



Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading % (Baseline Scenarios)					Loading % (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations	
31690 CARIBOU 60.0 31677 GRS F JT 60.0 1 1	RIO OSO-KNIGHTLD-WOODLD 115KV [3460] & TABLE MTN-RIO OSO 230KV [5700]	P6	N-1-1	<100	<100	<100	<100	<100	<100	<100	<100	100	Sensitivity only
31960 MOBILCHE 115 31966 WODLNDJ1 115 1 1	WEST SACRAMENTO-DAVIS 115KV [4120] & RIO OSO-WOODLAND #2 115KV [3470]	P6	N-1-1	<100	<100	<100	<100	<100	<100	<100	<100	101	Sensitivity only
31960 MOBILCHE 115 31970 WOODLD 115 1 1	WEST SACRAMENTO-DAVIS 115KV [4120] & RIO OSO-WOODLAND #2 115KV [3470]	P6	N-1-1	<100	<100	<100	<100	<100	<100	<100	<100	100	Sensitivity only
31962 WOODLANDTP 115 31970 WOODLD 115 1 1	BRIGHTN-UCD_TP2-BRKR SLG 115KV [1141] MOAS OPENED ON BRKRJCT_UCD_TP2 & WEST SACRAMENTO-DAVIS 115KV [4120]	P6	N-1-1	102	<100	<100	<100	<100	<100	<100	<100	<100	Project: Vaca Dixon Area Reinforcement In-Service Date: Dec 2021 Short term: Action plan
31962 WOODLANDTP 115 365506 Q653FJCT 115 1 1	DAVIS-UCD_TP2 115KV [6680] MOAS OPENED ON BRKRJCT_UCD_TP2 & WEST SACRAMENTO-DAVIS 115KV [4120]	P6	N-1-1	124	<100	<100	<100	<100	<100	<100	<100	<100	Project: Vaca Dixon Area Reinforcement In-Service Date: Dec 2021 Short term: Action plan
31964 KNIGHT2 115 31968 WODLNDJ2 115 2 1	WEST SACRAMENTO-DAVIS 115KV [4120] & RIO OSO-KNIGHTLD-WOODLD 115KV [3460]	P6	N-1-1	<100	<100	<100	<100	<100	<100	<100	<100	110	Sensitivity only
31965 KNIGHT1 115 31966 WODLNDJ1 115 1 1	WEST SACRAMENTO-DAVIS 115KV [4120] & RIO OSO-WOODLAND #2 115KV [3470]	P6	N-1-1	<100	<100	<100	<100	<100	<100	<100	<100	100	Sensitivity only
31978 DPWT_TP2 115 31984 BRIGHTN 115 1 1	WOODLAND-DAVIS 115KV [4210] & BRIGHTN-UCD_TP2-BRKR SLG 115KV [1141] MOAS OPENED ON BRKRJCT_UCD_TP2	P6	N-1-1	112	110	119	<100	<100	109	<100	<100	119	Project: Vaca Dixon Area Reinforcement. In-Service Date: Dec 2021 Short term: Action plan. An SPS is recommended in the project to address P6 issues.
31980 DPWTR_TP 115 31986 W.SCRMNO 115 1 1	BRIGHTN-UCD_TP2-BRKR SLG 115KV [1141] MOAS OPENED ON BRKRJCT_UCD_TP2 & WOODLAND-DAVIS 115KV [4210]	P6	N-1-1	<100	<100	108	<100	<100	<100	<100	<100	107	Continue to monitor future load forecast
31980 DPWTR_TP 115 31990 DAVIS 115 1 1	BRIGHTN-UCD_TP2-BRKR SLG 115KV [1141] MOAS OPENED ON BRKRJCT_UCD_TP2 & WOODLAND-DAVIS 115KV [4210]	P6	N-1-1	<100	<100	107	<100	<100	<100	<100	<100	107	Continue to monitor future load forecast
31984 BRIGHTN 115 30348 BRIGHTON 230 9 1	BRIGHTON 230/115KV TB 10 & WOODLAND-DAVIS 115KV [4210]	P6	N-1-1	<100	<100	101	<100	<100	<100	<100	<100	101	Continue to monitor future load forecast
31984 BRIGHTN 115 31993 BRKRJCT 115 1 1	WOODLAND-DAVIS 115KV [4210] & WEST SACRAMENTO-DAVIS 115KV [4120]	P6	N-1-1	126	129	145	<100	<100	119	<100	<100	145	Project: Vaca Dixon Area Reinforcement. In-Service Date: Dec 2021 Short term: Action plan. An SPS is recommended in the project to address P6 issues.
31993 BRKRJCT 115 32001 UCD_TP2 115 1 1	WOODLAND-DAVIS 115KV [4210] & WEST SACRAMENTO-DAVIS 115KV [4120]	P6	N-1-1	124	127	144	<100	<100	118	<100	<100	144	Project: Vaca Dixon Area Reinforcement. In-Service Date: Dec 2021 Short term: Action plan. An SPS is recommended in the project to address P6 issues.
31998 VACA-DIX 115 30460 VACA-DIX 230 3 1	WOLFSKIL 13.80KV GEN UNIT 1 & VACA-DIX 230/115KV TB 4	P3	G-1/N-1	<100	<100	102	<100	<100	<100	<100	<100	102	Continue to monitor future load forecast
	VACA-DIX 230/115KV TB 4 & WOLFSKIL 13.80KV GEN UNIT 1	P6	N-1-1	<100	<100	102	<100	<100	<100	<100	<100	102	Continue to monitor future load forecast
	WOLFSKIL 13.80KV GEN UNIT 1 & VACA-DIX 230/115KV TB 3	P3	G-1/N-1	<100	<100	102	<100	<100	<100	<100	<100	102	Continue to monitor future load forecast



Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading % (Baseline Scenarios)					Loading % (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations	
	VACA-DIX 230/115KV TB 3 & WOLFSKIL 13.80KV GEN UNIT 1	P6	N-1-1	<100	<100	102	<100	<100	<100	<100	<100	102	Continue to monitor future load forecast
31998 VACA-DIX 115 31997 SCHMLBCH 115 1 1	VACA-SUISUN 115KV [4070] MOAS OPENED ON VACA-DIX_WEC (2) & VACA-VACAVILLE-JAMESON-NORTH TOWER 115KV [1830] MOAS OPENED ON HALE J1_HALE	P6	N-1-1	<100	<100	113	<100	<100	104	<100	<100	113	Continue to monitor future load forecast
32001 UCD_TP2 115 31990 DAVIS 115 1 1	WOODLAND 13.80KV GEN UNIT 1 & WEST SACRAMENTO-BRIGHTON 115KV [4110]	P3	G-1/N-1	102	<100	103	<100	<100	<100	<100	<100	<100	Under review - Line rating
	WOODLAND-DAVIS 115KV [4210] & WEST SACRAMENTO-DAVIS 115KV [4120]	P6	N-1-1	145	149	168	<100	<100	137	<100	<100	168	Under review - Line rating
32056 CORTINA 60.0 30451 CRTNA M 230 1 1	WADHAM 9.11KV GEN UNIT 1 & CORTINA 230/115KV TB 4	P3	G-1/N-1	120	121	124	<100	<100	130	<100	<100	<100	Existing operating procedure
	DELEVAN-CORTINA 230KV [4384] & CORTINA 230/115KV TB 4	P6	N-1-1	<100	<100	<100	<100	111	<100	123	<100	<100	Existing operating procedure
	WADHMJCT 60/9.11KV TB 1 & CORTINA 230/115KV TB 4	P6	N-1-1	120	121	124	<100	<100	130	<100	<100	<100	Existing operating procedure
32082 PLFLDJCT 60.0 32090 WINTERS 60.0 1 1	PLAINFLD SVD=V & VACA-DIX 230/115KV TB 3	P6	N-1-1	<100	<100	111	<100	<100	<100	<100	<100	111	Continue to monitor future load forecast
32082 PLFLDJCT 60.0 32092 PLAINFLD 60.0 1 1	PLAINFLD SVD=V & VACA-DIX 230/115KV TB 3	P6	N-1-1	<100	<100	113	<100	<100	<100	<100	<100	112	Significant increase in load in base cases compared to last year. Load forecast under review.
32088 VACA-DXN 60.0 31998 VACA-DIX 115 5 1	VACA-DIX 115/60KV TB 9 & DIXON-VACA #1 60KV [6730] MOAS OPENED ON DIXONCAN_DIXON-J1	P6	N-1-1	101	<100	<100	<100	<100	<100	<100	<100	<100	Project: Vaca Dixon Area Reinforcement. In-Service Date: Dec 2021 Short term: Action plan.
32088 VACA-DXN 60.0 32090 WINTERS 60.0 1 1	PLAINFLD SVD=V & VACA-DIX 230/115KV TB 3	P6	N-1-1	<100	<100	105	<100	<100	<100	<100	<100	104	Significant increase in load in base cases compared to last year. Load forecast under review.
32100 DIXONPGE 60.0 32105 DIXON-J1 60.0 1 1	DIXON-VACA #2 60KV [6740] & VACA-DIX 230/115KV TB 3	P6	N-1-1	<100	<100	143	<100	<100	<100	<100	<100	143	Under review - Line rating
32214 RIO OSO 115 30330 RIO OSO 230 1 1	RIO OSO-BRIGHTON 230KV [5600] & RIO OSO 230/115KV TB 2	P6	N-1-1	100	<100	<100	<100	<100	<100	<100	<100	<100	Rio Oso 230/115 kV Transformer Upgrade
32214 RIO OSO 115 31964 KNIGHT2 115 2 1	WEST SACRAMENTO-DAVIS 115KV [4120] & WOODLD-KNIGHTLD-RIO OSO 115KV [3460]	P6	N-1-1	<100	<100	<100	<100	<100	<100	<100	<100	110	Sensitivity only
32214 RIO OSO 115 31965 KNIGHT1 115 1 1	WEST SACRAMENTO-DAVIS 115KV [4120] & RIO OSO-WOODLAND #2 115KV [3470]	P6	N-1-1	<100	<100	<100	<100	<100	<100	<100	<100	104	Sensitivity only
32214 RIO OSO 115 31986 W.SCRMNO 115 1 1	WOODLAND-DAVIS 115KV [4210] & RIO OSO-BRIGHTON 230KV [5600]	P6	N-1-1	117	109	107	<100	<100	105	<100	<100	106	Under review - Existing SPS
32214 RIO OSO 115 32225 BRNSWKTP 115 1 1	RIO OSO-DRUM-BRUNSWCK 115KV [1431] & DRUM-HIGGINS 115KV [4393] MOAS OPENED ON CHCGO PK_HIGGINS	P6	N-1-1	150	169	167	<100	163	161	168	205	167	Existing operating procedure
32214 RIO OSO 115 32244 BRNSWCKP 115 2 1	GOLDHILL 230/115KV TB 1 & GOLDHILL 230/115KV TB 2	P6	N-1-1	Diverge	Diverge	Diverge	<100	<100	Diverge	148	<100	Diverge	Project: Atlantic-Placer 115 kV Line Project on hold. Project scope under review
32214 RIO OSO 115 32404 SPI JCT 115 1 1	ATLANTIC-GOLD HILL 230KV [4330] & RIO OSO-ATLANTIC 230KV [5590]	P6	N-1-1	110	114	131	<100	<100	118	<100	<100	132	Existing operating action plan



Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading % (Baseline Scenarios)					Loading % (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations	
32218 DRUM 115 32220 DTCH FL1 115 1 1	GOLDHILL 230/115KV TB 1 & GOLDHILL 230/115KV TB 2	P6	N-1-1	Diverge	Diverge	Diverge	<100	124	Diverge	152	237	Diverge	Project: Atlantic-Placer 115 kV Line Project on hold. Project scope under review
32218 DRUM 115 32222 DTCH FL2 115 1 1	RIO OSO-DRUM-BRUNSWCK 115KV [1431] & DRUM-HIGGINS 115KV [4393] MOAS OPENED ON CHCGO PK_HIGGINS	P6	N-1-1	186	227	233	<100	135	221	137	239	233	Existing operating procedure
32218 DRUM 115 32242 DRUM 1M 115 1 1	RIO OSO-DRUM-BRUNSWCK 115KV [1431] & DRUM-HIGGINS 115KV [4393] MOAS OPENED ON CHCGO PK_HIGGINS	P6	N-1-1	145	139	146	<100	<100	131	<100	158	146	Existing operating procedure
32218 DRUM 115 32244 BRNSWCKP 115 2 1	GOLDHILL 230/115KV TB 1 & GOLDHILL 230/115KV TB 2	P6	N-1-1	Diverge	Diverge	Diverge	<100	<100	Diverge	145	<100	Diverge	Project: Atlantic-Placer 115 kV Line Project on hold. Project scope under review
32220 DTCH FL1 115 32224 CHCGO PK 115 1 1	GOLDHILL 230/115KV TB 1 & GOLDHILL 230/115KV TB 2	P6	N-1-1	Diverge	Diverge	Diverge	<100	<100	Diverge	103	190	Diverge	Project: Atlantic-Placer 115 kV Line Project on hold. Project scope under review
32224 CHCGO PK 115 32232 HIGGINS 115 1 1	GOLDHILL 230/115KV TB 1 & GOLDHILL 230/115KV TB 2	P6	N-1-1	Diverge	Diverge	Diverge	<100	<100	Diverge	<100	167	Diverge	Project: Atlantic-Placer 115 kV Line Project on hold. Project scope under review
32225 BRNSWKTP 115 32222 DTCH FL2 115 1 1	RIO OSO-DRUM-BRUNSWCK 115KV [1431] & DRUM-HIGGINS 115KV [4393] MOAS OPENED ON CHCGO PK_HIGGINS	P6	N-1-1	209	226	238	<100	159	220	161	242	237	Existing operating procedure
32228 PLACER 115 32238 BELL PGE 115 1 1	GOLDHILL 230/115KV TB 1 & GOLDHILL 230/115KV TB 2	P6	N-1-1	Diverge	Diverge	Diverge	<100	<100	Diverge	<100	204	Diverge	Project: Atlantic-Placer 115 kV Line Project on hold. Project scope under review
32232 HIGGINS 115 32238 BELL PGE 115 1 1	GOLDHILL 230/115KV TB 1 & GOLDHILL 230/115KV TB 2	P6	N-1-1	Diverge	Diverge	Diverge	<100	<100	Diverge	<100	180	Diverge	Project: Atlantic-Placer 115 kV Line Project on hold. Project scope under review
32356 LINCLN 115 32398 ULTRA JT 115 1 1	ATLANTIC-GOLD HILL 230KV [4330] & RIO OSO-ATLANTIC 230KV [5590]	P6	N-1-1	<100	<100	111	<100	<100	<100	<100	<100	111	Existing operating action plan
32356 LINCLN 115 32404 SPI JCT 115 1 1	ATLANTIC-GOLD HILL 230KV [4330] & RIO OSO-ATLANTIC 230KV [5590]	P6	N-1-1	116	120	139	<100	<100	124	<100	<100	139	Existing operating action plan
32374 DRUM 60.0 32242 DRUM 1M 115 1 1	RIO OSO-DRUM-BRUNSWCK 115KV [1431] & DRUM-HIGGINS 115KV [4393] MOAS OPENED ON CHCGO PK_HIGGINS	P6	N-1-1	<100	<100	<100	<100	<100	<100	<100	107	<100	Sensitivity only
32374 DRUM 60.0 32376 BONNIE N 60.0 1 1	ROLLINSF 6.60KV GEN UNIT 1 & COLGATE-GRASS VALLEY 60KV [6490]	P3	G-1/N-1	<100	<100	101	<100	<100	101	<100	<100	101	Continue to monitor future load forecast
32374 DRUM 60.0 32376 BONNIE N 60.0 1 1	COLGATE-GRASS VALLEY 60KV [6490] & ROLLINS 60/6.6KV TB 1	P6	N-1-1	<100	<100	101	<100	<100	101	<100	<100	101	Continue to monitor future load forecast
32398 ULTRA JT 115 32408 PLSNT GR 115 1 1	ATLANTIC-GOLD HILL 230KV [4330] & RIO OSO-ATLANTIC 230KV [5590]	P6	N-1-1	102	105	124	<100	<100	109	<100	<100	125	Existing operating action plan
33514 MANTECA 115 33970 INGRM C. 115 1 1	MANTECA-KASSON-SCHULTE 115kv [7472] & SCHULTE SW STA-LAMMERS 115kv [3993]	P6	N-1-1	223	<100	<100	<100	<100	<100	<100	<100	<100	Project: Vierra 115 kV Looping Project In-Service Date: Jan 2023 Short term: Action plan
33562 BELLOTA 115 33950 RVRBK TP 115 1 1	BELLOTA 230/115kv TB 1 & BELLOTA 230/115kv TB 2	P6	N-1-1	116	120	<100	<100	<100	121	<100	<100	<100	Existing operating action plan
33570 SPC JCT. 115 33595 VIERATP2 115 1 1	MANTECA-KASSON-SCHULTE 115kv [7472] & SCHULTE SW STA-LAMMERS 115kv [3993]	P6	N-1-1	<100	107	119	<100	<100	110	<100	<100	122	Kasson SPS



Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading % (Baseline Scenarios)					Loading % (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations	
33724 LOCKEFRD 60.0 38060 INDUSTRL 60.0 1 1	LOCKEFORD-LODI #2 60kV [7440] & LODI-INDUSTRIAL 60kV [6755]	P6	N-1-1	136	141	<100	<100	<100	151	<100	136	<100	Project: Lockeford-Lodi Area 230 kV Project In-Service Date: Dec 2023 Short term: Action plan
33735 INDSTR J 60.0 38060 INDUSTRL 60.0 1 1	LOCKEFORD-INDUSTRIAL 60kV [7420] & LODI-INDUSTRIAL 60kV [6755]	P6	N-1-1	142	147	<100	<100	<100	153	<100	142	<100	Project: Lockeford-Lodi Area 230 kV Project In-Service Date: Dec 2023 Short term: Action plan
33912 SPRNG GJ 115 33914 MI-WUK 115 1 1	BELLOTA 230/115kV TB 1 & BELLOTA 230/115kV TB 2	P6	N-1-1	<100	<100	108	<100	<100	<100	<100	<100	112	Existing operating procedure
33916 CURTISS 115 33917 SPISONORAJCT 115 1 1	BELLOTA 230/115kV TB 1 & BELLOTA 230/115kV TB 2	P6	N-1-1	<100	<100	<100	<100	<100	<100	<100	<100	103	Sensitivity only
33932 MELONES 115 33500 MELNS JA 115 1 1	STANISLS 14kV Gen Unit 1 & STANISLS-MELONES-RIVRBKJT 115kV [3841]	P3	G-1/N-1	<100	<100	<100	<100	101	<100	101	<100	<100	Generator dispatch
33932 MELONES 115 33500 MELNS JA 115 1 1	BELLOTA 230/115kV TB 2 & BELLOTA 230/115kV TB 1	P6	N-1-1	135	145	115	<100	<100	140	<100	<100	129	Existing operating procedure
33932 MELONES 115 33934 TULLOCH 115 1 1	BELLOTA 230/115kV TB 2 & BELLOTA 230/115kV TB 1	P6	N-1-1	196	206	173	<100	<100	203	<100	112	163	Existing operating procedure
33932 MELONES 115 33936 MELNS JB 115 1 1	BELLOTA 230/115kV TB 1 & BELLOTA 230/115kV TB 2	P6	N-1-1	137	146	115	<100	<100	141	<100	<100	130	Existing operating procedure
33936 MELNS JB 115 33947 RIVRBKJT 115 1 1	STANISLS 14kV Gen Unit 1 & MANTECA-RIPON 115kV [0]	P3	G-1/N-1	<100	<100	113	<100	<100	<100	<100	<100	114	Continue to monitor future load forecast
	SCHULTE SW STA-LAMMERS 115kV [3993] & MANTECA-KASSON-SCHULTE 115kV [7472]	P6	N-1-1	175	<100	<100	<100	<100	<100	<100	<100	<100	Project: Vierra 115 kV Looping Project In-Service Date: Jan 2023 Short term: Action plan
	WEST SACRAMENTO-BRIGHTON 115KV [4110] & MANTECA-RIPON 115kV [0]	P6	N-1-1	<100	<100	128	<100	<100	<100	<100	<100	123	Continue to monitor future load forecast
33946 RVRBK J1 115 33944 RVRBANK 115 1 1	MANTECA-KASSON-SCHULTE 115kV [7472] & SCHULTE SW STA-LAMMERS 115kV [3993]	P6	N-1-1	110	<100	<100	<100	<100	<100	<100	<100	<100	Project: Vierra 115 kV Looping Project In-Service Date: Jan 2023 Short term: Action plan
33947 RIVRBKJT 115 33951 VLYHMTP1 115 1 1	STANISLS 14kV Gen Unit 1 & MANTECA-RIPON 115kV [0]	P3	G-1/N-1	<100	<100	108	<100	<100	<100	<100	<100	110	Continue to monitor future load forecast
	SCHULTE SW STA-LAMMERS 115kV [3993] & MANTECA-KASSON-SCHULTE 115kV [7472]	P6	N-1-1	168	<100	<100	<100	<100	<100	<100	<100	<100	Project: Vierra 115 kV Looping Project In-Service Date: Jan 2023 Short term: Action plan
	WEST SACRAMENTO-BRIGHTON 115KV [4110] & MANTECA-RIPON 115kV [0]	P6	N-1-1	<100	<100	122	<100	<100	<100	<100	<100	118	Continue to monitor future load forecast
33950 RVRBK TP 115 33934 TULLOCH 115 1 1	BELLOTA 230/115kV TB 1 & BELLOTA 230/115kV TB 2	P6	N-1-1	221	231	205	<100	<100	233	<100	132	196	Existing operating procedure
33950 RVRBK TP 115 33944 RVRBANK 115 1 1	BELLOTA 230/115kV TB 1 & BELLOTA 230/115kV TB 2	P6	N-1-1	107	112	108	<100	<100	114	<100	<100	103	Existing operating procedure
33959 TCHRT_T2 115 33970 INGRM C. 115 1 1	MANTECA-KASSON-SCHULTE 115kV [7472] & SCHULTE SW STA-LAMMERS 115kV [3993]	P6	N-1-1	208	<100	<100	<100	<100	<100	<100	<100	<100	Project: Vierra 115 kV Looping Project In-Service Date: Jan 2023 Short term: Action plan





Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading % (Baseline Scenarios)					Loading % (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations	
33960 MDSTO CN 115 33962 SALDO TP 115 1 1	MANTECA-KASSON-SCHULTE 115kV [7472] & SCHULTE SW STA-LAMMERS 115kV [3993]	P6	N-1-1	146	<100	<100	<100	<100	<100	<100	<100	<100	Project: Vierra 115 kV Looping Project In-Service Date: Jan 2023 Short term: Action plan
33962 SALDO TP 115 33964 SALADO 115 1 1	MANTECA-KASSON-SCHULTE 115kV [7472] & SCHULTE SW STA-LAMMERS 115kV [3993]	P6	N-1-1	141	<100	<100	<100	<100	<100	<100	<100	<100	Project: Vierra 115 kV Looping Project In-Service Date: Jan 2023 Short term: Action plan
33970 INGRM C. 115 33965 SALADO J 115 1 1	MANTECA-KASSON-SCHULTE 115kV [7472] & SCHULTE SW STA-LAMMERS 115kV [3993]	P6	N-1-1	133	<100	<100	<100	<100	<100	<100	<100	<100	Project: Vierra 115 kV Looping Project In-Service Date: Jan 2023 Short term: Action plan
34002 SALADO 60.0 34006 PATTERSN 60.0 1 1	Q539 1kV Gen Unit 1 & CROWCREEK SS-SALADO 60kV [0]	P3	G-1/N-1	<100	<100	<100	<100	<100	118	<100	<100	<100	Under review - Line rating
	CROWCREEK SS-NEWMAN 60kV [7862] & GUSTINE SVD=v	P6	N-1-1	108	<100	119	<100	<100	117	<100	<100	118	Under review - Line rating
34002 SALADO 60.0 34008 STNSLSRP 60.0 1 1	STNSLSRP 14kV Gen Unit 1 & SALADO-NEWMAN #2 60kV [7870]	P3	G-1/N-1	<100	<100	100	<100	<100	<100	<100	<100	100	Continue to monitor future load forecast
	SALADO-NEWMAN #2 60kV [7870] & STNSLSRP 14kV Gen Unit 1	P6	N-1-1	<100	<100	100	<100	<100	<100	<100	<100	100	Continue to monitor future load forecast
34009 CROWCREEK SS 60.0 34016 MEDLIN J 60.0 1 1	STNSLSRP 14kV Gen Unit 1 & SALADO-NEWMAN #2 60kV [7870]	P3	G-1/N-1	101	105	109	<100	<100	108	<100	<100	109	Disabling automatics
	SALADO-NEWMAN #2 60kV [7870] & STNSLSRP 14kV Gen Unit 1	P6	N-1-1	101	105	109	<100	<100	108	<100	<100	109	Disabling automatics
38060 INDUSTRL 60.0 33728 LODI 60.0 1 1	LOCKEFORD-INDUSTRIAL 60kV [7420] & LOCKEFORD-LODI #2 60kV [7440]	P6	N-1-1	173	179	<100	<100	<100	187	<100	172	<100	Project: Lockeford-Lodi Area 230 kV Project In-Service Date: Dec 2023 Short term: Action plan
30330 RIO OSO 230 30348 BRIGHTON 230 1 1	RIO OSO 115KV - SECTION 1D & 2D	P2-4	Bus-Tie Breaker	<100	99	113	<100	19	99	18	<100	97	Continue to monitor future load forecast
30337 GOLDHILL 230 37012 LAKE 230 1 1	BELLOTA 230kV - Section 1D & 2D	P2-4	Bus-Tie Breaker	40	<100	<100	45	<100	<100	<100	110	<100	Sensitivity only
	RANCHO SECO-BELLOTA #1 230KV [5550] & RANCHO SECO-BELLOTA #2 230KV [5560]	P7	DCTL	43	33	31	47	56	59	57	115	30	Sensitivity only
30500 BELLOTA 230 30515 WARNERVL 230 1 1	BELLOTA-COTTLE 230kV [4360]	P1	N-1	26	<100	<100	70	<100	<100	<100	102	<100	Sensitivity only
	COTTLE-MELONES 230kV [4530]	P1	N-1	33	28	20	72	52	40	51	106	21	Sensitivity only
	BELLOTA 230kV Section 1E	P2-2	Bus	21	<100	<100	62	<100	<100	<100	103	<100	Sensitivity only
	COTTLE 230kV - Ring R2 & R1	P2-3	Non-Bus-Tie Breaker	33	27	20	72	52	39	51	106	20	Sensitivity only
	COTTLE 230kV - Ring R2 & R3	P2-3	Non-Bus-Tie Breaker	33	27	20	71	52	39	51	106	20	Sensitivity only
	COTTLE 230kV - Ring R4 & R3	P2-3	Non-Bus-Tie Breaker	28	26	17	71	52	38	50	103	18	Sensitivity only
	COTTLE 230kV - Ring R4 & R5	P2-3	Non-Bus-Tie Breaker	27	26	17	71	52	38	51	103	18	Sensitivity only
	RIO OSO 115KV SECTION 2D	P2-2	Bus	<100	94	99	<100	6	91	11	<100	104	Sensitivity only
	RIO OSO - 2D 115KV & BOGUE-RIO OSO LINE	P2-3	Non-Bus-Tie Breaker	<100	95	99	<100	6	92	11	<100	104	Sensitivity only



Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading % (Baseline Scenarios)					Loading % (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations	
31978 DPWT_TP2 115 31984 BRIGHTN 115 1 1	RIO OSO - 2D 115KV & RIO OSO-DRUM-BRUNSWCK LINE	P2-3	Non-Bus-Tie Breaker	<100	95	98	<100	6	92	11	<100	104	Sensitivity only
	RIO OSO - 2D 115KV & RIO OSO-WOODLAND #2 LINE	P2-3	Non-Bus-Tie Breaker	<100	91	95	<100	6	88	11	<100	101	Sensitivity only
	RIO OSO 115KV - SECTION 1D & 2D	P2-4	Bus-Tie Breaker	<100	143	153	<100	7	140	14	<100	126	Substation upgrade or SPS
	Rio Oso-Woodland No. 1 115 kV Line & Rio Oso-Woodland No. 2 115 kV Line	P7	DCTL	91	93	100	8	8	89	13	52	109	Continue to monitor future load forecast
31980 DPWTR_TP 115 31986 W.SCRMNO 115 1 1	Rio Oso-Woodland No. 1 115 kV Line & Rio Oso-Woodland No. 2 115 kV Line	P7	DCTL	78	81	91	8	8	74	12	42	103	Sensitivity only
31980 DPWTR_TP 115 31990 DAVIS 115 1 1	Rio Oso-Woodland No. 1 115 kV Line & Rio Oso-Woodland No. 2 115 kV Line	P7	DCTL	77	80	91	7	9	73	13	41	103	Sensitivity only
31984 BRIGHTN 115 31993 BRKRJCT 115 1 1	W.SCRMNO - DE 115KV & WEST SACRAMENTO-BRIGHTON LINE	P2-3	Non-Bus-Tie Breaker	<100	90	96	<100	12	84	17	<100	103	Sensitivity only
	RIO OSO 115KV - SECTION 1D & 2D	P2-4	Bus-Tie Breaker	<100	123	135	<100	9	118	16	<100	104	Substation upgrade or SPS
	Rio Oso-West Sacramento 115 kV Line & West Sacramento-Brighton 115 kV Line	P7	DCTL	94	90	94	18	11	84	17	60	101	Sensitivity only
	Rio Oso-Woodland No. 1 115 kV Line & Rio Oso-Woodland No. 2 115 kV Line	P7	DCTL	94	96	106	2	9	90	14	52	117	Continue to monitor future load forecast
31993 BRKRJCT 115 32001 UCD_TP2 115 1 1	W.SCRMNO - DE 115KV & WEST SACRAMENTO-BRIGHTON LINE	P2-3	Non-Bus-Tie Breaker	<100	88	94	<100	13	82	19	<100	102	Sensitivity only
	RIO OSO 115KV - SECTION 1D & 2D	P2-4	Bus-Tie Breaker	<100	122	134	<100	11	116	17	<100	102	Substation upgrade or SPS
	Rio Oso-Woodland No. 1 115 kV Line & Rio Oso-Woodland No. 2 115 kV Line	P7	DCTL	92	94	105	2	10	88	16	51	116	Continue to monitor future load forecast
32001 UCD_TP2 115 31990 DAVIS 115 1 1	WEST SACRAMENTO-BRIGHTON 115KV [4110]	P1	N-1	98	89	97	23	15	83	21	47	105	Sensitivity only
	W.SCRMNO - DE 115KV & WEST SACRAMENTO-BRIGHTON LINE	P2-3	Non-Bus-Tie Breaker	<100	103	110	<100	15	96	22	<100	119	Under review - Line rating
	RIO OSO 115KV - SECTION 1D & 2D	P2-4	Bus-Tie Breaker	<100	142	156	<100	13	135	20	<100	119	Substation upgrade or SPS
	Rio Oso-Woodland #1 115 kV Line & Rio Oso-Woodland #2 115 kV Line	P7	DCTL	108	110	122	2	12	103	18	59	135	Under review - Line rating
	Rio Oso-West Sacramento 115 kV Line & West Sacramento-Brighton 115 kV Line	P7	DCTL	108	103	108	19	14	96	21	67	116	Under review - Line rating
	Rio Oso-Woodland No. 1 115 kV Line & Rio Oso-Woodland No. 2 115 kV Line	P7	DCTL	108	110	122	2	12	103	18	59	135	Under review - Line rating
32056 CORTINA 60.0 30451 CRTNA M 230 1 1	CORTINA 115/60KV TB 5	P1	N-1	69	70	72	38	59	75	69	13	105	Sensitivity only
	CORTINA 230/115KV TB 4	P1	N-1	102	101	105	90	101	111	117	35	123	Existing operating procedure
	CORTINA 115KV - MIDDLE BREAKER BAY 1	P2-3	Non-Bus-Tie Breaker	<100	70	72	<100	59	75	69	<100	105	Sensitivity only
	CORTINA 230KV - RING R2 & R1	P2-3	Non-Bus-Tie Breaker	<100	83	82	<100	111	91	123	<100	100	Existing operating procedure
	CORTINA 115KV BAAH BUS #2 (FAILURE OF NON-REDUNDENT RELAY)	P5	Non-Redundant Relay	69	70	72	38	59	75	69	13	105	Sensitivity only



Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading % (Baseline Scenarios)					Loading % (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations	
32082 PLFLDJCT 60.0 32090 WINTERS 60.0 1 1	Base Case	P0	Base Case	98	116	117	29	17	119	18	68	117	Significant increase in load in base cases compared to last year. Load forecast under review.
	PLAINFLD SVD=V	P1	N-1	<100	91	109	<100	15	94	15	<100	109	Significant increase in load in base cases compared to last year. Load forecast under review.
	VACA-DIX 230KV SECTION 1E	P2-2	Bus	<100	101	104	<100	15	103	15	<100	103	Significant increase in load in base cases compared to last year. Load forecast under review.
	VACA-DIX 230KV - SECTION 1E & 1F	P2-4	Bus-Tie Breaker	<100	101	105	<100	15	104	15	<100	104	Significant increase in load in base cases compared to last year. Load forecast under review.
	VACA-DIX 230KV - SECTION 1E & 2E	P2-4	Bus-Tie Breaker	<100	101	104	<100	15	103	15	<100	104	Significant increase in load in base cases compared to last year. Load forecast under review.
	VACA-DIX 230KV - SECTION 1F & 2F	P2-4	Bus-Tie Breaker	<100	101	104	<100	15	103	15	<100	104	Significant increase in load in base cases compared to last year. Load forecast under review.
	VACA-DIX 230KV - SECTION 2F & 2E	P2-4	Bus-Tie Breaker	<100	101	103	<100	15	103	15	<100	103	Significant increase in load in base cases compared to last year. Load forecast under review.
32082 PLFLDJCT 60.0 32092 PLAINFLD 60.0 1 1	Base Case	P0	Base Case	99	117	118	28	16	120	16	69	118	Significant increase in load in base cases compared to last year. Load forecast under review.
	PLAINFLD SVD=V	P1	N-1	<100	92	110	<100	14	95	14	<100	110	Significant increase in load in base cases compared to last year. Load forecast under review.
	VACA-DIX 230KV SECTION 1E	P2-2	Bus	<100	101	105	<100	14	104	14	<100	104	Significant increase in load in base cases compared to last year. Load forecast under review.
	VACA-DIX 230KV - SECTION 1E & 1F	P2-4	Bus-Tie Breaker	<100	102	106	<100	14	104	14	<100	106	Significant increase in load in base cases compared to last year. Load forecast under review.
	VACA-DIX 230KV - SECTION 1E & 2E	P2-4	Bus-Tie Breaker	<100	101	105	<100	14	104	14	<100	105	Significant increase in load in base cases compared to last year. Load forecast under review.
	VACA-DIX 230KV - SECTION 1F & 2F	P2-4	Bus-Tie Breaker	<100	102	105	<100	14	104	14	<100	105	Significant increase in load in base cases compared to last year. Load forecast under review.
	VACA-DIX 230KV - SECTION 2F & 2E	P2-4	Bus-Tie Breaker	<100	101	104	<100	14	104	14	<100	104	Significant increase in load in base cases compared to last year. Load forecast under review.
32088 VACA-DXN 60.0 31998 VACA-DIX 115 5 1	VACA-DIX 115/60KV TB 9	P1	N-1	105	44	47	33	11	46	9	84	47	Project: Vierra 115 kV Looping Project In-Service Date: Jan 2023 Short term: Action plan
32088 VACA-DXN 60.0 32090 WINTERS 60.0 1 1	Base Case	P0	Base Case	95	108	111	23	13	111	14	65	111	Significant increase in load in base cases compared to last year. Load forecast under review.
	PLAINFLD SVD=V	P1	N-1	<100	87	102	<100	11	90	12	<100	102	Significant increase in load in base cases compared to last year. Load forecast under review.
32088 VACA-DXN 60.0 32094 VACA-JT2 60.0 2 1	DIXON-VACA #1 60KV [6730] (VACA-DXN-VACA-JT1)	P2-1	Line Section w/o Fault	<100	98	109	<100	37	103	34	<100	109	Continue to monitor future load forecast
32100 DIXONDCFE 60.0 32101 DIXONL 12 60.0 2 1	DIXON-VACA #1 60KV [6730] MOAS OPENED ON DIXONCAN_DIXON-J1	P1	N-1	117	55	62	17	4	57	2	91	62	Project: Vierra 115 kV Looping Project In-Service Date: Jan 2023 Short term: Action plan



Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading % (Baseline Scenarios)					Loading % (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations	
32100 DIXONPGE 60.0 32105 DIXON-J1 60.0 1 1	VACA-DXN-DIXON-J1-TRAVIS 60KV [6731] MOAS OPENED ON TRAVIS_TRAVISJT	P1	N-1	128	59	67	27	8	62	6	102	67	Project: Vierra 115 kV Looping Project In-Service Date: Jan 2023 Short term: Action plan
32100 DIXONPGE 60.0 32105 DIXON-J1 60.0 1 1	DIXON-VACA #2 60KV [6740]	P1	N-1	118	125	141	17	8	130	5	92	141	Under review - Line rating
	DIXON-VACA #2 60KV [6740] (DIXONPGE-DIXON-J2)	P2-1	Line Section w/o Fault	<100	125	141	<100	8	130	5	<100	141	Under review - Line rating
	DIXON-VACA #2 60KV [6740] (VACA-DXN-VACA-JT2)	P2-1	Line Section w/o Fault	<100	125	142	<100	9	130	5	<100	141	Under review - Line rating
32101 DIXON-J2 60.0 32109 CACHSLJ2 60.0 2 1	DIXON-VACA #1 60KV [6730] (VACA-DXN-VACA-JT1)	P2-1	Line Section w/o Fault	<100	98	109	<100	36	103	34	<100	109	Continue to monitor future load forecast
32109 CACHSLJ2 60.0 32094 VACA-JT2 60.0 2 1	DIXON-VACA #1 60KV [6730] (VACA-DXN-VACA-JT1)	P2-1	Line Section w/o Fault	<100	98	109	<100	37	103	34	<100	109	Continue to monitor future load forecast
32214 RIO OSO 115 32225 BRNSWKTP 115 1 1	GOLDHILL 230KV - SECTION 1D & 2D	P2-4	Bus-Tie Breaker	Diverge	Diverge	Diverge	<100	95	Diverge	153	<100	Diverge	Project: Atlantic-Placer 115 kV Line Project on hold. Project scope under review
32214 RIO OSO 115 32244 BRNSWCKP 115 2 1	GOLDHILL 230KV - SECTION 1D & 2D	P2-4	Bus-Tie Breaker	Diverge	Diverge	Diverge	<100	91	Diverge	149	<100	Diverge	Project: Atlantic-Placer 115 kV Line Project on hold. Project scope under review
32214 RIO OSO 115 32404 SPI JCT 115 1 1	ATLANTIC 230 KV BAAH BUS #1 (FAILURE OF NON-REDUNDENT RELAY)	P5	Non-Redundant Relay	110	114	132	10	24	118	31	62	132	Protection upgrade
	Rio Oso-Atlantic 230 kV Line & Rio Oso-Gold Hill 230 kV Line	P7	DCTL	79	89	104	7	23	99	23	74	101	Continue to monitor future load forecast
32218 DRUM 115 32220 DTCH FL1 115 1 1	GOLDHILL 115KV - SECTION 1F & 2F	P2-4	Bus-Tie Breaker	<100	164	233	<100	89	185	102	<100	233	Project: Atlantic-Placer 115 kV Line Project on hold. Project scope under review
	GOLDHILL 230KV - SECTION 1D & 2D	P2-4	Bus-Tie Breaker	Diverge	Diverge	Diverge	<100	125	Diverge	153	<100	Diverge	Project: Atlantic-Placer 115 kV Line Project on hold. Project scope under review
	Placer-Gold Hill No. 1 115 kV Line and Placer-Gold Hill No. 2 115 kV Line	P7	DCTL	96	99	100	55	77	107	86	23	100	Project: Atlantic-Placer 115 kV Line Project on hold. Project scope under review
	Rio Oso-Atlantic 230 kV Line & Rio Oso-Gold Hill 230 kV Line	P7	DCTL	88	91	95	22	22	102	21	84	92	Sensitivity only
	GOLDHILL 230KV - SECTION 1D & 2D	P2-4	Bus-Tie Breaker	Diverge	Diverge	Diverge	<100	70	Diverge	126	<100	Diverge	Project: Atlantic-Placer 115 kV Line Project on hold. Project scope under review
32218 DRUM 115 32244 BRNSWCKP 115 2 1	DRUM-HIGGINS 115KV [4393] MOAS OPENED ON CHCGO PK_HIGGINS	P1	N-1	111	107	100	66	63	109	63	115	100	Existing operating procedure
	DRUM-HIGGINS 115KV [4393] (CHCGO PK-HIGGINS)	P2-1	Line Section w/o Fault	<100	107	100	<100	63	109	63	<100	100	Existing operating procedure
	GOLDHILL 230KV - SECTION 1D & 2D	P2-4	Bus-Tie Breaker	Diverge	Diverge	Diverge	<100	91	Diverge	146	<100	Diverge	Project: Atlantic-Placer 115 kV Line Project on hold. Project scope under review
32220 DTCH FL1 115 32224 CHCGO PK 115 1 1	GOLDHILL 115KV - SECTION 1F & 2F	P2-4	Bus-Tie Breaker	<100	137	190	<100	57	153	66	<100	190	Project: Atlantic-Placer 115 kV Line Project on hold. Project scope under review
	GOLDHILL 230KV - SECTION 1D & 2D	P2-4	Bus-Tie Breaker	Diverge	Diverge	Diverge	<100	84	Diverge	103	<100	Diverge	Project: Atlantic-Placer 115 kV Line Project on hold. Project scope under review





Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading % (Baseline Scenarios)					Loading % (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations	
32224 CHCGO PK 115 32232 HIGGINS 115 1 1	GOLDHILL 115KV - SECTION 1F & 2F	P2-4	Bus-Tie Breaker	<100	128	171	<100	23	141	30	<100	171	Project: Atlantic-Placer 115 kV Line Project on hold. Project scope under review
	GOLDHILL 230KV - SECTION 1D & 2D	P2-4	Bus-Tie Breaker	Diverge	Diverge	Diverge	<100	44	Diverge	59	<100	Diverge	Project: Atlantic-Placer 115 kV Line Project on hold. Project scope under review
32225 BRNSWKTP 115 32222 DTCH FL2 115 1 1	DRUM-HIGGINS 115KV [4393] MOAS OPENED ON CHCGO PK_HIGGINS	P1	N-1	98	94	89	67	65	96	66	107	88	Sensitivity only
	BRNSWALT 115KV - RING R4 & R3	P2-3	Non-Bus-Tie Breaker	<100	126	116	<100	67	129	67	<100	115	Existing operating procedure
	GOLDHILL 230KV - SECTION 1D & 2D	P2-4	Bus-Tie Breaker	Diverge	Diverge	Diverge	<100	93	Diverge	150	<100	Diverge	Project: Atlantic-Placer 115 kV Line Project on hold. Project scope under review
32228 PLACER 115 32238 BELL PGE 115 1 1	GOLDHILL 115KV - SECTION 1F & 2F	P2-4	Bus-Tie Breaker	<100	120	156	<100	31	133	38	<100	156	Project: Atlantic-Placer 115 kV Line Project on hold. Project scope under review
	GOLDHILL 230KV - SECTION 1D & 2D	P2-4	Bus-Tie Breaker	Diverge	Diverge	Diverge	<100	62	Diverge	80	<100	Diverge	Project: Atlantic-Placer 115 kV Line Project on hold. Project scope under review
32232 HIGGINS 115 32238 BELL PGE 115 1 1	GOLDHILL 115KV - SECTION 1F & 2F	P2-4	Bus-Tie Breaker	<100	125	167	<100	27	139	34	<100	167	Project: Atlantic-Placer 115 kV Line Project on hold. Project scope under review
	GOLDHILL 230KV - SECTION 1D & 2D	P2-4	Bus-Tie Breaker	Diverge	Diverge	Diverge	<100	52	Diverge	68	<100	Diverge	Project: Atlantic-Placer 115 kV Line Project on hold. Project scope under review
32250 ELDORAD 115 32481 APLHTAP2 115 2 1	MISSOURI FLAT-GOLD HILL #1 115KV [2660] (GOLDHILL-CPM TAP)	P2-1	Line Section w/o Fault	<100	94	103	<100	20	100	25	<100	103	Continue to monitor future load forecast
	MISSOURI FLAT-GOLD HILL #1 115KV [2660] (GOLDHILL-CPM TAP)	P2-1	Line Section w/o Fault	<100	92	104	<100	10	97	10	<100	104	Continue to monitor future load forecast
32356 LINCLN 115 32398 ULTRA JT 115 1 1	ATLANTIC 230 KV BAAH BUS #1 (FAILURE OF NON-REDUNDENT RELAY)	P5	Non-Redundant Relay	90	94	111	10	17	98	22	52	112	Protection upgrade
32356 LINCLN 115 32404 SPI JCT 115 1 1	ATLANTIC 230 KV BAAH BUS #1 (FAILURE OF NON-REDUNDENT RELAY)	P5	Non-Redundant Relay	116	120	139	8	18	124	25	68	139	Protection upgrade
	Rio Oso-Atlantic 230 kV Line & Rio Oso-Gold Hill 230 kV Line	P7	DCTL	85	95	111	12	25	105	24	80	107	Continue to monitor future load forecast
32398 ULTRA JT 115 32408 PLSNT GR 115 1 1	ATLANTIC 230 KV BAAH BUS #1 (FAILURE OF NON-REDUNDENT RELAY)	P5	Non-Redundant Relay	102	105	125	12	10	109	14	63	125	Protection upgrade
32481 APLHTAP2 115 32257 PLCRVLT2 115 2 1	MISSOURI FLAT-GOLD HILL #1 115KV [2660] (GOLDHILL-CPM TAP)	P2-1	Line Section w/o Fault	<100	95	103	<100	20	101	25	<100	103	Continue to monitor future load forecast
33506 STANISLS 115 33948 RVRBK J2 115 1 1	TESLA 115kV - Section 1D & 2D	P2-4	Bus-Tie Breaker	92	<100	<100	32	<100	<100	<100	Diverge	<100	Sensitivity only
33514 MANTECA 115 33970 INGRM C. 115 1 1	KASSON - 1D 115kV & MANTECA-KASSON-SCHULTE line	P2-3	Non-Bus-Tie Breaker	130	<100	<100	9	<100	<100	<100	69	<100	Project: Vierra 115 kV Looping Project In-Service Date: Jan 2023 Short term: Action plan
	TESLA-SCHULTE SW STA #2 115KV [3970] & TESLA-SCHULTE SW STA #1 115KV [3982]	P7	DCTL	22	15	15	7	10	20	11	104	16	Sensitivity only
33562 BELLOTA 115 33950 RVRBK TP 115 1 1	BELLOTA 230KV - Section 1E & 2E	P2-4	Bus-Tie Breaker	116	120	99	19	13	121	11	77	94	Project: Vierra 115 kV Looping Project In-Service Date: Jan 2023 Short term: Action plan
	TESLA 115kV - Section 1D & 2D	P2-4	Bus-Tie Breaker	147	155	Diverge	19	65	150	84	Diverge	Diverge	Substation upgrade or SPS



Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading % (Baseline Scenarios)					Loading % (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations	
33745 LID TAP 60.0 33750 CALVO 60.0 1 1	KASSON 115kV Section 1D	P2-2	Bus	109	111	129	21	15	116	11	83	129	Kasson SPS
	KASSON - 1D 115kV & LAMMERS-KASSON line	P2-3	Non-Bus-Tie Breaker	109	111	129	21	15	116	11	83	129	Kasson SPS
	KASSON - 1D 115kV & MANTECA-KASSON-SCHULTE line	P2-3	Non-Bus-Tie Breaker	114	113	134	21	15	118	11	86	133	Kasson SPS
	KASSON - 1D 115kV & VIERRA-TRACY-KASSON line	P2-3	Non-Bus-Tie Breaker	109	111	129	21	15	116	11	83	129	Kasson SPS
33748 MSSDLESW 60.0 33745 LID TAP 60.0 1 1	KASSON 115kV Section 1D	P2-2	Bus	109	111	129	21	15	116	11	83	129	Kasson SPS
	KASSON - 1D 115kV & LAMMERS-KASSON line	P2-3	Non-Bus-Tie Breaker	109	111	129	21	15	116	11	83	129	Kasson SPS
	KASSON - 1D 115kV & MANTECA-KASSON-SCHULTE line	P2-3	Non-Bus-Tie Breaker	114	113	134	21	15	118	11	86	133	Kasson SPS
	KASSON - 1D 115kV & VIERRA-TRACY-KASSON line	P2-3	Non-Bus-Tie Breaker	109	111	129	21	15	116	11	83	129	Kasson SPS
33912 SPRNG GJ 115 33914 MI-WUK 115 1 1	BELLOTA 230kV - Section 1E & 2E	P2-4	Bus-Tie Breaker	<100	85	108	<100	49	94	49	<100	112	Continue to monitor future load forecast
33916 CURTISS 115 33917 SPISONORAJCT 115 1 1	BELLOTA 230kV - Section 1E & 2E	P2-4	Bus-Tie Breaker	<100	81	100	<100	51	89	51	<100	103	Sensitivity only
33932 MELONES 115 33500 MELNS JA 115 1 1	BELLOTA 230kV - Section 1E & 2E	P2-4	Bus-Tie Breaker	135	145	115	44	56	139	63	51	129	Substation upgrade or SPS
	TESLA 115kV - Section 1D & 2D	P2-4	Bus-Tie Breaker	154	161	Diverge	41	7	164	24	Diverge	Diverge	Substation upgrade or SPS
33932 MELONES 115 33934 TULLOCH 115 1 1	BELLOTA 230kV - Section 1E & 2E	P2-4	Bus-Tie Breaker	196	206	173	9	6	203	10	112	162	Substation upgrade or SPS
	TESLA 115kV - Section 1D & 2D	P2-4	Bus-Tie Breaker	193	203	Diverge	10	75	200	100	Diverge	Diverge	Substation upgrade or SPS
33932 MELONES 115 33936 MELNS JB 115 1 1	BELLOTA 230kV - Section 1E & 2E	P2-4	Bus-Tie Breaker	137	147	115	43	54	141	60	53	129	Substation upgrade or SPS
	TESLA 115kV - Section 1D & 2D	P2-4	Bus-Tie Breaker	155	162	Diverge	40	9	165	27	Diverge	Diverge	Substation upgrade or SPS
33936 MELNS JB 115 33947 RIVRBKJT 115 1 1	MANTECA-RIPON 115kV [0]	P1	N-1	<100	91	108	<100	13	95	17	<100	110	Continue to monitor future load forecast
	RIVERBANK JCT SW STA-MANTECA 115kV [3841] (RPN JNCN-MANTECA)	P2-1	Line Section w/o Fault	<100	91	108	<100	12	95	17	<100	109	Continue to monitor future load forecast
	RPN JNCN-RIPON 115kV [0] No Fault	P2-1	Line Section w/o Fault	<100	91	108	<100	13	95	17	<100	110	Continue to monitor future load forecast
	TESLA 115kV - Section 1D & 2D	P2-4	Bus-Tie Breaker	158	161	Diverge	45	7	161	9	Diverge	Diverge	Substation upgrade or SPS
	STANISLAUS-MANTECA #2 115KV [3820] & MANTECA-RIPON 115KV [0]	P7	DCTL	<100	91	108	<100	13	95	17	<100	110	Continue to monitor future load forecast
33946 RVRBK J1 115 33944 RVRBANK 115 1 1	TESLA 115kV - Section 1D & 2D	P2-4	Bus-Tie Breaker	118	125	Diverge	12	45	122	59	Diverge	Diverge	Substation upgrade or SPS
33947 RIVRBKJT 115 33951 VLYHMP1 115 1 1	MANTECA-RIPON 115kV [0]	P1	N-1	<100	88	104	<100	13	91	16	<100	105	Continue to monitor future load forecast
	RIVERBANK JCT SW STA-MANTECA 115kV [3841] (RPN JNCN-MANTECA)	P2-1	Line Section w/o Fault	<100	87	103	<100	12	91	16	<100	105	Continue to monitor future load forecast
	RPN JNCN-RIPON 115kV [0] No Fault	P2-1	Line Section w/o Fault	<100	88	104	<100	13	91	16	<100	105	Continue to monitor future load forecast
	TESLA 115kV - Section 1D & 2D	P2-4	Bus-Tie Breaker	151	154	Diverge	43	6	154	9	Diverge	Diverge	Substation upgrade or SPS
	STANISLAUS-MANTECA #2 115KV [3820] & MANTECA-RIPON 115KV [0]	P7	DCTL	<100	88	104	<100	13	91	17	<100	105	Continue to monitor future load forecast
33948 RVRBK J2 115 33953 VLYHMP2 115 1 1	TESLA 115kV - Section 1D & 2D	P2-4	Bus-Tie Breaker	87	<100	<100	30	<100	<100	<100	Diverge	<100	Sensitivity only
33950 RVRBK TP 115 33934 TULLOCH 115 1 1	BELLOTA 230kV - Section 1E & 2E	P2-4	Bus-Tie Breaker	221	230	205	29	19	233	15	132	196	Substation upgrade or SPS
	TESLA 115kV - Section 1D & 2D	P2-4	Bus-Tie Breaker	179	189	Diverge	29	93	181	120	Diverge	Diverge	Substation upgrade or SPS



Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading % (Baseline Scenarios)					Loading % (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations	
33950 RVRBK TP 115 33944 RVRBANK 115 1 1	BELLOTA 230kV - Section 1E & 2E	P2-4	Bus-Tie Breaker	107	112	108	10	6	114	4	55	103	Substation upgrade or SPS
33959 TCHRT_T2 115 33970 INGRM C. 115 1 1	KASSON - 1D 115kV & MANTECA-KASSON-SCHULTE line	P2-3	Non-Bus-Tie Breaker	128	<100	<100	17	<100	<100	<100	57	<100	Project: Vierra 115 kV Looping Project In-Service Date: Jan 2023 Short term: Action plan
34002 SALADO 60.0 34006 PATTERSN 60.0 1 1	CROWCREEK SS-NEWMAN 60kV [7862]	P1	N-1	106	110	116	6	7	115	13	51	116	Under review - Line rating
	CROWCREEK SS-SALADO 60kV [0]	P1	N-1	108	113	117	39	49	69	54	14	117	Under review - Line rating
	MEDLIN J-NWMN JCT 60kV [0] No Fault	P2-1	Line Section w/o Fault	107	111	117	6	7	116	13	51	117	Under review - Line rating
	SALADO-NEWMAN #1 60kV [7860] (CROWCREEK SS-MEDLIN J)	P2-1	Line Section w/o Fault	106	111	117	6	8	116	13	51	117	Under review - Line rating
	SALADO-STNSLSRP 60kV [0] No Fault	P2-1	Line Section w/o Fault	<100	64	68	<100	95	24	101	<100	68	Sensitivity only
	CROWCREEK SS 60kV - Ring R2 & R1	P2-3	Non-Bus-Tie Breaker	107	112	115	6	7	117	13	52	116	Under review - Line rating
34009 CROWCREEK SS 60.0 34016 MEDLIN J 60.0 1 1	SALADO-NEWMAN #2 60kV [7870]	P1	N-1	<100	102	107	<100	7	105	12	<100	107	Disable automatics
	SALADO-NEWMAN #2 60kV [7870] (CRWS LDJ-GUSTN JT)	P2-1	Line Section w/o Fault	<100	96	100	<100	6	99	11	<100	100	Disable automatics
	SALADO-NEWMAN #2 60kV [7870] (GUSTN JT-NEWMAN)	P2-1	Line Section w/o Fault	<100	96	100	<100	6	99	11	<100	100	Disable automatics
	SALADO-NEWMAN #2 60kV [7870] (PATTERSN-CRWS LDJ)	P2-1	Line Section w/o Fault	<100	103	108	<100	7	106	12	<100	108	Disable automatics
	SALADO-NEWMAN #2 60kV [7870] (SALADO-PATTERSN)	P2-1	Line Section w/o Fault	<100	103	108	<100	7	106	12	<100	108	Disable automatics
34014 NEWMAN 60.0 34018 NWMN JCT 60.0 1 1	SALADO-STNSLSRP 60kV [0] No Fault	P2-1	Line Section w/o Fault	10	13	17	100	104	51	105	76	16	Generator dispatch
35202 DYERJCT 60.0 33776 SOUTH BY 60.0 1 1	Base Case	P0	Base Case	45	79	80	5	3	107	74	80	81	Sensitivity only
365506 Q653FJCT 115 31990 DAVIS 115 1 1	BRIGHTN-UCD_TP2-BRKR SLG 115KV [1141] MOAS OPENED ON BRKRJCT_UCD_TP2 & WEST SACRAMENTO-DAVIS 115KV [4120]	P6	N-1-1	100	<100	<100	<100	<100	<100	<100	<100	<100	Project: Vierra 115 kV Looping Project In-Service Date: Jan 2023 Short term: Action plan
	DAVIS-UCD_TP2 115KV [6680] MOAS OPENED ON BRKRJCT_UCD_TP2 & WEST SACRAMENTO-DAVIS 115KV [4120]	P6	N-1-1	100	<100	<100	<100	<100	<100	<100	<100	<100	Project: Vierra 115 kV Looping Project In-Service Date: Jan 2023 Short term: Action plan
37016 RNCHSECO 230 30500 BELLOTA 230 1 1	RANCHO SECO-BELLOTA #2 230kV [5560]	P1	N-1	28	<100	<100	43	<100	<100	<100	103	<100	Sensitivity only
	RANCHO SECO-BELLOTA #2 230kV [5560] (CAMANCH-BELLOTA)	P2-1	Line Section w/o Fault	28	20	21	43	43	47	43	103	21	Sensitivity only
	RANCHO SECO-BELLOTA #2 230kV [5560] (RNCHSECO-CAMANCH)	P2-1	Line Section w/o Fault	28	20	21	43	42	47	42	103	21	Sensitivity only
37016 RNCHSECO 230 30510 CAMANCH 230 2 1	RANCHO SECO-BELLOTA #1 230kV [5550]	P1	N-1	28	<100	<100	42	<100	<100	<100	103	<100	Sensitivity only
	BELLOTA 230kV Section 1D	P2-2	Bus	29	21	22	43	42	47	42	103	22	Sensitivity only
	BELLOTA 230kV - Section 1E & 1D	P2-4	Bus-Tie Breaker	31	<100	<100	44	<100	<100	<100	101	<100	Sensitivity only
37649 LLNLAB 115 33574 LLNL TAP 115 1 1	TESLA D 230kV - Section 1D & 2D	P2-4	Bus-Tie Breaker	63	54	30	58	80	36	147	121	38	Sensitivity only

