APPENDIX C: Reliability Assessment Study Results

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Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading % (Baseline Scenarios)							Loading % (Sensitivity Scenarios)			Project & Potential Mitigation Solutions
				2022 Summer Peak	2025 Summer Peak	2030 Summer Peak	2022 Spring Off- Peak	2025 Spring Off- Peak	2030 Spring Off- Peak	2030 Winter Off- Peak	2022 SP Heavy Renewable & Min Gas Gen	2025 SP High CEC Forecast	2025 SpOP Hi Renew & Min Gas Gen	
500 kV LINES														
MALIN-ROUND MTN # 1 500 kV	Diablo unit and Malin-Round Mtn # 2 500 kV	P3	G-1/L-1	<95%	95.3%	N/A	<95%	<95%	<95%	<95%	106%	<95%	<95%	Sensitivity only
ROUND MTN –TABLE MTN #1 or #2 500 kV	Rnd Mtn –Table Mtn #2 or # 1 500 kV	P1	L-1	105%	N/A	N/A	<95%	<95%	<95%	<95%	103%	N/A	N/A	Bypass series capacitors on Round Mtn and Table Mtn on both lines as recommended in previous cycles
ROUND MTN-TABLE MTN # 2 or # 1 500 KV	Round Mtn-Table Mtn # 1 or # 2 and Table Mtn 500/230 kV	P6	L-1/T-1	106%	N/A	N/A	<95%	<95%	<95%	<95%	106%	N/A	N/A	
ROUND MTN-TABLE MTN # 1 500 KV	Round Mtn-Table Mtn # 2 and Table Mtn 500/230 kV	P2	BRK	106%	N/A	N/A	<95%	<95%	<95%	<95%	106%	N/A	N/A	
ROUND MTN-TABLE MTN # 1 or # 2 500 KV	Round Mtn-Table Mtn # 2 or # 1 500 KV and Diablo unit	P3	G-1/L-1	116%	N/A	N/A	<95%	<95%	<95%	<95%	113%	N/A	N/A	
ROUND MTN –ROUND MT STATCOM #1 or #2 500 kV	Round Mtn - Round Mtn Statcom # 1 or 2 500 kV	P1	L-1	N/A	114%	108%	<95%	<95%	<95%	<95%	N/A	115%	<95%	Bypass series capacitors on Round Mtn and Table Mtn on both lines as recommended in previous cycles
ROUND MTN –ROUND MT STATCOM #1 or #2 500 kV	Round Mtn - Round Mtn Statcom # 1 or 2 500 kV and Diablo unit	P3	G-1/L-1	N/A	127%	N/A	<95%	<95%	<95%	<95%	N/A	127%	<95%	
ROUND MTN –ROUND MT STATCOM #1 or #2 500 kV	Round Mtn - Round Mtn Statcom # 2 or 1 and Table Mtn-Round Mtn Statcom # 2 or # 1 500 kV	P6	L-1/L-1	N/A	104%	98%	<95%	<95%	<95%	<95%	N/A	106%	<95%	
ROUND MTN –ROUND MT STATCOM #1 or #2 500 kV	Round Mtn - Round Mtn Statcom # 1 or 2 500 kV and Round Mtn 500/230	P6	L-1/T-1	N/A	106%	100%	<95%	<95%	<95%	<95%	N/A	107%	<95%	
ROUND MT STATCOM - ROUND MTN #2 500 kV	Round Mtn Statcom-Round Mtn # 1 and Round Mtn 500/230 kV	P2/P6	BRK	N/A	106%	99%	<95%	<95%	<95%	<95%	N/A	107%	<95%	
TABLE MTN –ROUND MT STATCOM #1 or #2 500 kV	Table Mtn - Round Mtn Statcom # 1 or 2 500 kV and Diablo unit	P3	G-1/L-1	N/A	116%	N/A	<95%	<95%	<95%	<95%	N/A	115%	<95%	Bypass series capacitors on Round Mtn and Table Mtn on both lines as recommended in previous cycles
TABLE MTN –ROUND MT STATCOM #1 or #2 500 kV	Round Mtn Statcom - Table Mtn # 1 or 2 500 kV	P1	L-1	N/A	105%	99%	<95%	<95%	<95%	<95%	N/A	106%	<95%	
TABLE MTN –ROUND MT STATCOM #1 or #2 500 kV	Round Mtn - Round Mtn Statcom # 2 or 1 and Table Mtn-Round Mtn Statcom # 2 or # 1 500 kV	P6	L-1/L-1	N/A	103%	98%	<95%	<95%	<95%	<95%	N/A	105%	<95%	
TABLE MTN –ROUND MT STATCOM #1 or # 2 500 kV	Round Mtn Statcom - Table Mtn # 2 or # 1 500 kV and Table Mtn 500/230 kV	P6	L-1/T-1	N/A	107%	102%	<95%	<95%	<95%	<95%	N/A	106%	<95%	
TABLE MTN –ROUND MT STATCOM #1 500 kV	Round Mtn Statcom-Table Mtn # 2 and Table Mtn 500/230 kV	P2	BRK	N/A	106%	<95%	<95%	<95%	<95%	<95%	N/A	106%	<95%	
MIDWAY-WHIRLWIND # 3 500 kV	Midway-Vincent # 2 and Midway-Whirlwind	P7	L-2	<95%	<95%	<95%	<95%	<95%	<95%	<95%	98%	<95%	113%	Sensitivity Only
MIDWAY-VINCENT # 1 500 kV	Midway-Vincent # 2 and Midway-Whirlwind	P6	L-1/L-1	104%	<95%	<95%	98%	<95%	<95%	<95%	106%	<95%	123%	Existing Path 26 procedure under review.
MIDWAY-VINCENT # 2 500 kV	Midway-Vincent # 1 and Midway-Whirlwind 500 kV	P6	L-1/L-1	106%	<95%	<95%	100%	<95%	<95%	<95%	108%	<95%	126%	
ANTELOPE-WHIRLWIND (SCE) 500 kV	Midway-Vincent # 1 and # 2 500 kV	P7	L-2	<95%	<95%	<95%	<95%	<95%	<95%	<95%	<95%	<95%	103%	Sensitivity only
500/230 kV TRANSFORMERS														

ROUND MTN 500/230 kV x-former	Olinda 500/230 kV x-former	P1	T-1	<95%	<95%	<95%	<95%	109%	101%	101%	<95%	<95%	115%	Reduce COI flow according to the nomogram
	Captain Jack-Olinda 500 kV	P1	L-1	<95%	<95%	<95%	<95%	105%	<95%	<95%	<95%	<95%	108%	
	Captain Jack-Olinda 500 kV and Olinda 500/230 kV transformer	P6	L-1/T-1	<95%	<95%	<95%	<95%	116%	107%	105%	<95%	<95%	121%	
	Olinda 500/230 kV x-former and Olinda-Tracy 500 kV line	P6	L-1/T-1	<95%	<95%	<95%	96%	116%	107%	105%	<95%	<95%	123%	
	Diablo unit and Capt Jack-Olinda 500 kV	P3	G-1/L-1	<95%	<95%	<95%	<95%	97%	N/A	N/A	<95%	<95%	101%	
	Diablo unit and Olinda 500/230 kV kV	P3	G-1/T-1	<95%	<95%	<95%	<95%	107%	N/A	N/A	<95%	<95%	113%	
	Olinda-Tracy 500 kV and Captain Jack-Olinda 500 kV	P6	L-1/L-1	<95%	<95%	<95%	<95%	116%	107%	104%	<95%	<95%	122%	
	Round Mnt-Round Mnt Statcom # 1 and #2 500 kV	P7	L-2	<95%	<95%	<95%	<95%	115%	106%	<95%	<95%	<95%	119%	
	Table Mnt-Round Mnt Statcom # 1 and #2 500 kV	P7	L-2	<95%	<95%	<95%	<95%	125%	115%	96%	<95%	<95%	128%	
TABLE MTN 500/230 kV x-former	Table Mtn-Vaca Dix 500 kV	P1	L-1	<95%	<95%	<95%	<95%	<95%	<95%	<95%	<95%	<95%	101%	Reduce COI flow according to the nomogram
	Captain Jack-Olinda 500 kV	P1	L-1	<95%	<95%	<95%	<95%	96%	96%	<95%	<95%	<95%	103%	
	Round Mtn 500/230 kV x-former	P1	T-1	<95%	<95%	<95%	<95%	96%	95%	95%	<95%	<95%	102%	
	Tesla 500/230 kV x-former	P1	T-1	<95%	<95%	<95%	<95%	<95%	<95%	<95%	<95%	<95%	101%	
	Vaca DIx 500 kV stuck BRK- lines to Table Mtn & transformer #11	P2/P6	BRK	<95%	<95%	<95%	<95%	96%	97%	<95%	<95%	<95%	103%	
	Round Mtn 500 kV stuck BRK- line to Table Mtn # 2 & x-former	P2/P6	L-1/T-1	<95%	<95%	<95%	<95%	97%	96%	95%	<95%	<95%	104%	
	Round Mtn 500 kV stuck BRK- line to Table Mtn # 1 & x-former	P2/P6	BRK	<95%	<95%	<95%	<95%	97%	96%	95%	<95%	<95%	104%	
	Table Mtn 500 kV stuck BRK- line to Vaca Dix and Round Mnt	P2/P6	BRK	<95%	<95%	<95%	<95%	96%	97%	<95%	<95%	<95%	103%	
	Diablo unit and Capt Jack-Olinda 500 kV	P3	G-1/L-1	<95%	<95%	<95%	<95%	<95%	N/A	<95%	<95%	<95%	101%	
	Round Mtn 500/230 and Diablo unit	P3	G-1/T-1	<95%	<95%	<95%	<95%	<95%	N/A	<95%	<95%	<95%	101%	
	Olinda-Tracy 500 kV and Olinda 500/230 kV transformer	P6	L-1/T-1	<95%	<95%	<95%	<95%	97%	97%	95%	<95%	<95%	104%	
	Table Mnt-Tesla 500 kV and Tesla 500/230 kV transformer	P6	L-1/T-1	<95%	<95%	<95%	<95%	97%	98%	<95%	<95%	<95%	103%	
	Table Mtn-Vaca Dix and Table Mtn-Tesla 500 kV	P7	L-2	<95%	<95%	<95%	<95%	102%	104%	<95%	<95%	<95%	102%	
	Table Mtn-Tesla and Vaca Dix-Tesla 500 kV	P7	L-2	<95%	<95%	<95%	<95%	100%	101%	<95%	<95%	<95%	108%	
	Captain Jack-Olinda 500 kV and Olinda 500/230 kV transformer	P6	L-1/T-1	<95%	<95%	<95%	<95%	<95%	<95%	<95%	<95%	<95%	102%	

TESLA 500/230 kV # 6	Tesla-Metcalf and Mosslndg-Los Banos 500 kV	P6	L-1/L-1	<95%	<95%	<95%	<95%	<95%	<95%	<95%	102%	<95%	<95%	sensitivity only
METCALF 500/230 kV x-former #11, 12 or 13	Metcalf 500/230 kV Tranformers #11 & #12 or #13	P6	T-1/T-1	<95%	<95%	<95%	129%	<95%	<95%	<95%	127%	<95%	<95%	Increase generation in the area after 1st contingency
LOS BANOS 500/230 kV transformer	Gates 500/230 kV # 11 and # 12 transformers	P6	T-1/T-1	<95%	<95%	<95%	<95%	<95%	<95%	<95%	<95%	<95%	102%	sensitivity only
GATES 500/230 kV # 11 x-former	Gates 500/230 kV # 12 x-former	P1	T-1	<95%	<95%	<95%	95%	122%	95%	<95%	105%	<95%	156%	Reduce generation in the area
	Losbanos-Gates #3 500kV & Gates # 12 230/500kV	P6	L-1/T-1	<95%	<95%	<95%	106%	117%	<95%	<95%	104%	<95%	154%	
	Losbanos-Gates #1 500kV & Gates# 12 230/500kV	P6	L-1/T-1	<95%	<95%	<95%	124%	109%	<95%	<95%	99%	<95%	151%	
	Gates-Diablo 500 kV and Gates 500/230 # 12	P6	L-1/T-1	<95%	<95%	<95%	<95%	125%	<95%	<95%	110%	<95%	157%	
	Gates-MIdway 500 kV and Gates 500/230 # 12	P6	L-1/T-1	<95%	<95%	<95%	<95%	114%	<95%	<95%	<95%	<95%	125%	
	LOSBANOS 230/500kV & GATES 230/500kV # 12	P6	T-1/T-1	<95%	<95%	<95%	108%	142%	106%	<95%	115%	<95%	182%	
	MIDWAY 230/500kV & GATES 230/500kV #12	P6	T-1/T-1	<95%	<95%	<95%	99%	130%	102%	<95%	110%	<95%	167%	
	Los Banos-Gates 500 kV # 1 and Los Banos-Midway 500 kV	P7	L-2	<95%	<95%	<95%	<95%	<95%	<95%	<95%	<95%	<95%	101%	
	Gates 500/230 kV # 12 x-former and Diablo unit	P3	G-1/T-1	<95%	<95%	<95%	<95%	131%	N/A	N/A	113%	<95%	165%	
GATES 500/230 kV # 12 x-former	Gates 500/230 kV # 11 x-former	P1	T-1	<95%	<95%	<95%	<95%	114%	<95%	N/A	99%	<95%	146%	Reduce generation in the area
	Los Banos-Gates # 1 and # 3 500 kV	P6	L-1/L-1	<95%	<95%	<95%	<95%	<95%	<95%	<95%	<95%	<95%	145%	
	Losbanos-Gates #3 500kV & Gates# 11 230/500kV	P6	L-1/T-1	<95%	<95%	<95%	98%	109%	<95%	<95%	97%	<95%	145%	
	Losbanos-Gates #1 500kV & Gates# 11 230/500kV	P6	L-1/T-1	<95%	<95%	<95%	117%	101%	<95%	<95%	<95%	<95%	143%	
	Gates-Diablo 500 kV and Gates 500/230 # 11	P6	L-1/T-1	<95%	<95%	<95%	<95%	117%	<95%	<95%	104%	<95%	148%	
	Gates-MIdway 500 kV and Gates 500/230 # 11	P6	L-1/T-1	<95%	<95%	<95%	<95%	106%	<95%	<95%	<95%	<95%	117%	
	LOSBANOS 230/500kV & GATES 230/500kV #11	P6	T-1/T-1	<95%	<95%	<95%	100%	132%	103%	<95%	109%	<95%	173%	
	MIDWAY 230/500kV & GATES 230/500kV #11	P6	T-1/T-1	<95%	<95%	<95%	<95%	120%	99%	<95%	104%	<95%	158%	
	Los Banos-Gates 500 kV # 1 and Los Banos-Midway 500 kV	P7	L-2	<95%	<95%	<95%	<95%	<95%	<95%	<95%	<95%	<95%	100%	
	Gates 500/230 kV # 11 x-former and Diablo unit	P3	G-1/T-1	<95%	<95%	<95%	<95%	123%	N/A	N/A	107%	<95%	156%	
230 kV LINES														

COTTONWD E-ROUND MTN 230kV #2	Table Mtn-Vaca Dix and Table Mtn-Tesla 500 kV	P7	L-2	<95%	<95%	<95%	<95%	<95%	<95%	<95%	108%	<95%	<95%	Sensitivity only
COTTONWD E-ROUND MTN 230kV #3	Table Mtn-Vaca Dix and Table Mtn-Tesla 500 kV	P7	L-2	99%	100%	97%	<95%	<95%	<95%	<95%	118%	96%	<95%	
TABLE MTN-RIO OSO 230 kV	Tbl Mtn-Vaca Dix 500 kV and Table Mtn-Palermo 230 kV	P6	L-1/L-1	109%	<95%	<95%	<95%	<95%	<95%	<95%	<95%	<95%	<95%	Project: Rio Oso 230 kV BAAH Bus Upgrade Project ISD: Dec 2022, modeled in 2025 and 2030 cases Short term: COI Nomogram
	Table Mtn-Vaca Dix and Table Mtn-Tesla 500 kV	P7	L-2	100%	<95%	<95%	<95%	<95%	<95%	<95%	98%	<95%	<95%	
NEWARK-LOS ESTEROS 230 kV	Tesla-Metcalf and Mosslndg-Los Banos 500 kV	P6	L-1/L-1	<95%	<95%	<95%	119%	<95%	<95%	<95%	120%	<95%	<95%	generation redispatch after first contingency
	Tesla-Metcalf and Mosslndg-Metcalf 500 kV	P6	L-1/L-1	<95%	<95%	<95%	<95%	<95%	<95%	<95%	98%	<95%	<95%	
NEWARK-E-F BRK (to LOS ESTEROS) 230 kV	Tesla-Metcalf and Mosslndg-Los Banos 500 kV	P6	L-1/L-1	<95%	<95%	<95%	119%	<95%	<95%	<95%	118%	<95%	<95%	
	Tesla-Metcalf and Mosslndg-Metcalf 500 kV	P6	L-1/L-1	<95%	<95%	<95%	<95%	<95%	<95%	<95%	99%	<95%	<95%	
NEWARK-TESLA # 1 230 kV	Tesla-Metcalf and Mosslndg-Los Banos 500 kV	P6	L-1/L-1	<95%	<95%	<95%	100%	<95%	<95%	<95%	<95%	<95%	<95%	
NEWARK-TESLA # 2 230 kV	Tesla-Metcalf and Mosslndg-Los Banos 500 kV	P6	L-1/L-1	<95%	<95%	<95%	101%	<95%	<95%	<95%	97%	<95%	<95%	
DELTA PUMPS-TESLA 230 kV	Table Mtn-Vaca Dix and Vaca Dix-Tesla 500 kV	P6	L-1/L-1	<95%	<95%	<95%	101%	<95%	<95%	<95%	<95%	<95%	<95%	generation redispatch after first contingency
	VACA-DIX 230/500kV #11 & #12, or 13	P6	T-1/T-1	<95%	<95%	<95%	103%	<95%	<95%	<95%	<95%	<95%	<95%	
GOLDHILL-EIGHT MILE 230 kV	Table Mtn 500/230 kV and Eight MIle-Lodi 230 kV	P6	T-1/L-1	<95%	<95%	<95%	<95%	109%	117%	<95%	<95%	<95%	118%	generation redispatch after first contingency
	Table Mtn 500/230 kV and Goldhill-Lodi 230 kV	P6	T-1/L-1	<95%	<95%	<95%	<95%	105%	112%	<95%	<95%	<95%	118%	
GOLDHILL-LODI 230 kV	Table Mtn 500/230 kV and Gold Hill-Eight Mile 230 kV	P6	T-1/T-1	<95%	<95%	<95%	<95%	105%	113%	<95%	<95%	<95%	119%	
EIGHT MILE -TESLA 230 kV	Table Mtn 500/230 kV and Stagg-Eight Mile 230 kV	P6	T-1/L-1	<95%	<95%	<95%	<95%	134%	147%	<95%	<95%	<95%	145%	generation redispatch after first contingency
	Table Mtn 500/230 kV and Stagg-Tesla 230 kV, or Stagg BRK	P6	T-1/L-1	<95%	<95%	<95%	<95%	134%	153%	<95%	<95%	<95%	148%	
	Table Mtn 500/230 kV and Round Mtn 500/230 kV transformers	P6	T-1/T-1	<95%	<95%	<95%	<95%	<95%	102%	97.1%	<95%	<95%	99.2%	
STAGG-EIGHT MILE 230 kV	Table Mtn 500/230 kV and Eight Mile-Tesla 230 kV	P6	T-1/L-1	<95%	<95%	<95%	<95%	118%	127%	<95%	<95%	<95%	126%	generation redispatch after first contingency
STAGG H - STAGG F BRK 230 kV		P6	T-1/L-1	<95%	<95%	<95%	<95%	<95%	104%	<95%	<95%	<95%	103%	
STAGG D - STAGG F BRK 230 kV		P6	T-1/L-1	<95%	<95%	<95%	<95%	<95%	105%	<95%	<95%	<95%	103%	
STAGG-TESLA E 230 kV		P6	T-1/L-1	<95%	<95%	<95%	<95%	117%	135%	<95%	<95%	<95%	130%	
BELLOTA-WEBER 230 kV	Table Mtn 500/230 kV and Bellota-Tesla 230 kV	P6	T-1/L-1	<95%	<95%	<95%	<95%	104%	106%	<95%	<95%	<95%	108%	Under Review for generation redispatch mitigation
TESLA-WEBER 230 kV		P6	T-1/L-1	<95%	<95%	<95%	<95%	104%	113%	<95%	<95%	<95%	112%	

BELLOTA-TESLA 230 kV	Table Mtn 500/230 kV and Bellota-Weber 230 kV	P6	T-1/L-1	<95%	<95%	<95%	<95%	104%	109%	<95%	<95%	<95%	110%	Under Review for generation redispatch mitigation
	Table Mtn 500/230 kV and Tesla-Weber 230 kV	P6	T-1/L-1	<95%	<95%	<95%	<95%	104%	111%	<95%	<95%	<95%	111%	
DELEVAN-CORTINA 230 KV	Olinda-Tracy 500 kV and Diablo unit	P3	G-1/L-1	<95%	101%	N/A	<95%	<95%	<95%	<95%	<95%	97%	<95%	Reduce generation in the area
	Round Mtn Statcom-Round Mtn 500 kV #2 and Malin-Round Mtn # 2 500 kV	P6	L-1/L-1	101%	103%	99%	<95%	<95%	<95%	<95%	<95%	101%	<95%	
	Round Mtn-Table Mtn 500 kV #1 and #2 500 kV	P7	L-2	101%	N/A	N/A	<95%	<95%	<95%	<95%	<95%	N/A	<95%	
	Round Mtn Statcom-Table Mtn 500 kV #1 and #2 500 kV	P7	L-2	N/A	103%	99%	<95%	<95%	<95%	<95%	<95%	101%	<95%	
	Round Mtn-Round Mtn Statcom 500 kV #1 and #2 500 kV	P7	L-2	N/A	103%	99%	<95%	<95%	<95%	<95%	<95%	101%	<95%	
	Table Mtn-Vaca Dix and Table Mtn-Tesla 500 kV	P7	L-2	103%	107%	103%	<95%	<95%	<95%	<95%	<95%	102%	<95%	
MOSSLANDING-LAS AGUILAS 230 kV	Mosslanding-Los Banos 500 kV & Tesla-Metcalf 500 kV	P6	L-1/L-1	<95%	<95%	<95%	149%	106%	110%	<95%	156%	<95%	<95%	Turning off generation in the area for P6 will not eliminate overloads without turning on Moss Landing generation in some cases.
PANOCHE-GATES # 1 and # 2 230 kV	Los Banos-Gates # 1 and # 3 500 kV	P6	L-1/L-1	<95%	<95%	<95%	106%	<95%	<95%	<95%	<95%	<95%	<95%	Use Path 15 procedure for high Path 15 flow
230/115 kV TRANSFORMERS														
NEWARK 230/115 kV #11	Tesla-Metcalf 500 kV and Newark -Los Esteros 230 kV kV	P6	L-1/L-1	<95%	95%	101%	<95%	<95%	<95%	<95%	<95%	99%	<95%	generation redispatch after first contingency
	Tesla-Metcalf 500 kV and Newark E-F 230 kV kV bus tie (to Los Esteros)	P6	L-1/BRK	99%	100%	106%	<95%	<95%	<95%	<95%	98%	105%	<95%	
115 kV LINES														
NEWARK-NRS 115 kV	Tesla-Metcalf 500 kV and Newark- Newark brk (to Los Esteros) 115 kV	P6	L-1/L-1	<95%	<95%	101%	<95%	<95%	<95%	<95%	<95%	<95%	<95%	generation redispatch after first contingency
KRS-FMC 115 kV	Tesla-Metcalf and Mosslndg-Los Banos 500 kV	P6	L-1/L-1	<95%	<95%	<95%	112%	<95%	<95%	<95%	<95%	<95%	<95%	generation redispatch after first contingency
AMES-MT VIEW 115 kV	Tesla-Metcalf and Mosslndg-Los Banos 500 kV	P6	L-1/L-1	<95%	<95%	<95%	109%	<95%	<95%	<95%	<95%	<95%	<95%	
AMES-WHISMAN 115 kV	Tesla-Metcalf and Mosslndg-Los Banos 500 kV	P6	L-1/L-1	<95%	<95%	<95%	116%	<95%	<95%	<95%	<95%	<95%	<95%	

Study Area: PG&E Bulk

Low Voltages

Substation	Contingency (All and Worst P6)	Category	Category Description	Post Cont. Voltage, kV (Baseline Scenarios)							Post Cont. Voltage, kV (Sensitivity Scenarios)			Project & Potential Mitigation Solutions
				2022 Summer Peak	2025 Summer Peak	2030 Summer Peak	2022 Spring Off-Peak	2025 Spring Off-Peak	2030 Spring Off-Peak	2030 Winter Off-Peak	2022 SP Heavy Renewable & Min Gas Gen	2025 SP High CEC Forecast	2025 SpOP Hi Renew & Min Gas Gen	
ROUND MTN	Round Mt-Malin # 2 and Round Mt 500/230	P2	BRK	within limits	within limits	within limits	1.107	within limits	within limits	within limits	within limits	within limits	within limits	Round Mtn dynamic reactive support will mitigate
	Olinda-Tracy and Diablo unit	P3	G-1/L-1	within limits	within limits	within limits	within limits	within limits	within limits	within limits	0.986	within limits	within limits	reduce COI flow after first contingency
TABLE MTN 500 kV	Olinda-Tracy and Diablo unit	P3	G-1/L-1	within limits	within limits	within limits	within limits	within limits	within limits	within limits	0.983	within limits	within limits	reduce COI flow after first contingency

Study Area: PG&E Bulk

Voltage Deviation

Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)							Voltage PU (Sensitivity Scenarios)			Project & Potential Mitigation Solutions
				2021 Summer Peak	2024 Summer Peak	2029 Summer Peak	2021 Spring Off-Peak	2024 Spring Off-Peak	2029 Spring Off-Peak	2029 Winter Off-Peak	2021 SP Heavy Renewable & Min Gas Gen	2024 SP High CEC Forecast	2024 SpOP Hi Renew & Min Gas Gen	
NONE over 8%														

Study Area: **PG&E Bulk**

Transient Stability

			Transient Stability Performance (Number of voltage and frequency violations)						
			Baseline scenarios				Sensitivity		
Contingency	Category	Category Description	2025 Summer Peak	2030 Summer Peak	2025 Spring Off-Peak	2030 Spring Off- Peak	2025 SP High CEC Forecast	2025 SpOP Hi Renew & Min Gas Gen	Potential Mitigation Solutions/ Comments
3 phase fault TESLA-METCALF 500 kV	P1	L-1	Potential WECC/NERC criteria violation	Potential WECC/NERC criteria violation	no issues	no issues	Potential WECC/NERC criteria violation	no issues	Change UVLS relay settings on Watsonville load (Peak cases). Review Chilibar hydro unit and steam unit at Sobrante Standard Oil models for errors because of out-of-step tripping. Review Dawson unit model because of undamped oscillations, also in other cases
3 phase fault TESLA - LOSBANOS 500 kV	P1	L-1	no issues	Potential WECC/NERC criteria violation	no issues	no issues	Potential WECC/NERC criteria violation	no issues	Change UVLS relay settings on Watsonville load (Peak cases). Review Chilibar hydro unit and steam unit at Sobrante Standard Oil models for errors because of out-of-step tripping. Review Dawson unit model because of undamped oscillations, also in other cases
3 phase fault METCALF - MOSSLAND 500 kV	P1	L-1	no issues	Potential WECC/NERC criteria violation	no issues	no issues	no issues	no issues	Change UVLS relay settings on Watsonville load (Peak cases)
3 phase fault LOSBANOS -GATES 500 kV # 3	P1	L-1	no issues	Potential WECC/NERC criteria violations	no issues	no issues	no issues	no issues	Review Clearwater (SCE) generator model for errors because of out-of-step tripping
3 phase fault LOSBANOS -GATES 500 kV # 1	P1	L-1	no issues	Potential WECC/NERC criteria violations	no issues	no issues	no issues	no issues	Review Clearwater (SCE) generator model for errors because of out-of-step tripping
3 phase fault LOSBANOS - MIDWAY 500 kV	P1	L-1	no issues	Potential WECC/NERC criteria violations	no issues	no issues	no issues	no issues	Review Clearwater (SCE) generator model for errors because of out-of-step tripping
3 phase fault GATES - DIABLO 500 kV	P1	L-1	no issues	Potential WECC/NERC criteria violations	no issues	no issues	no issues	no issues	Review Clearwater (SCE) generator model for errors because of out-of-step tripping

Study Area: **PG&E Bulk**

Transient Stability

			Transient Stability Performance (Number of voltage and frequency violations)						
			Baseline scenarios				Sensitivity		
Contingency	Category	Category Description	2025 Summer Peak	2030 Summer Peak	2025 Spring Off-Peak	2030 Spring Off- Peak	2025 SP High CEC Forecast	2025 SpOP Hi Renew & Min Gas Gen	Potential Mitigation Solutions/ Comments
3 phase fault GATES - MIDWAY 500 kV	P1	L-1	no issues	Potential WECC/NERC criteria violations	no issues	no issues	no issues	no issues	Review Clearwater (SCE) generator model for errors because of out-of-step tripping
3 phase fault MIDWAY - VINCENT 500 kV # 1	P1	L-1	no issues	Potential WECC/NERC criteria violations	no issues	no issues	no issues	no issues	Review Clearwater (SCE) generator model for errors because of out-of-step tripping
3 phase fault MIDWAY-WHIRLWIND 500 kV	P1	L-1	no issues	Potential WECC/NERC criteria violations	no issues	no issues	no issues	no issues	Review Clearwater (SCE) generator model for errors because of out-of-step tripping
3 phase faultTRACY 500/230 kV transformer # 1	P1	T-1	no issues	Potential WECC/NERC criteria violations	no issues	no issues	no issues	no issues	Review Chilibar generator model for errors because of out-of-step tripping
3 phase fault TESLA 500/230 kV transformer # 4	P1	T-1	no issues	Potential WECC/NERC criteria violations	no issues	no issues	Potential WECC/NERC criteria violations	no issues	Change UVLS relay settings on Watsonville load (Peak cases). Review Chilibar hydro unit and steam unit at Sobrante Standard Oil models for errors because of out-of-step tripping
3 phase fault METCALF 500/230 kV transformer # 11	P1	T-1	no issues	Potential WECC/NERC criteria violations	no issues	no issues	Potential WECC/NERC criteria violations	no issues	Change UVLS relay settings on Watsonville load (Peak cases).
3 phase fault LOS BANOS 500/230 kV transformer	P1	T-1	no issues	Potential WECC/NERC criteria violations	no issues	no issues	no issues	no issues	Review Clearwater (SCE) generator model for errors because of out-of-step tripping
3 phase fault GATES 500/230 kV transformer # 11	P1	T-1	no issues	Potential WECC/NERC criteria violations	no issues	no issues	no issues	no issues	Review Clearwater (SCE) generator model for errors because of out-of-step tripping

Study Area: **PG&E Bulk**

Transient Stability

			Transient Stability Performance (Number of voltage and frequency violations)						
			Baseline scenarios				Sensitivity		
Contingency	Category	Category Description	2025 Summer Peak	2030 Summer Peak	2025 Spring Off-Peak	2030 Spring Off- Peak	2025 SP High CEC Forecast	2025 SpOP Hi Renew & Min Gas Gen	Potential Mitigation Solutions/ Comments
3 phase fault MIDWAY 500/230 kV transformer # 11	P1	T-1	no issues	Potential WECC/NERC criteria violations	no issues	no issues	no issues	no issues	Review Clearwater (SCE) generator model for errors because of out-of-step tripping
LOSE LOSBANOS-MIDWAY #1 500KV LINE & MIDWAY-VINCENT #1 500KV 1 PHASE FAULT ON MIDWAY 500KV BUS - DELAYED CLEARING	P2	STUCK BRK	no issues	Potential WECC/NERC criteria violations	no issues	no issues	no issues	no issues	Review Clearwater (SCE) generator model for errors because of out-of-step tripping
LOSE GATES-MIDWAY #1 500KV LINE & DIABLO-MIDWAY #2 500KV LINE 1 PHASE FAULT ON MIDWAY 500KV BUS - DELAYED CLEARING	P2	STUCK BRK	no issues	Potential WECC/NERC criteria violations	no issues	no issues	no issues	no issues	Review Clearwater (SCE) generator model for errors because of out-of-step tripping
LOSE MIDWAY-VINCENT #1 500KV LINE & MIDWAY #11 500/230KV BANK 1 PHASE FAULT ON MIDWAY 500KV BUS - DELAYED CLEARING	P2	STUCK BRK	no issues	Potential WECC/NERC criteria violations	no issues	no issues	no issues	no issues	Review Clearwater (SCE) generator model for errors because of out-of-step tripping
LOSE MIDWAY-WIRLWIND #3 500KV LINE & MIDWAY #11 500/230KV BANK 1 PHASE FAULT ON MIDWAY 500KV BUS - DELAYED CLEARING	P2	STUCK BRK	no issues	Potential WECC/NERC criteria violations	no issues	no issues	no issues	no issues	Review Clearwater (SCE) generator model for errors because of out-of-step tripping
3 PHASE FAULT, DELAYED CLEARING ON DIABLO GENERATOR FAULT ON DIABLO 500KV BUS	P4	3ph delayed clearing	no issues	Potential WECC/NERC criteria violations	no issues	no issues	no issues	no issues	Review Clearwater (SCE) generator model for errors because of out-of-step tripping
3 phase fault TESLA-TABLE MTN 500 kV and TESLA-TRACY 500 kV	P6	L-1/L-1	no issues	Potential WECC/NERC criteria violations	no issues	no issues	Potential WECC/NERC criteria violations	no issues	Change UVLS relay settings on Watsonville load (Peak cases). Review Chilibar hydro unit and steam unit at Sobrante Standard Oil models for errors because of out-of-step tripping (2030)
3 phase fault TESLA-TABLE MTN 500 kV and TESLA-METCALF 500 kV	P6	L-1/L-1	no issues	Potential WECC/NERC criteria violations	no issues	no issues	Potential WECC/NERC criteria violations	no issues	Change UVLS relay settings on Watsonville load (Peak cases). Review steam unit at Sobrante Standard Oil models for errors because of out-of-step tripping (2030)

Study Area: **PG&E Bulk**

Transient Stability

			Transient Stability Performance (Number of voltage and frequency violations)						
			Baseline scenarios				Sensitivity		
Contingency	Category	Category Description	2025 Summer Peak	2030 Summer Peak	2025 Spring Off-Peak	2030 Spring Off- Peak	2025 SP High CEC Forecast	2025 SpOP Hi Renew & Min Gas Gen	Potential Mitigation Solutions/ Comments
3 phase faultTESLA-TABLE MTN 500 kV and TESLA-LOS BANOS 500 kV	P6	L-1/L-1	no issues	Potential WECC/NERC criteria violations	no issues	no issues	Potential WECC/NERC criteria violations	no issues	Change UVLS relay settings on Watsonville load (Peak cases). Review Chilibar hydro unit and steam unit at Sobrante Standard Oil models for errors because of out-of-step tripping (2030)
3 phase fault TESLA-VACA DIX 500 kV and TESLA-TRACY 500 kV	P6	L-1/L-1	no issues	Potential WECC/NERC criteria violations	no issues	no issues	Potential WECC/NERC criteria violations	no issues	Change UVLS relay settings on Watsonville load (Peak cases). Review Chilibar hydro unit and steam unit at Sobrante Standard Oil models for errors because of out-of-step tripping (2030)
3 phase fault TESLA-VACA DIX 500 kV and TESLA-METCALF 500 kV	P6	L-1/L-1	Potential WECC/NERC criteria violations	Potential WECC/NERC criteria violations	no issues	no issues	Potential WECC/NERC criteria violations	no issues	Change UVLS relay settings on Watsonville load (Peak cases). Review Chilibar hydro unit and steam unit at Sobrante Standard Oil models for errors because of out-of-step tripping (2030)
3 phase fault TESLA-VACA DIX 500 kV and TESLA-LOS BANOS 500 kV	P6	L-1/L-1	no issues	Potential WECC/NERC criteria violations	no issues	no issues	Potential WECC/NERC criteria violations	no issues	Change UVLS relay settings on Watsonville load (Peak cases). Review Chilibar hydro unit and steam unit at Sobrante Standard Oil models for errors because of out-of-step tripping (2030)
3 phase fault TESLA-TRACY 500 kV and TESLA-METCALF 500 kV	P6	L-1/L-1	Potential WECC/NERC criteria violations	Potential WECC/NERC criteria violations	no issues	no issues	Potential WECC/NERC criteria violations	no issues	Change UVLS relay settings on Watsonville load (Peak cases). Review Chilibar hydro unit and steam unit at Sobrante Standard Oil models for errors because of out-of-step tripping (2030)
3 phase fault TESLA-TRACY 500 kV and TESLA-LOS BANOS 500 kV	P6	L-1/L-1	no issues	Potential WECC/NERC criteria violations	no issues	no issues	Potential WECC/NERC criteria violations	no issues	Change UVLS relay settings on Watsonville load (Peak cases). Review Chilibar hydro unit and steam unit at Sobrante Standard Oil models for errors because of out-of-step tripping (2030)
3 phase fault TESLA-METCALF 500 kV and TESLA-LOS BANOS 500 kV	P6	L-1/L-1	UVLS Watsonville load	Potential WECC/NERC criteria violations	no issues	no issues	Potential WECC/NERC criteria violations	no issues	Change UVLS relay settings on Watsonville load (Peak cases). Review Chilibar hydro unit and steam unit at Sobrante Standard Oil models for errors because of out-of-step tripping (2030)
3 phase fault METCALF-TESLA 500 kV and METCALF- MOSS LANDING 500 kV	P6	L-1/L-1	no issues	Potential WECC/NERC criteria violations	no issues	no issues	Potential WECC/NERC criteria violations	no issues	Change UVLS relay settings on Watsonville load (Peak cases). Review Dawson unit model because of undamped oscillations

Study Area: **PG&E Bulk**

Transient Stability

			Transient Stability Performance (Number of voltage and frequency violations)						
			Baseline scenarios				Sensitivity		
Contingency	Category	Category Description	2025 Summer Peak	2030 Summer Peak	2025 Spring Off-Peak	2030 Spring Off- Peak	2025 SP High CEC Forecast	2025 SpOP Hi Renew & Min Gas Gen	Potential Mitigation Solutions/ Comments
3 phase fault LOS BANOS-TRACY 500 kV and LOS BANOS-MOSS LANDING 500 kV	P6	L-1/L-1	no issues	Potential WECC/NERC criteria violations	no issues	no issues	no issues	no issues	Review Clearwater (SCE) generator model for errors because of out-of-step tripping
3 phase fault LOS BANOS-TRACY 500 kV and LOS BANOS-GATES 500 kV # 3	P6	L-1/L-1	no issues	Potential WECC/NERC criteria violations	no issues	no issues	no issues	no issues	Review Clearwater (SCE) generator model for errors because of out-of-step tripping
3 phase fault LOS BANOS-TRACY 500 kV and LOS BANOS-GATES 500 kV # 1	P6	L-1/L-1	no issues	Potential WECC/NERC criteria violations	no issues	no issues	no issues	no issues	Review Clearwater (SCE) generator model for errors because of out-of-step tripping
3 phase fault LOS BANOS-TRACY 500 kV and LOS BANOS-MIDWAY 500 kV	P6	L-1/L-1	no issues	Potential WECC/NERC criteria violations	no issues	no issues	no issues	no issues	Review Clearwater (SCE) generator model for errors because of out-of-step tripping
3 phase fault LOS BANOS-TESLA 500 kV and LOS BANOS-MOSS LANDING 500 kV	P6	L-1/L-1	no issues	Potential WECC/NERC criteria violations	no issues	no issues	no issues	no issues	Review Clearwater (SCE) generator model for errors because of out-of-step tripping
3 phase fault LOS BANOS-TESLA 500 kV and LOS BANOS-GATES 500 kV # 3	P6	L-1/L-1	no issues	Potential WECC/NERC criteria violations	no issues	no issues	no issues	no issues	Review Clearwater (SCE) generator model for errors because of out-of-step tripping
3 phase fault LOS BANOS-TESLA 500 kV and LOS BANOS-GATES 500 kV # 1	P6	L-1/L-1	no issues	Potential WECC/NERC criteria violations	no issues	no issues	no issues	no issues	Review Clearwater (SCE) generator model for errors because of out-of-step tripping
3 phase fault LOS BANOS-TESLA 500 kV and LOS BANOS-MIDWAY 500 kV	P6	L-1/L-1	no issues	Potential WECC/NERC criteria violations	no issues	no issues	no issues	no issues	Review Clearwater (SCE) generator model for errors because of out-of-step tripping

Study Area: **PG&E Bulk**

Transient Stability

			Transient Stability Performance (Number of voltage and frequency violations)						
			Baseline scenarios				Sensitivity		
Contingency	Category	Category Description	2025 Summer Peak	2030 Summer Peak	2025 Spring Off-Peak	2030 Spring Off- Peak	2025 SP High CEC Forecast	2025 SpOP Hi Renew & Min Gas Gen	Potential Mitigation Solutions/ Comments
3 phase fault LOS BANOS-MOSS LANDING 500 kV and LOS BANOS-GATES 500 kV # 3	P6	L-1/L-1	no issues	Potential WECC/NERC criteria violations	no issues	no issues	no issues	no issues	Review Clearwater (SCE) generator model for errors because of out-of-step tripping
3 phase fault LOS BANOS-MOSS LANDING 500 kV and LOS BANOS-GATES 500 kV # 1	P6	L-1/L-1	no issues	Potential WECC/NERC criteria violations	no issues	no issues	no issues	no issues	Review Clearwater (SCE) generator model for errors because of out-of-step tripping
3 phase fault LOS BANOS-MOSS LANDING 500 kV and LOS BANOS-MIDWAY 500 kV	P6	L-1/L-1	no issues	Potential WECC/NERC criteria violations	no issues	no issues	no issues	no issues	Review Clearwater (SCE) generator model for errors because of out-of-step tripping
3 phase fault LOS BANOS-GATES 500 kV # 1 and # 3, fault on Los Banos	P6	L-1/L-1	no issues	Potential WECC/NERC criteria violations	no issues	no issues	no issues	no issues	Review Clearwater (SCE) generator model for errors because of out-of-step tripping
3 phase fault LOS BANOS-GATES 500 kV # 1 and LOS BANOS-MIDWAY 500 kV, fault on Los Banos	P6	L-1/L-1	no issues	Potential WECC/NERC criteria	no issues	no issues	no issues	no issues	Review Clearwater (SCE) generator model for errors because of out-of-step tripping
3 phase fault GATES-LOSBANOS 500 kV # 1 and 3, fault on Gates	P6	L-1/L-1	no issues	Potential WECC/NERC criteria violations	no issues	no issues	no issues	no issues	Review Clearwater (SCE) generator model for errors because of out-of-step tripping
3 phase fault GATES-LOSBANOS 500 kV # 1 and GATES-DIABLO 500 kV	P6	L-1/L-1	no issues	Potential WECC/NERC criteria violations	no issues	no issues	no issues	no issues	Review Clearwater (SCE) generator model for errors because of out-of-step tripping
3 phase fault GATES-LOS BANOS 500 kV # 1 and GATES - MIDWAY 500 kV	P6	L-1/L-1	no issues	Potential WECC/NERC criteria violations	no issues	no issues	no issues	no issues	Review Clearwater (SCE) generator model for errors because of out-of-step tripping
3 phase fault GATES-LOS BANOS 500 kV # 1 and GATES-DIABLO 500 kV	P6	L-1/L-1	no issues	Potential WECC/NERC criteria violations	no issues	no issues	no issues	no issues	Review Clearwater (SCE) generator model for errors because of out-of-step tripping

Study Area: **PG&E Bulk**

Transient Stability

			Transient Stability Performance (Number of voltage and frequency violations)						
			Baseline scenarios				Sensitivity		
Contingency	Category	Category Description	2025 Summer Peak	2030 Summer Peak	2025 Spring Off-Peak	2030 Spring Off- Peak	2025 SP High CEC Forecast	2025 SpOP Hi Renew & Min Gas Gen	Potential Mitigation Solutions/ Comments
3 phase fault GATES-LOS BANOS 500 kV # 1 and GATES-MIDWAY 500 kV	P6	L-1/L-1	no issues	Potential WECC/NERC criteria violations	no issues	no issues	no issues	no issues	Review Clearwater (SCE) generator model for errors because of out-of-step tripping
3 phase fault GATES-DIABLO 500 kV and GATES-MIDWAY 500 kV	P6	L-1/L-1	no issues	Potential WECC/NERC criteria violations	no issues	no issues	no issues	no issues	Review Clearwater (SCE) generator model for errors because of out-of-step tripping
3 phase fault MIDWAY-LOS BANOS 500 kV and MIDWAY-DIABLO 500 kV # 2	P6	L-1/L-1	no issues	Potential WECC/NERC criteria violations	no issues	no issues	no issues	no issues	Review Clearwater (SCE) generator model for errors because of out-of-step tripping
3 phase fault MIDWAY-LOS BANOS 500 kV and MIDWAY-VINCENT 500 kV #1	P6	L-1/L-1	no issues	Potential WECC/NERC	no issues	no issues	no issues	no issues	Review Clearwater (SCE) generator model for errors because of out-of-step tripping
3 phase fault MIDWAY-LOS BANOS 500 kV and MIDWAY-WHIRLWIND 500 kV	P6	L-1/L-1	no issues	Potential WECC/NERC criteria violations	no issues	no issues	no issues	no issues	Review Clearwater (SCE) generator model for errors because of out-of-step tripping
3 phase fault MIDWAY- GATES 500 kV and MIDWAY-DIABLO 500 kV # 2	P6	L-1/L-1	no issues	Potential WECC/NERC criteria violations	no issues	no issues	no issues	no issues	Review Clearwater (SCE) generator model for errors because of out-of-step tripping
3 phase fault MIDWAY- GATES 500 kV and MIDWAY-VINCENT 500 kV #1	P6	L-1/L-1	no issues	Potential WECC/NERC criteria violations	no issues	no issues	no issues	no issues	Review Clearwater (SCE) generator model for errors because of out-of-step tripping
3 phase fault MIDWAY- GATES 500 kV and MIDWAY-WHIRLWIND 500 kV	P6	L-1/L-1	no issues	Potential WECC/NERC criteria violations	no issues	no issues	no issues	no issues	Review Clearwater (SCE) generator model for errors because of out-of-step tripping
3 phase fault MIDWAY-DIABLO 500 kV # 2 and 3	P6	L-1/L-1	no issues	Potential WECC/NERC criteria violations	no issues	no issues	no issues	no issues	Review Clearwater (SCE) generator model for errors because of out-of-step tripping

Study Area: **PG&E Bulk**

Transient Stability

			Transient Stability Performance (Number of voltage and frequency violations)						
			Baseline scenarios				Sensitivity		
Contingency	Category	Category Description	2025 Summer Peak	2030 Summer Peak	2025 Spring Off-Peak	2030 Spring Off- Peak	2025 SP High CEC Forecast	2025 SpOP Hi Renew & Min Gas Gen	Potential Mitigation Solutions/ Comments
3 phase fault MIDWAY- DIABLO # 2 500 kV and MIDWAY-VINCENT # 1 500 kV	P6	L-1/L-1	no issues	Potential WECC/NERC criteria violations	no issues	no issues	no issues	no issues	Review Clearwater (SCE) generator model for errors because of out-of-step tripping
3 phase fault MIDWAY- DIABLO # 2 500 kV and MIDWAY-WHIRLWIND 500 kV	P6	L-1/L-1	no issues	Potential WECC/NERC criteria violations	no issues	no issues	no issues	no issues	Review Clearwater (SCE) generator model for errors because of out-of-step tripping
3 phase fault MIDWAY- VINCENT # 1 500 kV and MIDWAY-WHIRLWIND 500 kV	P6	L-1/L-1	no issues	Potential WECC/NERC criteria violations	no issues	no issues	no issues	no issues	Review Clearwater (SCE) generator model for errors because of out-of-step tripping
3 phase fault TESLA-METCALF and MOSS LANDING-LOS BANOS 500 kV, fault on METCALF	P6	L-1/L-1	no issues	Potential WECC/NERC criteria violations	no issues	no issues	Potential WECC/NERC criteria violations	no issues	Change UVLS relay settings on Watsonville load (Peak cases). Review Dawson unit model because of undamped oscillations
3 phase fault TESLA - TABLE MTN 500 kV and TESLA 500/230 kV transformer	P6	L-1/T-1	no issues	Potential WECC/NERC criteria violations	no issues	no issues	Potential WECC/NERC criteria violations	no issues	Change UVLS relay settings on Watsonville load (Peak cases). Review Chilibar hydro unit and steam unit at Sobrante Standard Oil models for errors because of out-of-step tripping (2030)
3 phase fault TESLA - VACA DIX 500 kV and TESLA 500/230 kV transformer	P6	L-1/T-1	no issues	Potential WECC/NERC criteria violations	no issues	no issues	Potential WECC/NERC criteria violations	no issues	Change UVLS relay settings on Watsonville load (Peak cases). Review steam unit at Sobrante Standard Oil model for errors because of out-of-step tripping (2030)
3 phase fault TESLA - METCALF 500 kV and TESLA 500/230 kV transformer	P6	L-1/T-1	no issues	Potential WECC/NERC criteria violations	no issues	no issues	Potential WECC/NERC criteria violations	no issues	Change UVLS relay settings on Watsonville load (Peak cases). Review Chilibar hydro unit and steam unit and Sobrante Standard Oil models for errors because of out-of-step tripping (2030)
3 phase fault TESLA - METCALF 500 kV and TESLA 500/230 kV transformer	P6	L-1/T-1	Potential WECC/NERC criteria violations	Potential WECC/NERC criteria violations	no issues	no issues	Potential WECC/NERC criteria violations	no issues	Change UVLS relay settings on Watsonville load (Peak cases). Review Chilibar hydro unit and steam unit at Sobrante Standard Oil models for errors because of out-of-step tripping (2030)

Study Area: **PG&E Bulk**

Transient Stability

			Transient Stability Performance (Number of voltage and frequency violations)						
			Baseline scenarios				Sensitivity		
Contingency	Category	Category Description	2025 Summer Peak	2030 Summer Peak	2025 Spring Off-Peak	2030 Spring Off- Peak	2025 SP High CEC Forecast	2025 SpOP Hi Renew & Min Gas Gen	Potential Mitigation Solutions/ Comments
3 phase fault TESLA - LOSBANOS 500 kV and TESLA 500/230 kV transformer	P6	L-1/T-1	no issues	Potential WECC/NERC criteria violations	no issues	no issues	Potential WECC/NERC criteria violations	no issues	Change UVLS relay settings on Watsonville load (Peak cases). Review Chilibar hydro unit and steam unit at Sobrante Standard Oil models for errors because of out-of-step tripping (2030)
3 phase fault LOS BANOS-TRACY 500 kV and LOS BANOS 500/230 kV transformer	P6	L-1/T-1	no issues	Potential WECC/NERC criteria violations	no issues	no issues	no issues	no issues	Review Clearwater (SCE) generator model for errors because of out-of-step tripping
3 phase fault LOS BANOS-TESLA 500 kV and LOS BANOS 500/230 kV transformer	P6	L-1/T-1	no issues	Potential WECC/NERC criteria violations	no issues	no issues	no issues	no issues	Review Clearwater (SCE) generator model for errors because of out-of-step tripping
3 phase fault LOS BANOS- MOSS LANDING 500 kV and LOS BANOS 500/230 kV transformer	P6	L-1/T-1	no issues	Potential WECC/NERC criteria violations	no issues	no issues	no issues	no issues	Review Clearwater (SCE) generator model for errors because of out-of-step tripping
3 phase fault LOS BANOS- GATES 500 kV # 3 and LOS BANOS 500/230 kV transformer	P6	L-1/T-1	no issues	Potential WECC/NERC criteria violations	no issues	no issues	no issues	no issues	Review Clearwater (SCE) generator model for errors because of out-of-step tripping
3 phase fault LOS BANOS- GATES 500 kV # 1 and LOS BANOS 500/230 kV transformer	P6	L-1/T-1	no issues	Potential WECC/NERC criteria violations	no issues	no issues	no issues	no issues	Review Clearwater (SCE) generator model for errors because of out-of-step tripping
3 phase fault LOS BANOS- MIDWAY 500 kV and LOS BANOS 500/230 kV transformer	P6	L-1/T-1	no issues	Potential WECC/NERC criteria violations	no issues	no issues	no issues	no issues	Review Clearwater (SCE) generator model for errors because of out-of-step tripping
3 phase fault GATES-LOSBANOS 500 kV # 3 and GATES 500/230 kV transformer	P6	L-1/T-1	no issues	Potential WECC/NERC criteria violations	no issues	no issues	no issues	no issues	Review Clearwater (SCE) generator model for errors because of out-of-step tripping

Study Area: **PG&E Bulk**

Transient Stability

			Transient Stability Performance (Number of voltage and frequency violations)						
			Baseline scenarios				Sensitivity		
Contingency	Category	Category Description	2025 Summer Peak	2030 Summer Peak	2025 Spring Off-Peak	2030 Spring Off- Peak	2025 SP High CEC Forecast	2025 SpOP Hi Renew & Min Gas Gen	Potential Mitigation Solutions/ Comments
3 phase fault GATES-LOS BANOS 500 kV # 1 and GATES 500/230 kV transformer	P6	L-1/T-1	no issues	Potential WECC/NERC criteria violations	no issues	no issues	no issues	no issues	Review Clearwater (SCE) generator model for errors because of out-of-step tripping
3 phase fault GATES-DIABLO 500 kV and GATES 500/230 kV transformer	P6	L-1/T-1	no issues	Potential WECC/NERC criteria violations	no issues	no issues	no issues	no issues	Review Clearwater (SCE) generator model for errors because of out-of-step tripping
3 phase fault GATES-MIDWAY 500 kV and GATES 500/230 kV transformer	P6	L-1/T-1	no issues	Potential WECC/NERC criteria violations	no issues	no issues	no issues	no issues	Review Clearwater (SCE) generator model for errors because of out-of-step tripping
3 phase fault MIDWAY-LOS BANOS 500 kV and MIDWAY 500/230 kV transformer	P6	L-1/T-1	no issues	Potential WECC/NERC criteria violations	no issues	no issues	no issues	no issues	Review Clearwater (SCE) generator model for errors because of out-of-step tripping
3 phase fault MIDWAY-GATES 500 kV and MIDWAY 500/230 kV transformer	P6	L-1/T-1	no issues	Potential WECC/NERC criteria violations	no issues	no issues	no issues	no issues	Review Clearwater (SCE) generator model for errors because of out-of-step tripping
3 phase fault MIDWAY-DIABLO 500 kV and MIDWAY 500/230 kV transformer	P6	L-1/T-1	no issues	Potential WECC/NERC criteria violations	no issues	no issues	no issues	no issues	Review Clearwater (SCE) generator model for errors because of out-of-step tripping
3 phase fault MIDWAY-VINCENT 500 kV # 1 and MIDWAY 500/230 kV transformer	P6	L-1/T-1	no issues	Potential WECC/NERC criteria violations	no issues	no issues	no issues	no issues	Review Clearwater (SCE) generator model for errors because of out-of-step tripping
3 phase fault MIDWAY-WHIRLWIND 500 kV and MIDWAY 500/230 kV transformer	P6	L-1/T-1	no issues	Potential WECC/NERC criteria violations	no issues	no issues	no issues	no issues	Review Clearwater (SCE) generator model for errors because of out-of-step tripping

Study Area: **PG&E Bulk**

Transient Stability

			Transient Stability Performance (Number of voltage and frequency violations)						
			Baseline scenarios				Sensitivity		
Contingency	Category	Category Description	2025 Summer Peak	2030 Summer Peak	2025 Spring Off-Peak	2030 Spring Off- Peak	2025 SP High CEC Forecast	2025 SpOP Hi Renew & Min Gas Gen	Potential Mitigation Solutions/ Comments
3 phase fault TRACY-LOS BANOS 500 kV and TRACY 500/230 kV transformer	P6	L-1/T-1	no issues	Potential WECC/NERC criteria violations	no issues	no issues	no issues	no issues	Review Chilibar hydro unit model for errors because of out-of-step tripping (2030)
3 phase fault TESLA 500/230 kV transformers # 2 and 4	P6	T-1/T-1	no issues	Potential WECC/NERC criteria violations	no issues	no issues	Potential WECC/NERC criteria violations	no issues	Change UVLS relay settings on Watsonville load (Peak cases). Review Chilibar hydro unit and steam unit at Sobrante Standard Oil models for errors because of out-of-step tripping (2030)
3 phase fault METCALF 500/230 kV transformers # 11 and 12	P6	T-1/T-1	no issues	Potential WECC/NERC criteria violations	no issues	no issues	Potential WECC/NERC criteria violations	no issues	Change UVLS relay settings on Watsonville load
3 phase fault GATES 500/230 kV transformers # 11 and 12	P6	T-1/T-1	no issues	Potential WECC/NERC criteria violations	no issues	no issues	Potential WECC/NERC criteria violations	no issues	Change UVLS relay settings on Watsonville load
3 phase fault MIDWAY 500/230 kV transformers # 11 and 12	P6	T-1/T-1	no issues	Potential WECC/NERC criteria violations	no issues	no issues	no issues	no issues	Review Clearwater (SCE) generator model for errors because of out-of-step tripping
3 phase fault TRACY 500/230 kV transformers # 1 and 2	P6	T-1/T-1	no issues	Potential WECC/NERC criteria violations	no issues	no issues	no issues	no issues	Review Chilibar hydro unit model for errors because of out-of-step tripping (2030)
3 phase fault TESLA-TABLE MTN 500 kV and TESLA-VACA DIX 500 kV	P7	L-2	Potential WECC/NERC criteria violations	Potential WECC/NERC criteria violations	no issues	no issues	Potential WECC/NERC criteria violations	no issues	Change UVLS relay settings on Watsonville load (Peak cases). Review Chilibar hydro unit and steam unit and Sobrante Standard Oil models for errors because of out-of-step tripping (2030)
3 phase fault LOS BANOS- TRACY 500 kV and LOS BANOS -TESLA 500 kV	P7	L-2	no issues	Potential WECC/NERC criteria violations	no issues	no issues	no issues	no issues	Review Clearwater (SCE) generator model for errors because of out-of-step tripping

Study Area: **PG&E Bulk**

Transient Stability

			Transient Stability Performance (Number of voltage and frequency violations)						
			Baseline scenarios				Sensitivity		
Contingency	Category	Category Description	2025 Summer Peak	2030 Summer Peak	2025 Spring Off-Peak	2030 Spring Off- Peak	2025 SP High CEC Forecast	2025 SpOP Hi Renew & Min Gas Gen	Potential Mitigation Solutions/ Comments
3 phase fault LOS BANOS-GATES 500 kV # 1 and LOS BANOS-MIDWAY 500 kV	P7	L-2	no issues	Potential WECC/NERC criteria violations	no issues	no issues	no issues	no issues	Review Clearwater (SCE) generator model for errors because of out-of-step tripping
3 phase fault MIDWAY-LOS BANOS 500 kV and MIDWAY-GATES 500 kV	P7	L-2	no issues	Potential WECC/NERC criteria violations	no issues	no issues	no issues	no issues	Review Clearwater (SCE) generator model for errors because of out-of-step tripping
3 phase fault MIDWAY-VINCENT # 1 and 2 500 kV	P7	L-2	no issues	Potential WECC/NERC criteria violations	no issues	no issues	no issues	no issues	Review Clearwater (SCE) generator model for errors because of out-of-step tripping

Study Area: PG&E Bulk

Single Contingency Load Drop

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

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

Study Area: PG&E Bulk

Single Source Substation with more than 100 MW Load

Substation	Load Served (MW)										Potential Mitigation Solutions
	2021 Summer Peak	2024 Summer Peak	2029 Summer Peak	2021 Spring Off- Peak	2024 Spring Off- Peak	2029 Spring Off- Peak	2029 Winter Off- Peak	2021 SP Heavy Renewable & Min Gas Gen	2024 SP High CEC Forecast	2024 SpOP Hi Renew & Min Gas Gen	
N/A											

No single source substation with more than 100 MW Load

Study Area Entire PG&E System

High Voltages Under P0 Conditions

Bus/Substation	Zone	Voltage PU (Baseline Scenarios)			Voltage PU (Sensitivity Scenario)	Project & Potential Mitigation Solutions
		2022 Spring Off-Peak	2025 Spring Off-Peak	2030 Spring Off-Peak	2025 SpOP Hi Renew & Min Gas Gen	
MN_RM_11 500 kV	300 - Bulk System	1.1082	1.0961	1.0954	1.0737	Action plan until Round Mtn. DRS is in service
MN_RM_22 500 kV	300 - Bulk System	1.1047	1.0674	1.0674	1.0593	Action plan until Round Mtn. DRS is in service
MENDOCNO 115 kV	302 - North Coast	1.043	1.067	1.018	1.069	System adjustments or voltage support if needed
MNDCNO M 115 kV	302 - North Coast	1.042	1.069	1.019	1.072	System adjustments or voltage support if needed
CALPELLA 115 kV	302 - North Coast	1.041	1.063	1.017	1.065	System adjustments or voltage support if needed
GUALALA 60 kV	302 - North Coast	1.024	1.057	1.031	1.063	System adjustments or voltage support if needed
UKIAH 115 kV	302 - North Coast	1.037	1.056	1.016	1.058	System adjustments or voltage support if needed
ANNAPOLS 60 kV	302 - North Coast	1.029	1.057	1.031	1.061	System adjustments or voltage support if needed
FORT RSS 60 kV	302 - North Coast	1.032	1.056	1.031	1.060	System adjustments or voltage support if needed
WHLR JCT 60 kV	302 - North Coast	1.045	1.053	1.035	1.055	System adjustments or voltage support if needed
MIRABEL 60 kV	302 - North Coast	1.045	1.053	1.035	1.055	System adjustments or voltage support if needed
MIRBELTP 60 kV	302 - North Coast	1.045	1.053	1.035	1.055	System adjustments or voltage support if needed
WHLR TAP 60 kV	302 - North Coast	1.046	1.052	1.036	1.054	System adjustments or voltage support if needed
TRNTN JT 60 kV	302 - North Coast	1.046	1.052	1.037	1.054	System adjustments or voltage support if needed
TRNTN_JC 60 kV	302 - North Coast	1.046	1.052	1.037	1.054	System adjustments or voltage support if needed
SLMN JCT 60 kV	302 - North Coast	1.034	1.055	1.031	1.059	System adjustments or voltage support if needed
FULTON 60 kV	302 - North Coast	1.048	1.051	1.040	1.052	System adjustments or voltage support if needed
WOHLER 60 kV	302 - North Coast	1.046	1.052	1.036	1.053	System adjustments or voltage support if needed
MONTE RO 60 kV	302 - North Coast	1.038	1.054	1.030	1.057	System adjustments or voltage support if needed
SLMN CRK 60 kV	302 - North Coast	1.032	1.055	1.030	1.059	System adjustments or voltage support if needed
ER_FTNJT 115 kV	302 - North Coast	1.054	1.045	1.027	1.047	System adjustments or voltage support if needed
MONROE2 115 kV	302 - North Coast	1.056	1.050	1.018	1.051	System adjustments or voltage support if needed
RINCONJ2 115 kV	302 - North Coast	1.054	1.045	1.025	1.047	System adjustments or voltage support if needed
RINCON 115 kV	302 - North Coast	1.054	1.045	1.025	1.047	System adjustments or voltage support if needed
SNTA RSA 115 kV	302 - North Coast	1.054	1.050	1.016	1.051	System adjustments or voltage support if needed
MONROE1 115 kV	302 - North Coast	1.054	1.048	1.018	1.050	System adjustments or voltage support if needed
FULTON 115 kV	302 - North Coast	1.054	1.045	1.025	1.046	System adjustments or voltage support if needed
MOLINO 60 kV	302 - North Coast	1.043	1.049	1.029	1.052	System adjustments or voltage support if needed
LUCERNJ1 115 kV	302 - North Coast	1.043	1.051	1.012	1.058	System adjustments or voltage support if needed
LUCERNE 115 kV	302 - North Coast	1.043	1.051	1.011	1.058	System adjustments or voltage support if needed
CEDR CRK 60 kV	303 - North Valley	1.054	1.044	1.089	1.089	System adjustments or voltage support if needed
CLOV TAP 60 kV	303 - North Valley	1.056	1.044	1.089	1.089	System adjustments or voltage support if needed
KILARC 60 kV	303 - North Valley	1.056	1.044	1.088	1.088	System adjustments or voltage support if needed

Study Area Entire PG&E System

High Voltages Under P0 Conditions

Bus/Substation	Zone	Voltage PU (Baseline Scenarios)			Voltage PU (Sensitivity Scenario)	Project & Potential Mitigation Solutions
		2022 Spring Off-Peak	2025 Spring Off-Peak	2030 Spring Off-Peak	2025 SpOP Hi Renew & Min Gas Gen	
OLSEN JT 60 kV	303 - North Valley	1.053	1.043	1.083	1.084	System adjustments or voltage support if needed
WHITMORE 60 kV	303 - North Valley	1.051	1.042	1.080	1.082	System adjustments or voltage support if needed
WILLOWS 60 kV	303 - North Valley	1.038	1.071	1.053	1.074	System adjustments or voltage support if needed
ELKCREEK 60 kV	303 - North Valley	1.038	1.071	1.052	1.074	System adjustments or voltage support if needed
ELKCRKJT 60 kV	303 - North Valley	1.039	1.070	1.053	1.072	System adjustments or voltage support if needed
ANITA 60 kV	303 - North Valley	1.022	1.064	1.062	1.069	System adjustments or voltage support if needed
CHICO JT 60 kV	303 - North Valley	1.033	1.056	1.055	1.059	System adjustments or voltage support if needed
HMLTN JT 60 kV	303 - North Valley	1.047	1.057	1.057	1.058	System adjustments or voltage support if needed
HAMILTON 60 kV	303 - North Valley	1.047	1.057	1.057	1.058	System adjustments or voltage support if needed
JACINTO 60 kV	303 - North Valley	1.044	1.054	1.058	1.057	System adjustments or voltage support if needed
HEADGATE 60 kV	303 - North Valley	1.038	1.053	1.051	1.054	System adjustments or voltage support if needed
ESQUON 60 kV	303 - North Valley	1.050	1.051	1.049	1.056	System adjustments or voltage support if needed
TKO TAP 60 kV	303 - North Valley	1.044	1.039	1.068	1.071	System adjustments or voltage support if needed
COWCK TP 60 kV	303 - North Valley	1.043	1.039	1.068	1.071	System adjustments or voltage support if needed
LS MLNSJ 60 kV	303 - North Valley	1.034	1.076	1.047	1.083	System adjustments or voltage support if needed
LS ML JT 60 kV	303 - North Valley	1.034	1.075	1.047	1.082	System adjustments or voltage support if needed
VINA 60 kV	303 - North Valley	1.033	1.074	1.045	1.081	System adjustments or voltage support if needed
DIRYVLLE 60 kV	303 - North Valley	1.037	1.071	1.045	1.077	System adjustments or voltage support if needed
GERBER 60 kV	303 - North Valley	1.035	1.069	1.034	1.076	System adjustments or voltage support if needed
RED BLFF 60 kV	303 - North Valley	1.038	1.070	1.043	1.075	System adjustments or voltage support if needed
RED B JT 60 kV	303 - North Valley	1.038	1.069	1.043	1.074	System adjustments or voltage support if needed
LP FB SP 60 kV	303 - North Valley	1.038	1.066	1.024	1.071	System adjustments or voltage support if needed
GRBR JCT 60 kV	303 - North Valley	1.039	1.065	1.029	1.070	System adjustments or voltage support if needed
TYLERJT 60 kV	303 - North Valley	1.039	1.065	1.025	1.070	System adjustments or voltage support if needed
RWSN J2 60 kV	303 - North Valley	1.039	1.064	1.028	1.069	System adjustments or voltage support if needed
CLMN JCT 60 kV	303 - North Valley	1.039	1.064	1.042	1.068	System adjustments or voltage support if needed
CASCADE 115 kV	303 - North Valley	1.044	1.055	1.043	1.062	System adjustments or voltage support if needed
OREGNTRL 115 kV	303 - North Valley	1.043	1.053	1.042	1.060	System adjustments or voltage support if needed
CORNING 60 kV	303 - North Valley	1.036	1.061	1.049	1.064	System adjustments or voltage support if needed
SYCAMORE 115 kV	303 - North Valley	1.041	1.055	1.048	1.059	System adjustments or voltage support if needed
NORD 1 115 kV	303 - North Valley	1.041	1.054	1.049	1.058	System adjustments or voltage support if needed
NDAME J 115 kV	303 - North Valley	1.041	1.052	1.048	1.056	System adjustments or voltage support if needed
ORL B JT 60 kV	303 - North Valley	1.044	1.055	1.048	1.056	System adjustments or voltage support if needed

Study Area Entire PG&E System

High Voltages Under P0 Conditions

Bus/Substation	Zone	Voltage PU (Baseline Scenarios)			Voltage PU (Sensitivity Scenario)	Project & Potential Mitigation Solutions
		2022 Spring Off-Peak	2025 Spring Off-Peak	2030 Spring Off-Peak	2025 SpOP Hi Renew & Min Gas Gen	
OROVILLE 60 kV	303 - North Valley	1.021	1.058	1.031	1.061	System adjustments or voltage support if needed
KLLY RDE 60 kV	303 - North Valley	1.030	1.058	1.032	1.061	System adjustments or voltage support if needed
OROVLENRGJCT 60 kV	303 - North Valley	1.022	1.058	1.032	1.061	System adjustments or voltage support if needed
OROVLENRG 60 kV	303 - North Valley	1.022	1.058	1.032	1.061	System adjustments or voltage support if needed
ELGN JCT 60 kV	303 - North Valley	1.023	1.058	1.032	1.061	System adjustments or voltage support if needed
LSNA PCC 60 kV	303 - North Valley	1.022	1.058	1.031	1.061	System adjustments or voltage support if needed
APT ORVC 60 kV	303 - North Valley	1.022	1.058	1.031	1.061	System adjustments or voltage support if needed
PALERMO 60 kV	303 - North Valley	1.023	1.059	1.032	1.061	System adjustments or voltage support if needed
CAPAY 60 kV	303 - North Valley	1.042	1.050	1.049	1.051	System adjustments or voltage support if needed
CAPAYJCT 60 kV	303 - North Valley	1.042	1.050	1.049	1.051	System adjustments or voltage support if needed
ROCKCK 1 230 kV	303 - North Valley	1.033	1.052	1.034	1.056	System adjustments or voltage support if needed
POE 230 kV	303 - North Valley	1.033	1.053	1.034	1.057	System adjustments or voltage support if needed
HONCUT 115 kV	303 - North Valley	1.018	1.046	1.055	1.049	System adjustments or voltage support if needed
HONC JT3 115 kV	303 - North Valley	1.018	1.045	1.055	1.049	System adjustments or voltage support if needed
WYANDTTE 115 kV	303 - North Valley	1.011	1.038	1.055	1.041	System adjustments or voltage support if needed
WYANDJT1 115 kV	303 - North Valley	1.011	1.038	1.055	1.041	System adjustments or voltage support if needed
SLYCREEK 115 kV	303 - North Valley	1.034	1.034	1.057	1.036	System adjustments or voltage support if needed
WODLF TP 115 kV	303 - North Valley	1.030	1.034	1.057	1.036	System adjustments or voltage support if needed
FRBSTNTP 115 kV	303 - North Valley	1.025	1.034	1.057	1.036	System adjustments or voltage support if needed
FORBSTWN 115 kV	303 - North Valley	1.026	1.034	1.057	1.036	System adjustments or voltage support if needed
KANAKAJT 115 kV	303 - North Valley	1.023	1.034	1.057	1.036	System adjustments or voltage support if needed
OWID 115 kV	303 - North Valley	1.024	1.034	1.057	1.036	System adjustments or voltage support if needed
PALERMO 115 kV	303 - North Valley	1.014	1.033	1.055	1.036	System adjustments or voltage support if needed
CHALLNGE 60 kV	303 - North Valley	1.042	1.050	1.048	1.052	System adjustments or voltage support if needed
NOTRDAME 115 kV	303 - North Valley	1.041	1.052	1.048	1.055	System adjustments or voltage support if needed
CHICOTP2 115 kV	303 - North Valley	1.041	1.052	1.048	1.055	System adjustments or voltage support if needed
BUTTE 115 kV	303 - North Valley	1.041	1.051	1.048	1.054	System adjustments or voltage support if needed
COLEMAN 60 kV	303 - North Valley	1.043	1.047	1.041	1.051	System adjustments or voltage support if needed
CLMN TAP 60 kV	303 - North Valley	1.043	1.047	1.041	1.051	System adjustments or voltage support if needed
PARADSE 115 kV	303 - North Valley	1.042	1.050	1.048	1.053	System adjustments or voltage support if needed
CLMN FSH 60 kV	303 - North Valley	1.042	1.047	1.040	1.050	System adjustments or voltage support if needed
ORLAND B 60 kV	303 - North Valley	1.041	1.047	1.052	1.049	System adjustments or voltage support if needed
DRHM JCB 60 kV	303 - North Valley	1.050	1.050	1.048	1.054	System adjustments or voltage support if needed

Study Area Entire PG&E System

High Voltages Under P0 Conditions

Bus/Substation	Zone	Voltage PU (Baseline Scenarios)			Voltage PU (Sensitivity Scenario)	Project & Potential Mitigation Solutions
		2022 Spring Off-Peak	2025 Spring Off-Peak	2030 Spring Off-Peak	2025 SpOP Hi Renew & Min Gas Gen	
COTTONWD 60 kV	303 - North Valley	1.043	1.047	1.046	1.050	System adjustments or voltage support if needed
BCKS CRK 230 kV	303 - North Valley	1.036	1.051	1.039	1.053	System adjustments or voltage support if needed
ROCKCK 2 230 kV	303 - North Valley	1.036	1.051	1.039	1.053	System adjustments or voltage support if needed
RK C JT2 230 kV	303 - North Valley	1.036	1.051	1.039	1.053	System adjustments or voltage support if needed
CRESTA 230 kV	303 - North Valley	1.035	1.051	1.039	1.054	System adjustments or voltage support if needed
RK C JT1 230 kV	303 - North Valley	1.033	1.052	1.034	1.056	System adjustments or voltage support if needed
BELDEN 230 kV	303 - North Valley	1.033	1.052	1.033	1.055	System adjustments or voltage support if needed
VACA-CB 115 kV	304 - Sacramento	1.088	1.092	1.066	1.095	System adjustments or voltage support if needed
WILLIAMS 60 kV	304 - Sacramento	1.053	1.058	1.034	1.066	System adjustments or voltage support if needed
WESCOT2 60 kV	304 - Sacramento	1.055	1.057	1.033	1.065	System adjustments or voltage support if needed
WADHMJCT 60 kV	304 - Sacramento	1.055	1.055	1.032	1.062	System adjustments or voltage support if needed
GRAND IS 115 kV	304 - Sacramento	1.053	1.054	1.045	1.060	Action plan until Rio Oso Tx and SVC project
MERIDIAN 60 kV	304 - Sacramento	1.046	1.083	1.047	1.097	System adjustments or voltage support if needed
MERIDJCT 60 kV	304 - Sacramento	1.046	1.081	1.046	1.095	System adjustments or voltage support if needed
COLUSA 60 kV	304 - Sacramento	1.044	1.080	1.045	1.093	System adjustments or voltage support if needed
CLSA JCT 60 kV	304 - Sacramento	1.045	1.078	1.045	1.091	System adjustments or voltage support if needed
WESCOT1 60 kV	304 - Sacramento	1.047	1.074	1.042	1.085	System adjustments or voltage support if needed
DUNNIGAN 60 kV	304 - Sacramento	1.031	1.066	1.041	1.078	System adjustments or voltage support if needed
RICE 60 kV	304 - Sacramento	1.036	1.061	1.042	1.073	System adjustments or voltage support if needed
CLSA CRS 60 kV	304 - Sacramento	1.042	1.060	1.042	1.071	System adjustments or voltage support if needed
WILSONAV 60 kV	304 - Sacramento	1.042	1.060	1.042	1.071	System adjustments or voltage support if needed
DRAKE 60 kV	304 - Sacramento	1.036	1.063	1.037	1.073	System adjustments or voltage support if needed
ARBUCKLE 60 kV	304 - Sacramento	1.040	1.063	1.037	1.073	System adjustments or voltage support if needed
HARINTON 60 kV	304 - Sacramento	1.038	1.063	1.036	1.073	System adjustments or voltage support if needed
DUNNTAP 60 kV	304 - Sacramento	1.040	1.063	1.037	1.073	System adjustments or voltage support if needed
DELEVAN 60 kV	304 - Sacramento	1.046	1.059	1.041	1.070	System adjustments or voltage support if needed
MAXWELL 60 kV	304 - Sacramento	1.046	1.059	1.041	1.070	System adjustments or voltage support if needed
MAXTAP 60 kV	304 - Sacramento	1.046	1.059	1.041	1.070	System adjustments or voltage support if needed
WILL JCT 60 kV	304 - Sacramento	1.049	1.052	1.036	1.060	System adjustments or voltage support if needed
CORTINA 60 kV	304 - Sacramento	1.052	1.045	1.031	1.052	System adjustments or voltage support if needed
BRIGHTN 115 kV	304 - Sacramento	1.050	1.056	1.044	1.061	System adjustments or voltage support if needed
HOWARDJCT1 115 kV	304 - Sacramento	1.051	1.056	1.045	1.061	System adjustments or voltage support if needed
HOWARDJCT2 115 kV	304 - Sacramento	1.051	1.056	1.045	1.061	System adjustments or voltage support if needed

Study Area Entire PG&E System

High Voltages Under P0 Conditions

Bus/Substation	Zone	Voltage PU (Baseline Scenarios)			Voltage PU (Sensitivity Scenario)	Project & Potential Mitigation Solutions
		2022 Spring Off-Peak	2025 Spring Off-Peak	2030 Spring Off-Peak	2025 SpOP Hi Renew & Min Gas Gen	
HOWARDJCT3 115 kV	304 - Sacramento	1.049	1.053	1.045	1.059	System adjustments or voltage support if needed
CRTNA M 230 kV	304 - Sacramento	1.026	1.069	0.991	1.082	System adjustments or voltage support if needed
HUSTD 60 kV	304 - Sacramento	1.049	1.045	1.027	1.052	System adjustments or voltage support if needed
ARBALT 60 kV	304 - Sacramento	1.041	1.045	1.018	1.053	System adjustments or voltage support if needed
ARBJCT 60 kV	304 - Sacramento	1.041	1.045	1.018	1.053	System adjustments or voltage support if needed
BOGUE 115 kV	305 - Sierra	1.025	1.067	1.056	1.071	System adjustments or voltage support if needed
FREC TAP 115 kV	305 - Sierra	1.025	1.067	1.056	1.071	System adjustments or voltage support if needed
DEL MAR 60 kV	305 - Sierra	1.052	1.069	1.033	1.076	System adjustments or voltage support if needed
SIERRAPI 60 kV	305 - Sierra	1.052	1.069	1.033	1.076	System adjustments or voltage support if needed
OLIVH J3 115 kV	305 - Sierra	1.024	1.059	1.054	1.063	System adjustments or voltage support if needed
ROCKLIN 60 kV	305 - Sierra	1.057	1.051	1.037	1.059	System adjustments or voltage support if needed
TAYLOR 60 kV	305 - Sierra	1.057	1.051	1.037	1.058	System adjustments or voltage support if needed
GLEAF 1 115 kV	305 - Sierra	1.039	1.059	1.055	1.062	System adjustments or voltage support if needed
GLEAF TP 115 kV	305 - Sierra	1.039	1.059	1.055	1.062	System adjustments or voltage support if needed
E.MRYSVE 115 kV	305 - Sierra	1.033	1.054	1.061	1.057	System adjustments or voltage support if needed
E.MRY J2 115 kV	305 - Sierra	1.033	1.054	1.061	1.057	System adjustments or voltage support if needed
E.NICOLS 115 kV	305 - Sierra	1.050	1.054	1.054	1.056	System adjustments or voltage support if needed
ATLANTI 60 kV	305 - Sierra	1.058	1.050	1.038	1.057	System adjustments or voltage support if needed
PIKE CTY 60 kV	305 - Sierra	1.044	1.051	1.048	1.054	System adjustments or voltage support if needed
ALLEGHNY 60 kV	305 - Sierra	1.044	1.051	1.047	1.054	System adjustments or voltage support if needed
CLMBA HL 60 kV	305 - Sierra	1.044	1.051	1.050	1.054	System adjustments or voltage support if needed
HIGGINS 115 kV	305 - Sierra	1.036	1.059	1.049	1.056	System adjustments or voltage support if needed
BELL PGE 115 kV	305 - Sierra	1.032	1.056	1.050	1.054	System adjustments or voltage support if needed
NEWCSTL1 115 kV	305 - Sierra	1.034	1.056	1.050	1.053	System adjustments or voltage support if needed
NEWCSTLE 115 kV	305 - Sierra	1.034	1.056	1.050	1.053	System adjustments or voltage support if needed
HORSHE1 115 kV	305 - Sierra	1.036	1.057	1.049	1.054	System adjustments or voltage support if needed
HORSESHE 115 kV	305 - Sierra	1.036	1.057	1.049	1.054	System adjustments or voltage support if needed
FLINT1 115 kV	305 - Sierra	1.032	1.056	1.050	1.053	System adjustments or voltage support if needed
PLACER 115 kV	305 - Sierra	1.031	1.055	1.050	1.053	System adjustments or voltage support if needed
FLINT2 115 kV	305 - Sierra	1.032	1.055	1.050	1.052	System adjustments or voltage support if needed
FLINT 115 kV	305 - Sierra	1.032	1.055	1.050	1.052	System adjustments or voltage support if needed
BANGOR 60 kV	305 - Sierra	1.032	1.058	1.039	1.061	System adjustments or voltage support if needed
BRUNSWCK 115 kV	305 - Sierra	1.046	1.061	1.044	1.061	System adjustments or voltage support if needed

Study Area Entire PG&E System

High Voltages Under P0 Conditions

Bus/Substation	Zone	Voltage PU (Baseline Scenarios)			Voltage PU (Sensitivity Scenario)	Project & Potential Mitigation Solutions
		2022 Spring Off-Peak	2025 Spring Off-Peak	2030 Spring Off-Peak	2025 SpOP Hi Renew & Min Gas Gen	
BRNSWCKP 115 kV	305 - Sierra	1.047	1.058	1.045	1.058	Action plan until Rio Oso Tx and SVC project
CHCGO PK 115 kV	305 - Sierra	1.044	1.057	1.046	1.053	System adjustments or voltage support if needed
ELDORAD 115 kV	305 - Sierra	1.055	1.052	1.050	1.049	System adjustments or voltage support if needed
RIO OSO 115 kV	305 - Sierra	1.052	1.048	1.053	1.050	Action plan until Rio Oso Tx and SVC project
APLHTAP2 115 kV	305 - Sierra	1.053	1.052	1.048	1.050	System adjustments or voltage support if needed
DTCH FL1 115 kV	305 - Sierra	1.044	1.056	1.044	1.052	System adjustments or voltage support if needed
BRNSWKTP 115 kV	305 - Sierra	1.050	1.054	1.047	1.054	System adjustments or voltage support if needed
BRNSWALT 115 kV	305 - Sierra	1.050	1.054	1.047	1.054	System adjustments or voltage support if needed
DTCH FL2 115 kV	305 - Sierra	1.049	1.056	1.044	1.054	System adjustments or voltage support if needed
DRUM 115 kV	305 - Sierra	1.048	1.056	1.042	1.053	System adjustments or voltage support if needed
MIDLFORK 230 kV	305 - Sierra	1.029	1.053	1.030	1.065	System adjustments or voltage support if needed
RALSTON 230 kV	305 - Sierra	1.027	1.053	1.028	1.065	System adjustments or voltage support if needed
GOLDHILL 230 kV	305 - Sierra	1.020	1.053	1.020	1.062	System adjustments or voltage support if needed
ATLANTC 230 kV	305 - Sierra	1.016	1.058	1.019	1.065	System adjustments or voltage support if needed
GRSS VLY 60 kV	305 - Sierra	1.038	1.050	1.049	1.053	System adjustments or voltage support if needed
OXBOW 60 kV	305 - Sierra	1.040	1.064	1.046	1.029	System adjustments or voltage support if needed
ENVRO_HY 60 kV	305 - Sierra	1.040	1.063	1.046	1.029	System adjustments or voltage support if needed
DOBBINS 60 kV	305 - Sierra	1.044	1.049	1.050	1.052	System adjustments or voltage support if needed
CHLLNGEA 60 kV	305 - Sierra	1.044	1.049	1.050	1.052	System adjustments or voltage support if needed
COLGATEA 60 kV	305 - Sierra	1.044	1.049	1.050	1.052	System adjustments or voltage support if needed
COLGATE 60 kV	305 - Sierra	1.044	1.049	1.050	1.052	System adjustments or voltage support if needed
FORST HL 60 kV	305 - Sierra	1.037	1.060	1.043	1.029	System adjustments or voltage support if needed
NEWCSTL2 115 kV	305 - Sierra	1.033	1.054	1.049	1.052	System adjustments or voltage support if needed
CLRKSVLE 115 kV	305 - Sierra	1.036	1.053	1.050	1.052	System adjustments or voltage support if needed
HORSHE2 115 kV	305 - Sierra	1.035	1.053	1.049	1.050	System adjustments or voltage support if needed
APPLE HL 115 kV	305 - Sierra	1.054	1.051	1.049	1.048	System adjustments or voltage support if needed
SPICAMIN 115 kV	305 - Sierra	1.054	1.051	1.049	1.048	System adjustments or voltage support if needed
APLHTAP1 115 kV	305 - Sierra	1.054	1.051	1.049	1.048	System adjustments or voltage support if needed
PLCRVLB2 115 kV	305 - Sierra	1.052	1.052	1.047	1.050	System adjustments or voltage support if needed
PLCRVLB3 115 kV	305 - Sierra	1.052	1.052	1.047	1.050	System adjustments or voltage support if needed
PLCRVLT2 115 kV	305 - Sierra	1.052	1.052	1.047	1.050	System adjustments or voltage support if needed
MIZOU_T2 115 kV	305 - Sierra	1.052	1.052	1.047	1.050	System adjustments or voltage support if needed
DMND SPR 115 kV	305 - Sierra	1.052	1.052	1.047	1.051	System adjustments or voltage support if needed

Study Area Entire PG&E System

High Voltages Under P0 Conditions

Bus/Substation	Zone	Voltage PU (Baseline Scenarios)			Voltage PU (Sensitivity Scenario)	Project & Potential Mitigation Solutions
		2022 Spring Off-Peak	2025 Spring Off-Peak	2030 Spring Off-Peak	2025 SpOP Hi Renew & Min Gas Gen	
DIMOND_2 115 kV	305 - Sierra	1.052	1.052	1.047	1.050	System adjustments or voltage support if needed
RIO OSO 230 kV	305 - Sierra	1.010	1.049	1.018	1.055	System adjustments or voltage support if needed
RICHMOND 115 kV	307 - East Bay	1.041	1.050	1.026	1.053	System adjustments or voltage support if needed
ELCRTJ2 115 kV	307 - East Bay	1.041	1.049	1.026	1.052	System adjustments or voltage support if needed
CLAYTN 115 kV	308 - Diablo	1.053	1.051	1.034	1.055	System adjustments or voltage support if needed
MEDW LNE 115 kV	308 - Diablo	1.056	1.052	1.029	1.056	System adjustments or voltage support if needed
EBAYMUDJ 115 kV	308 - Diablo	1.055	1.051	1.030	1.055	System adjustments or voltage support if needed
WALNUTCR 115 kV	308 - Diablo	1.054	1.050	1.030	1.055	System adjustments or voltage support if needed
LKWD_JCT 115 kV	308 - Diablo	1.055	1.050	1.030	1.055	System adjustments or voltage support if needed
LAKEWD-C 115 kV	308 - Diablo	1.055	1.050	1.030	1.055	System adjustments or voltage support if needed
LAKEWD-M 115 kV	308 - Diablo	1.055	1.050	1.030	1.054	System adjustments or voltage support if needed
MDLRVRJT 60 kV	308 - Diablo	1.036	1.062	1.043	1.063	System adjustments or voltage support if needed
WLLW PSS 60 kV	308 - Diablo	1.032	1.053	1.037	1.053	System adjustments or voltage support if needed
SHLL CHM 60 kV	308 - Diablo	1.032	1.053	1.037	1.053	System adjustments or voltage support if needed
BIXLER 60 kV	308 - Diablo	1.034	1.060	1.041	1.061	System adjustments or voltage support if needed
BXLR_TAP 60 kV	308 - Diablo	1.034	1.060	1.041	1.061	System adjustments or voltage support if needed
PITTSBRG 60 kV	308 - Diablo	1.034	1.051	1.039	1.051	System adjustments or voltage support if needed
SHLLCHMT 60 kV	308 - Diablo	1.034	1.051	1.039	1.051	System adjustments or voltage support if needed
KIRKER 115 kV	308 - Diablo	1.048	1.048	1.037	1.052	System adjustments or voltage support if needed
UNITEDSP 115 kV	308 - Diablo	1.048	1.048	1.037	1.052	System adjustments or voltage support if needed
DOW TAP2 115 kV	308 - Diablo	1.048	1.048	1.037	1.052	System adjustments or voltage support if needed
COLSTJT2 115 kV	308 - Diablo	1.048	1.048	1.037	1.052	System adjustments or voltage support if needed
KIRKTAP2 115 kV	308 - Diablo	1.048	1.048	1.037	1.052	System adjustments or voltage support if needed
LINDETP2 115 kV	308 - Diablo	1.048	1.048	1.037	1.052	System adjustments or voltage support if needed
W.P.BART 115 kV	308 - Diablo	1.050	1.052	1.035	1.056	System adjustments or voltage support if needed
BOLLMAN1 115 kV	308 - Diablo	1.047	1.050	1.035	1.054	System adjustments or voltage support if needed
BOLLMAN 115 kV	308 - Diablo	1.047	1.050	1.034	1.053	System adjustments or voltage support if needed
IMHOFF_1 115 kV	308 - Diablo	1.046	1.050	1.034	1.053	System adjustments or voltage support if needed
BAYSHOR1 115 kV	309 - Saan Francisco	1.036	1.047	1.034	1.053	System adjustments or voltage support if needed
BAYSHOR2 115 kV	309 - Saan Francisco	1.036	1.047	1.034	1.053	System adjustments or voltage support if needed
POTRERO 115 kV	309 - Saan Francisco	1.036	1.047	1.035	1.054	System adjustments or voltage support if needed
HNTRS PT 115 kV	309 - Saan Francisco	1.037	1.046	1.032	1.053	System adjustments or voltage support if needed
POT_SVC 115 kV	309 - Saan Francisco	1.036	1.047	1.035	1.054	System adjustments or voltage support if needed

Study Area Entire PG&E System

High Voltages Under P0 Conditions

Bus/Substation	Zone	Voltage PU (Baseline Scenarios)			Voltage PU (Sensitivity Scenario)	Project & Potential Mitigation Solutions
		2022 Spring Off-Peak	2025 Spring Off-Peak	2030 Spring Off-Peak	2025 SpOP Hi Renew & Min Gas Gen	
MISSON 115 kV	309 - Saan Francisco	1.036	1.046	1.032	1.053	System adjustments or voltage support if needed
LARKIN E 115 kV	309 - Saan Francisco	1.036	1.046	1.032	1.053	System adjustments or voltage support if needed
LARKIN F 115 kV	309 - Saan Francisco	1.035	1.046	1.032	1.053	System adjustments or voltage support if needed
LARKIN D 115 kV	309 - Saan Francisco	1.035	1.046	1.034	1.053	System adjustments or voltage support if needed
WOODSIDE 60 kV	310 - Peninsula	1.042	1.053	1.026	1.059	System adjustments or voltage support if needed
JEFRSN_D 60 kV	310 - Peninsula	1.048	1.054	1.032	1.059	System adjustments or voltage support if needed
JEFRSN_E 60 kV	310 - Peninsula	1.048	1.054	1.032	1.059	System adjustments or voltage support if needed
LAS PLGS 60 kV	310 - Peninsula	1.041	1.051	1.025	1.057	System adjustments or voltage support if needed
EMRLD LE 60 kV	310 - Peninsula	1.047	1.053	1.031	1.059	System adjustments or voltage support if needed
WTRSHDTP 60 kV	310 - Peninsula	1.047	1.051	1.031	1.056	System adjustments or voltage support if needed
WATRSHED 60 kV	310 - Peninsula	1.047	1.051	1.031	1.056	System adjustments or voltage support if needed
OX_MTN60 60 kV	310 - Peninsula	1.049	1.053	1.037	1.052	System adjustments or voltage support if needed
HLF MNBY 60 kV	310 - Peninsula	1.046	1.052	1.034	1.052	System adjustments or voltage support if needed
OXMTN_TP 60 kV	310 - Peninsula	1.047	1.052	1.035	1.052	System adjustments or voltage support if needed
RLSTN45 60 kV	310 - Peninsula	1.041	1.050	1.029	1.056	System adjustments or voltage support if needed
RALSTON 60 kV	310 - Peninsula	1.041	1.050	1.029	1.056	System adjustments or voltage support if needed
HILDAL47 60 kV	310 - Peninsula	1.041	1.050	1.029	1.055	System adjustments or voltage support if needed
CAROLD2 60 kV	310 - Peninsula	1.040	1.049	1.028	1.055	System adjustments or voltage support if needed
CRYSTLSG 60 kV	310 - Peninsula	1.040	1.049	1.028	1.055	System adjustments or voltage support if needed
SLACTAP2 230 kV	310 - Peninsula	1.044	1.048	1.028	1.053	System adjustments or voltage support if needed
JEFFERSN 230 kV	310 - Peninsula	1.043	1.048	1.029	1.054	System adjustments or voltage support if needed
SLACTAP1 230 kV	310 - Peninsula	1.040	1.047	1.028	1.052	System adjustments or voltage support if needed
JMDAMCX1 230 kV	310 - Peninsula	1.044	1.049	1.030	1.055	System adjustments or voltage support if needed
JMDAMCX2 230 kV	310 - Peninsula	1.044	1.049	1.030	1.055	System adjustments or voltage support if needed
LSPLGSJT 60 kV	310 - Peninsula	1.041	1.049	1.027	1.055	System adjustments or voltage support if needed
TRAN230A 230 kV	310 - Peninsula	1.043	1.048	1.030	1.054	System adjustments or voltage support if needed
MNLOJCT2 60 kV	310 - Peninsula	1.037	1.046	1.024	1.052	System adjustments or voltage support if needed
RLSTN35 60 kV	310 - Peninsula	1.046	1.050	1.031	1.054	System adjustments or voltage support if needed
S.L.A.C. 60 kV	310 - Peninsula	1.035	1.045	1.022	1.051	System adjustments or voltage support if needed
SLAC TAP 60 kV	310 - Peninsula	1.035	1.045	1.022	1.051	System adjustments or voltage support if needed
RVNSWD E 115 kV	310 - Peninsula	1.045	1.052	1.040	1.058	System adjustments or voltage support if needed
RVNSWD D 115 kV	310 - Peninsula	1.045	1.052	1.040	1.058	System adjustments or voltage support if needed
CLY LND2 115 kV	310 - Peninsula	1.044	1.052	1.038	1.058	System adjustments or voltage support if needed

Study Area Entire PG&E System

High Voltages Under P0 Conditions

Bus/Substation	Zone	Voltage PU (Baseline Scenarios)			Voltage PU (Sensitivity Scenario)	Project & Potential Mitigation Solutions
		2022 Spring Off-Peak	2025 Spring Off-Peak	2030 Spring Off-Peak	2025 SpOP Hi Renew & Min Gas Gen	
CLY LND 115 kV	310 - Peninsula	1.044	1.052	1.038	1.058	System adjustments or voltage support if needed
HILDAL49 60 kV	310 - Peninsula	1.045	1.047	1.031	1.051	System adjustments or voltage support if needed
HLLSDLJT 60 kV	310 - Peninsula	1.045	1.047	1.031	1.051	System adjustments or voltage support if needed
TRAN-60 60 kV	310 - Peninsula	1.047	1.047	1.030	1.051	System adjustments or voltage support if needed
MLLBTP97 60 kV	310 - Peninsula	1.047	1.047	1.030	1.051	System adjustments or voltage support if needed
CAROLD1 60 kV	310 - Peninsula	1.047	1.047	1.030	1.051	System adjustments or voltage support if needed
CAROLNDS 60 kV	310 - Peninsula	1.047	1.047	1.030	1.051	System adjustments or voltage support if needed
STANISLS 115 kV	311 - Stockton	1.053	1.067	1.054	1.070	System adjustments or voltage support if needed
WEST PNT 60 kV	311 - Stockton	1.054	1.059	1.061	1.064	System adjustments or voltage support if needed
2008-RD 60 kV	311 - Stockton	1.054	1.059	1.061	1.064	System adjustments or voltage support if needed
FRGTNTP1 115 kV	311 - Stockton	1.048	1.065	1.053	1.068	System adjustments or voltage support if needed
FROGTOWN 115 kV	311 - Stockton	1.048	1.065	1.053	1.068	System adjustments or voltage support if needed
CATARACT 115 kV	311 - Stockton	1.052	1.066	1.054	1.069	System adjustments or voltage support if needed
FRGTNTP2 115 kV	311 - Stockton	1.048	1.064	1.052	1.067	System adjustments or voltage support if needed
PNE GRVE 60 kV	311 - Stockton	1.044	1.061	1.054	1.066	System adjustments or voltage support if needed
P.GRVEJ. 60 kV	311 - Stockton	1.047	1.059	1.055	1.064	System adjustments or voltage support if needed
BUENA_TP 60 kV	311 - Stockton	1.034	1.062	1.050	1.068	System adjustments or voltage support if needed
BUENAVISTA 60 kV	311 - Stockton	1.034	1.062	1.050	1.068	System adjustments or voltage support if needed
ELECTRAJ 60 kV	311 - Stockton	1.045	1.056	1.051	1.060	System adjustments or voltage support if needed
PRDESWS 60 kV	311 - Stockton	1.037	1.058	1.052	1.063	System adjustments or voltage support if needed
PARDEE A 60 kV	311 - Stockton	1.047	1.053	1.056	1.057	System adjustments or voltage support if needed
VSLDSW87 60 kV	311 - Stockton	1.046	1.052	1.055	1.056	System adjustments or voltage support if needed
PRDEJCT 60 kV	311 - Stockton	1.045	1.051	1.054	1.055	System adjustments or voltage support if needed
MELNS JA 115 kV	311 - Stockton	1.046	1.062	1.052	1.066	System adjustments or voltage support if needed
AVENATP1 115 kV	311 - Stockton	1.034	1.057	1.034	1.062	System adjustments or voltage support if needed
AVENA 115 kV	311 - Stockton	1.034	1.058	1.034	1.062	System adjustments or voltage support if needed
VLYHMTP1 115 kV	311 - Stockton	1.030	1.059	1.034	1.064	System adjustments or voltage support if needed
VLYHMTP2 115 kV	311 - Stockton	1.038	1.058	1.036	1.062	System adjustments or voltage support if needed
AVENATP2 115 kV	311 - Stockton	1.035	1.055	1.032	1.059	System adjustments or voltage support if needed
VIERRA 115 kV	311 - Stockton	1.032	1.053	1.030	1.057	System adjustments or voltage support if needed
TESLAMTR 115 kV	311 - Stockton	1.047	1.053	1.030	1.057	System adjustments or voltage support if needed
VIERATP1 115 kV	311 - Stockton		1.053	1.030	1.057	System adjustments or voltage support if needed
RPNJ2 115 kV	311 - Stockton	1.029	1.055	1.028	1.059	System adjustments or voltage support if needed

Study Area Entire PG&E System

High Voltages Under P0 Conditions

Bus/Substation	Zone	Voltage PU (Baseline Scenarios)			Voltage PU (Sensitivity Scenario)	Project & Potential Mitigation Solutions
		2022 Spring Off-Peak	2025 Spring Off-Peak	2030 Spring Off-Peak	2025 SpOP Hi Renew & Min Gas Gen	
CROSRDJT 115 kV	311 - Stockton	1.033	1.053	1.031	1.057	System adjustments or voltage support if needed
TRACY 115 kV	311 - Stockton	1.036	1.052	1.032	1.057	System adjustments or voltage support if needed
HJ HEINZ 115 kV	311 - Stockton	1.036	1.052	1.032	1.057	System adjustments or voltage support if needed
CL AMMNA 115 kV	311 - Stockton	1.033	1.053	1.031	1.057	System adjustments or voltage support if needed
RIPON 115 kV	311 - Stockton	1.027	1.056	1.028	1.061	System adjustments or voltage support if needed
RPN JNCN 115 kV	311 - Stockton	1.026	1.055	1.029	1.060	System adjustments or voltage support if needed
MANTECA 115 kV	311 - Stockton	1.030	1.052	1.026	1.056	System adjustments or voltage support if needed
INE PRSN 60 kV	311 - Stockton	1.028	1.063	1.046	1.069	System adjustments or voltage support if needed
MCSPJT 60 kV	311 - Stockton	1.028	1.063	1.046	1.069	System adjustments or voltage support if needed
MCSP 60 kV	311 - Stockton	1.028	1.063	1.046	1.069	System adjustments or voltage support if needed
CLAY 60 kV	311 - Stockton	1.033	1.063	1.050	1.069	System adjustments or voltage support if needed
INE_TP 60 kV	311 - Stockton	1.033	1.063	1.049	1.068	System adjustments or voltage support if needed
LINDEN 60 kV	311 - Stockton	1.021	1.067	1.047	1.069	System adjustments or voltage support if needed
OLETA 60 kV	311 - Stockton	1.030	1.058	1.049	1.064	System adjustments or voltage support if needed
MARTELL 60 kV	311 - Stockton	1.034	1.056	1.049	1.061	System adjustments or voltage support if needed
MARTELTP 60 kV	311 - Stockton	1.034	1.056	1.049	1.061	System adjustments or voltage support if needed
AMFOR_SW 60 kV	311 - Stockton	1.034	1.056	1.049	1.061	System adjustments or voltage support if needed
AM FORST 60 kV	311 - Stockton	1.032	1.054	1.048	1.059	System adjustments or voltage support if needed
MRMN JCT 60 kV	311 - Stockton	1.023	1.060	1.044	1.061	System adjustments or voltage support if needed
MSHR 60V 60 kV	311 - Stockton	1.035	1.062	1.041	1.062	System adjustments or voltage support if needed
MORMON 60 kV	311 - Stockton	1.024	1.059	1.043	1.060	System adjustments or voltage support if needed
HERDLYN 60 kV	311 - Stockton	1.042	1.067	1.049	1.068	System adjustments or voltage support if needed
HRDLNJCT 60 kV	311 - Stockton	1.042	1.067	1.049	1.068	System adjustments or voltage support if needed
N BRANCH 60 kV	311 - Stockton	1.042	1.049	1.051	1.053	System adjustments or voltage support if needed
ALTA-CGE 60 kV	311 - Stockton	1.042	1.065	1.048	1.067	System adjustments or voltage support if needed
B.BTHNY- 60 kV	311 - Stockton	1.042	1.065	1.048	1.066	System adjustments or voltage support if needed
VLLY SPS 60 kV	311 - Stockton	1.043	1.049	1.052	1.053	System adjustments or voltage support if needed
WEST SDE 60 kV	311 - Stockton	1.040	1.065	1.047	1.066	System adjustments or voltage support if needed
WATRLJCT 60 kV	311 - Stockton	1.034	1.054	1.041	1.053	System adjustments or voltage support if needed
TOSCO-PP 60 kV	311 - Stockton	1.040	1.061	1.045	1.062	System adjustments or voltage support if needed
MORADAJT 60 kV	311 - Stockton	1.040	1.055	1.044	1.055	System adjustments or voltage support if needed
SOUTH BY 60 kV	311 - Stockton	1.039	1.059	1.044	1.061	System adjustments or voltage support if needed
HAMMER 60 kV	311 - Stockton	1.041	1.053	1.046	1.054	System adjustments or voltage support if needed

Study Area Entire PG&E System

High Voltages Under P0 Conditions

Bus/Substation	Zone	Voltage PU (Baseline Scenarios)			Voltage PU (Sensitivity Scenario)	Project & Potential Mitigation Solutions
		2022 Spring Off-Peak	2025 Spring Off-Peak	2030 Spring Off-Peak	2025 SpOP Hi Renew & Min Gas Gen	
HMMR JCT 60 kV	311 - Stockton	1.041	1.053	1.045	1.054	System adjustments or voltage support if needed
WSTLNESW 60 kV	311 - Stockton	1.042	1.052	1.046	1.052	System adjustments or voltage support if needed
STAGG 60 kV	311 - Stockton	1.045	1.053	1.049	1.053	System adjustments or voltage support if needed
STAGG JT 60 kV	311 - Stockton	1.045	1.052	1.049	1.053	System adjustments or voltage support if needed
UOP 60 kV	311 - Stockton	1.043	1.050	1.047	1.051	System adjustments or voltage support if needed
CNTRY CB 60 kV	311 - Stockton	1.043	1.050	1.048	1.051	System adjustments or voltage support if needed
LEPRINO 115 kV	311 - Stockton	1.036	1.052	1.032	1.056	System adjustments or voltage support if needed
SP CMPNY 115 kV	311 - Stockton	1.048	1.050	1.033	1.052	System adjustments or voltage support if needed
SPC JCT. 115 kV	311 - Stockton	1.047	1.051	1.033	1.055	System adjustments or voltage support if needed
KSSN-JC2 115 kV	311 - Stockton	1.035	1.051	1.032	1.056	System adjustments or voltage support if needed
TRACY JC 115 kV	311 - Stockton	1.039	1.051	1.036	1.055	System adjustments or voltage support if needed
LID 115 kV	311 - Stockton	1.033	1.051	1.029	1.055	System adjustments or voltage support if needed
LID JCT 115 kV	311 - Stockton	1.033	1.051	1.029	1.055	System adjustments or voltage support if needed
KSSN-JC1 115 kV	311 - Stockton	1.035	1.050	1.032	1.054	System adjustments or voltage support if needed
KASSON 115 kV	311 - Stockton	1.035	1.050	1.032	1.054	System adjustments or voltage support if needed
OWENSTP1 115 kV	311 - Stockton	1.042	1.049	1.037	1.053	System adjustments or voltage support if needed
LAMMERS 115 kV	311 - Stockton	1.042	1.048	1.037	1.053	System adjustments or voltage support if needed
OWENSTP2 115 kV	311 - Stockton	1.043	1.048	1.037	1.053	System adjustments or voltage support if needed
OI GLASS 115 kV	311 - Stockton	1.041	1.048	1.037	1.052	System adjustments or voltage support if needed
SCHULTE 115 kV	311 - Stockton	1.044	1.048	1.037	1.052	System adjustments or voltage support if needed
GWFTRACY 115 kV	311 - Stockton	1.044	1.048	1.037	1.052	System adjustments or voltage support if needed
CAL CMNT 60 kV	311 - Stockton	1.040	1.049	1.049	1.053	System adjustments or voltage support if needed
N.HOGAN 60 kV	311 - Stockton	1.035	1.045	1.054	1.050	System adjustments or voltage support if needed
N.HGN JT 60 kV	311 - Stockton	1.034	1.044	1.053	1.050	System adjustments or voltage support if needed
CORRAL 60 kV	311 - Stockton	1.025	1.040	1.056	1.048	System adjustments or voltage support if needed
CORRAL2 60 kV	311 - Stockton	1.025	1.040	1.056	1.048	System adjustments or voltage support if needed
MDL_RIVR 60 kV	311 - Stockton	1.020	1.049	1.030	1.051	System adjustments or voltage support if needed
CURTISS 115 kV	312 - Stanislaus	1.040	1.062	1.054	1.066	System adjustments or voltage support if needed
SPISONORAJCT 115 kV	312 - Stanislaus	1.040	1.062	1.054	1.066	System adjustments or voltage support if needed
SPISONORA 115 kV	312 - Stanislaus	1.040	1.062	1.054	1.066	System adjustments or voltage support if needed
MI-WUK 115 kV	312 - Stanislaus	1.039	1.060	1.055	1.064	System adjustments or voltage support if needed
BEARDSLY 115 kV	312 - Stanislaus	1.042	1.059	1.057	1.063	System adjustments or voltage support if needed
RCTRK J. 115 kV	312 - Stanislaus	1.041	1.061	1.054	1.065	System adjustments or voltage support if needed

Study Area Entire PG&E System

High Voltages Under P0 Conditions

Bus/Substation	Zone	Voltage PU (Baseline Scenarios)			Voltage PU (Sensitivity Scenario)	Project & Potential Mitigation Solutions
		2022 Spring Off-Peak	2025 Spring Off-Peak	2030 Spring Off-Peak	2025 SpOP Hi Renew & Min Gas Gen	
DONNELLS 115 kV	312 - Stanislaus	1.041	1.059	1.057	1.062	System adjustments or voltage support if needed
BRDSLY J 115 kV	312 - Stanislaus	1.041	1.059	1.057	1.062	System adjustments or voltage support if needed
SPRNG GJ 115 kV	312 - Stanislaus	1.041	1.058	1.057	1.062	System adjustments or voltage support if needed
SPRNG GP 115 kV	312 - Stanislaus	1.042	1.058	1.057	1.061	System adjustments or voltage support if needed
SNDBR JT 115 kV	312 - Stanislaus	1.042	1.058	1.057	1.061	System adjustments or voltage support if needed
SANDBAR 115 kV	312 - Stanislaus	1.042	1.058	1.057	1.061	System adjustments or voltage support if needed
MELONES 115 kV	312 - Stanislaus	1.046	1.061	1.056	1.064	System adjustments or voltage support if needed
R.TRACK 115 kV	312 - Stanislaus	1.046	1.060	1.056	1.064	System adjustments or voltage support if needed
CH.STN 115 kV	312 - Stanislaus	1.044	1.061	1.055	1.064	System adjustments or voltage support if needed
PEORIA 115 kV	312 - Stanislaus	1.043	1.060	1.055	1.064	System adjustments or voltage support if needed
CH.STNJT 115 kV	312 - Stanislaus	1.042	1.060	1.054	1.064	System adjustments or voltage support if needed
TULLOCH 115 kV	312 - Stanislaus	1.046	1.052	1.057	1.055	System adjustments or voltage support if needed
MELNS JB 115 kV	312 - Stanislaus	1.044	1.062	1.051	1.065	System adjustments or voltage support if needed
RVRBK J2 115 kV	312 - Stanislaus	1.039	1.059	1.038	1.062	System adjustments or voltage support if needed
RIVRBKJT 115 kV	312 - Stanislaus	1.031	1.059	1.036	1.064	System adjustments or voltage support if needed
VALLY HM 115 kV	312 - Stanislaus	1.029	1.059	1.034	1.064	System adjustments or voltage support if needed
SJ COGEN 115 kV	312 - Stanislaus	1.047	1.053	1.030	1.057	System adjustments or voltage support if needed
VIERATP2 115 kV	312 - Stanislaus		1.053	1.031	1.057	System adjustments or voltage support if needed
MILLER 115 kV	312 - Stanislaus	1.051	1.060	1.047	1.063	System adjustments or voltage support if needed
Q1103JCT 115 kV	312 - Stanislaus	1.051	1.060	1.047	1.063	System adjustments or voltage support if needed
Q1103 115 kV	312 - Stanislaus	1.051	1.060	1.047	1.063	System adjustments or voltage support if needed
MILER TP 115 kV	312 - Stanislaus	1.051	1.059	1.047	1.062	System adjustments or voltage support if needed
SALADO 115 kV	312 - Stanislaus	1.049	1.054	1.042	1.057	System adjustments or voltage support if needed
SALADO J 115 kV	312 - Stanislaus	1.049	1.053	1.041	1.056	System adjustments or voltage support if needed
SALDO TP 115 kV	312 - Stanislaus	1.050	1.053	1.041	1.056	System adjustments or voltage support if needed
INGRM C. 115 kV	312 - Stanislaus	1.045	1.048	1.035	1.052	System adjustments or voltage support if needed
MDSTO CN 115 kV	312 - Stanislaus	1.050	1.049	1.038	1.052	System adjustments or voltage support if needed
RVRBK TP 115 kV	312 - Stanislaus	1.041	1.045	1.053	1.049	System adjustments or voltage support if needed
RVRBANK 115 kV	312 - Stanislaus	1.040	1.043	1.053	1.048	System adjustments or voltage support if needed
WESTLEY 60 kV	312 - Stanislaus	0.978	1.044	1.011	1.051	System adjustments or voltage support if needed
EL PECO 70 kV	313 - Yosemite	1.037	1.049	1.049	1.052	System adjustments or voltage support if needed
ELPECO T 70 kV	313 - Yosemite	1.038	1.047	1.047	1.049	System adjustments or voltage support if needed
SNTA RTA 70 kV	313 - Yosemite	1.043	1.058	1.043	1.063	System adjustments or voltage support if needed

Study Area Entire PG&E System

High Voltages Under P0 Conditions

Bus/Substation	Zone	Voltage PU (Baseline Scenarios)			Voltage PU (Sensitivity Scenario)	Project & Potential Mitigation Solutions
		2022 Spring Off-Peak	2025 Spring Off-Peak	2030 Spring Off-Peak	2025 SpOP Hi Renew & Min Gas Gen	
LIVNGSTN 70 kV	313 - Yosemite	1.042	1.059	1.039	1.066	System adjustments or voltage support if needed
TRIGO 70 kV	313 - Yosemite	1.039	1.045	1.044	1.047	System adjustments or voltage support if needed
TRIGO J 70 kV	313 - Yosemite	1.038	1.045	1.044	1.047	System adjustments or voltage support if needed
MADERA 70 kV	313 - Yosemite	1.040	1.045	1.045	1.047	System adjustments or voltage support if needed
CANANDGA 70 kV	313 - Yosemite	1.038	1.045	1.044	1.046	System adjustments or voltage support if needed
GLASS 70 kV	313 - Yosemite	1.038	1.045	1.044	1.046	System adjustments or voltage support if needed
BORDEN 70 kV	313 - Yosemite	1.042	1.040	1.043	1.041	System adjustments or voltage support if needed
Q723 70 kV	313 - Yosemite	1.044	1.043	1.043	1.043	System adjustments or voltage support if needed
BONITA 70 kV	313 - Yosemite	1.032	1.053	1.053	1.058	System adjustments or voltage support if needed
BONITA T 70 kV	313 - Yosemite	1.034	1.051	1.051	1.054	System adjustments or voltage support if needed
SJNO3 70 kV	313 - Yosemite	1.020	1.044	1.050	1.049	System adjustments or voltage support if needed
2007-RD 70 kV	313 - Yosemite	1.020	1.044	1.050	1.049	System adjustments or voltage support if needed
NRTHFORK 70 kV	313 - Yosemite	1.021	1.043	1.049	1.048	System adjustments or voltage support if needed
SJNO2 70 kV	313 - Yosemite	1.022	1.042	1.048	1.047	System adjustments or voltage support if needed
CASSIDY 70 kV	313 - Yosemite	1.036	1.043	1.040	1.045	System adjustments or voltage support if needed
DOS PALS 70 kV	313 - Yosemite	1.044	1.052	1.035	1.056	System adjustments or voltage support if needed
ORO LOMA 70 kV	313 - Yosemite	1.045	1.046	1.027	1.048	System adjustments or voltage support if needed
CANAL 70 kV	313 - Yosemite	1.041	1.048	1.021	1.053	System adjustments or voltage support if needed
LVNGSTNT 70 kV	313 - Yosemite	1.042	1.047	1.021	1.051	System adjustments or voltage support if needed
ORTIGA 70 kV	313 - Yosemite	1.043	1.046	1.021	1.050	System adjustments or voltage support if needed
MRCYSPRS 70 kV	313 - Yosemite	1.044	1.042	1.020	1.046	System adjustments or voltage support if needed
VEGA 70 kV	313 - Yosemite	1.045	1.042	1.020	1.046	System adjustments or voltage support if needed
MERCYSPRNGSS 70 kV	313 - Yosemite	1.045	1.042	1.020	1.046	System adjustments or voltage support if needed
ARBURU T 70 kV	313 - Yosemite	1.045	1.040	1.019	1.043	System adjustments or voltage support if needed
WRIGHT T 70 kV	313 - Yosemite	1.044	1.037	1.019	1.040	System adjustments or voltage support if needed
WRGHT PP 70 kV	313 - Yosemite	1.043	1.037	1.018	1.040	System adjustments or voltage support if needed
LOS BANS 70 kV	313 - Yosemite	1.043	1.037	1.020	1.040	System adjustments or voltage support if needed
PCHCOWND 70 kV	313 - Yosemite	1.043	1.037	1.019	1.040	System adjustments or voltage support if needed
MCCABEJ1 70 kV	313 - Yosemite	1.043	1.037	1.020	1.040	System adjustments or voltage support if needed
CHEVPIPE 70 kV	313 - Yosemite	1.042	1.037	1.018	1.040	System adjustments or voltage support if needed
SNTA NLA 70 kV	313 - Yosemite	1.042	1.037	1.018	1.040	System adjustments or voltage support if needed
MARIPOS2 70 kV	313 - Yosemite	0.989	1.046	1.032	1.046	System adjustments or voltage support if needed
DAIRYLND 115 kV	313 - Yosemite	1.043	1.056	1.045	1.056	System adjustments or voltage support if needed

Study Area Entire PG&E System

High Voltages Under P0 Conditions

Bus/Substation	Zone	Voltage PU (Baseline Scenarios)			Voltage PU (Sensitivity Scenario)	Project & Potential Mitigation Solutions
		2022 Spring Off-Peak	2025 Spring Off-Peak	2030 Spring Off-Peak	2025 SpOP Hi Renew & Min Gas Gen	
1318-RD 115 kV	313 - Yosemite	1.043	1.056	1.045	1.056	System adjustments or voltage support if needed
CORSGOLD 115 kV	313 - Yosemite	1.049	1.055	1.043	1.058	System adjustments or voltage support if needed
OAKHURST 115 kV	313 - Yosemite	1.047	1.054	1.043	1.058	System adjustments or voltage support if needed
MENDOTA 115 kV	313 - Yosemite	1.052	1.049	1.053	1.051	System adjustments or voltage support if needed
NORTHSTAR 115 kV	313 - Yosemite	1.052	1.050	1.052	1.050	System adjustments or voltage support if needed
Q1028Q1029 115 kV	313 - Yosemite	1.052	1.050	1.052	1.050	System adjustments or voltage support if needed
OAKH_JCT 115 kV	313 - Yosemite	1.049	1.053	1.042	1.055	System adjustments or voltage support if needed
CHWCHLASLRJT 115 kV	313 - Yosemite	1.043	1.053	1.043	1.054	System adjustments or voltage support if needed
CHWCHLASLR 115 kV	313 - Yosemite	1.043	1.053	1.043	1.054	System adjustments or voltage support if needed
ARBURUA 70 kV	313 - Yosemite	1.042	1.035	1.015	1.039	System adjustments or voltage support if needed
MCCABEJ2 70 kV	313 - Yosemite	1.038	1.035	1.020	1.038	System adjustments or voltage support if needed
WSTLDJCT 70 kV	313 - Yosemite	0.992	1.053	1.007	1.055	System adjustments or voltage support if needed
WESTLAND 70 kV	313 - Yosemite	0.990	1.051	1.006	1.054	System adjustments or voltage support if needed
WESIX 70 kV	313 - Yosemite	0.988	1.050	1.004	1.052	System adjustments or voltage support if needed
ADAMS_E 70 kV	313 - Yosemite	0.983	1.052	1.002	1.054	System adjustments or voltage support if needed
ADAMS_E TP 70 kV	313 - Yosemite	0.983	1.052	0.999	1.054	System adjustments or voltage support if needed
POSO J1 70 kV	313 - Yosemite	0.982	1.048	0.982	1.050	System adjustments or voltage support if needed
FIREBAGH 70 kV	313 - Yosemite	0.958	1.047	0.964	1.049	System adjustments or voltage support if needed
TOMATAK 70 kV	313 - Yosemite	0.952	1.046	0.959	1.047	System adjustments or voltage support if needed
CALRENEW 70 kV	313 - Yosemite	0.953	1.050	0.958	1.051	System adjustments or voltage support if needed
BIOMSJCT 70 kV	313 - Yosemite	0.953	1.050	0.958	1.051	System adjustments or voltage support if needed
BIOMASS 70 kV	313 - Yosemite	0.953	1.050	0.958	1.051	System adjustments or voltage support if needed
MENDOTA 70 kV	313 - Yosemite	0.938	1.048	0.938	1.049	System adjustments or voltage support if needed
EXCHEQUR 115 kV	313 - Yosemite	1.062	1.050	1.050	1.048	System adjustments or voltage support if needed
NEWHALL 115 kV	313 - Yosemite	1.045	1.051	1.046	1.053	System adjustments or voltage support if needed
MADERAPR 115 kV	313 - Yosemite	1.045	1.051	1.046	1.053	System adjustments or voltage support if needed
GILLTAP 115 kV	313 - Yosemite	1.045	1.051	1.047	1.052	System adjustments or voltage support if needed
CHWCGN 115 kV	313 - Yosemite	1.050	1.057	1.048	1.049	System adjustments or voltage support if needed
CHWCHLA2 115 kV	313 - Yosemite	1.050	1.057	1.048	1.049	System adjustments or voltage support if needed
CHWCGNJT 115 kV	313 - Yosemite	1.047	1.055	1.045	1.049	System adjustments or voltage support if needed
SHARON T 115 kV	313 - Yosemite	1.045	1.053	1.042	1.052	System adjustments or voltage support if needed
CHWCHLLA 115 kV	313 - Yosemite	1.044	1.054	1.043	1.052	System adjustments or voltage support if needed
CERTTEED 115 kV	313 - Yosemite	1.047	1.054	1.045	1.049	System adjustments or voltage support if needed

