



Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading % (Baseline Scenarios)								Loading % (Sensitivity Scenarios)			Project & Potential Mitigation Solutions
				2023 Summer Peak	2026 Summer Peak	2031 Summer Peak	2023 Winter Peak	2026 Winter Peak	2031 Winter Peak	2023 Spring Off-Peak	2026 Spring Off-Peak	2026 SP High CEC Forecast	2023 SP Heavy Renewable & Min Gas Gen	2023 OP Heavy Renewable & Min Gas Gen	
Clear Lake - Eagle Rock 60 kV (Clear Lake 60 kV sub to Konocti Sub 60 kV) (31334 31338)	FULTON 115KV - SECTION 2F & 1F	P2-4	Bus Tie Breaker Fault	NConv	NConv	51.07	NConv	NConv	44.65	41.32	37.31	NConv	58.42	34.33	Clear Lake 60 kV System Reinforcement – Dec 2027
	FULTON BUS 1 & 2 SECTION D(FAILURE OF NON-REDUNDENT RELAY)	P5	Non-Redundant Relay	NConv	NConv	52.25	NConv	NConv	46.58	44.94	46.08	NConv	64.8	43.14	Clear Lake 60 kV System Reinforcement – Dec 2027
	EAGLE ROCK-REDBUD 115KV [1480] & GEYSERS #3-CLOVERDALE 115KV [1650] MOAS OPENED ON MPE TAP_MPE	P6	N-1-1	121.78	120.62	117.98	97.11	98.58	NConv	90.34	<100	124.59	99.28	<100	Overload under review
Clear Lake- Hopland 60 Kv(Clear Lake 60 KV sub to Granite Sub 60 KV) (31334 31335)	EGLE RCK - MA 115KV & EGLE RCK-HOMSTKTP-CORTINA LINE	P2-3	Non-Bus Tie Breaker Fault	<100	94.66	NConv	<100	73.98	NConv	<100	35.71	98.6	<100	<100	Overload under review
Corona- Lakeville 115kV Line (31254 31255)	FULTON 115KV - SECTION 2D & 1D	P2-4	Bus Tie Breaker Fault	112.26	112	135.08	121.36	128.09	156.32	74.07	35.69	113.63	82.49	49.4	Fulton 115 SPS or other more cost effective alternative
	FULTON 230 KV BAAH BUS #1 (FAILURE OF NON-REDUNDENT RELAY)	P5	Non-Redundant Relay	116.66	112.82	124.66	111.4	119.39	NConv	55.18	18.43	117.3	62.3	20.54	Fulton 115 SPS or other more cost effective alternative
	FULTON BUS 1 & 2 SECTION D(FAILURE OF NON-REDUNDENT RELAY)	P5	Non-Redundant Relay	NConv	NConv	135.02	NConv	NConv	155.87	74.51	35.7	NConv	82.1	49.42	Fulton 115 SPS or other more cost effective alternative
	FULTON 230/115KV TB 4 & FULTON 230/115KV TB 9	P6	N-1-1	116.36	111.12	124.45	108.73	117.37	NConv	<100	<100	115.4	<100	<100	Fulton 115 SPS or other more cost effective alternative
	FULTON-SANTA ROSA #1 & FULTON-SANTA ROSA #2 LINES	P7	DCTL	112.24	112.02	134.84	122.11	128.87	159.55	73.99	35.7	113.63	82.48	49.41	Fulton 115 SPS or other more cost effective alternative
EAGLE ROCK 115/60 KV BANK NO.1 (31344 31220)	GEYSERS #3-CLOVERDALE 115KV [1650] MOAS OPENED ON MPE TAP_MPE & EAGLE ROCK-REDBUD 115KV [1480] (2)	P6	N-1-1	107.19	105.87	111.78	98.89	100.69	NConv	<100	<100	109.98	<100	<100	Generation redispatch
Eagle Rock- Redbud 115 kV (Eagle Rock 115kV to Lower Lake 115 Kv Jct) (31225 31262)	CORTINA-MENDOCINO #1 115KV [1330] MOAS OPENED ON LUCERNJ1_LUCERNE & GEYSERS #3-CLOVERDALE 115KV [1650] MOAS OPENED ON MPE TAP_MPE	P6	N-1-1	107.12	104.35	112.01	<100	<100	NConv	<100	<100	109.74	<100	<100	Generation redispatch
Fulton - Hopland 60 kV (Hopland Jct 60 kV to Cloverdale Jct 60 kV) (31336 31370)	FULTON 115KV - SECTION 2F & 1F	P2-4	Bus Tie Breaker Fault	NConv	NConv	226.27	NConv	NConv	160.42	199.64	120.85	NConv	245.43	74.96	Fulton 115 SPS or other more cost effective alternative
	FULTON BUS 1 & 2 SECTION E/F(FAILURE OF NON-REDUNDENT RELAY)	P5	Non-Redundant Relay	NConv	NConv	212	NConv	NConv	147.64	194.28	120.94	NConv	245.28	71.87	Fulton 115 SPS or other more cost effective alternative



Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading % (Baseline Scenarios)								Loading % (Sensitivity Scenarios)			Project & Potential Mitigation Solutions
				2023 Summer Peak	2026 Summer Peak	2031 Summer Peak	2023 Winter Peak	2026 Winter Peak	2031 Winter Peak	2023 Spring Off-Peak	2026 Spring Off-Peak	2026 SP High CEC Forecast	2023 SP Heavy Renewable & Min Gas Gen	2023 OP Heavy Renewable & Min Gas Gen	
	GEYSERS #9-LAKEVILLE & EAGLE ROCK-FULTON-SILVERADO LINES	P7	DCTL	100.68	113.24	111.29	79.5	81.82	82.37	112	101.04	105.03	120.34	101.46	Fulton 115 SPS or other more cost effective alternative
Fulton- Molino- Cotati 60 kV(Molino sub 60 kV to Molino Jct 60 kV) (31366 31385)	FULTON 115KV - SECTION 2F & 1F	P2-4	Bus Tie Breaker Fault	NConv	NConv	217.59	NConv	NConv	148.55	193.62	21.72	NConv	19.74	35.52	Fulton 115 SPS or other more cost effective alternative
	FULTON BUS 1 & 2 SECTION E/F(FAILURE OF NON-REDUNDENT RELAY)	P5	Non-Redundant Relay	NConv	NConv	222	NConv	NConv	153.57	198.72	21.73	NConv	19.87	38.12	Fulton 115 SPS or other more cost effective alternative
Fulton- Santa Rosa No.1 115 kV (Fulton 115kv sub to Monoroe 1 115 kv Tap) (31236 31238)	FULTON-SANTA ROSA #2 115KV [1630] & CORONA-LAKEVILLE 115KV [4311]	P6	N-1-1	125.48	123.79	150.08	117.54	124.14	NConv	<100	<100	125.11	92.67	<100	Fulton 115 SPS or other more cost effective alternative
GEYSER # 3 - CLOVERDALE 115K (CLOVERDALE 115KV to MPE TAP115KV) (31208 31210)	FULTON 115KV - SECTION 2F & 1F	P2-4	Bus Tie Breaker Fault	NConv	NConv	70.05	NConv	NConv	58.37	51.67	38.86	NConv	53.92	34.92	Overload under review
HOPLAND BANK 115/60.00 BANK NO.2 (31336 31206)	EGLE RCK 115/60KV TB 1	P1	N-1	97.72	50.66	45.67	100.1	52.99	NConv	41.12	25.43	51.77	80.63	31.01	Generation redispatch
	FULTON 115KV - SECTION 2F & 1F	P2-4	Bus Tie Breaker Fault	NConv	NConv	80.47	NConv	NConv	78.7	60.63	35.61	NConv	166.03	32.79	Maintenance project to increase capacity of Hopland Bank#2 by 2024
	FULTON BUS 1 & 2 SECTION D(FAILURE OF NON-REDUNDENT RELAY)	P5	Non-Redundant Relay	NConv	NConv	77.19	NConv	NConv	75.37	62.34	37.19	NConv	162.85	39.05	Maintenance project to increase capacity of Hopland Bank#2 by 2024
	FULTON 115/60KV TB 1 & FULTON 115/60KV TB 2	P6	N-1-1	NConv	NConv	<100	<100	NConv	<100	<100	<100	NConv	166.82	<100	Maintenance project to increase capacity of Hopland Bank#2 by 2024