Study Area: PG&E Central Valley

High/Low Voltages



Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)					Voltage PU (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations	
ALLEGHNY 60 kV	Base Case	P0	Base case	1.04	1.05	1.02	1.09	1.08	1.04	1.08	1.05	1.02	Load power factor correction and voltage support if needed
AMEGTAP 115 kV	Base Case	P0	Base case	1.06	1.07	1.02	1.11	1.10	1.06	1.10	1.07	1.03	Load power factor correction and voltage support if needed
AMERIGAS 115 kV	Base Case	P0	Base case	1.06	1.07	1.02	1.11	1.10	1.06	1.10	1.07	1.03	Load power factor correction and voltage support if needed
APLHTAP1 115 kV	Base Case	P0	Base case	1.05	1.07	1.01	1.15	1.12	1.06	1.12	1.05	1.01	Load power factor correction and voltage support if needed
APLHTAP2 115 kV	Base Case	P0	Base case	1.04	1.06	1.01	1.15	1.12	1.05	1.12	1.05	1.01	Load power factor correction and voltage support if needed
APPLE HL 115 kV	Base Case	P0	Base case	1.05	1.07	1.01	1.15	1.12	1.06	1.12	1.05	1.01	Load power factor correction and voltage support if needed
ARBALT 60 kV	Base Case	P0	Base case	1.01	1.00	0.99	1.05	1.06	1.01	1.06	1.02	0.99	Load power factor correction and voltage support if needed
ARBJCT 60 kV	Base Case	P0	Base case	1.01	1.00	0.99	1.05	1.06	1.01	1.06	1.02	0.99	Load power factor correction and voltage support if needed
ATLANTC 230 kV	Base Case	P0	Base case	0.99	1.02	0.98	1.08	1.05	1.01	1.05	1.00	0.98	Load power factor correction and voltage support if needed
ATLANTI 60 kV	Base Case	P0	Base case	1.06	1.07	0.99	1.15	1.11	1.06	1.11	1.06	0.99	Load power factor correction and voltage support if needed
ATLANTIC 115 kV	Base Case	P0	Base case	1.02	1.04	1.00	1.11	1.07	1.03	1.07	1.02	1.00	Load power factor correction and voltage support if needed
AUBURN 60 kV	Base Case	P0	Base case	1.03	1.03	1.02	1.06	1.03	1.03	1.03	1.03	1.02	Load power factor correction and voltage support if needed
BANGOR 60 kV	Base Case	P0	Base case	1.03	1.04	1.02	1.09	1.08	1.03	1.08	1.03	1.02	Load power factor correction and voltage support if needed
BDLSWSTA 230 kV	Base Case	P0	Base case	1.03	1.03	1.01	1.06	1.06	1.02	1.05	1.03	1.01	Load power factor correction and voltage support if needed
BEALE_1 60 kV	Base Case	P0	Base case	1.02	1.03	1.03	1.06	1.05	1.02	1.05	1.02	1.03	Load power factor correction and voltage support if needed
BEALE_2 60 kV	Base Case	P0	Base case	1.01	1.02	1.02	1.06	1.05	1.01	1.05	1.01	1.02	Load power factor correction and voltage support if needed
BEALE1J1 60 kV	Base Case	P0	Base case	1.02	1.03	1.03	1.06	1.05	1.02	1.05	1.02	1.03	Load power factor correction and voltage support if needed

Study Area: PG&E Central Valley

High/Low Voltages



Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)					Voltage PU (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations	
BEALE1J2 60 kV	Base Case	P0	Base case	1.01	1.02	1.02	1.06	1.05	1.01	1.05	1.01	1.02	Load power factor correction and voltage support if needed
BEALE2J1 60 kV	Base Case	P0	Base case	1.01	1.02	1.02	1.06	1.05	1.01	1.05	1.01	1.02	Load power factor correction and voltage support if needed
BEALE2J2 60 kV	Base Case	P0	Base case	1.03	1.04	1.03	1.07	1.06	1.03	1.06	1.03	1.03	Load power factor correction and voltage support if needed
BEARDSLY 115 kV	Base Case	P0	Base case	1.04	1.04	1.03	1.05	1.05	1.04	1.05	1.04	1.03	Load power factor correction and voltage support if needed
BELL PGE 115 kV	Base Case	P0	Base case	1.03	1.04	1.00	1.13	1.11	1.03	1.11	1.04	1.00	Load power factor correction and voltage support if needed
BOGUE 115 kV	Base Case	P0	Base case	1.04	1.04	1.04	1.11	1.05	1.04	1.05	1.03	1.04	Load power factor correction and voltage support if needed
BOWMN TP 60 kV	Base Case	P0	Base case	1.03	1.03	1.03	1.05	1.04	1.03	1.04	1.03	1.03	Load power factor correction and voltage support if needed
BRIGHTN 115 kV	Base Case	P0	Base case	1.04	1.04	1.04	1.05	1.05	1.05	1.05	1.04	1.04	Load power factor correction and voltage support if needed
BRIGHTON 230 kV	Base Case	P0	Base case	0.99	1.01	0.97	1.09	1.06	1.00	1.06	0.99	0.97	Load power factor correction and voltage support if needed
BRKR SLG 115 kV	Base Case	P0	Base case	1.02	1.02	1.01	1.07	1.05	1.03	1.05	1.03	1.01	Load power factor correction and voltage support if needed
BRKR TP 115 kV	Base Case	P0	Base case	1.02	1.02	1.01	1.07	1.05	1.03	1.05	1.03	1.01	Load power factor correction and voltage support if needed
BRKRJCT 115 kV	Base Case	P0	Base case	1.03	1.02	1.01	1.07	1.05	1.03	1.05	1.03	1.01	Load power factor correction and voltage support if needed
BRNSWALT 115 kV	Base Case	P0	Base case	1.01	1.02	1.03	1.11	1.06	1.02	1.06	1.02	1.03	Load power factor correction and voltage support if needed
BRNSWCKP 115 kV	Base Case	P0	Base case	1.02	1.03	1.03	1.11	1.06	1.02	1.06	1.03	1.03	Load power factor correction and voltage support if needed
BRNSWKTP 115 kV	Base Case	P0	Base case	1.02	1.03	1.03	1.11	1.06	1.03	1.06	1.03	1.04	Load power factor correction and voltage support if needed
BRUNSWCK 115 kV	Base Case	P0	Base case	1.01	1.01	1.02	1.11	1.06	1.01	1.06	1.02	1.02	Load power factor correction and voltage support if needed
BRWNS VY 60 kV	Base Case	P0	Base case	1.03	1.04	1.03	1.07	1.06	1.03	1.06	1.03	1.03	Load power factor correction and voltage support if needed



Study Area: PG&E Central Valley

High/Low Voltages



Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)					Voltage PU (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations	
BTAV-JCT 60 kV	Base Case	P0	Base case	1.05	1.06	1.01	1.11	1.10	1.06	1.10	1.06	1.02	Load power factor correction and voltage support if needed
CACHSLJ1 60 kV	Base Case	P0	Base case	1.05	1.06	1.01	1.10	1.10	1.06	1.10	1.06	1.01	Load power factor correction and voltage support if needed
CACHSLJ2 60 kV	Base Case	P0	Base case	1.05	1.06	1.01	1.11	1.10	1.06	1.10	1.06	1.02	Load power factor correction and voltage support if needed
CACHSTAP 60 kV	Base Case	P0	Base case	1.05	1.06	1.01	1.11	1.10	1.06	1.10	1.06	1.02	Load power factor correction and voltage support if needed
CAMPUS 115 kV	Base Case	P0	Base case	1.02	1.02	1.01	1.08	1.05	1.03	1.05	1.03	1.01	Load power factor correction and voltage support if needed
CAPEHORN 60 kV	Base Case	P0	Base case	1.01	1.01	1.00	1.05	1.04	1.01	1.04	1.01	1.00	Load power factor correction and voltage support if needed
CH.STN 115 kV	Base Case	P0	Base case	1.03	1.03	1.02	1.06	1.06	1.03	1.06	1.03	1.00	Load power factor correction and voltage support if needed
CH.STNJT 115 kV	Base Case	P0	Base case	1.02	1.03	1.01	1.06	1.06	1.03	1.06	1.03	1.00	Load power factor correction and voltage support if needed
CHCGO PK 115 kV	Base Case	P0	Base case	1.04	1.04	1.03	1.12	1.09	1.04	1.09	1.05	1.03	Load power factor correction and voltage support if needed
CHLLNGEA 60 kV	Base Case	P0	Base case	1.04	1.05	1.03	1.09	1.07	1.04	1.07	1.04	1.03	Load power factor correction and voltage support if needed
CISCO GR 60 kV	Base Case	P0	Base case	1.03	1.02	1.03	1.07	1.04	1.02	1.04	1.03	1.03	Load power factor correction and voltage support if needed
CISCOTAP 60 kV	Base Case	P0	Base case	1.03	1.02	1.03	1.07	1.04	1.02	1.04	1.03	1.03	Load power factor correction and voltage support if needed
CLMBA HL 60 kV	Base Case	P0	Base case	1.05	1.05	1.03	1.09	1.08	1.05	1.08	1.05	1.03	Load power factor correction and voltage support if needed
CLRKSVLE 115 kV	Base Case	P0	Base case	1.04	1.06	1.01	1.15	1.12	1.05	1.12	1.04	1.01	Load power factor correction and voltage support if needed
CLRKSVLT 115 kV	Base Case	P0	Base case	1.05	1.07	1.02	1.14	1.12	1.06	1.12	1.05	1.02	Load power factor correction and voltage support if needed
CLSA CRS 60 kV	Base Case	P0	Base case	0.99	1.00	0.94	1.08	1.09	1.00	1.10	1.05	0.94	Continue to monitor future load forecast
CLSA JCT 60 kV	Base Case	P0	Base case	1.01	1.01	0.99	1.05	1.06	1.02	1.06	1.03	0.97	Load power factor correction and voltage support if needed

Study Area: PG&E Central Valley

High/Low Voltages



Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)					Voltage PU (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations	
CMP FRWT 60 kV	Base Case	P0	Base case	1.03	1.04	1.03	1.06	1.04	1.03	1.04	1.03	1.03	Load power factor correction and voltage support if needed
COLFAXJT 60 kV	Base Case	P0	Base case	1.01	1.01	1.00	1.05	1.04	1.01	1.04	1.01	1.00	Load power factor correction and voltage support if needed
COLGATE 230 kV	Base Case	P0	Base case	1.01	1.02	1.00	1.05	1.04	1.01	1.04	1.01	1.00	Load power factor correction and voltage support if needed
COLGATE 60 kV	Base Case	P0	Base case	1.05	1.06	1.04	1.09	1.07	1.05	1.07	1.05	1.04	Load power factor correction and voltage support if needed
COLGATEA 60 kV	Base Case	P0	Base case	1.04	1.05	1.03	1.09	1.07	1.04	1.07	1.04	1.03	Load power factor correction and voltage support if needed
COLGTE1 230 kV	Base Case	P0	Base case	1.01	1.02	1.00	1.05	1.04	1.01	1.04	1.01	1.00	Load power factor correction and voltage support if needed
COLGTE2 230 kV	Base Case	P0	Base case	1.01	1.02	1.00	1.05	1.04	1.01	1.04	1.01	1.00	Load power factor correction and voltage support if needed
COLUSA 60 kV	Base Case	P0	Base case	0.99	1.00	0.94	1.08	1.09	1.00	1.10	1.05	0.94	Continue to monitor future load forecast
CORDELIA 115 kV	Base Case	P0	Base case	1.05	1.05	1.01	1.11	1.10	1.04	1.10	1.05	1.01	Load power factor correction and voltage support if needed
CORDELLT 115 kV	Base Case	P0	Base case	1.01	1.02	0.97	1.08	1.08	1.01	1.09	1.03	0.97	Load power factor correction and voltage support if needed
CORT_D 115 kV	Base Case	P0	Base case	1.08	1.06	1.03	1.10	1.09	1.05	1.09	1.08	1.02	Load power factor correction and voltage support if needed
CORTINA 115 kV	Base Case	P0	Base case	1.08	1.06	1.03	1.10	1.09	1.05	1.09	1.08	1.02	Load power factor correction and voltage support if needed
COTTLE 230 kV	Base Case	P0	Base case	1.01	1.01	1.00	1.06	1.08	1.01	1.08	1.00	1.00	Load power factor correction and voltage support if needed
CPEHRNTP 60 kV	Base Case	P0	Base case	1.01	1.01	1.00	1.05	1.04	1.01	1.04	1.01	1.00	Load power factor correction and voltage support if needed
CPM 115 kV	Base Case	P0	Base case	1.05	1.07	1.02	1.14	1.12	1.06	1.12	1.05	1.02	Load power factor correction and voltage support if needed
CPM TAP 115 kV	Base Case	P0	Base case	1.05	1.07	1.02	1.14	1.12	1.06	1.12	1.05	1.02	Load power factor correction and voltage support if needed
CROWCREEK SS 60 kV	Base Case	P0	Base case	1.04	1.04	1.02	1.06	1.06	1.04	1.06	1.04	1.02	Load power factor correction and voltage support if needed

Study Area: PG&E Central Valley

High/Low Voltages



Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)					Voltage PU (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations	
CRWS LDG 60 kV	Base Case	P0	Base case	1.02	1.02	1.00	1.06	1.06	1.02	1.06	1.03	1.00	Load power factor correction and voltage support if needed
CRWS LDJ 60 kV	Base Case	P0	Base case	1.02	1.03	1.01	1.06	1.06	1.02	1.06	1.03	1.01	Load power factor correction and voltage support if needed
CURTISS 115 kV	Base Case	P0	Base case	1.02	1.02	1.01	1.05	1.05	1.02	1.05	1.03	1.00	Load power factor correction and voltage support if needed
DAVIS 115 kV	Base Case	P0	Base case	1.02	1.02	1.01	1.08	1.05	1.03	1.05	1.03	1.01	Load power factor correction and voltage support if needed
DEEPWATR 115 kV	Base Case	P0	Base case	1.04	1.03	1.03	1.07	1.05	1.04	1.05	1.04	1.03	Load power factor correction and voltage support if needed
DEL MAR 60 kV	Base Case	P0	Base case	1.06	1.07	0.98	1.16	1.12	1.06	1.12	1.06	0.98	Load power factor correction and voltage support if needed
DELEVAN 60 kV	Base Case	P0	Base case	1.00	1.00	0.96	1.07	1.08	1.01	1.08	1.04	0.96	Load power factor correction and voltage support if needed
DIMOND_1 115 kV	Base Case	P0	Base case	1.05	1.07	1.01	1.15	1.12	1.06	1.12	1.05	1.01	Load power factor correction and voltage support if needed
DIMOND_2 115 kV	Base Case	P0	Base case	1.04	1.06	1.01	1.15	1.12	1.05	1.12	1.04	1.01	Load power factor correction and voltage support if needed
DIST2047 60 kV	Base Case	P0	Base case	0.98	0.98	0.96	1.05	1.07	0.98	1.07	1.01	0.97	Load power factor correction and voltage support if needed
DIXONCAN 60 kV	Base Case	P0	Base case	1.04	1.06	1.00	1.10	1.10	1.05	1.10	1.05	1.01	Load power factor correction and voltage support if needed
DIXON-J1 60 kV	Base Case	P0	Base case	1.04	1.06	1.01	1.10	1.10	1.05	1.10	1.05	1.01	Load power factor correction and voltage support if needed
DIXON-J2 60 kV	Base Case	P0	Base case	1.04	1.06	1.01	1.10	1.10	1.05	1.10	1.05	1.01	Load power factor correction and voltage support if needed
DIXONPGE 60 kV	Base Case	P0	Base case	1.04	1.06	1.01	1.10	1.10	1.05	1.10	1.05	1.01	Load power factor correction and voltage support if needed
DMND SPR 115 kV	Base Case	P0	Base case	1.04	1.06	1.01	1.15	1.12	1.05	1.12	1.04	1.01	Load power factor correction and voltage support if needed
DOBBINS 60 kV	Base Case	P0	Base case	1.04	1.05	1.03	1.09	1.07	1.04	1.07	1.04	1.03	Load power factor correction and voltage support if needed
DPWT_TP2 115 kV	Base Case	P0	Base case	1.04	1.03	1.03	1.07	1.05	1.04	1.05	1.04	1.03	Load power factor correction and voltage support if needed

Study Area: PG&E Central Valley

High/Low Voltages



Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)					Voltage PU (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations	
DPWTR_TP 115 kV	Base Case	P0	Base case	1.04	1.03	1.03	1.07	1.05	1.04	1.05	1.04	1.03	Load power factor correction and voltage support if needed
DRUM 115 kV	Base Case	P0	Base case	1.04	1.05	1.04	1.11	1.07	1.04	1.08	1.05	1.04	Load power factor correction and voltage support if needed
DTCH FL1 115 kV	Base Case	P0	Base case	1.04	1.04	1.03	1.11	1.08	1.04	1.08	1.04	1.03	Load power factor correction and voltage support if needed
DTCH FL2 115 kV	Base Case	P0	Base case	1.04	1.04	1.04	1.11	1.07	1.04	1.07	1.04	1.04	Load power factor correction and voltage support if needed
DUNNIGAN 60 kV	Base Case	P0	Base case	0.98	0.96	0.94	1.04	1.04	0.97	1.05	1.00	0.95	Continue to monitor future load forecast
E.MRY J1 115 kV	Base Case	P0	Base case	1.03	1.03	1.01	1.12	1.06	1.03	1.06	1.02	1.01	Load power factor correction and voltage support if needed
E.MRY J2 115 kV	Base Case	P0	Base case	1.04	1.05	1.03	1.11	1.06	1.05	1.06	1.05	1.03	Load power factor correction and voltage support if needed
E.MRYSVE 115 kV	Base Case	P0	Base case	1.05	1.05	1.03	1.11	1.06	1.05	1.06	1.05	1.03	Load power factor correction and voltage support if needed
E.NICOLS 115 kV	Base Case	P0	Base case	1.04	1.05	1.03	1.12	1.05	1.05	1.05	1.04	1.03	Load power factor correction and voltage support if needed
ELDORAD 115 kV	Base Case	P0	Base case	1.05	1.06	1.01	1.15	1.12	1.06	1.12	1.05	1.01	Load power factor correction and voltage support if needed
ENVRO_HY 60 kV	Base Case	P0	Base case	1.00	1.00	1.00	1.07	1.06	1.00	1.06	1.01	1.00	Load power factor correction and voltage support if needed
FLINT 115 kV	Base Case	P0	Base case	1.03	1.04	1.00	1.13	1.11	1.03	1.11	1.04	1.00	Load power factor correction and voltage support if needed
FLINT1 115 kV	Base Case	P0	Base case	1.03	1.04	1.00	1.14	1.11	1.03	1.11	1.04	1.00	Load power factor correction and voltage support if needed
FLINT2 115 kV	Base Case	P0	Base case	1.03	1.04	1.00	1.14	1.11	1.03	1.11	1.04	1.00	Load power factor correction and voltage support if needed
FLTN JCT 115 kV	Base Case	P0	Base case	1.06	1.07	1.02	1.11	1.10	1.06	1.10	1.07	1.02	Load power factor correction and voltage support if needed
FLTN JT2 115 kV	Base Case	P0	Base case	1.06	1.06	1.02	1.11	1.10	1.06	1.10	1.07	1.02	Load power factor correction and voltage support if needed
FORST HL 60 kV	Base Case	P0	Base case	1.00	1.00	0.99	1.07	1.06	1.00	1.06	1.01	0.99	Load power factor correction and voltage support if needed

Study Area: PG&E Central Valley

High/Low Voltages



Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)					Voltage PU (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations	
FREC TAP 115 kV	Base Case	P0	Base case	1.04	1.05	1.04	1.11	1.05	1.04	1.05	1.03	1.04	Load power factor correction and voltage support if needed
FRONTIERPV 60 kV	Base Case	P0	Base case	1.04	1.04	1.02	1.06	1.06	1.04	1.06	1.05	1.02	Load power factor correction and voltage support if needed
GLEAF 1 115 kV	Base Case	P0	Base case	1.04	1.04	1.04	1.11	1.05	1.04	1.05	1.04	1.04	Load power factor correction and voltage support if needed
GLEAF TP 115 kV	Base Case	P0	Base case	1.04	1.04	1.04	1.11	1.05	1.04	1.05	1.03	1.04	Load power factor correction and voltage support if needed
GOLD HLL 60 kV	Base Case	P0	Base case	1.04	1.04	1.04	1.06	1.04	1.04	1.04	1.04	1.05	Load power factor correction and voltage support if needed
GOLDHILL 115 kV	Base Case	P0	Base case	1.05	1.07	1.02	1.14	1.12	1.06	1.12	1.05	1.02	Load power factor correction and voltage support if needed
GOLDHILL 230 kV	Base Case	P0	Base case	1.00	1.01	0.98	1.08	1.06	1.01	1.06	0.99	0.98	Load power factor correction and voltage support if needed
GRAND IS 115 kV	Base Case	P0	Base case	1.03	1.03	1.03	1.06	1.05	1.04	1.05	1.03	1.03	Load power factor correction and voltage support if needed
GRSS VLY 60 kV	Base Case	P0	Base case	1.03	1.04	1.02	1.09	1.08	1.03	1.08	1.03	1.02	Load power factor correction and voltage support if needed
GUSTINE 60 kV	Base Case	P0	Base case	1.01	1.01	0.98	1.05	1.06	1.01	1.06	1.03	0.98	Load power factor correction and voltage support if needed
GUSTN JT 60 kV	Base Case	P0	Base case	1.02	1.02	0.99	1.06	1.06	1.02	1.06	1.04	1.00	Load power factor correction and voltage support if needed
HALE 115 kV	Base Case	P0	Base case	1.05	1.06	1.00	1.11	1.11	1.06	1.11	1.06	1.00	Load power factor correction and voltage support if needed
HALE J1 115 kV	Base Case	P0	Base case	1.05	1.06	1.00	1.11	1.11	1.06	1.11	1.06	1.00	Load power factor correction and voltage support if needed
HALE J2 115 kV	Base Case	P0	Base case	1.05	1.05	1.01	1.11	1.10	1.04	1.10	1.06	1.01	Load power factor correction and voltage support if needed
HALE2 115 kV	Base Case	P0	Base case	1.05	1.06	1.00	1.11	1.11	1.05	1.11	1.06	1.00	Load power factor correction and voltage support if needed
HALSEY 60 kV	Base Case	P0	Base case	1.03	1.03	1.02	1.06	1.03	1.03	1.04	1.03	1.02	Load power factor correction and voltage support if needed
HIGGINS 115 kV	Base Case	P0	Base case	1.03	1.04	1.01	1.13	1.10	1.03	1.10	1.04	1.01	Load power factor correction and voltage support if needed



Study Area: PG&E Central Valley

High/Low Voltages



Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)					Voltage PU (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations	
HighWINDS 230 kV	Base Case	P0	Base case	1.03	1.03	1.01	1.06	1.06	1.02	1.05	1.03	1.01	Load power factor correction and voltage support if needed
HIGWINDS3 230 kV	Base Case	P0	Base case	1.03	1.03	1.01	1.06	1.06	1.02	1.05	1.03	1.01	Load power factor correction and voltage support if needed
HORSESHE 115 kV	Base Case	P0	Base case	1.04	1.05	1.01	1.14	1.11	1.04	1.11	1.04	1.01	Load power factor correction and voltage support if needed
HORSHE1 115 kV	Base Case	P0	Base case	1.04	1.05	1.01	1.14	1.11	1.04	1.11	1.04	1.01	Load power factor correction and voltage support if needed
HORSHE2 115 kV	Base Case	P0	Base case	1.04	1.06	1.01	1.14	1.11	1.05	1.11	1.04	1.01	Load power factor correction and voltage support if needed
INGRM C. 115 kV	Base Case	P0	Base case	1.03	1.03	1.02	1.08	1.07	1.03	1.07	1.02	1.02	Load power factor correction and voltage support if needed
JAMESN-A 115 kV	Base Case	P0	Base case	1.05	1.06	1.01	1.10	1.10	1.05	1.10	1.05	1.01	Load power factor correction and voltage support if needed
JAMESON 115 kV	Base Case	P0	Base case	1.05	1.06	0.99	1.11	1.11	1.05	1.11	1.06	0.99	Load power factor correction and voltage support if needed
JMSN JCT 115 kV	Base Case	P0	Base case	1.05	1.06	0.99	1.11	1.11	1.05	1.11	1.06	0.99	Load power factor correction and voltage support if needed
KNIGHT1 115 kV	Base Case	P0	Base case	1.03	1.03	1.02	1.10	1.05	1.03	1.05	1.03	1.02	Load power factor correction and voltage support if needed
KNIGHT2 115 kV	Base Case	P0	Base case	1.03	1.03	1.02	1.10	1.05	1.03	1.05	1.03	1.02	Load power factor correction and voltage support if needed
KNIGHTLD 115 kV	Base Case	P0	Base case	1.03	1.03	1.02	1.10	1.05	1.03	1.05	1.03	1.02	Load power factor correction and voltage support if needed
LAMBIE 230 kV	Base Case	P0	Base case	1.03	1.02	1.00	1.06	1.05	1.02	1.05	1.02	1.01	Load power factor correction and voltage support if needed
LIMESTNE 60 kV	Base Case	P0	Base case	1.04	1.05	1.04	1.07	1.05	1.05	1.05	1.04	1.04	Load power factor correction and voltage support if needed
LINCLN 115 kV	Base Case	P0	Base case	1.03	1.04	1.02	1.11	1.06	1.03	1.06	1.03	1.02	Load power factor correction and voltage support if needed
LOCKJ1 230 kV	Base Case	P0	Base case	NA	1.01	0.98	NA	1.08	1.00	1.08	NA	0.98	Load power factor correction and voltage support if needed
MADISON 115 kV	Base Case	P0	Base case	1.05	1.06	1.01	1.11	1.11	1.05	1.11	1.07	1.01	Load power factor correction and voltage support if needed

Study Area: PG&E Central Valley

High/Low Voltages



Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)					Voltage PU (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations	
MAINE-PR 60 kV	Base Case	P0	Base case	1.05	1.06	1.01	1.11	1.10	1.06	1.10	1.06	1.02	Load power factor correction and voltage support if needed
MAXTAP 60 kV	Base Case	P0	Base case	1.00	1.00	0.96	1.07	1.08	1.01	1.08	1.04	0.96	Load power factor correction and voltage support if needed
MAXWELL 60 kV	Base Case	P0	Base case	1.00	1.00	0.96	1.07	1.08	1.01	1.08	1.04	0.96	Load power factor correction and voltage support if needed
MDSNVDSW159 115 kV	Base Case	P0	Base case	1.06	1.06	1.02	1.11	1.10	1.06	1.10	1.07	1.02	Load power factor correction and voltage support if needed
MDSTO CN 115 kV	Base Case	P0	Base case	1.04	1.04	1.02	1.08	1.08	1.04	1.08	1.03	1.03	Load power factor correction and voltage support if needed
MEDLIN J 60 kV	Base Case	P0	Base case	1.03	1.03	1.01	1.06	1.06	1.04	1.06	1.04	1.02	Load power factor correction and voltage support if needed
MELNS JB 115 kV	Base Case	P0	Base case	1.03	1.03	1.01	1.07	1.06	1.03	1.06	1.03	1.01	Load power factor correction and voltage support if needed
MELONES 115 kV	Base Case	P0	Base case	1.03	1.03	1.02	1.07	1.06	1.03	1.06	1.03	1.01	Load power factor correction and voltage support if needed
MERIDIAN 60 kV	Base Case	P0	Base case	1.01	1.01	0.98	1.04	1.07	1.01	1.07	1.03	0.96	Load power factor correction and voltage support if needed
MERIDJCT 60 kV	Base Case	P0	Base case	1.01	1.01	0.98	1.04	1.06	1.01	1.07	1.03	0.97	Load power factor correction and voltage support if needed
MIDLFORK 230 kV	Base Case	P0	Base case	1.02	1.03	1.01	1.07	1.06	1.03	1.06	1.02	1.01	Load power factor correction and voltage support if needed
MILER TP 115 kV	Base Case	P0	Base case	1.04	1.04	1.02	1.08	1.08	1.04	1.08	1.04	1.03	Load power factor correction and voltage support if needed
MILLER 115 kV	Base Case	P0	Base case	1.04	1.04	1.02	1.08	1.08	1.04	1.08	1.04	1.03	Load power factor correction and voltage support if needed
MI-WUK 115 kV	Base Case	P0	Base case	1.02	1.03	1.01	1.05	1.05	1.02	1.05	1.03	1.01	Load power factor correction and voltage support if needed
MIZOU_T1 115 kV	Base Case	P0	Base case	1.05	1.07	1.01	1.15	1.12	1.06	1.12	1.05	1.01	Load power factor correction and voltage support if needed
MIZOU_T2 115 kV	Base Case	P0	Base case	1.04	1.06	1.01	1.15	1.12	1.05	1.12	1.04	1.01	Load power factor correction and voltage support if needed
MOBILCHE 115 kV	Base Case	P0	Base case	1.02	1.02	1.01	1.10	1.05	1.03	1.05	1.03	1.00	Load power factor correction and voltage support if needed

Study Area: PG&E Central Valley

High/Low Voltages



Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)					Voltage PU (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations	
MONTEZUMASS 230 kV	Base Case	P0	Base case	1.03	1.03	1.01	1.06	1.06	1.02	1.05	1.03	1.01	Load power factor correction and voltage support if needed
MONTZMA2 230 kV	Base Case	P0	Base case	1.03	1.03	1.01	1.06	1.06	1.02	1.05	1.03	1.01	Load power factor correction and voltage support if needed
MRYSVLE 60 kV	Base Case	P0	Base case	1.02	1.02	1.01	1.05	1.05	1.02	1.05	1.02	1.01	Load power factor correction and voltage support if needed
MRYSVLLE 60 kV	Base Case	P0	Base case	1.02	1.02	1.01	1.05	1.05	1.02	1.05	1.02	1.01	Load power factor correction and voltage support if needed
MTN_QJCT 60 kV	Base Case	P0	Base case	1.03	1.03	1.02	1.06	1.03	1.03	1.03	1.03	1.02	Load power factor correction and voltage support if needed
MTN_QUAR 60 kV	Base Case	P0	Base case	1.03	1.03	1.02	1.06	1.03	1.03	1.03	1.03	1.02	Load power factor correction and voltage support if needed
NARRWS 1 60 kV	Base Case	P0	Base case	1.03	1.03	1.03	1.07	1.06	1.03	1.06	1.03	1.03	Load power factor correction and voltage support if needed
NARRWS 2 60 kV	Base Case	P0	Base case	1.03	1.04	1.04	1.07	1.06	1.03	1.06	1.03	1.03	Load power factor correction and voltage support if needed
NEWCSTL1 115 kV	Base Case	P0	Base case	1.03	1.04	1.01	1.14	1.11	1.04	1.11	1.04	1.01	Load power factor correction and voltage support if needed
NEWCSTL2 115 kV	Base Case	P0	Base case	1.03	1.04	1.01	1.14	1.11	1.04	1.11	1.04	1.01	Load power factor correction and voltage support if needed
NEWCSTLE 115 kV	Base Case	P0	Base case	1.03	1.04	1.01	1.14	1.11	1.04	1.11	1.04	1.01	Load power factor correction and voltage support if needed
NEWMAN 60 kV	Base Case	P0	Base case	1.02	1.02	0.99	1.06	1.06	1.02	1.06	1.04	0.99	Load power factor correction and voltage support if needed
NRRWS1TP 60 kV	Base Case	P0	Base case	1.03	1.04	1.03	1.07	1.06	1.03	1.06	1.03	1.03	Load power factor correction and voltage support if needed
NRRWS2TP 60 kV	Base Case	P0	Base case	1.03	1.04	1.03	1.07	1.06	1.03	1.06	1.03	1.03	Load power factor correction and voltage support if needed
NWMN JCT 60 kV	Base Case	P0	Base case	1.02	1.02	1.00	1.06	1.06	1.02	1.06	1.04	1.00	Load power factor correction and voltage support if needed
OLIVH J1 115 kV	Base Case	P0	Base case	1.03	1.04	1.01	1.12	1.06	1.03	1.06	1.03	1.01	Load power factor correction and voltage support if needed
OLIVH J3 115 kV	Base Case	P0	Base case	1.04	1.05	1.04	1.11	1.06	1.05	1.06	1.04	1.04	Load power factor correction and voltage support if needed

