	1.05	1.08	1.07	1.05	1.06	1.08	1.06	1.06	1.07	Load power factor correction and voltage support if needed
HEADGATE 60kV	Base Case	P0	Base Case	1.05	1.06	1.03	1.06	1.06	1.05	1.04	1.06	1.03	Load power factor correction and voltage support if needed
HONCUT 115kV	Base Case	P0	Base Case	1.04	1.05	1.03	1.08	1.06	1.05	1.04	1.06	1.03	Load power factor correction and voltage support if needed
HT CRKRG 60kV	Base Case	P0	Base Case	1.05	1.08	1.07	1.05	1.06	1.08	1.06	1.06	1.07	Load power factor correction and voltage support if needed
HYAMPOM 60kV	Base Case	P0	Base Case	1.03	1.04	1.02	1.04	1.04	1.04	1.04	1.04	1.02	Load power factor correction and voltage support if needed
INSKIP 60kV	Base Case	P0	Base Case	1.04	1.04	1.03	1.05	1.05	1.04	1.04	1.05	1.03	Load power factor correction and voltage support if needed
JESSUP 115kV	Base Case	P0	Base Case	1.04	1.04	1.02	1.06	1.06	1.04	1.04	1.06	1.02	Load power factor correction and voltage support if needed
KESWICK 60kV	Base Case	P0	Base Case	1.04	1.04	1.01	1.05	1.06	1.04	1.05	1.06	1.01	Load power factor correction and voltage support if needed
KILARC 60kV	Base Case	P0	Base Case	1.06	1.06	1.04	1.11	1.11	1.06	1.09	1.12	1.04	Load power factor correction and voltage support if needed
NEO REDT 60kV	Base Case	P0	Base Case	1.06	1.05	1.04	1.00	1.01	1.04	1.04	1.01	1.04	Load power factor correction and voltage support if needed
NORD 1 115kV	Base Case	P0	Base Case	1.02	1.02	1.01	1.06	1.06	1.02	1.04	1.06	1.01	Load power factor correction and voltage support if needed
NOTRDAME 115kV	Base Case	P0	Base Case	1.03	1.03	1.02	1.06	1.06	1.03	1.04	1.06	1.02	Load power factor correction and voltage support if needed
OREGNTRL 60kV	Base Case	P0	Base Case	1.05	1.05	1.02	1.05	1.06	1.05	1.05	1.06	1.02	Load power factor correction and voltage support if needed

Study Area: PG&E North Valley

High/Low Voltages



Substation	Contingency (All and Worst P6)	Category	Category Description	VoltagePU (Baseline Scenarios)					VoltagePU (Sensitivity Scenarios)				ISO Approved Projects & Potential Mitigation Solutions
				2021 Summer Peak	2024 Summer Peak	2029 Summer Peak	2021 Spring Off-Peak	2024 Spring Off-Peak	2024 SP High CEC Forecast	2024 SpOP Hi Renew & Min Gas Gen	2021 SP Heavy Renewable & Min Gas Gen	2029 Retirement of QF Generations	
OREGNTRL 115kV	Base Case	P0	Base Case	1.04	1.04	1.02	1.05	1.06	1.04	1.05	1.06	1.02	Load power factor correction and voltage support if needed
OWID 115kV	Base Case	P0	Base Case	1.04	1.05	1.04	1.07	1.05	1.05	1.05	1.03	1.04	Load power factor correction and voltage support if needed
PALERMO 115kV	Base Case	P0	Base Case	1.04	1.05	1.03	1.08	1.06	1.05	1.05	1.07	1.03	Load power factor correction and voltage support if needed
PANRAMA 115kV	Base Case	P0	Base Case	1.04	1.04	1.03	1.06	1.05	1.04	1.04	1.06	1.03	Load power factor correction and voltage support if needed
PARADSE 115kV	Base Case	P0	Base Case	1.03	1.03	1.02	1.05	1.06	1.03	1.03	1.05	1.02	Load power factor correction and voltage support if needed
POE 230kV	Base Case	P0	Base Case	1.03	1.03	1.02	1.05	1.04	1.03	1.03	1.05	1.02	Load power factor correction and voltage support if needed
RASN JNT 60kV	Base Case	P0	Base Case	1.06	1.05	1.04	1.00	1.01	1.04	1.03	1.01	1.04	Load power factor correction and voltage support if needed
ROCKCK 1 230kV	Base Case	P0	Base Case	1.03	1.03	1.02	1.05	1.04	1.03	1.03	1.05	1.02	Load power factor correction and voltage support if needed
ROCKCK 2 230kV	Base Case	P0	Base Case	1.03	1.04	1.03	1.05	1.05	1.04	1.03	1.05	1.03	Load power factor correction and voltage support if needed
SLYCREEK 115kV	Base Case	P0	Base Case	1.05	1.05	1.04	1.07	1.06	1.05	1.05	1.06	1.04	Load power factor correction and voltage support if needed
SMPSN-AN 115kV	Base Case	P0	Base Case	1.04	1.04	1.03	1.06	1.05	1.04	1.04	1.06	1.03	Load power factor correction and voltage support if needed
SOUTH 60kV	Base Case	P0	Base Case	1.04	1.04	1.03	1.05	1.05	1.04	1.04	1.05	1.03	Load power factor correction and voltage support if needed
SPI_AND 115kV	Base Case	P0	Base Case	1.04	1.04	1.02	1.06	1.06	1.04	1.04	1.06	1.02	Load power factor correction and voltage support if needed
SPIAND2 115kV	Base Case	P0	Base Case	1.04	1.04	1.02	1.06	1.06	1.04	1.04	1.06	1.02	Load power factor correction and voltage support if needed
SYCAMORE 115kV	Base Case	P0	Base Case	1.03	1.03	1.01	1.06	1.06	1.02	1.04	1.06	1.01	Load power factor correction and voltage support if needed
TBLE MTN 115kV	Base Case	P0	Base Case	1.04	1.04	1.04	1.05	1.05	1.04	1.04	1.05	1.04	Load power factor correction and voltage support if needed
TRINITY 60kV	Base Case	P0	Base Case	1.04	1.05	1.03	1.06	1.06	1.05	1.06	1.06	1.03	Load power factor correction and voltage support if needed
TRINITY 115kV	Base Case	P0	Base Case	1.04	1.05	1.03	1.06	1.06	1.05	1.06	1.06	1.03	Load power factor correction and voltage support if needed
TYLER 60kV	Base Case	P0	Base Case	1.06	1.05	1.04	1.00	1.01	1.04	1.03	1.01	1.04	Load power factor correction and voltage support if needed

