

APPENDIX C: Reliability Assessment Study Results

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2017-2018 ISO Reliability Assessment - Study Results

Study Area: **PG&E Bulk**



Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)										Potential Mitigation Solutions	
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2027 Summer Partial Peak	2019 Light Spring	2022 Spring Off-peak	2027 Spring Off-peak	2022 Summer Peak, High renew	2027 Summer Peak shift	2022 Spring Off-peak, max PV		
500 kV LINES	NORTHERN CALIFORNIA														
ROUND MTN –TABLE MTN #1 or #2 500 kV	Rnd Mtn –Table Mtn #2 or # 1 500 kV	P1	L-1	106.5%	102.4%	102.5%	101.5%	<95%	<95%	<95%	103.9%	101.3%	<95%	Reduce COI flow according to seasonal nomogram or bypass ser caps on the remaining Round Mtn-Table Mtn 500 kV line or Tbl Mtn-Vaca Dix	
ROUND MTN-TABLE MTN # 1 500 kV	Round Mtn-Table Mtn # 2 and Table Mtn 500/230 kV	P2	BRK	107.0%	104.2%	104.1%	102.4%	<95%	<95%	<95%	105.7%	102.9%	<95%		
ROUND MTN-TABLE MTN # 2 500 kV	Round Mtn-Table Mtn # 1 and Round Mtn 500/230 kV	P2	BRK	<95%	99.1%	<95%	98.6%	<95%	<95%	<95%	99.7%	95.1%	<95%		
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	118.2%	115.7%	N/A	N/A	<95%	<95%	N/A	116.1%	N/A	<95%		
ROUND MTN –TABLE MTN #1 or #2 500 kV	Table Mtn 500/230 kV x-former & Round Mtn-Table Mtn #2 or # 1	P6	T-1/L-1	107.0%	104.2%	104.3%	102.7%	<95%	<95%	<95%	106.3%	103.1%	<95%	Reduce COI flow according to seasonal nomogram or bypass ser caps on the remaining Round Mtn-Table Mtn 500 kV line or Tbl Mtn-Vaca Dix	
		Round Mtn-Table Mtn #2 or # 1 500 kV and Table Mtn-Thermalito 230 kV	P6	L-1/L-1	117.6%	116.1%	117.4%	114.8%	<95%	<95%	<95%	117.2%	109.1%		<95%
CAPTAIN JACK-OLINDA 500 kV	Round Mtn-Table Mtn # 2 & Round Mtn-Malin # 2 500 kV	P6	L-1/L-1	105.1%	105.6%	108.8%	107.8%	<95%	<95%	<95%	109.1%	105.4%	<95%	Operate within seasonal COI nomogram	
CAPTAIN JACK-OLINDA 500 kV	Malin- Round Mtn #1 and #2 500 kV	P7	L-2	103.9%	105.1%	106.1%	106.0%	<95%	<95%	<95%	107.8%	104.1%	<95%		
		Round Mtn-Table Mtn # 1 & # 2 500 kV	P7	L-2	103.4%	106.6%	107.2%	105.6%	<95%	<95%	<95%	110.0%	106.6%	<95%	
OLINDA-MAXWELL 500 kV	Round Mtn-Table Mtn # 2 & Round Mtn-Malin # 2 500 kV	P6	L-1/L-1	100.8%	96.2%	100.3%	96.6%	<95%	<95%	<95%	100.8%	97.1%	<95%	Operate within seasonal COI nomogram	
OLINDA-MAXWELL 500 kV	Round Mtn-Table Mtn # 1 & # 2 500 kV	P7	L-2	99.1%	96.6%	98.8%	96.6%	<95%	<95%	<95%	102.4%	97.9%	<95%		
MAXWELL-TRACY 500 kV	Round Mtn-Table Mtn # 1 & # 2 500 kV	P7	L-2	96.3%	<95%	96.8%	<95%	<95%	<95%	<95%	100.4%	96.0%	<95%		
MAXWELL - TRACY 500 kV	Round Mtn-Table Mtn # 2 & Round Mtn-Malin # 2 500 kV	P6	L-1/L-1	98.2%	95.9%	98.5%	<95%	<95%	<95%	<95%	98.9%	95.3%	<95%		
500 kV LINES	CENTRAL CALIFORNIA														
TESLA-LOS BANOS 500 kV	Tracy-Los Banos and Moss Landing-Los Banos 500kV	P6	L-1/L-1	<95%	<95%	<95%	<95%	<95%	116.1%	<95%	<95%	<95%	<95%	Reduce Path 15 flow under normal conditions	
TRACY-LOS BANOS 500 kV	Tesla-Los Banos and Moss Landing-Los Banos 500kV	P6	L-1/L-1	<95%	<95%	<95%	<95%	<95%	110.2%	<95%	<95%	<95%	<95%		
LOS BANOS - GATES # 1 500 kV	normal conditions	P0	normal	<95%	<95%	<95%	<95%	<95%	98.7%	<95%	<95%	<95%	<95%	Not a violation. Reduce Path 15 flow under normal conditions	
500/230 kV TRANSFORMERS															

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Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)										Potential Mitigation Solutions
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2027 Summer Partial Peak	2019 Light Spring	2022 Spring Off-peak	2027 Spring Off-peak	2022 Summer Peak, High renew	2027 Summer Peak shift	2022 Spring Off-peak, max PV	
ROUND MTN 500/230 kV x-former	Olinda-Tracy 500 kV & Capt Jack-Olinda 500 kV	P6	L-1/L-1	<95%	<95%	<95%	<95%	<95%	95.9%	<95%	<95%	<95%	<95%	reduce some Pit River generation after first contingency
	Olinda-Tracy 500 kV & Olinda 500/230 kV	P6	L-1/T-1	<95%	<95%	<95%	<95%	<95%	100.5%	100.3%	<95%	<95%	<95%	
	Capt Jack-Olinda 500 kV and Table Mtn 500/230 kV x-former	P6	T-1/L-1	<95%	<95%	<95%	<95%	<95%	99.7%	<95%	<95%	<95%	<95%	
ROUND MTN 500/230 kV x-former	Round Mtn-Table Mtn # 1 and # 2 500 kV	P7	L-2	<95%	<95%	<95%	<95%	<95%	100.7%	99.9%	<95%	<95%	<95%	reduce Pit River generation
TABLE MTN 500/230 kV x-former	Table Mtn -Tesla and Vaca Dix-Tesla 500 kV	P6	L-1/L-1	<95%	<95%	<95%	<95%	<95%	<95%	98.6%	<95%	<95%	<95%	not a violation, monitor
TABLE MTN 500/230 kV x-former	Table Mtn -Tesla and Table Mtn -Vaca Dix-Tesla 500 kV	P7	L-2	<95%	<95%	<95%	<95%	<95%	<95%	99.3%	<95%	<95%	<95%	not a violation, monitor
OLINDA 500/230 kV x-former	Round Mtn 500/230 kV x-former & Olinda-Tracy 500 kV	P6	T-1/L-1	<95%	<95%	<95%	<95%	<95%	126.1%	128.0%	<95%	<95%	<95%	Colusa is off in off-peak cases, thus Colusa SPS is not applicable. Reduce Shasta generation after first contingency
	Malin-Round Mnt 500 kV #1 and Round Mtn 500/230 kV	P6	T-1/L-1	<95%	<95%	<95%	<95%	<95%	100.7%	96.0%	<95%	<95%	<95%	
	Malin-Round Mnt 500 kV #1 and Table Mtn 500/230 kV	P6	T-1/L-1	<95%	<95%	<95%	<95%	<95%	<95%	96.0%	<95%	<95%	<95%	
OLINDA 500/230 kV x-former	Malin-Round Mtn # 1 and # 2 500 kV	P7	L-2	<95%	<95%	<95%	<95%	<95%	107.3%	<95%	<95%	<95%	<95%	reduce Shasta generation
TRACY 500 /230 kV x-former #1 or # 2	Tesla-Tracy 500 kV Line and Tracy 500/230 kV x-former # 2 or # 1	P6	L-1/T-1	<95%	<95%	<95%	107.7%	<95%	<95%	<95%	98.6%	101.1%	<95%	open Tracy-Tesla 230 kV lines if overload, trip Tracy pumps if it persists
METCALF 500/230 kV x-former #11, 12 or 13	Metcalf 500/230 kV Transformers #11 & #12 or #13	P6	T-1/T-1	<95%	100.5%	96.8%	111.9%	<95%	103.9%	95.9%	118.5%	114.0%	<95%	dispatch Ls Esteros peakers after 1st contingency, trip load in San Jose if overload persists
GATES 500/230 kV x-former	Los Banos 500/230 kV	P1	T-1	<95%	<95%	<95%	102.8%	<95%	<95%	<95%	<95%	<95%	<95%	install 2-nd Gates 500/230 kV transformer, approved project
	Los Banos-Gates 500 kV # 1	P1	L-1	<95%	<95%	<95%	96.0%	<95%	<95%	<95%	<95%	<95%	<95%	
	MossLandg-Ls Banos 500 kV	P1	L-1	<95%	<95%	<95%	95.5%	<95%	<95%	<95%	<95%	<95%	<95%	
GATES 500/230 kV x-former	Los Banos-Midway 500 kV and Los Banos 500/230 kV	P2	BRK	<95%	<95%	<95%	103.0%	<95%	<95%	<95%	<95%	<95%	<95%	install 2-nd Gates 500/230 kV transformer, approved project
	Tracy-Los Banos and Los Banos-Gates # 1 500 kV	P2	BRK	<95%	<95%	<95%	96.3%	<95%	<95%	<95%	<95%	<95%	<95%	
	Gates-Midway and Diablo-Midway 500 kV	P2	BRK	<95%	<95%	<95%	<95%	<95%	<95%	96.9%	<95%	<95%	<95%	
Los Banos-Moss Landing 500 kV and Los Banos 500/230 kV	Los Banos-Moss Landing 500 kV and Los Banos 500/230 kV	P6	L-1/T-1	<95%	<95%	<95%	110.4%	<95%	<95%	<95%	<95%	<95%	<95%	
	Los Banos 500/230 kV and Midway 500/230 kV # 11,12 or 13	P6	T-1/T-1	<95%	<95%	<95%	106.0%	<95%	<95%	<95%	<95%	<95%	<95%	
	Los Banos-Gates # 1 500 kV and Los Banos 500/230 kV	P6	L-1/T-1	<95%	<95%	<95%	105.9%	<95%	<95%	<95%	<95%	<95%	<95%	

Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)										Potential Mitigation Solutions
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GATES 500/230 kV x-former	Moss Landing-Los Banos and Tesla-Metcalf 500 kV	P6	L-1/L-1	<95%	<95%	<95%	105.8%	<95%	<95%	<95%	<95%	<95%	<95%	install 2-nd Gates 500/230 kV transformer, approved project
	Tesla 500/230 kV and Los Banos 500/230 kV	P6	T-1/T-1	<95%	<95%	<95%	105.8%	<95%	<95%	<95%	<95%	<95%	<95%	
	Los Banos-Tesla 500 kV and Los Banos 500/230 kV	P6	L-1/T-1	<95%	<95%	<95%	104.9%	<95%	<95%	<95%	<95%	<95%	<95%	
	Moss Landing 500/230 kV and Los Banos 500/230 kV	P6	T-1/T-1	<95%	<95%	<95%	104.2%	<95%	<95%	<95%	<95%	<95%	<95%	
	Tracy 500/230 kV and Los Banos 500/230 kV	P6	T-1/T-1	<95%	<95%	<95%	104.1%	<95%	<95%	<95%	<95%	<95%	<95%	
	Los Banos-Tracy 500 kV and Los Banos 500/230 kV	P6	L-1/T-1	<95%	<95%	<95%	104.0%	<95%	<95%	<95%	<95%	<95%	<95%	
	Los Banos-Gates # 3 500 kV and Los Banos 500/230 kV	P6	L-1/T-1	<95%	<95%	<95%	103.9%	<95%	<95%	<95%	<95%	<95%	<95%	
	Los Banos-Gates #1 and #3 500 kV	P6	L-1/L-1	<95%	<95%	<95%	103.8%	<95%	<95%	<95%	<95%	<95%	<95%	
	Midway 500/230 # 11 (or 13) and # 12 (or 13)	P6	T-1/T-1	<95%	<95%	<95%	101.0%	<95%	<95%	105.5%	<95%	<95%	<95%	
	Moss Landing-Los Banos and Los Banos-Gates # 1 500 kV	P6	L-1/L-1	<95%	<95%	<95%	99.8%	<95%	<95%	<95%	<95%	<95%	<95%	
	Gates-Midway 500 kV and Midway 500/230 kV # 11,12 or 13	P6	L-1/T-1	<95%	<95%	<95%	<95%	<95%	<95%	101.4%	<95%	<95%	<95%	
	Gates-Midway and Gates-Diablo 500 kV	P6	L-1/L-1	<95%	<95%	<95%	<95%	<95%	<95%	109.8%	<95%	<95%	<95%	
Gates-Midway and Diablo-Midway 500 kV	P6	L-1/L-1	<95%	<95%	<95%	<95%	<95%	<95%	97.1%	<95%	<95%	<95%		
GATES 500/230 kV x-former	Los Banos-Gates #1 and Los Banos-Midway 500 kV	P7	L-2	<95%	<95%	<95%	106.1%	<95%	<95%	<95%	<95%	<95%	install 2-nd Gates 500/230 kV transformer, approved project	
MIDWAY 500/230 kV x-former #11, 12 or 13	MIDWAY 500/230 kV x-former #11&12 or 12&13 or 11&13	P6	T-1/T-1	<95%	<95%	<95%	<95%	<95%	136.4%	148.5%	<95%	<95%	<95%	reduce generation at Midway 230 kV after first contingency
	MIDWAY 500/230 kV x-former #11, 12 or 13 and Gates 500/230 kV	P6	T-1/T-1	<95%	<95%	<95%	<95%	<95%	<95%	109.1%	<95%	<95%	<95%	
230 kV LINES	NORTHERN CALIFORNIA													
COTTONWD E-ROUND MTN 230kV #2	Tbl Mtn-Vaca Dix 500 kV & Cottonwood-Round Mtn #1 or #3 230 kV	P6	L-1/L-1	<95%	108.7%	111.3%	111.1%	<95%	<95%	<95%	99.1%	95.0%	<95%	limit COI import within nomogram or upgrade the line
COTTONWD E-ROUND MTN 230kV #2	Tbl Mtn-Tesla and Tbl Mtn-Vaca Dix 500 kV	P7	L-2	<95%	100.5%	102.8%	102.2%	<95%	<95%	<95%	109.6%	103.7%	<95%	
COTTONWD E-ROUND MTN 230kV #3	Tbl Mtn-Vaca Dix 500 kV and Cottonwood-Round Mtn # 1 or #2 230 kV	P6	L-1/L-1	110.5%	121.0%	124.1%	123.6%	<95%	<95%	<95%	110.4%	105.5%	<95%	limit COI import within nomogram or upgrade the line
COTTONWD E-ROUND MTN 230kV #3	Tbl Mtn-Tesla and Tbl Mtn-Vaca Dix 500 kV	P7	L-2	99.7%	110.7%	113.2%	112.3%	<95%	<95%	<95%	120.7%	113.9%	<95%	
TARLE MTN-RIO OSCO 230 kV	Tbl Mtn-Tesla 500 kV and Tbl Mtn-Palermo 230 kV	P6	L-1/L-1	117.0%	<95%	<95%	<95%	<95%	<95%	<95%	<95%	<95%	<95%	

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TABLE MTN-RIO OSO 230 kV	Tbl Mtn-Vaca Dix 500 kV and Table Mtn-Palermo 230 kV	P6	L-1/L-1	125.4%	<95%	<95%	<95%	<95%	<95%	<95%	<95%	<95%	<95%	Upgrade terminal equipment on this line. Modeled upgraded starting from 2022
TABLE MTN-RIO OSO 230 kV	Tbl Mtn-Tesla and Tbl Mtn-Vaca Dix 500 kV	P7	L-2	100.3%	<95%	<95%	<95%	<95%	<95%	<95%	<95%	<95%	<95%	
LONE TREE-CAYETANO 230 kV	Tesla-Metcalf 500 kV & Moss Landing-Los Banos 500 kV	P6	L-1/L-1	<95%	<95%	<95%	101.6%	<95%	<95%	<95%	<95%	<95%	<95%	reduce generation at Contra Costa after first contingency
LS ESTEROS - NWK DIST 230 kV	Tesla-Metcalf 500 kV & Moss Landing-Los Banos 500 kV	P6	L-1/L-1	<95%	<95%	<95%	98.6%	<95%	106.5%	<95%	106.2%	<95%	<95%	dispatch Metcalf generation after 1st contingency
	Tesla-Metcalf 500 kV & Metcalf-Moss Landing 500 kV	P6	L-1/L-1	<95%	<95%	<95%	<95%	<95%	<95%	<95%	100.6%	98.0%	<95%	
NEWARK E - NWK DIST 230 kV	Tesla-Metcalf 500 kV & Moss Landing-Los Banos 500 kV	P6	L-1/L-1	<95%	<95%	<95%	98.3%	<95%	105.2%	<95%	105.1%	98.3%	<95%	
	Tesla-Metcalf 500kV & Metcalf-Moss Landing 500kV	P6	L-1/L-1	<95%	<95%	<95%	98.3%	<95%	105.2%	<95%	100.0%	<95%	<95%	
DELEVAN-CORTINA 230 kV	Malin-Round Mtn #2 500 kV & Round Mtn-Table Mtn #2 500 kV	P6	L-1/L-1	104.8%	<95%	<95%	<95%	<95%	<95%	<95%	<95%	<95%	<95%	reduce Colusa generation after first contingency, if overload
	Olinda-Tracy 500 kV & Tracy-Tesla 500 kV	P6	L-1/L-1	95.3%	<95%	<95%	<95%	<95%	<95%	<95%	<95%	<95%	<95%	
	Table Mtn-Vaca Dix 500 kV & Delevan-Vaca-Dixon 230 kV	P6	L-1/L-1	113.7%	105.8%	102.8%	110.4%	<95%	<95%	<95%	<95%	<95%	<95%	
	Table Mtn-Tesla 500 kV & Delevan-Vaca-Dixon 230 kV	P6	L-1/L-1	105.2%	<95%	<95%	101.8%	<95%	<95%	<95%	<95%	<95%	<95%	
	Olinda-Tracy 500 kV & Delevan-Vaca-Dixon 230 kV	P6	L-1/L-1	109.8%	102.1%	<95%	104.9%	<95%	<95%	<95%	<95%	<95%	<95%	
DELEVAN-CORTINA 230 kV	Tbl Mtn-Tesla and Tbl Mtn-Vaca Dix 500 kV	P7	L-2	103.8%	98.1%	<95%	103.6%	<95%	<95%	<95%	<95%	<95%	<95%	Depends on Colusa generation, reduce generation or re-rate the line
	Round Mtn-Table Mtn # 1 and # 2 500 kV	P7	L-2	<95%	<95%	<95%	97.5%	<95%	<95%	<95%	<95%	<95%	<95%	
BELLOTA-WARNERVILLE 230 kV	Los Banos-Moss Landing and Los Banos-Tesla 500 kV	P6	L-1/L-1	<95%	<95%	<95%	<95%	<95%	100.1%	<95%	<95%	<95%	<95%	Insert series reactor on Warnerville-Wilson if overload
BELLOTA-WARNERVILLE 230 kV	Los Banos-Tracy and Los Banos-Tesla 500 kV	P7	L-2	<95%	<95%	<95%	<95%	<95%	114.8%	<95%	<95%	<95%	<95%	
WARNERVILLE-WILSON 230 kV	Tesla-Metcalf 500 kV	P1	L-1	<95%	<95%	<95%	95.4%	<95%	<95%	<95%	<95%	<95%	<95%	insert series reactor if overload
WARNERVILLE-WILSON 230 kV	Los Banos 500/230 kV and Gates 500/230 kV	P6	T-1/T-1	<95%	<95%	<95%	131.8%	<95%	<95%	<95%	<95%	<95%	<95%	insert series reactor if overload
	Gates 500/230 kV and Midway # 11,12,or 13 500/230 kV	P6	T-1/T-1	<95%	<95%	<95%	121.2%	<95%	<95%	<95%	<95%	<95%	<95%	
	Gates-Diablo 500 kV and Gates 500/230 kV	P6	L-1/T-1	<95%	<95%	<95%	118.5%	<95%	<95%	<95%	<95%	<95%	<95%	

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WARNERVILLE-WILSON 230 kV	Los Banos-Gates #3 500 kV and Gates 500/230 kV	P6	L-1/T-1	<95%	<95%	<95%	118.3%	<95%	<95%	<95%	<95%	<95%	<95%	
	Los Banos-Gates #1 500 kV and Gates 500/230 kV	P6	L-1/T-1	<95%	<95%	<95%	117.1%	<95%	<95%	<95%	<95%	<95%	<95%	
	Gates-Midway 500 kV and Gates 500/230 kV	P6	L-1/T-1	<95%	<95%	<95%	116.4%	<95%	<95%	<95%	<95%	<95%	<95%	
WARNERVILLE-WILSON 230 kV	PDCI Bi-pole	P7	Bi-pole DC	<95%	<95%	<95%	106.1%	N/A	N/A	N/A	<95%	<95%	N/A	Insert series reactor
	Los Banos-Tracy and Los Banos-Tesla 500 kV	P7	L-2	<95%	<95%	<95%	<95%	<95%	100.1%	111.8%	<95%	<95%	<95%	
230 kV LINES	CENTRAL CALIFORNIA													
EIGHT MILE-LODI 230 kV	normal conditions	P0	normal	<95%	<95%	<95%	<95%	104.4%	<95%	<95%	<95%	<95%	<95%	reconductoring in December 2019, reduce Lodi generation under norm
EIGHT MILE-LODI 230 kV	Table Mtn 500/230 kV	P1	T-1	<95%	<95%	<95%	<95%	99.4%	<95%	<95%	<95%	<95%	<95%	
EIGHT MILE-LODI 230 kV	Table Mtn-Vaca Dix (or Tesla) 500 kV and Gold Hill-8 Mile 230 kV	P6	L-1/L-1	<95%	<95%	<95%	<95%	105.3%	<95%	<95%	<95%	<95%	<95%	
LOS BANOS - QUINTO_SS 230 kV	normal conditions	P0	normal	<95%	<95%	<95%	<95%	<95%	105.1%	101.5%	<95%	<95%	<95%	Reduce Path 15 flow under normal conditions. Reduce generation from the project connected to the Panoche-Los Banos 230 kV line. Or consider line upgrade
LOS BANOS - QUINTO_SS 230 kV	Los Banos-Tesla 500 kV	P1	L-1	<95%	<95%	<95%	<95%	<95%	128.4%	119.9%	<95%	<95%	<95%	Reduce Path 15 flow under normal conditions. Reduce generation from the project connected to the Panoche-Los Banos 230 kV line, use short-term rating if still overload
	Los Banos-Tracy 500 kV	P1	L-1	<95%	<95%	<95%	<95%	<95%	122.9%	115.5%	<95%	<95%	<95%	
	Moss Landing -Los Banos 500 kV	P1	L-1	<95%	<95%	<95%	<95%	<95%	110.6%	104.4%	<95%	<95%	<95%	
	Moss Landing -Metcalf 500 kV	P1	L-1	<95%	<95%	<95%	<95%	<95%	105.9%	101.3%	<95%	<95%	<95%	
	Los Banos-Gates # 1 500 kV	P1	L-1	<95%	<95%	<95%	<95%	<95%	97.1%	<95%	<95%	<95%	<95%	
	Gates 500/230 kV	P1	L-1	<95%	<95%	<95%	<95%	<95%	96.3%	96.5%	<95%	<95%	<95%	
LOS BANOS - QUINTO_SS 230 kV	Tesla-Los Banos and Los Banos-Gates #3 500 kV	P2	BRK	<95%	<95%	<95%	<95%	<95%	130.8%	121.9%	<95%	<95%	<95%	Reduce Path 15 flow under normal conditions. Reduce generation from the project connected to the Panoche-Los Banos 230 kV line, use short-term rating if still overload
	Tesla-Los Banos and Tesla-Vaca Dix 500 kV	P2	BRK	<95%	<95%	<95%	<95%	<95%	129.4%	120.6%	<95%	<95%	<95%	
	Tracy-Los Banos and Los Banos-Gates #1 500 kV	P2	BRK	<95%	<95%	<95%	<95%	<95%	128.1%	119.4%	<95%	<95%	<95%	
	Moss Landing-Los Banos 500 kV and Moss Landing 500/230 kV	P2	BRK	<95%	<95%	<95%	<95%	<95%	111.8%	105.9%	<95%	<95%	<95%	



Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)										Potential Mitigation Solutions
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2027 Summer Partial Peak	2019 Light Spring	2022 Spring Off-peak	2027 Spring Off-peak	2022 Summer Peak, High renew	2027 Summer Peak shift	2022 Spring Off-peak, max PV	
	Los Banos-Midway 500 kV and Los Banos 500/230 kV	P2	BRK	<95%	<95%	<95%	<95%	<95%	97.2%	105.7%	<95%	<95%	<95%	
LOS BANOS - QUINTO_SS 230 kV	Moss Langing-Los Banos 500 kV & Tesla-Los Banos 500 kV	P6	L-1/L-1	<95%	<95%	<95%	<95%	<95%	174.4%	156.8%	<95%	<95%	96.8%	Reduce Path 15 flow under normal conditions. Reduce generation from the project connected to the Panoche-Los Banos 230 kV line, use short-term rating if still overload
	Moss Landing-Los Banos 500 kV & Tracy-Los Banos 500 kV	P6	L-1/L-1	<95%	<95%	<95%	<95%	<95%	161.4%	147.9%	<95%	<95%	<95%	
	Tesla-Los Banos 500 kV & Metcalf-Moss Landing 500 kV	P6	L-1/L-1	<95%	<95%	<95%	<95%	<95%	155.9%	146.6%	<95%	<95%	<95%	
	Tracy-Tesla and Tesla-Los Banos 500 kV	P6	L-1/L-1	<95%	<95%	<95%	<95%	<95%	134.0%	124.3%	<95%	<95%	<95%	
	Tesla-Los Banos and Los Banos-Gates # 1 500 kV	P6	L-1/L-1	<95%	<95%	<95%	<95%	<95%	133.0%	123.6%	<95%	<95%	<95%	
	Tesla-Los Banos and Los Banos-Midway 500 kV	P6	L-1/L-1	<95%	<95%	<95%	<95%	<95%	132.1%	122.1%	<95%	<95%	<95%	
	Tracy-Tesla and Tracy-Los Banos 500 kV	P6	L-1/L-1	<95%	<95%	<95%	<95%	<95%	129.8%	122.1%	<95%	<95%	<95%	
	Tesla-Los Banos and Tesla-Vaca Dix 500 kV	P6	L-1/L-1	<95%	<95%	<95%	<95%	<95%	129.4%	120.6%	<95%	<95%	<95%	
	Tesla-Los Banos and Table Mtn-Tesla 500 kV	P6	L-1/L-1	<95%	<95%	<95%	<95%	<95%	129.1%	120.3%	<95%	<95%	<95%	
	Tesla-Metcalf and Tesla-Los Banos 500 kV	P6	L-1/L-1	<95%	<95%	<95%	<95%	<95%	127.4%	121.6%	<95%	<95%	<95%	
	Los Banos-Midway and Los Banos-Tracy 500 kV	P6	L-1/L-1	<95%	<95%	<95%	<95%	<95%	126.5%	117.9%	<95%	<95%	<95%	
	Tracy-Los Banos and Los Banos-Gates #3 500 kV	P6	L-1/L-1	<95%	<95%	<95%	<95%	<95%	125.3%	117.5%	<95%	<95%	<95%	
	Moss Landing-Los Banos and Los Banos-Gates # 1 500 kV	P6	L-1/L-1	<95%	<95%	<95%	<95%	<95%	115.4%	108.1%	<95%	<95%	<95%	
	Los Banos-Midway 500 kV & Mosslanding-Los Banos 500 kV	P6	L-1/L-1	<95%	<95%	<95%	<95%	<95%	113.7%	106.7%	<95%	<95%	<95%	
	Moss Landing-Los Banos & Los Banos-Gates #3 500 kV	P6	L-1/L-1	<95%	<95%	<95%	<95%	<95%	112.8%	106.2%	<95%	<95%	<95%	
	Metcalf-Moss Landing 500 kV and Moss Landing 500/230 kV	P6	L-1/T-1	<95%	<95%	<95%	<95%	<95%	111.6%	105.7%	<95%	<95%	<95%	
Moss Landing-Metcalf and Moss Landing-Los Banos 500 kV	P6	L-1/L-1	<95%	<95%	<95%	<95%	<95%	110.5%	105.5%	<95%	<95%	<95%		
Moss Landing-Los Banos and Moss Landing 500/230 kV	P6	L-1/T-1	<95%	<95%	<95%	<95%	<95%	110.5%	105.9%	<95%	<95%	<95%		

Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)										Potential Mitigation Solutions
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2027 Summer Partial Peak	2019 Light Spring	2022 Spring Off-peak	2027 Spring Off-peak	2022 Summer Peak, High renew	2027 Summer Peak shift	2022 Spring Off-peak, max PV	
	Los Banos-Gates # 1 and # 3 230 kV	P6	L-1/L-1	<95%	<95%	<95%	<95%	<95%	103.4%	101.1%	<95%	<95%	<95%	
	Gates 500/230 kV and Los Banos 500/230 kV	P6	T-1/T-1	<95%	<95%	<95%	<95%	<95%	101.6%	121.4%	<95%	<95%	<95%	
	Los Banos-Gates #1 500 kV and Los Banos 500/230 kV	P6	L-1/T-1	<95%	<95%	<95%	<95%	<95%	101.3%	109.2%	<95%	<95%	<95%	
	Los Banos-Gates # 3 and Los Banos-Midway 500 kV	P6	L-1/L-1	<95%	<95%	<95%	<95%	<95%	100.5%	95.6%	<95%	<95%	<95%	
	Gates 500/230 kV and Midway 500/230 kV	P6	T-1/T-1	<95%	<95%	<95%	<95%	<95%	98.4%	99.1%	<95%	<95%	<95%	
	Los Banos-Midway 500 kV and Los Banos 500/230 kV	P6	L-1/T-1	<95%	<95%	<95%	<95%	<95%	96.5%	105.7%	<95%	<95%	<95%	
	Los Banos-Gates #3 500 kV and Los Banos 500/230 kV	P6	L-1/T-1	<95%	<95%	<95%	<95%	<95%	<95%	100.8%	<95%	<95%	<95%	
	Moss Landing-Los Banos 500 kV & 230 kV line	P6	L-1/L-1	<95%	<95%	<95%	<95%	<95%	123.0%	116.2%	<95%	<95%	<95%	
	Tesla-Los Banos 500 kV & a 230 kV line	P6	L-1/L-1	<95%	<95%	<95%	<95%	<95%	136.4%	128.1%	<95%	<95%	<95%	
	Tracy-Los Banos 500 kV & a 230 kV line	P6	L-1/L-1	<95%	<95%	<95%	<95%	<95%	131.2%	124.2%	<95%	<95%	<95%	
LOS BANOS - QUINTO_SS 230 kV	Los Banos-Tesla & Los Banos-Tracy 500 kV with RAS off peak	P7	L-2	<95%	<95%	<95%	<95%	<95%	207.6%	183.3%	<95%	<95%	121.7%	Reduce Path 15 flow under normal conditions, reduce generation from the project connected to the Panoche-Los Banos 230 kV line, use short-term rating if still overload
WESTLEY - QUINTO_SS 230 kV	Moss Landing-Los Banos & Tesla-Los Banos 500kV	P6	L-1/L-1	<95%	<95%	<95%	<95%	<95%	108.0%	97.9%	<95%	<95%	<95%	Reduce Path 15 flow under normal conditions. Reduce generation from thje project conneted to Panoche-Los Banos 230 kV
	Moss Landing-Los Banos 500 kV & Tracy-Los Banos 500 kV	P6	L-1/L-1	<95%	<95%	<95%	<95%	<95%	100.6%	<95%	<95%	<95%	<95%	
WESTLEY-QUINTO_SS 230 kV	Los Banos-Tracy and Los Banos-Tesla 500 kV with RAS off peak	P7	L-2	<95%	<95%	<95%	<95%	<95%	126.9%	112.9%	<95%	<95%	<95%	
MOSSLANDING-LAS AGUILAS 230 kV	normal conditions	P0	normal	<95%	<95%	<95%	<95%	<95%	114.7%	116.8%	<95%	<95%	<95%	congestion management if overload: reduce output of the project connected to Las Aguilas, increase generation from Moss Landing
	Moss Landing -Los Banos 500 kV	P1	L-1	<95%	<95%	<95%	<95%	<95%	151.3%	146.7%	<95%	<95%	<95%	
	Moss Landing 500/230 kV x-former	P1	T-1	<95%	<95%	<95%	<95%	<95%	121.4%	117.2%	<95%	<95%	<95%	
	Los Banos-Gates 500 kV # 1	P1	L-1	<95%	<95%	<95%	<95%	<95%	120.7%	119.9%	<95%	<95%	<95%	
	Los Banos-Tesla 500 kV	P1	L-1	<95%	<95%	<95%	<95%	<95%	118.3%	118.2%	<95%	<95%	<95%	
	Gates 500/230 kV	P1	T-1	<95%	<95%	<95%	<95%	<95%	118.0%	127.9%	<95%	<95%	<95%	
	Los Banos-Midway 500 kV	P1	L-1	<95%	<95%	<95%	<95%	<95%	117.0%	117.2%	<95%	<95%	<95%	

Study Area: **PG&E Bulk**



Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)										Potential Mitigation Solutions
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2027 Summer Partial Peak	2019 Light Spring	2022 Spring Off-peak	2027 Spring Off-peak	2022 Summer Peak, High renew	2027 Summer Peak shift	2022 Spring Off-peak, max PV	
MOSSLANDING-LAS AGUILAS 230 kV	Los Banos-Tracy 500 kV	P1	L-1	<95%	<95%	<95%	<95%	<95%	115.3%	115.8%	<95%	<95%	<95%	reduce output of the project connected to Las Aguilas, increase generation from Moss Landing. Use short-term rating
	Metcalf-Tesla 500 kV	P1	L-1	<95%	<95%	<95%	<95%	<95%	114.7%	114.9%	<95%	<95%	<95%	
	Los Banos-Gates 500 kV # 3	P1	L-1	<95%	<95%	<95%	<95%	<95%	111.7%	112.7%	<95%	<95%	<95%	
	Table Mtn 500/230 kV	P1	T-1	<95%	<95%	<95%	<95%	<95%	109.4%	111.7%	<95%	<95%	<95%	
	Midway 500/230 kV # 11, 12 or 13	P1	T-1	<95%	<95%	<95%	<95%	<95%	108.1%	110.2%	<95%	<95%	<95%	
	Tracy-Tesla 500 kV	P1	L-1	<95%	<95%	<95%	<95%	<95%	108.0%	109.6%	<95%	<95%	<95%	
	Metcalf 500/230 kV	P1	T-1	<95%	<95%	<95%	<95%	<95%	107.5%	109.3%	<95%	<95%	<95%	
	Los Banos 500/230 kV transformer	P1	T-1	<95%	<95%	<95%	<95%	<95%	104.1%	111.1%	<95%	<95%	<95%	
MOSSLANDING-LAS AGUILAS 230 kV	Moss Landing-Los Banos 500 kV & Moss Landing 500/230 kV	P2	BRK	<95%	<95%	<95%	<95%	<95%	145.3%	138.1%	<95%	<95%	<95%	reduce output of the project connected to Las Aguilas, increase generation from Moss Landing. Use short-term rating
	Tracy-Los Banos and Los Banos-Gates #1 500 kV	P2	BRK	<95%	<95%	<95%	<95%	<95%	129.4%	127.0%	<95%	<95%	<95%	
	Tesla-Los Banos and Los Banos-Gates #3 500 kV	P2	BRK	<95%	<95%	<95%	<95%	<95%	123.6%	122.5%	<95%	<95%	<95%	
	Round Mtn-Table Mtn # 2 500 kV and Table Mtn 500/230 kV	P2	BRK	<95%	<95%	<95%	<95%	<95%	118.0%	111.7%	<95%	<95%	<95%	
	Los Banos-Midway 500 kV and Los Banos 500/230 kV	P2	BRK	<95%	<95%	<95%	<95%	<95%	117.6%	122.5%	<95%	<95%	<95%	
	Mosslanding-Los Banos 500 kV & Tesla-Metcalf 500 kV	P6	L-1/L-1	<95%	<95%	<95%	<95%	<95%	216.6%	202.0%	131.5%	<95%	<95%	
	Tesla-Los Banos & Mosslanding-Los Banos 500kV	P6	L-1/L-1	<95%	<95%	<95%	<95%	<95%	194.2%	182.8%	<95%	<95%	<95%	
	Tracy-Los Banos & Mosslanding-Los Banos 500 kV	P6	L-1/L-1	<95%	<95%	<95%	<95%	<95%	182.1%	172.9%	<95%	<95%	<95%	
	Moss Landing-Los Banos & Los Banos-Gates #1 500 kV	P6	L-1/L-1	<95%	<95%	<95%	<95%	<95%	163.4%	156.2%	<95%	<95%	<95%	
	Los Banos-Midway 500 kV & Mosslanding-Los Banos 500 kV	P6	L-1/L-1	<95%	<95%	<95%	<95%	<95%	160.1%	153.8%	<95%	<95%	<95%	
	Moss Landing-Los Banos and Los Banos-Gates # 3 500 kV	P6	L-1/L-1	<95%	<95%	<95%	<95%	<95%	156.0%	150.5%	<95%	<95%	<95%	
	Moss Landing 500/230 kV x-former & Metcalf-Moss Landing 500 kV	P6	T-1/L-1	<95%	<95%	<95%	<95%	<95%	145.2%	137.9%	<95%	<95%	<95%	
	Los Banos-Gates # 1 and # 3 500 kV	P6	L-1/L-1	<95%	<95%	<95%	<95%	<95%	143.0%	138.9%	<95%	<95%	<95%	

Study Area: **PG&E Bulk**



Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)										Potential Mitigation Solutions
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2027 Summer Partial Peak	2019 Light Spring	2022 Spring Off-peak	2027 Spring Off-peak	2022 Summer Peak, High renew	2027 Summer Peak shift	2022 Spring Off-peak, max PV	
MOSSLANDING-LAS AGUILAS 230 kV	Tesla-Los Banos and Los Banos-Gates #1 500 kV	P6	L-1/L-1	<95%	<95%	<95%	<95%	<95%	131.9%	129.2%	<95%	<95%	<95%	reduce output of the project connected to Las Aguilas, increase generation from Moss Landing. Use short-term rating
	Tesla-Los Banos and Los Banos-Midway 500 kV	P6	L-1/L-1	<95%	<95%	<95%	<95%	<95%	129.0%	126.8%	<95%	<95%	<95%	
	Los Banos-Gates # 3 and Los Banos-Midway 500 kV	P6	L-1/L-1	<95%	<95%	<95%	<95%	<95%	128.6%	126.3%	<95%	<95%	<95%	
	Los Banos-Midway and Los Banos-Tracy 500 kV	P6	L-1/L-1	<95%	<95%	<95%	<95%	<95%	126.0%	124.4%	<95%	<95%	<95%	
	Moss Landing 500/230 kV and Metcalf 500/230 kV	P6	T-1/T-1	<95%	<95%	<95%	<95%	<95%	125.5%	120.8%	<95%	<95%	<95%	
	Los Banos-Gates # 1 500 kV 500 kV and Gates 500/230 kV	P6	L-1/T-1	<95%	<95%	<95%	<95%	<95%	124.9%	133.0%	<95%	<95%	<95%	
	Gates-Midway 500 kV and Gates 500/230 kV	P6	L-1/T-1	<95%	<95%	<95%	<95%	<95%	124.8%	135.0%	<95%	<95%	<95%	
	Tracy-Tesla and Tesla-Los Banos 500 kV	P6	L-1/L-1	<95%	<95%	<95%	<95%	<95%	124.6%	123.3%	<95%	<95%	<95%	
	Gates 500/230 kV and Midway 500/230 kV	P6	T-1/T-1	<95%	<95%	<95%	<95%	<95%	123.1%	134.0%	<95%	<95%	<95%	
	Los Banos-Gates # 1 500 kV and Los Banos 500/230kV	P6	L-1/T-1	<95%	<95%	<95%	<95%	<95%	122.4%	126.1%	<95%	<95%	<95%	
	Los Banos-Gates # 3 500 kV 500 kV and Gates 500/230 kV	P6	L-1/T-1	<95%	<95%	<95%	<95%	<95%	120.7%	130.0%	<95%	<95%	<95%	
	Tracy-Los Banos and Los Banos-Gates #3 500 kV	P6	L-1/L-1	<95%	<95%	<95%	<95%	<95%	120.6%	120.1%	<95%	<95%	<95%	
	Gates 500/230 kV and Los Banos 500/230 kV	P6	T-1/T-1	<95%	<95%	<95%	<95%	<95%	119.2%	139.4%	<95%	<95%	<95%	
	Moss Landing 500/230 kV and Los Banos 500/230 kV	P6	T-1/T-1	<95%	<95%	<95%	<95%	<95%	119.1%	118.8%	<95%	<95%	<95%	
	Los Banos-Midway #1 500 kV & Midway 500/230 kV # 11, 12 or 13	P6	L-1/T-1	<95%	<95%	<95%	<95%	<95%	118.3%	118.7%	<95%	<95%	<95%	
	Los Banos-Midway 500 kV & Los Banos 500/230 kV	P6	L-1/T-1	<95%	<95%	<95%	<95%	<95%	117.6%	122.5%	<95%	<95%	<95%	
	Tesla-Vaca Dix and Tesla-Metcalf 500 kV	P6	L-1/L-1	<95%	<95%	<95%	<95%	<95%	115.7%	115.7%	<95%	<95%	<95%	
	Tracy-Tesla and Tesla-Metcalf 500 kV	P6	L-1/L-1	<95%	<95%	<95%	<95%	<95%	115.1%	115.3%	<95%	<95%	<95%	
	Two Midway 500/230 kV x-formers	P6	T-1/T-1	<95%	<95%	<95%	<95%	<95%	111.9%	114.5%	<95%	<95%	<95%	
	Table Mtn 500/230 kV and Round Mtn 500/230 kV, or two Metcalf 500/230 kV	P6	T-1/T-1	<95%	<95%	<95%	<95%	<95%	110.1%	112.3%	<95%	<95%	<95%	
two Metcalf 500/230 kV transformers	P6	T-1/T-1	<95%	<95%	<95%	<95%	<95%	109.8%	111.2%	<95%	<95%	<95%		

Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)										Potential Mitigation Solutions
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2027 Summer Partial Peak	2019 Light Spring	2022 Spring Off-peak	2027 Spring Off-peak	2022 Summer Peak, High renew	2027 Summer Peak shift	2022 Spring Off-peak, max PV	
	Table Mtn 500/230 kV and Tesla or Vaca Dix 500/230 kV	P6	T-1/T-1	<95%	<95%	<95%	<95%	<95%	109.4%	111.7%	<95%	<95%	<95%	
	Los Banos 500/230 and Midway 500/230 # 11,12 or 13	P6	T-1/T-1	<95%	<95%	<95%	<95%	<95%	106.2%	113.5%	<95%	<95%	<95%	
	Midway 500/230 kV and Moss Landing-Coburn 230 kV	P6	T-1/L-1	<95%	<95%	<95%	<95%	<95%	115.8%	119.2%	<95%	<95%	<95%	
	Tesla - Los Banos 500 kV & Moss Landing-Coburn 230 kV	P6	L-1/L-1	<95%	<95%	<95%	<95%	<95%	139.7%	139.2%	<95%	<95%	<95%	
	Tesla -Metcalf 500 kV & Moss Landing-Coburn 230 kV	P6	L-1/L-1	<95%	<95%	<95%	<95%	<95%	136.4%	137.6%	<95%	<95%	<95%	
	Mosslanding-Coburn 230 kV & 500 kV line from Los Banos	P6	L-1/L-1	<95%	<95%	<95%	<95%	<95%	138.2%	137.9%	<95%	<95%	<95%	
	Moss Landing-Los Banos 500 kV & Moss Landing-Coburn 230 kV	P6	L-1/L-1	<95%	<95%	<95%	<95%	<95%	179.9%	174.7%	<95%	<95%	<95%	
	Moss Landing-Los Banos 500 kV & Westley-Quinto 230 kV	P6	L-1/L-1	<95%	<95%	<95%	<95%	<95%	173.5%	167.2%	<95%	<95%	<95%	
	Moss Landing-Los Banos 500 kV & other 230 kV lines	P6	L-1/L-1	<95%	<95%	<95%	<95%	<95%	170.4%	164.4%	<95%	<95%	<95%	
	other 500 kV lines & Westley-Quinto 230 kV	P6	L-1/L-1	<95%	<95%	<95%	<95%	<95%	136.1%	128.4%	<95%	<95%	<95%	
MOSSLANDING-LAS AGUILAS 230 kV	Los Banos-Gates #1 and Los Banos-Midway 500 kV	P7	L-2	<95%	<95%	<95%	<95%	<95%	120.7%	118.1%	<95%	<95%	<95%	reduce output of the project connected to Las Aguilas, increase generation from Moss Landing. Use short-term rating or trip 3rd Helms pump
	Los Banos-Tracy and Los Banos-Tesla 500 kV w/RAS off -peak	P7	L-2	<95%	<95%	<95%	<95%	<95%	132.4%	128.9%	<95%	<95%	<95%	
MOSS LANDING-COBURN 230 kV	Metcalf-Tesla & Mosslandg-Los Banos 500kV	P6	L-1/L-1	<95%	<95%	<95%	<95%	<95%	107.5%	101.5%	<95%	<95%	<95%	Dispatch Moss Landing generation after first contingency
	Moss Landing - Las Aguilas 230 kV & Mosslanding-Los Banos 500 kV	P6	L-1/L-1	<95%	<95%	<95%	<95%	<95%	108.7%	106.6%	<95%	<95%	<95%	
LAS AGUILASS-PANOCHÉ 230kV #1 or #2	Tesla-Metcalf 500 kV & Moss Landing-Los Banos 500 kV	P6	L-1/L-1	<95%	<95%	<95%	<95%	<95%	103.9%	<95%	<95%	<95%	<95%	Dispatch Moss Landing generation after first contingency
PANOCHÉ-DOS AMIGOS 230 kV	Gates 500/230 kV transformer	P1	T-1	<95%	<95%	<95%	<95%	<95%	<95%	96.6%	<95%	<95%	<95%	istall 2-nd Gates transformer
PANOCHÉ-DOS AMIGOS 230 kV	Los Banos-Gates # 1 and # 3 500 kV	P6	L-1/L-1	<95%	<95%	<95%	<95%	<95%	109.9%	109.2%	<95%	<95%	<95%	Follow Operational Procedure for Path 15 after first contingency
	Gates-Midway 500 kV and Gates 500/230 kV	P6	L-1/T-1	<95%	<95%	<95%	<95%	<95%	<95%	105.5%	<95%	<95%	<95%	
	Gates 500/230 kV and Midway 500/230 kV	P6	T-1/T-1	<95%	<95%	<95%	<95%	<95%	<95%	104.4%	<95%	<95%	<95%	

Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)										Potential Mitigation Solutions	
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2027 Summer Partial Peak	2019 Light Spring	2022 Spring Off-peak	2027 Spring Off-peak	2022 Summer Peak, High renew	2027 Summer Peak shift	2022 Spring Off-peak, max PV		
	Los Banos-Gates # 1 500 kV and Gates 500/230 kV	P6	L-1/T-1	<95%	<95%	<95%	<95%	<95%	<95%	<95%	102.6%	<95%	<95%	<95%	
PANOCHÉ-GATES # 1 and 2 230 kV	Los Banos-Gates #1 and #3 500 kV	P6	L-1/L-1	<95%	<95%	<95%	<95%	<95%	<95%	130.4%	101.0%	<95%	<95%	<95%	Reduce Path 15 flow under normal conditions, follow Operational Procedure after first contingency
	Los Banos-Gates # 3 and Los Banos-Midway 500 kV	P6	L-1/L-1	<95%	<95%	<95%	<95%	<95%	<95%	101.6%	<95%	<95%	<95%	<95%	
	Moss Landing-Los Banos and Los Banos-Gates # 1 500 kV	P6	L-1/L-1	<95%	<95%	<95%	<95%	<95%	<95%	99.0%	<95%	<95%	<95%	<95%	
PANOCHÉ_GATES # 1 and # 2 230 kV	Los Banos-Gates #1 and Los Banos-Midway 500 kV	P7	L-2	<95%	<95%	<95%	<95%	<95%	<95%	99.9%	<95%	<95%	<95%	<95%	Reduce Path 15 flow under normal conditions
MORROBAY- SOLARSS 230 kV # 1 or # 2	Gates-Midway 500 kV & Morro Bay-Solar SS 230 kV # 2 or # 1	P6	L-1/L-1	<95%	<95%	<95%	<95%	<95%	<95%	112.0%	100.3%	<95%	<95%	<95%	reduce generation from Topaz Solar after first contingency
	Midway 500/230 kV x-former # 11,12 or 13 & Morro Bay-Solar SS 230 kV #2 or #1	P6	L-1/L-1	<95%	<95%	<95%	<95%	<95%	<95%	107.1%	<95%	<95%	<95%	<95%	
	Gates-Diablo 500 kV & Morro Bay-Solar SS 230 kV # 2 or # 1	P6	L-1/L-1	<95%	<95%	<95%	<95%	<95%	<95%	101.0%	<95%	<95%	<95%	<95%	
	Los Banos-Midway 500 kV & Morro Bay-Solar SS 230 kV # 2 or # 1	P6	L-1/L-1	<95%	<95%	<95%	<95%	<95%	<95%	106.8%	<95%	<95%	<95%	<95%	
GATES -CALFLATSSS 230 kV	Gates-Midway and Gates-Diablo 500 kV	P6	L-1/L-1	<95%	<95%	<95%	<95%	<95%	<95%	98.7%	<95%	<95%	<95%	<95%	reduce generation from renewable project connected to Estrella-Gates 230 kV line
GATES-MIDWAY 230 kV	Gates-Midway and Gates-Diablo 500 kV	P6	L-1/L-1	<95%	<95%	<95%	<95%	<95%	<95%	107.0%	<95%	<95%	<95%	<95%	Short-term emergency rating used. Reduce Path 15 flow under normal conditions
115 kV LINES															
DRUM-BRUNSW-RIO OSO 115 kV	Round Mtn-Table Mtn #1 & 2 500 kV	P7	L-2	104.9%	100.3%	<95%	101.4%	<95%	<95%	<95%	<95%	111.8%	102.6%	<95%	reduce Drum generation
PEASE-E.MRSVLE-OLIVH 115 kV	Tbl Mtn-Tesla 500 kV and Tbl Mtn-Rio Oso 230 kV	P6	L-1/L-1	107.4%	<95%	<95%	<95%	<95%	<95%	<95%	<95%	<95%	<95%	<95%	South of Palermo Project. Prior to the project: limit COI import within nomogram
	Tbl Mtn-Vaca Dix 500 kV and Table Mtn-Rio Oso 230 kV	P6	L-1/L-1	113.9%	<95%	<95%	<95%	<95%	<95%	<95%	<95%	<95%	<95%	<95%	
RIO OSO-GREENLEAF TAP 115 kV	Tbl Mtn-Tesla 500 kV and Colgate-Rio Oso 230 kV	P6	L-1/L-1	109.9%	<95%	<95%	<95%	<95%	<95%	<95%	<95%	<95%	<95%	<95%	South of Palermo Project. Prior to the project: limit COI import within nomogram
	Tbl Mtn-Vaca Dix 500 kV and Colgate-Rio Oso 230 kV	P6	L-1/L-1	113.9%	<95%	<95%	<95%	<95%	<95%	<95%	<95%	<95%	<95%	<95%	
RIO OSO-GREENLEAF TAP 115 kV	Tbl Mtn-Tesla & Tbl Mtn-Vaca Dix 500 kV	P7	L-2	98.3%	<95%	<95%	<95%	<95%	<95%	<95%	<95%	<95%	<95%	<95%	

2017-2018 ISO Reliability Assessment - Study Results

Study Area: **PG&E Bulk**



Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)										Potential Mitigation Solutions
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2027 Summer Partial Peak	2019 Light Spring	2022 Spring Off-peak	2027 Spring Off-peak	2022 Summer Peak, High renew	2027 Summer Peak shift	2022 Spring Off-peak, max PV	
NEWARK F - LCKHD J1 115kV	Tesla-Metcalf 500 kV & Moss Landing-Los Banos 500 kV	P6	L-1/L-1	<95%	99.2%	<95%	105.7%	<95%	99.9%	<95%	<95%	100.3%	<95%	dispatch Metcalf generation after 1st contingency
TRIMBLE - SAN JOSE B DG 115 kV	Tesla-Metcalf 500 kV	P1	L-1	<95%	100.8%	102.4%	<95%	<95%	<95%	<95%	<95%	101.9%	<95%	reduce generation from Los Esteros or increase generation from Metcalf, or upgrade the line. See mitigation in the local area studies
TRIMBLE - SAN JOSE B DG 115 kV	Tesla-Metcalf 500 kV & Metcalf 500/230 kV	P2	BRK	<95%	102.5%	104.0%	<95%	<95%	<95%	<95%	<95%	103.9%	<95%	
TRIMBLE - SAN JOSE B DG 115 kV	Tesla-Metcalf 500 kV & Moss Landing-Los Banos 500 kV	P6	L-1/L-1	109.9%	140.3%	139.9%	147.1%	<95%	102.0%	<95%	109.0%	153.8%	<95%	reduce generation from Los Esteros or increase generation from Metcalf, or upgrade the line. See mitigation in the local area studies
	Tesla-Metcalf 500 kV & Moss Landing-Metcalf 500 kV	P6	L-1/L-1	108.0%	132.9%	133.3%	125.2%	<95%	<95%	<95%	103.1%	140.1%	<95%	
	Tesla-Metcalf 500 kV & SSS 230 - NRSrizer 230	P6	L-1/L-1	<95%	114.3%	116.0%	102.5%	<95%	<95%	<95%	<95%	115.7%	<95%	
	Tesla-Metcalf 500 kV & Tesla-Los Banos 500 kV	P6	L-1/L-1	<95%	110.1%	111.6%	<95%	<95%	<95%	<95%	<95%	106.9%	<95%	
	Tesla-Metcalf 500 kV & Tesla-Vaca Dix 500 kV	P6	L-1/L-1	<95%	103.3%	104.9%	<95%	<95%	<95%	<95%	<95%	104.0%	<95%	
MIDWAY-BELRIDGE JCT (MIDWAY-TEMBLOR) 115 kV	normal conditions	P0	L-1	<95%	<95%	<95%	102.2%	<95%	<95%	<95%	<95%	<95%	<95%	decrease generation at Midway or dispatch generation at Pump Jack
MIDWAY-BELRIDGE JCT (MIDWAY-TEMBLOR) 115 kV	Gates-Midway 500 kV	P1	L-1	<95%	<95%	<95%	97.0%	<95%	<95%	<95%	<95%	<95%	<95%	install 2-nd Gates 500/230 kV transformer and decrease generation at Midway or dispatch generation at Pump Jack after first contingency if overload expected
	Gates 500/230 kV	P1	T-1	<95%	<95%	<95%	109.8%	<95%	<95%	<95%	<95%	<95%	<95%	
MIDWAY-BELRIDGE JCT (MIDWAY-TEMBLOR) 115 kV	Los Banos-Gates # 1 and Gates-Midway 500 kV	P2	BRK	<95%	<95%	<95%	97.7%	<95%	<95%	<95%	<95%	<95%	<95%	install 2-nd Gates 500/230 kV transformer and decrease generation at Midway or dispatch generation at Pump Jack after first contingency if overload expected
	Gates-Midway and Diablo-Midway # 2 500kV	P2	BRK	<95%	<95%	<95%	98.3%	<95%	<95%	<95%	<95%	<95%	<95%	
MIDWAY-BELRIDGE JCT (MIDWAY-TEMBLOR) 115 kV	Los Banos 500/230 kV and Gates 500/230kV	P6	T-1/T-1	<95%	<95%	<95%	118.2%	<95%	<95%	<95%	<95%	<95%	<95%	install 2-nd Gates 500/230 kV transformer and decrease generation at Midway or dispatch generation at Pump Jack after first contingency if overload expected
	Gates-Midway 500 kV and Gates 500/230kV	P6	L-1/T-1	<95%	<95%	<95%	113.7%	<95%	<95%	<95%	<95%	<95%	<95%	
	Los Banos-Gates # 1 500 kV and Gates 500/230kV	P6	L-1/T-1	<95%	<95%	<95%	112.6%	<95%	<95%	<95%	<95%	<95%	<95%	
	Los Banos-Gates # 3 500 kV and Gates 500/230kV	P6	L-1/T-1	<95%	<95%	<95%	111.0%	<95%	<95%	<95%	<95%	<95%	<95%	
	Gates-Diablo 500 kV and Gates 500/230kV	P6	L-1/T-1	<95%	<95%	<95%	110.2%	<95%	<95%	<95%	<95%	<95%	<95%	
	Gates-Midway 500 kV and Diablo-Gates 500 kV	P6	L-1/L-1	<95%	<95%	<95%	104.6%	<95%	<95%	<95%	<95%	<95%	<95%	
LOWER VOLTAGE FACILITIES	ONLY NORMAL CONDITIONS OVERLOADS SHOWN													
GFFNJCT-GIFFEN 70 kV (Westlands-Helm 70 kV)	normal conditions	P0	normal	<95%	<95%	<95%	<95%	<95%	123.5%	129.0%	96.1%	<95%	108.3%	reduce output for solar PV at Giffen, if overload, mitigation in local area studies

Study Area: **PG&E Bulk**



Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)										Potential Mitigation Solutions
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2027 Summer Partial Peak	2019 Light Spring	2022 Spring Off-peak	2027 Spring Off-peak	2022 Summer Peak, High renew	2027 Summer Peak shift	2022 Spring Off-peak, max PV	
AVENAL T - KETTLEMAN T 70 kV	normal conditions	P0	normal	<95%	<95%	<95%	<95%	<95%	103.5%	104.0%	<95%	<95%	<95%	reduce output from Sun City and/or Sandrag, mitigation in local area studies
HELM-STROUD 70 kV	normal conditions	P0	normal	<95%	<95%	<95%	<95%	<95%	<95%	101.0%	<95%	<95%	<95%	reduce output of solar PV connected to Helm 70 kV, mitigation in local area studies
MENDOTA-BIOMASS -ADAMS70 kV	normal conditions	P0	normal	<95%	<95%	<95%	<95%	<95%	<95%	166.3%	<95%	<95%	<95%	reduce output from Adams E, mitigation in local area studies
WHEELR 115/70 kV	normal conditions	P0	normal	<95%	<95%	<95%	<95%	<95%	<95%	127.7%	<95%	<95%	<95%	reduce output of solar PV connected to Wheeler, mitigation in local area studies
HELM 230/70 kV	normal conditions	P0	normal	<95%	<95%	<95%	<95%	<95%	114.7%	<95%	95.4%	<95%	<95%	reduce output of solar PV connected to Helm 70 kV, mitigation in local area studies
KETTLEMAN T -GATES 70 kV	normal conditions	P0	normal	<95%	<95%	<95%	<95%	<95%	151.8%	154.6%	126.6%	<95%	140.7%	reduce output from Sun City and/or Sandrag, mitigation in local area studies
AFFECTED SYSTEMS														
Ponderosa B -Captain Jack 500kV (Fort Rock series caps)	PDCI bi-pole	P7	PDCI	101.2%	126.0%	109.4%	108.4%	<95%	<95%	<95%	125.0%	108.62	<95%	overload due to insertion of Fort Rock series capacitors. Case diverges if they are not inserted, 2700 MW NW was tripped by RAS in 2022 and 2027, 2400 MW in 2019. Discuss with BPA as affected system
Grizzly-Malin 500kV (Fort Rock series caps)	PDCI bi-pole	P7	PDCI	100.7%	107.8%	<95%	<95%	<95%	<95%	<95%	107.1%	<95%	<95%	

Study Area: **PG&E Bulk**

Voltage Deviations



ID	Substation	Worst Contingency	Category	Category Description	Post Cont. Voltage Deviation %										Potential Mitigation Solutions
					2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2027 Summer Partial Peak	2019 Light Spring	2022 Spring Off-peak	2027 Spring Off-peak	2022 Summer Peak, High renew	2027 Summer Peak shift	2022 Spring Off-peak, max PV	
	NONE														
	OLINDA 500 kV	Round Mtn-Table Mtn # 1 and #2 500 kV	p7	L-2	<8%	<8%	<8%	<8%	<8%	<8%	<8%	10.9%	<8%	<8%	
	reactive margin	Paloverde units # 1 and 2	extreme	G-2	sufficient	sufficient	sufficient	sufficient	sufficient	sufficient	sufficient	insufficient	sufficient	sufficient	consider installing dynamic reactive device at Round Mtn
	reactive margin	Diablo units # 1 and 2	extreme	G-2	sufficient	sufficient	sufficient	sufficient	sufficient	sufficient	sufficient	insufficient	sufficient	sufficient	
	reactive margin	PDCI bi-pole	P7	DC	sufficient	sufficient	sufficient	sufficient	sufficient	sufficient	sufficient	insufficient	sufficient	sufficient	insert series capacitors at Ponderosa-Summer Lake 500 kV



Substation	Worst Contingency	Category	Category Description	Voltage (kV)										Potential Mitigation Solutions	
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2027 Summer Partial Peak	2019 Light Spring	2022 Spring Off-peak	2027 Spring Off-peak	2022 Summer Peak, High renew	2027 Summer Peak shift	2022 Spring Off-peak, max PV		
Diablo 500kV	normal conditions and all contingencies	P0-P7	normal & outages			>=549 kV - 552.2 (LB 500/230)	540						>=550 kV		consider installing shunt reactor or dynamic reactive device on Diablo or Gates 500 kV after Diablo Canyon plant retires and opening one of the Diablo-Midway 500kV lines
Diablo 500kV	normal conditions and all contingencies	P0-P7	normal & outages			553 (LB 500/230&Gates 500/230 or Moss 500/230)		up to 558 kV w/ Diablo1&2 out	>=543 kV norm 552 kV conting	>=544					
Midway 500 kV	normal conditions and all contingencies	P0-P7	normal & outages			>=540 kV							>=540 kV		
Gates 500 kV	normal conditions and all contingencies	P0-P7	normal & outages			>=545 kV		>=545					>=545 kV		
Gates 500 kV	contingencies	P0-P7	normal & outages					up to 553 kV					up to 552 kV		
Tracy 500 kV	normal conditions and all contingencies	P0-P7	normal & outages					>=544							
Tesla 500 kV	normal conditions and all contingencies	P0-P7	normal & outages					>=543							
Los Banos 500 kV	normal conditions and all contingencies	P0-P7	normal & outages					>=544							
Maxwell 500 kV	normal conditions and all contingencies	P0-P7	normal & outages					>=544					>=546		consider installing shunt reactor or dynamic reactive device on 500 kV in North PG&E
Maxwell 500 kV	Loss of one Diablo unit	P3	G-1			N/A	N/A	up to 555 kV	552 kV	N/A			up to 557 kV		
Maxwell 500 kV	Loss of one Diablo unit & line or x-former	P3	G-1/L-1, or T-1			N/A	N/A	up to 557 kV	up to 555 kV	N/A			up to 557 kV		
Vaca Dixon 500 kV	normal conditions and all contingencies	P0-P7	normal & outages					>=543							
Table Mtn 500 kV	normal conditions and all contingencies	P0-P7	normal & outages					>=542							
Round Mtn 500 kV	normal conditions and all contingencies	P0-P7	normal & outages					>=541							
Alameda 115 kV	normal conditions	P0	normal & outages			up to 128.6 kV		up to 146.3 kV					up to 132.2 kV	mitigation in area studies	
Cortina 115 kV system	normal conditions	P0	normal & outages			up to 123.5 kV		up to 124.6 kV						mitigation in area studies	
Plain field 60 kV (Winters area)	normal conditions	P0	normal & outages			53.8 kV								mitigation in area studies, requires moving some load to other substations	
500 kV buses in NW	normal conditions and all contingencies	P0-P7	normal & outages					up to 552 kV	up to 549 kV norm, 555 kV conting				up to 556 kV	reduce or turn off PDCI to increase COI North to South flow in part peak, turn on all available reactors in off peak	
230, 115 and 60-70 kV in PG&E	normal conditions and all contingencies	P0-P7	normal & outages					up to 1.277 p.u					up to 1.095 p.u.	mitigation in area studies	



Generator/Load	Contingency	Category	Category Description	Transient Stability Performance									Potential Mitigation Solutions	
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2027 Summer Partial Peak	2019 Light Spring	2022 Spring Off-peak	2027 Spring Off-peak	2022 Summer Peak, High renew	2027 Summer Peak shift		2022 Spring Off-peak, max PV
No violations if stalling of single phase air conditioners is disabled														need to develop more accurate load models
Delayed voltage recovery on the buses close to three phase faults with stalling of single phase air conditioners enabled														need to clarify criteria for transient voltage recovery
Voltages on all BES buses recovered to 80% of initial voltage for all buses and all contingencies														
32510 CHILI BAR, hydro	Tracy-Tesla and Tracy-Los Banos 500 kV	P7	L-2	tripped for under-excitation after 11 sec, 5.5 MW	not tripped, 5.5 MW	not tripped, 5.5 MW	not tripped, 5.5 MW	not tripped, 5.5 MW	not tripped, 7 MW	not tripped, 7 MW	not tripped, 5.5 MW	not tripped, 7 MW	not tripped, 3.3 kV	where tripped, high voltage in the base case, absorbs reactive power, went out-of-step
	Tesla-Metcalf 500 kV	P1	L-1											
	Tesla-Los Banos 500 kV	P1	L-1											
	Tracy-Los Banos 500 kV	P1	L-1											
	Tracy-Tesla 500 kV	P1	L-1											
	Tracy 500/230 kV	P1	T-1											
	Tesla 500/230 kV	P1	T-1											
3phase faults on Tesla or Tracy	P6	L-1/L-1												
PV on bus 365554 on Midway-Wheelridge 230 kV	3phase fault on Midway 500 kV	P1-P7	any	tripped w/fault for high voltage, 25.1 MW	tripped w/fault for high voltage, 25.1 MW	tripped w/fault for high voltage, 25.1 MW	modeled off-line	modeled off-line	tripped w/fault for high voltage, 25.1 MW	tripped w/fault for high voltage, 25.1 MW	tripped w/fault for high voltage, 25.1 MW	tripped w/fault for high voltage, 25.1 MW	tripped w/fault for high voltage, 25.1 MW	possibly numerical issue,
PV on bus 365534 connected to Gates 230 kV	3phase fault on Midway 500 kV	P1-P7	any	modeled off-line	tripped w/fault for high voltage, 37.6 MW	tripped w/fault for high voltage, 37.6 MW	modeled off-line	modeled off-line	tripped w/fault for high voltage, 37.6 MW	tripped w/fault for high voltage, 37.6 MW	tripped w/fault for high voltage, 37.6 MW	tripped w/fault for high voltage, 37.6 MW	tripped w/fault for high voltage, 37.6 MW	possibly numerical issue,
	3phase fault on Los Banos, Gates or Tesla 500 kV	P1-7	any											
PV bus 365539 on Gardner-Maricopa 70 kV	3phase fault at Midway 500 kV	P1-P7	any	tripped w/fault for high voltage, 5 MW	tripped w/fault for high voltage, 5.1 MW	tripped w/fault for high voltage, 5.1 MW	modeled off-line	modeled off-line	tripped w/fault for high voltage, 5.1 MW	tripped w/fault for high voltage, 5.1 MW	tripped w/fault for high voltage, 5.1 MW	tripped w/fault for high voltage, 5.1 MW	tripped w/fault for high voltage, 5.1 MW	numerical issue, high voltags in the base case
33102 COLUMBIA , solar PV	Tesla-Los Banos 500 kV	P1	L-1	tripped for high volt, 4.8 MW	not tripped, 4.8 MW	not tripped, 4.8 MW	not tripped, 4.8 MW	modeled off-line	not tripped, 19.2MW	not tripped, 19.2MW	not tripped, 19.2MW	not tripped, 1.3MW	not tripped, 17 MW	high voltages in the base case, need to turn off shunt capacitor
	Tracy-Los Banos 500 kV	P1	L-1											
	Tracy-Tesla 500 kV	P1	L-1											
	Tracy 500/230 kV	P1	T-1											
	Tesla 500/230 kV	P1	T-1											
	Vaca Dix 500/230kV	P1	T-1											
3phase faults on Vaca Dix	P1	T-1												
32700 Monticello, hydro	Tesla-Los Banos 500 kV	P1	L-1	tripped for under-excitation, 1.5 MW	tripped for under-excitation, 1.5 MW	tripped for under-excitation, 1.5 MW	tripped for under-excitation, 1.5 MW	not tripped, 1.5 MW	not tripped, 1.5 MW	not tripped, 1.5 MW	not tripped, 1.5 MW	not tripped, 1.5 MW	not tripped, 3.4 MW	small units, possible modeling error
	Tesla 500/230 kV	P1	T-1											
	Tracy 500/230 kV	P1	T-1											
	Tesla-Metcalf 500 kV	P1	L-1											
	Tracy-Tesla 500 kV	P1	L-1											
	Vaca Dix 500/230kV	P1	T-1											
3phase faults on Tesla or Vaca Dix	P6	L-1/L-1												
365502 Solar PV at HELM 70 kV	3phase fault on LOSBANOS 500 kV	P1-P7	any	not tripped, 5MW	not tripped, 5MW	not tripped, 5MW	modeled off-line	modeled off-line	not tripped, 20 MW	not tripped, 20 MW	not tripped, 20 MW	not tripped, 1.4 MW	tripped for high voltage with fault, 9 MW	possibly numerical issue,
				Transient Stability Performance										
Generator/Load	Contingency	Category	Category Description	2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2027 Summer Partial Peak	2019 Light Spring	2022 Spring Off-peak	2027 Spring Off-peak	2022 Summer Peak, High renew	2027 Summer Peak shift	2022 Spring Off-peak, max PV	Potential Mitigation Solutions

Study Area: **PG&E Bulk**

Single Contingency Load Drop



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

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

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

No single source substation with more than 100 MW Load

Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading % (Baseline Scenarios)								Loading % (Sensitivity Scenarios)					Project & Potential Mitigation Solutions
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Winter Peak	2022 Winter Peak	2027 Winter Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022 SP High CEC Forecast	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations	
31000 HUMBOLDT 115 31452 TRINITY 115 1 1	P1-1:A1:2:_BLUELKPP 12.47KV GEN UNIT 1 & P1-2:A1:4:_BRIDGEVILLE-COTTONWOOD 115KV [1110]	P3	G-1/N-1	<90	<90	<90	<90	<90	103	<90	<90	<90	<90	<90	<90	<90	System upgrade or preferred resource
	P1-2:A1:1:_HUMBOLDT BAY-HUMBOLDT #2 115KV [7090] & P1-2:A1:4:_BRIDGEVILLE-COTTONWOOD 115KV [1110]	P6	N-1-1	<90	<90	92	NConv	<90	NConv	<90	<90	101	<90	100	<90	96	Severe voltage issue
	P1-2:A1:4:_BRIDGEVILLE-COTTONWOOD 115KV [1110] & P1-2:A1:1:_HUMBOLDT BAY-HUMBOLDT #2 115KV [7090]	P6	N-1-1	<90	<90	92	NConv	NConv	NConv	<90	<90	101	<90	100	<90	99	Severe voltage issue
31080 HUMBOLDT 60.0 31088 HMBLT JT 60.0 1 1	P2-3:A1:9:_HMBLT BY 60KV - MIDDLE BREAKER BAY 3	P2	Non-bus-tie breaker	12	17	9	7	47	8	105	113	8	16	8	46	10	System upgrade or preferred resource
	P7-1:A1:2:_HUMBOLDT BAY-HUMBOLDT #1 & HUMBOLDT BAY-HUMBOLDT #2 LINES	P7	DCTL	24	25	48	38	22	44	100	97	54	23	54	23	55	System upgrade or preferred resource
31084 HARRISST 60.0 31086 EUREKA 60.0 1 1	P1-2:A1:13:_HUMBOLDT BAY-HUMBOLDT #2 60KV [7090] & P1-2:A1:12:_HUMBOLDT BAY-HUMBOLDT #1 60KV [7080]	P6	N-1-1	<90	<90	100	<90	<90	89	81	67	100	<90	100	<90	<90	System upgrade or preferred resource
	P2-3:A1:10:_HMBLT BY 60KV - MIDDLE BREAKER BAY 4	P2	Non-bus-tie breaker	110	111	117	83	79	93	44	36	123	112	123	89	119	Short Term : Action Plan ; Long Term : Preferred resource
31086 EUREKA 60.0 31090 HMBLT BY 60.0 1 1	P1-2:A1:12:_HUMBOLDT BAY-HUMBOLDT #1 60KV [7080] & P1-2:A1:13:_HUMBOLDT BAY-HUMBOLDT #2 60KV [7090]	P6	N-1-1	<90	<90	<90	<90	<90	<90	99	100	<90	<90	<90	<90	<90	System upgrade or preferred resource
	P2-1:A1:14:_HUMBOLDT BAY-EUREKA 60KV [7070] (HUMBOLDT-HARRIS)	P2	Line section w/o fault	92	89	90	71	67	71	37	63	108	92	101	60	91	Sensitivity only
31090 HMBLT BY 60.0 31100 EEL RIVR 60.0 1 1	P2-2:A1:1:_HUMBOLDT 115KV SECTION MA	P2	Bus	54	50	62	NConv	36	NConv	140	133	NConv	58	NConv	52	NConv	Bridgeville - Garberville Revised Scope
	P2-3:A1:1:_HUMBOLDT - MA 115KV & HUMBOLDT-TRINITY LINE	P2	Non-bus-tie breaker	70	64	90	NConv	35	NConv	150	143	NConv	76	NConv	50	NConv	Bridgeville - Garberville Revised Scope
31091 RDGE CBN 60.0 31093 HYPOMJT 60.0 1 1	P1-2:A1:3:_HUMBOLDT-TRINITY 115KV [1820] & P1-2:A1:4:_BRIDGEVILLE-COTTONWOOD 115KV [1110]	P6	N-1-1	<90	<90	<90	<90	<90	<90	46	<90	NConv	<90	<90	<90	<90	Sensitivity only
31100 EEL RIVR 60.0 31102 NEWBURG 60.0 1 1	P2-2:A1:1:_HUMBOLDT 115KV SECTION MA	P2	Bus	46	45	56	NConv	14	NConv	104	95	NConv	53	NConv	27	NConv	Severe voltage issue
	P2-3:A1:1:_HUMBOLDT - MA 115KV & HUMBOLDT-TRINITY LINE	P2	Non-bus-tie breaker	61	57	78	NConv	16	NConv	113	103	NConv	68	NConv	26	NConv	Severe voltage issue
31102 NEWBURG 60.0 31105 RIODLLTP 60.0 1 1	P2-2:A1:1:_HUMBOLDT 115KV SECTION MA	P2	Bus	76	74	95	NConv	19	NConv	133	113	NConv	85	NConv	18	NConv	Severe voltage issue
	P2-3:A1:1:_HUMBOLDT - MA 115KV & HUMBOLDT-TRINITY LINE	P2	Non-bus-tie breaker	95	91	127	NConv	27	NConv	145	125	NConv	106	NConv	17	NConv	Severe voltage issue
31104 CARLOTTA 60.0 31105 RIODLLTP 60.0 1 1	P2-2:A1:1:_HUMBOLDT 115KV SECTION MA	P2	Bus	93	84	108	NConv	30	NConv	122	104	NConv	96	NConv	9	NConv	Severe voltage issue
	P2-3:A1:1:_HUMBOLDT - MA 115KV & HUMBOLDT-TRINITY LINE	P2	Non-bus-tie breaker	113	102	140	NConv	38	NConv	133	115	NConv	117	NConv	7	NConv	Severe voltage issue

Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading % (Baseline Scenarios)								Loading % (Sensitivity Scenarios)					Project & Potential Mitigation Solutions
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Winter Peak	2022 Winter Peak	2027 Winter Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022 SP High CEC Forecast	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations	
31104 CARLOTTA 60.0 31108 SWNS FLT 60.0 1 1	P1-3:A1:1:_HUMBOLDT 115/60KV TB 2 & P1-3:A1:4:_HUMBOLDT 115/60KV TB 1	P6	N-1-1	98	95	102	NConv	102	NConv	79	68	100	101	100	<90	98	Severe voltage issue
	P2-2:A1:1:_HUMBOLDT 115KV SECTION MA	P2	Bus	98	88	111	NConv	34	NConv	120	102	NConv	100	NConv	10	NConv	Severe voltage issue
	P2-3:A1:1:_HUMBOLDT - MA 115KV & HUMBOLDT-TRINITY LINE	P2	Non-bus-tie breaker	118	105	143	NConv	42	NConv	131	113	NConv	120	NConv	10	NConv	Severe voltage issue
31108 SWNS FLT 60.0 31110 BRDGVILLE 60.0 1 1	P1-3:A1:1:_HUMBOLDT 115/60KV TB 2 & P1-3:A1:4:_HUMBOLDT 115/60KV TB 1	P6	N-1-1	98	95	102	NConv	102	NConv	79	67	100	101	100	<90	98	Severe voltage issue
	P2-2:A1:1:_HUMBOLDT 115KV SECTION MA	P2	Bus	98	88	111	NConv	34	NConv	119	102	NConv	100	NConv	9	NConv	Severe voltage issue
	P2-3:A1:1:_HUMBOLDT - MA 115KV & HUMBOLDT-TRINITY LINE	P2	Non-bus-tie breaker	118	105	143	NConv	42	NConv	130	113	NConv	120	NConv	9	NConv	Severe voltage issue
31116 GRBRVILLE 60.0 31118 KEKAWAKA 60.0 1 1	P1-2:A1:15:_HUMBOLDT BAY-RIO DELL JCT 60KV [7100] & P1-3:A1:3:_BRDGVILLE 115/60KV TB 1	P6	N-1-1	100	<90	<90	<90	<90	<90	<90	<90	90	<90	<90	<90	<90	Significant leading power factor in 2019 [0.7]
	P1-3:A1:3:_BRDGVILLE 115/60KV TB 1 & P1-2:A1:15:_HUMBOLDT BAY-RIO DELL JCT 60KV [7100]	P6	N-1-1	101	<90	<90	<90	<90	<90	<90	<90	<90	<90	<90	<90	<90	Significant leading power factor in 2019 [0.7]
31120 FRUTLDJT 60.0 31122 FTSWRDJT 60.0 1 1	P1-2:A1:4:_BRIDGEVILLE-COTTONWOOD 115KV [1110] & P1-2:A1:3:_HUMBOLDT-TRINITY 115KV [1820]	P6	N-1-1	<90	<90	<90	<90	<90	<90	98	101	<90	<90	<90	92	<90	System upgrade or preferred resource



Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)								Voltage PU (Sensitivity Scenarios)					Project & Potential Mitigation Solutions
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Winter Peak	2022 Winter Peak	2027 Winter Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022 SP High CEC Forecast	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations	
BIG_LAGN 60 kV	Base Case	P0	N-0	1.05	1.03	1.03	1.01	1.02	1.01	1.05	1.03	1.01	1.03	1.02	1.03	1.01	Load power factor correction and voltage support if needed
BRDGVILLE 115 kV	Base Case	P0	N-0	1.05	1.04	1.04	1.03	1.04	1.03	1.06	1.07	1.02	1.04	1.03	1.04	1.03	Load power factor correction and voltage support if needed
HMBLDT B 115 kV	Base Case	P0	N-0	1.05	1.04	1.04	1.03	1.04	1.03	1.07	1.09	1.03	1.04	1.03	1.05	1.03	Load power factor correction and voltage support if needed
HOOPA 60 kV	Base Case	P0	N-0	0.96	0.96	0.96	0.96	0.98	0.97	1.02	1.01	0.94	0.96	0.95	0.98	0.97	Load power factor correction and voltage support if needed
HUMB_BS1 115 kV	Base Case	P0	N-0	1.05	1.04	1.04	1.03	1.04	1.03	1.07	1.09	1.03	1.04	1.03	1.05	1.03	Load power factor correction and voltage support if needed
HUMBOLDT 115 kV	Base Case	P0	N-0	1.05	1.04	1.04	1.03	1.05	1.03	1.07	1.09	1.03	1.05	1.03	1.06	1.03	Load power factor correction and voltage support if needed
LOW GAP1 115 kV	Base Case	P0	N-0	1.05	1.04	1.04	1.03	1.04	1.03	1.06	1.07	1.03	1.04	1.03	1.04	1.03	Load power factor correction and voltage support if needed
ORICK 60 kV	Base Case	P0	N-0	1.05	1.03	1.03	1.00	1.02	1.01	1.05	1.03	1.01	1.02	1.02	1.03	1.01	Load power factor correction and voltage support if needed
HOOPA 60 kV	P1-1:A1:10:_HUMB_G2 13.80KV GEN UNIT 7 & P1-2:A1:4:_BRIDGEVILLE-COTTONWOOD 115KV [1110]	P3	G-1/N-1	>0.9	>0.9	>0.9	>0.9	>0.9	0.89	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	Load power factor correction and voltage support if needed
HOOPA 60 kV	P1-1:A1:9:_HUMB_G2 13.80KV GEN UNIT 6 & P1-2:A1:4:_BRIDGEVILLE-COTTONWOOD 115KV [1110]	P3	G-1/N-1	>0.9	>0.9	>0.9	>0.9	>0.9	0.89	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	Load power factor correction and voltage support if needed
HUMBOLDT 115 kV	P1-1:A1:10:_HUMB_G2 13.80KV GEN UNIT 7 & P1-2:A1:4:_BRIDGEVILLE-COTTONWOOD 115KV [1110]	P3	G-1/N-1	<1.05	<1.05	<1.05	<1.05	<1.05	0.89	<1.05	1.12	<1.05	<1.05	<1.05	<1.05	<1.05	Load power factor correction and voltage support if needed
HUMBOLDT 115 kV	P1-1:A1:4:_HUMB_G1 13.80KV GEN UNIT 1 & P1-2:A1:11:_HUMBOLDT BAY-EUREKA 60KV [7070]	P3	G-1/N-1	<1.05	<1.05	<1.05	<1.05	<1.05	<1.05	<1.05	1.12	<1.05	1.10	<1.05	1.11	<1.05	Load power factor correction and voltage support if needed
HUMBOLDT 115 kV	P1-1:A1:4:_HUMB_G1 13.80KV GEN UNIT 1 & P1-2:A1:2:_HUMBOLDT-BRIDGEVILLE 115KV [1810]	P3	G-1/N-1	<1.05	<1.05	<1.05	<1.05	<1.05	<1.05	1.10	1.15	<1.05	<1.05	<1.05	1.12	<1.05	Load power factor correction and voltage support if needed
HUMBOLDT 115 kV	P1-1:A1:4:_HUMB_G1 13.80KV GEN UNIT 1 & P1-2:A1:4:_BRIDGEVILLE-COTTONWOOD 115KV [1110]	P3	G-1/N-1	<1.05	<1.05	<1.05	<1.05	<1.05	0.88	<1.05	1.13	<1.05	<1.05	<1.05	<1.05	<1.05	Load power factor correction and voltage support if needed
WILLWCRK 60 kV	P1-1:A1:4:_HUMB_G1 13.80KV GEN UNIT 1 & P1-2:A1:4:_BRIDGEVILLE-COTTONWOOD 115KV [1110]	P3	G-1/N-1	>0.9	>0.9	>0.9	>0.9	>0.9	0.90	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	Load power factor correction and voltage support if needed
ARCATA 60 kV	P1-3:A1:5:_FPC 60/13.8KV TB 1 & P1-3:A1:2:_HUMB_BS1 115/13.8KV TB 1	P6	N-1-1	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	0.86	>0.9	>0.9	>0.9	>0.9	Voltage support, UVLS and/ or SPS
ARCATA 60 kV	P1-4:A1:1:_HUMBOLDT SHUNT=7H & P1-2:A1:10:_FAIRHAVEN #1 60KV [6850]	P6	N-1-1	>0.9	>0.9	>0.9	>0.9	>0.9	0.88	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	Voltage support, UVLS and/ or SPS



Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)								Voltage PU (Sensitivity Scenarios)					Project & Potential Mitigation Solutions	
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Winter Peak	2022 Winter Peak	2027 Winter Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022 SP High CEC Forecast	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations		
BCHIPMIL 60 kV	P1-2:A1:10:_FAIRHAVEN #1 60KV [6850] & P1-2:A1:1:_HUMBOLDT BAY-HUMBOLDT #2 115KV [7090]	P6	N-1-1	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	0.86	>0.9	>0.9	>0.9	>0.9	Voltage support, UVLS and/ or SPS
BIG_LAGN 60 kV	P1-2:A1:10:_FAIRHAVEN #1 60KV [6850] & P1-2:A1:1:_HUMBOLDT BAY-HUMBOLDT #2 115KV [7090]	P6	N-1-1	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	0.87	>0.9	>0.9	>0.9	>0.9	Voltage support, UVLS and/ or SPS
BIG_LAGN 60 kV	P1-2:A1:10:_FAIRHAVEN #1 60KV [6850] & P1-3:A1:2:_HUMB_BS1 115/13.8KV TB 1	P6	N-1-1	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	0.89	>0.9	>0.9	>0.9	>0.9	Voltage support, UVLS and/ or SPS
BIG_LAGN 60 kV	P1-4:A1:11:_HUMBOLDT SVD=V & P1-2:A1:2:_HUMBOLDT-BRIDGEVILLE 115KV [1810]	P6	N-1-1	1.10	<1.05	<1.05	<1.05	<1.05	<1.05	<1.05	<1.05	<1.05	<1.05	<1.05	<1.05	<1.05	<1.05	Voltage support, UVLS and/ or SPS
BLUE LKE 60 kV	P1-2:A1:10:_FAIRHAVEN #1 60KV [6850] & P1-2:A1:1:_HUMBOLDT BAY-HUMBOLDT #2 115KV [7090]	P6	N-1-1	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	0.87	>0.9	>0.9	>0.9	>0.9	Voltage support, UVLS and/ or SPS
BLUE LKE 60 kV	P1-2:A1:10:_FAIRHAVEN #1 60KV [6850] & P1-3:A1:2:_HUMB_BS1 115/13.8KV TB 1	P6	N-1-1	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	0.88	>0.9	>0.9	>0.9	>0.9	Voltage support, UVLS and/ or SPS
BLUE LKE 60 kV	P1-3:A1:5:_FPC 60/13.8KV TB 1 & P1-2:A1:1:_HUMBOLDT BAY-HUMBOLDT #2 115KV [7090]	P6	N-1-1	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	0.87	>0.9	>0.9	>0.9	>0.9	Voltage support, UVLS and/ or SPS
BRDGVLE 60 kV	P1-3:A1:3:_BRDGVLE 115/60KV TB 1 & P1-2:A1:15:_HUMBOLDT BAY-RIO DELL JCT 60KV [7100]	P6	N-1-1	>0.9	0.46	0.50	0.45	0.44	0.45	>0.9	0.86	0.48	0.52	0.48	0.56	0.43	Voltage support, UVLS and/ or SPS	
BRDGVLE 60 kV	P1-4:A1:11:_HUMBOLDT SVD=V & P1-2:A1:15:_HUMBOLDT BAY-RIO DELL JCT 60KV [7100]	P6	N-1-1	1.11	<1.05	<1.05	<1.05	<1.05	<1.05	<1.05	<1.05	<1.05	<1.05	<1.05	<1.05	<1.05	<1.05	Voltage support, UVLS and/ or SPS
BRDGVLE 115 kV	P1-2:A1:10:_FAIRHAVEN #1 60KV [6850] & P1-2:A1:1:_HUMBOLDT BAY-HUMBOLDT #2 115KV [7090]	P6	N-1-1	>0.9	>0.9	>0.9	0.87	>0.9	0.87	>0.9	>0.9	>0.9	0.81	>0.9	>0.9	>0.9	>0.9	Voltage support, UVLS and/ or SPS
BRDGVLE 115 kV	P1-4:A1:10:_GRBRVLE SVD=V & P1-2:A1:4:_BRIDGEVILLE-COTTONWOOD 115KV [1110]	P6	N-1-1	<1.05	<1.05	<1.05	<1.05	<1.05	0.87	1.14	1.15	<1.05	<1.05	<1.05	1.11	<1.05	Voltage support, UVLS and/ or SPS	
BRDGVLE 115 kV	P1-4:A1:10:_GRBRVLE SVD=V & P1-3:A1:5:_FPC 60/13.8KV TB 1	P6	N-1-1	<1.05	<1.05	<1.05	<1.05	<1.05	<1.05	1.12	<1.05	<1.05	<1.05	<1.05	<1.05	<1.05	<1.05	Voltage support, UVLS and/ or SPS
CARLOTTA 60 kV	P1-2:A1:15:_HUMBOLDT BAY-RIO DELL JCT 60KV [7100] & P1-3:A1:3:_BRDGVLE 115/60KV TB 1	P6	N-1-1	>0.9	0.45	0.45	0.41	0.41	0.39	>0.9	>0.9	>0.9	0.45	0.48	0.42	0.49	0.39	Voltage support, UVLS and/ or SPS
EUREKA 60 kV	P1-2:A1:10:_FAIRHAVEN #1 60KV [6850] & P1-2:A1:1:_HUMBOLDT BAY-HUMBOLDT #2 115KV [7090]	P6	N-1-1	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	0.83	>0.9	>0.9	>0.9	>0.9	Voltage support, UVLS and/ or SPS



Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)								Voltage PU (Sensitivity Scenarios)					Project & Potential Mitigation Solutions		
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Winter Peak	2022 Winter Peak	2027 Winter Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022 SP High CEC Forecast	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations			
EUREKA 60 kV	P1-2:A1:10:_FAIRHAVEN #1 60KV [6850] & P1-3:A1:2:_HUMB_BS1 115/13.8KV TB 1	P6	N-1-1	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	0.84	>0.9	>0.9	>0.9	>0.9	Voltage support, UVLS and/ or SPS
EUREKA 60 kV	P1-4:A1:1:_HUMBOLDT SHUNT=7H & P1-2:A1:10:_FAIRHAVEN #1 60KV [6850]	P6	N-1-1	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	0.87	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	0.87	Voltage support, UVLS and/ or SPS
EUREKA 60 kV	P1-4:A1:1:_HUMBOLDT SHUNT=7H & P1-3:A1:5:_FPC 60/13.8KV TB 1	P6	N-1-1	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	0.87	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	0.87	Voltage support, UVLS and/ or SPS
EUREKA 60 kV	P1-4:A1:11:_HUMBOLDT SVD=V & P1-2:A1:2:_HUMBOLDT-BRIDGEVILLE 115KV [1810]	P6	N-1-1	1.10	<1.05	<1.05	<1.05	<1.05	<1.05	<1.05	<1.05	<1.05	<1.05	<1.05	<1.05	<1.05	<1.05	<1.05	Voltage support, UVLS and/ or SPS
FAIRHAVN 60 kV	P1-2:A1:10:_FAIRHAVEN #1 60KV [6850] & P1-2:A1:1:_HUMBOLDT BAY-HUMBOLDT #2 115KV [7090]	P6	N-1-1	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	0.85	>0.9	>0.9	>0.9	>0.9	Voltage support, UVLS and/ or SPS
FAIRHAVN 60 kV	P1-2:A1:10:_FAIRHAVEN #1 60KV [6850] & P1-3:A1:2:_HUMB_BS1 115/13.8KV TB 1	P6	N-1-1	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	0.86	>0.9	>0.9	>0.9	>0.9	Voltage support, UVLS and/ or SPS
FAIRHAVN 60 kV	P1-4:A1:1:_HUMBOLDT SHUNT=7H & P1-2:A1:10:_FAIRHAVEN #1 60KV [6850]	P6	N-1-1	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	0.88	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	Voltage support, UVLS and/ or SPS
FAIRHAVN 60 kV	P1-4:A1:1:_HUMBOLDT SHUNT=7H & P1-3:A1:5:_FPC 60/13.8KV TB 1	P6	N-1-1	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	0.88	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	Voltage support, UVLS and/ or SPS
FRUITLND 60 kV	P1-2:A1:15:_HUMBOLDT BAY-RIO DELL JCT 60KV [7100] & P1-3:A1:3:_BRDGVILLE 115/60KV TB 1	P6	N-1-1	>0.9	0.57	0.56	0.52	0.52	0.50	>0.9	>0.9	0.55	0.58	0.53	0.61	0.50	>0.9	>0.9	Voltage support, UVLS and/ or SPS
FRUITLND 60 kV	P1-4:A1:10:_GRBRVILLE SVD=V & P1-2:A1:20:_GARBERVILLE-LAYTONVILLE 60KV [8365]	P6	N-1-1	1.13	<1.05	<1.05	<1.05	<1.05	<1.05	<1.05	<1.05	<1.05	<1.05	<1.05	<1.05	<1.05	<1.05	<1.05	Voltage support, UVLS and/ or SPS
FRUITLND 60 kV	P1-4:A1:10:_GRBRVILLE SVD=V & P1-2:A1:4:_BRIDGEVILLE-COTTONWOOD 115KV [1110]	P6	N-1-1	<1.05	<1.05	<1.05	<1.05	<1.05	<1.05	<1.05	1.13	1.11	<1.05	<1.05	<1.05	<1.05	<1.05	<1.05	Voltage support, UVLS and/ or SPS
GRBRVILLE 60 kV	P1-3:A1:3:_BRDGVILLE 115/60KV TB 1 & P1-2:A1:15:_HUMBOLDT BAY-RIO DELL JCT 60KV [7100]	P6	N-1-1	>0.9	0.59	0.62	0.58	0.57	0.57	>0.9	>0.9	0.59	0.63	0.59	0.68	0.56	>0.9	>0.9	Voltage support, UVLS and/ or SPS
GRBRVILLE 60 kV	P1-4:A1:10:_GRBRVILLE SVD=V & P1-2:A1:15:_HUMBOLDT BAY-RIO DELL JCT 60KV [7100]	P6	N-1-1	1.13	<1.05	<1.05	<1.05	<1.05	<1.05	<1.05	1.16	<1.05	<1.05	<1.05	<1.05	<1.05	<1.05	<1.05	Voltage support, UVLS and/ or SPS
GRBRVILLE 60 kV	P1-4:A1:10:_GRBRVILLE SVD=V & P1-2:A1:20:_GARBERVILLE-LAYTONVILLE 60KV [8365]	P6	N-1-1	1.20	<1.05	<1.05	<1.05	<1.05	1.16	<1.05	<1.05	<1.05	<1.05	<1.05	<1.05	<1.05	<1.05	<1.05	Voltage support, UVLS and/ or SPS



Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)								Voltage PU (Sensitivity Scenarios)					Project & Potential Mitigation Solutions	
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Winter Peak	2022 Winter Peak	2027 Winter Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022 SP High CEC Forecast	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations		
GRBRVLE 60 kV	P1-4:A1:10:_GRBRVLE SVD=V & P1-2:A1:4:_BRIDGEVILLE-COTTONWOOD 115KV [1110]	P6	N-1-1	<1.05	<1.05	<1.05	<1.05	<1.05	<1.05	<1.05	1.16	1.15	<1.05	<1.05	<1.05	<1.05	<1.05	Voltage support, UVLS and/ or SPS
HARRIS 60 kV	P1-3:A1:5:_FPC 60/13.8KV TB 1 & P1-3:A1:2:_HUMB_BS1 115/13.8KV TB 1	P6	N-1-1	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	0.85	>0.9	>0.9	>0.9	>0.9	Voltage support, UVLS and/ or SPS
HARRIS 60 kV	P1-4:A1:1:_HUMBOLDT SHUNT=7H & P1-2:A1:10:_FAIRHAVEN #1 60KV [6850]	P6	N-1-1	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	0.88	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	0.88	Voltage support, UVLS and/ or SPS
HOOPA 60 kV	P1-3:A1:5:_FPC 60/13.8KV TB 1 & P1-2:A1:1:_HUMBOLDT BAY-HUMBOLDT #2 115KV [7090]	P6	N-1-1	>0.9	>0.9	>0.9	0.86	>0.9	0.86	>0.9	>0.9	>0.9	0.74	>0.9	>0.9	>0.9	0.86	Voltage support, UVLS and/ or SPS
HOOPA 60 kV	P1-4:A1:1:_HUMBOLDT SHUNT=7H & P1-2:A1:10:_FAIRHAVEN #1 60KV [6850]	P6	N-1-1	>0.9	>0.9	>0.9	>0.9	>0.9	0.81	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	0.81	Voltage support, UVLS and/ or SPS
HUMB_BS1 115 kV	P1-1:A1:4:_HUMB_G1 13.80KV GEN UNIT 1 & P1-2:A1:4:_BRIDGEVILLE-COTTONWOOD 115KV [1110]	P6	N-1-1	<1.05	<1.05	<1.05	<1.05	<1.05	0.89	<1.05	1.13	<1.05	<1.05	<1.05	<1.05	<1.05	<1.05	Voltage support, UVLS and/ or SPS
HUMB_BS1 115 kV	P1-2:A1:2:_HUMBOLDT-BRIDGEVILLE 115KV [1810] & P1-2:A1:11:_HUMBOLDT BAY-EUREKA 60KV [7070]	P6	N-1-1	<1.05	1.13	1.12	<1.05	<1.05	<1.05	<1.05	1.15	1.17	1.12	1.16	1.14	1.13	<1.05	Voltage support, UVLS and/ or SPS
HUMB_BS1 115 kV	P1-2:A1:5:_ESSEX JCT-ORICK 60KV [6810] & P1-2:A1:4:_BRIDGEVILLE-COTTONWOOD 115KV [1110]	P6	N-1-1	>0.9	>0.9	>0.9	>0.9	>0.9	0.87	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	0.87	Voltage support, UVLS and/ or SPS
HUMBOLDT 60 kV	P1-4:A1:11:_HUMBOLDT SVD=V & P1-2:A1:2:_HUMBOLDT-BRIDGEVILLE 115KV [1810]	P6	N-1-1	1.11	<1.05	<1.05	<1.05	<1.05	<1.05	<1.05	<1.05	<1.05	<1.05	<1.05	<1.05	<1.05	<1.05	Voltage support, UVLS and/ or SPS
MPLE CRK 60 kV	P1-3:A1:5:_FPC 60/13.8KV TB 1 & P1-2:A1:1:_HUMBOLDT BAY-HUMBOLDT #2 115KV [7090]	P6	N-1-1	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	0.82	>0.9	>0.9	>0.9	>0.9	Voltage support, UVLS and/ or SPS
MPLE CRK 60 kV	P1-4:A1:1:_HUMBOLDT SHUNT=7H & P1-2:A1:10:_FAIRHAVEN #1 60KV [6850]	P6	N-1-1	>0.9	>0.9	>0.9	>0.9	>0.9	0.86	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	0.86	Voltage support, UVLS and/ or SPS
NEWBURG 60 kV	P1-2:A1:10:_FAIRHAVEN #1 60KV [6850] & P1-2:A1:1:_HUMBOLDT BAY-HUMBOLDT #2 115KV [7090]	P6	N-1-1	>0.9	>0.9	>0.9	0.90	>0.9	0.89	>0.9	>0.9	>0.9	0.81	>0.9	>0.9	>0.9	0.89	Voltage support, UVLS and/ or SPS
NEWBURG 60 kV	P1-2:A1:10:_FAIRHAVEN #1 60KV [6850] & P1-3:A1:2:_HUMB_BS1 115/13.8KV TB 1	P6	N-1-1	>0.9	>0.9	>0.9	0.90	>0.9	0.89	>0.9	>0.9	>0.9	0.82	>0.9	>0.9	>0.9	0.89	Voltage support, UVLS and/ or SPS
ORICK 60 kV	P1-2:A1:10:_FAIRHAVEN #1 60KV [6850] & P1-2:A1:1:_HUMBOLDT BAY-HUMBOLDT #2 115KV [7090]	P6	N-1-1	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	0.88	>0.9	>0.9	>0.9	>0.9	Voltage support, UVLS and/ or SPS



Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)								Voltage PU (Sensitivity Scenarios)					Project & Potential Mitigation Solutions	
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Winter Peak	2022 Winter Peak	2027 Winter Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022 SP High CEC Forecast	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations		
ORICK 60 kV	P1-2:A1:10:_FAIRHAVEN #1 60KV [6850] & P1-3:A1:2:_HUMB_BS1 115/13.8KV TB 1	P6	N-1-1	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	0.89	>0.9	>0.9	>0.9	>0.9	Voltage support, UVLS and/ or SPS
ORICK 60 kV	P1-4:A1:11:_HUMBOLDT SVD=V & P1-2:A1:2:_HUMBOLDT-BRIDGEVILLE 115KV [1810]	P6	N-1-1	1.11	<1.05	<1.05	<1.05	<1.05	<1.05	<1.05	<1.05	<1.05	<1.05	<1.05	<1.05	<1.05	<1.05	Voltage support, UVLS and/ or SPS
PCLUMBER 60 kV	P1-2:A1:10:_FAIRHAVEN #1 60KV [6850] & P1-2:A1:1:_HUMBOLDT BAY-HUMBOLDT #2 115KV [7090]	P6	N-1-1	>0.9	>0.9	>0.9	>0.9	>0.9	0.90	>0.9	>0.9	0.82	>0.9	>0.9	>0.9	0.90	Voltage support, UVLS and/ or SPS	
PCLUMBER 60 kV	P1-2:A1:15:_HUMBOLDT BAY-RIO DELL JCT 60KV [7100] & P1-3:A1:3:_BRDGVILLE 115/60KV TB 1	P6	N-1-1	>0.9	0.45	0.45	0.41	0.41	0.39	>0.9	>0.9	0.45	0.48	0.42	0.49	0.39	Voltage support, UVLS and/ or SPS	
RDGE CBN 60 kV	P1-3:A1:5:_FPC 60/13.8KV TB 1 & P1-3:A1:2:_HUMB_BS1 115/13.8KV TB 1	P6	N-1-1	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	0.84	>0.9	>0.9	>0.9	>0.9	Voltage support, UVLS and/ or SPS	
RDGE CBN 60 kV	P1-4:A1:1:_HUMBOLDT SHUNT=7H & P1-2:A1:10:_FAIRHAVEN #1 60KV [6850]	P6	N-1-1	>0.9	>0.9	>0.9	>0.9	>0.9	0.88	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	0.88	Voltage support, UVLS and/ or SPS	
RIO DELL 60 kV	P1-2:A1:10:_FAIRHAVEN #1 60KV [6850] & P1-2:A1:1:_HUMBOLDT BAY-HUMBOLDT #2 115KV [7090]	P6	N-1-1	>0.9	>0.9	>0.9	0.89	>0.9	0.88	>0.9	>0.9	0.80	>0.9	>0.9	>0.9	0.88	Voltage support, UVLS and/ or SPS	
RIO DELL 60 kV	P1-2:A1:15:_HUMBOLDT BAY-RIO DELL JCT 60KV [7100] & P1-3:A1:3:_BRDGVILLE 115/60KV TB 1	P6	N-1-1	>0.9	0.44	0.44	0.40	0.40	0.38	>0.9	>0.9	0.43	0.46	0.41	0.48	0.38	Voltage support, UVLS and/ or SPS	
RIO DELL 60 kV	P1-3:A1:3:_BRDGVILLE 115/60KV TB 1 & P1-2:A1:15:_HUMBOLDT BAY-RIO DELL JCT 60KV [7100]	P6	N-1-1	>0.9	0.39	0.44	0.39	0.38	0.38	>0.9	0.80	0.41	0.46	0.41	0.49	0.36	Voltage support, UVLS and/ or SPS	
RUSS RCH 60 kV	P1-2:A1:10:_FAIRHAVEN #1 60KV [6850] & P1-2:A1:1:_HUMBOLDT BAY-HUMBOLDT #2 115KV [7090]	P6	N-1-1	>0.9	>0.9	>0.9	>0.9	>0.9	0.90	>0.9	>0.9	0.80	>0.9	>0.9	>0.9	0.90	Voltage support, UVLS and/ or SPS	
SCOTIATP 60 kV	P1-2:A1:1:_HUMBOLDT BAY-HUMBOLDT #2 115KV [7090] & P1-2:A1:10:_FAIRHAVEN #1 60KV [6850]	P6	N-1-1	>0.9	>0.9	>0.9	0.89	>0.9	0.89	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	Voltage support, UVLS and/ or SPS	
SCOTIATP 60 kV	P1-2:A1:10:_FAIRHAVEN #1 60KV [6850] & P1-3:A1:2:_HUMB_BS1 115/13.8KV TB 1	P6	N-1-1	>0.9	>0.9	>0.9	0.89	>0.9	0.88	>0.9	>0.9	0.81	>0.9	>0.9	>0.9	0.88	Voltage support, UVLS and/ or SPS	
SCOTIATP 60 kV	P1-2:A1:15:_HUMBOLDT BAY-RIO DELL JCT 60KV [7100] & P1-3:A1:3:_BRDGVILLE 115/60KV TB 1	P6	N-1-1	>0.9	0.44	0.44	0.40	0.40	0.38	>0.9	>0.9	0.43	0.46	0.41	0.48	0.38	Voltage support, UVLS and/ or SPS	
SCOTIATP 60 kV	P1-3:A1:3:_BRDGVILLE 115/60KV TB 1 & P1-2:A1:15:_HUMBOLDT BAY-RIO DELL JCT 60KV [7100]	P6	N-1-1	>0.9	0.39	0.44	0.39	0.38	0.38	>0.9	0.80	0.41	0.46	0.41	0.49	0.36	Voltage support, UVLS and/ or SPS	



Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)								Voltage PU (Sensitivity Scenarios)					Project & Potential Mitigation Solutions
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Winter Peak	2022 Winter Peak	2027 Winter Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022 SP High CEC Forecast	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations	
SWNS FLT 60 kV	P1-2:A1:15:_HUMBOLDT BAY-RIO DELL JCT 60KV [7100] & P1-3:A1:3:_BRDGVILLE 115/60KV TB 1	P6	N-1-1	>0.9	0.50	0.49	0.45	0.45	0.43	>0.9	>0.9	0.48	0.51	0.46	0.54	0.43	Voltage support, UVLS and/ or SPS
SWNS FLT 60 kV	P1-4:A1:11:_HUMBOLDT SVD=V & P1-2:A1:15:_HUMBOLDT BAY-RIO DELL JCT 60KV [7100]	P6	N-1-1	1.11	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	Voltage support, UVLS and/ or SPS
TRINIDAD 60 kV	P1-2:A1:10:_FAIRHAVEN #1 60KV [6850] & P1-2:A1:1:_HUMBOLDT BAY-HUMBOLDT #2 115KV [7090]	P6	N-1-1	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	0.87	>0.9	>0.9	>0.9	>0.9	Voltage support, UVLS and/ or SPS
TRINIDAD 60 kV	P1-4:A1:11:_HUMBOLDT SVD=V & P1-2:A1:2:_HUMBOLDT-BRIDGEVILLE 115KV [1810]	P6	N-1-1	1.10	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	Voltage support, UVLS and/ or SPS
WILLWCRK 60 kV	P1-2:A1:10:_FAIRHAVEN #1 60KV [6850] & P1-2:A1:1:_HUMBOLDT BAY-HUMBOLDT #2 115KV [7090]	P6	N-1-1	>0.9	>0.9	>0.9	0.88	>0.9	0.87	>0.9	>0.9	0.76	>0.9	>0.9	>0.9	0.87	Voltage support, UVLS and/ or SPS
WILLWCRK 60 kV	P1-2:A1:3:_HUMBOLDT-TRINITY 115KV [1820] & P1-2:A1:1:_HUMBOLDT BAY-HUMBOLDT #2 115KV [7090]	P6	N-1-1	>0.9	>0.9	>0.9	0.90	0.89	0.89	>0.9	>0.9	0.85	>0.9	>0.9	>0.9	0.89	Voltage support, UVLS and/ or SPS

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	
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Winter Peak	2022 Winter Peak	2027 Winter Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022 SP High CEC Forecast	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP Heavy Renewable & Min Gas Gen		2027 Retirement of QF Generations
None																	



Contingency	Category	Category Description	Transient Stability Performance (Number of voltage and frequency violations)										Potential Mitigation Solutions	
			2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	Select..	Select..	Select..	Select..	Select..		
LP SAMOA Unit 1 (Bus #31158)	P1-1		0	0	0	0	0							No violation
HMBLDT B - HUMB_BS1 115 kV Line	P1-2		32	46	32	32	46							Under review with PTO .
HUMB_BS1/HUMB_G1 115/13.8 kV No.1 Transformer	P1-3		0	0	0	0	0							No violation
HUMBOLDT 60 kV ID v SVD	P1-4		0	0	0	0	0							No violation
Bus Fault at HUMBOLDT 115 kV	P2-2		12	27	63	63	27							Under review with PTO .
Internal fault at Non-bus-tie-breaker #182 at HUMBOLDT 115 kV	P2-3		63	53	55	53	63							Under review with PTO .
Not Applicable (There is no Bus-Tie-Breaker at HUMBOLDT 115 kV substation)	P2-4		0	0	0	0	0							No violation
LP SAMOA Unit 1 and HUMB_G1 Unit 1	P3-1		0	0	0	0	0							No violation
LP SAMOA Unit 1 and HUMBOLDT - HMBLDT B 115 kV No.1 Line	P3-2		32	50	32	32	49							Under review with PTO .
LP SAMOA Unit 1 and HUMB_BS1/HUMB_G1 115/13.8 kV No.1 Transformer	P3-3		0	0	0	0	0							No violation
LP SAMOA Unit 1 and HUMBOLDT 60 kV ID v SVD	P3-4		0	0	0	0	0							No violation
Breaker stuck for CB #BAE071 protecting HUMB_G1 Unit 1	P4-1		0	0	0	0	0							No violation
Breaker stuck for CB #182 protecting HUMBOLDT-BRDGVLE 115 kV No.1 Line	P4-2		58	57	57	58	57							Under review with PTO .
Breaker stuck for CB #322 protecting HUMBOLDT/HUMBOLDT 60/115 kV No.2 Transformer	P4-3		57	59	61	59	62							Under review with PTO .



Contingency	Category	Category Description	Transient Stability Performance (Number of voltage and frequency violations)										Potential Mitigation Solutions	
			2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	Select..	Select..	Select..	Select..	Select..		
Breaker stuck for CB #6222 protecting HUMBOLDT 60 kV ID v SVD	P4-4		67	59	67	58	64							Under review with PTO .
Breaker stuck for CB #172 protecting Bus Section HUMBOLDT 115 kV	P4-5		24	60	63	63	58							Under review with PTO .
HUMB_G1 Unit 1	P5-1		0	0	0	0	0							No violation
HUMBOLDT -HMBLDT B 115 kV No.1 Line	P5-2		0	0	0	0	0							No violation
HUMBOLDT/HUMBOLDT 115/60 kV No.2 Transformer	P5-3		64	66	65	0	65							Under review with PTO .
HUMBOLDT 60 kV ID v SVD	P5-4		0	0	0	0	0							No violation
HUMBOLDT -HMBLDT B 115 kV No.1 Line and HUMBOLDT -BRDGVLE 115 kV No.1 Line	P6-1		55	55	55	53	55							Under review with PTO .
HUMBOLDT -HMBLDT B 115 kV No.1 Line and HUMBOLDT/HUMBOLDT 115/60 kV No.2 Transformer	P6-2		0	3	10	7	0							Under review with PTO .
HUMBOLDT 60 kV ID v SVD and HUMBOLDT 60 kV ID.7h SVD	P6-3		0	0	0	0	0							No violation
Arcata - Humboldt 60 kV (31067 - 31080) and Humboldt #1 60 kV (31066 - 31080) Lines	P7-1		0	0	0	0	0							No violation

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.

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 Load.

Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading % (Baseline Scenarios)								Loading % (Sensitivity Scenarios)						Project & Potential Mitigation Solutions	
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Winter Peak	2022 Winter Peak	2027 Winter Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022 SP High CEC Forecast	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations			
31386 MCDWLLSW 60.0 31388 PETLMA C 60.0 1 1	Base Case	P0	N-0	74	73	71	87	89	91	36	50	78	77	74	53	110			Sensitivity only
31334 CLER LKE 60.0 31335 GRANITE 60.0 1 1	P1-2:A2:54:_KONOCTI-EAGLE ROCK 60KV [6861]	P1	N-1	97	101	98	77	75	75	42	33	110	103	98	87	103			Short Term: Middletown UVLS Long Term: Clear Lake Reinforcement Project Revised Scope
31334 CLER LKE 60.0 31335 GRANITE 60.0 1 1	P1-3:A2:27:_EGLE RCK 115/60KV TB 1	P1	N-1	97	101	98	77	75	75	42	33	110	103	97	87	103			Short Term: Middletown UVLS Long Term: Clear Lake Reinforcement Project Revised Scope
31335 GRANITE 60.0 31336 HPLND JT 60.0 1 1	P1-2:A2:54:_KONOCTI-EAGLE ROCK 60KV [6861]	P1	N-1	100	104	100	79	77	77	45	36	114	107	100	90	105			Short Term: Middletown UVLS Long Term: Clear Lake Reinforcement Project Revised Scope
31335 GRANITE 60.0 31336 HPLND JT 60.0 1 1	P1-3:A2:27:_EGLE RCK 115/60KV TB 1	P1	N-1	100	104	100	79	77	77	45	36	113	107	100	90	105			Short Term: Middletown UVLS Long Term: Clear Lake Reinforcement Project Revised Scope
31336 HPLND JT 60.0 31206 HPLND JT 115 2 1	P1-2:A2:18:_GEYSERS #3-EAGLE ROCK 115KV [1660]	P1	N-1	86	95	94	98	112	96	96	89	96	96	93	82	96			Reverse power relay will activate.
31336 HPLND JT 60.0 31206 HPLND JT 115 2 1	P1-2:A2:20:_EGLE RCK-FULTON-SILVERDO 115KV [0]	P1	N-1	84	80	80	94	100	94	63	60	84	81	79	73	94			Reverse power relay will activate.
31336 HPLND JT 60.0 31206 HPLND JT 115 2 1	P1-2:A2:54:_KONOCTI-EAGLE ROCK 60KV [6861]	P1	N-1	92	87	85	101	103	100	63	55	93	89	86	79	100			Reverse power relay will activate.
31336 HPLND JT 60.0 31206 HPLND JT 115 2 1	P1-2:A6:13:_SILVERDO-FULTON-EGLE RCK 115KV [0]	P1	N-1	84	80	80	94	100	94	63	60	84	81	79	73	94			Reverse power relay will activate.
31336 HPLND JT 60.0 31206 HPLND JT 115 2 1	P1-3:A2:27:_EGLE RCK 115/60KV TB 1	P1	N-1	92	87	85	101	103	100	63	55	93	89	86	79	100			Reverse power relay will activate.
31362 TRNTN JT 60.0 31378 FULTON 60.0 1 1	P1-2:A2:58:_FULTON-LAGUNA-COTATI-SNMALDFL 60KV [0]	P1	N-1	61	60	59	81	81	85	52	37	65	62	63	47	119			Sensitivity only
31364 MOLINO 60.0 31363 TRNTN_JC 60.0 1 1	P1-2:A2:58:_FULTON-LAGUNA-COTATI-SNMALDFL 60KV [0]	P1	N-1	73	71	69	89	90	93	60	39	76	73	75	51	127			Sensitivity only
31378 FULTON 60.0 32650 ST.HELNA 60.0 1 1	P1-2:A2:63:_LAKEVILLE #1 60KV [7360]	P1	N-1	103	93	90	57	57	57	37	25	100	96	96	66	77			Short Term : Action Plan ; Long Term : Preferred resource
31384 COTATI 60.0 31389 PETC_JCT 60.0 1 1	P1-2:A2:2:_FULTON-BEARCNYN-WFSRDLT-GEYSR16-GEYSR12-GEYSR14 230KV [0]	P1	N-1	65	63	60	72	72	76	34	22	70	66	66	44	103			Sensitivity only
31384 COTATI 60.0 31389 PETC_JCT 60.0 1 1	P1-2:A2:32:_CORONA-LAKEVILLE 115KV [4311]	P1	N-1	62	60	56	73	72	76	25	14	68	64	63	37	103			Sensitivity only
31384 COTATI 60.0 31389 PETC_JCT 60.0 1 1	P1-2:A2:6:_FULTON-LAKEVILLE 230KV [4950]	P1	N-1	59	56	52	71	69	75	13	3	66	61	60	30	102			Sensitivity only
31384 COTATI 60.0 31389 PETC_JCT 60.0 1 1	P1-3:A2:18:_FULTON 230/115KV TB 9	P1	N-1	61	58	56	71	70	74	27	15	66	62	62	37	100			Sensitivity only
31390 PETLMA A 60.0 31394 LKVL JT 60.0 1 1	P1-2:A2:62:_LAKEVILLE-PETALUMA C 60KV [7350]	P1	N-1	100	99	95	142	142	149	46	52	107	101	102	68	160			Lakeville #2 Upgrade (formerly known as Fulton 230/115 kV Transformer project)
31392 LAKEVILLE 60.0 31394 LKVL JT 60.0 1 1	P1-2:A2:62:_LAKEVILLE-PETALUMA C 60KV [7350]	P1	N-1	94	92	89	123	123	129	43	49	100	95	95	64	150			System upgrade or preferred resource
31397 WILLITSJ 60.0 31312 FRT BRGG 60.0 1 1	P1-2:A2:40:_MENDOCINO-PHILO JCT-HOPLAND 60KV [7520]	P1	N-1	42	44	45	78	105	NConv	30	33	47	44	44	39	NConv			Fort Bragg UVLS
32568 IGNACIO 115 30445 IGNACIO 230 4 1	P1-3:A6:4:_IGNACIO 230/115KV TB 6	P1	N-1	70	73	74	95	97	104	31	38	77	74	78	57	104			System upgrade or preferred resource
32568 IGNACIO 115 30445 IGNACIO 230 6 1	P1-3:A6:3:_IGNACIO 230/115KV TB 4	P1	N-1	71	73	74	95	97	104	31	38	77	74	78	57	104			System upgrade or preferred resource
32568 IGNACIO 115 32570 LS GLLNS 115 3 1	P1-2:A6:17:_IGNACIO-SAN RAFAEL #1 115KV [1850]	P1	N-1	83	88	90	107	109	117	33	44	92	89	95	66	127			Ignacio - Alto Voltage Conversion Revised Scope
32664 IGNACO A 60.0 32666 IGNACO B 60.0 1 1	P1-3:A6:8:_IGNACIO 115/60KV TB 3	P1	N-1	61	65	64	112	115	125	30	35	70	66	69	49	125			System upgrade or preferred resource
32667 IG JCT 60.0 32678 SAN_RFLJ 60.0 1 1	P1-2:A6:23:_IGNACIO-ALTO-SAUSALITO #2 60KV [7170]	P1	N-1	52	54	53	99	102	112	27	29	59	55	58	42	121			Ignacio - Alto Voltage Conversion Revised Scope
32667 IG JCT 60.0 32678 SAN_RFLJ 60.0 1 1	P1-2:A6:24:_IGNACIO-ALTO-SAUSALITO #1 60KV [7160]	P1	N-1	52	54	53	99	102	112	27	29	59	55	58	42	121			Ignacio - Alto Voltage Conversion Revised Scope
32678 SAN_RFLJ 60.0 32680 GREENBRE 60.0 1 1	P1-2:A6:23:_IGNACIO-ALTO-SAUSALITO #2 60KV [7170]	P1	N-1	52	54	52	89	93	101	26	29	58	55	58	42	121			Ignacio - Alto Voltage Conversion Revised Scope

Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading % (Baseline Scenarios)								Loading % (Sensitivity Scenarios)						Project & Potential Mitigation Solutions		
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Winter Peak	2022 Winter Peak	2027 Winter Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022 SP High CEC Forecast	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations				
32678 SAN_RFLJ 60.0 32680 GREENBRE 60.0 1 1	P1-2:A6:24:_IGNACIO-ALTO-SAUSALITO #1 60KV [7160]	P1	N-1	52	54	52	89	93	101	26	29	58	55	58	42	121				Ignacio - Alto Voltage Conversion Revised Scope
30435 LAKEVILLE 230 30460 VACA-DIX 230 1 1	P2-4:A2:3:_LAKEVILLE 230KV - SECTION 2E & 2D	P2	Bus-tie breaker	98	94	91	106	109	113	16	34	106	98	103	71	129				Substation upgrade
30440 TULUCAY 230 30460 VACA-DIX 230 1 1	P2-4:A2:1:_LAKEVILLE 230KV - SECTION 1E & 2E	P2	Bus-tie breaker	100	95	93	98	101	103	20	43	106	99	104	77	118				Substation upgrade
31118 KEKAWAKA 60.0 31308 LYTNVLE 60.0 1 1	P2-3:A2:38:_MENDOCNO - MA 60KV & MENDOCINO-PHILO JCT-HOPLAND LINE	P2	Non-bus-tie breaker	NConv	NConv	NConv	NConv	NConv	NConv	55	NConv	NConv	NConv	NConv	NConv	NConv				No thermal overload issue - NConvs are due to voltage issue
31224 INDIN VL 115 31215 LUCERNJ1 115 1 1	P2-3:A2:26:_EGLE RCK - MA 115KV & EAGLE ROCK-CORTINA LINE	P2	Non-bus-tie breaker	85	71	70	97	87	101	15	19	84	72	73	51	101				System upgrade or preferred resource
31246 BELLVUE 115 31248 PENNGRVE 115 1 1	P2-4:A2:7:_FULTON 115KV - SECTION 2D & 1D	P2	Bus-tie breaker	95	100	96	119	118	120	47	58	106	102	98	75	128				Substation upgrade
31248 PENNGRVE 115 31254 CORONA 115 1 1	P2-4:A2:7:_FULTON 115KV - SECTION 2D & 1D	P2	Bus-tie breaker	98	104	100	125	126	128	50	61	111	106	102	78	136				Substation upgrade
31254 CORONA 115 31255 LAKEVILLE 115 1 1	P2-4:A2:7:_FULTON 115KV - SECTION 2D & 1D	P2	Bus-tie breaker	95	99	95	131	132	134	48	59	106	101	98	73	128				Substation upgrade
31306 WILLITS 60.0 31308 LYTNVLE 60.0 1 1	P2-3:A2:38:_MENDOCNO - MA 60KV & MENDOCINO-PHILO JCT-HOPLAND LINE	P2	Non-bus-tie breaker	NConv	NConv	NConv	NConv	NConv	NConv	43	NConv	NConv	NConv	NConv	NConv	NConv				No thermal overload issue - NConvs are due to voltage issue
31326 PHLO JCT 60.0 31336 HPLND JT 60.0 1 1	P2-2:A2:42:_MENDOCNO 60KV SECTION MA	P2	Bus	57	57	59	120	115	NConv	28	36	72	58	65	42	NConv				No thermal overload issue - NConvs are due to voltage issue
31326 PHLO JCT 60.0 31336 HPLND JT 60.0 1 1	P2-3:A2:39:_MENDOCNO - MA 60KV & MENDOCINO-HARTLEY LINE	P2	Non-bus-tie breaker	57	57	59	124	NConv	NConv	29	36	72	58	65	42	NConv				No thermal overload issue - NConvs are due to voltage issue
31326 PHLO JCT 60.0 31336 HPLND JT 60.0 1 1	P2-4:A2:5:_MENDOCNO 115KV - SECTION 1D & 2D	P2	Bus-tie breaker	67	64	66	95	90	109	30	36	78	66	72	45	115				Substation upgrade
31334 CLER LKE 60.0 31335 GRANITE 60.0 1 1	P2-1:A2:56:_KONOCITI-EAGLE ROCK 60KV [6861] (KONOCITI6-EGLE RCK)	P2	Line section w/o fault	97	101	98	77	75	75	42	33	110	103	98	87	103				Short Term: Middletown UVLS Long Term: Clear Lake Reinforcement Project Revised Scope
31334 CLER LKE 60.0 31335 GRANITE 60.0 1 1	P2-2:A2:23:_EGLE RCK 115KV SECTION MA	P2	Bus	100	104	100	78	77	77	48	37	112	106	100	89	105				Short Term: Middletown UVLS Long Term: Clear Lake Reinforcement Project Revised Scope
31334 CLER LKE 60.0 31335 GRANITE 60.0 1 1	P2-2:A2:57:_EGLE RCK 60KV SECTION 1D	P2	Bus	97	101	98	77	75	75	42	33	110	103	98	87	103				Short Term: Middletown UVLS Long Term: Clear Lake Reinforcement Project Revised Scope
31334 CLER LKE 60.0 31335 GRANITE 60.0 1 1	P2-3:A2:26:_EGLE RCK - MA 115KV & EAGLE ROCK-CORTINA LINE	P2	Non-bus-tie breaker	102	105	103	79	78	78	49	37	114	108	102	89	106				Short Term: Middletown UVLS Long Term: Clear Lake Reinforcement Project Revised Scope
31334 CLER LKE 60.0 31335 GRANITE 60.0 1 1	P2-3:A2:27:_EGLE RCK - MA 115KV & EAGLE ROCK-REDBUD LINE	P2	Non-bus-tie breaker	100	104	100	78	77	77	48	38	112	106	100	89	105				Short Term: Middletown UVLS Long Term: Clear Lake Reinforcement Project Revised Scope
31335 GRANITE 60.0 31336 HPLND JT 60.0 1 1	P2-1:A2:56:_KONOCITI-EAGLE ROCK 60KV [6861] (KONOCITI6-EGLE RCK)	P2	Line section w/o fault	100	104	100	79	77	77	45	36	114	107	100	90	105				Short Term: Middletown UVLS Long Term: Clear Lake Reinforcement Project Revised Scope
31335 GRANITE 60.0 31336 HPLND JT 60.0 1 1	P2-2:A2:23:_EGLE RCK 115KV SECTION MA	P2	Bus	103	107	103	80	79	79	51	41	116	109	103	92	108				Short Term: Middletown UVLS Long Term: Clear Lake Reinforcement Project Revised Scope
31335 GRANITE 60.0 31336 HPLND JT 60.0 1 1	P2-3:A2:26:_EGLE RCK - MA 115KV & EAGLE ROCK-CORTINA LINE	P2	Non-bus-tie breaker	105	108	106	82	80	80	52	40	118	112	104	92	109				Short Term: Middletown UVLS Long Term: Clear Lake Reinforcement Project Revised Scope
31335 GRANITE 60.0 31336 HPLND JT 60.0 1 1	P2-3:A2:27:_EGLE RCK - MA 115KV & EAGLE ROCK-REDBUD LINE	P2	Non-bus-tie breaker	103	107	103	80	79	79	51	41	116	109	103	92	108				Short Term: Middletown UVLS Long Term: Clear Lake Reinforcement Project Revised Scope
31335 GRANITE 60.0 31336 HPLND JT 60.0 1 1	P2-3:A2:28:_EGLE RCK - MA 115KV & EAGLE RCK-FULTON-SILVERDO LINE	P2	Non-bus-tie breaker	103	107	103	80	79	79	51	41	116	109	103	92	108				Short Term: Middletown UVLS Long Term: Clear Lake Reinforcement Project Revised Scope
31336 HPLND JT 60.0 31206 HPLND JT 115 2 1	P2-1:A2:20:_EAGLE ROCK-FULTON-SILVERADO 115KV [4392] (EGLE RCK-ERFT5_25)	P2	Line section w/o fault	84	81	80	94	100	94	63	60	84	82	80	73	94				Reverse power relay will activate.

Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading % (Baseline Scenarios)								Loading % (Sensitivity Scenarios)						Project & Potential Mitigation Solutions	
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Winter Peak	2022 Winter Peak	2027 Winter Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022 SP High CEC Forecast	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations			
31336 HPLND JT 60.0 31206 HPLND JT 115 2 1	P2-2:A2:23:_EGLE RCK 115KV SECTION MA	P2	Bus	94	103	101	108	121	105	99	89	104	103	100	88	105			Reverse power relay will activate.
31336 HPLND JT 60.0 31206 HPLND JT 115 2 1	P2-2:A2:42:_MENDOCNO 60KV SECTION MA	P2	Bus	95	91	89	128	128	NConv	51	48	103	93	93	76	NConv			Reverse power relay will activate.
31336 HPLND JT 60.0 31206 HPLND JT 115 2 1	P2-2:A2:57:_EGLE RCK 60KV SECTION 1D	P2	Bus	92	87	85	101	103	100	63	55	93	89	86	79	100			Reverse power relay will activate.
31336 HPLND JT 60.0 31206 HPLND JT 115 2 1	P2-3:A2:27:_EGLE RCK - MA 115KV & EAGLE ROCK-REDBUD LINE	P2	Non-bus-tie breaker	94	103	101	107	121	104	99	89	104	103	100	89	104			Reverse power relay will activate.
31336 HPLND JT 60.0 31206 HPLND JT 115 2 1	P2-3:A2:28:_EGLE RCK - MA 115KV & EGLE RCK-FULTON-SILVERDO LINE	P2	Non-bus-tie breaker	93	102	100	107	121	104	99	89	103	103	100	88	104			Reverse power relay will activate.
31336 HPLND JT 60.0 31206 HPLND JT 115 2 1	P2-3:A2:39:_MENDOCNO - MA 60KV & MENDOCINO-HARTLEY LINE	P2	Non-bus-tie breaker	93	89	88	125	NConv	NConv	50	47	101	92	91	74	NConv			Reverse power relay will activate.
31336 HPLND JT 60.0 31206 HPLND JT 115 2 1	P2-3:A2:40:_MENDOCNO - MA 60KV & MENDOCINO-WILLITS-FORT BRAGG LINE	P2	Non-bus-tie breaker	84	80	78	106	109	107	49	42	86	82	79	70	107			Reverse power relay will activate.
31336 HPLND JT 60.0 31206 HPLND JT 115 2 1	P2-4:A2:5:_MENDOCNO 115KV - SECTION 1D & 2D	P2	Bus-tie breaker	77	76	76	106	105	107	51	45	87	79	80	67	107			Reverse power relay will activate.
31338 KONOCTI6 60.0 31344 EGLE RCK 60.0 1 1	P2-4:A2:5:_MENDOCNO 115KV - SECTION 1D & 2D	P2	Bus-tie breaker	85	84	82	83	82	87	43	42	93	85	84	67	102			Sensitivity only
31362 TRNTN JT 60.0 31363 TRNTN_JC 60.0 1 1	P2-3:A2:58:_FULTON 60KV - MIDDLE BREAKER BAY 4	P2	Non-bus-tie breaker	56	56	55	86	86	90	49	34	60	58	58	43	110			Sensitivity only
31362 TRNTN JT 60.0 31378 FULTON 60.0 1 1	P2-3:A2:58:_FULTON 60KV - MIDDLE BREAKER BAY 4	P2	Non-bus-tie breaker	61	61	59	80	81	85	52	37	65	62	63	47	118			Sensitivity only
31362 TRNTN JT 60.0 31378 FULTON 60.0 1 1	P2-3:A2:60:_LAGUNA - 1D 60KV & FULTON-LAGUNA-COTATI-SNMALDFL LINE	P2	Non-bus-tie breaker	61	60	59	81	81	85	52	37	65	62	63	47	119			Sensitivity only
31364 MOLINO 60.0 31363 TRNTN_JC 60.0 1 1	P2-3:A2:58:_FULTON 60KV - MIDDLE BREAKER BAY 4	P2	Non-bus-tie breaker	74	71	69	89	89	93	60	39	76	74	74	51	127			Sensitivity only
31366 MLNO JCT 60.0 31378 FULTON 60.0 1 1	P2-1:A2:81:_LAKEVILLE #2 60KV [7340] (PETLMA A-LKVLE JT)	P2	Line section w/o fault	53	53	51	69	69	72	40	30	58	55	55	40	101			Sensitivity only
31377 FCHMNT2 60.0 31380 FTCH MTN 60.0 1 1	P2-1:A2:93:_FULTON-WINDSOR 60KV [0] NO FAULT	P2	Line section w/o fault	125	109	109	77	77	78	100	73	114	111	113	91	106			Short Term : Action Plan ; Long Term : Preferred resource
31377 FCHMNT2 60.0 31380 FTCH MTN 60.0 1 1	P2-1:A2:94:_WINDSOR-FCHMNT2 60KV [0] NO FAULT	P2	Line section w/o fault	114	98	97	68	67	68	92	63	103	100	101	80	92			Short Term : Action Plan ; Long Term : Preferred resource
31378 FULTON 60.0 31382 FTCHMNTN 60.0 1 1	P2-1:A2:93:_FULTON-WINDSOR 60KV [0] NO FAULT	P2	Line section w/o fault	125	113	111	80	77	81	85	56	121	117	116	89	111			Fulton - Fitch Mountain Reconductoring Project
31378 FULTON 60.0 31382 FTCHMNTN 60.0 1 1	P2-1:A2:94:_WINDSOR-FCHMNT2 60KV [0] NO FAULT	P2	Line section w/o fault	117	103	102	72	70	73	79	49	112	108	107	81	101			Fulton - Fitch Mountain Reconductoring Project
31378 FULTON 60.0 32650 ST.HELNA 60.0 1 1	P2-3:A2:64:_LAKEVILLE - 2D 60KV & LAKEVILLE #1 LINE	P2	Non-bus-tie breaker	102	93	90	58	57	57	37	25	100	96	96	66	77			Short Term : Action Plan ; Long Term : Preferred resource
31384 COTATI 60.0 31389 PETC_JCT 60.0 1 1	P2-1:A2:32:_SANTA ROSA-CORONA 115KV [4309] (PENNGRVE-CORONA)	P2	Line section w/o fault	59	57	54	71	70	74	24	12	64	61	60	35	100			Sensitivity only
31384 COTATI 60.0 31389 PETC_JCT 60.0 1 1	P2-2:A2:23:_EGLE RCK 115KV SECTION MA	P2	Bus	67	63	61	74	74	77	32	21	71	67	66	43	104			Sensitivity only
31384 COTATI 60.0 31389 PETC_JCT 60.0 1 1	P2-2:A2:37:_CORONA 115KV SECTION 1D	P2	Bus	59	57	54	71	70	74	24	12	64	61	60	35	100			Sensitivity only
31384 COTATI 60.0 31389 PETC_JCT 60.0 1 1	P2-2:A2:38:_LAKEVILLE 115KV SECTION 1D	P2	Bus	63	61	58	74	73	77	26	14	69	65	64	38	105			Sensitivity only
31384 COTATI 60.0 31389 PETC_JCT 60.0 1 1	P2-2:A2:7:_NCPA2 230KV SECTION 1D	P2	Bus	65	63	60	72	72	76	34	22	70	66	66	44	103			Sensitivity only
31384 COTATI 60.0 31389 PETC_JCT 60.0 1 1	P2-3:A2:1:_GEYSR12 - 1D 230KV & FULTON-BEARCNYN-WFSRDLT-GEYSR16-GEYSR12-GEYSR14 LINE	P2	Non-bus-tie breaker	65	63	60	72	72	76	34	22	70	66	66	44	103			Sensitivity only
31384 COTATI 60.0 31389 PETC_JCT 60.0 1 1	P2-3:A2:11:_FULTON 230KV - MIDDLE BREAKER BAY 7	P2	Non-bus-tie breaker	65	63	60	72	72	76	34	22	70	66	66	44	103			Sensitivity only
31384 COTATI 60.0 31389 PETC_JCT 60.0 1 1	P2-3:A2:12:_FULTON 230KV - MIDDLE BREAKER BAY 3	P2	Non-bus-tie breaker	67	64	60	77	75	81	20	7	73	69	68	37	110			Sensitivity only
31384 COTATI 60.0 31389 PETC_JCT 60.0 1 1	P2-3:A2:26:_EGLE RCK - MA 115KV & EAGLE ROCK-CORTINA LINE	P2	Non-bus-tie breaker	68	64	62	75	74	78	33	21	72	68	67	44	106			Sensitivity only

Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading % (Baseline Scenarios)								Loading % (Sensitivity Scenarios)						Project & Potential Mitigation Solutions	
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Winter Peak	2022 Winter Peak	2027 Winter Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022 SP High CEC Forecast	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations			
31384 COTATI 60.0 31389 PETC_JCT 60.0 1 1	P2-3:A2:27:_EGLE RCK - MA 115KV & EAGLE ROCK-REDBUD LINE	P2	Non-bus-tie breaker	67	63	61	74	74	77	32	21	71	67	66	43	104			Sensitivity only
31384 COTATI 60.0 31389 PETC_JCT 60.0 1 1	P2-3:A2:3:_GEYSR14 - 1D 230KV & FULTON-BEARCNYN-WSFRDFTL-GEYSR16-GEYSR12-GEYSR14 LINE	P2	Non-bus-tie breaker	65	63	60	72	72	76	34	22	70	66	66	44	103			Sensitivity only
31384 COTATI 60.0 31389 PETC_JCT 60.0 1 1	P2-3:A2:4:_BEARCNYN - 1D 230KV & FULTON-BEARCNYN-WSFRDFTL-GEYSR16-GEYSR12-GEYSR14 LINE	P2	Non-bus-tie breaker	65	63	60	72	72	76	34	22	70	66	66	44	103			Sensitivity only
31384 COTATI 60.0 31389 PETC_JCT 60.0 1 1	P2-3:A2:5:_WSFRDFTL - 1D 230KV & FULTON-BEARCNYN-WSFRDFTL-GEYSR16-GEYSR12-GEYSR14 LINE	P2	Non-bus-tie breaker	65	63	60	72	72	76	34	22	70	66	66	44	103			Sensitivity only
31384 COTATI 60.0 31389 PETC_JCT 60.0 1 1	P2-3:A2:6:_GEYSR16 - 1D 230KV & FULTON-BEARCNYN-WSFRDFTL-GEYSR16-GEYSR12-GEYSR14 LINE	P2	Non-bus-tie breaker	65	63	60	72	72	76	34	22	70	66	66	44	103			Sensitivity only
31384 COTATI 60.0 31389 PETC_JCT 60.0 1 1	P2-4:A2:11:_LAKEVILLE 115KV - SECTION 1D & 2D	P2	Bus-tie breaker	75	75	71	84	83	88	30	19	84	79	79	47	119			Sensitivity only
31388 PETLMA C 60.0 31389 PETC_JCT 60.0 1 1	P2-3:A2:65:_LAKEVILLE - 1D 60KV & LAKEVILLE-PETALUMA C LINE	P2	Non-bus-tie breaker	71	71	69	74	75	78	35	49	76	74	72	52	108			System upgrade or preferred resource
31389 PETC_JCT 60.0 31390 PETLMA A 60.0 1 1	P2-3:A2:65:_LAKEVILLE - 1D 60KV & LAKEVILLE-PETALUMA C LINE	P2	Non-bus-tie breaker	90	88	84	101	101	105	41	46	95	90	91	60	145			Lakeville #2 Upgrade (formerly known as Fulton 230/115 kV Transformer project)
31390 PETLMA A 60.0 31394 LKVL JT 60.0 1 1	P2-3:A2:65:_LAKEVILLE - 1D 60KV & LAKEVILLE-PETALUMA C LINE	P2	Non-bus-tie breaker	94	92	88	134	134	140	43	49	100	95	95	63	151			System upgrade or preferred resource
31392 LAKEVILLE 60.0 31394 LKVL JT 60.0 1 1	P2-3:A2:65:_LAKEVILLE - 1D 60KV & LAKEVILLE-PETALUMA C LINE	P2	Non-bus-tie breaker	88	86	83	116	116	121	41	46	93	89	89	59	142			System upgrade or preferred resource
31397 WILLITSJ 60.0 31306 WILLITS 60.0 1 1	P2-3:A2:38:_MENDOCINO - MA 60KV & MENDOCINO-PHILO JCT-HOPLAND LINE	P2	Non-bus-tie breaker	NConv	NConv	NConv	NConv	NConv	NConv	54	NConv	NConv	NConv	NConv	NConv	NConv			No thermal overload issue - NConvs are due to voltage issue
31397 WILLITSJ 60.0 31312 FRT BRGG 60.0 1 1	P2-1:A2:48:_PHILO JCT-ELK 60KV [7780] (PHILO-PHILO JCT)	P2	Line section w/o fault	42	44	45	78	105	NConv	29	33	47	44	44	39	NConv			Fort Bragg UVLS
32568 IGNACIO 115 32574 SAN RAFL 115 1 1	P2-1:A6:5:_IGNACIO-SAN RAFAEL #3 115KV [1860] (IGNACIO-LS GLLNS)	P2	Line section w/o fault	92	98	100	129	132	142	36	49	102	98	106	73	142			System upgrade or preferred resource
32618 NTWRJCT1 115 32020 JMSN JCT 115 1 1	P2-2:A6:15:_NRTH TWR 115KV SECTION 1G	P2	Bus	102	84	80	78	76	69	25	58	87	95	91	86	92			Short Term : Action Plan ; Long Term : Preferred resource
32655 TULCAY1 60.0 32662 TULCY JT 60.0 1 1	P2-1:A2:88:_TULUCAY-NAPA #2 60KV [8190] (TULUCAY-BSLT TAP)	P2	Line section w/o fault	110	117	118	73	75	77	48	62	122	116	121	89	108			Short Term : Action Plan ; Long Term : Preferred resource
32655 TULCAY1 60.0 32662 TULCY JT 60.0 1 1	P2-1:A6:24:_TULUCAY-NAPA #2 60KV [8190] (TULUCAY-BSLT TAP)	P2	Line section w/o fault	110	117	118	73	75	77	48	62	122	116	121	89	108			Short Term : Action Plan ; Long Term : Preferred resource
32656 NAPA 60.0 32662 TULCY JT 60.0 1 1	P2-1:A2:88:_TULUCAY-NAPA #2 60KV [8190] (TULUCAY-BSLT TAP)	P2	Line section w/o fault	133	141	142	124	127	131	58	75	148	140	146	107	131			Short Term : Action Plan ; Long Term : Preferred resource
32656 NAPA 60.0 32662 TULCY JT 60.0 1 1	P2-1:A6:24:_TULUCAY-NAPA #2 60KV [8190] (TULUCAY-BSLT TAP)	P2	Line section w/o fault	133	141	142	124	127	131	58	75	148	140	146	107	131			Short Term : Action Plan ; Long Term : Preferred resource
32666 IGNACO B 60.0 32674 WOODACRE 60.0 1 1	P2-1:A6:30:_IGNACIO-BOLINAS #2 60KV [7180] (IGNACO B-STAF_JCT)	P2	Line section w/o fault	65	80	83	105	106	111	25	23	90	83	93	55	120			System upgrade or preferred resource
32667 IG JCT 60.0 32678 SAN_RFLJ 60.0 1 1	P2-1:A6:41:_IGNACIO-ALTO-SAUSALITO #2 60KV [7170] (ALTO-ALTOJ2)	P2	Line section w/o fault	52	54	53	99	102	112	27	29	59	55	58	42	121			Ignacio - Alto Voltage Conversion Revised Scope
32669 STAF_JCT 60.0 32673 TOCA_JCT 60.0 1 1	P2-1:A6:30:_IGNACIO-BOLINAS #2 60KV [7180] (IGNACO B-STAF_JCT)	P2	Line section w/o fault	65	82	84	82	82	83	21	18	95	86	97	54	106			System upgrade or preferred resource
32671 BOLINAS 60.0 32674 WOODACRE 60.0 1 1	P2-1:A6:30:_IGNACIO-BOLINAS #2 60KV [7180] (IGNACO B-STAF_JCT)	P2	Line section w/o fault	85	107	110	126	126	130	31	29	122	111	125	72	155			System upgrade or preferred resource
32672 OLEMA 60.0 32671 BOLINAS 60.0 1 1	P2-1:A6:30:_IGNACIO-BOLINAS #2 60KV [7180] (IGNACO B-STAF_JCT)	P2	Line section w/o fault	158	201	206	232	233	237	56	51	232	210	237	134	295			Short Term : Action Plan ; Long Term : Preferred resource
32673 TOCA_JCT 60.0 32672 OLEMA 60.0 1 1	P2-1:A6:31:_IGNACIO-BOLINAS #1 60KV [7140] (IGNACO B-WOODACRE)	P2	Line section w/o fault	69	78	85	109	114	133	35	34	84	78	91	61	163			System upgrade or preferred resource
32678 SAN_RFLJ 60.0 32680 GREENBRE 60.0 1 1	P2-1:A6:29:_IGNACIO-ALTO-SAUSALITO #1 60KV [7160] (IGNACO A-TWR2_19)	P2	Line section w/o fault	52	54	52	90	93	102	27	29	58	55	58	42	121			System upgrade or preferred resource

Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading % (Baseline Scenarios)								Loading % (Sensitivity Scenarios)						Project & Potential Mitigation Solutions		
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Winter Peak	2022 Winter Peak	2027 Winter Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022 SP High CEC Forecast	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations				
31334 CLER LKE 60.0 31335 GRANITE 60.0 1 1	P1-1:A2:1: SANTA FE 13.80KV GEN UNIT 1 & P1-3:A2:27: EGGLE RCK 115/60KV TB 1	P3	G-1/N-1	97	100	98	<90	<90	<90	<90	<90	109	103	97	101	<90				Short Term: Middletown UVLS Long Term: Clear Lake Reinforcement Project Revised Scope
31334 CLER LKE 60.0 31335 GRANITE 60.0 1 1	P1-1:A2:19: POTTRVLY 2.40KV GEN UNIT 3 & P1-3:A2:27: EGGLE RCK 115/60KV TB 1	P3	G-1/N-1	97	100	98	<90	<90	<90	<90	<90	109	103	97	102	<90				Short Term: Middletown UVLS Long Term: Clear Lake Reinforcement Project Revised Scope
31334 CLER LKE 60.0 31335 GRANITE 60.0 1 1	P1-1:A2:2: SANTA FE 13.80KV GEN UNIT 2 & P1-3:A2:27: EGGLE RCK 115/60KV TB 1	P3	G-1/N-1	97	100	98	<90	<90	<90	<90	<90	109	103	97	101	<90				Short Term: Middletown UVLS Long Term: Clear Lake Reinforcement Project Revised Scope
31334 CLER LKE 60.0 31335 GRANITE 60.0 1 1	P1-1:A2:20: POTTRVLY 2.40KV GEN UNIT 4 & P1-3:A2:27: EGGLE RCK 115/60KV TB 1	P3	G-1/N-1	97	100	98	<90	<90	<90	<90	<90	109	103	97	102	<90				Short Term: Middletown UVLS Long Term: Clear Lake Reinforcement Project Revised Scope
31334 CLER LKE 60.0 31335 GRANITE 60.0 1 1	P1-1:A2:21: GEO. ENGY 9.11KV GEN UNIT 1 & P1-3:A2:27: EGGLE RCK 115/60KV TB 1	P3	G-1/N-1	97	100	98	<90	<90	<90	<90	<90	109	103	97	102	<90				Short Term: Middletown UVLS Long Term: Clear Lake Reinforcement Project Revised Scope
31334 CLER LKE 60.0 31335 GRANITE 60.0 1 1	P1-1:A2:22: GEO. ENGY 9.11KV GEN UNIT 2 & P1-2:A2:54: KONOCTI-EAGLE ROCK 60KV [6861]	P3	G-1/N-1	97	101	98	<90	<90	<90	<90	<90	109	103	98	102	<90				Short Term: Middletown UVLS Long Term: Clear Lake Reinforcement Project Revised Scope
31334 CLER LKE 60.0 31335 GRANITE 60.0 1 1	P1-1:A2:23: INDIAN V 9.11KV GEN UNIT 1 & P1-2:A2:54: KONOCTI-EAGLE ROCK 60KV [6861]	P3	G-1/N-1	97	101	98	<90	<90	<90	<90	<90	109	103	98	102	<90				Short Term: Middletown UVLS Long Term: Clear Lake Reinforcement Project Revised Scope
31334 CLER LKE 60.0 31335 GRANITE 60.0 1 1	P1-1:A2:24: SONMA LF 9.11KV GEN UNIT 1 & P1-2:A2:54: KONOCTI-EAGLE ROCK 60KV [6861]	P3	G-1/N-1	97	101	98	<90	<90	<90	<90	<90	109	103	98	102	<90				Short Term: Middletown UVLS Long Term: Clear Lake Reinforcement Project Revised Scope
31334 CLER LKE 60.0 31335 GRANITE 60.0 1 1	P1-1:A2:25: Q1221 13.80KV GEN UNIT 1 & P1-2:A2:54: KONOCTI-EAGLE ROCK 60KV [6861]	P3	G-1/N-1	97	100	98	<90	<90	<90	<90	<90	109	102	97	101	<90				Short Term: Middletown UVLS Long Term: Clear Lake Reinforcement Project Revised Scope
31334 CLER LKE 60.0 31335 GRANITE 60.0 1 1	P1-1:A2:3: WEST FOR 13.80KV GEN UNIT 1 & P1-3:A2:27: EGGLE RCK 115/60KV TB 1	P3	G-1/N-1	97	100	98	<90	<90	<90	<90	<90	109	103	97	102	<90				Short Term: Middletown UVLS Long Term: Clear Lake Reinforcement Project Revised Scope
31334 CLER LKE 60.0 31335 GRANITE 60.0 1 1	P1-1:A2:4: WEST FOR 13.80KV GEN UNIT 2 & P1-3:A2:27: EGGLE RCK 115/60KV TB 1	P3	G-1/N-1	97	100	98	<90	<90	<90	<90	<90	109	103	97	102	<90				Short Term: Middletown UVLS Long Term: Clear Lake Reinforcement Project Revised Scope
31334 CLER LKE 60.0 31335 GRANITE 60.0 1 1	P1-1:A2:9: GEYSER11 13.80KV GEN UNIT 1 & P1-2:A2:54: KONOCTI-EAGLE ROCK 60KV [6861]	P3	G-1/N-1	97	100	98	<90	<90	<90	<90	<90	109	103	97	101	<90				Short Term: Middletown UVLS Long Term: Clear Lake Reinforcement Project Revised Scope
31334 CLER LKE 60.0 31335 GRANITE 60.0 1 1	P1-1:A6:1: EXXON_BH 12.47KV GEN UNIT 1 & P1-2:A2:54: KONOCTI-EAGLE ROCK 60KV [6861]	P3	G-1/N-1	97	101	98	<90	<90	<90	<90	<90	109	103	98	102	<90				Short Term: Middletown UVLS Long Term: Clear Lake Reinforcement Project Revised Scope
31334 CLER LKE 60.0 31335 GRANITE 60.0 1 1	P1-1:A6:2: MONTICLO 9.11KV GEN UNIT 3 & P1-2:A2:54: KONOCTI-EAGLE ROCK 60KV [6861]	P3	G-1/N-1	97	101	98	<90	<90	<90	<90	<90	109	103	98	102	<90				Short Term: Middletown UVLS Long Term: Clear Lake Reinforcement Project Revised Scope
31335 GRANITE 60.0 31336 HPLND JT 60.0 1 1	P1-1:A2:9: GEYSER11 13.80KV GEN UNIT 1 & P1-3:A2:27: EGGLE RCK 115/60KV TB 1	P3	G-1/N-1	100	103	100	<90	<90	<90	<90	<90	113	106	100	104	<90				Short Term : Action Plan ; Long Term : Preferred resource
31335 GRANITE 60.0 31336 HPLND JT 60.0 1 1	P1-1:A6:1: EXXON_BH 12.47KV GEN UNIT 1 & P1-2:A2:54: KONOCTI-EAGLE ROCK 60KV [6861]	P3	G-1/N-1	100	104	100	<90	<90	<90	<90	<90	113	106	100	104	<90				Short Term : Action Plan ; Long Term : Preferred resource
31335 GRANITE 60.0 31336 HPLND JT 60.0 1 1	P1-1:A6:1: EXXON_BH 12.47KV GEN UNIT 1 & P1-3:A2:27: EGGLE RCK 115/60KV TB 1	P3	G-1/N-1	100	103	100	<90	<90	<90	<90	<90	113	106	100	104	<90				Short Term : Action Plan ; Long Term : Preferred resource
31335 GRANITE 60.0 31336 HPLND JT 60.0 1 1	P1-1:A6:2: MONTICLO 9.11KV GEN UNIT 3 & P1-2:A2:54: KONOCTI-EAGLE ROCK 60KV [6861]	P3	G-1/N-1	100	104	100	<90	<90	<90	<90	<90	113	106	100	104	<90				Short Term : Action Plan ; Long Term : Preferred resource
31335 GRANITE 60.0 31336 HPLND JT 60.0 1 1	P1-1:A6:2: MONTICLO 9.11KV GEN UNIT 3 & P1-3:A2:27: EGGLE RCK 115/60KV TB 1	P3	G-1/N-1	100	103	100	<90	<90	<90	<90	<90	112	106	100	104	<90				Short Term : Action Plan ; Long Term : Preferred resource

Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading % (Baseline Scenarios)								Loading % (Sensitivity Scenarios)						Project & Potential Mitigation Solutions		
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Winter Peak	2022 Winter Peak	2027 Winter Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022 SP High CEC Forecast	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations				
31362 TRNTN JT 60.0 31378 FULTON 60.0 1 1	P1-1:A2:9:_GEYSER11 13.80KV GEN UNIT 1 & P1-2:A2:58:_FULTON-LAGUNA-COTATI-SNMALDFL 60KV [0]	P3	G-1/N-1	<90	<90	<90	<90	<90	<90	<90	<90	<90	<90	<90	<90	119	<90			Sensitivity only
31362 TRNTN JT 60.0 31378 FULTON 60.0 1 1	P1-1:A6:1:_EXXON_BH 12.47KV GEN UNIT 1 & P1-2:A2:58:_FULTON-LAGUNA-COTATI-SNMALDFL 60KV [0]	P3	G-1/N-1	<90	<90	<90	<90	<90	<90	<90	<90	<90	<90	<90	<90	119	<90			Sensitivity only
31362 TRNTN JT 60.0 31378 FULTON 60.0 1 1	P1-1:A6:2:_MONTICLO 9.11KV GEN UNIT 3 & P1-2:A2:58:_FULTON-LAGUNA-COTATI-SNMALDFL 60KV [0]	P3	G-1/N-1	<90	<90	<90	<90	<90	<90	<90	<90	<90	<90	<90	<90	119	<90			Sensitivity only
31364 MOLINO 60.0 31363 TRNTN_JC 60.0 1 1	P1-1:A2:20:_POTTRVLY 2.40KV GEN UNIT 4 & P1-2:A2:58:_FULTON-LAGUNA-COTATI-SNMALDFL 60KV [0]	P3	G-1/N-1	<90	<90	<90	<90	<90	93	<90	<90	<90	<90	<90	<90	127	<90			Sensitivity only
31364 MOLINO 60.0 31363 TRNTN_JC 60.0 1 1	P1-1:A2:21:_GEO.ENGY 9.11KV GEN UNIT 1 & P1-2:A2:58:_FULTON-LAGUNA-COTATI-SNMALDFL 60KV [0]	P3	G-1/N-1	<90	<90	<90	<90	<90	93	<90	<90	<90	<90	<90	<90	127	<90			Sensitivity only
31364 MOLINO 60.0 31363 TRNTN_JC 60.0 1 1	P1-1:A2:23:_INDIAN V 9.11KV GEN UNIT 1 & P1-2:A2:58:_FULTON-LAGUNA-COTATI-SNMALDFL 60KV [0]	P3	G-1/N-1	<90	<90	<90	<90	<90	93	<90	<90	<90	<90	<90	<90	127	<90			Sensitivity only
31364 MOLINO 60.0 31363 TRNTN_JC 60.0 1 1	P1-1:A2:24:_SONMA LF 9.11KV GEN UNIT 1 & P1-2:A2:58:_FULTON-LAGUNA-COTATI-SNMALDFL 60KV [0]	P3	G-1/N-1	<90	<90	<90	<90	<90	93	<90	<90	<90	<90	<90	<90	127	<90			Sensitivity only
31364 MOLINO 60.0 31363 TRNTN_JC 60.0 1 1	P1-1:A2:25:_Q1221 13.80KV GEN UNIT 1 & P1-2:A2:58:_FULTON-LAGUNA-COTATI-SNMALDFL 60KV [0]	P3	G-1/N-1	<90	<90	<90	<90	<90	93	<90	<90	<90	<90	<90	<90	128	<90			Sensitivity only
31378 FULTON 60.0 32650 ST.HELNA 60.0 1 1	P1-1:A6:2:_MONTICLO 9.11KV GEN UNIT 3 & P1-2:A2:63:_LAKEVILLE #1 60KV [7360]	P3	G-1/N-1	<90	<90	<90	<90	<90	<90	<90	<90	100	<90	<90	<90	<90	<90			Sensitivity only
31384 COTATI 60.0 31389 PETC_JCT 60.0 1 1	P1-1:A2:10:_GEYSER12 13.80KV GEN UNIT 1 & P1-2:A2:20:_EGLE RCK-FULTON-SILVERDO 115KV [0]	P3	G-1/N-1	<90	<90	<90	<90	<90	<90	<90	<90	<90	<90	<90	<90	101	<90			Sensitivity only
31389 PETC_JCT 60.0 31390 PETLMA A 60.0 1 1	P1-1:A2:14:_GEYSER17 13.80KV GEN UNIT 1 & P1-2:A2:62:_LAKEVILLE-PETALUMA C 60KV [7350]	P3	G-1/N-1	<90	<90	94	109	110	114	<90	<90	<90	<90	<90	<90	156	<90			Lakeville #2 Upgrade (formerly known as Fulton 230/115 kV Transformer project)
31389 PETC_JCT 60.0 31390 PETLMA A 60.0 1 1	P1-1:A2:24:_SONMA LF 9.11KV GEN UNIT 1 & P1-2:A2:62:_LAKEVILLE-PETALUMA C 60KV [7350]	P3	G-1/N-1	<90	<90	94	110	110	115	<90	<90	<90	<90	<90	<90	157	<90			Lakeville #2 Upgrade (formerly known as Fulton 230/115 kV Transformer project)
31389 PETC_JCT 60.0 31390 PETLMA A 60.0 1 1	P1-1:A2:9:_GEYSER11 13.80KV GEN UNIT 1 & P1-2:A2:62:_LAKEVILLE-PETALUMA C 60KV [7350]	P3	G-1/N-1	<90	<90	93	109	109	113	<90	<90	<90	<90	<90	<90	156	<90			Lakeville #2 Upgrade (formerly known as Fulton 230/115 kV Transformer project)
31390 PETLMA A 60.0 31394 LKVLE JT 60.0 1 1	P1-1:A2:24:_SONMA LF 9.11KV GEN UNIT 1 & P1-2:A2:62:_LAKEVILLE-PETALUMA C 60KV [7350]	P3	G-1/N-1	<90	<90	98	146	146	152	<90	<90	<90	<90	<90	<90	164	<90			Lakeville #2 Upgrade (formerly known as Fulton 230/115 kV Transformer project)
31390 PETLMA A 60.0 31394 LKVLE JT 60.0 1 1	P1-1:A2:9:_GEYSER11 13.80KV GEN UNIT 1 & P1-2:A2:62:_LAKEVILLE-PETALUMA C 60KV [7350]	P3	G-1/N-1	<90	<90	97	144	145	151	<90	<90	<90	<90	<90	<90	162	<90			Lakeville #2 Upgrade (formerly known as Fulton 230/115 kV Transformer project)
31390 PETLMA A 60.0 31394 LKVLE JT 60.0 1 1	P1-1:A6:1:_EXXON_BH 12.47KV GEN UNIT 1 & P1-2:A2:62:_LAKEVILLE-PETALUMA C 60KV [7350]	P3	G-1/N-1	100	<90	<90	<90	<90	<90	<90	<90	<90	101	<90	<90	<90	<90			Lakeville #2 Upgrade (formerly known as Fulton 230/115 kV Transformer project)
31390 PETLMA A 60.0 31394 LKVLE JT 60.0 1 1	P1-1:A6:2:_MONTICLO 9.11KV GEN UNIT 3 & P1-2:A2:62:_LAKEVILLE-PETALUMA C 60KV [7350]	P3	G-1/N-1	100	<90	<90	<90	<90	<90	<90	<90	<90	101	<90	<90	<90	<90			Lakeville #2 Upgrade (formerly known as Fulton 230/115 kV Transformer project)
31392 LAKEVILLE 60.0 31394 LKVLE JT 60.0 1 1	P1-1:A2:24:_SONMA LF 9.11KV GEN UNIT 1 & P1-2:A2:62:_LAKEVILLE-PETALUMA C 60KV [7350]	P3	G-1/N-1	<90	<90	92	126	126	132	<90	<90	<90	<90	<90	<90	154	<90			System upgrade or preferred resource
31392 LAKEVILLE 60.0 31394 LKVLE JT 60.0 1 1	P1-1:A2:9:_GEYSER11 13.80KV GEN UNIT 1 & P1-2:A2:62:_LAKEVILLE-PETALUMA C 60KV [7350]	P3	G-1/N-1	<90	<90	91	125	125	130	<90	<90	<90	<90	<90	<90	152	<90			System upgrade or preferred resource

Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading % (Baseline Scenarios)								Loading % (Sensitivity Scenarios)					Project & Potential Mitigation Solutions		
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Winter Peak	2022 Winter Peak	2027 Winter Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022 SP High CEC Forecast	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations			
31397 WILLITSJ 60.0 31312 FRT BRGG 60.0 1 1	P1-1:A2:7:_GEYSER78 13.80KV GEN UNIT 1 & P1-2:A2:40:_MENDOCINO-PHILO JCT-HOPLAND 60KV [7520]	P3	G-1/N-1	<90	<90	<90	<90	<90	<90	<90	<90	<90	<90	<90	116	<90			Sensitivity only
32568 IGNACIO 115 32570 LS GLLNS 115 3 1	P1-1:A2:15:_GEYSER18 13.80KV GEN UNIT 1 & P1-2:A6:17:_IGNACIO-SAN RAFAEL #1 115KV [1850]	P3	G-1/N-1	<90	<90	<90	107	109	117	<90	<90	<90	<90	<90	127	<90			Ignacio - Alto Voltage Conversion Revised Scope
32568 IGNACIO 115 32570 LS GLLNS 115 3 1	P1-1:A2:4:_WEST FOR 13.80KV GEN UNIT 2 & P1-2:A6:17:_IGNACIO-SAN RAFAEL #1 115KV [1850]	P3	G-1/N-1	<90	<90	<90	<90	109	117	<90	<90	<90	<90	<90	127	<90			Ignacio - Alto Voltage Conversion Revised Scope
32664 IGNACO A 60.0 32666 IGNACO B 60.0 1 1	P1-1:A2:5:_GEYSR5-6 13.80KV GEN UNIT 1 & P1-3:A6:8:_IGNACIO 115/60KV TB 3	P3	G-1/N-1	<90	<90	<90	112	115	125	<90	<90	<90	<90	<90	125	<90			System upgrade or preferred resource
32664 IGNACO A 60.0 32666 IGNACO B 60.0 1 1	P1-1:A6:1:_EXXON_BH 12.47KV GEN UNIT 1 & P1-3:A6:8:_IGNACIO 115/60KV TB 3	P3	G-1/N-1	<90	<90	<90	112	115	125	<90	<90	<90	<90	<90	125	<90			System upgrade or preferred resource
32664 IGNACO A 60.0 32666 IGNACO B 60.0 1 1	P1-1:A6:2:_MONTICLO 9.11KV GEN UNIT 3 & P1-3:A6:8:_IGNACIO 115/60KV TB 3	P3	G-1/N-1	<90	<90	<90	112	115	125	<90	<90	<90	<90	<90	125	<90			System upgrade or preferred resource
32667 IG JCT 60.0 32678 SAN_RFLJ 60.0 1 1	P1-1:A2:1:_SANTA FE 13.80KV GEN UNIT 1 & P1-2:A6:23:_IGNACIO-ALTO-SAUSALITO #2 60KV [7170]	P3	G-1/N-1	<90	<90	<90	<90	102	111	<90	<90	<90	<90	<90	121	<90			Ignacio - Alto Voltage Conversion Revised Scope
32667 IG JCT 60.0 32678 SAN_RFLJ 60.0 1 1	P1-1:A2:12:_GEYSER14 13.80KV GEN UNIT 1 & P1-2:A6:24:_IGNACIO-ALTO-SAUSALITO #1 60KV [7160]	P3	G-1/N-1	<90	<90	<90	<90	102	112	<90	<90	<90	<90	<90	121	<90			Ignacio - Alto Voltage Conversion Revised Scope
32667 IG JCT 60.0 32678 SAN_RFLJ 60.0 1 1	P1-1:A2:17:_SMUDGE01 13.80KV GEN UNIT 1 & P1-2:A6:23:_IGNACIO-ALTO-SAUSALITO #2 60KV [7170]	P3	G-1/N-1	<90	<90	<90	<90	102	112	<90	<90	<90	<90	<90	121	<90			Ignacio - Alto Voltage Conversion Revised Scope
32667 IG JCT 60.0 32678 SAN_RFLJ 60.0 1 1	P1-1:A2:20:_POTTRVLY 2.40KV GEN UNIT 4 & P1-2:A6:23:_IGNACIO-ALTO-SAUSALITO #2 60KV [7170]	P3	G-1/N-1	<90	<90	<90	<90	102	111	<90	<90	<90	<90	<90	121	<90			Ignacio - Alto Voltage Conversion Revised Scope
32667 IG JCT 60.0 32678 SAN_RFLJ 60.0 1 1	P1-1:A2:21:_GEO.ENGY 9.11KV GEN UNIT 1 & P1-2:A6:23:_IGNACIO-ALTO-SAUSALITO #2 60KV [7170]	P3	G-1/N-1	<90	<90	<90	<90	102	111	<90	<90	<90	<90	<90	121	<90			Ignacio - Alto Voltage Conversion Revised Scope
32667 IG JCT 60.0 32678 SAN_RFLJ 60.0 1 1	P1-1:A2:23:_INDIAN V 9.11KV GEN UNIT 1 & P1-2:A6:23:_IGNACIO-ALTO-SAUSALITO #2 60KV [7170]	P3	G-1/N-1	<90	<90	<90	<90	102	111	<90	<90	<90	<90	<90	121	<90			Ignacio - Alto Voltage Conversion Revised Scope
32667 IG JCT 60.0 32678 SAN_RFLJ 60.0 1 1	P1-1:A2:24:_SONMA LF 9.11KV GEN UNIT 1 & P1-2:A6:23:_IGNACIO-ALTO-SAUSALITO #2 60KV [7170]	P3	G-1/N-1	<90	<90	<90	<90	102	112	<90	<90	<90	<90	<90	121	<90			Ignacio - Alto Voltage Conversion Revised Scope
32667 IG JCT 60.0 32678 SAN_RFLJ 60.0 1 1	P1-1:A2:25:_Q1221 13.80KV GEN UNIT 1 & P1-2:A6:24:_IGNACIO-ALTO-SAUSALITO #1 60KV [7160]	P3	G-1/N-1	<90	<90	<90	<90	102	112	<90	<90	<90	<90	<90	122	<90			Ignacio - Alto Voltage Conversion Revised Scope
32667 IG JCT 60.0 32678 SAN_RFLJ 60.0 1 1	P1-1:A2:4:_WEST FOR 13.80KV GEN UNIT 2 & P1-2:A6:24:_IGNACIO-ALTO-SAUSALITO #1 60KV [7160]	P3	G-1/N-1	<90	<90	<90	<90	102	112	<90	<90	<90	<90	<90	121	<90			Ignacio - Alto Voltage Conversion Revised Scope
32667 IG JCT 60.0 32678 SAN_RFLJ 60.0 1 1	P1-1:A2:9:_GEYSER11 13.80KV GEN UNIT 1 & P1-2:A6:24:_IGNACIO-ALTO-SAUSALITO #1 60KV [7160]	P3	G-1/N-1	<90	<90	<90	<90	102	112	<90	<90	<90	<90	<90	122	<90			Ignacio - Alto Voltage Conversion Revised Scope
32667 IG JCT 60.0 32678 SAN_RFLJ 60.0 1 1	P1-1:A6:1:_EXXON_BH 12.47KV GEN UNIT 1 & P1-2:A6:23:_IGNACIO-ALTO-SAUSALITO #2 60KV [7170]	P3	G-1/N-1	<90	<90	<90	<90	102	111	<90	<90	<90	<90	<90	121	<90			Ignacio - Alto Voltage Conversion Revised Scope
32667 IG JCT 60.0 32678 SAN_RFLJ 60.0 1 1	P1-1:A6:2:_MONTICLO 9.11KV GEN UNIT 3 & P1-2:A6:23:_IGNACIO-ALTO-SAUSALITO #2 60KV [7170]	P3	G-1/N-1	<90	<90	<90	<90	102	111	<90	<90	<90	<90	<90	121	<90			Ignacio - Alto Voltage Conversion Revised Scope
31246 BELLVUE 115 31248 PENNGRVE 115 1 1	P5-5:A2:1:_FULTON 230 KV BAAH BUS #1 (FAILURE OF NON-REDUNDENT RELAY)	P5	Non-redundant relay (Bus)	78	85	81	100	97	102	30	33	92	88	86	58	109			System upgrade or preferred resource

Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading % (Baseline Scenarios)								Loading % (Sensitivity Scenarios)						Project & Potential Mitigation Solutions		
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Winter Peak	2022 Winter Peak	2027 Winter Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022 SP High CEC Forecast	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations				
31248 PENNGRVE 115 31254 CORONA 115 1 1	P5-5:A2:1:_ FULTON 230 KV BAAH BUS #1 (FAILURE OF NON-REDUNDENT RELAY)	P5	Non-redndant relay (Bus)	82	89	85	106	104	110	33	35	97	92	90	61	117				System upgrade or preferred resource
31254 CORONA 115 31255 LAKEVILLE 115 1 1	P5-5:A2:1:_ FULTON 230 KV BAAH BUS #1 (FAILURE OF NON-REDUNDENT RELAY)	P5	Non-redndant relay (Bus)	80	86	83	112	110	116	32	37	94	89	87	59	111				System upgrade or preferred resource
31358 WHLR JCT 60.0 31356 MONTE RO 60.0 1 1	P5-5:A2:1:_ FULTON 230 KV BAAH BUS #1 (FAILURE OF NON-REDUNDENT RELAY)	P5	Non-redndant relay (Bus)	39	40	39	77	79	82	35	26	44	42	41	34	106				Sensitivity only
31366 MLNO JCT 60.0 31385 LAGUNATP 60.0 1 1	P5-5:A2:1:_ FULTON 230 KV BAAH BUS #1 (FAILURE OF NON-REDUNDENT RELAY)	P5	Non-redndant relay (Bus)	99	92	88	78	74	81	41	27	102	96	96	58	111				Sensitivity only
31384 COTATI 60.0 31389 PETC_JCT 60.0 1 1	P5-5:A2:1:_ FULTON 230 KV BAAH BUS #1 (FAILURE OF NON-REDUNDENT RELAY)	P5	Non-redndant relay (Bus)	136	137	130	147	143	153	60	44	152	144	142	91	207				Short Term : Action Plan ; Long Term : Preferred resource
31389 PETC_JCT 60.0 31390 PETLMA A 60.0 1 1	P5-5:A2:1:_ FULTON 230 KV BAAH BUS #1 (FAILURE OF NON-REDUNDENT RELAY)	P5	Non-redndant relay (Bus)	91	92	88	98	95	101	41	30	103	97	96	61	140				System upgrade or preferred resource
31390 PETLMA A 60.0 31394 LKYLE JT 60.0 1 1	P5-5:A2:1:_ FULTON 230 KV BAAH BUS #1 (FAILURE OF NON-REDUNDENT RELAY)	P5	Non-redndant relay (Bus)	95	97	92	130	127	135	42	33	107	101	100	64	146				Lakeville #2 Upgrade (formerly known as Fulton 230/115 kV Transformer project)
31391 SNMA TAP 60.0 31385 LAGUNATP 60.0 1 1	P5-5:A2:1:_ FULTON 230 KV BAAH BUS #1 (FAILURE OF NON-REDUNDENT RELAY)	P5	Non-redndant relay (Bus)	103	98	93	83	79	85	44	31	109	103	101	64	117				Short Term : Action Plan ; Long Term : Preferred resource
31392 LAKEVILLE 60.0 31394 LKYLE JT 60.0 1 1	P5-5:A2:1:_ FULTON 230 KV BAAH BUS #1 (FAILURE OF NON-REDUNDENT RELAY)	P5	Non-redndant relay (Bus)	89	90	86	112	110	117	40	31	100	95	94	60	137				System upgrade or preferred resource
30435 LAKEVILLE 230 30460 VACA-DIX 230 1 1	P1-2:A2:3:_ GEYSR18-LAKEVILLE-GEYSR20-SNTAFE-GEYSR13 230KV [0] & P1-2:A6:6:_ TULUCAY-VACA 230KV [5800]	P6	N-1-1	100	97	95	101	102	105	<90	<90	103	100	100	<90	117				System upgrade or preferred resource
30440 TULUCAY 230 30460 VACA-DIX 230 1 1	P1-2:A2:9:_ VACA-LAKEVILLE #1 230KV [5840] & P1-2:A2:3:_ GEYSR18-LAKEVILLE-GEYSR20-SNTAFE-GEYSR13 230KV [0]	P6	N-1-1	100	96	94	100	100	101	<90	<90	104	100	100	<90	114				System upgrade or preferred resource
30440 TULUCAY 230 30460 VACA-DIX 230 1 1	P1-2:A2:9:_ VACA-LAKEVILLE #1 230KV [5840] & P1-2:A6:5:_ IGNACIO-SOBRANTE 230KV [4920]	P6	N-1-1	90	<90	<90	95	95	98	<90	<90	95	90	91	<90	111				Sensitivity only
30440 TULUCAY 230 30460 VACA-DIX 230 1 1	P1-2:A6:13:_ SILVERDO-FULTON-EGLE RCK 115KV [0] & P1-2:A2:9:_ VACA-LAKEVILLE #1 230KV [5840]	P6	N-1-1	<90	<90	<90	<90	85	88	<90	<90	93	<90	91	<90	100				Sensitivity only
30440 TULUCAY 230 30460 VACA-DIX 230 1 1	P1-2:A6:5:_ IGNACIO-SOBRANTE 230KV [4920] & P1-2:A2:9:_ VACA-LAKEVILLE #1 230KV [5840]	P6	N-1-1	90	<90	<90	95	95	98	<90	<90	98	91	95	<90	111				Sensitivity only
31200 MENDOCNO 115 31260 MNDCCNO M 115 1 1	P1-2:A2:16:_ UKIAH-HOPLAND-CLOVERDALE 115KV [4050] & P1-2:A2:15:_ MENDOCINO-REDBUD 115KV [2410]	P6	N-1-1	<90	<90	<90	<90	<90	<90	103	<90	<90	<90	<90	<90	<90				System upgrade or preferred resource
31200 MENDOCNO 115 31260 MNDCCNO M 115 1 1	P1-2:A2:19:_ CORTINA-MENDOCINO #1 115KV [1330] & P1-2:A2:24:_ REDBUD-HGHLNDJ1 115KV [0]	P6	N-1-1	<90	<90	<90	<90	<90	<90	<90	<90	<90	<90	<90	115	<90				Sensitivity only
31223 REDBUDJ1 115 31222 REDBUD 115 1 1	P1-2:A2:17:_ CLOVRDLE-MPE-GEYSERS34 115KV [0] & P1-2:A2:19:_ CORTINA-MENDOCINO #1 115KV [1330]	P6	N-1-1	95	93	93	<90	<90	<90	<90	<90	99	95	94	<90	100				Sensitivity only

Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading % (Baseline Scenarios)								Loading % (Sensitivity Scenarios)						Project & Potential Mitigation Solutions	
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Winter Peak	2022 Winter Peak	2027 Winter Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022 SP High CEC Forecast	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations			
31223 REDBUDJ1 115 31222 REDBUD 115 1 1	P1-2:A2:19:_CORTINA-MENDOCINO #1 115KV [1330] & P1-2:A2:17:_CLOVRDLE-MPE-GEYSERS34 115KV [0]	P6	N-1-1	95	93	93	<90	<90	<90	<90	<90	99	95	94	<90	102			Sensitivity only
31224 INDIN VL 115 31215 LUCERNJ1 115 1 1	P1-2:A2:13:_EAGLE ROCK-REDBUD 115KV [1480] & P1-2:A2:17:_CLOVRDLE-MPE-GEYSERS34 115KV [0]	P6	N-1-1	91	<90	<90	100	100	100	<90	<90	100	<90	<90	<90	101			System upgrade or preferred resource
31224 INDIN VL 115 31215 LUCERNJ1 115 1 1	P1-2:A2:17:_CLOVRDLE-MPE-GEYSERS34 115KV [0] & P1-2:A2:13:_EAGLE ROCK-REDBUD 115KV [1480]	P6	N-1-1	88	<90	<90	97	99	101	<90	<90	94	<90	<90	<90	100			System upgrade or preferred resource
31224 INDIN VL 115 31215 LUCERNJ1 115 1 1	P1-2:A2:17:_CLOVRDLE-MPE-GEYSERS34 115KV [0] & P1-2:A2:24:_REDBUD-HGHLNDJ1 115KV [0]	P6	N-1-1	88	<90	<90	97	99	100	<90	<90	94	<90	<90	<90	100			System upgrade or preferred resource
31224 INDIN VL 115 31215 LUCERNJ1 115 1 1	P1-2:A2:24:_REDBUD-HGHLNDJ1 115KV [0] & P1-2:A2:17:_CLOVRDLE-MPE-GEYSERS34 115KV [0]	P6	N-1-1	91	<90	<90	100	100	100	<90	<90	100	<90	<90	<90	101			System upgrade or preferred resource
31229 REDBUDJ2 115 31222 REDBUD 115 1 1	P1-2:A2:17:_CLOVRDLE-MPE-GEYSERS34 115KV [0] & P1-2:A2:22:_CORTINA-MENDOCINO #1 115KV [1330] (2)	P6	N-1-1	101	102	101	94	95	96	<90	<90	107	103	102	<90	112			Short Term : Action Plan ; Long Term : Preferred resource
31229 REDBUDJ2 115 31222 REDBUD 115 1 1	P1-2:A2:22:_CORTINA-MENDOCINO #1 115KV [1330] (2) & P1-2:A2:17:_CLOVRDLE-MPE-GEYSERS34 115KV [0]	P6	N-1-1	101	102	101	97	95	100	<90	<90	107	103	102	<90	113			Short Term : Action Plan ; Long Term : Preferred resource
31236 FULTON 115 31239 MONROE2 115 1 1	P1-2:A2:32:_CORONA-LAKEVILLE 115KV [4311] & P1-2:A2:25:_FULTON-SANTA ROSA #1 115KV [1620]	P6	N-1-1	101	107	103	125	126	129	<90	<90	114	109	106	<90	137			Short Term : Action Plan ; Long Term : Preferred resource
31236 FULTON 115 31239 MONROE2 115 1 1	P1-2:A2:32:_CORONA-LAKEVILLE 115KV [4311] & P1-2:A2:28:_FULTON-SANTA ROSA #1 115KV [1620] (2)	P6	N-1-1	92	97	94	115	116	119	<90	<90	104	99	96	<90	127			System upgrade or preferred resource
31238 MONROE1 115 31240 SNTA RSA 115 1 1	P1-2:A2:26:_FULTON-SANTA ROSA #2 115KV [1630] & P1-2:A2:31:_SANTA ROSA-CORONA 115KV [4309] (2)	P6	N-1-1	<90	<90	<90	98	99	101	<90	<90	<90	<90	<90	<90	107			System upgrade or preferred resource
31239 MONROE2 115 31240 SNTA RSA 115 1 1	P1-2:A2:25:_FULTON-SANTA ROSA #1 115KV [1620] & P1-2:A2:32:_CORONA-LAKEVILLE 115KV [4311]	P6	N-1-1	<90	<90	<90	103	104	107	<90	<90	95	91	<90	<90	114			System upgrade or preferred resource
31239 MONROE2 115 31240 SNTA RSA 115 1 1	P1-2:A2:32:_CORONA-LAKEVILLE 115KV [4311] & P1-2:A2:25:_FULTON-SANTA ROSA #1 115KV [1620]	P6	N-1-1	<90	<90	<90	103	104	106	<90	<90	95	91	<90	<90	113			System upgrade or preferred resource
31246 BELLVUE 115 31248 PENNGRVE 115 1 1	P1-2:A2:25:_FULTON-SANTA ROSA #1 115KV [1620] & P1-2:A2:26:_FULTON-SANTA ROSA #2 115KV [1630]	P6	N-1-1	95	100	96	118	118	122	<90	<90	107	103	99	<90	129			System upgrade or preferred resource
31248 PENNGRVE 115 31254 CORONA 115 1 1	P1-2:A2:26:_FULTON-SANTA ROSA #2 115KV [1630] & P1-2:A2:25:_FULTON-SANTA ROSA #1 115KV [1620]	P6	N-1-1	98	104	100	124	126	129	<90	<90	111	106	103	<90	137			System upgrade or preferred resource
31248 PENNGRVE 115 31254 CORONA 115 1 1	P1-2:A2:28:_FULTON-SANTA ROSA #1 115KV [1620] (2) & P1-2:A2:26:_FULTON-SANTA ROSA #2 115KV [1630]	P6	N-1-1	<90	92	<90	112	113	116	<90	<90	98	94	91	<90	124			System upgrade or preferred resource
31254 CORONA 115 31255 LAKEVILLE 115 1 1	P1-2:A2:25:_FULTON-SANTA ROSA #1 115KV [1620] & P1-2:A2:26:_FULTON-SANTA ROSA #2 115KV [1630]	P6	N-1-1	95	100	96	130	131	135	<90	<90	107	102	99	<90	128			System upgrade or preferred resource
31254 CORONA 115 31255 LAKEVILLE 115 1 1	P1-2:A2:29:_FULTON-SANTA ROSA #2 115KV [1630] (2) & P1-2:A2:25:_FULTON-SANTA ROSA #1 115KV [1620]	P6	N-1-1	<90	<90	<90	102	103	105	<90	<90	<90	<90	<90	<90	100			System upgrade or preferred resource

Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading % (Baseline Scenarios)								Loading % (Sensitivity Scenarios)						Project & Potential Mitigation Solutions	
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Winter Peak	2022 Winter Peak	2027 Winter Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022 SP High CEC Forecast	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations			
31254 CORONA 115 31255 LAKEVILLE 115 1 1	P1-3:A2:18:_FULTON 230/115KV TB 9 & P1-3:A2:17:_FULTON 230/115KV TB 4	P6	N-1-1	<90	<90	<90	109	109	115	<90	<90	94	<90	<90	<90	109			System upgrade or preferred resource
31262 CACHE J2 115 31229 REDBUDJ2 115 1 1	P1-2:A2:16:_UKIAH-HOPLAND-CLOVERDALE 115KV [4050] & P1-2:A2:19:_CORTINA-MENDOCINO #1 115KV [1330]	P6	N-1-1	88	88	88	94	92	94	<90	<90	95	90	90	<90	101			Sensitivity only
31262 CACHE J2 115 31229 REDBUDJ2 115 1 1	P1-2:A2:19:_CORTINA-MENDOCINO #1 115KV [1330] & P1-2:A2:17:_CLOVRDLE-MPE-GEYSERS34 115KV [0]	P6	N-1-1	95	95	95	100	98	100	<90	<90	100	96	95	<90	106			System upgrade or preferred resource
31300 MENDOCNO 60.0 31330 UPRR LKE 60.0 1 1	P1-2:A2:50:_CLEAR LAKE-HOPLAND 60KV [6390] & P1-2:A2:54:_KONOCTI-EAGLE ROCK 60KV [6861]	P6	N-1-1	223	221	217	196	195	194	<90	<90	231	224	216	197	229			Short Term : Action Plan ; Long Term : Preferred resource
31300 MENDOCNO 60.0 31330 UPRR LKE 60.0 1 1	P1-2:A2:50:_CLEAR LAKE-HOPLAND 60KV [6390] & P1-3:A2:27:_EGLE RCK 115/60KV TB 1	P6	N-1-1	223	221	216	195	195	195	<90	<90	231	224	217	196	229			Short Term : Action Plan ; Long Term : Preferred resource
31300 MENDOCNO 60.0 31330 UPRR LKE 60.0 1 1	P1-2:A2:54:_KONOCTI-EAGLE ROCK 60KV [6861] & P1-2:A2:50:_CLEAR LAKE-HOPLAND 60KV [6390]	P6	N-1-1	224	220	217	195	194	194	<90	<90	230	224	217	196	229			Short Term : Action Plan ; Long Term : Preferred resource
31300 MENDOCNO 60.0 31330 UPRR LKE 60.0 1 1	P1-3:A2:27:_EGLE RCK 115/60KV TB 1 & P1-2:A2:50:_CLEAR LAKE-HOPLAND 60KV [6390]	P6	N-1-1	224	220	217	195	194	194	<90	<90	230	224	217	197	229			Short Term : Action Plan ; Long Term : Preferred resource
31334 CLER LKE 60.0 31335 GRANITE 60.0 1 1	P1-2:A2:54:_KONOCTI-EAGLE ROCK 60KV [6861] & P1-2:A2:24:_REDBUD-HIGHLNDJ1 115KV [0]	P6	N-1-1	101	103	100	<90	<90	<90	<90	<90	114	106	99	89	105			Short Term: Middletown UVLS Long Term: Clear Lake Reinforcement Project Revised Scope
31334 CLER LKE 60.0 31335 GRANITE 60.0 1 1	P1-2:A2:54:_KONOCTI-EAGLE ROCK 60KV [6861] & P1-2:A2:41:_MENDOCINO-HARTLEY 60KV [7510]	P6	N-1-1	175	194	183	153	150	147	<90	<90	221	198	183	142	201			Short Term: Middletown UVLS Long Term: Clear Lake Reinforcement Project Revised Scope
31334 CLER LKE 60.0 31335 GRANITE 60.0 1 1	P1-3:A6:8:_IGNACIO 115/60KV TB 3 & P1-2:A2:54:_KONOCTI-EAGLE ROCK 60KV [6861]	P6	N-1-1	97	101	98	<90	<90	<90	<90	<90	109	103	98	<90	102			Short Term: Middletown UVLS Long Term: Clear Lake Reinforcement Project Revised Scope
31334 CLER LKE 60.0 31335 GRANITE 60.0 1 1	P1-3:A6:8:_IGNACIO 115/60KV TB 3 & P1-3:A2:27:_EGLE RCK 115/60KV TB 1	P6	N-1-1	97	100	98	<90	<90	<90	<90	<90	109	103	97	<90	102			Short Term: Middletown UVLS Long Term: Clear Lake Reinforcement Project Revised Scope
31334 CLER LKE 60.0 31338 KONOCTI6 60.0 1 1	P1-2:A2:17:_CLOVRDLE-MPE-GEYSERS34 115KV [0] & P1-2:A2:24:_REDBUD-HIGHLNDJ1 115KV [0]	P6	N-1-1	116	121	121	100	100	101	98	100	124	121	122	100	126			Short Term : Action Plan ; Long Term : Preferred resource
31334 CLER LKE 60.0 31338 KONOCTI6 60.0 1 1	P1-2:A2:17:_CLOVRDLE-MPE-GEYSERS34 115KV [0] & P1-2:A6:13:_SILVERDO-FULTON-EGLE RCK 115KV [0]	P6	N-1-1	100	101	101	87	89	86	<90	86	102	100	102	88	106			System upgrade or preferred resource
31334 CLER LKE 60.0 31338 KONOCTI6 60.0 1 1	P1-2:A2:41:_MENDOCINO-HARTLEY 60KV [7510] & P1-3:A2:27:_EGLE RCK 115/60KV TB 1	P6	N-1-1	<90	<90	<90	<90	<90	<90	<90	<90	106	93	<90	<90	94			Sensitivity only
31334 CLER LKE 60.0 31338 KONOCTI6 60.0 1 1	P1-2:A2:54:_KONOCTI-EAGLE ROCK 60KV [6861] & P1-2:A2:41:_MENDOCINO-HARTLEY 60KV [7510]	P6	N-1-1	<90	90	<90	<90	<90	<90	<90	<90	106	93	<90	<90	93			Sensitivity only
31334 CLER LKE 60.0 31338 KONOCTI6 60.0 1 1	P1-2:A6:13:_SILVERDO-FULTON-EGLE RCK 115KV [0] & P1-2:A2:16:_UKIAH-HOPLAND-CLOVERDALE 115KV [4050]	P6	N-1-1	98	98	99	86	87	88	82	91	101	98	100	90	104			Sensitivity only
31334 CLER LKE 60.0 31338 KONOCTI6 60.0 1 1	P1-3:A2:27:_EGLE RCK 115/60KV TB 1 & P1-2:A2:41:_MENDOCINO-HARTLEY 60KV [7510]	P6	N-1-1	<90	<90	<90	<90	<90	<90	<90	<90	106	92	<90	<90	93			Sensitivity only

Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading % (Baseline Scenarios)								Loading % (Sensitivity Scenarios)						Project & Potential Mitigation Solutions		
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Winter Peak	2022 Winter Peak	2027 Winter Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022 SP High CEC Forecast	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations				
31335 GRANITE 60.0 31336 HPLND JT 60.0 1 1	P1-4:A2:6:_MENDOCNO SVD=V & P1-3:A2:27:_EGLE RCK 115/60KV TB 1	P6	N-1-1	99	103	99	<90	<90	<90	<90	<90	112	105	99	<90	104				System upgrade or preferred resource
31335 GRANITE 60.0 31336 HPLND JT 60.0 1 1	P1-4:A2:8:_FT_BRGD2 SVD=V & P1-2:A2:54:_KONOCTI-EAGLE ROCK 60KV [6861]	P6	N-1-1	100	104	100	<90	<90	<90	<90	<90	113	106	100	<90	105				Short Term : Action Plan ; Long Term : Preferred resource
31335 GRANITE 60.0 31336 HPLND JT 60.0 1 1	P1-4:A2:9:_FT_BRGD2 SVD=V & P1-3:A2:27:_EGLE RCK 115/60KV TB 1	P6	N-1-1	100	104	100	<90	<90	<90	<90	<90	113	106	100	<90	105				Short Term : Action Plan ; Long Term : Preferred resource
31335 GRANITE 60.0 31336 HPLND JT 60.0 1 1	P1-4:A2:9:_ELK_D SVD=V & P1-2:A2:54:_KONOCTI-EAGLE ROCK 60KV [6861]	P6	N-1-1	100	104	100	<90	<90	<90	<90	<90	113	106	100	<90	105				Short Term : Action Plan ; Long Term : Preferred resource
31335 GRANITE 60.0 31336 HPLND JT 60.0 1 1	P1-4:A2:9:_ELK_D SVD=V & P1-3:A2:27:_EGLE RCK 115/60KV TB 1	P6	N-1-1	100	103	100	<90	<90	<90	<90	<90	113	106	100	<90	105				Short Term : Action Plan ; Long Term : Preferred resource
31335 GRANITE 60.0 31336 HPLND JT 60.0 1 1	P1-4:A6:1:_PUEBLO SVD=V & P1-2:A2:54:_KONOCTI-EAGLE ROCK 60KV [6861]	P6	N-1-1	100	104	100	<90	<90	<90	<90	<90	113	106	100	<90	104				Short Term : Action Plan ; Long Term : Preferred resource
31336 HPLND JT 60.0 31206 HPLND JT 115 2 1	P1-3:A2:23:_MENDOCNO 115/60KV TB 3 & P1-2:A2:54:_KONOCTI-EAGLE ROCK 60KV [6861]	P6	N-1-1	96	91	<90	102	102	101	<90	<90	96	93	90	<90	104				Reverse power relay will activate.
31336 HPLND JT 60.0 31206 HPLND JT 115 2 1	P1-3:A2:23:_MENDOCNO 115/60KV TB 3 & P1-3:A2:27:_EGLE RCK 115/60KV TB 1	P6	N-1-1	96	91	<90	102	102	101	<90	<90	96	93	90	<90	104				Reverse power relay will activate.
31336 HPLND JT 60.0 31206 HPLND JT 115 2 1	P1-3:A2:23:_MENDOCNO 115/60KV TB 3 & P1-3:A2:33:_MENDOCNO 115/60KV TB 1	P6	N-1-1	100	92	97	121	124	126	<90	<90	101	94	100	<90	129				Reverse power relay will activate.
31338 KONOCTI6 60.0 31344 EGLE RCK 60.0 1 1	P1-2:A2:17:_CLOVRDLE-MPE-GEYSERS34 115KV [0] & P1-2:A2:24:_REDBUD-HGHLNDJ1 115KV [0]	P6	N-1-1	112	112	110	100	99	100	<90	<90	119	113	111	95	117				Short Term : Action Plan ; Long Term : Preferred resource
31338 KONOCTI6 60.0 31344 EGLE RCK 60.0 1 1	P1-2:A2:17:_CLOVRDLE-MPE-GEYSERS34 115KV [0] & P1-2:A6:13:_SILVERDO-FULTON-EGLE RCK 115KV [0]	P6	N-1-1	102	100	98	92	92	89	<90	<90	105	101	99	89	104				Short Term : Action Plan ; Long Term : Preferred resource
31338 KONOCTI6 60.0 31344 EGLE RCK 60.0 1 1	P1-2:A2:20:_EGLE RCK-FULTON-SILVERDO 115KV [0] & P1-2:A2:17:_CLOVRDLE-MPE-GEYSERS34 115KV [0]	P6	N-1-1	102	99	98	91	91	91	<90	<90	105	100	99	90	103				Short Term : Action Plan ; Long Term : Preferred resource
31338 KONOCTI6 60.0 31344 EGLE RCK 60.0 1 1	P1-2:A2:22:_CORTINA-MENDOCINO #1 115KV [1330] (2) & P1-2:A2:17:_CLOVRDLE-MPE-GEYSERS34 115KV [0]	P6	N-1-1	106	103	101	96	95	98	<90	<90	111	105	102	<90	112				Short Term : Action Plan ; Long Term : Preferred resource
31338 KONOCTI6 60.0 31344 EGLE RCK 60.0 1 1	P1-2:A2:24:_REDBUD-HGHLNDJ1 115KV [0] & P1-2:A2:17:_CLOVRDLE-MPE-GEYSERS34 115KV [0]	P6	N-1-1	111	112	110	100	97	100	<90	<90	116	113	111	95	116				Short Term : Action Plan ; Long Term : Preferred resource
31338 KONOCTI6 60.0 31344 EGLE RCK 60.0 1 1	P1-2:A6:13:_SILVERDO-FULTON-EGLE RCK 115KV [0] & P1-2:A2:16:_UKIAH-HOPLAND-CLOVERDALE 115KV [4050]	P6	N-1-1	101	99	97	92	91	91	<90	<90	104	100	98	90	104				Short Term : Action Plan ; Long Term : Preferred resource
31338 KONOCTI6 60.0 31344 EGLE RCK 60.0 1 1	P1-2:A6:13:_SILVERDO-FULTON-EGLE RCK 115KV [0] & P1-2:A2:17:_CLOVRDLE-MPE-GEYSERS34 115KV [0]	P6	N-1-1	102	99	98	91	91	91	<90	<90	105	100	99	90	103				Short Term : Action Plan ; Long Term : Preferred resource
31358 WHLR JCT 60.0 31356 MONTE RO 60.0 1 1	P1-3:A2:18:_FULTON 230/115KV TB 9 & P1-3:A2:17:_FULTON 230/115KV TB 4	P6	N-1-1	<90	<90	<90	<90	<90	<90	<90	<90	<90	<90	<90	<90	106				Sensitivity only
31362 TRNTN JT 60.0 31378 FULTON 60.0 1 1	P1-4:A6:1:_PUEBLO SVD=V & P1-2:A2:58:_FULTON-LAGUNA-COTATI-SNMALDFL 60KV [0]	P6	N-1-1	<90	<90	<90	<90	<90	<90	<90	<90	<90	<90	<90	<90	119				Sensitivity only

Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading % (Baseline Scenarios)								Loading % (Sensitivity Scenarios)						Project & Potential Mitigation Solutions		
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Winter Peak	2022 Winter Peak	2027 Winter Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022 SP High CEC Forecast	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations				
31366 MLNO JCT 60.0 31385 LAGUNATP 60.0 1 1	P1-3:A2:21:_LAKEVILLE 230/60KV TB 3 & P1-3:A2:22:_LAKEVILLE 230/60KV TB 5	P6	N-1-1	299	304	297	272	273	277	113	141	317	311	308	204	379				Short Term : Action Plan ; Long Term : Preferred resource
31366 MLNO JCT 60.0 31385 LAGUNATP 60.0 1 1	P1-3:A2:31:_FULTON 115/60KV TB 2 & P1-3:A2:30:_FULTON 115/60KV TB 1	P6	N-1-1	296	274	273	213	214	216	197	119	282	278	278	235	297				Short Term : Action Plan ; Long Term : Preferred resource
31370 CLVRDLJT 60.0 31374 GYSRJCT1 60.0 1 1	P1-3:A2:17:_FULTON 230/115KV TB 4 & P1-2:A2:20:_EGLE RCK-FULTON-SILVERDO 115KV [0]	P6	N-1-1	99	96	92	92	92	<90	<90	<90	100	99	99	<90	111				Sensitivity only
31370 CLVRDLJT 60.0 31374 GYSRJCT1 60.0 1 1	P1-3:A2:17:_FULTON 230/115KV TB 4 & P1-2:A6:13:_SILVERDO-FULTON-EGLE RCK 115KV [0]	P6	N-1-1	99	96	92	92	92	<90	<90	<90	100	99	99	<90	111				Sensitivity only
31370 CLVRDLJT 60.0 31374 GYSRJCT1 60.0 1 1	P1-3:A2:18:_FULTON 230/115KV TB 9 & P1-2:A2:20:_EGLE RCK-FULTON-SILVERDO 115KV [0]	P6	N-1-1	99	97	93	93	93	<90	<90	<90	100	99	99	<90	116				Sensitivity only
31370 CLVRDLJT 60.0 31374 GYSRJCT1 60.0 1 1	P1-3:A2:18:_FULTON 230/115KV TB 9 & P1-2:A6:13:_SILVERDO-FULTON-EGLE RCK 115KV [0]	P6	N-1-1	99	97	93	93	93	<90	<90	<90	100	99	99	<90	116				Sensitivity only
31370 CLVRDLJT 60.0 31374 GYSRJCT1 60.0 1 1	P1-3:A2:31:_FULTON 115/60KV TB 2 & P1-3:A2:30:_FULTON 115/60KV TB 1	P6	N-1-1	202	187	185	149	149	149	152	100	191	189	190	170	203				Short Term : Action Plan ; Long Term : Preferred resource
31374 GYSRJCT1 60.0 31382 FTCHMTNP 60.0 1 1	P1-2:A2:20:_EGLE RCK-FULTON-SILVERDO 115KV [0] & P1-2:A2:12:_EAGLE ROCK-CORTINA 115KV [1470]	P6	N-1-1	96	93	92	<90	53	<90	101	101	89	92	91	99	85				System upgrade or preferred resource
31374 GYSRJCT1 60.0 31382 FTCHMTNP 60.0 1 1	P1-2:A2:6:_FULTON-LAKEVILLE 230KV [4950] & P1-2:A6:13:_SILVERDO-FULTON-EGLE RCK 115KV [0]	P6	N-1-1	99	97	92	<90	<90	<90	<90	<90	99	97	92	<90	100				Sensitivity only
31374 GYSRJCT1 60.0 31382 FTCHMTNP 60.0 1 1	P1-2:A2:9:_VACA-LAKEVILLE #1 230KV [5840] & P1-2:A6:13:_SILVERDO-FULTON-EGLE RCK 115KV [0]	P6	N-1-1	99	99	99	<90	80	<90	<90	<90	99	99	97	90	106				Sensitivity only
31374 GYSRJCT1 60.0 31382 FTCHMTNP 60.0 1 1	P1-2:A6:13:_SILVERDO-FULTON-EGLE RCK 115KV [0] & P1-2:A2:12:_EAGLE ROCK-CORTINA 115KV [1470]	P6	N-1-1	96	93	92	<90	53	<90	101	101	89	92	91	99	85				System upgrade or preferred resource
31377 FCHMNTP2 60.0 31380 FTCH MTN 60.0 1 1	P1-3:A2:31:_FULTON 115/60KV TB 2 & P1-3:A2:30:_FULTON 115/60KV TB 1	P6	N-1-1	136	124	124	92	92	91	123	<90	125	125	126	116	124				Short Term : Action Plan ; Long Term : Preferred resource
31378 FULTON 60.0 32650 ST.HELNA 60.0 1 1	P1-2:A2:2:_FULTON-BEARCNYN-WSFRDLT-GEYSR16-GEYSR12-GEYSR14 230KV [0] & P1-2:A2:63:_LAKEVILLE #1 60KV [7360]	P6	N-1-1	<90	93	<90	<90	<90	<90	<90	<90	101	98	96	<90	<90				Sensitivity only
31378 FULTON 60.0 32650 ST.HELNA 60.0 1 1	P1-2:A2:20:_EGLE RCK-FULTON-SILVERDO 115KV [0] & P1-2:A2:63:_LAKEVILLE #1 60KV [7360]	P6	N-1-1	<90	93	<90	<90	<90	<90	<90	<90	101	98	96	<90	<90				Sensitivity only
31378 FULTON 60.0 32650 ST.HELNA 60.0 1 1	P1-2:A2:21:_GEYSERS #11-EAGLE ROCK 115KV [4391] & P1-2:A2:63:_LAKEVILLE #1 60KV [7360]	P6	N-1-1	<90	<90	<90	<90	<90	<90	<90	<90	100	97	96	<90	<90				Sensitivity only
31378 FULTON 60.0 32650 ST.HELNA 60.0 1 1	P1-2:A2:22:_CORTINA-MENDOCINO #1 115KV [1330] (2) & P1-2:A2:63:_LAKEVILLE #1 60KV [7360]	P6	N-1-1	<90	92	<90	<90	<90	<90	<90	<90	100	97	96	<90	<90				Sensitivity only
31378 FULTON 60.0 32650 ST.HELNA 60.0 1 1	P1-2:A2:23:_LOWER LAKE-HOMESTAKE 115KV [1481] & P1-2:A2:63:_LAKEVILLE #1 60KV [7360]	P6	N-1-1	<90	<90	<90	<90	<90	<90	<90	<90	100	<90	<90	<90	<90				Sensitivity only
31378 FULTON 60.0 32650 ST.HELNA 60.0 1 1	P1-2:A2:24:_REDBUD-HIGHLNDJ1 115KV [0] & P1-2:A2:63:_LAKEVILLE #1 60KV [7360]	P6	N-1-1	<90	<90	<90	<90	<90	<90	<90	<90	101	<90	<90	<90	<90				Sensitivity only
31378 FULTON 60.0 32650 ST.HELNA 60.0 1 1	P1-2:A2:25:_FULTON-SANTA ROSA #1 115KV [1620] & P1-2:A2:63:_LAKEVILLE #1 60KV [7360]	P6	N-1-1	<90	<90	<90	<90	<90	<90	<90	<90	100	<90	<90	<90	<90				Sensitivity only

Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading % (Baseline Scenarios)								Loading % (Sensitivity Scenarios)						Project & Potential Mitigation Solutions	
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Winter Peak	2022 Winter Peak	2027 Winter Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022 SP High CEC Forecast	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations			
31378 FULTON 60.0 32650 ST.HELNA 60.0 1 1	P1-3:A2:16:_GEYSR17 230/13.8KV TB 1 & P1-2:A2:63:_LAKEVILLE #1 60KV [7360]	P6	N-1-1	<90	<90	<90	<90	<90	<90	<90	<90	101	97	97	<90	<90			Sensitivity only
31384 COTATI 60.0 31389 PETC_JCT 60.0 1 1	P1-3:A2:31:_FULTON 115/60KV TB 2 & P1-3:A2:30:_FULTON 115/60KV TB 1	P6	N-1-1	372	345	342	314	315	320	245	151	360	353	351	293	435			Short Term : Action Plan ; Long Term : Preferred resource
31384 COTATI 60.0 31391 SNMA TAP 60.0 1 1	P1-3:A2:22:_LAKEVILLE 230/60KV TB 5 & P1-3:A2:21:_LAKEVILLE 230/60KV TB 3	P6	N-1-1	301	306	301	275	276	281	116	143	318	313	312	206	385			Short Term : Action Plan ; Long Term : Preferred resource
31386 MCDWLLSW 60.0 31392 LAKEVILLE 60.0 1 1	P1-3:A2:22:_LAKEVILLE 230/60KV TB 5 & P1-3:A2:21:_LAKEVILLE 230/60KV TB 3	P6	N-1-1	94	97	95	106	106	106	<90	<90	100	99	98	<90	110			System upgrade or preferred resource
31390 PETLMA A 60.0 31394 LKVLE JT 60.0 1 1	P1-3:A2:21:_LAKEVILLE 230/60KV TB 3 & P1-3:A2:22:_LAKEVILLE 230/60KV TB 5	P6	N-1-1	172	176	173	167	166	166	<90	<90	181	179	177	117	179			Lakeville #2 Upgrade (formerly known as Fulton 230/115 kV Transformer project)
31390 PETLMA A 60.0 31394 LKVLE JT 60.0 1 1	P1-3:A2:22:_LAKEVILLE 230/60KV TB 5 & P1-3:A2:21:_LAKEVILLE 230/60KV TB 3	P6	N-1-1	172	176	173	167	166	166	<90	<90	181	179	178	117	179			Lakeville #2 Upgrade (formerly known as Fulton 230/115 kV Transformer project)
31390 PETLMA A 60.0 31394 LKVLE JT 60.0 1 1	P1-3:A2:3:_GEYSR14 230/13.8KV TB 1 & P1-2:A2:62:_LAKEVILLE-PETALUMA C 60KV [7350]	P6	N-1-1	<90	<90	97	145	145	151	<90	<90	<90	103	<90	<90	163			Lakeville #2 Upgrade (formerly known as Fulton 230/115 kV Transformer project)
31390 PETLMA A 60.0 31394 LKVLE JT 60.0 1 1	P1-3:A2:31:_FULTON 115/60KV TB 2 & P1-3:A2:30:_FULTON 115/60KV TB 1	P6	N-1-1	256	238	235	272	273	277	168	106	248	243	242	201	300			Lakeville #2 Upgrade (formerly known as Fulton 230/115 kV Transformer project)
31392 LAKEVILLE 60.0 31394 LKVLE JT 60.0 1 1	P1-2:A2:2:_FULTON-BEARCNYN-WSRFDLT-GEYSR16-GEYSR12-GEYSR14 230KV [0] & P1-2:A2:62:_LAKEVILLE-PETALUMA C 60KV [7350]	P6	N-1-1	103	101	97	131	132	137	<90	<90	109	105	104	<90	159			Short Term : Action Plan ; Long Term : Preferred resource
31392 LAKEVILLE 60.0 31394 LKVLE JT 60.0 1 1	P1-2:A2:62:_LAKEVILLE-PETALUMA C 60KV [7350] & P1-2:A2:32:_CORONA-LAKEVILLE 115KV [4311]	P6	N-1-1	99	98	94	129	130	135	<90	<90	107	101	101	<90	158			System upgrade or preferred resource
31392 LAKEVILLE 60.0 31394 LKVLE JT 60.0 1 1	P1-2:A2:62:_LAKEVILLE-PETALUMA C 60KV [7350] & P1-2:A2:58:_FULTON-LAGUNA-COTATI-SNMALDFL 60KV [0]	P6	N-1-1	105	105	102	144	146	152	<90	<90	112	110	107	<90	177			Short Term : Action Plan ; Long Term : Preferred resource
31392 LAKEVILLE 60.0 31394 LKVLE JT 60.0 1 1	P1-3:A2:30:_FULTON 115/60KV TB 1 & P1-2:A2:62:_LAKEVILLE-PETALUMA C 60KV [7350]	P6	N-1-1	99	97	94	129	130	134	<90	<90	105	100	100	<90	157			System upgrade or preferred resource
31392 LAKEVILLE 60.0 31394 LKVLE JT 60.0 1 1	P1-3:A2:30:_FULTON 115/60KV TB 1 & P1-3:A2:31:_FULTON 115/60KV TB 2	P6	N-1-1	240	222	220	235	236	240	157	99	232	228	226	188	281			Short Term : Action Plan ; Long Term : Preferred resource
31392 LAKEVILLE 60.0 31394 LKVLE JT 60.0 1 1	P1-3:A2:31:_FULTON 115/60KV TB 2 & P1-2:A2:62:_LAKEVILLE-PETALUMA C 60KV [7350]	P6	N-1-1	99	97	94	129	130	134	<90	<90	105	100	100	<90	157			System upgrade or preferred resource
31392 LAKEVILLE 60.0 31394 LKVLE JT 60.0 1 1	P1-3:A2:31:_FULTON 115/60KV TB 2 & P1-3:A2:30:_FULTON 115/60KV TB 1	P6	N-1-1	240	222	220	235	236	240	157	99	232	228	226	188	281			Short Term : Action Plan ; Long Term : Preferred resource
31392 LAKEVILLE 60.0 31394 LKVLE JT 60.0 1 1	P1-3:A2:32:_GYSR78TP 115/13.8KV TB 1 & P1-2:A2:62:_LAKEVILLE-PETALUMA C 60KV [7350]	P6	N-1-1	<90	<90	91	125	125	131	<90	<90	<90	<90	<90	<90	152			System upgrade or preferred resource
31397 WILLITSJ 60.0 31306 WILLITS 60.0 1 1	P1-4:A2:6:_MENDOCNO SVD=V & P1-2:A2:40:_MENDOCINO-PHILO JCT-HOPLAND 60KV [7520]	P6	N-1-1	<90	<90	<90	<90	<90	<90	<90	<90	<90	<90	<90	<90	NConv			Sensitivity only
31397 WILLITSJ 60.0 31306 WILLITS 60.0 1 1	P1-4:A2:8:_FT_BRGD2 SVD=V & P1-2:A2:40:_MENDOCINO-PHILO JCT-HOPLAND 60KV [7520]	P6	N-1-1	<90	<90	<90	<90	<90	<90	<90	<90	<90	<90	<90	<90	NConv			Sensitivity only
31397 WILLITSJ 60.0 31312 FRT BRGG 60.0 1 1	P1-1:A2:7:_GEYSER78 13.80KV GEN UNIT 1 & P1-2:A2:40:_MENDOCINO-PHILO JCT-HOPLAND 60KV [7520]	P6	N-1-1	<90	<90	<90	<90	<90	<90	<90	<90	<90	<90	<90	<90	116			Sensitivity only
31397 WILLITSJ 60.0 31312 FRT BRGG 60.0 1 1	P1-2:A2:40:_MENDOCINO-PHILO JCT-HOPLAND 60KV [7520] & P1-2:A2:47:_ELK-GUALALA 60KV [8410]	P6	N-1-1	<90	<90	<90	<90	100	105	<90	<90	<90	<90	<90	<90	<90			Fort Bragg UVLS

Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading % (Baseline Scenarios)								Loading % (Sensitivity Scenarios)						Project & Potential Mitigation Solutions
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Winter Peak	2022 Winter Peak	2027 Winter Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022 SP High CEC Forecast	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations		
31397 WILLITSJ 60.0 31312 FRT BRGG 60.0 1 1	P1-2:A2:40:_MENDOCINO-PHILO JCT-HOPLAND 60KV [7520] & P1-2:A2:49:_HARTLEY-CLEARLAKE 60KV [7515]	P6	N-1-1	<90	<90	<90	<90	104	<90	<90	<90	<90	<90	<90	<90	<90	<90	Fort Bragg UVLS
31397 WILLITSJ 60.0 31312 FRT BRGG 60.0 1 1	P1-2:A2:40:_MENDOCINO-PHILO JCT-HOPLAND 60KV [7520] & P1-2:A2:55:_GUALALA-MONTE RIO 60KV [6980]	P6	N-1-1	<90	<90	<90	<90	NConv	NConv	<90	<90	<90	<90	<90	<90	<90	<90	Fort Bragg UVLS
32568 IGNACIO 115 32570 LS GLLNS 115 3 1	P1-4:A2:6:_MENDOCNO SVD=V & P1-2:A6:17:_IGNACIO-SAN RAFAEL #1 115KV [1850]	P6	N-1-1	<90	<90	<90	107	109	117	<90	<90	<90	<90	<90	<90	127		Ignacio - Alto Voltage Conversion Revised Scope
32568 IGNACIO 115 32570 LS GLLNS 115 3 1	P1-4:A6:1:_PUEBLO SVD=V & P1-2:A6:17:_IGNACIO-SAN RAFAEL #1 115KV [1850]	P6	N-1-1	<90	<90	<90	<90	109	117	<90	<90	<90	<90	<90	<90	127		Ignacio - Alto Voltage Conversion Revised Scope
32570 LS GLLNS 115 32574 SAN RAFL 115 3 1	P1-2:A6:17:_IGNACIO-SAN RAFAEL #1 115KV [1850] & P1-3:A6:3:_IGNACIO 230/115KV TB 4	P6	N-1-1	<90	<90	<90	<90	<90	100	<90	<90	<90	<90	<90	<90	100		Sensitivity only
32570 LS GLLNS 115 32574 SAN RAFL 115 3 1	P1-2:A6:17:_IGNACIO-SAN RAFAEL #1 115KV [1850] & P1-3:A6:4:_IGNACIO 230/115KV TB 6	P6	N-1-1	<90	<90	<90	90	93	101	<90	<90	<90	<90	<90	<90	101		System upgrade or preferred resource
32650 ST.HELNA 60.0 32652 CALISTGA 60.0 1 1	P1-3:A2:31:_FULTON 115/60KV TB 2 & P1-3:A2:30:_FULTON 115/60KV TB 1	P6	N-1-1	105	<90	<90	<90	<90	<90	<90	<90	<90	<90	<90	<90	<90		Short Term : Action Plan ; Long Term : Preferred resource
32664 IGNACO A 60.0 32568 IGNACIO 115 3 1	P1-3:A6:9:_IGNACIO 115/60KV TB 1 & P1-2:A6:24:_IGNACIO-ALTO-SAUSALITO #1 60KV [7160]	P6	N-1-1	<90	<90	<90	91	93	102	<90	<90	<90	<90	<90	<90	102		Ignacio - Alto Voltage Conversion Revised Scope
32664 IGNACO A 60.0 32666 IGNACO B 60.0 1 1	P1-4:A2:1:_BIG RIVR SHUNT=7H & P1-3:A6:8:_IGNACIO 115/60KV TB 3	P6	N-1-1	<90	<90	<90	112	115	125	<90	<90	<90	<90	<90	<90	125		
32667 IG JCT 60.0 32678 SAN_RFLJ 60.0 1 1	P1-2:A2:4:_GEYSERS #17-FULTON 230KV [4770] & P1-2:A6:24:_IGNACIO-ALTO-SAUSALITO #1 60KV [7160]	P6	N-1-1	<90	<90	<90	100	104	114	<90	<90	<90	<90	<90	<90	123		Ignacio - Alto Voltage Conversion Revised Scope
32667 IG JCT 60.0 32678 SAN_RFLJ 60.0 1 1	P1-2:A2:40:_MENDOCINO-PHILO JCT-HOPLAND 60KV [7520] & P1-2:A6:23:_IGNACIO-ALTO-SAUSALITO #2 60KV [7170]	P6	N-1-1	<90	<90	<90	<90	102	NConv	<90	<90	<90	<90	<90	<90	<90		Ignacio - Alto Voltage Conversion Revised Scope
32667 IG JCT 60.0 32678 SAN_RFLJ 60.0 1 1	P1-2:A6:21:_TULUCAY-NAPA #2 60KV [8190] & P1-2:A6:24:_IGNACIO-ALTO-SAUSALITO #1 60KV [7160]	P6	N-1-1	<90	<90	<90	<90	102	111	<90	<90	<90	<90	<90	<90	121		Ignacio - Alto Voltage Conversion Revised Scope
32667 IG JCT 60.0 32678 SAN_RFLJ 60.0 1 1	P1-2:A6:23:_IGNACIO-ALTO-SAUSALITO #2 60KV [7170] & P1-3:A6:9:_IGNACIO 115/60KV TB 1	P6	N-1-1	<90	<90	<90	101	105	115	<90	<90	<90	<90	<90	<90	126		Ignacio - Alto Voltage Conversion Revised Scope
32667 IG JCT 60.0 32678 SAN_RFLJ 60.0 1 1	P1-2:A6:24:_IGNACIO-ALTO-SAUSALITO #1 60KV [7160] & P1-2:A6:23:_IGNACIO-ALTO-SAUSALITO #2 60KV [7170]	P6	N-1-1	93	96	93	245	247	253	<90	<90	107	99	105	<90	274		
32667 IG JCT 60.0 32678 SAN_RFLJ 60.0 1 1	P1-2:A6:24:_IGNACIO-ALTO-SAUSALITO #1 60KV [7160] & P1-3:A6:3:_IGNACIO 230/115KV TB 4	P6	N-1-1	<90	<90	<90	102	106	116	<90	<90	<90	<90	<90	<90	127		Ignacio - Alto Voltage Conversion Revised Scope
32667 IG JCT 60.0 32678 SAN_RFLJ 60.0 1 1	P1-2:A6:3:_LAKEVILLE-TULUCAY 230KV [4970] & P1-2:A6:24:_IGNACIO-ALTO-SAUSALITO #1 60KV [7160]	P6	N-1-1	<90	<90	<90	<90	103	112	<90	<90	<90	<90	<90	<90	121		Ignacio - Alto Voltage Conversion Revised Scope
32667 IG JCT 60.0 32678 SAN_RFLJ 60.0 1 1	P1-2:A6:5:_IGNACIO-SOBRANTE 230KV [4920] & P1-2:A6:24:_IGNACIO-ALTO-SAUSALITO #1 60KV [7160]	P6	N-1-1	<90	<90	<90	100	104	114	<90	<90	<90	<90	<90	<90	124		Ignacio - Alto Voltage Conversion Revised Scope
32667 IG JCT 60.0 32678 SAN_RFLJ 60.0 1 1	P1-3:A6:9:_IGNACIO 115/60KV TB 1 & P1-2:A6:24:_IGNACIO-ALTO-SAUSALITO #1 60KV [7160]	P6	N-1-1	<90	<90	<90	101	105	115	<90	<90	<90	<90	<90	<90	126		Ignacio - Alto Voltage Conversion Revised Scope

Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading % (Baseline Scenarios)								Loading % (Sensitivity Scenarios)						Project & Potential Mitigation Solutions		
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Winter Peak	2022 Winter Peak	2027 Winter Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022 SP High CEC Forecast	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations				
32667 IG JCT 60.0 32678 SAN_RFLJ 60.0 1 1	P1-4:A6:1: PUEBLO SVD=V & P1-2:A6:24: IG_NACIO-ALTO-SAUSALITO #1 60KV [7160]	P6	N-1-1	<90	<90	<90	<90	102	111	<90	<90	<90	<90	<90	<90	121				Ignacio - Alto Voltage Conversion Revised Scope
32678 SAN_RFLJ 60.0 32680 GREENBRE 60.0 1 1	P1-2:A2:4: GEYSERS #17-FULTON 230KV [4770] & P1-2:A6:24: IG_NACIO-ALTO-SAUSALITO #1 60KV [7160]	P6	N-1-1	<90	<90	<90	<90	94	103	<90	<90	<90	<90	<90	<90	122				Ignacio - Alto Voltage Conversion Revised Scope
32678 SAN_RFLJ 60.0 32680 GREENBRE 60.0 1 1	P1-2:A2:40: MENDOCINO-PHILO JCT-HOPLAND 60KV [7520] & P1-2:A6:24: IG_NACIO-ALTO-SAUSALITO #1 60KV [7160]	P6	N-1-1	<90	<90	<90	<90	<90	NConv	<90	<90	<90	<90	<90	<90	<90				Ignacio - Alto Voltage Conversion Revised Scope
32678 SAN_RFLJ 60.0 32680 GREENBRE 60.0 1 1	P1-2:A6:24: IG_NACIO-ALTO-SAUSALITO #1 60KV [7160] & P1-2:A6:23: IG_NACIO-ALTO-SAUSALITO #2 60KV [7170]	P6	N-1-1	92	96	93	221	224	229	<90	<90	106	99	105	<90	272				Ignacio - Alto Voltage Conversion Revised Scope
32678 SAN_RFLJ 60.0 32680 GREENBRE 60.0 1 1	P1-3:A6:9: IG_NACIO 115/60KV TB 1 & P1-2:A6:24: IG_NACIO-ALTO-SAUSALITO #1 60KV [7160]	P6	N-1-1	<90	<90	<90	91	95	104	<90	<90	<90	<90	<90	<90	125				Ignacio - Alto Voltage Conversion Revised Scope
32678 SAN_RFLJ 60.0 32680 GREENBRE 60.0 1 1	P1-4:A2:4: BIG RIVR SVD=V & P1-2:A6:23: IG_NACIO-ALTO-SAUSALITO #2 60KV [7170]	P6	N-1-1	<90	<90	<90	<90	<90	101	<90	<90	<90	<90	<90	<90	120				Ignacio - Alto Voltage Conversion Revised Scope
32678 SAN_RFLJ 60.0 32680 GREENBRE 60.0 1 1	P1-4:A2:6: MENDOCNO SVD=V & P1-2:A6:23: IG_NACIO-ALTO-SAUSALITO #2 60KV [7170]	P6	N-1-1	<90	<90	<90	<90	<90	101	<90	<90	<90	<90	<90	<90	120				Ignacio - Alto Voltage Conversion Revised Scope
32678 SAN_RFLJ 60.0 32680 GREENBRE 60.0 1 1	P1-4:A2:8: FT_BRGD2 SVD=V & P1-2:A6:23: IG_NACIO-ALTO-SAUSALITO #2 60KV [7170]	P6	N-1-1	<90	<90	<90	<90	<90	101	<90	<90	<90	<90	<90	<90	120				Ignacio - Alto Voltage Conversion Revised Scope
32678 SAN_RFLJ 60.0 32680 GREENBRE 60.0 1 1	P1-4:A2:9: ELK_D SVD=V & P1-2:A6:23: IG_NACIO-ALTO-SAUSALITO #2 60KV [7170]	P6	N-1-1	<90	<90	<90	<90	<90	101	<90	<90	<90	<90	<90	<90	120				Ignacio - Alto Voltage Conversion Revised Scope
32678 SAN_RFLJ 60.0 32680 GREENBRE 60.0 1 1	P1-4:A6:1: PUEBLO SVD=V & P1-2:A6:23: IG_NACIO-ALTO-SAUSALITO #2 60KV [7170]	P6	N-1-1	<90	<90	<90	<90	<90	101	<90	<90	<90	<90	<90	<90	120				Ignacio - Alto Voltage Conversion Revised Scope
30435 LAKEVILLE 230 30445 IGNACIO 230 2 1	P7-1:A6:2: LAKEVILLE-IGNACIO #1 & IGNACIO-SOBRANTE LINES	P7	DCTL	68	70	70	68	68	74	21	26	76	72	76	49	105				Sensitivity only
30435 LAKEVILLE 230 30460 VACA-DIX 230 1 1	P7-1:A2:11: GEYSERS #12-FULTON & GEYSERS #9-LAKEVILLE LINES	P7	DCTL	83	80	78	84	87	88	24	41	89	83	87	67	100				Sensitivity only
30440 TULUCAY 230 30460 VACA-DIX 230 1 1	P7-1:A2:11: GEYSERS #12-FULTON & GEYSERS #9-LAKEVILLE LINES	P7	DCTL	86	84	82	85	88	89	26	43	93	87	91	69	102				Sensitivity only
31246 BELLVUE 115 31248 PENNGRVE 115 1 1	P7-1:A2:15: FULTON-SANTA ROSA #1 & FULTON-SANTA ROSA #2 LINES	P7	DCTL	95	100	96	118	118	121	47	58	107	103	98	74	129				System upgrade or preferred resource
31248 PENNGRVE 115 31254 CORONA 115 1 1	P7-1:A2:15: FULTON-SANTA ROSA #1 & FULTON-SANTA ROSA #2 LINES	P7	DCTL	98	103	100	124	125	129	50	60	111	106	102	78	137				System upgrade or preferred resource
31254 CORONA 115 31255 LAKEVILLE 115 1 1	P7-1:A2:15: FULTON-SANTA ROSA #1 & FULTON-SANTA ROSA #2 LINES	P7	DCTL	95	99	96	130	131	134	48	59	107	102	98	73	128				System upgrade or preferred resource
31336 HPLND JT 60.0 31206 HPLND JT 115 2 1	P7-1:A2:5: GEYSERS #17-FULTON & EAGLE ROCK-FULTON-SILVERADO LINES	P7	DCTL	85	82	81	96	102	95	65	61	86	83	81	75	95				System upgrade or preferred resource
31336 HPLND JT 60.0 31206 HPLND JT 115 2 1	P7-1:A2:6: GEYSERS #9-LAKEVILLE & EAGLE ROCK-FULTON-SILVERADO LINES	P7	DCTL	88	85	85	99	105	99	68	64	89	86	84	78	99				System upgrade or preferred resource
31336 HPLND JT 60.0 31206 HPLND JT 115 2 1	P7-1:A2:7: GEYSERS #3-EAGLE ROCK & GEYSERS #7-EAGLE ROCK LINES	P7	DCTL	85	94	93	97	111	96	96	88	95	95	93	81	96				System upgrade or preferred resource
31336 HPLND JT 60.0 31370 CLVRDLT 60.0 1 1	P7-1:A2:6: GEYSERS #9-LAKEVILLE & EAGLE ROCK-FULTON-SILVERADO LINES	P7	DCTL	104	100	99	77	90	78	90	91	99	99	99	94	107				Short Term : Action Plan ; Long Term : Preferred resource
31362 TRNTN JT 60.0 31363 TRNTN_JC 60.0 1 1	P7-1:A2:12: FULTON-SANTA ROSA #1 & FULTON-MOLINO-COTATI LINES	P7	DCTL	56	56	54	86	87	90	48	34	60	58	58	43	110				Sensitivity only
31362 TRNTN JT 60.0 31378 FULTON 60.0 1 1	P7-1:A2:12: FULTON-SANTA ROSA #1 & FULTON-MOLINO-COTATI LINES	P7	DCTL	61	60	59	81	81	85	52	37	65	62	63	47	119				Sensitivity only

Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading % (Baseline Scenarios)								Loading % (Sensitivity Scenarios)						Project & Potential Mitigation Solutions	
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Winter Peak	2022 Winter Peak	2027 Winter Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022 SP High CEC Forecast	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations			
31364 MOLINO 60.0 31363 TRNTN_JC 60.0 1 1	P7-1:A2:12:_FULTON-SANTA ROSA #1 & FULTON-MOLINO-COTATI LINES	P7	DCTL	73	71	69	89	89	93	60	39	77	73	75	51	127			Sensitivity only
31370 CLVRDLJT 60.0 31374 GYSRJCT1 60.0 1 1	P7-1:A2:6:_GEYSERS #9-LAKEVILLE & EAGLE ROCK-FULTON-SILVERADO LINES	P7	DCTL	104	99	99	77	89	78	90	91	99	99	98	93	106			Short Term : Action Plan ; Long Term : Preferred resource
31374 GYSRJCT1 60.0 31382 FTCHMTPN 60.0 1 1	P7-1:A2:6:_GEYSERS #9-LAKEVILLE & EAGLE ROCK-FULTON-SILVERADO LINES	P7	DCTL	104	99	99	77	89	77	90	91	99	98	98	93	106			Short Term : Action Plan ; Long Term : Preferred resource
31384 COTATI 60.0 31389 PETC_JCT 60.0 1 1	P7-1:A2:10:_FULTON-IGNACIO #1 & FULTON-LAKEVILLE LINES	P7	DCTL	63	58	52	79	75	85	15	34	73	67	64	14	115			Sensitivity only
31384 COTATI 60.0 31389 PETC_JCT 60.0 1 1	P7-1:A2:11:_GEYSERS #12-FULTON & GEYSERS #9-LAKEVILLE LINES	P7	DCTL	64	61	59	73	73	77	33	21	68	65	64	43	105			Sensitivity only
31384 COTATI 60.0 31389 PETC_JCT 60.0 1 1	P7-1:A2:19:_GEYSER 12 - FULTON & GEYSER 17 - FULTON 230 KV LINES	P7	DCTL	69	67	64	77	77	81	38	26	74	70	70	48	110			Sensitivity only
31384 COTATI 60.0 31389 PETC_JCT 60.0 1 1	P7-1:A2:2:_EAGLE ROCK-CORTINA & CORTINA-MENDOCINO #1 LINES	P7	DCTL	62	56	53	71	70	75	16	5	65	60	60	34	101			Sensitivity only
31384 COTATI 60.0 31389 PETC_JCT 60.0 1 1	P7-1:A2:23:_FULTON - HOPLAND 60 KV & GEYSER 12 - FULTON & GEYSER 17 - FULTON 230 KV LINES	P7	DCTL	71	69	67	79	79	83	40	28	76	72	72	50	113			Sensitivity only
31384 COTATI 60.0 31389 PETC_JCT 60.0 1 1	P7-1:A2:5:_GEYSERS #17-FULTON & EAGLE ROCK-FULTON-SILVERADO LINES	P7	DCTL	65	62	59	72	72	75	35	22	69	65	65	42	102			Sensitivity only
31384 COTATI 60.0 31389 PETC_JCT 60.0 1 1	P7-1:A6:16:_FULTON-HOPLAND 60KV & GEYSERS #17-FULTON 230KV & EAGLE ROCK-FULTON-SILVERADO 115KV LINES	P7	DCTL	63	60	57	72	72	74	36	24	66	63	62	42	101			Sensitivity only
32568 IGNACIO 115 32570 LS GLLNS 115 3 1	P7-1:A6:19:_IGNACIO - SAN RAFAEL #1 & IGNACIO - ALTO LINES	P7	DCTL	83	88	90	106	108	116	33	44	92	88	95	66	126			Ignacio - Alto Voltage Conversion Revised Scope
32664 IGNACO A 60.0 32667 IG JCT 60.0 1 1	P7-1:A6:6:_IGNACIO-ALTO-SAUSALITO #2 & IGNACIO-ALTO-SAUSALITO #1 LINES	P7	DCTL	58	62	61	134	135	139	27	31	67	63	67	46	145			Ignacio - Alto Voltage Conversion Revised Scope
32667 IG JCT 60.0 32678 SAN_RFLJ 60.0 1 1	P7-1:A6:6:_IGNACIO-ALTO-SAUSALITO #2 & IGNACIO-ALTO-SAUSALITO #1 LINES	P7	DCTL	93	97	94	245	247	253	46	49	106	100	106	73	274			Ignacio - Alto Voltage Conversion Revised Scope
32678 SAN_RFLJ 60.0 32680 GREENBRE 60.0 1 1	P7-1:A6:6:_IGNACIO-ALTO-SAUSALITO #2 & IGNACIO-ALTO-SAUSALITO #1 LINES	P7	DCTL	92	96	93	221	223	229	45	48	106	99	105	73	272			Ignacio - Alto Voltage Conversion Revised Scope

Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)								Voltage PU (Sensitivity Scenarios)						Project & Potential Mitigation Solutions	
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Winter Peak	2022 Winter Peak	2027 Winter Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022 SP High CEC Forecast	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations			
ALTO 60 kV	Base Case	P0	N-0	1.03	0.98	0.98	0.93	0.93	0.91	1.06	1.03	0.98	0.99	0.98	1.00	0.91			Load power factor correction and voltage support if needed
ANNAPOLS 60 kV	Base Case	P0	N-0	1.01	1.01	1.01	0.93	0.93	0.92	1.00	1.02	1.00	1.01	1.00	1.01	0.92			Load power factor correction and voltage support if needed
BELLVUE 115 kV	Base Case	P0	N-0	1.03	1.01	1.02	1.00	1.00	0.99	1.05	1.03	1.01	1.01	1.01	1.02	0.99			Load power factor correction and voltage support if needed
BOLINAS 60 kV	Base Case	P0	N-0	1.05	1.00	1.00	0.97	0.97	0.96	1.07	1.04	1.00	1.00	1.00	1.01	0.96			Load power factor correction and voltage support if needed
CALISTGA 60 kV	Base Case	P0	N-0	1.05	0.97	0.97	0.98	0.99	0.99	1.05	1.03	0.96	0.97	0.96	0.99	0.99			Load power factor correction and voltage support if needed
CALPELLA 115 kV	Base Case	P0	N-0	1.05	1.03	1.04	1.04	1.04	1.03	1.05	1.04	1.03	1.03	1.03	1.05	1.03			Load power factor correction and voltage support if needed
CARQUINZ 115 kV	Base Case	P0	N-0	1.08	1.00	1.01	0.99	0.99	0.98	1.09	1.04	1.00	1.01	1.00	1.01	0.98			Load power factor correction and voltage support if needed
CH.STN 115 kV	Base Case	P0	N-0	1.04	1.03	1.03	1.03	1.03	1.03	1.05	1.04	1.03	1.03	1.03	1.03	1.03			Load power factor correction and voltage support if needed
CROWCREEK SS60 kV	Base Case	P0	N-0	1.04	1.03	1.03	1.04	1.04	1.04	1.05	1.05	1.04	1.03	1.04	1.04	1.04			Load power factor correction and voltage support if needed
EGLE RCK 60 kV	Base Case	P0	N-0	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.04	1.05	1.06	1.05			Load power factor correction and voltage support if needed
FORT RSS 60 kV	Base Case	P0	N-0	1.01	1.01	1.01	0.94	0.94	0.94	1.01	1.02	1.01	1.01	1.01	1.02	0.94			Load power factor correction and voltage support if needed
FRONTIERPV 60 kV	Base Case	P0	N-0	1.04	1.03	1.03	1.04	1.04	1.04	1.05	1.05	1.04	1.03	1.04	1.04	1.04			Load power factor correction and voltage support if needed
FULTON 60 kV	Base Case	P0	N-0	1.04	1.05	1.05	1.04	1.04	1.04	1.04	1.05	1.05	1.05	1.05	1.05	1.04			Load power factor correction and voltage support if needed
FULTON 115 kV	Base Case	P0	N-0	1.06	1.03	1.03	1.02	1.02	1.02	1.07	1.05	1.03	1.03	1.03	1.04	1.02			Load power factor correction and voltage support if needed
GEYSR11 115 kV	Base Case	P0	N-0	1.04	1.03	1.03	1.03	1.03	1.03	1.05	1.04	1.03	1.03	1.03	1.04	1.03			Load power factor correction and voltage support if needed
GREENBRE 60 kV	Base Case	P0	N-0	1.02	0.98	0.98	0.93	0.93	0.91	1.06	1.03	0.98	0.98	0.98	1.00	0.91			Load power factor correction and voltage support if needed
GUALALA 60 kV	Base Case	P0	N-0	1.00	1.00	1.00	0.90	0.90	0.89	0.99	1.01	0.99	1.00	0.99	1.00	0.89			Voltage support
GUSTINE 60 kV	Base Case	P0	N-0	1.01	1.01	1.00	1.03	1.03	1.02	1.03	1.04	1.01	1.01	1.01	1.03	1.02			Load power factor correction and voltage support if needed
HIGHLAND 115 kV	Base Case	P0	N-0	1.05	1.04	1.04	1.04	1.04	1.04	1.06	1.06	1.04	1.04	1.04	1.04	1.04			Load power factor correction and voltage support if needed
HOMEGRND 115 kV	Base Case	P0	N-0	1.05	1.04	1.04	1.04	1.04	1.04	1.06	1.06	1.04	1.04	1.04	1.04	1.04			Load power factor correction and voltage support if needed
IGNACIO 115 kV	Base Case	P0	N-0	1.06	1.02	1.02	1.01	1.00	1.00	1.08	1.05	1.02	1.02	1.02	1.03	1.00			Load power factor correction and voltage support if needed
INDIN VL 115 kV	Base Case	P0	N-0	1.07	1.05	1.05	1.06	1.06	1.06	1.07	1.07	1.05	1.05	1.05	1.05	1.06			Load power factor correction and voltage support if needed
INGRM C. 115 kV	Base Case	P0	N-0	1.03	1.02	1.02	1.03	1.03	1.03	1.05	1.04	1.02	1.03	1.02	1.02	1.03			Load power factor correction and voltage support if needed
JMSCNPMP 115 kV	Base Case	P0	N-0	1.07	1.01	1.01	1.00	0.99	0.99	1.08	1.04	1.00	1.01	1.01	1.02	0.99			Load power factor correction and voltage support if needed
LS GLLNS 115 kV	Base Case	P0	N-0	1.05	1.01	1.01	1.00	0.99	0.99	1.08	1.05	1.01	1.02	1.01	1.02	0.99			Load power factor correction and voltage support if needed
LUCERNE 115 kV	Base Case	P0	N-0	1.05	1.04	1.04	1.05	1.05	1.04	1.06	1.06	1.04	1.04	1.04	1.05	1.04			Load power factor correction and voltage support if needed

Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)								Voltage PU (Sensitivity Scenarios)						Project & Potential Mitigation Solutions
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Winter Peak	2022 Winter Peak	2027 Winter Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022 SP High CEC Forecast	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations		
MDSTO CN 115 kV	Base Case	P0	N-0	1.04	1.03	1.03	1.04	1.04	1.03	1.06	1.04	1.03	1.04	1.03	1.03	1.03		Load power factor correction and voltage support if needed
MELONES 115 kV	Base Case	P0	N-0	1.04	1.03	1.03	1.03	1.03	1.03	1.05	1.04	1.03	1.03	1.03	1.03	1.03		Load power factor correction and voltage support if needed
MENDOCNO 115 kV	Base Case	P0	N-0	1.05	1.04	1.04	1.04	1.04	1.04	1.05	1.04	1.03	1.04	1.04	1.05	1.04		Load power factor correction and voltage support if needed
MEYERS 115 kV	Base Case	P0	N-0	1.08	1.00	1.01	0.99	0.99	0.98	1.09	1.04	1.00	1.01	1.00	1.01	0.98		Load power factor correction and voltage support if needed
MILLER 115 kV	Base Case	P0	N-0	1.04	1.03	1.03	1.04	1.04	1.04	1.06	1.04	1.03	1.04	1.03	1.03	1.04		Load power factor correction and voltage support if needed
MNTCLOPH 115 kV	Base Case	P0	N-0	1.05	1.01	1.02	1.01	1.01	1.01	1.07	1.05	1.01	1.01	1.01	1.03	1.01		Load power factor correction and voltage support if needed
MONTCLLO 115 kV	Base Case	P0	N-0	1.05	1.01	1.02	1.01	1.01	1.01	1.07	1.05	1.01	1.01	1.01	1.03	1.01		Load power factor correction and voltage support if needed
NEWMAN 60 kV	Base Case	P0	N-0	1.03	1.01	1.01	1.03	1.03	1.03	1.04	1.05	1.02	1.02	1.02	1.03	1.03		Load power factor correction and voltage support if needed
NOVATO 60 kV	Base Case	P0	N-0	1.06	1.01	1.01	1.00	0.99	0.98	1.08	1.05	1.01	1.02	1.01	1.02	0.98		Load power factor correction and voltage support if needed
NRTH TWR 115 kV	Base Case	P0	N-0	1.04	1.03	1.03	1.02	1.03	1.03	1.07	1.04	1.03	1.02	1.03	1.04	1.03		Load power factor correction and voltage support if needed
NTWR ALT 115 kV	Base Case	P0	N-0	1.02	0.98	0.98	0.97	0.97	0.96	1.05	1.03	0.98	0.98	0.98	0.99	0.96		Load power factor correction and voltage support if needed
NVTO JCT 60 kV	Base Case	P0	N-0	1.06	1.01	1.01	1.00	0.99	0.98	1.08	1.05	1.01	1.02	1.01	1.02	0.98		Load power factor correction and voltage support if needed
OLEMA 60 kV	Base Case	P0	N-0	1.05	0.99	0.99	0.96	0.95	0.94	1.07	1.04	0.99	0.99	0.99	1.00	0.94		Load power factor correction and voltage support if needed
PATTERSN 60 kV	Base Case	P0	N-0	1.03	1.02	1.02	1.03	1.03	1.03	1.04	1.04	1.03	1.03	1.03	1.03	1.03		Load power factor correction and voltage support if needed
PEORIA 115 kV	Base Case	P0	N-0	1.04	1.03	1.02	1.03	1.03	1.03	1.05	1.04	1.02	1.03	1.02	1.03	1.03		Load power factor correction and voltage support if needed
R.TRACK 115 kV	Base Case	P0	N-0	1.04	1.03	1.03	1.03	1.03	1.03	1.06	1.04	1.03	1.03	1.03	1.03	1.03		Load power factor correction and voltage support if needed
REDBUD 115 kV	Base Case	P0	N-0	1.04	1.03	1.04	1.03	1.03	1.03	1.04	1.05	1.03	1.03	1.03	1.04	1.03		Load power factor correction and voltage support if needed
RINCON 115 kV	Base Case	P0	N-0	1.05	1.03	1.03	1.02	1.02	1.02	1.07	1.05	1.02	1.03	1.03	1.03	1.02		Load power factor correction and voltage support if needed
RVRBK TP 115 kV	Base Case	P0	N-0	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04		Load power factor correction and voltage support if needed
SALADO 115 kV	Base Case	P0	N-0	1.04	1.03	1.03	1.04	1.04	1.04	1.06	1.05	1.03	1.04	1.03	1.03	1.04		Load power factor correction and voltage support if needed
SAN RAFL 115 kV	Base Case	P0	N-0	1.05	1.01	1.01	0.99	0.99	0.98	1.07	1.04	1.01	1.01	1.01	1.02	0.98		Load power factor correction and voltage support if needed
SAUSALTO 60 kV	Base Case	P0	N-0	1.02	0.98	0.98	0.92	0.91	0.89	1.06	1.02	0.97	0.98	0.97	0.99	0.89		Load power factor correction and voltage support if needed
SILVERDO 115 kV	Base Case	P0	N-0	1.04	1.01	1.02	1.01	1.01	1.01	1.06	1.05	1.01	1.01	1.01	1.03	1.01		Load power factor correction and voltage support if needed
SKAGGS 115 kV	Base Case	P0	N-0	1.06	1.02	1.02	1.00	1.00	0.99	1.08	1.05	1.01	1.02	1.01	1.02	0.99		Load power factor correction and voltage support if needed
SLMN CRK 60 kV	Base Case	P0	N-0	1.01	1.01	1.01	0.95	0.95	0.94	1.00	1.02	1.01	1.01	1.01	1.02	0.94		Load power factor correction and voltage support if needed

Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)								Voltage PU (Sensitivity Scenarios)							Project & Potential Mitigation Solutions
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Winter Peak	2022 Winter Peak	2027 Winter Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022 SP High CEC Forecast	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations			
SNTA RSA 115 kV	Base Case	P0	N-0	1.04	1.02	1.02	1.00	1.00	1.00	1.06	1.04	1.01	1.01	1.01	1.02	1.00			Load power factor correction and voltage support if needed
STAFFORD 60 kV	Base Case	P0	N-0	1.05	0.99	0.99	0.96	0.96	0.95	1.08	1.04	0.99	1.00	0.99	1.01	0.95			Load power factor correction and voltage support if needed
STNSLSRP 60 kV	Base Case	P0	N-0	1.04	1.03	1.03	1.04	1.04	1.04	1.05	1.05	1.04	1.03	1.04	1.04	1.04			Load power factor correction and voltage support if needed
STONY PT 115 kV	Base Case	P0	N-0	1.04	1.01	1.02	1.00	1.00	1.00	1.05	1.03	1.01	1.01	1.01	1.02	1.00			Load power factor correction and voltage support if needed
TOCALOMA 60 kV	Base Case	P0	N-0	1.05	0.99	0.99	0.96	0.96	0.94	1.07	1.04	0.99	0.99	0.99	1.00	0.94			Load power factor correction and voltage support if needed
TULLOCH 115 kV	Base Case	P0	N-0	1.04	1.04	1.03	1.04	1.04	1.04	1.05	1.04	1.04	1.04	1.03	1.03	1.04			Load power factor correction and voltage support if needed
WOODACRE 60 kV	Base Case	P0	N-0	1.05	1.01	1.01	0.98	0.98	0.97	1.07	1.04	1.00	1.01	1.00	1.01	0.97			Load power factor correction and voltage support if needed
PHLO JCT 60kV	P2-4:A2:5:_MENDOCNO 115KV - SECTION 1D & 2D	P2	Bus-tie breaker	0.68	0.54	0.55	0.45	0.45	0.43	>0.9	0.84	0.52	0.53	0.53	0.73	0.43			Voltage support
WILLITS 60 kV	P2-4:A2:5:_MENDOCNO 115KV - SECTION 1D & 2D	P2	Bus-tie breaker	0.51	0.49	0.49	0.38	0.37	0.37	0.63	0.79	0.47	0.48	0.48	0.54	0.37			Voltage support
KEKAWAKA 60 kV	P2-4:A2:5:_MENDOCNO 115KV - SECTION 1D & 2D	P2	Bus-tie breaker	0.59	0.56	0.57	0.48	0.48	0.47	0.71	0.83	0.54	0.56	0.55	0.62	0.47			Voltage support
HPLND JT 60 kV	P2-3:A2:27:_EGLE RCK - MA 115KV & EAGLE ROCK-REDBUD LINE	P2	Non-bus-tie breaker	0.52	0.52	0.53	0.45	0.45	0.45	0.66	0.81	0.51	0.52	0.52	0.58	0.45			Voltage support
PETC_JCT 60 kV	P2-3:A2:65:_LAKEVILLE - 1D 60KV & LAKEVILLE-PETALUMA C LINE	P2	Non-bus-tie breaker	0.54	0.52	0.52	0.43	0.43	0.42	0.67	0.81	0.50	0.51	0.51	0.57	0.42			Voltage support
ALTO 60 kV	P1-1:A2:14:_GEYSER17 13.80KV GEN UNIT 1 & P1-3:A6:4:_IGNACIO 230/115KV TB 6	P3	G-1/N-1	>0.9	>0.9	>0.9	0.90	0.89	0.87	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	0.87			Ignacio - Alto Voltage Conversion Revised Scope
ANNAPOLS 60 kV	P1-1:A2:14:_GEYSER17 13.80KV GEN UNIT 1 & P1-2:A2:2:_FULTON-BEARCNYN-WSFRDFT-GEYSR16-GEYSR12-GEYSR14 230KV [0]	P3	G-1/N-1	>0.9	>0.9	>0.9	0.90	0.89	0.87	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	0.87			Voltage support
BIG RIVR 60 kV	P1-1:A2:13:_GEYSER16 13.80KV GEN UNIT 1 & P1-2:A2:40:_MENDOCINO-PHILO JCT-HOPLAND 60KV [7520]	P3	G-1/N-1	>0.9	>0.9	>0.9	>0.9	0.56	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9			Voltage support
BIG RIVR 60 kV	P1-1:A2:7:_GEYSER78 13.80KV GEN UNIT 1 & P1-2:A2:40:_MENDOCINO-PHILO JCT-HOPLAND 60KV [7520]	P3	G-1/N-1	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	0.53			Sensitivity only
CALISTGA 60 kV	P1-1:A2:10:_GEYSER12 13.80KV GEN UNIT 1 & P1-2:A2:63:_LAKEVILLE #1 60KV [7360]	P3	G-1/N-1	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	0.88	0.89	0.89	>0.9	>0.9			Sensitivity only
CLER LKE 60 kV	P1-1:A2:13:_GEYSER16 13.80KV GEN UNIT 1 & P1-2:A2:54:_KONOCTI-EAGLE ROCK 60KV [6861]	P3	G-1/N-1	>0.9	>0.9	>0.9	>0.9	0.90	>0.9	>0.9	>0.9	0.89	>0.9	>0.9	>0.9	>0.9			Short Term: Middletown UVLS Long Term: Clear Lake Reinforcement Project Revised Scope
CLER LKE 60 kV	P1-1:A2:14:_GEYSER17 13.80KV GEN UNIT 1 & P1-2:A2:54:_KONOCTI-EAGLE ROCK 60KV [6861]	P3	G-1/N-1	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	0.89	>0.9	>0.9	>0.9	0.90			Sensitivity only
DUNBAR 60 kV	P1-1:A2:13:_GEYSER16 13.80KV GEN UNIT 1 & P1-2:A2:63:_LAKEVILLE #1 60KV [7360]	P3	G-1/N-1	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	0.90	>0.9	>0.9	>0.9	>0.9			Sensitivity only

Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)								Voltage PU (Sensitivity Scenarios)							Project & Potential Mitigation Solutions	
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Winter Peak	2022 Winter Peak	2027 Winter Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022 SP High CEC Forecast	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations				
EGLE RCK 60 kV	P1-1:A2:14:_GEYSER17 13.80KV GEN UNIT 1 & P1-3:A2:27:_EGLE RCK 115/60KV TB 1	P3	G-1/N-1	>0.9	>0.9	0.86	>0.9	0.84	>0.9	>0.9	>0.9	>0.9	0.83	0.85	>0.9	>0.9	>0.9			Voltage support
EGLE RCK 60 kV	P1-1:A2:9:_GEYSER11 13.80KV GEN UNIT 1 & P1-3:A2:27:_EGLE RCK 115/60KV TB 1	P3	G-1/N-1	>0.9	0.85	>0.9	>0.9	0.85	0.85	>0.9	>0.9	>0.9	0.83	0.85	0.86	0.88	>0.9			Voltage support
ELK 60 kV	P1-1:A2:12:_GEYSER14 13.80KV GEN UNIT 1 & P1-2:A2:40:_MENDOCINO-PHILO JCT-HOPLAND 60KV [7520]	P3	G-1/N-1	>0.9	>0.9	>0.9	>0.9	0.52	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9			Load power factor correction and voltage support if needed
ELK 60 kV	P1-1:A2:7:_GEYSER78 13.80KV GEN UNIT 1 & P1-2:A2:40:_MENDOCINO-PHILO JCT-HOPLAND 60KV [7520]	P3	G-1/N-1	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	0.49			Sensitivity only
FORT RSS 60 kV	P1-1:A2:14:_GEYSER17 13.80KV GEN UNIT 1 & P1-2:A2:2:_FULTON-BEARCNYN-WSFRDFT-GEYSR16-GEYSR12-GEYSR14 230KV [0]	P3	G-1/N-1	>0.9	>0.9	>0.9	>0.9	>0.9	0.89	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	0.89			Voltage support
FRT BRGG 60 kV	P1-1:A2:12:_GEYSER14 13.80KV GEN UNIT 1 & P1-2:A2:40:_MENDOCINO-PHILO JCT-HOPLAND 60KV [7520]	P3	G-1/N-1	>0.9	>0.9	>0.9	>0.9	0.59	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9			Voltage support
FRT BRGG 60 kV	P1-1:A2:5:_GEYSR5-6 13.80KV GEN UNIT 1 & P1-2:A2:46:_FORT BRAGG-ELK 60KV [2060]	P3	G-1/N-1	>0.9	>0.9	>0.9	>0.9	>0.9	0.90	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9			Fort Bragg UVLS
FRT BRGG 60 kV	P1-1:A2:7:_GEYSER78 13.80KV GEN UNIT 1 & P1-2:A2:40:_MENDOCINO-PHILO JCT-HOPLAND 60KV [7520]	P3	G-1/N-1	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	0.57			Sensitivity only
GARCIA 60 kV	P1-1:A2:12:_GEYSER14 13.80KV GEN UNIT 1 & P1-2:A2:40:_MENDOCINO-PHILO JCT-HOPLAND 60KV [7520]	P3	G-1/N-1	>0.9	>0.9	>0.9	>0.9	0.51	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9			Voltage support
GARCIA 60 kV	P1-1:A2:7:_GEYSER78 13.80KV GEN UNIT 1 & P1-2:A2:40:_MENDOCINO-PHILO JCT-HOPLAND 60KV [7520]	P3	G-1/N-1	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	0.48			Sensitivity only
GREENBRE 60 kV	P1-1:A2:10:_GEYSER12 13.80KV GEN UNIT 1 & P1-2:A2:3:_GEYSR18-LAKEVILLE-GEYSR20-SNTAFE-GEYSR13 230KV [0]	P3	G-1/N-1	>0.9	>0.9	>0.9	>0.9	0.90	0.89	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	0.89			Load power factor correction and voltage support if needed
GREENBRE 60 kV	P1-1:A2:14:_GEYSER17 13.80KV GEN UNIT 1 & P1-2:A2:2:_FULTON-BEARCNYN-WSFRDFT-GEYSR16-GEYSR12-GEYSR14 230KV [0]	P3	G-1/N-1	>0.9	>0.9	>0.9	0.89	0.88	0.86	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	0.86			Voltage support
GUALALA 60 kV	P1-1:A2:10:_GEYSER12 13.80KV GEN UNIT 1 & P1-2:A2:58:_FULTON-LAGUNA-COTATI-SNMALDFL 60KV [0]	P3	G-1/N-1	>0.9	>0.9	>0.9	0.87	0.87	0.86	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	0.86			Voltage support
HARTLEY 60 kV	P1-1:A2:14:_GEYSER17 13.80KV GEN UNIT 1 & P1-2:A2:54:_KONOCTI-EAGLE ROCK 60KV [6861]	P3	G-1/N-1	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	0.90	>0.9	>0.9	>0.9	>0.9			Sensitivity only
KONOCTI6 60 kV	P1-1:A2:14:_GEYSER17 13.80KV GEN UNIT 1 & P1-3:A2:27:_EGLE RCK 115/60KV TB 1	P3	G-1/N-1	>0.9	>0.9	0.86	>0.9	0.84	>0.9	>0.9	>0.9	>0.9	0.83	0.85	>0.9	>0.9	>0.9			Voltage support
KONOCTI6 60 kV	P1-1:A2:6:_GEYSR5-6 13.80KV GEN UNIT 2 & P1-2:A2:54:_KONOCTI-EAGLE ROCK 60KV [6861]	P3	G-1/N-1	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	0.83	0.85	>0.9	>0.9	0.84			Sensitivity only

Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)								Voltage PU (Sensitivity Scenarios)							Project & Potential Mitigation Solutions
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Winter Peak	2022 Winter Peak	2027 Winter Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022 SP High CEC Forecast	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations			
KONOCTI6 60 kV	P1-1:A2:9:_GEYSER11 13.80KV GEN UNIT 1 & P1-2:A2:54:_KONOCTI-EAGLE ROCK 60KV [6861]	P3	G-1/N-1	>0.9	0.85	>0.9	>0.9	0.84	0.84	>0.9	>0.9	0.83	0.85	0.86	0.88	>0.9			Voltage support
LOWR LKE 60 kV	P1-1:A2:14:_GEYSER17 13.80KV GEN UNIT 1 & P1-2:A2:54:_KONOCTI-EAGLE ROCK 60KV [6861]	P3	G-1/N-1	>0.9	>0.9	0.84	>0.9	0.82		>0.9	>0.9	0.81	0.83	>0.9	>0.9	0.82			Voltage support
LOWR LKE 60 kV	P1-1:A2:9:_GEYSER11 13.80KV GEN UNIT 1 & P1-2:A2:54:_KONOCTI-EAGLE ROCK 60KV [6861]	P3	G-1/N-1	>0.9	0.83		>0.9	0.82	0.82	>0.9	>0.9	0.81	0.82	0.84	0.86	>0.9			Voltage support
MIDDLTWN 60 kV	P1-1:A2:14:_GEYSER17 13.80KV GEN UNIT 1 & P1-3:A2:27:_EGLE RCK 115/60KV TB 1	P3	G-1/N-1	>0.9	>0.9	0.80	>0.9	0.79		>0.9	>0.9	0.77	0.79	>0.9	>0.9	0.79			Short Term: Middletown UVLS Long Term: Clear Lake Reinforcement Project Revised Scope
MIDDLTWN 60 kV	P1-1:A2:9:_GEYSER11 13.80KV GEN UNIT 1 & P1-2:A2:54:_KONOCTI-EAGLE ROCK 60KV [6861]	P3	G-1/N-1	>0.9	0.79	0.80	>0.9	0.79	0.79	>0.9	>0.9	0.77	0.79	0.80	0.83	>0.9			Short Term: Middletown UVLS Long Term: Clear Lake Reinforcement Project Revised Scope
OLEMA 60 kV	P1-1:A2:14:_GEYSER17 13.80KV GEN UNIT 1 & P1-2:A2:2:_FULTON-BEARCNYN-WSFRDFT-GEYSR16-GEYSR12-GEYSR14 230KV [0]	P3	G-1/N-1	>0.9	>0.9	>0.9	>0.9	>0.9	0.89	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	0.89			Voltage support
PHILO 60 kV	P1-1:A2:12:_GEYSER14 13.80KV GEN UNIT 1 & P1-2:A2:40:_MENDOCINO-PHILO JCT-HOPLAND 60KV [7520]	P3	G-1/N-1	>0.9	>0.9	>0.9	>0.9	0.49	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9			Voltage support
PHILO 60 kV	P1-1:A2:7:_GEYSER78 13.80KV GEN UNIT 1 & P1-2:A2:40:_MENDOCINO-PHILO JCT-HOPLAND 60KV [7520]	P3	G-1/N-1	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	0.46			Sensitivity only
PNT ARNA 60 kV	P1-1:A2:12:_GEYSER14 13.80KV GEN UNIT 1 & P1-2:A2:40:_MENDOCINO-PHILO JCT-HOPLAND 60KV [7520]	P3	G-1/N-1	>0.9	>0.9	>0.9	>0.9	0.51	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9			Voltage support
PNT ARNA 60 kV	P1-1:A2:13:_GEYSER16 13.80KV GEN UNIT 1 & P1-2:A2:40:_MENDOCINO-PHILO JCT-HOPLAND 60KV [7520]	P3	G-1/N-1	>0.9	>0.9	>0.9	>0.9	0.51	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9			Voltage support
PNT ARNA 60 kV	P1-1:A2:16:_GEYSER20 13.80KV GEN UNIT 1 & P1-2:A2:40:_MENDOCINO-PHILO JCT-HOPLAND 60KV [7520]	P3	G-1/N-1	>0.9	>0.9	>0.9	>0.9	0.52	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9			Voltage support
SAN_RFLJ 60 kV	P1-1:A2:13:_GEYSER16 13.80KV GEN UNIT 1 & P1-2:A6:23:_IGNACIO-ALTO-SAUSALITO #2 60KV [7170]	P3	G-1/N-1	>0.9	>0.9	>0.9	>0.9	0.89	0.87	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	0.87			Voltage support
SAUSALTO 60 kV	P1-1:A2:10:_GEYSER12 13.80KV GEN UNIT 1 & P1-2:A2:3:_GEYSR18-LAKEVILLE-GEYSR20-SNTAFE-GEYSR13 230KV [0]	P3	G-1/N-1	>0.9	>0.9	>0.9	0.89	0.88	0.87	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	0.87			Voltage support
SAUSALTO 60 kV	P1-1:A2:12:_GEYSER14 13.80KV GEN UNIT 1 & P1-2:A6:5:_IGNACIO-SOBRENTE 230KV [4920]	P3	G-1/N-1	>0.9	>0.9	>0.9	0.90	0.89	0.87	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	0.87			Voltage support
ALTO 60 kV	P1-2:A2:2:_FULTON-BEARCNYN-WSFRDFT-GEYSR16-GEYSR12-GEYSR14 230KV [0] & P1-2:A2:20:_EGLE RCK-FULTON-SILVERDO 115KV [0]	P6	N-1-1	>0.9	>0.9	>0.9	0.89	0.88	0.87	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	0.87			Ignacio - Alto Voltage Conversion Revised Scope

Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)								Voltage PU (Sensitivity Scenarios)							Project & Potential Mitigation Solutions	
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Winter Peak	2022 Winter Peak	2027 Winter Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022 SP High CEC Forecast	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations				
ALTO 60 kV	P1-2:A6:24:_IGNACIO-ALTO-SAUSALITO #1 60KV [7160] & P1-2:A6:23:_IGNACIO-ALTO-SAUSALITO #2 60KV [7170]	P6	N-1-1	>0.9	>0.9	>0.9	0.57	0.56	0.53	>0.9		0.89		0.90		0.53				Ignacio - Alto Voltage Conversion Revised Scope
ANNAPOLS 60 kV	P1-2:A2:2:_FULTON-BEARCNYN-WSFRDFTL-GEYSR16-GEYSR12-GEYSR14 230KV [0] & P1-2:A2:20:_EGLE RCK-FULTON-SILVERDO 115KV [0]	P6	N-1-1	>0.9	>0.9	>0.9	>0.9	0.89	0.88	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	0.89				Voltage support, UVLS and/ or SPS
ANNAPOLS 60 kV	P1-2:A2:2:_FULTON-BEARCNYN-WSFRDFTL-GEYSR16-GEYSR12-GEYSR14 230KV [0] & P1-2:A2:31:_SANTA ROSA-CORONA 115KV [4309] (2)	P6	N-1-1	>0.9	>0.9	>0.9	>0.9	>0.9	0.89	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	0.90				Voltage support, UVLS and/ or SPS
BIG RIVR 60 kV	P1-2:A2:18:_GEYSERS #3-EAGLE ROCK 115KV [1660] & P1-2:A2:40:_MENDOCINO-PHILO JCT-HOPLAND 60KV [7520]	P6	N-1-1	>0.9	>0.9	>0.9	0.88	>0.9	0.55	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9				Voltage support, UVLS and/ or SPS
BIG RIVR 60 kV	P1-2:A2:67:_HPLND JT-FULTON-FULTON 60KV [0] & P1-2:A2:40:_MENDOCINO-PHILO JCT-HOPLAND 60KV [7520]	P6	N-1-1	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	0.56				Sensitivity only
BIG RIVR 60 kV	P1-2:A2:9:_VACA-LAKEVILLE #1 230KV [5840] & P1-2:A2:40:_MENDOCINO-PHILO JCT-HOPLAND 60KV [7520]	P6	N-1-1	>0.9	>0.9	>0.9	0.88	0.56	0.54	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9				Voltage support, UVLS and/ or SPS
BOLINAS 60 kV	P1-2:A2:2:_FULTON-BEARCNYN-WSFRDFTL-GEYSR16-GEYSR12-GEYSR14 230KV [0] & P1-2:A6:5:_IGNACIO-SOBRANTE 230KV [4920]	P6	N-1-1	>0.9	>0.9	>0.9	>0.9	>0.9	0.90	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9				Voltage support, UVLS and/ or SPS
BOLINAS 60 kV	P1-3:A6:4:_IGNACIO 230/115KV TB 6 & P1-2:A6:26:_IGNACIO-BOLINAS #1 60KV [7140]	P6	N-1-1	>0.9	>0.9	>0.9	>0.9	0.90	0.88	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	0.87				Voltage support, UVLS and/ or SPS
CALISTGA 60 kV	P1-2:A2:62:_LAKEVILLE-PETALUMA C 60KV [7350] & P1-2:A2:63:_LAKEVILLE #1 60KV [7360]	P6	N-1-1	>0.9	0.89	0.90	>0.9	>0.9	>0.9	>0.9	>0.9	0.88	0.89	0.89	>0.9	>0.9				Voltage support, UVLS and/ or SPS
CALISTGA 60 kV	P1-3:A2:30:_FULTON 115/60KV TB 1 & P1-3:A2:31:_FULTON 115/60KV TB 2	P6	N-1-1	0.53	0.43	0.44	0.39	0.39	0.38	0.69	0.80	0.41	0.42	0.42	0.50	0.38				Voltage support, UVLS and/ or SPS
CLER LKE 60 kV	P1-2:A2:16:_UKIAH-HOPLAND-CLOVERDALE 115KV [4050] & P1-2:A2:54:_KONOCTI-EAGLE ROCK 60KV [6861]	P6	N-1-1	0.87	0.86	0.87	0.85	0.85	0.85	>0.9	>0.9	0.84	0.86	0.87	0.89	0.85				Short Term: Middletown UVLS Long Term: Clear Lake Reinforcement Project Revised Scope
CLER LKE 60 kV	P1-2:A2:54:_KONOCTI-EAGLE ROCK 60KV [6861] & P1-2:A2:50:_CLEAR LAKE-HOPLAND 60KV [6390]	P6	N-1-1	0.59	0.58	0.59	0.57	0.57	0.57	0.90	>0.9	0.55	0.57	0.59	0.63	0.57				Short Term: Middletown UVLS Long Term: Clear Lake Reinforcement Project Revised Scope
CLOVRDLE 115 kV	P1-2:A2:14:_MENDOCINO-UKIAH 115KV [2420] & P1-2:A2:17:_CLOVRDLE-MPE-GEYSERS34 115KV [0]	P6	N-1-1	0.83	0.83	0.84	0.86	0.87	0.87	>0.9	>0.9	0.82	0.83	0.83	0.90	0.87				Voltage support, UVLS and/ or SPS

Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)								Voltage PU (Sensitivity Scenarios)							Project & Potential Mitigation Solutions	
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Winter Peak	2022 Winter Peak	2027 Winter Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022 SP High CEC Forecast	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations				
CLOVRDLE 115 kV	P1-2:A2:17:_CLOVRDLE-MPE-GEYSERS34 115KV [0] & P1-2:A2:14:_MENDOCINO-UKIAH 115KV [2420]	P6	N-1-1	0.82	0.83	0.83	0.87	0.87	0.86	>0.9	>0.9	0.82	0.83	0.83	0.89	0.86				Voltage support, UVLS and/ or SPS
COTATI 60 kV	P1-3:A2:21:_LAKEVILLE 230/60KV TB 3 & P1-3:A2:22:_LAKEVILLE 230/60KV TB 5	P6	N-1-1	0.80	0.74	0.75	0.65	0.65	0.64	>0.9	>0.9	0.73	0.74	0.74	0.86	0.64				Voltage support, UVLS and/ or SPS
COTATI 60 kV	P1-3:A2:31:_FULTON 115/60KV TB 2 & P1-3:A2:30:_FULTON 115/60KV TB 1	P6	N-1-1	0.75	0.74	0.75	0.68	0.68	0.67	0.83	>0.9	0.73	0.74	0.74	0.78	0.67				Voltage support, UVLS and/ or SPS
COVELO6 60 kV	P1-2:A2:19:_CORTINA-MENDOCINO #1 115KV [1330] & P1-2:A2:16:_UKIAH-HOPLAND-CLOVERDALE 115KV [4050]	P6	N-1-1	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	0.90				Sensitivity only
DUNBAR 60 kV	P1-1:A2:13:_GEYSER16 13.80KV GEN UNIT 1 & P1-2:A2:63:_LAKEVILLE #1 60KV [7360]	P6	N-1-1	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	0.90	>0.9	>0.9	>0.9	>0.9				Sensitivity only
DUNBAR 60 kV	P1-3:A2:21:_LAKEVILLE 230/60KV TB 3 & P1-3:A2:22:_LAKEVILLE 230/60KV TB 5	P6	N-1-1	0.68	0.54	0.55	0.45	0.45	0.43	>0.9	0.84	0.52	0.53	0.53	0.73	0.43				Voltage support, UVLS and/ or SPS
EGLE RCK 60 kV	P1-2:A2:11:_GEYSERS #5-GEYSERS #3 115KV [1670] & P1-3:A2:27:_EGLE RCK 115/60KV TB 1	P6	N-1-1	>0.9	0.85	0.86	0.84	0.84	0.85	>0.9	>0.9	>0.9	0.85	0.86	0.88	>0.9				Voltage support, UVLS and/ or SPS
EGLE RCK 60 kV	P1-2:A2:12:_EAGLE ROCK-CORTINA 115KV [1470] & P1-3:A2:27:_EGLE RCK 115/60KV TB 1	P6	N-1-1	0.89	0.85	0.86	0.84	0.84	0.84	>0.9	>0.9	0.83	>0.9	>0.9	0.88	0.84				Voltage support, UVLS and/ or SPS
EGLE RCK 60 kV	P1-2:A2:41:_MENDOCINO-HARTLEY 60KV [7510] & P1-3:A2:27:_EGLE RCK 115/60KV TB 1	P6	N-1-1	0.82	0.73	0.75	0.70	0.70	0.70	>0.9	>0.9	0.67	0.72	0.75	0.81	0.70				Voltage support, UVLS and/ or SPS
ELK 60 kV	P1-1:A2:12:_GEYSER14 13.80KV GEN UNIT 1 & P1-2:A2:40:_MENDOCINO-PHILO JCT-HOPLAND 60KV [7520]	P6	N-1-1	>0.9	>0.9	>0.9	>0.9	0.52	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9				Voltage support, UVLS and/ or SPS
ELK 60 kV	P1-1:A2:7:_GEYSER78 13.80KV GEN UNIT 1 & P1-2:A2:40:_MENDOCINO-PHILO JCT-HOPLAND 60KV [7520]	P6	N-1-1	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	0.49				Sensitivity only
ELK 60 kV	P1-2:A2:18:_GEYSERS #3-EAGLE ROCK 115KV [1660] & P1-2:A2:40:_MENDOCINO-PHILO JCT-HOPLAND 60KV [7520]	P6	N-1-1	>0.9	>0.9	>0.9	0.87	>0.9	0.51	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9				Voltage support, UVLS and/ or SPS
ELK 60 kV	P1-2:A2:48:_PHILO JCT-ELK 60KV [7780] & P1-2:A2:55:_GUALALA-MONTE RIO 60KV [6980]	P6	N-1-1	>0.9	>0.9	>0.9	0.55	0.55	0.51	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	0.50				Voltage support, UVLS and/ or SPS
FCHMNT2 60 kV	P1-3:A2:30:_FULTON 115/60KV TB 1 & P1-3:A2:31:_FULTON 115/60KV TB 2	P6	N-1-1	0.51	0.52	0.53	0.45	0.45	0.45	0.65	0.81	0.50	0.51	0.51	0.58	0.45				Voltage support, UVLS and/ or SPS
FORT RSS 60 kV	P1-3:A2:18:_FULTON 230/115KV TB 9 & P1-3:A2:17:_FULTON 230/115KV TB 4	P6	N-1-1	>0.9	>0.9	>0.9	0.79	0.79	0.78	>0.9	>0.9	0.89	>0.9	>0.9	>0.9	0.78				Voltage support, UVLS and/ or SPS
FORT RSS 60 kV	P1-3:A2:30:_FULTON 115/60KV TB 1 & P1-3:A2:31:_FULTON 115/60KV TB 2	P6	N-1-1	0.49	0.47	0.48	0.35	0.35	0.34	0.61	0.78	0.45	0.47	0.46	0.53	0.34				Voltage support, UVLS and/ or SPS
FRT BRGG 60 kV	P1-2:A2:67:_HPLND JT-FULTON-FULTON 60KV [0] & P1-2:A2:40:_MENDOCINO-PHILO JCT-HOPLAND 60KV [7520]	P6	N-1-1	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	0.59				Sensitivity only

Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)								Voltage PU (Sensitivity Scenarios)							Project & Potential Mitigation Solutions
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Winter Peak	2022 Winter Peak	2027 Winter Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022 SP High CEC Forecast	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations			
FRT BRGG 60 kV	P1-2:A2:9:_VACA-LAKEVILLE #1 230KV [5840] & P1-2:A2:40:_MENDOCINO-PHILO JCT-HOPLAND 60KV [7520]	P6	N-1-1	>0.9	>0.9	>0.9	0.87	0.59	0.57	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9		Fort Bragg UVLS
FTCH MTN 60 kV	P1-3:A2:30:_FULTON 115/60KV TB 1 & P1-3:A2:31:_FULTON 115/60KV TB 2	P6	N-1-1	0.51	0.52	0.53	0.45	0.45	0.45	0.65	0.81	0.50	0.51	0.51	0.58	0.45			Voltage support
GARCIA 60 kV	P1-2:A2:18:_GEYSERS #3-EAGLE ROCK 115KV [1660] & P1-2:A2:40:_MENDOCINO-PHILO JCT-HOPLAND 60KV [7520]	P6	N-1-1	>0.9	>0.9	>0.9	0.87	>0.9	0.50	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9			Voltage support, UVLS and/ or SPS
GARCIA 60 kV	P1-2:A2:48:_PHILO JCT-ELK 60KV [7780] & P1-2:A2:55:_GUALALA-MONTE RIO 60KV [6980]	P6	N-1-1	>0.9	>0.9	>0.9	0.53	0.53	0.49	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	0.48			Voltage support, UVLS and/ or SPS
GREENBRE 60 kV	P1-1:A2:10:_GEYSER12 13.80KV GEN UNIT 1 & P1-3:A6:4:_IGNACIO 230/115KV TB 6	P6	N-1-1	>0.9	>0.9	>0.9	>0.9	0.90	0.88	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	0.88			Voltage support, UVLS and/ or SPS
GREENBRE 60 kV	P1-2:A2:1:_LAKEVILLE-IGNACIO #2 230KV [3745] & P1-2:A2:8:_LAKEVILLE-IGNACIO #1 230KV [4940]	P6	N-1-1	>0.9	>0.9	>0.9	0.89	0.88	0.86	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	0.86			Voltage support, UVLS and/ or SPS
MIDDLTWN 60 kV	P1-3:A2:26:_GEYSERS56 115/13.8KV TB 1 & P1-2:A2:54:_KONOCTI-EAGLE ROCK 60KV [6861]	P6	N-1-1	>0.9	0.79	0.80	0.79	0.79	0.79	>0.9	>0.9	>0.9	0.79	0.80	0.83	>0.9			Short Term: Middletown UVLS Long Term: Clear Lake Reinforcement Project Revised Scope
MIDDLTWN 60 kV	P1-3:A2:27:_EGLE RCK 115/60KV TB 1 & P1-2:A2:50:_CLEAR LAKE-HOPLAND 60KV [6390]	P6	N-1-1	0.49	0.46	0.47	0.44	0.45	0.45	0.89	>0.9	0.43	0.45	0.47	0.50	0.45			Short Term: Middletown UVLS Long Term: Clear Lake Reinforcement Project Revised Scope
MIDDLTWN 60 kV	P1-3:A2:27:_EGLE RCK 115/60KV TB 1 & P1-2:A2:67:_HPLND JT-FULTON-FULTON 60KV [0]	P6	N-1-1	>0.9	0.79	0.80	>0.9	0.78	0.78	>0.9	>0.9	0.78	0.79	0.80	0.83	0.78			Short Term: Middletown UVLS Long Term: Clear Lake Reinforcement Project Revised Scope
MIRABEL 60 kV	P1-3:A2:30:_FULTON 115/60KV TB 1 & P1-3:A2:31:_FULTON 115/60KV TB 2	P6	N-1-1	0.53	0.51	0.52	0.42	0.42	0.41	0.66	0.81	0.49	0.51	0.50	0.57	0.41			Voltage support, UVLS and/ or SPS
MOLINO 60 kV	P1-3:A2:30:_FULTON 115/60KV TB 1 & P1-3:A2:31:_FULTON 115/60KV TB 2	P6	N-1-1	0.59	0.56	0.57	0.48	0.48	0.47	0.71	0.83	0.54	0.56	0.55	0.62	0.47			Voltage support, UVLS and/ or SPS
MONROE1 115 kV	P1-2:A2:25:_FULTON-SANTA ROSA #1 115KV [1620] & P1-2:A2:26:_FULTON-SANTA ROSA #2 115KV [1630]	P6	N-1-1	>0.9	0.89	0.89	0.86	0.86	0.84	>0.9	>0.9	0.88	0.89	0.89	>0.9	0.85			Voltage support, UVLS and/ or SPS
MONTCLO 115 kV	P1-3:A2:17:_FULTON 230/115KV TB 4 & P1-3:A2:18:_FULTON 230/115KV TB 9	P6	N-1-1	>0.9	>0.9	>0.9	0.89	0.89	0.88	>0.9	>0.9	0.90	>0.9	>0.9	>0.9	0.88			Voltage support, UVLS and/ or SPS
MONTE RO 60 kV	P1-3:A2:31:_FULTON 115/60KV TB 2 & P1-3:A2:30:_FULTON 115/60KV TB 1	P6	N-1-1	0.51	0.49	0.49	0.38	0.37	0.37	0.63	0.79	0.47	0.48	0.48	0.54	0.37			Voltage support, UVLS and/ or SPS
NTWR ALT 115 kV	P1-2:A2:2:_FULTON-BEARCNYN-WSFRFLT-GEYSR16-GEYSR12-GEYSR14 230KV [0] & P1-2:A2:3:_GEYSR18-LAKEVILLE-GEYSR20-SNTAFE-GEYSR13 230KV [0]	P6	N-1-1	>0.9	>0.9	>0.9	>0.9	>0.9	0.89	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	0.90			Voltage support, UVLS and/ or SPS
OLEMA 60 kV	P1-2:A2:2:_FULTON-BEARCNYN-WSFRFLT-GEYSR16-GEYSR12-GEYSR14 230KV [0] & P1-2:A2:3:_GEYSR18-LAKEVILLE-GEYSR20-SNTAFE-GEYSR13 230KV [0]	P6	N-1-1	>0.9	>0.9	>0.9	0.89	0.88	0.87	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	0.87			Voltage support, UVLS and/ or SPS

Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)								Voltage PU (Sensitivity Scenarios)							Project & Potential Mitigation Solutions	
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Winter Peak	2022 Winter Peak	2027 Winter Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022 SP High CEC Forecast	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations				
PETLMA A 60 kV	P1-3:A2:21:_LAKEVILLE 230/60KV TB 3 & P1-3:A2:22:_LAKEVILLE 230/60KV TB 5	P6	N-1-1	0.72	0.63	0.63	0.53	0.53	0.51		0.87	0.61	0.62	0.62	0.79	0.51				Lakeville #2 Upgrade (formerly known as Fulton 230/115 kV Transformer project)
PHILO 60 kV	P1-2:A2:67:_HPLND JT-FULTON-FULTON 60KV [0] & P1-2:A2:40:_MENDOCINO-PHILO JCT-HOPLAND 60KV [7520]	P6	N-1-1	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	0.48				Voltage support, UVLS and/ or SPS
PHILO 60 kV	P1-2:A2:9:_VACA-LAKEVILLE #1 230KV [5840] & P1-2:A2:40:_MENDOCINO-PHILO JCT-HOPLAND 60KV [7520]	P6	N-1-1	>0.9	>0.9	>0.9	0.86	0.49	0.46	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9				Voltage support, UVLS and/ or SPS
PNT ARNA 60 kV	P1-1:A2:7:_GEYSER78 13.80KV GEN UNIT 1 & P1-2:A2:40:_MENDOCINO-PHILO JCT-HOPLAND 60KV [7520]	P6	N-1-1	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	0.48				Sensitivity only
PNT ARNA 60 kV	P1-2:A2:1:_LAKEVILLE-IGNACIO #2 230KV [3745] & P1-2:A2:40:_MENDOCINO-PHILO JCT-HOPLAND 60KV [7520]	P6	N-1-1	>0.9	>0.9	>0.9	>0.9	0.52	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9				Voltage support, UVLS and/ or SPS
PNT ARNA 60 kV	P1-2:A2:18:_GEYSERS #3-EAGLE ROCK 115KV [1660] & P1-2:A2:40:_MENDOCINO-PHILO JCT-HOPLAND 60KV [7520]	P6	N-1-1	>0.9	>0.9	>0.9	0.87	>0.9	0.50	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9				Voltage support, UVLS and/ or SPS
PUEBLO 115 kV	P1-2:A2:33:_LAKEVILLE-SONOMA #1 115KV [2063] & P1-2:A2:34:_LAKEVILLE-SONOMA #2 115KV [2070]	P6	N-1-1	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	0.89	0.90	0.90	>0.9	>0.9				Voltage support, UVLS and/ or SPS
RINCON 115 kV	P1-3:A2:18:_FULTON 230/115KV TB 9 & P1-3:A2:17:_FULTON 230/115KV TB 4	P6	N-1-1	>0.9	>0.9	>0.9	0.88	0.88	0.88	>0.9	>0.9	0.90	>0.9	>0.9	>0.9	0.88				Voltage support, UVLS and/ or SPS
SAN_RFLJ 60 kV	P1-1:A2:13:_GEYSER16 13.80KV GEN UNIT 1 & P1-2:A6:24:_IGNACIO-ALTO-SAUSALITO #1 60KV [7160]	P6	N-1-1	>0.9	>0.9	>0.9	>0.9	0.89	0.87	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	0.87				Ignacio - Alto Voltage Conversion Revised Scope
SAN_RFLJ 60 kV	P1-1:A2:14:_GEYSER17 13.80KV GEN UNIT 1 & P1-2:A6:23:_IGNACIO-ALTO-SAUSALITO #2 60KV [7170]	P6	N-1-1	>0.9	>0.9	>0.9	>0.9	0.89	0.87	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	0.87				Ignacio - Alto Voltage Conversion Revised Scope
SAUSALTO 60 kV	P1-1:A2:10:_GEYSER12 13.80KV GEN UNIT 1 & P1-2:A2:3:_GEYSR18-LAKEVILLE-GEYSR20-SNTAFE-GEYSR13 230KV [0]	P6	N-1-1	>0.9	>0.9	>0.9	0.89	0.88	0.87	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	0.87				Voltage support, UVLS and/ or SPS
SAUSALTO 60 kV	P1-1:A2:10:_GEYSER12 13.80KV GEN UNIT 1 & P1-2:A6:5:_IGNACIO-SOBRAANTE 230KV [4920]	P6	N-1-1	>0.9	>0.9	>0.9	0.90	0.89	0.87	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	0.87				Voltage support, UVLS and/ or SPS
SILVERDO 115 kV	P1-3:A2:17:_FULTON 230/115KV TB 4 & P1-3:A2:18:_FULTON 230/115KV TB 9	P6	N-1-1	>0.9	>0.9	>0.9	0.89	0.89	0.88	>0.9	>0.9	0.90	>0.9	>0.9	>0.9	0.88				Voltage support, UVLS and/ or SPS
SLMN CRK 60 kV	P1-1:A2:14:_GEYSER17 13.80KV GEN UNIT 1 & P1-2:A2:2:_FULTON-BEARCNYN-WFRDFTL-GEYSR16-GEYSR12-GEYSR14 230KV [0]	P6	N-1-1	>0.9	>0.9	>0.9	>0.9	>0.9	0.90	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	0.90				Voltage support, UVLS and/ or SPS
SLMN CRK 60 kV	P1-3:A2:30:_FULTON 115/60KV TB 1 & P1-3:A2:31:_FULTON 115/60KV TB 2	P6	N-1-1	0.49	0.47	0.48	0.36	0.35	0.35	0.61	0.78	0.45	0.47	0.46	0.53	0.35				Voltage support, UVLS and/ or SPS

Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)								Voltage PU (Sensitivity Scenarios)						Project & Potential Mitigation Solutions	
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Winter Peak	2022 Winter Peak	2027 Winter Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022 SP High CEC Forecast	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations			
SLMN CRK 60 kV	P1-3:A2:31:_FULTON 115/60KV TB 2 & P1-3:A2:30:_FULTON 115/60KV TB 1	P6	N-1-1	0.49	0.47	0.48	0.36	0.35	0.35	0.61	0.78	0.45	0.47	0.46	0.53	0.35			Voltage support, UVLS and/ or SPS
SNMALDFL 60 kV	P1-3:A2:21:_LAKEVILLE 230/60KV TB 3 & P1-3:A2:22:_LAKEVILLE 230/60KV TB 5	P6	N-1-1	0.80	0.75	0.75	0.66	0.66	0.65	>0.9	>0.9	0.74	0.75	0.75	0.86	0.65			Voltage support, UVLS and/ or SPS
SNTA RSA 115 kV	P1-2:A2:25:_FULTON-SANTA ROSA #1 115KV [1620] & P1-2:A2:26:_FULTON-SANTA ROSA #2 115KV [1630]	P6	N-1-1	>0.9	0.89	0.90	0.86	0.86	0.85	>0.9	>0.9	0.88	0.89	0.89	>0.9	0.85			Voltage support, UVLS and/ or SPS
SNTA RSA 115 kV	P1-3:A2:18:_FULTON 230/115KV TB 9 & P1-3:A2:17:_FULTON 230/115KV TB 4	P6	N-1-1	>0.9	>0.9	>0.9	0.87	0.87	0.87	>0.9	>0.9	0.89	0.90	0.90	>0.9	0.87			Voltage support, UVLS and/ or SPS
SONOMA 115 kV	P1-2:A2:33:_LAKEVILLE-SONOMA #1 115KV [2063] & P1-2:A2:34:_LAKEVILLE-SONOMA #2 115KV [2070]	P6	N-1-1	>0.9	0.88	0.89	0.90	0.89	0.89	>0.9	>0.9	0.87	0.88	0.87	>0.9	0.89			Voltage support, UVLS and/ or SPS
ST.HELNA 60 kV	P1-3:A2:30:_FULTON 115/60KV TB 1 & P1-3:A2:31:_FULTON 115/60KV TB 2	P6	N-1-1	0.51	0.48	0.48	0.42	0.42	0.41	0.68	0.81	0.46	0.47	0.47	0.54	0.41			Voltage support, UVLS and/ or SPS
STAFFORD 60 kV	P1-2:A2:3:_GEYSR18-LAKEVILLE-GEYSR20-SNTAFE-GEYSR13 230KV [0] & P1-2:A2:2:_FULTON-BEARCNYN-WSFRDFTL-GEYSR16-GEYSR12-GEYSR14 230KV [0]	P6	N-1-1	>0.9	>0.9	>0.9	>0.9	0.89	0.88	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	0.88			Voltage support, UVLS and/ or SPS
STAFFORD 60 kV	P1-2:A2:3:_GEYSR18-LAKEVILLE-GEYSR20-SNTAFE-GEYSR13 230KV [0] & P1-2:A6:5:_IGNACIO-SOBRANTE 230KV [4920]	P6	N-1-1	>0.9	>0.9	>0.9	>0.9	>0.9	0.89	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9			Voltage support, UVLS and/ or SPS
STAFFORD 60 kV	P1-2:A6:5:_IGNACIO-SOBRANTE 230KV [4920] & P1-2:A2:2:_FULTON-BEARCNYN-WSFRDFTL-GEYSR16-GEYSR12-GEYSR14 230KV [0]	P6	N-1-1	>0.9	>0.9	>0.9	>0.9	>0.9	0.89	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	0.89			Voltage support, UVLS and/ or SPS
STAFFORD 60 kV	P1-3:A6:4:_IGNACIO 230/115KV TB 6 & P1-3:A6:9:_IGNACIO 115/60KV TB 1	P6	N-1-1	>0.9	>0.9	>0.9	>0.9	>0.9	0.90	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	0.89			Voltage support, UVLS and/ or SPS
STNY PTP 115 kV	P1-2:A2:26:_FULTON-SANTA ROSA #2 115KV [1630] & P1-2:A2:25:_FULTON-SANTA ROSA #1 115KV [1620]	P6	N-1-1	>0.9	>0.9	>0.9	0.87	0.87	0.86	>0.9	>0.9	0.89	>0.9	>0.9	>0.9	0.87			Voltage support, UVLS and/ or SPS
STONY PT 115 kV	P1-2:A2:26:_FULTON-SANTA ROSA #2 115KV [1630] & P1-2:A2:25:_FULTON-SANTA ROSA #1 115KV [1620]	P6	N-1-1	>0.9	>0.9	>0.9	0.87	0.87	0.86	>0.9	>0.9	0.89	>0.9	>0.9	>0.9	0.87			Voltage support, UVLS and/ or SPS
TICALOMA 60 kV	P1-2:A2:3:_GEYSR18-LAKEVILLE-GEYSR20-SNTAFE-GEYSR13 230KV [0] & P1-2:A2:2:_FULTON-BEARCNYN-WSFRDFTL-GEYSR16-GEYSR12-GEYSR14 230KV [0]	P6	N-1-1	>0.9	>0.9	>0.9	0.90	0.89	0.87	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	0.88			Voltage support, UVLS and/ or SPS
UKIAH 115 kV	P1-2:A2:14:_MENDOCINO-UKIAH 115KV [2420] & P1-2:A2:17:_CLOVRDLE-MPE-GEYSERS34 115KV [0]	P6	N-1-1	0.83	0.82	0.82	0.85	0.86	0.86	>0.9	0.90	0.81	0.82	0.82	0.89	0.86			Voltage support, UVLS and/ or SPS
UPPR LKE 60 kV	P1-2:A2:16:_UKIAH-HOPLAND-CLOVERDALE 115KV [4050] & P1-3:A2:27:_EGLE RCK 115/60KV TB 1	P6	N-1-1	>0.9	>0.9	>0.9	0.90	0.90	0.89	>0.9	>0.9	0.89	>0.9	>0.9	>0.9	0.90			Reverse power relay

Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)								Voltage PU (Sensitivity Scenarios)						Project & Potential Mitigation Solutions		
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Winter Peak	2022 Winter Peak	2027 Winter Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022 SP High CEC Forecast	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations				
UPPR LKE 60 kV	P1-2:A2:50:_CLEAR LAKE-HOPLAND 60KV [6390] & P1-3:A2:27:_EGLE RCK 115/60KV TB 1	P6	N-1-1	0.73	0.72	0.72	0.71	0.71	0.71	>0.9	>0.9	0.70	0.72	0.72	0.76	0.71				Reverse power relay
UPPR LKE 60 kV	P1-2:A2:54:_KONOCTI-EAGLE ROCK 60KV [6861] & P1-2:A2:50:_CLEAR LAKE-HOPLAND 60KV [6390]	P6	N-1-1	0.73	0.72	0.72	0.71	0.71	0.70	>0.9	>0.9	0.70	0.71	0.73	0.76	0.70				Reverse power relay
WINDSOR 60 kV	P1-3:A2:30:_FULTON 115/60KV TB 1 & P1-3:A2:31:_FULTON 115/60KV TB 2	P6	N-1-1	0.52	0.52	0.53	0.45	0.45	0.45	0.66	0.81	0.51	0.52	0.52	0.58	0.45				Reverse power relay
WOHLER 60 kV	P1-3:A2:30:_FULTON 115/60KV TB 1 & P1-3:A2:31:_FULTON 115/60KV TB 2	P6	N-1-1	0.54	0.52	0.52	0.43	0.43	0.42	0.67	0.81	0.50	0.51	0.51	0.57	0.42				Reverse power relay
WOODACRE 60 kV	P1-2:A2:3:_GEYSR18-LAKEVILE-GEYSR20-SNTAFE-GEYSR13 230KV [0] & P1-2:A2:2:_FULTON-BEARCNYN-WSFRDFTL-GEYSR16-GEYSR12-GEYSR14 230KV [0]	P6	N-1-1	>0.9	>0.9	>0.9	>0.9	>0.9	0.90	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9				Reverse power relay

Study Area: **PG&E North Coast & North Bay**

Voltage Deviation



Substation	Contingency (All and Worst P6)	Category	Category Description	Post Cont. Voltage Deviation % (Baseline Scenarios)								Post Cont. Voltage Deviation % (Sensitivity Scenarios)							Project & Potential Mitigation Solutions		
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Winter Peak	2022 Winter Peak	2027 Winter Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022 SP High CEC Forecast	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations					
None																					

Contingency	Category	Category Description	Transient Stability Performance (Number of voltage and frequency violations)										Potential Mitigation Solutions	
			2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	Select..	Select..	Select..	Select..	Select..		
IGNACIO/IGNACIO 230/115 kV No.6 Transformer	P1-3		0	0	0	0	0							No violation
GEYSER11 Unit 1	P1-1		0	0	0	0	0							No violation
PUEBLO 115kV ID. v SVD	P1-4		0	0	0	0	0							No violation
Bus fault at LAKEVILLE 230kV	P2-2		0	0	0	0	0							No violation
Internal fault at Non-bus-tie-breaker #222 at LAKEVILLE 230kV	P2-3		0	0	0	0	0							No violation
Internal fault at Bus-tie-breaker #422 at LAKEVILLE 230kV	P2-4		0	0	0	0	0							No violation
GEYSER11 Unit 1 and LAKEVILLE - CR2T3_18 230kV No.1 Line	P3-2		0	0	0	0	0							No violation
LP SAMOA Unit 1 and HUMB_BS1/HUMB_G1 115/13.8 kV No.1 Transformer	P3-3		0	0	0	0	0							No violation
GEYSER11 Unit 1 and PUEBLO 115 kV ID v SVD	P3-4		0	0	0	0	0							No violation
GEYSER11 Unit 1 and GEYSER13 Unit 1	P3-1		0	0	0	0	0							No violation
Breaker stuck for CB #182 protecting GEYSER78 Unit 1	P4-1		0	0	0	0	0							No violation
Breaker stuck for CB #212 protecting LAKEVILLE-CR2T3_18 230kV #1 Line	P4-2		0	0	0	0	0							No violation
Breaker stuck for CB #282 protecting LAKEVILLE/LAKEVILLE 115/230kV No.2 Transformer	P4-3		0	0	0	0	0							No violation
Breaker stuck for CB #366 protecting MENDOCNO 115 kV ID v SVD	P4-4		0	0	0	0	0							No violation

Contingency	Category	Category Description	Transient Stability Performance (Number of voltage and frequency violations)										Potential Mitigation Solutions	
			2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	Select..	Select..	Select..	Select..	Select..		
Breaker stuck for CB #202 protecting LAKEVILLE 230 kV Bus #2 SEC E	P4-5		0	0	0	0	0							No violation
Breaker stuck for CB #422 protecting LAKEVILLE 230kV Bus #2 SEC E	P4-6		0	0	0	0	0							No violation
GEYSER78 Unit 1	P5-1		0	0	0	0	0							No violation
LAKEVILLE -CR2T3_18 230kV No.1 Line	P5-2		0	0	0	0	0							No violation
LAKEVILLE/LAKEVILLE 230/115 kV No.1 Transformer	P5-3		0	0	0	0	0							No violation
MENDOCNO 115 kV ID v SVD	P5-4		0	0	0	0	0							No violation
LAKEVILLE 230kV SEC E	P5-5		0	0	0	0	0							No violation
LAKEVILLE -CR2T3_18 230kV No.1 Line and TULUCAY-VACA-DIX 230kV No.1 Line	P6-1		0	0	0	0	0							No violation
LAKEVILLE -CR2T3_18 230kV No.1 Line and IGNACIO/IGNACIO 230/115 kV No.6 Transformer	P6-2		0	0	0	0	0							No violation
PUEBLO 115 kV ID v SVD and BIG RIVR 60 kV ID v SVD	P6-3		0	0	0	0	0							No violation
Fulton - Lakeville 230kV Line [Tower 37/161] (30435 - 30432), Geysers 9 - Lakeville 230kV Line (30397 - 30435)	P7-1		0	0	0	0	0							No violation

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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.