Study Area: PG&E Central Valley

High/Low Voltages



Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)					Voltage PU (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations	
OLIVHRST 115 kV	Base Case	P0	Base case	1.03	1.04	1.01	1.12	1.06	1.03	1.06	1.03	1.01	Load power factor correction and voltage support if needed
OXBOW 60 kV	Base Case	P0	Base case	1.01	1.01	1.00	1.07	1.06	1.01	1.06	1.01	1.00	Load power factor correction and voltage support if needed
PATTERSN 60 kV	Base Case	P0	Base case	1.03	1.03	1.01	1.06	1.06	1.03	1.06	1.03	1.01	Load power factor correction and voltage support if needed
PEABODY 230 kV	Base Case	P0	Base case	1.02	1.02	0.99	1.06	1.05	1.02	1.05	1.02	0.99	Load power factor correction and voltage support if needed
PEAS RG 60 kV	Base Case	P0	Base case	0.99	0.99	0.96	1.06	1.02	0.98	1.02	0.98	0.96	Load power factor correction and voltage support if needed
PEASE 115 kV	Base Case	P0	Base case	1.03	1.03	1.00	1.12	1.07	1.03	1.07	1.02	1.00	Load power factor correction and voltage support if needed
PENRYN 60 kV	Base Case	P0	Base case	1.02	1.02	1.01	1.07	1.04	1.01	1.04	1.02	1.01	Load power factor correction and voltage support if needed
PEORIA 115 kV	Base Case	P0	Base case	1.02	1.03	1.01	1.06	1.06	1.03	1.06	1.03	1.00	Load power factor correction and voltage support if needed
PIKE CTY 60 kV	Base Case	P0	Base case	1.04	1.05	1.02	1.09	1.08	1.04	1.08	1.05	1.02	Load power factor correction and voltage support if needed
PLACER 115 kV	Base Case	P0	Base case	1.03	1.04	1.00	1.13	1.11	1.03	1.11	1.04	1.00	Load power factor correction and voltage support if needed
PLACER 60 kV	Base Case	P0	Base case	1.03	1.03	1.02	1.06	1.03	1.03	1.03	1.03	1.02	Load power factor correction and voltage support if needed
PLAINFLD 60 kV	Base Case	P0	Base case	0.94	1.04	0.90	1.14	1.13	1.03	1.14	0.99	0.91	Significant increase in load in base cases compared to last year. Load forecast under review.
PLCRVLB2 115 kV	Base Case	P0	Base case	1.04	1.06	1.01	1.15	1.12	1.05	1.12	1.04	1.01	Load power factor correction and voltage support if needed
PLCRVLB3 115 kV	Base Case	P0	Base case	1.04	1.06	1.01	1.15	1.12	1.05	1.12	1.04	1.01	Load power factor correction and voltage support if needed
PLCRVLT1 115 kV	Base Case	P0	Base case	1.05	1.07	1.01	1.15	1.12	1.06	1.12	1.05	1.01	Load power factor correction and voltage support if needed
PLCRVLT2 115 kV	Base Case	P0	Base case	1.04	1.06	1.01	1.15	1.12	1.05	1.12	1.04	1.01	Load power factor correction and voltage support if needed

Study Area: PG&E Central Valley

High/Low Voltages



Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)					Voltage PU (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations	
PLFLDJCT 60 kV	Base Case	P0	Base case	0.95	1.04	0.91	1.14	1.13	1.03	1.13	1.00	0.92	Significant increase in load in base cases compared to last year. Load forecast under review.
PLSNT GR 115 kV	Base Case	P0	Base case	1.02	1.03	1.00	1.11	1.07	1.03	1.07	1.02	1.00	Load power factor correction and voltage support if needed
PLUMAS 60 kV	Base Case	P0	Base case	1.02	1.02	0.98	1.06	1.05	1.01	1.05	1.02	0.99	Load power factor correction and voltage support if needed
POST 115 kV	Base Case	P0	Base case	1.04	1.03	1.03	1.07	1.05	1.04	1.05	1.04	1.03	Load power factor correction and voltage support if needed
PUTH CRK 115 kV	Base Case	P0	Base case	1.06	1.06	1.02	1.11	1.10	1.06	1.10	1.07	1.02	Load power factor correction and voltage support if needed
PUTHCRK1 115 kV	Base Case	P0	Base case	1.06	1.07	1.02	1.11	1.10	1.06	1.10	1.07	1.02	Load power factor correction and voltage support if needed
Q653F 115 kV	Base Case	P0	Base case	1.02	1.02	1.01	1.08	1.05	1.03	1.05	1.03	1.01	Load power factor correction and voltage support if needed
Q653FJCT 115 kV	Base Case	P0	Base case	1.02	1.02	1.01	1.08	1.05	1.03	1.05	1.03	1.01	Load power factor correction and voltage support if needed
R.TRACK 115 kV	Base Case	P0	Base case	1.03	1.03	1.01	1.07	1.06	1.02	1.06	1.03	1.01	Load power factor correction and voltage support if needed
RALSTON 230 kV	Base Case	P0	Base case	1.02	1.03	1.00	1.08	1.06	1.03	1.06	1.02	1.00	Load power factor correction and voltage support if needed
RCTRK J. 115 kV	Base Case	P0	Base case	1.02	1.03	1.01	1.06	1.06	1.02	1.06	1.03	1.00	Load power factor correction and voltage support if needed
RICE 60 kV	Base Case	P0	Base case	0.97	0.98	0.97	1.08	1.10	0.98	1.10	1.00	0.97	Load power factor correction and voltage support if needed
RIO OSO 115 kV	Base Case	P0	Base case	1.04	1.05	1.04	1.12	1.05	1.05	1.05	1.04	1.04	Load power factor correction and voltage support if needed
RIO OSO 230 kV	Base Case	P0	Base case	0.99	1.02	0.98	1.07	1.04	1.01	1.04	0.99	0.98	Load power factor correction and voltage support if needed
RIVRBKJT 115 kV	Base Case	P0	Base case	1.01	1.02	0.99	1.07	1.06	1.01	1.06	1.01	0.99	Load power factor correction and voltage support if needed
ROCKLIN 60 kV	Base Case	P0	Base case	1.06	1.08	0.99	1.15	1.12	1.07	1.12	1.07	0.99	Load power factor correction and voltage support if needed



Study Area: PG&E Central Valley

High/Low Voltages



Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)					Voltage PU (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations	
ROLLINS 60 kV	Base Case	P0	Base case	1.01	1.01	1.01	1.06	1.04	1.01	1.04	1.02	1.01	Load power factor correction and voltage support if needed
ROLLNSTP 60 kV	Base Case	P0	Base case	1.01	1.01	1.01	1.06	1.04	1.01	1.04	1.01	1.01	Load power factor correction and voltage support if needed
RVRBANK 115 kV	Base Case	P0	Base case	1.04	1.04	1.03	1.05	1.06	1.04	1.06	1.04	1.03	Load power factor correction and voltage support if needed
RVRBK J1 115 kV	Base Case	P0	Base case	1.04	1.04	1.03	1.05	1.05	1.04	1.05	1.04	1.03	Load power factor correction and voltage support if needed
RVRBK J2 115 kV	Base Case	P0	Base case	1.03	1.03	1.01	1.07	1.06	1.03	1.06	1.02	1.01	Load power factor correction and voltage support if needed
RVRBK TP 115 kV	Base Case	P0	Base case	1.04	1.04	1.03	1.06	1.06	1.04	1.06	1.04	1.03	Load power factor correction and voltage support if needed
SALADO 115 kV	Base Case	P0	Base case	1.04	1.04	1.02	1.08	1.08	1.04	1.08	1.04	1.02	Load power factor correction and voltage support if needed
SALADO 60 kV	Base Case	P0	Base case	1.03	1.04	1.02	1.06	1.06	1.03	1.05	1.03	1.02	Load power factor correction and voltage support if needed
SALADO J 115 kV	Base Case	P0	Base case	1.04	1.04	1.02	1.08	1.08	1.04	1.08	1.03	1.02	Load power factor correction and voltage support if needed
SALDO TP 115 kV	Base Case	P0	Base case	1.04	1.04	1.02	1.08	1.08	1.04	1.08	1.04	1.03	Load power factor correction and voltage support if needed
SANDBAR 115 kV	Base Case	P0	Base case	1.03	1.04	1.03	1.05	1.05	1.04	1.05	1.04	1.03	Load power factor correction and voltage support if needed
SCHMLBCH 115 kV	Base Case	P0	Base case	1.05	1.06	1.01	1.10	1.10	1.05	1.10	1.05	1.01	Load power factor correction and voltage support if needed
SHADYGLN 60 kV	Base Case	P0	Base case	1.01	1.01	1.00	1.05	1.04	1.01	1.04	1.01	1.00	Load power factor correction and voltage support if needed
SHILOH 3 230 kV	Base Case	P0	Base case	1.03	1.03	1.01	1.06	1.06	1.02	1.05	1.03	1.01	Load power factor correction and voltage support if needed
SHILOH 4 230 kV	Base Case	P0	Base case	1.03	1.03	1.01	1.06	1.06	1.02	1.05	1.03	1.01	Load power factor correction and voltage support if needed
SHILOH1 230 kV	Base Case	P0	Base case	1.03	1.03	1.01	1.06	1.06	1.02	1.05	1.03	1.01	Load power factor correction and voltage support if needed
SHILOH2 230 kV	Base Case	P0	Base case	1.03	1.03	1.01	1.06	1.06	1.02	1.05	1.03	1.01	Load power factor correction and voltage support if needed

Study Area: PG&E Central Valley

High/Low Voltages



Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)					Voltage PU (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations	
SHLH3 TP 230 kV	Base Case	P0	Base case	1.03	1.03	1.01	1.06	1.06	1.02	1.05	1.03	1.01	Load power factor correction and voltage support if needed
SHLH4 TP 230 kV	Base Case	P0	Base case	1.03	1.03	1.01	1.06	1.06	1.02	1.05	1.03	1.01	Load power factor correction and voltage support if needed
SHPRING 115 kV	Base Case	P0	Base case	1.04	1.07	1.01	1.15	1.12	1.06	1.12	1.04	1.01	Load power factor correction and voltage support if needed
SHPRING1 115 kV	Base Case	P0	Base case	1.05	1.07	1.01	1.14	1.12	1.06	1.12	1.05	1.01	Load power factor correction and voltage support if needed
SHPRING2 115 kV	Base Case	P0	Base case	1.04	1.06	1.02	1.15	1.12	1.05	1.12	1.04	1.02	Load power factor correction and voltage support if needed
SIERRAPI 60 kV	Base Case	P0	Base case	1.06	1.07	0.98	1.16	1.12	1.06	1.12	1.06	0.98	Load power factor correction and voltage support if needed
SJ COGEN 115 kV	Base Case	P0	Base case	1.02	1.02	1.00	1.06	1.06	1.02	1.06	1.02	1.00	Load power factor correction and voltage support if needed
SLNO-WND 230 kV	Base Case	P0	Base case	1.03	1.03	1.01	1.06	1.06	1.02	1.06	1.03	1.01	Load power factor correction and voltage support if needed
SMRTSVLE 60 kV	Base Case	P0	Base case	1.03	1.03	1.03	1.07	1.06	1.03	1.06	1.03	1.03	Load power factor correction and voltage support if needed
SMRTVLE1 60 kV	Base Case	P0	Base case	1.03	1.03	1.03	1.07	1.06	1.03	1.06	1.03	1.03	Load power factor correction and voltage support if needed
SMRTVLLE 60 kV	Base Case	P0	Base case	1.03	1.03	1.03	1.07	1.06	1.03	1.06	1.03	1.03	Load power factor correction and voltage support if needed
SNDBR JT 115 kV	Base Case	P0	Base case	1.03	1.04	1.03	1.05	1.05	1.03	1.05	1.04	1.02	Load power factor correction and voltage support if needed
SPAULDNG 60 kV	Base Case	P0	Base case	1.03	1.03	1.03	1.05	1.04	1.03	1.04	1.04	1.03	Load power factor correction and voltage support if needed
SPI JCT 115 kV	Base Case	P0	Base case	1.03	1.04	1.02	1.11	1.06	1.04	1.06	1.03	1.02	Load power factor correction and voltage support if needed
SPICAMIN 115 kV	Base Case	P0	Base case	1.05	1.07	1.01	1.15	1.12	1.06	1.12	1.05	1.01	Load power factor correction and voltage support if needed
SPI-LINC 115 kV	Base Case	P0	Base case	1.03	1.04	1.02	1.11	1.06	1.04	1.06	1.03	1.02	Load power factor correction and voltage support if needed
SPISONORA 115 kV	Base Case	P0	Base case	1.02	1.02	1.01	1.05	1.05	1.02	1.05	1.03	1.00	Load power factor correction and voltage support if needed

Study Area: PG&E Central Valley

High/Low Voltages



Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)					Voltage PU (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations	
SPISONORAJCT 115 kV	Base Case	P0	Base case	1.02	1.02	1.01	1.06	1.05	1.02	1.05	1.03	1.00	Load power factor correction and voltage support if needed
SPRNG GJ 115 kV	Base Case	P0	Base case	1.03	1.03	1.03	1.05	1.05	1.03	1.05	1.04	1.02	Load power factor correction and voltage support if needed
SPRNG GP 115 kV	Base Case	P0	Base case	1.03	1.04	1.03	1.05	1.05	1.03	1.05	1.04	1.02	Load power factor correction and voltage support if needed
STNSLSRP 60 kV	Base Case	P0	Base case	1.04	1.04	1.02	1.06	1.06	1.04	1.06	1.04	1.02	Load power factor correction and voltage support if needed
SUISUN 115 kV	Base Case	P0	Base case	1.05	1.06	1.01	1.10	1.10	1.06	1.10	1.05	1.01	Load power factor correction and voltage support if needed
SUMMIT 60 kV	Base Case	P0	Base case	1.03	1.02	1.03	1.08	1.04	1.02	1.04	1.03	1.03	Load power factor correction and voltage support if needed
TAMARACK 60 kV	Base Case	P0	Base case	1.03	1.02	1.03	1.07	1.04	1.02	1.04	1.03	1.03	Load power factor correction and voltage support if needed
TAYLOR 60 kV	Base Case	P0	Base case	1.06	1.08	0.99	1.15	1.12	1.07	1.11	1.06	0.99	Load power factor correction and voltage support if needed
TRAVIS 60 kV	Base Case	P0	Base case	1.01	1.03	0.98	1.06	1.06	1.02	1.06	1.02	0.98	Load power factor correction and voltage support if needed
TRAVISJT 60 kV	Base Case	P0	Base case	1.02	1.03	0.99	1.07	1.06	1.02	1.06	1.02	0.99	Load power factor correction and voltage support if needed
TRVS_HPT 60 kV	Base Case	P0	Base case	1.01	1.03	0.98	1.06	1.06	1.02	1.06	1.02	0.98	Load power factor correction and voltage support if needed
TULLOCH 115 kV	Base Case	P0	Base case	1.03	1.04	1.02	1.06	1.06	1.03	1.06	1.04	1.02	Load power factor correction and voltage support if needed
UCD_TP2 115 kV	Base Case	P0	Base case	1.02	1.02	1.01	1.08	1.05	1.03	1.05	1.03	1.01	Load power factor correction and voltage support if needed
UCDAVSJ1 115 kV	Base Case	P0	Base case	1.02	1.02	1.01	1.08	1.05	1.03	1.05	1.03	1.01	Load power factor correction and voltage support if needed
ULTRA JT 115 kV	Base Case	P0	Base case	1.02	1.03	1.00	1.11	1.07	1.03	1.07	1.02	1.00	Load power factor correction and voltage support if needed
ULTR-RCK 115 kV	Base Case	P0	Base case	1.02	1.04	1.01	1.11	1.07	1.03	1.07	1.02	1.01	Load power factor correction and voltage support if needed
USWP-RUS 230 kV	Base Case	P0	Base case	1.03	1.03	1.01	1.06	1.06	1.02	1.05	1.03	1.01	Load power factor correction and voltage support if needed

Study Area: PG&E Central Valley

High/Low Voltages



Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)					Voltage PU (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations	
VACA-CB 115 kV	Base Case	P0	Base case	1.08	1.08	1.05	1.12	1.11	1.08	1.11	1.08	1.05	Load power factor correction and voltage support if needed
VACA-D&1 115 kV	Base Case	P0	Base case	1.05	1.06	1.01	1.10	1.10	1.06	1.10	1.05	1.02	Load power factor correction and voltage support if needed
VACA-DIX 115 kV	Base Case	P0	Base case	1.06	1.07	1.03	1.11	1.10	1.06	1.10	1.07	1.03	Load power factor correction and voltage support if needed
VACA-DIX 230 kV	Base Case	P0	Base case	1.02	1.02	0.99	1.05	1.05	1.01	1.05	1.02	0.99	Load power factor correction and voltage support if needed
VACA-DXN 60 kV	Base Case	P0	Base case	1.06	1.07	1.03	1.11	1.11	1.07	1.11	1.07	1.03	Load power factor correction and voltage support if needed
VACA-JT1 60 kV	Base Case	P0	Base case	1.05	1.06	1.01	1.10	1.10	1.06	1.10	1.06	1.02	Load power factor correction and voltage support if needed
VACA-JT2 60 kV	Base Case	P0	Base case	1.05	1.07	1.02	1.11	1.10	1.06	1.10	1.06	1.02	Load power factor correction and voltage support if needed
VACAVLL1 115 kV	Base Case	P0	Base case	1.06	1.07	1.02	1.11	1.10	1.06	1.10	1.07	1.02	Load power factor correction and voltage support if needed
VACAVLL2 115 kV	Base Case	P0	Base case	1.06	1.06	1.02	1.11	1.10	1.06	1.10	1.06	1.02	Load power factor correction and voltage support if needed
VALLY HM 115 kV	Base Case	P0	Base case	1.01	1.01	0.99	1.07	1.06	1.01	1.06	1.01	0.99	Load power factor correction and voltage support if needed
VCVLLE1J 115 kV	Base Case	P0	Base case	1.06	1.07	1.02	1.11	1.10	1.06	1.10	1.07	1.03	Load power factor correction and voltage support if needed
VCVLLE2J 115 kV	Base Case	P0	Base case	1.06	1.06	1.02	1.11	1.10	1.06	1.10	1.07	1.02	Load power factor correction and voltage support if needed
VIERATP2 115 kV	Base Case	P0	Base case	NA	1.03	1.00	NA	1.06	1.02	1.06	NA	1.00	Load power factor correction and voltage support if needed
W.SCRMNO 115 kV	Base Case	P0	Base case	1.04	1.03	1.03	1.07	1.05	1.04	1.05	1.04	1.03	Load power factor correction and voltage support if needed
WDLND_BM 115 kV	Base Case	P0	Base case	1.02	1.02	1.01	1.09	1.05	1.03	1.05	1.03	1.00	Load power factor correction and voltage support if needed
WEC 115 kV	Base Case	P0	Base case	1.05	1.06	1.01	1.10	1.10	1.06	1.10	1.05	1.01	Load power factor correction and voltage support if needed
WEMR SWS 60 kV	Base Case	P0	Base case	1.01	1.01	1.00	1.06	1.04	1.01	1.04	1.01	1.00	Load power factor correction and voltage support if needed

Study Area: PG&E Central Valley

High/Low Voltages



Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)					Voltage PU (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations	
WESCOT1 60 kV	Base Case	P0	Base case	1.02	1.01	0.99	1.05	1.06	1.02	1.06	1.03	0.98	Load power factor correction and voltage support if needed
WESCOT2 60 kV	Base Case	P0	Base case	1.03	1.03	1.01	1.05	1.05	1.03	1.05	1.04	1.00	Load power factor correction and voltage support if needed
WEST JCT 60 kV	Base Case	P0	Base case	1.04	1.04	1.04	1.07	1.06	1.04	1.05	1.04	1.04	Load power factor correction and voltage support if needed
WESTLEY 60 kV	Base Case	P0	Base case	0.96	0.96	0.93	1.02	1.02	0.96	1.02	0.96	0.93	Continue to monitor future load forecast
WILKINS 60 kV	Base Case	P0	Base case	0.98	0.98	0.96	1.05	1.07	0.98	1.07	1.01	0.97	Load power factor correction and voltage support if needed
WILL JCT 60 kV	Base Case	P0	Base case	1.01	1.01	0.98	1.06	1.06	1.02	1.06	1.04	0.99	Load power factor correction and voltage support if needed
WILLIAMS 60 kV	Base Case	P0	Base case	1.03	1.02	1.00	1.05	1.05	1.03	1.05	1.03	0.99	Load power factor correction and voltage support if needed
WILSONAV 60 kV	Base Case	P0	Base case	0.99	1.00	0.94	1.08	1.09	1.00	1.10	1.05	0.94	Continue to monitor future load forecast
WINTERS 60 kV	Base Case	P0	Base case	1.02	1.05	0.99	1.12	1.11	1.05	1.11	1.04	0.99	Load power factor correction and voltage support if needed
WLKSLJCT 60 kV	Base Case	P0	Base case	0.99	0.98	0.97	1.05	1.07	0.98	1.07	1.01	0.97	Load power factor correction and voltage support if needed
WODLNDJ1 115 kV	Base Case	P0	Base case	1.03	1.03	1.02	1.10	1.05	1.03	1.05	1.03	1.02	Load power factor correction and voltage support if needed
WODLNDJ2 115 kV	Base Case	P0	Base case	1.03	1.03	1.02	1.10	1.05	1.03	1.05	1.03	1.01	Load power factor correction and voltage support if needed
WOODLANDTP 115 kV	Base Case	P0	Base case	1.02	1.02	1.01	1.09	1.05	1.03	1.05	1.03	1.00	Load power factor correction and voltage support if needed
WOODLD 115 kV	Base Case	P0	Base case	1.02	1.02	1.01	1.09	1.05	1.03	1.05	1.03	1.00	Load power factor correction and voltage support if needed
WSID 60 kV	Base Case	P0	Base case	0.96	0.96	0.93	1.02	1.02	0.96	1.02	0.96	0.93	Continue to monitor future load forecast
WSID TAP 60 kV	Base Case	P0	Base case	0.96	0.96	0.93	1.02	1.02	0.96	1.02	0.96	0.93	Continue to monitor future load forecast
YUBAGOLD 60 kV	Base Case	P0	Base case	1.03	1.04	1.03	1.07	1.06	1.03	1.06	1.03	1.03	Load power factor correction and voltage support if needed
ZAMORA 115 kV	Base Case	P0	Base case	1.03	1.03	1.01	1.10	1.05	1.03	1.05	1.03	1.01	Load power factor correction and voltage support if needed
ZAMORA1 115 kV	Base Case	P0	Base case	1.03	1.03	1.02	1.10	1.05	1.03	1.05	1.03	1.02	Load power factor correction and voltage support if needed



Study Area: PG&E Central Valley

High/Low Voltages



Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)					Voltage PU (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations	
ZAMORA2 115 kV	Base Case	P0	Base case	1.03	1.03	1.01	1.10	1.05	1.03	1.05	1.03	1.01	Load power factor correction and voltage support if needed
CROWCREEK SS 60 kV	P1-2:A12:16:_CROWCREEK SS-SALADO 60kV [0]	P1	N-1	NA	0.99	0.95	NA	1.11	1.04	1.11	NA	0.96	Load power factor correction and voltage support if needed
FRONTIERPV 60 kV	P1-2:A12:16:_CROWCREEK SS-SALADO 60kV [0]	P1	N-1	NA	0.99	0.96	NA	1.11	1.04	1.11	NA	0.96	Load power factor correction and voltage support if needed
MEDLIN J 60 kV	P1-2:A12:16:_CROWCREEK SS-SALADO 60kV [0]	P1	N-1	NA	0.98	0.95	NA	1.10	1.04	1.10	NA	0.96	Load power factor correction and voltage support if needed
COTTLE 230 kV	P1-2:A12:2:_COTTLE-MELONES 230kV [4530]	P1	N-1	1.01	1.02	0.99	1.10	1.10	1.01	1.09	1.00	0.99	Load power factor correction and voltage support if needed
MOBILCHE 115 kV	P1-2:A4:25:_WOODLAND-DAVIS 115KV [4210]	P1	N-1	1.02	1.02	1.00	1.12	1.05	1.02	1.05	1.03	1.01	Load power factor correction and voltage support if needed
WOODLD 115 kV	P1-2:A4:25:_WOODLAND-DAVIS 115KV [4210]	P1	N-1	1.02	1.02	1.00	1.12	1.05	1.02	1.05	1.03	1.01	Load power factor correction and voltage support if needed
PLFLDJCT 60 kV	P1-2:A4:50:_VACA-PLAINFIELD 60KV [8200] MOAS OPENED ON PLFLDJCT_PLAINFLD	P1	N-1	1.06	1.06	1.02	1.11	1.11	1.06	1.11	1.06	1.03	Load power factor correction and voltage support if needed
TRAVISJT 60 kV	P1-2:A4:53:_VACA-DXN-DIXON-J1-TRAVIS 60KV [6731] MOAS OPENED ON TRAVIS_TRAVISJT	P1	N-1	1.05	1.07	1.01	1.11	1.11	1.06	1.11	1.06	1.01	Load power factor correction and voltage support if needed
TRAVISJT 60 kV	P1-2:A4:54:_TRVS_HPT-TRAVIS 60KV [6731] MOAS OPENED ON TRAVIS_TRAVISJT	P1	N-1	1.06	1.07	1.02	1.11	1.11	1.07	1.11	1.07	1.02	Load power factor correction and voltage support if needed
BRIGHTON 230 kV	P1-2:A4:9:_RIO OSO-BRIGHTON 230KV [5600]	P1	N-1	0.99	0.99	0.94	1.11	1.09	0.99	1.09	0.99	0.94	Load power factor correction and voltage support if needed
CHCGO PK 115 kV	P1-2:A5:37:_DRUM-HIGGINS 115KV [4393] MOAS OPENED ON DRUM_DTCH FL1	P1	N-1	1.03	1.04	1.01	1.14	1.11	1.03	1.11	1.04	1.01	Load power factor correction and voltage support if needed
DTCH FL1 115 kV	P1-2:A5:37:_DRUM-HIGGINS 115KV [4393] MOAS OPENED ON DRUM_DTCH FL1	P1	N-1	1.03	1.04	1.01	1.14	1.11	1.03	1.11	1.04	1.01	Load power factor correction and voltage support if needed
BELL PGE 115 kV	P1-2:A5:38:_DRUM-HIGGINS 115KV [4393] MOAS OPENED ON CHCGO PK_HIGGINS	P1	N-1	1.02	1.03	0.98	1.16	1.13	1.03	1.13	1.04	0.98	Load power factor correction and voltage support if needed
FLINT 115 kV	P1-2:A5:38:_DRUM-HIGGINS 115KV [4393] MOAS OPENED ON CHCGO PK_HIGGINS	P1	N-1	1.03	1.04	0.99	1.16	1.13	1.03	1.13	1.04	0.99	Load power factor correction and voltage support if needed
FLINT1 115 kV	P1-2:A5:38:_DRUM-HIGGINS 115KV [4393] MOAS OPENED ON CHCGO PK_HIGGINS	P1	N-1	1.03	1.04	0.99	1.16	1.13	1.03	1.13	1.04	0.99	Load power factor correction and voltage support if needed

Study Area: PG&E Central Valley

High/Low Voltages



Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)					Voltage PU (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations	
FLINT2 115 kV	P1-2:A5:38:_DRUM-HIGGINS 115KV [4393] MOAS OPENED ON CHCGO PK_HIGGINS	P1	N-1	1.03	1.04	0.99	1.16	1.13	1.03	1.13	1.04	0.99	Load power factor correction and voltage support if needed
HIGGINS 115 kV	P1-2:A5:38:_DRUM-HIGGINS 115KV [4393] MOAS OPENED ON CHCGO PK_HIGGINS	P1	N-1	1.02	1.03	0.97	1.16	1.13	1.02	1.13	1.04	0.97	Load power factor correction and voltage support if needed
NEWCSTL1 115 kV	P1-2:A5:38:_DRUM-HIGGINS 115KV [4393] MOAS OPENED ON CHCGO PK_HIGGINS	P1	N-1	1.03	1.04	0.99	1.16	1.13	1.03	1.13	1.04	0.99	Load power factor correction and voltage support if needed
NEWCSTL2 115 kV	P1-2:A5:38:_DRUM-HIGGINS 115KV [4393] MOAS OPENED ON CHCGO PK_HIGGINS	P1	N-1	1.03	1.04	0.99	1.16	1.13	1.03	1.13	1.04	0.99	Load power factor correction and voltage support if needed
NEWCSTLE 115 kV	P1-2:A5:38:_DRUM-HIGGINS 115KV [4393] MOAS OPENED ON CHCGO PK_HIGGINS	P1	N-1	1.03	1.04	0.99	1.16	1.13	1.03	1.13	1.04	0.99	Load power factor correction and voltage support if needed
PLACER 115 kV	P1-2:A5:38:_DRUM-HIGGINS 115KV [4393] MOAS OPENED ON CHCGO PK_HIGGINS	P1	N-1	1.02	1.04	0.99	1.16	1.13	1.03	1.13	1.04	0.99	Load power factor correction and voltage support if needed
WESTLEY 60 kV	P1-3:A11:33:_MANTECA 115/60kV TB 3	P1	N-1	NA	0.94	0.89	NA	1.02	0.93	1.02	NA	0.89	Continue to monitor future load forecast
WSID 60 kV	P1-3:A11:33:_MANTECA 115/60kV TB 3	P1	N-1	NA	0.94	0.89	NA	1.02	0.93	1.02	NA	0.89	Continue to monitor future load forecast
WSID TAP 60 kV	P1-3:A11:33:_MANTECA 115/60kV TB 3	P1	N-1	NA	0.94	0.89	NA	1.02	0.93	1.02	NA	0.89	Continue to monitor future load forecast
PLAINFLD 60 kV	P1-4:A4:8:_PLAINFLD SVD=V	P1	N-1	NA	0.97	0.84	NA	1.13	0.96	1.14	NA	0.84	Significant increase in load in base cases compared to last year. Load forecast under review.
PLFLDJCT 60 kV	P1-4:A4:8:_PLAINFLD SVD=V	P1	N-1	NA	0.98	0.85	NA	1.13	0.97	1.13	NA	0.85	Significant increase in load in base cases compared to last year. Load forecast under review.
ALLEGHNY 60 kV	P1-4:A5:2:_RIO OSO SVC	P1	N-1	NA	1.04	1.01	NA	1.10	1.03	1.11	NA	1.01	Load power factor correction and voltage support if needed
APLHTAP1 115 kV	P1-4:A5:2:_RIO OSO SVC	P1	N-1	NA	1.05	1.00	NA	1.15	1.05	1.15	NA	1.00	Load power factor correction and voltage support if needed
APLHTAP2 115 kV	P1-4:A5:2:_RIO OSO SVC	P1	N-1	NA	1.05	1.00	NA	1.15	1.04	1.15	NA	1.00	Load power factor correction and voltage support if needed
APPLE HL 115 kV	P1-4:A5:2:_RIO OSO SVC	P1	N-1	NA	1.05	1.00	NA	1.15	1.05	1.15	NA	1.00	Load power factor correction and voltage support if needed
ATLANTI 60 kV	P1-4:A5:2:_RIO OSO SVC	P1	N-1	NA	1.05	0.97	NA	1.15	1.04	1.15	NA	0.97	Load power factor correction and voltage support if needed
ATLANTIC 115 kV	P1-4:A5:2:_RIO OSO SVC	P1	N-1	NA	1.02	0.98	NA	1.10	1.01	1.10	NA	0.98	Load power factor correction and voltage support if needed