Study Area: PG&E North Valley

High/Low Voltages



Substation	Contingency (All and Worst P6)	Category	Category Description	VoltagePU (Baseline Scenarios)					VoltagePU (Sensitivity Scenarios)				ISO Approved Projects & Potential Mitigation Solutions
				2021 Summer Peak	2024 Summer Peak	2029 Summer Peak	2021 Spring Off-Peak	2024 Spring Off-Peak	2024 SP High CEC Forecast	2024 SpOP Hi Renew & Min Gas Gen	2021 SP Heavy Renewable & Min Gas Gen	2029 Retirement of QF Generations	
VOLTA 60kV	Base Case	P0	Base Case	1.04	1.05	1.03	1.06	1.06	1.05	1.04	1.06	1.03	Load power factor correction and voltage support if needed
WHEELBR 115kV	Base Case	P0	Base Case	1.04	1.04	1.03	1.06	1.05	1.04	1.04	1.06	1.03	Load power factor correction and voltage support if needed
WHITMORE 60kV	Base Case	P0	Base Case	1.06	1.06	1.03	1.10	1.10	1.06	1.08	1.11	1.03	Load power factor correction and voltage support if needed
WILDWOOD 115kV	Base Case	P0	Base Case	1.05	1.05	1.04	1.06	1.06	1.05	1.07	1.06	1.04	Load power factor correction and voltage support if needed
WNTU PMS 60kV	Base Case	P0	Base Case	1.04	1.05	1.02	1.05	1.06	1.05	1.04	1.06	1.02	Load power factor correction and voltage support if needed
WODLF TP 115kV	Base Case	P0	Base Case	1.04	1.05	1.04	1.07	1.06	1.05	1.05	1.06	1.04	Load power factor correction and voltage support if needed
WYANDTTE 115kV	Base Case	P0	Base Case	1.04	1.05	1.03	1.08	1.06	1.05	1.04	1.07	1.03	Load power factor correction and voltage support if needed
ANITA 60kV	P1-3:A3:32:_GLENN 230/60kV TB 2	P1	N-1	1.09	1.17	1.04	1.11	1.14	1.17	1.03	1.15	1.04	Load power factor correction and voltage support if needed
CAPAY 60kV	P1-3:A3:32:_GLENN 230/60kV TB 2	P1	N-1	1.07	1.15	1.08	1.11	1.14	1.15	1.06	1.14	1.08	Load power factor correction and voltage support if needed
CAPYSWCH 60kV	P1-3:A3:32:_GLENN 230/60kV TB 2	P1	N-1	1.07	1.15	1.09	1.11	1.14	1.15	1.06	1.14	1.09	Load power factor correction and voltage support if needed
CEDR CRK 60kV	P1-2:A3:27:_CASCADE-BENTON-DESCHUTES 60kV	P1	N-1	1.04	1.04	0.99	1.17	1.16	1.04	1.10	1.19	0.99	Load power factor correction and voltage support if needed
CORNING 60kV	P1-3:A3:32:_GLENN 230/60kV TB 2	P1	N-1	1.05	1.13	1.04	1.11	1.15	1.13	1.06	1.15	1.04	Load power factor correction and voltage support if needed
CORNSWCH 60kV	P1-3:A3:32:_GLENN 230/60kV TB 2	P1	N-1	1.07	1.15	1.09	1.11	1.14	1.15	1.06	1.14	1.09	Load power factor correction and voltage support if needed
DESCHUTS 60kV	P1-2:A3:27:_CASCADE-BENTON-DESCHUTES 60kV	P1	N-1	1.02	1.02	0.97	1.13	1.12	1.02	1.05	1.14	0.97	Load power factor correction and voltage support if needed
ELKCREEK 60kV	P1-3:A3:32:_GLENN 230/60kV TB 2	P1	N-1	1.03	1.11	1.03	1.10	1.13	1.11	1.03	1.13	1.03	Load power factor correction and voltage support if needed
FRNCHGLH 60kV	P1-2:A3:68:_KESWICK-CASCADE 60kV MOAS OPENED on CASCADE_STLLWATR	P1	N-1	1.03	1.04	0.97	1.07	1.08	1.04	1.04	1.08	0.97	Load power factor correction and voltage support if needed
GLENN 60kV	P1-3:A3:32:_GLENN 230/60kV TB 2	P1	N-1	1.07	1.15	1.10	1.11	1.14	1.15	1.06	1.14	1.10	Load power factor correction and voltage support if needed
HAMILTON 60kV	P1-3:A3:32:_GLENN 230/60kV TB 2	P1	N-1	1.05	1.13	1.07	1.11	1.15	1.13	1.05	1.15	1.07	Load power factor correction and voltage support if needed