Study Area Entire PG&E System

High Voltages Under P0 Conditions

Bus/Substation	Zone	Voltage PU (Baseline Scenarios)			Voltage PU (Sensitivity Scenario)	Project & Potential Mitigation Solutions
		2022 Spring Off-Peak	2025 Spring Off-Peak	2030 Spring Off-Peak	2025 SpOP Hi Renew & Min Gas Gen	
CERTANJ1 115 kV	313 - Yosemite	1.044	1.054	1.043	1.052	System adjustments or voltage support if needed
SHARON 115 kV	313 - Yosemite	1.044	1.052	1.042	1.051	System adjustments or voltage support if needed
CERTANJ2 115 kV	313 - Yosemite	1.045	1.052	1.042	1.050	System adjustments or voltage support if needed
CERTAN T 115 kV	313 - Yosemite	1.044	1.052	1.042	1.050	System adjustments or voltage support if needed
Q1127 115 kV	313 - Yosemite	1.052	1.045	1.045	1.051	System adjustments or voltage support if needed
MC SWAIN 70 kV	313 - Yosemite	1.008	1.035	1.037	1.032	System adjustments or voltage support if needed
POSO J2 70 kV	313 - Yosemite	1.022	1.038	1.029	1.021	System adjustments or voltage support if needed
ELNIDO 70 kV	313 - Yosemite	1.022	1.037	1.029	1.020	System adjustments or voltage support if needed
ELNIDOTP 70 kV	313 - Yosemite	1.021	1.037	1.029	1.020	System adjustments or voltage support if needed
ORO LOMA 115 kV	313 - Yosemite	1.016	1.051	1.025	1.053	System adjustments or voltage support if needed
ANGIOLA 70 kV	314 - Fresno	1.060	1.054	1.054	1.055	System adjustments or voltage support if needed
CORCORAN 70 kV	314 - Fresno	1.060	1.057	1.057	1.057	System adjustments or voltage support if needed
BSWLL TP 70 kV	314 - Fresno	1.059	1.055	1.055	1.055	System adjustments or voltage support if needed
JGBSWLL 70 kV	314 - Fresno	1.059	1.054	1.055	1.055	System adjustments or voltage support if needed
BOSWELL 70 kV	314 - Fresno	1.059	1.054	1.055	1.055	System adjustments or voltage support if needed
TLRE LKE 70 kV	314 - Fresno	1.042	1.055	1.064	1.057	System adjustments or voltage support if needed
LEMOORE 70 kV	314 - Fresno	1.040	1.058	1.040	1.056	System adjustments or voltage support if needed
LPRNO TP 70 kV	314 - Fresno	1.041	1.057	1.040	1.056	System adjustments or voltage support if needed
CANDLEWK 70 kV	314 - Fresno	1.041	1.057	1.040	1.056	System adjustments or voltage support if needed
LEPRINO 70 kV	314 - Fresno	1.039	1.056	1.038	1.054	System adjustments or voltage support if needed
KERMAN1 70 kV	314 - Fresno	1.040	1.072	1.041	1.077	System adjustments or voltage support if needed
KERMAN2 70 kV	314 - Fresno	1.040	1.072	1.041	1.077	System adjustments or voltage support if needed
STROUD 70 kV	314 - Fresno	1.040	1.071	1.051	1.075	System adjustments or voltage support if needed
GUERNSEY 70 kV	314 - Fresno	1.042	1.060	1.054	1.060	System adjustments or voltage support if needed
GUR3TPT 70 kV	314 - Fresno	1.042	1.060	1.053	1.060	System adjustments or voltage support if needed
ARMSTRNG 70 kV	314 - Fresno	1.042	1.060	1.053	1.060	System adjustments or voltage support if needed
RESERVE 70 kV	314 - Fresno	1.042	1.060	1.053	1.060	System adjustments or voltage support if needed
AMSTG SW 70 kV	314 - Fresno	1.042	1.060	1.053	1.060	System adjustments or voltage support if needed
HENRIETTAD 70 kV	314 - Fresno	1.052	1.044	1.042	1.041	System adjustments or voltage support if needed
COPPRMNE 70 kV	314 - Fresno	1.039	1.047	1.045	1.049	System adjustments or voltage support if needed
AGRCJCT 70 kV	314 - Fresno	1.040	1.067	1.039	1.071	System adjustments or voltage support if needed
Q272 70 kV	314 - Fresno	1.052	1.043	1.042	1.040	System adjustments or voltage support if needed
LEMORNAS 70 kV	314 - Fresno	1.051	1.042	1.041	1.039	System adjustments or voltage support if needed

Study Area Entire PG&E System

High Voltages Under P0 Conditions

Bus/Substation	Zone	Voltage PU (Baseline Scenarios)			Voltage PU (Sensitivity Scenario)	Project & Potential Mitigation Solutions
		2022 Spring Off-Peak	2025 Spring Off-Peak	2030 Spring Off-Peak	2025 SpOP Hi Renew & Min Gas Gen	
AGRICO 70 kV	314 - Fresno	1.039	1.067	1.037	1.071	System adjustments or voltage support if needed
RVRRCK T 70 kV	314 - Fresno	1.037	1.045	1.042	1.047	System adjustments or voltage support if needed
RIVERROC 70 kV	314 - Fresno	1.037	1.045	1.042	1.047	System adjustments or voltage support if needed
CRESCENTSS 70 kV	314 - Fresno	1.041	1.066	1.045	1.069	System adjustments or voltage support if needed
Q632B 70 kV	314 - Fresno	1.041	1.066	1.045	1.069	System adjustments or voltage support if needed
FRANTDM 70 kV	314 - Fresno	1.040	1.044	1.043	1.046	System adjustments or voltage support if needed
HENRIETTAE 70 kV	314 - Fresno	1.046	1.047	1.039	1.047	System adjustments or voltage support if needed
GWF_HENR 70 kV	314 - Fresno	1.046	1.047	1.039	1.047	System adjustments or voltage support if needed
SAN JOQN 70 kV	314 - Fresno	1.041	1.061	1.039	1.063	System adjustments or voltage support if needed
SNJQTP 70 kV	314 - Fresno	1.041	1.061	1.039	1.063	System adjustments or voltage support if needed
KENT SS 70 kV	314 - Fresno	1.046	1.047	1.039	1.046	System adjustments or voltage support if needed
KENT_S 70 kV	314 - Fresno	1.046	1.047	1.039	1.046	System adjustments or voltage support if needed
HELM 70 kV	314 - Fresno	1.042	1.059	1.040	1.061	System adjustments or voltage support if needed
KANSASS_JCT 70 kV	314 - Fresno	1.045	1.045	1.036	1.045	System adjustments or voltage support if needed
KANSASS_P 70 kV	314 - Fresno	1.045	1.045	1.036	1.045	System adjustments or voltage support if needed
SCHINDLR 115 kV	314 - Fresno	1.042	1.063	1.056	1.063	System adjustments or voltage support if needed
1316-RD 115 kV	314 - Fresno	1.042	1.063	1.056	1.063	System adjustments or voltage support if needed
EXCELSIORSS 115 kV	314 - Fresno	1.043	1.062	1.055	1.062	System adjustments or voltage support if needed
Q678 115 kV	314 - Fresno	1.043	1.062	1.055	1.062	System adjustments or voltage support if needed
WESTLNDS 115 kV	314 - Fresno	1.044	1.061	1.054	1.062	System adjustments or voltage support if needed
CANTUA 115 kV	314 - Fresno	1.044	1.060	1.053	1.061	System adjustments or voltage support if needed
DINUBA 70 kV	314 - Fresno	1.056	1.051	1.033	1.056	System adjustments or voltage support if needed
SANDCRK 70 kV	314 - Fresno	1.056	1.049	1.032	1.053	System adjustments or voltage support if needed
DUNLAP 70 kV	314 - Fresno	1.055	1.048	1.031	1.053	System adjustments or voltage support if needed
BIOLA 70 kV	314 - Fresno	1.030	1.043	1.046	1.047	System adjustments or voltage support if needed
TVY VLLY 70 kV	314 - Fresno	1.054	1.049	1.036	1.053	System adjustments or voltage support if needed
STCRRL J 70 kV	314 - Fresno	1.057	1.047	1.031	1.051	System adjustments or voltage support if needed
OROSI 70 kV	314 - Fresno	1.057	1.047	1.031	1.051	System adjustments or voltage support if needed
ORSI JCT 70 kV	314 - Fresno	1.057	1.047	1.031	1.051	System adjustments or voltage support if needed
DNUBAEGY 70 kV	314 - Fresno	1.059	1.049	1.031	1.052	System adjustments or voltage support if needed
DNUBAJCT 70 kV	314 - Fresno	1.059	1.049	1.031	1.052	System adjustments or voltage support if needed
CMDN JCT 70 kV	314 - Fresno	1.031	1.049	1.049	1.054	System adjustments or voltage support if needed
CARUTHRS 70 kV	314 - Fresno	1.030	1.049	1.049	1.053	System adjustments or voltage support if needed

Study Area Entire PG&E System

High Voltages Under P0 Conditions

Bus/Substation	Zone	Voltage PU (Baseline Scenarios)			Voltage PU (Sensitivity Scenario)	Project & Potential Mitigation Solutions
		2022 Spring Off-Peak	2025 Spring Off-Peak	2030 Spring Off-Peak	2025 SpOP Hi Renew & Min Gas Gen	
REEDLEY 70 kV	314 - Fresno	1.060	1.048	1.031	1.051	System adjustments or voltage support if needed
STONCRRL 70 kV	314 - Fresno	1.053	1.044	1.030	1.048	System adjustments or voltage support if needed
BOWLES 70 kV	314 - Fresno	1.028	1.040	1.046	1.043	System adjustments or voltage support if needed
KEARNEY 70 kV	314 - Fresno	1.034	1.040	1.044	1.043	System adjustments or voltage support if needed
FRWWTAP 70 kV	314 - Fresno	1.033	1.040	1.044	1.042	System adjustments or voltage support if needed
FRESNOWW 70 kV	314 - Fresno	1.033	1.039	1.043	1.042	System adjustments or voltage support if needed
AUBERRY 70 kV	314 - Fresno	1.025	1.041	1.049	1.046	System adjustments or voltage support if needed
AUBRYTP 70 kV	314 - Fresno	1.029	1.041	1.047	1.046	System adjustments or voltage support if needed
WISHON 70 kV	314 - Fresno	1.028	1.041	1.047	1.046	System adjustments or voltage support if needed
KETTLETP 70 kV	314 - Fresno	1.046	1.042	1.036	1.041	System adjustments or voltage support if needed
KETTLEMNS 70 kV	314 - Fresno	1.046	1.042	1.036	1.041	System adjustments or voltage support if needed
JCBS TAP 70 kV	314 - Fresno	1.044	1.044	1.035	1.044	System adjustments or voltage support if needed
JCBSCRNR 70 kV	314 - Fresno	1.044	1.044	1.035	1.044	System adjustments or voltage support if needed
BULLARD 115 kV	314 - Fresno	1.025	1.057	1.035	1.059	System adjustments or voltage support if needed
PNEDLE 115 kV	314 - Fresno	1.026	1.056	1.034	1.059	System adjustments or voltage support if needed
PNDLJ1 115 kV	314 - Fresno	1.026	1.056	1.035	1.058	System adjustments or voltage support if needed
PNEDLE2 115 kV	314 - Fresno	1.026	1.055	1.034	1.058	System adjustments or voltage support if needed
PNDLJ2 115 kV	314 - Fresno	1.026	1.055	1.034	1.057	System adjustments or voltage support if needed
CAMDEN 70 kV	314 - Fresno	1.012	1.038	1.023	1.044	System adjustments or voltage support if needed
KAMM 115 kV	314 - Fresno	1.046	1.054	1.049	1.055	System adjustments or voltage support if needed
MC CALL 230 kV	314 - Fresno	1.015	1.057	1.032	1.059	System adjustments or voltage support if needed
SCHLNDLR 70 kV	314 - Fresno	1.007	1.036	1.035	1.037	System adjustments or voltage support if needed
SNJQJCT 70 kV	314 - Fresno	1.031	1.058	1.032	1.060	System adjustments or voltage support if needed
GFFNJCT 70 kV	314 - Fresno	0.995	1.053	1.009	1.056	System adjustments or voltage support if needed
Q679 70 kV	314 - Fresno	0.995	1.053	1.010	1.056	System adjustments or voltage support if needed
GIFFEN 70 kV	314 - Fresno	0.995	1.053	1.010	1.056	System adjustments or voltage support if needed
MANCHSTR 115 kV	314 - Fresno	1.037	1.051	1.038	1.054	System adjustments or voltage support if needed
KNGSRVR1 115 kV	314 - Fresno	1.052	1.046	1.047	1.047	System adjustments or voltage support if needed
MC CALL 115 kV	314 - Fresno	1.055	1.025	1.035	1.026	System adjustments or voltage support if needed
AVENAL 70 kV	314 - Fresno	0.988	1.045	1.027	1.026	System adjustments or voltage support if needed
SUN CITY 70 kV	314 - Fresno	0.988	1.044	1.026	1.025	System adjustments or voltage support if needed
AVNLPARK 70 kV	314 - Fresno	0.989	1.043	1.025	1.024	System adjustments or voltage support if needed
ANTELOPE 70 kV	315 - Kern	1.059	1.061	1.036	1.058	System adjustments or voltage support if needed

Study Area Entire PG&E System

High Voltages Under P0 Conditions

Bus/Substation	Zone	Voltage PU (Baseline Scenarios)			Voltage PU (Sensitivity Scenario)	Project & Potential Mitigation Solutions
		2022 Spring Off-Peak	2025 Spring Off-Peak	2030 Spring Off-Peak	2025 SpOP Hi Renew & Min Gas Gen	
ANTLP JC 70 kV	315 - Kern	1.059	1.061	1.036	1.058	System adjustments or voltage support if needed
BRRNDA C 70 kV	315 - Kern	1.059	1.061	1.036	1.058	System adjustments or voltage support if needed
BRRNDA A 70 kV	315 - Kern	1.060	1.061	1.037	1.059	System adjustments or voltage support if needed
SW85 J1 70 kV	315 - Kern	1.061	1.062	1.038	1.059	System adjustments or voltage support if needed
CHLME JT 70 kV	315 - Kern	1.061	1.062	1.038	1.059	System adjustments or voltage support if needed
DEVLS DN 70 kV	315 - Kern	1.057	1.058	1.040	1.055	System adjustments or voltage support if needed
BDGRHL T 70 kV	315 - Kern	1.050	1.053	1.045	1.052	System adjustments or voltage support if needed
LOSTHL T 70 kV	315 - Kern	1.054	1.055	1.043	1.052	System adjustments or voltage support if needed
ARCO 70 kV	315 - Kern	1.056	1.056	1.042	1.053	System adjustments or voltage support if needed
BDGR HLL 70 kV	315 - Kern	1.047	1.051	1.042	1.050	System adjustments or voltage support if needed
LST HLLS 70 kV	315 - Kern	1.052	1.054	1.041	1.051	System adjustments or voltage support if needed
TWSL J2 70 kV	315 - Kern	1.055	1.052	1.040	1.051	System adjustments or voltage support if needed
BLACKWLL 70 kV	315 - Kern	1.052	1.048	1.039	1.050	System adjustments or voltage support if needed
Q705JCT 70 kV	315 - Kern	1.051	1.048	1.039	1.050	System adjustments or voltage support if needed
Q705 70 kV	315 - Kern	1.051	1.048	1.039	1.050	System adjustments or voltage support if needed
OLD RIVR 70 kV	315 - Kern	1.037	1.050	1.043	1.050	System adjustments or voltage support if needed
CARNERAS 70 kV	315 - Kern	1.048	1.047	1.037	1.049	System adjustments or voltage support if needed
OLD_RVR1 70 kV	315 - Kern	1.037	1.051	1.043	1.050	System adjustments or voltage support if needed
LOSTHILLTP 70 kV	315 - Kern	1.052	1.046	1.037	1.048	System adjustments or voltage support if needed
LOSTHILL 70 kV	315 - Kern	1.052	1.046	1.037	1.048	System adjustments or voltage support if needed
OLD_RVR1_TP 70 kV	315 - Kern	1.037	1.050	1.042	1.049	System adjustments or voltage support if needed
TWSL J1 70 kV	315 - Kern	1.052	1.047	1.038	1.045	System adjustments or voltage support if needed
KRN CNYN 70 kV	315 - Kern	1.042	1.050	1.044	1.045	System adjustments or voltage support if needed
MORELSTP 70 kV	315 - Kern	1.050	1.045	1.036	1.043	System adjustments or voltage support if needed
MORELS 70 kV	315 - Kern	1.050	1.045	1.036	1.043	System adjustments or voltage support if needed
RIOBRVQF 70 kV	315 - Kern	1.042	1.049	1.043	1.045	System adjustments or voltage support if needed
PANMJCT1 70 kV	315 - Kern	1.039	1.047	1.039	1.045	System adjustments or voltage support if needed
KERN PW1 70 kV	315 - Kern	1.041	1.049	1.040	1.045	System adjustments or voltage support if needed
KERN PW2 70 kV	315 - Kern	1.041	1.049	1.040	1.045	System adjustments or voltage support if needed
FRUITVLE 70 kV	315 - Kern	1.041	1.048	1.040	1.045	System adjustments or voltage support if needed
MAGNDN J 70 kV	315 - Kern	1.040	1.048	1.042	1.043	System adjustments or voltage support if needed
MAGUNDEN 70 kV	315 - Kern	1.040	1.048	1.041	1.043	System adjustments or voltage support if needed
LAKEVIEW 70 kV	315 - Kern	1.041	1.047	1.045	1.040	System adjustments or voltage support if needed

Study Area Entire PG&E System

High Voltages Under P0 Conditions

Bus/Substation	Zone	Voltage PU (Baseline Scenarios)			Voltage PU (Sensitivity Scenario)	Project & Potential Mitigation Solutions
		2022 Spring Off-Peak	2025 Spring Off-Peak	2030 Spring Off-Peak	2025 SpOP Hi Renew & Min Gas Gen	
ORION 70 kV	315 - Kern	1.037	1.047	1.042	1.041	System adjustments or voltage support if needed
FRUITTAP 70 kV	315 - Kern	1.039	1.045	1.038	1.041	System adjustments or voltage support if needed
ORIONTP 70 kV	315 - Kern	1.037	1.047	1.042	1.040	System adjustments or voltage support if needed
ARVIN 70 kV	315 - Kern	1.037	1.047	1.041	1.040	System adjustments or voltage support if needed
BAKRSFLD 70 kV	315 - Kern	1.038	1.044	1.038	1.040	System adjustments or voltage support if needed
STALLION 70 kV	315 - Kern	1.039	1.046	1.042	1.039	System adjustments or voltage support if needed
EMDO JCT 70 kV	315 - Kern	1.042	1.046	1.045	1.039	System adjustments or voltage support if needed
STALIONJ 70 kV	315 - Kern	1.039	1.046	1.041	1.039	System adjustments or voltage support if needed
TECUYA T 70 kV	315 - Kern	1.041	1.045	1.042	1.038	System adjustments or voltage support if needed
WHEELER 70 kV	315 - Kern	1.045	1.047	1.047	1.040	System adjustments or voltage support if needed
TEJON 70 kV	315 - Kern	1.040	1.045	1.042	1.038	System adjustments or voltage support if needed
TECUYA 70 kV	315 - Kern	1.040	1.044	1.041	1.037	System adjustments or voltage support if needed
SN BRNRD 70 kV	315 - Kern	1.040	1.044	1.041	1.037	System adjustments or voltage support if needed
DEVLDNPP 70 kV	315 - Kern	1.055	1.056	1.029	1.053	System adjustments or voltage support if needed
SW85 J2 70 kV	315 - Kern	1.055	1.056	1.028	1.053	System adjustments or voltage support if needed
BLUSTNPP 70 kV	315 - Kern	1.054	1.056	1.024	1.052	System adjustments or voltage support if needed
POLPASPP 70 kV	315 - Kern	1.053	1.055	1.022	1.052	System adjustments or voltage support if needed
PANAMA 70 kV	315 - Kern	1.035	1.055	1.037	1.053	System adjustments or voltage support if needed
UNIONJCT 70 kV	315 - Kern	1.035	1.055	1.037	1.053	System adjustments or voltage support if needed
PRMTFMTP 70 kV	315 - Kern	1.053	1.047	1.036	1.048	System adjustments or voltage support if needed
PANMJCT2 70 kV	315 - Kern	1.036	1.051	1.037	1.049	System adjustments or voltage support if needed
SAN EMDO 70 kV	315 - Kern	1.034	1.049	1.042	1.049	System adjustments or voltage support if needed
CARNAT T 70 kV	315 - Kern	1.036	1.050	1.037	1.047	System adjustments or voltage support if needed
CARNATIO 70 kV	315 - Kern	1.035	1.050	1.037	1.047	System adjustments or voltage support if needed
S_KERN 70 kV	315 - Kern	1.032	1.049	1.040	1.048	System adjustments or voltage support if needed
S_KERN_TP 70 kV	315 - Kern	1.032	1.049	1.040	1.048	System adjustments or voltage support if needed
TWISSLMN 70 kV	315 - Kern	1.046	1.042	1.035	1.039	System adjustments or voltage support if needed
TX_LOSHL 70 kV	315 - Kern	1.045	1.040	1.034	1.038	System adjustments or voltage support if needed
WEEDPTCH 70 kV	315 - Kern	1.034	1.044	1.038	1.038	System adjustments or voltage support if needed
WEEDPATCH_SF 70 kV	315 - Kern	1.034	1.044	1.038	1.038	System adjustments or voltage support if needed
VALPREDO 70 kV	315 - Kern	1.037	1.041	1.040	1.034	System adjustments or voltage support if needed
COPUS_D 70 kV	315 - Kern	1.030	1.043	1.035	1.042	System adjustments or voltage support if needed
COPUS_E 70 kV	315 - Kern	1.030	1.043	1.035	1.042	System adjustments or voltage support if needed

Study Area Entire PG&E System

High Voltages Under P0 Conditions

Bus/Substation	Zone	Voltage PU (Baseline Scenarios)			Voltage PU (Sensitivity Scenario)	Project & Potential Mitigation Solutions
		2022 Spring Off-Peak	2025 Spring Off-Peak	2030 Spring Off-Peak	2025 SpOP Hi Renew & Min Gas Gen	
BSCSCH T 70 kV	315 - Kern	1.030	1.043	1.035	1.042	System adjustments or voltage support if needed
BSCL_PLD 70 kV	315 - Kern	1.030	1.043	1.035	1.042	System adjustments or voltage support if needed
KRN OL J 70 kV	315 - Kern	1.036	1.040	1.031	1.036	System adjustments or voltage support if needed
ROSE 70 kV	315 - Kern	1.036	1.042	1.039	1.035	System adjustments or voltage support if needed
Q620TP 70 kV	315 - Kern	1.032	1.041	1.032	1.040	System adjustments or voltage support if needed
Q620 70 kV	315 - Kern	1.032	1.041	1.032	1.040	System adjustments or voltage support if needed
GARDNR T 70 kV	315 - Kern	1.033	1.039	1.031	1.038	System adjustments or voltage support if needed
GARDNER 70 kV	315 - Kern	1.032	1.038	1.030	1.038	System adjustments or voltage support if needed
3EMIDIO 70 kV	315 - Kern	1.034	1.039	1.038	1.032	System adjustments or voltage support if needed
WELLFILD 70 kV	315 - Kern	1.029	1.041	1.034	1.035	System adjustments or voltage support if needed
GRMMWY T 70 kV	315 - Kern	1.030	1.041	1.034	1.036	System adjustments or voltage support if needed
EISENTP 70 kV	315 - Kern	1.035	1.040	1.034	1.036	System adjustments or voltage support if needed
GRMWY_SM 70 kV	315 - Kern	1.029	1.039	1.032	1.034	System adjustments or voltage support if needed
ELK HLLS 70 kV	315 - Kern	1.025	1.035	1.021	1.037	System adjustments or voltage support if needed
TAFT A 70 kV	315 - Kern	1.044	1.035	1.025	1.034	System adjustments or voltage support if needed
TAFT_SW_TAFM 70 kV	315 - Kern	1.044	1.035	1.025	1.034	System adjustments or voltage support if needed
TAFT_SW_TAFC 70 kV	315 - Kern	1.043	1.035	1.025	1.034	System adjustments or voltage support if needed
TAFT A_J 70 kV	315 - Kern	1.040	1.034	1.026	1.033	System adjustments or voltage support if needed
NTPTRL 70 kV	315 - Kern	1.039	1.030	1.027	1.029	System adjustments or voltage support if needed
BRY_PTLM 70 kV	315 - Kern	1.039	1.033	1.025	1.033	System adjustments or voltage support if needed
SLR_TANH 70 kV	315 - Kern	1.039	1.033	1.025	1.033	System adjustments or voltage support if needed
CUYAMA2 70 kV	315 - Kern	1.038	1.031	1.020	1.030	System adjustments or voltage support if needed
MCKTTRCK 70 kV	315 - Kern	1.038	1.031	1.022	1.030	System adjustments or voltage support if needed
NORTHMWY 70 kV	315 - Kern	1.038	1.031	1.022	1.030	System adjustments or voltage support if needed
MDWY_P_S 70 kV	315 - Kern	1.038	1.031	1.022	1.030	System adjustments or voltage support if needed
DYERJCT 60 kV	316 - Mission	1.038	1.053	1.041	1.056	System adjustments or voltage support if needed
ALTAMONT 60 kV	316 - Mission	1.038	1.053	1.041	1.056	System adjustments or voltage support if needed
DYERWND 60 kV	316 - Mission	1.039	1.050	1.039	1.055	System adjustments or voltage support if needed
SAN RAMN 60 kV	316 - Mission	1.051	1.033	1.019	1.037	System adjustments or voltage support if needed
E DUBLIN 60 kV	316 - Mission	1.052	1.038	1.018	1.042	System adjustments or voltage support if needed
PARKS 60 kV	316 - Mission	1.052	1.038	1.018	1.042	System adjustments or voltage support if needed
PARKS TP 60 kV	316 - Mission	1.052	1.038	1.018	1.042	System adjustments or voltage support if needed
RADUM 60 kV	316 - Mission	1.053	1.043	1.017	1.047	System adjustments or voltage support if needed

Study Area Entire PG&E System

High Voltages Under P0 Conditions

Bus/Substation	Zone	Voltage PU (Baseline Scenarios)			Voltage PU (Sensitivity Scenario)	Project & Potential Mitigation Solutions
		2022 Spring Off-Peak	2025 Spring Off-Peak	2030 Spring Off-Peak	2025 SpOP Hi Renew & Min Gas Gen	
VINEYARD 60 kV	316 - Mission	1.053	1.043	1.017	1.047	System adjustments or voltage support if needed
IUKAJCT 60 kV	316 - Mission	1.052	1.043	1.017	1.047	System adjustments or voltage support if needed
IUKA 60 kV	316 - Mission	1.052	1.043	1.017	1.047	System adjustments or voltage support if needed
CALMAT60 60 kV	316 - Mission	1.053	1.043	1.017	1.047	System adjustments or voltage support if needed
VALLCITJ 60 kV	316 - Mission	1.050	1.043	1.017	1.047	System adjustments or voltage support if needed
LIVERMRE 60 kV	316 - Mission	1.052	1.045	1.020	1.049	System adjustments or voltage support if needed
LIVRMR_2 60 kV	316 - Mission	1.052	1.045	1.020	1.049	System adjustments or voltage support if needed
SNRAMONJ 60 kV	316 - Mission	1.051	1.045	1.020	1.049	System adjustments or voltage support if needed
LPOSTAS 60 kV	316 - Mission	1.052	1.043	1.025	1.047	System adjustments or voltage support if needed
VASCJCT. 60 kV	316 - Mission	1.052	1.042	1.024	1.045	System adjustments or voltage support if needed
VASCO 60 kV	316 - Mission	1.052	1.042	1.024	1.045	System adjustments or voltage support if needed
FOREBAYWIND 60 kV	316 - Mission	1.051	1.041	1.024	1.044	System adjustments or voltage support if needed
SNTACLRAJCT 60 kV	316 - Mission	1.051	1.041	1.024	1.044	System adjustments or voltage support if needed
FRICKWND 60 kV	316 - Mission	1.051	1.041	1.024	1.044	System adjustments or voltage support if needed
SNTACLRAWIND 60 kV	316 - Mission	1.051	1.041	1.024	1.044	System adjustments or voltage support if needed
JARVIS 115 kV	316 - Mission	1.034	1.047	1.019	1.052	System adjustments or voltage support if needed
JV BART 115 kV	316 - Mission	1.034	1.047	1.019	1.052	System adjustments or voltage support if needed
CRYOGEN 115 kV	316 - Mission	1.034	1.047	1.019	1.052	System adjustments or voltage support if needed
EASTSHRE 115 kV	316 - Mission	1.041	1.047	1.047	1.052	System adjustments or voltage support if needed
A100US 115 kV	316 - Mission	1.041	1.047	1.047	1.052	System adjustments or voltage support if needed
LOYOLA 60 kV	317 - De Anza	1.047	1.064	1.051	1.070	System adjustments or voltage support if needed
LOS ALTS 60 kV	317 - De Anza	1.052	1.063	1.046	1.069	System adjustments or voltage support if needed
PRMNT J3 60 kV	317 - De Anza	1.041	1.054	1.059	1.060	System adjustments or voltage support if needed
MNTA VSA 60 kV	317 - De Anza	1.040	1.054	1.060	1.059	System adjustments or voltage support if needed
LOS GATS 60 kV	317 - De Anza	1.042	1.072	1.046	1.079	System adjustments or voltage support if needed
PRMNT J1 60 kV	317 - De Anza	1.036	1.049	1.055	1.054	System adjustments or voltage support if needed
PERMNNTE 60 kV	317 - De Anza	1.034	1.046	1.052	1.051	System adjustments or voltage support if needed
PRMNT J2 60 kV	317 - De Anza	1.034	1.046	1.052	1.051	System adjustments or voltage support if needed
GREENVALLEY 60 kV	319 - Central Coast	1.065	1.055	1.055	1.055	System adjustments or voltage support if needed
ERTA 60 kV	319 - Central Coast	1.060	1.051	1.050	1.051	System adjustments or voltage support if needed
ERTA JCT 60 kV	319 - Central Coast	1.060	1.051	1.050	1.051	System adjustments or voltage support if needed
PT MRTTI 60 kV	319 - Central Coast	1.046	1.061	1.052	1.067	System adjustments or voltage support if needed
CRUSHER 60 kV	319 - Central Coast	1.046	1.061	1.052	1.067	System adjustments or voltage support if needed

Study Area Entire PG&E System

High Voltages Under P0 Conditions

Bus/Substation	Zone	Voltage PU (Baseline Scenarios)			Voltage PU (Sensitivity Scenario)	Project & Potential Mitigation Solutions
		2022 Spring Off-Peak	2025 Spring Off-Peak	2030 Spring Off-Peak	2025 SpOP Hi Renew & Min Gas Gen	
BIG BASN 60 kV	319 - Central Coast	1.045	1.061	1.054	1.067	System adjustments or voltage support if needed
BURNS 60 kV	319 - Central Coast	1.045	1.061	1.053	1.066	System adjustments or voltage support if needed
BURNS J2 60 kV	319 - Central Coast	1.045	1.061	1.053	1.066	System adjustments or voltage support if needed
BURNS J1 60 kV	319 - Central Coast	1.045	1.061	1.053	1.066	System adjustments or voltage support if needed
L.STAR J 60 kV	319 - Central Coast	1.044	1.060	1.052	1.066	System adjustments or voltage support if needed
LONE STR 60 kV	319 - Central Coast	1.044	1.060	1.052	1.065	System adjustments or voltage support if needed
JOLON 60 kV	319 - Central Coast	1.038	1.048	1.041	1.055	System adjustments or voltage support if needed
CIC JCT 60 kV	319 - Central Coast	1.056	1.046	1.045	1.046	System adjustments or voltage support if needed
AGRILINK 60 kV	319 - Central Coast	1.054	1.044	1.044	1.045	System adjustments or voltage support if needed
WTSNVLLE 60 kV	319 - Central Coast	1.053	1.043	1.043	1.044	System adjustments or voltage support if needed
DIVIDE 70 kV	320 - Los Padres	1.039	1.042	1.039	1.043	System adjustments or voltage support if needed
VAFB A-N 70 kV	320 - Los Padres	1.038	1.042	1.036	1.042	System adjustments or voltage support if needed
CHOLAME 70 kV	320 - Los Padres	1.060	1.067	1.027	1.065	System adjustments or voltage support if needed
VAFB SSA 70 kV	320 - Los Padres	1.036	1.042	1.036	1.042	System adjustments or voltage support if needed
VAFB SSB 70 kV	320 - Los Padres	1.036	1.042	1.036	1.042	System adjustments or voltage support if needed
1257-RD 70 kV	320 - Los Padres	1.036	1.042	1.036	1.042	System adjustments or voltage support if needed
MESA PGE 230 kV	320 - Los Padres	1.034	1.056	1.032	1.056	System adjustments or voltage support if needed
PSA RBLS 70 kV	320 - Los Padres	1.033	1.048	1.008	1.049	System adjustments or voltage support if needed
TEMPL J 70 kV	320 - Los Padres	1.035	1.046	1.013	1.047	System adjustments or voltage support if needed
TEMPLT7 70 kV	320 - Los Padres	1.036	1.046	1.014	1.046	System adjustments or voltage support if needed
TEMPL J2 70 kV	320 - Los Padres	1.025	1.040	1.010	1.041	System adjustments or voltage support if needed
ATASCDRO 70 kV	320 - Los Padres	1.024	1.040	1.010	1.040	System adjustments or voltage support if needed

2020-2021 ISO Reliability Assessment - Study Results
Study Area: PG&E Humboldt
Thermal Overloads

Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading % (Baseline Scenarios)								Loading % (Sensitivity Scenarios)					Project & Potential Mitigation Solutions
				2022 Summer Peak	2025 Summer Peak	2030 Summer Peak	2022 Winter Peak	2025 Winter Peak	2030 Winter Peak	2022 Spring Off-Peak	2025 Spring Off-Peak	2025 SP High CEC Forecast	2025 SpOP Hi Renew & Min Gas Gen	2022 SP Heavy Renewable & Min Gas Gen	2030 Retirement of QF Generations	2030 Summer Peak w/o Facility Rerates	

In accordance with TPL-001-4- Requirement R2.6, this area relies on the past studies from the 2019-20 Transmission Planning Process.
http://www.caiso.com/Documents/AppendixC-BoardApprovedt2019-2020TransmissionPlan.pdf

2020-2021 ISO Reliability Assessment - Study Results

Study Area: PG&E Humboldt

Low Voltages

Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)								Voltage PU (Sensitivity Scenarios)					Project & Potential Mitigation Solutions
				2022 Summer Peak	2025 Summer Peak	2030 Summer Peak	2022 Winter Peak	2025 Winter Peak	2030 Winter Peak	2022 Spring Off-Peak	2025 Spring Off-Peak	2025 SP High CEC Forecast	2025 SpOP Hi Renew & Min Gas Gen	2022 SP Heavy Renewable & Min Gas Gen	2030 Retirement of QF Generations	2030 Summer Peak w/o Facility Rerates	
FRT SWRD 60 kV	GRBRVLLE 60.00KV ID=7H & GRBRVLLE 60.00KV ID=5H & GRBRVLLE 60.00KV ID=8H & GRBRVLLE 60.00KV ID=V SHUNT DEVICES	P1	N-1	0.88	0.92	0.8899	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.8899	Garberville SVC setting change or additional reactive support
FTSWRDJT 60 kV		P1	N-1	0.882	0.9217	0.8906	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.8906	Garberville SVC setting change or additional reactive support
GRBRVLLE 60 kV		P1	N-1	0.8587	0.9084	0.8709	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.8709	Garberville SVC setting change or additional reactive support
KEKAWAKA 60 kV		P1	N-1	0.8797	0.924	0.8835	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.8835	Garberville SVC setting change or additional reactive support

In accordance with TPL-001-4- Requirement R2.6, this area relies on the past studies from the 2019-20 Transmission Planning Process. The results shown here are for new contingencies and new sensitivity scenario only.

http://www.caiso.com/Documents/AppendixC-BoardApprovedt2019-2020TransmissionPlan.pdf

2020-2021 ISO Reliability Assessment - Study Results

Study Area: PG&E Humboldt

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
				2022 Summer Peak	2025 Summer Peak	2030 Summer Peak	2022 Winter Peak	2025 Winter Peak	2030 Winter Peak	2022 Spring Off-Peak	2025 Spring Off-Peak	2025 SP High CEC Forecast	2025 SpOP Hi Renew & Min Gas Gen	2022 SP Heavy Renewable & Min Gas Gen	2030 Retirement of QF Generations	
FRT SWRD 60 kV	GRBRVLLE 60.00KV ID=7H & GRBRVLLE 60.00KV ID=5H & GRBRVLLE 60.00KV ID=8H & GRBRVLLE 60.00KV ID=V SHUNT DEVICES	P1	N-1	9.896	9.330	10.367	NA	NA	NA	NA	NA	NA	NA	NA	NA	Garberville SVC setting change or additional reactive support
FRUITLND 60 kV		P1	N-1	< 8%	< 8%	8.391	NA	NA	NA	NA	NA	NA	NA	NA	NA	Garberville SVC setting change or additional reactive support
FRUTLDJT 60 kV		P1	N-1	7.897	< 8%	8.375	NA	NA	NA	NA	NA	NA	NA	NA	NA	Garberville SVC setting change or additional reactive support
FTSWRDJT 60 kV		P1	N-1	9.897	9.323	10.357	NA	NA	NA	NA	NA	NA	NA	NA	NA	Garberville SVC setting change or additional reactive support
GRBRVLLE 60 kV		P1	N-1	13.029	12.276	13.435	NA	NA	NA	NA	NA	NA	NA	NA	NA	Garberville SVC setting change or additional reactive support
KEKAWAKA 60 kV		P1	N-1	11.418	10.553	11.862	NA	NA	NA	NA	NA	NA	NA	NA	NA	Garberville SVC setting change or additional reactive support

In accordance with TPL-001-4- Requirement R2.6, this area relies on the past studies from the 2019-20 Transmission Planning Process. The results shown here are for new contingencies and new sensitivity scenario only.

http://www.caiso.com/Documents/AppendixC-BoardApprovedt2019-2020TransmissionPlan.pdf

2020-2021 ISO Reliability Assessment - Study Results

Study Area: PG&E Humboldt

Transient Stability

Contingency	Category	Category Description	Transient Stability Performance					Potential Mitigation Solutions
			Baseline Scenarios			Sensitivity Scenarios		
			2025 Summer Peak	2030 Summer Peak	2025 Spring Off-Peak	2025 SP High CEC Forecast	2025 SpOP Hi Renew & Min Gas Gen	
LP SAMOA Unit 1 (Bus #31158)	P1-1	N-1	No Issue	No Issue	No Issue	No Issue	No Issue	No Violation
HMBLDT B - HUMB_BS1 115 kV Line	P1-2	N-1	Potential WECC/NERC criteria violation	Potential WECC/NERC criteria violation	No Issue	Potential WECC/NERC criteria violation	No Issue	Under Review with PTO
HUMB_BS1/HUMB_G1 115/13.8 kV No.1 Transformer	P1-3	N-1	No Issue	No Issue	No Issue	No Issue	No Issue	No Violation
Bus Fault at HUMBOLDT 115 kV	P2-2	Bus	No Issue	No Issue	No Issue	No Issue	Potential WECC/NERC criteria violation	Under Review with PTO
Internal fault at Non-bus-tie-breaker #182 at HUMBOLDT 115 kV	P2-3	Non-Bus-Tie Breaker	No Issue	No Issue	No Issue	No Issue	Potential WECC/NERC criteria violation	Under Review with PTO
LP SAMOA Unit 1 and HUMB_G1 Unit 1	P3-1	G-1/N-1	No Issue	No Issue	No Issue	No Issue	No Issue	No Violation
LP SAMOA Unit 1 and HUMBOLDT -HMBLDT B 115 kV No.1 Line	P3-2	G-1/N-1	Potential WECC/NERC criteria violation	Potential WECC/NERC criteria violation	No Issue	Potential WECC/NERC criteria violation	No Issue	Under Review with PTO
LP SAMOA Unit 1 and HUMB_BS1/HUMB_G1 115/13.8 kV No.1 Transformer	P3-3	G-1/N-1	No Issue	No Issue	No Issue	No Issue	No Issue	No Violation
LP SAMOA Unit 1 and HUMBOLDT 60 kV ID v SVD	P3-4	G-1/N-1	No Issue	No Issue	No Issue	No Issue	No Issue	No Violation
Breaker stuck for CB #182 protecting HUMBOLDT-BRDGVLLE 115 kV No.1 Line	P4-2	Stuck Breaker	Potential WECC/NERC criteria violation	Potential WECC/NERC criteria violation	No Issue	Potential WECC/NERC criteria violation	Potential WECC/NERC criteria violation	Under Review with PTO
Breaker stuck for CB #322 protecting HUMBOLDT/HUMBOLDT 60/115 kV No.2 Transformer	P4-3	Stuck Breaker	Potential WECC/NERC criteria violation	Potential WECC/NERC criteria violation	No Issue	No Issue	Potential WECC/NERC criteria violation	Under Review with PTO
Breaker stuck for CB #6222 protecting HUMBOLDT 60 kV ID v SVD	P4-4	Stuck Breaker	Potential WECC/NERC criteria violation	Potential WECC/NERC criteria violation	No Issue	Potential WECC/NERC criteria violation	No Issue	Under Review with PTO
Breaker stuck for CB #172 protecting Bus Section HUMBOLDT 115 kV	P4-5	Stuck Breaker	No Issue	No Issue	No Issue	No Issue	Potential WECC/NERC criteria violation	Under Review with PTO
Breaker stuck for CB #BAE071 protecting HUMB_G1 Unit 1	P4-1	Stuck Breaker	No Issue	No Issue	No Issue	No Issue	Potential WECC/NERC criteria violation	Under Review with PTO
HUMB_G1 Unit 1	P5-1	Non-Redundant Relay	No Issue	No Issue	No Issue	No Issue	No Issue	No Violation
HUMBOLDT -HMBLDT B 115 kV No.1 Line	P5-2	Non-Redundant Relay	No Issue	No Issue	No Issue	No Issue	No Issue	No Violation
HUMBOLDT/HUMBOLDT 115/60 kV No.2 Transformer	P5-3	Non-Redundant Relay	No Issue	Potential WECC/NERC criteria violation	No Issue	No Issue	No Issue	Under Review with PTO
HUMBOLDT 60 kV ID v SVD	P5-5	Non-Redundant Relay	Potential WECC/NERC criteria violation	Potential WECC/NERC criteria violation	Potential WECC/NERC criteria violation	Potential WECC/NERC criteria violation	Potential WECC/NERC criteria violation	Under Review with PTO
HUMBOLDT -HMBLDT B 115 kV No.1 Line and HUMBOLDT -BRDGVLLE 115 kV No.1 Line	P6-1	N-1-1	Potential WECC/NERC criteria violation	Potential WECC/NERC criteria violation	No Issue	Potential WECC/NERC criteria violation	Potential WECC/NERC criteria violation	Under Review with PTO
HUMBOLDT -HMBLDT B 115 kV No.1 Line and HUMBOLDT/HUMBOLDT 115/60 kV No.2 Transformer	P6-2	N-1-1	No Issue	No Issue	No Issue	No Issue	No Issue	No Violation

2020-2021 ISO Reliability Assessment - Study Results

Study Area: PG&E Humboldt

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

2020-2021 ISO Reliability Assessment - Study Results

Study Area: PG&E Humboldt

Single Source Substation with more than 100 MW Load

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

No single source substation with more than 100 MW

2020-2021 ISO Reliability Assessment - Study Results
Study Area: PG&E North Coast & North Bay
Thermal Overloads

California ISO

Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading % (Baseline Scenarios)								Loading % (Sensitivity Scenarios)					Project & Potential Mitigation Solutions
				2022 Summer Peak	2025 Summer Peak	2030 Summer Peak	2022 Winter Peak	2025 Winter Peak	2030 Winter Peak	2022 Spring Off-Peak	2025 Spring Off-Peak	2025 SP High CEC Forecast	2025 SpOP Hi Renew & Min Gas Gen	2022 SP Heavy Renewable & Min Gas Gen	2030 Retirement of QF Generations	2030 Summer Peak w/o Facility Rerates	
Tulucay - Napa #2 60 kV (Tulucay 60 kV to Basalt 60 kV)	Base Case	P0	N-0	108.4	63.2	68.6	57.9	47.8	51.2	73.9	24.5	63.9	22.3	89.5	N/A	122.9	Tulucay - Napa #2 60 kV Line Project In service on April, 2023 Short Term : Action Plan
Fitch Mountain Tap #2 60 kV	Fulton-Windsor #1 60kV Line	P1	N-1	161.6	162.7	174.0	N/A	N/A	N/A	N/A	N/A	163.4	N/A	115.4	N/A	174.0	Rescope Fulton-Fitch Mountain 60 kV Line Reconductor Project to incorporate 0.07 mile line reconductoring of Fitch Mountain Tap #2 60 kV Line
Santa Rosa- Corona 115 kv (Santa Rosa 115kv sub to Stony Point Sub 115 kv)	FULTON 115KV - SECTION 2D & 1D	P2-4	Bus Tie Breaker Fault	N/A	92.7	102.1	N/A	72.1	82.8	N/A	35.6	94.5	32.9	N/A	N/A	102.0	Fulton 115 SPS recommended in 2017-18 TPP (PGAE is looking at the options of load drop in the Fulton area)
	FULTON-SANTA ROSA #1 & FULTON-SANTA ROSA #2 LINES	P7-1	DCTL	N/A	N/A	101.8	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	101.6	Fulton 115 SPS recommended in 2017-18 TPP (PGAE is looking at the options of load drop in the Fulton area)
Corona-Lakeville 115 kV Line	FULTON 230 KV BAAH BUS #1 (FAILURE OF NON-REDUNDENT RELAY)	P5-5	Non-Redundant Relay	105.1	109.5	122.8	89.8	90.2	107.0	62.7	16.2	111.7	10.9	62.4	N/A	137.9	Fulton 230 SPS recommended in 2017-18 TPP (PGAE is looking at the options of load drop in the Fulton area)
	FULTON 115KV - SECTION 2D & 1D	P2-4	Bus Tie Breaker Fault	114.0	119.6	130.9	103.6	102.8	118.5	79.3	43.5	121.9	39.4	84.2	N/A	149.6	Fulton 115 SPS recommended in 2017-18 TPP (PGAE is looking at the options of load drop in the Fulton area)
	FULTON-SANTA ROSA #1 & FULTON-SANTA ROSA #2 LINES	P7-1	DCTL	N/A	N/A	130.4	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	149.1	Fulton 115 SPS recommended in 2017-18 TPP (PGAE is looking at the options of load drop in the Fulton area)
Sonoma - Pueblo 115 kV	FULTON 230 KV BAAH BUS #1 (FAILURE OF NON-REDUNDENT RELAY)	P5-5	Non-Redundant Relay	103.5	105.8	118.5	72.1	72.3	84.5	61.0	14.5	107.7	9.0	62.1	N/A	138.0	Fulton 230 SPS recommended in 2017-18 TPP (PGAE is looking at the options of load drop in the Fulton area)
Mendocino -Clearlake 60 kV (Mendocino Sub 60 kV to Upper Lake Sub 60 Kv)	EGLE RCK - MA 115KV & EGLE RCK-FULTON-SILVERDO LINE	P2-3	Non-Bus Tie Breaker Fault	103.6	103.5	72.4	81.2	81.7	63.9	80.1	25.5	106.0	22.1	67.4	N/A	73.5	Eagle Rock 115 SPS recommended in 2018-19 TPP (PGAE is looking at the options of load drop in the Fulton area)
	EGLE RCK 115KV SECTION MA	P2-2	Bus Fault	103.6	103.5	72.5	81.2	81.7	64.0	80.1	25.4	106.0	21.9	67.7	N/A	73.5	Eagle Rock 115 SPS recommended in 2018-19 TPP (PGAE is looking at the options of load drop in the Fulton area)
Fulton-Hopland 60 kV Line (Cloverdale Jct-Hopland)	FULTON 115KV - SECTION 2F & 1F	P2-4	Bus Tie Breaker Fault	227.8	223.4	216.0	161.8	162.2	146.5	207.6	61.3	224.0	51.2	194.0	N/A	216.2	Fulton 115 SPS recommended in 2017-18 TPP (PGAE is looking at the options of load drop in the Fulton area)
Fulton- Molino- Cotati 60 kV(Molino sub 60 kV to Molino Jct 60 kV)	FULTON 115KV - SECTION 2F & 1F	P2-4	Bus Tie Breaker Fault	220.0	210.2	216.2	167.9	170.5	148.1	205.6	25.3	212.3	2.7	180.9	N/A	215.4	Fulton 115 SPS recommended in 2017-18 TPP (PGAE is looking at the options of load drop in the Fulton area)
Fulton-Hopland 60 kV Line (Geysers Jct-Cloverdale Jct)	FULTON 115KV - SECTION 2F & 1F	P2-4	Bus Tie Breaker Fault	228.0	223.7	216.2	161.9	162.3	146.6	208.3	61.3	223.9	51.1	194.5	N/A	216.4	Fulton 115 SPS recommended in 2017-18 TPP (PGAE is looking at the options of load drop in the Fulton area)
Fulton-Hopland 60 kV Line (Fitch Mountain Tap-Geysers Jct)	FULTON 115KV - SECTION 2F & 1F	P2-4	Bus Tie Breaker Fault	228.0	224.1	216.3	162.5	162.9	147.3	207.3	61.2	224.1	51.0	194.6	N/A	216.5	Fulton 115 SPS recommended in 2017-18 TPP (PGAE is looking at the options of load drop in the Fulton area)
LAKEVILLE #2 60KV	FULTON 230 KV BAAH BUS #1 (FAILURE OF NON-REDUNDENT RELAY)	P5-5	Non-Redundant Relay	140.1	143.1	160.0	89.2	90.1	97.2	86.9	20.2	145.3	21.6	71.7	N/A	156.3	Fulton 230 SPS recommended in 2017-18 TPP (PGAE is looking at the options of load drop in the Fulton area)
	FULTON 115KV - SECTION 2F & 1F	P2-4	Bus Tie Breaker Fault	328.5	322.8	321.3	232.8	235.5	221.4	281.3	35.7	326.1	6.7	247.3	N/A	320.3	Fulton 115 SPS recommended in 2017-18 TPP (PGAE is looking at the options of load drop in the Fulton area)
Fulton- Molino- Cotati 60 kV(Molino sub 60 kV to Molino Jct 60 kV)	FULTON 230 KV BAAH BUS #1 (FAILURE OF NON-REDUNDENT RELAY)	P5-5	Non-Redundant Relay	89.3	91.0	102.4	58.3	59.8	62.4	54.4	18.9	92.4	16.0	49.4	N/A	98.5	Fulton 230 SPS recommended in 2017-18 TPP (PGAE is looking at the options of load drop in the Fulton area)
	FULTON 115KV - SECTION 2F & 1F	P2-4	Bus Tie Breaker Fault	243.8	234.1	234.3	180.1	182.9	162.8	229.9	36.3	236.3	13.7	206.2	N/A	233.5	Fulton 115 SPS recommended in 2017-18 TPP (PGAE is looking at the options of load drop in the Fulton area)

2020-2021 ISO Reliability Assessment - Study Results

Study Area: PG&E North Coast & North Bay

Thermal Overloads

Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading % (Baseline Scenarios)								Loading % (Sensitivity Scenarios)					Project & Potential Mitigation Solutions
				2022 Summer Peak	2025 Summer Peak	2030 Summer Peak	2022 Winter Peak	2025 Winter Peak	2030 Winter Peak	2022 Spring Off-Peak	2025 Spring Off-Peak	2025 SP High CEC Forecast	2025 SpOP Hi Renew & Min Gas Gen	2022 SP Heavy Renewable & Min Gas Gen	2030 Retirement of QF Generations	2030 Summer Peak w/o Facility Rerates	

In accordance with TPL-001-4- Requirement R2.6, this area relies on the past studies from the 2019-20 Transmission Planning Process. The results shown here are for new contingencies and new sensitivity

http://www.caiso.com/Documents/AppendixC-BoardApprovedt2019-2020TransmissionPlan.pdf

2020-2021 ISO Reliability Assessment - Study Results

Study Area: PG&E North Valley

Low Voltages

Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)								Voltage PU (Sensitivity Scenarios)					Project & Potential Mitigation Solutions
				2022 Summer Peak	2025 Summer Peak	2030 Summer Peak	2022 Winter Peak	2025 Winter Peak	2030 Winter Peak	2022 Spring Off-Peak	2025 Spring Off-Peak	2025 SP High CEC Forecast	2025 SpOP Hi Renew & Min Gas Gen	2022 SP Heavy Renewable & Min Gas Gen	2030 Retirement of QF Generations	2030 Summer Peak w/o Facility Rerates	
HGHWY J2 115 kV	CR1T3_18-FULTON 230KV [4750] NO FAULT	P2-1	Line Section w/o Fault	>0.9	0.93	0.90	>0.9	1.00	0.96	>0.9	1.03	0.93	1.03	>0.9	>0.9	0.89	Monitor issue in the long term
HIGHWAY 115 kV		P2-1	Line Section w/o Fault	>0.9	0.93	0.90	>0.9	1.00	0.96	>0.9	1.03	0.93	1.03	>0.9	>0.9	0.89	Monitor issue in the long term
NTWR ALT 115 kV		P2-1	Line Section w/o Fault	>0.9	0.93	0.89	>0.9	1.00	0.95	>0.9	1.02	0.93	1.03	>0.9	>0.9	0.89	Monitor issue in the long term
CRQNZTP2 115 kV		P2-1	Line Section w/o Fault	>0.9	0.93	0.89	>0.9	0.99	0.95	>0.9	1.02	0.93	1.03	>0.9	>0.9	0.89	Monitor issue in the long term
MEYERTP2 115 kV		P2-1	Line Section w/o Fault	>0.9	0.93	0.89	>0.9	0.99	0.95	>0.9	1.02	0.93	1.03	>0.9	>0.9	0.89	Monitor issue in the long term
HGHWY J2 115 kV	CR2T3_18-LAKEVILE 230KV [4780] NO FAULT	P2-1	Line Section w/o Fault	>0.9	0.93	0.90	>0.9	1.00	0.96	>0.9	1.03	0.93	1.03	>0.9	>0.9	0.90	Sensitivity only
HIGHWAY 115 kV		P2-1	Line Section w/o Fault	>0.9	0.93	0.90	>0.9	1.00	0.96	>0.9	1.03	0.93	1.03	>0.9	>0.9	0.89	Sensitivity only
NTWR ALT 115 kV		P2-1	Line Section w/o Fault	>0.9	0.93	0.90	>0.9	1.00	0.96	>0.9	1.02	0.93	1.03	>0.9	>0.9	0.89	Monitor issue in the long term
CRQNZTP2 115 kV		P2-1	Line Section w/o Fault	>0.9	0.93	0.90	>0.9	1.00	0.95	>0.9	1.02	0.93	1.03	>0.9	>0.9	0.89	Monitor issue in the long term
MEYERTP2 115 kV		P2-1	Line Section w/o Fault	>0.9	0.93	0.90	>0.9	1.00	0.95	>0.9	1.02	0.93	1.03	>0.9	>0.9	0.89	Monitor issue in the long term

In accordance with TPL-001-4- Requirement R2.6, this area relies on the past studies from the 2019-20 Transmission Planning Process. The results shown here are for new contingencies and new sensitivity

http://www.caiso.com/Documents/AppendixC-BoardApprovedt2019-2020TransmissionPlan.pdf

2020-2021 ISO Reliability Assessment - Study Results

Study Area: PG&E North Coast & North Bay

Voltage Deviation

Substation	Contingency (All and Worst P3)	Category	Category Description	Post Cont. Voltage Deviation % (Baseline Scenarios)								Post Cont. Voltage Deviation % (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2022 Summer Peak	2025 Summer Peak	2030 Summer Peak	2022 Winter Peak	2025 Winter Peak	2030 Winter Peak	2022 Spring Off-Peak	2025 Spring Off-Peak	2025 SP High CEC Forecast	2025 SpOP Hi Renew & Min Gas Gen	2022 SP Heavy Renewable & Min Gas Gen	2029 Retirement of QF Generations	
None																

Study Area: PG&E North Coast & North Bay

Transient Stability

Contingency	Category	Category Description	Transient Stability Performance					Potential Mitigation Solutions
			Baseline Scenarios			Sensitivity Scenarios		
			Select..	Select..	Select..	Select..	Select..	
In accordance with TPL-001-4- Requirement R2.6, this area relies on the past studies from the 2019-20 Transmission Planning Process for transient stability studies:								
http://www.caiso.com/Documents/AppendixC-BoardApprovedt2019-2020TransmissionPlan.pdf								

2020-2021 ISO Reliability Assessment - Study Results

Study Area: PG&E North Valley

Single Contingency Load Drop

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

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

2020-2021 ISO Reliability Assessment - Study Results

Study Area: PG&E North Valley

Single Source Substation with more than 100 MW Load

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

No single source substation with more than 100 MW

2020-2021 ISO Reliability Assessment - Study Results

Study Area PG&E North Valley

Thermal Overloads

Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading % (Baseline Scenarios)								Loading % (Sensitivity Scenarios)					Project & Potential Mitigation Solutions
				2022 Summer Peak	2025 Summer Peak	2030 Summer Peak	2022 Winter Peak	2025 Winter Peak	2030 Winter Peak	2022 Spring Off-Peak	2025 Spring Off-Peak	2025 SP High CEC Forecast	2025 SpOP Hi Renew & Min Gas Gen	2022 SP Heavy Renewable & Min Gas Gen	2030 Retirement of QF Generations	2030 Summer Peak w/o Facility Rerates	
Palermo-Wyandotte 115 kV Line	Base Case	P0	N-0	108.0	104.3	108.1	NA	NA	NA	41.2	33.6	105.6	38.6	65.4	NA	108.1	Upgrade the jumper
Caribou-Plumas Jct 60 kV Line	CARIBOU-TABLE MTN 230KV (BELDENTP-TBL MT D)	P2-1	Line Section w/o Fault	Diverge	Diverge	Diverge	NA	NA	NA	Diverge	20.3	Diverge	19.9	Diverge	NA	Diverge	Existing SPS Modification
Caribou 230/115/60 kV Transformer Bank 11 (60 kV-230 kV)	CARIBOU-TABLE MTN 230KV (BELDENTP-TBL MT D)	P2-1	Line Section w/o Fault	Diverge	Diverge	Diverge	NA	NA	NA	Diverge	1.2	Diverge	1.2	Diverge	NA	Diverge	Existing SPS Modification
Cascade-Benton-Deschute 60 kV line	Cottonwood 230kV Bus Section E (FAILURE OF NON-REDUNDENT RELAY)	P5-5	Non-Redundant Relay	212.8	228.1	Diverge	NA	NA	NA	32.5	102.3	236.3	149.6	Diverge	NA	Diverge	Protection Upgrade
	Cottonwood 230kV Bus Section E (FAILURE OF NON-REDUNDENT RELAY)	P5-5	Non-Redundant Relay	225.2	239.7	Diverge	NA	NA	NA	26.9	106.0	248.1	154.6	Diverge	NA	Diverge	Protection Upgrade
	Cottonwood 230kV Bus Section E (FAILURE OF NON-REDUNDENT RELAY)	P5-5	Non-Redundant Relay	143.7	154.2	275.4	NA	NA	NA	14.8	51.9	159.4	72.2	260.9	NA	275.4	Protection Upgrade
	Cottonwood 230kV Bus Section E (FAILURE OF NON-REDUNDENT RELAY)	P5-5	Non-Redundant Relay	70.4	75.6	133.0	NA	NA	NA	5.2	22.1	78.1	31.4	125.2	NA	133.0	Protection Upgrade
	COTWDPGE 115KV - SECTION 2D & 1D	P2-4	Bus Tie Breaker Falut	106.5	<100	<100	NA	NA	NA	22.8	<100	<100	<100	Diverge	NA	<100	- Cottonwood 115 kV Bus Sectionalizing Breaker Project - Expected ISD: Dec. 2022 - Short term: Action Plan
	COTWDPGE 115KV - SECTION 2D & 1D	P2-4	Bus Tie Breaker Falut	119.4	<100	<100	NA	NA	NA	27.1	<100	<100	<100	Diverge	NA	<100	- Cottonwood 115 kV Bus Sectionalizing Breaker Project - Expected ISD: Dec. 2022 - Short term: Action Plan
Sycamore Creek-Notre Dame-Table Mountain 115 kV Line (Notre Dame Jct-Sycamore)	BUTTE - MD 115KV & BUTTE-CHICO B-TBLE MTN LINE	P2-3	Non-Bus Tie Breaker Fault	130.2	133.0	141.4	NA	NA	NA	52.0	19.4	135.0	26.6	78.7	NA	141.4	Table Mountain SPS recommended in 2017-2018 TPP
	BUTTE 115KV - SECTION MD & ME	P2-4	Bus Tie Breaker Falut	103.8	107.0	116.2	NA	NA	NA	41.0	19.8	108.5	27.0	56.9	NA	116.2	Table Mountain SPS recommended in 2017-2018 TPP
	BUTTE 115KV SECTION MD	P2-2	Bus Fault	100.7	103.8	110.6	NA	NA	NA	41.0	20.0	105.3	27.4	55.7	NA	110.6	Table Mountain SPS recommended in 2017-2018 TPP
	BUTTE-SYCAMORE CREEK 115KV (CHICOTP2-BUTTE)	P2-1	Line Section w/o Fault	100.5	103.4	110.4	NA	NA	NA	40.9	20.1	104.9	27.5	55.6	NA	110.4	System Upgrade/ Preferred Resources/Operating Solution as needed
Cottonwood-Round Mountain 230 kV Line	Round Mountain 230kV Bus 1 & 2 Sec. E (FAILURE OF NON-REDUNDENT RELAY)	P5-5	Non-Redundant Relay	Diverge	149.0	146.7	NA	NA	NA	58.6	76.4	149.0	6.9	149.6	NA	146.7	Protection upgrade
Cascade-Cottonwood 115 kV Line	Cottonwood 230kV Bus Section E (FAILURE OF NON-REDUNDENT RELAY)	P5-5	Non-Redundant Relay	112.4	117.8	175.4	NA	NA	NA	49.3	33.1	121.0	45.0	168.1	NA	175.4	Protection Upgrade
	Cottonwood 230kV Bus Section E (FAILURE OF NON-REDUNDENT RELAY)	P5-5	Non-Redundant Relay	113.8	NA	NA	NA	NA	NA	57.3	NA	NA	NA	158.2	NA	NA	Protection Upgrade
	Cottonwood 230kV Bus Section E (FAILURE OF NON-REDUNDENT RELAY)	P5-5	Non-Redundant Relay	91.6	97.0	149.8	NA	NA	NA	65.7	46.6	100.2	60.1	145.8	NA	149.8	Protection Upgrade

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Thermal Overloads

Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading % (Baseline Scenarios)								Loading % (Sensitivity Scenarios)					Project & Potential Mitigation Solutions
				2022 Summer Peak	2025 Summer Peak	2030 Summer Peak	2022 Winter Peak	2025 Winter Peak	2030 Winter Peak	2022 Spring Off-Peak	2025 Spring Off-Peak	2025 SP High CEC Forecast	2025 SpOP Hi Renew & Min Gas Gen	2022 SP Heavy Renewable & Min Gas Gen	2030 Retirement of QF Generations	2030 Summer Peak w/o Facility Rerates	
	Cottonwood 230kV Bus Section E (FAILURE OF NON-REDUNDENT RELAY)	P5-5	Non-Redundant Relay	100.8	105.9	163.8	NA	NA	NA	53.3	28.2	108.9	38.0	164.5	NA	163.8	Protection Upgrade
Glenn #3 60 kV Line (Capay Switches-Capay Jct)	Base Case	P0	N-0	84.5	95.7	108.6	NA	NA	NA	32.1	28.6	96.9	41.0	28.5	NA	108.6	Contineue to monitor
Glenn #3 60 kV Line (Chico Jct-Anita)	Base Case	P0	N-0	81.4	97.9	114.4	NA	NA	NA	30.0	30.3	99.0	42.5	23.5	NA	114.4	Contineue to monitor
Glenn #3 60 kV Line (Glenn-Capay Switches)	Base Case	P0	N-0	84.5	95.6	108.6	NA	NA	NA	32.1	28.6	96.9	41.0	28.4	NA	108.6	Contineue to monitor
Cascade 115/60 kV Transformer Bank No. 1	CASCADE - MA 115KV & CASCADE-COTTONWOOD LINE	P2-3	Non-Bus Tie Breaker Fault	67.0	66.2	68.1	NA	NA	NA	38.0	98.8	66.0	100.3	92.8	NA	68.1	Sensitivity only
	CASCADE 115KV SECTION MA	P2-2	Bus Fault	67.0	66.1	68.1	NA	NA	NA	38.1	98.9	66.0	100.4	92.8	NA	68.1	Sensitivity only
	COTWD_2D - 2D 115KV & COTTONWOOD-PANORAMA LINE	P2-3	Non-Bus Tie Breaker Fault	NA	15.2	74.5	NA	NA	NA		97.3	15.7	100.4	NA	NA	74.5	Sensitivity only
	COTWD_2D 115KV SECTION 2D	P2-2	Bus Fault	NA	15.2	74.5	NA	NA	NA		97.3	15.7	100.4	NA	NA	74.5	Sensitivity only
Coleman-Red Bluff 60 kV Line	COTTONWOOD-RED BLUFF 60KV MOAS OPENED ON RED B JT_RED BLFF	P1-2	N-1	104.5	42.5	49.4	NA	NA	NA	38.8	13.9	43.2	16.0	51.4	NA	49.4	- Red Bluff - Coleman 60 kV Line Upgrade - Expected ISD: Jul. 2023 - Short term: Action Plan
	P7-1:A3:1_Cottonwood-Benton No.1 and Cottonwood-Red Bluff 60 kV Lines	P7-1	DCTL	104.4	42.5	49.2	NA	NA	NA	38.8	13.9	43.1	16.0	51.4	NA	49.2	- Red Bluff - Coleman 60 kV Line Upgrade - Expected ISD: Jul. 2023 - Short term: Action Plan
	SOUTH G 4.16KV GEN UNIT 1 & COTTONWOOD-RED BLUFF 60KV [6660] MOAS OPENED ON RED B JT_RED BLFF	P3	N-G-1	104.9	<100	<100	NA	NA	NA	<100	<100	<100	<100	<100	NA	<100	- Red Bluff - Coleman 60 kV Line Upgrade - Expected ISD: Jul. 2023 - Short term: Action Plan
	COTTONWOOD-RED BLUFF 60KV MOAS OPENED ON RED B JT_RED BLFF	P1-2	N-1	148.7	60.5	69.4	NA	NA	NA	54.7	18.4	61.4	21.5	75.0	NA	69.4	- Red Bluff - Coleman 60 kV Line Upgrade - Expected ISD: Jul. 2023 - Short term: Action Plan
	P7-1:A3:1_Cottonwood-Benton No.1 and Cottonwood-Red Bluff 60 kV Lines	P7-1	DCTL	148.6	60.4	69.1	NA	NA	NA	54.7	18.4	61.3	21.6	75.0	NA	69.1	- Red Bluff - Coleman 60 kV Line Upgrade - Expected ISD: Jul. 2023 - Short term: Action Plan
	SOUTH G 4.16KV GEN UNIT 1 & COTTONWOOD-RED BLUFF 60KV [6660] MOAS OPENED ON RED B JT_RED BLFF	P3	N-G-1	149.3	<100	<100	NA	NA	NA	<100	<100	<100	<100	<100	NA	<100	- Red Bluff - Coleman 60 kV Line Upgrade - Expected ISD: Jul. 2023 - Short term: Action Plan
Cottonwood-Benton #1 60 kV Line (Benton-Girvan)	Cottonwood 230kV Bus Section E (FAILURE OF NON-REDUNDENT RELAY)	P5-5	Non-Redundant Relay	87.4	92.4	165.0	NA	NA	NA	4.4	27.1	95.2	37.8	141.7	NA	165.0	Sensitivity only
Cottonwood-Benton #1 60 kV Line (Girvan-Anderson)	Cottonwood 230kV Bus Section E (FAILURE OF NON-REDUNDENT RELAY)	P5-5	Non-Redundant Relay	58.4	65.7	121.3	NA	NA	NA	11.2	20.2	68.1	29.6	126.5	NA	121.3	Sensitivity only
Keswick-Cascade 60 kV Line (Keswick-Stillwater)	COTWDPGE 115KV - SECTION 2D & 1D	P2-4	Bus Tie Breaker Falut	119.9	NA	NA	NA	NA	NA	50.5	NA	NA	NA	Diverge	NA	NA	- Cottonwood 115 kV Bus Sectionalizing Breaker Project - Expected ISD: Dec. 2022 - Short term: Action Plan
Keswick-Trinity-Weaverville 60 kV Line (French Gulch-Keswick)	COTWDPGE 115KV - SECTION 2D & 1D	P2-4	Bus Tie Breaker Falut	105.5	NA	NA	NA	NA	NA	46.3	NA	NA	NA	Diverge	NA	NA	- Cottonwood 115 kV Bus Sectionalizing Breaker Project - Expected ISD: Dec. 2022 - Short term: Action Plan

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Thermal Overloads

Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading % (Baseline Scenarios)								Loading % (Sensitivity Scenarios)					Project & Potential Mitigation Solutions
				2022 Summer Peak	2025 Summer Peak	2030 Summer Peak	2022 Winter Peak	2025 Winter Peak	2030 Winter Peak	2022 Spring Off-Peak	2025 Spring Off-Peak	2025 SP High CEC Forecast	2025 SpOP Hi Renew & Min Gas Gen	2022 SP Heavy Renewable & Min Gas Gen	2030 Retirement of QF Generations	2030 Summer Peak w/o Facility Rerates	
Keswick-Trinity-Weaverville 60 kV Line (Trinity-French Gulch)	COTWDPGE 115KV - SECTION 2D & 1D	P2-4	Bus Tie Breaker Falut	107.7	NA	NA	NA	NA	NA	48.0	NA	NA	NA	Diverge	NA	NA	- Cottonwood 115 kV Bus Sectionalizing Breaker Project - Expected ISD: Dec. 2022 - Short term: Action Plan
Peachton-Pease 60 kV Line (Peachton-Gridley\)	P7-1:A3:15_Palermo-Pease 115 kV Line and Pease-Rio Oso 115 kV Line	P7-1	DCTL	128.0	52.1	43.6	NA	NA	NA	53.7	14.1	52.0	16.2	28.8	NA	43.6	- East Marysville 115/60 kV Transformer Project - Expected ISD: Dec. 2022 - Short term: Action Plan
Sycamore Creek-Notre Dame-Table Mountain 115 kV Line (Table Mountain-Notre Dame Jct)	TBLE MTN - 1D 115KV & BUTTE-CHICO B-TBLE MTN LINE	P2-3	Non-Bus Tie Breaker Fault	88.3	94.9	102.7	NA	NA	NA	33.2	10.7	96.4	17.6	51.3	NA	102.7	Table Mountain SPS recommended in 2017-2018 TPP
	TBLE MTN 115KV SECTION 1D	P2-2	Bus Fault	88.2	94.8	102.6	NA	NA	NA	33.1	11.0	96.3	17.8	51.1	NA	102.6	Table Mountain SPS recommended in 2017-2018 TPP
Table Mountain-Butte #1 115 kV Line (Butte-Chico Tap 1)	P7-1:A3:4_Sycamore Creek-Notre Dame-Table Mountain and Table Mountain-Butte No.2 115 kV Lines	P7-1	DCTL	103.3	111.2	121.3	NA	NA	NA	38.2	14.9	112.9	24.1	55.5	NA	121.3	Table Mountain SPS recommended in 2017-2018 TPP
	SYCAMORE CREEK-NOTRE DAME-TABLE MTN 115KV [4314] & TABLE MTN-BUTTE #2 115KV [3920]	P6	N-1-1	103.2	111.2	121.3	NA	NA	NA			112.9			NA	121.3	Table Mountain SPS recommended in 2017-2018 TPP
Table Mountain-Butte #1 115 kV Line (Chico Tap 1-Table Mountain)	P7-1:A3:4_Sycamore Creek-Notre Dame-Table Mountain and Table Mountain-Butte No.2 115 kV Lines	P7-1	DCTL	121.7	129.3	139.5	NA	NA	NA	45.7	13.7	131.2	23.2	70.4	NA	139.5	Table Mountain SPS recommended in 2017-2018 TPP
Table Mountain-Butte No.2 115 kV Line	BUTTE-CHICO B-TBLE MTN 115KV [0] & SYCAMORE CREEK-NOTRE DAME-TABLE MTN 115KV [4314]	P6	N-1-1	119.5	128.7	139.9	NA	NA	NA			130.7			NA	139.9	Table Mountain SPS recommended in 2017-2018 TPP
Table Mountain-Peachton 60 kV Line (Peachton-Biggs Jct)	P7-1:A3:15_Palermo-Pease 115 kV Line and Pease-Rio Oso 115 kV Line	P7-1	DCTL	139.3	61.6	52.5	NA	NA	NA	56.5	19.6	61.6	24.2	28.0	NA	52.5	- East Marysville 115/60 kV Transformer Project - Expected ISD: Dec. 2022 - Short term: Action Plan
Table Mountain-Peachton 60 kV Line (Tres Vias-Biggs Jct)	P7-1:A3:15_Palermo-Pease 115 kV Line and Pease-Rio Oso 115 kV Line	P7-1	DCTL	144.8	65.5	56.7	NA	NA	NA	60.0	17.4	65.5	21.8	32.1	NA	56.7	- East Marysville 115/60 kV Transformer Project - Expected ISD: Dec. 2022 - Short term: Action Plan
Table Mountain-Peachton 60 kV Line (Tres Vias-Table Mountain)	P7-1:A3:15_Palermo-Pease 115 kV Line and Pease-Rio Oso 115 kV Line	P7-1	DCTL	138.2	68.6	59.9	NA	NA	NA	56.9	21.0	68.7	27.1	26.4	NA	59.9	- East Marysville 115/60 kV Transformer Project - Expected ISD: Dec. 2022 - Short term: Action Plan
Keswick-Trinity-Weaverville 60 kV Line (French Gulch-Keswick)	CASCADE-BENTON-DESCHUTES 60KV & CASCADE 115/60KV TB 1	P6	N-1-1	116.43	117.14	115.27	NA	NA	NA	<100	<100	120.54	<100	<100	NA	115.27	- East Marysville 115/60 kV Transformer Project - Expected ISD: Dec. 2022 - Short term: Action Plan

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Study Area: PG&E North Valley

Low Voltages

California ISO

Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)								Voltage PU (Sensitivity Scenarios)					Project & Potential Mitigation Solutions
				2022 Summer Peak	2025 Summer Peak	2030 Summer Peak	2022 Winter Peak	2025 Winter Peak	2030 Winter Peak	2022 Spring Off-Peak	2025 Spring Off-Peak	2025 SP High CEC Forecast	2025 SpOP Hi Renew & Min Gas Gen	2022 SP Heavy Renewable & Min Gas Gen	2030 Retirement of QF Generations	2030 Summer Peak w/o Facility Rerates	
CANAL TP 60kV	Base Case	P0	N-0	1.02	1.03	0.99	NA	NA	NA	1.04	1.03	1.03	1.04	0.95	NA	NA	Sensitivity only
CR CANAL 60kV				1.02	1.03	0.99	NA	NA	NA	1.04	1.03	1.03	1.04	0.95	NA	NA	Sensitivity only
NEO REDT 60kV				1.03	1.03	0.99	NA	NA	NA	1.05	1.03	1.03	1.04	0.95	NA	NA	Sensitivity only
PALERMO 230kV				0.95	1.00	0.99	NA	NA	NA	1.03	1.04	1.00	1.05	0.98	NA	NA	- Rio Oso Area 230 kV Voltage Support Project - Expected ISD: Sep. 2022 - Short term: Action Plan
TYLER 60kV				1.02	1.03	0.99	NA	NA	NA	1.04	1.03	1.03	1.04	0.95	NA	NA	Sensitivity only
NORD 1 115kV	BUTTE-CHICO B-TBLE MTN 115KV & SYCAMORECREEK-NOTREDAME-TABLEMTN 115KV	P6	N-1-1	>0.9	>0.9	0.90	NA	NA	NA	>0.9	>0.9	>0.9	>0.9	>0.9	NA	NA	Continue to monitor
SYCAMORE 115kV				>0.9	>0.9	0.88	NA	NA	NA	>0.9	>0.9	>0.9	>0.9	>0.9	NA	NA	
ANTLER 60kV	CASCADE - MA 115KV & CASCADE-COTTONWOOD LINE	P2-3	Non-Bus Tie Breaker	0.91	0.90	0.91	NA	NA	NA	1.02	1.05	0.90	1.06	0.93	NA	NA	System adjustments or voltage support if needed
CASCADE 115kV				0.88	0.87	0.88	NA	NA	NA	1.12	1.14	0.87	1.14	0.91	NA	NA	
MTN GATE 60kV				0.91	0.90	0.92	NA	NA	NA	1.02	1.05	0.90	1.06	0.93	NA	NA	
PPL 60kV				0.91	0.90	0.91	NA	NA	NA	1.02	1.05	0.90	1.06	0.93	NA	NA	
ANTLER 60kV	CASCADE 115KV SECTION MA	P2-2	Bus Fault	0.91	0.90	0.91	NA	NA	NA	1.02	1.05	0.90	1.06	0.93	NA	NA	System adjustments or voltage support if needed
CASCADE 115kV				0.88	0.87	0.88	NA	NA	NA	1.12	1.14	0.87	1.15	0.91	NA	NA	
MTN GATE 60kV				0.91	0.90	0.92	NA	NA	NA	1.02	1.05	0.90	1.06	0.93	NA	NA	
PPL 60kV				0.91	0.90	0.91	NA	NA	NA	1.02	1.05	0.90	1.06	0.93	NA	NA	
CASCADE 115kV	CASCADE-COTTONWOOD 115KV & CRAGVIEW-CASCADE115KV	P6	N-1-1	>0.9	0.88	0.89	NA	NA	NA	>0.9	>0.9	0.88	>0.9	>0.9	NA	NA	System adjustments or voltage support if needed
CASCADE 115kV				>0.9	>0.9	0.89	NA	NA	NA	>0.9	>0.9	0.90	>0.9	>0.9	NA	NA	
CASCADE 115kV	CASCADE-COTTONWOOD 115KV (CASCADE-OREGNTRL)	P2-1	Line Section w/o Fault	0.88	1.00	0.93	NA	NA	NA	1.12	1.09	1.00	1.10	1.03	NA	NA	System adjustments or voltage support if needed
ANTLER 60kV				0.89	0.96	0.94	NA	NA	NA	1.01	1.06	0.96	1.03	0.99	NA	NA	
CASCADE 115kV				0.85	0.93	0.91	NA	NA	NA	1.06	1.15	0.93	1.11	1.03	NA	NA	
MTN GATE 60kV				0.88	0.96	0.95	NA	NA	NA	1.02	1.06	0.96	1.03	0.99	NA	NA	
OREGNTRL 115kV				0.85	0.93	0.91	NA	NA	NA	1.06	1.15	0.93	1.11	1.02	NA	NA	
PPL 60kV				0.89	0.96	0.94	NA	NA	NA	1.01	1.06	0.96	1.03	0.99	NA	NA	
COTWD_E2 230kV	Cottonwood 230kV Bus Section E (FAILURE OF NON-REDUNDENT RELAY)	P5-5	Non-Redundant Relay	0.88	>0.9	>0.9	NA	NA	NA	0.99	>0.9	>0.9	>0.9	0.52	NA	NA	Protection upgrade
VINA 60kV	COTTONWOOD-RED BLUFF 60KV MOAS OPENED ON RED B JT_RED BLFF	P1-2	N-1	0.91	0.97	0.89	NA	NA	NA	1.02	1.10	0.97	1.10	0.99	NA	NA	Continue to monitor
COTWD_E2 230kV	COTWD_F2 SECTION 2F & COTWD_E2 SECTION 2E 230KV	P2-4	Bus Tie Breaker	0.87	0.90	0.94	NA	NA	NA	0.98	1.06	0.90	1.05	0.90	NA	NA	System adjustments or voltage support if needed
CASCADE 115kV	COTWDPGE - 2D 115KV & CASCADE-COTTONWOOD LINE	P2-3	Non-Bus Tie Breaker	0.87	>0.9	>0.9	NA	NA	NA	1.11	>0.9	>0.9	>0.9	1.03	NA	NA	System adjustments or voltage support if needed
HONCUT 115kV	FORBSTWN-PALERMO 115KV & PALERMO230/115KVTB2	P6	N-1-1	0.89	>0.9	>0.9	NA	NA	NA	>0.9	>0.9	>0.9	>0.9	>0.9	NA	NA	- South of Palermo 115 kV Reinforcement Project - Expected ISD: Nov. 2022 - Short term: Action Plan
PALERMO 115kV				0.89	>0.9	>0.9	NA	NA	NA	>0.9	>0.9	>0.9	>0.9	>0.9	NA	NA	
WYANDTTE 115kV				0.88	>0.9	>0.9	NA	NA	NA	>0.9	>0.9	>0.9	>0.9	>0.9	NA	NA	
KESWICK 60kV	KESWICK-CASCADE 60KV (CASCADE-STLLWATR)	P2-1	Line Section w/o Fault	0.87	0.84	0.94	NA	NA	NA	0.97	1.05	0.84	1.06	0.93	NA	NA	Disable automatics
STLLWATR 60kV				0.85	0.81	0.92	NA	NA	NA	0.96	1.06	0.81	1.07	0.91	NA	NA	Disable automatics
KESWICK 60kV	KESWICK-CASCADE 60KV MOAS OPENED ON CASCADE_STLLWATR	P1-2	N-1	0.87	0.84	0.94	NA	NA	NA	0.97	1.05	0.84	1.06	0.93	NA	NA	Disable automatics
STLLWATR 60kV				0.85	0.81	0.92	NA	NA	NA	0.96	1.06	0.81	1.07	0.91	NA	NA	
PEACHTON 60kV	P7-1:A3:15_Palermo-Pease 115 kV Line and Pease-Rio Oso 115 kV Line	P7-1	DCTL	0.69	0.99	0.98	NA	NA	NA	0.92	1.03	0.99	1.03	0.95	NA	NA	- East Marysivlle 115/60 kV Project - Expected ISD: Dec. 2022
TBLE MTN 60kV				0.88	1.01	1.00	NA	NA	NA	1.00	1.03	1.01	1.03	0.98	NA	NA	

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Low Voltages

Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)								Voltage PU (Sensitivity Scenarios)					Project & Potential Mitigation Solutions
				2022 Summer Peak	2025 Summer Peak	2030 Summer Peak	2022 Winter Peak	2025 Winter Peak	2030 Winter Peak	2022 Spring Off-Peak	2025 Spring Off-Peak	2025 SP High CEC Forecast	2025 SpOP Hi Renew & Min Gas Gen	2022 SP Heavy Renewable & Min Gas Gen	2030 Retirement of QF Generations	2030 Summer Peak w/o Facility Rerates	
TRES VIS 60kV	Fuse Kic 030 115 kV Line			0.78	1.00	0.98	NA	NA	NA	0.96	1.03	1.00	1.03	0.97	NA	NA	- Short term: Action Plan
SYCAMORE 115kV	P7-1:A3:4_Sycamore Creek-Notre Dame-Table Mountain and Table Mountain-Butte No.2 115 kV Lines	P7-1	DCTL	0.95	0.93	0.90	NA	NA	NA	1.03	1.07	0.93	1.08	1.00	NA	NA	Table Mountain SPS Recommneded in 2017-2018 TPP
HONCUT 115kV	PALERMO 230/115KV TB 2 & FORBSTWN-PALERMO115KV	P6	N-1-1	0.89	>0.9	>0.9	NA	NA	NA	>0.9	>0.9	>0.9	>0.9	>0.9	NA	NA	- South of Palermo 115 kV Reinforcement Project - Expected ISD: Nov. 2022 - Short term: Action Plan
PALERMO 115kV				0.89	>0.9	>0.9	NA	NA	NA	>0.9	>0.9	>0.9	>0.9	>0.9	NA	NA	
WYANDTTE 115kV				0.88	>0.9	>0.9	NA	NA	NA	>0.9	>0.9	>0.9	>0.9	>0.9	NA	NA	
WYANDTTE 115kV	PALERMO 230/115KV TB 2 & PALERMO-NICOLAUS 115KV MOAS OPENED ON PALERMO_E.MRYJ2	P6	N-1-1	>0.9	>0.9	0.89	NA	NA	NA	>0.9	>0.9	>0.9	>0.9	>0.9	NA	NA	Continue to monitor
FORBSTWN 115kV	PALERMO-NICOLAUS 115KV MOAS OPENED ON PALERMO_E.MRY J2 & PALERMO230/115KVTB2	P6	N-1-1	>0.9	>0.9	0.90	NA	NA	NA	>0.9	>0.9	>0.9	>0.9	>0.9	NA	NA	Continue to monitor
OWID 115kV				>0.9	>0.9	0.90	NA	NA	NA	>0.9	>0.9	>0.9	>0.9	>0.9	NA	NA	Continue to monitor
PALERMO 115kV				>0.9	>0.9	0.90	NA	NA	NA	>0.9	>0.9	>0.9	>0.9	>0.9	NA	NA	Continue to monitor
WYANDTTE 115kV				>0.9	>0.9	0.89	NA	NA	NA	>0.9	>0.9	>0.9	>0.9	>0.9	NA	NA	Continue to monitor
NORD 1 115kV	SYCAMORE CREEK-NOTRE DAME-TABLE MTN 115KV & BUTTE-CHICOB-TBLEMTN115KV	P6	N-1-1	>0.9	>0.9	0.90	NA	NA	NA	>0.9	>0.9	>0.9	>0.9	>0.9	NA	NA	Continue to monitor
SYCAMORE 115kV				>0.9	>0.9	0.88	NA	NA	NA	>0.9	>0.9	>0.9	>0.9	>0.9	NA	NA	Continue to monitor
SYCAMORE 115kV	SYCAMORE CREEK-NOTRE DAME-TABLE MTN 115KV & TABLEMTN-BUTTE#2115KV	P6	N-1-1	>0.9	>0.9	0.90	NA	NA	NA	>0.9	>0.9	>0.9	>0.9	>0.9	NA	NA	Continue to monitor
SYCAMORE 115kV	TABLE MTN-BUTTE #2 115KV & SYCAMORECREEK-NOTREDAME-TABLEMTN115KV	P6	N-1-1	>0.9	>0.9	0.90	NA	NA	NA	>0.9	>0.9	>0.9	>0.9	>0.9	NA	NA	Continue to monitor
CANAL TP 60kV	TYLER SVD=V	P1-4	N-1	>0.9	1.03	0.89	NA	NA	NA	>0.9	1.03	1.03	1.04	>0.9	NA	NA	Continue to monitor
CR CANAL 60kV				>0.9	1.03	0.89	NA	NA	NA	>0.9	1.03	1.03	1.04	>0.9	NA	NA	
NEO REDT 60kV				>0.9	1.03	0.89	NA	NA	NA	>0.9	1.03	1.03	1.04	>0.9	NA	NA	
TYLER 60kV				>0.9	1.03	0.89	NA	NA	NA	>0.9	1.03	1.03	1.04	>0.9	NA	NA	

2020-2021 ISO Reliability Assessment - Study Results

Study Area: PG&E North Valley

Voltage Deviation

California ISO

Substation	Contingency (All and Worst P3)	Category	Category Description	Post Cont. Voltage Deviation % (Baseline Scenarios)								Post Cont. Voltage Deviation % (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2022 Summer Peak	2025 Summer Peak	2030 Summer Peak	2022 Winter Peak	2025 Winter Peak	2030 Winter Peak	2022 Spring Off-Peak	2025 Spring Off-Peak	2025 SP High CEC Forecast	2025 SpOP Hi Renew & Min Gas Gen	2022 SP Heavy Renewable & Min Gas Gen	2030 Retirement of QF Generation	
FRNCHGLH 60kV	KESWICK-CASCADE 60KV	P1	N-1	8	11	5	NA	NA	NA	2	-3	11	-3	5	NA	Disable automatics
KESWICK 60kV	KESWICK-CASCADE 60KV	P1	N-1	13	17	7	NA	NA	NA	4	-4	17	-5	9	NA	Disable automatics
STLLWATR 60kV	KESWICK-CASCADE 60KV	P1	N-1	15	19	8	NA	NA	NA	4	-5	20	-5	10	NA	Disable automatics
WHITMORE 60kV	CASCADE-BENTON-DESCHUTES 60KV	P1	N-1	2	3	2	NA	NA	NA	-3	-6	3	-8	2	NA	Sensitivity only
CEDR CRK 60kV	CASCADE-BENTON-DESCHUTES 60KV	P1	N-1	2	3	2	NA	NA	NA	-3	-6	3	-8	2	NA	Sensitivity only
DESCHUTS 60kV	CASCADE-BENTON-DESCHUTES 60KV	P1	N-1	2	3	3	NA	NA	NA	-3	-6	3	-8	2	NA	Sensitivity only
KILARC 60kV	CASCADE-BENTON-DESCHUTES 60KV	P1	N-1	2	3	2	NA	NA	NA	-3	-6	3	-8	2	NA	Sensitivity only
RED BLFF 60kV	COTTONWOOD-RED BLUFF 60KV	P1	N-1	10	4	8	NA	NA	NA	2	-3	4	-3	5	NA	- Red Bluff - Coleman 60 kV Line upgrade project (ISD: July 2023) addreses near term issue - Continue to monitor the long term issue
OWID 115kV	PALERMO 230/115KV TB 2	P1	N-1	4	4	8	NA	NA	NA	-1	-7	4	-7	3	NA	Continue to monitor
FORBSTWN 115kV	PALERMO 230/115KV TB 2	P1	N-1	4	3	8	NA	NA	NA	-1	-7	3	-7	2	NA	Continue to monitor
WYANDTTE 115kV	PALERMO 230/115KV TB 2	P1	N-1	6	5	8	NA	NA	NA	-1	-7	5	-7	4	NA	Continue to monitor
PALERMO 115kV	PALERMO 230/115KV TB 2	P1	N-1	5	5	8	NA	NA	NA	-1	-7	5	-7	4	NA	Continue to monitor
NEO REDT 60kV	NEO REDT 60/13.8KV TB 1	P1	N-1	12	1	0	NA	NA	NA	6	0	1	0	0	NA	- Tyler 60 kV Shunt Capacitor Project - Expected ISD: Dec. 2022 - Short term: Action Plan
CR CANAL 60kV	NEO REDT 60/13.8KV TB 1	P1	N-1	11	1	0	NA	NA	NA	6	0	1	0	0	NA	- Tyler 60 kV Shunt Capacitor Project - Expected ISD: Dec. 2022 - Short term: Action Plan
TYLER 60kV	NEO REDT 60/13.8KV TB 1	P1	N-1	11	1	0	NA	NA	NA	6	0	1	0	0	NA	- Tyler 60 kV Shunt Capacitor Project - Expected ISD: Dec. 2022 - Short term: Action Plan
NEO REDT 60kV	TYLER SVD=V	P1	N-1	NA	0	10	NA	NA	NA	NA	0	0	0	NA	NA	Continue to monitor
CR CANAL 60kV	TYLER SVD=V	P1	N-1	NA	0	10	NA	NA	NA	NA	0	0	0	NA	NA	Continue to monitor
TYLER 60kV	TYLER SVD=V	P1	N-1	NA	0	10	NA	NA	NA	NA	0	0	0	NA	NA	Continue to monitor

2020-2021 ISO Reliability Assessment - Study Results

Study Area: PG&E North Valley

Transient Stability

Contingency	Category	Category Description	Transient Stability Performance					Potential Mitigation Solutions
			Baseline Scenarios			Sensitivity Scenarios		
			Select..	Select..	Select..	Select..	Select..	
In accordance with TPL-001-4- Requirement R2.6, this area relies on the past studies from the 2019-20 Transmission Planning Process for transient stability studies:								
http://www.caiso.com/Documents/AppendixC-BoardApprovedt2019-2020TransmissionPlan.pdf								

2020-2021 ISO Reliability Assessment - Study Results

Study Area: PG&E North Valley

Single Contingency Load Drop

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

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

2020-2021 ISO Reliability Assessment - Study Results

Study Area: PG&E North Valley

Single Source Substation with more than 100 MW Load

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

No single source substation with more than 100 MW

2020-2021 ISO Reliability Assessment - Study Results
Study Area: PG&E Central Valley
Thermal Overloads

California ISO

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

2020-2021 ISO Reliability Assessment - Study Results
Study Area: PG&E Central Valley
Thermal Overloads

California ISO

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

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

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

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

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California ISO

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

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California ISO

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

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Low Voltages

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

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Low Voltages

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

Study Area: PG&E Central Valley

Low Voltages

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

Study Area: PG&E Central Valley

Low Voltages

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

Study Area: PG&E Central Valley

Low Voltages

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

Study Area: PG&E Central Valley

Low Voltages

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

Study Area: PG&E Central Valley

Low Voltages

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

Study Area: PG&E Central Valley

Low Voltages

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

Study Area: PG&E Central Valley

Low Voltages

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

Study Area: PG&E Central Valley

Low Voltages

California ISO

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

Study Area: PG&E Central Valley

Low Voltages

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

Study Area: PG&E Central Valley

Low Voltages

Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)								Voltage PU (Sensitivity Scenarios)					Project & Potential Mitigation Solutions
				2022 Summer Peak	2025 Summer Peak	2030 Summer Peak	2022 Winter Peak	2025 Winter Peak	2030 Winter Peak	2022 Spring Off-Peak	2025 Spring Off-Peak	2025 SP High CEC Forecast	2025 SpOP Hi Renew & Min Gas Gen	2022 SP Heavy Renewable & Min Gas Gen	2030 Retirement of QF Generations	2030 Summer Peak w/o Facility Rerates	
RIO OSO 230kV				0.89	1.00	0.82	NA	NA	NA	0.94	1.06	0.91	1.08	0.15	NA	NA	Continue to monitor
ROCKLIN 60kV				0.99	1.01	0.89	NA	NA	NA	1.06	1.07	1.00	1.08	0.18	NA	NA	Continue to monitor
ROLLINS 60kV				1.01	1.00	0.86	NA	NA	NA	1.02	1.02	1.00	1.02	0.48	NA	NA	Continue to monitor
SHADYGLN 60kV				1.01	1.00	0.86	NA	NA	NA	1.02	1.02	1.00	1.02	0.47	NA	NA	Continue to monitor
SIERRAPI 60kV				0.99	1.01	0.86	NA	NA	NA	1.06	1.09	1.00	1.10	0.18	NA	NA	Continue to monitor
TAYLOR 60kV				0.99	1.01	0.89	NA	NA	NA	1.06	1.07	1.01	1.08	0.18	NA	NA	Continue to monitor
UCD_TP2 115kV				0.96	1.02	0.88	NA	NA	NA	1.03	1.05	1.01	1.05	0.18	NA	NA	Continue to monitor
WDLND_BM 115kV				0.95	1.02	0.88	NA	NA	NA	1.02	1.05	1.01	1.06	0.17	NA	NA	Continue to monitor
WEMR SWS 60kV				1.01	0.99	0.85	NA	NA	NA	1.03	1.04	0.99	1.03	0.47	NA	NA	Continue to monitor
WOODLD 115kV				0.94	1.02	0.88	NA	NA	NA	1.02	1.05	1.01	1.06	0.17	NA	NA	Continue to monitor
ZAMORA 115kV				0.94	1.02	0.88	NA	NA	NA	1.01	1.05	1.01	1.06	0.17	NA	NA	Continue to monitor
BRIGHTON 230kV	TESLA 230kV BUS E (FAILURE OF NON-REDUNDENT RELAY)	P5-5	Non-Redundant Relay	0.95	0.98	0.87	NA	NA	NA	1.00	1.04	0.98	0.03	1.04	NA	NA	Continue to monitor
ATLANTC 230kV	ATLANTIC-GOLD HILL 230KV & RIOOSO-ATLANTIC230KV	P6	N-1-1	0.89	>0.9	0.80	NA	NA	NA	>0.9	>0.9	>0.9	>0.9	>0.9	NA	NA	Continue to monitor
ATLANTI 60kV				>0.9	>0.9	0.77	NA	NA	NA	>0.9	>0.9	>0.9	>0.9	>0.9	NA	NA	Continue to monitor
ATLANTIC 115kV				>0.9	>0.9	0.82	NA	NA	NA	>0.9	>0.9	>0.9	>0.9	>0.9	NA	NA	Continue to monitor
DEL MAR 60kV				>0.9	>0.9	0.73	NA	NA	NA	>0.9	>0.9	>0.9	>0.9	>0.9	NA	NA	Continue to monitor
PLSNT GR 115kV				>0.9	>0.9	0.84	NA	NA	NA	>0.9	>0.9	>0.9	>0.9	>0.9	NA	NA	Continue to monitor
ROCKLIN 60kV				>0.9	>0.9	0.76	NA	NA	NA	>0.9	>0.9	>0.9	>0.9	>0.9	NA	NA	Continue to monitor
SIERRAPI 60kV				>0.9	>0.9	0.73	NA	NA	NA	>0.9	>0.9	>0.9	>0.9	>0.9	NA	NA	Continue to monitor
TAYLOR 60kV				>0.9	>0.9	0.76	NA	NA	NA	>0.9	>0.9	>0.9	>0.9	>0.9	NA	NA	Continue to monitor
ULTR-RCK 120.75kV				>0.9	>0.9	0.85	NA	NA	NA	>0.9	>0.9	>0.9	>0.9	>0.9	NA	NA	Continue to monitor
CH.STN 115kV	BELLOTA 230/115KV TB 1 & BELLOTA230/115KVTB2	P6	N-1-1	0.82	0.88	0.78	NA	NA	NA	>0.9	>0.9	>0.9	>0.9	>0.9	NA	NA	Operating procedure
CURTISS 115kV				0.84	0.89	0.80	NA	NA	NA	>0.9	>0.9	>0.9	>0.9	>0.9	NA	NA	Operating procedure
MELNS JB 115kV				0.84	0.89	0.80	NA	NA	NA	>0.9	>0.9	>0.9	>0.9	>0.9	NA	NA	Operating procedure
MELONES 115kV				0.80	0.86	0.77	NA	NA	NA	>0.9	>0.9	>0.9	>0.9	>0.9	NA	NA	Operating procedure
MI-WUK 115kV				0.88	>0.9	0.84	NA	NA	NA	>0.9	>0.9	>0.9	>0.9	>0.9	NA	NA	Operating procedure
PEORIA 115kV				0.81	0.87	0.78	NA	NA	NA	>0.9	>0.9	>0.9	>0.9	>0.9	NA	NA	Operating procedure
R.TRACK 115kV				0.80	0.86	0.76	NA	NA	NA	>0.9	>0.9	>0.9	>0.9	>0.9	NA	NA	Operating procedure
RVRBANK 115kV				0.59	0.75	0.54	NA	NA	NA	>0.9	>0.9	>0.9	>0.9	>0.9	NA	NA	Operating procedure
SPISONORA 115kV				0.84	0.89	0.80	NA	NA	NA	>0.9	>0.9	>0.9	>0.9	>0.9	NA	NA	Operating procedure
SPRNG GP 115kV				>0.9	>0.9	0.90	NA	NA	NA	>0.9	>0.9	>0.9	>0.9	>0.9	NA	NA	Operating procedure
TULLOCH 115kV				0.73	0.82	0.70	NA	NA	NA	>0.9	>0.9	>0.9	>0.9	>0.9	NA	NA	Operating procedure
VALLY HM 115kV				0.89	>0.9	0.86	NA	NA	NA	>0.9	>0.9	>0.9	>0.9	>0.9	NA	NA	Operating procedure
BRIGHTON 230kV	BELLOTA-LOCKFORD 230KV & LOCKEFORD-BELLOTA230KV	P6	N-1-1	>0.9	>0.9	0.86	NA	NA	NA	>0.9	>0.9	>0.9	>0.9	>0.9	NA	NA	Continue to monitor
DEL MAR 60kV	BRIGHTON 230/115KV TB 10 & BRIGHTON230/115KVTB9	P6	N-1-1	>0.9	>0.9	0.89	NA	NA	NA	>0.9	>0.9	>0.9	>0.9	>0.9	NA	NA	Continue to monitor
SIERRAPI 60kV				>0.9	>0.9	0.89	NA	NA	NA	>0.9	>0.9	>0.9	>0.9	>0.9	NA	NA	Continue to monitor
BRIGHTN 115kV				>0.9	>0.9	0.82	NA	NA	NA	>0.9	>0.9	>0.9	>0.9	>0.9	NA	NA	Continue to monitor
BRIGHTON 230kV				>0.9	>0.9	0.71	NA	NA	NA	>0.9	>0.9	>0.9	>0.9	>0.9	NA	NA	Continue to monitor
BRKR SLG 115kV				>0.9	>0.9	0.82	NA	NA	NA	>0.9	>0.9	>0.9	>0.9	>0.9	NA	NA	Continue to monitor
CAMPUS 115kV				>0.9	>0.9	0.82	NA	NA	NA	>0.9	>0.9	>0.9	>0.9	>0.9	NA	NA	Continue to monitor
DAVIS 115kV				>0.9	>0.9	0.82	NA	NA	NA	>0.9	>0.9	>0.9	>0.9	>0.9	NA	NA	Continue to monitor
DEEPWATR 115kV				>0.9	>0.9	0.82	NA	NA	NA	>0.9	>0.9	>0.9	>0.9	>0.9	NA	NA	Continue to monitor
GRAND IS 115kV				>0.9	>0.9	0.79	NA	NA	NA	>0.9	>0.9	>0.9	>0.9	>0.9	NA	NA	Continue to monitor
MOBILCHE 115kV				>0.9	>0.9	0.88	NA	NA	NA	>0.9	>0.9	>0.9	>0.9	>0.9	NA	NA	Continue to monitor
POST 115kV				>0.9	>0.9	0.83	NA	NA	NA	>0.9	>0.9	>0.9	>0.9	>0.9	NA	NA	Continue to monitor

Study Area: PG&E Central Valley

Low Voltages

Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)								Voltage PU (Sensitivity Scenarios)					Project & Potential Mitigation Solutions
				2022 Summer Peak	2025 Summer Peak	2030 Summer Peak	2022 Winter Peak	2025 Winter Peak	2030 Winter Peak	2022 Spring Off-Peak	2025 Spring Off-Peak	2025 SP High CEC Forecast	2025 SpOP Hi Renew & Min Gas Gen	2022 SP Heavy Renewable & Min Gas Gen	2030 Retirement of QF Generations	2030 Summer Peak w/o Facility Rerates	
Q653F 115kV				>0.9	>0.9	0.83	NA	NA	NA	>0.9	>0.9	>0.9	>0.9	>0.9	NA	NA	Continue to monitor
UCD_TP2 115kV				>0.9	>0.9	0.82	NA	NA	NA	>0.9	>0.9	>0.9	>0.9	>0.9	NA	NA	Continue to monitor
W.SCRMNO 115kV				>0.9	>0.9	0.83	NA	NA	NA	>0.9	>0.9	>0.9	>0.9	>0.9	NA	NA	Continue to monitor
WDLND_BM 115kV				>0.9	>0.9	0.87	NA	NA	NA	>0.9	>0.9	>0.9	>0.9	>0.9	NA	NA	Continue to monitor
WOODLD 115kV				>0.9	>0.9	0.87	NA	NA	NA	>0.9	>0.9	>0.9	>0.9	>0.9	NA	NA	Continue to monitor
CLRKSVLE 115kV	GOLDHILL 230/115KV TB 1 & GOLDHILL230/115KVTB2	P6	N-1-1	>0.9	>0.9	>0.9	NA	NA	NA	>0.9	>0.9	>0.9	>0.9	0.56	NA	NA	Sensitivity only
CPM 115kV				>0.9	>0.9	>0.9	NA	NA	NA	>0.9	>0.9	>0.9	>0.9	0.58	NA	NA	Sensitivity only
DIMOND_1 115kV				>0.9	>0.9	>0.9	NA	NA	NA	>0.9	>0.9	>0.9	>0.9	0.58	NA	NA	Sensitivity only
DIMOND_2 115kV				>0.9	>0.9	>0.9	NA	NA	NA	>0.9	>0.9	>0.9	>0.9	0.55	NA	NA	Sensitivity only
DMND SPR 115kV				>0.9	>0.9	>0.9	NA	NA	NA	>0.9	>0.9	>0.9	>0.9	0.55	NA	NA	Sensitivity only
ELDORAD 115kV				>0.9	>0.9	>0.9	NA	NA	NA	>0.9	>0.9	>0.9	>0.9	0.57	NA	NA	Sensitivity only
FLINT 115kV				>0.9	>0.9	>0.9	NA	NA	NA	>0.9	>0.9	>0.9	>0.9	0.62	NA	NA	Sensitivity only
GOLD HLL 60kV				>0.9	>0.9	>0.9	NA	NA	NA	>0.9	>0.9	>0.9	>0.9	0.61	NA	NA	Sensitivity only
GOLDHILL 115kV				>0.9	>0.9	>0.9	NA	NA	NA	>0.9	>0.9	>0.9	>0.9	0.58	NA	NA	Sensitivity only
HORSESHE 115kV				>0.9	>0.9	>0.9	NA	NA	NA	>0.9	>0.9	>0.9	>0.9	0.59	NA	NA	Sensitivity only
LIMESTNE 60kV				>0.9	>0.9	>0.9	NA	NA	NA	>0.9	>0.9	>0.9	>0.9	0.60	NA	NA	Sensitivity only
NEWCSTLE 115kV				>0.9	>0.9	>0.9	NA	NA	NA	>0.9	>0.9	>0.9	>0.9	0.61	NA	NA	Sensitivity only
SHPRING 115kV				>0.9	>0.9	>0.9	NA	NA	NA	>0.9	>0.9	>0.9	>0.9	0.55	NA	NA	Sensitivity only
SPICAMIN 115kV				>0.9	>0.9	>0.9	NA	NA	NA	>0.9	>0.9	>0.9	>0.9	0.57	NA	NA	Sensitivity only
APPLE HL 115kV				>0.9	>0.9	>0.9	NA	NA	NA	>0.9	>0.9	>0.9	>0.9	0.57	NA	NA	Sensitivity only
BRIGHTON 230kV	LOCKEFORD-BELLOTA 230KV & BELLOTA-LOCKFORD230KV	P6	N-1-1	>0.9	>0.9	0.86	NA	NA	NA	>0.9	>0.9	>0.9	>0.9	>0.9	NA	NA	Continue to monitor
DEL MAR 60kV	LOCKFORD-BRIGHTON 230KV & GOLDHILL-EIGHTMILEROAD230KV	P6	N-1-1	>0.9	>0.9	0.87	NA	NA	NA	>0.9	>0.9	>0.9	>0.9	>0.9	NA	NA	Continue to monitor
SIERRAPI 60kV				>0.9	>0.9	0.87	NA	NA	NA	>0.9	>0.9	>0.9	>0.9	>0.9	NA	NA	Continue to monitor
ALMENDRA 60kV	PALERMO-PEASE 115KV MOAS OPENED ON PALERMO_HONC JT1 & PEASE-RIOOSO115KVMOASOPENEDONOLIVHJ1_E.MRYJ1	P6	N-1-1	0.55	>0.9	>0.9	NA	NA	NA	>0.9	>0.9	>0.9	>0.9	>0.9	NA	NA	- East Marysville 115/60 kV Transformer Project - Expected ISD: Dec. 2022 - Short term: Action Plan
ENCINAL 60kV				0.59	>0.9	>0.9	NA	NA	NA	>0.9	>0.9	>0.9	>0.9	>0.9	NA	NA	- East Marysville 115/60 kV Transformer Project - Expected ISD: Dec. 2022 - Short term: Action Plan
GLEAF2 60kV				0.55	>0.9	>0.9	NA	NA	NA	>0.9	>0.9	>0.9	>0.9	>0.9	NA	NA	- East Marysville 115/60 kV Transformer Project - Expected ISD: Dec. 2022 - Short term: Action Plan
HARTER 60kV				0.56	>0.9	>0.9	NA	NA	NA	>0.9	>0.9	>0.9	>0.9	>0.9	NA	NA	- East Marysville 115/60 kV Transformer Project - Expected ISD: Dec. 2022 - Short term: Action Plan
LIVE OAK 60kV				0.61	>0.9	>0.9	NA	NA	NA	>0.9	>0.9	>0.9	>0.9	>0.9	NA	NA	- East Marysville 115/60 kV Transformer Project - Expected ISD: Dec. 2022 - Short term: Action Plan
MRYSVLLE 60kV				0.53	>0.9	>0.9	NA	NA	NA	>0.9	>0.9	>0.9	>0.9	>0.9	NA	NA	- East Marysville 115/60 kV Transformer Project - Expected ISD: Dec. 2022 - Short term: Action Plan
PEASE 115kV				0.51	>0.9	>0.9	NA	NA	NA	0.90	>0.9	>0.9	>0.9	>0.9	NA	NA	- East Marysville 115/60 kV Transformer Project - Expected ISD: Dec. 2022 - Short term: Action Plan
PEASETP 60kV				0.55	>0.9	>0.9	NA	NA	NA	>0.9	>0.9	>0.9	>0.9	>0.9	NA	NA	- East Marysville 115/60 kV Transformer Project - Expected ISD: Dec. 2022 - Short term: Action Plan

Study Area: PG&E Central Valley

Low Voltages

Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)								Voltage PU (Sensitivity Scenarios)					Project & Potential Mitigation Solutions
				2022 Summer Peak	2025 Summer Peak	2030 Summer Peak	2022 Winter Peak	2025 Winter Peak	2030 Winter Peak	2022 Spring Off-Peak	2025 Spring Off-Peak	2025 SP High CEC Forecast	2025 SpOP Hi Renew & Min Gas Gen	2022 SP Heavy Renewable & Min Gas Gen	2030 Retirement of QF Generations	2030 Summer Peak w/o Facility Rerates	
YCEC 60kV				0.57	>0.9	>0.9	NA	NA	NA	>0.9	>0.9	>0.9	>0.9	>0.9	NA	NA	- East Marysville 115/60 kV Transformer Project - Expected ISD: Dec. 2022 - Short term: Action Plan
YUBACITY 60kV				0.57	>0.9	>0.9	NA	NA	NA	>0.9	>0.9	>0.9	>0.9	>0.9	NA	NA	- East Marysville 115/60 kV Transformer Project - Expected ISD: Dec. 2022 - Short term: Action Plan
BOGUE 115kV	PEASE-RIO OSO 115KV MOAS OPENED ON OLIVH J1_E.MRY J1 (2) & BOGUE-RIOOSO115KV	P6	N-1-1	>0.9	>0.9	0.89	NA	NA	NA	>0.9	>0.9	>0.9	>0.9	>0.9	NA	NA	Continue to monitor
PENRYN 60kV	PLACER-GOLD HILL #1 115KV & PLACER-GOLDHILL#2115KV	P6	N-1-1	>0.9	>0.9	0.49	NA	NA	NA	>0.9	>0.9	>0.9	>0.9	>0.9	NA	NA	Continue to monitor
AUBURN 60kV				>0.9	>0.9	0.51	NA	NA	NA	>0.9	>0.9	>0.9	>0.9	>0.9	NA	NA	Continue to monitor
BELL PGE 115kV				>0.9	>0.9	0.51	NA	NA	NA	>0.9	>0.9	>0.9	>0.9	>0.9	NA	NA	Continue to monitor
BOWMN PH 60kV				>0.9	>0.9	0.71	NA	NA	NA	>0.9	>0.9	>0.9	>0.9	>0.9	NA	NA	Continue to monitor
BRNSWALT 115kV				>0.9	>0.9	0.81	NA	NA	NA	>0.9	>0.9	>0.9	>0.9	>0.9	NA	NA	Continue to monitor
BRUNSWCK 115kV				>0.9	>0.9	0.79	NA	NA	NA	>0.9	>0.9	>0.9	>0.9	>0.9	NA	NA	Continue to monitor
CHCGO PK 115kV				>0.9	>0.9	0.65	NA	NA	NA	>0.9	>0.9	>0.9	>0.9	>0.9	NA	NA	Continue to monitor
DRUM 60kV				>0.9	>0.9	0.68	NA	NA	NA	>0.9	>0.9	>0.9	>0.9	>0.9	NA	NA	Continue to monitor
DTCH FL1 115kV				>0.9	>0.9	0.68	NA	NA	NA	>0.9	>0.9	>0.9	>0.9	>0.9	NA	NA	Continue to monitor
DTCH FL2 115kV				>0.9	>0.9	0.75	NA	NA	NA	>0.9	>0.9	>0.9	>0.9	>0.9	NA	NA	Continue to monitor
HALSEY 60kV				>0.9	>0.9	0.51	NA	NA	NA	>0.9	>0.9	>0.9	>0.9	>0.9	NA	NA	Continue to monitor
HAYPRESS 60kV				>0.9	>0.9	0.71	NA	NA	NA	>0.9	>0.9	>0.9	>0.9	>0.9	NA	NA	Continue to monitor
HIGGINS 115kV				>0.9	>0.9	0.55	NA	NA	NA	>0.9	>0.9	>0.9	>0.9	>0.9	NA	NA	Continue to monitor
MTN_QUAR 60kV				>0.9	>0.9	0.50	NA	NA	NA	>0.9	>0.9	>0.9	>0.9	>0.9	NA	NA	Continue to monitor
PENRYN 60kV				>0.9	>0.9	0.48	NA	NA	NA	>0.9	>0.9	>0.9	>0.9	>0.9	NA	NA	Continue to monitor
PLACER 115kV				>0.9	>0.9	0.50	NA	NA	NA	>0.9	>0.9	>0.9	>0.9	>0.9	NA	NA	Continue to monitor
SPAULDNG 60kV				>0.9	>0.9	0.70	NA	NA	NA	>0.9	>0.9	>0.9	>0.9	>0.9	NA	NA	Continue to monitor
PLAINFLD 60kV	PLAINFLD SVD=V & VACA-DIX230/115KVTB3	P6	N-1-1	0.80	0.79	0.76	NA	NA	NA	>0.9	>0.9	0.78	>0.9	0.83	NA	NA	Under review
BRIGHTON 230kV	RIO OSO-KNIGHTLD-WOODLD 115KV & RIOOSO-BRIGHTON230KV	P6	N-1-1	>0.9	>0.9	0.89	NA	NA	NA	>0.9	>0.9	>0.9	>0.9	>0.9	NA	NA	Continue to monitor
BARRY 60kV	RIO OSO-NICOLAUS 115KV & PALERMO-NICOLAUS115KVMOASOPENEDONPALERMO_E.MRYJ2	P6	N-1-1	>0.9	>0.9	0.77	NA	NA	NA	>0.9	>0.9	>0.9	>0.9	>0.9	NA	NA	Continue to monitor
CATLETT 60kV				>0.9	>0.9	0.78	NA	NA	NA	>0.9	>0.9	>0.9	>0.9	>0.9	NA	NA	Continue to monitor
DIST1001 60kV				>0.9	>0.9	0.79	NA	NA	NA	>0.9	>0.9	>0.9	>0.9	>0.9	NA	NA	Continue to monitor
DIST1500 60kV				>0.9	>0.9	0.79	NA	NA	NA	>0.9	>0.9	>0.9	>0.9	>0.9	NA	NA	Continue to monitor
DST1001A 60kV				>0.9	>0.9	0.79	NA	NA	NA	>0.9	>0.9	>0.9	>0.9	>0.9	NA	NA	Continue to monitor
DST1001B 60kV				>0.9	>0.9	0.79	NA	NA	NA	>0.9	>0.9	>0.9	>0.9	>0.9	NA	NA	Continue to monitor
E.MRYSVE 115kV				>0.9	0.85	0.75	NA	NA	NA	>0.9	>0.9	0.85	>0.9	>0.9	NA	NA	Under review
E.NICOLS 115kV				>0.9	0.85	0.70	NA	NA	NA	>0.9	>0.9	0.85	>0.9	>0.9	NA	NA	Under review
KNTJALT 60kV				>0.9	>0.9	0.79	NA	NA	NA	>0.9	>0.9	>0.9	>0.9	>0.9	NA	NA	Continue to monitor
PLUMAS 60kV				>0.9	>0.9	0.74	NA	NA	NA	>0.9	>0.9	>0.9	>0.9	>0.9	NA	NA	Continue to monitor
TUDOR 60kV				>0.9	>0.9	0.78	NA	NA	NA	>0.9	>0.9	>0.9	>0.9	>0.9	NA	NA	Continue to monitor
WHEATLND 60kV				>0.9	>0.9	0.74	NA	NA	NA	>0.9	>0.9	>0.9	>0.9	>0.9	NA	NA	Continue to monitor
WHTLND1 60kV				>0.9	>0.9	0.74	NA	NA	NA	>0.9	>0.9	>0.9	>0.9	>0.9	NA	NA	Continue to monitor
WHTLNDAL 60kV				>0.9	>0.9	0.79	NA	NA	NA	>0.9	>0.9	>0.9	>0.9	>0.9	NA	NA	Continue to monitor
VACA-D&1 115kV	VACA-DIX 230/115KV TB 3 & VACA-SUISUN115KVMOASOPENEDONVACA-DIX_WEC	P6	N-1-1	>0.9	>0.9	>0.9	NA	NA	NA	>0.9	>0.9	>0.9	>0.9	0.90	NA	NA	Sensitivity only
WEC 115kV				>0.9	>0.9	>0.9	NA	NA	NA	>0.9	>0.9	>0.9	>0.9	0.90	NA	NA	Sensitivity only
JAMESN-A 115kV	VACA-DIX 230/115KV TB 3 & VACA-SUISUN115KVMOASOPENEDONVACA-	P6	N-1-1	>0.9	>0.9	>0.9	NA	NA	NA	>0.9	>0.9	>0.9	>0.9	0.90	NA	NA	Sensitivity only
SCHMLBCH 115kV				>0.9	>0.9	>0.9	NA	NA	NA	>0.9	>0.9	>0.9	>0.9	0.90	NA	NA	Sensitivity only

