

Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading % (Baseline Scenarios)					Loading % (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations	
30300 TBL MT D 230 30325 PALERMO 230 1 1	BUS TIE 230KV [9999] & TABLE MTN-RIO OSO 230KV [5700]	P6	N-1-1	<100	<100	<100	91	<100	103	<100	<100	<100	Sensitivity only
30300 TBL MT D 230 30330 RIO OSO 230 1 1	BUS TIE 230KV [9999] & TABLE MTN-PALERMO 230KV [5690] MOAS OPENED ON TBL MT D_PALERMO	P6	N-1-1	<100	<100	<100	112	<100	99	<100	<100	<100	Project: Rio Oso Transformer Upgrade and Voltage Support projects In-Service Date: June 2022 Short term: Action plan
31464 COTWDPGE 115 30104 COTWD_E2 230 1 1	DE SABLA 6.90KV GEN UNIT 1 & COTWD_F2 230/115KV TB 4	P3	G-1/N-1	<100	<100	<100	100	<100	<100	<100	79.2	<100	Generator dispatch
	COTWD_F2 230/115KV TB 4	P1	N-1	70	20	20	101	26	17	28	101	11	Generator dispatch
	BRNY_FST 230/13.2KV TB 1 & COTWD_F2 230/115KV TB 4	P6	N-1-1	<100	<100	<100	100	<100	<100	<100	72	<100	Continue to monitor future load forecast. Potential future mitigation are preferred resources or line rerate/upgrade
	COTWD_F2 230KV SECTION 2F	P2-2	Bus	68	19	18	101	26	17	28	96	11	Generator dispatch
	COTWDPGE 115KV SECTION 2F	P2-2	Bus	70	20	20	101	26	17	28	101	11	Generator dispatch
	COTWD_F2 - 2F 230KV & PIT #1-COTTONWOOD LINE	P2-3	Non-Bus-Tie Breaker	68	19	19	101	26	17	28	97	10	Generator dispatch
	COTWD_F SECTION 1F & COTWD_F2 SECTION 2F 230KV	P2-4	Bus-Tie Breaker	69	19	18	101	26	17	28	97	10	Generator dispatch
	COTWWAP2 SECTION 2G & COTWD_F2 SECTION 2F 230KV	P2-4	Bus-Tie Breaker	68	19	18	101	26	17	28	96	11	Generator dispatch
31464 COTWDPGE 115 31466 JESSUPJ1 115 1 1	COTWD_E2 230/60KV TB 2 & COTWD_E 230/60KV TB 3	P6	N-1-1	<100	<100	<100	100	101	<100	100	<100	94	Generator dispatch
31478 TBLM JCT 115 31494 BIGBENTP 115 1 1	TABLE MTN-BUTTE #2 115KV [3920] & BUTTE-CHICO B-TBLE MTN 115KV [3910]	P6	N-1-1	114	116	135	<100	<100	121	<100	<100	135	SPS recommended in 2017-2018 TPP
	TBLE MTN 115KV SECTION 1D	P2-2	Bus	114	117	135	14	10	121	13	85	135	SPS recommended in 2017-2018 TPP
	TBLE MTN - 1D 115KV & BUTTE-CHICO B-TBLE MTN LINE	P2-3	Non-Bus-Tie Breaker	114	116	135	13	10	121	13	85	135	SPS recommended in 2017-2018 TPP
	Sycamore Creek-Notre Dame-Table Mountain and Table Mountain-Butte No.2 115 kV Lines	P7	DCTL	100	102	118	11	8	106	11	73	117	SPS recommended in 2017-2018 TPP
31480 WYANDTTE 115 31518 WYANDJT1 115 1 1	Base Case	P0	Base Case	98	100	109	13	8	103	11	79	109	Continue to monitor future load forecast. Potential future mitigation are preferred resources or line rerate/upgrade
31482 PALERMO 115 31516 WYANDJT2 115 2 1	CARIBOU-TABLE MTN 230KV [4440] & PALERMO-WYANDOTTE 115KV [4315]	P6	N-1-1	102	110	140	<100	<100	118	<100	<100	139	Existing SPS under review
	CARIBOU-TABLE MTN 230KV [4440] (BELDENTP-TBL MT D)	P2-1	Line Section w/o Fault	Diverge	Diverge	Diverge	35	43	Diverge	44	Diverge	Diverge	Existing SPS under review
	TBL MT D 230KV SECTION 1D	P2-2	Bus	Diverge	Diverge	Diverge	35	43	Diverge	44	Diverge	Diverge	Existing SPS under review
	TBL MT D SECTION 1D & TBL MT E SECTION 1E 230KV	P2-4	Bus-Tie Breaker	Diverge	Diverge	Diverge	36	43	Diverge	44	Diverge	Diverge	Existing SPS under review
	TBL MT D 230KV - SECTION 1D & 2D	P2-4	Bus-Tie Breaker	Diverge	N/A	N/A	30	N/A	N/A	N/A	Diverge		Existing SPS under review
31486 CARIBOU 115 31488 GRIZ JCT 115 1 1	TABLE MT 500/230KV TB 1 & CARIBOU 230/230KV TB 11	P6	N-1-1	99	99	100	<100	<100	100	<100	100	<100	Existing SPS under review
	CARIBOU-TABLE MTN 230KV [4440] (BELDENTP-TBL MT D)	P2-1	Line Section w/o Fault	Diverge	Diverge	Diverge	13	20	Diverge	21	Diverge	Diverge	Existing SPS under review
	TBL MT D 230KV SECTION 1D	P2-2	Bus	Diverge	Diverge	Diverge	13	20	Diverge	20	Diverge	Diverge	Existing SPS under review
	TBL MT D SECTION 1D & TBL MT E SECTION 1E 230KV	P2-4	Bus-Tie Breaker	Diverge	Diverge	Diverge	15	20	Diverge	21	Diverge	Diverge	Existing SPS under review
	TBL MT D 230KV - SECTION 1D & 2D	P2-4	Bus-Tie Breaker	Diverge	N/A	N/A	10	N/A	N/A	N/A	Diverge		Existing SPS under review
31488 GRIZ JCT 115 31512 BIG BEND 115 1 1	TABLE MT 500/230KV TB 1 & CARIBOU 230/230KV TB 11	P6	N-1-1	105	105	106	<100	<100	106	<100	106	<100	Existing SPS under review
	CARIBOU-TABLE MTN 230KV [4440] (BELDENTP-TBL MT D)	P2-1	Line Section w/o Fault	Diverge	Diverge	Diverge	36	44	Diverge	45	Diverge	Diverge	Existing SPS under review
	TBL MT D 230KV SECTION 1D	P2-2	Bus	Diverge	Diverge	Diverge	36	43	Diverge	44	Diverge	Diverge	Existing SPS under review
	TBL MT D SECTION 1D & TBL MT E SECTION 1E 230KV	P2-4	Bus-Tie Breaker	Diverge	Diverge	Diverge	38	44	Diverge	45	Diverge	Diverge	Existing SPS under review

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				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations	
	TBL MT D 230KV - SECTION 1D & 2D	P2-4	Bus-Tie Breaker	Diverge	N/A	N/A	31.83	N/A	N/A	N/A	Diverge		Existing SPS under review
31497 NDAME J 115 31498 SYCAMORE 115 1 1	NOTRE DAME-BUTTE 115KV [4312] & BUTTE-SYCAMORE CREEK 115KV [1190] MOAS OPENED ON NORD 1_CHICOTP2	P6	N-1-1	<100	<100	119	<100	<100	<100	<100	<100	119	SPS recommended in 2017-2018 TPP
	BUTTE-SYCAMORE CREEK 115KV [1190] MOAS OPENED ON NORD 1_CHICOTP2	P1	N-1	97	102	115	12	14	106	19	69	115	Significant increase in load in base cases compared to last year. Load forecast under review.
	BUTTE-SYCAMORE CREEK 115KV [1190] (NORD 1-CHICOTP2)	P2-1	Line Section w/o Fault	97	102	115	12	14	106	19	69	114	SPS recommended in 2017-2018 TPP
	BUTTE 115KV SECTION MD	P2-2	Bus	98	103	115	13	15	107	20	70	115	SPS recommended in 2017-2018 TPP
	BUTTE - MD 115KV & BUTTE-CHICO B-TBLE MTN LINE	P2-3	Non-Bus-Tie Breaker	129	136	150	19	18	140	23	96	150	SPS recommended in 2017-2018 TPP
	BUTTE - MD 115KV & BUTTE-SYCAMORE CREEK LINE	P2-3	Non-Bus-Tie Breaker	98	103	115	12	14	106	19	69	115	SPS recommended in 2017-2018 TPP
	BUTTE 115KV - SECTION ME & MD	P2-4	Bus-Tie Breaker	98	103	119	13	15	107	19	69	119	SPS recommended in 2017-2018 TPP
31500 BUTTE 115 31501 CHICOTP1 115 1 1	TABLE MTN-BUTTE #2 115KV [3920] & SYCAMORE CREEK-NOTRE DAME-TABLE MTN 115KV [4314]	P6	N-1-1	115	118	139	<100	<100	122	<100	<100	140	SPS recommended in 2017-2018 TPP
	Sycamore Creek-Notre Dame-Table Mountain and Table Mountain-Butte No.2 115 kV Lines	P7	DCTL	115	118	139	10	13	123	19	81	139	SPS recommended in 2017-2018 TPP
31500 BUTTE 115 31504 TBLE MTN 115 2 1	BUTTE-CHICO B-TBLE MTN 115KV [3910] & SYCAMORE CREEK-NOTRE DAME-TABLE MTN 115KV [4314]	P6	N-1-1	132	135	161	<100	<100	141	<100	95	160	SPS recommended in 2017-2018 TPP
	TBLE MTN - 2D 115KV & SYCAMORE CREEK-NOTRE DAME-TABLE MTN LINE	P2-3	Non-Bus-Tie Breaker	85	87	100	8	9	91	12	62	100	SPS recommended in 2017-2018 TPP
31501 CHICOTP1 115 31504 TBLE MTN 115 1 1	TABLE MTN-BUTTE #2 115KV [3920] & SYCAMORE CREEK-NOTRE DAME-TABLE MTN 115KV [4314]	P6	N-1-1	135	138	160	<100	<100	143	<100	98	161	SPS recommended in 2017-2018 TPP
	TBLE MTN 115KV SECTION 2D	P2-2	Bus	101	103	117	12	11	107	14	75	117	SPS recommended in 2017-2018 TPP
	TBLE MTN - 2D 115KV & PARADISE-TABLE MTN LINE	P2-3	Non-Bus-Tie Breaker	101	103	117	12	11	107	14	75	117	SPS recommended in 2017-2018 TPP
	TBLE MTN - 2D 115KV & SYCAMORE CREEK-NOTRE DAME-TABLE MTN LINE	P2-3	Non-Bus-Tie Breaker	101	104	118	12	11	108	14	76	118	SPS recommended in 2017-2018 TPP
	Sycamore Creek-Notre Dame-Table Mountain and Table Mountain-Butte No.2 115 kV Lines	P7	DCTL	135	138	161	15	15	143	20	98	160	SPS recommended in 2017-2018 TPP
31503 CHICOTP2 115 31500 BUTTE 115 1 1	BUTTE-CHICO B-TBLE MTN 115KV [3910] & SYCAMORE CREEK-NOTRE DAME-TABLE MTN 115KV [4314]	P6	N-1-1	93	97	113	<100	<100	100	<100	<100	112	SPS recommended in 2017-2018 TPP
31504 TBLE MTN 115 31497 NDAME J 115 1 1	BUTTE-CHICO B-TBLE MTN 115KV [3910] & TABLE MTN-BUTTE #2 115KV [3920]	P6	N-1-1	98	101	118	<100	<100	104	<100	<100	119	SPS recommended in 2017-2018 TPP
	TBLE MTN 115KV SECTION 1D	P2-2	Bus	98	100	118	11	11	104	15	71	118	SPS recommended in 2017-2018 TPP
	TBLE MTN - 1D 115KV & BUTTE-CHICO B-TBLE MTN LINE	P2-3	Non-Bus-Tie Breaker	98	100	118	10	11	104	15	71	118	SPS recommended in 2017-2018 TPP
31514 PARADSE 115 31494 BIGBENTP 115 1 1	BUTTE-CHICO B-TBLE MTN 115KV [3910] & TABLE MTN-BUTTE #2 115KV [3920]	P6	N-1-1	98	101	116	<100	<100	104	<100	<100	117	SPS recommended in 2017-2018 TPP
	TBLE MTN 115KV SECTION 1D	P2-2	Bus	99	101	117	11	8	105	11	74	117	SPS recommended in 2017-2018 TPP
	TBLE MTN - 1D 115KV & BUTTE-CHICO B-TBLE MTN LINE	P2-3	Non-Bus-Tie Breaker	99	101	117	11	8	104	11	73	117	SPS recommended in 2017-2018 TPP
	Sycamore Creek-Notre Dame-Table Mountain and Table Mountain-Butte No.2 115 kV Lines	P7	DCTL	86	88	102	9	6	92	9	63	101	SPS recommended in 2017-2018 TPP
31516 WYANDJT2 115 31512 BIG BEND 115 2 1	TABLE MT 500/230KV TB 1 & CARIBOU 230/230KV TB 11	P6	N-1-1	105	105	106	<100	<100	106	<100	106	<100	Existing SPS under review
	CARIBOU-TABLE MTN 230KV [4440] (BELDENTP-TBL MT D)	P2-1	Line Section w/o Fault	Diverge	Diverge	Diverge	35	43	Diverge	44	Diverge	Diverge	Existing SPS under review
	TBL MT D 230KV SECTION 1D	P2-2	Bus	Diverge	Diverge	Diverge	36	43	Diverge	44	Diverge	Diverge	Existing SPS under review

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	TBL MT D SECTION 1D & TBL MT E SECTION 1E 230KV	P2-4	Bus-Tie Breaker	Diverge	Diverge	Diverge	37	44	Diverge	44	Diverge	Diverge	Existing SPS under review
	TBL MT D 230KV - SECTION 1D & 2D	P2-4	Bus-Tie Breaker	Diverge	N/A	N/A	31	N/A	N/A	N/A	Diverge	N/A	Existing SPS under review
31556 TRINITY 60.0 31564 FRNCHGLH 60.0 1 1	COTWDPGE 115KV - SECTION 2D & 1D	P2-4	Bus-Tie Breaker	146	142	141	20	52	138	41	162	115	Substation upgrade or SPS
31564 FRNCHGLH 60.0 31566 KESWICK 60.0 1 1	COTWDPGE 115KV - SECTION 2D & 1D	P2-4	Bus-Tie Breaker	145	142	139	20	53	137	42	161	113	Substation upgrade or SPS
31566 KESWICK 60.0 31582 STILLWATR 60.0 1 1	COTWDPGE 115KV - SECTION 2D & 1D	P2-4	Bus-Tie Breaker	160	158	152	22	61	153	48	180	121	Substation upgrade or SPS
31570 BENTON 60.0 31572 GIRVAN 60.0 1 1	COTWD_E 230/60KV TB 3 & COTWD_E2 230/60KV TB 2	P6	N-1-1	<100	<100	127	<100	<100	91	<100	<100	124	SPS
	COTWD_F2 SECTION 2F & COTWD_E2 SECTION 2E 230KV	P2-4	Bus-Tie Breaker	78	77	67	95	94	71	102	102	23	Sensitivity only
31572 GIRVAN 60.0 31574 ANDERSON 60.0 1 1	COTWD_F2 230/115KV TB 4 & COTWD_E2 230/115KV TB 1	P6	N-1-1	<100	<100	<100	73	102	<100	107	<100	<100	Generator dispatch
	COTWD_F2 SECTION 2F & COTWD_E2 SECTION 2E 230KV	P2-4	Bus-Tie Breaker	45	43	40	95	98	36	109	81	33	Sensitivity only
31574 ANDERSON 60.0 31604 COTTONWD 60.0 1 1	COTWD_F2 SECTION 2F & COTWD_E2 SECTION 2E 230KV	P2-4	Bus-Tie Breaker	22	22	49	84	90	22	102	51	82	Sensitivity only
31576 WNTU PMS 60.0 31570 BENTON 60.0 1 1	NEO REDB 13.80KV GEN UNIT 1 & CASCADE-COTTONWOOD 115KV [1240]	P3	G-1/N-1	<100	<100	<100	94	100	<100	101	<100	<100	Sensitivity only
	COTWD_F2 230/115KV TB 4 & COTWD_E2 230/115KV TB 1	P6	N-1-1	36	33	38	147	200	32	210	69	<100	Generator dispatch
	CASCADE-COTTONWOOD 115KV [1240] (COTWDPGE-JESSUPJ1)	P2-1	Line Section w/o Fault	32	25	24	117	129	14	137	69	52	Generator dispatch
	COTWDPGE 115KV SECTION 2D	P2-2	Bus	37	29	29	119	129	18	138	76	54	Generator dispatch
	COTWDPGE - 2D 115KV & BRIDGEVILLE-COTTONWOOD LINE	P2-3	Non-Bus-Tie Breaker	37	29	29	119	129	18	137	76	55	Generator dispatch
	COTWD_F2 SECTION 2F & COTWD_E2 SECTION 2E 230KV	P2-4	Bus-Tie Breaker	123	119	105	191	194	106	214	184	50	Substation upgrade or SPS
	COTWDPGE 115KV - SECTION 2D & 1D	P2-4	Bus-Tie Breaker	79	68	75	145	137	55	151	127	80	Generator dispatch
31576 WNTU PMS 60.0 31578 LOMS JCT 60.0 1 1	NEO REDB 13.80KV GEN UNIT 1 & CASCADE-COTTONWOOD 115KV [1240]	P3	G-1/N-1	<100	<100	<100	100	106	<100	106	<100	<100	Generator dispatch
	COTWD_F2 230/115KV TB 4 & COTWD_E2 230/115KV TB 1	P6	N-1-1	43	39	42	153	206	38	216	75	<100	Generator dispatch
	CASCADE-COTTONWOOD 115KV [1240] (COTWDPGE-JESSUPJ1)	P2-1	Line Section w/o Fault	39	31	24	123	135	21	143	76	49	Generator dispatch
	COTWDPGE 115KV SECTION 2D	P2-2	Bus	43	35	30	125	135	25	144	82	52	Generator dispatch
	COTWDPGE - 2D 115KV & BRIDGEVILLE-COTTONWOOD LINE	P2-3	Non-Bus-Tie Breaker	43	35	30	125	135	25	143	82	52	Generator dispatch
	COTWD_F2 SECTION 2F & COTWD_E2 SECTION 2E 230KV	P2-4	Bus-Tie Breaker	129	125	110	197	200	112	219	190	48	Substation upgrade or SPS
	COTTONWD 60KV - SECTION 1D & 1E	P2-4	Bus-Tie Breaker	N/A	Diverge	Diverge	N/A	12	Diverge	11	N/A	Diverge	Non-BES Facility
	COTWDPGE 115KV - SECTION 2D & 1D	P2-4	Bus-Tie Breaker	84	73	77	150	143	61	157	132	79	Generator dispatch
31578 LOMS JCT 60.0 31592 DESCHUTS 60.0 1 1	COTTONWD 60KV - SECTION 1D & 1E	P2-4	Bus-Tie Breaker	N/A	Diverge	Diverge	N/A	37	Diverge	26	N/A	Diverge	Non-BES Facility
	Base Case	P0	Base Case	85	95	106	44	40	109	57	72	71	Significant increase in load in base cases compared to last year. Load forecast under review.
	COLEMAN 6.60KV GEN UNIT 1 & CASCADE-COTTONWOOD 115KV [1240]	P3	G-1/N-1	101	100	100	98	98	103	101	102	100	Significant increase in load in base cases compared to last year. Load forecast under review.
	NEO REDB 13.80KV GEN UNIT 1	P1	N-1	82	93	102	45	41	104	49	71	71	Significant increase in load in base cases compared to last year. Load forecast under review.

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31580 CASCADE 60.0 31581 OREGNTRL 60.0 1 1	CASCADE-COTTONWOOD 115KV [1240]	P1	N-1	111	112	112	100	100	115	112	108	100	Significant increase in load in base cases compared to last year. Load forecast under review.
	COTWD_E2 230/60KV TB 2	P1	N-1	81	92	108	31	25	108	47	64	75	Significant increase in load in base cases compared to last year. Load forecast under review.
	COTWD_E 230/60KV TB 3	P1	N-1	81	92	107	31	24	108	46	64	75	Significant increase in load in base cases compared to last year. Load forecast under review.
	COTWD_E 230/60KV TB 3 & COTWD_E2 230/60KV TB 2	P6	N-1-1	232	239	339	<100	<100	255	<100	<100	306	Substation upgrade or SPS
	NEO REDT 60/13.8KV TB 1	P1	N-1	82	93	101	45	41	104	49	71	70	Significant increase in load in base cases compared to last year. Load forecast under review.
	CASCADE-COTTONWOOD 115KV [1240] (COTWDPGE-JESSUPJ1)	P2-1	Line Section w/o Fault	97	94	89	143	152	96	169	117	55	Generator dispatch
	COTWDPGE 115KV SECTION 2D	P2-2	Bus	105	102	95	146	152	103	170	126	62	Generator dispatch for off peak cases. Significant increase in load in base cases compared to last year. Load forecast under review in peak cases.
	COTTONWD 60KV SECTION MA	P2-2	Bus	Diverge	N/A	N/A	23	N/A	N/A	N/A	153	N/A	Non-BES Facility
	COTTONWD 60KV SECTION 1D	P2-2	Bus	N/A	117	141	N/A	21	135	39	N/A	108	Non-BES Facility
	COTTONWD - 1D 60KV & COTTONWOOD-RED BLUFF LINE	P2-3	Non-Bus-Tie Breaker	N/A	117	141	N/A	21	135	39	N/A	108	Non-BES Facility
	COTWDPGE - 2D 115KV & BRIDGEVILLE-COTTONWOOD LINE	P2-3	Non-Bus-Tie Breaker	105	102	96	146	151	103	169	126	62	Generator dispatch
	COTWDPGE - 2D 115KV & CASCADE-COTTONWOOD LINE	P2-3	Non-Bus-Tie Breaker	120	120	119	104	100	123	113	118	106	Significant increase in load in base cases compared to last year. Load forecast under review.
	COTTONWD - MA 60KV & COTTONWOOD-RED BLUFF LINE	P2-3	Non-Bus-Tie Breaker	Diverge	N/A	N/A	23	N/A	N/A	N/A	153	N/A	Non-BES Facility
	COTTONWD - MA 60KV & COTTONWOOD #2 LINE	P2-3	Non-Bus-Tie Breaker	Diverge	N/A	N/A	23	N/A	N/A	N/A	153	N/A	Non-BES Facility
	COTTONWD - MA 60KV & COTTONWOOD #1 LINE	P2-3	Non-Bus-Tie Breaker	240	N/A	N/A	36	N/A	N/A	N/A	117	N/A	Non-BES Facility
	COTTONWD - MA 60KV & RED BLFF-COTTONWD LINE	P2-3	Non-Bus-Tie Breaker	240	N/A	N/A	36	N/A	N/A	N/A	117	N/A	Non-BES Facility
	COTWD_F2 SECTION 2F & COTWD_E2 SECTION 2E 230KV	P2-4	Bus-Tie Breaker	220	223	212	243	238	222	271	272	61	Substation upgrade or SPS
	COTTONWD 60KV - SECTION 1D & 1E	P2-4	Bus-Tie Breaker	N/A	Diverge	Diverge	N/A	57	Diverge	55	N/A	Diverge	Non-BES Facility
	COTWDPGE 115KV - SECTION 2D & 1D	P2-4	Bus-Tie Breaker	164	157	153	180	162	157	187	200	109	Substation upgrade or SPS
31580 CASCADE 60.0 31582 STILLWATR 60.0 1 1	COTWDPGE 115KV - SECTION 2D & 1D	P2-4	Bus-Tie Breaker	116	115	119	23	51	109	40	137	88	Substation upgrade or SPS
31581 OREGNTRL 60.0 31578 LOMS JCT 60.0 1 1	NEO REDB 13.80KV GEN UNIT 1 & CASCADE-COTTONWOOD 115KV [1240]	P3	G-1/N-1	84	84	79	100	102	82	109	89	86	Generator dispatch
	CASCADE-COTTONWOOD 115KV [1240]	P1	N-1	95	95	98	103	102	98	115	96	87	Generator dispatch
	COTWD_F2 230/115KV TB 4 & COTWD_E2 230/115KV TB 1	P6	N-1-1	86	84	86	197	252	85	272	104	<100	Generator dispatch
	CASCADE-COTTONWOOD 115KV [1240] (COTWDPGE-JESSUPJ1)	P2-1	Line Section w/o Fault	82	78	75	145	154	80	172	106	53	Generator dispatch
	COTWDPGE 115KV SECTION 2D	P2-2	Bus	89	85	82	148	155	86	174	116	59	Generator dispatch
	COTTONWD 60KV SECTION MA	P2-2	Bus	Diverge	N/A	N/A	24	N/A	N/A	N/A	142	N/A	Non-BES Facility
	COTTONWD 60KV SECTION 1D	P2-2	Bus	N/A	101	126	N/A	20	119	40	N/A	93	Non-BES Facility
	COTTONWD - 1D 60KV & COTTONWOOD-RED BLUFF LINE	P2-3	Non-Bus-Tie Breaker	N/A	101	126	N/A	20	119	40	N/A	93	Significant increase in load in base cases compared to last year. Load forecast under review.
	COTWDPGE - 2D 115KV & BRIDGEVILLE-COTTONWOOD LINE	P2-3	Non-Bus-Tie Breaker	89	85	82	148	154	86	173	115	60	Generator dispatch



Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading % (Baseline Scenarios)					Loading % (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations	
	COTWDPGE - 2D 115KV & CASCADE-COTTONWOOD LINE	P2-3	Non-Bus-Tie Breaker	103	103	106	106	102	106	116	106	93	Significant increase in load in base cases compared to last year. Load forecast under review.
	COTTONWD - MA 60KV & COTTONWOOD-RED BLUFF LINE	P2-3	Non-Bus-Tie Breaker	Diverge	N/A	N/A	24	N/A	N/A	N/A	142	N/A	Non-BES Facility
	COTTONWD - MA 60KV & COTTONWOOD #2 LINE	P2-3	Non-Bus-Tie Breaker	Diverge	N/A	N/A	24	N/A	N/A	N/A	142	N/A	Non-BES Facility
	COTTONWD - MA 60KV & COTTONWOOD #1 LINE	P2-3	Non-Bus-Tie Breaker	224	N/A	N/A	38	N/A	N/A	N/A	107	N/A	Non-BES Facility
	COTTONWD - MA 60KV & RED BLFF-COTTONWD LINE	P2-3	Non-Bus-Tie Breaker	224	N/A	N/A	37	N/A	N/A	N/A	107	N/A	Non-BES Facility
	COTWD_F2 SECTION 2F & COTWD_E2 SECTION 2E 230KV	P2-4	Bus-Tie Breaker	204	206	198	245	241	205	275	261	56	Substation upgrade or SPS
	COTTONWD 60KV - SECTION 1D & 1E	P2-4	Bus-Tie Breaker	N/A	Diverge	Diverge	N/A	53	Diverge	49	N/A	Diverge	Non-BES Facility
	COTWDPGE 115KV - SECTION 2D & 1D	P2-4	Bus-Tie Breaker	145	139	141	182	165	138	191	186	104	Substation upgrade or SPS
31592 DESCHUTS 60.0 31594 VOLTA 60.0 1 1	COTTONWD 60KV - SECTION 1D & 1E	P2-4	Bus-Tie Breaker	N/A	Diverge	Diverge	N/A	47	Diverge	22	N/A	Diverge	Non-BES Facility
31594 VOLTA 60.0 31596 SOUTH 60.0 1 1	VOLTA1-2 9.11KV GEN UNIT 1 & CASCADE-BENTON-DESCHUTES 60KV [6310]	P3	G-1/N-1	102	104	117	<100	<100	108	<100	<100	<100	Significant increase in load in base cases compared to last year. Load forecast under review.
	CASCADE-BENTON-DESCHUTES 60KV [6310]	P1	N-1	68	79	108	36	42	104	35	27	41	Continue to monitor future load forecast. Potential future mitigation are preferred resources or line rerate/upgrade
	COLEMAN-COTTONWOOD 60KV [6430] & COLEMAN-RED BLFF 60KV [6640]	P6	N-1-1	110	100	100	<100	<100	100	<100	100	<100	Project: Cottonwood-Red Bluff Reconductoring In-Service Date: May 2021 Short term: Action plan Continue to monitor future load forecast.
	CASCADE-BENTON-DESCHUTES 60KV [6310] (LOMS JCT-DESCHUTS)	P2-1	Line Section w/o Fault	68	79	108	36	43	105	35	27	41	Continue to monitor future load forecast. Potential future mitigation are preferred resources or line rerate/upgrade
	COTTONWD 60KV SECTION MA	P2-2	Bus	Diverge	N/A	N/A	18	N/A	N/A	N/A	76	N/A	Non-BES Facility
	BENTON - 1D 60KV & CASCADE-BENTON-DESCHUTES LINE	P2-3	Non-Bus-Tie Breaker	68	79	108	36	42	105	35	27	41	Non-BES Facility
	CASCADE - MA 60KV & CASCADE-BENTON-DESCHUTES LINE	P2-3	Non-Bus-Tie Breaker	68	79	108	36	42	104	35	27	41	Non-BES Facility
	COTTONWD - MA 60KV & COLEMAN-COTTONWOOD LINE	P2-3	Non-Bus-Tie Breaker	Diverge	N/A	N/A	32	N/A	N/A	N/A	55	N/A	Non-BES Facility
	COTTONWD - MA 60KV & COTTONWOOD-RED BLUFF LINE	P2-3	Non-Bus-Tie Breaker	Diverge	N/A	N/A	18	N/A	N/A	N/A	76	N/A	Non-BES Facility
	COTTONWD - MA 60KV & COTTONWOOD #2 LINE	P2-3	Non-Bus-Tie Breaker	Diverge	N/A	N/A	18	N/A	N/A	N/A	76	N/A	Non-BES Facility
	COTTONWD - MA 60KV & COTTONWOOD #1 LINE	P2-3	Non-Bus-Tie Breaker	106	N/A	N/A	23	N/A	N/A	N/A	32	N/A	Non-BES Facility
	COTTONWD 60KV - SECTION 1D & 1E	P2-4	Bus-Tie Breaker	N/A	Diverge	Diverge	N/A	42	Diverge	26	N/A	Diverge	Non-BES Facility
31602 COLEMAN 60.0 31606 CLMN JCT 60.0 1 1	COLEMAN 6.60KV GEN UNIT 1 & RED BLFF-COTTONWD 60KV [6660] MOAS OPENED ON COTTONWD_RED B JT	P3	G-1/N-1	136	<100	<100	<100	<100	<100	<100	<100	<100	Project: Red Bluff-Coleman 60 kV Reinforcement In-Service Date: Dec 2021 Short term: Action plan
	COLEMAN-COTTONWOOD 60KV [6430] & RED BLFF-COTTONWD 60KV [6660] MOAS OPENED ON COTTONWD_RED B JT	P6	N-1-1	137	<100	<100	<100	<100	<100	<100	<100	<100	Project: Red Bluff-Coleman 60 kV Reinforcement In-Service Date: Dec 2021 Short term: Action plan
	RED BLFF-COTTONWD 60KV [6660] MOAS OPENED ON COTTONWD_RED B JT	P1	N-1	136	56	65	29	13	58	15	93	66	Project: Red Bluff-Coleman 60 kV Reinforcement In-Service Date: Dec 2021 Short term: Action plan
	COTTONWD 60KV SECTION MA	P2-2	Bus	Diverge	N/A	N/A	23	N/A	N/A	N/A	121	N/A	Non-BES Facility
	COTTONWD - MA 60KV & COLEMAN-COTTONWOOD LINE	P2-3	Non-Bus-Tie Breaker	Diverge	N/A	N/A	22	N/A	N/A	N/A	120	N/A	Non-BES Facility

Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading % (Baseline Scenarios)					Loading % (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations	
	COTTONWD - MA 60KV & COTTONWOOD-RED BLUFF LINE	P2-3	Non-Bus-Tie Breaker	Diverge	N/A	N/A	23	N/A	N/A	N/A	121	N/A	Non-BES Facility
	COTTONWD - MA 60KV & COTTONWOOD #2 LINE	P2-3	Non-Bus-Tie Breaker	Diverge	N/A	N/A	23	N/A	N/A	N/A	121	N/A	Non-BES Facility
	COTTONWD - MA 60KV & RED BLFF-COTTONWD LINE	P2-3	Non-Bus-Tie Breaker	142	N/A	N/A	27	N/A	N/A	N/A	93	N/A	Non-BES Facility
	Cottonwood-Benton No.1 and Cottonwood-Red Bluff 60 kV Lines	P7	DCTL	136	56	65	29	13	58	15	93	65	Project: Red Bluff-Coleman 60 kV Reinforcement In-Service Date: Dec 2021 Short term: Action plan
31604 COTTONWD 60.0 31607 RED B JT 60.0 1 1	COLEMAN-RED BLUFF 60KV [6440] (COLEMAN-CLMN JCT)	P2-1	Line Section w/o Fault	134	56	64	30	13	58	15	93	64	Project: Cottonwood-Red Bluff Reconductoring In-Service Date: May 2021 Short term: Action plan
	COLEMAN 60KV SECTION 1D	P2-2	Bus	134	56	64	30	13	58	15	93	64	Project: Cottonwood-Red Bluff Reconductoring In-Service Date: May 2021 Short term: Action plan
	COLEMAN - 1D 60KV & COLEMAN-COTTONWOOD LINE	P2-3	Non-Bus-Tie Breaker	134	56	64	30	13	58	15	93	64	Non-BES Facility
31604 COTTONWD 60.0 31611 RASN JNT 60.0 2 1	BELDEN 13.80KV GEN UNIT 1 & NEO REDB 13.80KV GEN UNIT 1	P3	G-1/N-1	<100	<100	107	<100	<100	93	<100	<100	107	Continue to monitor future load forecast. Potential future mitigation are preferred resources or line rerate/upgrade
	NEO REDB 13.80KV GEN UNIT 1	P1	N-1	89	92	107	37	36	94	33	74	107	Continue to monitor future load forecast. Potential future mitigation are preferred resources or line rerate/upgrade
	KILARC 60/9.11KV TB 1 & NEO REDB 13.80KV GEN UNIT 1	P6	N-1-1	<100	<100	107	<100	<100	93	<100	<100	107	Continue to monitor future load forecast. Potential future mitigation are preferred resources or line rerate/upgrade
	NEO REDT 60/13.8KV TB 1	P1	N-1	88	91	106	37	36	94	33	74	106	Continue to monitor future load forecast. Potential future mitigation are preferred resources or line rerate/upgrade
	COTTONWOOD #2 60KV [6630] (NEO REDT-RASN JNT)	P2-1	Line Section w/o Fault	88	91	106	37	36	94	33	74	106	Continue to monitor future load forecast. Potential future mitigation are preferred resources or line rerate/upgrade
31604 COTTONWD 60.0 31614 RWSN J2 60.0 1 1	COTTONWOOD-RED BLUFF 60KV [6660] MOAS OPENED ON COTTONWD_RED B JT & COLEMAN-RED BLFF 60KV [6640]	P6	N-1-1	<100	<100	102	<100	<100	<100	<100	<100	103	Disable Automatics
31606 CLMN JCT 60.0 31608 RED BLFF 60.0 1 1	COLEMAN 6.60KV GEN UNIT 1 & RED BLFF-COTTONWD 60KV [6660] MOAS OPENED ON COTTONWD_RED B JT	P3	G-1/N-1	101	<100	<100	<100	<100	<100	<100	<100	<100	Project: Red Bluff-Coleman 60 kV Reinforcement In-Service Date: Dec 2021 Short term: Action plan
	COLEMAN-COTTONWOOD 60KV [6430] & RED BLFF-COTTONWD 60KV [6660] MOAS OPENED ON COTTONWD_RED B JT	P6	N-1-1	102	<100	<100	<100	<100	<100	<100	<100	<100	Project: Red Bluff-Coleman 60 kV Reinforcement In-Service Date: Dec 2021 Short term: Action plan
	RED BLFF-COTTONWD 60KV [6660] MOAS OPENED ON COTTONWD_RED B JT	P1	N-1	101	42	48	24	8	43	9	72	49	Project: Red Bluff-Coleman 60 kV Reinforcement In-Service Date: Dec 2021 Short term: Action plan
	COTTONWD 60KV SECTION MA	P2-2	Bus	Diverge	N/A	N/A	20	N/A	N/A	N/A	100	N/A	Non-BES Facility
	COTTONWD - MA 60KV & COLEMAN-COTTONWOOD LINE	P2-3	Non-Bus-Tie Breaker	Diverge	N/A	N/A	19	N/A	N/A	N/A	99	N/A	Non-BES Facility
	COTTONWD - MA 60KV & COTTONWOOD-RED BLUFF LINE	P2-3	Non-Bus-Tie Breaker	Diverge	N/A	N/A	20	N/A	N/A	N/A	100	N/A	Non-BES Facility
	COTTONWD - MA 60KV & COTTONWOOD #2 LINE	P2-3	Non-Bus-Tie Breaker	Diverge	N/A	N/A	20	N/A	N/A	N/A	100	N/A	Non-BES Facility
	COTTONWD - MA 60KV & COTTONWOOD #1 LINE	P2-3	Non-Bus-Tie Breaker	106	N/A	N/A	23	N/A	N/A	N/A	72	N/A	Non-BES Facility



Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading % (Baseline Scenarios)					Loading % (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations	
	Cottonwood-Benton No.1 and Cottonwood-Red Bluff 60 kV Lines	P7	DCTL	101	42	48	24	8	43	9	72	48	Project: Red Bluff-Coleman 60 kV Reinforcement In-Service Date: Dec 2021 Short term: Action plan
31607 RED B JT 60.0 31608 RED BLFF 60.0 1 1	COLEMAN-RED BLFF 60KV [6640] & COTTONWOOD-RED BLUFF 60KV [6660] MOAS OPENED ON COTTONWD_RED B JT	P6	N-1-1	101	<100	<100	<100	<100	<100	<100	<100	<100	Project: Cottonwood-Red Bluff Reconductoring In-Service Date: May 2021 Short term: Action plan
	COLEMAN-RED BLUFF 60KV [6440] (COLEMAN-CLMN JCT)	P2-1	Line Section w/o Fault	134	56	64	29	13	58	15	92	64	Project: Cottonwood-Red Bluff Reconductoring In-Service Date: May 2021 Short term: Action plan
	COLEMAN 60KV SECTION 1D	P2-2	Bus	134	56	64	29	13	58	15	92	64	Project: Cottonwood-Red Bluff Reconductoring In-Service Date: May 2021 Short term: Action plan
	COLEMAN - 1D 60KV & COLEMAN-COTTONWOOD LINE	P2-3	Non-Bus-Tie Breaker	134	56	64	29	13	58	15	92	64	Non-BES Facility
31607 RED B JT 60.0 31614 RWSN J2 60.0 1 1	COLEMAN-RED BLFF 60KV [6640] & COTTONWOOD-RED BLUFF 60KV [6660] MOAS OPENED ON COTTONWD_RED B JT	P6	N-1-1	101	102	121	<100	<100	105	<100	<100	122	Disable Automatics
31626 CORNING 60.0 31729 CORNSWCH 60.0 4 1	Base Case	P0	Base Case	92	94	103	13	15	97	18	71	103	Continue to monitor future load forecast. Potential future mitigation are preferred resources or line rerate/upgrade
31677 GRS F JT 60.0 31689 ELIZ TWN 60.0 1 1	CARIBOU-TABLE MTN 230KV [4440] (BELDENTP-TBL MT D)	P2-1	Line Section w/o Fault	Diverge	Diverge	Diverge	5	5	Diverge	6	Diverge	Diverge	Existing SPS under review
	TBL MT D 230KV SECTION 1D	P2-2	Bus	Diverge	Diverge	Diverge	5	5	Diverge	6	Diverge	Diverge	Existing SPS under review
	TBL MT D SECTION 1D & TBL MT E SECTION 1E 230KV	P2-4	Bus-Tie Breaker	Diverge	Diverge	Diverge	4	6	Diverge	6	Diverge	Diverge	Existing SPS under review
31683 EST Q1 60.0 31688 SPIQUINCYJCT 60.0 1 1	CARIBOU-TABLE MTN 230KV [4440] (BELDENTP-TBL MT D)	P2-1	Line Section w/o Fault	Diverge	Diverge	Diverge	4	4	Diverge	5	Diverge	Diverge	Existing SPS under review
	TBL MT D 230KV SECTION 1D	P2-2	Bus	Diverge	Diverge	Diverge	3	4	Diverge	5	Diverge	Diverge	Existing SPS under review
	TBL MT D SECTION 1D & TBL MT E SECTION 1E 230KV	P2-4	Bus-Tie Breaker	Diverge	Diverge	Diverge	2	5	Diverge	5	Diverge	Diverge	Existing SPS under review
	CARIBOU-TABLE MTN 230KV [4440] (BELDENTP-TBL MT D)	P2-1	Line Section w/o Fault	Diverge	Diverge	Diverge	5	5	Diverge	6	Diverge	Diverge	Existing SPS under review
	TBL MT D 230KV SECTION 1D	P2-2	Bus	Diverge	Diverge	Diverge	5	5	Diverge	6	Diverge	Diverge	Existing SPS under review
31688 SPIQUINCYJCT 60.0 38056 PLMS-SRA 60.0 1 1	TBL MT D SECTION 1D & TBL MT E SECTION 1E 230KV	P2-4	Bus-Tie Breaker	Diverge	Diverge	Diverge	4	6	Diverge	6	Diverge	Diverge	Existing SPS under review
	CARIBOU-TABLE MTN 230KV [4440] (BELDENTP-TBL MT D)	P2-1	Line Section w/o Fault	Diverge	Diverge	Diverge	22	25	Diverge	24	Diverge	Diverge	Existing SPS under review
	TBL MT D 230KV SECTION 1D	P2-2	Bus	Diverge	Diverge	Diverge	21	25	Diverge	24	Diverge	Diverge	Existing SPS under review
31690 CARIBOU 60.0 31677 GRS F JT 60.0 1 1	TBL MT D SECTION 1D & TBL MT E SECTION 1E 230KV	P2-4	Bus-Tie Breaker	Diverge	Diverge	Diverge	20	24	Diverge	23	Diverge	Diverge	Existing SPS under review
	CARIBOU-TABLE MTN 230KV [4440] (BELDENTP-TBL MT D)	P2-1	Line Section w/o Fault	Diverge	Diverge	Diverge	6	7	Diverge	7	Diverge	Diverge	Existing SPS under review
	TBL MT D 230KV SECTION 1D	P2-2	Bus	Diverge	Diverge	Diverge	6	7	Diverge	7	Diverge	Diverge	Existing SPS under review
31722 GLENN 60.0 31725 ORL B JT 60.0 1 1	TBL MT D SECTION 1D & TBL MT E SECTION 1E 230KV	P2-4	Bus-Tie Breaker	Diverge	Diverge	Diverge	5	7	Diverge	7	Diverge	Diverge	Existing SPS under review
	GLENN #5 60KV [8427]	P1	N-1	84	89	100	5	10	92	15	57	101	Continue to monitor future load forecast. Potential future mitigation are preferred resources or line rerate/upgrade
31722 GLENN 60.0 31729 CORNSWCH 60.0 4 1	GLENN #5 60KV [8427] & ELKCREEK 60/9.11KV TB 1	P6	N-1-1	<100	<100	100	<100	<100	91	<100	<100	101	Continue to monitor future load forecast. Potential future mitigation are preferred resources or line rerate/upgrade
	Base Case	P0	Base Case	92	94	103	13	15	97	18	71	103	Continue to monitor future load forecast. Potential future mitigation are preferred resources or line rerate/upgrade
31722 GLENN 60.0 31733 CAPYSWCH 60.0 3 1	Base Case	P0	Base Case	84	87	102	7	22	90	30	50	102	Continue to monitor future load forecast. Potential future mitigation are preferred resources or line rerate/upgrade



Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading % (Baseline Scenarios)					Loading % (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations	
31733 CAPYSWCH 60.0 31731 CAPAYJCT 60.0 3 1	Base Case	P0	Base Case	84	87	102	7	22	90	30	50	102	Continue to monitor future load forecast. Potential future mitigation are preferred resources or line rerate/upgrade
31735 CHICO JT 60.0 31738 ANITA 60.0 3 1	Base Case	P0	Base Case	87	91	106	10	25	93	33	51	107	Continue to monitor future load forecast. Potential future mitigation are preferred resources or line rerate/upgrade

Study Area: PG&E North Valley



High/Low Voltages

Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)					Voltage PU (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations	
ANITA 60 kv	Base Case	P0	Base Case	0.99	1.00	0.98	1.06	1.07	1.00	1.07	1.01	0.98	Load power factor correction and voltage support if needed
APT ORVC 60 kv	Base Case	P0	Base Case	1.02	1.02	1.02	1.06	1.04	1.02	1.04	1.02	1.01	Load power factor correction and voltage support if needed
BCKS CRK 230 kv	Base Case	P0	Base Case	1.03	1.04	1.03	1.07	1.05	1.04	1.05	1.03	1.03	Load power factor correction and voltage support if needed
BELDEN 230 kv	Base Case	P0	Base Case	1.03	1.04	1.03	1.07	1.06	1.04	1.05	1.03	1.03	Load power factor correction and voltage support if needed
BENTON 60 kv	Base Case	P0	Base Case	1.03	1.04	1.02	1.06	1.05	1.04	1.05	1.03	1.01	Load power factor correction and voltage support if needed
BIG BAR 60 kv	Base Case	P0	Base Case	1.03	1.02	1.02	1.07	1.05	1.03	1.05	1.04	1.02	Load power factor correction and voltage support if needed
BIG BEND 115 kv	Base Case	P0	Base Case	1.03	1.04	1.02	1.07	1.05	1.03	1.05	1.03	1.02	Load power factor correction and voltage support if needed
BTTE CRK 60 kv	Base Case	P0	Base Case	1.03	1.03	1.03	1.06	1.06	1.03	1.06	1.04	1.01	Load power factor correction and voltage support if needed
BURNEY 60 kv	Base Case	P0	Base Case	1.07	1.07	1.04	1.06	1.06	1.07	1.12	1.07	1.04	Load power factor correction and voltage support if needed
BURNEYQF 60 kv	Base Case	P0	Base Case	1.07	1.07	1.04	1.06	1.06	1.07	1.12	1.07	1.04	Load power factor correction and voltage support if needed
BURNYJCT 60 kv	Base Case	P0	Base Case	1.07	1.07	1.04	1.06	1.06	1.07	1.12	1.07	1.04	Load power factor correction and voltage support if needed
CAPAY 60 kv	Base Case	P0	Base Case	1.03	1.04	1.04	1.06	1.06	1.05	1.06	1.04	1.04	Load power factor correction and voltage support if needed
CAPAYJCT 60 kv	Base Case	P0	Base Case	1.03	1.04	1.04	1.06	1.06	1.05	1.06	1.04	1.04	Load power factor correction and voltage support if needed
CAPYSWCH 60 kv	Base Case	P0	Base Case	1.04	1.05	1.05	1.06	1.06	1.06	1.06	1.04	1.05	Load power factor correction and voltage support if needed
CARBOU M 230 kv	Base Case	P0	Base Case	1.04	1.04	1.03	1.05	1.04	1.04	1.04	1.04	1.03	Load power factor correction and voltage support if needed
CASCADE 115 kv	Base Case	P0	Base Case	1.04	1.04	1.02	1.06	1.05	1.04	1.05	1.04	1.01	Load power factor correction and voltage support if needed
CASCADE 60 kv	Base Case	P0	Base Case	1.04	1.04	1.02	1.06	1.05	1.04	1.05	1.04	1.01	Load power factor correction and voltage support if needed
CEDR CRK 60 kv	Base Case	P0	Base Case	1.07	1.06	1.01	1.10	1.09	1.06	1.10	1.09	1.07	Load power factor correction and voltage support if needed
CHALLENGE 60 kv	Base Case	P0	Base Case	1.04	1.05	1.03	1.09	1.07	1.05	1.07	1.04	1.03	Load power factor correction and voltage support if needed
CHICO JT 60 kv	Base Case	P0	Base Case	1.01	1.02	1.01	1.06	1.06	1.03	1.06	1.03	1.01	Load power factor correction and voltage support if needed
CLMN FSH 60 kv	Base Case	P0	Base Case	1.04	1.04	1.03	1.05	1.05	1.04	1.05	1.03	1.03	Load power factor correction and voltage support if needed
CLMN JCT 60 kv	Base Case	P0	Base Case	1.02	1.05	1.01	1.06	1.06	1.05	1.06	1.03	1.01	Load power factor correction and voltage support if needed
CLMN TAP 60 kv	Base Case	P0	Base Case	1.04	1.04	1.03	1.05	1.05	1.04	1.05	1.04	1.03	Load power factor correction and voltage support if needed
CLOV TAP 60 kv	Base Case	P0	Base Case	1.07	1.06	1.01	1.10	1.09	1.06	1.10	1.09	1.08	Load power factor correction and voltage support if needed
CNTRVLL 60 kv	Base Case	P0	Base Case	1.03	1.03	1.02	1.05	1.05	1.03	1.05	1.03	1.01	Load power factor correction and voltage support if needed
COLEMAN 60 kv	Base Case	P0	Base Case	1.04	1.04	1.03	1.05	1.05	1.04	1.05	1.04	1.02	Load power factor correction and voltage support if needed
CORNING 60 kv	Base Case	P0	Base Case	1.02	1.03	1.02	1.07	1.07	1.03	1.08	1.03	1.01	Load power factor correction and voltage support if needed
CORNSWCH 60 kv	Base Case	P0	Base Case	1.04	1.05	1.05	1.06	1.06	1.06	1.06	1.04	1.05	Load power factor correction and voltage support if needed
COTWDPGE 115 kv	Base Case	P0	Base Case	1.04	1.03	1.03	1.07	1.04	1.04	1.04	1.04	1.03	Load power factor correction and voltage support if needed
COWCK TP 60 kv	Base Case	P0	Base Case	1.06	1.05	1.01	1.09	1.08	1.05	1.08	1.07	1.05	Load power factor correction and voltage support if needed
CRESTA 230 kv	Base Case	P0	Base Case	1.03	1.04	1.03	1.07	1.05	1.04	1.05	1.03	1.03	Load power factor correction and voltage support if needed
DE SABLA 60 kv	Base Case	P0	Base Case	1.03	1.03	1.03	1.06	1.06	1.03	1.06	1.04	1.01	Load power factor correction and voltage support if needed
DESCHUTS 60 kv	Base Case	P0	Base Case	1.04	1.04	1.01	1.07	1.06	1.04	1.06	1.04	1.00	Load power factor correction and voltage support if needed
DIRYVLL 60 kv	Base Case	P0	Base Case	1.01	1.04	0.99	1.06	1.06	1.04	1.07	1.03	0.99	Load power factor correction and voltage support if needed
ELGN JCT 60 kv	Base Case	P0	Base Case	1.02	1.02	1.02	1.06	1.04	1.02	1.04	1.02	1.01	Load power factor correction and voltage support if needed
ELKCREEK 60 kv	Base Case	P0	Base Case	0.95	0.96	0.98	1.05	1.05	0.96	1.06	0.96	0.98	Load power factor correction and voltage support if needed
ELKCRKJT 60 kv	Base Case	P0	Base Case	0.98	0.99	1.00	1.05	1.06	0.99	1.06	0.99	1.00	Load power factor correction and voltage support if needed
FRBSTNTP 115 kv	Base Case	P0	Base Case	1.05	1.05	1.04	1.08	1.06	1.05	1.06	1.05	1.04	Load power factor correction and voltage support if needed
FRNCHGLH 60 kv	Base Case	P0	Base Case	1.03	1.03	1.02	1.08	1.05	1.04	1.06	1.04	1.02	Load power factor correction and voltage support if needed
FRSTGLEN 115 kv	Base Case	P0	Base Case	1.05	1.04	1.04	1.10	1.07	1.06	1.07	1.06	1.04	Load power factor correction and voltage support if needed
GIRVAN 60 kv	Base Case	P0	Base Case	1.03	1.03	1.01	1.06	1.05	1.04	1.05	1.03	1.01	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	Voltage PU (Baseline Scenarios)					Voltage PU (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations	
GLENN 60 kv	Base Case	P0	Base Case	1.04	1.05	1.05	1.06	1.06	1.06	1.06	1.04	1.05	Load power factor correction and voltage support if needed
GRIZ JCT 115 kv	Base Case	P0	Base Case	1.04	1.04	1.03	1.06	1.05	1.04	1.05	1.04	1.03	Load power factor correction and voltage support if needed
GRIZZLY1 115 kv	Base Case	P0	Base Case	1.04	1.04	1.03	1.06	1.05	1.04	1.05	1.04	1.03	Load power factor correction and voltage support if needed
GROUSCRK 60 kv	Base Case	P0	Base Case	1.02	1.02	1.02	1.06	1.05	1.03	1.05	1.04	1.02	Load power factor correction and voltage support if needed
HAMILTON 60 kv	Base Case	P0	Base Case	1.02	1.03	1.02	1.07	1.08	1.03	1.08	1.03	1.02	Load power factor correction and voltage support if needed
HAT CRK1 60 kv	Base Case	P0	Base Case	1.06	1.06	1.04	1.06	1.06	1.06	1.12	1.06	1.04	Load power factor correction and voltage support if needed
HAT CRK2 60 kv	Base Case	P0	Base Case	1.07	1.07	1.04	1.07	1.07	1.06	1.12	1.06	1.04	Load power factor correction and voltage support if needed
HATLOSCK 60 kv	Base Case	P0	Base Case	1.06	1.07	1.05	1.08	1.07	1.07	1.08	1.07	1.05	Load power factor correction and voltage support if needed
HEADGATE 60 kv	Base Case	P0	Base Case	1.02	1.03	1.03	1.06	1.06	1.04	1.06	1.03	1.02	Load power factor correction and voltage support if needed
HMLTN JT 60 kv	Base Case	P0	Base Case	1.02	1.03	1.02	1.07	1.08	1.03	1.08	1.03	1.02	Load power factor correction and voltage support if needed
HONC JT1 115 kv	Base Case	P0	Base Case	1.05	1.05	1.03	1.11	1.07	1.04	1.07	1.04	1.03	Load power factor correction and voltage support if needed
HONC JT3 115 kv	Base Case	P0	Base Case	1.05	1.05	1.04	1.10	1.06	1.05	1.06	1.04	1.04	Load power factor correction and voltage support if needed
HONCUT 115 kv	Base Case	P0	Base Case	1.05	1.05	1.04	1.10	1.06	1.05	1.06	1.04	1.04	Load power factor correction and voltage support if needed
HT CRKRG 60 kv	Base Case	P0	Base Case	1.06	1.07	1.05	1.08	1.07	1.07	1.08	1.07	1.05	Load power factor correction and voltage support if needed
HYAMPOM 60 kv	Base Case	P0	Base Case	1.02	1.02	1.02	1.06	1.05	1.03	1.05	1.03	1.02	Load power factor correction and voltage support if needed
HYMPOMJT 60 kv	Base Case	P0	Base Case	1.02	1.02	1.02	1.06	1.05	1.03	1.05	1.04	1.02	Load power factor correction and voltage support if needed
INSKIP 60 kv	Base Case	P0	Base Case	1.04	1.04	1.03	1.05	1.04	1.04	1.05	1.04	1.03	Load power factor correction and voltage support if needed
JACINTO 60 kv	Base Case	P0	Base Case	0.99	1.01	0.99	1.08	1.09	1.01	1.10	1.01	0.99	Load power factor correction and voltage support if needed
JESSTAP 115 kv	Base Case	P0	Base Case	1.04	1.03	1.03	1.07	1.04	1.04	1.04	1.04	1.03	Load power factor correction and voltage support if needed
JESSUP 115 kv	Base Case	P0	Base Case	1.04	1.04	1.03	1.07	1.04	1.04	1.04	1.04	1.02	Load power factor correction and voltage support if needed
JESSUPJ1 115 kv	Base Case	P0	Base Case	1.04	1.04	1.03	1.07	1.04	1.04	1.04	1.04	1.02	Load power factor correction and voltage support if needed
KANAKAJT 115 kv	Base Case	P0	Base Case	1.05	1.05	1.04	1.09	1.06	1.05	1.06	1.05	1.04	Load power factor correction and voltage support if needed
KESWICK 60 kv	Base Case	P0	Base Case	1.03	1.03	1.01	1.07	1.05	1.04	1.05	1.04	1.01	Load power factor correction and voltage support if needed
KILARC 60 kv	Base Case	P0	Base Case	1.07	1.06	1.02	1.10	1.09	1.06	1.10	1.09	1.08	Load power factor correction and voltage support if needed
KLLY RDE 60 kv	Base Case	P0	Base Case	1.03	1.03	1.03	1.06	1.04	1.03	1.04	1.03	1.02	Load power factor correction and voltage support if needed
LOMS JCT 60 kv	Base Case	P0	Base Case	1.04	1.04	1.01	1.06	1.05	1.04	1.06	1.04	1.01	Load power factor correction and voltage support if needed
LS ML JT 60 kv	Base Case	P0	Base Case	1.01	1.04	0.99	1.07	1.07	1.04	1.08	1.03	0.98	Load power factor correction and voltage support if needed
LS MLNSJ 60 kv	Base Case	P0	Base Case	1.01	1.04	0.98	1.07	1.07	1.04	1.08	1.03	0.98	Load power factor correction and voltage support if needed
LSNA PCC 60 kv	Base Case	P0	Base Case	1.02	1.02	1.02	1.06	1.04	1.02	1.04	1.02	1.01	Load power factor correction and voltage support if needed
OLSEN JT 60 kv	Base Case	P0	Base Case	1.06	1.06	1.01	1.10	1.09	1.06	1.09	1.09	1.08	Load power factor correction and voltage support if needed
OREGNTRL 115 kv	Base Case	P0	Base Case	1.04	1.04	1.02	1.07	1.05	1.04	1.05	1.04	1.01	Load power factor correction and voltage support if needed
OREGNTRL 60 kv	Base Case	P0	Base Case	1.04	1.05	1.02	1.07	1.05	1.05	1.06	1.04	1.01	Load power factor correction and voltage support if needed
ORL B JT 60 kv	Base Case	P0	Base Case	1.02	1.03	1.04	1.06	1.06	1.04	1.06	1.03	1.03	Load power factor correction and voltage support if needed
ORLAND B 60 kv	Base Case	P0	Base Case	1.03	1.04	1.04	1.06	1.06	1.04	1.06	1.04	1.03	Load power factor correction and voltage support if needed
ORLND JT 60 kv	Base Case	P0	Base Case	1.04	1.05	1.05	1.06	1.06	1.05	1.06	1.04	1.04	Load power factor correction and voltage support if needed
OROVILLE 60 kv	Base Case	P0	Base Case	1.02	1.02	1.01	1.06	1.04	1.02	1.04	1.02	1.01	Load power factor correction and voltage support if needed
OROVLENRG 60 kv	Base Case	P0	Base Case	1.02	1.02	1.02	1.06	1.04	1.02	1.04	1.02	1.01	Load power factor correction and voltage support if needed
OROVLENRGJCT 60 kv	Base Case	P0	Base Case	1.02	1.02	1.02	1.06	1.04	1.02	1.04	1.02	1.01	Load power factor correction and voltage support if needed
OWID 115 kv	Base Case	P0	Base Case	1.05	1.05	1.04	1.09	1.06	1.05	1.06	1.05	1.04	Load power factor correction and voltage support if needed
PALERMO 115 kv	Base Case	P0	Base Case	1.05	1.06	1.04	1.10	1.07	1.05	1.07	1.05	1.04	Load power factor correction and voltage support if needed
PALERMO 60 kv	Base Case	P0	Base Case	1.03	1.03	1.02	1.06	1.04	1.02	1.04	1.03	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	Voltage PU (Baseline Scenarios)					Voltage PU (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations	
PANRAMA 115 kv	Base Case	P0	Base Case	1.04	1.03	1.03	1.07	1.04	1.04	1.04	1.04	1.03	Load power factor correction and voltage support if needed
PIT 1 60 kv	Base Case	P0	Base Case	1.06	1.06	1.05	1.07	1.07	1.06	1.12	1.06	1.05	Load power factor correction and voltage support if needed
POE 230 kv	Base Case	P0	Base Case	1.03	1.04	1.03	1.08	1.06	1.04	1.06	1.02	1.03	Load power factor correction and voltage support if needed
RED B JT 60 kv	Base Case	P0	Base Case	1.02	1.05	1.01	1.06	1.06	1.05	1.06	1.03	1.00	Load power factor correction and voltage support if needed
RED BLFF 60 kv	Base Case	P0	Base Case	1.02	1.05	1.01	1.06	1.06	1.05	1.06	1.03	1.00	Load power factor correction and voltage support if needed
RK C JT1 230 kv	Base Case	P0	Base Case	1.03	1.04	1.03	1.07	1.06	1.04	1.06	1.03	1.03	Load power factor correction and voltage support if needed
RK C JT2 230 kv	Base Case	P0	Base Case	1.03	1.04	1.03	1.07	1.05	1.04	1.05	1.03	1.03	Load power factor correction and voltage support if needed
ROCKCK 1 230 kv	Base Case	P0	Base Case	1.03	1.04	1.03	1.07	1.06	1.04	1.06	1.03	1.03	Load power factor correction and voltage support if needed
ROCKCK 2 230 kv	Base Case	P0	Base Case	1.03	1.04	1.03	1.07	1.05	1.04	1.05	1.03	1.03	Load power factor correction and voltage support if needed
SLYCREEK 115 kv	Base Case	P0	Base Case	1.05	1.06	1.04	1.09	1.06	1.05	1.06	1.05	1.04	Load power factor correction and voltage support if needed
SMPSN-AN 115 kv	Base Case	P0	Base Case	1.04	1.03	1.03	1.07	1.04	1.04	1.04	1.04	1.03	Load power factor correction and voltage support if needed
SOUTH 60 kv	Base Case	P0	Base Case	1.04	1.05	1.03	1.05	1.04	1.04	1.05	1.04	1.03	Load power factor correction and voltage support if needed
SPI_AND 115 kv	Base Case	P0	Base Case	1.04	1.04	1.03	1.07	1.04	1.04	1.04	1.04	1.02	Load power factor correction and voltage support if needed
SPIAND2 115 kv	Base Case	P0	Base Case	1.04	1.04	1.03	1.07	1.04	1.04	1.04	1.04	1.02	Load power factor correction and voltage support if needed
SPIQUINCY 60 kv	Base Case	P0	Base Case	1.03	1.03	0.95	1.04	1.04	1.03	1.04	1.03	0.95	Load power factor correction and voltage support if needed
SPIQUINCYJCT 60 kv	Base Case	P0	Base Case	1.03	1.03	0.95	1.04	1.04	1.03	1.04	1.03	0.95	Load power factor correction and voltage support if needed
STLLWATR 60 kv	Base Case	P0	Base Case	1.04	1.04	1.01	1.07	1.05	1.04	1.05	1.04	1.01	Load power factor correction and voltage support if needed
SYCAMORE 115 kv	Base Case	P0	Base Case	1.02	1.03	1.01	1.05	1.05	1.02	1.05	1.02	1.01	Load power factor correction and voltage support if needed
TAP 65 60 kv	Base Case	P0	Base Case	1.03	1.03	1.03	1.09	1.06	1.04	1.06	1.04	1.03	Load power factor correction and voltage support if needed
TKO TAP 60 kv	Base Case	P0	Base Case	1.06	1.05	1.01	1.09	1.08	1.05	1.08	1.07	1.05	Load power factor correction and voltage support if needed
TRINITY 115 kv	Base Case	P0	Base Case	1.03	1.03	1.03	1.09	1.06	1.04	1.06	1.04	1.03	Load power factor correction and voltage support if needed
TRINITY 60 kv	Base Case	P0	Base Case	1.03	1.03	1.03	1.09	1.06	1.04	1.06	1.04	1.03	Load power factor correction and voltage support if needed
VINA 60 kv	Base Case	P0	Base Case	1.01	1.04	0.98	1.07	1.07	1.03	1.08	1.02	0.98	Load power factor correction and voltage support if needed
VOLTA 60 kv	Base Case	P0	Base Case	1.04	1.05	1.03	1.06	1.05	1.04	1.06	1.05	1.03	Load power factor correction and voltage support if needed
WHEELBR 115 kv	Base Case	P0	Base Case	1.04	1.03	1.03	1.07	1.04	1.04	1.04	1.04	1.03	Load power factor correction and voltage support if needed
WHITMORE 60 kv	Base Case	P0	Base Case	1.06	1.06	1.01	1.10	1.08	1.05	1.09	1.08	1.07	Load power factor correction and voltage support if needed
WILDWOOD 115 kv	Base Case	P0	Base Case	1.05	1.04	1.04	1.09	1.06	1.05	1.06	1.05	1.04	Load power factor correction and voltage support if needed
WILLOWS 60 kv	Base Case	P0	Base Case	0.98	0.99	1.00	1.05	1.06	0.99	1.06	0.99	1.00	Load power factor correction and voltage support if needed
WNTU PMS 60 kv	Base Case	P0	Base Case	1.03	1.04	1.02	1.06	1.05	1.04	1.06	1.04	1.01	Load power factor correction and voltage support if needed
WODLF TP 115 kv	Base Case	P0	Base Case	1.05	1.05	1.04	1.08	1.06	1.05	1.06	1.05	1.04	Load power factor correction and voltage support if needed
WYANDJT1 115 kv	Base Case	P0	Base Case	1.05	1.05	1.03	1.10	1.07	1.05	1.07	1.05	1.03	Load power factor correction and voltage support if needed
WYANDJT2 115 kv	Base Case	P0	Base Case	1.05	1.06	1.04	1.09	1.07	1.05	1.06	1.05	1.04	Load power factor correction and voltage support if needed
WYANDTTE 115 kv	Base Case	P0	Base Case	1.05	1.05	1.03	1.10	1.07	1.05	1.07	1.05	1.03	Load power factor correction and voltage support if needed
CANAL TP 60 kv	NEO REDB 13.80KV GEN UNIT 1	P1	N-1	0.91	0.91	0.86	0.98	0.96	0.91	0.97	0.93	0.86	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
CR CANAL 60 kv	NEO REDB 13.80KV GEN UNIT 1	P1	N-1	0.91	0.91	0.86	0.98	0.96	0.91	0.97	0.93	0.86	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
NEO REDT 60 kv	NEO REDB 13.80KV GEN UNIT 1	P1	N-1	0.92	0.91	0.86	0.98	0.96	0.91	0.97	0.93	0.86	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
RASN JNT 60 kv	NEO REDB 13.80KV GEN UNIT 1	P1	N-1	0.92	0.91	0.86	0.98	0.96	0.91	0.97	0.93	0.86	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations

Study Area: PG&E North Valley

High/Low Voltages



Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)					Voltage PU (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations	
TYLER 60 kv	NEO REDB 13.80KV GEN UNIT 1	P1	N-1	0.91	0.91	0.86	0.98	0.96	0.91	0.97	0.93	0.86	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
TRINITY 115 kv	TRINITY-COTTONWOOD 115KV [4040]	P1	N-1	1.04	1.03	1.03	1.11	1.09	1.05	1.09	1.06	1.03	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
HONC JT1 115 kv	PALERMO-PEASE 115KV [3220] MOAS OPENED ON PALERMO_HONC JT1	P1	N-1	1.03	1.03	1.00	1.14	1.06	1.03	1.07	0.99	1.00	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
CEDR CRK 60 kv	CASCADE-BENTON-DESCHUTES 60KV [6310]	P1	N-1	1.04	1.04	0.88	1.14	1.13	1.02	1.16	1.09	1.02	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
CLOV TAP 60 kv	CASCADE-BENTON-DESCHUTES 60KV [6310]	P1	N-1	1.04	1.04	0.88	1.14	1.13	1.02	1.15	1.09	1.03	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
COWCK TP 60 kv	CASCADE-BENTON-DESCHUTES 60KV [6310]	P1	N-1	1.03	1.03	0.88	1.13	1.12	1.01	1.14	1.07	1.00	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
DESCHUTS 60 kv	CASCADE-BENTON-DESCHUTES 60KV [6310]	P1	N-1	1.01	1.01	0.88	1.11	1.10	1.00	1.12	1.04	0.94	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
KILARC 60 kv	CASCADE-BENTON-DESCHUTES 60KV [6310]	P1	N-1	1.04	1.04	0.89	1.14	1.13	1.02	1.15	1.09	1.03	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
OLSEN JT 60 kv	CASCADE-BENTON-DESCHUTES 60KV [6310]	P1	N-1	1.04	1.04	0.88	1.14	1.13	1.02	1.15	1.08	1.02	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
TKO TAP 60 kv	CASCADE-BENTON-DESCHUTES 60KV [6310]	P1	N-1	1.03	1.03	0.88	1.13	1.12	1.01	1.14	1.07	1.00	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
WHITMORE 60 kv	CASCADE-BENTON-DESCHUTES 60KV [6310]	P1	N-1	1.04	1.03	0.88	1.14	1.13	1.02	1.15	1.08	1.02	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
FRNCHGLH 60 kv	KESWICK-CASCADE 60KV [7260] MOAS OPENED ON CASCADE_STLLWATR	P1	N-1	1.00	0.99	0.96	1.10	1.07	1.00	1.08	1.02	0.97	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
KESWICK 60 kv	KESWICK-CASCADE 60KV [7260] MOAS OPENED ON CASCADE_STLLWATR	P1	N-1	0.99	0.97	0.93	1.11	1.07	0.98	1.08	1.02	0.93	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
STLLWATR 60 kv	KESWICK-CASCADE 60KV [7260] MOAS OPENED ON CASCADE_STLLWATR	P1	N-1	0.99	0.97	0.92	1.11	1.08	0.98	1.08	1.02	0.92	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
ELIZ TWN 60 kv	CARIBOU #2 60KV [6280] MOAS OPENED ON CARIBOU_GRS F JT	P1	N-1	1.04	1.04	0.48	1.05	1.05	1.04	1.05	1.04	0.48	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
EST Q JT 60 kv	CARIBOU #2 60KV [6280] MOAS OPENED ON CARIBOU_GRS F JT	P1	N-1	1.04	1.04	0.48	1.05	1.05	1.04	1.05	1.04	0.48	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
EST Q1 60 kv	CARIBOU #2 60KV [6280] MOAS OPENED ON CARIBOU_GRS F JT	P1	N-1	1.04	1.04	0.48	1.05	1.05	1.04	1.05	1.04	0.48	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
EST QNCY 60 kv	CARIBOU #2 60KV [6280] MOAS OPENED ON CARIBOU_GRS F JT	P1	N-1	1.04	1.04	0.48	1.05	1.05	1.04	1.05	1.04	0.48	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
GRS F JT 60 kv	CARIBOU #2 60KV [6280] MOAS OPENED ON CARIBOU_GRS F JT	P1	N-1	1.04	1.04	0.48	1.05	1.05	1.04	1.05	1.04	0.48	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
PLMS JCT 60 kv	CARIBOU #2 60KV [6280] MOAS OPENED ON CARIBOU_GRS F JT	P1	N-1	1.04	1.04	0.48	1.05	1.05	1.04	1.05	1.04	0.48	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations

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High/Low Voltages

Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)					Voltage PU (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations	
SPIQUINCY 60 kv	CARIBOU #2 60KV [6280] MOAS OPENED ON CARIBOU_GRS F JT	P1	N-1	1.04	1.04	0.48	1.05	1.05	1.04	1.05	1.04	0.48	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
SPIQUINCYJCT 60 kv	CARIBOU #2 60KV [6280] MOAS OPENED ON CARIBOU_GRS F JT	P1	N-1	1.04	1.04	0.48	1.05	1.05	1.04	1.05	1.04	0.48	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
BURNEY 60 kv	PIT 1 230/11KV TB 1	P1	N-1	1.11	1.11	1.07	1.10	1.10	1.11	1.12	1.11	1.06	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
BURNEYQF 60 kv	PIT 1 230/11KV TB 1	P1	N-1	1.11	1.11	1.07	1.10	1.10	1.10	1.12	1.11	1.06	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
BURNYJCT 60 kv	PIT 1 230/11KV TB 1	P1	N-1	1.11	1.11	1.07	1.10	1.10	1.10	1.12	1.11	1.06	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
HAT CRK1 60 kv	PIT 1 230/11KV TB 1	P1	N-1	1.10	1.09	1.07	1.10	1.10	1.09	1.12	1.10	1.07	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
HAT CRK2 60 kv	PIT 1 230/11KV TB 1	P1	N-1	1.10	1.10	1.07	1.10	1.10	1.10	1.12	1.10	1.07	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
PIT 1 60 kv	PIT 1 230/11KV TB 1	P1	N-1	1.10	1.10	1.08	1.10	1.10	1.10	1.12	1.10	1.07	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
FRBSTNTP 115 kv	TABLE MT 500/230KV TB 1	P1	N-1	1.04	1.05	1.03	1.12	1.07	1.03	1.06	1.04	1.03	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
HONC JT1 115 kv	TABLE MT 500/230KV TB 1	P1	N-1	1.04	1.05	1.01	1.13	1.07	1.03	1.07	1.03	1.01	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
HONC JT3 115 kv	TABLE MT 500/230KV TB 1	P1	N-1	1.04	1.05	1.02	1.13	1.07	1.03	1.07	1.04	1.02	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
HONCUT 115 kv	TABLE MT 500/230KV TB 1	P1	N-1	1.04	1.05	1.02	1.13	1.07	1.03	1.07	1.04	1.02	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
KANAKAJT 115 kv	TABLE MT 500/230KV TB 1	P1	N-1	1.04	1.05	1.03	1.12	1.07	1.03	1.07	1.04	1.03	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
OWID 115 kv	TABLE MT 500/230KV TB 1	P1	N-1	1.04	1.05	1.03	1.12	1.07	1.03	1.07	1.04	1.03	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
PALERMO 115 kv	TABLE MT 500/230KV TB 1	P1	N-1	1.04	1.05	1.02	1.13	1.08	1.03	1.07	1.04	1.02	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
SLYCREEK 115 kv	TABLE MT 500/230KV TB 1	P1	N-1	1.05	1.05	1.04	1.12	1.07	1.04	1.07	1.05	1.04	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
WODLF TP 115 kv	TABLE MT 500/230KV TB 1	P1	N-1	1.05	1.05	1.03	1.12	1.07	1.04	1.07	1.05	1.03	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
WYANDJT1 115 kv	TABLE MT 500/230KV TB 1	P1	N-1	1.04	1.05	1.01	1.13	1.08	1.03	1.08	1.04	1.01	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
WYANDJT2 115 kv	TABLE MT 500/230KV TB 1	P1	N-1	1.04	1.06	1.02	1.13	1.08	1.03	1.07	1.05	1.02	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
WYANDTTE 115 kv	TABLE MT 500/230KV TB 1	P1	N-1	1.04	1.05	1.01	1.13	1.08	1.03	1.08	1.04	1.01	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations

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High/Low Voltages

Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)					Voltage PU (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations	
ANITA 60 kv	GLENN 230/60KV TB 2	P1	N-1	1.01	0.99	0.96	1.22	1.23	0.99	1.23	1.03	0.96	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
CAPAY 60 kv	GLENN 230/60KV TB 2	P1	N-1	1.05	1.03	1.02	1.22	1.22	1.03	1.22	1.06	1.02	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
CAPAYJCT 60 kv	GLENN 230/60KV TB 2	P1	N-1	1.05	1.03	1.02	1.22	1.22	1.03	1.22	1.06	1.02	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
CAPYSWCH 60 kv	GLENN 230/60KV TB 2	P1	N-1	1.06	1.04	1.03	1.22	1.22	1.04	1.22	1.07	1.03	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
CHICO JT 60 kv	GLENN 230/60KV TB 2	P1	N-1	1.03	1.01	1.00	1.22	1.22	1.01	1.23	1.05	1.00	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
CORNING 60 kv	GLENN 230/60KV TB 2	P1	N-1	1.04	1.03	1.00	1.23	1.23	1.03	1.24	1.05	1.00	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
CORNSWCH 60 kv	GLENN 230/60KV TB 2	P1	N-1	1.06	1.04	1.03	1.22	1.22	1.04	1.22	1.07	1.03	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
ELKCREEK 60 kv	GLENN 230/60KV TB 2	P1	N-1	0.97	0.94	0.96	1.21	1.22	0.95	1.22	0.99	0.96	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
ELKCRKJT 60 kv	GLENN 230/60KV TB 2	P1	N-1	1.00	0.98	0.98	1.22	1.22	0.98	1.22	1.02	0.99	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
GLENN 60 kv	GLENN 230/60KV TB 2	P1	N-1	1.06	1.04	1.03	1.22	1.22	1.04	1.22	1.07	1.03	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
HAMILTON 60 kv	GLENN 230/60KV TB 2	P1	N-1	1.03	1.02	1.00	1.23	1.24	1.02	1.25	1.05	1.00	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
HEADGATE 60 kv	GLENN 230/60KV TB 2	P1	N-1	1.04	1.02	1.01	1.22	1.22	1.03	1.22	1.06	1.01	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
HMLTN JT 60 kv	GLENN 230/60KV TB 2	P1	N-1	1.03	1.02	1.00	1.23	1.24	1.02	1.25	1.05	1.00	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
JACINTO 60 kv	GLENN 230/60KV TB 2	P1	N-1	1.01	1.00	0.97	1.24	1.25	1.00	1.26	1.03	0.98	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
ORL B JT 60 kv	GLENN 230/60KV TB 2	P1	N-1	1.04	1.02	1.02	1.22	1.22	1.02	1.22	1.05	1.02	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
ORLAND B 60 kv	GLENN 230/60KV TB 2	P1	N-1	1.05	1.03	1.02	1.22	1.22	1.03	1.22	1.06	1.02	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
ORLND JT 60 kv	GLENN 230/60KV TB 2	P1	N-1	1.06	1.04	1.03	1.22	1.22	1.04	1.22	1.06	1.03	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
WILLOWS 60 kv	GLENN 230/60KV TB 2	P1	N-1	1.00	0.98	0.98	1.22	1.22	0.98	1.22	1.02	0.98	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
ANTLER 60 kv	CASCADE 115/60KV TB 1	P1	N-1	0.97	0.97	0.90	1.02	1.02	0.97	1.03	0.98	0.91	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
CASCADE 115 kv	CASCADE 115/60KV TB 1	P1	N-1	N/A	0.99	0.93	N/A	1.04	0.99	1.05	N/A	0.94	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations

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High/Low Voltages

Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)					Voltage PU (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations	
CASCADE 60 kv	CASCADE 115/60KV TB 1	P1	N-1	0.99	0.99	0.93	1.04	1.04	0.99	1.05	1.00	0.94	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
MTN GATE 60 kv	CASCADE 115/60KV TB 1	P1	N-1	0.97	0.97	0.91	1.02	1.02	0.97	1.03	0.98	0.91	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
OREGNTRL 60 kv	CASCADE 115/60KV TB 1	P1	N-1	0.99	1.00	0.94	1.04	1.04	0.99	1.05	1.01	0.94	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
PPL 60 kv	CASCADE 115/60KV TB 1	P1	N-1	0.97	0.97	0.90	1.02	1.02	0.97	1.03	0.98	0.91	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
STLLWATR 60 kv	CASCADE 115/60KV TB 1	P1	N-1	0.99	0.99	0.93	1.04	1.04	0.99	1.05	1.00	0.94	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
CANAL TP 60 kv	NEO REDT 60/13.8KV TB 1	P1	N-1	0.91	0.91	0.86	0.98	0.96	0.91	0.97	0.93	0.86	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
CR CANAL 60 kv	NEO REDT 60/13.8KV TB 1	P1	N-1	0.91	0.91	0.86	0.98	0.96	0.91	0.97	0.93	0.86	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
NEO REDT 60 kv	NEO REDT 60/13.8KV TB 1	P1	N-1	0.92	0.91	0.86	0.98	0.96	0.91	0.97	0.93	0.86	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
RASN JNT 60 kv	NEO REDT 60/13.8KV TB 1	P1	N-1	0.92	0.91	0.86	0.98	0.96	0.91	0.97	0.93	0.86	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
TYLER 60 kv	NEO REDT 60/13.8KV TB 1	P1	N-1	0.91	0.91	0.86	0.98	0.96	0.91	0.97	0.93	0.86	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
FRBSTNTP 115 kv	TB MT 1T SVD=V	P1	N-1	1.05	1.05	1.04	1.11	1.07	1.05	1.07	1.05	1.04	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
HONC JT1 115 kv	TB MT 1T SVD=V	P1	N-1	1.05	1.05	1.02	1.13	1.08	1.04	1.08	1.04	1.03	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
HONC JT3 115 kv	TB MT 1T SVD=V	P1	N-1	1.05	1.05	1.04	1.12	1.08	1.05	1.08	1.04	1.04	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
HONCUT 115 kv	TB MT 1T SVD=V	P1	N-1	1.05	1.05	1.03	1.12	1.08	1.05	1.08	1.04	1.04	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
KANAKAJT 115 kv	TB MT 1T SVD=V	P1	N-1	1.05	1.05	1.04	1.11	1.07	1.05	1.07	1.05	1.04	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
OWID 115 kv	TB MT 1T SVD=V	P1	N-1	1.05	1.05	1.04	1.11	1.07	1.05	1.07	1.05	1.04	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
PALERMO 115 kv	TB MT 1T SVD=V	P1	N-1	1.05	1.05	1.04	1.12	1.08	1.05	1.08	1.05	1.04	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
SLYCREEK 115 kv	TB MT 1T SVD=V	P1	N-1	1.05	1.05	1.04	1.11	1.07	1.05	1.07	1.05	1.04	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
WODLF TP 115 kv	TB MT 1T SVD=V	P1	N-1	1.05	1.05	1.04	1.11	1.07	1.05	1.07	1.05	1.04	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
WYANDJT1 115 kv	TB MT 1T SVD=V	P1	N-1	1.05	1.05	1.03	1.12	1.08	1.05	1.08	1.05	1.03	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations

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High/Low Voltages



Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)					Voltage PU (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations	
WYANDJT2 115 kv	TB MT 1T SVD=V	P1	N-1	1.05	1.05	1.04	1.12	1.08	1.05	1.08	1.05	1.04	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
WYANDTTE 115 kv	TB MT 1T SVD=V	P1	N-1	1.05	1.05	1.03	1.12	1.08	1.05	1.08	1.05	1.03	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
ELIZ TWN 60 kv	CARIBOU-PLUMAS JCT 60KV [6290] (GRS F JT-ELIZ TWN)	P2-1	Line Section w/o Fault	1.03	1.04	0.48	1.05	1.05	1.04	1.05	1.03	0.49	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
EST Q JT 60 kv	CARIBOU-PLUMAS JCT 60KV [6290] (GRS F JT-ELIZ TWN)	P2-1	Line Section w/o Fault	1.03	1.04	0.48	1.05	1.05	1.04	1.05	1.03	0.49	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
EST Q1 60 kv	CARIBOU-PLUMAS JCT 60KV [6290] (GRS F JT-ELIZ TWN)	P2-1	Line Section w/o Fault	1.03	1.04	0.48	1.05	1.05	1.04	1.05	1.03	0.49	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
EST QNCY 60 kv	CARIBOU-PLUMAS JCT 60KV [6290] (GRS F JT-ELIZ TWN)	P2-1	Line Section w/o Fault	1.03	1.04	0.48	1.05	1.05	1.04	1.05	1.03	0.49	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
PLMS JCT 60 kv	CARIBOU-PLUMAS JCT 60KV [6290] (GRS F JT-ELIZ TWN)	P2-1	Line Section w/o Fault	1.03	1.04	0.48	1.05	1.05	1.04	1.05	1.03	0.49	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
SPIQUINCY 60 kv	CARIBOU-PLUMAS JCT 60KV [6290] (GRS F JT-ELIZ TWN)	P2-1	Line Section w/o Fault	1.04	1.04	0.48	1.05	1.05	1.04	1.05	1.04	0.49	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
SPIQUINCYJCT 60 kv	CARIBOU-PLUMAS JCT 60KV [6290] (GRS F JT-ELIZ TWN)	P2-1	Line Section w/o Fault	1.03	1.04	0.48	1.05	1.05	1.04	1.05	1.03	0.49	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
EST Q JT 60 kv	CARIBOU-PLUMAS JCT 60KV [6290] (EST Q1-ELIZ TWN)	P2-1	Line Section w/o Fault	1.03	1.04	0.48	1.05	1.05	1.04	1.05	1.03	0.48	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
EST Q1 60 kv	CARIBOU-PLUMAS JCT 60KV [6290] (EST Q1-ELIZ TWN)	P2-1	Line Section w/o Fault	1.03	1.04	0.48	1.05	1.05	1.04	1.05	1.03	0.48	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
EST QNCY 60 kv	CARIBOU-PLUMAS JCT 60KV [6290] (EST Q1-ELIZ TWN)	P2-1	Line Section w/o Fault	1.03	1.04	0.48	1.05	1.05	1.04	1.05	1.03	0.48	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
PLMS JCT 60 kv	CARIBOU-PLUMAS JCT 60KV [6290] (EST Q1-ELIZ TWN)	P2-1	Line Section w/o Fault	1.03	1.04	0.48	1.05	1.05	1.04	1.05	1.03	0.48	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
SPIQUINCY 60 kv	CARIBOU-PLUMAS JCT 60KV [6290] (EST Q1-ELIZ TWN)	P2-1	Line Section w/o Fault	1.03	1.04	0.48	1.05	1.05	1.04	1.05	1.03	0.48	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
SPIQUINCYJCT 60 kv	CARIBOU-PLUMAS JCT 60KV [6290] (EST Q1-ELIZ TWN)	P2-1	Line Section w/o Fault	1.03	1.04	0.48	1.05	1.05	1.04	1.05	1.03	0.48	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
ELIZ TWN 60 kv	CARIBOU #2 60KV [6280] (CARIBOU-GRS F JT)	P2-1	Line Section w/o Fault	1.04	1.04	0.48	1.05	1.05	1.04	1.05	1.04	0.48	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
EST Q JT 60 kv	CARIBOU #2 60KV [6280] (CARIBOU-GRS F JT)	P2-1	Line Section w/o Fault	1.04	1.04	0.48	1.05	1.05	1.04	1.05	1.04	0.48	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
EST Q1 60 kv	CARIBOU #2 60KV [6280] (CARIBOU-GRS F JT)	P2-1	Line Section w/o Fault	1.04	1.04	0.48	1.05	1.05	1.04	1.05	1.04	0.48	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
EST QNCY 60 kv	CARIBOU #2 60KV [6280] (CARIBOU-GRS F JT)	P2-1	Line Section w/o Fault	1.04	1.04	0.48	1.05	1.05	1.04	1.05	1.04	0.48	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
GRS F JT 60 kv	CARIBOU #2 60KV [6280] (CARIBOU-GRS F JT)	P2-1	Line Section w/o Fault	1.04	1.04	0.48	1.05	1.05	1.04	1.05	1.04	0.48	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations

Study Area: PG&E North Valley

High/Low Voltages



Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)					Voltage PU (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations	
PLMS JCT 60 kv	CARIBOU #2 60KV [6280] (CARIBOU-GRS F JT)	P2-1	Line Section w/o Fault	1.04	1.04	0.48	1.05	1.05	1.04	1.05	1.04	0.48	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
SPIQUINCY 60 kv	CARIBOU #2 60KV [6280] (CARIBOU-GRS F JT)	P2-1	Line Section w/o Fault	1.04	1.04	0.48	1.05	1.05	1.04	1.05	1.04	0.48	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
SPIQUINCYJCT 60 kv	CARIBOU #2 60KV [6280] (CARIBOU-GRS F JT)	P2-1	Line Section w/o Fault	1.04	1.04	0.48	1.05	1.05	1.04	1.05	1.04	0.48	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
FRSTGLEN 115 kv	BRIDGEVILLE-COTTONWOOD 115KV [1110] (WILDWOOD-FRSTGLEN)	P2-1	Line Section w/o Fault	1.06	1.05	1.05	1.13	1.10	1.08	1.11	1.09	1.05	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
FRSTGLEN 115 kv	BRIDGEVILLE-COTTONWOOD 115KV [1110] (WILDWOOD-COTWDPGE)	P2-1	Line Section w/o Fault	1.06	1.06	1.05	1.14	1.11	1.08	1.12	1.10	1.05	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
WILDWOOD 115 kv	BRIDGEVILLE-COTTONWOOD 115KV [1110] (WILDWOOD-COTWDPGE)	P2-1	Line Section w/o Fault	1.06	1.06	1.05	1.14	1.11	1.08	1.12	1.10	1.05	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
TRINITY 115 kv	TRINITY-COTTONWOOD 115KV [4040] (TRINITY-JESSTAP)	P2-1	Line Section w/o Fault	1.04	1.03	1.03	1.11	1.09	1.05	1.09	1.06	1.03	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
HONC JT1 115 kv	PALERMO-PEASE 115KV [3220] (PALERMO-HONC JT1)	P2-1	Line Section w/o Fault	1.03	1.03	1.00	1.14	1.06	1.03	1.07	0.99	1.00	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
CEDR CRK 60 kv	CASCADE-BENTON-DESCHUTES 60KV [6310] (LOMS JCT-DESCHUTS)	P2-1	Line Section w/o Fault	1.04	1.04	0.88	1.14	1.13	1.02	1.15	1.09	1.02	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
CLOV TAP 60 kv	CASCADE-BENTON-DESCHUTES 60KV [6310] (LOMS JCT-DESCHUTS)	P2-1	Line Section w/o Fault	1.04	1.04	0.88	1.14	1.13	1.02	1.15	1.09	1.03	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
COWCK TP 60 kv	CASCADE-BENTON-DESCHUTES 60KV [6310] (LOMS JCT-DESCHUTS)	P2-1	Line Section w/o Fault	1.03	1.03	0.88	1.13	1.12	1.01	1.14	1.07	1.00	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
DESCHUTS 60 kv	CASCADE-BENTON-DESCHUTES 60KV [6310] (LOMS JCT-DESCHUTS)	P2-1	Line Section w/o Fault	1.01	1.01	0.87	1.11	1.10	1.00	1.11	1.04	0.94	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
KILARC 60 kv	CASCADE-BENTON-DESCHUTES 60KV [6310] (LOMS JCT-DESCHUTS)	P2-1	Line Section w/o Fault	1.04	1.04	0.88	1.14	1.13	1.02	1.15	1.09	1.03	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
OLSEN JT 60 kv	CASCADE-BENTON-DESCHUTES 60KV [6310] (LOMS JCT-DESCHUTS)	P2-1	Line Section w/o Fault	1.04	1.04	0.88	1.14	1.13	1.02	1.15	1.08	1.02	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
TKO TAP 60 kv	CASCADE-BENTON-DESCHUTES 60KV [6310] (LOMS JCT-DESCHUTS)	P2-1	Line Section w/o Fault	1.03	1.03	0.88	1.13	1.12	1.01	1.14	1.07	1.00	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
WHITMORE 60 kv	CASCADE-BENTON-DESCHUTES 60KV [6310] (LOMS JCT-DESCHUTS)	P2-1	Line Section w/o Fault	1.04	1.03	0.88	1.14	1.12	1.02	1.14	1.08	1.02	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
FRNCHGLH 60 kv	KESWICK-CASCADE 60KV [7260] (CASCADE-STLLWATR)	P2-1	Line Section w/o Fault	1.00	0.99	0.96	1.10	1.07	1.00	1.08	1.02	0.97	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
KESWICK 60 kv	KESWICK-CASCADE 60KV [7260] (CASCADE-STLLWATR)	P2-1	Line Section w/o Fault	0.99	0.97	0.93	1.11	1.07	0.98	1.08	1.02	0.93	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
STLLWATR 60 kv	KESWICK-CASCADE 60KV [7260] (CASCADE-STLLWATR)	P2-1	Line Section w/o Fault	0.99	0.97	0.92	1.11	1.08	0.98	1.08	1.02	0.92	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
CANAL TP 60 kv	COTTONWOOD #2 60KV [6630] (NEO REDT-RASN JNT)	P2-1	Line Section w/o Fault	0.91	0.91	0.86	0.98	0.96	0.91	0.97	0.93	0.86	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations

Study Area: PG&E North Valley



High/Low Voltages

Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)					Voltage PU (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations	
CR CANAL 60 kv	COTTONWOOD #2 60KV [6630] (NEO REDT-RASN JNT)	P2-1	Line Section w/o Fault	0.91	0.91	0.86	0.98	0.96	0.91	0.97	0.93	0.86	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
RASN JNT 60 kv	COTTONWOOD #2 60KV [6630] (NEO REDT-RASN JNT)	P2-1	Line Section w/o Fault	0.92	0.91	0.86	0.98	0.96	0.91	0.97	0.93	0.86	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
TYLER 60 kv	COTTONWOOD #2 60KV [6630] (NEO REDT-RASN JNT)	P2-1	Line Section w/o Fault	0.91	0.91	0.86	0.98	0.96	0.91	0.97	0.93	0.86	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
FRBSTNTP 115 kv	TBL MTX1 230KV SECTION NA	P2-2	Bus	1.04	1.05	1.03	1.12	1.07	1.03	1.06	1.04	1.03	Load power factor correction and voltage support if needed
HONC JT1 115 kv	TBL MTX1 230KV SECTION NA	P2-2	Bus	1.04	1.05	1.01	1.13	1.07	1.03	1.07	1.03	1.01	Load power factor correction and voltage support if needed
HONC JT3 115 kv	TBL MTX1 230KV SECTION NA	P2-2	Bus	1.04	1.05	1.02	1.13	1.07	1.03	1.07	1.04	1.02	Load power factor correction and voltage support if needed
HONCUT 115 kv	TBL MTX1 230KV SECTION NA	P2-2	Bus	1.04	1.05	1.02	1.13	1.07	1.03	1.07	1.04	1.02	Load power factor correction and voltage support if needed
KANAKAJT 115 kv	TBL MTX1 230KV SECTION NA	P2-2	Bus	1.04	1.05	1.03	1.12	1.07	1.03	1.07	1.04	1.03	Load power factor correction and voltage support if needed
OWID 115 kv	TBL MTX1 230KV SECTION NA	P2-2	Bus	1.04	1.05	1.03	1.12	1.07	1.03	1.07	1.04	1.03	Load power factor correction and voltage support if needed
PALERMO 115 kv	TBL MTX1 230KV SECTION NA	P2-2	Bus	1.04	1.05	1.02	1.13	1.08	1.03	1.07	1.04	1.02	Load power factor correction and voltage support if needed
SLYCREEK 115 kv	TBL MTX1 230KV SECTION NA	P2-2	Bus	1.05	1.05	1.04	1.12	1.07	1.04	1.07	1.05	1.04	Load power factor correction and voltage support if needed
WODLF TP 115 kv	TBL MTX1 230KV SECTION NA	P2-2	Bus	1.05	1.05	1.03	1.12	1.07	1.04	1.07	1.05	1.03	Load power factor correction and voltage support if needed
WYANDJT1 115 kv	TBL MTX1 230KV SECTION NA	P2-2	Bus	1.04	1.05	1.01	1.13	1.08	1.03	1.08	1.04	1.01	Load power factor correction and voltage support if needed
WYANDJT2 115 kv	TBL MTX1 230KV SECTION NA	P2-2	Bus	1.04	1.06	1.02	1.13	1.08	1.03	1.07	1.05	1.02	Load power factor correction and voltage support if needed
WYANDTTE 115 kv	TBL MTX1 230KV SECTION NA	P2-2	Bus	1.04	1.05	1.01	1.13	1.08	1.03	1.08	1.04	1.01	Load power factor correction and voltage support if needed
FRSTGLEN 115 kv	COTWDPGE 115KV SECTION 2D	P2-2	Bus	1.06	1.06	1.05	1.13	1.11	1.08	1.11	1.09	1.05	Load power factor correction and voltage support if needed
WILDWOOD 115 kv	COTWDPGE 115KV SECTION 2D	P2-2	Bus	1.06	1.06	1.05	1.13	1.11	1.08	1.11	1.10	1.05	Load power factor correction and voltage support if needed
BIG BAR 60 kv	COTWDPGE 115KV SECTION 1D	P2-2	Bus	1.04	1.04	1.04	1.10	1.08	1.05	1.09	1.06	1.04	Load power factor correction and voltage support if needed
FRNCHGLH 60 kv	COTWDPGE 115KV SECTION 1D	P2-2	Bus	1.03	1.03	1.02	1.10	1.08	1.04	1.08	1.05	1.02	Load power factor correction and voltage support if needed
JESSTAP 115 kv	COTWDPGE 115KV SECTION 1D	P2-2	Bus	1.05	1.05	1.04	1.13	1.11	1.07	1.11	1.08	1.05	Load power factor correction and voltage support if needed
TAP 65 60 kv	COTWDPGE 115KV SECTION 1D	P2-2	Bus	1.05	1.05	1.04	1.12	1.10	1.07	1.10	1.08	1.04	Load power factor correction and voltage support if needed
TRINITY 115 kv	COTWDPGE 115KV SECTION 1D	P2-2	Bus	1.05	1.04	1.04	1.13	1.10	1.06	1.11	1.07	1.04	Load power factor correction and voltage support if needed
TRINITY 60 kv	COTWDPGE 115KV SECTION 1D	P2-2	Bus	1.05	1.05	1.04	1.12	1.10	1.07	1.10	1.08	1.04	Load power factor correction and voltage support if needed
ANTLER 60 kv	CASCADE 115KV SECTION 1D	P2-2	Bus	0.97	0.97	0.90	1.02	1.02	0.97	1.03	0.98	0.91	Continue to monitor future load forecast
PPL 60 kv	CASCADE 115KV SECTION 1D	P2-2	Bus	0.97	0.97	0.90	1.02	1.02	0.97	1.03	0.98	0.91	Continue to monitor future load forecast
HONC JT1 115 kv	PALERMO 115KV SECTION 1D	P2-2	Bus	1.03	1.03	1.00	1.14	1.06	1.03	1.07	0.99	1.00	Load power factor correction and voltage support if needed
HONC JT3 115 kv	PALERMO 115KV SECTION 1D	P2-2	Bus	1.04	1.04	1.03	1.13	1.05	1.04	1.05	1.02	1.03	Load power factor correction and voltage support if needed
HONCUT 115 kv	PALERMO 115KV SECTION 1D	P2-2	Bus	1.04	1.04	1.03	1.13	1.05	1.04	1.05	1.02	1.03	Load power factor correction and voltage support if needed
FRNCHGLH 60 kv	CASCADE 60KV SECTION MA	P2-2	Bus	1.01	0.99	0.97	1.11	1.07	1.00	1.08	1.03	0.97	Load power factor correction and voltage support if needed
KESWICK 60 kv	CASCADE 60KV SECTION MA	P2-2	Bus	0.99	0.97	0.93	1.11	1.08	0.98	1.08	1.02	0.93	Load power factor correction and voltage support if needed
STLLWATR 60 kv	CASCADE 60KV SECTION MA	P2-2	Bus	0.99	0.97	0.92	1.12	1.08	0.98	1.08	1.02	0.92	Load power factor correction and voltage support if needed
CEDR CRK 60 kv	COTTONWD 60KV SECTION MA	P2-2	Bus	0.94	N/A	N/A	1.12	N/A	N/A	N/A	1.09	N/A	Non BES Facility
CLMN JCT 60 kv	COTTONWD 60KV SECTION MA	P2-2	Bus	0.48	N/A	N/A	1.11	N/A	N/A	N/A	0.97	N/A	Non BES Facility
CLOV TAP 60 kv	COTTONWD 60KV SECTION MA	P2-2	Bus	0.94	N/A	N/A	1.12	N/A	N/A	N/A	1.09	N/A	Non BES Facility
COWCK TP 60 kv	COTTONWD 60KV SECTION MA	P2-2	Bus	0.92	N/A	N/A	1.11	N/A	N/A	N/A	1.07	N/A	Non BES Facility
DIRYVLL 60 kv	COTTONWD 60KV SECTION MA	P2-2	Bus	0.47	N/A	N/A	1.11	N/A	N/A	N/A	0.97	N/A	Non BES Facility
GERBER 60 kv	COTTONWD 60KV SECTION MA	P2-2	Bus	0.39	N/A	N/A	1.10	N/A	N/A	N/A	0.92	N/A	Non BES Facility
GRBR JCT 60 kv	COTTONWD 60KV SECTION MA	P2-2	Bus	0.41	N/A	N/A	1.10	N/A	N/A	N/A	0.93	N/A	Non BES Facility

