

Study Area: PG&E Central Valley  
Thermal Overloads



Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading % (Baseline Scenarios)								Loading % (Sensitivity Scenarios)					Project & Potential Mitigation Solutions
				2022 Summer Peak	2025 Summer Peak	2030 Summer Peak	2022 Winter Peak	2025 Winter Peak	2030 Winter Peak	2022 Spring Off-Peak	2025 Spring Off-Peak	2025 SP High CEC Forecast	2025 SpOP Hi Renew & Min Gas Gen	2022 SP Heavy Renewable & Min Gas Gen	2030 Retirement of QF Generations	2030 Summer Peak w/o Facility Rerates	
Manteca 60 kV Line No. 1 (Different sections)	Base Case	P0	N-0	106.8	104.6	97.3	NA	NA	NA	40.0	32.1	105.6	30.9	97.8	NA	97.4	System Upgrade/ Preferred Resources/Operating Solution as needed
	KASSON 115/60KV TB 1	P1-3	N-1	108.9	108.1	99.7	NA	NA	NA	34.8	28.0	110.0	27.0	95.6	NA	99.8	
	KASSON 115KV SECTION 1D	P2-2	Bus Fault	111.2	107.7	102.8	NA	NA	NA	34.9	27.9	109.6	28.1	95.1	NA	103.0	
	KASSON - 1D 115KV & LAMMERS-KASSON LINE	P2-3	Non-Bus Tie Breaker Fault	111.2	107.6	102.7	NA	NA	NA	34.9	27.9	109.5	27.3	95.1	NA	103.0	
	KASSON - 1D 115KV & SCHULTE SW STA-KASSON-MANTECA LINE	P2-3	Non-Bus Tie Breaker Fault	128.9	113.3	115.0	NA	NA	NA	34.9	28.0	115.6	26.3	100.1	NA	114.8	
	KASSON - 1D 115KV & VIERRA-TRACY-KASSON LINE	P2-3	Non-Bus Tie Breaker Fault	117.3	108.4	103.9	NA	NA	NA	34.9	28.0	110.4	29.5	96.5	NA	104.0	
	Base Case	P0	N-0	121.0	118.7	109.6	NA	NA	NA	53.3	37.2	119.7	35.3	112.1	NA	109.7	
	KASSON 115/60KV TB 1	P1-3	N-1	123.1	122.3	112.0	NA	NA	NA	46.4	32.3	124.3	30.9	109.2	NA	112.1	
	KASSON 115KV SECTION 1D	P2-2	Bus Fault	125.6	121.8	115.4	NA	NA	NA	46.6	32.3	123.8	30.9	108.8	NA	115.6	
	KASSON - 1D 115KV & LAMMERS-KASSON LINE	P2-3	Non-Bus Tie Breaker Fault	125.6	121.7	115.4	NA	NA	NA	34.9	27.9	109.5	32.2	95.1	NA	103.0	
	KASSON - 1D 115KV & SCHULTE SW STA-KASSON-MANTECA LINE	P2-3	Non-Bus Tie Breaker Fault	145.0	128.0	128.7	NA	NA	NA	46.6	32.3	130.5	31.0	114.3	NA	128.6	
	KASSON - 1D 115KV & VIERRA-TRACY-KASSON LINE	P2-3	Non-Bus Tie Breaker Fault	132.4	122.6	116.6	NA	NA	NA	46.6	32.3	124.7	30.9	110.2	NA	116.7	
	KASSON 115/60KV TB 1	P1-3	N-1	100.2	99.6	91.3	NA	NA	NA	34.8	28.0	101.2	30.9	95.6	NA	91.4	
	KASSON 115KV SECTION 1D	P2-2	Bus Fault	102.3	99.2	94.0	NA	NA	NA	34.9	27.9	100.9	32.2	95.1	NA	94.2	
	KASSON - 1D 115KV & LAMMERS-KASSON LINE	P2-3	Non-Bus Tie Breaker Fault	102.3	99.1	94.0	NA	NA	NA	34.9	27.9	100.8	31.0	95.1	NA	94.2	
	KASSON - 1D 115KV & SCHULTE SW STA-KASSON-MANTECA LINE	P2-3	Non-Bus Tie Breaker Fault	118.2	104.3	104.9	NA	NA	NA	34.9	28.0	106.3	30.9	93.0	NA	104.8	
	KASSON - 1D 115KV & VIERRA-TRACY-KASSON LINE	P2-3	Non-Bus Tie Breaker Fault	107.8	99.9	95.0	NA	NA	NA	34.9	28.0	101.6	32.6	89.7	NA	95.2	
Shulte - Kasson - Manteca 115 kV Line	Schulte - Lammers 115 kV Line	P1-2	N-1	119.6	99.7	105.2	NA	NA	NA	43.4	3.4	99.7	8.5	66.5	NA	105.6	System Upgrade/ Preferred Resources/Operating Solution as needed
	LAMMERS 115KV - RING R4 & R3	P2-3	Non-Bus Tie Breaker Fault	115.2	90.1	94.6	NA	NA	NA	39.0	1.4	90.1	6.0	61.1	NA	95.0	
	LAMMERS 115KV - RING R1 & R4	P2-3	Non-Bus Tie Breaker Fault	111.6	87.5	91.0	NA	NA	NA	36.9	2.6	87.6	6.9	58.4	NA	91.4	
	SCHULTE 115KV - MIDDLE BREAKER BAY 2	P2-3	Non-Bus Tie Breaker Fault	120.5	106.9	108.6	NA	NA	NA	41.5	2.4	106.2	4.3	63.9	NA	108.3	
	Base Case	P0	N-0	116.7	119.6	129.1	NA	NA	NA	53.4	32.6	121.7	38.7	55.1	NA	129.6	
	NICOLAUS-WILKINS SLOUGH 60KV [7710]	P1-2	N-1	100.6	103.1	111.3	NA	NA	NA	46.0	28.1	104.9	33.4	47.5	NA	111.7	
	VACA-DIX 115/60KV TB 5	P1-3	N-1	101.3	103.8	113.6	NA	NA	NA	46.2	28.3	107.2	33.5	48.1	NA	114.1	
	VACA-DIX 230/115KV TB 3	P1-3	N-1	102.8	106.0	115.0	NA	NA	NA	46.1	28.2	108.0	33.5	48.4	NA	115.6	
	VACA-DIX 230/115KV TB 4	P1-3	N-1	102.8	106.0	115.0	NA	NA	NA	46.1	28.2	108.0	33.5	48.4	NA	115.6	
	PLAINFLD SVD=V	P1-4	N-1	114.1	116.4	125.1	NA	NA	NA	41.3	28.1	117.6	33.4	57.2	NA	125.7	
	VACA-DIX 230KV SECTION 1E	P2-2	Bus Fault	103.7	106.8	116.0	NA	NA	NA	46.1	28.3	108.7	33.6	48.9	NA	117.3	
	VACA-DIX 230KV SECTION 2F	P2-2	Bus Fault	103.1	106.1	115.3	NA	NA	NA	46.2	28.3	108.0	33.5	49.0	NA	116.4	
	VACA-DIX 115KV - MIDDLE BREAKER BAY 6	P2-3	Non-Bus Tie Breaker Fault	102.8	105.8	115.1	NA	NA	NA	46.2	28.2	108.0	33.5	48.6	NA	115.7	
	VACA-DIX 230KV - SECTION 1E & 2E	P2-4	Bus Tie Breaker Falut	104.4	107.4	116.3	NA	NA	NA	46.1	28.3	109.4	33.6	49.4	NA	117.7	
	VACA-DIX 230KV - SECTION 2F & 2E	P2-4	Bus Tie Breaker Falut	103.4	106.4	115.3	NA	NA	NA	46.2	28.3	108.3	33.6	49.2	NA	116.5	
	Base Case	P0	N-0	115.4	118.2	127.6	NA	NA	NA	53.6	33.7	120.3	39.5	54.7	NA	128.1	
	NICOLAUS-WILKINS SLOUGH 60KV [7710]	P1-2	N-1	99.6	102.1	110.2	NA	NA	NA	46.2	29.1	103.8	34.1	47.2	NA	110.6	
	VACA-DIX 115/60KV TB 5	P1-3	N-1	100.3	102.8	112.4	NA	NA	NA	46.4	29.2	106.1	34.2	47.7	NA	112.9	

Study Area: PG&E Central Valley  
Thermal Overloads



Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading % (Baseline Scenarios)								Loading % (Sensitivity Scenarios)					Project & Potential Mitigation Solutions
				2022 Summer Peak	2025 Summer Peak	2030 Summer Peak	2022 Winter Peak	2025 Winter Peak	2030 Winter Peak	2022 Spring Off-Peak	2025 Spring Off-Peak	2025 SP High CEC Forecast	2025 SpOP Hi Renew & Min Gas Gen	2022 SP Heavy Renewable & Min Gas Gen	2030 Retirement of QF Generations	2030 Summer Peak w/o Facility Rerates	
VacaDixon-Plainfield 60 kV Line (Different sections))	VACA-DIX 230/115KV TB 3	P1-3	N-1	101.8	105.0	113.8	NA	NA	NA	46.3	29.2	106.9	34.2	48.1	NA	114.4	System Upgrade/ Preferred Resources/Operating Solution as needed
	VACA-DIX 230/115KV TB 4	P1-3	N-1	101.8	105.0	113.8	NA	NA	NA	46.3	29.2	106.9	34.2	48.1	NA	114.4	
	PLAINFLD SVD=V	P1-4	N-1	113.8	114.9	123.8	NA	NA	NA	41.0	29.1	116.3	34.1	56.5	NA	124.4	
	VACA-DIX 230KV SECTION 1E	P2-2	Bus Fault	102.7	105.7	114.8	NA	NA	NA	46.3	29.2	107.6	34.2	48.5	NA	116.1	
	VACA-DIX 230KV SECTION 2F	P2-2	Bus Fault	102.0	105.0	114.1	NA	NA	NA	46.4	29.2	106.9	34.2	48.6	NA	115.2	
	VACA-DIX 115KV - MIDDLE BREAKER BAY 6	P2-3	Non-Bus Tie Breaker Fault	101.9	104.9	113.9	NA	NA	NA	46.4	29.2	106.9	34.2	48.2	NA	114.5	
	VACA-DIX 230KV - SECTION 1E & 2E	P2-4	Bus Tie Breaker Falut	103.4	106.3	115.2	NA	NA	NA	46.3	29.3	108.3	34.3	49.0	NA	116.5	
	VACA-DIX 230KV - SECTION 2F & 2E	P2-4	Bus Tie Breaker Falut	102.3	105.3	114.2	NA	NA	NA	46.4	29.2	107.2	34.2	48.8	NA	115.3	
	Base Case	P0	N-0	111.9	113.8	121.6	NA	NA	NA	48.7	23.8	115.7	30.9	55.2	NA	122.0	
	PLAINFLD SVD=V	P1-4	N-1	109.6	108.8	115.8	NA	NA	NA	39.1	20.5	110.6	26.6	58.7	NA	116.4	
	VACA-DIX 230KV SECTION 1E	P2-2	Bus Fault	99.3	101.3	108.9	NA	NA	NA	42.0	20.6	103.2	26.7	49.3	NA	110.1	
	VACA-DIX 230KV SECTION 2F	P2-2	Bus Fault	98.6	100.7	108.2	NA	NA	NA	42.1	20.6	102.5	26.7	49.4	NA	109.2	
	VACA-DIX 115KV - MIDDLE BREAKER BAY 6	P2-3	Non-Bus Tie Breaker Fault	98.6	100.7	108.1	NA	NA	NA	42.1	20.6	102.5	26.7	48.9	NA	108.6	
	VACA-DIX 230KV - SECTION 1E & 2E	P2-4	Bus Tie Breaker Falut	100.0	101.9	109.2	NA	NA	NA	42.0	20.6	103.8	26.8	49.9	NA	110.4	
	VACA-DIX 230KV - SECTION 2F & 2E	P2-4	Bus Tie Breaker Falut	99.0	100.9	108.3	NA	NA	NA	42.1	20.6	102.8	26.8	49.7	NA	109.4	
Brighton-Davis 115 kV Line (Different sections)	WEST SACRAMENTO-BRIGHTON 115KV [4110]	P1-2	N-1	99.6	89.6	106.9	NA	NA	NA	42.5	23.9	92.0	22.6	44.1	NA	93.8	System Upgrade/ Preferred Resources/Operating Solution as needed
	WEST SACRAMENTO-BRIGHTON 115KV [4110] (DPWT_TP2-BRIGHTN)	P2-1	Line Section w/o Fault	99.4	89.3	106.7	NA	NA	NA	42.3	23.7	91.7	22.5	44.0	NA	93.6	
	W.SCRMNO - DE 115KV & WEST SACRAMENTO-BRIGHTON LINE	P2-3	Non-Bus Tie Breaker Fault	106.7	102.5	118.1	NA	NA	NA	45.6	26.6	105.7	26.1	41.8	NA	106.1	
	RIO OSO 115KV - SECTION 2D & 1D	P2-4	Bus Tie Breaker Falut	115.2	119.1	93.6	NA	NA	NA	56.8	16.3	121.3	19.0	58.8	NA	95.8	
	P7-1:A4:17_Rio Oso-West Sacramento 115 kV Line & West Sacramento-Brighton 115 kV Line	P7-1	DCTL	131.1	122.9	143.7	NA	NA	NA	53.8	26.2	125.2	25.0	55.2	NA	133.3	
	WEST SACRAMENTO-BRIGHTON 115KV [4110]	P1-2	N-1	117.8	106.2	126.2	NA	NA	NA	50.6	25.1	109.1	23.1	51.0	NA	110.6	
	WEST SACRAMENTO-BRIGHTON 115KV [4110] (DPWT_TP2-BRIGHTN)	P2-1	Line Section w/o Fault	117.5	105.9	126.0	NA	NA	NA	50.4	24.9	108.7	23.0	50.8	NA	110.3	
	W.SCRMNO 115KV SECTION DE	P2-2	Bus Fault	88.3	84.8	100.8	NA	NA	NA	42.7	19.4	87.7	19.5	35.8	NA	86.2	
	W.SCRMNO - DE 115KV & WEST SACRAMENTO-BRIGHTON LINE	P2-3	Non-Bus Tie Breaker Fault	126.2	121.4	139.5	NA	NA	NA	54.9	28.1	125.1	27.1	48.7	NA	125.3	
	RIO OSO 115KV - SECTION 2D & 1D	P2-4	Bus Tie Breaker Falut	136.6	141.2	111.2	NA	NA	NA	68.3	16.0	143.7	18.6	70.3	NA	113.8	
	P7-1:A4:16_Rio Oso-Woodland #1 115 kV Line & Rio Oso-Woodland #2 115 kV Line	P7-1	DCTL	111.0	114.1	87.5	NA	NA	NA	54.1	16.4	116.2	17.4	52.2	NA	85.5	
	P7-1:A4:17_Rio Oso-West Sacramento 115 kV Line & West Sacramento-Brighton 115 kV Line	P7-1	DCTL	154.7	145.3	169.4	NA	NA	NA	64.6	27.9	148.1	25.8	64.9	NA	157.2	
	P7-1:A5:15_Rio Oso-Woodland No. 1 115 kV Line & Rio Oso-Woodland No. 2 115 kV Line	P7-1	DCTL	111.0	114.1	87.5	NA	NA	NA	54.1	16.4	116.2	17.4	52.2	NA	85.5	
	WEST SACRAMENTO-BRIGHTON 115KV [4110]	P1-2	N-1	118.1	106.4	126.5	NA	NA	NA	50.8	26.1	109.2	24.2	51.7	NA	110.9	
	WEST SACRAMENTO-BRIGHTON 115KV [4110] (DPWT_TP2-BRIGHTN)	P2-1	Line Section w/o Fault	117.8	106.1	126.2	NA	NA	NA	50.7	26.0	108.9	24.0	51.6	NA	110.7	
	W.SCRMNO 115KV SECTION DE	P2-2	Bus Fault	88.4	84.7	101.0	NA	NA	NA	42.9	20.4	87.7	20.6	36.6	NA	86.4	
	W.SCRMNO - DE 115KV & WEST SACRAMENTO-BRIGHTON LINE	P2-3	Non-Bus Tie Breaker Fault	126.5	121.6	139.7	NA	NA	NA	55.0	29.2	125.3	28.1	49.3	NA	125.5	

Study Area: PG&E Central Valley  
Thermal Overloads



Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading % (Baseline Scenarios)								Loading % (Sensitivity Scenarios)					Project & Potential Mitigation Solutions
				2022 Summer Peak	2025 Summer Peak	2030 Summer Peak	2022 Winter Peak	2025 Winter Peak	2030 Winter Peak	2022 Spring Off-Peak	2025 Spring Off-Peak	2025 SP High CEC Forecast	2025 SpOP Hi Renew & Min Gas Gen	2022 SP Heavy Renewable & Min Gas Gen	2030 Retirement of QF Generations	2030 Summer Peak w/o Facility Rerates	
	RIO OSO 115KV - SECTION 2D & 1D	P2-4	Bus Tie Breaker Falut	136.7	141.3	111.3	NA	NA	NA	68.3	17.1	143.8	19.6	70.4	NA	113.9	
	P7-1:A4:16_Rio Oso-Woodland #1 115 kV Line & Rio Oso-Woodland #2 115 kV Line	P7-1	DCTL	111.1	114.2	87.6	NA	NA	NA	54.2	17.5	116.3	18.5	52.4	NA	85.7	
	P7-1:A4:17_Rio Oso-West Sacramento 115 kV Line & West Sacramento-Brighton 115 kV Line	P7-1	DCTL	155.0	145.5	169.7	NA	NA	NA	64.7	28.9	148.3	26.9	65.5	NA	157.5	
	P7-1:A5:15_Rio Oso-Woodland No. 1 115 kV Line & Rio Oso-Woodland No. 2 115 kV Line	P7-1	DCTL	111.1	114.2	87.6	NA	NA	NA	54.2	17.5	116.3	18.5	52.4	NA	85.7	
	P7-1:A4:17_Rio Oso-West Sacramento 115 kV Line & West Sacramento-Brighton 115 kV Line	P7-1	DCTL	106.0	99.4	116.2	NA	NA	NA	43.5	21.3	101.3	20.3	44.7	NA	107.8	
Salado-Newman #1 or #2 60 kV Lines (Different sections)	SALADO-CROWCREEK SS 60KV [0]	P1-2	N-1	88.7	94.2	113.5	NA	NA	NA	34.6	50.2	97.6	58.1	13.7	NA	112.7	System Upgrade/ Preferred Resources/Operating Solution as needed
	SALADO-NEWMAN #2 60KV [7870] MOAS OPENED ON CRWS LDG_CRWS LDJ	P1-2	N-1	67.9	72.7	85.4	NA	NA	NA	7.5	82.9	74.4	92.3	21.6	NA	100.4	
	SALADO-NEWMAN #2 60KV [7870] MOAS OPENED ON CRWS LDG_CRWS LDJ	P1-2	N-1	102.7	108.8	128.4	NA	NA	NA	39.6	53.5	110.7	61.9	15.9	NA	151.1	
	SALADO-NEWMAN #2 60KV [7870] MOAS OPENED ON CRWS LDG_CRWS LDJ	P1-2	N-1	95.9	101.6	122.1	NA	NA	NA	37.0	23.0	103.5	28.9	51.6	NA	143.6	
	SALADO-NEWMAN #2 60KV [7870] MOAS OPENED ON CRWS LDG_CRWS LDJ	P1-2	N-1	79.9	84.1	100.7	NA	NA	NA	30.2	30.4	85.5	36.7	38.5	NA	100.0	
	CROWCREEK SS-NEWMAN 60KV [0]	P1-2	N-1	87.6	93.4	113.2	NA	NA	NA	34.0	22.0	95.4	27.6	47.5	NA	112.6	
	SALADO-CROWCREEK SS 60KV [0]	P1-2	N-1	89.2	95.0	113.5	NA	NA	NA	34.7	50.2	97.6	58.1	14.1	NA	112.7	
	SALADO-NEWMAN #2 60KV [7870] MOAS OPENED ON CRWS LDG_CRWS LDJ	P1-2	N-1	102.4	109.2	129.6	NA	NA	NA	39.4	24.4	111.1	30.5	54.3	NA	128.7	
	CROWCREEK SS-NEWMAN 60KV [0]	P1-2	N-1	93.7	100.6	120.2	NA	NA	NA	36.3	23.3	102.6	29.1	50.2	NA	119.7	
	SALADO-CROWCREEK SS 60KV [0]	P1-2	N-1	95.2	102.2	120.6	NA	NA	NA	36.8	51.1	104.8	59.4	14.5	NA	119.7	
Atlantic-Gold Hill 230 kV Line	GOLDHILL 230KV SECTION 2D	P2-2	Bus Fault	57.8	7.0	12.1	NA	NA	NA	44.3	8.7	8.2	17.8	103.9	NA	5.5	Sensitivity only
Atlantic-Gold Hill 230 kV Line	GOLDHILL - 2D 230KV & MIDDLE FORK-GOLD HILL LINE	P2-3	Non-Bus Tie Breaker Fault	57.8	NA	NA	NA	NA	NA	44.3	NA	NA	NA	103.9	NA	NA	Sensitivity only
Bellota-Riverbank-Melones 115 kV Line	BELLOTA 230KV - SECTION 1E & 2E	P2-4	Bus Tie Breaker Falut	111.8	98.5	111.7	NA	NA	NA	35.4	9.1	114.7	16.0	45.2	NA	111.9	SPS recommended in 2019-2020 TPP
Bellota-Riverbank-Melones 115 kV Line (Bellota-Riverbank Tap)	BELLOTA 230KV - SECTION 1E & 2E	P2-4	Bus Tie Breaker Falut	110.1	98.8	98.2	NA	NA	NA	43.5	8.1	114.3	4.0	52.0	NA	102.5	SPS recommended in 2019-2020 TPP
Bellota-Riverbank-Melones 115 kV Line (Melones-Tulloch)	BELLOTA 230KV - SECTION 1E & 2E	P2-4	Bus Tie Breaker Falut	191.4	162.2	172.5	NA	NA	NA	62.7	22.9	190.3	33.8	67.4	NA	181.7	SPS recommended in 2019-2020 TPP
Bellota-Riverbank-Melones 115 kV Line (Riverbank Tap-Tulloch)	BELLOTA 230KV - SECTION 1E & 2E	P2-4	Bus Tie Breaker Falut	221.6	195.2	208.6	NA	NA	NA	78.8	1.7	226.0	13.6	96.8	NA	213.5	SPS recommended in 2019-2020 TPP
Cortina 230/60 kV Transformer Bank 1	CORTINA 230/115KV TB 4	P1-3	N-1	103.1	107.0	107.5	NA	NA	NA	66.1	94.9	108.0	99.9	54.1	NA	1.1	Operating procedure
	CORTINA 230KV - RING R2 & R1	P2-3	Non-Bus Tie Breaker Fault	82.2	85.7	88.2	NA	NA	NA	43.4	89.9	86.7	105.0	25.6	NA	0.8	Under Review
CURTISS-MI-WUK 115 kV	BELLOTA 230KV - SECTION 1E & 2E	P2-4	Bus Tie Breaker Falut	95.5	93.5	105.2	NA	NA	NA	77.9	22.1	100.5	22.3	86.9	NA	95.3	SPS recommended in 2019-2020 TPP
Delta Pumps-Tesla 230 kV Line (Delta Pumps-Altamont)	VACA-DIX 230KV SECTION NA	P2-2	Bus Fault	23.3	31.7	30.8	NA	NA	NA	103.6	57.7	31.8	14.9	95.1	NA	48.9	Under Review
	BDLSWSTA 230KV - MIDDLE BREAKER BAY 2	P2-3	Non-Bus Tie Breaker Fault	21.1	28.0	28.9	NA	NA	NA	106.1	66.2	27.9	52.5	Diverge	NA	60.2	Under review
	VACA-DIXON 230KV BUS (FAILURE OF NON-REDUNDENT RELAY)	P5-5	Non-Redundant Relay	11.5	19.5	18.1	NA	NA	NA	107.6	61.8	19.5	24.2	Diverge	NA	53.8	Under Review
	P7-1:A4:13_Birds Landing-CC Sub 230kV Line & Birds Landing-Contra Costa PP 230kV Line	P7-1	DCTL	21.0	27.9	28.9	NA	NA	NA	106.1	66.2	27.8	52.5	105.0	NA	60.3	Under review
Drum - Grass Valley - Weimar 60 kV Line	COLGATE-GRASS VALLEY 60KV [6490]	P1-2	N-1	78.1	79.7	76.4	NA	NA	NA	45.3	10.5	78.2	19.4	104.2	NA	98.5	Continue to monitor
	COLGATE-GRASS VALLEY 60KV [6490]	P1-2	N-1	35.4	23.1	105.3	NA	NA	NA	17.9	28.9	24.2	30.5	14.2	NA	25.1	Continue to monitor