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Low Voltages

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

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Low Voltages

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

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Voltage Deviation

California ISO

Substation	Contingency (All and Worst P3)	Category	Category Description	Post Cont. Voltage Deviation % (Baseline Scenarios)								Post Cont. Voltage Deviation % (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2022 Summer Peak	2025 Summer Peak	2030 Summer Peak	2022 Winter Peak	2025 Winter Peak	2030 Winter Peak	2022 Spring Off-Peak	2025 Spring Off-Peak	2025 SP High CEC Forecast	2025 SpOP Hi Renew & Min Gas Gen	2022 SP Heavy Renewable & Min Gas Gen	2030 Retirement of QF Generation	
GRSS VLY 60kV	COLGATE-GRASS VALLEY 60KV	P1-2	N-1	2.1	6.7	16.2	NA	NA	NA	2.3	3.1	6.7	3.4	1.1	NA	Contionue to monitor
NEWMAN 60kV	CROWCREEK SS-NEWMAN 60KV	P1-2	N-1	3.9	5.8	11.2	NA	NA	NA	1.2	2.9	6.2	2.6	1.4	NA	Contionue to monitor
GUSTINE 60kV				3.0	5.0	10.4	NA	NA	NA	0.8	3.1	5.4	2.9	0.7	NA	Contionue to monitor
CISCOTAP 60kV	DRUM 115/115KV TB 1	P1-3	N-1	0.2	0.2	9.4	NA	NA	NA	1.0	0.0	0.2	0.0	0.2	NA	Contionue to monitor
TAMARACK 60kV				0.3	0.3	8.6	NA	NA	NA	1.2	0.1	0.3	0.1	0.4	NA	Contionue to monitor
CISCO GR 60kV				0.2	0.2	9.4	NA	NA	NA	1.0	0.0	0.2	0.0	0.2	NA	Contionue to monitor
CAPEHORN 60kV				-1.1	-1.0	18.2	NA	NA	NA	-3.6	-2.6	-1.0	-2.8	-2.9	NA	Contionue to monitor
ENVRO_HY 60kV				-0.3	-0.8	20.0	NA	NA	NA	0.1	0.0	-1.0	-0.4	-2.9	NA	Contionue to monitor
SPAULDNG 60kV				-0.9	-0.5	14.4	NA	NA	NA	-1.0	-1.2	-0.5	-1.3	-1.2	NA	Contionue to monitor
DRUM 60kV				-2.9	-1.8	16.5	NA	NA	NA	-3.9	-3.5	-1.7	-3.6	-4.0	NA	Contionue to monitor
BONNIE N 60kV				-2.3	-1.5	17.1	NA	NA	NA	-3.8	-3.2	-1.5	-3.4	-3.6	NA	Contionue to monitor
ROLLINS 60kV				-0.8	-0.8	18.2	NA	NA	NA	-3.5	-2.5	-0.9	-2.6	-2.7	NA	Contionue to monitor
WEMR SWS 60kV				-0.8	-0.9	18.6	NA	NA	NA	0.1	0.0	-1.0	-0.4	-2.9	NA	Contionue to monitor
SHADYGLN 60kV				-1.0	-0.9	18.3	NA	NA	NA	-3.5	-2.6	-1.0	-2.8	-2.9	NA	Contionue to monitor
FORST HL 60kV				-0.5	-0.9	20.0	NA	NA	NA	0.1	0.0	-1.0	-0.4	-2.9	NA	Contionue to monitor
OXBOW 60kV				-0.3	-0.8	20.0	NA	NA	NA	0.1	0.0	-1.0	-0.4	-2.9	NA	Contionue to monitor
BOWMN PH 60kV				-0.4	-0.2	14.4	NA	NA	NA	-0.9	-0.4	-0.2	-0.4	-0.8	NA	Contionue to monitor
HAYPRESS 60kV				-0.4	-0.2	14.4	NA	NA	NA	-0.9	-0.4	-0.2	-0.4	-0.8	NA	Contionue to monitor
WESTLEY 60kV	KASSON 115/60KV TB 1	P1-3	N-1	14.5	15.5	15.0	NA	NA	NA	0.7	0.8	16.2	1.5	10.6	NA	System adjustments or voltage support if needed
E.NICOLS 115kV	RIO OSO-NICOLAUS 115KV	P1-2	N-1	0.2	2.1	11.8	NA	NA	NA	1.2	-3.8	2.2	-4.3	-1.9	NA	Contionue to monitor
PLUMAS 60kV		P1-2	N-1	0.2	2.1	8.1	NA	NA	NA	1.1	-3.4	2.2	-3.8	-1.9	NA	Contionue to monitor
WHEATLND 60kV		P1-2	N-1	0.2	2.2	8.0	NA	NA	NA	0.7	-2.2	2.3	-2.5	-2.0	NA	Contionue to monitor
CROWCREEK SS 60kV	SALADO-CROWCREEK SS 60KV	P1-2	N-1	6.8	10.2	17.6	NA	NA	NA	2.6	2.0	11.1	2.2	-0.8	NA	System adjustments or voltage support if needed
FRONTIERPV 60kV				6.8	10.2	17.6	NA	NA	NA	2.6	2.0	11.1	2.2	-0.8	NA	System adjustments or voltage support if needed
NEWMAN 60kV				4.3	6.6	10.8	NA	NA	NA	1.5	2.5	7.4	3.0	-0.1	NA	Contionue to monitor
GUSTINE 60kV				4.7	7.4	12.8	NA	NA	NA	1.7	2.5	8.3	3.0	-0.2	NA	Contionue to monitor
NEWMAN 60kV	SALADO-NEWMAN #2 60KV MOAS OPENED ON CRWS LDG_CRWS LDJ	P1-2	N-1	4.7	6.0	11.0	NA	NA	NA	1.3	0.3	6.2	-0.1	1.0	NA	Contionue to monitor
GUSTINE 60kV				4.3	5.5	10.0	NA	NA	NA	1.2	0.3	5.7	-0.1	1.0	NA	Contionue to monitor
POST 115kV	WEST SACRAMENTO-BRIGHTON 115KV	P1-2	N-1	8.1	6.0	8.4	NA	NA	NA	3.1	2.8	6.2	2.4	4.5	NA	System adjustments or voltage support if needed
W.SCRMNO 115kV				8.0	5.7	8.3	NA	NA	NA	3.1	2.7	6.0	2.3	4.3	NA	Contionue to monitor
DEEPWATR 115kV				8.2	5.9	8.5	NA	NA	NA	3.1	2.8	6.2	2.4	4.6	NA	System adjustments or voltage support if needed
GRSS VLY 60kV	ROLLINSF 6.60KV GEN UNIT 1 & COLGATE-GRASSVALLEY60KV	P3	N-G-1	<8	12.5	17.4	NA	NA	NA	<8	<8	12.6	<8	<8	NA	System adjustments or voltage support if needed
WESTLEY 60kV	CH.STN. 12.47KV GEN UNIT 1 & KASSON115/60KVTB1	P3	N-G-1	15.3	15.9	15.2	NA	NA	NA	<8	<8	<8	<8	<8	NA	System adjustments or voltage support if needed
BELL PGE 115kV	CHI.PARK 11.50KV GEN UNIT 1 & BELL-			<8	<8	16.9	NA	NA	NA	<8	<8	<8	<8	<8	NA	Contionue to monitor
HIGGINS 115kV				<8	<8	15.6	NA	NA	NA	<8	<8	<8	<8	<8	NA	Contionue to monitor
CHCGO PK 115kV				<8	<8	13.0	NA	NA	NA	<8	<8	<8	<8	<8	NA	Contionue to monitor
DTCH FL1 115kV				<8	<8	12.1	NA	NA	NA	<8	<8	<8	<8	<8	NA	Contionue to monitor
FORST HL 60kV				<8	<8	11.6	NA	NA	NA	<8	<8	<8	<8	<8	NA	Contionue to monitor
ENVRO_HY 60kV				<8	<8	11.5	NA	NA	NA	<8	<8	<8	<8	<8	NA	Contionue to monitor
OXBOW 60kV				<8	<8	11.5	NA	NA	NA	<8	<8	<8	<8	<8	NA	Contionue to monitor
SPAULDNG 60kV				<8	<8	11.4	NA	NA	NA	<8	<8	<8	<8	<8	NA	Contionue to monitor

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Voltage Deviation

Substation	Contingency (All and Worst P3)	Category	Category Description	Post Cont. Voltage Deviation % (Baseline Scenarios)								Post Cont. Voltage Deviation % (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2022 Summer Peak	2025 Summer Peak	2030 Summer Peak	2022 Winter Peak	2025 Winter Peak	2030 Winter Peak	2022 Spring Off-Peak	2025 Spring Off-Peak	2025 SP High CEC Forecast	2025 SpOP Hi Renew & Min Gas Gen	2022 SP Heavy Renewable & Min Gas Gen	2030 Retirement of QF Generation	
WEMR SWS 60kV	PLACER115KVMOASOPENEDONPLACER_BELLPGE	P3	N-G-1	<8	<8	11.3	NA	NA	NA	<8	<8	<8	<8	<8	NA	Contionue to monitor
BOWMN PH 60kV				<8	<8	11.2	NA	NA	NA	<8	<8	<8	<8	<8	NA	Contionue to monitor
HAYPRESS 60kV				<8	<8	11.2	NA	NA	NA	<8	<8	<8	<8	<8	NA	Contionue to monitor
COLFAXJT 60kV				<8	<8	11.2	NA	NA	NA	<8	<8	<8	<8	<8	NA	Contionue to monitor
SHADYGLN 60kV				<8	<8	11.2	NA	NA	NA	<8	<8	<8	<8	<8	NA	Contionue to monitor
CAPEHORN 60kV				<8	<8	11.2	NA	NA	NA	<8	<8	<8	<8	<8	NA	Contionue to monitor
ROLLINS 60kV				<8	<8	11.2	NA	NA	NA	<8	<8	<8	<8	<8	NA	Contionue to monitor
BONNIE N 60kV				<8	<8	10.8	NA	NA	NA	<8	<8	<8	<8	<8	NA	Contionue to monitor
DRUM 115kV				<8	<8	10.7	NA	NA	NA	<8	<8	<8	<8	<8	NA	Contionue to monitor

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Transient Stability

Contingency	Category	Category Description	Transient Stability Performance					Potential Mitigation Solutions
			Baseline Scenarios			Sensitivity Scenarios		
			Select..	Select..	Select..	Select..	Select..	
In accordance with TPL-001-4- Requirement R2.6, this area relies on the past studies from the 2019-20 Transmission Planning Process for transient stability studies:								
http://www.caiso.com/Documents/AppendixC-BoardApprovedt2019-2020TransmissionPlan.pdf								

2020-2021 ISO Reliability Assessment - Study Results

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

2020-2021 ISO Reliability Assessment - Study Results

Study Area: PG&E Central Valley

Single Source Substation with more than 100 MW Load

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

No single source substation with more than 100 MW

2020-2021 ISO Reliability Assessment - Study Results
Study Area: PG&E Greater Bay Area
Thermal Overloads

California ISO

Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading % (Baseline Scenarios)								Loading % (Sensitivity Scenarios)					Project & Potential Mitigation Solutions
				2022 Summer Peak	2025 Summer Peak	2030 Summer Peak	2022 Winter Peak	2025 Winter Peak	2030 Winter Peak	2022 Spring Off-Peak	2025 Spring Off-Peak	2025 SP High CEC Forecast	2025 SpOP Hi Renew & Min Gas Gen	2022 SP Heavy Renewable & Min Gas Gen	2030-Summer Peak-High SVP	2030 Summer Peak w/o Facility Rerates	
Bair 115/60kV Transformer #1	CLY LND 115/60KV TB 1 & CLY LND2 115/60KV TB 2	P6	N-1-1	<100	139	157	<100	146	162	<100	<100	142	<100	111	<100	<100	Operating solution as recommended in 2018-2019 TP.
Bair-Cooley Landing #1 60kV Line	CLY LND 115/60KV TB 1 & CLY LND2 115/60KV TB 2	P6	N-1-1	<100	124	142	<100	114	133	<100	<100	125	<100	92	<100	<100	Operating solution as recommended in 2018-2019 TP.
Bair-Cooley Landing #2 60kV Line	CLY LND 115/60KV TB 1 & CLY LND2 115/60KV TB 2	P6	N-1-1	<100	106	119	<100	84	92	<100	<100	107	<100	88	<100	87	Operating solution as recommended in 2018-2019 TP.
Birds Landing - Contra Costa PP 230 kV Line	BIRDS LANDING SW STA-CONTRA COSTA SUB 230kV [6161]	P1	N-1	50	62	62	1	2	3	70	24	55	52	101	69	63	Sensitivity only
Birds Landing - Contra Costa Sub 230 kV Line	C.COSTAPPD 230kV Section 1D	P2	Bus/Breaker	85	96	97	6	6	36	63	21	89	48	90	Diverge	97	Sensitivity only
Cayetano-Lone Tree (Lone Tree-USWP) 230kV Line	Normal	P0	N-0	<100	<100	95	<100	<100	55	<100	<100	<100	<100	<100	103	113	Sensitivity only
Cayetano-Lone Tree (Lone Tree-USWP) 230kV Line	CONTRA COSTA-LAS POSITAS 230kV [4510]	P1	N-1	87	95	99	42	44	61	44	18	97	20	71	107	117	Sensitivity only
Cayetano-Lone Tree (Lone Tree-USWP) 230kV Line	LAS POSITAS-NEWARK 230kV [4980]	P1	N-1	81	88	92	37	40	56	39	17	91	18	66	100	109	Sensitivity only
Cayetano-Lone Tree (Lone Tree-USWP) 230kV Line	PPASSJCT-NEWARK E #2 230kV [0]	P1	N-1	80	87	92	39	42	56	44	17	90	17	69	100	109	Sensitivity only
Cayetano-Lone Tree (Lone Tree-USWP) 230kV Line	ROSSMOOR-MORAGA-C.COSTAPPE 230kV [0]	P1	N-1	78	86	91	39	41	56	40	18	89	18	64	98	107	Sensitivity only
Cayetano-Lone Tree (Lone Tree-USWP) 230kV Line	TESLA-NEWARK #1 230kV [5720]	P1	N-1	80	86	92	41	44	57	46	21	89	20	70	100	108	Sensitivity only
Cayetano-Lone Tree (Lone Tree-USWP) 230kV Line	C.COSTAPPD Section 1D & C.COSTAPPE Section 1E 230kV	P2	Bus/Breaker	136	Diverge	128	107	107	124	7	5	136	5	41	Diverge	151	Redispatch Generation/ Propose Operating Solution/Capital Project
Cayetano-Lone Tree (Lone Tree-USWP) 230kV Line	C.COSTAPPE - 1E 230kV & ROSSMOOR-MORAGA-C.COSTAPPE line	P2	Bus/Breaker	136	120	128	107	107	124	7	5	136	5	41	Diverge	151	Redispatch Generation/ Propose Operating Solution/Capital Project
Cayetano-Lone Tree (Lone Tree-USWP) 230kV Line	C.COSTAPPE 230kV Section 1E	P2	Bus/Breaker	136	120	128	107	107	124	7	5	136	5	41	Diverge	151	Redispatch Generation/ Propose Operating Solution/Capital Project
Cayetano-Lone Tree (Lone Tree-USWP) 230kV Line	C.COSTAPPE Section 1E & C.COSTAPPF Section 1F 230kV	P2	Bus/Breaker	136	120	128	107	107	124	7	5	136	5	41	Diverge	151	Redispatch Generation/ Propose Operating Solution/Capital Project
Cayetano-Lone Tree (Lone Tree-USWP) 230kV Line	C.COSTAPPF 230kV - Section 2F & 1F	P2	Bus/Breaker	<100	100	102	<100	41	63	<100	13	103	20	<100	110	121	Redispatch Generation/ Propose Operating Solution/Capital Project
Cayetano-Lone Tree (Lone Tree-USWP) 230kV Line	C.COSTAPPF 230kV Section 1F	P2	Bus/Breaker	<100	100	103	<100	42	63	<100	14	103	20	<100	111	122	Redispatch Generation/ Propose Operating Solution/Capital Project
Cayetano-Lone Tree (Lone Tree-USWP) 230kV Line	COYOTE SW STA (FAILURE OF NON-REDUNDENT RELAY)	P5	Non-Redundent Relay	76	83	87	37	40	54	37	18	86	18	60	Diverge	103	Sensitivity only
Cayetano-Lone Tree (Lone Tree-USWP) 230kV Line	EAST SHORE 230 KV BAAH BUS #1 (FAILURE OF NON-REDUNDENT RELAY)	P5	Non-Redundent Relay	77	84	88	39	40	55	36	15	87	15	59	Diverge	104	Sensitivity only
Cayetano-Lone Tree (Lone Tree-USWP) 230kV Line	LS PSTAS 230kV(FAILURE OF NON-REDUNDENT RELAY)	P5	Non-Redundent Relay	85	93	97	40	43	59	43	18	96	19	70	105	115	Sensitivity only
Cayetano-Lone Tree (Lone Tree-USWP) 230kV Line	MONTA VISTA 115KV BAAH BUS #1 (FAILURE OF NON-REDUNDENT RELAY)	P5	Non-Redundent Relay	75	82	87	38	40	54	39	17	85	17	62	Diverge	103	Sensitivity only
Cayetano-Lone Tree (Lone Tree-USWP) 230kV Line	MORAGA 230kV Bus #1 &2(FAILURE OF NON-REDUNDENT RELAY)	P5	Non-Redundent Relay	96	106	112	49	53	69	53	25	108	26	83	Diverge	133	Project: Moraga 230 kV bus upgrade In-service date: 2024
Cayetano-Lone Tree (Lone Tree-USWP) 230kV Line	ROSSMOOR 230kV (FAILURE OF NON-REDUNDENT RELAY)	P5	Non-Redundent Relay	78	85	90	38	41	56	40	18	88	18	64	97	106	Sensitivity only
Cayetano-Lone Tree (Lone Tree-USWP) 230kV Line	Contra Costa-Brentwood 230 kV and Contra Costa-Delta Switching Yard 230 kV lines	P7	DCTL	85	89	92	34	35	55	28	10	92	16	57	99	108	Sensitivity only
Cayetano-Lone Tree (Lone Tree-USWP) 230kV Line	Contra Costa-Moraga Nos. 1 & 2 230 kV lines	P7	DCTL	90	98	105	47	50	66	48	23	101	24	74	Diverge	124	Continue to monitor future load forecast
Cayetano-Lone Tree (Lone Tree-USWP) 230kV Line	Tesla - Newark No.2 and Metcalf - Los Esteros 230 kV lines	P7	DCTL	83	91	96	42	45	59	47	20	94	19	73	Diverge	113	Sensitivity only

2020-2021 ISO Reliability Assessment - Study Results
Study Area: PG&E Greater Bay Area
Thermal Overloads

California ISO

Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading % (Baseline Scenarios)								Loading % (Sensitivity Scenarios)					Project & Potential Mitigation Solutions
				2022 Summer Peak	2025 Summer Peak	2030 Summer Peak	2022 Winter Peak	2025 Winter Peak	2030 Winter Peak	2022 Spring Off-Peak	2025 Spring Off-Peak	2025 SP High CEC Forecast	2025 SpOP Hi Renew & Min Gas Gen	2022 SP Heavy Renewable & Min Gas Gen	2030-Summer Peak-High SVP	2030 Summer Peak w/o Facility Rerates	
Cayetano-Lone Tree (Lone Tree-USWP) 230kV Line	Tesla-Newark No.1 and Tesla-Ravenswood 230 kV lines	P7	DCTL	86	92	99	46	49	63	55	26	95	24	Diverge	Diverge	117	Sensitivity only
Cayetano-Lone Tree (USWP-Cayetano) 230kV Line	CONTRA COSTA-LAS POSITAS 230kV [4510]	P1	N-1	98	104	104	50	54	72	55	22	100	32	83	107	123	Redispatch Generation/ Propose Operating Solution/Capital Project
Cayetano-Lone Tree (USWP-Cayetano) 230kV Line	LAS POSITAS-NEWARK 230kV [4980]	P1	N-1	92	97	97	45	48	66	50	<100	93	30	78	100	114	Sensitivity only
Cayetano-Lone Tree (USWP-Cayetano) 230kV Line	PPASSJCT-NEWARK E #2 230kV [0]	P1	N-1	91	97	97	48	50	66	55	21	93	29	81	100	115	Sensitivity only
Cayetano-Lone Tree (USWP-Cayetano) 230kV Line	ROSSMOOR-MORAGA-C.COSTAPPE 230kV [0]	P1	N-1	89	95	95	47	50	67	51	21	91	30	76	98	113	Sensitivity only
Cayetano-Lone Tree (USWP-Cayetano) 230kV Line	TESLA-NEWARK #1 230kV [5720]	P1	N-1	90	95	96	49	53	68	57	25	92	32	82	100	114	Sensitivity only
Cayetano-Lone Tree (USWP-Cayetano) 230kV Line	C.COSTAPPD Section 1D & C.COSTAPPE Section 1E 230kV	P2	Bus/Breaker	148	Diverge	133	126	125	145	7	10	138	16	53	Diverge	157	Redispatch Generation/ Propose Operating Solution/Capital Project
Cayetano-Lone Tree (USWP-Cayetano) 230kV Line	C.COSTAPPE - 1E 230kV & ROSSMOOR-MORAGA-C.COSTAPPE line	P2	Bus/Breaker	148	129	133	126	125	145	7	10	138	16	53	Diverge	157	Redispatch Generation/ Propose Operating Solution/Capital Project
Cayetano-Lone Tree (USWP-Cayetano) 230kV Line	C.COSTAPPE 230kV Section 1E	P2	Bus/Breaker	148	129	133	126	125	145	7	10	138	16	53	Diverge	157	Redispatch Generation/ Propose Operating Solution/Capital Project
Cayetano-Lone Tree (USWP-Cayetano) 230kV Line	C.COSTAPPE Section 1E & C.COSTAPPF Section 1F 230kV	P2	Bus/Breaker	148	129	133	126	125	145	7	10	139	16	53	Diverge	157	Redispatch Generation/ Propose Operating Solution/Capital Project
Cayetano-Lone Tree (USWP-Cayetano) 230kV Line	C.COSTAPPF 230kV - Section 2F & 1F	P2	Bus/Breaker	106	109	107	48	49	75	43	17	105	32	75	110	127	Redispatch Generation/ Propose Operating Solution/Capital Project
Cayetano-Lone Tree (USWP-Cayetano) 230kV Line	C.COSTAPPF 230kV Section 1F	P2	Bus/Breaker	106	110	108	49	50	75	45	17	105	32	76	111	127	Redispatch Generation/ Propose Operating Solution/Capital Project
Cayetano-Lone Tree (USWP-Cayetano) 230kV Line	COYOTE SW STA (FAILURE OF NON-REDUNDENT RELAY)	P5	Non-Redundent Relay	87	92	92	46	48	64	47	21	88	30	71	Diverge	108	Sensitivity only
Cayetano-Lone Tree (USWP-Cayetano) 230kV Line	EAST SHORE 230 KV BAAH BUS #1 (FAILURE OF NON-REDUNDENT RELAY)	P5	Non-Redundent Relay	88	93	93	47	49	65	47	19	89	27	71	Diverge	110	Sensitivity only
Cayetano-Lone Tree (USWP-Cayetano) 230kV Line	LS PSTAS 230kV(FAILURE OF NON-REDUNDENT RELAY)	P5	Non-Redundent Relay	96	102	102	49	52	70	53	22	98	31	82	105	120	Continue to monitor future load forecast
Cayetano-Lone Tree (USWP-Cayetano) 230kV Line	MONTA VISTA 115KV BAAH BUS #1 (FAILURE OF NON-REDUNDENT RELAY)	P5	Non-Redundent Relay	86	92	92	46	48	64	50	21	88	29	74	Diverge	109	Sensitivity only
Cayetano-Lone Tree (USWP-Cayetano) 230kV Line	MORAGA 230kV Bus #1 &2(FAILURE OF NON-REDUNDENT RELAY)	P5	Non-Redundent Relay	107	115	117	59	63	82	64	29	111	38	95	Diverge	138	Project: Moraga 230 kV bus upgrade In-service date: 2024 Short term: Generation redispatch
Cayetano-Lone Tree (USWP-Cayetano) 230kV Line	ROSSMOOR 230kV (FAILURE OF NON-REDUNDENT RELAY)	P5	Non-Redundent Relay	89	94	95	46	49	66	50	21	91	30	76	98	112	Sensitivity only
Cayetano-Lone Tree (USWP-Cayetano) 230kV Line	Contra Costa-Brentwood 230 kV and Contra Costa-Delta Switching Yard 230 kV lines	P7	DCTL	96	99	96	42	43	66	39	14	95	28	68	99	114	Sensitivity only
Cayetano-Lone Tree (USWP-Cayetano) 230kV Line	Contra Costa-Moraga Nos. 1 & 2 230 kV lines	P7	DCTL	101	108	109	56	60	79	59	26	104	36	86	Diverge	129	Redispatch Generation/ Propose Operating Solution/Capital Project
Cayetano-Lone Tree (USWP-Cayetano) 230kV Line	Tesla - Newark No.2 and Metcalf - Los Esteros 230 kV lines	P7	DCTL	94	100	101	51	54	69	58	24	96	31	85	Diverge	119	Continue to monitor future load forecast
Cayetano-Lone Tree (USWP-Cayetano) 230kV Line	Tesla-Newark No.1 and Tesla-Ravenswood 230 kV lines	P7	DCTL	97	102	104	55	59	74	65	30	98	36	Diverge	Diverge	123	Sensitivity only
Cayetano-Lone Tree (USWP-Cayetano) 230kV Line	TESLA-RAVENSWOOD 230KV [5730] & CONTRA COSTA-LAS POSITAS 230kV [4510]	P6	N-1-1	100	100	100	<100	<100	80	<100	<100	100	<100	90	<100	101	Sensitivity only
Christie-Sobrante (Oleum-Sobrante) 115kV Line	Sobrante-G Nos. 1 & 2 115 kV lines	P7	DCTL	109	79	85	86	54	58	102	35	79	31	115	85	130	Project: Christie-Sobrante 115 kV reconductor project. In-service date: 12/22 Short term: Operating solution

2020-2021 ISO Reliability Assessment - Study Results
Study Area: PG&E Greater Bay Area
Thermal Overloads

California ISO

Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading % (Baseline Scenarios)								Loading % (Sensitivity Scenarios)					Project & Potential Mitigation Solutions
				2022 Summer Peak	2025 Summer Peak	2030 Summer Peak	2022 Winter Peak	2025 Winter Peak	2030 Winter Peak	2022 Spring Off-Peak	2025 Spring Off-Peak	2025 SP High CEC Forecast	2025 SpOP Hi Renew & Min Gas Gen	2022 SP Heavy Renewable & Min Gas Gen	2030-Summer Peak-High SVP	2030 Summer Peak w/o Facility Rerates	
Christie-Sobrante (Oleum-Sobrante) 115kV Line	SOBRANTE-G #1 115kV [3720] & SOBRANTE-G #2 115kV [3730]	P6	N-1-1	105	79	84	86	<100	<100	100	<100	79	<100	100	<100	<100	Project: Christie-Sobrante 115 kV reconductor project. In-service date: 12/22 Short term: Operating solution
Contra Costa-Contra Costa Sub 230kV Line	BIRDS LANDING SW STA-CONTRA COSTA PP 230kV [5830]	P1	N-1	47	60	55	8	9	8	74	35	50	65	108	64	56	Sensitivity only
Contra Costa-Contra Costa Sub 230kV Line	C.COSTAPPD 230kV Section 1D	P2	Bus/Breaker	89	102	98	2	3	37	67	32	92	62	98	Diverge	98	Redispatch Generation/ Propose Operating Solution/Capital Project
Contra Costa-Contra Costa Sub 230kV Line	C.COSTAPPD 230kV Section 2D	P2	Bus/Breaker	59	73	69	8	9	5	74	35	63	65	108	77	69	Sensitivity only
Contra Costa-Contra Costa Sub 230kV Line	C.COSTAPPD Section 2D & C.COSTAPPE Section 2E 230kV	P2	Bus/Breaker	50	<100	<100	14	<100	<100	69	<100	<100	<100	100	<100	<100	Sensitivity only
Contra Costa-Las Positas 230kV Line	C.COSTAPPE - 1E 230kV & ROSSMOOR-MORAGA-C.COSTAPPE line	P2	Bus/Breaker	98	106	106	38	39	67	50	21	101	35	73	Diverge	106	Redispatch Generation/ Propose Operating Solution/Capital Project
Contra Costa-Las Positas 230kV Line	C.COSTAPPE 230kV - Section 2E & 1E	P2	Bus/Breaker	104	112	112	43	44	73	50	21	107	35	76	Diverge	112	Redispatch Generation/ Propose Operating Solution/Capital Project
Contra Costa-Las Positas 230kV Line	C.COSTAPPE 230kV Section 1E	P2	Bus/Breaker	<100	106	106	<100	39	67	<100	21	101	35	<100	Diverge	106	Redispatch Generation/ Propose Operating Solution/Capital Project
Contra Costa-Las Positas 230kV Line	C.COSTAPPE Section 1E & C.COSTAPPF Section 1F 230kV	P2	Bus/Breaker	<100	106	106	<100	39	67	<100	21	101	35	<100	Diverge	106	Redispatch Generation/ Propose Operating Solution/Capital Project
Eastshore 230/115kV Transformer #1	E. SHORE 230kV - Middle Breaker Bay 3	P2	Bus/Breaker	100	<100	<100	85	<100	<100	23	<100	<100	<100	34	<100	<100	Project: East Shore 230 kV Bus Terminals Reconfiguration In-service date: 2024 Short term: Operating solution
Eastshore-San Mateo 230kV Line	RAVENSWOOD 115 (FAILURE OF NON-REDUNDENT RELAY)	P5	Non-Redundent Relay	74	75	77	65	62	66	39	37	75	37	Diverge	Diverge	77	Sensitivity only
El Patio-San Jose Sta. 'A' 115 kV Line	Metcalf - Evergreen #1 and #2 115 kV Lines	P7	DCTL	79	89	100	65	73	79	60	51	91	44	88	112	100	Sensitivity only
El Patio-San Jose Sta. 'A' 115 kV Line	Metcalf - Evergreen #1 and #2 115 kV Lines	P7	DCTL	79	89	100	65	73	79	60	51	91	44	88	112	100	Sensitivity only
Evergreen-Almaden 60 kV Line	Normal	P0	N-0	84	84	97	46	46	49	66	40	84	36	61	99	116	Sensitivity only
Evergreen-Almaden 60 kV Line	MONTA VISTA-LOS GATOS 60kV [7610]	P1	N-1	114	119	137	75	74	83	95	61	120	56	83	140	162	Disable automatics
Grant-Eastshore #1 115kV Line	EASTSHORE-SAN MATEO 230kV [4650]	P1	N-1	31	40	45	22	46	46	21	11	40	7	26	45	117	Sensitivity only
Grant-Eastshore #1 115kV Line	GRANT-EASTSHORE #2 115kV [1701]	P1	N-1	62	38	55	44	55	56	42	21	39	12	51	58	144	Sensitivity only
Jefferson-Hillsdale JCT 60kV Line	JEFFERSON 230 KV BAAH BUS #1 (FAILURE OF NON-REDUNDENT RELAY)	P5	Non-Redundent Relay	139	145	159	133	135	158	131	66	147	59	105	160	187	Project: Jefferson 230 kV bus upgrade project In-service date: 2024 Short term: Operating solution
Jefferson-Hillsdale JCT 60kV Line	JEFFERSON 230 KV BAAH BUS #2 (FAILURE OF NON-REDUNDENT RELAY)	P5	Non-Redundent Relay	142	147	162	135	137	160	131	67	149	60	107	164	191	Project: Jefferson 230 kV bus upgrade project In-service date: 2024 Short term: Operating solution
Jefferson-Hillsdale JCT 60kV Line	Monta Vista-Jefferson Nos. 1 & 2 230 kV lines	P7	DCTL	142	49	50	135	47	46	132	32	50	26	107	51	59	Project: Jefferson 230 kV bus upgrade project In-service date: 2024 Short term: Operating solution
Kifer-FMC 115 kV Line	NRS 400 115 kV bus tie breaker to NRS 300 115 kV bus	P2	Bus/Breaker	73	73	79	67	69	73	14	22	73	20	76	Diverge	94	Project: SVP breaker upgrade project
Lakewood Bus Tie	PITSBURG 115kV - Section 2E & 2D	P2	Bus/Breaker	101	97	145	58	58	71	60	26	98	22	73	Diverge	145	Pittsburg-Lakewood RAS
Lakewood Bus Tie	PITSBURG 115kV Section 2E	P2	Bus/Breaker	101	97	145	58	58	71	60	26	98	22	73	Diverge	145	Pittsburg-Lakewood RAS
Lakewood-Clayton 115kV Line	PITSBURG 115kV - Section 2E & 2D	P2	Bus/Breaker	101	93	136	55	54	70	57	8	94	7	72	Diverge	136	Pittsburg-Lakewood RAS

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Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading % (Baseline Scenarios)								Loading % (Sensitivity Scenarios)					Project & Potential Mitigation Solutions
				2022 Summer Peak	2025 Summer Peak	2030 Summer Peak	2022 Winter Peak	2025 Winter Peak	2030 Winter Peak	2022 Spring Off-Peak	2025 Spring Off-Peak	2025 SP High CEC Forecast	2025 SpOP Hi Renew & Min Gas Gen	2022 SP Heavy Renewable & Min Gas Gen	2030-Summer Peak-High SVP	2030 Summer Peak w/o Facility Rerates	
Lakewood-Clayton 115kV Line	PITSBURG 115kV Section 2E	P2	Bus/Breaker	101	93	136	55	54	70	57	8	94	7	72	Diverge	136	Pittsburg-Lakewood RAS
Lakewood-Meadow Lane-Clayton 115kV Line	CLAYTON-MEADOW LANE 115kV [1270] & LAKEWOOD-CLAYTON 115kV [2082]	P6	N-1-1	100	100	103	76	75	74	75	<100	100	<100	81	<100	78	Existing Pittsburg-Lakewood RAS
Las Positas-Newark 230kV Line	C.COSTAPPE - 1E 230kV & ROSSMOOR-MORAGA-C.COSTAPPE line	P2	Bus/Breaker	131	144	141	20	22	58	52	27	135	52	98	Diverge	141	Redispatch Generation/ Propose Operating Solution/Capital Project
Las Positas-Newark 230kV Line	C.COSTAPPE 230kV - Section 2E & 1E	P2	Bus/Breaker	143	155	152	27	29	67	52	27	147	52	103	Diverge	152	Redispatch Generation/ Propose Operating Solution/Capital Project
Las Positas-Newark 230kV Line	C.COSTAPPE 230kV Section 1E	P2	Bus/Breaker	130	144	141	20	22	58	52	27	135	52	98	Diverge	141	Redispatch Generation/ Propose Operating Solution/Capital Project
Las Positas-Newark 230kV Line	C.COSTAPPE Section 1E & C.COSTAPPF Section 1F 230kV	P2	Bus/Breaker	130	144	141	20	22	58	52	27	135	52	98	Diverge	141	Redispatch Generation/ Propose Operating Solution/Capital Project
Las Positas-Newark 230kV Line	C.COSTAPPE Section 2E & C.COSTAPPF Section 2F 230kV	P2	Bus/Breaker	110	119	117	31	33	57	38	25	116	39	86	Diverge	117	Redispatch Generation/ Propose Operating Solution/Capital Project
Las Positas-Newark 230kV Line	C.COSTAPPF 230kV Section 1F	P2	Bus/Breaker	100	105	102	22	23	47	24	20	102	35	69	107	102	Redispatch Generation/ Propose Operating Solution/Capital Project
Las Positas-Newark 230kV Line	MORAGA 230kV Bus #1 &2(FAILURE OF NON-REDUNDENT RELAY)	P5	Non-Redundent Relay	100	111	113	31	35	54	48	30	108	42	93	Diverge	113	Project: Moraga 230 kV bus upgrade In-service date: 2024
Las Positas-Newark 230kV Line	Contra Costa-Moraga Nos. 1 & 2 230 kV lines	P7	DCTL	92	102	103	29	32	50	43	28	99	40	82	Diverge	103	Contra Coasta area generation redispatch
Los Esteros-Nortech 115 kV Line	SSS 230/230kV TB 1	P1	N-1	99	98	102	64	64	64	42	27	97	26	76	124	102	Under review for a potential project
Los Esteros-Nortech 115 kV Line	SSS-NRS 230 kV same as outage of SVP's PST or NRS T2	P1	N-1	100	98	102	65	64	64	42	25	97	24	76	125	102	Under review for a potential project
Los Esteros-Nortech 115 kV Line	LS ESTRS 230kV - Middle Breaker Bay 8	P2	Bus/Breaker	99	98	102	64	64	64	42	27	97	26	76	124	102	Under review for a potential project
Los Esteros-Nortech 115 kV Line	NRS 400 115 kV bus	P2	Bus/Breaker	106	107	111	67	67	68	44	26	106	25	84	139	111	Under review for a potential project
Los Esteros-Nortech 115 kV Line	Los Esteros - Trimble & Los Esteros - Montague 115 kV	P7	DCTL	85	84	88	45	44	45	17	25	82	26	52	110	89	Under review for a potential project
Los Esteros-Silicon Switching Station 230 kV Line	LOS ESTEROS 115KV BAAH BUS #2 (FAILURE OF NON-REDUNDENT RELAY)	P5	Non-Redundent Relay	96	94	97	90	88	88	88	80	96	79	94	Diverge	4	Sensitivity only
Los Esteros-Silicon Switching Station 230 kV Line	PALO ALTO SW. STA. 115KV DBDB BUS #1 (FAILURE OF NON-REDUNDENT RELAY)	P5	Non-Redundent Relay	98	102	105	92	94	94	91	84	103	84	96	Diverge	4	Protection upgrade
Loyola-Monta Vista 60 kV Line	Normal	P0	N-0	84	96	94	65	64	63	82	39	97	35	57	94	113	Sensitivity only
Metcalf 230/115 kV Trans No. 1	METCALF 230kV - Section 2D & 2E	P2	Bus/Breaker	97	98	116	83	83	78	110	33	102	22	113	119	5	Continue to monitor future load forecast
Metcalf 230/115 kV Trans No. 2	METCALF 230kV - Section 1D & 1E	P2	Bus/Breaker	92	92	108	80	78	73	98	32	95	23	97	Diverge	5	Continue to monitor future load forecast
Metcalf 230/115 kV Trans No. 3	METCALF 230kV - Section 2D & 2E	P2	Bus/Breaker	96	97	115	83	82	77	108	32	101	22	112	118	5	Continue to monitor future load forecast
Metcalf 230/115 kV Trans No. 4	METCALF 230kV - Section 1D & 1E	P2	Bus/Breaker	92	93	109	80	78	73	100	32	96	23	98	Diverge	5	Continue to monitor future load forecast
METCALF 500/230kV TB 13	METCALF 500/230kV TB 11& METCALF 500/230kV TB 12	P6	N-1-1	89	95	103	<100	<100	<100	100	<100	98	<100	100	<100	103	Long Term: Propose Capital Project; Short erm: Propose operating solutions
METCALF 500/230kV TB 12	METCALF 500/230kV TB 11& METCALF 500/230kV TB 13	P6	N-1-1	88	94	101	<100	<100	<100	100	<100	96	<100	100	<100	101	Long Term: Propose Capital Project; Short erm: Propose operating solutions
Metcalf-El Patio No. 1 115 kV Line	MTCALF D Section 2D & MTCALF E Section 2E 115kV	P2	Bus/Breaker	80	86	96	58	63	66	61	44	88	38	81	104	95	Sensitivity only

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				2022 Summer Peak	2025 Summer Peak	2030 Summer Peak	2022 Winter Peak	2025 Winter Peak	2030 Winter Peak	2022 Spring Off-Peak	2025 Spring Off-Peak	2025 SP High CEC Forecast	2025 SpOP Hi Renew & Min Gas Gen	2022 SP Heavy Renewable & Min Gas Gen	2030-Summer Peak-High SVP	2030 Summer Peak w/o Facility Rerates	
Metcalf-El Patio No. 1 115 kV Line	MTCALF D Section 2D & MTCALF E Section 2E 115kV	P2	Bus/Breaker	80	86	96	58	63	66	61	44	88	38	81	104	95	Sensitivity only
Metcalf-El Patio No. 2 115 kV Line	MTCALF D Section 1D & MTCALF E Section 1E 115kV	P2	Bus/Breaker	79	85	94	59	64	67	61	44	87	39	81	103	94	Sensitivity only
Metcalf-El Patio No. 2 115 kV Line	MTCALF D Section 1D & MTCALF E Section 1E 115kV	P2	Bus/Breaker	79	85	94	58	62	66	61	44	87	39	81	103	94	Sensitivity only
Monta Vista-Wolfe 115 kV Line	STELLING-MONTA VISTA 115kV [1000]	P1	N-1	89	99	112	56	60	67	77	37	99	31	63	112	112	Continue to monitor future load forecast
Moraga 230/115kV Transformer #1	MORAGA.D Section 2D & MORAGA.E Section 2E 115kV	P2	Bus/Breaker	<100	92	111	<100	79	88	<100	64	96	62	<100	111	5	Continue to monitor future load forecast
Moraga 230/115kV Transformer #3	MORAGA 230kV - Section 2D & 2E	P2	Bus/Breaker	<100	96	112	<100	83	90	<100	51	96	51	<100	113	4	Continue to monitor future load forecast
Moraga 230/115kV Transformer #3	MORAGA 230kV Section 2D	P2	Bus/Breaker	94	97	118	85	90	98	92	58	98	56	96	118	5	Continue to monitor future load forecast
Moraga-Lakewood 115kV Line (Lakewood Reactors)	PITSBG D 230kV - Section 2D & 1D	P2	Bus/Breaker	56	60	64	10	7	12	17	69	62	58	185	Diverge	64	Sensitivity only
Moraga-Lakewood 115kV Line (Lakewood Reactors)	PITSBG D 230kV Section 1D	P2	Bus/Breaker	19	19	19	48	34	49	65	101	16	92	Diverge	14	19	Sensitivity only
Moraga-Lakewood 115kV Line (Lakewood Reactors)	PITSBG D Section 1D & PITSBG E Section 1E 230kV	P2	Bus/Breaker	19	20	18	48	34	49	66	101	17	91	Diverge	13	18	Sensitivity only
Moraga-Lakewood 115kV Line (Lakewood Reactors)	PITSBURG 115kV - Section 2E & 2D	P2	Bus/Breaker	278	267	403	124	123	150	168	72	269	62	210	Diverge	403	Pittsburg-Lakewood RAS
Moraga-Lakewood 115kV Line (Lakewood Reactors)	PITSBURG 115kV Section 2E	P2	Bus/Breaker	278	267	403	124	123	150	168	72	269	62	210	Diverge	403	Pittsburg-Lakewood RAS
Moraga-Lakewood 115kV Line (Lakewood Reactors)	PITSBURG 115kV - Section 2E & 2D	P2	Bus/Breaker	278	<100	<100	124	<100	<100	168	<100	<100	<100	210	<100	<100	Pittsburg-Lakewood RAS
Moraga-Lakewood 115kV Line (Lakewood Reactors)	PITSBURG 115kV Section 2E	P2	Bus/Breaker	278	<100	<100	124	<100	<100	168	<100	<100	<100	210	<100	<100	Pittsburg-Lakewood RAS
Moraga-Lakewood 115kV Line (Lakewood Reactors)	PITSBURG 115kV - Section 2E & 2D	P2	Bus/Breaker	<100	267	403	<100	123	150	<100	73	269	62	<100	Diverge	403	Pittsburg-Lakewood RAS
Moraga-Lakewood 115kV Line (Lakewood Reactors)	PITSBURG 115kV Section 2E	P2	Bus/Breaker	<100	267	403	<100	123	150	<100	73	269	62	<100	Diverge	403	Pittsburg-Lakewood RAS
Moraga-Oakland J 115kV Line	SN LNDRO 115kV - Section 1E & 2E	P2	Bus/Breaker	132	<100	<100	95	<100	<100	90	<100	<100	<100	114	<100	<100	Project: East Shore-Oakland J 115 kV Reconductoring Project In-service date: 6/22 Short term: Operating solution
Moraga-Oakland J 115kV Line	EASTSHRE 115kV - Section 1D & 1E	P2	Bus/Breaker	<100	95	99	<100	60	67	<100	28	93	28	<100	Diverge	117	Sensitivity only
Moraga-Oakland J 115kV Line	EAST SHORE 230 KV BAAH BUS #2 (FAILURE OF NON-REDUNDENT RELAY)	P5	Non-Redundent Relay	<100	95	99	<100	60	67	<100	28	93	29	<100	Diverge	117	Sensitivity only
Moraga-Oakland J 115kV Line	STATIN J-EDES-GRANT 115kV [0] & SAN LEANDRO-OAKLND J #1 115kV [3520]	P6	N-1-1	94	133	148	88	124	135	98	75	133	71	99	<100	175	Rely on operating solution
Moraga-San Leandro #1 115kV Line	MORAGA 115kV - Section 2D & 2E	P2	Bus/Breaker	126	<100	<100	106	<100	<100	101	<100	<100	<100	112	<100	<100	Project: East Shore-Oakland J 115 kV Reconductoring Project In-service date: 6/22 Short term: Operating solution
Moraga-San Leandro #1 115kV Line	MORAGA 115kV Section 2E	P2	Bus/Breaker	128	<100	<100	106	<100	<100	102	<100	<100	<100	113	<100	<100	Project: East Shore-Oakland J 115 kV Reconductoring Project In-service date: 6/22 Short term: Operating solution
Moraga-San Leandro #1 115kV Line	EASTSHRE 115kV - Section 1D & 1E	P2	Bus/Breaker	<100	86	91	<100	55	61	<100	26	85	25	<100	Diverge	108	Sensitivity only

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				2022 Summer Peak	2025 Summer Peak	2030 Summer Peak	2022 Winter Peak	2025 Winter Peak	2030 Winter Peak	2022 Spring Off-Peak	2025 Spring Off-Peak	2025 SP High CEC Forecast	2025 SpOP Hi Renew & Min Gas Gen	2022 SP Heavy Renewable & Min Gas Gen	2030-Summer Peak-High SVP	2030 Summer Peak w/o Facility Rerates	
Moraga-San Leandro #1 115kV Line	MORAGA.E 115kV Section 2E	P2	Bus/Breaker	<100	90	86	<100	46	50	<100	36	88	38	<100	90	102	Sensitivity only
Moraga-San Leandro #1 115kV Line	EAST SHORE 230 KV BAAH BUS #2 (FAILURE OF NON-REDUNDENT RELAY)	P5	Non-Redundent Relay	<100	86	91	<100	55	60	<100	26	85	25	<100	Diverge	108	Sensitivity only
Moraga-San Leandro #1 115kV Line	Moraga-Oakland J 115 kV and Moraga-San Leandro No. 3 115 kV lines	P7	DCTL	133	<100	<100	111	<100	<100	107	<100	<100	<100	118	<100	<100	Project: East Shore-Oakland J 115 kV Reconductoring Project In-service date: 6/22 Short term: Operating solution
Moraga-San Leandro #2 115kV Line	MORAGA 115kV - Section 1D & 1E	P2	Bus/Breaker	153	<100	<100	123	<100	<100	119	<100	<100	<100	135	<100	<100	Project: East Shore-Oakland J 115 kV Reconductoring Project In-service date: 6/22 Short term: Operating solution
Moraga-San Leandro #2 115kV Line	EASTSHRE 115kV - Section 1D & 1E	P2	Bus/Breaker	<100	87	92	<100	56	61	<100	26	86	26	<100	Diverge	109	Sensitivity only
Moraga-San Leandro #2 115kV Line	EAST SHORE 230 KV BAAH BUS #2 (FAILURE OF NON-REDUNDENT RELAY)	P5	Non-Redundent Relay	<100	87	92	<100	55	61	<100	26	86	26	<100	Diverge	109	Sensitivity only
Moraga-San Leandro #2 115kV Line	Moraga-Oakland J 115 kV and Moraga-San Leandro No. 3 115 kV lines	P7	DCTL	135	<100	<100	112	<100	<100	108	<100	<100	<100	119	<100	<100	Project: East Shore-Oakland J 115 kV Reconductoring Project In-service date: 6/22 Short term: Operating solution
Moraga-San Leandro #3 115kV Line	MORAGA 115kV - Section 2D & 2E	P2	Bus/Breaker	108	<100	<100	92	<100	<100	87	<100	<100	<100	96	<100	<100	Project: East Shore-Oakland J 115 kV Reconductoring Project In-service date: 6/22 Short term: Operating solution
Moraga-San Leandro #3 115kV Line	MORAGA 115kV Section 2E	P2	Bus/Breaker	110	<100	<100	92	<100	<100	88	<100	<100	<100	97	<100	<100	Project: East Shore-Oakland J 115 kV Reconductoring Project In-service date: 6/22 Short term: Operating solution
Moraga-San Leandro #3 115kV Line	Moraga-San Leandro Nos. 1 & 2 115 kV lines	P7	DCTL	121	<100	<100	100	<100	<100	95	<100	<100	<100	107	<100	<100	Project: East Shore-Oakland J 115 kV Reconductoring Project In-service date: 6/22 Short term: Operating solution
Moraga-San Leandro #3 115kV Line	MORAGA-SAN LEANDRO #1 115kV [2770] & MORAGA-SAN LEANDRO #2 115kV [2780]	P6	N-1-1	121	<100	<100	100	<100	<100	95	<100	<100	<100	107	<100	<100	Project: East Shore-Oakland J 115 kV Reconductoring Project In-service date: 6/22 Short term: Operating solution
Mountain View-Monta Vista 115 kV Line	LMECCT2 18.00kV & LMECCT1 18.00kV & LMECST1 18.00kV Gen Units & WHISMAN-MTN VIEW 115kV [4150]	P3	G-1/N-1	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	109	Sensitivity only
Mountain View-Monta Vista 115 kV Line	JEFFERSON-MARTIN 230KV [5710] (2) & WHISMAN-MTN VIEW 115kV [4150]	P6	N-1-1	<100	74	87	76	79	74	80	82	78	<100	92	<100	113	Sensitivity only
Newark 230/115kV Transformer #11	NEWARK D Section 1D & NEWARK E Section 1E 230kV	P2	Bus/Breaker	105	<100	<100	60	<100	<100	81	<100	<100	<100	104	<100	<100	Project: Newark 230/115 kV Transformer Bank #7 Circuit Breaker Addition In-service date: 2024 Short term: Operating solution
Newark 230/115kV Transformer #11	NEWARK D Section 1D & NEWARK E Section 1E 230kV	P2	Bus/Breaker	103	<100	<100	60	<100	<100	80	<100	<100	<100	103	<100	<100	Project: Newark 230/115 kV Transformer Bank #7 Circuit Breaker Addition In-service date: 2024 Short term: Operating solution
Newark-Ames #1 115kV Line	MONTA VISTA 115KV BAAH BUS #1 (FAILURE OF NON-REDUNDENT RELAY)	P5	Non-Redundent Relay	79	82	86	68	70	73	80	55	83	52	71	Diverge	102	Sensitivity only
Newark-Ames #1 115kV Line	TESLA-RAVENSWOOD 230KV [5730] & NEWARK-RAVENSWOOD 230kV [5936]	P6	N-1-1	81	79	82	<100	<100	<100	89	<100	78	<100	89	<100	104	Sensitivity only

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				2022 Summer Peak	2025 Summer Peak	2030 Summer Peak	2022 Winter Peak	2025 Winter Peak	2030 Winter Peak	2022 Spring Off-Peak	2025 Spring Off-Peak	2025 SP High CEC Forecast	2025 SpOP Hi Renew & Min Gas Gen	2022 SP Heavy Renewable & Min Gas Gen	2030-Summer Peak-High SVP	2030 Summer Peak w/o Facility Rerates	
Newark-Ames #3 115kV Line	MONTAVIS 230kV - Section 2E & 2D	P2	Bus/Breaker	<100	84	88	<100	71	74	<100	59	85	56	<100	Diverge	104	Sensitivity only
Newark-Ames #3 115kV Line	MONTA VISTA 115KV BAAH BUS #1 (FAILURE OF NON-REDUNDENT RELAY)	P5	Non-Redundent Relay	86	89	94	74	77	79	87	60	91	57	78	Diverge	111	Sensitivity only
Newark-Ames #3 115kV Line	Newark-Ravenswood 230 kV and Tesla-Ravenswood 230 kV lines	P7	DCTL	86	84	92	71	71	75	97	59	83	57	Diverge	Diverge	108	Sensitivity only
Newark-Ames #3 115kV Line	TESLA-RAVENSWOOD 230KV [5730] & NEWARK-RAVENSWOOD 230kV [5936]	P6	N-1-1	88	86	89	74	72	75	97	<100	85	<100	97	<100	113	Sensitivity only
Newark-Ames Dist 115kV Line	MONTAVIS 230kV - Section 2E & 2D	P2	Bus/Breaker	<100	85	89	<100	72	74	<100	59	86	56	<100	Diverge	105	Sensitivity only
Newark-Ames Dist 115kV Line	MONTA VISTA 115KV BAAH BUS #1 (FAILURE OF NON-REDUNDENT RELAY)	P5	Non-Redundent Relay	87	90	95	75	78	80	88	61	92	57	79	Diverge	112	Sensitivity only
Newark-Ames Dist 115kV Line	Newark-Ravenswood 230 kV and Tesla-Ravenswood 230 kV lines	P7	DCTL	87	85	92	72	73	76	98	59	84	58	Diverge	Diverge	109	Sensitivity only
Newark-Ames Dist 115kV Line	TESLA-RAVENSWOOD 230KV [5730] & NEWARK-RAVENSWOOD 230kV [5936]	P6	N-1-1	89	87	90	75	73	76	98	<100	86	<100	98	<100	114	Sensitivity only
Newark-Dixon Landing 115kV Line	MCKEE-PIERCY 115kV [2379]	P1	N-1	<100	62	70	<100	39	43	<100	18	62	14	<100	71	102	Sensitivity only
Newark-Dixon Landing 115kV Line	PIERCY-METCALF 115kV [4318]	P1	N-1	<100	77	88	<100	49	53	<100	21	77	16	<100	90	129	Sensitivity only
Newark-Dixon Landing 115kV Line	MTCALF D Section 2D & MTCALF E Section 2E 115kV	P2	Bus/Breaker	75	77	89	49	49	53	57	21	77	16	57	90	130	Sensitivity only
Newark-Dixon Landing 115kV Line	MTCALF E 115kV Section 2E	P2	Bus/Breaker	75	77	89	49	49	53	57	21	77	16	57	90	129	Sensitivity only
Newark-Dixon Landing 115kV Line	PIERCY 115kV Section 1D	P2	Bus/Breaker	<100	62	70	<100	39	43	<100	18	62	14	<100	71	102	Sensitivity only
Newark-Dixon Landing 115kV Line	McKee - Piercy & Milpitas - Swift 115 kV Lines	P7	DCTL	62	62	70	39	39	43	47	18	62	14	48	71	102	Sensitivity only
Newark-Dixon Landing 115kV Line	Swift - Metcalf & Piercy - Metcalf 115 kV Lines	P7	DCTL	75	77	89	49	49	53	57	21	77	16	57	91	130	Sensitivity only
Newark-Dixon Landing 115kV Line	LECEFGT1 13.80kV & LECEFGT2 13.80kV & LECEFGT3 13.80kV & LECEFGT4 13.80kV Gen Units & PIERCY-METCALF 115kV [4318]	P3	G-1/N-1	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	131	Sensitivity only
Newark-Dixon Landing 115kV Line	POTRERO-TBC_POT1 #1 115KV [0] & PIERCY-METCALF 115kV [4318]	P6	N-1-1	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	130	Sensitivity only
Newark-Kifer 115kV Line	NRS 400 115 kV bus tie breaker to NRS 300 115 kV bus	P2	Bus/Breaker	98	99	110	59	58	63	31	15	97	16	101	Diverge	130	Project: SVP breaker upgrade project
Newark-Kifer 115kV Line	NRS 400 115 kV bus tie breaker to NRS 300 115 kV bus	P2	Bus/Breaker	100	101	112	60	59	65	32	17	99	18	103	Diverge	132	Project: SVP breaker upgrade project
Newark-Kifer 115kV Line	LOS ESTEROS 230 KV BAAH BUS #1 (FAILURE OF NON-REDUNDENT RELAY)	P5	Non-Redundent Relay	58	68	76	29	36	40	35	23	67	23	81	101	90	Sensitivity only
Newark-Lawerence 115kV Line	Newark-Applied Materials & Lawrence-Monta Vista 115 kV Lines	P7	DCTL	94	96	102	59	60	64	77	57	96	56	94	104	102	Continue to monitor future load forecast
Newark-Northern Receiving Station #1 115kV Line	LOS ESTEROS 230 KV BAAH BUS #1 (FAILURE OF NON-REDUNDENT RELAY)	P5	Non-Redundent Relay	83	97	103	41	49	55	57	37	95	39	105	131	122	Continue to monitor future load forecast
Newark-Northern Receiving Station #1 115kV Line	LOS ESTEROS 230 KV BAAH BUS #2 (FAILURE OF NON-REDUNDENT RELAY)	P5	Non-Redundent Relay	75	89	97	32	40	46	48	29	87	34	102	Diverge	115	Sensitivity only
Newark-Northern Receiving Station #1 115kV Line	PALO ALTO SW. STA. 115KV DBDB BUS #1 (FAILURE OF NON-REDUNDENT RELAY)	P5	Non-Redundent Relay	60	76	85	23	31	39	6	14	72	12	51	Diverge	101	Sensitivity only
Newark-Northern Receiving Station #1 115kV Line	Newark - Los Esteros & Los Esteros - Metcalf 230 kV Lines	P7	DCTL	75	89	97	32	40	46	48	29	87	34	102	Diverge	115	Sensitivity only
Newark-Northern Receiving Station #2 115kV Line	NRS 400 115 kV bus tie breaker to NRS 300 115 kV bus	P2	Bus/Breaker	86	106	107	58	69	68	33	29	104	29	88	Diverge	126	Project: SVP breaker upgrade project

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				2022 Summer Peak	2025 Summer Peak	2030 Summer Peak	2022 Winter Peak	2025 Winter Peak	2030 Winter Peak	2022 Spring Off-Peak	2025 Spring Off-Peak	2025 SP High CEC Forecast	2025 SpOP Hi Renew & Min Gas Gen	2022 SP Heavy Renewable & Min Gas Gen	2030-Summer Peak-High SVP	2030 Summer Peak w/o Facility Rerates	
Newark-Northern Receiving Station #2 115kV Line	LOS ESTEROS 230 KV BAAH BUS #1 (FAILURE OF NON-REDUNDENT RELAY)	P5	Non-Redundent Relay	64	78	86	30	40	45	44	30	77	30	96	113	102	Sensitivity only
Newark-Northern Receiving Station #2 115kV Line	LOS ESTEROS 230 KV BAAH BUS #2 (FAILURE OF NON-REDUNDENT RELAY)	P5	Non-Redundent Relay	56	70	80	22	32	36	36	23	69	25	92	Diverge	95	Sensitivity only
Newark-Northern Receiving Station #2 115kV Line	Newark - Los Esteros & Los Esteros - Metcalf 230 kV Lines	P7	DCTL	56	70	80	22	32	36	36	23	69	25	92	Diverge	95	Sensitivity only
Newark-Trimble 115kV Line	LOS ESTEROS 115KV BAAH BUS #2 (FAILURE OF NON-REDUNDENT RELAY)	P5	Non-Redundent Relay	71	78	88	34	35	41	44	20	76	21	66	Diverge	104	Sensitivity only
Newark-Trimble 115kV Line	LOS ESTEROS 115KV BAAH BUS #2 (FAILURE OF NON-REDUNDENT RELAY)	P5	Non-Redundent Relay	71	78	88	34	35	41	44	20	76	21	66	Diverge	104	Sensitivity only
Nortech-NRS 115 kV Line	SSS 230/230kV TB 1	P1	N-1	85	83	85	66	65	64	31	22	82	21	61	107	85	Sensitivity only
Nortech-NRS 115 kV Line	SSS-NRS 230 kV same as outage of SVP's PST or NRS T2	P1	N-1	86	83	85	66	65	64	30	19	82	18	61	108	85	Sensitivity only
Nortech-NRS 115 kV Line	LS ESTRS 230kV - Middle Breaker Bay 8	P2	Bus/Breaker	85	83	85	66	65	64	31	22	82	21	61	107	85	Sensitivity only
Nortech-NRS 115 kV Line	NRS 400 115 kV bus	P2	Bus/Breaker	92	93	94	69	69	69	32	19	91	18	69	122	94	Sensitivity only
North Dublin-Cayetano 230kV Cable	CONTRA COSTA-LAS POSITAS 230kV [4510]	P1	N-1	93	99	98	47	50	67	51	23	95	32	80	102	98	Sensitivity only
North Dublin-Cayetano 230kV Cable	C.COSTAPPD Section 1D & C.COSTAPPE Section 1E 230kV	P2	Bus/Breaker	144	Diverge	128	122	121	140	11	15	134	19	51	Diverge	128	Redispatch Generation/ Propose Operating Solution/Capital Project
North Dublin-Cayetano 230kV Cable	C.COSTAPPE - 1E 230kV & ROSSMOOR-MORAGA-C.COSTAPPE line	P2	Bus/Breaker	143	125	127	122	121	140	11	15	134	19	51	Diverge	128	Redispatch Generation/ Propose Operating Solution/Capital Project
North Dublin-Cayetano 230kV Cable	C.COSTAPPE 230kV Section 1E	P2	Bus/Breaker	143	125	127	122	121	140	11	15	134	19	51	Diverge	128	Redispatch Generation/ Propose Operating Solution/Capital Project
North Dublin-Cayetano 230kV Cable	C.COSTAPPE Section 1E & C.COSTAPPF Section 1F 230kV	P2	Bus/Breaker	143	125	127	122	121	140	11	15	134	19	51	Diverge	128	Redispatch Generation/ Propose Operating Solution/Capital Project
North Dublin-Cayetano 230kV Cable	C.COSTAPPF 230kV - Section 2F & 1F	P2	Bus/Breaker	101	104	102	44	46	70	40	18	100	32	72	105	102	Redispatch Generation/ Propose Operating Solution/Capital Project
North Dublin-Cayetano 230kV Cable	C.COSTAPPF 230kV Section 1F	P2	Bus/Breaker	101	105	102	45	47	71	42	19	101	32	73	105	102	Redispatch Generation/ Propose Operating Solution/Capital Project
North Dublin-Cayetano 230kV Cable	MORAGA 230kV Bus #1 &2(FAILURE OF NON-REDUNDENT RELAY)	P5	Non-Redundent Relay	102	111	112	55	59	78	60	29	106	38	92	Diverge	112	Project: Moraga 230 kV bus upgrade In-service date: 2024
North Dublin-Cayetano 230kV Cable	Contra Costa-Moraga Nos. 1 & 2 230 kV lines	P7	DCTL	97	103	104	52	56	74	56	27	99	36	83	Diverge	104	Continue to monitor future load forecast
North Dublin-Vineyard 230 kV Line	CONTRA COSTA-LAS POSITAS 230kV [4510]	P1	N-1	83	88	88	39	42	58	45	24	84	31	72	91	104	Sensitivity only
North Dublin-Vineyard 230 kV Line	C.COSTAPPD Section 1D & C.COSTAPPE Section 1E 230kV	P2	Bus/Breaker	133	Diverge	117	112	111	131	19	23	123	24	49	Diverge	138	Redispatch Generation/ Propose Operating Solution/Capital Project
North Dublin-Vineyard 230 kV Line	C.COSTAPPE - 1E 230kV & ROSSMOOR-MORAGA-C.COSTAPPE line	P2	Bus/Breaker	133	114	117	112	111	131	19	23	123	24	48	Diverge	138	Redispatch Generation/ Propose Operating Solution/Capital Project
North Dublin-Vineyard 230 kV Line	C.COSTAPPE 230kV Section 1E	P2	Bus/Breaker	133	114	117	112	111	131	19	23	123	24	48	Diverge	138	Redispatch Generation/ Propose Operating Solution/Capital Project
North Dublin-Vineyard 230 kV Line	C.COSTAPPE Section 1E & C.COSTAPPF Section 1F 230kV	P2	Bus/Breaker	133	114	117	112	111	131	19	23	123	24	48	Diverge	138	Redispatch Generation/ Propose Operating Solution/Capital Project
North Dublin-Vineyard 230 kV Line	C.COSTAPPF 230kV - Section 2F & 1F	P2	Bus/Breaker	<100	94	91	<100	38	61	<100	20	89	31	<100	94	108	Sensitivity only
North Dublin-Vineyard 230 kV Line	C.COSTAPPF 230kV Section 1F	P2	Bus/Breaker	<100	94	92	<100	39	61	<100	21	90	31	<100	95	108	Sensitivity only
North Dublin-Vineyard 230 kV Line	LS PSTAS 230kV(FAILURE OF NON-REDUNDENT RELAY)	P5	Non-Redundent Relay	81	87	85	38	40	57	43	24	82	32	71	89	101	Sensitivity only
North Dublin-Vineyard 230 kV Line	MORAGA 230kV Bus #1 &2(FAILURE OF NON-REDUNDENT RELAY)	P5	Non-Redundent Relay	92	100	101	47	51	69	54	29	95	37	84	Diverge	119	Project: Moraga 230 kV bus upgrade In-service date: 2024

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Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading % (Baseline Scenarios)								Loading % (Sensitivity Scenarios)					Project & Potential Mitigation Solutions
				2022 Summer Peak	2025 Summer Peak	2030 Summer Peak	2022 Winter Peak	2025 Winter Peak	2030 Winter Peak	2022 Spring Off-Peak	2025 Spring Off-Peak	2025 SP High CEC Forecast	2025 SpOP Hi Renew & Min Gas Gen	2022 SP Heavy Renewable & Min Gas Gen	2030-Summer Peak-High SVP	2030 Summer Peak w/o Facility Rerates	
North Dublin-Vineyard 230 kV Line	Contra Costa-Moraga Nos. 1 & 2 230 kV lines	P7	DCTL	86	92	93	45	48	65	49	27	88	35	75	Diverge	110	Sensitivity only
North Dublin-Vineyard 230 kV Line	Tesla - Newark No.2 and Metcalf - Los Esteros 230 kV lines	P7	DCTL	79	84	84	40	42	56	48	26	81	32	74	Diverge	100	Sensitivity only
North Dublin-Vineyard 230 kV Line	Tesla-Newark No.1 and Tesla-Ravenswood 230 kV lines	P7	DCTL	82	86	88	44	47	61	55	30	82	36	Diverge	Diverge	104	Sensitivity only
Cooley Landing 60 kV Bus Tie	RAVENSWOOD 115 (FAILURE OF NON-REDUNDENT RELAY)	P5	Non-Redundent Relay	131	129	133	87	95	101	114	91	130	85	Diverge	Diverge	133	Ravenswood 115 kV bus upgrade
NRS 115 kV Bus-Tie	PALO ALTO SW. STA. 115KV DBDB BUS #1 (FAILURE OF NON-REDUNDENT RELAY)	P5	Non-Redundent Relay	83	99	104	69	79	83	70	64	98	64	78	Diverge	103	Continue to monitor future load forecast
NRS 230/115kV TB 1	LOS ESTEROS 115KV BAAH BUS #2 (FAILURE OF NON-REDUNDENT RELAY)	P5	Non-Redundent Relay	94	93	95	90	88	87	87	79	95	79	93	Diverge	4	Sensitivity only
NRS 230/115kV TB 1	PALO ALTO SW. STA. 115KV DBDB BUS #1 (FAILURE OF NON-REDUNDENT RELAY)	P5	Non-Redundent Relay	97	100	102	92	93	93	91	84	101	84	95	Diverge	4	Continue to monitor future load forecast
Oakland C - Oakland L #1 115kV Cable	CLARMNT 115kV - Section 2D & 1D	P2	Bus/Breaker	107	101	108	109	108	118	95	61	101	59	98	110	108	Project: Oakland Clean Energy Initiative In-service date: 8/22 Short term: Generation
Oakland C - Oakland L #1 115kV Cable	MORAGA 115kV - Section 1D & 2D	P2	Bus/Breaker	71	<100	<100	7	<100	<100	23	<100	<100	<100	103	<100	<100	Sensitivity only
Oakland C - Oakland L #1 115kV Cable	Moraga-Claremont Nos. 1 & 2 115 kV lines	P7	DCTL	93	85	51	51	48	54	54	26	86	23	101	50	51	Sensitivity only
Oakland C - Oakland L #1 115kV Cable	K-D #1 115kV [9966] & K-D #2 115kV [9967]	P6	N-1-1	<100	101	109	109	108	118	95	<100	101	<100	100	<100	<100	Project: Oakland Clean Energy Initiative In-service date: 8/22 Short term: Generation
Oakland C - Oakland X #2 115kV Cable	CLARMNT 115kV - Section 2D & 1D	P2	Bus/Breaker	39	42	110	94	115	117	85	70	44	68	28	111	110	Project: Oakland Clean Energy Initiative In-service date: 8/22 Short term: Generation
Oakland C - Oakland X #2 115kV Cable	C-X #3 115kV [9925] & D-L #1 115kV [9963]	P6	N-1-1	84	<100	121	94	128	125	85	81	<100	79	86	<100	69	Project: Oakland Clean Energy Initiative In-service date: 8/22 Short term: Generation
Oakland D - Oakland L 115kV Cable	STATIN X 115kV - Section 2D & 1D	P2	Bus/Breaker	32	18	117	87	119	121	81	84	21	81	18	118	117	Project: Oakland Clean Energy Initiative In-service date: 8/22 Short term: Generation
Oakland D - Oakland L 115kV Cable	C-X #3 115kV [9925] & C-X #2 115kV [9962]	P6	N-1-1	<100	<100	109	87	110	113	81	80	<100	78	<100	<100	<100	Project: Oakland Clean Energy Initiative In-service date: 8/22 Short term: Generation
Oleum-Christie 115kV Line	Sobrante-G Nos. 1 & 2 115 kV lines	P7	DCTL	89	101	99	53	61	59	80	45	100	39	110	100	99	Continue to monitor future load forecast
Piercy-Metcalf 115 kV Line	NEWARK-DIXON LANDING 115kV [2990]	P1	N-1	74	75	87	49	48	52	57	21	76	16	56	87	117	Sensitivity only
Pittsburg-Clayton #3 115 kV Line	PITTSBURG-CLAYTON #1 115kV [3280] & PITTSBURG-CLAYTON #4 115kV [3291]	P6	N-1-1	89	91	103	73	71	73	<100	<100	92	<100	<100	<100	<100	Existing Pittsburg-Lakewood RAS
Pittsburg-Clayton #4 115kV Line	PITTSBURG-CLAYTON #1 115kV [3280] & PITTSBURG-KIRKER-COLUMBIA STEEL 115kV [3310]	P6	N-1-1	96	98	111	73	71	73	<100	<100	99	<100	<100	<100	<100	Existing Pittsburg-Lakewood RAS
Ravenswood-Bair #1 115kV Line	BAIR-RVNSWD D-LONESTAR 115KV [0] & SAN MATEO-BELMONT 115KV [3570]	P6	N-1-1	<100	88	87	<100	88	92	<100	<100	89	<100	77	<100	117	Sensitivity only
Ravenswood-Cooley Landing #1 115kV Line	RVNSWD E 115KV - SECTION 2E & 1E	P2	Bus/Breaker	112	112	117	99	103	106	102	71	111	67	102	120	152	Ravenswood 115 kV bus upgrade
Ravenswood-Cooley Landing #1 115kV Line	RVNSWD E 115KV SECTION 1X	P2	Bus/Breaker	84	85	92	58	57	66	59	37	82	38	69	96	119	Sensitivity only
Ravenswood-Cooley Landing #2 115kV Line	RAVENSWOOD 115 (FAILURE OF NON-REDUNDENT RELAY)	P5	Non-Redundent Relay	113	113	120	90	97	110	96	70	114	64	Diverge	Diverge	155	Ravenswood 115 kV bus upgrade
Ravenswood-San Mateo #1 115kV Line	SANMATEO 230KV - SECTION 1D & 1E	P2	Bus/Breaker	97	80	49	85	87	40	81	48	81	44	89	Diverge	106	Sensitivity only

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				2022 Summer Peak	2025 Summer Peak	2030 Summer Peak	2022 Winter Peak	2025 Winter Peak	2030 Winter Peak	2022 Spring Off-Peak	2025 Spring Off-Peak	2025 SP High CEC Forecast	2025 SpOP Hi Renew & Min Gas Gen	2022 SP Heavy Renewable & Min Gas Gen	2030-Summer Peak-High SVP	2030 Summer Peak w/o Facility Rerates	
Ravenswood-San Mateo #1 115kV Line	SANMATEO 230KV - SECTION 1E & 2E	P2	Bus/Breaker	77	80	53	73	79	47	89	68	83	59	84	53	116	Sensitivity only
Ravenswood-San Mateo #1 115kV Line	SANMATEO 230KV - SECTION 2D & 1D	P2	Bus/Breaker	83	85	50	75	74	44	72	33	86	31	71	50	109	Sensitivity only
Ravenswood-San Mateo #1 115kV Line	RAVENSWOOD 115 (FAILURE OF NON-REDUNDENT RELAY)	P5	Non-Redundent Relay	160	161	93	133	141	85	137	97	163	89	Diverge	Diverge	203	Ravenswood 115 kV bus upgrade
Ravenswood-San Mateo #1 115kV Line	RAVENSWOOD 230 KV BAAH BUS #1 (FAILURE OF NON-REDUNDENT RELAY)	P5	Non-Redundent Relay	61	63	44	57	60	36	85	56	62	49	Diverge	Diverge	96	Sensitivity only
Ravenswood-San Mateo #1 115kV Line	Ravenswood-San Mateo Nos. 1 & 2 230 kV lines	P7	DCTL	69	70	48	66	72	42	87	67	74	57	98	48	105	Sensitivity only
Ravenswood-San Mateo #1 115kV Line	POTRERO-TBC_POT1 #1 115KV [0] & JEFFERSON-MARTIN 230KV [5710] (2)	P6	N-1-1	<100	72	<100	<100	72	<100	<100	<100	74	<100	98	<100	101	Sensitivity only
San Jose 'B'-Stone-Evergreen 115 kV Line	Metcalf - Evergreen #1 and #2 115 kV Lines	P7	DCTL	83	86	101	45	45	50	65	31	86	27	62	104	101	Continue to monitor future load forecast
San Jose 'B'-Stone-Evergreen 115 kV Line	Metcalf - Evergreen #1 and #2 115 kV Lines	P7	DCTL	80	82	98	45	46	51	62	30	82	26	58	100	98	Sensitivity only
San Jose Sta 'A'-'B' 115 kV Line	Metcalf - Evergreen #1 and #2 115 kV Lines	P7	DCTL	73	84	95	55	63	69	56	49	87	42	85	109	96	Sensitivity only
San Leandro - Oakland J #1 115kV Line	EASTSHRE 115kV - Section 1D & 1E	P2	Bus/Breaker	<100	98	102	<100	60	68	<100	29	96	31	<100	Diverge	121	Continue to monitor future load forecast
San Leandro - Oakland J #1 115kV Line	EAST SHORE 230 KV BAAH BUS #2 (FAILURE OF NON-REDUNDENT RELAY)	P5	Non-Redundent Relay	55	99	102	52	60	68	51	29	96	31	51	Diverge	121	Continue to monitor future load forecast
San Leandro - Oakland J #1 115kV Line	STATIN J-EDES-GRANT 115kV [0] & MORAGA-OAKLAND J 115kV [2760]	P6	N-1-1	98	97	105	75	88	93	72	<100	100	<100	89	<100	125	Continue to monitor future load forecast
San Mateo-Bair 60kV Line	RAVENSWOOD 115 (FAILURE OF NON-REDUNDENT RELAY)	P5	Non-Redundent Relay	133	133	137	127	135	127	128	83	134	78	Diverge	Diverge	162	Ravenswood 115 kV bus upgrade
San Mateo-Bair 60kV Line	CLY LND 115/60KV TB 1 & CLY LND2 115/60KV TB 2	P6	N-1-1	<100	121	135	<100	120	126	<100	<100	121	<100	91	<100	93	Operating solution as recommended in 2018-2019 TP.
San Mateo-Bay Meadows #1 115kV Line	SAN MATEO-BAY MEADOWS #2 115KV [3560]	P1	N-1	87	86	93	80	79	80	78	45	87	43	78	94	110	Sensitivity only
San Mateo-Bay Meadows #2 115kV Line	SAN MATEO-BAY MEADOWS #1 115KV [3550]	P1	N-1	87	86	93	80	79	80	78	45	87	43	78	94	110	Sensitivity only
San Mateo-Belmont 115kV Line	RVNSWD D 115KV - SECTION 1D & 2D	P2	Bus/Breaker	106	110	103	93	90	94	79	50	109	47	91	104	103	Ravenswood 115 kV bus upgrade
San Mateo-Belmont 115kV Line	RAVENSWOOD 115 (FAILURE OF NON-REDUNDENT RELAY)	P5	Non-Redundent Relay	186	188	189	158	166	174	157	104	190	97	Diverge	Diverge	189	Ravenswood 115 kV bus upgrade
San Mateo-Belmont 115kV Line	RAVENSWOOD 230 KV BAAH BUS #2 (FAILURE OF NON-REDUNDENT RELAY)	P5	Non-Redundent Relay	96	100	98	76	70	77	57	38	96	38	79	Diverge	97	Continue to monitor future load forecast
San Mateo-Belmont 115kV Line	RAVENSWD 230/115KV TB 1 & RAVENSWD 230/115KV TB 2	P6	N-1-1	<100	96	93	<100	81	86	<100	<100	100	<100	88	<100	102	Continue to monitor future load forecast
San Mateo-Hillsdale JCT 60kV Line	MONTAVIS 230kV - Section 1E & 2E	P2	Bus/Breaker	82	83	92	79	81	83	81	37	85	41	77	Diverge	109	Sensitivity only
San Mateo-Hillsdale JCT 60kV Line	JEFFERSON 230 KV BAAH BUS #1 (FAILURE OF NON-REDUNDENT RELAY)	P5	Non-Redundent Relay	160	169	189	159	160	184	159	65	172	70	130	188	224	Project: Jefferson 230 kV bus upgrade project In-service date: 2024 Short term: Operating solution
San Mateo-Hillsdale JCT 60kV Line	JEFFERSON 230 KV BAAH BUS #2 (FAILURE OF NON-REDUNDENT RELAY)	P5	Non-Redundent Relay	162	171	192	160	162	186	158	65	173	71	132	191	228	Project: Jefferson 230 kV bus upgrade project In-service date: 2024 Short term: Operating solution
San Mateo-Hillsdale JCT 60kV Line	Metcalf-Monta Vista No. 3 & Monta Vista-Coyote Sw. Sta. 230 kV Line	P7	DCTL	82	84	92	79	81	83	82	38	84	41	77	Diverge	109	Sensitivity only
San Mateo-Hillsdale JCT 60kV Line	Monta Vista-Jefferson Nos. 1 & 2 230 kV lines	P7	DCTL	162	69	77	160	69	69	160	27	70	31	132	77	91	Project: Jefferson 230 kV bus upgrade project In-service date: 2024 Short term: Operating solution

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				2022 Summer Peak	2025 Summer Peak	2030 Summer Peak	2022 Winter Peak	2025 Winter Peak	2030 Winter Peak	2022 Spring Off-Peak	2025 Spring Off-Peak	2025 SP High CEC Forecast	2025 SpOP Hi Renew & Min Gas Gen	2022 SP Heavy Renewable & Min Gas Gen	2030-Summer Peak-High SVP	2030 Summer Peak w/o Facility Rerates	
San Mateo-Hillsdale JCT 60kV Line (Beresford-Hillsdale)	JEFFERSON 230 KV BAAH BUS #1 (FAILURE OF NON-REDUNDENT RELAY)	P5	Non-Redundent Relay	181	189	212	151	152	175	180	73	191	79	149	210	212	Project: Jefferson 230 kV bus upgrade project In-service date: 2024 Short term: Operating solution
San Mateo-Hillsdale JCT 60kV Line (Beresford-Hillsdale)	JEFFERSON 230 KV BAAH BUS #2 (FAILURE OF NON-REDUNDENT RELAY)	P5	Non-Redundent Relay	184	191	216	152	154	177	179	73	193	80	152	214	216	Project: Jefferson 230 kV bus upgrade project In-service date: 2024 Short term: Operating solution
San Mateo-Hillsdale JCT 60kV Line (Beresford-Hillsdale)	Monta Vista-Jefferson Nos. 1 & 2 230 kV lines	P7	DCTL	184	74	81	153	58	62	181	32	75	36	152	82	81	Project: Jefferson 230 kV bus upgrade project In-service date: 2024 Short term: Operating solution
San Mateo-Hillsdale JCT 60kV Line (Hillsdale-Hillsdale JCT)	JEFFERSON 230 KV BAAH BUS #1 (FAILURE OF NON-REDUNDENT RELAY)	P5	Non-Redundent Relay	174	180	203	171	173	198	173	72	183	79	145	201	203	Project: Jefferson 230 kV bus upgrade project In-service date: 2024 Short term: Operating solution
San Mateo-Hillsdale JCT 60kV Line (Hillsdale-Hillsdale JCT)	JEFFERSON 230 KV BAAH BUS #2 (FAILURE OF NON-REDUNDENT RELAY)	P5	Non-Redundent Relay	176	182	207	173	175	200	172	72	184	80	147	205	207	Project: Jefferson 230 kV bus upgrade project In-service date: 2024 Short term: Operating solution
San Mateo-Hillsdale JCT 60kV Line (Hillsdale-Hillsdale JCT)	Monta Vista-Jefferson Nos. 1 & 2 230 kV lines	P7	DCTL	176	71	75	173	65	66	174	33	71	38	147	76	75	Project: Jefferson 230 kV bus upgrade project In-service date: 2024 Short term: Operating solution
Sobrante-El Cerrito STA G #2 115kV Line	SOBRANTE 115kV - Section 1D & 2D	P2	Bus/Breaker	98	107	112	69	74	77	91	45	107	38	105	113	112	Project: Sobrante Bus Maintenance Project
Sobrante-Moraga 115kV Line	MORAGA 230kV - Section 2D & 1D	P2	Bus/Breaker	101	72	99	94	60	59	106	50	72	51	102	Diverge	99	Project: Moraga 230 kV bus upgrade In-service date: 2024
Sobrante-Moraga 115kV Line	SOBRANTE 230kV - Section 2D & 1D	P2	Bus/Breaker	85	96	111	68	77	86	88	44	95	38	95	112	111	Monitot the overload as seen only in long term and sensitivity studies
Sobrante-Moraga 115kV Line	MORAGA 230kV Bus #1 &2(FAILURE OF NON-REDUNDENT RELAY)	P5	Non-Redundent Relay	101	72	99	94	60	59	106	50	71	50	102	Diverge	99	Project: Moraga 230 kV bus upgrade In-service date: 2024
Sobrante-Moraga 115kV Line	SOBRANTE 230kV Bus #1&2(FAILURE OF NON-REDUNDENT RELAY)	P5	Non-Redundent Relay	85	95	110	68	77	86	88	44	95	38	96	Diverge	110	Monitot the overload as seen only in long term and sensitivity studies
Swift-Metcalf 115 kV Line	NEWARK E Section 1E & NEWARK F Section 1F 115kV	P2	Bus/Breaker	<100	68	79	<100	45	49	<100	20	68	16	<100	80	102	Sensitivity only
Swift-Metcalf 115 kV Line	NEWARK F - 1F 115kV & NEWARK F-LAWRENCE-LOCKHD 1 line	P2	Bus/Breaker	47	68	79	38	45	49	41	20	68	16	40	80	102	Sensitivity only
Swift-Metcalf 115 kV Line	NEWARK F - 1F 115kV & NEWARK F-ZANKER-KRS line	P2	Bus/Breaker	47	68	79	38	45	49	41	20	68	16	39	80	102	Sensitivity only
Swift-Metcalf 115 kV Line	NEWARK F - 1F 115kV & NEWARK-MILPITAS #1 line	P2	Bus/Breaker	47	68	79	38	45	49	41	20	68	16	39	80	102	Sensitivity only
Swift-Metcalf 115 kV Line	NEWARK F 115kV Section 1F	P2	Bus/Breaker	<100	68	79	<100	45	49	<100	20	68	16	<100	80	102	Sensitivity only
Tesla - Newark 230 kV Line No. 2	Tesla-Newark No.1 and Tesla-Ravenswood 230 kV lines	P7	DCTL	73	74	81	48	49	47	81	32	73	26	Diverge	Diverge	104	Sensitivity only
Tesla - Newark 230 kV Line No. 2	LMECCT2 18.00kV & LMECCT1 18.00kV & LMECST1 18.00kV Gen Units & TESLA-NEWARK #1 230kV [5720]	P3	G-1/N-1	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	102	Sensitivity only
Tesla - Newark 230 kV Line No. 2	TESLA-RAVENSWOOD 230KV [5730] & TESLA-NEWARK #1 230kV [5720]	P6	N-1-1	73	76	81	<100	<100	<100	81	<100	74	<100	93	<100	114	Sensitivity only
Vineyard-Newark 230kV Line	C.COSTAPPD Section 1D & C.COSTAPPE Section 1E 230kV	P2	Bus/Breaker	109	Diverge	89	89	88	106	31	23	97	22	40	Diverge	90	Redispatch Generation/ Propose Operating Solution
Vineyard-Newark 230kV Line	C.COSTAPPE - 1E 230kV & ROSSMOOR-MORAGA-C.COSTAPPE line	P2	Bus/Breaker	109	88	89	89	88	106	31	23	97	22	39	Diverge	90	Redispatch Generation/ Propose Operating Solution
Vineyard-Newark 230kV Line	C.COSTAPPE 230kV Section 1E	P2	Bus/Breaker	109	88	89	89	88	106	31	23	97	22	39	Diverge	90	Redispatch Generation/ Propose Operating Solution
Vineyard-Newark 230kV Line	C.COSTAPPE Section 1E & C.COSTAPPF Section 1F 230kV	P2	Bus/Breaker	109	88	89	89	88	106	31	23	97	22	39	Diverge	90	Redispatch Generation/ Propose Operating Solution

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Thermal Overloads

Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading % (Baseline Scenarios)								Loading % (Sensitivity Scenarios)					Project & Potential Mitigation Solutions
				2022 Summer Peak	2025 Summer Peak	2030 Summer Peak	2022 Winter Peak	2025 Winter Peak	2030 Winter Peak	2022 Spring Off-Peak	2025 Spring Off-Peak	2025 SP High CEC Forecast	2025 SpOP Hi Renew & Min Gas Gen	2022 SP Heavy Renewable & Min Gas Gen	2030-Summer Peak-High SVP	2030 Summer Peak w/o Facility Rerates	
Whisman-Monta Vista 115 kV Line	MONTA VISTA 115KV BAAH BUS #1 (FAILURE OF NON-REDUNDENT RELAY)	P5	Non-Redundent Relay	77	87	98	56	59	67	65	31	87	26	57	Diverge	116	Sensitivity only
Whisman-Monta Vista 115 kV Line	LMECCT2 18.00kV & LMECCT1 18.00kV & LMECST1 18.00kV Gen Units & MTN VIEW-MONTA VISTA 115kV [2920]	P3	G-1/N-1	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	103	Sensitivity only
Whisman-Monta Vista 115 kV Line	JEFFERSON-MARTIN 230KV [5710] (2) & MTN VIEW-MONTA VISTA 115kV [2920]	P6	N-1-1	<100	<100	82	72	77	72	78	85	73	<100	90	<100	108	Sensitivity only

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Study Area: PG&E Greater Bay Area

High/Low Voltages

California ISO

Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)								Voltage PU (Sensitivity Scenarios)					Project & Potential Mitigation Solutions
				2022 Summer Peak	2025 Summer Peak	2030 Summer Peak	2022 Winter Peak	2025 Winter Peak	2030 Winter Peak	2022 Spring Off-Peak	2025 Spring Off-Peak	2025 SP High CEC Forecast	2025 SpOP Hi Renew & Min Gas Gen	2022 SP Heavy Renewable & Min Gas Gen	2030-Summer Peak-High SVP	2030 Summer Peak w/o Facility Rerates	
Brokaw&1 60 kV	Normal	P0	N-0	1.00	1.00	0.98	1.02	1.03	1.01	1.02	1.03	1.01	1.03	0.98	0.95	0.98	Sensitivity Only
DCJ 60 kV		P0	N-0	1.00	1.00	0.98	1.02	1.03	1.01	1.02	1.03	1.01	1.03	0.98	0.95	0.98	Sensitivity Only
EVERGREN 60 kV		P0	N-0	1.00	1.00	0.96	1.04	1.04	1.00	1.03	0.99	1.01	0.99	0.98	0.94	0.96	Sensitivity Only
FairView 60 kV		P0	N-0	1.00	0.99	0.98	1.01	1.02	1.01	1.02	1.03	1.01	1.03	0.97	0.95	0.98	Sensitivity Only
Homestea 60 kV		P0	N-0	1.00	0.99	0.98	1.01	1.02	1.01	1.02	1.03	1.01	1.03	0.98	0.95	0.98	Sensitivity Only
JENNINGS 60 kV		P0	N-0	1.00	1.00	0.96	1.04	1.04	1.00	1.03	0.99	1.01	0.99	0.99	0.94	0.96	Sensitivity Only
MABURY 60 kV		P0	N-0	1.00	1.00	0.96	1.04	1.04	1.00	1.03	0.99	1.01	0.99	0.99	0.94	0.96	Sensitivity Only
Mathew 60 kV		P0	N-0	1.00	1.00	0.98	1.02	1.03	1.01	1.02	1.03	1.01	1.03	0.98	0.95	0.98	Sensitivity Only
Memorex 60 kV		P0	N-0	1.00	1.00	0.98	1.02	1.03	1.01	1.02	1.03	1.01	1.03	0.98	0.95	0.98	Sensitivity Only
MORAGA 230 kV		P0	N-0	0.97	0.97	0.96	1.03	1.03	0.99	1.02	1.04	0.99	1.05	0.95	0.95	0.96	Sensitivity Only
Northwes 60 kV		P0	N-0	1.00	0.99	0.98	1.01	1.02	1.01	1.02	1.03	1.01	1.03	0.97	0.95	0.98	Sensitivity Only
Parker 60 kV		P0	N-0	1.00	1.00	0.98	1.02	1.03	1.01	1.02	1.03	1.01	1.03	0.98	0.95	0.98	Sensitivity Only
SENTER 60 kV		P0	N-0	1.00	1.00	0.96	1.04	1.04	1.00	1.03	0.99	1.01	0.99	0.98	0.94	0.96	Sensitivity Only
Serra 60 kV		P0	N-0	1.00	0.99	0.98	1.01	1.02	1.01	1.02	1.03	1.01	1.03	0.98	0.95	0.98	Sensitivity Only
Uranium 60 kV		P0	N-0	1.00	1.00	0.98	1.02	1.03	1.01	1.02	1.03	1.01	1.03	0.98	0.95	0.98	Sensitivity Only
Zeno 60 kV		P0	N-0	1.00	0.99	0.98	1.01	1.02	1.01	1.02	1.03	1.01	1.03	0.98	0.95	0.98	Sensitivity Only
ALMADEN 60 kV	MONTA VISTA-LOS GATOS 60kV [7610]	P1	N-1	0.96	0.93	0.87	1.02	1.01	0.95	1.03	1.02	0.94	1.03	0.96	0.86	0.87	Disable automatic
ALMADEN 60 kV	METCALF-EVERGREEN #1 115kV [2520]	P1	N-1	NA	0.97	0.90	NA	1.03	0.97	NA	1.00	0.98	1.01	NA	0.88	0.90	Disable automatic
ALMADEN 60 kV	STONE-EVERGREEN-METCALF 115kV [2530]	P1	N-1	NA	0.97	0.90	NA	1.03	0.97	NA	1.00	0.98	1.01	NA	0.88	0.90	Disable automatic
ALMADEN 60 kV	METCALF SVD=v	P1	N-1	0.97	0.98	0.90	1.03	1.03	0.97	1.02	1.00	0.99	1.01	0.94	0.89	0.90	Sensitivity Only
LOS GATS 60 kV	MONTA VISTA-LOS GATOS 60kV [7610]	P1	N-1	0.95	0.90	0.85	1.00	1.00	0.93	1.03	1.03	0.92	1.04	0.95	0.84	0.85	Disable automatic
MCKEE 115 kV	PIERCY-METCALF 115kV [4318]	P1	N-1	NA	0.96	0.92	NA	1.03	0.97	NA	1.04	0.97	1.04	NA	0.90	0.91	Sensitivity Only
PIERCY 115 kV		P1	N-1	NA	0.96	0.91	NA	1.04	0.97	NA	1.04	0.97	1.05	NA	0.89	0.90	Sensitivity Only
EVRGRN 1 115 kV		P2	Bus/Breaker	0.97	0.96	0.90	1.03	1.02	0.97	1.00	1.04	0.97	0.94	1.05	0.80	0.90	Continue to monitor future load forecast
MABURY 60 kV		P2	Bus/Breaker	0.96	0.95	0.88	1.03	1.03	0.96	1.00	1.00	0.97	0.94	1.00	0.80	0.88	Continue to monitor future load forecast

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High/Low Voltages

California ISO

Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)								Voltage PU (Sensitivity Scenarios)					Project & Potential Mitigation Solutions
				2022 Summer Peak	2025 Summer Peak	2030 Summer Peak	2022 Winter Peak	2025 Winter Peak	2030 Winter Peak	2022 Spring Off-Peak	2025 Spring Off-Peak	2025 SP High CEC Forecast	2025 SpOP Hi Renew & Min Gas Gen	2022 SP Heavy Renewable & Min Gas Gen	2030-Summer Peak-High SVP	2030 Summer Peak w/o Facility Rerates	
MCKEE 115 kV	MTCALF E 115kV - Section 1E & 2E	P2	Bus/Breaker	0.95	0.95	0.90	1.04	1.03	0.96	1.00	1.04	0.96	0.94	1.05	0.82	0.90	Continue to monitor future load forecast
PIERCY 115 kV		P2	Bus/Breaker	0.95	0.95	0.89	1.05	1.04	0.96	1.00	1.04	0.96	0.94	1.05	0.82	0.89	Continue to monitor future load forecast
STONE 115 kV		P2	Bus/Breaker	0.96	0.95	0.89	1.03	1.02	0.97	1.00	1.04	0.97	0.94	1.05	0.80	0.89	Continue to monitor future load forecast
MCKEE 115 kV	MTCALF E 115kV Section 2E	P2	Bus/Breaker	0.96	0.96	0.91	1.05	1.03	0.97	1.01	1.04	0.97	0.96	1.04	0.90	0.91	Sensitivity only
PIERCY 115 kV		P2	Bus/Breaker	0.96	0.96	0.90	1.05	1.04	0.97	1.01	1.04	0.97	0.95	1.05	0.89	0.90	Sensitivity only
PIERCY 115 kV	MTCALF D Section 2D & MTCALF E Section 2E 115kV	P2	Bus/Breaker	0.96	0.96	0.90	1.05	1.04	0.96	1.01	1.04	0.97	0.95	1.04	0.88	0.90	Continue to monitor future load forecast
SANRAMON 230 kV	PITSBG E - 1E 230kV & PITTSBURG-TESLA #1 line	P2	Bus/Breaker	0.98	0.99	0.96	1.04	1.04	0.98	1.02	1.04	1.00	0.87	1.04	0.95	0.96	Sensitivity only
TASSAJAR 230 kV		P2	Bus/Breaker	1.00	1.01	0.98	1.03	1.04	1.00	1.02	1.03	1.02	0.90	1.04	0.97	0.98	Sensitivity only
SANRAMON 230 kV	PITSBG E 230kV Section 1E	P2	Bus/Breaker	0.98	0.99	0.96	1.04	1.04	0.98	1.02	1.04	1.00	0.88	1.04	0.95	0.96	Sensitivity only
STELLING 115 kV	MONTAVIS 230kV - Section 2E & 2D	P2	Bus/Breaker	0.96	0.94	0.90	1.01	1.01	0.96	1.01	1.05	0.95	0.94	1.06	0.75	0.90	Monta Vista 230 kV bus upgrade project
WOLFE 115 kV		P2	Bus/Breaker	0.96	0.94	0.89	1.01	1.01	0.96	1.01	1.05	0.95	0.94	1.06	0.75	0.90	Monta Vista 230 kV bus upgrade project
E. SHORE 230 kV	EAST SHORE 230 KV BAAH BUS #1 (FAILURE OF NON-REDUNDENT RELAY)	P5	Non-Redundent Relay	0.94	0.89	0.85	1.04	1.04	0.90	1.01	1.04	0.93	1.05	0.90	0.98	0.85	Continue to monitor future load forecast
CAROLD1 60 kV		P5	Non-Redundent Relay	0.95	0.93	0.90	0.99	0.97	0.90	0.98	1.02	0.93	1.02	0.95	0.90	0.90	Project: Jefferson 230 kV bus upgrade project In-service date: 2024

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Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)								Voltage PU (Sensitivity Scenarios)					Project & Potential Mitigation Solutions
				2022 Summer Peak	2025 Summer Peak	2030 Summer Peak	2022 Winter Peak	2025 Winter Peak	2030 Winter Peak	2022 Spring Off-Peak	2025 Spring Off-Peak	2025 SP High CEC Forecast	2025 SpOP Hi Renew & Min Gas Gen	2022 SP Heavy Renewable & Min Gas Gen	2030-Summer Peak-High SVP	2030 Summer Peak w/o Facility Rerates	
CAROLD2 60 kV	JEFFERSON 230 KV BAAH BUS #1 or # 2 (FAILURE OF NON-REDUNDENT RELAY)	P5	Non-Redundent Relay	0.87	0.84	0.81	0.92	0.90	0.80	0.92	0.99	0.84	1.00	0.89	0.81	0.81	Project: Jefferson 230 kV bus upgrade project In-service date: 2024 Short term: Operating solution
HILDAL47 60 kV		P5	Non-Redundent Relay	0.87	0.85	0.81	0.92	0.90	0.80	0.92	0.99	0.84	1.00	0.89	0.81	0.81	Project: Jefferson 230 kV bus upgrade project In-service date: 2024 Short term: Operating solution
HILDAL49 60 kV		P5	Non-Redundent Relay	0.95	0.93	0.90	0.98	0.97	0.90	0.98	1.02	0.93	1.02	0.95	0.90	0.90	Project: Jefferson 230 kV bus upgrade project In-service date: 2024 Short term: Operating solution
HLLSDLJT 60 kV		P5	Non-Redundent Relay	0.95	0.93	0.91	0.98	0.97	0.90	0.98	1.02	0.93	1.02	0.95	0.90	0.91	Project: Jefferson 230 kV bus upgrade project In-service date: 2024 Short term: Operating solution
JEFRSN_D 60 kV		P5	Non-Redundent Relay	0.88	0.86	0.82	0.93	0.91	0.81	0.93	0.99	0.85	1.00	0.90	0.82	0.82	Project: Jefferson 230 kV bus upgrade project In-service date: 2024 Short term: Operating solution
JEFRSN_E 60 kV		P5	Non-Redundent Relay	0.88	0.86	0.83	0.93	0.91	0.81	0.93	0.99	0.85	1.00	0.90	0.82	0.83	Project: Jefferson 230 kV bus upgrade project In-service date: 2024 Short term: Operating solution
LSPLGS&1 60 kV		P5	Non-Redundent Relay	0.87	0.84	0.81	0.91	0.90	0.79	0.92	0.99	0.84	0.99	0.89	0.80	0.81	Project: Jefferson 230 kV bus upgrade project In-service date: 2024 Short term: Operating solution
LSPLGSJT 60 kV		P5	Non-Redundent Relay	0.87	0.85	0.81	0.92	0.90	0.80	0.92	0.99	0.84	1.00	0.89	0.81	0.81	Project: Jefferson 230 kV bus upgrade project In-service date: 2024 Short term: Operating solution
MLLBTP97 60 kV		P5	Non-Redundent Relay	0.95	0.93	0.90	0.99	0.97	0.90	0.98	1.02	0.93	1.02	0.95	0.90	0.90	Project: Jefferson 230 kV bus upgrade project In-service date: 2024 Short term: Operating solution
MNLOJCT2 60 kV		P5	Non-Redundent Relay	0.86	0.84	0.81	0.91	0.90	0.79	0.92	0.99	0.84	0.99	0.89	0.80	0.81	Project: Jefferson 230 kV bus upgrade project In-service date: 2024 Short term: Operating solution
RLSTN35 60 kV		P5	Non-Redundent Relay	0.92	0.90	0.87	0.96	0.95	0.86	0.96	1.01	0.90	1.01	0.93	0.87	0.87	Project: Jefferson 230 kV bus upgrade project In-service date: 2024 Short term: Operating solution
RLSTN45 60 kV		P5	Non-Redundent Relay	0.87	0.85	0.81	0.92	0.90	0.80	0.92	0.99	0.84	1.00	0.89	0.81	0.81	Project: Jefferson 230 kV bus upgrade project In-service date: 2024 Short term: Operating solution
S.L.A.C. 60 kV		P5	Non-Redundent Relay	0.86	0.84	0.81	0.91	0.89	0.79	0.92	0.99	0.83	0.99	0.88	0.80	0.81	Project: Jefferson 230 kV bus upgrade project In-service date: 2024 Short term: Operating solution

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Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)								Voltage PU (Sensitivity Scenarios)					Project & Potential Mitigation Solutions
				2022 Summer Peak	2025 Summer Peak	2030 Summer Peak	2022 Winter Peak	2025 Winter Peak	2030 Winter Peak	2022 Spring Off-Peak	2025 Spring Off-Peak	2025 SP High CEC Forecast	2025 SpOP Hi Renew & Min Gas Gen	2022 SP Heavy Renewable & Min Gas Gen	2030-Summer Peak-High SVP	2030 Summer Peak w/o Facility Rerates	
SLAC TAP 60 kV		P5	Non-Redundent Relay	0.86	0.84	0.81	0.91	0.89	0.79	0.92	0.99	0.83	0.99	0.88	0.80	0.81	Project: Jefferson 230 kV bus upgrade project In-service date: 2024 Short term: Operating solution
TRAN-60 60 kV		P5	Non-Redundent Relay	0.95	0.93	0.90	0.99	0.97	0.90	0.98	1.02	0.93	1.02	0.95	0.90	0.90	Project: Jefferson 230 kV bus upgrade project In-service date: 2024 Short term: Operating solution
WTRSHDTP 60 kV		P5	Non-Redundent Relay	0.91	0.89	0.86	0.95	0.94	0.85	0.95	1.00	0.88	1.01	0.92	0.85	0.86	Project: Jefferson 230 kV bus upgrade project In-service date: 2024 Short term: Operating solution
LARKIN D 115 kV	POTRERO 115 (FAILURE OF NON-REDUNDENT RELAY)	P5	Non-Redundent Relay	0.96	0.93	0.89	1.01	1.00	0.93	1.00	1.00	0.95	1.01	0.13	-0.44	0.89	Continue to monitor future load forecast
CLY LND 115 kV	RAVENSWOOD 115 (FAILURE OF NON-REDUNDENT RELAY)	P5	Non-Redundent Relay	0.92	0.91	0.90	0.99	0.96	0.90	0.96	0.96	0.91	0.99	0.26	0.90	0.90	Continue to monitor future load forecast
CLY LND2 115 kV	RAVENSWOOD 115 (FAILURE OF NON-REDUNDENT RELAY)	P5	Non-Redundent Relay	0.92	0.91	0.90	0.99	0.96	0.91	0.97	0.96	0.91	0.99	0.26	0.90	0.90	Continue to monitor future load forecast
DMTAR_SL 115 kV	STATIN J-EDES-GRANT 115kV [0] & SAN LEANDRO-OAKLND J #1 115kV [3520]	P6	N1/N1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.90	Sensitivity only
EDES 115 kV		P6	N1/N1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.90	Sensitivity only
ALMADEN 60 kV	Metcalf - El Patio No. 1 & 2 115 kV Lines	P7	DCTL	0.97	0.97	0.90	1.03	1.03	0.97	1.02	1.00	0.98	1.01	0.96	0.88	0.90	Continue to monitor future load forecast
ALMADEN 60 kV	Metcalf - Evergreen #1 and #2 115 kV Lines	P7	DCTL	0.95	0.95	0.85	1.02	1.02	0.94	1.01	1.01	0.96	1.02	0.93	0.83	0.85	Continue to monitor future load forecast
EVRGRN 1 115 kV		P7	DCTL	0.98	0.97	0.91	1.03	1.03	0.98	1.01	1.04	0.98	1.05	0.95	0.89	0.91	Sensitivity only
MABURY 60 kV		P7	DCTL	0.97	0.96	0.89	1.03	1.03	0.97	1.02	1.00	0.97	1.00	0.95	0.87	0.89	Continue to monitor future load forecast
STONE 115 kV		P7	DCTL	0.97	0.96	0.91	1.02	1.02	0.97	1.01	1.04	0.97	1.05	0.95	0.88	0.91	Sensitivity only
CRYSTLSG 60 kV	Monta Vista-Jefferson Nos. 1 & 2 230 kV lines	P7	DCTL	0.85	1.02	1.02	0.90	1.04	1.02	0.91	1.06	1.02	1.07	0.87	1.01	1.02	Project: Jefferson 230 kV bus upgrade project In-service date: 2024 Short term: Operating solution
EMRLD LE 60 kV		P7	DCTL	0.87	1.03	1.02	0.91	1.05	1.03	0.92	1.06	1.03	1.07	0.89	1.02	1.02	Project: Jefferson 230 kV bus upgrade project In-service date: 2024 Short term: Operating solution
LAS PLGS 60 kV		P7	DCTL	0.86	1.02	1.01	0.90	1.04	1.01	0.91	1.06	1.02	1.07	0.88	1.00	1.01	Project: Jefferson 230 kV bus upgrade project In-service date: 2024 Short term: Operating solution
RALSTON 60 kV		P7	DCTL	0.86	1.03	1.02	0.90	1.04	1.02	0.91	1.06	1.03	1.07	0.88	1.01	1.02	Project: Jefferson 230 kV bus upgrade project In-service date: 2024 Short term: Operating solution
STANFORD 60 kV		P7	DCTL	0.85	1.02	1.01	0.89	1.03	1.01	0.90	1.06	1.02	1.06	0.87	1.01	1.01	Project: Jefferson 230 kV bus upgrade project In-service date: 2024 Short term: Operating solution

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High/Low Voltages

Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)								Voltage PU (Sensitivity Scenarios)					Project & Potential Mitigation Solutions
				2022 Summer Peak	2025 Summer Peak	2030 Summer Peak	2022 Winter Peak	2025 Winter Peak	2030 Winter Peak	2022 Spring Off-Peak	2025 Spring Off-Peak	2025 SP High CEC Forecast	2025 SpOP Hi Renew & Min Gas Gen	2022 SP Heavy Renewable & Min Gas Gen	2030-Summer Peak-High SVP	2030 Summer Peak w/o Facility Rerates	
WOODSIDE 60 kV		P7	DCTL	0.86	1.02	1.01	0.90	1.04	1.01	0.91	1.06	1.02	1.07	0.88	1.01	1.01	Project: Jefferson 230 kV bus upgrade project In-service date: 2024 Short term: Operating solution
ALMADEN 60 kV	Newark - Los Esteros & Los Esteros - Metcalf 230 kV Lines	P7	DCTL	0.98	0.97	0.90	1.03	1.03	0.97	1.02	1.00	0.98	1.01	0.94	0.83	0.90	Continue to monitor future load forecast
BARTLP 115 kV	Swift - Metcalf & Piercy - Metcalf 115 kV Lines	P2	Bus/Breaker	0.96	0.96	0.91	1.04	1.03	0.97	1.01	1.04	0.97	1.04	0.95	0.89	0.91	Sensitivity only
MABURY 115 kV		P2	Bus/Breaker	0.96	0.96	0.91	1.04	1.03	0.97	1.01	1.04	0.97	1.04	0.95	0.89	0.91	Sensitivity only
MCKEE 115 kV		P2	Bus/Breaker	0.96	0.96	0.91	1.04	1.03	0.97	1.01	1.04	0.97	1.05	0.95	0.89	0.91	Sensitivity only
PIERCY 115 kV		P2	Bus/Breaker	0.96	0.95	0.90	1.05	1.04	0.96	1.01	1.04	0.96	1.05	0.95	0.88	0.90	Continue to monitor future load forecast
ALMADEN 60 kV	Trimble - San Jose B & Kifer - FMC 115 kV Lines	P2	Bus/Breaker	0.97	0.96	0.89	1.03	1.03	0.96	1.01	1.00	0.98	1.01	0.96	0.89	0.89	Continue to monitor future load forecast

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Voltage Deviation

Substation	Contingency (All and Worst P6)	Category	Category Description	Post Cont. Voltage Deviation % (Baseline Scenarios)								Post Cont. Voltage Deviation % (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2022 Summer Peak	2025 Summer Peak	2030 Summer Peak	2022 Winter Peak	2025 Winter Peak	2030 Winter Peak	2022 Spring Off-Peak	2025 Spring Off-Peak	2025 SP High CEC Forecast	2025 SpOP Hi Renew & Min Gas Gen	2022 SP Heavy Renewable & Min Gas Gen	2030-Summer Peak-High SVP	
E. SHORE 230 kV	EASTSHORE-SAN M**ATEO 230KV [4650]**	P1	N-1	0.3	0.5	1.5	0.0	-0.2	0.9	1.3	-0.3	0.7	-0.7	9	1.8	Sensitivity Only
E. SHORE 230 kV	EASTSHORE-SAN MATEO 230kV [4650]	P1	N-1	0.3	0.5	1.5	0.0	-0.2	0.9	1.3	-0.3	0.7	-0.7	9	1.8	Sensitivity Only
RUSELCTY 230 kV	EASTSHORE-SAN MATEO 230KV [4650]	P1	N-1	0.3	0.5	1.4	0.0	-0.2	0.9	1.3	-0.3	0.7	-0.7	9	1.7	Sensitivity Only
RUSELCTY 230 kV	EASTSHORE-SAN MATEO 230kV [4650]	P1	N-1	0.3	0.5	1.4	0.0	-0.2	0.9	1.3	-0.3	0.7	-0.7	9	1.7	Sensitivity Only
LOS GATS 60 kV	MONTA VISTA-LOS GATOS 60kV [7610]	P1	N-1	7.4	9.1	17	2.2	2.6	10	1.3	3.8	8	3.6	9	18	Diable Automatics
MCKEE &1 115 kV	PIERCY-METCALF 115kV [4318]	P1	N-1	NA	5.8	9	NA	0.8	5.5	NA	-0.6	5.6	-0.9	NA	9	Continue to monitor future load forecast
PIERCY 115 kV	PIERCY-METCALF 115kV [4318]	P1	N-1	NA	6.8	10	NA	0.8	6.5	NA	-0.8	6.5	-1.1	NA	11	Continue to monitor future load forecast

Study Area: PG&E Greater Bay Area

Transient Stability

Contingency	Category	Category Description	Transient Stability Performance					Potential Mitigation Solutions
			Baseline Scenarios			Sensitivity Scenarios		
			2025 Summer Peak	2030 Summer Peak	2025 Spring Off-Peak	2025 SP High CEC Forecast	2025 SP Heavy Renewable & Min Gas Gen	
Metcalf 500/230 kV #13 Transformer 3Ø fault with normal clearing.	P1-3	N-1	Potential WECC/NERC criteria violation	Potential WECC/NERC criteria violation	Potential WECC/NERC criteria violation	Potential WECC/NERC criteria violation	Potential WECC/NERC criteria violation	Under Review
Metcalf 500/230 kV #13 Transformer 3Ø fault with normal clearing with LMEC offline in the base case.	P3-3	G-1/N-1	Potential WECC/NERC criteria violation	Potential WECC/NERC criteria violation	Potential WECC/NERC criteria violation	Potential WECC/NERC criteria violation	Potential WECC/NERC criteria violation	Under Review
Metcalf 500/230 kV #13 Transformer SLG fault with delayed clearing.	P5-3	Non-Redundant Relay	No issue	No issue	No issue	No issue	No issue	No mitigation required
Tesla-Newark 230 kV line 3Ø fault with normal clearing with Metcalf 500/230 kV #13 Transformer offline in the base case.	P6-1	N-1-1	No issue	No issue	No issue	No issue	No issue	No mitigation required
Metcalf 230 kV bus 3Ø fault with normal clearing with Metcalf 500/230 kV #13 Transformer offline in the base case.	P6-2	N-1-1	Potential WECC/NERC criteria violation	Potential WECC/NERC criteria violation	Potential WECC/NERC criteria violation	Potential WECC/NERC criteria violation	Potential WECC/NERC criteria violation	Under Review
Contra Costa-Gateway 230 kV SLG fault with delayed clearing.	P5-2	Non-Redundant Relay	No issue	No issue	No issue	No issue	No issue	No mitigation required
Contra Costa-Gateway 230 kV SLG fault expanded to elements lost due to stuck breaker and clear fault from remote breakers with normal clearing time.	P4-2	Stuck Breaker	No issue	No issue	No issue	No issue	No issue	No mitigation required
TBC SLG fault with normal clearing.	P1-5	N-1	No issue	No issue	No issue	No issue	No issue	No mitigation required
TBC SLG fault with normal clearing with LMEC offline in the base case.	P3-5	G-1/N-1	No issue	No issue	No issue	No issue	No issue	No mitigation required
TBC SLG fault with normal clearing with Tesla-Newark 230 kV line offline in the base case.	P6-4	N-1-1	No issue	No issue	No issue	No issue	No issue	No mitigation required
Newark 230 kV 3Ø fault with normal clearing.	P1-2	N-1	No issue	No issue	No issue	No issue	No issue	No mitigation required
Tesla-Newark 230 kV line 3Ø fault with normal clearing with LMEC offline in the base case.	P3-2	G-1/N-1	No issue	No issue	No issue	No issue	No issue	No mitigation required
Monta Vista 230 kV SVD 3Ø fault with normal clearing.	P1-4	N-1	No issue	No issue	No issue	No issue	No issue	No mitigation required
Monta Vista 230 kV SVD 3Ø fault with normal clearing with LMEC offline in the base case.	P3-4	G-1/N-1	Potential WECC/NERC criteria violation	Potential WECC/NERC criteria violation	Potential WECC/NERC criteria violation	Potential WECC/NERC criteria violation	Potential WECC/NERC criteria violation	Under Review
Monta Vista 230 kV SVD SLG fault expanded to elements lost due to stuck breaker and clear fault from remote breakers with normal clearing time.	P4-4	Stuck Breaker	No issue	No issue	No issue	No issue	No issue	No mitigation required
Monta Vista 230 kV SVD SLG fault with delayed clearing.	P5-4	Non-Redundant Relay	No issue	No issue	No issue	No issue	No issue	No mitigation required
Ravenswood 230 kV SVD 3Ø fault with normal clearing with Monta Vista 230 kV SVD offline in the base case.	P6-3	N-1-1	Potential WECC/NERC criteria violation	Potential WECC/NERC criteria violation	Potential WECC/NERC criteria violation	Potential WECC/NERC criteria violation	Potential WECC/NERC criteria violation	Under Review
Metcalf 230 kV bus SLG fault with normal clearing.	P2-2	Bus	No issue	No issue	No issue	No issue	No issue	No mitigation required
Metcalf 230 kV line breaker SLG fault with normal clearing.	P2-3	Non-Bus-Tie Breaker	No issue	No issue	No issue	No issue	No issue	No mitigation required
Metcalf 230 kV bus-tie breaker SLG fault with normal clearing.	P2-4	Bus-Tie Breaker	No issue	No issue	No issue	No issue	No issue	No mitigation required

Study Area: PG&E Greater Bay Area

Transient Stability

Contingency	Category	Category Description	Transient Stability Performance					Potential Mitigation Solutions
			Baseline Scenarios			Sensitivity Scenarios		
			2025 Summer Peak	2030 Summer Peak	2025 Spring Off-Peak	2025 SP High CEC Forecast	2025 SP Heavy Renewable & Min Gas Gen	
Metcalf 500/230 kV #13 Transformer SLG fault expanded to elements lost due to stuck breaker and clear fault from remote breakers with normal clearing time.	P4-3	Stuck Breaker	No issue	No issue	No issue	No issue	No issue	No mitigation required
Crocket 3Ø fault with normal clearing with LMEC offline in the base case.	P3-1	G-1/N-1	No issue	No issue	No issue	No issue	No issue	No mitigation required
LMEC 3Ø fault with normal clearing.	P1-1	N-1	No issue	No issue	No issue	No issue	No issue	No mitigation required
DEC 3Ø fault with normal clearing.	P1-1	N-1	No issue	No issue	No issue	No issue	No issue	No mitigation required
Metcalf 115 kV bus SVD SLG fault expanded to elements lost due to stuck breaker and clear fault from remote breakers with normal clearing time.	P4-5	Stuck Breaker	No issue	No issue	No issue	No issue	No issue	No mitigation required
Metcalf 115 kV bus-tie breaker SVD SLG fault expanded to elements lost due to stuck breaker and clear fault from remote breakers with normal clearing time.	P4-6	Stuck Breaker	No issue	No issue	No issue	No issue	No issue	No mitigation required
Metcalf 115 kV bus SLG fault with delayed clearing.	P5-5	Non-Redundant Relay	Potential WECC/NERC criteria violation	Potential WECC/NERC criteria violation	No issue	No issue	No issue	Under Review
Los Esteros SLG fault expanded to elements lost due to stuck breaker and clear fault from remote breakers with normal clearing time.	P4-1	Stuck Breaker	No issue	No issue	No issue	No issue	No issue	No mitigation required
Los Esteros SLG fault with delayed clearing.	P5-1	Non-Redundant Relay	No issue	No issue	No issue	No issue	No issue	No mitigation required
Contra Costa-Moraga # 1 & 2 230 kV lines SLG fault with successful high speed reclose.	P7-1	DCTL	No issue	No issue	No issue	No issue	No issue	No mitigation required
Contra Costa-Moraga # 1 & 2 230 kV lines SLG fault with unsuccessful high speed reclose.	P7-1	DCTL	No issue	No issue	No issue	No issue	No issue	No mitigation required
Tesla-Newark & Tesla-Ravenswood 230 kV lines SLG fault with successful high speed reclose.	P7-1	DCTL	No issue	No issue	No issue	No issue	No issue	No mitigation required
Tesla-Newark & Tesla-Ravenswood 230 kV lines SLG fault with unsuccessful high speed reclose.	P7-1	DCTL	No issue	No issue	No issue	No issue	No issue	No mitigation required

2020-2021 ISO Reliability Assessment - Study Results

Study Area: PG&E Greater Bay Area

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

2020-2021 ISO Reliability Assessment - Study Results

Study Area: PG&E Greater Bay Area

Single Source Substation with more than 100 MW Load

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

No single source substation with more than 100 MW

2020-2021 ISO Reliability Assessment - Study Results
Study Area: PG&E Greater Fresno
Thermal Overloads

California ISO

Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading % (Baseline Scenarios)								Loading % (Sensitivity Scenarios)					Project & Potential Mitigation Solutions
				2022 Summer Peak	2025 Summer Peak	2030 Summer Peak	2022 Winter Peak	2025 Winter Peak	2030 Winter Peak	2022 Spring Off-Peak	2025 Spring Off-Peak	2025 SP High CEC Forecast	2025 SpOP Hi Renew & Min Gas Gen	2022 SP Heavy Renewable & Min Gas Gen	2030 Retirement of QF Generations	2030 Summer Peak w/o Facility Rerates	
Bellota-Warnerville 230 kV Line	P7-1-210025_Ext - Cottle-Melones & Melones-Wilson 230kV Lines Out	P7-1	DCTL	25.63	5.29	18.72	N/A	N/A	N/A	27.93	32.32	7.13	23.91	100.13	N/A	47.89	Sensitivity Only
	MUSTANGSS 230KV - MIDDLE BREAKER BAY 2	P2-3	Bus/Breaker	7.6	12.9	4.91	N/A	N/A	N/A	16.73	49.08	20.39	39.95	102.02	N/A	14.75	Sensitivity Only
	GATES Section D & E 230 KV BUS (FAILURE OF NON-REDUNDENT RELAY)	P5-5	Non-Redundent Relay	7.86	14.18	4.56	N/A	N/A	N/A	12.52	55.85	21.11	47.68	109.16	N/A	14.08	Install Redundant protection
Warnerville - Wilson 230 kV Line	GATES-GREGG 230KV [4700] & P1-2:A14:137:_CHSR09SWSTA-MUSTANGSS 230KV [0]	P6	N1/N1	<100	<100	<100	N/A	N/A	N/A	<100	102.22	<100	100.6	<100	N/A	<100	Generation re-dispatch
	GATES Section D & E 230 KV BUS (FAILURE OF NON-REDUNDENT RELAY)	P5-5	Non-Redundent Relay	30.14	19.22	38.86	N/A	N/A	N/A	57.43	151.01	38.8	134.62	123.57	N/A	32.92	Install Redundant protection
	MUSTANGSS 230KV - MIDDLE BREAKER BAY 2	P2-3	Bus/Breaker	31.11	15.02	36.65	N/A	N/A	N/A	43.79	129.95	36.42	109.47	114.36	N/A	31.48	Generation re-dispatch
	MUSTANGSS-GATES #1 230KV [0] & MUSTANGSS-GATES #2 230KV [0]	P7-1	DCTL	31.56	14.97	36.45	N/A	N/A	N/A	41.27	128.16	36.39	109.43	110.21	N/A	31.21	Generation re-dispatch
	P7-1-210025_Ext - Cottle-Melones & Melones-Wilson 230kV Lines Out	P7-1	DCTL	7.48	28.3	8.17	N/A	N/A	N/A	19.75	72.7	1.61	55.81	100.07	N/A	11.2	Sensitivity Only
MOSSLNSW-LASAGUILASS #2 230KV	GATES Section D & E 230 KV BUS (FAILURE OF NON-REDUNDENT RELAY)	P5-5	Non-Redundent Relay	2.45	10.69	4.46	N/A	N/A	N/A	24.26	107.29	17.32	87.53	87.13	N/A	5.17	Install Redundant protection
Los Banos 500/230kV TB #1	GATES Section D & E 230 KV BUS (FAILURE OF NON-REDUNDENT RELAY)	P5-5	Non-Redundent Relay	4.7	26.79	7.32	N/A	N/A	N/A	57.3	96.34	21.84	102.32	43.76	N/A	0.81	Install Redundant protection
Los Banos-Panoche #2 230 kV Line	GATES Section D & E 230 KV BUS (FAILURE OF NON-REDUNDENT RELAY)	P5-5	Non-Redundent Relay	10.54	8.56	12.09	N/A	N/A	N/A	24.5	121.38	12.01	112.71	80.89	N/A	8.54	Install Redundant protection
Los Banos-Dos Amigos #1 230 kV Line	GATES Section D & E 230 KV BUS (FAILURE OF NON-REDUNDENT RELAY)	P5-5	Non-Redundent Relay	5.36	23.6	26.64	N/A	N/A	N/A	39.2	108.74	27.15	99.92	67.9	N/A	22.58	Install Redundant protection
Los Banos-San Luis PGP #1 230 kV Line	LOS BANOS-SAN LUIS PUMPS #2 230KV [5060] & Base Case	P6	N1/N1	<100	<100	114.43	N/A	N/A	N/A	<100	<100	<100	<100	<100	N/A	114.41	Continue to monitor future forecast
Los Banos-San Luis PGP #2 230 kV Line	LOS BANOS-SAN LUIS PUMPS #1 230KV [5050] & Base Case	P6	N1/N1	<100	<100	114.43	N/A	N/A	N/A	<100	<100	<100	<100	<100	N/A	114.41	Continue to monitor future forecast
Panoche-Gates #1 230 kV Line	P7-1-210012_Ext - Los Banos-Gates #1 & Los Banos-Midway 500kV Lines Out (X-2b)	P7-1	DCTL	48.17	<100	<100	N/A	N/A	N/A	123.53	<100	<100	<100	9.26	N/A	<100	Generation re-dispatch