	GEYSERS #9-LAKEVILLE & EAGLE ROCK-FULTON-SILVERADO LINES	P7	DCTL	100.97	53.52	52.21	101.53	54.18	53.74	48.02	33.57	52.36	94.4	41.04	Maintenance project to increase capacity of Hopland Bank#2 by 2024
Igancio-Alto 60kV (32664 32678)	IGNACIO-ALTO-SAUSALITO #2 & IGNACIO-ALTO-SAUSALITO #1 LINES	P7	DCTL	93.55	91.18	43.36	140.48	160.67	84.97	70.98	13.16	93.1	54.97	36.68	Ignacio Area Upgrade by Dec 2029
IGNACO A 115/60.00 kV BANK No. 2 (32664 32568)	IGNACIO 230/115KV TB 4	P1	N-1	38.35	66.84	40.35	93.98	92.79	57.16	79.03	102.98	63.19	75.88	86.18	Generation redispatch
	IGNACIO SVD=R	P1	N-1	30.21	54.94		84.35	83.71		80.62	100.81	51.79	66.55	87.81	Generation redispatch
Konocti - Eagle Rock 60kV (31338 31344)	FULTON 115KV - SECTION 2F & 1F	P2-4	Bus Tie Breaker Fault	NConv	NConv	82.04	NConv	NConv	64.71	61.05	30	NConv	68.17	39.48	Clear Lake 60 kV System Reinforcement – Dec 2027
	FULTON BUS 1 & 2 SECTION D(FAILURE OF NON-REDUNDENT RELAY)	P5	Non-Redundant Relay	NConv	NConv	82.72	NConv	NConv	66.09	63.74	35.36	NConv	71.93	44.97	Clear Lake 60 kV System Reinforcement – Dec 2027
Mendocino - Philo Jct - Hopland 60 kV(Mendocino Sub 60kV to UKIAH JT 60kV) (31300 31327)	FULTON 115KV - SECTION 2F & 1F	P2-4	Bus Tie Breaker Fault	NConv	NConv	45.3	NConv	NConv	34.47	30.61	14.52	NConv	52.32	18.73	Overload under review
	FULTON BUS 1 & 2 SECTION D(FAILURE OF NON-REDUNDENT RELAY)	P5	Non-Redundant Relay	NConv	NConv	46.12	NConv	NConv	35.46	29.07	9.36	NConv	49.47	16.63	Overload under review
	FULTON 115/60KV TB 1 & FULTON 115/60KV TB 2	P6	N-1-1	NConv	NConv	<100	<100	<100	<100	<100	<100	NConv	<100	<100	Overload under review
	GEYSERS #3-CLOVERDALE 115KV [1650] MOAS OPENED ON MPE TAP_MPE & MENDOCINO-UKIAH 115KV [2420] MOAS OPENED ON MENDOCNO_CALPELLA	P6	N-1-1	103.68	109.1	142.14	<100	<100	NConv	<100	<100	109.37	<100	<100	Generation redispatch
Mendocino -Clearlake 60 kV (Mendocino Sub 60 kV to Upper Lake Sub 60 Kv) (31300 31330)	EGLE RCK - MA 115KV & EGLE RCK-HOMSTKTP-CORTINA LINE	P2-3	Non-Bus Tie Breaker Fault	<100	56.46	NConv	<100	50.53	NConv	<100	15.8	57.71	<100	<100	Generation redispatch
	KONOCTI-EAGLE ROCK 60KV [6861] & CLEAR LAKE-HOPLAND 60KV [6390] MOAS OPENED ON GRANITE_HPLND JT	P6	N-1-1	172.86	162.13	205.3	114.37	119.38	NConv	158.53	<100	172.76	98.74	93.94	Generation redispatch
San Rafeal Jct-Greenbre 60 kV Line (32678 32680)	IGNACIO-ALTO-SAUSALITO #2 & IGNACIO-ALTO-SAUSALITO #1 LINES	P7	DCTL	93.56	91.19	43.37	140.48	160.74	85	70.5	13.25	93.11	54.99	36.44	Ignacio Area Upgrade by Dec 2029



Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading % (Baseline Scenarios)								Loading % (Sensitivity Scenarios)			Project & Potential Mitigation Solutions
				2023 Summer Peak	2026 Summer Peak	2031 Summer Peak	2023 Winter Peak	2026 Winter Peak	2031 Winter Peak	2023 Spring Off-Peak	2026 Spring Off-Peak	2026 SP High CEC Forecast	2023 SP Heavy Renewable & Min Gas Gen	2023 OP Heavy Renewable & Min Gas Gen	
Santa Rosa- Corona 115 kv (Santa Rosa 115kv sub to Pennygrove Sub 115 kv) (31246 31248)	FULTON 115KV - SECTION 2D & 1D	P2-4	Bus Tie Breaker Fault	115.83	114.59	139.77	114.41	119.24	144.44	76.34	34.86	116.28	86.1	53.88	Fulton 115 SPS or other more cost effective alternative
	FULTON 230 KV BAAH BUS #1 (FAILURE OF NON-REDUNDENT RELAY)	P5	Non-Redundant Relay	121.93	115.89	128.3	103.99	110.01	NConv	54.38	13.83	120.8	64.16	21.33	Fulton 115 SPS or other more cost effective alternative
	FULTON 230/115KV TB 4 & FULTON 230/115KV TB 9	P6	N-1-1	121.6	113.96	128.11	101.41	108.04	NConv	<100	<100	118.68	<100	<100	Fulton 115 SPS or other more cost effective alternative
	FULTON-SANTA ROSA #1 & FULTON-SANTA ROSA #2 LINES	P7	DCTL	115.82	114.62	139.57	115.15	120	147.39	76.25	34.87	116.28	86.09	53.9	Fulton 115 SPS or other more cost effective alternative
Sonoma - Pueblo 115 kv (31258 32564)	FULTON 230 KV BAAH BUS #1 (FAILURE OF NON-REDUNDENT RELAY)	P5	Non-Redundant Relay	106.58	102.82	113	79.72	85.09	NConv	53.63	15.32	106.71	55.69	17.42	Fulton 115 SPS or other more cost effective alternative
	FULTON 230/115KV TB 9 & FULTON 230/115KV TB 4	P6	N-1-1	106.47	101.39	114.84	<100	<100	<100	<100	<100	105.23	<100	<100	Fulton 115 SPS or other more cost effective alternative
Tulucay - Vaca 230 kv (30440 30 30)	GEYSR18-LAKEVILE-GEYSR20-GEYSR13 230KV [0] MOAS OPENED ON G13TT1_8_SANTAFE & VACA-LAKEVILLE #1 230KV [5840]	P6	N-1-1	110.89	<100	<100	92.11	<100	<100	<100	<100	<100	<100	<100	Switch in Vaca Dixon-Lakeville 230 kV series reactor
	LAKEVILE 230KV - SECTION 1E & 2E	P2-4	Bus Tie Breaker Fault	113.49	113.25	101.14	89.73	91	101.25	<100	22.45	115.23	81.42	<100	Switch in Vaca Dixon-Lakeville 230 kV series reactor
	VACA-LAKEVILLE #1 230KV [5840] & GEYSR18-LAKEVILE-GEYSR20-GEYSR13 230KV [0] MOAS OPENED ON G13TT1_8_SANTAFE	P6	N-1-1	<100	106.22	99.49	<100	93.52	NConv	<100	<100	108.98	<100	<100	Switch in Vaca Dixon-Lakeville 230 kV series reactor
Vaca-Lakeville #1 230Kv (30435 30 30)	LAKEVILE 230KV - SECTION 2E & 2D	P2-4	Bus Tie Breaker Fault	108.56	115.8	101.28	93.21	96.04	107.33	<100	11.68	118.51	69.27	<100	Switch in Vaca Dixon-Lakeville 230 kV series reactor
	TULUCAY-VACA 230KV [5800] & GEYSR18-LAKEVILE-GEYSR20-GEYSR13 230KV [0] MOAS OPENED ON G13TT1_8_SANTAFE	P6	N-1-1	105.6	<100	<100	95.57	<100	<100	<100	<100	<100	<100	<100	Switch in Vaca Dixon-Lakeville 230 kV series reactor
	LAKEVILLE BUS 1&2 SECTION E(FAILURE OF NON-REDUNDENT RELAY)	P5	Non-Redundant Relay	<100	105.83	94.74	<100	86.6	96.39	69.45	20.58	107.61	<100	31.2	Switch in Vaca Dixon-Lakeville 230 kV series reactor
	GEYSR18-LAKEVILE-GEYSR20-GEYSR13 230KV [0] MOAS OPENED ON G13TT1_8_SANTAFE & TULUCAY-VACA 230KV [5800]	P6	N-1-1	<100	108.03	99.63	<100	97.21	NConv	<100	<100	111.59	<100	<100	Switch in Vaca Dixon-Lakeville 230 kV series reactor
Clear Lake- Hopland 60 Kv(Clear Lake 60 KV sub to Granite Sub 60 KV) (31334 31335)	KONOCI-EAGLE ROCK 60KV [6861]	P1	N-1	128.02	126.01	145.62	95.75	99.13	<100	108.84	<100	131.29	96.14	<100	Overload under review