Study Area: PG&E Central Valley  
Thermal Overloads



Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading % (Baseline Scenarios)								Loading % (Sensitivity Scenarios)					Project & Potential Mitigation Solutions
				2022 Summer Peak	2025 Summer Peak	2030 Summer Peak	2022 Winter Peak	2025 Winter Peak	2030 Winter Peak	2022 Spring Off-Peak	2025 Spring Off-Peak	2025 SP High CEC Forecast	2025 SpOP Hi Renew & Min Gas Gen	2022 SP Heavy Renewable & Min Gas Gen	2030 Retirement of QF Generations	2030 Summer Peak w/o Facility Rerates	
Drum - Rio Oso 115 kV No. 1 Line	P7-1:A5:19_Placer-Gold Hill No. 1 115 kV Line and Placer-Gold Hill No. 2 115 kV Line	P7-1	DCTL	12.6	24.5	130.1	NA	NA	NA	45.8	15.8	25.8	6.6	18.6	NA	33.3	Under review
Drum - Rio Oso 115 kV No. 2 Line	P7-1:A5:19_Placer-Gold Hill No. 1 115 kV Line and Placer-Gold Hill No. 2 115 kV Line	P7-1	DCTL	13.6	26.7	165.4	NA	NA	NA	59.4	41.4	28.3	22.3	26.7	NA	36.8	Under review
Drum-Grass Valley-Weimar 60 kV Line (Drum-Bonnie N)	COLGATE-GRASS VALLEY 60KV [6490]	P1-2	N-1	46.9	42.3	102.1	NA	NA	NA	13.5	32.7	43.8	35.9	19.4	NA	44.8	Continue to monitor
	P7-1:A5:19_Placer-Gold Hill No. 1 115 kV Line and Placer-Gold Hill No. 2 115 kV Line	P7-1	DCTL	62.2	56.8	119.5	NA	NA	NA	7.2	26.7	58.2	30.2	33.1	NA	59.1	Under review
Drum-Higgins 115 kV Line (Chicago Park-Higgins)	GOLDHILL 115KV - SECTION 1F & 2F	P2-4	Bus Tie Breaker Falut	117.4	63.7	32.8	NA	NA	NA	34.9	4.8	63.7	5.4	47.2	NA	68.0	- Gold Hill 230/115 kV Transformer Addition Project - Expected ISD: Dec. 2024 - Short term: Action Plan
	P7-1:A5:19_Placer-Gold Hill No. 1 115 kV Line and Placer-Gold Hill No. 2 115 kV Line	P7-1	DCTL	84.2	87.6	117.6	NA	NA	NA	28.5	22.8	89.4	16.6	39.1	NA	104.0	Under review
Drum-Higgins 115 kV Line (Drum-Dutch Flat 1)	GOLDHILL 115KV - SECTION 1F & 2F	P2-4	Bus Tie Breaker Falut	143.8	56.4	20.5	NA	NA	NA	12.5	58.7	56.2	31.4	25.9	NA	62.4	- Gold Hill 230/115 kV Transformer Addition Project - Expected ISD: Dec. 2024 - Short term: Action Plan
	PLACER-GOLD HILL #1 115KV [3340] & PLACER-GOLD HILL #2 115KV [4290]	P6	N-1-1	<100	<100	176.1	NA	NA	NA	<100	100.3	<100	<100	<100	NA	107.9	Continue to monitor
	PLACER-GOLD HILL #2 115KV [4290] & PLACER-GOLD HILL #1 115KV [3340]	P6	N-1-1	<100	<100	177.9	NA	NA	NA	<100	100.3	<100	<100	<100	NA	107.8	Continue to monitor
	P7-1:A5:19_Placer-Gold Hill No. 1 115 kV Line and Placer-Gold Hill No. 2 115 kV Line	P7-1	DCTL	88.3	96.9	160.8	NA	NA	NA	19.8	105.3	99.8	63.8	16.7	NA	119.0	Continue to monitor
	P7-1:A5:7_Atantic-Gold Hill 230 kV Line & Rio Oso-Gold Hill 230 kV Line	P7-1	DCTL	58.4	47.4	19.5	NA	NA	NA	46.9	31.0	45.1	4.8	102.8	NA	55.7	Sensitivity only
Drum-Rio Oso #1 115 kV Line (Brunswick Tap 1-Dutch Flat 2)	BRNSWALT 115KV - RING R4 & R3	P2-3	Non-Bus Tie Breaker Fault	105.5	91.8	33.0	NA	NA	NA	116.8	5.3	92.0	3.9	97.5	NA	90.9	Under review
	P7-1:A5:19_Placer-Gold Hill No. 1 115 kV Line and Placer-Gold Hill No. 2 115 kV Line	P7-1	DCTL	21.2	9.0	130.0	NA	NA	NA	77.8	47.9	7.5	26.5	51.0	NA	13.3	Under review
Drum-Rio Oso #1 115 kV Line (Brunswick Tap-Rio Oso)	BRNSWALT 115KV - RING R4 & R3	P2-3	Non-Bus Tie Breaker Fault	40.9	30.5	109.5	NA	NA	NA	86.9	9.8	29.6	10.1	51.2	NA	32.7	Under review
	P7-1:A5:19_Placer-Gold Hill No. 1 115 kV Line and Placer-Gold Hill No. 2 115 kV Line	P7-1	DCTL	2.9	16.1	157.6	NA	NA	NA	66.0	48.5	17.7	28.9	36.5	NA	26.7	Under review
Drum-Rio Oso #2 115 kV Line (Drum-Brunswick Tap 2)	P7-1:A5:19_Placer-Gold Hill No. 1 115 kV Line and Placer-Gold Hill No. 2 115 kV Line	P7-1	DCTL	31.5	17.6	111.5	NA	NA	NA	78.5	50.4	16.6	29.3	59.0	NA	16.9	Under review
East Marysville-East Marysville Jct 115 kV	PALERMO-NICOLAUS 115KV [3210] MOAS OPENED ON PALERMO_E.MRY J2 & RIO OSO-NICOLAUS 115KV [3440]	P6	N-1-1	<100	<100	<100	NA	NA	NA	<100	<100	<100	<100	<100	NA	148.3	Sensitivity only
	RIO OSO-NICOLAUS 115KV [3440] & PALERMO-NICOLAUS 115KV [3210] MOAS OPENED ON PALERMO_E.MRY J2	P6	N-1-1	<100	<100	<100	NA	NA	NA	<100	<100	<100	<100	<100	NA	147.3	Sensitivity only
El Dorado-Missouri Flat #1 115 kV Line (Apple Hill Tap 1-Placerville Tap 1)	MISSOURI FLAT-GOLD HILL #2 115KV [2670] (GOLDHILL-SHPRING2)	P2-1	Line Section w/o Fault	192.4	82.7	85.2	NA	NA	NA	66.9	10.6	84.2	11.6	97.2	NA	85.4	Load Reconfiguration Recommended in 2017-2018 TPP
	MISSOURI FLAT-GOLD HILL #2 115KV [2670] (GOLDHILL-SHPRING2)	P2-1	Line Section w/o Fault	145.4	57.5	59.0	NA	NA	NA	42.2	28.1	58.3	8.6	63.4	NA	70.2	Load Reconfiguration Recommended in 2017-2018 TPP
	GOLDHILL 115KV SECTION 2F	P2-2	Bus Fault	18.3	94.8	96.7	NA	NA	NA	3.9	19.7	96.9	28.7	9.1	NA	115.0	Sensitivity only
	GOLDHILL 115KV - SECTION 1F & 2F	P2-4	Bus Tie Breaker Falut	18.3	96.6	96.5	NA	NA	NA	3.6	19.7	97.8	28.8	9.2	NA	114.8	Sensitivity only
	GOLDHILL 115KV - SECTION 2G & 2F	P2-4	Bus Tie Breaker Falut		95.5	96.5	NA	NA	NA		19.7	97.3	28.7		NA	115.2	Sensitivity only



Study Area: PG&E Central Valley  
Thermal Overloads



Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading % (Baseline Scenarios)								Loading % (Sensitivity Scenarios)					Project & Potential Mitigation Solutions
				2022 Summer Peak	2025 Summer Peak	2030 Summer Peak	2022 Winter Peak	2025 Winter Peak	2030 Winter Peak	2022 Spring Off-Peak	2025 Spring Off-Peak	2025 SP High CEC Forecast	2025 SpOP Hi Renew & Min Gas Gen	2022 SP Heavy Renewable & Min Gas Gen	2030 Retirement of QF Generations	2030 Summer Peak w/o Facility Rerates	
El Dorado-Missouri Flat #2 115 kV Line (Apple Hill Tap 2-Placerville Tap 2)	MISSOURI FLAT-GOLD HILL #2 115KV [2670] (GOLDHILL-SHPRING2)	P2-1	Line Section w/o Fault	59.9	59.7	56.8	NA	NA	NA	41.9	22.9	57.7	34.2	101.8	NA	78.2	Sensitivity only
El Dorado-Missouri Flat #2 115 kV Line (El Dorado-Apple Hill Tap 2)	MISSOURI FLAT-GOLD HILL #2 115KV [2670] (GOLDHILL-SHPRING2)	P2-1	Line Section w/o Fault	192.3	82.7	85.1	NA	NA	NA	67.2	10.8	84.1	12.0	97.0	NA	85.3	Load Reconfiguration Recommended in 2017-2018 TPP
Higgins-Bell 115 kV Line	GOLDHILL 115KV - SECTION 1F & 2F	P2-4	Bus Tie Breaker Falut	114.5	54.9	16.3	NA	NA	NA	32.0	4.3	54.7	4.0	43.4	NA	57.9	Load Reconfiguration Recommended in 2017-2018 TPP
	P7-1:A5:19_Placer-Gold Hill No. 1 115 kV Line and Placer-Gold Hill No. 2 115 kV Line	P7-1	DCTL	76.8	81.3	105.3	NA	NA	NA	24.6	27.4	83.0	17.6	33.4	NA	97.5	Under review
Lawrence Lab 115 kV Tap #1	TESLA D 230KV - SECTION 1D & 2D	P2-4	Bus Tie Breaker Falut	50.8	84.6	150.5	NA	NA	NA	19.7	157.0	97.8	186.8	64.2	NA	166.8	Continue to monitor
	TESLA 230kV BUS D (FAILURE OF NON-REDUNDENT RELAY)	P5-5	Non-Redundant Relay	50.8	84.6	150.5	NA	NA	NA	19.7	157.0	97.8	186.8	57.6	NA	166.8	Continue to monitor
Lincoln - Pleasant Grove 115 kV Line	P7-1:A5:2_Rio Oso-Atlantic 230 kV Line & Rio Oso-Gold Hill 230 kV Line	P7-1	DCTL	0.0	0.0	0.0	NA	NA	NA	125.2	18.8	0.0	15.7	0.0	NA	0.0	Sensitivity only
	P7-1:A5:2_Rio Oso-Atlantic 230 kV Line & Rio Oso-Gold Hill 230 kV Line	P7-1	DCTL	57.4	50.9	111.3	NA	NA	NA	7.9	26.7	52.3	30.0	30.2	NA	52.9	Sensitivity only
Nicolaus - Marysville 60 kV Line (Plumas-East Nicolaus)	Base Case	P0	N-0	76.4	88.7	100.3	NA	NA	NA	36.5	32.7	89.7	37.4	36.8	NA	100.4	Under review
	PALERMO-NICOLAUS 115KV [3210] MOAS OPENED ON PALERMO_E.MRY J2 & RIO OSO-NICOLAUS 115KV [3440]	P6	N-1-1	<100	<100	115.1	NA	NA	NA	<100	<100	<100	<100	<100	NA	117.1	Continue to monitor
	RIO OSO-NICOLAUS 115KV [3440] & PALERMO-NICOLAUS 115KV [3210] MOAS OPENED ON PALERMO_E.MRY J2	P6	N-1-1	<100	<100	116.1	NA	NA	NA	<100	<100	<100	<100	<100	NA	116.3	Continue to monitor
Palermo-Pease 115 kV Line (Pease-Honcut Jct 1)	PALERMO-NICOLAUS 115KV [3210] MOAS OPENED ON PALERMO_E.MRY J2 & RIO OSO-NICOLAUS 115KV [3440]	P6	N-1-1	<100	100.5	<100	NA	NA	NA	<100	<100	100.5	<100	<100	NA	111.5	Continue to monitor
	PALERMO-NICOLAUS 115KV [3210] MOAS OPENED ON PALERMO_E.MRY J2 & TABLE MTN-RIO OSO 230KV [5700]	P6	N-1-1	<100	<100	<100	NA	NA	NA	<100	<100	<100	<100	<100	NA	105.7	Continue to monitor
	P7-1:A5:5_Colgate-Rio Oso 230 kV Line & Table Mountain-Rio Oso 230 kV Line	P7-1	DCTL	98.7	97.8	110.2	NA	NA	NA	37.6	38.1	100.5	39.8	55.4	NA	103.1	Continue to monitor
	P7-1:A5:6_Table Mountain-Rio Oso 230 kV Line & Palermo-Colgate 230 kV Line	P7-1	DCTL	93.3	94.2	105.7	NA	NA	NA	34.8	41.7	96.7	43.6	40.8	NA	98.2	Continue to monitor
Peachton-Pease 60 kV Line (Gridley-Live Oak)	P7-1:A5:20_Palermo-Pease 115 kV Line amd Pease-Rio Oso 115 kV Line	P7-1	DCTL	166.3	79.5	80.9	NA	NA	NA	54.9	31.4	80.6	13.1	72.2	NA	96.1	- East Marysville 115/60 kV Transformer Project - Expected ISD: Dec. 2022 - Short term: Action Plan
Pease-Rio Oso 115 kV Line (Olivehurst Jct 1-E. Marysville Jct 1)	RIO OSO 230KV SECTION 1D	P2-2	Bus Fault	73.0	30.6	40.3	NA	NA	NA	32.2	9.8	31.9	8.0	102.5	NA	92.6	Sensitivity only
	RIO OSO - 1D 230KV & COLGATE-RIO OSO LINE	P2-3	Non-Bus Tie Breaker Fault	73.0	30.6	40.3	NA	NA	NA	32.2	9.8	31.9	8.0	102.5	NA	92.6	Sensitivity only
	P7-1:A5:5_Colgate-Rio Oso 230 kV Line & Table Mountain-Rio Oso 230 kV Line	P7-1	DCTL	85.7	39.3	53.5	NA	NA	NA	31.2	19.5	40.7	16.4	116.2	NA	114.0	Sensitivity only
	P7-1:A5:6_Table Mountain-Rio Oso 230 kV Line & Palermo-Colgate 230 kV Line	P7-1	DCTL	81.8	38.5	51.5	NA	NA	NA	29.2	19.7	39.5	16.8	98.8	NA	110.2	Sensitivity only
Pease-Rio Oso 115 kV Line (Olivehurst Jct 1-Rio Oso)	P7-1:A5:5_Colgate-Rio Oso 230 kV Line & Table Mountain-Rio Oso 230 kV Line	P7-1	DCTL	74.0	31.6	42.6	NA	NA	NA	32.4	17.8	32.9	13.2	112.8	NA	94.0	Sensitivity only
	RIO OSO 230KV SECTION 1D	P2-2	Bus Fault	73.3	30.8	40.4	NA	NA	NA	32.7	9.9	32.0	8.1	102.7	NA	92.8	Sensitivity only
	RIO OSO - 1D 230KV & COLGATE-RIO OSO LINE	P2-3	Non-Bus Tie Breaker Fault	73.3	30.8	40.4	NA	NA	NA	32.7	9.9	32.0	8.1	102.7	NA	92.8	Sensitivity only

Study Area: PG&E Central Valley  
Thermal Overloads



Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading % (Baseline Scenarios)								Loading % (Sensitivity Scenarios)					Project & Potential Mitigation Solutions
				2022 Summer Peak	2025 Summer Peak	2030 Summer Peak	2022 Winter Peak	2025 Winter Peak	2030 Winter Peak	2022 Spring Off-Peak	2025 Spring Off-Peak	2025 SP High CEC Forecast	2025 SpOP Hi Renew & Min Gas Gen	2022 SP Heavy Renewable & Min Gas Gen	2030 Retirement of QF Generations	2030 Summer Peak w/o Facility Rerates	
Pease-Rio Oso 115 kV Line (Pease-E. Marysville Jct 1)	P7-1:A5:13_Palermo-Nicolaus 115 kV Line & Bogue-Rio Oso 115 kV Line	P7-1	DCTL	78.0	32.1	38.4	NA	NA	NA	34.8	14.5	33.0	12.8	107.5	NA	89.3	Sensitivity only
	P7-1:A5:5_Colgate-Rio Oso 230 kV Line & Table Mountain-Rio Oso 230 kV Line	P7-1	DCTL	86.0	39.4	53.6	NA	NA	NA	31.7	19.5	40.8	16.4	116.4	NA	114.2	Sensitivity only
	P7-1:A5:6_Table Mountain-Rio Oso 230 kV Line & Palermo-Colgate 230 kV Line	P7-1	DCTL	82.0	38.6	51.6	NA	NA	NA	29.7	19.8	39.6	16.8	99.0	NA	110.4	Sensitivity only
Placer - Bell 115 kV Line	GOLDHILL 115KV - SECTION 1F & 2F	P2-4	Bus Tie Breaker Falut	106.6	41.3	15.5	NA	NA	NA	27.0	6.9	40.9	8.5	35.8	NA	41.7	- Gold Hill 230/115 kV Transformer Addition Project - Expected ISD: Dec. 2024 - Short term: Action Plan
	P7-1:A5:7_Atlantic-Gold Hill 230 kV Line & Rio Oso-Gold Hill 230 kV Line	P7-1	DCTL	50.6	40.3	44.2	NA	NA	NA	65.2	27.8	37.7	34.0	105.9	NA	47.0	Sensitivity only
Rio Oso 230/115 kV Transformer Bank 1	BRIGHTN 115KV SECTION ME	P2-2	Bus Fault	103.7	46.8	65.1	NA	NA	NA	62.7	2.7	47.9	4.5	42.2	NA	2.6	- Rio Oso Transformer Upgrade Project - Expected ISD: Jun. 2022 - Short term: Action Plan
	BRIGHTN - ME 115KV & BRIGHTON-DAVIS LINE	P2-3	Non-Bus Tie Breaker Fault	103.8	46.8	65.1	NA	NA	NA	62.8	2.6	47.9	4.5	42.3	NA	2.6	- Rio Oso Transformer Upgrade Project - Expected ISD: Jun. 2022 - Short term: Action Plan
	BRIGHTN - ME 115KV & BRIGHTON-GRAND ISLAND #1 LINE	P2-3	Non-Bus Tie Breaker Fault	103.7	46.8	65.1	NA	NA	NA	62.7	2.7	47.9	4.5	42.2	NA	2.6	- Rio Oso Transformer Upgrade Project - Expected ISD: Jun. 2022 - Short term: Action Plan
	BRIGHTN - ME 115KV & BRIGHTON-GRAND ISLAND #2 LINE	P2-3	Non-Bus Tie Breaker Fault	103.7	46.8	65.1	NA	NA	NA	62.7	2.7	47.9	4.5	42.2	NA	2.6	- Rio Oso Transformer Upgrade Project - Expected ISD: Jun. 2022 - Short term: Action Plan
	BRIGHTN - ME 115KV & WEST SACRAMENTO-BRIGHTON LINE	P2-3	Non-Bus Tie Breaker Fault	103.7	46.9	65.1	NA	NA	NA	62.7	2.7	47.9	4.5	42.2	NA	2.6	- Rio Oso Transformer Upgrade Project - Expected ISD: Jun. 2022 - Short term: Action Plan
	BRIGHTN 115KV - SECTION ME & MD	P2-4	Bus Tie Breaker Falut	103.7	46.9	65.1	NA	NA	NA	62.7	2.7	47.9	4.5	42.2	NA	2.6	- Rio Oso Transformer Upgrade Project - Expected ISD: Jun. 2022 - Short term: Action Plan
	P7-1:A5:2_Rio Oso-Atlantic 230 kV Line & Rio Oso-Gold Hill 230 kV Line	P7-1	DCTL	104.4	43.9	55.2	NA	NA	NA	63.2	7.6	43.8	8.8	68.7	NA	2.4	- Rio Oso Transformer Upgrade Project - Expected ISD: Jun. 2022 - Short term: Action Plan
Rio Oso 230/115 kV Transformer Bank 2	RIO OSO 230KV SECTION 1D	P2-2	Bus Fault	102.9	55.7	82.8	NA	NA	NA	54.9	7.0	55.5	10.8	28.2	NA	3.5	- Rio Oso Transformer Upgrade Project - Expected ISD: Jun. 2022 - Short term: Action Plan
	RIO OSO - 1D 230KV & COLGATE-RIO OSO LINE	P2-3	Non-Bus Tie Breaker Fault	102.9	55.7	82.8	NA	NA	NA	54.9	7.0	55.5	10.8	28.2	NA	3.5	- Rio Oso Transformer Upgrade Project - Expected ISD: Jun. 2022 - Short term: Action Plan
	P7-1:A5:2_Rio Oso-Atlantic 230 kV Line & Rio Oso-Gold Hill 230 kV Line	P7-1	DCTL	102.0	43.9	55.2	NA	NA	NA	57.6	7.6	43.8	8.8	67.2	NA	2.4	- Rio Oso Transformer Upgrade Project - Expected ISD: Jun. 2022 - Short term: Action Plan
Rio Oso-Brighton 230 kV Line	RIO OSO 115KV - SECTION 2D & 1D	P2-4	Bus Tie Breaker Falut	101.4	88.1	73.6	NA	NA	NA	58.2	12.3	87.2	10.9	95.0	NA	110.2	- Rio Oso Transformer Upgrade Project - Expected ISD: Jun. 2022 - Short term: Action Plan
	LOCKEFORD 230kV BUS (FAILURE OF NON-REDUNDENT RELAY)	P5-5	Non-Redundant Relay	65.2	42.9	101.7	NA	NA	NA	42.0	10.8	40.8	10.9	80.0	NA	107.5	- Rio Oso Transformer Upgrade Project - Expected ISD: Jun. 2022 - Short term: Action Plan