2020-2021 ISO Reliability Assessment - Study Results
Study Area: PG&E Greater Fresno
Thermal Overloads

California ISO

Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading % (Baseline Scenarios)								Loading % (Sensitivity Scenarios)					Project & Potential Mitigation Solutions
				2022 Summer Peak	2025 Summer Peak	2030 Summer Peak	2022 Winter Peak	2025 Winter Peak	2030 Winter Peak	2022 Spring Off-Peak	2025 Spring Off-Peak	2025 SP High CEC Forecast	2025 SpOP Hi Renew & Min Gas Gen	2022 SP Heavy Renewable & Min Gas Gen	2030 Retirement of QF Generations	2030 Summer Peak w/o Facility Rerates	
Panoche-Gates #2 230 kV Line	P7-1-210012_Ext - Los Banos-Gates #1 & Los Banos-Midway 500kV Lines Out (X-2b)	P7-1	DCTL	48.17	<100	<100	N/A	N/A	N/A	123.53	<100	<100	<100	9.26	N/A	<100	Generation re-dispatch
Helms-Gregg #1 230kV line	HELMS 3 18.00KV GEN UNIT 1 & HELMS-GREGG #2 230KV [4880]	P3	G1/N1	<100	<100	<100	N/A	N/A	N/A	<100	<100	Diverge	<100	<100	N/A	<100	Sensitivity Only
	BORDEN-GREGG 230KV [4400] & HELMS-GREGG #2 230KV [4880]	P6	N1/N1	<100	<100	<100	N/A	N/A	N/A	<100	<100	Diverge	<100	<100	N/A	<100	Sensitivity Only
	BORDEN-GREGG 230KV [4400] (2) & HELMS-GREGG #2 230KV [4880]	P6	N1/N1	<100	<100	<100	N/A	N/A	N/A	<100	<100	Diverge	<100	<100	N/A	<100	Sensitivity Only
Helms-Gregg #2 230kV line	HELMS 1 18.00KV GEN UNIT 1 & HELMS-GREGG #1 230KV [4870]	P3	G1/N1	<100	<100	<100	N/A	N/A	N/A	<100	<100	Diverge	<100	<100	N/A	<100	Sensitivity Only
Gregg-Ashlan 230 kV Line (Gregg-Figarden Tap 2)	GREGG-HERNDON #1 230KV [4830] & GREGG-HERNDON #2 230KV [4840]	P6	N1/N1	<100	<100	<100	N/A	N/A	N/A	<100	104.1	<100	111.56	<100	N/A	131.03	Generation re-dispatch
	GREGG-HERNDON #2 230KV [4840] & GREGG-HERNDON #1 230KV [4830]	P6	N1/N1	<100	<100	<100	N/A	N/A	N/A	<100	104.1	<100	111.56	<100	N/A	131.03	Generation re-dispatch
	HERNDON-ASHLAN 230KV [4890] & Base Case	P6	N1/N1	<100	<100	101.64	N/A	N/A	N/A	<100	<100	<100	<100	<100	N/A	101.67	Continue to monitor future forecast
	GREGG-ASHLAN 230KV [4820] & Base Case	P6	N1/N1	<100	<100	100.7	N/A	N/A	N/A	<100	<100	<100	<100	<100	N/A	100.52	Continue to monitor future forecast
Gregg-Ashlan 230 kV Line (Figarden Tap 2-Ashlan)	GREGG-HERNDON #1 230KV [4830] & GREGG-HERNDON #2 230KV [4840]	P6	N1/N1	<100	<100	<100	N/A	N/A	N/A	<100	<100	<100	104.67	<100	N/A	<100	Sensitivity only
	GREGG-HERNDON #2 230KV [4840] & GREGG-HERNDON #1 230KV [4830]	P6	N1/N1	<100	<100	<100	N/A	N/A	N/A	<100	<100	<100	104.67	<100	N/A	<100	Sensitivity only
Balch-McCall 230 kV Line (Balch-Pine Flats)	GREGG-HERNDON #1 230KV [4830] & HELMS-GREGG #2 230KV [4880]	P6	N1/N1	<100	<100	<100	N/A	N/A	N/A	<100	<100	Diverge	<100	<100	N/A	<100	sensitivity Only
	GREGG-HERNDON #2 230KV [4840] & HELMS-GREGG #2 230KV [4880]	P6	N1/N1	<100	<100	<100	N/A	N/A	N/A	<100	<100	Diverge	<100	<100	N/A	<100	sensitivity Only
McCall 230/115kV TB #2	MC CALL 230KV - SECTION 1D & 2D	P2-4	Bus/Breaker	88.99	93.82	107.93	N/A	N/A	N/A	69.96	28.07	97.13	27.21	60.5	N/A	5.14	Continue to monitor future forecast
McCall 230/115kV TB #3	MC CALL 115KV - MIDDLE BREAKER BAY 3	P2-3	Bus/Breaker	95.74	104.39	116.57	N/A	N/A	N/A	81.14	27.02	107.21	33.74	63.29	N/A	5.45	Continue to monitor future forecast
Gates-Gregg 230 kV Line (Henrietta Tap 1-Henrietta)	P1-2:A14:137:_CHSR09SWSTA-MUSTANGSS 230KV [0] & PANOCHE-HELM 230KV [5370]	P6	N1/N1	<100	<100	<100	N/A	N/A	N/A	<100	<100	<100	101.34	<100	N/A	<100	Sensitivity Only
	P1-2:A14:138:_MC CALL-CHSR09SWSTA #1 230KV [0] & HELM-MCCALL 230KV [4860]	P6	N1/N1	<100	<100	<100	N/A	N/A	N/A	<100	<100	<100	101.33	<100	N/A	<100	Sensitivity Only
	P1-2:A14:138:_MC CALL-CHSR09SWSTA #1 230KV [0] & PANOCHE-HELM 230KV [5370]	P6	N1/N1	<100	<100	<100	N/A	N/A	N/A	<100	<100	<100	101.73	<100	N/A	<100	Sensitivity Only
Mustang-Gregg 230kV line	HELM-MCCALL 230KV [4860] & P1-2:A14:137:_CHSR09SWSTA-MUSTANGSS 230KV [0]	P6	N1/N1	<100	<100	<100	N/A	N/A	N/A	<100	<100	<100	108.1	<100	N/A	<100	Sensitivity Only
	P1-2:A14:137:_CHSR09SWSTA-MUSTANGSS 230KV [0] & HELMS PP3 230/18KV TB 1	P6	N1/N1	<100	<100	<100	N/A	N/A	N/A	<100	<100	<100	104.37	<100	N/A	<100	Sensitivity Only
	P1-2:A14:137:_CHSR09SWSTA-MUSTANGSS 230KV [0] & HELMS-GREGG #2 230KV [4880]	P6	N1/N1	<100	<100	<100	N/A	N/A	N/A	<100	<100	<100	104.49	<100	N/A	<100	Sensitivity Only
	HELM-MCCALL 230KV [4860] & HENTAP2-MUSTANGSS #1 230KV [0]	P7-1	DCTL	<100	<100	<100	N/A	N/A	N/A	<100	<100	<100	108.08	<100	N/A	33.96	Sensitivity Only
	PANOCHE 230KV - SECTION 1D & 2D	P2-4	Bus/Breaker	14.52	29.15	32.05	N/A	N/A	N/A	52.58	82.54	29.22	100.71	48.52	N/A	30.7	Sensitivity Only
	HOLM Gen Unit 1 (CCSF) & GATES-GREGG 230KV [4700]	P3	G1/N1	<100	<100	<100	N/A	N/A	N/A	<100	<100	<100	100.89	<100	N/A	<100	Sensitivity Only
	Q877PH12 0.39KV GEN UNIT 12 & GATES-GREGG 230KV [4700]	P3	G1/N1	<100	<100	<100	N/A	N/A	N/A	<100	<100	<100	103.44	<100	N/A	<100	Sensitivity Only

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Study Area: PG&E Greater Fresno
Thermal Overloads

California ISO

Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading % (Baseline Scenarios)								Loading % (Sensitivity Scenarios)					Project & Potential Mitigation Solutions
				2022 Summer Peak	2025 Summer Peak	2030 Summer Peak	2022 Winter Peak	2025 Winter Peak	2030 Winter Peak	2022 Spring Off-Peak	2025 Spring Off-Peak	2025 SP High CEC Forecast	2025 SpOP Hi Renew & Min Gas Gen	2022 SP Heavy Renewable & Min Gas Gen	2030 Retirement of QF Generations	2030 Summer Peak w/o Facility Rerates	
Mustang-McCall 230kV line	Q877PH3 0.63KV GEN UNIT 3 & GATES-GREGG 230KV [4700]	P3	G1/N1	<100	<100	<100	N/A	N/A	N/A	<100	<100	<100	103.71	<100	N/A	<100	Sensitivity Only
	GATES-GREGG 230KV [4700] & HELM-MCCALL 230KV [4860]	P6	N1/N1	<100	<100	<100	N/A	N/A	N/A	<100	<100	<100	112.37	<100	N/A	<100	Sensitivity Only
	GATES-GREGG 230KV [4700] & PANOCHE-HELM 230KV [5370]	P6	N1/N1	<100	<100	<100	N/A	N/A	N/A	<100	<100	<100	114.33	<100	N/A	<100	Sensitivity Only
	LOSBANOS 500/230KV TB 1 & GATES-GREGG 230KV [4700]	P6	N1/N1	<100	<100	<100	N/A	N/A	N/A	<100	<100	<100	109.84	<100	N/A	<100	Sensitivity Only
	HENTAP1-MUSTANGSS #1 230KV [0] & TRANQLTYSS-MCMULLN1 #1 230KV [0]	P7-1	DCTL	24.73	41.33	41.28	N/A	N/A	N/A	36.65	85.24	41.38	103.91	30.85	N/A	39.17	Sensitivity Only
	HENTAP1-MUSTANGSS #1 230KV [0] & HERNDON-KEARNEY 230KV [4900]	P7-1	DCTL	23.19	39.45	39.37	N/A	N/A	N/A	36.27	84.71	39.32	103.2	31.33	N/A	37.24	Sensitivity Only
	GREGG 230KV - MIDDLE BREAKER BAY 5	P2-3	Bus/Breaker	22.05	36.66	37.38	N/A	N/A	N/A	32.05	84.21	36.27	101.61	31.1	N/A	35.35	Sensitivity Only
	GATES-GREGG 230KV [4700]	P1-2	N-1	22.06	36.59	37.28	N/A	N/A	N/A	32.06	84.2	36.19	101.6	31.1	N/A	35.25	Sensitivity Only
	HENRIETA - 1D 230KV & GATES-GREGG LINE	P2-3	Bus/Breaker	22.06	36.59	37.28	N/A	N/A	N/A	32.06	84.2	36.19	101.6	31.1	N/A	35.25	Sensitivity Only
	MUSTANGSS 230KV - MIDDLE BREAKER BAY 3	P2-3	Bus/Breaker	22.06	36.59	37.28	N/A	N/A	N/A	32.06	84.2	36.19	101.6	31.1	N/A	35.25	Sensitivity Only
Gates-Mustang #1 230kV Line	Q779SPV 0.55KV GEN UNIT 1 & 230KV [2605]	P3	G1/N1	<100	<100	<100	N/A	N/A	N/A	<100	115.1	<100	101.55	<100	N/A	<100	Generation re-dispatch
	Q877PH12 0.39KV GEN UNIT 12 & 230KV [2605]	P3	G1/N1	<100	<100	<100	N/A	N/A	N/A	<100	116.94	<100	104.32	<100	N/A	<100	Generation re-dispatch
	Q877PH3 0.63KV GEN UNIT 3 & 230KV [2605]	P3	G1/N1	<100	<100	<100	N/A	N/A	N/A	<100	117.16	<100	104.59	<100	N/A	<100	Generation re-dispatch
	230KV [5000] & 230KV [2605]	P6	N1/N1	<100	<100	<100	N/A	N/A	N/A	<100	121.02	<100	108.14	<100	N/A	<100	Generation re-dispatch
	230KV [5481] & 230KV [2605]	P6	N1/N1	<100	<100	<100	N/A	N/A	N/A	<100	121.02	<100	108.14	<100	N/A	<100	Generation re-dispatch
	LOSBANOS 500/230KV TB 1 & 230KV [2605]	P6	N1/N1	<100	<100	<100	N/A	N/A	N/A	<100	122.7	<100	111.22	<100	N/A	<100	Generation re-dispatch
	GATES F 230KV - MIDDLE BREAKER BAY 4	P2-3	Bus/Breaker	7.26	27.7	22.82	N/A	N/A	N/A	48.61	115.91	26.44	102.46	88.26	N/A	19.76	Generation re-dispatch
Gates-Mustang #2 230kV Line	KANSAS 12.47KV GEN UNIT 1 & 230KV [2604]	P3	G1/N1	<100	<100	<100	N/A	N/A	N/A	<100	114.34	<100	101.8	<100	N/A	<100	Generation re-dispatch
	Q877PH12 0.39KV GEN UNIT 12 & 230KV [2604]	P3	G1/N1	<100	<100	<100	N/A	N/A	N/A	<100	116.94	<100	104.32	<100	N/A	<100	Generation re-dispatch
	Q877PH3 0.63KV GEN UNIT 3 & 230KV [2604]	P3	G1/N1	<100	<100	<100	N/A	N/A	N/A	<100	117.16	<100	104.59	<100	N/A	<100	Generation re-dispatch
	230KV [5000] & 230KV [2604]	P6	N1/N1	<100	<100	<100	N/A	N/A	N/A	<100	121.02	<100	108.14	<100	N/A	<100	Generation re-dispatch
	230KV [5481] & 230KV [2604]	P6	N1/N1	<100	<100	<100	N/A	N/A	N/A	<100	121.02	<100	108.14	<100	N/A	<100	Generation re-dispatch
	LOSBANOS 500/230KV TB 1 & 230KV [2604]	P6	N1/N1	<100	<100	<100	N/A	N/A	N/A	<100	122.7	<100	111.22	<100	N/A	<100	Generation re-dispatch
	GATES F 230KV - MIDDLE BREAKER BAY 5	P2-3	Bus/Breaker	6.94	27.38	22.46	N/A	N/A	N/A	48.29	115.59	26.15	102.2	88.07	N/A	19.4	Generation re-dispatch
Gates-Arco 230kV line	P7-1-210014_Ext - Los Banos-Midway & Gates-Midway 500kV Lines Out	P7-1	DCTL	57.67	17.91	16.08	N/A	N/A	N/A	119.07	9.41	45.83	43.56	31.6	N/A	16.71	Generation re-dispatch
Gates-Midway 230kV Line	P7-1-210014_Ext - Los Banos-Midway & Gates-Midway 500kV Lines Out	P7-1	DCTL	49.78	3.78	4.92	N/A	N/A	N/A	163.1	22.57	35.64	68.17	47.87	N/A	4.06	Generation re-dispatch
Atwater-Merced 115 kV Line (Atwater-Atwater Jct)	WILSON 115 KV #1 & #2 BUS (FAILURE OF NON-REDUNDENT RELAY)	P5-5	Non-Redundent Relay	Diverge	N/A	N/A	N/A	N/A	N/A	42.65	N/A	N/A	N/A	29.63	N/A	N/A	Project: Wilson 115kV Reinforcement Project In-service date: 05/23 Short term: Action plan
	WILSON A SECTION 1D & WILSON B SECTION 2D 115KV	P2-4	Bus/Breaker	Diverge	N/A	N/A	N/A	N/A	N/A	42.66	7.32	N/A	N/A	29.63	N/A	N/A	Project: Wilson 115kV Reinforcement Project In-service date: 05/23 Short term: Action plan

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Thermal Overloads

California ISO

Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading % (Baseline Scenarios)								Loading % (Sensitivity Scenarios)					Project & Potential Mitigation Solutions
				2022 Summer Peak	2025 Summer Peak	2030 Summer Peak	2022 Winter Peak	2025 Winter Peak	2030 Winter Peak	2022 Spring Off-Peak	2025 Spring Off-Peak	2025 SP High CEC Forecast	2025 SpOP Hi Renew & Min Gas Gen	2022 SP Heavy Renewable & Min Gas Gen	2030 Retirement of QF Generations	2030 Summer Peak w/o Facility Rerates	
Chowchilla-Kerckhoff #2 115 kV Line (Certanteed Jct 1-Chowchilla)	PANOCHE-MENDOTA 115KV [3230] & WILSON-LE GRAND 115KV [4170]	P6	N1/N1	<100	<100	<100	N/A	N/A	N/A	<100	<100	152.1	<100	<100	N/A	<100	Sensitivity Only
	WILSON-LE GRAND 115KV [4170] & PANOCHE-MENDOTA 115KV [3230]	P6	N1/N1	<100	<100	<100	N/A	N/A	N/A	<100	<100	152	<100	<100	N/A	<100	Sensitivity Only
Chowchilla-Kerckhoff #2 115 kV Line (Certanteed Jct 1-Sharon Tap)	DAIRYLAND-MENDOTA 115KV [1360] & WILSON-LE GRAND 115KV [4170]	P6	N1/N1	<100	<100	<100	N/A	N/A	N/A	<100	123.85	117.15	110.98	<100	N/A	<100	Generation re-dispatch
	WILSON-LE GRAND 115KV [4170] & DAIRYLAND-MENDOTA 115KV [1360]	P6	N1/N1	<100	<100	<100	N/A	N/A	N/A	<100	124.51	114.63	<100	<100	N/A	<100	Generation re-dispatch
	WILSON-LE GRAND 115KV [4170] & PANOCHE-MENDOTA 115KV [3230]	P6	N1/N1	<100	<100	<100	N/A	N/A	N/A	<100	116.16	195.97	<100	<100	N/A	<100	Generation re-dispatch
Atwater-Merced 115 kV Line (Atwater Jct-Merced)	WILSON 115 KV #1 & #2 BUS (FAILURE OF NON-REDUNDENT RELAY)	P5-5	Non-Redundent Relay	Diverge	N/A	N/A	N/A	N/A	N/A	43.66	N/A	N/A	N/A	30.83	N/A	N/A	Project: Wilson 115kV Reinforcement Project In-service date: 05/23 Short term: Action plan
	WILSON A SECTION 1D & WILSON B SECTION 2D 115KV	P2-4	Bus/Breaker	Diverge	N/A	N/A	N/A	N/A	N/A	43.67	8.01	N/A	N/A	30.83	N/A	N/A	Project: Wilson 115kV Reinforcement Project In-service date: 05/23 Short term: Action plan
Exchequer-LeGrand 115 kV Line	WILSON 115 KV #1 & #2 BUS (FAILURE OF NON-REDUNDENT RELAY)	P5-5	Non-Redundent Relay	Diverge	N/A	N/A	N/A	N/A	N/A	84.96	N/A	N/A	N/A	77.23	N/A	N/A	Project: Wilson 115kV Reinforcement Project In-service date: 05/23 Short term: Action plan
	EXCHEQUR 70/115KV TB 1 & Base Case	P6	N1/N1	100.47	<100	<100	N/A	N/A	N/A	100.52	<100	<100	<100	<100	N/A	<100	New Exchequer SPS
	MERCED-MERCED FALLS 70KV [9010] & Base Case	P6	N1/N1	<100	<100	<100	N/A	N/A	N/A	100.27	<100	<100	<100	<100	N/A	<100	New Exchequer SPS
	Moccasin 230/13.8kV Transformer #1 (CCSF) & EXCHEQUR 70/115KV TB 1	P6	N1/N1	<100	<100	122.04	N/A	N/A	N/A	<100	<100	<100	<100	<100	N/A	<100	New Exchequer SPS
	WILSON 230/115KV TB 2 & EXCHEQUR 70/115KV TB 1	P6	N1/N1	111.04	N/A	N/A	N/A	N/A	N/A	<100	<100	<100	N/A	<100	N/A	N/A	New Exchequer SPS
	Moccasin 230/13.8kV Transformer #1 (CCSF) & EXCHEQUR 70/115KV TB 1	P6	N1/N1	<100	<100	<100	N/A	N/A	N/A	<100	<100	<100	<100	<100	N/A	125.34	New Exchequer SPS
	EXCHEQUR 70/115KV TB 1	P1-3	N-1	99.84	69.56	122.04	N/A	N/A	N/A	99.83	40.7	2.86	36.67	2.89	N/A	125.34	New Exchequer SPS
	EXCHEQUR - 1D 70KV & MERCED FALLS-EXCHEQUER LINE	P2-3	Bus/Breaker	99.8	69.52	121.96	N/A	N/A	N/A	99.82	40.68	2.86	36.61	2.89	N/A	125.26	New Exchequer SPS
	EXCHEQUR 70KV SECTION 1D	P2-2	Bus/Breaker	99.77	69.51	121.86	N/A	N/A	N/A	99.78	40.62	2.86	36.54	2.89	N/A	125.16	New Exchequer SPS
	EXCHEQUR - 1D 70KV & EXCHEQUER-YOSEMITE LINE	P2-3	Bus/Breaker	99.77	69.51	121.86	N/A	N/A	N/A	99.78	40.62	2.86	36.54	2.89	N/A	125.16	New Exchequer SPS
	MERCED FALLS-EXCHEQUER 70KV [8990] (MCSWAINJ-MRCDFLLS)	P2-1	Line Section w/o Fault	84.1	49.69	119.97	N/A	N/A	N/A	97.14	48.85	28.96	46.83	17.29	N/A	123.24	New Exchequer SPS
	MRCDFLLS 70KV SECTION 1D	P2-2	Bus/Breaker	84.08	49.67	119.91	N/A	N/A	N/A	97.14	48.87	28.95	46.86	17.29	N/A	123.19	New Exchequer SPS
	MERCED 70KV SECTION MA	P2-2	Bus/Breaker	76.88	40.86	113.83	N/A	N/A	N/A	96.79	59.38	41.11	59.2	20.78	N/A	117.67	New Exchequer SPS
	MERCED-MERCED FALLS 70KV [9010]	P1-2	N-1	76.85	40.86	113.61	N/A	N/A	N/A	96.76	59.35	41.06	59.2	20.78	N/A	117.44	New Exchequer SPS
	MERCED 115/70KV TB 2	P1-3	N-1	86.54	38.38	112.69	N/A	N/A	N/A	99.8	69.59	37.27	58.61	23.29	N/A	117.11	New Exchequer SPS

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California ISO

Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading % (Baseline Scenarios)								Loading % (Sensitivity Scenarios)					Project & Potential Mitigation Solutions
				2022 Summer Peak	2025 Summer Peak	2030 Summer Peak	2022 Winter Peak	2025 Winter Peak	2030 Winter Peak	2022 Spring Off-Peak	2025 Spring Off-Peak	2025 SP High CEC Forecast	2025 SpOP Hi Renew & Min Gas Gen	2022 SP Heavy Renewable & Min Gas Gen	2030 Retirement of QF Generations	2030 Summer Peak w/o Facility Rerates	
	MERCED 115 KV #1 BUS (FAILURE OF NON-REDUNDENT RELAY)	P5-5	Non-Redundent Relay	86.34	40.69	113.05	N/A	N/A	N/A	99.33	59.45	40.97	59.3	23.29	N/A	116.87	New Exchequer SPS
	MERCED FALLS-EXCHEQUER 70KV [8990]	P1-2	N-1	74.37	43.44	112.74	N/A	N/A	N/A	87.78	38.87	29.49	36.79	17.33	N/A	116.03	New Exchequer SPS
	EL CAPITAN-WILSON 115KV [1510] & EXCHEQUR 70/115KV TB 1	P6	N1/N1	<100	100.55	<100	N/A	N/A	N/A	<100	<100	<100	<100	<100	N/A	107.01	New Exchequer SPS
	P7-1-210036_Ext - Helms-Gregg #1 & Helms-Gregg #3 230kV Lines Out	P7-1	DCTL	69.14	34.19	97.91	N/A	N/A	N/A	70.63	39.56	26.39	38.45	19.01	N/A	100.81	New Exchequer SPS
	HELMS-GREGG #1 230KV [4870] & HELMS-GREGG #2 230KV [4880]	P7-1	DCTL	69.13	34.17	97.89	N/A	N/A	N/A	70.63	39.56	26.39	38.45	19.01	N/A	100.79	New Exchequer SPS
	WESTLNDS 0.48KV GEN UNIT 1 & EXCHEQUR 70/115KV TB 1	P3	G1/N1	<100	<100	<100	N/A	N/A	N/A	<100	<100	<100	<100	<100	N/A	100.13	New Exchequer SPS
	WILSON A SECTION 1D & WILSON B SECTION 2D 115KV	P2-4	Bus/Breaker	Diverge	N/A	N/A	N/A	N/A	N/A	85.03	21.31	N/A	N/A	77.22	N/A	N/A	Project: Wilson 115kV Reinforcement Project In-service date: 05/23 Short term: Action plan
Exchequer 115/70 kV Transformer Bank 1	WILSON 115 KV #1 & #2 BUS (FAILURE OF NON-REDUNDENT RELAY)	P5-5	Non-Redundent Relay	Diverge	N/A	N/A	N/A	N/A	N/A	24.27	N/A	N/A	N/A	22.98	N/A	N/A	Project: Wilson 115kV Reinforcement Project In-service date: 05/23 Short term: Action plan
	WILSON A SECTION 1D & WILSON B SECTION 2D 115KV	P2-4	Bus/Breaker	Diverge	N/A	N/A	N/A	N/A	N/A	24.27	8.2	N/A	N/A	22.98	N/A	N/A	
Le Grand-Chowchilla 115kV Line	PANOCHE-MENDOTA 115KV [3230] & Base Case	P6	N1/N1	<100	<100	<100	N/A	N/A	N/A	<100	<100	<100	<100	110.38	N/A	<100	
	PANOCHE-MENDOTA 115KV [3230] & TOMATAK-MENDOTA #1 70KV [0]	P6	N1/N1	<100	<100	<100	N/A	N/A	N/A	<100	<100	<100	<100	100.01	N/A	<100	
	TOMATAK-MENDOTA #1 70KV [0] & PANOCHE-MENDOTA 115KV [3230]	P6	N1/N1	<100	<100	<100	N/A	N/A	N/A	<100	<100	<100	<100	100.03	N/A	<100	Sensitivity only
Wilson-Oro Loma 115 kV Line (LeGrand Jct-Wilson)	CHV.COAL 9.11KV GEN UNIT 1 & ARCO-TULARE LAKE 70KV [8460]	P3	G1/N1	108.74	<100	<100	N/A	N/A	N/A	<100	<100	<100	<100	<100	N/A	<100	Disable automatic restoration
	SANDDRAG 12.00KV GEN UNIT 1 & ARCO-TULARE LAKE 70KV [8460]	P3	G1/N1	103.72	<100	<100	N/A	N/A	N/A	<100	<100	100.68	<100	<100	N/A	<100	Disable automatic restoration
	SUNCTY D 12.00KV GEN UNIT 1 & ARCO-TULARE LAKE 70KV [8460]	P3	G1/N1	103.52	<100	100.07	N/A	N/A	N/A	<100	<100	100.85	<100	<100	N/A	<100	Disable automatic restoration
	P1-2:A14:121:_ARCO-TULARE LAKE 70KV [8460] & GATES D 230/70KV TB 5	P6	N1/N1	111.75	108.64	128.71	N/A	N/A	N/A	<100	<100	111.63	<100	<100	N/A	128.51	Disable automatic restoration
	GATES D 230/70KV TB 5 & P1-2:A14:121:_ARCO-TULARE LAKE 70KV [8460]	P6	N1/N1	111.54	111.17	128.37	N/A	N/A	N/A	<100	<100	112.48	<100	<100	N/A	127.25	Disable automatic restoration
	P1-2:A14:121:_ARCO-TULARE LAKE 70KV [8460] & Base Case	P6	N1/N1	125.66	112.04	114.14	N/A	N/A	N/A	<100	100.46	114.02	<100	<100	N/A	114.16	Disable automatic restoration
	ARCO-TULARE LAKE 70KV [8460]	P1-2	N-1	108.42	96.72	98.41	N/A	N/A	N/A	37	99.09	98.45	64.29	57.18	N/A	98.44	Disable automatic restoration
	TLRE LKE 70KV SECTION MA	P2-2	Bus/Breaker	108.43	96.73	98.41	N/A	N/A	N/A	37.01	99.08	98.46	64.29	57.19	N/A	98.44	Disable automatic restoration
	TLRE LKE - MA 70KV & ARCO-TULARE LAKE LINE	P2-3	Bus/Breaker	108.42	96.72	98.41	N/A	N/A	N/A	37	99.09	98.45	64.29	57.18	N/A	98.44	Disable automatic restoration
	MELONES-WILSON 230KV [5080] & PANOCHE-ORO LOMA 115KV [3240]	P6	N1/N1	<100	<100	<100	N/A	N/A	N/A	<100	<100	106.54	<100	<100	N/A	<100	Project: Wilson-Oro Loma Reconductoring In-service date: 01/26 Short term: Action plan

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California ISO

Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading % (Baseline Scenarios)								Loading % (Sensitivity Scenarios)					Project & Potential Mitigation Solutions
				2022 Summer Peak	2025 Summer Peak	2030 Summer Peak	2022 Winter Peak	2025 Winter Peak	2030 Winter Peak	2022 Spring Off-Peak	2025 Spring Off-Peak	2025 SP High CEC Forecast	2025 SpOP Hi Renew & Min Gas Gen	2022 SP Heavy Renewable & Min Gas Gen	2030 Retirement of QF Generations	2030 Summer Peak w/o Facility Rerates	
Wilson-Oro Loma 115 kV Line (LeGrand Jct-Wilson)	WILSONPGAE SVD=V & PANOCHE-ORO LOMA 115KV [3240]	P6	N1/N1	<100	105.49	<100	N/A	N/A	N/A	<100	<100	109.84	<100	<100	N/A	<100	Project: Wilson-Oro Loma Reconductoring In-service date: 01/26 Short term: Action plan
	PANOCHE1 SECTION 1D & PANOCHE2 SECTION 2D 115KV	P2-4	Bus/Breaker	**122.76**	158.38	89.11	N/A	N/A	N/A	N/A	22.57	181.02	28.12	N/A	N/A	129.3	Project: Wilson-Oro Loma Reconductoring In-service date: 01/26 Short term: Action plan
	PANOCHE-ORO LOMA 115KV [3240] (PANOCHEJ-PANOCHE2)	P2-1	Line Section w/o Fault	**104.12**	157.47	88.89	N/A	N/A	N/A	N/A	18.5	171.79	22.76	N/A	N/A	129.04	Project: Wilson-Oro Loma Reconductoring In-service date: 01/26 Short term: Action plan
	PANOCHE2 115KV SECTION 2D	P2-2	Bus/Breaker	**122.72**	157.49	88.88	N/A	N/A	N/A	N/A	18.66	171.83	22.95	N/A	N/A	129.03	Project: Wilson-Oro Loma Reconductoring In-service date: 01/26 Short term: Action plan
	PANOCHE2 - 2D 115KV & PANOCHE2-EXCELSIORSS LINE	P2-3	Bus/Breaker	**122.71**	157.45	88.88	N/A	N/A	N/A	N/A	18.66	171.95	22.95	N/A	N/A	129.02	Project: Wilson-Oro Loma Reconductoring In-service date: 01/26 Short term: Action plan
	PANOCHE-ORO LOMA 115KV [3240] (PANOCHEJ-HAMMONDS)	P2-1	Line Section w/o Fault	**122.7**	130.94	78	N/A	N/A	N/A	N/A	22	137.6	26.31	N/A	N/A	113.22	Project: Wilson-Oro Loma Reconductoring In-service date: 01/26 Short term: Action plan
	PANOCHE-ORO LOMA 115KV [3240] & Base Case	P6	N1/N1	<100	115.19	<100	N/A	N/A	N/A	<100	<100	118.95	<100	<100	N/A	108.4	Project: Wilson-Oro Loma Reconductoring In-service date: 01/26 Short term: Action plan
	PANOCHE-ORO LOMA 115KV [3240] (HAMMONDS-DFSTP)	P2-1	Line Section w/o Fault	N/A	105.1	67.71	N/A	N/A	N/A	N/A	20.24	108.72	24.01	N/A	N/A	98.28	Project: Wilson-Oro Loma Reconductoring In-service date: 01/26 Short term: Action plan
	PANOCHE-ORO LOMA 115KV [3240]	P1-2	N-1	N/A	100.97	65.58	N/A	N/A	N/A	N/A	21.44	104.3	25.17	N/A	N/A	95.2	Project: Wilson-Oro Loma Reconductoring In-service date: 01/26 Short term: Action plan
	HAMMONDS 115 KV #1 BUS (FAILURE OF NON-REDUNDENT RELAY)	P5-5	Non-Redundent Relay	N/A	100.97	65.58	N/A	N/A	N/A	N/A	21.44	104.3	25.17	N/A	N/A	95.2	Project: Wilson-Oro Loma Reconductoring In-service date: 01/26 Short term: Action plan
	LOS BANOS-PANOCHE #1 230KV [5030] & PANOCHE-ORO LOMA 115KV [3240]	P7-1	DCTL	N/A	100.98	65.59	N/A	N/A	N/A	N/A	20.39	104.32	24.32	N/A	N/A	95.2	Project: Wilson-Oro Loma Reconductoring In-service date: 01/26 Short term: Action plan
Wilson-Oro Loma 115 kV Line (LeGrand Jct-El Nido)	HAMMONDS 115 KV #1 BUS (FAILURE OF NON-REDUNDENT RELAY)	P5-5	Non-Redundent Relay	N/A	100.79	65.69	N/A	N/A	N/A	N/A	21.08	104.11	24.84	N/A	N/A	94.98	Reconductoring project Wilson-Oro loma
Chowchilla-Kerckhoff #2 115 kV Line (Sharon Tap-Oakhurst Jct)	DAIRYLAND-MENDOTA 115KV [1360] & WILSON-LE GRAND 115KV [4170]	P6	N1/N1	<100	<100	<100	N/A	N/A	N/A	<100	121.4	120.35	108.54	<100	N/A	<100	Generation re-dispatch
	PANOCHE-MENDOTA 115KV [3230] & WILSON-LE GRAND 115KV [4170]	P6	N1/N1	<100	102.75	<100	N/A	N/A	N/A	<100	<100	199.12	<100	<100	N/A	<100	Continue to monitor future forecast
	WILSON-LE GRAND 115KV [4170] & PANOCHE-MENDOTA 115KV [3230]	P6	N1/N1	<100	102.73	<100	N/A	N/A	N/A	<100	113.73	199	<100	<100	N/A	<100	Under review
Chowchilla-Kerckhoff #2 115 kV Line (Kerckhoff Jct 1-Kerckhoff 2)	PANOCHE-MENDOTA 115KV [3230] & WILSON-LE GRAND 115KV [4170]	P6	N1/N1	<100	<100	<100	N/A	N/A	N/A	<100	<100	136.1	<100	<100	N/A	<100	Sensitivity only
	WILSON-LE GRAND 115KV [4170] & PANOCHE-MENDOTA 115KV [3230]	P6	N1/N1	<100	<100	<100	N/A	N/A	N/A	<100	<100	136.07	<100	<100	N/A	<100	Sensitivity only
Chowchilla-Kerckhoff #2 115 kV Line (Oakhurst Jct-Kerckhoff Jct 1)	PANOCHE-MENDOTA 115KV [3230] & WILSON-LE GRAND 115KV [4170]	P6	N1/N1	<100	<100	<100	N/A	N/A	N/A	<100	<100	136.1	<100	<100	N/A	<100	Sensitivity only
	WILSON-LE GRAND 115KV [4170] & PANOCHE-MENDOTA 115KV [3230]	P6	N1/N1	<100	<100	<100	N/A	N/A	N/A	<100	<100	136.07	<100	<100	N/A	<100	Sensitivity only

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Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading % (Baseline Scenarios)								Loading % (Sensitivity Scenarios)					Project & Potential Mitigation Solutions
				2022 Summer Peak	2025 Summer Peak	2030 Summer Peak	2022 Winter Peak	2025 Winter Peak	2030 Winter Peak	2022 Spring Off-Peak	2025 Spring Off-Peak	2025 SP High CEC Forecast	2025 SpOP Hi Renew & Min Gas Gen	2022 SP Heavy Renewable & Min Gas Gen	2030 Retirement of QF Generations	2030 Summer Peak w/o Facility Rerates	
Wilson-Atwater #2 115 kV Line	EL CAPITAN-WILSON 115KV [1510] & LIVINGSTON TAP 115KV [1031] MOAS OPENED ON ATWATR J_MERCED	P6	N1/N1	129.44	N/A	N/A	N/A	N/A	N/A	<100	<100	<100	N/A	<100	N/A	N/A	Project: Wilson 115kV Reinforcement Project In-service date: 05/23 Short term: Action plan
	LIVINGSTON TAP 115KV [1031] MOAS OPENED ON ATWATR J_MERCED & EL CAPITAN-WILSON 115KV [1510]	P6	N1/N1	129.46	N/A	N/A	N/A	N/A	N/A	<100	<100	<100	N/A	<100	N/A	N/A	Project: Wilson 115kV Reinforcement Project In-service date: 05/23 Short term: Action plan
Wilson-Merced #1 115 kV Line	WILSON B 115KV SECTION 2D	P2-2	Bus/Breaker	111.88	N/A	N/A	N/A	N/A	N/A	35.56	N/A	N/A	N/A	66.01	N/A	N/A	Project: Wilson 115kV Reinforcement Project In-service date: 05/23 Short term: Action plan
	WILSON B - 2D 115KV & WILSON-ORO LOMA LINE	P2-3	Bus/Breaker	111.84	N/A	N/A	N/A	N/A	N/A	35.56	22.75	N/A	N/A	65.99	N/A	N/A	Project: Wilson 115kV Reinforcement Project In-service date: 05/23 Short term: Action plan
	WILSON-MERCED #2 115KV [4190] & EL CAPITAN-WILSON 115KV [1510]	P6	N1/N1	111.47	N/A	N/A	N/A	N/A	N/A	<100	<100	<100	N/A	<100	N/A	N/A	Project: Wilson 115kV Reinforcement Project In-service date: 05/23 Short term: Action plan
Wilson-Atwater #2 115 kV Line	EL CAPITAN-WILSON 115KV [1510] & LIVINGSTON TAP 115KV [1031] MOAS OPENED ON ATWATR J_MERCED	P6	N1/N1	<100	139.51	144.55	N/A	N/A	N/A	<100	<100	141.98	<100	<100	N/A	144.63	Expand Atwater SPS
	LIVINGSTON TAP 115KV [1031] MOAS OPENED ON ATWATR J_MERCED & EL CAPITAN-WILSON 115KV [1510]	P6	N1/N1	<100	139.79	144.48	N/A	N/A	N/A	<100	<100	143.85	<100	<100	N/A	144.5	Expand Atwater SPS
El Capitan-Wilson 115 kV Line	WILSON-ATWATER #2 115KV [4160] & LIVINGSTON TAP 115KV [1031] MOAS OPENED ON ATWATR J_MERCED	P6	N1/N1	105.3	112.75	117.07	N/A	N/A	N/A	<100	<100	114.54	<100	<100	N/A	139.24	Expand Atwater SPS
	LIVINGSTON TAP 115KV [1031] MOAS OPENED ON ATWATR J_MERCED & WILSON-ATWATER #2 115KV [4160]	P6	N1/N1	105.32	112.97	117.02	N/A	N/A	N/A	<100	<100	115.92	<100	<100	N/A	139.17	Expand Atwater SPS
Wilson-Merced #2 115 kV Line	EL CAPITAN-WILSON 115KV [1510] & WILSON-MERCED #2 115KV [4190]	P6	N1/N1	111.47	114.23	126.67	N/A	N/A	N/A	<100	<100	120.49	<100	<100	N/A	149.39	Expand Atwater SPS
	ATWATER-EL CAPITAN 115KV [1020] & WILSON-ATWATER #2 115KV [4160]	P7-1	DCTL	88.65	98.85	98.73	N/A	N/A	N/A	32.17	31.54	108.55	38.12	54.12	N/A	116.57	Sensitivity Only
	EL CAPITAN-WILSON 115KV [1510] & WILSON-ATWATER #2 115KV [4160]	P7-1	DCTL	<100	99.04	98.05	N/A	N/A	N/A	<100	47.42	107.81	59.4	<100	N/A	115.77	Sensitivity Only
	WILSON-MERCED #1 115KV [4180] & EL CAPITAN-WILSON 115KV [1510]	P6	N1/N1	115.1	117.82	130.68	N/A	N/A	N/A	<100	<100	124.21	<100	<100	N/A	130.59	Expand Atwater SPS
	EL CAPITAN-WILSON 115KV [1510] & WILSON-MERCED #1 115KV [4180]	P6	N1/N1	115.1	117.82	130.72	N/A	N/A	N/A	<100	<100	124.28	<100	<100	N/A	129.83	Expand Atwater SPS
	ATWATER-EL CAPITAN 115KV [1020] & WILSON-ATWATER #2 115KV [4160]	P7-1	DCTL	88.65	93.93	93.81	N/A	N/A	N/A	32.17	29.97	103.13	36.23	54.12	N/A	93.28	Sensitivity only
	EL CAPITAN-WILSON 115KV [1510] & WILSON-ATWATER #2 115KV [4160]	P7-1	DCTL	88.59	94.11	93.17	N/A	N/A	N/A	44.4	45.06	102.44	56.44	65.92	N/A	92.63	Sensitivity only
	WILSONPGAE 115KV - MIDDLE BREAKER BAY 2	P2-3	Bus/Breaker	<100	89.18	84.33	N/A	N/A	N/A	<100	<100	103.24	42.9	<100	N/A	83.48	Sensitivity only
	WILSON-MERCED #1 115KV [4180]	P1-2	N-1	<100	87.49	83.67	N/A	N/A	N/A	<100	39.16	100.43	43.63	<100	N/A	82.81	Sensitivity only
	WILSON-MERCED #1 115KV [4180] & EL CAPITAN-WILSON 115KV [1510]	P6	N1/N1	115.11	N/A	N/A	N/A	N/A	N/A	<100	<100	<100	N/A	<100	N/A	N/A	Project: Wilson 115kV Reinforcement Project In-service date: 05/23 Short term: Action plan
	WILSON A 115KV SECTION 1D	P2-2	Bus/Breaker	105.16	N/A	N/A	N/A	N/A	N/A	28.56	N/A	N/A	N/A	63.89	N/A	N/A	
	WILSON 115 KV #1 & #2 BUS (FAILURE OF NON-REDUNDENT	P5-5	Redundent	Diverge	N/A	N/A	N/A	N/A	N/A	43.53	N/A	N/A	N/A	21.77	N/A	N/A	

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				2022 Summer Peak	2025 Summer Peak	2030 Summer Peak	2022 Winter Peak	2025 Winter Peak	2030 Winter Peak	2022 Spring Off-Peak	2025 Spring Off-Peak	2025 SP High CEC Forecast	2025 SpOP Hi Renew & Min Gas Gen	2022 SP Heavy Renewable & Min Gas Gen	2030 Retirement of QF Generations	2030 Summer Peak w/o Facility Rerates	
	WILSON A SECTION 1D & WILSON B SECTION 2D 115KV	P2-4	Bus/Breaker	Diverge	N/A	N/A	N/A	N/A	N/A	43.53	68.35	N/A	N/A	21.76	N/A	N/A	
	HELM-MCCALL 230KV [4860] & P1-2:A14:137:_CHSR09SWSTA-MUSTANGSS 230KV [0]	P6	N1/N1	<100	<100	<100	N/A	N/A	N/A	<100	<100	<100	100.29	<100	N/A	<100	Sensitivity only
	HELM-MCCALL 230KV [4860] & HENTAP2-MUSTANGSS #1 230KV [0]	P7-1	DCTL	29.4	32.56	28.81	N/A	N/A	N/A	20.08	90.35	33.66	100.25	8.61	N/A	28.81	Sensitivity Only
	HERNDON #1 115KV BUS (FAILURE OF NON-REDUNDENT RELAY)	P5-5	Non-Redundent Relay	29.21	32.45	28.68	N/A	N/A	N/A	59.57	112.91	33.19	117.94	8.08	N/A	28.68	Generation re-dispatch
	HERNDON 115KV - SECTION 1D & 2D	P2-4	Bus/Breaker	29.17	32.43	28.66	N/A	N/A	N/A	59.14	112.73	33.16	117.77	8.69	N/A	28.67	Generation re-dispatch
	HERNDON 230KV - SECTION 1E & 2E	P2-4	Bus/Breaker	28.88	32.33	28.65	N/A	N/A	N/A	57.56	106	33.25	110.42	7.88	N/A	28.66	Generation re-dispatch
Panoche-Schindler #2 115 kV Line (Cheny Tap-Panoche)	SCHINDLR 115/12.47KV TB 2 & PANOCHE-SCHINDLER #1 115KV [3250] MOAS OPENED ON PANOCHE1_KAMM	P6	N1/N1	<100	<100	<100	N/A	N/A	N/A	<100	104.32	<100	102.88	<100	N/A	<100	Generation re-dispatch
	PANOCHE-SCHINDLER #1 115KV [3250] MOAS OPENED ON PANOCHE1_KAMM & GATES D 230/70KV TB 5	P6	N1/N1	<100	102.05	153.27	N/A	N/A	N/A	<100	<100	104.96	164.66	141.44	N/A	153.29	Monitor future forecast
	GATES D 230/70KV TB 5 & PANOCHE-SCHINDLER #1 115KV [3250] MOAS OPENED ON PANOCHE1_KAMM	P6	N1/N1	<100	<100	148.75	N/A	N/A	N/A	<100	<100	103.11	159.85	138.13	N/A	149.56	Monitor future forecast
	WESTLNDS-EXCELSIORSS #1 115KV [0] MOAS OPENED ON PANOCHE1_KAMM & GATES D 230/70KV TB 5	P6	N1/N1	<100	100.16	119.72	N/A	N/A	N/A	<100	<100	100.21	148.95	130.17	N/A	119.84	Monitor future forecast
PANOCHE2-EXCELSIORSS 115kV Line	PANOCHE-SCHINDLER #1 115KV [3250] MOAS OPENED ON PANOCHE1_KAMM & GATES D 230/70KV TB 5	P6	N1/N1	129.96	137.99	178.54	N/A	N/A	N/A	<100	<100	141.27	155.56	133.68	N/A	178.57	Continue to monitor Fresno procedure
	GATES D 230/70KV TB 5 & PANOCHE-SCHINDLER #1 115KV [3250] MOAS OPENED ON PANOCHE1_KAMM	P6	N1/N1	122.97	136.32	175.33	N/A	N/A	N/A	<100	<100	139.53	151.01	130.56	N/A	174.87	Continue to monitor Fresno procedure
	WESTLNDS-EXCELSIORSS #1 115KV [0] MOAS OPENED ON PANOCHE1_KAMM & GATES D 230/70KV TB 5	P6	N1/N1	113.24	122.6	149.45	N/A	N/A	N/A	<100	<100	125.43	140.78	123.09	N/A	149.56	Continue to monitor Fresno procedure
Dairyland-Le Grand 115 kV Line (Newhall-Dairyland)	HELMS 1 18.00KV GEN UNIT 1 & PANOCHE-MENDOTA 115KV [3230]	P3	G1/N1	<100	<100	<100	N/A	N/A	N/A	<100	<100	<100	<100	101.28	N/A	<100	Sensitivity only
	HELMS 2 18.00KV GEN UNIT 1 & PANOCHE-MENDOTA 115KV [3230]	P3	G1/N1	<100	<100	<100	N/A	N/A	N/A	<100	<100	<100	<100	101.28	N/A	<100	Sensitivity only
	Q1158S 0.42KV GEN UNIT 1 & PANOCHE-MENDOTA 115KV [3230]	P3	G1/N1	<100	<100	<100	N/A	N/A	N/A	<100	<100	<100	<100	100.96	N/A	<100	Sensitivity only
	MENDOTA 115/70KV TB 1 & PANOCHE-MENDOTA 115KV [3230]	P6	N1/N1	<100	<100	<100	N/A	N/A	N/A	<100	<100	<100	<100	104.77	N/A	<100	Sensitivity only
	PANOCHE-MENDOTA 115KV [3230] & TOMATAK-MENDOTA #1 70KV [0]	P6	N1/N1	<100	<100	<100	N/A	N/A	N/A	<100	<100	<100	<100	105.74	N/A	<100	Sensitivity only
	TOMATAK-MENDOTA #1 70KV [0] & PANOCHE-MENDOTA 115KV [3230]	P6	N1/N1	<100	<100	<100	N/A	N/A	N/A	<100	<100	<100	<100	105.74	N/A	<100	Sensitivity only
Panoche-Schindler #1 115 kV Line	GATES D 230KV - SECTION 1D & 2D	P2-4	Bus/Breaker	80.02	N/A	<100	N/A	N/A	N/A	31.99	107.52	N/A	N/A	83.69	N/A	N/A	Generation re-dispatch
	EXCELSIORSS-PANOCHE2 115KV [0] & GATES D 230/70KV TB 5	P6	N1/N1	132.24	144.68	183.12	N/A	N/A	N/A	<100	<100	147.81	165.13	141.98	N/A	183.2	Continue to monitor Fresno procedure
	PANOCHE2-EXCELSIORSS 115KV [0] & GATES D 230/70KV TB 5	P6	N1/N1	132.24	144.68	183.12	N/A	N/A	N/A	<100	<100	147.81	165.13	141.98	N/A	183.2	Continue to monitor Fresno procedure

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				2022 Summer Peak	2025 Summer Peak	2030 Summer Peak	2022 Winter Peak	2025 Winter Peak	2030 Winter Peak	2022 Spring Off-Peak	2025 Spring Off-Peak	2025 SP High CEC Forecast	2025 SpOP Hi Renew & Min Gas Gen	2022 SP Heavy Renewable & Min Gas Gen	2030 Retirement of QF Generations	2030 Summer Peak w/o Facility Rerates	
(Panoche-Kamm)	GATES D 230/70KV TB 5 & EXCELSIORSS-PANOCHE2 115KV [0]	P6	N1/N1	129.72	143.5	180.58	N/A	N/A	N/A	<100	<100	146.84	161.37	139.64	N/A	179.35	Continue to monitor Fresno procedure
	GATES D 230KV - SECTION 2D & 1D	P2-4	Bus/Breaker	N/A	85.23	100.13	N/A	N/A	N/A	N/A	N/A	87.62	99.94	N/A	N/A	100.24	Continue to monitor future forecast
	GATES D 230KV SECTION 2D	P2-2	Bus/Breaker	74.81	81.49	97.27	N/A	N/A	N/A	31.6	104.07	83.47	96.06	80.75	N/A	97.35	Generation re-dispatch
Panoche-Oro Loma 115 kV Line (Panoche Jct-Hammonds)	WILSON 230/115KV TB 1 & WILSON 230/115KV TB 2	P6	N1/N1	148.12	<100	<100	N/A	N/A	N/A	<100	<100	<100	<100	<100	N/A	<100	Project: Wilson 115kV Reinforcement Project In-service date: 05/23 Short term: Action plan
	WILSON 230/115KV TB 2 & WILSON 230/115KV TB 1	P6	N1/N1	148.11	N/A	N/A	N/A	N/A	N/A	<100	<100	<100	N/A	<100	N/A	N/A	
Panoche-Oro Loma 115 kV Line (Hammonds-DFS Tap)	WILSON 230/115KV TB 1 & WILSON 230/115KV TB 2	P6	N1/N1	137.72	N/A	N/A	N/A	N/A	N/A	<100	<100	<100	N/A	<100	N/A	N/A	
	WILSON 230/115KV TB 2 & WILSON 230/115KV TB 1	P6	N1/N1	137.72	N/A	N/A	N/A	N/A	N/A	<100	<100	<100	N/A	<100	N/A	N/A	
Panoche-Oro Loma 115 kV Line (DeFrancesco Tap-Oro Loma)	WILSON 230/115KV TB 1 & WILSON 230/115KV TB 2	P6	N1/N1	135.14	N/A	N/A	N/A	N/A	N/A	<100	<100	<100	N/A	<100	N/A	N/A	
	WILSON 230/115KV TB 2 & WILSON 230/115KV TB 1	P6	N1/N1	135.14	N/A	N/A	N/A	N/A	N/A	<100	<100	<100	N/A	<100	N/A	N/A	
Wilson-Oro Loma 115 kV Line (Oro Loma-El Nido)	WILSON 230/115KV TB 1 & WILSON 230/115KV TB 2	P6	N1/N1	105.78	N/A	N/A	N/A	N/A	N/A	<100	<100	<100	N/A	<100	N/A	N/A	
	WILSON 230/115KV TB 2 & WILSON 230/115KV TB 1	P6	N1/N1	105.78	N/A	N/A	N/A	N/A	N/A	<100	<100	<100	N/A	<100	N/A	N/A	
	PANOCHE1 SECTION 1D & PANOCHE2 SECTION 2D 115KV	P2-4	Bus/Breaker	<100	134.77	100.01	N/A	N/A	N/A	<100	19.08	157.05	21.96	<100	N/A	100.02	Continue to monitor future forecast
Coalinga1-Coalinga2 70 kV Line (Tornado Jct-Penn Zier Jct)	GATES D 230/70KV TB 5 & SCHINDLR 115/12.47KV TB 2	P6	N1/N1	Diverge	Diverge	Diverge	N/A	N/A	N/A	<100	101.12	Diverge	<100	<100	N/A	Diverge	System Reconfiguration
	SCHINDLR 115/12.47KV TB 2 & GATES D 230/70KV TB 5	P6	N1/N1	Diverge	Diverge	Diverge	N/A	N/A	N/A	<100	124.09	Diverge	<100	<100	N/A	Diverge	System Reconfiguration
	TEMPLETON-GATES 230KV [5934] & P1-2:A14:123:_GATES-JAYNE SW STA 70KV [8652]	P6	N1/N1	100.04	<100	<100	N/A	N/A	N/A	<100	<100	<100	<100	<100	N/A	<100	System Reconfiguration
Chowchilla-Dairyland 115kv Line	PANOCHE-MENDOTA 115KV [3230] & Base Case	P6	N1/N1	<100	<100	<100	N/A	N/A	N/A	<100	<100	<100	<100	111.12	N/A	<100	Sensitivity Only
	PANOCHE-MENDOTA 115KV [3230] & TOMATAK-MENDOTA #1 70KV [0]	P6	N1/N1	<100	<100	<100	N/A	N/A	N/A	<100	<100	<100	<100	100.65	N/A	<100	Sensitivity Only
	TOMATAK-MENDOTA #1 70KV [0] & PANOCHE-MENDOTA 115KV [3230]	P6	N1/N1	<100	<100	<100	N/A	N/A	N/A	<100	<100	<100	<100	100.66	N/A	<100	Sensitivity Only
Oro Loma-Canal #1 70 kV Line (Oro Loma-Dos Palos)	CANAL-MERCYSPRNGSS 70KV [0] & LOS BANOS-LIVINGSTON JCT-CANAL 70KV [8940]	P6	N1/N1	<100	<100	<100	N/A	N/A	N/A	<100	<100	<100	103.74	<100	N/A	<100	Sensitivity Only
	LOS BANOS-LIVINGSTON JCT-CANAL 70KV [8940] & CANAL-MERCYSPRNGSS 70KV [0]	P6	N1/N1	<100	<100	<100	N/A	N/A	N/A	<100	<100	<100	103.74	<100	N/A	<100	Sensitivity Only
Oro Loma-Mendota 70 kV Line (Oro Loma-Poso Jct 1)	PANOCHE-HELM 230KV [5370] & PANOCHE-MENDOTA 115KV [3230]	P6	N1/N1	<100	<100	<100	N/A	N/A	N/A	<100	135.72	<100	137.57	<100	N/A	<100	Generation re-dispatch
	PANOCHE-MENDOTA 115KV [3230] & WILSON-LE GRAND 115KV [4170]	P6	N1/N1	<100	<100	<100	N/A	N/A	N/A	<100	118.98	<100	111.69	<100	N/A	<100	Generation re-dispatch
	WILSON-LE GRAND 115KV [4170] & PANOCHE-MENDOTA 115KV [3230]	P6	N1/N1	<100	<100	<100	N/A	N/A	N/A	<100	165.13	<100	161.65	<100	N/A	<100	Generation re-dispatch

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Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading % (Baseline Scenarios)								Loading % (Sensitivity Scenarios)					Project & Potential Mitigation Solutions
				2022 Summer Peak	2025 Summer Peak	2030 Summer Peak	2022 Winter Peak	2025 Winter Peak	2030 Winter Peak	2022 Spring Off-Peak	2025 Spring Off-Peak	2025 SP High CEC Forecast	2025 SpOP Hi Renew & Min Gas Gen	2022 SP Heavy Renewable & Min Gas Gen	2030 Retirement of QF Generations	2030 Summer Peak w/o Facility Rerates	
(Oro Loma-Poso Jct 1)	PANOCHE-MENDOTA 115KV [3230]	P1-2	N-1	46.16	45.73	49.21	N/A	N/A	N/A	67.35	99.82	46.81	100.18	22.73	N/A	49.22	Sensitivity Only
	PANOCHE-MENDOTA 115KV [3230] (PANOCHET-MENDOTA)	P2-1	Line Section w/o Fault	46.16	45.73	49.21	N/A	N/A	N/A	67.35	99.82	46.81	100.18	22.73	N/A	49.22	Sensitivity Only
	PANOCHE-MENDOTA 115KV [3230] (PANOCHET-PANOCHE1)	P2-1	Line Section w/o Fault	46.16	45.73	49.21	N/A	N/A	N/A	66.93	99.81	46.81	100.16	22.73	N/A	49.22	Sensitivity Only
Merced 115/70 kV Transformer #2	WILSON 115 KV #1 & #2 BUS (FAILURE OF NON-REDUNDENT RELAY)	P5-5	Non-Redundent Relay	Diverge	N/A	N/A	N/A	N/A	N/A	75.1	N/A	N/A	N/A	42.9	N/A	N/A	Project: Wilson 115kV Reinforcement Project In-service date: 05/23 Short term: Action plan
	PANOCHE-MENDOTA 115KV [3230] & WILSON-LE GRAND 115KV [4170]	P6	N1/N1	<100	<100	<100	N/A	N/A	N/A	<100	<100	101.23	<100	<100	N/A	<100	Sensitivity Only
	WILSON-LE GRAND 115KV [4170] & PANOCHE-MENDOTA 115KV [3230]	P6	N1/N1	<100	<100	<100	N/A	N/A	N/A	<100	<100	101.78	<100	<100	N/A	<100	Sensitivity Only
	WILSON A SECTION 1D & WILSON B SECTION 2D 115KV	P2-4	Bus/Breaker	Diverge	N/A	N/A	N/A	N/A	N/A	75.1	66.03	N/A	N/A	42.89	N/A	N/A	Project: Wilson 115kV Reinforcement Project In-service date: 05/23 Short term: Action plan
Merced-Merced Falls 70 kV Line	WILSON 115 KV #1 & #2 BUS (FAILURE OF NON-REDUNDENT RELAY)	P5-5	Non-Redundent Relay	Diverge	N/A	N/A	N/A	N/A	N/A	148.55	N/A	N/A	N/A	136.37	N/A	N/A	Project: Wilson 115kV Reinforcement Project In-service date: 05/23 Short term: Action plan
	DAIRYLAND-MENDOTA 115KV [1360] & WILSON-LE GRAND 115KV [4170]	P6	N1/N1	<100	<100	<100	N/A	N/A	N/A	<100	100.68	100.59	<100	<100	N/A	<100	Generation re-dispatch
	EXCHEQUER-LE GRAND 115KV [1560] & Base Case	P6	N1/N1	<100	<100	<100	N/A	N/A	N/A	<100	100.69	<100	100.72	<100	N/A	<100	Generation re-dispatch
	PANOCHE-MENDOTA 115KV [3230] & WILSON-LE GRAND 115KV [4170]	P6	N1/N1	<100	<100	<100	N/A	N/A	N/A	<100	<100	150.25	<100	<100	N/A	<100	Generation re-dispatch
	WILSON-LE GRAND 115KV [4170] & PANOCHE-MENDOTA 115KV [3230]	P6	N1/N1	<100	<100	<100	N/A	N/A	N/A	<100	<100	149.7	<100	<100	N/A	<100	Generation re-dispatch
	WILSON A SECTION 1D & WILSON B SECTION 2D 115KV	P2-4	Bus/Breaker	Diverge	N/A	N/A	N/A	N/A	N/A	148.55	68.12	N/A	N/A	136.35	N/A	N/A	Project: Wilson 115kV Reinforcement Project In-service date: 05/23 Short term: Action plan
Los Banos-Livingston-Canal 70 kV Line (Chevron Pipeline-Santa Nella)	LOS BANOS-MERCY SPRINGS SW STA 70KV [8929] & Base Case	P6	N1/N1	104.1	<100	<100	N/A	N/A	N/A	<100	<100	<100	<100	<100	N/A	128.93	Under review
Los Banos 230/70 kV Transformer Bank #3	GATES D 230/70KV TB 5 & LOSBANOS 230/70KV TB 4	P6	N1/N1	<100	<100	100.01	N/A	N/A	N/A	<100	<100	<100	<100	<100	N/A	<100	Monitor future forecast
Los Banos-Pacheco 70 kV Line (Los Banos-Pacheco Wind)	LOS BANOS-LIVINGSTON JCT-CANAL 70KV [8940] & Base Case	P6	N1/N1	<100	<100	115.91	N/A	N/A	N/A	<100	<100	<100	<100	<100	N/A	115.88	Monitor future forecast
	LOS BANOS-LIVINGSTON JCT-CANAL 70KV [8940] & LOSBANOS 230/70KV TB 3	P6	N1/N1	<100	<100	108.48	N/A	N/A	N/A	<100	<100	<100	<100	<100	N/A	108.45	Monitor future forecast
	LOSBANOS 230/70KV TB 3 & LOS BANOS-LIVINGSTON JCT-CANAL 70KV [8940]	P6	N1/N1	<100	<100	108.48	N/A	N/A	N/A	<100	<100	<100	<100	<100	N/A	108.45	Monitor future forecast
	VEGA 0.36KV GEN UNIT 1 & LOS BANOS-LIVINGSTON JCT-CANAL 70KV [8940]	P3	G1/N1	<100	<100	105.19	N/A	N/A	N/A	<100	<100	<100	<100	<100	N/A	105.16	Monitor future forecast
Oro Loma-Mendota 115 kV Line (Poso Jct 1-Firebaugh)	LE GRAND-DAIRYLAND 115KV [2100] MOAS OPENED ON LE GRAND_CHWCHLASLRJT & PANOCHE-MENDOTA 115KV [3230]	P6	N1/N1	<100	<100	<100	N/A	N/A	N/A	<100	<100	<100	144.47	<100	N/A	<100	Sensitivity only
	PANOCHE-MENDOTA 115KV [3230] & LE GRAND-DAIRYLAND 115KV [2100] MOAS OPENED ON LE GRAND_CHWCHLASLRJT	P6	N1/N1	<100	<100	<100	N/A	N/A	N/A	<100	<100	<100	138.35	<100	N/A	<100	Sensitivity only
	WILSON-LE GRAND 115KV [4170] & PANOCHE-MENDOTA 115KV [3230]	P6	N1/N1	<100	<100	<100	N/A	N/A	N/A	<100	116.84	<100	114.37	<100	N/A	<100	Redispatch Generation

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				2022 Summer Peak	2025 Summer Peak	2030 Summer Peak	2022 Winter Peak	2025 Winter Peak	2030 Winter Peak	2022 Spring Off-Peak	2025 Spring Off-Peak	2025 SP High CEC Forecast	2025 SpOP Hi Renew & Min Gas Gen	2022 SP Heavy Renewable & Min Gas Gen	2030 Retirement of QF Generations	2030 Summer Peak w/o Facility Rerates	
Borden 230/70 kV Transformer Bank 1	FRIANTDM 6.60KV GEN UNIT 2 & BORDEN 230/70KV TB 4	P3	G1/N1	105.04	<100	<100	N/A	N/A	N/A	<100	<100	<100	<100	<100	N/A	<100	Project: Borden 230/70kV TB Capacity increase Project In-service date: 01/25 Short term: Action plan
	FRIANTDM 6.60KV GEN UNIT 3 & BORDEN 230/70KV TB 4	P3	G1/N1	101.71	<100	<100	N/A	N/A	N/A	<100	<100	<100	<100	<100	N/A	<100	
	HELMS 1 18.00KV GEN UNIT 1 & BORDEN 230/70KV TB 4	P3	G1/N1	100.79	<100	<100	N/A	N/A	N/A	<100	<100	<100	<100	<100	N/A	<100	
	BORDEN 230/70KV TB 4 & Base Case	P6	N1/N1	121.54	<100	<100	N/A	N/A	N/A	<100	<100	<100	<100	<100	N/A	<100	
	BORDEN 230/70KV TB 4 & FRIANT-COPPERMINE 70KV [8660]	P6	N1/N1	109.4	<100	<100	N/A	N/A	N/A	<100	<100	<100	<100	<100	N/A	<100	
	FRIANT-COPPERMINE 70KV [8660] & BORDEN 230/70KV TB 4	P6	N1/N1	109.49	<100	<100	N/A	N/A	N/A	<100	<100	<100	<100	<100	N/A	<100	
Borden-Coppermine 70 kV Line (Borden-Cassidy)	BORDEN 230/70KV TB 1 & BORDEN 230/70KV TB 4	P6	N1/N1	<100	<100	<100	N/A	N/A	N/A	108.59	<100	<100	104.32	<100	N/A	<100	Generation re-dispatch
	BORDEN 230/70KV TB 4 & BORDEN 230/70KV TB 1	P6	N1/N1	<100	<100	<100	N/A	N/A	N/A	108.59	<100	<100	104.32	<100	N/A	<100	Generation re-dispatch
	HERNDON #1 115KV BUS (FAILURE OF NON-REDUNDENT RELAY)	P5-5	Non-Redundent Relay	58.49	64.24	61.83	N/A	N/A	N/A	41.91	93.72	65.21	100.23	18.75	N/A	61.83	Sensitivity only
	HERNDON 115KV - SECTION 1D & 2D	P2-4	Bus/Breaker	58.47	64.23	61.82	N/A	N/A	N/A	41.53	93.57	65.18	100.08	19.56	N/A	61.82	Sensitivity only
Borden-Coppermine 70 kV Line (Cassidy-River Rock)	BORDEN 230/70KV TB 1 & BORDEN 230/70KV TB 4	P6	N1/N1	<100	<100	<100	N/A	N/A	N/A	152.37	<100	<100	123.15	<100	N/A	<100	Generation re-dispatch
	BORDEN 230/70KV TB 4 & BORDEN 230/70KV TB 1	P6	N1/N1	<100	<100	<100	N/A	N/A	N/A	152.37	<100	<100	123.15	<100	N/A	<100	Generation re-dispatch
	HELM-MCCALL 230KV [4860] & P1-2:A14:138:_MC CALL-CHSR09SWSTA #1 230KV [0]	P6	N1/N1	<100	<100	<100	N/A	N/A	N/A	<100	<100	<100	102.77	<100	N/A	<100	Sensitivity only
	HERNDON #1 115KV BUS (FAILURE OF NON-REDUNDENT RELAY)	P5-5	Non-Redundent Relay	29.42	32.62	28.84	N/A	N/A	N/A	59.23	112.47	33.35	117.49	7.8	N/A	28.85	Continue to Monitor future forecast
	HERNDON 115KV - SECTION 1D & 2D	P2-4	Bus/Breaker	29.37	32.6	28.83	N/A	N/A	N/A	58.8	112.29	33.32	117.32	8.38	N/A	28.83	Generation re-dispatch
	HERNDON 230KV - SECTION 1E & 2E	P2-4	Bus/Breaker	29.07	32.5	28.81	N/A	N/A	N/A	57.21	105.57	33.41	109.99	7.65	N/A	28.81	Generation re-dispatch
Firebaugh-Mendota 115 kV Line (Firebaugh-Tomatek)	LE GRAND-DAIRYLAND 115KV [2100] MOAS OPENED ON LE GRAND_CHWCHLASLRJT & PANOCHE-MENDOTA 115KV [3230]	P6	N1/N1	<100	<100	<100	N/A	N/A	N/A	<100	<100	<100	136.54	<100	N/A	<100	Sensitivity Only
	PANOCHE-MENDOTA 115KV [3230] & LE GRAND-DAIRYLAND 115KV [2100] MOAS OPENED ON LE GRAND_CHWCHLASLRJT	P6	N1/N1	<100	<100	<100	N/A	N/A	N/A	<100	<100	<100	130.73	<100	N/A	<100	Sensitivity Only
	WILSON-LE GRAND 115KV [4170] & PANOCHE-MENDOTA 115KV [3230]	P6	N1/N1	<100	<100	<100	N/A	N/A	N/A	<100	112.66	<100	106.93	<100	N/A	<100	Generation re-dispatch
Oro Loma-Mendota 70 kV Line (Tomatek-Mendota)	LE GRAND-DAIRYLAND 115KV [2100] MOAS OPENED ON LE GRAND_CHWCHLASLRJT & PANOCHE-MENDOTA 115KV [3230]	P6	N1/N1	<100	<100	<100	N/A	N/A	N/A	<100	<100	<100	145.97	<100	N/A	<100	Sensitivity Only
	PANOCHE-HELM 230KV [5370] & PANOCHE-MENDOTA 115KV [3230]	P6	N1/N1	<100	<100	<100	N/A	N/A	N/A	<100	100.9	<100	<100	<100	N/A	<100	Generation re-dispatch
	WILSON-LE GRAND 115KV [4170] & PANOCHE-MENDOTA 115KV [3230]	P6	N1/N1	<100	<100	<100	N/A	N/A	N/A	<100	121.68	<100	115.73	<100	N/A	<100	Generation re-dispatch

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				2022 Summer Peak	2025 Summer Peak	2030 Summer Peak	2022 Winter Peak	2025 Winter Peak	2030 Winter Peak	2022 Spring Off-Peak	2025 Spring Off-Peak	2025 SP High CEC Forecast	2025 SpOP Hi Renew & Min Gas Gen	2022 SP Heavy Renewable & Min Gas Gen	2030 Retirement of QF Generations	2030 Summer Peak w/o Facility Rerates	
Mendota 115/70 kV Transformer Bank 1	LE GRAND-DAIRYLAND 115KV [2100] MOAS OPENED ON LE GRAND_CHWCHLASLRJT & PANOCHE-MENDOTA 115KV [3230]	P6	N1/N1	<100	<100	<100	N/A	N/A	N/A	<100	<100	<100	135.2	<100	N/A	<100	Sensitivity Only
	PANOCHE-MENDOTA 115KV [3230] & LE GRAND-DAIRYLAND 115KV [2100] MOAS OPENED ON LE GRAND_CHWCHLASLRJT	P6	N1/N1	<100	<100	<100	N/A	N/A	N/A	<100	<100	<100	135.92	<100	N/A	<100	Sensitivity Only
	WILSON-LE GRAND 115KV [4170] & PANOCHE-MENDOTA 115KV [3230]	P6	N1/N1	<100	<100	<100	N/A	N/A	N/A	<100	106.85	<100	102.03	<100	N/A	<100	Generation re-dispatch
Mendota-San Juaquin-Helm 70kV Line (Mendota-Bio Mass)	NORTHSTAR 0.36KV GEN UNIT 1 & HELM 230/70KV TB 1	P3	G1/N1	<100	<100	<100	N/A	N/A	N/A	<100	<100	<100	127.36	<100	N/A	<100	Sensitivity Only
	Q1028Q1029PV 34.50KV GEN UNIT 1 & HELM 230/70KV TB 1	P3	G1/N1	<100	<100	<100	N/A	N/A	N/A	<100	<100	<100	127.5	<100	N/A	<100	Sensitivity Only
	Q1032G3 0.55KV GEN UNIT 3 & HELM 230/70KV TB 1	P3	G1/N1	<100	<100	<100	N/A	N/A	N/A	<100	<100	<100	127.75	<100	N/A	<100	Sensitivity Only
	230KV [5000] & 230KV [5481]	P6	N1/N1	<100	<100	<100	N/A	N/A	N/A	<100	122.26	<100	132.39	<100	N/A	<100	Generation re-dispatch
	230KV [5481] & 230KV [5000]	P6	N1/N1	<100	<100	<100	N/A	N/A	N/A	<100	122.26	<100	132.39	<100	N/A	<100	Generation re-dispatch
	P1-2:A14:137:_CHSR09SWSTA-MUSTANGSS 230KV [0] & PANOCHE-HELM 230KV [5370]	P6	N1/N1	<100	<100	<100	N/A	N/A	N/A	<100	128	<100	<100	<100	N/A	<100	Generation re-dispatch
	HELM 230/70KV TB 1	P1-3	N-1	<100	<100	<100	N/A	N/A	N/A	<100	98.79	<100	127.3	<100	N/A	<100	Sensitivity Only
	HELM 230KV SECTION 1D	P2-2	Bus/Breaker	<100	<100	<100	N/A	N/A	N/A	<100	98.8	<100	127.43	<100	N/A	<100	Sensitivity Only
	PANOCHE 230KV - SECTION 1D & 2D	P2-4	Bus/Breaker	<100	<100	<100	N/A	N/A	N/A	<100	118.72	<100	119.84	<100	N/A	<100	Generation re-dispatch
	PANOCHE-TRANQLTYSS #1 230KV [0] & PANOCHE-TRANQLTYSS #2 230KV [0]	P7-1	DCTL	<100	<100	<100	N/A	N/A	N/A	<100	121.44	<100	131.24	<100	N/A	<100	Generation re-dispatch
Mendota-San Juaquin-Helm 70kV Line (Bio Mass-Adams East))	Q1028Q1029PV 34.50KV GEN UNIT 1 & HELM 230/70KV TB 1	P3	G1/N1	<100	<100	<100	N/A	N/A	N/A	<100	<100	<100	128.75	<100	N/A	<100	Sensitivity Only
	Q1032G3 0.55KV GEN UNIT 3 & HELM 230/70KV TB 1	P3	G1/N1	<100	<100	<100	N/A	N/A	N/A	<100	<100	<100	129	<100	N/A	<100	Sensitivity Only
	Q829SPV1 0.42KV GEN UNIT 1 & HELM 230/70KV TB 1	P3	G1/N1	<100	<100	<100	N/A	N/A	N/A	<100	<100	<100	128.61	<100	N/A	<100	Sensitivity Only
	230KV [5000] & 230KV [5481]	P6	N1/N1	<100	<100	<100	N/A	N/A	N/A	<100	123.56	<100	133.8	<100	N/A	<100	Generation re-dispatch
	230KV [5481] & 230KV [5000]	P6	N1/N1	<100	<100	<100	N/A	N/A	N/A	<100	123.56	<100	133.8	<100	N/A	<100	Generation re-dispatch
	P1-2:A14:137:_CHSR09SWSTA-MUSTANGSS 230KV [0] & PANOCHE-HELM 230KV [5370]	P6	N1/N1	<100	<100	<100	N/A	N/A	N/A	<100	129.27	<100	<100	<100	N/A	<100	Generation re-dispatch
	HELM 230/70KV TB 1	P1-3	N-1	N/A	N/A	N/A	N/A	N/A	N/A	41.06	99.81	N/A	128.55	N/A	N/A	N/A	Sensitivity Only
	HELM 230KV SECTION 1D	P2-2	Bus/Breaker	N/A	N/A	N/A	N/A	N/A	N/A	41.02	99.82	N/A	128.68	N/A	N/A	N/A	Sensitivity Only
	PANOCHE 230KV - SECTION 1D & 2D	P2-4	Bus/Breaker	N/A	N/A	N/A	N/A	N/A	N/A	52.17	119.99	N/A	121.13	N/A	N/A	N/A	Generation re-dispatch
	PANOCHE-TRANQLTYSS #1 230KV [0] & PANOCHE-TRANQLTYSS #2 230KV [0]	P7-1	DCTL	N/A	N/A	N/A	N/A	N/A	N/A	46.31	122.73	N/A	132.63	N/A	N/A	N/A	Generation re-dispatch
	Q1028Q1029PV 34.50KV GEN UNIT 1 & HELM 230/70KV TB 1	P3	G1/N1	<100	<100	<100	N/A	N/A	N/A	<100	<100	<100	128.79	<100	N/A	<100	Sensitivity Only
	Q1032G3 0.55KV GEN UNIT 3 & HELM 230/70KV TB 1	P3	G1/N1	<100	<100	<100	N/A	N/A	N/A	<100	<100	<100	129.04	<100	N/A	<100	Sensitivity Only

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				2022 Summer Peak	2025 Summer Peak	2030 Summer Peak	2022 Winter Peak	2025 Winter Peak	2030 Winter Peak	2022 Spring Off-Peak	2025 Spring Off-Peak	2025 SP High CEC Forecast	2025 SpOP Hi Renew & Min Gas Gen	2022 SP Heavy Renewable & Min Gas Gen	2030 Retirement of QF Generations	2030 Summer Peak w/o Facility Rerates	
Mendota-San Juaquin-Helm 70kV Line (Adams East-Westlands Sub)	Q829SPV1 0.42KV GEN UNIT 1 & HELM 230/70KV TB 1	P3	G1/N1	<100	<100	<100	N/A	N/A	N/A	<100	<100	<100	128.65	<100	N/A	<100	Sensitivity Only
	230KV [5000] & 230KV [5481]	P6	N1/N1	<100	<100	<100	N/A	N/A	N/A	<100	117.49	<100	133.87	<100	N/A	<100	Generation re-dispatch
	230KV [5481] & 230KV [5000]	P6	N1/N1	<100	<100	<100	N/A	N/A	N/A	<100	117.49	<100	133.87	<100	N/A	<100	Generation re-dispatch
	P1-2:A14:137:_CHSR09SWSTA-MUSTANGSS 230KV [0] & PANOCHE-HELM 230KV [5370]	P6	N1/N1	<100	<100	<100	N/A	N/A	N/A	<100	122.47	<100	<100	<100	N/A	<100	Generation re-dispatch
	PANOCHE 230KV - SECTION 1D & 2D	P2-4	Bus/Breaker	0.77	2.47	3.89	N/A	N/A	N/A	51.79	113.75	2.57	121.2	37.85	N/A	4.07	Generation re-dispatch
	PANOCHE-TRANQLTYSS #1 230KV [0] & PANOCHE-TRANQLTYSS #2 230KV [0]	P7-1	DCTL	0.75	2.46	3.88	N/A	N/A	N/A	45.81	116.52	2.56	132.71	37.85	N/A	4.06	Generation re-dispatch
	HELM 230/70KV TB 1	P1-3	N-1	N/A	N/A	N/A	N/A	N/A	N/A	40.86	93.01	N/A	128.59	N/A	N/A	N/A	Sensitivity Only
	HELM 230KV SECTION 1D	P2-2	Bus/Breaker	N/A	N/A	N/A	N/A	N/A	N/A	40.82	93.05	N/A	128.72	N/A	N/A	N/A	Sensitivity Only
Merced Falls-Exchequer 70 kV Line (McSwain Jct-Merced Falls)	WILSON 115 KV #1 & #2 BUS (FAILURE OF NON-REDUNDENT RELAY)	P5-5	Non-Redundent Relay	Diverge	N/A	N/A	N/A	N/A	N/A	142.58	N/A	N/A	N/A	136.85	N/A	N/A	Project: Wilson 115kV Reinforcement Project In-service date: 05/23 Short term: Action plan
	PANOCHE-MENDOTA 115KV [3230] & WILSON-LE GRAND 115KV [4170]	P6	N1/N1	<100	<100	<100	N/A	N/A	N/A	<100	<100	136.35	<100	<100	N/A	<100	Sensitivity Only
	WILSON-LE GRAND 115KV [4170] & PANOCHE-MENDOTA 115KV [3230]	P6	N1/N1	<100	<100	<100	N/A	N/A	N/A	<100	<100	128.41	<100	<100	N/A	<100	Sensitivity Only
	WILSON A SECTION 1D & WILSON B SECTION 2D 115KV	P2-4	Bus/Breaker	Diverge	N/A	N/A	N/A	N/A	N/A	142.58	49.66	N/A	N/A	136.84	N/A	N/A	Project: Wilson 115kV Reinforcement Project In-service date: 05/23 Short term: Action plan
Merced Falls-Exchequer 70 kV Line (McSwain Jct-Exchequer)	WILSON A SECTION 1D & WILSON B SECTION 2D 115KV	P2-4	Bus/Breaker	Diverge	N/A	N/A	N/A	N/A	N/A	168.3	41.34	N/A	N/A	183.4	N/A	N/A	Project: Wilson 115kV Reinforcement Project In-service date: 05/23 Short term: Action plan
	WILSON 115 KV #1 & #2 BUS (FAILURE OF NON-REDUNDENT RELAY)	P5-5	Non-Redundent Relay	Diverge	N/A	N/A	N/A	N/A	N/A	168.31	N/A	N/A	N/A	183.42	N/A	N/A	Project: Wilson 115kV Reinforcement Project In-service date: 05/23 Short term: Action plan
	PANOCHE-MENDOTA 115KV [3230] & WILSON-LE GRAND 115KV [4170]	P6	N1/N1	<100	<100	<100	N/A	N/A	N/A	<100	<100	178.7	<100	<100	N/A	<100	Generation re-dispatch
	WILSON-LE GRAND 115KV [4170] & DAIRYLAND-MENDOTA 115KV [1360]	P6	N1/N1	<100	<100	<100	N/A	N/A	N/A	<100	<100	108.66	<100	<100	N/A	<100	Generation re-dispatch
	WILSON-LE GRAND 115KV [4170] & PANOCHE-MENDOTA 115KV [3230]	P6	N1/N1	<100	<100	<100	N/A	N/A	N/A	<100	<100	171.55	<100	<100	N/A	<100	Generation re-dispatch
Panoche-Schindler #1 115 kV Line (Kamm-Cantua)	GATES D 230KV - SECTION 1D & 2D	P2-4	Bus/Breaker	72.32	<100	<100	N/A	N/A	N/A	27.37	103.91	<100	<100	81.48	N/A	<100	Under Review
	EXCELSIORSS-PANOCHE2 115KV [0] & GATES D 230/70KV TB 5	P6	N1/N1	121.64	133.08	169.03	N/A	N/A	N/A	<100	<100	135.99	158.12	136.13	N/A	169.11	Under Review
	PANOCHE2-EXCELSIORSS 115KV [0] & GATES D 230/70KV TB 5	P6	N1/N1	121.64	133.08	169.03	N/A	N/A	N/A	<100	<100	135.99	158.12	136.13	N/A	169.11	Under Review
	GATES D 230/70KV TB 5 & EXCELSIORSS-PANOCHE2 115KV [0]	P6	N1/N1	119.25	131.96	166.66	N/A	N/A	N/A	<100	<100	135.07	154.58	133.93	N/A	165.52	Under Review
	GATES D 230KV SECTION 2D	P2-2	Bus/Breaker	67.46	73.61	88.3	N/A	N/A	N/A	27	100.65	75.45	93.12	78.72	N/A	88.37	Generation re-dispatch

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Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading % (Baseline Scenarios)								Loading % (Sensitivity Scenarios)					Project & Potential Mitigation Solutions
				2022 Summer Peak	2025 Summer Peak	2030 Summer Peak	2022 Winter Peak	2025 Winter Peak	2030 Winter Peak	2022 Spring Off-Peak	2025 Spring Off-Peak	2025 SP High CEC Forecast	2025 SpOP Hi Renew & Min Gas Gen	2022 SP Heavy Renewable & Min Gas Gen	2030 Retirement of QF Generations	2030 Summer Peak w/o Facility Rerates	
Panoche-Schindler #1 115 kV Line (Cantua-Westlands)	EXCELSIORSS-PANOCHE2 115KV [0] & GATES D 230/70KV TB 5	P6	N1/N1	109.19	119.68	152.93	N/A	N/A	N/A	<100	<100	122.38	137.97	118.61	N/A	153.01	Under Review
	PANOCHE2-EXCELSIORSS 115KV [0] & GATES D 230/70KV TB 5	P6	N1/N1	109.19	119.68	152.93	N/A	N/A	N/A	<100	<100	122.38	137.97	118.61	N/A	153.01	Under Review
	GATES D 230/70KV TB 5 & EXCELSIORSS-PANOCHE2 115KV [0]	P6	N1/N1	106.87	118.53	150.57	N/A	N/A	N/A	<100	<100	121.48	134.42	116.43	N/A	149.57	Under Review
Chowchilla-Kerckhoff #2 115 kV Line (Kerckhoff 2-Woodward Jct)	KERCKHOFF-CLOVIS-SANGER #2 115KV [1900] & Base Case	P6	N1/N1	<100	<100	<100	N/A	N/A	N/A	<100	100.06	<100	<100	<100	N/A	<100	Generation re-dispatch
	KERCKHOFF-CLOVIS-SANGER #2 115KV [1900] & CHOWCHILLA-KERCKHOFF 115KV [1250] MOAS OPENED ON OAKH_JCT_K1-JCT	P6	N1/N1	<100	<100	<100	N/A	N/A	N/A	<100	<100	<100	100.57	<100	N/A	<100	Sensitivity only
	LE GRAND 115KV SECTION MA	P2-2	Bus/Breaker	47.77	40.42	46.48	N/A	N/A	N/A	84.14	100.11	22.51	79.83	15.85	N/A	50.44	Generation re-dispatch
	LE GRAND - MA 115KV & LE GRAND-DAIRYLAND LINE	P2-3	Bus/Breaker	47.77	40.42	46.48	N/A	N/A	N/A	84.14	100.11	22.51	79.83	15.85	N/A	50.44	Generation re-dispatch
Barton-Airways-Sanger 115 kV Line (Airways Jct 2-Barton)	HELM-MCCALL 230KV [4860] & P1-2:A14:138:_MC CALL-CHSR09SWSTA #1 230KV [0]	P6	N1/N1	<100	<100	<100	N/A	N/A	N/A	<100	<100	<100	100.09	<100	N/A	<100	Sensitivity only
	HERNDON 115KV SECTION 2D	P2-2	Bus/Breaker	42.95	32.01	37.64	N/A	N/A	N/A	82.97	101.86	35.74	99.69	3.22	N/A	35.42	Generation re-dispatch
	HERNDON - 2D 115KV & HERNDON-BULLARD #2 LINE	P2-3	Bus/Breaker	42.95	32.03	37.64	N/A	N/A	N/A	82.97	101.87	35.75	99.68	3.23	N/A	35.42	Generation re-dispatch
	HERNDON - 2D 115KV & HERNDON-WOODWARD LINE	P2-3	Bus/Breaker	42.31	31.64	37.29	N/A	N/A	N/A	83.32	102.12	35.36	99.94	2.87	N/A	35.07	Generation re-dispatch
Kerckhoff-Clovis-Sanger #1 115 kV Line (Woodward Jct-Shepherd)	BARTON-AIRWAYS-SANGER 115KV [1060] & MANCHESTER-AIRWAYS-SANGER 115KV [2180]	P7-1	DCTL	19.55	27.82	28.19	N/A	N/A	N/A	101.03	90.31	24.09	82.5	12.79	N/A	30.3	Generation re-dispatch
Barton-Airways-Sanger 115 kV Line (Sanger-Airways Jct 2)	KERCKHOFF-CLOVIS-SANGER #1 115KV [1890] & MANCHESTER-AIRWAYS-SANGER 115KV [2180]	P6	N1/N1	<100	<100	<100	N/A	N/A	N/A	100.03	<100	<100	<100	<100	N/A	<100	Generation re-dispatch
Kingsriver-Sanger-Reedley 115 kV Line (Sanger-Rainbow Tap)	MCCALL-REEDLEY 115KV [2320] MOAS OPENED ON MC CALL_WAHTOKE & SANGER-REEDLEY 115KV [9140] MOAS OPENED ON PARLIER_REEDLEY	P6	N1/N1	141.27	142.75	231.92	N/A	N/A	N/A	<100	<100	146.59	<100	<100	N/A	283.94	System upgrade, operating solution or SPS
	SANGER-REEDLEY 115KV [9140] MOAS OPENED ON PARLIER_REEDLEY & MCCALL-REEDLEY 115KV [2320] MOAS OPENED ON MC CALL_WAHTOKE	P6	N1/N1	141.15	142.8	231.93	N/A	N/A	N/A	<100	<100	146.63	<100	<100	N/A	276.3	System upgrade, operating solution or SPS
	SANGER-REEDLEY 115KV [9140] MOAS OPENED ON PARLIER_REEDLEY & MCCALL-REEDLEY 115KV [2320] MOAS OPENED ON WAHTOKE_REEDLEY	P6	N1/N1	<100	<100	117.24	N/A	N/A	N/A	<100	<100	<100	<100	<100	N/A	139.69	Monitor future forecast
	KINGSRIV 13.80KV GEN UNIT 1 & MCCALL-REEDLEY 115KV [2320] MOAS OPENED ON MC CALL_WAHTOKE	P3	G1/N1	<100	<100	<100	N/A	N/A	N/A	<100	<100	<100	<100	<100	N/A	113.17	Re-rate sensitivity
Sanger-Reedley 115 kV Line	MCCALL-REEDLEY 115KV [2320] MOAS OPENED ON MC CALL_WAHTOKE & KINGS RIVER-SANGER-REEDLEY 115KV [2030]	P6	N1/N1	<100	<100	101.69	N/A	N/A	N/A	<100	<100	<100	<100	<100	N/A	101.71	Monitor future forecast
	KINGS RIVER-SANGER-REEDLEY 115KV [2030] & MCCALL-REEDLEY 115KV [2320] MOAS OPENED ON MC CALL_WAHTOKE	P6	N1/N1	<100	<100	101.69	N/A	N/A	N/A	<100	<100	<100	<100	<100	N/A	101.7	Monitor future forecast
McCall 230/115kV TB #2	MC CALL 230KV - SECTION 1D & 2D	P2-4	Bus/Breaker	86.83	91.55	104.13	N/A	N/A	N/A	69.16	29.02	94.75	28.07	59.18	N/A	4.97	Monitor future forecast

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				2022 Summer Peak	2025 Summer Peak	2030 Summer Peak	2022 Winter Peak	2025 Winter Peak	2030 Winter Peak	2022 Spring Off-Peak	2025 Spring Off-Peak	2025 SP High CEC Forecast	2025 SpOP Hi Renew & Min Gas Gen	2022 SP Heavy Renewable & Min Gas Gen	2030 Retirement of QF Generations	2030 Summer Peak w/o Facility Rerates	
McCall 230/115kV TB #3	MC CALL 115KV - MIDDLE BREAKER BAY 3	P2-3	Bus/Breaker	94.2	102.45	114.58	N/A	N/A	N/A	79.68	25.86	105.18	33.34	63.08	N/A	5.36	Continue to Monitor future forecast
McCall-Reedley 115 kV Line (McCall-Wahtoke)	KINGS RIVER-SANGER-REEDLEY 115KV [2030] & SANGER-REEDLEY 115KV [9140] MOAS OPENED ON PARLIER_REEDLEY	P6	N1/N1	<100	<100	105.37	N/A	N/A	N/A	<100	<100	<100	<100	<100	N/A	105.39	Monitor future forecast
	SANGER-REEDLEY 115KV [9140] MOAS OPENED ON PARLIER_REEDLEY & KINGS RIVER-SANGER-REEDLEY 115KV [2030]	P6	N1/N1	<100	<100	105.37	N/A	N/A	N/A	<100	<100	<100	<100	<100	N/A	105.39	Monitor future forecast
McCall-Kingsburg #1 115 kV Line (McCall-Kingsburg Jct 1)	GATES-GREGG 230KV [4700] & GATES-MCCALL 230KV [4710]	P6	N1/N1	<100	<100	<100	N/A	N/A	N/A	<100	<100	<100	<100	118.99	N/A	<100	Sensitivity only
	GATES-GREGG 230KV [4700] & P1-2:A14:137:_CHSR09SWSTA-MUSTANGSS 230KV [0]	P6	N1/N1	<100	<100	<100	N/A	N/A	N/A	<100	134.69	<100	136.46	<100	N/A	<100	Generation re-dispatch
	HENRIETA 230/115KV TB 3 & MCCALL-KINGSBURG #2 115KV [2300]	P6	N1/N1	<100	<100	<100	N/A	N/A	N/A	<100	<100	<100	121.89	116.64	N/A	<100	Sensitivity Only
Kingsriver-Sanger-Reedley 115 kV Line (Reedley-Piedra 1)	MCCALL-REEDLEY 115KV [2320] MOAS OPENED ON MC CALL_WAHTOKE & SANGER-REEDLEY 115KV [9140] MOAS OPENED ON PARLIER_REEDLEY	P6	N1/N1	134.53	134.56	205.85	N/A	N/A	N/A	<100	<100	137.63	<100	<100	N/A	298.36	System upgrade, operating solution or SPS
	SANGER-REEDLEY 115KV [9140] MOAS OPENED ON PARLIER_REEDLEY & MCCALL-REEDLEY 115KV [2320] MOAS OPENED ON MC CALL_WAHTOKE	P6	N1/N1	134.4	134.56	205.84	N/A	N/A	N/A	<100	<100	137.63	<100	<100	N/A	298.3	System upgrade, operating solution or SPS
	MCCALL-REEDLEY 115KV [2320] MOAS OPENED ON WAHTOKE_REEDLEY & SANGER-REEDLEY 115KV [9140] MOAS OPENED ON PARLIER_REEDLEY	P6	N1/N1	<100	<100	111.37	N/A	N/A	N/A	<100	<100	<100	<100	<100	N/A	161.41	System upgrade, operating solution or SPS
McCall-Reedley 115 kV Line (Wahtoke-Reedley)	KINGS RIVER-SANGER-REEDLEY 115KV [2030] & SANGER-REEDLEY 115KV [9140] MOAS OPENED ON PARLIER_REEDLEY	P6	N1/N1	111.81	113.54	130.96	N/A	N/A	N/A	<100	<100	115.53	<100	<100	N/A	130.98	System upgrade, operating solution or SPS
	SANGER-REEDLEY 115KV [9140] MOAS OPENED ON PARLIER_REEDLEY & KINGS RIVER-SANGER-REEDLEY 115KV [2030]	P6	N1/N1	111.81	113.54	130.95	N/A	N/A	N/A	<100	<100	115.53	<100	<100	N/A	130.98	System upgrade, operating solution or SPS
McCall-Kingsburg #1 115 kV Line (Kingsburg Jct1-Kingsburg Jct 2)	GATES-GREGG 230KV [4700] & GATES-MCCALL 230KV [4710]	P6	N1/N1	<100	<100	<100	N/A	N/A	N/A	<100	<100	<100	<100	101.19	N/A	<100	Sensitivity only
	GATES-GREGG 230KV [4700] & P1-2:A14:137:_CHSR09SWSTA-MUSTANGSS 230KV [0]	P6	N1/N1	<100	<100	<100	N/A	N/A	N/A	<100	123.88	<100	125.45	<100	N/A	<100	Generation re-dispatch
	MCCALL-KINGSBURG #2 115KV [2300] & P1-2:A14:140:_JACKSONSWSTA-GWF_HEP 115KV [0]	P6	N1/N1	<100	103.55	116.16	N/A	N/A	N/A	<100	<100	105.21	<100	<100	N/A	116.17	Continue to Monitor future forecast
	P1-2:A14:140:_JACKSONSWSTA-GWF_HEP 115KV [0] & MCCALL-KINGSBURG #2 115KV [2300]	P6	N1/N1	<100	103.55	116.16	N/A	N/A	N/A	<100	<100	105.2	<100	<100	N/A	116.17	Continue to Monitor future forecast
Kingsriver-Sanger-Reedley 115 kV Line (Rainbow Tap-Piedra 1)	MCCALL-REEDLEY 115KV [2320] MOAS OPENED ON MC CALL_WAHTOKE & SANGER-REEDLEY 115KV [9140] MOAS OPENED ON PARLIER_REEDLEY	P6	N1/N1	121.06	120.49	210.56	N/A	N/A	N/A	<100	<100	124.06	<100	<100	N/A	257.79	System upgrade, operating solution or SPS
	SANGER-REEDLEY 115KV [9140] MOAS OPENED ON PARLIER_REEDLEY & MCCALL-REEDLEY 115KV [2320] MOAS OPENED ON MC CALL_WAHTOKE	P6	N1/N1	120.96	120.53	210.57	N/A	N/A	N/A	<100	<100	124.1	<100	<100	N/A	250.85	System upgrade, operating solution or SPS
	MCCALL-REEDLEY 115KV [2320] MOAS OPENED ON WAHTOKE_REEDLEY & SANGER-REEDLEY 115KV [9140] MOAS OPENED ON PARLIER_REEDLEY	P6	N1/N1	<100	<100	<100	N/A	N/A	N/A	<100	<100	<100	<100	<100	N/A	113.7	Sensitivity only
McCall-California Ave 115 kV Line	MCCALL-WEST FRESNO #2 115KV [2370] & SANGER-CALIFORNIA AVE 115KV [9130]	P6	N1/N1	<100	<100	116.67	N/A	N/A	N/A	<100	<100	<100	<100	<100	N/A	116.71	Monitor Future forecast

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				2022 Summer Peak	2025 Summer Peak	2030 Summer Peak	2022 Winter Peak	2025 Winter Peak	2030 Winter Peak	2022 Spring Off-Peak	2025 Spring Off-Peak	2025 SP High CEC Forecast	2025 SpOP Hi Renew & Min Gas Gen	2022 SP Heavy Renewable & Min Gas Gen	2030 Retirement of QF Generations	2030 Summer Peak w/o Facility Rerates	
(Danish Creamery-McCall)	SANGER-CALIFORNIA AVE 115KV [9130] & MCCALL-WEST FRESNO #2 115KV [2370]	P6	N1/N1	<100	<100	116.67	N/A	N/A	N/A	<100	<100	<100	<100	<100	N/A	116.71	Monitor Future forecast
EXCELSIORSS-SCHINDLR #1 115kV Line	EXCELSIORSS-SCHINDLR #2 115KV [0] & GATES D 230/70KV TB 5	P6	N1/N1	113.66	122.71	152.46	N/A	N/A	N/A	<100	<100	125.61	<100	<100	N/A	152.54	Monitor Fresno Procedure
	GATES D 230/70KV TB 5 & EXCELSIORSS-SCHINDLR #2 115KV [0]	P6	N1/N1	106.76	117.91	150.13	N/A	N/A	N/A	<100	<100	121.01	<100	<100	N/A	149.81	Monitor Fresno Procedure
EXCELSIORSS-SCHINDLR #2 115kV Line	EXCELSIORSS-SCHINDLR #1 115KV [0] & GATES D 230/70KV TB 5	P6	N1/N1	113.66	122.71	152.46	N/A	N/A	N/A	<100	<100	125.61	<100	<100	N/A	152.54	Monitor Fresno Procedure
	GATES D 230/70KV TB 5 & EXCELSIORSS-SCHINDLR #1 115KV [0]	P6	N1/N1	106.76	117.91	150.13	N/A	N/A	N/A	<100	<100	121.01	<100	<100	N/A	149.81	Monitor Fresno Procedure
California Ave-Sanger 115 kV Line	CALIFORNIA AVE-MCCALL 115KV [2360] & MCCALL-WEST FRESNO #2 115KV [2370]	P7-1	DCTL	88.62	93.99	106.8	N/A	N/A	N/A	32.43	7.49	95.41	3.66	70.06	N/A	106.82	Continue to Monitor future forecast
	CALIFORNIA AVE-MCCALL 115KV [2360] & MCCALL-WEST FRESNO #2 115KV [2370]	P6	N1/N1	<100	<100	106.77	N/A	N/A	N/A	<100	<100	<100	<100	<100	N/A	106.79	Continue to Monitor future forecast
	MCCALL-WEST FRESNO #2 115KV [2370] & CALIFORNIA AVE-MCCALL 115KV [2360]	P6	N1/N1	<100	<100	106.77	N/A	N/A	N/A	<100	<100	<100	<100	<100	N/A	106.79	Continue to Monitor future forecast
McCall-California Ave 115 kV Line (California Ave-Danish Creamery)	MCCALL-WEST FRESNO #2 115KV [2370] & SANGER-CALIFORNIA AVE 115KV [9130]	P6	N1/N1	<100	<100	114.41	N/A	N/A	N/A	<100	<100	<100	<100	<100	N/A	114.46	Continue to Monitor future forecast
	SANGER-CALIFORNIA AVE 115KV [9130] & MCCALL-WEST FRESNO #2 115KV [2370]	P6	N1/N1	<100	<100	114.41	N/A	N/A	N/A	<100	<100	<100	<100	<100	N/A	114.46	Continue to Monitor future forecast
McCall-West Fresno 115 kV Line	CALIFORNIA AVE-MCCALL 115KV [2360] & SANGER-CALIFORNIA AVE 115KV [9130]	P6	N1/N1	<100	<100	105.75	N/A	N/A	N/A	<100	<100	<100	<100	<100	N/A	105.78	Continue to Monitor future forecast
	SANGER-CALIFORNIA AVE 115KV [9130] & CALIFORNIA AVE-MCCALL 115KV [2360]	P6	N1/N1	<100	<100	105.75	N/A	N/A	N/A	<100	<100	<100	<100	<100	N/A	105.78	Continue to Monitor future forecast
Herndon-Barton 115 kV Line	HELM-MCCALL 230KV [4860] & P1-2:A14:138:_MC CALL-CHSR09SWSTA #1 230KV [0]	P6	N1/N1	<100	<100	<100	N/A	N/A	N/A	<100	106.2	<100	115.34	<100	N/A	<100	Generation re-dispatch
	PANOCHE-HELM 230KV [5370] & P1-2:A14:137:_CHSR09SWSTA-MUSTANGSS 230KV [0]	P6	N1/N1	<100	<100	<100	N/A	N/A	N/A	<100	104.79	<100	113.88	<100	N/A	<100	Generation re-dispatch
	PANOCHE-HELM 230KV [5370] & P1-2:A14:138:_MC CALL-CHSR09SWSTA #1 230KV [0]	P6	N1/N1	<100	<100	<100	N/A	N/A	N/A	<100	104.96	<100	114.06	<100	N/A	<100	Generation re-dispatch
	HERNDON - 2D 115KV & HERNDON-BULLARD #2 LINE	P2-3	Bus/Breaker	94.38	85.6	95.47	N/A	N/A	N/A	79.07	113.78	90.59	113.85	37.44	N/A	92.88	Generation re-dispatch
	HERNDON 115KV SECTION 2D	P2-2	Bus/Breaker	94.36	85.58	95.43	N/A	N/A	N/A	79.07	113.78	90.57	113.85	37.43	N/A	92.84	Generation re-dispatch
	HERNDON - 2D 115KV & HERNDON-WOODWARD LINE	P2-3	Bus/Breaker	93.84	85.14	94.93	N/A	N/A	N/A	79.46	114.08	90.12	114.15	36.99	N/A	92.35	Generation re-dispatch
	HELM-MCCALL 230KV [4860] & HENTAP2-MUSTANGSS #1 230KV [0]	P7-1	DCTL	77.84	78.2	82.46	N/A	N/A	N/A	26.05	99.57	83.12	108.63	16.71	N/A	77.48	Sensitivity only
Herndon-Bullard #1 115 kV Line	HERNDON-BULLARD #1 115KV [1760] & Base Case	P6	N1/N1	<100	<100	100.06	N/A	N/A	N/A	<100	<100	<100	<100	<100	N/A	100.09	Continue to monitor future forecast
Manchester-Airways-Sanger 115 kV Line (Manchester-Las Palmas)	HELM-MCCALL 230KV [4860] & P1-2:A14:138:_MC CALL-CHSR09SWSTA #1 230KV [0]	P6	N1/N1	<100	<100	<100	N/A	N/A	N/A	<100	102.11	<100	108.24	<100	N/A	<100	Generation re-dispatch
	PANOCHE-HELM 230KV [5370] & P1-2:A14:137:_CHSR09SWSTA-MUSTANGSS 230KV [0]	P6	N1/N1	<100	<100	<100	N/A	N/A	N/A	<100	100.76	<100	106.82	<100	N/A	<100	Generation re-dispatch
	PANOCHE-HELM 230KV [5370] & P1-2:A14:138:_MC CALL-CHSR09SWSTA #1 230KV [0]	P6	N1/N1	<100	<100	<100	N/A	N/A	N/A	<100	100.93	<100	107.01	<100	N/A	<100	Generation re-dispatch
	HELM-MCCALL 230KV [4860] & HENTAP2-MUSTANGSS #1 230KV [0]	P7-1	DCTL	38.5	37.15	39.06	N/A	N/A	N/A	37.01	95.95	41.22	102.12	11.72	N/A	34.5	Sensitivity Only
	HELM-MCCALL 230KV [4860] & P1-2:A14:138:_MC CALL-CHSR09SWSTA #1 230KV [0]	P6	N1/N1	<100	<100	<100	N/A	N/A	N/A	<100	<100	<100	104.39	<100	N/A	<100	Sensitivity only

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Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading % (Baseline Scenarios)								Loading % (Sensitivity Scenarios)					Project & Potential Mitigation Solutions
				2022 Summer Peak	2025 Summer Peak	2030 Summer Peak	2022 Winter Peak	2025 Winter Peak	2030 Winter Peak	2022 Spring Off-Peak	2025 Spring Off-Peak	2025 SP High CEC Forecast	2025 SpOP Hi Renew & Min Gas Gen	2022 SP Heavy Renewable & Min Gas Gen	2030 Retirement of QF Generations	2030 Summer Peak w/o Facility Rerates	
Herndon-Manchester 115 kV Line	PANOCHE-HELM 230KV [5370] & P1-2:A14:137:_CHSR09SWSTA-MUSTANGSS 230KV [0]	P6	N1/N1	<100	<100	<100	N/A	N/A	N/A	<100	<100	<100	103.05	<100	N/A	<100	Sensitivity only
	PANOCHE-HELM 230KV [5370] & P1-2:A14:138:_MC CALL-CHSR09SWSTA #1 230KV [0]	P6	N1/N1	<100	<100	<100	N/A	N/A	N/A	<100	<100	<100	103.22	<100	N/A	<100	Sensitivity only
Herndon-Woodward 115 kV Line(Henrdon-Children's Hospital)	HERNDON-BARTON 115KV [1750] & HERNDON-MANCHESTER 115KV [1780]	P7-1	DCTL	86.2	81.68	89.32	N/A	N/A	N/A	61.92	106.31	86.99	109.23	38.4	N/A	87.08	Continue to Monitor future forecast
	HERNDON-BARTON 115KV [1750] & MANCHESTER-AIRWAYS-SANGER 115KV [2180]	P7-1	DCTL	71.83	67.22	74.13	N/A	N/A	N/A	67.19	107.83	72.29	110.09	27.42	N/A	71.92	Continue to Monitor future forecast
	BARTON-AIRWAYS-SANGER 115KV [1060] & MANCHESTER-AIRWAYS-SANGER 115KV [2180]	P7-1	DCTL	52.12	46.38	51.09	N/A	N/A	N/A	74.31	107.16	51.12	107.88	15.47	N/A	48.92	Continue to Monitor future forecast
Herndon-Woodward 115 kV Line(Woodward-Children's Hospital)	HELM-MCCALL 230KV [4860] & P1-2:A14:138:_MC CALL-CHSR09SWSTA #1 230KV [0]	P6	N1/N1	<100	<100	<100	N/A	N/A	N/A	<100	<100	<100	100.32	<100	N/A	<100	Sensitivity Only
	HERNDON-BARTON 115KV [1750] & HERNDON-MANCHESTER 115KV [1780]	P7-1	DCTL	84.29	79.64	87.23	N/A	N/A	N/A	64.07	107.82	84.92	110.75	36.39	N/A	84.99	Generation re-dispatch
	HERNDON-BARTON 115KV [1750] & MANCHESTER-AIRWAYS-SANGER 115KV [2180]	P7-1	DCTL	69.97	65.19	72.07	N/A	N/A	N/A	69.26	109.32	70.23	111.59	25.4	N/A	69.86	Generation re-dispatch
	BARTON-AIRWAYS-SANGER 115KV [1060] & MANCHESTER-AIRWAYS-SANGER 115KV [2180]	P7-1	DCTL	50.35	44.36	49.1	N/A	N/A	N/A	76.4	108.62	49.08	109.35	13.4	N/A	46.93	Generation re-dispatch
McCall-Kingsburg #1 115 kV Line (Kingsburg Jct 2-Kingsburg)	GATES-GREGG 230KV [4700] & GATES-MCCALL 230KV [4710]	P6	N1/N1	<100	<100	<100	N/A	N/A	N/A	<100	<100	<100	<100	101.32	N/A	<100	Sensitivity only
	GATES-GREGG 230KV [4700] & P1-2:A14:137:_CHSR09SWSTA-MUSTANGSS 230KV [0]	P6	N1/N1	<100	<100	<100	N/A	N/A	N/A	<100	123.96	<100	125.52	<100	N/A	<100	Generation re-dispatch
	MCCALL-KINGSBURG #2 115KV [2300] & P1-2:A14:140:_JACKSONSWSTA-GWF_HEP 115KV [0]	P6	N1/N1	<100	103.58	116.19	N/A	N/A	N/A	<100	<100	105.24	<100	<100	N/A	116.2	Continue to Monitor future forecast
	P1-2:A14:140:_JACKSONSWSTA-GWF_HEP 115KV [0] & MCCALL-KINGSBURG #2 115KV [2300]	P6	N1/N1	<100	103.58	116.19	N/A	N/A	N/A	<100	<100	105.23	<100	<100	N/A	116.2	Continue to Monitor future forecast
McCall-Kingsburg #1 115 kV Line (Kingsburg Jct 2-Kingsburg)	GATES-GREGG 230KV [4700] & GATES-MCCALL 230KV [4710]	P6	N1/N1	<100	<100	<100	N/A	N/A	N/A	<100	<100	<100	<100	127.65	N/A	<100	Sensitivity only
	HENRIETTA-LEPRINO SW STA 115KV [1737] & MCCALL-KINGSBURG #1 115KV [2290] MOAS OPENED ON KINGS J1_KINGS J2	P6	N1/N1	<100	<100	<100	N/A	N/A	N/A	<100	<100	<100	<100	107.95	N/A	<100	Sensitivity only
	MCCALL-KINGSBURG #1 115KV [2290] MOAS OPENED ON KINGS J1_KINGS J2 & HENRIETTA-LEPRINO SW STA 115KV [1737]	P6	N1/N1	<100	<100	<100	N/A	N/A	N/A	<100	<100	<100	<100	107.95	N/A	<100	Sensitivity only
GWF-Kingsburg 115 kV Line (Kingsburg-Contadina)	GATES-GREGG 230KV [4700] & GATES-MCCALL 230KV [4710]	P6	N1/N1	<100	<100	<100	N/A	N/A	N/A	<100	<100	<100	<100	139.97	N/A	<100	Sensitivity Only
Kingsburg-Corcoran #2 115 kV Line (Kingsburg-Waukena)	CORCORAN 115/70KV TB 1 & KINGSBURG-CORCORAN #1 115KV [2040] MOAS OPENED ON KINGSBURGE_Q529TP	P6	N1/N1	<100	<100	<100	N/A	N/A	N/A	<100	<100	<100	<100	108.5	N/A	<100	Sensitivity Only
	KINGSBURG-CORCORAN #1 115KV [2040] MOAS OPENED ON KINGSBURGE_Q529TP & Base Case	P6	N1/N1	<100	<100	<100	N/A	N/A	N/A	<100	<100	<100	<100	116.2	N/A	<100	Sensitivity Only
	KINGSBURG-CORCORAN #1 115KV [2040] MOAS OPENED ON Q529TP_CORCORAN & Base Case	P6	N1/N1	<100	<100	<100	N/A	N/A	N/A	<100	<100	<100	<100	110.39	N/A	<100	Sensitivity Only
Kingsburg-Corcoran #2 115 kV Line (Kingsburg-Jacksson)	GATES-GREGG 230KV [4700] & P1-2:A14:137:_CHSR09SWSTA-MUSTANGSS 230KV [0]	P6	N1/N1	<100	<100	<100	N/A	N/A	N/A	<100	122.05	<100	118.81	<100	N/A	<100	Generation re-dispatch
	GATES-GREGG 230KV [4700] & P1-2:A14:137:_CHSR09SWSTA-MUSTANGSS 230KV [0]	P6	N1/N1	<100	<100	<100	N/A	N/A	N/A	<100	131.97	<100	133.69	<100	N/A	<100	Generation re-dispatch

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				2022 Summer Peak	2025 Summer Peak	2030 Summer Peak	2022 Winter Peak	2025 Winter Peak	2030 Winter Peak	2022 Spring Off-Peak	2025 Spring Off-Peak	2025 SP High CEC Forecast	2025 SpOP Hi Renew & Min Gas Gen	2022 SP Heavy Renewable & Min Gas Gen	2030 Retirement of QF Generations	2030 Summer Peak w/o Facility Rerates	
McCall-Kingsburg #2 115kV line(Kingsburg-Guardian sub)	MCCALL-KINGSBURG #1 115KV [2290] MOAS OPENED ON KINGS J1_SUNMAIDJCT & P1-2:A14:140:_JACKSONSWSTA-GWF_HEP 115KV [0]	P6	N1/N1	<100	103.86	116.9	N/A	N/A	N/A	<100	<100	105.55	<100	<100	N/A	116.9	Continue to Monitor future forecast
	MCCALL-KINGSBURG #1 115KV [2290] MOAS OPENED ON KINGS J1_KINGS J2 & P1-2:A14:140:_JACKSONSWSTA-GWF_HEP 115KV [0]	P6	N1/N1	<100	103.89	116.8	N/A	N/A	N/A	<100	<100	105.58	<100	<100	N/A	116.81	Continue to Monitor future forecast
	P1-2:A14:140:_JACKSONSWSTA-GWF_HEP 115KV [0] & MCCALL-KINGSBURG #1 115KV [2290] MOAS OPENED ON KINGS J1_KINGS J2	P6	N1/N1	<100	103.89	116.8	N/A	N/A	N/A	<100	<100	105.56	<100	<100	N/A	116.81	Continue to Monitor future forecast
Kingsburg-Corcoran #2 115 kV Line (Kingsburg-529T)	CORCORAN 115/70KV TB 1 & KINGSBURG-WAUKENA SW STA 115KV [2050]	P6	N1/N1	<100	<100	<100	N/A	N/A	N/A	<100	<100	<100	<100	108.17	N/A	<100	Sensitivity Only
	KINGSBURG-WAUKENA SW STA 115KV [2050] & Base Case	P6	N1/N1	<100	<100	<100	N/A	N/A	N/A	<100	<100	<100	<100	115.9	N/A	<100	Sensitivity Only
	KINGSBURG-WAUKENA SW STA 115KV [2050] & CORCORAN 115/70KV TB 1	P6	N1/N1	<100	<100	<100	N/A	N/A	N/A	<100	<100	<100	<100	108.17	N/A	<100	Sensitivity Only
Kingsburg-Corcoran #2 115 kV Line (Kingsburg-Jackson)	GATES-GREGG 230KV [4700] & P1-2:A14:137:_CHSR09SWSTA-MUSTANGSS 230KV [0]	P6	N1/N1	<100	<100	<100	N/A	N/A	N/A	<100	124.94	<100	121.62	<100	N/A	<100	Generation re-dispatch
McCall-Kingsburg #2 115kV line(McCall-Guardian sub)	GATES-GREGG 230KV [4700] & GATES-MCCALL 230KV [4710]	P6	N1/N1	<100	<100	<100	N/A	N/A	N/A	<100	<100	<100	<100	110.53	N/A	<100	Sensitivity only
	GATES-GREGG 230KV [4700] & P1-2:A14:137:_CHSR09SWSTA-MUSTANGSS 230KV [0]	P6	N1/N1	<100	<100	<100	N/A	N/A	N/A	<100	129.17	<100	130.86	<100	N/A	<100	Generation re-dispatch
	GWF-KINGSBURG 115KV [1743] & MCCALL-KINGSBURG #1 115KV [2290] MOAS OPENED ON KINGS J1_KINGS J2	P6	N1/N1	102.32	<100	<100	N/A	N/A	N/A	<100	<100	<100	<100	<100	N/A	<100	Under Review
	MCCALL-KINGSBURG #1 115KV [2290] MOAS OPENED ON KINGS J1_KINGS J2 & P1-2:A14:140:_JACKSONSWSTA-GWF_HEP 115KV [0]	P6	N1/N1	<100	107.85	120.55	N/A	N/A	N/A	<100	<100	109.57	<100	<100	N/A	120.55	Continue to Monitor future forecast
GWF-Kingsburg 115 kV Line (GWF-Contadina)	GATES-GREGG 230KV [4700] & GATES-MCCALL 230KV [4710]	P6	N1/N1	<100	<100	<100	N/A	N/A	N/A	<100	<100	<100	<100	143.1	N/A	<100	Sensitivity only
	GATES-GREGG 230KV [4700] & P1-2:A14:137:_CHSR09SWSTA-MUSTANGSS 230KV [0]	P6	N1/N1	<100	<100	<100	N/A	N/A	N/A	<100	143.48	<100	138.54	<100	N/A	<100	Generation re-dispatch
	HELM-MCCALL 230KV [4860] & HENTAP2-MUSTANGSS #1 230KV [0]	P7-1	DCTL	60.4	90.18	88.6	N/A	N/A	N/A	14.48	97.84	92.39	123.83	13.91	N/A	83.04	Sensitivity only
	MUSTANGSS 230KV - MIDDLE BREAKER BAY 2	P2-3	Bus/Breaker	43.05	48.22	51.2	N/A	N/A	N/A	26.32	35.19	49.14	<100	102.5	N/A	50.15	Sensitivity only
Henrietta 230/115 kV Transformer Bank 3	Q272 0.55KV GEN UNIT 1 & CHSR09SWSTA-MUSTANGSS 230KV [0]	P3	G1/N1	<100	<100	<100	N/A	N/A	N/A	<100	<100	<100	111.98	<100	N/A	<100	Sensitivity only
	Q877PH12 0.39KV GEN UNIT 12 & CHSR09SWSTA-MUSTANGSS 230KV [0]	P3	G1/N1	<100	<100	<100	N/A	N/A	N/A	<100	<100	<100	111.85	<100	N/A	<100	Sensitivity only
	Q877PH3 0.63KV GEN UNIT 3 & CHSR09SWSTA-MUSTANGSS 230KV [0]	P3	G1/N1	<100	<100	<100	N/A	N/A	N/A	<100	<100	<100	111.83	<100	N/A	<100	Sensitivity only
	HELM-MCCALL 230KV [4860] & P1-2:A14:137:_CHSR09SWSTA-MUSTANGSS 230KV [0]	P6	N1/N1	<100	<100	<100	N/A	N/A	N/A	<100	127.8	<100	148.86	<100	N/A	<100	Generation re-dispatch
	HELM-MCCALL 230KV [4860] & P1-2:A14:138:_MC CALL-CHSR09SWSTA #1 230KV [0]	P6	N1/N1	<100	<100	<100	N/A	N/A	N/A	<100	118.61	<100	140.03	<100	N/A	<100	Generation re-dispatch
	PANOCHE-HELM 230KV [5370] & P1-2:A14:138:_MC CALL-CHSR09SWSTA #1 230KV [0]	P6	N1/N1	<100	<100	<100	N/A	N/A	N/A	<100	117.42	<100	138.52	<100	N/A	<100	Generation re-dispatch
	HELM-MCCALL 230KV [4860] & HENTAP2-MUSTANGSS #1 230KV [0]	P7-1	DCTL	28.43	57.51	55.13	N/A	N/A	N/A	25.53	128.04	59.78	148.86	40.15	N/A	0.98	Generation re-dispatch