Study Area: **PG&E North Coast & North Bay**



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..	
											Under review with PTO

Study Area: **PG&E North Valley**



Thermal Overloads

Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading (%)										Project & Potential Mitigation Solutions
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP High CEC Forecast	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations	
Cascade - Cottonwood 115 kV Line (31459 OREGNTRL 115 31469 SPI_AND 115 1 1)	P1-3:A3:4:_COTWD_E2 230/60KV TB 2 P1-3:A3:5:_COTWD_E 230/60KV TB 3	P6	N-1-1	82.9	87.9	91.3	<80	71.3	88.9	116.1	105.4	<80	87.8	Sensitivity only
	P2-2:A3:63:_COTTONWD 60KV SECTION MA	P2	Bus	NConv	NConv	96.0	7.5	51.0	94.5	NConv	NConv	63.3	NConv	Project: Cottonwood - Red Bluff - Scope under review
	P2-3:A3:70:_COTTONWD - MA 60KV & COLEMAN-COTTONWOOD LINE	P2	Non-bus-tie breaker	93.8	90.5	93.7	6.7	54.6	91.4	NConv	NConv	26.1	NConv	Sensitivity only
	P2-3:A3:71:_COTTONWD - MA 60KV & COTTONWD-RED BLFF LINE	P2	Non-bus-tie breaker	83.9	92.4	NConv	7.3	54.1	93.2	106.4	NConv	27.1	95.4	Project: Cottonwood - Red Bluff - Scope under review
	P2-3:A3:72:_COTTONWD - MA 60KV & COTTONWOOD #2 LINE	P2	Non-bus-tie breaker	NConv	NConv	96.0	7.5	51.0	94.5	NConv	NConv	63.3	NConv	Project: Cottonwood - Red Bluff - Scope under review
	P2-3:A3:73:_COTTONWD - MA 60KV & COTTONWOOD #1 LINE	P2	Non-bus-tie breaker	83.9	91.9	94.6	7.3	54.1	93.4	NConv	NConv	27.1	NConv	Sensitivity only
Cascade - Cottonwood 115 kV Line (31464 COTWDPGE 115 31466 JESSUPJ1 115 1 1)	P1-3:A3:4:_COTWD_E2 230/60KV TB 2 P1-3:A3:5:_COTWD_E 230/60KV TB 3	P6	N-1-1	78.6	83.2	88.3	<80	90.1	84.2	114.4	101.6	<80	113.9	Sensitivity only
	P2-3:A3:71:_COTTONWD - MA 60KV & COTTONWD-RED BLFF LINE	P2	Non-bus-tie breaker	79.6	83.3	NConv	14.6	72.9	84.9	100.8	NConv	31.9	119.3	Project: Cottonwood - Red Bluff - Scope under review
Cascade - Cottonwood 115 kV Line (31466 JESSUPJ1 115 31469 SPI_AND 115 1 1)	P2-3:A3:71:_COTTONWD - MA 60KV & COTTONWD-RED BLFF LINE	P2	Non-bus-tie breaker	60.0	64.4	NConv	19.9	76.0	66.7	78.4	NConv	43.2	98.5	Project: Cottonwood - Red Bluff - Scope under review
Cascade - Cottonwood 115 kV Line (31468 CASCADE 115 31459 OREGNTRL 115 1 1)	P1-3:A3:4:_COTWD_E2 230/60KV TB 2 P1-3:A3:5:_COTWD_E 230/60KV TB 3	P6	N-1-1	71.0	75.4	78.9	<80	72.0	76.3	101.7	92.0	<80	75.2	Sensitivity only
	P2-3:A3:71:_COTTONWD - MA 60KV & COTTONWD-RED BLFF LINE	P2	Non-bus-tie breaker	72.0	80.8	NConv	4.8	54.7	81.5	93.3	NConv	31.6	84.0	Project: Cottonwood - Red Bluff - Scope under review
Palermo - Wyandotte 115 kV Line (31480 WYANDTTE 115 31518 WYANDJT1 115 1 1)	Base Case	P0	Normal	90.5	93.3	94.5	26.1	21.7	93.8	103.0	99.0	64.1	94.6	Sensitivity only
Caribou - Palermo 115KV (31482 PALERMO 115 31516 WYANDJT2 115 2 1)	P1-2:A3:53:_PALERMO-WYANDOTTE 115KV P1-2:A3:22:_CARIBOU-TABLE MTN 230KV	P6	N-1-1	85.0	86.8	104.4	<80	<80	87.4	96.3	93.6	75.2	104.5	Action plan or SPS
Sycamore Creek - Notre Dame - Table Mountain 115 kV Line (31497 NDAME J 115 31498 SYCAMORE 115 1 1)	P2-1:A3:50:_BUTTE-SYCAMORE CREEK 115KV (NORD 1-CHICOTP2)	P2-1	Line Section w/o fault	90.3	95.4	97.9	16.3	9.6	91.5	106.9	100.8	63.8	98.0	Project: Table Mountain - Sycamore 115 kV Line - Scope under review
	P2-2:A3:43:_BUTTE 115KV SECTION MD	P2	Bus	91.0	95.4	98.0	16.9	9.2	91.5	107.0	100.9	63.5	98.1	Project: Table Mountain - Sycamore 115 kV Line - Scope under review
	P2-3:A3:50:_BUTTE - MD 115KV & BUTTE-CHICO B-TBLE MTN LINE	P2	Non-bus-tie breaker	118.3	123.7	126.1	23.3	17.9	119.7	137.3	131.3	83.0	126.2	Project: Table Mountain - Sycamore 115 kV Line - Scope under review

Study Area: **PG&E North Valley**



Thermal Overloads

Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading (%)										Project & Potential Mitigation Solutions
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP High CEC Forecast	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations	
	P2-3:A3:54:_TBLE MTN - 1D 115KV & BUTTE-CHICO B-TBLE MTN LINE	P2	Non-bus-tie breaker	81.7	87.9	90.9	15.7	11.2	85.7	100.0	93.8	57.9	90.3	Project: Table Mountain - Sycamore 115 kV Line - Scope under review
	P2-4:A3:11:_BUTTE 115KV - SECTION MD & ME	P2	Bus-tie breaker	91.0	98.0	100.9	16.9	9.2	93.7	110.5	103.7	64.5	101.0	Project: Table Mountain - Sycamore 115 kV Line - Scope under review
Table Mountain - Butte #1 115 kV (31500 BUTTE 115 31501 CHICOTP1 115 1 1)	P1-2:A3:48:_SYCAMORE CREEK-NOTRE DAME-TABLE MTN 115KV P1-2:A3:51:_TABLE MTN-BUTTE #2 115KV	P6	N-1-1	106.3	113.5	120.5	<80	<80	110.6	131.8	121.7	74.9	120.6	Project: Table Mountain - Sycamore 115 kV Line - Scope under review
	P7-1:A3:4_Sycamore Creek-Notre Dame-Table Mountain and Table Mountain-Butte No.2 115 kV Lines	P7	DCTL	106.3	113.6	120.5	21.8	17.6	110.6	131.8	121.7	74.9	120.6	Project: Table Mountain - Sycamore 115 kV Line - Scope under review
Table Mountain - Butte #2 115 kV (31500 BUTTE 115 31504 TBLE MTN 115 2 1)	P1-2:A3:48:_SYCAMORE CREEK-NOTRE DAME-TABLE MTN 115KV P1-2:A3:50:_BUTTE-CHICO B-TBLE MTN 115KV	P6	N-1-1	120.5	130.2	136.4	<80	<80	127.3	150.3	139.9	86.0	136.5	Project: Table Mountain - Sycamore 115 kV Line - Scope under review
Table Mountain - Butte #1 115 kV (31501 CHICOTP1 115 31504 TBLE MTN 115 1 1)	P1-2:A3:48:_SYCAMORE CREEK-NOTRE DAME-TABLE MTN 115KV P1-2:A3:51:_TABLE MTN-BUTTE #2 115KV	P6	N-1-1	123.3	131.0	137.8	<80	<80	128.2	150.3	140.4	87.3	138.0	Project: Table Mountain - Sycamore 115 kV Line - Scope under review
	P2-2:A3:46:_TBLE MTN 115KV SECTION 2D	P2	Bus	92.1	96.5	100.0	20.5	18.5	95.0	109.3	103.1	65.1	100.1	Project: Table Mountain - Sycamore 115 kV Line - Scope under review
	P2-3:A3:52:_TBLE MTN - 2D 115KV & PARADISE-TABLE MTN LINE	P2	Non-bus-tie breaker	92.1	96.6	100.1	20.4	18.5	95.1	109.4	103.2	65.2	100.2	Project: Table Mountain - Sycamore 115 kV Line - Scope under review
	P2-3:A3:53:_TBLE MTN - 2D 115KV & SYCAMORE CREEK-NOTRE DAME-TABLE MTN LINE	P2	Non-bus-tie breaker	92.7	97.6	101.2	20.5	18.5	96.0	110.2	104.4	65.6	101.2	Project: Table Mountain - Sycamore 115 kV Line - Scope under review
	P7-1:A3:4_Sycamore Creek-Notre Dame-Table Mountain and Table Mountain-Butte No.2 115 kV Lines	P7	DCTL	123.3	131.0	137.8	26.4	23.3	128.3	150.3	140.4	87.3	137.9	Project: Table Mountain - Sycamore 115 kV Line - Scope under review
Butte - Sycamore Creek 115 kV (31503 CHICOTP2 115 31500 BUTTE 115 1 1)	P1-2:A3:48:_SYCAMORE CREEK-NOTRE DAME-TABLE MTN 115KV P1-2:A3:50:_BUTTE-CHICO B-TBLE MTN 115KV	P6	N-1-1	83.8	90.6	92.8	<80	<80	87.8	102.8	97.3	<80	92.9	Project: Table Mountain - Sycamore 115 kV Line - Scope under review

Study Area: **PG&E North Valley**



Thermal Overloads

Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading (%)										Project & Potential Mitigation Solutions
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP High CEC Forecast	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations	
Sycamore Creek - Notre Dame - Table Mountain 115 kV Line (31504 TBLE MTN 115 31497 NDAME J 115 1 1)	P1-2:A3:50:_BUTTE-CHICO B-TBLE MTN 115KV P1-2:A3:51:_TABLE MTN-BUTTE #2 115KV	P6	N-1-1	90.0	96.2	101.5	<80	<80	94.1	110.8	103.2	<80	100.8	Project: Table Mountain - Sycamore 115 kV Line - Scope under review
	P2-2:A3:47:_TBLE MTN 115KV SECTION 1D	P2	Bus	89.9	96.4	101.2	19.0	16.4	94.8	110.9	103.0	63.8	101.2	Project: Table Mountain - Sycamore 115 kV Line - Scope under review
	P2-3:A3:54:_TBLE MTN - 1D 115KV & BUTTE-CHICO B-TBLE MTN LINE	P2	Non-bus-tie breaker	89.9	96.6	101.3	18.9	16.6	95.0	111.0	103.1	63.9	100.7	Project: Table Mountain - Sycamore 115 kV Line - Scope under review
Paradise - Table Mountain 115 kV (31514 PARADSE 115 31494 BIGBENTP 115 1 1)	P1-2:A3:50:_BUTTE-CHICO B-TBLE MTN 115KV P1-2:A3:51:_TABLE MTN-BUTTE #2 115KV	P6	N-1-1	90.6	96.0	100.1	<80	<80	94.6	109.1	102.6	<80	99.5	Project: Table Mountain - Sycamore 115 kV Line - Scope under review
	P2-2:A3:47:_TBLE MTN 115KV SECTION 1D	P2	Bus	90.7	96.5	100.1	20.0	17.7	95.6	109.4	102.7	64.5	100.1	Project: Table Mountain - Sycamore 115 kV Line - Scope under review
	P2-3:A3:54:_TBLE MTN - 1D 115KV & BUTTE-CHICO B-TBLE MTN LINE	P2	Non-bus-tie breaker	90.5	96.4	100.0	19.8	17.7	95.5	109.3	102.5	64.5	99.3	Project: Table Mountain - Sycamore 115 kV Line - Scope under review
Keswick - Trinity 60 kV (31556 TRINITY 60.0 31564 FRNCHGLH 60.0 1 1)	P2-4:A3:8:_COTWDPGE 115KV - SECTION 2D & 1D	P2	Bus-tie breaker	22.5	26.8	34.2	148.8	96.2	11.1	37.4	82.4	63.7	143.7	Project: Cottonwood - Red Bluff - Scope under review
Keswick - Trinity 60 kV (31564 FRNCHGLH 60.0 31566 KESWICK 60.0 1 1)	P2-4:A3:8:_COTWDPGE 115KV - SECTION 2D & 1D	P2	Bus-tie breaker	21.8	25.2	32.4	146.6	94.1	11.0	39.3	84.3	62.3	141.3	Project: Cottonwood - Red Bluff - Scope under review
Keswick - Cascade 60 kV (31566 KESWICK 60.0 31582 STILLWATR 60.0 1 1)	P2-4:A3:8:_COTWDPGE 115KV - SECTION 2D & 1D	P2	Bus-tie breaker	18.6	20.1	27.9	165.0	106.1	12.4	52.7	105.6	65.7	153.5	Project: Cottonwood - Red Bluff - Scope under review
Cottonwood - Benton #1 60 kV (31570 BENTON 60.0 31572 GIRVAN 60.0 1 1)	P1-3:A3:4:_COTWD_E2 230/60KV TB 2 P1-3:A3:5:_COTWD_E 230/60KV TB 3	P6	N-1-1	73.1	76.5	84.3	<80	<80	74.9	106.6	89.9	<80	85.1	Project: Cascade - Benton - Scope under review
	P2-2:A3:62:_COTTONWD 60KV SECTION 1D	P2	Bus	74.3	81.1	91.9	19.8	11.3	79.2	101.0	86.7	52.3	93.8	Project: Cottonwood - Red Bluff - Scope under review
	P2-3:A3:71:_COTTONWD - MA 60KV & COTTONWD-RED BLFF LINE	P2	Non-bus-tie breaker	56.6	69.8	NConv	15.9	7.5	68.3	90.3	NConv	38.1	83.2	Project: Cottonwood - Red Bluff - Scope under review
	P2-4:A3:20:_COTWD_F2 SECTION 2F & COTWD_E2 SECTION 2E 230KV	P2	Bus-tie breaker	4.0	6.0	7.6	103.7	91.2	11.8	26.3	15.3	39.6	31.6	Project: Cottonwood - Red Bluff - Scope under review
Cottonwood - Benton #1 60 kV	P1-2:A3:63:_COTTONWOOD-BENTON #2 60KV P1-3:A3:42:_CASCADE 115/60KV TB 1	P6	N-1-1	102.1	111.2	116.0	<80	<80	112.6	129.7	121.2	73.6	104.8	Project: Cascade - Benton - Scope under review

Study Area: **PG&E North Valley**



Thermal Overloads

Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading (%)										Project & Potential Mitigation Solutions
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP High CEC Forecast	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations	
(31574 ANDERSON 60.0 31604 COTTONWD 60.0 1 1)	P2-4:A3:8:_COTWDPGE 115KV - SECTION 2D & 1D	P2	Bus-tie breaker	30.8	37.8	42.9	17.2	36.8	40.4	64.5	66.9	37.0	125.4	Project: Cottonwood - Red Bluff - Scope under review
Cascade - Benton - Deschutes 60 kV (31576 WNTU PMS 60.0 31570 BENTON 60.0 1 1)	P1-3:A3:3:_COTWD_E2 230/115KV TB 1 P1-3:A3:6:_COTWD_F2 230/115KV TB 4	P6	N-1-1	<80	<80	<80	207.0	189.7	<80	<80	<80	68.9	<80	Project: Cascade - Benton - Scope under review
	P2-2:A3:62:_COTTONWD 60KV SECTION 1D	P2	Bus	74.4	81.1	91.9	20.0	11.2	79.2	101.0	86.6	52.2	93.8	Project: Cottonwood - Red Bluff - Scope under review
	P2-2:A3:63:_COTTONWD 60KV SECTION MA	P2	Bus	NConv	NConv	111.2	20.6	10.9	94.5	NConv	NConv	59.2	NConv	Project: Cottonwood - Red Bluff - Scope under review
	P2-3:A3:70:_COTTONWD - MA 60KV & COLEMAN-COTTONWOOD LINE	P2	Non-bus-tie breaker	75.1	95.4	110.2	20.6	11.0	92.8	NConv	NConv	52.2	NConv	Project: Cottonwood - Red Bluff - Scope under review
	P2-3:A3:71:_COTTONWD - MA 60KV & COTTONWD-RED BLFF LINE	P2	Non-bus-tie breaker	74.3	94.2	NConv	20.5	11.0	91.9	122.9	NConv	51.9	113.8	Project: Cottonwood - Red Bluff - Scope under review
	P2-3:A3:72:_COTTONWD - MA 60KV & COTTONWOOD #2 LINE	P2	Non-bus-tie breaker	NConv	NConv	111.2	20.6	10.9	94.5	NConv	NConv	59.2	NConv	Project: Cottonwood - Red Bluff - Scope under review
	P2-3:A3:73:_COTTONWD - MA 60KV & COTTONWOOD #1 LINE	P2	Non-bus-tie breaker	74.3	94.0	108.4	20.5	11.0	92.0	NConv	NConv	51.9	NConv	Project: Cottonwood - Red Bluff - Scope under review
	P2-4:A3:20:_COTWD_F2 SECTION 2F & COTWD_E2 SECTION 2E 230KV	P2	Bus-tie breaker	36.4	35.3	30.1	204.5	189.6	55.2	15.6	12.8	65.6	45.2	Project: Cottonwood - Red Bluff - Scope under review
P2-4:A3:8:_COTWDPGE 115KV - SECTION 2D & 1D	P2	Bus-tie breaker	46.2	56.4	57.3	65.1	87.9	46.0	16.2	22.6	17.8	145.1	Project: Cottonwood - Red Bluff - Scope under review	
Cascade - Benton - Deschutes 60 kV (31580 CASCADE 60.0 31581 OREGNTRL 60.0 1 1)	P1-3:A3:4:_COTWD_E2 230/60KV TB 2 P1-3:A3:5:_COTWD_E 230/60KV TB 3	P6	N-1-1	173.9	188.3	203.6	99.9	76.5	187.6	267.3	227.1	<80	201.3	Project: Cascade - Benton - Scope under review
	P2-2:A3:63:_COTTONWD 60KV SECTION MA	P2	Bus	NConv	NConv	229.8	19.2	8.6	218.5	NConv	NConv	146.9	NConv	Project: Cottonwood - Red Bluff - Scope under review
	P2-3:A3:70:_COTTONWD - MA 60KV & COLEMAN-COTTONWOOD LINE	P2	Non-bus-tie breaker	209.0	209.6	220.8	28.7	14.6	207.7	NConv	NConv	88.1	NConv	Project: Cottonwood - Red Bluff - Scope under review
	P2-3:A3:71:_COTTONWD - MA 60KV & COTTONWD-RED BLFF LINE	P2	Non-bus-tie breaker	177.1	208.7	NConv	28.5	12.6	208.5	250.5	NConv	73.8	227.6	Project: Cottonwood - Red Bluff - Scope under review
	P2-3:A3:72:_COTTONWD - MA 60KV & COTTONWOOD #2 LINE	P2	Non-bus-tie breaker	NConv	NConv	229.8	19.2	8.6	218.5	NConv	NConv	146.9	NConv	Project: Cottonwood - Red Bluff - Scope under review
	P2-3:A3:73:_COTTONWD - MA 60KV & COTTONWOOD #1 LINE	P2	Non-bus-tie breaker	177.1	209.9	220.3	28.4	12.6	211.8	NConv	NConv	73.8	NConv	Project: Cottonwood - Red Bluff - Scope under review
	P2-4:A3:20:_COTWD_F2 SECTION 2F & COTWD_E2 SECTION 2E 230KV	P2	Bus-tie breaker	22.2	17.2	10.6	261.4	245.9	42.9	49.6	20.8	88.5	74.8	Project: Cottonwood - Red Bluff - Scope under review

Study Area: **PG&E North Valley**



Thermal Overloads

Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading (%)										Project & Potential Mitigation Solutions
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP High CEC Forecast	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations	
	P2-4:A3:8:_COTWDPGE 115KV - SECTION 2D & 1D	P2	Bus-tie breaker	88.4	98.8	99.6	75.7	107.9	86.2	44.2	8.0	16.0	165.9	Project: Cottonwood - Red Bluff - Scope under review
Keswick - Cascade 60 kV (31580 CASCADE 60.0 31582 STILLWATR 60.0 1 1)	P2-4:A3:8:_COTWDPGE 115KV - SECTION 2D & 1D	P2	Bus-tie breaker	13.7	6.0	3.6	137.8	90.2	27.1	65.0	111.2	44.6	116.1	Project: Cottonwood - Red Bluff - Scope under review
Cascade - Benton - Deschutes 60 kV (31581 OREGNTRL 60.0 31578 LOMS JCT 60.0 1 1)	P1-3:A3:3:_COTWD_E2 230/115KV TB 1 P1-3:A3:6:_COTWD_F2 230/115KV TB 4	P6	N-1-1	31.9	27.7	21.0	261.4	234.4	87.9	<80	<80	87.0	<80	Project: Cascade - Benton - Scope under review
	P2-2:A3:63:_COTTONWD 60KV SECTION MA	P2	Bus	NConv	NConv	216.9	22.6	8.9	205.0	NConv	NConv	138.9	NConv	Project: Cottonwood - Red Bluff - Scope under review
	P2-3:A3:70:_COTTONWD - MA 60KV & COLEMAN-COTTONWOOD LINE	P2	Non-bus-tie breaker	197.7	194.1	211.8	32.1	13.8	194.3	NConv	NConv	81.3	NConv	Project: Cottonwood - Red Bluff - Scope under review
	P2-3:A3:71:_COTTONWD - MA 60KV & COTTONWD-RED BLFF LINE	P2	Non-bus-tie breaker	165.9	198.9	NConv	31.9	11.9	198.6	235.2	NConv	67.3	214.2	Project: Cottonwood - Red Bluff - Scope under review
	P2-3:A3:72:_COTTONWD - MA 60KV & COTTONWOOD #2 LINE	P2	Non-bus-tie breaker	NConv	NConv	216.9	22.6	8.9	205.0	NConv	NConv	138.9	NConv	Project: Cottonwood - Red Bluff - Scope under review
	P2-3:A3:73:_COTTONWD - MA 60KV & COTTONWOOD #1 LINE	P2	Non-bus-tie breaker	165.9	195.5	210.9	31.8	11.9	196.7	NConv	NConv	67.3	NConv	Project: Cottonwood - Red Bluff - Scope under review
	P2-4:A3:20:_COTWD_F2 SECTION 2F & COTWD_E2 SECTION 2E 230KV	P2	Bus-tie breaker	32.5	28.3	21.9	257.9	246.8	54.1	37.6	9.1	83.2	67.3	Project: Cottonwood - Red Bluff - Scope under review
	P2-4:A3:8:_COTWDPGE 115KV - SECTION 2D & 1D	P2	Bus-tie breaker	77.2	88.6	89.5	72.1	108.8	75.5	32.6	5.6	13.1	176.1	Project: Cottonwood - Red Bluff - Scope under review
Volta - Deschutes 60 kV (31592 DESCHUTS 60.0 31594 VOLTA 60.0 1 1)	P2-2:A3:63:_COTTONWD 60KV SECTION MA	P2	Bus	NConv	NConv	107.9	51.2	5.5	108.6	NConv	NConv	78.0	NConv	Project: Cottonwood - Red Bluff - Scope under review
	P2-3:A3:70:_COTTONWD - MA 60KV & COLEMAN-COTTONWOOD LINE	P2	Non-bus-tie breaker	80.3	98.0	109.2	60.4	20.2	99.4	NConv	NConv	7.1	NConv	Project: Cottonwood - Red Bluff - Scope under review
	P2-3:A3:71:_COTTONWD - MA 60KV & COTTONWD-RED BLFF LINE	P2	Non-bus-tie breaker	52.4	88.6	NConv	59.8	17.8	91.3	105.5	NConv	9.9	91.5	Project: Cottonwood - Red Bluff - Scope under review
	P2-3:A3:72:_COTTONWD - MA 60KV & COTTONWOOD #2 LINE	P2	Non-bus-tie breaker	NConv	NConv	107.9	51.2	5.5	108.6	NConv	NConv	78.0	NConv	Project: Cottonwood - Red Bluff - Scope under review
	P2-3:A3:73:_COTTONWD - MA 60KV & COTTONWOOD #1 LINE	P2	Non-bus-tie breaker	52.4	86.3	93.1	59.7	17.8	87.1	NConv	NConv	10.0	NConv	Project: Cottonwood - Red Bluff - Scope under review
	P1-2:A3:73:_COTTONWD-RED BLFF 60KV P1-2:A3:71:_COLEMAN-COTTONWOOD 60KV	P6	N-1-1	<80	146.8	147.6	<80	<80	149.6	150.9	151.2	<80	142.1	Project: Cascade - Benton - Scope under review
	P2-2:A3:63:_COTTONWD 60KV SECTION MA	P2	Bus	NConv	NConv	157.0	45.3	13.0	159.3	NConv	NConv	125.8	NConv	Project: Cottonwood - Red Bluff - Scope under review

Study Area: **PG&E North Valley**



Thermal Overloads

Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading (%)										Project & Potential Mitigation Solutions
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP High CEC Forecast	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations	
Volta - South 60 kV (31594 VOLTA 60.0 31596 SOUTH 60.0 1 1)	P2-3:A3:70:_COTTONWD - MA 60KV & COLEMAN-COTTONWOOD LINE	P2	Non-bus-tie breaker	108.4	143.6	153.9	56.6	26.1	145.4	NConv	NConv	29.8	NConv	Project: Cottonwood - Red Bluff - Scope under review
	P2-3:A3:71:_COTTONWD - MA 60KV & COTTONWD-RED BLFF LINE	P2	Non-bus-tie breaker	75.1	136.1	NConv	55.6	21.3	138.6	154.3	NConv	8.8	135.5	Project: Cottonwood - Red Bluff - Scope under review
	P2-3:A3:72:_COTTONWD - MA 60KV & COTTONWOOD #2 LINE	P2	Non-bus-tie breaker	NConv	NConv	157.0	45.3	13.0	159.3	NConv	NConv	125.8	NConv	Project: Cottonwood - Red Bluff - Scope under review
	P2-3:A3:73:_COTTONWD - MA 60KV & COTTONWOOD #1 LINE	P2	Non-bus-tie breaker	75.1	133.1	138.7	55.5	21.2	134.3	NConv	NConv	8.7	NConv	Project: Cottonwood - Red Bluff - Scope under review
Coleman - Red Bluff 60 kV Line (31602 COLEMAN 60.0 31606 CLMN JCT 60.0 1 1)	P1-1:A3:75:_COLUSGT1 18.00KV & COLUSGT2 18.00KV & COLUSST1 18.00KV GEN UNITS P1-2:A3:73:_COTTONWD-RED BLFF 60KV	P3	G-1/N-1	119.4	122.6	124.5	<80	123.4	141.8	132.7	<80	123.7	<80	Project: Cottonwood - Red Bluff - Scope under review
	P1-2:A3:71:_COLEMAN-COTTONWOOD 60KV P1-2:A3:73:_COTTONWD-RED BLFF 60KV	P6	N-1-1	119.3	NConv	222.8	<80	<80	224.0	228.9	NConv	<80	220.1	Project: Cottonwood - Red Bluff - Scope under review
	P1-2:A3:73:_COTTONWD-RED BLFF 60KV	P1	N-1	119.4	121.9	124.5	33.5	10.8	122.8	140.8	132.1	74.7	124.7	Project: Cottonwood - Red Bluff - Scope under review
	P2-2:A3:63:_COTTONWD 60KV SECTION MA	P2	Bus	NConv	NConv	175.0	39.9	26.2	179.5	NConv	NConv	185.3	NConv	Project: Cottonwood - Red Bluff - Scope under review
	P2-3:A3:70:_COTTONWD - MA 60KV & COLEMAN-COTTONWOOD LINE	P2	Non-bus-tie breaker	158.7	196.4	185.9	39.3	25.9	198.5	NConv	NConv	114.6	NConv	Project: Cottonwood - Red Bluff - Scope under review
	P2-3:A3:71:_COTTONWD - MA 60KV & COTTONWD-RED BLFF LINE	P2	Non-bus-tie breaker	120.2	183.9	NConv	32.3	10.9	185.5	169.7	NConv	77.6	171.2	Project: Cottonwood - Red Bluff - Scope under review
	P2-3:A3:72:_COTTONWD - MA 60KV & COTTONWOOD #2 LINE	P2	Non-bus-tie breaker	NConv	NConv	175.0	39.9	26.2	179.5	NConv	NConv	185.3	NConv	Project: Cottonwood - Red Bluff - Scope under review
	P2-3:A3:73:_COTTONWD - MA 60KV & COTTONWOOD #1 LINE	P2	Non-bus-tie breaker	120.3	187.7	179.1	32.5	10.8	186.8	NConv	NConv	77.5	NConv	Project: Cottonwood - Red Bluff - Scope under review
	P7-1:A3:1_Cottonwood-Benton No.1 and Cottonwood-Red Bluff 60 kV Lines	P7	DCTL	119.6	121.7	124.3	33.5	10.8	122.6	140.6	131.8	74.3	124.4	Project: Cottonwood - Red Bluff - Scope under review
Cottonwood - Red Bluff 60 kV Line (31604 COTTONWD 60.0 31607 RED B JT 60.0 1 1)	P2-1:A3:94:_COLEMAN-RED BLUFF 60KV (COLEMAN-CLMN JCT)	P2-1	Line Section w/o fault	119.1	118.4	121.0	33.8	10.7	119.1	135.8	127.7	72.7	121.2	Project: Cottonwood - Red Bluff - Scope under review
	P2-2:A3:61:_COLEMAN 60KV SECTION 1D	P2	Bus	119.2	118.3	121.0	33.9	10.7	119.0	135.8	127.6	73.0	121.2	Project: Cottonwood - Red Bluff - Scope under review
	P2-3:A3:68:_COLEMAN - 1D 60KV & COLEMAN-COTTONWOOD LINE	P2	Non-bus-tie breaker	119.1	118.3	121.0	33.8	10.7	118.9	135.8	127.5	73.0	121.2	Project: Cottonwood - Red Bluff - Scope under review

Study Area: **PG&E North Valley**



Thermal Overloads

Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading (%)										Project & Potential Mitigation Solutions	
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP High CEC Forecast	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations		
Coleman - Red Bluff 60 kV Line (31606 CLMN JCT 60.0 31608 RED BLFF 60.0 1 1)	P1-1:A3:75:_COLUSGT1 18.00KV & COLUSGT2 18.00KV & COLUSST1 18.00	P3	G-1/N-1	<80	<80	<80	<80	<80	<80	104.7	98.1	<80	<80	<80	Project: Cottonwood - Red Bluff - Scope under review
	P1-2:A3:71:_COLEMAN-COTTONWOOD 60KV P1-2:A3:73:_COTTONWD-RED BLFF 60KV	P6	N-1-1	<80	<80	160.4	<80	<80	<80	162.2	164.6	NConv	<80	157.4	Project: Cottonwood - Red Bluff - Scope under review
	P1-2:A3:73:_COTTONWD-RED BLFF 60KV	P1	N-1	85.9	90.2	92.3	23.4	8.6	90.7	102.7	97.6	56.3	92.5	Project: Cottonwood - Red Bluff - Scope under review	
	P2-2:A3:63:_COTTONWD 60KV SECTION MA	P2	Bus	NConv	NConv	134.1	29.8	24.0	136.8	NConv	NConv	147.0	NConv	Project: Cottonwood - Red Bluff - Scope under review	
	P2-3:A3:70:_COTTONWD - MA 60KV & COLEMAN-COTTONWOOD LINE	P2	Non-bus-tie breaker	124.2	150.0	140.3	29.3	23.8	151.9	NConv	NConv	93.3	NConv	Project: Cottonwood - Red Bluff - Scope under review	
	P2-3:A3:71:_COTTONWD - MA 60KV & COTTONWD-RED BLFF LINE	P2	Non-bus-tie breaker	86.5	133.1	NConv	22.5	8.7	133.1	121.6	NConv	58.2	124.7	Project: Cottonwood - Red Bluff - Scope under review	
	P2-3:A3:72:_COTTONWD - MA 60KV & COTTONWOOD #2 LINE	P2	Non-bus-tie breaker	NConv	NConv	134.1	29.8	24.0	136.8	NConv	NConv	147.0	NConv	Project: Cottonwood - Red Bluff - Scope under review	
	P2-3:A3:73:_COTTONWD - MA 60KV & COTTONWOOD #1 LINE	P2	Non-bus-tie breaker	86.6	134.7	128.2	22.7	8.5	135.0	NConv	NConv	58.1	NConv	Project: Cottonwood - Red Bluff - Scope under review	
	P7-1:A3:1_Cottonwood-Benton No.1 and Cottonwood-Red Bluff 60 kV Lines	P7	DCTL	86.0	90.0	92.2	23.4	8.6	90.6	103.6	97.4	56.1	92.3	Project: Cottonwood - Red Bluff - Scope under review	
Cottonwood - Red Bluff 60 kV Line (31607 RED B JT 60.0 31608 RED BLFF 60.0 1 1)	P2-1:A3:94:_COLEMAN-RED BLUFF 60KV (COLEMAN-CLMN JCT)	P2-1	Line Section w/o fault	118.7	118.3	121.0	33.2	10.7	119.1	134.9	127.7	72.0	121.2	Project: Cottonwood - Red Bluff - Scope under review	
	P2-2:A3:61:_COLEMAN 60KV SECTION 1D	P2	Bus	118.8	118.4	121.0	33.2	10.7	119.0	135.7	127.6	73.0	121.2	Project: Cottonwood - Red Bluff - Scope under review	
	P2-3:A3:68:_COLEMAN - 1D 60KV & COLEMAN-COTTONWOOD LINE	P2	Non-bus-tie breaker	118.7	118.3	121.0	33.2	10.7	118.9	135.6	127.5	73.0	121.2	Project: Cottonwood - Red Bluff - Scope under review	
Glen #4 60 kV Line (31626 CORNING 60.0 31729 CORNSWCH 60.0 4 1)	Base Case	P0	Normal	88.3	89.1	97.2	26.7	23.1	86.6	103.6	93.6	62.5	97.1	Sensitivity only	
Glen #4 60 kV Line (31722 GLENN 60.0 31729 CORNSWCH 60.0 4 1)	Base Case	P0	Normal	88.3	89.1	97.2	26.7	22.9	86.6	103.6	93.6	62.5	97.1	Sensitivity only	

Study Area: **PG&E North Valley**



Voltage Deviations

Substation	Contingency (All and Worst P6)	Category	Category Description	Post Cont. Voltage pu										Project & Potential Mitigation Solutions
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP High CEC Forecast	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations	
ANDERSON 60	P2-2:A3:62:_COTTONWD 60KV SECTION 1D	P2	Bus	1.00	0.91	0.89	1.06	1.02	0.92	0.88	0.90	0.96	0.87	Project: Cottonwood - Red Bluff - Scope under review
ANDERSON 60	P2-2:A3:63:_COTTONWD 60KV SECTION MA	P2	Bus	0.90	0.76	0.74	1.06	1.02	0.77	0.74	0.80	0.84	0.74	Project: Cottonwood - Red Bluff - Scope under review
ANDERSON 60	P2-3:A3:70:_COTTONWD - MA 60KV & COLEMAN-COTTONWOOD LINE	P2	Non-bus-tie breaker	1.00	0.77	0.74	1.06	1.02	0.78	0.46	0.66	0.95	0.48	Project: Cottonwood - Red Bluff - Scope under review
ANDERSON 60	P2-3:A3:71:_COTTONWD - MA 60KV & COTTONWD-RED BLFF LINE	P2	Non-bus-tie breaker	1.01	0.78	0.76	1.06	1.02	0.79	0.72	0.75	0.96	0.72	Project: Cottonwood - Red Bluff - Scope under review
ANDERSON 60	P2-3:A3:72:_COTTONWD - MA 60KV & COTTONWOOD #2 LINE	P2	Non-bus-tie breaker	0.90	0.76	0.74	1.06	1.02	0.77	0.74	0.80	0.84	0.74	Project: Cottonwood - Red Bluff - Scope under review
ANDERSON 60	P2-3:A3:73:_COTTONWD - MA 60KV & COTTONWOOD #1 LINE	P2	Non-bus-tie breaker	1.01	0.78	0.75	1.06	1.02	0.79	0.73	0.74	0.96	0.69	Project: Cottonwood - Red Bluff - Scope under review
ANDERSON 60	P1-3:A3:4:_COTWD_E2 230/60KV TB 2 P1-3:A3:5:_COTWD_E 230/60KV TB 3	P6	N-1/N-1	>0.9	0.91	0.89	>0.9	>0.9	0.93	0.85	0.88	0.97	0.89	Project: Cascade - Benton - Scope under review
ANITA 60	Base Case	P0	Normal	1.01	1.00	1.00	1.03	1.05	1.01	1.00	1.01	1.02	1.00	Glenn 230/60 kV Transformer Tap Adjustment
ANTLER 60	P2-2:A3:63:_COTTONWD 60KV SECTION MA	P2	Bus	0.94	0.86	0.85	1.05	1.02	0.86	0.87	0.89	0.90	0.86	Project: Cottonwood - Red Bluff - Scope under review
ANTLER 60	P2-3:A3:70:_COTTONWD - MA 60KV & COLEMAN-COTTONWOOD LINE	P2	Non-bus-tie breaker	0.99	0.86	0.85	1.05	1.02	0.87	0.69	0.80	0.97	0.69	Project: Cottonwood - Red Bluff - Scope under review
ANTLER 60	P2-3:A3:71:_COTTONWD - MA 60KV & COTTONWD-RED BLFF LINE	P2	Non-bus-tie breaker	1.00	0.87	0.86	1.05	1.02	0.87	0.84	0.85	0.98	0.83	Project: Cottonwood - Red Bluff - Scope under review
ANTLER 60	P2-3:A3:72:_COTTONWD - MA 60KV & COTTONWOOD #2 LINE	P2	Non-bus-tie breaker	0.94	0.86	0.85	1.05	1.02	0.86	0.87	0.89	0.90	0.86	Project: Cottonwood - Red Bluff - Scope under review
ANTLER 60	P2-3:A3:73:_COTTONWD - MA 60KV & COTTONWOOD #1 LINE	P2	Non-bus-tie breaker	1.00	0.87	0.86	1.05	1.02	0.88	0.85	0.85	0.98	0.81	Project: Cottonwood - Red Bluff - Scope under review
ANTLER 60	P2-4:A3:8:_COTWDPGE 115KV - SECTION 2D & 1D	P2	Bus-tie breaker	1.01	1.00	1.00	1.00	1.01	0.99	0.99	0.99	0.99	0.77	Sensitivity only
ANTLER 60	P1-3:A3:42:_CASCADE 115/60KV TB 1 P1-2:A3:64:_CASCADE-BENTON-DESCHUTES 60KV [6310]	P6	N-1/N-1	0.63	0.35	0.53	0.93	0.86	0.33	0.35	0.33	0.69	0.54	Project: Cascade - Benton - Scope under review
APT ORVC 60	Base Case	P0	Normal	1.03	1.01	1.01	1.07	1.03	1.02	1.01	1.01	1.01	1.01	Load power factor correction
APT ORVC 60	P1-2:A3:29:_IDLE LINE - NO DATA 230KV [9999]	P1	N-1	1.03	1.00	0.99	1.10	1.02	1.01	1.00	1.00	1.00	0.99	Load power factor correction
APT ORVC 60	P1-3:A3:2:_TABLE MT 500/230KV TB 1	P1	N-1	1.04	1.00	1.00	1.10	1.03	1.00	0.99	1.00	1.01	0.99	Load power factor correction
APT ORVC 60	P2-2:A3:26:_TBL MTX1 230KV SECTION NA	P2	Bus	1.04	1.00	1.00	1.10	1.03	1.00	0.99	1.00	1.01	0.99	Load power factor correction
APT ORVC 60	P2-3:A3:105:_PALERMO 230KV - RING R2 & R3	P2	Non-bus-tie breaker	>0.9	>0.9	>0.9	1.12	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	Load power factor correction
APT ORVC 60	P2-3:A3:29:_TBL MT E - 1E 230KV & IDLE LINE - NO DATA LINE	P2	Non-bus-tie breaker	1.03	1.00	1.00	1.10	1.03	1.00	0.99	0.99	1.00	0.99	Load power factor correction

Study Area: **PG&E North Valley**



Voltage Deviations

Substation	Contingency (All and Worst P6)	Category	Category Description	Post Cont. Voltage pu										Project & Potential Mitigation Solutions	
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP High CEC Forecast	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generation s		
APT ORVC 60	P1-1:A3:62:_OROVILLE 9.11KV GEN UNIT 1 P1-2:A3:29:_IDLE LINE - NO DATA 230KV [9999]	P3	G-1/N-1	>0.9	>0.9	>0.9	1.11	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	Load power factor correction
APT ORVC 60	P1-2:A3:27:_TABLE MTN-PALERMO 230KV [5690] P1-3:A3:35:_PALERMO 230/115KV TB 2	P6	N-1/N-1	>0.9	>0.9	>0.9	1.12	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	Load power factor correction
BCKS CRK 230	Base Case	P0	Normal	1.04	1.02	1.02	1.06	1.04	1.03	1.02	1.02	1.00	1.02	1.02	Load power factor correction
BELDEN 230	Base Case	P0	Normal	1.03	1.02	1.02	1.07	1.04	1.03	1.02	1.02	1.02	1.02	1.02	Load power factor correction
BENTON 60	P2-2:A3:63:_COTTONWD 60KV SECTION MA	P2	Bus	0.91	0.78	0.77	1.06	1.03	0.79	0.77	0.83	0.86	0.77	0.77	Project: Cottonwood - Red Bluff - Scope under review
BENTON 60	P2-3:A3:70:_COTTONWD - MA 60KV & COLEMAN-COTTONWOOD LINE	P2	Non-bus-tie breaker	1.01	0.80	0.77	1.06	1.03	0.80	0.50	0.69	0.97	0.53	0.53	Project: Cottonwood - Red Bluff - Scope under review
BENTON 60	P2-3:A3:71:_COTTONWD - MA 60KV & COTTONWD-RED BLFF LINE	P2	Non-bus-tie breaker	1.02	0.80	0.78	1.06	1.03	0.81	0.75	0.77	0.97	0.75	0.75	Project: Cottonwood - Red Bluff - Scope under review
BENTON 60	P2-3:A3:72:_COTTONWD - MA 60KV & COTTONWOOD #2 LINE	P2	Non-bus-tie breaker	0.91	0.78	0.77	1.06	1.03	0.79	0.77	0.83	0.86	0.77	0.77	Project: Cottonwood - Red Bluff - Scope under review
BENTON 60	P2-3:A3:73:_COTTONWD - MA 60KV & COTTONWOOD #1 LINE	P2	Non-bus-tie breaker	1.02	0.80	0.78	1.06	1.03	0.81	0.76	0.77	0.97	0.72	0.72	Project: Cottonwood - Red Bluff - Scope under review
BENTON 60	P1-3:A3:4:_COTWD_E2 230/60KV TB 2 P1-3:A3:5:_COTWD_E 230/60KV TB 3	P6	N-1/N-1	>0.9	0.93	0.91	>0.9	>0.9	0.94	0.87	0.90	>0.9	0.90	0.90	Project: Cascade - Benton - Scope under review
BIG BEND 115	Base Case	P0	Normal	1.04	1.02	1.02	1.07	1.05	1.03	1.02	1.02	1.02	1.02	1.02	Load power factor correction
	P2-1:A3:14:_CARIBOU-TABLE MTN 230KV [4440] (BELDENTP-TBL MT D)	P2-1	Line Section w/o fault	>0.9	Nconv	Nconv	>0.9	>0.9	Nconv	Nconv	Nconv	Nconv	Nconv	Nconv	Existing Caribou RAS should drop Caribou generator
	P2-2:A3:24:_TBL MT D 230KV SECTION 1D	P2	Bus	>0.9	Nconv	Nconv	>0.9	>0.9	Nconv	Nconv	Nconv	Nconv	Nconv	Nconv	Existing Caribou RAS should drop Caribou generator
BIG BEND 115	P2-3:A3:44:_PALERMO - 1D 115KV & PALERMO-WYANDOTTE LINE	P2	Non-bus-tie breaker	0.97	0.70	0.68	1.06	1.03	0.70	0.69	0.70	0.95	0.68	0.68	Mitigation under review
	P2-4:A3:24:_TBL MT D SECTION 1D & TBL MT E SECTION 1E 230KV	P2	Bus-tie breaker	>0.9	Nconv	Nconv	>0.9	>0.9	Nconv	Nconv	Nconv	Nconv	Nconv	Nconv	Existing Caribou RAS should drop Caribou generator
BIG BEND 115	P1-1:A3:66:_GRIZZLYG 6.90KV GEN UNIT 1 P1-3:A3:23:_CARIBOU 230/230KV TB 11	P3	G-1/N-1	>0.9	>0.9	>0.9	1.12	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	Load power factor correction
BIG BEND 115	P1-3:A3:23:_CARIBOU 230/230KV TB 11 P1-3:A3:2:_TABLE MT 500/230KV TB 1	P6	N-1/N-1	>0.9	>0.9	>0.9	1.13	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	Load power factor correction
BIG MDWS 60	P2-3:A3:44:_PALERMO - 1D 115KV & PALERMO-WYANDOTTE LINE	P2	Non-bus-tie breaker	1.03	0.95	0.90	1.04	1.02	0.95	0.94	0.94	1.01	0.90	0.90	Issue is in long term - Continue to monitor
BIGGSJCT 60	P7-1:A3:15_Palermo-Pease 115 kV Line and Pease-Rio Oso 115 kV Line	P7	DCTL	1.01	0.99	0.99	1.02	1.00	0.99	0.99	0.99	0.84	0.99	0.99	Sensitivity only
BTTE CRK 60	Base Case	P0	Normal	1.04	1.02	1.03	1.05	1.05	1.03	1.02	1.02	1.03	1.03	1.03	Load power factor correction
BURNEY 60	Base Case	P0	Normal	1.01	1.04	1.04	1.07	1.05	1.04	1.04	1.04	1.04	1.04	1.04	Load power factor correction and/or transformer tap adjustment

Study Area: **PG&E North Valley**



Voltage Deviations

Substation	Contingency (All and Worst P6)	Category	Category Description	Post Cont. Voltage pu											Project & Potential Mitigation Solutions
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP High CEC Forecast	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations		
BURNEY 60	P1-1:A3:67:_HAT CRK1 6.60KV GEN UNIT 1 P1-3:A3:11:_PIT 1 230/11KV TB 1	P3	G-1/N-1	>0.9	>0.9	>0.9	>0.9	1.11	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	Transformer tap adjustment
BURNEY 60	P1-3:A3:11:_PIT 1 230/11KV TB 1 P1-3:A3:62:_HT CRKRG 60/60KV TB 1	P6	N-1/N-1	>0.9	>0.9	>0.9	>0.9	1.11	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	Transformer tap adjustment
BUTTVLLY 115	Base Case	P0	Normal	1.04	1.03	1.03	1.06	1.04	1.04	1.03	1.03	1.03	1.03	1.03	Load power factor correction
BUTTVLLY 115	P1-1:A3:66:_GRIZZLYG 6.90KV GEN UNIT 1 P1-3:A3:23:_CARIBOU 230/230KV TB 11	P3	G-1/N-1	>0.9	>0.9	>0.9	1.12	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	Load power factor correction
BUTTVLLY 115	P1-3:A3:23:_CARIBOU 230/230KV TB 11 P1-3:A3:2:_TABLE MT 500/230KV TB 1	P6	N-1/N-1	>0.9	>0.9	>0.9	1.13	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	Load power factor correction
CAPAY 60	Base Case	P0	Normal	1.04	1.04	1.04	1.04	1.05	1.05	1.04	1.05	1.05	1.04	1.04	Glenn 230/60 kV Transformer Tap Adjustment
CAPYSWCH 60	Base Case	P0	Normal	1.05	1.05	1.04	1.04	1.05	1.05	1.05	1.05	1.05	1.04	1.04	Glenn 230/60 kV Transformer Tap Adjustment
CARIBOU 115	Base Case	P0	Normal	1.04	1.03	1.03	1.06	1.04	1.04	1.03	1.03	1.03	1.03	1.03	Load power factor correction
CARIBOU 115	P1-1:A3:66:_GRIZZLYG 6.90KV GEN UNIT 1 P1-3:A3:23:_CARIBOU 230/230KV TB 11	P3	G-1/N-1	>0.9	>0.9	>0.9	1.12	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	Load power factor correction
CARIBOU 115	P1-3:A3:23:_CARIBOU 230/230KV TB 11 P1-3:A3:2:_TABLE MT 500/230KV TB 1	P6	N-1/N-1	>0.9	>0.9	>0.9	1.13	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	Load power factor correction
CARIBOU 60	P2-3:A3:44:_PALERMO - 1D 115KV & PALERMO-WYANDOTTE LINE	P2	Non-bus-tie breaker	1.02	0.94	0.90	1.04	1.02	0.94	0.93	0.93	1.01	0.90	0.90	Issue is in long term - Continue to monitor
CASCADE 115	Base Case	P0	Normal	1.04	1.02	1.02	1.06	1.04	1.03	1.02	1.03	1.02	1.02	1.02	Load power factor correction
CASCADE 115	P2-3:A3:70:_COTTONWD - MA 60KV & COLEMAN-COTTONWOOD LINE	P2	Non-bus-tie breaker	1.02	0.94	0.93	1.07	1.04	0.95	0.84	0.90	1.01	0.83	0.83	Project: Cottonwood - Red Bluff - Scope under review
CASCADE 115	P2-4:A3:8:_COTWDPGE 115KV - SECTION 2D & 1D	P2	Bus-tie breaker	1.04	1.02	1.02	1.04	1.03	1.02	1.01	1.01	1.02	0.79	0.79	Project: Cottonwood - Red Bluff - Scope under review
CASCADE 60	Base Case	P0	Normal	1.04	1.02	1.02	1.05	1.04	1.02	1.02	1.02	1.02	1.02	1.01	Load power factor correction
CASCADE 60	P2-2:A3:63:_COTTONWD 60KV SECTION MA	P2	Bus	0.96	0.89	0.88	1.06	1.03	0.89	0.89	0.92	0.92	0.88	0.88	Project: Cottonwood - Red Bluff - Scope under review
CASCADE 60	P2-3:A3:70:_COTTONWD - MA 60KV & COLEMAN-COTTONWOOD LINE	P2	Non-bus-tie breaker	1.02	0.89	0.88	1.06	1.03	0.90	0.73	0.83	0.99	0.73	0.73	Project: Cottonwood - Red Bluff - Scope under review
CASCADE 60	P2-3:A3:71:_COTTONWD - MA 60KV & COTTONWD-RED BLFF LINE	P2	Non-bus-tie breaker	1.03	0.89	0.89	1.06	1.03	0.90	0.87	0.88	1.00	0.86	0.86	Project: Cottonwood - Red Bluff - Scope under review
CASCADE 60	P2-3:A3:72:_COTTONWD - MA 60KV & COTTONWOOD #2 LINE	P2	Non-bus-tie breaker	0.96	0.89	0.88	1.06	1.03	0.89	0.89	0.92	0.92	0.88	0.88	Project: Cottonwood - Red Bluff - Scope under review
CASCADE 60	P2-3:A3:73:_COTTONWD - MA 60KV & COTTONWOOD #1 LINE	P2	Non-bus-tie breaker	1.03	0.90	0.88	1.06	1.03	0.90	0.88	0.88	1.00	0.84	0.84	Project: Cottonwood - Red Bluff - Scope under review
CASCADE 60	P2-4:A3:8:_COTWDPGE 115KV - SECTION 2D & 1D	P2	Bus-tie breaker	1.04	1.02	1.02	1.01	1.02	1.02	1.01	1.01	1.01	0.80	0.80	Project: Cottonwood - Red Bluff - Scope under review
CASCADE 60	P1-3:A3:42:_CASCADE 115/60KV TB 1 P1-2:A3:64:_CASCADE-BENTON-DESCHUTES 60KV [6310]	P6	N-1/N-1	0.67	0.40	0.58	0.94	0.88	0.39	0.41	0.38	0.72	0.58	0.58	Project: Cascade - Benton - Scope under review

Study Area: **PG&E North Valley**



Voltage Deviations

Substation	Contingency (All and Worst P6)	Category	Category Description	Post Cont. Voltage pu										Project & Potential Mitigation Solutions
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP High CEC Forecast	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generation s	
CEDR CRK 60	Base Case	P0	Normal	1.05	1.04	1.04	1.08	1.05	1.04	1.03	1.04	1.05	1.02	Load power factor correction and/or transformer tap adjustment
CEDR CRK 60	P2-2:A3:63:_COTTONWD 60KV SECTION MA	P2	Bus	0.89	0.80	0.78	1.08	1.04	0.80	0.78	0.83	0.88	0.77	Project: Cottonwood - Red Bluff - Scope under review
CEDR CRK 60	P2-3:A3:70:_COTTONWD - MA 60KV & COLEMAN-COTTONWOOD LINE	P2	Non-bus-tie breaker	1.04	0.81	0.78	1.09	1.04	0.82	0.51	0.68	1.01	0.51	Project: Cottonwood - Red Bluff - Scope under review
CEDR CRK 60	P2-3:A3:71:_COTTONWD - MA 60KV & COTTONWD-RED BLFF LINE	P2	Non-bus-tie breaker	1.04	0.81	0.80	1.09	1.04	0.82	0.77	0.78	1.04	0.76	Project: Cottonwood - Red Bluff - Scope under review
CEDR CRK 60	P2-3:A3:72:_COTTONWD - MA 60KV & COTTONWOOD #2 LINE	P2	Non-bus-tie breaker	0.89	0.80	0.78	1.08	1.04	0.80	0.78	0.83	0.88	0.77	Project: Cottonwood - Red Bluff - Scope under review
CEDR CRK 60	P2-3:A3:73:_COTTONWD - MA 60KV & COTTONWOOD #1 LINE	P2	Non-bus-tie breaker	1.04	0.82	0.80	1.09	1.04	0.83	0.79	0.78	1.04	0.72	Project: Cottonwood - Red Bluff - Scope under review
CEDR CRK 60	P2-4:A3:8:_COTWDPGE 115KV - SECTION 2D & 1D	P2	Bus-tie breaker	1.05	1.04	1.04	1.06	1.05	1.04	1.03	1.03	1.04	0.88	Project: Cottonwood - Red Bluff - Scope under review
CEDR CRK 60	P1-2:A3:64:_CASCADE-BENTON-DESCHUTES 60KV [6310] P1-2:A3:71:_COLEMAN-COTTONWOOD 60KV [6430]	P6	N-1/N-1	>0.9	>0.9	>0.9	1.13	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	Load power factor correction
CHALLENGE 60	Base Case	P0	Normal	1.05	1.02	1.02	1.08	1.05	1.02	1.02	1.02	1.02	1.02	Load power factor correction
CHALLENGE 60	P1-3:A3:2:_TABLE MT 500/230KV TB 1	P1	N-1	1.05	1.02	1.02	1.10	1.05	1.01	1.01	1.01	1.02	1.01	Load power factor correction
CHALLENGE 60	P2-2:A3:26:_TBL MTX1 230KV SECTION NA	P2	Bus	1.05	1.02	1.02	1.10	1.05	1.01	1.01	1.01	1.02	1.01	Load power factor correction
CHESTER 60	P2-3:A3:44:_PALERMO - 1D 115KV & PALERMO-WYANDOTTE LINE	P2	Non-bus-tie breaker	1.03	0.97	0.87	1.04	1.03	0.97	0.96	0.96	1.02	0.87	Issue is in long term - Continue to monitor
CHICO JT 60	Base Case	P0	Normal	1.02	1.02	1.02	1.04	1.05	1.03	1.02	1.03	1.04	1.02	Glenn 230/60 kV Transformer Tap Adjustment
CLMN FSH 60	P2-2:A3:63:_COTTONWD 60KV SECTION MA	P2	Bus	0.43	0.42	0.41	1.06	1.01	0.42	0.38	0.43	0.54	0.43	Project: Cottonwood - Red Bluff - Scope under review
CLMN FSH 60	P2-3:A3:71:_COTTONWD - MA 60KV & COTTONWD-RED BLFF LINE	P2	Non-bus-tie breaker	1.03	0.47	0.46	1.08	1.02	0.46	0.41	0.41	0.98	0.44	Project: Cottonwood - Red Bluff - Scope under review
CLMN FSH 60	P2-3:A3:72:_COTTONWD - MA 60KV & COTTONWOOD #2 LINE	P2	Non-bus-tie breaker	0.43	0.42	0.41	1.06	1.01	0.42	0.38	0.43	0.54	0.43	Project: Cottonwood - Red Bluff - Scope under review
CLMN FSH 60	P2-3:A3:73:_COTTONWD - MA 60KV & COTTONWOOD #1 LINE	P2	Non-bus-tie breaker	1.03	0.48	0.45	1.08	1.03	0.48	0.43	0.40	0.98	0.37	Project: Cottonwood - Red Bluff - Scope under review
CLMN FSH 60	P1-3:A3:4:_COTWD_E2 230/60KV TB 2 P1-3:A3:5:_COTWD_E 230/60KV TB 3	P6	N-1/N-1	>0.9	0.93	0.91	>0.9	>0.9	0.94	0.86	0.90	>0.9	0.90	Project: Cascade - Benton - Scope under review
COLEMAN 60	P2-2:A3:63:_COTTONWD 60KV SECTION MA	P2	Bus	0.43	0.42	0.41	1.06	1.01	0.42	0.38	0.43	0.55	0.43	Project: Cottonwood - Red Bluff - Scope under review
COLEMAN 60	P2-3:A3:70:_COTTONWD - MA 60KV & COLEMAN-COTTONWOOD LINE	P2	Non-bus-tie breaker	0.99	0.47	0.43	1.08	1.02	0.47	0.08	0.25	0.94	0.19	Project: Cottonwood - Red Bluff - Scope under review

Study Area: **PG&E North Valley**



Voltage Deviations

Substation	Contingency (All and Worst P6)	Category	Category Description	Post Cont. Voltage pu										Project & Potential Mitigation Solutions
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP High CEC Forecast	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations	
COLEMAN 60	P2-3:A3:71:_COTTONWD - MA 60KV & COTTONWD-RED BLFF LINE	P2	Non-bus-tie breaker	1.03	0.47	0.46	1.08	1.03	0.47	0.41	0.41	0.98	0.44	Project: Cottonwood - Red Bluff - Scope under review
COLEMAN 60	P2-3:A3:72:_COTTONWD - MA 60KV & COTTONWOOD #2 LINE	P2	Non-bus-tie breaker	0.43	0.42	0.41	1.06	1.01	0.42	0.38	0.43	0.55	0.43	Project: Cottonwood - Red Bluff - Scope under review
COLEMAN 60	P2-3:A3:73:_COTTONWD - MA 60KV & COTTONWOOD #1 LINE	P2	Non-bus-tie breaker	1.03	0.48	0.45	1.09	1.03	0.48	0.43	0.40	0.98	0.37	Project: Cottonwood - Red Bluff - Scope under review
COLEMAN 60	P1-2:A3:73:_COTTONWD-RED BLFF 60KV [0] P1-2:A3:71:_COLEMAN-COTTONWOOD 60KV [6430]	P6	N-1/N-1	>0.9	0.56	0.56	>0.9	>0.9	0.56	0.54	0.55	>0.9	0.57	Project: Cottonwood - Red Bluff - Scope under review
CORNSWCH 60	Base Case	P0	Normal	1.05	1.05	1.04	1.04	1.05	1.05	1.05	1.05	1.05	1.04	Glenn 230/60 kV Transformer Tap Adjustment
COTTONWD 60	P2-2:A3:63:_COTTONWD 60KV SECTION MA	P2	Bus	0.90	0.77	0.75	1.06	1.03	0.78	0.75	0.81	0.85	0.75	Project: Cottonwood - Red Bluff - Scope under review
COTTONWD 60	P2-3:A3:70:_COTTONWD - MA 60KV & COLEMAN-COTTONWOOD LINE	P2	Non-bus-tie breaker	1.01	0.78	0.75	1.06	1.02	0.79	0.47	0.67	0.96	0.50	Project: Cottonwood - Red Bluff - Scope under review
COTTONWD 60	P2-3:A3:71:_COTTONWD - MA 60KV & COTTONWD-RED BLFF LINE	P2	Non-bus-tie breaker	1.02	0.78	0.77	1.06	1.02	0.80	0.73	0.76	0.96	0.73	Project: Cottonwood - Red Bluff - Scope under review
COTTONWD 60	P2-3:A3:72:_COTTONWD - MA 60KV & COTTONWOOD #2 LINE	P2	Non-bus-tie breaker	0.90	0.77	0.75	1.06	1.03	0.78	0.75	0.81	0.85	0.75	Project: Cottonwood - Red Bluff - Scope under review
COTTONWD 60	P2-3:A3:73:_COTTONWD - MA 60KV & COTTONWOOD #1 LINE	P2	Non-bus-tie breaker	1.02	0.79	0.76	1.06	1.02	0.80	0.74	0.75	0.96	0.70	Project: Cottonwood - Red Bluff - Scope under review
COTTONWD 60	P1-3:A3:4:_COTWD_E2 230/60KV TB 2 P1-3:A3:5:_COTWD_E 230/60KV TB 3	P6	N-1/N-1	>0.9	0.92	0.90	>0.9	>0.9	0.94	0.85	0.89	0.98	0.89	Project: Cottonwood - Red Bluff - Scope under review
COTWDPGE 115	Base Case	P0	Normal	1.05	1.03	1.03	1.06	1.05	1.04	1.04	1.04	1.02	1.03	Load power factor correction
CR CANAL 60	Base Case	P0	Normal	1.06	1.03	1.03	1.05	1.04	1.04	1.03	1.03	1.03	1.03	Load power factor correction
CRESTA 230	Base Case	P0	Normal	1.04	1.02	1.02	1.06	1.04	1.03	1.02	1.02	1.00	1.02	Load power factor correction
DE SABLA 60	Base Case	P0	Normal	1.04	1.02	1.03	1.05	1.05	1.03	1.02	1.02	1.03	1.03	Load power factor correction
DESCHUTS 60	P2-2:A3:63:_COTTONWD 60KV SECTION MA	P2	Bus	0.87	0.77	0.75	1.06	1.03	0.77	0.76	0.80	0.84	0.75	Project: Cottonwood - Red Bluff - Scope under review
DESCHUTS 60	P2-3:A3:70:_COTTONWD - MA 60KV & COLEMAN-COTTONWOOD LINE	P2	Non-bus-tie breaker	1.01	0.78	0.76	1.06	1.03	0.79	0.47	0.65	0.98	0.50	Project: Cottonwood - Red Bluff - Scope under review
DESCHUTS 60	P2-3:A3:71:_COTTONWD - MA 60KV & COTTONWD-RED BLFF LINE	P2	Non-bus-tie breaker	1.03	0.79	0.78	1.06	1.03	0.80	0.74	0.76	0.99	0.74	Project: Cottonwood - Red Bluff - Scope under review
DESCHUTS 60	P2-3:A3:72:_COTTONWD - MA 60KV & COTTONWOOD #2 LINE	P2	Non-bus-tie breaker	0.87	0.77	0.75	1.06	1.03	0.77	0.76	0.80	0.84	0.75	Project: Cottonwood - Red Bluff - Scope under review
DESCHUTS 60	P2-3:A3:73:_COTTONWD - MA 60KV & COTTONWOOD #1 LINE	P2	Non-bus-tie breaker	1.03	0.79	0.77	1.06	1.03	0.80	0.76	0.75	0.99	0.70	Project: Cottonwood - Red Bluff - Scope under review

Study Area: **PG&E North Valley**



Voltage Deviations

Substation	Contingency (All and Worst P6)	Category	Category Description	Post Cont. Voltage pu										Project & Potential Mitigation Solutions
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP High CEC Forecast	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generation s	
DESCHUTS 60	P2-4:A3:8:_COTWDPGE 115KV - SECTION 2D & 1D	P2	Bus-tie breaker	1.03	1.02	1.02	1.03	1.03	1.02	1.01	1.01	1.02	0.87	Sensitivity only
DESCHUTS 60	P1-3:A3:4:_COTWD_E2 230/60KV TB 2 P1-3:A3:5:_COTWD_E 230/60KV TB 3	P6	N-1/N-1	>0.9	0.94	0.93	>0.9	>0.9	0.96	0.89	0.92	>0.9	0.93	Sensitivity only
DIRYVLE 60	P2-1:A3:94:_COLEMAN-RED BLUFF 60KV [6440] (COLEMAN-CLMN JCT)	P2-1	Line Section w/o fault	1.02	0.91	0.90	1.04	1.03	0.92	0.89	0.90	0.96	0.90	Sensitivity only
DIRYVLE 60	P2-2:A3:61:_COLEMAN 60KV SECTION 1D	P2	Bus	1.02	0.91	0.90	1.04	1.03	0.92	0.89	0.90	0.96	0.90	Sensitivity only
DIRYVLE 60	P2-2:A3:63:_COTTONWD 60KV SECTION MA	P2	Bus	0.26	0.25	0.24	1.05	0.99	0.24	0.21	0.23	0.37	0.26	Project: Cottonwood - Red Bluff - Scope under review
DIRYVLE 60	P2-3:A3:68:_COLEMAN - 1D 60KV & COLEMAN-COTTONWOOD LINE	P2	Non-bus-tie breaker	1.02	0.91	0.90	1.04	1.03	0.92	0.89	0.91	0.96	0.90	Sensitivity only
DIRYVLE 60	P2-3:A3:70:_COTTONWD - MA 60KV & COLEMAN-COTTONWOOD LINE	P2	Non-bus-tie breaker	0.93	0.28	0.25	1.07	1.00	0.27	>0.9	0.13	0.85	0.10	Project: Cottonwood - Red Bluff - Scope under review
DIRYVLE 60	P2-3:A3:71:_COTTONWD - MA 60KV & COTTONWD-RED BLFF LINE	P2	Non-bus-tie breaker	1.01	0.29	0.29	1.09	1.02	0.29	0.24	0.26	0.92	0.27	Project: Cottonwood - Red Bluff - Scope under review
DIRYVLE 60	P2-3:A3:72:_COTTONWD - MA 60KV & COTTONWOOD #2 LINE	P2	Non-bus-tie breaker	0.26	0.25	0.24	1.05	0.99	0.24	0.21	0.23	0.37	0.26	Project: Cottonwood - Red Bluff - Scope under review
DIRYVLE 60	P2-3:A3:73:_COTTONWD - MA 60KV & COTTONWOOD #1 LINE	P2	Non-bus-tie breaker	1.01	0.30	0.28	1.09	1.02	0.30	0.23	0.25	0.92	0.24	Project: Cottonwood - Red Bluff - Scope under review
DIRYVLE 60	P1-1:A3:75:_COLUSGT1 18.00KV & COLUSGT2 18.00KV & COLUSST1 18.00KV GEN UNITS P1-2:A3:73:_COTTONWD-RED BLFF 60KV [0]	P3	G-1/N-1	>0.9	0.92	>0.9	>0.9	>0.9	0.92	0.90	0.91	>0.9	>0.9	Sensitivity only
DIRYVLE 60	P1-2:A3:73:_COTTONWD-RED BLFF 60KV [0] P1-2:A3:71:_COLEMAN-COTTONWOOD 60KV [6430]	P6	N-1/N-1	>0.9	0.35	0.34	>0.9	>0.9	0.34	0.33	0.33	>0.9	0.36	Project: Cottonwood - Red Bluff - Scope under review
ELIZ TWN 60	P2-3:A3:44:_PALERMO - 1D 115KV & PALERMO-WYANDOTTE LINE	P2	Non-bus-tie breaker	1.03	0.96	0.87	1.05	1.03	0.96	0.95	0.95	1.01	0.87	Issue is in long term - Continue to monitor
FRNCHGLH 60	Base Case	P0	Normal	1.04	1.03	1.03	1.05	1.05	1.03	1.03	1.03	1.02	1.01	Load power factor correction
FRNCHGLH 60	P2-3:A3:70:_COTTONWD - MA 60KV & COLEMAN-COTTONWOOD LINE	P2	Non-bus-tie breaker	1.04	0.96	0.95	1.06	1.04	0.96	0.86	0.92	1.01	0.85	Project: Cottonwood - Red Bluff - Scope under review
FRNCHGLH 60	P2-4:A3:8:_COTWDPGE 115KV - SECTION 2D & 1D	P2	Bus-tie breaker	1.07	1.06	1.06	0.98	1.06	1.03	1.02	0.99	1.06	0.83	Sensitivity only
FRNCHGLH 60	P1-2:A3:34:_HUMBOLDT-TRINITY 115KV [1820] P1-2:A3:35:_BRIDGEVILLE-COTTONWOOD 115KV [1110]	P6	N-1/N-1	>0.9	>0.9	>0.9	0.95	0.97	>0.9	>0.9	>0.9	>0.9	0.89	Sensitivity only
FRNCHGLH 60	P1-2:A3:37:_TRINITY-COTTONWOOD 115KV [4040] P1-2:A3:65:_KESWICK-CASCADE 60KV [7260]	P6	N-1/N-1	>0.9	>0.9	>0.9	1.10	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	Load power factor correction
FRNCHGLH 60	P1-3:A3:42:_CASCADE 115/60KV TB 1 P1-2:A3:64:_CASCADE-BENTON-DESCHUTES 60KV [6310]	P6	N-1/N-1	0.83	0.67	0.77	>0.9	0.96	0.67	0.67	0.66	0.87	0.77	Project: Cascade - Benton - Scope under review
FRSTGLEN 115	Base Case	P0	Normal	1.06	1.04	1.04	1.06	1.07	1.05	1.04	1.04	1.04	1.04	Glenn 230/60 kV Transformer Tap Adjustment

Study Area: **PG&E North Valley**



Voltage Deviations

Substation	Contingency (All and Worst P6)	Category	Category Description	Post Cont. Voltage pu										Project & Potential Mitigation Solutions
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP High CEC Forecast	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations	
FRSTGLEN 115	P2-1:A3:27:_BRIDGEVILLE-COTTONWOOD 115KV [1110] (WILDWOOD-FRSTGLEN)	P2-1	Line Section w/o fault	1.06	1.04	1.05	1.07	1.12	1.04	1.04	1.03	1.08	1.05	Project: Cottonwood - Red Bluff - Scope under review
FRSTGLEN 115	P2-1:A3:28:_BRIDGEVILLE-COTTONWOOD 115KV [1110] (WILDWOOD-COTWDPGE)	P2-1	Line Section w/o fault	1.08	1.05	1.05	1.08	1.13	1.05	1.04	1.04	1.10	1.06	Project: Cottonwood - Red Bluff - Scope under review
FRSTGLEN 115	P2-2:A3:33:_COTWDPGE 115KV SECTION 2D	P2	Bus	1.08	1.05	1.05	1.08	1.13	1.05	1.04	1.04	1.10	1.06	Project: Cottonwood - Red Bluff - Scope under review
FRSTGLEN 115	P2-3:A3:35:_COTWDPGE - 2D 115KV & CASCADE-COTTONWOOD LINE	P2	Non-bus-tie breaker	1.07	1.05	1.05	1.08	1.13	1.05	1.04	1.04	1.09	1.06	Project: Cottonwood - Red Bluff - Scope under review
FRSTGLEN 115	P2-4:A3:8:_COTWDPGE 115KV - SECTION 2D & 1D	P2	Bus-tie breaker	1.13	1.11	1.12	1.06	1.15	1.05	1.04	1.03	1.15	1.03	Project: Cottonwood - Red Bluff - Scope under review
GANSNER 60	P2-3:A3:44:_PALERMO - 1D 115KV & PALERMO-WYANDOTTE LINE	P2	Non-bus-tie breaker	1.04	0.93	0.89	1.05	1.02	0.93	0.92	0.92	1.00	0.89	Issue is in long term - Continue to monitor
GERBER 60	P2-2:A3:63:_COTTONWD 60KV SECTION MA	P2	Bus	0.17	0.17	0.17	1.04	0.97	0.17	0.14	0.15	0.28	0.18	Project: Cottonwood - Red Bluff - Scope under review
GERBER 60	P2-3:A3:70:_COTTONWD - MA 60KV & COLEMAN-COTTONWOOD LINE	P2	Non-bus-tie breaker	0.87	0.20	0.17	1.06	0.98	0.19	0.00	0.08	0.79	0.06	Project: Cottonwood - Red Bluff - Scope under review
GERBER 60	P2-3:A3:72:_COTTONWD - MA 60KV & COTTONWOOD #2 LINE	P2	Non-bus-tie breaker	0.17	0.17	0.17	1.04	0.97	0.17	0.14	0.15	0.28	0.18	Project: Cottonwood - Red Bluff - Scope under review
GERBER 60	P1-3:A3:4:_COTWD_E2 230/60KV TB 2 P1-3:A3:5:_COTWD_E 230/60KV TB 3	P6	N-1/N-1	>0.9	0.86	0.85	>0.9	>0.9	0.88	0.79	0.83	0.94	0.84	Project: Cascade - Benton - Scope under review
GIRVAN 60	P2-2:A3:62:_COTTONWD 60KV SECTION 1D	P2	Bus	1.02	0.92	0.91	1.06	1.03	0.93	0.90	0.92	0.97	0.89	Sensitivity only
GIRVAN 60	P2-2:A3:63:_COTTONWD 60KV SECTION MA	P2	Bus	0.91	0.77	0.75	1.06	1.03	0.78	0.76	0.81	0.85	0.76	Project: Cottonwood - Red Bluff - Scope under review
GIRVAN 60	P2-3:A3:70:_COTTONWD - MA 60KV & COLEMAN-COTTONWOOD LINE	P2	Non-bus-tie breaker	1.01	0.78	0.75	1.06	1.02	0.79	0.48	0.67	0.96	0.50	Project: Cottonwood - Red Bluff - Scope under review
GIRVAN 60	P2-3:A3:71:_COTTONWD - MA 60KV & COTTONWD-RED BLFF LINE	P2	Non-bus-tie breaker	1.02	0.79	0.77	1.06	1.02	0.80	0.74	0.76	0.97	0.73	Project: Cottonwood - Red Bluff - Scope under review
GIRVAN 60	P2-3:A3:72:_COTTONWD - MA 60KV & COTTONWOOD #2 LINE	P2	Non-bus-tie breaker	0.91	0.77	0.75	1.06	1.03	0.78	0.76	0.81	0.85	0.76	Project: Cottonwood - Red Bluff - Scope under review
GIRVAN 60	P2-3:A3:73:_COTTONWD - MA 60KV & COTTONWOOD #1 LINE	P2	Non-bus-tie breaker	1.02	0.79	0.77	1.06	1.02	0.80	0.75	0.75	0.97	0.70	Project: Cottonwood - Red Bluff - Scope under review
GIRVAN 60	P1-3:A3:4:_COTWD_E2 230/60KV TB 2 P1-3:A3:5:_COTWD_E 230/60KV TB 3	P6	N-1/N-1	>0.9	0.92	0.90	>0.9	>0.9	0.94	0.86	0.89	>0.9	0.89	Project: Cascade - Benton - Scope under review
GLENN 60	Base Case	P0	Normal	1.05	1.05	1.04	1.04	1.05	1.05	1.05	1.05	1.05	1.04	Glenn 230/60 kV Transformer Tap Adjustment
GRIZZLY1 115	Base Case	P0	Normal	1.04	1.04	1.03	1.06	1.05	1.04	1.04	1.04	1.03	1.03	Load power factor correction

Study Area: **PG&E North Valley**



Voltage Deviations

Substation	Contingency (All and Worst P6)	Category	Category Description	Post Cont. Voltage pu										Project & Potential Mitigation Solutions
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP High CEC Forecast	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations	
GRIZZLY1 115	P2-3:A3:44:_PALERMO - 1D 115KV & PALERMO-WYANDOTTE LINE	P2	Non-bus-tie breaker	1.02	0.89	0.86	1.06	1.04	0.89	0.88	0.88	1.00	0.86	Mitigation under review
GRIZZLY1 115	P1-1:A3:66:_GRIZZLYG 6.90KV GEN UNIT 1 P1-3:A3:23:_CARIBOU 230/230KV TB 11	P3	G-1/N-1	>0.9	>0.9	>0.9	1.12	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	Load power factor correction
GRIZZLY1 115	P1-3:A3:23:_CARIBOU 230/230KV TB 11 P1-3:A3:2:_TABLE MT 500/230KV TB 1	P6	N-1/N-1	>0.9	>0.9	>0.9	1.14	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	Load power factor correction
GROUSCRK 60	P1-2:A3:34:_HUMBOLDT-TRINITY 115KV [1820] P1-2:A3:35:_BRIDGEVILLE-COTTONWOOD 115KV [1110]	P6	N-1/N-1	>0.9	>0.9	>0.9	0.90	0.94	>0.9	>0.9	0.95	>0.9	0.85	Project: Cascade - Benton - Scope under review
HAMILTON 60	Base Case	P0	Normal	1.03	1.02	1.02	1.05	1.06	1.03	1.02	1.03	1.04	1.02	Load power factor correction and/or transformer tap adjustment
HAT CRK1 60	Base Case	P0	Normal	1.03	1.04	1.04	1.07	1.05	1.04	1.04	1.04	1.04	1.04	Load power factor correction and/or transformer tap adjustment
HAT CRK1 60	P1-1:A3:42:_PIT 1 U1 11.00KV GEN UNIT 2 P1-3:A3:60:_HAT CRK1 6.6/60KV TB 1	P3	G-1/N-1	>0.9	>0.9	>0.9	1.10	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	Load power factor correction and/or transformer tap adjustment
HAT CRK1 60	P1-3:A3:11:_PIT 1 230/11KV TB 1 P1-3:A3:60:_HAT CRK1 6.6/60KV TB 1	P6	N-1/N-1	>0.9	>0.9	>0.9	1.10	1.11	>0.9	>0.9	>0.9	>0.9	>0.9	Load power factor correction and/or transformer tap adjustment
HAT CRK2 60	Base Case	P0	Normal	1.02	1.04	1.04	1.07	1.06	1.04	1.04	1.04	1.04	1.04	Load power factor correction and/or transformer tap adjustment
HAT CRK2 60	P1-1:A3:42:_PIT 1 U1 11.00KV GEN UNIT 2 P1-3:A3:60:_HAT CRK1 6.6/60KV TB 1	P3	G-1/N-1	>0.9	>0.9	>0.9	1.10	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	Load power factor correction and/or transformer tap adjustment
HAT CRK2 60	P1-1:A3:67:_HAT CRK1 6.60KV GEN UNIT 1 P1-3:A3:11:_PIT 1 230/11KV TB 1	P3	G-1/N-1	>0.9	>0.9	>0.9	>0.9	1.11	>0.9	>0.9	>0.9	>0.9	>0.9	Load power factor correction and/or transformer tap adjustment
HAT CRK2 60	P1-3:A3:11:_PIT 1 230/11KV TB 1 P1-3:A3:62:_HT CRKRG 60/60KV TB 1	P6	N-1/N-1	>0.9	>0.9	>0.9	>0.9	1.11	>0.9	>0.9	>0.9	>0.9	>0.9	Load power factor correction and/or transformer tap adjustment
HAT CRK2 60	P1-3:A3:60:_HAT CRK1 6.6/60KV TB 1 P1-1:A3:42:_PIT 1 U1 11.00KV GEN UNIT 2	P6	N-1/N-1	>0.9	>0.9	>0.9	1.10	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	Load power factor correction and/or transformer tap adjustment
HATLOSCK 60	Base Case	P0	Normal	1.05	1.05	1.05	1.08	1.07	1.06	1.05	1.05	1.05	1.05	Load power factor correction and/or transformer tap adjustment
HEADGATE 60	Base Case	P0	Normal	1.03	1.03	1.03	1.04	1.05	1.04	1.03	1.04	1.04	1.03	Glenn 230/60 kV Transformer Tap Adjustment
HMLTN BR 60	P2-3:A3:44:_PALERMO - 1D 115KV & PALERMO-WYANDOTTE LINE	P2	Non-bus-tie breaker	1.02	0.96	0.90	1.04	1.02	0.96	0.95	0.95	1.01	0.90	Issue is in long term - Continue to monitor
HONCUT 115	Base Case	P0	Normal	1.06	1.03	1.03	1.10	1.05	1.03	1.03	1.03	1.03	1.03	Load power factor correction
HONCUT 115	P1-2:A3:27:_TABLE MTN-PALERMO 230KV [5690]	P1	N-1	1.05	1.02	1.02	1.10	1.03	1.01	1.02	1.02	1.01	1.01	Load power factor correction
HONCUT 115	P1-2:A3:29:_IDLE LINE - NO DATA 230KV [9999]	P1	N-1	1.06	1.02	1.02	1.13	1.03	1.03	1.02	1.02	1.01	1.02	Load power factor correction
HONCUT 115	P1-3:A3:2:_TABLE MT 500/230KV TB 1	P1	N-1	1.06	1.03	1.02	1.13	1.05	1.02	1.02	1.02	1.02	1.02	Load power factor correction
HONCUT 115	P1-3:A3:35:_PALERMO 230/115KV TB 2	P1	N-1	1.05	1.02	1.02	1.10	1.03	1.01	1.02	1.02	1.02	1.02	Load power factor correction
HONCUT 115	P1-4:A3:3:_TB MT 1T SVD=V	P1	N-1	1.06	1.03	1.03	1.12	1.05	1.03	1.03	1.03	1.03	1.03	Load power factor correction

Study Area: **PG&E North Valley**



Voltage Deviations

Substation	Contingency (All and Worst P6)	Category	Category Description	Post Cont. Voltage pu										Project & Potential Mitigation Solutions	
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP High CEC Forecast	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generation s		
HONCUT 115	P2-1:A3:20:_TABLE MTN-PALERMO 230KV [5690] (TBL MT D-PALERMO)	P2-1	Line Section w/o fault	1.06	1.03	1.03	1.10	1.04	1.03	1.03	1.03	1.03	1.03	1.03	Load power factor correction
HONCUT 115	P2-1:A3:42:_PALERMO-BOGUE 115KV [3200] (PALERMO-HONC JT3)	P2-1	Line Section w/o fault	1.06	1.04	1.04	1.10	1.04	1.03	1.04	1.04	1.04	1.03	1.04	Load power factor correction
HONCUT 115	P2-2:A3:25:_TBL MT D 230KV SECTION 2D	P2	Bus	1.06	1.03	1.03	1.11	1.05	1.03	1.03	1.03	1.03	1.03	1.03	Load power factor correction
HONCUT 115	P2-2:A3:26:_TBL MTX1 230KV SECTION NA	P2	Bus	1.06	1.03	1.02	1.13	1.05	1.02	1.02	1.02	1.02	1.02	1.02	Load power factor correction
HONCUT 115	P2-2:A3:38:_PALERMO 115KV SECTION 1D	P2	Bus	1.06	1.04	1.04	1.10	1.04	1.03	1.04	1.04	1.04	1.03	1.04	Load power factor correction
HONCUT 115	P2-3:A3:104:_PALERMO 230KV - RING R2 & R1	P2	Non-bus-tie breaker	1.05	1.02	1.01	1.10	1.03	1.01	1.02	1.02	1.02	1.01	1.01	Load power factor correction
HONCUT 115	P2-3:A3:105:_PALERMO 230KV - RING R2 & R3	P2	Non-bus-tie breaker	1.05	1.02	1.01	1.10	1.03	1.01	1.02	1.02	1.02	1.01	1.01	Load power factor correction
HONCUT 115	P2-3:A3:106:_PALERMO 230KV - RING R1 & R3	P2	Non-bus-tie breaker	1.05	1.02	1.02	1.10	1.03	1.01	1.02	1.02	1.02	1.02	1.02	Load power factor correction
HONCUT 115	P2-3:A3:27:_TBL MT D - 2D 230KV & TABLE MTN-PALERMO LINE	P2	Non-bus-tie breaker	1.05	1.02	1.02	1.12	1.03	1.01	1.02	1.02	1.02	1.02	1.02	Load power factor correction
HONCUT 115	P2-3:A3:28:_TBL MT D - 2D 230KV & IDLE LINE - NO DATA LINE	P2	Non-bus-tie breaker	1.06	1.03	1.03	1.11	1.04	1.03	1.03	1.03	1.03	1.03	1.03	Load power factor correction
HONCUT 115	P2-3:A3:29:_TBL MT E - 1E 230KV & IDLE LINE - NO DATA LINE	P2	Non-bus-tie breaker	1.06	1.02	1.02	1.13	1.05	1.02	1.02	1.02	1.02	1.02	1.02	Load power factor correction
HONCUT 115	P2-3:A3:39:_PALERMO - 1D 115KV & WOODLEAF-PALERMO LINE	P2	Non-bus-tie breaker	1.06	1.04	1.04	1.10	1.04	1.03	1.04	1.04	1.04	1.03	1.04	Load power factor correction
HONCUT 115	P2-3:A3:40:_PALERMO - 1D 115KV & PALERMO-PEASE LINE	P2	Non-bus-tie breaker	1.06	1.04	1.04	1.10	1.04	1.03	1.04	1.04	1.04	1.03	1.04	Load power factor correction
HONCUT 115	P2-3:A3:42:_PALERMO - 1D 115KV & CARIBOU-PALERMO LINE	P2	Non-bus-tie breaker	1.06	1.04	1.04	1.10	1.04	1.03	1.04	1.04	1.04	1.03	1.04	Load power factor correction
HONCUT 115	P2-3:A3:43:_PALERMO - 1D 115KV & PALERMO-NICOLAUS LINE	P2	Non-bus-tie breaker	1.06	1.04	1.04	1.10	1.04	1.03	1.04	1.04	1.04	1.03	1.04	Load power factor correction
HONCUT 115	P2-3:A3:44:_PALERMO - 1D 115KV & PALERMO-WYANDOTTE LINE	P2	Non-bus-tie breaker	1.06	1.04	1.04	1.10	1.04	1.03	1.04	1.04	1.04	1.03	1.04	Load power factor correction
	P2-4:A3:5:_TBL MT D 230KV - SECTION 1D & 2D	P2	Bus-tie breaker	Nconv	Nconv	Nconv	>0.9	Nconv	Nconv	Nconv	Nconv	Nconv	Nconv	Nconv	Existing Caribou RAS should drop Caribou generator
HONCUT 115	P1-3:A3:23:_CARIBOU 230/230KV TB 11 P1-3:A3:2:_TABLE MT 500/230KV TB 1	P6	N-1/N-1	>0.9	>0.9	>0.9	1.13	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	Load power factor correction
HONCUT 115	P7-1:A3:18_Table Mountain(D)-Rio Oso 230 kV Line and Table Mountain(D)-Palermo 230 kV Line	P7	DCTL	1.06	1.03	1.03	1.11	1.04	1.03	1.03	1.03	1.03	1.02	1.03	Load power factor correction
HOWELLS 60	P2-3:A3:44:_PALERMO - 1D 115KV & PALERMO-WYANDOTTE LINE	P2	Non-bus-tie breaker	1.03	0.93	0.89	1.04	1.02	0.93	0.93	0.93	1.00	0.89	0.89	Issue is in long term - Continue to monitor
HT CRKRG 60	Base Case	P0	Normal	1.05	1.05	1.05	1.08	1.06	1.06	1.05	1.05	1.05	1.05	1.05	Load power factor correction and/or transformer tap adjustment
HYAMPOM 60	P1-2:A3:34:_HUMBOLDT-TRINITY 115KV [1820] P1-2:A3:35:_BRIDGEVILLE-COTTONWOOD 115KV [1110]	P6	N-1/N-1	>0.9	>0.9	>0.9	0.90	0.94	>0.9	>0.9	0.95	>0.9	0.85	0.85	Project: Cascade - Benton - Scope under review

Study Area: **PG&E North Valley**



Voltage Deviations

Substation	Contingency (All and Worst P6)	Category	Category Description	Post Cont. Voltage pu										Project & Potential Mitigation Solutions
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP High CEC Forecast	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations	
INSKIP 60	P2-2:A3:63:_COTTONWD 60KV SECTION MA	P2	Bus	0.52	0.51	0.50	1.06	1.02	0.50	0.47	0.52	0.62	0.51	Project: Cottonwood - Red Bluff - Scope under review
INSKIP 60	P2-3:A3:70:_COTTONWD - MA 60KV & COLEMAN-COTTONWOOD LINE	P2	Non-bus-tie breaker	0.99	0.55	0.51	1.08	1.03	0.55	0.11	0.34	0.96	0.22	Project: Cottonwood - Red Bluff - Scope under review
INSKIP 60	P2-3:A3:71:_COTTONWD - MA 60KV & COTTONWD-RED BLFF LINE	P2	Non-bus-tie breaker	1.03	0.54	0.54	1.09	1.03	0.54	0.49	0.50	1.00	0.52	Project: Cottonwood - Red Bluff - Scope under review
INSKIP 60	P2-3:A3:72:_COTTONWD - MA 60KV & COTTONWOOD #2 LINE	P2	Non-bus-tie breaker	0.52	0.51	0.50	1.06	1.02	0.50	0.47	0.52	0.62	0.51	Project: Cottonwood - Red Bluff - Scope under review
INSKIP 60	P2-3:A3:73:_COTTONWD - MA 60KV & COTTONWOOD #1 LINE	P2	Non-bus-tie breaker	1.03	0.55	0.53	1.09	1.03	0.56	0.51	0.49	1.00	0.46	Project: Cottonwood - Red Bluff - Scope under review
INSKIP 60	P1-2:A3:73:_COTTONWD-RED BLFF 60KV [0] P1-2:A3:71:_COLEMAN-COTTONWOOD 60KV [6430]	P6	N-1/N-1	>0.9	0.64	0.64	>0.9	>0.9	0.64	0.63	0.63	>0.9	0.65	Project: Cottonwood - Red Bluff - Scope under review
JACINTO 60	Base Case	P0	Normal	1.01	1.00	1.00	1.05	1.06	1.01	1.00	1.01	1.02	1.00	Glenn 230/60 kV Transformer Tap Adjustment
JESSUP 115	Base Case	P0	Normal	1.05	1.03	1.03	1.06	1.05	1.04	1.03	1.03	1.02	1.02	Load power factor correction
JESSUP 115	P2-4:A3:8:_COTWDPGE 115KV - SECTION 2D & 1D	P2	Bus-tie breaker	1.04	1.02	1.02	1.04	1.03	1.02	1.01	1.01	1.02	0.77	Project: Cottonwood - Red Bluff - Scope under review
KESWICK 60	Base Case	P0	Normal	1.04	1.02	1.02	1.05	1.04	1.02	1.02	1.02	1.02	1.01	Load power factor correction
KESWICK 60	P2-2:A3:63:_COTTONWD 60KV SECTION MA	P2	Bus	0.98	0.91	0.90	1.06	1.04	0.91	0.91	0.94	0.94	0.90	Project: Cottonwood - Red Bluff - Scope under review
KESWICK 60	P2-3:A3:70:_COTTONWD - MA 60KV & COLEMAN-COTTONWOOD LINE	P2	Non-bus-tie breaker	1.02	0.91	0.90	1.06	1.04	0.92	0.77	0.86	1.00	0.77	Project: Cottonwood - Red Bluff - Scope under review
KESWICK 60	P2-3:A3:71:_COTTONWD - MA 60KV & COTTONWD-RED BLFF LINE	P2	Non-bus-tie breaker	1.03	0.91	0.91	1.06	1.04	0.92	0.89	0.90	1.00	0.88	Project: Cottonwood - Red Bluff - Scope under review
KESWICK 60	P2-3:A3:72:_COTTONWD - MA 60KV & COTTONWOOD #2 LINE	P2	Non-bus-tie breaker	0.98	0.91	0.90	1.06	1.04	0.91	0.91	0.94	0.94	0.90	Project: Cottonwood - Red Bluff - Scope under review
KESWICK 60	P2-3:A3:73:_COTTONWD - MA 60KV & COTTONWOOD #1 LINE	P2	Non-bus-tie breaker	1.03	0.92	0.91	1.06	1.04	0.92	0.90	0.90	1.00	0.86	Project: Cottonwood - Red Bluff - Scope under review
KESWICK 60	P2-4:A3:8:_COTWDPGE 115KV - SECTION 2D & 1D	P2	Bus-tie breaker	1.05	1.03	1.03	0.99	1.03	1.02	1.01	1.00	1.03	0.79	Project: Cottonwood - Red Bluff - Scope under review
KESWICK 60	P1-3:A3:42:_CASCADE 115/60KV TB 1 P1-2:A3:64:_CASCADE-BENTON-DESCHUTES 60KV [6310]	P6	N-1/N-1	0.73	0.49	0.64	0.96	0.91	0.49	0.50	0.48	0.78	0.65	Project: Cascade - Benton - Scope under review
KILARC 60	Base Case	P0	Normal	1.05	1.04	1.04	1.08	1.05	1.04	1.04	1.04	1.05	1.02	Project: Cascade - Benton - Scope under review
KILARC 60	P2-2:A3:63:_COTTONWD 60KV SECTION MA	P2	Bus	0.90	0.80	0.78	1.09	1.05	0.81	0.78	0.83	0.88	0.77	Project: Cottonwood - Red Bluff - Scope under review

Study Area: **PG&E North Valley**



Voltage Deviations

Substation	Contingency (All and Worst P6)	Category	Category Description	Post Cont. Voltage pu										Project & Potential Mitigation Solutions
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP High CEC Forecast	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generation s	
KILARC 60	P2-3:A3:70:_COTTONWD - MA 60KV & COLEMAN-COTTONWOOD LINE	P2	Non-bus-tie breaker	1.04	0.81	0.79	1.09	1.04	0.82	0.51	0.69	1.01	0.52	Project: Cottonwood - Red Bluff - Scope under review
KILARC 60	P2-3:A3:71:_COTTONWD - MA 60KV & COTTONWD-RED BLFF LINE	P2	Non-bus-tie breaker	1.05	0.82	0.81	1.09	1.05	0.83	0.77	0.79	1.04	0.76	Project: Cottonwood - Red Bluff - Scope under review
KILARC 60	P2-3:A3:72:_COTTONWD - MA 60KV & COTTONWOOD #2 LINE	P2	Non-bus-tie breaker	0.90	0.80	0.78	1.09	1.05	0.81	0.78	0.83	0.88	0.77	Project: Cottonwood - Red Bluff - Scope under review
KILARC 60	P2-3:A3:73:_COTTONWD - MA 60KV & COTTONWOOD #1 LINE	P2	Non-bus-tie breaker	1.05	0.82	0.80	1.09	1.05	0.83	0.79	0.78	1.04	0.72	Project: Cottonwood - Red Bluff - Scope under review
KILARC 60	P2-4:A3:8:_COTWDPGE 115KV - SECTION 2D & 1D	P2	Bus-tie breaker	1.06	1.04	1.04	1.06	1.05	1.04	1.04	1.04	1.05	0.89	Project: Cottonwood - Red Bluff - Scope under review
KILARC 60	P1-2:A3:64:_CASCADE-BENTON-DESCHUTES 60KV [6310] P1-2:A3:71:_COLEMAN-COTTONWOOD 60KV [6430]	P6	N-1/N-1	>0.9	>0.9	>0.9	1.13	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	Load power factor correction
KLLY RDE 60	Base Case	P0	Normal	1.04	1.02	1.03	1.07	1.04	1.03	1.02	1.02	1.02	1.02	Load power factor correction
KLLY RDE 60	P1-2:A3:29:_IDLE LINE - NO DATA 230KV [9999]	P1	N-1	1.04	1.01	1.01	1.11	1.03	1.02	1.01	1.01	1.01	1.00	Load power factor correction
KLLY RDE 60	P1-3:A3:2:_TABLE MT 500/230KV TB 1	P1	N-1	1.04	1.01	1.01	1.11	1.04	1.01	1.00	1.01	1.02	1.00	Load power factor correction
KLLY RDE 60	P2-2:A3:26:_TBL MTX1 230KV SECTION NA	P2	Bus	1.04	1.01	1.01	1.11	1.04	1.01	1.00	1.01	1.02	1.00	Load power factor correction
KLLY RDE 60	P2-3:A3:105:_PALERMO 230KV - RING R2 & R3	P2	Non-bus-tie breaker	>0.9	>0.9	>0.9	1.12	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	Load power factor correction
KLLY RDE 60	P2-3:A3:29:_TBL MT E - 1E 230KV & IDLE LINE - NO DATA LINE	P2	Non-bus-tie breaker	1.04	1.01	1.01	1.11	1.04	1.01	1.00	1.00	1.02	1.00	Load power factor correction
KLLY RDE 60	P1-1:A3:62:_OROVILLE 9.11KV GEN UNIT 1 P1-2:A3:29:_IDLE LINE - NO DATA 230KV [9999]	P3	G-1/N-1	>0.9	>0.9	>0.9	1.11	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	Load power factor correction
KLLY RDE 60	P1-3:A3:35:_PALERMO 230/115KV TB 2 P1-2:A3:27:_TABLE MTN-PALERMO 230KV [5690]	P6	N-1/N-1	>0.9	>0.9	>0.9	1.12	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	Load power factor correction
LP FB SP 60	P2-2:A3:63:_COTTONWD 60KV SECTION MA	P2	Bus	0.19	0.18	0.18	1.04	0.97	0.18	0.15	0.17	0.29	0.20	Project: Cottonwood - Red Bluff - Scope under review
LP FB SP 60	P2-3:A3:70:_COTTONWD - MA 60KV & COLEMAN-COTTONWOOD LINE	P2	Non-bus-tie breaker	0.88	0.21	0.19	1.06	0.98	0.21	0.00	0.09	0.80	0.07	Project: Cottonwood - Red Bluff - Scope under review
LP FB SP 60	P2-3:A3:72:_COTTONWD - MA 60KV & COTTONWOOD #2 LINE	P2	Non-bus-tie breaker	0.19	0.18	0.18	1.04	0.97	0.18	0.15	0.17	0.29	0.20	Project: Cottonwood - Red Bluff - Scope under review
LP FB SP 60	P1-3:A3:4:_COTWD_E2 230/60KV TB 2 P1-3:A3:5:_COTWD_E 230/60KV TB 3	P6	N-1/N-1	>0.9	0.88	0.86	>0.9	>0.9	0.90	0.81	0.85	0.95	0.85	Project: Cascade - Benton - Scope under review
LSNA PCC 60	Base Case	P0	Normal	1.03	1.01	1.01	1.07	1.03	1.02	1.01	1.01	1.01	1.01	Load power factor correction
LSNA PCC 60	P1-2:A3:29:_IDLE LINE - NO DATA 230KV [9999]	P1	N-1	1.03	1.00	0.99	1.10	1.02	1.01	1.00	1.00	1.00	0.99	Load power factor correction
LSNA PCC 60	P1-3:A3:2:_TABLE MT 500/230KV TB 1	P1	N-1	1.04	1.00	1.00	1.10	1.03	1.00	0.99	1.00	1.01	0.99	Load power factor correction
LSNA PCC 60	P2-2:A3:26:_TBL MTX1 230KV SECTION NA	P2	Bus	1.04	1.00	1.00	1.10	1.03	1.00	0.99	1.00	1.01	0.99	Load power factor correction
LSNA PCC 60	P2-3:A3:105:_PALERMO 230KV - RING R2 & R3	P2	Non-bus-tie breaker	>0.9	>0.9	>0.9	1.12	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	Load power factor correction

Study Area: **PG&E North Valley**



Voltage Deviations

Substation	Contingency (All and Worst P6)	Category	Category Description	Post Cont. Voltage pu										Project & Potential Mitigation Solutions
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP High CEC Forecast	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations	
LSNA PCC 60	P2-3:A3:29:_TBL MT E - 1E 230KV & IDLE LINE - NO DATA LINE	P2	Non-bus-tie breaker	1.03	1.00	1.00	1.10	1.03	1.00	0.99	0.99	1.00	0.99	Load power factor correction
LSNA PCC 60	P1-1:A3:62:_OROVLE 9.11KV GEN UNIT 1 P1-2:A3:29:_IDLE LINE - NO DATA 230KV [9999]	P3	G-1/N-1	>0.9	>0.9	>0.9	1.11	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	Load power factor correction
LSNA PCC 60	P1-3:A3:35:_PALERMO 230/115KV TB 2 P1-2:A3:27:_TABLE MTN-PALERMO 230KV [5690]	P6	N-1/N-1	>0.9	>0.9	>0.9	1.12	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	Load power factor correction
MTN GATE 60	P2-2:A3:63:_COTTONWD 60KV SECTION MA	P2	Bus	0.94	0.86	0.85	1.05	1.02	0.87	0.87	0.90	0.90	0.86	Project: Cottonwood - Red Bluff - Scope under review
MTN GATE 60	P2-3:A3:70:_COTTONWD - MA 60KV & COLEMAN-COTTONWOOD LINE	P2	Non-bus-tie breaker	1.00	0.87	0.86	1.05	1.02	0.88	0.70	0.80	0.98	0.70	Project: Cottonwood - Red Bluff - Scope under review
MTN GATE 60	P2-3:A3:71:_COTTONWD - MA 60KV & COTTONWD-RED BLFF LINE	P2	Non-bus-tie breaker	1.01	0.87	0.87	1.05	1.02	0.88	0.85	0.86	0.98	0.83	Project: Cottonwood - Red Bluff - Scope under review
MTN GATE 60	P2-3:A3:72:_COTTONWD - MA 60KV & COTTONWOOD #2 LINE	P2	Non-bus-tie breaker	0.94	0.86	0.85	1.05	1.02	0.87	0.87	0.90	0.90	0.86	Project: Cottonwood - Red Bluff - Scope under review
MTN GATE 60	P2-3:A3:73:_COTTONWD - MA 60KV & COTTONWOOD #1 LINE	P2	Non-bus-tie breaker	1.01	0.88	0.86	1.05	1.02	0.88	0.86	0.85	0.98	0.82	Project: Cottonwood - Red Bluff - Scope under review
MTN GATE 60	P2-4:A3:8:_COTWDPGE 115KV - SECTION 2D & 1D	P2	Bus-tie breaker	1.02	1.00	1.00	1.00	1.01	1.00	1.00	0.99	1.00	0.77	Project: Cottonwood - Red Bluff - Scope under review
MTN GATE 60	P1-3:A3:42:_CASCADE 115/60KV TB 1 P1-2:A3:64:_CASCADE-BENTON-DESCHUTES 60KV [6310]	P6	N-1/N-1	0.64	0.36	0.54	0.93	0.86	0.35	0.37	0.34	0.70	0.55	Project: Cascade - Benton - Scope under review
NEO REDT 60	Base Case	P0	Normal	1.06	1.03	1.03	1.05	1.04	1.05	1.03	1.03	1.04	1.03	Project: Cascade - Benton - Scope under review
OREGNTRL 115	Base Case	P0	Normal	1.04	1.02	1.02	1.06	1.04	1.03	1.02	1.03	1.02	1.02	Load power factor correction
OREGNTRL 115	P2-3:A3:70:_COTTONWD - MA 60KV & COLEMAN-COTTONWOOD LINE	P2	Non-bus-tie breaker	1.02	0.95	0.94	1.07	1.04	0.96	0.86	0.92	1.01	0.85	Project: Cottonwood - Red Bluff - Scope under review
OREGNTRL 115	P2-4:A3:8:_COTWDPGE 115KV - SECTION 2D & 1D	P2	Bus-tie breaker	1.04	1.02	1.02	1.04	1.03	1.02	1.01	1.01	1.02	0.79	Project: Cottonwood - Red Bluff - Scope under review
OREGNTRL 60	Base Case	P0	Normal	1.04	1.02	1.02	1.05	1.04	1.02	1.02	1.02	1.02	1.01	Load power factor correction
OREGNTRL 60	P2-2:A3:63:_COTTONWD 60KV SECTION MA	P2	Bus	0.94	0.85	0.83	1.06	1.03	0.85	0.85	0.88	0.90	0.84	Project: Cottonwood - Red Bluff - Scope under review
OREGNTRL 60	P2-3:A3:70:_COTTONWD - MA 60KV & COLEMAN-COTTONWOOD LINE	P2	Non-bus-tie breaker	1.03	0.86	0.84	1.06	1.03	0.86	0.63	0.77	0.99	0.64	Project: Cottonwood - Red Bluff - Scope under review
OREGNTRL 60	P2-3:A3:71:_COTTONWD - MA 60KV & COTTONWD-RED BLFF LINE	P2	Non-bus-tie breaker	1.03	0.86	0.85	1.06	1.03	0.87	0.83	0.84	1.00	0.82	Project: Cottonwood - Red Bluff - Scope under review
OREGNTRL 60	P2-3:A3:72:_COTTONWD - MA 60KV & COTTONWOOD #2 LINE	P2	Non-bus-tie breaker	0.94	0.85	0.83	1.06	1.03	0.85	0.85	0.88	0.90	0.84	Project: Cottonwood - Red Bluff - Scope under review

Study Area: **PG&E North Valley**



Voltage Deviations

Substation	Contingency (All and Worst P6)	Category	Category Description	Post Cont. Voltage pu										Project & Potential Mitigation Solutions
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP High CEC Forecast	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations	
OREGNTRL 60	P2-3:A3:73:_COTTONWD - MA 60KV & COTTONWOOD #1 LINE	P2	Non-bus-tie breaker	1.03	0.86	0.85	1.06	1.03	0.87	0.84	0.83	1.00	0.79	Project: Cottonwood - Red Bluff - Scope under review
OREGNTRL 60	P2-4:A3:8:_COTWDPGE 115KV - SECTION 2D & 1D	P2	Bus-tie breaker	1.04	1.02	1.02	1.02	1.03	1.02	1.02	1.01	1.02	0.83	Project: Cottonwood - Red Bluff - Scope under review
ORLAND B 60	Base Case	P0	Normal	1.04	1.03	1.03	1.04	1.05	1.04	1.03	1.04	1.04	1.03	Glenn 230/60 kV Transformer Tap Adjustment
OROENEGY 60	Base Case	P0	Normal	1.03	1.01	1.02	1.07	1.03	1.02	1.01	1.01	1.01	1.01	Load power factor correction
OROENEGY 60	P1-2:A3:29:_IDLE LINE - NO DATA 230KV [9999]	P1	N-1	1.03	1.00	1.00	1.10	1.02	1.01	1.00	1.00	1.00	0.99	Load power factor correction
OROENEGY 60	P1-3:A3:2:_TABLE MT 500/230KV TB 1	P1	N-1	1.04	1.00	1.00	1.10	1.03	1.00	0.99	1.00	1.01	0.99	Load power factor correction
OROENEGY 60	P2-2:A3:26:_TBL MTX1 230KV SECTION NA	P2	Bus	1.04	1.00	1.00	1.10	1.03	1.00	0.99	1.00	1.01	0.99	Load power factor correction
OROENEGY 60	P2-3:A3:105:_PALERMO 230KV - RING R2 & R3	P2	Non-bus-tie breaker	>0.9	>0.9	>0.9	1.12	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	Load power factor correction
OROENEGY 60	P2-3:A3:29:_TBL MT E - 1E 230KV & IDLE LINE - NO DATA LINE	P2	Non-bus-tie breaker	1.04	1.00	1.00	1.10	1.03	1.00	0.99	0.99	1.01	0.99	Load power factor correction
OROENEGY 60	P1-3:A3:35:_PALERMO 230/115KV TB 2 P1-2:A3:27:_TABLE MTN-PALERMO 230KV [5690]	P6	N-1/N-1	>0.9	>0.9	>0.9	1.12	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	Load power factor correction
OROVILLE 60	Base Case	P0	Normal	1.03	1.01	1.01	1.07	1.03	1.02	1.01	1.01	1.01	1.00	Load power factor correction
OROVILLE 60	P1-2:A3:29:_IDLE LINE - NO DATA 230KV [9999]	P1	N-1	1.03	1.00	0.99	1.10	1.02	1.01	1.00	1.00	1.00	0.98	Load power factor correction
OROVILLE 60	P1-3:A3:2:_TABLE MT 500/230KV TB 1	P1	N-1	1.04	1.00	1.00	1.10	1.03	1.00	0.99	0.99	1.01	0.99	Load power factor correction
OROVILLE 60	P2-2:A3:26:_TBL MTX1 230KV SECTION NA	P2	Bus	1.04	1.00	1.00	1.10	1.03	1.00	0.99	0.99	1.01	0.99	Load power factor correction
OROVILLE 60	P2-3:A3:105:_PALERMO 230KV - RING R2 & R3	P2	Non-bus-tie breaker	>0.9	>0.9	>0.9	1.12	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	Load power factor correction
OROVILLE 60	P2-3:A3:29:_TBL MT E - 1E 230KV & IDLE LINE - NO DATA LINE	P2	Non-bus-tie breaker	1.03	1.00	1.00	1.10	1.03	1.00	0.99	0.99	1.00	0.98	Load power factor correction
OROVILLE 60	P1-2:A3:27:_TABLE MTN-PALERMO 230KV [5690] P1-3:A3:23:_CARIBOU 230/230KV TB 11	P6	N-1/N-1	>0.9	>0.9	>0.9	>0.9	>0.9	0.91	>0.9	>0.9	0.92	0.90	Sensitivity only
OROVILLE 60	P1-2:A3:27:_TABLE MTN-PALERMO 230KV [5690] P1-3:A3:35:_PALERMO 230/115KV TB 2	P6	N-1/N-1	>0.9	>0.9	>0.9	1.12	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	Load power factor correction
OWID 115	Base Case	P0	Normal	1.05	1.03	1.03	1.09	1.05	1.04	1.03	1.03	1.03	1.03	Load power factor correction and/or transformer tap adjustment
OWID 115	P1-2:A3:27:_TABLE MTN-PALERMO 230KV [5690]	P1	N-1	1.04	1.02	1.02	1.11	1.03	1.02	1.02	1.02	1.02	1.02	Load power factor correction
OWID 115	P1-2:A3:29:_IDLE LINE - NO DATA 230KV [9999]	P1	N-1	1.05	1.03	1.02	1.13	1.04	1.03	1.03	1.03	1.02	1.02	Load power factor correction
OWID 115	P1-3:A3:2:_TABLE MT 500/230KV TB 1	P1	N-1	1.05	1.03	1.03	1.13	1.05	1.03	1.02	1.03	1.03	1.03	Load power factor correction
OWID 115	P1-3:A3:35:_PALERMO 230/115KV TB 2	P1	N-1	1.04	1.02	1.02	1.10	1.03	1.02	1.02	1.02	1.02	1.02	Load power factor correction
OWID 115	P1-4:A3:3:_TB MT 1T SVD=V	P1	N-1	1.05	1.03	1.03	1.12	1.05	1.04	1.03	1.03	1.03	1.03	Load power factor correction
OWID 115	P2-1:A3:20:_TABLE MTN-PALERMO 230KV [5690] (TBL MT D-PALERMO)	P2-1	Line Section w/o fault	1.05	1.03	1.03	1.11	1.05	1.03	1.03	1.03	1.03	1.03	Load power factor correction
OWID 115	P2-2:A3:25:_TBL MT D 230KV SECTION 2D	P2	Bus	1.05	1.03	1.03	1.11	1.05	1.03	1.03	1.03	1.03	1.03	Load power factor correction
OWID 115	P2-2:A3:26:_TBL MTX1 230KV SECTION NA	P2	Bus	1.05	1.03	1.03	1.13	1.05	1.03	1.02	1.03	1.03	1.03	Load power factor correction

Study Area: **PG&E North Valley**



Voltage Deviations

Substation	Contingency (All and Worst P6)	Category	Category Description	Post Cont. Voltage pu										Project & Potential Mitigation Solutions	
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP High CEC Forecast	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations		
OWID 115	P2-3:A3:104:_PALERMO 230KV - RING R2 & R1	P2	Non-bus-tie breaker	1.04	1.02	1.02	1.10	1.03	1.02	1.02	1.02	1.02	1.02	1.02	Load power factor correction
OWID 115	P2-3:A3:105:_PALERMO 230KV - RING R2 & R3	P2	Non-bus-tie breaker	1.04	1.02	1.02	1.10	1.03	1.02	1.02	1.02	1.02	1.02	1.02	Load power factor correction
OWID 115	P2-3:A3:106:_PALERMO 230KV - RING R1 & R3	P2	Non-bus-tie breaker	1.04	1.02	1.02	1.10	1.03	1.02	1.02	1.02	1.02	1.02	1.02	Load power factor correction
OWID 115	P2-3:A3:27:_TBL MT D - 2D 230KV & TABLE MTN-PALERMO LINE	P2	Non-bus-tie breaker	1.05	1.02	1.02	1.12	1.04	1.02	1.02	1.03	1.03	1.03	1.02	Load power factor correction
OWID 115	P2-3:A3:28:_TBL MT D - 2D 230KV & IDLE LINE - NO DATA LINE	P2	Non-bus-tie breaker	1.05	1.03	1.03	1.11	1.05	1.03	1.03	1.03	1.03	1.03	1.03	Load power factor correction
OWID 115	P2-3:A3:29:_TBL MT E - 1E 230KV & IDLE LINE - NO DATA LINE	P2	Non-bus-tie breaker	1.05	1.03	1.03	1.13	1.05	1.03	1.02	1.02	1.03	1.03	1.02	Load power factor correction
	P2-4:A3:5:_TBL MT D 230KV - SECTION 1D & 2D	P2	Bus-tie breaker	Nconv	Nconv	Nconv	>0.9	Nconv	Nconv	Nconv	Nconv	Nconv	Nconv	Nconv	Existing Caribou RAS should drop Caribou generator
OWID 115	P1-3:A3:23:_CARIBOU 230/230KV TB 11 P1-3:A3:2:_TABLE MT 500/230KV TB 1	P6	N-1/N-1	>0.9	>0.9	>0.9	1.13	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	Load power factor correction
OWID 115	P7-1:A3:18_Table Mountain(D)-Rio Oso 230 kV Line and Table Mountain(D)-Palermo 230 kV Line	P7	DCTL	1.05	1.03	1.03	1.11	1.05	1.03	1.03	1.03	1.03	1.03	1.03	Load power factor correction
PALERMO 115	Base Case	P0	Normal	1.06	1.03	1.03	1.09	1.05	1.04	1.03	1.03	1.03	1.03	1.03	Load power factor correction and/or transformer tap adjustment
PALERMO 115	P1-2:A3:27:_TABLE MTN-PALERMO 230KV [5690]	P1	N-1	1.05	1.01	1.01	1.10	1.03	1.01	1.01	1.01	1.01	1.01	1.01	Load power factor correction
PALERMO 115	P1-2:A3:29:_IDLE LINE - NO DATA 230KV [9999]	P1	N-1	1.05	1.02	1.01	1.13	1.03	1.03	1.02	1.02	1.01	1.01	1.01	Load power factor correction
PALERMO 115	P1-3:A3:2:_TABLE MT 500/230KV TB 1	P1	N-1	1.06	1.02	1.02	1.13	1.06	1.02	1.02	1.02	1.02	1.02	1.02	Load power factor correction
PALERMO 115	P1-3:A3:35:_PALERMO 230/115KV TB 2	P1	N-1	1.05	1.01	1.01	1.10	1.03	1.01	1.01	1.01	1.01	1.01	1.01	Load power factor correction
PALERMO 115	P1-4:A3:3:_TB MT 1T SVD=V	P1	N-1	1.06	1.03	1.03	1.12	1.05	1.04	1.03	1.03	1.03	1.03	1.03	Load power factor correction
PALERMO 115	P2-1:A3:20:_TABLE MTN-PALERMO 230KV [5690] (TBL MT D-PALERMO)	P2-1	Line Section w/o fault	1.06	1.03	1.03	1.10	1.05	1.03	1.03	1.03	1.03	1.03	1.02	Load power factor correction
PALERMO 115	P2-2:A3:25:_TBL MT D 230KV SECTION 2D	P2	Bus	1.06	1.03	1.03	1.11	1.05	1.03	1.03	1.03	1.03	1.03	1.03	Load power factor correction
PALERMO 115	P2-2:A3:26:_TBL MTX1 230KV SECTION NA	P2	Bus	1.06	1.02	1.02	1.13	1.06	1.02	1.02	1.02	1.02	1.02	1.02	Load power factor correction
PALERMO 115	P2-3:A3:104:_PALERMO 230KV - RING R2 & R1	P2	Non-bus-tie breaker	1.04	1.01	1.01	1.10	1.03	1.01	1.01	1.01	1.01	1.01	1.01	Load power factor correction
PALERMO 115	P2-3:A3:105:_PALERMO 230KV - RING R2 & R3	P2	Non-bus-tie breaker	1.04	1.01	1.01	1.10	1.03	1.01	1.01	1.01	1.01	1.01	1.01	Load power factor correction
PALERMO 115	P2-3:A3:106:_PALERMO 230KV - RING R1 & R3	P2	Non-bus-tie breaker	1.05	1.01	1.01	1.10	1.03	1.01	1.01	1.01	1.01	1.01	1.01	Load power factor correction
PALERMO 115	P2-3:A3:27:_TBL MT D - 2D 230KV & TABLE MTN-PALERMO LINE	P2	Non-bus-tie breaker	1.05	1.02	1.02	1.12	1.03	1.01	1.02	1.02	1.02	1.02	1.01	Load power factor correction
PALERMO 115	P2-3:A3:28:_TBL MT D - 2D 230KV & IDLE LINE - NO DATA LINE	P2	Non-bus-tie breaker	1.06	1.03	1.03	1.11	1.05	1.03	1.03	1.03	1.03	1.03	1.03	Load power factor correction
PALERMO 115	P2-3:A3:29:_TBL MT E - 1E 230KV & IDLE LINE - NO DATA LINE	P2	Non-bus-tie breaker	1.06	1.02	1.02	1.13	1.05	1.02	1.01	1.02	1.02	1.02	1.02	Load power factor correction

Study Area: **PG&E North Valley**



Voltage Deviations

Substation	Contingency (All and Worst P6)	Category	Category Description	Post Cont. Voltage pu										Project & Potential Mitigation Solutions	
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP High CEC Forecast	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generation s		
	P2-4:A3:5:_TBL MT D 230KV - SECTION 1D & 2D	P2	Bus-tie breaker	Nconv	Nconv	Nconv	>0.9	Nconv	Nconv	Nconv	Nconv	Nconv	Nconv	Nconv	Existing Caribou RAS should drop Caribou generator
PALERMO 115	P1-3:A3:23:_CARIBOU 230/230KV TB 11 P1-3:A3:2:_TABLE MT 500/230KV TB 1	P6	N-1/N-1	>0.9	>0.9	>0.9	1.13	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	Load power factor correction
PALERMO 115	P7-1:A3:18_Table Mountain(D)-Rio Oso 230 kV Line and Table Mountain(D)-Palermo 230 kV Line	P7	DCTL	1.06	1.03	1.03	1.11	1.05	1.03	1.03	1.03	1.02	1.02	1.02	Load power factor correction
PALERMO 230	P1-2:A3:40:_WOODLEAF-PALERMO 115KV [4220] P1-2:A3:27:_TABLE MTN-PALERMO 230KV [5690]	P6	N-1/N-1	>0.9	>0.9	>0.9	>0.9	>0.9	0.88	>0.9	>0.9	0.89	0.89	0.89	Sensitivity only
PALERMO 60	Base Case	P0	Normal	1.04	1.01	1.02	1.07	1.03	1.02	1.01	1.01	1.01	1.01	1.01	Load power factor correction
PALERMO 60	P1-2:A3:29:_IDLE LINE - NO DATA 230KV [9999]	P1	N-1	1.03	1.00	1.00	1.10	1.02	1.01	1.00	1.00	1.00	1.00	0.99	Load power factor correction
PALERMO 60	P1-3:A3:2:_TABLE MT 500/230KV TB 1	P1	N-1	1.04	1.00	1.00	1.10	1.03	1.00	0.99	1.00	1.01	1.01	0.99	Load power factor correction
PALERMO 60	P2-2:A3:26:_TBL MTX1 230KV SECTION NA	P2	Bus	1.04	1.00	1.00	1.10	1.03	1.00	0.99	1.00	1.01	1.01	0.99	Load power factor correction
PALERMO 60	P2-3:A3:105:_PALERMO 230KV - RING R2 & R3	P2	Non-bus-tie breaker	>0.9	>0.9	>0.9	1.11	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	Load power factor correction
PALERMO 60	P1-1:A3:62:_OROVILLE 9.11KV GEN UNIT 1 P1-3:A3:2:_TABLE MT 500/230KV TB 1	P3	G-1/N-1	>0.9	>0.9	>0.9	1.10	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	Load power factor correction
PANRAMA 115	Base Case	P0	Normal	1.05	1.03	1.03	1.06	1.05	1.04	1.03	1.04	1.02	1.03	1.03	Load power factor correction
PEACHTON 60	P7-1:A3:15_Palermo-Pease 115 kV Line and Pease-Rio Oso 115 kV Line	P7	DCTL	1.01	0.98	0.99	1.02	1.00	0.99	0.98	0.98	0.82	0.82	0.99	Sensitivity only
PIT 1 60	Base Case	P0	Normal	1.03	1.04	1.04	1.07	1.06	1.04	1.04	1.04	1.04	1.05	1.04	Load power factor correction and/or transformer tap adjustment
PIT 1 60	P2-2:A3:66:_PIT 1 60KV SECTION MA	P2	Bus	1.07	1.06	1.06	1.10	1.07	1.07	1.06	1.06	1.06	1.06	1.06	Load power factor correction
PIT 1 60	P2-3:A3:77:_PIT 1 - MA 60KV & PIT #1-MCARTHUR LINE	P2	Non-bus-tie breaker	1.07	1.06	1.06	1.10	1.07	1.07	1.06	1.06	1.06	1.06	1.06	Load power factor correction
PIT 1 60	P2-3:A3:78:_PIT 1 - MA 60KV & HAT CREEK #1-PIT #1 LINE	P2	Non-bus-tie breaker	1.07	1.06	1.06	1.10	1.07	1.07	1.06	1.06	1.06	1.06	1.06	Load power factor correction
PIT 1 60	P2-3:A3:79:_PIT 1 - MA 60KV & PIT #1-HAT CREEK #2-BURNEY LINE	P2	Non-bus-tie breaker	1.07	1.06	1.06	1.10	1.07	1.07	1.06	1.06	1.06	1.06	1.06	Load power factor correction
PIT 1 60	P1-1:A3:42:_PIT 1 U1 11.00KV GEN UNIT 2 P1-3:A3:60:_HAT CRK1 6.6/60KV TB 1	P3	G-1/N-1	>0.9	>0.9	>0.9	1.10	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	Load power factor correction
PIT 1 60	P1-3:A3:11:_PIT 1 230/11KV TB 1 P1-3:A3:62:_HT CRKG 60/60KV TB 1	P6	N-1/N-1	>0.9	>0.9	>0.9	>0.9	1.11	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	Load power factor correction and/or transformer tap adjustment
PIT 1 60	P1-3:A3:60:_HAT CRK1 6.6/60KV TB 1 P1-1:A3:42:_PIT 1 U1 11.00KV GEN UNIT 2	P6	N-1/N-1	>0.9	>0.9	>0.9	1.10	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	Load power factor correction
POE 230	Base Case	P0	Normal	1.03	1.02	1.02	1.07	1.04	1.02	1.01	1.01	1.02	1.02	1.02	Load power factor correction
PPL 60	P2-2:A3:63:_COTTONWD 60KV SECTION MA	P2	Bus	0.94	0.86	0.85	1.05	1.02	0.86	0.87	0.89	0.90	0.86	0.86	Project: Cottonwood - Red Bluff - Scope under review
PPL 60	P2-3:A3:70:_COTTONWD - MA 60KV & COLEMAN-COTTONWOOD LINE	P2	Non-bus-tie breaker	0.99	0.86	0.85	1.05	1.02	0.87	0.69	0.80	0.97	0.69	0.69	Project: Cottonwood - Red Bluff - Scope under review

Study Area: **PG&E North Valley**



Voltage Deviations

Substation	Contingency (All and Worst P6)	Category	Category Description	Post Cont. Voltage pu										Project & Potential Mitigation Solutions
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP High CEC Forecast	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations	
PPL 60	P2-3:A3:71:_COTTONWD - MA 60KV & COTTONWD-RED BLFF LINE	P2	Non-bus-tie breaker	1.00	0.87	0.86	1.05	1.02	0.87	0.84	0.85	0.98	0.83	Project: Cottonwood - Red Bluff - Scope under review
PPL 60	P2-3:A3:72:_COTTONWD - MA 60KV & COTTONWOOD #2 LINE	P2	Non-bus-tie breaker	0.94	0.86	0.85	1.05	1.02	0.86	0.87	0.89	0.90	0.86	Project: Cottonwood - Red Bluff - Scope under review
PPL 60	P2-3:A3:73:_COTTONWD - MA 60KV & COTTONWOOD #1 LINE	P2	Non-bus-tie breaker	1.00	0.87	0.86	1.05	1.02	0.88	0.85	0.85	0.98	0.81	Project: Cottonwood - Red Bluff - Scope under review
PPL 60	P2-4:A3:8:_COTWDPGE 115KV - SECTION 2D & 1D	P2	Bus-tie breaker	1.01	1.00	1.00	1.00	1.01	0.99	0.99	0.99	0.99	0.77	Project: Cottonwood - Red Bluff - Scope under review
PPL 60	P1-3:A3:42:_CASCADE 115/60KV TB 1 P1-2:A3:64:_CASCADE-BENTON-DESCHUTES 60KV [6310]	P6	N-1/N-1	0.63	0.35	0.53	0.93	0.86	0.33	0.35	0.33	0.69	0.54	Project: Cascade - Benton - Scope under review
RED BLFF 60	P1-2:A3:73:_COTTONWD-RED BLFF 60KV [0]	P1	N-1	1.01	0.90	0.89	1.05	1.02	0.90	0.88	0.89	0.95	0.89	Project: Cottonwood - Red Bluff - Scope under review
RED BLFF 60	P2-2:A3:63:_COTTONWD 60KV SECTION MA	P2	Bus	0.21	0.20	0.20	1.05	0.98	0.20	0.16	0.18	0.32	0.21	Project: Cottonwood - Red Bluff - Scope under review
RED BLFF 60	P2-3:A3:70:_COTTONWD - MA 60KV & COLEMAN-COTTONWOOD LINE	P2	Non-bus-tie breaker	0.90	0.23	0.20	1.06	0.98	0.23	0.00	0.10	0.81	0.08	Project: Cottonwood - Red Bluff - Scope under review
RED BLFF 60	P2-3:A3:71:_COTTONWD - MA 60KV & COTTONWD-RED BLFF LINE	P2	Non-bus-tie breaker	1.00	0.26	0.26	1.09	1.01	0.25	0.21	0.24	0.91	0.24	Project: Cottonwood - Red Bluff - Scope under review
RED BLFF 60	P2-3:A3:72:_COTTONWD - MA 60KV & COTTONWOOD #2 LINE	P2	Non-bus-tie breaker	0.21	0.20	0.20	1.05	0.98	0.20	0.16	0.18	0.32	0.21	Project: Cottonwood - Red Bluff - Scope under review
RED BLFF 60	P2-3:A3:73:_COTTONWD - MA 60KV & COTTONWOOD #1 LINE	P2	Non-bus-tie breaker	1.00	0.27	0.24	1.09	1.01	0.27	0.20	0.23	0.91	0.21	Project: Cottonwood - Red Bluff - Scope under review
RED BLFF 60	P1-1:A3:68:_COLEMAN 6.60KV GEN UNIT 1 P1-2:A3:73:_COTTONWD-RED BLFF 60KV [0]	P3	G-1/N-1	>0.9	0.90	0.89	>0.9	>0.9	0.90	0.87	0.89	>0.9	0.89	Project: Cottonwood - Red Bluff - Scope under review
RED BLFF 60	P1-2:A3:73:_COTTONWD-RED BLFF 60KV [0] P1-2:A3:71:_COLEMAN-COTTONWOOD 60KV [6430]	P6	N-1/N-1	>0.9	0.31	0.30	>0.9	>0.9	0.30	0.29	0.29	>0.9	0.32	Project: Cottonwood - Red Bluff - Scope under review
RED BLFF 60	P7-1:A3:1_Cottonwood-Benton No.1 and Cottonwood-Red Bluff 60 kV Lines	P7	DCTL	1.00	0.90	0.89	1.05	1.02	0.90	0.88	0.89	0.95	0.89	Project: Cottonwood - Red Bluff - Scope under review
ROCKCK 1 230	Base Case	P0	Normal	1.03	1.02	1.02	1.07	1.04	1.02	1.02	1.02	1.02	1.02	Load power factor correction
ROCKCK 2 230	Base Case	P0	Normal	1.04	1.02	1.02	1.06	1.04	1.03	1.02	1.02	1.00	1.02	Load power factor correction
SLYCREEK 115	Base Case	P0	Normal	1.06	1.04	1.04	1.10	1.05	1.04	1.04	1.04	1.04	1.04	Load power factor correction and/or transformer tap adjustment
SLYCREEK 115	P1-2:A3:27:_TABLE MTN-PALERMO 230KV [5690]	P1	N-1	1.05	1.03	1.03	1.11	1.04	1.03	1.03	1.03	1.03	1.03	Load power factor correction
SLYCREEK 115	P1-2:A3:29:_IDLE LINE - NO DATA 230KV [9999]	P1	N-1	1.05	1.04	1.03	1.13	1.04	1.04	1.04	1.04	1.03	1.03	Load power factor correction
SLYCREEK 115	P1-3:A3:2:_TABLE MT 500/230KV TB 1	P1	N-1	1.06	1.04	1.04	1.13	1.05	1.04	1.03	1.04	1.04	1.04	Load power factor correction

Study Area: **PG&E North Valley**



Voltage Deviations

Substation	Contingency (All and Worst P6)	Category	Category Description	Post Cont. Voltage pu										Project & Potential Mitigation Solutions	
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP High CEC Forecast	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations		
SLYCREEK 115	P1-3:A3:35:_PALERMO 230/115KV TB 2	P1	N-1	1.05	1.03	1.03	1.11	1.04	1.03	1.03	1.03	1.03	1.03	1.03	Load power factor correction
SLYCREEK 115	P1-4:A3:3:_TB MT 1T SVD=V	P1	N-1	1.06	1.04	1.04	1.12	1.05	1.04	1.04	1.04	1.04	1.04	1.04	Load power factor correction
SLYCREEK 115	P2-1:A3:20:_TABLE MTN-PALERMO 230KV [5690] (TBL MT D-PALERMO)	P2-1	Line Section w/o fault	1.06	1.04	1.04	1.11	1.05	1.04	1.04	1.04	1.04	1.04	1.04	Load power factor correction
SLYCREEK 115	P2-2:A3:25:_TBL MT D 230KV SECTION 2D	P2	Bus	1.06	1.04	1.04	1.12	1.05	1.04	1.04	1.04	1.04	1.04	1.04	Load power factor correction
SLYCREEK 115	P2-2:A3:26:_TBL MTX1 230KV SECTION NA	P2	Bus	1.06	1.04	1.04	1.13	1.05	1.04	1.03	1.04	1.04	1.04	1.04	Load power factor correction
SLYCREEK 115	P2-3:A3:104:_PALERMO 230KV - RING R2 & R1	P2	Non-bus-tie breaker	1.05	1.03	1.03	1.11	1.04	1.03	1.03	1.03	1.03	1.03	1.03	Load power factor correction
SLYCREEK 115	P2-3:A3:105:_PALERMO 230KV - RING R2 & R3	P2	Non-bus-tie breaker	1.05	1.03	1.03	1.11	1.04	1.03	1.03	1.03	1.03	1.03	1.03	Load power factor correction
SLYCREEK 115	P2-3:A3:106:_PALERMO 230KV - RING R1 & R3	P2	Non-bus-tie breaker	1.05	1.03	1.03	1.11	1.04	1.03	1.03	1.03	1.03	1.03	1.03	Load power factor correction
SLYCREEK 115	P2-3:A3:27:_TBL MT D - 2D 230KV & TABLE MTN-PALERMO LINE	P2	Non-bus-tie breaker	1.05	1.04	1.03	1.12	1.04	1.03	1.04	1.04	1.04	1.04	1.03	Load power factor correction
SLYCREEK 115	P2-3:A3:28:_TBL MT D - 2D 230KV & IDLE LINE - NO DATA LINE	P2	Non-bus-tie breaker	1.06	1.04	1.04	1.12	1.05	1.04	1.04	1.04	1.04	1.04	1.04	Load power factor correction
SLYCREEK 115	P2-3:A3:29:_TBL MT E - 1E 230KV & IDLE LINE - NO DATA LINE	P2	Non-bus-tie breaker	1.06	1.04	1.04	1.13	1.05	1.04	1.03	1.04	1.04	1.04	1.03	Load power factor correction
	P2-4:A3:5:_TBL MT D 230KV - SECTION 1D & 2D	P2	Bus-tie breaker	Nconv	Nconv	Nconv	>0.9	Nconv	Nconv	Nconv	Nconv	Nconv	Nconv	Nconv	Existing Caribou RAS should drop Caribou generator
SLYCREEK 115	P1-3:A3:23:_CARIBOU 230/230KV TB 11 P1-3:A3:2:_TABLE MT 500/230KV TB 1	P6	N-1/N-1	>0.9	>0.9	>0.9	1.13	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	Load power factor correction
SLYCREEK 115	P7-1:A3:18_Table Mountain(D)-Rio Oso 230 kV Line and Table Mountain(D)-Palermo 230 kV Line	P7	DCTL	1.06	1.04	1.04	1.11	1.05	1.04	1.04	1.04	1.04	1.04	1.04	Load power factor correction
SMPSN-AN 115	Base Case	P0	Normal	1.05	1.03	1.03	1.06	1.05	1.04	1.03	1.04	1.02	1.03	1.03	Load power factor correction
SOUTH 60	P2-2:A3:63:_COTTONWD 60KV SECTION MA	P2	Bus	0.57	0.55	0.54	1.07	1.03	0.55	0.52	0.56	0.65	0.55	0.55	Project: Cottonwood - Red Bluff - Scope under review
SOUTH 60	P2-3:A3:70:_COTTONWD - MA 60KV & COLEMAN-COTTONWOOD LINE	P2	Non-bus-tie breaker	0.99	0.59	0.55	1.08	1.03	0.59	0.14	0.39	0.97	0.25	0.25	Project: Cottonwood - Red Bluff - Scope under review
SOUTH 60	P2-3:A3:71:_COTTONWD - MA 60KV & COTTONWD-RED BLFF LINE	P2	Non-bus-tie breaker	1.03	0.58	0.58	1.09	1.03	0.58	0.53	0.54	1.00	0.55	0.55	Project: Cottonwood - Red Bluff - Scope under review
SOUTH 60	P2-3:A3:72:_COTTONWD - MA 60KV & COTTONWOOD #2 LINE	P2	Non-bus-tie breaker	0.57	0.55	0.54	1.07	1.03	0.55	0.52	0.56	0.65	0.55	0.55	Project: Cottonwood - Red Bluff - Scope under review
SOUTH 60	P2-3:A3:73:_COTTONWD - MA 60KV & COTTONWOOD #1 LINE	P2	Non-bus-tie breaker	1.03	0.59	0.57	1.09	1.03	0.60	0.55	0.53	1.00	0.50	0.50	Project: Cottonwood - Red Bluff - Scope under review
SOUTH 60	P1-2:A3:73:_COTTONWD-RED BLFF 60KV [0] P1-2:A3:71:_COLEMAN-COTTONWOOD 60KV [6430]	P6	N-1/N-1	>0.9	0.68	0.68	>0.9	>0.9	0.68	0.67	0.67	>0.9	0.69	0.69	Project: Cottonwood - Red Bluff - Scope under review
SPANSHCK 60	P2-3:A3:44:_PALERMO - 1D 115KV & PALERMO-WYANDOTTE LINE	P2	Non-bus-tie breaker	1.03	0.93	0.89	1.05	1.02	0.93	0.93	0.93	1.00	0.89	0.89	Issue is in long term - Continue to monitor
SPI_AND 115	Base Case	P0	Normal	1.05	1.03	1.03	1.06	1.05	1.04	1.03	1.03	1.02	1.02	1.02	Load power factor correction

Study Area: **PG&E North Valley**



Voltage Deviations

Substation	Contingency (All and Worst P6)	Category	Category Description	Post Cont. Voltage pu										Project & Potential Mitigation Solutions
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP High CEC Forecast	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generation s	
SPI_AND 115	P2-4:A3:8:_COTWDPGE 115KV - SECTION 2D & 1D	P2	Bus-tie breaker	1.04	1.02	1.02	1.04	1.04	1.02	1.01	1.01	1.02	0.77	Sensitivity only
SPIQUINCY 60	P2-3:A3:44:_PALERMO - 1D 115KV & PALERMO-WYANDOTTE LINE	P2	Non-bus-tie breaker	1.03	0.96	0.87	1.05	1.03	0.96	0.96	0.96	1.02	0.87	Issue is in long term - Continue to monitor
SPIQUINCYJCT60	P2-3:A3:44:_PALERMO - 1D 115KV & PALERMO-WYANDOTTE LINE	P2	Non-bus-tie breaker	1.03	0.96	0.87	1.05	1.03	0.96	0.96	0.96	1.02	0.87	Issue is in long term - Continue to monitor
STLLWATR 60	Base Case	P0	Normal	1.03	1.02	1.02	1.05	1.04	1.02	1.02	1.02	1.02	1.01	Load power factor correction
STLLWATR 60	P2-2:A3:63:_COTTONWD 60KV SECTION MA	P2	Bus	0.96	0.89	0.88	1.06	1.03	0.89	0.90	0.92	0.93	0.88	Project: Cottonwood - Red Bluff - Scope under review
STLLWATR 60	P2-3:A3:70:_COTTONWD - MA 60KV & COLEMAN-COTTONWOOD LINE	P2	Non-bus-tie breaker	1.02	0.89	0.88	1.06	1.03	0.90	0.73	0.83	0.99	0.73	Project: Cottonwood - Red Bluff - Scope under review
STLLWATR 60	P2-3:A3:71:_COTTONWD - MA 60KV & COTTONWD-RED BLFF LINE	P2	Non-bus-tie breaker	1.02	0.90	0.89	1.06	1.03	0.90	0.87	0.88	1.00	0.86	Project: Cottonwood - Red Bluff - Scope under review
STLLWATR 60	P2-3:A3:72:_COTTONWD - MA 60KV & COTTONWOOD #2 LINE	P2	Non-bus-tie breaker	0.96	0.89	0.88	1.06	1.03	0.89	0.90	0.92	0.93	0.88	Project: Cottonwood - Red Bluff - Scope under review
STLLWATR 60	P2-3:A3:73:_COTTONWD - MA 60KV & COTTONWOOD #1 LINE	P2	Non-bus-tie breaker	1.02	0.90	0.89	1.06	1.03	0.91	0.88	0.88	1.00	0.84	Project: Cottonwood - Red Bluff - Scope under review
STLLWATR 60	P2-4:A3:8:_COTWDPGE 115KV - SECTION 2D & 1D	P2	Bus-tie breaker	1.04	1.02	1.02	1.00	1.02	1.02	1.01	1.01	1.02	0.79	Project: Cottonwood - Red Bluff - Scope under review
STLLWATR 60	P1-3:A3:42:_CASCADE 115/60KV TB 1 P1-2:A3:64:_CASCADE-BENTON-DESCHUTES 60KV [6310]	P6	N-1/N-1	0.68	0.41	0.59	0.95	0.89	0.40	0.42	0.39	0.73	0.59	Project: Cascade - Benton - Scope under review
TBLE MTN 115	Base Case	P0	Normal	1.04	1.04	1.04	1.04	1.04	1.05	1.05	1.05	1.04	1.04	Transformer tap adjustment
TRES VIS 60	P7-1:A3:15_Palermo-Pease 115 kV Line and Pease-Rio Oso 115 kV Line	P7	DCTL	1.02	0.99	0.99	1.03	1.01	1.00	0.99	0.99	0.88	0.99	Sensitivity only
TRINITY 115	Base Case	P0	Normal	1.05	1.04	1.04	1.05	1.05	1.04	1.04	1.04	1.03	1.03	Load power factor correction and/or transformer tap adjustment
TRINITY 115	P2-4:A3:8:_COTWDPGE 115KV - SECTION 2D & 1D	P2	Bus-tie breaker	1.10	1.09	1.10	1.01	1.11	1.05	1.04	1.02	1.12	0.94	Project: Cottonwood - Red Bluff - Scope under review
TRINITY 115	P1-2:A3:37:_TRINITY-COTTONWOOD 115KV [4040] P1-2:A3:65:_KESWICK-CASCADE 60KV [7260]	P6	N-1/N-1	>0.9	>0.9	>0.9	1.10	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	Load power factor correction
TRINITY 60	Base Case	P0	Normal	1.05	1.04	1.04	1.05	1.05	1.04	1.04	1.04	1.03	1.03	Load power factor correction and/or transformer tap adjustment
TRINITY 60	P2-4:A3:8:_COTWDPGE 115KV - SECTION 2D & 1D	P2	Bus-tie breaker	1.10	1.09	1.09	1.01	1.11	1.05	1.04	1.01	1.11	0.93	Project: Cottonwood - Red Bluff - Scope under review
TRINITY 60	P1-2:A3:34:_HUMBOLDT-TRINITY 115KV [1820] P1-2:A3:35:_BRIDGEVILLE-COTTONWOOD 115KV [1110]	P6	N-1/N-1	>0.9	>0.9	>0.9	0.91	0.94	>0.9	>0.9	0.95	>0.9	0.85	Sensitivity only
TYLERJT 60	P2-2:A3:63:_COTTONWD 60KV SECTION MA	P2	Bus	0.19	0.19	0.18	1.04	0.97	0.18	0.15	0.17	0.30	0.20	Project: Cottonwood - Red Bluff - Scope under review

Study Area: **PG&E North Valley**



Voltage Deviations

Substation	Contingency (All and Worst P6)	Category	Category Description	Post Cont. Voltage pu										Project & Potential Mitigation Solutions
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP High CEC Forecast	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations	
TYLERJT 60	P2-3:A3:70:_COTTONWD - MA 60KV & COLEMAN-COTTONWOOD LINE	P2	Non-bus-tie breaker	0.89	0.21	0.19	1.06	0.98	0.21	0.00	0.09	0.80	0.07	Project: Cottonwood - Red Bluff - Scope under review
TYLERJT 60	P2-3:A3:72:_COTTONWD - MA 60KV & COTTONWOOD #2 LINE	P2	Non-bus-tie breaker	0.19	0.19	0.18	1.04	0.97	0.18	0.15	0.17	0.30	0.20	Project: Cottonwood - Red Bluff - Scope under review
TYLERJT 60	P1-3:A3:4:_COTWD_E2 230/60KV TB 2 P1-3:A3:5:_COTWD_E 230/60KV TB 3	P6	N-1/N-1	>0.9	0.88	0.87	>0.9	>0.9	0.90	0.81	0.85	0.95	0.86	Project: Cascade - Benton - Scope under review
ULTR WSD 60	P2-3:A3:44:_PALERMO - 1D 115KV & PALERMO-WYANDOTTE LINE	P2	Non-bus-tie breaker	1.02	0.96	0.90	1.04	1.02	0.96	0.95	0.96	1.01	0.90	Issue is in long term - Continue to monitor
VINA 60	P1-2:A3:73:_COTTONWD-RED BLFF 60KV [0]	P1	N-1	1.02	0.91	0.91	1.04	1.03	0.92	0.89	0.90	0.96	0.90	Project: Cottonwood - Red Bluff - Scope under review
VINA 60	P2-1:A3:94:_COLEMAN-RED BLUFF 60KV [6440] (COLEMAN-CLMN JCT)	P2-1	Line Section w/o fault	1.01	0.90	0.89	1.04	1.03	0.91	0.88	0.89	0.96	0.89	Project: Cottonwood - Red Bluff - Scope under review
VINA 60	P2-2:A3:61:_COLEMAN 60KV SECTION 1D	P2	Bus	1.01	0.90	0.89	1.04	1.03	0.91	0.88	0.89	0.96	0.89	Project: Cottonwood - Red Bluff - Scope under review
VINA 60	P2-2:A3:63:_COTTONWD 60KV SECTION MA	P2	Bus	0.25	0.23	0.23	1.05	0.99	0.23	0.19	0.22	0.36	0.24	Project: Cottonwood - Red Bluff - Scope under review
VINA 60	P2-3:A3:68:_COLEMAN - 1D 60KV & COLEMAN-COTTONWOOD LINE	P2	Non-bus-tie breaker	1.01	0.90	0.89	1.04	1.03	0.91	0.88	0.90	0.96	0.89	Project: Cottonwood - Red Bluff - Scope under review
VINA 60	P2-3:A3:70:_COTTONWD - MA 60KV & COLEMAN-COTTONWOOD LINE	P2	Non-bus-tie breaker	0.93	0.26	0.24	1.07	1.00	0.26	0.00	0.12	0.84	0.09	Project: Cottonwood - Red Bluff - Scope under review
VINA 60	P2-3:A3:71:_COTTONWD - MA 60KV & COTTONWD-RED BLFF LINE	P2	Non-bus-tie breaker	1.01	0.27	0.28	1.09	1.02	0.27	0.23	0.25	0.92	0.26	Project: Cottonwood - Red Bluff - Scope under review
VINA 60	P2-3:A3:72:_COTTONWD - MA 60KV & COTTONWOOD #2 LINE	P2	Non-bus-tie breaker	0.25	0.23	0.23	1.05	0.99	0.23	0.19	0.22	0.36	0.24	Project: Cottonwood - Red Bluff - Scope under review
VINA 60	P2-3:A3:73:_COTTONWD - MA 60KV & COTTONWOOD #1 LINE	P2	Non-bus-tie breaker	1.01	0.28	0.26	1.09	1.02	0.29	0.22	0.24	0.92	0.23	Project: Cottonwood - Red Bluff - Scope under review
VINA 60	P1-1:A3:47:_SOUTH G 4.16KV GEN UNIT 1 P1-2:A3:73:_COTTONWD-RED BLFF 60KV [0]	P3	G-1/N-1	>0.9	0.91	0.90	>0.9	>0.9	>0.9	0.89	0.90	>0.9	0.90	Project: Cottonwood - Red Bluff - Scope under review
VINA 60	P1-2:A3:73:_COTTONWD-RED BLFF 60KV [0] P1-2:A3:71:_COLEMAN-COTTONWOOD 60KV [6430]	P6	N-1/N-1	>0.9	0.33	0.32	>0.9	>0.9	0.33	0.31	0.31	>0.9	0.34	Project: Cottonwood - Red Bluff - Scope under review
VINA 60	P7-1:A3:1_Cottonwood-Benton No.1 and Cottonwood-Red Bluff 60 kV Lines	P7	DCTL	1.01	0.91	0.91	1.04	1.03	0.92	0.90	0.91	0.96	0.91	Project: Cottonwood - Red Bluff - Scope under review
VOLTA 60	P2-2:A3:63:_COTTONWD 60KV SECTION MA	P2	Bus	0.64	0.59	0.58	1.06	1.03	0.59	0.56	0.61	0.70	0.59	Project: Cottonwood - Red Bluff - Scope under review
VOLTA 60	P2-3:A3:70:_COTTONWD - MA 60KV & COLEMAN-COTTONWOOD LINE	P2	Non-bus-tie breaker	1.01	0.62	0.59	1.07	1.03	0.63	0.14	0.41	0.98	0.24	Project: Cottonwood - Red Bluff - Scope under review

Study Area: **PG&E North Valley**



Voltage Deviations

Substation	Contingency (All and Worst P6)	Category	Category Description	Post Cont. Voltage pu										Project & Potential Mitigation Solutions
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP High CEC Forecast	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations	
VOLTA 60	P2-3:A3:71:_COTTONWD - MA 60KV & COTTONWD-RED BLFF LINE	P2	Non-bus-tie breaker	1.04	0.63	0.62	1.08	1.03	0.63	0.57	0.58	1.01	0.59	Project: Cottonwood - Red Bluff - Scope under review
VOLTA 60	P2-3:A3:72:_COTTONWD - MA 60KV & COTTONWOOD #2 LINE	P2	Non-bus-tie breaker	0.64	0.59	0.58	1.06	1.03	0.59	0.56	0.61	0.70	0.59	Project: Cottonwood - Red Bluff - Scope under review
VOLTA 60	P2-3:A3:73:_COTTONWD - MA 60KV & COTTONWOOD #1 LINE	P2	Non-bus-tie breaker	1.04	0.64	0.61	1.08	1.03	0.64	0.60	0.57	1.01	0.53	Project: Cottonwood - Red Bluff - Scope under review
VOLTA 60	P1-2:A3:73:_COTTONWD-RED BLFF 60KV [0] P1-2:A3:71:_COLEMAN-COTTONWOOD 60KV [6430]	P6	N-1/N-1	>0.9	0.73	0.73	>0.9	>0.9	0.73	0.72	0.73	>0.9	0.74	Project: Cottonwood - Red Bluff - Scope under review
WESTWOOD 60	P2-3:A3:44:_PALERMO - 1D 115KV & PALERMO-WYANDOTTE LINE	P2	Non-bus-tie breaker	1.02	0.96	0.90	1.04	1.01	0.96	0.95	0.96	1.01	0.90	Issue is in long term - Continue to monitor
WHEELBR 115	Base Case	P0	Normal	1.05	1.03	1.03	1.06	1.05	1.04	1.03	1.04	1.02	1.03	Load power factor correction
WHITMORE 60	Base Case	P0	Normal	1.05	1.04	1.04	1.08	1.05	1.04	1.03	1.04	1.04	1.02	Load power factor correction and/or transformer tap adjustment
WHITMORE 60	P2-2:A3:63:_COTTONWD 60KV SECTION MA	P2	Bus	0.89	0.79	0.78	1.08	1.04	0.80	0.78	0.83	0.87	0.77	Project: Cottonwood - Red Bluff - Scope under review
WHITMORE 60	P2-3:A3:70:_COTTONWD - MA 60KV & COLEMAN-COTTONWOOD LINE	P2	Non-bus-tie breaker	1.04	0.81	0.78	1.08	1.04	0.82	0.51	0.68	1.01	0.51	Project: Cottonwood - Red Bluff - Scope under review
WHITMORE 60	P2-3:A3:71:_COTTONWD - MA 60KV & COTTONWD-RED BLFF LINE	P2	Non-bus-tie breaker	1.04	0.81	0.80	1.09	1.04	0.82	0.77	0.78	1.03	0.76	Project: Cottonwood - Red Bluff - Scope under review
WHITMORE 60	P2-3:A3:72:_COTTONWD - MA 60KV & COTTONWOOD #2 LINE	P2	Non-bus-tie breaker	0.89	0.79	0.78	1.08	1.04	0.80	0.78	0.83	0.87	0.77	Project: Cottonwood - Red Bluff - Scope under review
WHITMORE 60	P2-3:A3:73:_COTTONWD - MA 60KV & COTTONWOOD #1 LINE	P2	Non-bus-tie breaker	1.04	0.82	0.80	1.09	1.04	0.83	0.79	0.78	1.03	0.72	Project: Cottonwood - Red Bluff - Scope under review
WHITMORE 60	P2-4:A3:8:_COTWDPGE 115KV - SECTION 2D & 1D	P2	Bus-tie breaker	1.05	1.04	1.04	1.05	1.05	1.04	1.03	1.03	1.04	0.89	Project: Cottonwood - Red Bluff - Scope under review
WHITMORE 60	P1-2:A3:71:_COLEMAN-COTTONWOOD 60KV [6430] P1-2:A3:64:_CASCADE-BENTON-DESCHUTES 60KV [6310]	P6	N-1/N-1	>0.9	>0.9	>0.9	1.12	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	Load power factor correction
WILDWOOD 115	Base Case	P0	Normal	1.06	1.04	1.04	1.06	1.06	1.05	1.04	1.04	1.04	1.04	Load power factor correction and/or transformer tap adjustment
WILDWOOD 115	P2-1:A3:28:_BRIDGEVILLE-COTTONWOOD 115KV [1110] (WILDWOOD-COTWDPGE)	P2-1	Line Section w/o fault	1.08	1.05	1.05	1.09	1.13	1.05	1.04	1.04	1.10	1.06	Reactor Projects
WILDWOOD 115	P2-2:A3:33:_COTWDPGE 115KV SECTION 2D	P2	Bus	1.08	1.05	1.05	1.08	1.13	1.05	1.04	1.04	1.10	1.06	Project: Cottonwood - Red Bluff - Scope under review
WILDWOOD 115	P2-3:A3:35:_COTWDPGE - 2D 115KV & CASCADE-COTTONWOOD LINE	P2	Non-bus-tie breaker	1.07	1.05	1.05	1.08	1.13	1.05	1.04	1.04	1.09	1.06	Project: Cottonwood - Red Bluff - Scope under review
WILDWOOD 115	P2-4:A3:8:_COTWDPGE 115KV - SECTION 2D & 1D	P2	Bus-tie breaker	1.13	1.11	1.12	1.06	1.15	1.05	1.04	1.03	1.15	1.03	Project: Cottonwood - Red Bluff - Scope under review

Study Area: **PG&E North Valley**



Voltage Deviations

Substation	Contingency (All and Worst P6)	Category	Category Description	Post Cont. Voltage pu										Project & Potential Mitigation Solutions
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP High CEC Forecast	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations	
WNTU PMS 60	P2-2:A3:63:_COTTONWD 60KV SECTION MA	P2	Bus	0.91	0.80	0.79	1.06	1.03	0.81	0.79	0.84	0.87	0.79	Project: Cottonwood - Red Bluff - Scope under review
WNTU PMS 60	P2-3:A3:70:_COTTONWD - MA 60KV & COLEMAN-COTTONWOOD LINE	P2	Non-bus-tie breaker	1.02	0.81	0.79	1.06	1.03	0.82	0.54	0.71	0.98	0.56	Project: Cottonwood - Red Bluff - Scope under review
WNTU PMS 60	P2-3:A3:71:_COTTONWD - MA 60KV & COTTONWD-RED BLFF LINE	P2	Non-bus-tie breaker	1.03	0.82	0.80	1.06	1.03	0.83	0.77	0.79	0.98	0.77	Project: Cottonwood - Red Bluff - Scope under review
WNTU PMS 60	P2-3:A3:72:_COTTONWD - MA 60KV & COTTONWOOD #2 LINE	P2	Non-bus-tie breaker	0.91	0.80	0.79	1.06	1.03	0.81	0.79	0.84	0.87	0.79	Project: Cottonwood - Red Bluff - Scope under review
WNTU PMS 60	P2-3:A3:73:_COTTONWD - MA 60KV & COTTONWOOD #1 LINE	P2	Non-bus-tie breaker	1.03	0.82	0.80	1.06	1.03	0.83	0.79	0.79	0.98	0.74	Project: Cottonwood - Red Bluff - Scope under review
WNTU PMS 60	P2-4:A3:8:_COTWDPGE 115KV - SECTION 2D & 1D	P2	Bus-tie breaker	1.04	1.02	1.02	1.03	1.04	1.03	1.02	1.02	1.02	0.89	Project: Cottonwood - Red Bluff - Scope under review
WNTU PMS 60	P1-3:A3:4:_COTWD_E2 230/60KV TB 2 P1-3:A3:5:_COTWD_E 230/60KV TB 3	P6	N-1/N-1	>0.9	0.94	0.93	>0.9	>0.9	0.96	0.89	0.92	>0.9	0.92	Project: Cascade - Benton - Scope under review
WYANDTTE 115	Base Case	P0	Normal	1.06	1.02	1.02	1.09	1.05	1.03	1.02	1.02	1.02	1.02	Load power factor correction and/or transformer tap adjustment
WYANDTTE 115	P1-2:A3:27:_TABLE MTN-PALERMO 230KV [5690]	P1	N-1	1.04	1.00	1.00	1.10	1.03	1.00	1.00	1.00	1.00	1.00	Load power factor correction
WYANDTTE 115	P1-2:A3:29:_IDLE LINE - NO DATA 230KV [9999]	P1	N-1	1.05	1.01	1.01	1.13	1.03	1.02	1.01	1.01	1.01	1.01	Load power factor correction
WYANDTTE 115	P1-3:A3:2:_TABLE MT 500/230KV TB 1	P1	N-1	1.06	1.02	1.01	1.13	1.05	1.01	1.01	1.01	1.02	1.01	Load power factor correction
WYANDTTE 115	P1-3:A3:35:_PALERMO 230/115KV TB 2	P1	N-1	1.04	1.01	1.01	1.10	1.03	1.00	1.01	1.01	1.01	1.01	Load power factor correction
WYANDTTE 115	P1-4:A3:3:_TB MT 1T SVD=V	P1	N-1	1.06	1.02	1.02	1.12	1.05	1.03	1.02	1.02	1.02	1.02	Load power factor correction
WYANDTTE 115	P2-1:A3:20:_TABLE MTN-PALERMO 230KV [5690] (TBL MT D-PALERMO)	P2-1	Line Section w/o fault	1.06	1.02	1.02	1.10	1.05	1.02	1.02	1.02	1.02	1.02	Load power factor correction
WYANDTTE 115	P2-2:A3:25:_TBL MT D 230KV SECTION 2D	P2	Bus	1.06	1.03	1.03	1.11	1.05	1.02	1.02	1.02	1.03	1.02	Load power factor correction
WYANDTTE 115	P2-2:A3:26:_TBL MTX1 230KV SECTION NA	P2	Bus	1.06	1.02	1.01	1.13	1.05	1.01	1.01	1.01	1.02	1.01	Load power factor correction
WYANDTTE 115	P2-3:A3:104:_PALERMO 230KV - RING R2 & R1	P2	Non-bus-tie breaker	1.04	1.00	1.00	1.10	1.03	1.00	1.00	1.00	1.00	1.00	Load power factor correction
WYANDTTE 115	P2-3:A3:105:_PALERMO 230KV - RING R2 & R3	P2	Non-bus-tie breaker	1.04	1.00	1.00	1.10	1.03	1.00	1.00	1.00	1.00	1.00	Load power factor correction
WYANDTTE 115	P2-3:A3:106:_PALERMO 230KV - RING R1 & R3	P2	Non-bus-tie breaker	1.04	1.01	1.01	1.10	1.03	1.00	1.01	1.01	1.01	1.01	Load power factor correction
WYANDTTE 115	P2-3:A3:27:_TBL MT D - 2D 230KV & TABLE MTN-PALERMO LINE	P2	Non-bus-tie breaker	1.05	1.01	1.01	1.12	1.03	1.00	1.01	1.01	1.01	1.01	Load power factor correction
WYANDTTE 115	P2-3:A3:28:_TBL MT D - 2D 230KV & IDLE LINE - NO DATA LINE	P2	Non-bus-tie breaker	1.06	1.03	1.02	1.11	1.05	1.02	1.02	1.02	1.03	1.02	Load power factor correction
WYANDTTE 115	P2-3:A3:29:_TBL MT E - 1E 230KV & IDLE LINE - NO DATA LINE	P2	Non-bus-tie breaker	1.06	1.01	1.01	1.13	1.05	1.01	1.01	1.01	1.02	1.01	Load power factor correction
WYANDTTE 115	P2-3:A3:44:_PALERMO - 1D 115KV & PALERMO-WYANDOTTE LINE	P2	Non-bus-tie breaker	0.95	0.32	0.30	1.08	1.00	0.31	0.29	0.30	0.87	0.30	Mitigation under review

Study Area: **PG&E North Valley**



Voltage Deviations

Substation	Contingency (All and Worst P6)	Category	Category Description	Post Cont. Voltage pu										Project & Potential Mitigation Solutions
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP High CEC Forecast	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations	
WYANDTTE 115	P1-3:A3:23:_CARIBOU 230/230KV TB 11 P1-3:A3:2:_TABLE MT 500/230KV TB 1	P6	N-1/N-1	>0.9	>0.9	>0.9	1.13	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	Load power factor correction
WYANDTTE 115	P7-1:A3:18_Table Mountain(D)-Rio Oso 230 kV Line and Table Mountain(D)-Palermo 230 kV Line	P7	DCTL	1.06	1.02	1.02	1.11	1.04	1.02	1.02	1.02	1.02	1.02	Load power factor correction

Study Area: **PG&E North Valley**



High/Low Voltage

Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage (PU)										Project & Potential Mitigation Solutions
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP High CEC Forecast	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations	
CR CANAL 60	P1-3:A3:59:_NEO REDT 60/13.8KV TB 1	P1	N-1	4.3	10.7	11.7	4.2	5.2	7.3	11.7	11.0	8.6	11.2	Project: Cottonwood - Red Bluff - Scope under review
NEO REDT 60	P1-3:A3:59:_NEO REDT 60/13.8KV TB 1	P1	N-1	4.3	10.8	11.7	4.2	5.2	7.3	11.8	11.1	8.6	11.2	Project: Cottonwood - Red Bluff - Scope under review
RED BLFF 60	P1-2:A3:73:_COTTONWD-RED BLFF 60KV [0]	P1	N-1	2.4	9.3	9.5	-0.7	1.2	9.4	10.9	10.2	5.7	9.5	Project: Cottonwood - Red Bluff - Scope under review
TYLER 60	P1-3:A3:59:_NEO REDT 60/13.8KV TB 1	P1	N-1	4.3	10.7	11.6	4.2	5.2	7.3	11.7	11.0	8.6	11.1	Project: Cottonwood - Red Bluff - Scope under review

Contingency	Category	Category Description	Transient Stability Performance (Number of voltage and frequency violations)										Potential Mitigation Solutions	
			2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	Select..	Select..	Select..	Select..	Select..		
Colusa Generator fault (steam unit)	P1-1		0	0	0	1	1							Under review with PTO
Table Mountain to Thermalito 230 kV line fault	P1-2		0	0	0	0	0							No Violation
Round Mountain 500/230 kV Transformer fault	P1-3		0	0	0	0	0							No Violation
Delevan SVD fault	P1-4		0	1	1	0	1							Under review with PTO
Round Mountain 230 kV Bus Section fault	P2-2		1	1	1	1	1							Under review with PTO
Round Mountain 230 kV non-bus-tie breaker fault	P2-3		1	1	1	1	1							Under review with PTO
Round Mountain 230 kV bus-tie breaker fault	P2-4		1	1	1	1	1							Under review with PTO
Colusa steam unit out and gas unit fault	P3-1		0	0	0	1	1							Under review with PTO
Colusa steam unit out and Table Mountain to Thermalito 230 kV line fault	P3-2		0	0	0	1	1							Under review with PTO
Colusa generator out and Round Mountain 500/230 kV Transformer	P3-3		0	0	0	1	1							Under review with PTO
Colusa generator out and Delevan SVD fault	P3-4		0	1	1	1	1							Under review with PTO
Colusa steam and gas units fault + stuck breaker	P4-1		0	0	0	1	1							Under review with PTO
Table Mountain -Rio Oso and Table Mountain-Palermo 230 kV line fault + stuck breaker	P4-2		1	1	1	1	1							Under review with PTO
Round Mountain transformer and Round Mountain - Cottonwood 230 kV lines + stuck breaker	P4-3		0	0	0	0	0							No Violation
Delevan SVD fault plus stuck breaker	P4-4		0	1	1	0	1							Under review with PTO
Round Mountain bus section fault plus stuck breaker (non-bus-tie breaker)	P4-5		0	0	0	0	0							No Violation
Round Mountain bus section fault plus stuck breaker (bus-tie breaker)	P4-6		1	1	1	1	1							Under review with PTO
Colusa gas turbine fault plus relay failure	P5-1		0	0	0	1	1							Under review with PTO
Table Mountain - Rio Oso 230 kV line fault plus relay failure	P5-2		0	0	0	0	0							No Violation
Round Mountain 500/230 kV Transformer fault plus relay failure	P5-3		0	0	0	0	0							No Violation
Delevan SVD fault plus relay failure	P5-4		0	1	1	0	1							Under review with PTO
Round Mountain 230 kV Bus section fault plus relay failure	P5-5		1	1	1	1	1							Under review with PTO
Tesla 230 kV Bus section fault plus relay failure	P5-5		0	0	0	0	0							No Violation
Round Mountain Transformer and Round Mountain - Thermalito and Hyatt 230 kV lines	P6-1		0	0	0	0	0							No Violation
Round Mountain and Table Mountain transformer faults	P6-2		0	0	0	0	0							No Violation
Delevan and Cottonwood SVD faults	P6-3		0	1	1	0	1							Under review with PTO
Palermo-Pease and Palermo-Rio Oso 115 kV lines - Temporary DCTL fault	P7-1		1	1	1	1	1							Under review with PTO
Palermo-Pease and Palermo-Rio Oso 115 kV lines - Permanent DCTL fault	P7-1		0	1	1	1	1							Under review with PTO

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.