Study Area: PG&E Central Valley  
Thermal Overloads



Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading % (Baseline Scenarios)								Loading % (Sensitivity Scenarios)					Project & Potential Mitigation Solutions
				2022 Summer Peak	2025 Summer Peak	2030 Summer Peak	2022 Winter Peak	2025 Winter Peak	2030 Winter Peak	2022 Spring Off-Peak	2025 Spring Off-Peak	2025 SP High CEC Forecast	2025 SpOP Hi Renew & Min Gas Gen	2022 SP Heavy Renewable & Min Gas Gen	2030 Retirement of QF Generations	2030 Summer Peak w/o Facility Rerates	
Rio Oso-Nicolaus 115 kV Line	PALERMO-NICOLAUS 115KV [3210] MOAS OPENED ON PALERMO_E.MRY J2 & PALERMO-PEASE 115KV [3220] MOAS OPENED ON PALERMO_HONC JT1	P6	N-1-1	<100	<100	<100	NA	NA	NA	<100	<100	<100	<100	<100	NA	113.8	Sensitivity only
	PALERMO-PEASE 115KV [3220] MOAS OPENED ON PALERMO_HONC JT1 & PALERMO-NICOLAUS 115KV [3210] MOAS OPENED ON PALERMO_E.MRY J2	P6	N-1-1	<100	<100	<100	NA	NA	NA	<100	<100	<100	<100	<100	NA	115.4	Sensitivity only
Rio Oso-West Sacramento 115 kV Line	BRIGHTON 230KV BUS (FAILURE OF NON-REDUNDENT RELAY)	P5-5	Non-Redundant Relay	91.0	98.7	119.2	NA	NA	NA	58.9	6.4	100.7	3.6	71.4	NA	137.4	Under Review
	P7-1:A5:3_Rio Oso-Brighton 230 kV Line & Rio Oso-Lockeford 230 kV Line	P7-1	DCTL	77.9	68.8	63.3	NA	NA	NA	47.3	8.1	67.7	4.5	84.7	NA	107.7	Sensitivity only
Riverbank Jct-Manteca 115 kV Line (Melones Jct B-Riverbank Jct)	RPNJ2-MANTECA 115KV [0] NO FAULT	P2-1	Line Section w/o Fault	89.8	112.0	125.1	NA	NA	NA	36.7	24.3	113.5	27.1	45.6	NA	125.6	Under review
	RPNJ2-RIPON 115KV [0] NO FAULT	P2-1	Line Section w/o Fault	89.9	112.1	125.2	NA	NA	NA	36.7	24.0	113.5	26.8	45.6	NA	125.7	Under review
	STANISLAUS-MELONES SW STA-MANTECA #1 115KV [3830] (MELNS JA-AVENATP1)	P2-1	Line Section w/o Fault	52.0	58.1	59.6	NA	NA	NA	101.3	96.6	57.6	96.3	80.9	NA	45.0	Under review
Riverbank Jct-Manteca 115 kV Line (Riverbank Jct-Valley Home Tap)	RPNJ2-MANTECA 115KV [0] NO FAULT	P2-1	Line Section w/o Fault	85.9	106.9	120.0	NA	NA	NA	35.1	21.4	108.8	24.3	43.8	NA	120.4	Under review
	RPNJ2-RIPON 115KV [0] NO FAULT	P2-1	Line Section w/o Fault	86.0	107.0	120.1	NA	NA	NA	35.1	21.2	108.9	24.1	43.8	NA	120.5	Under review
Smartville-Marysville 60 kV Line (Browns Valley-Marysville)	P7-1:A5:20_Palermo-Pease 115 kV Line amd Pease-Rio Oso 115 kV Line	P7-1	DCTL	6.9	7.3	8.3	NA	NA	NA	127.7	17.2	7.4	12.4	3.2	NA	8.3	Under review
Smartville-Marysville 60 kV Line (Smartville-Yuba Gold)	P7-1:A5:20_Palermo-Pease 115 kV Line amd Pease-Rio Oso 115 kV Line	P7-1	DCTL	172.9	65.6	49.7	NA	NA	NA	0.0	0.0	65.1	0.0	99.1	NA	97.1	- East Marysville 115/60 kV Transformer Project - Expected ISD: Dec. 2022 - Short term: Action Plan
Smartville-Marysville 60 kV Line (Yuba Gold-Browns Valley)	P7-1:A5:20_Palermo-Pease 115 kV Line amd Pease-Rio Oso 115 kV Line	P7-1	DCTL	7.2	7.6	8.6	NA	NA	NA	128.1	17.5	7.7	12.7	3.5	NA	8.6	- East Marysville 115/60 kV Transformer Project - Expected ISD: Dec. 2022 - Short term: Action Plan
Spring Gap-MI-WUK 115 kV Line	BELLOTA 230KV - SECTION 1E & 2E	P2-4	Bus Tie Breaker Falut	99.4	97.9	109.7	NA	NA	NA	77.2	17.2	104.9	17.0	89.5	NA	99.5	SPS recommended in 2019-2020 TPP
Stanislaus-Melones-Manteca #1 115 kV Line (Melones-Melones Jct A)	BELLOTA 230KV - SECTION 1E & 2E	P2-4	Bus Tie Breaker Falut	123.3	104.4	106.0	NA	NA	NA	8.5	42.6	121.1	57.0	28.0	NA	118.8	SPS recommended in 2019-2020 TPP
Stanislaus-Melones-Riverbank Jct 115 kV Line (Melones-Melones Jct B)	BELLOTA 230KV - SECTION 1E & 2E	P2-4	Bus Tie Breaker Falut	127.5	105.6	107.6	NA	NA	NA	6.2	45.3	123.1	60.1	28.3	NA	120.8	SPS recommended in 2019-2020 TPP
West Sacramento - Brighton 115 kV Line	RIO OSO 115KV - SECTION 2D & 1D	P2-4	Bus Tie Breaker Falut	99.2	101.9	86.6	NA	NA	NA	49.2	12.6	103.7	13.6	55.6	NA	88.5	- Rio Oso Transformer Upgrade Project - Expected ISD: Jun. 2022 - Short term: Action Plan
	P7-1:A4:17_Rio Oso-West Sacramento 115 kV Line & West Sacramento-Brighton 115 kV Line	P7-1	DCTL	94.5	93.3	101.1	NA	NA	NA	43.2	11.5	94.8	9.5	63.8	NA	102.0	Continue to monitor
Woodland-Davis 115 kV Line (Davis-Q653F Jct)	BRIGHTON 230KV BUS (FAILURE OF NON-REDUNDENT RELAY)	P5-5	Non-Redundant Relay	99.5	88.7	106.0	NA	NA	NA	58.0	19.7	90.4	13.2	75.0	NA	124.0	Under Review
Woodland-Davis 115 kV Line (Woodland tap-Q653F Jct)	BRIGHTON 230KV BUS (FAILURE OF NON-REDUNDENT RELAY)	P5-5	Non-Redundant Relay	99.5	88.7	106.0	NA	NA	NA	58.1	13.9	90.4	7.6	60.8	NA	153.4	Under Review

Study Area: PG&E Central Valley

Low Voltages



Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)								Voltage PU (Sensitivity Scenarios)					Project & Potential Mitigation Solutions
				2022 Summer Peak	2025 Summer Peak	2030 Summer Peak	2022 Winter Peak	2025 Winter Peak	2030 Winter Peak	2022 Spring Off-Peak	2025 Spring Off-Peak	2025 SP High CEC Forecast	2025 SpOP Hi Renew & Min Gas Gen	2022 SP Heavy Renewable & Min Gas Gen	2030 Retirement of QF Generations	2030 Summer Peak w/o Facility Rerates	
ATLANTC 230kV	Base Case	P0	N-0	0.97	1.00	0.96	NA	NA	NA	1.02	1.06	1.00	1.07	0.95	NA	NA	- Rio Oso Area 230 kV Voltage Support Project - Expected ISD: Sep. 2022 - Short term: Action Plan
BONNIE N 60kV	Base Case	P0	N-0	1.01	1.01	0.94	NA	NA	NA	1.01	1.01	1.01	1.01	1.01	NA	NA	Continue to monitor
BRIGHTON 230kV	KASSON - 1D 115kV & SCHULTE SW STA-KASSON-MANTECA LINE	P0	N-0	0.96	0.99	0.94	NA	NA	NA	1.01	1.03	0.99	1.04	0.93	NA	NA	Continue to monitor
CAPEHORN 60kV	Base Case	P0	N-0	1.01	1.00	0.91	NA	NA	NA	1.02	1.02	1.00	1.02	1.01	NA	NA	Continue to monitor
CORDELLT 115kV	Base Case	P0	N-0	0.96	0.96	0.94	NA	NA	NA	1.00	1.03	0.96	1.03	0.95	NA	NA	Continue to monitor
CORTINA 230kV	Base Case	P0	N-0	0.98	0.98	0.98	NA	NA	NA	1.02	1.02	0.98	1.03	0.95	NA	NA	- Rio Oso Area 230 kV Voltage Support Project - Expected ISD: Sep. 2022 - Short term: Action Plan
DEL MAR 60kV	Base Case	P0	N-0	1.00	1.03	0.93	NA	NA	NA	1.05	1.07	1.02	1.08	0.98	NA	NA	Continue to monitor
DIST2047 60kV	Base Case	P0	N-0	0.94	0.94	0.94	NA	NA	NA	1.01	1.03	0.94	1.04	0.95	NA	NA	Under review
ENVRO_HY 60kV	Base Case	P0	N-0	1.01	0.99	0.85	NA	NA	NA	1.04	1.06	0.99	1.03	1.01	NA	NA	Continue to monitor
FORST HL 60kV	Base Case	P0	N-0	1.00	0.99	0.85	NA	NA	NA	1.04	1.06	0.99	1.03	1.01	NA	NA	Continue to monitor
GOLDHILL 230kV	Base Case	P0	N-0	0.98	1.00	0.96	NA	NA	NA	1.02	1.05	1.00	1.06	0.95	NA	NA	- Rio Oso Area 230 kV Voltage Support Project - Expected ISD: Sep. 2022 - Short term: Action Plan
GUSTINE 60kV	Base Case	P0	N-0	1.00	0.99	0.92	NA	NA	NA	1.03	1.01	0.99	1.02	1.02	NA	NA	Continue to monitor
JAMESON 115kV	Base Case	P0	N-0	0.99	0.99	0.99	NA	NA	NA	1.02	1.02	0.99	1.02	0.95	NA	NA	Sensitivity only
OXBOW 60kV	Base Case	P0	N-0	1.01	1.00	0.85	NA	NA	NA	1.04	1.06	0.99	1.03	1.01	NA	NA	Continue to monitor
PLAINFLD 60kV	Base Case	P0	N-0	0.89	0.89	0.87	NA	NA	NA	1.03	1.04	0.88	1.05	0.92	NA	NA	Under review
RIO OSO 230kV	Base Case	P0	N-0	0.97	1.00	0.96	NA	NA	NA	1.01	1.05	1.00	1.06	0.95	NA	NA	- Rio Oso Area 230 kV Voltage Support Project - Expected ISD: Sep. 2022 - Short term: Action Plan
ROCKLIN 60kV	Base Case	P0	N-0	1.00	1.03	0.95	NA	NA	NA	1.06	1.05	1.03	0.98	1.06	NA	NA	Continue to monitor
ROLLINS 60kV	Base Case	P0	N-0	1.02	1.01	0.91	NA	NA	NA	1.02	1.02	1.01	1.02	1.02	NA	NA	Continue to monitor
SHADYGLN 60kV	Base Case	P0	N-0	1.01	1.00	0.91	NA	NA	NA	1.02	1.02	1.00	1.02	1.01	NA	NA	Continue to monitor
SIERRAPI 60kV	Base Case	P0	N-0	1.00	1.03	0.93	NA	NA	NA	1.05	1.07	1.02	1.08	0.98	NA	NA	Continue to monitor
TRAVIS 60kV	Base Case	P0	N-0	0.98	0.98	0.98	NA	NA	NA	1.00	0.94	0.98	0.94	0.93	NA	NA	Continue to monitor
VACA-DIX 230kV	Base Case	P0	N-0	1.00	1.00	1.00	NA	NA	NA	1.02	1.03	1.00	1.03	0.95	NA	NA	Sensitivity only
WEMR SWS 60kV	Base Case	P0	N-0	1.01	0.99	0.90	NA	NA	NA	1.03	1.04	0.99	1.03	1.01	NA	NA	Continue to monitor
WESTLEY 60kV	Base Case	P0	N-0	0.94	0.95	0.95	NA	NA	NA	0.98	1.04	0.95	1.05	0.94	NA	NA	Under review
CAPEHORN 60kV	BELL-PLACER 115kV MOAS OPENED ON PLACER_BELL PGE	P1-2	N-1	1.01	1.00	0.88	NA	NA	NA	1.02	1.02	1.00	1.02	1.01	NA	NA	Continue to monitor
ENVRO_HY 60kV			N-1	1.01	0.99	0.82	NA	NA	NA	1.04	1.06	0.99	1.03	1.01	NA	NA	Continue to monitor
FORST HL 60kV			N-1	1.00	0.98	0.82	NA	NA	NA	1.04	1.06	0.98	1.03	1.01	NA	NA	Continue to monitor
OXBOW 60kV			N-1	1.01	0.99	0.82	NA	NA	NA	1.04	1.06	0.99	1.03	1.01	NA	NA	Continue to monitor
ROLLINS 60kV			N-1	1.02	1.00	0.88	NA	NA	NA	1.02	1.02	1.00	1.02	1.02	NA	NA	Continue to monitor
SHADYGLN 60kV			N-1	1.01	1.00	0.88	NA	NA	NA	1.02	1.02	1.00	1.02	1.01	NA	NA	Continue to monitor
WEMR SWS 60kV			N-1	1.01	0.99	0.87	NA	NA	NA	1.03	1.04	0.99	1.03	1.01	NA	NA	Continue to monitor
CAPEHORN 60kV	COLGATE-GRASS VALLEY 60kV	P1-2	N-1	1.01	0.97	0.85	NA	NA	NA	1.02	1.02	0.97	1.02	1.01	NA	NA	Continue to monitor
ENVRO_HY 60kV			N-1	1.01	0.96	0.79	NA	NA	NA	1.04	1.06	0.96	1.03	1.01	NA	NA	Continue to monitor
FORST HL 60kV			N-1	1.00	0.95	0.79	NA	NA	NA	1.04	1.06	0.95	1.03	1.01	NA	NA	Continue to monitor
GRSS VLY 60kV			N-1	1.00	0.95	0.83	NA	NA	NA	1.02	1.02	0.95	1.02	1.00	NA	NA	Continue to monitor
OXBOW 60kV			N-1	1.01	0.96	0.79	NA	NA	NA	1.04	1.06	0.96	1.03	1.01	NA	NA	Continue to monitor
ROLLINS 60kV			N-1	1.01	0.97	0.85	NA	NA	NA	1.02	1.02	0.97	1.02	1.01	NA	NA	Continue to monitor
SHADYGLN 60kV			N-1	1.01	0.97	0.85	NA	NA	NA	1.02	1.02	0.97	1.02	1.01	NA	NA	Continue to monitor



Study Area: PG&E Central Valley

Low Voltages



Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)								Voltage PU (Sensitivity Scenarios)					Project & Potential Mitigation Solutions
				2022 Summer Peak	2025 Summer Peak	2030 Summer Peak	2022 Winter Peak	2025 Winter Peak	2030 Winter Peak	2022 Spring Off-Peak	2025 Spring Off-Peak	2025 SP High CEC Forecast	2025 SpOP Hi Renew & Min Gas Gen	2022 SP Heavy Renewable & Min Gas Gen	2030 Retirement of QF Generations	2030 Summer Peak w/o Facility Rerates	
WEMR SWS 60kV	CROWCREEK SS-NEWMAN 60KV	P1-2	N-1	1.00	0.96	0.84	NA	NA	NA	1.03	1.04	0.96	1.03	1.01	NA	NA	Continue to monitor
GUSTINE 60kV			N-1	0.97	0.94	0.82	NA	NA	NA	1.02	0.98	0.93	1.01	0.99	NA	NA	Continue to monitor
NEWMAN 60kV			N-1	0.98	0.95	0.84	NA	NA	NA	1.03	0.98	0.94	1.02	0.99	NA	NA	Continue to monitor
PLAINFLD 60kV	NICOLAUS-WILKINS SLOUGH 60KV	P1-2	N-1	0.89	0.89	0.87	NA	NA	NA	1.03	1.04	0.88	1.05	0.92	NA	NA	Under review
CROWCREEK SS60kV	SALADO-CROWCREEK SS 60KV	P1-2	N-1	0.98	0.94	0.84	NA	NA	NA	1.02	1.01	0.93	1.05	1.01	NA	NA	Continue to monitor
FRONTIERPV 60kV		P1-2	N-1	0.98	0.94	0.84	NA	NA	NA	1.02	1.01	0.93	1.05	1.01	NA	NA	Continue to monitor
GUSTINE 60kV		P1-2	N-1	0.96	0.91	0.80	NA	NA	NA	1.01	0.99	0.90	1.02	0.99	NA	NA	Continue to monitor
NEWMAN 60kV		P1-2	N-1	0.98	0.94	0.84	NA	NA	NA	1.02	0.99	0.93	1.03	0.99	NA	NA	Continue to monitor
GUSTINE 60kV	SALADO-NEWMAN #2 60KV MOAS OPENED ON CRWS LDG_CRWS LDJ	P1-2	N-1	0.96	0.93	0.82	NA	NA	NA	1.02	1.01	0.93	1.01	1.02	NA	NA	Continue to monitor
NEWMAN 60kV		P1-2	N-1	0.98	0.95	0.84	NA	NA	NA	1.02	1.01	0.94	1.02	1.02	NA	NA	Continue to monitor
BONNIE N 60kV	DRUM 115/115KV TB 1	P1-3	N-1	1.03	1.02	0.77	NA	NA	NA	1.05	1.04	1.02	1.04	1.04	NA	NA	Continue to monitor
BOWMN PH 60kV			N-1	1.04	1.04	0.84	NA	NA	NA	1.04	1.04	1.04	1.04	1.04	NA	NA	Continue to monitor
CAPEHORN 60kV			N-1	1.02	1.01	0.73	NA	NA	NA	1.05	1.04	1.01	1.04	1.04	NA	NA	Continue to monitor
DRUM 60kV			N-1	1.03	1.03	0.79	NA	NA	NA	1.05	1.04	1.03	1.04	1.04	NA	NA	Continue to monitor
ENVRO_HY 60kV			N-1	1.01	1.00	0.65	NA	NA	NA	1.04	1.06	1.00	1.03	1.04	NA	NA	Continue to monitor
FORST HL 60kV			N-1	1.01	1.00	0.65	NA	NA	NA	1.04	1.06	1.00	1.03	1.04	NA	NA	Continue to monitor
HAYPRESS 60kV			N-1	1.04	1.04	0.84	NA	NA	NA	1.04	1.04	1.04	1.04	1.04	NA	NA	Continue to monitor
OXBOW 60kV			N-1	1.01	1.00	0.65	NA	NA	NA	1.04	1.06	1.00	1.03	1.04	NA	NA	Continue to monitor
ROLLINS 60kV			N-1	1.02	1.01	0.73	NA	NA	NA	1.06	1.04	1.01	1.05	1.04	NA	NA	Continue to monitor
SHADYGLN 60kV			N-1	1.02	1.01	0.72	NA	NA	NA	1.05	1.04	1.01	1.04	1.04	NA	NA	Continue to monitor
SPAULDNG 60kV			N-1	1.04	1.04	0.83	NA	NA	NA	1.05	1.04	1.04	1.04	1.04	NA	NA	Continue to monitor
WEMR SWS 60kV			N-1	1.02	1.00	0.71	NA	NA	NA	1.03	1.04	1.00	1.03	1.04	NA	NA	Continue to monitor
WESTLEY 60kV	KASSON 115/60KV TB 1	P1-3	N-1	0.80	0.79	0.80	NA	NA	NA	0.97	1.04	0.79	0.83	1.04	NA	NA	Under review
CAPEHORN 60kV	ROLLINS 60/6.6KV TB 1	P1-3	N-1	0.99	0.96	0.87	NA	NA	NA	1.01	1.00	0.95	1.00	1.00	NA	NA	Continue to monitor
ENVRO_HY 60kV			N-1	1.00	0.95	0.81	NA	NA	NA	1.04	1.06	0.95	1.03	1.01	NA	NA	Continue to monitor
FORST HL 60kV			N-1	0.99	0.94	0.81	NA	NA	NA	1.04	1.06	0.94	1.03	1.00	NA	NA	Continue to monitor
OXBOW 60kV			N-1	1.00	0.95	0.81	NA	NA	NA	1.04	1.06	0.95	1.03	1.01	NA	NA	Continue to monitor
ROLLINS 60kV			N-1	0.99	0.96	0.87	NA	NA	NA	1.01	1.00	0.95	1.00	1.00	NA	NA	Continue to monitor
SHADYGLN 60kV			N-1	0.99	0.96	0.87	NA	NA	NA	1.01	1.00	0.95	1.00	1.00	NA	NA	Continue to monitor
WEMR SWS 60kV			N-1	0.99	0.95	0.85	NA	NA	NA	1.03	1.04	0.95	1.03	1.00	NA	NA	Continue to monitor
PLAINFLD 60kV	VACA-DIX 230/115KV TB 3	P1-3	N-1	0.87	0.86	0.84	NA	NA	NA	1.03	1.03	0.86	1.05	0.90	NA	NA	Under review
PLAINFLD 60kV	VACA-DIX 230/115KV TB 4	P1-3	N-1	0.87	0.86	0.84	NA	NA	NA	1.03	1.03	0.86	1.05	0.90	NA	NA	Under review
PLAINFLD 60kV	PLAINFLD SVD=V	P1-4	N-1	0.81	0.81	0.79	NA	NA	NA	1.00	1.04	0.81	1.05	0.85	NA	NA	Under review
CAPEHORN 60kV	BELL-PLACER 115KV (PLACER-BELL PGE)	P2-1	Line Section w/o Fault	1.01	1.00	0.88	NA	NA	NA	1.02	1.02	1.00	1.02	1.01	NA	NA	Continue to monitor
ENVRO_HY 60kV			Line Section w/o Fault	1.01	0.99	0.82	NA	NA	NA	1.04	1.06	0.99	1.03	1.01	NA	NA	Continue to monitor
FORST HL 60kV			Line Section w/o Fault	1.00	0.98	0.82	NA	NA	NA	1.04	1.06	0.98	1.03	1.01	NA	NA	Continue to monitor
OXBOW 60kV			Line Section w/o Fault	1.01	0.99	0.82	NA	NA	NA	1.04	1.06	0.99	1.03	1.01	NA	NA	Continue to monitor
ROLLINS 60kV			Line Section w/o Fault	1.02	1.00	0.88	NA	NA	NA	1.02	1.02	1.00	1.02	1.02	NA	NA	Continue to monitor
SHADYGLN 60kV			Line Section w/o Fault	1.01	1.00	0.88	NA	NA	NA	1.02	1.02	1.00	1.02	1.01	NA	NA	Continue to monitor
WEMR SWS 60kV			Line Section w/o Fault	1.01	0.99	0.87	NA	NA	NA	1.03	1.04	0.99	1.03	1.01	NA	NA	Continue to monitor
ENVRO_HY 60kV			Line Section w/o Fault	1.00	0.95	0.81	NA	NA	NA	1.04	1.06	0.95	1.03	1.01	NA	NA	Continue to monitor
FORST HL 60kV			Line Section w/o Fault	0.99	0.94	0.81	NA	NA	NA	1.04	1.06	0.94	1.03	1.00	NA	NA	Continue to monitor
OXBOW 60kV			Line Section w/o Fault	1.00	0.95	0.81	NA	NA	NA	1.04	1.06	0.95	1.03	1.01	NA	NA	Continue to monitor
SHADYGLN 60kV			Line Section w/o Fault	0.99	0.96	0.87	NA	NA	NA	1.01	1.00	0.95	1.00	1.00	NA	NA	Continue to monitor
WEMR SWS 60kV			Line Section w/o Fault	0.99	0.95	0.85	NA	NA	NA	1.03	1.04	0.95	1.03	1.00	NA	NA	Continue to monitor
ENVRO_HY 60kV			Line Section w/o Fault	1.00	0.95	0.81	NA	NA	NA	1.04	1.06	0.95	1.03	1.01	NA	NA	Continue to monitor
FORST HL 60kV			Line Section w/o Fault	0.99	0.94	0.81	NA	NA	NA	1.04	1.06	0.94	1.03	1.00	NA	NA	Continue to monitor