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				2022 Summer Peak	2025 Summer Peak	2030 Summer Peak	2022 Winter Peak	2025 Winter Peak	2030 Winter Peak	2022 Spring Off-Peak	2025 Spring Off-Peak	2025 SP High CEC Forecast	2025 SpOP Hi Renew & Min Gas Gen	2022 SP Heavy Renewable & Min Gas Gen	2030 Retirement of QF Generations	2030 Summer Peak w/o Facility Rerates	
	PANOCHE-TRANQLTYSS #1 230KV [0] & PANOCHE-TRANQLTYSS #2 230KV [0]	P7-1	DCTL	17.81	39.06	38.27	N/A	N/A	N/A	26.77	94.66	40.72	105.89	54.36	N/A	0.7	Sensitivity only
	PANOCHE 230KV - SECTION 1D & 2D	P2-4	Bus/Breaker	16.5	37.68	36.69	N/A	N/A	N/A	28.33	95.44	38.99	106.81	53.72	N/A	0.67	Sensitivity only
	CHSR09SWSTA-MUSTANGSS 230KV [0]	P1-2	N-1	<100	37.6	35.83	N/A	N/A	N/A	<100	93.84	37.44	111.57	<100	N/A	0.64	Sensitivity only
	GATES-MCCALL 230KV [4710] (HENTAP2-MUSTANGSS)	P2-1	Line Section w/o Fault	15.78	37.61	35.78	N/A	N/A	N/A	28.13	93.77	37.44	111.52	37.45	N/A	0.64	Sensitivity only
	CHSR09SWSTA 230KV - MIDDLE BREAKER BAY 2	P2-3	Bus/Breaker	<100	37.6	35.83	N/A	N/A	N/A	<100	<100	37.44	111.57	<100	N/A	0.64	Sensitivity only
Henrietta-GWF 115 kV Line (Henrietta-Leprino Jct)	ALPAUGHSTH 0.40KV GEN UNIT 1 & CHSR09SWSTA-MUSTANGSS 230KV [0]	P3	G1/N1	<100	<100	<100	N/A	N/A	N/A	<100	<100	<100	109.51	<100	N/A	<100	Sensitivity only
	KANSASS_S 12.47KV GEN UNIT F & CHSR09SWSTA-MUSTANGSS 230KV [0]	P3	G1/N1	<100	<100	<100	N/A	N/A	N/A	<100	<100	<100	109.52	<100	N/A	<100	Sensitivity only
	KENT_S 0.80KV GEN UNIT 1 & CHSR09SWSTA-MUSTANGSS 230KV [0]	P3	G1/N1	<100	<100	<100	N/A	N/A	N/A	<100	<100	<100	109.5	<100	N/A	<100	Sensitivity only
	HELM-MCCALL 230KV [4860] & P1-2:A14:137:_CHSR09SWSTA-MUSTANGSS 230KV [0]	P6	N1/N1	<100	<100	<100	N/A	N/A	N/A	<100	125.63	<100	145.97	<100	N/A	<100	Generation re-dispatch
	HELM-MCCALL 230KV [4860] & P1-2:A14:138:_MC CALL-CHSR09SWSTA #1 230KV [0]	P6	N1/N1	<100	<100	<100	N/A	N/A	N/A	<100	116.52	<100	137.3	<100	N/A	<100	Generation re-dispatch
	PANOCHE-HELM 230KV [5370] & P1-2:A14:138:_MC CALL-CHSR09SWSTA #1 230KV [0]	P6	N1/N1	<100	<100	<100	N/A	N/A	N/A	<100	115.35	<100	135.76	<100	N/A	<100	Generation re-dispatch
	HELM-MCCALL 230KV [4860] & HENTAP2-MUSTANGSS #1 230KV [0]	P7-1	DCTL	28.51	57.03	53.84	N/A	N/A	N/A	25.69	125.93	59.32	145.95	39.92	N/A	48.24	Generation re-dispatch
	PANOCHE-TRANQLTYSS #1 230KV [0] & PANOCHE-TRANQLTYSS #2 230KV [0]	P7-1	DCTL	17.86	38.72	37.25	N/A	N/A	N/A	26.81	93.06	40.39	104.56	54.35	N/A	34.43	Sensitivity only
	PANOCHE 230KV - SECTION 1D & 2D	P2-4	Bus/Breaker	16.55	37.35	35.64	N/A	N/A	N/A	28.17	93.83	38.66	105.65	53.76	N/A	32.79	Sensitivity only
	CHSR09SWSTA-MUSTANGSS 230KV [0]	P1-2	N-1	<100	37.26	34.71	N/A	N/A	N/A	<100	92.14	37.11	109.28	<100	N/A	31.32	Sensitivity only
	CHSR09SWSTA 230KV - MIDDLE BREAKER BAY 2	P2-3	Bus/Breaker	<100	37.26	34.71	N/A	N/A	N/A	<100	<100	37.11	109.28	<100	N/A	31.32	Sensitivity only
	GATES-MCCALL 230KV [4710] (HENTAP2-MUSTANGSS)	P2-1	Line Section w/o Fault	15.82	37.27	34.66	N/A	N/A	N/A	28.3	92.07	37.12	109.22	37.26	N/A	31.27	Sensitivity only
Panoche-Schindler #1 115 kV Line	EXCELSIORSS-PANOCHE2 115KV [0] & GATES D 230/70KV TB 5	P6	N1/N1	106.64	117.55	150.7	N/A	N/A	N/A	<100	<100	120.23	139.88	120.94	N/A	150.78	Continue to monitor Fresno procedure
	PANOCHE2-EXCELSIORSS 115KV [0] & GATES D 230/70KV TB 5	P6	N1/N1	106.64	117.55	150.7	N/A	N/A	N/A	<100	<100	120.23	139.88	120.94	N/A	150.78	Continue to monitor Fresno procedure
	GATES D 230/70KV TB 5 & EXCELSIORSS-PANOCHE2 115KV [0]	P6	N1/N1	104.35	116.4	148.34	N/A	N/A	N/A	<100	<100	119.33	136.33	118.77	N/A	147.36	Continue to monitor Fresno procedure
Kingsburg-Corcoran #1 115 kV Line (S0529 Tap-Corcoran)	KINGSBURG-WAUKENA SW STA 115KV [2050] & Base Case	P6	N1/N1	<100	<100	<100	N/A	N/A	N/A	<100	<100	<100	<100	110.49	N/A	<100	Sensitivity only
	P1-2:A14:117:_CORCORAN-ANGIOLA 70KV [8600] & KINGSBURG-WAUKENA SW STA 115KV [2050]	P6	N1/N1	<100	<100	<100	N/A	N/A	N/A	<100	<100	<100	<100	103.49	N/A	<100	Sensitivity only
	P1-2:A14:142:_JACKSONSWSTA-WAUKENA_SS #1 115KV [0] & Base Case	P6	N1/N1	<100	<100	<100	N/A	N/A	N/A	<100	100.57	<100	115.79	<100	N/A	<100	Generation re-dispatch
Coppermine-Tivy Valley 70 kV Line	BORDEN 230/70KV TB 1 & BORDEN 230/70KV TB 4	P6	N1/N1	<100	<100	<100	N/A	N/A	N/A	123.98	<100	<100	150.43	<100	N/A	<100	Generation re-dispatch
	BORDEN 230/70KV TB 4 & BORDEN 230/70KV TB 1	P6	N1/N1	<100	<100	<100	N/A	N/A	N/A	123.98	<100	<100	150.43	<100	N/A	<100	Generation re-dispatch

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Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading % (Baseline Scenarios)								Loading % (Sensitivity Scenarios)					Project & Potential Mitigation Solutions
				2022 Summer Peak	2025 Summer Peak	2030 Summer Peak	2022 Winter Peak	2025 Winter Peak	2030 Winter Peak	2022 Spring Off-Peak	2025 Spring Off-Peak	2025 SP High CEC Forecast	2025 SpOP Hi Renew & Min Gas Gen	2022 SP Heavy Renewable & Min Gas Gen	2030 Retirement of QF Generations	2030 Summer Peak w/o Facility Rerates	
Mendota-Giffen 70 kV Line (Giffen Jct-Westland Jct)	NORTHSTAR 0.36KV GEN UNIT 1 & HELM 230/70KV TB 1	P3	G1/N1	<100	<100	<100	N/A	N/A	N/A	<100	<100	<100	134.95	<100	N/A	<100	sensitivity only
	Q1028Q1029PV 34.50KV GEN UNIT 1 & HELM 230/70KV TB 1	P3	G1/N1	<100	<100	<100	N/A	N/A	N/A	<100	<100	<100	135.11	<100	N/A	<100	sensitivity only
	Q1032G3 0.55KV GEN UNIT 3 & HELM 230/70KV TB 1	P3	G1/N1	<100	<100	<100	N/A	N/A	N/A	<100	<100	<100	135.36	<100	N/A	<100	sensitivity only
	230KV [5000] & 230KV [5481]	P6	N1/N1	<100	<100	<100	N/A	N/A	N/A	<100	123.42	<100	139.59	<100	N/A	<100	Generation re-dispatch
	230KV [5481] & 230KV [5000]	P6	N1/N1	<100	<100	<100	N/A	N/A	N/A	<100	123.42	<100	139.59	<100	N/A	<100	Generation re-dispatch
	P1-2:A14:137:_CHSR09SWSTA-MUSTANGSS 230KV [0] & PANOCHE-HELM 230KV [5370]	P6	N1/N1	<100	<100	<100	N/A	N/A	N/A	<100	128.98	<100	106.36	<100	N/A	<100	Generation re-dispatch
	PANOCHE 230KV - SECTION 1D & 2D	P2-4	Bus/Breaker	10.57	9.61	9.77	N/A	N/A	N/A	64.91	119.77	9.66	127.09	27.14	N/A	9.81	Generation re-dispatch
	PANOCHE-TRANQLTYSS #1 230KV [0] & PANOCHE-TRANQLTYSS #2 230KV [0]	P7-1	DCTL	10.56	9.61	9.77	N/A	N/A	N/A	56.99	122.51	9.66	138.46	27.14	N/A	9.81	Generation re-dispatch
	HELM 230/70KV TB 1	P1-3	N-1	N/A	N/A	N/A	N/A	N/A	N/A	54.08	99.8	N/A	134.89	N/A	N/A	N/A	sensitivity only
	HELM 230KV SECTION 1D	P2-2	Bus/Breaker	N/A	N/A	N/A	N/A	N/A	N/A	54.04	99.84	N/A	135.03	N/A	N/A	N/A	sensitivity only
Mendota-San Joaquin-Helm 70 kV Line (San Joaquin Jct-Giffen Jct)	NORTHSTAR 0.36KV GEN UNIT 1 & HELM 230/70KV TB 1	P3	G1/N1	<100	<100	<100	N/A	N/A	N/A	<100	<100	<100	116.98	<100	N/A	<100	sensitivity only
	Q1028Q1029PV 34.50KV GEN UNIT 1 & HELM 230/70KV TB 1	P3	G1/N1	<100	<100	<100	N/A	N/A	N/A	<100	<100	<100	117.11	<100	N/A	<100	sensitivity only
	Q1032G3 0.55KV GEN UNIT 3 & HELM 230/70KV TB 1	P3	G1/N1	<100	<100	<100	N/A	N/A	N/A	<100	<100	<100	117.33	<100	N/A	<100	sensitivity only
	230KV [5000] & 230KV [5481]	P6	N1/N1	<100	<100	<100	N/A	N/A	N/A	<100	109.65	<100	121.24	<100	N/A	<100	Generation re-dispatch
	230KV [5481] & 230KV [5000]	P6	N1/N1	<100	<100	<100	N/A	N/A	N/A	<100	109.65	<100	121.24	<100	N/A	<100	Generation re-dispatch
	P1-2:A14:137:_CHSR09SWSTA-MUSTANGSS 230KV [0] & PANOCHE-HELM 230KV [5370]	P6	N1/N1	<100	<100	<100	N/A	N/A	N/A	<100	115.5	<100	<100	<100	N/A	<100	Generation re-dispatch
	PANOCHE-TRANQLTYSS #1 230KV [0] & PANOCHE-TRANQLTYSS #2 230KV [0]	P7-1	DCTL	29.2	31.93	36.54	N/A	N/A	N/A	48.64	108.75	32.31	120.15	70.64	N/A	36.5	Generation re-dispatch
	PANOCHE 230KV - SECTION 1D & 2D	P2-4	Bus/Breaker	29.2	31.93	36.54	N/A	N/A	N/A	62.45	106.01	32.31	108.76	70.63	N/A	36.49	Generation re-dispatch
	HELM 230/70KV TB 1	P1-3	N-1	N/A	N/A	N/A	N/A	N/A	N/A	57.02	86.3	N/A	116.93	N/A	N/A	N/A	sensitivity only
	HELM 230KV SECTION 1D	P2-2	Bus/Breaker	N/A	N/A	N/A	N/A	N/A	N/A	56.99	86.34	N/A	117.04	N/A	N/A	N/A	sensitivity only
Helm-Kerman 70 kV Line	GREGG-HERNDON #1 230KV [4830] & HELMS-GREGG #2 230KV [4880]	P6	N1/N1	<100	<100	<100	N/A	N/A	N/A	<100	<100	Diverge	<100	<100	N/A	<100	Sensitivity only
	GREGG-HERNDON #2 230KV [4840] & HELMS-GREGG #2 230KV [4880]	P6	N1/N1	<100	<100	<100	N/A	N/A	N/A	<100	<100	Diverge	<100	<100	N/A	<100	Sensitivity only
Tivy Valley-Reedley 70 kV Line	BORDEN 230/70KV TB 1 & BORDEN 230/70KV TB 4	P6	N1/N1	<100	<100	<100	N/A	N/A	N/A	133.12	100.02	<100	159.72	<100	N/A	<100	Generation re-dispatch
	BORDEN 230/70KV TB 4 & BORDEN 230/70KV TB 1	P6	N1/N1	<100	<100	<100	N/A	N/A	N/A	133.12	100.02	<100	159.72	<100	N/A	<100	Generation re-dispatch
Sanger-Reedley 115 kV Line(	KINGS RIVER-SANGER-REEDLEY 115KV [2030] & MCCALL-REEDLEY 115KV [2320] MOAS OPENED ON MC CALL_WAHTOKE	P6	N1/N1	106.58	106.93	129.64	N/A	N/A	N/A	<100	<100	108.84	<100	<100	N/A	129.66	System upgrade, operating solution or SPS

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				2022 Summer Peak	2025 Summer Peak	2030 Summer Peak	2022 Winter Peak	2025 Winter Peak	2030 Winter Peak	2022 Spring Off-Peak	2025 Spring Off-Peak	2025 SP High CEC Forecast	2025 SpOP Hi Renew & Min Gas Gen	2022 SP Heavy Renewable & Min Gas Gen	2030 Retirement of QF Generations	2030 Summer Peak w/o Facility Rerates	
Sanger - Parlier)	MCCALL-REEDLEY 115KV [2320] MOAS OPENED ON MC CALL_WAHTOKE & KINGS RIVER-SANGER-REEDLEY 115KV [2030]	P6	N1/N1	106.66	106.94	129.64	N/A	N/A	N/A	<100	<100	108.84	<100	<100	N/A	129.66	System upgrade, operating solution or SPS
Sanger-Reedley 115 kV Line(Parlier- Reedley)	KINGS RIVER-SANGER-REEDLEY 115KV [2030] & MCCALL-REEDLEY 115KV [2320] MOAS OPENED ON MC CALL_WAHTOKE	P6	N1/N1	<100	<100	117.54	N/A	N/A	N/A	<100	<100	<100	<100	<100	N/A	117.56	Monitor future forecast
	MCCALL-REEDLEY 115KV [2320] MOAS OPENED ON MC CALL_WAHTOKE & KINGS RIVER-SANGER-REEDLEY 115KV [2030]	P6	N1/N1	<100	<100	117.54	N/A	N/A	N/A	<100	<100	<100	<100	<100	N/A	117.56	Monitor future forecast
Reedley 115/70 kV Transformer #2	KERCKHOF 13.80KV GEN UNIT 1 & REEDLEY 115/70KV TB 4	P3	G1/N1	<100	<100	114.58	N/A	N/A	N/A	<100	<100	<100	<100	<100	N/A	<100	Maintenance Project
	KINGSRIV 13.80KV GEN UNIT 1 & REEDLEY 115/70KV TB 4	P3	G1/N1	<100	<100	114.54	N/A	N/A	N/A	<100	<100	<100	<100	<100	N/A	<100	Maintenance Project
	MCCALL1T 13.20KV GEN UNIT 1 & REEDLEY 115/70KV TB 4	P3	G1/N1	<100	<100	114.55	N/A	N/A	N/A	<100	<100	<100	<100	<100	N/A	<100	Maintenance Project
	P1-2:A14:109:_REEDLEY-DINUBA #1 70KV [9050] & REEDLEY 115/70KV TB 4	P6	N1/N1	105.18	107.41	122.92	N/A	N/A	N/A	<100	<100	109.28	<100	<100	N/A	<100	Maintenance Project
	REEDLEY 115/70KV TB 4 & Base Case	P6	N1/N1	118.21	122.14	132.39	N/A	N/A	N/A	<100	<100	123.99	<100	<100	N/A	<100	Maintenance Project
	REEDLEY 115/70KV TB 4 & P1-2:A14:109:_REEDLEY-DINUBA #1 70KV [9050]	P6	N1/N1	105.17	<100	122.92	N/A	N/A	N/A	<100	<100	109.28	<100	<100	N/A	<100	Maintenance Project
	REEDLEY 115/70KV TB 4	P1-3	N-1	102.2	105.6	114.47	N/A	N/A	N/A	53.42	4.16	107.1	11.83	61.53	N/A	<100	Maintenance Project
	REEDLEY 115KV - RING R3 & R4	P2-3	Bus/Breaker	102.19	105.59	114.47	N/A	N/A	N/A	52.6	4.25	107.19	13.11	61.52	N/A	<100	Maintenance Project
	REEDLEY 115KV - RING R5 & R4	P2-3	Bus/Breaker	102.26	105.61	114.89	N/A	N/A	N/A	50.92	3.5	107.16	10.62	61.53	N/A	<100	Maintenance Project
Reedley 115/70 kV Transformer #2	KERCKHOF 13.80KV GEN UNIT 1 & REEDLEY 115/70KV TB 2	P3	G1/N1	<100	<100	101.77	N/A	N/A	N/A	<100	<100	<100	<100	<100	N/A	<100	Continue to monitor future forecast
	KINGSRIV 13.80KV GEN UNIT 1 & REEDLEY 115/70KV TB 2	P3	G1/N1	<100	<100	101.71	N/A	N/A	N/A	<100	<100	<100	<100	<100	N/A	<100	Continue to monitor future forecast
	MCCALL1T 13.20KV GEN UNIT 1 & REEDLEY 115/70KV TB 2	P3	G1/N1	<100	<100	101.73	N/A	N/A	N/A	<100	<100	<100	<100	<100	N/A	<100	Continue to monitor future forecast
	P1-2:A14:109:_REEDLEY-DINUBA #1 70KV [9050] & REEDLEY 115/70KV TB 2	P6	N1/N1	<100	<100	110.34	N/A	N/A	N/A	<100	<100	<100	<100	<100	N/A	<100	Continue to monitor future forecast
	REEDLEY 115/70KV TB 2 & Base Case	P6	N1/N1	<100	101.36	111.77	N/A	N/A	N/A	<100	<100	102.9	<100	<100	N/A	<100	Continue to monitor future forecast
	REEDLEY 115/70KV TB 2 & P1-2:A14:109:_REEDLEY-DINUBA #1 70KV [9050]	P6	N1/N1	<100	<100	110.34	N/A	N/A	N/A	<100	<100	<100	<100	<100	N/A	<100	Continue to monitor future forecast
	REEDLEY 115/70KV TB 2	P1-3	N-1	89.38	92.15	101.62	N/A	N/A	N/A	45.22	2.19	93.56	9.18	53.68	N/A	1.12	Continue to monitor future forecast
	REEDLEY 115KV - RING R1 & R6	P2-3	Bus/Breaker	89.37	92.14	101.68	N/A	N/A	N/A	44.72	1.99	93.57	9.92	53.67	N/A	1.12	Continue to monitor future forecast
	REEDLEY 115KV - RING R5 & R6	P2-3	Bus/Breaker	89.46	92.16	102.23	N/A	N/A	N/A	43.11	1.81	93.51	8.23	53.68	N/A	1.12	Continue to monitor future forecast
	P1-2:A14:110:_REEDLEY-OROSI 70KV [9060] & Base Case	P6	N1/N1	122.74	124.92	143.87	N/A	N/A	N/A	<100	<100	127.19	<100	<100	N/A	143.89	
	REEDLEY-OROSI 70KV [9060] (REEDLEY-ORSI JCT)	P2-1	Line Section w/o Fault	115.58	117.68	138.21	N/A	N/A	N/A	39.12	13.9	119.6	24.07	65.75	N/A	138.25	

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				2022 Summer Peak	2025 Summer Peak	2030 Summer Peak	2022 Winter Peak	2025 Winter Peak	2030 Winter Peak	2022 Spring Off-Peak	2025 Spring Off-Peak	2025 SP High CEC Forecast	2025 SpOP Hi Renew & Min Gas Gen	2022 SP Heavy Renewable & Min Gas Gen	2030 Retirement of QF Generations	2030 Summer Peak w/o Facility Rerates	
Reedley-Dinuba 70 kV Line	MCCALL-REEDLEY 115KV [2320] MOAS OPENED ON MC CALL_WAHTOKE & P1-2:A14:110:_REEDLEY-OROSI 70KV [9060]	P6	N1/N1	108.88	109.93	131.95	N/A	N/A	N/A	<100	<100	111.99	<100	<100	N/A	131.99	Project: Reedley 70 kV Reinforcement (Dinuba Battery Energy Storage) In-service date: 05/22 Short term: Action plan
	P1-2:A14:110:_REEDLEY-OROSI 70KV [9060] & MCCALL-REEDLEY 115KV [2320] MOAS OPENED ON MC CALL_WAHTOKE	P6	N1/N1	108.79	109.79	131.96	N/A	N/A	N/A	<100	<100	112.03	<100	<100	N/A	131.98	
	KERCKHOF 13.80KV GEN UNIT 1 & REEDLEY-OROSI 70KV [9060]	P3	G1/N1	105.36	<100	124.34	N/A	N/A	N/A	<100	<100	<100	<100	<100	N/A	124.35	
	MCCALL1T 13.20KV GEN UNIT 1 & REEDLEY-OROSI 70KV [9060]	P3	G1/N1	105.48	<100	124.03	N/A	N/A	N/A	<100	<100	<100	<100	<100	N/A	124.06	
	KINGSRIV 13.80KV GEN UNIT 1 & REEDLEY-OROSI 70KV [9060]	P3	G1/N1	105.34	<100	123.88	N/A	N/A	N/A	<100	<100	<100	<100	<100	N/A	123.9	
	REEDLEY-OROSI 70KV [9060] (OROSI-ORSI JCT)	P2-1	Line Section w/o Fault	104.75	106.59	123.49	N/A	N/A	N/A	35.52	14.21	108.53	23.7	58.87	N/A	123.51	
	REEDLEY-OROSI 70KV [9060]	P1-2	N-1	105.01	106.87	123.11	N/A	N/A	N/A	35.57	14.23	108.82	23.73	59.03	N/A	123.14	
	OROSI 70KV SECTION 1D	P2-2	Bus/Breaker	87.47	89.6	102.85	N/A	N/A	N/A	30.26	13.41	91.4	21.96	47.47	N/A	102.87	
	OROSI - 1D 70KV & REEDLEY-OROSI LINE	P2-3	Bus/Breaker	87.68	89.82	102.57	N/A	N/A	N/A	30.3	13.43	91.64	21.98	47.6	N/A	102.59	
Reedley-Orosi 70 kV Line (Reedley-Orosi Jct)	P1-2:A14:109:_REEDLEY-DINUBA #1 70KV [9050] & MCCALL-REEDLEY 115KV [2320] MOAS OPENED ON MC CALL_WAHTOKE	P6	N1/N1	103.69	104.25	132.77	N/A	N/A	N/A	<100	<100	106.55	<100	<100	N/A	132.91	
	MCCALL-REEDLEY 115KV [2320] MOAS OPENED ON MC CALL_WAHTOKE & P1-2:A14:109:_REEDLEY-DINUBA #1 70KV [9050]	P6	N1/N1	103.85	104.14	132.76	N/A	N/A	N/A	<100	<100	106.52	<100	<100	N/A	132.8	
	MCCALL-REEDLEY 115KV [2320] MOAS OPENED ON WAHTOKE_REEDLEY & P1-2:A14:109:_REEDLEY-DINUBA #1 70KV [9050]	P6	N1/N1	101.76	102.56	127.03	N/A	N/A	N/A	<100	<100	104.77	<100	<100	N/A	127.06	
	KERCKHOF 13.80KV GEN UNIT 1 & REEDLEY-DINUBA #1 70KV [9050]	P3	G1/N1	100.14	<100	122.5	N/A	N/A	N/A	<100	<100	<100	<100	<100	N/A	122.51	
	MCCALL1T 13.20KV GEN UNIT 1 & REEDLEY-DINUBA #1 70KV [9050]	P3	G1/N1	100.25	<100	122.12	N/A	N/A	N/A	<100	<100	<100	<100	<100	N/A	122.15	
	KINGSRIV 13.80KV GEN UNIT 1 & REEDLEY-DINUBA #1 70KV [9050]	P3	G1/N1	100.11	<100	121.95	N/A	N/A	N/A	<100	<100	<100	<100	<100	N/A	121.97	
	REEDLEY-DINUBA #1 70KV [9050]	P1-2	N-1	99.77	101.3	121.06	N/A	N/A	N/A	33.52	11.9	103.23	20.56	56.18	N/A	121.09	

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				2022 Summer Peak	2025 Summer Peak	2030 Summer Peak	2022 Winter Peak	2025 Winter Peak	2030 Winter Peak	2022 Spring Off-Peak	2025 Spring Off-Peak	2025 SP High CEC Forecast	2025 SpOP Hi Renew & Min Gas Gen	2022 SP Heavy Renewable & Min Gas Gen	2030 Retirement of QF Generations	2030 Summer Peak w/o Facility Rerates	
	REEDLEY-DINUBA #1 70KV [9050] (DNUBAJCT-DINUBA)	P2-1	Line Section w/o Fault	99.76	101.28	121.03	N/A	N/A	N/A	33.52	11.9	103.21	20.56	56.17	N/A	121.06	
	REEDLEY-DINUBA #1 70KV [9050] (REEDLEY-DNUBAJCT)	P2-1	Line Section w/o Fault	99.69	101.24	120.89	N/A	N/A	N/A	33.52	11.86	103.17	20.53	56.12	N/A	120.92	
Dinuba-Orosi 70 kV Line	KERCKHOF 13.80KV GEN UNIT 1 & REEDLEY-DINUBA #1 70KV [9050]	P3	G1/N1	<100	100.44	<100	N/A	N/A	N/A	<100	<100	<100	<100	<100	N/A	<100	Project: Reedley 70 kV Reinforcement (Dinuba Battery Energy Storage) In-service date: 05/22 Short term: Action plan
	P1-2:A14:109:_REEDLEY-DINUBA #1 70KV [9050] & Base Case	P6	N1/N1	114.28	116.2	138.89	N/A	N/A	N/A	<100	<100	118.53	<100	<100	N/A	138.98	
	P1-2:A14:109:_REEDLEY-DINUBA #1 70KV [9050] & MCCALL-REEDLEY 115KV [2320] MOAS OPENED ON MC CALL_WAHTOKE	P6	N1/N1	102.27	102.61	132.01	N/A	N/A	N/A	<100	<100	105.46	<100	<100	N/A	132.17	
	MCCALL-REEDLEY 115KV [2320] MOAS OPENED ON MC CALL_WAHTOKE & P1-2:A14:109:_REEDLEY-DINUBA #1 70KV [9050]	P6	N1/N1	102.57	102.23	132	N/A	N/A	N/A	<100	<100	105.42	<100	<100	N/A	132.05	
	KERCKHOF 13.80KV GEN UNIT 1 & REEDLEY-DINUBA #1 70KV [9050]	P3	G1/N1	<100	<100	121.16	N/A	N/A	N/A	<100	<100	102.58	<100	<100	N/A	121.17	
	MCCALL1T 13.20KV GEN UNIT 1 & REEDLEY-DINUBA #1 70KV [9050]	P3	G1/N1	<100	<100	120.77	N/A	N/A	N/A	<100	<100	102.67	<100	<100	N/A	120.79	
	KINGSRIV 13.80KV GEN UNIT 1 & REEDLEY-DINUBA #1 70KV [9050]	P3	G1/N1	<100	<100	120.58	N/A	N/A	N/A	<100	<100	102.44	<100	<100	N/A	120.61	
	REEDLEY-DINUBA #1 70KV [9050]	P1-2	N-1	98.33	100.08	119.65	N/A	N/A	N/A	32.71	19.06	102.08	28.37	48.71	N/A	119.69	
	REEDLEY-DINUBA #1 70KV [9050] (DNUBAJCT-DINUBA)	P2-1	Line Section w/o Fault	98.31	100.06	119.63	N/A	N/A	N/A	32.71	19.06	102.07	28.37	48.7	N/A	119.66	
	REEDLEY-DINUBA #1 70KV [9050] (REEDLEY-DNUBAJCT)	P2-1	Line Section w/o Fault	98.22	100.06	119.39	N/A	N/A	N/A	32.7	19.29	102.06	28.52	48.64	N/A	119.43	
Reedley-Dinuba 70 kV Line (Dinuba Jct-Dinuba)	P1-2:A14:110:_REEDLEY-OROSI 70KV [9060] & Base Case	P6	N1/N1	<100	<100	100.33	N/A	N/A	N/A	<100	<100	<100	<100	<100	N/A	100.35	
Reedley-Orosi 70 kV Line (Orosi Jct-Orosi)	MCCALL1T 13.20KV GEN UNIT 1 & REEDLEY-DINUBA #1 70KV [9050]	P3	G1/N1	<100	108.43	130.47	N/A	N/A	N/A	<100	<100	<100	<100	<100	N/A	<100	
	P1-2:A14:109:_REEDLEY-DINUBA #1 70KV [9050] & Base Case	P6	N1/N1	124.67	126.3	151.13	N/A	N/A	N/A	<100	<100	128.71	<100	<100	N/A	151.21	
	P1-2:A14:109:_REEDLEY-DINUBA #1 70KV [9050] & MCCALL-REEDLEY 115KV [2320] MOAS OPENED ON MC CALL_WAHTOKE	P6	N1/N1	110.85	111.21	141.9	N/A	N/A	N/A	<100	<100	113.7	<100	<100	N/A	142.06	
	MCCALL-REEDLEY 115KV [2320] MOAS OPENED ON MC CALL_WAHTOKE & P1-2:A14:109:_REEDLEY-DINUBA #1 70KV [9050]	P6	N1/N1	111.04	111.06	141.89	N/A	N/A	N/A	<100	<100	113.66	<100	<100	N/A	141.94	
	KERCKHOF 13.80KV GEN UNIT 1 & REEDLEY-DINUBA #1 70KV [9050]	P3	G1/N1	107.04	<100	130.87	N/A	N/A	N/A	<100	<100	110.64	<100	<100	N/A	130.88	
	MCCALL1T 13.20KV GEN UNIT 1 & REEDLEY-DINUBA #1 70KV [9050]	P3	G1/N1	107.15	<100	130.47	N/A	N/A	N/A	<100	<100	110.74	<100	<100	N/A	130.5	

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Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading % (Baseline Scenarios)								Loading % (Sensitivity Scenarios)					Project & Potential Mitigation Solutions
				2022 Summer Peak	2025 Summer Peak	2030 Summer Peak	2022 Winter Peak	2025 Winter Peak	2030 Winter Peak	2022 Spring Off-Peak	2025 Spring Off-Peak	2025 SP High CEC Forecast	2025 SpOP Hi Renew & Min Gas Gen	2022 SP Heavy Renewable & Min Gas Gen	2030 Retirement of QF Generations	2030 Summer Peak w/o Facility Rerates	
	KINGSRIV 13.80KV GEN UNIT 1 & REEDLEY-DINUBA #1 70KV [9050]	P3	G1/N1	107	<100	130.28	N/A	N/A	N/A	<100	<100	110.49	<100	<100	N/A	130.3	
	REEDLEY-DINUBA #1 70KV [9050]	P1-2	N-1	106.64	108.05	129.33	N/A	N/A	N/A	35.63	14.28	110.12	23.67	59	N/A	129.36	
	REEDLEY-DINUBA #1 70KV [9050] (DNUBAJCT-DINUBA)	P2-1	Line Section w/o Fault	106.62	108.04	129.3	N/A	N/A	N/A	35.63	14.28	110.1	23.67	58.99	N/A	129.33	
	REEDLEY-DINUBA #1 70KV [9050] (REEDLEY-DNUBAJCT)	P2-1	Line Section w/o Fault	106.52	107.97	129.13	N/A	N/A	N/A	35.59	14.17	110.03	23.6	58.88	N/A	129.17	Project: Reedley 70 kV Reinforcement (Dinuba Battery Energy Storage) In-service date: 05/22 Short term: Action plan
Leprino Jct SS-GWF 115 kV Line	GATES-GREGG 230KV [4700] & GATES-MCCALL 230KV [4710]	P6	N1/N1	<100	<100	<100	N/A	N/A	N/A	<100	<100	<100	<100	143.15	N/A	<100	sensitivity only
	GATES-GREGG 230KV [4700] & P1-2:A14:137:_CHSR09SWSTA-MUSTANGSS 230KV [0]	P6	N1/N1	<100	<100	<100	N/A	N/A	N/A	<100	143.55	<100	138.6	<100	N/A	<100	Generation re-dispatch
	GATES-GREGG 230KV [4700] & P1-2:A14:138:_MC CALL-CHSR09SWSTA #1 230KV [0]	P6	N1/N1	<100	<100	<100	N/A	N/A	N/A	<100	<100	<100	103.1	<100	N/A	<100	sensitivity only
	HELM-MCCALL 230KV [4860] & HENTAP2-MUSTANGSS #1 230KV [0]	P7-1	DCTL	13.92	43.34	41.07	N/A	N/A	N/A	14.82	97.84	45.52	123.83	14.06	N/A	35.53	sensitivity only
	MUSTANGSS 230KV - MIDDLE BREAKER BAY 2	P2-3	Bus/Breaker	5.63	1.93	5.95	N/A	N/A	N/A	26.32	35.25	2.68	5	102.53	N/A	5.69	sensitivity only
GWF-Henrietta 70kV Line	GATES D 230/70KV TB 5 & SCHINDLR 115/12.47KV TB 2	P6	N1/N1	Diverge	Diverge	Diverge	N/A	N/A	N/A	<100	<100	Diverge	<100	<100	N/A	Diverge	System reconfiguration
	GATES D 230/70KV TB 5 & HELMS-GREGG #2 230KV [4880]	P6	N1/N1	<100	<100	<100	N/A	N/A	N/A	<100	<100	Diverge	<100	<100	N/A	<100	System reconfiguration
Gates 230/70 kV Transformer Bank 5	PANOCHE-SCHINDLER #1 115KV [3250] & EXCELSIORSS-PANOCHE2 115KV [3231]	P7-1	DCTL	76.42	82.88	97.67	N/A	N/A	N/A	40.76	105.48	83.99	95.73	81.74	N/A	1.93	Generation re-dispatch
	PANOCHE1 SECTION 1D & PANOCHE2 SECTION 2D 115KV	P2-4	Bus/Breaker	<100	59.8	74.35	N/A	N/A	N/A	<100	105.38	60.9	95.56	<100	N/A	1.44	Generation re-dispatch
Gates-Jayne SWT 70kV Line	GATES D 230/70KV TB 5 & SCHINDLR 115/12.47KV TB 2	P6	N1/N1	<100	<100	Diverge	N/A	N/A	N/A	<100	<100	<100	<100	<100	N/A	Diverge	Continue to monitor future forecast
	SCHINDLR 115/12.47KV TB 2 & GATES D 230/70KV TB 5	P6	N1/N1	<100	<100	Diverge	N/A	N/A	N/A	<100	<100	<100	<100	<100	N/A	Diverge	Continue to monitor future forecast
Jayne SWT-Coalinga #1 70kV Line	GATES D 230/70KV TB 5 & SCHINDLR 115/12.47KV TB 2	P6	N1/N1	<100	Diverge	Diverge	N/A	N/A	N/A	<100	<100	Diverge	<100	<100	N/A	Diverge	Continue to monitor future forecast
	SCHINDLR 115/12.47KV TB 2 & GATES D 230/70KV TB 5	P6	N1/N1	<100	<100	Diverge	N/A	N/A	N/A	<100	<100	<100	<100	<100	N/A	Diverge	Continue to monitor future forecast
Five points-Huron-Gates 70 kV	PANOCHE-SCHINDLER #1 115KV [3250] & EXCELSIORSS-PANOCHE2 115KV [3231]	P7-1	DCTL	104.22	127.34	152.56	N/A	N/A	N/A	54.15	177.34	128.74	187	145.53	N/A	152.62	System reconfiguration
	PANOCHE-SCHINDLER #1 115KV [3250] MOAS OPENED ON PANOCHE1_KAMM & EXCELSIORSS-PANOCHE2 115KV [0]	P6	N1/N1	104.13	127.09	152.53	N/A	N/A	N/A	<100	<100	128.47	186.99	145.59	N/A	152.54	System reconfiguration
	PANOCHE-SCHINDLER #1 115KV [3250] MOAS OPENED ON PANOCHE1_KAMM & PANOCHE2-EXCELSIORSS 115KV [0]	P6	N1/N1	104.13	127.09	152.53	N/A	N/A	N/A	<100	<100	128.47	186.99	145.59	N/A	152.54	System reconfiguration
	EXCELSIORSS-PANOCHE2 115KV [0] & PANOCHE-SCHINDLER #1 115KV [3250] MOAS OPENED ON PANOCHE1_KAMM	P6	N1/N1	103.8	127.09	152.37	N/A	N/A	N/A	<100	<100	128.4	187	145.58	N/A	152.36	System reconfiguration
	EXCELSIORSS 115KV - MIDDLE BREAKER BAY 2	P2-3	Bus/Breaker	82.74	103.72	127.16	N/A	N/A	N/A	36.24	91.89	104.72	102.95	60.42	N/A	127.22	System reconfiguration

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Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading % (Baseline Scenarios)								Loading % (Sensitivity Scenarios)					Project & Potential Mitigation Solutions
				2022 Summer Peak	2025 Summer Peak	2030 Summer Peak	2022 Winter Peak	2025 Winter Peak	2030 Winter Peak	2022 Spring Off-Peak	2025 Spring Off-Peak	2025 SP High CEC Forecast	2025 SpOP Hi Renew & Min Gas Gen	2022 SP Heavy Renewable & Min Gas Gen	2030 Retirement of QF Generations	2030 Summer Peak w/o Facility Rerates	
Line (Huron Jct-Calflax)	EXCELSIORSS-PANOCHE1 115KV [3250] & EXCELSIORSS-PANOCHE2 115KV [3231]	P7-1	DCTL	82.34	105.12	123.3	N/A	N/A	N/A	37.02	155.8	106.06	166.7	128.98	N/A	123.35	System reconfiguration
	PANOCHE1 SECTION 1D & PANOCHE2 SECTION 2D 115KV	P2-4	Bus/Breaker	<100	71.17	92.3	N/A	N/A	N/A	<100	176.79	72.44	186.37	<100	N/A	87.45	Generation re-dispatch
	MUSTANGSS-GATES #1 230KV [0] & MUSTANGSS-GATES #2 230KV [0] (2)	P7-1	DCTL	24.79	51.86	37.98	N/A	N/A	N/A	55.26	76.71	47.65	101.67	32.93	N/A	36.03	Sensitivity only
	MUSTANGSS-GATES #1 230KV [0] & MUSTANGSS-GATES #2 230KV [0]	P7-1	DCTL	19.49	45.92	31.39	N/A	N/A	N/A	57.27	91.61	41.78	105.95	54.89	N/A	29.25	Sensitivity only
	MUSTANGSS 230KV - MIDDLE BREAKER BAY 2	P2-3	Bus/Breaker	19.5	45.9	31.38	N/A	N/A	N/A	57.06	91.23	41.76	105.94	54.21	N/A	29.23	Sensitivity only
Schindler-Coalinga #2 70 kV Line (S0526 Tap-Pleasant Valley)	GATES D 230KV - SECTION 1D & 2D	P2-4	Bus/Breaker	105.33	<100	<100	N/A	N/A	N/A	42.6	35.06	<100	<100	20.23	N/A	<100	System reconfiguration
	P1-2:A14:129:_SCHLNDLR-FIVEPOINTSSS #1 70KV [0] & GATES D 230/70KV TB 5	P6	N1/N1	173.63	177.49	252.47	N/A	N/A	N/A	<100	<100	183.65	<100	<100	N/A	253.32	System reconfiguration
	GATES D 230/70KV TB 5 & P1-2:A14:129:_SCHLNDLR-FIVEPOINTSSS #1 70KV [0]	P6	N1/N1	169.03	176.99	250.52	N/A	N/A	N/A	<100	<100	184.03	<100	<100	N/A	250.64	System reconfiguration
	P1-2:A14:125:_GATES-HURON-FIVEPOINTSSS 70KV [0] & GATES D 230/70KV TB 5	P6	N1/N1	152.67	161.25	176.48	N/A	N/A	N/A	<100	<100	166.38	<100	<100	N/A	176.64	System reconfiguration
	GATES D 230KV - SECTION 2D & 1D	P2-4	Bus/Breaker	<100	101.2	108.03	N/A	N/A	N/A	<100	<100	104.54	17.97	<100	N/A	108.45	System reconfiguration
	GATES Section D & E 230 KV BUS (FAILURE OF NON-REDUNDENT RELAY)	P5-5	Non-Redundent Relay	105.55	98.72	106.96	N/A	N/A	N/A	38.95	14.95	103.2	6.83	25.06	N/A	107.86	Install Redundant protection
	GATES D 230KV SECTION 2D	P2-2	Bus/Breaker	95	94.5	102.78	N/A	N/A	N/A	41.76	27.22	97.25	9.4	22.59	N/A	103.12	System reconfiguration
	WESTLNDS 0.48KV GEN UNIT 1 & GATES D 230/70KV TB 5	P3	G1/N1	<100	<100	101	N/A	N/A	N/A	<100	<100	<100	<100	<100	N/A	101.36	System reconfiguration
	GATES - MA 70KV & GATES-HURON-FIVEPOINTSSS LINE	P2-3	Bus/Breaker	106.48	99.13	100.19	N/A	N/A	N/A	48.57	16.38	102.5	33.04	55.41	N/A	100.72	System reconfiguration
	SUNCTY D 12.00KV GEN UNIT 1 & GATES D 230/70KV TB 5	P3	G1/N1	<100	<100	<100	N/A	N/A	N/A	<100	<100	<100	<100	<100	N/A	100.44	System reconfiguration
	SANDDRAG 12.00KV GEN UNIT 1 & GATES D 230/70KV TB 5	P3	G1/N1	<100	<100	<100	N/A	N/A	N/A	<100	<100	<100	<100	<100	N/A	100.4	System reconfiguration
	GATES - MA 70KV & GATES-COALINGA #2 LINE	P2-3	Bus/Breaker	101.14	93.57	93.26	N/A	N/A	N/A	46.67	20.01	97.11	37.13	56.76	N/A	93.77	System reconfiguration
	GATES 70KV SECTION MA	P2-2	Bus/Breaker	101.09	93.35	93.09	N/A	N/A	N/A	46.69	19.97	96.86	37.21	56.71	N/A	93.59	System reconfiguration
	GATES - MA 70KV & GATES-TULARE LAKE LINE	P2-3	Bus/Breaker	101.09	93.35	93.09	N/A	N/A	N/A	46.69	19.97	96.86	37.21	56.71	N/A	93.59	System reconfiguration
	PANOCHE-SCHINDLER #1 115KV [3250] & EXCELSIORSS-PANOCHE2 115KV [3231]	P7-1	DCTL	33.52	50.68	58.79	N/A	N/A	N/A	15.47	143.19	50.97	146.77	143.76	N/A	58.81	Generation re-dispatch
	EXCELSIORSS-PANOCHE1 115KV [3250] & EXCELSIORSS-PANOCHE2 115KV [3231]	P7-1	DCTL	24.68	41.41	41.42	N/A	N/A	N/A	7.5	127.59	41.37	132.1	131.93	N/A	41.44	Generation re-dispatch
	PANOCHE1 SECTION 1D & PANOCHE2 SECTION 2D 115KV	P2-4	Bus/Breaker	<100	32.41	20.78	N/A	N/A	N/A	<100	142.76	32.45	146.29	<100	N/A	18.08	Generation re-dispatch

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				2022 Summer Peak	2025 Summer Peak	2030 Summer Peak	2022 Winter Peak	2025 Winter Peak	2030 Winter Peak	2022 Spring Off-Peak	2025 Spring Off-Peak	2025 SP High CEC Forecast	2025 SpOP Hi Renew & Min Gas Gen	2022 SP Heavy Renewable & Min Gas Gen	2030 Retirement of QF Generations	2030 Summer Peak w/o Facility Rerates	
Schindler 115/70 kV Transformer Bank 1	GATES D 230KV - SECTION 1D & 2D	P2-4	Bus/Breaker	110.18	<100	<100	N/A	N/A	N/A	41.27	89.56	<100	<100	51.06	N/A	<100	System Reconfiguration
	ELNIDO 13.80KV GEN UNIT 1 & GATES D 230/70KV TB 5	P3	G1/N1	<100	<100	100.36	N/A	N/A	N/A	<100	<100	<100	<100	<100	N/A	<100	Monitor future forecast
	Q581 0.38KV GEN UNIT 1 & GATES D 230/70KV TB 5	P3	G1/N1	<100	<100	100.35	N/A	N/A	N/A	<100	<100	<100	<100	<100	N/A	<100	Monitor future forecast
	WESTLNDS 0.48KV GEN UNIT 1 & GATES D 230/70KV TB 5	P3	G1/N1	<100	<100	100.65	N/A	N/A	N/A	<100	<100	<100	<100	<100	N/A	<100	System reconfiguration
	GATES D 230/70KV TB 5 & P1-2:A14:132:_COALINGA #1-SAN MIGUEL 70KV [8580]	P6	N1/N1	106.51	116.57	132.79	N/A	N/A	N/A	<100	<100	117.99	<100	<100	N/A	<100	System reconfiguration
	P1-2:A14:121:_ARCO-TULARE LAKE 70KV [8460] & GATES D 230/70KV TB 5	P6	N1/N1	109.88	106.9	119.69	N/A	N/A	N/A	<100	<100	109.57	<100	<100	N/A	<100	System reconfiguration
	P1-2:A14:132:_COALINGA #1-SAN MIGUEL 70KV [8580] & GATES D 230/70KV TB 5	P6	N1/N1	106.6	116.41	132.62	N/A	N/A	N/A	<100	<100	117.87	<100	<100	N/A	<100	System reconfiguration
	GATES D 230KV - SECTION 2D & 1D	P2-4	Bus/Breaker	<100	105.94	109.18	N/A	N/A	N/A	<100	<100	109.46	66.84	<100	N/A	<100	System reconfiguration
	GATES Section D & E 230 KV BUS (FAILURE OF NON-REDUNDENT RELAY)	P5-5	Non-Redundent Relay	110.38	103.29	108.05	N/A	N/A	N/A	37.54	69.24	108.01	45.59	39.47	N/A	<100	Install Redundant protection
	GATES D 230KV SECTION 2D	P2-2	Bus/Breaker	100.21	98.77	104.09	N/A	N/A	N/A	40.39	82.34	101.62	58.75	44.95	N/A	<100	System reconfiguration
	GATES D 230/70KV TB 5	P1-3	N-1	97.49	94.16	100.19	N/A	N/A	N/A	41.65	71.08	96.6	46.87	41.08	N/A	<100	Monitor future forecast
	PANOCHE-SCHINDLER #1 115KV [3250] & EXCELSIORSS-PANOCHE2 115KV [3231]	P7-1	DCTL	47.8	61.62	80.08	N/A	N/A	N/A	27.1	133.53	62.28	140.84	122.65	N/A	<100	Generation re-dispatch
	EXCELSIORSS-PANOCHE1 115KV [3250] & EXCELSIORSS-PANOCHE2 115KV [3231]	P7-1	DCTL	28.55	41.52	58.25	N/A	N/A	N/A	10.46	114.66	41.88	122.63	107.85	N/A	<100	Generation re-dispatch
	PANOCHE1 SECTION 1D & PANOCHE2 SECTION 2D 115KV	P2-4	Bus/Breaker	<100	11.45	34.66	N/A	N/A	N/A	<100	133.36	12.09	140.67	<100	N/A	<100	Generation re-dispatch
Schindler-Coalinga2 70 kV Line (Schindler-Q526 Tap)	GATES D 230KV - SECTION 1D & 2D	P2-4	Bus/Breaker	108.27	<100	<100	N/A	N/A	N/A	43.47	64.72	<100	<100	28.73	N/A	<100	Under Review
	P1-2:A14:129:_SCHLNDLR-FIVEPOINTSSS #1 70KV [0] & GATES D 230/70KV TB 5	P6	N1/N1	173	174.47	242.91	N/A	N/A	N/A	<100	<100	180.54	<100	<100	N/A	243.88	System Reconfiguration
	GATES D 230/70KV TB 5 & P1-2:A14:129:_SCHLNDLR-FIVEPOINTSSS #1 70KV [0]	P6	N1/N1	168.22	173.76	240.72	N/A	N/A	N/A	<100	<100	180.66	<100	<100	N/A	240.85	System Reconfiguration
	P1-2:A14:125:_GATES-HURON-FIVEPOINTSSS 70KV [0] & GATES D 230/70KV TB 5	P6	N1/N1	151.22	154.9	170.74	N/A	N/A	N/A	<100	<100	160.1	<100	<100	N/A	170.94	System Reconfiguration
	GATES D 230KV - SECTION 2D & 1D	P2-4	Bus/Breaker	<100	101.18	108.08	N/A	N/A	N/A	<100	<100	104.63	50.82	<100	N/A	108.53	System Reconfiguration
	GATES Section D & E 230 KV BUS (FAILURE OF NON-REDUNDENT RELAY)	P5-5	Non-Redundent Relay	108.49	98.49	106.91	N/A	N/A	N/A	39.64	45.08	103.2	30.19	17.91	N/A	107.89	Install Redundant protection
	GATES D 230KV SECTION 2D	P2-2	Bus/Breaker	97.57	93.83	102.25	N/A	N/A	N/A	42.62	57.63	96.78	42.91	22.6	N/A	102.63	System Reconfiguration
	WESTLNDS 0.48KV GEN UNIT 1 & GATES D 230/70KV TB 5	P3	G1/N1	<100	<100	100.48	N/A	N/A	N/A	<100	<100	<100	<100	<100	N/A	100.86	System Reconfiguration
	SUNCTY D 12.00KV GEN UNIT 1 & GATES D 230/70KV TB 5	P3	G1/N1	<100	<100	<100	N/A	N/A	N/A	<100	<100	<100	<100	<100	N/A	100.04	System Reconfiguration
	GATES - MA 70KV & GATES-HURON-FIVEPOINTSSS LINE	P2-3	Bus/Breaker	107.46	95.59	98.46	N/A	N/A	N/A	49.28	22.17	99.24	5.31	16.15	N/A	99.03	Under Review

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Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading % (Baseline Scenarios)								Loading % (Sensitivity Scenarios)					Project & Potential Mitigation Solutions
				2022 Summer Peak	2025 Summer Peak	2030 Summer Peak	2022 Winter Peak	2025 Winter Peak	2030 Winter Peak	2022 Spring Off-Peak	2025 Spring Off-Peak	2025 SP High CEC Forecast	2025 SpOP Hi Renew & Min Gas Gen	2022 SP Heavy Renewable & Min Gas Gen	2030 Retirement of QF Generations	2030 Summer Peak w/o Facility Rerates	
	GATES - MA 70KV & GATES-COALINGA #2 LINE	P2-3	Bus/Breaker	102.31	89.1	91.42	N/A	N/A	N/A	47.44	17	92.72	1.9	17.76	N/A	91.97	Under Review
	GATES 70KV SECTION MA	P2-2	Bus/Breaker	102.37	89	91.39	N/A	N/A	N/A	47.48	17	92.61	1.9	17.76	N/A	91.94	Under Review
	GATES - MA 70KV & GATES-TULARE LAKE LINE	P2-3	Bus/Breaker	102.37	89	91.39	N/A	N/A	N/A	47.48	17	92.61	1.9	17.76	N/A	91.94	Under Review
	PANOCHE-SCHINDLER #1 115KV [3250] & EXCELSIORSS-PANOCHE2 115KV [3231]	P7-1	DCTL	18.66	35.31	52.01	N/A	N/A	N/A	11.44	110.57	35.65	114.7	107.09	N/A	52.01	Generation re-dispatch
	EXCELSIORSS-PANOCHE1 115KV [3250] & EXCELSIORSS-PANOCHE2 115KV [3231]	P7-1	DCTL	4.24	22.27	31.89	N/A	N/A	N/A	7.13	95.17	22.25	100.05	95.32	N/A	31.88	Generation re-dispatch
	PANOCHE1 SECTION 1D & PANOCHE2 SECTION 2D 115KV	P2-4	Bus/Breaker	<100	14.81	11.94	N/A	N/A	N/A	<100	110.06	14.69	114.15	<100	N/A	9.49	Generation re-dispatch
Schindler-Five Points 70 kV Line	GATES D 230KV - SECTION 1D & 2D	P2-4	Bus/Breaker	100.95	<100	<100	N/A	N/A	N/A	33.43	96.64	<100	<100	62.55	N/A	<100	System reconfiguration
	P1-2:A14:128:_SCHINDLER-COALINGA #2 70KV [9150] & GATES D 230/70KV TB 5	P6	N1/N1	129.81	129.91	153.07	N/A	N/A	N/A	<100	100.4	134.12	<100	<100	N/A	153.25	System reconfiguration
	GATES D 230/70KV TB 5 & P1-2:A14:128:_SCHINDLER-COALINGA #2 70KV [9150]	P6	N1/N1	125.79	125.28	149.52	N/A	N/A	N/A	<100	<100	130.07	<100	<100	N/A	149.28	System reconfiguration
	GATES D 230/70KV TB 5 & P1-2:A14:132:_COALINGA #1-SAN MIGUEL 70KV [8580]	P6	N1/N1	<100	112.26	137.28	N/A	N/A	N/A	<100	<100	113.57	<100	<100	N/A	137.48	System reconfiguration
	GATES D 230KV - SECTION 2D & 1D	P2-4	Bus/Breaker	<100	101.09	110.8	N/A	N/A	N/A	<100	<100	104.15	69.72	<100	N/A	111.18	System reconfiguration
	GATES Section D & E 230 KV BUS (FAILURE OF NON-REDUNDENT RELAY)	P5-5	Non-Redundent Relay	101.13	98.76	109.86	N/A	N/A	N/A	30.18	79.71	102.97	51.93	52.96	N/A	110.68	Install Redundant protection
	Q532 0.55KV GEN UNIT 1 & GATES D 230/70KV TB 5	P3	G1/N1	<100	<100	104.39	N/A	N/A	N/A	<100	<100	<100	<100	<100	N/A	106.42	Monitor future forecast
	PANOCHE-SCHINDLER #1 115KV [3250] & EXCELSIORSS-PANOCHE2 115KV [3231]	P7-1	DCTL	69.17	84.28	106.35	N/A	N/A	N/A	41.42	135.42	85.27	144.56	118.8	N/A	106.39	Monitor future forecast
	GATES D 230KV SECTION 2D	P2-2	Bus/Breaker	92.03	94.64	105.94	N/A	N/A	N/A	32.73	90.54	97.51	62.87	57.53	N/A	106.25	System reconfiguration
	WESTLNDS 0.48KV GEN UNIT 1 & GATES D 230/70KV TB 5	P3	G1/N1	<100	<100	103.19	N/A	N/A	N/A	<100	<100	<100	<100	<100	N/A	103.66	System reconfiguration
	Q1032G3 0.55KV GEN UNIT 3 & GATES D 230/70KV TB 5	P3	G1/N1	<100	<100	102.57	N/A	N/A	N/A	<100	<100	<100	<100	<100	N/A	102.75	Continue to monitor future forecast
	GATES D 230/70KV TB 5	P1-3	N-1	89.59	90.49	102.13	N/A	N/A	N/A	33.74	81.12	92.96	52.86	54.29	N/A	102.39	Continue to monitor future forecast
	EXCELSIORSS-PANOCHE1 115KV [3250] & EXCELSIORSS-PANOCHE2 115KV [3231]	P7-1	DCTL	48.84	61.94	79.9	N/A	N/A	N/A	25.51	115.72	62.63	125.87	103.63	N/A	79.93	Generation re-dispatch
	PANOCHE1 SECTION 1D & PANOCHE2 SECTION 2D 115KV	P2-4	Bus/Breaker	<100	32.53	53.49	N/A	N/A	N/A	<100	134.86	33.38	143.95	<100	N/A	49.43	Generation re-dispatch
Schindler-Coalinga2 70 kV Line	P1-2:A14:129:_SCHLNDLR-FIVEPOINTSSS #1 70KV [0] & GATES D 230/70KV TB 5	P6	N1/N1	142.78	145.39	211	N/A	N/A	N/A	<100	100.1	151.11	<100	<100	N/A	211.62	System reconfiguration
	GATES D 230/70KV TB 5 & P1-2:A14:129:_SCHLNDLR-FIVEPOINTSSS #1 70KV [0]	P6	N1/N1	138.26	143.93	209.43	N/A	N/A	N/A	<100	<100	150.84	<100	<100	N/A	209.53	System reconfiguration
	P1-2:A14:125:_GATES-HURON-FIVEPOINTSSS 70KV [0] & GATES D 230/70KV TB 5	P6	N1/N1	122.14	127.31	141.71	N/A	N/A	N/A	<100	<100	132.05	<100	<100	N/A	141.88	System reconfiguration

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				2022 Summer Peak	2025 Summer Peak	2030 Summer Peak	2022 Winter Peak	2025 Winter Peak	2030 Winter Peak	2022 Spring Off-Peak	2025 Spring Off-Peak	2025 SP High CEC Forecast	2025 SpOP Hi Renew & Min Gas Gen	2022 SP Heavy Renewable & Min Gas Gen	2030 Retirement of QF Generations	2030 Summer Peak w/o Facility Rerates	
(Pleasant Valley-Coalinga #2)	PANOCHE-SCHINDLER #1 115KV [3250] & EXCELSIORSS-PANOCHE2 115KV [3231]	P7-1	DCTL	54.11	65.95	84.6	N/A	N/A	N/A	31.23	122.21	66.4	125.92	115.98	N/A	84.61	Generation re-dispatch
	EXCELSIORSS-PANOCHE1 115KV [3250] & EXCELSIORSS-PANOCHE2 115KV [3231]	P7-1	DCTL	39.08	50.2	64.15	N/A	N/A	N/A	21.75	106.55	50.33	111.1	104.13	N/A	64.16	Generation re-dispatch
	PANOCHE1 SECTION 1D & PANOCHE2 SECTION 2D 115KV	P2-4	Bus/Breaker	<100	26.71	41.81	N/A	N/A	N/A	<100	121.74	27.07	125.4	<100	N/A	38.3	Generation re-dispatch
Five Points-Huron-Gates 70 kV Line (Five points-Calflax)	P1-2:A14:128:_SCHINDLER-COALINGA #2 70KV [9150] & GATES D 230/70KV TB 5	P6	N1/N1	130.42	130.46	157.96	N/A	N/A	N/A	<100	<100	134.65	<100	<100	N/A	158.11	System reconfiguration
	GATES D 230/70KV TB 5 & P1-2:A14:128:_SCHINDLER-COALINGA #2 70KV [9150]	P6	N1/N1	126.6	126.15	154.69	N/A	N/A	N/A	<100	<100	130.86	<100	<100	N/A	154.39	System reconfiguration
	GATES D 230/70KV TB 5 & P1-2:A14:132:_COALINGA #1-SAN MIGUEL 70KV [8580]	P6	N1/N1	<100	111.03	141.61	N/A	N/A	N/A	<100	<100	112.5	<100	<100	N/A	141.83	System reconfiguration
	GATES D 230KV - SECTION 2D & 1D	P2-4	Bus/Breaker	N/A	98.4	112.85	N/A	N/A	N/A	N/A	N/A	101.57	35.49	N/A	N/A	113.21	System reconfiguration
	GATES Section D & E 230 KV BUS (FAILURE OF NON-REDUNDENT RELAY)	P5-5	Non-Redundent Relay	100.05	96.09	111.97	N/A	N/A	N/A	29.87	45.56	100.38	19.01	20.43	N/A	112.74	Install Redundant protection
	WESTLNDS 0.48KV GEN UNIT 1 & GATES D 230/70KV TB 5	P3	G1/N1	<100	<100	108.23	N/A	N/A	N/A	<100	<100	<100	<100	<100	N/A	108.69	System reconfiguration
	GATES D 230KV SECTION 2D	P2-2	Bus/Breaker	91.11	92.04	108.32	N/A	N/A	N/A	32.27	56.55	94.92	28.71	24.16	N/A	108.62	System reconfiguration
	SUNCTY D 12.00KV GEN UNIT 1 & GATES D 230/70KV TB 5	P3	G1/N1	<100	<100	105.35	N/A	N/A	N/A	<100	<100	<100	<100	<100	N/A	107.39	System reconfiguration
	PANOCHE-SCHINDLER #1 115KV [3250] & EXCELSIORSS-PANOCHE2 115KV [3231]	P7-1	DCTL	73.81	85.46	107.11	N/A	N/A	N/A	43.39	168.82	86.46	177.54	154.58	N/A	107.16	Monitor future forecast
	Q1032G3 0.55KV GEN UNIT 3 & GATES D 230/70KV TB 5	P3	G1/N1	<100	<100	105.4	N/A	N/A	N/A	<100	<100	<100	<100	<100	N/A	105.56	Continue to monitor future forecast
	GATES D 230/70KV TB 5	P1-3	N-1	88.72	88	104.77	N/A	N/A	N/A	33.28	46.5	90.48	19.12	20.56	N/A	105.02	Continue to monitor future forecast
	EXCELSIORSS 115KV - MIDDLE BREAKER BAY 2	P2-3	Bus/Breaker	54.55	63.37	82.4	N/A	N/A	N/A	25.67	90.42	64.04	100.42	75.52	N/A	82.44	Sensitivity only
	EXCELSIORSS-PANOCHE1 115KV [3250] & EXCELSIORSS-PANOCHE2 115KV [3231]	P7-1	DCTL	54.18	63.67	81.53	N/A	N/A	N/A	26.58	149.05	64.3	158.93	139.36	N/A	81.58	Generation re-dispatch
	PANOCHE1 SECTION 1D & PANOCHE2 SECTION 2D 115KV	P2-4	Bus/Breaker	<100	31.28	52.77	N/A	N/A	N/A	<100	168.29	32.23	176.95	<100	N/A	48.28	Generation re-dispatch
	MUSTANGSS-GATES #1 230KV [0] & MUSTANGSS-GATES #2 230KV [0]	P7-1	DCTL	19.12	5.36	9.99	N/A	N/A	N/A	45.95	90.16	2.61	103.18	70.36	N/A	10.47	Sensitivity only
	MUSTANGSS 230KV - MIDDLE BREAKER BAY 2	P2-3	Bus/Breaker	19.08	5.34	9.98	N/A	N/A	N/A	45.75	89.81	2.58	103.17	69.72	N/A	10.46	Sensitivity only
Gates-Coalinga #1 70 kV Line	GATES D 230/70KV TB 5 & SCHINDLR 115/12.47KV TB 2	P6	N1/N1	Diverge	Diverge	Diverge	N/A	N/A	N/A	<100	<100	Diverge	<100	<100	N/A	Diverge	System Reconfiguration
	SCHINDLR 115/12.47KV TB 2 & GATES D 230/70KV TB 5	P6	N1/N1	<100	Diverge	Diverge	N/A	N/A	N/A	<100	<100	Diverge	<100	<100	N/A	Diverge	System Reconfiguration
Coalinga #1-San Miguel 70 kV Line	GATES D 230/70KV TB 5 & SCHINDLR 115/12.47KV TB 2	P6	N1/N1	Diverge	Diverge	Diverge	N/A	N/A	N/A	<100	200.84	Diverge	165.9	144.96	N/A	Diverge	System reconfiguration
	SCHINDLR 115/12.47KV TB 2 & GATES D 230/70KV TB 5	P6	N1/N1	Diverge	Diverge	Diverge	N/A	N/A	N/A	<100	234.4	Diverge	165.9	144.97	N/A	Diverge	System reconfiguration
	GATES D 230/70KV TB 5 & P1-2:A14:129:_SCHLNDLR-FIVEPOINTSSS #1 70KV [0]	P6	N1/N1	<100	105.89	152.45	N/A	N/A	N/A	<100	<100	103.34	<100	<100	N/A	152.31	System reconfiguration

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				2022 Summer Peak	2025 Summer Peak	2030 Summer Peak	2022 Winter Peak	2025 Winter Peak	2030 Winter Peak	2022 Spring Off-Peak	2025 Spring Off-Peak	2025 SP High CEC Forecast	2025 SpOP Hi Renew & Min Gas Gen	2022 SP Heavy Renewable & Min Gas Gen	2030 Retirement of QF Generations	2030 Summer Peak w/o Facility Rerates	
GWF-Kingsburg 115kV Line (Jacksson- Contandina)	GATES-GREGG 230KV [4700] & P1-2:A14:137:_CHSR09SWSTA-MUSTANGSS 230KV [0]	P6	N1/N1	<100	<100	<100	N/A	N/A	N/A	<100	140.92	<100	135.97	<100	N/A	<100	Generation re-dispatch
	GATES-GREGG 230KV [4700] & P1-2:A14:138:_MC CALL-CHSR09SWSTA #1 230KV [0]	P6	N1/N1	<100	<100	<100	N/A	N/A	N/A	<100	<100	<100	105.84	<100	N/A	<100	sensitivity only
	HELM-MCCALL 230KV [4860] & HENTAP2-MUSTANGSS #1 230KV [0]	P7-1	DCTL	<100	87.07	85.13	N/A	N/A	N/A	<100	100.59	89.24	126.61	<100	N/A	79.52	Generation re-dispatch
Kingsburg-Waukena 115kV line (Jacksson-Waukena)	KINGSBURG-CORCORAN #1 115KV [2040] MOAS OPENED ON Q529TP_CORCORAN & Base Case	P6	N1/N1	<100	<100	<100	N/A	N/A	N/A	<100	100.65	<100	116.11	<100	N/A	<100	Generation re-dispatch
	P1-2:A14:117:_CORCORAN-ANGIOLA 70KV [8600] & P1-2:A14:146:_JACKSONSWSTA-Q529TP #1 115KV [0] MOAS OPENED ON JACKSONSWSTA_Q529TP	P6	N1/N1	<100	<100	<100	N/A	N/A	N/A	<100	<100	<100	100.45	<100	N/A	<100	sensitivity only
	P1-2:A14:146:_JACKSONSWSTA-Q529TP #1 115KV [0] MOAS OPENED ON JACKSONSWSTA_Q529TP & Base Case	P6	N1/N1	<100	<100	<100	N/A	N/A	N/A	<100	100.3	<100	115.94	<100	N/A	<100	Generation re-dispatch
Jacksson-Corcoran 115kV line(Jacksson-529T)	CORCORAN 115/70KV TB 1 & P1-2:A14:142:_JACKSONSWSTA-WAUKENA_SS #1 115KV [0]	P6	N1/N1	<100	<100	<100	N/A	N/A	N/A	<100	<100	<100	100.07	<100	N/A	<100	sensitivity only
	P1-2:A14:117:_CORCORAN-ANGIOLA 70KV [8600] & P1-2:A14:142:_JACKSONSWSTA-WAUKENA_SS #1 115KV [0]	P6	N1/N1	<100	<100	<100	N/A	N/A	N/A	<100	<100	<100	100.04	<100	N/A	<100	sensitivity only
	P1-2:A14:142:_JACKSONSWSTA-WAUKENA_SS #1 115KV [0] & Base Case	P6	N1/N1	<100	<100	<100	N/A	N/A	N/A	<100	100.39	<100	115.62	<100	N/A	<100	Generation re-dispatch

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Low Voltages

Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)								Voltage PU (Sensitivity Scenarios)					Project & Potential Mitigation Solutions
				2022 Summer Peak	2025 Summer Peak	2030 Summer Peak	2022 Winter Peak	2025 Winter Peak	2030 Winter Peak	2022 Spring Off-Peak	2025 Spring Off-Peak	2025 SP High CEC Forecast	2025 SpOP Hi Renew & Min Gas Gen	2022 SP Heavy Renewable & Min Gas Gen	2030 Retirement of QF Generations	2030 Summer Peak w/o Facility Rerates	
MARIPOS2 70 kV	Base Case	P0	Base Case	0.9418	0.9823	0.8933	N/A	N/A	N/A	0.9886	1.0464	0.9499	1.0462	0.9428	N/A	0.8932	System Reconfiguration
MRCDFLLS 70 kV		P0	Base Case	0.9927	1.0252	0.9471	N/A	N/A	N/A	1.0061	1.0344	0.9951	1.0314	0.9765	N/A	0.9467	System Reconfiguration
BER VLLY 70 kV		P0	Base Case	0.9722	1.0122	0.9244	N/A	N/A	N/A	0.9922	1.0319	0.9811	1.0299	0.964	N/A	0.9242	System Reconfiguration
INDN FLT 70 kV		P0	Base Case	0.9617	1.0022	0.9097	N/A	N/A	N/A	0.9857	1.0309	0.9705	1.0293	0.9556	N/A	0.9096	System Reconfiguration
YOSEMITE 70 kV		P0	Base Case	0.9598	1.0003	0.9062	N/A	N/A	N/A	0.9825	1.0289	0.9685	1.0273	0.9536	N/A	0.9061	System Reconfiguration
TOMATAK 70 kV		P0	Base Case	0.8963	0.8913	0.8803	N/A	N/A	N/A	0.9522	1.0455	0.8888	1.0473	0.8986	N/A	0.8803	System Reconfiguration
DUNLAP 70 kV		P0	Base Case	1.0045	1.0154	0.9359	N/A	N/A	N/A	1.0545	1.0484	1.0129	1.0527	1.0314	N/A	0.9357	System Reconfiguration
SANDCRK 70 kV		P0	Base Case	1.0095	1.0197	0.9433	N/A	N/A	N/A	1.0558	1.0489	1.0174	1.0531	1.0356	N/A	0.9431	System Reconfiguration
STONCRRL 70 kV		P0	Base Case	1.0051	1.0136	0.9454	N/A	N/A	N/A	1.0527	1.0437	1.0113	1.0476	1.0296	N/A	0.9452	System Reconfiguration
CAMDEN 70 kV		P0	Base Case	0.9731	0.9407	0.9284	N/A	N/A	N/A	1.0122	1.0384	0.939	1.044	1.0035	N/A	0.9283	System Reconfiguration
CHWCHLLA 115 kV	LE GRAND-CHOWCHILLA 115KV [2110]	P1-2	N-1	0.9994	0.9832	0.9112	N/A	N/A	N/A	1.0336	1.0821	0.9812	1.089	1.0369	N/A	0.9112	Continue to Monitor future forecast
CANAL 70 kV	LOS BANOS-LIVINGSTON JCT-CANAL 70KV [8940]	P1-2	N-1	0.9403	0.9523	0.8826	N/A	N/A	N/A	1.0343	1.061	0.945	1.0666	0.9879	N/A	0.8828	System Reconfiguration
DUNLAP 70 kV	MCCALL-REEDLEY 115KV [2320] MOAS OPENED ON MC CALL_WAHTOKE	P1-2	N-1	0.9737	0.9908	0.8787	N/A	N/A	N/A	1.0468	1.056	0.9875	1.0612	1.0147	N/A	0.8786	Continue to Monitor future forecast
SANDCRK 70 kV		P1-2	N-1	0.9788	0.9953	0.8867	N/A	N/A	N/A	1.0482	1.0566	0.9921	1.0616	1.019	N/A	0.8865	Continue to Monitor future forecast
STONCRRL 70 kV		P1-2	N-1	0.9743	0.989	0.889	N/A	N/A	N/A	1.045	1.0514	0.9859	1.056	1.0129	N/A	0.8888	Continue to Monitor future forecast
DINUBA 70 kV		P1-2	N-1	0.9817	0.9999	0.8986	N/A	N/A	N/A	1.0481	1.059	0.997	1.0638	1.021	N/A	0.8984	Continue to Monitor future forecast
INDN FLT 70 kV	MERCED FALLS-EXCHEQUER 70KV [8990]	P1-2	N-1	0.9404	0.988	0.8877	N/A	N/A	N/A	0.9532	1.0245	0.9508	1.0253	0.9336	N/A	0.8872	Continue to Monitor future forecast
YOSEMITE 70 kV	MERCED FALLS-EXCHEQUER 70KV [8990]	P1-2	N-1	0.9383	0.9861	0.8842	N/A	N/A	N/A	0.9499	1.0226	0.9489	1.0233	0.9316	N/A	0.8836	Continue to Monitor future forecast
FIREBAGH 70 kV	ORO LOMA-MENDOTA 70KV [9030]	P1-2	N-1	>0.9	>0.9	>0.9	N/A	N/A	N/A	0.8988	1.0302	>0.9	1.0313	>0.9	N/A	>0.9	Under Review
TOMATAK 70 kV		P1-2	N-1	0.8964	0.8915	0.8807	N/A	N/A	N/A	0.8988	1.0302	0.8891	1.0313	0.8987	N/A	0.8807	System Reconfiguration
ORO LOMA 70 kV	PANOCHE-ORO LOMA 115KV [3240]	P1-2	N-1	0.9524	0.8856	0.8795	N/A	N/A	N/A	1.0138	1.0538	0.8673	1.0599	1.0255	N/A	0.8792	Continue to Monitor future forecast
SNTA RTA 70 kV		P1-2	N-1	0.9372	0.8687	0.8622	N/A	N/A	N/A	1.0181	1.0627	0.8497	1.0705	1.0258	N/A	0.8618	Continue to Monitor future forecast
DOS PALS 70 kV		P1-2	N-1	0.9419	0.8738	0.8674	N/A	N/A	N/A	1.0155	1.0588	0.855	1.0658	1.0235	N/A	0.867	Continue to Monitor future forecast
FIREBAGH 70 kV		P1-2	N-1	0.9039	0.8326	0.8249	N/A	N/A	N/A	0.9477	1.0487	0.812	1.0506	0.9994	N/A	0.8245	Continue to Monitor future forecast
DUNLAP 70 kV	REEDLEY-DINUBA #1 70KV [9050]	P1-2	N-1	0.9805	0.9958	0.8888	N/A	N/A	N/A	1.0502	1.0504	0.9924	1.0552	1.0214	N/A	0.8885	Project: Reedley 70 kV Reinforcement (Dinuba Battery Energy Storage) In-service date: 05/22 Short term: Action plan
SANDCRK 70 kV		P1-2	N-1	0.9856	1.0002	0.8966	N/A	N/A	N/A	1.0516	1.0509	0.997	1.0556	1.0256	N/A	0.8964	Project: Reedley 70 kV Reinforcement (Dinuba Battery Energy Storage) In-service date: 05/22 Short term: Action plan
STONCRRL 70 kV		P1-2	N-1	0.9779	0.9918	0.8921	N/A	N/A	N/A	1.0477	1.0463	0.9885	1.0507	1.018	N/A	0.8919	Project: Reedley 70 kV Reinforcement (Dinuba Battery Energy Storage) In-service date: 05/22 Short term: Action plan
DINUBA 70 kV		P1-2	N-1	0.9487	0.9709	0.8443	N/A	N/A	N/A	1.0399	1.0597	0.9669	1.0674	1.0064	N/A	0.8441	Project: Reedley 70 kV Reinforcement (Dinuba Battery Energy Storage) In-service date: 05/22 Short term: Action plan

2020-2021 ISO Reliability Assessment - Study Results

Study Area: PG&E Greater Fresno

Low Voltages

California ISO

Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)								Voltage PU (Sensitivity Scenarios)					Project & Potential Mitigation Solutions
				2022 Summer Peak	2025 Summer Peak	2030 Summer Peak	2022 Winter Peak	2025 Winter Peak	2030 Winter Peak	2022 Spring Off-Peak	2025 Spring Off-Peak	2025 SP High CEC Forecast	2025 SpOP Hi Renew & Min Gas Gen	2022 SP Heavy Renewable & Min Gas Gen	2030 Retirement of QF Generations	2030 Summer Peak w/o Facility Rerates	
STONCRRL 70 kV	REEDLEY-OROSI 70KV [9060]	P1-2	N-1	0.9466	0.9559	0.8778	N/A	N/A	N/A	1.0346	1.0398	0.9525	1.0466	0.9906	N/A	0.8776	Project: Reedley 70 kV Reinforcement (Dinuba Battery Energy Storage) In-service date: 05/22 Short term: Action plan
OROSI 70 kV		P1-2	N-1	0.9547	0.9653	0.8887	N/A	N/A	N/A	1.0383	1.0428	0.9622	1.0494	0.9975	N/A	0.8885	Project: Reedley 70 kV Reinforcement (Dinuba Battery Energy Storage) In-service date: 05/22 Short term: Action plan
AVENAL 70 kV	GATES D 230/70KV TB 5	P1-3	N-1	0.9705	0.9558	0.8902	N/A	N/A	N/A	1.0114	1.0682	0.9533	1.0663	1.0418	N/A	0.8902	Continue to Monitor future forecast
KETTLEMN 70 kV		P1-3	N-1	0.9629	0.9499	0.8834	N/A	N/A	N/A	1.0124	1.0624	0.9474	1.0619	1.0313	N/A	0.8834	Continue to Monitor future forecast
CHEVPLIN 70 kV		P1-3	N-1	0.9641	0.9508	0.8847	N/A	N/A	N/A	1.0117	1.0604	0.9483	1.06	1.032	N/A	0.8847	Continue to Monitor future forecast
CALFLAX 70 kV		P1-3	N-1	0.979	0.9772	0.8986	N/A	N/A	N/A	1.0156	1.0428	0.9747	1.0434	1.0304	N/A	0.8985	Continue to Monitor future forecast
PLSNTVLY 70 kV		P1-3	N-1	0.9776	0.9585	0.9018	N/A	N/A	N/A	1.014	1.03	0.9562	1.0317	1.0212	N/A	0.9017	Continue to Monitor future forecast
COLNGA 2 70 kV		P1-3	N-1	0.9627	0.9408	0.8816	N/A	N/A	N/A	1.0155	1.0357	0.9384	1.0384	1.0159	N/A	0.8815	Continue to Monitor future forecast
TORNADO 70 kV		P1-3	N-1	0.9598	0.938	0.8801	N/A	N/A	N/A	1.0136	1.0334	0.9357	1.0371	1.0124	N/A	0.88	Continue to Monitor future forecast
COLNGA 1 70 kV		P1-3	N-1	0.9621	0.9393	0.8801	N/A	N/A	N/A	1.0135	1.037	0.9373	1.0428	1.0126	N/A	0.8801	Continue to Monitor future forecast
PCHCO PP 70 kV	LOSBANOS 230/70KV TB 3	P1-3	N-1	0.9066	0.904	0.9505	N/A	N/A	N/A	0.9491	0.9732	0.896	0.9811	0.9137	N/A	0.9507	Sensitivity only
DUNLAP 70 kV	MCCALL-REEDLEY 115KV [2320] (MC CALL-WAHTOKE)	P2-1	Line Section w/o Fault	0.9737	0.9908	0.8787	N/A	N/A	N/A	1.0468	1.056	0.9875	1.0612	1.0147	N/A	0.8786	Continue to Monitor future forecast
SANDCRK 70 kV		P2-1	Line Section w/o Fault	0.9788	0.9953	0.8867	N/A	N/A	N/A	1.0482	1.0566	0.9921	1.0616	1.019	N/A	0.8865	Continue to Monitor future forecast
STONCRRL 70 kV		P2-1	Line Section w/o Fault	0.9743	0.989	0.889	N/A	N/A	N/A	1.045	1.0514	0.9859	1.056	1.0129	N/A	0.8888	Continue to Monitor future forecast
DINUBA 70 kV		P2-1	Line Section w/o Fault	0.9817	0.9999	0.8986	N/A	N/A	N/A	1.0481	1.059	0.997	1.0638	1.021	N/A	0.8984	Continue to Monitor future forecast
ORO LOMA 70 kV	PANOCHE-ORO LOMA 115KV [3240] (DFSTP-ORO LOMA)	P2-1	Line Section w/o Fault	0.9523	0.8855	0.8795	N/A	N/A	N/A	1.0139	1.0539	0.8672	1.0599	1.0255	N/A	0.8792	Continue to Monitor future forecast
SNTA RTA 70 kV		P2-1	Line Section w/o Fault	0.9371	0.8686	0.8622	N/A	N/A	N/A	1.0182	1.0627	0.8495	1.0705	1.0258	N/A	0.8618	Continue to Monitor future forecast
DOS PALS 70 kV		P2-1	Line Section w/o Fault	0.9418	0.8737	0.8674	N/A	N/A	N/A	1.0156	1.0588	0.8549	1.0658	1.0235	N/A	0.867	Continue to Monitor future forecast
FIREBAGH 70 kV		P2-1	Line Section w/o Fault	0.9038	0.8326	0.8248	N/A	N/A	N/A	0.9479	1.0487	0.8118	1.0506	0.9994	N/A	0.8245	Continue to Monitor future forecast
DFS 115 kV	PANOCHE-ORO LOMA 115KV [3240] (HAMMONDS-DFSTP)	P2-1	Line Section w/o Fault	0.9247	0.8501	0.8989	N/A	N/A	N/A	0.9828	1.0559	0.8315	1.0618	1.0086	N/A	0.8985	System Reconfiguration
ORO LOMA 70 kV		P2-1	Line Section w/o Fault	0.945	0.8765	0.8767	N/A	N/A	N/A	1.0132	1.0515	0.8572	1.0576	1.0215	N/A	0.8764	System Reconfiguration
SNTA RTA 70 kV		P2-1	Line Section w/o Fault	0.9297	0.8594	0.8593	N/A	N/A	N/A	1.0177	1.0609	0.8393	1.0687	1.0219	N/A	0.8589	System Reconfiguration
DOS PALS 70 kV		P2-1	Line Section w/o Fault	0.9344	0.8646	0.8645	N/A	N/A	N/A	1.015	1.0567	0.8447	1.0637	1.0195	N/A	0.8642	System Reconfiguration
FIREBAGH 70 kV		P2-1	Line Section w/o Fault	0.896	0.8229	0.8218	N/A	N/A	N/A	0.9477	1.0478	0.801	1.0498	0.9954	N/A	0.8215	System Reconfiguration

Study Area: PG&E Greater Fresno

Low Voltages

Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)								Voltage PU (Sensitivity Scenarios)					Project & Potential Mitigation Solutions
				2022 Summer Peak	2025 Summer Peak	2030 Summer Peak	2022 Winter Peak	2025 Winter Peak	2030 Winter Peak	2022 Spring Off-Peak	2025 Spring Off-Peak	2025 SP High CEC Forecast	2025 SpOP Hi Renew & Min Gas Gen	2022 SP Heavy Renewable & Min Gas Gen	2030 Retirement of QF Generations	2030 Summer Peak w/o Facility Rerates	
HAMMONDS 115 kV	PANOCHE-ORO LOMA 115KV [3240] (PANOCHEJ-HAMMONDS)	P2-1	Line Section w/o Fault	0.8597	0.7666	0.869	N/A	N/A	N/A	0.9835	1.0605	0.7368	1.0669	0.9715	N/A	0.8686	System Reconfiguration
DFS 115 kV		P2-1	Line Section w/o Fault	0.8667	0.7731	0.8708	N/A	N/A	N/A	0.9833	1.0596	0.7436	1.0659	0.9767	N/A	0.8705	System Reconfiguration
EL NIDO 115 kV		P2-1	Line Section w/o Fault	0.9545	0.913	0.949	N/A	N/A	N/A	1.0151	1.0519	0.8919	1.0568	1.0095	N/A	0.9487	System Reconfiguration
ORO LOMA 70 kV		P2-1	Line Section w/o Fault	0.8905	0.8011	0.8504	N/A	N/A	N/A	1.0134	1.0542	0.7705	1.0606	0.9929	N/A	0.85	System Reconfiguration
SNTA RTA 70 kV		P2-1	Line Section w/o Fault	0.8741	0.7823	0.8323	N/A	N/A	N/A	1.0179	1.0629	0.7505	1.0709	0.9932	N/A	0.832	System Reconfiguration
DOS PALS 70 kV		P2-1	Line Section w/o Fault	0.8792	0.788	0.8377	N/A	N/A	N/A	1.0151	1.0591	0.7566	1.0664	0.9908	N/A	0.8374	System Reconfiguration
FIREBAGH 70 kV		P2-1	Line Section w/o Fault	0.8379	0.7411	0.7934	N/A	N/A	N/A	0.9479	1.0487	0.7065	1.0506	0.9659	N/A	0.793	System Reconfiguration
HAMMONDS 115 kV	PANOCHE-ORO LOMA 115KV [3240] (PANOCHEJ-PANOCHE2)	P2-1	Line Section w/o Fault	0.8093	0.6956	0.8402	N/A	N/A	N/A	0.9784	1.0543	0.6404	1.0609	0.9469	N/A	0.8398	System Reconfiguration
LUIS_#3 115 kV		P2-1	Line Section w/o Fault	0.8032	0.6898	0.837	N/A	N/A	N/A	0.9769	1.0519	0.634	1.0586	0.942	N/A	0.8366	System Reconfiguration
DFS 115 kV		P2-1	Line Section w/o Fault	0.821	0.7058	0.8433	N/A	N/A	N/A	0.9792	1.0544	0.6516	1.061	0.9557	N/A	0.8429	System Reconfiguration
LUIS_#5 115 kV		P2-1	Line Section w/o Fault	0.8035	0.6902	0.8372	N/A	N/A	N/A	0.9769	1.052	0.6344	1.0587	0.9423	N/A	0.8368	System Reconfiguration
OXFORD 115 kV		P2-1	Line Section w/o Fault	0.8043	0.691	0.8379	N/A	N/A	N/A	0.9769	1.052	0.6353	1.0587	0.9429	N/A	0.8375	System Reconfiguration
EL NIDO 115 kV		P2-1	Line Section w/o Fault	0.9338	0.8823	0.9367	N/A	N/A	N/A	1.0137	1.0501	0.849	1.0552	1.0025	N/A	0.9364	System Reconfiguration
WSTLD1RA 115 kV		P2-1	Line Section w/o Fault	0.8046	0.6913	0.838	N/A	N/A	N/A	0.9772	1.0524	0.6357	1.0591	0.9432	N/A	0.8376	System Reconfiguration
ORO LOMA 70 kV		P2-1	Line Section w/o Fault	0.8468	0.7337	0.8242	N/A	N/A	N/A	1.0098	1.0501	0.7034	1.0568	0.974	N/A	0.8238	System Reconfiguration
SNTA RTA 70 kV		P2-1	Line Section w/o Fault	0.8296	0.7129	0.8055	N/A	N/A	N/A	1.0151	1.06	0.6811	1.0683	0.9744	N/A	0.8051	System Reconfiguration
DOS PALS 70 kV		P2-1	Line Section w/o Fault	0.8349	0.7191	0.8111	N/A	N/A	N/A	1.0119	1.0556	0.6878	1.0631	0.9719	N/A	0.8107	System Reconfiguration
FIREBAGH 70 kV		P2-1	Line Section w/o Fault	0.7909	0.6664	0.7649	N/A	N/A	N/A	0.9467	1.0476	0.6304	1.0497	0.9464	N/A	0.7645	System Reconfiguration

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Study Area: PG&E Greater Fresno

Low Voltages

Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)								Voltage PU (Sensitivity Scenarios)					Project & Potential Mitigation Solutions
				2022 Summer Peak	2025 Summer Peak	2030 Summer Peak	2022 Winter Peak	2025 Winter Peak	2030 Winter Peak	2022 Spring Off-Peak	2025 Spring Off-Peak	2025 SP High CEC Forecast	2025 SpOP Hi Renew & Min Gas Gen	2022 SP Heavy Renewable & Min Gas Gen	2030 Retirement of QF Generations	2030 Summer Peak w/o Facility Rerates	
AVENAL 70 kV	GATES D 230KV SECTION 2D	P2-2	Bus/Breaker	0.9695	0.956	0.8897	N/A	N/A	N/A	1.0102	1.0685	0.9533	1.0666	1.0416	N/A	0.8896	Continue to Monitor future forecast
KETTLEMN 70 kV		P2-2	Bus/Breaker	0.9619	0.9501	0.8829	N/A	N/A	N/A	1.0111	1.0628	0.9474	1.0623	1.0311	N/A	0.8828	Continue to Monitor future forecast
CHEVPLIN 70 kV		P2-2	Bus/Breaker	0.9631	0.951	0.8842	N/A	N/A	N/A	1.0105	1.0608	0.9483	1.0603	1.0318	N/A	0.8841	Continue to Monitor future forecast
CALFLAX 70 kV		P2-2	Bus/Breaker	0.9776	0.9764	0.8971	N/A	N/A	N/A	1.0145	1.0436	0.9736	1.0443	1.0306	N/A	0.8969	Continue to Monitor future forecast
COLNGA 2 70 kV		P2-2	Bus/Breaker	0.9614	0.9406	0.8808	N/A	N/A	N/A	1.0146	1.0371	0.938	1.0398	1.0159	N/A	0.8807	Continue to Monitor future forecast
TORNADO 70 kV		P2-2	Bus/Breaker	0.9584	0.938	0.8794	N/A	N/A	N/A	1.0126	1.0357	0.9354	1.0393	1.0126	N/A	0.8793	Continue to Monitor future forecast
COLNGA 1 70 kV		P2-2	Bus/Breaker	0.9612	0.9401	0.8804	N/A	N/A	N/A	1.0122	1.0391	0.9379	1.0445	1.0122	N/A	0.8803	Continue to Monitor future forecast
PCHCO PP 70 kV	LOSBANOS 230KV SECTION 1D	P2-2	Bus/Breaker	0.8988	0.8963	0.9501	N/A	N/A	N/A	0.9365	0.9664	0.8839	0.9738	0.8913	N/A	0.95	Under Review
DUNLAP 70 kV	MC CALL 230KV SECTION 1D	P2-2	Bus/Breaker	0.9818	0.9922	0.8957	N/A	N/A	N/A	1.0421	1.0454	0.9885	1.053	1.0116	N/A	0.8939	Continue to Monitor future forecast
CAMDEN 70 kV		P2-2	Bus/Breaker	0.9532	0.9197	0.8972	N/A	N/A	N/A	0.9985	1.0356	0.917	1.042	0.9852	N/A	0.8959	Continue to Monitor future forecast
HAMMONDS 115 kV	PANOCHE2 115KV SECTION 2D	P2-2	Bus/Breaker	0.8091	0.6955	0.8403	N/A	N/A	N/A	0.9776	1.0538	0.6402	1.0605	0.9469	N/A	0.8399	System Reconfiguration
LUIS_#3 115 kV		P2-2	Bus/Breaker	0.803	0.6897	0.8371	N/A	N/A	N/A	0.9762	1.0514	0.6337	1.0581	0.942	N/A	0.8367	System Reconfiguration
DFS 115 kV		P2-2	Bus/Breaker	0.8209	0.7057	0.8434	N/A	N/A	N/A	0.9785	1.0539	0.6514	1.0605	0.9557	N/A	0.843	System Reconfiguration
LUIS_#5 115 kV		P2-2	Bus/Breaker	0.8034	0.6901	0.8373	N/A	N/A	N/A	0.9762	1.0515	0.6341	1.0582	0.9423	N/A	0.8369	System Reconfiguration
OXFORD 115 kV		P2-2	Bus/Breaker	0.8042	0.6909	0.838	N/A	N/A	N/A	0.9762	1.0515	0.6351	1.0582	0.9429	N/A	0.8376	System Reconfiguration
EL NIDO 115 kV		P2-2	Bus/Breaker	0.9337	0.8822	0.9368	N/A	N/A	N/A	1.0134	1.0498	0.8488	1.0549	1.0025	N/A	0.9364	System Reconfiguration
WSTLD1RA 115 kV		P2-2	Bus/Breaker	0.8045	0.6912	0.838	N/A	N/A	N/A	0.9764	1.0519	0.6354	1.0586	0.9431	N/A	0.8376	System Reconfiguration
ORO LOMA 70 kV		P2-2	Bus/Breaker	0.8467	0.7335	0.8242	N/A	N/A	N/A	1.0089	1.0496	0.7031	1.0563	0.974	N/A	0.8238	System Reconfiguration
SNTA RTA 70 kV		P2-2	Bus/Breaker	0.8294	0.7128	0.8056	N/A	N/A	N/A	1.0144	1.0596	0.6808	1.0679	0.9744	N/A	0.8052	System Reconfiguration
DOS PALS 70 kV		P2-2	Bus/Breaker	0.8348	0.719	0.8112	N/A	N/A	N/A	1.0111	1.0551	0.6875	1.0627	0.9719	N/A	0.8108	System Reconfiguration
FIREBAGH 70 kV		P2-2	Bus/Breaker	0.7907	0.6663	0.765	N/A	N/A	N/A	0.9432	1.0474	0.6302	1.0491	0.9464	N/A	0.7645	System Reconfiguration
SJNO2 70 kV	GREGG 230KV - MIDDLE BREAKER BAY 1	P2-3	Bus/Breaker	0.9863	0.9626	>0.9	N/A	N/A	N/A	1.0218	1.0416	0.896	1.0459	1.008	N/A	>0.9	Sensitivity only
SJNO3 70 kV	GREGG 230KV - MIDDLE BREAKER BAY 1	P2-3	Bus/Breaker	0.9829	0.9592	>0.9	N/A	N/A	N/A	1.0191	1.0436	0.8921	1.0482	1.0021	N/A	>0.9	Sensitivity only
AUBERRY 70 kV	GREGG 230KV - MIDDLE BREAKER BAY 1	P2-3	Bus/Breaker	0.9891	0.9633	>0.9	N/A	N/A	N/A	1.0242	1.0412	0.8968	1.0455	1.0153	N/A	>0.9	Sensitivity only
DUNLAP 70 kV	MC CALL 115KV - MIDDLE BREAKER BAY 2	P2-3	Bus/Breaker	0.9701	0.9876	0.8714	N/A	N/A	N/A	1.0446	1.0574	0.9842	1.0627	1.0122	N/A	0.8712	Continue to Monitor future forecast
SANDCRK 70 kV		P2-3	Bus/Breaker	0.9753	0.9921	0.8795	N/A	N/A	N/A	1.046	1.0579	0.9888	1.0631	1.0165	N/A	0.8792	Continue to Monitor future forecast
STONCRRL 70 kV		P2-3	Bus/Breaker	0.9708	0.9858	0.8818	N/A	N/A	N/A	1.0428	1.0528	0.9826	1.0576	1.0104	N/A	0.8815	Continue to Monitor future forecast
DINUBA 70 kV		P2-3	Bus/Breaker	0.9782	0.9968	0.8915	N/A	N/A	N/A	1.0459	1.0604	0.9937	1.0654	1.0185	N/A	0.8913	Continue to Monitor future forecast
OROSI 70 kV		P2-3	Bus/Breaker	0.9805	0.9967	0.8949	N/A	N/A	N/A	1.0471	1.056	0.9936	1.0605	1.0184	N/A	0.8947	Continue to Monitor future forecast
ORO LOMA 70 kV	ORO LOMA 115KV - MIDDLE BREAKER BAY 4	P2-3	Bus/Breaker	0.9264	0.8608	0.8965	N/A	N/A	N/A	1.0024	1.0446	0.8428	1.0508	0.9984	N/A	0.8962	System Reconfiguration
SNTA RTA 70 kV		P2-3	Bus/Breaker	0.9108	0.8434	0.8795	N/A	N/A	N/A	1.0087	1.0555	0.8246	1.0634	0.9988	N/A	0.8792	System Reconfiguration
DOS PALS 70 kV		P2-3	Bus/Breaker	0.9156	0.8487	0.8847	N/A	N/A	N/A	1.0052	1.0506	0.8301	1.0577	0.9964	N/A	0.8843	System Reconfiguration
FIREBAGH 70 kV		P2-3	Bus/Breaker	0.8763	0.806	0.8431	N/A	N/A	N/A	0.9429	1.0453	0.7855	1.0473	0.9716	N/A	0.8428	System Reconfiguration
HAMMONDS 115 kV	PANOCHE2 - 2D 115KV & PANOCHE2-EXCELSIORSS LINE	P2-3	Bus/Breaker	0.8092	0.6957	0.8404	N/A	N/A	N/A	0.9775	1.0538	0.6397	1.0605	0.9469	N/A	0.8399	System Reconfiguration
LUIS_#3 115 kV		P2-3	Bus/Breaker	0.8031	0.6899	0.8372	N/A	N/A	N/A	0.9761	1.0514	0.6332	1.0581	0.942	N/A	0.8367	System Reconfiguration
DFS 115 kV		P2-3	Bus/Breaker	0.8209	0.7058	0.8435	N/A	N/A	N/A	0.9784	1.0539	0.6509	1.0605	0.9557	N/A	0.8431	System Reconfiguration
LUIS_#5 115 kV		P2-3	Bus/Breaker	0.8035	0.6903	0.8374	N/A	N/A	N/A	0.9761	1.0515	0.6336	1.0582	0.9423	N/A	0.8369	System Reconfiguration
OXFORD 115 kV		P2-3	Bus/Breaker	0.8042	0.6911	0.8381	N/A	N/A	N/A	0.9761	1.0515	0.6346	1.0582	0.9429	N/A	0.8376	System Reconfiguration
EL NIDO 115 kV		P2-3	Bus/Breaker	0.9337	0.8823	0.9368	N/A	N/A	N/A	1.0134	1.0498	0.8485	1.0549	1.0025	N/A	0.9365	System Reconfiguration
WSTLD1RA 115 kV		P2-3	Bus/Breaker	0.8045	0.6914	0.8381	N/A	N/A	N/A	0.9763	1.0519	0.6349	1.0586	0.9431	N/A	0.8377	System Reconfiguration
ORO LOMA 70 kV		P2-3	Bus/Breaker	0.8468	0.7337	0.8243	N/A	N/A	N/A	1.0089	1.0496	0.7025	1.0563	0.974	N/A	0.8239	System Reconfiguration

Study Area: PG&E Greater Fresno

Low Voltages

California ISO

Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)								Voltage PU (Sensitivity Scenarios)					Project & Potential Mitigation Solutions
				2022 Summer Peak	2025 Summer Peak	2030 Summer Peak	2022 Winter Peak	2025 Winter Peak	2030 Winter Peak	2022 Spring Off-Peak	2025 Spring Off-Peak	2025 SP High CEC Forecast	2025 SpOP Hi Renew & Min Gas Gen	2022 SP Heavy Renewable & Min Gas Gen	2030 Retirement of QF Generations	2030 Summer Peak w/o Facility Rerates	
SNTA RTA 70 kV		P2-3	Bus/Breaker	0.8295	0.713	0.8057	N/A	N/A	N/A	1.0144	1.0596	0.6802	1.0679	0.9744	N/A	0.8053	System Reconfiguration
DOS PALS 70 kV		P2-3	Bus/Breaker	0.8348	0.7192	0.8112	N/A	N/A	N/A	1.0111	1.0551	0.687	1.0627	0.9719	N/A	0.8108	System Reconfiguration
FIREBAGH 70 kV		P2-3	Bus/Breaker	0.7908	0.6665	0.765	N/A	N/A	N/A	0.943	1.0474	0.6296	1.0491	0.9464	N/A	0.7646	System Reconfiguration
ORO LOMA 70 kV	PANOCHE2 - 2D 115KV & PANOCHE-ORO LOMA LINE	P2-3	Bus/Breaker	0.9523	0.8855	0.8796	N/A	N/A	N/A	1.0129	1.0533	0.8668	1.0594	1.0254	N/A	0.8792	System Reconfiguration
SNTA RTA 70 kV		P2-3	Bus/Breaker	0.9371	0.8686	0.8622	N/A	N/A	N/A	1.0174	1.0622	0.8491	1.0701	1.0258	N/A	0.8618	System Reconfiguration
DOS PALS 70 kV		P2-3	Bus/Breaker	0.9418	0.8737	0.8674	N/A	N/A	N/A	1.0147	1.0583	0.8545	1.0654	1.0235	N/A	0.8671	System Reconfiguration
FIREBAGH 70 kV		P2-3	Bus/Breaker	0.9038	0.8325	0.8249	N/A	N/A	N/A	0.9442	1.0485	0.8114	1.05	0.9994	N/A	0.8245	System Reconfiguration
DUNLAP 70 kV	REEDLEY 115KV - RING R5 & R4	P2-3	Bus/Breaker	0.9823	0.9998	0.889	N/A	N/A	N/A	1.0455	1.0502	0.9971	1.0548	1.0174	N/A	0.8889	Continue to Monitor future forecast
SANDCRK 70 kV		P2-3	Bus/Breaker	0.9873	1.0042	0.8969	N/A	N/A	N/A	1.0469	1.0507	1.0016	1.0552	1.0216	N/A	0.8967	Continue to Monitor future forecast
STONCRRL 70 kV		P2-3	Bus/Breaker	0.9829	0.998	0.8992	N/A	N/A	N/A	1.0437	1.0456	0.9956	1.0497	1.0155	N/A	0.899	Continue to Monitor future forecast
DUNLAP 70 kV	REEDLEY 115KV - RING R5 & R6	P2-3	Bus/Breaker	0.9887	1.0103	0.8767	N/A	N/A	N/A	1.0559	1.061	1.0077	1.0656	1.0289	N/A	0.8765	Continue to Monitor future forecast
SANDCRK 70 kV		P2-3	Bus/Breaker	0.9937	1.0147	0.8847	N/A	N/A	N/A	1.0572	1.0615	1.0122	1.066	1.0331	N/A	0.8845	Continue to Monitor future forecast
STONCRRL 70 kV		P2-3	Bus/Breaker	0.9892	1.0085	0.887	N/A	N/A	N/A	1.0541	1.0564	1.0061	1.0605	1.027	N/A	0.8868	Continue to Monitor future forecast
DINUBA 70 kV		P2-3	Bus/Breaker	0.9965	1.0192	0.8966	N/A	N/A	N/A	1.0572	1.0639	1.0169	1.0682	1.035	N/A	0.8964	Continue to Monitor future forecast
OROSI 70 kV		P2-3	Bus/Breaker	0.9988	1.0191	0.9	N/A	N/A	N/A	1.0583	1.0596	1.0168	1.0634	1.035	N/A	0.8998	Continue to Monitor future forecast
AVENAL 70 kV	GATES D 230KV - SECTION 2D & 1D	P2-4	Bus/Breaker	>0.9	0.9557	0.8904	N/A	N/A	N/A	>0.9	>0.9	0.9553	1.0659	>0.9	N/A	0.8902	Continue to Monitor future forecast
KETTLEMN 70 kV		P2-4	Bus/Breaker	>0.9	0.9498	0.8836	N/A	N/A	N/A	>0.9	>0.9	0.9494	1.0615	>0.9	N/A	0.8834	Continue to Monitor future forecast
CHEVPLIN 70 kV		P2-4	Bus/Breaker	>0.9	0.9507	0.8849	N/A	N/A	N/A	>0.9	>0.9	0.9503	1.0596	>0.9	N/A	0.8847	Continue to Monitor future forecast
CALFLAX 70 kV		P2-4	Bus/Breaker	>0.9	0.9747	0.8963	N/A	N/A	N/A	>0.9	>0.9	0.9745	1.0445	>0.9	N/A	0.8961	Continue to Monitor future forecast
COLNGA 2 70 kV		P2-4	Bus/Breaker	>0.9	0.9397	0.881	N/A	N/A	N/A	>0.9	>0.9	0.9395	1.0398	>0.9	N/A	0.8809	Continue to Monitor future forecast
TORNADO 70 kV		P2-4	Bus/Breaker	>0.9	0.9372	0.8799	N/A	N/A	N/A	>0.9	>0.9	0.9369	1.0396	>0.9	N/A	0.8798	Continue to Monitor future forecast
COLNGA 1 70 kV		P2-4	Bus/Breaker	>0.9	0.9406	0.8821	N/A	N/A	N/A	>0.9	>0.9	0.9406	1.0441	>0.9	N/A	0.882	Continue to Monitor future forecast
DUNLAP 70 kV	HERNDON 115KV - SECTION 1D & 2D	P2-4	Bus/Breaker	0.9969	1.0051	0.9	N/A	N/A	N/A	1.0599	1.0445	1.0013	1.0461	1.0295	N/A	0.9	Continue to Monitor future forecast
AIRWAYS 115 kV	HERNDON 230KV - SECTION 1E & 2E	P2-4	Bus/Breaker	0.9821	0.9837	0.8964	N/A	N/A	N/A	1.0444	1.0531	0.9798	1.0542	1.0173	N/A	0.8958	Continue to Monitor future forecast
SESWTF 115 kV		P2-4	Bus/Breaker	0.9832	0.9848	0.898	N/A	N/A	N/A	1.0448	1.052	0.981	1.053	1.018	N/A	0.8974	Continue to Monitor future forecast
BARTON 115 kV		P2-4	Bus/Breaker	0.9787	0.9818	0.8901	N/A	N/A	N/A	1.0442	1.0545	0.9777	1.0556	1.0153	N/A	0.8896	Continue to Monitor future forecast
MANCHSTR 115 kV		P2-4	Bus/Breaker	0.98	0.9805	0.8836	N/A	N/A	N/A	1.0478	1.0594	0.9759	1.0602	1.0201	N/A	0.8833	Continue to Monitor future forecast
PNEDLE 115 kV		P2-4	Bus/Breaker	0.9452	0.9491	0.8445	N/A	N/A	N/A	1.0411	1.0715	0.9433	1.0726	0.9967	N/A	0.8445	Continue to Monitor future forecast
WOODWARD 115 kV		P2-4	Bus/Breaker	0.9891	0.9874	0.8879	N/A	N/A	N/A	1.0466	1.0559	0.983	1.0573	1.0319	N/A	0.8876	Continue to Monitor future forecast
PNEDLE2 115 kV		P2-4	Bus/Breaker	0.9461	0.9501	0.8477	N/A	N/A	N/A	1.0414	1.0706	0.9443	1.0716	0.9969	N/A	0.8477	Continue to Monitor future forecast
CHLDHOSP 115 kV		P2-4	Bus/Breaker	0.98	0.9799	0.8819	N/A	N/A	N/A	1.0457	1.0574	0.9752	1.0585	1.0238	N/A	0.8817	Continue to Monitor future forecast
DUNLAP 70 kV		P2-4	Bus/Breaker	0.9853	0.9947	0.8699	N/A	N/A	N/A	1.0605	1.0501	0.9905	1.0528	1.0253	N/A	0.8691	Continue to Monitor future forecast
SANDCRK 70 kV		P2-4	Bus/Breaker	0.9903	0.9992	0.8779	N/A	N/A	N/A	1.0619	1.0507	0.9951	1.0532	1.0295	N/A	0.8772	Continue to Monitor future forecast
STONCRRL 70 kV		P2-4	Bus/Breaker	0.9859	0.9929	0.8803	N/A	N/A	N/A	1.0587	1.0455	0.9889	1.0477	1.0235	N/A	0.8795	Continue to Monitor future forecast
DINUBA 70 kV		P2-4	Bus/Breaker	0.9933	1.0038	0.89	N/A	N/A	N/A	1.0618	1.0532	0.9999	1.0555	1.0315	N/A	0.8893	Continue to Monitor future forecast
OROSI 70 kV		P2-4	Bus/Breaker	0.9955	1.0037	0.8934	N/A	N/A	N/A	1.0629	1.0487	0.9999	1.0506	1.0314	N/A	0.8927	Continue to Monitor future forecast
CAMDEN 70 kV		P2-4	Bus/Breaker	0.9598	0.9255	0.8868	N/A	N/A	N/A	1.0169	1.0364	0.9225	1.0398	0.9992	N/A	0.8864	Continue to Monitor future forecast
PCHCO PP 70 kV	LOSBANOS 230KV - SECTION 1D & 2D	P2-4	Bus/Breaker	>0.9	>0.9	>0.9	N/A	N/A	N/A	0.8533	1.0053	>0.9	1.0195	>0.9	N/A	us Disconnecte	Under Review
TVY VLLY 70 kV	MC CALL 230KV - SECTION 1D & 1E	P2-4	Bus/Breaker	>0.9	1.0115	0.8922	N/A	N/A	N/A	>0.9	>0.9	1.0065	1.0574	>0.9	N/A	0.8919	Continue to Monitor future forecast
DUNLAP 70 kV		P2-4	Bus/Breaker	>0.9	0.9775	0.8525	N/A	N/A	N/A	>0.9	>0.9	0.9718	1.0605	>0.9	N/A	0.8522	Continue to Monitor future forecast
SANDCRK 70 kV		P2-4	Bus/Breaker	>0.9	0.9821	0.8607	N/A	N/A	N/A	>0.9	>0.9	0.9765	1.0609	>0.9	N/A	0.8604	Continue to Monitor future forecast
STONCRRL 70 kV		P2-4	Bus/Breaker	>0.9	0.9757	0.8631	N/A	N/A	N/A	>0.9	>0.9	0.9702	1.0553	>0.9	N/A	0.8628	Continue to Monitor future forecast
DINUBA 70 kV		P2-4	Bus/Breaker	>0.9	0.9868	0.8731	N/A	N/A	N/A	>0.9	>0.9	0.9815	1.0632	>0.9	N/A	0.8728	Continue to Monitor future forecast

2020-2021 ISO Reliability Assessment - Study Results

Study Area: PG&E Greater Fresno

Low Voltages

California ISO

Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)								Voltage PU (Sensitivity Scenarios)					Project & Potential Mitigation Solutions
				2022 Summer Peak	2025 Summer Peak	2030 Summer Peak	2022 Winter Peak	2025 Winter Peak	2030 Winter Peak	2022 Spring Off-Peak	2025 Spring Off-Peak	2025 SP High CEC Forecast	2025 SpOP Hi Renew & Min Gas Gen	2022 SP Heavy Renewable & Min Gas Gen	2030 Retirement of QF Generations	2030 Summer Peak w/o Facility Rerates	
OROSI 70 kV		P2-4	Bus/Breaker	>0.9	0.9867	0.8765	N/A	N/A	N/A	>0.9	>0.9	0.9814	1.0583	>0.9	N/A	0.8762	Continue to Monitor future forecast
CAMDEN 70 kV		P2-4	Bus/Breaker	>0.9	0.9068	0.8638	N/A	N/A	N/A	>0.9	>0.9	0.9027	1.0505	>0.9	N/A	0.8637	Continue to Monitor future forecast
TVY VLLY 70 kV	MC CALL 230KV - SECTION 1D & 2D	P2-4	Bus/Breaker	0.9928	1.0122	0.9012	N/A	N/A	N/A	1.0414	1.0491	1.0081	1.053	1.0209	N/A	0.8987	Continue to Monitor future forecast
DUNLAP 70 kV		P2-4	Bus/Breaker	0.968	0.9783	0.8621	N/A	N/A	N/A	1.0366	1.0481	0.9735	1.055	1.0034	N/A	0.8594	Continue to Monitor future forecast
SANDCRK 70 kV		P2-4	Bus/Breaker	0.9732	0.9829	0.8702	N/A	N/A	N/A	1.038	1.0487	0.9782	1.0554	1.0078	N/A	0.8676	Continue to Monitor future forecast
STONCRRL 70 kV		P2-4	Bus/Breaker	0.9687	0.9765	0.8725	N/A	N/A	N/A	1.0348	1.0435	0.9719	1.0499	1.0016	N/A	0.87	Continue to Monitor future forecast
DINUBA 70 kV		P2-4	Bus/Breaker	0.9762	0.9876	0.8824	N/A	N/A	N/A	1.038	1.0511	0.9831	1.0578	1.0098	N/A	0.8798	Continue to Monitor future forecast
OROSI 70 kV		P2-4	Bus/Breaker	0.9784	0.9875	0.8858	N/A	N/A	N/A	1.0391	1.0467	0.9831	1.0528	1.0097	N/A	0.8832	Continue to Monitor future forecast
CAMDEN 70 kV		P2-4	Bus/Breaker	0.9419	0.9077	0.8714	N/A	N/A	N/A	0.993	1.0381	0.9043	1.0442	0.9775	N/A	0.8694	Continue to Monitor future forecast
DUNLAP 70 kV	MC CALL 230KV - SECTION 2E & 1E	P2-4	Bus/Breaker	0.9834	0.9943	0.8859	N/A	N/A	N/A	1.0537	1.0602	0.9895	1.0647	1.0216	N/A	0.8858	Continue to Monitor future forecast
SANDCRK 70 kV		P2-4	Bus/Breaker	0.9885	0.9988	0.8938	N/A	N/A	N/A	1.0551	1.0607	0.9941	1.065	1.0258	N/A	0.8937	Continue to Monitor future forecast
STONCRRL 70 kV		P2-4	Bus/Breaker	0.984	0.9925	0.8961	N/A	N/A	N/A	1.052	1.0556	0.9878	1.0595	1.0197	N/A	0.896	Continue to Monitor future forecast
CAMDEN 70 kV		P2-4	Bus/Breaker	0.955	0.9212	0.8892	N/A	N/A	N/A	1.0122	1.0501	0.9175	1.056	0.9945	N/A	0.8893	Continue to Monitor future forecast
HAMMONDS 115 kV	PANOCHE1 SECTION 1D & PANOCHE2 SECTION 2D 115KV	P2-4	Bus/Breaker	0.8088	0.6913	0.8381	N/A	N/A	N/A	0.9814	1.0422	0.6032	1.0479	0.9451	N/A	0.838	System Reconfiguration
LUIS_#3 115 kV		P2-4	Bus/Breaker	0.8027	0.6854	0.8349	N/A	N/A	N/A	0.98	1.0398	0.5963	1.0455	0.9402	N/A	0.8348	System Reconfiguration
DFS 115 kV		P2-4	Bus/Breaker	0.8206	0.7015	0.8412	N/A	N/A	N/A	0.9823	1.0424	0.6152	1.048	0.9539	N/A	0.8411	System Reconfiguration
LUIS_#5 115 kV		P2-4	Bus/Breaker	0.8031	0.6858	0.8351	N/A	N/A	N/A	0.98	1.0399	0.5968	1.0456	0.9404	N/A	0.835	System Reconfiguration
OXFORD 115 kV		P2-4	Bus/Breaker	0.8038	0.6866	0.8358	N/A	N/A	N/A	0.98	1.0399	0.5978	1.0456	0.941	N/A	0.8357	System Reconfiguration
EL NIDO 115 kV		P2-4	Bus/Breaker	0.9334	0.8794	0.9349	N/A	N/A	N/A	1.0148	1.0418	0.8272	1.0461	1.0008	N/A	0.9349	System Reconfiguration
WSTLD1RA 115 kV		P2-4	Bus/Breaker	0.8042	0.687	0.8358	N/A	N/A	N/A	0.9802	1.0403	0.5981	1.046	0.9413	N/A	0.8357	System Reconfiguration
ORO LOMA 70 kV		P2-4	Bus/Breaker	0.8464	0.7292	0.8221	N/A	N/A	N/A	1.0135	1.0371	0.7045	1.0427	0.9722	N/A	0.822	System Reconfiguration
SNTA RTA 70 kV		P2-4	Bus/Breaker	0.8291	0.7083	0.8034	N/A	N/A	N/A	1.0183	1.0479	0.6822	1.0549	0.9726	N/A	0.8033	System Reconfiguration
DOS PALS 70 kV		P2-4	Bus/Breaker	0.8345	0.7146	0.809	N/A	N/A	N/A	1.0152	1.0434	0.6889	1.0498	0.9701	N/A	0.8089	System Reconfiguration
FIREBAGH 70 kV		P2-4	Bus/Breaker	0.7904	0.6615	0.7626	N/A	N/A	N/A	0.9496	1.0456	0.6318	1.0489	0.9445	N/A	0.7625	System Reconfiguration
ATWATER 115 kV	WILSON A SECTION 1D & WILSON B SECTION 2D 115KV	P2-4	Bus/Breaker	Diverge	>0.9	>0.9	N/A	N/A	N/A	0.294	1.058	>0.9	>0.9	0.1891	N/A	>0.9	Project: Wilson 115kV Reinforcement Project In-service date: 05/23 Short term: Action plan
LIVNGSTN 115 kV		P2-4	Bus/Breaker	Diverge	>0.9	>0.9	N/A	N/A	N/A	0.2895	1.0531	>0.9	>0.9	0.187	N/A	>0.9	Project: Wilson 115kV Reinforcement Project In-service date: 05/23 Short term: Action plan
GALLO 115 kV		P2-4	Bus/Breaker	Diverge	>0.9	>0.9	N/A	N/A	N/A	0.286	1.0508	>0.9	>0.9	0.1854	N/A	>0.9	Project: Wilson 115kV Reinforcement Project In-service date: 05/23 Short term: Action plan
EL CAPTN 115 kV		P2-4	Bus/Breaker	Diverge	>0.9	>0.9	N/A	N/A	N/A	0.2911	1.0605	>0.9	>0.9	0.1857	N/A	>0.9	Project: Wilson 115kV Reinforcement Project In-service date: 05/23 Short term: Action plan
CRESSEY 115 kV		P2-4	Bus/Breaker	Diverge	>0.9	>0.9	N/A	N/A	N/A	0.2908	1.0567	>0.9	>0.9	0.1867	N/A	>0.9	Project: Wilson 115kV Reinforcement Project In-service date: 05/23 Short term: Action plan