Study Area: PG&E North Valley

High/Low Voltages



Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)					Voltage PU (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations	
KILARC 60 kv	COTTONWD 60KV SECTION MA	P2-2	Bus	0.94	N/A	N/A	1.12	N/A	N/A	N/A	1.09	N/A	Non BES Facility
LP FB SP 60 kv	COTTONWD 60KV SECTION MA	P2-2	Bus	0.41	N/A	N/A	1.10	N/A	N/A	N/A	0.93	N/A	Non BES Facility
LS ML JT 60 kv	COTTONWD 60KV SECTION MA	P2-2	Bus	0.46	N/A	N/A	1.11	N/A	N/A	N/A	0.97	N/A	Non BES Facility
LS MLNSJ 60 kv	COTTONWD 60KV SECTION MA	P2-2	Bus	0.46	N/A	N/A	1.11	N/A	N/A	N/A	0.97	N/A	Non BES Facility
OLSEN JT 60 kv	COTTONWD 60KV SECTION MA	P2-2	Bus	0.93	N/A	N/A	1.12	N/A	N/A	N/A	1.08	N/A	Non BES Facility
RED B JT 60 kv	COTTONWD 60KV SECTION MA	P2-2	Bus	0.43	N/A	N/A	1.11	N/A	N/A	N/A	0.94	N/A	Non BES Facility
RED BLFF 60 kv	COTTONWD 60KV SECTION MA	P2-2	Bus	0.43	N/A	N/A	1.11	N/A	N/A	N/A	0.95	N/A	Non BES Facility
RWSN J2 60 kv	COTTONWD 60KV SECTION MA	P2-2	Bus	0.42	N/A	N/A	1.10	N/A	N/A	N/A	0.93	N/A	Non BES Facility
TKO TAP 60 kv	COTTONWD 60KV SECTION MA	P2-2	Bus	0.92	N/A	N/A	1.11	N/A	N/A	N/A	1.07	N/A	Non BES Facility
TYLERJT 60 kv	COTTONWD 60KV SECTION MA	P2-2	Bus	0.41	N/A	N/A	1.10	N/A	N/A	N/A	0.93	N/A	Non BES Facility
VINA 60 kv	COTTONWD 60KV SECTION MA	P2-2	Bus	0.46	N/A	N/A	1.11	N/A	N/A	N/A	0.96	N/A	Non BES Facility
WHITMORE 60 kv	COTTONWD 60KV SECTION MA	P2-2	Bus	0.93	N/A	N/A	1.12	N/A	N/A	N/A	1.08	N/A	Non BES Facility
ELIZ TWN 60 kv	CARIBOU 60KV SECTION 1D	P2-2	Bus	1.04	1.04	0.48	1.05	1.05	1.04	1.05	1.04	0.48	Non BES Facility
EST Q JT 60 kv	CARIBOU 60KV SECTION 1D	P2-2	Bus	1.04	1.04	0.48	1.05	1.05	1.04	1.05	1.04	0.48	Non BES Facility
EST Q1 60 kv	CARIBOU 60KV SECTION 1D	P2-2	Bus	1.04	1.04	0.48	1.05	1.05	1.04	1.05	1.04	0.48	Non BES Facility
EST QNCY 60 kv	CARIBOU 60KV SECTION 1D	P2-2	Bus	1.04	1.04	0.48	1.05	1.05	1.04	1.05	1.04	0.48	Non BES Facility
GRS F JT 60 kv	CARIBOU 60KV SECTION 1D	P2-2	Bus	1.04	1.04	0.48	1.05	1.05	1.04	1.05	1.04	0.48	Non BES Facility
PLMS JCT 60 kv	CARIBOU 60KV SECTION 1D	P2-2	Bus	1.04	1.04	0.48	1.05	1.05	1.04	1.05	1.04	0.48	Non BES Facility
SPIQUINCY 60 kv	CARIBOU 60KV SECTION 1D	P2-2	Bus	1.04	1.04	0.48	1.05	1.05	1.04	1.05	1.04	0.48	Non BES Facility
SPIQUINCYJCT 60 kv	CARIBOU 60KV SECTION 1D	P2-2	Bus	1.04	1.04	0.48	1.05	1.05	1.04	1.05	1.04	0.48	Non BES Facility
GLENN 60 kv	GLENN 60KV SECTION ME	P2-2	Bus	1.08	1.06	1.05	1.21	1.21	1.06	1.21	1.08	1.05	Non BES Facility
HAMILTON 60 kv	GLENN 60KV SECTION ME	P2-2	Bus	1.06	1.04	1.01	1.23	1.24	1.04	1.24	1.06	1.01	Non BES Facility
HMLTN JT 60 kv	GLENN 60KV SECTION ME	P2-2	Bus	1.06	1.04	1.01	1.23	1.24	1.04	1.24	1.06	1.01	Non BES Facility
JACINTO 60 kv	GLENN 60KV SECTION ME	P2-2	Bus	1.04	1.02	0.99	1.24	1.25	1.02	1.25	1.05	0.99	Non BES Facility
ORLAND B 60 kv	GLENN 60KV SECTION ME	P2-2	Bus	1.07	1.05	1.03	1.21	1.21	1.05	1.22	1.07	1.03	Non BES Facility
ORLND JT 60 kv	GLENN 60KV SECTION ME	P2-2	Bus	1.08	1.05	1.04	1.21	1.21	1.06	1.21	1.08	1.04	Non BES Facility
BURNEY 60 kv	PIT 1 U1 11KV SECTION 1D	P2-2	Bus	1.11	1.11	1.07	1.10	1.10	1.11	1.12	1.11	1.06	Non BES Facility
BURNEYQF 60 kv	PIT 1 U1 11KV SECTION 1D	P2-2	Bus	1.11	1.11	1.07	1.10	1.10	1.10	1.12	1.11	1.06	Non BES Facility
BURNYJCT 60 kv	PIT 1 U1 11KV SECTION 1D	P2-2	Bus	1.11	1.11	1.07	1.10	1.10	1.10	1.12	1.11	1.06	Non BES Facility
HAT CRK1 60 kv	PIT 1 U1 11KV SECTION 1D	P2-2	Bus	1.10	1.09	1.07	1.10	1.10	1.09	1.12	1.10	1.07	Non BES Facility
HAT CRK2 60 kv	PIT 1 U1 11KV SECTION 1D	P2-2	Bus	1.10	1.10	1.07	1.10	1.10	1.10	1.12	1.10	1.07	Non BES Facility
PIT 1 60 kv	PIT 1 U1 11KV SECTION 1D	P2-2	Bus	1.10	1.10	1.08	1.10	1.10	1.10	1.12	1.10	1.07	Non BES Facility
BURNEY 60 kv	PIT 1 U1 11KV SECTION 1F	P2-2	Bus	1.11	1.11	1.07	1.10	1.10	1.11	1.12	1.11	1.06	Non BES Facility
BURNEYQF 60 kv	PIT 1 U1 11KV SECTION 1F	P2-2	Bus	1.11	1.11	1.07	1.10	1.10	1.10	1.12	1.11	1.06	Non BES Facility
BURNYJCT 60 kv	PIT 1 U1 11KV SECTION 1F	P2-2	Bus	1.11	1.11	1.07	1.10	1.10	1.10	1.12	1.11	1.06	Non BES Facility
HAT CRK1 60 kv	PIT 1 U1 11KV SECTION 1F	P2-2	Bus	1.10	1.09	1.07	1.10	1.10	1.09	1.12	1.10	1.07	Non BES Facility
HAT CRK2 60 kv	PIT 1 U1 11KV SECTION 1F	P2-2	Bus	1.10	1.10	1.07	1.10	1.10	1.10	1.12	1.10	1.07	Non BES Facility
PIT 1 60 kv	PIT 1 U1 11KV SECTION 1F	P2-2	Bus	1.10	1.10	1.08	1.10	1.10	1.10	1.12	1.10	1.07	Non BES Facility
DIRYVLL 60 kv	COTTONWD 60KV SECTION 1D	P2-2	Bus	N/A	1.00	0.89	N/A	1.07	0.99	1.08	N/A	0.89	Non BES Facility
GERBER 60 kv	COTTONWD 60KV SECTION 1D	P2-2	Bus	N/A	0.97	0.83	N/A	1.06	0.97	1.07	N/A	0.83	Non BES Facility
GRBR JCT 60 kv	COTTONWD 60KV SECTION 1D	P2-2	Bus	N/A	0.99	0.85	N/A	1.06	0.98	1.07	N/A	0.85	Non BES Facility

Study Area: PG&E North Valley

High/Low Voltages



Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)					Voltage PU (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations	
LP FB SP 60 kv	COTTONWD 60KV SECTION 1D	P2-2	Bus	N/A	0.99	0.85	N/A	1.06	0.98	1.07	N/A	0.85	Non BES Facility
LS ML JT 60 kv	COTTONWD 60KV SECTION 1D	P2-2	Bus	N/A	1.00	0.88	N/A	1.07	0.99	1.08	N/A	0.88	Non BES Facility
LS MLNSJ 60 kv	COTTONWD 60KV SECTION 1D	P2-2	Bus	N/A	1.00	0.87	N/A	1.07	0.99	1.08	N/A	0.88	Non BES Facility
RED B JT 60 kv	COTTONWD 60KV SECTION 1D	P2-2	Bus	N/A	1.00	0.87	N/A	1.06	1.00	1.07	N/A	0.87	Non BES Facility
RED BLFF 60 kv	COTTONWD 60KV SECTION 1D	P2-2	Bus	N/A	1.00	0.87	N/A	1.06	1.00	1.07	N/A	0.87	Non BES Facility
RWSN J2 60 kv	COTTONWD 60KV SECTION 1D	P2-2	Bus	N/A	0.99	0.86	N/A	1.06	0.98	1.07	N/A	0.86	Non BES Facility
TYLERJT 60 kv	COTTONWD 60KV SECTION 1D	P2-2	Bus	N/A	0.99	0.85	N/A	1.06	0.98	1.07	N/A	0.85	Non BES Facility
VINA 60 kv	COTTONWD 60KV SECTION 1D	P2-2	Bus	N/A	1.00	0.87	N/A	1.07	0.99	1.08	N/A	0.87	Non BES Facility
GLENN 60 kv	GLENN - ME 60KV & GLENN-ELKCRKJT LINE	P2-3	Non-Bus-Tie Breaker	1.08	1.06	1.05	1.21	1.21	1.06	1.21	1.08	1.05	Non BES Facility
HAMILTON 60 kv	GLENN - ME 60KV & GLENN-ELKCRKJT LINE	P2-3	Non-Bus-Tie Breaker	1.06	1.04	1.01	1.23	1.24	1.04	1.24	1.06	1.01	Non BES Facility
HMLTN JT 60 kv	GLENN - ME 60KV & GLENN-ELKCRKJT LINE	P2-3	Non-Bus-Tie Breaker	1.06	1.04	1.01	1.23	1.24	1.04	1.24	1.06	1.01	Non BES Facility
JACINTO 60 kv	GLENN - ME 60KV & GLENN-ELKCRKJT LINE	P2-3	Non-Bus-Tie Breaker	1.04	1.02	0.99	1.24	1.25	1.02	1.25	1.05	0.99	Non BES Facility
ORLAND B 60 kv	GLENN - ME 60KV & GLENN-ELKCRKJT LINE	P2-3	Non-Bus-Tie Breaker	1.07	1.05	1.03	1.21	1.21	1.05	1.22	1.07	1.03	Non BES Facility
ORLND JT 60 kv	GLENN - ME 60KV & GLENN-ELKCRKJT LINE	P2-3	Non-Bus-Tie Breaker	1.08	1.05	1.04	1.21	1.21	1.06	1.21	1.08	1.04	Non BES Facility
GLENN 60 kv	GLENN - ME 60KV & GLENN #4 LINE	P2-3	Non-Bus-Tie Breaker	1.08	1.06	1.05	1.21	1.21	1.06	1.21	1.08	1.05	Non BES Facility
HAMILTON 60 kv	GLENN - ME 60KV & GLENN #4 LINE	P2-3	Non-Bus-Tie Breaker	1.06	1.04	1.01	1.23	1.24	1.04	1.24	1.06	1.01	Non BES Facility
HMLTN JT 60 kv	GLENN - ME 60KV & GLENN #4 LINE	P2-3	Non-Bus-Tie Breaker	1.06	1.04	1.01	1.23	1.24	1.04	1.24	1.06	1.01	Non BES Facility
JACINTO 60 kv	GLENN - ME 60KV & GLENN #4 LINE	P2-3	Non-Bus-Tie Breaker	1.04	1.02	0.99	1.24	1.25	1.02	1.25	1.05	0.99	Non BES Facility
ORLAND B 60 kv	GLENN - ME 60KV & GLENN #4 LINE	P2-3	Non-Bus-Tie Breaker	1.07	1.05	1.03	1.21	1.21	1.05	1.22	1.07	1.03	Non BES Facility
ORLND JT 60 kv	GLENN - ME 60KV & GLENN #4 LINE	P2-3	Non-Bus-Tie Breaker	1.08	1.05	1.04	1.21	1.21	1.06	1.21	1.08	1.04	Non BES Facility
GLENN 60 kv	GLENN - ME 60KV & GLENN #3 LINE	P2-3	Non-Bus-Tie Breaker	1.08	1.06	1.05	1.21	1.21	1.06	1.21	1.08	1.05	Non BES Facility
HAMILTON 60 kv	GLENN - ME 60KV & GLENN #3 LINE	P2-3	Non-Bus-Tie Breaker	1.06	1.04	1.01	1.23	1.24	1.04	1.24	1.06	1.01	Non BES Facility
HMLTN JT 60 kv	GLENN - ME 60KV & GLENN #3 LINE	P2-3	Non-Bus-Tie Breaker	1.06	1.04	1.01	1.23	1.24	1.04	1.24	1.06	1.01	Non BES Facility
JACINTO 60 kv	GLENN - ME 60KV & GLENN #3 LINE	P2-3	Non-Bus-Tie Breaker	1.04	1.02	0.99	1.24	1.25	1.02	1.25	1.05	0.99	Non BES Facility
ORLAND B 60 kv	GLENN - ME 60KV & GLENN #3 LINE	P2-3	Non-Bus-Tie Breaker	1.07	1.05	1.03	1.21	1.21	1.05	1.22	1.07	1.03	Non BES Facility
ORLND JT 60 kv	GLENN - ME 60KV & GLENN #3 LINE	P2-3	Non-Bus-Tie Breaker	1.08	1.05	1.04	1.21	1.21	1.06	1.21	1.08	1.04	Non BES Facility
DIRYVLE 60 kv	COTTONWD - 1D 60KV & COTTONWOOD-BENTON #1 LINE	P2-3	Non-Bus-Tie Breaker	N/A	1.00	0.89	N/A	1.06	1.00	1.07	N/A	0.89	Non BES Facility
GERBER 60 kv	COTTONWD - 1D 60KV & COTTONWOOD-BENTON #1 LINE	P2-3	Non-Bus-Tie Breaker	N/A	0.97	0.84	N/A	1.06	0.97	1.07	N/A	0.84	Non BES Facility
GRBR JCT 60 kv	COTTONWD - 1D 60KV & COTTONWOOD-BENTON #1 LINE	P2-3	Non-Bus-Tie Breaker	N/A	0.99	0.85	N/A	1.06	0.98	1.07	N/A	0.86	Non BES Facility
LP FB SP 60 kv	COTTONWD - 1D 60KV & COTTONWOOD-BENTON #1 LINE	P2-3	Non-Bus-Tie Breaker	N/A	0.99	0.85	N/A	1.05	0.98	1.06	N/A	0.86	Non BES Facility
LS ML JT 60 kv	COTTONWD - 1D 60KV & COTTONWOOD-BENTON #1 LINE	P2-3	Non-Bus-Tie Breaker	N/A	1.00	0.88	N/A	1.07	0.99	1.08	N/A	0.88	Non BES Facility
LS MLNSJ 60 kv	COTTONWD - 1D 60KV & COTTONWOOD-BENTON #1 LINE	P2-3	Non-Bus-Tie Breaker	N/A	1.00	0.88	N/A	1.07	0.99	1.08	N/A	0.88	Non BES Facility
RED B JT 60 kv	COTTONWD - 1D 60KV & COTTONWOOD-BENTON #1 LINE	P2-3	Non-Bus-Tie Breaker	N/A	1.00	0.87	N/A	1.06	1.00	1.07	N/A	0.87	Non BES Facility

Study Area: PG&E North Valley



High/Low Voltages

Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)					Voltage PU (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations	
RED BLFF 60 kv	COTTONWD - 1D 60KV & COTTONWOOD-BENTON #1 LINE	P2-3	Non-Bus-Tie Breaker	N/A	1.00	0.87	N/A	1.06	1.00	1.07	N/A	0.87	Non BES Facility
RWSN J2 60 kv	COTTONWD - 1D 60KV & COTTONWOOD-BENTON #1 LINE	P2-3	Non-Bus-Tie Breaker	N/A	0.99	0.86	N/A	1.06	0.99	1.07	N/A	0.86	Non BES Facility
TYLERJT 60 kv	COTTONWD - 1D 60KV & COTTONWOOD-BENTON #1 LINE	P2-3	Non-Bus-Tie Breaker	N/A	0.99	0.86	N/A	1.06	0.98	1.06	N/A	0.86	Non BES Facility
VINA 60 kv	COTTONWD - 1D 60KV & COTTONWOOD-BENTON #1 LINE	P2-3	Non-Bus-Tie Breaker	N/A	1.00	0.88	N/A	1.07	0.99	1.08	N/A	0.88	Non BES Facility
DIRYVLE 60 kv	COTTONWD - 1D 60KV & COTTONWOOD-RED BLUFF LINE	P2-3	Non-Bus-Tie Breaker	N/A	1.00	0.89	N/A	1.07	0.99	1.08	N/A	0.89	Non BES Facility
GERBER 60 kv	COTTONWD - 1D 60KV & COTTONWOOD-RED BLUFF LINE	P2-3	Non-Bus-Tie Breaker	N/A	0.97	0.83	N/A	1.06	0.97	1.07	N/A	0.83	Non BES Facility
GRBR JCT 60 kv	COTTONWD - 1D 60KV & COTTONWOOD-RED BLUFF LINE	P2-3	Non-Bus-Tie Breaker	N/A	0.99	0.85	N/A	1.06	0.98	1.07	N/A	0.85	Non BES Facility
LP FB SP 60 kv	COTTONWD - 1D 60KV & COTTONWOOD-RED BLUFF LINE	P2-3	Non-Bus-Tie Breaker	N/A	0.99	0.85	N/A	1.06	0.98	1.07	N/A	0.85	Non BES Facility
LS ML JT 60 kv	COTTONWD - 1D 60KV & COTTONWOOD-RED BLUFF LINE	P2-3	Non-Bus-Tie Breaker	N/A	1.00	0.88	N/A	1.07	0.99	1.08	N/A	0.88	Non BES Facility
LS MLNSJ 60 kv	COTTONWD - 1D 60KV & COTTONWOOD-RED BLUFF LINE	P2-3	Non-Bus-Tie Breaker	N/A	1.00	0.87	N/A	1.07	0.99	1.08	N/A	0.88	Non BES Facility
RED B JT 60 kv	COTTONWD - 1D 60KV & COTTONWOOD-RED BLUFF LINE	P2-3	Non-Bus-Tie Breaker	N/A	1.00	0.87	N/A	1.06	1.00	1.07	N/A	0.87	Non BES Facility
RED BLFF 60 kv	COTTONWD - 1D 60KV & COTTONWOOD-RED BLUFF LINE	P2-3	Non-Bus-Tie Breaker	N/A	1.00	0.87	N/A	1.06	1.00	1.07	N/A	0.87	Non BES Facility
RWSN J2 60 kv	COTTONWD - 1D 60KV & COTTONWOOD-RED BLUFF LINE	P2-3	Non-Bus-Tie Breaker	N/A	0.99	0.86	N/A	1.06	0.98	1.07	N/A	0.86	Non BES Facility
TYLERJT 60 kv	COTTONWD - 1D 60KV & COTTONWOOD-RED BLUFF LINE	P2-3	Non-Bus-Tie Breaker	N/A	0.99	0.85	N/A	1.06	0.98	1.07	N/A	0.85	Non BES Facility
VINA 60 kv	COTTONWD - 1D 60KV & COTTONWOOD-RED BLUFF LINE	P2-3	Non-Bus-Tie Breaker	N/A	1.00	0.87	N/A	1.07	0.99	1.08	N/A	0.87	Non BES Facility
FRBSTNTP 115 kv	TBL MT E - 1E 230KV & BUS TIE LINE	P2-3	Non-Bus-Tie Breaker	1.04	1.05	1.03	1.11	1.07	1.03	1.06	1.04	1.03	Load power factor correction and voltage support if needed
HONC JT1 115 kv	TBL MT E - 1E 230KV & BUS TIE LINE	P2-3	Non-Bus-Tie Breaker	1.04	1.05	1.01	1.13	1.07	1.02	1.07	1.03	1.01	Load power factor correction and voltage support if needed
HONC JT3 115 kv	TBL MT E - 1E 230KV & BUS TIE LINE	P2-3	Non-Bus-Tie Breaker	1.04	1.05	1.02	1.13	1.07	1.02	1.07	1.04	1.02	Load power factor correction and voltage support if needed
HONCUT 115 kv	TBL MT E - 1E 230KV & BUS TIE LINE	P2-3	Non-Bus-Tie Breaker	1.04	1.05	1.02	1.13	1.07	1.02	1.07	1.04	1.02	Load power factor correction and voltage support if needed
KANAKAJT 115 kv	TBL MT E - 1E 230KV & BUS TIE LINE	P2-3	Non-Bus-Tie Breaker	1.04	1.05	1.03	1.12	1.07	1.03	1.07	1.04	1.03	Load power factor correction and voltage support if needed
OWID 115 kv	TBL MT E - 1E 230KV & BUS TIE LINE	P2-3	Non-Bus-Tie Breaker	1.04	1.05	1.03	1.12	1.07	1.03	1.07	1.04	1.03	Load power factor correction and voltage support if needed
PALERMO 115 kv	TBL MT E - 1E 230KV & BUS TIE LINE	P2-3	Non-Bus-Tie Breaker	1.04	1.05	1.02	1.13	1.07	1.02	1.07	1.04	1.02	Load power factor correction and voltage support if needed
SLYCREEK 115 kv	TBL MT E - 1E 230KV & BUS TIE LINE	P2-3	Non-Bus-Tie Breaker	1.05	1.05	1.04	1.12	1.07	1.04	1.07	1.05	1.04	Load power factor correction and voltage support if needed
WODLF TP 115 kv	TBL MT E - 1E 230KV & BUS TIE LINE	P2-3	Non-Bus-Tie Breaker	1.05	1.05	1.03	1.12	1.07	1.03	1.06	1.05	1.03	Load power factor correction and voltage support if needed
WYANDJT1 115 kv	TBL MT E - 1E 230KV & BUS TIE LINE	P2-3	Non-Bus-Tie Breaker	1.04	1.05	1.01	1.13	1.08	1.02	1.07	1.04	1.01	Load power factor correction and voltage support if needed
WYANDJT2 115 kv	TBL MT E - 1E 230KV & BUS TIE LINE	P2-3	Non-Bus-Tie Breaker	1.04	1.05	1.02	1.12	1.07	1.03	1.07	1.04	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	Voltage PU (Baseline Scenarios)					Voltage PU (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations	
WYANDTTE 115 kv	TBL MT E - 1E 230KV & BUS TIE LINE	P2-3	Non-Bus-Tie Breaker	1.04	1.05	1.01	1.13	1.08	1.02	1.08	1.04	1.01	Load power factor correction and voltage support if needed
FRSTGLEN 115 kv	COTWDPGE - 2D 115KV & CASCADE-COTTONWOOD LINE	P2-3	Non-Bus-Tie Breaker	1.06	1.06	1.05	1.14	1.11	1.08	1.12	1.09	1.05	Load power factor correction and voltage support if needed
WILDWOOD 115 kv	COTWDPGE - 2D 115KV & CASCADE-COTTONWOOD LINE	P2-3	Non-Bus-Tie Breaker	1.06	1.06	1.05	1.14	1.11	1.08	1.12	1.10	1.05	Load power factor correction and voltage support if needed
BIG BAR 60 kv	COTWDPGE - 1D 115KV & COTTONWOOD-PANORAMA LINE	P2-3	Non-Bus-Tie Breaker	1.04	1.04	1.04	1.10	1.08	1.05	1.09	1.06	1.04	Load power factor correction and voltage support if needed
FRNCHGLH 60 kv	COTWDPGE - 1D 115KV & COTTONWOOD-PANORAMA LINE	P2-3	Non-Bus-Tie Breaker	1.03	1.03	1.02	1.10	1.08	1.04	1.08	1.05	1.02	Load power factor correction and voltage support if needed
JESSTAP 115 kv	COTWDPGE - 1D 115KV & COTTONWOOD-PANORAMA LINE	P2-3	Non-Bus-Tie Breaker	1.05	1.05	1.04	1.13	1.11	1.07	1.11	1.08	1.05	Load power factor correction and voltage support if needed
TAP 65 60 kv	COTWDPGE - 1D 115KV & COTTONWOOD-PANORAMA LINE	P2-3	Non-Bus-Tie Breaker	1.05	1.05	1.04	1.12	1.10	1.07	1.10	1.08	1.04	Load power factor correction and voltage support if needed
TRINITY 115 kv	COTWDPGE - 1D 115KV & COTTONWOOD-PANORAMA LINE	P2-3	Non-Bus-Tie Breaker	1.05	1.04	1.04	1.13	1.10	1.06	1.11	1.07	1.04	Load power factor correction and voltage support if needed
TRINITY 60 kv	COTWDPGE - 1D 115KV & COTTONWOOD-PANORAMA LINE	P2-3	Non-Bus-Tie Breaker	1.05	1.05	1.04	1.12	1.10	1.07	1.10	1.08	1.04	Load power factor correction and voltage support if needed
TAP 65 60 kv	COTWDPGE - 1D 115KV & TRINITY-COTTONWOOD LINE	P2-3	Non-Bus-Tie Breaker	1.04	1.04	1.03	1.11	1.08	1.06	1.09	1.06	1.03	Load power factor correction and voltage support if needed
TRINITY 115 kv	COTWDPGE - 1D 115KV & TRINITY-COTTONWOOD LINE	P2-3	Non-Bus-Tie Breaker	1.04	1.03	1.03	1.11	1.09	1.05	1.09	1.06	1.03	Load power factor correction and voltage support if needed
TRINITY 60 kv	COTWDPGE - 1D 115KV & TRINITY-COTTONWOOD LINE	P2-3	Non-Bus-Tie Breaker	1.04	1.04	1.03	1.11	1.08	1.06	1.09	1.06	1.03	Load power factor correction and voltage support if needed
HONC JT1 115 kv	PALERMO - 1D 115KV & WOODLEAF-PALERMO LINE	P2-3	Non-Bus-Tie Breaker	1.03	1.03	1.00	1.14	1.06	1.03	1.07	0.99	1.00	Load power factor correction and voltage support if needed
HONC JT3 115 kv	PALERMO - 1D 115KV & WOODLEAF-PALERMO LINE	P2-3	Non-Bus-Tie Breaker	1.04	1.04	1.03	1.13	1.05	1.04	1.05	1.02	1.03	Load power factor correction and voltage support if needed
HONCUT 115 kv	PALERMO - 1D 115KV & WOODLEAF-PALERMO LINE	P2-3	Non-Bus-Tie Breaker	1.04	1.04	1.03	1.13	1.05	1.04	1.05	1.02	1.03	Load power factor correction and voltage support if needed
HONC JT1 115 kv	PALERMO - 1D 115KV & PALERMO-PEASE LINE	P2-3	Non-Bus-Tie Breaker	1.03	1.03	1.00	1.14	1.06	1.03	1.07	0.99	1.00	Load power factor correction and voltage support if needed
HONC JT3 115 kv	PALERMO - 1D 115KV & PALERMO-PEASE LINE	P2-3	Non-Bus-Tie Breaker	1.04	1.04	1.03	1.13	1.05	1.04	1.05	1.02	1.03	Load power factor correction and voltage support if needed
HONCUT 115 kv	PALERMO - 1D 115KV & PALERMO-PEASE LINE	P2-3	Non-Bus-Tie Breaker	1.04	1.04	1.03	1.13	1.05	1.04	1.05	1.02	1.03	Load power factor correction and voltage support if needed
HONC JT1 115 kv	PALERMO - 1D 115KV & PALERMO-BOGUE LINE	P2-3	Non-Bus-Tie Breaker	1.03	1.03	1.00	1.14	1.06	1.03	1.07	0.99	1.00	Load power factor correction and voltage support if needed
HONC JT3 115 kv	PALERMO - 1D 115KV & PALERMO-BOGUE LINE	P2-3	Non-Bus-Tie Breaker	1.04	1.04	1.03	1.13	1.05	1.04	1.05	1.02	1.03	Load power factor correction and voltage support if needed
HONCUT 115 kv	PALERMO - 1D 115KV & PALERMO-BOGUE LINE	P2-3	Non-Bus-Tie Breaker	1.04	1.04	1.03	1.13	1.05	1.04	1.05	1.02	1.03	Load power factor correction and voltage support if needed
HONC JT1 115 kv	PALERMO - 1D 115KV & CARIBOU-PALERMO LINE	P2-3	Non-Bus-Tie Breaker	1.03	1.03	1.00	1.14	1.06	1.03	1.07	0.99	1.00	Load power factor correction and voltage support if needed
HONC JT3 115 kv	PALERMO - 1D 115KV & CARIBOU-PALERMO LINE	P2-3	Non-Bus-Tie Breaker	1.04	1.04	1.03	1.13	1.05	1.04	1.05	1.02	1.03	Load power factor correction and voltage support if needed
HONCUT 115 kv	PALERMO - 1D 115KV & CARIBOU-PALERMO LINE	P2-3	Non-Bus-Tie Breaker	1.04	1.04	1.03	1.13	1.05	1.04	1.05	1.02	1.03	Load power factor correction and voltage support if needed
HONC JT1 115 kv	PALERMO - 1D 115KV & PALERMO-NICOLAUS LINE	P2-3	Non-Bus-Tie Breaker	1.03	1.03	1.00	1.14	1.06	1.03	1.07	0.99	1.00	Load power factor correction and voltage support if needed
HONC JT3 115 kv	PALERMO - 1D 115KV & PALERMO-NICOLAUS LINE	P2-3	Non-Bus-Tie Breaker	1.04	1.04	1.03	1.13	1.05	1.04	1.05	1.02	1.03	Load power factor correction and voltage support if needed
HONCUT 115 kv	PALERMO - 1D 115KV & PALERMO-NICOLAUS LINE	P2-3	Non-Bus-Tie Breaker	1.04	1.04	1.03	1.13	1.05	1.04	1.05	1.02	1.03	Load power factor correction and voltage support if needed
HONC JT1 115 kv	PALERMO - 1D 115KV & PALERMO-WYANDOTTE LINE	P2-3	Non-Bus-Tie Breaker	1.03	1.03	1.00	1.14	1.06	1.03	1.07	0.99	1.00	Load power factor correction and voltage support if needed
HONC JT3 115 kv	PALERMO - 1D 115KV & PALERMO-WYANDOTTE LINE	P2-3	Non-Bus-Tie Breaker	1.04	1.04	1.03	1.13	1.05	1.04	1.05	1.02	1.03	Load power factor correction and voltage support if needed
HONCUT 115 kv	PALERMO - 1D 115KV & PALERMO-WYANDOTTE LINE	P2-3	Non-Bus-Tie Breaker	1.04	1.04	1.03	1.13	1.05	1.04	1.05	1.02	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	Voltage PU (Baseline Scenarios)					Voltage PU (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations	
HONC JT3 115 kv	PALERMO - 1D 115KV & PALERMO-PEASE LINE (2)	P2-3	Non-Bus-Tie Breaker	1.04	1.04	1.03	1.13	1.05	1.04	1.05	1.02	1.03	Load power factor correction and voltage support if needed
HONCUT 115 kv	PALERMO - 1D 115KV & PALERMO-PEASE LINE (2)	P2-3	Non-Bus-Tie Breaker	1.04	1.04	1.03	1.13	1.05	1.04	1.05	1.02	1.03	Load power factor correction and voltage support if needed
CEDR CRK 60 kv	BENTON - 1D 60KV & CASCADE-BENTON-DESCHUTES LINE	P2-3	Non-Bus-Tie Breaker	1.04	1.04	0.88	1.14	1.13	1.02	1.15	1.09	1.02	Non BES Facility
CLOV TAP 60 kv	BENTON - 1D 60KV & CASCADE-BENTON-DESCHUTES LINE	P2-3	Non-Bus-Tie Breaker	1.04	1.04	0.88	1.14	1.13	1.02	1.15	1.09	1.03	Non BES Facility
COWCK TP 60 kv	BENTON - 1D 60KV & CASCADE-BENTON-DESCHUTES LINE	P2-3	Non-Bus-Tie Breaker	1.03	1.03	0.88	1.13	1.12	1.01	1.14	1.07	1.00	Non BES Facility
DESCHUTS 60 kv	BENTON - 1D 60KV & CASCADE-BENTON-DESCHUTES LINE	P2-3	Non-Bus-Tie Breaker	1.01	1.01	0.88	1.11	1.10	1.00	1.12	1.04	0.94	Non BES Facility
KILARC 60 kv	BENTON - 1D 60KV & CASCADE-BENTON-DESCHUTES LINE	P2-3	Non-Bus-Tie Breaker	1.04	1.04	0.89	1.14	1.13	1.02	1.15	1.09	1.03	Non BES Facility
OLSEN JT 60 kv	BENTON - 1D 60KV & CASCADE-BENTON-DESCHUTES LINE	P2-3	Non-Bus-Tie Breaker	1.04	1.04	0.88	1.14	1.13	1.02	1.15	1.08	1.02	Non BES Facility
TKO TAP 60 kv	BENTON - 1D 60KV & CASCADE-BENTON-DESCHUTES LINE	P2-3	Non-Bus-Tie Breaker	1.03	1.03	0.88	1.13	1.12	1.01	1.14	1.07	1.00	Non BES Facility
WHITMORE 60 kv	BENTON - 1D 60KV & CASCADE-BENTON-DESCHUTES LINE	P2-3	Non-Bus-Tie Breaker	1.04	1.03	0.88	1.14	1.13	1.02	1.15	1.08	1.02	Non BES Facility
CEDR CRK 60 kv	CASCADE - MA 60KV & CASCADE-BENTON-DESCHUTES LINE	P2-3	Non-Bus-Tie Breaker	1.04	1.04	0.88	1.14	1.13	1.02	1.16	1.09	1.02	Non BES Facility
CLOV TAP 60 kv	CASCADE - MA 60KV & CASCADE-BENTON-DESCHUTES LINE	P2-3	Non-Bus-Tie Breaker	1.04	1.04	0.88	1.14	1.13	1.02	1.16	1.09	1.03	Non BES Facility
COWCK TP 60 kv	CASCADE - MA 60KV & CASCADE-BENTON-DESCHUTES LINE	P2-3	Non-Bus-Tie Breaker	1.03	1.03	0.88	1.13	1.12	1.01	1.14	1.07	1.00	Non BES Facility
DESCHUTS 60 kv	CASCADE - MA 60KV & CASCADE-BENTON-DESCHUTES LINE	P2-3	Non-Bus-Tie Breaker	1.01	1.01	0.88	1.11	1.10	1.00	1.12	1.04	0.94	Non BES Facility
FRNCHGLH 60 kv	CASCADE - MA 60KV & CASCADE-BENTON-DESCHUTES LINE	P2-3	Non-Bus-Tie Breaker	1.01	0.99	0.97	1.11	1.07	1.00	1.08	1.03	0.97	Non BES Facility
KESWICK 60 kv	CASCADE - MA 60KV & CASCADE-BENTON-DESCHUTES LINE	P2-3	Non-Bus-Tie Breaker	0.99	0.97	0.93	1.11	1.08	0.98	1.08	1.02	0.93	Non BES Facility
KILARC 60 kv	CASCADE - MA 60KV & CASCADE-BENTON-DESCHUTES LINE	P2-3	Non-Bus-Tie Breaker	1.04	1.04	0.89	1.14	1.13	1.02	1.15	1.09	1.03	Non BES Facility
OLSEN JT 60 kv	CASCADE - MA 60KV & CASCADE-BENTON-DESCHUTES LINE	P2-3	Non-Bus-Tie Breaker	1.04	1.04	0.88	1.14	1.13	1.02	1.15	1.08	1.02	Non BES Facility
STLLWATR 60 kv	CASCADE - MA 60KV & CASCADE-BENTON-DESCHUTES LINE	P2-3	Non-Bus-Tie Breaker	0.99	0.97	0.92	1.12	1.08	0.98	1.08	1.02	0.92	Non BES Facility
TKO TAP 60 kv	CASCADE - MA 60KV & CASCADE-BENTON-DESCHUTES LINE	P2-3	Non-Bus-Tie Breaker	1.03	1.03	0.88	1.13	1.12	1.01	1.14	1.07	1.00	Non BES Facility
WHITMORE 60 kv	CASCADE - MA 60KV & CASCADE-BENTON-DESCHUTES LINE	P2-3	Non-Bus-Tie Breaker	1.04	1.04	0.88	1.14	1.13	1.02	1.15	1.08	1.02	Non BES Facility
FRNCHGLH 60 kv	CASCADE - MA 60KV & KESWICK-CASCADE LINE	P2-3	Non-Bus-Tie Breaker	1.01	0.99	0.97	1.11	1.07	1.00	1.08	1.03	0.97	Non BES Facility