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 Load.

Study Area: **PG&E Central Valley**



Thermal Overloads

Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading (%)										Project & Potential Mitigation Solutions
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP High CEC Forecast	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations	
Woodland - Davis 115 kV line (31962 WOODLANDTP 115 31970 WOODLD 115 1 1)	P2-4:A5:6:_RIO OSO 115KV - SECTION 1D & 2D	P2	Bus-tie breaker	98.9	105.3	110.3	17.7	13.6	101.5	122.4	117.4	70.2	112.5	Project: Vaca-Dixon voltage conversion project Project ISD: on-hold Review project scope
	P7-1:A4:16_Rio Oso-Woodland #1 115 kV Line & Rio Oso-Woodland #2 115 kV Line	P7	DCTL	81.0	87.1	91.3	12.7	10.1	82.9	100.4	97.7	59.1	93.0	Project: Vaca-Dixon voltage conversion project Project ISD: on-hold Review project scope
	P1-2:A11:6:_BRIGHTON-BELOTA 230KV P1-2:A4:9:_RIO OSO-BRIGHTON 230KV	P6	N-1-1	82.9	81.7	81.8	<90	<90	85.1	91.6	90.6	<90	100.8	Project: Vaca-Dixon voltage conversion project Project ISD: on-hold Review project scope
Woodland - Davis 115 kV line (31962 WOODLANDTP 115 365506 Q653FJCT 115 1 1)	P2-2:A4:20:_BRIGHTN 115KV SECTION ME	P2	Bus	110.3	84.6	84.1	39.4	22.0	86.9	92.1	92.8	69.9	83.2	Project: Vaca-Dixon voltage conversion project Project ISD: on-hold Review project scope
	P2-3:A4:19:_BRIGHTN - ME 115KV & WEST SACRAMENTO-BRIGHTON LINE	P2	Non-bus-tie breaker	110.7	113.0	84.6	39.5	22.0	87.3	92.6	93.3	70.2	83.7	Project: Vaca-Dixon voltage conversion project Project ISD: on-hold Review project scope
	P2-3:A4:20:_BRIGHTN - ME 115KV & BRIGHTN-DAVIS-BRKR SLG LINE	P2	Non-bus-tie breaker	109.3	111.7	83.3	38.8	21.2	85.8	91.3	91.8	68.9	82.4	Project: Vaca-Dixon voltage conversion project Project ISD: on-hold Review project scope
	P2-4:A4:10:_BRIGHTN 115KV - SECTION ME & MD	P2	Bus-tie breaker	110.3	84.6	84.1	39.4	22.0	86.9	92.1	92.8	69.9	83.2	Project: Vaca-Dixon voltage conversion project Project ISD: on-hold Review project scope
	P2-4:A5:6:_RIO OSO 115KV - SECTION 1D & 2D	P2	Bus-tie breaker	79.7	85.1	89.9	4.0	6.4	82.2	101.6	96.9	51.1	113.8	Project: Vaca-Dixon voltage conversion project Project ISD: on-hold Review project scope
	P7-1:A4:17_Rio Oso-West Sacramento 115 kV Line & West Sacramento-Brighton 115 kV Line	P7	DCTL	95.5	102.7	103.5	44.4	26.1	96.6	87.5	86.1	70.2	77.3	Project: Vaca-Dixon voltage conversion project Project ISD: on-hold Review project scope
	P1-2:A4:34:_WEST SACRAMENTO-DAVIS 115KV P1-2:A4:35:_BRIGHTN-DAVIS-BRKR SLG 115KV	P6	N-1-1	102.0	106.1	106.6	<90	<90	104.4	117.0	119.7	<90	110.8	Project: Vaca-Dixon voltage conversion project Project ISD: on-hold Review project scope
Brighton - Davis 115 kV line (31984 BRIGHTN 115 31993 BRKRJCT 115 1 1)	P2-4:A5:6:_RIO OSO 115KV - SECTION 1D & 2D	P2	Bus-tie breaker	104.0	107.4	110.2	23.9	10.2	106.8	122.6	119.6	65.3	123.2	Project: Vaca-Dixon voltage conversion project Project ISD: on-hold Review project scope
	P1-2:A4:34:_WEST SACRAMENTO-DAVIS 115KV P1-2:A4:25:_WOODLAND-DAVIS 115KV	P6	N-1-1	108.0	110.2	110.9	<90	<90	110.5	120.5	124.8	73.6	114.1	Project: Vaca-Dixon voltage conversion project Project ISD: on-hold Review project scope

Study Area: **PG&E Central Valley**



Thermal Overloads

Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading (%)										Project & Potential Mitigation Solutions
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP High CEC Forecast	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations	
Brighton - Davis 115 kV line (31993 BRKRJCT 115 32001 UCD_TP2 115 1 1)	P2-4:A5:6:_RIO OSO 115KV - SECTION 1D & 2D	P2	Bus-tie breaker	102.4	106.0	108.9	22.1	9.4	105.3	121.2	118.1	63.8	121.9	Project: Vaca-Dixon voltage conversion project Project ISD: on-hold Review project scope
	P1-2:A4:34:_WEST SACRAMENTO-DAVIS 115KV P1-2:A4:25:_WOODLAND-DAVIS 115KV	P6	N-1-1	106.7	109.1	109.9	<90	<90	109.2	119.5	123.5	72.6	113.2	Project: Vaca-Dixon voltage conversion project Project ISD: on-hold Review project scope
Vaca - Plainfield 60 kV line (32082 PLFLDJCT 60.0 32090 WINTERS 60.0 1 1)	Base Case	P0	Normal	80.9	87.5	91.8	14.4	2.7	82.5	101.6	93.4	66.2	92.0	Project: Vaca-Dixon voltage conversion project Project ISD: on-hold Review project scope
Vaca - Plainfield 60 kV line (32082 PLFLDJCT 60.0 32092 PLAINFLD 60.0 1 1)	Base Case	P0	Normal	81.3	88.6	92.9	13.5	3.0	83.0	102.9	94.5	67.1	93.2	Project: Vaca-Dixon voltage conversion project Project ISD: on-hold Review project scope
Vaca - Plainfield 60 kV line (32088 VACA-DXN 60.0 32090 WINTERS 60.0 1 1)	Base Case	P0	Normal	80.1	87.9	92.2	13.7	5.9	81.6	100.9	93.1	67.2	92.4	Project: Vaca-Dixon voltage conversion project Project ISD: on-hold Review project scope
Vaca 115/60 kV Transformer No. 5 (32088 VACA-DXN 60.0 31998 VACA-DIX 115 5 1)	P1-3:A4:19:_VACA-DIX 115/60KV TB 9	P1	N-1	96.4	106.8	110.6	44.5	49.8	97.8	117.8	115.7	85.4	110.7	Project: Vaca-Dixon voltage conversion project Project ISD: on-hold Review project scope
	P2-3:A4:33:_VACA-DIX 115KV - MIDDLE BREAKER BAY 4	P2	Non-bus-tie breaker	96.4	106.9	110.7	44.5	49.8	97.9	118.0	115.8	85.5	110.8	Project: Vaca-Dixon voltage conversion project Project ISD: on-hold Review project scope
	P1-1:A4:9:_WADHAM 9.11KV GEN UNIT 1 P1-3:A4:19:_VACA-DIX 115/60KV TB 9	P3	G-1/N-1	<90	106.9	110.6	<90	<90	<90	118.0	115.2	<90	110.7	Project: Vaca-Dixon voltage conversion project Project ISD: on-hold Review project scope
	P1-3:A4:19:_VACA-DIX 115/60KV TB 9 P1-2:A4:49:_DIXON-VACA #2 60KV	P6	N-1-1	<90	108.3	112.3	<90	<90	<90	119.2	116.9	86.1	112.4	Project: Vaca-Dixon voltage conversion project Project ISD: on-hold Review project scope
Dixon-Vaca #2 60 kV (32100 DIXONPGE 60.0 32101 DIXON-J2 60.0 2 1)	P2-1:A4:58:_DIXON-VACA #1 60KV (VACA-DXN-VACA-JT1)	P2-1	Line Section w/o fault	92.5	105.8	108.5	54.4	65.1	93.6	114.5	116.6	87.3	108.8	Project: Vaca-Dixon voltage conversion project Project ISD: on-hold Review project scope
Pease - Rio Oso 115 kV Line (32200 PEASE 115 32288 E.MRY J1 115 1 1)	P2-4:A5:2:_RIO OSO 230KV - SECTION 2D & 1D	P2	Bus-tie breaker	102.6	<90	<90	20.1	<90	102.9	<90	<90	<90	<90	Near term: Action plan Long term: South of Palermo project (ISD: 4/22)
Pease - Rio Oso 115 kV Line (32208 GLEAF TP 115 32214 RIO OSO 115 1 1)	P2-4:A5:2:_RIO OSO 230KV - SECTION 2D & 1D	P2	Bus-tie breaker	109.1	<90	<90	20.6	<90	109.4	<90	<90	<90	<90	Near term: Action plan Long term: South of Palermo project (ISD: 4/22)
Pease - Rio Oso 115 kV Line (32290 OLIVH J1 115 32288 E.MRY J1 115 1 1)	P2-4:A5:2:_RIO OSO 230KV - SECTION 2D & 1D	P2	Bus-tie breaker	102.5	<90	<90	20.2	<90	102.8	<90	<90	<90	<90	Near term: Action plan Long term: South of Palermo project (ISD: 4/22)

Study Area: **PG&E Central Valley**



Thermal Overloads

Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading (%)										Project & Potential Mitigation Solutions
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP High CEC Forecast	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations	
Rio Oso - Lincoln 115 kV Line (32214 RIO OSO 115 32404 SPI JCT 115 1 1)	P5-5:A5:1:_Atlantic 230 kV BAAH Bus #1 (failure of non-redundent relay)	P55	Non-redundant	111.0	125.0	116.3	14.7	14.2	113.5	121.1	135.6	75.7	134.4	Protection upgrade Project: Rio Oso - Atlantic 230 kV
	P7-1:A5:2_ Rio Oso-Atlantic 230 kV Line & Rio Oso-Gold Hill 230 kV Line	P7	DCTL	82.9	98.6	94.5	10.6	32.5	83.3	96.2	101.1	94.9	95.2	Action plan or SPS Project: Rio Oso - Atlantic 230 kV
	P1-2:A5:10:_ATLANTIC-GOLD HILL 230KV P1-2:A5:6:_RIO OSO-ATLANTIC 230KV	P6	N-1-1	111.0	124.4	115.7	<90	<90	113.5	120.6	135.3	75.6	115.0	Action plan or SPS Project: Rio Oso - Atlantic 230 kV
Lincoln - Pleasant Grove 115 kV Line (32356 LINCLN 115 32398 ULTRA JT 115 1 1)	P5-5:A5:1:_Atlantic 230 kV BAAH Bus #1 (failure of non-redundent relay)	P55	Non-redundant	85.4	97.7	88.1	9.3	8.7	87.6	92.5	107.3	56.9	105.8	Protection upgrade Project: Rio Oso - Atlantic 230 kV
	P1-2:A5:10:_ATLANTIC-GOLD HILL 230KV P1-2:A5:6:_RIO OSO-ATLANTIC 230KV	P6	N-1-1	85.5	97.1	87.6	<90	<90	87.6	92.0	107.0	56.8	86.9	Action plan or SPS Project: Rio Oso - Atlantic 230 kV
Lincoln - Pleasant Grove 115 kV Line (32398 ULTRA JT 115 32408 PLSNT GR 115 1 1)	P5-5:A5:1:_Atlantic 230 kV BAAH Bus #1 (failure of non-redundent relay)	P55	Non-redundant	96.4	110.8	101.2	20.5	18.0	98.5	105.6	120.5	69.3	104.9	Protection upgrade Project: Rio Oso - Atlantic 230 kV
	P1-2:A5:10:_ATLANTIC-GOLD HILL 230KV P1-2:A5:6:_RIO OSO-ATLANTIC 230KV	P6	N-1-1	96.4	110.1	100.5	<90	<90	98.5	104.9	120.1	69.2	100.5	Action plan or SPS Project: Rio Oso - Atlantic 230 kV
Drum - Higgins 115 kV line (32218 DRUM 115 32220 DTCH FL1 115 1 1)	P2-3:A5:83:_DRUM 115KV - RING R5 & R4	P2	Non-bus-tie breaker	78.8	95.7	96.0	65.5	8.7	81.1	90.5	101.2	90.6	82.1	Project: Atlantic-Placer 115 kV line Project ISD: on-hold Review project scope
	P2-4:A5:4:_GOLDHILL 115KV - SECTION 1F & 2F	P2	Bus-tie breaker	133.9	147.8	144.1	49.5	52.2	142.3	169.0	NConv	90.0	144.0	Project: Atlantic-Placer 115 kV line Project ISD: on-hold Review project scope
	P1-2:A5:21:_PLACER-GOLD HILL #2 115KV P1-2:A5:20:_PLACER-GOLD HILL #1 115KV	P6	N-1-1	83.2	88.6	85.7	<90	<90	87.8	101.0	98.1	<90	85.7	Project: Atlantic-Placer 115 kV line Project ISD: on-hold Review project scope
	P7-1:A5:11_Drum-Rio Oso No. 1 115 kV Line & Drum-Rio Oso No. 2 115 kV Line	P7	DCTL	78.8	95.7	96.0	65.5	8.7	81.1	90.5	101.2	90.6	82.1	Project: Atlantic-Placer 115 kV line Project ISD: on-hold Review project scope
	P7-1:A5:19_Placer-Gold Hill No. 1 115 kV Line and Placer-Gold Hill No. 2 115 kV Line	P7	DCTL	83.1	88.7	85.8	51.4	43.1	87.7	96.4	103.8	57.2	85.7	Project: Atlantic-Placer 115 kV line Project ISD: on-hold Review project scope
Drum - Higgins 115 kV line (32220 DTCH FL1 115 32224 CHCGO PK 115 1 1)	P2-4:A5:4:_GOLDHILL 115KV - SECTION 1F & 2F	P2	Bus-tie breaker	85.7	94.7	92.6	13.8	21.5	90.4	106.7	NConv	60.0	92.5	Project: Atlantic-Placer 115 kV line Project ISD: on-hold Review project scope
Drum - Higgins 115 kV line (32224 CHCGO PK 115 32232 HIGGINS 115 1 1)	P2-4:A5:4:_GOLDHILL 115KV - SECTION 1F & 2F	P2	Bus-tie breaker	107.6	118.2	116.1	10.7	2.8	112.6	130.3	NConv	83.0	116.0	Project: Atlantic-Placer 115 kV line Project ISD: on-hold Review project scope

Study Area: **PG&E Central Valley**



Thermal Overloads

Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading (%)										Project & Potential Mitigation Solutions
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP High CEC Forecast	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations	
Stanislaus-Melones-Manteca 115 kV Line No. 1 (33500 MELNS JA 115 33509 AVENATP1 115 1 1)	P2-4:A11:3:_BELLOTA 230KV - SECTION 1E & 2E	P2	Bus-tie breaker	41.4	NConv	112.7	29.8	57.1	43.4	NConv	NConv	14.0	119.7	Short term: Action plan Project: Vierra looping project
	P2-4:A11:9:_TESLA 115KV - SECTION 1D & 2D	P2	Bus-tie breaker	66.3	76.8	86.3	36.3	43.1	69.5	121.3	106.4	NConv	104.6	Short term: Action plan Project: Vierra looping project
	P7-1:A11:3:_STANISLAUS-MANTECA #2 115KV & STANISLAUS-MELONES SW STA-RIVERBANK JCT SW STA 115KV	P7	DCTL	44.3	45.4	45.0	104.5	97.5	44.6	42.6	42.1	77.7	34.4	Short term: Action plan Project: Vierra looping project
	P7-1:A12:4:_STANISLAUS-MANTECA #2 115KV & STANISLAUS-MELONES SW STA-RIVERBANK JCT SW STA 115KV	P7	DCTL	44.3	45.4	45.0	104.5	97.5	44.6	42.6	42.1	77.7	34.4	Short term: Action plan Project: Vierra looping project
Stanislaus-Melones-Manteca 115 kV Line No. 1 (33506 STANISLS 115 33501 FRGTNTP1 115 1 1)	P2-4:A11:3:_BELLOTA 230KV - SECTION 1E & 2E	P2	Bus-tie breaker	71.3	NConv	84.7	19.1	14.2	72.2	NConv	NConv	51.3	90.2	Short term: Action plan Project: Vierra looping project
Stanislaus-Melones-Manteca 115 kV Line No. 1 (33509 AVENATP1 115 33514 MANTECA 115 1 1)	P2-4:A11:3:_BELLOTA 230KV - SECTION 1E & 2E	P2	Bus-tie breaker	56.5	NConv	120.4	19.5	50.2	58.9	NConv	NConv	22.4	128.9	Short term: Action plan Project: Vierra looping project
	P2-4:A11:9:_TESLA 115KV - SECTION 1D & 2D	P2	Bus-tie breaker	51.5	61.9	71.1	26.0	50.0	54.4	104.4	90.5	NConv	89.1	Short term: Action plan Project: Vierra looping project
Riverbank Jct - Manteca 115 kV Line (33516 RPN JNCN 115 33514 MANTECA 115 1 1)	P2-4:A11:3:_BELLOTA 230KV - SECTION 1E & 2E	P2	Bus-tie breaker	115.6	NConv	166.6	18.6	35.3	118.9	NConv	NConv	57.5	178.4	Short term: Action plan Project: Vierra looping project
	P1-2:A11:36:_SCHULTE SW STA-KASSON-MANTECA 115KV P1-2:A11:39:_STANISLS-MELONES-RIVRBKJT 115KV	P6	N-1-1	<90	83.4	94.9	<90	<90	<90	102.8	88.0	<90	95.7	Short term: Action plan Project: Vierra looping project
Riverbank Jct - Manteca 115 kV Line (33516 RPN JNCN 115 33520 RIPON 115 1 1)	P2-4:A11:3:_BELLOTA 230KV - SECTION 1E & 2E	P2	Bus-tie breaker	38.0	NConv	105.6	19.2	22.6	38.5	NConv	NConv	36.5	113.2	Short term: Action plan Project: Vierra looping project
Schulte - Kasson - Manteca 115 kV Line (33526 KSSN-JC1 115 33528 KASSON 115 1 1)	P1-2:A11:54:_SCHULTE SW STA-LAMMERS 115KV P1-2:A11:48:_TESLA-TRACY 115KV MOAS OPENED ON LEPRINO_TRACY JC	P6	N-1-1	109.8	119.0	125.2	<90	<90	110.8	140.5	135.6	85.6	125.5	Short term: Action plan Project: Vierra looping project
Schulte - Kasson - Manteca 115 kV Line (33530 KSSN-JC2 115 33550 HJ HEINZ 115 1 1)	P1-2:A11:54:_SCHULTE SW STA-LAMMERS 115KV P1-2:A11:36:_SCHULTE SW STA-KASSON-MANTECA 115KV	P6	N-1-1	92.4	101.6	113.7	<90	<90	93.1	130.4	118.4	73.4	113.2	Short term: Action plan Project: Vierra looping project
Schulte - Kasson - Manteca 115 kV Line (33533 OWENSTP2 115 33526 KSSN-JC1 115 1 1)	P1-2:A11:48:_TESLA-TRACY 115KV MOAS OPENED ON LEPRINO_TRACY JC P1-2:A11:54:_SCHULTE SW STA-LAMMERS 115KV	P6	N-1-1	96.7	103.2	105.5	<90	<90	98.0	114.8	109.0	<90	105.8	Short term: Action plan Project: Vierra looping project
Schulte - Kasson - Manteca 115 kV Line (33540 TESLA 115 33541 AEC_TP1 115 1 1)	P1-2:A11:48:_TESLA-TRACY 115KV MOAS OPENED ON LEPRINO_TRACY JC P1-2:A11:54:_SCHULTE SW STA-LAMMERS 115KV	P6	N-1-1	96.6	103.1	105.4	<90	<90	97.9	114.7	108.9	<90	105.8	Short term: Action plan Project: Vierra looping project
Tesla Schulte SW STA #2 115KV (33540 TESLA 115 33541 AEC_TP1 115 1 1)	P1-2:A11:37:_TESLA-SCHULTE SW STA #1 115KV P1-2:A11:55:_GWFTRACY-SCHULTE #1 115KV	P6	N-1-1	81.9	87.0	92.3	<90	<90	83.0	100.5	98.4	<90	97.0	Short term: Action plan Project: Vierra looping project
Tesla Schulte SW STA #1 115KV (33540 TESLA 115 33543 AEC_TP2 115 1 1)	P1-2:A11:47:_TESLA-SCHULTE SW STA #2 115KV P1-2:A11:55:_GWFTRACY-SCHULTE #1 115KV	P6	N-1-1	82.5	87.4	92.6	<90	<90	83.6	100.7	98.9	<90	97.3	Short term: Action plan Project: Vierra looping project
Tesla - Tracy 115 kV Line	P2-3:A11:15:_KASSON - 1D 115KV & SCHULTE SW STA-KASSON-MANTECA LINE	P2	Non-bus-tie breaker	86.8	91.7	97.4	15.4	15.5	88.0	109.7	103.5	61.3	103.1	Short term: Action plan Project: Vierra looping project

Study Area: **PG&E Central Valley**



Thermal Overloads

Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading (%)										Project & Potential Mitigation Solutions
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP High CEC Forecast	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations	
(33540 TESLA 115 33544 ELLS GTY 115 1 1)	P1-2:A11:54:_SCHULTE SW STA-LAMMERS 115KV P1-2:A11:36:_SCHULTE SW STA-KASSON-MANTECA 115KV	P6	N-1-1	100.6	107.7	114.7	<90	<90	101.4	130.0	123.3	78.7	114.7	Short term: Action plan Project: Vierra looping project
Tesla - Tracy 115 kV Line (33544 ELLS GTY 115 33546 TRACY JC 115 1 1)	P1-2:A11:54:_SCHULTE SW STA-LAMMERS 115KV P1-2:A11:36:_SCHULTE SW STA-KASSON-MANTECA 115KV	P6	N-1-1	85.4	91.8	97.8	<90	<90	86.2	111.1	105.3	<90	97.9	Short term: Action plan Project: Vierra looping project
Tesla - Tracy 115 kV Line (33542 LEPRINO 115 33546 TRACY JC 115 1 1)	P2-3:A11:15:_KASSON - 1D 115KV & SCHULTE SW STA-KASSON-MANTECA LINE	P2	Non-bus-tie breaker	84.9	90.0	95.7	14.5	14.7	86.1	108.1	101.8	59.6	101.4	Short term: Action plan Project: Vierra looping project
	P1-2:A11:54:_SCHULTE SW STA-LAMMERS 115KV P1-2:A11:36:_SCHULTE SW STA-KASSON-MANTECA 115KV	P6	N-1-1	98.7	106.0	113.0	<90	<90	99.5	128.3	121.6	77.0	113.1	Short term: Action plan Project: Vierra looping project
Tesla - Tracy 115 kV Line (33542 LEPRINO 115 33548 TRACY 115 1 1)	P2-3:A11:15:_KASSON - 1D 115KV & SCHULTE SW STA-KASSON-MANTECA LINE	P2	Non-bus-tie breaker	109.2	116.2	124.4	17.1	18.4	110.7	140.6	131.0	76.2	131.8	Short term: Action plan Project: Vierra looping project
	P5-5:A11:1:_SCHULTE 115KV BAAH BUS #1 (FAILURE OF NON-REDUNDANT RELAY)	P55	Non-redundant	86.5	92.4	98.2	15.4	16.6	87.7	110.3	104.0	64.6	103.1	Short term: Action plan Project: Vierra looping project
	P1-2:A11:54:_SCHULTE SW STA-LAMMERS 115KV P1-2:A11:36:_SCHULTE SW STA-KASSON-MANTECA 115KV	P6	N-1-1	127.1	137.2	147.1	<90	<90	128.2	167.2	157.0	99.1	147.2	Short term: Action plan Project: Vierra looping project
Tesla - Lawrence Lab 115 kV Line (33540 TESLA 115 33574 LLNL TAP 115 1 1)	P2-4:A11:8:_TESLA D 230KV - SECTION 1D & 2D	P2	Bus-tie breaker	3.6	6.2	8.8	42.4	137.3	3.5	28.1	21.3	36.0	24.7	Short term: Action plan Project: Vierra looping project
Vierra - Tracy - Kasson 115 kV Line (33548 TRACY 115 33550 HJ HEINZ 115 1 1)	P1-2:A11:54:_SCHULTE SW STA-LAMMERS 115KV P1-2:A11:36:_SCHULTE SW STA-KASSON-MANTECA 115KV	P6	N-1-1	90.8	99.8	111.7	<90	<90	91.6	128.2	116.4	72.1	111.3	Short term: Action plan Project: Vierra looping project
Stockton "A" - Lockeford - Bellota #1 115KV (33560 LCKFRDJA 115 33562 BELLOTA 115 1 1)	P2-4:A11:3:_BELLOTA 230KV - SECTION 1E & 2E	P2	Bus-tie breaker	73.0	NConv	103.8	24.9	22.1	74.2	NConv	NConv	58.6	98.7	Short term: Action plan Project: Vierra looping project
Bellota-Riverbank-Melones 115 kV Line (33562 BELLOTA 115 33950 RVRBK TP 115 1 1)	P2-4:A11:3:_BELLOTA 230KV - SECTION 1E & 2E	P2	Bus-tie breaker	90.6	NConv	124.5	28.9	21.7	93.0	NConv	NConv	64.6	118.3	Short term: Action plan Project: Vierra looping project
	P2-4:A11:9:_TESLA 115KV - SECTION 1D & 2D	P2	Bus-tie breaker	45.0	53.9	66.9	19.2	131.3	49.4	114.6	94.7	NConv	100.6	Short term: Action plan Project: Vierra looping project
Cortina 230/115/60 kV Transformer No. 1 (32056 CORTINA 60.0 30451 CRTNA M 230 1 1)	P1-3:A4:5:_CORTINA 230/115KV TB 4	P1	N-1	102.5	106.4	106.7	57.3	68.0	103.0	104.9	102.7	62.7	101.7	Under review: Existing operating procedure
	P1-1:A4:9:_WADHAM 9.11KV GEN UNIT 1 P1-3:A4:5:_CORTINA 230/115KV TB 4	P3	G-1/N-1	100.1	100.1	98.4	<90	58.3	105.9	108.2	117.4	81.6	99.4	Under review: Existing operating procedure
Drum - Rio Oso 115 kV No. 1 line (32214 RIO OSO 115 32225 BRNSWKTP 115 1 1)	P2-3:A5:85:_BRNSWALT 115KV - RING R4 & R3	P2	Non-bus-tie breaker	70.3	78.4	76.6	161.3	16.9	71.6	70.1	73.3	61.8	65.1	Under review: Existing operating procedure
	P2-4:A5:4:_GOLDHILL 115KV - SECTION 1F & 2F	P2	Bus-tie breaker	25.4	24.3	22.4	88.7	33.0	27.2	25.2	NConv	24.3	19.9	Under review: Existing operating procedure
	P1-2:A5:35:_RIO OSO-DRUM-BRUNSWCK 115KV P1-2:A5:37:_BELL-PLACER 115KV	P6	N-1-1	124.3	160.4	158.5	204.0	<90	122.6	97.9	149.8	143.4	122.7	Under review: Existing operating procedure
Drum - Rio Oso 115 kV No. 2 line (32214 RIO OSO 115 32244 BRNSWCKP 115 2 1)	P1-2:A5:34:_RIO OSO-BRNSWALT-DRUM 115KV P1-2:A5:37:_BELL-PLACER 115KV	P6	N-1-1	58.6	93.8	95.0	206.7	<90	58.2	93.3	91.5	133.6	60.8	Under review: Existing operating procedure
Summit - Summit Metering Station 60 kV	P2-3:A5:80:_DRUM 115KV - RING R7 & R6	P2	Non-bus-tie breaker	86.5	86.7	86.7	116.2	48.7	85.8	85.5	83.8	100.5	84.4	Under review: Existing operating procedure

Study Area: **PG&E Central Valley**



Thermal Overloads

Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading (%)										Project & Potential Mitigation Solutions
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP High CEC Forecast	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations	
(30993 SUMMIT 60.0 64109 SUMMIT 3 60.0 1 1)	P2-3:A5:84:_BRNSWALT 115KV - RING R5 & R6	P2	Non-bus-tie breaker	86.6	86.8	86.8	116.2	48.7	86.0	85.6	83.9	100.6	84.5	Under review: Existing operating procedure
Drum - Rio Oso 115 kV No. 1 line (32218 DRUM 115 32222 DTCH FL2 115 1 1)	P2-3:A5:85:_BRNSWALT 115KV - RING R4 & R3	P2	Non-bus-tie breaker	90.2	139.3	134.6	159.4	21.8	92.6	97.4	139.9	94.6	89.7	Under review: Existing operating procedure
	P1-2:A5:35:_RIO OSO-DRUM-BRUNSWCK 115KV P1-2:A5:37:_BELL-PLACER 115KV	P6	N-1-1	178.0	220.5	215.8	220.6	<90	177.3	156.0	216.0	174.2	179.5	Under review: Existing operating procedure
Drum - Rio Oso 115 kV No. 1 line (32214 RIO OSO 115 32225 BRNSWKTP 115 1 1)	P2-3:A5:85:_BRNSWALT 115KV - RING R4 & R3	P2	Non-bus-tie breaker	123.5	139.2	134.5	177.8	41.1	126.0	130.9	139.9	100.5	123.1	Under review: Existing operating procedure
	P2-4:A5:4:_GOLDHILL 115KV - SECTION 1F & 2F	P2	Bus-tie breaker	10.3	14.3	15.9	92.8	42.6	8.2	16.1	NConv	33.5	16.2	Under review: Existing operating procedure
	P2-1:A5:31:_DRUM-HIGGINS 115KV (CHCGO PK-HIGGINS)	P2-1	Line Section w/o fault	91.9	90.6	91.6	100.2	42.0	93.4	98.8	93.5	91.3	94.3	Under review: Existing operating procedure
	P1-2:A5:35:_RIO OSO-DRUM-BRUNSWCK 115KV P1-2:A5:37:_BELL-PLACER 115KV	P6	N-1-1	177.9	220.4	215.7	220.5	<90	177.3	157.9	215.9	180.9	179.5	Under review: Existing operating procedure
Drum - Rio Oso 115 kV No. 2 line (32218 DRUM 115 32244 BRNSWKCP 115 2 1)	P1-2:A5:37:_BELL-PLACER 115KV	P1	N-1	103.5	102.1	102.9	102.7	41.5	105.1	106.9	105.6	98.2	101.7	Under review: Existing operating procedure
	P2-3:A5:24:_PLACER - 1D 115KV & BELL-PLACER LINE	P2	Non-bus-tie breaker	101.7	100.1	100.9	102.7	41.6	103.2	104.4	103.4	96.5	99.7	Under review: Existing operating procedure
	P2-1:A5:31:_DRUM-HIGGINS 115KV (CHCGO PK-HIGGINS)	P2-1	Line Section w/o fault	105.1	103.9	104.8	103.1	41.8	106.7	108.7	107.6	99.4	103.6	Under review: Existing operating procedure
	P1-2:A5:34:_RIO OSO-BRNSWALT-DRUM 115KV P1-2:A5:37:_BELL-PLACER 115KV	P6	N-1-1	99.5	134.0	133.8	219.9	<90	99.6	134.0	134.8	159.6	99.8	Under review: Existing operating procedure
Drum - Summit 60 kV Line (32365 TAMARACK 60.0 30993 SUMMIT 60.0 1 1)	P2-3:A5:80:_DRUM 115KV - RING R7 & R6	P2	Non-bus-tie breaker	83.5	84.8	85.0	110.3	48.3	83.0	83.8	82.1	97.0	82.8	Under review: Existing operating procedure
	P2-3:A5:84:_BRNSWALT 115KV - RING R5 & R6	P2	Non-bus-tie breaker	83.6	84.9	85.0	110.3	48.3	83.0	83.8	82.1	97.1	82.8	Under review: Existing operating procedure
Drum - Summit 60 kV Line (32366 CISCO GR 60.0 32365 TAMARACK 60.0 1 1)	P2-3:A5:80:_DRUM 115KV - RING R7 & R6	P2	Non-bus-tie breaker	89.9	91.3	91.5	118.7	52.2	89.3	90.2	88.4	104.0	89.2	Under review: Existing operating procedure
	P2-3:A5:84:_BRNSWALT 115KV - RING R5 & R6	P2	Non-bus-tie breaker	89.9	91.3	91.6	118.7	52.3	89.3	90.3	88.5	104.1	89.2	Under review: Existing operating procedure
Drum - Summit 60 kV Line (32366 CISCO GR 60.0 32372 SPAULDNG 60.0 1 1)	P2-3:A5:80:_DRUM 115KV - RING R7 & R6	P2	Non-bus-tie breaker	91.9	93.2	93.5	120.4	54.1	91.3	92.2	90.4	106.0	91.1	Under review: Existing operating procedure
	P2-3:A5:84:_BRNSWALT 115KV - RING R5 & R6	P2	Non-bus-tie breaker	92.0	93.3	93.5	120.4	54.1	91.4	92.2	90.5	106.1	91.2	Under review: Existing operating procedure
Eldorado - Missouri Flat 115 kV No. 2 Line (32250 ELDORAD 115 32481 APLHTAP2 115 2 1)	P2-1:A5:12:_MISSOURI FLAT-GOLD HILL #2 115KV (GOLDHILL-SHPRING2)	P2-1	Line Section w/o fault	148.5	169.7	162.2	46.2	28.3	152.3	177.5	201.3	110.6	164.0	Under review: Load connection reconfiguration

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Thermal Overloads

Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading (%)										Project & Potential Mitigation Solutions
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP High CEC Forecast	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations	
Eldorado - Missouri Flat 115 kV No. 2 Line (32481 APLHTAP2 115 32257 PLCRVLT2 115 2 1)	P2-1:A5:12:_MISSOURI FLAT-GOLD HILL #2 115KV (GOLDHILL-SHPRING2)	P2-1	Line Section w/o fault	148.5	169.8	162.3	46.1	28.5	152.3	177.5	201.4	110.6	164.1	Under review: Load connection reconfiguration
Eldorado - Missouri Flat 115 kV No. 1 Line (32482 APLHTAP1 115 32255 PLCRVLT1 115 1 1)	P2-1:A5:12:_MISSOURI FLAT-GOLD HILL #2 115KV (GOLDHILL-SHPRING2)	P2-1	Line Section w/o fault	140.0	153.8	146.5	34.1	20.3	143.6	161.3	183.0	119.3	148.1	Under review: Load connection reconfiguration
Eldorado - Missouri Flat 115 kV No. 1 Line (32250 ELDORAD 115 32482 APLHTAP1 115 1 1)	P2-1:A5:12:_MISSOURI FLAT-GOLD HILL #2 115KV (GOLDHILL-SHPRING2)	P2-1	Line Section w/o fault	114.2	127.5	121.0	25.1	13.9	117.5	134.0	153.7	101.5	122.3	Under review: Load connection reconfiguration
Eldorado - Missouri Flat 115 kV No. 1 Line (32255 PLCRVLT1 115 32261 MIZOU_T1 115 1 1)	P2-1:A5:12:_MISSOURI FLAT-GOLD HILL #2 115KV (GOLDHILL-SHPRING2)	P2-1	Line Section w/o fault	84.3	92.6	88.2	20.5	12.0	86.5	97.1	110.1	71.8	89.1	Under review: Load connection reconfiguration
Smartville - Camp Far West 60 kV Line (32314 SMRTSVLE 60.0 32341 BEALE1J1 60.0 2 1)	P2-2:A5:29:_COLGATE 60KV SECTION 1D	P2	Bus	<90	<90	<90	53.4	108.8	<90	<90	<90	<90	<90	Apply summer setup if needed
	P2-3:A5:35:_COLGATE - 1D 60KV & COLGATE-PALERMO LINE	P2	Non-bus-tie breaker	<90	<90	<90	53.4	108.8	<90	<90	<90	<90	<90	Apply summer setup if needed
	P2-3:A5:36:_COLGATE - 1D 60KV & COLGATE-CHALLENGE LINE	P2	Non-bus-tie breaker	<90	<90	<90	53.4	108.8	<90	<90	<90	<90	<90	Apply summer setup if needed
	P2-3:A5:37:_COLGATE - 1D 60KV & COLGATE-SMARTVILLE #1 LINE	P2	Non-bus-tie breaker	<90	<90	<90	44.0	113.0	<90	<90	<90	<90	<90	Apply summer setup if needed
	P2-3:A5:39:_COLGATE - 1D 60KV & COLGATE-ALLEGHANY LINE	P2	Non-bus-tie breaker	<90	<90	<90	53.4	108.8	<90	<90	<90	<90	<90	Apply summer setup if needed
Valley Springs - Martell 60 kV Line No. 1 (33610 VLLY SPS 60.0 33619 AMFOR_SW 60.0 1 1)	P1-2:A11:74:_VALLEY SPRINGS-CLAY 60KV	P1	N-1	109.6	108.2	107.3	68.2	44.4	111.2	116.7	117.7	82.7	107.5	Disable automatics
	P2-3:A11:43:_VLLY SPS 60KV - MIDDLE BREAKER BAY 2	P2	Non-bus-tie breaker	109.5	108.0	107.2	68.2	44.1	111.2	116.5	117.6	83.0	107.4	Disable automatics
	P2-1:A11:95:_VALLEY SPRINGS-CLAY 60KV (CLAY-BUENA_TP)	P2-1	Line Section w/o fault	109.9	108.5	107.7	68.1	45.3	111.6	117.1	118.1	83.0	107.9	Disable automatics
	P1-1:A11:21:_WEST PNT 11.50KV GEN UNIT 1	P3	G-1/N-1	109.5	<90	<90	<90	<90	111.8	117.3	118.3	82.9	<90	Disable automatics
	P1-2:A11:74:_VALLEY SPRINGS-CLAY 60KV	P7	DCTL	109.6	108.2	107.3	68.2	44.4	111.2	116.7	117.7	82.7	107.5	Disable automatics
	P7-1:A11:14:_VALLEY SPRINGS-CLAY 60KV & VALLEY SPRINGS #2 60KV	P7	DCTL	0.0	0.0	0.0	0.0	78.8	0.0	0.0	0.0	0.0	0.0	Disable automatics
	P7-1:A11:4:_ELECTRA-BELLOTA 230KV & VALLEY SPRINGS-BELLOTA 230KV	P6	N-1-1	109.6	<90	<90	<90	<90	111.3	117.0	118.7	83.8	<90	Disable automatics
Valley Springs - Martell 60 kV Line No. 1 (33610 VLLY SPS 60.0 33619 AMFOR_SW 60.0 1 1)	P1-2:A11:9:_TIGER CREEK-VALLEY SPRINGS 230KV	P1	N-1	98.6	98.1	97.3	60.6	38.5	100.1	106.1	107.1	74.1	97.5	Disable automatics
	P1-2:A11:74:_VALLEY SPRINGS-CLAY 60KV	P2	Non-bus-tie breaker	98.5	98.0	97.2	60.6	38.3	100.1	106.0	106.9	74.4	97.3	Disable automatics

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Thermal Overloads

Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading (%)										Project & Potential Mitigation Solutions
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP High CEC Forecast	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations	
Valley Springs - Martell 60 kV Line No. 1 (33619 AMFOR_SW 60.0 33616 MARTELL 60.0 1 1)	P2-1:A11:95:_ VALLEY SPRINGS-CLAY 60KV (CLAY-BUENA_TP)	P2-1	Line Section w/o fault	98.8	98.4	97.6	60.5	39.2	100.4	106.4	107.4	74.4	97.8	Disable automatics
	P1-1:A11:35:_ PARDE 2 7.20KV GEN UNIT 1	P3	G-1/N-1	98.5	98.0	97.0	90.0	39.0	100.7	106.0	107.0	74.0	97.0	Disable automatics
	P1-2:A11:74:_ VALLEY SPRINGS-CLAY 60KV	P7	DCTL	98.5	98.1	97.3	60.6	38.5	100.1	106.1	107.1	74.1	97.5	Disable automatics
	P7-1:A11:14:_ VALLEY SPRINGS-CLAY 60KV & VALLEY SPRINGS #2 60KV	P6	N-1-1	98.6	98.0	97.0	90.0	39.0	100.1	106.0	108.0	75.2	97.0	Disable automatics
Stockton 'A' - Weber 60 kV Line No. 1 (33674 HAZLTN J 60.0 33670 STCKTN A 60.0 1 1)	P1-2:A11:9:_ TIGER CREEK-VALLEY SPRINGS 230KV	P6	N-1-1	98.6	98.0	97.0	90.0	39.0	100.1	106.0	108.0	75.2	97.0	Disable automatics
	P1-2:A11:74:_ VALLEY SPRINGS-CLAY 60KV	P6	N-1-1	98.6	98.0	97.0	90.0	39.0	100.1	106.0	108.0	75.2	97.0	Disable automatics
Stagg - Country Club 60 kV Line No. 1 (33704 STAGG 60.0 33706 CNTRY CB 60.0 1 1)	P2-1:A11:112:_ STOCKTON A-WEBER #3 60KV (WEBER E-HAZLTN J)	P2-1	Line Section w/o fault	106.5	105.5	109.8	42.8	45.9	106.8	117.6	117.4	80.8	109.7	Mitigation under review
	P2-2:A11:44:_ STAGG 60KV SECTION MD	P2	Bus	134.4	137.5	137.3	34.0	37.7	135.2	147.5	148.7	102.7	136.6	Project: Stagg - Hammer 60 kV line project Scope under review
	P1-2:A11:85:_ STAGG-HAMMER 60KV	P6	N-1-1	134.0	137.2	136.9	<90	<90	135.7	146.8	147.9	102.2	137.2	Project: Stagg - Hammer 60 kV line project Scope under review
Stagg - Hammer 60 kV Line No. 1 (33704 STAGG 60.0 33714 HAMMER 60.0 1 1)	P1-2:A11:84:_ STAGG-COUNTRY CLUB #2 60KV	P6	N-1-1	134.0	137.2	136.9	<90	<90	135.7	146.8	147.9	102.2	137.2	Project: Stagg - Hammer 60 kV line project Scope under review
	P1-2:A11:85:_ STAGG-HAMMER 60KV	P6	N-1-1	134.0	137.2	136.9	<90	<90	135.7	146.8	147.9	102.2	137.2	Project: Stagg - Hammer 60 kV line project Scope under review
	P1-2:A11:83:_ STAGG-COUNTRY CLUB #1 60KV	P6	N-1-1	134.0	137.2	136.9	<90	<90	135.7	146.8	147.9	102.2	137.2	Project: Stagg - Hammer 60 kV line project Scope under review
	P2-2:A11:47:_ CNTRY CB 60KV SECTION 1E	P2	Bus	108.0	107.4	107.7	26.7	30.1	108.7	114.9	116.2	80.3	107.2	Project: Stagg - Hammer 60 kV line project Scope under review
	P2-4:A11:16:_ CNTRY CB 60KV - SECTION 1D & 1E	P2	Bus-tie breaker	108.0	107.3	107.6	26.7	30.1	108.6	114.6	116.0	80.2	107.1	Project: Stagg - Hammer 60 kV line project Scope under review
	P2-4:A11:17:_ CNTRY CB 60KV - SECTION 1F & 1E	P2	Bus-tie breaker	107.4	107.3	107.6	26.7	30.1	108.8	114.7	116.1	80.2	107.1	Project: Stagg - Hammer 60 kV line project Scope under review
Hammer - Country Club 60 kV (33714 HAMMER 60.0 33716 HMMR JCT 60.0 1 1)	P2-1:A11:131:_ HAMMER-COUNTRY CLUB 60KV (CNTRY CB-UOP)	P2-1	Line Section w/o fault	108.0	107.5	107.9	26.7	30.1	108.6	115.0	116.3	80.5	107.4	Project: Stagg - Hammer 60 kV line project Scope under review
	P2-1:A11:133:_ HAMMER-COUNTRY CLUB 60KV (WSTLNESW-HMMR JCT)	P2-1	Line Section w/o fault	101.2	102.1	103.0	22.5	24.8	101.8	110.1	109.8	75.0	102.5	Project: Stagg - Hammer 60 kV line project Scope under review
	P7-1:A11:19:_ STAGG-COUNTRY CLUB #1 60KV & STAGG-COUNTRY CLUB #2 60KV	P7	DCTL	135.0	138.2	137.8	34.0	37.7	136.8	148.0	149.2	102.8	138.2	Project: Stagg - Hammer 60 kV line project Scope under review
Lockeford - Lodi 60 kV Line No. 1 (33724 LOCKEFRD 60.0 33725 LOCKFRD1 60.0 1 1)	P7-1:A11:19:_ STAGG-COUNTRY CLUB #1 60KV & STAGG-COUNTRY CLUB #2 60KV	P7	DCTL	93.3	95.7	95.6	24.5	25.1	94.7	103.3	103.8	70.8	95.8	Project: Stagg - Hammer 60 kV line project Scope under review
Lockeford - Lodi 60 kV Line No. 1 (33724 LOCKEFRD 60.0 33725 LOCKFRD1 60.0 1 1)	P1-2:A11:89:_ LOCKEFORD-LODI #2 60KV	P6	N-1-1	94.1	83.7	83.5	82.3	<90	94.3	85.9	85.6	78.9	100.2	Project: Lockeford-Lodi area 230 kV development Scope is under review
	P1-2:A11:91:_ LOCKEFORD-INDUSTRIAL 60KV	P6	N-1-1	94.1	83.7	83.5	82.3	<90	94.3	85.9	85.6	78.9	100.2	Project: Lockeford-Lodi area 230 kV development Scope is under review

Study Area: **PG&E Central Valley**



Thermal Overloads

Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading (%)										Project & Potential Mitigation Solutions
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP High CEC Forecast	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations	
Lockeford - Lodi 60 kV Line No. 2 (33724 LOCKEFRD 60.0 33726 VICTOR 60.0 1 1)	P1-2:A11:91:_LOCKEFORD-INDUSTRIAL 60KV	P1	N-1	107.9	92.8	96.3	89.8	61.0	108.0	98.6	95.2	88.2	96.6	Significant leading power factor in 2019 (0.7) Project: Lockeford-Lodi area 230 kV development Scope is under review
	P1-2:A11:101:_LODI-INDUSTRIAL 60KV P1-2:A11:91:_LOCKEFORD-INDUSTRIAL 60KV	P6	N-1-1	164.9	134.2	140.1	151.8	119.2	164.9	141.6	135.5	132.4	169.0	Project: Lockeford-Lodi area 230 kV development Scope is under review
Lockeford - Lodi 60 kV Line No. 3 (33724 LOCKEFRD 60.0 33736 LODI JCT 60.0 1 1)	P1-2:A11:91:_LOCKEFORD-INDUSTRIAL 60KV	P1	N-1	101.3	86.3	87.2	86.4	58.2	101.5	89.1	88.6	82.7	87.5	Significant leading power factor in 2019 (0.7) Project: Lockeford-Lodi area 230 kV development Scope is under review
	P1-2:A11:89:_LOCKEFORD-LODI #2 60KV P1-2:A11:91:_LOCKEFORD-INDUSTRIAL 60KV	P6	N-1-1	169.9	147.2	146.9	153.2	120.5	170.2	150.4	150.4	140.6	178.1	Project: Lockeford-Lodi area 230 kV development Scope is under review
Lockeford - Industrial 60 kV Line (33724 LOCKEFRD 60.0 38060 INDUSTR 60.0 1 1)	P1-2:A11:101:_LODI-INDUSTRIAL 60KV	P1	N-1	103.0	81.3	83.2	91.0	61.3	103.0	83.6	81.8	80.7	83.4	Significant leading power factor in 2019 (0.7)
	P1-2:A11:89:_LOCKEFORD-LODI #2 60KV	P1	N-1	108.6	90.0	90.6	93.6	63.2	108.7	92.1	92.0	87.2	90.9	Significant leading power factor in 2019 (0.7) Project: Lockeford-Lodi area 230 kV development Scope is under review
	P2-2:A11:52:_LODI 60KV SECTION MA	P2	Bus	102.8	81.1	82.9	90.9	61.3	103.3	83.3	81.5	80.5	83.2	Significant leading power factor in 2019 (0.7)
	P2-3:A11:66:_LODI - MA 60KV & LOCKEFORD-LODI #3 LINE	P2	Non-bus-tie breaker	102.8	81.1	82.9	90.9	61.3	103.3	83.3	81.5	80.5	83.2	Significant leading power factor in 2019 (0.7) Project: Lockeford-Lodi area 230 kV development Scope is under review
	P2-3:A11:67:_LODI - MA 60KV & LOCKEFORD-LODI #2 LINE	P2	Non-bus-tie breaker	102.8	81.1	82.9	90.9	61.3	103.3	83.3	81.5	80.5	83.2	Significant leading power factor in 2019 (0.7) Project: Lockeford-Lodi area 230 kV development Scope is under review
	P2-1:A11:142:_LOCKEFORD-LODI #2 60KV (LOCKEFRD-VICTOR)	P2-1	Line Section w/o fault	113.1	96.5	99.2	95.7	64.9	113.3	101.4	98.9	92.2	99.6	Significant leading power factor in 2019 (0.7) Project: Lockeford-Lodi area 230 kV development Scope is under review
	P2-1:A11:145:_LOCKEFORD-LODI #2 60KV (VICTOR-WODBRG J)	P2-1	Line Section w/o fault	108.7	90.2	90.8	93.6	63.2	108.8	92.3	92.2	87.3	91.2	Significant leading power factor in 2019 (0.7) Project: Lockeford-Lodi area 230 kV development Scope is under review
	P2-1:A11:150:_LOCKEFORD-LODI #2 60KV (INDSTR J-INDUSTR)	P2-1	Line Section w/o fault	108.7	90.2	90.8	93.5	63.2	108.8	92.3	92.2	87.3	91.2	Significant leading power factor in 2019 (0.7) Project: Lockeford-Lodi area 230 kV development Scope is under review
P1-2:A11:101:_LODI-INDUSTRIAL 60KV P1-2:A11:89:_LOCKEFORD-LODI #2 60KV	P6	N-1-1	159.9	122.1	124.2	150.6	114.6	159.8	124.4	122.4	122.3	152.4	Project: Lockeford-Lodi area 230 kV development Scope is under review	
Lockeford - Lodi 60 kV Line No. 1 (33725 LOCKFRD1 60.0 33732 COLONY 60.0 1 1)	P1-2:A11:89:_LOCKEFORD-LODI #2 60KV P1-2:A11:91:_LOCKEFORD-INDUSTRIAL 60KV	P6	N-1-1	138.1	122.9	122.6	120.9	95.3	138.4	126.1	125.7	115.8	147.2	Project: Lockeford-Lodi area 230 kV development Scope is under review
Lockeford - Lodi 60 kV Line No. 2 (33726 VICTOR 60.0 33731 WODBRG J 60.0 1 1)	P1-2:A11:101:_LODI-INDUSTRIAL 60KV P1-2:A11:91:_LOCKEFORD-INDUSTRIAL 60KV	P6	N-1-1	157.3	123.7	126.3	147.8	116.2	157.2	126.8	124.4	124.1	155.1	Project: Lockeford-Lodi area 230 kV development Scope is under review

Study Area: **PG&E Central Valley**



Thermal Overloads

Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading (%)										Project & Potential Mitigation Solutions
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP High CEC Forecast	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations	
Lockeford - Lodi 60 kV Line No. 1 (33728 LODI 60.0 33734 CLNY JCT 60.0 1 1)	P1-2:A11:89:_LOCKEFORD-LODI #2 60KV P1-2:A11:91:_LOCKEFORD-INDUSTRIAL 60KV	P6	N-1-1	133.0	111.5	111.1	124.1	97.2	133.2	113.0	113.5	108.5	136.7	Project: Lockeford-Lodi area 230 kV development Scope is under review
Lockeford - Lodi 60 kV Line No. 3 (33728 LODI 60.0 33736 LODI JCT 60.0 1 1)	P1-2:A11:89:_LOCKEFORD-LODI #2 60KV P1-2:A11:91:_LOCKEFORD-INDUSTRIAL 60KV	P6	N-1-1	137.1	119.0	118.7	122.0	97.4	137.4	121.5	121.5	113.6	144.0	Project: Lockeford-Lodi area 230 kV development Scope is under review
Lockeford - Lodi 60 kV Line No. 2 (33731 WODBRG J 60.0 33735 INDSTR J 60.0 1 1)	P1-2:A11:101:_LODI-INDUSTRIAL 60KV P1-2:A11:91:_LOCKEFORD-INDUSTRIAL 60KV	P6	N-1-1	157.2	123.7	126.3	147.7	116.2	157.1	126.8	124.4	124.1	155.1	Project: Lockeford-Lodi area 230 kV development Scope is under review
Lockeford - Lodi 60 kV Line No. 1 (33732 COLONY 60.0 33734 CLNY JCT 60.0 1 1)	P1-2:A11:89:_LOCKEFORD-LODI #2 60KV P1-2:A11:91:_LOCKEFORD-INDUSTRIAL 60KV	P6	N-1-1	130.8	112.3	112.2	117.5	93.4	131.0	114.6	114.7	107.4	136.2	Project: Lockeford-Lodi area 230 kV development Scope is under review
Lockeford - Lodi 60 kV Line No. 2 (33735 INDSTR J 60.0 38060 INDUSTR L 60.0 1 1)	P1-2:A11:101:_LODI-INDUSTRIAL 60KV P1-2:A11:91:_LOCKEFORD-INDUSTRIAL 60KV	P6	N-1-1	157.2	123.7	126.3	147.7	116.2	157.1	126.8	124.4	124.2	155.1	Project: Lockeford-Lodi area 230 kV development Scope is under review
Lodi - Industrial 60 kV Line (38060 INDUSTR L 60.0 33728 LODI 60.0 1 1)	P1-2:A11:89:_LOCKEFORD-LODI #2 60KV	P1	N-1	100.6	70.8	72.9	91.2	59.9	100.4	71.8	69.6	73.5	73.1	Significant leading power factor in 2019 (0.7) Project: Lockeford-Lodi area 230 kV development Scope is under review
	P1-2:A11:91:_LOCKEFORD-INDUSTRIAL 60KV	P1	N-1	110.9	81.1	83.9	99.5	65.9	110.7	83.1	80.2	82.8	84.3	Significant leading power factor in 2019 (0.7) Project: Lockeford-Lodi area 230 kV development Scope is under review
	P2-1:A11:142:_LOCKEFORD-LODI #2 60KV (LOCKEFRD-VICTOR)	P2-1	Line Section w/o fault	104.6	77.4	81.5	93.3	61.6	104.4	81.1	76.5	78.4	81.8	Significant leading power factor in 2019 (0.7) Project: Lockeford-Lodi area 230 kV development Scope is under review
	P2-1:A11:145:_LOCKEFORD-LODI #2 60KV (VICTOR-WODBRG J)	P2-1	Line Section w/o fault	100.7	71.0	73.1	91.1	59.9	100.5	71.9	69.7	73.6	73.3	Significant leading power factor in 2019 (0.7) Project: Lockeford-Lodi area 230 kV development Scope is under review
	P2-1:A11:150:_LOCKEFORD-LODI #2 60KV (INDSTR J-INDUSTR L)	P2-1	Line Section w/o fault	100.7	71.0	73.1	91.1	59.9	100.5	72.0	69.7	73.5	73.3	Significant leading power factor in 2019 (0.7) Project: Lockeford-Lodi area 230 kV development Scope is under review
	P1-2:A11:89:_LOCKEFORD-LODI #2 60KV P1-2:A11:91:_LOCKEFORD-INDUSTRIAL 60KV	P6	N-1-1	194.1	154.7	156.3	181.3	142.1	194.1	157.3	154.8	153.4	193.8	Project: Lockeford-Lodi area 230 kV development Scope is under review
Stanislaus-Melones-Manteca 115 kV Line (33932 MELONES 115 33500 MELNS JA 115 1 1)	P2-4:A11:3:_BELLOTA 230KV - SECTION 1E & 2E	P2	Bus-tie breaker	87.0	NConv	154.4	20.1	51.3	89.5	NConv	NConv	44.3	165.4	Short term: Action plan Project: Vierra looping project
	P2-4:A11:9:_TESLA 115KV - SECTION 1D & 2D	P2	Bus-tie breaker	55.2	68.7	81.6	29.3	77.2	59.7	128.9	109.2	NConv	105.5	Short term: Action plan Project: Vierra looping project
BELLOTA - RIVERBANK - MELONES 115KV Line (33932 MELONES 115 33934 TULLOCH 115 1 1)	P2-4:A11:3:_BELLOTA 230KV - SECTION 1E & 2E	P2	Bus-tie breaker	148.2	NConv	227.9	34.2	11.4	152.2	NConv	NConv	99.1	214.0	Short term: Action plan Project: Vierra looping project
	P2-4:A11:9:_TESLA 115KV - SECTION 1D & 2D	P2	Bus-tie breaker	51.8	64.3	81.0	20.1	171.9	57.8	146.8	120.9	NConv	129.7	Short term: Action plan Project: Vierra looping project

Study Area: **PG&E Central Valley**



Thermal Overloads

Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading (%)										Project & Potential Mitigation Solutions
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP High CEC Forecast	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations	
	P1-3:A11:10:_BELLOTA 230/115KV TB 1 P1-3:A11:11:_BELLOTA 230/115KV TB 2	P6	N-1-1	104.3	138.8	129.2	<90	<90	106.6	NConv	NConv	80.6	128.1	Short term: Action plan Project: Vierra looping project
Stanislaus-Melones-Riverbank 115 kV Line (33932 MELONES 115 33936 MELNS JB 115 1 1)	P2-4:A11:3:_BELLOTA 230KV - SECTION 1E & 2E	P2	Bus-tie breaker	96.6	NConv	152.9	23.2	53.0	99.5	NConv	NConv	43.1	163.9	Short term: Action plan Project: Vierra looping project
	P2-4:A11:9:_TESLA 115KV - SECTION 1D & 2D	P2	Bus-tie breaker	61.5	70.9	85.5	33.7	76.2	66.4	132.9	111.2	NConv	109.4	Short term: Action plan Project: Vierra looping project
Stanislaus-Melones-Riverbank 115 kV Line (33936 MELNS JB 115 33947 RIVRBKJT 115 1 1)	P1-2:A11:104:_MANTECA-RIPON 115KV	P1	N-1	<90	83.9	96.8	<90	37.2	<90	104.6	88.3	61.3	98.0	Short term: Action plan Project: Vierra looping project
	P2-3:A11:92:_MANTECA 115KV - RING R4 & R5	P2	Non-bus-tie breaker	1.9	83.9	96.7	1.9	37.2	1.9	104.4	88.2	61.1	97.8	Short term: Action plan Project: Vierra looping project
	P2-3:A11:98:_MANTECA 115KV - RING R6 & R5	P2	Non-bus-tie breaker	1.9	83.9	96.8	1.9	37.2	1.9	104.5	88.2	61.1	97.9	Short term: Action plan Project: Vierra looping project
	P2-4:A11:3:_BELLOTA 230KV - SECTION 1E & 2E	P2	Bus-tie breaker	40.5	NConv	108.0	38.9	63.7	42.8	NConv	NConv	12.0	113.2	Short term: Action plan Project: Vierra looping project
	P2-4:A11:9:_TESLA 115KV - SECTION 1D & 2D	P2	Bus-tie breaker	89.2	94.0	105.7	47.3	37.2	93.3	142.8	124.8	NConv	124.8	Short term: Action plan Project: Vierra looping project
	P2-1:A11:174:_RPN JNCN-RIPON 115KV NO FAULT	P2-1	Line Section w/o fault	<90	83.9	96.8	<90	37.2	<90	104.6	88.3	61.3	98.0	Short term: Action plan Project: Vierra looping project
	P2-1:A11:25:_RIVERBANK JCT SW STA-MANTECA 115KV (RPN JNCN-MANTECA)	P2-1	Line Section w/o fault	77.5	83.8	96.6	39.4	37.1	78.5	104.4	88.1	61.1	97.8	Short term: Action plan Project: Vierra looping project
	P1-1:A12:8:_STANISLS 13.80KV GEN UNIT 1 P1-2:A11:104:_MANTECA-RIPON 115KV	P3	G-1/N-1	<90	86.1	99.9	<90	<90	<90	108.3	90.9	<90	100.7	Short term: Action plan Project: Vierra looping project
P7-1:A11:37:_STANISLAUS-MANTECA #2 115KV & MANTECA-RIPON 115KV	P7	DCTL	<90	84.0	96.9	<90	37.3	<90	104.6	88.3	61.3	98.1	Short term: Action plan Project: Vierra looping project	
Stanislaus-Melones-Riverbank 115 kV Line (33936 MELNS JB 115 33947 RIVRBKJT 115 1 1)	P1-2:A11:104:_MANTECA-RIPON 115KV P1-2:A11:61:_BELLOTA-RIVERBANK-MELONES SW STA 115KV	P6	N-1-1	<90	<90	99.2	<90	<90	<90	108.6	90.4	<90	102.8	Short term: Action plan Project: Vierra looping project
	P1-2:A11:104:_MANTECA-RIPON 115KV	P1	N-1	<90	83.8	96.7	<90	37.2	<90	104.4	88.2	61.2	97.9	Short term: Action plan Project: Vierra looping project
	P2-3:A11:92:_MANTECA 115KV - RING R4 & R5	P2	Non-bus-tie breaker	0.0	83.8	96.6	0.0	37.2	0.0	104.2	88.1	61.0	97.7	Short term: Action plan Project: Vierra looping project
	P2-3:A11:98:_MANTECA 115KV - RING R6 & R5	P2	Non-bus-tie breaker	0.0	83.8	96.7	0.0	37.2	0.0	104.4	88.1	61.0	97.8	Short term: Action plan Project: Vierra looping project
	P2-4:A11:3:_BELLOTA 230KV - SECTION 1E & 2E	P2	Bus-tie breaker	40.0	NConv	106.5	38.0	63.0	42.3	NConv	NConv	10.4	111.8	Short term: Action plan Project: Vierra looping project

Study Area: **PG&E Central Valley**



Thermal Overloads

Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading (%)										Project & Potential Mitigation Solutions
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP High CEC Forecast	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations	
Stanislaus-Melones-Riverbank 115 kV Line (33947 RIVRBKJT 115 33951 VLYHMTP1 115 1 1)	P2-4:A11:9:_TESLA 115KV - SECTION 1D & 2D	P2	Bus-tie breaker	88.7	93.6	105.4	46.6	37.2	92.8	142.3	124.4	NConv	124.4	Short term: Action plan Project: Vierra looping project
	P2-1:A11:174:_RPN JNCN-RIPON 115KV NO FAULT	P2-1	Line Section w/o fault	<90	83.8	96.7	<90	37.2	<90	104.4	88.2	61.2	97.8	Short term: Action plan Project: Vierra looping project
	P2-1:A11:25:_RIVERBANK JCT SW STA-MANTECA 115KV (RPN JNCN-MANTECA)	P2-1	Line Section w/o fault	77.4	83.7	96.5	39.3	37.0	78.5	104.2	88.0	61.1	97.7	Short term: Action plan Project: Vierra looping project
	P1-1:A12:8:_STANISLS 13.80KV GEN UNIT 1 P1-2:A11:104:_MANTECA-RIPON 115KV	P3	G-1/N-1	<90	86.0	99.8	<90	<90	<90	108.2	90.8	<90	100.5	Short term: Action plan Project: Vierra looping project
	P7-1:A11:37:_STANISLAUS-MANTECA #2 115KV & MANTECA-RIPON 115KV	P7	DCTL	<90	83.9	96.8	<90	37.3	<90	104.5	88.2	61.3	98.0	Short term: Action plan Project: Vierra looping project
	P1-2:A11:104:_MANTECA-RIPON 115KV P1-2:A11:61:_BELLOTA-RIVERBANK-MELONES SW STA 115KV	P6	N-1-1	<90	<90	99.1	<90	<90	<90	108.5	90.3	<90	102.6	Short term: Action plan Project: Vierra looping project
Bellota - Riverbank - Melones 115KV Line (33950 RVRBK TP 115 33934 TULLOCH 115 1 1)	P2-4:A11:3:_BELLOTA 230KV - SECTION 1E & 2E	P2	Bus-tie breaker	168.3	NConv	252.6	50.0	35.9	172.5	NConv	NConv	118.6	240.1	Short term: Action plan Project: Vierra looping project
	P2-4:A11:8:_TESLA D 230KV - SECTION 1D & 2D	P2	Bus-tie breaker	25.5	24.8	20.4	23.1	104.6	25.0	10.8	15.7	15.1	8.8	Short term: Action plan Project: Vierra looping project
	P2-4:A11:9:_TESLA 115KV - SECTION 1D & 2D	P2	Bus-tie breaker	37.6	48.5	65.6	35.9	195.5	43.5	131.7	105.9	NConv	114.1	Short term: Action plan Project: Vierra looping project
	P1-3:A11:10:_BELLOTA 230/115KV TB 1 P1-3:A11:11:_BELLOTA 230/115KV TB 2	P6	N-1-1	130.8	168.3	158.4	<90	<90	133.3	NConv	NConv	99.7	157.1	Short term: Action plan Project: Vierra looping project
Bellota - Riverbank - Melones 115KV Line (33950 RVRBK TP 115 33944 RVRBANK 115 1 1)	P2-4:A11:3:_BELLOTA 230KV - SECTION 1E & 2E	P2	Bus-tie breaker	77.8	NConv	129.8	21.2	14.6	79.7	NConv	NConv	54.5	123.3	Short term: Action plan Project: Vierra looping project
Stanislaus-Melones-Riverbank 115 kV Line (33951 VLYHMTP1 115 33517 RPNJN2 115 1 1)	P2-4:A11:3:_BELLOTA 230KV - SECTION 1E & 2E	P2	Bus-tie breaker	<90	NConv	108.4	<90	56.7	<90	NConv	NConv	12.3	115.2	Short term: Action plan Project: Vierra looping project
	P2-4:A11:9:_TESLA 115KV - SECTION 1D & 2D	P2	Bus-tie breaker	<90	75.4	85.9	<90	39.8	<90	119.9	104.1	NConv	103.7	Short term: Action plan Project: Vierra looping project
Tesla - Lawrence Lab 115 kV Line (37649 LLNLAB 115 33574 LLNL TAP 115 1 1)	P2-4:A11:8:_TESLA D 230KV - SECTION 1D & 2D	P2	Bus-tie breaker	5.5	10.2	14.3	68.4	222.1	5.1	45.5	34.5	58.3	40.0	Short term: Action plan Project: Vierra looping project
Table Mountain - Pease 60 kV line (38054 GRIDLEY 60.0 32334 LIVE OAK 60.0 1 1)	P1-1:A5:24:_GRNLEAF2 13.80KV GEN UNIT 1 P1-3:A5:31:_PEAS RG 60/60KV TB 1	P3	G-1/N-1	<90	<90	<90	<90	<90	<90	<90	<90	124.2	<90	Sensitivity only
	P1-2:A5:57:_MRYSVLE-PEASE 60KV P1-3:A5:31:_PEAS RG 60/60KV TB 1	P6	N-1-1	<90	<90	<90	<90	<90	<90	<90	<90	<90	166.5	Sensitivity only
	P1-1:A5:24:_GRNLEAF2 13.80KV GEN UNIT 1 P1-3:A5:31:_PEAS RG 60/60KV TB 1	P3	G-1/N-1	<90	<90	<90	<90	<90	<90	<90	<90	103.9	<90	Sensitivity only
Table Mountain - Pease 60 kV line (32326 ENCL TAP 60.0 32332 PEASE 60.0 1 1)	P1-2:A5:57:_MRYSVLE-PEASE 60KV P1-3:A5:31:_PEAS RG 60/60KV TB 1	P6	N-1-1	<90	<90	<90	<90	<90	<90	<90	<90	<90	114.3	Sensitivity only

Study Area: **PG&E Central Valley**



Thermal Overloads

Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading (%)										Project & Potential Mitigation Solutions		
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP High CEC Forecast	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations			
Table Mountain - Pease 60 kV line (32326 ENCL TAP 60.0 32334 LIVE OAK 60.0 1 1)	P1-1:A5:24:_GRNLEAF2 13.80KV GEN UNIT 1	P3	G-1/N-1	<90	<90	<90	<90	<90	<90	<90	<90	<90	105.2	<90	Sensitivity only	
	P1-3:A5:31:_PEAS RG 60/60KV TB 1	P6	N-1-1	<90	<90	<90	<90	<90	<90	<90	<90	<90	<90	116.7	Sensitivity only	
	P1-2:A5:57:_MRYSVLLE-PEASE 60KV P1-3:A5:31:_PEAS RG 60/60KV TB 1	P6	N-1-1	<90	<90	<90	<90	<90	<90	<90	<90	<90	<90	<90	113.4	Sensitivity only
Pease - Harter 60 kV Line (32328 YBA CTYJ 60.0 32332 PEASE 60.0 1 1)	P1-3:A5:31:_PEAS RG 60/60KV TB 1 P1-2:A5:57:_MRYSVLLE-PEASE 60KV	P6	N-1-1	<90	<90	<90	<90	<90	<90	<90	<90	<90	<90	<90	113.4	Sensitivity only
Drum - Grass Valley - Weimar 60 kV Line (32374 DRUM 60.0 32376 BONNIE N 60.0 1 1)	P1-1:A5:17:_ROLLINSF 6.60KV GEN UNIT 1 P1-2:A5:50:_COLGATE-GRASS VALLEY 60KV	P3	G-1/N-1	92.6	93.8	93.4	<90	<90	94.1	97.0	101.9	<90	<90	93.5	Sensitivity only	
Placer - Bell 115 kV line (32228 PLACER 115 32238 BELL PGE 115 1 1)	P2-4:A5:4:_GOLDHILL 115KV - SECTION 1F & 2F	P2	Bus-tie breaker	81.9	90.3	88.9	4.6	9.1	86.1	100.9	NConv	68.7	68.7	88.8	Sensitivity only	
Higgins - Bell 115 kV line (32232 HIGGINS 115 32238 BELL PGE 115 1 1)	P2-4:A5:4:_GOLDHILL 115KV - SECTION 1F & 2F	P2	Bus-tie breaker	87.8	96.7	94.8	6.5	4.7	92.1	106.9	NConv	69.4	69.4	94.7	Sensitivity only	
Rio Oso - West Sacramento 115 kV line (32214 RIO OSO 115 31986 W.SCRMNO 115 1 1)	P1-2:A4:25:_WOODLAND-DAVIS 115KV P1-2:A4:9:_RIO OSO-BRIGHTON 230KV	P6	N-1-1	86.1	97.1	98.8	<90	<90	85.2	101.7	96.6	88.1	88.1	98.5	Sensitivity only	
Rio Oso - Brighton 230 kV Line (30330 RIO OSO 230 30348 BRIGHTON 230 1 1)	P2-4:A5:6:_RIO OSO 115KV - SECTION 1D & 2D	P2	Bus-tie breaker	87.5	93.0	96.3	9.7	26.7	87.5	101.6	96.2	66.8	66.8	101.5	Sensitivity only	
Birds Landing - Contra Costa PP 230 kV Line (30525 C.COSTA 230 30479 BDLSWSTA 230 1 1)	P2-3:A4:4:_BDLSWSTA 230KV - MIDDLE BREAKER BAY 2	P2	Non-bus-tie breaker	41.5	43.0	43.7	22.9	89.6	41.5	44.4	42.5	106.1	42.5	46.4	Sensitivity only	
Donnells - Curtis 115KV (33916 CURTISS 115 33917 SPISONORAJCT 115 1 1)	P2-4:A11:3:_BELLOTA 230KV - SECTION 1E & 2E	P2	Bus-tie breaker	75.2	NConv	99.0	67.8	70.4	75.7	NConv	NConv	67.3	67.3	103.7	Sensitivity only	
Donnells - Curtis 115KV (33912 SPRNG GJ 115 33914 MI-WUK 115 1 1)	P2-4:A11:3:_BELLOTA 230KV - SECTION 1E & 2E	P2	Bus-tie breaker	78.5	NConv	105.0	68.1	70.2	79.0	NConv	NConv	69.0	69.0	110.2	The issue is in the long term - continue to monitor the issue	

Study Area: **PG&E Central Valley**



High/Low Voltage

Substation	Contingency (All and Worst P6)	Category	Category Description	Post Cont. Voltage Deviation %										Project & Potential Mitigation Solutions
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP High CEC Forecast	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generation s	
AEC_300 115	Base Case	P0	N-0	1.04	1.03	1.03	1.06	1.04	1.04	1.03	1.03	1.02	1.03	Load power factor correction or voltage support if needed
ALLEGHNY 60	Base Case	P0	N-0	1.04	1.01	1.01	1.08	1.05	1.04	1.01	1.01	1.02	1.01	Load power factor correction or voltage support if needed
ALMENDRA 60	P1-1:A5:24:_GRNLEAF2 13.80KV GEN UNIT 1 P1-3:A5:31:_PEAS RG 60/60KV TB 1	P3	G-1/N-1	>0.9	>0.9	>0.9	>0.9	0.86	>0.9	>0.9	>0.9	>0.9	>0.9	Project: Pease Transformer
ALMENDRA 60	P1-3:A5:31:_PEAS RG 60/60KV TB 1 P1-2:A5:57:_MRYSVLLE-PEASE 60KV [0]	P6	N-1/N-1	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	0.29	Sensitivity only
ALMENDRA 60	P7-1:A5:20_Palermo-Pease 115 kV Line & Pease-Rio Oso 115 kV Line	P7	DCTL	1.04	1.01	1.01	1.01	1.01	1.04	1.01	1.01	0.78	0.00	Sensitivity only
ALTA-CGE 60	Base Case	P0	N-0	1.06	1.04	1.04	1.09	1.06	1.06	1.04	1.04	1.03	1.04	- Load power factor correction - Reactor projects
AMERIGAS 115	Base Case	P0	N-0	1.07	1.04	1.04	1.09	1.07	1.07	1.04	1.04	1.03	1.04	- Load power factor correction - Reactor projects
AMERIGAS 115	P1-3:A4:1:_VACA-DIX 500/230KV TB 11	P1	N-1	1.07	1.04	1.05	1.10	1.08	1.07	1.04	1.04	1.04	1.04	- Load power factor correction - Reactor projects
AMERIGAS 115	P1-4:A4:6:_VC DX11T SVD=V	P1	N-1	1.07	1.04	1.04	1.10	1.07	1.07	1.04	1.04	1.03	1.04	- Load power factor correction - Reactor projects
AMERIGAS 115	P2-2:A4:7:_VACA-DIX 230KV SECTION NA	P2	Bus	1.08	1.05	1.05	1.10	1.08	1.08	1.05	1.04	1.05	1.05	- Load power factor correction - Reactor projects
APPLE HL 115	Base Case	P0	N-0	1.06	1.02	1.02	1.10	1.06	1.06	1.02	1.02	1.01	1.02	- Load power factor correction - Reactor projects - Project: Rio Oso Area 230 kV Voltage Support
APPLE HL 115	P1-2:A5:36:_DRUM-HIGGINS 115KV [4393]	P1	N-1	1.06	1.02	1.02	1.11	1.07	1.06	1.01	1.01	1.01	1.01	- Load power factor correction - Reactor projects - Project: Rio Oso Area 230 kV Voltage Support
APPLE HL 115	P1-2:A5:37:_BELL-PLACER 115KV [4395]	P1	N-1	1.06	1.03	1.02	1.10	1.07	1.06	1.02	1.02	1.02	1.02	- Load power factor correction - Reactor projects - Project: Rio Oso Area 230 kV Voltage Support
APPLE HL 115	P2-2:A5:19:_PLACER 115KV SECTION 1D	P2	Bus	1.07	1.03	1.03	1.11	1.07	1.07	1.03	1.03	1.03	1.03	- Load power factor correction - Reactor projects - Project: Rio Oso Area 230 kV Voltage Support
APPLE HL 115	P2-2:A5:21:_ELDORAD 115KV SECTION 1D	P2	Bus	1.07	1.02	1.02	1.11	1.07	1.07	1.02	1.01	1.02	1.01	- Load power factor correction - Reactor projects - Project: Rio Oso Area 230 kV Voltage Support

Study Area: **PG&E Central Valley**



High/Low Voltage

Substation	Contingency (All and Worst P6)	Category	Category Description	Post Cont. Voltage Deviation %										Project & Potential Mitigation Solutions
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP High CEC Forecast	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generation s	
APPLE HL 115	P2-3:A5:22:_PLACER - 1D 115KV & PLACER-GOLD HILL #1 LINE	P2	Non-bus-tie breaker	1.07	1.03	1.03	1.11	1.07	1.07	1.03	1.02	1.02	1.02	- Load power factor correction - Reactor projects - Project: Rio Oso Area 230 kV Voltage Support
APPLE HL 115	P2-3:A5:23:_PLACER - 1D 115KV & PLACER-GOLD HILL #2 LINE	P2	Non-bus-tie breaker	1.07	1.03	1.03	1.11	1.07	1.07	1.03	1.03	1.03	1.03	- Load power factor correction - Reactor projects - Project: Rio Oso Area 230 kV Voltage Support
APPLE HL 115	P2-3:A5:24:_PLACER - 1D 115KV & BELL-PLACER LINE	P2	Non-bus-tie breaker	1.07	1.03	1.03	1.11	1.07	1.07	1.03	1.03	1.03	1.03	- Load power factor correction - Reactor projects - Project: Rio Oso Area 230 kV Voltage Support
APPLE HL 115	P2-3:A5:26:_ELDORAD - 1D 115KV & ELDORAD-MIZOU_T2 LINE	P2	Non-bus-tie breaker	1.08	1.02	1.02	1.11	1.07	1.08	1.02	1.02	1.03	1.02	- Load power factor correction - Reactor projects - Project: Rio Oso Area 230 kV Voltage Support
APPLE HL 115	P2-3:A5:27:_ELDORAD - 1D 115KV & ELDORAD-MIZOU_T1 LINE	P2	Non-bus-tie breaker	1.06	0.99	0.98	1.11	1.06	1.05	0.98	0.97	0.99	0.98	- Load power factor correction - Reactor projects - Project: Rio Oso Area 230 kV Voltage Support
APPLE HL 115	P2-3:A5:81:_DRUM 115KV - RING R2 & R3	P2	Non-bus-tie breaker	1.06	1.02	1.02	1.11	1.07	1.06	1.01	1.01	1.01	1.01	- Load power factor correction - Reactor projects - Project: Rio Oso Area 230 kV Voltage Support
APPLE HL 115	P2-3:A5:85:_BRNSWALT 115KV - RING R4 & R3	P2	Non-bus-tie breaker	1.06	1.02	1.02	1.10	1.07	1.06	1.01	1.01	1.01	1.01	- Load power factor correction - Reactor projects - Project: Rio Oso Area 230 kV Voltage Support
APPLE HL 115	P2-4:A11:3:_BELLOTA 230KV - SECTION 1E & 2E	P2	Bus-tie breaker	1.06	1.00	1.00	1.11	1.06	1.06	0.99	0.99	0.99	0.99	- Load power factor correction - Reactor projects - Project: Rio Oso Area 230 kV Voltage Support
APPLE HL 115	P2-4:A5:4:_GOLDHILL 115KV - SECTION 1F & 2F	P2	Bus-tie breaker	1.08	1.03	1.03	1.10	1.07	1.08	1.03	1.01	1.02	1.03	- Load power factor correction - Reactor projects - Project: Rio Oso Area 230 kV Voltage Support
APPLE HL 115	P2-1:A5:12:_MISSOURI FLAT-GOLD HILL #2 115KV [2670] (GOLDHILL-SHPRING2)	P2-1	Line Section w/o fault	1.03	0.92	0.93	1.09	1.05	1.03	0.91	0.88	0.94	0.92	- Load power factor correction - Reactor projects - Project: Rio Oso Area 230 kV Voltage Support
APPLE HL 115	P2-1:A5:30:_DRUM-HIGGINS 115KV [4393] (DTCH FL1-CHCGO PK)	P2-1	Line Section w/o fault	1.06	1.02	1.02	1.11	1.07	1.06	1.01	1.01	1.01	1.01	- Load power factor correction - Reactor projects - Project: Rio Oso Area 230 kV Voltage Support

Study Area: **PG&E Central Valley**



High/Low Voltage

Substation	Contingency (All and Worst P6)	Category	Category Description	Post Cont. Voltage Deviation %										Project & Potential Mitigation Solutions
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP High CEC Forecast	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations	
APPLE HL 115	P2-1:A5:31:_DRUM-HIGGINS 115KV [4393] (CHCGO PK-HIGGINS)	P2-1	Line Section w/o fault	1.06	1.02	1.02	1.10	1.07	1.06	1.01	1.01	1.01	1.01	- Load power factor correction - Reactor projects - Project: Rio Oso Area 230 kV Voltage Support
APPLE HL 115	P2-1:A5:34:_BELL-PLACER 115KV [4395] (PLACER-BELL PGE)	P2-1	Line Section w/o fault	1.07	1.03	1.03	1.10	1.07	1.07	1.02	1.02	1.02	1.02	- Load power factor correction - Reactor projects - Project: Rio Oso Area 230 kV Voltage Support
APPLE HL 115	P2-1:A5:37:_HIGGINS-BELL 115KV [1412] (HIGGINS-BELL PGE)	P2-1	Line Section w/o fault	1.06	1.02	1.02	1.10	1.07	1.06	1.02	1.01	1.01	1.02	- Load power factor correction - Reactor projects - Project: Rio Oso Area 230 kV Voltage Support
APPLE HL 115	P2-1:A5:39:_EL DORADO-MISSOURI FLAT #1 115KV [1530] (ELDORAD-APLHTAP1)	P2-1	Line Section w/o fault	1.07	1.02	1.02	1.11	1.07	1.07	1.02	1.02	1.02	1.02	- Load power factor correction - Reactor projects - Project: Rio Oso Area 230 kV Voltage Support
APPLE HL 115	P7-1:A5:19_Placer-Gold Hill No. 1 115 kV Line and Placer-Gold Hill No. 2 115 kV Line	P7	DCTL	1.07	1.03	1.03	1.11	1.07	1.07	1.03	1.03	1.03	1.03	- Load power factor correction - Reactor projects - Project: Rio Oso Area 230 kV Voltage Support
ATLANTC 230	Base Case	P0	N-0	1.01	0.97	0.97	1.05	1.02	1.01	0.97	0.97	0.97	0.97	- Load power factor correction - Reactor projects
ATLANTC 230	P5-5:A5:1:_Atlantic 230 kV BAAH Bus #1 (failure of non-redundent relay)	P55	Non-Redundant	1.00	0.90	0.91	1.08	1.00	1.00	0.91	0.89	0.96	0.88	- Load power factor correction for high voltage - Low voltage: Sensitivity only
ATLANTC 230	P1-2:A5:6:_RIO OSO-ATLANTIC 230KV [5590] P1-2:A5:10:_ATLANTIC-GOLD HILL 230KV [4330]	P6	N-1/N-1	>0.9	0.91	0.92	>0.9	>0.9	>0.9	0.91	0.90	>0.9	0.92	Sensitivity only
ATLANTI 60	Base Case	P0	N-0	1.08	0.99	0.99	>0.9	1.06	1.08	0.98	0.98	1.00	0.98	- Load power factor correction - Reactor projects - Project: Rio Oso Area 230 kV Voltage Support
ATLANTI 60	P2-4:A11:3:_BELLOTA 230KV - SECTION 1E & 2E	P2	Bus-tie breaker	1.08	0.96	0.95	>0.9	1.06	1.08	0.94	0.94	0.97	0.94	- Load power factor correction - Reactor projects - Project: Rio Oso Area 230 kV Voltage Support
ATLANTI 60	P5-5:A5:1:_Atlantic 230 kV BAAH Bus #1 (failure of non-redundent relay)	P55	Non-Redundant	1.08	0.91	0.92	>0.9	1.04	1.08	0.91	0.90	0.99	0.88	- Load power factor correction for high voltage - Low voltage: Sensitivity only
ATLANTI 60	P7-1:A5:7_Atlantic-Gold Hill 230 kV Line & Rio Oso-Gold Hill 230 kV Line	P7	DCTL	1.08	0.97	0.96	>0.9	1.06	1.08	0.96	0.96	0.99	0.95	- Load power factor correction - Reactor projects - Project: Rio Oso Area 230 kV Voltage Support
ATLANTIC 115	Base Case	P0	N-0	1.03	1.00	1.00	>0.9	1.04	1.03	0.99	0.99	1.00	0.99	Load power factor correction or voltage support if needed
ATLANTIC 115	P5-5:A5:1:_Atlantic 230 kV BAAH Bus #1 (failure of non-redundent relay)	P55	Non-Redundant	1.02	0.93	0.94	>0.9	1.02	1.02	0.94	0.92	0.99	0.91	Load power factor correction or voltage support if needed

Study Area: **PG&E Central Valley**



High/Low Voltage

Substation	Contingency (All and Worst P6)	Category	Category Description	Post Cont. Voltage Deviation %										Project & Potential Mitigation Solutions
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP High CEC Forecast	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generation s	
AUBURN 60	P2-4:A5:4:_GOLDHILL 115KV - SECTION 1F & 2F	P2	Bus-tie breaker	1.00	0.87	0.87	>0.9	1.02	0.98	0.83	0.27	0.94	0.88	Project: Atlantic-Placer 115 kV line Project ISD: on-hold Review project scope
AVENA 115	P2-4:A11:3:_BELLOTA 230KV - SECTION 1E & 2E	P2	Bus-tie breaker	0.99	0.85	0.85	>0.9	1.03	0.98	0.83	0.84	0.98	0.83	Project: Vierra looping project
B.BTHNY- 60	Base Case	P0	N-0	1.06	1.04	1.04	>0.9	1.06	1.06	1.04	1.04	1.03	1.04	- Load power factor correction - Reactor projects
BANGOR 60	Base Case	P0	N-0	1.04	1.01	1.01	>0.9	1.05	1.04	1.01	1.01	1.02	1.01	- Load power factor correction - Reactor projects
BANTA 60	Base Case	P0	N-0	1.04	1.04	1.03	>0.9	1.05	1.04	1.03	1.03	1.03	1.03	- Reactor projects
BEALE2J2 60	Base Case	P0	N-0	1.03	1.03	1.03	>0.9	1.04	1.03	1.03	1.03	1.03	1.03	Load power factor correction or voltage support if needed
BEARDSLY 115	P2-4:A11:3:_BELLOTA 230KV - SECTION 1E & 2E	P2	Bus-tie breaker	1.00	0.78	0.78	>0.9	1.04	1.00	0.75	0.76	1.01	0.74	Bellota 230 kV bus upgrade
BELL PGE 115	Base Case	P0	N-0	1.04	1.01	1.01	>0.9	1.06	1.04	1.01	1.00	1.01	1.01	- Load power factor correction - Reactor projects - Project: Rio Oso Area 230 kV Voltage Support
BELL PGE 115	P1-2:A5:36:_DRUM-HIGGINS 115KV [4393]	P1	N-1	1.04	0.99	0.99	>0.9	1.07	1.04	0.98	0.98	0.99	0.98	- Load power factor correction - Reactor projects - Project: Rio Oso Area 230 kV Voltage Support
BELL PGE 115	P2-3:A5:81:_DRUM 115KV - RING R2 & R3	P2	Non-bus-tie breaker	1.04	0.99	0.99	>0.9	1.07	1.04	0.98	0.98	0.99	0.98	- Load power factor correction - Reactor projects - Project: Rio Oso Area 230 kV Voltage Support
BELL PGE 115	P2-3:A5:85:_BRNSWALT 115KV - RING R4 & R3	P2	Non-bus-tie breaker	1.04	0.99	0.99	>0.9	1.07	1.04	0.98	0.98	0.99	0.98	- Load power factor correction - Reactor projects - Project: Rio Oso Area 230 kV Voltage Support
BELL PGE 115	P2-4:A11:3:_BELLOTA 230KV - SECTION 1E & 2E	P2	Bus-tie breaker	1.04	0.99	0.99	>0.9	1.06	1.04	0.98	0.98	0.99	0.98	- Load power factor correction - Reactor projects - Project: Rio Oso Area 230 kV Voltage Support
BELL PGE 115	P2-4:A5:4:_GOLDHILL 115KV - SECTION 1F & 2F	P2	Bus-tie breaker	0.92	0.83	0.83	>0.9	1.05	0.91	0.80	0.32	0.90	0.84	Project: Atlantic-Placer 115 kV line Project ISD: on-hold Review project scope
BELL PGE 115	P2-1:A5:30:_DRUM-HIGGINS 115KV [4393] (DTCH FL1-CHCGO PK)	P2-1	Line Section w/o fault	1.04	0.99	0.99	>0.9	1.07	1.04	0.98	0.98	0.99	0.98	- Load power factor correction - Reactor projects - Project: Rio Oso Area 230 kV Voltage Support

Study Area: **PG&E Central Valley**



High/Low Voltage

Substation	Contingency (All and Worst P6)	Category	Category Description	Post Cont. Voltage Deviation %										Project & Potential Mitigation Solutions
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP High CEC Forecast	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generation s	
BELL PGE 115	P2-1:A5:31:_DRUM-HIGGINS 115KV [4393] (CHCGO PK-HIGGINS)	P2-1	Line Section w/o fault	1.04	0.99	0.99	>0.9	1.07	1.04	0.98	0.98	0.99	0.98	- Load power factor correction - Reactor projects - Project: Rio Oso Area 230 kV Voltage Support
BELL PGE 115	P2-1:A5:37:_HIGGINS-BELL 115KV [1412] (HIGGINS-BELL PGE)	P2-1	Line Section w/o fault	1.04	1.01	1.01	>0.9	1.07	1.04	1.00	1.00	1.00	1.00	- Load power factor correction - Reactor projects - Project: Rio Oso Area 230 kV Voltage Support
BELL PGE 115	P1-2:A5:36:_DRUM-HIGGINS 115KV [4393] P1-2:A5:20:_PLACER-GOLD HILL #1 115KV [3340]	P6	N-1/N-1	>0.9	0.93	0.93	>0.9	>0.9	>0.9	0.91	0.90	>0.9	0.92	Project: Atlantic-Placer 115 kV line Project ISD: on-hold Review project scope
BELLOTA 115	P2-4:A11:3:_BELLOTA 230KV - SECTION 1E & 2E	P2	Bus-tie breaker	0.83	0.32	0.33	>0.9	1.02	0.82	0.30	0.30	0.87	0.31	Bellota 230 kV bus upgrade
BELLOTA 115	P1-3:A11:10:_BELLOTA 230/115KV TB 1 P1-3:A11:11:_BELLOTA 230/115KV TB 2	P6	N-1/N-1	0.92	0.73	0.75	>0.9	>0.9	0.92	>0.9	>0.9	0.90	0.75	Action plan or SPS
BELLOTA 230	Base Case	P0	N-0	1.03	1.00	1.00	>0.9	1.03	1.03	0.99	1.00	0.99	0.99	- Load power factor correction - Reactor projects
BOGUE 115	Base Case	P0	N-0	1.05	1.03	1.03	>0.9	1.04	1.05	1.03	1.04	1.03	1.03	- Load power factor correction - Reactor projects
BOGUE 115	P1-2:A4:25:_WOODLAND-DAVIS 115KV [4210]	P1	N-1	1.05	1.03	1.03	>0.9	1.04	1.05	1.03	1.03	1.03	1.03	- Load power factor correction - Reactor projects
BOGUE 115	P2-2:A4:20:_BRIGHTN 115KV SECTION ME	P2	Bus	1.05	1.04	1.04	>0.9	1.04	1.05	1.04	1.04	1.03	1.03	- Load power factor correction - Reactor projects
BOGUE 115	P2-3:A4:19:_BRIGHTN - ME 115KV & WEST SACRAMENTO-BRIGHTON LINE	P2	Non-bus-tie breaker	1.05	1.03	1.04	>0.9	1.04	1.05	1.04	1.04	1.03	1.03	- Load power factor correction - Reactor projects
BOGUE 115	P2-3:A4:20:_BRIGHTN - ME 115KV & BRIGHTN-DAVIS-BRKR SLG LINE	P2	Non-bus-tie breaker	1.05	1.03	1.04	>0.9	1.04	1.05	1.04	1.04	1.03	1.03	- Load power factor correction - Reactor projects
BOGUE 115	P2-3:A4:24:_DAVIS - 1D 115KV & WOODLAND-DAVIS LINE	P2	Non-bus-tie breaker	1.05	1.03	1.03	>0.9	1.04	1.05	1.03	1.04	1.03	1.03	- Load power factor correction - Reactor projects
BOGUE 115	P2-3:A5:83:_DRUM 115KV - RING R5 & R4	P2	Non-bus-tie breaker	1.05	1.03	1.03	>0.9	1.04	1.05	1.03	1.04	1.03	1.03	- Load power factor correction - Reactor projects
BOGUE 115	P2-4:A11:3:_BELLOTA 230KV - SECTION 1E & 2E	P2	Bus-tie breaker	1.05	1.03	1.03	>0.9	1.04	1.05	1.03	1.03	1.02	1.02	- Load power factor correction - Reactor projects
BOGUE 115	P2-4:A4:10:_BRIGHTN 115KV - SECTION ME & MD	P2	Bus-tie breaker	1.05	1.04	1.04	>0.9	1.04	1.05	1.04	1.04	1.03	1.03	- Load power factor correction - Reactor projects
BOGUE 115	P2-4:A4:12:_DAVIS 115KV - SECTION 1E & 1F	P2	Bus-tie breaker	1.05	1.03	1.03	>0.9	1.04	1.05	1.03	1.04	1.03	1.03	- Load power factor correction - Reactor projects
BOGUE 115	P2-4:A5:6:_RIO OSO 115KV - SECTION 1D & 2D	P2	Bus-tie breaker	1.05	1.03	1.03	>0.9	1.04	1.05	1.03	1.03	1.00	1.02	- Load power factor correction - Reactor projects

Study Area: **PG&E Central Valley**



High/Low Voltage

Substation	Contingency (All and Worst P6)	Category	Category Description	Post Cont. Voltage Deviation %										Project & Potential Mitigation Solutions
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP High CEC Forecast	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations	
BOGUE 115	P2-1:A4:14:_WOODLAND-DAVIS 115KV [4210] (WOODLANDTP-WOODLD)	P2-1	Line Section w/o fault	1.05	1.03	1.03	>0.9	1.04	1.05	1.03	1.04	1.03	1.03	- Load power factor correction - Reactor projects
BOGUE 115	P1-1:A5:4:_DRUM 5 13.80KV GEN UNIT 1 P1-2:A4:25:_WOODLAND-DAVIS 115KV [4210]	P3	G-1/N-1	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	- Load power factor correction - Reactor projects
BOGUE 115	P1-2:A5:17:_RIO OSO-LINCOLN 115KV [1320] P1-2:A4:25:_WOODLAND-DAVIS 115KV [4210]	P6	N-1/N-1	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	- Load power factor correction - Reactor projects
BOGUE 115	P7-1:A5:11_Drum-Rio Oso No. 1 115 kV Line & Drum-Rio Oso No. 2 115 kV Line	P7	DCTL	1.05	1.03	1.03	>0.9	1.04	1.05	1.03	1.04	1.03	1.03	- Load power factor correction - Reactor projects
BOWMN TP 60	Base Case	P0	N-0	1.03	1.04	1.03	>0.9	1.04	1.03	1.04	1.04	1.04	1.03	- Load power factor correction - Reactor projects
BRIGHTN 115	P1-2:A4:9:_RIO OSO-BRIGHTON 230KV [5600] P1-2:A11:6:_BRIGHTON-BELLOTA 230KV [4420]	P6	N-1/N-1	>0.9	0.99	0.99	>0.9	>0.9	>0.9	0.98	0.98	>0.9	0.98	Load power factor correction or voltage support if needed
BRIGHTON 230	Base Case	P0	N-0	1.01	0.97	0.97	>0.9	1.02	1.01	0.96	0.96	0.97	0.96	Load power factor correction
BRIGHTON 230	P2-4:A11:3:_BELLOTA 230KV - SECTION 1E & 2E	P2	Bus-tie breaker	0.99	0.91	0.90	>0.9	1.01	0.99	0.89	0.89	0.93	0.89	- Load power factor correction for high voltage - Low voltage: Sensitivity only
BRIGHTON 230	P1-2:A4:9:_RIO OSO-BRIGHTON 230KV [5600] P1-2:A11:6:_BRIGHTON-BELLOTA 230KV [4420]	P6	N-1/N-1	0.89	0.86	0.86	>0.9	0.89	0.89	0.85	0.85	0.87	0.85	- Load power factor correction for high voltage - Action Plan or SPS for how voltage
BRIGHTON 230	P7-1:A11:12:_BRIGHTON-BELLOTA 230KV [4420] & LOCKEFORD-BELLOTA 230KV [4990]	P7	DCTL	0.99	0.91	0.90	>0.9	1.01	0.99	0.89	0.89	0.93	0.89	- Load power factor correction for high voltage - Low voltage: Sensitivity only
BRKR SLG 115	Base Case	P0	N-0	1.02	1.02	1.02	>0.9	1.04	1.02	1.02	1.03	1.04	1.02	Load power factor correction
BRKR SLG 115	P1-3:A4:3:_BRIGHTON 230/115KV TB 10 P1-3:A4:4:_BRIGHTON 230/115KV TB 9	P6	N-1/N-1	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	Load power factor correction
BRNSWALT 115	Base Case	P0	N-0	1.02	1.04	1.03	>0.9	1.05	1.02	1.03	1.04	1.04	1.03	Load power factor correction
BRNSWALT 115	P1-2:A5:36:_DRUM-HIGGINS 115KV [4393] P1-3:A5:14:_DRUM 5 13.8/115KV TB 1	P6	N-1/N-1	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	Load power factor correction
BRUNSWCK 115	Base Case	P0	N-0	1.03	1.03	1.02	>0.9	1.05	1.03	1.02	1.03	1.04	1.02	Load power factor correction
BRUNSWCK 115	P1-2:A5:36:_DRUM-HIGGINS 115KV [4393] P1-3:A5:14:_DRUM 5 13.8/115KV TB 1	P6	N-1/N-1	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	Load power factor correction
CALVO 60	Base Case	P0	N-0	1.04	1.03	1.03	>0.9	1.05	1.04	1.03	1.03	1.03	1.03	- Load power factor correction - Reactor projects
CAMANACH 230	Base Case	P0	N-0	1.03	1.00	1.00	>0.9	1.03	1.03	1.00	1.00	0.99	1.00	Load power factor correction
CAMANACHE 115	P2-4:A11:3:_BELLOTA 230KV - SECTION 1E & 2E	P2	Bus-tie breaker	0.83	0.32	0.33	>0.9	1.03	0.82	0.30	0.30	0.87	0.31	Bellota 230 kV bus upgrade
CAMANACHE 115	P1-3:A11:10:_BELLOTA 230/115KV TB 1 P1-3:A11:11:_BELLOTA 230/115KV TB 2	P6	N-1/N-1	0.93	0.73	0.75	>0.9	>0.9	0.92	>0.9	>0.9	0.91	0.76	Action plan or SPS
CAMANCPP 230	Base Case	P0	N-0	1.03	1.00	1.00	>0.9	1.03	1.03	1.00	1.00	0.99	1.00	Load power factor correction
CAMPUS 115	Base Case	P0	N-0	1.02	1.02	1.01	>0.9	1.03	1.02	1.01	1.02	1.03	1.01	Load power factor correction

Study Area: **PG&E Central Valley**



High/Low Voltage

Substation	Contingency (All and Worst P6)	Category	Category Description	Post Cont. Voltage Deviation %										Project & Potential Mitigation Solutions
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP High CEC Forecast	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generation s	
CARBONA 60	P2-3:A11:15:_KASSON - 1D 115KV & SCHULTE SW STA-KASSON-MANTECA LINE	P2	Non-bus-tie breaker	0.92	0.91	0.89	>0.9	1.00	0.92	0.88	0.89	0.95	0.88	Project: Vierra looping project
CARBONA 60	P1-2:A11:36:_SCHULTE SW STA-KASSON-MANTECA 115KV [7472] P1-3:A11:32:_KASSON 115/60KV TB 1	P6	N-1/N-1	0.93	0.92	0.91	>0.9	>0.9	0.93	0.89	0.91	>0.9	0.90	Sensitivity only
CATARACT 115	Base Case	P0	N-0	1.04	1.03	1.03	>0.9	1.04	1.04	1.03	1.03	1.03	1.02	Load power factor correction
CATARACT 115	P2-4:A11:3:_BELLOTA 230KV - SECTION 1E & 2E	P2	Bus-tie breaker	0.97	0.75	0.75	>0.9	1.04	0.97	0.73	0.74	0.99	0.73	Bellota 230 kV bus upgrade
CDCRSTN 115	P2-4:A11:3:_BELLOTA 230KV - SECTION 1E & 2E	P2	Bus-tie breaker	0.82	0.27	0.28	>0.9	1.01	0.81	0.25	0.25	0.85	0.26	Bellota 230 kV bus upgrade
CDCRSTN 115	P1-3:A11:10:_BELLOTA 230/115KV TB 1 P1-3:A11:11:_BELLOTA 230/115KV TB 2	P6	N-1/N-1	0.91	0.69	0.72	>0.9	>0.9	0.91	>0.9	>0.9	0.88	0.72	Action plan or SPS
CDCRSTNJT 115	P2-4:A11:3:_BELLOTA 230KV - SECTION 1E & 2E	P2	Bus-tie breaker	0.82	0.27	0.28	>0.9	1.01	0.81	0.25	0.26	0.85	0.27	Bellota 230 kV bus upgrade
CDCRSTNJT 115	P1-3:A11:10:_BELLOTA 230/115KV TB 1 P1-3:A11:11:_BELLOTA 230/115KV TB 2	P6	N-1/N-1	0.91	0.70	0.72	>0.9	>0.9	0.91	>0.9	>0.9	0.88	0.72	Action plan or SPS
CH.STN 115	Base Case	P0	N-0	1.04	1.02	1.02	>0.9	1.04	1.04	1.02	1.02	1.03	1.01	Load power factor correction
CH.STN 115	P2-4:A11:3:_BELLOTA 230KV - SECTION 1E & 2E	P2	Bus-tie breaker	0.94	0.67	0.67	>0.9	1.04	0.94	0.65	0.66	0.96	0.63	Bellota 230 kV bus upgrade
CH.STN 115	P1-3:A11:10:_BELLOTA 230/115KV TB 1 P1-3:A11:11:_BELLOTA 230/115KV TB 2	P6	N-1/N-1	>0.9	0.89	0.90	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	0.90	Action plan or SPS
CH.STNJT 115	P2-4:A11:3:_BELLOTA 230KV - SECTION 1E & 2E	P2	Bus-tie breaker	0.94	0.67	0.67	>0.9	1.04	0.94	0.64	0.65	0.96	0.63	Bellota 230 kV bus upgrade
CH.STNJT 115	P1-3:A11:10:_BELLOTA 230/115KV TB 1 P1-3:A11:11:_BELLOTA 230/115KV TB 2	P6	N-1/N-1	>0.9	0.89	0.90	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	0.90	Action plan or SPS
CHCGO PK 115	Base Case	P0	N-0	1.04	1.03	1.03	>0.9	1.06	1.04	1.03	1.03	1.04	1.03	- Load power factor correction - Reactor projects
CHCGO PK 115	P1-3:A5:23:_DTCH FL1 115/11KV TB 1	P1	N-1	1.05	1.04	1.04	>0.9	1.06	1.05	1.03	1.04	1.04	1.03	- Load power factor correction - Reactor projects
CHCGO PK 115	P2-4:A11:3:_BELLOTA 230KV - SECTION 1E & 2E	P2	Bus-tie breaker	1.04	1.03	1.02	>0.9	1.06	1.04	1.02	1.02	1.03	1.02	- Load power factor correction - Reactor projects
CHCGO PK 115	P2-4:A5:4:_GOLDHILL 115KV - SECTION 1F & 2F	P2	Bus-tie breaker	0.99	0.95	0.95	>0.9	1.05	0.98	0.93	0.62	0.99	0.95	- Load power factor correction for high voltage - Low voltage: Sensitivity only
CHCGO PK 115	P2-1:A5:30:_DRUM-HIGGINS 115KV [4393] (DTCH FL1-CHCGO PK)	P2-1	Line Section w/o fault	1.04	0.99	0.99	>0.9	1.07	1.04	0.98	0.97	0.99	0.98	- Load power factor correction - Reactor projects
CHCGO PK 115	P1-1:A5:18:_HALSEY F 6.60KV GEN UNIT 1 P1-1:A5:10:_DTCHFLT1 11.00KV GEN UNIT 1	P3	G-1/N-1	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	Load power factor correction
CHCGO PK 115	P1-2:A5:37:_BELL-PLACER 115KV [4395] P1-3:A5:23:_DTCH FL1 115/11KV TB 1	P6	N-1/N-1	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	Load power factor correction
CHLLNGEA 60	Base Case	P0	N-0	1.05	1.02	1.02	>0.9	1.06	1.05	1.02	1.02	1.02	1.02	- Load power factor correction - Reactor projects
CISCO GR 60	Base Case	P0	N-0	1.03	1.04	1.04	>0.9	1.05	1.03	1.04	1.04	1.04	1.04	Load power factor correction

Study Area: **PG&E Central Valley**



High/Low Voltage

Substation	Contingency (All and Worst P6)	Category	Category Description	Post Cont. Voltage Deviation %										Project & Potential Mitigation Solutions
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP High CEC Forecast	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations	
CISCO GR 60	P2-2:A5:39:_SPAULDNG 60KV SECTION MA	P2	Bus	1.02	1.05	1.05	>0.9	1.07	1.02	1.05	1.05	1.06	1.05	- Load power factor correction - Reactor projects
CISCO GR 60	P2-3:A5:63:_DRUM - MA 60KV & DRUM-SPAULDING LINE	P2	Non-bus-tie breaker	1.03	1.05	1.05	>0.9	1.06	1.03	1.05	1.05	1.05	1.05	- Load power factor correction - Reactor projects
CISCO GR 60	P2-3:A5:85:_BRNSWALT 115KV - RING R4 & R3	P2	Non-bus-tie breaker	1.03	1.05	1.05	>0.9	1.05	1.03	1.05	1.06	1.06	1.04	- Load power factor correction - Reactor projects
CISCO GR 60	P2-1:A5:95:_SPAULDING-SUMMIT 60KV [8060] (CISCO GR-SPAULDNG)	P2-1	Line Section w/o fault	1.02	1.05	1.05	>0.9	1.07	1.02	1.05	1.06	1.06	1.05	- Load power factor correction - Reactor projects
CISCO GR 60	P1-1:A5:13:_SPAULDG 9.11KV GEN UNIT 1 P1-2:A5:67:_DRUM-SPAULDING 60KV [6770]	P3	G-1/N-1	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	Load power factor correction
CISCO GR 60	P1-1:A5:13:_SPAULDG 9.11KV GEN UNIT 1 P1-2:A5:67:_DRUM-SPAULDING 60KV [6770]	P6	N-1/N-1	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	Load power factor correction
CL AMMNA 115	P1-2:A11:54:_SCHULTE SW STA-LAMMERS 115KV [3993] P1-2:A11:48:_TESLA-TRACY 115KV [4020] MOAS OPENED ON LEPRINO TRACY JC	P6	N-1/N-1	>0.9	>0.9	0.92	>0.9	>0.9	>0.9	0.90	0.91	>0.9	0.92	Sensitivity only
CLAY 60	P1-2:A11:74:_VALLEY SPRINGS-CLAY 60KV [8252] P1-2:A11:73:_VALLEY SPRINGS-MARTELL #1 60KV [8241]	P6	N-1/N-1	>0.9	>0.9	>0.9	>0.9	0.84	>0.9	>0.9	>0.9	>0.9	>0.9	Action plan or SPS
CLMBA HL 60	Base Case	P0	N-0	1.05	1.02	1.02	>0.9	1.05	1.05	1.02	1.02	1.03	1.02	- Load power factor correction - Reactor projects
CLMBA HL 60	P1-2:A5:47:_COLGATE-SMARTVILLE #1 60KV [6510] P1-2:A5:48:_COLGATE-SMARTVILLE #2 60KV [6520]	P6	N-1/N-1	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	Load power factor correction
CLRKSVLE 115	Base Case	P0	N-0	1.05	1.02	1.02	>0.9	1.07	1.05	1.02	1.02	1.02	1.02	- Load power factor correction - Reactor projects
CLRKSVLE 115	P1-2:A5:36:_DRUM-HIGGINS 115KV [4393]	P1	N-1	1.05	1.02	1.02	>0.9	1.07	1.05	1.01	1.01	1.02	1.01	- Load power factor correction - Reactor projects
CLRKSVLE 115	P1-2:A5:37:_BELL-PLACER 115KV [4395]	P1	N-1	1.05	1.03	1.02	>0.9	1.07	1.05	1.02	1.02	1.02	1.02	- Load power factor correction - Reactor projects
CLRKSVLE 115	P2-2:A5:19:_PLACER 115KV SECTION 1D	P2	Bus	1.05	1.03	1.03	>0.9	1.08	1.05	1.03	1.03	1.03	1.03	- Load power factor correction - Reactor projects
CLRKSVLE 115	P2-3:A5:22:_PLACER - 1D 115KV & PLACER-GOLD HILL #1 LINE	P2	Non-bus-tie breaker	1.05	1.03	1.03	>0.9	1.08	1.05	1.03	1.02	1.03	1.02	- Load power factor correction - Reactor projects
CLRKSVLE 115	P2-3:A5:23:_PLACER - 1D 115KV & PLACER-GOLD HILL #2 LINE	P2	Non-bus-tie breaker	1.06	1.03	1.03	>0.9	1.08	1.06	1.03	1.03	1.03	1.03	- Load power factor correction - Reactor projects
CLRKSVLE 115	P2-3:A5:24:_PLACER - 1D 115KV & BELL-PLACER LINE	P2	Non-bus-tie breaker	1.05	1.03	1.03	>0.9	1.08	1.05	1.03	1.03	1.03	1.03	- Load power factor correction - Reactor projects

Study Area: **PG&E Central Valley**



High/Low Voltage

Substation	Contingency (All and Worst P6)	Category	Category Description	Post Cont. Voltage Deviation %										Project & Potential Mitigation Solutions
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP High CEC Forecast	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generation s	
CLRKSVLE 115	P2-3:A5:81:_DRUM 115KV - RING R2 & R3	P2	Non-bus-tie breaker	1.05	1.02	1.02	>0.9	1.07	1.05	1.01	1.01	1.02	1.01	- Load power factor correction - Reactor projects
CLRKSVLE 115	P2-3:A5:85:_BRNSWALT 115KV - RING R4 & R3	P2	Non-bus-tie breaker	1.05	1.02	1.01	>0.9	1.07	1.05	1.01	1.01	1.02	1.01	- Load power factor correction - Reactor projects
CLRKSVLE 115	P2-4:A11:3:_BELLOTA 230KV - SECTION 1E & 2E	P2	Bus-tie breaker	1.05	1.00	0.99	>0.9	1.07	1.05	0.99	0.99	1.00	0.98	- Load power factor correction - Reactor projects
CLRKSVLE 115	P2-1:A5:30:_DRUM-HIGGINS 115KV [4393] (DTCH FL1-CHCGO PK)	P2-1	Line Section w/o fault	1.05	1.02	1.02	>0.9	1.08	1.05	1.01	1.01	1.02	1.01	- Load power factor correction - Reactor projects
CLRKSVLE 115	P2-1:A5:31:_DRUM-HIGGINS 115KV [4393] (CHCGO PK-HIGGINS)	P2-1	Line Section w/o fault	1.05	1.02	1.01	>0.9	1.07	1.05	1.01	1.01	1.02	1.01	- Load power factor correction - Reactor projects
CLRKSVLE 115	P2-1:A5:34:_BELL-PLACER 115KV [4395] (PLACER-BELL PGE)	P2-1	Line Section w/o fault	1.05	1.03	1.03	>0.9	1.07	1.05	1.02	1.02	1.02	1.02	- Load power factor correction - Reactor projects
CLRKSVLE 115	P2-1:A5:37:_HIGGINS-BELL 115KV [1412] (HIGGINS-BELL PGE)	P2-1	Line Section w/o fault	1.05	1.02	1.02	>0.9	1.07	1.05	1.02	1.01	1.02	1.01	- Load power factor correction - Reactor projects
CLRKSVLE 115	P7-1:A5:19_Placer-Gold Hill No. 1 115 kV Line and Placer-Gold Hill No. 2 115 kV Line	P7	DCTL	1.06	1.04	1.03	>0.9	1.08	1.06	1.03	1.03	1.04	1.03	- Load power factor correction - Reactor projects
CLSA CRS 60	Base Case	P0	N-0	0.99	0.96	0.96	>0.9	1.02	0.99	0.95	0.93	0.96	0.96	Sensitivity only
COLGATE 60	Base Case	P0	N-0	1.05	1.03	1.03	>0.9	1.06	1.05	1.03	1.03	1.03	1.03	- Load power factor correction - Reactor projects
COLGATE 60	P1-2:A5:47:_COLGATE-SMARTVILLE #1 60KV [6510] P1-2:A5:48:_COLGATE-SMARTVILLE #2 60KV [6520]	P6	N-1/N-1	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	Load power factor correction
COLONY 60	P2-3:A11:81:_LOCKFORD 230KV - RING R3 & R4	P2	Non-bus-tie breaker	1.05	0.86	0.83	>0.9	1.02	1.05	0.81	0.82	0.89	0.80	Significant leading power factor in 2019 (0.7) Project: Lockeford-Lodi area 230 kV development Scope is under review
COLONY 60	P2-3:A11:82:_LOCKFORD 230KV - RING R3 & R2	P2	Non-bus-tie breaker	1.05	0.86	0.83	>0.9	1.02	1.05	0.79	0.82	0.89	0.79	Significant leading power factor in 2019 (0.7) Project: Lockeford-Lodi area 230 kV development Scope is under review
COLONY 60	P2-4:A11:1:_BELLOTA 230KV - SECTION 2D & 2E	P2	Bus-tie breaker	1.05	0.93	0.91	>0.9	1.02	1.05	0.90	0.91	0.94	0.90	- Load power factor correction for high voltage - Low voltage: Sensitivity only
COLONY 60	P2-4:A11:3:_BELLOTA 230KV - SECTION 1E & 2E	P2	Bus-tie breaker	1.05	0.90	0.88	>0.9	1.02	1.05	0.86	0.87	0.93	0.86	Bellota 230 kV bus upgrade
COLONY 60	P1-3:A11:5:_LOCKFORD 230/60KV TB 3 P1-2:A11:7:_LOCKFORD-BELLOTA 230KV [4990]	P6	N-1/N-1	>0.9	0.86	0.88	>0.9	>0.9	>0.9	0.87	0.88	0.89	0.82	Significant leading power factor in 2019 (0.7) Project: Lockeford-Lodi area 230 kV development Scope is under review

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High/Low Voltage

Substation	Contingency (All and Worst P6)	Category	Category Description	Post Cont. Voltage Deviation %										Project & Potential Mitigation Solutions
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP High CEC Forecast	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations	
COLONY 60	P7-1:A11:12:_BRIGHTON-BELLOTA 230KV [4420] & LOCKEFORD-BELLOTA 230KV [4990]	P7	DCTL	1.05	0.90	0.88	>0.9	1.02	1.06	0.86	0.87	0.93	0.86	Significant leading power factor in 2019 (0.7) Project: Lockeford-Lodi area 230 kV development Scope is under review
COLUSA 60	Base Case	P0	N-0	0.99	0.96	0.96	>0.9	1.02	0.99	0.94	0.93	0.96	0.95	Sensitivity only
CORDELIA 115	Base Case	P0	N-0	1.05	1.02	1.02	>0.9	1.07	1.05	1.02	1.02	1.02	1.02	- Load power factor correction - Reactor projects
CORDELLT 115	Base Case	P0	N-0	1.02	0.99	0.99	>0.9	1.03	1.02	0.99	0.99	0.99	0.99	Load power factor correction
CORRAL 60	Base Case	P0	N-0	1.04	1.01	1.01	>0.9	1.04	1.04	1.00	1.01	1.02	1.01	Load power factor correction
CORTINA 115	Base Case	P0	N-0	1.08	1.07	1.07	>0.9	1.08	1.08	1.07	1.05	1.05	1.07	- Load power factor correction - Reactor projects
CORTINA 115	P2-3:A4:10:_CORTINA 115KV - MIDDLE BREAKER BAY 3	P2	Non-bus-tie breaker	1.09	1.08	1.08	>0.9	1.10	1.09	1.07	1.05	1.05	1.07	- Load power factor correction - Reactor projects
CORTINA 115	P5-5:A4:5:_Cortina 115kv BAAH Bus #2 (failure of non-redundent relay)	P55	Non-Redundant	1.08	1.07	1.07	>0.9	1.09	1.08	1.06	1.05	1.05	1.07	- Load power factor correction - Reactor projects
CORTINA 115	P1-2:A4:28:_EAGLE ROCK-CORTINA 115KV [1470] P1-3:A4:5:_CORTINA 230/115KV TB 4	P6	N-1/N-1	1.11	1.10	1.10	>0.9	>0.9	1.11	>0.9	>0.9	>0.9	1.10	- Load power factor correction - Reactor projects
CORTINA 115	P7-1:A4:25:_EAGLE ROCK-CORTINA & CORTINA-MENDOCINO #1 Lines	P7	DCTL	1.09	1.08	1.08	>0.9	1.10	1.09	1.07	1.05	1.05	1.07	- Load power factor correction - Reactor projects
CPM 115	Base Case	P0	N-0	1.06	1.04	1.03	>0.9	1.07	1.06	1.03	1.03	1.03	1.03	- Load power factor correction - Reactor projects
CPM 115	P1-2:A5:36:_DRUM-HIGGINS 115KV [4393]	P1	N-1	1.06	1.03	1.03	>0.9	1.08	1.06	1.02	1.02	1.02	1.02	- Load power factor correction - Reactor projects
CPM 115	P1-2:A5:37:_BELL-PLACER 115KV [4395]	P1	N-1	1.07	1.04	1.04	>0.9	1.07	1.07	1.03	1.03	1.03	1.03	- Load power factor correction - Reactor projects
CPM 115	P2-2:A5:19:_PLACER 115KV SECTION 1D	P2	Bus	1.07	1.04	1.04	>0.9	1.08	1.07	1.04	1.04	1.04	1.04	- Load power factor correction - Reactor projects
CPM 115	P2-3:A5:22:_PLACER - 1D 115KV & PLACER-GOLD HILL #1 LINE	P2	Non-bus-tie breaker	1.07	1.04	1.04	>0.9	1.08	1.07	1.04	1.04	1.04	1.04	- Load power factor correction - Reactor projects
CPM 115	P2-3:A5:23:_PLACER - 1D 115KV & PLACER-GOLD HILL #2 LINE	P2	Non-bus-tie breaker	1.07	1.04	1.04	>0.9	1.08	1.07	1.04	1.04	1.04	1.04	- Load power factor correction - Reactor projects
CPM 115	P2-3:A5:24:_PLACER - 1D 115KV & BELL-PLACER LINE	P2	Non-bus-tie breaker	1.07	1.04	1.04	>0.9	1.08	1.07	1.04	1.04	1.04	1.04	- Load power factor correction - Reactor projects
CPM 115	P2-3:A5:26:_ELDORAD - 1D 115KV & ELDORAD-MIZOU_T2 LINE	P2	Non-bus-tie breaker	1.07	1.03	1.03	>0.9	1.07	1.07	1.03	1.03	1.03	1.03	- Load power factor correction - Reactor projects

Study Area: **PG&E Central Valley**



High/Low Voltage

Substation	Contingency (All and Worst P6)	Category	Category Description	Post Cont. Voltage Deviation %										Project & Potential Mitigation Solutions
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP High CEC Forecast	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations	
CPM 115	P2-3:A5:81:_DRUM 115KV - RING R2 & R3	P2	Non-bus-tie breaker	1.06	1.03	1.03	>0.9	1.07	1.06	1.02	1.02	1.02	1.02	- Load power factor correction - Reactor projects
CPM 115	P2-3:A5:85:_BRNSWALT 115KV - RING R4 & R3	P2	Non-bus-tie breaker	1.06	1.03	1.03	>0.9	1.07	1.06	1.02	1.02	1.02	1.02	- Load power factor correction - Reactor projects
CPM 115	P2-4:A11:3:_BELLOTA 230KV - SECTION 1E & 2E	P2	Bus-tie breaker	1.06	1.01	1.01	>0.9	1.07	1.06	1.00	1.00	1.01	1.00	- Load power factor correction - Reactor projects
CPM 115	P2-4:A5:4:_GOLDHILL 115KV - SECTION 1F & 2F	P2	Bus-tie breaker	1.08	1.04	1.04	>0.9	1.08	1.08	1.04	1.03	1.04	1.04	- Load power factor correction - Reactor projects
CPM 115	P2-1:A5:30:_DRUM-HIGGINS 115KV [4393] (DTCH FL1-CHCGO PK)	P2-1	Line Section w/o fault	1.06	1.03	1.03	>0.9	1.08	1.06	1.02	1.02	1.03	1.02	- Load power factor correction - Reactor projects
CPM 115	P2-1:A5:31:_DRUM-HIGGINS 115KV [4393] (CHCGO PK-HIGGINS)	P2-1	Line Section w/o fault	1.06	1.03	1.03	>0.9	1.07	1.06	1.02	1.02	1.02	1.02	- Load power factor correction - Reactor projects
CPM 115	P2-1:A5:34:_BELL-PLACER 115KV [4395] (PLACER-BELL PGE)	P2-1	Line Section w/o fault	1.07	1.04	1.04	>0.9	1.07	1.07	1.03	1.03	1.03	1.03	- Load power factor correction - Reactor projects
CPM 115	P2-1:A5:37:_HIGGINS-BELL 115KV [1412] (HIGGINS-BELL PGE)	P2-1	Line Section w/o fault	1.06	1.03	1.03	>0.9	1.07	1.06	1.03	1.03	1.03	1.03	- Load power factor correction - Reactor projects
CPM 115	P7-1:A5:19_Placer-Gold Hill No. 1 115 kV Line and Placer-Gold Hill No. 2 115 kV Line	P7	DCTL	1.07	1.05	1.05	>0.9	1.08	1.07	1.04	1.04	1.04	1.04	- Load power factor correction - Reactor projects
CRBNA JC 60	Base Case	P0	N-0	1.04	1.04	1.03	>0.9	1.05	1.04	1.03	1.03	1.03	1.03	- Load power factor correction - Reactor projects
CURTISS 115	P2-4:A11:3:_BELLOTA 230KV - SECTION 1E & 2E	P2	Bus-tie breaker	0.94	0.69	0.69	>0.9	1.03	0.94	0.66	0.67	0.97	0.64	Bellota 230 kV bus upgrade
DAVIS 115	Base Case	P0	N-0	1.02	1.02	1.01	>0.9	1.03	1.02	1.01	1.02	1.04	1.01	Load power factor correction
DAVIS 115	P2-4:A4:12:_DAVIS 115KV - SECTION 1E & 1F	P2	Bus-tie breaker	1.03	1.00	1.00	>0.9	1.03	1.03	1.00	1.00	1.02	0.99	Load power factor correction
DEEPWATR 115	Base Case	P0	N-0	1.03	1.04	1.03	>0.9	1.03	1.03	1.03	1.04	1.05	1.03	Load power factor correction
DEL MAR 60	Base Case	P0	N-0	1.10	0.97	0.97	>0.9	1.06	1.10	0.97	0.96	0.99	0.96	- Load power factor correction - Reactor projects
DEL MAR 60	P2-2:A5:10:_GOLDHILL 115KV SECTION 1F	P2	Bus	1.10	0.98	0.98	>0.9	1.06	1.10	0.97	0.97	0.99	0.97	- Load power factor correction - Reactor projects
DEL MAR 60	P2-4:A11:3:_BELLOTA 230KV - SECTION 1E & 2E	P2	Bus-tie breaker	1.10	0.94	0.93	>0.9	1.05	1.09	0.92	0.92	0.96	0.92	- Load power factor correction - Reactor projects
DEL MAR 60	P2-4:A5:4:_GOLDHILL 115KV - SECTION 1F & 2F	P2	Bus-tie breaker	1.10	0.98	0.97	>0.9	1.06	1.10	0.97	0.95	0.99	0.97	- Load power factor correction - Reactor projects
DEL MAR 60	P2-4:A5:5:_GOLDHILL 115KV - SECTION 1F & 1E	P2	Bus-tie breaker	1.10	0.98	0.98	>0.9	1.06	1.10	0.97	0.97	0.99	0.97	- Load power factor correction - Reactor projects
DEL MAR 60	P5-5:A5:1:_Atlantic 230 kV BAAH Bus #1 (failure of non-redundent relay)	P55	Non-Redundant	1.09	0.89	0.90	>0.9	1.04	1.09	0.89	0.87	0.97	0.86	Protection upgrade

Study Area: **PG&E Central Valley**



High/Low Voltage

Substation	Contingency (All and Worst P6)	Category	Category Description	Post Cont. Voltage Deviation %										Project & Potential Mitigation Solutions
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP High CEC Forecast	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generation s	
DEL MAR 60	P1-2:A5:10:_ATLANTIC-GOLD HILL 230KV [4330] P1-2:A5:6:_RIO OSO-ATLANTIC 230KV [5590]	P6	N-1/N-1	>0.9	0.90	0.91	>0.9	>0.9	>0.9	0.90	0.88	>0.9	>0.9	Load power factor correction or voltage support if needed
DEL MAR 60	P7-1:A5:19_Placer-Gold Hill No. 1 115 kV Line and Placer-Gold Hill No. 2 115 kV Line	P7	DCTL	1.10	0.98	0.98	>0.9	1.06	1.10	0.97	0.97	0.99	0.97	Load power factor correction or voltage support if needed
DEL MAR 60	P7-1:A5:7_Atlantic-Gold Hill 230 kV Line & Rio Oso-Gold Hill 230 kV Line	P7	DCTL	1.10	0.95	0.94	>0.9	1.06	1.09	0.94	0.94	0.98	0.93	Load power factor correction or voltage support if needed
DELEVAN 60	Base Case	P0	N-0	1.00	0.97	0.97	>0.9	1.03	1.00	0.96	0.95	0.97	0.97	Sensitivity only
DIST2047 60	P1-2:A4:44:_CORTINA #1 60KV [6580] P1-3:A4:6:_CORTINA 230/230KV TB 1	P6	N-1/N-1	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	0.89	>0.9	>0.9	>0.9	Sensitivity only
DIXONCAN 60	Base Case	P0	N-0	1.07	1.02	>0.9	>0.9	1.06	1.07	1.01	1.01	1.02	1.02	- Load power factor correction - Reactor projects
DIXONCAN 60	P2-2:A4:7:_VACA-DIX 230KV SECTION NA	P2	Bus	1.09	1.03	>0.9	>0.9	1.06	1.08	1.02	1.01	1.03	1.03	- Load power factor correction - Reactor projects
DIXONCAN 60	P1-3:A4:19:_VACA-DIX 115/60KV TB 9 P1-3:A4:1:_VACA-DIX 500/230KV TB 11	P6	N-1/N-1	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	Load power factor correction
DIXONPGE 60	Base Case	P0	N-0	1.07	1.02	>0.9	>0.9	1.06	1.07	1.02	1.01	1.02	1.02	- Load power factor correction - Reactor projects
DIXONPGE 60	P1-3:A4:1:_VACA-DIX 500/230KV TB 11	P1	N-1	1.08	1.02	>0.9	>0.9	1.06	1.08	1.02	1.01	1.02	1.02	- Load power factor correction - Reactor projects
DIXONPGE 60	P1-4:A4:6:_VC DX11T SVD=V	P1	N-1	1.07	1.02	>0.9	>0.9	1.06	1.07	1.02	1.01	1.02	1.02	- Load power factor correction - Reactor projects
DIXONPGE 60	P2-2:A4:7:_VACA-DIX 230KV SECTION NA	P2	Bus	1.09	1.03	>0.9	>0.9	1.06	1.09	1.02	1.02	1.03	1.03	- Load power factor correction - Reactor projects
DIXONPGE 60	P1-3:A4:19:_VACA-DIX 115/60KV TB 9 P1-3:A4:1:_VACA-DIX 500/230KV TB 11	P6	N-1/N-1	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	Load power factor correction
DMND SPR 115	Base Case	P0	N-0	1.05	1.02	>0.9	>0.9	1.06	1.05	1.01	1.01	1.01	1.01	- Load power factor correction - Reactor projects
DMND SPR 115	P1-2:A5:36:_DRUM-HIGGINS 115KV [4393]	P1	N-1	1.06	1.01	>0.9	>0.9	1.07	1.05	1.00	1.00	1.01	1.00	- Load power factor correction - Reactor projects
DMND SPR 115	P1-2:A5:37:_BELL-PLACER 115KV [4395]	P1	N-1	1.06	1.02	>0.9	>0.9	1.07	1.06	1.01	1.01	1.01	1.01	- Load power factor correction - Reactor projects
DMND SPR 115	P1-2:A5:38:_ELDORAD-MIZOU_T2 115KV [0]	P1	N-1	1.06	1.01	>0.9	>0.9	1.07	1.06	1.01	1.00	1.02	1.01	- Load power factor correction - Reactor projects
DMND SPR 115	P2-2:A5:19:_PLACER 115KV SECTION 1D	P2	Bus	1.06	1.02	>0.9	>0.9	1.07	1.06	1.02	1.02	1.02	1.02	- Load power factor correction - Reactor projects
DMND SPR 115	P2-2:A5:21:_ELDORAD 115KV SECTION 1D	P2	Bus	1.05	1.00	>0.9	>0.9	1.06	1.05	1.00	0.99	1.01	1.00	- Load power factor correction - Reactor projects

High/Low Voltage

Substation	Contingency (All and Worst P6)	Category	Category Description	Post Cont. Voltage Deviation %										Project & Potential Mitigation Solutions
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP High CEC Forecast	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generation s	
DMND SPR 115	P2-3:A5:22:_PLACER - 1D 115KV & PLACER-GOLD HILL #1 LINE	P2	Non-bus-tie breaker	1.06	1.02	>0.9	>0.9	1.07	1.06	1.02	1.01	1.02	1.02	- Load power factor correction - Reactor projects
DMND SPR 115	P2-3:A5:23:_PLACER - 1D 115KV & PLACER-GOLD HILL #2 LINE	P2	Non-bus-tie breaker	1.06	1.02	>0.9	>0.9	1.07	1.06	1.02	1.02	1.02	1.02	- Load power factor correction - Reactor projects
DMND SPR 115	P2-3:A5:24:_PLACER - 1D 115KV & BELL-PLACER LINE	P2	Non-bus-tie breaker	1.06	1.02	>0.9	>0.9	1.07	1.06	1.02	1.02	1.02	1.02	- Load power factor correction - Reactor projects
DMND SPR 115	P2-3:A5:26:_ELDORAD - 1D 115KV & ELDORAD-MIZOU_T2 LINE	P2	Non-bus-tie breaker	1.07	1.01	>0.9	>0.9	1.07	1.07	1.01	1.00	1.02	1.00	- Load power factor correction - Reactor projects
DMND SPR 115	P2-3:A5:27:_ELDORAD - 1D 115KV & ELDORAD-MIZOU_T1 LINE	P2	Non-bus-tie breaker	1.05	0.99	>0.9	>0.9	1.06	1.05	0.98	0.98	1.00	0.98	- Load power factor correction - Reactor projects
DMND SPR 115	P2-3:A5:81:_DRUM 115KV - RING R2 & R3	P2	Non-bus-tie breaker	1.06	1.01	>0.9	>0.9	1.07	1.05	1.00	1.00	1.01	1.00	- Load power factor correction - Reactor projects
DMND SPR 115	P2-3:A5:85:_BRNSWALT 115KV - RING R4 & R3	P2	Non-bus-tie breaker	1.06	1.01	>0.9	>0.9	1.07	1.05	1.00	1.00	1.01	1.00	- Load power factor correction - Reactor projects
DMND SPR 115	P2-4:A11:3:_BELLOTA 230KV - SECTION 1E & 2E	P2	Bus-tie breaker	1.05	0.99	>0.9	>0.9	1.06	1.05	0.98	0.98	0.99	0.98	- Load power factor correction - Reactor projects
DMND SPR 115	P2-4:A5:4:_GOLDHILL 115KV - SECTION 1F & 2F	P2	Bus-tie breaker	1.07	1.02	>0.9	>0.9	1.07	1.07	1.02	1.00	1.02	1.02	- Load power factor correction - Reactor projects
DMND SPR 115	P2-1:A5:12:_MISSOURI FLAT-GOLD HILL #2 115KV [2670] (GOLDHILL-SHPRING2)	P2-1	Line Section w/o fault	0.99	0.85	>0.9	>0.9	1.04	0.99	0.83	0.79	0.88	0.85	Connect Shingle Spring load to Missouri Flat-Gold Hill #1 115KV
DMND SPR 115	P2-1:A5:30:_DRUM-HIGGINS 115KV [4393] (DTCH FL1-CHCGO PK)	P2-1	Line Section w/o fault	1.06	1.01	>0.9	>0.9	1.07	1.06	1.00	1.00	1.01	1.00	- Load power factor correction - Reactor projects
DMND SPR 115	P2-1:A5:31:_DRUM-HIGGINS 115KV [4393] (CHCGO PK-HIGGINS)	P2-1	Line Section w/o fault	1.05	1.01	>0.9	>0.9	1.06	1.05	1.00	1.00	1.00	1.00	- Load power factor correction - Reactor projects
DMND SPR 115	P2-1:A5:34:_BELL-PLACER 115KV [4395] (PLACER-BELL PGE)	P2-1	Line Section w/o fault	1.06	1.02	>0.9	>0.9	1.07	1.06	1.01	1.01	1.01	1.01	- Load power factor correction - Reactor projects
DMND SPR 115	P2-1:A5:37:_HIGGINS-BELL 115KV [1412] (HIGGINS-BELL PGE)	P2-1	Line Section w/o fault	1.06	1.01	>0.9	>0.9	1.06	1.06	1.01	1.00	1.01	1.01	- Load power factor correction - Reactor projects
DMND SPR 115	P2-1:A5:40:_MISSOURI FLAT-GOLD HILL #2 115KV [2670] (PLCRVLT2-MIZOU_T2)	P2-1	Line Section w/o fault	1.06	1.01	>0.9	>0.9	1.07	1.06	1.01	1.00	1.01	1.00	- Load power factor correction - Reactor projects
DMND SPR 115	P1-1:A5:4:_DRUM 5 13.80KV GEN UNIT 1 P1-2:A5:38:_ELDORAD-MIZOU_T2 115KV [0]	P3	G-1/N-1	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	Load power factor correction
DMND SPR 115	P1-2:A5:36:_DRUM-HIGGINS 115KV [4393] P1-2:A5:38:_ELDORAD-MIZOU_T2 115KV [0]	P6	N-1/N-1	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	Load power factor correction
DMND SPR 115	P7-1:A5:18_El Dorado-Missouri Flat No. 2 115 kV Line & El Dorado-Missouri Flat No. 1 115 kV Line	P7	DCTL	1.06	1.01	>0.9	>0.9	1.07	1.06	1.01	1.00	1.02	1.01	- Load power factor correction - Reactor projects

Study Area: **PG&E Central Valley**



High/Low Voltage

Substation	Contingency (All and Worst P6)	Category	Category Description	Post Cont. Voltage Deviation %										Project & Potential Mitigation Solutions
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP High CEC Forecast	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generation s	
DMND SPR 115	P7-1:A5:19_Placer-Gold Hill No. 1 115 kV Line and Placer-Gold Hill No. 2 115 kV Line	P7	DCTL	1.06	1.02	>0.9	>0.9	1.07	1.06	1.02	1.02	1.02	1.02	- Load power factor correction - Reactor projects
DOBBINS 60	Base Case	P0	N-0	1.05	1.02	>0.9	>0.9	1.06	1.05	1.02	1.02	1.02	1.02	- Load power factor correction - Reactor projects
DONNELLS 115	P2-4:A11:3:_BELLOTA 230KV - SECTION 1E & 2E	P2	Bus-tie breaker	1.01	0.79	>0.9	>0.9	1.04	1.01	0.77	0.78	1.02	0.75	Bellota 230 kV bus upgrade
DRUM 115	Base Case	P0	N-0	1.04	1.05	>0.9	>0.9	1.06	1.04	1.04	1.05	1.05	1.04	- Load power factor correction - Reactor projects
DRUM 115	P1-2:A5:36:_DRUM-HIGGINS 115KV [4393]	P1	N-1	1.05	1.06	>0.9	>0.9	1.06	1.05	1.06	1.06	1.07	1.06	- Load power factor correction - Reactor projects
DRUM 115	P1-3:A5:14:_DRUM 5 13.8/115KV TB 1	P1	N-1	1.05	1.05	>0.9	>0.9	1.06	1.05	1.05	1.05	1.05	1.05	- Load power factor correction - Reactor projects
DRUM 115	P2-3:A5:81:_DRUM 115KV - RING R2 & R3	P2	Non-bus-tie breaker	1.05	1.06	>0.9	>0.9	1.06	1.05	1.06	1.06	1.07	1.06	- Load power factor correction - Reactor projects
DRUM 115	P2-3:A5:82:_DRUM 115KV - RING R2 & R1	P2	Non-bus-tie breaker	1.05	1.05	>0.9	>0.9	1.06	1.05	1.05	1.05	1.05	1.05	- Load power factor correction - Reactor projects
DRUM 115	P2-4:A11:3:_BELLOTA 230KV - SECTION 1E & 2E	P2	Bus-tie breaker	1.04	1.04	>0.9	>0.9	1.06	1.04	1.04	1.04	1.04	1.04	- Load power factor correction - Reactor projects
DRUM 115	P2-1:A5:27:_DRUM-HIGGINS 115KV [4393] (DRUM-DTCH FL1)	P2-1	Line Section w/o fault	1.05	1.06	>0.9	>0.9	1.06	1.05	1.06	1.06	1.07	1.06	- Load power factor correction - Reactor projects
DRUM 115	P2-1:A5:30:_DRUM-HIGGINS 115KV [4393] (DTCH FL1-CHCGO PK)	P2-1	Line Section w/o fault	1.05	1.06	>0.9	>0.9	1.06	1.05	1.06	1.06	1.07	1.06	- Load power factor correction - Reactor projects
DRUM 115	P1-1:A5:4:_DRUM 5 13.80KV GEN UNIT 1 P1-2:A5:36:_DRUM-HIGGINS 115KV [4393]	P3	G-1/N-1	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	Load power factor correction
DRUM 115	P1-3:A5:14:_DRUM 5 13.8/115KV TB 1 P1-2:A5:36:_DRUM-HIGGINS 115KV [4393]	P6	N-1/N-1	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	Load power factor correction
DTCH FL1 115	Base Case	P0	N-0	1.04	1.04	>0.9	>0.9	1.06	1.04	1.03	1.04	1.04	1.03	- Load power factor correction - Reactor projects
DTCH FL1 115	P1-1:A5:10:_DTCHFLT1 11.00KV GEN UNIT 1	P1	N-1	1.04	1.04	>0.9	>0.9	1.06	1.04	1.04	1.04	1.04	1.04	- Load power factor correction - Reactor projects
DTCH FL1 115	P1-1:A5:4:_DRUM 5 13.80KV GEN UNIT 1	P1	N-1	1.04	1.04	>0.9	>0.9	1.06	1.04	1.04	1.04	1.04	1.04	- Load power factor correction - Reactor projects
DTCH FL1 115	P1-3:A5:14:_DRUM 5 13.8/115KV TB 1	P1	N-1	1.05	1.04	>0.9	>0.9	1.06	1.04	1.04	1.04	1.04	1.04	- Load power factor correction - Reactor projects
DTCH FL1 115	P1-3:A5:23:_DTCH FL1 115/11KV TB 1	P1	N-1	1.04	1.04	>0.9	>0.9	1.06	1.05	1.04	1.04	1.05	1.04	- Load power factor correction - Reactor projects