2020-2021 ISO Reliability Assessment - Study Results

Study Area: PG&E Greater Fresno

Low Voltages

California ISO

Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)								Voltage PU (Sensitivity Scenarios)					Project & Potential Mitigation Solutions
				2022 Summer Peak	2025 Summer Peak	2030 Summer Peak	2022 Winter Peak	2025 Winter Peak	2030 Winter Peak	2022 Spring Off-Peak	2025 Spring Off-Peak	2025 SP High CEC Forecast	2025 SpOP Hi Renew & Min Gas Gen	2022 SP Heavy Renewable & Min Gas Gen	2030 Retirement of QF Generations	2030 Summer Peak w/o Facility Rerates	
MERCED 115 kV		P2-4	Bus/Breaker	Diverge	>0.9	>0.9	N/A	N/A	N/A	0.3242	1.0664	>0.9	>0.9	0.215	N/A	>0.9	Project: Wilson 115kV Reinforcement Project In-service date: 05/23 Short term: Action plan
MARIPOS2 70 kV		P2-4	Bus/Breaker	-1.6035	>0.9	>0.9	N/A	N/A	N/A	0.8833	1.0582	>0.9	>0.9	0.7375	N/A	>0.9	System Reconfiguration
MRCDFLLS 70 kV		P2-4	Bus/Breaker	-2.3931	>0.9	>0.9	N/A	N/A	N/A	0.8075	1.0378	>0.9	>0.9	0.653	N/A	>0.9	System Reconfiguration
BER VLLY 70 kV		P2-4	Bus/Breaker	-1.5954	>0.9	>0.9	N/A	N/A	N/A	0.8782	1.0439	>0.9	>0.9	0.7307	N/A	>0.9	System Reconfiguration
INDN FLT 70 kV		P2-4	Bus/Breaker	-1.6219	>0.9	>0.9	N/A	N/A	N/A	0.8703	1.0429	>0.9	>0.9	0.7179	N/A	>0.9	System Reconfiguration
YOSEMITE 70 kV		P2-4	Bus/Breaker	-1.6307	>0.9	>0.9	N/A	N/A	N/A	0.8666	1.041	>0.9	>0.9	0.715	N/A	>0.9	System Reconfiguration
BER VLLY 70 kV	CHOWCOGN 13.80KV GEN UNIT 1 & MERCED FALLS-EXCHEQUER 70KV [8990]	P3	G1/N1	>0.9	>0.9	0.8884	N/A	N/A	N/A	>0.9	>0.9	>0.9	>0.9	>0.9	N/A	0.8884	Continue to Monitor future forecast
INDN FLT 70 kV		P3	G1/N1	>0.9	>0.9	0.8729	N/A	N/A	N/A	>0.9	>0.9	>0.9	>0.9	>0.9	N/A	0.873	Continue to Monitor future forecast
YOSEMITE 70 kV		P3	G1/N1	>0.9	>0.9	0.8693	N/A	N/A	N/A	>0.9	>0.9	>0.9	>0.9	>0.9	N/A	0.8693	Continue to Monitor future forecast
DOS PALS 70 kV	CHOWCOGN 13.80KV GEN UNIT 1 & PANOCHE-ORO LOMA 115KV [3240]	P3	G1/N1	>0.9	0.8708	0.8627	N/A	N/A	N/A	>0.9	>0.9	0.8505	>0.9	>0.9	N/A	0.8626	Continue to Monitor future forecast
FIREBAGH 70 kV		P3	G1/N1	>0.9	0.8294	0.8199	N/A	N/A	N/A	0.8966	>0.9	0.8073	>0.9	>0.9	N/A	0.8198	Continue to Monitor future forecast
ORO LOMA 70 kV		P3	G1/N1	>0.9	0.8827	0.8749	N/A	N/A	N/A	>0.9	>0.9	0.8629	>0.9	>0.9	N/A	0.8748	Continue to Monitor future forecast
ORO LOMA 115 kV		P3	G1/N1	>0.9	0.8566	0.8973	N/A	N/A	N/A	>0.9	>0.9	>0.9	>0.9	>0.9	N/A	0.8972	Continue to Monitor future forecast
SNTA RTA 70 kV		P3	G1/N1	>0.9	0.8657	0.8575	N/A	N/A	N/A	>0.9	>0.9	0.8452	>0.9	>0.9	N/A	0.8574	Continue to Monitor future forecast
TOMATAK 70 kV		P3	G1/N1	>0.9	>0.9	>0.9	N/A	N/A	N/A	0.8966	>0.9	>0.9	>0.9	>0.9	N/A	0.7315	Continue to Monitor future forecast
CHWCHLLA 115 kV	KERCKHOF 13.80KV GEN UNIT 1 & LE GRAND-CHOWCHILLA 115KV [2110]	P3	G1/N1	>0.9	>0.9	0.8666	N/A	N/A	N/A	>0.9	>0.9	>0.9	>0.9	>0.9	N/A	0.8668	Continue to Monitor future forecast
SHARON 115 kV		P3	G1/N1	>0.9	>0.9	0.8771	N/A	N/A	N/A	>0.9	>0.9	>0.9	>0.9	>0.9	N/A	0.8773	Continue to Monitor future forecast
DUNLAP 70 kV	KERCKHOF 13.80KV GEN UNIT 1 & MCCALL-REEDLEY 115KV [2320] MOAS OPENED ON MC CALL_WAHTOKE	P3	G1/N1	>0.9	>0.9	0.8673	N/A	N/A	N/A	>0.9	>0.9	>0.9	>0.9	>0.9	N/A	0.8672	Continue to Monitor future forecast
SANDCRK 70 kV		P3	G1/N1	>0.9	>0.9	0.8753	N/A	N/A	N/A	>0.9	>0.9	>0.9	>0.9	>0.9	N/A	0.8753	Continue to Monitor future forecast
AVENAL 70 kV	WESTLNDS 0.48KV GEN UNIT 1 & GATES D 230/70KV TB 5	P3	G1/N1	>0.9	>0.9	0.8377	N/A	N/A	N/A	>0.9	>0.9	>0.9	>0.9	>0.9	N/A	0.833	Continue to Monitor future forecast
CALFLAX 70 kV		P3	G1/N1	>0.9	>0.9	0.8555	N/A	N/A	N/A	>0.9	>0.9	>0.9	>0.9	>0.9	N/A	0.8508	Continue to Monitor future forecast
CHEVPLIN 70 kV		P3	G1/N1	>0.9	>0.9	0.8319	N/A	N/A	N/A	>0.9	>0.9	>0.9	>0.9	>0.9	N/A	0.8271	Continue to Monitor future forecast
COLNGA 1 70 kV		P3	G1/N1	>0.9	>0.9	0.8329	N/A	N/A	N/A	>0.9	>0.9	>0.9	>0.9	>0.9	N/A	0.8285	Continue to Monitor future forecast
COLNGA 2 70 kV		P3	G1/N1	>0.9	>0.9	0.8353	N/A	N/A	N/A	>0.9	>0.9	>0.9	>0.9	>0.9	N/A	0.8307	Continue to Monitor future forecast
KETTLEMN 70 kV		P3	G1/N1	>0.9	>0.9	0.8306	N/A	N/A	N/A	>0.9	>0.9	>0.9	>0.9	>0.9	N/A	0.8258	Continue to Monitor future forecast
PLSNTVLY 70 kV		P3	G1/N1	>0.9	>0.9	0.8601	N/A	N/A	N/A	>0.9	>0.9	>0.9	>0.9	>0.9	N/A	0.8554	Continue to Monitor future forecast
TORNADO 70 kV		P3	G1/N1	>0.9	>0.9	0.8336	N/A	N/A	N/A	>0.9	>0.9	>0.9	>0.9	>0.9	N/A	0.8291	Continue to Monitor future forecast
GILLRAN 115 kV	WESTLNDS 0.48KV GEN UNIT 1 & PANOCHE-MENDOTA 115KV [3230]	P3	G1/N1	>0.9	>0.9	>0.9	N/A	N/A	N/A	>0.9	>0.9	>0.9	>0.9	>0.9	N/A	0.8826	Sensitivity Only
MENDOTA 115 kV		P3	G1/N1	>0.9	>0.9	>0.9	N/A	N/A	N/A	>0.9	>0.9	>0.9	>0.9	>0.9	N/A	0.864	Sensitivity Only
NEWHALL 115 kV		P3	G1/N1	>0.9	>0.9	>0.9	N/A	N/A	N/A	>0.9	>0.9	>0.9	>0.9	>0.9	N/A	0.8865	Sensitivity Only
PMTFMPP 115 kV		P3	G1/N1	>0.9	>0.9	>0.9	N/A	N/A	N/A	>0.9	>0.9	>0.9	>0.9	>0.9	N/A	0.8828	Sensitivity Only
AVENAL 70 kV		P5-5	Non-Redundent Relay	0.9664	0.9554	0.8892	N/A	N/A	N/A	1.0121	1.0682	0.9547	1.0663	1.0416	N/A	0.8891	Install Redundant Protection
KETTLEMN 70 kV		P5-5	Non-Redundent Relay	0.9588	0.9494	0.8824	N/A	N/A	N/A	1.0131	1.0624	0.9488	1.0619	1.0312	N/A	0.8823	Install Redundant Protection
CHEVPLIN 70 kV		P5-5	Non-Redundent Relay	0.9601	0.9504	0.8837	N/A	N/A	N/A	1.0124	1.0604	0.9497	1.06	1.0319	N/A	0.8836	Install Redundant Protection

Study Area: PG&E Greater Fresno

Low Voltages

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				2022 Summer Peak	2025 Summer Peak	2030 Summer Peak	2022 Winter Peak	2025 Winter Peak	2030 Winter Peak	2022 Spring Off-Peak	2025 Spring Off-Peak	2025 SP High CEC Forecast	2025 SpOP Hi Renew & Min Gas Gen	2022 SP Heavy Renewable & Min Gas Gen	2030 Retirement of QF Generations	2030 Summer Peak w/o Facility Rerates	
CALFLAX 70 kV	GATES Section D & E 230 KV BUS (FAILURE OF NON-REDUNDENT RELAY)	P5-5	Non-Redundent Relay	0.9731	0.9749	0.8954	N/A	N/A	N/A	1.0173	1.0427	0.9741	1.0434	1.0303	N/A	0.8951	Install Redundant Protection
PLSNTVLY 70 kV		P5-5	Non-Redundent Relay	0.9722	0.9567	0.8992	N/A	N/A	N/A	1.0154	1.0299	0.9562	1.0317	1.0211	N/A	0.899	Install Redundant Protection
COLNGA 2 70 kV		P5-5	Non-Redundent Relay	0.9573	0.9396	0.88	N/A	N/A	N/A	1.0163	1.0355	0.9389	1.0384	1.0156	N/A	0.8799	Install Redundant Protection
TORNADO 70 kV		P5-5	Non-Redundent Relay	0.9542	0.937	0.8788	N/A	N/A	N/A	1.0144	1.0331	0.9363	1.0371	1.0121	N/A	0.8788	Install Redundant Protection
COLNGA 1 70 kV		P5-5	Non-Redundent Relay	0.9584	0.9399	0.8808	N/A	N/A	N/A	1.0136	1.0368	0.9399	1.0428	1.0121	N/A	0.8809	Install Redundant Protection
ORO LOMA 70 kV	HAMMONDS 115 KV #1 BUS (FAILURE OF NON-REDUNDENT RELAY)	P5-5	Non-Redundent Relay	0.9524	0.8856	0.8795	N/A	N/A	N/A	1.0138	1.0538	0.8673	1.0599	1.0255	N/A	0.8792	Monitor future forecast
SNTA RTA 70 kV		P5-5	Non-Redundent Relay	0.9372	0.8687	0.8622	N/A	N/A	N/A	1.0181	1.0627	0.8497	1.0705	1.0258	N/A	0.8618	Monitor future forecast
DOS PALS 70 kV		P5-5	Non-Redundent Relay	0.9419	0.8738	0.8674	N/A	N/A	N/A	1.0155	1.0588	0.855	1.0658	1.0235	N/A	0.867	Monitor future forecast
FIREBAGH 70 kV		P5-5	Non-Redundent Relay	0.9039	0.8326	0.8249	N/A	N/A	N/A	0.9477	1.0487	0.812	1.0506	0.9994	N/A	0.8245	Project: Wilson 115kV Reinforcement Project In-service date: 05/23 Short term: Action plan
ATWATER 115 kV	WILSON 115 KV #1 & #2 BUS (FAILURE OF NON-REDUNDENT RELAY)	P5-5	Non-Redundent Relay	Diverge	>0.9	>0.9	N/A	N/A	N/A	0.294	>0.9	>0.9	>0.9	0.1891	N/A	>0.9	Project: Wilson 115kV Reinforcement Project In-service date: 05/23 Short term: Action plan
LIVNGSTN 115 kV		P5-5	Non-Redundent Relay	Diverge	>0.9	>0.9	N/A	N/A	N/A	0.2895	>0.9	>0.9	>0.9	0.187	N/A	>0.9	Project: Wilson 115kV Reinforcement Project In-service date: 05/23 Short term: Action plan
GALLO 115 kV		P5-5	Non-Redundent Relay	Diverge	>0.9	>0.9	N/A	N/A	N/A	0.286	>0.9	>0.9	>0.9	0.1854	N/A	>0.9	Project: Wilson 115kV Reinforcement Project In-service date: 05/23 Short term: Action plan
EL CAPTN 115 kV		P5-5	Non-Redundent Relay	Diverge	>0.9	>0.9	N/A	N/A	N/A	0.2911	>0.9	>0.9	>0.9	0.1857	N/A	>0.9	Project: Wilson 115kV Reinforcement Project In-service date: 05/23 Short term: Action plan
CRESSEY 115 kV		P5-5	Non-Redundent Relay	Diverge	>0.9	>0.9	N/A	N/A	N/A	0.2908	>0.9	>0.9	>0.9	0.1867	N/A	>0.9	Project: Wilson 115kV Reinforcement Project In-service date: 05/23 Short term: Action plan
MERCED 115 kV		P5-5	Non-Redundent Relay	Diverge	>0.9	>0.9	N/A	N/A	N/A	0.3242	>0.9	>0.9	>0.9	0.2151	N/A	>0.9	Project: Wilson 115kV Reinforcement Project In-service date: 05/23 Short term: Action plan
MARIPOS2 70 kV		P5-5	Non-Redundent Relay	-1.5935	>0.9	>0.9	N/A	N/A	N/A	0.8833	>0.9	>0.9	>0.9	0.7376	N/A	>0.9	Project: Wilson 115kV Reinforcement Project In-service date: 05/23 Short term: Action plan
MRCDFLLS 70 kV		P5-5	Non-Redundent Relay	-2.3839	>0.9	>0.9	N/A	N/A	N/A	0.8074	>0.9	>0.9	>0.9	0.6531	N/A	>0.9	Project: Wilson 115kV Reinforcement Project In-service date: 05/23 Short term: Action plan
BER VLLY 70 kV		P5-5	Non-Redundent Relay	-1.5854	>0.9	>0.9	N/A	N/A	N/A	0.8782	>0.9	>0.9	>0.9	0.7308	N/A	>0.9	Wilson Project mitigatesProject: Wilson 115kV Reinforcement Project In-service date: 05/23 Short term: Action plan

2020-2021 ISO Reliability Assessment - Study Results

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Low Voltages

California ISO

Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)								Voltage PU (Sensitivity Scenarios)					Project & Potential Mitigation Solutions
				2022 Summer Peak	2025 Summer Peak	2030 Summer Peak	2022 Winter Peak	2025 Winter Peak	2030 Winter Peak	2022 Spring Off-Peak	2025 Spring Off-Peak	2025 SP High CEC Forecast	2025 SpOP Hi Renew & Min Gas Gen	2022 SP Heavy Renewable & Min Gas Gen	2030 Retirement of QF Generations	2030 Summer Peak w/o Facility Rerates	
INDN FLT 70 kV		P5-5	Non-Redundent Relay	-1.6117	>0.9	>0.9	N/A	N/A	N/A	0.8703	>0.9	>0.9	>0.9	0.718	N/A	>0.9	Project: Wilson 115kV Reinforcement Project In-service date: 05/23 Short term: Action plan
YOSEMITE 70 kV		P5-5	Non-Redundent Relay	-1.6205	>0.9	>0.9	N/A	N/A	N/A	0.8666	>0.9	>0.9	>0.9	0.7151	N/A	>0.9	Project: Wilson 115kV Reinforcement Project In-service date: 05/23 Short term: Action plan
FIREBAGH 70 kV	ASHLAN SVD=V1 & PANOCHE-ORO LOMA 115KV [3240]	P6	N1/N1	0.8624	0.7896	0.7876	N/A	N/A	N/A	0.8743	>0.9	0.7622	>0.9	>0.9	N/A	0.7879	Project: Wilson 115kV Reinforcement Project In-service date: 05/23 Short term: Action plan
STOREY 2 230 kV	BORDEN-GREGG 230KV [4400] & BORDEN-GREGG 230KV [4400] (2)	P6	N1/N1	>0.9	>0.9	>0.9	N/A	N/A	N/A	>0.9	>0.9	0.8907	>0.9	>0.9	N/A	>0.9	Operating Solution
DOS PALS 70 kV	BORDEN-GREGG 230KV [4400] & PANOCHE-ORO LOMA 115KV [3240]	P6	N1/N1	>0.9	0.8332	0.8323	N/A	N/A	N/A	>0.9	>0.9	0.8083	>0.9	>0.9	N/A	0.8326	Project: Wilson 115kV Reinforcement Project In-service date: 05/23 Short term: Action plan
ORO LOMA 70 kV		P6	N1/N1	>0.9	0.8456	0.845	N/A	N/A	N/A	>0.9	>0.9	0.8213	>0.9	>0.9	N/A	0.8453	Project: Wilson 115kV Reinforcement Project In-service date: 05/23 Short term: Action plan
ORO LOMA 115 kV		P6	N1/N1	0.8949	0.8211	0.8669	N/A	N/A	N/A	>0.9	>0.9	>0.9	>0.9	>0.9	N/A	0.8672	Project: Wilson 115kV Reinforcement Project In-service date: 05/23 Short term: Action plan
SNTA RTA 70 kV		P6	N1/N1	0.8975	0.8279	0.8269	N/A	N/A	N/A	>0.9	>0.9	0.8026	>0.9	>0.9	N/A	0.8272	Operating Solution
GALLO 115 kV	EL CAPITAN-WILSON 115KV [1510] & LIVINGSTON TAP 115KV [1031] MOAS OPENED ON ATWATR J_MERCED	P6	N1/N1	0.8717	0.8838	0.8892	N/A	N/A	N/A	>0.9	>0.9	0.87	>0.9	>0.9	N/A	0.8888	Project: Wilson 115kV Reinforcement Project In-service date: 05/23 Short term: Action plan
LIVNGSTN 115 kV		P6	N1/N1	0.8741	0.8778	0.8826	N/A	N/A	N/A	>0.9	>0.9	0.8638	>0.9	>0.9	N/A	0.8822	Project: Wilson 115kV Reinforcement Project In-service date: 05/23 Short term: Action plan
CHWCHLLA 115 kV	GATES D 230/70KV TB 5 & LE GRAND-CHOWCHILLA 115KV [2110]	P6	N1/N1	>0.9	>0.9	0.8611	N/A	N/A	N/A	>0.9	>0.9	0.8913	>0.9	>0.9	N/A	0.8664	Project: Wilson 115kV Reinforcement Project In-service date: 05/23 Short term: Action plan
SHARON 115 kV		P6	N1/N1	>0.9	>0.9	0.8717	N/A	N/A	N/A	>0.9	>0.9	0.8908	>0.9	>0.9	N/A	0.8769	Operating Solution
MRCDFLLS 70 kV	GATES D 230/70KV TB 5 & MERCED-MERCED FALLS 70KV [9010]	P6	N1/N1	>0.9	>0.9	0.891	N/A	N/A	N/A	>0.9	>0.9	>0.9	>0.9	>0.9	N/A	>0.9	Project: Wilson 115kV Reinforcement Project In-service date: 05/23 Short term: Action plan
CERTTEED 115 kV		P6	N1/N1	>0.9	>0.9	0.8905	N/A	N/A	N/A	>0.9	>0.9	0.8964	>0.9	>0.9	N/A	>0.9	Project: Wilson 115kV Reinforcement Project In-service date: 05/23 Short term: Action plan

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Low Voltages

California ISO

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				2022 Summer Peak	2025 Summer Peak	2030 Summer Peak	2022 Winter Peak	2025 Winter Peak	2030 Winter Peak	2022 Spring Off-Peak	2025 Spring Off-Peak	2025 SP High CEC Forecast	2025 SpOP Hi Renew & Min Gas Gen	2022 SP Heavy Renewable & Min Gas Gen	2030 Retirement of QF Generations	2030 Summer Peak w/o Facility Rerates	
DAIRYLND 115 kV	GATES D 230/70KV TB 5 & PANOCHE-MENDOTA 115KV [3230]	P6	N1/N1	>0.9	>0.9	0.8555	N/A	N/A	N/A	>0.9	>0.9	>0.9	>0.9	>0.9	N/A	0.8965	Project: Wilson 115kV Reinforcement Project In-service date: 05/23 Short term: Action plan
GILLRAN 115 kV		P6	N1/N1	>0.9	0.8923	0.8124	N/A	N/A	N/A	>0.9	>0.9	0.8826	>0.9	>0.9	N/A	0.8561	Project: Wilson 115kV Reinforcement Project In-service date: 05/23 Short term: Action plan
MENDOTA 115 kV		P6	N1/N1	0.8848	0.8695	0.7919	N/A	N/A	N/A	>0.9	>0.9	0.8594	>0.9	>0.9	N/A	0.8369	Project: Wilson 115kV Reinforcement Project In-service date: 05/23 Short term: Action plan
NEWHALL 115 kV		P6	N1/N1	>0.9	0.8973	0.8167	N/A	N/A	N/A	>0.9	>0.9	0.8877	>0.9	>0.9	N/A	0.8602	Project: Wilson 115kV Reinforcement Project In-service date: 05/23 Short term: Action plan
PMTFMPP 115 kV		P6	N1/N1	>0.9	0.893	0.8126	N/A	N/A	N/A	>0.9	>0.9	0.8833	>0.9	>0.9	N/A	0.8563	Operating Solution
TOMATAK 70 kV		P6	N1/N1	0.7664	0.7478	0.6657	N/A	N/A	N/A	0.8743	>0.9	0.7387	>0.9	>0.9	N/A	0.7068	Operating Solution
KAMM 115 kV	GATES D 230/70KV TB 5 & PANOCHE-SCHINDLER #1 115KV [3250] MOAS OPENED ON PANOCHE1_KAMM	P6	N1/N1	>0.9	>0.9	0.8776	N/A	N/A	N/A	>0.9	>0.9	>0.9	>0.9	>0.9	N/A	0.8826	Project: Wilson 115kV Reinforcement Project In-service date: 05/23 Short term: Action plan
SCHINDLR 115 kV		P6	N1/N1	>0.9	>0.9	0.8698	N/A	N/A	N/A	>0.9	>0.9	>0.9	>0.9	>0.9	N/A	0.8748	Operating Solution
WESTLNDS 115 kV		P6	N1/N1	>0.9	>0.9	0.8812	N/A	N/A	N/A	>0.9	>0.9	>0.9	>0.9	>0.9	N/A	0.8863	Operating Solution
LE GRAND 115 kV	GATES D 230/70KV TB 5 & WILSON-LE GRAND 115KV [4170]	P6	N1/N1	>0.9	>0.9	0.8961	N/A	N/A	N/A	>0.9	>0.9	>0.9	>0.9	>0.9	N/A	>0.9	Project: Wilson 115kV Reinforcement Project In-service date: 05/23 Short term: Action plan
CRESSEY 115 kV	LIVINGSTON TAP 115KV [1031] MOAS OPENED ON ATWATR J_MERCED & EL CAPITAN-WILSON 115KV [1510]	P6	N1/N1	0.8772	>0.9	>0.9	N/A	N/A	N/A	>0.9	>0.9	0.8962	>0.9	>0.9	N/A	>0.9	Project: Wilson 115kV Reinforcement Project In-service date: 05/23 Short term: Action plan
CAMDEN 70 kV	MCCALL-KINGSBURG #1 115KV [2290] MOAS OPENED ON KINGS J1_KINGS J2 & MCCALL-KINGSBURG #2 115KV [2300]	P6	N1/N1	>0.9	0.889	0.8818	N/A	N/A	N/A	>0.9	>0.9	0.8872	>0.9	>0.9	N/A	0.8818	Continue to Monitor future forecast
DINUBA 70 kV	MCCALL-REEDLEY 115KV [2320] MOAS OPENED ON MC CALL_WAHTOKE & SANGER-REEDLEY 115KV [9140] MOAS OPENED ON PARLIER_REEDLEY	P6	N1/N1	0.8722	>0.9	0.5873	N/A	N/A	N/A	>0.9	>0.9	0.8989	>0.9	>0.9	N/A	0.5865	Operating Solution
DUNLAP 70 kV		P6	N1/N1	0.8628	0.8972	0.5598	N/A	N/A	N/A	>0.9	>0.9	0.8881	>0.9	>0.9	N/A	0.5589	Operating Solution
OROSI 70 kV		P6	N1/N1	0.8746	>0.9	0.5921	N/A	N/A	N/A	>0.9	>0.9	0.8987	>0.9	>0.9	N/A	0.5913	Operating Solution
REEDLEY 70 kV		P6	N1/N1	0.8913	>0.9	0.633	N/A	N/A	N/A	>0.9	>0.9	>0.9	>0.9	>0.9	N/A	0.6321	Operating Solution
REEDLEY 115 kV		P6	N1/N1	0.8827	>0.9	0.6501	N/A	N/A	N/A	>0.9	>0.9	>0.9	>0.9	>0.9	N/A	0.6492	Operating Solution
SANDCRK 70 kV		P6	N1/N1	0.8686	>0.9	0.5708	N/A	N/A	N/A	>0.9	>0.9	0.8932	>0.9	>0.9	N/A	0.5699	Operating Solution
STONCRRL 70 kV		P6	N1/N1	0.8636	0.8953	0.5735	N/A	N/A	N/A	>0.9	>0.9	0.8864	>0.9	>0.9	N/A	0.5727	Operating Solution
WAHTOKE 115 kV		P6	N1/N1	0.8753	>0.9	0.6369	N/A	N/A	N/A	>0.9	>0.9	0.8942	>0.9	>0.9	N/A	0.6359	Operating Solution
CAL AVE 115 kV	MCCALL-WEST FRESNO #2 115KV [2370] &	P6	N1/N1	>0.9	0.88	0.7712	N/A	N/A	N/A	>0.9	>0.9	0.8741	>0.9	>0.9	N/A	0.771	Continue to Monitor future forecast

Study Area: PG&E Greater Fresno

Low Voltages

California ISO

Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)								Voltage PU (Sensitivity Scenarios)					Project & Potential Mitigation Solutions
				2022 Summer Peak	2025 Summer Peak	2030 Summer Peak	2022 Winter Peak	2025 Winter Peak	2030 Winter Peak	2022 Spring Off-Peak	2025 Spring Off-Peak	2025 SP High CEC Forecast	2025 SpOP Hi Renew & Min Gas Gen	2022 SP Heavy Renewable & Min Gas Gen	2030 Retirement of QF Generations	2030 Summer Peak w/o Facility Rerates	
DANISHCM 115 kV	MCCALL-WEST FRESNO #2 115KV [2370] & SANGER-CALIFORNIA AVE 115KV [9130]	P6	N1/N1	>0.9	0.8879	0.7838	N/A	N/A	N/A	>0.9	>0.9	0.8821	>0.9	>0.9	N/A	0.7835	Continue to Monitor future forecast
WST FRSO 115 kV		P6	N1/N1	0.8986	0.8723	0.7547	N/A	N/A	N/A	>0.9	>0.9	0.8662	>0.9	>0.9	N/A	0.7544	Operating Solution
BER VLLY 70 kV	MERCED FALLS-EXCHEQUER 70KV [8990] & WILSON-LE GRAND 115KV [4170]	P6	N1/N1	>0.9	>0.9	0.8813	N/A	N/A	N/A	>0.9	>0.9	>0.9	>0.9	>0.9	N/A	0.8814	Continue to Monitor future forecast
INDN FLT 70 kV	MERCED FALLS-EXCHEQUER 70KV [8990] & WILSON-LE GRAND 115KV [4170]	P6	N1/N1	>0.9	>0.9	0.8657	N/A	N/A	N/A	>0.9	>0.9	>0.9	>0.9	>0.9	N/A	0.8658	Continue to Monitor future forecast
MARIPOS2 70 kV	MERCED FALLS-EXCHEQUER 70KV [8990] & WILSON-LE GRAND 115KV [4170]	P6	N1/N1	>0.9	>0.9	0.8938	N/A	N/A	N/A	>0.9	>0.9	>0.9	>0.9	>0.9	N/A	0.8939	Continue to Monitor future forecast
YOSEMITE 70 kV	MERCED FALLS-EXCHEQUER 70KV [8990] & WILSON-LE GRAND 115KV [4170]	P6	N1/N1	>0.9	>0.9	0.862	N/A	N/A	N/A	>0.9	>0.9	>0.9	>0.9	>0.9	N/A	0.8621	Continue to Monitor future forecast
HENRIETA 230 kV	P1-2:A14:14:_GATES-GREGG 230KV [4700] & P1-2:A14:137:_CHSR09SWSTA-MUSTANGSS 230KV [0]	P6	N1/N1	>0.9	>0.9	>0.9	N/A	N/A	N/A	>0.9	0.8926	>0.9	0.8972	>0.9	N/A	>0.9	Project: Wilson 115kV Reinforcement Project In-service date: 05/23 Short term: Action plan
HENTAP2 230 kV		P6	N1/N1	>0.9	>0.9	>0.9	N/A	N/A	N/A	>0.9	0.8926	>0.9	0.8972	>0.9	N/A	>0.9	Project: Wilson 115kV Reinforcement Project In-service date: 05/23 Short term: Action plan
EL NIDO 115 kV	PANOCHE-ORO LOMA 115KV [3240] & WILSONPGAE SVD=V	P6	N1/N1	>0.9	>0.9	>0.9	N/A	N/A	N/A	>0.9	>0.9	0.8979	>0.9	>0.9	N/A	>0.9	Sensitivity Only
ATWATER 115 kV	WILSON 230/115KV TB 1 & WILSON 230/115KV TB 2	P6	N1/N1	0.8866	>0.9	>0.9	N/A	N/A	N/A	>0.9	>0.9	>0.9	>0.9	>0.9	N/A	>0.9	Project: Wilson 115kV Reinforcement Project In-service date: 05/23 Short term: Action plan
EL CAPTN 115 kV		P6	N1/N1	0.8921	>0.9	>0.9	N/A	N/A	N/A	>0.9	>0.9	>0.9	>0.9	>0.9	N/A	>0.9	Project: Wilson 115kV Reinforcement Project In-service date: 05/23 Short term: Action plan
SJNO2 70 kV	BORDEN-GREGG 230KV #1 & #2 [4400]	P7-1	DCTL	0.9863	0.9626	>0.9	N/A	N/A	N/A	1.0218	1.0416	0.896	1.0459	1.008	N/A	>0.9	Sensitivity Only
SJNO3 70 kV		P7-1	DCTL	0.9829	0.9592	>0.9	N/A	N/A	N/A	1.0191	1.0436	0.8921	1.0482	1.0021	N/A	>0.9	Sensitivity Only
AUBERRY 70 kV		P7-1	DCTL	0.9891	0.9633	>0.9	N/A	N/A	N/A	1.0242	1.0412	0.8968	1.0455	1.0153	N/A	>0.9	Sensitivity Only
ORO LOMA 70 kV	LOS BANOS-PANOCHE #1 230KV [5030] & PANOCHE-ORO LOMA 115KV [3240]	P7-1	DCTL	0.9523	0.8855	0.8795	N/A	N/A	N/A	1.0134	1.0527	0.8672	1.059	1.0254	N/A	0.8791	System Reconfiguration
SNTA RTA 70 kV		P7-1	DCTL	0.9371	0.8686	0.8621	N/A	N/A	N/A	1.0176	1.0613	0.8495	1.0694	1.0258	N/A	0.8618	System Reconfiguration
DOS PALS 70 kV		P7-1	DCTL	0.9418	0.8737	0.8674	N/A	N/A	N/A	1.0151	1.0576	0.8549	1.0649	1.0235	N/A	0.867	System Reconfiguration
FIREBAGH 70 kV		P7-1	DCTL	0.9038	0.8325	0.8248	N/A	N/A	N/A	0.9473	1.0489	0.8118	1.0508	0.9994	N/A	0.8244	System Reconfiguration
CAMDEN 70 kV	MCCALL-KINGSBURG #1 115KV [2290] & MCCALL-KINGSBURG #2 115KV [2301]	P7-1	DCTL	0.9288	0.889	0.8817	N/A	N/A	N/A	0.9766	1.0544	0.8872	1.0637	0.9596	N/A	0.8817	Under Review
DUNLAP 70 kV	MCCALL-REEDLEY 115KV [2320] & MCCALL-SANGER #2 115KV [2350]	P7-1	DCTL	0.9701	0.9879	0.8709	N/A	N/A	N/A	1.0449	1.0578	0.9844	1.063	1.0123	N/A	0.8707	Monitor future forecast
SANDCRK 70 kV		P7-1	DCTL	0.9752	0.9924	0.879	N/A	N/A	N/A	1.0463	1.0584	0.989	1.0634	1.0166	N/A	0.8787	Monitor future forecast
STONCRRL 70 kV		P7-1	DCTL	0.9707	0.986	0.8813	N/A	N/A	N/A	1.0431	1.0532	0.9828	1.0579	1.0105	N/A	0.8811	Monitor future forecast
DINUBA 70 kV		P7-1	DCTL	0.9782	0.997	0.891	N/A	N/A	N/A	1.0463	1.0608	0.9939	1.0657	1.0186	N/A	0.8908	Monitor future forecast

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Study Area: PG&E Greater Fresno

Low Voltages

Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)								Voltage PU (Sensitivity Scenarios)					Project & Potential Mitigation Solutions
				2022 Summer Peak	2025 Summer Peak	2030 Summer Peak	2022 Winter Peak	2025 Winter Peak	2030 Winter Peak	2022 Spring Off-Peak	2025 Spring Off-Peak	2025 SP High CEC Forecast	2025 SpOP Hi Renew & Min Gas Gen	2022 SP Heavy Renewable & Min Gas Gen	2030 Retirement of QF Generations	2030 Summer Peak w/o Facility Rerates	
OROSI 70 kV	SANGER #3 115KV [2350]	P7-1	DCTL	0.9804	0.9969	0.8944	N/A	N/A	N/A	1.0474	1.0564	0.9938	1.0608	1.0185	N/A	0.8942	Monitor future forecast

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Voltage Deviation

California ISO

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
				2022 Summer Peak	2025 Summer Peak	2030 Summer Peak	2022 Winter Peak	2025 Winter Peak	2030 Winter Peak	2022 Spring Off-Peak	2025 Spring Off-Peak	2025 SP High CEC Forecast	2025 SpOP Hi Renew & Min Gas Gen	2022 SP Heavy Renewable & Min Gas Gen	2030 Retirement of QF Generation	
CHWCHLLA 115 kV	LE GRAND-CHOWCHILLA 115KV [2110]	P1-2	N-1	3.824	5.175	8.989	N/A	N/A	N/A	1.052	-2.852	3.706	-3.725	0.017	N/A	Conitinue to monitor future forecast
CANAL 70 kV	LOS BANOS-LIVINGSTON JCT-CANAL 70KV [8940]	P1-2	N-1	5.806	4.599	9.471	N/A	N/A	N/A	0.718	-1.31	4.757	-1.395	2.039	N/A	Conitinue to monitor future forecast
ORO LOMA 70 kV	PANOCHE-ORO LOMA 115KV [3240]	P1-2	N-1	7.974	15.514	11.246	N/A	N/A	N/A	3.163	-0.764	17.07	-1.161	2.224	N/A	System Reconfiguration
SNTA RTA 70 kV	PANOCHE-ORO LOMA 115KV [3240]	P1-2	N-1	8.101	15.787	11.46	N/A	N/A	N/A	2.506	-0.512	17.384	-0.732	2.225	N/A	System Reconfiguration
DOS PALS 70 kV	PANOCHE-ORO LOMA 115KV [3240]	P1-2	N-1	8.062	15.706	11.397	N/A	N/A	N/A	2.842	-0.645	17.29	-0.963	2.229	N/A	System Reconfiguration
FIREBAGH 70 kV	PANOCHE-ORO LOMA 115KV [3240]	P1-2	N-1	8.413	16.441	11.984	N/A	N/A	N/A	0.998	-0.17	18.144	-0.166	2.286	N/A	System Reconfiguration
DINUBA 70 kV	REEDLEY-DINUBA #1 70KV [9050]	P1-2	N-1	6.356	5.329	11.01	N/A	N/A	N/A	1.584	-0.834	5.513	-1.192	3.109	N/A	System Reconfiguration
AVENAL 70 kV	GATES D 230/70KV TB 5	P1-3	N-1	2.776	4.693	11.555	N/A	N/A	N/A	-2.31	-2.352	4.817	-4.077	-1.191	N/A	Conitinue to monitor future forecast
KETTLEMN 70 kV		P1-3	N-1	2.794	4.716	11.619	N/A	N/A	N/A	-2.307	-2.698	4.84	-4.092	-1.43	N/A	Conitinue to monitor future forecast
CHEVPLIN 70 kV		P1-3	N-1	2.792	4.714	11.611	N/A	N/A	N/A	-2.31	-2.671	4.838	-4.102	-1.406	N/A	Conitinue to monitor future forecast
CALFLAX 70 kV		P1-3	N-1	3.166	4.655	10.319	N/A	N/A	N/A	-1.388	-2.387	4.762	-2.783	-1.382	N/A	Conitinue to monitor future forecast
PLSNTVLY 70 kV		P1-3	N-1	2.511	3.91	8.93	N/A	N/A	N/A	-1.638	-0.829	4.017	-1.091	-0.693	N/A	Conitinue to monitor future forecast
COLNGA 2 70 kV		P1-3	N-1	2.962	4.715	10.519	N/A	N/A	N/A	-1.518	-1.727	4.808	-2.165	-1.384	N/A	Conitinue to monitor future forecast
TORNADO 70 kV		P1-3	N-1	2.862	4.662	10.488	N/A	N/A	N/A	-1.559	-1.752	4.747	-2.287	-1.333	N/A	Conitinue to monitor future forecast
COLNGA 1 70 kV		P1-3	N-1	2.642	4.506	10.368	N/A	N/A	N/A	-1.666	-1.729	4.582	-2.426	-1.196	N/A	Conitinue to monitor future forecast
KERMAN1 70 kV	AGRICO 13.80KV & AGRICO 13.80KV & AGRICO 13.80KV GEN UNITS & HELM 230/70KV TB 1	P3	G1/N1	0	0	0	N/A	N/A	N/A	17.646	0	0	0	0	N/A	Under Review
KERMAN2 70 kV		P3	G1/N1	0	0	0	N/A	N/A	N/A	17.645	0	0	0	0	N/A	Under Review
SAN JOQN 70 kV		P3	G1/N1	0	0	0	N/A	N/A	N/A	17.633	0	0	0	0	N/A	Under Review
WESIX 70 kV		P3	G1/N1	0	0	0	N/A	N/A	N/A	11.433	0	0	0	0	N/A	Under Review
WESTLAND 70 kV		P3	G1/N1	0	0	0	N/A	N/A	N/A	11.401	0	0	0	0	N/A	Under Review
DOS PALS 70 kV	CHOWCOGN 13.80KV GEN UNIT 1 & PANOCHE-ORO LOMA 115KV [3240]	P3	G1/N1	0	16.008	12.05	N/A	N/A	N/A	0	0	17.632	0	0	N/A	Conitinue to monitor future forecast
FIREBAGH 70 kV		P3	G1/N1	0	16.761	12.674	N/A	N/A	N/A	5.95	0	18.508	0	0	N/A	Conitinue to monitor future forecast
ORO LOMA 70 kV		P3	G1/N1	0	15.811	11.891	N/A	N/A	N/A	0	0	17.406	0	0	N/A	Conitinue to monitor future forecast
SNTA RTA 70 kV		P3	G1/N1	0	16.091	12.117	N/A	N/A	N/A	0	0	17.728	0	0	N/A	Conitinue to monitor future forecast
CHWCHLLA 115 kV	KERCKHOF 13.80KV GEN UNIT 1 & LE GRAND-CHOWCHILLA 115KV [2110]	P3	G1/N1	0	0	12.883	N/A	N/A	N/A	0	0	0	0	0	N/A	Conitinue to monitor future forecast
SHARON 115 kV		P3	G1/N1	0	0	11.332	N/A	N/A	N/A	0	0	0	0	0	N/A	Conitinue to monitor future forecast
McCall 230/115kV TB #2	KERCKHOF 13.80KV GEN UNIT 1 & REEDLEY-DINUBA #1 70KV [9050]	P3	G1/N1	0	0	11.234	N/A	N/A	N/A	0	0	0	0	0	N/A	Conitinue to monitor future forecast
CANAL 70 kV	VEGA 0.36KV GEN UNIT 1 & LOS BANOS-LIVINGSTON JCT-CANAL 70KV [8940]	P3	G1/N1	0	0	12.218	N/A	N/A	N/A	0	0	0	0	0	N/A	Conitinue to monitor future forecast
ORTIGA 70 kV	VEGA 0.36KV GEN UNIT 1 & LOS BANOS-LIVINGSTON JCT-CANAL 70KV [8940]	P3	G1/N1	0	0	10.159	N/A	N/A	N/A	0	0	0	0	0	N/A	Conitinue to monitor future forecast
AVENAL 70 kV	WESTLNDS 0.48KV GEN UNIT 1 & GATES D 230/70KV TB 5	P3	G1/N1	0	0	16.693	N/A	N/A	N/A	0	0	0	0	0	N/A	Conitinue to monitor future forecast
CALFLAX 70 kV	WESTLNDS 0.48KV GEN UNIT 1 & GATES D 230/70KV TB 5	P3	G1/N1	0	0	14.587	N/A	N/A	N/A	0	0	0	0	0	N/A	Conitinue to monitor future forecast
Henrietta-Mustang #1 230kV line	WESTLNDS 0.48KV GEN UNIT 1 & GATES D 230/70KV TB 5	P3	G1/N1	0	0	16.776	N/A	N/A	N/A	0	0	0	0	0	N/A	Conitinue to monitor future forecast

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Voltage Deviation

Substation	Contingency (All and Worst P6)	Category	Category Description	Post Cont. Voltage Deviation % (Baseline Scenarios)								Post Cont. Voltage Deviation % (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2022 Summer Peak	2025 Summer Peak	2030 Summer Peak	2022 Winter Peak	2025 Winter Peak	2030 Winter Peak	2022 Spring Off-Peak	2025 Spring Off-Peak	2025 SP High CEC Forecast	2025 SpOP Hi Renew & Min Gas Gen	2022 SP Heavy Renewable & Min Gas Gen	2030 Retirement of QF Generation	
COLNGA 1 70 kV	WESTLNDS 0.48KV GEN UNIT 1 & GATES D 230/70KV TB 5	P3	G1/N1	0	0	14.921	N/A	N/A	N/A	0	0	0	0	0	N/A	Conitinue to monitor future forecast
COLNGA 2 70 kV	WESTLNDS 0.48KV GEN UNIT 1 & GATES D 230/70KV TB 5	P3	G1/N1	0	0	15.008	N/A	N/A	N/A	0	0	0	0	0	N/A	Conitinue to monitor future forecast
KETTLEMN 70 kV	WESTLNDS 0.48KV GEN UNIT 1 & GATES D 230/70KV TB 5	P3	G1/N1	0	0	16.789	N/A	N/A	N/A	0	0	0	0	0	N/A	Conitinue to monitor future forecast
PLSNTVLY 70 kV	WESTLNDS 0.48KV GEN UNIT 1 & GATES D 230/70KV TB 5	P3	G1/N1	0	0	12.843	N/A	N/A	N/A	0	0	0	0	0	N/A	Conitinue to monitor future forecast
Henrietta-Mustang #2 230kV line	WESTLNDS 0.48KV GEN UNIT 1 & GATES D 230/70KV TB 5	P3	G1/N1	0	0	15.01	N/A	N/A	N/A	0	0	0	0	0	N/A	Conitinue to monitor future forecast

Study Area: PG&E Greater Fresno

Transient Stability

Contingency	Category	Category Description	Transient Stability Performance					Potential Mitigation Solutions
			Baseline Scenarios			Sensitivity Scenarios		
			2025 Summer Peak	2030 Summer Peak	2025 Spring Off-Peak	2025 SP High CEC Forecast	2025 SP Heavy Renewable & Min Gas Gen	
Helms unit 1	P1-1	N-1	No Issues	No Issues	No Issues	No Issues	No Issues	No Violation
Gates 500/230kV Transformer #11	P1-3	T-1	No Issues	WECC Criteria Not Met	No Issues	No Issues	No Issues	Continue to monitor future forecast
Wilson 230/115kV TB #1	P1-3	T-2	No Issues	No Issues	No Issues	No Issues	No Issues	No Violation
Gates 230kV Bus	P2-4	Bus Breaker	No Issues	No Issues	No Issues	No Issues	No Issues	No Violation
McCall 230kV Bus	P2-4	Bus Breaker	WECC Criteria Not Met	WECC Criteria Not Met	No Issues	WECC Criteria Not Met	No Issues	Under Review
Borden 230kV Bus	P2-4	Bus Breaker	WECC Criteria Not Met	WECC Criteria Not Met	No Issues	WECC Criteria Not Met	No Issues	Under Review
McCall 115kV Middle breaker	P2-4	Bus Breaker	No Issues	No Issues	No Issues	No Issues	No Issues	No Violation
McCall 230kV TB plus Helms unit 1	P3-3	G-1/T-1	WECC Criteria Not Met	WECC Criteria Not Met	No Issues	WECC Criteria Not Met	No Issues	Under Review
Wilson 230/115kV TB #1 & #2	P6	N-1-1	No Issues	No Issues	No Issues	No Issues	No Issues	No Violation
Helms-Gregg 230kv line and Mustang-Gregg 230kV line	P6	N-1-1	WECC Criteria Not Met	WECC Criteria Not Met	No Issues	WECC Criteria Not Met	No Issues	Under Review
Bellota-Warnerville 230kV and Warnerville-Wilson 230kV lines	P7-1	DCTL	No Issues	No Issues	No Issues	No Issues	No Issues	No Violation
Panoche-Tranquility #1 and #2 230kV Lines	P7-1	DCTL	No Issues	No Issues	No Issues	No Issues	No Issues	No Violation
Gates-McCall 230kV and Helms-McCall 230kV Lines	P7-1	DCTL	No Issues	No Issues	No Issues	No Issues	No Issues	No Violation
Gregg-Helms #1 and #2 230kV Lines Temporary	P7-1	DCTL	WECC Criteria Not Met	WECC Criteria Not Met	No Issues	WECC Criteria Not Met	No Issues	Under Review
Gregg-Helms #1 and #2 230kV Lines Permanent	P7-1	DCTL	WECC Criteria Not Met	WECC Criteria Not Met	No Issues	WECC Criteria Not Met	WECC Criteria Not Met	Under Review
Gates-Mustang #1 and #2	P7-1	DCTL	No Issues	No Issues	No Issues	No Issues	No Issues	No Violation
Herndon-Barton 115kV Line and Sanger-Manchester 115kV line	P7-1	DCTL	WECC Criteria Not Met	WECC Criteria Not Met	WECC Criteria Not Met	WECC Criteria Not Met	WECC Criteria Not Met	Under Review
McCall-Reedley 115kV Line and McCall- Sanger #1 115kV Line	P7-1	DCTL	WECC Criteria Not Met	WECC Criteria Not Met	No Issues	WECC Criteria Not Met	No Issues	Under Review

2020-2021 ISO Reliability Assessment - Study Results

Study Area: PG&E Greater Fresno

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 Greater Fresno

Single Source Substation with more than 100 MW Load

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

No single source substation with more than 100 MW

2020-2021 ISO Reliability Assessment - Study Results
Study Area: PG&E Kern
Thermal Overloads

California ISO

Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading % (Baseline Scenarios)								Loading % (Sensitivity Scenarios)					Project & Potential Mitigation Solutions
				2022 Summer Peak	2025 Summer Peak	2030 Summer Peak	2022 Winter Peak	2025 Winter Peak	2030 Winter Peak	2022 Spring Off-Peak	2025 Spring Off-Peak	2025 SP High CEC Forecast	2025 SpOP Hi Renew & Min Gas Gen	2022 SP Heavy Renewable & Min Gas Gen	2030 Retirement of QF Generations	2030 Summer Peak w/o Facility Rerates	
Midway-Kern #1 230 kV Line (Kern PP-Stockdale Jct 1)	KERN PP-BKRSFLDB-MIDWAY 230kV [0] & MIDWAY-KERN #3 230kV [5160]	P6	N-1-1	140.05	NA	NA	NA	NA	NA	<100	NA	NA	NA	<100	NA	NA	Midway-Kern PP 230 kV #2 Line Project Phase 1- In service on March 5, 2021 Phase 2: Expected In service on March 31, 2023 ; Short Term : Action Plan
	MIDWAY-KERN #3 230kV [5160] & KERN PP-BKRSFLDB-MIDWAY 230kV [0]	P6	N-1-1	140.09	NA	NA	NA	NA	NA	<100	NA	NA	NA	<100	NA	NA	Midway-Kern PP 230 kV #2 Line Project Phase 1- In service on March 5, 2021 Phase 2: Expected In service on March 31, 2023 ; Short Term : Action Plan
	Midway-Kern No. 3 & Midway-Kern No. 4 230 kV Lines	P7	DCTL	140.09	NA	NA	NA	NA	NA	<100	NA	NA	NA	<100	NA	NA	Midway-Kern PP 230 kV #2 Line Project Phase 1- In service on March 5, 2021 Phase 2: Expected In service on March 31, 2023 ; Short Term : Action Plan
Midway-Kern PP #4 230 kV Line (Kern PP-Bakersfield Jct 2)	KERN PP-MIDWAY 230kV [0] & MIDWAY-KERN #3 230kV [5160]	P6	N-1-1	132.2	NA	NA	NA	NA	NA	<100	NA	NA	NA	<100	NA	NA	Midway-Kern PP 230 kV #2 Line Project Phase 1- In service on March 5, 2021 Phase 2: Expected In service on March 31, 2023 ; Short Term : Action Plan
	MIDWAY-KERN #3 230kV [5160] & KERN PP-MIDWAY 230kV [0]	P6	N-1-1	132.2	NA	NA	NA	NA	NA	<100	NA	NA	NA	<100	NA	NA	Midway-Kern PP 230 kV #2 Line Project Phase 1- In service on March 5, 2021 Phase 2: Expected In service on March 31, 2023 ; Short Term : Action Plan
	Midway-Kern No. 3 & Midway-Kern No. 1 230 kV Lines	P7	DCTL	132.2	NA	NA	NA	NA	NA	<100	NA	NA	NA	<100	NA	NA	WheelerRidge Junction Project On Hold (TPP 19-20) Short Term : Action Plan

2020-2021 ISO Reliability Assessment - Study Results
Study Area: PG&E Kern
Thermal Overloads

California ISO

Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading % (Baseline Scenarios)								Loading % (Sensitivity Scenarios)					Project & Potential Mitigation Solutions
				2022 Summer Peak	2025 Summer Peak	2030 Summer Peak	2022 Winter Peak	2025 Winter Peak	2030 Winter Peak	2022 Spring Off-Peak	2025 Spring Off-Peak	2025 SP High CEC Forecast	2025 SpOP Hi Renew & Min Gas Gen	2022 SP Heavy Renewable & Min Gas Gen	2030 Retirement of QF Generations	2030 Summer Peak w/o Facility Rerates	
Midway-Temblor 115 kV Line (Belridge Jct-Midway)	MIDWAY-TEMBLOR 115kV [2630] (TEMBLOR-PSE MCKJ)	P2-1	Line Section w/o Fault	40.67	26.26	23.92	NA	NA	NA	39.58	61.67	38.66	61.06	101.57	5.2	38.35	Project : Midway-Temblor 115 kV Line Reconductor and Voltage Support Project. In Service Date : 12/2022. Short term: Action Plan
	TEMBLOR 115kV Section 1D	P2-2	Bus	40.67	26.26	23.92	NA	NA	NA	39.59	61.66	38.66	61.05	101.55	5.14	38.34	Project : Midway-Temblor 115 kV Line Reconductor and Voltage Support Project. In Service Date : 12/2022. Short term: Action Plan
	TEMBLOR - 1D 115kV & TEMBLOR-SAN LUIS OBISPO line	P2-3	Non-Bus Tie Breaker	40.66	26.26	23.92	NA	NA	NA	39.58	61.66	38.66	61.05	101.55	5.15	38.34	Project : Midway-Temblor 115 kV Line Reconductor and Voltage Support Project. In Service Date : 12/2022. Short term: Action Plan
	CALIENTE SW STA-MIDWAY #1 230kV [5216] & CALIENTE SW STA-MIDWAY #2 230kV [5226]	P6	N-1-1	<100	<100	<100	NA	NA	NA	<100	<100	<100	<100	Diverge	<100	<100	Project : Midway-Temblor 115 kV Line Reconductor and Voltage Support Project. In Service Date : 12/2022. Short term: Action Plan
	TEMBLOR 115/12.47kV TB 1 & Base Case	P6	N-1-1	<100	<100	<100	NA	NA	NA	<100	<100	<100	<100	100.82	<100	<100	Project : Midway-Temblor 115 kV Line Reconductor and Voltage Support Project. In Service Date : 12/2022. Short term: Action Plan
	Caliente Sw Sta - Midway #1 & #2 230 kV Lines	P7	DCTL	33.66	29.1	7.64	NA	NA	NA	54.89	42.54	45.71	50.49	Diverge	66.31	12.46	Project : Midway-Temblor 115 kV Line Reconductor and Voltage Support Project. In Service Date : 12/2022. Short term: Action Plan
Semitropic-Famoso 115 kV Line (Semitropic-Wasco Prison)	MIDWAY115kVSection2E	P2-2	Bus	NA	NA	NA	NA	NA	NA	36.57	142.29	NA	149.29	NA	NA	NA	Utilize Summer Setup for summer and non-summer months
	MIDWAY115kV-Section2D&2E	P2-4	Bus-Tie Breaker	NA	NA	NA	NA	NA	NA	36.76	142.48	NA	149.59	NA	NA	NA	Utilize Summer Setup for summer and non-summer months
	MIDWAY115kV-Section2E&1E	P2-4	Bus-Tie Breaker	NA	NA	NA	NA	NA	NA	36.58	142.32	NA	149.32	NA	NA	NA	Utilize Summer Setup for summer and non-summer months
Kern PP-Westpark #1 115 kV Line	KERN-MAGUNDEN-WITCO115kV[1970]&KERN-WESTPARK#2115kV[2010]	P6	N-1-1	<100	102.77	103.67	NA	NA	NA	<100	<100	<100	<100	<100	136.56	122.74	Midway-Kern PP 230 kV #2 Line Project Phase 1- In service on March 5, 2021 Phase 2: Expected In service on March 31, 2023 ; Short Term : Action Plan
Kern PP-Westpark #2 115 kV Line	KERN-MAGUNDEN-WITCO115kV[1970]&KERN-WESTPARK#1115kV[2010]	P7	N-2	<100	102.77	103.67	NA	NA	NA	<100	<100	<100	<100	<100	136.56	122.74	WheelerRidge Junction Project On Hold (TPP 19-20) Short Term : Action Plan
Kern PP-7th Standard 115 kV Line	KERN-MAGUNDEN-WITCO 115kV [1970] (KERN PWR-KERNWATR)	P2-1	Line Section w/o Fault	67.13	56.94	61.15	NA	NA	NA	18.4	35.88	65.1	41.91	19.12	103.42	61.15	Sensitivity Only
	KERN-MAGUNDEN-WITCO 115kV [1970] (KRN OL J-KERNWATR)	P2-1	Line Section w/o Fault	64.66	55.46	59.72	NA	NA	NA	17.16	36.68	62.63	42.77	16.24	101.68	59.72	Sensitivity Only
	KERN-MAGUNDEN-WITCO 115kV [1970] & KERN-LIVE OAK 115kV [1960]	P6	N-1-1	<100	<100	<100	NA	NA	NA	<99	<100	<100	<100	<100	157.68	<100	Sensitivity Only

2020-2021 ISO Reliability Assessment - Study Results
Study Area: PG&E Kern
Thermal Overloads

California ISO

Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading % (Baseline Scenarios)								Loading % (Sensitivity Scenarios)					Project & Potential Mitigation Solutions
				2022 Summer Peak	2025 Summer Peak	2030 Summer Peak	2022 Winter Peak	2025 Winter Peak	2030 Winter Peak	2022 Spring Off-Peak	2025 Spring Off-Peak	2025 SP High CEC Forecast	2025 SpOP Hi Renew & Min Gas Gen	2022 SP Heavy Renewable & Min Gas Gen	2030 Retirement of QF Generations	2030 Summer Peak w/o Facility Rerates	
Charca-Famoso 115 kV Line	MIDWAY 115kV Section 2E	P2-2	Bus	NA	NA	NA	NA	NA	NA	47.75	135.37	NA	142.81	NA	NA	NA	Utilize Summer Setup for summer and non-summer months
	MIDWAY 115kV - Section 2D & 2E	P2-4	Bus-Tie Breaker	NA	NA	NA	NA	NA	NA	48.19	135.56	NA	143.11	NA	NA	NA	Utilize Summer Setup for summer and non-summer months
	MIDWAY 115kV - Section 2E & 1E	P2-4	Bus-Tie Breaker	NA	NA	NA	NA	NA	NA	47.76	135.39	NA	142.83	NA	NA	NA	Utilize Summer Setup for summer and non-summer months
Lerdo-Famoso 115 kV Line (Famoso-Cawelo C)	MIDWAY 115kV Section 2E	P2-2	Bus	NA	NA	NA	NA	NA	NA	52.06	128.76	NA	136.21	NA	NA	NA	Utilize Summer Setup for summer and non-summer months
	MIDWAY 115kV - Section 2D & 2E	P2-4	Bus-Tie Breaker	NA	NA	NA	NA	NA	NA	52.46	128.95	NA	136.5	NA	NA	NA	Utilize Summer Setup for summer and non-summer months
	MIDWAY 115kV - Section 2E & 1E	P2-4	Bus-Tie Breaker	NA	NA	NA	NA	NA	NA	52.07	128.78	NA	136.23	NA	NA	NA	Utilize Summer Setup for summer and non-summer months
Lerdo-Famoso 115 kV Line (Lerdo-Ogle Jct)	MIDWAY 115kV Section 2E	P2-2	Bus	26.56	25.95	27.1	NA	NA	NA	28.4	150.2	26.36	157.04	29.27	10.65	27.1	Utilize Summer Setup for summer and non-summer months
Lerdo-Famoso 115 kV Line (Lerdo-Ogle Jct)	MIDWAY 115kV - Section 2D & 2E	P2-4	Bus-Tie Breaker	26.51	25.91	27.07	NA	NA	NA	29.67	150.4	26.31	157.24	29.03	10.67	27.07	Utilize Summer Setup for summer and non-summer months
Lerdo-Famoso 115 kV Line (Lerdo-Ogle Jct)	MIDWAY 115kV - Section 2E & 1E	P2-4	Bus-Tie Breaker	26.56	25.95	27.12	NA	NA	NA	28.4	150.24	26.36	157.06	29.21	10.66	27.12	Utilize Summer Setup for summer and non-summer months
7th Standard-Lerdo-Kern Oil 115 kV Line (Lerdo-Lerdo Jct)	MIDWAY 115kV Section 2E	P2-2	Bus	6.23	5.34	8.54	NA	NA	NA	40.95	150.95	5.24	159.4	14.82	48.12	8.54	Utilize Summer Setup for summer and non-summer months
7th Standard-Lerdo-Kern Oil 115 kV Line (Lerdo-Lerdo Jct)	MIDWAY 115kV - Section 2D & 2E	P2-4	Bus-Tie Breaker	6.03	5.21	8.55	NA	NA	NA	42.1	151.13	5.03	159.6	14.37	48.21	8.55	Utilize Summer Setup for summer and non-summer months
7th Standard-Lerdo-Kern Oil 115 kV Line (Lerdo-Lerdo Jct)	MIDWAY 115kV - Section 2E & 1E	P2-4	Bus-Tie Breaker	6.23	5.34	8.54	NA	NA	NA	40.95	150.98	5.24	159.42	14.72	48.17	8.54	Utilize Summer Setup for summer and non-summer months
Lerdo-Kern Oil-7th Standard 115 kV Line (Lerdo Jct-7th Standard)	KERN-MAGUNDEN-WITCO115kV[1970]&KERN-LIVEOAK115kV[1960]	P6	N-1-1	<100	<100	<100	NA	NA	NA	<100	<100	<100	<100	<100	130.69	<100	Sensitivity Only
Kern-Magunden-Witco 115 kV Line (Kern Oil Jct-Magunden)	KERN-WESTPARK#2115kV[2010]&KERN-WESTPARK#1115kV[2000]	P6	N-1-1	<100	107.92	108.83	NA	NA	NA	<100	<100	<100	<100	<100	154	128.63	WheelerRidge Junction Project On Hold (TPP 19-20) Short Term : Action Plan
Kern-Magunden-Witco 115 kV Line (Kern Oil Jct-Magunden)	KernPP-WestparkNo.1&2115kVLines	P7	DCTL	43.84	107.92	109.08	NA	NA	NA	35.37	24.18	42.59	30.78	32.93	154.23	128.93	WheelerRidge Junction Project On Hold (TPP 19-20) Short Term : Action Plan
Kern-Magunden-Witco 115 kV Line (Kern Oil Jct-Kern Water)	7THSTANDARD-KERN115kV[1981]	P1	N-1	75.05	58.13	61.92	NA	NA	NA	20.57	29.19	72.81	33.84	26.08	105.87	73.53	Sensitivity Only
Kern-Magunden-Witco 115 kV Line (Kern Oil Jct-Kern Water)	WESTPARK-MAGUNDEN115kV[4130](COLUMBUS-BEARTAP)	P2-1	Line Section w/o Fault	51.27	70.8	71.65	NA	NA	NA	33.01	15.92	49.84	18.64	25.59	101.67	85.08	Sensitivity Only
Kern-Magunden-Witco 115 kV Line (Kern Oil Jct-Kern Water)	WESTPARK115kVSection1D	P2-2	Bus	51.48	60.16	62.53	NA	NA	NA	17.15	30.16	50.12	35.16	25.66	110.18	74.25	Sensitivity Only
Kern-Magunden-Witco 115 kV Line (Kern Oil Jct-Kern Water)	7STNDRD115kV-RingR1&R4	P2-3	Non-Bus Tie Breaker	75.14	58.19	61.98	NA	NA	NA	20.57	24.88	72.81	29.41	33.04	105.94	73.6	Sensitivity Only
Kern-Magunden-Witco 115 kV Line (Kern Oil Jct-Kern Water)	WESTPARK115kVBus(failureofnon-redundentrelayactuallysemi)	P5-5	Non-Redundant Relay	51.48	70.97	71.68	NA	NA	NA	32.89	16.57	50.12	19.26	25.66	100.65	85.12	Sensitivity Only

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Study Area: PG&E Kern
Thermal Overloads

California ISO

Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading % (Baseline Scenarios)								Loading % (Sensitivity Scenarios)					Project & Potential Mitigation Solutions
				2022 Summer Peak	2025 Summer Peak	2030 Summer Peak	2022 Winter Peak	2025 Winter Peak	2030 Winter Peak	2022 Spring Off-Peak	2025 Spring Off-Peak	2025 SP High CEC Forecast	2025 SpOP Hi Renew & Min Gas Gen	2022 SP Heavy Renewable & Min Gas Gen	2030 Retirement of QF Generations	2030 Summer Peak w/o Facility Rerates	
Kern-Magunden-Witco 115 kV Line (Kern Oil Jct-Kern Water)	WESTPARK-MAGUNDEN 115kV [4130] MOAS OPENED on COLUMBUS_BEAR TAP & 7TH STANDARD-KERN 115kV [1981]	P6	N-1-1	<100	<100	100.43	NA	NA	NA	<100	<100	<100	<100	<100	149.84	119.25	WheelerRidge Junction Project On Hold (TPP 19-20) Short Term : Action Plan
Kern-Magunden-Witco 115 kV Line (Kern Oil Jct-Kern Water)	KernPP-WestparkNo.1&2115kVLines	P7	DCTL	51.48	85.85	89.98	NA	NA	NA	28.15	27.76	50.12	33.42	25.66	147.17	106.84	Sensitivity Only
Kern-Magunden-Witco 115 kV Line (Kern Oil Jct-Kern Water)	Lerdo-KernOil-7thStandard115kVLine&Kern-LiveOak115kVLines	P7	DCTL	74.77	57.08	58.68	NA	NA	NA	17.56	19.12	72.5	21.44	49.91	104.92	69.68	Sensitivity Only
Westpark-Magunden 115 kV Line (Columbus-Magunden Jct)	KernPP-WestparkNo.1&2115kVLines	P7	DCTL	NA	68.99	75.7	NA	NA	NA	14.42	35.9	NA	43.22	NA	130.21	98.16	Sensitivity Only
Westpark-Magunden 115 kV Line (Magunden-Magunden Jct)	KernPP-WestparkNo.1&2115kVLines	P7	DCTL	NA	28.84	30.29	NA	NA	NA	27.37	8.3	NA	10.31	NA	48.37	117.73	Sensitivity Only
Kern-Lamont 115 kV Line	KERN-TEVIS-STOCKDALE115kV[1990](KERNPWR-TEVISJ1)	P2-1	Line Section w/o Fault	88.5	91.44	101.22	NA	NA	NA	47.48	82.24	87.36	86.88	38.22	103.72	101.22	WheelerRidge Junction Project On Hold (TPP 19-20) Short Term : Action Plan
Midway-Semitropic 115 kV Line (Semitropic_E - Midway 115 kV)	SMYRNA-SEMITROPIC-MIDWAY115kV[3710](GANSO-MIDWAY)	P2-1	Line Section w/o Fault	56.79	68.37	78.17	NA	NA	NA	23.12	76.54	56.71	82.16	68.52	78.47	157.47	Sensitivity Only
Midway-Semitropic 115 kV Line (Semitropic_E - Midway 115 kV)	SMYRNA-SEMITROPIC-MIDWAY115kV[3710](SEMITRPJ-GANSO)	P2-1	Line Section w/o Fault	53.53	64.15	71.99	NA	NA	NA	22.11	73.24	53.59	77.85	65.89	72.27	145.03	Sensitivity Only
Midway-Tupman-Renfro 115 kV Line (Tupmant Tap 1-Tupman)	MIDWAY115kV-Section2E&1E	P2-4	Bus-Tie Breaker	88.89	100.27	123.51	NA	NA	NA	40.45	13.92	86.7	23.9	33.64	132.34	123.51	Rely on Summer Setup proposed in 17-18 TP
Midway-Tupman-Rio Bravo-Renfro 115 kV Line (Tupman Tap 2-Tupman)	MIDWAY115kV-Section2E&1E	P2-4	Bus-Tie Breaker	75.23	84.67	101.01	NA	NA	NA	34.8	15.08	73.45	22.25	30.99	103.07	101.01	Rely on Summer Setup proposed in 17-18 TP
Kern PP 230/115 kV Transformer Bank 3	KERNPP230/115kVTB4&KERNPP230/115kVTB5	P6	N-1-1	<100	<100	113.55	NA	NA	NA	<100	<100	<100	<100	<100	203.87	<100	Monitor Overload in the long term
Kern PP 230/115 kV Transformer Bank 4	KERNPP230/115kVTB3&KERNPP230/115kVTB5	P6	N-1-1	<100	<100	113.47	NA	NA	NA	<100	<100	<100	<100	<100	203.16	<100	Monitor Overload in the long term
Kern PP 230/115 kV Transformer Bank 5	KERNPP230/115kVTB3&KERNPP230/115kVTB4	P6	N-1-1	<100	<100	113.52	NA	NA	NA	<100	<100	<100	<100	<100	203.2	<100	Monitor Overload in the long term
Kern-Stockdale 115 kV Line (Kern Power-Tevis J1)	KERN-TEVIS-STOCKDALE-LAMONT115kV[1940]	P1	N-1	98.39	103.09	114.53	NA	NA	NA	47.52	90.2	97.02	97.79	39.19	116.62	114.53	WheelerRidge Junction Project On Hold (TPP 19-20) Short Term : Action Plan
Kern-Stockdale 115 kV Line (Kern Power-Tevis J1)	KERN-TEVIS-STOCKDALE-LAMONT115kV[1940](KERNPWR-TEVISJ2)	P2-1	Line Section w/o Fault	106.99	111.46	124	NA	NA	NA	56.12	84.99	105.62	92.44	30.22	126.82	124	WheelerRidge Junction Project On Hold (TPP 19-20) Short Term : Action Plan
Kern-Stockdale 115 kV Line (Kern Power-Tevis J1)	KERNPWR115kV-MiddleBreakerBay2	P2-3	Non-Bus Tie Breaker	98.34	103.04	114.58	NA	NA	NA	47.54	90.29	96.93	97.82	39.14	116.32	114.58	WheelerRidge Junction Project On Hold (TPP 19-20) Short Term : Action Plan
Kern-Stockdale 115 kV Line (Kern Power-Tevis J1)	LAMONT115kV-MiddleBreakerBay3	P2-3	Non-Bus Tie Breaker	98.79	103.51	115.04	NA	NA	NA	47.67	54.7	96.99	62.58	1.2	117.77	115.04	WheelerRidge Junction Project On Hold (TPP 19-20) Short Term : Action Plan

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California ISO

Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading % (Baseline Scenarios)								Loading % (Sensitivity Scenarios)					Project & Potential Mitigation Solutions
				2022 Summer Peak	2025 Summer Peak	2030 Summer Peak	2022 Winter Peak	2025 Winter Peak	2030 Winter Peak	2022 Spring Off-Peak	2025 Spring Off-Peak	2025 SP High CEC Forecast	2025 SpOP Hi Renew & Min Gas Gen	2022 SP Heavy Renewable & Min Gas Gen	2030 Retirement of QF Generations	2030 Summer Peak w/o Facility Rerates	
Kern-Stockdale 115 kV Line (Kern Power-Tevis J1)	TEVIS2-1E115kV&KERN-TEVIS-STOCKDALE-LAMONTline	P2-3	Non-Bus Tie Breaker	98.39	103.09	114.53	NA	NA	NA	47.52	90.2	97.02	97.79	39.19	116.62	114.53	WheelerRidge Junction Project On Hold (TPP 19-20) Short Term : Action Plan
Kern-Stockdale 115 kV Line (Kern Power-Tevis J1)	KERN-TEVIS-STOCKDALE-LAMONT 115kV [1940] & GRIMMWAY-MALAGA TAP 115kV [1942]	P6	N-1-1	<100	<100	106.21	NA	NA	NA	<100	<100	<100	104.05	<100	107.77	106.21	WheelerRidge Junction Project On Hold (TPP 19-20) Short Term : Action Plan
Kern-Lamont 115 kV Line (Kern-Tevis Jct 2)	KERN-TEVIS-STOCKDALE 115kV [1990]	P1	N-1	107.09	111.62	123.99	NA	NA	NA	55.81	85.14	105.72	30.55	92.55	126.82	123.99	WheelerRidge Junction Project On Hold (TPP 19-20) Short Term : Action Plan
Kern-Lamont 115 kV Line (Kern-Tevis Jct 2)	KERN-TEVIS-STOCKDALE 115kV [1990] (KERN PWR-TEVISJ1)	P2-1	Line Section w/o Fault	108.21	112.73	126.34	NA	NA	NA	56.22	84.2	106.77	30.2	91.72	129.4	126.34	WheelerRidge Junction Project On Hold (TPP 19-20) Short Term : Action Plan
Kern-Lamont 115 kV Line (Kern-Tevis Jct 2)	KERN PWR 115kV - Middle Breaker Bay 1	P2-3	Non-Bus Tie Breaker	106.96	111.53	123.9	NA	NA	NA	55.81	85.13	105.59	30.57	92.52	127.15	123.9	WheelerRidge Junction Project On Hold (TPP 19-20) Short Term : Action Plan
Kern-Lamont 115 kV Line (Kern-Tevis Jct 2)	STOCKDLE - 1D 115kV & KERN-TEVIS-STOCKDALE line	P2-3	Non-Bus Tie Breaker	106.5	111.14	123.04	NA	NA	NA	56.01	84.05	105.09	31.66	91.55	125.78	123.04	WheelerRidge Junction Project On Hold (TPP 19-20) Short Term : Action Plan
Kern-Lamont 115 kV Line (Kern-Tevis Jct 2)	TEVIS - 1D 115kV & KERN-TEVIS-STOCKDALE line	P2-3	Non-Bus Tie Breaker	107.09	111.62	123.99	NA	NA	NA	55.81	85.14	105.72	30.55	92.55	126.82	123.99	WheelerRidge Junction Project On Hold (TPP 19-20) Short Term : Action Plan
Kern-Lamont 115 kV Line (Kern-Tevis Jct 2)	KERN-TEVIS-STOCKDALE 115kV [1990] & Q744-LAMONT #1 115kV [0]	P6	N-1-1	<100	<100	129.46	NA	NA	NA	<100	<100	<100	<100	<100	132.25	129.46	WheelerRidge Junction Project On Hold (TPP 19-20) Short Term : Action Plan
Kern-Magunden-Witco 115 kV Line (Kern-Kern Water)	7TH STANDARD-KERN 115kV [1981]	P1	N-1	66.9	61.43	65	NA	NA	NA	20.29	28.17	65.02	26.12	32.45	109.25	65	Sensitivity Only
Kern-Magunden-Witco 115 kV Line (Kern-Kern Water)	WESTPARK-MAGUNDEN 115kV [4130] (COLUMBUS-BEAR TAP)	P2-1	Line Section w/o Fault	46.99	74.2	74.87	NA	NA	NA	30.83	16.55	45.8	25.64	18.33	105.08	74.87	Sensitivity Only
Kern-Magunden-Witco 115 kV Line (Kern-Kern Water)	WESTPARK-MAGUNDEN 115kV [4130] (WESTPARK-BEAR TAP)	P2-1	Line Section w/o Fault	47	63.33	65.66	NA	NA	NA	17.21	29.15	45.82	25.58	33.76	114.53	65.66	Sensitivity Only
Kern-Magunden-Witco 115 kV Line (Kern-Kern Water)	WESTPARK 115kV Section 1D	P2-2	Bus	47.18	63.53	65.68	NA	NA	NA	17.47	29.19	46.05	25.7	33.8	113.58	65.68	Sensitivity Only
Kern-Magunden-Witco 115 kV Line (Kern-Kern Water)	7STNDRD 115kV - Ring R1 & R4	P2-3	Non-Bus Tie Breaker	66.97	61.49	65.06	NA	NA	NA	20.29	24.1	65.02	31.88	28.14	109.32	65.06	Sensitivity Only
Kern-Magunden-Witco 115 kV Line (Kern-Kern Water)	KERN PWR 115kV - Middle Breaker Bay 1	P2-3	Non-Bus Tie Breaker	66.91	61.5	65	NA	NA	NA	20.24	28.06	64.91	25.95	32.31	109.47	65	Sensitivity Only
Kern-Magunden-Witco 115 kV Line (Kern-Kern Water)	WESTPARK - 1D 115kV & WESTPARK-MAGUNDEN line	P2-3	Non-Bus Tie Breaker	47.18	74.36	74.9	NA	NA	NA	30.73	17.2	46.05	25.7	18.98	104.03	74.9	Sensitivity Only
Kern-Magunden-Witco 115 kV Line (Kern-Kern Water)	WESTPARK 115kV Bus (failure of non-redundent relay actually semi)	P5-5	Non-Redundant Relay	47.18	74.36	74.9	NA	NA	NA	30.73	17.2	46.05	25.7	18.98	104.03	74.9	Sensitivity Only
Kern-Magunden-Witco 115 kV Line (Kern-Kern Water)	7TH STANDARD-KERN 115kV [1981] & WESTPARK-MAGUNDEN 115kV [4130] MOAS OPENED on COLUMBUS_BEAR TAP	P6	N-1-1	<100	<100	103.61	NA	NA	NA	<100	<100	<100	<100	<100	153.3	103.61	Monitor Overload in the long term
Kern-Magunden-Witco 115 kV Line (Kern-Kern Water)	Kern PP-Westpark No. 1 & 2 115 kV Lines	P7	DCTL	47.18	89.24	93.21	NA	NA	NA	26.7	27	46.05	25.7	32.17	150.71	93.21	Sensitivity Only
Kern-Lamont 115 kV Line(TevisJ2-StockdaleJn)	KERN-TEVIS-STOCKDALE 115kV [1990] (KERN PWR-TEVISJ1)	P2-1	Line Section w/o Fault	88.51	91.44	101.19	NA	NA	NA	47.49	82.1	87.37	38.22	86.75	103.71	101.19	WheelerRidge Junction Project On Hold (TPP 19-20) Short Term : Action Plan

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Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading % (Baseline Scenarios)								Loading % (Sensitivity Scenarios)					Project & Potential Mitigation Solutions
				2022 Summer Peak	2025 Summer Peak	2030 Summer Peak	2022 Winter Peak	2025 Winter Peak	2030 Winter Peak	2022 Spring Off-Peak	2025 Spring Off-Peak	2025 SP High CEC Forecast	2025 SpOP Hi Renew & Min Gas Gen	2022 SP Heavy Renewable & Min Gas Gen	2030 Retirement of QF Generations	2030 Summer Peak w/o Facility Rerates	
Midway 230/115 kV Transformer Bank 2	MIDWAY 115kV - Section 1E & 1D	P2-4	Bus-Tie Breaker	57.49	69.9	72.88	NA	NA	NA	22.85	75.37	60.47	82.09	49.52	121.65	3.37	Sensitivity Only
Midway 230/115 kV Transformer Bank 2	MIDWAY 230kV - Section 1D & 1E	P2-4	Bus-Tie Breaker	60.26	73.01	77.65	NA	NA	NA	26.01	79.2	63.4	87.03	52.18	123.91	3.59	Sensitivity Only
Midway-Taft 115 kV Line	CYMRIC TAP 115kV [2582] (MIDWAY-CYMRIC)	P2-1	Line Section w/o Fault	18.98	22.64	22.55	NA	NA	NA	19.68	67.83	22.25	67.31	39.04	101.98	22.56	Sensitivity Only
Midway-Taft 115 kV Line	MIDWAY 115kV Section 1D	P2-2	Bus	18.43	22.13	22.09	NA	NA	NA	19.77	66.7	21.81	66.17	38.48	101.8	22.09	Sensitivity Only
Midway-Taft 115 kV Line	MIDWAY 115kV - Section 1E & 1D	P2-4	Bus-Tie Breaker	17	20.8	21.21	NA	NA	NA	19.91	63.93	20.67	63.23	37.88	101.74	21.21	Sensitivity Only
Midsun-Midway 115 kV Line (Midway-Cymric)	MIDWAY-TAFT 115kV [2620]	P1	N-1	24.74	29.24	31.06	NA	NA	NA	27.29	79.98	28.83	79.2	51.91	129.46	31.06	Sensitivity Only
Midsun-Midway 115 kV Line (Midway-Cymric)	MIDWAY 115kV Section 2D	P2-2	Bus	24.53	29.19	30.14	NA	NA	NA	27.29	79.34	28.66	78.45	51.99	128.75	30.15	Sensitivity Only
Midsun-Midway 115 kV Line (Midway-Cymric)	MIDWAY - 2D 115kV & MIDWAY-RENFRO-TUPMAN line	P2-3	Non-Bus Tie Breaker	24.5	29.16	30.12	NA	NA	NA	27.25	79.33	28.63	78.43	51.97	128.77	30.12	Sensitivity Only
Midsun-Midway 115 kV Line (Midway-Cymric)	MIDWAY - 2D 115kV & MIDWAY-TEMBLOR line	P2-3	Non-Bus Tie Breaker	24.54	29.17	30.13	NA	NA	NA	27.28	79.63	28.64	78.76	52.35	128.8	30.13	Sensitivity Only
Midsun-Midway 115 kV Line (Midway-Cymric)	TAFT 115kV - Ring R2 & R1	P2-3	Non-Bus Tie Breaker	23.02	24.13	23.21	NA	NA	NA	31.57	79.12	23.11	77.2	57.28	108.27	23.22	Sensitivity Only
Midsun-Midway 115 kV Line (Midway-Cymric)	TAFT 115kV - Ring R2 & R3	P2-3	Non-Bus Tie Breaker	22.87	27.76	29.52	NA	NA	NA	27.02	79.36	27.72	78.71	49.81	130.63	29.52	Sensitivity Only
Midsun-Midway 115 kV Line (Midway-Cymric)	MIDWAY 115kV - Section 2D & 2E	P2-4	Bus-Tie Breaker	24.49	29.28	30.72	NA	NA	NA	26.16	83.75	28.49	82.99	53.1	129.38	30.72	Sensitivity Only
Taft 115/70 kV Transformer Bank 2	TAFT 115/70kV TB 1	P1	N-1	76.08	77.81	80.82	NA	NA	NA	42.91	45.23	76.5	41.06	40.35	108.8	0.55	Sensitivity Only
Taft 115/70 kV Transformer Bank 2	TAFT 115kV - Ring R2 & R3	P2-3	Non-Bus Tie Breaker	75.8	77.41	80.51	NA	NA	NA	47.2	28.66	76.21	24.93	37.72	109.91	0.55	Sensitivity Only
Taft 115/70 kV Transformer Bank 2	TAFT 115kV - Ring R4 & R3	P2-3	Non-Bus Tie Breaker	76.39	77.97	81.15	NA	NA	NA	48.07	38.09	76.69	34.37	41.7	108.85	0.55	Sensitivity Only
Taft 115/70 kV Transformer Bank 2	SLR-TANN 9.11kV Gen Unit 1 & TAFT 115/70kV TB 1	P3	G-1/N-1	<100	<100	101.37	NA	NA	NA	<100	<100	<100	<100	<100	<100	<100	Monitor Overload in the long term
Taft 115/70 kV Transformer Bank 2	MIDWAY-MIDSUN 115kV [0] & TAFT 115/70kV TB 1	P6	N-1-1	<100	<100	<100	NA	NA	NA	<100	<100	<100	<100	<100	109.08	<100	Sensitivity Only
Fellows-Taft 115 kV Line (Fellows-Morgan)	MIDWAY-TAFT 115kV [2620]	P1	N-1	14.73	12.26	5.95	NA	NA	NA	37.15	99.44	15.18	98.66	86	107.36	5.95	Sensitivity Only
Fellows-Taft 115 kV Line (Fellows-Morgan)	MIDWAY 115kV Section 2D	P2-2	Bus	14.57	12.21	5.51	NA	NA	NA	37.31	98.83	15	97.98	86.02	106.75	5.51	Sensitivity Only
Fellows-Taft 115 kV Line (Fellows-Morgan)	MIDWAY - 2D 115kV & MIDWAY-RENFRO-TUPMAN line	P2-3	Non-Bus Tie Breaker	14.54	12.18	5.5	NA	NA	NA	37.3	98.82	14.97	97.97	86.02	106.77	5.5	Sensitivity Only
Fellows-Taft 115 kV Line (Fellows-Morgan)	MIDWAY - 2D 115kV & MIDWAY-TEMBLOR line	P2-3	Non-Bus Tie Breaker	14.62	12.25	5.56	NA	NA	NA	37.35	99.02	15.03	98.19	86.24	106.8	5.56	Sensitivity Only
Fellows-Taft 115 kV Line (Fellows-Morgan)	TAFT 115kV - Ring R2 & R3	P2-3	Non-Bus Tie Breaker	12.47	10.09	5.35	NA	NA	NA	39.11	98.31	13.66	97.74	84.47	108.47	5.35	Sensitivity Only
Fellows-Taft 115 kV Line (Fellows-Morgan)	MIDWAY 115kV - Section 2D & 2E	P2-4	Bus-Tie Breaker	14.39	12.05	5.5	NA	NA	NA	35.51	104.13	14.69	103.59	86.52	107.29	5.5	Generation Redispatch
Fellows-Taft 115 kV Line (Fellows-Morgan)	KERN-OLD RIVER #1 70kV [8890] & MIDWAY-TAFT 115kV [2620]	P6	N-1-1	<100	<100	<100	NA	NA	NA	<100	<100	<100	106.42	<100	106.59	<100	Sensitivity Only
Lerdo-Famoso 115 kV Line (Cawelo C-Ogle Jct)	MIDWAY 115kV Section 2E	P2-2	Bus	4.14	4.07	4.11	NA	NA	NA	54.42	120.85	4.13	128.04	4.17	4.34	4.11	Utilize Summer Setup for summer and non-summer months

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Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading % (Baseline Scenarios)								Loading % (Sensitivity Scenarios)					Project & Potential Mitigation Solutions
				2022 Summer Peak	2025 Summer Peak	2030 Summer Peak	2022 Winter Peak	2025 Winter Peak	2030 Winter Peak	2022 Spring Off-Peak	2025 Spring Off-Peak	2025 SP High CEC Forecast	2025 SpOP Hi Renew & Min Gas Gen	2022 SP Heavy Renewable & Min Gas Gen	2030 Retirement of QF Generations	2030 Summer Peak w/o Facility Rerates	
Lerdo-Famoso 115 kV Line (Cawelo C-Ogle Jct)	MIDWAY 115kV - Section 2D & 2E	P2-4	Bus-Tie Breaker	4.14	4.07	4.11	NA	NA	NA	54.78	121.03	4.13	128.32	4.16	4.34	4.11	Utilize Summer Setup for summer and non-summer months
Lerdo-Famoso 115 kV Line (Cawelo C-Ogle Jct)	MIDWAY 115kV - Section 2E & 1E	P2-4	Bus-Tie Breaker	4.14	4.07	4.11	NA	NA	NA	54.42	120.87	4.13	128.06	4.17	4.34	4.11	Utilize Summer Setup for summer and non-summer months
Temblor-Kernridge 115 kV Line	KERNRDGELH 69/4.16kV TB 1 & MIDWAY-TEMBLOR 115kV [2630]	P6	N-1-1	<100	<100	<100	NA	NA	NA	<100	<100	<100	<100	<100	104.6	<100	Sensitivity Only
Taft A -TAFT_SW_TAFM 70 kV Line	MIDWAY 115kV - Section 2D & 1D	P2-4	Bus-Tie Breaker	NA	NA	NA	NA	NA	NA	61.33	152.2	NA	147.6	NA	NA	NA	Utilize Summer Setup for summer and non-summer months
Taft A -TAFT_SW_TAFM 70 kV Line	Midway-Taft & Fellows-Taft 115 kV Lines	P7	DCTL	NA	NA	NA	NA	NA	NA	102.9	160.93	NA	154.84	NA	NA	NA	Utilize Summer Setup for summer and non-summer months
Taft-Maricopa 70 kV Line (Taft Jct-Moco Jct, Multiple Sections of Line)	MIDWAY 115kV - Section 2D & 1D	P2-4	Bus-Tie Breaker	NA	NA	NA	NA	NA	NA	85.14	177.74	NA	173.15	NA	NA	NA	Utilize Summer Setup for summer and non-summer months
Taft-Maricopa 70 kV Line (Taft Jct-Moco Jct, Multiple Sections of Line)	Midway-Taft & Fellows-Taft 115 kV Lines	P7	DCTL	NA	NA	NA	NA	NA	NA	126.88	186.44	NA	180.19	NA	NA	NA	Utilize Summer Setup for summer and non-summer months
WeedPatch-Weedpatch Shoofly 70 kV	MIDWAY 230kV Section 1D	P2-2	Bus	38.57	38.51	40.67	NA	NA	NA	91.82	106.99	38.19	110.88	38.61	29.44	40.66	Utilize Summer Setup for summer and non-summer months
WeedPatch-Weedpatch Shoofly 70 kV	MIDWAY 230kV Section 2D	P2-2	Bus	38.92	38.65	39.17	NA	NA	NA	92.59	107.86	38.4	111.13	38.51	29.49	39.16	Utilize Summer Setup for summer and non-summer months
WeedPatch-Weedpatch Shoofly 70 kV	MIDWAY - 2D 230kV & MIDWAY-MIDWAY-R12 #1 line	P2-3	Non-Bus Tie Breaker	38.87	38.73	39.28	NA	NA	NA	96.12	108.55	38.37	113.71	38.28	29.52	39.27	Utilize Summer Setup for summer and non-summer months
WeedPatch-Weedpatch Shoofly 70 kV	MIDWAY 230kV Section 1D & MIDWAY-MIDWAY-R12 #1 line	P2-3	Non-Bus Tie Breaker	38.6	38.52	41.63	NA	NA	NA	91.56	107.53	38.2	110.85	38.35	29.51	41.63	Utilize Summer Setup for summer and non-summer months
WeedPatch-Weedpatch Shoofly 70 kV	MIDWAY 230kV - Section 1D & 1E	P2-4	Bus-Tie Breaker	38.56	38.48	40.77	NA	NA	NA	91.26	108.74	38.22	114.36	38.56	29.47	40.77	Utilize Summer Setup for summer and non-summer months
WeedPatch-Weedpatch Shoofly 70 kV	MIDWAY 230kV - Section 2E & 2D	P2-4	Bus-Tie Breaker	<100	37.71	39.91	NA	NA	NA		113.14	38.83	117.53		29.5	39.8	Utilize Summer Setup for summer and non-summer months
WeedPatch-Weedpatch Shoofly 70 kV	WHEELER 230/70kV TB 4 & WHEELER 230/70kV TB 5	P6	N-1-1	<100	<100	<100	NA	NA	NA	146.46	<100	<100	<100	<100	<100	<100	Utilize Summer Setup for summer and non-summer months
WeedPatch-Weedpatch Shoofly 70 kV	Midway-Wheeler Ridge #1 & #2 230 kV Lines	P7	DCTL	NA	NA	NA	NA	NA	NA	160.56	42.12	NA	43.94	NA	NA	NA	Utilize Summer Setup for summer and non-summer months
Magunden Jn-Weedpatch Shoofly 70 kV	MIDWAY 230kV Section 1D	P2-2	Bus	38.57	38.51	40.67	NA	NA	NA	91.82	106.99	38.19	110.88	38.61	29.44	40.66	Utilize Summer Setup for summer and non-summer months
Magunden Jn-Weedpatch Shoofly 70 kV	MIDWAY 230kV Section 2D	P2-2	Bus	38.92	38.65	39.17	NA	NA	NA	92.59	107.86	38.4	111.13	38.51	29.49	39.16	Utilize Summer Setup for summer and non-summer months
Magunden Jn-Weedpatch Shoofly 70 kV	MIDWAY - 2D 230kV & MIDWAY-MIDWAY-R12 #1 line	P2-3	Non-Bus Tie Breaker	38.87	38.73	39.28	NA	NA	NA	96.12	108.55	38.37	113.71	38.28	29.52	39.27	Utilize Summer Setup for summer and non-summer months
Magunden Jn-Weedpatch Shoofly 70 kV	MIDWAY 230kV Section 1D & MIDWAY-MIDWAY-R12 #1 line	P2-3	Non-Bus Tie Breaker	38.6	38.52	41.63	NA	NA	NA	91.56	107.53	38.2	110.85	38.35	29.51	41.63	Utilize Summer Setup for summer and non-summer months
Magunden Jn-Weedpatch Shoofly 70 kV	MIDWAY 230kV - Section 1D & 1E	P2-4	Bus-Tie Breaker	38.56	38.48	40.77	NA	NA	NA	91.26	108.74	38.22	114.36	38.56	29.47	40.77	Utilize Summer Setup for summer and non-summer months
Magunden Jn-Weedpatch Shoofly 70 kV	MIDWAY 230kV - Section 2E & 2D	P2-4	Bus-Tie Breaker	<100	37.71	39.91	NA	NA	NA		113.14	38.83	117.53		29.5	39.8	Utilize Summer Setup for summer and non-summer months
Magunden Jn-Weedpatch Shoofly 70 kV	WHEELER 70kV - Section ME & MD	P2-4	Bus-Tie Breaker	NA	NA	NA	NA	NA	NA	105.9	16.59	NA	14.46	NA	NA	NA	Utilize Summer Setup for summer and non-summer months
Magunden Jn-Weedpatch Shoofly 70 kV	Midway-Wheeler Ridge #1 & #2 230 kV Lines	P7	DCTL	NA	NA	NA	NA	NA	NA	160.56	42.12	NA	43.94	NA	NA	NA	Utilize Summer Setup for summer and non-summer months
Kern-Magunden 70 kV Line (Multiple Sections	Midway-Wheeler Ridge #1 & #2 230 kV Lines	P7	DCTL	14.8	14.97	13.41	NA	NA	NA	107.84	56.73	14.86	58.15	14.96	13.36	13.41	Utilize Summer Setup for summer and non-summer months

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Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading % (Baseline Scenarios)								Loading % (Sensitivity Scenarios)					Project & Potential Mitigation Solutions
				2022 Summer Peak	2025 Summer Peak	2030 Summer Peak	2022 Winter Peak	2025 Winter Peak	2030 Winter Peak	2022 Spring Off-Peak	2025 Spring Off-Peak	2025 SP High CEC Forecast	2025 SpOP Hi Renew & Min Gas Gen	2022 SP Heavy Renewable & Min Gas Gen	2030 Retirement of QF Generations	2030 Summer Peak w/o Facility Rerates	
Kern-Kern Oil-Famoso 70 kV Line (Kern-Kern Oil Jct)	MIDWAY 115kV Section 2E	P2-2	Bus	37.97	39.04	41.99	NA	NA	NA	49.18	112.4	37.21	119.88	28.03	41.92	41.99	Utilize Summer Setup for summer and non-summer months
Kern-Kern Oil-Famoso 70 kV Line (Kern-Kern Oil Jct)	MIDWAY 115kV - Section 2D & 2E	P2-4	Bus-Tie Breaker	37.95	39.02	41.98	NA	NA	NA	48.99	112.27	37.2	119.11	28.01	42	41.98	Utilize Summer Setup for summer and non-summer months
Kern-Kern Oil-Famoso 70 kV Line (Kern-Kern Oil Jct)	MIDWAY 115kV - Section 2E & 1E	P2-4	Bus-Tie Breaker	37.97	39.04	41.99	NA	NA	NA	49.17	112.36	37.21	119.82	28.03	41.96	41.99	Utilize Summer Setup for summer and non-summer months
Wasco-Famoso 70 kV Line (Famoso-McFarland Tap)	MIDWAY 115kV Section 2E	P2-2	Bus	34.74	35.9	36.39	NA	NA	NA	44.88	114.82	33.98	122.32	26.06	36.33	36.39	Utilize Summer Setup for summer and non-summer months
Wasco-Famoso 70 kV Line (Famoso-McFarland Tap)	MIDWAY 115kV - Section 2D & 2E	P2-4	Bus-Tie Breaker	34.73	35.88	36.38	NA	NA	NA	44.31	114.63	33.96	121.57	26.03	36.4	36.38	Utilize Summer Setup for summer and non-summer months
Wasco-Famoso 70 kV Line (Famoso-McFarland Tap)	MIDWAY 115kV - Section 2E & 1E	P2-4	Bus-Tie Breaker	34.74	35.9	36.39	NA	NA	NA	44.87	114.78	33.98	122.26	26.05	36.37	36.39	Utilize Summer Setup for summer and non-summer months
Wasco-Famoso 70 kV Line (Famoso-Cawelo B Tap)	MIDWAY 115kV Section 2E	P2-2	Bus	38.39	39.65	39.71	NA	NA	NA	49.01	125.4	37.55	133.61	29.04	39.65	39.71	Utilize Summer Setup for summer and non-summer months
Wasco-Famoso 70 kV Line (Famoso-Cawelo B Tap)	MIDWAY 115kV - Section 2D & 2E	P2-4	Bus-Tie Breaker	38.37	39.63	39.71	NA	NA	NA	48.4	125.2	37.53	132.8	29.02	39.73	39.71	Utilize Summer Setup for summer and non-summer months
Wasco-Famoso 70 kV Line (Famoso-Cawelo B Tap)	MIDWAY 115kV - Section 2E & 1E	P2-4	Bus-Tie Breaker	38.39	39.65	39.72	NA	NA	NA	49	125.36	37.55	133.55	29.04	39.69	39.72	Utilize Summer Setup for summer and non-summer months
Semitropic-Wasco 70 kV Line	MIDWAY 115kV Section 2E	P2-2	Bus	NA	NA	NA	NA	NA	NA	24.35	118.8	NA	122.41	NA	NA	NA	Utilize Summer Setup for summer and non-summer months
Semitropic-Wasco 70 kV Line	MIDWAY 115kV - Section 2D & 2E	P2-4	Bus-Tie Breaker	NA	NA	NA	NA	NA	NA	22.89	118.7	NA	121.63	NA	NA	NA	Utilize Summer Setup for summer and non-summer months
Semitropic-Wasco 70 kV Line	MIDWAY 115kV - Section 2E & 1E	P2-4	Bus-Tie Breaker	NA	NA	NA	NA	NA	NA	24.35	118.77	NA	122.36	NA	NA	NA	Utilize Summer Setup for summer and non-summer months
Temblor-San Luis Obispo 115 kV Line (Carrizo-San Luis Obispo)	MIDWAY-TEMBLOR 115kV [2630] & TEMBLOR SVD=v	P6	N-1-1	NA	NA	NA	NA	NA	NA	<100	<100	<100	<100	<100	127.17	<100	Project : Midway-Temblor 115 kV Line Reconductor and Voltage Support Project. In Service Date : 12/2022. Short term: Action Plan
Midway-Wheeler Ridge #1 230 kV Line (Buena Vista PP Jct 1-Midway)	MIDWAY-WHEELER RIDGE #2 230kV [5200] (BUENAVJ2-MIDWAY)	P2-1	Line Section w/o Fault	103.09	107.21	111.79	NA	NA	NA	86.58	72.45	102.87	68.21	87.29	115.03	111.79	WheelerRidge Junction Project On Hold (TPP 19-20) Short Term : Action Plan
Midway-Wheeler Ridge #1 230 kV Line (Buena Vista PP Jct 1-Midway)	MIDWAY 230kV Section 2D	P2-2	Bus	103.13	107.28	111.96	NA	NA	NA	86.82	72.01	102.92	67.98	87.76	115.62	111.96	WheelerRidge Junction Project On Hold (TPP 19-20) Short Term : Action Plan
Midway-Wheeler Ridge #1 230 kV Line (Buena Vista PP Jct 1-Midway)	MIDWAY - 2D 230kV & MIDWAY-MIDWAY-R12 #1 line	P2-3	Non-Bus Tie Breaker	103.04	107.26	112.1	NA	NA	NA	83.37	72.1	102.88	71.57	88.18	116.1	112.1	WheelerRidge Junction Project On Hold (TPP 19-20) Short Term : Action Plan
Midway-Wheeler Ridge #1 230 kV Line (Buena Vista PP Jct 1-Midway)	MIDWAY 230kV - Section 2D & 2E	P2-4	Bus-Tie Breaker	103.65			NA	NA	NA	87.02				87.79			WheelerRidge Junction Project On Hold (TPP 19-20) Short Term : Action Plan
Midway-Wheeler Ridge #1 230 kV Line (Buena Vista PP Jct 1-Midway)	MIDWAY 230kV - Section 2E & 2D	P2-4	Bus-Tie Breaker		108	113.16	NA	NA	NA		71.48	103.56	67.52		118.36	113.08	WheelerRidge Junction Project On Hold (TPP 19-20) Short Term : Action Plan
Midway-Wheeler Ridge #1 230 kV Line (Buena Vista PP Jct 1-Wheeler Ridge PP Jct 1)	MIDWAY-WHEELER RIDGE #2 230kV [5200] (BUENAVJ2-MIDWAY)	P2-1	Line Section w/o Fault	93.67	97.71	100.87	NA	NA	NA	77.44	63.24	93.44	58.21	77.68	103.93	100.87	WheelerRidge Junction Project On Hold (TPP 19-20) Short Term : Action Plan
Midway-Wheeler Ridge #1 230 kV Line (Buena Vista PP Jct 1-Wheeler Ridge PP Jct 1)	MIDWAY 230kV Section 2D	P2-2	Bus	93.69	97.77	101.02	NA	NA	NA	77.71	62.74	93.48	57.93	78.09	104.5	101.01	WheelerRidge Junction Project On Hold (TPP 19-20) Short Term : Action Plan

2020-2021 ISO Reliability Assessment - Study Results
Study Area: PG&E Kern
Thermal Overloads

California ISO

Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading % (Baseline Scenarios)								Loading % (Sensitivity Scenarios)					Project & Potential Mitigation Solutions
				2022 Summer Peak	2025 Summer Peak	2030 Summer Peak	2022 Winter Peak	2025 Winter Peak	2030 Winter Peak	2022 Spring Off-Peak	2025 Spring Off-Peak	2025 SP High CEC Forecast	2025 SpOP Hi Renew & Min Gas Gen	2022 SP Heavy Renewable & Min Gas Gen	2030 Retirement of QF Generations	2030 Summer Peak w/o Facility Rerates	
Midway-Wheeler Ridge #1 230 kV Line (Buena Vista PP Jct 1-Wheeler Ridge PP Jct 1)	MIDWAY - 2D 230kV & MIDWAY-MIDWAY-R12 #1 line	P2-3	Non-Bus Tie Breaker	93.61	97.75	101.14	NA	NA	NA	73.74	62.75	93.45	62.09	78.45	104.93	101.14	WheelerRidge Junction Project On Hold (TPP 19-20) Short Term : Action Plan
Midway-Wheeler Ridge #1 230 kV Line (Buena Vista PP Jct 1-Wheeler Ridge PP Jct 1)	MIDWAY 230kV - Section 2E & 2D	P2-4	Bus-Tie Breaker		98.44	102.08	NA	NA	NA		62.19	94.03	57.42		106.96	102.01	WheelerRidge Junction Project On Hold (TPP 19-20) Short Term : Action Plan
Midway-Wheeler Ridge #2 230 kV Line (Buena Vista PP Jct 2-Midway)	MIDWAY-WHEELER RIDGE #1 230kV [5190] (BUENAVJ1-MIDWAY)	P2-1	Line Section w/o Fault	103.11	107.38	111.76	NA	NA	NA	83.24	72.63	102.94	68.22	88.41	114.95	111.76	WheelerRidge Junction Project On Hold (TPP 19-20) Short Term : Action Plan
Midway-Wheeler Ridge #2 230 kV Line (Buena Vista PP Jct 2-Midway)	MIDWAY 230kV Section 1D	P2-2	Bus	103.65	107.82	112.73	NA	NA	NA	87.28	72.21	103.5	68.11	87.83	117.2	112.72	WheelerRidge Junction Project On Hold (TPP 19-20) Short Term : Action Plan
Midway-Wheeler Ridge #2 230 kV Line (Buena Vista PP Jct 2-Midway)	MIDWAY 230kV Section 1D & MIDWAY-MIDWAY-R12 #1 line	P2-3	Non-Bus Tie Breaker	103.61	107.86	112.92	NA	NA	NA	87.21	72.3	103.52	68.48	88.25	118.52	112.91	WheelerRidge Junction Project On Hold (TPP 19-20) Short Term : Action Plan
Midway-Wheeler Ridge #2 230 kV Line (Buena Vista PP Jct 2-Midway)	MIDWAY 230kV - Section 1D & 1E	P2-4	Bus-Tie Breaker	103.68	107.81	112.8	NA	NA	NA	87.39	72.04	103.54	68.24	87.9	117.85	112.8	WheelerRidge Junction Project On Hold (TPP 19-20) Short Term : Action Plan
Midway-Wheeler Ridge #2 230 kV Line (Buena Vista PP Jct 2-Wheeler Ridge PP Jct 2)	MIDWAY-WHEELER RIDGE #1 230kV [5190] (BUENAVJ1-MIDWAY)	P2-1	Line Section w/o Fault	93.24	97.45	101.59	NA	NA	NA	73.1	63.01	93.07	57.7	78.48	104.63	101.59	WheelerRidge Junction Project On Hold (TPP 19-20) Short Term : Action Plan
Midway-Wheeler Ridge #2 230 kV Line (Buena Vista PP Jct 2-Wheeler Ridge PP Jct 2)	MIDWAY 230kV Section 1D	P2-2	Bus	93.71	97.78	102.47	NA	NA	NA	77.67	62.52	93.53	57.53	77.71	106.69	102.47	WheelerRidge Junction Project On Hold (TPP 19-20) Short Term : Action Plan
Midway-Wheeler Ridge #2 230 kV Line (Buena Vista PP Jct 2-Wheeler Ridge PP Jct 2)	MIDWAY 230kV Section 1D & MIDWAY-MIDWAY-R12 #1 line	P2-3	Non-Bus Tie Breaker	93.67	97.81	102.65	NA	NA	NA	77.61	62.52	93.55	57.84	78.07	107.89	102.65	WheelerRidge Junction Project On Hold (TPP 19-20) Short Term : Action Plan
Midway-Wheeler Ridge #2 230 kV Line (Buena Vista PP Jct 2-Wheeler Ridge PP Jct 2)	MIDWAY 230kV - Section 1D & 1E	P2-4	Bus-Tie Breaker	93.73	97.77	102.55	NA	NA	NA	77.77	62.33	93.57	57.62	77.77	107.28	102.54	WheelerRidge Junction Project On Hold (TPP 19-20) Short Term : Action Plan
Fellows-Midsun 115 kV Line (Aera Victory Jct-Midsun)	MIDWAY-TAFT 115kV [2620]	P1	N-1	15.64	15.54	16.99	NA	NA	NA	16.55	79.75	14.83	79.43	57.7	117.67	0.19	Sensitivity Only
Fellows-Midsun 115 kV Line (Aera Victory Jct-Midsun)	MIDWAY 115kV Section 2D	P2-2	Bus	15.52	15.5	16.7	NA	NA	NA	16.66	79.17	14.73	78.77	57.73	117.01	0.19	Sensitivity Only
Fellows-Midsun 115 kV Line (Aera Victory Jct-Midsun)	MIDWAY - 2D 115kV & MIDWAY-RENFRO-TUPMAN line	P2-3	Non-Bus Tie Breaker	15.5	15.49	16.69	NA	NA	NA	16.65	79.16	14.71	78.76	57.72	117.03	0.19	Sensitivity Only
Fellows-Midsun 115 kV Line (Aera Victory Jct-Midsun)	MIDWAY - 2D 115kV & MIDWAY-TEMBLOR line	P2-3	Non-Bus Tie Breaker	15.51	15.48	16.66	NA	NA	NA	16.69	79.4	14.71	79.01	57.96	117.06	0.19	Sensitivity Only
Fellows-Midsun 115 kV Line (Aera Victory Jct-Midsun)	TAFT 115kV - Ring R2 & R3	P2-3	Non-Bus Tie Breaker	14.12	14.31	16.43	NA	NA	NA	17.76	79.26	13.68	79.08	56.06	118.84	0.18	Sensitivity Only
Fellows-Midsun 115 kV Line (Aera Victory Jct-Midsun)	MIDWAY 115kV - Section 2D & 2E	P2-4	Bus-Tie Breaker	15.55	15.62	16.99	NA	NA	NA	15.1	83.74	14.65	83.55	58.33	117.6	0.19	Sensitivity Only

2020-2021 ISO Reliability Assessment - Study Results

Study Area: PG&E Kern

Low Voltages

Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)								Voltage PU (Sensitivity Scenarios)					Project & Potential Mitigation Solutions
				2022 Summer Peak	2025 Summer Peak	2030 Summer Peak	2022 Winter Peak	2025 Winter Peak	2030 Winter Peak	2022 Spring Off-Peak	2025 Spring Off-Peak	2025 SP High CEC Forecast	2025 SpOP Hi Renew & Min Gas Gen	2022 SP Heavy Renewable & Min Gas Gen	2030 Retirement of QF Generation	2030 Summer Peak w/o Facility Rerates	
BSCL_PLD 70kV	MIDWAY-TAFT 115kV [2620]	P1	N-1	1.00	1.00	0.99	NA	NA	NA	1.03	1.04	0.99	0.99	1.04	0.88	0.99	Sensitivity Only
GARDNR T 70kV		P1	N-1	1.01	1.01	1.00	NA	NA	NA	1.03	1.04	1.00	1.00	1.04	0.89	1.00	Sensitivity Only
COPUS_D 70kV		P1	N-1	1.00	1.00	0.99	NA	NA	NA	1.03	1.04	0.99	0.99	1.04	0.88	0.99	Sensitivity Only
COPUS_E 70kV		P1	N-1	1.00	1.00	0.99	NA	NA	NA	1.03	1.04	0.99	0.99	1.04	0.88	0.99	Sensitivity Only
TEMBLOR 70kV		P1	N-1	1.02	1.02	1.01	NA	NA	NA	1.03	1.03	1.01	1.00	1.03	0.91	1.01	Sensitivity Only
Q620TP 70kV		P1	N-1	1.00	1.00	0.99	NA	NA	NA	1.03	1.04	1.00	1.00	1.04	0.89	0.99	Sensitivity Only
Q620 70kV		P1	N-1	1.00	1.00	0.99	NA	NA	NA	1.03	1.04	1.00	1.00	1.04	0.89	0.99	Sensitivity Only
MOCO 70kV		P1	N-1	1.01	1.01	1.00	NA	NA	NA	1.03	1.03	1.01	1.00	1.03	0.90	1.00	Sensitivity Only
CADET 70kV		P1	N-1	1.01	1.01	1.00	NA	NA	NA	1.03	1.03	1.01	1.00	1.03	0.90	1.00	Sensitivity Only
TX_BV_HL 70kV		P1	N-1	1.01	1.01	0.99	NA	NA	NA	1.02	1.03	1.01	1.00	1.03	0.89	0.99	Sensitivity Only
ELK HLLS 70kV		P1	N-1	1.00	1.00	0.98	NA	NA	NA	1.02	1.04	1.00	1.00	1.04	0.88	0.98	Sensitivity Only
CUYAMA2 70kV		P1	N-1	1.00	1.01	1.00	NA	NA	NA	1.03	1.03	1.00	0.99	1.03	0.89	1.00	Sensitivity Only
KNG_ELIS 70kV		P1	N-1	1.01	1.01	1.00	NA	NA	NA	1.02	1.02	1.01	0.99	1.02	0.90	1.00	Sensitivity Only
CELERON 70kV		P1	N-1	1.01	1.01	1.00	NA	NA	NA	1.02	1.02	1.01	0.99	1.02	0.90	1.00	Sensitivity Only
SLR_TANH 70kV		P1	N-1	1.02	1.02	1.01	NA	NA	NA	1.04	1.03	1.02	1.01	1.03	0.91	1.01	Sensitivity Only
KERNRDGE 115kV	MIDWAY-TEMBLOR 115kV [2630]	P1	N-1	1.04	1.03	1.04	NA	NA	NA	1.04	1.04	1.03	1.03	1.04	0.83	1.04	Sensitivity Only
KERNRDGELH 69kV		P1	N-1	0.99	0.99	0.99	NA	NA	NA	0.99	0.99	0.99	0.99	0.99	0.80	0.99	Sensitivity Only
TEMBLOR 115kV		P1	N-1	1.03	1.03	1.03	NA	NA	NA	1.04	1.03	1.03	1.03	1.04	0.84	1.03	Sensitivity Only
CARRIZO 115kV		P1	N-1	1.03	1.03	1.03	NA	NA	NA	1.04	1.04	1.03	1.03	1.04	0.89	1.03	Sensitivity Only
KERNRDGE_G32115kV		P1	N-1	1.04	1.04	1.04	NA	NA	NA	1.04	1.04	1.04	1.04	1.04	0.83	1.04	Sensitivity Only
KERNRDGE_L11115kV		P1	N-1	1.03	1.03	1.03	NA	NA	NA	1.03	1.03	1.03	1.03	1.03	0.83	1.03	Sensitivity Only
KERNRDGE_L34115kV		P1	N-1	1.03	1.03	1.03	NA	NA	NA	1.03	1.03	1.03	1.03	1.03	0.83	1.03	Sensitivity Only
KERNRDGE_S17115kV		P1	N-1	1.03	1.03	1.03	NA	NA	NA	1.03	1.03	1.03	1.03	1.03	0.83	1.03	Sensitivity Only
KERNRDGE_S20115kV		P1	N-1	1.03	1.03	1.03	NA	NA	NA	1.03	1.03	1.03	1.03	1.03	0.83	1.03	Sensitivity Only
KERNRDGE_L18115kV		P1	N-1	1.03	1.03	1.03	NA	NA	NA	1.03	1.03	1.03	1.03	1.03	0.83	1.03	Sensitivity Only
KERNRDGE_L32115kV		P1	N-1	1.03	1.03	1.03	NA	NA	NA	1.03	1.03	1.03	1.03	1.04	0.83	1.03	Sensitivity Only
KERNRDGE_L06115kV		P1	N-1	1.03	1.03	1.03	NA	NA	NA	1.03	1.03	1.03	1.03	1.03	0.83	1.03	Sensitivity Only
KERNRDGE_L0669kV		P1	N-1	0.99	0.99	0.99	NA	NA	NA	0.99	0.99	0.99	0.99	0.99	0.79	0.99	Sensitivity Only
KERNRDGE_L0469kV		P1	N-1	0.99	0.99	0.99	NA	NA	NA	0.99	0.99	0.99	0.99	0.99	0.79	0.99	Sensitivity Only
KERNRDGE_L1969kV		P1	N-1	0.99	0.99	0.99	NA	NA	NA	0.99	0.99	0.99	0.99	0.99	0.80	0.99	Sensitivity Only
BSCSCH T 70kV	MIDWAY 115kV Section 2D	P2-2	Bus	1.00	1.00	0.99	NA	NA	NA	1.03	1.04	0.99	0.99	1.04	0.88	0.99	Sensitivity Only
GARDNER 70kV		P2-2	Bus	1.01	1.01	1.00	NA	NA	NA	1.03	1.04	1.00	1.00	1.04	0.89	1.00	Sensitivity Only
BSCL_PLD 70kV		P2-2	Bus	1.00	1.00	0.99	NA	NA	NA	1.03	1.04	0.99	0.99	1.04	0.88	0.99	Sensitivity Only
GARDNR T 70kV		P2-2	Bus	1.01	1.01	1.00	NA	NA	NA	1.03	1.04	1.00	1.00	1.04	0.89	1.00	Sensitivity Only
COPUS_D 70kV		P2-2	Bus	1.00	1.00	0.99	NA	NA	NA	1.03	1.04	0.99	0.99	1.04	0.88	0.99	Sensitivity Only
COPUS_E 70kV		P2-2	Bus	1.00	1.00	0.99	NA	NA	NA	1.03	1.04	0.99	0.99	1.04	0.88	0.99	Sensitivity Only
Q620TP 70kV		P2-2	Bus	1.00	1.00	0.99	NA	NA	NA	1.03	1.04	1.00	1.00	1.04	0.89	0.99	Sensitivity Only
Q620 70kV		P2-2	Bus	1.00	1.00	0.99	NA	NA	NA	1.03	1.04	1.00	1.00	1.04	0.89	0.99	Sensitivity Only
TX_BV_HL 70kV		P2-2	Bus	1.01	1.01	0.99	NA	NA	NA	1.02	1.03	1.01	1.00	1.03	0.90	0.99	Sensitivity Only
ELK HLLS 70kV		P2-2	Bus	1.00	1.00	0.98	NA	NA	NA	1.02	1.04	1.00	1.00	1.04	0.88	0.98	Sensitivity Only
CUYAMA2 70kV		P2-2	Bus	1.00	1.01	0.99	NA	NA	NA	1.03	1.03	1.00	0.99	1.03	0.90	0.99	Sensitivity Only
BSCSCH T 70kV		P2-3	Non-Bus Tie Breaker	1.00	1.00	0.99	NA	NA	NA	1.03	1.04	0.99	0.99	1.04	0.88	0.99	Sensitivity Only
GARDNER 70kV		P2-3	Non-Bus Tie Breaker	1.01	1.01	1.00	NA	NA	NA	1.03	1.04	1.00	1.00	1.04	0.89	1.00	Sensitivity Only
BSCL_PLD 70kV		P2-3	Non-Bus Tie Breaker	1.00	1.00	0.99	NA	NA	NA	1.03	1.04	0.99	0.99	1.04	0.88	0.99	Sensitivity Only
GARDNR T 70kV		P2-3	Non-Bus Tie Breaker	1.01	1.01	1.00	NA	NA	NA	1.03	1.04	1.00	1.00	1.04	0.89	1.00	Sensitivity Only

2020-2021 ISO Reliability Assessment - Study Results

Study Area: PG&E Kern

Low Voltages

Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)								Voltage PU (Sensitivity Scenarios)					Project & Potential Mitigation Solutions
				2022 Summer Peak	2025 Summer Peak	2030 Summer Peak	2022 Winter Peak	2025 Winter Peak	2030 Winter Peak	2022 Spring Off-Peak	2025 Spring Off-Peak	2025 SP High CEC Forecast	2025 SpOP Hi Renew & Min Gas Gen	2022 SP Heavy Renewable & Min Gas Gen	2030 Retirement of QF Generation	2030 Summer Peak w/o Facility Rerates	
COPUS_D 70kV	MIDWAY - 2D 115kV & MIDWAY-RENFRO-TUPMAN line	P2-3	Non-Bus Tie Breaker	1.00	1.00	0.99	NA	NA	NA	1.03	1.04	0.99	0.99	1.04	0.88	0.99	Sensitivity Only
COPUS_E 70kV		P2-3	Non-Bus Tie Breaker	1.00	1.00	0.99	NA	NA	NA	1.03	1.04	0.99	0.99	1.04	0.88	0.99	Sensitivity Only
Q620TP 70kV		P2-3	Non-Bus Tie Breaker	1.00	1.00	0.99	NA	NA	NA	1.03	1.04	1.00	1.00	1.04	0.89	0.99	Sensitivity Only
Q620 70kV		P2-3	Non-Bus Tie Breaker	1.00	1.00	0.99	NA	NA	NA	1.03	1.04	1.00	1.00	1.04	0.89	0.99	Sensitivity Only
MOCO 70kV		P2-3	Non-Bus Tie Breaker	1.01	1.01	1.00	NA	NA	NA	1.03	1.03	1.01	1.00	1.03	0.90	1.00	Sensitivity Only
TX_BV_HL 70kV		P2-3	Non-Bus Tie Breaker	1.01	1.01	0.99	NA	NA	NA	1.02	1.03	1.01	1.00	1.03	0.90	0.99	Sensitivity Only
ELK HLLS 70kV		P2-3	Non-Bus Tie Breaker	1.00	1.00	0.98	NA	NA	NA	1.02	1.04	1.00	1.00	1.04	0.88	0.98	Sensitivity Only
CUYAMA2 70kV		P2-3	Non-Bus Tie Breaker	1.00	1.01	0.99	NA	NA	NA	1.03	1.03	1.00	0.99	1.03	0.90	0.99	Sensitivity Only
KERNRDGE 115kV	PUMPJACK - 1D 115kV & line	P2-3	Non-Bus Tie Breaker	1.04	1.03	1.04	NA	NA	NA	1.04	1.04	1.03	1.03	1.04	0.83	1.04	Sensitivity Only
KERNRDGELH 69kV		P2-3	Non-Bus Tie Breaker	0.99	0.99	0.99	NA	NA	NA	0.99	0.99	0.99	0.99	0.99	0.80	0.99	Sensitivity Only
TEMBLOR 115kV		P2-3	Non-Bus Tie Breaker	1.03	1.03	1.03	NA	NA	NA	1.04	1.03	1.03	1.03	1.04	0.84	1.03	Sensitivity Only
CARRIZO 115kV		P2-3	Non-Bus Tie Breaker	1.03	1.03	1.03	NA	NA	NA	1.04	1.04	1.03	1.03	1.04	0.89	1.03	Sensitivity Only
KERNRDGE_G32115kV		P2-3	Non-Bus Tie Breaker	1.04	1.04	1.04	NA	NA	NA	1.04	1.04	1.04	1.04	1.04	0.83	1.04	Sensitivity Only
KERNRDGE_L11115kV		P2-3	Non-Bus Tie Breaker	1.03	1.03	1.03	NA	NA	NA	1.03	1.03	1.03	1.03	1.03	0.83	1.03	Sensitivity Only
KERNRDGE_L34115kV		P2-3	Non-Bus Tie Breaker	1.03	1.03	1.03	NA	NA	NA	1.03	1.03	1.03	1.03	1.03	0.83	1.03	Sensitivity Only
KERNRDGE_S17115kV		P2-3	Non-Bus Tie Breaker	1.03	1.03	1.03	NA	NA	NA	1.03	1.03	1.03	1.03	1.03	0.83	1.03	Sensitivity Only
KERNRDGE_S20115kV		P2-3	Non-Bus Tie Breaker	1.03	1.03	1.03	NA	NA	NA	1.03	1.03	1.03	1.03	1.03	0.83	1.03	Sensitivity Only
KERNRDGE_L18115kV		P2-3	Non-Bus Tie Breaker	1.03	1.03	1.03	NA	NA	NA	1.03	1.03	1.03	1.03	1.03	0.83	1.03	Sensitivity Only
KERNRDGE_L32115kV		P2-3	Non-Bus Tie Breaker	1.03	1.03	1.03	NA	NA	NA	1.03	1.03	1.03	1.03	1.04	0.83	1.03	Sensitivity Only
KERNRDGE_L06115kV		P2-3	Non-Bus Tie Breaker	1.03	1.03	1.03	NA	NA	NA	1.03	1.03	1.03	1.03	1.03	0.83	1.03	Sensitivity Only
KERNRDGE_L0669kV		P2-3	Non-Bus Tie Breaker	0.99	0.99	0.99	NA	NA	NA	0.99	0.99	0.99	0.99	0.99	0.79	0.99	Sensitivity Only
KERNRDGE_L0469kV		P2-3	Non-Bus Tie Breaker	0.99	0.99	0.99	NA	NA	NA	0.99	0.99	0.99	0.99	0.99	0.79	0.99	Sensitivity Only
KERNRDGE_L1969kV		P2-3	Non-Bus Tie Breaker	0.99	0.99	0.99	NA	NA	NA	0.99	0.99	0.99	0.99	0.99	0.80	0.99	Sensitivity Only
BSCSCH T 70kV	TAFT 115kV - Ring R2 & R3	P2-3	Non-Bus Tie Breaker	0.98	0.98	0.97	NA	NA	NA	1.02	1.04	0.97	0.98	1.04	0.85	0.97	Sensitivity Only
TAFT_SW_TAFC70kV		P2-3	Non-Bus Tie Breaker	1.01	1.01	1.00	NA	NA	NA	1.02	1.02	1.00	0.99	1.02	0.89	1.00	Sensitivity Only
MCKTTRCK 70kV		P2-3	Non-Bus Tie Breaker	1.00	1.00	0.99	NA	NA	NA	1.02	1.02	0.99	0.98	1.02	0.88	0.99	Sensitivity Only
NORTHMWY 70kV		P2-3	Non-Bus Tie Breaker	1.00	1.00	0.99	NA	NA	NA	1.02	1.02	0.99	0.98	1.02	0.88	0.99	Sensitivity Only
MDWY_P_S 70kV		P2-3	Non-Bus Tie Breaker	1.00	1.00	0.99	NA	NA	NA	1.02	1.02	0.99	0.98	1.02	0.88	0.99	Sensitivity Only
TAFT A 70kV		P2-3	Non-Bus Tie Breaker	1.01	1.01	1.00	NA	NA	NA	1.02	1.02	1.00	0.99	1.02	0.89	1.00	Sensitivity Only
TAFT A_J 70kV		P2-3	Non-Bus Tie Breaker	1.01	1.01	1.00	NA	NA	NA	1.02	1.02	1.00	0.99	1.02	0.88	1.00	Sensitivity Only
MARICOPA 70kV		P2-3	Non-Bus Tie Breaker	1.00	1.00	0.99	NA	NA	NA	1.02	1.02	0.99	0.98	1.02	0.87	0.99	Sensitivity Only
MOCO_JCT 70kV		P2-3	Non-Bus Tie Breaker	1.00	1.00	0.99	NA	NA	NA	1.02	1.02	0.99	0.98	1.02	0.87	0.99	Sensitivity Only
GARDNER 70kV		P2-3	Non-Bus Tie Breaker	0.99	0.99	0.98	NA	NA	NA	1.02	1.03	0.98	0.98	1.03	0.86	0.98	Sensitivity Only
BRY_PTLM 70kV		P2-3	Non-Bus Tie Breaker	1.01	1.01	1.00	NA	NA	NA	1.02	1.02	1.00	0.99	1.02	0.88	1.00	Sensitivity Only
BSCL_PLD 70kV		P2-3	Non-Bus Tie Breaker	0.98	0.98	0.97	NA	NA	NA	1.02	1.04	0.97	0.98	1.04	0.85	0.97	Sensitivity Only
GARDNR T 70kV		P2-3	Non-Bus Tie Breaker	0.99	0.99	0.98	NA	NA	NA	1.02	1.03	0.98	0.98	1.03	0.86	0.98	Sensitivity Only
COPUS_D 70kV		P2-3	Non-Bus Tie Breaker	0.98	0.98	0.97	NA	NA	NA	1.02	1.04	0.97	0.98	1.04	0.85	0.97	Sensitivity Only
COPUS_E 70kV		P2-3	Non-Bus Tie Breaker	0.98	0.98	0.97	NA	NA	NA	1.02	1.04	0.97	0.98	1.04	0.85	0.97	Sensitivity Only
TEMBLOR 70kV		P2-3	Non-Bus Tie Breaker	1.00	1.00	0.99	NA	NA	NA	1.01	1.01	0.99	0.98	1.01	0.88	0.99	Sensitivity Only
Q620TP 70kV		P2-3	Non-Bus Tie Breaker	0.99	0.99	0.98	NA	NA	NA	1.02	1.03	0.98	0.98	1.03	0.86	0.98	Sensitivity Only
Q620 70kV		P2-3	Non-Bus Tie Breaker	0.99	0.99	0.98	NA	NA	NA	1.02	1.03	0.98	0.98	1.03	0.86	0.98	Sensitivity Only
TAFT_SW_TAFM70kV		P2-3	Non-Bus Tie Breaker	1.01	1.01	1.00	NA	NA	NA	1.02	1.02	1.00	0.99	1.02	0.89	1.00	Sensitivity Only
MOCO 70kV		P2-3	Non-Bus Tie Breaker	0.99	1.00	0.99	NA	NA	NA	1.02	1.02	0.99	0.98	1.02	0.86	0.99	Sensitivity Only
CADET 70kV		P2-3	Non-Bus Tie Breaker	1.00	1.00	0.99	NA	NA	NA	1.02	1.02	0.99	0.98	1.02	0.87	0.99	Sensitivity Only
TX_BV_HL 70kV		P2-3	Non-Bus Tie Breaker	0.99	0.99	0.97	NA	NA	NA	1.00	1.01	0.98	0.98	1.02	0.86	0.97	Sensitivity Only