Study Area: PG&E Central Valley

High/Low Voltages



Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)					Voltage PU (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations	
BANGOR 60 kV	P1-4:A5:2:_RIO OSO SVC	P1	N-1	NA	1.03	1.01	NA	1.10	1.02	1.10	NA	1.01	Load power factor correction and voltage support if needed
BELL PGE 115 kV	P1-4:A5:2:_RIO OSO SVC	P1	N-1	NA	1.03	0.99	NA	1.13	1.02	1.13	NA	0.99	Load power factor correction and voltage support if needed
CLRKSVLE 115 kV	P1-4:A5:2:_RIO OSO SVC	P1	N-1	NA	1.04	1.00	NA	1.15	1.04	1.15	NA	1.00	Load power factor correction and voltage support if needed
CLRKSVLT 115 kV	P1-4:A5:2:_RIO OSO SVC	P1	N-1	NA	1.05	1.01	NA	1.15	1.05	1.15	NA	1.01	Load power factor correction and voltage support if needed
CPM 115 kV	P1-4:A5:2:_RIO OSO SVC	P1	N-1	NA	1.05	1.01	NA	1.15	1.05	1.15	NA	1.01	Load power factor correction and voltage support if needed
CPM TAP 115 kV	P1-4:A5:2:_RIO OSO SVC	P1	N-1	NA	1.05	1.01	NA	1.15	1.05	1.15	NA	1.01	Load power factor correction and voltage support if needed
DEL MAR 60 kV	P1-4:A5:2:_RIO OSO SVC	P1	N-1	NA	1.05	0.96	NA	1.16	1.04	1.16	NA	0.96	Load power factor correction and voltage support if needed
DIMOND_1 115 kV	P1-4:A5:2:_RIO OSO SVC	P1	N-1	NA	1.05	1.00	NA	1.15	1.05	1.15	NA	1.00	Load power factor correction and voltage support if needed
DIMOND_2 115 kV	P1-4:A5:2:_RIO OSO SVC	P1	N-1	NA	1.05	1.00	NA	1.15	1.04	1.15	NA	1.00	Load power factor correction and voltage support if needed
DMND SPR 115 kV	P1-4:A5:2:_RIO OSO SVC	P1	N-1	NA	1.05	1.00	NA	1.15	1.04	1.15	NA	1.00	Load power factor correction and voltage support if needed
ELDORAD 115 kV	P1-4:A5:2:_RIO OSO SVC	P1	N-1	NA	1.05	1.01	NA	1.15	1.05	1.15	NA	1.01	Load power factor correction and voltage support if needed
FLINT 115 kV	P1-4:A5:2:_RIO OSO SVC	P1	N-1	NA	1.03	0.99	NA	1.13	1.02	1.13	NA	1.00	Load power factor correction and voltage support if needed
FLINT1 115 kV	P1-4:A5:2:_RIO OSO SVC	P1	N-1	NA	1.03	1.00	NA	1.13	1.02	1.13	NA	1.00	Load power factor correction and voltage support if needed
FLINT2 115 kV	P1-4:A5:2:_RIO OSO SVC	P1	N-1	NA	1.03	0.99	NA	1.13	1.02	1.13	NA	1.00	Load power factor correction and voltage support if needed
GOLDHILL 115 kV	P1-4:A5:2:_RIO OSO SVC	P1	N-1	NA	1.05	1.02	NA	1.15	1.05	1.15	NA	1.02	Load power factor correction and voltage support if needed
GRSS VLY 60 kV	P1-4:A5:2:_RIO OSO SVC	P1	N-1	NA	1.03	1.01	NA	1.10	1.03	1.10	NA	1.01	Load power factor correction and voltage support if needed
HIGGINS 115 kV	P1-4:A5:2:_RIO OSO SVC	P1	N-1	NA	1.03	1.00	NA	1.12	1.02	1.12	NA	1.00	Load power factor correction and voltage support if needed

Study Area: PG&E Central Valley

High/Low Voltages



Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)					Voltage PU (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations	
HORSESHE 115 kV	P1-4:A5:2:_RIO OSO SVC	P1	N-1	NA	1.04	1.00	NA	1.14	1.03	1.14	NA	1.00	Load power factor correction and voltage support if needed
HORSHE1 115 kV	P1-4:A5:2:_RIO OSO SVC	P1	N-1	NA	1.04	1.00	NA	1.14	1.03	1.14	NA	1.00	Load power factor correction and voltage support if needed
HORSHE2 115 kV	P1-4:A5:2:_RIO OSO SVC	P1	N-1	NA	1.04	1.01	NA	1.14	1.04	1.14	NA	1.01	Load power factor correction and voltage support if needed
MIZOU_T1 115 kV	P1-4:A5:2:_RIO OSO SVC	P1	N-1	NA	1.05	1.00	NA	1.15	1.05	1.15	NA	1.00	Load power factor correction and voltage support if needed
MIZOU_T2 115 kV	P1-4:A5:2:_RIO OSO SVC	P1	N-1	NA	1.05	1.00	NA	1.15	1.04	1.15	NA	1.00	Load power factor correction and voltage support if needed
NEWCSTL1 115 kV	P1-4:A5:2:_RIO OSO SVC	P1	N-1	NA	1.04	1.00	NA	1.13	1.03	1.14	NA	1.00	Load power factor correction and voltage support if needed
NEWCSTL2 115 kV	P1-4:A5:2:_RIO OSO SVC	P1	N-1	NA	1.04	1.00	NA	1.13	1.03	1.14	NA	1.00	Load power factor correction and voltage support if needed
NEWCSTLE 115 kV	P1-4:A5:2:_RIO OSO SVC	P1	N-1	NA	1.04	1.00	NA	1.13	1.03	1.14	NA	1.00	Load power factor correction and voltage support if needed
PIKE CTY 60 kV	P1-4:A5:2:_RIO OSO SVC	P1	N-1	NA	1.04	1.02	NA	1.10	1.04	1.10	NA	1.02	Load power factor correction and voltage support if needed
PLACER 115 kV	P1-4:A5:2:_RIO OSO SVC	P1	N-1	NA	1.03	0.99	NA	1.13	1.02	1.13	NA	0.99	Load power factor correction and voltage support if needed
PLCRVLB2 115 kV	P1-4:A5:2:_RIO OSO SVC	P1	N-1	NA	1.05	1.00	NA	1.15	1.04	1.15	NA	1.00	Load power factor correction and voltage support if needed
PLCRVLB3 115 kV	P1-4:A5:2:_RIO OSO SVC	P1	N-1	NA	1.05	1.00	NA	1.15	1.04	1.15	NA	1.00	Load power factor correction and voltage support if needed
PLCRVLT1 115 kV	P1-4:A5:2:_RIO OSO SVC	P1	N-1	NA	1.06	1.00	NA	1.15	1.05	1.15	NA	1.00	Load power factor correction and voltage support if needed
PLCRVLT2 115 kV	P1-4:A5:2:_RIO OSO SVC	P1	N-1	NA	1.05	1.00	NA	1.15	1.04	1.15	NA	1.00	Load power factor correction and voltage support if needed
ROCKLIN 60 kV	P1-4:A5:2:_RIO OSO SVC	P1	N-1	NA	1.06	0.97	NA	1.15	1.05	1.15	NA	0.97	Load power factor correction and voltage support if needed
SHPRING 115 kV	P1-4:A5:2:_RIO OSO SVC	P1	N-1	NA	1.05	1.00	NA	1.15	1.05	1.15	NA	1.00	Load power factor correction and voltage support if needed
SHPRING1 115 kV	P1-4:A5:2:_RIO OSO SVC	P1	N-1	NA	1.05	1.00	NA	1.15	1.05	1.15	NA	1.00	Load power factor correction and voltage support if needed

Study Area: PG&E Central Valley

High/Low Voltages



Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)					Voltage PU (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations	
SHPRING2 115 kV	P1-4:A5:2:_RIO OSO SVC	P1	N-1	NA	1.05	1.01	NA	1.15	1.04	1.15	NA	1.01	Load power factor correction and voltage support if needed
SIERRAPI 60 kV	P1-4:A5:2:_RIO OSO SVC	P1	N-1	NA	1.05	0.96	NA	1.16	1.04	1.16	NA	0.96	Load power factor correction and voltage support if needed
SPICAMIN 115 kV	P1-4:A5:2:_RIO OSO SVC	P1	N-1	NA	1.05	1.00	NA	1.15	1.05	1.15	NA	1.00	Load power factor correction and voltage support if needed
TAYLOR 60 kV	P1-4:A5:2:_RIO OSO SVC	P1	N-1	NA	1.06	0.97	NA	1.15	1.05	1.15	NA	0.97	Load power factor correction and voltage support if needed
TRAVISJT 60 kV	P2-1:A4:62:_TRAVIS TAP 60KV [6731] (TRAVIS-TRAVISJT)	P2	Line Section w/o Fault	NA	1.07	1.02	NA	1.11	1.07	1.11	NA	1.02	Load power factor correction and voltage support if needed
CLRKSVLT 115 kV	P2-1:A5:13:_MISSOURI FLAT-GOLD HILL #1 115KV [2660] (GOLDHILL-CPM TAP)	P2	Line Section w/o Fault	NA	1.02	0.89	NA	1.14	1.01	1.14	NA	0.89	Continue to monitor future load forecast
CPM 115 kV	P2-1:A5:13:_MISSOURI FLAT-GOLD HILL #1 115KV [2660] (GOLDHILL-CPM TAP)	P2	Line Section w/o Fault	NA	1.02	0.89	NA	1.14	1.01	1.14	NA	0.89	Continue to monitor future load forecast
CPM TAP 115 kV	P2-1:A5:13:_MISSOURI FLAT-GOLD HILL #1 115KV [2660] (GOLDHILL-CPM TAP)	P2	Line Section w/o Fault	NA	1.02	0.89	NA	1.14	1.01	1.14	NA	0.89	Continue to monitor future load forecast
DIMOND_1 115 kV	P2-1:A5:13:_MISSOURI FLAT-GOLD HILL #1 115KV [2660] (GOLDHILL-CPM TAP)	P2	Line Section w/o Fault	NA	1.02	0.89	NA	1.14	1.01	1.14	NA	0.89	Continue to monitor future load forecast
MIZOU_T1 115 kV	P2-1:A5:13:_MISSOURI FLAT-GOLD HILL #1 115KV [2660] (GOLDHILL-CPM TAP)	P2	Line Section w/o Fault	NA	1.02	0.90	NA	1.14	1.01	1.14	NA	0.90	Continue to monitor future load forecast
SHPRING 115 kV	P2-1:A5:13:_MISSOURI FLAT-GOLD HILL #1 115KV [2660] (GOLDHILL-CPM TAP)	P2	Line Section w/o Fault	NA	1.02	0.89	NA	1.14	1.01	1.14	NA	0.89	Continue to monitor future load forecast
SHPRING1 115 kV	P2-1:A5:13:_MISSOURI FLAT-GOLD HILL #1 115KV [2660] (GOLDHILL-CPM TAP)	P2	Line Section w/o Fault	NA	1.02	0.89	NA	1.14	1.01	1.14	NA	0.89	Continue to monitor future load forecast



Study Area: PG&E Central Valley

High/Low Voltages



Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)					Voltage PU (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations	
CHCGO PK 115 kV	P2-1:A5:27:_DRUM-HIGGINS 115KV [4393] (DRUM-DTCH FL1)	P2	Line Section w/o Fault	NA	1.04	1.01	NA	1.11	1.03	1.11	NA	1.01	Load power factor correction and voltage support if needed
DTCH FL1 115 kV	P2-1:A5:27:_DRUM-HIGGINS 115KV [4393] (DRUM-DTCH FL1)	P2	Line Section w/o Fault	NA	1.04	1.01	NA	1.11	1.03	1.11	NA	1.01	Load power factor correction and voltage support if needed
BELL PGE 115 kV	P2-1:A5:30:_DRUM-HIGGINS 115KV [4393] (DTCH FL1-CHCGO PK)	P2	Line Section w/o Fault	NA	1.04	0.97	NA	1.13	1.03	1.14	NA	0.97	Load power factor correction and voltage support if needed
CHCGO PK 115 kV	P2-1:A5:30:_DRUM-HIGGINS 115KV [4393] (DTCH FL1-CHCGO PK)	P2	Line Section w/o Fault	NA	1.03	0.97	NA	1.14	1.02	1.14	NA	0.97	Load power factor correction and voltage support if needed
FLINT 115 kV	P2-1:A5:30:_DRUM-HIGGINS 115KV [4393] (DTCH FL1-CHCGO PK)	P2	Line Section w/o Fault	NA	1.04	0.98	NA	1.13	1.03	1.13	NA	0.98	Load power factor correction and voltage support if needed
FLINT1 115 kV	P2-1:A5:30:_DRUM-HIGGINS 115KV [4393] (DTCH FL1-CHCGO PK)	P2	Line Section w/o Fault	NA	1.04	0.98	NA	1.13	1.03	1.13	NA	0.98	Load power factor correction and voltage support if needed
FLINT2 115 kV	P2-1:A5:30:_DRUM-HIGGINS 115KV [4393] (DTCH FL1-CHCGO PK)	P2	Line Section w/o Fault	NA	1.04	0.98	NA	1.13	1.03	1.13	NA	0.98	Load power factor correction and voltage support if needed
HIGGINS 115 kV	P2-1:A5:30:_DRUM-HIGGINS 115KV [4393] (DTCH FL1-CHCGO PK)	P2	Line Section w/o Fault	NA	1.03	0.97	NA	1.14	1.02	1.14	NA	0.97	Load power factor correction and voltage support if needed
NEWCSTL1 115 kV	P2-1:A5:30:_DRUM-HIGGINS 115KV [4393] (DTCH FL1-CHCGO PK)	P2	Line Section w/o Fault	NA	1.04	0.99	NA	1.13	1.04	1.13	NA	0.99	Load power factor correction and voltage support if needed
NEWCSTL2 115 kV	P2-1:A5:30:_DRUM-HIGGINS 115KV [4393] (DTCH FL1-CHCGO PK)	P2	Line Section w/o Fault	NA	1.05	0.99	NA	1.13	1.04	1.13	NA	0.99	Load power factor correction and voltage support if needed
NEWCSTLE 115 kV	P2-1:A5:30:_DRUM-HIGGINS 115KV [4393] (DTCH FL1-CHCGO PK)	P2	Line Section w/o Fault	NA	1.04	0.99	NA	1.13	1.04	1.13	NA	0.99	Load power factor correction and voltage support if needed

Study Area: PG&E Central Valley

High/Low Voltages



Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)					Voltage PU (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations	
PLACER 115 kV	P2-1:A5:30:_DRUM-HIGGINS 115KV [4393] (DTCH FL1-CHCGO PK)	P2	Line Section w/o Fault	NA	1.04	0.98	NA	1.13	1.03	1.13	NA	0.98	Load power factor correction and voltage support if needed
BELL PGE 115 kV	P2-1:A5:31:_DRUM-HIGGINS 115KV [4393] (CHCGO PK-HIGGINS)	P2	Line Section w/o Fault	NA	1.03	0.98	NA	1.13	1.03	1.13	NA	0.98	Load power factor correction and voltage support if needed
FLINT 115 kV	P2-1:A5:31:_DRUM-HIGGINS 115KV [4393] (CHCGO PK-HIGGINS)	P2	Line Section w/o Fault	NA	1.04	0.99	NA	1.13	1.03	1.13	NA	0.99	Load power factor correction and voltage support if needed
FLINT1 115 kV	P2-1:A5:31:_DRUM-HIGGINS 115KV [4393] (CHCGO PK-HIGGINS)	P2	Line Section w/o Fault	NA	1.04	0.99	NA	1.13	1.03	1.13	NA	0.99	Load power factor correction and voltage support if needed
FLINT2 115 kV	P2-1:A5:31:_DRUM-HIGGINS 115KV [4393] (CHCGO PK-HIGGINS)	P2	Line Section w/o Fault	NA	1.04	0.99	NA	1.13	1.03	1.13	NA	0.99	Load power factor correction and voltage support if needed
HIGGINS 115 kV	P2-1:A5:31:_DRUM-HIGGINS 115KV [4393] (CHCGO PK-HIGGINS)	P2	Line Section w/o Fault	NA	1.03	0.97	NA	1.13	1.02	1.13	NA	0.97	Load power factor correction and voltage support if needed
NEWCSTL1 115 kV	P2-1:A5:31:_DRUM-HIGGINS 115KV [4393] (CHCGO PK-HIGGINS)	P2	Line Section w/o Fault	NA	1.04	0.99	NA	1.13	1.03	1.13	NA	0.99	Load power factor correction and voltage support if needed
NEWCSTL2 115 kV	P2-1:A5:31:_DRUM-HIGGINS 115KV [4393] (CHCGO PK-HIGGINS)	P2	Line Section w/o Fault	NA	1.04	0.99	NA	1.13	1.03	1.13	NA	0.99	Load power factor correction and voltage support if needed
NEWCSTLE 115 kV	P2-1:A5:31:_DRUM-HIGGINS 115KV [4393] (CHCGO PK-HIGGINS)	P2	Line Section w/o Fault	NA	1.04	0.99	NA	1.13	1.03	1.13	NA	0.99	Load power factor correction and voltage support if needed
PLACER 115 kV	P2-1:A5:31:_DRUM-HIGGINS 115KV [4393] (CHCGO PK-HIGGINS)	P2	Line Section w/o Fault	NA	1.04	0.99	NA	1.13	1.03	1.13	NA	0.99	Load power factor correction and voltage support if needed
BELL PGE 115 kV	P2-1:A5:37:_HIGGINS-BELL 115KV [1412] (HIGGINS-BELL PGE)	P2	Line Section w/o Fault	NA	1.04	0.99	NA	1.13	1.03	1.13	NA	0.99	Load power factor correction and voltage support if needed

Study Area: PG&E Central Valley

High/Low Voltages



Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)					Voltage PU (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations	
FLINT 115 kV	P2-1:A5:37:_HIGGINS-BELL 115KV [1412] (HIGGINS-BELL PGE)	P2	Line Section w/o Fault	NA	1.05	0.99	NA	1.13	1.04	1.13	NA	0.99	Load power factor correction and voltage support if needed
FLINT1 115 kV	P2-1:A5:37:_HIGGINS-BELL 115KV [1412] (HIGGINS-BELL PGE)	P2	Line Section w/o Fault	NA	1.05	0.99	NA	1.13	1.04	1.13	NA	0.99	Load power factor correction and voltage support if needed
FLINT2 115 kV	P2-1:A5:37:_HIGGINS-BELL 115KV [1412] (HIGGINS-BELL PGE)	P2	Line Section w/o Fault	NA	1.05	0.99	NA	1.13	1.04	1.13	NA	0.99	Load power factor correction and voltage support if needed
PLACER 115 kV	P2-1:A5:37:_HIGGINS-BELL 115KV [1412] (HIGGINS-BELL PGE)	P2	Line Section w/o Fault	NA	1.04	0.99	NA	1.13	1.03	1.13	NA	0.99	Load power factor correction and voltage support if needed
WESTLEY 60 kV	P2-2:A11:25:_KASSON 115kV Section 1D	P2	Bus	NA	0.94	0.88	NA	1.01	0.93	1.01	NA	0.88	Continue to monitor future load forecast
WSID 60 kV	P2-2:A11:25:_KASSON 115kV Section 1D	P2	Bus	NA	0.94	0.89	NA	1.01	0.93	1.01	NA	0.89	Continue to monitor future load forecast
WSID TAP 60 kV	P2-2:A11:25:_KASSON 115kV Section 1D	P2	Bus	NA	0.94	0.89	NA	1.01	0.93	1.01	NA	0.89	Continue to monitor future load forecast
PLAINFLD 60 kV	P2-2:A4:1:_VACA-DIX 230KV SECTION 1E	P2	Bus	NA	1.04	0.88	NA	1.13	1.02	1.13	NA	0.88	Significant increase in load in base cases compared to last year. Load forecast under review.
PLFLDJCT 60 kV	P2-2:A4:1:_VACA-DIX 230KV SECTION 1E	P2	Bus	NA	1.04	0.89	NA	1.13	1.02	1.13	NA	0.89	Significant increase in load in base cases compared to last year. Load forecast under review.
E.NICOLS 115 kV	P2-2:A5:15:_RIO OSO 115KV SECTION 2D	P2	Bus	NA	1.05	0.96	NA	1.10	1.05	1.10	NA	0.96	Load power factor correction and voltage support if needed
FLINT1 115 kV	P2-2:A5:19:_PLACER 115KV SECTION 1D	P2	Bus	NA	1.07	1.03	NA	1.13	1.06	1.13	NA	1.03	Load power factor correction and voltage support if needed
WESTLEY 60 kV	P2-3:A11:18:_KASSON - 1D 115kV & MANTECA-KASSON-SCHULTE line	P2	Non Bus-tie Breaker	0.86	NA	NA	1.00	NA	NA	NA	0.90	NA	Operating Solution
WSID 60 kV	P2-3:A11:18:_KASSON - 1D 115kV & MANTECA-KASSON-SCHULTE line	P2	Non Bus-tie Breaker	0.86	NA	NA	1.00	NA	NA	NA	0.90	NA	Operating Solution
WSID TAP 60 kV	P2-3:A11:18:_KASSON - 1D 115kV & MANTECA-KASSON-SCHULTE line	P2	Non Bus-tie Breaker	0.86	NA	NA	1.00	NA	NA	NA	0.90	NA	Operating Solution
WESTLEY 60 kV	P2-3:A11:24:_KASSON - 1D 115kV & MANTECA-KASSON-SCHULTE line	P2	Non Bus-tie Breaker	NA	0.92	0.85	NA	1.00	0.91	1.00	NA	0.86	Operating Solution

Study Area: PG&E Central Valley

High/Low Voltages



Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)					Voltage PU (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations	
WSID 60 kV	P2-3:A11:24:_KASSON - 1D 115kV & MANTECA-KASSON-SCHULTE line	P2	Non Bus-tie Breaker	NA	0.92	0.85	NA	1.00	0.91	1.00	NA	0.86	Operating Solution
WSID TAP 60 kV	P2-3:A11:24:_KASSON - 1D 115kV & MANTECA-KASSON-SCHULTE line	P2	Non Bus-tie Breaker	NA	0.92	0.85	NA	1.00	0.91	1.00	NA	0.86	Operating Solution
WESTLEY 60 kV	P2-3:A11:25:_KASSON - 1D 115kV & VIERRA-TRACY-KASSON line	P2	Non Bus-tie Breaker	NA	0.94	0.88	NA	1.00	0.93	1.01	NA	0.88	Operating Solution
WSID 60 kV	P2-3:A11:25:_KASSON - 1D 115kV & VIERRA-TRACY-KASSON line	P2	Non Bus-tie Breaker	NA	0.94	0.89	NA	1.00	0.93	1.01	NA	0.89	Operating Solution
WSID TAP 60 kV	P2-3:A11:25:_KASSON - 1D 115kV & VIERRA-TRACY-KASSON line	P2	Non Bus-tie Breaker	NA	0.94	0.89	NA	1.00	0.93	1.01	NA	0.89	Operating Solution
WESTLEY 60 kV	P2-3:A11:26:_KASSON - 1D 115kV & LAMMERS-KASSON line	P2	Non Bus-tie Breaker	NA	0.94	0.88	NA	1.01	0.93	1.01	NA	0.89	Operating Solution
WSID 60 kV	P2-3:A11:26:_KASSON - 1D 115kV & LAMMERS-KASSON line	P2	Non Bus-tie Breaker	NA	0.94	0.89	NA	1.01	0.93	1.01	NA	0.89	Operating Solution
WSID TAP 60 kV	P2-3:A11:26:_KASSON - 1D 115kV & LAMMERS-KASSON line	P2	Non Bus-tie Breaker	NA	0.94	0.89	NA	1.01	0.93	1.01	NA	0.89	Continue to monitor future load forecast
WESTLEY 60 kV	P2-3:A11:27:_TESLA - 2D 115kV & VIERRA-TESLA line	P2	Non Bus-tie Breaker	NA	0.94	0.90	NA	1.02	0.94	1.02	NA	0.90	Continue to monitor future load forecast
WSID 60 kV	P2-3:A11:27:_TESLA - 2D 115kV & VIERRA-TESLA line	P2	Non Bus-tie Breaker	NA	0.94	0.90	NA	1.02	0.94	1.02	NA	0.90	Continue to monitor future load forecast
WSID TAP 60 kV	P2-3:A11:27:_TESLA - 2D 115kV & VIERRA-TESLA line	P2	Non Bus-tie Breaker	NA	0.94	0.90	NA	1.02	0.94	1.02	NA	0.90	Continue to monitor future load forecast
CORTINA 230 kV	P2-3:A4:51:_CORTINA 230KV - RING R2 & R3	P2	Non Bus-tie Breaker	NA	0.96	0.92	NA	1.01	0.96	1.01	NA	0.89	Sensitivity only
E.NICOLS 115 kV	P2-3:A5:17:_RIO OSO - 2D 115KV & BOGUE-RIO OSO LINE	P2	Non Bus-tie Breaker	NA	1.05	0.96	NA	1.10	1.05	1.10	NA	0.96	Load power factor correction and voltage support if needed
E.NICOLS 115 kV	P2-3:A5:18:_RIO OSO - 2D 115KV & RIO OSO-WOODLAND #2 LINE	P2	Non Bus-tie Breaker	NA	1.05	0.96	NA	1.10	1.05	1.10	NA	0.96	Load power factor correction and voltage support if needed
E.NICOLS 115 kV	P2-3:A5:19:_RIO OSO - 2D 115KV & RIO OSO-DRUM-BRUNSWCK LINE	P2	Non Bus-tie Breaker	NA	1.05	0.96	NA	1.10	1.05	1.10	NA	0.96	Load power factor correction and voltage support if needed
FLINT 115 kV	P2-3:A5:22:_PLACER - 1D 115KV & PLACER-GOLD HILL #1 LINE	P2	Non Bus-tie Breaker	NA	1.07	1.02	NA	1.13	1.06	1.13	NA	1.02	Load power factor correction and voltage support if needed
FLINT2 115 kV	P2-3:A5:22:_PLACER - 1D 115KV & PLACER-GOLD HILL #1 LINE	P2	Non Bus-tie Breaker	NA	1.07	1.02	NA	1.13	1.06	1.13	NA	1.02	Load power factor correction and voltage support if needed

Study Area: PG&E Central Valley

High/Low Voltages



Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)					Voltage PU (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations	
FLINT1 115 kV	P2-3:A5:23:_PLACER - 1D 115KV & PLACER-GOLD HILL #2 LINE	P2	Non Bus-tie Breaker	NA	1.07	1.03	NA	1.13	1.06	1.13	NA	1.03	Load power factor correction and voltage support if needed
ALLEGHNY 60 kV	P2-3:A5:44:_SMRTSVLE - MA 60KV & SMRTSVLE-COLGATE LINE	P2	Non Bus-tie Breaker	NA	1.06	1.03	NA	1.11	1.06	1.11	NA	1.03	Load power factor correction and voltage support if needed
BANGOR 60 kV	P2-3:A5:44:_SMRTSVLE - MA 60KV & SMRTSVLE-COLGATE LINE	P2	Non Bus-tie Breaker	NA	1.05	1.03	NA	1.10	1.05	1.10	NA	1.03	Load power factor correction and voltage support if needed
CLMBA HL 60 kV	P2-3:A5:44:_SMRTSVLE - MA 60KV & SMRTSVLE-COLGATE LINE	P2	Non Bus-tie Breaker	NA	1.07	1.04	NA	1.10	1.06	1.10	NA	1.04	Load power factor correction and voltage support if needed
GRSS VLY 60 kV	P2-3:A5:44:_SMRTSVLE - MA 60KV & SMRTSVLE-COLGATE LINE	P2	Non Bus-tie Breaker	NA	1.06	1.02	NA	1.10	1.05	1.10	NA	1.02	Load power factor correction and voltage support if needed
PIKE CTY 60 kV	P2-3:A5:44:_SMRTSVLE - MA 60KV & SMRTSVLE-COLGATE LINE	P2	Non Bus-tie Breaker	NA	1.07	1.03	NA	1.10	1.06	1.10	NA	1.03	Load power factor correction and voltage support if needed
CHCGO PK 115 kV	P2-3:A5:84:_DRUM 115KV - RING R2 & R3	P2	Non Bus-tie Breaker	NA	1.04	1.01	NA	1.11	1.03	1.11	NA	1.01	Load power factor correction and voltage support if needed
DTCH FL1 115 kV	P2-3:A5:84:_DRUM 115KV - RING R2 & R3	P2	Non Bus-tie Breaker	NA	1.04	1.01	NA	1.11	1.03	1.11	NA	1.01	Load power factor correction and voltage support if needed
CHCGO PK 115 kV	P2-3:A5:88:_BRNSWALT 115KV - RING R4 & R3	P2	Non Bus-tie Breaker	NA	1.04	1.01	NA	1.11	1.03	1.11	NA	1.01	Load power factor correction and voltage support if needed
DTCH FL1 115 kV	P2-3:A5:88:_BRNSWALT 115KV - RING R4 & R3	P2	Non Bus-tie Breaker	NA	1.04	1.01	NA	1.11	1.03	1.11	NA	1.01	Load power factor correction and voltage support if needed
BEARDSLY 115 kV	P2-4:A11:1:_BELLOTA 230kV - Section 1E & 2E	P2	Bus-tie Breaker	NA	0.90	0.87	NA	1.05	0.89	1.05	NA	0.83	Operating Solution
BRDSLY J 115 kV	P2-4:A11:1:_BELLOTA 230kV - Section 1E & 2E	P2	Bus-tie Breaker	NA	0.89	0.87	NA	1.05	0.89	1.05	NA	0.83	Operating Solution
CH.STN 115 kV	P2-4:A11:1:_BELLOTA 230kV - Section 1E & 2E	P2	Bus-tie Breaker	NA	0.79	0.77	NA	1.07	0.78	1.07	NA	0.73	Operating Solution
CH.STNJT 115 kV	P2-4:A11:1:_BELLOTA 230kV - Section 1E & 2E	P2	Bus-tie Breaker	NA	0.78	0.77	NA	1.07	0.78	1.07	NA	0.73	Operating Solution
CURTISS 115 kV	P2-4:A11:1:_BELLOTA 230kV - Section 1E & 2E	P2	Bus-tie Breaker	NA	0.81	0.78	NA	1.06	0.80	1.06	NA	0.75	Operating Solution
DONNELLS 115 kV	P2-4:A11:1:_BELLOTA 230kV - Section 1E & 2E	P2	Bus-tie Breaker	NA	0.91	0.88	NA	1.05	0.90	1.05	NA	0.85	Operating Solution
LOCKJ1 230 kV	P2-4:A11:1:_BELLOTA 230kV - Section 1E & 2E	P2	Bus-tie Breaker	NA	0.97	0.90	NA	1.03	0.95	1.02	NA	0.90	Operating Solution