Study Area: PG&E North Valley

High/Low Voltages



Substation	Contingency (All and Worst P6)	Category	Category Description	VoltagePU (Baseline Scenarios)					VoltagePU (Sensitivity Scenarios)				ISO Approved Projects & Potential Mitigation Solutions
				2021 Summer Peak	2024 Summer Peak	2029 Summer Peak	2021 Spring Off-Peak	2024 Spring Off-Peak	2024 SP High CEC Forecast	2024 SpOP Hi Renew & Min Gas Gen	2021 SP Heavy Renewable & Min Gas Gen	2029 Retirement of QF Generations	
HEADGATE 60kV	P1-3:A3:32:_GLENN 230/60kV TB 2	P1	N-1	1.07	1.16	1.08	1.11	1.14	1.15	1.05	1.14	1.08	Load power factor correction and voltage support if needed
HONCUT 115kV	P1-2:A3:67:_IDLE LINE - NO DATA 230kV	P1	N-1	1.01	1.03	1.00	1.06	1.06	1.03	1.02	1.07	1.00	Load power factor correction and voltage support if needed
HONCUT 115kV	P1-2:A3:85:_PALERMO-BOGUE 115kV MOAS OPENED on PALERMO_HONC JT3	P1	N-1	1.02	1.02	1.00	1.12	1.07	1.02	1.01	1.08	1.00	Load power factor correction and voltage support if needed
HONCUT 115kV	P1-3:A3:68:_TABLE MT 500/230kV TB 1	P1	N-1	1.03	1.05	1.02	1.08	1.07	1.05	1.03	1.08	1.02	Load power factor correction and voltage support if needed
HONCUT 115kV	P1-4:A3:6:_TB MT 1T SVD=v	P1	N-1	1.04	1.05	1.03	1.08	1.06	1.05	1.04	1.07	1.03	Load power factor correction and voltage support if needed
JACINTO 60kV	P1-3:A3:32:_GLENN 230/60kV TB 2	P1	N-1	1.03	1.12	1.05	1.11	1.15	1.11	1.04	1.15	1.05	Load power factor correction and voltage support if needed
KESWICK 60kV	P1-2:A3:68:_KESWICK-CASCADE 60kV MOAS OPENED on CASCADE_STLLWATR	P1	N-1	1.01	1.03	0.94	1.07	1.09	1.03	1.03	1.09	0.94	Load power factor correction and voltage support if needed. - Continue to monitor future load forecast
KILARC 60kV	P1-2:A3:27:_CASCADE-BENTON-DESCHUTES 60kV	P1	N-1	1.05	1.05	0.99	1.17	1.16	1.04	1.10	1.18	0.99	Load power factor correction and voltage support if needed
ORLAND B 60kV	P1-3:A3:32:_GLENN 230/60kV TB 2	P1	N-1	1.06	1.14	1.08	1.11	1.14	1.14	1.05	1.14	1.08	Load power factor correction and voltage support if needed
OWID 115kV	P1-2:A3:67:_IDLE LINE - NO DATA 230kV	P1	N-1	1.02	1.04	1.02	1.05	1.06	1.04	1.03	1.06	1.02	Load power factor correction and voltage support if needed
OWID 115kV	P1-3:A3:68:_TABLE MT 500/230kV TB 1	P1	N-1	1.04	1.05	1.03	1.07	1.06	1.05	1.04	1.07	1.03	Load power factor correction and voltage support if needed
OWID 115kV	P1-4:A3:6:_TB MT 1T SVD=v	P1	N-1	1.04	1.05	1.03	1.07	1.06	1.05	1.05	1.06	1.03	Load power factor correction and voltage support if needed
PALERMO 115kV	P1-2:A3:67:_IDLE LINE - NO DATA 230kV	P1	N-1	1.01	1.03	1.00	1.06	1.06	1.03	1.03	1.07	1.00	Load power factor correction and voltage support if needed
PALERMO 115kV	P1-3:A3:68:_TABLE MT 500/230kV TB 1	P1	N-1	1.03	1.05	1.02	1.07	1.07	1.05	1.03	1.08	1.02	Load power factor correction and voltage support if needed
PALERMO 115kV	P1-4:A3:6:_TB MT 1T SVD=v	P1	N-1	1.04	1.05	1.03	1.08	1.06	1.05	1.05	1.07	1.03	Load power factor correction and voltage support if needed
RED BLFF 60kV	P1-2:A3:34:_COLEMAN-RED BLUFF 60kV MOAS OPENED on COTTONWD_RED B JT	P1	N-1	0.92	1.01	0.94	1.08	1.08	1.01	0.96	1.09	0.94	Project: Coleman - Red Bluff 60 kV Line Upgrade ISD: May 2021 Short term: Action Plan
SLYCREEK 115kV	P1-2:A3:67:_IDLE LINE - NO DATA 230kV	P1	N-1	1.03	1.04	1.03	1.05	1.06	1.04	1.04	1.06	1.03	Load power factor correction and voltage support if needed

Study Area: PG&E North Valley

High/Low Voltages



Substation	Contingency (All and Worst P6)	Category	Category Description	VoltagePU (Baseline Scenarios)					VoltagePU (Sensitivity Scenarios)				ISO Approved Projects & Potential Mitigation Solutions
				2021 Summer Peak	2024 Summer Peak	2029 Summer Peak	2021 Spring Off-Peak	2024 Spring Off-Peak	2024 SP High CEC Forecast	2024 SpOP Hi Renew & Min Gas Gen	2021 SP Heavy Renewable & Min Gas Gen	2029 Retirement of QF Generations	
SLYCREEK 115kV	P1-3:A3:68:_TABLE MT 500/230kV TB 1	P1	N-1	1.04	1.05	1.04	1.07	1.06	1.05	1.04	1.07	1.04	Load power factor correction and voltage support if needed
SLYCREEK 115kV	P1-4:A3:6:_TB MT 1T SVD=v	P1	N-1	1.05	1.05	1.04	1.07	1.06	1.05	1.05	1.06	1.04	Load power factor correction and voltage support if needed
SOUTH 60kV	P1-2:A3:35:_COLEMAN-SOUTH 60kV	P1	N-1	1.07	1.07	1.04	1.10	1.10	1.07	1.07	1.09	1.04	Load power factor correction and voltage support if needed
STLLWATR 60kV	P1-2:A3:68:_KESWICK-CASCADE 60kV MOAS OPENED on CASCADE_STLLWATR	P1	N-1	1.01	1.03	0.92	1.07	1.09	1.02	1.03	1.10	0.92	Load power factor correction and voltage support if needed. - Continue to monitor future load forecast
VOLTA 60kV	P1-2:A3:127:_VOLTA-SOUTH 60kV	P1	N-1	1.06	1.07	1.03	1.09	1.10	1.06	1.07	1.11	1.03	Load power factor correction and voltage support if needed
WHITMORE 60kV	P1-2:A3:27:_CASCADE-BENTON- DESCHUTES 60kV	P1	N-1	1.04	1.04	0.99	1.17	1.16	1.04	1.09	1.18	0.99	Load power factor correction and voltage support if needed
WILLOWS 60kV	P1-3:A3:32:_GLENN 230/60kV TB 2	P1	N-1	1.03	1.11	1.05	1.10	1.13	1.11	1.03	1.14	1.05	Load power factor correction and voltage support if needed
WYANDTTE 115kV	P1-2:A3:67:_IDLE LINE - NO DATA 230kV	P1	N-1	1.01	1.03	1.00	1.06	1.06	1.03	1.03	1.07	1.00	Load power factor correction and voltage support if needed
WYANDTTE 115kV	P1-3:A3:68:_TABLE MT 500/230kV TB 1	P1	N-1	1.03	1.05	1.01	1.07	1.07	1.05	1.03	1.08	1.01	Load power factor correction and voltage support if needed
WYANDTTE 115kV	P1-4:A3:6:_TB MT 1T SVD=v	P1	N-1	1.04	1.05	1.03	1.08	1.06	1.05	1.04	1.07	1.03	Load power factor correction and voltage support if needed
BIG BEND 115kV	P2-2:A3:7:_CARIBOU 115kV Section 1D	P2	Bus	NA	1.08	1.04	NA	1.06	1.08	NA	1.07	1.04	Load power factor correction and voltage support if needed
BIG BEND 115kV	P2-3:A3:19:_CARIBOU - 1D 115kV & BUTT VALLEY-CARIBOU line	P2	Non-Bus-Tie Breaker	NA	1.08	1.04	NA	1.06	1.08	NA	1.07	1.04	Load power factor correction and voltage support if needed
BIG BEND 115kV	P2-3:A3:98:_PALERMO - 1D 115kV & PALERMO-WYANDOTTE line	P2	Non-Bus-Tie Breaker	NA	NA	0.76	NA	1.05	NA	NA	1.06	0.76	Load power factor correction and voltage support if needed. - Continue to monitor future load forecast
CARIBOU 115kV	P2-2:A3:7:_CARIBOU 115kV Section 1D	P2	Bus	NA	1.08	1.05	NA	1.06	1.08	NA	1.07	1.05	Load power factor correction and voltage support if needed
CARIBOU 115kV	P2-3:A3:19:_CARIBOU - 1D 115kV & BUTT VALLEY-CARIBOU line	P2	Non-Bus-Tie Breaker	NA	1.08	1.05	NA	1.06	1.08	NA	1.07	1.05	Load power factor correction and voltage support if needed
COTWD_1D 115kV	P2-2:A3:24:_COTWD_1D 115kV Section 1D	P2	Bus	NA	1.08	1.06	NA	1.07	1.08	NA	1.08	1.06	Load power factor correction and voltage support if needed
COTWD_1D 115kV	P2-4:A3:5:_COTWD_1D Section 1D & COTWD_1E Section 1E 115kV	P2	Bus-Tie Breaker	NA	1.08	1.06	NA	1.07	1.08	NA	1.08	1.06	Load power factor correction and voltage support if needed
COTWD_2E 115kV	P2-2:A3:27:_COTWD_2E 115kV Section 2E	P2	Bus	NA	1.08	1.07	NA	1.05	1.08	NA	1.06	1.07	Load power factor correction and voltage support if needed