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Study Area: PG&E Kern

Low Voltages

Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)								Voltage PU (Sensitivity Scenarios)					Project & Potential Mitigation Solutions
				2022 Summer Peak	2025 Summer Peak	2030 Summer Peak	2022 Winter Peak	2025 Winter Peak	2030 Winter Peak	2022 Spring Off-Peak	2025 Spring Off-Peak	2025 SP High CEC Forecast	2025 SpOP Hi Renew & Min Gas Gen	2022 SP Heavy Renewable & Min Gas Gen	2030 Retirement of QF Generation	2030 Summer Peak w/o Facility Rerates	
ELK HLLS 70kV		P2-3	Non-Bus Tie Breaker	0.98	0.98	0.96	NA	NA	NA	1.00	1.02	0.98	0.98	1.02	0.85	0.96	Sensitivity Only
CUYAMA2 70kV		P2-3	Non-Bus Tie Breaker	0.99	0.99	0.98	NA	NA	NA	1.01	1.02	0.98	0.97	1.02	0.86	0.98	Sensitivity Only
KNG_ELIS 70kV		P2-3	Non-Bus Tie Breaker	0.99	1.00	0.99	NA	NA	NA	1.01	1.01	0.98	0.97	1.01	0.87	0.99	Sensitivity Only
CELERON 70kV		P2-3	Non-Bus Tie Breaker	0.99	1.00	0.99	NA	NA	NA	1.01	1.01	0.98	0.97	1.01	0.87	0.99	Sensitivity Only
SLR_TANH 70kV		P2-3	Non-Bus Tie Breaker	1.01	1.01	1.00	NA	NA	NA	1.02	1.02	1.00	0.99	1.02	0.88	1.00	Sensitivity Only
BSCSCH T 70kV	MIDWAY 115kV - Section 2D & 2E	P2-4	Bus-Tie Breaker	1.00	1.00	0.99	NA	NA	NA	1.03	1.04	0.99	1.00	1.04	0.88	0.99	Sensitivity Only
MARICOPA 70kV		P2-4	Bus-Tie Breaker	1.01	1.01	1.00	NA	NA	NA	1.03	1.03	1.01	1.00	1.03	0.90	1.00	Sensitivity Only
MOCO_JCT 70kV		P2-4	Bus-Tie Breaker	1.01	1.01	1.00	NA	NA	NA	1.03	1.03	1.01	1.00	1.03	0.90	1.00	Sensitivity Only
GARDNER 70kV		P2-4	Bus-Tie Breaker	1.01	1.01	1.00	NA	NA	NA	1.03	1.04	1.00	1.00	1.04	0.89	1.00	Sensitivity Only
BSCL_PLD 70kV		P2-4	Bus-Tie Breaker	1.00	1.00	0.99	NA	NA	NA	1.03	1.04	0.99	0.99	1.04	0.88	0.99	Sensitivity Only
GARDNR T 70kV		P2-4	Bus-Tie Breaker	1.01	1.01	1.00	NA	NA	NA	1.03	1.04	1.00	1.00	1.04	0.89	1.00	Sensitivity Only
COPUS_D 70kV		P2-4	Bus-Tie Breaker	1.00	1.00	0.99	NA	NA	NA	1.03	1.04	0.99	0.99	1.04	0.88	0.99	Sensitivity Only
COPUS_E 70kV		P2-4	Bus-Tie Breaker	1.00	1.00	0.99	NA	NA	NA	1.03	1.04	0.99	0.99	1.04	0.88	0.99	Sensitivity Only
Q620TP 70kV		P2-4	Bus-Tie Breaker	1.00	1.00	0.99	NA	NA	NA	1.03	1.04	1.00	1.00	1.04	0.89	0.99	Sensitivity Only
Q620 70kV		P2-4	Bus-Tie Breaker	1.00	1.00	0.99	NA	NA	NA	1.03	1.04	1.00	1.00	1.04	0.89	0.99	Sensitivity Only
MOCO 70kV		P2-4	Bus-Tie Breaker	1.01	1.01	1.00	NA	NA	NA	1.03	1.03	1.01	1.00	1.03	0.90	1.00	Sensitivity Only
CADET 70kV		P2-4	Bus-Tie Breaker	1.01	1.01	1.00	NA	NA	NA	1.03	1.03	1.01	1.00	1.03	0.90	1.00	Sensitivity Only
TX_BV_HL 70kV		P2-4	Bus-Tie Breaker	1.01	1.01	0.99	NA	NA	NA	1.02	1.03	1.01	1.00	1.03	0.89	0.99	Sensitivity Only
ELK HLLS 70kV		P2-4	Bus-Tie Breaker	1.00	1.00	0.98	NA	NA	NA	1.02	1.03	1.00	1.00	1.04	0.88	0.98	Sensitivity Only
CUYAMA2 70kV		P2-4	Bus-Tie Breaker	1.00	1.01	1.00	NA	NA	NA	1.03	1.03	1.00	0.99	1.03	0.89	1.00	Sensitivity Only
STCKDLEA 230kV	MIDWAY 230kV - Section 2E & 2D	P2-4	Bus-Tie Breaker	>0.9	0.98	0.96	NA	NA	NA	>0.9	1.00	0.99	NA	0.99	0.89	0.96	Sensitivity Only
STCKDLEB 230kV		P2-4	Bus-Tie Breaker	>0.9	0.98	0.96	NA	NA	NA	>0.9	1.00	0.99	NA	0.99	0.89	0.96	Sensitivity Only
KERN PP 230kV		P2-4	Bus-Tie Breaker	>0.9	0.98	0.96	NA	NA	NA	>0.9	0.99	0.99	NA	0.98	0.89	0.96	Sensitivity Only
OGLE TAP 115kV		P2-4	Bus-Tie Breaker	>0.9	1.03	1.02	NA	NA	NA	>0.9	1.04	1.03	NA	1.04	0.88	1.02	Sensitivity Only
LERDO 115kV		P2-4	Bus-Tie Breaker	>0.9	1.02	1.00	NA	NA	NA	>0.9	1.04	1.03	NA	1.04	0.88	1.01	Sensitivity Only
OGLE JCT 115kV		P2-4	Bus-Tie Breaker	>0.9	1.03	1.01	NA	NA	NA	>0.9	1.04	1.03	NA	1.04	0.88	1.01	Sensitivity Only
LRDO JCT 115kV		P2-4	Bus-Tie Breaker	>0.9	1.02	1.00	NA	NA	NA	>0.9	1.04	1.02	NA	1.04	0.90	1.00	Sensitivity Only
DEXZEL 115kV		P2-4	Bus-Tie Breaker	>0.9	1.02	1.00	NA	NA	NA	>0.9	1.04	1.02	NA	1.04	0.89	1.00	Sensitivity Only
KERN OIL 115kV		P2-4	Bus-Tie Breaker	>0.9	1.02	1.00	NA	NA	NA	>0.9	1.04	1.02	NA	1.04	0.89	1.00	Sensitivity Only
POSOMTJT 115kV		P2-4	Bus-Tie Breaker	>0.9	1.01	1.00	NA	NA	NA	>0.9	1.04	1.02	NA	1.04	0.89	1.00	Sensitivity Only
DSCVRYTP 115kV		P2-4	Bus-Tie Breaker	>0.9	1.02	1.00	NA	NA	NA	>0.9	1.04	1.02	NA	1.04	0.89	1.00	Sensitivity Only
RASMSNTP 115kV		P2-4	Bus-Tie Breaker	>0.9	1.02	1.01	NA	NA	NA	>0.9	1.04	1.02	NA	1.04	0.89	1.01	Sensitivity Only
RASMUSEN 115kV		P2-4	Bus-Tie Breaker	>0.9	1.02	1.01	NA	NA	NA	>0.9	1.04	1.02	NA	1.04	0.89	1.01	Sensitivity Only
DISCOVER 115kV		P2-4	Bus-Tie Breaker	>0.9	1.02	1.01	NA	NA	NA	>0.9	1.04	1.02	NA	1.04	0.89	1.01	Sensitivity Only
KRN OL J 115kV		P2-4	Bus-Tie Breaker	>0.9	1.01	1.00	NA	NA	NA	>0.9	1.04	1.02	NA	1.03	0.90	1.00	Sensitivity Only
PTRL JCT 115kV		P2-4	Bus-Tie Breaker	>0.9	1.02	1.00	NA	NA	NA	>0.9	1.04	1.02	NA	1.04	0.90	1.00	Sensitivity Only
CALWATER 115kV		P2-4	Bus-Tie Breaker	>0.9	1.01	1.00	NA	NA	NA	>0.9	1.04	1.02	NA	1.04	0.89	1.00	Sensitivity Only
CALWTRTP 115kV		P2-4	Bus-Tie Breaker	>0.9	1.01	1.00	NA	NA	NA	>0.9	1.04	1.02	NA	1.04	0.89	1.00	Sensitivity Only
COLUMBUS 115kV		P2-4	Bus-Tie Breaker	>0.9	1.01	1.00	NA	NA	NA	>0.9	1.04	1.02	NA	1.03	0.89	1.00	Sensitivity Only
BEAR MTN 115kV		P2-4	Bus-Tie Breaker	>0.9	1.01	1.00	NA	NA	NA	>0.9	1.04	1.02	NA	1.04	0.89	1.00	Sensitivity Only
BEAR TAP 115kV		P2-4	Bus-Tie Breaker	>0.9	1.01	1.00	NA	NA	NA	>0.9	1.04	1.02	NA	1.04	0.90	1.00	Sensitivity Only
MAGUDN J 115kV		P2-4	Bus-Tie Breaker	>0.9	0.99	0.99	NA	NA	NA	>0.9	1.03	1.01	NA	1.03	0.88	0.99	Sensitivity Only
MAGUNDEN 115kV		P2-4	Bus-Tie Breaker	>0.9	0.99	0.99	NA	NA	NA	>0.9	1.03	1.00	NA	1.03	0.88	0.99	Sensitivity Only
BOLTHSE 115kV		P2-4	Bus-Tie Breaker	>0.9	0.99	0.98	NA	NA	NA	>0.9	1.03	1.01	NA	1.03	0.88	0.98	Sensitivity Only
GODN_BER 115kV		P2-4	Bus-Tie Breaker	>0.9	1.02	1.00	NA	NA	NA	>0.9	1.04	1.02	NA	1.04	0.90	1.00	Sensitivity Only

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Study Area: PG&E Kern

Low Voltages

California ISO

Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)								Voltage PU (Sensitivity Scenarios)					Project & Potential Mitigation Solutions
				2022 Summer Peak	2025 Summer Peak	2030 Summer Peak	2022 Winter Peak	2025 Winter Peak	2030 Winter Peak	2022 Spring Off-Peak	2025 Spring Off-Peak	2025 SP High CEC Forecast	2025 SpOP Hi Renew & Min Gas Gen	2022 SP Heavy Renewable & Min Gas Gen	2030 Retirement of QF Generation	2030 Summer Peak w/o Facility Rerates	
KRNFRNTT 115kV		P2-4	Bus-Tie Breaker	>0.9	1.01	1.00	NA	NA	NA	>0.9	1.04	1.02	NA	1.03	0.89	1.00	Sensitivity Only
CAWELO C 115kV		P2-4	Bus-Tie Breaker	>0.9	1.03	1.01	NA	NA	NA	>0.9	1.04	1.03	NA	1.04	0.88	1.01	Sensitivity Only
KERNFRNT 115kV		P2-4	Bus-Tie Breaker	>0.9	1.01	0.99	NA	NA	NA	>0.9	1.04	1.01	NA	1.03	0.88	0.99	Sensitivity Only
POSO MT 115kV		P2-4	Bus-Tie Breaker	>0.9	1.00	0.99	NA	NA	NA	>0.9	1.03	1.00	NA	1.03	0.88	0.99	Sensitivity Only
VEDDER 115kV		P2-4	Bus-Tie Breaker	>0.9	1.00	0.99	NA	NA	NA	>0.9	1.03	1.00	NA	1.03	0.88	0.99	Sensitivity Only
7STNDRD 115kV	7TH STANDARD-KERN 115kV [1981] & KERN-MAGUNDEN-WITCO115kV[1970]	P6	N-1-1	>0.9	>0.9	>0.9	NA	NA	NA	>0.9	>0.9	>0.9	>0.9	>0.9	0.85	>0.9	Sensitivity Only
OGLE TAP 115kV		P6	N-1-1	>0.9	>0.9	>0.9	NA	NA	NA	>0.9	>0.9	>0.9	>0.9	>0.9	0.84	>0.9	Sensitivity Only
LERDO 115kV		P6	N-1-1	>0.9	>0.9	>0.9	NA	NA	NA	>0.9	>0.9	>0.9	>0.9	>0.9	0.84	>0.9	Sensitivity Only
OGLE JCT 115kV		P6	N-1-1	>0.9	>0.9	>0.9	NA	NA	NA	>0.9	>0.9	>0.9	>0.9	>0.9	0.84	>0.9	Sensitivity Only
LRDO JCT 115kV		P6	N-1-1	>0.9	>0.9	>0.9	NA	NA	NA	>0.9	>0.9	>0.9	>0.9	>0.9	0.85	>0.9	Sensitivity Only
DEXZEL 115kV		P6	N-1-1	>0.9	>0.9	>0.9	NA	NA	NA	>0.9	>0.9	>0.9	>0.9	>0.9	0.86	>0.9	Sensitivity Only
KERN OIL 115kV		P6	N-1-1	>0.9	>0.9	>0.9	NA	NA	NA	>0.9	>0.9	>0.9	>0.9	>0.9	0.86	>0.9	Sensitivity Only
POSOMTJT 115kV		P6	N-1-1	>0.9	>0.9	>0.9	NA	NA	NA	>0.9	>0.9	>0.9	>0.9	>0.9	0.87	>0.9	Sensitivity Only
DSCVRYTP 115kV		P6	N-1-1	>0.9	>0.9	>0.9	NA	NA	NA	>0.9	>0.9	>0.9	>0.9	>0.9	0.86	>0.9	Sensitivity Only
RASMSNTP 115kV		P6	N-1-1	>0.9	>0.9	>0.9	NA	NA	NA	>0.9	>0.9	>0.9	>0.9	>0.9	0.86	>0.9	Sensitivity Only
RASMUSEN 115kV		P6	N-1-1	>0.9	>0.9	>0.9	NA	NA	NA	>0.9	>0.9	>0.9	>0.9	>0.9	0.86	>0.9	Sensitivity Only
DISCOVER 115kV		P6	N-1-1	>0.9	>0.9	>0.9	NA	NA	NA	>0.9	>0.9	>0.9	>0.9	>0.9	0.86	>0.9	Sensitivity Only
PTRL JCT 115kV		P6	N-1-1	>0.9	>0.9	>0.9	NA	NA	NA	>0.9	>0.9	>0.9	>0.9	>0.9	0.89	>0.9	Sensitivity Only
LIVE OAK 115kV		P6	N-1-1	>0.9	>0.9	>0.9	NA	NA	NA	>0.9	>0.9	>0.9	>0.9	>0.9	0.90	>0.9	Sensitivity Only
GODN_BER 115kV		P6	N-1-1	>0.9	>0.9	>0.9	NA	NA	NA	>0.9	>0.9	>0.9	>0.9	>0.9	0.86	>0.9	Sensitivity Only
KRNFRNTT 115kV		P6	N-1-1	>0.9	>0.9	>0.9	NA	NA	NA	>0.9	>0.9	>0.9	>0.9	>0.9	0.87	>0.9	Sensitivity Only
CAWELO C 115kV		P6	N-1-1	>0.9	>0.9	>0.9	NA	NA	NA	>0.9	>0.9	>0.9	>0.9	>0.9	0.84	>0.9	Sensitivity Only
KERNFRNT 115kV		P6	N-1-1	>0.9	>0.9	>0.9	NA	NA	NA	>0.9	>0.9	>0.9	>0.9	>0.9	0.86	>0.9	Sensitivity Only
POSO MT 115kV		P6	N-1-1	>0.9	>0.9	>0.9	NA	NA	NA	>0.9	>0.9	>0.9	>0.9	>0.9	0.86	>0.9	Sensitivity Only
VEDDER 115kV		P6	N-1-1	>0.9	>0.9	>0.9	NA	NA	NA	>0.9	>0.9	>0.9	>0.9	>0.9	0.86	>0.9	Sensitivity Only
STCKDLEA 230kV		P7	DCTL	0.96	0.97	0.95	NA	NA	NA	1.02	1.00	0.98	0.95	1.00	0.86	0.95	Sensitivity Only
STCKDLEB 230kV		P7	DCTL	0.96	0.97	0.95	NA	NA	NA	1.02	1.00	0.98	0.95	1.00	0.86	0.95	Sensitivity Only
KERN PP 230kV		P7	DCTL	0.96	0.97	0.95	NA	NA	NA	1.02	1.00	0.99	0.96	1.00	0.86	0.95	Sensitivity Only
BKRSFLDA 230kV		P7	DCTL	0.96	0.98	0.96	NA	NA	NA	1.02	1.00	0.98	0.95	0.99	0.88	0.96	Sensitivity Only
BKRSFLDB 230kV		P7	DCTL	0.96	0.98	0.96	NA	NA	NA	1.02	1.00	0.99	0.95	0.99	0.88	0.96	Sensitivity Only
DOUBLECJ 115kV		P7	DCTL	1.03	1.03	1.02	NA	NA	NA	1.04	1.05	1.04	1.02	1.05	0.88	1.02	Sensitivity Only
BDGRCRKJ 115kV		P7	DCTL	1.03	1.03	1.02	NA	NA	NA	1.04	1.05	1.04	1.02	1.05	0.88	1.02	Sensitivity Only
HIGHSRA 115kV		P7	DCTL	1.03	1.03	1.02	NA	NA	NA	1.04	1.05	1.04	1.03	1.05	0.88	1.02	Sensitivity Only
BDGRCRKP 115kV		P7	DCTL	1.03	1.03	1.02	NA	NA	NA	1.04	1.05	1.04	1.02	1.05	0.88	1.02	Sensitivity Only
WESTPARK 115kV		P7	DCTL	1.01	1.01	0.99	NA	NA	NA	1.03	1.05	1.03	1.00	1.04	0.88	0.99	Sensitivity Only
7STNDRD 115kV		P7	DCTL	1.00	1.01	0.99	NA	NA	NA	1.03	1.05	1.02	1.00	1.05	0.87	0.99	Sensitivity Only
OGLE TAP 115kV		P7	DCTL	1.02	1.03	1.01	NA	NA	NA	1.04	1.04	1.03	1.02	1.04	0.85	1.01	Sensitivity Only
LERDO 115kV		P7	DCTL	1.01	1.02	1.00	NA	NA	NA	1.03	1.04	1.02	1.01	1.04	0.85	1.00	Sensitivity Only
OGLE JCT 115kV		P7	DCTL	1.02	1.03	1.01	NA	NA	NA	1.04	1.04	1.03	1.02	1.04	0.85	1.01	Sensitivity Only
LRDO JCT 115kV		P7	DCTL	1.00	1.01	1.00	NA	NA	NA	1.03	1.05	1.02	1.00	1.04	0.86	1.00	Sensitivity Only
DEXZEL 115kV		P7	DCTL	1.00	1.01	0.99	NA	NA	NA	1.03	1.04	1.02	1.00	1.04	0.86	0.99	Sensitivity Only
KERN OIL 115kV		P7	DCTL	1.00	1.01	0.99	NA	NA	NA	1.03	1.04	1.02	1.00	1.04	0.86	0.99	Sensitivity Only
POSOMTJT 115kV		P7	DCTL	1.00	1.01	0.99	NA	NA	NA	1.03	1.04	1.02	1.00	1.04	0.86	0.99	Sensitivity Only
DSCVRYTP 115kV		P7	DCTL	1.00	1.01	0.99	NA	NA	NA	1.03	1.04	1.02	1.00	1.04	0.86	0.99	Sensitivity Only
RASMSNTP 115kV		P7	DCTL	1.00	1.01	1.00	NA	NA	NA	1.03	1.04	1.02	1.00	1.04	0.86	1.00	Sensitivity Only

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Low Voltages

Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)								Voltage PU (Sensitivity Scenarios)					Project & Potential Mitigation Solutions
				2022 Summer Peak	2025 Summer Peak	2030 Summer Peak	2022 Winter Peak	2025 Winter Peak	2030 Winter Peak	2022 Spring Off-Peak	2025 Spring Off-Peak	2025 SP High CEC Forecast	2025 SpOP Hi Renew & Min Gas Gen	2022 SP Heavy Renewable & Min Gas Gen	2030 Retirement of QF Generation	2030 Summer Peak w/o Facility Rerates	
RASMUSEN 115kV	Midway-Kern No. 3 & Midway-Kern No. 4 230 kV Lines	P7	DCTL	1.00	1.01	1.00	NA	NA	NA	1.03	1.04	1.02	1.00	1.04	0.86	1.00	Sensitivity Only
DISCOVER 115kV		P7	DCTL	1.00	1.01	1.00	NA	NA	NA	1.03	1.04	1.02	1.00	1.04	0.86	1.00	Sensitivity Only
KRN OL J 115kV		P7	DCTL	1.00	1.01	0.99	NA	NA	NA	1.03	1.04	1.02	1.00	1.04	0.87	0.99	Sensitivity Only
PTRL JCT 115kV		P7	DCTL	1.00	1.01	1.00	NA	NA	NA	1.03	1.04	1.02	1.00	1.04	0.86	1.00	Sensitivity Only
LIVE OAK 115kV		P7	DCTL	1.01	1.01	1.00	NA	NA	NA	1.03	1.05	1.02	1.00	1.04	0.87	1.00	Sensitivity Only
CALWATER 115kV		P7	DCTL	1.00	1.00	0.99	NA	NA	NA	1.02	1.04	1.02	0.99	1.04	0.86	0.99	Sensitivity Only
PSE-3 115kV		P7	DCTL	1.03	1.03	1.02	NA	NA	NA	1.04	1.05	1.04	1.02	1.05	0.88	1.02	Sensitivity Only
CALWTRTP 115kV		P7	DCTL	1.00	1.00	0.99	NA	NA	NA	1.03	1.04	1.02	0.99	1.04	0.86	0.99	Sensitivity Only
COLUMBUS 115kV		P7	DCTL	1.00	1.00	0.99	NA	NA	NA	1.02	1.04	1.02	0.99	1.04	0.86	0.99	Sensitivity Only
BEAR MTN 115kV		P7	DCTL	1.00	1.00	0.99	NA	NA	NA	1.03	1.04	1.02	0.99	1.04	0.86	0.99	Sensitivity Only
BEAR TAP 115kV		P7	DCTL	1.00	1.00	0.99	NA	NA	NA	1.03	1.04	1.02	0.99	1.04	0.86	0.99	Sensitivity Only
MAGUDN J 115kV		P7	DCTL	0.99	0.99	0.98	NA	NA	NA	1.02	1.04	1.01	0.98	1.03	0.85	0.98	Sensitivity Only
MAGUNDEN 115kV		P7	DCTL	0.98	0.99	0.98	NA	NA	NA	1.02	1.04	1.00	0.97	1.04	0.85	0.98	Sensitivity Only
BOLTHSE 115kV		P7	DCTL	0.98	0.98	0.98	NA	NA	NA	1.01	1.03	1.00	0.98	1.03	0.85	0.98	Sensitivity Only
GRIMWAY 115kV		P7	DCTL	1.03	1.02	0.99	NA	NA	NA	1.03	1.04	1.04	1.03	1.04	0.90	0.99	Sensitivity Only
STOCKDLE 115kV		P7	DCTL	1.01	1.02	0.99	NA	NA	NA	1.03	1.05	1.03	1.01	1.04	0.88	0.99	Sensitivity Only
STCKDLJ 115kV		P7	DCTL	1.01	1.02	1.00	NA	NA	NA	1.03	1.05	1.03	1.01	1.04	0.89	1.00	Sensitivity Only
GODN_BER 115kV		P7	DCTL	1.00	1.01	0.99	NA	NA	NA	1.03	1.04	1.02	1.00	1.04	0.86	0.99	Sensitivity Only
KERN PWR 115kV		P7	DCTL	1.01	1.02	1.00	NA	NA	NA	1.03	1.05	1.03	1.00	1.04	0.89	1.00	Sensitivity Only
TEVISJ1 115kV		P7	DCTL	1.01	1.02	0.99	NA	NA	NA	1.03	1.05	1.03	1.01	1.04	0.88	0.99	Sensitivity Only
TEVIS 115kV		P7	DCTL	1.01	1.02	0.99	NA	NA	NA	1.03	1.04	1.03	1.01	1.04	0.88	0.99	Sensitivity Only
TEVISJ2 115kV		P7	DCTL	1.01	1.02	1.00	NA	NA	NA	1.03	1.05	1.03	1.01	1.04	0.89	1.00	Sensitivity Only
TEVIS2 115kV		P7	DCTL	1.01	1.02	0.99	NA	NA	NA	1.03	1.05	1.03	1.01	1.05	0.88	0.99	Sensitivity Only
LAMONT 115kV		P7	DCTL	1.03	1.03	1.00	NA	NA	NA	1.03	1.04	1.03	1.03	1.04	0.90	1.00	Sensitivity Only
REGULUS 115kV		P7	DCTL	1.03	1.03	1.00	NA	NA	NA	1.03	1.04	1.03	1.03	1.04	0.90	1.00	Sensitivity Only
KRNFRNTT 115kV		P7	DCTL	1.00	1.01	0.99	NA	NA	NA	1.02	1.04	1.01	0.99	1.04	0.86	0.99	Sensitivity Only
CAWELO C 115kV		P7	DCTL	1.02	1.03	1.01	NA	NA	NA	1.04	1.04	1.03	1.02	1.04	0.85	1.01	Sensitivity Only
KERNFRNT 115kV		P7	DCTL	0.99	1.00	0.98	NA	NA	NA	1.02	1.04	1.01	0.99	1.04	0.85	0.98	Sensitivity Only
EANDBJT 115kV		P7	DCTL	1.02	1.03	1.02	NA	NA	NA	1.03	1.05	1.03	1.02	1.05	0.88	1.02	Sensitivity Only
EANDB 115kV		P7	DCTL	1.02	1.03	1.02	NA	NA	NA	1.03	1.05	1.03	1.02	1.05	0.88	1.02	Sensitivity Only
KERNWATR 115kV		P7	DCTL	1.00	1.01	0.99	NA	NA	NA	1.03	1.04	1.02	1.00	1.04	0.87	0.99	Sensitivity Only
KTL_SF_J1 115kV		P7	DCTL	1.02	1.02	0.99	NA	NA	NA	1.03	1.04	1.03	1.02	1.04	0.89	0.99	Sensitivity Only
ARVINJ1 115kV		P7	DCTL	1.02	1.02	1.00	NA	NA	NA	1.03	1.04	1.03	1.02	1.04	0.89	1.00	Sensitivity Only
ARVIN_ED 115kV		P7	DCTL	1.02	1.02	0.99	NA	NA	NA	1.03	1.04	1.03	1.02	1.04	0.89	0.99	Sensitivity Only
ARVINJ2 115kV		P7	DCTL	1.02	1.02	1.00	NA	NA	NA	1.03	1.04	1.03	1.02	1.04	0.89	1.00	Sensitivity Only
ROSEDAL 115kV		P7	DCTL	1.01	1.02	1.00	NA	NA	NA	1.03	1.05	1.03	1.00	1.05	0.89	1.00	Sensitivity Only
TX_ROSDL 115kV		P7	DCTL	1.01	1.02	1.00	NA	NA	NA	1.03	1.05	1.03	1.00	1.05	0.89	1.00	Sensitivity Only
POSO MT 115kV		P7	DCTL	0.98	0.99	0.98	NA	NA	NA	1.02	1.04	1.00	0.98	1.03	0.85	0.98	Sensitivity Only
VEDDER 115kV		P7	DCTL	0.98	0.99	0.98	NA	NA	NA	1.01	1.04	1.00	0.98	1.03	0.85	0.98	Sensitivity Only
SDA15199 115kV		P7	DCTL	1.02	1.02	0.99	NA	NA	NA	1.03	1.04	1.03	1.02	1.04	0.89	0.99	Sensitivity Only
MC FRLND 70kV		P7	DCTL	1.04	1.04	0.98	NA	NA	NA	1.01	1.01	1.04	1.06	1.01	0.89	0.98	Sensitivity Only
WHEELER 230kV		P7	DCTL	>0.9	>0.9	>0.9	NA	NA	NA	0.74	1.08	>0.9	>0.9	1.11	>0.9	>0.9	Utilize Summer Setup for summer and non-summer months
TECUYA T 70kV		P7	DCTL	>0.9	>0.9	>0.9	NA	NA	NA	0.79	1.04	>0.9	>0.9	1.04	>0.9	>0.9	Utilize Summer Setup for summer and non-summer months

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Low Voltages

Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)								Voltage PU (Sensitivity Scenarios)					Project & Potential Mitigation Solutions
				2022 Summer Peak	2025 Summer Peak	2030 Summer Peak	2022 Winter Peak	2025 Winter Peak	2030 Winter Peak	2022 Spring Off-Peak	2025 Spring Off-Peak	2025 SP High CEC Forecast	2025 SpOP Hi Renew & Min Gas Gen	2022 SP Heavy Renewable & Min Gas Gen	2030 Retirement of QF Generation	2030 Summer Peak w/o Facility Rerates	
GRMMWY T 70kV	Midway-Wheeler Ridge #1 & #2 230 kV Lines	P7	DCTL	>0.9	>0.9	>0.9	NA	NA	NA	0.82	1.03	>0.9	>0.9	1.04	>0.9	>0.9	Utilize Summer Setup for summer and non-summer months
WHEELER 115kV		P7	DCTL	>0.9	>0.9	>0.9	NA	NA	NA	0.78	1.03	>0.9	>0.9	1.03	>0.9	>0.9	Utilize Summer Setup for summer and non-summer months
ADOBESWSTA 115kV		P7	DCTL	>0.9	>0.9	>0.9	NA	NA	NA	0.78	1.03	>0.9	>0.9	1.03	>0.9	>0.9	Utilize Summer Setup for summer and non-summer months
LAKEVIEW 70kV		P7	DCTL	>0.9	>0.9	>0.9	NA	NA	NA	0.79	1.04	>0.9	>0.9	1.04	>0.9	>0.9	Utilize Summer Setup for summer and non-summer months
WHEELER 70kV		P7	DCTL	>0.9	>0.9	>0.9	NA	NA	NA	0.79	1.04	>0.9	>0.9	1.04	>0.9	>0.9	Utilize Summer Setup for summer and non-summer months
TEJON 70kV		P7	DCTL	>0.9	>0.9	>0.9	NA	NA	NA	0.79	1.04	>0.9	>0.9	1.04	>0.9	>0.9	Utilize Summer Setup for summer and non-summer months
ORIONTP 70kV		P7	DCTL	>0.9	>0.9	>0.9	NA	NA	NA	0.80	1.04	>0.9	>0.9	1.04	>0.9	>0.9	Utilize Summer Setup for summer and non-summer months
ORION 70kV		P7	DCTL	>0.9	>0.9	>0.9	NA	NA	NA	0.80	1.04	>0.9	>0.9	1.04	>0.9	>0.9	Utilize Summer Setup for summer and non-summer months
SN BRNRD 70kV		P7	DCTL	>0.9	>0.9	>0.9	NA	NA	NA	0.79	1.04	>0.9	>0.9	1.04	>0.9	>0.9	Utilize Summer Setup for summer and non-summer months
ARVIN 70kV		P7	DCTL	>0.9	>0.9	>0.9	NA	NA	NA	0.80	1.04	>0.9	>0.9	1.04	>0.9	>0.9	Utilize Summer Setup for summer and non-summer months
WEEDPTCH 70kV		P7	DCTL	>0.9	>0.9	>0.9	NA	NA	NA	0.82	1.04	>0.9	>0.9	1.04	>0.9	>0.9	Utilize Summer Setup for summer and non-summer months
WEEDPATCH_SF70kV		P7	DCTL	>0.9	>0.9	>0.9	NA	NA	NA	0.82	1.04	>0.9	>0.9	1.04	>0.9	>0.9	Utilize Summer Setup for summer and non-summer months
GRMWY_SM 70kV		P7	DCTL	>0.9	>0.9	>0.9	NA	NA	NA	0.82	1.03	>0.9	>0.9	1.03	>0.9	>0.9	Utilize Summer Setup for summer and non-summer months
WELLFILD 70kV		P7	DCTL	>0.9	>0.9	>0.9	NA	NA	NA	0.82	1.03	>0.9	>0.9	1.04	>0.9	>0.9	Utilize Summer Setup for summer and non-summer months
3EMIDIO 70kV		P7	DCTL	>0.9	>0.9	>0.9	NA	NA	NA	0.78	1.03	>0.9	>0.9	1.03	>0.9	>0.9	Utilize Summer Setup for summer and non-summer months
VALPREDO 70kV		P7	DCTL	>0.9	>0.9	>0.9	NA	NA	NA	0.78	1.03	>0.9	>0.9	1.04	>0.9	>0.9	Utilize Summer Setup for summer and non-summer months
ROSE 70kV		P7	DCTL	>0.9	>0.9	>0.9	NA	NA	NA	0.78	1.03	>0.9	>0.9	1.04	>0.9	>0.9	Utilize Summer Setup for summer and non-summer months
PACI_PIP 70kV		P7	DCTL	>0.9	>0.9	>0.9	NA	NA	NA	0.77	1.03	>0.9	>0.9	1.03	>0.9	>0.9	Utilize Summer Setup for summer and non-summer months
TECUYA 70kV		P7	DCTL	>0.9	>0.9	>0.9	NA	NA	NA	0.79	1.04	>0.9	>0.9	1.04	>0.9	>0.9	Utilize Summer Setup for summer and non-summer months
GRAPEVNE 70kV		P7	DCTL	>0.9	>0.9	>0.9	NA	NA	NA	0.77	1.03	>0.9	>0.9	1.03	>0.9	>0.9	Utilize Summer Setup for summer and non-summer months
STALLION 70kV		P7	DCTL	>0.9	>0.9	>0.9	NA	NA	NA	0.80	1.04	>0.9	>0.9	1.04	>0.9	>0.9	Utilize Summer Setup for summer and non-summer months
STALIONJ 70kV		P7	DCTL	>0.9	>0.9	>0.9	NA	NA	NA	0.80	1.04	>0.9	>0.9	1.04	>0.9	>0.9	Utilize Summer Setup for summer and non-summer months
LEBEC 70kV		P7	DCTL	>0.9	>0.9	>0.9	NA	NA	NA	0.76	1.02	>0.9	>0.9	1.02	>0.9	>0.9	Utilize Summer Setup for summer and non-summer months
EMDO JCT 70kV		P7	DCTL	>0.9	>0.9	>0.9	NA	NA	NA	0.79	1.04	>0.9	>0.9	1.04	>0.9	>0.9	Utilize Summer Setup for summer and non-summer months

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Low Voltages

Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)								Voltage PU (Sensitivity Scenarios)					Project & Potential Mitigation Solutions
				2022 Summer Peak	2025 Summer Peak	2030 Summer Peak	2022 Winter Peak	2025 Winter Peak	2030 Winter Peak	2022 Spring Off-Peak	2025 Spring Off-Peak	2025 SP High CEC Forecast	2025 SpOP Hi Renew & Min Gas Gen	2022 SP Heavy Renewable & Min Gas Gen	2030 Retirement of QF Generation	2030 Summer Peak w/o Facility Rerates	
CASTAC 70kV		P7	DCTL	>0.9	>0.9	>0.9	NA	NA	NA	0.76	1.02	>0.9	>0.9	1.03	>0.9	>0.9	Utilize Summer Setup for summer and non-summer months
KELLEY 70kV		P7	DCTL	>0.9	>0.9	>0.9	NA	NA	NA	0.77	1.03	>0.9	>0.9	1.03	>0.9	>0.9	Utilize Summer Setup for summer and non-summer months
Q622B 115kV		P7	DCTL	>0.9	>0.9	>0.9	NA	NA	NA	0.78	1.03	>0.9	>0.9	1.03	>0.9	>0.9	Utilize Summer Setup for summer and non-summer months
WESTPARK 115kV	Kern PP-Westpark No. 1 & 2 115 kV Lines	P7	DCTL	>0.9	0.93	0.94	NA	NA	NA	1.02	1.04	>0.9	>0.9	1.04	0.83	0.94	Sensitivity Only
CALWATER 115kV		P7	DCTL	>0.9	0.94	0.95	NA	NA	NA	1.02	1.04	>0.9	>0.9	1.04	0.83	0.95	Sensitivity Only
CALWTRTP 115kV		P7	DCTL	>0.9	0.94	0.95	NA	NA	NA	1.02	1.04	>0.9	>0.9	1.04	0.83	0.95	Sensitivity Only
COLUMBUS 115kV		P7	DCTL	>0.9	0.94	0.95	NA	NA	NA	1.02	1.04	>0.9	>0.9	1.04	0.84	0.95	Sensitivity Only
BEAR MTN 115kV		P7	DCTL	>0.9	0.94	0.95	NA	NA	NA	1.02	1.04	>0.9	>0.9	1.04	0.83	0.95	Sensitivity Only
BEAR TAP 115kV		P7	DCTL	>0.9	0.94	0.95	NA	NA	NA	1.02	1.04	>0.9	>0.9	1.04	0.84	0.95	Sensitivity Only
MAGUDN J 115kV		P7	DCTL	>0.9	0.95	0.96	NA	NA	NA	1.01	1.03	>0.9	>0.9	1.03	0.87	0.96	Sensitivity Only
MAGUNDEN 115kV		P7	DCTL	1.01	0.95	0.96	NA	NA	NA	1.01	1.03	1.01	0.99	1.03	0.87	0.96	Sensitivity Only
BOLTHSE 115kV		P7	DCTL	>0.9	0.95	0.96	NA	NA	NA	1.01	1.03	>0.9	>0.9	1.03	0.87	0.96	Sensitivity Only

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Voltage Deviation

Substation	Contingency (All and Worst P6)	Category	Category Description	Post Cont. Voltage Deviation % (Baseline Scenarios)								Post Cont. Voltage Deviation % (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2022 Summer Peak	2025 Summer Peak	2030 Summer Peak	2022 Winter Peak	2025 Winter Peak	2030 Winter Peak	2022 Spring Off-Peak	2025 Spring Off-Peak	2025 SP High CEC Forecast	2025 SpOP Hi Renew & Min Gas Gen	2022 SP Heavy Renewable & Min Gas Gen	2030 Retirement of QF Generation	
BSCSCH T 70kV	MIDWAY-TAFT 115kV [2620]	P1	N-1	1	1	1	NA	NA	NA	0	0	1	1	0	8	Sensitivity Only
TAFT 115kV	MIDWAY-TAFT 115kV [2620]	P1	N-1	1	1	1	NA	NA	NA	1	0	1	1	0	8	Sensitivity Only
UNIVRSTY 115kV	MIDWAY-TAFT 115kV [2620]	P1	N-1	0	0	1	NA	NA	NA	0	0	1	1	0	8	Sensitivity Only
MCKTTRCK 70kV	MIDWAY-TAFT 115kV [2620]	P1	N-1	1	1	1	NA	NA	NA	0	0	1	1	0	8	Sensitivity Only
NORTHMWY 70kV	MIDWAY-TAFT 115kV [2620]	P1	N-1	1	1	1	NA	NA	NA	0	0	1	1	0	8	Sensitivity Only
MDWY_P_S 70kV	MIDWAY-TAFT 115kV [2620]	P1	N-1	1	1	1	NA	NA	NA	0	0	1	1	0	8	Sensitivity Only
TAFT A_J 70kV	MIDWAY-TAFT 115kV [2620]	P1	N-1	1	1	1	NA	NA	NA	0	0	1	1	0	8	Sensitivity Only
MARICOPA 70kV	MIDWAY-TAFT 115kV [2620]	P1	N-1	1	1	1	NA	NA	NA	0	0	1	1	0	8	Sensitivity Only
MOCO_JCT 70kV	MIDWAY-TAFT 115kV [2620]	P1	N-1	1	1	1	NA	NA	NA	0	0	1	1	0	8	Sensitivity Only
GARDNER 70kV	MIDWAY-TAFT 115kV [2620]	P1	N-1	1	1	1	NA	NA	NA	0	0	1	1	0	8	Sensitivity Only
BRY_PTLM 70kV	MIDWAY-TAFT 115kV [2620]	P1	N-1	1	1	1	NA	NA	NA	0	0	1	1	0	8	Sensitivity Only
BSCL_PLD 70kV	MIDWAY-TAFT 115kV [2620]	P1	N-1	1	1	1	NA	NA	NA	0	0	1	1	0	8	Sensitivity Only
GARDNR T 70kV	MIDWAY-TAFT 115kV [2620]	P1	N-1	1	1	1	NA	NA	NA	0	0	1	1	0	8	Sensitivity Only
COPUS_D 70kV	MIDWAY-TAFT 115kV [2620]	P1	N-1	1	1	1	NA	NA	NA	0	0	1	1	0	8	Sensitivity Only
COPUS_E 70kV	MIDWAY-TAFT 115kV [2620]	P1	N-1	1	1	1	NA	NA	NA	0	0	1	1	0	8	Sensitivity Only
TEMBLOR 70kV	MIDWAY-TAFT 115kV [2620]	P1	N-1	1	1	1	NA	NA	NA	0	0	1	1	0	8	Sensitivity Only
Q620TP 70kV	MIDWAY-TAFT 115kV [2620]	P1	N-1	1	1	1	NA	NA	NA	0	0	1	1	0	8	Sensitivity Only
Q620 70kV	MIDWAY-TAFT 115kV [2620]	P1	N-1	1	1	1	NA	NA	NA	0	0	1	1	0	8	Sensitivity Only
MOCO 70kV	MIDWAY-TAFT 115kV [2620]	P1	N-1	1	1	1	NA	NA	NA	0	0	1	1	0	8	Sensitivity Only
CADET 70kV	MIDWAY-TAFT 115kV [2620]	P1	N-1	1	1	1	NA	NA	NA	0	0	1	1	0	8	Sensitivity Only
TX_BV_HL 70kV	MIDWAY-TAFT 115kV [2620]	P1	N-1	1	1	1	NA	NA	NA	1	0	1	1	0	8	Sensitivity Only
ELK HLLS 70kV	MIDWAY-TAFT 115kV [2620]	P1	N-1	1	1	1	NA	NA	NA	1	0	1	1	0	8	Sensitivity Only
CUYAMA2 70kV	MIDWAY-TAFT 115kV [2620]	P1	N-1	1	1	1	NA	NA	NA	0	0	1	1	0	8	Sensitivity Only
KNG_ELIS 70kV	MIDWAY-TAFT 115kV [2620]	P1	N-1	1	1	1	NA	NA	NA	1	0	1	1	0	8	Sensitivity Only
CELERON 70kV	MIDWAY-TAFT 115kV [2620]	P1	N-1	1	1	1	NA	NA	NA	1	0	1	1	0	8	Sensitivity Only
SLR_TANH 70kV	MIDWAY-TAFT 115kV [2620]	P1	N-1	1	1	1	NA	NA	NA	0	0	1	1	0	8	Sensitivity Only
KERNRDGE 115kV	MIDWAY-TEMBLOR 115kV [2630]	P1	N-1	0	0	0	NA	NA	NA	0	0	0	0	0	19	Sensitivity Only
KERNRDGELH 69kV	MIDWAY-TEMBLOR 115kV [2630]	P1	N-1	0	0	0	NA	NA	NA	0	0	0	0	0	19	Sensitivity Only
TEMBLOR 115kV	MIDWAY-TEMBLOR 115kV [2630]	P1	N-1	0	1	0	NA	NA	NA	0	0	0	0	0	19	Sensitivity Only
CARRIZO 115kV	MIDWAY-TEMBLOR 115kV [2630]	P1	N-1	0	0	0	NA	NA	NA	0	0	0	0	0	14	Sensitivity Only
KERNRDGE_G32115kV	MIDWAY-TEMBLOR 115kV [2630]	P1	N-1	0	0	0	NA	NA	NA	0	0	0	0	0	19	Sensitivity Only
KERNRDGE_L11115kV	MIDWAY-TEMBLOR 115kV [2630]	P1	N-1	0	0	0	NA	NA	NA	0	0	0	0	0	19	Sensitivity Only
KERNRDGE_L34115kV	MIDWAY-TEMBLOR 115kV [2630]	P1	N-1	0	0	0	NA	NA	NA	0	0	0	0	0	19	Sensitivity Only
KERNRDGE_S17115kV	MIDWAY-TEMBLOR 115kV [2630]	P1	N-1	0	0	0	NA	NA	NA	0	0	0	0	0	19	Sensitivity Only
KERNRDGE_S20115kV	MIDWAY-TEMBLOR 115kV [2630]	P1	N-1	0	0	0	NA	NA	NA	0	0	0	0	0	19	Sensitivity Only
KERNRDGE_L18115kV	MIDWAY-TEMBLOR 115kV [2630]	P1	N-1	0	0	0	NA	NA	NA	0	0	0	0	0	19	Sensitivity Only
KERNRDGE_L32115kV	MIDWAY-TEMBLOR 115kV [2630]	P1	N-1	0	0	0	NA	NA	NA	0	0	0	0	0	19	Sensitivity Only
KERNRDGE_L06115kV	MIDWAY-TEMBLOR 115kV [2630]	P1	N-1	0	0	0	NA	NA	NA	0	0	0	0	0	19	Sensitivity Only
KERNRDGE_L0669kV	MIDWAY-TEMBLOR 115kV [2630]	P1	N-1	0	0	0	NA	NA	NA	0	0	0	0	0	19	Sensitivity Only
KERNRDGE_L0469kV	MIDWAY-TEMBLOR 115kV [2630]	P1	N-1	0	0	0	NA	NA	NA	0	0	0	0	0	19	Sensitivity Only
KERNRDGE_L1969kV	MIDWAY-TEMBLOR 115kV [2630]	P1	N-1	0	0	0	NA	NA	NA	0	0	0	0	0	19	Sensitivity Only

Study Area: PG&E Kern

Transient Stability

Contingency	Category	Category Description	Transient Stability Performance					Potential Mitigation Solutions
			Baseline Scenarios			Sensitivity Scenarios		
			2025 Summer Peak	2030 Summer Peak	2025 Spring Off-Peak	2025 SP High CEC Forecast	2025 SP Heavy Renewable & Min Gas Gen	
Midway-Caliente Sw. Station 230 kV line	P1-2	N-1	No Issues	No Issues	No Issues	No Issues	No Issues	No Violation
Kern PP 230/115 kV #13 Transformer 3Ø fault with normal clearing.	P1-3	N-1	No Issues	No Issues	No Issues	No Issues	No Issues	No Violation
Midway 230/115 Bank Transformer 3Ø fault with normal clearing.	P1-3	N-1	No Issues	No Issues	No Issues	No Issues	No Issues	No Violation
Wheeler 230 kV Cap Bank 3Ø fault with normal clearing.	P1-4	N-1	No Issues	No Issues	No Issues	No Issues	No Issues	No Violation
Midway 230 kV bus SLG fault with normal clearing.	P2-2	Bus Section Fault	No Issues	No Issues	No Issues	No Issues	No Issues	No Violation
Midway 115 kV bus-tie breaker SLG fault with normal clearing.	P2-4	Internal Breaker Fault(Bus Tie Fault)	Potential WECC/NERC criteria violation	Potential WECC/NERC criteria violation	No Issues	Potential WECC/NERC criteria violation	No Issues	Under Review
Kern Power to 7 Standard 115 kV line fault with normal clearing with Mt. Poso Offline in the case	P3-2	G-1/N-1	No Issues	No Issues	No Issues	No Issues	No Issues	No Violation
Tx Sunset SLG fault expanded to elements lost due to stuck breaker and clear fault from remote breakers with normal clearing time.	P4-1	Stuck Breaker	No Issues	No Issues	No Issues	No Issues	No Issues	No Violation
Kern Power to 7 Standard 115 kv line expanded to elements lost due to stuck breaker and clear fault from remote breakers with normal clearing time.	P4-2	Stuck Breaker	No Issues	No Issues	No Issues	No Issues	No Issues	No Violation
La Paloma SLG Fault with delayed clearing	P5-1	Non Redundant Relay	No Issues	No Issues	No Issues	No Issues	No Issues	No Violation
Midway-Wheeler Ridge #1 & #2 230 kV Lines SLG fault with successful high speed reclose.	P7	DCTL	No Issues	Potential WECC/NERC criteria violation	No Issues	No Issues	No Issues	Under Review

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Study Area: PG&E Kern

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 Kern

Single Source Substation with more than 100 MW Load

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

No single source substation with more than 100 MW

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Thermal Overloads PG&E Los Padres

California ISO

Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading % (Baseline Scenarios)								Loading % (Sensitivity Scenarios)					Project & Potential Mitigation Solutions
				2022 Summer Peak	2025 Summer Peak	2030 Summer Peak	2022 Winter Peak	2025 Winter Peak	2030 Winter Peak	2022 Spring Off-Peak	2025 Spring Off-Peak	2025 SP High CEC Forecast	2025 SpOP Hi Renew & Min Gas Gen	2022 SP Heavy Renewable & Min Gas Gen	2030 Retirement of QF Generations	2030 Summer Peak w/o Facility Rerates	
Atascadero-Cayucos 70 kV Line	MORRO BAY 230kV Bus (failure of non-redundent relay)	P5-5	Non Redundant Relay	Diverge	Diverge	Diverge	Diverge	Diverge	Diverge	Diverge	33.61	Diverge	78.46	18.86	NA	Diverge	Add redundant relay
	MORRO BAY 230kV Bus (failure of non-redundent relay)	P5-5	Non Redundant Relay	Diverge	Diverge	Diverge	Diverge	Diverge	Diverge	Diverge	33.61	Diverge	78.27	18.87	NA	Diverge	Add redundant relay
Atascadero-San Luis Obispo 70 kV Line	MORRO BAY 230kV Bus (failure of non-redundent relay)	P5-5	Non Redundant Relay	Diverge	Diverge	Diverge	Diverge	Diverge	Diverge	Diverge	26.41	Diverge	70.86	10.2	NA	Diverge	Add redundant relay
Callendar Sw Sta-Mesa 115 kV Line	MORROBAY 230kV - Section 1E & 2E	P2-4	Internal Breaker Fault(Bus Tie Fault)	149.23	148.88	Diverge	99.86	104.75	Diverge	79.43	34.52	150.94	65.9	7.69	NA	Diverge	Project: North of Mesa Upgrades (On Hold) In-service date: TBD Short term: Action plan
	MORRO BAY-MESA 230kV [5290] & MORRO BAY-DIABLO 230kV [5260]	P6	N-1-1	NA	126.57	151.15	NA	<100	119.15	NA	<100	129.09	NA	<100	NA	151.13	Project: North of Mesa Upgrades (On Hold) In-service date: TBD Short term: Action plan
	MESA PGE 230/115kV TB 2 & MESA PGE 230/115kV TB 3	P6	N-1-1	NA	<100	115.96	NA	<100	<100	NA	<100	100.31	NA	<100	NA	114.88	Project: North of Mesa Upgrades (On Hold) In-service date: TBD Short term: Action plan
	MESA PGE 230/115kV TB 3 & MESA PGE 230/115kV TB 2	P6	N-1-1	NA	<100	115.96	NA	<100	<100	NA	<100	100.31	NA	<100	NA	114.88	Project: North of Mesa Upgrades (On Hold) In-service date: TBD Short term: Action plan
	Morro Bay-Mesa and Diablo-Mesa 230 kV Lines	P7-1	DCTL	NA	128.48	0	NA	97.04	107.8	NA	31.94	131.05	NA	2.77	NA	0	Project: North of Mesa Upgrades (On Hold) In-service date: TBD Short term: Action plan
	Morro Bay-Mesa and Morro Bay-Diablo 230 kV Lines	P7-1	DCTL	NA	137.5	0	NA	97.38	119.18	NA	34.82	139.69	NA	8.73	NA	0	Project: North of Mesa Upgrades (On Hold) In-service date: TBD Short term: Action plan
Crazy Horse-Natividad #1 115 kV Line	MOSS LANDING-SALINAS #2 115kV [2890] & SALINAS-MOSSLNSW-DOLAN RD 115kV [0]	P6	N-1-1	NA	136.4	146.48	NA	<100	<100	NA	<100	138.37	NA	<100	NA	146.47	Project: RAS Identified in 2018-2019 TPP In-service date: TBD Short term: Action plan
	SALINAS-MOSSLNSW-DOLAN RD 115kV [0] & MOSS LANDING-SALINAS #2 115kV [2890]	P6	N-1-1	NA	136.4	146.48	NA	<100	<100	NA	<100	138.37	NA	<100	NA	146.47	Project: RAS Identified in 2018-2019 TPP In-service date: TBD Short term: Action plan
	HORSE CANYON-SALINAS-SOLEDAD #2 115kV [2910] & MOSS LANDING-SALINAS #2 115kV	P6	N-1-1	NA	114.63	121.2	NA	<100	<100	NA	<100	116.13	NA	<100	NA	121.2	Project: RAS Identified in 2018-2019 TPP In-service date: TBD Short term: Action plan
	Moss Landing - Salinas #1 and #2 115 kV Lines	P7-1	DCTL	NA	136.68	146.6	NA	81.7	91.89	NA	39.65	138.65	NA	34.27	NA	146.84	Project: RAS Identified in 2018-2019 TPP In-service date: TBD Short term: Action plan

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Thermal Overloads PG&E Los Padres

California ISO

Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading % (Baseline Scenarios)								Loading % (Sensitivity Scenarios)					Project & Potential Mitigation Solutions
				2022 Summer Peak	2025 Summer Peak	2030 Summer Peak	2022 Winter Peak	2025 Winter Peak	2030 Winter Peak	2022 Spring Off-Peak	2025 Spring Off-Peak	2025 SP High CEC Forecast	2025 SpOP Hi Renew & Min Gas Gen	2022 SP Heavy Renewable & Min Gas Gen	2030 Retirement of QF Generations	2030 Summer Peak w/o Facility Rerates	
Crazy Horse-Natividad #1 115 kV Line (Natividad Sw 1-Salinas)	ANYON #2 115kV [2983] & MOSS LANDING-CRAZY HORSE CANYON #1 115kV [2930] MOAS	P6	N-1-1	NA	<100	103.16	NA	<100	<100	NA	<100	<100	NA	<100	NA	103.16	Project: RAS Identified in 2018-2019 TPP In-service date: TBD Short term: Action plan
	MOSS LANDING-SALINAS #2 115kV [2890] & SALINAS-MOSSLNSW-DOLAN RD 115kV [0]	P6	N-1-1	NA	117.99	127.33	NA	<100	<100	NA	<100	119.68	NA	<100	NA	127.32	Project: RAS Identified in 2018-2019 TPP In-service date: TBD Short term: Action plan
	SALINAS-MOSSLNSW-DOLAN RD 115kV [0] & MOSS LANDING-SALINAS #2 115kV [2890]	P6	N-1-1	NA	117.99	127.33	NA	<100	<100	NA	<100	119.68	NA	<100	NA	127.32	Project: RAS Identified in 2018-2019 TPP In-service date: TBD Short term: Action plan
	Moss Landing - Crazy Horse #1 and #2 115 kV Lines	P7-1	DCTL	NA	93.77	103.12	NA	59.4	66.82	NA	3.97	95.18	NA	7.11	NA	103.16	Project: RAS Identified in 2018-2019 TPP In-service date: TBD Short term: Action plan
	Moss Landing - Salinas #1 and #2 115 kV Lines	P7-1	DCTL	NA	118.3	127.47	NA	72.94	81.47	NA	40.33	119.99	NA	35.96	NA	127.73	Project: RAS Identified in 2018-2019 TPP In-service date: TBD Short term: Action plan
Crazy Horse-Soledad 115 kV Line (Crazy Horse-Natividad Sw 2)	MOSS LANDING-SALINAS #2 115kV [2890] & SALINAS-MOSSLNSW-DOLAN RD 115kV [0]	P6	N-1-1	NA	136.4	146.48	NA	<100	<100	NA	<100	138.37	NA	<100	NA	146.47	Project: RAS Identified in 2018-2019 TPP In-service date: TBD Short term: Action plan
	SALINAS-MOSSLNSW-DOLAN RD 115kV [0] & MOSS LANDING-SALINAS #2 115kV [2890]	P6	N-1-1	NA	136.4	146.48	NA	<100	<100	NA	<100	138.37	NA	<100	NA	146.47	Project: RAS Identified in 2018-2019 TPP In-service date: TBD Short term: Action plan
	HORSE CANYON-SALINAS-SOLEDAD #1 115kV [2900] & MOSS LANDING-SALINAS #2 115kV	P6	N-1-1	NA	114.63	121.2	NA	<100	<100	NA	<100	116.13	NA	<100	NA	121.2	Project: RAS Identified in 2018-2019 TPP In-service date: TBD Short term: Action plan
	Moss Landing - Salinas #1 and #2 115 kV Lines	P7-1	DCTL	NA	136.68	146.6	NA	81.7	91.89	NA	39.65	138.65	NA	34.27	NA	146.84	Project: RAS Identified in 2018-2019 TPP In-service date: TBD Short term: Action plan
Crazy Horse-Soledad 115 kV Line (Natividad Sw 2-Salinas)	MOSS LANDING-SALINAS #2 115kV [2890] & SALINAS-MOSSLNSW-DOLAN RD 115kV [0]	P6	N-1-1	NA	117.99	127.33	NA	<100	<100	NA	<100	119.68	NA	<100	NA	127.32	Project: RAS Identified in 2018-2019 TPP In-service date: TBD Short term: Action plan
	SALINAS-MOSSLNSW-DOLAN RD 115kV [0] & MOSS LANDING-SALINAS #2 115kV [2890]	P6	N-1-1	NA	117.99	127.33	NA	<100	<100	NA	<100	119.68	NA	<100	NA	127.32	Project: RAS Identified in 2018-2019 TPP In-service date: TBD Short term: Action plan
	ANYON #1 115kV [2930] MOAS OPENED on PRNDL J1_PRUNEDLE & MOSS LANDING-CRAZY	P6	N-1-1	NA	<100	103.16	NA	<100	<100	NA	<100	<100	NA	<100	NA	103.16	Project: RAS Identified in 2018-2019 TPP In-service date: TBD Short term: Action plan
	Moss Landing - Crazy Horse #1 and #2 115 kV Lines	P7-1	DCTL	NA	93.77	103.12	NA	59.4	66.82	NA	3.97	95.18	NA	7.11	NA	103.16	Project: RAS Identified in 2018-2019 TPP In-service date: TBD Short term: Action plan
	Moss Landing - Salinas #1 and #2 115 kV Lines	P7-1	DCTL	NA	118.3	127.47	NA	72.94	81.47	NA	40.33	119.99	NA	35.96	NA	127.73	Project: RAS Identified in 2018-2019 TPP In-service date: TBD Short term: Action plan
Morro Bay 230/115 Transformer No. 6	MESA_PGE 115kV - Section 2D & 1D	P2-4	Internal Breaker Fault(Bus Tie Fault)	Diverge	Diverge	Diverge	Diverge	Diverge	Diverge	84.11	34.82	Diverge	71.93	14.12	NA	Diverge	Project: North of Mesa Upgrades (On Hold) In-service date: TBD Short term: Action plan
	MORROBAY 230kV - Section 1E & 2E	P2-4	Internal Breaker Fault(Bus Tie Fault)	129.4	127.94	Diverge	83.34	81	Diverge	80.54	28.95	129.7	68.17	12.9	NA	Diverge	Project: North of Mesa Upgrades (On Hold) In-service date: TBD Short term: Action plan
	MORRO BAY-MESA 230kV [5290] & MORRO BAY-DIABLO 230kV [5260]	P6	N-1-1	NA	130.39	145.5	NA	<100	102.12	NA	<100	132.42	NA	<100	NA		Project: North of Mesa Upgrades (On Hold) In-service date: TBD Short term: Action plan
	MESA PGE 230/115kV TB 2 & MESA PGE 230/115kV TB 3	P6	N-1-1	NA	117.47	126.73	NA	<100	<100	NA	<100	119.3	NA	<100	NA		Project: North of Mesa Upgrades (On Hold) In-service date: TBD Short term: Action plan
	MESA PGE 230/115kV TB 3 & MESA PGE 230/115kV TB 2	P6	N-1-1	NA	117.47	126.73	NA	<100	<100	NA	<100	119.3	NA	<100	NA		Project: North of Mesa Upgrades (On Hold) In-service date: TBD Short term: Action plan
	Morro Bay-Mesa and Diablo-Mesa 230 kV Lines	P7-1	DCTL	NA	135.16	55.33	NA	89.93	98.83	NA	35.32	137.42	NA	14.31	NA	1.16	Project: North of Mesa Upgrades (On Hold) In-service date: TBD Short term: Action plan

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Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading % (Baseline Scenarios)								Loading % (Sensitivity Scenarios)					Project & Potential Mitigation Solutions
				2022 Summer Peak	2025 Summer Peak	2030 Summer Peak	2022 Winter Peak	2025 Winter Peak	2030 Winter Peak	2022 Spring Off-Peak	2025 Spring Off-Peak	2025 SP High CEC Forecast	2025 SpOP Hi Renew & Min Gas Gen	2022 SP Heavy Renewable & Min Gas Gen	2030 Retirement of QF Generations	2030 Summer Peak w/o Facility Rerates	
	Morro Bay-Mesa and Morro Bay-Diablo 230 kV Lines	P7-1	DCTL	NA	137.59	55.02	NA	91.13	102.28	NA	37.42	139.48	NA	17.97	NA	1.16	Project: North of Mesa Upgrades (On Hold) In-service date: TBD Short term: Action plan

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Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading % (Baseline Scenarios)								Loading % (Sensitivity Scenarios)					Project & Potential Mitigation Solutions
				2022 Summer Peak	2025 Summer Peak	2030 Summer Peak	2022 Winter Peak	2025 Winter Peak	2030 Winter Peak	2022 Spring Off-Peak	2025 Spring Off-Peak	2025 SP High CEC Forecast	2025 SpOP Hi Renew & Min Gas Gen	2022 SP Heavy Renewable & Min Gas Gen	2030 Retirement of QF Generations	2030 Summer Peak w/o Facility Rerates	
San Luis Obispo-Callendar Sw Sta 115 kV Line	MORROBAY 230kV - Section 1E & 2E	P2-4	Internal Breaker Fault(Bus Tie Fault)	139.63	144.82	Diverge	101.92	105.57	Diverge	88.16	26.36	147.13	59.71	8.32	NA	Diverge	Project: North of Mesa Upgrades (On Hold) In-service date: TBD Short term: Action plan
	MORRO BAY-MESA 230kV [5290] & MORRO BAY-DIABLO 230kV [5260]	P6	N-1-1	NA	126.69	146.9	NA	100.23	116.72	NA	<100	128.96	NA	<100	NA	146.88	Project: North of Mesa Upgrades (On Hold) In-service date: TBD Short term: Action plan
	MESA PGE 230/115kV TB 2 & MESA PGE 230/115kV TB 3	P6	N-1-1	NA	108.7	121.85	NA	<100	<100	NA	<100	110.75	NA	<100	NA	120.9	Project: North of Mesa Upgrades (On Hold) In-service date: TBD Short term: Action plan
	MESA PGE 230/115kV TB 3 & MESA PGE 230/115kV TB 2	P6	N-1-1	NA	108.7	121.85	NA	<100	<100	NA	<100	110.75	NA	<100	NA	120.9	Project: North of Mesa Upgrades (On Hold) In-service date: TBD Short term: Action plan
	Morro Bay-Mesa and Diablo-Mesa 230 kV Lines	P7-1	DCTL	NA	131.63	44.72	NA	98.28	110.22	NA	24.31	134.32	NA	6.2	NA	44.72	Project: North of Mesa Upgrades (On Hold) In-service date: TBD Short term: Action plan
	Morro Bay-Mesa and Morro Bay-Diablo 230 kV Lines	P7-1	DCTL	NA	135.3	44.97	NA	100.27	116.99	NA	26.6	137.6	NA	9.01	NA	44.97	Project: North of Mesa Upgrades (On Hold) In-service date: TBD Short term: Action plan
San Luis Obispo-Mesa 115 kV Line (Oceano-Callender Sw. Sta)	MORROBAY 230kV - Section 1E & 2E	P2-4	Internal Breaker Fault(Bus Tie Fault)	150.07	158.17	Diverge	102.03	107.07	Diverge	85.26	34.09	160.33	67.81	4.32	NA	Diverge	Project: North of Mesa Upgrades (On Hold) In-service date: TBD Short term: Action plan
	MORRO BAY-MESA 230kV [5290] & MORRO BAY-DIABLO 230kV [5260]	P6	N-1-1	NA	135.38	156.04	NA	<100	122.9	NA	<100	137.96	NA	<100	NA	156.02	Project: North of Mesa Upgrades (On Hold) In-service date: TBD Short term: Action plan
	MESA PGE 230/115kV TB 2 & MESA PGE 230/115kV TB 3	P6	N-1-1	NA	107.32	121.01	NA	<100	<100	NA	<100	109.31	NA	<100	NA	119.92	Project: North of Mesa Upgrades (On Hold) In-service date: TBD Short term: Action plan
	MESA PGE 230/115kV TB 3 & MESA PGE 230/115kV TB 2	P6	N-1-1	NA	107.32	121.01	NA	<100	<100	NA	<100	109.31	NA	<100	NA	119.92	Project: North of Mesa Upgrades (On Hold) In-service date: TBD Short term: Action plan
	Morro Bay-Mesa and Diablo-Mesa 230 kV Lines	P7-1	DCTL	NA	137.56	7.26	NA	97.9	112.07	NA	31.96	140.24	NA	1.76	NA	7.26	Project: North of Mesa Upgrades (On Hold) In-service date: TBD Short term: Action plan
	Morro Bay-Mesa and Morro Bay-Diablo 230 kV Lines	P7-1	DCTL	NA	146.37	7.3	NA	100.1	123.14	NA	34.34	148.64	NA	5.22	NA	7.3	Project: North of Mesa Upgrades (On Hold) In-service date: TBD Short term: Action plan
San Luis Obispo-Santa Maria 115 kV Line	MESA_PGE 115kV - Section 2D & 1D	P2-4	Internal Breaker Fault(Bus Tie Fault)	Diverge	Diverge	Diverge	Diverge	Diverge	Diverge	148.89	64.25	Diverge	117.88	6.31	NA	Diverge	Project: North of Mesa Upgrades (On Hold) In-service date: TBD Short term: Action plan
	MORROBAY 230kV - Section 1E & 2E	P2-4	Internal Breaker Fault(Bus Tie Fault)	191.99	196.89	Diverge	146.87	152.75	Diverge	116.37	40.93	199.94	86.89	9.89	NA	Diverge	Project: North of Mesa Upgrades (On Hold) In-service date: TBD Short term: Action plan
	MORRO BAY 230kV Bus (failure of non-redundent relay)	P5-5	Non Redundant Relay	Diverge	Diverge	Diverge	Diverge	Diverge	Diverge	Diverge	68.62	Diverge	183.87	5.1	NA	Diverge	Add redundant relay
	MORRO BAY-MESA 230kV [5290] & MORRO BAY-DIABLO 230kV [5260]	P6	N-1-1	NA	171.39	200.03	NA	144.47	169.83	NA	<100	174.54	NA	<100	NA	200.01	Project: North of Mesa Upgrades (On Hold) In-service date: TBD Short term: Action plan
	MESA PGE 230/115kV TB 2 & MESA PGE 230/115kV TB 3	P6	N-1-1	NA	145.37	164.3	NA	128.16	142.95	NA	<100	148.09	NA	<100	NA	162.99	Project: North of Mesa Upgrades (On Hold) In-service date: TBD Short term: Action plan
	MESA PGE 230/115kV TB 3 & MESA PGE 230/115kV TB 2	P6	N-1-1	NA	145.37	164.3	NA	128.16	142.95	NA	<100	148.09	NA	<100	NA	162.99	Project: North of Mesa Upgrades (On Hold) In-service date: TBD Short term: Action plan
	Morro Bay-Mesa and Diablo-Mesa 230 kV Lines	P7-1	DCTL	NA	177.76	0	NA	142.32	159.39	NA	38.28	181.35	NA	4.94	NA	0	Project: North of Mesa Upgrades (On Hold) In-service date: TBD Short term: Action plan

2020-2021 ISO Reliability Assessment - Study Results
Study Area: PG&E Central Coast
Thermal Overloads PG&E Los Padres

California ISO

Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading % (Baseline Scenarios)								Loading % (Sensitivity Scenarios)					Project & Potential Mitigation Solutions
				2022 Summer Peak	2025 Summer Peak	2030 Summer Peak	2022 Winter Peak	2025 Winter Peak	2030 Winter Peak	2022 Spring Off-Peak	2025 Spring Off-Peak	2025 SP High CEC Forecast	2025 SpOP Hi Renew & Min Gas Gen	2022 SP Heavy Renewable & Min Gas Gen	2030 Retirement of QF Generations	2030 Summer Peak w/o Facility Rerates	
	Morro Bay-Mesa and Morro Bay-Diablo 230 kV Lines	P7-1	DCTL	NA	183.56	0	NA	144.62	170.15	NA	41.25	186.63	NA	11	NA	0	Project: North of Mesa Upgrades (On Hold) In-service date: TBD Short term: Action plan

2020-2021 ISO Reliability Assessment - Study Results
Study Area: PG&E Central Coast
Thermal Overloads PG&E Los Padres

California ISO

Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading % (Baseline Scenarios)								Loading % (Sensitivity Scenarios)					Project & Potential Mitigation Solutions
				2022 Summer Peak	2025 Summer Peak	2030 Summer Peak	2022 Winter Peak	2025 Winter Peak	2030 Winter Peak	2022 Spring Off-Peak	2025 Spring Off-Peak	2025 SP High CEC Forecast	2025 SpOP Hi Renew & Min Gas Gen	2022 SP Heavy Renewable & Min Gas Gen	2030 Retirement of QF Generations	2030 Summer Peak w/o Facility Rerates	
Santa Maria-Sisquoc 115 kV Line	MESA_PGE 115kV - Section 2D & 1D	P2-4	Internal Breaker Fault(Bus Tie Fault)	Diverge	Diverge	Diverge	Diverge	Diverge	Diverge	75.69	35.96	Diverge	54.62	10.7	NA	Diverge	Project: North of Mesa Upgrades (On Hold) In-service date: TBD Short term: Action plan
Sisquoc-Santa Ynez 115 kV	MESA_PGE 115kV - Section 2D & 1D	P2-4	Internal Breaker Fault(Bus Tie	Diverge	Diverge	Diverge	Diverge	Diverge	Diverge	70.86	15.89	Diverge	40.77	14.48	NA	Diverge	Project: North of Mesa Upgrades (On Hold) In-service date: TBD Short term: Action plan
Sisquoc-Santa Ynez Sw Sta 115 kV Line (Santa Ynez Sw Sta-Zaca)	MESA_PGE 115kV - Section 2D & 1D	P2-4	Internal Breaker Fault(Bus Tie	Diverge	Diverge	Diverge	Diverge	Diverge	Diverge	64.31	11.7	Diverge	32.89	18.59	NA	Diverge	Project: North of Mesa Upgrades (On Hold) In-service date: TBD Short term: Action plan
	Mesa-Divide #1 and #2 115 kV Lines	P7-1	DCTL	NA	46.58	49.94	NA	45.39	46.65	NA	11.58	47.37	NA	18.48	NA	107.64	Project: North of Mesa Upgrades (On Hold) In-service date: TBD Short term: Action plan
Sisquoc-Santa Ynez Sw Sta 115 kV Line (Sisquoc-Palmer)	MESA_PGE 115kV - Section 2D & 1D	P2-4	Internal Breaker Fault(Bus Tie Fault)	Diverge	Diverge	Diverge	Diverge	Diverge	Diverge	74.44	17.41	Diverge	44.87	13.02	NA	Diverge	Project: North of Mesa Upgrades (On Hold) In-service date: TBD Short term: Action plan
	Mesa-Divide #1 and #2 115 kV Lines	P7-1	DCTL	NA	59.71	63.13	NA	54.45	55.73	NA	17.31	60.59	NA	12.88	NA	117.22	Project: North of Mesa Upgrades (On Hold) In-service date: TBD Short term: Action plan
Temblor-San Luis Obispo 115 kV Line (Carrizo-San Luis Obispo)	MORROBAY 230kV - Section 1E & 2E	P2-4	Internal Breaker Fault(Bus Tie Fault)	103.82	109.73	Diverge	85.04	92.21	Diverge	104.95	31.43	111.38	43.24	12.35	NA	Diverge	Project: North of Mesa Upgrades (On Hold) In-service date: TBD Short term: Action plan
	MORRO BAY 230kV Bus (failure of non-redundent relay)	P5-5	Non Redundant Relay	Diverge	Diverge	Diverge	Diverge	Diverge	Diverge	Diverge	60.75	Diverge	138.93	20.82	NA	Diverge	Add redundant relay
Templeton 230/70 kV Transformer	MORRO BAY 230kV Bus (failure of non-redundent relay)	P5-5	Non Redundant Relay	Diverge	Diverge	Diverge	Diverge	Diverge	Diverge	Diverge	10.91	Diverge	67.06	0	NA	Diverge	Add redundant relay
Templeton-Atascadero 70 kV Line	MORRO BAY 230kV Bus (failure of non-redundent relay)	P5-5	Non Redundant Relay	Diverge	Diverge	Diverge	Diverge	Diverge	Diverge	Diverge	36.15	Diverge	90.97	8.97	NA	Diverge	Add redundant relay
	MORRO BAY 230kV Bus (failure of non-redundent relay)	P5-5	Non Redundant Relay	Diverge	Diverge	Diverge	Diverge	Diverge	Diverge	Diverge	36.12	Diverge	90.95	8.97	NA	Diverge	Add redundant relay

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Study Area: PG&E Central Coast
PG&E Los Padres

Low Voltages

California ISO

Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)								Voltage PU (Sensitivity Scenarios)					Project & Potential Mitigation Solutions
				2022 Summer Peak	2025 Summer Peak	2030 Summer Peak	2022 Winter Peak	2025 Winter Peak	2030 Winter Peak	2022 Spring Off-Peak	2025 Spring Off-Peak	2025 SP High CEC Forecast	2025 SpOP Hi Renew & Min Gas Gen	2022 SP Heavy Renewable & Min Gas Gen	2030 Retirement of QF Generations	2030 Summer Peak w/o Facility Rerates	
9 ST JCT 60 kV	CRAZY HORSE CANYON-SALINAS-SOLEDAD #1 115kV [2900]	P1-2	N-1	NA	0.90	0.92	NA	> 0.9	0.95	NA	1.00	0.90	NA	1.01	NA	0.92	Project: RAS Identified in 2018-2019 TPP In-service date: TBD
GONZALES 60 kV		P1-2	N-1	NA	0.90	0.92	NA	> 0.9	0.95	NA	1.00	0.90	NA	1.01	NA	0.92	Project: RAS Identified in 2018-2019 TPP In-service date: TBD
9 ST JCT 60 kV	CRAZY HORSE CANYON-SALINAS-SOLEDAD #2 115kV [2910]	P1-2	N-1	NA	0.90	0.92	NA	> 0.9	0.95	NA	1.00	0.90	NA	1.01	NA	0.92	Project: RAS Identified in 2018-2019 TPP In-service date: TBD
GONZALES 60 kV		P1-2	N-1	NA	0.90	0.92	NA	> 0.9	0.95	NA	1.00	0.90	NA	1.01	NA	0.92	Project: RAS Identified in 2018-2019 TPP In-service date: TBD
SAN MIGL 70 kV	SAN MIGL-UNIONPGAE #1 70kV [0]	P1-2	N-1	NA	0.90	0.87	NA	> 0.9	0.90	NA	1.07	0.90	NA	1.08	NA	0.87	Continue to monitor
9 ST JCT 60 kV	CRAZY HORSE CANYON-SALINAS-SOLEDAD #1 115kV [2900] (NTVD SW1-SOLEDAD)	P2-1	Line Section w/o Fault	0.95	0.90	0.92	NA	0.99	0.95	0.97	1.00	0.90	0.99	1.01	NA	0.92	Project: RAS Identified in 2018-2019 TPP In-service date: TBD Short term: Action plan
GONZALES 60 kV		P2-1	Line Section w/o Fault	0.95	0.90	0.92	NA	0.99	0.95	0.97	1.00	0.90	0.98	1.01	NA	0.92	Project: RAS Identified in 2018-2019 TPP In-service date: TBD Short term: Action plan
9 ST JCT 60 kV	CRAZY HORSE CANYON-SALINAS-SOLEDAD #2 115kV [2910] (NTVD SW2-SOLEDAD)	P2-1	Line Section w/o Fault	0.95	0.90	0.92	NA	0.99	0.95	0.97	1.00	0.90	0.99	1.01	NA	0.92	Project: RAS Identified in 2018-2019 TPP In-service date: TBD Short term: Action plan
GONZALES 60 kV		P2-1	Line Section w/o Fault	0.95	0.90	0.92	NA	0.99	0.95	0.97	1.00	0.90	0.98	1.01	NA	0.92	Project: RAS Identified in 2018-2019 TPP In-service date: TBD Short term: Action plan
9 ST JCT 60 kV	CRZY_HRS 115kV - Middle Breaker Bay 3	P2-3	Non-Bus Tie Breaker	0.94	0.89	0.91	NA	0.99	0.94	0.97	1.00	0.89	0.98	1.01	NA	0.91	Project: RAS Identified in 2018-2019 TPP In-service date: TBD
GONZALES 60 kV		P2-3	Non-Bus Tie Breaker	0.94	0.89	0.91	NA	0.99	0.94	0.96	1.00	0.89	0.98	1.01	NA	0.91	Project: RAS Identified in 2018-2019 TPP In-service date: TBD
CMPHR J1 60 kV		P2-3	Non-Bus Tie Breaker	0.95	0.89	0.91	NA	0.99	0.94	0.97	1.00	0.89	0.99	1.01	NA	0.91	Project: RAS Identified in 2018-2019 TPP In-service date: TBD
9 ST JCT 60 kV	CRZY_HRS 115kV - Middle Breaker Bay 4	P2-3	Non-Bus Tie Breaker	0.95	0.90	0.92	NA	0.99	0.95	0.97	1.00	0.90	0.98	1.01	NA	0.92	Project: RAS Identified in 2018-2019 TPP In-service date: TBD
GONZALES 60 kV		P2-3	Non-Bus Tie Breaker	0.95	0.90	0.92	NA	0.99	0.95	0.97	1.00	0.90	0.98	1.01	NA	0.92	Project: RAS Identified in 2018-2019 TPP In-service date: TBD
9 ST JCT 60 kV	SALINAS 115kV - Middle Breaker Bay 3	P2-3	Non-Bus Tie Breaker	0.95	0.90	0.92	NA	0.99	0.95	0.97	1.01	0.90	0.99	1.01	NA	0.92	Project: RAS Identified in 2018-2019 TPP In-service date: TBD
GONZALES 60 kV		P2-3	Non-Bus Tie Breaker	0.95	0.90	0.92	NA	0.99	0.95	0.97	1.01	0.90	0.98	1.01	NA	0.92	Project: RAS Identified in 2018-2019 TPP In-service date: TBD
9 ST JCT 60 kV		P2-3	Non-Bus Tie Breaker	0.95	0.90	0.92	NA	0.99	0.95	0.97	1.00	0.90	0.99	1.01	NA	0.92	Sensitivity Olny
GONZALES 60 kV		P2-3	Non-Bus Tie Breaker	0.95	0.90	0.92	NA	0.99	0.95	0.97	1.00	0.90	0.98	1.01	NA	0.92	Project: RAS Identified in 2018-2019 TPP In-service date: TBD
DIABLOCN 230 kV	MORROBAY 230kV - Section 1E & 2E	P2-4	Bus-Tie Breaker	0.97	0.96	0.46	NA	1.01	0.55	1.02	1.21	0.96	1.01	1.22	NA	0.46	Project: North of Mesa Upgrades (On Hold) In-service date: TBD Short term: Action plan
MESA PGE 230 kV		P2-4	Bus-Tie Breaker	0.94	0.93	0.45	NA	1.01	0.54	1.01	1.21	0.93	1.01	1.22	NA	0.45	Project: North of Mesa Upgrades (On Hold) In-service date: TBD Short term: Action plan
SAN MIGL 70 kV	BAF COG2 13.80kV Gen Unit 1 & SANMIGL-UNIONPGAE#170kV[0]	P3	G-1/N-1	NA	> 0.9	0.87	NA	> 0.9	> 0.9	NA	> 0.9	> 0.9	NA	> 0.9	NA	0.87	Continue to monitor
9 ST JCT 60 kV	DUKMOSS1 18.00kV & DUKMOSS2 18.00kV & DUKMOSS3 18.00kV Gen Units & CRAZYHORSECANYON-SALINAS-SOLEDAD#1115kV[2900]	P3	G-1/N-1	NA	0.90	> 0.9	NA	> 0.9	> 0.9	NA	> 0.9	0.89	NA	> 0.9	NA	> 0.9	Project: RAS Identified in 2018-2019 TPP In-service date: TBD Short term: Action plan
GONZALES 60 kV		P3	G-1/N-1	NA	0.90	> 0.9	NA	> 0.9	> 0.9	NA	> 0.9	0.89	NA	> 0.9	NA	> 0.9	Project: RAS Identified in 2018-2019 TPP In-service date: TBD Short term: Action plan
CMPHR J1 60 kV		P3	G-1/N-1	NA	> 0.9	> 0.9	NA	> 0.9	> 0.9	NA	> 0.9	0.90	NA	> 0.9	NA	> 0.9	Project: RAS Identified in 2018-2019 TPP In-service date: TBD Short term: Action plan

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Study Area: PG&E Central Coast
PG&E Los Padres

Low Voltages

Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)								Voltage PU (Sensitivity Scenarios)					Project & Potential Mitigation Solutions
				2022 Summer Peak	2025 Summer Peak	2030 Summer Peak	2022 Winter Peak	2025 Winter Peak	2030 Winter Peak	2022 Spring Off-Peak	2025 Spring Off-Peak	2025 SP High CEC Forecast	2025 SpOP Hi Renew & Min Gas Gen	2022 SP Heavy Renewable & Min Gas Gen	2030 Retirement of QF Generations	2030 Summer Peak w/o Facility Rerates	
9 ST JCT 60 kV	DUKMOSS1 18.00kV & DUKMOSS2 18.00kV & DUKMOSS3 18.00kV Gen Units & CRAZYHORSECANYON-SALINAS-SOLEDAD#2115kV[2910]	P3	G-1/N-1	NA	0.90	> 0.9	NA	> 0.9	> 0.9	NA	> 0.9	0.89	NA	> 0.9	NA	> 0.9	Project: RAS Identified in 2018-2019 TPP In-service date: TBD Short term: Action plan
GONZALES 60 kV		P3	G-1/N-1	NA	0.90	> 0.9	NA	> 0.9	> 0.9	NA	> 0.9	0.89	NA	> 0.9	NA	> 0.9	Project: RAS Identified in 2018-2019 TPP In-service date: TBD Short term: Action plan
CMPHR J1 60 kV		P3	G-1/N-1	NA	> 0.9	> 0.9	NA	> 0.9	> 0.9	NA	> 0.9	0.90	NA	> 0.9	NA	> 0.9	Project: RAS Identified in 2018-2019 TPP In-service date: TBD Short term: Action plan
SAN MIGL 70 kV	DUKMOSS1 18.00kV & DUKMOSS2 18.00kV & DUKMOSS3 18.00kV Gen Units & SANMIGL-UNIONPGAE#170kV[0]	P3	G-1/N-1	NA	> 0.9	0.87	NA	> 0.9	> 0.9	NA	> 0.9	> 0.9	NA	> 0.9	NA	0.87	Continue to monitor
SAN MIGL 70 kV	DUKMOSS4 18.00kV & DUKMOSS5 18.00kV & DUKMOSS6 18.00kV Gen Units & SANMIGL-UNIONPGAE#170kV[0]	P3	G-1/N-1	NA	> 0.9	0.87	NA	> 0.9	> 0.9	NA	> 0.9	> 0.9	NA	> 0.9	NA	0.87	Continue to monitor
TEXCO J2 60 kV	SALNR GN 13.80kV Gen Unit 1 & COBURN-OILFIELDS#160kV[6410]	P3	G-1/N-1	NA	> 0.9	0.87	NA	> 0.9	0.88	NA	> 0.9	> 0.9	NA	> 0.9	NA	0.87	Continue to monitor
OILFLDS 60 kV		P3	G-1/N-1	NA	> 0.9	0.87	NA	> 0.9	0.88	NA	> 0.9	> 0.9	NA	> 0.9	NA	0.87	Continue to monitor
CHVSANARDO 60 kV		P3	G-1/N-1	NA	> 0.9	0.86	NA	> 0.9	0.87	NA	> 0.9	> 0.9	NA	> 0.9	NA	0.86	Continue to monitor
SARG CYN 60 kV		P3	G-1/N-1	NA	> 0.9	0.87	NA	> 0.9	0.88	NA	> 0.9	> 0.9	NA	> 0.9	NA	0.87	Continue to monitor
SALN RVR 60 kV		P3	G-1/N-1	NA	> 0.9	0.87	NA	> 0.9	0.88	NA	> 0.9	> 0.9	NA	> 0.9	NA	0.87	Continue to monitor
AERA_ENG 60 kV		P3	G-1/N-1	NA	> 0.9	0.87	NA	> 0.9	0.88	NA	> 0.9	> 0.9	NA	> 0.9	NA	0.87	Continue to monitor
AERA_MTR 60 kV	SALNR GN 13.80kV Gen Unit 1 & COBURN-OILFIELDS#160kV[6410]	P3	G-1/N-1	NA	> 0.9	0.87	NA	> 0.9	0.88	NA	> 0.9	> 0.9	NA	> 0.9	NA	0.87	Continue to monitor
AERA_TP1 60 kV		P3	G-1/N-1	NA	> 0.9	0.87	NA	> 0.9	0.88	NA	> 0.9	> 0.9	NA	> 0.9	NA	0.87	Continue to monitor
AERA_TP2 60 kV		P3	G-1/N-1	NA	> 0.9	0.87	NA	> 0.9	0.88	NA	> 0.9	> 0.9	NA	> 0.9	NA	0.87	Continue to monitor
AERA_TP3 60 kV		P3	G-1/N-1	NA	> 0.9	0.87	NA	> 0.9	0.88	NA	> 0.9	> 0.9	NA	> 0.9	NA	0.87	Continue to monitor
TEXCO J1 60 kV	SALNR GN 13.80kV Gen Unit 1 & COBURN-OILFIELDS#260kV[6420]	P3	G-1/N-1	NA	> 0.9	0.90	NA	> 0.9	> 0.9	NA	> 0.9	> 0.9	NA	> 0.9	NA	0.90	Continue to monitor
OILFLDS 60 kV		P3	G-1/N-1	NA	> 0.9	0.90	NA	> 0.9	> 0.9	NA	> 0.9	> 0.9	NA	> 0.9	NA	0.90	Continue to monitor
CHVSANARDO 60 kV		P3	G-1/N-1	NA	> 0.9	0.89	NA	> 0.9	0.90	NA	> 0.9	> 0.9	NA	> 0.9	NA	0.89	Continue to monitor
SARG CYN 60 kV		P3	G-1/N-1	NA	> 0.9	0.90	NA	> 0.9	> 0.9	NA	> 0.9	> 0.9	NA	> 0.9	NA	0.90	Continue to monitor
SALN RVR 60 kV		P3	G-1/N-1	NA	> 0.9	0.89	NA	> 0.9	0.90	NA	> 0.9	> 0.9	NA	> 0.9	NA	0.89	Continue to monitor
AERA_ENG 60 kV		P3	G-1/N-1	NA	> 0.9	0.90	NA	> 0.9	> 0.9	NA	> 0.9	> 0.9	NA	> 0.9	NA	0.90	Continue to monitor
AERA_MTR 60 kV		P3	G-1/N-1	NA	> 0.9	0.90	NA	> 0.9	> 0.9	NA	> 0.9	> 0.9	NA	> 0.9	NA	0.90	Continue to monitor
AERA_TP1 60 kV		P3	G-1/N-1	NA	> 0.9	0.90	NA	> 0.9	> 0.9	NA	> 0.9	> 0.9	NA	> 0.9	NA	0.90	Continue to monitor
AERA_TP2 60 kV		P3	G-1/N-1	NA	> 0.9	0.90	NA	> 0.9	> 0.9	NA	> 0.9	> 0.9	NA	> 0.9	NA	0.90	Continue to monitor
AERA_TP3 60 kV		P3	G-1/N-1	NA	> 0.9	0.90	NA	> 0.9	> 0.9	NA	> 0.9	> 0.9	NA	> 0.9	NA	0.90	Continue to monitor
SAN MIGL 70 kV	TEMPLETN 230.00kV Gen Unit VW & SANMIGL-UNIONPGAE#170kV[0]	P3	G-1/N-1	NA	> 0.9	> 0.9	NA	> 0.9	0.90	NA	> 0.9	> 0.9	NA	> 0.9	NA	> 0.9	Continue to monitor

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Study Area: PG&E Central Coast
PG&E Los Padres

Low Voltages

Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)								Voltage PU (Sensitivity Scenarios)					Project & Potential Mitigation Solutions
				2022 Summer Peak	2025 Summer Peak	2030 Summer Peak	2022 Winter Peak	2025 Winter Peak	2030 Winter Peak	2022 Spring Off-Peak	2025 Spring Off-Peak	2025 SP High CEC Forecast	2025 SpOP Hi Renew & Min Gas Gen	2022 SP Heavy Renewable & Min Gas Gen	2030 Retirement of QF Generations	2030 Summer Peak w/o Facility Rerates	
OCEANO 115 kV	CALLENDAR SW STA-MESA 115kV [1210] & MORROBAY230/115kVTB6	P6	N-1-1	NA	> 0.9	0.87	NA	> 0.9	> 0.9	NA	> 0.9	> 0.9	NA	> 0.9	NA	0.87	Project: North of Mesa Upgrades (On Hold) In-service date: TBD Short term: Action plan
UNIONOIL 115 kV		P6	N-1-1	NA	> 0.9	0.87	NA	> 0.9	> 0.9	NA	> 0.9	> 0.9	NA	> 0.9	NA	0.87	Project: North of Mesa Upgrades (On Hold) In-service date: TBD Short term: Action plan
CALLENDERSS 115 kV		P6	N-1-1	NA	> 0.9	0.87	NA	> 0.9	> 0.9	NA	> 0.9	> 0.9	NA	> 0.9	NA	0.87	Project: North of Mesa Upgrades (On Hold) In-service date: TBD Short term: Action plan
SAN MIGL 70 kV	DUKE ML1-MOSSLNSW #1 230kV [0] & SANMIGL-UNIONPGAE#170kV[0]	P6	N-1-1	NA	> 0.9	0.87	NA	> 0.9	> 0.9	NA	> 0.9	> 0.9	NA	> 0.9	NA	0.87	Continue to monitor
SAN MIGL 70 kV		P6	N-1-1	NA	> 0.9	0.87	NA	> 0.9	> 0.9	NA	> 0.9	> 0.9	NA	> 0.9	NA	0.87	Continue to monitor
CMPHR J1 60 kV	GREENVALLEY 115/60kV TB 1 & CRAZYHORSECANYON-SALINAS-SOLEDAD#1115kV[2900]	P6	N-1-1	NA	> 0.9	> 0.9	NA	> 0.9	> 0.9	NA	> 0.9	0.90	NA	> 0.9	NA	> 0.9	Adjust Transformer Tap Settings
CMPHR J1 60 kV		P6	N-1-1	NA	> 0.9	> 0.9	NA	> 0.9	> 0.9	NA	> 0.9	0.90	NA	> 0.9	NA	> 0.9	Adjust Transformer Tap Settings
MESA PGE 230 kV	MORRO BAY-DIABLO 230kV [5260] & MORROBAY-MESA230kV[5290]	P6	N-1-1	NA	> 0.9	> 0.9	NA	> 0.9	> 0.9	NA	> 0.9	> 0.9	NA	> 0.9	NA	0.88	Sensitivity Olny
MESA PGE 230 kV	MORRO BAY-MESA 230kV [5290] & MORROBAY-DIABLO230kV[5260]	P6	N-1-1	NA	> 0.9	0.88	NA	> 0.9	> 0.9	NA	> 0.9	> 0.9	NA	> 0.9	NA	0.88	Project: North of Mesa Upgrades (On Hold) In-service date: TBD Short term: Action plan
SAN MIGL 70 kV	MORRO BAY-TEMPLETON 230kV [5933] & SANMIGL-UNIONPGAE#170kV[0]	P6	N-1-1	NA	> 0.9	0.87	NA	> 0.9	> 0.9	NA	> 0.9	> 0.9	NA	> 0.9	NA	0.87	Project: North of Mesa Upgrades (On Hold) In-service date: TBD Short term: Action plan
OCEANO 115 kV	MORROBAY 230/115kV TB 6 & CALLENDARSWSTA-MESA115kV[1210]	P6	N-1-1	NA	> 0.9	0.87	NA	> 0.9	> 0.9	NA	> 0.9	> 0.9	NA	> 0.9	NA	0.87	Project: North of Mesa Upgrades (On Hold) In-service date: TBD Short term: Action plan
UNIONOIL 115 kV		P6	N-1-1	NA	> 0.9	0.87	NA	> 0.9	> 0.9	NA	> 0.9	> 0.9	NA	> 0.9	NA	0.87	Project: North of Mesa Upgrades (On Hold) In-service date: TBD Short term: Action plan
CALLENDERSS 115 kV		P6	N-1-1	NA	> 0.9	0.87	NA	> 0.9	> 0.9	NA	> 0.9	> 0.9	NA	> 0.9	NA	0.87	Project: North of Mesa Upgrades (On Hold) In-service date: TBD Short term: Action plan
OCEANO 115 kV	MORROBAY 230/115kV TB 6 & OCEANO-CALLENDARSWSTA115kV[2394]	P6	N-1-1	NA	> 0.9	0.88	NA	> 0.9	> 0.9	NA	> 0.9	> 0.9	NA	> 0.9	NA	0.88	Project: North of Mesa Upgrades (On Hold) In-service date: TBD Short term: Action plan
OCEANO 115 kV	OCEANO-CALLENDAR SW STA 115kV [2394] & MORROBAY230/115kVTB6	P6	N-1-1	NA	> 0.9	0.88	> 0.9	> 0.9	> 0.9	NA	> 0.9	> 0.9	NA	> 0.9	NA	0.88	Project: North of Mesa Upgrades (On Hold) In-service date: TBD Short term: Action plan
9 ST JCT 60 kV	SOLEDAD 115/115kV TB 1 COPY2 & CRAZYHORSECANYON-SALINAS-SOLEDAD#1115kV[2900]	P6	N-1-1	NA	0.88	> 0.9	> 0.9	> 0.9	> 0.9	NA	> 0.9	0.88	NA	> 0.9	NA	> 0.9	Project: RAS Identified in 2018-2019 TPP In-service date: TBD Short term: Action plan
GONZALES 60 kV		P6	N-1-1	NA	0.88	> 0.9	> 0.9	> 0.9	> 0.9	NA	> 0.9	0.88	NA	> 0.9	NA	> 0.9	Project: RAS Identified in 2018-2019 TPP In-service date: TBD Short term: Action plan
CMPHR J1 60 kV		P6	N-1-1	NA	0.89	> 0.9	> 0.9	> 0.9	> 0.9	NA	> 0.9	0.89	NA	> 0.9	NA	> 0.9	Project: RAS Identified in 2018-2019 TPP In-service date: TBD Short term: Action plan

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Study Area: PG&E Central Coast
PG&E Los Padres

Low Voltages

Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)								Voltage PU (Sensitivity Scenarios)					Project & Potential Mitigation Solutions
				2022 Summer Peak	2025 Summer Peak	2030 Summer Peak	2022 Winter Peak	2025 Winter Peak	2030 Winter Peak	2022 Spring Off-Peak	2025 Spring Off-Peak	2025 SP High CEC Forecast	2025 SpOP Hi Renew & Min Gas Gen	2022 SP Heavy Renewable & Min Gas Gen	2030 Retirement of QF Generations	2030 Summer Peak w/o Facility Rerates	
9 ST JCT 60 kV	SOLEDAD 115/115kV TB 1 COPY2 & CRAZYHORSECANYON-SALINAS-SOLEDAD#2115kV[2910]	P6	N-1-1	NA	**0.88**	> 0.9	> 0.9	> 0.9	> 0.9	NA	> 0.9	**0.88**	NA	> 0.9	NA	> 0.9	Project: RAS Identified in 2018-2019 TPP In-service date: TBD Short term: Action plan
GONZALES 60 kV		P6	N-1-1	NA	**0.88**	> 0.9	> 0.9	> 0.9	> 0.9	NA	> 0.9	**0.88**	NA	> 0.9	NA	> 0.9	Project: RAS Identified in 2018-2019 TPP In-service date: TBD Short term: Action plan
CMPHR J1 60 kV		P6	N-1-1	NA	**0.89**	> 0.9	> 0.9	> 0.9	> 0.9	NA	> 0.9	**0.89**	NA	> 0.9	NA	> 0.9	Project: RAS Identified in 2018-2019 TPP In-service date: TBD Short term: Action plan
MESA PGE 230 kV	Morro Bay-Mesa and Diablo-Mesa 230 kV Lines	P7-1	DCTL	NA	0.92	NA	> 0.9	> 0.9	**0.87**	NA	1.08	0.91	NA	1.20	NA	NA	Project: North of Mesa Upgrades (On Hold) In-service date: TBD Short term: Action plan
9 ST JCT 60 kV	Moss Landing - Crazy Horse #1 and #2 115 kV Lines	P7-1	DCTL	NA	0.90	0.91	> 0.9	> 0.9	0.94	NA	1.01	**0.90**	NA	1.01	NA	0.91	Project: RAS Identified in 2018-2019 TPP In-service date: TBD
GONZALES 60 kV		P7-1	DCTL	NA	0.90	0.91	> 0.9	> 0.9	0.94	NA	1.01	**0.90**	NA	1.01	NA	0.91	Project: RAS Identified in 2018-2019 TPP In-service date: TBD
9 ST JCT 60 kV	Moss Landing - Salinas #1 and #2 115 kV Lines	P7-1	DCTL	NA	**0.89**	**0.90**	> 0.9	> 0.9	0.93	NA	1.00	**0.89**	NA	1.00	NA	**0.90**	Project: RAS Identified in 2018-2019 TPP In-service date: TBD
GONZALES 60 kV		P7-1	DCTL	NA	**0.89**	**0.90**	> 0.9	> 0.9	0.93	NA	1.00	**0.89**	NA	1.00	NA	**0.90**	Project: RAS Identified in 2018-2019 TPP In-service date: TBD
CMPHR J1 60 kV		P7-1	DCTL	NA	**0.89**	**0.90**	> 0.9	> 0.9	0.93	NA	1.00	**0.89**	NA	1.01	NA	**0.90**	Project: RAS Identified in 2018-2019 TPP In-service date: TBD

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Study Area: PG&E Central Coast

Voltage Deviation PG&E Los Padres

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
				2022 Summer Peak	2025 Summer Peak	2030 Summer Peak	2022 Winter Peak	2025 Winter Peak	2030 Winter Peak	2022 Spring Off-Peak	2025 Spring Off-Peak	2025 SP High CEC Forecast	2025 SpOP Hi Renew & Min Gas Gen	2022 SP Heavy Renewable & Min Gas Gen	2030 Retirement of QF Generations	2030 Summer Peak w/o Facility Rerates	
WTSNVLLE 60 kV	GREEN VALLEY-WATSONVILLE 60kV [6970]	P1-2	N-1	NA	10	8	NA	>-8,<8	7.2	NA	9	10	9	NA	NA	7.8	Adjust Transformer Tap Settings
SAN MIGL 70 kV	SAN MIGL-UNIONPGAE #1 70kV [0]	P1-2	N-1	NA	9	11	NA	>-8,<8	9	NA	-4.3	9	-4.8	NA	NA	11	Continue to Monitor
GREENVALLEY 60 kV	GREENVALLEY 115/60kV TB 1	P1-3	N-1	NA	13	10	NA	>-8,<8	9	NA	10	12	10	NA	NA	10	Adjust Transformer Tap Settings
ERTA 60 kV	GREENVALLEY 115/60kV TB 1	P1-3	N-1	NA	12	10	NA	>-8,<8	9	NA	10	12	10	NA	NA	10	Adjust Transformer Tap Settings
CIC JCT 60 kV	GREENVALLEY 115/60kV TB 1	P1-3	N-1	NA	12	9	NA	>-8,<8	8	NA	9	11	9	NA	NA	9	Adjust Transformer Tap Settings
WTSNVLLE 60 kV	GREENVALLEY 115/60kV TB 1	P1-3	N-1	NA	11	9	NA	>-8,<8	8	NA	9	11	9	NA	NA	9	Adjust Transformer Tap Settings
ERTA JCT 60 kV	GREENVALLEY 115/60kV TB 1	P1-3	N-1	NA	12	10	NA	>-8,<8	9	NA	10	12	10	NA	NA	10	Adjust Transformer Tap Settings
AGRILINK 60 kV	GREENVALLEY 115/60kV TB 1	P1-3	N-1	NA	11	9	NA	>-8,<8	8	NA	9	11	9	NA	NA	9	Adjust Transformer Tap Settings
SAN MIGL 70 kV	BAF COG2 13.80kV Gen Unit 1 & SANMIGL-UNIONPGAE#170kV[0]	P3	G-1/N-1	NA	>-8,<8	12	NA	>-8,<8	>-8,<8	NA	>-8,<8	>-8,<8	>-8,<8	NA	NA	12	Continue to Monitor
SAN MIGL 70 kV	DUKMOSS1 18.00kV & DUKMOSS2 18.00kV & DUKMOSS3 18.00kV Gen Units & SANMIGL-UNIONPGAE#170kV[0]	P3	G-1/N-1	NA	>-8,<8	12	NA	>-8,<8	>-8,<8	NA	>-8,<8	>-8,<8	>-8,<8	NA	NA	12	Continue to Monitor
SAN MIGL 70 kV	DUKMOSS4 18.00kV & DUKMOSS5 18.00kV & DUKMOSS6 18.00kV Gen Units & SANMIGL-UNIONPGAE#170kV[0]	P3	G-1/N-1	NA	>-8,<8	12	NA	>-8,<8	>-8,<8	NA	>-8,<8	>-8,<8	>-8,<8	NA	NA	12	Continue to Monitor
TEXCO J2 60 kV	SALNR GN 13.80kV Gen Unit 1 & COBURN-OILFIELDS#160kV[6410]	P3	G-1/N-1	NA	>-8,<8	9	NA	>-8,<8	9	NA	>-8,<8	>-8,<8	>-8,<8	NA	NA	9	Continue to Monitor
OILFLDS 60 kV	SALNR GN 13.80kV Gen Unit 1 & COBURN-OILFIELDS#160kV[6410]	P3	G-1/N-1	NA	>-8,<8	9	NA	>-8,<8	9	NA	>-8,<8	>-8,<8	>-8,<8	NA	NA	9	Continue to Monitor
CHVSANARDO 60 kV	SALNR GN 13.80kV Gen Unit 1 & COBURN-OILFIELDS#160kV[6410]	P3	G-1/N-1	NA	>-8,<8	9	NA	>-8,<8	9	NA	>-8,<8	>-8,<8	>-8,<8	NA	NA	9	Continue to Monitor
SARG CYN 60 kV	SALNR GN 13.80kV Gen Unit 1 & COBURN-OILFIELDS#160kV[6410]	P3	G-1/N-1	NA	>-8,<8	9	NA	>-8,<8	9	NA	>-8,<8	>-8,<8	>-8,<8	NA	NA	9	Continue to Monitor
SALN RVR 60 kV	SALNR GN 13.80kV Gen Unit 1 & COBURN-OILFIELDS#160kV[6410]	P3	G-1/N-1	NA	>-8,<8	9	NA	>-8,<8	9	NA	>-8,<8	>-8,<8	>-8,<8	NA	NA	9	Continue to Monitor
AERA_ENG 60 kV	SALNR GN 13.80kV Gen Unit 1 & COBURN-OILFIELDS#160kV[6410]	P3	G-1/N-1	NA	>-8,<8	9	NA	>-8,<8	9	NA	>-8,<8	>-8,<8	>-8,<8	NA	NA	9	Continue to Monitor
AERA_MTR 60 kV	SALNR GN 13.80kV Gen Unit 1 & COBURN-OILFIELDS#160kV[6410]	P3	G-1/N-1	NA	>-8,<8	9	NA	>-8,<8	9	NA	>-8,<8	>-8,<8	>-8,<8	NA	NA	9	Continue to Monitor
AERA_TP1 60 kV	SALNR GN 13.80kV Gen Unit 1 & COBURN-OILFIELDS#160kV[6410]	P3	G-1/N-1	NA	>-8,<8	9	NA	>-8,<8	9	NA	>-8,<8	>-8,<8	>-8,<8	NA	NA	9	Continue to Monitor
AERA_TP2 60 kV	SALNR GN 13.80kV Gen Unit 1 & COBURN-OILFIELDS#160kV[6410]	P3	G-1/N-1	NA	>-8,<8	9	NA	>-8,<8	9	NA	>-8,<8	>-8,<8	>-8,<8	NA	NA	9	Continue to Monitor
AERA_TP3 60 kV	SALNR GN 13.80kV Gen Unit 1 & COBURN-OILFIELDS#160kV[6410]	P3	G-1/N-1	NA	>-8,<8	9	NA	>-8,<8	9	NA	>-8,<8	>-8,<8	>-8,<8	NA	NA	9	Continue to Monitor
SAN MIGL 70 kV	TEMPLETN 230.00kV Gen Unit VW & SANMIGL-UNIONPGAE#170kV[0]	P3	G-1/N-1	NA	>-8,<8	>-8,<8	NA	>-8,<8	10	NA	>-8,<8	>-8,<8	>-8,<8	NA	NA	>-8,<8	Continue to Monitor

Study Area: PG&E Central Coast
PG&E Los Padres

Transient Stability

Contingency	Category	Category Description	Transient Stability Performance					Potential Mitigation Solutions
			Baseline Scenarios			Sensitivity Scenarios		
			Select..	Select..	Select..	Select..	Select..	

In accordance with TPL-001-4- Requirement R2.6, this area relies on the past studies from the 2019-20 Transmission Planning Process for transient stability studies:
http://www.caiso.com/Documents/AppendixC-BoardApprovedt2019-2020TransmissionPlan.pdf

2020-2021 ISO Reliability Assessment - Study Results

Study Area: PG&E Central Coast
PG&E Los Padres

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

2020-2021 ISO Reliability Assessment - Study Results

Study Area: PG&E Central Coast
PG&E Los Padres

Single Source Substation with more than 100 MW Load

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

No single source substation with more than 100 MW

2020-2021 ISO Reliability Assessment - Study Results
Study Area: SCE Bulk
Thermal Overloads

California ISO

Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading % (Baseline Scenarios)						Loading % (Sensitivity Scenarios)			Project & Potential Mitigation Solutions
				2022 Summer Peak	2025 Summer Peak	2030 Summer Peak	2022 Spring Off-Peak	2025 Spring Off-Peak	2030 Spring Off-Peak	2025 SP High CEC Forecast	2022 SpOP Hi Renew & Min Gas Gen	2022 SP Heavy Renewable & Min Gas Gen	
ANTELOPE-WIRLWIND 500kV	ANTELOPE 500.0 to WINDHUB 500.0 Circuit 1 & VINCENT 500.0 to WIRLWIND 500.0 Circuit 3	P6	N-1-1	<100	<100	<100	<100	108.54	<100	<100	111.2	<100	Generation redispatch, reduce gen at Whirlwind 230kV
The remaining two Sylmar banks	Lugo-Victorville 500kV & one Sylmar bank	P6	N-1-1	<100	<100	142.56	<100	<100	<100	<100	<100	<100	Reduce PDCI and generation redispatch following the first outage
Serrano 500/230kV transformers	Loss of two Serrano 500/230kV transformers	P6	N-1-1	<100	<100	<100	<100	<100	<100	104.4	100.6	<100	Operating procedure 7590
Vincent 500/230kV transformer No. 2 or 3	Vincent-Mesa 500kV & Vincent 500/230kV transformer No.3 or 2	P6	N-1-1	<100	<100	<100	<100	<100	<100	<100	<100	104.1	Operating procedure 7550
Vincent 500/230kV transformer No. 1 or 4	Vincent-Mesa 500kV & Vincent 500/230kV transformer No.4 or 1	P6	N-1-1	<100	<100	<100	<100	<100	<100	<100	<100	107	Operating procedure 7550
System	Lugo-Mohave 500kV & Eldorado-Mohave 500kV lines	P6	N-1-1	Nonconv	Nonconv	Nonconv	Nonconv	Nonconv	Nonconv	Nonconv	Nonconv	Nonconv	Generation redispatch following the first outage at Mohave; NVE operating procedure

Note: The off-peak sensitivity case with heavy renewable output and minimum gas generation commitment is based on the 2022 Spring Off-Peak Case rather than the 2025 Spring Off-Peak Case as indicated in the study plan.

2020-2021 ISO Reliability Assessment - Study Results

Study Area: SCE Bulk

High/Low Voltages

Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)					Voltage PU (Sensitivity Scenarios)			Project & Potential Mitigation Solutions
				2022 Summer Peak	2025 Summer Peak	2030 Summer Peak	2022 Spring Off-Peak	2025 Spring Off-Peak	2025 SP High CEC Forecast	2022 SpOP Hi Renew & Min Gas Gen	2022 SP Heavy Renewable & Min Gas Gen	

No violations

Note: The off-peak sensitivity case with heavy renewable output and minimum gas generation commitment is based on the 2022 Spring Off-Peak Case rather than the 2025 Spring Off-Peak Case as indicated in the study plan.

2020-2021 ISO Reliability Assessment - Study Results

Study Area: SCE Bulk

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
				2021 Summer Peak	2024 Summer Peak	2029 Summer Peak	2021 Spring Off-Peak	2024 Spring Off-Peak	2024 SP High CEC Forecast	2024 SpOP Hi Renew & Min Gas Gen	2021 SP Heavy Renewable & Min Gas Gen	

No violations

Note: The off-peak sensitivity case with heavy renewable output and minimum gas generation commitment is based on the 2022 Spring Off-Peak Case rather than the 2025 Spring Off-Peak Case as indicated in the study plan.

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Study Area: SCE Bulk

Transient Stability

Contingency	Category	Category Description	Transient Stability Performance					Potential Mitigation Solutions
			Baseline Scenarios			Sensitivity Scenarios		
			2025 Summer Peak	2030 Summer Peak	2022 Spring Off-Peak	2025 SP High CEC Forecast	2022 SpOP Hi Renew & Min Gas Gen	
Lugo-Victorville 500kV Line (fault at Lugo 500kV)	P1.3	Normal clearing	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Imperial Valley-N. Gila 500kV Line (fault at Imperial Valley 500kV)	P1.3	Normal clearing	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Palo Verde Unit No. 1 (fault at Palo Verde 500kV)	P1.1	Normal clearing	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Devers-Red Bluff 500kV & Devers-Valley No.1 500kV	P4	Stuck breaker	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Lugo-Rancho Vista 500kV & Lugo-Vincent No.1 500kV	P4	Stuck breaker	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Lugo-Vincent No.2 500kV & Lugo-Victorville 500kV	P4	Stuck breaker	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Mira Loma-Rancho Vista 500kV & Mira Loma-Serrano No.1 500kV	P4	Stuck breaker	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Mesa-Vincent 500kV & Midway-Vincent No. 2 500kV	P4	Stuck breaker	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Antelope-Vincent No.1 500kV & Lugo-Vincent No.2 500kV	P4	Stuck breaker	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Midway-Whirlwind 500kV & Vincent-Whirlwind 500kV	P4	Stuck breaker	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Antelope-Whirlwind and Antelope-Vincent No.1 500kV	P6	Normal clearing	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Antelope-Whirlwind and Antelope-Windhub 500kV	P6	Normal clearing	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Antelope-Windhub and Antelope-Vincent No.1 500kV	P6	Normal clearing	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Eldorado-Lugo and Eldorado-Mohave 500kV lines	P6	Normal clearing	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Eldorado-Lugo and Lugo-Mohave 500kV lines	P6	Normal clearing	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Devers-RedBluff No.1 & No.2 500 kV	P6	Normal clearing	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Devers-Valley No.1 & No.2 500 kV	P6	Normal clearing	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
ECO-Miguel & Ocotillo-Suncrest 500 kV	P6	Normal clearing	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Mesa-Mira Loma 500kV & Mira Loma 4AA Bank	P6	Normal clearing	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Mira Loma-Serrano No.2 & Mira Loma 4AA Bank	P6	Normal clearing	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Eldorado-Mohave and Lugo-Mohave 500kV	P6	Normal clearing	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Lugo-Rancho Vista & Rancho Vista-Serrano No.1 500kV	P6	Normal clearing	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Rancho Vista 3AA & 4AA Banks	P6	Normal clearing	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Serrano-Valley & Rancho Vista-Serrano No.1 500kV	P6	Normal clearing	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Serrano-Valley & Mira Loma-Serrano No.2 500kV	P6	Normal clearing	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Serrano 2AA & 3AA Banks	P6	Normal clearing	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Midway-Vincent No.1 & Midway-Whirlwind No.3 + No RAS	P6	Normal clearing	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Lugo-Vincent No.1 & No.2 500kV	P6	Normal clearing	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Midway-Whirlwind No.3 & Windhub-Whirlwind 500kV	P6	Normal clearing	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Whirlwind-Windhub & Antelope-Whirlwind 500kV	P6	Normal clearing	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Mesa-Vincent & Mesa-Mira Loma 500kV	P6	Normal clearing	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
IPPDC_bipole	P7.2	Normal clearing	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
PDCI_bipole_SPS	P7.2	Normal clearing	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Mesa-Mira Loma 500kV & Chino-Mira Loma No.3 230kV	P7.2	Normal clearing	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Mira Loma-Serrano No.2 500kV & Rancho Vista-Serrano No.1 500kV	P7.2	Normal clearing	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation

Note: The off-peak sensitivity case with heavy renewable output and minimum gas generation commitment is based on the 2022 Spring Off-Peak Case rather than the 2025 Spring Off-Peak Case as indicated in the study plan.

2020-2021 ISO Reliability Assessment - Study Results

Study Area: SCE Bulk

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

Note: The off-peak sensitivity case with heavy renewable output and minimum gas generation commitment is based on the 2022 Spring Off-Peak Case rather than the 2025 Spring Off-Peak Case as indicated in the study plan.

2020-2021 ISO Reliability Assessment - Study Results

Study Area: SCE Bulk

Single Source Substation with more than 100 MW Load

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

No single source substation with more than 100 MW

Note: The off-peak sensitivity case with heavy renewable output and minimum gas generation commitment is based on the 2022 Spring Off-Peak Case rather than the 2025 Spring Off-Peak Case as indicated in the study plan.

Study Area: SCE Tehachapi & Big Creek Corridor

Thermal Overloads

Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading % (Baseline Scenarios)					Loading % (Sensitivity Scenarios)			ISO Approved Projects & Potential Mitigation Solutions
				2022 Summer Peak	2025 Summer Peak	2030 Summer Peak	2022 Spring Off-Peak	2025 Spring Off-Peak	2025 SP High CEC Forecast	2022 Spring OP Hi Renew & Min Gas Gen	2022 SP Heavy Renewable & Min Gas Gen	
Whilwind 500/230 kV Transformers	All elements in sevice	P0	N-0	<100	<100	<100	<100	<100	<100	102	<100	Congestion management
	One Whilwind 500/230 kV Transformer With RAS	P1	N-0	<100	<100	<100	<100	116	<100	129	119	Whirlwind RAS
	Two Whilwind 500/230 kV Transformers (Worst case) With RAS	P6	T-1/T-1	127	<100	<100	<100	241	<100	277	248	Whirlwind RAS
Neenach — Bailey/Westpac Tap 66 kV	All elements in sevice	P0	N-0	<100	<100	<100	<100	<100	<100	<100	104	Congestion management
Antelope–Neenach 66 kV	Neenach — Bailey/Westpac 66 kV	P1/P2.1	L-1	<100	<100	<100	<100	101	<100	104	101	
Big Creek 2–Big Creek 3 230 kV	Big Creek 1–Rector & Big Creek 8–Big Creek 3 230 kV lines	P6	L-1/L-1	<100	130	130	136	<100	130	136	<100	Reduce Big Creek generation after initial contingency
	Big Creek 1–Rector & Big Creek 8–Big Creek 2 230 kV lines	P6	L-1/L-1	<100	114	114	120	<100	114	120	<100	
Antelope 230/66 kV Transformers	Two Antelope 230/66 kV Transformers	P6	T-1/T-1	<100	124	157	<100	<100	132	<100	<100	Energize spare after initial contingency

Note: The off-peak sensitivity case with heavy renewable output and minimum gas generation commitment is based on the 2022 Spring Off-Peak Case rather than the 2025 Spring Off-Peak Case as indicated in the study plan.

Study Area: SCE Tehachapi & Big Creek Corridor

High/Low Voltages

Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)					Voltage PU (Sensitivity Scenarios)			ISO Approved Projects & Potential Mitigation Solutions
				2022 Summer Peak	2025 Summer Peak	2030 Summer Peak	2022 Spring Off-Peak	2025 Spring Off-Peak	2025 SP High CEC Forecast	2022 Spring OP Hi Renew & Min Gas Gen	2022 SP Heavy Renewable & Min Gas Gen	
Bailey 66 kV sytem	Bailey–Pardee & Bailey–Pastoria 230 kV	P6	L-1/L-1	Diverged	Diverged	Diverged	Diverged	>0.9	Diverged	Diverged	Diverged	Split Antelope–Bailey 66 kV System per existing SCE operating procedure after initial contingency
Bailey 66 kV sytem	Bailey 230/66 kV #2 $ #3 Tran.	P6	T-1/T-1	Diverged	Diverged	Diverged	Diverged	>0.9	Diverged	Diverged	Diverged	

Note: The off-peak sensitivity case with heavy renewable output and minimum gas generation commitment is based on the 2022 Spring Off-Peak Case rather than the 2025 Spring Off-Peak Case as indicated in the study plan.

Study Area: SCE Tehachapi & Big Creek Corridor

Voltage Deviation

Substation	Contingency (All and Worst P6)	Category	Category Description	Post Cont. Voltage Deviation % (Baseline Scenarios)					Post Cont. Voltage Deviation % (Sensitivity Scenarios)			ISO Approved Projects & Potential Mitigation Solutions
				2022 Summer Peak	2025 Summer Peak	2030 Summer Peak	2022 Spring Off-Peak	2025 Spring Off-Peak	2025 SP High CEC Forecast	2022 Spring OP Hi Renew & Min Gas Gen	2022 SP Heavy Renewable & Min Gas Gen	

No voltage deviation issues were identified

Note: The off-peak sensitivity case with heavy renewable output and minimum gas generation commitment is based on the 2022 Spring Off-Peak Case rather than the 2025 Spring Off-Peak Case as indicated in the study plan.