Study Area: PG&E Central Valley

Low Voltages



Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)								Voltage PU (Sensitivity Scenarios)					Project & Potential Mitigation Solutions
				2022 Summer Peak	2025 Summer Peak	2030 Summer Peak	2022 Winter Peak	2025 Winter Peak	2030 Winter Peak	2022 Spring Off-Peak	2025 Spring Off-Peak	2025 SP High CEC Forecast	2025 SpOP Hi Renew & Min Gas Gen	2022 SP Heavy Renewable & Min Gas Gen	2030 Retirement of QF Generations	2030 Summer Peak w/o Facility Rerates	
OXBOW 60kV			Line Section w/o Fault	1.00	0.95	0.81	NA	NA	NA	1.04	1.06	0.95	1.03	1.01	NA	NA	Continue to monitor
SHADYGLN 60kV			Line Section w/o Fault	0.99	0.96	0.87	NA	NA	NA	1.01	1.00	0.95	1.00	1.00	NA	NA	Continue to monitor
WEMR SWS 60kV			Line Section w/o Fault	0.99	0.95	0.85	NA	NA	NA	1.03	1.04	0.95	1.03	1.00	NA	NA	Continue to monitor
NEWMAN 60kV			Line Section w/o Fault	0.98	0.94	0.83	NA	NA	NA	1.03	0.98	0.94	1.02	0.99	NA	NA	Continue to monitor
CPM 115kV	MISSOURI FLAT-GOLD HILL #1 115KV (GOLDHILL-CPM TAP)	P2-1	Line Section w/o Fault	1.02	0.90	0.89	NA	NA	NA	1.07	1.05	0.90	1.04	1.02	NA	NA	Continue to monitor
DIMOND_1 115kV			Line Section w/o Fault	1.02	0.91	0.89	NA	NA	NA	1.07	1.05	0.90	1.05	1.02	NA	NA	Continue to monitor
SHPRING 115kV			Line Section w/o Fault	1.02	0.90	0.89	NA	NA	NA	1.06	1.05	0.90	1.04	1.02	NA	NA	Continue to monitor
DIMOND_1 115kV	MISSOURI FLAT-GOLD HILL #1 115KV (SHPRING1-CLRKSVLT)	P2-1	Line Section w/o Fault	1.02	0.91	0.89	NA	NA	NA	1.07	1.04	0.90	1.04	1.02	NA	NA	Continue to monitor
SHPRING 115kV			Line Section w/o Fault	1.02	0.90	0.89	NA	NA	NA	1.06	1.04	0.90	1.04	1.02	NA	NA	Continue to monitor
DIMOND_2 115kV	MISSOURI FLAT-GOLD HILL #2 115KV (GOLDHILL-SHPRING2)	P2-1	Line Section w/o Fault	0.80	0.95	0.94	NA	NA	NA	1.08	1.06	0.95	1.06	0.92	NA	NA	Load Reconfiguration Recommended in 2017-2018 TPP
DMND SPR 115kV			Line Section w/o Fault	0.80	0.95	0.94	NA	NA	NA	1.08	1.06	0.95	1.06	0.92	NA	NA	Load Reconfiguration Recommended in 2017-2018 TPP
ELDORAD 115kV			Line Section w/o Fault	0.88	0.97	0.97	NA	NA	NA	1.07	1.06	0.98	1.05	0.97	NA	NA	Load Reconfiguration Recommended in 2017-2018 TPP
SHPRING 115kV			Line Section w/o Fault	0.79	1.01	1.00	NA	NA	NA	1.08	1.05	1.01	1.05	0.92	NA	NA	Load Reconfiguration Recommended in 2017-2018 TPP
E.MRYSVE 115kV	PALERMO-NICOLAUS 115KV (E.MRYSVE-E.MRY J2)	P2-1	Line Section w/o Fault	NA	0.89	0.88	NA	NA	NA	NA	1.13	0.89	1.13	NA	NA	NA	Under review
MRYSVLE 60kV			Line Section w/o Fault	NA	1.01	1.00	NA	NA	NA	0.87	1.01	1.01	1.01	NA	NA	NA	Under review
PEASETP 60kV			Line Section w/o Fault	NA	1.01	1.00	NA	NA	NA	0.86	1.00	1.01	1.00	NA	NA	NA	Under review
YCEC 60kV			Line Section w/o Fault	NA	1.01	0.99	NA	NA	NA	0.85	1.00	1.01	1.00	NA	NA	NA	Under review
YUBACITY 60kV			Line Section w/o Fault	NA	1.01	0.99	NA	NA	NA	0.85	1.00	1.01	1.00	NA	NA	NA	Under review
ENVRO_HY 60kV	PLACER-GOLD HILL #1 115KV (GOLDHILL-HORSHE1)	P2-1	Line Section w/o Fault	1.01	0.99	0.83	NA	NA	NA	1.04	1.07	0.99	1.04	1.01	NA	NA	Continue to monitor
FORST HL 60kV			Line Section w/o Fault	1.00	0.98	0.83	NA	NA	NA	1.04	1.06	0.98	1.04	1.01	NA	NA	Continue to monitor
OXBOW 60kV			Line Section w/o Fault	1.01	0.99	0.83	NA	NA	NA	1.04	1.07	0.99	1.04	1.01	NA	NA	Continue to monitor
WEMR SWS 60kV			Line Section w/o Fault	1.01	0.99	0.88	NA	NA	NA	1.03	1.04	0.99	1.04	1.01	NA	NA	Continue to monitor
VALLY HM 115kV	RPNJ2-MANTECA 115KV NO FAULT	P2-1	Line Section w/o Fault	0.95	0.92	0.88	NA	NA	NA	1.03	1.09	0.92	0.99	1.10	NA	NA	Continue to monitor
VALLY HM 115kV	RPNJ2-RIPON 115KV NO FAULT	P2-1	Line Section w/o Fault	0.95	0.92	0.88	NA	NA	NA	1.03	1.09	0.91	0.99	1.10	NA	NA	Continue to monitor
BRKR SLG 115kV	BRIGHTN 115KV SECTION ME	P2-2	Bus Fault	0.87	0.94	0.92	NA	NA	NA	1.02	1.04	0.94	1.04	0.93	NA	NA	- Rio Oso Area 230 kV Voltage Support Project - Expected ISD: Sep. 2022 - Short term: Action Plan
CAMPUS 115kV				0.87	0.94	0.92	NA	NA	NA	1.02	1.03	0.94	1.04	0.93	NA	NA	- Rio Oso Area 230 kV Voltage Support Project - Expected ISD: Sep. 2022 - Short term: Action Plan
DAVIS 115kV				0.87	0.94	0.92	NA	NA	NA	1.02	1.03	0.94	1.04	0.93	NA	NA	- Rio Oso Area 230 kV Voltage Support Project - Expected ISD: Sep. 2022 - Short term: Action Plan
DEEPWATR 115kV				0.88	0.95	0.93	NA	NA	NA	1.02	1.04	0.95	1.05	0.93	NA	NA	- Rio Oso Area 230 kV Voltage Support Project - Expected ISD: Sep. 2022 - Short term: Action Plan
POST 115kV				0.88	0.95	0.94	NA	NA	NA	1.02	1.04	0.95	1.05	0.93	NA	NA	- Rio Oso Area 230 kV Voltage Support Project - Expected ISD: Sep. 2022 - Short term: Action Plan
Q653F 115kV				0.88	0.95	0.93	NA	NA	NA	1.02	1.04	0.95	1.04	0.93	NA	NA	- Rio Oso Area 230 kV Voltage Support Project - Expected ISD: Sep. 2022 - Short term: Action Plan

Study Area: PG&E Central Valley

Low Voltages



Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)								Voltage PU (Sensitivity Scenarios)					Project & Potential Mitigation Solutions
				2022 Summer Peak	2025 Summer Peak	2030 Summer Peak	2022 Winter Peak	2025 Winter Peak	2030 Winter Peak	2022 Spring Off-Peak	2025 Spring Off-Peak	2025 SP High CEC Forecast	2025 SpOP Hi Renew & Min Gas Gen	2022 SP Heavy Renewable & Min Gas Gen	2030 Retirement of QF Generations	2030 Summer Peak w/o Facility Rerates	
UCD_TP2 115kV				0.87	0.94	0.92	NA	NA	NA	1.02	1.03	0.94	1.04	0.93	NA	NA	- Rio Oso Area 230 kV Voltage Support Project - Expected ISD: Sep. 2022 - Short term: Action Plan
W.SCRMNO 115kV				0.89	0.96	0.94	NA	NA	NA	1.02	1.04	0.95	1.05	0.93	NA	NA	- Rio Oso Area 230 kV Voltage Support Project - Expected ISD: Sep. 2022 - Short term: Action Plan
CPM 115kV	GOLDHILL 115KV SECTION 2F	P2-2	Bus Fault	1.05	0.90	0.89	NA	NA	NA	1.05	1.05	0.90	1.05	1.04	NA	NA	Continue to monitor
DIMOND_1 115kV				1.04	0.90	0.89	NA	NA	NA	1.05	1.05	0.90	1.05	1.04	NA	NA	Continue to monitor
SHPRING 115kV				1.02	0.90	0.89	NA	NA	NA	1.06	1.05	0.89	1.05	1.02	NA	NA	Continue to monitor
DEL MAR 60kV	GOLDHILL 230KV SECTION 1E	P2-2	Bus Fault	NA	1.02	0.89	NA	NA	NA	NA	1.07	1.01	1.07	NA	NA	NA	Continue to monitor
SIERRAPI 60kV			Bus Fault	NA	1.02	0.89	NA	NA	NA	NA	1.07	1.01	1.07	NA	NA	NA	Continue to monitor
WESTLEY 60kV	KASSON 115KV SECTION 1D	P2-2	Bus Fault	0.78	0.79	0.78	NA	NA	NA	0.97	1.04	0.79	0.83	1.04	NA	NA	Under review
CAPEHORN 60kV	PLACER 115KV SECTION 1D	P2-2	Bus Fault	1.01	1.00	0.88	NA	NA	NA	1.02	1.02	0.99	1.02	1.01	NA	NA	Continue to monitor
ENVRO_HY 60kV				1.01	0.99	0.82	NA	NA	NA	NA	NA	0.99	NA	1.01	NA	NA	Continue to monitor
FORST HL 60kV				1.00	0.98	0.82	NA	NA	NA	NA	NA	0.98	NA	1.01	NA	NA	Continue to monitor
OXBOW 60kV				1.01	0.99	0.82	NA	NA	NA	NA	NA	0.99	NA	1.01	NA	NA	Continue to monitor
ROLLINS 60kV				1.02	1.00	0.88	NA	NA	NA	1.02	1.02	1.00	1.02	1.02	NA	NA	Continue to monitor
SHADYGLN 60kV				1.01	1.00	0.88	NA	NA	NA	1.02	1.02	1.00	1.02	1.01	NA	NA	Continue to monitor
WEMR SWS 60kV				1.01	0.99	0.87	NA	NA	NA	NA	NA	0.99	NA	1.01	NA	NA	Continue to monitor
BRIGHTON 230kV	RIO OSO 230KV SECTION 1D	P2-2	Bus Fault	0.92	0.96	0.88	NA	NA	NA	0.99	1.01	0.95	1.02	0.91	NA	NA	Continue to monitor
DEL MAR 60kV				1.00	1.02	0.90	NA	NA	NA	1.06	1.08	1.01	1.09	0.98	NA	NA	Continue to monitor
SIERRAPI 60kV				1.00	1.02	0.90	NA	NA	NA	1.06	1.08	1.01	1.09	0.98	NA	NA	Continue to monitor
DEL MAR 60kV	RIO OSO 230KV SECTION 2D	P2-2	Bus Fault	0.99	1.02	0.90	NA	NA	NA	1.05	1.07	1.02	1.08	0.97	NA	NA	Continue to monitor
SIERRAPI 60kV				0.99	1.02	0.90	NA	NA	NA	1.05	1.07	1.02	1.08	0.97	NA	NA	Continue to monitor
PLAINFLD 60kV	VACA-DIX 230KV SECTION 1E	P2-2	Bus Fault	0.86	0.85	0.83	NA	NA	NA	1.03	1.03	0.85	1.04	0.89	NA	NA	Under review
PLAINFLD 60kV	VACA-DIX 230KV SECTION 1F	P2-2	Bus Fault	0.88	0.88	0.86	NA	NA	NA	1.02	1.03	0.87	1.05	0.89	NA	NA	Under review
TRAVIS 60kV			Bus Fault	0.98	0.97	0.98	NA	NA	NA	0.99	0.94	0.97	0.94	0.90	NA	NA	Sensitivity only
PLAINFLD 60kV	VACA-DIX 230KV SECTION 2F	P2-2	Bus Fault	0.87	0.86	0.84	NA	NA	NA	1.03	1.03	0.86	1.05	0.89	NA	NA	Under review
PLAINFLD 60kV	VACA-DIX 230KV SECTION NA	P2-2	Bus Fault	0.88	0.86	0.84	NA	NA	NA	1.03	1.04	0.86	1.06	0.91	NA	NA	Under review
PLAINFLD 60kV	BDLSWSTA 230KV - MIDDLE BREAKER BAY 3	P2-3	Non-Bus Tie Breaker Fault	0.89	0.88	0.87	NA	NA	NA	1.03	1.04	0.88	1.05	0.90	NA	NA	Under review
BRKR SLG 115kV	BRIGHTN - ME 115KV & BRIGHTON-DAVIS LINE	P2-3	Non-Bus Tie Breaker Fault	0.87	0.94	0.92	NA	NA	NA	1.02	1.03	0.94	1.04	0.92	NA	NA	- Rio Oso Area 230 kV Voltage Support Project - Expected ISD: Sep. 2022 - Short term: Action Plan
CAMPUS 115kV				0.87	0.94	0.92	NA	NA	NA	1.02	1.03	0.94	1.04	0.92	NA	NA	- Rio Oso Area 230 kV Voltage Support Project - Expected ISD: Sep. 2022 - Short term: Action Plan
DAVIS 115kV				0.87	0.94	0.92	NA	NA	NA	1.02	1.03	0.94	1.04	0.93	NA	NA	- Rio Oso Area 230 kV Voltage Support Project - Expected ISD: Sep. 2022 - Short term: Action Plan
DEEPWATR 115kV				0.88	0.95	0.93	NA	NA	NA	1.02	1.04	0.95	1.05	0.93	NA	NA	- Rio Oso Area 230 kV Voltage Support Project - Expected ISD: Sep. 2022 - Short term: Action Plan
POST 115kV			Non-Bus Tie Breaker Fault	0.88	0.95	0.94	NA	NA	NA	1.02	1.04	0.95	1.05	0.93	NA	NA	- Rio Oso Area 230 kV Voltage Support Project - Expected ISD: Sep. 2022 - Short term: Action Plan

Study Area: PG&E Central Valley

Low Voltages



Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)								Voltage PU (Sensitivity Scenarios)					Project & Potential Mitigation Solutions
				2022 Summer Peak	2025 Summer Peak	2030 Summer Peak	2022 Winter Peak	2025 Winter Peak	2030 Winter Peak	2022 Spring Off-Peak	2025 Spring Off-Peak	2025 SP High CEC Forecast	2025 SpOP Hi Renew & Min Gas Gen	2022 SP Heavy Renewable & Min Gas Gen	2030 Retirement of QF Generations	2030 Summer Peak w/o Facility Rerates	
Q653F 115kV				0.88	0.95	0.93	NA	NA	NA	1.02	1.03	0.95	1.04	0.93	NA	NA	- Rio Oso Area 230 kV Voltage Support Project - Expected ISD: Sep. 2022 - Short term: Action Plan
UCD_TP2 115kV				0.87	0.94	0.92	NA	NA	NA	1.02	1.03	0.94	1.04	0.93	NA	NA	- Rio Oso Area 230 kV Voltage Support Project - Expected ISD: Sep. 2022 - Short term: Action Plan
W.SCRMNO 115kV				0.88	0.96	0.94	NA	NA	NA	1.02	1.04	0.95	1.05	0.93	NA	NA	- Rio Oso Area 230 kV Voltage Support Project - Expected ISD: Sep. 2022 - Short term: Action Plan
WDLND_BM 115kV				0.90	0.97	0.95	NA	NA	NA	1.02	1.04	0.97	1.04	0.94	NA	NA	- Rio Oso Area 230 kV Voltage Support Project - Expected ISD: Sep. 2022 - Short term: Action Plan
BRKR SLG 115kV	BRIGHTN - ME 115kV & BRIGHTON-GRAND ISLAND #1 LINE	P2-3	Non-Bus Tie Breaker Fault	0.87	0.94	0.92	NA	NA	NA	1.02	1.04	0.94	1.04	0.93	NA	NA	- Rio Oso Area 230 kV Voltage Support Project - Expected ISD: Sep. 2022 - Short term: Action Plan
CAMPUS 115kV				0.87	0.94	0.92	NA	NA	NA	1.02	1.03	0.94	1.04	0.93	NA	NA	- Rio Oso Area 230 kV Voltage Support Project - Expected ISD: Sep. 2022 - Short term: Action Plan
DAVIS 115kV				0.87	0.94	0.92	NA	NA	NA	1.02	1.03	0.94	1.04	0.93	NA	NA	- Rio Oso Area 230 kV Voltage Support Project - Expected ISD: Sep. 2022 - Short term: Action Plan
DEEPWATR 115kV				0.88	0.95	0.93	NA	NA	NA	1.02	1.04	0.95	1.05	0.93	NA	NA	- Rio Oso Area 230 kV Voltage Support Project - Expected ISD: Sep. 2022 - Short term: Action Plan
POST 115kV				0.88	0.95	0.94	NA	NA	NA	1.02	1.04	0.95	1.05	0.93	NA	NA	- Rio Oso Area 230 kV Voltage Support Project - Expected ISD: Sep. 2022 - Short term: Action Plan
Q653F 115kV				0.88	0.95	0.93	NA	NA	NA	1.02	1.04	0.95	1.04	0.93	NA	NA	- Rio Oso Area 230 kV Voltage Support Project - Expected ISD: Sep. 2022 - Short term: Action Plan
UCD_TP2 115kV				0.87	0.94	0.92	NA	NA	NA	1.02	1.03	0.94	1.04	0.93	NA	NA	- Rio Oso Area 230 kV Voltage Support Project - Expected ISD: Sep. 2022 - Short term: Action Plan
W.SCRMNO 115kV				0.89	0.96	0.94	NA	NA	NA	1.02	1.04	0.95	1.05	0.93	NA	NA	- Rio Oso Area 230 kV Voltage Support Project - Expected ISD: Sep. 2022 - Short term: Action Plan
BRKR SLG 115kV				0.87	0.94	0.92	NA	NA	NA	1.02	1.04	0.94	1.04	0.93	NA	NA	- Rio Oso Area 230 kV Voltage Support Project - Expected ISD: Sep. 2022 - Short term: Action Plan
CAMPUS 115kV				0.87	0.94	0.92	NA	NA	NA	1.02	1.03	0.94	1.04	0.93	NA	NA	- Rio Oso Area 230 kV Voltage Support Project - Expected ISD: Sep. 2022 - Short term: Action Plan
DAVIS 115kV				0.87	0.94	0.92	NA	NA	NA	1.02	1.03	0.94	1.04	0.93	NA	NA	- Rio Oso Area 230 kV Voltage Support Project - Expected ISD: Sep. 2022 - Short term: Action Plan