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High/Low Voltages



Substation	Contingency (All and Worst P6)	Category	Category Description	VoltagePU (Baseline Scenarios)					VoltagePU (Sensitivity Scenarios)				ISO Approved Projects & Potential Mitigation Solutions
				2021 Summer Peak	2024 Summer Peak	2029 Summer Peak	2021 Spring Off-Peak	2024 Spring Off-Peak	2024 SP High CEC Forecast	2024 SpOP Hi Renew & Min Gas Gen	2021 SP Heavy Renewable & Min Gas Gen	2029 Retirement of QF Generations	
COTWD_2E 115kV	P2-4:A3:6:_COTWD_1E Section 1E & COTWD_2E Section 2E 115kV	P2	Bus-Tie Breaker	NA	1.08	1.07	NA	1.05	1.08	NA	1.06	1.07	Load power factor correction and voltage support if needed
COTWD_2E 115kV	P2-4:A3:7:_COTWD_2D Section 2D & COTWD_2E Section 2E 115kV	P2	Bus-Tie Breaker	NA	1.08	1.07	NA	1.06	1.08	NA	1.07	1.07	Load power factor correction and voltage support if needed
FRSTGLEN 115kV	P2-1:A3:161:_WILDWOOD-COTWD_2E 115kV No Fault	P2	Line Section w/o Fault	NA	1.06	1.05	NA	1.04	1.06	NA	1.05	1.05	Load power factor correction and voltage support if needed
FRSTGLEN 115kV	P2-1:A3:3:_BRIDGEVILLE-COTTONWOOD 115kV (FRSTGLEN-LOW GAP1)	P2	Line Section w/o Fault	1.05	1.05	1.03	1.07	1.06	1.05	1.05	1.07	1.03	Load power factor correction and voltage support if needed
FRSTGLEN 115kV	P2-1:A3:5:_BRIDGEVILLE-COTTONWOOD 115kV (WILDWOOD-COTWDPGE)	P2	Line Section w/o Fault	1.06	NA	NA	1.03	NA	NA	1.14	NA	NA	Load power factor correction and voltage support if needed
FRSTGLEN 115kV	P2-1:A3:6:_BRIDGEVILLE-COTTONWOOD 115kV (WILDWOOD-FRSTGLEN)	P2	Line Section w/o Fault	1.06	1.06	1.05	1.02	1.03	1.06	1.13	1.04	1.05	Load power factor correction and voltage support if needed
FRSTGLEN 115kV	P2-2:A3:22:_COTWDPGE 115kV Section 2D	P2	Bus	1.06	NA	NA	1.03	NA	NA	1.14	NA	NA	Load power factor correction and voltage support if needed
FRSTGLEN 115kV	P2-2:A3:24:_COTWD_1D 115kV Section 1D	P2	Bus	NA	1.07	1.05	NA	1.07	1.07	NA	1.07	1.05	Load power factor correction and voltage support if needed
FRSTGLEN 115kV	P2-2:A3:25:_COTWD_1D 115kV Section 2D	P2	Bus	NA	1.07	1.05	NA	1.07	1.07	NA	1.07	1.05	Load power factor correction and voltage support if needed
FRSTGLEN 115kV	P2-2:A3:27:_COTWD_2E 115kV Section 2E	P2	Bus	NA	1.08	1.07	NA	1.04	1.07	NA	1.05	1.07	Load power factor correction and voltage support if needed
FRSTGLEN 115kV	P2-3:A3:53:_COTWDPGE - 2D 115kV & CASCADE-COTTONWOOD line	P2	Non-Bus-Tie Breaker	1.06	NA	NA	1.03	NA	NA	1.14	NA	NA	Load power factor correction and voltage support if needed
FRSTGLEN 115kV	P2-4:A3:4:_COTWD_1D 115kV - Section 2D & 1D	P2	Bus-Tie Breaker	NA	1.07	1.05	NA	1.07	1.07	NA	1.07	1.05	Load power factor correction and voltage support if needed
FRSTGLEN 115kV	P2-4:A3:5:_COTWD_1D Section 1D & COTWD_1E Section 1E 115kV	P2	Bus-Tie Breaker	NA	1.07	1.05	NA	1.07	1.07	NA	1.07	1.05	Load power factor correction and voltage support if needed
FRSTGLEN 115kV	P2-4:A3:6:_COTWD_1E Section 1E & COTWD_2E Section 2E 115kV	P2	Bus-Tie Breaker	NA	1.08	1.07	NA	1.04	1.07	NA	1.05	1.07	Load power factor correction and voltage support if needed
FRSTGLEN 115kV	P2-4:A3:7:_COTWD_2D Section 2D & COTWD_2E Section 2E 115kV	P2	Bus-Tie Breaker	NA	1.07	1.07	NA	1.05	1.07	NA	1.06	1.07	Load power factor correction and voltage support if needed
GRIZZLY1 115kV	P2-2:A3:7:_CARIBOU 115kV Section 1D	P2	Bus	NA	1.08	1.05	NA	1.06	1.08	NA	1.07	1.05	Load power factor correction and voltage support if needed
GRIZZLY1 115kV	P2-3:A3:19:_CARIBOU - 1D 115kV & BUTT VALLEY-CARIBOU line	P2	Non-Bus-Tie Breaker	NA	1.08	1.05	NA	1.06	1.08	NA	1.07	1.05	Load power factor correction and voltage support if needed