Study Area: **PG&E Central Valley**



High/Low Voltage

Substation	Contingency (All and Worst P6)	Category	Category Description	Post Cont. Voltage Deviation %										Project & Potential Mitigation Solutions	
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP High CEC Forecast	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generation s		
DTCH FL1 115	P2-3:A5:82:_DRUM 115KV - RING R2 & R1	P2	Non-bus-tie breaker	1.05	1.04	>0.9	>0.9	1.06	1.05	1.04	1.04	1.04	1.04	1.04	- Load power factor correction - Reactor projects
DTCH FL1 115	P2-4:A11:3:_BELLOTA 230KV - SECTION 1E & 2E	P2	Bus-tie breaker	1.04	1.03	>0.9	>0.9	1.06	1.04	1.03	1.03	1.03	1.03	1.03	- Load power factor correction - Reactor projects
DTCH FL1 115	P2-4:A5:4:_GOLDHILL 115KV - SECTION 1F & 2F	P2	Bus-tie breaker	1.00	0.97	>0.9	>0.9	1.05	1.00	0.96	0.71	1.01	0.98	0.98	- Load power factor correction for high voltage - Low voltage: Sensitivity only
DTCH FL1 115	P2-1:A5:30:_DRUM-HIGGINS 115KV [4393] (DTCH FL1-CHCGO PK)	P2-1	Line Section w/o fault	1.05	1.06	>0.9	>0.9	1.06	1.05	1.06	1.06	1.06	1.07	1.06	- Load power factor correction - Reactor projects
DTCH FL1 115	P1-1:A5:4:_DRUM 5 13.80KV GEN UNIT 1 P1-3:A5:23:_DTCH FL1 115/11KV TB 1	P3	G-1/N-1	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	Load power factor correction
DTCH FL1 115	P1-3:A5:14:_DRUM 5 13.8/115KV TB 1 P1-3:A5:23:_DTCH FL1 115/11KV TB 1	P6	N-1/N-1	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	Load power factor correction
DTCH FL2 115	Base Case	P0	N-0	1.04	1.04	>0.9	>0.9	1.06	1.04	1.04	1.04	1.04	1.05	1.04	- Load power factor correction - Reactor projects
DTCH FL2 115	P1-1:A5:4:_DRUM 5 13.80KV GEN UNIT 1	P1	N-1	1.04	1.05	>0.9	>0.9	1.06	1.04	1.05	1.05	1.05	1.05	1.04	- Load power factor correction - Reactor projects
DTCH FL2 115	P1-2:A5:36:_DRUM-HIGGINS 115KV [4393]	P1	N-1	1.04	1.06	>0.9	>0.9	1.06	1.04	1.05	1.06	1.06	1.06	1.05	- Load power factor correction - Reactor projects
DTCH FL2 115	P1-3:A5:14:_DRUM 5 13.8/115KV TB 1	P1	N-1	1.04	1.05	>0.9	>0.9	1.06	1.04	1.05	1.05	1.05	1.05	1.04	- Load power factor correction - Reactor projects
DTCH FL2 115	P2-3:A5:81:_DRUM 115KV - RING R2 & R3	P2	Non-bus-tie breaker	1.04	1.06	>0.9	>0.9	1.06	1.04	1.05	1.06	1.06	1.06	1.05	- Load power factor correction - Reactor projects
DTCH FL2 115	P2-3:A5:82:_DRUM 115KV - RING R2 & R1	P2	Non-bus-tie breaker	1.05	1.05	>0.9	>0.9	1.06	1.05	1.04	1.05	1.05	1.05	1.04	- Load power factor correction - Reactor projects
DTCH FL2 115	P2-4:A11:3:_BELLOTA 230KV - SECTION 1E & 2E	P2	Bus-tie breaker	1.04	1.04	>0.9	>0.9	1.05	1.04	1.04	1.03	1.04	1.04	1.03	- Load power factor correction - Reactor projects
DTCH FL2 115	P2-1:A5:30:_DRUM-HIGGINS 115KV [4393] (DTCH FL1-CHCGO PK)	P2-1	Line Section w/o fault	1.04	1.06	>0.9	>0.9	1.06	1.04	1.05	1.06	1.06	1.06	1.05	- Load power factor correction - Reactor projects
DTCH FL2 115	P1-1:A5:4:_DRUM 5 13.80KV GEN UNIT 1 P1-2:A5:36:_DRUM-HIGGINS 115KV [4393]	P3	G-1/N-1	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	Load power factor correction
DTCH FL2 115	P1-3:A5:14:_DRUM 5 13.8/115KV TB 1 P1-2:A5:36:_DRUM-HIGGINS 115KV [4393]	P6	N-1/N-1	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	Load power factor correction
E.MRYSVE 115	Base Case	P0	N-0	1.05	1.03	>0.9	>0.9	1.05	1.05	1.02	1.03	1.03	1.03	1.02	Load power factor correction
E.MRYSVE 115	P2-2:A4:20:_BRIGHTN 115KV SECTION ME	P2	Bus	1.04	1.03	>0.9	>0.9	1.05	1.05	1.03	1.03	1.03	1.03	1.03	Load power factor correction
E.MRYSVE 115	P2-3:A4:19:_BRIGHTN - ME 115KV & WEST SACRAMENTO-BRIGHTON LINE	P2	Non-bus-tie breaker	1.04	1.02	>0.9	>0.9	1.05	1.05	1.03	1.03	1.03	1.03	1.03	Load power factor correction

Study Area: **PG&E Central Valley**



High/Low Voltage

Substation	Contingency (All and Worst P6)	Category	Category Description	Post Cont. Voltage Deviation %										Project & Potential Mitigation Solutions
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP High CEC Forecast	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generation s	
E.MRYSVE 115	P2-3:A5:17:_RIO OSO - 2D 115KV & BOGUE-RIO OSO LINE	P2	Non-bus-tie breaker	1.04	0.98	>0.9	>0.9	1.05	1.04	0.98	0.98	0.99	0.97	- Load power factor correction - Reactor projects
E.MRYSVE 115	P2-3:A5:83:_DRUM 115KV - RING R5 & R4	P2	Non-bus-tie breaker	1.05	1.03	>0.9	>0.9	1.05	1.05	1.03	1.03	1.03	1.02	- Load power factor correction - Reactor projects
E.MRYSVE 115	P2-4:A11:3:_BELLOTA 230KV - SECTION 1E & 2E	P2	Bus-tie breaker	1.05	1.02	>0.9	>0.9	1.04	1.05	1.01	1.01	1.02	1.01	Load power factor correction
E.MRYSVE 115	P2-4:A4:10:_BRIGHTN 115KV - SECTION ME & MD	P2	Bus-tie breaker	1.04	1.03	>0.9	>0.9	1.05	1.05	1.03	1.03	1.03	1.03	Load power factor correction
E.MRYSVE 115	P2-4:A5:6:_RIO OSO 115KV - SECTION 1D & 2D	P2	Bus-tie breaker	1.04	0.98	>0.9	>0.9	1.05	1.04	0.97	0.98	0.99	0.97	- Load power factor correction - Reactor projects
E.MRYSVE 115	P2-1:A5:8:_PALERMO-NICOLAUS 115KV [3210] (PALERMO-E.MRY J2)	P2-1	Line Section w/o fault	1.04	1.03	>0.9	>0.9	1.04	1.04	1.03	1.04	1.04	1.03	Load power factor correction
E.MRYSVE 115	P1-1:A5:11:_NARROWS2 13.80KV GEN UNIT 1 P1-2:A5:30:_RIO OSO-NICOLAUS 115KV [3440]	P3	G-1/N-1	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	Load power factor correction
E.MRYSVE 115	P1-2:A5:17:_RIO OSO-LINCOLN 115KV [1320] P1-2:A4:25:_WOODLAND-DAVIS 115KV [4210]	P6	N-1/N-1	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	Load power factor correction
E.MRYSVE 115	P7-1:A5:11_Drum-Rio Oso No. 1 115 kV Line & Drum-Rio Oso No. 2 115 kV Line	P7	DCTL	1.05	1.03	>0.9	>0.9	1.05	1.05	1.03	1.03	1.03	1.02	- Load power factor correction - Reactor projects
E.NICOLS 115	Base Case	P0	N-0	1.05	1.03	>0.9	>0.9	1.04	1.05	1.03	1.04	1.04	1.03	Load power factor correction
E.NICOLS 115	P1-2:A4:25:_WOODLAND-DAVIS 115KV [4210]	P1	N-1	1.05	1.03	>0.9	>0.9	1.04	1.05	1.03	1.04	1.04	1.03	Load power factor correction
E.NICOLS 115	P1-2:A5:30:_RIO OSO-NICOLAUS 115KV [3440]	P1	N-1	1.04	0.97	>0.9	>0.9	1.05	1.03	0.96	0.96	0.98	0.96	Load power factor correction
E.NICOLS 115	P2-2:A4:17:_WOODLD 115KV SECTION 1F	P2	Bus	1.05	1.04	>0.9	>0.9	1.04	1.05	1.03	1.04	1.04	1.03	Load power factor correction
E.NICOLS 115	P2-2:A4:20:_BRIGHTN 115KV SECTION ME	P2	Bus	1.04	1.04	>0.9	>0.9	1.04	1.05	1.04	1.04	1.04	1.04	Load power factor correction
E.NICOLS 115	P2-2:A5:15:_RIO OSO 115KV SECTION 2D	P2	Bus	1.03	0.96	>0.9	>0.9	1.05	1.03	0.96	0.96	0.98	0.96	Load power factor correction
E.NICOLS 115	P2-3:A4:16:_WOODLD - 1F 115KV & WOODLAND-DAVIS LINE	P2	Non-bus-tie breaker	1.05	1.03	>0.9	>0.9	1.04	1.05	1.03	1.04	1.04	1.03	Load power factor correction
E.NICOLS 115	P2-3:A4:19:_BRIGHTN - ME 115KV & WEST SACRAMENTO-BRIGHTON LINE	P2	Non-bus-tie breaker	1.04	1.03	>0.9	>0.9	1.04	1.05	1.04	1.04	1.04	1.04	Load power factor correction
E.NICOLS 115	P2-3:A4:20:_BRIGHTN - ME 115KV & BRIGHTN-DAVIS-BRKR SLG LINE	P2	Non-bus-tie breaker	1.04	1.03	>0.9	>0.9	1.04	1.05	1.04	1.04	1.04	1.04	Load power factor correction
E.NICOLS 115	P2-3:A4:24:_DAVIS - 1D 115KV & WOODLAND-DAVIS LINE	P2	Non-bus-tie breaker	1.05	1.03	>0.9	>0.9	1.04	1.05	1.03	1.04	1.04	1.03	Load power factor correction
E.NICOLS 115	P2-3:A5:17:_RIO OSO - 2D 115KV & BOGUE-RIO OSO LINE	P2	Non-bus-tie breaker	1.04	0.96	>0.9	>0.9	1.05	1.04	0.95	0.96	0.98	0.95	Load power factor correction
E.NICOLS 115	P2-3:A5:18:_RIO OSO - 2D 115KV & RIO OSO-WOODLAND #2 LINE	P2	Non-bus-tie breaker	1.03	0.97	>0.9	>0.9	1.05	1.03	0.96	0.96	0.98	0.96	Load power factor correction
E.NICOLS 115	P2-3:A5:19:_RIO OSO - 2D 115KV & RIO OSO-DRUM-BRUNSWCK LINE	P2	Non-bus-tie breaker	1.03	0.96	>0.9	>0.9	1.05	1.03	0.96	0.96	0.98	0.95	Load power factor correction

Study Area: **PG&E Central Valley**



High/Low Voltage

Substation	Contingency (All and Worst P6)	Category	Category Description	Post Cont. Voltage Deviation %										Project & Potential Mitigation Solutions
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP High CEC Forecast	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations	
E.NICOLS 115	P2-3:A5:78:_E.NICOLS 115KV - RING R1 & R2	P2	Non-bus-tie breaker	1.03	0.97	>0.9	>0.9	1.05	1.03	0.96	0.96	0.98	0.96	Load power factor correction
E.NICOLS 115	P2-3:A5:79:_E.NICOLS 115KV - RING R1 & R5	P2	Non-bus-tie breaker	>0.9	>0.9	>0.9	>0.9	1.03	>0.9	>0.9	>0.9	>0.9	>0.9	Load power factor correction
E.NICOLS 115	P2-3:A5:83:_DRUM 115KV - RING R5 & R4	P2	Non-bus-tie breaker	1.05	1.04	>0.9	>0.9	1.04	1.05	1.03	1.04	1.04	1.03	- Load power factor correction - Reactor projects
E.NICOLS 115	P2-4:A11:3:_BELLOTA 230KV - SECTION 1E & 2E	P2	Bus-tie breaker	1.04	1.03	>0.9	>0.9	1.04	1.04	1.02	1.02	1.03	1.02	Load power factor correction
E.NICOLS 115	P2-4:A4:10:_BRIGHTN 115KV - SECTION ME & MD	P2	Bus-tie breaker	1.04	1.04	>0.9	>0.9	1.04	1.05	1.04	1.04	1.04	1.04	Load power factor correction
E.NICOLS 115	P2-4:A4:11:_DAVIS 115KV - SECTION 1D & 1E	P2	Bus-tie breaker	1.05	1.04	>0.9	>0.9	1.04	1.05	1.03	1.04	1.04	1.03	Load power factor correction
E.NICOLS 115	P2-4:A4:12:_DAVIS 115KV - SECTION 1E & 1F	P2	Bus-tie breaker	1.05	1.04	>0.9	>0.9	1.04	1.05	1.03	1.04	1.04	1.03	Load power factor correction
E.NICOLS 115	P2-4:A4:8:_WOODLD 115KV - SECTION 1F & 1E	P2	Bus-tie breaker	1.05	1.04	>0.9	>0.9	1.04	1.05	1.04	1.04	1.04	1.04	Load power factor correction
E.NICOLS 115	P2-4:A5:6:_RIO OSO 115KV - SECTION 1D & 2D	P2	Bus-tie breaker	1.03	0.96	>0.9	>0.9	1.05	1.03	0.95	0.96	0.97	0.95	Load power factor correction
E.NICOLS 115	P2-1:A4:14:_WOODLAND-DAVIS 115KV [4210] (WOODLANDTP-WOODLD)	P2-1	Line Section w/o fault	1.05	1.03	>0.9	>0.9	1.04	1.05	1.03	1.04	1.04	1.03	Load power factor correction
E.NICOLS 115	P2-1:A4:5:_WOODLAND-DAVIS 115KV [4210] (Q653FJCT-DAVIS)	P2-1	Line Section w/o fault	1.05	1.03	>0.9	>0.9	1.04	1.05	1.03	1.04	1.04	1.03	Load power factor correction
E.NICOLS 115	P2-1:A4:6:_WOODLAND-DAVIS 115KV [4210] (WOODLANDTP-Q653FJCT)	P2-1	Line Section w/o fault	1.05	1.03	>0.9	>0.9	1.04	1.05	1.03	1.04	1.04	1.03	Load power factor correction
E.NICOLS 115	P1-1:A5:11:_NARROWS2 13.80KV GEN UNIT 1 P1-2:A5:30:_RIO OSO-NICOLAUS 115KV [3440]	P3	G-1/N-1	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	Load power factor correction
E.NICOLS 115	P7-1:A5:11_Drum-Rio Oso No. 1 115 kV Line & Drum-Rio Oso No. 2 115 kV Line	P7	DCTL	1.05	1.04	>0.9	>0.9	1.04	1.05	1.03	1.04	1.04	1.03	Load power factor correction
E.NICOLS 115	P7-1:A5:12_Rio Oso-Nicolaus 115 kV Line & Bogue-Rio Oso 115 kV Line	P7	DCTL	1.04	0.96	>0.9	>0.9	1.05	1.04	0.96	0.96	0.97	0.95	- Load power factor correction - Reactor projects
ELDORAD 115	Base Case	P0	N-0	1.06	1.02	>0.9	>0.9	1.06	1.06	1.02	1.02	1.01	1.02	- Load power factor correction - Reactor projects
ELDORAD 115	P1-2:A5:36:_DRUM-HIGGINS 115KV [4393]	P1	N-1	1.06	1.02	>0.9	>0.9	1.07	1.06	1.01	1.01	1.01	1.01	- Load power factor correction - Reactor projects
ELDORAD 115	P1-2:A5:37:_BELL-PLACER 115KV [4395]	P1	N-1	1.06	1.03	>0.9	>0.9	1.07	1.06	1.02	1.02	1.01	1.02	- Load power factor correction - Reactor projects
ELDORAD 115	P2-2:A5:19:_PLACER 115KV SECTION 1D	P2	Bus	1.06	1.03	>0.9	>0.9	1.07	1.06	1.03	1.03	1.02	1.03	- Load power factor correction - Reactor projects
ELDORAD 115	P2-3:A5:22:_PLACER - 1D 115KV & PLACER-GOLD HILL #1 LINE	P2	Non-bus-tie breaker	1.06	1.03	>0.9	>0.9	1.07	1.06	1.03	1.02	1.02	1.02	- Load power factor correction - Reactor projects
ELDORAD 115	P2-3:A5:23:_PLACER - 1D 115KV & PLACER-GOLD HILL #2 LINE	P2	Non-bus-tie breaker	1.06	1.03	>0.9	>0.9	1.07	1.06	1.03	1.03	1.02	1.03	- Load power factor correction - Reactor projects

Study Area: **PG&E Central Valley**



High/Low Voltage

Substation	Contingency (All and Worst P6)	Category	Category Description	Post Cont. Voltage Deviation %										Project & Potential Mitigation Solutions
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP High CEC Forecast	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generation s	
ELDORAD 115	P2-3:A5:24:_PLACER - 1D 115KV & BELL-PLACER LINE	P2	Non-bus-tie breaker	1.06	1.03	>0.9	>0.9	1.07	1.06	1.03	1.02	1.02	1.03	- Load power factor correction - Reactor projects
ELDORAD 115	P2-3:A5:81:_DRUM 115KV - RING R2 & R3	P2	Non-bus-tie breaker	1.06	1.02	>0.9	>0.9	1.07	1.06	1.01	1.01	1.01	1.01	- Load power factor correction - Reactor projects
ELDORAD 115	P2-3:A5:85:_BRNSWALT 115KV - RING R4 & R3	P2	Non-bus-tie breaker	1.06	1.02	>0.9	>0.9	1.07	1.06	1.01	1.01	1.01	1.01	- Load power factor correction - Reactor projects
ELDORAD 115	P2-4:A11:3:_BELLOTA 230KV - SECTION 1E & 2E	P2	Bus-tie breaker	1.06	1.00	>0.9	>0.9	1.06	1.06	0.99	0.99	0.99	0.99	- Load power factor correction - Reactor projects
ELDORAD 115	P2-4:A5:4:_GOLDHILL 115KV - SECTION 1F & 2F	P2	Bus-tie breaker	1.07	1.03	>0.9	>0.9	1.07	1.07	1.03	1.01	1.02	1.03	- Load power factor correction - Reactor projects
ELDORAD 115	P2-1:A5:12:_MISSOURI FLAT-GOLD HILL #2 115KV [2670] (GOLDHILL-SHPRING2)	P2-1	Line Section w/o fault	1.02	0.91	>0.9	>0.9	1.05	1.02	0.89	0.86	0.92	0.90	Connect Shingle Spring load to Missouri Flat-Gold Hill #1 115KV
ELDORAD 115	P2-1:A5:30:_DRUM-HIGGINS 115KV [4393] (DTCH FL1-CHCGO PK)	P2-1	Line Section w/o fault	1.06	1.02	>0.9	>0.9	1.07	1.06	1.01	1.01	1.01	1.01	Connect Shingle Spring load to Missouri Flat-Gold Hill #1 115KV
ELDORAD 115	P2-1:A5:34:_BELL-PLACER 115KV [4395] (PLACER-BELL PGE)	P2-1	Line Section w/o fault	1.06	1.03	>0.9	>0.9	1.07	1.06	1.02	1.02	1.01	1.02	Connect Shingle Spring load to Missouri Flat-Gold Hill #1 115KV
ELDORAD 115	P7-1:A5:19_Placer-Gold Hill No. 1 115 kV Line and Placer-Gold Hill No. 2 115 kV Line	P7	DCTL	1.07	1.03	>0.9	>0.9	1.07	1.07	1.03	1.03	1.03	1.03	- Load power factor correction - Reactor projects
ELECTRA 230	Base Case	P0	N-0	1.04	1.01	>0.9	>0.9	1.03	1.04	1.01	1.01	1.01	1.01	Load power factor correction
ELECTRAJ 60	P1-2:A11:12:_VALLEY SPRINGS-BELLOTA 230KV [5860] P1-2:A11:9:_TIGER CREEK-VALLEY SPRINGS 230KV [5790]	P6	N-1/N-1	>0.9	>0.9	>0.9	>0.9	0.90	>0.9	>0.9	>0.9	>0.9	>0.9	Action plan or SPS
ELLS GTY 115	Base Case	P0	N-0	1.04	1.03	>0.9	>0.9	1.04	1.04	1.03	1.03	1.02	1.03	Load power factor correction
ENCINAL 60	P1-3:A5:31:_PEAS RG 60/60KV TB 1 P1-2:A5:57:_MRYSVLLE-PEASE 60KV [0]	P6	N-1/N-1	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	0.35	Sensitivity only
ENCINAL 60	P7-1:A5:20_Palermo-Pease 115 kV Line and Pease-Rio Oso 115 kV Line	P7	DCTL	1.02	0.99	>0.9	>0.9	1.00	1.02	0.99	0.99	0.77	>0.9	Sensitivity only
ENCINAL 60	P1-1:A5:24:_GRNLEAF2 13.80KV GEN UNIT 1 P1-3:A5:31:_PEAS RG 60/60KV TB 1	P3	G-1/N-1	>0.9	>0.9	>0.9	>0.9	0.88	>0.9	>0.9	>0.9	>0.9	>0.9	Project: Pease Transformer
ENCL TAP 60	P1-3:A5:31:_PEAS RG 60/60KV TB 1 P1-2:A5:57:_MRYSVLLE-PEASE 60KV [0]	P6	N-1/N-1	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	0.35	Sensitivity only
ENCL TAP 60	P7-1:A5:20_Palermo-Pease 115 kV Line and Pease-Rio Oso 115 kV Line	P7	DCTL	1.02	0.99	>0.9	>0.9	1.00	1.02	0.99	0.99	0.77	>0.9	Sensitivity only
ENVRO_HY 60	P1-2:A4:33:_WEST SACRAMENTO-BRIGHTON 115KV [4110] P1-2:A5:50:_COLGATE-GRASS VALLEY 60KV [6490]	P6	N-1/N-1	>0.9	0.89	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	Action plan or SPS
FLINT 115	Base Case	P0	N-0	1.04	1.01	>0.9	>0.9	1.06	1.04	1.01	1.01	1.01	1.01	- Load power factor correction - Reactor projects

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High/Low Voltage

Substation	Contingency (All and Worst P6)	Category	Category Description	Post Cont. Voltage Deviation %										Project & Potential Mitigation Solutions
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP High CEC Forecast	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations	
FLINT 115	P1-2:A5:36:_DRUM-HIGGINS 115KV [4393]	P1	N-1	1.04	1.00	>0.9	>0.9	1.07	1.04	0.99	0.98	0.99	0.99	- Load power factor correction - Reactor projects
FLINT 115	P1-2:A5:37:_BELL-PLACER 115KV [4395]	P1	N-1	1.05	1.02	>0.9	>0.9	1.07	1.05	1.02	1.01	1.01	1.02	- Load power factor correction - Reactor projects
FLINT 115	P2-2:A5:19:_PLACER 115KV SECTION 1D	P2	Bus	1.06	1.04	>0.9	>0.9	1.08	1.06	1.04	1.04	1.04	1.04	- Load power factor correction - Reactor projects
FLINT 115	P2-3:A5:22:_PLACER - 1D 115KV & PLACER-GOLD HILL #1 LINE	P2	Non-bus-tie breaker	1.05	1.03	>0.9	>0.9	1.08	1.05	1.03	1.03	1.03	1.03	- Load power factor correction - Reactor projects
FLINT 115	P2-3:A5:24:_PLACER - 1D 115KV & BELL-PLACER LINE	P2	Non-bus-tie breaker	1.06	1.04	>0.9	>0.9	1.08	1.06	1.04	1.04	1.04	1.04	- Load power factor correction - Reactor projects
FLINT 115	P2-3:A5:81:_DRUM 115KV - RING R2 & R3	P2	Non-bus-tie breaker	1.04	1.00	>0.9	>0.9	1.07	1.04	0.99	0.98	0.99	0.99	- Load power factor correction - Reactor projects
FLINT 115	P2-3:A5:85:_BRNSWALT 115KV - RING R4 & R3	P2	Non-bus-tie breaker	1.04	1.00	>0.9	>0.9	1.07	1.04	0.99	0.98	0.99	0.99	- Load power factor correction - Reactor projects
FLINT 115	P2-4:A11:3:_BELLOTA 230KV - SECTION 1E & 2E	P2	Bus-tie breaker	1.04	0.99	>0.9	>0.9	1.06	1.04	0.98	0.98	0.99	0.98	- Load power factor correction - Reactor projects
FLINT 115	P2-4:A5:4:_GOLDHILL 115KV - SECTION 1F & 2F	P2	Bus-tie breaker	0.92	0.82	>0.9	>0.9	1.05	0.90	0.79	0.30	0.89	0.83	Project: Atlantic-Placer 115 kV line Project ISD: on-hold Review project scope
FLINT 115	P2-1:A5:30:_DRUM-HIGGINS 115KV [4393] (DTCH FL1-CHCGO PK)	P2-1	Line Section w/o fault	1.04	1.00	>0.9	>0.9	1.07	1.04	0.99	0.99	1.00	0.99	- Load power factor correction - Reactor projects
FLINT 115	P2-1:A5:31:_DRUM-HIGGINS 115KV [4393] (CHCGO PK-HIGGINS)	P2-1	Line Section w/o fault	1.04	1.00	>0.9	>0.9	1.07	1.04	0.99	0.98	0.99	0.99	- Load power factor correction - Reactor projects
FLINT 115	P2-1:A5:34:_BELL-PLACER 115KV [4395] (PLACER-BELL PGE)	P2-1	Line Section w/o fault	1.05	1.02	>0.9	>0.9	1.07	1.05	1.02	1.01	1.01	1.02	- Load power factor correction - Reactor projects
FLINT 115	P2-1:A5:35:_PLACER-GOLD HILL #2 115KV [4290] (PLACER-FLINT2)	P2-1	Line Section w/o fault	1.05	1.04	>0.9	>0.9	1.07	1.05	1.03	1.03	1.03	1.03	- Load power factor correction - Reactor projects
FLINT 115	P2-1:A5:37:_HIGGINS-BELL 115KV [1412] (HIGGINS-BELL PGE)	P2-1	Line Section w/o fault	1.05	1.01	>0.9	>0.9	1.07	1.04	1.00	1.00	1.00	1.00	- Load power factor correction - Reactor projects
FORST HL 60	P1-2:A4:33:_WEST SACRAMENTO-BRIGHTON 115KV [4110] P1-2:A5:50:_COLGATE-GRASS VALLEY 60KV [6490]	P6	N-1/N-1	>0.9	0.89	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	Action plan or SPS
FRGTNTP1 115	Base Case	P0	N-0	1.04	1.02	>0.9	>0.9	1.04	1.04	1.02	1.02	1.03	1.02	Load power factor correction
FRGTNTP1 115	P2-4:A11:3:_BELLOTA 230KV - SECTION 1E & 2E	P2	Bus-tie breaker	0.96	0.73	>0.9	>0.9	1.04	0.96	0.71	0.71	0.98	0.70	Bellota 230 kV bus upgrade
FRGTNTP2 115	Base Case	P0	N-0	1.04	1.03	>0.9	>0.9	1.04	1.04	1.02	1.02	1.03	1.02	Load power factor correction
FRGTNTP2 115	P2-4:A11:3:_BELLOTA 230KV - SECTION 1E & 2E	P2	Bus-tie breaker	0.96	0.73	>0.9	>0.9	1.04	0.96	0.71	0.72	0.98	0.70	Bellota 230 kV bus upgrade

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High/Low Voltage

Substation	Contingency (All and Worst P6)	Category	Category Description	Post Cont. Voltage Deviation %										Project & Potential Mitigation Solutions
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP High CEC Forecast	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generation s	
FRNCH MS 60	Base Case	P0	N-0	1.03	1.02	>0.9	>0.9	1.03	1.03	1.01	1.01	0.94	1.01	Sensitivity only
FROGTOWN 115	Base Case	P0	N-0	1.04	1.02	>0.9	>0.9	1.04	1.04	1.02	1.02	1.03	1.02	Load power factor correction
FROGTOWN 115	P2-4:A11:3:_BELLOTA 230KV - SECTION 1E & 2E	P2	Bus-tie breaker	0.96	0.73	>0.9	>0.9	1.04	0.96	0.71	0.71	0.98	0.70	Bellota 230 kV bus upgrade
GLEAF 1 115	Base Case	P0	N-0	1.05	1.04	>0.9	>0.9	1.04	1.05	1.04	1.04	1.03	1.03	Load power factor correction
GLEAF 1 115	P1-2:A4:25:_WOODLAND-DAVIS 115KV [4210]	P1	N-1	1.05	1.04	>0.9	>0.9	1.04	1.05	1.03	1.04	1.03	1.03	Load power factor correction
GLEAF 1 115	P2-2:A4:20:_BRIGHTN 115KV SECTION ME	P2	Bus	1.05	1.04	>0.9	>0.9	1.04	1.05	1.04	1.04	1.03	1.04	Load power factor correction
GLEAF 1 115	P2-3:A4:19:_BRIGHTN - ME 115KV & WEST SACRAMENTO-BRIGHTON LINE	P2	Non-bus-tie breaker	1.05	1.03	>0.9	>0.9	1.04	1.05	1.04	1.04	1.03	1.04	Load power factor correction
GLEAF 1 115	P2-3:A4:20:_BRIGHTN - ME 115KV & BRIGHTN-DAVIS-BRKR SLG LINE	P2	Non-bus-tie breaker	1.05	1.03	>0.9	>0.9	1.04	1.05	1.04	1.04	1.03	1.04	Load power factor correction
GLEAF 1 115	P2-3:A4:24:_DAVIS - 1D 115KV & WOODLAND-DAVIS LINE	P2	Non-bus-tie breaker	1.05	1.04	>0.9	>0.9	1.04	1.05	1.04	1.04	1.03	1.04	Load power factor correction
GLEAF 1 115	P2-3:A5:83:_DRUM 115KV - RING R5 & R4	P2	Non-bus-tie breaker	1.05	1.04	>0.9	>0.9	1.04	1.05	1.04	1.04	1.03	1.04	Load power factor correction
GLEAF 1 115	P2-4:A11:3:_BELLOTA 230KV - SECTION 1E & 2E	P2	Bus-tie breaker	1.05	1.03	>0.9	>0.9	1.04	1.05	1.03	1.03	1.02	1.03	Load power factor correction
GLEAF 1 115	P2-4:A4:10:_BRIGHTN 115KV - SECTION ME & MD	P2	Bus-tie breaker	1.05	1.04	>0.9	>0.9	1.04	1.05	1.04	1.04	1.03	1.04	Load power factor correction
GLEAF 1 115	P2-4:A4:12:_DAVIS 115KV - SECTION 1E & 1F	P2	Bus-tie breaker	1.05	1.04	>0.9	>0.9	1.04	1.05	1.04	1.04	1.03	1.04	Load power factor correction
GLEAF 1 115	P2-4:A4:8:_WOODLD 115KV - SECTION 1F & 1E	P2	Bus-tie breaker	1.05	1.04	>0.9	>0.9	1.04	1.05	1.04	1.04	1.03	1.04	Load power factor correction
GLEAF 1 115	P2-1:A4:14:_WOODLAND-DAVIS 115KV [4210] (WOODLANDTP-WOODLD)	P2-1	Line Section w/o fault	1.05	1.04	>0.9	>0.9	1.04	1.05	1.04	1.04	1.03	1.03	Load power factor correction
GLEAF 1 115	P1-1:A5:4:_DRUM 5 13.80KV GEN UNIT 1 P1-2:A4:25:_WOODLAND-DAVIS 115KV [4210]	P3	G-1/N-1	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	Load power factor correction
GLEAF 1 115	P1-2:A5:17:_RIO OSO-LINCOLN 115KV [1320] P1-2:A4:25:_WOODLAND-DAVIS 115KV [4210]	P6	N-1/N-1	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	Load power factor correction
GLEAF 1 115	P7-1:A5:11_Drum-Rio Oso No. 1 115 kV Line & Drum-Rio Oso No. 2 115 kV Line	P7	DCTL	1.05	1.04	>0.9	>0.9	1.04	1.05	1.04	1.04	1.03	1.04	Load power factor correction
GLEAF2 60	P1-1:A5:24:_GRNLEAF2 13.80KV GEN UNIT 1 P1-3:A5:31:_PEAS RG 60/60KV TB 1	P3	G-1/N-1	>0.9	>0.9	>0.9	>0.9	0.86	>0.9	>0.9	>0.9	>0.9	>0.9	Project: Pease Transformer
GLEAF2 60	P1-3:A5:31:_PEAS RG 60/60KV TB 1 P1-2:A5:57:_MRYSVLLE-PEASE 60KV [0]	P6	N-1/N-1	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	0.28	Sensitivity only
GLEAF2 60	P7-1:A5:20_Palermo-Pease 115 kV Line and Pease-Rio Oso 115 kV Line	P7	DCTL	1.04	1.02	>0.9	>0.9	1.01	1.04	1.01	1.01	0.78	>0.9	Sensitivity only
GOLDHILL 115	Base Case	P0	N-0	1.06	1.04	>0.9	>0.9	1.07	1.06	1.03	1.03	1.03	1.03	- Load power factor correction - Reactor projects
GOLDHILL 115	P1-2:A5:36:_DRUM-HIGGINS 115KV [4393]	P1	N-1	1.06	1.03	>0.9	>0.9	1.08	1.06	1.02	1.02	1.03	1.02	- Load power factor correction - Reactor projects
GOLDHILL 115	P1-2:A5:37:_BELL-PLACER 115KV [4395]	P1	N-1	1.06	1.04	>0.9	>0.9	1.08	1.06	1.03	1.03	1.03	1.03	- Load power factor correction - Reactor projects

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High/Low Voltage

Substation	Contingency (All and Worst P6)	Category	Category Description	Post Cont. Voltage Deviation %										Project & Potential Mitigation Solutions
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP High CEC Forecast	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generation s	
GOLDHILL 115	P2-2:A5:19:_PLACER 115KV SECTION 1D	P2	Bus	1.07	1.05	>0.9	>0.9	1.08	1.07	1.04	1.04	1.04	1.04	- Load power factor correction - Reactor projects
GOLDHILL 115	P2-3:A5:22:_PLACER - 1D 115KV & PLACER-GOLD HILL #1 LINE	P2	Non-bus-tie breaker	1.07	1.04	>0.9	>0.9	1.08	1.07	1.04	1.04	1.04	1.04	- Load power factor correction - Reactor projects
GOLDHILL 115	P2-3:A5:23:_PLACER - 1D 115KV & PLACER-GOLD HILL #2 LINE	P2	Non-bus-tie breaker	1.07	1.05	>0.9	>0.9	1.08	1.07	1.04	1.04	1.04	1.04	- Load power factor correction - Reactor projects
GOLDHILL 115	P2-3:A5:24:_PLACER - 1D 115KV & BELL-PLACER LINE	P2	Non-bus-tie breaker	1.07	1.05	>0.9	>0.9	1.08	1.07	1.04	1.04	1.04	1.04	- Load power factor correction - Reactor projects
GOLDHILL 115	P2-3:A5:81:_DRUM 115KV - RING R2 & R3	P2	Non-bus-tie breaker	1.06	1.03	>0.9	>0.9	1.08	1.06	1.02	1.02	1.03	1.02	- Load power factor correction - Reactor projects
GOLDHILL 115	P2-3:A5:85:_BRNSWALT 115KV - RING R4 & R3	P2	Non-bus-tie breaker	1.06	1.03	>0.9	>0.9	1.08	1.06	1.02	1.02	1.03	1.02	- Load power factor correction - Reactor projects
GOLDHILL 115	P2-4:A11:3:_BELLOTA 230KV - SECTION 1E & 2E	P2	Bus-tie breaker	1.06	1.01	>0.9	>0.9	1.07	1.06	1.00	1.00	1.01	1.00	- Load power factor correction - Reactor projects
GOLDHILL 115	P2-4:A5:4:_GOLDHILL 115KV - SECTION 1F & 2F	P2	Bus-tie breaker	1.08	1.05	>0.9	>0.9	1.08	1.08	1.04	1.03	1.04	1.04	- Load power factor correction - Reactor projects
GOLDHILL 115	P2-1:A5:30:_DRUM-HIGGINS 115KV [4393] (DTCH FL1-CHCGO PK)	P2-1	Line Section w/o fault	1.06	1.03	>0.9	>0.9	1.08	1.06	1.02	1.02	1.03	1.02	- Load power factor correction - Reactor projects
GOLDHILL 115	P2-1:A5:31:_DRUM-HIGGINS 115KV [4393] (CHCGO PK-HIGGINS)	P2-1	Line Section w/o fault	1.06	1.03	>0.9	>0.9	1.08	1.06	1.02	1.02	1.03	1.02	- Load power factor correction - Reactor projects
GOLDHILL 115	P2-1:A5:34:_BELL-PLACER 115KV [4395] (PLACER-BELL PGE)	P2-1	Line Section w/o fault	1.06	1.04	>0.9	>0.9	1.08	1.06	1.03	1.03	1.03	1.03	- Load power factor correction - Reactor projects
GOLDHILL 115	P2-1:A5:37:_HIGGINS-BELL 115KV [1412] (HIGGINS-BELL PGE)	P2-1	Line Section w/o fault	1.06	1.04	>0.9	>0.9	1.08	1.06	1.03	1.03	1.03	1.03	- Load power factor correction - Reactor projects
GOLDHILL 115	P7-1:A5:19_Placer-Gold Hill No. 1 115 kV Line and Placer-Gold Hill No. 2 115 kV Line	P7	DCTL	1.07	1.05	>0.9	>0.9	1.08	1.07	1.05	1.04	1.05	1.04	- Load power factor correction - Reactor projects
GOLDHILL 230	Base Case	P0	N-0	1.01	0.98	>0.9	>0.9	1.02	1.01	0.98	0.98	0.98	0.97	Load power factor correction
GRAND IS 115	P1-2:A4:9:_RIO OSO-BRIGHTON 230KV [5600] P1-2:A11:6:_BRIGHTON-BELLOTA 230KV [4420]	P6	N-1/N-1	>0.9	0.98	>0.9	>0.9	>0.9	>0.9	0.96	0.97	>0.9	0.97	Load power factor correction
GRANITE 115	Base Case	P0	N-0	1.04	1.03	>0.9	>0.9	1.04	1.04	1.03	1.03	1.03	1.02	Load power factor correction
GRANITE 115	P2-4:A11:9:_TESLA 115KV - SECTION 1D & 2D	P2	Bus-tie breaker	1.02	0.99	>0.9	>0.9	1.06	1.02	0.95	0.97	NConv	0.91	Sensitivity only
GRSS VLY 60	Base Case	P0	N-0	1.03	1.01	>0.9	>0.9	1.05	1.03	1.01	1.00	1.02	1.00	- Load power factor correction - Reactor projects
GRSS VLY 60	P1-2:A4:33:_WEST SACRAMENTO-BRIGHTON 115KV [4110] P1-2:A5:50:_COLGATE-GRASS VALLEY 60KV [6490]	P6	N-1/N-1	>0.9	0.92	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	Action plan or SPS

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High/Low Voltage

Substation	Contingency (All and Worst P6)	Category	Category Description	Post Cont. Voltage Deviation %										Project & Potential Mitigation Solutions
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP High CEC Forecast	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generation s	
GWFRACY 115	Base Case	P0	N-0	1.04	1.03	>0.9	>0.9	1.04	1.04	1.03	1.03	1.02	1.03	Load power factor correction
HALE 115	Base Case	P0	N-0	1.06	1.02	>0.9	>0.9	1.07	1.06	1.02	1.02	1.02	1.02	- Load power factor correction - Reactor projects
HALE 115	P1-3:A4:2:_VACA-DIX 500/230KV TB 12 P1-4:A4:6:_VC DX11T SVD=V	P6	N-1/N-1	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	Load power factor correction
HALE2 115	Base Case	P0	N-0	1.06	1.02	>0.9	>0.9	1.07	1.06	1.02	1.02	1.02	1.02	- Load power factor correction - Reactor projects
HALE2 115	P1-3:A4:2:_VACA-DIX 500/230KV TB 12 P1-4:A4:6:_VC DX11T SVD=V	P6	N-1/N-1	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	Load power factor correction
HALSEY 60	P2-4:A5:4:_GOLDHILL 115KV - SECTION 1F & 2F	P2	Bus-tie breaker	1.00	0.87	>0.9	>0.9	1.03	0.99	0.83	0.27	0.94	0.88	Project: Atlantic-Placer 115 kV line Project ISD: on-hold Review project scope
HARTER 60	P1-1:A5:24:_GRNLEAF2 13.80KV GEN UNIT 1 P1-3:A5:31:_PEAS RG 60/60KV TB 1	P3	G-1/N-1	>0.9	>0.9	>0.9	>0.9	0.86	>0.9	>0.9	>0.9	>0.9	>0.9	Project: Pease Transformer
HARTER 60	P1-3:A5:31:_PEAS RG 60/60KV TB 1 P1-2:A5:57:_MRYSVLLE-PEASE 60KV [0]	P6	N-1/N-1	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	0.28	Sensitivity only
HARTER 60	P7-1:A5:20:_Palermo-Pease 115 kV Line and Pease-Rio Oso 115 kV Line	P7	DCTL	1.04	1.02	>0.9	>0.9	1.00	1.04	1.01	1.01	0.75	>0.9	Sensitivity only
HERDLYN 60	Base Case	P0	N-0	1.06	1.04	>0.9	>0.9	1.05	1.06	1.04	1.04	1.03	1.04	- Load power factor correction - Reactor projects
HERDLYN 60	P2-2:A11:56:_HERDLYN 60KV SECTION 1D	P2	Bus	1.07	1.04	>0.9	>0.9	1.06	1.07	1.04	1.04	1.03	1.04	- Load power factor correction - Reactor projects
HERDLYN 60	P2-3:A11:77:_HERDLYN - 1D 60KV & VASCO-HERDLYN LINE	P2	Non-bus-tie breaker	1.07	1.04	>0.9	>0.9	1.06	1.07	1.04	1.04	1.03	1.04	- Load power factor correction - Reactor projects
HERDLYN 60	P2-3:A11:78:_HERDLYN - 1D 60KV & HERDLYN-BALFOUR LINE	P2	Non-bus-tie breaker	1.07	1.04	>0.9	>0.9	1.06	1.07	1.04	1.04	1.03	1.04	- Load power factor correction - Reactor projects
HIGGINS 115	Base Case	P0	N-0	1.04	1.02	>0.9	>0.9	1.06	1.04	1.01	1.01	1.02	1.01	- Load power factor correction - Reactor projects
HIGGINS 115	P1-2:A5:36:_DRUM-HIGGINS 115KV [4393]	P1	N-1	1.04	0.99	>0.9	>0.9	1.07	1.04	0.98	0.97	0.98	0.98	- Load power factor correction - Reactor projects
HIGGINS 115	P2-3:A5:81:_DRUM 115KV - RING R2 & R3	P2	Non-bus-tie breaker	1.04	0.99	>0.9	>0.9	1.07	1.04	0.98	0.97	0.99	0.98	- Load power factor correction - Reactor projects
HIGGINS 115	P2-4:A11:3:_BELLOTA 230KV - SECTION 1E & 2E	P2	Bus-tie breaker	1.04	1.00	>0.9	>0.9	1.06	1.04	0.99	0.99	1.00	0.99	- Load power factor correction - Reactor projects
HIGGINS 115	P2-4:A5:4:_GOLDHILL 115KV - SECTION 1F & 2F	P2	Bus-tie breaker	0.94	0.86	>0.9	>0.9	1.05	0.93	0.83	0.40	0.93	0.87	Project: Atlantic-Placer 115 kV line Project ISD: on-hold Review project scope

Study Area: **PG&E Central Valley**



High/Low Voltage

Substation	Contingency (All and Worst P6)	Category	Category Description	Post Cont. Voltage Deviation %										Project & Potential Mitigation Solutions
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP High CEC Forecast	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generation s	
HIGGINS 115	P2-1:A5:30:_DRUM-HIGGINS 115KV [4393] (DTCH FL1-CHCGO PK)	P2-1	Line Section w/o fault	1.04	0.99	>0.9	>0.9	1.07	1.04	0.98	0.97	0.99	0.98	- Load power factor correction - Reactor projects
HIGGINS 115	P2-1:A5:31:_DRUM-HIGGINS 115KV [4393] (CHCGO PK-HIGGINS)	P2-1	Line Section w/o fault	1.04	0.98	>0.9	>0.9	1.07	1.04	0.97	0.97	0.98	0.97	- Load power factor correction - Reactor projects
HIGGINS 115	P1-2:A5:36:_DRUM-HIGGINS 115KV [4393] P1-2:A5:20:_PLACER-GOLD HILL #1 115KV [3340]	P6	N-1/N-1	>0.9	0.92	>0.9	>0.9	>0.9	>0.9	0.91	0.89	>0.9	0.91	Mitigation under review
HIGGINS 115	P7-1:A5:19_Placer-Gold Hill No. 1 115 kV Line and Placer-Gold Hill No. 2 115 kV Line	P7	DCTL	1.00	0.95	>0.9	>0.9	1.05	1.00	0.94	0.93	0.97	0.95	Load power factor correction
HJ HEINZ 115	P2-4:A11:3:_BELLOTA 230KV - SECTION 1E & 2E	P2	Bus-tie breaker	1.02	0.96	>0.9	>0.9	1.03	1.02	0.95	0.95	1.00	0.95	Load power factor correction
HJ HEINZ 115	P1-2:A11:54:_SCHULTE SW STA-LAMMERS 115KV [3993] P1-2:A11:48:_TESLA-TRACY 115KV [4020] MOAS OPENED ON LEPRINO TRACY JC	P6	N-1/N-1	>0.9	0.92	>0.9	>0.9	>0.9	>0.9	0.89	0.90	>0.9	0.91	Sensitivity only
HORSESHE 115	Base Case	P0	N-0	1.05	1.02	>0.9	>0.9	1.07	1.05	1.02	1.02	1.02	1.02	- Load power factor correction - Reactor projects
HORSESHE 115	P1-2:A5:36:_DRUM-HIGGINS 115KV [4393]	P1	N-1	1.05	1.01	>0.9	>0.9	1.07	1.05	1.00	1.00	1.01	1.00	- Load power factor correction - Reactor projects
HORSESHE 115	P1-2:A5:37:_BELL-PLACER 115KV [4395]	P1	N-1	1.05	1.03	>0.9	>0.9	1.07	1.05	1.02	1.02	1.02	1.02	- Load power factor correction - Reactor projects
HORSESHE 115	P2-2:A5:19:_PLACER 115KV SECTION 1D	P2	Bus	1.06	1.04	>0.9	>0.9	1.08	1.06	1.04	1.03	1.04	1.03	- Load power factor correction - Reactor projects
HORSESHE 115	P2-3:A5:22:_PLACER - 1D 115KV & PLACER-GOLD HILL #1 LINE	P2	Non-bus-tie breaker	1.05	1.04	>0.9	>0.9	1.08	1.05	1.03	1.03	1.04	1.03	- Load power factor correction - Reactor projects
HORSESHE 115	P2-3:A5:23:_PLACER - 1D 115KV & PLACER-GOLD HILL #2 LINE	P2	Non-bus-tie breaker	1.06	1.04	>0.9	>0.9	1.08	1.06	1.04	1.04	1.04	1.03	- Load power factor correction - Reactor projects
HORSESHE 115	P2-3:A5:24:_PLACER - 1D 115KV & BELL-PLACER LINE	P2	Non-bus-tie breaker	1.06	1.04	>0.9	>0.9	1.08	1.06	1.04	1.03	1.04	1.03	- Load power factor correction - Reactor projects
HORSESHE 115	P2-3:A5:81:_DRUM 115KV - RING R2 & R3	P2	Non-bus-tie breaker	1.05	1.01	>0.9	>0.9	1.07	1.05	1.00	1.00	1.01	1.00	- Load power factor correction - Reactor projects
HORSESHE 115	P2-3:A5:85:_BRNSWALT 115KV - RING R4 & R3	P2	Non-bus-tie breaker	1.05	1.01	>0.9	>0.9	1.07	1.05	1.00	1.00	1.01	1.00	- Load power factor correction - Reactor projects
HORSESHE 115	P2-4:A11:3:_BELLOTA 230KV - SECTION 1E & 2E	P2	Bus-tie breaker	1.05	1.00	>0.9	>0.9	1.06	1.05	0.99	0.99	1.00	0.99	- Load power factor correction - Reactor projects
HORSESHE 115	P2-4:A5:4:_GOLDHILL 115KV - SECTION 1F & 2F	P2	Bus-tie breaker	0.90	0.81	>0.9	>0.9	1.05	0.89	0.77	0.26	0.88	0.81	Project: Atlantic-Placer 115 kV line Project ISD: on-hold Review project scope
HORSESHE 115	P2-1:A5:30:_DRUM-HIGGINS 115KV [4393] (DTCH FL1-CHCGO PK)	P2-1	Line Section w/o fault	1.05	1.01	>0.9	>0.9	1.07	1.05	1.00	1.00	1.01	1.00	- Load power factor correction - Reactor projects

Study Area: **PG&E Central Valley**



High/Low Voltage

Substation	Contingency (All and Worst P6)	Category	Category Description	Post Cont. Voltage Deviation %										Project & Potential Mitigation Solutions
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP High CEC Forecast	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations	
HORSESHE 115	P2-1:A5:31:_DRUM-HIGGINS 115KV [4393] (CHCGO PK-HIGGINS)	P2-1	Line Section w/o fault	1.05	1.01	>0.9	>0.9	1.07	1.05	1.00	1.00	1.01	1.00	- Load power factor correction - Reactor projects
HORSESHE 115	P2-1:A5:34:_BELL-PLACER 115KV [4395] (PLACER-BELL PGE)	P2-1	Line Section w/o fault	1.06	1.03	>0.9	>0.9	1.07	1.05	1.02	1.02	1.02	1.02	- Load power factor correction - Reactor projects
HORSESHE 115	P2-1:A5:37:_HIGGINS-BELL 115KV [1412] (HIGGINS-BELL PGE)	P2-1	Line Section w/o fault	1.05	1.02	>0.9	>0.9	1.07	1.05	1.01	1.01	1.01	1.01	- Load power factor correction - Reactor projects
INDSTR J 60	Base Case	P0	N-0	1.07	1.02	>0.9	>0.9	1.02	1.06	1.01	1.01	1.02	1.01	- Load power factor correction - Reactor projects
INDSTR J 60	P1-2:A11:7:_LOCKEFORD-BELLOTA 230KV [4990]	P1	N-1	1.07	0.92	>0.9	>0.9	1.01	1.07	0.89	0.90	0.94	0.89	Significant leading power factor in 2019 (0.7) Project: Lockeford-Lodi area 230 kV development Scope is under review
INDSTR J 60	P2-2:A11:9:_BELLOTA 230KV SECTION 2E	P2	Bus	1.07	0.92	>0.9	>0.9	1.01	1.07	0.89	0.90	0.94	0.89	Significant leading power factor in 2019 (0.7) Project: Lockeford-Lodi area 230 kV development Scope is under review
INDSTR J 60	P2-3:A11:81:_LOCKFORD 230KV - RING R3 & R4	P2	Non-bus-tie breaker	1.07	0.84	>0.9	>0.9	1.01	1.07	0.79	0.81	0.88	0.78	Significant leading power factor in 2019 (0.7) Project: Lockeford-Lodi area 230 kV development Scope is under review
INDSTR J 60	P2-3:A11:82:_LOCKFORD 230KV - RING R3 & R2	P2	Non-bus-tie breaker	1.07	0.84	>0.9	>0.9	1.01	1.07	0.77	0.80	0.88	0.77	Significant leading power factor in 2019 (0.7) Project: Lockeford-Lodi area 230 kV development Scope is under review
INDSTR J 60	P2-4:A11:1:_BELLOTA 230KV - SECTION 2D & 2E	P2	Bus-tie breaker	1.07	0.92	>0.9	>0.9	1.01	1.07	0.89	0.89	0.93	0.88	Significant leading power factor in 2019 (0.7) Project: Lockeford-Lodi area 230 kV development Scope is under review
INDSTR J 60	P2-4:A11:3:_BELLOTA 230KV - SECTION 1E & 2E	P2	Bus-tie breaker	1.07	0.88	>0.9	>0.9	1.01	1.07	0.84	0.85	0.91	0.84	Significant leading power factor in 2019 (0.7) Project: Lockeford-Lodi area 230 kV development Scope is under review
INDSTR J 60	P1-3:A11:5:_LOCKFORD 230/60KV TB 3 P1-2:A11:7:_LOCKEFORD-BELLOTA 230KV [4990]	P6	N-1/N-1	>0.9	0.84	>0.9	>0.9	>0.9	>0.9	0.86	0.86	0.87	0.81	Significant leading power factor in 2019 (0.7) Project: Lockeford-Lodi area 230 kV development Scope is under review
INDSTR J 60	P7-1:A11:12:_BRIGHTON-BELLOTA 230KV [4420] & LOCKEFORD-BELLOTA 230KV [4990]	P7	DCTL	1.07	0.88	>0.9	>0.9	1.01	1.08	0.85	0.86	0.92	0.84	Significant leading power factor in 2019 (0.7) Project: Lockeford-Lodi area 230 kV development Scope is under review
INE PRSN 60	P1-2:A11:74:_VALLEY SPRINGS-CLAY 60KV [8252] P1-2:A11:73:_VALLEY SPRINGS-MARTELL #1 60KV [8241]	P6	N-1/N-1	>0.9	>0.9	>0.9	>0.9	0.83	>0.9	>0.9	>0.9	>0.9	>0.9	Action plan or SPS
INGRM C. 115	Base Case	P0	N-0	1.04	1.02	>0.9	>0.9	1.04	1.04	1.02	1.02	1.02	1.02	Load power factor correction

Study Area: **PG&E Central Valley**



High/Low Voltage

Substation	Contingency (All and Worst P6)	Category	Category Description	Post Cont. Voltage Deviation %										Project & Potential Mitigation Solutions
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP High CEC Forecast	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generation s	
JAMESN-A 115	Base Case	P0	N-0	1.05	1.03	>0.9	>0.9	1.06	1.05	1.02	1.02	1.01	1.03	- Load power factor correction - Reactor projects
JAMESON 115	Base Case	P0	N-0	1.06	1.02	>0.9	>0.9	1.06	1.06	1.01	1.01	1.02	1.01	- Load power factor correction - Reactor projects
JAMESON 115	P1-3:A4:2:_VACA-DIX 500/230KV TB 12 P1-4:A4:6:_VC DX11T SVD=V	P6	N-1/N-1	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	Load power factor correction
KASSON 115	P1-2:A11:54:_SCHULTE SW STA-LAMMERS 115KV [3993] P1-2:A11:48:_TESLA-TRACY 115KV [4020] MOAS OPENED ON LEPRINO TRACY JC	P6	N-1/N-1	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	0.90	0.91	>0.9	0.92	Sensitivity only
KASSON 60	Base Case	P0	N-0	1.04	1.04	>0.9	>0.9	1.05	1.04	1.03	1.03	1.03	1.03	- Load power factor correction - Reactor projects
KNIGHTLD 115	Base Case	P0	N-0	1.03	1.02	>0.9	>0.9	1.04	1.03	1.02	1.03	1.04	1.02	Load power factor correction
KNIGHTLD 115	P1-2:A4:25:_WOODLAND-DAVIS 115KV [4210]	P1	N-1	1.04	1.02	>0.9	>0.9	1.04	1.04	1.01	1.03	1.03	1.02	Load power factor correction
KNIGHTLD 115	P2-2:A4:17:_WOODLD 115KV SECTION 1F	P2	Bus	1.03	1.02	>0.9	>0.9	1.04	1.03	1.01	1.02	1.03	1.01	Load power factor correction
KNIGHTLD 115	P2-2:A4:18:_WOODLD 115KV SECTION 1D	P2	Bus	1.05	1.04	>0.9	>0.9	1.04	1.05	1.04	1.05	1.05	1.04	- Load power factor correction - Reactor projects
KNIGHTLD 115	P2-2:A4:20:_BRIGHTN 115KV SECTION ME	P2	Bus	1.01	1.02	>0.9	>0.9	1.03	1.03	1.02	1.01	1.03	1.01	Load power factor correction
KNIGHTLD 115	P2-2:A4:26:_DAVIS 115KV SECTION 1D	P2	Bus	1.04	1.03	>0.9	>0.9	1.04	1.04	1.02	1.03	1.04	1.02	Load power factor correction
KNIGHTLD 115	P2-3:A4:16:_WOODLD - 1F 115KV & WOODLAND-DAVIS LINE	P2	Non-bus-tie breaker	1.03	1.02	>0.9	>0.9	1.04	1.03	1.01	1.02	1.03	1.01	Load power factor correction
KNIGHTLD 115	P2-3:A4:17:_WOODLD - 1F 115KV & RIO OSO-WOODLAND #2 LINE	P2	Non-bus-tie breaker	1.03	1.02	>0.9	>0.9	1.04	1.03	1.01	1.02	1.03	1.01	Load power factor correction
KNIGHTLD 115	P2-3:A4:19:_BRIGHTN - ME 115KV & WEST SACRAMENTO-BRIGHTON LINE	P2	Non-bus-tie breaker	1.01	1.00	>0.9	>0.9	1.03	1.03	1.02	1.01	1.03	1.01	Load power factor correction
KNIGHTLD 115	P2-3:A4:24:_DAVIS - 1D 115KV & WOODLAND-DAVIS LINE	P2	Non-bus-tie breaker	1.04	1.02	>0.9	>0.9	1.04	1.04	1.02	1.03	1.03	1.02	Load power factor correction
KNIGHTLD 115	P2-4:A4:10:_BRIGHTN 115KV - SECTION ME & MD	P2	Bus-tie breaker	1.01	1.02	>0.9	>0.9	1.03	1.03	1.02	1.01	1.03	1.01	Load power factor correction
KNIGHTLD 115	P2-4:A4:11:_DAVIS 115KV - SECTION 1D & 1E	P2	Bus-tie breaker	1.04	1.03	>0.9	>0.9	1.04	1.04	1.02	1.03	1.04	1.02	Load power factor correction
KNIGHTLD 115	P2-4:A4:12:_DAVIS 115KV - SECTION 1E & 1F	P2	Bus-tie breaker	1.04	1.02	>0.9	>0.9	1.04	1.04	1.02	1.02	1.03	1.01	Load power factor correction
KNIGHTLD 115	P2-4:A4:8:_WOODLD 115KV - SECTION 1F & 1E	P2	Bus-tie breaker	1.04	1.04	>0.9	>0.9	1.04	1.04	1.03	1.04	1.04	1.03	Load power factor correction
KNIGHTLD 115	P2-4:A4:9:_WOODLD 115KV - SECTION 1D & 1E	P2	Bus-tie breaker	1.05	1.05	>0.9	>0.9	1.04	1.05	1.05	1.05	1.05	1.05	- Load power factor correction - Reactor projects
KNIGHTLD 115	P2-1:A4:14:_WOODLAND-DAVIS 115KV [4210] (WOODLANDTP-WOODLD)	P2-1	Line Section w/o fault	1.04	1.02	>0.9	>0.9	1.04	1.04	1.02	1.03	1.03	1.02	Load power factor correction
KNIGHTLD 115	P2-1:A4:5:_WOODLAND-DAVIS 115KV [4210] (Q653FJCT-DAVIS)	P2-1	Line Section w/o fault	1.04	1.03	>0.9	>0.9	1.04	1.04	1.02	1.03	1.04	1.02	Load power factor correction

Study Area: **PG&E Central Valley**



High/Low Voltage

Substation	Contingency (All and Worst P6)	Category	Category Description	Post Cont. Voltage Deviation %										Project & Potential Mitigation Solutions
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP High CEC Forecast	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generation s	
KNIGHTLD 115	P2-1:A4:6:_WOODLAND-DAVIS 115KV [4210] (WOODLANDTP-Q653FJCT)	P2-1	Line Section w/o fault	1.04	1.03	>0.9	>0.9	1.04	1.04	1.02	1.03	1.04	1.02	Load power factor correction
KNIGHTLD 115	P1-1:A5:4:_DRUM 5 13.80KV GEN UNIT 1 P1-2:A4:25:_WOODLAND-DAVIS 115KV [4210]	P3	G-1/N-1	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	Load power factor correction
KNIGHTLD 115	P1-2:A5:17:_RIO OSO-LINCOLN 115KV [1320] P1-2:A4:25:_WOODLAND-DAVIS 115KV [4210]	P6	N-1/N-1	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	Load power factor correction
LAMMERS 115	Base Case	P0	N-0	1.04	1.03	>0.9	>0.9	1.04	1.04	1.03	1.03	1.02	1.03	Load power factor correction
LAMMERS 115	P1-2:A11:54:_SCHULTE SW STA-LAMMERS 115KV [3993] P1-2:A11:48:_TESLA-TRACY 115KV [4020] MOAS OPENED ON LEPRINO TRACY JC	P6	N-1/N-1	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	0.89	0.90	>0.9	0.91	Sensitivity only
LEPRINO 115	P1-2:A11:54:_SCHULTE SW STA-LAMMERS 115KV [3993] P1-2:A11:48:_TESLA-TRACY 115KV [4020] MOAS OPENED ON LEPRINO TRACY JC	P6	N-1/N-1	>0.9	0.92	>0.9	>0.9	>0.9	>0.9	0.89	0.90	>0.9	0.91	Action plan or SPS
LINCLN 115	Base Case	P0	N-0	1.04	1.02	>0.9	>0.9	1.04	1.04	1.01	1.02	1.02	1.01	Load power factor correction
LINCLN 115	P1-2:A5:18:_LINCOLN-PLEASANT GROVE 115KV [7400]	P1	N-1	1.05	1.04	>0.9	>0.9	1.04	1.05	1.03	1.04	1.04	1.03	Load power factor correction
LINCLN 115	P1-1:A5:4:_DRUM 5 13.80KV GEN UNIT 1 P1-2:A5:18:_LINCOLN-PLEASANT GROVE 115KV [7400]	P3	G-1/N-1	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	Load power factor correction
LINCLN 115	P5-5:A5:1:_Atlantic 230 kV BAAH Bus #1 (failure of non-redundent relay)	P55	Non-Redundant	1.02	0.97	>0.9	>0.9	1.03	1.02	0.98	0.97	1.01	0.96	Load power factor correction
LINCLN 115	P1-2:A4:25:_WOODLAND-DAVIS 115KV [4210] P1-2:A5:18:_LINCOLN-PLEASANT GROVE 115KV [7400]	P6	N-1/N-1	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	Load power factor correction
LIVE OAK 60	P1-1:A5:24:_GRNLEAF2 13.80KV GEN UNIT 1 P1-3:A5:31:_PEAS RG 60/60KV TB 1	P3	G-1/N-1	>0.9	>0.9	>0.9	>0.9	0.89	>0.9	>0.9	>0.9	>0.9	>0.9	Project: Pease Transformer
LIVE OAK 60	P1-3:A5:31:_PEAS RG 60/60KV TB 1 P1-2:A5:57:_MRYSVLE-PEASE 60KV [0]	P6	N-1/N-1	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	0.37	Sensitivity only
LIVE OAK 60	P7-1:A5:20_Palermo-Pease 115 kV Line and Pease-Rio Oso 115 kV Line	P7	DCTL	1.02	0.99	>0.9	>0.9	1.00	1.02	0.98	0.98	0.78	>0.9	Sensitivity only
LLNL TAP 115	Base Case	P0	N-0	1.04	1.03	>0.9	>0.9	1.04	1.04	1.03	1.03	1.02	1.02	Load power factor correction
LOCKEFRD 60	P2-3:A11:81:_LOCKFORD 230KV - RING R3 & R4	P2	Non-bus-tie breaker	1.05	0.88	>0.9	>0.9	1.03	1.05	0.83	0.84	0.91	0.82	Significant leading power factor in 2019 (0.7) Project: Lockeford-Lodi area 230 kV development Scope is under review
LOCKEFRD 60	P2-3:A11:82:_LOCKFORD 230KV - RING R3 & R2	P2	Non-bus-tie breaker	1.05	0.87	>0.9	>0.9	1.03	1.05	0.81	0.84	0.91	0.81	Significant leading power factor in 2019 (0.7) Project: Lockeford-Lodi area 230 kV development Scope is under review
LOCKEFRD 60	P2-4:A11:3:_BELLOTA 230KV - SECTION 1E & 2E	P2	Bus-tie breaker	1.04	0.91	>0.9	>0.9	1.03	1.04	0.88	0.89	0.94	0.88	Significant leading power factor in 2019 (0.7) Project: Lockeford-Lodi area 230 kV development Scope is under review

Study Area: **PG&E Central Valley**



High/Low Voltage

Substation	Contingency (All and Worst P6)	Category	Category Description	Post Cont. Voltage Deviation %										Project & Potential Mitigation Solutions	
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP High CEC Forecast	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generation s		
LOCKEFRD 60	P1-3:A11:5:_LOCKFORD 230/60KV TB 3 P1-2:A11:7:_LOCKEFORD-BELLOTA 230KV [4990]	P6	N-1/N-1	>0.9	0.87	>0.9	>0.9	>0.9	>0.9	>0.9	0.88	0.89	0.90	0.84	Significant leading power factor in 2019 (0.7) Project: Lockeford-Lodi area 230 kV development Scope is under review
LOCKEFRD 60	P7-1:A11:12:_BRIGHTON-BELLOTA 230KV [4420] & LOCKEFORD-BELLOTA 230KV [4990]	P7	DCTL	1.04	0.91	>0.9	>0.9	1.03	1.05	0.88	0.89	0.94	0.88	Significant leading power factor in 2019 (0.7) Project: Lockeford-Lodi area 230 kV development Scope is under review	
LOCKFORD 115	P2-4:A11:3:_BELLOTA 230KV - SECTION 1E & 2E	P2	Bus-tie breaker	0.83	0.31	>0.9	>0.9	1.02	0.82	0.29	0.29	0.87	0.31	Significant leading power factor in 2019 (0.7) Project: Lockeford-Lodi area 230 kV development Scope is under review	
LOCKFORD 115	P1-3:A11:10:_BELLOTA 230/115KV TB 1 P1-3:A11:11:_BELLOTA 230/115KV TB 2	P6	N-1/N-1	0.92	0.72	>0.9	>0.9	>0.9	0.92	>0.9	>0.9	0.90	0.75	Significant leading power factor in 2019 (0.7) Project: Lockeford-Lodi area 230 kV development Scope is under review	
LOCKFORD 230	Base Case	P0	N-0	1.04	0.98	>0.9	>0.9	1.02	1.04	0.98	0.98	0.97	0.98	Load power factor correction	
LOCKFORD 230	P1-2:A11:7:_LOCKEFORD-BELLOTA 230KV [4990]	P1	N-1	1.07	0.84	>0.9	>0.9	0.97	1.07	0.82	0.83	0.86	0.82	Significant leading power factor in 2019 (0.7) Project: Lockeford-Lodi area 230 kV development Scope is under review	
LOCKFORD 230	P2-2:A11:9:_BELLOTA 230KV SECTION 2E	P2	Bus	1.07	0.84	>0.9	>0.9	0.97	1.07	0.82	0.83	0.86	0.82	Significant leading power factor in 2019 (0.7) Project: Lockeford-Lodi area 230 kV development Scope is under review	
LOCKFORD 230	P2-3:A11:81:_LOCKFORD 230KV - RING R3 & R4	P2	Non-bus-tie breaker	1.06	0.81	>0.9	>0.9	0.97	1.06	0.78	0.78	0.83	0.77	Significant leading power factor in 2019 (0.7) Project: Lockeford-Lodi area 230 kV development Scope is under review	
LOCKFORD 230	P2-3:A11:82:_LOCKFORD 230KV - RING R3 & R2	P2	Non-bus-tie breaker	1.06	0.81	>0.9	>0.9	0.97	1.06	0.76	0.78	0.83	0.76	Significant leading power factor in 2019 (0.7) Project: Lockeford-Lodi area 230 kV development Scope is under review	
LOCKFORD 230	P2-4:A11:1:_BELLOTA 230KV - SECTION 2D & 2E	P2	Bus-tie breaker	1.07	0.84	>0.9	>0.9	0.97	1.07	0.82	0.82	0.85	0.81	Significant leading power factor in 2019 (0.7) Project: Lockeford-Lodi area 230 kV development Scope is under review	
LOCKFORD 230	P2-4:A11:3:_BELLOTA 230KV - SECTION 1E & 2E	P2	Bus-tie breaker	1.06	0.81	>0.9	>0.9	0.97	1.06	0.78	0.79	0.84	0.78	Significant leading power factor in 2019 (0.7) Project: Lockeford-Lodi area 230 kV development Scope is under review	
LOCKFORD 230	P7-1:A11:12:_BRIGHTON-BELLOTA 230KV [4420] & LOCKEFORD-BELLOTA 230KV [4990]	P7	DCTL	1.06	0.81	>0.9	>0.9	0.97	1.06	0.79	0.79	0.84	0.78	Significant leading power factor in 2019 (0.7) Project: Lockeford-Lodi area 230 kV development Scope is under review	
LODI 60	Base Case	P0	N-0	1.06	1.02	>0.9	>0.9	1.02	1.06	1.01	1.01	1.02	1.01	Load power factor correction	

Study Area: **PG&E Central Valley**



High/Low Voltage

Substation	Contingency (All and Worst P6)	Category	Category Description	Post Cont. Voltage Deviation %										Project & Potential Mitigation Solutions
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP High CEC Forecast	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations	
LODI 60	P1-2:A11:7:_LOCKEFORD-BELLOTA 230KV [4990]	P1	N-1	1.07	0.92	>0.9	>0.9	1.01	1.07	0.89	0.90	0.94	0.89	Significant leading power factor in 2019 (0.7) Project: Lockeford-Lodi area 230 kV development Scope is under review
LODI 60	P2-2:A11:9:_BELLOTA 230KV SECTION 2E	P2	Bus	1.07	0.92	>0.9	>0.9	1.01	1.07	0.89	0.90	0.93	0.88	Load power factor correction or voltage support if needed
LODI 60	P2-3:A11:81:_LOCKFORD 230KV - RING R3 & R4	P2	Non-bus-tie breaker	1.07	0.84	>0.9	>0.9	1.01	1.07	0.79	0.80	0.88	0.78	Significant leading power factor in 2019 (0.7) Project: Lockeford-Lodi area 230 kV development Scope is under review
LODI 60	P2-3:A11:82:_LOCKFORD 230KV - RING R3 & R2	P2	Non-bus-tie breaker	1.07	0.84	>0.9	>0.9	1.01	1.07	0.77	0.80	0.87	0.77	Significant leading power factor in 2019 (0.7) Project: Lockeford-Lodi area 230 kV development Scope is under review
LODI 60	P2-4:A11:1:_BELLOTA 230KV - SECTION 2D & 2E	P2	Bus-tie breaker	1.07	0.91	>0.9	>0.9	1.01	1.07	0.88	0.89	0.92	0.88	Load power factor correction or voltage support if needed
LODI 60	P2-4:A11:3:_BELLOTA 230KV - SECTION 1E & 2E	P2	Bus-tie breaker	1.07	0.88	>0.9	>0.9	1.01	1.07	0.84	0.85	0.91	0.84	Load power factor correction or voltage support if needed
LODI 60	P1-3:A11:5:_LOCKFORD 230/60KV TB 3 P1-2:A11:7:_LOCKEFORD-BELLOTA 230KV [4990]	P6	N-1/N-1	>0.9	0.84	>0.9	>0.9	>0.9	>0.9	0.85	0.86	0.87	0.81	Significant leading power factor in 2019 (0.7) Project: Lockeford-Lodi area 230 kV development Scope is under review
LODI 60	P7-1:A11:12:_BRIGHTON-BELLOTA 230KV [4420] & LOCKEFORD-BELLOTA 230KV [4990]	P7	DCTL	1.07	0.88	>0.9	>0.9	1.01	1.07	0.84	0.85	0.91	0.84	Significant leading power factor in 2019 (0.7) Project: Lockeford-Lodi area 230 kV development Scope is under review
LYOTH-SP 60	Base Case	P0	N-0	1.04	1.04	>0.9	>0.9	1.05	1.04	1.03	1.03	1.03	1.03	Load power factor correction
MADISON 115	Base Case	P0	N-0	1.06	1.03	>0.9	>0.9	1.07	1.07	1.03	1.03	1.03	1.03	- Load power factor correction - Reactor projects
MADISON 115	P1-3:A4:1:_VACA-DIX 500/230KV TB 11	P1	N-1	1.07	1.03	>0.9	>0.9	1.07	1.07	1.03	1.03	1.03	1.03	- Load power factor correction - Reactor projects
MADISON 115	P1-4:A4:6:_VC DX11T SVD=V	P1	N-1	1.06	1.03	>0.9	>0.9	1.07	1.07	1.03	1.03	1.03	1.03	- Load power factor correction - Reactor projects
MADISON 115	P2-2:A4:7:_VACA-DIX 230KV SECTION NA	P2	Bus	1.08	1.04	>0.9	>0.9	1.07	1.08	1.04	1.03	1.04	1.04	- Load power factor correction - Reactor projects
MADISON 115	P1-3:A4:2:_VACA-DIX 500/230KV TB 12 P1-4:A4:6:_VC DX11T SVD=V	P6	N-1/N-1	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	Load power factor correction
MAINE-PR 60	Base Case	P0	N-0	1.07	1.03	>0.9	>0.9	1.07	1.07	1.02	1.02	1.02	1.03	- Load power factor correction - Reactor projects
MAINE-PR 60	P1-3:A4:1:_VACA-DIX 500/230KV TB 11	P1	N-1	1.08	1.03	>0.9	>0.9	1.07	1.08	1.03	1.02	1.03	1.03	- Load power factor correction - Reactor projects

Study Area: **PG&E Central Valley**



High/Low Voltage

Substation	Contingency (All and Worst P6)	Category	Category Description	Post Cont. Voltage Deviation %										Project & Potential Mitigation Solutions
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP High CEC Forecast	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generation s	
MAINE-PR 60	P1-4:A4:6:_VC DX11T SVD=V	P1	N-1	1.07	1.03	>0.9	>0.9	1.07	1.07	1.02	1.02	1.02	1.03	- Load power factor correction - Reactor projects
MAINE-PR 60	P2-2:A4:7:_VACA-DIX 230KV SECTION NA	P2	Bus	1.09	1.04	>0.9	>0.9	1.07	1.08	1.03	1.02	1.04	1.04	- Load power factor correction - Reactor projects
MAINE-PR 60	P1-2:A4:50:_VACA-DXN-TRVS_HPT 60KV [0] P1-3:A4:1:_VACA-DIX 500/230KV TB 11	P6	N-1/N-1	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	Load power factor correction
MANTECA 115	P2-4:A11:3:_BELLOTA 230KV - SECTION 1E & 2E	P2	Bus-tie breaker	1.01	0.91	>0.9	>0.9	1.02	1.01	0.90	0.90	0.99	0.90	Sensitivity only
MANTECA 115	P1-2:A11:54:_SCHULTE SW STA-LAMMERS 115KV [3993] P1-2:A11:48:_TESLA-TRACY 115KV [4020] MOAS OPENED ON LEPRINO TRACY JC	P6	N-1/N-1	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	0.90	0.91	>0.9	>0.9	Sensitivity only
MARTELL 60	P1-2:A11:74:_VALLEY SPRINGS-CLAY 60KV [8252] P1-2:A11:73:_VALLEY SPRINGS-MARTELL #1 60KV [8241]	P6	N-1/N-1	>0.9	>0.9	>0.9	>0.9	0.87	>0.9	>0.9	>0.9	>0.9	>0.9	- Load power factor correction - Reactor projects
MARTELT 60	P1-2:A11:74:_VALLEY SPRINGS-CLAY 60KV [8252] P1-2:A11:73:_VALLEY SPRINGS-MARTELL #1 60KV [8241]	P6	N-1/N-1	>0.9	>0.9	>0.9	>0.9	0.87	>0.9	>0.9	>0.9	>0.9	>0.9	- Load power factor correction - Reactor projects
MCD_ISLE 60	Base Case	P0	N-0	1.00	0.99	>0.9	>0.9	1.01	1.00	0.99	0.99	0.98	0.99	Load power factor correction
MCSP 60	P1-2:A11:74:_VALLEY SPRINGS-CLAY 60KV [8252] P1-2:A11:73:_VALLEY SPRINGS-MARTELL #1 60KV [8241]	P6	N-1/N-1	>0.9	>0.9	>0.9	>0.9	0.83	>0.9	>0.9	>0.9	>0.9	>0.9	- Load power factor correction - Reactor projects
MDL_RIVR 60	Base Case	P0	N-0	1.01	1.00	>0.9	>0.9	1.02	1.02	1.00	1.00	0.99	1.00	Load power factor correction
MDSNVDSW159 115	Base Case	P0	N-0	1.07	1.04	>0.9	>0.9	1.07	1.07	1.04	1.04	1.03	1.04	- Load power factor correction - Reactor projects
MDSNVDSW159 115	P1-3:A4:1:_VACA-DIX 500/230KV TB 11	P1	N-1	1.07	1.04	>0.9	>0.9	1.08	1.07	1.04	1.04	1.04	1.04	- Load power factor correction - Reactor projects
MDSNVDSW159 115	P1-4:A4:6:_VC DX11T SVD=V	P1	N-1	1.07	1.04	>0.9	>0.9	1.07	1.07	1.04	1.04	1.03	1.04	- Load power factor correction - Reactor projects
MDSNVDSW159 115	P2-2:A4:7:_VACA-DIX 230KV SECTION NA	P2	Bus	1.08	1.05	>0.9	>0.9	1.08	1.08	1.05	1.04	1.05	1.05	- Load power factor correction - Reactor projects
MDSNVDSW159 115	P1-3:A4:2:_VACA-DIX 500/230KV TB 12 P1-4:A4:6:_VC DX11T SVD=V	P6	N-1/N-1	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	Load power factor correction
MDSTO CN 115	Base Case	P0	N-0	1.04	1.03	>0.9	>0.9	1.04	1.04	1.03	1.03	1.03	1.02	Load power factor correction
MDSTO CN 115	P2-4:A11:9:_TESLA 115KV - SECTION 1D & 2D	P2	Bus-tie breaker	1.02	0.99	>0.9	>0.9	1.06	1.02	0.95	0.97	NConv	0.91	Sensitivity only
MDWYWND 115	Base Case	P0	N-0	1.04	1.03	>0.9	>0.9	1.04	1.04	1.03	1.03	1.03	1.03	Load power factor correction
MELONES 115	Base Case	P0	N-0	1.04	1.02	>0.9	>0.9	1.04	1.04	1.02	1.02	1.03	1.01	Load power factor correction
MELONES 115	P2-4:A11:3:_BELLOTA 230KV - SECTION 1E & 2E	P2	Bus-tie breaker	0.93	0.66	>0.9	>0.9	1.04	0.93	0.63	0.64	0.95	0.62	Bellota 230 kV bus upgrade
MELONES 115	P1-3:A11:10:_BELLOTA 230/115KV TB 1 P1-3:A11:11:_BELLOTA 230/115KV TB 2	P6	N-1/N-1	0.98	0.88	>0.9	>0.9	>0.9	0.98	>0.9	>0.9	0.97	0.89	Action plan or SPS
METTLER 60	Base Case	P0	N-0	1.02	1.02	>0.9	>0.9	1.04	1.02	1.02	1.02	1.03	1.02	Load power factor correction

High/Low Voltage

Substation	Contingency (All and Worst P6)	Category	Category Description	Post Cont. Voltage Deviation %										Project & Potential Mitigation Solutions
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP High CEC Forecast	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generation s	
METTLER 60	P1-2:A11:7:_LOCKEFORD-BELLOTA 230KV [4990]	P1	N-1	1.02	1.02	>0.9	>0.9	1.04	1.02	1.02	1.02	1.03	1.02	Load power factor correction
METTLER 60	P2-2:A11:9:_BELLOTA 230KV SECTION 2E	P2	Bus	1.02	1.02	>0.9	>0.9	1.04	1.02	1.02	1.02	1.03	1.02	Load power factor correction
METTLER 60	P2-3:A11:81:_LOCKFORD 230KV - RING R3 & R4	P2	Non-bus-tie breaker	1.02	1.02	>0.9	>0.9	1.04	1.02	1.02	1.02	1.03	1.01	Load power factor correction
METTLER 60	P2-3:A11:82:_LOCKFORD 230KV - RING R3 & R2	P2	Non-bus-tie breaker	1.02	1.02	>0.9	>0.9	1.04	1.02	1.02	1.02	1.03	1.01	Load power factor correction
METTLER 60	P2-4:A11:3:_BELLOTA 230KV - SECTION 1E & 2E	P2	Bus-tie breaker	1.02	1.02	>0.9	>0.9	1.04	1.02	1.02	1.01	1.03	1.01	Load power factor correction
METTLER 60	P7-1:A11:12:_BRIGHTON-BELLOTA 230KV [4420] & LOCKEFORD-BELLOTA 230KV [4990]	P7	DCTL	1.02	1.02	>0.9	>0.9	1.04	1.02	1.01	1.02	1.03	1.02	Load power factor correction
MIDLFORK 230	Base Case	P0	N-0	1.03	1.01	>0.9	>0.9	1.04	1.03	1.00	1.00	0.98	1.00	Load power factor correction
MILLER 115	Base Case	P0	N-0	1.04	1.03	>0.9	>0.9	1.04	1.05	1.03	1.03	1.03	1.02	Load power factor correction
MILLER 115	P2-4:A11:9:_TESLA 115KV - SECTION 1D & 2D	P2	Bus-tie breaker	1.02	0.99	>0.9	>0.9	1.06	1.02	0.95	0.97	NConv	0.91	Sensitivity only
MI-WUK 115	P2-4:A11:3:_BELLOTA 230KV - SECTION 1E & 2E	P2	Bus-tie breaker	0.97	0.72	>0.9	>0.9	1.03	0.96	0.69	0.70	0.99	0.68	Bellota 230 kV bus upgrade
MOBILCHE 115	Base Case	P0	N-0	1.03	1.02	>0.9	>0.9	1.03	1.02	1.01	1.02	1.03	1.01	Load power factor correction
MOBILCHE 115	P1-2:A4:25:_WOODLAND-DAVIS 115KV [4210]	P1	N-1	1.03	1.01	>0.9	>0.9	1.04	1.03	1.00	1.01	1.03	1.01	Load power factor correction
MOBILCHE 115	P2-2:A4:17:_WOODLD 115KV SECTION 1F	P2	Bus	1.02	1.00	>0.9	>0.9	1.04	1.02	0.99	1.00	1.02	1.00	Load power factor correction
MOBILCHE 115	P2-2:A4:18:_WOODLD 115KV SECTION 1D	P2	Bus	1.05	1.04	>0.9	>0.9	1.04	1.05	1.04	1.05	1.05	1.04	- Load power factor correction - Reactor projects
MOBILCHE 115	P2-2:A4:26:_DAVIS 115KV SECTION 1D	P2	Bus	1.03	1.02	>0.9	>0.9	1.04	1.03	1.01	1.02	1.03	1.01	Load power factor correction
MOBILCHE 115	P2-3:A4:16:_WOODLD - 1F 115KV & WOODLAND-DAVIS LINE	P2	Non-bus-tie breaker	1.02	1.00	>0.9	>0.9	1.04	1.02	0.99	1.00	1.02	1.00	Load power factor correction
MOBILCHE 115	P2-3:A4:17:_WOODLD - 1F 115KV & RIO OSO-WOODLAND #2 LINE	P2	Non-bus-tie breaker	1.02	1.00	>0.9	>0.9	1.04	1.02	0.99	1.00	1.02	1.00	Load power factor correction
MOBILCHE 115	P2-3:A4:24:_DAVIS - 1D 115KV & WOODLAND-DAVIS LINE	P2	Non-bus-tie breaker	1.03	1.01	>0.9	>0.9	1.04	1.03	1.01	1.02	1.02	1.01	Load power factor correction
MOBILCHE 115	P2-4:A4:11:_DAVIS 115KV - SECTION 1D & 1E	P2	Bus-tie breaker	1.04	1.02	>0.9	>0.9	1.04	1.04	1.01	1.02	1.03	1.01	Load power factor correction
MOBILCHE 115	P2-4:A4:12:_DAVIS 115KV - SECTION 1E & 1F	P2	Bus-tie breaker	1.03	1.01	>0.9	>0.9	1.04	1.03	1.00	1.01	1.03	1.00	Load power factor correction
MOBILCHE 115	P2-4:A4:8:_WOODLD 115KV - SECTION 1F & 1E	P2	Bus-tie breaker	1.03	1.03	>0.9	>0.9	1.04	1.03	1.03	1.03	1.04	1.03	Load power factor correction
MOBILCHE 115	P2-4:A4:9:_WOODLD 115KV - SECTION 1D & 1E	P2	Bus-tie breaker	1.05	1.05	>0.9	>0.9	1.04	1.05	1.05	1.05	1.05	1.05	- Load power factor correction - Reactor projects
MOBILCHE 115	P2-1:A4:14:_WOODLAND-DAVIS 115KV [4210] (WOODLANDTP-WOODLD)	P2-1	Line Section w/o fault	1.03	1.01	>0.9	>0.9	1.04	1.03	1.00	1.02	1.03	1.01	Load power factor correction
MOBILCHE 115	P2-1:A4:5:_WOODLAND-DAVIS 115KV [4210] (Q653FJCT-DAVIS)	P2-1	Line Section w/o fault	1.03	1.02	>0.9	>0.9	1.04	1.03	1.01	1.02	1.03	1.01	Load power factor correction
MOBILCHE 115	P2-1:A4:6:_WOODLAND-DAVIS 115KV [4210] (WOODLANDTP-Q653FJCT)	P2-1	Line Section w/o fault	1.03	1.02	>0.9	>0.9	1.04	1.03	1.01	1.02	1.03	1.01	Load power factor correction

Study Area: **PG&E Central Valley**



High/Low Voltage

Substation	Contingency (All and Worst P6)	Category	Category Description	Post Cont. Voltage Deviation %										Project & Potential Mitigation Solutions	
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP High CEC Forecast	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations		
MOBILCHE 115	P1-1:A5:4:_DRUM 5 13.80KV GEN UNIT 1 P1-2:A4:25:_WOODLAND-DAVIS 115KV [4210]	P3	G-1/N-1	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	Load power factor correction
MOBILCHE 115	P1-2:A5:17:_RIO OSO-LINCOLN 115KV [1320] P1-2:A4:25:_WOODLAND-DAVIS 115KV [4210]	P6	N-1/N-1	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	Load power factor correction
MONDAVI 60	Base Case	P0	N-0	1.06	1.02	>0.9	>0.9	1.02	1.06	1.01	1.01	1.01	1.02	1.01	Load power factor correction
MONDAVI 60	P1-2:A11:7:_LOCKEFORD-BELLOTA 230KV [4990]	P1	N-1	1.07	0.92	>0.9	>0.9	1.01	1.07	0.89	0.90	0.93	0.89	0.89	Significant leading power factor in 2019 (0.7) Project: Lockeford-Lodi area 230 kV development Scope is under review
MONDAVI 60	P2-2:A11:9:_BELLOTA 230KV SECTION 2E	P2	Bus	1.07	0.92	>0.9	>0.9	1.01	1.07	0.89	0.90	0.93	0.88	0.88	Significant leading power factor in 2019 (0.7) Project: Lockeford-Lodi area 230 kV development Scope is under review
MONDAVI 60	P2-3:A11:81:_LOCKFORD 230KV - RING R3 & R4	P2	Non-bus-tie breaker	1.07	0.84	>0.9	>0.9	1.01	1.07	0.79	0.80	0.88	0.78	0.78	Significant leading power factor in 2019 (0.7) Project: Lockeford-Lodi area 230 kV development Scope is under review
MONDAVI 60	P2-3:A11:82:_LOCKFORD 230KV - RING R3 & R2	P2	Non-bus-tie breaker	1.07	0.84	>0.9	>0.9	1.01	1.07	0.77	0.80	0.87	0.77	0.77	Significant leading power factor in 2019 (0.7) Project: Lockeford-Lodi area 230 kV development Scope is under review
MONDAVI 60	P2-4:A11:1:_BELLOTA 230KV - SECTION 2D & 2E	P2	Bus-tie breaker	1.07	0.91	>0.9	>0.9	1.01	1.07	0.88	0.89	0.92	0.88	0.88	Significant leading power factor in 2019 (0.7) Project: Lockeford-Lodi area 230 kV development Scope is under review
MONDAVI 60	P2-4:A11:3:_BELLOTA 230KV - SECTION 1E & 2E	P2	Bus-tie breaker	1.07	0.88	>0.9	>0.9	1.01	1.06	0.84	0.85	0.91	0.84	0.84	Significant leading power factor in 2019 (0.7) Project: Lockeford-Lodi area 230 kV development Scope is under review
MONDAVI 60	P1-3:A11:5:_LOCKFORD 230/60KV TB 3 P1-2:A11:7:_LOCKEFORD-BELLOTA 230KV [4990]	P6	N-1/N-1	>0.9	0.84	>0.9	>0.9	>0.9	>0.9	0.85	0.86	0.87	0.81	0.81	Significant leading power factor in 2019 (0.7) Project: Lockeford-Lodi area 230 kV development Scope is under review
MONDAVI 60	P7-1:A11:12:_BRIGHTON-BELLOTA 230KV [4420] & LOCKEFORD-BELLOTA 230KV [4990]	P7	DCTL	1.07	0.88	>0.9	>0.9	1.01	1.07	0.84	0.85	0.91	0.84	0.84	Significant leading power factor in 2019 (0.7) Project: Lockeford-Lodi area 230 kV development Scope is under review
MRYSVLE 60	P1-1:A5:24:_GRNLEAF2 13.80KV GEN UNIT 1 P1-3:A5:31:_PEASE RG 60/60KV TB 1	P3	G-1/N-1	>0.9	>0.9	>0.9	>0.9	0.86	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	Project: Pease Transformer
MRYSVLE 60	P1-2:A5:26:_PEASE-RIO OSO 115KV [3270] P1-2:A5:25:_PALERMO-PEASE 115KV [3220]	P6	N-1/N-1	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	0.72	>0.9	>0.9	Sensitivity only
MRYSVLE 60	P7-1:A5:20_Palermo-Pease 115 kV Line and Pease-Rio Oso 115 kV Line	P7	DCTL	1.03	0.99	>0.9	>0.9	0.99	1.03	0.98	0.98	0.74	0.00	0.00	Sensitivity only
MRYSVLE 60	P1-1:A5:24:_GRNLEAF2 13.80KV GEN UNIT 1 P1-3:A5:31:_PEASE RG 60/60KV TB 1	P3	G-1/N-1	>0.9	>0.9	>0.9	>0.9	0.86	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	Project: Pease Transformer

Study Area: **PG&E Central Valley**



High/Low Voltage

Substation	Contingency (All and Worst P6)	Category	Category Description	Post Cont. Voltage Deviation %										Project & Potential Mitigation Solutions
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP High CEC Forecast	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations	
MRYSVLE 60	P7-1:A5:20_Palermo-Pease 115 kV Line and Pease-Rio Oso 115 kV Line	P7	DCTL	1.03	0.99	>0.9	>0.9	0.99	1.03	0.98	0.98	0.74	0.00	Sensitivity only
MTN_QUAR 60	P2-4:A5:4:_GOLDHILL 115KV - SECTION 1F & 2F	P2	Bus-tie breaker	1.00	0.87	>0.9	>0.9	1.02	0.98	0.83	0.26	0.94	0.87	Project: Atlantic-Placer 115 kV line Project ISD: on-hold Review project scope
NARRWS 1 60	Base Case	P0	N-0	1.02	1.02	>0.9	>0.9	1.04	1.02	1.02	1.01	1.02	1.02	Load power factor correction
NARRWS 2 60	Base Case	P0	N-0	1.02	1.03	>0.9	>0.9	1.05	1.02	1.03	1.03	1.03	1.03	Load power factor correction
NARRWS 2 60	P2-2:A5:30:_SMRTSVLE 60KV SECTION MA	P2	Bus	1.03	1.03	>0.9	>0.9	1.06	1.03	1.03	1.03	1.04	1.03	- Load power factor correction - Reactor projects
NARRWS 2 60	P2-3:A5:40:_SMRTSVLE - MA 60KV & COLGATE-SMARTVILLE #1 LINE	P2	Non-bus-tie breaker	1.03	1.04	>0.9	>0.9	1.06	1.03	1.03	1.03	1.04	1.03	- Load power factor correction - Reactor projects
NARRWS 2 60	P2-3:A5:42:_SMRTSVLE - MA 60KV & SMARTVILLE-MARYSVILLE LINE	P2	Non-bus-tie breaker	1.03	1.03	>0.9	>0.9	1.06	1.03	1.03	1.03	1.04	1.03	- Load power factor correction - Reactor projects
NARRWS 2 60	P2-3:A5:43:_SMRTSVLE - MA 60KV & SMRTSVLE-BEALE_1-E.NICOLS LINE	P2	Non-bus-tie breaker	1.03	1.03	>0.9	>0.9	1.06	1.03	1.03	1.03	1.04	1.03	- Load power factor correction - Reactor projects
NARRWS 2 60	P2-3:A5:44:_SMRTSVLE - MA 60KV & SMARTVILLE-NICOLAUS #1 LINE	P2	Non-bus-tie breaker	1.03	1.03	>0.9	>0.9	1.06	1.03	1.03	1.03	1.04	1.03	- Load power factor correction - Reactor projects
NEW HOPE 60	P1-2:A11:7:_LOCKEFORD-BELLOTA 230KV [4990]	P1	N-1	1.05	0.91	>0.9	>0.9	1.01	1.05	0.88	0.89	0.93	0.88	Significant leading power factor in 2019 (0.7) Project: Lockeford-Lodi area 230 kV development Scope is under review
NEW HOPE 60	P2-2:A11:9:_BELLOTA 230KV SECTION 2E	P2	Bus	1.05	0.91	>0.9	>0.9	1.01	1.05	0.88	0.89	0.93	0.87	Significant leading power factor in 2019 (0.7) Project: Lockeford-Lodi area 230 kV development Scope is under review
NEW HOPE 60	P2-3:A11:81:_LOCKFORD 230KV - RING R3 & R4	P2	Non-bus-tie breaker	1.05	0.83	>0.9	>0.9	1.01	1.05	0.78	0.79	0.87	0.77	Significant leading power factor in 2019 (0.7) Project: Lockeford-Lodi area 230 kV development Scope is under review
NEW HOPE 60	P2-3:A11:82:_LOCKFORD 230KV - RING R3 & R2	P2	Non-bus-tie breaker	1.05	0.83	>0.9	>0.9	1.01	1.05	0.76	0.79	0.87	0.76	Significant leading power factor in 2019 (0.7) Project: Lockeford-Lodi area 230 kV development Scope is under review
NEW HOPE 60	P2-4:A11:1:_BELLOTA 230KV - SECTION 2D & 2E	P2	Bus-tie breaker	1.05	0.90	>0.9	>0.9	1.01	1.05	0.87	0.88	0.92	0.87	Significant leading power factor in 2019 (0.7) Project: Lockeford-Lodi area 230 kV development Scope is under review
NEW HOPE 60	P2-4:A11:3:_BELLOTA 230KV - SECTION 1E & 2E	P2	Bus-tie breaker	1.05	0.87	>0.9	>0.9	1.01	1.05	0.83	0.84	0.91	0.83	Significant leading power factor in 2019 (0.7) Project: Lockeford-Lodi area 230 kV development Scope is under review

Study Area: **PG&E Central Valley**



High/Low Voltage

Substation	Contingency (All and Worst P6)	Category	Category Description	Post Cont. Voltage Deviation %										Project & Potential Mitigation Solutions	
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP High CEC Forecast	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generation s		
NEW HOPE 60	P1-3:A11:5:_LOCKFORD 230/60KV TB 3 P1-2:A11:7:_LOCKFORD-BELLOTA 230KV [4990]	P6	N-1/N-1	>0.9	0.83	>0.9	>0.9	>0.9	>0.9	>0.9	0.84	0.85	0.87	0.79	Significant leading power factor in 2019 (0.7) Project: Lockeford-Lodi area 230 kV development Scope is under review
NEW HOPE 60	P7-1:A11:12:_BRIGHTON-BELLOTA 230KV [4420] & LOCKEFORD-BELLOTA 230KV [4990]	P7	DCTL	1.05	0.87	>0.9	>0.9		1.01	1.05	0.83	0.84	0.91	0.83	Significant leading power factor in 2019 (0.7) Project: Lockeford-Lodi area 230 kV development Scope is under review
NEWCSTLE 115	Base Case	P0	N-0	1.04	1.02	>0.9	>0.9		1.07	1.04	1.01	1.01	1.01	1.01	- Load power factor correction - Reactor projects
NEWCSTLE 115	P1-2:A5:36:_DRUM-HIGGINS 115KV [4393]	P1	N-1	1.05	1.00	>0.9	>0.9		1.07	1.04	0.99	0.99	1.00	0.99	- Load power factor correction - Reactor projects
NEWCSTLE 115	P1-2:A5:37:_BELL-PLACER 115KV [4395]	P1	N-1	1.05	1.03	>0.9	>0.9		1.07	1.05	1.02	1.02	1.01	1.02	- Load power factor correction - Reactor projects
NEWCSTLE 115	P2-2:A5:19:_PLACER 115KV SECTION 1D	P2	Bus	1.06	1.04	>0.9	>0.9		1.08	1.06	1.04	1.04	1.04	1.04	- Load power factor correction - Reactor projects
NEWCSTLE 115	P2-3:A5:23:_PLACER - 1D 115KV & PLACER-GOLD HILL #2 LINE	P2	Non-bus-tie breaker	1.06	1.04	>0.9	>0.9		1.08	1.06	1.04	1.04	1.04	1.04	- Load power factor correction - Reactor projects
NEWCSTLE 115	P2-3:A5:24:_PLACER - 1D 115KV & BELL-PLACER LINE	P2	Non-bus-tie breaker	1.06	1.04	>0.9	>0.9		1.08	1.06	1.04	1.04	1.04	1.04	- Load power factor correction - Reactor projects
NEWCSTLE 115	P2-3:A5:81:_DRUM 115KV - RING R2 & R3	P2	Non-bus-tie breaker	1.05	1.00	>0.9	>0.9		1.07	1.04	0.99	0.99	1.00	0.99	- Load power factor correction - Reactor projects
NEWCSTLE 115	P2-3:A5:85:_BRNSWALT 115KV - RING R4 & R3	P2	Non-bus-tie breaker	1.05	1.00	>0.9	>0.9		1.07	1.04	0.99	0.99	1.00	0.99	- Load power factor correction - Reactor projects
NEWCSTLE 115	P2-4:A11:3:_BELLOTA 230KV - SECTION 1E & 2E	P2	Bus-tie breaker	1.04	1.00	>0.9	>0.9		1.06	1.04	0.99	0.99	0.99	0.98	- Load power factor correction - Reactor projects
NEWCSTLE 115	P2-4:A5:4:_GOLDHILL 115KV - SECTION 1F & 2F	P2	Bus-tie breaker	0.91	0.82	>0.9	>0.9		1.05	0.90	0.78	0.28	0.89	0.82	Project: Atlantic-Placer 115 kV line Project ISD: on-hold Review project scope
NEWCSTLE 115	P2-1:A5:30:_DRUM-HIGGINS 115KV [4393] (DTCH FL1-CHCGO PK)	P2-1	Line Section w/o fault	1.05	1.01	>0.9	>0.9		1.07	1.05	1.00	0.99	1.00	1.00	- Load power factor correction - Reactor projects
NEWCSTLE 115	P2-1:A5:31:_DRUM-HIGGINS 115KV [4393] (CHCGO PK-HIGGINS)	P2-1	Line Section w/o fault	1.05	1.00	>0.9	>0.9		1.07	1.04	0.99	0.99	1.00	0.99	- Load power factor correction - Reactor projects
NEWCSTLE 115	P2-1:A5:34:_BELL-PLACER 115KV [4395] (PLACER-BELL PGE)	P2-1	Line Section w/o fault	1.05	1.03	>0.9	>0.9		1.07	1.05	1.02	1.02	1.01	1.02	- Load power factor correction - Reactor projects
NEWCSTLE 115	P2-1:A5:37:_HIGGINS-BELL 115KV [1412] (HIGGINS-BELL PGE)	P2-1	Line Section w/o fault	1.05	1.02	>0.9	>0.9		1.07	1.05	1.01	1.00	1.01	1.01	- Load power factor correction - Reactor projects

High/Low Voltage

Substation	Contingency (All and Worst P6)	Category	Category Description	Post Cont. Voltage Deviation %										Project & Potential Mitigation Solutions
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP High CEC Forecast	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations	
OI GLASS 115	Base Case	P0	N-0	1.04	1.03	>0.9	>0.9	1.04	1.04	1.03	1.03	1.02	1.03	Load power factor correction
OI GLASS 115	P1-2:A11:54:_SCHULTE SW STA-LAMMERS 115KV [3993] P1-2:A11:48:_TESLA-TRACY 115KV [4020] MOAS OPENED ON LEPRINO TRACY JC	P6	N-1/N-1	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	0.89	0.90	>0.9	0.91	Sensitivity only
OLIVHRST 115	Base Case	P0	N-0	1.04	1.02	>0.9	>0.9	1.04	1.04	1.02	1.02	1.02	1.01	Load power factor correction
OLIVHRST 115	P2-3:A5:83:_DRUM 115KV - RING R5 & R4	P2	Non-bus-tie breaker	1.05	1.02	>0.9	>0.9	1.04	1.05	1.02	1.03	1.02	1.02	Load power factor correction
OLIVHRST 115	P2-4:A11:3:_BELLOTA 230KV - SECTION 1E & 2E	P2	Bus-tie breaker	1.04	1.01	>0.9	>0.9	1.03	1.04	1.01	1.01	1.01	1.00	Load power factor correction
OLIVHRST 115	P2-4:A5:6:_RIO OSO 115KV - SECTION 1D & 2D	P2	Bus-tie breaker	1.03	0.97	>0.9	>0.9	1.03	1.03	0.97	0.97	0.97	0.96	Load power factor correction
OLIVHRST 115	P1-1:A5:4:_DRUM 5 13.80KV GEN UNIT 1 P1-2:A4:25:_WOODLAND-DAVIS 115KV [4210]	P3	G-1/N-1	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	Load power factor correction
OLIVHRST 115	P1-2:A5:17:_RIO OSO-LINCOLN 115KV [1320] P1-2:A4:25:_WOODLAND-DAVIS 115KV [4210]	P6	N-1/N-1	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	Load power factor correction
OLIVHRST 115	P7-1:A5:11_Drum-Rio Oso No. 1 115 kV Line & Drum-Rio Oso No. 2 115 kV Line	P7	DCTL	1.05	1.02	>0.9	>0.9	1.04	1.05	1.02	1.03	1.02	1.02	Load power factor correction
OXBOW 60	P1-2:A4:33:_WEST SACRAMENTO-BRIGHTON 115KV [4110] P1-2:A5:50:_COLGATE-GRASS VALLEY 60KV [6490]	P6	N-1/N-1	>0.9	0.89	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	Action plan or SPS
P.GRVEJ. 60	P1-2:A11:12:_VALLEY SPRINGS-BELLOTA 230KV [5860] P1-2:A11:9:_TIGER CREEK-VALLEY SPRINGS 230KV [5790]	P6	N-1/N-1	>0.9	>0.9	>0.9	>0.9	0.89	>0.9	>0.9	>0.9	>0.9	>0.9	Action plan or SPS
PARDEE A 60	Base Case	P0	N-0	1.05	1.05	>0.9	>0.9	1.04	1.05	1.05	1.05	1.06	1.05	- Load power factor correction - Reactor projects
PEAS RG 60	Base Case	P0	N-0	1.01	0.96	>0.9	>0.9	1.00	1.01	0.96	0.96	0.95	0.96	Load power factor correction
PEAS RG 60	P2-2:A5:13:_PEASE 115KV SECTION MA	P2	Bus	0.96	0.94	>0.9	>0.9	0.93	0.96	0.94	0.94	0.89	0.91	Sensitivity only
PEAS RG 60	P2-3:A5:11:_PEASE - MA 115KV & PALERMO-PEASE LINE	P2	Non-bus-tie breaker	0.96	0.94	>0.9	>0.9	0.93	0.96	0.94	0.94	0.89	0.91	Sensitivity only
PEAS RG 60	P2-3:A5:12:_PEASE - MA 115KV & PEASE-RIO OSO LINE	P2	Non-bus-tie breaker	0.96	0.94	>0.9	>0.9	0.93	0.96	0.94	0.94	0.89	0.91	Sensitivity only
PEAS RG 60	P1-2:A5:26:_PEASE-RIO OSO 115KV [3270] P1-2:A5:25:_PALERMO-PEASE 115KV [3220]	P6	N-1/N-1	>0.9	>0.9	>0.9	>0.9	0.93	>0.9	>0.9	>0.9	0.69	>0.9	Sensitivity only
PEAS RG 60	P7-1:A5:20_Palermo-Pease 115 kV Line and Pease-Rio Oso 115 kV Line	P7	DCTL	1.01	0.93	>0.9	>0.9	0.93	1.01	0.93	0.93	0.71	>0.9	Sensitivity only
PEASE 115	Base Case	P0	N-0	1.04	1.01	>0.9	>0.9	1.03	1.04	1.01	1.01	1.01	1.00	Load power factor correction
PEASE 115	P1-2:A5:17:_RIO OSO-LINCOLN 115KV [1320] P1-3:A5:31:_PEAS RG 60/60KV TB 1	P6	N-1/N-1	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	Load power factor correction
PEASE 115	P7-1:A5:20_Palermo-Pease 115 kV Line and Pease-Rio Oso 115 kV Line	P7	DCTL	1.04	0.95	>0.9	>0.9	0.95	1.04	0.94	0.94	0.71	>0.9	Sensitivity only
PEASE 60	P1-1:A5:24:_GRNLEAF2 13.80KV GEN UNIT 1 P1-3:A5:31:_PEAS RG 60/60KV TB 1	P3	G-1/N-1	>0.9	>0.9	>0.9	>0.9	0.86	>0.9	>0.9	>0.9	>0.9	>0.9	Project: Pease Transformer

Study Area: **PG&E Central Valley**



High/Low Voltage

Substation	Contingency (All and Worst P6)	Category	Category Description	Post Cont. Voltage Deviation %										Project & Potential Mitigation Solutions	
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP High CEC Forecast	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generation s		
PEASE 60	P1-3:A5:31:_PEAS RG 60/60KV TB 1 P1-2:A5:57:_MRYSVLE-PEASE 60KV [0]	P6	N-1/N-1	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	0.31	Sensitivity only
PEASE 60	P7-1:A5:20_Palermo-Pease 115 kV Line and Pease-Rio Oso 115 kV Line	P7	DCTL	1.03	1.00	>0.9	>0.9	1.00	1.03	1.00	1.00	1.00	0.76	>0.9	Sensitivity only
PENRYN 60	P2-4:A5:4:_GOLDHILL 115KV - SECTION 1F & 2F	P2	Bus-tie breaker	1.00	0.86	>0.9	>0.9	1.02	0.99	0.82	0.24	0.94	0.86		Project: Atlantic-Placer 115 kV line Project ISD: on-hold Review project scope
PEORIA 115	Base Case	P0	N-0	1.03	1.02	>0.9	>0.9	1.04	1.04	1.02	1.02	1.03	1.01		Load power factor correction
PEORIA 115	P2-4:A11:3:_BELLOTA 230KV - SECTION 1E & 2E	P2	Bus-tie breaker	0.94	0.66	>0.9	>0.9	1.04	0.93	0.64	0.65	0.96	0.63		Bellota 230 kV bus upgrade
PEORIA 115	P1-3:A11:10:_BELLOTA 230/115KV TB 1 P1-3:A11:11:_BELLOTA 230/115KV TB 2	P6	N-1/N-1	>0.9	0.88	>0.9	>0.9	>0.9	0.98	>0.9	>0.9	>0.9	0.89		Action plan or SPS
PIKE CTY 60	Base Case	P0	N-0	1.04	1.02	>0.9	>0.9	1.05	1.04	1.01	1.01	1.02	1.01		Load power factor correction
PLACER 115	Base Case	P0	N-0	1.04	1.01	>0.9	>0.9	1.06	1.04	1.01	1.00	1.01	1.01		- Load power factor correction - Reactor projects
PLACER 115	P1-2:A5:36:_DRUM-HIGGINS 115KV [4393]	P1	N-1	1.04	1.00	>0.9	>0.9	1.07	1.04	0.99	0.98	0.99	0.99		- Load power factor correction - Reactor projects
PLACER 115	P1-2:A5:37:_BELL-PLACER 115KV [4395]	P1	N-1	1.05	1.02	>0.9	>0.9	1.07	1.05	1.02	1.01	1.01	1.01		- Load power factor correction - Reactor projects
PLACER 115	P2-3:A5:81:_DRUM 115KV - RING R2 & R3	P2	Non-bus-tie breaker	1.04	1.00	>0.9	>0.9	1.07	1.04	0.99	0.98	0.99	0.99		- Load power factor correction - Reactor projects
PLACER 115	P2-3:A5:85:_BRNSWALT 115KV - RING R4 & R3	P2	Non-bus-tie breaker	1.04	0.99	>0.9	>0.9	1.07	1.04	0.99	0.98	0.99	0.99		- Load power factor correction - Reactor projects
PLACER 115	P2-4:A11:3:_BELLOTA 230KV - SECTION 1E & 2E	P2	Bus-tie breaker	1.04	0.99	>0.9	>0.9	1.06	1.04	0.98	0.98	0.99	0.98		- Load power factor correction - Reactor projects
PLACER 115	P2-4:A5:4:_GOLDHILL 115KV - SECTION 1F & 2F	P2	Bus-tie breaker	0.92	0.83	>0.9	>0.9	1.05	0.90	0.79	0.30	0.89	0.83		Project: Atlantic-Placer 115 kV line Project ISD: on-hold Review project scope
PLACER 115	P2-1:A5:30:_DRUM-HIGGINS 115KV [4393] (DTCH FL1-CHCGO PK)	P2-1	Line Section w/o fault	1.04	1.00	>0.9	>0.9	1.07	1.04	0.99	0.98	0.99	0.99		- Load power factor correction - Reactor projects
PLACER 115	P2-1:A5:31:_DRUM-HIGGINS 115KV [4393] (CHCGO PK-HIGGINS)	P2-1	Line Section w/o fault	1.04	0.99	>0.9	>0.9	1.07	1.04	0.98	0.98	0.99	0.98		- Load power factor correction - Reactor projects
PLACER 115	P2-1:A5:34:_BELL-PLACER 115KV [4395] (PLACER-BELL PGE)	P2-1	Line Section w/o fault	1.05	1.02	>0.9	>0.9	1.07	1.05	1.02	1.01	1.01	1.01		- Load power factor correction - Reactor projects
PLACER 115	P2-1:A5:37:_HIGGINS-BELL 115KV [1412] (HIGGINS-BELL PGE)	P2-1	Line Section w/o fault	1.05	1.01	>0.9	>0.9	1.07	1.04	1.00	1.00	1.00	1.00		- Load power factor correction - Reactor projects

Study Area: **PG&E Central Valley**



High/Low Voltage

Substation	Contingency (All and Worst P6)	Category	Category Description	Post Cont. Voltage Deviation %										Project & Potential Mitigation Solutions
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP High CEC Forecast	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations	
PLACER 60	P2-4:A5:4:_GOLDHILL 115KV - SECTION 1F & 2F	P2	Bus-tie breaker	1.00	0.88	>0.9	>0.9	1.02	0.98	0.84	0.27	0.95	0.88	Project: Atlantic-Placer 115 kV line Project ISD: on-hold Review project scope
PLAINFLD 60	Base Case	P0	N-0	1.02	0.91	>0.9	>0.9	1.07	1.02	0.89	0.90	0.93	0.90	Project: Vaca-Dixon voltage conversion project Project ISD: on-hold Review project scope
PLAINFLD 60	P1-2:A11:55:_GWFTRACY-SCHULTE #1 115KV [0]	P1	N-1	1.02	0.90	>0.9	>0.9	1.07	1.02	0.88	0.89	0.93	0.89	Project: Vaca-Dixon voltage conversion project Project ISD: on-hold Review project scope
PLAINFLD 60	P1-2:A4:17:_VACA-LAMBIE SW STA 230KV [5845]	P1	N-1	1.02	0.91	>0.9	>0.9	1.07	1.02	0.88	0.89	0.93	0.90	Project: Vaca-Dixon voltage conversion project Project ISD: on-hold Review project scope
PLAINFLD 60	P1-2:A4:41:_VACA-SUISUN 115KV [4070]	P1	N-1	1.02	0.90	>0.9	>0.9	1.07	1.02	0.88	0.89	0.93	0.90	Project: Vaca-Dixon voltage conversion project Project ISD: on-hold Review project scope
PLAINFLD 60	P1-2:A4:50:_VACA-DXN-TRVS_HPT 60KV [0]	P1	N-1	1.02	0.92	>0.9	>0.9	1.07	1.02	0.90	0.91	0.94	0.91	Project: Vaca-Dixon voltage conversion project Project ISD: on-hold Review project scope
PLAINFLD 60	P1-2:A5:11:_MIDDLE FORK-GOLD HILL 230KV [5140]	P1	N-1	1.02	0.91	>0.9	>0.9	1.07	1.02	0.88	0.89	0.93	0.90	Project: Vaca-Dixon voltage conversion project Project ISD: on-hold Review project scope
PLAINFLD 60	P1-2:A5:2:_POE-RIO OSO 230KV [5540]	P1	N-1	1.02	0.90	>0.9	>0.9	1.07	1.02	0.88	0.89	0.93	0.90	Project: Vaca-Dixon voltage conversion project Project ISD: on-hold Review project scope
PLAINFLD 60	P1-3:A4:1:_VACA-DIX 500/230KV TB 11	P1	N-1	1.03	0.91	>0.9	>0.9	1.07	1.02	0.89	0.90	0.94	0.90	Project: Vaca-Dixon voltage conversion project Project ISD: on-hold Review project scope
PLAINFLD 60	P1-3:A4:18:_VACA-DIX 115/60KV TB 5	P1	N-1	1.02	0.90	>0.9	>0.9	1.06	1.02	0.88	0.89	0.93	0.89	Project: Vaca-Dixon voltage conversion project Project ISD: on-hold Review project scope
PLAINFLD 60	P1-3:A4:19:_VACA-DIX 115/60KV TB 9	P1	N-1	1.03	0.89	>0.9	>0.9	1.07	1.03	0.86	0.87	0.92	0.88	Project: Vaca-Dixon voltage conversion project Project ISD: on-hold Review project scope

Study Area: **PG&E Central Valley**



High/Low Voltage

Substation	Contingency (All and Worst P6)	Category	Category Description	Post Cont. Voltage Deviation %										Project & Potential Mitigation Solutions
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP High CEC Forecast	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations	
PLAINFLD 60	P1-3:A4:7:_VACA-DIX 230/115KV TB 3	P1	N-1	1.02	0.90	>0.9	>0.9	1.06	1.02	0.87	0.88	0.92	0.89	Project: Vaca-Dixon voltage conversion project Project ISD: on-hold Review project scope
PLAINFLD 60	P1-3:A4:8:_VACA-DIX 230/115KV TB 4	P1	N-1	1.02	0.90	>0.9	>0.9	1.06	1.02	0.87	0.88	0.92	0.89	Project: Vaca-Dixon voltage conversion project Project ISD: on-hold Review project scope
PLAINFLD 60	P1-4:A4:4:_VACA-DIX SVD=V	P1	N-1	1.02	0.90	>0.9	>0.9	1.06	1.01	0.88	0.89	0.92	0.89	Project: Vaca-Dixon voltage conversion project Project ISD: on-hold Review project scope
PLAINFLD 60	P1-4:A4:6:_VC DX11T SVD=V	P1	N-1	1.02	0.91	>0.9	>0.9	1.07	1.02	0.89	0.90	0.93	0.90	Project: Vaca-Dixon voltage conversion project Project ISD: on-hold Review project scope
PLAINFLD 60	P2-2:A11:15:_TESLA E 230KV SECTION 2E	P2	Bus	1.02	0.91	>0.9	>0.9	1.07	1.02	0.88	0.89	0.93	0.90	Project: Vaca-Dixon voltage conversion project Project ISD: on-hold Review project scope
PLAINFLD 60	P2-2:A4:1:_VACA-DIX 230KV SECTION 1E	P2	Bus	1.01	0.89	>0.9	>0.9	1.06	1.01	0.86	0.87	0.92	0.88	Project: Vaca-Dixon voltage conversion project Project ISD: on-hold Review project scope
PLAINFLD 60	P2-2:A4:4:_VACA-DIX 230KV SECTION 1F	P2	Bus	1.01	0.90	>0.9	>0.9	1.06	1.01	0.87	0.88	0.92	0.89	Project: Vaca-Dixon voltage conversion project Project ISD: on-hold Review project scope
PLAINFLD 60	P2-2:A4:45:_VACA-DIXN 60KV SECTION ME	P2	Bus	1.03	0.92	>0.9	>0.9	1.08	1.03	0.90	0.91	0.95	0.91	Project: Vaca-Dixon voltage conversion project Project ISD: on-hold Review project scope
PLAINFLD 60	P2-2:A4:47:_PLAINFLD 60KV SECTION 1D	P2	Bus	1.04	0.96	>0.9	>0.9	1.07	1.04	0.94	0.95	0.97	0.95	Project: Vaca-Dixon voltage conversion project Project ISD: on-hold Review project scope
PLAINFLD 60	P2-2:A4:48:_DIXONPGE 60KV SECTION 2D	P2	Bus	1.02	0.91	>0.9	>0.9	1.07	1.02	0.89	0.90	0.94	0.91	Project: Vaca-Dixon voltage conversion project Project ISD: on-hold Review project scope
PLAINFLD 60	P2-2:A4:49:_DIXONPGE 60KV SECTION 1D	P2	Bus	1.02	0.92	>0.9	>0.9	1.07	1.02	0.90	0.91	0.94	0.91	Project: Vaca-Dixon voltage conversion project Project ISD: on-hold Review project scope

Study Area: **PG&E Central Valley**



High/Low Voltage

Substation	Contingency (All and Worst P6)	Category	Category Description	Post Cont. Voltage Deviation %										Project & Potential Mitigation Solutions
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP High CEC Forecast	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations	
PLAINFLD 60	P2-2:A4:5:_VACA-DIX 230KV SECTION 2F	P2	Bus	1.02	0.89	>0.9	>0.9	1.07	1.01	0.87	0.88	0.92	0.88	Project: Vaca-Dixon voltage conversion project Project ISD: on-hold Review project scope
PLAINFLD 60	P2-2:A4:7:_VACA-DIX 230KV SECTION NA	P2	Bus	1.04	0.92	>0.9	>0.9	1.07	1.03	0.90	0.90	0.95	0.91	Project: Vaca-Dixon voltage conversion project Project ISD: on-hold Review project scope
PLAINFLD 60	P2-2:A5:7:_GOLDHILL 230KV SECTION 2D	P2	Bus	1.02	0.90	>0.9	>0.9	1.07	1.02	0.88	0.89	0.93	0.90	Project: Vaca-Dixon voltage conversion project Project ISD: on-hold Review project scope
PLAINFLD 60	P2-3:A11:30:_SCHULTE 115KV - MIDDLE BREAKER BAY 3	P2	Non-bus-tie breaker	1.02	0.90	>0.9	>0.9	1.07	1.02	0.88	0.89	0.93	0.89	Project: Vaca-Dixon voltage conversion project Project ISD: on-hold Review project scope
PLAINFLD 60	P2-3:A11:6:_TESLA E - 2E 230KV & STAGG-TESLA LINE	P2	Non-bus-tie breaker	1.02	0.91	>0.9	>0.9	1.07	1.02	0.88	0.89	0.93	0.90	Project: Vaca-Dixon voltage conversion project Project ISD: on-hold Review project scope
PLAINFLD 60	P2-3:A4:1:_LAMBIE 230KV - MIDDLE BREAKER BAY 1	P2	Non-bus-tie breaker	1.02	0.90	>0.9	>0.9	1.07	1.02	0.88	0.89	0.93	0.89	Project: Vaca-Dixon voltage conversion project Project ISD: on-hold Review project scope
PLAINFLD 60	P2-3:A4:2:_LAMBIE 230KV - MIDDLE BREAKER BAY 0	P2	Non-bus-tie breaker	1.02	0.91	>0.9	>0.9	1.07	1.02	0.88	0.89	0.93	0.90	Project: Vaca-Dixon voltage conversion project Project ISD: on-hold Review project scope
PLAINFLD 60	P2-3:A4:28:_VACA-DIX 115KV - MIDDLE BREAKER BAY 7	P2	Non-bus-tie breaker	1.02	0.90	>0.9	>0.9	1.06	1.01	0.87	0.88	0.92	0.89	Project: Vaca-Dixon voltage conversion project Project ISD: on-hold Review project scope
PLAINFLD 60	P2-3:A4:29:_VACA-DIX 115KV - MIDDLE BREAKER BAY 8	P2	Non-bus-tie breaker	1.02	0.90	>0.9	>0.9	1.06	1.02	0.88	0.89	0.93	0.89	Project: Vaca-Dixon voltage conversion project Project ISD: on-hold Review project scope
PLAINFLD 60	P2-3:A4:3:_BDLSWSTA 230KV - MIDDLE BREAKER BAY 4	P2	Non-bus-tie breaker	1.02	0.90	>0.9	>0.9	1.07	1.02	0.88	0.89	0.92	0.90	Project: Vaca-Dixon voltage conversion project Project ISD: on-hold Review project scope
PLAINFLD 60	P2-3:A4:32:_VACA-DIX 115KV - MIDDLE BREAKER BAY 6	P2	Non-bus-tie breaker	1.02	0.90	>0.9	>0.9	1.06	1.02	0.87	0.88	0.92	0.89	Project: Vaca-Dixon voltage conversion project Project ISD: on-hold Review project scope

Study Area: **PG&E Central Valley**



High/Low Voltage

Substation	Contingency (All and Worst P6)	Category	Category Description	Post Cont. Voltage Deviation %										Project & Potential Mitigation Solutions
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP High CEC Forecast	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations	
PLAINFLD 60	P2-3:A4:33:_VACA-DIX 115KV - MIDDLE BREAKER BAY 4	P2	Non-bus-tie breaker	1.03	0.88	>0.9	>0.9	1.07	1.03	0.85	0.86	0.92	0.87	Project: Vaca-Dixon voltage conversion project Project ISD: on-hold Review project scope
PLAINFLD 60	P2-3:A4:46:_VACA-DXN - ME 60KV & DIXON-VACA #2 LINE	P2	Non-bus-tie breaker	1.03	0.92	>0.9	>0.9	1.08	1.03	0.90	0.91	0.95	0.91	Project: Vaca-Dixon voltage conversion project Project ISD: on-hold Review project scope
PLAINFLD 60	P2-3:A4:47:_VACA-DXN - ME 60KV & VACA-DXN-TRVS_HPT LINE	P2	Non-bus-tie breaker	1.03	0.92	>0.9	>0.9	1.08	1.03	0.90	0.91	0.95	0.91	Project: Vaca-Dixon voltage conversion project Project ISD: on-hold Review project scope
PLAINFLD 60	P2-3:A4:49:_DIXONPGE - 2D 60KV & DIXON-VACA #2 LINE	P2	Non-bus-tie breaker	1.02	0.91	>0.9	>0.9	1.07	1.02	0.89	0.90	0.94	0.91	Project: Vaca-Dixon voltage conversion project Project ISD: on-hold Review project scope
PLAINFLD 60	P2-3:A4:6:_BDLSWSTA 230KV - MIDDLE BREAKER BAY 3	P2	Non-bus-tie breaker	1.02	0.90	>0.9	>0.9	1.07	1.02	0.88	0.89	0.91	0.90	Project: Vaca-Dixon voltage conversion project Project ISD: on-hold Review project scope
PLAINFLD 60	P2-3:A5:5:_GOLDHILL - 2D 230KV & MIDDLE FORK-GOLD HILL LINE	P2	Non-bus-tie breaker	1.02	0.90	>0.9	>0.9	1.07	1.02	0.88	0.89	0.93	0.90	Project: Vaca-Dixon voltage conversion project Project ISD: on-hold Review project scope
PLAINFLD 60	P2-3:A5:6:_MIDLFORK - 1D 230KV & MIDDLE FORK-GOLD HILL LINE	P2	Non-bus-tie breaker	1.02	0.91	>0.9	>0.9	1.07	1.02	0.88	0.89	0.93	0.90	Project: Vaca-Dixon voltage conversion project Project ISD: on-hold Review project scope
PLAINFLD 60	P2-3:A5:89:_RIO OSO 230KV - MIDDLE BREAKER BAY 3	P2	Non-bus-tie breaker	>0.9	0.90	>0.9	>0.9	1.07	>0.9	0.88	0.89	0.93	0.90	Project: Vaca-Dixon voltage conversion project Project ISD: on-hold Review project scope
PLAINFLD 60	P2-4:A11:2:_BELLOTA 230KV - SECTION 2D & 1D	P2	Bus-tie breaker	1.02	0.90	>0.9	>0.9	1.07	1.02	0.88	0.89	0.91	0.89	Project: Vaca-Dixon voltage conversion project Project ISD: on-hold Review project scope
PLAINFLD 60	P2-4:A4:1:_VACA-DIX 230KV - SECTION 1E & 1F	P2	Bus-tie breaker	1.00	0.88	>0.9	>0.9	1.05	1.00	0.85	0.86	0.90	0.87	Project: Vaca-Dixon voltage conversion project Project ISD: on-hold Review project scope
PLAINFLD 60	P2-4:A4:2:_VACA-DIX 230KV - SECTION 1E & 2E	P2	Bus-tie breaker	1.01	0.89	>0.9	>0.9	1.06	1.01	0.86	0.87	0.91	0.88	Project: Vaca-Dixon voltage conversion project Project ISD: on-hold Review project scope

Study Area: **PG&E Central Valley**



High/Low Voltage

Substation	Contingency (All and Worst P6)	Category	Category Description	Post Cont. Voltage Deviation %										Project & Potential Mitigation Solutions
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP High CEC Forecast	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations	
PLAINFLD 60	P2-4:A4:22:_DIXONPGE 60KV - SECTION 2D & 1D	P2	Bus-tie breaker	1.02	0.92	>0.9	>0.9	1.07	1.02	0.90	0.91	0.94	0.91	Project: Vaca-Dixon voltage conversion project Project ISD: on-hold Review project scope
PLAINFLD 60	P2-4:A4:3:_VACA-DIX 230KV - SECTION 1F & 2F	P2	Bus-tie breaker	1.00	0.88	>0.9	>0.9	1.06	1.00	0.86	0.87	0.90	0.87	Project: Vaca-Dixon voltage conversion project Project ISD: on-hold Review project scope
PLAINFLD 60	P2-4:A4:4:_VACA-DIX 230KV - SECTION 2F & 2E	P2	Bus-tie breaker	1.01	0.89	>0.9	>0.9	1.07	1.01	0.87	0.88	0.91	0.88	Project: Vaca-Dixon voltage conversion project Project ISD: on-hold Review project scope
PLAINFLD 60	P2-1:A11:49:_GWFRACY-SCHULTE 115KV [0] NO FAULT	P2-1	Line Section w/o fault	1.02	0.90	>0.9	>0.9	1.07	1.02	0.88	0.89	0.93	0.89	Project: Vaca-Dixon voltage conversion project Project ISD: on-hold Review project scope
PLAINFLD 60	P2-1:A4:24:_VACA-VACAVILLE-CORDELIA 115KV [4090] (VACA-DIX-VCVLE2J)	P2-1	Line Section w/o fault	1.02	0.91	>0.9	>0.9	1.07	1.02	0.89	0.90	0.94	0.91	Project: Vaca-Dixon voltage conversion project Project ISD: on-hold Review project scope
PLAINFLD 60	P2-1:A5:3:_MIDDLE FORK-GOLD HILL 230KV [5140] (GOLDHILL-RALSTON)	P2-1	Line Section w/o fault	1.02	0.91	>0.9	>0.9	1.07	1.02	0.88	0.89	0.93	0.90	Project: Vaca-Dixon voltage conversion project Project ISD: on-hold Review project scope
PLAINFLD 60	P1-1:A11:24:_COG.CAPT 9.11KV GEN UNIT 1 P1-2:A11:55:_GWFRACY-SCHULTE #1 115KV [0]	P3	G-1/N-1	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	Project: Vaca-Dixon voltage conversion project Project ISD: on-hold Review project scope
PLAINFLD 60	P5-5:A11:1:_SCHULTE 115KV BAAH BUS #1 (FAILURE OF NON-REDUNDENT RELAY)	P55	Non-Redundant	1.02	0.90	>0.9	>0.9	1.07	1.02	0.88	0.89	0.93	0.89	Project: Vaca-Dixon voltage conversion project Project ISD: on-hold Review project scope
PLAINFLD 60	P5-5:A4:2:_Lambie 230 kV BAAH Bus #2 (failure of non-redundent relay)	P55	Non-Redundant	1.02	0.90	>0.9	>0.9	1.07	1.02	0.88	0.89	0.93	0.90	Project: Vaca-Dixon voltage conversion project Project ISD: on-hold Review project scope
PLAINFLD 60	P5-5:A4:3:_Bird's Landing Sw. Sta. 230 kV BAAH Bus #1 (failure of non-redundent relay)	P55	Non-Redundant	1.02	0.90	>0.9	>0.9	1.07	1.02	0.88	0.89	0.92	0.90	Project: Vaca-Dixon voltage conversion project Project ISD: on-hold Review project scope
PLAINFLD 60	P5-5:A4:4:_Bird's Landing Sw. Sta. 230 kV BAAH Bus #2 (failure of non-redundent relay)	P55	Non-Redundant	1.02	0.90	>0.9	>0.9	1.07	1.02	0.88	0.89	0.91	0.89	Project: Vaca-Dixon voltage conversion project Project ISD: on-hold Review project scope

Study Area: **PG&E Central Valley**



High/Low Voltage

Substation	Contingency (All and Worst P6)	Category	Category Description	Post Cont. Voltage Deviation %										Project & Potential Mitigation Solutions	
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP High CEC Forecast	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations		
PLAINFLD 60	P1-3:A4:19:_VACA-DIX 115/60KV TB 9 P1-3:A4:7:_VACA-DIX 230/115KV TB 3	P6	N-1/N-1	>0.9	0.87	>0.9	>0.9	>0.9	>0.9	>0.9	0.84	0.85	>0.9	0.86	Project: Vaca-Dixon voltage conversion project Project ISD: on-hold Review project scope
PLAINFLD 60	P1-3:A4:19:_VACA-DIX 115/60KV TB 9 P1-3:A4:1:_VACA-DIX 500/230KV TB 11	P6	N-1/N-1	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	Project: Vaca-Dixon voltage conversion project Project ISD: on-hold Review project scope
PLAINFLD 60	P7-1:A11:28:_TESLA-NEWARK #1 230KV [5720] & TESLA-RAVENSWOOD 230KV [5730]	P7	DCTL	1.02	0.91	>0.9	>0.9	1.07	1.02	0.88	0.89	0.93	0.90	Project: Vaca-Dixon voltage conversion project Project ISD: on-hold Review project scope	
PLAINFLD 60	P7-1:A12:2:_MELONES-WILSON 230KV [5080] & COTTLE-MELONES 230KV [4530]	P7	DCTL	1.02	0.91	>0.9	>0.9	1.07	1.02	0.88	0.89	0.93	0.90	Project: Vaca-Dixon voltage conversion project Project ISD: on-hold Review project scope	
PLAINFLD 60	P7-1:A4:12_Lambie Sw Sta-Birds Landing Sw Sta 230 kV Line & Peabody-Birds Landing Sw Sta 230 kV Line	P7	DCTL	1.02	0.90	>0.9	>0.9	1.07	1.02	0.88	0.89	0.93	0.89	Project: Vaca-Dixon voltage conversion project Project ISD: on-hold Review project scope	
PLAINFLD 60	P7-1:A4:15_Vaca-Vacaville-Jameson-North Tower 115 kV Line & Vaca-Vacaville-Coredelia 115 kV Line	P7	DCTL	1.03	0.92	>0.9	>0.9	1.07	1.03	0.89	0.90	0.94	0.91	Project: Vaca-Dixon voltage conversion project Project ISD: on-hold Review project scope	
PLAINFLD 60	P7-1:A4:23_CORTINA-VACA1 and DELEVAN-CORTINA	P7	DCTL	1.02	0.90	>0.9	>0.9	1.07	1.02	0.88	0.89	0.93	0.90	Project: Vaca-Dixon voltage conversion project Project ISD: on-hold Review project scope	
PLAINFLD 60	P7-1:A4:26:_VACA-SUISUN & VACA-SUISUN-JAMESON	P7	DCTL	1.02	0.90	>0.9	>0.9	1.07	1.02	0.88	0.89	0.93	0.90	Project: Vaca-Dixon voltage conversion project Project ISD: on-hold Review project scope	
PLAINFLD 60	P7-1:A5:4_Poe-Rio Oso 230 kV Line & Cresta-Rio Oso 230 kV Line	P7	DCTL	1.02	0.90	>0.9	>0.9	1.07	1.02	0.88	0.89	0.93	0.89	Project: Vaca-Dixon voltage conversion project Project ISD: on-hold Review project scope	
PLAINFLD 60	P7-1:A5:6_Table Mountain-Rio Oso 230 kV Line & Palermo-Colgate 230 kV Line	P7	DCTL	1.02	0.91	>0.9	>0.9	1.07	1.02	0.88	0.89	0.93	0.90	Project: Vaca-Dixon voltage conversion project Project ISD: on-hold Review project scope	
PLAINFLD 60	P7-1:A5:8_Middle Fork-Gold Hill 230 kV Line & Placer-Gold Hill No. 1 115 kV Line	P7	DCTL	1.02	0.90	>0.9	>0.9	1.07	1.02	0.88	0.89	0.93	0.90	Project: Vaca-Dixon voltage conversion project Project ISD: on-hold Review project scope	
PLCRVLB2 115	Base Case	P0	N-0	1.05	1.02	>0.9	>0.9	1.06	1.05	1.01	1.01	1.01	1.01	- Load power factor correction - Reactor projects	

Study Area: **PG&E Central Valley**



High/Low Voltage

Substation	Contingency (All and Worst P6)	Category	Category Description	Post Cont. Voltage Deviation %										Project & Potential Mitigation Solutions
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP High CEC Forecast	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generation s	
PLCRVLB2 115	P1-2:A5:36:_DRUM-HIGGINS 115KV [4393]	P1	N-1	1.05	1.01	>0.9	>0.9	1.07	1.05	1.00	1.00	1.00	1.00	- Load power factor correction - Reactor projects
PLCRVLB2 115	P1-2:A5:37:_BELL-PLACER 115KV [4395]	P1	N-1	1.06	1.02	>0.9	>0.9	1.06	1.06	1.01	1.01	1.01	1.01	- Load power factor correction - Reactor projects
PLCRVLB2 115	P2-2:A5:19:_PLACER 115KV SECTION 1D	P2	Bus	1.06	1.02	>0.9	>0.9	1.07	1.06	1.02	1.02	1.02	1.02	- Load power factor correction - Reactor projects
PLCRVLB2 115	P2-2:A5:21:_ELDORAD 115KV SECTION 1D	P2	Bus	1.05	1.00	>0.9	>0.9	1.06	1.05	1.00	0.99	1.01	0.99	- Load power factor correction - Reactor projects
PLCRVLB2 115	P2-3:A5:22:_PLACER - 1D 115KV & PLACER-GOLD HILL #1 LINE	P2	Non-bus-tie breaker	1.06	1.02	>0.9	>0.9	1.07	1.06	1.02	1.01	1.02	1.02	- Load power factor correction - Reactor projects
PLCRVLB2 115	P2-3:A5:23:_PLACER - 1D 115KV & PLACER-GOLD HILL #2 LINE	P2	Non-bus-tie breaker	1.06	1.02	>0.9	>0.9	1.07	1.06	1.02	1.02	1.02	1.02	- Load power factor correction - Reactor projects
PLCRVLB2 115	P2-3:A5:24:_PLACER - 1D 115KV & BELL-PLACER LINE	P2	Non-bus-tie breaker	1.06	1.02	>0.9	>0.9	1.07	1.06	1.02	1.02	1.02	1.02	- Load power factor correction - Reactor projects
PLCRVLB2 115	P2-3:A5:27:_ELDORAD - 1D 115KV & ELDORAD-MIZOU_T1 LINE	P2	Non-bus-tie breaker	1.05	0.99	>0.9	>0.9	1.06	1.05	0.98	0.98	1.00	0.98	- Load power factor correction - Reactor projects
PLCRVLB2 115	P2-3:A5:81:_DRUM 115KV - RING R2 & R3	P2	Non-bus-tie breaker	1.05	1.01	>0.9	>0.9	1.06	1.05	1.00	1.00	1.00	1.00	- Load power factor correction - Reactor projects
PLCRVLB2 115	P2-3:A5:85:_BRNSWALT 115KV - RING R4 & R3	P2	Non-bus-tie breaker	1.05	1.01	>0.9	>0.9	1.06	1.05	1.00	1.00	1.00	1.00	- Load power factor correction - Reactor projects
PLCRVLB2 115	P2-4:A11:3:_BELLOTA 230KV - SECTION 1E & 2E	P2	Bus-tie breaker	1.05	0.99	>0.9	>0.9	1.06	1.05	0.98	0.98	0.99	0.98	- Load power factor correction - Reactor projects
PLCRVLB2 115	P2-4:A5:4:_GOLDHILL 115KV - SECTION 1F & 2F	P2	Bus-tie breaker	1.07	1.02	>0.9	>0.9	1.07	1.07	1.02	1.01	1.02	1.02	- Load power factor correction - Reactor projects
PLCRVLB2 115	P2-1:A5:12:_MISSOURI FLAT-GOLD HILL #2 115KV [2670] (GOLDHILL-SHPRING2)	P2-1	Line Section w/o fault	0.99	0.86	>0.9	>0.9	1.04	0.99	0.84	0.80	0.89	0.86	Connect Shingle Spring load to Missouri Flat-Gold Hill #1 115KV
PLCRVLB2 115	P2-1:A5:30:_DRUM-HIGGINS 115KV [4393] (DTCH FL1-CHCGO PK)	P2-1	Line Section w/o fault	1.05	1.01	>0.9	>0.9	1.07	1.05	1.00	1.00	1.01	1.00	- Load power factor correction - Reactor projects
PLCRVLB2 115	P2-1:A5:34:_BELL-PLACER 115KV [4395] (PLACER-BELL PGE)	P2-1	Line Section w/o fault	1.06	1.02	>0.9	>0.9	1.06	1.06	1.01	1.01	1.01	1.01	- Load power factor correction - Reactor projects
PLCRVLB2 115	P7-1:A5:19_Placer-Gold Hill No. 1 115 kV Line and Placer-Gold Hill No. 2 115 kV Line	P7	DCTL	1.06	1.02	>0.9	>0.9	1.07	1.06	1.02	1.02	1.02	1.02	- Load power factor correction - Reactor projects
PLCRVLB3 115	Base Case	P0	N-0	1.05	1.02	>0.9	>0.9	1.06	1.05	1.01	1.01	1.01	1.01	- Load power factor correction - Reactor projects

Study Area: **PG&E Central Valley**



High/Low Voltage

Substation	Contingency (All and Worst P6)	Category	Category Description	Post Cont. Voltage Deviation %										Project & Potential Mitigation Solutions
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP High CEC Forecast	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generation s	
PLCRVLB3 115	P1-2:A5:36:_DRUM-HIGGINS 115KV [4393]	P1	N-1	1.05	1.01	>0.9	>0.9	1.07	1.05	1.00	1.00	1.00	1.00	- Load power factor correction - Reactor projects
PLCRVLB3 115	P1-2:A5:37:_BELL-PLACER 115KV [4395]	P1	N-1	1.06	1.02	>0.9	>0.9	1.06	1.06	1.01	1.01	1.01	1.01	- Load power factor correction - Reactor projects
PLCRVLB3 115	P2-2:A5:19:_PLACER 115KV SECTION 1D	P2	Bus	1.06	1.02	>0.9	>0.9	1.07	1.06	1.02	1.02	1.02	1.02	- Load power factor correction - Reactor projects
PLCRVLB3 115	P2-2:A5:21:_ELDORAD 115KV SECTION 1D	P2	Bus	1.05	1.00	>0.9	>0.9	1.06	1.05	1.00	0.99	1.01	0.99	- Load power factor correction - Reactor projects
PLCRVLB3 115	P2-3:A5:22:_PLACER - 1D 115KV & PLACER-GOLD HILL #1 LINE	P2	Non-bus-tie breaker	1.06	1.02	>0.9	>0.9	1.07	1.06	1.02	1.01	1.02	1.02	- Load power factor correction - Reactor projects
PLCRVLB3 115	P2-3:A5:23:_PLACER - 1D 115KV & PLACER-GOLD HILL #2 LINE	P2	Non-bus-tie breaker	1.06	1.02	>0.9	>0.9	1.07	1.06	1.02	1.02	1.02	1.02	- Load power factor correction - Reactor projects
PLCRVLB3 115	P2-3:A5:24:_PLACER - 1D 115KV & BELL-PLACER LINE	P2	Non-bus-tie breaker	1.06	1.02	>0.9	>0.9	1.07	1.06	1.02	1.02	1.02	1.02	- Load power factor correction - Reactor projects
PLCRVLB3 115	P2-3:A5:26:_ELDORAD - 1D 115KV & ELDORAD-MIZOU_T2 LINE	P2	Non-bus-tie breaker	1.08	1.03	>0.9	>0.9	1.07	1.08	1.02	1.02	1.03	1.02	- Load power factor correction - Reactor projects
PLCRVLB3 115	P2-3:A5:27:_ELDORAD - 1D 115KV & ELDORAD-MIZOU_T1 LINE	P2	Non-bus-tie breaker	1.05	0.99	>0.9	>0.9	1.06	1.05	0.98	0.98	1.00	0.98	- Load power factor correction - Reactor projects
PLCRVLB3 115	P2-3:A5:81:_DRUM 115KV - RING R2 & R3	P2	Non-bus-tie breaker	1.05	1.01	>0.9	>0.9	1.06	1.05	1.00	1.00	1.00	1.00	- Load power factor correction - Reactor projects
PLCRVLB3 115	P2-3:A5:85:_BRNSWALT 115KV - RING R4 & R3	P2	Non-bus-tie breaker	1.05	1.01	>0.9	>0.9	1.06	1.05	1.00	1.00	1.00	1.00	- Load power factor correction - Reactor projects
PLCRVLB3 115	P2-4:A11:3:_BELLOTA 230KV - SECTION 1E & 2E	P2	Bus-tie breaker	1.05	0.99	>0.9	>0.9	1.06	1.05	0.98	0.98	0.99	0.98	- Load power factor correction - Reactor projects
PLCRVLB3 115	P2-4:A5:4:_GOLDHILL 115KV - SECTION 1F & 2F	P2	Bus-tie breaker	1.07	1.02	>0.9	>0.9	1.07	1.07	1.02	1.01	1.02	1.02	- Load power factor correction - Reactor projects
PLCRVLB3 115	P2-1:A5:12:_MISSOURI FLAT-GOLD HILL #2 115KV [2670] (GOLDHILL-SHPRING2)	P2-1	Line Section w/o fault	0.99	0.86	>0.9	>0.9	1.04	0.99	0.84	0.80	0.89	0.86	Connect Shingle Spring load to Missouri Flat-Gold Hill #1 115KV
PLCRVLB3 115	P2-1:A5:30:_DRUM-HIGGINS 115KV [4393] (DTCH FL1-CHCGO PK)	P2-1	Line Section w/o fault	1.05	1.01	>0.9	>0.9	1.07	1.05	1.00	1.00	1.00	1.00	- Load power factor correction - Reactor projects
PLCRVLB3 115	P2-1:A5:34:_BELL-PLACER 115KV [4395] (PLACER-BELL PGE)	P2-1	Line Section w/o fault	1.06	1.02	>0.9	>0.9	1.06	1.06	1.01	1.01	1.01	1.01	- Load power factor correction - Reactor projects
PLCRVLB3 115	P7-1:A5:19_Placer-Gold Hill No. 1 115 kV Line and Placer-Gold Hill No. 2 115 kV Line	P7	DCTL	1.06	1.02	>0.9	>0.9	1.07	1.06	1.02	1.02	1.02	1.02	- Load power factor correction - Reactor projects
PLSNT GR 115	Base Case	P0	N-0	1.03	1.00	>0.9	>0.9	1.04	1.03	1.00	1.00	1.00	0.99	Load power factor correction

Study Area: **PG&E Central Valley**



High/Low Voltage

Substation	Contingency (All and Worst P6)	Category	Category Description	Post Cont. Voltage Deviation %										Project & Potential Mitigation Solutions
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP High CEC Forecast	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generation s	
PLSNT GR 115	P5-5:A5:1: Atlantic 230 kV BAAH Bus #1 (failure of non-redundant relay)	P55	Non-Redundant	1.02	0.94	>0.9	>0.9	1.02	1.02	0.95	0.93	0.99	0.92	Load power factor correction
PLSNT GR 115	P1-2:A5:6: RIO OSO-ATLANTIC 230KV [5590] P1-2:A5:10: ATLANTIC-GOLD HILL 230KV [4330]	P6	N-1/N-1	>0.9	0.94	>0.9	>0.9	>0.9	>0.9	0.95	0.93	>0.9	0.95	Load power factor correction
PLUMAS 60	P1-2:A5:63: NICOLAUS-MARYSVILLE 60KV [7690] P1-3:A5:31: PEAS RG 60/60KV TB 1	P6	N-1/N-1	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	0.77	>0.9	Sensitivity only
PNE GRVE 60	P1-2:A11:12: VALLEY SPRINGS-BELLOTA 230KV [5860] P1-2:A11:9: TIGER CREEK-VALLEY SPRINGS 230KV [5790]	P6	N-1/N-1	>0.9	>0.9	>0.9	>0.9	0.89	>0.9	>0.9	>0.9	>0.9	>0.9	Action plan or SPS
POST 115	Base Case	P0	N-0	1.03	1.04	>0.9	>0.9	1.03	1.03	1.03	1.04	1.05	1.03	Load power factor correction
PRDEJCT 60	Base Case	P0	N-0	1.04	1.05	>0.9	>0.9	1.04	1.04	1.05	1.05	1.06	1.05	- Load power factor correction - Reactor projects
PUTH CRK 115	Base Case	P0	N-0	1.07	1.04	>0.9	>0.9	1.07	1.07	1.04	1.04	1.03	1.04	- Load power factor correction - Reactor projects
PUTH CRK 115	P1-3:A4:1: VACA-DIX 500/230KV TB 11	P1	N-1	1.07	1.04	>0.9	>0.9	1.08	1.07	1.04	1.04	1.04	1.04	- Load power factor correction - Reactor projects
PUTH CRK 115	P1-4:A4:6: VC DX11T SVD=V	P1	N-1	1.07	1.04	>0.9	>0.9	1.07	1.07	1.04	1.04	1.03	1.04	- Load power factor correction - Reactor projects
PUTH CRK 115	P2-2:A4:7: VACA-DIX 230KV SECTION NA	P2	Bus	1.08	1.05	>0.9	>0.9	1.08	1.08	1.05	1.04	1.05	1.05	- Load power factor correction - Reactor projects
PUTH CRK 115	P1-3:A4:2: VACA-DIX 500/230KV TB 12 P1-4:A4:6: VC DX11T SVD=V	P6	N-1/N-1	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	Load power factor correction
Q653F 115	Base Case	P0	N-0	1.02	1.02	>0.9	>0.9	1.03	1.02	1.01	1.02	1.03	1.01	Load power factor correction
Q653F 115	P2-2:A4:26: DAVIS 115KV SECTION 1D	P2	Bus	1.03	1.02	>0.9	>0.9	1.04	1.03	1.02	1.02	1.03	1.01	Load power factor correction
Q653F 115	P2-3:A4:19: BRIGHTN - ME 115KV & WEST SACRAMENTO-BRIGHTON LINE	P2	Non-bus-tie breaker	1.00	0.96	>0.9	>0.9	1.03	1.02	0.99	0.99	1.01	0.99	Load power factor correction
Q653F 115	P2-3:A4:20: BRIGHTN - ME 115KV & BRIGHTN-DAVIS-BRKR SLG LINE	P2	Non-bus-tie breaker	1.00	0.96	>0.9	>0.9	1.02	1.02	0.99	0.99	1.01	0.99	Load power factor correction
Q653F 115	P2-4:A4:11: DAVIS 115KV - SECTION 1D & 1E	P2	Bus-tie breaker	1.04	1.02	>0.9	>0.9	1.04	1.04	1.01	1.02	1.03	1.01	Load power factor correction
Q653F 115	P2-4:A4:12: DAVIS 115KV - SECTION 1E & 1F	P2	Bus-tie breaker	1.03	1.01	>0.9	>0.9	1.04	1.03	1.00	1.00	1.02	0.99	Load power factor correction
Q653F 115	P2-1:A4:5: WOODLAND-DAVIS 115KV [4210] (Q653FJCT-DAVIS)	P2-1	Line Section w/o fault	1.03	1.02	>0.9	>0.9	1.04	1.03	1.01	1.02	1.03	1.01	Load power factor correction
R.TRACK 115	Base Case	P0	N-0	1.04	1.02	>0.9	>0.9	1.04	1.04	1.02	1.02	1.03	1.01	Load power factor correction
R.TRACK 115	P2-4:A11:3: BELLOTA 230KV - SECTION 1E & 2E	P2	Bus-tie breaker	0.94	0.65	>0.9	>0.9	1.04	0.93	0.63	0.64	0.95	0.62	Bellota 230 kV bus upgrade
R.TRACK 115	P1-3:A11:10: BELLOTA 230/115KV TB 1 P1-3:A11:11: BELLOTA 230/115KV TB 2	P6	N-1/N-1	0.99	0.87	>0.9	>0.9	>0.9	0.99	>0.9	>0.9	0.97	0.88	Action plan or SPS
RALSTON 230	Base Case	P0	N-0	1.03	1.01	>0.9	>0.9	1.04	1.03	1.00	1.00	0.98	1.00	Load power factor correction