Study Area: PG&E Central Valley

High/Low Voltages



Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)					Voltage PU (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations	
MELNS JB 115 kV	P2-4:A11:1:_BELLOTA 230kV - Section 1E & 2E	P2	Bus-tie Breaker	NA	0.82	0.80	NA	1.07	0.81	1.07	NA	0.77	Operating Solution
MELONES 115 kV	P2-4:A11:1:_BELLOTA 230kV - Section 1E & 2E	P2	Bus-tie Breaker	NA	0.77	0.76	NA	1.07	0.76	1.07	NA	0.73	Operating Solution
MI-WUK 115 kV	P2-4:A11:1:_BELLOTA 230kV - Section 1E & 2E	P2	Bus-tie Breaker	NA	0.84	0.81	NA	1.06	0.84	1.06	NA	0.78	Operating Solution
PEORIA 115 kV	P2-4:A11:1:_BELLOTA 230kV - Section 1E & 2E	P2	Bus-tie Breaker	NA	0.78	0.76	NA	1.07	0.78	1.07	NA	0.73	Operating Solution
R.TRACK 115 kV	P2-4:A11:1:_BELLOTA 230kV - Section 1E & 2E	P2	Bus-tie Breaker	NA	0.76	0.75	NA	1.07	0.76	1.07	NA	0.73	Operating Solution
RCTRK J. 115 kV	P2-4:A11:1:_BELLOTA 230kV - Section 1E & 2E	P2	Bus-tie Breaker	NA	0.80	0.77	NA	1.06	0.79	1.06	NA	0.74	Operating Solution
RIVRBKJT 115 kV	P2-4:A11:1:_BELLOTA 230kV - Section 1E & 2E	P2	Bus-tie Breaker	NA	0.88	0.85	NA	1.06	0.87	1.06	NA	0.83	Operating Solution
RVRBANK 115 kV	P2-4:A11:1:_BELLOTA 230kV - Section 1E & 2E	P2	Bus-tie Breaker	NA	0.56	0.56	NA	1.09	0.55	1.09	NA	0.54	Operating Solution
RVRBK J1 115 kV	P2-4:A11:1:_BELLOTA 230kV - Section 1E & 2E	P2	Bus-tie Breaker	NA	0.55	0.55	NA	1.08	0.54	1.09	NA	0.53	Operating Solution
RVRBK J2 115 kV	P2-4:A11:1:_BELLOTA 230kV - Section 1E & 2E	P2	Bus-tie Breaker	NA	0.94	0.91	NA	1.07	0.93	1.06	NA	0.89	Operating Solution
RVRBK TP 115 kV	P2-4:A11:1:_BELLOTA 230kV - Section 1E & 2E	P2	Bus-tie Breaker	NA	0.58	0.58	NA	1.08	0.57	1.09	NA	0.56	Operating Solution
SANDBAR 115 kV	P2-4:A11:1:_BELLOTA 230kV - Section 1E & 2E	P2	Bus-tie Breaker	NA	0.89	0.86	NA	1.05	0.88	1.06	NA	0.83	Operating Solution
SNDBR JT 115 kV	P2-4:A11:1:_BELLOTA 230kV - Section 1E & 2E	P2	Bus-tie Breaker	NA	0.89	0.86	NA	1.05	0.88	1.06	NA	0.83	Operating Solution
SPISONORA 115 kV	P2-4:A11:1:_BELLOTA 230kV - Section 1E & 2E	P2	Bus-tie Breaker	NA	0.81	0.78	NA	1.06	0.80	1.06	NA	0.75	Operating Solution
SPISONORAJCT 115 kV	P2-4:A11:1:_BELLOTA 230kV - Section 1E & 2E	P2	Bus-tie Breaker	NA	0.81	0.78	NA	1.06	0.80	1.06	NA	0.75	Operating Solution
SPRNG GJ 115 kV	P2-4:A11:1:_BELLOTA 230kV - Section 1E & 2E	P2	Bus-tie Breaker	NA	0.89	0.86	NA	1.05	0.88	1.06	NA	0.82	Operating Solution
SPRNG GP 115 kV	P2-4:A11:1:_BELLOTA 230kV - Section 1E & 2E	P2	Bus-tie Breaker	NA	0.89	0.86	NA	1.05	0.88	1.06	NA	0.83	Operating Solution

Study Area: PG&E Central Valley

High/Low Voltages



Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)					Voltage PU (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations	
TULLOCH 115 kV	P2-4:A11:1:_BELLOTA 230kV - Section 1E & 2E	P2	Bus-tie Breaker	NA	0.69	0.69	NA	1.07	0.68	1.08	NA	0.66	Operating Solution
VALLY HM 115 kV	P2-4:A11:1:_BELLOTA 230kV - Section 1E & 2E	P2	Bus-tie Breaker	NA	0.89	0.86	NA	1.06	0.88	1.06	NA	0.84	Operating Solution
WESTLEY 60 kV	P2-4:A11:1:_BELLOTA 230kV - Section 1E & 2E	P2	Bus-tie Breaker	NA	0.91	0.88	NA	1.02	0.90	1.02	NA	0.87	Operating Solution
WSID 60 kV	P2-4:A11:1:_BELLOTA 230kV - Section 1E & 2E	P2	Bus-tie Breaker	NA	0.91	0.88	NA	1.02	0.90	1.02	NA	0.87	Operating Solution
WSID TAP 60 kV	P2-4:A11:1:_BELLOTA 230kV - Section 1E & 2E	P2	Bus-tie Breaker	NA	0.91	0.88	NA	1.02	0.90	1.02	NA	0.87	Operating Solution
WESTLEY 60 kV	P2-4:A11:10:_TESLA 115kV - Section 1D & 2D	P2	Bus-tie Breaker	0.89	0.90	Diverge	0.97	0.99	0.89	1.00	Diverge	Diverge	Operating Solution
WSID 60 kV	P2-4:A11:10:_TESLA 115kV - Section 1D & 2D	P2	Bus-tie Breaker	0.89	0.90	Diverge	0.97	0.99	0.90	1.00	Diverge	Diverge	Operating Solution
WSID TAP 60 kV	P2-4:A11:10:_TESLA 115kV - Section 1D & 2D	P2	Bus-tie Breaker	0.89	0.90	Diverge	0.97	0.99	0.90	1.00	Diverge	Diverge	Operating Solution
BEARDSLY 115 kV	P2-4:A11:3:_BELLOTA 230kV - Section 1E & 2E	P2	Bus-tie Breaker	0.87	NA	NA	1.05	NA	NA	NA	1.01	NA	Operating Solution
BRDSLY J 115 kV	P2-4:A11:3:_BELLOTA 230kV - Section 1E & 2E	P2	Bus-tie Breaker	0.87	NA	NA	1.05	NA	NA	NA	1.01	NA	Operating Solution
CH.STN 115 kV	P2-4:A11:3:_BELLOTA 230kV - Section 1E & 2E	P2	Bus-tie Breaker	0.76	NA	NA	1.07	NA	NA	NA	0.95	NA	Operating Solution
CH.STNJT 115 kV	P2-4:A11:3:_BELLOTA 230kV - Section 1E & 2E	P2	Bus-tie Breaker	0.76	NA	NA	1.07	NA	NA	NA	0.95	NA	Operating Solution
CURTISS 115 kV	P2-4:A11:3:_BELLOTA 230kV - Section 1E & 2E	P2	Bus-tie Breaker	0.78	NA	NA	1.06	NA	NA	NA	0.96	NA	Operating Solution
DONNELLS 115 kV	P2-4:A11:3:_BELLOTA 230kV - Section 1E & 2E	P2	Bus-tie Breaker	0.89	NA	NA	1.05	NA	NA	NA	1.02	NA	Operating Solution
MELNS JB 115 kV	P2-4:A11:3:_BELLOTA 230kV - Section 1E & 2E	P2	Bus-tie Breaker	0.79	NA	NA	1.07	NA	NA	NA	0.96	NA	Operating Solution
MELONES 115 kV	P2-4:A11:3:_BELLOTA 230kV - Section 1E & 2E	P2	Bus-tie Breaker	0.75	NA	NA	1.07	NA	NA	NA	0.94	NA	Operating Solution
MI-WUK 115 kV	P2-4:A11:3:_BELLOTA 230kV - Section 1E & 2E	P2	Bus-tie Breaker	0.82	NA	NA	1.06	NA	NA	NA	0.98	NA	Operating Solution

Study Area: PG&E Central Valley

High/Low Voltages



Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)					Voltage PU (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations	
PEORIA 115 kV	P2-4:A11:3:_BELLOTA 230kV - Section 1E & 2E	P2	Bus-tie Breaker	0.76	NA	NA	1.07	NA	NA	NA	0.95	NA	Operating Solution
R.TRACK 115 kV	P2-4:A11:3:_BELLOTA 230kV - Section 1E & 2E	P2	Bus-tie Breaker	0.74	NA	NA	1.07	NA	NA	NA	0.94	NA	Operating Solution
RCTRK J. 115 kV	P2-4:A11:3:_BELLOTA 230kV - Section 1E & 2E	P2	Bus-tie Breaker	0.77	NA	NA	1.06	NA	NA	NA	0.96	NA	Operating Solution
RIVRBKJT 115 kV	P2-4:A11:3:_BELLOTA 230kV - Section 1E & 2E	P2	Bus-tie Breaker	0.85	NA	NA	1.08	NA	NA	NA	0.97	NA	Operating Solution
RVRBANK 115 kV	P2-4:A11:3:_BELLOTA 230kV - Section 1E & 2E	P2	Bus-tie Breaker	0.55	NA	NA	1.08	NA	NA	NA	0.86	NA	Operating Solution
RVRBK J1 115 kV	P2-4:A11:3:_BELLOTA 230kV - Section 1E & 2E	P2	Bus-tie Breaker	0.54	NA	NA	1.08	NA	NA	NA	0.86	NA	Operating Solution
RVRBK TP 115 kV	P2-4:A11:3:_BELLOTA 230kV - Section 1E & 2E	P2	Bus-tie Breaker	0.57	NA	NA	1.08	NA	NA	NA	0.87	NA	Operating Solution
SANDBAR 115 kV	P2-4:A11:3:_BELLOTA 230kV - Section 1E & 2E	P2	Bus-tie Breaker	0.86	NA	NA	1.05	NA	NA	NA	1.01	NA	Operating Solution
SNDBR JT 115 kV	P2-4:A11:3:_BELLOTA 230kV - Section 1E & 2E	P2	Bus-tie Breaker	0.86	NA	NA	1.05	NA	NA	NA	1.01	NA	Operating Solution
SPISONORA 115 kV	P2-4:A11:3:_BELLOTA 230kV - Section 1E & 2E	P2	Bus-tie Breaker	0.78	NA	NA	1.06	NA	NA	NA	0.97	NA	Operating Solution
SPISONORAJCT 115 kV	P2-4:A11:3:_BELLOTA 230kV - Section 1E & 2E	P2	Bus-tie Breaker	0.78	NA	NA	1.06	NA	NA	NA	0.97	NA	Operating Solution
SPRNG GJ 115 kV	P2-4:A11:3:_BELLOTA 230kV - Section 1E & 2E	P2	Bus-tie Breaker	0.86	NA	NA	1.05	NA	NA	NA	1.01	NA	Operating Solution
SPRNG GP 115 kV	P2-4:A11:3:_BELLOTA 230kV - Section 1E & 2E	P2	Bus-tie Breaker	0.86	NA	NA	1.05	NA	NA	NA	1.01	NA	Operating Solution
TULLOCH 115 kV	P2-4:A11:3:_BELLOTA 230kV - Section 1E & 2E	P2	Bus-tie Breaker	0.67	NA	NA	1.07	NA	NA	NA	0.91	NA	Operating Solution
VALLY HM 115 kV	P2-4:A11:3:_BELLOTA 230kV - Section 1E & 2E	P2	Bus-tie Breaker	0.86	NA	NA	1.08	NA	NA	NA	0.97	NA	Operating Solution
WESTLEY 60 kV	P2-4:A11:3:_BELLOTA 230kV - Section 1E & 2E	P2	Bus-tie Breaker	0.88	NA	NA	1.01	NA	NA	NA	0.94	NA	Operating Solution
WSID 60 kV	P2-4:A11:3:_BELLOTA 230kV - Section 1E & 2E	P2	Bus-tie Breaker	0.88	NA	NA	1.01	NA	NA	NA	0.94	NA	Operating Solution

Study Area: PG&E Central Valley

High/Low Voltages



Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)					Voltage PU (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations	
WSID TAP 60 kV	P2-4:A11:3:_BELLOTA 230kV - Section 1E & 2E	P2	Bus-tie Breaker	0.88	NA	NA	1.01	NA	NA	NA	0.94	NA	Operating Solution
PLAINFLD 60 kV	P2-4:A4:1:_VACA-DIX 230KV - SECTION 1E & 1F	P2	Bus-tie Breaker	NA	1.03	0.87	NA	1.13	1.02	1.13	NA	0.87	Significant increase in load in base cases compared to last year. Load forecast under review.
PLFLDJCT 60 kV	P2-4:A4:1:_VACA-DIX 230KV - SECTION 1E & 1F	P2	Bus-tie Breaker	NA	1.03	0.88	NA	1.13	1.02	1.13	NA	0.88	Significant increase in load in base cases compared to last year. Load forecast under review.
PLAINFLD 60 kV	P2-4:A4:2:_VACA-DIX 230KV - SECTION 1E & 2E	P2	Bus-tie Breaker	NA	1.03	0.87	NA	1.13	1.02	1.13	NA	0.88	Significant increase in load in base cases compared to last year. Load forecast under review.
PLFLDJCT 60 kV	P2-4:A4:2:_VACA-DIX 230KV - SECTION 1E & 2E	P2	Bus-tie Breaker	NA	1.03	0.88	NA	1.13	1.02	1.13	NA	0.89	Significant increase in load in base cases compared to last year. Load forecast under review.
PLAINFLD 60 kV	P2-4:A4:3:_VACA-DIX 230KV - SECTION 1F & 2F	P2	Bus-tie Breaker	NA	1.03	0.88	NA	1.13	1.02	1.13	NA	0.88	Significant increase in load in base cases compared to last year. Load forecast under review.
PLFLDJCT 60 kV	P2-4:A4:3:_VACA-DIX 230KV - SECTION 1F & 2F	P2	Bus-tie Breaker	NA	1.03	0.89	NA	1.13	1.02	1.13	NA	0.89	Significant increase in load in base cases compared to last year. Load forecast under review.
PLAINFLD 60 kV	P2-4:A4:4:_VACA-DIX 230KV - SECTION 2F & 2E	P2	Bus-tie Breaker	NA	1.04	0.88	NA	1.13	1.02	1.13	NA	0.89	Significant increase in load in base cases compared to last year. Load forecast under review.
PLFLDJCT 60 kV	P2-4:A4:4:_VACA-DIX 230KV - SECTION 2F & 2E	P2	Bus-tie Breaker	NA	1.04	0.89	NA	1.13	1.02	1.13	NA	0.89	Significant increase in load in base cases compared to last year. Load forecast under review.
APLHTAP1 115 kV	P2-4:A5:3:_GOLDHILL 230KV - SECTION 2D & 1D	P2	Bus-tie Breaker	NA	Diverge	Diverge	NA	1.15	Diverge	1.15	NA	Diverge	Project: Atlantic-Placer 115 kV Line Project on hold. Project scope under review
APLHTAP2 115 kV	P2-4:A5:3:_GOLDHILL 230KV - SECTION 2D & 1D	P2	Bus-tie Breaker	NA	Diverge	Diverge	NA	1.15	Diverge	1.15	NA	Diverge	Project: Atlantic-Placer 115 kV Line Project on hold. Project scope under review
APPLE HL 115 kV	P2-4:A5:3:_GOLDHILL 230KV - SECTION 2D & 1D	P2	Bus-tie Breaker	NA	Diverge	Diverge	NA	1.15	Diverge	1.15	NA	Diverge	Project: Atlantic-Placer 115 kV Line Project on hold. Project scope under review
CLRKSVLE 115 kV	P2-4:A5:3:_GOLDHILL 230KV - SECTION 2D & 1D	P2	Bus-tie Breaker	NA	Diverge	Diverge	NA	1.15	Diverge	1.15	NA	Diverge	Project: Atlantic-Placer 115 kV Line Project on hold. Project scope under review

Study Area: PG&E Central Valley

High/Low Voltages



Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)					Voltage PU (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations	
CLRKSVLT 115 kV	P2-4:A5:3:_GOLDHILL 230KV - SECTION 2D & 1D	P2	Bus-tie Breaker	NA	Diverge	Diverge	NA	1.15	Diverge	1.15	NA	Diverge	Project: Atlantic-Placer 115 kV Line Project on hold. Project scope under review
CPM 115 kV	P2-4:A5:3:_GOLDHILL 230KV - SECTION 2D & 1D	P2	Bus-tie Breaker	NA	Diverge	Diverge	NA	1.15	Diverge	1.15	NA	Diverge	Project: Atlantic-Placer 115 kV Line Project on hold. Project scope under review
CPM TAP 115 kV	P2-4:A5:3:_GOLDHILL 230KV - SECTION 2D & 1D	P2	Bus-tie Breaker	NA	Diverge	Diverge	NA	1.15	Diverge	1.15	NA	Diverge	Project: Atlantic-Placer 115 kV Line Project on hold. Project scope under review
DIMOND_1 115 kV	P2-4:A5:3:_GOLDHILL 230KV - SECTION 2D & 1D	P2	Bus-tie Breaker	NA	Diverge	Diverge	NA	1.15	Diverge	1.15	NA	Diverge	Project: Atlantic-Placer 115 kV Line Project on hold. Project scope under review
DIMOND_2 115 kV	P2-4:A5:3:_GOLDHILL 230KV - SECTION 2D & 1D	P2	Bus-tie Breaker	NA	Diverge	Diverge	NA	1.15	Diverge	1.15	NA	Diverge	Project: Atlantic-Placer 115 kV Line Project on hold. Project scope under review
DMND SPR 115 kV	P2-4:A5:3:_GOLDHILL 230KV - SECTION 2D & 1D	P2	Bus-tie Breaker	NA	Diverge	Diverge	NA	1.15	Diverge	1.15	NA	Diverge	Project: Atlantic-Placer 115 kV Line Project on hold. Project scope under review
ELDORAD 115 kV	P2-4:A5:3:_GOLDHILL 230KV - SECTION 2D & 1D	P2	Bus-tie Breaker	NA	Diverge	Diverge	NA	1.15	Diverge	1.15	NA	Diverge	Project: Atlantic-Placer 115 kV Line Project on hold. Project scope under review
FLINT 115 kV	P2-4:A5:3:_GOLDHILL 230KV - SECTION 2D & 1D	P2	Bus-tie Breaker	NA	Diverge	Diverge	NA	1.13	Diverge	1.13	NA	Diverge	Project: Atlantic-Placer 115 kV Line Project on hold. Project scope under review
FLINT1 115 kV	P2-4:A5:3:_GOLDHILL 230KV - SECTION 2D & 1D	P2	Bus-tie Breaker	NA	Diverge	Diverge	NA	1.13	Diverge	1.13	NA	Diverge	Project: Atlantic-Placer 115 kV Line Project on hold. Project scope under review
FLINT2 115 kV	P2-4:A5:3:_GOLDHILL 230KV - SECTION 2D & 1D	P2	Bus-tie Breaker	NA	Diverge	Diverge	NA	1.13	Diverge	1.13	NA	Diverge	Project: Atlantic-Placer 115 kV Line Project on hold. Project scope under review
GOLDHILL 115 kV	P2-4:A5:3:_GOLDHILL 230KV - SECTION 2D & 1D	P2	Bus-tie Breaker	NA	Diverge	Diverge	NA	1.14	Diverge	1.14	NA	Diverge	Project: Atlantic-Placer 115 kV Line Project on hold. Project scope under review
HORSESHE 115 kV	P2-4:A5:3:_GOLDHILL 230KV - SECTION 2D & 1D	P2	Bus-tie Breaker	NA	Diverge	Diverge	NA	1.14	Diverge	1.14	NA	Diverge	Project: Atlantic-Placer 115 kV Line Project on hold. Project scope under review
HORSHE1 115 kV	P2-4:A5:3:_GOLDHILL 230KV - SECTION 2D & 1D	P2	Bus-tie Breaker	NA	Diverge	Diverge	NA	1.14	Diverge	1.14	NA	Diverge	Project: Atlantic-Placer 115 kV Line Project on hold. Project scope under review
HORSHE2 115 kV	P2-4:A5:3:_GOLDHILL 230KV - SECTION 2D & 1D	P2	Bus-tie Breaker	NA	Diverge	Diverge	NA	1.14	Diverge	1.14	NA	Diverge	Project: Atlantic-Placer 115 kV Line Project on hold. Project scope under review
MIZOU_T1 115 kV	P2-4:A5:3:_GOLDHILL 230KV - SECTION 2D & 1D	P2	Bus-tie Breaker	NA	Diverge	Diverge	NA	1.15	Diverge	1.15	NA	Diverge	Project: Atlantic-Placer 115 kV Line Project on hold. Project scope under review
MIZOU_T2 115 kV	P2-4:A5:3:_GOLDHILL 230KV - SECTION 2D & 1D	P2	Bus-tie Breaker	NA	Diverge	Diverge	NA	1.15	Diverge	1.15	NA	Diverge	Project: Atlantic-Placer 115 kV Line Project on hold. Project scope under review
NEWCSTL1 115 kV	P2-4:A5:3:_GOLDHILL 230KV - SECTION 2D & 1D	P2	Bus-tie Breaker	NA	Diverge	Diverge	NA	1.13	Diverge	1.13	NA	Diverge	Project: Atlantic-Placer 115 kV Line Project on hold. Project scope under review



Study Area: PG&E Central Valley

High/Low Voltages



Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)					Voltage PU (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations	
NEWCSTL2 115 kV	P2-4:A5:3:_GOLDHILL 230KV - SECTION 2D & 1D	P2	Bus-tie Breaker	NA	Diverge	Diverge	NA	1.13	Diverge	1.13	NA	Diverge	Project: Atlantic-Placer 115 kV Line Project on hold. Project scope under review
NEWCSTLE 115 kV	P2-4:A5:3:_GOLDHILL 230KV - SECTION 2D & 1D	P2	Bus-tie Breaker	NA	Diverge	Diverge	NA	1.13	Diverge	1.13	NA	Diverge	Project: Atlantic-Placer 115 kV Line Project on hold. Project scope under review
PLACER 115 kV	P2-4:A5:3:_GOLDHILL 230KV - SECTION 2D & 1D	P2	Bus-tie Breaker	NA	Diverge	Diverge	NA	1.13	Diverge	1.13	NA	Diverge	Project: Atlantic-Placer 115 kV Line Project on hold. Project scope under review
PLCRVLB2 115 kV	P2-4:A5:3:_GOLDHILL 230KV - SECTION 2D & 1D	P2	Bus-tie Breaker	NA	Diverge	Diverge	NA	1.15	Diverge	1.15	NA	Diverge	Project: Atlantic-Placer 115 kV Line Project on hold. Project scope under review
PLCRVLB3 115 kV	P2-4:A5:3:_GOLDHILL 230KV - SECTION 2D & 1D	P2	Bus-tie Breaker	NA	Diverge	Diverge	NA	1.15	Diverge	1.15	NA	Diverge	Project: Atlantic-Placer 115 kV Line Project on hold. Project scope under review
PLCRVLT1 115 kV	P2-4:A5:3:_GOLDHILL 230KV - SECTION 2D & 1D	P2	Bus-tie Breaker	NA	Diverge	Diverge	NA	1.15	Diverge	1.15	NA	Diverge	Project: Atlantic-Placer 115 kV Line Project on hold. Project scope under review
PLCRVLT2 115 kV	P2-4:A5:3:_GOLDHILL 230KV - SECTION 2D & 1D	P2	Bus-tie Breaker	NA	Diverge	Diverge	NA	1.15	Diverge	1.15	NA	Diverge	Project: Atlantic-Placer 115 kV Line Project on hold. Project scope under review
SHPRING 115 kV	P2-4:A5:3:_GOLDHILL 230KV - SECTION 2D & 1D	P2	Bus-tie Breaker	NA	Diverge	Diverge	NA	1.15	Diverge	1.15	NA	Diverge	Project: Atlantic-Placer 115 kV Line Project on hold. Project scope under review
SHPRING1 115 kV	P2-4:A5:3:_GOLDHILL 230KV - SECTION 2D & 1D	P2	Bus-tie Breaker	NA	Diverge	Diverge	NA	1.15	Diverge	1.15	NA	Diverge	Project: Atlantic-Placer 115 kV Line Project on hold. Project scope under review
SHPRING2 115 kV	P2-4:A5:3:_GOLDHILL 230KV - SECTION 2D & 1D	P2	Bus-tie Breaker	NA	Diverge	Diverge	NA	1.15	Diverge	1.15	NA	Diverge	Project: Atlantic-Placer 115 kV Line Project on hold. Project scope under review
SPICAMIN 115 kV	P2-4:A5:3:_GOLDHILL 230KV - SECTION 2D & 1D	P2	Bus-tie Breaker	NA	Diverge	Diverge	NA	1.15	Diverge	1.15	NA	Diverge	Project: Atlantic-Placer 115 kV Line Project on hold. Project scope under review
AUBURN 60 kV	P2-4:A5:4:_GOLDHILL 115KV - SECTION 1F & 2F	P2	Bus-tie Breaker	NA	0.91	0.60	NA	1.02	0.86	1.02	NA	0.60	Project: Atlantic-Placer 115 kV Line Project on hold. Project scope under review
BELL PGE 115 kV	P2-4:A5:4:_GOLDHILL 115KV - SECTION 1F & 2F	P2	Bus-tie Breaker	NA	0.86	0.60	NA	1.09	0.81	1.09	NA	0.60	Project: Atlantic-Placer 115 kV Line Project on hold. Project scope under review
BONNIE N 60 kV	P2-4:A5:4:_GOLDHILL 115KV - SECTION 1F & 2F	P2	Bus-tie Breaker	NA	0.98	0.88	NA	1.02	0.96	1.02	NA	0.88	Project: Atlantic-Placer 115 kV Line Project on hold. Project scope under review
CAPEHORN 60 kV	P2-4:A5:4:_GOLDHILL 115KV - SECTION 1F & 2F	P2	Bus-tie Breaker	NA	0.98	0.88	NA	1.03	0.97	1.03	NA	0.88	Project: Atlantic-Placer 115 kV Line Project on hold. Project scope under review
CHCGO PK 115 kV	P2-4:A5:4:_GOLDHILL 115KV - SECTION 1F & 2F	P2	Bus-tie Breaker	NA	0.96	0.80	NA	1.07	0.93	1.07	NA	0.80	Project: Atlantic-Placer 115 kV Line Project on hold. Project scope under review
COLFAXJT 60 kV	P2-4:A5:4:_GOLDHILL 115KV - SECTION 1F & 2F	P2	Bus-tie Breaker	NA	0.99	0.88	NA	1.03	0.97	1.03	NA	0.88	Project: Atlantic-Placer 115 kV Line Project on hold. Project scope under review