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High/Low Voltages



Substation	Contingency (All and Worst P6)	Category	Category Description	VoltagePU (Baseline Scenarios)					VoltagePU (Sensitivity Scenarios)				ISO Approved Projects & Potential Mitigation Solutions
				2021 Summer Peak	2024 Summer Peak	2029 Summer Peak	2021 Spring Off-Peak	2024 Spring Off-Peak	2024 SP High CEC Forecast	2024 SpOP Hi Renew & Min Gas Gen	2021 SP Heavy Renewable & Min Gas Gen	2029 Retirement of QF Generations	
GRIZZLY1 115kV	P2-3:A3:98:_PALERMO - 1D 115kV & PALERMO-WYANDOTTE line	P2	Non-Bus-Tie Breaker	NA	NA	0.89	NA	1.05	NA	NA	1.05	0.89	Continue to monitor future load forecast
HONCUT 115kV	P2-1:A3:121:_PALERMO-BOGUE 115kV (PALERMO-HONC JT3)	P2	Line Section w/o Fault	1.02	1.02	1.00	1.12	1.07	1.02	1.01	1.08	1.00	Load power factor correction and voltage support if needed
HONCUT 115kV	P2-2:A3:45:_PALERMO 115kV Section 1D	P2	Bus	1.02	1.02	1.00	1.12	1.07	1.02	1.01	1.07	1.00	Load power factor correction and voltage support if needed
HONCUT 115kV	P2-2:A3:80:_TBL MTX1 230kV Section NA	P2	Bus	1.03	1.05	1.02	1.08	1.07	1.05	1.03	1.08	1.02	Load power factor correction and voltage support if needed
HONCUT 115kV	P2-3:A3:84:_PALERMO - 1D 115kV & PALERMO-BOGUE line	P2	Non-Bus-Tie Breaker	1.02	1.02	1.00	1.12	1.07	1.02	1.01	1.07	1.00	Load power factor correction and voltage support if needed
HONCUT 115kV	P2-3:A3:85:_PALERMO - 1D 115kV & PALERMO-NICOLAUS line	P2	Non-Bus-Tie Breaker	1.02	1.02	1.00	1.12	1.07	1.02	1.01	1.07	1.00	Load power factor correction and voltage support if needed
HONCUT 115kV	P2-3:A3:86:_PALERMO - 1D 115kV & PALERMO-PEASE line COPY-11	P2	Non-Bus-Tie Breaker	1.02	NA	NA	1.12	NA	NA	1.01	NA	NA	Load power factor correction and voltage support if needed
HONCUT 115kV	P2-3:A3:87:_PALERMO - 1D 115kV & PALERMO-PEASE line COPY-12	P2	Non-Bus-Tie Breaker	1.02	NA	NA	1.12	NA	NA	1.01	NA	NA	Load power factor correction and voltage support if needed
HONCUT 115kV	P2-3:A3:98:_PALERMO - 1D 115kV & PALERMO-WYANDOTTE line	P2	Non-Bus-Tie Breaker	1.02	1.03	1.00	1.12	1.07	1.03	1.01	1.07	1.00	Load power factor correction and voltage support if needed
HONCUT 115kV	P2-3:A3:99:_PALERMO - 1D 115kV & WOODLEAF-PALERMO line	P2	Non-Bus-Tie Breaker	1.02	1.02	1.00	1.12	1.07	1.02	1.01	1.07	1.00	Load power factor correction and voltage support if needed
OWID 115kV	P2-2:A3:80:_TBL MTX1 230kV Section NA	P2	Bus	1.04	1.05	1.03	1.07	1.06	1.05	1.04	1.07	1.03	Load power factor correction and voltage support if needed
PALERMO 115kV	P2-2:A3:80:_TBL MTX1 230kV Section NA	P2	Bus	1.03	1.05	1.02	1.07	1.07	1.05	1.03	1.08	1.02	Load power factor correction and voltage support if needed
PALERMO 115kV	P2-3:A3:98:_PALERMO - 1D 115kV & PALERMO-WYANDOTTE line	P2	Non-Bus-Tie Breaker	NA	NA	0.52	NA	1.08	NA	NA	1.08	0.52	Continue to monitor future load forecast
SLYCREEK 115kV	P2-2:A3:80:_TBL MTX1 230kV Section NA	P2	Bus	1.04	1.05	1.04	1.07	1.06	1.05	1.04	1.07	1.04	Load power factor correction and voltage support if needed
TRINITY 115kV	P2-1:A3:155:_TRINITY-COTTONWOOD 115kV (TRINITY-JESSTAP)	P2	Line Section w/o Fault	1.05	1.05	1.03	1.04	1.04	1.05	1.09	1.04	1.03	Load power factor correction and voltage support if needed
TRINITY 115kV	P2-1:A3:4:_BRIDGEVILLE-COTTONWOOD 115kV (JESSTAP-COTWD_1D)	P2	Line Section w/o Fault	NA	1.06	1.04	NA	1.05	1.06	NA	1.06	1.04	Load power factor correction and voltage support if needed
TRINITY 115kV	P2-2:A3:21:_COTWDPGE 115kV Section 1D	P2	Bus	1.06	NA	NA	1.05	NA	NA	1.11	NA	NA	Load power factor correction and voltage support if needed
TRINITY 115kV	P2-2:A3:24:_COTWD_1D 115kV Section 1D	P2	Bus	NA	1.08	1.05	NA	1.07	1.07	NA	1.07	1.05	Load power factor correction and voltage support if needed