Study Area: PG&E North Valley

High/Low Voltages



Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)					Voltage PU (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations	
KESWICK 60 kv	CASCADE - MA 60KV & KESWICK-CASCADE LINE	P2-3	Non-Bus-Tie Breaker	0.99	0.97	0.93	1.11	1.08	0.98	1.08	1.02	0.93	Non BES Facility
STLLWATR 60 kv	CASCADE - MA 60KV & KESWICK-CASCADE LINE	P2-3	Non-Bus-Tie Breaker	0.99	0.97	0.92	1.12	1.08	0.98	1.08	1.02	0.92	Non BES Facility
CEDR CRK 60 kv	COTTONWD - MA 60KV & COLEMAN-COTTONWOOD LINE	P2-3	Non-Bus-Tie Breaker	0.98	N/A	N/A	1.13	N/A	N/A	N/A	1.09	N/A	Non BES Facility
CLMN JCT 60 kv	COTTONWD - MA 60KV & COLEMAN-COTTONWOOD LINE	P2-3	Non-Bus-Tie Breaker	0.61	N/A	N/A	1.13	N/A	N/A	N/A	0.98	N/A	Non BES Facility
CLOV TAP 60 kv	COTTONWD - MA 60KV & COLEMAN-COTTONWOOD LINE	P2-3	Non-Bus-Tie Breaker	0.98	N/A	N/A	1.13	N/A	N/A	N/A	1.09	N/A	Non BES Facility
COLEMAN 60 kv	COTTONWD - MA 60KV & COLEMAN-COTTONWOOD LINE	P2-3	Non-Bus-Tie Breaker	0.73	N/A	N/A	1.12	N/A	N/A	N/A	1.02	N/A	Non BES Facility
COWCK TP 60 kv	COTTONWD - MA 60KV & COLEMAN-COTTONWOOD LINE	P2-3	Non-Bus-Tie Breaker	0.96	N/A	N/A	1.11	N/A	N/A	N/A	1.07	N/A	Non BES Facility
DIRYVLE 60 kv	COTTONWD - MA 60KV & COLEMAN-COTTONWOOD LINE	P2-3	Non-Bus-Tie Breaker	0.59	N/A	N/A	1.13	N/A	N/A	N/A	0.97	N/A	Non BES Facility
GERBER 60 kv	COTTONWD - MA 60KV & COLEMAN-COTTONWOOD LINE	P2-3	Non-Bus-Tie Breaker	0.52	N/A	N/A	1.13	N/A	N/A	N/A	0.93	N/A	Non BES Facility
GRBR JCT 60 kv	COTTONWD - MA 60KV & COLEMAN-COTTONWOOD LINE	P2-3	Non-Bus-Tie Breaker	0.54	N/A	N/A	1.13	N/A	N/A	N/A	0.94	N/A	Non BES Facility
INSKIP 60 kv	COTTONWD - MA 60KV & COLEMAN-COTTONWOOD LINE	P2-3	Non-Bus-Tie Breaker	0.77	N/A	N/A	1.12	N/A	N/A	N/A	1.03	N/A	Non BES Facility
KILARC 60 kv	COTTONWD - MA 60KV & COLEMAN-COTTONWOOD LINE	P2-3	Non-Bus-Tie Breaker	0.98	N/A	N/A	1.12	N/A	N/A	N/A	1.09	N/A	Non BES Facility
LP FB SP 60 kv	COTTONWD - MA 60KV & COLEMAN-COTTONWOOD LINE	P2-3	Non-Bus-Tie Breaker	0.54	N/A	N/A	1.13	N/A	N/A	N/A	0.94	N/A	Non BES Facility
LS ML JT 60 kv	COTTONWD - MA 60KV & COLEMAN-COTTONWOOD LINE	P2-3	Non-Bus-Tie Breaker	0.59	N/A	N/A	1.14	N/A	N/A	N/A	0.97	N/A	Non BES Facility
LS MLNSJ 60 kv	COTTONWD - MA 60KV & COLEMAN-COTTONWOOD LINE	P2-3	Non-Bus-Tie Breaker	0.59	N/A	N/A	1.14	N/A	N/A	N/A	0.97	N/A	Non BES Facility
OLSEN JT 60 kv	COTTONWD - MA 60KV & COLEMAN-COTTONWOOD LINE	P2-3	Non-Bus-Tie Breaker	0.97	N/A	N/A	1.12	N/A	N/A	N/A	1.08	N/A	Non BES Facility
RED B JT 60 kv	COTTONWD - MA 60KV & COLEMAN-COTTONWOOD LINE	P2-3	Non-Bus-Tie Breaker	0.56	N/A	N/A	1.13	N/A	N/A	N/A	0.95	N/A	Non BES Facility
RED BLFF 60 kv	COTTONWD - MA 60KV & COLEMAN-COTTONWOOD LINE	P2-3	Non-Bus-Tie Breaker	0.56	N/A	N/A	1.13	N/A	N/A	N/A	0.95	N/A	Non BES Facility
RWSN J2 60 kv	COTTONWD - MA 60KV & COLEMAN-COTTONWOOD LINE	P2-3	Non-Bus-Tie Breaker	0.54	N/A	N/A	1.13	N/A	N/A	N/A	0.94	N/A	Non BES Facility
SOUTH 60 kv	COTTONWD - MA 60KV & COLEMAN-COTTONWOOD LINE	P2-3	Non-Bus-Tie Breaker	0.80	N/A	N/A	1.11	N/A	N/A	N/A	1.03	N/A	Non BES Facility
TKO TAP 60 kv	COTTONWD - MA 60KV & COLEMAN-COTTONWOOD LINE	P2-3	Non-Bus-Tie Breaker	0.96	N/A	N/A	1.11	N/A	N/A	N/A	1.07	N/A	Non BES Facility

Study Area: PG&E North Valley

High/Low Voltages



Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)					Voltage PU (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations	
TYLERJT 60 kv	COTTONWD - MA 60KV & COLEMAN-COTTONWOOD LINE	P2-3	Non-Bus-Tie Breaker	0.54	N/A	N/A	1.13	N/A	N/A	N/A	0.94	N/A	Non BES Facility
VINA 60 kv	COTTONWD - MA 60KV & COLEMAN-COTTONWOOD LINE	P2-3	Non-Bus-Tie Breaker	0.58	N/A	N/A	1.14	N/A	N/A	N/A	0.97	N/A	Non BES Facility
VOLTA 60 kv	COTTONWD - MA 60KV & COLEMAN-COTTONWOOD LINE	P2-3	Non-Bus-Tie Breaker	0.84	N/A	N/A	1.11	N/A	N/A	N/A	1.04	N/A	Non BES Facility
WHITMORE 60 kv	COTTONWD - MA 60KV & COLEMAN-COTTONWOOD LINE	P2-3	Non-Bus-Tie Breaker	0.97	N/A	N/A	1.12	N/A	N/A	N/A	1.08	N/A	Non BES Facility
CEDR CRK 60 kv	COTTONWD - MA 60KV & COTTONWOOD-RED BLUFF LINE	P2-3	Non-Bus-Tie Breaker	0.94	N/A	N/A	1.12	N/A	N/A	N/A	1.09	N/A	Non BES Facility
CLMN JCT 60 kv	COTTONWD - MA 60KV & COTTONWOOD-RED BLUFF LINE	P2-3	Non-Bus-Tie Breaker	0.48	N/A	N/A	1.11	N/A	N/A	N/A	0.97	N/A	Non BES Facility
CLOV TAP 60 kv	COTTONWD - MA 60KV & COTTONWOOD-RED BLUFF LINE	P2-3	Non-Bus-Tie Breaker	0.94	N/A	N/A	1.12	N/A	N/A	N/A	1.09	N/A	Non BES Facility
COWCK TP 60 kv	COTTONWD - MA 60KV & COTTONWOOD-RED BLUFF LINE	P2-3	Non-Bus-Tie Breaker	0.92	N/A	N/A	1.11	N/A	N/A	N/A	1.07	N/A	Non BES Facility
DIRYVLE 60 kv	COTTONWD - MA 60KV & COTTONWOOD-RED BLUFF LINE	P2-3	Non-Bus-Tie Breaker	0.47	N/A	N/A	1.11	N/A	N/A	N/A	0.97	N/A	Non BES Facility
GERBER 60 kv	COTTONWD - MA 60KV & COTTONWOOD-RED BLUFF LINE	P2-3	Non-Bus-Tie Breaker	0.39	N/A	N/A	1.10	N/A	N/A	N/A	0.92	N/A	Non BES Facility
GRBR JCT 60 kv	COTTONWD - MA 60KV & COTTONWOOD-RED BLUFF LINE	P2-3	Non-Bus-Tie Breaker	0.41	N/A	N/A	1.10	N/A	N/A	N/A	0.93	N/A	Non BES Facility
KILARC 60 kv	COTTONWD - MA 60KV & COTTONWOOD-RED BLUFF LINE	P2-3	Non-Bus-Tie Breaker	0.94	N/A	N/A	1.12	N/A	N/A	N/A	1.09	N/A	Non BES Facility
LP FB SP 60 kv	COTTONWD - MA 60KV & COTTONWOOD-RED BLUFF LINE	P2-3	Non-Bus-Tie Breaker	0.41	N/A	N/A	1.10	N/A	N/A	N/A	0.93	N/A	Non BES Facility
LS ML JT 60 kv	COTTONWD - MA 60KV & COTTONWOOD-RED BLUFF LINE	P2-3	Non-Bus-Tie Breaker	0.46	N/A	N/A	1.11	N/A	N/A	N/A	0.97	N/A	Non BES Facility
LS MLNSJ 60 kv	COTTONWD - MA 60KV & COTTONWOOD-RED BLUFF LINE	P2-3	Non-Bus-Tie Breaker	0.46	N/A	N/A	1.11	N/A	N/A	N/A	0.97	N/A	Non BES Facility
OLSEN JT 60 kv	COTTONWD - MA 60KV & COTTONWOOD-RED BLUFF LINE	P2-3	Non-Bus-Tie Breaker	0.93	N/A	N/A	1.12	N/A	N/A	N/A	1.08	N/A	Non BES Facility
RED B JT 60 kv	COTTONWD - MA 60KV & COTTONWOOD-RED BLUFF LINE	P2-3	Non-Bus-Tie Breaker	0.43	N/A	N/A	1.11	N/A	N/A	N/A	0.94	N/A	Non BES Facility
RED BLFF 60 kv	COTTONWD - MA 60KV & COTTONWOOD-RED BLUFF LINE	P2-3	Non-Bus-Tie Breaker	0.43	N/A	N/A	1.11	N/A	N/A	N/A	0.95	N/A	Non BES Facility
RWSN J2 60 kv	COTTONWD - MA 60KV & COTTONWOOD-RED BLUFF LINE	P2-3	Non-Bus-Tie Breaker	0.42	N/A	N/A	1.10	N/A	N/A	N/A	0.93	N/A	Non BES Facility
TKO TAP 60 kv	COTTONWD - MA 60KV & COTTONWOOD-RED BLUFF LINE	P2-3	Non-Bus-Tie Breaker	0.92	N/A	N/A	1.11	N/A	N/A	N/A	1.07	N/A	Non BES Facility

Study Area: PG&E North Valley

High/Low Voltages



Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)					Voltage PU (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations	
TYLERJT 60 kv	COTTONWD - MA 60KV & COTTONWOOD-RED BLUFF LINE	P2-3	Non-Bus-Tie Breaker	0.41	N/A	N/A	1.10	N/A	N/A	N/A	0.93	N/A	Non BES Facility
VINA 60 kv	COTTONWD - MA 60KV & COTTONWOOD-RED BLUFF LINE	P2-3	Non-Bus-Tie Breaker	0.46	N/A	N/A	1.11	N/A	N/A	N/A	0.96	N/A	Non BES Facility
WHITMORE 60 kv	COTTONWD - MA 60KV & COTTONWOOD-RED BLUFF LINE	P2-3	Non-Bus-Tie Breaker	0.93	N/A	N/A	1.12	N/A	N/A	N/A	1.08	N/A	Non BES Facility
CEDR CRK 60 kv	COTTONWD - MA 60KV & COTTONWOOD #2 LINE	P2-3	Non-Bus-Tie Breaker	0.94	N/A	N/A	1.12	N/A	N/A	N/A	1.09	N/A	Non BES Facility
CLMN JCT 60 kv	COTTONWD - MA 60KV & COTTONWOOD #2 LINE	P2-3	Non-Bus-Tie Breaker	0.48	N/A	N/A	1.11	N/A	N/A	N/A	0.97	N/A	Non BES Facility
CLOV TAP 60 kv	COTTONWD - MA 60KV & COTTONWOOD #2 LINE	P2-3	Non-Bus-Tie Breaker	0.94	N/A	N/A	1.12	N/A	N/A	N/A	1.09	N/A	Non BES Facility
COWCK TP 60 kv	COTTONWD - MA 60KV & COTTONWOOD #2 LINE	P2-3	Non-Bus-Tie Breaker	0.92	N/A	N/A	1.11	N/A	N/A	N/A	1.07	N/A	Non BES Facility
DIRYVLE 60 kv	COTTONWD - MA 60KV & COTTONWOOD #2 LINE	P2-3	Non-Bus-Tie Breaker	0.47	N/A	N/A	1.11	N/A	N/A	N/A	0.97	N/A	Non BES Facility
GERBER 60 kv	COTTONWD - MA 60KV & COTTONWOOD #2 LINE	P2-3	Non-Bus-Tie Breaker	0.39	N/A	N/A	1.10	N/A	N/A	N/A	0.92	N/A	Non BES Facility
GRBR JCT 60 kv	COTTONWD - MA 60KV & COTTONWOOD #2 LINE	P2-3	Non-Bus-Tie Breaker	0.41	N/A	N/A	1.10	N/A	N/A	N/A	0.93	N/A	Non BES Facility
KILARC 60 kv	COTTONWD - MA 60KV & COTTONWOOD #2 LINE	P2-3	Non-Bus-Tie Breaker	0.94	N/A	N/A	1.12	N/A	N/A	N/A	1.09	N/A	Non BES Facility
LP FB SP 60 kv	COTTONWD - MA 60KV & COTTONWOOD #2 LINE	P2-3	Non-Bus-Tie Breaker	0.41	N/A	N/A	1.10	N/A	N/A	N/A	0.93	N/A	Non BES Facility
LS ML JT 60 kv	COTTONWD - MA 60KV & COTTONWOOD #2 LINE	P2-3	Non-Bus-Tie Breaker	0.46	N/A	N/A	1.11	N/A	N/A	N/A	0.97	N/A	Non BES Facility
LS MLNSJ 60 kv	COTTONWD - MA 60KV & COTTONWOOD #2 LINE	P2-3	Non-Bus-Tie Breaker	0.46	N/A	N/A	1.11	N/A	N/A	N/A	0.97	N/A	Non BES Facility
OLSEN JT 60 kv	COTTONWD - MA 60KV & COTTONWOOD #2 LINE	P2-3	Non-Bus-Tie Breaker	0.93	N/A	N/A	1.12	N/A	N/A	N/A	1.08	N/A	Non BES Facility
RED B JT 60 kv	COTTONWD - MA 60KV & COTTONWOOD #2 LINE	P2-3	Non-Bus-Tie Breaker	0.43	N/A	N/A	1.11	N/A	N/A	N/A	0.94	N/A	Non BES Facility
RED BLFF 60 kv	COTTONWD - MA 60KV & COTTONWOOD #2 LINE	P2-3	Non-Bus-Tie Breaker	0.43	N/A	N/A	1.11	N/A	N/A	N/A	0.95	N/A	Non BES Facility
RWSN J2 60 kv	COTTONWD - MA 60KV & COTTONWOOD #2 LINE	P2-3	Non-Bus-Tie Breaker	0.42	N/A	N/A	1.10	N/A	N/A	N/A	0.93	N/A	Non BES Facility
TKO TAP 60 kv	COTTONWD - MA 60KV & COTTONWOOD #2 LINE	P2-3	Non-Bus-Tie Breaker	0.92	N/A	N/A	1.11	N/A	N/A	N/A	1.07	N/A	Non BES Facility
TYLERJT 60 kv	COTTONWD - MA 60KV & COTTONWOOD #2 LINE	P2-3	Non-Bus-Tie Breaker	0.41	N/A	N/A	1.10	N/A	N/A	N/A	0.93	N/A	Non BES Facility
VINA 60 kv	COTTONWD - MA 60KV & COTTONWOOD #2 LINE	P2-3	Non-Bus-Tie Breaker	0.46	N/A	N/A	1.11	N/A	N/A	N/A	0.96	N/A	Non BES Facility
WHITMORE 60 kv	COTTONWD - MA 60KV & COTTONWOOD #2 LINE	P2-3	Non-Bus-Tie Breaker	0.93	N/A	N/A	1.12	N/A	N/A	N/A	1.08	N/A	Non BES Facility
ANDERSON 60 kv	COTTONWD - MA 60KV & COTTONWOOD #1 LINE	P2-3	Non-Bus-Tie Breaker	0.97	N/A	N/A	1.10	N/A	N/A	N/A	1.01	N/A	Non BES Facility
CEDR CRK 60 kv	COTTONWD - MA 60KV & COTTONWOOD #1 LINE	P2-3	Non-Bus-Tie Breaker	1.04	N/A	N/A	1.14	N/A	N/A	N/A	1.09	N/A	Non BES Facility
CLMN FSH 60 kv	COTTONWD - MA 60KV & COTTONWOOD #1 LINE	P2-3	Non-Bus-Tie Breaker	0.99	N/A	N/A	1.16	N/A	N/A	N/A	1.04	N/A	Non BES Facility
CLMN JCT 60 kv	COTTONWD - MA 60KV & COTTONWOOD #1 LINE	P2-3	Non-Bus-Tie Breaker	0.95	N/A	N/A	1.18	N/A	N/A	N/A	1.03	N/A	Non BES Facility
CLMN TAP 60 kv	COTTONWD - MA 60KV & COTTONWOOD #1 LINE	P2-3	Non-Bus-Tie Breaker	0.99	N/A	N/A	1.16	N/A	N/A	N/A	1.04	N/A	Non BES Facility
CLOV TAP 60 kv	COTTONWD - MA 60KV & COTTONWOOD #1 LINE	P2-3	Non-Bus-Tie Breaker	1.04	N/A	N/A	1.14	N/A	N/A	N/A	1.09	N/A	Non BES Facility
COLEMAN 60 kv	COTTONWD - MA 60KV & COTTONWOOD #1 LINE	P2-3	Non-Bus-Tie Breaker	0.99	N/A	N/A	1.16	N/A	N/A	N/A	1.04	N/A	Non BES Facility
COWCK TP 60 kv	COTTONWD - MA 60KV & COTTONWOOD #1 LINE	P2-3	Non-Bus-Tie Breaker	1.03	N/A	N/A	1.13	N/A	N/A	N/A	1.07	N/A	Non BES Facility
DESCHUTS 60 kv	COTTONWD - MA 60KV & COTTONWOOD #1 LINE	P2-3	Non-Bus-Tie Breaker	1.01	N/A	N/A	1.11	N/A	N/A	N/A	1.04	N/A	Non BES Facility
DIRYVLE 60 kv	COTTONWD - MA 60KV & COTTONWOOD #1 LINE	P2-3	Non-Bus-Tie Breaker	0.94	N/A	N/A	1.18	N/A	N/A	N/A	1.02	N/A	Non BES Facility
GIRVAN 60 kv	COTTONWD - MA 60KV & COTTONWOOD #1 LINE	P2-3	Non-Bus-Tie Breaker	0.98	N/A	N/A	1.10	N/A	N/A	N/A	1.02	N/A	Non BES Facility
INSKIP 60 kv	COTTONWD - MA 60KV & COTTONWOOD #1 LINE	P2-3	Non-Bus-Tie Breaker	1.00	N/A	N/A	1.15	N/A	N/A	N/A	1.04	N/A	Non BES Facility
KILARC 60 kv	COTTONWD - MA 60KV & COTTONWOOD #1 LINE	P2-3	Non-Bus-Tie Breaker	1.04	N/A	N/A	1.14	N/A	N/A	N/A	1.09	N/A	Non BES Facility
LS ML JT 60 kv	COTTONWD - MA 60KV & COTTONWOOD #1 LINE	P2-3	Non-Bus-Tie Breaker	0.93	N/A	N/A	1.19	N/A	N/A	N/A	1.02	N/A	Non BES Facility
LS MLNSJ 60 kv	COTTONWD - MA 60KV & COTTONWOOD #1 LINE	P2-3	Non-Bus-Tie Breaker	0.93	N/A	N/A	1.19	N/A	N/A	N/A	1.02	N/A	Non BES Facility
OLSEN JT 60 kv	COTTONWD - MA 60KV & COTTONWOOD #1 LINE	P2-3	Non-Bus-Tie Breaker	1.04	N/A	N/A	1.14	N/A	N/A	N/A	1.09	N/A	Non BES Facility

Study Area: PG&E North Valley

High/Low Voltages



Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)					Voltage PU (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations	
RED B JT 60 kv	COTTONWD - MA 60KV & COTTONWOOD #1 LINE	P2-3	Non-Bus-Tie Breaker	0.93	N/A	N/A	1.19	N/A	N/A	N/A	1.02	N/A	Non BES Facility
RED BLFF 60 kv	COTTONWD - MA 60KV & COTTONWOOD #1 LINE	P2-3	Non-Bus-Tie Breaker	0.93	N/A	N/A	1.19	N/A	N/A	N/A	1.02	N/A	Non BES Facility
RWSN J2 60 kv	COTTONWD - MA 60KV & COTTONWOOD #1 LINE	P2-3	Non-Bus-Tie Breaker	0.93	N/A	N/A	1.19	N/A	N/A	N/A	1.02	N/A	Non BES Facility
SOUTH 60 kv	COTTONWD - MA 60KV & COTTONWOOD #1 LINE	P2-3	Non-Bus-Tie Breaker	1.00	N/A	N/A	1.15	N/A	N/A	N/A	1.04	N/A	Non BES Facility
TKO TAP 60 kv	COTTONWD - MA 60KV & COTTONWOOD #1 LINE	P2-3	Non-Bus-Tie Breaker	1.03	N/A	N/A	1.13	N/A	N/A	N/A	1.07	N/A	Non BES Facility
VINA 60 kv	COTTONWD - MA 60KV & COTTONWOOD #1 LINE	P2-3	Non-Bus-Tie Breaker	0.93	N/A	N/A	1.19	N/A	N/A	N/A	1.02	N/A	Non BES Facility
VOLTA 60 kv	COTTONWD - MA 60KV & COTTONWOOD #1 LINE	P2-3	Non-Bus-Tie Breaker	1.01	N/A	N/A	1.14	N/A	N/A	N/A	1.05	N/A	Non BES Facility
WHITMORE 60 kv	COTTONWD - MA 60KV & COTTONWOOD #1 LINE	P2-3	Non-Bus-Tie Breaker	1.04	N/A	N/A	1.13	N/A	N/A	N/A	1.08	N/A	Non BES Facility
ANDERSON 60 kv	COTTONWD - MA 60KV & RED BLFF-COTTONWD LINE	P2-3	Non-Bus-Tie Breaker	0.97	N/A	N/A	1.10	N/A	N/A	N/A	1.01	N/A	Non BES Facility
CEDR CRK 60 kv	COTTONWD - MA 60KV & RED BLFF-COTTONWD LINE	P2-3	Non-Bus-Tie Breaker	1.04	N/A	N/A	1.14	N/A	N/A	N/A	1.09	N/A	Non BES Facility
CLMN FSH 60 kv	COTTONWD - MA 60KV & RED BLFF-COTTONWD LINE	P2-3	Non-Bus-Tie Breaker	0.99	N/A	N/A	1.16	N/A	N/A	N/A	1.04	N/A	Non BES Facility
CLMN JCT 60 kv	COTTONWD - MA 60KV & RED BLFF-COTTONWD LINE	P2-3	Non-Bus-Tie Breaker	0.94	N/A	N/A	1.18	N/A	N/A	N/A	1.03	N/A	Non BES Facility
CLMN TAP 60 kv	COTTONWD - MA 60KV & RED BLFF-COTTONWD LINE	P2-3	Non-Bus-Tie Breaker	0.99	N/A	N/A	1.16	N/A	N/A	N/A	1.04	N/A	Non BES Facility
CLOV TAP 60 kv	COTTONWD - MA 60KV & RED BLFF-COTTONWD LINE	P2-3	Non-Bus-Tie Breaker	1.04	N/A	N/A	1.14	N/A	N/A	N/A	1.09	N/A	Non BES Facility
COLEMAN 60 kv	COTTONWD - MA 60KV & RED BLFF-COTTONWD LINE	P2-3	Non-Bus-Tie Breaker	0.99	N/A	N/A	1.16	N/A	N/A	N/A	1.04	N/A	Non BES Facility
COWCK TP 60 kv	COTTONWD - MA 60KV & RED BLFF-COTTONWD LINE	P2-3	Non-Bus-Tie Breaker	1.03	N/A	N/A	1.13	N/A	N/A	N/A	1.07	N/A	Non BES Facility
DESCHUTS 60 kv	COTTONWD - MA 60KV & RED BLFF-COTTONWD LINE	P2-3	Non-Bus-Tie Breaker	1.01	N/A	N/A	1.11	N/A	N/A	N/A	1.04	N/A	Non BES Facility
DIRYVLE 60 kv	COTTONWD - MA 60KV & RED BLFF-COTTONWD LINE	P2-3	Non-Bus-Tie Breaker	0.94	N/A	N/A	1.18	N/A	N/A	N/A	1.02	N/A	Non BES Facility
GIRVAN 60 kv	COTTONWD - MA 60KV & RED BLFF-COTTONWD LINE	P2-3	Non-Bus-Tie Breaker	0.98	N/A	N/A	1.10	N/A	N/A	N/A	1.02	N/A	Non BES Facility
INSKIP 60 kv	COTTONWD - MA 60KV & RED BLFF-COTTONWD LINE	P2-3	Non-Bus-Tie Breaker	1.00	N/A	N/A	1.15	N/A	N/A	N/A	1.04	N/A	Non BES Facility
KILARC 60 kv	COTTONWD - MA 60KV & RED BLFF-COTTONWD LINE	P2-3	Non-Bus-Tie Breaker	1.04	N/A	N/A	1.14	N/A	N/A	N/A	1.09	N/A	Non BES Facility
LS ML JT 60 kv	COTTONWD - MA 60KV & RED BLFF-COTTONWD LINE	P2-3	Non-Bus-Tie Breaker	0.93	N/A	N/A	1.18	N/A	N/A	N/A	1.02	N/A	Non BES Facility
LS MLNSJ 60 kv	COTTONWD - MA 60KV & RED BLFF-COTTONWD LINE	P2-3	Non-Bus-Tie Breaker	0.93	N/A	N/A	1.19	N/A	N/A	N/A	1.02	N/A	Non BES Facility
OLSEN JT 60 kv	COTTONWD - MA 60KV & RED BLFF-COTTONWD LINE	P2-3	Non-Bus-Tie Breaker	1.04	N/A	N/A	1.14	N/A	N/A	N/A	1.09	N/A	Non BES Facility