Study Area: PG&E North Coast & North Bay

High/Low Voltages



Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)								Voltage PU (Sensitivity Scenarios)			Project & Potential Mitigation Solutions
				2023 Summer Peak	2026 Summer Peak	2031 Summer Peak	2023 Winter Peak	2026 Winter Peak	2031 Winter Peak	2023 Spring Off-Peak	2026 Spring Off-Peak	2026 SP High CEC Forecast	2023 SP Heavy Renewable & Min Gas Gen	2023 OP Heavy Renewable & Min Gas Gen	
CALISTGA 60kv	CORONA - 1D 115KV & SANTA ROSA-CORONA LINE	P2-3	Non-Bus Tie Breaker Fault	0.85	>0.9	>0.9	0.90	>0.9	>0.9	1.01	>0.9	1.02	>0.9	0.87	Switch in the Fulton SVD (230 kV)
CALISTGA 60kv	CORONA 115KV SECTION 1D	P2-2	Bus Fault	0.85	0.94	0.93	0.90	0.90	0.97	1.01	1.04	1.02	0.94	0.87	Switch in the Fulton SVD (230 kV)
CALISTGA 60kv	CORONA-LAKEVILLE 115KV [4311]	P1	N-1	0.86	0.94	0.92	0.91	0.89	0.96	1.01	1.05	0.94	0.87	1.02	Switch in the Fulton SVD (230 kV)
CALISTGA 60kv	EAGLE ROCK-FULTON-SILVERADO 115KV [4392] (EGLE RCK-ERFT4_23CRJ)	P2-1	Line Section w/o Fault	0.85	>0.9	>0.9	0.90	>0.9	>0.9	1.00	>0.9	1.02	>0.9	0.87	Switch in the Fulton SVD (230 kV)
CALISTGA 60kv	EAGLE ROCK-FULTON-SILVERADO 115KV [4392] (FULTON-RINCONJ2)	P2-1	Line Section w/o Fault	>0.9	0.95	0.94	>0.9	0.89	0.98	>0.9	1.04	>0.9	0.94	>0.9	Switch in the Fulton SVD (230 kV)
CALISTGA 60kv	EGLE RCK-FULTON-SILVERDO 115KV [0]	P1	N-1	0.85	0.93	0.92	0.91	0.90	0.97	1.00	1.04	0.94	0.87	1.02	Switch in the Fulton SVD (230 kV)
CALISTGA 60kv	FULTON - 1D 115KV & FULTON-PUEBLO LINE	P2-3	Non-Bus Tie Breaker Fault	0.85	>0.9	>0.9	0.91	>0.9	>0.9	1.00	>0.9	1.01	>0.9	0.87	Switch in the Fulton SVD (230 kV)
CALISTGA 60kv	FULTON - 2D 115KV & EGLE RCK-FULTON-SILVERDO LINE	P2-3	Non-Bus Tie Breaker Fault	0.85	>0.9	>0.9	0.91	>0.9	>0.9	1.00	>0.9	1.01	>0.9	0.87	Switch in the Fulton SVD (230 kV)
CALISTGA 60kv	FULTON 115/60KV TB 1	P1	N-1	0.85	0.94	0.93	0.91	0.89	0.96	1.00	1.05	0.94	0.87	1.02	Switch in the Fulton SVD (230 kV)
CALISTGA 60kv	FULTON 115/60KV TB 2	P1	N-1	0.85	0.94	0.93	0.91	0.89	0.96	1.00	1.05	0.94	0.87	1.02	Switch in the Fulton SVD (230 kV)
CALISTGA 60kv	FULTON 115KV - SECTION 2D & 1D	P2-4	Bus Tie Breaker Fault	0.85	0.93	0.91	0.91	0.90	0.98	0.99	1.03	>0.9	0.94	0.87	Switch in the Fulton SVD (230 kV)
CALISTGA 60kv	FULTON 115KV - SECTION 2F & 1F	P2-4	Bus Tie Breaker Fault	NConv	NConv	0.31	NConv	NConv	0.32	0.53	0.98	0.93	NConv	0.24	Switch in the Fulton SVD (230 kV)
SLMN CRK 60kV		P2-4	Bus Tie Breaker Fault	NConv	NConv	0.34	NConv	NConv	0.30	0.56	0.99	0.96	NConv	0.33	Low voltage under review
WINDSOR 60kV		P2-4	Bus Tie Breaker Fault	NConv	NConv	0.39	NConv	NConv	0.40	0.58	0.98	0.95	NConv	0.35	Low voltage under review
WOHLER 60kV		P2-4	Bus Tie Breaker Fault	NConv	NConv	0.38	NConv	NConv	0.37	0.59	0.98	0.96	NConv	0.34	Low voltage under review
CALISTGA 60kv	FULTON 115KV SECTION 1D	P2-2	Bus Fault	0.85	0.93	0.91	0.91	0.90	0.97	1.00	1.03	1.01	0.93	0.87	Switch in the Fulton SVD (230 kV)
CALISTGA 60kv	FULTON 115KV SECTION 1F	P2-2	Bus Fault	0.85	0.94	0.93	0.91	0.89	0.96	1.00	1.05	1.02	0.94	0.87	Switch in the Fulton SVD (230 kV)
CALISTGA 60kv	FULTON 115KV SECTION 2D	P2-2	Bus Fault	0.86	0.95	0.94	0.91	0.89	0.98	1.00	1.04	1.02	0.94	0.87	Switch in the Fulton SVD (230 kV)
CALISTGA 60kv	FULTON 115KV SECTION 2F	P2-2	Bus Fault	0.86	0.95	0.93	0.91	0.90	0.96	1.01	1.04	1.03	0.95	0.88	Switch in the Fulton SVD (230 kV)
CALISTGA 60kv	FULTON 230 KV BAAH BUS #1 (FAILURE OF NON-REDUNDENT RELAY)	P5	Non-Redundant Relay	0.73	0.88	0.74	0.82	0.81	0.76	1.00	1.04	1.01	0.87	0.85	Switch in the Fulton SVD (230 kV)
CALISTGA 60kv	FULTON 230 KV BAAH BUS #2 (FAILURE OF NON-REDUNDENT RELAY)	P5	Non-Redundant Relay	0.85	0.94	0.87	0.90	0.89	0.86	1.00	1.04	1.01	0.93	0.87	Switch in the Fulton SVD (230 kV)
CALISTGA 60kv	FULTON 230/115KV TB 4	P1	N-1	0.86	0.95	0.95	0.92	0.91	0.97	1.01	1.04	0.94	0.88	1.02	Switch in the Fulton SVD (230 kV)
CALISTGA 60kv	FULTON 230/115KV TB 9	P1	N-1	0.85	0.93	0.91	0.91	0.89	0.96	1.00	1.03	0.94	0.87	1.01	Switch in the Fulton SVD (230 kV)
CALISTGA 60kv	FULTON 230KV - MIDDLE BREAKER BAY 1	P2-1	Line Section w/o Fault	0.86	0.95	0.94	0.92	0.91	0.96	1.01	1.04	1.02	0.94	0.88	Switch in the Fulton SVD (230 kV)
CALISTGA 60kv	FULTON 230KV - MIDDLE BREAKER BAY 3	P2-1	Line Section w/o Fault	0.85	0.93	0.92	0.91	0.90	0.96	1.00	1.05	1.02	0.93	0.87	Switch in the Fulton SVD (230 kV)