Study Area: SCE Tehachapi & Big Creek Corridor

Transient Stability

California ISO

Contingency	Category	Category Description	Fault Duration (cycles)	Transient Stability Performance					Potential Mitigation Solutions
				2025 Summer Peak	2030 Summer Peak	2022 Spring Off-Peak	2025 SP High CEC Forecast	2022 Spring OP Hi Renew & Min Gas Gen	
Pardee-Pastoria-Warne, 3-PH Fault @ Pardee, Normal Clearing	P1	Single contingency	5	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Antelope-Magunden No. 1 or 2, 3-PH Fault @ Magunden, Normal Clearing	P1	Single contingency	5	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Big Creek 1 - Rector & Rector-Vestal No. 1 , 1-PH Fault @ Big Creek 1, Delayed Clearing	P4.2	Two overlapping events	15	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Big Creek 3-Rector No. 1 & Rector-Vestal No. 2, 1-PH Fault @ Big Creek 1, Delayed Clearing	P4.2	Single contingency	15	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Big Creek 4-Springville & Magunden-Springville No. 2, 1-PH Fault @ Big Creek 4, Delayed Clearing	P4.2	Stuck Breaker	15	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Magunden-Pastoria No. 1 & Bailey-Pastoria, 1-PH Fault @ Pastoria, Delayed Clearing	P4.2	Stuck Breaker	15	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Magunden-Pastoria No. 2 & Pardee-Pastoria, 1-PH Fault @ Pastoria, Delayed Clearing	P4.2	Stuck Breaker	15	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Magunden-Pastoria No. 3 & Pardee-Pastoria-Warne, 1-PH Fault @ Pastoria, Delayed Clearing	P4.2	Stuck Breaker	15	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Pardee-Pastoria & Pardee-Vincent No. 2, 1-PH Fault @ Pardee, Delayed Clearing	P4.2	Stuck Breaker	15	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Bailey-Pardee & Pardee-Vincent No. 1, 1-PH Fault @ Pardee, Delayed Clearing	P4.2	Stuck Breaker	15	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Pardee-Pastoria-Warne & Pardee-Santa Clara, 1-PH Fault @ Pardee, Delayed Clearing	P4.2	Stuck Breaker	15	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Springville, 1-PH Fault @ Springville, Delayed Clearing	P5	Non-Redundant Bus Diff Relay Failure	30	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Big Creek 1, 1-PH Fault @ Big Creek 1, Delayed Clearing	P5	Non-Redundant Bus Diff Relay Failure	30	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation

Study Area: SCE Tehachapi & Big Creek Corridor

Transient Stability

Contingency	Category	Category Description	Fault Duration (cycles)	Transient Stability Performance					Potential Mitigation Solutions
				2025 Summer Peak	2030 Summer Peak	2022 Spring Off-Peak	2025 SP High CEC Forecast	2022 Spring OP Hi Renew & Min Gas Gen	
Big Creek 2, 1-PH Fault @ Big Creek 2, Delayed Clearing	P5	Non-Redundant Bus Diff Relay Failure	30	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Big Creek 4, 1-PH Fault @ Big Creek 4, Delayed Clearing	P5	Non-Redundant Bus Diff Relay Failure	30	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Big Creek 8, 1-PH Fault @ Big Creek 8, Delayed Clearing	P5	Non-Redundant Bus Diff Relay Failure	30	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Big Creek 1-Rector & Big Creek 3-Rector No. 1, 3-PH Fault @ Big Creek 1, Normal Clearing	P6.1	Two overlapping events	5	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Big Creek 1-Rector & Big Creek 3-Rector No. 1 w/RAS, 3-PH Fault @ Big Creek 1, Normal Clearing	P6.1	Two overlapping events	5	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Big Creek 1-Rector & Big Creek 3-Rector No. 2, 3-PH Fault @ Rector, Normal Clearing	P6.1	Two overlapping events	5	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Big Creek 1-Rector & Big Creek 3-Rector No. 2 w/RAS, 3-PH Fault @ Rector, Normal Clearing	P6.1	Two overlapping events	5	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Big Creek 3-Rector No. 2 & Big Creek 4-Springville, 3-PH Fault @ Big Creek 3, Normal Clearing	P6.1	Two overlapping events	5	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Big Creek 3-Rector No. 2 & Big Creek 4-Springville w/Big Creek RAS Modification, 3-PH Fault @ Big Creek 3, Normal Clearing	P6.1	Two overlapping events	5	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Big Creek 4-Springville & Rector-Springville, 3-PH Fault @ Big Creek 4, Normal Clearing	P6.1	Two overlapping events	5	Stable/WECC criteria met	Big Creek Generators go out of synchronism	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Big Creek RAS
Big Creek 4-Springville & Rector-Springville, 3-PH Fault @ Big Creek 4, Normal Clearing, with RAS	P6.1	Two overlapping events	5	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Rector-Vestal No. 1 & Rector-Vestal No. 2, 3-PH Fault @ Rector, Normal Clearing	P6.1	Two overlapping events	5	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Rector-Vestal No. 1 & Rector-Vestal No. 2 w/RAS, 3-PH Fault @ Rector, Normal Clearing	P6.1	Two overlapping events	5	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation

Study Area: SCE Tehachapi & Big Creek Corridor

Transient Stability

Contingency	Category	Category Description	Fault Duration (cycles)	Transient Stability Performance					Potential Mitigation Solutions
				2025 Summer Peak	2030 Summer Peak	2022 Spring Off-Peak	2025 SP High CEC Forecast	2022 Spring OP Hi Renew & Min Gas Gen	
Magunden-Springville No. 1 & Magunden-Springville No. 2, 3-PH Fault @ Magunden, Normal Clearing	P6.1	Two overlapping events	5	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Magunden-Vestal No. 1 & Magunden-Vestal No. 2, 3-PH Fault @ Magunden, Normal Clearing	P6.1	Two overlapping events	5	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Big Creek 1-Rector & Big Creek 3-Big Creek 8, 3-PH Fault @ Rector, Normal Clearing	P6.1	Two overlapping events	5	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Magunden-Vestal No. 1 & Rector-Springville, 3-PH Fault @ Rector, Normal Clearing	P6.1	Two overlapping events	5	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Magunden-Vestal No. 2 & Rector-Springville, 3-PH Fault @ Rector, Normal Clearing	P6.1	Two overlapping events	5	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Rector-Vestal No. 1 & Magunden-Springville No. 1, 3-PH Fault @ Rector, Normal Clearing	P6.1	Two overlapping events	5	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Rector-Vestal No. 2 & Magunden-Springville No. 1, 3-PH Fault @ Rector, Normal Clearing	P6.1	Two overlapping events	5	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Magunden-Vestal No. 1 & Magunden-Springville No. 1, 3-PH Fault @ Rector, Normal Clearing	P6.1	Two overlapping events	5	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Magunden-Vestal No. 2 & Magunden-Springville No. 1, 3-PH Fault @ Rector, Normal Clearing	P6.1	Two overlapping events	5	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Rector-Vestal No. 1 & Rector-Springville, 3-PH Fault @ Rector, Normal Clearing	P6.1	Two overlapping events	5	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Rector-Vestal No. 2 & Rector-Springville, 3-PH Fault @ Pardee, Normal Clearing	P6.1	Two overlapping events	5	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Bailey–Pastoria & Bailey–Pardee 230 kV, 3-PH Fault @ Pardee, Normal Clearing	P6.1	Two overlapping events	5	Stable/WECC criteria met	local 66kV instability	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Split Antelope–Bailey 66 kV System per existing SCE operating procedure after initial contingency
Magunden-Pastoria No. 1 & Magunden-Pastoria No. 2, 3-PH Fault @ Magunden, Normal Clearing	P6.1	Two overlapping events	5	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation

Study Area: SCE Tehachapi & Big Creek Corridor

Transient Stability

Contingency	Category	Category Description	Fault Duration (cycles)	Transient Stability Performance					Potential Mitigation Solutions
				2025 Summer Peak	2030 Summer Peak	2022 Spring Off-Peak	2025 SP High CEC Forecast	2022 Spring OP Hi Renew & Min Gas Gen	
Magunden-Pastoria No. 1 & Magunden-Pastoria No. 3, 3-PH Fault @ Magunden, Normal Clearing	P6.1	Two overlapping events	5	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Magunden-Pastoria No. 2 & Magunden-Pastoria No. 3, 3-PH Fault @ Magunden, Normal Clearing	P6.1	Two overlapping events	5	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Bailey-Pastoria & Pardee-Pastoria, 3-PH Fault @ Bailey, Normal Clearing	P6.1	Two overlapping events	5	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Bailey-Pastoria & Pardee-Pastoria-Warne* , 3-PH Fault @ Bailey, Normal Clearing	P6.1	Two overlapping events	5	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Pardee-Pastoria & Pardee-Pastoria-Warne*, 3-PH Fault @ Pardee, Normal Clearing	P6.1	Two overlapping events	5	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Pardee-Pastoria & Bailey-Pardee, 3-PH Fault @ Pardee, Normal Clearing	P6.1	Two overlapping events	5	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Pardee-Pastoria-Warne & Bailey-Pardee*, 3-PH Fault @ Pardee, Normal Clearing	P6.1	Two overlapping events	5	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Antelope-Magunden No. 1 & Antelope-Magunden No. 2, 3-PH Fault @ Magunden, Normal Clearing	P6.1	Two overlapping events	5	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Antelope-Magunden No. 1 & Pardee-Pastoria-Warne*, 3-PH Fault @ Magunden, Normal Clearing	P6.1	Two overlapping events	5	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Antelope-Magunden No. 2 & Pardee-Pastoria-Warne*, 3-PH Fault @ Magunden, Normal Clearing	P6.1	Two overlapping events	5	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Antelope-Pardee & Pardee-Pastoria-Warne*, 3-PH Fault @ Pardee, Normal Clearing	P6.1	Two overlapping events	5	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Bailey-Pastoria & Bailey-Pardee, 3-PH Fault @ Pardee, Normal Clearing	P6.1	Two overlapping events	5	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Big Creek 1 -Rector and Big Creek 2-Big Creek 8, 3-PH Fault @ Rector, Normal Clearing	P6.1	Two overlapping events	5	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation

Study Area: SCE Tehachapi & Big Creek Corridor

Transient Stability

Contingency	Category	Category Description	Fault Duration (cycles)	Transient Stability Performance					Potential Mitigation Solutions
				2025 Summer Peak	2030 Summer Peak	2022 Spring Off-Peak	2025 SP High CEC Forecast	2022 Spring OP Hi Renew & Min Gas Gen	
Antelope-Pardee & Bailey-Pastoria , 3-PH Fault @ Pardee, Normal Clearing	P6.1	Two overlapping events	5	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Bailey-Pardee & Pastoria-Edmonston, 3-PH Fault @ Pardee, Normal Clearing	P6.1	Two overlapping events	5	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Bailey-Pastoria & Pastoria-Edmonston, 3-PH Fault @ Pastoria, Normal Clearing	P6.1	Two overlapping events	5	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Big Creek 3-Rector No. 2 & Rector-Springville, 1-PH Fault @ Big Creek 3, Normal Clearing	P7.1	DCTL	5	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation

Note: The off-peak sensitivity case with heavy renewable output and minimum gas generation commitment is based on the 2022 Spring Off-Peak Case rather than the 2025 Spring Off-Peak Case as indicated in the study plan.

Study Area: SCE Tehachapi & Big Creek Corridor

Single Contingency Load Drop

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

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

Note: The off-peak sensitivity case with heavy renewable output and minimum gas generation commitment is based on the 2022 Spring Off-Peak Case rather than the 2025 Spring Off-Peak Case as indicated in the study plan.

Study Area: SCE Tehachapi & Big Creek Corridor

Single Source Substation with more than 100 MW Load

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

No single source substation with more than 100 MW

Note: The off-peak sensitivity case with heavy renewable output and minimum gas generation commitment is based on the 2022 Spring Off-Peak Case rather than the 2025 Spring Off-Peak Case as indicated in the study plan.

2020-2021 ISO Reliability Assessment - Study Results

Study Area: SCE North of Lugo

Thermal Overloads

Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading % (Baseline Scenarios)					Loading % (Sensitivity Scenarios)			Project & Potential Mitigation Solutions
				2022 Summer Peak	2025 Summer Peak	2030 Summer Peak	2022 Spring Off-Peak	2025 Spring Off-Peak	2025 SP High CEC Forecast	2022 SpOP Hi Renew & Min Gas Gen	2022 SP Heavy Renewable & Min Gas Gen	
Control-Inyo 115kV Line	INYOKERN - KRAMER 115.0 ck 1 and KRAMER-INYOKERN-RANDSB 115 ck 1	P6	N-1-1	138.38	139.44	153.41	Nonconv	Nonconv	<100	132.56	<100	Operating Procedure 7690
System	KRAMER - COLWATER 115.0 ck 1 KRAMER - TORTILLA 115.0 ck 1	P6	N-1-1	<100	<100	<100	<100	<100	Nonconv	<100	<100	SCE Operating Procedure 127

Note: The off-peak sensitivity case with heavy renewable output and minimum gas generation commitment is based on the 2022 Spring Off-Peak Case rather than the 2025 Spring Off-Peak Case as indicated in the study plan.

2020-2021 ISO Reliability Assessment - Study Results

Study Area: SCE North of Lugo

High/Low Voltages

Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)					Voltage PU (Sensitivity Scenarios)			Project & Potential Mitigation Solutions
				2022 Summer Peak	2025 Summer Peak	2030 Summer Peak	2022 Spring Off-Peak	2025 Spring Off-Peak	2025 SP High CEC Forecast	2022 SpOP Hi Renew & Min Gas Gen	2022 SP Heavy Renewable & Min Gas Gen	
Coolwater 115kV	KRAMER - COLWATER 115.0 ck 1 & COLWATER-SEG2-TORTILLA 115 ck 1	P6	N-1-1	0.80	0.82	0.76	>0.9	>0.9	0.73	>0.9	0.82	Operating Procedure 127
Inyo 115kV	CONTROL - INYO 115.0 ck 1	P1	N-1-1	1.17	1.20	<1.1	1.16	1.13	1.20	1.16	1.17	Future shunt reactor at Inyo 230kV bus
Control 115kV	INYOKERN - KRAMER 115.0 ck 1 and KRAMER-INYOKERN-RANDSB 115 ck 1	P6	N-1-1	>0.9	>0.9	0.85	>0.9	>0.9	>0.9	>0.9	>0.9	Operating Procedure 7690

Note: The off-peak sensitivity case with heavy renewable output and minimum gas generation commitment is based on the 2022 Spring Off-Peak Case rather than the 2025 Spring Off-Peak Case as indicated in the study plan.

2020-2021 ISO Reliability Assessment - Study Results

Study Area: SCE North of Lugo

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
				2021 Summer Peak	2024 Summer Peak	2029 Summer Peak	2021 Spring Off-Peak	2024 Spring Off-Peak	2024 SP High CEC Forecast	2024 SpOP Hi Renew & Min Gas Gen	2021 SP Heavy Renewable & Min Gas Gen	

No violations

Note: The off-peak sensitivity case with heavy renewable output and minimum gas generation commitment is based on the 2022 Spring Off-Peak Case rather than the 2025 Spring Off-Peak Case as indicated in the study plan.

2020-2021 ISO Reliability Assessment - Study Results

Study Area: SCE North of Lugo

Transient Stability

Contingency	Category	Category Description	Transient Stability Performance					Potential Mitigation Solutions
			Baseline Scenarios			Sensitivity Scenarios		
			2025 Summer Peak	2030 Summer Peak	2022 Spring Off-Peak	2025 SP High CEC Forecast	2022 SpOP Hi Renew & Min Gas Gen	
Control-Casa Diablo 1150kV (1PH fault at Control)	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
Control-Casa Diablo 1150kV (1PH fault at Casa Diablo)	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
Control-Coso-Haiwee-Inyokern 115kV (1PH fault at Inyokern)	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
Control-Coso-Haiwee-Inyokern 115kV (1PH fault at Control)	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
Control-Haiwee-Inyokern (Fault at Control)	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
Control-Haiwee-Inyokern (Fault at Inyokern)	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
Control-Inyo 115kV (Fault at Control)	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
Control-SIlverPeak 55kV (Fault at Silver Peak)	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
Inyokern-Downs 115kV (Fault at Inyokern)	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
Inyokern-McGen-Searles 15kV (Fault at Inyokern)	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
Kramer-Roadway 115kV (Fault at Kramer)	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
Kramer-Roadway 115kV (Fault at Roadway)	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
Kramer-Victor 115kV (Fault at Kramer)	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
Kramer-Victor 115kV (Fault at Victor)	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
Victor 115kV bus	P5.5	No Redundant Relay	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Inyo 115kV bus	P5.5	No Redundant Relay	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Control 115/55kV Transforemer Banks	P6	Normal clearing	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Kramer 230/115kV Transformer Banks	P6	Normal clearing	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Lugo 500/230kkV Transformer Banks no RAS	P6	Normal clearing	Unstable	Unstable	Unstable	Unstable	Unstable	HDPP RAS
Lugo 500/230kV Transformer Banks RAS	P6	Normal clearing	WECC Criteria Not Met at Victor 115kV bus	WECC Criteria Not Met at Victor 115kV bus	Stable/WECC criteria met	WECC Criteria Not Met at Victor,Kramer,Inyokern 115kV buses	Stable/WECC criteria met	Generation redispatch after the first contingency and existing RAS
Kramer-Inyokern-Randsburg Nos.1 & 3 115kV	P6	Normal clearing	Stable/WECC criteria met	Unstable	Unstable	Stable/WECC criteria met	Stable/WECC criteria met	Operating Procedure 7690
Coolwater-Kramer & Coolwater-Seg2-Tortilla 115kV (Fault at Coolwater)	P6	Normal clearing	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Coolwater-Kramer & Coolwater-Seg2-Tortilla 115kV_OP (Fault at Coolwater)	P6	Normal clearing	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Coolwater-Kramer & Kramer-Tortilla 115kV (Fault at Kramer)	P6	Normal clearing	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Coolwater-Kramer & Kramer-Tortilla 115kV_OP (Fault at Kramer)	P6	Normal clearing	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Kramer-Victor 230kV Nos.1 & 2 no RAS	P7	Normal clearing	Unstable	Unstable	Unstable	Stable/WECC criteria met	Stable/WECC criteria met	Mojave RAS
Kramer-Victor 230kV Nos.1 & 2 RAS	P7	Normal clearing	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Lugo-Victor 230kV Nos.1 & 2 no RAS	P7	Normal clearing	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Lugo-Victor 230kV Nos.1 & 2 RAS	P7	Normal clearing	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Control-Coso-Inyokern & Control-Inyokern 115kV no RAS	P7	Normal clearing	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Control-Coso-Inyokern & Control-Inyokern 115kV RAS	P7	Normal clearing	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Kramer-Victor & Roadway-Victor 115kV	P7	Normal clearing	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Kramer-Victor & Kramer-Roadway 115kV	P7	Normal clearing	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation

Note: The off-peak sensitivity case with heavy renewable output and minimum gas generation commitment is based on the 2022 Spring Off-Peak Case rather than the 2025 Spring Off-Peak Case as indicated in the study plan.

2020-2021 ISO Reliability Assessment - Study Results

Study Area: SCE North of Lugo

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

Note: The off-peak sensitivity case with heavy renewable output and minimum gas generation commitment is based on the 2022 Spring Off-Peak Case rather than the 2025 Spring Off-Peak Case as indicated in the study plan.

2020-2021 ISO Reliability Assessment - Study Results

Study Area: SCE North of Lugo

Single Source Substation with more than 100 MW Load

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

No single source substation with more than 100 MW

2020-2021 ISO Reliability Assessment - Study Results

Study Area: SCE East of Lugo

Thermal Overloads

Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading % (Baseline Scenarios)					Loading % (Sensitivity Scenarios)			Project & Potential Mitigation Solutions
				2022 Summer Peak	2025 Summer Peak	2030 Summer Peak	2022 Spring Off-Peak	2025 Spring Off-Peak	2025 SP High CEC Forecast	2022 SpOP Hi Renew & Min Gas Gen	2022 SP Heavy Renewable & Min Gas Gen	
J.HINDS-MIRAGE 230kV	ELDORDO-LUGO 500kV line	P1	N-1	<100	103.95	<100	<100	<100	<100	<100	<100	Blythe Energy RAS
System	Lugo-Mohave 500kV & Eldorado-Mohave 500kV lines	P6	N-1-1	Nonconv	Nonconv	Nonconv	Nonconv	Nonconv	Nonconv	Nonconv	Nonconv	NVE operating procedure

Note: The off-peak sensitivity case with heavy renewable output and minimum gas generation commitment is based on the 2022 Spring Off-Peak Case rather than the 2025 Spring Off-Peak Case as indicated in the study plan.

2020-2021 ISO Reliability Assessment - Study Results

Study Area: SCE East of Lugo

High/Low Voltages

Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)					Voltage PU (Sensitivity Scenarios)			Project & Potential Mitigation Solutions
				2022 Summer Peak	2025 Summer Peak	2030 Summer Peak	2022 Spring Off-Peak	2025 Spring Off-Peak	2025 SP High CEC Forecast	2022 SpOP Hi Renew & Min Gas Gen	2022 SP Heavy Renewable & Min Gas Gen	

No violations

Note: The off-peak sensitivity case with heavy renewable output and minimum gas generation commitment is based on the 2022 Spring Off-Peak Case rather than the 2025 Spring Off-Peak Case as indicated in the study plan.

2020-2021 ISO Reliability Assessment - Study Results

Study Area: SCE East of Lugo

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
				2021 Summer Peak	2024 Summer Peak	2029 Summer Peak	2021 Spring Off-Peak	2024 Spring Off-Peak	2024 SP High CEC Forecast	2024 SpOP Hi Renew & Min Gas Gen	2021 SP Heavy Renewable & Min Gas Gen	

No violations

Note: The off-peak sensitivity case with heavy renewable output and minimum gas generation commitment is based on the 2022 Spring Off-Peak Case rather than the 2025 Spring Off-Peak Case as indicated in the study plan.

2020-2021 ISO Reliability Assessment - Study Results

Study Area: SCE East of Lugo

Transient Stability

California ISO

Contingency	Category	Category Description	Transient Stability Performance					Potential Mitigation Solutions
			Baseline Scenarios			Sensitivity Scenarios		
			2025 Summer Peak	2030 Summer Peak	2022 Spring Off-Peak	2025 SP High CEC Forecast	2022 SpOP Hi Renew & Min Gas Gen	
Lugo-Victorville 500kV line	P1	Normal clearing	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Cima-Eldorado-Pisgah No.1 230 kV (fault at Eldorado)	P1	Normal clearing	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Cima-Eldorado-Pisgah No.1 230 kV (fault at Pisgah)	P1	Normal clearing	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Lugo-Pisgah No.2 230 kV (fault at Lugo)	P1	Normal clearing	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Lugo-Pisgah No.2 230 kV (fault at Pisgah)	P1	Normal clearing	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Eldorado-Lugo and Eldorado-Mohave	P6	Normal clearing	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Eldorado-Lugo and Lugo-Mohave	P6	Normal clearing	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Eldorado-Mohave and Lugo-Mohave	P6	Normal clearing	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation

Note: The off-peak sensitivity case with heavy renewable output and minimum gas generation commitment is based on the 2022 Spring Off-Peak Case rather than the 2025 Spring Off-Peak Case as indicated in the study plan.

2020-2021 ISO Reliability Assessment - Study Results

Study Area: SCE East of Lugo

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

Note: The off-peak sensitivity case with heavy renewable output and minimum gas generation commitment is based on the 2022 Spring Off-Peak Case rather than the 2025 Spring Off-Peak Case as indicated in the study plan.

2020-2021 ISO Reliability Assessment - Study Results

Study Area: SCE East of Lugo

Single Source Substation with more than 100 MW Load

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

No single source substation with more than 100 MW

2020-2021 ISO Reliability Assessment - Study Results

Study Area: SCE Eastern area

Thermal Overloads

Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading % (Baseline Scenarios)					Loading % (Sensitivity Scenarios)			Project & Potential Mitigation Solutions
				2022 Summer Peak	2025 Summer Peak	2030 Summer Peak	2022 Spring Off-Peak	2025 Spring Off-Peak	2025 SP High CEC Forecast	2022 SpOP Hi Renew & Min Gas Gen	2022 SP Heavy Renewable & Min Gas Gen	
Devers 500/230 kV Transformer ck 1	line_10172_Line SERRANO - VALLEYSC 500.0 #1 AND tran_10039_Tran DEVERS 500/230/13.8 #2	P6	N-1-1	<90	<90	<90	<90	<90	<90	<90	127.59	Congestion Management, Generation Re-dispatch
Devers 500/230 kV Transformer ck 2	line_10172_Line SERRANO - VALLEYSC 500.0 #1 AND tran_10038_Tran DEVERS 500/230/13.8 #1	P6	N-1-1	<90	<90	<90	<90	<90	<90	<90	125.59	Congestion Management, Generation Re-dispatch
Devers-Red Bluff 500 kV ck 1	line_10025_Line DEVERS - REDBLUFF 500.0 #2 AND line_10030_Line N.GILA 500.0 to IMPRLVLY 500.0 Ckt 1	P6	N-1-1	93.56	97.40	<90	<90	<90	97.22	93.12	128.19	Congestion Management, Generation Re-dispatch
Devers-Red Bluff 500 kV ck 2	line_10024_Line DEVERS - REDBLUFF 500.0 # 1 AND line_10030_Line N.GILA 500.0 to IMPRLVLY 500.0 Ckt 1	P6	N-1-1	90.92	94.65	<90	<90	<90	94.47	90.43	124.45	Congestion Management, Generation Re-dispatch
Julian Hinds MWD - Julian Hinds 230 kV ck 1	line_10007_Line DEVERS 230.0 to MIRAGE 230.0 Ckt 1 AND line_10008_Line DEVERS 230.0 to MIRAGE 230.0 Ckt 2	P7	N-2	93.69	<90	NConv	138.60	<90	<90	135.62	<90	Existing RAS to trip generation at Blythe and IID. Further analysis with IID.

The off-peak sensitivity case with heavy renewable output and minimum gas generation commitment is based on the 2022 Spring Off-Peak Case rather than the 2025 Spring Off-Peak Case as indicated in the study plan.

2020-2021 ISO Reliability Assessment - Study Results

Study Area: SCE Eastern area

High/Low Voltages

Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)					Voltage PU (Sensitivity Scenarios)			Project & Potential Mitigation Solutions
				2022 Summer Peak	2025 Summer Peak	2030 Summer Peak	2022 Spring Off-Peak	2025 Spring Off-Peak	2025 SP High CEC Forecast	2022 SpOP Hi Renew & Min Gas Gen	2022 SP Heavy Renewable & Min Gas Gen	
None	None											

2020-2021 ISO Reliability Assessment - Study Results

Study Area: SCE Eastern area

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
				2022 Summer Peak	2025 Summer Peak	2030 Summer Peak	2022 Spring Off-Peak	2025 Spring Off-Peak	2025 SP High CEC Forecast	2022 SpOP Hi Renew & Min Gas Gen	2022 SP Heavy Renewable & Min Gas Gen	
None	None											

2020-2021 ISO Reliability Assessment - Study Results

Study Area: SCE Eastern area

Transient Stability

Contingency	Category	Category Description	Transient Stability Performance					Potential Mitigation Solutions
			Baseline Scenarios			Sensitivity Scenarios		
			2025 Summer Peak	2030 Summer Peak	2022 Spring Off-Peak	2025 SP High CEC Forecast	2022 SpOP Hi Renew & Min Gas Gen	
3 Phase Fault at BlytheSCE 230 Bus, tripping BlytheSCE-BlytheWALC 161 kV	P1	Normal Clearing	Stable	Stable	Stable	Stable	Stable	No Violation
3 Phase Fault at Colorado River 500 kV, tripping Colorado River - Palo Verde 500 kV & Delaney-Colorado River 500 kV	P6.1	Normal Clearing	Stable	Stable	Stable	Stable	Stable	No Violation
3 Phase Fault at Colorado River 500 kV, tripping Delaney-Colorado River 500 kV	P1	Normal Clearing	Stable	Stable	Stable	Stable	Stable	No Violation
3 Phase Fault at Devers 230 kV, tripping Devers - El Cosco & Devers - Vista 230kV #2	P7.1	Normal Clearing	Stable	Stable	Stable	Stable	Stable	No Violation
3 Phase Fault at Devers 230 kV, tripping Devers-San Bernardino & Devers-El Casco 230 kV	P7.1	Normal Clearing	Stable	Stable	Stable	Stable	Stable	No Violation
3 Phase Fault at Devers 500 kV, tripping Devers - Red Bluff 500 kV #1	P1	Normal Clearing	Stable	Stable	Stable	Stable	Stable	No Violation
3 Phase Fault at Devers 500 kV, tripping Devers - Red Bluff 500 kV #1 & #2	P6.1	Normal Clearing	Stable	Stable	Stable	Stable	Stable	No Violation
3 Phase Fault at Devers 500 kV, tripping Devers - Red Bluff 500 kV #1 & #2 with CRC RAS	P6.1	Normal Clearing	Stable	Stable	Stable	Stable	Stable	No Violation
3 Phase Fault at Devers 500 kV, tripping Devers 500/230 AA #2	P1	Normal Clearing	Stable	Stable	Stable	Stable	Stable	No Violation
3 Phase Fault at EagleMTN 161 kV Bus, tripping EagleMTN 230/161 kV Transformer #5	P1	Normal Clearing	Stable	Stable	Stable	Stable	Stable	No Violation
3 Phase Fault at EagleMTN 161 kV Bus, tripping EagleMTN-BlytheSCE 161 kV	P1	Normal Clearing	Stable	Stable	Stable	Stable	Stable	No Violation
3 Phase Fault at EagleMTN 161 kV Bus, tripping EagleMTN-BlytheSCE 161 kV & Blythe 1CT	P1	Normal Clearing	Stable	Stable	Stable	Stable	Stable	No Violation
3 Phase Fault at EagleMTN 230 kV Bus, tripping EagleMTN-IronMTN 230 kV	P1	Normal Clearing	Stable	Stable	Stable	Stable	Stable	No Violation
3 Phase Fault at El Casco 230 kV, tripping Etiwanda - San Bernardino & Devers - El Cosco 230kV	P6.1	Normal Clearing	Stable	Stable	Stable	Stable	Stable	No Violation
3 Phase Fault at Julian Hinds 230 kV Bus, tripping Julian Hinds-EagleMTN 230 kV	P1	Normal Clearing	Stable	Stable	Stable	Stable	Stable	No Violation
3 Phase Fault at Julian Hinds 230 kV Bus, tripping Julian Hinds-EagleMTN 230 kV & Blythe 1CT trip (RAS)	P1	Normal Clearing	Stable	Stable	Stable	Stable	Stable	No Violation
3 Phase Fault at Julian Hinds 230 kV Bus, tripping Julian Hinds-Mirage & EagleMTN-IronMTN 230 kV	P6.1	Normal Clearing	Stable	Stable	Stable	Stable	Unstable	Stable after tripping generators through Blythe RAS
3 Phase Fault at Julian Hinds 230 kV Bus, tripping Julian Hinds-Mirage & EagleMTN-IronMTN 230 kV & Blythe 2CTs trip (RAS)	P6.1	Normal Clearing	Stable	Stable	Stable	Stable	Stable	No Violation
3 Phase Fault at Julian Hinds 230 kV Bus, tripping Julian Hinds-Mirage & EagleMTN-IronMTN 230 kV & ISO7720 1CT off (OP)	P6.1	Normal Clearing	Stable	Stable	Stable	Stable	Unstable	Stable after tripping generators through Blythe RAS
3 Phase Fault at Julian Hinds 230 kV Bus, tripping Julian Hinds-Mirage 230 kV	P1	Normal Clearing	Stable	Stable	Unstable	Stable	Unstable	Stable after tripping generators through Blythe RAS
3 Phase Fault at Julian Hinds 230 kV Bus, tripping Julian Hinds-Mirage 230 kV & Blythe 1CT trip (RAS)	P1	Normal Clearing	Stable	Stable	Stable	Stable	Stable	No Violation
3 Phase Fault at Palo Verde 500 kV Bus, tripping Colorado River-Palo Verde 500 kV	P1	Normal Clearing	Stable	Stable	Stable	Stable	Stable	No Violation
3 Phase Fault at Rud Bed Bulff 500 kV, tripping Colorado River - Red Bluff 500 kV #1	P1	Normal Clearing	Stable	Stable	Stable	Stable	Stable	No Violation
3 Phase Fault at Rud Bed Bulff 500 kV, tripping Colorado River - Red Bluff 500 kV #1 & #2	P6.1	Normal Clearing	Stable	Stable	Stable	Stable	Stable	No Violation
3 Phase Fault at Rud Bed Bulff 500 kV, tripping Colorado River - Red Bluff 500 kV #1 & #2 with CRC RAS	P6.1	Normal Clearing	Stable	Stable	Stable	Stable	Stable	No Violation
3 Phase Fault at San Bernardino 230 kV, tripping Devers-San Bernardino & Etiwanda-San Bernardino 230 kV	P7.1	Normal Clearing	Stable	Stable	Stable	Stable	Stable	No Violation
3 Phase Fault at San Bernardino 230 kV, tripping Devers-San Bernardino & San Bernardino-El Casco 230 kV	P7.1	Normal Clearing	Stable	Stable	Stable	Stable	Stable	No Violation
3 Phase Fault at San Bernardino 230 kV, tripping El Casco-San Bernardino & San Bernardino - Vista 230 kV	P7.1	Normal Clearing	Stable	Stable	Stable	Stable	Stable	No Violation

2020-2021 ISO Reliability Assessment - Study Results

Study Area: SCE Eastern area

Transient Stability

Contingency	Category	Category Description	Transient Stability Performance					Potential Mitigation Solutions
			Baseline Scenarios			Sensitivity Scenarios		
			2025 Summer Peak	2030 Summer Peak	2022 Spring Off-Peak	2025 SP High CEC Forecast	2022 SpOP Hi Renew & Min Gas Gen	
3 Phase Fault at San Bernardino 230 kV, tripping Etiwanda - San Bernardino & El Casco-San Bernardino 230kV	P6.1	Normal Clearing	Stable	Stable	Stable	Stable	Stable	No Violation
3 Phase Fault at San Bernardino 230 kV, tripping Etiwanda-San Bernardino & San Bernardino-Vista 230 kV	P7.1	Normal Clearing	Stable	Stable	Stable	Stable	Stable	No Violation
3 Phase Fault at San Bernardino 230 kV, tripping Etiwanda-San Bernardino & San Bernardino-Vista230 kV & trip MV #3 (RAS)	P7.1	Normal Clearing	Stable	Stable	Stable	Stable	Stable	No Violation
3 Phase Fault at San Bernardino 230 kV, tripping San Bernardino - Vista & Devers - San Bernardino 230kV	P6.1	Normal Clearing	Stable	Stable	Stable	Stable	Stable	No Violation
3 Phase Fault at Valley 500 kV, tripping Devers - Valley 500 kV #1 & #2	P6.1	Normal Clearing	Stable	Stable	Stable	Stable	Stable	No Violation
3 Phase Fault at Valley 500 kV, tripping Devers-Valley 500 kV #1	P1	Normal Clearing	Stable	Stable	Stable	Stable	Stable	No Violation
3 Phase Fault at Valley 500 kV, tripping Valley-Serrano/Alberhill 500 kV	P1	Normal Clearing	Stable	Stable	Stable	Stable	Stable	No Violation
3 Phase Fault at Vista 230 kV, tripping Devers - Vista 230 kV # 1 & #2	P7.1	Normal Clearing	Stable	Stable	Stable	Stable	Stable	No Violation
3 Phase Fault at Vista 230 kV, tripping Mira Loma-Vista #2 & Mira Loma-Vista #1/Vista-Wildlife 230 kV	P7.1	Normal Clearing	Stable	Stable	Stable	Stable	Stable	No Violation
SLG Fault at 20% from BlytheSCE 161 Bus, tripping BlytheSCE-EagleMTN 161 kV, non-redundant pilot relay fail	P5.2	Zone2 Clearing	Stable	Stable	Stable	Stable	Stable	No Violation
SLG Fault at 20% from EagleMTN 161 kV Bus, tripping BlytheSCE-EagleMTN 161 kV, non-redundant pilot relay fail	P5.2	Zone2 Clearing	Stable	Stable	Stable	Stable	Stable	No Violation
SLG Fault at 20% from EagleMTN 230 kV Bus, tripping EagleMTN-IronMTN 230 kV, non-redundant pilot relay fail	P5.2	Zone2 Clearing	Stable	Stable	Stable	Stable	Stable	No Violation
SLG Fault at 20% from EagleMTN 230 kV Bus, tripping Julian Hinds-EagleMTN 230 kV & Blythe 1CT trip (RAS), non-redundant pilot relay fail	P5.2	Zone2 Clearing	Stable	Stable	Stable	Stable	Stable	No Violation
SLG Fault at 20% from EagleMTN 230 kV Bus, tripping Julian Hinds-EagleMTN 230 kV, non-redundant pilot relay fail	P5.2	Zone2 Clearing	Stable	Stable	Stable	Stable	Stable	No Violation
SLG Fault at 20% from IronMTN 230 kV Bus, tripping EagleMTN-IronMTN 230 kV, non-redundant pilot relay fail	P5.2	Zone2 Clearing	Stable	Stable	Stable	Stable	Stable	No Violation
SLG Fault at 20% from Julian Hinds 230 kV Bus, tripping Julian Hinds-EagleMTN 230 kV & Blythe 1CT trip (RAS), non-redundant pilot relay fail	P5.2	Zone2 Clearing	Stable	Stable	Stable	Stable	Stable	No Violation
SLG Fault at 20% from Julian Hinds 230 kV Bus, tripping Julian Hinds-EagleMTN 230 kV, non-redundant pilot relay fail	P5.2	Zone2 Clearing	Stable	Stable	Stable	Stable	Stable	No Violation
SLG Fault at 20% from Julian Hinds 230 kV Bus, tripping Julian Hinds-Mirage 230 kV & Blythe 1CT trip (RAS),non-redundant pilot relay fail	P5.2	Zone2 Clearing	Stable	Stable	Stable	Stable	Stable	No Violation
SLG Fault at 20% from Julian Hinds 230 kV Bus, tripping Julian Hinds-Mirage 230 kV, non-redundant pilot relay fail	P5.2	Zone2 Clearing	Stable	Stable	Stable	Stable	Stable	No Violation
SLG Fault at 20% from Mirage 230 kV Bus, tripping Julian Hinds-Mirage 230 kV & Blythe 1CT trip (RAS), non-redundant pilot relay fail	P5.2	Zone2 Clearing	Stable	Stable	Stable	Stable	Stable	No Violation
SLG Fault at 20% from Mirage 230 kV Bus, tripping Julian Hinds-Mirage 230 kV, non-redundant pilot relay fail	P5.2	Zone2 Clearing	Stable	Stable	Unstable	Stable	Unstable	Stable after tripping generators through Blythe RAS
SLG Fault at BlytheSCE 161 kV, tripping BlytheSCE-EagleMTN 161 kV, CB 872 stuck at BlytheSCE	P4.2	Breaker Failure	Stable	Stable	Stable	Stable	Stable	No Violation
SLG Fault at BlytheSCE 161 kV, tripping BlytheSCE-EagleMTN 161 kV, CB 872 stuck at BlytheSCE & Blythe 1CT trip (RAS)	P4.2	Breaker Failure	Stable	Stable	Stable	Stable	Stable	No Violation
SLG Fault at Devers 230 kV, tripping Devers - Mirage 230 kV #1 & #2	P7.1	Normal Clearing	Stable	Unstable	Stable	Stable	Stable	Further analysis with IID
SLG Fault at Devers 230 kV, tripping Devers - Mirage 230 kV #1 & #2 with Blythe RAS and IID RAS	P7.1	Normal Clearing	Stable	Unstable	Stable	Stable	Stable	Further analysis with IID
SLG Fault at Devers 230 kV, tripping Devers - Vista 230 kV #1 with stuck breaker followed by Devers 3A bank	P4.2	Delayed Clearing	Stable	Stable	Stable	Stable	Stable	No Violation

Study Area: SCE Eastern area

Transient Stability

Contingency	Category	Category Description	Transient Stability Performance					Potential Mitigation Solutions
			Baseline Scenarios			Sensitivity Scenarios		
			2025 Summer Peak	2030 Summer Peak	2022 Spring Off-Peak	2025 SP High CEC Forecast	2022 SpOP Hi Renew & Min Gas Gen	
SLG Fault at Devers 230 kV, tripping Devers - Vista 230 kV #2 with stuck breaker followed by Devers-San Bernardino 230 kV	P4.2	Delayed Clearing	Stable	Stable	Stable	Stable	Stable	No Violation
SLG Fault at Devers 500 kV, tripping Devers - Red Bluff 500 kV #1 with stuck breaker followed by Devers-Valley 500 kV #1	P4.2	Delayed Clearing	Stable	Stable	Stable	Stable	Stable	No Violation
SLG Fault at Devers 500 kV, tripping Devers - Red Bluff 500 kV #2 with stuck breaker followed by Devers 1AA bank	P4.2	Delayed Clearing	Stable	Stable	Stable	Stable	Stable	No Violation
SLG Fault at EagleMTN 161 kV , tripping BlytheSCE-EagleMTN 161 kV, CB 70 stuck at EagleMTN	P4.2	Breaker Failure	Stable	Stable	Stable	Stable	Stable	No Violation
SLG Fault at EagleMTN 161 kV , tripping BlytheSCE-EagleMTN 161 kV, CB 70 stuck at EagleMTN & Blythe 1CT trip (RAS)	P4.2	Breaker Failure	Stable	Stable	Stable	Stable	Stable	No Violation
SLG Fault at EagleMTN 230 kV Bus, tripping EagleMTN 230/161 kV Transformer #5, Stuck CB432 at EagleMTN	P4.3	Breaker Failure	Stable	Stable	Stable	Stable	Stable	No Violation
SLG Fault at EagleMTN 230 kV Bus, tripping EagleMTN 230/161 kV Transformer #5, Stuck CB432 at EagleMTN & Blythe 1CT trip (RAS)	P4.3	Breaker Failure	Stable	Stable	Stable	Stable	Stable	No Violation
SLG Fault at EagleMTN 230 kV Bus, tripping EagleMTN Bus & Blythe 1CT trip, non-redundant relay fail	P5.5	Bus relay Failure	Stable	Stable	Stable	Stable	Stable	No Violation
SLG Fault at EagleMTN 230 kV Bus, tripping EagleMTN Bus, non-redundant relayfail	P5.5	Bus relay Failure	Stable	Stable	Stable	Stable	Stable	No Violation
SLG Fault at EagleMTN 230 kV Bus, tripping EagleMTN-IronMTN 230 kV, CB 407 stuck at EagleMTN & Blythe 1CT trip (RAS)	P4.2	Breaker Failure	Stable	Stable	Stable	Stable	Stable	No Violation
SLG Fault at EagleMTN 230 kV Bus, tripping EagleMTN-IronMTN 230 kV, CB 407 stuck at EagleMTN	P4.2	Breaker Failure	Stable	Stable	Stable	Stable	Stable	No Violation
SLG Fault at EagleMTN 230 kV Bus, tripping Julian Hinds-EagleMTN 230 kV, CB 405 stuck at EagleMTN	P4.2	Breaker Failure	Stable	Stable	Stable	Stable	Stable	No Violation
SLG Fault at EagleMTN 230 kV Bus, tripping Julian Hinds-EagleMTN 230 kV, CB 405 stuck at EagleMTN & Blythe 1CT trip (RAS)	P4.2	Breaker Failure	Stable	Stable	Stable	Stable	Stable	No Violation
SLG Fault at El Casco 230 kV, tripping Devers - El Casco 230 kV with stuck breaker followed by El Casco 2A bank	P4.2	Delayed Clearing	Stable	Stable	Stable	Stable	Stable	No Violation
SLG Fault at Etiwata 230 kV, tripping Etiwata 230 kV Bus, non-redundant relay fail	P5.5	Bus relay Failure	Stable	Stable	Stable	Stable	Stable	No Violation
SLG Fault at IronMTN 230 kV Bus, tripping EagleMTN-IronMTN 230 kV, CB 307 stuck (close to Iron)	P4.2	Breaker Failure	Stable	Stable	Stable	Stable	Stable	No Violation
SLG Fault at Julian Hinds 230 kV Bus, tripping Julian Hinds Bus tie CB faul, loss Julian Hinds	P2.4	Breaker Fault	Stable	Stable	Stable	Stable	Stable	No Violation
SLG Fault at Julian Hinds 230 kV Bus, tripping Julian Hinds-Mirage 230 kV, Stuck CB 509 at J.Hinds	P4.2	Breaker Failure	Stable	Stable	Stable	Stable	Stable	No Violation
SLG Fault at Mirage 230 kV, tripping Devers - Mirage 230 kV with stuck breaker followed by Coachell Valley-Mirage 230 kV	P4.2	Delayed Clearing	Stable	Stable	Stable	Stable	Stable	No Violation
SLG Fault at Mirage 230 kV, tripping Mirage-J.Hinds 230 kV with stuck breaker followed by Mirage-Ramon 230 kV	P4.2	Delayed Clearing	Stable	Stable	Unstable	Stable	Unstable	Stable after tripping generators through Blythe RAS
SLG Fault at Mirage 230 kV, tripping Mirage-J.Hinds 230 kV with stuck breaker followed by Mirage-Ramon 230 kV Blythe 1CT trip (RAS)	P4.2	Delayed Clearing	Stable	Stable	Stable	Stable	Stable	No Violation
SLG Fault at Valley 500 kV, tripping Valley-Serrano 500 kV with stuck breaker followed by Valley 4AA Bank	P4.2	Delayed Clearing	Stable	Stable	Stable	Stable	Stable	No Violation
SLG Fault at Valley 500 kV, tripping Valley-Serrano/Alberhill 500 kV with stuck breaker followed by Valley 4AA Bank	P4.2	Delayed Clearing	Stable	Stable	Stable	Stable	Stable	No Violation

The off-peak sensitivity case with heavy renewable output and minimum gas generation commitment is based on the 2022 Spring Off-Peak Case rather than the 2025 Spring Off-Peak Case as indicated in the study plan.

2020-2021 ISO Reliability Assessment - Study Results

Study Area: SCE Eastern area

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

2020-2021 ISO Reliability Assessment - Study Results

Study Area: SCE Eastern area

Single Source Substation with more than 100 MW Load

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

No single source substation with more than 100 MW

Study Area: SCE Metro

Thermal Overloads

Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading % (Baseline Scenarios)					Loading % (Sensitivity Scenarios)			ISO Approved Projects & Potential Mitigation Solutions
				2022 Summer Peak	2025 Summer Peak	2030 Summer Peak	2022 Spring Off-Peak	2025 Spring Off-Peak	2025 SP High CEC Forecast	2022 Spring OP Hi Renew & Min Gas Gen	2022 SP Heavy Renewable & Min Gas Gen	
Pardee - Sylmar 230 kV #1 or #2	Remaining Pardee - Sylmar 230 kV line & Victorville - Lugo 500 kV line	P6	L-1/L-1	<100	<100	110	<100	<100	<100	<100	<100	Dispatch available resources including energy storage and demand response after initial contingency
Mesa - Laguna Bell 230 kV #1	Mesa - Lighthipe & Mesa - Redondo 230 kV lines	P6	L-1/L-1	104	100	110	<100	<100	104	<100	117	Dispatch available resources including energy storage and demand response pre-contingency (P7) or after initial contingency (P6); monitor LCR impact in local capacity studies and economic impact in production simulation studies
	Mesa - Lighthipe & Mesa - Laguna Bell #2 230 kV lines	P7	L-2	100	<100	102	<100	<100	<100	<100	109	
Mesa 500/230 kV Transformers	Two 500/230 kV Transformers	P6	T-1/T-1	<100	<100	<100	<100	<100	<100	<100	102	System adjustment after intial contingency
Serrano 500/230 kV Transformers (Worst case T2)	Two Serrano 500/230 kV Transformers	P6	T-1/T-1	<100	<100	100	<100	<100	104	101	<100	System adjustment per OP 7590 after initial or second contingency .
Vincent 500/230 kV Transformer #2 or #3	Vincent – Mesa 230 kV & Vincent 500/230 kV Transformer #3 or #2	P6	L-1/T-1	<100	<100	<100	<100	<100	<100	<100	104	System adjustment per OP 7550 after initial or second contingency
Vincent 500/230 kV Transformer #1 or #4	Vincent – Mesa 500 kV & Vincent 500/230 kV Transformer #4 or #1	P6	L-1/T-1	<100	<100	<100	<100	<100	<100	<100	107	

Note: The off-peak sensitivity case with heavy renewable output and minimum gas generation commitment is based on the 2022 Spring Off-Peak Case rather than the 2025 Spring Off-Peak Case as indicated in the study plan.

Study Area: SCE Metro

High/Low Voltages

Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)						Voltage PU (Sensitivity Scenarios)			ISO Approved Projects & Potential Mitigation Solutions
				2022 Summer Peak	2025 Summer Peak	2030 Summer Peak	2029 CAISO Summer Peak	2022 Spring Off-Peak	2025 Spring Off-Peak	2025 SP High CEC Forecast	2022 Spring OP Hi Renew & Min Gas Gen	2022 SP Heavy Renewable & Min Gas Gen	
Goleta	Santa Clara–Goleta #1 or #2 230 kV & Santa Clara 230 kV Shunt Capacitor	P6	N-1/L-1	>0.9	>0.9	**0.90**	>0.9	>0.90	>0.90	**0.90**	>0.90	>0.90	Planned energy storage resources procured under the Santa Clara area RFO (ISD 2021)

Note: The off-peak sensitivity case with heavy renewable output and minimum gas generation commitment is based on the 2022 Spring Off-Peak Case rather than the 2025 Spring Off-Peak Case as indicated in the study plan.

Study Area: SCE Metro

Voltage Deviation

Substation	Contingency (All and Worst P6)	Category	Category Description	Post Cont. Voltage Deviation % (Baseline Scenarios)					Post Cont. Voltage Deviation % (Sensitivity Scenarios)			ISO Approved Projects & Potential Mitigation Solutions
				2022 Summer Peak	2025 Summer Peak	2030 Summer Peak	2022 Spring Off-Peak	2025 Spring Off-Peak	2025 SP High CEC Forecast	2022 Spring OP Hi Renew & Min Gas Gen	2022 SP Heavy Renewable & Min Gas Gen	

No voltage deviation issues were identified

Note: The off-peak sensitivity case with heavy renewable output and minimum gas generation commitment is based on the 2022 Spring Off-Peak Case rather than the 2025 Spring Off-Peak Case as indicated in the study plan.

Study Area: SCE Metro

Transient Stability

Contingency	Category	Category Description	Fault Duration (cycles)	Transient Stability Performance					Potential Mitigation Solutions
				2025 Summer Peak	2030 Summer Peak	2022 Spring Off-Peak	2025 SP High CEC Forecast	2022 Spring OP Hi Renew & Min Gas Gen	
Lugo-Victorville 500 kV, 3-PH Fault @ Lugo 500 kV, Normal Clearing	P1.2	Single contingency	4	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Imperial Valley-N.Gila 500 kV, 3-PH Fault @ Imperial Valley 500 kV, Normal Clearing	P1.2	Single contingency	4	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Loss of Palo Verde Unit No.1, 3-PH Fault @ Palo Verde 500 kV, Normal Clearing	P1.1	Two overlapping events	4	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Loss of Santiago Synchronous Condensers, 3-PH Fault @ Santiago 230 kV, Normal Clearing	P1.3	Single contingency	4	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Pardee-Sylmar No.1 230 kV & Gould-Sylmar 230 kV, 3-PH Fault @ Sylmar(SCE) 230 kV, Delayed Clearing	P4.2	Stuck Breaker	15	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Pardee-Sylmar No.2 230 kV & Eagle Rock-Sylmar 230 kV, 3-PH Fault @ Sylmar(SCE) 230 kV, Delayed Clearing	P4.2	Stuck Breaker	15	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Gould-Sylmar 230 kV & Sylmar Bank E 230 kV, 3-PH Fault @ Sylmar(SCE) 230 kV, Delayed Clearing	P4.3	Stuck Breaker	15	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Eagle Rock-Sylmar 230 kV & Sylmar Bank E 230 kV, 3-PH Fault @ Sylmar(SCE) 230 kV, Delayed Clearing	P4.2	Stuck Breaker	15	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Pardee-Sylmar No.1 230 kV & Sylmar Bank F 230 kV, 3-PH Fault @ Sylmar(SCE) 230 kV, Delayed Clearing	P4.3	Stuck Breaker	15	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Pardee-Sylmar No.2 230 kV & Sylmar Bank F 230 kV, 3-PH Fault @ Sylmar(SCE) 230 kV, Delayed Clearing	P4.3	Stuck Breaker	15	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Sylmar Bank G 230 kV & Sylmar Bank E 230 kV, 1-PH Fault @ Sylmar(SCE) 230 kV, Delayed Clearing	P4.3	Stuck Breaker	15	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Sylmar Bank G 230 kV & Sylmar Bank F 230 kV, 1-PH Fault @ Sylmar(SCE) 230 kV, Delayed Clearing	P4.3	Stuck Breaker	15	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation

Study Area: SCE Metro

Transient Stability

Contingency	Category	Category Description	Fault Duration (cycles)	Transient Stability Performance					Potential Mitigation Solutions
				2025 Summer Peak	2030 Summer Peak	2022 Spring Off-Peak	2025 SP High CEC Forecast	2022 Spring OP Hi Renew & Min Gas Gen	
Devers-Red Bluff No.1 500 kV& Devers-Valley No.1 500 kV, 3-PH Fault @ Devers 500 kV, Delayed Clearing	P4.2	Stuck Breaker	15	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Lugo-Rancho Vista 500 kV & Lugo-Vincent No.1 500 kV, 1-PH Fault @ Lugo 500 kV, Delayed Clearing	P4.2	Stuck Breaker	15	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Lugo-Vincent No.2 500 kV & Lugo-Victorville 500 kV, 1-PH Fault @ Lugo 500 kV, Delayed Clearing	P4.2	Stuck Breaker	15	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Mira Loma-Rancho Vista 500 kV & Mira Loma-Serrano No.1 500 kV, 3-PH Fault @ Mira Loma 500 kV, Delayed Clearing	P4.2	Stuck Breaker	15	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Mira Loma-Walnut 230 kV & Chino-Mira Loma No.2 230 kV, 3-PH Fault @ Mira Loma 230 kV, Delayed Clearing	P4.2	Non-Redundant Bus Diff Relay Failure	15	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Mira Loma-Olinda 230 kV & Chino-Mira Loma No.3 230 kV, 3-PH Fault @ Mira Loma 230 kV, Delayed Clearing	P4.2	Non-Redundant Bus Diff Relay Failure	15	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Mira Loma-Rancho Vista No.1 230 kV & Mira Loma-Vista No.2 230 kV, 3-PH Fault @ Mira Loma 230 kV, Delayed Clearing	P4.2	Non-Redundant Bus Diff Relay Failure	15	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Etiwanda-Rancho Vista No.1 230 kV & Mira Loma-Rancho Vista No.2 230 kV, 3-PH Fault @ Mira Loma 230 kV, Delayed Clearing	P4.2	Non-Redundant Bus Diff Relay Failure	15	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Padua-Rancho Vista No.1 230 kV & Etiwanda-Rancho Vista No.2 230 kV , 3-PH Fault @ Rancho Vista 230 kV, Delayed Clearing	P4.2	Non-Redundant Bus Diff Relay Failure	15	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Chino-Serrano 230 kV & Lewis-Serrano No.1 230 kV, 3-PH Fault @ Serrano 230 kV, Delayed Clearing	P4.2	Non-Redundant Bus Diff Relay Failure	15	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Lewis-Serrano No.2 230 kV & SONGS-Serrano 230 kV , 3-PH Fault @ Serrano 500 kV, Delayed Clearing	P4.2	Non-Redundant Bus Diff Relay Failure	15	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Mesa-Vincent 500 kV & Midway-Vincent No.2 500 kV , 3-PH Fault @ Vincent 500 kV, Delayed Clearing	P4.2	Non-Redundant Bus Diff Relay Failure	15	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Antelope-Vincent No.1 500 kV & Lugo-Vincent No.2 500 kV , 3-PH Fault @ Vincent 500 kV, Delayed Clearing	P4.2	Non-Redundant Bus Diff Relay Failure	15	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation

Study Area: SCE Metro

Transient Stability

Contingency	Category	Category Description	Fault Duration (cycles)	Transient Stability Performance					Potential Mitigation Solutions
				2025 Summer Peak	2030 Summer Peak	2022 Spring Off-Peak	2025 SP High CEC Forecast	2022 Spring OP Hi Renew & Min Gas Gen	
Mesa-Vincent No.2 230 kV & Santa Clara-Vincent 230 kV, 3-PH Fault @ Vincent 230 kV, Delayed Clearing	P4.2	Non-Redundant Bus Diff Relay Failure	15	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Pardee-Vincent No.1 230 kV & Mesa-Vincent No.1 230 kV, 3-PH Fault @ Vincent 230 kV, Delayed Clearing	P4.2	Non-Redundant Bus Diff Relay Failure	15	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Chino-Viejo 230 kV & Chino-Serrano 230 kV , 3-PH Fault @ Chino 230 kV , Delayed Clearing	P4.2	Non-Redundant Bus Diff Relay Failure	15	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Barre-Ellis No.2 230 kV & Ellis-Santiago 230 kV, 3-PH Fault @ Ellis 230 kV, Delayed Clearing	P4.2	Non-Redundant Bus Diff Relay Failure	15	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Ellis-Johanna 230 kV & Barre-Ellis No.1 230 kV, 3-PH Fault @ Ellis 230 kV, Delayed Clearing	P4.2	Non-Redundant Bus Diff Relay Failure	15	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Goodrich-Gould 230 kV & Goodrich-Mesa 230 kV , 3-PH Fault @ Goodrich 230 kV, Delayed Clearing	P4.2	Non-Redundant Bus Diff Relay Failure	15	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Hinson-Lighthipe 230 kV & Hinson-Harborgen 230 kV, 3-PH Fault @ Hinson 230 kV , Delayed Clearing	P4.2	Non-Redundant Bus Diff Relay Failure	15	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Olinda-Walnut 230 kV & Mira Loma-Olinda 230 kV, 3-PH Fault @ Olinda 230 kV , Delayed Clearing	P4.2	Two overlapping events	15	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Mesa-Rio Hondo No.2 230 kV & Rio Hondo-Vincent No.2 230 kV, 3-PH Fault @ Rio Hondo 230 kV, Delayed Clearing	P4.2	Two overlapping events	15	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Moorpark-Santa Clara No.1 230 kV & Goleta-Santa Clara No.1 230 kV, 3-PH Fault @ Santa Clara 230 kV, Delayed Clearing	P4.2	Two overlapping events	15	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Goleta-Santa Clara No.2 230 kV & Moorpark-Santa Clara No.2 230 kV, 3-PH Fault @ Santa Clara 230 kV, Delayed Clearing	P4.2	Two overlapping events	15	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
SONGS-Santiago No.2 230 kV & Ellis-Santiago 230 kV, 3-PH Fault @ Santiago 230 kV, Delayed Clearing	P4.2	Two overlapping events	15	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Bailey-Pardee 230 kV & Pardee-Vincent No.1 230 kV, 3-PH Fault @ Pardee 230 kV, Delayed Clearing	P4.2	Two overlapping events	15	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation

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Transient Stability

Contingency	Category	Category Description	Fault Duration (cycles)	Transient Stability Performance					Potential Mitigation Solutions
				2025 Summer Peak	2030 Summer Peak	2022 Spring Off-Peak	2025 SP High CEC Forecast	2022 Spring OP Hi Renew & Min Gas Gen	
Pardee-Vincent No.2 230 kV & Pardee-Pastoria 230 kV, 3-PH Fault @ Pardee 230 kV, Delayed Clearing	P4.2	Two overlapping events	15	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Pardee-Santa Clara 230 kV & Pardee-Pastoria-Warne 230 kV, 3-PH Fault @ Pardee 230 kV, Delayed Clearing	P4.2	Two overlapping events	15	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Moor Park-Pardee No.2 230 kV & Pardee-Sylmar No.2 230 kV, 3-PH Fault @ Pardee 230 kV, Delayed Clearing	P4.2	Two overlapping events	15	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Pardee-Sylmar No.1 230 kV & Moor Park-Pardee No.3 230 kV, 3-PH Fault @ Pardee 230 kV, Delayed Clearing	P4.2	Two overlapping events	15	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Barre-Villa Park 230 kV & Serrano-Villa Park No.1 230 kV, 3-PH Fault @ Villa Park 230 kV, Delayed Clearing	P4.2	Two overlapping events	15	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Barre-Lewis 230 kV & Lewis-Serrano No.2 230 kV, 3-PH Fault @ Lewis 230 kV, Delayed Clearing	P4.2	Bipolar DC	15	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Lewis-Serrano 230 kV & Lewis-Villa Park 230 kV, 3-PH Fault @ Lewis 230 kV , Delayed Clearing	P4.2	Bipolar DC	15	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Alamitos (Sec. "A"), 1-PH Fault @ Alamitos "A" 230 kV, Bus diff relay failure	P5.5	DCTL	29	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Alamitos (Sec. "B"), 1-PH Fault @ Alamitos "B" 230 kV, Bus diff relay failure	P5.5	DCTL	29	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Barre (N/S bus), 1-PH Fault @ Barre 230 kV , Bus diff relay failure	P5.5	DCTL	29	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Center (N/S bus), 1-PH Fault @ Center 230 kV , Bus diff relay failure	P5.5	DCTL	29	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Chino (E/W bus), 1-PH Fault @ Chino 230 kV , Bus diff relay failure	P5.5	DCTL	29	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Eagle Rock (N/S bus), 1-PH Fault @ Eagle Rock 230 kV , Bus diff relay failure	P5.5	DCTL	29	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation

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Transient Stability

Contingency	Category	Category Description	Fault Duration (cycles)	Transient Stability Performance					Potential Mitigation Solutions
				2025 Summer Peak	2030 Summer Peak	2022 Spring Off-Peak	2025 SP High CEC Forecast	2022 Spring OP Hi Renew & Min Gas Gen	
El Nido (N/S bus), 1-PH Fault @ El Nido 230 kV, Bus diff relay failure	P5.5	DCTL	29	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Harborgen, 1-PH Fault @ Harbor 230 kV , Bus diff relay failure	P5.5	DCTL	29	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Hinson, 1-PH Fault @ Hinson 230 kV , Bus diff relay failure	P5.5	DCTL	29	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Laguna Bell, 1-PH Fault @ Laguna Bell 230 kV, Bus diff relay failure	P5.5	DCTL	29	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Lewis, 1-PH Fault @ Lewis 230 kV , Bus diff relay failure	P5.5	DCTL	29	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Lighthipe, 1-PH Fault @ Lighthipe 230 kV , Bus diff relay failure	P5.5	DCTL	29	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Olinda, 1-PH Fault @ Olinda 230 kV, Bus diff relay failure	P5.5	DCTL	29	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Walnut , 1-PH Fault @ Walnut 230 kV , Bus diff relay failure	P5.5	DCTL	29	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
El Segundo (N/S bus), 1-PH Fault @ El Segundo 230 kV, Bus diff relay failure	P5.5	DCTL	29	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Goodrich, 1-PH Fault @ Goodrich 230 kV, Bus diff relay failure	P5.5	DCTL	29	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Antelope-Whirlwind 500 kV & Antelope-Vincent No.1 500 kV, 3-PH Fault @ Antelope 500 kV, Normal Clearing	P6.1	DCTL	4	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Antelope-Whirlwind 500 kV & Antelope-Windhub 500 kV, 3-PH Fault @ Antelope 500 kV, Normal Clearing	P6.1	DCTL	4	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Eldorado-Lugo 500 kV & Eldorado Mohave 500 kV , 3-PH Fault @ Eldorado 500kV, Normal Clearing	P6.1	DCTL	4	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation

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Transient Stability

Contingency	Category	Category Description	Fault Duration (cycles)	Transient Stability Performance					Potential Mitigation Solutions
				2025 Summer Peak	2030 Summer Peak	2022 Spring Off-Peak	2025 SP High CEC Forecast	2022 Spring OP Hi Renew & Min Gas Gen	
Eldorado-Lugo 500 kV & Lugo-Mohave 500 kV , 3-PH Fault @ Lugo 500 kV, Normal Clearing	P6.1	DCTL	4	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Devers-Red Bluff No.1 & No.2 500 kV, 3-PH Fault @ Devers 500 kV, Normal Clearing	P6.1	DCTL	4	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Devers-Valley No.1 & No.2 500 kV, 3-PH Fault @ Devers 500 kV, Normal Clearing	P6.1	DCTL	4	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
ECO-Miguel 500 kV & Ocotillo-Suncrest 500 kV, 3-PH Fault @ ECO 500 kV, Normal Clearing	P6.1	DCTL	4	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Mesa-Mira Loma 500 kV & Mira Loma 4AA bank, 3-PH Fault @ Mira Loma 500 kV, Normal Clearing	P6.1	DCTL	4	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Mira Loma-Serrano No.2 500 kV & Mira Loma 4AA bank, 3-PH Fault @ Mira Loma 500 kV, Normal Clearing	P6.1	DCTL	4	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Rancho Vista-Serrano 500 kV & Lugo-Rancho Vista 500 kV, 3-PH Fault @ Rancho Vista 500 kV, Normal Clearing	P6.1	DCTL	4	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Rancho Vista 3AA & 4AA bank, 3-PH Fault @ Rancho Vista 500 kV, Normal Clearing	P6.1	DCTL	4	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Serrano-Valley/Alberhill 500 kV & Rancho Vista-Serrano 500 kV, 3-PH Fault @ Serrano 500 kV, Normal Clearing	P6.1	DCTL	4	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Serrano- Valley/Alberhill 500 kV & Mira Loma-Serrano No. 2 500 kV, 3-PH Fault @ Serrano 500 kV, Normal Clearing	P6.1	DCTL	4	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Serrano 2AA bank & Serrano 3AA bank, 3-PH Fault @ Serrano 500 kV, Normal Clearing	P6.1	DCTL	4	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
SONGS-San Luis Rey No.1 & No.2 230 kV, 3-PH Fault @ SONGS 230 kV, Normal Clearing	P6.1	DCTL	4	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation

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Transient Stability

Contingency	Category	Category Description	Fault Duration (cycles)	Transient Stability Performance					Potential Mitigation Solutions
				2025 Summer Peak	2030 Summer Peak	2022 Spring Off-Peak	2025 SP High CEC Forecast	2022 Spring OP Hi Renew & Min Gas Gen	
Lugo-Vincent No.1 & No.2 500 kV, 3-PH Fault @ Vincent 500 kV, Normal Clearing	P6.1	DCTL	4	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Mesa-Vincent 500 kV & Mesa-Mira Loma 500 kV , 3-PH Fault @ Mesa 500 kV, Normal Clearing	P6.1	DCTL	4	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Loss of IPPDC Bipole with North-to-South flow, 1-PH Fault @ Adelanto 500 kV, Normal Clearing	P7.2	DCTL	4	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Loss of PDCI Bipole Converters with North-to-South flow, 1-PH Fault @ Sylmar(SCE) 230 kV, Normal Clearing	P7.2	DCTL	4	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Alamitos-Center 230 kV & Center-Del Amo 230 kV, 1-PH Fault @ Center 230 kV, Normal Clearing	P7.1	DCTL	4	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Center-Mesa 230 kV & Center-Olinda 230 kV, 1-PH Fault @ Center 230 kV, Normal Clearing	P7.1	DCTL	4	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Ellis-Santiago 230 kV & Ellis-Johanna 230 kV , 1-PH Fault @ Johanna 230 kV, Normal Clearing	P7.1	DCTL	4	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Center-Mesa 230 kV & Mesa-Walnut 230 kV, 1-PH Fault @ Mesa 230 kV, Normal Clearing	P7.1	DCTL	4	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Goodrich-Mesa 230 kV & Mesa-Vincent No. 1 230 kV, 1-PH Fault @ Mesa 230 kV, Normal Clearing	P7.1	DCTL	4	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Center-Olinda 230 kV & Mesa-Walnut 230 kV , 1-PH Fault @ Mesa 230 kV, Normal Clearing	P7.1	DCTL	4	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Mesa-Redondo 230 kV & Lighthipe-Harrison 230 kV, 1-PH Fault @ Mesa 230 kV, Normal Clearing	P7.1	DCTL	4	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Mesa-Redondo 230 kV & Harrison-Redondo 230 kV, 1-PH Fault @ Mesa 230 kV, Normal Clearing	P7.1	DCTL	4	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Mesa-Redondo 230 kV & La Fresa-Laguna Bell 230 kV , 1-PH Fault @ Mesa 230 kV, Normal Clearing	P7.1	DCTL	4	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation

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Transient Stability

Contingency	Category	Category Description	Fault Duration (cycles)	Transient Stability Performance					Potential Mitigation Solutions
				2025 Summer Peak	2030 Summer Peak	2022 Spring Off-Peak	2025 SP High CEC Forecast	2022 Spring OP Hi Renew & Min Gas Gen	
La Fresa-Laguna Bell 230 kV & Lighthipe-Mesa 230 kV, 1-PH Fault @ Mesa 230 kV, Normal Clearing	P7.1	DCTL	4	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Lighthipe-Mesa 230 kV & Del Amo-Laguna Bell 230 kV , 1-PH Fault @ Mesa 230 kV, Normal Clearing	P7.1	DCTL	4	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Mesa-Redondo 230 kV & Laguna Bell-Mesa No.1 230 kV , 1-PH Fault @ Mesa 230 kV, Normal Clearing	P7.1	DCTL	4	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Lighthipe-Mesa 230 kV & Laguna Bell-Mesa No.2 230 kV , 1-PH Fault @ Mesa 230 kV, Normal Clearing	P7.1	DCTL	4	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Mesa-Rio Hondo No.1 & No.2 230 kV , 1-PH Fault @ Mesa 230 kV, Normal Clearing	P7.1	DCTL	4	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Goodrich-Gould 230 kV & Mesa-Vincent No.2 230 kV , 1-PH Fault @ Mesa 230 kV, Normal Clearing	P7.1	DCTL	4	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Mesa-Vincent No.1 230 kV & Goodrich-Mesa 230 kV , 1-PH Fault @ Mesa 230 kV, Normal Clearing	P7.1	DCTL	4	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Mesa-Mira Loma 500 kV & Chino-Mira Loma No.3 230 kV, 1-PH Fault @ Mira Loma 500 kV, Normal Clearing	P7.1	DCTL	4	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Mira Loma-Walnut 230 kV & Mira Loma-Olinda 230 kV , 1-PH Fault @ Mira Loma 230 kV, Normal Clearing	P7.1	DCTL	4	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Mira Loma-Rancho Vista No.1 & No.2 230 kV, 1-PH Fault @ Rancho Vista 230 kV, Normal Clearing	P7.1	DCTL	4	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Ellis-Santiago 230 kV & Johanna-Santiago 230 kV , 1-PH Fault @ Santiago 230 kV, Normal Clearing	P7.1	DCTL	4	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Mira Loma Serrano No.2 500 kV & Rancho Vista-Serrano 500 kV, 1-PH Fault @ Serrano 500 kV, Normal Clearing	P7.1	DCTL	4	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation

Study Area: SCE Metro

Transient Stability

Contingency	Category	Category Description	Fault Duration (cycles)	Transient Stability Performance					Potential Mitigation Solutions
				2025 Summer Peak	2030 Summer Peak	2022 Spring Off-Peak	2025 SP High CEC Forecast	2022 Spring OP Hi Renew & Min Gas Gen	
Serrano-Villa Park No.1 & No.2 230 kV, 1-PH Fault @ Serrano 230 kV, Normal Clearing	P7.1	DCTL	4	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
San Onofre-Serrano 230 kV & Chino-Viejo 230 kV, 1-PH Fault @ Viejo 230 kV, Normal Clearing	P7.1	DCTL	4	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Rio Hondo-Vincent No.1 & No.2 230 kV, 1-PH Fault @ Vincent 230 kV, Normal Clearing	P7.1	DCTL	4	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation

Note: The off-peak sensitivity case with heavy renewable output and minimum gas generation commitment is based on the 2022 Spring Off-Peak Case rather than the 2025 Spring Off-Peak Case as indicated in the study plan.

Study Area: SCE Metro

Single Contingency Load Drop

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

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

Note: The off-peak sensitivity case with heavy renewable output and minimum gas generation commitment is based on the 2022 Spring Off-Peak Case rather than the 2025 Spring Off-Peak Case as indicated in the study plan.

Study Area: SCE Metro

Single Source Substation with more than 100 MW Load

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

No single source substation with more than 100 MW

Note: The off-peak sensitivity case with heavy renewable output and minimum gas generation commitment is based on the 2022 Spring Off-Peak Case rather than the 2025 Spring Off-Peak Case as indicated in the study plan.

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Study Area: Valley Electric Association

Thermal Overloads

Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading % (Baseline Scenarios)					Loading % (Sensitivity Scenarios)			Project & Potential Mitigation Solutions
				2022 Summer Peak	2025 Summer Peak	2030 Summer Peak	2022 Spring Off-Peak	2025 Spring Off-Peak	2022 SP Forecast Load Addition	2025 SP Forecast Load Addition	2025 OP Heavy Renewable	
Amargosa 230/138kV transformer	Nwest-Desert View 230kV	P1	N-1	<100	<100	<100	<100	<100	<100	<100	159.50	Sloan Canyon RAS and Innovation RAS
	Innovation-Desert View 230kV & Gamebird-Sloan Cyn/Trout Cyn 230kV lines	P6	N-1-1	107.24	146.35	166.46	<100	<100	119.22	168.63	Nonconv	New operating procedure to radialize system after the first contingency; for high renewable sensitivity case, Innovation RAS
	Pahrump-Gamebird 138kV & Gamebird 230/138kV Transformer	P6	N-1-1	108.69	110.55	125.25	<100	<100	128.25	152.74	<100	
Amargosa-Sandy 138kV line	Nwest-Desert View 230kV	P1	N-1	<100	<100	<100	<100	<100	<100	<100	113.07	Sloan Canyon RAS and Innovation RAS
	Innovation-Desert View 230kV & MercurySW-IS Tap 138kV lines	P6	N-1-1	<100	<100	<100	<100	<100	<100	<100	127.47	Innovation RAS and congestion management
Gamebird-Trout Canyon 230kV line	Trout Canyon-Sloan Canyon 230kV line	P1	N-1	<100	<100	<100	<100	<100	<100	<100	108.49	Sloan Canyon RAS
Trout Canyon-Sloan Canyon 230kV line	Gamebird-Trout Canyon 230kV line	P1	N-1	<100	<100	<100	<100	<100	<100	<100	108.90	Sloan Canyon RAS
Remaining Pahrump 230/138kV transformer	Pahrump 230/138kV transformer & Gamebird 230/138kV transformer	P6	N-1-1	<100	<100	107.51	<100	<100	<100	107.52	<100	Reyly on the short-term emergency rating of the transformer and perform manual load shedding; or a new RAS
Jackass Flat-Mercury SW 138kV line	Pahrump-Vista 138kV & Stockwash-Jackass Flat 138kV lines	P6	N-1-1	<100	<100	107.09	<100	<100	<100	<100	109.87	Congestion management
	Nwest-Desert View 230kV & Innovation-Mercury SW 138kV lines	P6	N-1-1	<100	<100	<100	<100	<100	<100	<100	111.22	Innovation RAS and congestion management
System	Sloan Canyon-Trout Canyon 230kV& Innovation-Desert View/Innovation Pahrump/Pahrump 230kV lines	P6	N-1-1	N/A	N/A	<100	N/A	N/A	N/A	N/A	Nonconv	Sloan Canyon RAS and Innovation RAS, congestion management

Study Area: Valley Electric Association

High/Low Voltages

Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)					Voltage PU (Sensitivity Scenarios)			Project & Potential Mitigation Solutions
				2022 Summer Peak	2025 Summer Peak	2030 Summer Peak	2022 Spring Off-Peak	2025 Spring Off-Peak	2022 SP Forecast Load Addition	2025 SP Forecast Load Addition	2025 OP Heavy Renewable	
Charleston-Thousandaire-Gamebird, Vista-Jackass138kV buses	Innovation-Desert View 230kV & Gamebird-Sloan Canyon/Trout Canyon 230kV	P6	N-1-1	0.8634	0.7984	0.681	>0.9	0.8829	0.8378	0.7031	>0.9	Existing UVLS
	Pahrump-Gamebird 138kV line & Gamebird 230/138kV transformer	P6	N-1-1	0.8191	0.8157	0.7913	>0.9	>0.9	0.7579	0.6789	>0.9	

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Study Area: Valley Electric Association

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
				2022 Summer Peak	2025 Summer Peak	2030 Summer Peak	2022 Spring Off-Peak	2025 Spring Off-Peak	2022 SP Forecast Load Addition	2025 SP Forecast Load Addition	2025 OP Heavy Renewable	

No violations

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Study Area: Valley Electric Association

Transient Stability

Contingency	Category	Category Description	Transient Stability Performance					Potential Mitigation Solutions
			Baseline Scenarios			Sensitivity Scenarios		
			2025 Summer Peak	2030 Summer Peak	2022 Spring Off-Peak	2025 SP Forecast Load Addition	2025 OP Heavy Renewable	
Pahrump-Innovation 230kV Fault	P1	Normal Clearing	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Pahrump-Gamebird 230kV	P1	Normal Clearing	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Pahrump 230/138kV Transformer No.1	P1	Normal Clearing	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Pahrump 230/138kV Transformer No.2	P1	Normal Clearing	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Amargosa-Sandy 138kV	P1	Normal Clearing	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Pahrump-Vista 138kV	P1	Normal Clearing	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Pahrump-Gamebird 138kV	P1	Normal Clearing	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Vista-Johnnie-Valley 138kV	P1	Normal Clearing	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Innovation-Desert View 230kV	P1	Normal Clearing	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Innovation 230/138kV Transformer	P1	Normal Clearing	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Northwest-Desert View 230kV	P1	Normal Clearing	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
PAHRUMP-VISTA 138 & PAHRUMP-GAMEBIRD 138; BKR PA222	P4	Stuck Breaker	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
PAHRUMP 138/230kV Tran Bnk. 1 & PAHRUMP-Sloan Canyon/Carpenter Canyon 230-kV Line; BKR PA112	P4	Stuck Breaker	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
PAHRUMP 138/230kV Tran Bnk. 1 & PAHRUMP-INNOVATION 230; BKR PA132	P4	Stuck Breaker	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
PAHRUMP 138/230kV Tran Bnk. 2 & PAHRUMP-INNOVATION 230; BKR PA122	P4	Stuck Breaker	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
PAHRUMP 138/230kV Tran Bnk. 2 & PAHRUMP-Sloan Canyon/Carpenter Canyon 230; BKR PA142	P4	Stuck Breaker	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
PAHRUMP 138/230kV Tran Bnk. 2 & PAHRUMP-VISTA 138-kV Line; BKR PA212	P4	Stuck Breaker	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
PAHRUMP 138/230kV Tran Bnk. 1 & PAHRUMP-GAMEBIRD 138; BKR PA232	P4	Stuck Breaker	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
INNOVATION -PAHRUMP 230 & INNNOVATION-DESERT VIEW 230 & INNOVATION TRANS	P4	Stuck Breaker	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
GAMEBIRD 138/230kV Tran Bnk. 1 & PAHRUMP-Gamebird 230-kV Line; BKR PA112	P4	Stuck Breaker	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Pahrump 230kV Bus	P5.5	Non-Redundant Relay	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Sloan Canyon 230kV Bus	P5.5	Non-Redundant Relay	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Desert View 230kV Bus	P5.5	Non-Redundant Relay	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Innovation 230kV Bus	P5.5	Non-Redundant Relay	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Gamebird 230kV Bus	P5.5	Non-Redundant Relay	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Innovation 138kV Bus	P5.5	Non-Redundant Relay	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Pahrump 138kV Bus	P5.5	Non-Redundant Relay	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Amargosa 138kV Bus	P5.5	Non-Redundant Relay	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Lathrop 138kV Bus	P5.5	Non-Redundant Relay	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Sandy 138kV Bus	P5.5	Non-Redundant Relay	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Valley 138kV Bus	P5.5	Non-Redundant Relay	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation

Study Area: Valley Electric Association

Transient Stability

Contingency	Category	Category Description	Transient Stability Performance					Potential Mitigation Solutions
			Baseline Scenarios			Sensitivity Scenarios		
			2025 Summer Peak	2030 Summer Peak	2022 Spring Off-Peak	2025 SP Forecast Load Addition	2025 OP Heavy Renewable	
Valley SS 138kV Bus	P5.5	Non-Redundant Relay	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Vista 138kV Bus	P5.5	Non-Redundant Relay	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Gamebird 138kV Bus	P5.5	Non-Redundant Relay	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Thousandaire 138kV Bus	P5.5	Non-Redundant Relay	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Pahrump-Innovation 230kV & Pahrump-Gamebird 230kV	P6	Normal Clearing	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Northwestt-Desert View 230kV & Pahrump-Gamebird 230kV	P6	Normal Clearing	WECC criteria violation at Stockwash, Mercury Dist 138kV buses	WECC criteria violation at Stockwash, Mercury Dist 138kV buses	Stable/WECC criteria met	WECC criteria violation at Stockwash, Mercury Dist 138kV buses	Stable/WECC criteria met	Existing UVLS
Pahrump-Gamebird 230kV & Pahrump-Gamebird 138kV	P7	Normal Clearing	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Pahrump-Gamebird 230kV & Gamebird-Sandy 138kV	P7	Normal Clearing	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Pahrump-Innovation 230kV & Pahrump-Vista 138kV	P7	Normal Clearing	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Pahrump-Innovation 230kV & Vista-ValleySS 138kV	P7	Normal Clearing	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation

2020-2021 ISO Reliability Assessment - Final Study Results

Study Area: Valley Electric Association

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

2020-2021 ISO Reliability Assessment - Final Study Results

Study Area: Valley Electric Association

Single Source Substation with more than 100 MW Load

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

No single source substation with more than 100 MW

2020-2021 ISO Reliability Assessment - Study Results
Study Area: San Diego Main
Thermal Overloads

California ISO

Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading % ** (Baseline Scenarios)					Loading % ** (Sensitivity Scenarios)			Project & Potential Mitigation Solutions
				B1-2022 Summer Peak	B2-2025 Summer Peak	B3-2030 Summer Peak	B4-2022 Spring Off-Peak	B5-2025 Spring Ligh Load	S1-2025 SP High CEC Forecast	S2-2022 SpOP Hi Renewable & Min Gas Gen*	S3-2022 SP Heavy Renewable & Min Gas Gen	
22886 SUNCREST 230 228860 SUNCREST TP1 230 1 1 and 22886 SUNCREST 230 228861 SUNCREST TP2 230 2 1	P1L-50001RAS0_22930 ECO-22468 MIGUEL 500KV &1	P1	L-1	<90	99.0	<90	<90	<90	99.2	105.1	127.4	Existing TL23040 IV 500 kV N-1 RAS would eliminate the P1 and the P3 overload concerns along with system adjustment after the G-1 event. The 30-minute short-term emergency ratings of the 230 kV lines (130% higher than their continuous ratings) allow the market and operators to bring down the overloads that do not exceed 130% for the P6 contingencies within the continuous ratings in 30 minutes as operational mitigation measures. The remaining P6 overloads that exceed 130% can be eliminated by additional system adjustment between the overlapping P1 events. Either the operational mitigations or the system adjustment could involve operational actions, such as reducing generation output in the greater IV area, dispatching convention gas generation, preferred resources, and/or energy storage in the San Diego area, and adjusting the IV phase shifting transformers as needed
	P1G_OT_OTAY MESA Plant G-1 -AND- 'P1L-50001RAS0_22930 ECO-22468 MIGUEL 500KV &1	P3***	G-1/L-1	<90	108.0	96.1	<90	<90	108.2	118.9	131.7	
	P1L-TIE35_22609 OTAYMESA-20149 TJI-230 230 1 -AND- 'P1L-50001RAS0_22930 ECO-22468 MIGUEL 500KV &1	P6***	L-1-1	<90	111.8	103.9	95.3	<90	112.1	130.8	134.1	
22886 SUNCREST 230 228861 SUNCREST TP2 230 2 1	P1L-23054RAS0_22886 SUNCREST-22832 SYCAMORE TP1 230KV 1 1 -AND- 'P1L-50001RAS2-P6-P_22930 ECO-22468 MIGUEL 500KV &1	P6***	L-1-1	117.7	152.2	127.0	141.3	<90	152.3	154.2	204.3	The 30-minute ratings allow the market and operators to eliminate the P6 overloads that do not exceed 130%, within 30 minutes as post-contingency operational mitigations, along with existing TL23054/23055 RAS. The remaining P6 overloads that exceed 130% can be addressed by additional system adjustment between the overlapping P1 events. The system adjustments could involve operational actions, such as reducing generation in the greater IV area while dispatching conventional gas units, preferred resources, and energy storage in the San Diego and SCE areas, curtailing the ISO import, adjusting the IV phase shifting transformers, and bypassing the series capacitor banks in the 500 kV lines between Hassayampa and North
	P1L-50001RAS0_22930 ECO-22468 MIGUEL 500KV &1 -AND- 'P1L-23054RAS2-P1P6-P_22886 SUNCREST-22832 SYCAMORE TP1 230KV 1 1	P6***	L-1-1	130.4	170.4	139.9	138.2	<90	170.9	149.7	229.1	

2020-2021 ISO Reliability Assessment - Study Results
Study Area: San Diego Main
Thermal Overloads

California ISO

Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading % ** (Baseline Scenarios)					Loading % ** (Sensitivity Scenarios)			Project & Potential Mitigation Solutions
				B1-2022 Summer Peak	B2-2025 Summer Peak	B3-2030 Summer Peak	B4-2022 Spring Off-Peak	B5-2025 Spring Ligh Load	S1-2025 SP High CEC Forecast	S2-2022 SpOP Hi Renewable & Min Gas Gen*	S3-2022 SP Heavy Renewable & Min Gas Gen	
	P1L-50001RAS0_22930 ECO-22468 MIGUEL 500KV &1 -AND- 'P1L-23054RAS2-P1P6-P_22886 SUNCREST-22832 SYCAMORE TP1 230KV 1 1 WITH system adjustment between two overlapping P1 events along with adjustment of the IV phase shifters after the 2nd contingency of P6 event	P6***	L-1-1	98.8	96.7	97.4	<90	<90	100.0	<90	94.9	banks in the 500 kV lines between Hassayampa and North Gila as needed. The results with the system adjustments along with adjustment of the IV phase shifters after the P6 contingency are shown for the worst P6 contingency.
22930 ECO 500 22468 MIGUEL 500 1 2	P1L-50003RAS0_23310 OCOTILLO-22885 SUNCREST 500KV &1	P1	L-1	<90	<90	<90	<90	<90	<90	<90	106.4	Existing TL23040 IV 500 kV N-1 RAS would eliminate the P1, P3, P4, and P7 overload concerns along with system adjustment after the G-1 event as needed. The P6 overload can be eliminated by the system adjustment between the overlapping P1 events.
	P1G_OT_OTAY MESA Plant G-1 -AND- 'P1L-50003RAS0_23310 OCOTILLO-22885 SUNCREST 500KV &1	P3***	G-1/L-1	<90	<90	<90	<90	<90	90.1	91.1	110.1	
	P4-SCR-500-2T_CB SUNCREST 500KV 2T	P4	Fault+Stuck Breaker	<90	<90	<90	<90	<90	<90	<90	106.3	
	P4-OCO-500-1E_CB OCOTILLO 500KV 1E	P4	Fault+Stuck Breaker	<90	<90	<90	<90	<90	<90	<90	105.5	
	P1L-TIE34_22358 IV PFC-20118 ROA-230 230 1 -AND- 'P1L-50003RAS0_23310 OCOTILLO-22885 SUNCREST 500KV &1	P6***	L-1-1	<90	<90	<90	<90	<90	<90	<90	125.4	
	P7_TL23054+23055_SCR-SX 230kV ck1 + SCR-SX 230kV ck2	P7	L-2	<90	<90	<90	<90	<90	<90	<90	105.9	
	P1L-50001RAS0_22930 ECO-22468 MIGUEL 500KV &1 -AND- 'P1T-50022RAS0_22885 SUNCREST BK81 500/230KV	P6***	T-1/L-1	113.4	141.3	118.8	124.5	<90	141.3	145.3	164.3	The 30-minute short-term emergency ratings of the Suncrest banks (125% of their long-term emergency ratings) should be utilized for the market and operators to eliminate the P6 overloads that do not exceed 125% in 30 minutes by performing post-contingency operational mitigation measures. The remaining P6 overloads that exceed 125% can be eliminated by additional system

2020-2021 ISO Reliability Assessment - Study Results
Study Area: San Diego Main
Thermal Overloads

California ISO

Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading % ** (Baseline Scenarios)					Loading % ** (Sensitivity Scenarios)			Project & Potential Mitigation Solutions
				B1-2022 Summer Peak	B2-2025 Summer Peak	B3-2030 Summer Peak	B4-2022 Spring Off-Peak	B5-2025 Spring Ligh Load	S1-2025 SP High CEC Forecast	S2-2022 SpOP Hi Renewable & Min Gas Gen*	S3-2022 SP Heavy Renewable & Min Gas Gen	
22885 SUNCREST 500 22888 SNCRSMP1 500/230 1 1	P1T-50022RAS0_22885 SUNCREST BK81 500/230KV -AND- 'P1L-50001RAS0_22930 ECO-22468 MIGUEL 500KV &1 WITH system adjustment between two overlapping P1 events and adjustment of the IV phase shifters after the 2nd contingency of P6 event as needed	P6***	T-1/L-1	<90	<90	<90	<90	<90	<90	<90	<90	adjustment between the overlapping P1 events. Either the operational mitigations or the system adjustment would be similar to the actions addressing the TL23054/23055 overload issues described above, but the scope of these operation actions tends to be relatively smaller. The results with the system adjustments along with adjustment of the IV phase shifters after the P6 contingency are shown for the P6 contingency.
22464 MIGUEL 230 22472 MIGUELMP 500 1 1 AND 22468 MIGUEL 500 22472 MIGUELMP 500 1 1	P1L-50003RAS0_23310 OCOTILLO-22885 SUNCREST 500KV &1	P1	L-1	<90	<90	<90	<90	<90	<90	<90	105.9	The 30-minute short-term emergency ratings of the Miguel banks (125% higher than their long-term emergency ratings) should be utilized for the market and operators to bring down the P1 and P3 overloads within the long-term emergency ratings within 30 minutes by performing post-contingeny operational mitigation measures
	P1G_OT_OTAY MESA Plant G-1 -AND- 'P1L-50003RAS0_23310 OCOTILLO-22885 SUNCREST 500KV &1	P3***	G-1/L-1	<90	<90	<90	<90	<90	<90	92.6	108.6	
22464 MIGUEL 230 22468 MIGUEL 500 2 1	P1T-50012RAS2-P1P6-P_22464 MIGUEL BK80 500/230KV	P1	T-1	<90	<90	<90	<90	<90	<90	<90	119.5	Similarly, as discussed above, the 30-minute short-term emergency ratings of the Miguel banks should be utilized for the market and operators to eliminate the P1, P3, and P6 overloads that do not exceed 125% in 30 minutes as post-contingency operational mitigation measures, along with the existing Miguel BK 80/81 RAS. The loading level that exceeds 125% for the remaining P6 contingency can be eliminated by additional system adjustments between the overlapping P1 events. These system adjustments would be similar to the actions addressing above for the TL23054/23055 overload issues, but the scope of these operation actions tends to be relatively smaller. The results with the system adjustments along with adjustment of the IV phase shifters after the P6 contingency are shown for the P6 contingency.
	P1G_OT_OTAY MESA Plant G-1 -AND- 'P1T-50012RAS2-P1P6-P_22464 MIGUEL BK80 500/230KV	P3***	G-1/L-1	<90	100.5	<90	<90	<90	100.7	95.5	123.4	
	P1L-50003RAS0_23310 OCOTILLO-22885 SUNCREST 500KV &1 -AND- 'P1T-50012RAS2-P1P6-P_22464 MIGUEL BK80 500/230KV	P6***	T-1/L-1	105.0	133.7	109.2	124.9	<90	133.9	131.0	179.8	
	P1L-50003RAS0_23310 OCOTILLO-22885 SUNCREST 500KV &1 -AND- 'P1T-50012RAS2-P1P6-P_22464 MIGUEL BK80 500/230KV WITH system adjustment between two overlapping P1 events and adjustment of the IV phase shifters after the 2nd contingency of P6 event as needed	P6***	T-1/L-1	97.7	93.7	94.4	<90	<90	95.7	<90	94.9	

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Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading % ** (Baseline Scenarios)					Loading % ** (Sensitivity Scenarios)			Project & Potential Mitigation Solutions
				B1-2022 Summer Peak	B2-2025 Summer Peak	B3-2030 Summer Peak	B4-2022 Spring Off-Peak	B5-2025 Spring Ligh Load	S1-2025 SP High CEC Forecast	S2-2022 SpOP Hi Renewable & Min Gas Gen*	S3-2022 SP Heavy Renewable & Min Gas Gen	
22360 IMPRLVLY 500 22361 IV BK80 MP 500 1 1	P1T-50032_22356 IMPRLVLY BK81 500/230 1 -AND- 'P1T-50033_22356 IMPRLVLY BK82 500/230 1	P6***	T-1-1	<90	<90	<90	<90	<90	<90	136.1	134.5	Curtail the generation that are delivered to the Imperial Valley 230 kV substation after the 1st contingency as System adjustment
22357 IV PFC1 230 22358 IV PFC 230 2 1	P1T-IVPST1_22357 IV PFC1-22358 IV PFC 230 1 1 -AND- 'P1L-TIE35_22609 OTAYMESA-20149 TJI-230 230 1	P6***	T-1/L-1	119.8	<90	<90	<90	<90	<90	<90	121.0	Curtail the path 45 flow southbound flow from SDGE to CENACE after the first contingency as system adjustment
22356 IMPRLVLY 230 22357 IV PFC1 230 1 1	P1L-50003RAS0_23310 OCOTILLO-22885 SUNCREST 500KV &1 -AND- 'P1L-50001RAS0_22930 ECO-22468 MIGUEL 500KV &1	P6***	L-1-1	<90	<90	<90	<90	<90	<90	<90	117.3	The P6 overloads can be eliminated by the system adjustments described above for the same P6 contingency between the overlapping P1 events, such as reducing generation output in the greater IV area while dispatching conventional gas unit, preferred resources, and energy storage in the San Diego area, and adjusting the IV phase shifting transformers if needed
22358 IV PFC 230 20118 ROA-230 230 1 1	P1L-50003RAS0_23310 OCOTILLO-22885 SUNCREST 500KV &1 -AND- 'P1L-50001RAS2-P6-P_22930 ECO-22468 MIGUEL 500KV &1	P6***	L-1-1	<90	<90	<90	<90	<90	<90	<90	106.0	
22609 OTAYMESA 230 20149 TJI-230 230 1 1	P1L-50003RAS0_23310 OCOTILLO-22885 SUNCREST 500KV &1 -AND- 'P1L-50001RAS2-P6-P_22930 ECO-22468 MIGUEL 500KV &1	P6***	L-1-1	<90	<90	98.0	<90	<90	<90	125.6	<90	
	P1L-50001RAS0_22930 ECO-22468 MIGUEL 500KV &1 -AND- 'P1L-50003RAS2-P6-P_23310 OCOTILLO-22885 SUNCREST 500KV &1	P6***	L-1-1	<90	<90	<90	<90	<90	<90	113.4	<90	
22227 ENCINATP 230 22716 SANLUSRY 230 1 1	P1L-23058_22710 SANLUSRY SC-22504 MISSION 230 2 -AND- 'P1L-23027_22716 SANLUSRY-22232 ENCINA 230 1	P6***	L-1-1	<90	<90	<90	<90	<90	<90	110.6	<90	Curtail the heavy flow from SDGE to LA Basin via the north of SONGS 230 kV path after the first contingency as system adjustment
	P1L-23057_22710 SANLUSRY SC-22504 MISSION 230 1 -AND- 'P1L-23027_22716 SANLUSRY-22232 ENCINA 230 1	P6***	L-1-1	<90	<90	<90	<90	<90	<90	110.3	<90	
	P1L-23027_22716 SANLUSRY-22232 ENCINA 230 1 -AND- 'P1L-ST6909_22256 ESCNDIDO-22724 SANMRCOS 69.0 1	P6***	L-1-1	<90	<90	<90	<90	<90	<90	101.1	<90	
22430 SILVERGT 230 22596 OLD TOWN 230 1 1	P1ML-23019_22596 MISSION-OLD TOWN-SILVERGT 3T 230 1	P1	L-1	<90	<90	91.5	<90	<90	<90	108.4	<90	
	P2.1-TL23028A_TL23028A SILVERGT-OLDTWNTP TAP A	P2	line section opened w/o a fault	<90	<90	92.5	<90	<90	<90	110.2	<90	
	P4-MS-230-1T_CB MISSION 230KV 1T	P4	Fault+Stuck Breaker	<90	<90	90.6	<90	<90	<90	108.0	<90	
	P5_MS-230_MISSION 230kV	P5	Non-Redundant Relay	<90	91.5	110.3	<90	<90	90.5	127.1	<90	
	P1ML-23019_22596 MISSION-OLD TOWN-SILVERGT 3T 230 1 -AND- 'P1L-23033_22832 SYCAMORE-22652 PENSQTOS 230 1	P6***	L-1-1	<90	108.5	123.7	<90	<90	107.3	151.4	104.0	

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				B1-2022 Summer Peak	B2-2025 Summer Peak	B3-2030 Summer Peak	B4-2022 Spring Off-Peak	B5-2025 Spring Ligh Load	S1-2025 SP High CEC Forecast	S2-2022 SpOP Hi Renewable & Min Gas Gen*	S3-2022 SP Heavy Renewable & Min Gas Gen	
	P1ML-23019_22596 MISSION-OLD TOWN-SILVERGT 3T 230 1 -AND- 'P1L-50003RAS0_23310 OCOTILLO-22885 SUNCREST 500KV &1	P6***	L-1-1	<90	107.3	119.8	<90	<90	106.3	144.3	108.9	The 2-hour short-term emergency ratings of TL23036, TL23028A, and TL23029 (129~143% higher than their normal ratings) would give the market and operators enough time to eliminate the P1, P2, P4, P5, P7, and most of the P6 overloads as post-contingency operational mitigation measures. The remaining P6 overloads over 143% of the normal ratings for the heavy northbound flow from SDGE to LA Basin via the north of SONGS 230 kV path could be eliminated by reducing generation, charging energy storage in the Otay Mesa area, and/or curtailing import from CENACE after the first contingency while dispatching the generation resources in the northern San Diego area and/or the SCE LA Basin
	P1L-23015_22464 MIGUEL-22504 MISSION 230 2 -AND- 'P1ML-23019_22596 MISSION-OLD TOWN-SILVERGT 3T 230 1	P6***	L-1-1	<90	91.4	110.9	<90	<90	90.3	128.9	<90	
22430 SILVERGT 230 22597 OLDTWNTP 230 1 1	P1L-23011_22430 SILVERGT-22596 OLD TOWN 230 1	P1	L-1	<90	<90	91.9	<90	<90	<90	109.6	<90	
	P4-SG2-2T_SILVERGT 230 2T	P4	Fault+Stuck Breaker	<90	<90	102.7	<90	<90	<90	117.2	<90	
	P1L-23011_22430 SILVERGT-22596 OLD TOWN 230 1 -AND- 'P1L-23033_22832 SYCAMORE-22652 PENSQTOS 230 1	P6***	L-1-1	<90	106.6	122.3	<90	<90	105.4	150.3	102.0	
	P1L-23011_22430 SILVERGT-22596 OLD TOWN 230 1 -AND- 'P1L-50003RAS0_23310 OCOTILLO-22885 SUNCREST 500KV &1	P6***	L-1-1	<90	106.4	119.4	<90	<90	105.4	144.6	107.7	
	P1L-23015_22464 MIGUEL-22504 MISSION 230 2 -AND- 'P1L-23011_22430 SILVERGT-22596 OLD TOWN 230 1	P6***	L-1-1	<90	92.7	112.7	<90	<90	91.6	131.4	<90	
	P1L-23014_22464 MIGUEL-22504 MISSION 230 1 -AND- 'P1L-23011_22430 SILVERGT-22596 OLD TOWN 230 1	P6***	L-1-1	<90	92.2	112.1	<90	<90	91.1	130.7	<90	
22430 SILVERGT 230 22771 BAY BLVD 230 1 1	P1L-23033_22832 SYCAMORE-22652 PENSQTOS 230 1	P1	L-1	<90	<90	96.2	<90	<90	<90	103.3	<90	
	P4-MS-230-5T_CB MISSION 230KV 5T	P4	Fault+Stuck Breaker	<90	91.4	105.7	<90	<90	91.3	108.0	<90	
	P7_TL23022+23023_ML-MS 230kV ck1 + ML-MS 230kV ck2	P7	L-2	<90	91.4	105.7	<90	<90	91.3	108.0	<90	
22716 SANLUSRY 230 24131 S.ONOFRE 230 3 1	P4-SA-230-1T_CB SAN LUIS REY 230KV 1T	P4	Fault+Stuck Breaker	<90	<90	<90	<90	<90	<90	101.0	<90	The overloads for the heavy northbound flow from SDGE to LA Basin via the north of SONGS 230 kV path could be eliminated by reducing generation and charging energy storage in the San Diego area, and curtailing import from CENACE
	P1L-TIE24_22716 SANLUSRY-24131 S.ONOFRE 230 1 -AND- 'P1L-TIE25_22716 SANLUSRY-24131 S.ONOFRE 230 2	P6***	L-1-1	<90	<90	<90	<90	<90	<90	101.2	<90	
	P1L-TIE25_22716 SANLUSRY-24131 S.ONOFRE 230 2 -AND- 'P1L-TIE24_22716 SANLUSRY-24131 S.ONOFRE 230 1	P6***	L-1-1	<90	<90	<90	<90	<90	<90	101.2	<90	

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				B1-2022 Summer Peak	B2-2025 Summer Peak	B3-2030 Summer Peak	B4-2022 Spring Off-Peak	B5-2025 Spring Ligh Load	S1-2025 SP High CEC Forecast	S2-2022 SpOP Hi Renewable & Min Gas Gen*	S3-2022 SP Heavy Renewable & Min Gas Gen	
24044 ELLIS 230 24134 SANTIAGO 230 1 1	P1L-SCE05_ 24044 ELLIS-24072 JOHANNA 230 1 -AND- 'P1L-50002_22536 N.GILA-22360 IMPRLVLY 500KV &1	P6***	L-1-1	90	101.63	<90	113.22	<90	101.91	<90	<90	Rely on the market and operators to dispatch generation resources including preferred resources and energy storage in the San Diego-IV area and southern Orange county after the first contingency as system adjustment
24072 JOHANNA 230 24134 SANTIAGO 230 1 1	P1L-SCE06_ 24044 ELLIS-24134 SANTIAGO 230 1 -AND- 'P1L-50002_22536 N.GILA-22360 IMPRLVLY 500KV &1	P6***	L-1-1	<90	<90	<90	111.02	<90	<90	<90	<90	
20102 RUM-230 230 20118 ROA-230 230 1 1	P7_TL23041+42_SPS_OM-ML 230kV ck1 + ck2 with SPS	P7	L-2	<90	<90	<90	108.47	<90	<90	<90	<90	Rely on modification of the 230kV Otay Mesa gen drop RAS to hook up the energy storage project under charging and discharging modes in the Otay Mesa area, or pre-contingency market congestion management to eliminate the P7 overload concern

Note (*): The off-peak sensitivity case with heavy renewable output and minimum gas generation commitment is based on the 2022 Spring Off-Peak Case rather than the 2025 Spring Off-Peak Case as indicated in the study plan.
(**): The loading level is calculated in percent of long-term emergency rating (four hours or longer) or its normal continuous rating if no long-term emergency rating is available
(***): P3 and P6 results are reported without System adjustment between the two single P1 events, unless indicated otherwise in the contingency description

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High/Low Voltages

Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)					Voltage PU (Sensitivity Scenarios)			Project & Potential Mitigation Solutions
				B1-2022 Summer Peak	B2-2025 Summer Peak	B3-2030 Summer Peak	B4-2022 Spring Off-Peak	B5-2025 Spring Ligh Load	S1-2025 SP High CEC Forecast	S2-2022 SpOP Hi Renewable & Min Gas Gen*	S3-2022 SP Heavy Renewable & Min Gas Gen	
NONE high/low voltage concern												

Note (*): The off-peak sensitivity case with heavy renewable output and minimum gas generation commitment is based on the 2022 Spring Off-Peak Case rather than the 2025 Spring Off-Peak Case as indicated in the study plan.

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Voltage Deviation

Substation	Contingency (All and Worst P6)	Category	Category Description	Post Cont. Voltage Deviation % (Baseline Scenarios)					Post Cont. Voltage Deviation % (Sensitivity Scenarios)			Project & Potential Mitigation Solutions
				B1-2022 Summer Peak	B2-2025 Summer Peak	B3-2030 Summer Peak	B4-2022 Spring Off-Peak	B5-2025 Spring Ligh Load	S1-2025 SP High CEC Forecast	S2-2022 SpOP Hi Renewable & Min Gas Gen*	S3-2022 SP Heavy Renewable & Min Gas Gen	
NONE voltage deviation concern												

Note (*): The off-peak sensitivity case with heavy renewable output and minimum gas generation commitment is based on the 2022 Spring Off-Peak Case rather than the 2025 Spring Off-Peak Case as indicated in the study plan.

Study Area: San Diego Main

Transient Stability

Contingency	Category	Category Description	Transient Stability Performance					Potential Mitigation Solutions
			Baseline Scenarios			Sensitivity Scenarios		
			B2-2025 Summer Peak	B3-2030 Summer Peak	B4-2022 Spring Off-Peak	S1-2025 SP High CEC Forecast	S2-2022 SpOP Hi Renewable & Min Gas Gen*	
P5-MS230_Mission 230 kV bus fault	P5	SLG Fault+Relay Failure	stable	stable	stable	stable	stable	No violation
P5-SG230_Silvergate 230 kV bus fault	P5	SLG Fault+Relay Failure	stable	stable	stable	stable	stable	No violation
P5-PEN230_Palamar 230 kV bus fault	P5	SLG Fault+Relay Failure	stable	stable	stable	stable	stable	No violation
ECO-MIGUEL 500 KV line (TL50001) out of service followed by the loss of Ocotillo-Suncrest 500 kV line (TL50003) that triggers 500 kV line TL50003 Gen Drop RAS, with system adjustment between the two events	P6	3Ø Fault @ Suncrest 500 kV	stable	stable	stable	stable	stable	No violation
Ocotillo-Suncrest 500 KV line (TL50003) out of service followed by the loss of ECO-Miguel 500 kV line (TL50001) that triggers 500 kV line TL50001 Gen Drop RAS, with system adjustment between the two events	P6	3Ø Fault @ Miguel 500 kV	stable	stable	stable	stable	stable	No violation
ECO-MIGUEL 500 KV line (TL50001) out of service followed by the loss of any of Sycamore-Suncrest 230 kV lines (TL23054 or TL23055) that triggers TL23054/TL23055 RAS, with system adjustment between the two events	P6	3Ø Fault @ Sycamore 230 kV	stable	stable	stable	stable	stable	No violation

Note (*): The off-peak sensitivity case with heavy renewable output and minimum gas generation commitment is based on the 2022 Spring Off-Peak Case rather than the 2025 Spring Off-Peak Case as indicated in the study plan.

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Single Contingency Load Drop

Worst Contingency	Category	Category Description	Amount of Load Drop (MW)								Potential Mitigation Solutions
			B1-2022 Summer Peak	B2-2025 Summer Peak	B3-2030 Summer Peak	B4-2022 Spring Off-Peak	B5-2025 Spring Ligh Load	S1-2025 SP High CEC Forecast	S2-2022 SpOP Hi Renewable & Min Gas Gen*	S3-2022 SP Heavy Renewable & Min Gas Gen	
No single contingency resulted in total load drop of more than 250 MW											

Note (*): The off-peak sensitivity case with heavy renewable output and minimum gas generation commitment is based on the 2022 Spring Off-Peak Case rather than the 2025 Spring Off-Peak Case as indicated in the study plan.

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Single Source Substation with more than 100 MW Load

Substation	Load Served (MW)										Potential Mitigation Solutions
	Category	Category Description	B1-2022 Summer Peak	B2-2025 Summer Peak	B3-2030 Summer Peak	B4-2022 Spring Off-Peak	B5-2025 Spring Ligh Load	S1-2025 SP High CEC Forecast	S2-2022 SpOP Hi Renewable & Min Gas Gen*	S3-2022 SP Heavy Renewable & Min Gas Gen	
No single source substation with load more than 100 MW											

Note (*): The off-peak sensitivity case with heavy renewable output and minimum gas generation commitment is based on the 2022 Spring Off-Peak Case rather than the 2025 Spring Off-Peak Case as indicated in the study plan.

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Study Area: San Diego Sub-Transmission

Thermal Overloads

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Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading % (Baseline Scenarios)					Loading % (Sensitivity Scenarios)			Project & Potential Mitigation Solutions
				2022 Summer Peak	2025 Summer Peak	2030 Summer Peak	2022 Spring Off-Peak	2025 Spring Off-Peak	2025 SP High CEC Forecast	2022 SpOP Hi Renew & Min Gas Gen	2022 SP Heavy Renewable & Min Gas Gen	
22016 AVCADOTP 69.0 22020 AVOCADO 69.0 1 1	TL698_Line AVOCADO-MONSRATE-PALA 69 kV ck 1	P1	N-1	<90	<90	<90	100.97	<90	<90	101.01	<90	Potential RAS to trip battery charging at Avocado
	TL0698A_TL0698A AVOCADO-MNSRATTP ck 1	P2.1	N-1	<90	<90	<90	100.60	<90	<90	100.51	<90	
22020 AVOCADO 69.0 22508 MNSRATTP 69.0 1 1	TL691_Line PENDLETN-MONSRATE-AVOCADO ck 1	P1	N-1	<90	<90	<90	101.36	<90	<90	101.29	<90	Potential RAS to trip battery charging at Avocado
	TL0691D_TL0691D AVOCADO-AVCADOTP ck 1	P2.1	N-1	<90	<90	<90	100.36	<90	<90	100.26	<90	
22056 BERNARDO 69.0 22284 FELCTATP 69.0 1 1	PEN-230_Non-Redundant Relay Failure PALOMAR 230KV	P5	Non-Redundant Relay	<90	<90	<90	<90	<90	<90	109.74	<90	Generation Re-dispatch/Potential RAS to trip battery charging
	TL23014 PEN-ESCNDIDO 230 kV ck 1 AND TL23015 PEN-ESCNDIDO 230 kV ck 2	P6	N-1-1	<90	<90	<90	<90	<90	<90	100.92	<90	
22192 DOUBLTTP 138 22300 FRIARS 138 1 1	TL23071 SYCAMORE-PENSQTOS 230 kV ck 1 AND TL23051 ARTESN-SYCAMORE 230 kV ck 1	P6	N-1-1	<90	<90	<90	<90	<90	<90	109.95	<90	Generation Re-dispatch/Potential RAS to trip generation/Upgrade Relay or adjust relay settings
	TL23013+23071_Lines PENSQTOS-OLD TOWN 230 kV ck 1 AND SYCAMORE-PENSQTOS 230 kV ck 1	P7	N-2	<90	105.62	110.81	<90	<90	101.87	170.14	105.57	
22208 EL CAJON 69.0 22408 LOSCOCHS 69.0 1 1	El Cajon GEN2 Generator AND GRANITE-LOSCOCHS-MIGUEL 69 kV ck 1	P3	G-1, N-1	100.91	102.28	102.80	<90	<90	104.61	<90	107.35	Granite Re-configuration Project, as previously approved for long term, 30-min rating and BESS storage in the interim
	El Cajon GEN1 Generator AND GRANITE-LOSCOCHS-MIGUEL 69 kV ck 1	P3	G-1, N-1	99.43	100.79	102.30	<90	<90	103.11	<90	105.90	
22256 ESCNDIDO 69.0 22724 SANMRCOS 69.0 1 1	TL23011 ENCINA-SANLUSRY-PEN 230 kV ck 1 AND TL23030 ESCNDIDO-TALEGA 230 kV ck 1	P6	N-1-1	<90	<90	<90	<90	<90	<90	105.68	<90	2nd Escondido-San Marcos line for long term, Generation-Redispatch in the interim
	TL23003+23011_Lines SANLUSRY-ENCINA 230 kV ck 1 AND ENCINA-SANLUSRY-PEN 230 kV ck 1	P7	N-2	<90	<90	<90	<90	<90	<90	112.92	<90	
22300 FRIARS 138 22500 MISSION 138 1 1	TL23013+23071_Lines PENSQTOS-OLD TOWN 230 kV ck 1 AND SYCAMORE-PENSQTOS 230 kV ck 1	P7	N-2	<90	103.16	107.67	<90	<90	100.72	142.46	102.40	Generation Re-dispatch/Potential RAS to trip generation/Upgrade Relay or adjust relay settings
22368 JAP MESA 69.0 22400 LASPULGS 69.0 1 1	TL23052 TALEGA-S.ONOFRE 230 kV ck 2 AND TL23007 CAPSTRNO - SONGS 230 kV ck 1	P6	N-1-1	N/A	122.01	<90	N/A	<90	124.20	N/A	N/A	TL695B Japanese Mesa-Talega Tap Reconductor project is expected in service by 2026, existing SPS to trip TL 695 in the interim
	TL23007+23052_Lines TALEGA-S.ONOFRE 230 kV ck 1 AND TALEGA-S.ONOFRE 230 kV ck 2	P7	N-2	119.66	N/A	N/A	<90	N/A	N/A	<90	134.19	
22420 SILVERGT 69.0 22868 URBAN 69.0 1 1	TL604_Line OLD TOWN-VINE SUB 69 kV ck 1	P1	N-1	<90	90.85	119.69	<90	<90	92.40	<90	<90	Silvergate-Urban Upgrade, as previously approved
	OT_BK70_Tran OLDTOWN 230/69 kV Transformer 1	P1	N-1	<90	<90	105.23	<90	<90	<90	<90	<90	
	OT_BK71_Tran OLDTOWN 230/69 kV Transformer 2	P1	N-1	<90	<90	105.23	<90	<90	<90	<90	<90	
	TL699_Line B-SILVERGT 69 kV ck 2	P1	N-1	<90	<90	101.97	<90	<90	<90	<90	<90	
	TL655_Line SILVERGT-CORONADO 69 kV ck 1	P1	N-1	<90	<90	100.28	<90	<90	<90	<90	<90	
	OT-1N_OLD TOWN 230 kV 1N CB	P4	Fault+Stuck Breaker	<90	<90	107.25	<90	<90	<90	<90	<90	
	OT-1S_OLD TOWN 230 kV 1S CB	P4	Fault+Stuck Breaker	<90	<90	107.12	<90	<90	<90	<90	<90	
	OT-1T_OLD TOWN 230 kV 1T CB	P4	Fault+Stuck Breaker	<90	<90	105.72	<90	<90	<90	<90	<90	
	OT-2N_OLD TOWN 230 kV 2N CB	P4	Fault+Stuck Breaker	<90	<90	105.36	<90	<90	<90	<90	<90	
	OT-2S_OLD TOWN 230 kV 2S CB	P4	Fault+Stuck Breaker	<90	<90	105.19	<90	<90	<90	<90	<90	
	TL23026 SILVERGT-BAY BLVD 230 kV ck 1 AND TL23027 OLD TOWN-MISSION 230 kV ck 1	P6	N-1-1	<90	<90	100.13	<90	<90	<90	<90	<90	
	TL23028+23029_Lines SILVERGT-OLD TOWN-MISSION 230 kV ck 1 AND SILVERGT-OLD TOWN 230 kV ck 1	P7	N-2	<90	<90	105.72	<90	<90	<90	<90	<90	
22442 MELRSETP 69.0 22724 SANMRCOS 69.0 1 1	TL23003+23011_Lines SANLUSRY-ENCINA 230 kV ck 1 AND ENCINA-SANLUSRY-PEN 230 kV ck 1	P7	N-2	<90	<90	<90	<90	<90	<90	100.23	<90	Generation re-dispatch/Existing RAS to trip the line/Congestion Management
22556 NAVSTMTR 69.0 22824 SWTWTRTP 69.0 1 1	SG-230_Non-Redundant Relay Failure SILVERGATE 230KV	P5	Non-Redundant Relay	96.78	103.45	111.78	<90	<90	104.48	<90	97.32	Sweetwater Reconfiguration Project, as previously approved, Generation Re-dispatch in the interim
22604 OTAY 69.0 22616 OTAYLKTP 69.0 1 1	TL6910_Line BORDER-SALT CREEK 69 kV ck 1	P1	N-1	135.78	131.97	128.08	<90	<90	130.47	<90	135.34	Pre-contingency Generation Re-dispatch/ Post-contingency Generation Re-dispatch within 30 minutes, 30-min rating
	TL6964_Line MIGUEL-SALT CREEK 69 kV ck 1	P1	N-1	102.22	<90	<90	<90	<90	<90	<90	101.79	
	TL0649D_TL0649D OTAYLKTP-SANYSDRO ck 1	P2.1	N-1	110.70	107.69	105.67	<90	<90	107.21	<90	111.87	
22808 STUARTTP 69.0 22400 LASPULGS 69.0 1 1	TL23052 TALEGA-S.ONOFRE 230 kV ck 2 AND TL23007 CAPSTRNO - SONGS 230 kV ck 1	P6	N-1-1	N/A	134.75	123.26	N/A	<90	137.14	N/A	N/A	Upgrade Las Pulgas - Stuart Tap 69 kV, as previously approved, existing SPS to trip TL 695 in the interim
	TL23007+23052_Lines TALEGA-S.ONOFRE 230 kV ck 1 AND TALEGA-S.ONOFRE 230 kV ck 2	P7	N-2	134.50	N/A	N/A	93.23	N/A	N/A	<90	149.19	
22820 SWEETWTR 69.0 22824 SWTWTRTP 69.0 1 1	SG-230_Non-Redundant Relay Failure SILVERGATE 230KV	P5	Non-Redundant Relay	100.39	108.03	117.53	<90	<90	109.04	<90	101.04	Sweetwater Reconfiguration Project, as previously approved, Generation Re-dispatch in the interim

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Thermal Overloads

Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading % (Baseline Scenarios)					Loading % (Sensitivity Scenarios)			Project & Potential Mitigation Solutions
				2022 Summer Peak	2025 Summer Peak	2030 Summer Peak	2022 Spring Off-Peak	2025 Spring Off-Peak	2025 SP High CEC Forecast	2022 SpOP Hi Renew & Min Gas Gen	2022 SP Heavy Renewable & Min Gas Gen	
	TL23026 SILVERGT-BAY BLVD 230 kV ck 1 AND TL23071 SYCAMORE-PENSQTOS 230 kV ck 1	P6	N-1-1	<90	92.64	101.68	<90	<90	92.71	<90	<90	
22841 LAGNA NL TAP 138 22396 LAGNA NL 138 1 1	PI-138-E_Bus	P2	Bus Fault	113.51	<90	<90	<90	<90	<90	<90	113.20	SOCRE project as previously approved in transmission plan, Operation Procedure in the interim
	PI-TCB_PICO TCB 138 kV 13836/46/16/48	P4	Fault+Stuck Breaker	111.34	<90	<90	<90	<90	<90	<90	111.04	
	TL13836+13846_Lines TALEGA-PICO 138 kV ck 1 AND PICO-SANMATEO-TALEGA 138 kV ck 1	P7	N-2	113.34	<90	<90	<90	<90	<90	<90	113.03	

The off-peak sensitivity case with heavy renewable output and minimum gas generation commitment is based on the 2022 Spring Off-Peak Case rather than the 2025 Spring Off-Peak Case as indicated in the study plan.

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Study Area: San Diego Sub-Transmission

High/Low Voltages

Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)					Voltage PU (Sensitivity Scenarios)			Project & Potential Mitigation Solutions
				2022 Summer Peak	2025 Summer Peak	2030 Summer Peak	2022 Spring Off-Peak	2025 Spring Off-Peak	2025 SP High CEC Forecast	2022 SpOP Hi Renew & Min Gas Gen	2022 SP Heavy Renewable & Min Gas Gen	
None	None											

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Voltage Deviation

Substation	Contingency (All and Worst P6)	Category	Category Description	Post Cont. Voltage Deviation % (Baseline Scenarios)					Post Cont. Voltage Deviation % (Sensitivity Scenarios)			Project & Potential Mitigation Solutions
				2022 Summer Peak	2025 Summer Peak	2030 Summer Peak	2022 Spring Off-Peak	2025 Spring Off-Peak	2025 SP High CEC Forecast	2022 SpOP Hi Renew & Min Gas Gen	2022 SP Heavy Renewable & Min Gas Gen	
None	None											

Study Area: San Diego Sub-Transmission

Transient Stability

Contingency	Category	Category Description	Transient Stability Performance					Potential Mitigation Solutions
			Baseline Scenarios			Sensitivity Scenarios		
			2025 Summer Peak	2030 Summer Peak	2022 Spring Off-Peak	2025 SP High CEC Forecast	2022 SpOP Hi Renew & Min Gas Gen	
None	None							

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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

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Single Source Substation with more than 100 MW Load

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

No single source substation with more than 100 MW