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High/Low Voltages



Substation	Contingency (All and Worst P6)	Category	Category Description	VoltagePU (Baseline Scenarios)					VoltagePU (Sensitivity Scenarios)				ISO Approved Projects & Potential Mitigation Solutions
				2021 Summer Peak	2024 Summer Peak	2029 Summer Peak	2021 Spring Off-Peak	2024 Spring Off-Peak	2024 SP High CEC Forecast	2024 SpOP Hi Renew & Min Gas Gen	2021 SP Heavy Renewable & Min Gas Gen	2029 Retirement of QF Generations	
TRINITY 115kV	P2-2:A3:25:_COTWD_1D 115kV Section 2D	P2	Bus	NA	1.07	1.05	NA	1.06	1.07	NA	1.07	1.05	Load power factor correction and voltage support if needed
TRINITY 115kV	P2-3:A3:50:_COTWDPGE - 1D 115kV & COTTONWOOD-PANORAMA line	P2	Non-Bus-Tie Breaker	1.06	NA	NA	1.05	NA	NA	1.11	NA	NA	Load power factor correction and voltage support if needed
TRINITY 115kV	P2-3:A3:54:_COTWD_1D - 2D 115kV & COTWD_1D-TRINITY line	P2	Non-Bus-Tie Breaker	NA	1.06	1.04	NA	1.05	1.06	NA	1.05	1.04	Load power factor correction and voltage support if needed
TRINITY 115kV	P2-4:A3:12:_COTWD_F2 Section 2F & COTWD_E2 Section 2E 230kV	P2	Bus-Tie Breaker	1.04	1.04	1.01	1.05	1.05	1.04	1.07	1.06	1.01	Load power factor correction and voltage support if needed
TRINITY 115kV	P2-4:A3:4:_COTWD_1D 115kV - Section 2D & 1D	P2	Bus-Tie Breaker	NA	1.07	1.05	NA	1.06	1.07	NA	1.07	1.05	Load power factor correction and voltage support if needed
TRINITY 115kV	P2-4:A3:5:_COTWD_1D Section 1D & COTWD_1E Section 1E 115kV	P2	Bus-Tie Breaker	NA	1.08	1.05	NA	1.07	1.07	NA	1.07	1.05	Load power factor correction and voltage support if needed
WILDWOOD 115kV	P2-1:A3:161:_WILDWOOD-COTWD_2E 115kV No Fault	P2	Line Section w/o Fault	NA	1.07	1.05	NA	1.04	1.06	NA	1.05	1.05	Load power factor correction and voltage support if needed
WILDWOOD 115kV	P2-1:A3:5:_BRIDGEVILLE-COTTONWOOD 115kV (WILDWOOD-COTWDPGE)	P2	Line Section w/o Fault	1.06	NA	NA	1.03	NA	NA	1.15	NA	NA	Load power factor correction and voltage support if needed
WILDWOOD 115kV	P2-2:A3:22:_COTWDPGE 115kV Section 2D	P2	Bus	1.06	NA	NA	1.04	NA	NA	1.14	NA	NA	Load power factor correction and voltage support if needed
WILDWOOD 115kV	P2-2:A3:27:_COTWD_2E 115kV Section 2E	P2	Bus	NA	1.08	1.07	NA	1.05	1.08	NA	1.06	1.07	Load power factor correction and voltage support if needed
WILDWOOD 115kV	P2-3:A3:53:_COTWDPGE - 2D 115kV & CASCADE-COTTONWOOD line	P2	Non-Bus-Tie Breaker	1.06	NA	NA	1.03	NA	NA	1.14	NA	NA	Load power factor correction and voltage support if needed
WILDWOOD 115kV	P2-4:A3:12:_COTWD_F2 Section 2F & COTWD_E2 Section 2E 230kV	P2	Bus-Tie Breaker	1.05	1.04	1.02	1.05	1.05	1.04	1.08	1.06	1.02	Load power factor correction and voltage support if needed
WILDWOOD 115kV	P2-4:A3:6:_COTWD_1E Section 1E & COTWD_2E Section 2E 115kV	P2	Bus-Tie Breaker	NA	1.08	1.07	NA	1.05	1.08	NA	1.06	1.07	Load power factor correction and voltage support if needed
WILDWOOD 115kV	P2-4:A3:7:_COTWD_2D Section 2D & COTWD_2E Section 2E 115kV	P2	Bus-Tie Breaker	NA	1.08	1.07	NA	1.06	1.08	NA	1.07	1.07	Load power factor correction and voltage support if needed
WYANDTTE 115kV	P2-2:A3:80:_TBL MTX1 230kV Section NA	P2	Bus	1.03	1.05	1.01	1.07	1.07	1.05	1.03	1.08	1.01	Load power factor correction and voltage support if needed
WYANDTTE 115kV	P2-3:A3:98:_PALERMO - 1D 115kV & PALERMO-WYANDOTTE line	P2	Non-Bus-Tie Breaker	NA	NA	0.52	NA	1.08	NA	NA	1.08	0.52	Continue to monitor future load forecast
APT ORVC 60kV	P1-1:A3:35:_KELLYRDG 4.16kV Gen Unit 1 & P1-3:A3:49:_PALERMO 230/230kV TB 1	P3	G-1/N-1	>0.9,<1.1	>0.9,<1.1	0.88	>0.9,<1.1	>0.9,<1.1	>0.9,<1.1	>0.9,<1.1	>0.9,<1.1	0.88	Continue to monitor future load forecast

Study Area: PG&E North Valley

High/Low Voltages



Substation	Contingency (All and Worst P6)	Category	Category Description	VoltagePU (Baseline Scenarios)					VoltagePU (Sensitivity Scenarios)				ISO Approved Projects & Potential Mitigation Solutions
				2021 Summer Peak	2024 Summer Peak	2029 Summer Peak	2021 Spring Off-Peak	2024 Spring Off-Peak	2024 SP High CEC Forecast	2024 SpOP Hi Renew & Min Gas Gen	2021 SP Heavy Renewable & Min Gas Gen	2029 Retirement of QF Generations	
CEDR CRK 60kV	P1-1:A3:32:_INSKIP 4.16kV Gen Unit 1 & P1-2:A3:27:_CASCADE-BENTON-DESCHUTES 60kV	P3	G-1/N-1	>0.9,<1.1	>0.9,<1.1	>0.9,<1.1	1.18	1.17	>0.9,<1.1	>0.9,<1.1	>0.9,<1.1	>0.9,<1.1	Load power factor correction and voltage support if needed
CLOV TAP 60kV	P1-1:A3:10:_COLEMAN 6.60kV Gen Unit 1 & P1-2:A3:27:_CASCADE-BENTON-DESCHUTES 60kV	P3	G-1/N-1	>0.9,<1.1	>0.9,<1.1	>0.9,<1.1	1.18	1.17	>0.9,<1.1	>0.9,<1.1	>0.9,<1.1	>0.9,<1.1	Load power factor correction and voltage support if needed
DESCHUTS 60kV	P1-1:A3:62:_SOUTH G 4.16kV Gen Unit 1 & P1-2:A3:27:_CASCADE-BENTON-DESCHUTES 60kV	P3	G-1/N-1	>0.9,<1.1	>0.9,<1.1	>0.9,<1.1	1.13	1.13	>0.9,<1.1	>0.9,<1.1	>0.9,<1.1	>0.9,<1.1	Load power factor correction and voltage support if needed
KILARC 60kV	P1-1:A3:10:_COLEMAN 6.60kV Gen Unit 1 & P1-2:A3:27:_CASCADE-BENTON-DESCHUTES 60kV	P3	G-1/N-1	>0.9,<1.1	>0.9,<1.1	>0.9,<1.1	1.17	1.16	>0.9,<1.1	>0.9,<1.1	>0.9,<1.1	>0.9,<1.1	Load power factor correction and voltage support if needed
KLLY RDE 60kV	P1-1:A3:35:_KELLYRDG 4.16kV Gen Unit 1 & P1-3:A3:49:_PALERMO 230/230kV TB 1	P3	G-1/N-1	>0.9,<1.1	>0.9,<1.1	0.88	>0.9,<1.1	>0.9,<1.1	>0.9,<1.1	>0.9,<1.1	>0.9,<1.1	0.88	Continue to monitor future load forecast
LSNA PCC 60kV	P1-1:A3:35:_KELLYRDG 4.16kV Gen Unit 1 & P1-3:A3:49:_PALERMO 230/230kV TB 1	P3	G-1/N-1	>0.9,<1.1	>0.9,<1.1	0.88	>0.9,<1.1	>0.9,<1.1	>0.9,<1.1	>0.9,<1.1	>0.9,<1.1	0.88	Continue to monitor future load forecast
OROVILLE 60kV	P1-1:A3:35:_KELLYRDG 4.16kV Gen Unit 1 & P1-3:A3:49:_PALERMO 230/230kV TB 1	P3	G-1/N-1	>0.9,<1.1	>0.9,<1.1	0.88	>0.9,<1.1	>0.9,<1.1	>0.9,<1.1	>0.9,<1.1	>0.9,<1.1	0.87	Continue to monitor future load forecast
OROVLENRG 60kV	P1-1:A3:35:_KELLYRDG 4.16kV Gen Unit 1 & P1-3:A3:49:_PALERMO 230/230kV TB 1	P3	G-1/N-1	>0.9,<1.1	>0.9,<1.1	0.88	>0.9,<1.1	>0.9,<1.1	>0.9,<1.1	>0.9,<1.1	>0.9,<1.1	0.88	Continue to monitor future load forecast
PALERMO 60kV	P1-1:A3:35:_KELLYRDG 4.16kV Gen Unit 1 & P1-3:A3:49:_PALERMO 230/230kV TB 1	P3	G-1/N-1	>0.9,<1.1	>0.9,<1.1	0.89	>0.9,<1.1	>0.9,<1.1	>0.9,<1.1	>0.9,<1.1	>0.9,<1.1	0.89	Continue to monitor future load forecast
SOUTH 60kV	P1-1:A3:62:_SOUTH G 4.16kV Gen Unit 1 & P1-2:A3:35:_COLEMAN-SOUTH 60kV	P3	G-1/N-1	>0.9,<1.1	>0.9,<1.1	>0.9,<1.1	>0.9,<1.1	>0.9,<1.1	>0.9,<1.1	>0.9,<1.1	1.10	>0.9,<1.1	Sensitivity only
VOLTA 60kV	P1-1:A3:62:_SOUTH G 4.16kV Gen Unit 1 & P1-2:A3:35:_COLEMAN-SOUTH 60kV	P3	G-1/N-1	>0.9,<1.1	>0.9,<1.1	>0.9,<1.1	>0.9,<1.1	1.10	>0.9,<1.1	>0.9,<1.1	1.10	>0.9,<1.1	Continue to monitor future load forecast
WHITMORE 60kV	P1-1:A3:62:_SOUTH G 4.16kV Gen Unit 1 & P1-2:A3:27:_CASCADE-BENTON-DESCHUTES 60kV	P3	G-1/N-1	>0.9,<1.1	>0.9,<1.1	>0.9,<1.1	1.17	1.16	>0.9,<1.1	>0.9,<1.1	>0.9,<1.1	>0.9,<1.1	Continue to monitor future load forecast