Study Area: PG&E North Valley

High/Low Voltages



Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)					Voltage PU (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations	
RED BLFF 60 kv	COTTONWD - MA 60KV & RED BLFF-COTTONWD LINE	P2-3	Non-Bus-Tie Breaker	0.93	N/A	N/A	1.19	N/A	N/A	N/A	1.02	N/A	Non BES Facility
SOUTH 60 kv	COTTONWD - MA 60KV & RED BLFF-COTTONWD LINE	P2-3	Non-Bus-Tie Breaker	1.00	N/A	N/A	1.14	N/A	N/A	N/A	1.04	N/A	Non BES Facility
TKO TAP 60 kv	COTTONWD - MA 60KV & RED BLFF-COTTONWD LINE	P2-3	Non-Bus-Tie Breaker	1.03	N/A	N/A	1.13	N/A	N/A	N/A	1.07	N/A	Non BES Facility
VINA 60 kv	COTTONWD - MA 60KV & RED BLFF-COTTONWD LINE	P2-3	Non-Bus-Tie Breaker	0.93	N/A	N/A	1.18	N/A	N/A	N/A	1.02	N/A	Non BES Facility
VOLTA 60 kv	COTTONWD - MA 60KV & RED BLFF-COTTONWD LINE	P2-3	Non-Bus-Tie Breaker	1.01	N/A	N/A	1.14	N/A	N/A	N/A	1.05	N/A	Non BES Facility
WHITMORE 60 kv	COTTONWD - MA 60KV & RED BLFF-COTTONWD LINE	P2-3	Non-Bus-Tie Breaker	1.04	N/A	N/A	1.13	N/A	N/A	N/A	1.08	N/A	Non BES Facility
ELIZ TWN 60 kv	CARIBOU - 1D 60KV & CARIBOU-WESTWOOD LINE	P2-3	Non-Bus-Tie Breaker	1.04	1.04	0.48	1.05	1.05	1.04	1.05	1.04	0.48	Non BES Facility
EST Q JT 60 kv	CARIBOU - 1D 60KV & CARIBOU-WESTWOOD LINE	P2-3	Non-Bus-Tie Breaker	1.04	1.04	0.48	1.05	1.05	1.04	1.05	1.04	0.48	Non BES Facility
EST Q1 60 kv	CARIBOU - 1D 60KV & CARIBOU-WESTWOOD LINE	P2-3	Non-Bus-Tie Breaker	1.04	1.04	0.48	1.05	1.05	1.04	1.05	1.04	0.48	Non BES Facility
EST QNCY 60 kv	CARIBOU - 1D 60KV & CARIBOU-WESTWOOD LINE	P2-3	Non-Bus-Tie Breaker	1.04	1.04	0.48	1.05	1.05	1.04	1.05	1.04	0.48	Non BES Facility
GRS F JT 60 kv	CARIBOU - 1D 60KV & CARIBOU-WESTWOOD LINE	P2-3	Non-Bus-Tie Breaker	1.04	1.04	0.48	1.05	1.05	1.04	1.05	1.04	0.48	Non BES Facility
PLMS JCT 60 kv	CARIBOU - 1D 60KV & CARIBOU-WESTWOOD LINE	P2-3	Non-Bus-Tie Breaker	1.04	1.04	0.48	1.05	1.05	1.04	1.05	1.04	0.48	Non BES Facility
SPIQUINCY 60 kv	CARIBOU - 1D 60KV & CARIBOU-WESTWOOD LINE	P2-3	Non-Bus-Tie Breaker	1.04	1.04	0.48	1.05	1.05	1.04	1.05	1.04	0.48	Non BES Facility
SPIQUINCYJCT 60 kv	CARIBOU - 1D 60KV & CARIBOU-WESTWOOD LINE	P2-3	Non-Bus-Tie Breaker	1.04	1.04	0.48	1.05	1.05	1.04	1.05	1.04	0.48	Non BES Facility
ELIZ TWN 60 kv	CARIBOU - 1D 60KV & CARIBOU #2 LINE	P2-3	Non-Bus-Tie Breaker	1.04	1.04	0.48	1.05	1.05	1.04	1.05	1.04	0.48	Non BES Facility
EST Q JT 60 kv	CARIBOU - 1D 60KV & CARIBOU #2 LINE	P2-3	Non-Bus-Tie Breaker	1.04	1.04	0.48	1.05	1.05	1.04	1.05	1.04	0.48	Non BES Facility
EST Q1 60 kv	CARIBOU - 1D 60KV & CARIBOU #2 LINE	P2-3	Non-Bus-Tie Breaker	1.04	1.04	0.48	1.05	1.05	1.04	1.05	1.04	0.48	Non BES Facility
EST QNCY 60 kv	CARIBOU - 1D 60KV & CARIBOU #2 LINE	P2-3	Non-Bus-Tie Breaker	1.04	1.04	0.48	1.05	1.05	1.04	1.05	1.04	0.48	Non BES Facility
GRS F JT 60 kv	CARIBOU - 1D 60KV & CARIBOU #2 LINE	P2-3	Non-Bus-Tie Breaker	1.04	1.04	0.48	1.05	1.05	1.04	1.05	1.04	0.48	Non BES Facility
PLMS JCT 60 kv	CARIBOU - 1D 60KV & CARIBOU #2 LINE	P2-3	Non-Bus-Tie Breaker	1.04	1.04	0.48	1.05	1.05	1.04	1.05	1.04	0.48	Non BES Facility
SPIQUINCY 60 kv	CARIBOU - 1D 60KV & CARIBOU #2 LINE	P2-3	Non-Bus-Tie Breaker	1.04	1.04	0.48	1.05	1.05	1.04	1.05	1.04	0.48	Non BES Facility
SPIQUINCYJCT 60 kv	CARIBOU - 1D 60KV & CARIBOU #2 LINE	P2-3	Non-Bus-Tie Breaker	1.04	1.04	0.48	1.05	1.05	1.04	1.05	1.04	0.48	Non BES Facility
ELIZ TWN 60 kv	CARIBOU - 1D 60KV & CARIBOU #2 LINE (2)	P2-3	Non-Bus-Tie Breaker	1.04	1.04	0.48	1.05	1.05	1.04	1.05	1.04	0.48	Non BES Facility
EST Q JT 60 kv	CARIBOU - 1D 60KV & CARIBOU #2 LINE (2)	P2-3	Non-Bus-Tie Breaker	1.04	1.04	0.48	1.05	1.05	1.04	1.05	1.04	0.48	Non BES Facility
EST Q1 60 kv	CARIBOU - 1D 60KV & CARIBOU #2 LINE (2)	P2-3	Non-Bus-Tie Breaker	1.04	1.04	0.48	1.05	1.05	1.04	1.05	1.04	0.48	Non BES Facility
EST QNCY 60 kv	CARIBOU - 1D 60KV & CARIBOU #2 LINE (2)	P2-3	Non-Bus-Tie Breaker	1.04	1.04	0.48	1.05	1.05	1.04	1.05	1.04	0.48	Non BES Facility
GRS F JT 60 kv	CARIBOU - 1D 60KV & CARIBOU #2 LINE (2)	P2-3	Non-Bus-Tie Breaker	1.04	1.04	0.48	1.05	1.05	1.04	1.05	1.04	0.48	Non BES Facility
PLMS JCT 60 kv	CARIBOU - 1D 60KV & CARIBOU #2 LINE (2)	P2-3	Non-Bus-Tie Breaker	1.04	1.04	0.48	1.05	1.05	1.04	1.05	1.04	0.48	Non BES Facility
SPIQUINCY 60 kv	CARIBOU - 1D 60KV & CARIBOU #2 LINE (2)	P2-3	Non-Bus-Tie Breaker	1.04	1.04	0.48	1.05	1.05	1.04	1.05	1.04	0.48	Non BES Facility
SPIQUINCYJCT 60 kv	CARIBOU - 1D 60KV & CARIBOU #2 LINE (2)	P2-3	Non-Bus-Tie Breaker	1.04	1.04	0.48	1.05	1.05	1.04	1.05	1.04	0.48	Non BES Facility
COTWD_E2 230 kv	COTWD_F2 SECTION 2F & COTWD_E2 SECTION 2E 230KV	P2-4	Bus-Tie Breaker	0.99	0.97	0.95	1.03	1.05	0.97	1.05	1.00	0.88	Non BES Facility
FRSTGLEN 115 kv	COTWD_F2 SECTION 2F & COTWD_E2 SECTION 2E 230KV	P2-4	Bus-Tie Breaker	1.04	1.03	1.02	1.10	1.10	1.05	1.10	1.06	0.99	Non BES Facility
CEDR CRK 60 kv	COTTONWD 60KV - SECTION 1D & 1E	P2-4	Bus-Tie Breaker	N/A	0.92	0.78	N/A	1.10	0.92	1.13	N/A	0.97	Non BES Facility

Study Area: PG&E North Valley

High/Low Voltages



Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)					Voltage PU (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations	
CLMN FSH 60 kv	COTTONWD 60KV - SECTION 1D & 1E	P2-4	Bus-Tie Breaker	N/A	0.54	0.44	N/A	1.09	0.58	1.16	N/A	0.57	Non BES Facility
CLMN JCT 60 kv	COTTONWD 60KV - SECTION 1D & 1E	P2-4	Bus-Tie Breaker	N/A	0.48	0.35	N/A	1.10	0.53	1.18	N/A	0.48	Non BES Facility
CLMN TAP 60 kv	COTTONWD 60KV - SECTION 1D & 1E	P2-4	Bus-Tie Breaker	N/A	0.54	0.44	N/A	1.09	0.58	1.16	N/A	0.57	Non BES Facility
CLOV TAP 60 kv	COTTONWD 60KV - SECTION 1D & 1E	P2-4	Bus-Tie Breaker	N/A	0.92	0.79	N/A	1.10	0.92	1.13	N/A	0.98	Non BES Facility
COLEMAN 60 kv	COTTONWD 60KV - SECTION 1D & 1E	P2-4	Bus-Tie Breaker	N/A	0.54	0.44	N/A	1.09	0.58	1.16	N/A	0.57	Non BES Facility
COWCK TP 60 kv	COTTONWD 60KV - SECTION 1D & 1E	P2-4	Bus-Tie Breaker	N/A	0.91	0.78	N/A	1.08	0.91	1.12	N/A	0.94	Non BES Facility
DIRYVLE 60 kv	COTTONWD 60KV - SECTION 1D & 1E	P2-4	Bus-Tie Breaker	N/A	0.47	0.33	N/A	1.11	0.52	1.19	N/A	0.46	Non BES Facility
GERBER 60 kv	COTTONWD 60KV - SECTION 1D & 1E	P2-4	Bus-Tie Breaker	N/A	0.43	0.29	N/A	1.10	0.49	1.18	N/A	0.41	Non BES Facility
GRBR JCT 60 kv	COTTONWD 60KV - SECTION 1D & 1E	P2-4	Bus-Tie Breaker	N/A	0.45	0.30	N/A	1.10	0.50	1.18	N/A	0.43	Non BES Facility
INSKIP 60 kv	COTTONWD 60KV - SECTION 1D & 1E	P2-4	Bus-Tie Breaker	N/A	0.61	0.50	N/A	1.09	0.63	1.15	N/A	0.63	Non BES Facility
KILARC 60 kv	COTTONWD 60KV - SECTION 1D & 1E	P2-4	Bus-Tie Breaker	N/A	0.92	0.79	N/A	1.09	0.92	1.13	N/A	0.98	Non BES Facility
LP FB SP 60 kv	COTTONWD 60KV - SECTION 1D & 1E	P2-4	Bus-Tie Breaker	N/A	0.45	0.30	N/A	1.10	0.50	1.18	N/A	0.43	Non BES Facility
LS ML JT 60 kv	COTTONWD 60KV - SECTION 1D & 1E	P2-4	Bus-Tie Breaker	N/A	0.46	0.32	N/A	1.11	0.52	1.19	N/A	0.45	Non BES Facility
LS MLNSJ 60 kv	COTTONWD 60KV - SECTION 1D & 1E	P2-4	Bus-Tie Breaker	N/A	0.46	0.32	N/A	1.11	0.52	1.19	N/A	0.45	Non BES Facility
OLSEN JT 60 kv	COTTONWD 60KV - SECTION 1D & 1E	P2-4	Bus-Tie Breaker	N/A	0.92	0.79	N/A	1.09	0.91	1.13	N/A	0.97	Non BES Facility
RED B JT 60 kv	COTTONWD 60KV - SECTION 1D & 1E	P2-4	Bus-Tie Breaker	N/A	0.47	0.32	N/A	1.11	0.52	1.18	N/A	0.44	Non BES Facility
RED BLFF 60 kv	COTTONWD 60KV - SECTION 1D & 1E	P2-4	Bus-Tie Breaker	N/A	0.47	0.32	N/A	1.11	0.52	1.18	N/A	0.44	Non BES Facility
RWSN J2 60 kv	COTTONWD 60KV - SECTION 1D & 1E	P2-4	Bus-Tie Breaker	N/A	0.45	0.30	N/A	1.10	0.51	1.18	N/A	0.43	Non BES Facility
SOUTH 60 kv	COTTONWD 60KV - SECTION 1D & 1E	P2-4	Bus-Tie Breaker	N/A	0.64	0.53	N/A	1.09	0.65	1.15	N/A	0.66	Non BES Facility
TKO TAP 60 kv	COTTONWD 60KV - SECTION 1D & 1E	P2-4	Bus-Tie Breaker	N/A	0.91	0.78	N/A	1.08	0.91	1.12	N/A	0.94	Non BES Facility
TYLERJT 60 kv	COTTONWD 60KV - SECTION 1D & 1E	P2-4	Bus-Tie Breaker	N/A	0.45	0.30	N/A	1.10	0.50	1.18	N/A	0.43	Non BES Facility
VINA 60 kv	COTTONWD 60KV - SECTION 1D & 1E	P2-4	Bus-Tie Breaker	N/A	0.46	0.32	N/A	1.11	0.52	1.19	N/A	0.45	Non BES Facility
VOLTA 60 kv	COTTONWD 60KV - SECTION 1D & 1E	P2-4	Bus-Tie Breaker	N/A	0.71	0.59	N/A	1.08	0.71	1.14	N/A	0.71	Non BES Facility
WHITMORE 60 kv	COTTONWD 60KV - SECTION 1D & 1E	P2-4	Bus-Tie Breaker	N/A	0.92	0.78	N/A	1.09	0.91	1.13	N/A	0.97	Non BES Facility
ANTLER 60 kv	COTWDPGE 115KV - SECTION 2D & 1D	P2-4	Bus-Tie Breaker	0.98	0.99	0.92	1.05	1.06	0.99	1.06	0.98	0.87	Sensitivity only
BIG BAR 60 kv	COTWDPGE 115KV - SECTION 2D & 1D	P2-4	Bus-Tie Breaker	0.99	1.00	0.98	1.11	1.11	1.01	1.12	1.00	0.99	Load power factor correction and voltage support if needed
FRNCHGLH 60 kv	COTWDPGE 115KV - SECTION 2D & 1D	P2-4	Bus-Tie Breaker	0.95	0.96	0.92	1.11	1.10	0.98	1.11	0.95	0.92	Load power factor correction and voltage support if needed
FRSTGLEN 115 kv	COTWDPGE 115KV - SECTION 2D & 1D	P2-4	Bus-Tie Breaker	1.03	1.04	1.02	1.16	1.15	1.06	1.16	1.06	1.04	Load power factor correction and voltage support if needed
JESSTAP 115 kv	COTWDPGE 115KV - SECTION 2D & 1D	P2-4	Bus-Tie Breaker	0.99	0.99	0.98	1.15	1.14	1.02	1.15	1.00	0.99	Load power factor correction and voltage support if needed
JESSUP 115 kv	COTWDPGE 115KV - SECTION 2D & 1D	P2-4	Bus-Tie Breaker	1.01	1.01	0.95	1.06	1.07	1.02	1.07	1.02	0.89	Sensitivity only
JESSUPJ1 115 kv	COTWDPGE 115KV - SECTION 2D & 1D	P2-4	Bus-Tie Breaker	1.01	1.01	0.95	1.06	1.07	1.02	1.07	1.02	0.89	Sensitivity only
KESWICK 60 kv	COTWDPGE 115KV - SECTION 2D & 1D	P2-4	Bus-Tie Breaker	0.97	0.98	0.92	1.08	1.08	0.99	1.09	0.97	0.90	Sensitivity only
MTN GATE 60 kv	COTWDPGE 115KV - SECTION 2D & 1D	P2-4	Bus-Tie Breaker	0.98	0.99	0.92	1.05	1.06	0.99	1.06	0.98	0.88	Sensitivity only
OREGNTRL 115 kv	COTWDPGE 115KV - SECTION 2D & 1D	P2-4	Bus-Tie Breaker	1.01	1.01	0.95	1.06	1.07	1.02	1.07	1.02	0.90	Sensitivity only
PPL 60 kv	COTWDPGE 115KV - SECTION 2D & 1D	P2-4	Bus-Tie Breaker	0.98	0.99	0.92	1.05	1.06	0.99	1.06	0.98	0.87	Sensitivity only
SPI_AND 115 kv	COTWDPGE 115KV - SECTION 2D & 1D	P2-4	Bus-Tie Breaker	1.02	1.01	0.95	1.06	1.07	1.02	1.07	1.02	0.89	Sensitivity only
SPIAND2 115 kv	COTWDPGE 115KV - SECTION 2D & 1D	P2-4	Bus-Tie Breaker	1.02	1.01	0.95	1.06	1.07	1.02	1.07	1.02	0.89	Sensitivity only
STLLWATR 60 kv	COTWDPGE 115KV - SECTION 2D & 1D	P2-4	Bus-Tie Breaker	0.99	1.00	0.93	1.07	1.08	1.00	1.08	0.99	0.90	Sensitivity only
TAP 65 60 kv	COTWDPGE 115KV - SECTION 2D & 1D	P2-4	Bus-Tie Breaker	0.99	1.00	0.98	1.14	1.13	1.02	1.14	1.00	0.98	Load power factor correction and voltage support if needed
TRINITY 115 kv	COTWDPGE 115KV - SECTION 2D & 1D	P2-4	Bus-Tie Breaker	0.98	0.99	0.97	1.14	1.13	1.01	1.14	0.99	0.98	Load power factor correction and voltage support if needed
TRINITY 60 kv	COTWDPGE 115KV - SECTION 2D & 1D	P2-4	Bus-Tie Breaker	0.99	1.00	0.98	1.14	1.13	1.02	1.14	1.00	0.98	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	Voltage PU (Baseline Scenarios)					Voltage PU (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations	
WILDWOOD 115 kv	COTWDPGE 115KV - SECTION 2D & 1D	P2-4	Bus-Tie Breaker	1.03	1.04	1.02	1.16	1.15	1.06	1.16	1.06	1.04	Load power factor correction and voltage support if needed
CEDR CRK 60 kv	SPIAND2 12.50KV GEN UNIT 1 & CASCADE-BENTON-DESCHUTES 60KV [6310]	P3	G-1/N-1	<1.1	<1.1	<1.1	1.18	1.14	<1.1	<1.1	<1.1	<1.1	Load power factor correction and voltage support if needed
CLOV TAP 60 kv	SPIAND2 12.50KV GEN UNIT 1 & CASCADE-BENTON-DESCHUTES 60KV [6310]	P3	G-1/N-1	<1.1	<1.1	<1.1	1.18	1.14	<1.1	<1.1	<1.1	<1.1	Load power factor correction and voltage support if needed
COWCK TP 60 kv	SPIAND2 12.50KV GEN UNIT 1 & CASCADE-BENTON-DESCHUTES 60KV [6310]	P3	G-1/N-1	<1.1	<1.1	<1.1	1.15	1.13	<1.1	<1.1	<1.1	<1.1	Load power factor correction and voltage support if needed
DESCHUTS 60 kv	SPIAND2 12.50KV GEN UNIT 1 & CASCADE-BENTON-DESCHUTES 60KV [6310]	P3	G-1/N-1	<1.1	<1.1	<1.1	1.12	1.10	<1.1	<1.1	<1.1	<1.1	Load power factor correction and voltage support if needed
KILARC 60 kv	SPIAND2 12.50KV GEN UNIT 1 & CASCADE-BENTON-DESCHUTES 60KV [6310]	P3	G-1/N-1	<1.1	<1.1	<1.1	1.17	1.14	<1.1	<1.1	<1.1	<1.1	Load power factor correction and voltage support if needed
OLSEN JT 60 kv	SPIAND2 12.50KV GEN UNIT 1 & CASCADE-BENTON-DESCHUTES 60KV [6310]	P3	G-1/N-1	<1.1	<1.1	<1.1	1.17	1.14	<1.1	<1.1	<1.1	<1.1	Load power factor correction and voltage support if needed
TKO TAP 60 kv	SPIAND2 12.50KV GEN UNIT 1 & CASCADE-BENTON-DESCHUTES 60KV [6310]	P3	G-1/N-1	<1.1	<1.1	<1.1	1.16	1.13	<1.1	<1.1	<1.1	<1.1	Load power factor correction and voltage support if needed
WHITMORE 60 kv	SPIAND2 12.50KV GEN UNIT 1 & CASCADE-BENTON-DESCHUTES 60KV [6310]	P3	G-1/N-1	<1.1	<1.1	<1.1	1.17	1.13	<1.1	<1.1	<1.1	<1.1	Load power factor correction and voltage support if needed
SOUTH 60 kv	SPIAND2 12.50KV GEN UNIT 1 & COLEMAN-SOUTH 60KV [6450]	P3	G-1/N-1	<1.1	<1.1	<1.1	1.11	<1.1	<1.1	<1.1	<1.1	<1.1	Load power factor correction and voltage support if needed
ELKCREEK 60 kv	SPIAND2 12.50KV GEN UNIT 1 & GLENN 230/60KV TB 2	P3	G-1/N-1	<1.1	<1.1	<1.1	1.25	<1.1	<1.1	<1.1	<1.1	<1.1	Load power factor correction and voltage support if needed
WILLOWS 60 kv	SPIAND2 12.50KV GEN UNIT 1 & GLENN 230/60KV TB 2	P3	G-1/N-1	<1.1	<1.1	<1.1	1.22	<1.1	<1.1	<1.1	<1.1	<1.1	Load power factor correction and voltage support if needed
CEDR CRK 60 kv	JBBLACK1 13.80KV GEN UNIT 1 & CASCADE-BENTON-DESCHUTES 60KV [6310]	P3	G-1/N-1	<1.1	<1.1	<1.1	1.18	<1.1	<1.1	<1.1	<1.1	<1.1	Load power factor correction and voltage support if needed
CLOV TAP 60 kv	JBBLACK1 13.80KV GEN UNIT 1 & CASCADE-BENTON-DESCHUTES 60KV [6310]	P3	G-1/N-1	<1.1	<1.1	<1.1	1.18	<1.1	<1.1	<1.1	<1.1	<1.1	Load power factor correction and voltage support if needed
COWCK TP 60 kv	JBBLACK1 13.80KV GEN UNIT 1 & CASCADE-BENTON-DESCHUTES 60KV [6310]	P3	G-1/N-1	<1.1	<1.1	<1.1	1.15	<1.1	<1.1	<1.1	<1.1	<1.1	Load power factor correction and voltage support if needed
DESCHUTS 60 kv	JBBLACK1 13.80KV GEN UNIT 1 & CASCADE-BENTON-DESCHUTES 60KV [6310]	P3	G-1/N-1	<1.1	<1.1	<1.1	1.12	<1.1	<1.1	<1.1	<1.1	<1.1	Load power factor correction and voltage support if needed
KILARC 60 kv	JBBLACK1 13.80KV GEN UNIT 1 & CASCADE-BENTON-DESCHUTES 60KV [6310]	P3	G-1/N-1	<1.1	<1.1	<1.1	1.17	<1.1	<1.1	<1.1	<1.1	<1.1	Load power factor correction and voltage support if needed
OLSEN JT 60 kv	JBBLACK1 13.80KV GEN UNIT 1 & CASCADE-BENTON-DESCHUTES 60KV [6310]	P3	G-1/N-1	<1.1	<1.1	<1.1	1.17	<1.1	<1.1	<1.1	<1.1	<1.1	Load power factor correction and voltage support if needed
TKO TAP 60 kv	JBBLACK1 13.80KV GEN UNIT 1 & CASCADE-BENTON-DESCHUTES 60KV [6310]	P3	G-1/N-1	<1.1	<1.1	<1.1	1.15	<1.1	<1.1	<1.1	<1.1	<1.1	Load power factor correction and voltage support if needed
WHITMORE 60 kv	JBBLACK1 13.80KV GEN UNIT 1 & CASCADE-BENTON-DESCHUTES 60KV [6310]	P3	G-1/N-1	<1.1	<1.1	<1.1	1.17	<1.1	<1.1	<1.1	<1.1	<1.1	Load power factor correction and voltage support if needed
BIG BEND 115 kv	CRBU 4-5 13.80KV GEN UNIT 1 & TABLE MT 500/230KV TB 1	P3	G-1/N-1	<1.1	<1.1	<1.1	1.10	<1.1	<1.1	<1.1	<1.1	<1.1	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	Voltage PU (Baseline Scenarios)					Voltage PU (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations	
CHALLNGE 60 kv	CRBU 4-5 13.80KV GEN UNIT 1 & TABLE MT 500/230KV TB 1	P3	G-1/N-1	<1.1	<1.1	<1.1	1.11	<1.1	<1.1	<1.1	<1.1	<1.1	Load power factor correction and voltage support if needed
FRBSTNTP 115 kv	CRBU 4-5 13.80KV GEN UNIT 1 & TABLE MT 500/230KV TB 1	P3	G-1/N-1	<1.1	<1.1	<1.1	1.13	<1.1	<1.1	<1.1	<1.1	<1.1	Load power factor correction and voltage support if needed
HONC JT1 115 kv	CRBU 4-5 13.80KV GEN UNIT 1 & TABLE MT 500/230KV TB 1	P3	G-1/N-1	<1.1	<1.1	<1.1	1.14	<1.1	<1.1	<1.1	<1.1	<1.1	Load power factor correction and voltage support if needed
HONC JT3 115 kv	CRBU 4-5 13.80KV GEN UNIT 1 & TABLE MT 500/230KV TB 1	P3	G-1/N-1	<1.1	<1.1	<1.1	1.14	<1.1	<1.1	<1.1	<1.1	<1.1	Load power factor correction and voltage support if needed
KANAKAJT 115 kv	CRBU 4-5 13.80KV GEN UNIT 1 & TABLE MT 500/230KV TB 1	P3	G-1/N-1	<1.1	<1.1	<1.1	1.13	<1.1	<1.1	<1.1	<1.1	<1.1	Load power factor correction and voltage support if needed
KLLY RDE 60 kv	CRBU 4-5 13.80KV GEN UNIT 1 & TABLE MT 500/230KV TB 1	P3	G-1/N-1	<1.1	<1.1	<1.1	1.10	<1.1	<1.1	<1.1	<1.1	<1.1	Load power factor correction and voltage support if needed
OWID 115 kv	CRBU 4-5 13.80KV GEN UNIT 1 & TABLE MT 500/230KV TB 1	P3	G-1/N-1	<1.1	<1.1	<1.1	1.13	<1.1	<1.1	<1.1	<1.1	<1.1	Load power factor correction and voltage support if needed
PALERMO 115 kv	CRBU 4-5 13.80KV GEN UNIT 1 & TABLE MT 500/230KV TB 1	P3	G-1/N-1	<1.1	<1.1	<1.1	1.14	<1.1	<1.1	<1.1	<1.1	<1.1	Load power factor correction and voltage support if needed
PALERMO 60 kv	CRBU 4-5 13.80KV GEN UNIT 1 & TABLE MT 500/230KV TB 1	P3	G-1/N-1	<1.1	<1.1	<1.1	1.10	<1.1	<1.1	<1.1	<1.1	<1.1	Load power factor correction and voltage support if needed
WODLF TP 115 kv	CRBU 4-5 13.80KV GEN UNIT 1 & TABLE MT 500/230KV TB 1	P3	G-1/N-1	<1.1	<1.1	<1.1	1.13	<1.1	<1.1	<1.1	<1.1	<1.1	Load power factor correction and voltage support if needed
WYANDJT1 115 kv	CRBU 4-5 13.80KV GEN UNIT 1 & TABLE MT 500/230KV TB 1	P3	G-1/N-1	<1.1	<1.1	<1.1	1.14	<1.1	<1.1	<1.1	<1.1	<1.1	Load power factor correction and voltage support if needed
TAP 65 60 kv	VOLTA1-2 9.11KV GEN UNIT 1 & TRINITY-COTTONWOOD 115KV [4040]	P3	G-1/N-1	<1.1	<1.1	<1.1	<1.1	<1.1	<1.1	<1.1	1.10	<1.1	Sensitivity only
TRINITY 60 kv	VOLTA1-2 9.11KV GEN UNIT 1 & TRINITY-COTTONWOOD 115KV [4040]	P3	G-1/N-1	<1.1	<1.1	<1.1	<1.1	<1.1	<1.1	<1.1	1.10	<1.1	Sensitivity only
FRNCHGLH 60 kv	VOLTA1-2 9.11KV GEN UNIT 1 & KESWICK-CASCADE 60KV [7260] MOAS OPENED ON CASCADE_STLLWATR	P3	G-1/N-1	<1.1	<1.1	<1.1	1.10	<1.1	<1.1	<1.1	<1.1	<1.1	Load power factor correction and voltage support if needed
KESWICK 60 kv	VOLTA1-2 9.11KV GEN UNIT 1 & KESWICK-CASCADE 60KV [7260] MOAS OPENED ON CASCADE_STLLWATR	P3	G-1/N-1	<1.1	<1.1	<1.1	1.11	<1.1	<1.1	<1.1	<1.1	<1.1	Load power factor correction and voltage support if needed
STLLWATR 60 kv	VOLTA1-2 9.11KV GEN UNIT 1 & KESWICK-CASCADE 60KV [7260] MOAS OPENED ON CASCADE_STLLWATR	P3	G-1/N-1	<1.1	<1.1	<1.1	1.11	<1.1	<1.1	<1.1	<1.1	<1.1	Load power factor correction and voltage support if needed
APT ORVC 60 kv	OROVLENRG 4.16KV GEN UNIT 1 & TABLE MT 500/230KV TB 1	P3	G-1/N-1	<1.1	<1.1	<1.1	1.10	<1.1	<1.1	<1.1	<1.1	<1.1	Load power factor correction and voltage support if needed
ELGN JCT 60 kv	OROVLENRG 4.16KV GEN UNIT 1 & TABLE MT 500/230KV TB 1	P3	G-1/N-1	<1.1	<1.1	<1.1	1.10	<1.1	<1.1	<1.1	<1.1	<1.1	Load power factor correction and voltage support if needed
LSNA PCC 60 kv	OROVLENRG 4.16KV GEN UNIT 1 & TABLE MT 500/230KV TB 1	P3	G-1/N-1	<1.1	<1.1	<1.1	1.10	<1.1	<1.1	<1.1	<1.1	<1.1	Load power factor correction and voltage support if needed
OROVILLE 60 kv	OROVLENRG 4.16KV GEN UNIT 1 & TABLE MT 500/230KV TB 1	P3	G-1/N-1	<1.1	<1.1	<1.1	1.10	<1.1	<1.1	<1.1	<1.1	<1.1	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	Voltage PU (Baseline Scenarios)					Voltage PU (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations	
OROVLENRG 60 kv	OROVLENRG 4.16KV GEN UNIT 1 & TABLE MT 500/230KV TB 1	P3	G-1/N-1	<1.1	<1.1	<1.1	1.10	<1.1	<1.1	<1.1	<1.1	<1.1	Load power factor correction and voltage support if needed
OROVLENRGJCT 60 kv	OROVLENRG 4.16KV GEN UNIT 1 & TABLE MT 500/230KV TB 1	P3	G-1/N-1	<1.1	<1.1	<1.1	1.10	<1.1	<1.1	<1.1	<1.1	<1.1	Load power factor correction and voltage support if needed
HONCUT 115 kv	GRIZZLYG 6.90KV GEN UNIT 1 & TABLE MT 500/230KV TB 1	P3	G-1/N-1	<1.1	<1.1	<1.1	1.13	<1.1	<1.1	<1.1	<1.1	<1.1	Load power factor correction and voltage support if needed
SLYCREEK 115 kv	GRIZZLYG 6.90KV GEN UNIT 1 & TABLE MT 500/230KV TB 1	P3	G-1/N-1	<1.1	<1.1	<1.1	1.12	<1.1	<1.1	<1.1	<1.1	<1.1	Load power factor correction and voltage support if needed
WYANDJT2 115 kv	GRIZZLYG 6.90KV GEN UNIT 1 & TABLE MT 500/230KV TB 1	P3	G-1/N-1	<1.1	<1.1	<1.1	1.13	<1.1	<1.1	<1.1	<1.1	<1.1	Load power factor correction and voltage support if needed
WYANDTTE 115 kv	GRIZZLYG 6.90KV GEN UNIT 1 & TABLE MT 500/230KV TB 1	P3	G-1/N-1	<1.1	<1.1	<1.1	1.13	<1.1	<1.1	<1.1	<1.1	<1.1	Load power factor correction and voltage support if needed
CR CANAL 60 kv	HRIDGEGT 34.50KV GEN UNIT 5 & NEO REDT 60/13.8KV TB 1	P3	G-1/N-1	0.91	<1.1	<1.1	<1.1	<1.1	<1.1	<1.1	<1.1	<1.1	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
NEO REDT 60 kv	HRIDGEGT 34.50KV GEN UNIT 5 & NEO REDT 60/13.8KV TB 1	P3	G-1/N-1	0.91	<1.1	<1.1	<1.1	<1.1	<1.1	<1.1	<1.1	<1.1	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
RASN JNT 60 kv	HRIDGEGT 34.50KV GEN UNIT 5 & NEO REDT 60/13.8KV TB 1	P3	G-1/N-1	0.91	<1.1	<1.1	<1.1	<1.1	<1.1	<1.1	<1.1	<1.1	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
TYLER 60 kv	HRIDGEGT 34.50KV GEN UNIT 5 & NEO REDT 60/13.8KV TB 1	P3	G-1/N-1	0.91	<1.1	<1.1	<1.1	<1.1	<1.1	<1.1	<1.1	<1.1	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
CR CANAL 60 kv	COLUSGT1 18.00KV & COLUSGT2 18.00KV & COLUSST1 18.00KV GEN UNITS & NEO REDB 13.80KV GEN UNIT 1	P3	G-1/N-1	<1.1	<1.1	<1.1	<1.1	<1.1	0.91	<1.1	<1.1	<1.1	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
NEO REDT 60 kv	COLUSGT1 18.00KV & COLUSGT2 18.00KV & COLUSST1 18.00KV GEN UNITS & NEO REDB 13.80KV GEN UNIT 1	P3	G-1/N-1	<1.1	<1.1	<1.1	<1.1	<1.1	0.91	<1.1	<1.1	<1.1	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
RASN JNT 60 kv	COLUSGT1 18.00KV & COLUSGT2 18.00KV & COLUSST1 18.00KV GEN UNITS & NEO REDB 13.80KV GEN UNIT 1	P3	G-1/N-1	<1.1	<1.1	<1.1	<1.1	<1.1	0.91	<1.1	<1.1	<1.1	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
TYLER 60 kv	COLUSGT1 18.00KV & COLUSGT2 18.00KV & COLUSST1 18.00KV GEN UNITS & NEO REDB 13.80KV GEN UNIT 1	P3	G-1/N-1	<1.1	<1.1	<1.1	<1.1	<1.1	0.91	<1.1	<1.1	<1.1	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
CANAL TP 60 kv	COLUSGT1 18.00KV & COLUSGT2 18.00KV & COLUSST1 18.00KV GEN UNITS & NEO REDT 60/13.8KV TB 1	P3	G-1/N-1	<1.1	<1.1	<1.1	<1.1	<1.1	0.91	<1.1	<1.1	<1.1	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
TRINITY 115 kv	NEO REDB 13.80KV GEN UNIT 1 & TRINITY-COTTONWOOD 115KV [4040]	P3	G-1/N-1	<1.1	<1.1	<1.1	<1.1	<1.1	<1.1	<1.1	1.11	<1.1	Sensitivity only
DESCHUTS 60 kv	NEO REDB 13.80KV GEN UNIT 1 & CASCADE-BENTON-DESCHUTES 60KV [6310]	P3	G-1/N-1	<1.1	<1.1	<1.1	<1.1	1.10	<1.1	<1.1	<1.1	<1.1	Voltage adjustment after generator outage
CANAL TP 60 kv	MALCHA 13.80KV GEN UNIT 1 & NEO REDB 13.80KV GEN UNIT 1	P3	G-1/N-1	0.91	<1.1	<1.1	<1.1	<1.1	<1.1	<1.1	<1.1	<1.1	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations

Study Area: PG&E North Valley



High/Low Voltages

Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)					Voltage PU (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations	
VOLTA 60 kv	MALCHA 13.80KV GEN UNIT 1 & VOLTA-SOUTH 60KV [8300]	P3	G-1/N-1	<1.1	<1.1	<1.1	1.10	<1.1	<1.1	<1.1	<1.1	<1.1	Load power factor correction and voltage support if needed
ELKCRKJT 60 kv	MALCHA 13.80KV GEN UNIT 1 & GLENN 230/60KV TB 2	P3	G-1/N-1	<1.1	<1.1	<1.1	1.22	<1.1	<1.1	<1.1	<1.1	<1.1	Load power factor correction and voltage support if needed
CEDR CRK 60 kv	SPIAND2 12.50KV GEN UNIT 1 & CASCADE-BENTON-DESCHUTES 60KV [6310]	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.18	1.14	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	Load power factor correction and voltage support if needed
CLOV TAP 60 kv	SPIAND2 12.50KV GEN UNIT 1 & CASCADE-BENTON-DESCHUTES 60KV [6310]	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.18	1.14	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	Load power factor correction and voltage support if needed
KILARC 60 kv	SPIAND2 12.50KV GEN UNIT 1 & CASCADE-BENTON-DESCHUTES 60KV [6310]	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.17	1.14	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	Load power factor correction and voltage support if needed
OLSEN JT 60 kv	SPIAND2 12.50KV GEN UNIT 1 & CASCADE-BENTON-DESCHUTES 60KV [6310]	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.17	1.14	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	Load power factor correction and voltage support if needed
TKO TAP 60 kv	SPIAND2 12.50KV GEN UNIT 1 & CASCADE-BENTON-DESCHUTES 60KV [6310]	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.16	1.13	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	Load power factor correction and voltage support if needed
WHITMORE 60 kv	SPIAND2 12.50KV GEN UNIT 1 & CASCADE-BENTON-DESCHUTES 60KV [6310]	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.17	1.13	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	Load power factor correction and voltage support if needed
VOLTA 60 kv	SPIAND2 12.50KV GEN UNIT 1 & COLEMAN-SOUTH 60KV [6450]	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.10	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	Load power factor correction and voltage support if needed
ELKCRKJT 60 kv	SPIAND2 12.50KV GEN UNIT 1 & GLENN 230/60KV TB 2	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.22	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	Load power factor correction and voltage support if needed
WILLOWS 60 kv	SPIAND2 12.50KV GEN UNIT 1 & GLENN 230/60KV TB 2	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.22	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	Load power factor correction and voltage support if needed
KILARC 60 kv	JBBLACK1 13.80KV GEN UNIT 1 & CASCADE-BENTON-DESCHUTES 60KV [6310]	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.17	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	Load power factor correction and voltage support if needed
OLSEN JT 60 kv	JBBLACK1 13.80KV GEN UNIT 1 & CASCADE-BENTON-DESCHUTES 60KV [6310]	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.17	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	Load power factor correction and voltage support if needed
TKO TAP 60 kv	JBBLACK1 13.80KV GEN UNIT 1 & CASCADE-BENTON-DESCHUTES 60KV [6310]	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.15	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	Load power factor correction and voltage support if needed
WHITMORE 60 kv	JBBLACK1 13.80KV GEN UNIT 1 & CASCADE-BENTON-DESCHUTES 60KV [6310]	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.17	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	Load power factor correction and voltage support if needed
BIG BEND 115 kv	CRBU 4-5 13.80KV GEN UNIT 1 & TABLE MT 500/230KV TB 1	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.10	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	Load power factor correction and voltage support if needed
FRBSTNTP 115 kv	CRBU 4-5 13.80KV GEN UNIT 1 & TABLE MT 500/230KV TB 1	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.13	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	Load power factor correction and voltage support if needed
HONC JT1 115 kv	CRBU 4-5 13.80KV GEN UNIT 1 & TABLE MT 500/230KV TB 1	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.14	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	Load power factor correction and voltage support if needed
HONC JT3 115 kv	CRBU 4-5 13.80KV GEN UNIT 1 & TABLE MT 500/230KV TB 1	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.14	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	Load power factor correction and voltage support if needed
KANAKAJT 115 kv	CRBU 4-5 13.80KV GEN UNIT 1 & TABLE MT 500/230KV TB 1	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.13	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	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	Voltage PU (Baseline Scenarios)					Voltage PU (Sensitivity Scenarios)				Project & Potential Mitigation Solutions	
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations		
KLLY RDE 60 kv	CRBU 4-5 13.80KV GEN UNIT 1 & TABLE MT 500/230KV TB 1	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.10	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	Load power factor correction and voltage support if needed
OWID 115 kv	CRBU 4-5 13.80KV GEN UNIT 1 & TABLE MT 500/230KV TB 1	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.13	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	Load power factor correction and voltage support if needed
PALERMO 115 kv	CRBU 4-5 13.80KV GEN UNIT 1 & TABLE MT 500/230KV TB 1	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.14	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	Load power factor correction and voltage support if needed
PALERMO 60 kv	CRBU 4-5 13.80KV GEN UNIT 1 & TABLE MT 500/230KV TB 1	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.10	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	Load power factor correction and voltage support if needed
SLYCREEK 115 kv	CRBU 4-5 13.80KV GEN UNIT 1 & TABLE MT 500/230KV TB 1	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.13	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	Load power factor correction and voltage support if needed
WODLF TP 115 kv	CRBU 4-5 13.80KV GEN UNIT 1 & TABLE MT 500/230KV TB 1	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.13	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	Load power factor correction and voltage support if needed
WYANDJT1 115 kv	CRBU 4-5 13.80KV GEN UNIT 1 & TABLE MT 500/230KV TB 1	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.14	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	Load power factor correction and voltage support if needed
WYANDJT2 115 kv	CRBU 4-5 13.80KV GEN UNIT 1 & TABLE MT 500/230KV TB 1	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.14	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	Load power factor correction and voltage support if needed
WYANDTTE 115 kv	CRBU 4-5 13.80KV GEN UNIT 1 & TABLE MT 500/230KV TB 1	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.14	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	Load power factor correction and voltage support if needed
TRINITY 115 kv	VOLTA1-2 9.11KV GEN UNIT 1 & TRINITY-COTTONWOOD 115KV [4040]	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.11	> .9, < 1.1	Load power factor correction and voltage support if needed
STLLWATR 60 kv	VOLTA1-2 9.11KV GEN UNIT 1 & KESWICK-CASCADE 60KV [7260] MOAS OPENED ON CASCADE_STLLWATR	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.11	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	Load power factor correction and voltage support if needed
APT ORVC 60 kv	OROVLENRG 4.16KV GEN UNIT 1 & TABLE MT 500/230KV TB 1	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.10	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	Load power factor correction and voltage support if needed
ELGN JCT 60 kv	OROVLENRG 4.16KV GEN UNIT 1 & TABLE MT 500/230KV TB 1	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.10	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	Load power factor correction and voltage support if needed
LSNA PCC 60 kv	OROVLENRG 4.16KV GEN UNIT 1 & TABLE MT 500/230KV TB 1	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.10	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	Load power factor correction and voltage support if needed
OROVILLE 60 kv	OROVLENRG 4.16KV GEN UNIT 1 & TABLE MT 500/230KV TB 1	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.10	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	Load power factor correction and voltage support if needed
DESCHUTS 60 kv	GRIZZLYG 6.90KV GEN UNIT 1 & CASCADE-BENTON-DESCHUTES 60KV [6310]	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.12	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	Load power factor correction and voltage support if needed
BURNEY 60 kv	CARIBOU-TABLE MTN 230KV [4440] & PIT 1 230/11KV TB 1	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.11	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	Load power factor correction and voltage support if needed
BURNYJCT 60 kv	CARIBOU-TABLE MTN 230KV [4440] & PIT 1 230/11KV TB 1	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.11	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	Load power factor correction and voltage support if needed
HAT CRK2 60 kv	CARIBOU-TABLE MTN 230KV [4440] & PIT 1 230/11KV TB 1	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.10	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	Load power factor correction and voltage support if needed
PIT 1 60 kv	CARIBOU-TABLE MTN 230KV [4440] & PIT 1 230/11KV TB 1	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.10	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	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	Voltage PU (Baseline Scenarios)					Voltage PU (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations	
HONCUT 115 kv	COLGATE-PALERMO 230KV [9999] & TABLE MT 500/230KV TB 1	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.14	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	Load power factor correction and voltage support if needed
BIG BAR 60 kv	HUMBOLDT-TRINITY 115KV [4040] & BRIDGEVILLE-COTTONWOOD 115KV [1110]	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	0.90	Sensitivity only
BIG BAR 60 kv	HUMBOLDT-TRINITY 115KV [4040] & KESWICK-CASCADE 60KV [7260] MOAS OPENED ON CASCADE_STLLWATR	P6	N-1-1	0.85	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	Project: Maple Creek SVC In-Service Date: Dec 2020 Short term: Action Plan
FRNCHGLH 60 kv	HUMBOLDT-TRINITY 115KV [4040] & KESWICK-CASCADE 60KV [7260] MOAS OPENED ON CASCADE_STLLWATR	P6	N-1-1	0.77	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	Project: Maple Creek SVC In-Service Date: Dec 2020 Short term: Action Plan
GROUSCRK 60 kv	HUMBOLDT-TRINITY 115KV [4040] & KESWICK-CASCADE 60KV [7260] MOAS OPENED ON CASCADE_STLLWATR	P6	N-1-1	0.89	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	Project: Maple Creek SVC In-Service Date: Dec 2020 Short term: Action Plan
HYAMPOM 60 kv	HUMBOLDT-TRINITY 115KV [4040] & KESWICK-CASCADE 60KV [7260] MOAS OPENED ON CASCADE_STLLWATR	P6	N-1-1	0.89	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	Project: Maple Creek SVC In-Service Date: Dec 2020 Short term: Action Plan
HYMPOMJT 60 kv	HUMBOLDT-TRINITY 115KV [4040] & KESWICK-CASCADE 60KV [7260] MOAS OPENED ON CASCADE_STLLWATR	P6	N-1-1	0.89	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	Project: Maple Creek SVC In-Service Date: Dec 2020 Short term: Action Plan
KESWICK 60 kv	HUMBOLDT-TRINITY 115KV [4040] & KESWICK-CASCADE 60KV [7260] MOAS OPENED ON CASCADE_STLLWATR	P6	N-1-1	0.76	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	Project: Maple Creek SVC In-Service Date: Dec 2020 Short term: Action Plan
STLLWATR 60 kv	HUMBOLDT-TRINITY 115KV [4040] & KESWICK-CASCADE 60KV [7260] MOAS OPENED ON CASCADE_STLLWATR	P6	N-1-1	0.75	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	Project: Maple Creek SVC In-Service Date: Dec 2020 Short term: Action Plan
TAP 65 60 kv	HUMBOLDT-TRINITY 115KV [4040] & KESWICK-CASCADE 60KV [7260] MOAS OPENED ON CASCADE_STLLWATR	P6	N-1-1	0.81	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	Project: Maple Creek SVC In-Service Date: Dec 2020 Short term: Action Plan
TRINITY 115 kv	HUMBOLDT-TRINITY 115KV [4040] & KESWICK-CASCADE 60KV [7260] MOAS OPENED ON CASCADE_STLLWATR	P6	N-1-1	0.81	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	Project: Maple Creek SVC In-Service Date: Dec 2020 Short term: Action Plan
TRINITY 60 kv	HUMBOLDT-TRINITY 115KV [4040] & KESWICK-CASCADE 60KV [7260] MOAS OPENED ON CASCADE_STLLWATR	P6	N-1-1	0.81	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	Project: Maple Creek SVC In-Service Date: Dec 2020 Short term: Action Plan
TAP 65 60 kv	BRIDGEVILLE-COTTONWOOD 115KV [1110] & TRINITY-COTTONWOOD 115KV [4040]	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.12	> .9, < 1.1	Sensitivity only
TRINITY 60 kv	BRIDGEVILLE-COTTONWOOD 115KV [1110] & TRINITY-COTTONWOOD 115KV [4040]	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.12	> .9, < 1.1	Sensitivity only

Study Area: PG&E North Valley

High/Low Voltages



Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)					Voltage PU (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations	
BIG BAR 60 kv	TRINITY-COTTONWOOD 115KV [4040] & KESWICK-CASCADE 60KV [7260] MOAS OPENED ON CASCADE_STLLWATR	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.12	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	Load power factor correction and voltage support if needed
TAP 65 60 kv	TRINITY-COTTONWOOD 115KV [4040] & KESWICK-CASCADE 60KV [7260] MOAS OPENED ON CASCADE_STLLWATR	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.14	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	Load power factor correction and voltage support if needed
TRINITY 115 kv	TRINITY-COTTONWOOD 115KV [4040] & KESWICK-CASCADE 60KV [7260] MOAS OPENED ON CASCADE_STLLWATR	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.14	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	Load power factor correction and voltage support if needed
TRINITY 60 kv	TRINITY-COTTONWOOD 115KV [4040] & KESWICK-CASCADE 60KV [7260] MOAS OPENED ON CASCADE_STLLWATR	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.14	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	Load power factor correction and voltage support if needed
BELDENTP 230 kv	CASCADE-COTTONWOOD 115KV [1240] & BUS TIE 230KV [9999]	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.11	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	Load power factor correction and voltage support if needed
CARBOU M 230 kv	CASCADE-COTTONWOOD 115KV [1240] & BUS TIE 230KV [9999]	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.11	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	Load power factor correction and voltage support if needed
CARIBOU 230 kv	CASCADE-COTTONWOOD 115KV [1240] & BUS TIE 230KV [9999]	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.11	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	Load power factor correction and voltage support if needed
CHALLNGE 60 kv	CASCADE-COTTONWOOD 115KV [1240] & BUS TIE 230KV [9999]	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.13	1.12	> .9, < 1.1	1.12	> .9, < 1.1	> .9, < 1.1	Load power factor correction and voltage support if needed
FRBSTNTP 115 kv	CASCADE-COTTONWOOD 115KV [1240] & BUS TIE 230KV [9999]	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.14	1.11	> .9, < 1.1	1.11	> .9, < 1.1	> .9, < 1.1	Load power factor correction and voltage support if needed
GRIZ JCT 115 kv	CASCADE-COTTONWOOD 115KV [1240] & BUS TIE 230KV [9999]	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.11	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	Load power factor correction and voltage support if needed
HONC JT1 115 kv	CASCADE-COTTONWOOD 115KV [1240] & BUS TIE 230KV [9999]	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.16	1.10	> .9, < 1.1	1.10	> .9, < 1.1	> .9, < 1.1	Load power factor correction and voltage support if needed
HONCUT 115 kv	CASCADE-COTTONWOOD 115KV [1240] & BUS TIE 230KV [9999]	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.15	> .9, < 1.1	> .9, < 1.1	1.10	> .9, < 1.1	> .9, < 1.1	Load power factor correction and voltage support if needed
KANAKAJT 115 kv	CASCADE-COTTONWOOD 115KV [1240] & BUS TIE 230KV [9999]	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.15	1.11	> .9, < 1.1	1.11	> .9, < 1.1	> .9, < 1.1	Load power factor correction and voltage support if needed
MCNE JCT 60 kv	CASCADE-COTTONWOOD 115KV [1240] & BUS TIE 230KV [9999]	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.10	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	Load power factor correction and voltage support if needed
OWID 115 kv	CASCADE-COTTONWOOD 115KV [1240] & BUS TIE 230KV [9999]	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.15	1.11	> .9, < 1.1	1.11	> .9, < 1.1	> .9, < 1.1	Load power factor correction and voltage support if needed
PALERMO 115 kv	CASCADE-COTTONWOOD 115KV [1240] & BUS TIE 230KV [9999]	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.15	1.11	> .9, < 1.1	1.11	> .9, < 1.1	> .9, < 1.1	Load power factor correction and voltage support if needed
PALERMO 230 kv	CASCADE-COTTONWOOD 115KV [1240] & BUS TIE 230KV [9999]	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.10	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	Load power factor correction and voltage support if needed
TBL MT D 230 kv	CASCADE-COTTONWOOD 115KV [1240] & BUS TIE 230KV [9999]	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.11	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	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	Voltage PU (Baseline Scenarios)					Voltage PU (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations	
TBL MT2M 230 kv	CASCADE-COTTONWOOD 115KV [1240] & BUS TIE 230KV [9999]	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.10	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	Load power factor correction and voltage support if needed
TBLE MTN 60 kv	CASCADE-COTTONWOOD 115KV [1240] & BUS TIE 230KV [9999]	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.10	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	Load power factor correction and voltage support if needed
CASCADE 115 kv	CASCADE-COTTONWOOD 115KV [1240] & CASCADE-BENTON-DESCHUTES 60KV [6310]	P6	N-1-1	> .9, < 1.1	1.11	1.10	1.11	> .9, < 1.1	1.13	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	Load power factor correction and voltage support if needed
CASCADE 60 kv	CASCADE-COTTONWOOD 115KV [1240] & CASCADE-BENTON-DESCHUTES 60KV [6310]	P6	N-1-1	> .9, < 1.1	1.11	1.10	1.11	> .9, < 1.1	1.13	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	Load power factor correction and voltage support if needed
MTN GATE 60 kv	CASCADE-COTTONWOOD 115KV [1240] & CASCADE-BENTON-DESCHUTES 60KV [6310]	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.12	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	Load power factor correction and voltage support if needed
PPL 60 kv	CASCADE-COTTONWOOD 115KV [1240] & CASCADE-BENTON-DESCHUTES 60KV [6310]	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.12	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	Load power factor correction and voltage support if needed
STLLWATR 60 kv	CASCADE-COTTONWOOD 115KV [1240] & CASCADE-BENTON-DESCHUTES 60KV [6310]	P6	N-1-1	> .9, < 1.1	1.11	> .9, < 1.1	1.11	> .9, < 1.1	1.13	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	Load power factor correction and voltage support if needed
CHALLNGE 60 kv	CASCADE-COTTONWOOD 115KV [1240] & TABLE MT 500/230KV TB 1	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.12	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	Load power factor correction and voltage support if needed
SLYCREEK 115 kv	CASCADE-COTTONWOOD 115KV [1240] & TABLE MT 500/230KV TB 1	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.14	1.11	> .9, < 1.1	1.11	> .9, < 1.1	> .9, < 1.1	Load power factor correction and voltage support if needed
TBL MT E 230 kv	CASCADE-COTTONWOOD 115KV [1240] & TABLE MT 500/230KV TB 1	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.10	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	Load power factor correction and voltage support if needed
TBL MTX1 230 kv	CASCADE-COTTONWOOD 115KV [1240] & TABLE MT 500/230KV TB 1	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.10	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	Load power factor correction and voltage support if needed
WODLF TP 115 kv	CASCADE-COTTONWOOD 115KV [1240] & TABLE MT 500/230KV TB 1	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.14	1.11	> .9, < 1.1	1.11	> .9, < 1.1	> .9, < 1.1	Load power factor correction and voltage support if needed
WYANDJT1 115 kv	CASCADE-COTTONWOOD 115KV [1240] & TABLE MT 500/230KV TB 1	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.15	1.11	> .9, < 1.1	1.11	> .9, < 1.1	> .9, < 1.1	Load power factor correction and voltage support if needed
WYANDJT2 115 kv	CASCADE-COTTONWOOD 115KV [1240] & TABLE MT 500/230KV TB 1	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.15	1.11	> .9, < 1.1	1.11	> .9, < 1.1	> .9, < 1.1	Load power factor correction and voltage support if needed
WYANDTTE 115 kv	CASCADE-COTTONWOOD 115KV [1240] & TABLE MT 500/230KV TB 1	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.15	1.11	> .9, < 1.1	1.11	> .9, < 1.1	> .9, < 1.1	Load power factor correction and voltage support if needed
ANITA 60 kv	CRAG VIEW-CASCADE 115KV [1350] & GLENN 230/60KV TB 2	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.24	> .9, < 1.1	> .9, < 1.1	Load power factor correction and voltage support if needed
CAPAY 60 kv	CRAG VIEW-CASCADE 115KV [1350] & GLENN 230/60KV TB 2	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.22	> .9, < 1.1	> .9, < 1.1	Load power factor correction and voltage support if needed
CAPAYJCT 60 kv	CRAG VIEW-CASCADE 115KV [1350] & GLENN 230/60KV TB 2	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.22	> .9, < 1.1	> .9, < 1.1	Load power factor correction and voltage support if needed
CAPYSWCH 60 kv	CRAG VIEW-CASCADE 115KV [1350] & GLENN 230/60KV TB 2	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.22	> .9, < 1.1	> .9, < 1.1	Load power factor correction and voltage support if needed
CHICO JT 60 kv	CRAG VIEW-CASCADE 115KV [1350] & GLENN 230/60KV TB 2	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.23	> .9, < 1.1	> .9, < 1.1	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	Voltage PU (Baseline Scenarios)					Voltage PU (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations	
CORNING 60 kv	CRAG VIEW-CASCADE 115KV [1350] & GLENN 230/60KV TB 2	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.24	> .9, < 1.1	> .9, < 1.1	Load power factor correction and voltage support if needed
CORNSWCH 60 kv	CRAG VIEW-CASCADE 115KV [1350] & GLENN 230/60KV TB 2	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.22	> .9, < 1.1	> .9, < 1.1	Load power factor correction and voltage support if needed
ELKCREEK 60 kv	CRAG VIEW-CASCADE 115KV [1350] & GLENN 230/60KV TB 2	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.26	> .9, < 1.1	> .9, < 1.1	1.22	> .9, < 1.1	> .9, < 1.1	Load power factor correction and voltage support if needed
ELKCRKJT 60 kv	CRAG VIEW-CASCADE 115KV [1350] & GLENN 230/60KV TB 2	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.23	> .9, < 1.1	> .9, < 1.1	1.22	> .9, < 1.1	> .9, < 1.1	Load power factor correction and voltage support if needed
GLENN 60 kv	CRAG VIEW-CASCADE 115KV [1350] & GLENN 230/60KV TB 2	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.22	> .9, < 1.1	> .9, < 1.1	Load power factor correction and voltage support if needed
HAMILTON 60 kv	CRAG VIEW-CASCADE 115KV [1350] & GLENN 230/60KV TB 2	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.25	> .9, < 1.1	> .9, < 1.1	Load power factor correction and voltage support if needed
HEADGATE 60 kv	CRAG VIEW-CASCADE 115KV [1350] & GLENN 230/60KV TB 2	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.23	> .9, < 1.1	> .9, < 1.1	Load power factor correction and voltage support if needed
HMLTN JT 60 kv	CRAG VIEW-CASCADE 115KV [1350] & GLENN 230/60KV TB 2	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.25	> .9, < 1.1	> .9, < 1.1	Load power factor correction and voltage support if needed
JACINTO 60 kv	CRAG VIEW-CASCADE 115KV [1350] & GLENN 230/60KV TB 2	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.26	> .9, < 1.1	> .9, < 1.1	Load power factor correction and voltage support if needed
ORL B JT 60 kv	CRAG VIEW-CASCADE 115KV [1350] & GLENN 230/60KV TB 2	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.22	> .9, < 1.1	> .9, < 1.1	1.22	> .9, < 1.1	> .9, < 1.1	Load power factor correction and voltage support if needed
ORLAND B 60 kv	CRAG VIEW-CASCADE 115KV [1350] & GLENN 230/60KV TB 2	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.23	> .9, < 1.1	> .9, < 1.1	Load power factor correction and voltage support if needed
ORLND JT 60 kv	CRAG VIEW-CASCADE 115KV [1350] & GLENN 230/60KV TB 2	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.22	> .9, < 1.1	> .9, < 1.1	Load power factor correction and voltage support if needed
WILLOWS 60 kv	CRAG VIEW-CASCADE 115KV [1350] & GLENN 230/60KV TB 2	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.22	> .9, < 1.1	> .9, < 1.1	1.22	> .9, < 1.1	> .9, < 1.1	Load power factor correction and voltage support if needed
OROVLENRG 60 kv	WOODLEAF-PALERMO 115KV [4220] & TABLE MT 500/230KV TB 1	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.10	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	Load power factor correction and voltage support if needed
OROVLENRGJCT 60 kv	WOODLEAF-PALERMO 115KV [4220] & TABLE MT 500/230KV TB 1	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.10	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	Load power factor correction and voltage support if needed
ELKCREEK 60 kv	WOODLEAF-PALERMO 115KV [4220] & GLENN 230/60KV TB 2	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.25	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	Load power factor correction and voltage support if needed
CLOV TAP 60 kv	CARIBOU-PALERMO 115KV [3190] MOAS OPENED ON WYANDJT2_BIG BEND & CASCADE-BENTON-DESCHUTES 60KV [6310]	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.17	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	Load power factor correction and voltage support if needed
COWCK TP 60 kv	CARIBOU-PALERMO 115KV [3190] MOAS OPENED ON WYANDJT2_BIG BEND & CASCADE-BENTON-DESCHUTES 60KV [6310]	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.15	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	Load power factor correction and voltage support if needed
SYCAMORE 115 kv	SYCAMORE CREEK-NOTRE DAME-TABLE MTN 115KV [4314] & BUTTE-CHICO B-TBLE MTN 115KV [3910]	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	0.89	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	0.89	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	Voltage PU (Baseline Scenarios)					Voltage PU (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations	
ANITA 60 kv	COTTONWOOD-GLENN 230KV [4560] & GLENN 230/60KV TB 2	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.23	1.23	> .9, < 1.1	1.24	> .9, < 1.1	> .9, < 1.1	Load power factor correction and voltage support if needed
CAPAY 60 kv	COTTONWOOD-GLENN 230KV [4560] & GLENN 230/60KV TB 2	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.23	1.23	> .9, < 1.1	1.23	> .9, < 1.1	> .9, < 1.1	Load power factor correction and voltage support if needed
CAPAYJCT 60 kv	COTTONWOOD-GLENN 230KV [4560] & GLENN 230/60KV TB 2	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.23	1.23	> .9, < 1.1	1.23	> .9, < 1.1	> .9, < 1.1	Load power factor correction and voltage support if needed
CAPYSWCH 60 kv	COTTONWOOD-GLENN 230KV [4560] & GLENN 230/60KV TB 2	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.23	1.22	> .9, < 1.1	1.22	> .9, < 1.1	> .9, < 1.1	Load power factor correction and voltage support if needed
CHICO JT 60 kv	COTTONWOOD-GLENN 230KV [4560] & GLENN 230/60KV TB 2	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.23	1.23	> .9, < 1.1	1.23	> .9, < 1.1	> .9, < 1.1	Load power factor correction and voltage support if needed
CORNING 60 kv	COTTONWOOD-GLENN 230KV [4560] & GLENN 230/60KV TB 2	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.24	1.24	> .9, < 1.1	1.24	> .9, < 1.1	> .9, < 1.1	Load power factor correction and voltage support if needed
CORNSWCH 60 kv	COTTONWOOD-GLENN 230KV [4560] & GLENN 230/60KV TB 2	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.23	1.22	> .9, < 1.1	1.22	> .9, < 1.1	> .9, < 1.1	Load power factor correction and voltage support if needed
ELKCREEK 60 kv	COTTONWOOD-GLENN 230KV [4560] & GLENN 230/60KV TB 2	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.26	1.22	> .9, < 1.1	1.22	> .9, < 1.1	> .9, < 1.1	Load power factor correction and voltage support if needed
ELKCRKJT 60 kv	COTTONWOOD-GLENN 230KV [4560] & GLENN 230/60KV TB 2	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.23	1.22	> .9, < 1.1	1.23	> .9, < 1.1	> .9, < 1.1	Load power factor correction and voltage support if needed
GLENN 60 kv	COTTONWOOD-GLENN 230KV [4560] & GLENN 230/60KV TB 2	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.23	1.22	> .9, < 1.1	1.22	> .9, < 1.1	> .9, < 1.1	Load power factor correction and voltage support if needed
HAMILTON 60 kv	COTTONWOOD-GLENN 230KV [4560] & GLENN 230/60KV TB 2	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.24	1.25	> .9, < 1.1	1.25	> .9, < 1.1	> .9, < 1.1	Load power factor correction and voltage support if needed
HEADGATE 60 kv	COTTONWOOD-GLENN 230KV [4560] & GLENN 230/60KV TB 2	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.23	1.23	> .9, < 1.1	1.23	> .9, < 1.1	> .9, < 1.1	Load power factor correction and voltage support if needed
HMLTN JT 60 kv	COTTONWOOD-GLENN 230KV [4560] & GLENN 230/60KV TB 2	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.24	1.25	> .9, < 1.1	1.25	> .9, < 1.1	> .9, < 1.1	Load power factor correction and voltage support if needed
JACINTO 60 kv	COTTONWOOD-GLENN 230KV [4560] & GLENN 230/60KV TB 2	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.25	1.26	> .9, < 1.1	1.26	> .9, < 1.1	> .9, < 1.1	Load power factor correction and voltage support if needed
ORL B JT 60 kv	COTTONWOOD-GLENN 230KV [4560] & GLENN 230/60KV TB 2	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.23	1.22	> .9, < 1.1	1.23	> .9, < 1.1	> .9, < 1.1	Load power factor correction and voltage support if needed
ORLAND B 60 kv	COTTONWOOD-GLENN 230KV [4560] & GLENN 230/60KV TB 2	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.23	1.23	> .9, < 1.1	1.23	> .9, < 1.1	> .9, < 1.1	Load power factor correction and voltage support if needed
ORLND JT 60 kv	COTTONWOOD-GLENN 230KV [4560] & GLENN 230/60KV TB 2	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.23	1.23	> .9, < 1.1	1.23	> .9, < 1.1	> .9, < 1.1	Load power factor correction and voltage support if needed
WILLOWS 60 kv	COTTONWOOD-GLENN 230KV [4560] & GLENN 230/60KV TB 2	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.23	1.22	> .9, < 1.1	1.23	> .9, < 1.1	> .9, < 1.1	Load power factor correction and voltage support if needed
CEDR CRK 60 kv	COTTONWOOD-BENTON #1 60KV [6640] & CASCADE-BENTON-DESCHUTES 60KV [6310]	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.19	> .9, < 1.1	> .9, < 1.1	Sensitivity only
CLOV TAP 60 kv	COTTONWOOD-BENTON #1 60KV [6640] & CASCADE-BENTON-DESCHUTES 60KV [6310]	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.19	> .9, < 1.1	> .9, < 1.1	Sensitivity only

Study Area: PG&E North Valley



High/Low Voltages

Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)					Voltage PU (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations	
COWCK TP 60 kv	COTTONWOOD-BENTON #1 60KV [6640] & CASCADE-BENTON-DESCHUTES 60KV [6310]	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.17	> .9, < 1.1	> .9, < 1.1	Sensitivity only
DESCHUTS 60 kv	COTTONWOOD-BENTON #1 60KV [6640] & CASCADE-BENTON-DESCHUTES 60KV [6310]	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.13	> .9, < 1.1	> .9, < 1.1	Sensitivity only
KILARC 60 kv	COTTONWOOD-BENTON #1 60KV [6640] & CASCADE-BENTON-DESCHUTES 60KV [6310]	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.19	> .9, < 1.1	> .9, < 1.1	Sensitivity only
WHITMORE 60 kv	COTTONWOOD-BENTON #1 60KV [6640] & CASCADE-BENTON-DESCHUTES 60KV [6310]	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.18	> .9, < 1.1	> .9, < 1.1	Sensitivity only
ANTLER 60 kv	COTTONWOOD-BENTON #2 60KV [6650] & CASCADE 115/60KV TB 1	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	0.86	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	0.86	Continue to monitor future load forecast
CASCADE 115 kv	COTTONWOOD-BENTON #2 60KV [6650] & CASCADE 115/60KV TB 1	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	0.89	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	0.89	Continue to monitor future load forecast
OREGNTRL 60 kv	COTTONWOOD-BENTON #2 60KV [6650] & CASCADE 115/60KV TB 1	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	0.89	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	Continue to monitor future load forecast
STLLWATR 60 kv	COTTONWOOD-BENTON #2 60KV [6650] & CASCADE 115/60KV TB 1	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	0.89	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	0.89	Continue to monitor future load forecast
CEDR CRK 60 kv	CASCADE-BENTON-DESCHUTES 60KV [6310] & VOLTA1-2 9.11KV GEN UNIT 1	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	0.89	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	Non BES Facility
CLOV TAP 60 kv	CASCADE-BENTON-DESCHUTES 60KV [6310] & VOLTA1-2 9.11KV GEN UNIT 1	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	0.89	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	Non BES Facility
COWCK TP 60 kv	CASCADE-BENTON-DESCHUTES 60KV [6310] & VOLTA1-2 9.11KV GEN UNIT 1	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	0.89	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	Non BES Facility
DESCHUTS 60 kv	CASCADE-BENTON-DESCHUTES 60KV [6310] & VOLTA1-2 9.11KV GEN UNIT 1	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	0.87	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	Non BES Facility
KILARC 60 kv	CASCADE-BENTON-DESCHUTES 60KV [6310] & VOLTA1-2 9.11KV GEN UNIT 1	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	0.90	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	Non BES Facility
TKO TAP 60 kv	CASCADE-BENTON-DESCHUTES 60KV [6310] & VOLTA1-2 9.11KV GEN UNIT 1	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	0.89	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	Non BES Facility
FRBSTNTP 115 kv	CASCADE-BENTON-DESCHUTES 60KV [6310] & BUS TIE 230KV [9999]	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.11	> .9, < 1.1	> .9, < 1.1	Sensitivity only
HONC JT1 115 kv	CASCADE-BENTON-DESCHUTES 60KV [6310] & BUS TIE 230KV [9999]	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.10	> .9, < 1.1	> .9, < 1.1	Sensitivity only
KANAKAJT 115 kv	CASCADE-BENTON-DESCHUTES 60KV [6310] & BUS TIE 230KV [9999]	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.11	> .9, < 1.1	> .9, < 1.1	Sensitivity only
WODLF TP 115 kv	CASCADE-BENTON-DESCHUTES 60KV [6310] & BUS TIE 230KV [9999]	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.11	> .9, < 1.1	> .9, < 1.1	Sensitivity only
WYANDJT2 115 kv	CASCADE-BENTON-DESCHUTES 60KV [6310] & BUS TIE 230KV [9999]	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.11	> .9, < 1.1	> .9, < 1.1	Sensitivity only
ANTLER 60 kv	CASCADE-BENTON-DESCHUTES 60KV [6310] & CASCADE-COTTONWOOD 115KV [1240]	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.11	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	Sensitivity only