Study Area: PG&E Central Valley

Low Voltages



Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)								Voltage PU (Sensitivity Scenarios)					Project & Potential Mitigation Solutions
				2022 Summer Peak	2025 Summer Peak	2030 Summer Peak	2022 Winter Peak	2025 Winter Peak	2030 Winter Peak	2022 Spring Off-Peak	2025 Spring Off-Peak	2025 SP High CEC Forecast	2025 SpOP Hi Renew & Min Gas Gen	2022 SP Heavy Renewable & Min Gas Gen	2030 Retirement of QF Generations	2030 Summer Peak w/o Facility Rerates	
DEEPWATR 115kV	BRIGHTN - ME 115KV & BRIGHTON-GRAND ISLAND #2 LINE	P2-3	Non-Bus Tie Breaker Fault	0.88	0.95	0.93	NA	NA	NA	1.02	1.04	0.95	1.05	0.93	NA	NA	- Rio Oso Area 230 kV Voltage Support Project - Expected ISD: Sep. 2022 - Short term: Action Plan
POST 115kV				0.88	0.95	0.94	NA	NA	NA	1.02	1.04	0.95	1.05	0.93	NA	NA	- Rio Oso Area 230 kV Voltage Support Project - Expected ISD: Sep. 2022 - Short term: Action Plan
Q653F 115kV				0.88	0.95	0.93	NA	NA	NA	1.02	1.04	0.95	1.04	0.93	NA	NA	- Rio Oso Area 230 kV Voltage Support Project - Expected ISD: Sep. 2022 - Short term: Action Plan
UCD_TP2 115kV				0.87	0.94	0.92	NA	NA	NA	1.02	1.03	0.94	1.04	0.93	NA	NA	- Rio Oso Area 230 kV Voltage Support Project - Expected ISD: Sep. 2022 - Short term: Action Plan
W.SCRMNO 115kV				0.89	0.96	0.94	NA	NA	NA	1.02	1.04	0.95	1.05	0.93	NA	NA	- Rio Oso Area 230 kV Voltage Support Project - Expected ISD: Sep. 2022 - Short term: Action Plan
BRKR SLG 115kV	BRIGHTN - ME 115KV & WEST SACRAMENTO-BRIGHTON LINE	P2-3	Non-Bus Tie Breaker Fault	0.87	0.94	0.92	NA	NA	NA	1.02	1.03	0.94	1.04	0.93	NA	NA	- Rio Oso Area 230 kV Voltage Support Project - Expected ISD: Sep. 2022 - Short term: Action Plan
CAMPUS 115kV				0.87	0.94	0.92	NA	NA	NA	1.02	1.03	0.94	1.04	0.92	NA	NA	- Rio Oso Area 230 kV Voltage Support Project - Expected ISD: Sep. 2022 - Short term: Action Plan
DAVIS 115kV				0.87	0.94	0.92	NA	NA	NA	1.02	1.03	0.94	1.04	0.93	NA	NA	- Rio Oso Area 230 kV Voltage Support Project - Expected ISD: Sep. 2022 - Short term: Action Plan
DEEPWATR 115kV				0.88	0.95	0.93	NA	NA	NA	1.02	1.04	0.95	1.05	0.93	NA	NA	- Rio Oso Area 230 kV Voltage Support Project - Expected ISD: Sep. 2022 - Short term: Action Plan
POST 115kV				0.88	0.95	0.93	NA	NA	NA	1.02	1.04	0.95	1.05	0.93	NA	NA	- Rio Oso Area 230 kV Voltage Support Project - Expected ISD: Sep. 2022 - Short term: Action Plan
Q653F 115kV				0.88	0.95	0.93	NA	NA	NA	1.02	1.03	0.95	1.04	0.93	NA	NA	- Rio Oso Area 230 kV Voltage Support Project - Expected ISD: Sep. 2022 - Short term: Action Plan
UCD_TP2 115kV				0.87	0.94	0.92	NA	NA	NA	1.02	1.03	0.94	1.04	0.93	NA	NA	- Rio Oso Area 230 kV Voltage Support Project - Expected ISD: Sep. 2022 - Short term: Action Plan
W.SCRMNO 115kV				0.89	0.96	0.94	NA	NA	NA	1.02	1.04	0.96	1.05	0.94	NA	NA	- Rio Oso Area 230 kV Voltage Support Project - Expected ISD: Sep. 2022 - Short term: Action Plan
BONNIE N 60kV	BRNSWALT 115KV - RING R4 & R3	P2-3	Non-Bus Tie Breaker Fault	1.01	1.02	0.84	NA	NA	NA	1.01	1.01	1.02	1.01	1.01	NA	NA	Continue to monitor
BOWMN PH 60kV				1.04	1.04	0.89	NA	NA	NA	1.04	1.03	1.04	1.03	1.04	NA	NA	Continue to monitor
CAPEHORN 60kV				1.01	1.01	0.80	NA	NA	NA	1.02	1.02	1.00	1.02	1.02	NA	NA	Continue to monitor
DRUM 60kV				1.01	1.02	0.86	NA	NA	NA	1.01	1.00	1.02	1.00	1.01	NA	NA	Continue to monitor
ENVRO_HY 60kV				1.01	1.00	0.74	NA	NA	NA	1.04	1.06	1.00	1.03	1.01	NA	NA	Continue to monitor
FORST HL 60kV				1.00	0.99	0.74	NA	NA	NA	1.04	1.06	0.99	1.03	1.01	NA	NA	Continue to monitor
HAYPRESS 60kV				1.04	1.04	0.89	NA	NA	NA	1.04	1.03	1.04	1.03	1.04	NA	NA	Continue to monitor
OXBOW 60kV				1.01	1.00	0.74	NA	NA	NA	1.04	1.06	1.00	1.03	1.01	NA	NA	Continue to monitor



Study Area: PG&E Central Valley

Low Voltages



Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)								Voltage PU (Sensitivity Scenarios)					Project & Potential Mitigation Solutions
				2022 Summer Peak	2025 Summer Peak	2030 Summer Peak	2022 Winter Peak	2025 Winter Peak	2030 Winter Peak	2022 Spring Off-Peak	2025 Spring Off-Peak	2025 SP High CEC Forecast	2025 SpOP Hi Renew & Min Gas Gen	2022 SP Heavy Renewable & Min Gas Gen	2030 Retirement of QF Generations	2030 Summer Peak w/o Facility Rerates	
ROLLINS 60kV				1.02	1.01	0.81	NA	NA	NA	1.02	1.02	1.01	1.02	1.02	NA	NA	Continue to monitor
SHADYGLN 60kV				1.01	1.01	0.80	NA	NA	NA	1.02	1.02	1.01	1.02	1.02	NA	NA	Continue to monitor
SPAULDNG 60kV				1.03	1.04	0.87	NA	NA	NA	1.04	1.03	1.04	1.03	1.03	NA	NA	Continue to monitor
WEMR SWS 60kV				1.01	1.00	0.79	NA	NA	NA	1.03	1.04	1.00	1.03	1.01	NA	NA	Continue to monitor
BONNIE N 60kV	BRNSWALT 115KV - RING R5 & R6	P2-3	Non-Bus Tie Breaker Fault	1.04	1.03	0.77	NA	NA	NA	1.05	1.02	1.03	1.02	1.05	NA	NA	Continue to monitor
BOWMN PH 60kV				1.04	1.04	0.84	NA	NA	NA	1.04	1.03	1.04	1.03	1.04	NA	NA	Continue to monitor
CAPEHORN 60kV				1.04	1.01	0.72	NA	NA	NA	1.06	1.02	1.01	1.03	1.05	NA	NA	Continue to monitor
CISCO GR 60kV				1.00	1.00	0.90	NA	NA	NA	1.00	0.96	1.00	0.96	1.00	NA	NA	Continue to monitor
DRUM 60kV				1.05	1.04	0.79	NA	NA	NA	1.05	1.02	1.04	1.02	1.05	NA	NA	Continue to monitor
ENVRO_HY 60kV				1.02	1.00	0.65	NA	NA	NA	1.04	1.06	1.00	1.03	1.05	NA	NA	Continue to monitor
FORST HL 60kV				1.02	1.00	0.65	NA	NA	NA	1.04	1.06	1.00	1.03	1.04	NA	NA	Continue to monitor
HAYPRESS 60kV				1.04	1.04	0.84	NA	NA	NA	1.04	1.03	1.04	1.03	1.04	NA	NA	Continue to monitor
OXBOW 60kV				1.03	1.01	0.65	NA	NA	NA	1.04	1.06	1.01	1.03	1.05	NA	NA	Continue to monitor
ROLLINS 60kV				1.04	1.02	0.72	NA	NA	NA	1.06	1.03	1.02	1.03	1.05	NA	NA	Continue to monitor
SHADYGLN 60kV				1.04	1.01	0.72	NA	NA	NA	1.06	1.02	1.01	1.03	1.05	NA	NA	Continue to monitor
SPAULDNG 60kV				1.04	1.04	0.83	NA	NA	NA	1.04	1.02	1.04	1.02	1.04	NA	NA	Continue to monitor
WEMR SWS 60kV				1.03	1.01	0.70	NA	NA	NA	1.03	1.04	1.01	1.03	1.05	NA	NA	Continue to monitor
BONNIE N 60kV	BRNSWALT 115KV - RING R7 & R6	P2-3	Non-Bus Tie Breaker Fault	1.04	1.03	0.77	NA	NA	NA	1.05	1.02	1.03	1.02	1.05	NA	NA	Continue to monitor
BOWMN PH 60kV				1.04	1.04	0.85	NA	NA	NA	1.04	1.03	1.04	1.03	1.04	NA	NA	Continue to monitor
CAPEHORN 60kV				1.04	1.01	0.73	NA	NA	NA	1.06	1.02	1.01	1.03	1.05	NA	NA	Continue to monitor
DRUM 60kV				1.05	1.04	0.80	NA	NA	NA	1.05	1.02	1.04	1.02	1.05	NA	NA	Continue to monitor
ENVRO_HY 60kV				1.02	1.00	0.66	NA	NA	NA	1.04	1.06	1.00	1.03	1.05	NA	NA	Continue to monitor
FORST HL 60kV				1.02	1.00	0.66	NA	NA	NA	1.04	1.06	1.00	1.03	1.04	NA	NA	Continue to monitor
HAYPRESS 60kV				1.04	1.04	0.85	NA	NA	NA	1.04	1.03	1.04	1.03	1.04	NA	NA	Continue to monitor
OXBOW 60kV				1.03	1.01	0.66	NA	NA	NA	1.04	1.06	1.01	1.03	1.05	NA	NA	Continue to monitor
ROLLINS 60kV				1.04	1.02	0.73	NA	NA	NA	1.06	1.03	1.02	1.03	1.05	NA	NA	Continue to monitor
SHADYGLN 60kV				1.04	1.01	0.73	NA	NA	NA	1.06	1.02	1.01	1.03	1.05	NA	NA	Continue to monitor
SPAULDNG 60kV				1.04	1.04	0.84	NA	NA	NA	1.04	1.02	1.04	1.02	1.04	NA	NA	Continue to monitor
WEMR SWS 60kV				1.03	1.01	0.71	NA	NA	NA	1.03	1.04	1.01	1.03	1.05	NA	NA	Continue to monitor
WILKINS 60kV	CORTINA 230KV - RING R1 & R4	P2-3	Non-Bus Tie Breaker Fault	0.93	0.95	0.89	NA	NA	NA	1.02	1.04	0.95	1.05	0.99	NA	NA	Continue to monitor
WILKINS 60kV	CORTINA 230KV - RING R2 & R3	P2-3	Non-Bus Tie Breaker Fault	0.93	0.95	0.89	NA	NA	NA	1.02	1.05	0.94	1.04	0.99	NA	NA	Continue to monitor
DEL MAR 60kV	GOLDHILL - 1E 230KV & MIDDLE FORK-GOLD HILL LINE	P2-3	Non-Bus Tie Breaker Fault	NA	1.02	0.89	NA	NA	NA	NA	1.07	1.01	1.07	NA	NA	NA	Continue to monitor
SIERRAPI 60kV				NA	1.02	0.89	NA	NA	NA	NA	1.07	1.01	1.07	NA	NA	NA	Continue to monitor
WESTLEY 60kV	KASSON - 1D 115KV & LAMMERS-KASSON LINE	P2-3	Non-Bus Tie Breaker Fault	0.78	0.80	0.78	NA	NA	NA	0.97	1.04	0.79	0.83	1.04	NA	NA	Under review
WESTLEY 60kV	KASSON - 1D 115KV & SCHULTE SW STA-KASSON-MANTECA LINE	P2-3	Non-Bus Tie Breaker Fault	0.68	0.76	0.69	NA	NA	NA	0.97	1.04	0.75	0.79	1.04	NA	NA	Under review
WESTLEY 60kV	KASSON - 1D 115KV & VIERRA-TRACY-KASSON LINE	P2-3	Non-Bus Tie Breaker Fault	0.74	0.79	0.77	NA	NA	NA	0.97	1.04	0.78	0.82	1.04	NA	NA	Under review
CAPEHORN 60kV	PLACER - 1D 115KV & BELL-PLACER LINE	P2-3	Non-Bus Tie Breaker Fault	1.01	1.00	0.88	NA	NA	NA	1.02	1.02	0.99	1.02	1.01	NA	NA	Continue to monitor
ENVRO_HY 60kV				1.01	0.99	0.82	NA	NA	NA	NA	NA	0.99	NA	1.01	NA	NA	Continue to monitor
FORST HL 60kV				1.00	0.98	0.82	NA	NA	NA	NA	NA	0.98	NA	1.01	NA	NA	Continue to monitor
OXBOW 60kV				1.01	0.99	0.82	NA	NA	NA	NA	NA	0.99	NA	1.01	NA	NA	Continue to monitor
ROLLINS 60kV				1.02	1.00	0.88	NA	NA	NA	1.02	1.02	1.00	1.02	1.02	NA	NA	Continue to monitor
SHADYGLN 60kV				1.01	1.00	0.88	NA	NA	NA	1.02	1.02	1.00	1.02	1.01	NA	NA	Continue to monitor

Study Area: PG&E Central Valley

Low Voltages



Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)								Voltage PU (Sensitivity Scenarios)					Project & Potential Mitigation Solutions
				2022 Summer Peak	2025 Summer Peak	2030 Summer Peak	2022 Winter Peak	2025 Winter Peak	2030 Winter Peak	2022 Spring Off-Peak	2025 Spring Off-Peak	2025 SP High CEC Forecast	2025 SpOP Hi Renew & Min Gas Gen	2022 SP Heavy Renewable & Min Gas Gen	2030 Retirement of QF Generations	2030 Summer Peak w/o Facility Rerates	
WEMR SWS 60kV	PLACER - 1D 115KV & PLACER-GOLD HILL #1 LINE	P2-3	Non-Bus Tie Breaker Fault	1.01	0.99	0.87	NA	NA	NA	NA	NA	0.99	NA	1.01	NA	NA	Continue to monitor
CAPEHORN 60kV				1.01	1.00	0.88	NA	NA	NA	1.02	1.02	1.00	1.02	1.01	NA	NA	Continue to monitor
ENVRO_HY 60kV				1.01	0.99	0.82	NA	NA	NA	NA	NA	0.99	NA	1.01	NA	NA	Continue to monitor
FORST HL 60kV				1.00	0.98	0.82	NA	NA	NA	NA	NA	0.98	NA	1.01	NA	NA	Continue to monitor
OXBOW 60kV				1.01	0.99	0.82	NA	NA	NA	NA	NA	0.99	NA	1.01	NA	NA	Continue to monitor
ROLLINS 60kV				1.02	1.00	0.88	NA	NA	NA	1.02	1.02	1.00	1.02	1.02	NA	NA	Continue to monitor
SHADYGLN 60kV				1.01	1.00	0.88	NA	NA	NA	1.02	1.02	1.00	1.02	1.01	NA	NA	Continue to monitor
WEMR SWS 60kV				1.01	0.99	0.87	NA	NA	NA	NA	NA	0.99	NA	1.01	NA	NA	Continue to monitor
CAPEHORN 60kV	PLACER - 1D 115KV & PLACER-GOLD HILL #2 LINE	P2-3	Non-Bus Tie Breaker Fault	1.01	1.00	0.88	NA	NA	NA	1.02	1.02	0.99	1.02	1.01	NA	NA	Continue to monitor
ENVRO_HY 60kV				1.01	0.99	0.82	NA	NA	NA	NA	NA	0.99	NA	1.01	NA	NA	Continue to monitor
FORST HL 60kV				1.00	0.98	0.82	NA	NA	NA	NA	NA	0.98	NA	1.01	NA	NA	Continue to monitor
OXBOW 60kV				1.01	0.99	0.82	NA	NA	NA	NA	NA	0.99	NA	1.01	NA	NA	Continue to monitor
ROLLINS 60kV				1.02	1.00	0.88	NA	NA	NA	1.02	1.02	1.00	1.02	1.02	NA	NA	Continue to monitor
SHADYGLN 60kV				1.01	1.00	0.88	NA	NA	NA	1.02	1.02	1.00	1.02	1.01	NA	NA	Continue to monitor
WEMR SWS 60kV				1.01	0.99	0.87	NA	NA	NA	NA	NA	0.99	NA	1.01	NA	NA	Continue to monitor
BRIGHTON 230kV	RIO OSO - 1D 230KV & COLGATE-RIO OSO LINE	P2-3	Non-Bus Tie Breaker Fault	0.92	0.96	0.88	NA	NA	NA	0.99	1.01	0.95	1.02	0.91	NA	NA	Continue to monitor
DEL MAR 60kV				1.00	1.02	0.90	NA	NA	NA	1.06	1.08	1.01	1.09	0.98	NA	NA	Continue to monitor
SIERRAPI 60kV				1.00	1.02	0.90	NA	NA	NA	1.06	1.08	1.01	1.09	0.98	NA	NA	Continue to monitor
PLAINFLD 60kV	VACA-DIX - 2F 230KV & TULUCAY-VACA LINE	P2-3	Non-Bus Tie Breaker Fault	NA	0.86	0.84	NA	NA	NA	NA	1.03	0.86	1.05	NA	NA	NA	Under review
PLAINFLD 60kV	VACA-DIX 115KV - MIDDLE BREAKER BAY 6	P2-3	Non-Bus Tie Breaker Fault	0.87	0.86	0.84	NA	NA	NA	1.03	1.03	0.86	1.05	0.90	NA	NA	Under review
PLAINFLD 60kV	VACA-DIX 115KV - MIDDLE BREAKER BAY 7	P2-3	Non-Bus Tie Breaker Fault	0.87	0.87	0.84	NA	NA	NA	1.03	1.03	0.86	1.05	0.90	NA	NA	Under review
BRIGHTON 230kV	BELLOTA 230KV - SECTION 1E & 2E	P2-4	Bus Tie Breaker Falut	0.91	0.96	0.86	NA	NA	NA	0.98	1.04	0.96	0.90	1.05	NA	NA	SPS recommended in 2019-2020 TPP
CH.STN 115kV				0.80	0.87	0.78	NA	NA	NA	1.04	1.07	0.83	0.96	1.08	NA	NA	SPS recommended in 2019-2020 TPP
CURTISS 115kV				0.82	0.89	0.80	NA	NA	NA	1.04	1.07	0.85	0.96	1.08	NA	NA	SPS recommended in 2019-2020 TPP
DEL MAR 60kV				0.98	1.01	0.87	NA	NA	NA	1.04	1.07	1.01	0.95	1.08	NA	NA	SPS recommended in 2019-2020 TPP
MELNS JB 115kV				0.82	0.89	0.81	NA	NA	NA	1.04	1.07	0.85	0.97	1.07	NA	NA	SPS recommended in 2019-2020 TPP
MELONES 115kV				0.78	0.86	0.77	NA	NA	NA	1.04	1.07	0.81	0.96	1.08	NA	NA	SPS recommended in 2019-2020 TPP
MI-WUK 115kV				0.86	0.92	0.84	NA	NA	NA	1.04	1.07	0.89	0.98	1.08	NA	NA	SPS recommended in 2019-2020 TPP
PEORIA 115kV				0.79	0.87	0.78	NA	NA	NA	1.04	1.07	0.82	0.96	1.08	NA	NA	SPS recommended in 2019-2020 TPP
R.TRACK 115kV				0.78	0.86	0.76	NA	NA	NA	1.04	1.07	0.81	0.96	1.08	NA	NA	SPS recommended in 2019-2020 TPP
ROCKLIN 60kV				0.98	1.01	0.90	NA	NA	NA	1.05	1.05	1.01	0.95	1.06	NA	NA	SPS recommended in 2019-2020 TPP
RVRBANK 115kV				0.57	0.75	0.54	NA	NA	NA	1.04	1.06	0.64	0.89	1.07	NA	NA	SPS recommended in 2019-2020 TPP
SIERRAPI 60kV				0.98	1.01	0.87	NA	NA	NA	1.04	1.07	1.01	0.95	1.08	NA	NA	SPS recommended in 2019-2020 TPP
SPISONORA 115kV				0.82	0.89	0.80	NA	NA	NA	1.04	1.07	0.85	0.96	1.08	NA	NA	SPS recommended in 2019-2020 TPP
TAYLOR 60kV				0.98	1.01	0.90	NA	NA	NA	1.05	1.05	1.01	0.95	1.06	NA	NA	SPS recommended in 2019-2020 TPP
TULLOCH 115kV				0.71	0.81	0.70	NA	NA	NA	1.04	1.06	0.74	0.94	1.07	NA	NA	SPS recommended in 2019-2020 TPP
VALLY HM 115kV				0.88	0.93	0.86	NA	NA	NA	1.03	1.06	0.90	0.97	1.06	NA	NA	SPS recommended in 2019-2020 TPP
BRKR SLG 115kV	BRIGHTN 115KV - SECTION ME & MD	P2-4	Bus Tie Breaker Falut	0.87	0.94	0.92	NA	NA	NA	1.02	1.04	0.94	1.04	0.93	NA	NA	- Rio Oso Area 230 kV Voltage Support Project - Expected ISD: Sep. 2022 - Short term: Action Plan
CAMPUS 115kV				0.87	0.94	0.92	NA	NA	NA	1.02	1.03	0.94	1.04	0.93	NA	NA	
DAVIS 115kV				0.87	0.94	0.92	NA	NA	NA	1.02	1.03	0.94	1.04	0.93	NA	NA	
DEEPWATR 115kV				0.88	0.95	0.93	NA	NA	NA	1.02	1.04	0.95	1.05	0.93	NA	NA	
POST 115kV				0.88	0.95	0.94	NA	NA	NA	1.02	1.04	0.95	1.05	0.93	NA	NA	
Q653F 115kV				0.88	0.95	0.93	NA	NA	NA	1.02	1.04	0.95	1.04	0.93	NA	NA	
UCD_TP2 115kV				0.87	0.94	0.92	NA	NA	NA	1.02	1.03	0.94	1.04	0.93	NA	NA	