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Substation	Contingency (All and Worst P6)	Category	Category Description	VoltagePU (Baseline Scenarios)					VoltagePU (Sensitivity Scenarios)				ISO Approved Projects & Potential Mitigation Solutions
				2021 Summer Peak	2024 Summer Peak	2029 Summer Peak	2021 Spring Off-Peak	2024 Spring Off-Peak	2024 SP High CEC Forecast	2024 SpOP Hi Renew & Min Gas Gen	2021 SP Heavy Renewable & Min Gas Gen	2029 Retirement of QF Generations	
CASCADE 115kV	P1-2:A3:28:_CASCADE-COTTONWOOD 115kV &P1-3:A3:12:_CASCADE 115/60kV TB 1	P6	N-1/N-1	1.15	>0.9,<1.1	>0.9,<1.1	1.12	>0.9,<1.1	>0.9,<1.1	1.11	>0.9,<1.1	>0.9,<1.1	Continue to monitor future load forecast
HONCUT 115kV	P1-2:A3:28:_CASCADE-COTTONWOOD 115kV &P1-2:A3:85:_PALERMO-BOGUE 115kV MOAS OPENED on PALERMO_HONC JT3	P6	N-1/N-1	>0.9,<1.1	>0.9,<1.1	>0.9,<1.1	1.13	>0.9,<1.1	>0.9,<1.1	>0.9,<1.1	>0.9,<1.1	>0.9,<1.1	Continue to monitor future load forecast
OWID 115kV	P1-2:A3:28:_CASCADE-COTTONWOOD 115kV &P1-3:A3:68:_TABLE MT 500/230kV TB 1	P6	N-1/N-1	>0.9,<1.1	>0.9,<1.1	>0.9,<1.1	>0.9,<1.1	>0.9,<1.1	>0.9,<1.1	>0.9,<1.1	1.11	>0.9,<1.1	Sensitivity only
PALERMO 115kV	P1-2:A3:28:_CASCADE-COTTONWOOD 115kV &P1-2:A3:67:_IDLE LINE - NO DATA 230kV	P6	N-1/N-1	>0.9,<1.1	>0.9,<1.1	>0.9,<1.1	>0.9,<1.1	>0.9,<1.1	>0.9,<1.1	>0.9,<1.1	1.10	>0.9,<1.1	Sensitivity only
SLYCREEK 115kV	P1-2:A3:28:_CASCADE-COTTONWOOD 115kV &P1-3:A3:68:_TABLE MT 500/230kV TB 1	P6	N-1/N-1	>0.9,<1.1	>0.9,<1.1	>0.9,<1.1	>0.9,<1.1	>0.9,<1.1	>0.9,<1.1	>0.9,<1.1	1.11	>0.9,<1.1	Sensitivity only
TRINITY 115kV	P1-2:A3:123:_TRINITY-COTTONWOOD 115kV &P1-3:A3:74:_TRINITY 115/60kV TB 1	P6	N-1/N-1	>0.9,<1.1	>0.9,<1.1	>0.9,<1.1	>0.9,<1.1	>0.9,<1.1	>0.9,<1.1	1.17	>0.9,<1.1	>0.9,<1.1	Sensitivity only
WYANDTTE 115kV	P1-2:A3:28:_CASCADE-COTTONWOOD 115kV &P1-3:A3:68:_TABLE MT 500/230kV TB 1	P6	N-1/N-1	>0.9,<1.1	>0.9,<1.1	>0.9,<1.1	>0.9,<1.1	>0.9,<1.1	>0.9,<1.1	>0.9,<1.1	1.11	>0.9,<1.1	Sensitivity only

Study Area: PG&E North Valley

Voltage Deviation



Substation	Contingency (All and Worst P6)	Category	Category Description	Post Cont. Voltage Deviation PU (Baseline Scenarios)					Post Cont. Voltage Deviation PU (Sensitivity Scenarios)				ISO Approved Projects & Potential Mitigation Solutions
				2021 Summer Peak	2024 Summer Peak	2029 Summer Peak	2021 Spring Off-Peak	2024 Spring Off-Peak	2024 SP High CEC Forecast	2024 SpOP Hi Renew & Min Gas Gen	2021 SP Heavy Renewable & Min Gas Gen	2029 Retirement of QF Generations	
RED BLFF 60kV	P1-2:A3:34:_COLEMAN-RED BLUFF 60kV	P1	N-1	10	3	7	-3	-2	3	6	-2	7	Project: Coleman - Red Bluff 60 kV Line Upgrade ISD: May 2021 Short term: Action Plan
STLLWATR 60kV	P1-2:A3:68:_KESWICK-CASCADE 60kV M	P1	N-1	3	2	9	-2	-3	2	2	-4	9	Continue to monitor future load forecast