Study Area: PG&E Central Valley

High/Low Voltages



Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)					Voltage PU (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations	
CPEHRNTP 60 kV	P2-4:A5:4:_GOLDHILL 115KV - SECTION 1F & 2F	P2	Bus-tie Breaker	NA	0.99	0.88	NA	1.03	0.97	1.03	NA	0.88	Project: Atlantic-Placer 115 kV Line Project on hold. Project scope under review
DRUM 60 kV	P2-4:A5:4:_GOLDHILL 115KV - SECTION 1F & 2F	P2	Bus-tie Breaker	NA	0.98	0.89	NA	1.01	0.96	1.01	NA	0.89	Project: Atlantic-Placer 115 kV Line Project on hold. Project scope under review
DRUM 1M 115 kV	P2-4:A5:4:_GOLDHILL 115KV - SECTION 1F & 2F	P2	Bus-tie Breaker	NA	0.96	0.87	NA	0.99	0.94	0.99	NA	0.87	Project: Atlantic-Placer 115 kV Line Project on hold. Project scope under review
DRUM 2M 115 kV	P2-4:A5:4:_GOLDHILL 115KV - SECTION 1F & 2F	P2	Bus-tie Breaker	NA	0.96	0.87	NA	0.99	0.94	0.99	NA	0.87	Project: Atlantic-Placer 115 kV Line Project on hold. Project scope under review
DTCH FL1 115 kV	P2-4:A5:4:_GOLDHILL 115KV - SECTION 1F & 2F	P2	Bus-tie Breaker	NA	0.98	0.85	NA	1.07	0.95	1.07	NA	0.85	Project: Atlantic-Placer 115 kV Line Project on hold. Project scope under review
ENVRO_HY 60 kV	P2-4:A5:4:_GOLDHILL 115KV - SECTION 1F & 2F	P2	Bus-tie Breaker	NA	0.99	0.88	NA	1.06	0.97	1.06	NA	0.88	Project: Atlantic-Placer 115 kV Line Project on hold. Project scope under review
FLINT 115 kV	P2-4:A5:4:_GOLDHILL 115KV - SECTION 1F & 2F	P2	Bus-tie Breaker	NA	0.85	0.58	NA	1.09	0.80	1.10	NA	0.58	Project: Atlantic-Placer 115 kV Line Project on hold. Project scope under review
FLINT1 115 kV	P2-4:A5:4:_GOLDHILL 115KV - SECTION 1F & 2F	P2	Bus-tie Breaker	NA	0.85	0.58	NA	1.09	0.80	1.10	NA	0.58	Project: Atlantic-Placer 115 kV Line Project on hold. Project scope under review
FLINT2 115 kV	P2-4:A5:4:_GOLDHILL 115KV - SECTION 1F & 2F	P2	Bus-tie Breaker	NA	0.85	0.58	NA	1.09	0.80	1.10	NA	0.58	Project: Atlantic-Placer 115 kV Line Project on hold. Project scope under review
FORST HL 60 kV	P2-4:A5:4:_GOLDHILL 115KV - SECTION 1F & 2F	P2	Bus-tie Breaker	NA	0.98	0.87	NA	1.05	0.96	1.06	NA	0.87	Project: Atlantic-Placer 115 kV Line Project on hold. Project scope under review
HALSEY 60 kV	P2-4:A5:4:_GOLDHILL 115KV - SECTION 1F & 2F	P2	Bus-tie Breaker	NA	0.91	0.60	NA	1.03	0.86	1.03	NA	0.60	Project: Atlantic-Placer 115 kV Line Project on hold. Project scope under review
HIGGINS 115 kV	P2-4:A5:4:_GOLDHILL 115KV - SECTION 1F & 2F	P2	Bus-tie Breaker	NA	0.88	0.65	NA	1.08	0.84	1.09	NA	0.65	Project: Atlantic-Placer 115 kV Line Project on hold. Project scope under review
HORSESHE 115 kV	P2-4:A5:4:_GOLDHILL 115KV - SECTION 1F & 2F	P2	Bus-tie Breaker	NA	0.84	0.56	NA	1.10	0.79	1.10	NA	0.56	Project: Atlantic-Placer 115 kV Line Project on hold. Project scope under review
HORSHE1 115 kV	P2-4:A5:4:_GOLDHILL 115KV - SECTION 1F & 2F	P2	Bus-tie Breaker	NA	0.84	0.56	NA	1.10	0.79	1.10	NA	0.56	Project: Atlantic-Placer 115 kV Line Project on hold. Project scope under review
HORSHE2 115 kV	P2-4:A5:4:_GOLDHILL 115KV - SECTION 1F & 2F	P2	Bus-tie Breaker	NA	0.85	0.58	NA	1.09	0.80	1.10	NA	0.58	Project: Atlantic-Placer 115 kV Line Project on hold. Project scope under review
MTN_QJCT 60 kV	P2-4:A5:4:_GOLDHILL 115KV - SECTION 1F & 2F	P2	Bus-tie Breaker	NA	0.91	0.60	NA	1.02	0.86	1.03	NA	0.60	Project: Atlantic-Placer 115 kV Line Project on hold. Project scope under review
MTN_QUAR 60 kV	P2-4:A5:4:_GOLDHILL 115KV - SECTION 1F & 2F	P2	Bus-tie Breaker	NA	0.91	0.59	NA	1.02	0.85	1.03	NA	0.59	Project: Atlantic-Placer 115 kV Line Project on hold. Project scope under review

Study Area: PG&E Central Valley

High/Low Voltages



Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)					Voltage PU (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations	
NEWCSTL1 115 kV	P2-4:A5:4:_GOLDHILL 115KV - SECTION 1F & 2F	P2	Bus-tie Breaker	NA	0.85	0.58	NA	1.09	0.80	1.10	NA	0.58	Project: Atlantic-Placer 115 kV Line Project on hold. Project scope under review
NEWCSTL2 115 kV	P2-4:A5:4:_GOLDHILL 115KV - SECTION 1F & 2F	P2	Bus-tie Breaker	NA	0.85	0.58	NA	1.09	0.80	1.10	NA	0.58	Project: Atlantic-Placer 115 kV Line Project on hold. Project scope under review
NEWCSTLE 115 kV	P2-4:A5:4:_GOLDHILL 115KV - SECTION 1F & 2F	P2	Bus-tie Breaker	NA	0.85	0.58	NA	1.09	0.80	1.10	NA	0.58	Project: Atlantic-Placer 115 kV Line Project on hold. Project scope under review
OXBOW 60 kV	P2-4:A5:4:_GOLDHILL 115KV - SECTION 1F & 2F	P2	Bus-tie Breaker	NA	0.99	0.88	NA	1.06	0.97	1.06	NA	0.88	Project: Atlantic-Placer 115 kV Line Project on hold. Project scope under review
PENRYN 60 kV	P2-4:A5:4:_GOLDHILL 115KV - SECTION 1F & 2F	P2	Bus-tie Breaker	NA	0.90	0.58	NA	1.03	0.84	1.03	NA	0.58	Project: Atlantic-Placer 115 kV Line Project on hold. Project scope under review
PLACER 115 kV	P2-4:A5:4:_GOLDHILL 115KV - SECTION 1F & 2F	P2	Bus-tie Breaker	NA	0.85	0.58	NA	1.09	0.80	1.10	NA	0.58	Project: Atlantic-Placer 115 kV Line Project on hold. Project scope under review
PLACER 60 kV	P2-4:A5:4:_GOLDHILL 115KV - SECTION 1F & 2F	P2	Bus-tie Breaker	NA	0.91	0.60	NA	1.02	0.86	1.02	NA	0.60	Project: Atlantic-Placer 115 kV Line Project on hold. Project scope under review
ROLLINS 60 kV	P2-4:A5:4:_GOLDHILL 115KV - SECTION 1F & 2F	P2	Bus-tie Breaker	NA	0.99	0.89	NA	1.04	0.98	1.04	NA	0.89	Project: Atlantic-Placer 115 kV Line Project on hold. Project scope under review
ROLLNSTP 60 kV	P2-4:A5:4:_GOLDHILL 115KV - SECTION 1F & 2F	P2	Bus-tie Breaker	NA	0.99	0.89	NA	1.03	0.97	1.04	NA	0.89	Project: Atlantic-Placer 115 kV Line Project on hold. Project scope under review
SHADYGLN 60 kV	P2-4:A5:4:_GOLDHILL 115KV - SECTION 1F & 2F	P2	Bus-tie Breaker	NA	0.99	0.88	NA	1.03	0.97	1.03	NA	0.88	Project: Atlantic-Placer 115 kV Line Project on hold. Project scope under review
WEMR SWS 60 kV	P2-4:A5:4:_GOLDHILL 115KV - SECTION 1F & 2F	P2	Bus-tie Breaker	NA	0.98	0.88	NA	1.04	0.97	1.04	NA	0.88	Project: Atlantic-Placer 115 kV Line Project on hold. Project scope under review
E.NICOLS 115 kV	P2-4:A5:6:_RIO OSO 115KV - SECTION 1D & 2D	P2	Bus-tie Breaker	NA	1.05	0.96	NA	1.11	1.04	1.11	NA	0.96	Operating Solution
VALLY HM 115 kV	P1-1:A12:8:_STANISLS 14kV Gen Unit 1 & P1-2:A11:48:_MANTECA-RIPON 115kV [0]	P3	G1/N1	>0.9, <1.1	>0.9, <1.1	0.89	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	0.87	Continue to monitor future load forecast
BEALE_1 60 kV	P1-1:A5:11:_NARROWS2 13.80KV GEN UNIT 1 & P1-2:A5:4:_COLGATE-PALERMO 230KV [9999]	P3	G1/N1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	1.10	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	Load power factor correction and voltage support if needed
BRWNS VY 60 kV	P1-1:A5:11:_NARROWS2 13.80KV GEN UNIT 1 & P1-4:A5:2:_RIO OSO SVC	P3	G1/N1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	1.11	1.10	>0.9, <1.1	1.10	>0.9, <1.1	>0.9, <1.1	Load power factor correction and voltage support if needed
CHALLNGE 60 kV	P1-1:A5:11:_NARROWS2 13.80KV GEN UNIT 1 & P1-4:A5:2:_RIO OSO SVC	P3	G1/N1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	1.11	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	Load power factor correction and voltage support if needed

Study Area: PG&E Central Valley

High/Low Voltages



Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)					Voltage PU (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations	
CLMBA HL 60 kV	P1-1:A5:11:_NARROWS2 13.80KV GEN UNIT 1 & P1-4:A5:2:_RIO OSO SVC	P3	G1/N1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	1.11	>0.9, <1.1	1.11	>0.9, <1.1	>0.9, <1.1	Load power factor correction and voltage support if needed
COLGATE 60 kV	P1-1:A5:11:_NARROWS2 13.80KV GEN UNIT 1 & P1-4:A5:2:_RIO OSO SVC	P3	G1/N1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	1.11	>0.9, <1.1	1.11	>0.9, <1.1	>0.9, <1.1	Load power factor correction and voltage support if needed
DOBBINS 60 kV	P1-1:A5:11:_NARROWS2 13.80KV GEN UNIT 1 & P1-4:A5:2:_RIO OSO SVC	P3	G1/N1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	1.11	>0.9, <1.1	1.11	>0.9, <1.1	>0.9, <1.1	Load power factor correction and voltage support if needed
NARRWS 1 60 kV	P1-1:A5:11:_NARROWS2 13.80KV GEN UNIT 1 & P1-4:A5:2:_RIO OSO SVC	P3	G1/N1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	1.11	1.10	>0.9, <1.1	1.10	>0.9, <1.1	>0.9, <1.1	Load power factor correction and voltage support if needed
NARRWS 2 60 kV	P1-1:A5:11:_NARROWS2 13.80KV GEN UNIT 1 & P1-4:A5:2:_RIO OSO SVC	P3	G1/N1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	1.11	1.10	>0.9, <1.1	1.10	>0.9, <1.1	>0.9, <1.1	Load power factor correction and voltage support if needed
SMRTVLLE 60 kV	P1-1:A5:11:_NARROWS2 13.80KV GEN UNIT 1 & P1-4:A5:2:_RIO OSO SVC	P3	G1/N1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	1.11	1.10	>0.9, <1.1	1.10	>0.9, <1.1	>0.9, <1.1	Load power factor correction and voltage support if needed
WEST JCT 60 kV	P1-1:A5:11:_NARROWS2 13.80KV GEN UNIT 1 & P1-4:A5:2:_RIO OSO SVC	P3	G1/N1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	1.11	>0.9, <1.1	>0.9, <1.1	1.10	>0.9, <1.1	>0.9, <1.1	Load power factor correction and voltage support if needed
YUBAGOLD 60 kV	P1-1:A5:11:_NARROWS2 13.80KV GEN UNIT 1 & P1-4:A5:2:_RIO OSO SVC	P3	G1/N1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	1.11	1.10	>0.9, <1.1	1.10	>0.9, <1.1	>0.9, <1.1	Load power factor correction and voltage support if needed
FORST HL 60 kV	P1-1:A5:17:_ROLLINSF 6.60KV GEN UNIT 1 & P1-1:A5:20:_OXBOW F 9.11KV GEN UNIT 1	P3	G1/N1	>0.9, <1.1	>0.9, <1.1	0.88	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	0.88	Continue to monitor future load forecast
WESTLEY 60 kV	P5-5:A11:1:_SCHULTE 115KV BAAH BUS #1 (FAILURE OF NON-REDUNDENT RELAY)	P5	Non-Redundant Relay	0.90	0.94	0.89	1.01	1.02	0.93	1.02	0.94	0.89	Protection upgrade
WSID 60 kV	P5-5:A11:1:_SCHULTE 115KV BAAH BUS #1 (FAILURE OF NON-REDUNDENT RELAY)	P5	Non-Redundant Relay	0.90	0.94	0.89	1.01	1.02	0.93	1.02	0.94	0.89	Protection upgrade
WSID TAP 60 kV	P5-5:A11:1:_SCHULTE 115KV BAAH BUS #1 (FAILURE OF NON-REDUNDENT RELAY)	P5	Non-Redundant Relay	0.90	0.94	0.89	1.01	1.02	0.93	1.02	0.94	0.89	Protection upgrade
ATLANTC 230 kV	P5-5:A5:1:_ATLANTIC 230 KV BAAH BUS #1 (FAILURE OF NON-REDUNDENT RELAY)	P5	Non-Redundant Relay	0.98	0.99	0.89	1.12	1.04	0.98	1.04	1.01	0.89	Protection upgrade
ATLANTI 60 kV	P5-5:A5:1:_ATLANTIC 230 KV BAAH BUS #1 (FAILURE OF NON-REDUNDENT RELAY)	P5	Non-Redundant Relay	1.04	1.04	0.90	1.18	1.10	1.04	1.10	1.08	0.90	Protection upgrade



Study Area: PG&E Central Valley

High/Low Voltages



Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)					Voltage PU (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations	
ATLANTIC 115 kV	P5-5:A5:1:_ATLANTIC 230 KV BAAH BUS #1 (FAILURE OF NON-REDUNDENT RELAY)	P5	Non-Redundant Relay	1.00	1.01	0.92	1.14	1.06	1.00	1.06	1.03	0.92	Protection upgrade
DEL MAR 60 kV	P5-5:A5:1:_ATLANTIC 230 KV BAAH BUS #1 (FAILURE OF NON-REDUNDENT RELAY)	P5	Non-Redundant Relay	1.04	1.04	0.88	1.19	1.10	1.03	1.10	1.08	0.88	Protection upgrade
PLSNT GR 115 kV	P5-5:A5:1:_ATLANTIC 230 KV BAAH BUS #1 (FAILURE OF NON-REDUNDENT RELAY)	P5	Non-Redundant Relay	1.00	1.01	0.93	1.13	1.05	1.01	1.05	1.03	0.93	Protection upgrade
ROCKLIN 60 kV	P5-5:A5:1:_ATLANTIC 230 KV BAAH BUS #1 (FAILURE OF NON-REDUNDENT RELAY)	P5	Non-Redundant Relay	1.05	1.05	0.90	1.19	1.10	1.04	1.10	1.08	0.89	Protection upgrade
SIERRAPI 60 kV	P5-5:A5:1:_ATLANTIC 230 KV BAAH BUS #1 (FAILURE OF NON-REDUNDENT RELAY)	P5	Non-Redundant Relay	1.04	1.04	0.88	1.19	1.10	1.03	1.10	1.08	0.88	Protection upgrade
TAYLOR 60 kV	P5-5:A5:1:_ATLANTIC 230 KV BAAH BUS #1 (FAILURE OF NON-REDUNDENT RELAY)	P5	Non-Redundant Relay	1.04	1.05	0.90	1.19	1.10	1.04	1.10	1.08	0.89	Protection upgrade
ULTRA JT 115 kV	P5-5:A5:1:_ATLANTIC 230 KV BAAH BUS #1 (FAILURE OF NON-REDUNDENT RELAY)	P5	Non-Redundant Relay	1.00	1.01	0.94	1.13	1.05	1.01	1.05	1.03	0.94	Protection upgrade
ULTR-RCK 115 kV	P5-5:A5:1:_ATLANTIC 230 KV BAAH BUS #1 (FAILURE OF NON-REDUNDENT RELAY)	P5	Non-Redundant Relay	1.00	1.01	0.94	1.13	1.05	1.01	1.05	1.03	0.94	Protection upgrade
MI-WUK 115 kV	BELLOTA 230/115kV TB 1 & BELLOTA 230/115kV TB 2	P6	N-1-1	0.82	0.85	0.81	>0.9, <1.1	>0.9, <1.1	0.84	>0.9, <1.1	>0.9, <1.1	0.78	Operating Solution
VALLY HM 115 kV	BELLOTA 230/115kV TB 1 & BELLOTA 230/115kV TB 2	P6	N-1-1	0.86	0.89	0.86	>0.9, <1.1	>0.9, <1.1	0.88	>0.9, <1.1	>0.9, <1.1	0.84	Operating Solution
CURTISS 115 kV	BELLOTA 230/115kV TB 2 & BELLOTA 230/115kV TB 1	P6	N-1-1	0.78	0.81	0.78	>0.9, <1.1	>0.9, <1.1	0.80	>0.9, <1.1	>0.9, <1.1	0.75	Operating Solution
PEORIA 115 kV	BELLOTA 230/115kV TB 2 & BELLOTA 230/115kV TB 1	P6	N-1-1	0.76	0.78	0.76	>0.9, <1.1	>0.9, <1.1	0.78	>0.9, <1.1	>0.9, <1.1	0.73	Operating Solution
R.TRACK 115 kV	BELLOTA 230/115kV TB 2 & BELLOTA 230/115kV TB 1	P6	N-1-1	0.74	0.76	0.75	>0.9, <1.1	>0.9, <1.1	0.76	>0.9, <1.1	>0.9, <1.1	0.73	Operating Solution



Study Area: PG&E Central Valley

High/Low Voltages



Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)					Voltage PU (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations	
RVRBANK 115 kV	BELLOTA 230/115kV TB 2 & BELLOTA 230/115kV TB 1	P6	N-1-1	0.55	0.56	0.56	>0.9, <1.1	>0.9, <1.1	0.55	>0.9, <1.1	0.87	0.54	Operating Solution
SPRNG GP 115 kV	BELLOTA 230/115kV TB 2 & BELLOTA 230/115kV TB 1	P6	N-1-1	0.86	0.89	0.86	>0.9, <1.1	>0.9, <1.1	0.88	>0.9, <1.1	>0.9, <1.1	0.82	Operating Solution
BRIGHTN 115 kV	BRIGHTON 230/115KV TB 10 & BRIGHTON 230/115KV TB 9	P6	N-1-1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	1.13	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	Load power factor correction and voltage support if needed
CAMPUS 115 kV	BRIGHTON 230/115KV TB 10 & BRIGHTON 230/115KV TB 9	P6	N-1-1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	1.13	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	Load power factor correction and voltage support if needed
GRAND IS 115 kV	BRIGHTON 230/115KV TB 10 & BRIGHTON 230/115KV TB 9	P6	N-1-1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	1.14	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	Load power factor correction and voltage support if needed
MOBILCHE 115 kV	BRIGHTON 230/115KV TB 10 & BRIGHTON 230/115KV TB 9	P6	N-1-1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	1.13	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	Load power factor correction and voltage support if needed
POST 115 kV	BRIGHTON 230/115KV TB 10 & BRIGHTON 230/115KV TB 9	P6	N-1-1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	1.13	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	Load power factor correction and voltage support if needed
Q653F 115 kV	BRIGHTON 230/115KV TB 10 & BRIGHTON 230/115KV TB 9	P6	N-1-1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	1.13	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	Load power factor correction and voltage support if needed
UCD_TP2 115 kV	BRIGHTON 230/115KV TB 10 & BRIGHTON 230/115KV TB 9	P6	N-1-1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	1.13	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	Load power factor correction and voltage support if needed
W.SCRMNO 115 kV	BRIGHTON 230/115KV TB 10 & BRIGHTON 230/115KV TB 9	P6	N-1-1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	1.13	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	Load power factor correction and voltage support if needed
WDLND_BM 115 kV	BRIGHTON 230/115KV TB 10 & BRIGHTON 230/115KV TB 9	P6	N-1-1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	1.13	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	Load power factor correction and voltage support if needed
WOODLD 115 kV	BRIGHTON 230/115KV TB 10 & BRIGHTON 230/115KV TB 9	P6	N-1-1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	1.13	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	Load power factor correction and voltage support if needed
BEALE_1 60 kV	COLGATE-PALERMO 230KV [9999] & RIO OSO SVC	P6	N-1-1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	1.11	>0.9, <1.1	1.11	>0.9, <1.1	>0.9, <1.1	Load power factor correction and voltage support if needed
BEALE_2 60 kV	COLGATE-PALERMO 230KV [9999] & RIO OSO SVC	P6	N-1-1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	1.11	>0.9, <1.1	1.11	>0.9, <1.1	>0.9, <1.1	Load power factor correction and voltage support if needed
BRWNS VY 60 kV	COLGATE-PALERMO 230KV [9999] & RIO OSO SVC	P6	N-1-1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	1.12	>0.9, <1.1	1.12	>0.9, <1.1	>0.9, <1.1	Load power factor correction and voltage support if needed
CHALLNGE 60 kV	COLGATE-PALERMO 230KV [9999] & RIO OSO SVC	P6	N-1-1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	1.14	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	Load power factor correction and voltage support if needed
CHLLNGEA 60 kV	COLGATE-PALERMO 230KV [9999] & RIO OSO SVC	P6	N-1-1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	1.14	>0.9, <1.1	1.14	>0.9, <1.1	>0.9, <1.1	Load power factor correction and voltage support if needed

Study Area: PG&E Central Valley

High/Low Voltages



Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)					Voltage PU (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations	
CLMBA HL 60 kV	COLGATE-PALERMO 230KV [9999] & RIO OSO SVC	P6	N-1-1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	1.14	>0.9, <1.1	1.14	>0.9, <1.1	>0.9, <1.1	Load power factor correction and voltage support if needed
CMP FRWT 60 kV	COLGATE-PALERMO 230KV [9999] & RIO OSO SVC	P6	N-1-1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	1.11	>0.9, <1.1	1.11	>0.9, <1.1	>0.9, <1.1	Load power factor correction and voltage support if needed
COLGATE 60 kV	COLGATE-PALERMO 230KV [9999] & RIO OSO SVC	P6	N-1-1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	1.14	>0.9, <1.1	1.14	>0.9, <1.1	>0.9, <1.1	Load power factor correction and voltage support if needed
COLGATEA 60 kV	COLGATE-PALERMO 230KV [9999] & RIO OSO SVC	P6	N-1-1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	1.14	>0.9, <1.1	1.14	>0.9, <1.1	>0.9, <1.1	Load power factor correction and voltage support if needed
DOBBINS 60 kV	COLGATE-PALERMO 230KV [9999] & RIO OSO SVC	P6	N-1-1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	1.14	>0.9, <1.1	1.14	>0.9, <1.1	>0.9, <1.1	Load power factor correction and voltage support if needed
NARRWS 1 60 kV	COLGATE-PALERMO 230KV [9999] & RIO OSO SVC	P6	N-1-1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	1.12	>0.9, <1.1	1.12	>0.9, <1.1	>0.9, <1.1	Load power factor correction and voltage support if needed
NARRWS 2 60 kV	COLGATE-PALERMO 230KV [9999] & RIO OSO SVC	P6	N-1-1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	1.13	>0.9, <1.1	1.13	>0.9, <1.1	>0.9, <1.1	Load power factor correction and voltage support if needed
SMRTSVLE 60 kV	COLGATE-PALERMO 230KV [9999] & RIO OSO SVC	P6	N-1-1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	1.12	>0.9, <1.1	1.12	>0.9, <1.1	>0.9, <1.1	Load power factor correction and voltage support if needed
YUBAGOLD 60 kV	COLGATE-PALERMO 230KV [9999] & RIO OSO SVC	P6	N-1-1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	1.12	>0.9, <1.1	1.12	>0.9, <1.1	>0.9, <1.1	Load power factor correction and voltage support if needed
ALLEGHNY 60 kV	COLGATE-SMARTVILLE #2 60KV [6520] MOAS OPENED ON COLGATE_NRRWS2TP & COLGATE-SMARTVILLE #1 60KV [6510] MOAS OPENED ON COLGATE_NRRWS1TP (2)	P6	N-1-1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	1.12	1.10	>0.9, <1.1	1.11	>0.9, <1.1	>0.9, <1.1	Load power factor correction and voltage support if needed
BANGOR 60 kV	COLGATE-SMARTVILLE #2 60KV [6520] MOAS OPENED ON COLGATE_NRRWS2TP & COLGATE-SMARTVILLE #1 60KV [6510] MOAS OPENED ON COLGATE_NRRWS1TP (2)	P6	N-1-1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	1.12	1.10	>0.9, <1.1	1.10	>0.9, <1.1	>0.9, <1.1	Load power factor correction and voltage support if needed
GRSS VLY 60 kV	COLGATE-SMARTVILLE #2 60KV [6520] MOAS OPENED ON COLGATE_NRRWS2TP & COLGATE-SMARTVILLE #1 60KV [6510] MOAS OPENED ON COLGATE_NRRWS1TP (2)	P6	N-1-1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	1.12	1.10	>0.9, <1.1	1.10	>0.9, <1.1	>0.9, <1.1	Load power factor correction and voltage support if needed

Study Area: PG&E Central Valley

High/Low Voltages



Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)					Voltage PU (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations	
PIKE CTY 60 kV	COLGATE-SMARTVILLE #2 60KV [6520] MOAS OPENED ON COLGATE_NRRWS2TP & COLGATE-SMARTVILLE #1 60KV [6510] MOAS OPENED ON COLGATE_NRRWS1TP (2)	P6	N-1-1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	1.12	1.10	>0.9, <1.1	1.10	>0.9, <1.1	>0.9, <1.1	Load power factor correction and voltage support if needed
MERIDIAN 60 kV	CORTINA #4 60KV [6610] & CORTINA 115/60KV TB 5	P6	N-1-1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	0.90	Sensitivity only
COLUSA 60 kV	CORTINA 115/60KV TB 5 & CORTINA-VACA 230KV [4540]	P6	N-1-1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	0.90	Sensitivity only
CORT_D 115 kV	CORTINA 230/115KV TB 4 & EAGLE ROCK-CORTINA 115KV [1470]	P6	N-1-1	>0.9, <1.1	1.11	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	1.11	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	Load power factor correction and voltage support if needed
CORTINA 115 kV	CORTINA 230/115KV TB 4 & EAGLE ROCK-CORTINA 115KV [1470]	P6	N-1-1	>0.9, <1.1	1.11	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	1.11	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	Load power factor correction and voltage support if needed
COTTLE 230 kV	COTTLE-MELONES 230kv [4530] & BELLOTA-WARNERVILLE 230kv [4380]	P6	N-1-1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	1.12	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	Load power factor correction and voltage support if needed
CHCGO PK 115 kV	DRUM-HIGGINS 115KV [4393] MOAS OPENED ON DRUM_DTCH FL1 & DTCH FL1 115/11KV TB 1	P6	N-1-1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	1.13	>0.9, <1.1	1.13	>0.9, <1.1	>0.9, <1.1	Load power factor correction and voltage support if needed
DTCH FL1 115 kV	DRUM-HIGGINS 115KV [4393] MOAS OPENED ON DRUM_DTCH FL1 & RIO OSO SVC	P6	N-1-1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	1.14	>0.9, <1.1	1.15	>0.9, <1.1	>0.9, <1.1	Load power factor correction and voltage support if needed
AUBURN 60 kV	GOLDHILL 230/115KV TB 1 & GOLDHILL 230/115KV TB 2	P6	N-1-1	Diverge	Diverge	Diverge	1.10	>0.9, <1.1	Diverge	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	Project: Atlantic-Placer 115 kV Line Project on hold. Project scope under review
BELL PGE 115 kV	GOLDHILL 230/115KV TB 1 & GOLDHILL 230/115KV TB 2	P6	N-1-1	Diverge	Diverge	Diverge	>0.9, <1.1	>0.9, <1.1	Diverge	>0.9, <1.1	0.88	>0.9, <1.1	Project: Atlantic-Placer 115 kV Line Project on hold. Project scope under review
CLRKSVLE 115 kV	GOLDHILL 230/115KV TB 1 & GOLDHILL 230/115KV TB 2	P6	N-1-1	Diverge	Diverge	Diverge	>0.9, <1.1	>0.9, <1.1	Diverge	>0.9, <1.1	0.88	>0.9, <1.1	Project: Atlantic-Placer 115 kV Line Project on hold. Project scope under review
DMND SPR 115 kV	GOLDHILL 230/115KV TB 1 & GOLDHILL 230/115KV TB 2	P6	N-1-1	Diverge	Diverge	Diverge	>0.9, <1.1	>0.9, <1.1	Diverge	>0.9, <1.1	0.90	>0.9, <1.1	Project: Atlantic-Placer 115 kV Line Project on hold. Project scope under review
FLINT 115 kV	GOLDHILL 230/115KV TB 1 & GOLDHILL 230/115KV TB 2	P6	N-1-1	Diverge	Diverge	Diverge	>0.9, <1.1	>0.9, <1.1	Diverge	>0.9, <1.1	0.88	>0.9, <1.1	Project: Atlantic-Placer 115 kV Line Project on hold. Project scope under review
GOLD HLL 60 kV	GOLDHILL 230/115KV TB 1 & GOLDHILL 230/115KV TB 2	P6	N-1-1	Diverge	Diverge	Diverge	1.12	>0.9, <1.1	Diverge	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	Project: Atlantic-Placer 115 kV Line Project on hold. Project scope under review