2021-2022 ISO Reliability Assessment - Preliminary Study Results

Study Area: PG&E North Coast & North Bay

High/Low Voltages



Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)								Voltage PU (Sensitivity Scenarios)			Project & Potential Mitigation Solutions
				2023 Summer Peak	2026 Summer Peak	2031 Summer Peak	2023 Winter Peak	2026 Winter Peak	2031 Winter Peak	2023 Spring Off-Peak	2026 Spring Off-Peak	2026 SP High CEC Forecast	2023 SP Heavy Renewable & Min Gas Gen	2023 OP Heavy Renewable & Min Gas Gen	
CALISTGA 60kv	FULTON 230KV - MIDDLE BREAKER BAY 7	P2-1	Line Section w/o Fault	0.85	0.93	0.90	0.91	0.89	0.97	1.00	1.04	1.01	0.94	0.87	Switch in the Fulton SVD (230 kV)
CALISTGA 60kv	FULTON 230KV - MIDDLE BREAKER BAY 8	P2-1	Line Section w/o Fault	0.85	0.93	0.91	0.91	0.89	0.96	1.00	1.03	1.01	0.94	0.87	Switch in the Fulton SVD (230 kV)
CALISTGA 60kv	FULTON BUS 1 & 2 SECTION D(FAILURE OF NON-REDUNDENT RELAY)	P5	Non-Redundant Relay	NConv	NConv	0.31	NConv	NConv	0.32	0.52	0.97	0.91	NConv	0.24	Switch in the Fulton SVD (230 kV)
CALISTGA 60kv	FULTON BUS 1 & 2 SECTION E/F(FAILURE OF NON-REDUNDENT RELAY)	P5	Non-Redundant Relay	-5.45	-6.03	0.31	NConv	NConv	0.32	0.53	0.97	0.93	NConv	0.24	Switch in the Fulton SVD (230 kV)
CALISTGA 60kv	FULTON BUS 1&2 230 (FAILURE OF NON-REDUNDENT RELAY)	P5	Non-Redundant Relay	0.73	0.88	0.74	0.82	0.81	0.75	1.00	1.04	1.01	0.88	0.85	Switch in the Fulton SVD (230 kV)
CALISTGA 60kv	FULTON-LAKEVILLE 230KV [4950] (LAKEVILE-T22_93)	P2-1	Line Section w/o Fault	>0.9	0.94	0.94	>0.9	0.89	0.96	>0.9	1.04	>0.9	0.94	>0.9	Switch in the Fulton SVD (230 kV)
CALISTGA 60kv	FULTON-LAKEVILLE 230KV [4950] (T22_93-FULTON)	P2-1	Line Section w/o Fault	>0.9	0.94	0.94	>0.9	0.89	0.97	>0.9	1.04	>0.9	0.94	>0.9	Switch in the Fulton SVD (230 kV)
CORONA 115kv	GEYSER12 13.80KV GEN UNIT 1 & CORONA-LAKEVILLE 115KV [4311]	P3	N-G-1	>0.9	>0.9	0.90	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	Reactive support
DUNBAR 60kv	GEYSER12 13.80KV GEN UNIT 1 & LAKEVILLE #1 60KV [7360]	P3	N-G-1	0.85	>0.9	0.85	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	0.86	>0.9	Reactive support
CALISTGA 60kv	GEYSER16 13.80KV GEN UNIT 1 & LAKEVILLE #1 60KV [7360]	P3	N-G-1	0.77	0.83	0.83	>0.9	0.88	>0.9	>0.9	>0.9	>0.9	0.83	>0.9	Switch in the Fulton SVD (230 kV)
CALISTGA 60kv	GEYSERS #12-FULTON 230KV [4750] (CR1T3_18-FULTON)	P2-1	Line Section w/o Fault	0.85	0.93	0.90	0.91	0.89	0.97	1.00	1.04	1.01	0.94	0.87	Switch in the Fulton SVD (230 kV)
CALISTGA 60kv	GEYSERS #12-FULTON 230KV [4750] (CR1T3_18-NCPATT2)	P2-1	Line Section w/o Fault	0.85	>0.9	>0.9	0.91	>0.9	>0.9	1.00	>0.9	1.02	>0.9	0.87	Switch in the Fulton SVD (230 kV)
CALISTGA 60kv	GEYSERS #9-LAKEVILLE 230KV [4780] (CR2T3_18-LAKEVILE)	P2-1	Line Section w/o Fault	0.85	>0.9	>0.9	0.91	>0.9	>0.9	1.00	>0.9	1.01	>0.9	0.87	Switch in the Fulton SVD (230 kV)
CALISTGA 60kv	GEYSR12 - 1D 230KV & FULTON-GEYSR16-GEYSR12-GEYSR14 LINE	P2-3	Non-Bus Tie Breaker Fault	0.85	0.93	0.90	0.91	0.89	0.97	1.00	1.04	1.01	0.94	0.87	Switch in the Fulton SVD (230 kV)
CALISTGA 60kv	GEYSR13 - 1D 230KV & GEYSR18-LAKEVILE-GEYSR20-GEYSR13 LINE	P2-3	Non-Bus Tie Breaker Fault	0.85	0.94	0.93	0.91	0.90	0.96	1.00	1.04	1.01	0.93	0.87	Switch in the Fulton SVD (230 kV)
CALISTGA 60kv	GEYSR14 - 1D 230KV & FULTON-GEYSR16-GEYSR12-GEYSR14 LINE	P2-3	Non-Bus Tie Breaker Fault	0.85	0.93	0.90	0.91	0.89	0.97	1.00	1.04	1.01	0.94	0.87	Switch in the Fulton SVD (230 kV)
CALISTGA 60kv	GEYSR16 - 1D 230KV & FULTON-GEYSR16-GEYSR12-GEYSR14 LINE	P2-3	Non-Bus Tie Breaker Fault	0.85	0.93	0.90	0.91	0.89	0.97	1.00	1.04	1.01	0.94	0.87	Switch in the Fulton SVD (230 kV)



Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)								Voltage PU (Sensitivity Scenarios)			Project & Potential Mitigation Solutions
				2023 Summer Peak	2026 Summer Peak	2031 Summer Peak	2023 Winter Peak	2026 Winter Peak	2031 Winter Peak	2023 Spring Off-Peak	2026 Spring Off-Peak	2026 SP High CEC Forecast	2023 SP Heavy Renewable & Min Gas Gen	2023 OP Heavy Renewable & Min Gas Gen	
CALISTGA 60kv	GEYSR18 - 1D 230KV & GEYSR18-LAKEVILE-GEYSR20-GEYSR13 LINE	P2-3	Non-Bus Tie Breaker Fault	0.85	0.94	0.93	0.91	0.90	0.96	1.00	1.04	1.01	0.93	0.87	Switch in the Fulton SVD (230 kV)
CALISTGA 60kv	GEYSR20 - 1D 230KV & GEYSR18-LAKEVILE-GEYSR20-GEYSR13 LINE	P2-3	Non-Bus Tie Breaker Fault	0.85	0.94	0.93	0.91	0.90	0.96	1.00	1.04	1.01	0.93	0.87	Switch in the Fulton SVD (230 kV)
CALISTGA 60kv	IGNACIO - 1D 230KV & IGNACIO-SOBRANTE LINE	P2-3	Non-Bus Tie Breaker Fault	0.87	0.95	0.95	0.92	0.91	0.97	1.01	1.05	1.02	0.95	0.87	Switch in the Fulton SVD (230 kV)
CALISTGA 60kv	IGNACIO - MA 115KV & IGNACIO-MARE ISLAND #1 LINE	P2-3	Non-Bus Tie Breaker Fault	0.86	0.94	0.95	0.92	0.90	0.96	1.01	1.04	1.02	0.95	0.88	Switch in the Fulton SVD (230 kV)
CALISTGA 60kv	IGNACIO - MA 115KV & IGNACIO-MARE ISLAND #2 LINE	P2-3	Non-Bus Tie Breaker Fault	0.86	0.94	0.95	0.92	0.90	0.96	1.01	1.04	1.02	0.95	0.88	Switch in the Fulton SVD (230 kV)
CALISTGA 60kv	IGNACIO 115KV SECTION MA	P2-2	Bus Fault	0.86	0.94	0.95	0.92	0.90	0.96	1.01	1.04	1.02	0.95	0.88	Switch in the Fulton SVD (230 kV)
CALISTGA 60kv	IGNACIO 230KV SECTION 1D	P2-2	Bus Fault	0.86	0.95	0.95	0.92	0.90	0.96	1.01	1.05	1.02	0.95	0.88	Switch in the Fulton SVD (230 kV)
GREENBRE 60kV	IGNACIO-ALTO 60KV [7150] MOAS OPENED ON IGNACO A_SAN_RFLJ & IGNACIO-ALTO-SAUSALITO #1 60KV [7160]	P6	N-1-1	0.88	0.89	>0.9	0.86	0.74	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	Review effectiveness of switching in the Fulton SVD (230 kV), or reactive support
ALTO 60kV	IGNACIO-ALTO-SAUSALITO #2 & IGNACIO-ALTO-SAUSALITO #1 LINES	P7	DCTL	0.93	0.94	0.95	0.89	0.82	0.80	0.96	1.02	0.94	0.96	0.99	Review effectiveness of switching in the Fulton SVD (230 kV), or reactive support
GREENBRE 60kV		P7	DCTL	0.94	0.94	0.96	0.90	0.83	0.83	0.96	1.02	0.94	0.96	0.99	Review effectiveness of switching in the Fulton SVD (230 kV), or reactive support
CALISTGA 60kv	IGNACIO-SOBRANTE 230KV [4920] (CROCKETT-IGNACIO)	P2-1	Line Section w/o Fault	0.85	>0.9	>0.9	0.91	>0.9	>0.9	1.00	>0.9	1.02	>0.9	0.87	Switch in the Fulton SVD (230 kV)
CALISTGA 60kv	LAKEVILE - 2E 230KV & FULTON-LAKEVILLE LINE	P2-3	Non-Bus Tie Breaker Fault	0.85	>0.9	>0.9	0.91	>0.9	>0.9	1.00	>0.9	1.02	>0.9	0.87	Switch in the Fulton SVD (230 kV)
CALISTGA 60kv	LAKEVILE - 2E 230KV & GEYSR18-LAKEVILE-GEYSR20-GEYSR13 LINE	P2-3	Non-Bus Tie Breaker Fault	0.85	>0.9	>0.9	0.90	>0.9	>0.9	1.00	>0.9	1.02	>0.9	0.87	Switch in the Fulton SVD (230 kV)
CALISTGA 60kv	LAKEVILE 230KV - SECTION 2D & 1D	P2-4	Bus Tie Breaker Fault	0.85	>0.9	>0.9	0.91	>0.9	>0.9	1.00	>0.9	1.02	>0.9	0.87	Switch in the Fulton SVD (230 kV)
CALISTGA 60kv	LAKEVILE 230KV - SECTION 2E & 1E	P2-4	Bus Tie Breaker Fault	0.85	>0.9	>0.9	0.91	>0.9	>0.9	1.00	>0.9	1.02	>0.9	0.87	Switch in the Fulton SVD (230 kV)
CALISTGA 60kv	LAKEVILE 230KV - SECTION 2E & 2D	P2-4	Bus Tie Breaker Fault	0.85	>0.9	>0.9	0.91	>0.9	>0.9	1.00	>0.9	1.02	>0.9	0.87	Switch in the Fulton SVD (230 kV)
CALISTGA 60kv	LAKEVILE 230KV SECTION 2D	P2-2	Bus Fault	0.85	>0.9	>0.9	0.91	>0.9	>0.9	1.00	>0.9	1.02	>0.9	0.87	Switch in the Fulton SVD (230 kV)
CALISTGA 60kv	LAKEVILE 230KV SECTION 2E	P2-2	Bus Fault	0.85	>0.9	>0.9	0.90	>0.9	>0.9	1.00	>0.9	1.02	>0.9	0.87	Switch in the Fulton SVD (230 kV)



Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)								Voltage PU (Sensitivity Scenarios)			Project & Potential Mitigation Solutions
				2023 Summer Peak	2026 Summer Peak	2031 Summer Peak	2023 Winter Peak	2026 Winter Peak	2031 Winter Peak	2023 Spring Off-Peak	2026 Spring Off-Peak	2026 SP High CEC Forecast	2023 SP Heavy Renewable & Min Gas Gen	2023 OP Heavy Renewable & Min Gas Gen	
DUNBAR 60kV	LAKEVILLE #1 60KV [7360]	P1	N-1	0.85	0.86	0.86	0.95	0.95	0.94	0.96	0.99	0.99	0.86	0.91	Reactive support
CALISTGA 60kv	LAKEVLLE - 2D 60KV & LAKEVILLE #1 LINE	P2-3	Non-Bus Tie Breaker Fault	0.78	0.84	0.83	0.89	0.88	0.91	0.96	1.00	0.99	0.84	0.84	Switch in the Fulton SVD (230 kV)
SONOMA 115kV	LAKEVLLE 115KV - SECTION 1D & 2D	P2-4	Bus Tie Breaker Fault	0.94	0.95	0.90	0.98	0.99	0.94	1.02	1.11	1.07	0.95	0.96	Plublo UVLS under review
CALISTGA 60kv	LAKEVLLE 115KV SECTION 1D	P2-2	Bus Fault	0.85	0.94	0.92	0.91	0.89	0.96	1.01	1.05	1.02	0.94	0.87	Switch in the Fulton SVD (230 kV)
CALISTGA 60kv	NCPA2 230KV SECTION 1D	P2-2	Bus Fault	0.85	0.93	0.90	0.91	0.89	0.97	1.00	1.04	1.01	0.94	0.87	Switch in the Fulton SVD (230 kV)
CALISTGA 60kv	SANTA ROSA-CORONA 115KV [4309] (BELLVUE-PENNGRVE)	P2-1	Line Section w/o Fault	0.85	0.94	0.93	0.90	0.89	0.97	1.01	1.04	1.02	0.94	0.87	Switch in the Fulton SVD (230 kV)
CALISTGA 60kv	SANTAFE - 1D 230KV & GEYSR18-LAKEVILE-GEYSR20-GEYSR13 LINE	P2-3	Non-Bus Tie Breaker Fault	0.85	0.94	0.93	0.91	0.90	0.96	1.00	1.04	1.01	0.93	0.87	Switch in the Fulton SVD (230 kV)
CALISTGA 60kv	SILVERDO - 1E 115KV & SILVERDO-FULTON-EGLE RCK LINE	P2-3	Non-Bus Tie Breaker Fault	0.85	0.93	0.92	0.91	0.90	0.97	1.00	1.04	1.02	0.94	0.87	Switch in the Fulton SVD (230 kV)

Study Area: PG&E North Coast & North Bay

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
				2023 Summer Peak	2026 Summer Peak	2031 Summer Peak	2023 Winter Peak	2026 Winter Peak	2031 Winter Peak	2023 Spring Off-Peak	2026 Spring Off-Peak	2026 SP High CEC Forecast	2023 SP Heavy Renewable & Min Gas Gen	2023 OP Heavy Renewable & Min Gas Gen	
CORONA 115kV	GEYSER16 13.80KV GEN UNIT 1 & CORONA-LAKEVILLE 115KV [4311]	P3	N-G-1	<8	<8	12	<8	<8	<8	<8	<8	<8	<8	<8	Long term issue, keep monitor
PENNGRVE 115kV		P3	N-G-1	<8	<8	9	<8	<8	<8	<8	<8	<8	<8	<8	Long term issue, keep monitor
CALISTGA 60kV	GEYSER16 13.80KV GEN UNIT 1 & LAKEVILLE #1 60KV [7360]	P3	N-G-1	8	11	11	<8	2	<8	<8	<8	<8	<8	10	Switch in the Fulton SVD (230 kV)
DUNBAR 60kV		P3	N-G-1	15	12	13	<8	<8	<8	<8	<8	<8	<8	12	Under review
CALISTGA 60kV	LAKEVILLE #1 60KV [7360]	P1	N-1	8	11	10	2	2	6	5	4	3	10	3	Switch in the Fulton SVD (230 kV)
DUNBAR 60kV		P1	N-1	15	12	13	6	5	6	3	1	1	12	9	Under review

Study Area: PG&E North Coast & North Bay

Transient Stability



Contingency	Category	Category Description	Transient Stability Performance						Potential Mitigation Solutions
			Baseline Scenarios				Sensitivity Scenarios		
			2023 Spring Off-Peak	2026 Summer Peak	2031 Summer Peak	2031 Spring Off-Peak	2026 SP High CEC Forecast	2023 OP Heavy Renewable & Min Gas Gen	
In accordance with TPL-001-4- Requirement R2.6, this area relies on the past studies from the 2019-20 Transmission Planning Process for transient stability studies:									
http://www.caiso.com/Documents/AppendixC-BoardApprovedt2019-2020TransmissionPlan.pdf									

Study Area: PG&E North Coast & North Bay



Single Contingency Load Drop

Worst Contingency	Category	Category Description	Amount of Load Drop (MW)												Potential Mitigation Solutions
			2023 Summer Peak	2026 Summer Peak	2031 Summer Peak	2023 Winter Peak	2026 Winter Peak	2031 Winter Peak	2023 Spring Off-Peak	2026 Spring Off-Peak	2031 Spring Off-Peak	2026 SP High CEC Forecast	2023 SP Heavy Renewable & Min Gas Gen	2023 OP Heavy Renewable & Min Gas Gen	

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

Study Area: PG&E North Coast & North Bay



Single Source Substation with more than 100 MW Load

Substation	Load Served (MW)												Potential Mitigation Solutions
	2023 Summer Peak	2026 Summer Peak	2031 Summer Peak	2023 Winter Peak	2026 Winter Peak	2031 Winter Peak	2023 Spring Off-Peak	2026 Spring Off-Peak	2031 Spring Off-Peak	2026 SP High CEC Forecast	2023 SP Heavy Renewable & Min Gas Gen	2023 OP Heavy Renewable & Min Gas Gen	

No single source substation with more than 100 MW