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Transient Stability



Contingency	Category	Category Description	Transient Stability Performance					Potential Mitigation Solutions
			Baseline Scenarios			Sensitivity Scenarios		
			2024 Summer Peak	2029 Summer Peak	2024 Spring Off-Peak	2024 SP High CEC Forecast	2024 SpOP Hi Renew & Min Gas Gen	
Colusa gas turbine fault plus relay failure	P5-1	Non-Redundant Relary	No Issues	No Issues	No Issues	No Issues	No Issues	No mitigation required
Colusa Generator fault (steam unit)	P1-1	N-1	No Issues	No Issues	No Issues	No Issues	No Issues	No mitigation required
Colusa generator out and Delevan SVD fault	P3-4	G-1/N-2	No Issues	No Issues	No Issues	No Issues	No Issues	No mitigation required
Colusa generator out and Round Mountain 500/230 kV Transformer	P3-3	G-1/N-1	No Issues	No Issues	No Issues	No Issues	No Issues	No mitigation required
Colusa steam and gas units fault + stuck breaker	P4-1	Stuck Breaker	No Issues	No Issues	No Issues	No Issues	No Issues	No mitigation required
Colusa steam unit out and gas unit fault	P3-1	G-1/G-1	No Issues	No Issues	No Issues	No Issues	No Issues	No mitigation required
Colusa steam unit out and Table Mountain to Thermalito 230 kV line fault	P3-2	G-1/N-1	No Issues	No Issues	No Issues	No Issues	No Issues	No mitigation required
Delevan and Cottonwood SVD faults	P6-3	N-1-1	No Issues	No Issues	No Issues	No Issues	No Issues	No mitigation required
Delevan SVD fault	P1-4	N-1	No Issues	No Issues	No Issues	No Issues	No Issues	No mitigation required
Delevan SVD fault plus relay failure	P5-4	Non-Redundant Relary	No Issues	No Issues	No Issues	No Issues	No Issues	No mitigation required
Delevan SVD fault plus stuck breaker	P4-4	Stuck Breaker	No Issues	No Issues	No Issues	No Issues	No Issues	No mitigation required
Palermo-Pease and Palermo-Rio Oso 115 kV lines - Permanent DCTL fault	P7-1	DCTL	No Issues	No Issues	No Issues	No Issues	No Issues	No mitigation required
Palermo-Pease and Palermo-Rio Oso 115 kV lines - Temporary DCTL fault	P7-1	DCTL	No Issues	No Issues	No Issues	No Issues	No Issues	No mitigation required
Round Mountain 230 kV Bus Section fault	P2-2	Bus	No Issues	No Issues	No Issues	No Issues	No Issues	No mitigation required
Round Mountain 230 kV Bus section fault plus relay failure	P5-5	Non-Redundant Relary	No Issues	No Issues	No Issues	No Issues	No Issues	No mitigation required
Round Mountain 230 kV bus-tie breaker fault	P2-4	Bus-Tie Breaker	No Issues	No Issues	No Issues	No Issues	No Issues	No mitigation required
Round Mountain 230 kV non-bus-tie breaker fault	P2-3	Non-Bus-Tie Breaker	No Issues	No Issues	No Issues	No Issues	No Issues	No mitigation required
Round Mountain 500/230 kV Transformer fault	P1-3	N-1	No Issues	No Issues	No Issues	No Issues	No Issues	No mitigation required
Round Mountain 500/230 kV Transformer fault plus relay failure	P5-3	Non-Redundant Relary	No Issues	No Issues	No Issues	No Issues	No Issues	No mitigation required
Round Mountain and Table Mountain transformer faults	P6-2	N-1-1	No Issues	No Issues	No Issues	No Issues	No Issues	No mitigation required
Round Mountain bus section fault plus stuck breaker (bus-tie breaker)	P4-6	Stuck Breaker	No Issues	No Issues	No Issues	No Issues	No Issues	No mitigation required

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Transient Stability



Contingency	Category	Category Description	Transient Stability Performance					Potential Mitigation Solutions
			Baseline Scenarios			Sensitivity Scenarios		
			2024 Summer Peak	2029 Summer Peak	2024 Spring Off-Peak	2024 SP High CEC Forecast	2024 SpOP Hi Renew & Min Gas Gen	
Round Mountain bus section fault plus stuck breaker (non-bus-tie breaker)	P4-5	Stuck Breaker	No Issues	No Issues	No Issues	No Issues	No Issues	No mitigation required
Round Mountain transformer and Round Mountain - Cottonwood 230 kV lines + stuck breaker	P4-3	Stuck Breaker	No Issues	No Issues	No Issues	No Issues	No Issues	No mitigation required
Round Mountain Transformer and Round Mountain - Thermalito and Hyatt 230 kV lines	P6-1	N-1-1	No Issues	No Issues	No Issues	No Issues	No Issues	No mitigation required
Table Mountain - Rio Oso 230 kV line fault plus relay failure	P5-2	Non-Redundant Relary	No Issues	No Issues	No Issues	No Issues	No Issues	No mitigation required
Table Mountain -Rio Oso and Table Mountain-Palermo 230 kV line fault + stuck breaker	P4-2	Stuck Breaker	No Issues	No Issues	No Issues	No Issues	No Issues	No mitigation required
Table Mountain to Thermalito 230 kV line fault	P1-2	N-1	No Issues	No Issues	No Issues	No Issues	No Issues	No mitigation required
Tesla 230 kV Bus section fault plus relay failure	P5-5	Non-Redundant Relary	No Issues	No Issues	No Issues	No Issues	No Issues	No mitigation required

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Single Contingency Load Drop



Worst Contingency	Category	Category Description	Amount of Load Drop (MW)									Potential Mitigation Solutions
			2021 Summer Peak	2024 Summer Peak	2029 Summer Peak	2021 Spring Off-Peak	2024 Spring Off-Peak	2024 SP High CEC Forecast	2024 SpOP Hi Renew & Min Gas Gen	2021 SP Heavy Renewable & Min Gas Gen	2029 Retirement of QF Generations	

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

Study Area: PG&E North Valley



Single Source Substation with more than 100 MW Load

Substation	Load Served (MW)									Potential Mitigation Solutions
	2021 Summer Peak	2024 Summer Peak	2029 Summer Peak	2021 Spring Off-Peak	2024 Spring Off-Peak	2024 SP High CEC Forecast	2024 SpOP Hi Renew & Min Gas Gen	2021 SP Heavy Renewable & Min Gas Gen	2029 Retirement of QF Generations	

No single source substation with more than 100 MW Load