Study Area: PG&E Central Valley

High/Low Voltages



Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)					Voltage PU (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations	
HALSEY 60 kV	GOLDHILL 230/115KV TB 1 & GOLDHILL 230/115KV TB 2	P6	N-1-1	Diverge	Diverge	Diverge	1.10	>0.9, <1.1	Diverge	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	Project: Atlantic-Placer 115 kV Line Project on hold. Project scope under review
HIGGINS 115 kV	GOLDHILL 230/115KV TB 1 & GOLDHILL 230/115KV TB 2	P6	N-1-1	Diverge	Diverge	Diverge	>0.9, <1.1	>0.9, <1.1	Diverge	>0.9, <1.1	0.89	>0.9, <1.1	Project: Atlantic-Placer 115 kV Line Project on hold. Project scope under review
HORSESHE 115 kV	GOLDHILL 230/115KV TB 1 & GOLDHILL 230/115KV TB 2	P6	N-1-1	Diverge	Diverge	Diverge	>0.9, <1.1	>0.9, <1.1	Diverge	>0.9, <1.1	0.88	>0.9, <1.1	Project: Atlantic-Placer 115 kV Line Project on hold. Project scope under review
LIMESTNE 60 kV	GOLDHILL 230/115KV TB 1 & GOLDHILL 230/115KV TB 2	P6	N-1-1	Diverge	Diverge	Diverge	1.13	>0.9, <1.1	Diverge	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	Project: Atlantic-Placer 115 kV Line Project on hold. Project scope under review
MTN_QUAR 60 kV	GOLDHILL 230/115KV TB 1 & GOLDHILL 230/115KV TB 2	P6	N-1-1	Diverge	Diverge	Diverge	1.11	>0.9, <1.1	Diverge	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	Project: Atlantic-Placer 115 kV Line Project on hold. Project scope under review
PENRYN 60 kV	GOLDHILL 230/115KV TB 1 & GOLDHILL 230/115KV TB 2	P6	N-1-1	Diverge	Diverge	Diverge	1.11	>0.9, <1.1	Diverge	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	Project: Atlantic-Placer 115 kV Line Project on hold. Project scope under review
PLACER 115 kV	GOLDHILL 230/115KV TB 1 & GOLDHILL 230/115KV TB 2	P6	N-1-1	Diverge	Diverge	Diverge	>0.9, <1.1	>0.9, <1.1	Diverge	>0.9, <1.1	0.87	>0.9, <1.1	Project: Atlantic-Placer 115 kV Line Project on hold. Project scope under review
PLACER 60 kV	GOLDHILL 230/115KV TB 1 & GOLDHILL 230/115KV TB 2	P6	N-1-1	Diverge	Diverge	Diverge	1.11	>0.9, <1.1	Diverge	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	Project: Atlantic-Placer 115 kV Line Project on hold. Project scope under review
SHPRING 115 kV	GOLDHILL 230/115KV TB 1 & GOLDHILL 230/115KV TB 2	P6	N-1-1	Diverge	Diverge	Diverge	>0.9, <1.1	>0.9, <1.1	Diverge	>0.9, <1.1	0.89	>0.9, <1.1	Project: Atlantic-Placer 115 kV Line Project on hold. Project scope under review
INGRM C. 115 kV	MANTECA-KASSON-SCHULTE 115kV [7472] & SCHULTE SW STA-LAMMERS 115kV [3993]	P6	N-1-1	0.79	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	Project: Vierra 115 kV Looping Project In-Service Date: Jan 2023 Short term: Action plan
MILLER 115 kV	MANTECA-KASSON-SCHULTE 115kV [7472] & SCHULTE SW STA-LAMMERS 115kV [3993]	P6	N-1-1	0.88	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	Project: Vierra 115 kV Looping Project In-Service Date: Jan 2023 Short term: Action plan
VALLY HM 115 kV	MANTECA-KASSON-SCHULTE 115kV [7472] & SCHULTE SW STA-LAMMERS 115kV [3993]	P6	N-1-1	0.64	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	Project: Vierra 115 kV Looping Project In-Service Date: Jan 2023 Short term: Action plan
WESTLEY 60 kV	MANTECA-KASSON-SCHULTE 115kV [7472] & SCHULTE SW STA-LAMMERS 115kV [3993]	P6	N-1-1	0.52	>0.9, <1.1	0.86	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	0.89	0.86	Project: Vierra 115 kV Looping Project In-Service Date: Jan 2023 Short term: Action plan
WSID 60 kV	MANTECA-KASSON-SCHULTE 115kV [7472] & SCHULTE SW STA-LAMMERS 115kV [3993]	P6	N-1-1	0.52	>0.9, <1.1	0.86	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	0.89	0.86	Project: Vierra 115 kV Looping Project In-Service Date: Jan 2023 Short term: Action plan

Study Area: PG&E Central Valley

High/Low Voltages



Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)					Voltage PU (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations	
ENCINAL 60 kV	PALERMO-PEASE 115KV [3220] MOAS OPENED ON PALERMO_HONC JT1 & PEASE-RIO OSO 115KV [3270] MOAS OPENED ON OLIVH J1_E.MRY J1	P6	N-1-1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	0.79	Sensitivity only
HARTER 60 kV	PALERMO-PEASE 115KV [3220] MOAS OPENED ON PALERMO_HONC JT1 & PEASE-RIO OSO 115KV [3270] MOAS OPENED ON OLIVH J1_E.MRY J1	P6	N-1-1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	0.78	Sensitivity only
LIVE OAK 60 kV	PALERMO-PEASE 115KV [3220] MOAS OPENED ON PALERMO_HONC JT1 & PEASE-RIO OSO 115KV [3270] MOAS OPENED ON OLIVH J1_E.MRY J1	P6	N-1-1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	0.80	Sensitivity only
MRYSVLE 60 kV	PALERMO-PEASE 115KV [3220] MOAS OPENED ON PALERMO_HONC JT1 & PEASE-RIO OSO 115KV [3270] MOAS OPENED ON OLIVH J1_E.MRY J1	P6	N-1-1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	0.75	Sensitivity only
PEACHTON 60 kV	PALERMO-PEASE 115KV [3220] MOAS OPENED ON PALERMO_HONC JT1 & PEASE-RIO OSO 115KV [3270] MOAS OPENED ON OLIVH J1_E.MRY J1	P6	N-1-1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	0.84	Sensitivity only
TRES VIS 60 kV	PALERMO-PEASE 115KV [3220] MOAS OPENED ON PALERMO_HONC JT1 & PEASE-RIO OSO 115KV [3270] MOAS OPENED ON OLIVH J1_E.MRY J1	P6	N-1-1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	0.89	Sensitivity only
E.MRY J1 115 kV	PALERMO-PEASE 115KV [3220] MOAS OPENED ON PALERMO_HONC JT1 & PEASE-RIO OSO 115KV [3270] MOAS OPENED ON OLIVH J1_E.MRY J1 (2)	P6	N-1-1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	1.16	>0.9, <1.1	1.16	>0.9, <1.1	>0.9, <1.1	Load power factor correction and voltage support if needed
PEASE 115 kV	PALERMO-PEASE 115KV [3220] MOAS OPENED ON PALERMO_HONC JT1 & PEASE-RIO OSO 115KV [3270] MOAS OPENED ON OLIVH J1_E.MRY J1 (2)	P6	N-1-1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	1.16	>0.9, <1.1	1.16	>0.9, <1.1	0.75	Sensitivity only



Study Area: PG&E Central Valley

High/Low Voltages



Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)					Voltage PU (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations	
ULTR-RCK 115 kV	RIO OSO SVC & LINCOLN-PLEASANT GROVE 115KV [7400] MOAS OPENED ON LINCLN_ULTRA JT	P6	N-1-1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	1.12	>0.9, <1.1	1.12	>0.9, <1.1	>0.9, <1.1	Load power factor correction and voltage support if needed
PLSNT GR 115 kV	RIO OSO SVC & LINCOLN-PLEASANT GROVE 115KV [7400] MOAS OPENED ON ULTRA JT_PLSNT GR	P6	N-1-1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	1.12	>0.9, <1.1	1.12	>0.9, <1.1	>0.9, <1.1	Load power factor correction and voltage support if needed
LINCLN 115 kV	RIO OSO SVC & RIO OSO-LINCOLN 115KV [1320]	P6	N-1-1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	1.12	>0.9, <1.1	1.12	>0.9, <1.1	>0.9, <1.1	Load power factor correction and voltage support if needed
ATLANTC 230 kV	RIO OSO-ATLANTIC 230KV [5590] & ATLANTIC-GOLD HILL 230KV [4330]	P6	N-1-1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	1.11	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	Load power factor correction and voltage support if needed
DEL MAR 60 kV	RIO OSO-ATLANTIC 230KV [5590] & ATLANTIC-GOLD HILL 230KV [4330]	P6	N-1-1	>0.9, <1.1	>0.9, <1.1	0.89	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	0.89	Continue to monitor future load forecast
BRIGHTON 230 kV	RIO OSO-BRIGHTON 230KV [5600] & BRIGHTON-BELLOTA 230kV [4420]	P6	N-1-1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	1.17	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	Load power factor correction and voltage support if needed
SUMMIT 60 kV	RIO OSO-KNIGHTLD-WOODLD 115KV [3460] & BELL-PLACER 115KV [4395] MOAS OPENED ON PLACER_BELL PGE	P6	N-1-1	>0.9, <1.1	>0.9, <1.1	0.90	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	0.89	Continue to monitor future load forecast
FORST HL 60 kV	RIO OSO-KNIGHTLD-WOODLD 115KV [3460] & ROLLINSF 6.60KV GEN UNIT 1	P6	N-1-1	>0.9, <1.1	>0.9, <1.1	0.79	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	0.79	Continue to monitor future load forecast
DEEPWATR 115 kV	WEST SACRAMENTO-BRIGHTON 115KV [4110] & DAVIS-UCD_TP2 115KV [6680] MOAS OPENED ON BRKRJCT_UCD_TP2	P6	N-1-1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	1.12	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	Load power factor correction and voltage support if needed
DAVIS 115 kV	WEST SACRAMENTO-DAVIS 115KV [4120] & DAVIS-UCD_TP2 115KV [6680] MOAS OPENED ON BRKRJCT_UCD_TP2	P6	N-1-1	>0.9, <1.1	>0.9, <1.1	0.90	1.11	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	0.88	Continue to monitor future load forecast
CISCOTAP 60 kV	WOODLD-KNIGHTLD-RIO OSO 115KV [3460] & BELL-PLACER 115KV [4395] MOAS OPENED ON PLACER_BELL PGE	P6	N-1-1	>0.9, <1.1	>0.9, <1.1	0.90	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	0.90	Continue to monitor future load forecast
TAMARACK 60 kV	WOODLD-KNIGHTLD-RIO OSO 115KV [3460] & BELL-PLACER 115KV [4395] MOAS OPENED ON PLACER_BELL PGE	P6	N-1-1	>0.9, <1.1	>0.9, <1.1	0.90	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	0.90	Continue to monitor future load forecast
GRSS VLY 60 kV	WOODLD-KNIGHTLD-RIO OSO 115KV [3460] & COLGATE-GRASS VALLEY 60KV [6490]	P6	N-1-1	>0.9, <1.1	>0.9, <1.1	0.84	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	0.84	Continue to monitor future load forecast

Study Area: PG&E Central Valley

High/Low Voltages



Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)					Voltage PU (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations	
BONNIE N 60 kV	WOODLD-KNIGHTLD-RIO OSO 115KV [3460] & ROLLINSF 6.60KV GEN UNIT 1	P6	N-1-1	>0.9, <1.1	>0.9, <1.1	0.89	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	0.89	Continue to monitor future load forecast
CAPEHORN 60 kV	WOODLD-KNIGHTLD-RIO OSO 115KV [3460] & ROLLINSF 6.60KV GEN UNIT 1	P6	N-1-1	>0.9, <1.1	>0.9, <1.1	0.85	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	0.84	Continue to monitor future load forecast
SHADYGLN 60 kV	WOODLD-KNIGHTLD-RIO OSO 115KV [3460] & ROLLINSF 6.60KV GEN UNIT 1	P6	N-1-1	>0.9, <1.1	>0.9, <1.1	0.85	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	0.84	Continue to monitor future load forecast
WEMR SWS 60 kV	WOODLD-KNIGHTLD-RIO OSO 115KV [3460] & ROLLINSF 6.60KV GEN UNIT 1	P6	N-1-1	>0.9, <1.1	>0.9, <1.1	0.83	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	0.83	Continue to monitor future load forecast
WESTLEY 60 kV	P7-1:A11:29:_TESLA-SCHULTE SW STA #2 115KV [3970] & TESLA-SCHULTE SW STA #1 115KV [3982]	P7	DCTL	0.96	0.96	0.93	1.01	1.01	0.96	1.01	0.89	0.93	Sensitivity only
WSID 60 kV	P7-1:A11:29:_TESLA-SCHULTE SW STA #2 115KV [3970] & TESLA-SCHULTE SW STA #1 115KV [3982]	P7	DCTL	0.96	0.96	0.93	1.01	1.01	0.96	1.01	0.89	0.93	Sensitivity only
WSID TAP 60 kV	P7-1:A11:29:_TESLA-SCHULTE SW STA #2 115KV [3970] & TESLA-SCHULTE SW STA #1 115KV [3982]	P7	DCTL	0.96	0.96	0.93	1.01	1.01	0.96	1.01	0.89	0.93	Sensitivity only
COTTLE 230 kV	P7-1:A12:2:_MELONES-WILSON 230KV [5080] & COTTLE-MELONES 230KV [4530]	P7	DCTL	1.01	1.02	0.99	1.10	1.10	1.01	1.10	1.00	0.99	Load power factor correction and voltage support if needed
BRIGHTON 230 kV	P7-1:A12:8:_COTTLE-MELONES 230KV [4530] & BELLOTA-WARNERVILLE 230KV [4380]	P7	DCTL	0.99	1.01	0.97	1.11	1.07	1.00	1.07	0.99	0.97	Load power factor correction and voltage support if needed
COTTLE 230 kV	P7-1:A12:8:_COTTLE-MELONES 230KV [4530] & BELLOTA-WARNERVILLE 230KV [4380]	P7	DCTL	1.01	1.02	0.99	1.12	1.11	1.01	1.11	1.00	0.99	Load power factor correction and voltage support if needed
BRIGHTON 230 kV	P7-1:A4:10_Rio Oso-Brighton 230 kV Line & Rio Oso-Lockeford 230 kV Line	P7	DCTL	0.99	1.00	0.94	1.11	1.09	0.98	1.09	0.99	0.94	Load power factor correction and voltage support if needed
E.NICOLS 115 kV	P7-1:A5:12_Rio Oso-Nicolaus 115 kV Line & Bogue-Rio Oso 115 kV Line	P7	DCTL	1.05	1.06	0.96	1.12	1.10	1.05	1.10	1.07	0.96	Load power factor correction and voltage support if needed
PEAS RG 60 kV	P7-1:A5:20_Palermo-Pease 115 kV Line amd Pease-Rio Oso 115 kV Line	P7	DCTL	0.95	0.95	0.93	1.14	1.13	0.95	1.03	0.88	Diverge	Load power factor correction and voltage support if needed
PEASE 115 kV	P7-1:A5:20_Palermo-Pease 115 kV Line amd Pease-Rio Oso 115 kV Line	P7	DCTL	0.97	0.97	0.94	1.17	1.16	0.97	1.08	0.90	Diverge	Load power factor correction and voltage support if needed

Study Area: PG&E Central Valley

High/Low Voltages



Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)					Voltage PU (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations	
ALLEGHNY 60 kV	P7-1:A5:6_Table Mountain-Rio Oso 230 kV Line & Palermo-Colgate 230 kV Line	P7	DCTL	1.03	1.04	1.02	1.12	1.08	1.04	1.08	1.03	1.02	Load power factor correction and voltage support if needed
BANGOR 60 kV	P7-1:A5:6_Table Mountain-Rio Oso 230 kV Line & Palermo-Colgate 230 kV Line	P7	DCTL	1.02	1.03	1.02	1.11	1.08	1.03	1.08	1.02	1.02	Load power factor correction and voltage support if needed
CHALLENGE 60 kV	P7-1:A5:6_Table Mountain-Rio Oso 230 kV Line & Palermo-Colgate 230 kV Line	P7	DCTL	1.03	1.04	1.02	1.11	1.07	1.04	1.07	1.02	1.02	Load power factor correction and voltage support if needed
CHLLNGEA 60 kV	P7-1:A5:6_Table Mountain-Rio Oso 230 kV Line & Palermo-Colgate 230 kV Line	P7	DCTL	1.04	1.05	1.03	1.11	1.07	1.04	1.07	1.02	1.03	Load power factor correction and voltage support if needed
CLMBA HL 60 kV	P7-1:A5:6_Table Mountain-Rio Oso 230 kV Line & Palermo-Colgate 230 kV Line	P7	DCTL	1.04	1.05	1.03	1.11	1.08	1.04	1.08	1.03	1.03	Load power factor correction and voltage support if needed
COLGATE 60 kV	P7-1:A5:6_Table Mountain-Rio Oso 230 kV Line & Palermo-Colgate 230 kV Line	P7	DCTL	1.04	1.05	1.04	1.11	1.08	1.05	1.07	1.03	1.04	Load power factor correction and voltage support if needed
COLGATEA 60 kV	P7-1:A5:6_Table Mountain-Rio Oso 230 kV Line & Palermo-Colgate 230 kV Line	P7	DCTL	1.04	1.05	1.03	1.11	1.07	1.04	1.07	1.02	1.03	Load power factor correction and voltage support if needed
DOBBINS 60 kV	P7-1:A5:6_Table Mountain-Rio Oso 230 kV Line & Palermo-Colgate 230 kV Line	P7	DCTL	1.04	1.05	1.03	1.11	1.07	1.04	1.07	1.02	1.03	Load power factor correction and voltage support if needed
GRSS VLY 60 kV	P7-1:A5:6_Table Mountain-Rio Oso 230 kV Line & Palermo-Colgate 230 kV Line	P7	DCTL	1.02	1.04	1.01	1.11	1.08	1.03	1.08	1.02	1.01	Load power factor correction and voltage support if needed
PIKE CTY 60 kV	P7-1:A5:6_Table Mountain-Rio Oso 230 kV Line & Palermo-Colgate 230 kV Line	P7	DCTL	1.04	1.05	1.02	1.11	1.08	1.04	1.08	1.03	1.02	Load power factor correction and voltage support if needed
APLHTAP1 115 kV	P7-1:A5:7_Atlantic-Gold Hill 230 kV Line & Rio Oso-Gold Hill 230 kV Line	P7	DCTL	1.05	1.06	1.01	1.16	1.15	1.05	1.15	1.05	1.01	Load power factor correction and voltage support if needed
APLHTAP2 115 kV	P7-1:A5:7_Atlantic-Gold Hill 230 kV Line & Rio Oso-Gold Hill 230 kV Line	P7	DCTL	1.04	1.06	1.01	1.16	1.15	1.05	1.15	1.05	1.01	Load power factor correction and voltage support if needed
APPLE HL 115 kV	P7-1:A5:7_Atlantic-Gold Hill 230 kV Line & Rio Oso-Gold Hill 230 kV Line	P7	DCTL	1.05	1.06	1.01	1.16	1.15	1.05	1.15	1.05	1.01	Load power factor correction and voltage support if needed
CLRKSVLE 115 kV	P7-1:A5:7_Atlantic-Gold Hill 230 kV Line & Rio Oso-Gold Hill 230 kV Line	P7	DCTL	1.04	1.05	1.01	1.16	1.15	1.04	1.15	1.04	1.01	Load power factor correction and voltage support if needed
CLRKSVLT 115 kV	P7-1:A5:7_Atlantic-Gold Hill 230 kV Line & Rio Oso-Gold Hill 230 kV Line	P7	DCTL	1.05	1.06	1.02	1.16	1.14	1.05	1.14	1.05	1.02	Load power factor correction and voltage support if needed
CPM 115 kV	P7-1:A5:7_Atlantic-Gold Hill 230 kV Line & Rio Oso-Gold Hill 230 kV Line	P7	DCTL	1.05	1.06	1.02	1.16	1.14	1.05	1.14	1.05	1.02	Load power factor correction and voltage support if needed
CPM TAP 115 kV	P7-1:A5:7_Atlantic-Gold Hill 230 kV Line & Rio Oso-Gold Hill 230 kV Line	P7	DCTL	1.05	1.06	1.02	1.16	1.14	1.05	1.14	1.05	1.02	Load power factor correction and voltage support if needed

Study Area: PG&E Central Valley

High/Low Voltages



Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)					Voltage PU (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations	
DIMOND_1 115 kV	P7-1:A5:7_Atlantic-Gold Hill 230 kV Line & Rio Oso-Gold Hill 230 kV Line	P7	DCTL	1.05	1.06	1.01	1.16	1.15	1.05	1.15	1.05	1.01	Load power factor correction and voltage support if needed
DIMOND_2 115 kV	P7-1:A5:7_Atlantic-Gold Hill 230 kV Line & Rio Oso-Gold Hill 230 kV Line	P7	DCTL	1.04	1.05	1.01	1.16	1.15	1.05	1.15	1.04	1.01	Load power factor correction and voltage support if needed
DMND SPR 115 kV	P7-1:A5:7_Atlantic-Gold Hill 230 kV Line & Rio Oso-Gold Hill 230 kV Line	P7	DCTL	1.04	1.05	1.01	1.16	1.15	1.05	1.15	1.04	1.01	Load power factor correction and voltage support if needed
ELDORAD 115 kV	P7-1:A5:7_Atlantic-Gold Hill 230 kV Line & Rio Oso-Gold Hill 230 kV Line	P7	DCTL	1.05	1.06	1.01	1.16	1.15	1.05	1.15	1.05	1.01	Load power factor correction and voltage support if needed
GOLDHILL 115 kV	P7-1:A5:7_Atlantic-Gold Hill 230 kV Line & Rio Oso-Gold Hill 230 kV Line	P7	DCTL	1.05	1.06	1.03	1.16	1.14	1.05	1.14	1.05	1.03	Load power factor correction and voltage support if needed
HORSESHE 115 kV	P7-1:A5:7_Atlantic-Gold Hill 230 kV Line & Rio Oso-Gold Hill 230 kV Line	P7	DCTL	1.04	1.04	1.01	1.15	1.14	1.04	1.14	1.04	1.01	Load power factor correction and voltage support if needed
HORSHE1 115 kV	P7-1:A5:7_Atlantic-Gold Hill 230 kV Line & Rio Oso-Gold Hill 230 kV Line	P7	DCTL	1.04	1.04	1.01	1.15	1.14	1.04	1.14	1.04	1.01	Load power factor correction and voltage support if needed
HORSHE2 115 kV	P7-1:A5:7_Atlantic-Gold Hill 230 kV Line & Rio Oso-Gold Hill 230 kV Line	P7	DCTL	1.04	1.05	1.01	1.15	1.14	1.04	1.14	1.04	1.02	Load power factor correction and voltage support if needed
MIZOU_T1 115 kV	P7-1:A5:7_Atlantic-Gold Hill 230 kV Line & Rio Oso-Gold Hill 230 kV Line	P7	DCTL	1.05	1.06	1.01	1.16	1.15	1.05	1.15	1.05	1.01	Load power factor correction and voltage support if needed
MIZOU_T2 115 kV	P7-1:A5:7_Atlantic-Gold Hill 230 kV Line & Rio Oso-Gold Hill 230 kV Line	P7	DCTL	1.04	1.05	1.01	1.16	1.15	1.05	1.15	1.04	1.01	Load power factor correction and voltage support if needed
PLCRVLB2 115 kV	P7-1:A5:7_Atlantic-Gold Hill 230 kV Line & Rio Oso-Gold Hill 230 kV Line	P7	DCTL	1.04	1.05	1.01	1.16	1.15	1.05	1.15	1.04	1.01	Load power factor correction and voltage support if needed
PLCRVLB3 115 kV	P7-1:A5:7_Atlantic-Gold Hill 230 kV Line & Rio Oso-Gold Hill 230 kV Line	P7	DCTL	1.04	1.05	1.01	1.16	1.15	1.05	1.15	1.04	1.01	Load power factor correction and voltage support if needed
PLCRVLT1 115 kV	P7-1:A5:7_Atlantic-Gold Hill 230 kV Line & Rio Oso-Gold Hill 230 kV Line	P7	DCTL	1.05	1.06	1.01	1.16	1.15	1.05	1.15	1.05	1.01	Load power factor correction and voltage support if needed
PLCRVLT2 115 kV	P7-1:A5:7_Atlantic-Gold Hill 230 kV Line & Rio Oso-Gold Hill 230 kV Line	P7	DCTL	1.04	1.05	1.01	1.16	1.15	1.05	1.15	1.04	1.01	Load power factor correction and voltage support if needed
SHPRING 115 kV	P7-1:A5:7_Atlantic-Gold Hill 230 kV Line & Rio Oso-Gold Hill 230 kV Line	P7	DCTL	1.04	1.06	1.01	1.16	1.15	1.05	1.15	1.04	1.01	Load power factor correction and voltage support if needed
SHPRING1 115 kV	P7-1:A5:7_Atlantic-Gold Hill 230 kV Line & Rio Oso-Gold Hill 230 kV Line	P7	DCTL	1.05	1.06	1.01	1.16	1.15	1.05	1.15	1.05	1.01	Load power factor correction and voltage support if needed
SHPRING2 115 kV	P7-1:A5:7_Atlantic-Gold Hill 230 kV Line & Rio Oso-Gold Hill 230 kV Line	P7	DCTL	1.04	1.06	1.02	1.16	1.15	1.05	1.14	1.04	1.02	Load power factor correction and voltage support if needed

Study Area: PG&E Central Valley

High/Low Voltages



Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)					Voltage PU (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations	
SPICAMIN 115 kV	P7-1:A5:7_Atlantic-Gold Hill 230 kV Line & Rio Oso-Gold Hill 230 kV Line	P7	DCTL	1.05	1.06	1.01	1.16	1.15	1.05	1.15	1.05	1.01	Load power factor correction and voltage support if needed



Study Area: PG&E Central Valley

Voltage Deviation



Substation	Contingency (All and Worst P6)	Category	Category Description	Post Cont. Voltage Deviation % (Baseline Scenarios)					Post Cont. Voltage Deviation % (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations	
VALLY HM 115 kV	SPISONORA 14kV Gen Unit 1 & MANTECA-RIPON 115kV [0]	P3	G-1/N-1	<8	<8	<8	<8	<8	<8	<8	<8	8	Sensitivity only
VALLY HM 115 kV	TULLOCH 7kV Gen Unit 2 & MANTECA-RIPON 115kV [0]	P3	G-1/N-1	<8	<8	<8	<8	<8	<8	<8	<8	8	Sensitivity only
VALLY HM 115 kV	DONNELLS 14kV Gen Unit 1 & MANTECA-RIPON 115kV [0]	P3	G-1/N-1	<8	<8	<8	<8	<8	<8	<8	<8	9	Sensitivity only
VALLY HM 115 kV	STANISLS 14kV Gen Unit 1 & MANTECA-RIPON 115kV [0]	P3	G-1/N-1	<8	<8	10	<8	<8	<8	<8	<8	11	Continue to monitor future load forecast
GRSS VLY 60 kV	ROLLINSF 6.60KV GEN UNIT 1 & COLGATE-GRASS VALLEY 60KV [6490]	P3	G-1/N-1	<8	10	12	<8	<8	10	<8	<8	11	System adjustments after the first contingency or disable automatics
GRSS VLY 60 kV	OXBOW F 9.11KV GEN UNIT 1 & COLGATE-GRASS VALLEY 60KV [6490]	P3	G-1/N-1	<8	<8	8	<8	<8	<8	<8	<8	8	Continue to monitor future load forecast

Study Area: PG&E Central Valley

Transient Stability



Contingency	Category	Category Description	Transient Stability Performance					Potential Mitigation Solutions
			Baseline Scenarios			Sensitivity Scenarios		
			2020 Summer Peak	2028 Summer Peak	2023 Spring Off-Peak	2020 SP Heavy Renewable & Min Gas Gen	2023 SpOP Hi Renew & Min Gas Gen	
Colgate Generator 1 Trip	P1-1	N-1	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No Violation
Tesla - Newark 230 kV Line Fault	P1-2	N-1	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No Violation
Tesla 500/230 kV Transformer Fault	P1-3	N-1	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No Violation
Atlantic SVD Fault	P1-4	N-1	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No Violation
Tesla 230 kV Bus Fault	P2-2	Bus	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No Violation
Tesla 230 kV non-tie-breaker fault	P2-3	Non-Bus-Tie Breaker	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No Violation
Tesla 230 kV tie-breaker fault	P2-4	Bus-Tie Breaker	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No Violation
Golgate out and GWFTracy Generator fault	P3-1	G-1/G-1	Numerical issue	Stable/WECC criteria met	Numerical issue	Numerical issue	Numerical issue	Under review with PTO
Golgate out and Tesla-Newark 230 kV line fault	P3-2	G-1/N-1	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No Violation
Colgate out and Tesla 500/230 kV Transformer Fault	P3-3	G-1/N-1	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No Violation
Colgate out and Atlantic SVD Fault	P3-4	G-1/N-1	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No Violation
USWP-RUS Generator fault plus stuck breaker	P4-1	Stuck Breaker	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No Violation
Bellota line fault plus stuck breaker	P4-2	Stuck Breaker	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No Violation
Vaca Dixon transformer fault plus stuck breaker	P4-3	Stuck Breaker	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No Violation
Atlantic SVD Fault plus stuck breaker	P4-4	Stuck Breaker	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No Violation
Tesla 230 kV bus section fault plus stuck breaker	P4-5	Stuck Breaker	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No Violation
Tesla 230 kV bus tie-breaker fault	P4-6	Stuck Breaker	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No Violation
Solano generator fault plus relay failure	P5-1	Non-Redundant Relay	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No Violation
Bellota line fault plus relay failure	P5-2	Non-Redundant Relay	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No Violation
Vaca Dixon transformer fault plus relay failure	P5-3	Non-Redundant Relay	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No Violation
Atlantic SVD Fault plus relay failure	P5-4	Non-Redundant Relay	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No Violation
Tesla transformer out and Tesla-ADCC 230 kV line fault	P6-1	N-1/N-1	Numerical issue	Numerical issue	Numerical issue	Numerical issue	Numerical issue	Under review with PTO
Tesla transformer out and another Tesla transformer fault	P6-2	N-1/N-1	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No Violation
Atlantic SVD out and Vaca Dixon SVD fault	P6-3	N-1/N-1	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No Violation
Pease-Palermo and Pease-Rio Oso 115 kV lines (DCTL)- Temporary fault	P7-1	DCTL	Numerical issue	Numerical issue	Numerical issue	Numerical issue	Numerical issue	Under review with PTO
Pease-Palermo and Pease-Rio Oso 115 kV lines (DCTL)- Permanent fault	P7-1	DCTL	Numerical issue	Numerical issue	Numerical issue	Numerical issue	Numerical issue	Under review with PTO
Stanislaus-Manteca and Stanislaus-Melones_Riverbank 115 kV lines (DCTL) - Temporary fault	P7-1	DCTL	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No Violation
Stanislaus-Manteca and Stanislaus-Melones_Riverbank 115 kV lines (DCTL) - Permanent fault	P7-1	DCTL	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No Violation

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..	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 substation with more than 100 MW load