Study Area: PG&E North Valley

High/Low Voltages



Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)					Voltage PU (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations	
CASCADE 115 kv	CASCADE-BENTON-DESCHUTES 60KV [6310] & CASCADE-COTTONWOOD 115KV [1240]	P6	N-1-1	> .9, < 1.1	1.12	> .9, < 1.1	1.10	> .9, < 1.1	1.13	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	Voltage adjustment after first outage
CASCADE 60 kv	CASCADE-BENTON-DESCHUTES 60KV [6310] & CASCADE-COTTONWOOD 115KV [1240]	P6	N-1-1	> .9, < 1.1	1.12	> .9, < 1.1	1.11	> .9, < 1.1	1.13	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	Voltage adjustment after first outage
MTN GATE 60 kv	CASCADE-BENTON-DESCHUTES 60KV [6310] & CASCADE-COTTONWOOD 115KV [1240]	P6	N-1-1	> .9, < 1.1	1.10	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.11	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	Voltage adjustment after first outage
CEDR CRK 60 kv	CASCADE-BENTON-DESCHUTES 60KV [6310] & COLEMAN-COTTONWOOD 60KV [6430]	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	0.88	1.21	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	Non BES Facility
CLOV TAP 60 kv	CASCADE-BENTON-DESCHUTES 60KV [6310] & COLEMAN-COTTONWOOD 60KV [6430]	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	0.89	1.21	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	Non BES Facility
COLEMAN 60 kv	CASCADE-BENTON-DESCHUTES 60KV [6310] & COLEMAN-COTTONWOOD 60KV [6430]	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.13	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	Non BES Facility
COWCK TP 60 kv	CASCADE-BENTON-DESCHUTES 60KV [6310] & COLEMAN-COTTONWOOD 60KV [6430]	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	0.88	1.20	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	Non BES Facility
DESCHUTS 60 kv	CASCADE-BENTON-DESCHUTES 60KV [6310] & COLEMAN-COTTONWOOD 60KV [6430]	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	0.86	1.18	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	Non BES Facility
INSKIP 60 kv	CASCADE-BENTON-DESCHUTES 60KV [6310] & COLEMAN-COTTONWOOD 60KV [6430]	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.13	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	Non BES Facility
KILARC 60 kv	CASCADE-BENTON-DESCHUTES 60KV [6310] & COLEMAN-COTTONWOOD 60KV [6430]	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	0.89	1.21	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	Non BES Facility
LS ML JT 60 kv	CASCADE-BENTON-DESCHUTES 60KV [6310] & COLEMAN-COTTONWOOD 60KV [6430]	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.11	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	Non BES Facility
LS MLNSJ 60 kv	CASCADE-BENTON-DESCHUTES 60KV [6310] & COLEMAN-COTTONWOOD 60KV [6430]	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.11	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	Non BES Facility
OLSEN JT 60 kv	CASCADE-BENTON-DESCHUTES 60KV [6310] & COLEMAN-COTTONWOOD 60KV [6430]	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	0.89	1.21	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	Non BES Facility
TKO TAP 60 kv	CASCADE-BENTON-DESCHUTES 60KV [6310] & COLEMAN-COTTONWOOD 60KV [6430]	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	0.88	1.20	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	Non BES Facility
VINA 60 kv	CASCADE-BENTON-DESCHUTES 60KV [6310] & COLEMAN-COTTONWOOD 60KV [6430]	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.11	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	Non BES Facility
WHITMORE 60 kv	CASCADE-BENTON-DESCHUTES 60KV [6310] & COLEMAN-COTTONWOOD 60KV [6430]	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	0.88	1.21	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	Non BES Facility
COWCK TP 60 kv	CASCADE-BENTON-DESCHUTES 60KV [6310] & RED BLFF-COTTONWD 60KV [6660] MOAS OPENED ON COTTONWD_RED B JT	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	0.89	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	Non BES Facility
OLSEN JT 60 kv	CASCADE-BENTON-DESCHUTES 60KV [6310] & RED BLFF-COTTONWD 60KV [6660] MOAS OPENED ON COTTONWD_RED B JT	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	0.90	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	Non BES Facility
WHITMORE 60 kv	CASCADE-BENTON-DESCHUTES 60KV [6310] & RED BLFF-COTTONWD 60KV [6660] MOAS OPENED ON COTTONWD_RED B JT	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	0.90	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	Non BES Facility

Study Area: PG&E North Valley



High/Low Voltages

Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)					Voltage PU (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations	
OWID 115 kv	CASCADE-BENTON-DESCHUTES 60KV [6310] & TABLE MT 500/230KV TB 1	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.11	> .9, < 1.1	> .9, < 1.1	Sensitivity only
PALERMO 115 kv	CASCADE-BENTON-DESCHUTES 60KV [6310] & TABLE MT 500/230KV TB 1	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.11	> .9, < 1.1	> .9, < 1.1	Sensitivity only
SLYCREEK 115 kv	CASCADE-BENTON-DESCHUTES 60KV [6310] & TABLE MT 500/230KV TB 1	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.11	> .9, < 1.1	> .9, < 1.1	Sensitivity only
WYANDJT1 115 kv	CASCADE-BENTON-DESCHUTES 60KV [6310] & TABLE MT 500/230KV TB 1	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.11	> .9, < 1.1	> .9, < 1.1	Sensitivity only
WYANDTTE 115 kv	CASCADE-BENTON-DESCHUTES 60KV [6310] & TABLE MT 500/230KV TB 1	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.11	> .9, < 1.1	> .9, < 1.1	Sensitivity only
KESWICK 60 kv	KESWICK-CASCADE 60KV [7260] MOAS OPENED ON CASCADE_STLLWATR & TRINITY-COTTONWOOD 115KV [4040]	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.11	> .9, < 1.1	> .9, < 1.1	Sensitivity only
FRNCHGLH 60 kv	MTN GATE JCT-CASCADE 60KV [7640] & KESWICK-CASCADE 60KV [7260] MOAS OPENED ON CASCADE_STLLWATR	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.11	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	Non BES Facility
KESWICK 60 kv	MTN GATE JCT-CASCADE 60KV [7640] & KESWICK-CASCADE 60KV [7260] MOAS OPENED ON CASCADE_STLLWATR	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.11	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	Non BES Facility
CLMN JCT 60 kv	COLEMAN-COTTONWOOD 60KV [6430] & RED BLFF-COTTONWD 60KV [6660] MOAS OPENED ON COTTONWD_RED B JT	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.16	1.14	> .9, < 1.1	1.19	> .9, < 1.1	> .9, < 1.1	Non BES Facility
INSKIP 60 kv	COLEMAN-COTTONWOOD 60KV [6430] & RED BLFF-COTTONWD 60KV [6660] MOAS OPENED ON COTTONWD_RED B JT	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.13	1.11	> .9, < 1.1	1.16	> .9, < 1.1	> .9, < 1.1	Non BES Facility
LS ML JT 60 kv	COLEMAN-COTTONWOOD 60KV [6430] & RED BLFF-COTTONWD 60KV [6660] MOAS OPENED ON COTTONWD_RED B JT	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.17	1.15	> .9, < 1.1	1.20	> .9, < 1.1	> .9, < 1.1	Non BES Facility
LS MLNSJ 60 kv	COLEMAN-COTTONWOOD 60KV [6430] & RED BLFF-COTTONWD 60KV [6660] MOAS OPENED ON COTTONWD_RED B JT	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.17	1.15	> .9, < 1.1	1.20	> .9, < 1.1	> .9, < 1.1	Non BES Facility
RED BLFF 60 kv	COLEMAN-COTTONWOOD 60KV [6430] & RED BLFF-COTTONWD 60KV [6660] MOAS OPENED ON COTTONWD_RED B JT	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.17	1.15	> .9, < 1.1	1.20	> .9, < 1.1	> .9, < 1.1	Non BES Facility
SOUTH 60 kv	COLEMAN-COTTONWOOD 60KV [6430] & RED BLFF-COTTONWD 60KV [6660] MOAS OPENED ON COTTONWD_RED B JT	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.13	1.11	> .9, < 1.1	1.16	> .9, < 1.1	> .9, < 1.1	Non BES Facility
VINA 60 kv	COLEMAN-COTTONWOOD 60KV [6430] & RED BLFF-COTTONWD 60KV [6660] MOAS OPENED ON COTTONWD_RED B JT	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.17	1.15	> .9, < 1.1	1.20	> .9, < 1.1	> .9, < 1.1	Non BES Facility

Study Area: PG&E North Valley

High/Low Voltages



Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)					Voltage PU (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations	
VOLTA 60 kv	COLEMAN-COTTONWOOD 60KV [6430] & RED BLFF-COTTONWD 60KV [6660] MOAS OPENED ON COTTONWD_RED B JT	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.12	1.10	> .9, < 1.1	1.14	> .9, < 1.1	> .9, < 1.1	Non BES Facility
RED BLFF 60 kv	COLEMAN-RED BLFF 60KV [6640] & COTTONWOOD-RED BLUFF 60KV [6660] MOAS OPENED ON COTTONWD_RED B JT	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	0.85	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	0.85	Non BES Facility
RWSN J2 60 kv	COLEMAN-RED BLFF 60KV [6640] & COTTONWOOD-RED BLUFF 60KV [6660] MOAS OPENED ON COTTONWD_RED B JT	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	0.89	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	0.88	Non BES Facility
SOUTH 60 kv	COTTONWOOD #2 60KV [6630] & COLEMAN-SOUTH 60KV [6450]	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.11	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	Non BES Facility
CLMN JCT 60 kv	RED BLFF-COTTONWD 60KV [6660] MOAS OPENED ON COTTONWD_RED B JT & COLEMAN-COTTONWOOD 60KV [6430]	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.17	1.16	> .9, < 1.1	1.19	> .9, < 1.1	0.57	Non BES Facility
COLEMAN 60 kv	RED BLFF-COTTONWD 60KV [6660] MOAS OPENED ON COTTONWD_RED B JT & COLEMAN-COTTONWOOD 60KV [6430]	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.14	1.14	> .9, < 1.1	1.17	> .9, < 1.1	0.65	Non BES Facility
DIRYVLE 60 kv	RED BLFF-COTTONWD 60KV [6660] MOAS OPENED ON COTTONWD_RED B JT & COLEMAN-COTTONWOOD 60KV [6430]	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.17	1.16	> .9, < 1.1	1.20	> .9, < 1.1	0.54	Non BES Facility
SOUTH 60 kv	RED BLFF-COTTONWD 60KV [6660] MOAS OPENED ON COTTONWD_RED B JT & COLEMAN-COTTONWOOD 60KV [6430]	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.13	1.13	> .9, < 1.1	1.16	> .9, < 1.1	0.74	Non BES Facility
VOLTA 60 kv	RED BLFF-COTTONWD 60KV [6660] MOAS OPENED ON COTTONWD_RED B JT & COLEMAN-COTTONWOOD 60KV [6430]	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.12	1.11	> .9, < 1.1	1.13	> .9, < 1.1	0.79	Non BES Facility
OWID 115 kv	PALERMO-OROVILLE 60KV [7730] & TABLE MT 500/230KV TB 1	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.12	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	Voltage adjustment after first outage
ELIZ TWN 60 kv	TABLE MT 500/230KV TB 1 & CARIBOU #2 60KV [6280] MOAS OPENED ON CARIBOU_GRS F JT	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	0.49	Sensitivity only
EST Q JT 60 kv	TABLE MT 500/230KV TB 1 & CARIBOU #2 60KV [6280] MOAS OPENED ON CARIBOU_GRS F JT	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	0.49	Sensitivity only
EST Q1 60 kv	TABLE MT 500/230KV TB 1 & CARIBOU #2 60KV [6280] MOAS OPENED ON CARIBOU_GRS F JT	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	0.49	Sensitivity only
EST QNCY 60 kv	TABLE MT 500/230KV TB 1 & CARIBOU #2 60KV [6280] MOAS OPENED ON CARIBOU_GRS F JT	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	0.49	Sensitivity only
GRS F JT 60 kv	TABLE MT 500/230KV TB 1 & CARIBOU #2 60KV [6280] MOAS OPENED ON CARIBOU_GRS F JT	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	0.49	Sensitivity only
PLMS JCT 60 kv	TABLE MT 500/230KV TB 1 & CARIBOU #2 60KV [6280] MOAS OPENED ON CARIBOU_GRS F JT	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	0.49	Sensitivity only

Study Area: PG&E North Valley



High/Low Voltages

Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)					Voltage PU (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations	
SPIQUINCY 60 kv	TABLE MT 500/230KV TB 1 & CARIBOU #2 60KV [6280] MOAS OPENED ON CARIBOU_GRS F JT	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	0.49	Sensitivity only
SPIQUINCYJCT 60 kv	TABLE MT 500/230KV TB 1 & CARIBOU #2 60KV [6280] MOAS OPENED ON CARIBOU_GRS F JT	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	0.49	Sensitivity only
BURNEYQF 60 kv	TABLE MT 500/230KV TB 1 & PIT 1 230/11KV TB 1	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.11	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	Sensitivity only
BUTTVLLY 115 kv	CARIBOU 230/230KV TB 11 & TABLE MT 500/230KV TB 1	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.14	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	Load power factor correction and voltage support if needed
CARIBOU 115 kv	CARIBOU 230/230KV TB 11 & TABLE MT 500/230KV TB 1	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.14	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	Load power factor correction and voltage support if needed
GRIZZLY1 115 kv	CARIBOU 230/230KV TB 11 & TABLE MT 500/230KV TB 1	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.14	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	Load power factor correction and voltage support if needed
FRSTGLEN 115 kv	COTWD_E2 230/115KV TB 1 & COTWD_F2 230/115KV TB 4	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.10	> .9, < 1.1	1.11	1.12	> .9, < 1.1	Sensitivity only
TAP 65 60 kv	COTWD_E2 230/115KV TB 1 & COTWD_F2 230/115KV TB 4	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.10	1.11	> .9, < 1.1	Sensitivity only
TRINITY 115 kv	COTWD_E2 230/115KV TB 1 & COTWD_F2 230/115KV TB 4	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.10	1.11	> .9, < 1.1	Sensitivity only
TRINITY 60 kv	COTWD_E2 230/115KV TB 1 & COTWD_F2 230/115KV TB 4	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.10	1.11	> .9, < 1.1	Sensitivity only
WILDWOOD 115 kv	COTWD_E2 230/115KV TB 1 & COTWD_F2 230/115KV TB 4	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.10	1.11	> .9, < 1.1	Sensitivity only
ELIZ TWN 60 kv	PALERMO 230/115KV TB 2 & CARIBOU-TABLE MTN 230KV [4440]	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	0.90	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	Continue to monitor future load forecast
EST Q JT 60 kv	PALERMO 230/115KV TB 2 & CARIBOU-TABLE MTN 230KV [4440]	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	0.89	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	Continue to monitor future load forecast
EST Q1 60 kv	PALERMO 230/115KV TB 2 & CARIBOU-TABLE MTN 230KV [4440]	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	0.89	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	Continue to monitor future load forecast
EST QNCY 60 kv	PALERMO 230/115KV TB 2 & CARIBOU-TABLE MTN 230KV [4440]	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	0.89	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	Continue to monitor future load forecast
PLMS JCT 60 kv	PALERMO 230/115KV TB 2 & CARIBOU-TABLE MTN 230KV [4440]	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	0.89	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	Continue to monitor future load forecast
SPIQUINCY 60 kv	PALERMO 230/115KV TB 2 & CARIBOU-TABLE MTN 230KV [4440]	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	0.89	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	Continue to monitor future load forecast
SPIQUINCYJCT 60 kv	PALERMO 230/115KV TB 2 & CARIBOU-TABLE MTN 230KV [4440]	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	0.89	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	Continue to monitor future load forecast
ANDERSON 60 kv	COTWD_E2 230/60KV TB 2 & COTWD_E 230/60KV TB 3	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	0.79	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	0.80	Continue to monitor future load forecast
CANAL TP 60 kv	COTWD_E2 230/60KV TB 2 & COTWD_E 230/60KV TB 3	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	0.87	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	0.88	Continue to monitor future load forecast
CLMN FSH 60 kv	COTWD_E2 230/60KV TB 2 & COTWD_E 230/60KV TB 3	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	0.80	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	0.81	Continue to monitor future load forecast

Study Area: PG&E North Valley

High/Low Voltages



Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)					Voltage PU (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations	
CLMN JCT 60 kv	COTWD_E2 230/60KV TB 2 & COTWD_E 230/60KV TB 3	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	0.77	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	0.78	Continue to monitor future load forecast
COLEMAN 60 kv	COTWD_E2 230/60KV TB 2 & COTWD_E 230/60KV TB 3	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	0.80	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	0.81	Continue to monitor future load forecast
COTTONWD 60 kv	COTWD_E2 230/60KV TB 2 & COTWD_E 230/60KV TB 3	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	0.79	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	0.81	Continue to monitor future load forecast
CR CANAL 60 kv	COTWD_E2 230/60KV TB 2 & COTWD_E 230/60KV TB 3	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	0.87	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	0.88	Continue to monitor future load forecast
DIRYVLE 60 kv	COTWD_E2 230/60KV TB 2 & COTWD_E 230/60KV TB 3	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	0.74	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	0.76	Continue to monitor future load forecast
GIRVAN 60 kv	COTWD_E2 230/60KV TB 2 & COTWD_E 230/60KV TB 3	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	0.81	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	0.82	Continue to monitor future load forecast
LOMS JCT 60 kv	COTWD_E2 230/60KV TB 2 & COTWD_E 230/60KV TB 3	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	0.88	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	0.89	Continue to monitor future load forecast
NEO REDT 60 kv	COTWD_E2 230/60KV TB 2 & COTWD_E 230/60KV TB 3	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	0.88	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	0.89	Continue to monitor future load forecast
RASN JNT 60 kv	COTWD_E2 230/60KV TB 2 & COTWD_E 230/60KV TB 3	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	0.87	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	0.89	Continue to monitor future load forecast
SOUTH 60 kv	COTWD_E2 230/60KV TB 2 & COTWD_E 230/60KV TB 3	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	0.83	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	0.84	Continue to monitor future load forecast
TYLER 60 kv	COTWD_E2 230/60KV TB 2 & COTWD_E 230/60KV TB 3	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	0.87	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	0.88	Continue to monitor future load forecast
VOLTA 60 kv	COTWD_E2 230/60KV TB 2 & COTWD_E 230/60KV TB 3	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	0.85	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	0.86	Continue to monitor future load forecast
WNTU PMS 60 kv	COTWD_E2 230/60KV TB 2 & COTWD_E 230/60KV TB 3	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	0.86	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	0.87	Continue to monitor future load forecast
FRNCHGLH 60 kv	CASCADE 115/60KV TB 1 & HUMBOLDT-TRINITY 115KV [4040]	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	0.90	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	0.90	Continue to monitor future load forecast
KESWICK 60 kv	CASCADE 115/60KV TB 1 & HUMBOLDT-TRINITY 115KV [4040]	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	0.90	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	0.90	Continue to monitor future load forecast
CASCADE 60 kv	CASCADE 115/60KV TB 1 & COTTONWOOD-BENTON #2 60KV [6650]	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	0.88	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	0.89	Continue to monitor future load forecast
CASCADE 115 kv	CASCADE 115/60KV TB 1 & VOLTA-DESCHUTES 60KV [8290]	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	0.90	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	Continue to monitor future load forecast
BENTON 60 kv	COTWD_E 230/60KV TB 3 & COTWD_E2 230/60KV TB 2	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	0.83	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	0.84	Continue to monitor future load forecast
CLMN TAP 60 kv	COTWD_E 230/60KV TB 3 & COTWD_E2 230/60KV TB 2	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	0.80	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	0.81	Continue to monitor future load forecast
GERBER 60 kv	COTWD_E 230/60KV TB 3 & COTWD_E2 230/60KV TB 2	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	0.72	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	0.73	Continue to monitor future load forecast

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High/Low Voltages

Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)					Voltage PU (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations	
GRBR JCT 60 kv	COTWD_E 230/60KV TB 3 & COTWD_E2 230/60KV TB 2	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	0.74	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	0.75	Continue to monitor future load forecast
INSKIP 60 kv	COTWD_E 230/60KV TB 3 & COTWD_E2 230/60KV TB 2	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	0.82	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	0.83	Continue to monitor future load forecast
LP FB SP 60 kv	COTWD_E 230/60KV TB 3 & COTWD_E2 230/60KV TB 2	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	0.74	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	0.75	Continue to monitor future load forecast
LS ML JT 60 kv	COTWD_E 230/60KV TB 3 & COTWD_E2 230/60KV TB 2	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	0.73	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	0.74	Continue to monitor future load forecast
LS MLNSJ 60 kv	COTWD_E 230/60KV TB 3 & COTWD_E2 230/60KV TB 2	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	0.73	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	0.74	Continue to monitor future load forecast
RED B JT 60 kv	COTWD_E 230/60KV TB 3 & COTWD_E2 230/60KV TB 2	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	0.76	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	0.77	Continue to monitor future load forecast
TYLERJT 60 kv	COTWD_E 230/60KV TB 3 & COTWD_E2 230/60KV TB 2	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	0.74	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	0.76	Continue to monitor future load forecast
VINA 60 kv	COTWD_E 230/60KV TB 3 & COTWD_E2 230/60KV TB 2	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	0.73	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	0.74	Continue to monitor future load forecast
CHALLNGE 60 kv	Palermo-Colgate 230 kV Line and Table Mountain(D)-Rio Oso 230 kV Line	P7	DCTL	1.02	1.05	1.02	1.11	1.07	1.05	1.07	1.02	1.02	Voltage adjustment after first outage

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Voltage Deviation



Substation	Contingency (All and Worst P6)	Category	Category Description	Post Cont. Voltage Deviation % (Baseline Scenarios)					Post Cont. Voltage Deviation % (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations	
CANAL TP 60 kv	NEO REDB 13.80KV GEN UNIT 1	P1	N-1	12	12	16	6	7	12	0	10	16	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
CR CANAL 60 kv	NEO REDB 13.80KV GEN UNIT 1	P1	N-1	12	12	16	6	7	12	0	10	16	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
NEO REDT 60 kv	NEO REDB 13.80KV GEN UNIT 1	P1	N-1	12	13	16	6	7	12	0	10	16	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
RASN JNT 60 kv	NEO REDB 13.80KV GEN UNIT 1	P1	N-1	12	12	16	6	7	12	0	10	16	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
TYLER 60 kv	NEO REDB 13.80KV GEN UNIT 1	P1	N-1	12	12	16	6	7	12	0	10	16	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
CEDR CRK 60 kv	CASCADE-BENTON-DESCHUTES 60KV [6310]	P1	N-1	2	2	13	-4	-4	3	-5	0	5	Continue to monitor future load forecast
CLOV TAP 60 kv	CASCADE-BENTON-DESCHUTES 60KV [6310]	P1	N-1	2	2	13	-4	-4	3	-5	0	5	Continue to monitor future load forecast
COWCK TP 60 kv	CASCADE-BENTON-DESCHUTES 60KV [6310]	P1	N-1	3	2	13	-4	-4	4	-6	0	5	Continue to monitor future load forecast
DESCHUTS 60 kv	CASCADE-BENTON-DESCHUTES 60KV [6310]	P1	N-1	3	3	13	-4	-4	4	-6	0	6	Continue to monitor future load forecast
KILARC 60 kv	CASCADE-BENTON-DESCHUTES 60KV [6310]	P1	N-1	2	2	13	-4	-4	4	-5	0	5	Continue to monitor future load forecast
OLSEN JT 60 kv	CASCADE-BENTON-DESCHUTES 60KV [6310]	P1	N-1	3	2	13	-4	-4	4	-5	0	5	Continue to monitor future load forecast
TKO TAP 60 kv	CASCADE-BENTON-DESCHUTES 60KV [6310]	P1	N-1	3	2	13	-4	-4	4	-6	0	5	Continue to monitor future load forecast
WHITMORE 60 kv	CASCADE-BENTON-DESCHUTES 60KV [6310]	P1	N-1	3	2	13	-4	-4	4	-5	0	5	Continue to monitor future load forecast
KESWICK 60 kv	KESWICK-CASCADE 60KV [7260] MOAS OPENED ON CASCADE_STLLWATR	P1	N-1	4	6	8	-4	-3	5	-3	2	8	Continue to monitor future load forecast
STLLWATR 60 kv	KESWICK-CASCADE 60KV [7260] MOAS OPENED ON CASCADE_STLLWATR	P1	N-1	5	7	10	-4	-3	6	-3	2	9	Continue to monitor future load forecast
ELIZ TWN 60 kv	CARIBOU #2 60KV [6280] MOAS OPENED ON CARIBOU_GRS F JT	P1	N-1	-1	-2	47	-1	-1	-2	-1	-1	48	Continue to monitor future load forecast
EST Q JT 60 kv	CARIBOU #2 60KV [6280] MOAS OPENED ON CARIBOU_GRS F JT	P1	N-1	-1	-2	47	-1	-1	-2	-1	-1	47	Continue to monitor future load forecast
EST Q1 60 kv	CARIBOU #2 60KV [6280] MOAS OPENED ON CARIBOU_GRS F JT	P1	N-1	-1	-2	47	-1	-1	-2	-1	-1	47	Continue to monitor future load forecast
EST QNCY 60 kv	CARIBOU #2 60KV [6280] MOAS OPENED ON CARIBOU_GRS F JT	P1	N-1	-1	-2	47	-1	-1	-2	-1	-1	47	Continue to monitor future load forecast
GRS F JT 60 kv	CARIBOU #2 60KV [6280] MOAS OPENED ON CARIBOU_GRS F JT	P1	N-1	-1	-2	50	-1	-2	-2	-2	-1	50	Continue to monitor future load forecast
PLMS JCT 60 kv	CARIBOU #2 60KV [6280] MOAS OPENED ON CARIBOU_GRS F JT	P1	N-1	-1	-2	47	-1	-1	-2	-1	-1	47	Continue to monitor future load forecast
SPIQUINCY 60 kv	CARIBOU #2 60KV [6280] MOAS OPENED ON CARIBOU_GRS F JT	P1	N-1	-1	-1	47	-1	-1	-2	-1	-1	47	Continue to monitor future load forecast
SPIQUINCYJCT 60 kv	CARIBOU #2 60KV [6280] MOAS OPENED ON CARIBOU_GRS F JT	P1	N-1	-1	-2	47	-1	-1	-2	-1	-1	47	Continue to monitor future load forecast
ANTLER 60 kv	VOLTA1-2 9.11KV GEN UNIT 1 & CASCADE 115/60KV TB 1	P3	G1/N1	<8	<8	<8	<8	<8	<8	<8	<8	8	Sensitivity only

Study Area: PG&E North 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
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations	
CASCADE 60 kv	VOLTA1-2 9.11KV GEN UNIT 1 & CASCADE 115/60KV TB 1	P3	G1/N1	<8	<8	<8	<8	<8	<8	<8	<8	8	Sensitivity only
CASCADE 115 kv	VOLTA1-2 9.11KV GEN UNIT 1 & CASCADE 115/60KV TB 1	P3	G1/N1	<8	<8	<8	<8	<8	<8	<8	<8	8	Sensitivity only
MTN GATE 60 kv	VOLTA1-2 9.11KV GEN UNIT 1 & CASCADE 115/60KV TB 1	P3	G1/N1	<8	<8	<8	<8	<8	<8	<8	<8	8	Sensitivity only
PPL 60 kv	VOLTA1-2 9.11KV GEN UNIT 1 & CASCADE 115/60KV TB 1	P3	G1/N1	<8	<8	<8	<8	<8	<8	<8	<8	8	Sensitivity only
CR CANAL 60 kv	HRIDGEGT 34.50KV GEN UNIT 5 & NEO REDT 60/13.8KV TB 1	P3	G1/N1	12	<8	<8	<8	<8	<8	<8	<8	<8	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
NEO REDT 60 kv	HRIDGEGT 34.50KV GEN UNIT 5 & NEO REDT 60/13.8KV TB 1	P3	G1/N1	12	<8	<8	<8	<8	<8	<8	<8	<8	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
RASN JNT 60 kv	HRIDGEGT 34.50KV GEN UNIT 5 & NEO REDT 60/13.8KV TB 1	P3	G1/N1	12	<8	<8	<8	<8	<8	<8	<8	<8	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
TYLER 60 kv	HRIDGEGT 34.50KV GEN UNIT 5 & NEO REDT 60/13.8KV TB 1	P3	G1/N1	12	<8	<8	<8	<8	<8	<8	<8	<8	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations



Contingency	Category	Category Description	Transient Stability Performance					Potential Mitigation Solutions
			Baseline Scenarios			Sensitivity Scenarios		
			2020 Summer Peak	2028 Summer Peak	2023 Spring Off-Peak	2020 SP Heavy Renewable & Min Gas Gen	2023 SpOP Hi Renew & Min Gas Gen	
Colusa gas turbine fault plus relay failure	P5-1	Non-Redundant Relay	Stable/WECC criteria met	Numerical Issue	Stable/WECC criteria met	Numerical Issue	Stable/WECC criteria met	Under review with PTO
Colusa Generator fault (steam unit)	P1-1	N-1	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No Violation
Colusa generator out and Delevan SVD fault	P3-4	G-1/N-2	Stable/WECC criteria met	Numerical Issue	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Under review with PTO
Colusa generator out and Round Mountain 500/230 kV Transformer	P3-3	G-1/N-1	Stable/WECC criteria met	Numerical Issue	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Under review with PTO
Colusa steam and gas units fault + stuck breaker	P4-1	Stuck Breaker	Stable/WECC criteria met	Numerical Issue	Stable/WECC criteria met	Numerical Issue	Stable/WECC criteria met	Under review with PTO
Colusa steam unit out and gas unit fault	P3-1	G-1/G-1	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Numerical Issue	Stable/WECC criteria met	Under review with PTO
Colusa steam unit out and Table Mountain to Thermalito 230 kV line fault	P3-2	G-1/N-1	Stable/WECC criteria met	Numerical Issue	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Under review with PTO
Delevan and Cottonwood SVD faults	P6-3	N-1-1	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No Violation
Delevan SVD fault	P1-4	N-1	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No Violation
Delevan SVD fault plus relay failure	P5-4	Non-Redundant Relay	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No Violation
Delevan SVD fault plus stuck breaker	P4-4	Stuck Breaker	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No Violation
Palermo-Pease and Palermo-Rio Oso 115 kV lines - Permanent DCTL fault	P7-1	DCTL	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No Violation
Palermo-Pease and Palermo-Rio Oso 115 kV lines - Temporary DCTL fault	P7-1	DCTL	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No Violation
Round Mountain 230 kV Bus Section fault	P2-2	Bus	Numerical Issue	Numerical Issue	Numerical Issue	Numerical Issue	Numerical Issue	Under review with PTO
Round Mountain 230 kV Bus section fault plus relay failure	P5-5	Non-Redundant Relay	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No Violation
Round Mountain 230 kV bus-tie breaker fault	P2-4	Bus-Tie Breaker	Numerical Issue	Numerical Issue	Numerical Issue	Numerical Issue	Numerical Issue	Under review with PTO
Round Mountain 230 kV non-bus-tie breaker fault	P2-3	Non-Bus-Tie Breaker	Numerical Issue	Numerical Issue	Numerical Issue	Numerical Issue	Numerical Issue	Under review with PTO
Round Mountain 500/230 kV Transformer fault	P1-3	N-1	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No Violation
Round Mountain 500/230 kV Transformer fault plus relay failure	P5-3	Non-Redundant Relay	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No Violation
Round Mountain and Table Mountain transformer faults	P6-2	N-1-1	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No Violation
Round Mountain bus section fault plus stuck breaker (bus-tie breaker)	P4-6	Stuck Breaker	Numerical Issue	Numerical Issue	Numerical Issue	Numerical Issue	Numerical Issue	Under review with PTO
Round Mountain bus section fault plus stuck breaker (non-bus-tie breaker)	P4-5	Stuck Breaker	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No Violation
Round Mountain transformer and Round Mountain - Cottonwood 230 kV lines + stuck breaker	P4-3	Stuck Breaker	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No Violation
Round Mountain Transformer and Round Mountain - Thermalito and Hyatt 230 kV lines	P6-1	N-1-1	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No Violation
Table Mountain - Rio Oso 230 kV line fault plus relay failure	P5-2	Non-Redundant Relay	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No Violation
Table Mountain -Rio Oso and Table Mountain-Palermo 230 kV line fault + stuck breaker	P4-2	Stuck Breaker	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No Violation
Table Mountain to Thermalito 230 kV line fault	P1-2	N-1	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No Violation
Tesla 230 kV Bus section fault plus relay failure	P5-5	Non-Redundant Relay	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No Violation

Study Area: PG&E North Valley



Single Contingency Load Drop

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

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
	Select..	Select..	Select..	Select..	Select..	Select..	Select..	Select..	Select..	Select..	

No single substation with more than 100 MW load