Study Area: PG&E Central Valley

Low Voltages



Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)								Voltage PU (Sensitivity Scenarios)					Project & Potential Mitigation Solutions
				2022 Summer Peak	2025 Summer Peak	2030 Summer Peak	2022 Winter Peak	2025 Winter Peak	2030 Winter Peak	2022 Spring Off-Peak	2025 Spring Off-Peak	2025 SP High CEC Forecast	2025 SpOP Hi Renew & Min Gas Gen	2022 SP Heavy Renewable & Min Gas Gen	2030 Retirement of QF Generations	2030 Summer Peak w/o Facility Rerates	
W.SCRMNO 115kV	GOLDHILL 115KV - SECTION 1F & 1G	P2-4	Bus Tie Breaker Falut	0.89	0.96	0.94	NA	NA	NA	1.02	1.04	0.95	1.05	0.93	NA	NA	Continue to monitor
CAPEHORN 60kV				NA	1.00	0.89	NA	NA	NA	NA	1.02	0.99	1.02	NA	NA	NA	
ENVRO_HY 60kV				NA	0.99	0.83	NA	NA	NA	NA	1.06	0.99	1.04	NA	NA	NA	
FORST HL 60kV				NA	0.98	0.83	NA	NA	NA	NA	1.06	0.98	1.04	NA	NA	NA	
OXBOW 60kV				NA	0.99	0.83	NA	NA	NA	NA	1.07	0.99	1.04	NA	NA	NA	
ROLLINS 60kV				NA	1.00	0.89	NA	NA	NA	NA	1.02	1.00	1.02	NA	NA	NA	
SHADYGLN 60kV				NA	1.00	0.89	NA	NA	NA	NA	1.02	1.00	1.02	NA	NA	NA	
WEMR SWS 60kV				NA	0.99	0.87	NA	NA	NA	NA	1.04	0.99	1.03	NA	NA	NA	
BELL PGE 115kV	GOLDHILL 115KV - SECTION 1F & 2F	P2-4	Bus Tie Breaker Falut	0.85	1.00	0.95	NA	NA	NA	1.03	1.06	1.00	1.06	0.99	NA	NA	Load Reconfiguration Recommended in 2017-2018 TPP
CAPEHORN 60kV				1.00	1.00	0.89	NA	NA	NA	1.02	1.02	0.99	1.02	1.01	NA	NA	Continue to monitor
CPM 115kV				1.04	0.89	0.89	NA	NA	NA	1.05	1.04	0.89	1.04	1.04	NA	NA	Continue to monitor
DIMOND_1 115kV				1.04	0.89	0.90	NA	NA	NA	1.05	1.04	0.89	1.04	1.04	NA	NA	Continue to monitor
ENVRO_HY 60kV				1.00	0.99	0.83	NA	NA	NA	1.04	1.06	0.99	1.04	1.01	NA	NA	Continue to monitor
FLINT 115kV				0.85	1.00	0.96	NA	NA	NA	1.03	1.06	1.00	1.06	0.99	NA	NA	Load Reconfiguration Recommended in 2017-2018 TPP
FORST HL 60kV				1.00	0.98	0.83	NA	NA	NA	1.03	1.06	0.98	1.04	1.01	NA	NA	Continue to monitor
HIGGINS 115kV				0.88	1.01	0.96	NA	NA	NA	1.03	1.06	1.01	1.06	1.00	NA	NA	Load Reconfiguration Recommended in 2017-2018 TPP
HORSESHE 115kV				0.84	0.99	0.93	NA	NA	NA	1.03	1.07	0.99	1.07	0.99	NA	NA	Load Reconfiguration Recommended in 2017-2018 TPP
NEWCSTLE 115kV				0.84	1.00	0.95	NA	NA	NA	1.03	1.06	1.00	1.06	0.99	NA	NA	Load Reconfiguration Recommended in 2017-2018 TPP
OXBOW 60kV				1.01	0.99	0.83	NA	NA	NA	1.04	1.07	0.99	1.04	1.01	NA	NA	Continue to monitor
PENRYN 60kV				0.89	1.00	0.99	NA	NA	NA	1.01	1.02	1.01	1.01	1.01	NA	NA	Load Reconfiguration Recommended in 2017-2018 TPP
PLACER 115kV				0.85	1.00	0.95	NA	NA	NA	1.03	1.06	1.00	1.06	0.99	NA	NA	Load Reconfiguration Recommended in 2017-2018 TPP
ROLLINS 60kV				1.01	1.00	0.89	NA	NA	NA	1.02	1.02	1.00	1.02	1.02	NA	NA	Continue to monitor
SHADYGLN 60kV				1.00	1.00	0.89	NA	NA	NA	1.02	1.02	1.00	1.02	1.01	NA	NA	Continue to monitor
SHPRING 115kV				1.02	0.89	0.89	NA	NA	NA	1.06	1.04	0.89	1.04	1.02	NA	NA	Continue to monitor
WEMR SWS 60kV				1.00	0.99	0.88	NA	NA	NA	1.03	1.04	0.99	1.03	1.01	NA	NA	Continue to monitor
CPM 115kV	GOLDHILL 115KV - SECTION 2G & 2F	P2-4	Bus Tie Breaker Falut	NA	0.90	0.89	NA	NA	NA	NA	1.05	0.89	1.05	NA	NA	NA	Continue to monitor
DIMOND_1 115kV				NA	0.90	0.90	NA	NA	NA	NA	1.05	0.89	1.05	NA	NA	NA	Continue to monitor
SHPRING 115kV				NA	0.90	0.89	NA	NA	NA	NA	1.05	0.89	1.05	NA	NA	NA	Continue to monitor
DEL MAR 60kV	GOLDHILL 230KV - SECTION 1D & 1E	P2-4	Bus Tie Breaker Falut	NA	1.01	0.90	NA	NA	NA	NA	1.07	1.01	1.07	NA	NA	NA	Continue to monitor
SIERRAPI 60kV				NA	1.01	0.90	NA	NA	NA	NA	1.07	1.01	1.07	NA	NA	NA	Continue to monitor
DEL MAR 60kV	GOLDHILL 230KV - SECTION 2E & 1E	P2-4	Bus Tie Breaker Falut	NA	1.02	0.88	NA	NA	NA	NA	1.08	1.01	1.08	NA	NA	NA	Continue to monitor
SIERRAPI 60kV				NA	1.02	0.88	NA	NA	NA	NA	1.08	1.01	1.08	NA	NA	NA	Continue to monitor
CAPEHORN 60kV	RIO OSO 115KV - SECTION 2D & 1D	P2-4	Bus Tie Breaker Falut	1.01	1.00	0.89	NA	NA	NA	1.02	1.01	1.00	1.01	1.01	NA	NA	Continue to monitor
E.NICOLS 115kV				1.00	0.98	0.89	NA	NA	NA	1.03	1.10	0.98	1.10	1.02	NA	NA	Continue to monitor
ENVRO_HY 60kV				1.01	0.99	0.83	NA	NA	NA	1.04	1.06	0.99	1.03	1.01	NA	NA	Continue to monitor
FORST HL 60kV				1.00	0.98	0.83	NA	NA	NA	1.03	1.06	0.98	1.03	1.01	NA	NA	Continue to monitor
OXBOW 60kV				1.01	0.99	0.83	NA	NA	NA	1.04	1.06	0.99	1.03	1.01	NA	NA	Continue to monitor
ROLLINS 60kV				1.02	1.00	0.89	NA	NA	NA	1.02	1.02	1.00	1.02	1.02	NA	NA	Continue to monitor
SHADYGLN 60kV				1.01	1.00	0.89	NA	NA	NA	1.02	1.02	1.00	1.02	1.01	NA	NA	Continue to monitor
WEMR SWS 60kV				1.01	0.99	0.87	NA	NA	NA	1.03	1.04	0.99	1.03	1.01	NA	NA	Continue to monitor

Study Area: PG&E Central Valley

Low Voltages



Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)								Voltage PU (Sensitivity Scenarios)					Project & Potential Mitigation Solutions
				2022 Summer Peak	2025 Summer Peak	2030 Summer Peak	2022 Winter Peak	2025 Winter Peak	2030 Winter Peak	2022 Spring Off-Peak	2025 Spring Off-Peak	2025 SP High CEC Forecast	2025 SpOP Hi Renew & Min Gas Gen	2022 SP Heavy Renewable & Min Gas Gen	2030 Retirement of QF Generations	2030 Summer Peak w/o Facility Rerates	
SJ COGEN 115kV	TESLA 115KV - SECTION 2D & 1D	P2-4	Bus Tie Breaker Falut	Diverge	Diverge	Diverge	NA	NA	NA	NA	1.13	Diverge	NA	1.13	NA	NA	System Upgrade/ Preferred Resources/Operating Solution as needed
BRIGHTON 230kV	TESLA E 230KV - SECTION 2E & 1E	P2-4	Bus Tie Breaker Falut	0.95	0.98	0.87	NA	NA	NA	1.00	1.04	0.98	0.06	1.04	NA	NA	Continue to monitor
DEL MAR 60kV				0.99	1.01	0.84	NA	NA	NA	1.06	1.08	1.01	0.04	1.08	NA	NA	Continue to monitor
ROCKLIN 60kV				0.99	1.02	0.87	NA	NA	NA	1.06	1.06	1.01	0.04	1.07	NA	NA	Continue to monitor
SIERRAPI 60kV				0.99	1.01	0.84	NA	NA	NA	1.06	1.08	1.01	0.04	1.08	NA	NA	Continue to monitor
PLAINFLD 60kV	VACA-DIX 230KV - SECTION 1E & 2E	P2-4	Bus Tie Breaker Falut	0.86	0.85	0.83	NA	NA	NA	1.03	1.03	0.84	1.04	0.88	NA	NA	Under review
TRAVIS 60kV	VACA-DIX 230KV - SECTION 2F & 2E	P2-4	Bus Tie Breaker Falut	0.97	0.96	0.96	NA	NA	NA	1.00	0.93	0.96	0.93	0.90	NA	NA	Sensitivity only
BELL PGE 115kV	CHI.PARK 11.50KV GEN UNIT 1 & BELL-PLACER115KVMOASOPENEDONPLACER_BELL PGE	P3	N-G-1	>0.9	>0.9	0.82	NA	NA	NA	>0.9	>0.9	>0.9	>0.9	>0.9	NA	NA	Continue to monitor
BONNIE N 60kV				>0.9	>0.9	0.84	NA	NA	NA	>0.9	>0.9	>0.9	>0.9	>0.9	NA	NA	Continue to monitor
BOWMN PH 60kV				>0.9	>0.9	0.87	NA	NA	NA	>0.9	>0.9	>0.9	>0.9	>0.9	NA	NA	Continue to monitor
CHCGO PK 115kV				>0.9	>0.9	0.87	NA	NA	NA	>0.9	>0.9	>0.9	>0.9	>0.9	NA	NA	Continue to monitor
DRUM 60kV				>0.9	>0.9	0.85	NA	NA	NA	>0.9	>0.9	>0.9	>0.9	>0.9	NA	NA	Continue to monitor
DTCH FL1 115kV				>0.9	>0.9	0.88	NA	NA	NA	>0.9	>0.9	>0.9	>0.9	>0.9	NA	NA	Continue to monitor
FORST HL 60kV				>0.9	>0.9	0.78	NA	NA	NA	>0.9	>0.9	>0.9	>0.9	>0.9	NA	NA	Continue to monitor
HAYPRESS 60kV				>0.9	>0.9	0.87	NA	NA	NA	>0.9	>0.9	>0.9	>0.9	>0.9	NA	NA	Continue to monitor
HIGGINS 115kV				>0.9	>0.9	0.83	NA	NA	NA	>0.9	>0.9	>0.9	>0.9	>0.9	NA	NA	Continue to monitor
SPAULDNG 60kV				>0.9	>0.9	0.86	NA	NA	NA	>0.9	>0.9	>0.9	>0.9	>0.9	NA	NA	Continue to monitor
BRIGHTON 230kV	COLGATE1 13.80KV GEN UNIT 1 & RIOOSO-BRIGHTON230KV	P3	N-G-1	>0.9	>0.9	0.90	NA	NA	NA	>0.9	>0.9	>0.9	>0.9	>0.9	NA	NA	Continue to monitor
ENVRO_HY 60kV	OXBOW F 9.11KV GEN UNIT 1 & BELL-PLACER115KVMOASOPENEDONPLACER_BELL PGE	P3	N-G-1	>0.9	>0.9	0.77	NA	NA	NA	>0.9	>0.9	>0.9	>0.9	>0.9	NA	NA	Continue to monitor
FORST HL 60kV				>0.9	>0.9	0.77	NA	NA	NA	>0.9	>0.9	>0.9	>0.9	>0.9	NA	NA	Continue to monitor
OXBOW 60kV				>0.9	>0.9	0.77	NA	NA	NA	>0.9	>0.9	>0.9	>0.9	>0.9	NA	NA	Continue to monitor
SANDBAR 115kV	BELLOTA BUS (FAILURE OF NON-REDUNDENT RELAY)	P5-5	Non-Redundant Relay	0.91	0.95	0.90	NA	NA	NA	1.04	1.06	0.94	0.02	1.07	NA	NA	Continue to monitor
SPRNG GP 115kV				0.91	0.94	0.90	NA	NA	NA	1.04	1.06	0.94	0.01	1.08	NA	NA	Continue to monitor
PLAINFLD 60kV	BIRD'S LANDING SW. STA. 230 KV BAAH BUS #2 (FAILURE OF NON-REDUNDENT RELAY)	P5-5	Non-Redundant Relay	0.88	0.88	0.87	NA	NA	NA	1.03	1.03	0.88	1.05	0.88	NA	NA	Under review
TRAVIS 60kV				0.98	0.98	0.98	NA	NA	NA	1.00	0.94	0.98	0.94	0.90	NA	NA	Sensitivity only
BRIGHTN 115kV	BRIGHTON 230KV BUS (FAILURE OF NON-REDUNDENT RELAY)	P5-5	Non-Redundant Relay	0.89	0.96	0.83	NA	NA	NA	1.03	1.04	0.95	1.05	0.91	NA	NA	Protection upgrade
BRKR SLG 115kV				0.89	0.95	0.83	NA	NA	NA	1.03	1.04	0.95	1.04	0.91	NA	NA	Protection upgrade
CAMPUS 115kV				0.89	0.94	0.83	NA	NA	NA	1.02	1.03	0.94	1.04	0.91	NA	NA	Protection upgrade
DAVIS 115kV				0.89	0.95	0.83	NA	NA	NA	1.02	1.03	0.94	1.04	0.91	NA	NA	Protection upgrade
DEEPWATR 115kV				0.89	0.95	0.83	NA	NA	NA	1.03	1.04	0.94	1.05	0.91	NA	NA	Protection upgrade
DEL MAR 60kV				0.99	1.01	0.88	NA	NA	NA	1.05	1.07	1.01	1.08	0.97	NA	NA	Continue to monitor
GRAND IS 115kV				0.88	0.96	0.80	NA	NA	NA	1.03	1.04	0.95	1.05	0.91	NA	NA	Protection upgrade
MOBILCHE 115kV				0.92	0.98	0.88	NA	NA	NA	1.03	1.04	0.98	1.05	0.93	NA	NA	Continue to monitor
POST 115kV				0.89	0.96	0.84	NA	NA	NA	1.03	1.04	0.95	1.05	0.91	NA	NA	Protection upgrade
Q653F 115kV				0.89	0.95	0.84	NA	NA	NA	1.02	1.04	0.95	1.04	0.92	NA	NA	Protection upgrade
SIERRAPI 60kV				0.99	1.01	0.88	NA	NA	NA	1.05	1.07	1.01	1.08	0.97	NA	NA	Continue to monitor
UCD_TP2 115kV				0.89	0.95	0.83	NA	NA	NA	1.02	1.03	0.94	1.04	0.91	NA	NA	Protection upgrade
W.SCRMNO 115kV				0.89	0.96	0.84	NA	NA	NA	1.03	1.04	0.95	1.05	0.92	NA	NA	Protection upgrade
WDLND_BM 115kV				0.92	0.97	0.87	NA	NA	NA	1.03	1.04	0.97	1.05	0.93	NA	NA	Continue to monitor
WOODLD 115kV				0.92	0.98	0.88	NA	NA	NA	1.03	1.04	0.97	1.05	0.93	NA	NA	Continue to monitor
WILKINS 60kV	CORTINA 230KV BUS (FAILURE OF NON-REDUNDENT RELAY)	P5-5	Non-Redundant Relay	0.93	0.95	0.89	NA	NA	NA	1.02	1.04	0.95	1.05	0.99	NA	NA	Continue to monitor
APPLE HL 115kV				0.40	0.28	0.33	NA	NA	NA	1.05	1.07	0.38	1.11	0.32	NA	NA	Protection upgrade
CLRKSVLE 115kV				0.38	0.28	0.33	NA	NA	NA	1.03	1.07	0.38	1.11	0.30	NA	NA	Protection upgrade

Study Area: PG&E Central Valley

Low Voltages



Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)								Voltage PU (Sensitivity Scenarios)					Project & Potential Mitigation Solutions
				2022 Summer Peak	2025 Summer Peak	2030 Summer Peak	2022 Winter Peak	2025 Winter Peak	2030 Winter Peak	2022 Spring Off-Peak	2025 Spring Off-Peak	2025 SP High CEC Forecast	2025 SpOP Hi Renew & Min Gas Gen	2022 SP Heavy Renewable & Min Gas Gen	2030 Retirement of QF Generations	2030 Summer Peak w/o Facility Rerates	
CPM 115kV	GOLD HILL 230 KV BUS (FAILURE OF NON-REDUNDENT RELAY)	P5-5	Non-Redundant Relay	0.40	0.29	0.34	NA	NA	NA	1.04	1.07	0.39	1.11	0.31	NA	NA	Protection upgrade
DIMOND_1 115kV				0.40	0.28	0.33	NA	NA	NA	1.05	1.06	0.38	1.11	0.31	NA	NA	Protection upgrade
DIMOND_2 115kV				0.38	0.28	0.33	NA	NA	NA	1.05	1.07	0.38	1.11	0.30	NA	NA	Protection upgrade
DMND SPR 115kV				0.38	0.28	0.33	NA	NA	NA	1.05	1.07	0.38	1.11	0.30	NA	NA	Protection upgrade
ELDORAD 115kV				0.40	0.29	0.33	NA	NA	NA	1.05	1.07	0.39	1.11	0.32	NA	NA	Protection upgrade
GOLDHILL 115kV				0.40	0.30	0.34	NA	NA	NA	1.04	1.07	0.39	1.11	0.31	NA	NA	Protection upgrade
GOLDHILL 230kV				0.20	0.28	0.31	NA	NA	NA	NA	1.07	0.37	1.12	NA	NA	NA	Protection upgrade
HORSESHE 115kV				0.42	0.32	0.36	NA	NA	NA	1.03	1.07	0.41	1.11	0.31	NA	NA	Protection upgrade
NEWCSTLE 115kV				0.44	0.35	0.38	NA	NA	NA	1.03	1.06	0.44	1.10	0.32	NA	NA	Protection upgrade
SHPRING 115kV				0.38	0.28	0.33	NA	NA	NA	1.05	1.06	0.38	1.11	0.30	NA	NA	Protection upgrade
SPICAMIN 115kV				0.40	0.28	0.33	NA	NA	NA	1.05	1.07	0.38	1.11	0.32	NA	NA	Protection upgrade
ATLANTC 230kV	LOCKEFORD 230kV BUS (FAILURE OF NON-REDUNDENT RELAY)	P5-5	Non-Redundant Relay	0.97	0.99	0.90	NA	NA	NA	1.01	1.06	0.99	0.93	1.06	NA	NA	Continue to monitor
ATLANTI 60kV				1.00	1.03	0.89	NA	NA	NA	1.05	1.05	1.02	0.97	1.05	NA	NA	Continue to monitor
BRIGHTON 230kV				0.96	0.99	0.82	NA	NA	NA	1.00	1.04	0.98	0.93	1.04	NA	NA	Continue to monitor
CAMPUS 115kV				1.00	1.01	0.90	NA	NA	NA	1.03	1.04	1.01	1.00	1.04	NA	NA	Continue to monitor
CAPEHORN 60kV				1.01	1.00	0.88	NA	NA	NA	1.02	1.01	1.00	1.01	1.01	NA	NA	Continue to monitor
DAVIS 115kV				1.00	1.01	0.90	NA	NA	NA	1.03	1.04	1.01	1.00	1.04	NA	NA	Continue to monitor
DEL MAR 60kV				0.99	1.02	0.85	NA	NA	NA	1.04	1.07	1.02	0.97	1.07	NA	NA	Continue to monitor
ENVRO_HY 60kV				1.01	0.99	0.83	NA	NA	NA	1.04	1.06	0.99	1.01	1.03	NA	NA	Continue to monitor
FORST HL 60kV				1.00	0.99	0.83	NA	NA	NA	1.04	1.06	0.98	1.01	1.03	NA	NA	Continue to monitor
OXBOW 60kV				1.01	0.99	0.83	NA	NA	NA	1.04	1.06	0.99	1.01	1.03	NA	NA	Continue to monitor
Q653F 115kV				1.00	1.01	0.90	NA	NA	NA	1.03	1.04	1.01	1.00	1.04	NA	NA	Continue to monitor
RIO OSO 230kV				0.96	1.00	0.89	NA	NA	NA	1.00	1.05	1.00	0.94	1.05	NA	NA	Continue to monitor
ROCKLIN 60kV				0.99	1.02	0.88	NA	NA	NA	1.05	1.05	1.02	0.97	1.06	NA	NA	Continue to monitor
ROLLINS 60kV				1.02	1.00	0.89	NA	NA	NA	1.02	1.02	1.00	1.02	1.02	NA	NA	Continue to monitor
SHADYGLN 60kV				1.01	1.00	0.88	NA	NA	NA	1.02	1.02	1.00	1.01	1.02	NA	NA	Continue to monitor
SIERRAPI 60kV				0.99	1.02	0.85	NA	NA	NA	1.04	1.07	1.02	0.97	1.07	NA	NA	Continue to monitor
TAYLOR 60kV				0.99	1.02	0.88	NA	NA	NA	1.05	1.05	1.02	0.97	1.06	NA	NA	Continue to monitor
UCD_TP2 115kV				1.00	1.01	0.90	NA	NA	NA	1.03	1.04	1.01	1.00	1.04	NA	NA	Continue to monitor
WEMR SWS 60kV				1.01	0.99	0.87	NA	NA	NA	1.03	1.04	0.99	1.01	1.03	NA	NA	Continue to monitor
ATLANTC 230kV	RIO OSO 230 KV BUS (FAILURE OF NON-REDUNDENT RELAY)	P5-5	Non-Redundant Relay	0.97	0.98	0.90	NA	NA	NA	1.02	1.08	0.98	1.09	0.18	NA	NA	Sensitivity only
ATLANTI 60kV				1.00	1.01	0.89	NA	NA	NA	1.06	1.07	1.01	1.08	0.19	NA	NA	Continue to monitor
BONNIE N 60kV				1.00	1.01	0.90	NA	NA	NA	1.01	1.01	1.00	1.01	0.42	NA	NA	Continue to monitor
BRIGHTON 230kV				0.90	0.95	0.83	NA	NA	NA	0.98	1.01	0.93	1.02	0.19	NA	NA	Continue to monitor
BRKR SLG 115kV				0.98	1.03	0.89	NA	NA	NA	1.04	1.05	1.02	1.06	0.19	NA	NA	Continue to monitor
CAMPUS 115kV				0.96	1.02	0.88	NA	NA	NA	1.03	1.05	1.01	1.05	0.18	NA	NA	Continue to monitor
CAPEHORN 60kV				1.01	1.00	0.86	NA	NA	NA	1.02	1.02	0.99	1.02	0.47	NA	NA	Continue to monitor
DAVIS 115kV				0.96	1.02	0.88	NA	NA	NA	1.03	1.05	1.01	1.05	0.18	NA	NA	Continue to monitor
DEL MAR 60kV				0.99	1.01	0.86	NA	NA	NA	1.06	1.09	1.00	1.10	0.18	NA	NA	Continue to monitor
ENVRO_HY 60kV				1.01	0.99	0.80	NA	NA	NA	1.04	1.06	0.99	1.03	0.50	NA	NA	Continue to monitor
FORST HL 60kV				1.00	0.99	0.80	NA	NA	NA	1.04	1.06	0.98	1.03	0.49	NA	NA	Continue to monitor
KNIGHT1 115kV				0.95	1.02	0.89	NA	NA	NA	1.02	1.06	1.01	1.06	0.17	NA	NA	Continue to monitor
KNIGHT2 115kV				0.95	1.02	0.89	NA	NA	NA	1.01	1.05	1.01	1.06	0.17	NA	NA	Continue to monitor
KNIGHTLD 115kV				0.95	1.02	0.89	NA	NA	NA	1.02	1.06	1.01	1.06	0.17	NA	NA	Continue to monitor
MOBILCHE 115kV				0.94	1.02	0.88	NA	NA	NA	1.02	1.05	1.01	1.06	0.17	NA	NA	Continue to monitor
OXBOW 60kV				1.01	0.99	0.80	NA	NA	NA	1.04	1.07	0.99	1.03	0.50	NA	NA	Continue to monitor
Q653F 115kV				0.96	1.02	0.88	NA	NA	NA	1.02	1.05	1.01	1.05	0.18	NA	NA	Continue to monitor