Study Area: **PG&E Central Valley**



High/Low Voltage

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				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP High CEC Forecast	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations	
RICE 60	Base Case	P0	N-0	1.00	1.00	>0.9	>0.9	1.06	1.00	0.98	0.98	1.01	0.98	- Load power factor correction - Reactor projects
RIO OSO 115	Base Case	P0	N-0	1.05	1.04	>0.9	>0.9	1.04	1.05	1.04	1.05	1.05	1.04	Load power factor correction
RIO OSO 115	P1-2:A4:25:_WOODLAND-DAVIS 115KV [4210]	P1	N-1	1.05	1.04	>0.9	>0.9	1.04	1.05	1.04	1.05	1.05	1.04	Load power factor correction
RIO OSO 115	P2-2:A4:17:_WOODLD 115KV SECTION 1F	P2	Bus	1.05	1.04	>0.9	>0.9	1.04	1.05	1.04	1.05	1.05	1.04	- Load power factor correction - Reactor projects - Project: Rio Oso Area 230 kV Voltage Support
RIO OSO 115	P2-2:A4:20:_BRIGHTN 115KV SECTION ME	P2	Bus	1.04	1.05	>0.9	>0.9	1.04	1.05	1.05	1.05	1.05	1.05	Load power factor correction
RIO OSO 115	P2-2:A4:26:_DAVIS 115KV SECTION 1D	P2	Bus	1.05	1.04	>0.9	>0.9	1.04	1.05	1.04	1.05	1.05	1.04	- Load power factor correction - Reactor projects - Project: Rio Oso Area 230 kV Voltage Support
RIO OSO 115	P2-3:A4:16:_WOODLD - 1F 115KV & WOODLAND-DAVIS LINE	P2	Non-bus-tie breaker	1.05	1.04	>0.9	>0.9	1.04	1.05	1.04	1.05	1.05	1.04	Load power factor correction
RIO OSO 115	P2-3:A4:17:_WOODLD - 1F 115KV & RIO OSO-WOODLAND #2 LINE	P2	Non-bus-tie breaker	1.05	1.04	>0.9	>0.9	1.04	1.05	1.04	1.05	1.05	1.04	- Load power factor correction - Reactor projects - Project: Rio Oso Area 230 kV Voltage Support
RIO OSO 115	P2-3:A4:19:_BRIGHTN - ME 115KV & WEST SACRAMENTO-BRIGHTON LINE	P2	Non-bus-tie breaker	1.04	1.04	>0.9	>0.9	1.04	1.05	1.05	1.05	1.05	1.05	Load power factor correction
RIO OSO 115	P2-3:A4:20:_BRIGHTN - ME 115KV & BRIGHTN-DAVIS-BRKR SLG LINE	P2	Non-bus-tie breaker	1.04	1.04	>0.9	>0.9	1.04	1.05	1.05	1.05	1.05	1.05	Load power factor correction
RIO OSO 115	P2-3:A4:24:_DAVIS - 1D 115KV & WOODLAND-DAVIS LINE	P2	Non-bus-tie breaker	1.05	1.04	>0.9	>0.9	1.04	1.05	1.04	1.05	1.04	1.04	Load power factor correction
RIO OSO 115	P2-3:A5:83:_DRUM 115KV - RING R5 & R4	P2	Non-bus-tie breaker	1.05	1.04	>0.9	>0.9	1.04	1.05	1.04	1.05	1.05	1.04	- Load power factor correction - Reactor projects - Project: Rio Oso Area 230 kV Voltage Support
RIO OSO 115	P2-4:A11:3:_BELLOTA 230KV - SECTION 1E & 2E	P2	Bus-tie breaker	1.04	1.04	>0.9	>0.9	1.04	1.04	1.03	1.03	1.03	1.02	Load power factor correction
RIO OSO 115	P2-4:A4:10:_BRIGHTN 115KV - SECTION ME & MD	P2	Bus-tie breaker	1.04	1.05	>0.9	>0.9	1.04	1.05	1.05	1.05	1.05	1.05	Load power factor correction
RIO OSO 115	P2-4:A4:11:_DAVIS 115KV - SECTION 1D & 1E	P2	Bus-tie breaker	1.05	1.04	>0.9	>0.9	1.04	1.05	1.04	1.05	1.05	1.04	Load power factor correction
RIO OSO 115	P2-4:A4:12:_DAVIS 115KV - SECTION 1E & 1F	P2	Bus-tie breaker	1.05	1.04	>0.9	>0.9	1.04	1.05	1.04	1.05	1.05	1.04	Load power factor correction
RIO OSO 115	P2-4:A4:8:_WOODLD 115KV - SECTION 1F & 1E	P2	Bus-tie breaker	1.05	1.05	>0.9	>0.9	1.04	1.05	1.04	1.05	1.05	1.04	- Load power factor correction - Reactor projects - Project: Rio Oso Area 230 kV Voltage Support
RIO OSO 115	P2-1:A4:14:_WOODLAND-DAVIS 115KV [4210] (WOODLANDTP-WOODLD)	P2-1	Line Section w/o fault	1.05	1.04	>0.9	>0.9	1.04	1.05	1.04	1.05	1.05	1.04	Load power factor correction

Study Area: **PG&E Central Valley**



High/Low Voltage

Substation	Contingency (All and Worst P6)	Category	Category Description	Post Cont. Voltage Deviation %										Project & Potential Mitigation Solutions
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP High CEC Forecast	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations	
RIO OSO 115	P2-1:A4:5:_WOODLAND-DAVIS 115KV [4210] (Q653FJCT-DAVIS)	P2-1	Line Section w/o fault	1.05	1.04	>0.9	>0.9	1.04	1.05	1.04	1.05	1.05	1.04	Load power factor correction
RIO OSO 115	P2-1:A4:6:_WOODLAND-DAVIS 115KV [4210] (WOODLANDTP-Q653FJCT)	P2-1	Line Section w/o fault	1.05	1.04	>0.9	>0.9	1.04	1.05	1.04	1.05	1.05	1.04	Load power factor correction
RIO OSO 115	P1-1:A5:4:_DRUM 5 13.80KV GEN UNIT 1 P1-2:A4:25:_WOODLAND-DAVIS 115KV [4210]	P3	G-1/N-1	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	Load power factor correction
RIO OSO 115	P1-2:A5:17:_RIO OSO-LINCOLN 115KV [1320] P1-2:A4:25:_WOODLAND-DAVIS 115KV [4210]	P6	N-1/N-1	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	Load power factor correction
RIO OSO 115	P7-1:A5:11_Drum-Rio Oso No. 1 115 kV Line & Drum-Rio Oso No. 2 115 kV Line	P7	DCTL	1.05	1.04	>0.9	>0.9	1.04	1.05	1.04	1.05	1.05	1.04	- Load power factor correction - Reactor projects - Project: Rio Oso Area 230 kV Voltage Support
RIO OSO 230	Base Case	P0	N-0	1.00	0.97	>0.9	>0.9	1.02	1.00	0.96	0.96	0.97	0.96	Load power factor correction
RIPON 115	P2-4:A11:3:_BELLOTA 230KV - SECTION 1E & 2E	P2	Bus-tie breaker	0.99	0.85	>0.9	>0.9	1.02	0.98	0.83	0.84	0.98	0.83	Project: Vierra looping project
RIPON 115	P1-2:A11:104:_MANTECA-RIPON 115KV [0] P1-2:A11:61:_BELLOTA-RIVERBANK-MELONES SW STA 115KV [1070]	P6	N-1/N-1	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	0.87	>0.9	>0.9	0.86	Project: Vierra looping project
ROCKLIN 60	Base Case	P0	N-0	1.09	0.99	>0.9	>0.9	1.06	1.09	0.98	0.98	1.00	0.98	- Load power factor correction - Reactor projects
ROCKLIN 60	P2-4:A11:3:_BELLOTA 230KV - SECTION 1E & 2E	P2	Bus-tie breaker	1.09	0.95	>0.9	>0.9	1.05	1.09	0.94	0.94	0.97	0.93	- Load power factor correction - Reactor projects
ROCKLIN 60	P5-5:A5:1:_Atlantic 230 kV BAAH Bus #1 (failure of non-redundent relay)	P55	Non-Redundant	1.08	0.91	>0.9	>0.9	1.04	1.08	0.91	0.89	0.98	0.88	- Load power factor correction for high voltage - Low voltage: Sensitivity only
ROCKLIN 60	P1-2:A5:10:_ATLANTIC-GOLD HILL 230KV [4330] P1-2:A5:6:_RIO OSO-ATLANTIC 230KV [5590]	P6	N-1/N-1	>0.9	0.92	>0.9	>0.9	>0.9	>0.9	>0.9	0.90	>0.9	>0.9	- Load power factor correction for high voltage - Low voltage: Sensitivity only
ROCKLIN 60	P7-1:A5:7_Atlantic-Gold Hill 230 kV Line & Rio Oso-Gold Hill 230 kV Line	P7	DCTL	1.09	0.96	>0.9	>0.9	1.06	1.09	0.96	0.95	0.99	0.94	- Load power factor correction - Reactor projects
RVRBANK 115	P2-4:A11:3:_BELLOTA 230KV - SECTION 1E & 2E	P2	Bus-tie breaker	0.84	0.35	>0.9	>0.9	1.03	0.83	0.32	0.33	0.88	0.33	Bellota 230 kV bus upgrade
RVRBANK 115	P1-3:A11:10:_BELLOTA 230/115KV TB 1 P1-3:A11:11:_BELLOTA 230/115KV TB 2	P6	N-1/N-1	0.92	0.74	>0.9	>0.9	>0.9	0.92	>0.9	>0.9	0.91	0.76	Action plan or SPS
SAFEWAY 115	Base Case	P0	N-0	1.04	1.03	>0.9	>0.9	1.04	1.04	1.03	1.03	1.02	1.03	Load power factor correction
SALADO 115	Base Case	P0	N-0	1.04	1.03	>0.9	>0.9	1.05	1.04	1.03	1.03	1.03	1.02	Load power factor correction
SALADO 115	P2-4:A11:9:_TESLA 115KV - SECTION 1D & 2D	P2	Bus-tie breaker	1.02	1.00	>0.9	>0.9	1.06	1.02	0.95	0.97	NConv	0.91	Sensitivity only
SANDBAR 115	P2-4:A11:3:_BELLOTA 230KV - SECTION 1E & 2E	P2	Bus-tie breaker	1.00	0.77	>0.9	>0.9	1.04	1.00	0.74	0.75	1.01	0.73	Bellota 230 kV bus upgrade
SCHMLBCH 115	Base Case	P0	N-0	1.05	1.03	>0.9	>0.9	1.06	1.05	1.02	1.02	1.01	1.03	- Load power factor correction - Reactor projects
SCHULTE 115	Base Case	P0	N-0	1.04	1.03	>0.9	>0.9	1.04	1.04	1.03	1.03	1.02	1.03	Load power factor correction

Study Area: **PG&E Central Valley**



High/Low Voltage

Substation	Contingency (All and Worst P6)	Category	Category Description	Post Cont. Voltage Deviation %										Project & Potential Mitigation Solutions
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP High CEC Forecast	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generation s	
SHPRING 115	Base Case	P0	N-0	1.06	1.02	>0.9	>0.9	1.07	1.06	1.01	1.01	1.01	1.01	- Load power factor correction - Reactor projects - Project: Rio Oso Area 230 kV Voltage Support
SHPRING 115	P1-2:A5:36:_DRUM-HIGGINS 115KV [4393]	P1	N-1	1.06	1.01	>0.9	>0.9	1.07	1.06	1.01	1.00	1.01	1.01	- Load power factor correction - Reactor projects - Project: Rio Oso Area 230 kV Voltage Support
SHPRING 115	P1-2:A5:37:_BELL-PLACER 115KV [4395]	P1	N-1	1.06	1.02	>0.9	>0.9	1.07	1.06	1.02	1.01	1.02	1.01	- Load power factor correction - Reactor projects - Project: Rio Oso Area 230 kV Voltage Support
SHPRING 115	P1-2:A5:38:_ELDORAD-MIZOU_T2 115KV [0]	P1	N-1	1.06	1.02	>0.9	>0.9	1.07	1.06	1.01	1.01	1.02	1.01	- Load power factor correction - Reactor projects - Project: Rio Oso Area 230 kV Voltage Support
SHPRING 115	P2-2:A5:19:_PLACER 115KV SECTION 1D	P2	Bus	1.06	1.03	>0.9	>0.9	1.07	1.06	1.02	1.02	1.03	1.02	- Load power factor correction - Reactor projects - Project: Rio Oso Area 230 kV Voltage Support
SHPRING 115	P2-2:A5:21:_ELDORAD 115KV SECTION 1D	P2	Bus	1.05	1.01	>0.9	>0.9	1.07	1.05	1.00	1.00	1.01	1.00	- Load power factor correction - Reactor projects - Project: Rio Oso Area 230 kV Voltage Support
SHPRING 115	P2-3:A5:22:_PLACER - 1D 115KV & PLACER-GOLD HILL #1 LINE	P2	Non-bus-tie breaker	1.06	1.03	>0.9	>0.9	1.07	1.06	1.02	1.02	1.03	1.02	- Load power factor correction - Reactor projects - Project: Rio Oso Area 230 kV Voltage Support
SHPRING 115	P2-3:A5:23:_PLACER - 1D 115KV & PLACER-GOLD HILL #2 LINE	P2	Non-bus-tie breaker	1.06	1.03	>0.9	>0.9	1.07	1.06	1.02	1.02	1.03	1.02	- Load power factor correction - Reactor projects - Project: Rio Oso Area 230 kV Voltage Support
SHPRING 115	P2-3:A5:24:_PLACER - 1D 115KV & BELL-PLACER LINE	P2	Non-bus-tie breaker	1.06	1.03	>0.9	>0.9	1.07	1.06	1.02	1.02	1.03	1.02	- Load power factor correction - Reactor projects - Project: Rio Oso Area 230 kV Voltage Support
SHPRING 115	P2-3:A5:26:_ELDORAD - 1D 115KV & ELDORAD-MIZOU_T2 LINE	P2	Non-bus-tie breaker	1.06	1.02	>0.9	>0.9	1.07	1.06	1.01	1.01	1.02	1.01	- Load power factor correction - Reactor projects - Project: Rio Oso Area 230 kV Voltage Support
SHPRING 115	P2-3:A5:81:_DRUM 115KV - RING R2 & R3	P2	Non-bus-tie breaker	1.06	1.01	>0.9	>0.9	1.07	1.06	1.01	1.00	1.01	1.01	- Load power factor correction - Reactor projects - Project: Rio Oso Area 230 kV Voltage Support

Study Area: **PG&E Central Valley**



High/Low Voltage

Substation	Contingency (All and Worst P6)	Category	Category Description	Post Cont. Voltage Deviation %										Project & Potential Mitigation Solutions
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP High CEC Forecast	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generation s	
SHPRING 115	P2-3:A5:85:_BRNSWALT 115KV - RING R4 & R3	P2	Non-bus-tie breaker	1.06	1.01	>0.9	>0.9	1.07	1.06	1.01	1.00	1.01	1.00	- Load power factor correction - Reactor projects - Project: Rio Oso Area 230 kV Voltage Support
SHPRING 115	P2-4:A11:3:_BELLOTA 230KV - SECTION 1E & 2E	P2	Bus-tie breaker	1.06	0.99	>0.9	>0.9	1.06	1.05	0.98	0.98	0.99	0.98	- Load power factor correction - Reactor projects - Project: Rio Oso Area 230 kV Voltage Support
SHPRING 115	P2-4:A5:4:_GOLDHILL 115KV - SECTION 1F & 2F	P2	Bus-tie breaker	1.07	1.03	>0.9	>0.9	1.07	1.07	1.02	1.01	1.02	1.02	- Load power factor correction - Reactor projects - Project: Rio Oso Area 230 kV Voltage Support
SHPRING 115	P2-1:A5:12:_MISSOURI FLAT-GOLD HILL #2 115KV [2670] (GOLDHILL-SHPRING2)	P2-1	Line Section w/o fault	0.99	0.84	>0.9	>0.9	1.03	0.99	0.82	0.78	0.88	0.84	Connect Shingle Spring load to Missouri Flat-Gold Hill #1 115KV
SHPRING 115	P2-1:A5:30:_DRUM-HIGGINS 115KV [4393] (DTCH FL1-CHCGO PK)	P2-1	Line Section w/o fault	1.06	1.01	>0.9	>0.9	1.07	1.06	1.01	1.00	1.01	1.01	- Load power factor correction - Reactor projects - Project: Rio Oso Area 230 kV Voltage Support
SHPRING 115	P2-1:A5:31:_DRUM-HIGGINS 115KV [4393] (CHCGO PK-HIGGINS)	P2-1	Line Section w/o fault	1.06	1.01	>0.9	>0.9	1.07	1.06	1.00	1.00	1.01	1.00	- Load power factor correction - Reactor projects - Project: Rio Oso Area 230 kV Voltage Support
SHPRING 115	P2-1:A5:34:_BELL-PLACER 115KV [4395] (PLACER-BELL PGE)	P2-1	Line Section w/o fault	1.06	1.02	>0.9	>0.9	1.07	1.06	1.02	1.01	1.02	1.01	- Load power factor correction - Reactor projects - Project: Rio Oso Area 230 kV Voltage Support
SHPRING 115	P2-1:A5:37:_HIGGINS-BELL 115KV [1412] (HIGGINS-BELL PGE)	P2-1	Line Section w/o fault	1.06	1.02	>0.9	>0.9	1.07	1.06	1.01	1.01	1.01	1.01	- Load power factor correction - Reactor projects - Project: Rio Oso Area 230 kV Voltage Support
SHPRING 115	P1-1:A5:4:_DRUM 5 13.80KV GEN UNIT 1 P1-2:A5:38:_ELDORAD-MIZOU_T2 115KV [0]	P3	G-1/N-1	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	Load power factor correction
SHPRING 115	P1-2:A5:36:_DRUM-HIGGINS 115KV [4393] P1-2:A5:38:_ELDORAD-MIZOU_T2 115KV [0]	P6	N-1/N-1	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	Load power factor correction
SHPRING 115	P7-1:A5:18_El Dorado-Missouri Flat No. 2 115 kV Line & El Dorado-Missouri Flat No. 1 115 kV Line	P7	DCTL	1.06	1.02	>0.9	>0.9	1.07	1.06	1.01	1.01	1.02	1.01	- Load power factor correction - Reactor projects - Project: Rio Oso Area 230 kV Voltage Support
SHPRING 115	P7-1:A5:19_Placer-Gold Hill No. 1 115 kV Line and Placer-Gold Hill No. 2 115 kV Line	P7	DCTL	1.07	1.03	>0.9	>0.9	1.07	1.07	1.03	1.02	1.03	1.02	- Load power factor correction - Reactor projects - Project: Rio Oso Area 230 kV Voltage Support
SIERRAPI 60	Base Case	P0	N-0	1.10	0.97	>0.9	>0.9	1.06	1.10	0.97	0.96	0.99	0.96	- Load power factor correction - Reactor projects - Project: Rio Oso Area 230 kV Voltage Support

Study Area: **PG&E Central Valley**



High/Low Voltage

Substation	Contingency (All and Worst P6)	Category	Category Description	Post Cont. Voltage Deviation %										Project & Potential Mitigation Solutions
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP High CEC Forecast	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generation s	
SIERRAPI 60	P2-2:A5:10:_GOLDHILL 115KV SECTION 1F	P2	Bus	1.10	0.98	>0.9	>0.9	1.06	1.10	0.97	0.97	0.99	0.97	- Load power factor correction - Reactor projects - Project: Rio Oso Area 230 kV Voltage Support
SIERRAPI 60	P2-4:A11:3:_BELLOTA 230KV - SECTION 1E & 2E	P2	Bus-tie breaker	1.10	0.94	>0.9	>0.9	1.05	1.09	0.92	0.92	0.96	0.92	- Load power factor correction - Reactor projects - Project: Rio Oso Area 230 kV Voltage Support
SIERRAPI 60	P2-4:A5:4:_GOLDHILL 115KV - SECTION 1F & 2F	P2	Bus-tie breaker	1.10	0.98	>0.9	>0.9	1.06	1.10	0.97	0.95	0.99	0.97	- Load power factor correction - Reactor projects - Project: Rio Oso Area 230 kV Voltage Support
SIERRAPI 60	P2-4:A5:5:_GOLDHILL 115KV - SECTION 1F & 1E	P2	Bus-tie breaker	1.10	0.98	>0.9	>0.9	1.06	1.10	0.97	0.97	0.99	0.97	- Load power factor correction - Reactor projects - Project: Rio Oso Area 230 kV Voltage Support
SIERRAPI 60	P5-5:A5:1:_Atlantic 230 kV BAAH Bus #1 (failure of non-redundent relay)	P55	Non-Redundant	1.09	0.89	>0.9	>0.9	1.04	1.09	0.89	0.87	0.97	0.86	Protection upgrade
SIERRAPI 60	P1-2:A5:10:_ATLANTIC-GOLD HILL 230KV [4330] P1-2:A5:6:_RIO OSO-ATLANTIC 230KV [5590]	P6	N-1/N-1	>0.9	0.90	>0.9	>0.9	>0.9	>0.9	0.90	0.88	>0.9	>0.9	Action plan or SPS
SIERRAPI 60	P7-1:A5:19_Placer-Gold Hill No. 1 115 kV Line and Placer-Gold Hill No. 2 115 kV Line	P7	DCTL	1.10	0.98	>0.9	>0.9	1.06	1.10	0.97	0.97	0.99	0.97	- Load power factor correction - Reactor projects - Project: Rio Oso Area 230 kV Voltage Support
SIERRAPI 60	P7-1:A5:7_Atlantic-Gold Hill 230 kV Line & Rio Oso-Gold Hill 230 kV Line	P7	DCTL	1.10	0.95	>0.9	>0.9	1.06	1.09	0.94	0.94	0.98	0.93	- Load power factor correction - Reactor projects - Project: Rio Oso Area 230 kV Voltage Support
SMRTSVLE 60	Base Case	P0	N-0	1.02	1.02	>0.9	>0.9	1.04	1.02	1.02	1.02	1.03	1.02	Load power factor correction
SNDBR JT 115	P2-4:A11:3:_BELLOTA 230KV - SECTION 1E & 2E	P2	Bus-tie breaker	1.00	0.77	>0.9	>0.9	1.04	0.99	0.74	0.75	1.01	0.73	Bellota 230 kV bus upgrade
SOUTH BY 60	Base Case	P0	N-0	1.06	1.04	>0.9	>0.9	1.06	1.06	1.04	1.04	1.03	1.04	- Load power factor correction - Reactor projects - Project: Rio Oso Area 230 kV Voltage Support
SPAULDNG 60	Base Case	P0	N-0	1.03	1.04	>0.9	>0.9	1.04	1.04	1.04	1.04	1.04	1.04	Load power factor correction
SPAULDNG 60	P1-2:A5:67:_DRUM-SPAULDING 60KV [6770]	P1	N-1	1.05	1.05	>0.9	>0.9	1.06	1.05	1.05	1.05	1.05	1.05	- Load power factor correction - Reactor projects
SPAULDNG 60	P2-2:A5:40:_SPAULDNG 60KV SECTION 1D	P2	Bus	1.05	1.05	>0.9	>0.9	1.06	1.05	1.05	1.05	1.05	1.05	- Load power factor correction - Reactor projects
SPAULDNG 60	P2-3:A5:61:_SPAULDNG - 1D 60KV & DRUM-SPAULDING LINE	P2	Non-bus-tie breaker	1.05	1.05	>0.9	>0.9	1.06	1.05	1.05	1.05	1.05	1.05	- Load power factor correction - Reactor projects
SPAULDNG 60	P2-3:A5:63:_DRUM - MA 60KV & DRUM-SPAULDING LINE	P2	Non-bus-tie breaker	1.05	1.05	>0.9	>0.9	1.06	1.05	1.05	1.05	1.05	1.05	- Load power factor correction - Reactor projects

Study Area: **PG&E Central Valley**



High/Low Voltage

Substation	Contingency (All and Worst P6)	Category	Category Description	Post Cont. Voltage Deviation %										Project & Potential Mitigation Solutions	
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP High CEC Forecast	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations		
SPAULDNG 60	P2-1:A5:100:_DRUM-SPAULDING 60KV [6770] (SPAULDNG-BOWMN TP)	P2-1	Line Section w/o fault	1.05	1.05	>0.9	>0.9	1.06	1.05	1.05	1.05	1.05	1.05	1.05	- Load power factor correction - Reactor projects
SPAULDNG 60	P1-1:A5:13:_SPAULDG 9.11KV GEN UNIT 1 P1-2:A5:67:_DRUM-SPAULDING 60KV [6770]	P3	G-1/N-1	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	Load power factor correction
SPAULDNG 60	P1-1:A5:13:_SPAULDG 9.11KV GEN UNIT 1 P1-2:A5:67:_DRUM-SPAULDING 60KV [6770]	P6	N-1/N-1	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	Load power factor correction
SPI JCT 115	Base Case	P0	N-0	1.04	1.02	>0.9	>0.9	1.04	1.04	1.01	1.02	1.02	1.01	1.01	Load power factor correction
SPI JCT 115	P1-2:A5:18:_LINCOLN-PLEASANT GROVE 115KV [7400]	P1	N-1	1.05	1.04	>0.9	>0.9	1.04	1.05	1.03	1.04	1.04	1.04	1.03	Load power factor correction
SPI JCT 115	P1-1:A5:4:_DRUM 5 13.80KV GEN UNIT 1 P1-2:A5:18:_LINCOLN-PLEASANT GROVE 115KV [7400]	P3	G-1/N-1	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	Load power factor correction
SPI JCT 115	P5-5:A5:1:_Atlantic 230 kV BAAH Bus #1 (failure of non-redundent relay)	P55	Non-Redundant	1.02	0.98	>0.9	>0.9	1.03	1.02	0.98	0.97	1.01	0.96	0.96	Load power factor correction
SPI JCT 115	P1-2:A4:25:_WOODLAND-DAVIS 115KV [4210] P1-2:A5:18:_LINCOLN-PLEASANT GROVE 115KV [7400]	P6	N-1/N-1	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	Load power factor correction
SPICAMIN 115	Base Case	P0	N-0	1.06	1.02	>0.9	>0.9	1.06	1.06	1.02	1.02	1.01	1.02	1.02	- Load power factor correction - Reactor projects
SPICAMIN 115	P1-2:A5:36:_DRUM-HIGGINS 115KV [4393]	P1	N-1	1.06	1.02	>0.9	>0.9	1.07	1.06	1.01	1.01	1.01	1.01	1.01	- Load power factor correction - Reactor projects
SPICAMIN 115	P1-2:A5:37:_BELL-PLACER 115KV [4395]	P1	N-1	1.06	1.03	>0.9	>0.9	1.07	1.06	1.02	1.02	1.02	1.02	1.02	- Load power factor correction - Reactor projects
SPICAMIN 115	P2-2:A5:19:_PLACER 115KV SECTION 1D	P2	Bus	1.07	1.03	>0.9	>0.9	1.07	1.07	1.03	1.03	1.03	1.03	1.03	- Load power factor correction - Reactor projects
SPICAMIN 115	P2-2:A5:21:_ELDORAD 115KV SECTION 1D	P2	Bus	1.07	1.02	>0.9	>0.9	1.07	1.07	1.02	1.01	1.02	1.01	1.01	- Load power factor correction - Reactor projects
SPICAMIN 115	P2-3:A5:22:_PLACER - 1D 115KV & PLACER-GOLD HILL #1 LINE	P2	Non-bus-tie breaker	1.07	1.03	>0.9	>0.9	1.07	1.07	1.03	1.02	1.02	1.02	1.02	- Load power factor correction - Reactor projects
SPICAMIN 115	P2-3:A5:23:_PLACER - 1D 115KV & PLACER-GOLD HILL #2 LINE	P2	Non-bus-tie breaker	1.07	1.03	>0.9	>0.9	1.07	1.07	1.03	1.03	1.03	1.03	1.03	- Load power factor correction - Reactor projects
SPICAMIN 115	P2-3:A5:24:_PLACER - 1D 115KV & BELL-PLACER LINE	P2	Non-bus-tie breaker	1.07	1.03	>0.9	>0.9	1.07	1.07	1.03	1.03	1.03	1.03	1.03	- Load power factor correction - Reactor projects
SPICAMIN 115	P2-3:A5:26:_ELDORAD - 1D 115KV & ELDORAD-MIZOU_T2 LINE	P2	Non-bus-tie breaker	1.08	1.02	>0.9	>0.9	1.07	1.08	1.02	1.02	1.03	1.02	1.02	- Load power factor correction - Reactor projects
SPICAMIN 115	P2-3:A5:81:_DRUM 115KV - RING R2 & R3	P2	Non-bus-tie breaker	1.06	1.02	>0.9	>0.9	1.07	1.06	1.01	1.01	1.01	1.01	1.01	- Load power factor correction - Reactor projects

Study Area: **PG&E Central Valley**



High/Low Voltage

Substation	Contingency (All and Worst P6)	Category	Category Description	Post Cont. Voltage Deviation %										Project & Potential Mitigation Solutions
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP High CEC Forecast	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generation s	
SPICAMIN 115	P2-3:A5:85:_BRNSWALT 115KV - RING R4 & R3	P2	Non-bus-tie breaker	1.06	1.02	>0.9	>0.9	1.07	1.06	1.01	1.01	1.01	1.01	- Load power factor correction - Reactor projects
SPICAMIN 115	P2-4:A11:3:_BELLOTA 230KV - SECTION 1E & 2E	P2	Bus-tie breaker	1.06	1.00	>0.9	>0.9	1.06	1.06	0.99	0.99	0.99	0.99	- Load power factor correction - Reactor projects
SPICAMIN 115	P2-4:A5:4:_GOLDHILL 115KV - SECTION 1F & 2F	P2	Bus-tie breaker	1.08	1.03	>0.9	>0.9	1.07	1.08	1.03	1.01	1.02	1.03	- Load power factor correction - Reactor projects
SPICAMIN 115	P2-1:A5:12:_MISSOURI FLAT-GOLD HILL #2 115KV [2670] (GOLDHILL-SHPRING2)	P2-1	Line Section w/o fault	1.03	0.92	>0.9	>0.9	1.05	1.03	0.91	0.88	0.94	0.92	Sensitivity only
SPICAMIN 115	P2-1:A5:30:_DRUM-HIGGINS 115KV [4393] (DTCH FL1-CHCGO PK)	P2-1	Line Section w/o fault	1.06	1.02	>0.9	>0.9	1.07	1.06	1.01	1.01	1.01	1.01	- Load power factor correction - Reactor projects
SPICAMIN 115	P2-1:A5:31:_DRUM-HIGGINS 115KV [4393] (CHCGO PK-HIGGINS)	P2-1	Line Section w/o fault	1.06	1.02	>0.9	>0.9	1.07	1.06	1.01	1.01	1.01	1.01	- Load power factor correction - Reactor projects
SPICAMIN 115	P2-1:A5:34:_BELL-PLACER 115KV [4395] (PLACER-BELL PGE)	P2-1	Line Section w/o fault	1.07	1.03	>0.9	>0.9	1.07	1.06	1.02	1.02	1.02	1.02	- Load power factor correction - Reactor projects
SPICAMIN 115	P2-1:A5:37:_HIGGINS-BELL 115KV [1412] (HIGGINS-BELL PGE)	P2-1	Line Section w/o fault	1.06	1.02	>0.9	>0.9	1.07	1.06	1.02	1.01	1.01	1.02	- Load power factor correction - Reactor projects
SPICAMIN 115	P2-1:A5:39:_EL DORADO-MISSOURI FLAT #1 115KV [1530] (ELDORAD-APLHTAP1)	P2-1	Line Section w/o fault	1.07	1.02	>0.9	>0.9	1.07	1.07	1.02	1.02	1.02	1.02	- Load power factor correction - Reactor projects
SPICAMIN 115	P7-1:A5:19_Placer-Gold Hill No. 1 115 kV Line and Placer-Gold Hill No. 2 115 kV Line	P7	DCTL	1.07	1.03	>0.9	>0.9	1.07	1.07	1.03	1.03	1.03	1.03	- Load power factor correction - Reactor projects
SPI-LINC 115	Base Case	P0	N-0	1.04	1.02	>0.9	>0.9	1.04	1.04	1.01	1.02	1.02	1.01	Load power factor correction
SPI-LINC 115	P1-2:A5:18:_LINCOLN-PLEASANT GROVE 115KV [7400]	P1	N-1	1.05	1.04	>0.9	>0.9	1.04	1.05	1.03	1.04	1.04	1.03	Load power factor correction
SPI-LINC 115	P1-1:A5:4:_DRUM 5 13.80KV GEN UNIT 1 P1-2:A5:18:_LINCOLN-PLEASANT GROVE 115KV [7400]	P3	G-1/N-1	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	Load power factor correction
SPI-LINC 115	P5-5:A5:1:_Atlantic 230 kV BAAH Bus #1 (failure of non-redundent relay)	P55	Non-Redundant	1.02	0.98	>0.9	>0.9	1.03	1.02	0.98	0.97	1.01	0.96	Load power factor correction
SPI-LINC 115	P1-2:A4:25:_WOODLAND-DAVIS 115KV [4210] P1-2:A5:18:_LINCOLN-PLEASANT GROVE 115KV [7400]	P6	N-1/N-1	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	Load power factor correction
SPISONORA 115	P2-4:A11:3:_BELLOTA 230KV - SECTION 1E & 2E	P2	Bus-tie breaker	0.94	0.69	>0.9	>0.9	1.03	0.94	0.66	0.67	0.97	0.65	Bellota 230 kV bus upgrade
SPRNG GJ 115	P2-4:A11:3:_BELLOTA 230KV - SECTION 1E & 2E	P2	Bus-tie breaker	0.99	0.77	>0.9	>0.9	1.04	0.99	0.74	0.75	1.01	0.72	Bellota 230 kV bus upgrade
SPRNG GP 115	P2-4:A11:3:_BELLOTA 230KV - SECTION 1E & 2E	P2	Bus-tie breaker	1.00	0.77	>0.9	>0.9	1.04	0.99	0.74	0.75	1.01	0.73	Bellota 230 kV bus upgrade
STAGG 60	Base Case	P0	N-0	1.04	1.05	>0.9	>0.9	1.05	1.04	1.05	1.05	1.05	1.04	Sensitivity only
STANISLS 115	Base Case	P0	N-0	1.04	1.03	>0.9	>0.9	1.04	1.04	1.03	1.03	1.04	1.03	Load power factor correction
STANISLS 115	P2-4:A11:3:_BELLOTA 230KV - SECTION 1E & 2E	P2	Bus-tie breaker	0.98	0.76	>0.9	>0.9	1.04	0.97	0.74	0.75	0.99	0.73	Bellota 230 kV bus upgrade

Study Area: **PG&E Central Valley**



High/Low Voltage

Substation	Contingency (All and Worst P6)	Category	Category Description	Post Cont. Voltage Deviation %										Project & Potential Mitigation Solutions
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP High CEC Forecast	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generation s	
STKTON A 115	P2-4:A11:3:_BELLOTA 230KV - SECTION 1E & 2E	P2	Bus-tie breaker	0.82	0.26	>0.9	>0.9	1.01	0.81	0.24	0.25	0.84	0.25	Bellota 230 kV bus upgrade
STKTON A 115	P1-3:A11:10:_BELLOTA 230/115KV TB 1 P1-3:A11:11:_BELLOTA 230/115KV TB 2	P6	N-1/N-1	0.91	0.69	>0.9	>0.9	>0.9	0.91	>0.9	>0.9	0.88	0.71	Action plan or SPS
STKTON B 115	P2-4:A11:3:_BELLOTA 230KV - SECTION 1E & 2E	P2	Bus-tie breaker	0.83	0.30	>0.9	>0.9	1.02	0.82	0.28	0.28	0.86	0.29	Bellota 230 kV bus upgrade
STKTON B 115	P1-3:A11:10:_BELLOTA 230/115KV TB 1 P1-3:A11:11:_BELLOTA 230/115KV TB 2	P6	N-1/N-1	0.92	0.71	>0.9	>0.9	>0.9	0.92	>0.9	>0.9	0.90	0.74	Action plan or SPS
STN COGN 115	P2-4:A11:3:_BELLOTA 230KV - SECTION 1E & 2E	P2	Bus-tie breaker	0.82	0.27	>0.9	>0.9	1.01	0.81	0.25	0.25	0.84	0.26	Bellota 230 kV bus upgrade
STN COGN 115	P1-3:A11:10:_BELLOTA 230/115KV TB 1 P1-3:A11:11:_BELLOTA 230/115KV TB 2	P6	N-1/N-1	0.91	0.69	>0.9	>0.9	>0.9	0.91	>0.9	>0.9	0.88	0.72	Action plan or SPS
SUISUN 115	Base Case	P0	N-0	1.05	1.03	>0.9	>0.9	1.06	1.05	1.02	1.02	1.01	1.03	- Load power factor correction - Reactor projects
SUMMIT 60	Base Case	P0	N-0	1.02	1.05	>0.9	>0.9	1.06	1.02	1.05	1.05	1.05	1.04	- Load power factor correction - Reactor projects
SUMMIT 60	P1-2:A5:67:_DRUM-SPAULDING 60KV [6770]	P1	N-1	1.03	1.05	>0.9	>0.9	1.06	1.03	1.05	1.05	1.05	1.05	- Load power factor correction - Reactor projects
SUMMIT 60	P2-2:A5:39:_SPAULDNG 60KV SECTION MA	P2	Bus	1.02	1.06	>0.9	>0.9	1.07	1.02	1.05	1.06	1.06	1.05	- Load power factor correction - Reactor projects
SUMMIT 60	P2-2:A5:40:_SPAULDNG 60KV SECTION 1D	P2	Bus	1.03	1.05	>0.9	>0.9	1.06	1.03	1.05	1.05	1.05	1.05	- Load power factor correction - Reactor projects
SUMMIT 60	P2-3:A5:61:_SPAULDNG - 1D 60KV & DRUM-SPAULDING LINE	P2	Non-bus-tie breaker	1.03	1.05	>0.9	>0.9	1.06	1.03	1.05	1.05	1.05	1.05	- Load power factor correction - Reactor projects
SUMMIT 60	P2-3:A5:63:_DRUM - MA 60KV & DRUM-SPAULDING LINE	P2	Non-bus-tie breaker	1.03	1.05	>0.9	>0.9	1.06	1.03	1.05	1.05	1.05	1.04	- Load power factor correction - Reactor projects
SUMMIT 60	P2-3:A5:85:_BRNSWALT 115KV - RING R4 & R3	P2	Non-bus-tie breaker	1.02	1.06	>0.9	>0.9	1.06	1.02	1.05	1.06	1.06	1.05	- Load power factor correction - Reactor projects
SUMMIT 60	P2-1:A5:100:_DRUM-SPAULDING 60KV [6770] (SPAULDNG-BOWMN TP)	P2-1	Line Section w/o fault	1.03	1.05	>0.9	>0.9	1.06	1.03	1.05	1.05	1.05	1.05	- Load power factor correction - Reactor projects
SUMMIT 60	P2-1:A5:93:_SPAULDING-SUMMIT 60KV [8060] (TAMARACK-SUMMIT)	P2-1	Line Section w/o fault	1.03	1.06	>0.9	>0.9	1.08	1.03	1.06	1.06	1.06	1.06	- Load power factor correction - Reactor projects
SUMMIT 60	P2-1:A5:94:_SPAULDING-SUMMIT 60KV [8060] (CISCO GR-TAMARACK)	P2-1	Line Section w/o fault	1.02	1.06	>0.9	>0.9	1.08	1.02	1.06	1.06	1.06	1.05	- Load power factor correction - Reactor projects
SUMMIT 60	P2-1:A5:95:_SPAULDING-SUMMIT 60KV [8060] (CISCO GR-SPAULDNG)	P2-1	Line Section w/o fault	1.02	1.06	>0.9	>0.9	1.07	1.02	1.06	1.06	1.06	1.05	- Load power factor correction - Reactor projects
SUMMIT 60	P1-1:A5:13:_SPAULDG 9.11KV GEN UNIT 1 P1-2:A5:67:_DRUM-SPAULDING 60KV [6770]	P3	G-1/N-1	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	Load power factor correction
SUMMIT 60	P1-2:A5:67:_DRUM-SPAULDING 60KV [6770] P1-3:A5:33:_SPAULDNG 60/9.11KV TB 1	P6	N-1/N-1	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	Load power factor correction

Study Area: **PG&E Central Valley**



High/Low Voltage

Substation	Contingency (All and Worst P6)	Category	Category Description	Post Cont. Voltage Deviation %										Project & Potential Mitigation Solutions
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP High CEC Forecast	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generation s	
TAMARACK 60	Base Case	P0	N-0	1.03	1.04	>0.9	>0.9	1.05	1.03	1.04	1.04	1.05	1.04	- Load power factor correction - Reactor projects
TAMARACK 60	P2-2:A5:39:_SPAULDNG 60KV SECTION MA	P2	Bus	1.02	1.05	>0.9	>0.9	1.07	1.02	1.05	1.06	1.06	1.05	- Load power factor correction - Reactor projects
TAMARACK 60	P2-3:A5:63:_DRUM - MA 60KV & DRUM-SPAULDING LINE	P2	Non-bus-tie breaker	1.03	1.05	>0.9	>0.9	1.06	1.03	1.05	1.05	1.05	1.05	- Load power factor correction - Reactor projects
TAMARACK 60	P2-3:A5:85:_BRNSWALT 115KV - RING R4 & R3	P2	Non-bus-tie breaker	1.03	1.06	>0.9	>0.9	1.05	1.03	1.05	1.06	1.06	1.04	- Load power factor correction - Reactor projects
TAMARACK 60	P2-1:A5:94:_SPAULDING-SUMMIT 60KV [8060] (CISCO GR-TAMARACK)	P2-1	Line Section w/o fault	1.02	1.06	>0.9	>0.9	1.08	1.02	1.06	1.06	1.06	1.05	- Load power factor correction - Reactor projects
TAMARACK 60	P2-1:A5:95:_SPAULDING-SUMMIT 60KV [8060] (CISCO GR-SPAULDNG)	P2-1	Line Section w/o fault	1.02	1.06	>0.9	>0.9	1.07	1.02	1.05	1.06	1.06	1.05	- Load power factor correction - Reactor projects
TAMARACK 60	P1-1:A5:13:_SPAULDG 9.11KV GEN UNIT 1 P1-2:A5:67:_DRUM-SPAULDING 60KV [6770]	P3	G-1/N-1	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	Load power factor correction
TAMARACK 60	P1-1:A5:13:_SPAULDG 9.11KV GEN UNIT 1 P1-2:A5:67:_DRUM-SPAULDING 60KV [6770]	P6	N-1/N-1	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	Load power factor correction
TAYLOR 60	Base Case	P0	N-0	1.09	0.99	>0.9	>0.9	1.06	1.09	0.98	0.98	1.00	0.98	- Load power factor correction - Reactor projects
TAYLOR 60	P2-4:A11:3:_BELLOTA 230KV - SECTION 1E & 2E	P2	Bus-tie breaker	1.08	0.95	>0.9	>0.9	1.06	1.08	0.94	0.94	0.97	0.94	- Load power factor correction - Reactor projects
TAYLOR 60	P5-5:A5:1:_Atlantic 230 kV BAAH Bus #1 (failure of non-redundent relay)	P55	Non-Redundant	1.08	0.91	>0.9	>0.9	1.04	1.08	0.91	0.89	0.98	0.88	- Load power factor correction for high voltage - Low voltage: Sensitivity only
TAYLOR 60	P1-2:A5:10:_ATLANTIC-GOLD HILL 230KV [4330] P1-2:A5:6:_RIO OSO-ATLANTIC 230KV [5590]	P6	N-1/N-1	>0.9	0.92	>0.9	>0.9	>0.9	>0.9	>0.9	0.90	>0.9	>0.9	Load power factor correction
TAYLOR 60	P7-1:A5:7:_Atlantic-Gold Hill 230 kV Line & Rio Oso-Gold Hill 230 kV Line	P7	DCTL	1.08	0.96	>0.9	>0.9	1.06	1.08	0.96	0.96	0.99	0.94	- Load power factor correction - Reactor projects
TEICHERT 115	Base Case	P0	N-0	1.04	1.03	>0.9	>0.9	1.04	1.04	1.03	1.03	1.03	1.02	Load power factor correction
TEICHERT 115	P2-4:A11:9:_TESLA 115KV - SECTION 1D & 2D	P2	Bus-tie breaker	1.02	0.99	>0.9	>0.9	1.06	1.02	0.95	0.97	NConv	0.91	Sensitivity only
TESLA 115	Base Case	P0	N-0	1.04	1.03	>0.9	>0.9	1.04	1.04	1.03	1.03	1.03	1.03	Load power factor correction
TH.E.DV. 115	Base Case	P0	N-0	1.04	1.03	>0.9	>0.9	1.04	1.04	1.03	1.03	1.03	1.03	Load power factor correction
TIGR CRK 230	Base Case	P0	N-0	1.04	1.01	>0.9	>0.9	1.03	1.04	1.01	1.01	1.00	1.01	Load power factor correction
TOSCO-PP 60	Base Case	P0	N-0	1.06	1.04	>0.9	>0.9	1.06	1.06	1.04	1.04	1.03	1.04	- Load power factor correction - Reactor projects
TRACY 115	P1-2:A11:54:_SCHULTE SW STA-LAMMERS 115KV [3993] P1-2:A11:48:_TESLA-TRACY 115KV [4020] MOAS OPENED ON LEPRINO TRACY JC	P6	N-1/N-1	>0.9	0.92	>0.9	>0.9	>0.9	>0.9	0.89	0.90	>0.9	0.91	Action plan or SPS
TRAVISJT 60	P1-4:A4:6:_VC DX11T SVD=V P1-2:A4:50:_VACA-DXN-TRVS HPT 60KV [0]	P6	N-1/N-1	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	Load power factor correction

Study Area: **PG&E Central Valley**



High/Low Voltage

Substation	Contingency (All and Worst P6)	Category	Category Description	Post Cont. Voltage Deviation %										Project & Potential Mitigation Solutions
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP High CEC Forecast	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations	
TULLOCH 115	Base Case	P0	N-0	1.04	1.03	>0.9	>0.9	1.04	1.04	1.03	1.03	1.03	1.02	Load power factor correction
TULLOCH 115	P2-4:A11:3:_BELLOTA 230KV - SECTION 1E & 2E	P2	Bus-tie breaker	0.89	0.55	>0.9	>0.9	1.04	0.88	0.53	0.54	0.93	0.53	Bellota 230 kV bus upgrade
TULLOCH 115	P2-4:A11:9:_TESLA 115KV - SECTION 1D & 2D	P2	Bus-tie breaker	1.04	1.03	>0.9	>0.9	0.98	1.04	1.02	1.03	NConv	1.01	Sensitivity only
TULLOCH 115	P1-3:A11:10:_BELLOTA 230/115KV TB 1 P1-3:A11:11:_BELLOTA 230/115KV TB 2	P6	N-1/N-1	0.96	0.83	>0.9	>0.9	>0.9	0.95	>0.9	>0.9	0.95	0.84	Action plan or SPS
ULTR-RCK 115	Base Case	P0	N-0	1.03	1.01	>0.9	>0.9	1.04	1.03	1.00	1.00	1.01	0.99	Load power factor correction
ULTR-RCK 115	P5-5:A5:1:_Atlantic 230 kv BAAH Bus #1 (failure of non-redundent relay)	P55	Non-Redundant	1.02	0.95	>0.9	>0.9	1.03	1.02	0.95	0.94	1.00	0.92	Load power factor correction
ULTR-RCK 115	P1-2:A5:10:_ATLANTIC-GOLD HILL 230KV [4330] P1-2:A5:6:_RIO OSO-ATLANTIC 230KV [5590]	P6	N-1/N-1	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	0.94	>0.9	>0.9	Load power factor correction
VACA-CB 115	Base Case	P0	N-0	1.08	1.07	>0.9	>0.9	1.09	1.08	1.07	1.06	1.06	1.07	- Load power factor correction - Reactor projects
VACA-CB 115	P1-3:A4:1:_VACA-DIX 500/230KV TB 11	P1	N-1	1.09	1.07	>0.9	>0.9	1.09	1.09	1.07	1.06	1.06	1.07	- Load power factor correction - Reactor projects
VACA-CB 115	P1-4:A4:6:_VC DX11T SVD=V	P1	N-1	1.08	1.07	>0.9	>0.9	1.09	1.08	1.07	1.06	1.06	1.07	- Load power factor correction - Reactor projects
VACA-CB 115	P2-2:A4:7:_VACA-DIX 230KV SECTION NA	P2	Bus	1.10	1.08	>0.9	>0.9	1.09	1.10	1.07	1.07	1.07	1.08	- Load power factor correction - Reactor projects
VACA-CB 115	P1-3:A4:2:_VACA-DIX 500/230KV TB 12 P1-4:A4:6:_VC DX11T SVD=V	P6	N-1/N-1	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	Load power factor correction
VACA-D&1 115	Base Case	P0	N-0	1.05	1.03	>0.9	>0.9	1.06	1.05	1.03	1.03	1.02	1.03	- Load power factor correction - Reactor projects
VACA-DIX 115	Base Case	P0	N-0	1.07	1.04	>0.9	>0.9	1.08	1.07	1.04	1.04	1.04	1.04	- Load power factor correction - Reactor projects
VACA-DIX 115	P1-3:A4:1:_VACA-DIX 500/230KV TB 11	P1	N-1	1.07	1.05	>0.9	>0.9	1.08	1.07	1.04	1.04	1.04	1.04	- Load power factor correction - Reactor projects
VACA-DIX 115	P1-4:A4:6:_VC DX11T SVD=V	P1	N-1	1.07	1.04	>0.9	>0.9	1.08	1.07	1.04	1.04	1.04	1.04	- Load power factor correction - Reactor projects
VACA-DIX 115	P2-2:A4:7:_VACA-DIX 230KV SECTION NA	P2	Bus	1.08	1.06	>0.9	>0.9	1.08	1.08	1.05	1.04	1.05	1.05	- Load power factor correction - Reactor projects
VACA-DIX 115	P1-3:A4:2:_VACA-DIX 500/230KV TB 12 P1-4:A4:6:_VC DX11T SVD=V	P6	N-1/N-1	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	Load power factor correction
VACA-DXN 60	Base Case	P0	N-0	1.07	1.04	>0.9	>0.9	1.07	1.07	1.04	1.03	1.03	1.04	- Load power factor correction - Reactor projects
VACA-DXN 60	P1-3:A4:1:_VACA-DIX 500/230KV TB 11	P1	N-1	1.07	1.04	>0.9	>0.9	1.08	1.08	1.04	1.03	1.03	1.04	- Load power factor correction - Reactor projects

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High/Low Voltage

Substation	Contingency (All and Worst P6)	Category	Category Description	Post Cont. Voltage Deviation %										Project & Potential Mitigation Solutions
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP High CEC Forecast	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations	
VACA-DXN 60	P1-4:A4:6:_VC DX11T SVD=V	P1	N-1	1.07	1.04	>0.9	>0.9	1.07	1.07	1.04	1.03	1.03	1.04	- Load power factor correction - Reactor projects
VACA-DXN 60	P2-2:A4:45:_VACA-DXN 60KV SECTION ME	P2	Bus	1.08	1.05	>0.9	>0.9	1.09	1.08	1.05	1.04	1.04	1.05	- Load power factor correction - Reactor projects
VACA-DXN 60	P2-2:A4:7:_VACA-DIX 230KV SECTION NA	P2	Bus	1.09	1.05	>0.9	>0.9	1.08	1.08	1.04	1.04	1.04	1.05	- Load power factor correction - Reactor projects
VACA-DXN 60	P2-3:A4:46:_VACA-DXN - ME 60KV & DIXON-VACA #2 LINE	P2	Non-bus-tie breaker	1.08	1.05	>0.9	>0.9	1.09	1.08	1.05	1.04	1.04	1.05	- Load power factor correction - Reactor projects
VACA-DXN 60	P2-3:A4:47:_VACA-DXN - ME 60KV & VACA-DXN-TRVS_HPT LINE	P2	Non-bus-tie breaker	1.08	1.05	>0.9	>0.9	1.09	1.08	1.05	1.04	1.04	1.05	- Load power factor correction - Reactor projects
VACA-DXN 60	P1-3:A4:19:_VACA-DIX 115/60KV TB 9 P1-3:A4:1: VACA-DIX 500/230KV TB 11	P6	N-1/N-1	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	Load power factor correction
VACAVLL1 115	Base Case	P0	N-0	1.07	1.04	>0.9	>0.9	1.07	1.07	1.04	1.03	1.03	1.04	- Load power factor correction - Reactor projects
VACAVLL1 115	P1-3:A4:1:_VACA-DIX 500/230KV TB 11	P1	N-1	1.07	1.04	>0.9	>0.9	1.08	1.07	1.04	1.04	1.04	1.04	- Load power factor correction - Reactor projects
VACAVLL1 115	P1-4:A4:6:_VC DX11T SVD=V	P1	N-1	1.07	1.04	>0.9	>0.9	1.07	1.07	1.04	1.03	1.03	1.04	- Load power factor correction - Reactor projects
VACAVLL1 115	P2-2:A4:7:_VACA-DIX 230KV SECTION NA	P2	Bus	1.08	1.05	>0.9	>0.9	1.08	1.08	1.05	1.04	1.05	1.05	- Load power factor correction - Reactor projects
VACAVLL1 115	P1-3:A4:2:_VACA-DIX 500/230KV TB 12 P1-4:A4:6: VC DX11T SVD=V	P6	N-1/N-1	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	Load power factor correction
VACAVLL2 115	Base Case	P0	N-0	1.06	1.04	>0.9	>0.9	1.07	1.06	1.03	1.03	1.03	1.04	- Load power factor correction - Reactor projects
VACAVLL2 115	P1-3:A4:1:_VACA-DIX 500/230KV TB 11	P1	N-1	1.07	1.04	>0.9	>0.9	1.07	1.07	1.04	1.03	1.03	1.04	- Load power factor correction - Reactor projects
VACAVLL2 115	P2-2:A4:7:_VACA-DIX 230KV SECTION NA	P2	Bus	1.08	1.05	>0.9	>0.9	1.07	1.08	1.04	1.03	1.04	1.05	- Load power factor correction - Reactor projects
VACAVLL2 115	P1-3:A4:2:_VACA-DIX 500/230KV TB 12 P1-4:A4:6: VC DX11T SVD=V	P6	N-1/N-1	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	Load power factor correction
VALLY HM 115	P2-4:A11:3:_BELLOTA 230KV - SECTION 1E & 2E	P2	Bus-tie breaker	0.98	0.80	>0.9	>0.9	1.02	0.98	0.78	0.79	0.97	0.78	Bellota 230 kV bus upgrade
VALLY HM 115	P1-2:A11:104:_MANTECA-RIPON 115KV [0] P1-2:A11:61:_BELLOTA-RIVERBANK-MELONES SW STA 115KV [1070]	P6	N-1/N-1	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	0.90	>0.9	>0.9	0.89	Project: Vierra looping project
VICTOR 60	P2-3:A11:81:_LOCKFORD 230KV - RING R3 & R4	P2	Non-bus-tie breaker	1.06	0.86	>0.9	>0.9	1.03	1.06	0.81	0.83	0.90	0.80	Significant leading power factor in 2019 (0.7) Project: Lockeford-Lodi area 230 kV development Scope is under review

Study Area: **PG&E Central Valley**



High/Low Voltage

Substation	Contingency (All and Worst P6)	Category	Category Description	Post Cont. Voltage Deviation %										Project & Potential Mitigation Solutions
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP High CEC Forecast	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generation s	
VICTOR 60	P2-3:A11:82:_LOCKFORD 230KV - RING R3 & R2	P2	Non-bus-tie breaker	1.06	0.86	>0.9	>0.9	1.03	1.06	0.80	0.82	0.89	0.79	Significant leading power factor in 2019 (0.7) Project: Lockeford-Lodi area 230 kV development Scope is under review
VICTOR 60	P2-4:A11:1:_BELLOTA 230KV - SECTION 2D & 2E	P2	Bus-tie breaker	1.05	0.93	>0.9	>0.9	1.02	1.05	0.90	0.91	0.94	0.90	- Load power factor correction for high voltage - Low voltage: Sensitivity only
VICTOR 60	P2-4:A11:3:_BELLOTA 230KV - SECTION 1E & 2E	P2	Bus-tie breaker	1.05	0.90	>0.9	>0.9	1.03	1.05	0.86	0.87	0.93	0.86	Bellota 230 kV bus upgrade
VICTOR 60	P2-1:A11:142:_LOCKEFORD-LODI #2 60KV [7440] (LOCKEFRD-VICTOR)	P2-1	Line Section w/o fault	1.07	0.99	>0.9	>0.9	1.00	1.07	0.98	0.98	0.99	0.98	Significant leading power factor in 2019 (0.7) Project: Lockeford-Lodi area 230 kV development Scope is under review
VICTOR 60	P1-3:A11:5:_LOCKFORD 230/60KV TB 3 P1-2:A11:7:_LOCKEFORD-BELLOTA 230KV [4990]	P6	N-1/N-1	>0.9	0.86	>0.9	>0.9	>0.9	>0.9	0.87	0.88	0.89	0.83	Significant leading power factor in 2019 (0.7) Project: Lockeford-Lodi area 230 kV development Scope is under review
VICTOR 60	P7-1:A11:12:_BRIGHTON-BELLOTA 230KV [4420] & LOCKEFORD-BELLOTA 230KV [4990]	P7	DCTL	1.05	0.90	>0.9	>0.9	1.03	1.06	0.86	0.88	0.93	0.86	Significant leading power factor in 2019 (0.7) Project: Lockeford-Lodi area 230 kV development Scope is under review
VIERRA 115	P1-2:A11:54:_SCHULTE SW STA-LAMMERS 115KV [3993] P1-2:A11:48:_TESLA-TRACY 115KV [4020] MOAS OPENED ON LEPRINO TRACY JC	P6	N-1/N-1	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	0.90	0.91	>0.9	0.92	Sensitivity only
VLLY SPS 230	Base Case	P0	N-0	1.03	1.00	>0.9	>0.9	1.03	1.03	1.00	1.00	0.99	1.00	Load power factor correction
VLLY SPS 230	P1-2:A11:12:_VALLEY SPRINGS-BELLOTA 230KV [5860] P1-2:A11:9:_TIGER CREEK-VALLEY SPRINGS 230KV [5790]	P6	N-1/N-1	>0.9	>0.9	>0.9	>0.9	0.82	>0.9	>0.9	>0.9	>0.9	>0.9	Action plan or SPS
VLLY SPS 60	Base Case	P0	N-0	1.04	1.05	>0.9	>0.9	1.04	1.04	1.05	1.05	1.05	1.05	- Load power factor correction - Reactor projects
VSLDSW87 60	Base Case	P0	N-0	1.04	1.05	>0.9	>0.9	1.05	1.05	1.05	1.05	1.06	1.05	- Load power factor correction - Reactor projects
W.SCRMNO 115	Base Case	P0	N-0	1.04	1.04	>0.9	>0.9	1.03	1.03	1.03	1.04	1.05	1.03	- Load power factor correction - Reactor projects
WATRLJCT 60	P2-3:A11:81:_LOCKFORD 230KV - RING R3 & R4	P2	Non-bus-tie breaker	1.05	0.88	>0.9	>0.9	1.03	1.05	0.83	0.84	0.91	0.82	Significant leading power factor in 2019 (0.7) Project: Lockeford-Lodi area 230 kV development Scope is under review
WATRLJCT 60	P2-3:A11:82:_LOCKFORD 230KV - RING R3 & R2	P2	Non-bus-tie breaker	1.05	0.87	>0.9	>0.9	1.03	1.05	0.81	0.84	0.91	0.81	Significant leading power factor in 2019 (0.7) Project: Lockeford-Lodi area 230 kV development Scope is under review
WATRLJCT 60	P2-4:A11:3:_BELLOTA 230KV - SECTION 1E & 2E	P2	Bus-tie breaker	1.04	0.91	>0.9	>0.9	1.03	1.04	0.88	0.89	0.94	0.88	Significant leading power factor in 2019 (0.7) Project: Lockeford-Lodi area 230 kV development Scope is under review

Study Area: **PG&E Central Valley**



High/Low Voltage

Substation	Contingency (All and Worst P6)	Category	Category Description	Post Cont. Voltage Deviation %										Project & Potential Mitigation Solutions	
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP High CEC Forecast	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations		
WATRLJCT 60	P1-3:A11:5:_LOCKFORD 230/60KV TB 3 P1-2:A11:7:_LOCKFORD-BELLOTA 230KV [4990]	P6	N-1/N-1	>0.9	0.87	>0.9	>0.9	>0.9	>0.9	>0.9	0.88	0.89	0.90	0.84	Significant leading power factor in 2019 (0.7) Project: Lockeford-Lodi area 230 kV development Scope is under review
WATRLJCT 60	P7-1:A11:12:_BRIGHTON-BELLOTA 230KV [4420] & LOCKEFORD-BELLOTA 230KV [4990]	P7	DCTL	1.04	0.91	>0.9	>0.9	1.03	1.05	0.88	0.89	0.94	0.88	Significant leading power factor in 2019 (0.7) Project: Lockeford-Lodi area 230 kV development Scope is under review	
WDLND_BM 115	Base Case	P0	N-0	1.03	1.02	>0.9	>0.9	1.03	1.02	1.01	1.02	1.03	1.01	Load power factor correction	
WDLND_BM 115	P2-2:A4:26:_DAVIS 115KV SECTION 1D	P2	Bus	1.03	1.02	>0.9	>0.9	1.04	1.03	1.02	1.02	1.03	1.01	Load power factor correction	
WDLND_BM 115	P2-4:A4:11:_DAVIS 115KV - SECTION 1D & 1E	P2	Bus-tie breaker	1.04	1.02	>0.9	>0.9	1.04	1.04	1.02	1.02	1.03	1.01	Load power factor correction	
WDLND_BM 115	P2-4:A4:12:_DAVIS 115KV - SECTION 1E & 1F	P2	Bus-tie breaker	1.03	1.01	>0.9	>0.9	1.04	1.03	1.00	1.01	1.03	1.00	Load power factor correction	
WDLND_BM 115	P2-1:A4:5:_WOODLAND-DAVIS 115KV [4210] (Q653FJCT-DAVIS)	P2-1	Line Section w/o fault	1.03	1.02	>0.9	>0.9	1.04	1.03	1.01	1.02	1.03	1.01	Load power factor correction	
WDLND_BM 115	P2-1:A4:6:_WOODLAND-DAVIS 115KV [4210] (WOODLANDTP-Q653FJCT)	P2-1	Line Section w/o fault	1.03	1.02	>0.9	>0.9	1.04	1.03	1.01	1.02	1.03	1.01	Load power factor correction	
WDLND_BM 115	P1-3:A4:3:_BRIGHTON 230/115KV TB 10 P1-3:A4:4:_BRIGHTON 230/115KV TB 9	P6	N-1/N-1	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	Load power factor correction	
WEC 115	Base Case	P0	N-0	1.05	1.03	>0.9	>0.9	1.06	1.05	1.03	1.03	1.02	1.03	- Load power factor correction - Reactor projects	
WEST JCT 60	Base Case	P0	N-0	1.03	1.03	>0.9	>0.9	1.04	1.03	1.03	1.03	1.03	1.03	Load power factor correction	
WEST PNT 60	Base Case	P0	N-0	1.04	1.04	>0.9	>0.9	1.03	1.04	1.04	1.04	1.05	1.04	Load power factor correction	
WEST PNT 60	P1-2:A11:12:_VALLEY SPRINGS-BELLOTA 230KV [5860] P1-2:A11:9:_TIGER CREEK-VALLEY SPRINGS 230KV [5790]	P6	N-1/N-1	>0.9	>0.9	>0.9	>0.9	0.89	>0.9	>0.9	>0.9	>0.9	>0.9	Action plan or SPS	
WEST SDE 60	Base Case	P0	N-0	1.05	1.03	>0.9	>0.9	1.05	1.06	1.04	1.03	1.03	1.03	- Load power factor correction - Reactor projects	
WESTLEY 60	P2-3:A11:15:_KASSON - 1D 115KV & SCHULTE SW STA-KASSON-MANTECA LINE	P2	Non-bus-tie breaker	0.91	0.91	>0.9	>0.9	0.99	0.91	0.89	0.90	0.95	0.89	Project: Vierra looping project	
WESTLEY 60	P2-4:A11:3:_BELLOTA 230KV - SECTION 1E & 2E	P2	Bus-tie breaker	0.95	0.90	>0.9	>0.9	1.01	0.95	0.90	0.90	0.98	0.90	Project: Vierra looping project	
WESTLEY 60	P1-2:A11:36:_SCHULTE SW STA-KASSON-MANTECA 115KV [7472] P1-2:A11:45:_VIERRA-TRACY-KASSON 115KV [4310]	P6	N-1/N-1	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	0.89	0.90	>0.9	>0.9	Sensitivity only	
WILKINS 60	P1-2:A4:44:_CORTINA #1 60KV [6580] P1-3:A4:6:_CORTINA 230/230KV TB 1	P6	N-1/N-1	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	0.89	>0.9	>0.9	>0.9	Sensitivity only	
WINTERS 60	Base Case	P0	N-0	1.05	1.00	>0.9	>0.9	1.07	1.05	0.99	0.99	1.00	1.00	- Load power factor correction - Reactor projects	
WINTERS 60	P1-3:A4:1:_VACA-DIX 500/230KV TB 11	P1	N-1	1.06	1.00	>0.9	>0.9	1.07	1.06	0.99	0.99	1.01	1.00	- Load power factor correction - Reactor projects	

Study Area: **PG&E Central Valley**



High/Low Voltage

Substation	Contingency (All and Worst P6)	Category	Category Description	Post Cont. Voltage Deviation %										Project & Potential Mitigation Solutions
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP High CEC Forecast	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generation s	
WINTERS 60	P1-4:A4:6:_VC DX11T SVD=V	P1	N-1	1.05	1.00	>0.9	>0.9	1.07	1.05	0.99	0.99	1.00	0.99	- Load power factor correction - Reactor projects
WINTERS 60	P2-2:A4:45:_VACA-DXN 60KV SECTION ME	P2	Bus	1.06	1.01	>0.9	>0.9	1.08	1.06	1.00	1.00	1.01	1.01	- Load power factor correction - Reactor projects
WINTERS 60	P2-2:A4:7:_VACA-DIX 230KV SECTION NA	P2	Bus	1.07	1.01	>0.9	>0.9	1.07	1.06	1.00	0.99	1.01	1.01	- Load power factor correction - Reactor projects
WINTERS 60	P2-3:A4:46:_VACA-DXN - ME 60KV & DIXON-VACA #2 LINE	P2	Non-bus-tie breaker	1.06	1.01	>0.9	>0.9	1.08	1.06	1.00	1.00	1.01	1.01	- Load power factor correction - Reactor projects
WINTERS 60	P2-3:A4:47:_VACA-DXN - ME 60KV & VACA-DXN-TRVS_HPT LINE	P2	Non-bus-tie breaker	1.06	1.01	>0.9	>0.9	1.08	1.06	1.00	1.00	1.01	1.01	- Load power factor correction - Reactor projects
WINTERS 60	P1-3:A4:19:_VACA-DIX 115/60KV TB 9 P1-3:A4:1:_VACA-DIX 500/230KV TB 11	P6	N-1/N-1	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	Load power factor correction
WLKSLICT 60	P1-2:A4:44:_CORTINA #1 60KV [6580] P1-3:A4:6:_CORTINA 230/230KV TB 1	P6	N-1/N-1	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	0.89	>0.9	>0.9	>0.9	Sensitivity only
WODBRG J 60	Base Case	P0	N-0	1.06	1.02	>0.9	>0.9	1.02	1.06	1.01	1.02	1.02	1.01	Load power factor correction
WODBRG J 60	P1-2:A11:7:_LOCKFORD-BELLOTA 230KV [4990]	P1	N-1	1.07	0.92	>0.9	>0.9	1.01	1.07	0.89	0.90	0.94	0.89	Significant leading power factor in 2019 (0.7) Project: Lockeford-Lodi area 230 kV development Scope is under review
WODBRG J 60	P2-2:A11:9:_BELLOTA 230KV SECTION 2E	P2	Bus	1.07	0.92	>0.9	>0.9	1.01	1.07	0.89	0.90	0.94	0.89	Load power factor correction or voltage support if needed
WODBRG J 60	P2-3:A11:81:_LOCKFORD 230KV - RING R3 & R4	P2	Non-bus-tie breaker	1.07	0.85	>0.9	>0.9	1.02	1.07	0.80	0.81	0.88	0.78	Significant leading power factor in 2019 (0.7) Project: Lockeford-Lodi area 230 kV development Scope is under review
WODBRG J 60	P2-3:A11:82:_LOCKFORD 230KV - RING R3 & R2	P2	Non-bus-tie breaker	1.07	0.84	>0.9	>0.9	1.02	1.07	0.78	0.80	0.88	0.77	Significant leading power factor in 2019 (0.7) Project: Lockeford-Lodi area 230 kV development Scope is under review
WODBRG J 60	P2-4:A11:1:_BELLOTA 230KV - SECTION 2D & 2E	P2	Bus-tie breaker	1.07	0.92	>0.9	>0.9	1.01	1.07	0.89	0.90	0.93	0.88	Significant leading power factor in 2019 (0.7) Project: Lockeford-Lodi area 230 kV development Scope is under review
WODBRG J 60	P2-4:A11:3:_BELLOTA 230KV - SECTION 1E & 2E	P2	Bus-tie breaker	1.07	0.88	>0.9	>0.9	1.02	1.07	0.85	0.86	0.91	0.84	Significant leading power factor in 2019 (0.7) Project: Lockeford-Lodi area 230 kV development Scope is under review
WODBRG J 60	P1-3:A11:5:_LOCKFORD 230/60KV TB 3 P1-2:A11:7:_LOCKFORD-BELLOTA 230KV [4990]	P6	N-1/N-1	>0.9	0.84	>0.9	>0.9	>0.9	>0.9	0.86	0.86	0.88	0.81	Significant leading power factor in 2019 (0.7) Project: Lockeford-Lodi area 230 kV development Scope is under review

Study Area: **PG&E Central Valley**



High/Low Voltage

Substation	Contingency (All and Worst P6)	Category	Category Description	Post Cont. Voltage Deviation %										Project & Potential Mitigation Solutions
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP High CEC Forecast	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generation s	
WODBRG J 60	P7-1:A11:12:_BRIGHTON-BELOTA 230KV [4420] & LOCKEFORD-BELOTA 230KV [4990]	P7	DCTL	1.07	0.88	>0.9	>0.9	1.02	1.07	0.85	0.86	0.92	0.85	Significant leading power factor in 2019 (0.7) Project: Lockeford-Lodi area 230 kV development Scope is under review
WOODLD 115	Base Case	P0	N-0	1.02	1.02	>0.9	>0.9	1.03	1.02	1.01	1.02	1.03	1.01	Load power factor correction
WOODLD 115	P1-2:A4:25:_WOODLAND-DAVIS 115KV [4210]	P1	N-1	1.03	1.01	>0.9	>0.9	1.04	1.03	1.00	1.01	1.02	1.01	Load power factor correction
WOODLD 115	P2-2:A4:17:_WOODLD 115KV SECTION 1F	P2	Bus	1.02	1.00	>0.9	>0.9	1.04	1.02	0.99	1.00	1.02	1.00	Load power factor correction
WOODLD 115	P2-2:A4:26:_DAVIS 115KV SECTION 1D	P2	Bus	1.03	1.02	>0.9	>0.9	1.04	1.03	1.01	1.02	1.03	1.01	Load power factor correction
WOODLD 115	P2-3:A4:16:_WOODLD - 1F 115KV & WOODLAND-DAVIS LINE	P2	Non-bus-tie breaker	1.02	1.00	>0.9	>0.9	1.04	1.02	0.99	1.00	1.02	1.00	Load power factor correction
WOODLD 115	P2-3:A4:17:_WOODLD - 1F 115KV & RIO OSO-WOODLAND #2 LINE	P2	Non-bus-tie breaker	1.02	1.00	>0.9	>0.9	1.04	1.02	0.99	1.00	1.02	1.00	Load power factor correction
WOODLD 115	P2-3:A4:24:_DAVIS - 1D 115KV & WOODLAND-DAVIS LINE	P2	Non-bus-tie breaker	1.03	1.01	>0.9	>0.9	1.04	1.03	1.00	1.02	1.02	1.01	Load power factor correction
WOODLD 115	P2-4:A4:11:_DAVIS 115KV - SECTION 1D & 1E	P2	Bus-tie breaker	1.03	1.02	>0.9	>0.9	1.04	1.03	1.01	1.02	1.03	1.01	Load power factor correction
WOODLD 115	P2-4:A4:12:_DAVIS 115KV - SECTION 1E & 1F	P2	Bus-tie breaker	1.03	1.01	>0.9	>0.9	1.04	1.03	1.00	1.01	1.03	1.00	Load power factor correction
WOODLD 115	P2-4:A4:8:_WOODLD 115KV - SECTION 1F & 1E	P2	Bus-tie breaker	1.03	1.03	>0.9	>0.9	1.04	1.03	1.03	1.03	1.04	1.03	Load power factor correction
WOODLD 115	P2-1:A4:14:_WOODLAND-DAVIS 115KV [4210] (WOODLANDTP-WOODLD)	P2-1	Line Section w/o fault	1.03	1.01	>0.9	>0.9	1.04	1.03	1.00	1.01	1.03	1.01	Load power factor correction
WOODLD 115	P2-1:A4:5:_WOODLAND-DAVIS 115KV [4210] (Q653FJCT-DAVIS)	P2-1	Line Section w/o fault	1.03	1.02	>0.9	>0.9	1.04	1.03	1.01	1.02	1.03	1.01	Load power factor correction
WOODLD 115	P2-1:A4:6:_WOODLAND-DAVIS 115KV [4210] (WOODLANDTP-Q653FJCT)	P2-1	Line Section w/o fault	1.03	1.02	>0.9	>0.9	1.04	1.03	1.01	1.02	1.03	1.01	Load power factor correction
WOODLD 115	P1-1:A5:4:_DRUM 5 13.80KV GEN UNIT 1 P1-2:A4:25:_WOODLAND-DAVIS 115KV [4210]	P3	G-1/N-1	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	Load power factor correction
WOODLD 115	P1-2:A5:17:_RIO OSO-LINCOLN 115KV [1320] P1-2:A4:25:_WOODLAND-DAVIS 115KV [4210]	P6	N-1/N-1	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	Load power factor correction
WSID 60	P2-3:A11:15:_KASSON - 1D 115KV & SCHULTE SW STA-KASSON-MANTECA LINE	P2	Non-bus-tie breaker	0.91	0.91	>0.9	>0.9	0.99	0.91	0.89	0.90	0.95	0.89	Project: Vierra looping project
WSID 60	P2-4:A11:3:_BELLOTA 230KV - SECTION 1E & 2E	P2	Bus-tie breaker	0.95	0.90	>0.9	>0.9	1.01	0.95	0.90	0.90	0.98	0.90	Project: Vierra looping project
WSID 60	P2-4:A11:9:_TESLA 115KV - SECTION 1D & 2D	P2	Bus-tie breaker	0.94	0.95	>0.9	>0.9	1.02	0.94	0.91	0.93	NConv	0.91	Sensitivity only
WSID 60	P1-2:A11:36:_SCHULTE SW STA-KASSON-MANTECA 115KV [7472] P1-2:A11:45:_VIERRA-TRACY-KASSON 115KV [4310]	P6	N-1/N-1	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	0.89	0.90	>0.9	>0.9	Project: Vierra looping project
ZAMORA 115	Base Case	P0	N-0	1.02	1.02	>0.9	>0.9	1.03	1.02	1.01	1.02	1.03	1.01	Load power factor correction
ZAMORA 115	P1-2:A4:25:_WOODLAND-DAVIS 115KV [4210]	P1	N-1	1.02	1.01	>0.9	>0.9	1.04	1.02	1.01	1.02	1.03	1.01	Load power factor correction
ZAMORA 115	P2-2:A4:17:_WOODLD 115KV SECTION 1F	P2	Bus	1.03	1.04	>0.9	>0.9	1.04	1.03	1.03	1.04	1.04	1.03	Load power factor correction
ZAMORA 115	P2-2:A4:20:_BRIGHTN 115KV SECTION ME	P2	Bus	1.00	1.01	>0.9	>0.9	1.03	1.02	1.01	1.01	1.02	1.01	Load power factor correction

Study Area: **PG&E Central Valley**



High/Low Voltage

Substation	Contingency (All and Worst P6)	Category	Category Description	Post Cont. Voltage Deviation %										Project & Potential Mitigation Solutions
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP High CEC Forecast	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations	
ZAMORA 115	P2-2:A4:26:_ DAVIS 115KV SECTION 1D	P2	Bus	1.03	1.02	>0.9	>0.9	1.04	1.03	1.02	1.03	1.03	1.02	Load power factor correction
ZAMORA 115	P2-3:A4:16:_ WOODLD - 1F 115KV & WOODLAND-DAVIS LINE	P2	Non-bus-tie breaker	1.03	1.03	>0.9	>0.9	1.04	1.03	1.03	1.04	1.04	1.03	Load power factor correction
ZAMORA 115	P2-3:A4:19:_ BRIGHTN - ME 115KV & WEST SACRAMENTO-BRIGHTON LINE	P2	Non-bus-tie breaker	1.00	0.99	>0.9	>0.9	1.03	1.02	1.01	1.01	1.02	1.01	Load power factor correction
ZAMORA 115	P2-3:A4:20:_ BRIGHTN - ME 115KV & BRIGHTN-DAVIS-BRKR SLG LINE	P2	Non-bus-tie breaker	1.00	0.99	>0.9	>0.9	1.03	1.02	1.01	1.01	1.02	1.01	Load power factor correction
ZAMORA 115	P2-3:A4:24:_ DAVIS - 1D 115KV & WOODLAND-DAVIS LINE	P2	Non-bus-tie breaker	1.03	1.02	>0.9	>0.9	1.04	1.03	1.01	1.02	1.03	1.01	Load power factor correction
ZAMORA 115	P2-4:A4:10:_ BRIGHTN 115KV - SECTION ME & MD	P2	Bus-tie breaker	1.00	1.01	>0.9	>0.9	1.03	1.02	1.01	1.01	1.02	1.01	Load power factor correction
ZAMORA 115	P2-4:A4:11:_ DAVIS 115KV - SECTION 1D & 1E	P2	Bus-tie breaker	1.03	1.02	>0.9	>0.9	1.04	1.03	1.02	1.02	1.03	1.01	Load power factor correction
ZAMORA 115	P2-4:A4:12:_ DAVIS 115KV - SECTION 1E & 1F	P2	Bus-tie breaker	1.03	1.02	>0.9	>0.9	1.04	1.03	1.01	1.02	1.03	1.01	Load power factor correction
ZAMORA 115	P2-4:A4:8:_ WOODLD 115KV - SECTION 1F & 1E	P2	Bus-tie breaker	1.03	1.04	>0.9	>0.9	1.04	1.04	1.04	1.04	1.04	1.04	Load power factor correction
ZAMORA 115	P2-1:A4:14:_ WOODLAND-DAVIS 115KV [4210] (WOODLANDTP-WOODLD)	P2-1	Line Section w/o fault	1.03	1.02	>0.9	>0.9	1.04	1.03	1.01	1.02	1.03	1.01	Load power factor correction
ZAMORA 115	P2-1:A4:16:_ RIO OSO-WOODLAND #2 115KV [3470] (WODLNDJ2-WOODLD)	P2-1	Line Section w/o fault	1.03	1.03	>0.9	>0.9	1.04	1.03	1.03	1.04	1.04	1.03	Load power factor correction
ZAMORA 115	P2-1:A4:5:_ WOODLAND-DAVIS 115KV [4210] (Q653FJCT-DAVIS)	P2-1	Line Section w/o fault	1.03	1.02	>0.9	>0.9	1.04	1.03	1.02	1.03	1.03	1.01	Load power factor correction
ZAMORA 115	P2-1:A4:6:_ WOODLAND-DAVIS 115KV [4210] (WOODLANDTP-Q653FJCT)	P2-1	Line Section w/o fault	1.03	1.02	>0.9	>0.9	1.03	1.03	1.01	1.02	1.03	1.01	Load power factor correction
ZAMORA 115	P1-1:A5:4:_ DRUM 5 13.80KV GEN UNIT 1 P1-2:A4:25:_ WOODLAND-DAVIS 115KV [4210]	P3	G-1/N-1	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	Load power factor correction
ZAMORA 115	P1-2:A5:17:_ RIO OSO-LINCOLN 115KV [1320] P2:A4:25:_ WOODLAND-DAVIS 115KV [4210]	P1- P6	N-1/N-1	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	Load power factor correction
	P2-4:A5:3:_ GOLDHILL 230KV - SECTION 2D & 1D	P2	Bus-tie breaker	Diverge	Diverge	Diverge	>0.9	>0.9	Diverge	Diverge	Diverge	Diverge	Diverge	Project: Atlantic-Placer 115 kV line Project ISD: on-hold Review project scope
	P1-3:A5:7:_ GOLDHILL 230/115KV TB 1 P1-3:A5:8:_ GOLDHILL 230/115KV TB 2	P6	N-1/N-1	Diverge	Diverge	Diverge	>0.9	>0.9	Diverge	Diverge	Diverge	Diverge	Diverge	Project: Atlantic-Placer 115 kV line Project ISD: on-hold Review project scope

Study Area: **PG&E Central Valley**

Voltage Deviation



Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage (PU)										Project & Potential Mitigation Solutions
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP High CEC Forecast	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations	
COLONY 60	P1-2:A11:7:_LOCKEFORD-BELLOTA 230KV [4990]	P1	N-1	-0.8	9.7	10.6	-5.0	0.5	-1.4	11.8	11.1	8.4	12.2	Project: Lockeford-Lodi area 230 kV development Scope is under review
INDSTR J 60	P1-2:A11:7:_LOCKEFORD-BELLOTA 230KV [4990]	P1	N-1	-0.8	9.9	10.8	-4.9	0.5	-1.4	12.0	11.3	8.6	12.4	Project: Lockeford-Lodi area 230 kV development Scope is under review
LOCKEFRD 60	P1-2:A11:7:_LOCKEFORD-BELLOTA 230KV [4990]	P1	N-1	-0.8	9.5	10.4	-5.0	0.5	-1.4	11.5	10.9	8.3	12.0	Project: Lockeford-Lodi area 230 kV development Scope is under review
LOCKFORD 230	P1-2:A11:7:_LOCKEFORD-BELLOTA 230KV [4990]	P1	N-1	-3.1	13.9	14.6	-6.2	4.7	-3.0	15.5	15.0	11.8	15.9	Project: Lockeford-Lodi area 230 kV development Scope is under review
LODI 60	P1-2:A11:7:_LOCKEFORD-BELLOTA 230KV [4990]	P1	N-1	-0.8	9.9	10.8	-4.9	0.5	-1.4	12.0	11.3	8.6	12.5	Project: Lockeford-Lodi area 230 kV development Scope is under review
MONDAVI 60	P1-2:A11:7:_LOCKEFORD-BELLOTA 230KV [4990]	P1	N-1	-0.8	9.9	10.8	-4.9	0.5	-1.4	12.0	11.3	8.6	12.5	Project: Lockeford-Lodi area 230 kV development Scope is under review
NEW HOPE 60	P1-2:A11:7:_LOCKEFORD-BELLOTA 230KV [4990]	P1	N-1	-0.8	10.0	10.9	-5.0	0.5	-1.4	12.1	11.4	8.6	12.6	Project: Lockeford-Lodi area 230 kV development Scope is under review
PLUMAS 60	P1-2:A5:30:_RIO OSO-NICOLAUS 115KV [3440]	P1	N-1	1.0	7.0	7.3	-0.6	-0.8	1.0	7.3	8.0	5.9	7.6	Sensitivity only
RIPON 115	P1-2:A11:104:_MANTECA-RIPON 115KV [0]	P1	N-1	<8.0	6.1	7.4	<8.0	2.0	<8.0	8.1	6.3	3.3	8.2	Project: Vierra looping project
VICTOR 60	P1-2:A11:7:_LOCKEFORD-BELLOTA 230KV [4990]	P1	N-1	-0.8	9.7	10.6	-5.0	0.5	-1.4	11.7	11.0	8.4	12.2	Project: Lockeford-Lodi area 230 kV development Scope is under review
WATRLJCT 60	P1-2:A11:7:_LOCKEFORD-BELLOTA 230KV [4990]	P1	N-1	-0.8	9.5	10.4	-5.0	0.5	-1.4	11.5	10.9	8.3	12.0	Project: Lockeford-Lodi area 230 kV development Scope is under review
WHEATLND 60	P1-2:A5:30:_RIO OSO-NICOLAUS 115KV [3440]	P1	N-1	1.0	7.1	7.4	-0.5	-0.8	1.0	7.4	8.2	5.9	7.7	Sensitivity only
WINERY J 60	P1-2:A11:7:_LOCKEFORD-BELLOTA 230KV [4990]	P1	N-1	-0.8	9.9	10.8	-4.9	0.5	-1.4	12.0	11.3	8.6	12.5	Project: Lockeford-Lodi area 230 kV development Scope is under review
WODBRG J 60	P1-2:A11:7:_LOCKEFORD-BELLOTA 230KV [4990]	P1	N-1	-0.8	9.8	10.8	-4.9	0.5	-1.4	11.9	11.3	8.5	12.4	Project: Lockeford-Lodi area 230 kV development Scope is under review

Study Area: **PG&E Central Valley**

Transient Stability

Contingency	Category	Category Description	Transient Stability Performance (Number of voltage and frequency violations)										Potential Mitigation Solutions	
			2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	Select..	Select..	Select..	Select..	Select..		
Colgate Generator 1 Trip	P1-1		0	0	0	0	0							No Violation
Tesla - Newark 230 kV Line Fault	P1-2		0	0	0	0	0							No Violation
Tesla 500/230 kV Transformer Fault	P1-3		0	0	0	0	0							No Violation
Atlantic SVD Fault	P1-4		0	1	1	0	1							Under review with PTO
Tesla 230 kV Bus Fault	P2-2		0	0	0	0	0							No Violation
Tesla 230 kV non-tie-breaker fault	P2-3		0	0	0	0	0							No Violation
Tesla 230 kV tie-breaker fault	P2-4		0	0	0	0	0							No Violation
Golgate out and GWFTTracy Generator fault	P3-1		0	0	0	1	1							Under review with PTO
Golgate out and Tesla-Newark 230 kV line fault	P3-2		0	0	0	0	0							No Violation
Colgate out and Tesla 500/230 kV Transformer Fault	P3-3		0	0	0	0	0							No Violation
Colgate out and Atlantic SVD Fault	P3-4		0	1	1	1	1							Under review with PTO
USWP-RUS Generator fault plus stuck breaker	P4-1		0	0	0	0	0							No Violation
Bellota line fault plus stuck breaker	P4-2		0	0	0	0	0							No Violation
Vaca Dixon transformer fault plus stuck breaker	P4-3		0	0	0	0	0							No Violation
Atlantic SVD Fault plus stuck breaker	P4-4		0	1	1	0	1							Under review with PTO
Tesla 230 kV bus section fault plus stuck breaker	P4-5		0	0	0	1	1							Under review with PTO
Tesla 230 kV bus tie-breaker fault	P4-6		1	1	1	1	1							Under review with PTO
Solano generator fault plus relay failure	P5-1		0	0	0	0	0							No Violation
Bellota line fault plus relay failure	P5-2		0	0	0	0	0							No Violation
Vaca Dixon transformer fault plus relay failure	P5-3		0	0	0	0	0							No Violation
Atlantic SVD Fault plus relay failure	P5-4		0	1	1	0	1							Under review with PTO
Tesla transformer out and Tesla-ADCC 230 kV line fault	P6-1		1	1	1	1	1							Under review with PTO
Tesla transformer out and another Tesla transformer fault	P6-2		0	0	0	0	0							No Violation
Atlantic SVD out and Vaca Dixon SVD fault	P6-3		0	1	1	0	1							Under review with PTO
Pease-Palermo and Pease-Rio Oso 115 kV lines (DCTL)-Temporary fault	P7-1		1	1	1	1	1							Under review with PTO
Pease-Palermo and Pease-Rio Oso 115 kV lines (DCTL)-Permanent fault	P7-1		1	1	1	1	1							Under review with PTO
Stanislaus-Manteca and Stanislaus-Melones_Riverbank 115 kV lines (DCTL) - Temporary fault	P7-1		0	0	0	0	0							No Violation
Stanislaus-Manteca and Stanislaus-Melones_Riverbank 115 kV lines (DCTL) - Permanent fault	P7-1		1	1	1	1	1							Under review with PTO

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.

Single Source Substation with more than 100 MW Load

ID	Substation	Load Served (MW)										Potential Mitigation Solutions
		Select..	Select..	Select..	Select..	Select..	Select..	Select..	Select..	Select..	Select..	
												Under review with PTO

Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading % (Baseline Scenarios)								Loading % (Sensitivity Scenarios)								Project & Potential Mitigation Solutions
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Winter Peak	2022 Winter Peak	2027 Winter Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022 SP High CEC Forecast	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations	2027 SP - No East Bay Generation	2022 SP High CEC Forecast - No East Bay Generation	2027 SP Peak-Shift - No East Bay Generation	
Applied Materials-Britton 115 kV Line	MONTAVIS 230kV - Section 1D & 2D	P2	Bus-tie breaker	209	162	154	179	183	174	78	100	218	215	178	133	139	154	218	178	Project: Monta Vista 230 kV Bus Upgrade In-service date: 1/20 Short term: Action plan
Bair 115/60kV Transformer #1	CLY LNDG 60kV Section 1D	P2	Bus	99	120	117	105	122	122	53	97	133	102	125	137	151	117	133	125	Project: Jefferson - Stanford #2 60 kV Line Review Stanford 60 kV system configuration
	CLY LNDG - 1D 60kV & BAIR-COOLEY LANDING #2 line	P2	Non-bus-tie breaker	91	103	101	97	105	107	47	79	114	94	108	137	151	101	114	108	Project: Jefferson - Stanford #2 60 kV Line Review Stanford 60 kV system configuration
	CLY LNDG 60kV - Section 1D & 2D	P2	Bus-tie breaker	100	121	118	106	123	124	54	97	134	103	126	137	151	118	134	126	Project: Jefferson - Stanford #2 60 kV Line Review Stanford 60 kV system configuration
	CLY LND 115/60kV TB 1 & CLY LND2 115/60kV TB 2	P6	N-1-1	141	167	162	162	182	183	<90	122	186	147	176	137	151	162	186	177	Project: Jefferson - Stanford #2 60 kV Line Review Stanford 60 kV system configuration
Bair-Cooley Landing #1 60kV Line	CLY LNDG - 1D 60kV & BAIR-COOLEY LANDING #2 line	P2	Non-bus-tie breaker	111	128	129	81	92	96	56	96	142	115	136	129	124	129	142	136	Project: Jefferson - Stanford #2 60 kV Line Review Stanford 60 kV system configuration
	BAIR-COOLEY LANDING #1 60kV [6200] (BLHVNT1-CLY LNDG)	P2	Line section w/o fault	87	93	95	83	91	98	46	67	103	89	101	95	92	95	103	101	Sensitivity only
	CLY LNDG 60kV Section 1D	P2	Bus	87	96	98	85	93	98	46	67	106	90	104	98	89	98	106	104	Sensitivity only
	CLY LNDG - 1D 60kV & BAIR-COOLEY LANDING #2 line	P2	Non-bus-tie breaker	86	94	96	84	91	98	45	67	104	89	102	96	96	96	104	102	Sensitivity only
	CLY LNDG 60kV - Section 1D & 2D	P2	Bus-tie breaker	87	95	97	84	92	99	46	68	105	90	103	97	89	97	105	103	Sensitivity only
Bair-Cooley Landing #2 60kV Line	CLY LND 115/60kV TB 1 & CLY LND2 115/60kV TB 2	P6	N-1-1	120	139	137	131	146	151	<90	94	156	125	150	114	125	137	154	150	Project: Jefferson - Stanford #2 60 kV Line Review Stanford 60 kV system configuration
	CLY LNDG 60kV Section 1D	P2	Bus	65	92	90	44	62	60	35	78	100	66	92	131	144	90	100	92	Sensitivity only
	BAIR-COOLEY LANDING #2 60kV [6210] (BAIR-REDWTP2)	P2	Line section w/o fault	76	91	91	58	70	70	37	73	100	77	94	131	144	91	100	94	Sensitivity only
	BAIR 60kV Section MA	P2	Bus	76	91	91	58	70	70	37	73	100	77	94	131	144	91	100	94	Sensitivity only
Britton-Monta Vista 115 kV Line	CLY LND 115/60kV TB 1 & CLY LND2 115/60kV TB 2	P6	N-1-1	111	139	136	97	115	116	<90	103	155	114	146	110	118	136	154	147	Project: Jefferson - Stanford #2 60 kV Line Review Stanford 60 kV system configuration
	MONTAVIS 230kV - Section 1D & 2D	P2	Bus-tie breaker	154	110	105	125	128	120	52	62	152	157	123	96	100	105	152	123	Project: Monta Vista 230 kV Bus Upgrade In-service date: 1/20 Short term: Action plan
Christie-Sobrante (Oleum-Sobrante) 115kV Line	Sobrante-G Nos. 1 & 2 115 kV lines	P7	DCTL	135	108	102	133	111	109	79	85	120	138	112	125	132	102	120	112	System upgrade or preferred resource
Cooley Landing-Palo Alto 115kV Line	RVNSWD E 115kV - Section 1E & 2E	P2	Bus-tie breaker	126	110	108	83	83	81	102	105	110	126	108	111	115	108	110	108	Rerate
	Ravenswood-Palo Alto Nos. 1 & 2 115 kV lines	P7	DCTL	123	108	107	82	81	81	102	104	108	123	106	109	113	107	108	106	Rerate
	RAVENSWOOD-PALO ALTO #1 115kV & RAVENSWOOD-PALO ALTO #2 115kV	P6	N-1-1	123	108	106	<90	<90	<90	102	104	108	123	106	109	113	106	108	106	Rerate
Eastshore 230/115kV Transformer #1	E. SHORE 230kV - Middle Breaker Bay 3	P2	Non-bus-tie breaker	94	108	108	99	104	109	81	58	111	95	109	109	102	108	111	109	Operational action plan
Evergreen 115/60 kV Transformer No. 1	MONTA VISTA-LOS GATOS 60kV [7610]	P1	N-1	109	94	95	97	97	101	40	43	107	116	107	87	77	95	107	107	Disable automatic switching
	LOS GATS 60kV Section 1D	P2	Bus	109	94	95	97	97	101	40	43	107	116	107	87	77	95	107	107	Disable automatic switching
Evergreen-Almaden 60 kV Line	MONTA VISTA-LOS GATOS 60kV [7610]	P1	N-1	140	117	115	105	104	108	42	45	134	148	132	113	88	115	134	132	Disable automatic switching
	MONTA VISTA-LOS GATOS 60kV [7610]	P1	N-1	139	116	115	116	115	119	42	45	133	148	131	113	88	115	133	131	Disable automatic switching
	LOS GATS 60kV Section 1D	P2	Bus	140	117	115	105	104	108	42	45	134	148	132	113	88	115	134	132	Disable automatic switching
	LOS GATS 60kV Section 1D	P2	Bus	139	116	115	116	115	119	42	45	133	148	131	113	88	115	133	131	Disable automatic switching
Jefferson-Hillsdale JCT 60kV Line	Jefferson 230 kV BAAH Bus #1 (failure of non-redundent relay)	P5	Non-redundant relay (Bus)	136	137	131	188	192	202	93	92	147	142	148	131	164	131	147	148	Project: Jefferson - Stanford #2 60 kV Line Review Stanford 60 kV system configuration
	Jefferson 230 kV BAAH Bus #2 (failure of non-redundent relay)	P5	Non-redundant relay (Bus)	138	137	133	191	195	202	95	94	150	144	149	133	160	133	150	149	Project: Jefferson - Stanford #2 60 kV Line Review Stanford 60 kV system configuration

Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading % (Baseline Scenarios)								Loading % (Sensitivity Scenarios)							Project & Potential Mitigation Solutions	
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Winter Peak	2022 Winter Peak	2027 Winter Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022 SP High CEC Forecast	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations	2027 SP - No East Bay Generation	2022 SP High CEC Forecast - No East Bay Generation		2027 SP Peak-Shift - No East Bay Generation
Monta Vista-Jefferson Nos. 1 & 2 230 kV lines	JEFFERSN 230/60kV TB 1 & JEFFERSN 230/60kV TB 2	P6	N-1-1	136	136	131	187	191	194	93	92	147	142	148	147	161	131	151	148	Project: Jefferson - Stanford #2 60 kV Line Review Stanford 60 kV system configuration
	Monta Vista-Jefferson Nos. 1 & 2 230 kV lines	P7	DCTL	90	88	87	111	107	110	68	77	90	92	89	93	96	87	90	89	Project: Jefferson - Stanford #2 60 kV Line Review Stanford 60 kV system configuration
Jefferson-Stanford #1 60kV Line	JEFFERSN 230/60kV TB 1 & JEFFERSN 230/60kV TB 2	P6	N-1-1	<90	<90	<90	103	106	104	<90	<90	<90	90	<90	<90	<90	<90	91	<90	Project: Jefferson - Stanford #2 60 kV Line Review Stanford 60 kV system configuration
	Jefferson 230 kV BAAH Bus #2 (failure of non-redundant relay)	P5	Non-redundant relay (Bus)	90	87	87	106	108	110	68	76	90	92	89	87	92	87	90	89	Project: Jefferson - Stanford #2 60 kV Line Review Stanford 60 kV system configuration
	Monta Vista-Jefferson Nos. 1 & 2 230 kV lines	P7	DCTL	90	88	87	111	107	110	68	77	90	92	89	93	96	87	90	89	Project: Jefferson - Stanford #2 60 kV Line Review Stanford 60 kV system configuration
Las Positas-Newark 230kV Line	C.COSTA 230kV - Section 2F & 2E	P2	Bus-tie breaker	94	99	94	79	75	76	16	61	99	99	101	117	101	94	99	101	Sensitivity only
Lawrence - Monta Vista 115 kV	MONTAVIS 230kV - Section 1D & 2D	P2	Bus-tie breaker	169	130	124	148	151	143	60	75	178	173	144	154	163	124	178	144	Project: Monta Vista 230 kV Bus Upgrade In-service date: 1/20 Short term: Action plan
	MONTAVIS 230kV - Section 1D & 2D	P2	Bus-tie breaker	242	186	177	176	180	170	85	108	254	248	207	154	163	177	254	207	Project: Monta Vista 230 kV Bus Upgrade In-service date: 1/20 Short term: Action plan
Los Esteros-Montague 115 kV Line	LOS ESTEROS-NORTECH 115kV & LOS ESTEROS-TRIMBLE 115kV	P6	N-1-1	94	<90	<90	<90	<90	<90	<90	<90	100	<90	94	<90	<90	<90	100	93	Sensitivity only
Loyola-Monta Vista 60 kV Line	MONTAVIS 230kV - Section 1D & 2D	P2	Bus-tie breaker	105	88	86	114	118	113	39	35	119	109	107	86	86	86	119	107	Project: Monta Vista 230 kV Bus Upgrade In-service date: 1/20 Short term: Action plan
	Monta Vista 115kV BAAH Bus #1 (failure of non-redundant relay)	P5	Non-redundant relay (Bus)	106	<90	<90	119	<90	<90	39	<90	<90	110	<90	<90	<90	<90	<90	<90	Load power factor correction and reactive power compensation if needed
Martinez-Sobrante 115kV Line	PITSBG D 230kV Section 2D	P2	Bus	105	119	120	96	102	110	141	68	116	103	117	96	<90	120	116	117	System upgrade or preferred resource
	PITSBG D - 2D 230kV & PITSBG D-TBC_PT1 #1 line	P2	Non-bus-tie breaker	105	119	120	96	102	110	141	68	116	103	117	96	<90	120	116	117	System upgrade or preferred resource
	SOBRANTE 115kV Section 1D	P2	Bus	97	<90	<90	75	<90	<90	44	<90	<90	100	<90	96	<90	<90	<90	<90	Project: North Tower 115 kV Looping Project In-service date: 12/18 Short term: Action Plan
	SOBRANTE - 1D 115kV & SOBRANTE-GRIZZLY-CLAREMONT #1 line	P2	Non-bus-tie breaker	98	<90	<90	75	<90	<90	44	<90	<90	101	<90	96	<90	<90	<90	<90	Project: North Tower 115 kV Looping Project In-service date: 12/18 Short term: Action Plan
	SOBRANTE - 1D 115kV & SOBRANTE-G #1 line	P2	Non-bus-tie breaker	97	<90	<90	75	<90	<90	44	<90	<90	100	<90	96	<90	<90	<90	<90	Project: North Tower 115 kV Looping Project In-service date: 12/18 Short term: Action Plan
	SOBRANTE - 1D 115kV & SOBRANTE-STD. OIL line	P2	Non-bus-tie breaker	98	<90	<90	76	<90	<90	44	<90	<90	101	<90	96	<90	<90	<90	<90	Project: North Tower 115 kV Looping Project In-service date: 12/18 Short term: Action Plan
	SOBRANTE 115kV - Section 1D & 1E	P2	Bus-tie breaker	99	<90	<90	75	<90	<90	51	<90	<90	102	<90	96	<90	<90	<90	<90	Project: North Tower 115 kV Looping Project In-service date: 12/18 Short term: Action Plan
Martin-Larkin (HY-1) 115kV Cable	A-Y #1 115kV & X-Y #1 115kV	P6	N-1-1	158	173	176	195	198	202	<90	144	185	164	186	176	176	176	183	186	Long term: Larkin bus upgrade Short term: Action plan
Martin-Sneath Lane 60kV Line	MILLBRAE-SAN MATEO #1 115kV & MARTIN-MILLBRAE #1 115kV	P6	N-1-1	146	125	119	131	129	132	<90	90	142	152	132	114	119	119	142	131	Project: Jefferson - Stanford #2 60 kV Line Review Stanford 60 kV system configuration
Metcalf 230/115 kV Trans No. 1	MTCALF D 115kV Section 1X	P2	Bus	70	74	68	109	110	75	57	81	92	80	79	63	68	68	92	79	Short Term : Action Plan ; Long Term : Preferred resource
	MTCALF 230kV - Section 1E & 2E	P2	Bus-tie breaker	82	87	84	100	102	87	54	78	103	92	96	63	84	84	103	96	Short Term : Action Plan ; Long Term : Preferred resource
	MTCALF 230kV - Section 2D & 2E	P2	Bus-tie breaker	94	99	97	113	114	98	62	88	118	106	110	63	97	97	118	110	Short Term : Action Plan ; Long Term : Preferred resource
	MTCALF 230/115kV TB 2 & METCALF 230/115kV TB 4	P6	N-1-1	95	98	99	100	100	99	<90	<90	100	98	100	99	99	99	100	100	Short Term : Action Plan ; Long Term : Preferred resource

Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading % (Baseline Scenarios)								Loading % (Sensitivity Scenarios)							Project & Potential Mitigation Solutions	
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Winter Peak	2022 Winter Peak	2027 Winter Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022 SP High CEC Forecast	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations	2027 SP - No East Bay Generation	2022 SP High CEC Forecast - No East Bay Generation		2027 SP Peak-Shift - No East Bay Generation
Metcalf 230/115 kV Trans No. 2	MTCALF E 115kV Section 1Y	P2	Bus	95	99	100	95	93	97	52	72	115	105	112	88	100	100	115	112	Short Term : Action Plan ; Long Term : Preferred resource
	METCALF 230kV - Section 1D & 1E	P2	Bus-tie breaker	88	90	87	104	102	90	56	79	108	99	100	88	100	87	108	100	Short Term : Action Plan ; Long Term : Preferred resource
	METCALF 230kV - Section 1D & 2D	P2	Bus-tie breaker	100	102	99	116	113	100	63	89	123	113	114	88	100	99	123	114	Short Term : Action Plan ; Long Term : Preferred resource
Metcalf 230/115 kV Trans No. 3	MTCALF E 115kV Section 2X	P2	Bus	94	98	99	94	92	96	51	71	113	104	111	87	99	99	113	111	Short Term : Action Plan ; Long Term : Preferred resource
	METCALF 230kV - Section 1D & 2D	P2	Bus-tie breaker	97	99	96	112	110	97	61	87	119	109	110	87	99	96	119	110	Short Term : Action Plan ; Long Term : Preferred resource
	METCALF 230kV - Section 2D & 2E	P2	Bus-tie breaker	93	99	96	112	113	97	61	87	118	106	110	87	99	96	118	110	Short Term : Action Plan ; Long Term : Preferred resource
Metcalf 230/115 kV Trans No. 4	MTCALF D 115kV Section 2Y	P2	Bus	68	72	66	106	107	73	56	79	89	78	77	62	66	66	89	77	Short Term : Action Plan ; Long Term : Preferred resource
	METCALF 230kV - Section 1D & 1E	P2	Bus-tie breaker	89	91	87	105	104	90	56	80	108	99	100	62	87	87	108	100	Short Term : Action Plan ; Long Term : Preferred resource
	METCALF 230kV - Section 1E & 2E	P2	Bus-tie breaker	84	90	87	103	105	89	55	80	106	95	99	62	87	87	106	99	Short Term : Action Plan ; Long Term : Preferred resource
	METCALF 230/115kV TB 2 & METCALF 230/115kV TB 1	P6	N-1-1	95	98	99	100	100	99	<90	<90	100	98	100	99	99	99	100	100	Short Term : Action Plan ; Long Term : Preferred resource
Metcalf-El Patio No. 2 115 kV Line	MTCALF D Section 1D & MTCALF E Section 1E 115kV	P2	Bus-tie breaker	88	92	93	74	71	80	43	62	106	98	103	93	93	93	106	103	Sensitivity only
	MTCALF D Section 1D & MTCALF E Section 1E 115kV	P2	Bus-tie breaker	88	92	93	74	71	80	42	62	106	98	103	93	93	93	106	103	Sensitivity only
Metcalf-Evergreen No. 1 115 kV Line	MTCALF E 115kV Section 2E	P2	Bus	<90	88	89	<90	76	78	<90	65	101	<90	99	89	89	89	101	99	Project: Metcalf - Evergreen 115 kV line reconductoring Potential scope change
Metcalf-Llagas 115 kV Line	LLAGAS-GILROY-GILROY F-GILROYPK 115kV & METCALF-MORGAN HILL 115kV	P6	N-1-1	102	111	114	<90	<90	<90	<90	<90	130	109	134	<90	<90	114	130	134	Project: Morgan Hill Area Reinforcement (Spring) Short term: Action plan Potential scope change
Metcalf-Morgan Hill 115 kV Line	MTCALF D-LLAGAS 115kV & LLAGAS-GILROY-GILROY F-GILROYPK 115kV	P6	N-1-1	91	96	99	<90	<90	<90	<90	<90	110	96	113	<90	<90	99	110	113	Project: Morgan Hill Area Reinforcement (Spring) Short term: Action plan Potential scope change
Millbrae-Sneath Lane 60kV Line	MILLBRAE-SAN MATEO #1 115kV & MARTIN-MILLBRAE #1 115kV	P6	N-1-1	125	103	99	108	109	113	<90	<90	117	129	107	<90	91	99	117	105	Project: Jefferson - Stanford #2 60 kV Line Review Stanford 60 kV system configuration
Monta Vista 115/60 kV Trans No. 6	Monta Vista 115kV BAAH Bus #1 (failure of non-redundant relay)	P5	Non-redundant relay (Bus)	109	<90	<90	125	<90	<90	83	<90	<90	109	<90	<90	<90	<90	<90	<90	Load power factor correction and reactive power compensation if needed
Monta Vista 230/115 kV Trans No. 2	MONTAVIS 230kV Section 2D	P2	Bus	102	99	97	101	98	100	54	73	111	109	104	97	97	97	111	104	Project: Monta Vista 230 kV Bus Upgrade In-service date: 1/20 Short term: Action plan
	MONTAVIS - 2D 230kV & MONTA VISTA-JEFFERSON #2 line	P2	Non-bus-tie breaker	102	99	97	101	98	100	54	73	111	109	104	97	97	97	111	104	Project: Monta Vista 230 kV Bus Upgrade In-service date: 1/20 Short term: Action plan
	MONTAVIS 230/115kV TB 3 & MONTAVIS 230/115kV TB 4	P6	N-1-1	<90	100	100	<90	100	100	<90	<90	106	91	102	100	100	100	106	102	Sensitivity only
Monta Vista 230/115 kV Trans No. 3	MONTAVIS 230/115kV TB 2 & MONTAVIS 230/115kV TB 4	P6	N-1-1	<90	97	97	<90	97	97	<90	<90	103	<90	99	97	97	97	103	99	Sensitivity only
Monta Vista 230/115 kV Trans No. 4	MONTAVIS 230/115kV TB 2 & MONTAVIS 230/115kV TB 3	P6	N-1-1	<90	100	100	<90	100	100	<90	<90	105	91	102	100	100	100	105	102	Sensitivity only
Monta Vista-Permanente 60 kV	MONTAVIS 230kV - Section 1D & 2D	P2	Bus-tie breaker	109	<90	<90	53	<90	<90	59	<90	<90	107	<90	<90	<90	<90	<90	<90	Project: Monta Vista 230 kV Bus Upgrade In-service date: 1/20 Short term: Action plan
	MONTAVIS 230kV - Section 1D & 2D	P2	Bus-tie breaker	109	<90	<90	57	<90	<90	58	<90	<90	107	<90	<90	<90	<90	<90	<90	Project: Monta Vista 230 kV Bus Upgrade In-service date: 1/20 Short term: Action plan

Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading % (Baseline Scenarios)								Loading % (Sensitivity Scenarios)								Project & Potential Mitigation Solutions
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Winter Peak	2022 Winter Peak	2027 Winter Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022 SP High CEC Forecast	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations	2027 SP - No East Bay Generation	2022 SP High CEC Forecast - No East Bay Generation	2027 SP Peak-Shift - No East Bay Generation	
Line	Monta Vista 115kV BAAH Bus #1 (failure of non-redundant relay)	P5	Non-redundant relay (Bus)	110	<90	<90	61	<90	<90	59	<90	<90	109	<90	<90	<90	<90	<90	<90	Load power factor correction and reactive power compensation if needed
	Monta Vista 115kV BAAH Bus #1 (failure of non-redundant relay)	P5	Non-redundant relay (Bus)	109	<90	<90	65	<90	<90	58	<90	<90	108	<90	<90	<90	<90	<90	<90	Load power factor correction and reactive power compensation if needed
Monta Vista-Wolfe 115 kV Line	STELLING-MONTA VISTA 115kV [1000]	P1	N-1	103	95	93	79	80	82	49	60	105	107	100	86	91	93	105	100	Short Term : Action Plan ; Long Term : Preferred resource
Moraga-Claremont #1 115kV Line	OAK C115 115kV Section ME	P2	Bus	100	99	95	82	83	86	41	71	109	102	103	99	112	95	105	100	Substation upgrade
	MORAGA 115kV Section 2D	P2	Bus	99	95	97	87	89	93	49	73	106	101	99	99	112	97	107	100	Substation upgrade
	OAK C115 - ME 115kV & OAKLAND C-MARITIME line	P2	Non-bus-tie breaker	100	99	95	82	83	86	41	71	109	102	103	99	112	95	105	102	Substation upgrade
	STATIN X 115kV - Section 2D & 1D	P2	Bus-tie breaker	104	104	105	88	88	91	56	80	120	106	107	99	112	105	125	118	Substation upgrade
	SOBRANTE 230kV - Section 2D & 1D	P2	Bus-tie breaker	101	100	104	86	86	87	63	85	109	103	103	99	112	104	116	111	Substation upgrade
	MORAGA 115kV - Section 2E & 2D	P2	Bus-tie breaker	98	93	95	72	86	90	77	82	103	100	96	99	112	95	102	96	Substation upgrade
Moraga-Claremont #2 115kV Line	C-X #2 115kV & C-X #3 115kV	P6	N-1-1	104	102	103	98	96	99	<90	<90	118	104	105	101	109	103	112	107	System upgrade or preferred resource
	OAK C115 115kV Section ME	P2	Bus	100	99	96	83	83	86	41	71	109	102	103	99	110	96	105	100	Substation upgrade
	OAK C115 - ME 115kV & OAKLAND C-MARITIME line	P2	Non-bus-tie breaker	100	99	96	83	83	86	41	71	109	102	103	99	110	96	105	103	Substation upgrade
	STATIN X 115kV - Section 2D & 1D	P2	Bus-tie breaker	104	104	105	88	88	91	56	80	120	106	107	99	110	105	126	119	Substation upgrade
	SOBRANTE 230kV - Section 2D & 1D	P2	Bus-tie breaker	101	100	104	86	87	87	63	85	109	103	103	99	110	104	116	111	Substation upgrade
	MORAGA 115kV - Section 1E & 1D	P2	Bus-tie breaker	90	95	100	82	86	88	33	72	105	92	99	99	110	100	112	106	Substation upgrade
Moraga-Lakewood 115kV Line (Lakewood Reactors)	C-X #2 115kV & C-X #3 115kV	P6	N-1-1	104	102	103	98	96	99	<90	<90	118	104	105	101	109	103	112	108	System upgrade or preferred resource
	PITSBG D 230kV Section 2D	P2	Bus	71	82	85	95	93	102	131	50	76	67	77	85	85	85	76	77	Review existing SPS
	CLAYTN 115kV Section 1D	P2	Bus	186	207	205	168	168	170	84	105	219	188	213	205	205	205	219	213	Review existing SPS
	CLAYTN - 1D 115kV & PITTSBURG-KIRKER-COLUMBIA STEEL line	P2	Non-bus-tie breaker	186	207	205	168	168	170	84	105	219	188	213	205	205	205	219	213	Review existing SPS
Moraga-Oakland X #1 115kV Line	PITSBG D - 2D 230kV & PITSBG D-TBC_PT1 #1 line	P2	Non-bus-tie breaker	71	82	85	95	93	102	131	50	76	67	77	85	85	85	76	77	Review existing SPS
	K-D #1 115kV & K-D #2 115kV	P6	N-1-1	<90	<90	93	<90	<90	<90	<90	<90	95	<90	<90	<90	<90	98	109	102	System upgrade or preferred resource
	MORAGA 115kV - Section 2D & 1D	P2	Bus-tie breaker	108	118	127	101	109	113	23	89	132	111	123	119	138	127	132	123	Substation upgrade
	K-D #1 115kV & K-D #2 115kV	P6	N-1-1	<90	<90	93	<90	<90	<90	<90	<90	95	<90	<90	<90	<90	98	109	102	System upgrade or preferred resource
Moraga-Oakland X #2 115kV Line	MORAGA 115kV - Section 2D & 1D	P2	Bus-tie breaker	108	118	127	101	109	113	23	89	132	111	123	119	138	127	132	123	Substation upgrade
	K-D #1 115kV & K-D #2 115kV	P6	N-1-1	<90	<90	93	<90	<90	<90	<90	<90	95	<90	<90	<90	<90	98	109	102	System upgrade or preferred resource
Moraga-Oakland X #3 115kV Line	MORAGA 115kV - Section 2D & 1D	P2	Bus-tie breaker	108	118	127	101	109	113	23	89	132	111	123	119	138	127	132	123	Substation upgrade
	K-D #1 115kV & K-D #2 115kV	P6	N-1-1	<90	<90	93	<90	<90	<90	<90	<90	95	<90	<90	<90	<90	98	109	102	System upgrade or preferred resource
Moraga-Oakland X #4 115kV Line	MORAGA 115kV - Section 2D & 1D	P2	Bus-tie breaker	108	118	127	101	109	113	23	89	132	111	123	119	138	127	132	123	Substation upgrade
	K-D #1 115kV & K-D #2 115kV	P6	N-1-1	<90	<90	93	<90	<90	<90	<90	<90	95	<90	<90	<90	<90	98	109	102	System upgrade or preferred resource
Moraga-Oakland X #5 115kV Line	SN LNDRO 115kV Section 1E	P2	Bus	127	84	79	127	97	92	78	70	92	129	88	67	57	79	92	88	Project: East Shore - Oakland J 115 kV Reconductoring Project In-service date: 4/20 Short term: Action plan
	MORAGA 115kV Section 2E	P2	Bus	114	<90	<90	114	<90	<90	72	<90	<90	115	<90	67	57	<90	<90	<90	Project: East Shore - Oakland J 115 kV Reconductoring Project In-service date: 4/20 Short term: Action plan

Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading % (Baseline Scenarios)								Loading % (Sensitivity Scenarios)							Project & Potential Mitigation Solutions	
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Winter Peak	2022 Winter Peak	2027 Winter Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022 SP High CEC Forecast	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations	2027 SP - No East Bay Generation	2022 SP High CEC Forecast - No East Bay Generation		2027 SP Peak-Shift - No East Bay Generation
Moraga-San Leandro #1 115kV Line	MORAGA 115kV - Section 2E & 2D	P2	Bus-tie breaker	115	59	55	114	68	64	73	51	64	116	62	67	57	55	64	62	Project: East Shore - Oakland J 115 kV Reconductoring Project In-service date: 4/20 Short term: Action plan
	Moraga-Oakland J 115 kV and Moraga-San Leandro No. 3 115 kV lines	P7	DCTL	118	71	67	119	81	77	75	60	77	119	74	72	69	67	77	74	Project: East Shore - Oakland J 115 kV Reconductoring Project In-service date: 4/20 Short term: Action plan
	MORAGA-SAN LEANDRO #2 115kV & MORAGA-SAN LEANDRO #3 115kV	P6	N-1-1	131	<90	<90	131	100	94	<90	<90	95	132	91	<90	<90	<90	93	89	Project: East Shore - Oakland J 115 kV Reconductoring Project In-service date: 4/20 Short term: Action plan
Moraga-San Leandro #2 115kV Line	MORAGA 115kV Section 1E	P2	Bus	132	88	83	132	101	96	82	73	96	133	92	88	84	83	96	92	Project: East Shore - Oakland J 115 kV Reconductoring Project In-service date: 4/20 Short term: Action plan
	MORAGA 115kV - Section 1E & 1D	P2	Bus-tie breaker	129	86	82	131	99	93	80	71	94	130	91	88	84	82	94	91	Project: East Shore - Oakland J 115 kV Reconductoring Project In-service date: 4/20 Short term: Action plan
	Moraga-Oakland J 115 kV and Moraga-San Leandro No. 3 115 kV lines	P7	DCTL	119	71	68	120	82	78	76	61	78	120	75	73	70	68	78	75	Project: East Shore - Oakland J 115 kV Reconductoring Project In-service date: 4/20 Short term: Action plan
	MORAGA-SAN LEANDRO #1 115kV & MORAGA-SAN LEANDRO #3 115kV	P6	N-1-1	131	<90	<90	132	100	95	<90	<90	95	133	91	<90	<90	<90	93	90	Project: East Shore - Oakland J 115 kV Reconductoring Project In-service date: 4/20 Short term: Action plan
Moraga-San Leandro #3 115kV Line	Moraga-San Leandro Nos. 1 & 2 115 kV lines	P7	DCTL	106	71	68	107	83	78	66	60	78	107	75	72	69	68	78	75	Project: East Shore - Oakland J 115 kV Reconductoring Project In-service date: 4/20 Short term: Action plan
	MORAGA-SAN LEANDRO #1 115kV & MORAGA-SAN LEANDRO #2 115kV	P6	N-1-1	106	<90	<90	106	<90	<90	<90	<90	<90	107	<90	<90	<90	<90	<90	<90	Project: East Shore - Oakland J 115 kV Reconductoring Project In-service date: 4/20 Short term: Action plan
MOSSLNSW-LASAGUILASS #2 230KV	Moss Landing-Los Banos 500 kV Line	P1	N-1	6	27	29	12	32	22	8	113	47	15	30	29	30	29	47	30	Action plan
	Moss Landing-Los Banos & Tesla-Metcalf 500 kV Lines	P6	N-1-1	<90	<90	90	<90	99	<90	<90	<90	100	100	<90	100	90	100	90	100	100
Newark-Applied Materials 115kV Line	MONTAVIS 230kV - Section 1D & 2D	P2	Bus-tie breaker	263	224	213	218	223	211	110	148	296	270	244	135	140	213	296	244	Project: Monta Vista 230 kV Bus Upgrade In-service date: 1/20 Short term: Action plan
	MONTAVIS 230kV - Section 1D & 2D	P2	Bus-tie breaker	210	164	156	186	190	180	79	103	221	216	180	135	140	156	221	180	Project: Monta Vista 230 kV Bus Upgrade In-service date: 1/20 Short term: Action plan
	NEWARK F-LAWRENCE-LOCKHD 1 115kV & BRITTON-MONTA VISTA 115kV	P6	N-1-1	97	100	97	<90	<90	<90	<90	<90	109	99	102	97	97	97	109	102	System upgrade or preferred resource
PIERCY-METCALF 115kV [4318]	PIERCY-METCALF 115kV [4318]	P1	N-1	108	76	77	96	71	75	54	49	86	114	87	105	77	77	86	87	Project: Metcalf - Piercy & Swift and Newark - Dixon Landing 115 kV Upgrade In-service date: 4/19 Short term: Action plan
	MTCALF E 115kV Section 2E	P2	Bus	108	76	77	97	72	75	54	49	86	114	88	106	72	77	86	88	Project: Metcalf - Piercy & Swift and Newark - Dixon Landing 115 kV Upgrade In-service date: 4/19 Short term: Action plan

Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading % (Baseline Scenarios)								Loading % (Sensitivity Scenarios)							Project & Potential Mitigation Solutions	
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Winter Peak	2022 Winter Peak	2027 Winter Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022 SP High CEC Forecast	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations	2027 SP - No East Bay Generation	2022 SP High CEC Forecast - No East Bay Generation		2027 SP Peak-Shift - No East Bay Generation
Newark-Dixon Landing 115kV Line	MTCALF E - 2E 115kV & STONE- EVERGREEN-METCALF line	P2	Non-bus-tie breaker	108	76	77	97	71	75	54	49	86	114	87	106	72	77	86	87	Project: Metcalf - Piercy & Swift and Newark - Dixon Landing 115 kV Upgrade In-service date: 4/19 Short term: Action plan
	MTCALF E 115kV - Section 1E & 2E	P2	Bus-tie breaker	108	76	77	97	72	75	54	49	87	114	88	106	72	77	87	88	Project: Metcalf - Piercy & Swift and Newark - Dixon Landing 115 kV Upgrade In-service date: 4/19 Short term: Action plan
	Swift - Metcalf & Piercy - Metcalf 115 kV Lines	P7	DCTL	108	76	77	97	72	75	54	49	87	114	88	106	43	77	87	88	Project: Metcalf - Piercy & Swift and Newark - Dixon Landing 115 kV Upgrade In-service date: 4/19 Short term: Action plan
Newark-Lawrence 115kV Line	MONTAVIS 230kV - Section 1D & 2D	P2	Bus-tie breaker	331	274	260	239	246	232	138	182	360	340	297	220	227	260	360	297	Project: Monta Vista 230 kV Bus Upgrade In-service date: 1/20 Short term: Action plan
	MONTAVIS 230kV - Section 1D & 2D	P2	Bus-tie breaker	251	203	192	199	204	192	98	129	272	258	221	220	227	192	272	221	Project: Monta Vista 230 kV Bus Upgrade In-service date: 1/20 Short term: Action plan
	Newark-Applied Materials & Lawrence-Monta Vista 115 kV Lines	P7	DCTL	106	112	107	76	78	77	71	103	122	109	111	107	107	107	122	111	System upgrade or preferred resource
	Moss Landing-Los Banos & Tesla-Metcalf 500 kV Lines	P6	N-1-1	<90	<90	<90	<90	81	<90	<90	79	102	<90	92	<90	<90	<90	102	92	System upgrade or preferred resource
Newark-Milpitas #1 115kV Line	SWIFT-METCALF 115kV & NEWARK-MILPITAS #2 115kV	P6	N-1-1	114	118	115	97	99	97	<90	<90	138	121	132	127	137	115	138	132	System upgrade or preferred resource
Newark-Milpitas #2 115kV Line	NEWARK-MILPITAS #1 115kV & SWIFT-METCALF 115kV	P6	N-1-1	96	100	95	<90	<90	<90	<90	<90	114	100	109	106	114	95	114	109	Sensitivity only
Newark-Northern Receiving Station #1 115kV Line	Los Esteros 230 kV BAAH Bus #1 (failure of non-redundent relay)	P5	Non-redundant relay (Bus)	81	96	97	85	90	82	69	85	102	105	105	97	97	97	102	105	Sensitivity only
NRS-Scott No. 2 115 kV Line	DVRaGT1 13.80kV & DVRbGt2 13.80kV & DVRaST3 13.80kV Gen Units & NORTHERN RECEIVING STATION-SCOTT #1 115kV	P3	G-1/N-1	110	117	122	95	99	100	<90	92	120	111	125	122	122	122	119	125	Potential reconductor as part of NRS-SRS #1 115 kV line reconductor project
	DVRaGT1 13.80kV & DVRbGt2 13.80kV & DVRaST3 13.80kV Gen Units & NORTHERN RECEIVING STATION-SCOTT #1 115kV [3111]	P3	G-1/N-1	108	116	120	95	99	100	<90	92	119	109	123	120	120	120	119	123	Potential reconductor as part of NRS-SRS #1 115 kV line reconductor project
Oakland C - Oakland L #1 115kV Cable	CLARMNT 115kV - Section 2D & 1D	P2	Bus-tie breaker	100	101	99	97	97	99	55	79	108	101	102	91	91	99	108	102	Substation upgrade
	K-D #2 115kV & K-D #1 115kV	P6	N-1-1	99	100	99	96	96	98	<90	<90	108	100	102	91	91	99	108	102	System upgrade or preferred resource
Oakland C - Oakland X #2 115kV Cable	CLARMNT 115kV - Section 2D & 1D	P2	Bus-tie breaker	91	90	106	86	85	87	71	90	99	91	92	83	82	106	116	109	Substation upgrade
	C-X #3 115kV & D-L #1 115kV	P6	N-1-1	96	94	100	<90	<90	<90	<90	100	104	96	95	<90	<90	121	134	124	System upgrade or preferred resource
Oakland D - Oakland L 115kV Cable	STATIN X 115kV - Section 2D & 1D	P2	Bus-tie breaker	95	93	106	82	81	81	84	93	117	95	94	93	90	106	132	124	Substation upgrade
	C-X #2 115kV & C-X #3 115kV	P6	N-1-1	95	93	106	<90	<90	<90	<90	99	118	95	94	<90	<90	106	118	109	System upgrade or preferred resource
	CHRISTIE-SOBRANTE 115kV [1260]	P1	N-1	110	<90	<90	92	<90	<90	59	<90	<90	111	<90	107	74	<90	<90	<90	Project: North Tower 115 kV Looping Project In-service date: 12/18 Short term: Action Plan
	SOBRANTE 115kV Section 1D	P2	Bus	114	<90	<90	97	<90	<90	61	<90	<90	116	<90	108	82	<90	<90	<90	Project: North Tower 115 kV Looping Project In-service date: 12/18 Short term: Action Plan
	CHRISTIE 115kV - Ring R3 & R2	P2	Non-bus-tie breaker	110	50	49	92	42	42	59	37	53	111	52	108	82	49	53	52	Project: North Tower 115 kV Looping Project In-service date: 12/18 Short term: Action Plan
	SOBRANTE - 1D 115kV & SOBRANTE-GRIZZLY-CLAREMONT #1 line	P2	Non-bus-tie breaker	114	49	49	97	42	43	61	39	54	116	52	108	82	49	54	52	Project: North Tower 115 kV Looping Project In-service date: 12/18 Short term: Action Plan

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				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Winter Peak	2022 Winter Peak	2027 Winter Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022 SP High CEC Forecast	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations	2027 SP - No East Bay Generation	2022 SP High CEC Forecast - No East Bay Generation		2027 SP Peak-Shift - No East Bay Generation
Oleum-Christie 115kV Line	SOBRANTE - 1D 115kV & SOBRANTE-G #1 line	P2	Non-bus-tie breaker	114	49	49	97	42	43	61	39	54	116	52	108	82	49	54	52	Project: North Tower 115 kV Looping Project In-service date: 12/18 Short term: Action Plan
	SOBRANTE - 1D 115kV & SOBRANTE-STD. OIL line	P2	Non-bus-tie breaker	114	49	49	97	42	43	61	39	54	116	52	108	82	49	54	52	Project: North Tower 115 kV Looping Project In-service date: 12/18 Short term: Action Plan
	SOBRANTE 115kV - Section 1D & 2D	P2	Bus-tie breaker	116	49	49	99	42	43	61	39	53	118	52	108	82	49	53	52	Project: North Tower 115 kV Looping Project In-service date: 12/18 Short term: Action Plan
	SOBRANTE 115kV - Section 1D & 1E	P2	Bus-tie breaker	114	49	49	97	42	43	61	39	54	115	52	108	82	49	54	52	Project: North Tower 115 kV Looping Project In-service date: 12/18 Short term: Action Plan
	Christie-Sobrante 115 kV and Martinez-Sobrante 115 kV lines	P7	DCTL	110	50	49	92	42	42	59	38	54	111	53	107	100	49	54	53	Project: North Tower 115 kV Looping Project In-service date: 12/18 Short term: Action Plan
	Sobrante-G Nos. 1 & 2 115 kV lines	P7	DCTL	98	71	66	89	69	67	60	56	80	101	73	107	100	66	80	73	Project: North Tower 115 kV Looping Project In-service date: 12/18 Short term: Action Plan
	UNION CH 9.11kV Gen Unit 1 & CHRISTIE-SOBRANTE 115kV	P3	G-1/N-1	129	<90	<90	107	<90	<90	<90	<90	<90	131	<90	128	<90	<90	<90	<90	Project: North Tower 115 kV Looping Project In-service date: 12/18 Short term: Action Plan
Oleum-Martinez 115kV Line	SOBRANTE 115kV Section 1D	P2	Bus	246	193	182	260	211	212	170	160	215	250	197	222	255	182	215	197	System upgrade or preferred resource
	SOBRANTE - 1D 115kV & SOBRANTE-GRIZZLY-CLAREMONT #1 line	P2	Non-bus-tie breaker	246	193	182	260	211	212	170	160	215	250	197	222	255	182	215	197	System upgrade or preferred resource
	SOBRANTE - 1D 115kV & SOBRANTE-G #1 line	P2	Non-bus-tie breaker	246	193	182	260	211	212	170	160	215	250	197	222	255	182	215	197	System upgrade or preferred resource
	SOBRANTE - 1D 115kV & SOBRANTE-STD. OIL line	P2	Non-bus-tie breaker	246	193	182	260	211	212	170	160	215	250	197	222	255	182	215	197	System upgrade or preferred resource
	SOBRANTE - 1D 115kV & SOBRANTE-NRTH TWR line	P2	Non-bus-tie breaker	<90	193	182	<90	211	212	<90	160	215	<90	197	222	255	182	215	197	System upgrade or preferred resource
	PITSBG D - 2D 230kV & PITSBG D-TBC_PT1 #1 line	P2	Non-bus-tie breaker	123	123	123	129	118	126	153	79	120	120	118	222	255	123	120	118	System upgrade or preferred resource
	SOBRANTE 115kV - Section 1D & 2D	P2	Bus-tie breaker	251	192	182	266	210	211	172	160	215	256	196	222	255	182	215	196	System upgrade or preferred resource
	SOBRANTE 115kV - Section 1D & 1E	P2	Bus-tie breaker	245	193	182	259	211	212	170	160	215	249	197	222	255	182	215	197	System upgrade or preferred resource
NEWARK-DIXON LANDING 115kV [2990]	NEWARK F 115kV Section 2F	P2	Bus	98	76	77	95	71	75	48	49	87	102	88	99	71	77	87	88	Project: Metcalf - Piercy & Swift and Newark - Dixon Landing 115 kV Upgrade In-service date: 4/19 Short term: Action plan
	NEWARK F - 2F 115kV & NEWARK-NUMMI line	P2	Non-bus-tie breaker	98	76	77	95	71	75	48	49	87	102	88	99	71	77	87	88	Project: Metcalf - Piercy & Swift and Newark - Dixon Landing 115 kV Upgrade In-service date: 4/19 Short term: Action plan
	NEWARK F - 2F 115kV & NEWARK-F-LOCKHD 2-APP MAT line	P2	Non-bus-tie breaker	98	76	76	94	70	75	48	49	87	102	87	99	71	76	87	87	Project: Metcalf - Piercy & Swift and Newark - Dixon Landing 115 kV Upgrade In-service date: 4/19 Short term: Action plan
	Sobrante-G Nos. 1 & 2 115 kV lines	P7	DCTL	98	76	72	109	87	89	90	71	84	99	76	99	110	72	84	76	Project: North Tower 115 kV Looping Project In-service date: 12/18 Short term: Action Plan

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				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Winter Peak	2022 Winter Peak	2027 Winter Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022 SP High CEC Forecast	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations	2027 SP - No East Bay Generation	2022 SP High CEC Forecast - No East Bay Generation		2027 SP Peak-Shift - No East Bay Generation
Piercy-Metcalf 115 kV Line	NEWARK F - 2F 115kV & NEWARK-TRIMBLE line	P2	Non-bus-tie breaker	98	76	77	95	71	75	48	49	87	102	88	99	71	77	87	88	Project: Metcalf - Piercy & Swift and Newark - Dixon Landing 115 kV Upgrade In-service date: 4/19 Short term: Action plan
	NEWARK F 115kV - Section 1F & 2F	P2	Bus-tie breaker	98	76	77	96	72	76	48	49	88	103	88	99	71	77	88	88	Project: Metcalf - Piercy & Swift and Newark - Dixon Landing 115 kV Upgrade In-service date: 4/19 Short term: Action plan
	MONTAVIS 230kV - Section 1D & 2D	P2	Bus-tie breaker	100	<90	<90	90	<90	<90	48	<90	<90	106	<90	99	71	<90	<90	<90	Project: Metcalf - Piercy & Swift and Newark - Dixon Landing 115 kV Upgrade In-service date: 4/19 Short term: Action plan
	Newark-Dixon Landing 115 kV and Newark-Milpitas No. 1 115 kV lines	P7	DCTL	97	76	76	94	70	75	48	49	87	102	87	98	63	76	87	87	Project: Metcalf - Piercy & Swift and Newark - Dixon Landing 115 kV Upgrade In-service date: 4/19 Short term: Action plan
	Newark - Dixon Landing & Newark - Milpitas #1 115 kV Lines	P7	DCTL	97	76	76	94	70	75	48	49	87	102	87	98	63	76	87	87	Project: Metcalf - Piercy & Swift and Newark - Dixon Landing 115 kV Upgrade In-service date: 4/19 Short term: Action plan
Pittsburg 230/115kV Transformer #12	LMECCT2 18.00kV & LMECCT1 18.00kV & LMECST1 18.00kV Gen Units & PITSBG D 230/115kV TB 13	P3	G-1/N-1	104	<90	<90	86	<90	<90	<90	<90	<90	106	<90	97	<90	<90	<90	<90	Project: Pittsburg 230/115 kV Transformer Capacity Increase In-service date: 5/22 Short term: Action plan
Pittsburg 230/115kV Transformer #13	PITSBG D 230kV Section 2D	P2	Bus	112	60	60	105	58	57	74	4	62	111	60	101	57	60	62	60	Project: Pittsburg 230/115 kV Transformer Capacity Increase In-service date: 5/22 Short term: Action plan
	PITSBG D - 2D 230kV & PITSBG D-TBC_PTB1 #1 line	P2	Non-bus-tie breaker	112	60	60	105	58	57	74	4	62	111	60	101	57	60	62	60	Project: Pittsburg 230/115 kV Transformer Capacity Increase In-service date: 5/22 Short term: Action plan
	LMECCT2 18.00kV & LMECCT1 18.00kV & LMECST1 18.00kV Gen Units & PITSBG D 230/115kV TB 12	P3	G-1/N-1	120	<90	<90	100	<90	<90	<90	<90	<90	122	<90	112	<90	<90	<90	<90	Project: Pittsburg 230/115 kV Transformer Capacity Increase In-service date: 5/22 Short term: Action plan
Pittsburg-Clayton #1 115kV Line	PITSBURG 115kV Section 2D	P2	Bus	<90	97	97	<90	74	77	<90	52	100	<90	100	97	97	97	100	100	Sensitivity only
	PITSBURG - 2D 115kV & PITSBURG-KIRKER-COLUMBIA STEEL line	P2	Non-bus-tie breaker	94	97	97	75	74	77	60	52	100	95	100	97	97	97	100	100	Sensitivity only
	Pittsburg-Clayton Nos. 3 & 4 115 kV lines	P7	DCTL	94	97	97	75	74	77	60	52	100	95	100	97	97	97	100	100	Sensitivity only
	PITSBURG-CLAYTON #4 115kV & PITSBURG-KIRKER-COLUMBIA STEEL 115kV	P6	N-1-1	94	97	97	<90	<90	<90	<90	<90	100	95	100	97	97	97	101	100	Sensitivity only
Pittsburg-Clayton #3 115 kV Line	CLAYTN 115kV Section 2D	P2	Bus	<90	100	101	<90	88	91	<90	54	106	<90	104	101	101	101	106	104	Review existing SPS
	PITSBURG-CLAYTON #1 115kV & PITSBURG-CLAYTON #4 115kV	P6	N-1-1	99	100	101	<90	<90	91	<90	<90	106	99	104	101	101	101	106	104	Review existing SPS
Pittsburg-Clayton #4 115kV Line	PITSBURG-CLAYTON #1 115kV & PITSBURG-KIRKER-COLUMBIA STEEL 115kV	P6	N-1-1	105	108	108	<90	<90	91	<90	<90	114	106	112	108	108	108	115	112	Review existing SPS
Potrero-Larkin #1 (AY-1) 115kV Cable	H-Y #1 115kV & X-Y #1 115kV	P6	N-1-1	161	176	178	179	181	186	<90	146	186	167	187	178	178	178	186	187	Long term: Larkin bus upgrade Short term: Action plan
Potrero-Larkin #2 (AY-2) 115kV Cable	A-X #1 115kV & A-Y #1 115kV	P6	N-1-1	97	101	101	113	114	114	<90	<90	109	99	104	101	101	101	109	104	Project: TBC runback scheme modification and SF 115 kV cable upgrade Short term: Action plan

Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading % (Baseline Scenarios)								Loading % (Sensitivity Scenarios)							Project & Potential Mitigation Solutions	
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Winter Peak	2022 Winter Peak	2027 Winter Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022 SP High CEC Forecast	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations	2027 SP - No East Bay Generation	2022 SP High CEC Forecast - No East Bay Generation		2027 SP Peak-Shift - No East Bay Generation
Potrero-Mission (AX) 115kV Cable	POTRERO 115kV Section 2E	P2	Bus	67	78	77	100	101	101	33	70	94	67	81	77	77	77	94	81	Project: TBC runback scheme modification and SF 115 kV cable upgrade Short term: Action plan
	POTRERO - 2E 115kV & POTRERO-TBC_POT1 #1 line	P2	Non-bus-tie breaker	67	78	77	100	101	101	33	70	94	67	81	77	77	77	94	81	Project: TBC runback scheme modification and SF 115 kV cable upgrade Short term: Action plan
	P-X #1 115kV & P-X #2 115kV	P6	N-1-1	99	101	100	115	116	116	<90	<90	109	101	106	108	111	100	109	106	Project: TBC runback scheme modification and SF 115 kV cable upgrade Short term: Action plan
Ravenswood-Cooley Landing #1 115kV Line	RVNSWD E 115kV Section 1X	P2	Bus	109	117	114	95	99	96	94	94	124	114	118	117	124	114	124	118	Project: Ravenswood - Cooley Landing 115 kV Line Reconductor Short term: Action plan Potential scope change
	RVNSWD E 115kV - Section 1E & 2E	P2	Bus-tie breaker	166	167	163	140	147	146	120	141	177	169	170	117	124	163	177	170	Project: Ravenswood - Cooley Landing 115 kV Line Reconductor Short term: Action plan Potential scope change
	Ravenswood-Palo Alto Nos. 1 & 2 115 kV lines	P7	DCTL	133	130	128	110	113	113	102	115	135	135	131	93	98	128	135	131	Project: Ravenswood - Cooley Landing 115 kV Line Reconductor Short term: Action plan Potential scope change
	RAVENSWOOD-PALO ALTO #1 115kV & RAVENSWOOD-PALO ALTO #2 115kV	P6	N-1-1	133	130	128	110	113	113	102	115	135	135	131	93	98	128	135	131	Project: Ravenswood - Cooley Landing 115 kV Line Reconductor Short term: Action plan Potential scope change
Ravenswood-Cooley Landing #2 115kV Line	BAIR 115/60kV TB 1 & CLY LND 115/60kV TB 1	P6	N-1-1	<90	97	95	<90	<90	92	<90	<90	109	<90	102	95	95	95	109	102	Sensitivity only
Ravenswood-Palo Alto #1 115kV Line	RAVENSWOOD-COOLEY LANDING #1 115kV & RAVENSWOOD-PALO ALTO #2 115kV	P6	N-1-1	108	105	104	95	98	98	<90	94	109	110	106	102	107	104	109	106	Close Cooley Landing 115 kV Bus Tie
Ravenswood-Palo Alto #2 115kV Line	RVNSWD E Section 1E & RVNSWD D Section 1D 115kV	P2	Bus-tie breaker	108	104	103	95	97	96	81	93	108	109	105	100	105	103	108	105	Close Cooley Landing 115 kV Bus Tie
	Ravenswood-Palo Alto No. 1 115 kV and Cooley Landing-Palo Alto 115 kV lines	P7	DCTL	104	91	90	81	81	80	86	87	91	104	90	91	95	90	91	90	Load power factor correction and reactive power compensation if needed
	RAVENSWOOD-COOLEY LANDING #1 115kV & RAVENSWOOD-PALO ALTO #1 115kV	P6	N-1-1	108	105	104	95	97	97	<90	94	109	110	106	102	107	104	109	106	Close Cooley Landing 115 kV Bus Tie
San Jose 'B'-Stone-Evergreen 115 kV Line	MTCALF E 115kV - Section 1E & 2E	P2	Bus-tie breaker	88	90	90	69	70	72	40	52	102	94	103	90	90	90	102	103	Sensitivity only
San Mateo 115/60kV Transformer #8	Jefferson 230 kV BAAH Bus #1 (failure of non-redundant relay)	P5	Non-redundant relay (Bus)	90	90	86	132	135	141	67	63	101	93	98	86	86	86	101	98	Project: Jefferson - Stanford #2 60 kV Line Review Stanford 60 kV system configuration
	Jefferson 230 kV BAAH Bus #2 (failure of non-redundant relay)	P5	Non-redundant relay (Bus)	87	88	83	130	134	138	66	61	98	90	95	83	83	83	98	95	Project: Jefferson - Stanford #2 60 kV Line Review Stanford 60 kV system configuration
	Monta Vista-Jefferson Nos. 1 & 2 230 kV lines	P7	DCTL	88	88	84	132	134	139	66	61	98	90	95	92	101	84	98	95	Project: Jefferson - Stanford #2 60 kV Line Review Stanford 60 kV system configuration
	JEFFERSN 230/60kV TB 1 & JEFFERSN 230/60kV TB 2	P6	N-1-1	90	90	<90	131	135	137	<90	<90	101	93	98	93	102	<90	101	98	Project: Jefferson - Stanford #2 60 kV Line Review Stanford 60 kV system configuration
San Mateo-Bair 60kV Line	CLY LNDG 60kV Section 1D	P2	Bus	87	102	99	76	87	85	55	80	114	89	103	117	55	99	114	103	Project: Jefferson - Stanford #2 60 kV Line Review Stanford 60 kV system configuration
	CLY LNDG 60kV - Section 1D & 2D	P2	Bus-tie breaker	85	100	97	74	84	85	54	79	112	88	101	117	55	97	112	101	Project: Jefferson - Stanford #2 60 kV Line Review Stanford 60 kV system configuration
	CLY LND 115/60kV TB 1 & CLY LND2 115/60kV TB 2	P6	N-1-1	120	140	135	118	132	132	<90	102	157	125	145	116	<90	135	157	145	Project: Jefferson - Stanford #2 60 kV Line Review Stanford 60 kV system configuration

Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading % (Baseline Scenarios)								Loading % (Sensitivity Scenarios)							Project & Potential Mitigation Solutions	
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Winter Peak	2022 Winter Peak	2027 Winter Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022 SP High CEC Forecast	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations	2027 SP - No East Bay Generation	2022 SP High CEC Forecast - No East Bay Generation		2027 SP Peak-Shift - No East Bay Generation
San Mateo-Belmont 115kV Line	RVNSWD D 115kV - Section 1D & 2D	P2	Bus-tie breaker	107	107	106	96	98	99	73	90	116	109	111	96	97	106	116	111	Project: South of San Mateo capacity increase Short term: Action plan Potential scope change
	Ravenswood 230 kV BAAH Bus #2 (failure of non-redundant relay)	P5	Non-redundant relay (Bus)	97	104	103	89	93	91	88	82	81	102	108	103	103	103	81	108	Project: South of San Mateo capacity increase Short term: Action plan Potential scope change
	Ravenswood-Bair Nos. 1 & 2 115 kV lines	P7	DCTL	94	95	94	85	87	89	63	80	104	95	99	94	94	94	104	99	Sensitivity only
	RAVENSWD 230/115kV TB 1 & RAVENSWD 230/115kV TB 2	P6	N-1-1	100	102	101	100	100	100	<90	90	114	100	104	100	101	101	114	105	Project: South of San Mateo capacity increase Short term: Action plan Potential scope change
San Mateo-Hillsdale JCT 60kV Line	MONTAVIS 230kV - Section 1D & 2D	P2	Bus-tie breaker	80	78	74	100	102	102	49	58	89	84	83	74	74	74	89	83	Project: Monta Vista 230 kV Bus Upgrade In-service date: 1/20 Short term: Action plan
	Jefferson 230 kV BAAH Bus #1 (failure of non-redundant relay)	P5	Non-redundant relay (Bus)	161	162	154	240	246	259	110	106	177	168	178	154	154	154	177	178	Project: Jefferson - Stanford #2 60 kV Line Review Stanford 60 kV system configuration
	Jefferson 230 kV BAAH Bus #2 (failure of non-redundant relay)	P5	Non-redundant relay (Bus)	161	161	155	244	248	258	110	107	181	169	178	155	155	155	181	178	Project: Jefferson - Stanford #2 60 kV Line Review Stanford 60 kV system configuration
	Monta Vista-Jefferson Nos. 1 & 2 230 kV lines	P7	DCTL	161	163	155	252	248	260	111	108	181	170	178	176	197	155	181	178	Project: Jefferson - Stanford #2 60 kV Line Review Stanford 60 kV system configuration
	Metcalfe-Monta Vista No. 3 & Monta Vista-Coyote Sw. Sta. 230 kV Line	P7	DCTL	81	77	74	100	100	102	49	58	87	85	83	176	197	74	87	83	Project: Jefferson - Stanford #2 60 kV Line Review Stanford 60 kV system configuration
	JEFFERSN 230/60kV TB 1 & JEFFERSN 230/60kV TB 2	P6	N-1-1	160	162	153	239	245	250	110	106	177	168	177	173	194	153	182	177	Project: Jefferson - Stanford #2 60 kV Line Review Stanford 60 kV system configuration
San Mateo-Hillsdale JCT 60kV Line (Beresford-Hillsdale)	Jefferson 230 kV BAAH Bus #1 (failure of non-redundant relay)	P5	Non-redundant relay (Bus)	179	181	172	229	234	247	125	119	198	188	198	172	172	172	198	198	Project: Jefferson - Stanford #2 60 kV Line Review Stanford 60 kV system configuration
	Jefferson 230 kV BAAH Bus #2 (failure of non-redundant relay)	P5	Non-redundant relay (Bus)	180	180	173	232	237	246	125	120	202	189	198	173	173	173	202	198	Project: Jefferson - Stanford #2 60 kV Line Review Stanford 60 kV system configuration
	Monta Vista-Jefferson Nos. 1 & 2 230 kV lines	P7	DCTL	180	182	173	241	236	248	126	122	202	190	199	202	225	173	202	199	Project: Jefferson - Stanford #2 60 kV Line Review Stanford 60 kV system configuration
	JEFFERSN 230/60kV TB 1 & JEFFERSN 230/60kV TB 2	P6	N-1-1	179	180	171	227	233	238	125	119	198	188	198	198	220	171	203	198	Project: Jefferson - Stanford #2 60 kV Line Review Stanford 60 kV system configuration
San Mateo-Hillsdale JCT 60kV Line (Hillsdale-Hillsdale JCT)	Jefferson 230 kV BAAH Bus #1 (failure of non-redundant relay)	P5	Non-redundant relay (Bus)	172	173	164	255	262	276	120	114	189	180	189	164	164	164	189	189	Project: Jefferson - Stanford #2 60 kV Line Review Stanford 60 kV system configuration
	Jefferson 230 kV BAAH Bus #2 (failure of non-redundant relay)	P5	Non-redundant relay (Bus)	173	172	165	260	264	275	120	115	193	182	190	165	165	165	193	190	Project: Jefferson - Stanford #2 60 kV Line Review Stanford 60 kV system configuration
	Monta Vista-Jefferson Nos. 1 & 2 230 kV lines	P7	DCTL	173	174	166	270	264	277	121	117	193	183	190	192	214	166	193	190	Project: Jefferson - Stanford #2 60 kV Line Review Stanford 60 kV system configuration
	JEFFERSN 230/60kV TB 1 & JEFFERSN 230/60kV TB 2	P6	N-1-1	172	173	164	254	261	265	120	115	189	180	189	189	210	164	194	189	Project: Jefferson - Stanford #2 60 kV Line Review Stanford 60 kV system configuration
Sobrante 230/115kV Transformer #1	MORAGA 230kV - Section 2D & 1D	P2	Bus-tie breaker	94	78	79	102	85	83	62	66	83	96	80	79	79	79	83	80	Project: East Shore - Oakland J 115 kV Reconductoring Project In-service date: 4/20 Short term: Action plan
Sobrante-El Cerrito STA G #1 115kV Lin	CHRISTIE-SOBRANTE 115kV & SOBRANTE-G #1 115kV	P6	N-1-1	100	<90	<90	94	<90	<90	<90	<90	93	102	<90	95	101	<90	93	<90	Sensitivity only
Sobrante-El Cerrito STA G #2 115kV Line	CHRISTIE-SOBRANTE 115kV & SOBRANTE-G #1 115kV	P6	N-1-1	100	<90	<90	94	<90	<90	<90	<90	93	102	<90	95	102	<90	93	<90	Sensitivity only

Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading % (Baseline Scenarios)								Loading % (Sensitivity Scenarios)								Project & Potential Mitigation Solutions
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Winter Peak	2022 Winter Peak	2027 Winter Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022 SP High CEC Forecast	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations	2027 SP - No East Bay Generation	2022 SP High CEC Forecast - No East Bay Generation	2027 SP Peak-Shift - No East Bay Generation	
Sobrante-Moraga 115kV Line	SOBRANTE 230kV - Section 2D & 1D	P2	Bus-tie breaker	104	104	102	97	98	98	53	83	112	107	108	84	104	102	112	108	Substation upgrade or rerate
	MORAGA 230kV - Section 2D & 1D	P2	Bus-tie breaker	112	72	77	106	68	64	75	63	78	114	75	84	104	77	78	75	Project: East Shore - Oakland J 115 kV Reconductoring Project In-service date: 4/20 Short term: Action plan
	SOBRANTE 230/115kV TB 1 & SOBRANTE 230/115kV TB 2	P6	N-1-1	101	100	98	96	97	97	<90	<90	109	102	104	98	98	99	108	105	System upgrade or preferred resource
Stone-Evergreen-Metcalf 115kV Line	MTCALF D Section 1D & MTCALF E Section 1E 115kV	P2	Bus-tie breaker	<90	96	97	<90	81	83	<90	70	111	<90	108	97	97	97	111	108	Project: Metcalf - Evergreen 115 kV line reconductoring Potential scope change
	MTCALF-EVERGREEN #1 115kV & SAN JOSE B-STONE-EVERGREEN 115kV	P6	N-1-1	97	97	100	<90	<90	91	<90	<90	111	102	112	100	100	100	112	112	Project: Metcalf - Evergreen 115 kV line reconductoring Potential scope change
Tassajara-Newark 230kV Line	PITSBG D 230kV Section 2D	P2	Bus	92	89	89	89	77	79	106	42	83	92	86	89	89	89	83	86	Substation upgrade or rerate
	PITSBG D - 2D 230kV & PITSBG D-TBC_PT1 #1 line	P2	Non-bus-tie breaker	92	89	89	89	77	79	106	42	83	92	86	89	89	89	83	86	Substation upgrade or rerate
Trimble-San Jose 'B' 115 kV Line	MTCALF D 115kV - Section 1D & 2D	P2	Bus-tie breaker	105	108	111	78	85	89	37	54	115	93	118	142	145	111	115	118	Substation upgrade or rerate
	MTCALF E 115kV - Section 1E & 2E	P2	Bus-tie breaker	90	93	94	73	81	76	29	45	101	74	101	142	145	94	101	101	Substation upgrade or rerate
	Metcalf - El Patio No. 1 & 2 115 kV Lines	P7	DCTL	98	101	103	77	84	84	37	52	108	85	110	103	103	103	108	110	System upgrade or preferred resource
	Moss Landing-Los Banos & Tesla-Metcalf 500 kV Lines	P6	N-1-1	96	100	100	100	100	98	<90	99	121	100	115	101	101	100	121	115	System upgrade or preferred resource
Whisman-Monta Vista 115 kV Line	MONTAVIS SVD=v & MTN VIEW-MONTA VISTA 115kV	P6	N-1-1	97	<90	<90	<90	<90	<90	<90	<90	96	100	<90	<90	<90	<90	96	<90	Sensitivity only

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	
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Winter Peak	2022 Winter Peak	2027 Winter Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022 SP High CEC Forecast	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations	2027 SP - No East Bay Generation	2022 SP High CEC Forecast No East Bay Generation	2027 SP Peak-Shift - No East Bay Generation		
AGNEW 115 kV	Base Case	P0	N-0	1.05	<1.05	<1.05	1.02	<1.05	<1.05	1.05	<1.05	<1.05	1.03	<1.05	<1.05	<1.05	<1.05	<1.05	<1.05	<1.05	Load power factor correction and voltage support if needed
ALHAMBRA 115 kV	Base Case	P0	N-0	1.05	1.03	1.03	1.03	1.03	1.03	1.07	1.04	1.03	1.05	1.03	1.04	1.03	1.03	1.03	1.03	1.03	Load power factor correction and voltage support if needed
ALMADEN 60 kV	Base Case	P0	N-0	0.99	<1.05	<1.05	0.98	<1.05	<1.05	1.05	<1.05	<1.05	0.98	<1.05	<1.05	<1.05	<1.05	<1.05	<1.05	<1.05	Load power factor correction and voltage support if needed
ALMADEN 60 kV	MONTA VISTA-LOS GATOS 60kV [7610]	P1	N-1	0.89	0.93	0.93	0.94	0.94	0.93	1.04	1.00	0.91	0.88	0.92	0.95	0.93	0.93	0.93	0.92	0.91	Disable automatics
ALMADEN 60 kV	LOS GATS 60kV Section 1D	P2	Bus	0.89	0.93	0.93	0.94	0.94	0.93	1.04	1.00	0.91	0.88	0.92	0.95	0.93	0.93	0.93	0.92	0.91	Disable automatics
ALMADEN 60 kV	LECEFGT1 13.80kV & LECEFGT2 13.80kV & LECEFGT3 13.80kV & LECEFGT4 13.80kV Gen Units & MONTA VISTA-LOS GATOS 60kV [7610]	P3	G-1/N-1	0.88	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	0.87	0.90	>0.9	>0.9	>0.9	>0.9	0.90	0.90	Disable automatics
ALMADEN 60 kV	MONTA VISTA-LOS GATOS 60kV [7610] & METCALF-EVERGREEN #1 115kV [2520]	P6	N-1-1	0.87	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	0.89	0.86	0.89	>0.9	>0.9	>0.9	0.89	0.89	Disable automatics	
ALTAMONT 60 kV	Base Case	P0	N-0	1.06	1.04	1.04	1.05	1.05	1.05	1.09	1.06	1.04	1.07	1.04	1.04	1.04	1.04	1.04	1.04	1.04	Load power factor correction and voltage support if needed
AMES DST 115 kV	Base Case	P0	N-0	1.03	<1.05	<1.05	1.03	<1.05	<1.05	1.06	<1.05	<1.05	1.03	<1.05	<1.05	<1.05	<1.05	<1.05	<1.05	<1.05	Load power factor correction and voltage support if needed
APP MAT 115 kV	MONTAVIS 230kV - Section 1D & 2D	P2	Bus-tie breaker	0.74	0.83	0.84	0.77	0.75	0.78	0.97	0.93	0.70	0.74	0.79	0.87	0.84	0.84	0.79	0.79	0.70	Project: Monta Vista 230 kV Bus Upgrade In-service date: 1/20 Short term: Action plan
BARTLP 115 kV	Base Case	P0	N-0	1.04	<1.05	<1.05	1.01	<1.05	<1.05	1.06	<1.05	<1.05	1.04	<1.05	<1.05	<1.05	<1.05	<1.05	<1.05	<1.05	Load power factor correction and voltage support if needed
BARTRC 115 kV	Base Case	P0	N-0	1.03	<1.05	<1.05	1.02	<1.05	<1.05	1.06	<1.05	<1.05	1.03	<1.05	<1.05	<1.05	<1.05	<1.05	<1.05	<1.05	Load power factor correction and voltage support if needed
BIXLER 60 kV	Base Case	P0	N-0	1.03	<1.05	<1.05	1.03	<1.05	<1.05	1.08	<1.05	<1.05	1.04	<1.05	<1.05	<1.05	<1.05	<1.05	<1.05	<1.05	Load power factor correction and voltage support if needed
BOLLMAN 115 kV	Base Case	P0	N-0	1.05	1.03	1.03	1.03	1.03	1.03	1.07	1.04	1.03	1.05	1.03	1.04	1.03	1.03	1.03	1.03	1.03	Load power factor correction and voltage support if needed
BRENTWOD 230 kV	Base Case	P0	N-0	1.02	1.01	1.01	1.02	1.02	1.01	1.05	1.02	1.01	1.03	1.01	1.00	1.01	1.01	1.01	1.01	1.01	Load power factor correction and voltage support if needed
BRITTN 115 kV	MONTAVIS 230kV - Section 1D & 2D	P2	Bus-tie breaker	0.73	0.82	0.83	0.76	0.74	0.78	0.97	0.93	0.69	0.72	0.78	0.87	0.84	0.83	0.78	0.78	0.69	Project: Monta Vista 230 kV Bus Upgrade In-service date: 1/20 Short term: Action plan
CALMAT60 60 kV	Base Case	P0	N-0	1.04	<1.05	<1.05	1.02	<1.05	<1.05	1.06	<1.05	<1.05	1.04	<1.05	<1.05	<1.05	<1.05	<1.05	<1.05	<1.05	Load power factor correction and voltage support if needed
CALMAT60 60 kV	PITTSBURG-SAN RAMON 230kV [5490] & SAN RAMON-MORAGA 230kV [5660]	P6	N-1-1	0.69	0.69	0.69	0.74	0.74	0.74	>0.9	0.79	0.68	0.69	0.68	0.71	0.69	0.69	0.68	0.68	0.67	Reverse power relay at San Ramon
CAROLD2 60 kV	JEFFERSN 230/60kV TB 1 & JEFFERSN 230/60kV TB 2	P6	N-1-1	0.89	0.87	0.88	0.75	0.74	0.74	>0.9	>0.9	0.86	0.88	0.86	0.90	0.88	0.88	0.86	0.86	0.84	Project: Jefferson - Stanford #2 60 kV Line Review Stanford 60 kV system configuration

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
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Winter Peak	2022 Winter Peak	2027 Winter Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022 SP High CEC Forecast	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations	2027 SP - No East Bay Generation	2022 SP High CEC Forecast No East Bay Generation	2027 SP Peak-Shift - No East Bay Generation	
CAROLNDS 60 kV	JEFFERSN 230/60kV TB 1 & JEFFERSN 230/60kV TB 2	P6	N-1-1	>0.9	>0.9	>0.9	0.86	0.85	0.85	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	Project: Jefferson - Stanford #2 60 kV Line Review Stanford 60 kV system configuration
CASTROVL 230 kV	Base Case	P0	N-0	1.03	1.01	1.01	1.01	1.00	1.00	1.05	1.02	1.00	1.03	1.01	1.01	1.01	1.01	1.01	1.01	Load power factor correction and voltage support if needed
CHRISTIE 115 kV	Base Case	P0	N-0	1.05	1.03	1.04	1.03	1.03	1.03	1.08	1.04	1.03	1.04	1.03	1.04	1.03	1.04	1.03	1.03	Load power factor correction and voltage support if needed
CHRISTIE 60 kV	Base Case	P0	N-0	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.07	1.07	1.07	1.06	1.06	1.07	1.06	Load power factor correction and voltage support if needed
CLARMNT 115 kV	Base Case	P0	N-0	1.05	1.04	1.04	1.03	1.03	1.03	1.08	1.04	1.03	1.05	1.04	1.04	1.04	1.04	1.04	1.04	Load power factor correction and voltage support if needed
CLARMNT 115 kV	MORAGA - 2D 230kV & CONTRA COSTA-MORAGA #2 line	P2	Non-bus-tie breaker	1.08	1.04	1.04	1.04	1.04	1.04	1.11	1.06	1.04	1.08	1.04	1.05	1.04	1.04	1.04	1.04	Load power factor correction and voltage support if needed
CLARMNT 115 kV	MORAGA 115kV - Section 2D & 1D	P2	Bus-tie breaker	1.08	1.05	1.05	1.04	1.04	1.04	1.11	1.07	1.04	1.09	1.05	1.06	1.05	1.05	1.05	1.05	Load power factor correction and voltage support if needed
CLARMNT 115 kV	MORAGA 230kV - Section 2D & 1D	P2	Bus-tie breaker	1.08	1.03	1.03	1.01	1.03	1.03	1.11	1.05	1.03	1.08	1.03	1.04	1.03	1.03	1.03	1.03	Load power factor correction and voltage support if needed
CLARMNT 115 kV	MORAGA 230kV Section 2D	P2	Bus	1.08	<1.10	<1.10	1.04	<1.10	<1.10	1.11	<1.10	<1.10	1.08	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	Load power factor correction and voltage support if needed
CLARMNT 115 kV	MORAGA 230/115kV TB 1 & MORAGA 230/115kV TB 2	P6	N-1-1	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	1.11	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	Load power factor correction and voltage support if needed
CLAYTN 115 kV	Base Case	P0	N-0	1.05	1.03	1.03	1.03	1.03	1.03	1.07	1.04	1.02	1.05	1.02	1.03	1.03	1.03	1.03	1.02	Load power factor correction and voltage support if needed
CLMBIAHS 115 kV	Base Case	P0	N-0	1.05	1.04	1.04	1.03	1.04	1.04	1.07	1.04	1.03	1.05	1.04	1.04	1.04	1.04	1.04	1.04	Load power factor correction and voltage support if needed
CLMBIAPV 115 kV	Base Case	P0	N-0	1.05	1.04	1.04	1.03	1.04	1.04	1.07	1.04	1.03	1.05	1.04	1.04	1.04	1.04	1.04	1.04	Load power factor correction and voltage support if needed
CLY LND 115 kV	Base Case	P0	N-0	1.03	<1.05	<1.05	1.03	<1.05	<1.05	1.07	<1.05	<1.05	1.03	<1.05	<1.05	<1.05	<1.05	<1.05	<1.05	Load power factor correction and voltage support if needed
CON25 115 kV	Base Case	P0	N-0	1.05	<1.05	<1.05	1.03	<1.05	<1.05	1.08	<1.05	<1.05	1.05	<1.05	<1.05	<1.05	<1.05	<1.05	<1.05	Load power factor correction and voltage support if needed
CP LECEF 115 kV	Base Case	P0	N-0	1.04	<1.05	<1.05	1.02	<1.05	<1.05	1.05	<1.05	<1.05	1.03	<1.05	<1.05	<1.05	<1.05	<1.05	<1.05	Load power factor correction and voltage support if needed
CRYSTLSG 60 kV	JEFFERSN 230/60kV TB 1 & JEFFERSN 230/60kV TB 2	P6	N-1-1	0.89	0.87	0.88	0.75	0.74	0.74	>0.9	>0.9	0.86	0.88	0.86	0.90	0.88	0.88	0.86	0.84	Project: Jefferson - Stanford #2 60 kV Line Review Stanford 60 kV system configuration
CV BART 230 kV	Base Case	P0	N-0	1.03	1.01	1.01	1.01	1.00	1.00	1.05	1.02	1.00	1.03	1.01	1.01	1.01	1.01	1.01	1.01	Load power factor correction and voltage support if needed
CYTE PMP 115 kV	Base Case	P0	N-0	1.06	1.04	1.04	1.05	1.05	1.04	1.09	1.05	1.03	1.06	1.04	1.05	1.04	1.04	1.04	1.04	Load power factor correction and voltage support if needed
DIXON LD 115 kV	Base Case	P0	N-0	1.04	<1.05	<1.05	1.02	<1.05	<1.05	1.06	<1.05	<1.05	1.04	<1.05	<1.05	<1.05	<1.05	<1.05	<1.05	Load power factor correction and voltage support if needed
DMTAR_SL 115 kV	Base Case	P0	N-0	1.06	1.03	1.03	1.01	1.03	1.02	1.07	1.04	1.02	1.06	1.03	1.03	1.03	1.03	1.03	1.03	Load power factor correction and voltage support if needed
DMTAR_SL 115 kV	MORAGA - 2D 230kV & CONTRA COSTA-MORAGA #2 line	P2	Non-bus-tie breaker	1.09	1.04	1.04	1.02	1.03	1.03	1.11	1.05	1.03	1.10	1.04	1.04	1.04	1.04	1.04	1.04	Load power factor correction and voltage support if needed



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	
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Winter Peak	2022 Winter Peak	2027 Winter Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022 SP High CEC Forecast	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations	2027 SP - No East Bay Generation	2022 SP High CEC Forecast No East Bay Generation		2027 SP Peak-Shift - No East Bay Generation
DMTAR_SL 115 kV	MORAGA 115kV - Section 2D & 1D	P2	Bus-tie breaker	1.11	1.04	1.04	1.03	1.04	1.04	1.11	1.06	1.04	1.11	1.05	1.05	1.04	1.04	1.05	1.04	Load power factor correction and voltage support if needed
DMTAR_SL 115 kV	MORAGA 230kV - Section 2D & 1D	P2	Bus-tie breaker	1.09	1.03	1.03	0.99	1.02	1.02	1.11	1.05	1.03	1.09	1.03	1.04	1.03	1.03	1.03	1.03	Load power factor correction and voltage support if needed
DMTAR_SL 115 kV	MORAGA 230kV Section 2D	P2	Bus	1.09	<1.10	<1.10	1.02	<1.10	<1.10	1.11	<1.10	<1.10	1.10	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	Load power factor correction and voltage support if needed
DMTAR_SL 115 kV	MORAGA 230/115kV TB 1 & MORAGA 230/115kV TB 2	P6	N-1-1	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	1.11	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	Load power factor correction and voltage support if needed
DOW TAP2 115 kV	Base Case	P0	N-0	1.05	1.03	1.03	1.03	1.04	1.03	1.07	1.04	1.03	1.05	1.03	1.04	1.03	1.03	1.03	1.03	Load power factor correction and voltage support if needed
DYERWND 60 kV	Base Case	P0	N-0	1.06	1.04	1.04	1.06	1.05	1.05	1.10	1.07	1.04	1.07	1.04	1.04	1.04	1.04	1.04	1.04	Load power factor correction and voltage support if needed
E DUBLIN 60 kV	Base Case	P0	N-0	1.04	<1.05	<1.05	1.02	<1.05	<1.05	1.07	<1.05	<1.05	1.04	<1.05	<1.05	<1.05	<1.05	<1.05	<1.05	Load power factor correction and voltage support if needed
E DUBLIN 60 kV	PITTSBURG-SAN RAMON 230kV [5490] & SAN RAMON-MORAGA 230kV [5660]	P6	N-1-1	0.55	0.54	0.54	0.62	0.61	0.61	>0.9	0.68	0.53	0.55	0.53	0.58	0.54	0.54	0.53	0.53	Reverse power relay at San Ramon
EBMUDGRY 115 kV	Base Case	P0	N-0	1.05	<1.05	<1.05	1.02	<1.05	<1.05	1.07	<1.05	<1.05	1.05	<1.05	<1.05	<1.05	<1.05	<1.05	<1.05	Load power factor correction and voltage support if needed
EBMUDGRY 115 kV	CLAYTN - 1D 115kV & PITTSBURG-KIRKER-COLUMBIA STEEL line	P2	Non-bus-tie breaker	1.00	0.89	0.89	0.93	0.93	0.93	1.07	0.98	0.88	1.00	0.89	0.95	0.89	0.89	0.89	0.89	Review existing SPS
EBMUDGRY 115 kV	CLAYTN 115kV Section 1D	P2	Bus	>0.9	0.89	0.89	>0.9	0.93	0.93	>0.9	0.98	0.88	>0.9	0.89	0.95	0.89	0.89	0.89	0.88	Review existing SPS
EDENVALE 115 kV	Base Case	P0	N-0	1.06	1.04	1.04	1.04	1.05	1.04	1.09	1.05	1.03	1.07	1.03	1.05	1.04	1.04	1.03	1.03	Load power factor correction and voltage support if needed
EDENVALE 115 kV	POTRERO - 1E 115kV & POT_SVC-POTRERO #1 line	P2	Non-bus-tie breaker	1.06	1.04	<1.10	1.05	1.05	<1.10	1.10	1.05	1.03	1.07	<1.10	1.05	<1.10	<1.10	<1.10	1.03	Load power factor correction and voltage support if needed
EDENVALE 115 kV	POTRERO 115kV Section 1E	P2	Bus	1.06	1.04	<1.10	1.05	1.05	<1.10	1.10	1.05	1.03	1.07	<1.10	1.05	<1.10	<1.10	<1.10	1.03	Load power factor correction and voltage support if needed
EDENVALE 115 kV	SJB DG 115kV Section 1D	P2	Bus	1.06	1.04	1.04	1.04	1.05	1.04	1.10	1.05	1.03	1.07	1.03	1.05	1.04	1.04	1.03	1.03	Load power factor correction and voltage support if needed
EDENVALE 115 kV	SJB DG Section 1D & SJB EF Section 1F 115kV	P2	Bus-tie breaker	1.07	1.04	1.04	1.05	1.05	1.04	1.10	1.05	1.03	1.08	1.04	1.05	1.04	1.04	1.04	1.03	Load power factor correction and voltage support if needed
EDENVALE 115 kV	SJB EF - 1F 115kV & SAN JOSE B-STONE-EVERGREEN line	P2	Non-bus-tie breaker	1.06	1.04	1.04	1.05	1.05	1.04	1.10	1.05	1.03	1.07	1.04	1.05	1.04	1.04	1.04	1.03	Load power factor correction and voltage support if needed
EDENVALE 115 kV	SJB EF 115kV Section 1F	P2	Bus	1.07	1.04	1.04	1.05	1.05	1.04	1.10	1.06	1.03	1.07	1.04	1.05	1.04	1.04	1.04	1.03	Load power factor correction and voltage support if needed
EDES 115 kV	Base Case	P0	N-0	1.06	1.03	1.03	1.01	1.03	1.03	1.07	1.04	1.03	1.06	1.03	1.04	1.03	1.03	1.03	1.03	Load power factor correction and voltage support if needed
EDES 115 kV	MORAGA - 2D 230kV & CONTRA COSTA-MORAGA #2 line	P2	Non-bus-tie breaker	1.10	1.04	1.03	1.02	1.03	1.03	1.11	1.05	1.03	1.10	1.04	1.04	1.04	1.03	1.04	1.03	Load power factor correction and voltage support if needed
EDES 115 kV	MORAGA 115kV - Section 2D & 1D	P2	Bus-tie breaker	1.11	1.04	1.04	1.03	1.04	1.03	1.12	1.06	1.04	1.11	1.04	1.05	1.04	1.04	1.04	1.04	Load power factor correction and voltage support if needed
EDES 115 kV	MORAGA 230kV - Section 2D & 1D	P2	Bus-tie breaker	1.10	1.03	1.03	0.98	1.03	1.03	1.11	1.05	1.03	1.10	1.03	1.04	1.03	1.03	1.03	1.03	Load power factor correction and voltage support if needed
EDES 115 kV	MORAGA 230kV Section 2D	P2	Bus	1.10	<1.10	<1.10	1.02	<1.10	<1.10	1.11	<1.10	<1.10	1.10	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	Load power factor correction and voltage support if needed

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			
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Winter Peak	2022 Winter Peak	2027 Winter Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022 SP High CEC Forecast	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations	2027 SP - No East Bay Generation	2022 SP High CEC Forecast No East Bay Generation		2027 SP Peak-Shift - No East Bay Generation		
EDES 115 kV	MORAGA 230/115kV TB 2 & MORAGA 230/115kV TB 1	P6	N-1-1	1.10	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	1.11	<1.10	<1.10	1.10	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	Load power factor correction and voltage support if needed	
EL CRTO 115 kV	Base Case	P0	N-0	1.06	1.04	1.04	1.03	1.04	1.03	1.03	1.08	1.05	1.03	1.06	1.04	1.04	1.04	1.04	1.04	1.04	1.03	Load power factor correction and voltage support if needed
EL CRTO 115 kV	MORAGA - 2D 230kV & CONTRA COSTA-MORAGA #2 line	P2	Non-bus-tie breaker	1.08	1.04	1.04	1.04	1.04	1.04	1.04	1.11	1.06	1.04	1.08	1.04	1.05	1.04	1.04	1.04	1.04	1.04	Load power factor correction and voltage support if needed
EL CRTO 115 kV	MORAGA 115kV - Section 2D & 1D	P2	Bus-tie breaker	1.08	1.05	1.05	1.04	1.04	1.04	1.04	1.11	1.06	1.04	1.08	1.05	1.05	1.05	1.05	1.05	1.05	1.04	Load power factor correction and voltage support if needed
EL CRTO 115 kV	MORAGA 230kV - Section 2D & 1D	P2	Bus-tie breaker	1.08	1.04	1.04	1.02	1.03	1.03	1.03	1.11	1.05	1.03	1.08	1.04	1.04	1.04	1.04	1.04	1.04	1.03	Load power factor correction and voltage support if needed
EL CRTO 115 kV	MORAGA 230kV Section 2D	P2	Bus	1.08	<1.10	<1.10	1.04	<1.10	<1.10	<1.10	1.11	<1.10	<1.10	1.08	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	Load power factor correction and voltage support if needed
EL CRTO 115 kV	SOBRANTE - 1D 115kV & SOBRANTE-G #1 line	P2	Non-bus-tie breaker	0.97	0.97	0.97	0.92	0.93	0.93	0.93	1.03	0.98	0.95	0.97	0.96	0.98	0.89	0.97	0.96	0.95	0.95	Sensitivity only
EL CRTO 115 kV	SOBRANTE - 1D 115kV & SOBRANTE-GRIZZLY-CLAREMONT #1 line	P2	Non-bus-tie breaker	0.97	0.97	0.97	0.92	0.93	0.93	0.93	1.03	0.98	0.95	0.97	0.96	0.98	0.89	0.97	0.96	0.95	0.95	Sensitivity only
EL CRTO 115 kV	SOBRANTE - 1D 115kV & SOBRANTE-NRTH TWR line	P2	Non-bus-tie breaker	>0.9	0.97	0.97	>0.9	0.93	0.93	0.93	>0.9	0.98	0.95	>0.9	0.96	0.98	0.89	0.97	0.96	0.95	0.95	Sensitivity only
EL CRTO 115 kV	SOBRANTE - 1D 115kV & SOBRANTE-STD. OIL line	P2	Non-bus-tie breaker	0.97	0.97	0.97	0.92	0.93	0.93	0.93	1.03	0.98	0.95	0.97	0.96	0.98	0.89	0.97	0.96	0.95	0.95	Sensitivity only
EL CRTO 115 kV	SOBRANTE 115kV - Section 1D & 1E	P2	Bus-tie breaker	0.97	0.97	0.97	0.92	0.94	0.93	0.93	1.03	0.98	0.95	0.97	0.96	0.98	0.89	0.97	0.96	0.95	0.95	Sensitivity only
EL CRTO 115 kV	SOBRANTE 115kV - Section 1D & 2D	P2	Bus-tie breaker	0.95	0.97	0.97	0.91	0.94	0.93	0.93	1.02	0.99	0.95	0.94	0.96	0.98	0.89	0.97	0.96	0.95	0.95	Sensitivity only
EL CRTO 115 kV	SOBRANTE 115kV Section 1D	P2	Bus	>0.9	0.97	0.97	>0.9	0.93	0.93	0.93	>0.9	0.98	0.95	>0.9	0.96	0.98	0.89	0.97	0.96	0.95	0.95	Sensitivity only
EL CRTO 115 kV	MORAGA 230/115kV TB 1 & MORAGA 230/115kV TB 2	P6	N-1-1	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	1.11	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	Load power factor correction and voltage support if needed
EL PATIO 115 kV	Base Case	P0	N-0	1.04	<1.05	<1.05	1.02	<1.05	<1.05	<1.05	1.07	<1.05	<1.05	1.04	<1.05	<1.05	<1.05	<1.05	<1.05	<1.05	<1.05	Load power factor correction and voltage support if needed
EL PATIO 115 kV	SJB DG Section 1D & SJB EF Section 1F 115kV	P2	Bus-tie breaker	1.07	1.01	1.01	1.02	1.02	1.01	1.01	1.10	1.03	1.00	1.08	1.00	1.03	1.01	1.01	1.01	1.00	1.00	Load power factor correction and voltage support if needed
EL PATIO 115 kV	SJB EF - 1F 115kV & SAN JOSE B-STONE-EVERGREEN line	P2	Non-bus-tie breaker	1.07	1.01	1.01	1.02	1.02	1.01	1.01	1.10	1.03	1.00	1.08	1.00	1.03	1.01	1.01	1.01	1.00	1.00	Load power factor correction and voltage support if needed
EL PATIO 115 kV	SJB EF 115kV Section 1F	P2	Bus	1.07	1.01	1.01	1.02	1.02	1.01	1.01	1.10	1.04	0.99	1.08	1.00	1.02	1.01	1.01	1.01	1.00	0.99	Load power factor correction and voltage support if needed
EMRLD LE 60 kV	Base Case	P0	N-0	1.02	<1.05	<1.05	1.03	<1.05	<1.05	<1.05	1.05	<1.05	<1.05	1.03	<1.05	<1.05	<1.05	<1.05	<1.05	<1.05	<1.05	Load power factor correction and voltage support if needed
EMRLD LE 60 kV	JEFFERSN 230/60kV TB 1 & JEFFERSN 230/60kV TB 2	P6	N-1-1	0.89	0.88	0.89	0.76	0.75	0.75	0.75	>0.9	>0.9	0.87	0.89	0.86	>0.9	0.89	0.89	0.86	0.85	0.85	Project: Jefferson - Stanford #2 60 kV Line Review Stanford 60 kV system configuration
EST PRTL 115 kV	Base Case	P0	N-0	1.06	1.04	1.04	1.04	1.04	1.04	1.04	1.08	1.05	1.04	1.06	1.04	1.05	1.04	1.04	1.04	1.04	1.04	Load power factor correction and voltage support if needed

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		
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Winter Peak	2022 Winter Peak	2027 Winter Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022 SP High CEC Forecast	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations	2027 SP - No East Bay Generation	2022 SP High CEC Forecast No East Bay Generation		2027 SP Peak-Shift - No East Bay Generation	
EST PRTL 115 kV	MORAGA - 1D 115kV & MORAGA-LAKEWOOD line	P2	Non-bus-tie breaker	1.07	1.05	1.05	1.04	1.04	1.04	1.04	1.10	1.06	1.04	1.08	1.05	1.05	1.05	1.05	1.05	1.04	Load power factor correction and voltage support if needed
EST PRTL 115 kV	MORAGA - 2D 230kV & CONTRA COSTA-MORAGA #2 line	P2	Non-bus-tie breaker	1.08	1.05	1.05	1.04	1.04	1.04	1.04	1.11	1.06	1.04	1.09	1.05	1.05	1.05	1.05	1.05	1.04	Load power factor correction and voltage support if needed
EST PRTL 115 kV	MORAGA 115kV - Section 2D & 1D	P2	Bus-tie breaker	1.09	1.05	1.05	1.05	1.05	1.05	1.05	1.11	1.07	1.05	1.09	1.05	1.06	1.05	1.05	1.05	1.05	Load power factor correction and voltage support if needed
EST PRTL 115 kV	MORAGA 115kV Section 1D	P2	Bus	1.07	<1.10	<1.10	1.04	<1.10	<1.10	<1.10	1.10	<1.10	<1.10	1.08	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	Load power factor correction and voltage support if needed
EST PRTL 115 kV	MORAGA 230kV - Section 2D & 1D	P2	Bus-tie breaker	1.08	1.04	1.04	1.02	1.03	1.03	1.03	1.11	1.06	1.03	1.08	1.04	1.05	1.04	1.04	1.04	1.03	Load power factor correction and voltage support if needed
EST PRTL 115 kV	MORAGA 230kV Section 2D	P2	Bus	1.08	<1.10	<1.10	1.04	<1.10	<1.10	<1.10	1.11	<1.10	<1.10	1.09	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	Load power factor correction and voltage support if needed
EST PRTL 115 kV	MORAGA 230/115kV TB 1 & MORAGA 230/115kV TB 2	P6	N-1-1	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	1.11	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	Load power factor correction and voltage support if needed
EVERGREN 60 kV	Base Case	P0	N-0	1.02	<1.05	<1.05	1.00	<1.05	<1.05	<1.05	1.06	<1.05	<1.05	1.01	<1.05	<1.05	<1.05	<1.05	<1.05	<1.05	Load power factor correction and voltage support if needed
EVRGRN 1 115 kV	Base Case	P0	N-0	1.03	<1.05	<1.05	1.02	<1.05	<1.05	<1.05	1.07	<1.05	<1.05	1.03	<1.05	<1.05	<1.05	<1.05	<1.05	<1.05	Load power factor correction and voltage support if needed
FMC 115 kV	Base Case	P0	N-0	1.04	<1.05	<1.05	1.01	<1.05	<1.05	<1.05	1.06	<1.05	<1.05	1.03	<1.05	<1.05	<1.05	<1.05	<1.05	<1.05	Load power factor correction and voltage support if needed
FOREBAYWIND 60 kV	Base Case	P0	N-0	1.04	<1.05	<1.05	1.03	<1.05	<1.05	<1.05	1.06	<1.05	<1.05	1.04	<1.05	<1.05	<1.05	<1.05	<1.05	<1.05	Load power factor correction and voltage support if needed
FRANKLIN 60 kV	Base Case	P0	N-0	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.06	1.06	1.05	1.06	1.06	1.06	1.05	1.05	1.06	1.05	Load power factor correction and voltage support if needed
FREMNT 115 kV	Base Case	P0	N-0	1.03	<1.05	<1.05	1.02	<1.05	<1.05	<1.05	1.06	<1.05	<1.05	1.03	<1.05	<1.05	<1.05	<1.05	<1.05	<1.05	Load power factor correction and voltage support if needed
FRICKWND 60 kV	Base Case	P0	N-0	1.03	<1.05	<1.05	1.03	<1.05	<1.05	<1.05	1.06	<1.05	<1.05	1.03	<1.05	<1.05	<1.05	<1.05	<1.05	<1.05	Load power factor correction and voltage support if needed
FRKLNALT 60 kV	Base Case	P0	N-0	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.07	1.06	1.06	1.06	1.06	1.06	Load power factor correction and voltage support if needed
GILROY 115 kV	Base Case	P0	N-0	1.04	<1.05	<1.05	1.03	<1.05	<1.05	<1.05	1.09	<1.05	<1.05	1.04	<1.05	<1.05	<1.05	<1.05	<1.05	<1.05	Load power factor correction and voltage support if needed
GILROY 115 kV	METCALF-MORGAN HILL 115kV [2570]	P1	N-1	1.03	1.02	1.02	0.96	0.96	1.02	1.02	1.10	1.00	1.02	1.03	1.02	0.97	1.02	1.02	1.02	1.02	Load power factor correction and voltage support if needed
GILROY 115 kV	MTCALF D - 2D 115kV & METCALF-EL PATIO #2 line	P2	Non-bus-tie breaker	1.03	1.02	1.02	0.97	0.96	1.02	1.02	1.11	1.00	1.02	1.03	1.02	0.97	1.02	1.02	1.02	1.02	Load power factor correction and voltage support if needed
GILROY 115 kV	MTCALF D 115kV Section 2D	P2	Bus	1.03	1.02	1.02	0.97	0.96	1.02	1.02	1.11	1.00	1.02	1.03	1.02	0.97	1.02	1.02	1.02	1.02	Load power factor correction and voltage support if needed
GILROY 115 kV	SJB DG 115kV Section 1D	P2	Bus	1.04	1.03	1.03	1.03	1.03	1.03	1.03	1.10	1.04	1.03	1.05	1.03	1.03	1.03	1.03	1.03	1.03	Load power factor correction and voltage support if needed
GILROY 115 kV	SJB DG Section 1D & SJB EF Section 1F 115kV	P2	Bus-tie breaker	1.04	1.03	1.03	1.03	1.03	1.03	1.03	1.10	1.04	1.03	1.05	1.03	1.03	1.03	1.03	1.03	1.03	Load power factor correction and voltage support if needed
GILROY 115 kV	SJB EF - 1F 115kV & SAN JOSE B-STONE-EVERGREEN line	P2	Non-bus-tie breaker	1.04	1.03	1.03	1.03	1.03	1.03	1.03	1.10	1.04	1.03	1.05	1.03	1.03	1.03	1.03	1.03	1.03	Load power factor correction and voltage support if needed
GILROY 115 kV	SJB EF 115kV Section 1F	P2	Bus	1.04	1.03	1.03	1.03	1.03	1.03	1.03	1.10	1.04	1.03	1.05	1.03	1.03	1.03	1.03	1.03	1.03	Load power factor correction and voltage support if needed



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		
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Winter Peak	2022 Winter Peak	2027 Winter Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022 SP High CEC Forecast	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations	2027 SP - No East Bay Generation	2022 SP High CEC Forecast No East Bay Generation		2027 SP Peak-Shift - No East Bay Generation	
GLENWOOD 60 kV	CLY LND 115/60kV TB 1 & CLY LND2 115/60kV TB 2	P6	N-1-1	>0.9	>0.9	>0.9	>0.9	0.89	0.90	>0.9	>0.9	0.89	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	0.90	>0.9	Project: Jefferson - Stanford #2 60 kV Line Review Stanford 60 kV system configuration
GRIZZLY2 115 kV	Base Case	P0	N-0	1.06	1.04	1.04	1.04	1.04	1.04	1.04	1.09	1.05	1.04	1.06	1.04	1.05	1.04	1.04	1.04	1.04	Load power factor correction and voltage support if needed
GRIZZLY2 115 kV	MORAGA 230/115kV TB 1	P1	N-1	1.08	1.04	1.04	1.04	1.04	1.04	1.04	1.10	1.06	1.04	1.08	1.04	1.05	1.05	1.04	1.04	1.04	Load power factor correction and voltage support if needed
GRIZZLY2 115 kV	MORAGA - 1D 115kV & MORAGA-LAKEWOOD line	P2	Non-bus-tie breaker	1.08	1.05	1.05	1.04	1.04	1.04	1.04	1.10	1.06	1.04	1.08	1.05	1.05	1.05	1.05	1.05	1.04	Load power factor correction and voltage support if needed
GRIZZLY2 115 kV	MORAGA - 2D 230kV & CONTRA COSTA-MORAGA #2 line	P2	Non-bus-tie breaker	1.08	1.05	1.05	1.04	1.04	1.04	1.04	1.11	1.06	1.04	1.09	1.05	1.05	1.05	1.05	1.05	1.04	Load power factor correction and voltage support if needed
GRIZZLY2 115 kV	MORAGA 115kV - Section 1E & 1D	P2	Bus-tie breaker	1.07	1.05	1.05	1.04	1.04	1.04	1.04	1.10	1.06	1.04	1.08	1.05	1.05	1.05	1.05	1.05	1.04	Load power factor correction and voltage support if needed
GRIZZLY2 115 kV	MORAGA 115kV - Section 2D & 1D	P2	Bus-tie breaker	1.09	1.05	1.05	1.05	1.05	1.05	1.05	1.11	1.07	1.05	1.09	1.05	1.06	1.05	1.05	1.05	1.05	Load power factor correction and voltage support if needed
GRIZZLY2 115 kV	MORAGA 115kV Section 1D	P2	Bus	1.08	<1.10	<1.10	1.04	<1.10	<1.10	<1.10	1.10	<1.10	<1.10	1.08	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	Load power factor correction and voltage support if needed
GRIZZLY2 115 kV	MORAGA 230kV - Section 2D & 1D	P2	Bus-tie breaker	1.08	1.04	1.04	1.02	1.03	1.04	1.04	1.11	1.06	1.04	1.08	1.04	1.05	1.04	1.04	1.04	1.04	Load power factor correction and voltage support if needed
GRIZZLY2 115 kV	MORAGA 230kV Section 2D	P2	Bus	1.08	<1.10	<1.10	1.04	<1.10	<1.10	<1.10	1.11	<1.10	<1.10	1.09	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	Load power factor correction and voltage support if needed
GRIZZLY2 115 kV	MORAGA 230/115kV TB 1 & MORAGA 230/115kV TB 2	P6	N-1-1	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	1.11	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	Load power factor correction and voltage support if needed
HILLSIDE 60 kV	JEFFERSN 230/60kV TB 1 & JEFFERSN 230/60kV TB 2	P6	N-1-1	>0.9	>0.9	>0.9	>0.9	0.90	0.90	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	Project: Jefferson - Stanford #2 60 kV Line Review Stanford 60 kV system configuration
HILLSIDE 115 kV	Base Case	P0	N-0	1.06	1.04	1.04	1.04	1.04	1.04	1.04	1.09	1.05	1.04	1.06	1.04	1.05	1.04	1.04	1.04	1.04	Load power factor correction and voltage support if needed
HILLSIDE 115 kV	MORAGA 230/115kV TB 1	P1	N-1	1.08	1.04	1.04	1.04	1.04	1.04	1.04	1.10	1.06	1.04	1.08	1.04	1.05	1.05	1.04	1.04	1.04	Load power factor correction and voltage support if needed
HILLSIDE 115 kV	MORAGA - 1D 115kV & MORAGA-LAKEWOOD line	P2	Non-bus-tie breaker	1.08	1.05	1.05	1.04	1.04	1.04	1.04	1.10	1.06	1.04	1.08	1.05	1.05	1.05	1.05	1.05	1.04	Load power factor correction and voltage support if needed
HILLSIDE 115 kV	MORAGA - 2D 230kV & CONTRA COSTA-MORAGA #2 line	P2	Non-bus-tie breaker	1.08	1.05	1.05	1.04	1.04	1.04	1.04	1.11	1.06	1.04	1.09	1.05	1.05	1.05	1.05	1.05	1.04	Load power factor correction and voltage support if needed
HILLSIDE 115 kV	MORAGA 115kV - Section 1E & 1D	P2	Bus-tie breaker	1.07	1.05	1.05	1.04	1.04	1.04	1.04	1.10	1.06	1.04	1.08	1.05	1.05	1.05	1.05	1.05	1.04	Load power factor correction and voltage support if needed
HILLSIDE 115 kV	MORAGA 115kV - Section 2D & 1D	P2	Bus-tie breaker	1.09	1.05	1.05	1.05	1.05	1.05	1.05	1.11	1.07	1.05	1.09	1.05	1.06	1.05	1.05	1.05	1.05	Load power factor correction and voltage support if needed
HILLSIDE 115 kV	MORAGA 115kV Section 1D	P2	Bus	1.08	<1.10	<1.10	1.04	<1.10	<1.10	<1.10	1.10	<1.10	<1.10	1.08	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	Load power factor correction and voltage support if needed
HILLSIDE 115 kV	MORAGA 230kV - Section 2D & 1D	P2	Bus-tie breaker	1.08	1.04	1.04	1.02	1.03	1.04	1.04	1.11	1.06	1.04	1.08	1.04	1.05	1.04	1.04	1.04	1.04	Load power factor correction and voltage support if needed
HILLSIDE 115 kV	MORAGA 230kV Section 2D	P2	Bus	1.08	<1.10	<1.10	1.04	<1.10	<1.10	<1.10	1.11	<1.10	<1.10	1.09	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	Load power factor correction and voltage support if needed



Table with columns: Substation, Contingency (All and Worst P6), Category, Category Description, Post Cont. Voltage Deviation % (Baseline Scenarios) [2019 Summer Peak, 2022 Summer Peak, 2027 Summer Peak, 2019 Winter Peak, 2022 Winter Peak, 2027 Winter Peak, 2019 Spring Light Load, 2022 Spring Off-Peak, 2022 SP High CEC Forecast, 2019 SP Peak-Shift, 2027 SP Peak-Shift, 2022 SP Heavy Renewable & Min Gas Gen, 2027 Retirement of QF Generations, 2027 SP - No East Bay Generation, 2022 SP High CEC Forecast - No East Bay Generation, 2027 SP Peak-Shift - No East Bay Generation], Project & Potential Mitigation Solutions



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
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Winter Peak	2022 Winter Peak	2027 Winter Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022 SP High CEC Forecast	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations	2027 SP - No East Bay Generation	2022 SP High CEC Forecast No East Bay Generation	2027 SP Peak-Shift - No East Bay Generation	
SANRAMON 230 kV	PITTSBURG-SAN RAMON 230kV [5490] & SAN RAMON-MORAGA 230kV [5660]	P6	N-1-1	0.35	0.32	0.32	0.44	0.43	0.43	>0.9	0.51	0.30	0.34	0.30	0.38	0.32	0.32	0.30	0.30	Reverse power relay at San Ramon
SCHNITZ 115 kV	Base Case	P0	N-0	1.05	1.03	1.03	1.03	1.03	1.03	1.07	1.04	1.03	1.05	1.03	1.04	1.03	1.03	1.03	1.03	Load power factor correction and voltage support if needed
SCHNITZ 115 kV	MORAGA - 2D 230kV & CONTRA COSTA-MORAGA #2 line	P2	Non-bus-tie breaker	1.08	1.04	1.04	1.03	1.04	1.04	1.11	1.06	1.03	1.08	1.04	1.05	1.04	1.04	1.04	1.04	Load power factor correction and voltage support if needed
SCHNITZ 115 kV	MORAGA 115kV - Section 2D & 1D	P2	Bus-tie breaker	1.08	1.05	1.05	1.04	1.04	1.04	1.11	1.07	1.04	1.08	1.05	1.05	1.05	1.05	1.05	1.05	Load power factor correction and voltage support if needed
SCHNITZ 115 kV	MORAGA 230kV - Section 2D & 1D	P2	Bus-tie breaker	1.08	1.03	1.03	1.01	1.02	1.02	1.11	1.05	1.02	1.08	1.03	1.04	1.03	1.03	1.03	1.03	Load power factor correction and voltage support if needed
SCHNITZ 115 kV	MORAGA 230kV Section 2D	P2	Bus	1.08	<1.10	<1.10	1.03	<1.10	<1.10	1.11	<1.10	<1.10	1.08	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	Load power factor correction and voltage support if needed
SCHNITZ 115 kV	MORAGA 230/115kV TB 1 & MORAGA 230/115kV TB 2	P6	N-1-1	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	1.11	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	Load power factor correction and voltage support if needed
SENER 60 kV	Base Case	P0	N-0	1.02	<1.05	<1.05	1.00	<1.05	<1.05	1.06	<1.05	<1.05	1.01	<1.05	<1.05	<1.05	<1.05	<1.05	<1.05	Load power factor correction and voltage support if needed
SEQUOIA 60 kV	Base Case	P0	N-0	1.05	1.05	1.05	1.05	1.05	1.05	1.06	1.06	1.05	1.06	1.06	1.06	1.05	1.05	1.06	1.05	Load power factor correction and voltage support if needed
SFPP CNC 60 kV	Base Case	P0	N-0	1.04	<1.05	<1.05	1.05	<1.05	<1.05	1.04	<1.05	<1.05	1.04	<1.05	<1.05	<1.05	<1.05	<1.05	<1.05	Load power factor correction and voltage support if needed
SJB DG 115 kV	Base Case	P0	N-0	1.04	<1.05	<1.05	1.01	<1.05	<1.05	1.06	<1.05	<1.05	1.03	<1.05	<1.05	<1.05	<1.05	<1.05	<1.05	Load power factor correction and voltage support if needed
SJB EF 115 kV	Base Case	P0	N-0	1.04	<1.05	<1.05	1.01	<1.05	<1.05	1.06	<1.05	<1.05	1.03	<1.05	<1.05	<1.05	<1.05	<1.05	<1.05	Load power factor correction and voltage support if needed
SJB EF 115 kV	SJB DG Section 1D & SJB EF Section 1F 115kV	P2	Bus-tie breaker	1.07	1.01	1.01	1.01	1.01	1.01	1.11	1.03	0.99	1.08	1.00	1.02	1.01	1.01	1.00	0.99	Load power factor correction and voltage support if needed
SJB EF 115 kV	SJB EF - 1F 115kV & SAN JOSE B-STONE-EVERGREEN line	P2	Non-bus-tie breaker	1.07	1.00	1.01	1.01	1.02	1.01	1.10	1.03	0.99	1.08	1.00	1.02	1.00	1.01	1.00	0.99	Load power factor correction and voltage support if needed
SJB EF 115 kV	SJB EF 115kV Section 1F	P2	Bus	1.07	1.00	1.00	1.01	1.02	1.01	1.10	1.03	0.99	1.08	1.00	1.02	1.00	1.00	1.00	0.99	Load power factor correction and voltage support if needed
SN BRNOT 60 kV	Base Case	P0	N-0	1.00	<1.05	<1.05	1.02	<1.05	<1.05	1.09	<1.05	<1.05	1.00	<1.05	<1.05	<1.05	<1.05	<1.05	<1.05	Load power factor correction and voltage support if needed
SN JSE A 115 kV	Base Case	P0	N-0	1.04	<1.05	<1.05	1.01	<1.05	<1.05	1.06	<1.05	<1.05	1.04	<1.05	<1.05	<1.05	<1.05	<1.05	<1.05	Load power factor correction and voltage support if needed
SN JSE A 115 kV	SJB DG Section 1D & SJB EF Section 1F 115kV	P2	Bus-tie breaker	1.07	1.01	1.01	1.01	1.01	1.01	1.11	1.03	0.99	1.08	1.00	1.02	1.01	1.01	1.00	0.99	Load power factor correction and voltage support if needed
SN JSE A 115 kV	SJB EF - 1F 115kV & SAN JOSE B-STONE-EVERGREEN line	P2	Non-bus-tie breaker	1.07	1.00	1.01	1.01	1.02	1.01	1.10	1.03	0.99	1.08	1.00	1.02	1.01	1.01	1.00	0.99	Load power factor correction and voltage support if needed
SN JSE A 115 kV	SJB EF 115kV Section 1F	P2	Bus	1.07	1.00	1.01	1.01	1.02	1.01	1.10	1.03	0.99	1.08	1.00	1.02	1.00	1.01	1.00	0.99	Load power factor correction and voltage support if needed
SN LNDRO 115 kV	Base Case	P0	N-0	1.06	1.03	1.03	1.02	1.02	1.02	1.07	1.04	1.02	1.06	1.03	1.03	1.03	1.03	1.03	1.03	Load power factor correction and voltage support if needed
SN LNDRO 115 kV	MORAGA - 2D 230kV & CONTRA COSTA-MORAGA #2 line	P2	Non-bus-tie breaker	1.09	1.04	1.04	1.02	1.03	1.03	1.11	1.05	1.03	1.09	1.03	1.04	1.04	1.04	1.04	1.03	Load power factor correction and voltage support if needed

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		
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Winter Peak	2022 Winter Peak	2027 Winter Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022 SP High CEC Forecast	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations	2027 SP - No East Bay Generation	2022 SP High CEC Forecast No East Bay Generation		2027 SP Peak-Shift - No East Bay Generation	
SN LNDRO 115 kV	MORAGA 115kV - Section 2D & 1D	P2	Bus-tie breaker	1.10	1.04	1.04	1.03	1.04	1.04	1.11	1.06	1.04	1.11	1.05	1.05	1.04	1.04	1.05	1.04	Load power factor correction and voltage support if needed	
SN LNDRO 115 kV	MORAGA 230kV - Section 2D & 1D	P2	Bus-tie breaker	1.09	1.03	1.03	0.99	1.02	1.02	1.11	1.05	1.02	1.09	1.03	1.04	1.03	1.03	1.03	1.03	1.02	Load power factor correction and voltage support if needed
SN LNDRO 115 kV	MORAGA 230kV Section 2D	P2	Bus	1.09	<1.10	<1.10	1.02	<1.10	<1.10	1.11	<1.10	<1.10	1.09	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	Load power factor correction and voltage support if needed
SN LNDRO 115 kV	MORAGA 230/115kV TB 1 & MORAGA 230/115kV TB 2	P6	N-1-1	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	1.11	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	Load power factor correction and voltage support if needed
SNANDRES 60 kV	Base Case	P0	N-0	1.00	<1.05	<1.05	1.02	<1.05	<1.05	1.08	<1.05	<1.05	1.00	<1.05	<1.05	<1.05	<1.05	<1.05	<1.05	<1.05	Load power factor correction and voltage support if needed
SNTH LNE 60 kV	Base Case	P0	N-0	1.00	<1.05	<1.05	1.02	<1.05	<1.05	1.09	<1.05	<1.05	0.99	<1.05	<1.05	<1.05	<1.05	<1.05	<1.05	<1.05	Load power factor correction and voltage support if needed
SOBRANTE 115 kV	Base Case	P0	N-0	1.06	1.05	1.05	1.04	1.04	1.04	1.09	1.05	1.04	1.06	1.04	1.05	1.05	1.05	1.05	1.04	1.04	Load power factor correction and voltage support if needed
SOBRANTE 115 kV	MORAGA 230/115kV TB 1	P1	N-1	1.08	1.05	1.05	1.04	1.04	1.04	1.10	1.06	1.04	1.08	1.05	1.05	1.05	1.05	1.05	1.05	1.04	Load power factor correction and voltage support if needed
SOBRANTE 115 kV	MORAGA - 1D 115kV & MORAGA-LAKEWOOD line	P2	Non-bus-tie breaker	1.08	1.05	1.05	1.05	1.05	1.04	1.10	1.06	1.05	1.08	1.05	1.05	1.05	1.05	1.05	1.05	1.05	Load power factor correction and voltage support if needed
SOBRANTE 115 kV	MORAGA - 2D 230kV & CONTRA COSTA-MORAGA #2 line	P2	Non-bus-tie breaker	1.09	1.05	1.05	1.05	1.05	1.05	1.11	1.07	1.05	1.09	1.05	1.06	1.05	1.05	1.05	1.05	1.05	Load power factor correction and voltage support if needed
SOBRANTE 115 kV	MORAGA 115kV - Section 1E & 1D	P2	Bus-tie breaker	1.08	1.05	1.05	1.04	1.05	1.04	1.10	1.06	1.04	1.08	1.05	1.05	1.05	1.05	1.05	1.05	1.04	Load power factor correction and voltage support if needed
SOBRANTE 115 kV	MORAGA 115kV - Section 2D & 1D	P2	Bus-tie breaker	1.09	1.06	1.06	1.05	1.05	1.05	1.11	1.07	1.05	1.09	1.06	1.06	1.06	1.06	1.06	1.06	1.05	Load power factor correction and voltage support if needed
SOBRANTE 115 kV	MORAGA 115kV Section 1D	P2	Bus	1.08	<1.10	<1.10	1.05	<1.10	<1.10	1.10	<1.10	<1.10	1.08	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	Load power factor correction and voltage support if needed
SOBRANTE 115 kV	MORAGA 230kV - Section 2D & 1D	P2	Bus-tie breaker	1.08	1.04	1.04	1.02	1.04	1.04	1.11	1.06	1.04	1.08	1.04	1.05	1.04	1.04	1.04	1.04	1.04	Load power factor correction and voltage support if needed
SOBRANTE 115 kV	MORAGA 230kV Section 2D	P2	Bus	1.09	<1.10	<1.10	1.05	<1.10	<1.10	1.11	<1.10	<1.10	1.09	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	Load power factor correction and voltage support if needed
SOBRANTE 115 kV	SOBRANTE 115kV - Section 1D & 1E	P2	Bus-tie breaker	1.08	1.06	1.06	1.05	1.06	1.05	1.10	1.07	1.06	1.08	1.06	1.07	1.06	1.06	1.06	1.06	1.06	Load power factor correction and voltage support if needed
SOBRANTE 115 kV	SOBRANTE 115kV - Section 1D & 2D	P2	Bus-tie breaker	1.08	1.06	1.06	1.06	1.06	1.05	1.10	1.07	1.06	1.08	1.06	1.06	1.06	1.06	1.06	1.06	1.06	Load power factor correction and voltage support if needed
SOBRANTE 115 kV	MORAGA 230/115kV TB 1 & MORAGA 230/115kV TB 2	P6	N-1-1	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	1.11	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	Load power factor correction and voltage support if needed
STANFORD 60 kV	Jefferson 230 kV BAAH Bus #1 (failure of non-redundent relay)	P5	Relay	0.85	0.85	0.87	0.73	0.72	0.69	0.93	0.94	0.85	0.85	0.84	0.88	0.86	0.87	0.84	0.85	0.85	Redundent relay upgrade
STANFORD 60 kV	Jefferson 230 kV BAAH Bus #2 (failure of non-redundent relay)	P5	Relay	0.85	0.86	0.86	0.72	0.71	0.70	0.92	0.93	0.83	0.84	0.84	0.88	0.86	0.86	0.84	0.83	0.83	Redundent relay upgrade
STANFORD 60 kV	JEFFERSN 230/60kV TB 1 & JEFFERSN 230/60kV TB 2	P6	N-1-1	0.86	0.86	0.87	0.74	0.72	0.72	>0.9	>0.9	0.85	0.85	0.84	0.88	0.87	0.87	0.84	0.83	0.83	Project: Jefferson - Stanford #2 60 kV Line Review Stanford 60 kV system configuration
STANFORD 60 kV	Monta Vista-Jefferson Nos. 1 & 2 230 kV lines	P7	DCTL	0.85	0.85	0.86	0.69	0.71	0.69	0.91	0.91	0.83	0.83	0.84	0.87	0.86	0.86	0.84	0.83	0.83	Project: Jefferson - Stanford #2 60 kV Line Review Stanford 60 kV system configuration

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		
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Winter Peak	2022 Winter Peak	2027 Winter Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022 SP High CEC Forecast	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations	2027 SP - No East Bay Generation	2022 SP High CEC Forecast No East Bay Generation	2027 SP Peak-Shift - No East Bay Generation			
STATIN D 115 kV	Base Case	P0	N-0	1.05	1.04	1.04	1.03	1.03	1.03	1.03	1.08	1.04	1.03	1.05	1.03	1.04	1.03	1.04	1.03	1.03	Load power factor correction and voltage support if needed	
STATIN D 115 kV	MORAGA - 2D 230kV & CONTRA COSTA-MORAGA #2 line	P2	Non-bus-tie breaker	1.08	1.04	1.04	1.04	1.04	1.04	1.04	1.11	1.06	1.04	1.08	1.04	1.05	1.04	1.04	1.04	1.04	1.04	Load power factor correction and voltage support if needed
STATIN D 115 kV	MORAGA 115kV - Section 2D & 1D	P2	Bus-tie breaker	1.08	1.05	1.05	1.04	1.04	1.04	1.04	1.11	1.07	1.04	1.08	1.05	1.05	1.05	1.05	1.05	1.05	1.04	Load power factor correction and voltage support if needed
STATIN D 115 kV	MORAGA 230kV - Section 2D & 1D	P2	Bus-tie breaker	1.08	1.03	1.03	1.01	1.02	1.03	1.03	1.11	1.05	1.03	1.08	1.03	1.04	1.03	1.03	1.03	1.03	1.03	Load power factor correction and voltage support if needed
STATIN D 115 kV	MORAGA 230kV Section 2D	P2	Bus	1.08	<1.10	<1.10	1.04	<1.10	<1.10	<1.10	1.11	<1.10	<1.10	1.08	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	Load power factor correction and voltage support if needed
STATIN D 115 kV	MORAGA 230/115kV TB 1 & MORAGA 230/115kV TB 2	P6	N-1-1	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	1.11	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	Load power factor correction and voltage support if needed
STATIN J 115 kV	Base Case	P0	N-0	1.07	1.03	1.03	1.01	1.03	1.02	1.02	1.07	1.04	1.03	1.07	1.03	1.04	1.03	1.03	1.03	1.03	1.03	Load power factor correction and voltage support if needed
STATIN J 115 kV	MORAGA - 2D 230kV & CONTRA COSTA-MORAGA #2 line	P2	Non-bus-tie breaker	1.10	1.04	1.04	1.02	1.03	1.03	1.03	1.12	1.05	1.03	1.10	1.04	1.04	1.04	1.04	1.04	1.04	1.03	Load power factor correction and voltage support if needed
STATIN J 115 kV	MORAGA 115kV - Section 2D & 1D	P2	Bus-tie breaker	1.12	1.04	1.04	1.03	1.04	1.03	1.03	1.12	1.06	1.04	1.12	1.05	1.05	1.04	1.04	1.05	1.05	1.04	Load power factor correction and voltage support if needed
STATIN J 115 kV	MORAGA 230kV - Section 2D & 1D	P2	Bus-tie breaker	1.10	1.03	1.03	0.99	1.03	1.03	1.03	1.11	1.05	1.03	1.10	1.03	1.04	1.03	1.03	1.03	1.03	1.03	Load power factor correction and voltage support if needed
STATIN J 115 kV	MORAGA 230kV Section 2D	P2	Bus	1.10	<1.10	<1.10	1.02	<1.10	<1.10	<1.10	1.12	<1.10	<1.10	1.10	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	Load power factor correction and voltage support if needed
STATIN J 115 kV	MORAGA 230/115kV TB 2 & MORAGA 230/115kV TB 1	P6	N-1-1	1.11	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	1.12	<1.10	<1.10	1.11	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	Load power factor correction and voltage support if needed
STATIN L 115 kV	Base Case	P0	N-0	1.05	1.03	1.03	1.03	1.03	1.03	1.03	1.08	1.04	1.03	1.05	1.03	1.04	1.03	1.03	1.03	1.03	1.03	Load power factor correction and voltage support if needed
STATIN L 115 kV	MORAGA - 2D 230kV & CONTRA COSTA-MORAGA #2 line	P2	Non-bus-tie breaker	1.08	1.04	1.04	1.03	1.04	1.04	1.04	1.11	1.06	1.03	1.08	1.04	1.05	1.04	1.04	1.04	1.04	1.03	Load power factor correction and voltage support if needed
STATIN L 115 kV	MORAGA 115kV - Section 2D & 1D	P2	Bus-tie breaker	1.08	1.05	1.05	1.04	1.04	1.04	1.04	1.11	1.07	1.04	1.08	1.05	1.05	1.05	1.05	1.05	1.05	1.04	Load power factor correction and voltage support if needed
STATIN L 115 kV	MORAGA 230kV - Section 2D & 1D	P2	Bus-tie breaker	1.08	1.03	1.03	1.01	1.02	1.02	1.02	1.11	1.05	1.02	1.08	1.03	1.04	1.03	1.03	1.03	1.03	1.02	Load power factor correction and voltage support if needed
STATIN L 115 kV	MORAGA 230kV Section 2D	P2	Bus	1.08	<1.10	<1.10	1.03	<1.10	<1.10	<1.10	1.11	<1.10	<1.10	1.08	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	Load power factor correction and voltage support if needed
STATIN L 115 kV	MORAGA 230/115kV TB 1 & MORAGA 230/115kV TB 2	P6	N-1-1	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	1.11	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	Load power factor correction and voltage support if needed
STATIN X 115 kV	Base Case	P0	N-0	1.05	1.03	1.03	1.03	1.03	1.03	1.03	1.07	1.04	1.03	1.05	1.03	1.04	1.03	1.03	1.03	1.03	1.03	Load power factor correction and voltage support if needed
STATIN X 115 kV	MORAGA - 2D 230kV & CONTRA COSTA-MORAGA #2 line	P2	Non-bus-tie breaker	1.08	1.04	1.04	1.03	1.04	1.04	1.04	1.11	1.06	1.03	1.08	1.04	1.05	1.04	1.04	1.04	1.04	1.03	Load power factor correction and voltage support if needed
STATIN X 115 kV	MORAGA 115kV - Section 2D & 1D	P2	Bus-tie breaker	1.09	1.05	1.05	1.04	1.04	1.04	1.04	1.11	1.07	1.04	1.09	1.05	1.05	1.05	1.05	1.05	1.05	1.04	Load power factor correction and voltage support if needed
STATIN X 115 kV	MORAGA 230kV - Section 2D & 1D	P2	Bus-tie breaker	1.08	1.03	1.03	1.00	1.02	1.02	1.02	1.11	1.05	1.02	1.08	1.03	1.04	1.03	1.03	1.03	1.03	1.02	Load power factor correction and voltage support if needed
STATIN X 115 kV	MORAGA 230kV Section 2D	P2	Bus	1.08	<1.10	<1.10	1.03	<1.10	<1.10	<1.10	1.11	<1.10	<1.10	1.08	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	Load power factor correction and voltage support if needed



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		
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Winter Peak	2022 Winter Peak	2027 Winter Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022 SP High CEC Forecast	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations	2027 SP - No East Bay Generation	2022 SP High CEC Forecast No East Bay Generation	2027 SP Peak-Shift - No East Bay Generation			
STATIN X 115 kV	MORAGA 230/115kV TB 1 & MORAGA 230/115kV TB 2	P6	N-1-1	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	1.11	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	Load power factor correction and voltage support if needed	
STAUFFER 60 kV	Base Case	P0	N-0	1.05	<1.05	<1.05	1.05	<1.05	<1.05	<1.05	1.05	<1.05	<1.05	1.05	<1.05	<1.05	<1.05	<1.05	<1.05	<1.05	Load power factor correction and voltage support if needed	
STD. OIL 115 kV	Base Case	P0	N-0	1.04	1.03	1.03	1.02	1.02	1.02	1.02	1.07	1.03	1.02	1.05	1.03	1.03	1.03	1.03	1.03	1.02	Load power factor correction and voltage support if needed	
STELLING 115 kV	MONTAVIS 230kV - Section 1D & 2D	P2	Bus-tie breaker	0.61	0.76	0.78	0.69	0.66	0.71	0.94	0.90	0.60	0.60	0.71	0.82	0.78	0.78	0.78	0.71	0.60	Project: Monta Vista 230 kV Bus Upgrade In-service date: 1/20 Short term: Action plan	
STELLING 115 kV	Monta Vista 115kV BAAH Bus #1 (failure of non-redundent relay)	P5	Relay	0.46	>0.9	>0.9	0.51	>0.9	>0.9	0.90	>0.9	>0.9	0.45	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	Redundent relay upgrade
STONE 115 kV	Base Case	P0	N-0	1.03	<1.05	<1.05	1.01	<1.05	<1.05	1.07	<1.05	<1.05	1.03	<1.05	<1.05	<1.05	<1.05	<1.05	<1.05	<1.05	Load power factor correction and voltage support if needed	
SUNOL 60 kV	Base Case	P0	N-0	1.04	<1.05	<1.05	1.02	<1.05	<1.05	1.06	<1.05	<1.05	1.04	<1.05	<1.05	<1.05	<1.05	<1.05	<1.05	<1.05	Load power factor correction and voltage support if needed	
SUNOL 60 kV	PITTSBURG-SAN RAMON 230kV [5490] & SAN RAMON-MORAGA 230kV [5660]	P6	N-1-1	0.79	0.78	0.78	0.82	0.82	0.82	>0.9	0.85	0.77	0.79	0.77	0.80	0.78	0.78	0.78	0.77	0.77	Reverse power relay at San Ramon	
SWIFT 115 kV	Base Case	P0	N-0	1.04	<1.05	<1.05	1.02	<1.05	<1.05	1.07	<1.05	<1.05	1.04	<1.05	<1.05	<1.05	<1.05	<1.05	<1.05	<1.05	Load power factor correction and voltage support if needed	
TRIMBLE 115 kV	Base Case	P0	N-0	1.04	<1.05	<1.05	1.02	<1.05	<1.05	1.06	<1.05	<1.05	1.04	<1.05	<1.05	<1.05	<1.05	<1.05	<1.05	<1.05	Load power factor correction and voltage support if needed	
UNIN CHM 60 kV	Base Case	P0	N-0	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.07	1.06	1.06	1.06	1.06	1.06	Load power factor correction and voltage support if needed	
UNITEDSP 115 kV	Base Case	P0	N-0	1.05	1.03	1.03	1.03	1.04	1.03	1.07	1.04	1.03	1.05	1.03	1.04	1.03	1.03	1.03	1.03	1.03	Load power factor correction and voltage support if needed	
URICH 60 kV	Base Case	P0	N-0	1.04	<1.05	<1.05	1.05	<1.05	<1.05	1.05	<1.05	<1.05	1.05	<1.05	<1.05	<1.05	<1.05	<1.05	<1.05	<1.05	Load power factor correction and voltage support if needed	
VALLECTS 60 kV	Base Case	P0	N-0	1.04	<1.05	<1.05	1.02	<1.05	<1.05	1.06	<1.05	<1.05	1.04	<1.05	<1.05	<1.05	<1.05	<1.05	<1.05	<1.05	Load power factor correction and voltage support if needed	
VALLECTS 60 kV	PITTSBURG-SAN RAMON 230kV [5490] & SAN RAMON-MORAGA 230kV [5660]	P6	N-1-1	0.76	0.75	0.75	0.79	0.79	0.79	>0.9	0.83	0.74	0.75	0.74	0.77	0.75	0.75	0.75	0.74	0.74	Reverse power relay at San Ramon	
VALLY VW 115 kV	Base Case	P0	N-0	1.05	1.04	1.04	1.03	1.03	1.03	1.08	1.05	1.03	1.05	1.04	1.04	1.04	1.04	1.04	1.04	1.03	Load power factor correction and voltage support if needed	
VALLY VW 115 kV	MORAGA - 2D 230kV & CONTRA COSTA-MORAGA #2 line	P2	Non-bus-tie breaker	1.07	1.04	1.04	1.03	1.04	1.04	1.11	1.06	1.04	1.07	1.04	1.05	1.04	1.04	1.04	1.04	1.04	Load power factor correction and voltage support if needed	
VALLY VW 115 kV	MORAGA 115kV - Section 2D & 1D	P2	Bus-tie breaker	1.07	1.05	1.05	1.04	1.04	1.04	1.11	1.06	1.04	1.07	1.04	1.05	1.05	1.05	1.04	1.04	1.04	Load power factor correction and voltage support if needed	
VALLY VW 115 kV	MORAGA 230kV - Section 2D & 1D	P2	Bus-tie breaker	1.07	1.04	1.04	1.02	1.03	1.03	1.10	1.05	1.03	1.07	1.03	1.04	1.03	1.04	1.03	1.04	1.03	Load power factor correction and voltage support if needed	
VALLY VW 115 kV	MORAGA 230kV Section 2D	P2	Bus	1.07	<1.10	<1.10	1.03	<1.10	<1.10	1.11	<1.10	<1.10	1.07	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	Load power factor correction and voltage support if needed	
VALLY VW 115 kV	SOBRANTE - 1D 115kV & SOBRANTE-G #1 line	P2	Non-bus-tie breaker	0.97	0.97	0.97	0.92	0.94	0.94	1.03	0.99	0.96	0.97	0.97	0.98	0.89	0.97	0.97	0.96	0.96	Sensitivity only	

Study Area: **PG&E Greater Bay Area**

High/Low Voltages



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	
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Winter Peak	2022 Winter Peak	2027 Winter Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022 SP High CEC Forecast	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations	2027 SP - No East Bay Generation	2022 SP High CEC Forecast No East Bay Generation	2027 SP Peak-Shift - No East Bay Generation		
VALLY VW 115 kV	SOBRANTE - 1D 115kV & SOBRANTE-GRIZZLY-CLAREMONT #1 line	P2	Non-bus-tie breaker	0.97	0.97	0.97	0.92	0.94	0.94	1.03	0.99	0.96	0.97	0.97	0.98	0.89	0.97	0.97	0.96	Sensitivity only	
VALLY VW 115 kV	SOBRANTE - 1D 115kV & SOBRANTE-NRTH TWR line	P2	Non-bus-tie breaker	>0.9	0.97	0.97	>0.9	0.94	0.94	>0.9	0.99	0.96	>0.9	0.97	0.98	0.89	0.97	0.97	0.96	Sensitivity only	
VALLY VW 115 kV	SOBRANTE - 1D 115kV & SOBRANTE-STD. OIL line	P2	Non-bus-tie breaker	0.97	0.97	0.97	0.92	0.94	0.94	1.03	0.99	0.96	0.97	0.97	0.98	0.89	0.97	0.97	0.96	Sensitivity only	
VALLY VW 115 kV	SOBRANTE 115kV - Section 1D & 1E	P2	Bus-tie breaker	0.97	0.97	0.97	0.93	0.94	0.94	1.03	0.99	0.96	0.97	0.97	0.98	0.89	0.97	0.97	0.96	Sensitivity only	
VALLY VW 115 kV	SOBRANTE 115kV - Section 1D & 2D	P2	Bus-tie breaker	0.95	0.97	0.97	0.90	0.94	0.94	1.03	0.99	0.96	0.95	0.97	0.98	0.89	0.97	0.97	0.96	Sensitivity only	
VALLY VW 115 kV	SOBRANTE 115kV Section 1D	P2	Bus	>0.9	0.97	0.97	>0.9	0.94	0.94	>0.9	0.99	0.96	>0.9	0.97	0.98	0.89	0.97	0.97	0.96	Sensitivity only	
VALLY VW 115 kV	MORAGA 230/115kV TB 1 & MORAGA 230/115kV TB 2	P6	N-1-1	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	1.10	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	Load power factor correction and voltage support if needed	
VASCO 60 kV	Base Case	P0	N-0	1.03	<1.05	<1.05	1.03	<1.05	<1.05	1.06	<1.05	<1.05	1.03	<1.05	<1.05	<1.05	<1.05	<1.05	<1.05	Load power factor correction and voltage support if needed	
VASCO 60 kV	PITTSBURG-SAN RAMON 230kV [5490] & SAN RAMON-MORAGA 230kV [5660]	P6	N-1-1	0.84	0.63	0.62	0.85	0.79	0.84	>0.9	>0.9	0.60	0.84	0.60	0.85	0.62	0.63	0.60	0.60	Reverse power relay at San Ramon	
VINEYARD 60 kV	Base Case	P0	N-0	1.04	<1.05	<1.05	1.02	<1.05	<1.05	1.06	<1.05	<1.05	1.04	<1.05	<1.05	<1.05	<1.05	<1.05	<1.05	Load power factor correction and voltage support if needed	
W.P.BART 115 kV	Base Case	P0	N-0	1.05	1.03	1.03	1.03	1.03	1.03	1.07	1.04	1.03	1.05	1.03	1.04	1.03	1.03	1.03	1.03	Load power factor correction and voltage support if needed	
WARNERVL 230 kV	Base Case	P0	N-0	1.04	1.00	1.00	1.01	1.01	1.00	1.05	1.02	1.00	1.04	1.00	0.99	1.00	1.00	1.00	1.00	Load power factor correction and voltage support if needed	
WATRSLED 60 kV	Jefferson 230 kV BAAH Bus #1 (failure of non-redundent relay)	P5	Relay	0.92	0.90	0.91	0.80	0.79	0.77	0.98	0.97	0.90	0.91	0.89	0.93	0.91	0.91	0.91	0.89	0.90	Redundent relay upgrade
WATRSLED 60 kV	Jefferson 230 kV BAAH Bus #2 (failure of non-redundent relay)	P5	Relay	0.92	0.91	0.91	0.79	0.78	0.77	0.97	0.96	0.89	0.91	0.89	0.93	0.91	0.91	0.91	0.89	0.89	Redundent relay upgrade
WATRSLED 60 kV	JEFFERSN 230/60kV TB 1 & JEFFERSN 230/60kV TB 2	P6	N-1-1	>0.9	>0.9	>0.9	0.80	0.79	0.79	>0.9	>0.9	>0.9	>0.9	0.89	>0.9	>0.9	>0.9	0.89	0.88	Project: Jefferson - Stanford #2 60 kV Line Review Stanford 60 kV system configuration	
WATRSLED 60 kV	Monta Vista-Jefferson Nos. 1 & 2 230 kV lines	P7	DCTL	0.92	0.90	0.91	0.77	0.78	0.77	0.96	0.95	0.89	0.90	0.89	0.91	0.91	0.91	0.91	0.89	0.89	Project: Jefferson - Stanford #2 60 kV Line Review Stanford 60 kV system configuration
WHISMAN 115 kV	MONTAVIS 230kV - Section 1D & 2D	P2	Bus-tie breaker	0.60	0.76	0.77	0.68	0.66	0.70	0.93	0.90	0.60	0.59	0.71	0.82	0.78	0.77	0.71	0.60	Project: Monta Vista 230 kV Bus Upgrade In-service date: 1/20 Short term: Action plan	
WHISMAN 115 kV	Monta Vista 115kV BAAH Bus #1 (failure of non-redundent relay)	P5	Relay	0.45	>0.9	>0.9	0.50	>0.9	>0.9	0.90	>0.9	>0.9	0.44	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	Redundent relay upgrade	
WOLFE 115 kV	MONTAVIS 230kV - Section 1D & 2D	P2	Bus-tie breaker	0.61	0.76	0.77	0.69	0.66	0.70	0.94	0.90	0.60	0.60	0.71	0.82	0.78	0.77	0.71	0.60	Project: Monta Vista 230 kV Bus Upgrade In-service date: 1/20 Short term: Action plan	

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		
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Winter Peak	2022 Winter Peak	2027 Winter Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022 SP High CEC Forecast	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations	2027 SP - No East Bay Generation	2022 SP High CEC Forecast No East Bay Generation		2027 SP Peak-Shift - No East Bay Generation	
WOLFE 115 kV	Monta Vista 115kV BAAH Bus #1 (failure of non-redundent relay)	P5	Relay	0.46	>0.9	>0.9	0.51	>0.9	>0.9	0.90	>0.9	>0.9	0.45	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	Redundent relay upgrade
WOODSIDE 60 kV	Jefferson 230 kV BAAH Bus #1 (failure of non-redundent relay)	P5	Relay	0.89	0.87	0.88	0.74	0.73	0.70	0.95	0.95	0.86	0.89	0.85	0.89	0.88	0.88	0.88	0.85	0.86	Redundent relay upgrade
WOODSIDE 60 kV	Jefferson 230 kV BAAH Bus #2 (failure of non-redundent relay)	P5	Relay	0.89	0.87	0.87	0.73	0.72	0.71	0.95	0.94	0.84	0.88	0.85	0.89	0.87	0.87	0.87	0.85	0.84	Redundent relay upgrade
WOODSIDE 60 kV	JEFFERSN 230/60kV TB 1 & JEFFERSN 230/60kV TB 2	P6	N-1-1	0.89	0.87	0.88	0.75	0.73	0.73	>0.9	>0.9	0.86	0.89	0.85	0.89	0.88	0.88	0.88	0.85	0.84	Project: Jefferson - Stanford #2 60 kV Line Review Stanford 60 kV system configuration
WOODSIDE 60 kV	Monta Vista-Jefferson Nos. 1 & 2 230 kV lines	P7	DCTL	0.89	0.86	0.87	0.70	0.72	0.70	0.94	0.93	0.84	0.87	0.85	0.87	0.87	0.87	0.87	0.85	0.84	Project: Jefferson - Stanford #2 60 kV Line Review Stanford 60 kV system configuration
WRNRVLE 115 kV	Base Case	P0	N-0	1.05	<1.05	<1.05	1.01	<1.05	<1.05	1.07	<1.05	<1.05	1.05	<1.05	<1.05	<1.05	<1.05	<1.05	<1.05	<1.05	Load power factor correction and voltage support if needed
WTRSHDTP 60 kV	Base Case	P0	N-0	1.03	<1.05	<1.05	1.02	<1.05	<1.05	1.05	<1.05	<1.05	1.03	<1.05	<1.05	<1.05	<1.05	<1.05	<1.05	<1.05	Load power factor correction and voltage support if needed
ZANKER 115 kV	Base Case	P0	N-0	1.03	<1.05	<1.05	1.02	<1.05	<1.05	1.05	<1.05	<1.05	1.03	<1.05	<1.05	<1.05	<1.05	<1.05	<1.05	<1.05	Load power factor correction and voltage support if needed
ZONDWD 60 kV	Base Case	P0	N-0	1.04	<1.05	<1.05	1.03	<1.05	<1.05	1.06	<1.05	<1.05	1.04	<1.05	<1.05	<1.05	<1.05	<1.05	<1.05	<1.05	Load power factor correction and voltage support if needed

Study Area: **PG&E Greater Bay Area**

Transient Stability



Contingency	Category	Category Description	Transient Stability Performance (Number of voltage and frequency violations)										Potential Mitigation Solutions	
			2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	Select..	Select..	Select..	Select..	Select..		
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		0	0	0	0	0							No violation
Contra Costa-Gateway 230 kV SLG fault with delayed clearing.	P5-2		0	0	0	0	0							No violation
Contra Costa-Moraga # 1 & 2 SLG fault with normal clearing.	P7-1		0	0	0	0	0							No violation
Crocket 3Ø fault with normal clearing with LMEC offline in the base case.	P3-1		0	0	0	0	0							No violation
DEC 3Ø fault with normal clearing.	P1-1		0	0	0	0	0							No violation
LMEC 3Ø fault with normal clearing.	P1-1		0	0	0	0	0							No violation
Los Esteros SLG fault expanded to elements lost due to stuck breaker and clear fault from remote breakers with normal clearing time.	P4-1		0	0	0	0	0							No violation
Los Esteros SLG fault with delayed clearing.	P5-1		0	0	0	0	0							No violation
Metcalf 115 kV bus SLG fault with delayed clearing.	P5-5		0	0	0	0	0							No violation
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		6	0	0	0	0							Under review with PTO .
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		6	0	0	0	0							Under review with PTO .
Metcalf 230 kV bus 3Ø fault with normal clearing with Metcalf 500/230 kV #13 Transformer offline in the base case.	P6-2		0	0	0	0	0							No violation
Metcalf 230 kV bus SLG fault with normal clearing.	P2-2		0	0	0	0	0							No violation
Metcalf 230 kV bus-tie breaker SLG fault with normal clearing.	P2-4		17	0	8	0	7							Under review with PTO .
Metcalf 230 kV line breaker SLG fault with normal clearing.	P2-3		4	0	0	0	0							Under review with PTO .

Contingency	Category	Category Description	Transient Stability Performance (Number of voltage and frequency violations)										Potential Mitigation Solutions	
			2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	Select..	Select..	Select..	Select..	Select..		
Metcalf 500/230 kV #13 Transformer 3Ø fault with normal clearing with LMEC offline in the base case.	P3-3		0	0	0	0	0							No violation
Metcalf 500/230 kV #13 Transformer 3Ø fault with normal clearing.	P1-3		0	0	0	0	0							No violation
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		4	0	0	0	0							Under review with PTO .
Metcalf 500/230 kV #13 Transformer SLG fault with delayed clearing.	P5-3		5	0	0	0	0							Under review with PTO .
Monta Vista 230 kV SVD 3Ø fault with normal clearing with LMEC offline in the base case.	P3-4		0	0	0	0	0							No violation
Monta Vista 230 kV SVD 3Ø fault with normal clearing.	P1-4		0	0	0	0	0							No violation
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		0	0	0	0	0							No violation
Monta Vista 230 kV SVD SLG fault with delayed clearing.	P5-4		0	0	0	0	0							No violation
Newark 230 kV 3Ø fault with normal clearing.	P1-2		0	0	0	0	0							No violation
Ravenswood 230 kV SVD 3Ø fault with normal clearing with Monta Vista 230 kV SVD offline in the base case.	P6-3		0	0	0	0	0							No violation
TBC SLG fault with normal clearing with LMEC offline in the base case.	P3-5		0	0	0	0	0							No violation
TBC SLG fault with normal clearing with Tesla-Newark 230 kV line offline in the base case.	P6-4		0	0	0	0	0							No violation
TBC SLG fault with normal clearing.	P1-5		0	0	0	0	0							No violation
Tesla-Newark 230 kV line 3Ø fault with normal clearing with LMEC offline in the base case.	P3-2		0	0	0	0	0							No violation
Tesla-Newark 230 kV line 3Ø fault with normal clearing with Metcalf 500/230 kV #13 Transformer offline in the base case.	P6-1		0	0	0	0	0							No violation

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.

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..	
Kirker	102	101	102								Under review with PTO

2017-2018 ISO Reliability Assessment - Study Results

Study Area: **PG&E Greater Fresno**

Thermal Overloads



Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading % (Baseline Scenarios)					Loading % (Sensitivity Scenarios)					Project & Potential Mitigation Solutions
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022 SP High CEC Forecast	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations	
34117 KETLMN T 70.0 34552 GATES 70.0 1 1	Base Case	P0	Basecase	31	30	33	20	97	32	31	33	127	33	Sensitivity Only
34208 CHEVPIPE 70.0 34210 SNTA NLA 70.0 1 1	LOS BANOS-MERCY SPRINGS SW STA 70KV [8929]	P1	N-1	83	90	95	10	11	96	83	103	49	95	Scope Under Review: Oro Loma 70kV Reinforcement
34208 CHEVPIPE 70.0 34214 LOS BANS 70.0 1 1	LOS BANOS-MERCY SPRINGS SW STA 70KV [8929]	P1	N-1	84	90	96	11	11	97	84	104	50	96	Scope Under Review: Oro Loma 70kV Reinforcement
34321 MCSWAINJ 70.0 34232 EXCHEQR 70.0 1 1	EXCHEQUER-LE GRAND 115KV [1560]	P1	N-1	106	103	103	100	97	103	106	103	98	103	Exchequer SPS
34123 K1-JCT 115 34358 KERCKHF2 115 2 1	WILSON A SECTION 1D & WILSON B SECTION 2D 115KV	P2	Bus-tie breaker fault	NConv	NConv	NConv	22	20	NConv	NConv	NConv	NConv	NConv	Scope Under Review: Wilson 115 kV Area Reinforcement Project
34128 OAKH_JCT 115 34123 K1-JCT 115 1 1	WILSON A SECTION 1D & WILSON B SECTION 2D 115KV	P2	Bus-tie breaker fault	NConv	NConv	NConv	22	21	NConv	NConv	NConv	NConv	NConv	Scope Under Review: Wilson 115 kV Area Reinforcement Project
34134 WILSON A 115 34144 MERCED 115 1 1	WILSON B 115KV SECTION 2D	P2	Bus Section Fault	103	106	105	22	6	113	103	113	74	105	Scope Under Review: Wilson 115 kV Area Reinforcement Project
34134 WILSON A 115 34144 MERCED 115 1 1	WILSON B - 2D 115KV & WILSON-ORO LOMA LINE	P2	Non bus tie breaker fault	103	105	105	22	6	113	103	113	74	105	Scope Under Review: Wilson 115 kV Area Reinforcement Project
34136 WILSON B 115 34144 MERCED 115 2 1	WILSON A 115KV SECTION 1D	P2	Bus Section Fault	98	99	97	19	8	104	98	103	65	99	Scope Under Review: Wilson 115 kV Area Reinforcement Project
34144 MERCED 115 34146 MERCED M 115 2 1	WILSON A SECTION 1D & WILSON B SECTION 2D 115KV	P2	Bus-tie breaker fault	NConv	NConv	NConv	41	50	NConv	NConv	NConv	NConv	NConv	Scope Under Review: Wilson 115 kV Area Reinforcement Project
34162 ORO LOMA 115 34168 EL NIDO 115 1 1	PANOCH2 115KV SECTION 2D	P2	Bus Section Fault	83	98	98	29	15	107	83	106	54	98	Scope Under Review: Wilson 115 kV Area Reinforcement Project
34162 ORO LOMA 115 34168 EL NIDO 115 1 1	PANOCH2 - 2D 115KV & EXCELSIORSS-PANOCH2 LINE	P2	Non bus tie breaker fault	83	98	98	29	15	107	83	106	54	98	Scope Under Review: Wilson 115 kV Area Reinforcement Project
34162 ORO LOMA 115 34168 EL NIDO 115 1 1	PANOCH1 SECTION 1D & PANOCH2 SECTION 2D 115KV	P2	Bus-tie breaker fault	83	99	99	28	15	107	83	106	54	99	Scope Under Review: Wilson 115 kV Area Reinforcement Project
34202 MERCED 70.0 34146 MERCED M 115 2 1	WILSON A SECTION 1D & WILSON B SECTION 2D 115KV	P2	Bus-tie breaker fault	NConv	NConv	NConv	67	85	NConv	NConv	NConv	NConv	NConv	Scope Under Review: Wilson 115 kV Area Reinforcement Project
34202 MERCED 70.0 34230 MRCDLLS 70.0 1 1	WILSON A SECTION 1D & WILSON B SECTION 2D 115KV	P2	Bus-tie breaker fault	NConv	NConv	NConv	187	160	NConv	NConv	NConv	NConv	NConv	Scope Under Review: Wilson 115 kV Area Reinforcement Project
34208 CHEVPIPE 70.0 34210 SNTA NLA 70.0 1 1	ARBURUA 70KV - RING R1 & R3	P2	Non bus tie breaker fault	91	97	104	10	11	104	91	112	72	104	Scope Under Review: Oro Loma 70kV Reinforcement



Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading % (Baseline Scenarios)					Loading % (Sensitivity Scenarios)					Project & Potential Mitigation Solutions
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022 SP High CEC Forecast	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations	
34208 CHEVPIPE 70.0 34214 LOS BANS 70.0 1 1	ARBURUA 70KV - RING R1 & R3	P2	Non bus tie breaker fault	92	98	105	11	12	105	92	113	73	105	Scope Under Review: Oro Loma 70kV Reinforcement
34252 MADERA 70.0 34256 BORDEN 70.0 2 1	BORDEN 70KV SECTION MD	P2	Bus Section Fault	96	95	95	35	37	102	96	101	74	94	Sensitivity Only
34252 MADERA 70.0 34256 BORDEN 70.0 2 1	BORDEN - MD 70KV & BORDEN-COPPERMINE LINE	P2	Non bus tie breaker fault	96	95	95	35	37	102	96	101	74	94	Sensitivity Only
34321 MCSWAINJ 70.0 34230 MRCDFLLS 70.0 1 1	WILSON A SECTION 1D & WILSON B SECTION 2D 115KV	P2	Bus-tie breaker fault	NConv	NConv	NConv	189	153	NConv	NConv	NConv	NConv	NConv	Scope Under Review: Wilson 115 kV Area Reinforcement Project
34321 MCSWAINJ 70.0 34232 EXCHEQR 70.0 1 1	LE GRAND 115KV SECTION MA	P2	Bus Section Fault	106	104	104	100	98	103	106	103	98	104	Exchequer SPS
34321 MCSWAINJ 70.0 34232 EXCHEQR 70.0 1 1	LE GRAND - MA 115KV & LE GRAND-DAIRYLAND LINE	P2	Non bus tie breaker fault	106	104	104	100	98	103	106	103	98	104	Exchequer SPS
34321 MCSWAINJ 70.0 34232 EXCHEQR 70.0 1 1	LE GRAND - MA 115KV & LE GRAND-CHOWCHILLA LINE	P2	Non bus tie breaker fault	106	104	104	100	98	103	106	103	99	104	Exchequer SPS
34321 MCSWAINJ 70.0 34232 EXCHEQR 70.0 1 1	WILSON A SECTION 1D & WILSON B SECTION 2D 115KV	P2	Bus-tie breaker fault	NConv	NConv	NConv	252	183	NConv	NConv	NConv	NConv	NConv	Scope Under Review: Wilson 115 kV Area Reinforcement Project
34357 AIRWAYJ1 115 34366 SANGER 115 1 1	HERNDON 230KV - SECTION 1D & 2D	P2	Bus-tie breaker fault	92	92	94	13	13	109	92	NConv	62	101	Scope Under Review: Northen Fresno Project
34357 AIRWAYJ1 115 34368 LASPALMS 115 1 1	HERNDON 230KV - SECTION 1D & 2D	P2	Bus-tie breaker fault	80	79	80	11	12	95	80	NConv	53	87	Scope Under Review: Northen Fresno Project
34358 KERCKHF2 115 34360 WWARD JT 115 1 1	HERNDON 230KV - SECTION 1D & 2D	P2	Bus-tie breaker fault	96	97	101	56	26	73	96	NConv	66	75	Scope Under Review: Northen Fresno Project
34359 AIRWAYJ2 115 34408 BARTON 115 1 1	HERNDON 230KV - SECTION 1D & 2D	P2	Bus-tie breaker fault	85	86	89	12	11	103	85	NConv	57	96	Scope Under Review: Northen Fresno Project
34360 WWARD JT 115 34348 SHEPHERD 115 1 1	HERNDON 230KV - SECTION 1D & 2D	P2	Bus-tie breaker fault	87	88	92	26	12	92	87	NConv	57	89	Scope Under Review: Northen Fresno Project
34366 SANGER 115 34359 AIRWAYJ2 115 1 1	HERNDON 230KV - SECTION 1D & 2D	P2	Bus-tie breaker fault	101	102	105	16	11	122	101	NConv	67	113	Scope Under Review: Northen Fresno Project

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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
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022 SP High CEC Forecast	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations	
34366 SANGER 115 34370 MC CALL 115 1 1	HERNDON 230KV - SECTION 1D & 2D	P2	Bus-tie breaker fault	69	69	72	1	6	91	69	NConv	47	89	Scope Under Review: Northen Fresno Project
34366 SANGER 115 34370 MC CALL 115 3 1	HERNDON 230KV - SECTION 1D & 2D	P2	Bus-tie breaker fault	92	92	96	1	8	121	92	NConv	62	118	Scope Under Review: Northen Fresno Project
34382 WAHTOKE 115 34380 REEDLEY 115 1 1	HERNDON 230KV - SECTION 1D & 2D	P2	Bus-tie breaker fault	71	70	73	3	10	89	71	NConv	46	93	Scope Under Review: Northen Fresno Project
34382 WAHTOKE 115 34380 REEDLEY 115 1 1	SANGER 115KV - SECTION ME & MD	P2	Bus-tie breaker fault	71	79	85	15	19	87	71	95	46	129	Scope Under Review: McCall-Reedley Project
34408 BARTON 115 34412 HERNDON 115 1 1	MC CALL 230KV - SECTION 1D & 2D	P2	Bus-tie breaker fault	121	119	126	12	11	137	121	145	85	148	Scope Under Review: Northen Fresno Project
34409 PNDLJ2 115 34416 BULLARD 115 1 1	HERNDON-BULLARD #1 115KV [1760] (HERNDON-PNDLJ1)	P2	Line section w/o fault	113	111	110	19	12	121	113	118	74	111	Close NO Switch 462/Drop Load (<75 MW)/ Use Preferred Resources)
34409 PNDLJ2 115 34416 BULLARD 115 1 1	HERNDON 115KV SECTION 1D	P2	Bus Section Fault	113	111	110	19	12	121	113	118	74	111	Close NO Switch 462/Drop Load (<75 MW)/ Use Preferred Resources)
34410 MANCHSTR 115 34412 HERNDON 115 1 1	MC CALL 230KV - SECTION 1D & 2D	P2	Bus-tie breaker fault	121	119	124	12	8	136	121	143	85	145	Scope Under Review: Northen Fresno Project
34412 HERNDON 115 34422 CHLDHOSP 115 1 1	MC CALL 230KV - SECTION 1D & 2D	P2	Bus-tie breaker fault	83	82	87	4	19	95	83	103	57	99	Scope Under Review: Northen Fresno Project
34414 WOODWARD 115 34422 CHLDHOSP 115 1 1	MC CALL 230KV - SECTION 1D & 2D	P2	Bus-tie breaker fault	80	80	86	6	21	93	80	101	55	97	Scope Under Review: Northen Fresno Project
34418 KINGSBRG 115 34428 CONTADNA 115 1 1	MC CALL 230KV - SECTION 1D & 2D	P2	Bus-tie breaker fault	95	91	96	9	38	117	95	125	44	117	Scope Under Review: Northen Fresno Project
34429 GWF_HEP 115 34428 CONTADNA 115 1 1	HERNDON 230KV - SECTION 1D & 2D	P2	Bus-tie breaker fault	74	71	73	19	16	92	74	NConv	51	90	Scope Under Review: Northen Fresno Project
34429 GWF_HEP 115 34428 CONTADNA 115 1 1	MC CALL 230KV - SECTION 1D & 2D	P2	Bus-tie breaker fault	99	95	99	10	42	120	99	128	48	120	Scope Under Review: Northen Fresno Project



Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading % (Baseline Scenarios)					Loading % (Sensitivity Scenarios)					Project & Potential Mitigation Solutions
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022 SP High CEC Forecast	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations	
34559 HURONJ 70.0 34560 CALFLAX 70.0 1 1	GATES 230KV - SECTION 1D & 2D	P2	Bus-tie breaker fault	30	32	36	19	106	38	30	44	64	58	Short term rating followed by a redispatch
34562 SCHLNDLR 70.0 34567 FIVEPOINTSSS 70.0 1 1	GATES 230KV SECTION 2D	P2	Bus Section Fault	37	40	31	20	108	44	37	37	76	52	Short term rating followed by a redispatch
34562 SCHLNDLR 70.0 34567 FIVEPOINTSSS 70.0 1 1	GATES 230KV - SECTION 1D & 2D	P2	Bus-tie breaker fault	44	48	39	28	120	54	44	48	75	60	Short term rating followed by a redispatch
34562 SCHLNDLR 70.0 34567 FIVEPOINTSSS 70.0 1 1	GATES 230KV - SECTION 2D & 2E	P2	Bus-tie breaker fault	38	41	32	22	105	43	38	36	71	52	Short term rating followed by a redispatch
34567 FIVEPOINTSSS 70.0 34560 CALFLAX 70.0 1 1	PANOCH1 SECTION 1D & PANOCH2 SECTION 2D 115KV	P2	Bus-tie breaker fault	27	25	26	39	96	22	27	20	111	20	Sensitivity Only
34113 ARBURU T 70.0 34108 WRIGHT T 70.0 1 1	LOS BANOS-LIVINGSTON JCT-CANAL 70KV [8940] (CHEVPIPE-LOS BANS)	P2	Line section w/o fault	87	107	125	7	5	122	87	184	53	120	Scope Under Review: Oro Loma 70kV Reinforcement
34206 CANAL 70.0 34220 ORTIGA 70.0 1 1	LOS BANOS-LIVINGSTON JCT-CANAL 70KV [8940] (CHEVPIPE-LOS BANS)	P2	Line section w/o fault	126	158	184	16	17	179	126	270	101	175	Scope Under Review: Oro Loma 70kV Reinforcement
34208 CHEVPIPE 70.0 34210 SNTA NLA 70.0 1 1	LOS BANOS-MERCY SPRINGS SW STA 70KV [8929] (MERCYSPRNGSS-ARBURU T)	P2	Line section w/o fault	83	90	95	10	11	96	83	103	49	95	Scope Under Review: Oro Loma 70kV Reinforcement
34208 CHEVPIPE 70.0 34210 SNTA NLA 70.0 1 1	MRCYSPRS-MERCYSPRNGSS 70KV [0] NO FAULT	P2	Line section w/o fault	91	97	103	10	11	104	91	112	72	104	Scope Under Review: Oro Loma 70kV Reinforcement
34208 CHEVPIPE 70.0 34210 SNTA NLA 70.0 1 1	LOS BANOS-MERCY SPRINGS SW STA 70KV [8929] (LOS BANS-PCHCOWND)	P2	Line section w/o fault	98	98	103	11	7	105	98	111	55	103	Scope Under Review: Oro Loma 70kV Reinforcement
34208 CHEVPIPE 70.0 34210 SNTA NLA 70.0 1 1	MERCY SPRINGS SW STA-CANAL-ORO LOMA 70KV [8930] (ORTIGA-MRCYSPRS)	P2	Line section w/o fault	91	97	103	14	11	104	91	112	72	104	Scope Under Review: Oro Loma 70kV Reinforcement
34208 CHEVPIPE 70.0 34214 LOS BANS 70.0 1 1	LOS BANOS-MERCY SPRINGS SW STA 70KV [8929] (MERCYSPRNGSS-ARBURU T)	P2	Line section w/o fault	84	91	96	11	11	97	84	104	50	96	Scope Under Review: Oro Loma 70kV Reinforcement
34208 CHEVPIPE 70.0 34214 LOS BANS 70.0 1 1	MRCYSPRS-MERCYSPRNGSS 70KV [0] NO FAULT	P2	Line section w/o fault	91	98	104	11	12	105	91	113	73	105	Scope Under Review: Oro Loma 70kV Reinforcement

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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
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022 SP High CEC Forecast	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations	
34208 CHEVPIPE 70.0 34214 LOS BANS 70.0 1 1	LOS BANOS-MERCY SPRINGS SW STA 70KV [8929] (LOS BANS-PHCOWND)	P2	Line section w/o fault	99	98	104	12	7	106	99	112	56	104	Scope Under Review: Oro Loma 70kV Reinforcement
34214 LOS BANS 70.0 34231 PHCOWND 70.0 1 1	LOS BANOS-LIVINGSTON JCT-CANAL 70KV [8940] (CHEVPIPE-LOS BANS)	P2	Line section w/o fault	110	125	145	9	6	143	110	212	63	140	Scope Under Review: Oro Loma 70kV Reinforcement
34220 ORTIGA 70.0 34222 MRCYSPRS 70.0 1 1	LOS BANOS-LIVINGSTON JCT-CANAL 70KV [8940] (CANAL-LVNGSTNT)	P2	Line section w/o fault	107	98	108	16	11	105	107	118	70	108	Scope Under Review: Oro Loma 70kV Reinforcement
34220 ORTIGA 70.0 34222 MRCYSPRS 70.0 1 1	LOS BANOS-LIVINGSTON JCT-CANAL 70KV [8940] (CHEVPIPE-LOS BANS)	P2	Line section w/o fault	151	184	215	21	18	208	151	320	117	205	Scope Under Review: Oro Loma 70kV Reinforcement
34220 ORTIGA 70.0 34222 MRCYSPRS 70.0 1 1	LOS BANOS-LIVINGSTON JCT-CANAL 70KV [8940] (SNTA NLA-LVNGSTNT)	P2	Line section w/o fault	107	97	106	15	9	105	106	118	68	107	Scope Under Review: Oro Loma 70kV Reinforcement
34222 MRCYSPRS 70.0 34258 MERCYSPRNGSS 70.0 1 1	LOS BANOS-LIVINGSTON JCT-CANAL 70KV [8940] (CHEVPIPE-LOS BANS)	P2	Line section w/o fault	104	127	149	8	12	144	104	222	81	142	Scope Under Review: Oro Loma 70kV Reinforcement
34231 PHCOWND 70.0 34108 WRIGHT T 70.0 1 1	LOS BANOS-LIVINGSTON JCT-CANAL 70KV [8940] (CHEVPIPE-LOS BANS)	P2	Line section w/o fault	96	109	127	8	5	125	96	185	55	122	Scope Under Review: Oro Loma 70kV Reinforcement
34258 MERCYSPRNGSS 70.0 34113 ARBURU T 70.0 1 1	LOS BANOS-LIVINGSTON JCT-CANAL 70KV [8940] (CHEVPIPE-LOS BANS)	P2	Line section w/o fault	96	118	138	8	10	134	96	206	57	132	Scope Under Review: Oro Loma 70kV Reinforcement
34208 CHEVPIPE 70.0 34210 SNTA NLA 70.0 1 1	VEGA 0.36KV GEN UNIT 1 & LOS BANOS-MERCY SPRINGS SW STA 70KV [8929]	P3	G-1/N-1	91	98	104	<90	<90	104	91	112	<90	104	Scope Under Review: Oro Loma 70kV Reinforcement
34208 CHEVPIPE 70.0 34214 LOS BANS 70.0 1 1	VEGA 0.36KV GEN UNIT 1 & LOS BANOS-MERCY SPRINGS SW STA 70KV [8929]	P3	G-1/N-1	92	99	105	<90	<90	105	92	113	<90	105	Scope Under Review: Oro Loma 70kV Reinforcement
34321 MCSWAINJ 70.0 34232 EXCHEQR 70.0 1 1	HELMS 1 18.00KV GEN UNIT 1 & EXCHEQUER-LE GRAND 115KV [1560]	P3	G-1/N-1	100	100	100	<90	<90	100	100	100	100	100	Exchequer SPS
34220 ORTIGA 70.0 34222 MRCYSPRS 70.0 1 1	VEGA 0.36KV GEN UNIT 1 & LOS BANOS-LIVINGSTON JCT-CANAL 70KV [8940]	P3	G-1/N-1	112	101	112	<90	<90	109	112	123	<90	112	Scope Under Review: Oro Loma 70kV Reinforcement
30796 STOREY 1 230 30800 WILSON 230 1 1	GREGG 230 KV BAAH BUS #2 (FAILURE OF NON-REDUNDENT RELAY)	P5	Non-redndant relay (Bus)	NConv	NConv	NConv	18	50	NConv	NConv	NConv	NConv	NConv	Install Redundant relay at Gregg
30810 GREGG 230 30796 STOREY 1 230 1 1	GREGG 230 KV BAAH BUS #2 (FAILURE OF NON-REDUNDENT RELAY)	P5	Non-redndant relay (Bus)	NConv	NConv	NConv	15	50	NConv	NConv	NConv	NConv	NConv	Install Redundant relay at Gregg
30810 GREGG 230 30879 HENTAP1 230 1 1	GREGG 230 KV BAAH BUS #2 (FAILURE OF NON-REDUNDENT RELAY)	P5	Non-redndant relay (Bus)	NConv	NConv	NConv	9	66	NConv	NConv	NConv	NConv	NConv	Install Redundant relay at Gregg
30830 KEARNEY 230 30835 HERNDON 230 1 1	GREGG 230 KV BAAH BUS #2 (FAILURE OF NON-REDUNDENT RELAY)	P5	Non-redndant relay (Bus)	NConv	NConv	NConv	2	11	NConv	NConv	NConv	NConv	NConv	Install Redundant relay at Gregg

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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
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022 SP High CEC Forecast	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations	
30879 HENTAP1 230 30885 MUSTANGSS 230 1 1	GREGG 230 KV BAAH BUS #2 (FAILURE OF NON-REDUNDANT RELAY)	P5	Non-redundant relay (Bus)	NConv	NConv	NConv	3	48	NConv	NConv	NConv	NConv	NConv	Install Redundant relay at Gregg
34117 KETLMN T 70.0 34552 GATES 70.0 1 1	GREGG 230 KV BAAH BUS #2 (FAILURE OF NON-REDUNDANT RELAY)	P5	Non-redundant relay (Bus)	NConv	NConv	NConv	17	83	NConv	NConv	NConv	NConv	NConv	Install Redundant relay at Gregg
30810 GREGG 230 30835 HERNDON 230 1 1	BORDEN-GREGG 230KV [4400] & GREGG-HERNDON #2 230KV [4840]	P6	N-1-1	92	92	93	<90	<90	98	92	99	<90	97	SPS Under Review
30810 GREGG 230 30845 FGRDN T2 230 1 1	GREGG-HERNDON #1 230KV [4830] & GREGG-HERNDON #2 230KV [4840]	P6	N-1-1	100	100	100	<90	51	102	100	109	100	100	Sensitivity Only
30875 MC CALL 230 30878 MCCALL3M 115 3 1	MC CALL 230/115KV TB 1 & MC CALL 230/115KV TB 2	P6	N-1-1	93	<90	92	<90	<90	100	93	100	<90	100	Sensitivity Only
34105 CERTANJ1 115 34100 CHWCHLLA 115 1 1	WILSON-LE GRAND 115KV [4170] & PANOCHÉ-MENDOTA 115KV [3230]	P6	N-1-1	<90	<90	<90	<90	100	<90	<90	<90	<90	<90	Sensitivity Only
34107 CERTANJ2 115 34101 CERTAN T 115 1 1	WILSON 230/115KV TB 1 & WILSON 230/115KV TB 2	P6	N-1-1	<90	<90	<90	<90	<90	98	<90	101	<90	96	Sensitivity Only
34107 CERTANJ2 115 34103 CHWCGNJT 115 1 1	WILSON 230/115KV TB 1 & WILSON 230/115KV TB 2	P6	N-1-1	<90	<90	<90	<90	<90	98	<90	101	<90	96	Sensitivity Only
34116 LE GRAND 115 34134 WILSON A 115 1 1	WILSON 230/115KV TB 1 & WILSON 230/115KV TB 2	P6	N-1-1	138	<90	<90	<90	<90		138	<90	<90	<90	Scope Under Review: Wilson 115 kV Area Reinforcement Project
34118 LE GRNDJ 115 34168 EL NIDO 115 1 1	WILSON 230/115KV TB 1 & WILSON 230/115KV TB 2	P6	N-1-1	94	102	102	<90	<90	116	94	116	<90	93	Scope Under Review: Wilson 115 kV Area Reinforcement Project
34134 WILSON A 115 34104 ATWATER 115 1 1	ATWATER-LIVINGSTON-MERCED 115KV [1030] MOAS O & EL CAPITAN-WILSON 115KV [1510]	P6	N-1-1	111	117	117	<90	<90	130	111	129	<90	117	Scope Under Review: Wilson 115 kV Area Reinforcement Project
34134 WILSON A 115 34144 MERCED 115 1 1	WILSON-MERCED #2 115KV [4190] & EL CAPITAN-WILSON 115KV [1510]	P6	N-1-1	100	102	101	<90	<90	112	100	112	<90	101	Scope Under Review: Wilson 115 kV Area Reinforcement Project
34136 WILSON B 115 34138 EL CAPTN 115 1 1	ATWATER-LIVINGSTON-MERCED 115KV [1030] MOAS & WILSON-ATWATER #2 115KV [4160]	P6	N-1-1	92	97	96	<90	<90	106	92	106	<90	96	Scope Under Review: Wilson 115 kV Area Reinforcement Project
34136 WILSON B 115 34144 MERCED 115 2 1	WILSON-MERCED #1 115KV [4180] & EL CAPITAN-WILSON 115KV [1510]	P6	N-1-1	103	105	104	<90	<90	116	103	116	<90	105	Scope Under Review: Wilson 115 kV Area Reinforcement Project
34145 RVRRC T 70.0 34464 COPPRMNE 70.0 1 1	WILSON-BORDEN 230KV [9001] & BORDEN-GREGG 230KV [4400]	P6	N-1-1	<90	<90	<90	176	<90	<90	<90	<90	<90	<90	Mitigation Under Review (Extend Summer Setup for non-peak seasons)
34149 CHENYT 115 34158 PANOCHÉ2 115 1 1	GATES-COALINGA #2 70KV [8680] & PANOCHÉ-SCHINDLER #1 115KV [3250] MOAS OPENED ON PANOCHÉ1_KAMM	P6	N-1-1	<90	<90	<90	<90	102	<90	<90	<90	<90	<90	Scope Under Review: Wilson 115 kV Area Reinforcement Project
34155 PANOCHÉ1 115 34350 KAMM 115 1 1	EXCELSIORSS-PANOCHÉ2 115KV [3231] & GATES 230/70KV TB 5	P6	N-1-1	<90	<90	<90	<90	100	<90	<90	<90	122	<90	Sensitivity Only

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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	
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022 SP High CEC Forecast	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations		
34159 PANOCHEJ 115 34160 HAMMONDS 115 1 1	WILSON 230/115KV TB 1 & WILSON 230/115KV TB 2	P6	N-1-1	160	<90	<90	<90	<90			160	<90	<90	<90	Project : Panoche Oroloma Reconductor Project In Service Date : 12/2020. Short term: Action Plan
34160 HAMMONDS 115 34161 DFSTP 115 1 1	WILSON 230/115KV TB 1 & WILSON 230/115KV TB 2	P6	N-1-1	151	<90	<90	<90	<90		<90	151	<90	<90	<90	Project : Panoche Oroloma Reconductor Project In Service Date : 12/2020. Short term: Action Plan
34161 DFSTP 115 34162 ORO LOMA 115 1 1	WILSON 230/115KV TB 1 & WILSON 230/115KV TB 2	P6	N-1-1	149	<90	<90	<90	<90			149	<90	<90	<90	Project : Panoche Oroloma Reconductor Project In Service Date : 12/2020. Short term: Action Plan
34162 ORO LOMA 115 34168 EL NIDO 115 1 1	WILSON 230/115KV TB 1 & WILSON 230/115KV TB 2	P6	N-1-1	123	137	138	<90	<90		154	123	156	<90	127	Scope Under Review: Wilson 115 kV Area Reinforcement Project
34200 ORO LOMA 70.0 34234 POSO J1 70.0 1 1	MENDOTA 115/70KV TB 1 & HELM 230/70KV TB 1	P6	N-1-1	<90	<90	<90	103	<90		<90	<90	<90	<90	<90	Mitigation Under Review (Extend Summer Setup for non-peak seasons)
34208 CHEVPIPE 70.0 34210 SNTA NLA 70.0 1 1	VEGA-MERCYSPRNGSS #1 70KV [0] & LOS BANOS-MERCY SPRINGS SW STA 70KV [8929]	P6	N-1-1	91	97	104	<90	<90		104	91	112	<90	104	Scope Under Review: Oro Loma 70kV Reinforcement
34208 CHEVPIPE 70.0 34214 LOS BANS 70.0 1 1	VEGA-MERCYSPRNGSS #1 70KV [0] & LOS BANOS-MERCY SPRINGS SW STA 70KV [8929]	P6	N-1-1	92	98	105	<90	<90		105	92	113	<90	105	Scope Under Review: Oro Loma 70kV Reinforcement
34220 ORTIGA 70.0 34222 MRCYSPRS 70.0 1 1	VEGA-MERCYSPRNGSS #1 70KV [0] & LOS BANOS-LIVINGSTON JCT-CANAL 70KV [8940]	P6	N-1-1	112	101	112	<90	<90		109	112	123	<90	112	Scope Under Review: Oro Loma 70kV Reinforcement
34220 ORTIGA 70.0 34222 MRCYSPRS 70.0 1 1	LOS BANOS-LIVINGSTON JCT-CANAL 70KV [8940]	P1	N-1	107	97	107	16	11		105	107	117	70	107	Scope Under Review: Oro Loma 70kV Reinforcement
34240 GLASS 70.0 34256 BORDEN 70.0 1 1	BORDEN-MADERA #2 70KV [8520] & BORDEN-MADERA #1 70KV [8710]	P6	N-1-1	98	96	96	<90	<90		103	98	102	<90	95	Sensitivity Only
34252 MADERA 70.0 34256 BORDEN 70.0 2 1	BORDEN-GLASS 70KV [8510] & BORDEN-MADERA #1 70KV [8710]	P6	N-1-1	96	95	95	<90	<90		102	96	101	<90	95	Sensitivity Only
34252 MADERA 70.0 34256 BORDEN 70.0 2 1	BORDEN-MADERA #1 70KV [8710] & BORDEN-GLASS 70KV [8510]	P6	N-1-1	96	95	95	<90	<90		102	96	101	<90	95	Sensitivity Only
34256 BORDEN 70.0 34252 MADERA 70.0 1 1	BORDEN-GLASS 70KV [8510] & BORDEN-MADERA #2 70KV [8520]	P6	N-1-1	97	95	95	<90	<90		102	97	101	<90	95	Sensitivity Only
34256 BORDEN 70.0 34252 MADERA 70.0 1 1	BORDEN-MADERA #2 70KV [8520] & BORDEN-GLASS 70KV [8510]	P6	N-1-1	97	95	95	<90	<90		102	97	101	<90	95	Sensitivity Only
34256 BORDEN 70.0 34262 CASSIDY 70.0 1 1	WILSON-BORDEN 230KV [9001] & BORDEN-GREGG 230KV [4400]	P6	N-1-1	<90	<90	<90	132	<90		<90	<90	<90	<90	<90	Mitigation Under Review (Extend Summer Setup for non-peak seasons)
34262 CASSIDY 70.0 34145 RVRCK T 70.0 1 1	WILSON-BORDEN 230KV [9001] & BORDEN-GREGG 230KV [4400]	P6	N-1-1	<90	<90	<90	174	<90		<90	<90	<90	<90	<90	Mitigation Under Review (Extend Summer Setup for non-peak seasons)

2017-2018 ISO Reliability Assessment - Study Results

Study Area: **PG&E Greater Fresno**

Thermal Overloads



Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading % (Baseline Scenarios)					Loading % (Sensitivity Scenarios)					Project & Potential Mitigation Solutions
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022 SP High CEC Forecast	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations	
34269 BIOMSJCT 70.0 34268 MENDOTA 70.0 1 1	TRANQUILLITY SW STA-HELM 230KV [5370] & MUSTANG SW STA-MCCALL 230KV [4710]	P6	N-1-1	<90	<90	<90	100	<90	<90	<90	<90	<90	<90	Mitigation Under Review (Extend Summer Setup for non-peak seasons)
34350 KAMM 115 34352 CANTUA 115 1 1	GATES 230/70KV TB 5 & EXCELSIORSS-PANOCH2 115KV [3231]	P6	N-1-1	<90	<90	<90	<90	97	<90	<90	<90	123	90	Sensitivity Only
34352 CANTUA 115 34432 WESTLND 115 1 1	GATES 230/70KV TB 5 & EXCELSIORSS-PANOCH2 115KV [3231]	P6	N-1-1	<90	<90	<90	<90	94	<90	<90	<90	112	<90	Sensitivity Only
34366 SANGER 115 34389 RAINBWTP 115 1 1	SANGER-REEDLEY 115KV [9140] MOAS & MCCALL-REEDLEY 115KV [2320] MOAS OPENED ON MC CALL_WAHTOKE	P6	N-1-1	139	143	152	<90	<90	161	139	174	<90	163	Scope Under Review: McCall-Reedley Project
34366 SANGER 115 34487 SNGRJCT 115 1 1	KINGS RIVER-SANGER-REEDLEY 115KV [2030] & MCCALL-REEDLEY 115KV [2320] MOAS OPENED ON MC CALL_WAHTOKE	P6	N-1-1	<90	<90	<90	<90	<90	93	<90	96	<90	113	Scope Under Review: McCall-Reedley Project
34367 POMWDFLJT 115 34490 PARLIER 115 1 1	KINGS RIVER-SANGER-REEDLEY 115KV [2030] & MCCALL-REEDLEY 115KV [2320] MOAS OPENED ON MC CALL_WAHTOKE	P6	N-1-1	93	93	96	<90	<90	101	93	105	<90	101	Scope Under Review: McCall-Reedley Project
34380 REEDLEY 115 34394 PIEDRA 1 115 1 1	SANGER-REEDLEY 115KV [9140] MOAS & MCCALL-REEDLEY 115KV [2320] MOAS OPENED ON MC CALL_WAHTOKE	P6	N-1-1	168	166	172	<90	<90	185	168	194	101	184	Scope Under Review: McCall-Reedley Project
34382 WAHTOKE 115 34380 REEDLEY 115 1 1	KINGS RIVER-SANGER-REEDLEY 115KV [2030] & SANGER-REEDLEY 115KV [9140] MOAS OPENED ON POMWDFLJT_PARLIER	P6	N-1-1	116	114	117	<90	<90	123	116	127	<90	125	Scope Under Review: McCall-Reedley Project
34389 RAINBWTP 115 34394 PIEDRA 1 115 1 1	SANGER-REEDLEY 115KV [9140] MOAS & MCCALL-REEDLEY 115KV [2320] MOAS OPENED ON MC CALL_WAHTOKE	P6	N-1-1	122	121	127	<90	<90	138	122	148	<90	138	Scope Under Review: McCall-Reedley Project
34417 KINGS J2 115 34418 KINGSBRG 115 1 1	MCCALL-KINGSBURG #2 115KV [2301] & GWF-KINGSBURG 115KV [1743]	P6	N-1-1	100	93	91	<90	<90	100	100	100	<90	93	Mitigation Under Review
34464 COPPRMNE 70.0 34478 TVY VLLY 70.0 1 1	WILSON-BORDEN 230KV [9001] & BORDEN-GREGG 230KV [4400]	P6	N-1-1	<90	<90	<90	140	<90	<90	<90	<90	<90	<90	Mitigation Under Review (Extend Summer Setup for non-peak seasons)
34478 TVY VLLY 70.0 34492 REEDLEY 70.0 1 1	WILSON-BORDEN 230KV [9001] & BORDEN-GREGG 230KV [4400]	P6	N-1-1	<90	<90	<90	155	<90	<90	<90	<90	<90	<90	Mitigation Under Review (Extend Summer Setup for non-peak seasons)
34487 SNGRJCT 115 34367 POMWDFLJT 115 1 1	KINGS RIVER-SANGER-REEDLEY 115KV [2030] & MCCALL-REEDLEY 115KV [2320] MOAS OPENED ON MC CALL_WAHTOKE	P6	N-1-1	102	107	110	<90	<90	115	102	119	<90	115	Scope Under Review: McCall-Reedley Project



Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading % (Baseline Scenarios)					Loading % (Sensitivity Scenarios)					Project & Potential Mitigation Solutions
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022 SP High CEC Forecast	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations	
34561 Q526TP 70.0 34566 PLSNTVLY 70.0 1 1	GATES 230/70KV TB 5 & SCHLNDLR-FIVEPOINTSSS #1 70KV [0]	P6	N-1-1	<90	<90	<90	<90	73	<90	<90	<90	<90	102	Sensitivity Only
34562 SCHLNDLR 70.0 34561 Q526TP 70.0 1 1	SCHLNDLR-FIVEPOINTSSS #1 70KV [0] & GATES 230/70KV TB 5	P6	N-1-1	<90	<90	<90	<90	75	<90	<90	<90	103	100	Sensitivity Only
34562 SCHLNDLR 70.0 34567 FIVEPOINTSSS 70.0 1 1	COALINGA #1-SAN MIGUEL 70KV & GATES 230/70KV TB 5	P6	N-1-1	<90	<90	<90	<90	100	<90	<90	<90	103	<90	Sensitivity Only
36354 SAN MIGL 70.0 34574 COLNGA 1 70.0 1 1	GATES 230/70KV TB 5 & SCHINDLR 115/70KV TB 1	P6	N-1-1	<90	<90	<90	<90	100	101	<90	<90	232	194	Sensitivity Only
34321 MCSWAINJ 70.0 34232 EXCHEQUR 70.0 1 1	EXCHEQUER-LE GRAND 115KV [1560] & PANOCHÉ-MENDOTA 115 kV	P6	N-1-1	105	100	100	<90	<90	100	105	100	98	100	Exchequer SPS
34208 CHEVPIPE 70.0 34210 SNTA NLA 70.0 1 1	LOS BANOS-PANOCHÉ #1 230KV [5030] & LOS BANOS-MERCY SPRINGS SW STA 70KV [8929]	P7	N-2	83	89	95	9	11	96	83	103	49	95	Scope Under Review: Oro Loma 70kV Reinforcement
34208 CHEVPIPE 70.0 34214 LOS BANS 70.0 1 1	LOS BANOS-PANOCHÉ #1 230KV [5030] & LOS BANOS-MERCY SPRINGS SW STA 70KV [8929]	P7	N-2	84	90	96	10	11	97	84	104	50	96	Scope Under Review: Oro Loma 70kV Reinforcement
34567 FIVEPOINTSSS 70.0 34560 CALFLAX 70.0 1 1	EXCELSIORSS-PANOCHÉ1 115KV [3250] & EXCELSIORSS-PANOCHÉ2 115KV [3231]	P7	N-1-1	22	24	24	30	97	27	22	27	106	33	Sensitivity Only
34567 FIVEPOINTSSS 70.0 34560 CALFLAX 70.0 1 1	PANOCHÉ-SCHINDLER #1 115KV [3250] & EXCELSIORSS-PANOCHÉ2 115KV [3231]	P7	N-1-1	33	35	35	44	97	41	33	42	112	45	Sensitivity Only

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
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022 SP High CEC Forecast	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations	
ADAMS_E 70kV	Base Case	P0	Basecase	1.04	1.03	1.03	1.05	1.04	1.03	1.04	1.03	1.05	1.03	Under Review
ADAMS_E TP 70kV	Base Case	P0	Basecase	1.04	1.03	1.03	1.05	1.04	1.03	1.04	1.03	1.05	1.03	Under Review
AIRPROD 115kV	Base Case	P0	Basecase	1.04	1.04	1.03	1.06	1.05	1.03	1.04	1.03	1.03	1.03	Under Review
AIRWAYJ1 115kV	Base Case	P0	Basecase	1.02	1.02	1.01	1.06	1.05	1.01	1.02	1.01	1.02	1.01	Under Review
AIRWAYJ2 115kV	Base Case	P0	Basecase	1.02	1.02	1.02	1.06	1.04	1.01	1.02	1.01	1.03	1.02	Under Review
AIRWAYS 115kV	Base Case	P0	Basecase	1.02	1.02	1.01	1.06	1.04	1.01	1.02	1.01	1.03	1.01	Under Review
AIRWAYS2 115kV	Base Case	P0	Basecase	1.02	1.01	1.01	1.06	1.05	1.01	1.02	1.01	1.02	1.01	Under Review
ALPAUGH 115kV	Base Case	P0	Basecase	1.04	1.03	1.03	1.05	1.05	1.03	1.04	1.02	1.03	1.03	Under Review
ALPAUGHN_20P 115kV	Base Case	P0	Basecase	1.04	1.03	1.03	1.05	1.05	1.03	1.04	1.03	1.03	1.03	Under Review
ALPAUGHN_50P 115kV	Base Case	P0	Basecase	1.04	1.03	1.03	1.05	1.05	1.03	1.04	1.03	1.03	1.03	Under Review
ALPAUGHN_JCT 115kV	Base Case	P0	Basecase	1.04	1.03	1.03	1.05	1.05	1.03	1.04	1.03	1.03	1.03	Under Review
ALPAUGHNRTH 115kV	Base Case	P0	Basecase	1.04	1.03	1.03	1.05	1.05	1.03	1.04	1.03	1.03	1.03	Under Review
ANGIOLA 70kV	Base Case	P0	Basecase	1.02	1.03	1.03	1.08	1.07	1.02	1.02	1.03	1.05	1.03	Under Review
ARBURU T 70kV	Base Case	P0	Basecase	1.00	1.00	1.00	1.05	1.02	1.00	1.00	1.00	1.00	1.00	Under Review
ARBURUA 70kV	Base Case	P0	Basecase	1.00	1.00	1.00	1.05	1.01	0.99	1.00	0.99	1.00	1.00	Under Review
ATWATER 115kV	Base Case	P0	Basecase	1.03	1.01	1.01	1.07	1.05	1.00	1.03	1.00	1.02	1.01	Under Review
ATWATR J 115kV	Base Case	P0	Basecase	1.03	1.01	1.01	1.07	1.05	1.00	1.03	1.00	1.02	1.01	Under Review
ATWELL&1 115kV	Base Case	P0	Basecase	1.04	1.03	1.03	1.05	1.04	1.03	1.04	1.02	1.02	1.03	Under Review
ATWELL_JCT 115kV	Base Case	P0	Basecase	1.04	1.03	1.03	1.05	1.05	1.03	1.04	1.03	1.03	1.03	Under Review
BALCH 115kV	Base Case	P0	Basecase	1.04	1.04	1.04	1.07	1.05	1.03	1.04	1.03	1.04	1.03	Under Review
BARTON 115kV	Base Case	P0	Basecase	1.02	1.02	1.02	1.06	1.04	1.01	1.02	1.01	1.03	1.01	Under Review
BER VLLY 70kV	Base Case	P0	Basecase	1.01	1.01	1.01	1.07	1.03	1.01	1.01	1.01	1.02	1.01	Under Review
BIOLA 70kV	Base Case	P0	Basecase	1.02	1.02	1.02	1.05	1.03	1.02	1.02	1.01	1.03	1.01	Under Review
BOSWELL 70kV	Base Case	P0	Basecase	1.03	1.03	1.04	1.08	1.07	1.03	1.03	1.03	1.05	1.03	Under Review
BRCEBG J 70kV	Base Case	P0	Basecase	1.00	1.01	1.01	1.07	1.03	1.01	1.00	1.01	1.02	1.01	Under Review
BSWLL TP 70kV	Base Case	P0	Basecase	1.03	1.03	1.04	1.08	1.07	1.03	1.03	1.03	1.05	1.03	Under Review
BULLARD 115kV	Base Case	P0	Basecase	1.01	1.01	1.00	1.05	1.04	1.00	1.01	1.00	1.02	1.00	Under Review
CAL AVE 115kV	Base Case	P0	Basecase	1.02	1.02	1.01	1.06	1.05	1.01	1.02	1.01	1.02	1.01	Under Review
CAMDEN 70kV	Base Case	P0	Basecase	0.99	0.99	0.98	1.06	1.04	0.98	0.99	0.98	1.00	0.98	Under Review
CASTLE 115kV	Base Case	P0	Basecase	1.03	1.01	1.01	1.07	1.05	1.00	1.03	1.00	1.02	1.01	Under Review
CERTAN T 115kV	Base Case	P0	Basecase	1.03	1.02	1.02	1.07	1.04	1.01	1.03	1.01	1.02	1.02	Under Review
CERTANJ1 115kV	Base Case	P0	Basecase	1.02	1.02	1.02	1.07	1.04	1.01	1.02	1.01	1.02	1.02	Under Review
CERTANJ2 115kV	Base Case	P0	Basecase	1.03	1.02	1.02	1.07	1.04	1.02	1.03	1.01	1.03	1.02	Under Review
CERTTEED 115kV	Base Case	P0	Basecase	1.03	1.02	1.02	1.07	1.05	1.02	1.03	1.02	1.03	1.02	Under Review
CHEVPIPE 70kV	Base Case	P0	Basecase	1.00	1.00	1.01	1.05	1.02	1.00	1.00	1.00	1.01	1.00	Under Review
CHLDHOSP 115kV	Base Case	P0	Basecase	1.03	1.02	1.02	1.06	1.04	1.02	1.03	1.02	1.03	1.02	Under Review

2017-2018 ISO Reliability Assessment - Study Results

Study Area: **PG&E Greater Fresno**

High/Low Voltages



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
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022 SP High CEC Forecast	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations	
CHWCGN 115kV	Base Case	P0	Basecase	1.03	1.03	1.03	1.07	1.05	1.02	1.03	1.02	1.03	1.03	Under Review
CHWCGNJT 115kV	Base Case	P0	Basecase	1.03	1.02	1.02	1.07	1.05	1.02	1.03	1.02	1.03	1.02	Under Review
CHWCHLA2 115kV	Base Case	P0	Basecase	1.03	1.03	1.03	1.07	1.05	1.02	1.03	1.02	1.03	1.03	Under Review
CHWCHLASLR 115kV	Base Case	P0	Basecase	1.02	1.01	1.01	1.06	1.03	1.00	1.02	1.00	1.02	1.01	Under Review
CHWCHLASLRJT 115kV	Base Case	P0	Basecase	1.02	1.01	1.01	1.06	1.03	1.00	1.02	1.00	1.02	1.01	Under Review
CHWCHLLA 115kV	Base Case	P0	Basecase	1.02	1.02	1.02	1.07	1.04	1.01	1.02	1.01	1.02	1.02	Under Review
CLOVIS-1 115kV	Base Case	P0	Basecase	1.03	1.03	1.02	1.06	1.05	1.02	1.03	1.02	1.03	1.02	Under Review
CLOVIS-2 115kV	Base Case	P0	Basecase	1.02	1.02	1.02	1.06	1.05	1.02	1.02	1.02	1.03	1.02	Under Review
CLOVISJ1 115kV	Base Case	P0	Basecase	1.03	1.03	1.02	1.06	1.05	1.02	1.03	1.02	1.03	1.02	Under Review
CLOVISJ2 115kV	Base Case	P0	Basecase	1.03	1.02	1.02	1.06	1.05	1.02	1.03	1.02	1.03	1.02	Under Review
CORCORAN 70kV	Base Case	P0	Basecase	1.03	1.04	1.04	1.08	1.07	1.04	1.03	1.04	1.05	1.04	Under Review
CORCORAN 115kV	Base Case	P0	Basecase	1.02	1.02	1.02	1.06	1.05	1.02	1.02	1.02	1.04	1.02	Under Review
CORCORANPV_P 115kV	Base Case	P0	Basecase	1.02	1.02	1.02	1.06	1.05	1.02	1.02	1.02	1.04	1.02	Under Review
CORSGOLD 115kV	Base Case	P0	Basecase	1.01	1.01	1.01	1.06	1.04	1.00	1.01	1.00	1.02	1.01	Under Review
CRESSEY 115kV	Base Case	P0	Basecase	1.03	1.00	1.00	1.07	1.05	1.00	1.03	1.00	1.01	1.00	Under Review
DAIRYLND 115kV	Base Case	P0	Basecase	1.01	1.01	1.00	1.06	1.03	1.00	1.01	1.00	1.02	1.00	Under Review
DANISHCM 115kV	Base Case	P0	Basecase	1.02	1.02	1.01	1.06	1.05	1.01	1.02	1.01	1.03	1.01	Under Review
DINUBA 70kV	Base Case	P0	Basecase	1.01	1.01	1.01	1.06	1.06	1.00	1.01	1.00	1.02	1.00	Under Review
DNUBAEGY 70kV	Base Case	P0	Basecase	1.03	1.02	1.02	1.07	1.06	1.02	1.03	1.02	1.03	1.02	Under Review
DNUBAJCT 70kV	Base Case	P0	Basecase	1.03	1.02	1.02	1.07	1.06	1.01	1.03	1.01	1.03	1.01	Under Review
DOS PALS 70kV	Base Case	P0	Basecase	1.01	1.01	1.01	1.05	1.05	1.01	1.01	1.00	1.02	1.01	Under Review
DUNLAP 70kV	Base Case	P0	Basecase	1.00	0.99	0.99	1.05	1.05	0.98	1.00	0.98	1.01	0.98	Under Review
EL CAPTN 115kV	Base Case	P0	Basecase	1.03	1.01	1.01	1.08	1.05	1.00	1.03	1.00	1.02	1.01	Under Review
EL NIDO 115kV	Base Case	P0	Basecase	1.03	1.02	1.01	1.06	1.05	1.01	1.03	1.01	1.02	1.01	Under Review
ELNIDO 70kV	Base Case	P0	Basecase	1.04	1.03	1.03	1.06	1.05	1.03	1.04	1.03	1.03	1.03	Under Review
ELNIDOTP 70kV	Base Case	P0	Basecase	1.04	1.03	1.03	1.06	1.05	1.03	1.04	1.03	1.03	1.03	Under Review
EXCHEQUR 70kV	Base Case	P0	Basecase	1.02	1.02	1.02	1.07	1.03	1.02	1.02	1.02	1.03	1.02	Under Review
EXCHEQUR 115kV	Base Case	P0	Basecase	1.03	1.03	1.03	1.07	1.04	1.02	1.03	1.02	1.03	1.03	Under Review
FIREBAGH 70kV	Base Case	P0	Basecase	0.99	0.98	0.98	1.04	1.05	0.98	0.99	0.98	1.01	0.98	Under Review
GALLO 115kV	Base Case	P0	Basecase	1.03	1.00	1.00	1.07	1.05	1.00	1.03	1.00	1.01	1.00	Under Review
GATES 115kV	Base Case	P0	Basecase	1.11	1.10	1.10	1.10	1.09	1.10	1.11	1.10	1.09	1.10	Under Review
GAURD J1 115kV	Base Case	P0	Basecase	1.04	1.04	1.03	1.06	1.05	1.03	1.04	1.03	1.04	1.03	Under Review
GAURD J2 115kV	Base Case	P0	Basecase	1.04	1.04	1.03	1.06	1.05	1.03	1.04	1.03	1.04	1.03	Under Review
GFFNJCT 70kV	Base Case	P0	Basecase	1.04	1.03	1.03	1.05	1.04	1.03	1.04	1.03	1.04	1.03	Under Review
GIFFEN 70kV	Base Case	P0	Basecase	1.03	1.02	1.02	1.05	1.04	1.02	1.03	1.02	1.06	1.02	Under Review
GRDN GLS 115kV	Base Case	P0	Basecase	1.04	1.04	1.03	1.06	1.05	1.03	1.04	1.03	1.04	1.03	Under Review

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
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022 SP High CEC Forecast	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations	
GRDNGLS2 115kV	Base Case	P0	Basecase	1.04	1.04	1.04	1.06	1.05	1.03	1.04	1.03	1.04	1.03	Under Review
HARDWICK 70kV	Base Case	P0	Basecase	1.02	1.02	1.02	1.06	1.05	1.01	1.02	1.01	1.02	1.01	Under Review
HELM 70kV	Base Case	P0	Basecase	1.05	1.04	1.04	1.05	1.05	1.04	1.05	1.04	1.04	1.04	Under Review
HERNDON 115kV	Base Case	P0	Basecase	1.03	1.02	1.02	1.05	1.04	1.02	1.03	1.02	1.03	1.02	Under Review
HNFRD SW 70kV	Base Case	P0	Basecase	1.02	1.02	1.02	1.06	1.05	1.02	1.02	1.02	1.03	1.02	Under Review
HRDWK TP 70kV	Base Case	P0	Basecase	1.02	1.02	1.02	1.06	1.05	1.02	1.02	1.02	1.03	1.02	Under Review
INDN FLT 70kV	Base Case	P0	Basecase	0.99	1.00	1.00	1.07	1.03	1.00	0.99	1.00	1.01	1.00	Under Review
JGBSWLL 70kV	Base Case	P0	Basecase	1.03	1.03	1.03	1.08	1.07	1.03	1.03	1.03	1.05	1.03	Under Review
JR WOOD 115kV	Base Case	P0	Basecase	1.03	1.01	1.01	1.07	1.05	1.00	1.03	1.00	1.02	1.01	Under Review
JRWD GEN 115kV	Base Case	P0	Basecase	1.03	1.01	1.01	1.07	1.05	1.00	1.03	1.00	1.02	1.01	Under Review
K1-JCT 115kV	Base Case	P0	Basecase	1.04	1.03	1.03	1.06	1.05	1.03	1.04	1.03	1.04	1.03	Under Review
KCOGNJCT 115kV	Base Case	P0	Basecase	1.04	1.04	1.04	1.06	1.05	1.03	1.04	1.03	1.04	1.03	Under Review
KERCKHF1 115kV	Base Case	P0	Basecase	1.04	1.03	1.03	1.06	1.05	1.03	1.04	1.03	1.04	1.03	Under Review
KERCKHF2 115kV	Base Case	P0	Basecase	1.04	1.03	1.03	1.06	1.05	1.03	1.04	1.03	1.04	1.03	Under Review
KINGS J1 115kV	Base Case	P0	Basecase	1.04	1.04	1.03	1.06	1.05	1.03	1.04	1.03	1.04	1.03	Under Review
KINGS J2 115kV	Base Case	P0	Basecase	1.04	1.04	1.03	1.06	1.05	1.03	1.04	1.03	1.04	1.03	Under Review
KINGSBRG 115kV	Base Case	P0	Basecase	1.03	1.03	1.03	1.06	1.05	1.03	1.03	1.03	1.03	1.03	Under Review
KNGLOBUS 70kV	Base Case	P0	Basecase	1.03	1.03	1.03	1.06	1.05	1.03	1.03	1.02	1.03	1.03	Under Review
KNGSCOGN 115kV	Base Case	P0	Basecase	1.04	1.04	1.04	1.06	1.05	1.03	1.04	1.03	1.04	1.03	Under Review
KNGSRVR1 115kV	Base Case	P0	Basecase	1.04	1.04	1.04	1.06	1.05	1.03	1.04	1.03	1.04	1.03	Under Review
KRCDP 115kV	Base Case	P0	Basecase	1.04	1.04	1.03	1.06	1.05	1.03	1.04	1.03	1.03	1.03	Under Review
LASPALMS 115kV	Base Case	P0	Basecase	1.02	1.02	1.01	1.06	1.05	1.01	1.02	1.01	1.02	1.01	Under Review
LE GRAND 115kV	Base Case	P0	Basecase	1.02	1.01	1.01	1.07	1.04	1.01	1.02	1.01	1.02	1.01	Under Review
LE GRNDJ 115kV	Base Case	P0	Basecase	1.03	1.02	1.02	1.07	1.05	1.01	1.03	1.01	1.02	1.02	Under Review
LIVNGSTN 115kV	Base Case	P0	Basecase	1.03	1.00	1.00	1.07	1.05	1.00	1.03	1.00	1.01	1.00	Under Review
LOS BANS 70kV	Base Case	P0	Basecase	1.01	1.01	1.01	1.05	1.02	1.01	1.01	1.01	1.01	1.01	Under Review
LOSBANOS 230kV	Base Case	P0	Basecase	1.03	1.02	1.03	1.06	1.02	1.02	1.03	1.02	1.02	1.02	Under Review
MALAGA 115kV	Base Case	P0	Basecase	1.04	1.03	1.03	1.06	1.05	1.03	1.04	1.03	1.03	1.03	Under Review
MALAGATP 115kV	Base Case	P0	Basecase	1.04	1.03	1.03	1.06	1.05	1.03	1.04	1.03	1.03	1.03	Under Review
MANCHSTR 115kV	Base Case	P0	Basecase	1.01	1.01	1.01	1.06	1.05	1.00	1.01	1.00	1.02	1.01	Under Review
MARIPOS2 70kV	Base Case	P0	Basecase	0.99	0.98	0.98	1.07	1.03	0.98	0.99	0.98	1.00	0.98	Under Review
MC CALL 115kV	Base Case	P0	Basecase	1.04	1.04	1.04	1.06	1.06	1.04	1.04	1.04	1.04	1.04	Under Review
MC SWAIN 70kV	Base Case	P0	Basecase	1.03	1.03	1.03	1.06	1.04	1.03	1.03	1.02	1.03	1.03	Under Review
MCCABEJ1 70kV	Base Case	P0	Basecase	1.01	1.01	1.01	1.05	1.02	1.01	1.01	1.01	1.01	1.01	Under Review
MCCABEJ2 70kV	Base Case	P0	Basecase	1.00	1.01	1.01	1.05	1.02	1.01	1.00	1.01	1.01	1.01	Under Review
MCSWAINJ 70kV	Base Case	P0	Basecase	1.03	1.03	1.03	1.06	1.04	1.02	1.03	1.02	1.03	1.03	Under Review

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
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022 SP High CEC Forecast	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations	
MERCED 70kV	Base Case	P0	Basecase	1.03	1.02	1.02	1.06	1.04	1.02	1.03	1.02	1.03	1.02	Under Review
MERCED 115kV	Base Case	P0	Basecase	1.03	1.02	1.01	1.08	1.05	1.01	1.03	1.01	1.02	1.01	Under Review
MERCYSPRNGSS 70kV	Base Case	P0	Basecase	1.00	1.00	1.00	1.05	1.02	1.00	1.00	1.00	1.00	1.00	Under Review
MRCDFLLS 70kV	Base Case	P0	Basecase	1.03	1.03	1.03	1.06	1.04	1.02	1.03	1.02	1.03	1.03	Under Review
MRCYSPRS 70kV	Base Case	P0	Basecase	1.00	1.00	1.00	1.05	1.02	1.00	1.00	0.99	1.00	1.00	Under Review
OAKH_JCT 115kV	Base Case	P0	Basecase	1.03	1.03	1.02	1.06	1.05	1.02	1.03	1.02	1.03	1.02	Under Review
OAKHURST 115kV	Base Case	P0	Basecase	1.00	1.00	1.00	1.06	1.04	0.99	1.00	0.99	1.01	1.00	Under Review
OLIVE_SS 115kV	Base Case	P0	Basecase	1.04	1.03	1.03	1.05	1.05	1.03	1.04	1.03	1.03	1.03	Under Review
ONLL PMP 69kV	Base Case	P0	Basecase	1.01	1.01	1.01	1.05	1.02	1.01	1.01	1.01	1.01	1.01	Under Review
ORO LOMA 70kV	Base Case	P0	Basecase	1.02	1.02	1.02	1.05	1.05	1.02	1.02	1.02	1.03	1.02	Under Review
OROSI 70kV	Base Case	P0	Basecase	1.01	1.01	1.00	1.07	1.06	1.00	1.01	1.00	1.02	1.00	Under Review
ORSI JCT 70kV	Base Case	P0	Basecase	1.02	1.01	1.01	1.07	1.06	1.00	1.02	1.00	1.02	1.00	Under Review
PARLIER 115kV	Base Case	P0	Basecase	1.03	1.02	1.02	1.06	1.05	1.01	1.03	1.01	1.02	1.01	Under Review
PCHCO PP 70kV	Base Case	P0	Basecase	0.95	1.00	1.00	1.02	1.01	1.00	0.95	1.00	1.01	1.00	Under Review
PCHCOWND 70kV	Base Case	P0	Basecase	1.01	1.01	1.01	1.05	1.02	1.01	1.01	1.01	1.01	1.01	Under Review
PIEDRA 1 115kV	Base Case	P0	Basecase	1.03	1.02	1.02	1.06	1.05	1.02	1.03	1.02	1.03	1.02	Under Review
PIEDRA 2 115kV	Base Case	P0	Basecase	1.03	1.03	1.03	1.06	1.05	1.03	1.03	1.03	1.03	1.03	Under Review
PNDLJ1 115kV	Base Case	P0	Basecase	1.01	1.01	1.01	1.05	1.04	1.00	1.01	1.00	1.02	1.00	Under Review
PNDLJ2 115kV	Base Case	P0	Basecase	1.01	1.01	1.01	1.05	1.04	1.00	1.01	1.00	1.02	1.01	Under Review
PNEDLE 115kV	Base Case	P0	Basecase	1.01	1.01	1.00	1.05	1.04	1.00	1.01	1.00	1.02	1.00	Under Review
PNEDLE2 115kV	Base Case	P0	Basecase	1.01	1.01	1.01	1.05	1.04	1.00	1.01	1.00	1.02	1.01	Under Review
POMWDFL 115kV	Base Case	P0	Basecase	1.03	1.02	1.02	1.07	1.05	1.02	1.03	1.01	1.02	1.01	Under Review
POMWDFLJT 115kV	Base Case	P0	Basecase	1.03	1.02	1.02	1.07	1.05	1.02	1.03	1.02	1.03	1.02	Under Review
POSO J1 70kV	Base Case	P0	Basecase	0.99	0.99	0.99	1.05	1.05	0.99	0.99	0.98	1.01	0.99	Under Review
POSO J2 70kV	Base Case	P0	Basecase	1.04	1.03	1.03	1.06	1.05	1.03	1.04	1.03	1.03	1.03	Under Review
PPG 115kV	Base Case	P0	Basecase	1.04	1.03	1.03	1.06	1.05	1.03	1.04	1.03	1.03	1.03	Under Review
Q529 115kV	Base Case	P0	Basecase	1.02	1.02	1.02	1.06	1.05	1.02	1.02	1.02	1.04	1.02	Under Review
Q529TP 115kV	Base Case	P0	Basecase	1.02	1.02	1.02	1.06	1.05	1.02	1.02	1.02	1.04	1.02	Under Review
Q558 115kV	Base Case	P0	Basecase	1.02	1.02	1.02	1.06	1.05	1.02	1.02	1.02	1.04	1.02	Under Review
Q577 230kV	Base Case	P0	Basecase	1.03	1.02	1.02	1.06	1.02	1.02	1.03	1.02	1.02	1.02	Under Review
Q632B 70kV	Base Case	P0	Basecase	1.04	1.03	1.03	1.05	1.04	1.03	1.04	1.03	1.05	1.03	Under Review
Q679 70kV	Base Case	P0	Basecase	1.03	1.02	1.02	1.05	1.04	1.02	1.03	1.02	1.06	1.02	Under Review
QUEBEC 115kV	Base Case	P0	Basecase	1.05	1.02	1.03	1.06	1.05	1.02	1.05	1.02	1.03	1.02	Under Review
QUEBECTP 115kV	Base Case	P0	Basecase	1.04	1.03	1.03	1.05	1.05	1.02	1.04	1.02	1.03	1.03	Under Review
QUINTO_SS 230kV	Base Case	P0	Basecase	1.03	1.02	1.02	1.06	1.02	1.02	1.03	1.02	1.02	1.02	Under Review
RAINBW 115kV	Base Case	P0	Basecase	1.03	1.02	1.02	1.06	1.05	1.02	1.03	1.02	1.03	1.02	Under Review