Study Area: PG&E Central Valley

Low Voltages



Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)								Voltage PU (Sensitivity Scenarios)					Project & Potential Mitigation Solutions
				2022 Summer Peak	2025 Summer Peak	2030 Summer Peak	2022 Winter Peak	2025 Winter Peak	2030 Winter Peak	2022 Spring Off-Peak	2025 Spring Off-Peak	2025 SP High CEC Forecast	2025 SpOP Hi Renew & Min Gas Gen	2022 SP Heavy Renewable & Min Gas Gen	2030 Retirement of QF Generations	2030 Summer Peak w/o Facility Rerates	
RIO OSO 230kV				0.89	1.00	0.82	NA	NA	NA	0.94	1.06	0.91	1.08	0.15	NA	NA	Continue to monitor
ROCKLIN 60kV				0.99	1.01	0.89	NA	NA	NA	1.06	1.07	1.00	1.08	0.18	NA	NA	Continue to monitor
ROLLINS 60kV				1.01	1.00	0.86	NA	NA	NA	1.02	1.02	1.00	1.02	0.48	NA	NA	Continue to monitor
SHADYGLN 60kV				1.01	1.00	0.86	NA	NA	NA	1.02	1.02	1.00	1.02	0.47	NA	NA	Continue to monitor
SIERRAPI 60kV				0.99	1.01	0.86	NA	NA	NA	1.06	1.09	1.00	1.10	0.18	NA	NA	Continue to monitor
TAYLOR 60kV				0.99	1.01	0.89	NA	NA	NA	1.06	1.07	1.01	1.08	0.18	NA	NA	Continue to monitor
UCD_TP2 115kV				0.96	1.02	0.88	NA	NA	NA	1.03	1.05	1.01	1.05	0.18	NA	NA	Continue to monitor
WDLND_BM 115kV				0.95	1.02	0.88	NA	NA	NA	1.02	1.05	1.01	1.06	0.17	NA	NA	Continue to monitor
WEMR SWS 60kV				1.01	0.99	0.85	NA	NA	NA	1.03	1.04	0.99	1.03	0.47	NA	NA	Continue to monitor
WOODLD 115kV				0.94	1.02	0.88	NA	NA	NA	1.02	1.05	1.01	1.06	0.17	NA	NA	Continue to monitor
ZAMORA 115kV				0.94	1.02	0.88	NA	NA	NA	1.01	1.05	1.01	1.06	0.17	NA	NA	Continue to monitor
BRIGHTON 230kV	TESLA 230kV BUS E (FAILURE OF NON-REDUNDENT RELAY)	P5-5	Non-Redundant Relay	0.95	0.98	0.87	NA	NA	NA	1.00	1.04	0.98	0.03	1.04	NA	NA	Continue to monitor
ATLANTC 230kV	ATLANTIC-GOLD HILL 230KV & RIOOSO-ATLANTIC230KV	P6	N-1-1	0.89	>0.9	0.80	NA	NA	NA	>0.9	>0.9	>0.9	>0.9	>0.9	NA	NA	Continue to monitor
ATLANTI 60kV				>0.9	>0.9	0.77	NA	NA	NA	>0.9	>0.9	>0.9	>0.9	>0.9	NA	NA	Continue to monitor
ATLANTIC 115kV				>0.9	>0.9	0.82	NA	NA	NA	>0.9	>0.9	>0.9	>0.9	>0.9	NA	NA	Continue to monitor
DEL MAR 60kV				>0.9	>0.9	0.73	NA	NA	NA	>0.9	>0.9	>0.9	>0.9	>0.9	NA	NA	Continue to monitor
PLSNT GR 115kV				>0.9	>0.9	0.84	NA	NA	NA	>0.9	>0.9	>0.9	>0.9	>0.9	NA	NA	Continue to monitor
ROCKLIN 60kV				>0.9	>0.9	0.76	NA	NA	NA	>0.9	>0.9	>0.9	>0.9	>0.9	NA	NA	Continue to monitor
SIERRAPI 60kV				>0.9	>0.9	0.73	NA	NA	NA	>0.9	>0.9	>0.9	>0.9	>0.9	NA	NA	Continue to monitor
TAYLOR 60kV				>0.9	>0.9	0.76	NA	NA	NA	>0.9	>0.9	>0.9	>0.9	>0.9	NA	NA	Continue to monitor
ULTR-RCK 120.75kV				>0.9	>0.9	0.85	NA	NA	NA	>0.9	>0.9	>0.9	>0.9	>0.9	NA	NA	Continue to monitor
CH.STN 115kV	BELLOTA 230/115KV TB 1 & BELLOTA230/115KV TB2	P6	N-1-1	0.82	0.88	0.78	NA	NA	NA	>0.9	>0.9	>0.9	>0.9	>0.9	NA	NA	Operating procedure
CURTISS 115kV				0.84	0.89	0.80	NA	NA	NA	>0.9	>0.9	>0.9	>0.9	>0.9	NA	NA	Operating procedure
MELNS JB 115kV				0.84	0.89	0.80	NA	NA	NA	>0.9	>0.9	>0.9	>0.9	>0.9	NA	NA	Operating procedure
MELONES 115kV				0.80	0.86	0.77	NA	NA	NA	>0.9	>0.9	>0.9	>0.9	>0.9	NA	NA	Operating procedure
MI-WUK 115kV				0.88	>0.9	0.84	NA	NA	NA	>0.9	>0.9	>0.9	>0.9	>0.9	NA	NA	Operating procedure
PEORIA 115kV				0.81	0.87	0.78	NA	NA	NA	>0.9	>0.9	>0.9	>0.9	>0.9	NA	NA	Operating procedure
R.TRACK 115kV				0.80	0.86	0.76	NA	NA	NA	>0.9	>0.9	>0.9	>0.9	>0.9	NA	NA	Operating procedure
RVRBANK 115kV				0.59	0.75	0.54	NA	NA	NA	>0.9	>0.9	>0.9	>0.9	>0.9	NA	NA	Operating procedure
SPISONORA 115kV				0.84	0.89	0.80	NA	NA	NA	>0.9	>0.9	>0.9	>0.9	>0.9	NA	NA	Operating procedure
SPRNG GP 115kV				>0.9	>0.9	0.90	NA	NA	NA	>0.9	>0.9	>0.9	>0.9	>0.9	NA	NA	Operating procedure
TULLOCH 115kV				0.73	0.82	0.70	NA	NA	NA	>0.9	>0.9	>0.9	>0.9	>0.9	NA	NA	Operating procedure
VALLY HM 115kV				0.89	>0.9	0.86	NA	NA	NA	>0.9	>0.9	>0.9	>0.9	>0.9	NA	NA	Operating procedure
BRIGHTON 230kV	BELLOTA-LOCKFORD 230KV & LOCKEFORD-BELLOTA230KV	P6	N-1-1	>0.9	>0.9	0.86	NA	NA	NA	>0.9	>0.9	>0.9	>0.9	>0.9	NA	NA	Continue to monitor
DEL MAR 60kV	BRIGHTON 230/115KV TB 10 & BRIGHTON230/115KV TB9	P6	N-1-1	>0.9	>0.9	0.89	NA	NA	NA	>0.9	>0.9	>0.9	>0.9	>0.9	NA	NA	Continue to monitor
SIERRAPI 60kV				>0.9	>0.9	0.89	NA	NA	NA	>0.9	>0.9	>0.9	>0.9	>0.9	NA	NA	Continue to monitor
BRIGHTN 115kV				>0.9	>0.9	0.82	NA	NA	NA	>0.9	>0.9	>0.9	>0.9	>0.9	NA	NA	Continue to monitor
BRIGHTON 230kV				>0.9	>0.9	0.71	NA	NA	NA	>0.9	>0.9	>0.9	>0.9	>0.9	NA	NA	Continue to monitor
BRKR SLG 115kV				>0.9	>0.9	0.82	NA	NA	NA	>0.9	>0.9	>0.9	>0.9	>0.9	NA	NA	Continue to monitor
CAMPUS 115kV				>0.9	>0.9	0.82	NA	NA	NA	>0.9	>0.9	>0.9	>0.9	>0.9	NA	NA	Continue to monitor
DAVIS 115kV				>0.9	>0.9	0.82	NA	NA	NA	>0.9	>0.9	>0.9	>0.9	>0.9	NA	NA	Continue to monitor
DEEPWATR 115kV				>0.9	>0.9	0.82	NA	NA	NA	>0.9	>0.9	>0.9	>0.9	>0.9	NA	NA	Continue to monitor
GRAND IS 115kV				>0.9	>0.9	0.79	NA	NA	NA	>0.9	>0.9	>0.9	>0.9	>0.9	NA	NA	Continue to monitor
MOBILCHE 115kV				>0.9	>0.9	0.88	NA	NA	NA	>0.9	>0.9	>0.9	>0.9	>0.9	NA	NA	Continue to monitor
POST 115kV				>0.9	>0.9	0.83	NA	NA	NA	>0.9	>0.9	>0.9	>0.9	>0.9	NA	NA	Continue to monitor

Study Area: PG&E Central Valley

Low Voltages



Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)								Voltage PU (Sensitivity Scenarios)					Project & Potential Mitigation Solutions
				2022 Summer Peak	2025 Summer Peak	2030 Summer Peak	2022 Winter Peak	2025 Winter Peak	2030 Winter Peak	2022 Spring Off-Peak	2025 Spring Off-Peak	2025 SP High CEC Forecast	2025 SpOP Hi Renew & Min Gas Gen	2022 SP Heavy Renewable & Min Gas Gen	2030 Retirement of QF Generations	2030 Summer Peak w/o Facility Rerates	
Q653F 115kV				>0.9	>0.9	0.83	NA	NA	NA	>0.9	>0.9	>0.9	>0.9	>0.9	NA	NA	Continue to monitor
UCD_TP2 115kV				>0.9	>0.9	0.82	NA	NA	NA	>0.9	>0.9	>0.9	>0.9	>0.9	NA	NA	Continue to monitor
W.SCRMNO 115kV				>0.9	>0.9	0.83	NA	NA	NA	>0.9	>0.9	>0.9	>0.9	>0.9	NA	NA	Continue to monitor
WDLND_BM 115kV				>0.9	>0.9	0.87	NA	NA	NA	>0.9	>0.9	>0.9	>0.9	>0.9	NA	NA	Continue to monitor
WOODLD 115kV				>0.9	>0.9	0.87	NA	NA	NA	>0.9	>0.9	>0.9	>0.9	>0.9	NA	NA	Continue to monitor
CLRKSVLE 115kV	GOLDHILL 230/115KV TB 1 & GOLDHILL230/115KVTB2	P6	N-1-1	>0.9	>0.9	>0.9	NA	NA	NA	>0.9	>0.9	>0.9	>0.9	0.56	NA	NA	Sensitivity only
CPM 115kV				>0.9	>0.9	>0.9	NA	NA	NA	>0.9	>0.9	>0.9	>0.9	0.58	NA	NA	Sensitivity only
DIMOND_1 115kV				>0.9	>0.9	>0.9	NA	NA	NA	>0.9	>0.9	>0.9	>0.9	0.58	NA	NA	Sensitivity only
DIMOND_2 115kV				>0.9	>0.9	>0.9	NA	NA	NA	>0.9	>0.9	>0.9	>0.9	0.55	NA	NA	Sensitivity only
DMND SPR 115kV				>0.9	>0.9	>0.9	NA	NA	NA	>0.9	>0.9	>0.9	>0.9	0.55	NA	NA	Sensitivity only
ELDORAD 115kV				>0.9	>0.9	>0.9	NA	NA	NA	>0.9	>0.9	>0.9	>0.9	0.57	NA	NA	Sensitivity only
FLINT 115kV				>0.9	>0.9	>0.9	NA	NA	NA	>0.9	>0.9	>0.9	>0.9	0.62	NA	NA	Sensitivity only
GOLD HLL 60kV				>0.9	>0.9	>0.9	NA	NA	NA	>0.9	>0.9	>0.9	>0.9	0.61	NA	NA	Sensitivity only
GOLDHILL 115kV				>0.9	>0.9	>0.9	NA	NA	NA	>0.9	>0.9	>0.9	>0.9	0.58	NA	NA	Sensitivity only
HORSESHE 115kV				>0.9	>0.9	>0.9	NA	NA	NA	>0.9	>0.9	>0.9	>0.9	0.59	NA	NA	Sensitivity only
LIMESTNE 60kV				>0.9	>0.9	>0.9	NA	NA	NA	>0.9	>0.9	>0.9	>0.9	0.60	NA	NA	Sensitivity only
NEWCSTLE 115kV				>0.9	>0.9	>0.9	NA	NA	NA	>0.9	>0.9	>0.9	>0.9	0.61	NA	NA	Sensitivity only
SHPRING 115kV				>0.9	>0.9	>0.9	NA	NA	NA	>0.9	>0.9	>0.9	>0.9	0.55	NA	NA	Sensitivity only
SPICAMIN 115kV				>0.9	>0.9	>0.9	NA	NA	NA	>0.9	>0.9	>0.9	>0.9	0.57	NA	NA	Sensitivity only
APPLE HL 115kV				>0.9	>0.9	>0.9	NA	NA	NA	>0.9	>0.9	>0.9	>0.9	0.57	NA	NA	Sensitivity only
BRIGHTON 230kV	LOCKEFORD-BELLOTA 230KV & BELLOTA-LOCKFORD230KV	P6	N-1-1	>0.9	>0.9	0.86	NA	NA	NA	>0.9	>0.9	>0.9	>0.9	>0.9	NA	NA	Continue to monitor
DEL MAR 60kV	LOCKFORD-BRIGHTON 230KV & GOLDHILL-EIGHTMILEROAD230KV	P6	N-1-1	>0.9	>0.9	0.87	NA	NA	NA	>0.9	>0.9	>0.9	>0.9	>0.9	NA	NA	Continue to monitor
SIERRAPI 60kV				>0.9	>0.9	0.87	NA	NA	NA	>0.9	>0.9	>0.9	>0.9	>0.9	NA	NA	Continue to monitor
ALMENDRA 60kV	PALERMO-PEASE 115KV MOAS OPENED ON PALERMO_HONC JT1 & PEASE-RIOOSO115KVMOASOPENEDONOLIVHJ1_E.MR YJ1	P6	N-1-1	0.55	>0.9	>0.9	NA	NA	NA	>0.9	>0.9	>0.9	>0.9	>0.9	NA	NA	- East Marysville 115/60 kV Transformer Project - Expected ISD: Dec. 2022 - Short term: Action Plan
ENCINAL 60kV				0.59	>0.9	>0.9	NA	NA	NA	>0.9	>0.9	>0.9	>0.9	>0.9	NA	NA	- East Marysville 115/60 kV Transformer Project - Expected ISD: Dec. 2022 - Short term: Action Plan
GLEAF2 60kV				0.55	>0.9	>0.9	NA	NA	NA	>0.9	>0.9	>0.9	>0.9	>0.9	NA	NA	- East Marysville 115/60 kV Transformer Project - Expected ISD: Dec. 2022 - Short term: Action Plan
HARTER 60kV				0.56	>0.9	>0.9	NA	NA	NA	>0.9	>0.9	>0.9	>0.9	>0.9	NA	NA	- East Marysville 115/60 kV Transformer Project - Expected ISD: Dec. 2022 - Short term: Action Plan
LIVE OAK 60kV				0.61	>0.9	>0.9	NA	NA	NA	>0.9	>0.9	>0.9	>0.9	>0.9	NA	NA	- East Marysville 115/60 kV Transformer Project - Expected ISD: Dec. 2022 - Short term: Action Plan
MRYSVLE 60kV				0.53	>0.9	>0.9	NA	NA	NA	>0.9	>0.9	>0.9	>0.9	>0.9	NA	NA	- East Marysville 115/60 kV Transformer Project - Expected ISD: Dec. 2022 - Short term: Action Plan
PEASE 115kV				0.51	>0.9	>0.9	NA	NA	NA	0.90	>0.9	>0.9	>0.9	>0.9	NA	NA	- East Marysville 115/60 kV Transformer Project - Expected ISD: Dec. 2022 - Short term: Action Plan
PEASETP 60kV				0.55	>0.9	>0.9	NA	NA	NA	>0.9	>0.9	>0.9	>0.9	>0.9	NA	NA	- East Marysville 115/60 kV Transformer Project - Expected ISD: Dec. 2022 - Short term: Action Plan

Study Area: PG&E Central Valley

Low Voltages



Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)								Voltage PU (Sensitivity Scenarios)					Project & Potential Mitigation Solutions
				2022 Summer Peak	2025 Summer Peak	2030 Summer Peak	2022 Winter Peak	2025 Winter Peak	2030 Winter Peak	2022 Spring Off-Peak	2025 Spring Off-Peak	2025 SP High CEC Forecast	2025 SpOP Hi Renew & Min Gas Gen	2022 SP Heavy Renewable & Min Gas Gen	2030 Retirement of QF Generations	2030 Summer Peak w/o Facility Rerates	
YCEC 60kV				0.57	>0.9	>0.9	NA	NA	NA	>0.9	>0.9	>0.9	>0.9	>0.9	NA	NA	- East Marysville 115/60 kV Transformer Project - Expected ISD: Dec. 2022 - Short term: Action Plan
YUBACITY 60kV				0.57	>0.9	>0.9	NA	NA	NA	>0.9	>0.9	>0.9	>0.9	>0.9	NA	NA	- East Marysville 115/60 kV Transformer Project - Expected ISD: Dec. 2022 - Short term: Action Plan
BOGUE 115kV	PEASE-RIO OSO 115KV MOAS OPENED ON OLIVH J1_E.MRY J1 (2) & BOGUE-RIOOSO115KV	P6	N-1-1	>0.9	>0.9	0.89	NA	NA	NA	>0.9	>0.9	>0.9	>0.9	>0.9	NA	NA	Continue to monitor
PENRYN 60kV	PLACER-GOLD HILL #1 115KV & PLACER-GOLDHILL#2115KV	P6	N-1-1	>0.9	>0.9	0.49	NA	NA	NA	>0.9	>0.9	>0.9	>0.9	>0.9	NA	NA	Continue to monitor
AUBURN 60kV				>0.9	>0.9	0.51	NA	NA	NA	>0.9	>0.9	>0.9	>0.9	>0.9	NA	NA	Continue to monitor
BELL PGE 115kV				>0.9	>0.9	0.51	NA	NA	NA	>0.9	>0.9	>0.9	>0.9	>0.9	NA	NA	Continue to monitor
BOWMN PH 60kV				>0.9	>0.9	0.71	NA	NA	NA	>0.9	>0.9	>0.9	>0.9	>0.9	NA	NA	Continue to monitor
BRNSWALT 115kV				>0.9	>0.9	0.81	NA	NA	NA	>0.9	>0.9	>0.9	>0.9	>0.9	NA	NA	Continue to monitor
BRUNSWCK 115kV				>0.9	>0.9	0.79	NA	NA	NA	>0.9	>0.9	>0.9	>0.9	>0.9	NA	NA	Continue to monitor
CHCGO PK 115kV				>0.9	>0.9	0.65	NA	NA	NA	>0.9	>0.9	>0.9	>0.9	>0.9	NA	NA	Continue to monitor
DRUM 60kV				>0.9	>0.9	0.68	NA	NA	NA	>0.9	>0.9	>0.9	>0.9	>0.9	NA	NA	Continue to monitor
DTCH FL1 115kV				>0.9	>0.9	0.68	NA	NA	NA	>0.9	>0.9	>0.9	>0.9	>0.9	NA	NA	Continue to monitor
DTCH FL2 115kV				>0.9	>0.9	0.75	NA	NA	NA	>0.9	>0.9	>0.9	>0.9	>0.9	NA	NA	Continue to monitor
HALSEY 60kV				>0.9	>0.9	0.51	NA	NA	NA	>0.9	>0.9	>0.9	>0.9	>0.9	NA	NA	Continue to monitor
HAYPRESS 60kV				>0.9	>0.9	0.71	NA	NA	NA	>0.9	>0.9	>0.9	>0.9	>0.9	NA	NA	Continue to monitor
HIGGINS 115kV				>0.9	>0.9	0.55	NA	NA	NA	>0.9	>0.9	>0.9	>0.9	>0.9	NA	NA	Continue to monitor
MTN_QUAR 60kV				>0.9	>0.9	0.50	NA	NA	NA	>0.9	>0.9	>0.9	>0.9	>0.9	NA	NA	Continue to monitor
PENRYN 60kV				>0.9	>0.9	0.48	NA	NA	NA	>0.9	>0.9	>0.9	>0.9	>0.9	NA	NA	Continue to monitor
PLACER 115kV				>0.9	>0.9	0.50	NA	NA	NA	>0.9	>0.9	>0.9	>0.9	>0.9	NA	NA	Continue to monitor
SPAULDNG 60kV				>0.9	>0.9	0.70	NA	NA	NA	>0.9	>0.9	>0.9	>0.9	>0.9	NA	NA	Continue to monitor
PLAINFLD 60kV	PLAINFLD SVD=V & VACA-DIX230/115KV TB3	P6	N-1-1	0.80	0.79	0.76	NA	NA	NA	>0.9	>0.9	0.78	>0.9	0.83	NA	NA	Under review
BRIGHTON 230kV	RIO OSO-KNIGHTLD-WOODLD 115KV & RIOOSO-BRIGHTON230KV	P6	N-1-1	>0.9	>0.9	0.89	NA	NA	NA	>0.9	>0.9	>0.9	>0.9	>0.9	NA	NA	Continue to monitor
BARRY 60kV	RIO OSO-NICOLAUS 115KV & PALERMO-NICOLAUS115KVMOASOPENEDONPALERMO_E.MRYJ2	P6	N-1-1	>0.9	>0.9	0.77	NA	NA	NA	>0.9	>0.9	>0.9	>0.9	>0.9	NA	NA	Continue to monitor
CATLETT 60kV				>0.9	>0.9	0.78	NA	NA	NA	>0.9	>0.9	>0.9	>0.9	>0.9	NA	NA	Continue to monitor
DIST1001 60kV				>0.9	>0.9	0.79	NA	NA	NA	>0.9	>0.9	>0.9	>0.9	>0.9	NA	NA	Continue to monitor
DIST1500 60kV				>0.9	>0.9	0.79	NA	NA	NA	>0.9	>0.9	>0.9	>0.9	>0.9	NA	NA	Continue to monitor
DST1001A 60kV				>0.9	>0.9	0.79	NA	NA	NA	>0.9	>0.9	>0.9	>0.9	>0.9	NA	NA	Continue to monitor
DST1001B 60kV				>0.9	>0.9	0.79	NA	NA	NA	>0.9	>0.9	>0.9	>0.9	>0.9	NA	NA	Continue to monitor
E.MRYSVE 115kV				>0.9	0.85	0.75	NA	NA	NA	>0.9	>0.9	0.85	>0.9	>0.9	NA	NA	Under review
E.NICOLS 115kV				>0.9	0.85	0.70	NA	NA	NA	>0.9	>0.9	0.85	>0.9	>0.9	NA	NA	Under review
KNTJALT 60kV				>0.9	>0.9	0.79	NA	NA	NA	>0.9	>0.9	>0.9	>0.9	>0.9	NA	NA	Continue to monitor
PLUMAS 60kV				>0.9	>0.9	0.74	NA	NA	NA	>0.9	>0.9	>0.9	>0.9	>0.9	NA	NA	Continue to monitor
TUDOR 60kV				>0.9	>0.9	0.78	NA	NA	NA	>0.9	>0.9	>0.9	>0.9	>0.9	NA	NA	Continue to monitor
WHEATLND 60kV				>0.9	>0.9	0.74	NA	NA	NA	>0.9	>0.9	>0.9	>0.9	>0.9	NA	NA	Continue to monitor
WHTLND1 60kV				>0.9	>0.9	0.74	NA	NA	NA	>0.9	>0.9	>0.9	>0.9	>0.9	NA	NA	Continue to monitor
WHTLNDAL 60kV				>0.9	>0.9	0.79	NA	NA	NA	>0.9	>0.9	>0.9	>0.9	>0.9	NA	NA	Continue to monitor
VACA-D&1 115kV	VACA-DIX 230/115KV TB 3 & VACA-SUISUN115KVMOASOPENEDONVACA-DIX_WEC	P6	N-1-1	>0.9	>0.9	>0.9	NA	NA	NA	>0.9	>0.9	>0.9	>0.9	0.90	NA	NA	Sensitivity only
WEC 115kV				>0.9	>0.9	>0.9	NA	NA	NA	>0.9	>0.9	>0.9	>0.9	0.90	NA	NA	Sensitivity only
JAMESN-A 115kV	VACA-DIX 230/115KV TB 3 & VACA-SUISUN115KVMOASOPENEDONVACA-	P6	N-1-1	>0.9	>0.9	>0.9	NA	NA	NA	>0.9	>0.9	>0.9	>0.9	0.90	NA	NA	Sensitivity only
SCHMLBCH 115kV				>0.9	>0.9	>0.9	NA	NA	NA	>0.9	>0.9	>0.9	>0.9	0.90	NA	NA	Sensitivity only

Study Area: PG&E Central Valley

Low Voltages



Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)								Voltage PU (Sensitivity Scenarios)					Project & Potential Mitigation Solutions
				2022 Summer Peak	2025 Summer Peak	2030 Summer Peak	2022 Winter Peak	2025 Winter Peak	2030 Winter Peak	2022 Spring Off-Peak	2025 Spring Off-Peak	2025 SP High CEC Forecast	2025 SpOP Hi Renew & Min Gas Gen	2022 SP Heavy Renewable & Min Gas Gen	2030 Retirement of QF Generations	2030 Summer Peak w/o Facility Rerates	
SUISUN 115kV	DIX_WEC(2)			>0.9	>0.9	>0.9	NA	NA	NA	>0.9	>0.9	>0.9	>0.9	0.90	NA	NA	Sensitivity only
DEL MAR 60kV	GOLD HILL-EIGHT MILE ROAD 230KV & GOLD HILL-LODI STIG 230KV	P7-1	DCTL	0.99	1.02	0.88	NA	NA	NA	1.05	1.07	1.02	1.08	0.98	NA	NA	Continue to monitor
SIERRAPI 60kV				0.99	1.02	0.88	NA	NA	NA	1.05	1.07	1.02	1.08	0.98	NA	NA	Continue to monitor
PLAINFLD 60kV	P7-1:A4:13_Birds Landing-CC Sub 230kV Line & Birds Landing-Contra Costa PP 230kV Line	P7-1	DCTL	0.89	0.88	0.87	NA	NA	NA	1.03	1.03	0.88	1.05	0.89	NA	NA	Under review
BRIGHTON 230kV	P7-1:A4:9_Brighton-Bellota 230 kV Line & Rio Oso-Lockeford 230 kV Line	P7-1	DCTL	0.92	0.98	0.89	NA	NA	NA	1.00	1.03	0.98	1.04	0.91	NA	NA	Continue to monitor
DEL MAR 60kV				0.99	1.02	0.90	NA	NA	NA	1.05	1.07	1.02	1.08	0.96	NA	NA	Continue to monitor
SIERRAPI 60kV				0.99	1.02	0.90	NA	NA	NA	1.05	1.07	1.02	1.08	0.96	NA	NA	Continue to monitor
AUBURN 60kV	P7-1:A5:19_Placer-Gold Hill No. 1 115 kV Line and Placer-Gold Hill No. 2 115 kV Line	P7-1	DCTL	0.99	1.00	0.51	NA	NA	NA	1.02	1.03	1.00	1.03	1.02	NA	NA	Continue to monitor
BELL PGE 115kV				0.92	0.94	0.52	NA	NA	NA	1.02	1.06	0.94	1.06	1.00	NA	NA	Continue to monitor
BONNIE N 60kV				1.00	0.99	0.65	NA	NA	NA	1.01	1.00	0.99	1.01	1.00	NA	NA	Continue to monitor
BOWMN PH 60kV				1.03	1.03	0.71	NA	NA	NA	1.04	1.03	1.03	1.03	1.03	NA	NA	Continue to monitor
BRNSWALT 115kV				1.01	1.03	0.81	NA	NA	NA	1.05	1.05	1.03	1.05	1.02	NA	NA	Continue to monitor
BRUNSWCK 115kV				1.00	1.02	0.80	NA	NA	NA	1.04	1.06	1.02	1.06	1.01	NA	NA	Continue to monitor
CAPEHORN 60kV				1.01	0.99	0.60	NA	NA	NA	1.02	1.01	0.98	1.01	1.01	NA	NA	Continue to monitor
CHCGO PK 115kV				0.99	1.00	0.65	NA	NA	NA	1.04	1.05	1.00	1.05	1.02	NA	NA	Continue to monitor
DRUM 115kV				1.02	1.03	0.73	NA	NA	NA	1.05	1.05	1.03	1.05	1.03	NA	NA	Continue to monitor
DRUM 60kV				0.99	1.00	0.68	NA	NA	NA	1.01	1.00	1.00	1.00	1.00	NA	NA	Continue to monitor
DTCH FL1 115kV				1.00	1.02	0.69	NA	NA	NA	1.04	1.05	1.01	1.05	1.03	NA	NA	Continue to monitor
DTCH FL2 115kV				1.02	1.03	0.76	NA	NA	NA	1.05	1.05	1.03	1.05	1.03	NA	NA	Continue to monitor
ENVRO_HY 60kV				1.01	0.98	0.53	NA	NA	NA	1.04	1.06	0.98	1.04	1.01	NA	NA	Continue to monitor
FORST HL 60kV				1.00	0.97	0.53	NA	NA	NA	1.03	1.06	0.97	1.04	1.01	NA	NA	Continue to monitor
HALSEY 60kV				0.99	1.01	0.51	NA	NA	NA	1.03	1.04	1.00	1.03	1.02	NA	NA	Continue to monitor
HAYPRESS 60kV				1.03	1.03	0.71	NA	NA	NA	1.04	1.03	1.03	1.03	1.03	NA	NA	Continue to monitor
HIGGINS 115kV				0.94	0.96	0.55	NA	NA	NA	1.03	1.06	0.95	1.06	1.00	NA	NA	Continue to monitor
MTN_QUAR 60kV				0.98	1.00	0.51	NA	NA	NA	1.02	1.03	1.00	1.03	1.02	NA	NA	Continue to monitor
OXBOW 60kV				1.01	0.98	0.53	NA	NA	NA	1.04	1.06	0.98	1.04	1.01	NA	NA	Continue to monitor
PENRYN 60kV				0.97	0.99	0.49	NA	NA	NA	1.01	1.02	0.98	1.01	1.01	NA	NA	Continue to monitor
PLACER 115kV				0.92	0.94	0.51	NA	NA	NA	1.02	1.06	0.93	1.06	0.99	NA	NA	Continue to monitor
PLACER 60kV				0.99	1.01	0.52	NA	NA	NA	1.02	1.03	1.00	1.02	1.02	NA	NA	Continue to monitor
ROLLINS 60kV				1.01	0.99	0.61	NA	NA	NA	1.02	1.02	0.99	1.02	1.02	NA	NA	Continue to monitor
SHADYGLN 60kV				1.01	0.99	0.60	NA	NA	NA	1.02	1.02	0.98	1.02	1.01	NA	NA	Continue to monitor
SPAUDNG 60kV				1.03	1.03	0.69	NA	NA	NA	1.04	1.02	1.03	1.02	1.03	NA	NA	Continue to monitor
WEMR SWS 60kV				1.01	0.98	0.59	NA	NA	NA	1.03	1.04	0.98	1.03	1.01	NA	NA	Continue to monitor
ALMENDRA 60kV				0.56	1.00	1.01	NA	NA	NA	0.86	1.05	1.00	1.04	1.00	NA	NA	- East Marysville 115/60 kV Transformer Project - Expected ISD: Dec. 2022 - Short term: Action Plan
ENCINAL 60kV				0.60	0.99	0.99	NA	NA	NA	0.88	1.04	0.99	1.03	0.97	NA	NA	- East Marysville 115/60 kV Transformer Project - Expected ISD: Dec. 2022 - Short term: Action Plan
GLEAF2 60kV				0.56	1.00	1.02	NA	NA	NA	0.86	1.05	1.00	1.04	1.00	NA	NA	- East Marysville 115/60 kV Transformer Project - Expected ISD: Dec. 2022 - Short term: Action Plan
HARTER 60kV				0.57	1.00	1.00	NA	NA	NA	0.86	1.05	1.00	1.04	0.99	NA	NA	- East Marysville 115/60 kV Transformer Project - Expected ISD: Dec. 2022 - Short term: Action Plan

Study Area: PG&E Central Valley

Low Voltages



Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)								Voltage PU (Sensitivity Scenarios)					Project & Potential Mitigation Solutions
				2022 Summer Peak	2025 Summer Peak	2030 Summer Peak	2022 Winter Peak	2025 Winter Peak	2030 Winter Peak	2022 Spring Off-Peak	2025 Spring Off-Peak	2025 SP High CEC Forecast	2025 SpOP Hi Renew & Min Gas Gen	2022 SP Heavy Renewable & Min Gas Gen	2030 Retirement of QF Generations	2030 Summer Peak w/o Facility Rerates	
LIVE OAK 60kV	P7-1:A5:20_Palermo-Pease 115 kV Line amd Pease-Rio Oso 115 kV Line	P7-1	DCTL	0.61	0.99	0.98	NA	NA	NA	0.89	1.04	0.99	1.03	0.97	NA	NA	- East Marysville 115/60 kV Transformer Project - Expected ISD: Dec. 2022 - Short term: Action Plan
MRYSVLLE 60kV				0.53	1.00	1.00	NA	NA	NA	0.88	1.02	1.01	1.02	0.97	NA	NA	- East Marysville 115/60 kV Transformer Project - Expected ISD: Dec. 2022 - Short term: Action Plan
PEASE 115kV				0.52	0.92	0.93	NA	NA	NA	0.80	1.09	0.93	1.03	0.91	NA	NA	- East Marysville 115/60 kV Transformer Project - Expected ISD: Dec. 2022 - Short term: Action Plan
PEASE 60kV				0.56	1.00	1.00	NA	NA	NA	0.86	1.05	1.00	1.04	0.98	NA	NA	- East Marysville 115/60 kV Transformer Project - Expected ISD: Dec. 2022 - Short term: Action Plan
PEASETP 60kV				0.56	1.00	1.00	NA	NA	NA	0.86	1.05	1.00	1.04	0.98	NA	NA	- East Marysville 115/60 kV Transformer Project - Expected ISD: Dec. 2022 - Short term: Action Plan
YCEC 60kV				0.58	1.00	1.00	NA	NA	NA	0.86	1.05	1.00	1.04	0.99	NA	NA	- East Marysville 115/60 kV Transformer Project - Expected ISD: Dec. 2022 - Short term: Action Plan
YUBACITY 60kV				0.58	1.00	1.00	NA	NA	NA	0.86	1.05	1.00	1.04	0.99	NA	NA	- East Marysville 115/60 kV Transformer Project - Expected ISD: Dec. 2022 - Short term: Action Plan
PLAINFLD 60kV	P7-1:A5:23_NICOLAUS-WILKINS SLOUGH amd NICOLAUS-PLAINFIELD	P7-1	DCTL	0.89	0.89	0.87	NA	NA	NA	1.03	1.04	0.88	1.05	0.92	NA	NA	Under review
DEL MAR 60kV	P7-1:A5:5_Colgate-Rio Oso 230 kV Line & Table Mountain-Rio Oso 230 kV Line	P7-1	DCTL	1.00	1.03	0.90	NA	NA	NA	1.05	1.07	1.02	1.08	0.99	NA	NA	Continue to monitor
SIERRAPI 60kV				1.00	1.03	0.90	NA	NA	NA	1.05	1.07	1.02	1.08	0.99	NA	NA	Continue to monitor
DEL MAR 60kV	P7-1:A5:6_Table Mountain-Rio Oso 230 kV Line & Palermo-Colgate 230 kV Line	P7-1	DCTL	1.00	1.02	0.90	NA	NA	NA	1.05	1.07	1.02	1.08	0.99	NA	NA	Continue to monitor
SIERRAPI 60kV				1.00	1.02	0.90	NA	NA	NA	1.05	1.07	1.02	1.08	0.99	NA	NA	Continue to monitor



Study Area: PG&E Central Valley

Voltage Deviation



Substation	Contingency (All and Worst P3)	Category	Category Description	Post Cont. Voltage Deviation % (Baseline Scenarios)								Post Cont. Voltage Deviation % (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2022 Summer Peak	2025 Summer Peak	2030 Summer Peak	2022 Winter Peak	2025 Winter Peak	2030 Winter Peak	2022 Spring Off-Peak	2025 Spring Off-Peak	2025 SP High CEC Forecast	2025 SpOP Hi Renew & Min Gas Gen	2022 SP Heavy Renewable & Min Gas Gen	2030 Retirement of QF Generation	
GRSS VLY 60kV	COLGATE-GRASS VALLEY 60KV	P1-2	N-1	2.1	6.7	16.2	NA	NA	NA	2.3	3.1	6.7	3.4	1.1	NA	Contionue to monitor
NEWMAN 60kV	CROWCREEK SS-NEWMAN 60KV	P1-2	N-1	3.9	5.8	11.2	NA	NA	NA	1.2	2.9	6.2	2.6	1.4	NA	Contionue to monitor
GUSTINE 60kV				3.0	5.0	10.4	NA	NA	NA	0.8	3.1	5.4	2.9	0.7	NA	Contionue to monitor
CISCOTAP 60kV	DRUM 115/115KV TB 1	P1-3	N-1	0.2	0.2	9.4	NA	NA	NA	1.0	0.0	0.2	0.0	0.2	NA	Contionue to monitor
TAMARACK 60kV				0.3	0.3	8.6	NA	NA	NA	1.2	0.1	0.3	0.1	0.4	NA	Contionue to monitor
CISCO GR 60kV				0.2	0.2	9.4	NA	NA	NA	1.0	0.0	0.2	0.0	0.2	NA	Contionue to monitor
CAPEHORN 60kV				-1.1	-1.0	18.2	NA	NA	NA	-3.6	-2.6	-1.0	-2.8	-2.9	NA	Contionue to monitor
ENVRO_HY 60kV				-0.3	-0.8	20.0	NA	NA	NA	0.1	0.0	-1.0	-0.4	-2.9	NA	Contionue to monitor
SPAULDNG 60kV				-0.9	-0.5	14.4	NA	NA	NA	-1.0	-1.2	-0.5	-1.3	-1.2	NA	Contionue to monitor
DRUM 60kV				-2.9	-1.8	16.5	NA	NA	NA	-3.9	-3.5	-1.7	-3.6	-4.0	NA	Contionue to monitor
BONNIE N 60kV				-2.3	-1.5	17.1	NA	NA	NA	-3.8	-3.2	-1.5	-3.4	-3.6	NA	Contionue to monitor
ROLLINS 60kV				-0.8	-0.8	18.2	NA	NA	NA	-3.5	-2.5	-0.9	-2.6	-2.7	NA	Contionue to monitor
WEMR SWS 60kV				-0.8	-0.9	18.6	NA	NA	NA	0.1	0.0	-1.0	-0.4	-2.9	NA	Contionue to monitor
SHADYGLN 60kV				-1.0	-0.9	18.3	NA	NA	NA	-3.5	-2.6	-1.0	-2.8	-2.9	NA	Contionue to monitor
FORST HL 60kV				-0.5	-0.9	20.0	NA	NA	NA	0.1	0.0	-1.0	-0.4	-2.9	NA	Contionue to monitor
OXBOW 60kV				-0.3	-0.8	20.0	NA	NA	NA	0.1	0.0	-1.0	-0.4	-2.9	NA	Contionue to monitor
BOWMN PH 60kV				-0.4	-0.2	14.4	NA	NA	NA	-0.9	-0.4	-0.2	-0.4	-0.8	NA	Contionue to monitor
HAYPRESS 60kV				-0.4	-0.2	14.4	NA	NA	NA	-0.9	-0.4	-0.2	-0.4	-0.8	NA	Contionue to monitor
WESTLEY 60kV	KASSON 115/60KV TB 1	P1-3	N-1	14.5	15.5	15.0	NA	NA	NA	0.7	0.8	16.2	1.5	10.6	NA	System adjustments or voltage support if needed
E.NICOLS 115kV	RIO OSO-NICOLAUS 115KV	P1-2	N-1	0.2	2.1	11.8	NA	NA	NA	1.2	-3.8	2.2	-4.3	-1.9	NA	Contionue to monitor
PLUMAS 60kV		P1-2	N-1	0.2	2.1	8.1	NA	NA	NA	1.1	-3.4	2.2	-3.8	-1.9	NA	Contionue to monitor
WHEATLND 60kV		P1-2	N-1	0.2	2.2	8.0	NA	NA	NA	0.7	-2.2	2.3	-2.5	-2.0	NA	Contionue to monitor
CROWCREEK SS 60kV	SALADO-CROWCREEK SS 60KV	P1-2	N-1	6.8	10.2	17.6	NA	NA	NA	2.6	2.0	11.1	2.2	-0.8	NA	System adjustments or voltage support if needed
FRONTIERPV 60kV				6.8	10.2	17.6	NA	NA	NA	2.6	2.0	11.1	2.2	-0.8	NA	System adjustments or voltage support if needed
NEWMAN 60kV				4.3	6.6	10.8	NA	NA	NA	1.5	2.5	7.4	3.0	-0.1	NA	Contionue to monitor
GUSTINE 60kV				4.7	7.4	12.8	NA	NA	NA	1.7	2.5	8.3	3.0	-0.2	NA	Contionue to monitor
NEWMAN 60kV	SALADO-NEWMAN #2 60KV MOAS OPENED ON CRWS LDG_CRWS LDJ	P1-2	N-1	4.7	6.0	11.0	NA	NA	NA	1.3	0.3	6.2	-0.1	1.0	NA	Contionue to monitor
GUSTINE 60kV				4.3	5.5	10.0	NA	NA	NA	1.2	0.3	5.7	-0.1	1.0	NA	Contionue to monitor
POST 115kV	WEST SACRAMENTO-BRIGHTON 115KV	P1-2	N-1	8.1	6.0	8.4	NA	NA	NA	3.1	2.8	6.2	2.4	4.5	NA	System adjustments or voltage support if needed
W.SCRMNO 115kV				8.0	5.7	8.3	NA	NA	NA	3.1	2.7	6.0	2.3	4.3	NA	Contionue to monitor
DEEPWATR 115kV				8.2	5.9	8.5	NA	NA	NA	3.1	2.8	6.2	2.4	4.6	NA	System adjustments or voltage support if needed
GRSS VLY 60kV	ROLLINSF 6.60KV GEN UNIT 1 & COLGATE-GRASSVALLEY60KV	P3	N-G-1	<8	12.5	17.4	NA	NA	NA	<8	<8	12.6	<8	<8	NA	System adjustments or voltage support if needed
WESTLEY 60kV	CH.STN. 12.47KV GEN UNIT 1 & KASSON115/60KV/TB1	P3	N-G-1	15.3	15.9	15.2	NA	NA	NA	<8	<8	<8	<8	<8	NA	System adjustments or voltage support if needed
BELL PGE 115kV	CHI.PARK 11.50KV GEN UNIT 1 & BELL-			<8	<8	16.9	NA	NA	NA	<8	<8	<8	<8	<8	NA	Contionue to monitor
HIGGINS 115kV				<8	<8	15.6	NA	NA	NA	<8	<8	<8	<8	<8	NA	Contionue to monitor
CHCGO PK 115kV				<8	<8	13.0	NA	NA	NA	<8	<8	<8	<8	<8	NA	Contionue to monitor
DTCH FL1 115kV				<8	<8	12.1	NA	NA	NA	<8	<8	<8	<8	<8	NA	Contionue to monitor
FORST HL 60kV				<8	<8	11.6	NA	NA	NA	<8	<8	<8	<8	<8	NA	Contionue to monitor
ENVRO_HY 60kV				<8	<8	11.5	NA	NA	NA	<8	<8	<8	<8	<8	NA	Contionue to monitor
OXBOW 60kV				<8	<8	11.5	NA	NA	NA	<8	<8	<8	<8	<8	NA	Contionue to monitor
SPAULDNG 60kV				<8	<8	11.4	NA	NA	NA	<8	<8	<8	<8	<8	NA	Contionue to monitor

Study Area: PG&E Central Valley

Voltage Deviation



Substation	Contingency (All and Worst P3)	Category	Category Description	Post Cont. Voltage Deviation % (Baseline Scenarios)								Post Cont. Voltage Deviation % (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2022 Summer Peak	2025 Summer Peak	2030 Summer Peak	2022 Winter Peak	2025 Winter Peak	2030 Winter Peak	2022 Spring Off-Peak	2025 Spring Off-Peak	2025 SP High CEC Forecast	2025 SpOP Hi Renew & Min Gas Gen	2022 SP Heavy Renewable & Min Gas Gen	2030 Retirement of QF Generation	
WEMR SWS 60kV	PLACER115KVMOASOPENEDONPLACER_BEL LPGE	P3	N-G-1	<8	<8	11.3	NA	NA	NA	<8	<8	<8	<8	<8	NA	Contionue to monitor
BOWMN PH 60kV				<8	<8	11.2	NA	NA	NA	<8	<8	<8	<8	<8	NA	Contionue to monitor
HAYPRESS 60kV				<8	<8	11.2	NA	NA	NA	<8	<8	<8	<8	<8	NA	Contionue to monitor
COLFAXJT 60kV				<8	<8	11.2	NA	NA	NA	<8	<8	<8	<8	<8	NA	Contionue to monitor
SHADYGLN 60kV				<8	<8	11.2	NA	NA	NA	<8	<8	<8	<8	<8	NA	Contionue to monitor
CAPEHORN 60kV				<8	<8	11.2	NA	NA	NA	<8	<8	<8	<8	<8	NA	Contionue to monitor
ROLLINS 60kV				<8	<8	11.2	NA	NA	NA	<8	<8	<8	<8	<8	NA	Contionue to monitor
BONNIE N 60kV				<8	<8	10.8	NA	NA	NA	<8	<8	<8	<8	<8	NA	Contionue to monitor
DRUM 115kV				<8	<8	10.7	NA	NA	NA	<8	<8	<8	<8	<8	NA	Contionue to monitor

Study Area: PG&E Central Valley

Transient Stability



Contingency	Category	Category Description	Transient Stability Performance					Potential Mitigation Solutions
			Baseline Scenarios			Sensitivity Scenarios		
			Select..	Select..	Select..	Select..	Select..	
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:								
<a href="http://www.aiso.com/Documents/AppendixC-BoardApprovedt2019-2020TransmissionPlan.pdf">http://www.aiso.com/Documents/AppendixC-BoardApprovedt2019-2020TransmissionPlan.pdf</a>								

Study Area: PG&E Central 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..		

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

Study Area: PG&E Central Valley



Single Source Substation with more than 100 MW Load

Substation	Load Served (MW)										Potential Mitigation Solutions
	Select..	Select..	Select..	Select..	Select..	Select..	Select..	Select..	Select..	Select..	

No single source substation with more than 100 MW