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
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022 SP High CEC Forecast	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations	
RAINBWTP 115kV	Base Case	P0	Basecase	1.03	1.02	1.02	1.06	1.05	1.02	1.03	1.02	1.03	1.02	Under Review
RANCHRS 115kV	Base Case	P0	Basecase	1.04	1.03	1.03	1.06	1.05	1.03	1.04	1.03	1.03	1.03	Under Review
REEDLEY 70kV	Base Case	P0	Basecase	1.03	1.02	1.02	1.07	1.06	1.02	1.03	1.02	1.03	1.02	Under Review
REEDLEY 115kV	Base Case	P0	Basecase	1.02	1.02	1.01	1.06	1.05	1.01	1.02	1.01	1.02	1.01	Under Review
SANDCRK 70kV	Base Case	P0	Basecase	1.00	0.99	0.99	1.06	1.05	0.99	1.00	0.99	1.01	0.99	Under Review
SANGER 115kV	Base Case	P0	Basecase	1.03	1.03	1.02	1.06	1.05	1.02	1.03	1.02	1.03	1.02	Under Review
SAXONCRK 70kV	Base Case	P0	Basecase	1.00	1.01	1.01	1.07	1.03	1.00	1.00	1.01	1.02	1.01	Under Review
SCWAX 115kV	Base Case	P0	Basecase	1.04	1.03	1.03	1.06	1.05	1.03	1.04	1.03	1.03	1.03	Under Review
SCWAXJCT 115kV	Base Case	P0	Basecase	1.04	1.03	1.03	1.06	1.05	1.03	1.04	1.03	1.03	1.03	Under Review
SESWTF 115kV	Base Case	P0	Basecase	1.02	1.02	1.02	1.06	1.04	1.01	1.02	1.01	1.03	1.01	Under Review
SESWTFPT 115kV	Base Case	P0	Basecase	1.02	1.02	1.02	1.06	1.04	1.01	1.02	1.01	1.03	1.01	Under Review
SHARON 115kV	Base Case	P0	Basecase	1.03	1.02	1.02	1.07	1.04	1.01	1.03	1.01	1.02	1.02	Under Review
SHARON T 115kV	Base Case	P0	Basecase	1.03	1.02	1.02	1.07	1.04	1.01	1.03	1.01	1.02	1.02	Under Review
SHEPHERD 115kV	Base Case	P0	Basecase	1.04	1.03	1.03	1.06	1.04	1.03	1.04	1.03	1.03	1.03	Under Review
SJNO2 70kV	Base Case	P0	Basecase	1.04	1.04	1.04	1.05	1.04	1.04	1.04	1.04	1.04	1.04	Under Review
SNGRCOGN 115kV	Base Case	P0	Basecase	1.03	1.02	1.02	1.06	1.05	1.02	1.03	1.02	1.03	1.02	Under Review
SNGRJCT 115kV	Base Case	P0	Basecase	1.03	1.02	1.02	1.06	1.05	1.02	1.03	1.02	1.03	1.02	Under Review
SNJQJCT 70kV	Base Case	P0	Basecase	1.04	1.04	1.04	1.05	1.04	1.04	1.04	1.04	1.04	1.04	Under Review
SNTA NLA 70kV	Base Case	P0	Basecase	1.00	1.00	1.01	1.05	1.02	1.00	1.00	1.00	1.00	1.00	Under Review
SNTA RTA 70kV	Base Case	P0	Basecase	1.01	1.00	1.00	1.05	1.05	1.00	1.01	1.00	1.02	1.00	Under Review
STCRRJ 70kV	Base Case	P0	Basecase	1.01	1.01	1.00	1.07	1.06	1.00	1.01	1.00	1.02	1.00	Under Review
STONCRRL 70kV	Base Case	P0	Basecase	1.01	1.00	1.00	1.06	1.05	0.99	1.01	0.99	1.01	0.99	Under Review
STRD JCT 70kV	Base Case	P0	Basecase	1.04	1.03	1.03	1.05	1.04	1.03	1.04	1.03	1.05	1.03	Under Review
SUNMAID 115kV	Base Case	P0	Basecase	1.04	1.04	1.04	1.06	1.05	1.03	1.04	1.03	1.04	1.03	Under Review
TVY VLLY 70kV	Base Case	P0	Basecase	1.02	1.02	1.01	1.06	1.06	1.01	1.02	1.01	1.03	1.01	Under Review
ULTPWRJ 115kV	Base Case	P0	Basecase	1.04	1.04	1.03	1.06	1.05	1.03	1.04	1.03	1.03	1.03	Under Review
VEGA 70kV	Base Case	P0	Basecase	1.00	1.00	1.00	1.05	1.02	1.00	1.00	1.00	1.00	1.00	Under Review
WAHTOKE 115kV	Base Case	P0	Basecase	1.03	1.02	1.02	1.06	1.05	1.02	1.03	1.02	1.03	1.02	Under Review
WAUKENA_SS 115kV	Base Case	P0	Basecase	1.02	1.02	1.02	1.06	1.05	1.02	1.02	1.02	1.04	1.02	Under Review
WESIX 70kV	Base Case	P0	Basecase	1.04	1.03	1.03	1.05	1.04	1.03	1.04	1.03	1.04	1.03	Under Review
WESTLAND 70kV	Base Case	P0	Basecase	1.04	1.03	1.03	1.05	1.04	1.03	1.04	1.03	1.04	1.03	Under Review
WHITERIVER_P 115kV	Base Case	P0	Basecase	1.04	1.03	1.03	1.05	1.05	1.03	1.04	1.03	1.03	1.03	Under Review
WILSON A 115kV	Base Case	P0	Basecase	1.04	1.02	1.02	1.08	1.05	1.02	1.04	1.02	1.03	1.02	Under Review
WILSON B 115kV	Base Case	P0	Basecase	1.04	1.02	1.02	1.08	1.05	1.02	1.04	1.02	1.03	1.02	Under Review
WISHON 70kV	Base Case	P0	Basecase	1.03	1.03	1.03	1.05	1.04	1.03	1.03	1.03	1.04	1.03	Under Review
WOODWARD 115kV	Base Case	P0	Basecase	1.03	1.03	1.02	1.06	1.04	1.02	1.03	1.02	1.03	1.02	Under Review

2017-2018 ISO Reliability Assessment - Study Results

Study Area: **PG&E Greater Fresno**

High/Low Voltages



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
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022 SP High CEC Forecast	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations	
WRGHT PP 70kV	Base Case	P0	Basecase	1.00	1.01	1.01	1.06	1.02	1.00	1.00	1.00	1.01	1.01	Under Review
WRIGHT T 70kV	Base Case	P0	Basecase	1.01	1.01	1.01	1.06	1.02	1.00	1.01	1.00	1.01	1.01	Under Review
WST FRSO 115kV	Base Case	P0	Basecase	1.02	1.01	1.01	1.07	1.05	1.01	1.02	1.01	1.02	1.01	Under Review
WSTLDJCT 70kV	Base Case	P0	Basecase	1.04	1.03	1.03	1.05	1.04	1.03	1.04	1.03	1.04	1.03	Under Review
WWARD JT 115kV	Base Case	P0	Basecase	1.04	1.03	1.03	1.06	1.05	1.03	1.04	1.03	1.03	1.03	Under Review
YOSEMITE 70kV	Base Case	P0	Basecase	0.98	1.00	1.00	1.07	1.02	0.99	0.98	0.99	1.01	1.00	Under Review
BER VLLY 70kV	P1-3:A13:15:_EXCHEQUR 70/115KV TB 1	P1	N-1	0.95	0.97	0.97	1.12	1.05	0.95	0.95	0.95	1.01	0.96	Under Review
BRCEBG J 70kV	P1-3:A13:15:_EXCHEQUR 70/115KV TB 1	P1	N-1	0.94	0.96	0.96	1.12	1.05	0.95	0.94	0.94	1.00	0.96	Under Review
DOS PALS 70kV	P1-2:A13:50:_PANOCHE-ORO LOMA 115KV [3240]	P1	N-1	0.94	0.90	0.90	1.05	1.05	0.88	0.94	0.88	0.96	0.89	Under Review
ELNIDO 70kV	P1-3:A13:15:_EXCHEQUR 70/115KV TB 1	P1	N-1	1.03	1.03	1.03	1.10	1.06	1.03	1.04	1.03	1.04	1.03	Under Review
ELNIDOTP 70kV	P1-3:A13:15:_EXCHEQUR 70/115KV TB 1	P1	N-1	1.03	1.03	1.03	1.10	1.06	1.03	1.03	1.03	1.04	1.03	Under Review
EXCHEQUR 70kV	P1-3:A13:15:_EXCHEQUR 70/115KV TB 1	P1	N-1	0.96	0.98	0.97	1.12	1.05	0.96	0.96	0.96	1.01	0.97	Under Review
FIREBAGH 70kV	P1-2:A13:50:_PANOCHE-ORO LOMA 115KV [3240]	P1	N-1	0.91	0.87	0.86	1.05	1.05	0.85	0.91	0.85	0.94	0.86	Under Review
GATES 115kV	P1-3:A14:1:_GATES 500/230KV TB 11	P1	N-1	1.10	1.11	1.11	1.13	1.11	1.11	1.10	1.10	1.11	1.11	Under Review
GATES 115kV	P1-4:A14:19:_GATES11T SVD=V	P1	N-1	1.11	1.10	1.10	1.12	1.09	1.10	1.11	1.10	1.09	1.10	Under Review
INDN FLT 70kV	P1-3:A13:15:_EXCHEQUR 70/115KV TB 1	P1	N-1	0.93	0.95	0.95	1.12	1.04	0.94	0.93	0.94	1.00	0.95	Under Review
MARIPOS2 70kV	P1-3:A13:15:_EXCHEQUR 70/115KV TB 1	P1	N-1	0.92	0.94	0.94	1.12	1.04	0.92	0.92	0.91	0.99	0.93	Under Review
MC SWAIN 70kV	P1-3:A13:15:_EXCHEQUR 70/115KV TB 1	P1	N-1	0.99	1.00	1.00	1.12	1.05	0.98	0.99	0.98	1.03	1.00	Under Review
MCSWAINJ 70kV	P1-3:A13:15:_EXCHEQUR 70/115KV TB 1	P1	N-1	0.99	1.00	1.00	1.12	1.05	0.98	0.99	0.98	1.03	0.99	Under Review
MERCED 70kV	P1-3:A13:15:_EXCHEQUR 70/115KV TB 1	P1	N-1	1.03	1.02	1.02	1.10	1.05	1.02	1.03	1.02	1.04	1.02	Under Review
MRCDFLLS 70kV	P1-3:A13:15:_EXCHEQUR 70/115KV TB 1	P1	N-1	0.99	1.00	1.00	1.12	1.05	0.98	0.99	0.98	1.03	0.99	Under Review
OAKHURST 115kV	P1-2:A13:40:_CHOWCHILLA-KERCKHOFF 115KV [1250] MOAS OPENED ON OAKH_JCT_K1-JCT	P1	N-1	0.92	0.92	0.92	1.06	1.03	0.90	0.92	0.90	0.96	0.92	Sensitivity Only

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
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022 SP High CEC Forecast	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations	
OAKHURST 115kV	P1-2:A14:47:_CHOWCHILLA-KERCKHOFF 115KV [1250] MOAS OPENED ON OAKH_JCT_K1-JCT	P1	N-1	0.92	0.92	0.92	1.06	1.03	0.90	0.92	0.90	0.96	0.92	Sensitivity Only
ORO LOMA 70kV	P1-2:A13:50:_PANOCHE-ORO LOMA 115KV [3240]	P1	N-1	0.95	0.91	0.91	1.06	1.06	0.90	0.95	0.89	0.97	0.91	Sensitivity Only
ORO LOMA 115kV	P1-2:A13:50:_PANOCHE-ORO LOMA 115KV [3240]	P1	N-1	0.95	0.91	0.91	1.05	1.05	0.90	0.95	0.90	0.97	0.91	Sensitivity Only
POSO J1 70kV	P1-2:A13:50:_PANOCHE-ORO LOMA 115KV [3240]	P1	N-1	0.92	0.88	0.87	1.05	1.05	0.86	0.92	0.86	0.95	0.87	Under Review
POSO J2 70kV	P1-3:A13:15:_EXCHEQUR 70/115KV TB 1	P1	N-1	1.04	1.03	1.03	1.10	1.06	1.03	1.04	1.03	1.04	1.03	Under Review
SAXONCRK 70kV	P1-3:A13:15:_EXCHEQUR 70/115KV TB 1	P1	N-1	0.94	0.96	0.96	1.12	1.05	0.94	0.94	0.94	1.00	0.96	Under Review
SNTA RTA 70kV	P1-2:A13:50:_PANOCHE-ORO LOMA 115KV [3240]	P1	N-1	0.93	0.89	0.89	1.05	1.05	0.87	0.93	0.87	0.95	0.89	Under Review
YOSEMITE 70kV	P1-3:A13:15:_EXCHEQUR 70/115KV TB 1	P1	N-1	0.92	0.95	0.95	1.13	1.04	0.93	0.92	0.93	0.99	0.95	Under Review
ARBURU T 70kV	P2-1:A13:67:_LOS BANOS-LIVINGSTON JCT-CANAL 70KV [8940] (CHEVPIPE-LOS BANS)	P2	Line section w/o fault	0.93	0.87	0.83	1.05	1.02	0.84	0.93	0.63	0.96	0.84	Scope Under Review: Oro Loma 70kV Reinforcement
ARBURUA 70kV	P2-1:A13:67:_LOS BANOS-LIVINGSTON JCT-CANAL 70KV [8940] (CHEVPIPE-LOS BANS)	P2	Line section w/o fault	0.92	0.87	0.82	1.05	1.01	0.83	0.92	0.62	0.95	0.84	Scope Under Review: Oro Loma 70kV Reinforcement
CANAL 70kV	P2-1:A13:65:_LOS BANOS-LIVINGSTON JCT-CANAL 70KV [8940] (CANAL-LVNGSTNT)	P2	Line section w/o fault	0.91	0.93	0.91	1.04	1.01	0.91	0.91	0.89	0.95	0.91	Scope Under Review: Oro Loma 70kV Reinforcement
CANAL 70kV	P2-1:A13:67:_LOS BANOS-LIVINGSTON JCT-CANAL 70KV [8940] (CHEVPIPE-LOS BANS)	P2	Line section w/o fault	0.84	0.75	0.68	1.03	1.01	0.70	0.84	0.35	0.89	0.70	Scope Under Review: Oro Loma 70kV Reinforcement
CANAL 70kV	P2-1:A13:68:_LOS BANOS-LIVINGSTON JCT-CANAL 70KV [8940] (SNTA NLA-LVNGSTNT)	P2	Line section w/o fault	0.92	0.93	0.92	1.04	1.01	0.91	0.92	0.90	0.96	0.91	Scope Under Review: Oro Loma 70kV Reinforcement
CHEVPIPE 70kV	P2-1:A13:67:_LOS BANOS-LIVINGSTON JCT-CANAL 70KV [8940] (CHEVPIPE-LOS BANS)	P2	Line section w/o fault	0.83	0.72	0.65	1.03	1.00	0.67	0.83	0.30	0.87	0.67	Scope Under Review: Oro Loma 70kV Reinforcement
DFS 115kV	P2-1:A13:40:_PANOCHE-ORO LOMA 115KV [3240] (HAMMONDS-DFSTP)	P2	Line section w/o fault	0.95	0.91	0.91	1.05	1.05	0.89	0.95	0.89	0.97	0.91	Sensitivity Only

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
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022 SP High CEC Forecast	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations	
DFSTP 115kV	P2-1:A13:40:_PANOCHE-ORO LOMA 115KV [3240] (HAMMONDS-DFSTP)	P2	Line section w/o fault	0.95	0.91	0.91	1.05	1.05	0.89	0.95	0.89	0.97	0.91	Sensitivity Only
DOS PALS 70kV	P2-1:A13:40:_PANOCHE-ORO LOMA 115KV [3240] (HAMMONDS-DFSTP)	P2	Line section w/o fault	0.94	0.89	0.89	1.05	1.05	0.88	0.94	0.87	0.96	0.89	Scope Under Review: Oro Loma 70kV Reinforcement
DOS PALS 70kV	P2-1:A13:41:_PANOCHE-ORO LOMA 115KV [3240] (DFSTP-ORO LOMA)	P2	Line section w/o fault	0.94	0.90	0.89	1.05	1.05	0.88	0.94	0.88	0.96	0.89	Scope Under Review: Oro Loma 70kV Reinforcement
FIREBAGH 70kV	P2-1:A13:40:_PANOCHE-ORO LOMA 115KV [3240] (HAMMONDS-DFSTP)	P2	Line section w/o fault	0.91	0.86	0.86	1.05	1.05	0.84	0.91	0.84	0.94	0.86	Under Review
FIREBAGH 70kV	P2-1:A13:41:_PANOCHE-ORO LOMA 115KV [3240] (DFSTP-ORO LOMA)	P2	Line section w/o fault	0.91	0.87	0.86	1.05	1.05	0.85	0.91	0.85	0.94	0.86	Under Review
LIVNGSTN 70kV	P2-1:A13:67:_LOS BANOS-LIVINGSTON JCT-CANAL 70KV [8940] (CHEVPIPE-LOS BANS)	P2	Line section w/o fault	0.84	0.75	0.68	1.04	1.01	0.69	0.84	0.35	0.89	0.70	Scope Under Review: Oro Loma 70kV Reinforcement
LIVNGSTN 70kV	P2-1:A13:68:_LOS BANOS-LIVINGSTON JCT-CANAL 70KV [8940] (SNTA NLA-LVNGSTNT)	P2	Line section w/o fault	0.92	0.93	0.92	1.04	1.02	0.92	0.92	0.90	0.96	0.92	Scope Under Review: Oro Loma 70kV Reinforcement
LVNGSTNT 70kV	P2-1:A13:67:_LOS BANOS-LIVINGSTON JCT-CANAL 70KV [8940] (CHEVPIPE-LOS BANS)	P2	Line section w/o fault	0.84	0.75	0.67	1.03	1.01	0.69	0.84	0.34	0.89	0.70	Scope Under Review: Oro Loma 70kV Reinforcement
LVNGSTNT 70kV	P2-1:A13:68:_LOS BANOS-LIVINGSTON JCT-CANAL 70KV [8940] (SNTA NLA-LVNGSTNT)	P2	Line section w/o fault	0.92	0.93	0.92	1.04	1.01	0.91	0.92	0.90	0.96	0.91	Scope Under Review: Oro Loma 70kV Reinforcement
MERCYSPRNGSS 70kV	P2-1:A13:67:_LOS BANOS-LIVINGSTON JCT-CANAL 70KV [8940] (CHEVPIPE-LOS BANS)	P2	Line section w/o fault	0.91	0.85	0.80	1.05	1.01	0.81	0.91	0.57	0.95	0.82	Scope Under Review: Oro Loma 70kV Reinforcement
MRCYSPRS 70kV	P2-1:A13:67:_LOS BANOS-LIVINGSTON JCT-CANAL 70KV [8940] (CHEVPIPE-LOS BANS)	P2	Line section w/o fault	0.91	0.84	0.79	1.04	1.01	0.80	0.91	0.55	0.94	0.81	Scope Under Review: Oro Loma 70kV Reinforcement
OAKHURST 115kV	P2-1:A13:31:_CHOWCHILLA-KERCKHOFF 115KV [1250] (OAKH_JCT-K1-JCT)	P2	Line section w/o fault	0.92	0.92	0.92	1.06	1.03	0.90	0.92	0.90	0.96	0.92	Sensitivity Only
ORO LOMA 70kV	P2-1:A13:40:_PANOCHE-ORO LOMA 115KV [3240] (HAMMONDS-DFSTP)	P2	Line section w/o fault	0.95	0.91	0.91	1.06	1.05	0.89	0.95	0.89	0.97	0.90	Sensitivity Only

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
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022 SP High CEC Forecast	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations	
ORO LOMA 70kV	P2-1:A13:41: _PANOCHÉ-ORO LOMA 115KV [3240] (DFSTP-ORO LOMA)	P2	Line section w/o fault	0.95	0.91	0.91	1.06	1.06	0.90	0.95	0.89	0.97	0.91	Sensitivity Only
ORO LOMA 115kV	P2-1:A13:40: _PANOCHÉ-ORO LOMA 115KV [3240] (HAMMONDS-DFSTP)	P2	Line section w/o fault	0.95	0.91	0.91	1.05	1.05	0.89	0.95	0.89	0.97	0.91	Sensitivity Only
ORO LOMA 115kV	P2-1:A13:41: _PANOCHÉ-ORO LOMA 115KV [3240] (DFSTP-ORO LOMA)	P2	Line section w/o fault	0.95	0.91	0.91	1.05	1.05	0.90	0.95	0.90	0.97	0.91	Sensitivity Only
ORTIGA 70kV	P2-1:A13:67: _LOS BANOS-LIVINGSTON JCT-CANAL 70KV [8940] (CHEVPIPE-LOS BANS)	P2	Line section w/o fault	0.88	0.81	0.75	1.04	1.01	0.76	0.88	0.47	0.92	0.77	Scope Under Review: Oro Loma 70kV Reinforcement
POSO J1 70kV	P2-1:A13:40: _PANOCHÉ-ORO LOMA 115KV [3240] (HAMMONDS-DFSTP)	P2	Line section w/o fault	0.92	0.87	0.87	1.05	1.05	0.85	0.92	0.85	0.94	0.87	Scope Under Review: Oro Loma 70kV Reinforcement
POSO J1 70kV	P2-1:A13:41: _PANOCHÉ-ORO LOMA 115KV [3240] (DFSTP-ORO LOMA)	P2	Line section w/o fault	0.92	0.88	0.87	1.05	1.05	0.86	0.92	0.86	0.95	0.87	Under Review
SNTA NLA 70kV	P2-1:A13:67: _LOS BANOS-LIVINGSTON JCT-CANAL 70KV [8940] (CHEVPIPE-LOS BANS)	P2	Line section w/o fault	0.83	0.72	0.65	1.03	1.00	0.67	0.83	0.30	0.87	0.67	Scope Under Review: Oro Loma 70kV Reinforcement
SNTA RTA 70kV	P2-1:A13:40: _PANOCHÉ-ORO LOMA 115KV [3240] (HAMMONDS-DFSTP)	P2	Line section w/o fault	0.93	0.89	0.88	1.05	1.05	0.87	0.93	0.87	0.95	0.88	Under Review
SNTA RTA 70kV	P2-1:A13:41: _PANOCHÉ-ORO LOMA 115KV [3240] (DFSTP-ORO LOMA)	P2	Line section w/o fault	0.93	0.89	0.89	1.05	1.05	0.87	0.93	0.87	0.96	0.89	Under Review
VEGA 70kV	P2-1:A13:67: _LOS BANOS-LIVINGSTON JCT-CANAL 70KV [8940] (CHEVPIPE-LOS BANS)	P2	Line section w/o fault	0.91	0.85	0.80	1.05	1.01	0.81	0.91	0.57	0.95	0.82	Scope Under Review: Oro Loma 70kV Reinforcement
WRGHT PP 70kV	P2-1:A13:67: _LOS BANOS-LIVINGSTON JCT-CANAL 70KV [8940] (CHEVPIPE-LOS BANS)	P2	Line section w/o fault	0.97	0.94	0.92	1.05	1.02	0.92	0.97	0.82	0.99	0.93	Scope Under Review: Oro Loma 70kV Reinforcement
WRIGHT T 70kV	P2-1:A13:67: _LOS BANOS-LIVINGSTON JCT-CANAL 70KV [8940] (CHEVPIPE-LOS BANS)	P2	Line section w/o fault	0.97	0.94	0.92	1.05	1.02	0.92	0.97	0.82	0.99	0.93	Scope Under Review: Oro Loma 70kV Reinforcement
AIRPROD 115kV	P2-4:A14:5: _MC CALL 230KV - SECTION 1D & 2D	P2	Bus-tie breaker fault	0.96	0.95	0.93	1.05	1.03	0.90	0.96	0.87	0.97	0.88	Sensitivity Only

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
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022 SP High CEC Forecast	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations	
AIRWAYJ1 115kV	P2-4:A14:5:_MC CALL 230KV - SECTION 1D & 2D	P2	Bus-tie breaker fault	0.96	0.95	0.93	1.05	1.03	0.90	0.96	0.87	0.97	0.88	Under Review
AIRWAYJ2 115kV	P2-4:A14:1:_HERNDON 230KV - SECTION 1D & 2D	P2	Bus-tie breaker fault	0.96	0.95	0.93	1.05	1.03	0.90	0.96	0.87	0.97	0.88	Sensitivity Only
AIRWAYJ2 115kV	P2-4:A14:5:_MC CALL 230KV - SECTION 1D & 2D	P2	Bus-tie breaker fault	0.96	0.95	0.93	1.05	1.03	0.90	0.96	0.87	0.97	0.88	Sensitivity Only
AIRWAYS 115kV	P2-4:A14:1:_HERNDON 230KV - SECTION 1D & 2D	P2	Bus-tie breaker fault	0.96	0.95	0.93	1.05	1.03	0.90	0.96	0.87	0.97	0.88	Sensitivity Only
AIRWAYS 115kV	P2-4:A14:5:_MC CALL 230KV - SECTION 1D & 2D	P2	Bus-tie breaker fault	0.96	0.95	0.93	1.05	1.03	0.90	0.96	0.87	0.97	0.88	Under Review
AIRWAYS2 115kV	P2-4:A14:1:_HERNDON 230KV - SECTION 1D & 2D	P2	Bus-tie breaker fault	0.96	0.95	0.93	1.05	1.03	0.90	0.96	0.87	0.97	0.88	Sensitivity Only
AIRWAYS2 115kV	P2-4:A14:5:_MC CALL 230KV - SECTION 1D & 2D	P2	Bus-tie breaker fault	0.96	0.95	0.93	1.05	1.03	0.90	0.96	0.87	0.97	0.88	Sensitivity Only
ATWATER 115kV	P2-4:A13:11:_WILSON A SECTION 1D & WILSON B SECTION 2D 115KV	P2	Bus-tie breaker fault	0.96	0.95	0.93	1.05	1.03	0.90	0.96	0.87	0.97	0.88	Scope Under Review: Wilson 115 kV Area Reinforcement Project
ATWATR J 115kV	P2-4:A13:11:_WILSON A SECTION 1D & WILSON B SECTION 2D 115KV	P2	Bus-tie breaker fault	0.96	0.95	0.93	1.05	1.03	0.90	0.96	0.87	0.97	0.88	Scope Under Review: Wilson 115 kV Area Reinforcement Project
BALCH 115kV	P2-4:A14:5:_MC CALL 230KV - SECTION 1D & 2D	P2	Bus-tie breaker fault	0.96	0.95	0.93	1.05	1.03	0.90	0.96	0.87	0.97	0.88	Sensitivity Only
BARTON 115kV	P2-4:A14:1:_HERNDON 230KV - SECTION 1D & 2D	P2	Bus-tie breaker fault	0.96	0.95	0.93	1.05	1.03	0.90	0.96	0.87	0.97	0.88	Sensitivity Only
BARTON 115kV	P2-4:A14:5:_MC CALL 230KV - SECTION 1D & 2D	P2	Bus-tie breaker fault	0.96	0.95	0.93	1.05	1.03	0.90	0.96	0.87	0.97	0.88	Sensitivity Only
BER VLLY 70kV	P2-2:A13:9:_EXCHEQUR 115KV SECTION 1D	P2	Bus Section Fault	0.96	0.95	0.93	1.05	1.03	0.90	0.96	0.87	0.97	0.88	Sensitivity Only

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
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022 SP High CEC Forecast	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations	
BRCEBG J 70kV	P2-2:A13:9:_EXCHEQUR 115KV SECTION 1D	P2	Bus Section Fault	0.96	0.95	0.93	1.05	1.03	0.90	0.96	0.87	0.97	0.88	Sensitivity Only
BULLARD 115kV	P2-4:A14:1:_HERNDON 230KV - SECTION 1D & 2D	P2	Bus-tie breaker fault	0.96	0.95	0.93	1.05	1.03	0.90	0.96	0.87	0.97	0.88	Sensitivity Only
CAL AVE 115kV	P2-4:A14:5:_MC CALL 230KV - SECTION 1D & 2D	P2	Bus-tie breaker fault	0.96	0.95	0.93	1.05	1.03	0.90	0.96	0.87	0.97	0.88	Sensitivity Only
CAMDEN 70kV	P2-4:A14:5:_MC CALL 230KV - SECTION 1D & 2D	P2	Bus-tie breaker fault	0.96	0.95	0.93	1.05	1.03	0.90	0.96	0.87	0.97	0.88	Sensitivity Only
CASTLE 115kV	P2-4:A13:11:_WILSON A SECTION 1D & WILSON B SECTION 2D 115KV	P2	Bus-tie breaker fault	0.96	0.95	0.93	1.05	1.03	0.90	0.96	0.87	0.97	0.88	Sensitivity Only
CHLDHOSP 115kV	P2-4:A14:1:_HERNDON 230KV - SECTION 1D & 2D	P2	Bus-tie breaker fault	0.96	0.95	0.93	1.05	1.03	0.90	0.96	0.87	0.97	0.88	Sensitivity Only
CLOVIS-1 115kV	P2-4:A14:5:_MC CALL 230KV - SECTION 1D & 2D	P2	Bus-tie breaker fault	0.96	0.95	0.93	1.05	1.03	0.90	0.96	0.87	0.97	0.88	Sensitivity Only
CLOVIS-2 115kV	P2-4:A14:5:_MC CALL 230KV - SECTION 1D & 2D	P2	Bus-tie breaker fault	0.96	0.95	0.93	1.05	1.03	0.90	0.96	0.87	0.97	0.88	Sensitivity Only
CLOVISJ1 115kV	P2-4:A14:5:_MC CALL 230KV - SECTION 1D & 2D	P2	Bus-tie breaker fault	0.96	0.95	0.93	1.05	1.03	0.90	0.96	0.87	0.97	0.88	Sensitivity Only
CLOVISJ2 115kV	P2-4:A14:5:_MC CALL 230KV - SECTION 1D & 2D	P2	Bus-tie breaker fault	0.96	0.95	0.93	1.05	1.03	0.90	0.96	0.87	0.97	0.88	Sensitivity Only
CORCORAN 115kV	P2-4:A14:5:_MC CALL 230KV - SECTION 1D & 2D	P2	Bus-tie breaker fault	0.96	0.95	0.93	1.05	1.03	0.90	0.96	0.87	0.97	0.88	Sensitivity Only
CORCORANPV_P 115kV	P2-4:A14:5:_MC CALL 230KV - SECTION 1D & 2D	P2	Bus-tie breaker fault	0.96	0.95	0.93	1.05	1.03	0.90	0.96	0.87	0.97	0.88	Sensitivity Only
CORSGOLD 115kV	P2-4:A14:5:_MC CALL 230KV - SECTION 1D & 2D	P2	Bus-tie breaker fault	0.96	0.95	0.93	1.05	1.03	0.90	0.96	0.87	0.97	0.88	Sensitivity Only

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
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022 SP High CEC Forecast	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations	
CRESSEY 115kV	P2-4:A13:11:_WILSON A SECTION 1D & WILSON B SECTION 2D 115KV	P2	Bus-tie breaker fault	0.96	0.95	0.93	1.05	1.03	0.90	0.96	0.87	0.97	0.88	Sensitivity Only
DANISHCM 115kV	P2-4:A14:5:_MC CALL 230KV - SECTION 1D & 2D	P2	Bus-tie breaker fault	0.96	0.95	0.93	1.05	1.03	0.90	0.96	0.87	0.97	0.88	Sensitivity Only
DFS 115kV	P2-2:A13:22:_PANOCH2 115KV SECTION 2D	P2	Bus Section Fault	0.96	0.95	0.93	1.05	1.03	0.90	0.96	0.87	0.97	0.88	Sensitivity Only
DFS 115kV	P2-3:A13:30:_PANOCH2 - 2D 115KV & EXCELSIORSS-PANOCH2 LINE	P2	Non-bus-tie breaker fault	0.96	0.95	0.93	1.05	1.03	0.90	0.96	0.87	0.97	0.88	Sensitivity Only
DFS 115kV	P2-4:A13:12:_PANOCH1 SECTION 1D & PANOCH2 SECTION 2D 115KV	P2	Bus-tie breaker fault	0.96	0.95	0.93	1.05	1.03	0.90	0.96	0.87	0.97	0.88	Sensitivity Only
DFSTP 115kV	P2-2:A13:22:_PANOCH2 115KV SECTION 2D	P2	Bus Section Fault	0.96	0.95	0.93	1.05	1.03	0.90	0.96	0.87	0.97	0.88	Sensitivity Only
DFSTP 115kV	P2-3:A13:30:_PANOCH2 - 2D 115KV & EXCELSIORSS-PANOCH2 LINE	P2	Non-bus-tie breaker fault	0.96	0.95	0.93	1.05	1.03	0.90	0.96	0.87	0.97	0.88	Sensitivity Only
DFSTP 115kV	P2-4:A13:12:_PANOCH1 SECTION 1D & PANOCH2 SECTION 2D 115KV	P2	Bus-tie breaker fault	0.96	0.95	0.93	1.05	1.03	0.90	0.96	0.87	0.97	0.88	Sensitivity Only
DINUBA 70kV	P2-4:A14:5:_MC CALL 230KV - SECTION 1D & 2D	P2	Bus-tie breaker fault	0.96	0.95	0.93	1.05	1.03	0.90	0.96	0.87	0.97	0.88	Sensitivity Only
DNUBAEGY 70kV	P2-4:A14:5:_MC CALL 230KV - SECTION 1D & 2D	P2	Bus-tie breaker fault	0.96	0.95	0.93	1.05	1.03	0.90	0.96	0.87	0.97	0.88	Sensitivity Only
DNUBAJCT 70kV	P2-4:A14:5:_MC CALL 230KV - SECTION 1D & 2D	P2	Bus-tie breaker fault	0.96	0.95	0.93	1.05	1.03	0.90	0.96	0.87	0.97	0.88	Sensitivity Only
DOS PALS 70kV	P2-2:A13:22:_PANOCH2 115KV SECTION 2D	P2	Bus Section Fault	0.96	0.95	0.93	1.05	1.03	0.90	0.96	0.87	0.97	0.88	Sensitivity Only

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
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022 SP High CEC Forecast	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations	
DOS PALS 70kV	P2-3:A13:30:_PANOCHE2 - 2D 115KV & EXCELSIORSS-PANOCHE2 LINE	P2	Non-bus-tie breaker fault	0.96	0.95	0.93	1.05	1.03	0.90	0.96	0.87	0.97	0.88	Sensitivity Only
DOS PALS 70kV	P2-3:A13:31:_PANOCHE2 - 2D 115KV & PANOCHE-ORO LOMA LINE	P2	Non-bus-tie breaker fault	0.96	0.95	0.93	1.05	1.03	0.90	0.96	0.87	0.97	0.88	Sensitivity Only
DOS PALS 70kV	P2-4:A13:12:_PANOCHE1 SECTION 1D & PANOCHE2 SECTION 2D 115KV	P2	Bus-tie breaker fault	0.96	0.95	0.93	1.05	1.03	0.90	0.96	0.87	0.97	0.88	Sensitivity Only
DUNLAP 70kV	P2-4:A14:1:_HERNDON 230KV - SECTION 1D & 2D	P2	Bus-tie breaker fault	0.96	0.95	0.93	1.05	1.03	0.90	0.96	0.87	0.97	0.88	Sensitivity Only
DUNLAP 70kV	P2-4:A14:5:_MC CALL 230KV - SECTION 1D & 2D	P2	Bus-tie breaker fault	0.96	0.95	0.93	1.05	1.03	0.90	0.96	0.87	0.97	0.88	Sensitivity Only
EL CAPTN 115kV	P2-4:A13:11:_WILSON A SECTION 1D & WILSON B SECTION 2D 115KV	P2	Bus-tie breaker fault	0.96	0.95	0.93	1.05	1.03	0.90	0.96	0.87	0.97	0.88	Sensitivity Only
ELNIDO 70kV	P2-2:A13:9:_EXCHEQUR 115KV SECTION 1D	P2	Bus Section Fault	0.96	0.95	0.93	1.05	1.03	0.90	0.96	0.87	0.97	0.88	Sensitivity Only
ELNIDO 70kV	P2-4:A13:11:_WILSON A SECTION 1D & WILSON B SECTION 2D 115KV	P2	Bus-tie breaker fault	0.96	0.95	0.93	1.05	1.03	0.90	0.96	0.87	0.97	0.88	Sensitivity Only
ELNIDOTP 70kV	P2-2:A13:9:_EXCHEQUR 115KV SECTION 1D	P2	Bus Section Fault	0.96	0.95	0.93	1.05	1.03	0.90	0.96	0.87	0.97	0.88	Sensitivity Only
ELNIDOTP 70kV	P2-4:A13:11:_WILSON A SECTION 1D & WILSON B SECTION 2D 115KV	P2	Bus-tie breaker fault	0.96	0.95	0.93	1.05	1.03	0.90	0.96	0.87	0.97	0.88	Sensitivity Only
EXCHEQUR 70kV	P2-2:A13:9:_EXCHEQUR 115KV SECTION 1D	P2	Bus Section Fault	0.96	0.95	0.93	1.05	1.03	0.90	0.96	0.87	0.97	0.88	Sensitivity Only
FIREBAGH 70kV	P2-2:A13:22:_PANOCHE2 115KV SECTION 2D	P2	Bus Section Fault	0.96	0.95	0.93	1.05	1.03	0.90	0.96	0.87	0.97	0.88	Sensitivity Only

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
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022 SP High CEC Forecast	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations	
FIREBAGH 70kV	P2-3:A13:30:_PANOCHE2 - 2D 115KV & EXCELSIORSS-PANOCHE2 LINE	P2	Non-bus-tie breaker fault	0.96	0.95	0.93	1.05	1.03	0.90	0.96	0.87	0.97	0.88	Sensitivity Only
FIREBAGH 70kV	P2-3:A13:31:_PANOCHE2 - 2D 115KV & PANOCHE-ORO LOMA LINE	P2	Non-bus-tie breaker fault	0.96	0.95	0.93	1.05	1.03	0.90	0.96	0.87	0.97	0.88	Sensitivity Only
FIREBAGH 70kV	P2-4:A13:12:_PANOCHE1 SECTION 1D & PANOCHE2 SECTION 2D 115KV	P2	Bus-tie breaker fault	0.96	0.95	0.93	1.05	1.03	0.90	0.96	0.87	0.97	0.88	Sensitivity Only
GALLO 115kV	P2-4:A13:11:_WILSON A SECTION 1D & WILSON B SECTION 2D 115KV	P2	Bus-tie breaker fault	0.96	0.95	0.93	1.05	1.03	0.90	0.96	0.87	0.97	0.88	Sensitivity Only
GATES 115kV	P2-2:A14:18:_GATES 230KV SECTION 2E	P2	Bus Section Fault	0.96	0.95	0.93	1.05	1.03	0.90	0.96	0.87	0.97	0.88	Sensitivity Only
GATES 115kV	P2-3:A14:16:_HENRIETA - 1D 230KV & MUSTANG SW STA-GREGG LINE	P2	Non-bus-tie breaker fault	0.96	0.95	0.93	1.05	1.03	0.90	0.96	0.87	0.97	0.88	Sensitivity Only
GATES 115kV	P2-3:A14:19:_MUSTANGSS 230KV - MIDDLE BREAKER BAY 2	P2	Non-bus-tie breaker fault	0.96	0.95	0.93	1.05	1.03	0.90	0.96	0.87	0.97	0.88	Sensitivity Only
GATES 115kV	P2-4:A14:8:_GATES 230KV - SECTION 2E & 1E	P2	Bus-tie breaker fault	0.96	0.95	0.93	1.05	1.03	0.90	0.96	0.87	0.97	0.88	Sensitivity Only
GAURD J1 115kV	P2-4:A14:5:_MC CALL 230KV - SECTION 1D & 2D	P2	Bus-tie breaker fault	0.96	0.95	0.93	1.05	1.03	0.90	0.96	0.87	0.97	0.88	Sensitivity Only
GAURD J2 115kV	P2-4:A14:5:_MC CALL 230KV - SECTION 1D & 2D	P2	Bus-tie breaker fault	0.96	0.95	0.93	1.05	1.03	0.90	0.96	0.87	0.97	0.88	Sensitivity Only
GRDN GLS 115kV	P2-4:A14:5:_MC CALL 230KV - SECTION 1D & 2D	P2	Bus-tie breaker fault	0.96	0.95	0.93	1.05	1.03	0.90	0.96	0.87	0.97	0.88	Sensitivity Only

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
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022 SP High CEC Forecast	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations	
GRDNGLS2 115kV	P2-4:A14:5:_MC CALL 230KV - SECTION 1D & 2D	P2	Bus-tie breaker fault	0.96	0.95	0.93	1.05	1.03	0.90	0.96	0.87	0.97	0.88	Sensitivity Only
HAMMONDS 115kV	P2-2:A13:22:_PANOCHE2 115KV SECTION 2D	P2	Bus Section Fault	0.96	0.95	0.93	1.05	1.03	0.90	0.96	0.87	0.97	0.88	Sensitivity Only
HAMMONDS 115kV	P2-3:A13:30:_PANOCHE2 - 2D 115KV & EXCELSIORSS-PANOCHE2 LINE	P2	Non-bus-tie breaker fault	0.96	0.95	0.93	1.05	1.03	0.90	0.96	0.87	0.97	0.88	Sensitivity Only
HAMMONDS 115kV	P2-4:A13:12:_PANOCHE1 SECTION 1D & PANOCHE2 SECTION 2D 115KV	P2	Bus-tie breaker fault	0.96	0.95	0.93	1.05	1.03	0.90	0.96	0.87	0.97	0.88	Sensitivity Only
HARDWICK 70kV	P2-4:A14:5:_MC CALL 230KV - SECTION 1D & 2D	P2	Bus-tie breaker fault	0.96	0.95	0.93	1.05	1.03	0.90	0.96	0.87	0.97	0.88	Sensitivity Only
HERNDON 115kV	P2-4:A14:1:_HERNDON 230KV - SECTION 1D & 2D	P2	Bus-tie breaker fault	0.96	0.95	0.93	1.05	1.03	0.90	0.96	0.87	0.97	0.88	Sensitivity Only
HERNDON 230kV	P2-4:A14:1:_HERNDON 230KV - SECTION 1D & 2D	P2	Bus-tie breaker fault	0.96	0.95	0.93	1.05	1.03	0.90	0.96	0.87	0.97	0.88	Sensitivity Only
HNF RD SW 70kV	P2-4:A14:5:_MC CALL 230KV - SECTION 1D & 2D	P2	Bus-tie breaker fault	0.96	0.95	0.93	1.05	1.03	0.90	0.96	0.87	0.97	0.88	Sensitivity Only
HRDWK TP 70kV	P2-4:A14:5:_MC CALL 230KV - SECTION 1D & 2D	P2	Bus-tie breaker fault	0.96	0.95	0.93	1.05	1.03	0.90	0.96	0.87	0.97	0.88	Sensitivity Only
INDN FLT 70kV	P2-2:A13:9:_EXCHEQUR 115KV SECTION 1D	P2	Bus Section Fault	0.96	0.95	0.93	1.05	1.03	0.90	0.96	0.87	0.97	0.88	Sensitivity Only
JR WOOD 115kV	P2-4:A13:11:_WILSON A SECTION 1D & WILSON B SECTION 2D 115KV	P2	Bus-tie breaker fault	0.96	0.95	0.93	1.05	1.03	0.90	0.96	0.87	0.97	0.88	Sensitivity Only
JRWD GEN 115kV	P2-4:A13:11:_WILSON A SECTION 1D & WILSON B SECTION 2D 115KV	P2	Bus-tie breaker fault	0.96	0.95	0.93	1.05	1.03	0.90	0.96	0.87	0.97	0.88	Sensitivity Only
KCOGNJCT 115kV	P2-4:A14:5:_MC CALL 230KV - SECTION 1D & 2D	P2	Bus-tie breaker fault	0.96	0.95	0.93	1.05	1.03	0.90	0.96	0.87	0.97	0.88	Sensitivity Only

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
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022 SP High CEC Forecast	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations	
KINGS J1 115kV	P2-4:A14:5:_MC CALL 230KV - SECTION 1D & 2D	P2	Bus-tie breaker fault	0.96	0.95	0.93	1.05	1.03	0.90	0.96	0.87	0.97	0.88	Sensitivity Only
KINGS J2 115kV	P2-4:A14:5:_MC CALL 230KV - SECTION 1D & 2D	P2	Bus-tie breaker fault	0.96	0.95	0.93	1.05	1.03	0.90	0.96	0.87	0.97	0.88	Sensitivity Only
KINGSBRG 115kV	P2-4:A14:5:_MC CALL 230KV - SECTION 1D & 2D	P2	Bus-tie breaker fault	0.96	0.95	0.93	1.05	1.03	0.90	0.96	0.87	0.97	0.88	Sensitivity Only
KNGLOBUS 70kV	P2-4:A14:5:_MC CALL 230KV - SECTION 1D & 2D	P2	Bus-tie breaker fault	0.96	0.95	0.93	1.05	1.03	0.90	0.96	0.87	0.97	0.88	Sensitivity Only
KNGSCOGN 115kV	P2-4:A14:5:_MC CALL 230KV - SECTION 1D & 2D	P2	Bus-tie breaker fault	0.96	0.95	0.93	1.05	1.03	0.90	0.96	0.87	0.97	0.88	Sensitivity Only
KNGSRVR1 115kV	P2-4:A14:5:_MC CALL 230KV - SECTION 1D & 2D	P2	Bus-tie breaker fault	0.96	0.95	0.93	1.05	1.03	0.90	0.96	0.87	0.97	0.88	Sensitivity Only
KRCDP 115kV	P2-4:A14:5:_MC CALL 230KV - SECTION 1D & 2D	P2	Bus-tie breaker fault	0.96	0.95	0.93	1.05	1.03	0.90	0.96	0.87	0.97	0.88	Sensitivity Only
LASPALMS 115kV	P2-4:A14:5:_MC CALL 230KV - SECTION 1D & 2D	P2	Bus-tie breaker fault	0.96	0.95	0.93	1.05	1.03	0.90	0.96	0.87	0.97	0.88	Sensitivity Only
LIVNGSTN 115kV	P2-4:A13:11:_WILSON A SECTION 1D & WILSON B SECTION 2D 115KV	P2	Bus-tie breaker fault	0.96	0.95	0.93	1.05	1.03	0.90	0.96	0.87	0.97	0.88	Sensitivity Only
LUIS_#3 115kV	P2-2:A13:22:_PANOCHE2 115KV SECTION 2D	P2	Bus Section Fault	0.96	0.95	0.93	1.05	1.03	0.90	0.96	0.87	0.97	0.88	Sensitivity Only
LUIS_#3 115kV	P2-3:A13:30:_PANOCHE2 - 2D 115KV & EXCELSIORSS-PANOCHE2 LINE	P2	Non-bus-tie breaker fault	0.96	0.95	0.93	1.05	1.03	0.90	0.96	0.87	0.97	0.88	Sensitivity Only
LUIS_#3 115kV	P2-4:A13:12:_PANOCHE1 SECTION 1D & PANOCHE2 SECTION 2D 115KV	P2	Bus-tie breaker fault	0.96	0.95	0.93	1.05	1.03	0.90	0.96	0.87	0.97	0.88	Sensitivity Only
LUIS_#5 115kV	P2-2:A13:22:_PANOCHE2 115KV SECTION 2D	P2	Bus Section Fault	0.96	0.95	0.93	1.05	1.03	0.90	0.96	0.87	0.97	0.88	Sensitivity Only

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
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022 SP High CEC Forecast	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations	
LUIS_#5 115kV	P2-3:A13:30:_PANOCHE2 - 2D 115KV & EXCELSIORSS-PANOCHE2 LINE	P2	Non-bus-tie breaker fault	0.96	0.95	0.93	1.05	1.03	0.90	0.96	0.87	0.97	0.88	Sensitivity Only
LUIS_#5 115kV	P2-4:A13:12:_PANOCHE1 SECTION 1D & PANOCHE2 SECTION 2D 115KV	P2	Bus-tie breaker fault	0.96	0.95	0.93	1.05	1.03	0.90	0.96	0.87	0.97	0.88	Sensitivity Only
LUISJCT 115kV	P2-2:A13:22:_PANOCHE2 115KV SECTION 2D	P2	Bus Section Fault	0.96	0.95	0.93	1.05	1.03	0.90	0.96	0.87	0.97	0.88	Sensitivity Only
LUISJCT 115kV	P2-3:A13:30:_PANOCHE2 - 2D 115KV & EXCELSIORSS-PANOCHE2 LINE	P2	Non-bus-tie breaker fault	0.96	0.95	0.93	1.05	1.03	0.90	0.96	0.87	0.97	0.88	Sensitivity Only
LUISJCT 115kV	P2-4:A13:12:_PANOCHE1 SECTION 1D & PANOCHE2 SECTION 2D 115KV	P2	Bus-tie breaker fault	0.96	0.95	0.93	1.05	1.03	0.90	0.96	0.87	0.97	0.88	Sensitivity Only
MALAGA 115kV	P2-4:A14:5:_MC CALL 230KV - SECTION 1D & 2D	P2	Bus-tie breaker fault	0.96	0.95	0.93	1.05	1.03	0.90	0.96	0.87	0.97	0.88	Sensitivity Only
MALAGATP 115kV	P2-4:A14:5:_MC CALL 230KV - SECTION 1D & 2D	P2	Bus-tie breaker fault	0.96	0.95	0.93	1.05	1.03	0.90	0.96	0.87	0.97	0.88	Sensitivity Only
MANCHSTR 115kV	P2-4:A14:1:_HERNDON 230KV - SECTION 1D & 2D	P2	Bus-tie breaker fault	0.96	0.95	0.93	1.05	1.03	0.90	0.96	0.87	0.97	0.88	Sensitivity Only
MANCHSTR 115kV	P2-4:A14:5:_MC CALL 230KV - SECTION 1D & 2D	P2	Bus-tie breaker fault	0.96	0.95	0.93	1.05	1.03	0.90	0.96	0.87	0.97	0.88	Sensitivity Only
MARIPOS2 70kV	P2-2:A13:9:_EXCHEQUR 115KV SECTION 1D	P2	Bus Section Fault	0.96	0.95	0.93	1.05	1.03	0.90	0.96	0.87	0.97	0.88	Sensitivity Only
MC CALL 115kV	P2-4:A14:5:_MC CALL 230KV - SECTION 1D & 2D	P2	Bus-tie breaker fault	0.96	0.95	0.93	1.05	1.03	0.90	0.96	0.87	0.97	0.88	Sensitivity Only
MC SWAIN 70kV	P2-2:A13:9:_EXCHEQUR 115KV SECTION 1D	P2	Bus Section Fault	0.96	0.95	0.93	1.05	1.03	0.90	0.96	0.87	0.97	0.88	Sensitivity Only

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
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022 SP High CEC Forecast	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations	
MC SWAIN 70kV	P2-4:A13:11:_WILSON A SECTION 1D & WILSON B SECTION 2D 115KV	P2	Bus-tie breaker fault	0.96	0.95	0.93	1.05	1.03	0.90	0.96	0.87	0.97	0.88	Sensitivity Only
MCSWAINJ 70kV	P2-2:A13:9:_EXCHEQUR 115KV SECTION 1D	P2	Bus Section Fault	0.96	0.95	0.93	1.05	1.03	0.90	0.96	0.87	0.97	0.88	Sensitivity Only
MCSWAINJ 70kV	P2-4:A13:11:_WILSON A SECTION 1D & WILSON B SECTION 2D 115KV	P2	Bus-tie breaker fault	0.96	0.95	0.93	1.05	1.03	0.90	0.96	0.87	0.97	0.88	Sensitivity Only
MERCED 70kV	P2-2:A13:9:_EXCHEQUR 115KV SECTION 1D	P2	Bus Section Fault	0.96	0.95	0.93	1.05	1.03	0.90	0.96	0.87	0.97	0.88	Sensitivity Only
MERCED 70kV	P2-4:A13:11:_WILSON A SECTION 1D & WILSON B SECTION 2D 115KV	P2	Bus-tie breaker fault	0.96	0.95	0.93	1.05	1.03	0.90	0.96	0.87	0.97	0.88	Sensitivity Only
MERCED 115kV	P2-4:A13:11:_WILSON A SECTION 1D & WILSON B SECTION 2D 115KV	P2	Bus-tie breaker fault	0.96	0.95	0.93	1.05	1.03	0.90	0.96	0.87	0.97	0.88	Sensitivity Only
MRCDFLLS 70kV	P2-2:A13:9:_EXCHEQUR 115KV SECTION 1D	P2	Bus Section Fault	0.96	0.95	0.93	1.05	1.03	0.90	0.96	0.87	0.97	0.88	Sensitivity Only
MRCDFLLS 70kV	P2-4:A13:11:_WILSON A SECTION 1D & WILSON B SECTION 2D 115KV	P2	Bus-tie breaker fault	0.96	0.95	0.93	1.05	1.03	0.90	0.96	0.87	0.97	0.88	Sensitivity Only
OAKHURST 115kV	P2-2:A14:25:_KERCKHF2 115KV SECTION 1D	P2	Bus Section Fault	0.96	0.95	0.93	1.05	1.03	0.90	0.96	0.87	0.97	0.88	Sensitivity Only
OAKHURST 115kV	P2-3:A14:24:_KERCKHF2 - 1D 115KV & CHOWCHILLA-KERCKHOFF LINE	P2	Non-bus-tie breaker fault	0.96	0.95	0.93	1.05	1.03	0.90	0.96	0.87	0.97	0.88	Sensitivity Only
OAKHURST 115kV	P2-3:A14:25:_KERCKHF2 - 1D 115KV & KERCKHOFF-CLOVIS-SANGER #1 LINE	P2	Non-bus-tie breaker fault	0.96	0.95	0.93	1.05	1.03	0.90	0.96	0.87	0.97	0.88	Sensitivity Only
OAKHURST 115kV	P2-3:A14:26:_KERCKHF2 - 1D 115KV & KERCKHOFF-CLOVIS-SANGER #2 LINE	P2	Non-bus-tie breaker fault	0.96	0.95	0.93	1.05	1.03	0.90	0.96	0.87	0.97	0.88	Sensitivity Only

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
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022 SP High CEC Forecast	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations	
OAKHURST 115kV	P2-4:A14:1:_HERNDON 230KV - SECTION 1D & 2D	P2	Bus-tie breaker fault	0.96	0.95	0.93	1.05	1.03	0.90	0.96	0.87	0.97	0.88	Sensitivity Only
OAKHURST 115kV	P2-4:A14:38:_KERCKHF1 SECTION 1D & KERCKHF2 SECTION 1D 115KV	P2	Bus-tie breaker fault	0.96	0.95	0.93	1.05	1.03	0.90	0.96	0.87	0.97	0.88	Sensitivity Only
OAKHURST 115kV	P2-4:A14:5:_MC CALL 230KV - SECTION 1D & 2D	P2	Bus-tie breaker fault	0.96	0.95	0.93	1.05	1.03	0.90	0.96	0.87	0.97	0.88	Sensitivity Only
ORO LOMA 70kV	P2-2:A13:22:_PANOCH2 115KV SECTION 2D	P2	Bus Section Fault	0.96	0.95	0.93	1.05	1.03	0.90	0.96	0.87	0.97	0.88	Sensitivity Only
ORO LOMA 70kV	P2-3:A13:30:_PANOCH2 - 2D 115KV & EXCELSIORSS-PANOCH2 LINE	P2	Non-bus-tie breaker fault	0.96	0.95	0.93	1.05	1.03	0.90	0.96	0.87	0.97	0.88	Sensitivity Only
ORO LOMA 70kV	P2-3:A13:31:_PANOCH2 - 2D 115KV & PANOCH2-ORO LOMA LINE	P2	Non-bus-tie breaker fault	0.96	0.95	0.93	1.05	1.03	0.90	0.96	0.87	0.97	0.88	Sensitivity Only
ORO LOMA 70kV	P2-4:A13:12:_PANOCH1 SECTION 1D & PANOCH2 SECTION 2D 115KV	P2	Bus-tie breaker fault	0.96	0.95	0.93	1.05	1.03	0.90	0.96	0.87	0.97	0.88	Sensitivity Only
ORO LOMA 115kV	P2-2:A13:22:_PANOCH2 115KV SECTION 2D	P2	Bus Section Fault	0.96	0.95	0.93	1.05	1.03	0.90	0.96	0.87	0.97	0.88	Sensitivity Only
ORO LOMA 115kV	P2-3:A13:30:_PANOCH2 - 2D 115KV & EXCELSIORSS-PANOCH2 LINE	P2	Non-bus-tie breaker fault	0.96	0.95	0.93	1.05	1.03	0.90	0.96	0.87	0.97	0.88	Sensitivity Only
ORO LOMA 115kV	P2-3:A13:31:_PANOCH2 - 2D 115KV & PANOCH2-ORO LOMA LINE	P2	Non-bus-tie breaker fault	0.96	0.95	0.93	1.05	1.03	0.90	0.96	0.87	0.97	0.88	Sensitivity Only
ORO LOMA 115kV	P2-4:A13:12:_PANOCH1 SECTION 1D & PANOCH2 SECTION 2D 115KV	P2	Bus-tie breaker fault	0.96	0.95	0.93	1.05	1.03	0.90	0.96	0.87	0.97	0.88	Sensitivity Only

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
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022 SP High CEC Forecast	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations	
OROSI 70kV	P2-4:A14:5:_MC CALL 230KV - SECTION 1D & 2D	P2	Bus-tie breaker fault	0.96	0.95	0.93	1.05	1.03	0.90	0.96	0.87	0.97	0.88	Sensitivity Only
ORSI JCT 70kV	P2-4:A14:5:_MC CALL 230KV - SECTION 1D & 2D	P2	Bus-tie breaker fault	0.96	0.95	0.93	1.05	1.03	0.90	0.96	0.87	0.97	0.88	Sensitivity Only
OXFORD 115kV	P2-2:A13:22:_PANOCHE2 115KV SECTION 2D	P2	Bus Section Fault	0.96	0.95	0.93	1.05	1.03	0.90	0.96	0.87	0.97	0.88	Sensitivity Only
OXFORD 115kV	P2-3:A13:30:_PANOCHE2 - 2D 115KV & EXCELSIORSS-PANOCHE2 LINE	P2	Non-bus-tie breaker fault	0.96	0.95	0.93	1.05	1.03	0.90	0.96	0.87	0.97	0.88	Sensitivity Only
OXFORD 115kV	P2-4:A13:12:_PANOCHE1 SECTION 1D & PANOCHE2 SECTION 2D 115KV	P2	Bus-tie breaker fault	0.96	0.95	0.93	1.05	1.03	0.90	0.96	0.87	0.97	0.88	Sensitivity Only
OXFRDJCT 115kV	P2-2:A13:22:_PANOCHE2 115KV SECTION 2D	P2	Bus Section Fault	0.96	0.95	0.93	1.05	1.03	0.90	0.96	0.87	0.97	0.88	Sensitivity Only
OXFRDJCT 115kV	P2-3:A13:30:_PANOCHE2 - 2D 115KV & EXCELSIORSS-PANOCHE2 LINE	P2	Non-bus-tie breaker fault	0.96	0.95	0.93	1.05	1.03	0.90	0.96	0.87	0.97	0.88	Sensitivity Only
OXFRDJCT 115kV	P2-4:A13:12:_PANOCHE1 SECTION 1D & PANOCHE2 SECTION 2D 115KV	P2	Bus-tie breaker fault	0.96	0.95	0.93	1.05	1.03	0.90	0.96	0.87	0.97	0.88	Sensitivity Only
PANOCHEJ 115kV	P2-2:A13:22:_PANOCHE2 115KV SECTION 2D	P2	Bus Section Fault	0.96	0.95	0.93	1.05	1.03	0.90	0.96	0.87	0.97	0.88	Sensitivity Only
PANOCHEJ 115kV	P2-3:A13:30:_PANOCHE2 - 2D 115KV & EXCELSIORSS-PANOCHE2 LINE	P2	Non-bus-tie breaker fault	0.96	0.95	0.93	1.05	1.03	0.90	0.96	0.87	0.97	0.88	Sensitivity Only
PANOCHEJ 115kV	P2-4:A13:12:_PANOCHE1 SECTION 1D & PANOCHE2 SECTION 2D 115KV	P2	Bus-tie breaker fault	0.96	0.95	0.93	1.05	1.03	0.90	0.96	0.87	0.97	0.88	Sensitivity Only
PARLIER 115kV	P2-4:A14:5:_MC CALL 230KV - SECTION 1D & 2D	P2	Bus-tie breaker fault	0.96	0.95	0.93	1.05	1.03	0.90	0.96	0.87	0.97	0.88	Sensitivity Only

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
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022 SP High CEC Forecast	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations	
PIEDRA 1 115kV	P2-4:A14:5:_MC CALL 230KV - SECTION 1D & 2D	P2	Bus-tie breaker fault	0.96	0.95	0.93	1.05	1.03	0.90	0.96	0.87	0.97	0.88	Sensitivity Only
PIEDRA 2 115kV	P2-4:A14:5:_MC CALL 230KV - SECTION 1D & 2D	P2	Bus-tie breaker fault	0.96	0.95	0.93	1.05	1.03	0.90	0.96	0.87	0.97	0.88	Sensitivity Only
PNDLJ1 115kV	P2-4:A14:1:_HERNDON 230KV - SECTION 1D & 2D	P2	Bus-tie breaker fault	0.96	0.95	0.93	1.05	1.03	0.90	0.96	0.87	0.97	0.88	Sensitivity Only
PNDLJ2 115kV	P2-4:A14:1:_HERNDON 230KV - SECTION 1D & 2D	P2	Bus-tie breaker fault	0.96	0.95	0.93	1.05	1.03	0.90	0.96	0.87	0.97	0.88	Sensitivity Only
PNEDLE 115kV	P2-4:A14:1:_HERNDON 230KV - SECTION 1D & 2D	P2	Bus-tie breaker fault	0.96	0.95	0.93	1.05	1.03	0.90	0.96	0.87	0.97	0.88	Sensitivity Only
PNEDLE2 115kV	P2-4:A14:1:_HERNDON 230KV - SECTION 1D & 2D	P2	Bus-tie breaker fault	0.96	0.95	0.93	1.05	1.03	0.90	0.96	0.87	0.97	0.88	Sensitivity Only
POMWDFL 115kV	P2-4:A14:5:_MC CALL 230KV - SECTION 1D & 2D	P2	Bus-tie breaker fault	0.96	0.95	0.93	1.05	1.03	0.90	0.96	0.87	0.97	0.88	Sensitivity Only
POMWDFLJT 115kV	P2-4:A14:5:_MC CALL 230KV - SECTION 1D & 2D	P2	Bus-tie breaker fault	0.96	0.95	0.93	1.05	1.03	0.90	0.96	0.87	0.97	0.88	Sensitivity Only
POSO J1 70kV	P2-2:A13:22:_PANOCH2 115KV SECTION 2D	P2	Bus Section Fault	0.96	0.95	0.93	1.05	1.03	0.90	0.96	0.87	0.97	0.88	Sensitivity Only
POSO J1 70kV	P2-3:A13:30:_PANOCH2 - 2D 115KV & EXCELSIORSS-PANOCH2 LINE	P2	Non-bus-tie breaker fault	0.96	0.95	0.93	1.05	1.03	0.90	0.96	0.87	0.97	0.88	Sensitivity Only
POSO J1 70kV	P2-3:A13:31:_PANOCH2 - 2D 115KV & PANOCH2-ORO LOMA LINE	P2	Non-bus-tie breaker fault	0.96	0.95	0.93	1.05	1.03	0.90	0.96	0.87	0.97	0.88	Sensitivity Only
POSO J1 70kV	P2-4:A13:12:_PANOCH1 SECTION 1D & PANOCH2 SECTION 2D 115KV	P2	Bus-tie breaker fault	0.96	0.95	0.93	1.05	1.03	0.90	0.96	0.87	0.97	0.88	Sensitivity Only

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
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022 SP High CEC Forecast	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations	
POSO J2 70kV	P2-2:A13:9:_EXCHEQUR 115KV SECTION 1D	P2	Bus Section Fault	0.96	0.95	0.93	1.05	1.03	0.90	0.96	0.87	0.97	0.88	Sensitivity Only
POSO J2 70kV	P2-4:A13:11:_WILSON A SECTION 1D & WILSON B SECTION 2D 115KV	P2	Bus-tie breaker fault	0.96	0.95	0.93	1.05	1.03	0.90	0.96	0.87	0.97	0.88	Sensitivity Only
PPG 115kV	P2-4:A14:5:_MC CALL 230KV - SECTION 1D & 2D	P2	Bus-tie breaker fault	0.96	0.95	0.93	1.05	1.03	0.90	0.96	0.87	0.97	0.88	Sensitivity Only
Q529 115kV	P2-4:A14:5:_MC CALL 230KV - SECTION 1D & 2D	P2	Bus-tie breaker fault	0.96	0.95	0.93	1.05	1.03	0.90	0.96	0.87	0.97	0.88	Sensitivity Only
Q529TP 115kV	P2-4:A14:5:_MC CALL 230KV - SECTION 1D & 2D	P2	Bus-tie breaker fault	0.96	0.95	0.93	1.05	1.03	0.90	0.96	0.87	0.97	0.88	Sensitivity Only
Q558 115kV	P2-4:A14:5:_MC CALL 230KV - SECTION 1D & 2D	P2	Bus-tie breaker fault	0.96	0.95	0.93	1.05	1.03	0.90	0.96	0.87	0.97	0.88	Sensitivity Only
RAINBW 115kV	P2-4:A14:5:_MC CALL 230KV - SECTION 1D & 2D	P2	Bus-tie breaker fault	0.96	0.95	0.93	1.05	1.03	0.90	0.96	0.87	0.97	0.88	Sensitivity Only
RAINBWTP 115kV	P2-4:A14:5:_MC CALL 230KV - SECTION 1D & 2D	P2	Bus-tie breaker fault	0.96	0.95	0.93	1.05	1.03	0.90	0.96	0.87	0.97	0.88	Sensitivity Only
RANCHRS 115kV	P2-4:A14:5:_MC CALL 230KV - SECTION 1D & 2D	P2	Bus-tie breaker fault	0.96	0.95	0.93	1.05	1.03	0.90	0.96	0.87	0.97	0.88	Sensitivity Only
REEDLEY 70kV	P2-4:A14:5:_MC CALL 230KV - SECTION 1D & 2D	P2	Bus-tie breaker fault	0.96	0.95	0.93	1.05	1.03	0.90	0.96	0.87	0.97	0.88	Sensitivity Only
REEDLEY 115kV	P2-4:A14:5:_MC CALL 230KV - SECTION 1D & 2D	P2	Bus-tie breaker fault	0.96	0.95	0.93	1.05	1.03	0.90	0.96	0.87	0.97	0.88	Sensitivity Only
SANDCRK 70kV	P2-4:A14:5:_MC CALL 230KV - SECTION 1D & 2D	P2	Bus-tie breaker fault	0.96	0.95	0.93	1.05	1.03	0.90	0.96	0.87	0.97	0.88	Sensitivity Only
SANGER 115kV	P2-4:A14:5:_MC CALL 230KV - SECTION 1D & 2D	P2	Bus-tie breaker fault	0.96	0.95	0.93	1.05	1.03	0.90	0.96	0.87	0.97	0.88	Sensitivity Only

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
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022 SP High CEC Forecast	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations	
SAXONCRK 70kV	P2-2:A13:9:_EXCHEQUR 115KV SECTION 1D	P2	Bus Section Fault	0.96	0.95	0.93	1.05	1.03	0.90	0.96	0.87	0.97	0.88	Sensitivity Only
SCWAX 115kV	P2-4:A14:5:_MC CALL 230KV - SECTION 1D & 2D	P2	Bus-tie breaker fault	0.96	0.95	0.93	1.05	1.03	0.90	0.96	0.87	0.97	0.88	Sensitivity Only
SCWAXJCT 115kV	P2-4:A14:5:_MC CALL 230KV - SECTION 1D & 2D	P2	Bus-tie breaker fault	0.96	0.95	0.93	1.05	1.03	0.90	0.96	0.87	0.97	0.88	Sensitivity Only
SESWTF 115kV	P2-4:A14:1:_HERNDON 230KV - SECTION 1D & 2D	P2	Bus-tie breaker fault	0.96	0.95	0.93	1.05	1.03	0.90	0.96	0.87	0.97	0.88	Sensitivity Only
SESWTF 115kV	P2-4:A14:5:_MC CALL 230KV - SECTION 1D & 2D	P2	Bus-tie breaker fault	0.96	0.95	0.93	1.05	1.03	0.90	0.96	0.87	0.97	0.88	Sensitivity Only
SESWTFPT 115kV	P2-4:A14:1:_HERNDON 230KV - SECTION 1D & 2D	P2	Bus-tie breaker fault	0.96	0.95	0.93	1.05	1.03	0.90	0.96	0.87	0.97	0.88	Sensitivity Only
SESWTFPT 115kV	P2-4:A14:5:_MC CALL 230KV - SECTION 1D & 2D	P2	Bus-tie breaker fault	0.96	0.95	0.93	1.05	1.03	0.90	0.96	0.87	0.97	0.88	Sensitivity Only
SHEPHERD 115kV	P2-4:A14:1:_HERNDON 230KV - SECTION 1D & 2D	P2	Bus-tie breaker fault	0.96	0.95	0.93	1.05	1.03	0.90	0.96	0.87	0.97	0.88	Sensitivity Only
SNGRCOGN 115kV	P2-4:A14:5:_MC CALL 230KV - SECTION 1D & 2D	P2	Bus-tie breaker fault	0.96	0.95	0.93	1.05	1.03	0.90	0.96	0.87	0.97	0.88	Sensitivity Only
SNGRJCT 115kV	P2-4:A14:5:_MC CALL 230KV - SECTION 1D & 2D	P2	Bus-tie breaker fault	0.96	0.95	0.93	1.05	1.03	0.90	0.96	0.87	0.97	0.88	Sensitivity Only
SNTA RTA 70kV	P2-2:A13:22:_PANOCHE2 115KV SECTION 2D	P2	Bus Section Fault	0.96	0.95	0.93	1.05	1.03	0.90	0.96	0.87	0.97	0.88	Sensitivity Only
SNTA RTA 70kV	P2-3:A13:30:_PANOCHE2 - 2D 115KV & EXCELSIORSS-PANOCHE2 LINE	P2	Non-bus-tie breaker fault	0.96	0.95	0.93	1.05	1.03	0.90	0.96	0.87	0.97	0.88	Sensitivity Only

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
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022 SP High CEC Forecast	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations	
SNTA RTA 70kV	P2-3:A13:31:_PANOCH2 - 2D 115KV & PANOCH2-ORO LOMA LINE	P2	Non-bus-tie breaker fault	0.96	0.95	0.93	1.05	1.03	0.90	0.96	0.87	0.97	0.88	Sensitivity Only
SNTA RTA 70kV	P2-4:A13:12:_PANOCH1 SECTION 1D & PANOCH2 SECTION 2D 115KV	P2	Bus-tie breaker fault	0.96	0.95	0.93	1.05	1.03	0.90	0.96	0.87	0.97	0.88	Sensitivity Only
STCRRL J 70kV	P2-4:A14:5:_MC CALL 230KV - SECTION 1D & 2D	P2	Bus-tie breaker fault	0.96	0.95	0.93	1.05	1.03	0.90	0.96	0.87	0.97	0.88	Sensitivity Only
STONCRRL 70kV	P2-4:A14:5:_MC CALL 230KV - SECTION 1D & 2D	P2	Bus-tie breaker fault	0.96	0.95	0.93	1.05	1.03	0.90	0.96	0.87	0.97	0.88	Sensitivity Only
SUNMAID 115kV	P2-4:A14:5:_MC CALL 230KV - SECTION 1D & 2D	P2	Bus-tie breaker fault	0.96	0.95	0.93	1.05	1.03	0.90	0.96	0.87	0.97	0.88	Sensitivity Only
TVY VLLY 70kV	P2-4:A14:5:_MC CALL 230KV - SECTION 1D & 2D	P2	Bus-tie breaker fault	0.96	0.95	0.93	1.05	1.03	0.90	0.96	0.87	0.97	0.88	Sensitivity Only
ULTPWRJ 115kV	P2-4:A14:5:_MC CALL 230KV - SECTION 1D & 2D	P2	Bus-tie breaker fault	0.96	0.95	0.93	1.05	1.03	0.90	0.96	0.87	0.97	0.88	Sensitivity Only
WAHTOKE 115kV	P2-4:A14:5:_MC CALL 230KV - SECTION 1D & 2D	P2	Bus-tie breaker fault	0.96	0.95	0.93	1.05	1.03	0.90	0.96	0.87	0.97	0.88	Sensitivity Only
WAUKENA_SS 115kV	P2-4:A14:5:_MC CALL 230KV - SECTION 1D & 2D	P2	Bus-tie breaker fault	0.96	0.95	0.93	1.05	1.03	0.90	0.96	0.87	0.97	0.88	Sensitivity Only
WOODWARD 115kV	P2-4:A14:1:_HERNDON 230KV - SECTION 1D & 2D	P2	Bus-tie breaker fault	0.96	0.95	0.93	1.05	1.03	0.90	0.96	0.87	0.97	0.88	Sensitivity Only
WST FRSO 115kV	P2-4:A14:5:_MC CALL 230KV - SECTION 1D & 2D	P2	Bus-tie breaker fault	0.96	0.95	0.93	1.05	1.03	0.90	0.96	0.87	0.97	0.88	Sensitivity Only
WSTLD1RA 115kV	P2-2:A13:22:_PANOCH2 115KV SECTION 2D	P2	Bus Section Fault	0.96	0.95	0.93	1.05	1.03	0.90	0.96	0.87	0.97	0.88	Sensitivity Only

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
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022 SP High CEC Forecast	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations	
WSTLD1RA 115kV	P2-3:A13:30:_PANOCHE2 - 2D 115KV & EXCELSIORSS-PANOCHE2 LINE	P2	Non-bus-tie breaker fault	0.96	0.95	0.93	1.05	1.03	0.90	0.96	0.87	0.97	0.88	Sensitivity Only
WSTLD1RA 115kV	P2-4:A13:12:_PANOCHE1 SECTION 1D & PANOCHE2 SECTION 2D 115KV	P2	Bus-tie breaker fault	0.96	0.95	0.93	1.05	1.03	0.90	0.96	0.87	0.97	0.88	Sensitivity Only
WSTLDJCT 115kV	P2-2:A13:22:_PANOCHE2 115KV SECTION 2D	P2	Bus Section Fault	0.96	0.95	0.93	1.05	1.03	0.90	0.96	0.87	0.97	0.88	Sensitivity Only
WSTLDJCT 115kV	P2-3:A13:30:_PANOCHE2 - 2D 115KV & EXCELSIORSS-PANOCHE2 LINE	P2	Non-bus-tie breaker fault	0.96	0.95	0.93	1.05	1.03	0.90	0.96	0.87	0.97	0.88	Sensitivity Only
WSTLDJCT 115kV	P2-4:A13:12:_PANOCHE1 SECTION 1D & PANOCHE2 SECTION 2D 115KV	P2	Bus-tie breaker fault	0.96	0.95	0.93	1.05	1.03	0.90	0.96	0.87	0.97	0.88	Sensitivity Only
WWARD JT 115kV	P2-4:A14:5:_MC CALL 230KV - SECTION 1D & 2D	P2	Bus-tie breaker fault	0.96	0.95	0.93	1.05	1.03	0.90	0.96	0.87	0.97	0.88	Sensitivity Only
YOSEMITE 70kV	P2-2:A13:9:_EXCHEQUR 115KV SECTION 1D	P2	Bus Section Fault	0.96	0.95	0.93	1.05	1.03	0.90	0.96	0.87	0.97	0.88	Sensitivity Only
BER VLLY 70kV	P1-1:A13:15:_EXCHQUER 13.80KV GEN UNIT 1 & P1-2:A13:38:_EXCHEQUER-LE GRAND 115KV [1560]	P3	G-1/N-1	<1.10	<1.10	<1.10	1.12	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	Sensitivity Only
BER VLLY 70kV	P1-1:A13:15:_EXCHQUER 13.80KV GEN UNIT 1 & P1-3:A13:15:_EXCHEQUR 70/115KV TB 1	P3	G-1/N-1	<1.10	<1.10	<1.10	1.12	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	Under Review
BER VLLY 70kV	P1-1:A13:17:_MCSWAIN 4.16KV GEN UNIT 1 & P1-3:A13:15:_EXCHEQUR 70/115KV TB 1	P3	G-1/N-1	0.89	>0.90	>0.90	>0.90	>0.90	0.88	0.89	0.88	>0.90	>0.90	Under Review
BRCEBG J 70kV	P1-1:A13:15:_EXCHQUER 13.80KV GEN UNIT 1 & P1-2:A13:38:_EXCHEQUER-LE GRAND 115KV [1560]	P3	G-1/N-1	<1.10	<1.10	<1.10	1.12	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	Under Review
BRCEBG J 70kV	P1-1:A13:15:_EXCHQUER 13.80KV GEN UNIT 1 & P1-3:A13:15:_EXCHEQUR 70/115KV TB 1	P3	G-1/N-1	<1.10	<1.10	<1.10	1.13	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	Under Review

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
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022 SP High CEC Forecast	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations	
BRCEBG J 70kV	P1-1:A13:17:_MCSWAIN 4.16KV GEN UNIT 1 & P1-3:A13:15:_EXCHEQR 70/115KV TB 1	P3	G-1/N-1	0.89	>0.90	>0.90	>0.90	>0.90	0.87	0.89	0.87	>0.90	>0.90	Under Review
CANAL 70kV	P1-1:A13:10:_WRIGHT D 12.47KV GEN UNIT QF & P1-2:A13:60:_LOS BANOS-LIVINGSTON JCT-CANAL 70KV [8940]	P3	G-1/N-1	>0.90	>0.90	>0.90	>0.90	>0.90	>0.90	>0.90	0.90	>0.90	>0.90	Under Review
CANAL 70kV	P1-1:A13:7:_VEGA 0.36KV GEN UNIT 1 & P1-2:A13:60:_LOS BANOS-LIVINGSTON JCT-CANAL 70KV [8940]	P3	G-1/N-1	0.88	0.89	0.88	>0.90	>0.90	0.88	0.88	0.86	>0.90	0.88	Under Review
CORSGOLD 115kV	P1-1:A13:13:_CHOWCOGN 13.80KV GEN UNIT 1 & P1-2:A13:40:_CHOWCHILLA-KERCKHOFF 115KV [1250] MOAS OPENED ON OAKH_JCT_K1-JCT	P3	G-1/N-1	>0.90	0.90	0.90	>0.90	>0.90	0.88	>0.90	0.87	>0.90	0.90	Under Review
CORSGOLD 115kV	P1-1:A13:13:_CHOWCOGN 13.80KV GEN UNIT 1 & P1-2:A14:47:_CHOWCHILLA-KERCKHOFF 115KV [1250] MOAS OPENED ON OAKH_JCT_K1-JCT	P3	G-1/N-1	>0.90	0.90	0.90	>0.90	>0.90	0.88	>0.90	0.87	>0.90	0.90	Under Review
DOS PALS 70kV	P1-1:A13:13:_CHOWCOGN 13.80KV GEN UNIT 1 & P1-2:A13:50:_PANOCHÉ-ORO LOMA 115KV [3240]	P3	G-1/N-1	>0.90	0.89	0.89	>0.90	>0.90	0.87	>0.90	0.87	>0.90	0.89	Under Review
DOS PALS 70kV	P1-1:A13:15:_EXCHQUER 13.80KV GEN UNIT 1 & P1-2:A13:50:_PANOCHÉ-ORO LOMA 115KV [3240]	P3	G-1/N-1	>0.90	>0.90	0.89	>0.90	>0.90	0.88		0.88	>0.90	0.89	Under Review
DOS PALS 70kV	P1-1:A13:2:_ORO LOMA_3 12.47KV GEN UNIT EW & P1-2:A13:50:_PANOCHÉ-ORO LOMA 115KV [3240]	P3	G-1/N-1	>0.90	0.89	0.89	>0.90	>0.90	0.87	>0.90	0.87	>0.90	0.88	Under Review
DOS PALS 70kV	P1-1:A13:25:_ELNIDO 13.80KV GEN UNIT 1 & P1-2:A13:50:_PANOCHÉ-ORO LOMA 115KV [3240]	P3	G-1/N-1	>0.90	0.90	0.89	>0.90	>0.90	0.88	>0.90	0.88	>0.90	0.89	Under Review
DOS PALS 70kV	P1-1:A14:47:_KERCKHOF 13.80KV GEN UNIT 1 & P1-2:A13:50:_PANOCHÉ-ORO LOMA 115KV [3240]	P3	G-1/N-1	>0.90	>0.90	0.89	>0.90	>0.90	0.88	>0.90	0.88	>0.90	0.89	Under Review
ELNIDO 70kV	P1-1:A13:15:_EXCHQUER 13.80KV GEN UNIT 1 & P1-2:A13:38:_EXCHEQUER-LE GRAND 115KV [1560]	P3	G-1/N-1	<1.10	<1.10	<1.10	1.10	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	Under Review

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
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022 SP High CEC Forecast	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations	
ELNIDO 70kV	P1-1:A13:15:_EXCHQUER 13.80KV GEN UNIT 1 & P1-3:A13:15:_EXCHEQUR 70/115KV TB 1	P3	G-1/N-1	<1.10	<1.10	<1.10	1.11	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	Under Review
ELNIDOTP 70kV	P1-1:A13:15:_EXCHQUER 13.80KV GEN UNIT 1 & P1-2:A13:38:_EXCHEQUER-LE GRAND 115KV [1560]	P3	G-1/N-1	<1.10	<1.10	<1.10	1.10	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	Under Review
ELNIDOTP 70kV	P1-1:A13:15:_EXCHQUER 13.80KV GEN UNIT 1 & P1-3:A13:15:_EXCHEQUR 70/115KV TB 1	P3	G-1/N-1	<1.10	<1.10	<1.10	1.11	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	Under Review
EXCHEQUR 70kV	P1-1:A13:15:_EXCHQUER 13.80KV GEN UNIT 1 & P1-2:A13:38:_EXCHEQUER-LE GRAND 115KV [1560]	P3	G-1/N-1	<1.10	<1.10	<1.10	1.11	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	Under Review
EXCHEQUR 70kV	P1-1:A13:15:_EXCHQUER 13.80KV GEN UNIT 1 & P1-3:A13:15:_EXCHEQUR 70/115KV TB 1	P3	G-1/N-1	<1.10	<1.10	<1.10	1.12	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	Under Review
EXCHEQUR 70kV	P1-1:A13:17:_MCSWAIN 4.16KV GEN UNIT 1 & P1-3:A13:15:_EXCHEQUR 70/115KV TB 1	P3	G-1/N-1	>0.90	>0.90	>0.90	>0.90	>0.90	0.89	>0.90	0.89	>0.90	>0.90	Sensitivity Only
EXCHEQUR 115kV	P1-1:A13:15:_EXCHQUER 13.80KV GEN UNIT 1 & P1-2:A13:38:_EXCHEQUER-LE GRAND 115KV [1560]	P3	G-1/N-1	<1.10	<1.10	<1.10	1.12	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	Under Review
FIREBAGH 70kV	P1-1:A13:13:_CHOWCOGN 13.80KV GEN UNIT 1 & P1-2:A13:50:_PANOCHÉ-ORO LOMA 115KV [3240]	P3	G-1/N-1	>0.90	0.86	0.86	>0.90	>0.90	0.84	>0.90	0.84	>0.90	0.86	Under Review
FIREBAGH 70kV	P1-1:A13:15:_EXCHQUER 13.80KV GEN UNIT 1 & P1-2:A13:50:_PANOCHÉ-ORO LOMA 115KV [3240]	P3	G-1/N-1	>0.90	>0.90	0.86	>0.90	>0.90	0.85	>0.90	0.84	>0.90	0.86	Under Review
FIREBAGH 70kV	P1-1:A13:2:_ORO LOMA_3 12.47KV GEN UNIT EW & P1-2:A13:50:_PANOCHÉ-ORO LOMA 115KV [3240]	P3	G-1/N-1	>0.90	0.86	0.85	>0.90	>0.90	0.84	>0.90	0.84	>0.90	0.85	Under Review
FIREBAGH 70kV	P1-1:A13:25:_ELNIDO 13.80KV GEN UNIT 1 & P1-2:A13:50:_PANOCHÉ-ORO LOMA 115KV [3240]	P3	G-1/N-1	>0.90	0.87	0.86	>0.90	>0.90	0.85	>0.90	0.84	>0.90	0.86	Under Review
FIREBAGH 70kV	P1-1:A14:47:_KERCKHOF 13.80KV GEN UNIT 1 & P1-2:A13:50:_PANOCHÉ-ORO LOMA 115KV [3240]	P3	G-1/N-1	>0.90	0.87	0.86	>0.90	>0.90	0.85	>0.90	0.84	>0.90	0.86	Under Review
GATES 115kV	P1-1:A14:58:_HELMS 1 18.00KV GEN UNIT 1 & P1-3:A14:1:_GATES 500/230KV TB 11	P3	G-1/N-1	<1.10	1.11	1.11	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	1.11	Under Review

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
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022 SP High CEC Forecast	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations	
GATES 115kV	P1-1:A14:59:_HELMS 2 18.00KV GEN UNIT 1 & P1-3:A14:1:_GATES 500/230KV TB 11	P3	G-1/N-1	<1.10	1.11	1.11	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	1.11	Under Review
GATES 115kV	P1-1:A14:61:_HELMS 3 18.00KV GEN UNIT 1 & P1-3:A14:1:_GATES 500/230KV TB 11	P3	G-1/N-1	<1.10	1.11	1.11	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	1.11	Under Review
INDN FLT 70kV	P1-1:A13:15:_EXCHQUER 13.80KV GEN UNIT 1 & P1-2:A13:38:_EXCHEQUER-LE GRAND 115KV [1560]	P3	G-1/N-1	<1.10	<1.10	<1.10	1.12	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	Under Review
INDN FLT 70kV	P1-1:A13:15:_EXCHQUER 13.80KV GEN UNIT 1 & P1-3:A13:15:_EXCHEQUR 70/115KV TB 1	P3	G-1/N-1	<1.10	<1.10	<1.10	1.13	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	Under Review
INDN FLT 70kV	P1-1:A13:17:_MCSWAIN 4.16KV GEN UNIT 1 & P1-3:A13:15:_EXCHEQUR 70/115KV TB 1	P3	G-1/N-1	0.87	0.90	0.89	>0.90	>0.90	0.86	0.87	0.86	>0.90	0.89	Under Review
INDN FLT 70kV	P1-1:A13:25:_ELNIDO 13.80KV GEN UNIT 1 & P1-3:A13:15:_EXCHEQUR 70/115KV TB 1	P3	G-1/N-1	0.89	>0.90	>0.90	>0.90	>0.90	0.89	0.89	0.89	>0.90	>0.90	Under Review
MARIPOS2 70kV	P1-1:A13:15:_EXCHQUER 13.80KV GEN UNIT 1 & P1-2:A13:38:_EXCHEQUER-LE GRAND 115KV [1560]	P3	G-1/N-1	<1.10	<1.10	<1.10	1.12	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	Under Review
MARIPOS2 70kV	P1-1:A13:15:_EXCHQUER 13.80KV GEN UNIT 1 & P1-3:A13:15:_EXCHEQUR 70/115KV TB 1	P3	G-1/N-1	<1.10	<1.10	<1.10	1.13	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	Under Review
MARIPOS2 70kV	P1-1:A13:17:_MCSWAIN 4.16KV GEN UNIT 1 & P1-3:A13:15:_EXCHEQUR 70/115KV TB 1	P3	G-1/N-1	0.86	0.88	0.87	>0.90	>0.90	0.84	0.86	0.84	>0.90	0.87	Under Review
MARIPOS2 70kV	P1-1:A13:18:_MERCEDFL 9.11KV GEN UNIT 1 & P1-3:A13:15:_EXCHEQUR 70/115KV TB 1	P3	G-1/N-1	0.90	>0.90	>0.90	>0.90	>0.90	0.89	0.90	0.89	>0.90	>0.90	Under Review
MARIPOS2 70kV	P1-1:A13:25:_ELNIDO 13.80KV GEN UNIT 1 & P1-3:A13:15:_EXCHEQUR 70/115KV TB 1	P3	G-1/N-1	0.89	>0.90	0.90	>0.90	>0.90	0.87	0.89	0.87	>0.90	0.90	Under Review
MC SWAIN 70kV	P1-1:A13:15:_EXCHQUER 13.80KV GEN UNIT 1 & P1-2:A13:38:_EXCHEQUER-LE GRAND 115KV [1560]	P3	G-1/N-1	<1.10	<1.10	<1.10	1.11	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	Under Review
MC SWAIN 70kV	P1-1:A13:15:_EXCHQUER 13.80KV GEN UNIT 1 & P1-3:A13:15:_EXCHEQUR 70/115KV TB 1	P3	G-1/N-1	<1.10	<1.10	<1.10	1.12	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	Under Review

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	
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022 SP High CEC Forecast	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations		
MCSWAINJ 70kV	P1-1:A13:15:_EXCHQUER 13.80KV GEN UNIT 1 & P1-2:A13:38:_EXCHEQUER-LE GRAND 115KV [1560]	P3	G-1/N-1	<1.10	<1.10	<1.10	1.11	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	Under Review
MCSWAINJ 70kV	P1-1:A13:15:_EXCHQUER 13.80KV GEN UNIT 1 & P1-3:A13:15:_EXCHEQUR 70/115KV TB 1	P3	G-1/N-1	<1.10	<1.10	<1.10	1.12	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	Under Review
MERCED 70kV	P1-1:A13:15:_EXCHQUER 13.80KV GEN UNIT 1 & P1-2:A13:38:_EXCHEQUER-LE GRAND 115KV [1560]	P3	G-1/N-1	<1.10	<1.10	<1.10	1.10	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	Under Review
MERCED 70kV	P1-1:A13:15:_EXCHQUER 13.80KV GEN UNIT 1 & P1-3:A13:15:_EXCHEQUR 70/115KV TB 1	P3	G-1/N-1	<1.10	<1.10	<1.10	1.11	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	Under Review
MRCDFLLS 70kV	P1-1:A13:15:_EXCHQUER 13.80KV GEN UNIT 1 & P1-2:A13:38:_EXCHEQUER-LE GRAND 115KV [1560]	P3	G-1/N-1	<1.10	<1.10	<1.10	1.11	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	Under Review
MRCDFLLS 70kV	P1-1:A13:15:_EXCHQUER 13.80KV GEN UNIT 1 & P1-3:A13:15:_EXCHEQUR 70/115KV TB 1	P3	G-1/N-1	<1.10	<1.10	<1.10	1.12	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	Under Review
OAKH_JCT 115kV	P1-1:A13:13:_CHOWCOGN 13.80KV GEN UNIT 1 & P1-2:A13:40:_CHOWCHILLA-KERCKHOFF 115KV [1250] MOAS OPENED ON OAKH_JCT_K1-JCT	P3	G-1/N-1	>0.90	>0.90	>0.90	>0.90	>0.90	0.90	>0.90	0.90	>0.90	>0.90	>0.90	Under Review
OAKH_JCT 115kV	P1-1:A13:13:_CHOWCOGN 13.80KV GEN UNIT 1 & P1-2:A14:47:_CHOWCHILLA-KERCKHOFF 115KV [1250] MOAS OPENED ON OAKH_JCT_K1-JCT	P3	G-1/N-1	>0.90	>0.90	>0.90	>0.90	>0.90	0.90	>0.90	0.90	>0.90	>0.90	>0.90	Under Review
OAKHURST 115kV	P1-1:A13:13:_CHOWCOGN 13.80KV GEN UNIT 1 & P1-2:A13:40:_CHOWCHILLA-KERCKHOFF 115KV [1250] MOAS OPENED ON OAKH_JCT_K1-JCT	P3	G-1/N-1	0.89	0.89	0.89	>0.90	>0.90	0.86	0.89	0.86	>0.90	0.89	Under Review	
OAKHURST 115kV	P1-1:A13:13:_CHOWCOGN 13.80KV GEN UNIT 1 & P1-2:A14:47:_CHOWCHILLA-KERCKHOFF 115KV [1250] MOAS OPENED ON OAKH_JCT_K1-JCT	P3	G-1/N-1	0.89	0.89	0.89	>0.90	>0.90	0.86	0.89	0.86	>0.90	0.89	Under Review	

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
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022 SP High CEC Forecast	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations	
OAKHURST 115kV	P1-1:A13:14:_CHWCHLA2 13.80KV GEN UNIT 1 & P1-2:A13:40:_CHOWCHILLA-KERCKHOFF 115KV [1250] MOAS OPENED ON OAKH_JCT_K1-JCT	P3	G-1/N-1	>0.90	>0.90	>0.90	>0.90	>0.90	0.89	>0.90	0.89	>0.90	>0.90	Sensitivity Only
OAKHURST 115kV	P1-1:A13:14:_CHWCHLA2 13.80KV GEN UNIT 1 & P1-2:A14:47:_CHOWCHILLA-KERCKHOFF 115KV [1250] MOAS OPENED ON OAKH_JCT_K1-JCT	P3	G-1/N-1	>0.90	>0.90	>0.90	>0.90	>0.90	0.89	>0.90	0.89	>0.90	>0.90	Sensitivity Only
ORO LOMA 70kV	P1-1:A13:13:_CHOWCOGN 13.80KV GEN UNIT 1 & P1-2:A13:50:_PANOCHE-ORO LOMA 115KV [3240]	P3	G-1/N-1	>0.90	>0.90	>0.90	>0.90	>0.90	0.89	>0.90	0.89	>0.90	>0.90	Sensitivity Only
ORO LOMA 70kV	P1-1:A13:15:_EXCHQUER 13.80KV GEN UNIT 1 & P1-2:A13:50:_PANOCHE-ORO LOMA 115KV [3240]	P3	G-1/N-1	>0.90	>0.90	>0.90	>0.90	>0.90	0.89	>0.90	0.89	>0.90	>0.90	Sensitivity Only
ORO LOMA 70kV	P1-1:A13:2:_ORO LOMA_3 12.47KV GEN UNIT EW & P1-2:A13:50:_PANOCHE-ORO LOMA 115KV [3240]	P3	G-1/N-1	>0.90	>0.90	>0.90	>0.90	>0.90	0.89	>0.90	0.89	>0.90	0.90	Sensitivity Only
ORO LOMA 70kV	P1-1:A13:25:_ELNIDO 13.80KV GEN UNIT 1 & P1-2:A13:50:_PANOCHE-ORO LOMA 115KV [3240]	P3	G-1/N-1	>0.90	>0.90	>0.90	>0.90	>0.90	0.89	>0.90	0.89	>0.90	>0.90	Sensitivity Only
ORO LOMA 70kV	P1-1:A14:47:_KERCKHOF 13.80KV GEN UNIT 1 & P1-2:A13:50:_PANOCHE-ORO LOMA 115KV [3240]	P3	G-1/N-1	>0.90	>0.90	>0.90	>0.90	>0.90	0.89	>0.90	0.89	>0.90	>0.90	Sensitivity Only
ORO LOMA 115kV	P1-1:A13:13:_CHOWCOGN 13.80KV GEN UNIT 1 & P1-2:A13:50:_PANOCHE-ORO LOMA 115KV [3240]	P3	G-1/N-1	>0.90	>0.90	>0.90	>0.90	>0.90	0.89	>0.90	0.89	>0.90	>0.90	Sensitivity Only
ORO LOMA 115kV	P1-1:A13:15:_EXCHQUER 13.80KV GEN UNIT 1 & P1-2:A13:50:_PANOCHE-ORO LOMA 115KV [3240]	P3	G-1/N-1	>0.90	>0.90	>0.90	>0.90	>0.90	0.90	>0.90	0.89	>0.90	>0.90	Sensitivity Only
ORO LOMA 115kV	P1-1:A13:2:_ORO LOMA_3 12.47KV GEN UNIT EW & P1-2:A13:50:_PANOCHE-ORO LOMA 115KV [3240]	P3	G-1/N-1	>0.90	>0.90	>0.90	>0.90	>0.90	0.89	>0.90	0.89	>0.90	>0.90	Sensitivity Only
ORO LOMA 115kV	P1-1:A13:25:_ELNIDO 13.80KV GEN UNIT 1 & P1-2:A13:50:_PANOCHE-ORO LOMA 115KV [3240]	P3	G-1/N-1	>0.90	>0.90	>0.90	>0.90	>0.90	0.90	>0.90	0.89	>0.90	>0.90	Sensitivity Only

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
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022 SP High CEC Forecast	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations	
ORO LOMA 115kV	P1-1:A14:47:_KERCKHOF 13.80KV GEN UNIT 1 & P1-2:A13:50:_PANOCHÉ-ORO LOMA 115KV [3240]	P3	G-1/N-1	>0.90	>0.90	>0.90	>0.90	>0.90	0.90	>0.90	0.89	>0.90	>0.90	Sensitivity Only
ORTIGA 70kV	P1-1:A13:7:_VEGA 0.36KV GEN UNIT 1 & P1-2:A13:60:_LOS BANOS-LIVINGSTON JCT-CANAL 70KV [8940]	P3	G-1/N-1	>0.90	>0.90	>0.90	>0.90	>0.90	>0.90	>0.90	0.89	>0.90	>0.90	Under Review
POSO J1 70kV	P1-1:A13:13:_CHOWCOGN 13.80KV GEN UNIT 1 & P1-2:A13:50:_PANOCHÉ-ORO LOMA 115KV [3240]	P3	G-1/N-1	>0.90	0.87	0.87	>0.90	>0.90	0.85	>0.90	0.85	>0.90	0.87	Under Review
POSO J1 70kV	P1-1:A13:15:_EXCHQUER 13.80KV GEN UNIT 1 & P1-2:A13:50:_PANOCHÉ-ORO LOMA 115KV [3240]	P3	G-1/N-1	>0.90	>0.90	0.87	>0.90	>0.90	0.86	>0.90	0.85	>0.90	0.87	Under Review
POSO J1 70kV	P1-1:A13:2:_ORO LOMA_3 12.47KV GEN UNIT EW & P1-2:A13:50:_PANOCHÉ-ORO LOMA 115KV [3240]	P3	G-1/N-1	>0.90	0.87	0.87	>0.90	>0.90	0.85	>0.90	0.85	>0.90	0.86	Under Review
POSO J1 70kV	P1-1:A13:25:_ELNIDO 13.80KV GEN UNIT 1 & P1-2:A13:50:_PANOCHÉ-ORO LOMA 115KV [3240]	P3	G-1/N-1	>0.90	0.88	0.87	>0.90	>0.90	0.86	>0.90	0.85	>0.90	0.87	Under Review
POSO J1 70kV	P1-1:A14:47:_KERCKHOF 13.80KV GEN UNIT 1 & P1-2:A13:50:_PANOCHÉ-ORO LOMA 115KV [3240]	P3	G-1/N-1	>0.90	0.88	0.87	>0.90	>0.90	0.86	>0.90	0.85	>0.90	0.87	Under Review
POSO J2 70kV	P1-1:A13:15:_EXCHQUER 13.80KV GEN UNIT 1 & P1-2:A13:38:_EXCHEQUER-LE GRAND 115KV [1560]	P3	G-1/N-1	<1.10	<1.10	<1.10	1.10	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	Under Review
POSO J2 70kV	P1-1:A13:15:_EXCHQUER 13.80KV GEN UNIT 1 & P1-3:A13:15:_EXCHEQUR 70/115KV TB 1	P3	G-1/N-1	<1.10	<1.10	<1.10	1.11	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	Under Review
SAXONCRK 70kV	P1-1:A13:15:_EXCHQUER 13.80KV GEN UNIT 1 & P1-2:A13:38:_EXCHEQUER-LE GRAND 115KV [1560]	P3	G-1/N-1	<1.10	<1.10	<1.10	1.12	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	Under Review
SAXONCRK 70kV	P1-1:A13:15:_EXCHQUER 13.80KV GEN UNIT 1 & P1-3:A13:15:_EXCHEQUR 70/115KV TB 1	P3	G-1/N-1	<1.10	<1.10	<1.10	1.13	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	Under Review
SAXONCRK 70kV	P1-1:A13:17:_MCSWAIN 4.16KV GEN UNIT 1 & P1-3:A13:15:_EXCHEQUR 70/115KV TB 1	P3	G-1/N-1	0.88	>0.90	>0.90	>0.90	>0.90	0.87	0.88	0.87	>0.90	>0.90	Under Review
SNTA RTA 70kV	P1-1:A13:13:_CHOWCOGN 13.80KV GEN UNIT 1 & P1-2:A13:50:_PANOCHÉ-ORO LOMA 115KV [3240]	P3	G-1/N-1	>0.90	0.88	0.88	>0.90	>0.90	0.87	>0.90	0.86	>0.90	0.88	Under Review

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
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022 SP High CEC Forecast	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations	
SNTA RTA 70kV	P1-1:A13:15:_EXCHQUER 13.80KV GEN UNIT 1 & P1-2:A13:50:_PANOCHE-ORO LOMA 115KV [3240]	P3	G-1/N-1	>0.90	>0.90	0.88	>0.90	>0.90	0.87	>0.90	0.87	>0.90	0.88	Under Review
SNTA RTA 70kV	P1-1:A13:2:_ORO LOMA_3 12.47KV GEN UNIT EW & P1-2:A13:50:_PANOCHE-ORO LOMA 115KV [3240]	P3	G-1/N-1	>0.90	0.88	0.88	>0.90	>0.90	0.86	>0.90	0.86	>0.90	0.88	Under Review
SNTA RTA 70kV	P1-1:A13:25:_ELNIDO 13.80KV GEN UNIT 1 & P1-2:A13:50:_PANOCHE-ORO LOMA 115KV [3240]	P3	G-1/N-1	>0.90	0.89	0.88	>0.90	>0.90	0.87	>0.90	0.87	>0.90	0.88	Under Review
SNTA RTA 70kV	P1-1:A14:47:_KERCKHOF 13.80KV GEN UNIT 1 & P1-2:A13:50:_PANOCHE-ORO LOMA 115KV [3240]	P3	G-1/N-1	>0.90	0.89	0.88	>0.90	>0.90	0.87	>0.90	0.87	>0.90	0.88	Under Review
YOSEMITE 70kV	P1-1:A13:15:_EXCHQUER 13.80KV GEN UNIT 1 & P1-2:A13:38:_EXCHEQUER-LE GRAND 115KV [1560]	P3	G-1/N-1	<1.10	<1.10	<1.10	1.12	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	Under Review
YOSEMITE 70kV	P1-1:A13:15:_EXCHQUER 13.80KV GEN UNIT 1 & P1-3:A13:15:_EXCHEQR 70/115KV TB 1	P3	G-1/N-1	<1.10	<1.10	<1.10	1.13	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	Under Review
YOSEMITE 70kV	P1-1:A13:17:_MCSWAIN 4.16KV GEN UNIT 1 & P1-3:A13:15:_EXCHEQR 70/115KV TB 1	P3	G-1/N-1	0.86	0.89	0.89	>0.90	>0.90	0.86	0.86	0.86	>0.90	0.89	Under Review
YOSEMITE 70kV	P1-1:A13:18:_MERCEDFL 9.11KV GEN UNIT 1 & P1-3:A13:15:_EXCHEQR 70/115KV TB 1	P3	G-1/N-1	0.89	>0.90	>0.90	>0.90	>0.90	>0.90	0.89	>0.90	>0.90	>0.90	Under Review
YOSEMITE 70kV	P1-1:A13:25:_ELNIDO 13.80KV GEN UNIT 1 & P1-3:A13:15:_EXCHEQR 70/115KV TB 1	P3	G-1/N-1	0.88	>0.90	>0.90	>0.90	>0.90	0.89	0.88	0.89	>0.90	>0.90	Under Review
ATWATER 115kV	P1-3:A13:4:_WILSON 230/115KV TB 1 & P1-3:A13:5:_WILSON 230/115KV TB 2	P6	N-1-1	0.90	0.82	0.82	>0.90	>0.90	0.77	0.90	0.77	>0.90	0.84	Scope Under Review: Wilson 115 kV Area Reinforcement Project
AUBERRY 70kV	P1-2:A13:21:_WILSON-BORDEN 230KV [9001] & P1-2:A13:23:_BORDEN-GREGG 230KV [4400]	P6	N-1-1	>0.90	>0.90	>0.90	0.59	>0.90	>0.90	>0.90	>0.90	>0.90	>0.90	Under Review
BER VLLY 70kV	P1-3:A13:15:_EXCHEQR 70/115KV TB 1 & P1-1:A13:17:_MCSWAIN 4.16KV GEN UNIT 1	P3	G-1/N-1	0.89	>0.90	>0.90	>0.90	>0.90	0.88	0.89	0.88	>0.90	>0.90	Under Review
BONITA 70kV	P1-2:A13:21:_WILSON-BORDEN 230KV [9001] & P1-2:A13:23:_BORDEN-GREGG 230KV [4400]	P6	N-1-1	>0.90	>0.90	>0.90	0.34	>0.90	>0.90	>0.90	>0.90	>0.90	>0.90	Under Review

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
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022 SP High CEC Forecast	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations	
BORDEN 70kV	P1-2:A13:21:_WILSON-BORDEN 230KV [9001] & P1-2:A13:23:_BORDEN-GREGG 230KV [4400]	P6	N-1-1	>0.90	>0.90	>0.90	0.37	>0.90	>0.90	>0.90	>0.90	>0.90	>0.90	Under Review
BORDEN 230kV	P1-2:A13:10:_WARNERVILLE-WILSON 230KV [5870] & P1-2:A13:23:_BORDEN-GREGG 230KV [4400]	P6	N-1-1	>0.90	>0.90	>0.90	>0.90	>0.90	0.90		0.89	>0.90	>0.90	Under Review
CAL AVE 115kV	P1-2:A14:64:_SANGER-CALIFORNIA AVE 115KV [9130] & P1-2:A14:66:_MCCALL-WEST FRESNO #2 115KV [2370]	P6	N-1-1	>0.90	>0.90	0.89	>0.90	>0.90	0.88	>0.90	0.88	>0.90	0.89	Under Review
CANAL 70kV	P1-2:A13:51:_VEGA-MERCYSPRNGSS #1 70KV [0] & P1-2:A13:60:_LOS BANOS-LIVINGSTON JCT-CANAL 70KV [8940]	P6	N-1-1	0.88	0.89	0.88	>0.90	>0.90	0.88	0.88	0.86	>0.90	0.88	Under Review
CANANDGA 70kV	P1-2:A13:21:_WILSON-BORDEN 230KV [9001] & P1-2:A13:23:_BORDEN-GREGG 230KV [4400]	P6	N-1-1	>0.90	>0.90	>0.90	0.35	>0.90	>0.90	>0.90	>0.90	>0.90	>0.90	Under Review
CASSIDY 70kV	P1-2:A13:21:_WILSON-BORDEN 230KV [9001] & P1-2:A13:23:_BORDEN-GREGG 230KV [4400]	P6	N-1-1	>0.90	>0.90	>0.90	0.45	>0.90	>0.90	>0.90	>0.90	>0.90	>0.90	Under Review
CASTLE 115kV	P1-3:A13:4:_WILSON 230/115KV TB 1 & P1-3:A13:5:_WILSON 230/115KV TB 2	P6	N-1-1	0.90	0.83	0.82	>0.90	>0.90	0.77	0.90	0.77	>0.90	0.84	Scope Under Review: Wilson 115 kV Area Reinforcement Project
CERTTEED 115kV	P1-3:A13:4:_WILSON 230/115KV TB 1 & P1-3:A13:5:_WILSON 230/115KV TB 2	P6	N-1-1	>0.90	>0.90	0.90	>0.90	>0.90	0.86		0.86	>0.90	>0.90	Scope Under Review: Wilson 115 kV Area Reinforcement Project
CHWCGN 115kV	P1-3:A13:4:_WILSON 230/115KV TB 1 & P1-3:A13:5:_WILSON 230/115KV TB 2	P6	N-1-1	>0.90	>0.90	>0.90	>0.90	>0.90	0.87	>0.90	0.87	>0.90	>0.90	Sensitivity Only
CHWCHLA2 115kV	P1-3:A13:4:_WILSON 230/115KV TB 1 & P1-3:A13:5:_WILSON 230/115KV TB 2	P6	N-1-1	>0.90	>0.90	>0.90	>0.90	>0.90	0.87	>0.90	0.87	>0.90	>0.90	Sensitivity Only
CHWCHLASLR 115kV	P1-3:A13:4:_WILSON 230/115KV TB 1 & P1-3:A13:5:_WILSON 230/115KV TB 2	P6	N-1-1	>0.90	0.88	0.88	>0.90	>0.90	0.85	>0.90	0.84	>0.90	0.89	Scope Under Review: Wilson 115 kV Area Reinforcement Project
CHWCHLLA 115kV	P1-3:A13:4:_WILSON 230/115KV TB 1 & P1-3:A13:5:_WILSON 230/115KV TB 2	P6	N-1-1	>0.90	0.90	0.89	>0.90	>0.90	0.86	>0.90	0.85	>0.90	>0.90	Scope Under Review: Wilson 115 kV Area Reinforcement Project

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
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022 SP High CEC Forecast	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations	
COPPRMNE 70kV	P1-2:A13:21:_WILSON-BORDEN 230KV [9001] & P1-2:A13:23:_BORDEN-GREGG 230KV [4400]	P6	N-1-1	>0.90	>0.90		0.58	>0.90	>0.90	>0.90	>0.90	>0.90	>0.90	Under Review
CORCORAN 70kV	P1-3:A14:11:_HENRIETA 230/115KV TB 3 & P1-3:A14:1:_GATES 500/230KV TB 11	P6	N-1-1	<1.10	<1.10	<1.10	1.10	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	Under Review
CORSGOLD 115kV	P1-2:A14:47:_CHOWCHILLA-KERCKHOFF 115KV [1250] MOAS OPENED ON OAKH_JCT_K1-JCT & P1-2:A13:39:_WILSON-LE GRAND 115KV [4170]	P6	N-1-1	0.89	0.89	0.89	>0.90	>0.90	0.87	0.89	0.87	>0.90	0.89	Under Review
CRESSEY 115kV	P1-3:A13:4:_WILSON 230/115KV TB 1 & P1-3:A13:5:_WILSON 230/115KV TB 2	P6	N-1-1	0.89	0.82	0.82	>0.90	>0.90	0.77	0.89	0.76	>0.90	0.83	Scope Under Review: Wilson 115 kV Area Reinforcement Project
DAIRYLND 115kV	P1-3:A13:4:_WILSON 230/115KV TB 1 & P1-3:A13:5:_WILSON 230/115KV TB 2	P6	N-1-1	>0.90	0.89	0.88	>0.90	>0.90	0.85	>0.90	0.85	>0.90	0.90	Scope Under Review: Wilson 115 kV Area Reinforcement Project
DANISHCM 115kV	P1-2:A14:64:_SANGER-CALIFORNIA AVE 115KV [9130] & P1-2:A14:66:_MCCALL-WEST FRESNO #2 115KV [2370]	P6	N-1-1	>0.90	>0.90	0.90	>0.90	>0.90	0.88	>0.90	0.88	>0.90	0.89	Under Review
DINUBA 70kV	P1-2:A14:58:_MCCALL-REEDLEY 115KV [2320] MOAS OPENED ON MC CALL_WAHTOKE & P1-2:A14:57:_SANGER-REEDLEY 115KV [9140] MOAS OPENED ON POMWDFLJT_PARLIER	P6	N-1-1	0.86	0.86	0.85	>0.90	>0.90	0.83	0.86	0.81	>0.90	0.83	Under Review
DNUBAEGY 70kV	P1-2:A14:57:_SANGER-REEDLEY 115KV [9140] MOAS OPENED ON POMWDFLJT_PARLIER & P1-2:A14:58:_MCCALL-REEDLEY 115KV [2320] MOAS OPENED ON MC CALL_WAHTOKE	P6	N-1-1	0.88	0.88	0.87	>0.90	>0.90	0.85	0.88	0.83	>0.90	0.85	Under Review
DOS PALS 70kV	P1-2:A13:50:_PANOCHE-ORO LOMA 115KV [3240] & P1-2:A13:23:_BORDEN-GREGG 230KV [4400]	P6	N-1-1	>0.90	0.87	0.86	>0.90	>0.90	0.85	>0.90	0.85	>0.90	0.86	Under Review

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
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022 SP High CEC Forecast	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations	
DUNLAP 70kV	P1-2:A14:57:_SANGER-REEDLEY 115KV [9140] MOAS OPENED ON POMWDFLJT_PARLIER & P1-2:A14:58:_MCCALL-REEDLEY 115KV [2320] MOAS OPENED ON MC CALL_WAHTOKE	P6	N-1-1	0.84	0.84	0.82	>0.90	>0.90	0.80	0.84	0.79	>0.90	0.81	Under Review
EL CAPTN 115kV	P1-3:A13:4:_WILSON 230/115KV TB 1 & P1-3:A13:5:_WILSON 230/115KV TB 2	P6	N-1-1	0.90	0.83	0.83	>0.90	>0.90	0.78	0.90	0.77	>0.90	0.84	Scope Under Review: Wilson 115 kV Area Reinforcement Project
EL NIDO 115kV	P1-3:A13:4:_WILSON 230/115KV TB 1 & P1-3:A13:5:_WILSON 230/115KV TB 2	P6	N-1-1	>0.90	0.87	0.87	>0.90	>0.90	0.83	>0.90	0.83	>0.90	0.88	Scope Under Review: Wilson 115 kV Area Reinforcement Project
EL PECO 70kV	P1-2:A13:21:_WILSON-BORDEN 230KV [9001] & P1-2:A13:23:_BORDEN-GREGG 230KV [4400]	P6	N-1-1	>0.90	>0.90	>0.90	0.34	>0.90	>0.90	>0.90	>0.90	>0.90	>0.90	Under Review
ELNIDO 70kV	P1-3:A13:15:_EXCHEQUR 70/115KV TB 1 & P1-2:A13:39:_WILSON-LE GRAND 115KV [4170]	P6	N-1-1	<1.10	<1.10	<1.10	1.11	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	Under Review
ELNIDO 70kV	P1-3:A13:4:_WILSON 230/115KV TB 1 & P1-3:A13:5:_WILSON 230/115KV TB 2	P6	N-1-1	>0.90	>0.90	0.90	>0.90	>0.90	0.86	>0.90	0.85	>0.90	>0.90	Scope Under Review: Wilson 115 kV Area Reinforcement Project
EXCHEQUR 70kV	P1-2:A13:39:_WILSON-LE GRAND 115KV [4170] & P1-3:A13:15:_EXCHEQUR 70/115KV TB 1	P6	N-1-1	<1.10	<1.10	<1.10	1.13	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	Under Review
EXCHEQUR 70kV	P1-3:A13:15:_EXCHEQUR 70/115KV TB 1 & P1-1:A13:17:_MCSWAIN 4.16KV GEN UNIT 1	P3	G-1/N-1	>0.90	>0.90	>0.90	>0.90	>0.90	0.89	>0.90	0.89	>0.90	>0.90	Sensitivity Only
FIREBAGH 70kV	P1-2:A13:50:_PANOCHÉ-ORO LOMA 115KV [3240] & P1-2:A13:23:_BORDEN-GREGG 230KV [4400]	P6	N-1-1	0.89	0.84	0.83	>0.90	>0.90	0.82	0.89	0.81	>0.90	0.83	Under Review
FRANTDM 70kV	P1-2:A13:21:_WILSON-BORDEN 230KV [9001] & P1-2:A13:23:_BORDEN-GREGG 230KV [4400]	P6	N-1-1	>0.90	>0.90	>0.90	0.58	>0.90	>0.90	>0.90	>0.90	>0.90	>0.90	Under Review
GALLO 115kV	P1-3:A13:4:_WILSON 230/115KV TB 1 & P1-3:A13:5:_WILSON 230/115KV TB 2	P6	N-1-1	0.89	0.82	0.82	>0.90	>0.90	0.76	0.89	0.76	>0.90	0.83	Scope Under Review: Wilson 115 kV Area Reinforcement Project
GATES 115kV	P1-2:A14:117:_GWF-HENRIETTA 70KV [8774] & P1-3:A14:12:_HENRIETA 230/70KV TB 4	P6	N-1-1	<1.10	<1.10	<1.10	<1.10	<1.10	1.10	<1.10	1.11	<1.10	<1.10	Under Review

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
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022 SP High CEC Forecast	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations	
GILLRAN 115kV	P1-3:A13:4:_WILSON 230/115KV TB 1 & P1-3:A13:5:_WILSON 230/115KV TB 2	P6	N-1-1	>0.90	>0.90	>0.90	>0.90	>0.90	0.90	>0.90	0.90	>0.90	>0.90	Scope Under Review: Wilson 115 kV Area Reinforcement Project
GLASS 70kV	P1-2:A13:21:_WILSON-BORDEN 230KV [9001] & P1-2:A13:23:_BORDEN-GREGG 230KV [4400]	P6	N-1-1	>0.90	>0.90	>0.90	0.35	>0.90	>0.90	>0.90	>0.90	>0.90	>0.90	Under Review
HENRIETA 230kV	P1-2:A14:10:_MUSTANG SW STA-GREGG 230KV [4700] & P1-2:A14:8:_MUSTANG SW STA-MCCALL 230KV [4710]	P6	N-1-1	>0.90	0.90	0.90	0.87	0.87	0.90	>0.90	0.90	0.88	0.90	Under Review
INDN FLT 70kV	P1-2:A13:61:_EXCHEQUER-MARIPOSA 70KV [8640] & P1-3:A13:15:_EXCHEQR 70/115KV TB 1	P6	N-1-1	0.87	0.90	0.90	>0.90	>0.90	0.87	0.87	0.87	>0.90	0.90	Under Review
INDN FLT 70kV	P1-4:A14:19:_GATES11T SVD=V & P1-3:A13:15:_EXCHEQR 70/115KV TB 1	P6	N-1-1	<1.10	<1.10	<1.10	1.13	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	Under Review
JR WOOD 115kV	P1-3:A13:4:_WILSON 230/115KV TB 1 & P1-3:A13:5:_WILSON 230/115KV TB 2	P6	N-1-1	0.90	0.82	0.82	>0.90	>0.90	0.77	0.90	0.77	>0.90	0.84	Scope Under Review: Wilson 115 kV Area Reinforcement Project
LE GRAND 115kV	P1-3:A13:4:_WILSON 230/115KV TB 1 & P1-3:A13:5:_WILSON 230/115KV TB 2	P6	N-1-1	>0.90	0.88	0.88	>0.90	>0.90	0.84	>0.90	0.83	>0.90	0.89	Scope Under Review: Wilson 115 kV Area Reinforcement Project
LIVNGSTN 115kV	P1-3:A13:4:_WILSON 230/115KV TB 1 & P1-3:A13:5:_WILSON 230/115KV TB 2	P6	N-1-1	0.89	0.82	0.82	>0.90	>0.90	0.76	0.89	0.76	>0.90	0.83	Scope Under Review: Wilson 115 kV Area Reinforcement Project
MADERA 70kV	P1-2:A13:21:_WILSON-BORDEN 230KV [9001] & P1-2:A13:23:_BORDEN-GREGG 230KV [4400]	P6	N-1-1	>0.90	>0.90	>0.90	0.36	>0.90	>0.90	>0.90	>0.90	>0.90	>0.90	Under Review
MADERAPR 115kV	P1-2:A13:27:_LE GRAND-DAIRYLAND 115KV [2100] MOAS OPENED ON CHWCHLASLRJT_DAIRYLND & P1-2:A13:49:_PANOCHE-MENDOTA 115KV [3230]	P6	N-1-1	>0.90	>0.90	>0.90	0.87	>0.90	>0.90	>0.90	>0.90	>0.90	>0.90	Under Review
MARIPOS2 70kV	P1-3:A13:15:_EXCHEQR 70/115KV TB 1 & P1-2:A13:61:_EXCHEQUER-MARIPOSA 70KV [8640]	P6	N-1-1	0.86	0.89	0.89	>0.90	>0.90	0.86	0.86	0.86	>0.90	0.89	Under Review
MARIPOS2 70kV	P1-2:A13:25:_WILSON-ORO LOMA 115KV [4200] & P1-3:A13:15:_EXCHEQR 70/115KV TB 1	P6	N-1-1	<1.10	<1.10	<1.10	1.13	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	Under Review

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
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022 SP High CEC Forecast	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations	
MC SWAIN 70kV	P1-3:A13:15:_EXCHEQUR 70/115KV TB 1 & P1-2:A13:39:_WILSON-LE GRAND 115KV [4170]	P6	N-1-1	<1.10	<1.10	<1.10	1.13	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	Under Review
MC SWAIN 70kV	P1-3:A13:4:_WILSON 230/115KV TB 1 & P1-3:A13:5:_WILSON 230/115KV TB 2	P6	N-1-1	>0.90	>0.90	>0.90	>0.90	>0.90	0.90	>0.90	0.90	>0.90	>0.90	Scope Under Review: Wilson 115 kV Area Reinforcement Project
MENDOTA 115kV	P1-2:A13:27:_LE GRAND-DAIRYLAND 115KV [2100] MOAS OPENED ON CHWCHLASLRJT_DAIRYLND & P1-2:A13:49:_PANOCHÉ-MENDOTA 115KV [3230]	P6	N-1-1	>0.90	>0.90	>0.90	0.90	>0.90	>0.90	>0.90	>0.90	>0.90	>0.90	Under Review
MENDOTA 115kV	P1-2:A13:49:_PANOCHÉ-MENDOTA 115KV [3230] & P1-2:A13:46:_DAIRYLAND-MENDOTA 115KV [1360]	P6	N-1-1	<1.10	<1.10	<1.10	1.11	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	Under Review
MERCED 70kV	P1-3:A13:15:_EXCHEQUR 70/115KV TB 1 & P1-2:A13:39:_WILSON-LE GRAND 115KV [4170]	P6	N-1-1	<1.10	<1.10	<1.10	1.11	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	Under Review
MERCED 115kV	P1-3:A13:5:_WILSON 230/115KV TB 2 & P1-3:A13:4:_WILSON 230/115KV TB 1	P6	N-1-1	>0.90	0.85	0.85	>0.90	>0.90	0.80	>0.90	0.80	>0.90	0.85	Scope Under Review: Wilson 115 kV Area Reinforcement Project
MRCDFLLS 70kV	P1-3:A13:15:_EXCHEQUR 70/115KV TB 1 & P1-2:A13:39:_WILSON-LE GRAND 115KV [4170]	P6	N-1-1	<1.10	<1.10	<1.10	1.13	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	Under Review
MRCDFLLS 70kV	P1-3:A13:4:_WILSON 230/115KV TB 1 & P1-3:A13:5:_WILSON 230/115KV TB 2	P6	N-1-1	>0.90	>0.90	>0.90	>0.90	>0.90	0.90	>0.90	0.89	>0.90	>0.90	Scope Under Review: Wilson 115 kV Area Reinforcement Project
NEWHALL 115kV	P1-2:A13:27:_LE GRAND-DAIRYLAND 115KV [2100] MOAS OPENED ON CHWCHLASLRJT_DAIRYLND & P1-2:A13:49:_PANOCHÉ-MENDOTA 115KV [3230]	P6	N-1-1	>0.90	>0.90	>0.90	0.87	>0.90	>0.90	>0.90	>0.90	>0.90	>0.90	Under Review
NORTHSTAR 115kV	P1-2:A13:27:_LE GRAND-DAIRYLAND 115KV [2100] MOAS OPENED ON CHWCHLASLRJT_DAIRYLND & P1-2:A13:49:_PANOCHÉ-MENDOTA 115KV [3230]	P6	N-1-1	>0.90	>0.90	>0.90	0.90	>0.90	>0.90	>0.90	>0.90	>0.90	>0.90	Under Review

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
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022 SP High CEC Forecast	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations	
NORTHSTAR 115kV	P1-2:A13:49:_PANOCHE-MENDOTA 115KV [3230] & P1-2:A13:46:_DAIRYLAND-MENDOTA 115KV [1360]	P6	N-1-1	<1.10	<1.10	<1.10	1.11	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	Under Review
NRTHFORK 70kV	P1-2:A13:21:_WILSON-BORDEN 230KV [9001] & P1-2:A13:23:_BORDEN-GREGG 230KV [4400]	P6	N-1-1	>0.90	>0.90	>0.90	0.60	>0.90	>0.90	>0.90	>0.90	>0.90	>0.90	Under Review
OAKHURST 115kV	P1-2:A13:39:_WILSON-LE GRAND 115KV [4170] & P1-2:A13:40:_CHOWCHILLA-KERCKHOFF 115KV [1250] MOAS OPENED ON OAKH_JCT_K1-JCT	P6	N-1-1	0.88	0.88	0.88	>0.90	>0.90	0.85	0.88	0.85	>0.90	0.88	Under Review
ORO LOMA 70kV	P1-2:A13:23:_BORDEN-GREGG 230KV [4400] & P1-2:A13:50:_PANOCHE-ORO LOMA 115KV [3240]	P6	N-1-1	>0.90	0.88	0.88	>0.90	>0.90	0.87	>0.90	0.86	>0.90	0.88	Under Review
OROSI 70kV	P1-2:A14:57:_SANGER-REEDLEY 115KV [9140] MOAS OPENED ON POMWDFLJT_PARLIER & P1-2:A14:58:_MCCALL-REEDLEY 115KV [2320] MOAS OPENED ON MC CALL_WAHTOKE	P6	N-1-1	0.86	0.86	0.85	>0.90	>0.90	0.83	0.86	0.81	>0.90	0.83	Under Review
ORTIGA 70kV	P1-2:A13:60:_LOS BANOS-LIVINGSTON JCT-CANAL 70KV [8940] & P1-1:A13:7:_VEGA 0.36KV GEN UNIT 1	P3	G-1/N-1	>0.90	>0.90	>0.90	>0.90	>0.90	>0.90	>0.90	0.89	>0.90	>0.90	Sensitivity Only
PARLIER 115kV	P1-2:A14:57:_SANGER-REEDLEY 115KV [9140] MOAS OPENED ON POMWDFLJT_PARLIER & P1-2:A14:58:_MCCALL-REEDLEY 115KV [2320] MOAS OPENED ON MC CALL_WAHTOKE	P6	N-1-1	0.87	0.87	0.86	>0.90	>0.90	0.84	0.87	0.83	>0.90	0.85	Under Review
PMTFMPP 115kV	P1-2:A13:27:_LE GRAND-DAIRYLAND 115KV [2100] MOAS OPENED ON CHWCHLASLRJT_DAIRYLND & P1-2:A13:49:_PANOCHE-MENDOTA 115KV [3230]	P6	N-1-1	>0.90	>0.90	>0.90	0.87	>0.90	>0.90	>0.90	>0.90	>0.90	>0.90	Under Review

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
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022 SP High CEC Forecast	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations	
REEDLEY 115kV	P1-2:A14:58:_MCCALL-REEDLEY 115KV [2320] MOAS OPENED ON MC CALL_WAHTOKE & P1-2:A14:57:_SANGER-REEDLEY 115KV [9140] MOAS OPENED ON POMWDFLJT_PARLIER	P6	N-1-1	0.88	0.88	0.86	>0.90	>0.90	0.85	0.88	0.83	>0.90	0.85	Under Review (Being reviewed as part of REEDLEY-OROSO 70 kV line reconductor-20 MVar shunts caps at Dinuba)
RIVERROC 70kV	P1-2:A13:21:_WILSON-BORDEN 230KV [9001] & P1-2:A13:23:_BORDEN-GREGG 230KV [4400]	P6	N-1-1	>0.90	>0.90	>0.90	0.52	>0.90	>0.90	>0.90	>0.90	>0.90	>0.90	Under Review
SANDCRK 70kV	P1-2:A14:58:_MCCALL-REEDLEY 115KV [2320] MOAS OPENED ON MC CALL_WAHTOKE & P1-2:A14:57:_SANGER-REEDLEY 115KV [9140] MOAS OPENED ON POMWDFLJT_PARLIER	P6	N-1-1	0.85	0.84	0.83	>0.90	>0.90	0.81	0.85	0.79	>0.90	0.81	Under Review
SAXONCRK 70kV	P1-3:A13:15:_EXCHEQUR 70/115KV TB 1 & P1-2:A13:61:_EXCHEQUER-MARIPOSA 70KV [8640]	P6	N-1-1	0.88	>0.90	>0.90	>0.90	>0.90	0.88	0.88	0.88	>0.90	>0.90	Under Review
SAXONCRK 70kV	P1-3:A13:15:_EXCHEQUR 70/115KV TB 1 & P1-2:A13:39:_WILSON-LE GRAND 115KV [4170]	P6	N-1-1	<1.10	<1.10	<1.10	1.13	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	Under Review
SHARON 115kV	P1-3:A13:4:_WILSON 230/115KV TB 1 & P1-3:A13:5:_WILSON 230/115KV TB 2	P6	N-1-1	>0.90	>0.90	>0.90	>0.90	>0.90	0.87	>0.90	0.87	>0.90	>0.90	Scope Under Review: Wilson 115 kV Area Reinforcement Project
SJNO2 70kV	P1-2:A13:21:_WILSON-BORDEN 230KV [9001] & P1-2:A13:23:_BORDEN-GREGG 230KV [4400]	P6	N-1-1	>0.90	>0.90	>0.90	0.60	>0.90	>0.90	>0.90	>0.90	>0.90	>0.90	Under Review
SJNO3 70kV	P1-2:A13:21:_WILSON-BORDEN 230KV [9001] & P1-2:A13:23:_BORDEN-GREGG 230KV [4400]	P6	N-1-1	>0.90	>0.90	>0.90	0.59	>0.90	>0.90	>0.90	>0.90	>0.90	>0.90	Under Review
SNTA RTA 70kV	P1-2:A13:50:_PANOCHÉ-ORO LOMA 115KV [3240] & P1-2:A13:23:_BORDEN-GREGG 230KV [4400]	P6	N-1-1	>0.90	0.86	0.85	>0.90	>0.90	0.84	>0.90	0.84	>0.90	0.85	Under Review
STONCRRL 70kV	P1-2:A14:58:_MCCALL-REEDLEY 115KV [2320] MOAS OPENED ON MC CALL_WAHTOKE & P1-2:A14:57:_SANGER-REEDLEY 115KV [9140] MOAS OPENED ON POMWDFLJT_PARLIER	P6	N-1-1	0.85	0.85	0.84	>0.90	>0.90	0.82	0.85	0.80	>0.90	0.82	Under Review

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
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022 SP High CEC Forecast	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations	
STOREY 2 230kV	P1-2:A13:10:_WARNERVILLE-WILSON 230KV [5870] & P1-2:A13:23:_BORDEN-GREGG 230KV [4400]	P6	N-1-1	>0.90	>0.90	>0.90	>0.90	>0.90	0.90	>0.90	0.90	>0.90	>0.90	Under Review
TRIGO 70kV	P1-2:A13:21:_WILSON-BORDEN 230KV [9001] & P1-2:A13:23:_BORDEN-GREGG 230KV [4400]	P6	N-1-1	>0.90	>0.90	>0.90	0.35	>0.90	>0.90	>0.90	>0.90	>0.90	>0.90	Under Review
TVY VLLY 70kV	P1-2:A14:58:_MCCALL-REEDLEY 115KV [2320] MOAS OPENED ON MC CALL_WAHTOKE & P1-2:A14:57:_SANGER-REEDLEY 115KV [9140] MOAS OPENED ON POMWDFLJT_PARLIER	P6	N-1-1	0.87	0.87	0.86	>0.90	>0.90	0.84	0.87	0.82	>0.90	0.84	Under Review (Being reviewed as part of REEDLEY-OROSO 70 kV line reconductor-20 MVA shunts caps at Dinuba)
WAHTOKE 115kV	P1-2:A14:58:_MCCALL-REEDLEY 115KV [2320] MOAS OPENED ON MC CALL_WAHTOKE & P1-2:A14:57:_SANGER-REEDLEY 115KV [9140] MOAS OPENED ON POMWDFLJT_PARLIER	P6	N-1-1	0.87	0.87	0.86	>0.90	>0.90	0.84	0.87	0.82	>0.90	0.84	Under Review
WILSON A 115kV	P1-3:A13:4:_WILSON 230/115KV TB 1 & P1-3:A13:5:_WILSON 230/115KV TB 2	P6	N-1-1	>0.90	0.84	0.84	>0.90	>0.90	0.79	>0.90	0.79	>0.90	0.85	Scope Under Review: Wilson 115 kV Area Reinforcement Project
WISHON 70kV	P1-2:A14:15:_BORDEN-GREGG 230KV [4400] & P1-2:A13:21:_WILSON-BORDEN 230KV [9001]	P6	N-1-1	>0.90	>0.90	>0.90	0.60	>0.90	>0.90	>0.90	>0.90	>0.90	>0.90	Under Review
WST FRSO 115kV	P1-2:A14:64:_SANGER-CALIFORNIA AVE 115KV [9130] & P1-2:A14:66:_MCCALL-WEST FRESNO #2 115KV [2370]	P6	N-1-1	0.89	0.89	0.88	>0.90	>0.90	0.87	0.89	0.87	>0.90	0.88	Under Review
YOSEMITE 70kV	P1-3:A13:15:_EXCHEQUR 70/115KV TB 1 & P1-2:A13:61:_EXCHEQUER-MARIPOSA 70KV [8640]	P6	N-1-1	0.86	0.90	0.89	>0.90	>0.90	0.87	0.86	0.87	>0.90	0.89	Under Review
DOS PALS 70kV	P7-1:A13:7:_LOS BANOS-PANOCHÉ #1 230KV [5030] & PANOCHÉ-ORO LOMA 115KV [3240]	P7	N-2	0.94	0.90	0.89	1.05	1.05	0.88	0.94	0.88	0.96	0.89	Under Review
FIREBAGH 70kV	P7-1:A13:7:_LOS BANOS-PANOCHÉ #1 230KV [5030] & PANOCHÉ-ORO LOMA 115KV [3240]	P7	N-2	0.91	0.87	0.86	1.05	1.05	0.85	0.91	0.85	0.94	0.86	Under Review
GATES 115kV	P7-1:A14:3:_MUSTANGSS-GATES #1 230KV [0] & MUSTANGSS-GATES #2 230KV [0]	P7	N-2	1.10	1.10	1.10	1.10	1.10	1.11	1.10	1.10	1.10	1.10	Under Review

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
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022 SP High CEC Forecast	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations	
GATES 115kV	P7-1:A14:4:_MUSTANGSS-GATES #1 230KV [0] & MUSTANGSS-GATES #2 230KV [0] (2)	P7	N-2	1.10	1.11	1.10	1.10	1.10	1.11	1.10	1.10	1.10	1.10	Under Review
ORO LOMA 70kV	P7-1:A13:7:_LOS BANOS-PANOCHÉ #1 230KV [5030] & PANOCHÉ-ORO LOMA 115KV [3240]	P7	N-2	0.95	0.91	0.91	1.06	1.06	0.90	0.95	0.89	0.97	0.91	Under Review
ORO LOMA 115kV	P7-1:A13:7:_LOS BANOS-PANOCHÉ #1 230KV [5030] & PANOCHÉ-ORO LOMA 115KV [3240]	P7	N-2	0.95	0.91	0.91	1.05	1.05	0.90	0.95	0.90	0.97	0.91	Under Review
POSO J1 70kV	P7-1:A13:7:_LOS BANOS-PANOCHÉ #1 230KV [5030] & PANOCHÉ-ORO LOMA 115KV [3240]	P7	N-2	0.92	0.88	0.87	1.05	1.05	0.86	0.92	0.86	0.95	0.87	Under Review
SNTA RTA 70kV	P7-1:A13:7:_LOS BANOS-PANOCHÉ #1 230KV [5030] & PANOCHÉ-ORO LOMA 115KV [3240]	P7	N-2	0.93	0.89	0.89	1.05	1.05	0.87	0.93	0.87	0.95	0.89	Under Review

Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)					Voltage PU (Sensitivity Scenarios)					Project & Potential Mitigation Solutions
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022 SP High CEC Forecast	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations	
DOS PALS 70 kV	PANOCHÉ-ORO LOMA 115KV [3240]	P1	N-1	7.5	11.0	11.2	-0.4	-0.1	7.4	6.4	12.6	11.3	12.5	Under Review
FIREBAGH 70 kV	PANOCHÉ-ORO LOMA 115KV [3240]	P1	N-1	7.7	11.3	11.6	-0.1	-0.1	7.7	6.6	13.1	11.7	13.0	Under Review
OAKHURST 115 kV	CHOWCHILLA-KERCKHOFF 115KV [1250] MOAS OPENED ON OAKH_JCT_K1-JCT	P1	N-1	8.3	8.4	8.4	-0.3	1.0	8.3	5.5	9.6	8.2	9.7	Under Review
ORO LOMA 70 kV	PANOCHÉ-ORO LOMA 115KV [3240]	P1	N-1	7.4	10.8	11.0	-0.4	-0.1	7.3	6.3	12.4	11.1	12.3	Under Review
ORO LOMA 115 kV	PANOCHÉ-ORO LOMA 115KV [3240]	P1	N-1	7.2	10.6	10.8	-0.6	-0.1	7.2	6.2	12.1	10.8	12.0	Under Review
SNTA RTA 70 kV	PANOCHÉ-ORO LOMA 115KV [3240]	P1	N-1	7.5	11.1	11.3	-0.4	-0.1	7.5	6.5	12.7	11.4	12.6	Under Review

Study Area: **PG&E Greater Fresno**

Transient Stability



Contingency	Category	Category Description	Transient Stability Performance (Number of voltage and frequency violations)										Potential Mitigation Solutions	
			2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	Select..	Select..	Select..	Select..	Select..		
HELMS PP 1 3Ø fault with normal clearing.	P1-1		0	0	0	0	0							No violation
Line LOSBANOS 230.0 to SN LS PP 230.0 Circuit 1 3Ø fault with normal clearing.	P1-2		0	0	0	0	0							No violation
Line MUSTANGSS 230.0 to GATES 230.0 Circuit 2 1 3Ø fault with normal clearing.	P1-2		0	0	0	0	0							No violation
Line Q877PH12 230.0 to CALFLATSSS 230.0 Circuit 1 3Ø fault with normal clearing.	P1-2		NCONV	NCONV	NCONV	0	NCONV							Under review
BORDEN 230 kV Bus Section SLG fault with normal clearing	P2-2		0	0	0	0	0							No violation
PANOCHÉ 230 kV Bus Section SLG fault with normal clearing	P2-2		0	0	0	0	0							No violation
3Ø fault on MCCALL 230 kV Transformers with HELMS PP 1 Out of service.	P3-3		0	0	0	0	0							No violation
Helms - Gregg #1 & #2 230 kV Lines SLG fault with normal clearing	P7-1		0	0	0	0	0							No violation

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..	

Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading % (Baseline Scenarios)					Loading % (Sensitivity Scenarios)					Project & Potential Mitigation Solutions	
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022 SP High CEC Forecast	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations		
30945 KERN PP 230 30943 STCKDLJ2 230 1 1	MIDWAY - 2E 230kV & KERN PP-BKRSFLDB-MIDWAY line	P2	Non-bus-tie breaker fault	98	NA	NA	29	NA	NA	NA	103	NA	NA	NA	Project : Midway-Kern PP 230 kV line capacity increase project and Midway-Kern PP #2 230kV Line project. Service Date : 4/2020. Short term: Action Plan
	MIDWAY 230kV - Section 2D & 2E	P2	Bus-tie breaker fault	98	NA	NA	35	NA	NA	NA	104	NA	NA	NA	Project : Midway-Kern PP 230 kV line capacity increase project and Midway-Kern PP #2 230kV Line project. Service Date : 4/2020. Short term: Action Plan
	MIDWAY 230kV - Section 2E & 2F	P2	Bus-tie breaker fault	98	NA	NA	28	NA	NA	NA	103	NA	NA	NA	Project : Midway-Kern PP 230 kV line capacity increase project and Midway-Kern PP #2 230kV Line project. Service Date : 4/2020. Short term: Action Plan
	MIDWAY 230kV Section 2E	P2	Bus Section Fault	98	NA	NA	28	NA	NA	NA	103	NA	NA	NA	Project : Midway-Kern PP 230 kV line capacity increase project and Midway-Kern PP #2 230kV Line project. Service Date : 4/2020. Short term: Action Plan
30948 ELKHIL_G 230 30970 MIDWAY 230 1 1	MIDWAY 230kV - Section 2E & 2F	P2	Bus-tie breaker fault	87	102	<90	14	73	<90	70	<90	19	<90	Redispatch Generation	
	MIDWAY 230kV - Section 2F & 2E	P2	Bus-tie breaker fault	<90	<90	72	<90	<90	<90	<90	101	<90	103	Redispatch Generation	
	MIDWAY 230kV Section 2F	P2	Bus Section Fault	85	100	70	14	71	<90	68	100	19	100	Redispatch Generation	
30948 ELKHIL_G 230 30970 MIDWAY 230 2 1	ELKHIL_G-MIDWAY #1 230kV [0]	P1	N-1(Transmission Line)	85	100	70	14	71	<90	68	100	19	100	Redispatch Generation	
	MIDWAY - 1F 230kV & MIDWAY-MIDWAY-R13 #1 line	P2	Non-bus-tie breaker fault	85	100	70	14	73	<90	68	100	20	101	Redispatch Generation	
	MIDWAY 230kV - Section 1E & 1F	P2	Bus-tie breaker fault	<90	100	70	<90	81	<90	<90	101	20	102	Redispatch Generation	
	MIDWAY 230kV Section 1F	P2	Bus Section Fault	85	100	70	14	73	<90	68	100	20	101	Redispatch Generation	

Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading % (Baseline Scenarios)					Loading % (Sensitivity Scenarios)					Project & Potential Mitigation Solutions
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022 SP High CEC Forecast	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations	
30970 MIDWAY 230 30942 STCKDLJ1 230 1 1	Midway-Kern No. 3 & Midway-Kern No. 4 230 kV Lines	P7	N-2(Common structure)	99	48	NA	29	17	<90	104	37	17	NA	Project : Midway-Kern PP 230 kV line capacity increase project and Midway-Kern PP #2 230kV Line project. Service Date : 4/2020. Short term: Action Plan
	STCKDLEB-KERN PP-MIDWAY 230kV [0] & KERN PP-BKRSFLDB-MIDWAY 230kV [0]	P6	N-1-1	<90	<90	NA	<90	<90	<90	104	<90	<90	NA	
30970 MIDWAY 230 30945 KERN PP 230 3 1	MIDWAY-KERN #4 230kV [5170] & MIDWAY-KERN PP #2 230kV [0]	P6	N-1-1	NA	NA	<90	NA	NA	NA	NA	<90	<90	101	Sensitivity only
30970 MIDWAY 230 30945 KERN PP 230 4 1	MIDWAY 230kV - Section 1E & 1D	P2	Bus-tie breaker fault	NA	NA	69	NA	NA	NA	NA	<90	<90	NConv	Sensitivity only
	MIDWAY-KERN #3 230kV [5160] & MIDWAY-KERN PP #2 230kV [0]	P6	N-1-1	NA	NA	<90	NA	NA	NA	NA	<90	<90	102	Sensitivity only
30970 MIDWAY 230 30946 LAPALOMA 230 1 1	LAPALOMA 230kV - Middle Breaker Bay 2	P2	Non-bus-tie breaker fault	100	100	100	<90	97	<90	100	100	<90	100	Redispatch Generation
	MIDWAY - 1D 230kV & MIDWAY-WHEELER RIDGE #1 line	P2	Non-bus-tie breaker fault	100	100	100	<90	97	<90	100	100	<90	100	Redispatch Generation
	MIDWAY - 1D 230kV & STCKDLEB-KERN PP-MIDWAY line	P2	Bus Section Fault	100	NA	NA	<90	NA	NA	100	NA	NA	NA	Redispatch Generation
	MIDWAY 230kV - Section 1E & 1D	P2	Bus-tie breaker fault	100	101	102	2	98	<90	100	101	<90	NConv	Redispatch Generation
	MIDWAY 230kV Section 1D	P2	Bus Section Fault	100	101	101	2	97	<90	100	101	<90	102	Redispatch Generation
30970 MIDWAY 230 30946 LAPALOMA 230 2 1	LAPALOMA 230kV - Middle Breaker Bay 1	P2	Non-bus-tie breaker fault	100	100	100	<90	<90	<90	100	100	<90	100	Redispatch Generation
	MIDWAY - 2E 230kV & KERN PP-BKRSFLDA-MIDWAY line	P2	Bus Section Fault	100	100	NA	<90	102	100	100	NA	<90	NA	Redispatch Generation
	MIDWAY 230kV - Section 2D & 2E	P2	Bus-tie breaker fault	100	101	101	<90	<90	<90	100	101	<90	NConv	Redispatch Generation
	MIDWAY 230kV - Section 2E & 2F	P2		100	100	100	<90	102	<90	100	100	<90	101	Redispatch Generation
	MIDWAY 230kV Section 2E	P2	Bus Section Fault	100	100	100	<90	<90	<90	100	100	<90	100	Redispatch Generation

2017-2018 ISO Reliability Assessment - Study Results

Study Area: PG&E Kern

Thermal Overloads



Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading % (Baseline Scenarios)					Loading % (Sensitivity Scenarios)					Project & Potential Mitigation Solutions
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022 SP High CEC Forecast	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations	
30970 MIDWAY 230 30976 MIDWAY-R12 230 1 1	MIDWAY 230kV - Section 1E & 1F	P2	Bus-tie breaker fault	<90	<90	<90	<90	120	<90	NA	<90	<90	<90	Redispatch Generation
34139 BSCSCH T 70.0 34869 COPUS_E 70.0 1 1	MIDWAY 115kV - Section 2D & 1D	P2	Bus-tie breaker fault	<90	<90	<90	145	<90	<90	<90	<90	<90	<90	Mitigation Under Review (Extend the Summer Setup)
	Midway-Taft & Fellows-Taft 115 kV Lines	P7	N-2(Common structure)	<90	<90	<90	127	<90	<90	<90	<90	<90	<90	Mitigation Under Review (Extend the Summer Setup)
	MIDWAY-TAFT 115kV [2620] & FELLOWS-MIDSUN 115kV [1570]	P6	N-1-1	<90	<90	<90	182	<90	<90	<90	<90	<90	<90	Mitigation Under Review (Extend the Summer Setup)
34225 BELRDG J 115 34774 MIDWAY 115 1 1	MIDWAY-TEMBLOR 115kV [2630] (TEMBLOR-PSE MCKJ)	P2	Bus Section Fault	61	57	58	41	96	58	60	57	103	57	Sensitivity only
	TEMBLOR - 1D 115kV & TEMBLOR-KERNRIDGE line	P2	Non-bus-tie breaker fault	61	57	58	41	96	58	60	58	103	57	Sensitivity only
	TEMBLOR - 1D 115kV & TEMBLOR-SAN LUIS OBISPO line	P2	Non-bus-tie breaker fault	61	57	58	41	96	58	60	58	103	57	Sensitivity only
	TEMBLOR 115kV Section 1D	P2	Bus Section Fault	61	57	58	41	96	58	60	58	103	57	Sensitivity only
34226 BELRDG J 115 34774 MIDWAY 115 1 1	TEMBLOR-SAN LUIS OBISPO 115kV [3960] & TEMBLOR-KERNRIDGE 115kV [3950]	P6	N-1-1	<90	<90	<90	<90	<90	<90	<90	<90	100	<90	Sensitivity only
34245 PSE MCKJ 115 34225 BELRDG J 115 1 1	MIDWAY 230kV - Section 1E & 1F	P2	Bus-tie breaker fault	<90	55	36	<90	107	65	<90	62	17	46	Redispatch Generation
34246 PSE MCKJ 115 34225 BELRDG J 115 1 1	PSEMCKIT 9.11kV Gen Unit 1 & TEMBLORD 12.47kV Gen Unit WP	P3	G-1N-1	<90	<90	<90	<90	<90	104	<90	104	<90	<90	Redispatch Generation
34706 WESTPARK 115 34752 KERN PWR 115 1 1	KERN-WESTPARK #2 115kV [2010] & PSE-BEAR 13.80kV Gen Unit 1	P3	G-1N-1	<90	<90	<90	<90	<90	106	<90	109	<90	<90	Scope Under Review: Kern PP 115 kV reinforcement project.
34706 WESTPARK 115 34752 KERN PWR 115 2 1	KERN PWR 115kV - Section 1E & 1D	P2	Bus-tie breaker fault	61	62	63	6	8	<90	64	75	41	101	Scope Under Review: Kern PP 115 kV reinforcement project.
	KERN-WESTPARK #1 115kV [2010] & PSE-BEAR 13.80kV Gen Unit 1	P3	G-1N-1	<90	<90	<90	<90	<90	106	<90	109	<90	<90	Scope Under Review: Kern PP 115 kV reinforcement project.
34709 7STNDRD 115 34752 KERN DWR 115 1 1	KERN PWR - 2E 115kV & KERN-MAGUNDEN-WITCO line	P2	Non-bus-tie breaker fault	63	64	65	20	12	74	65	79	30	153	Scope under review : North East Conversion (Semitropic-Wasco-Famoso-Kern 70 kV)
	KERN PWR 115kV - Section 1E & 2E	P2	Non-bus-tie breaker	109	116	123	23	4	130	113	145	67	227	Scope under review : North East Conversion (Semitropic-Wasco-Famoso-Kern 70 kV)

Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading % (Baseline Scenarios)					Loading % (Sensitivity Scenarios)					Project & Potential Mitigation Solutions
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022 SP High CEC Forecast	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations	
PWR 115 1 1	KERN-LIVE OAK 115kV [1960] & KERN-MAGUNDEN-WITCO 115kV [1970]	P6	N-1-1	<90	<90	<90	<90	<90	<90	<90	<90	<90	151	Scope under review : North East Conversion (Semitropic-Wasco-Famoso-Kern 70 kV)
	KERN-MAGUNDEN-WITCO 115kV [1970] (KERN PWR-KERNWATR)	P2	Line section w/o fault	74	77	81	16	5	86	76	95	44	129	Scope under review : North East Conversion (Semitropic-Wasco-Famoso-Kern 70 kV)
34716 LRDO JCT 115 34709 7STNDRD 115 1 1	KERN PWR - 2E 115kV & KERN-MAGUNDEN-WITCO line	P2	Non-bus-tie breaker fault	45	45	44	44	55	53	44	55	31	130	Scope under review : North East Conversion (Semitropic-Wasco-Famoso-Kern 70 kV)
	KERN-LIVE OAK 115kV [1960] & KERN-MAGUNDEN-WITCO 115kV [1970]	P6	N-1-1	<90	<90	<90	<90	<90	<90	<90	<90	<90	128	Scope under review : North East Conversion (Semitropic-Wasco-Famoso-Kern 70 kV)
	KERN-MAGUNDEN-WITCO 115kV [1970] (KERN PWR-KERNWATR)	P2	Line section w/o fault	55	57	60	54	70	64	54	70	44	107	Scope under review : North East Conversion (Semitropic-Wasco-Famoso-Kern 70 kV)
34716 LRDO JCT 115 34718 KERN OIL 115 1 1	KERN PWR - 2E 115kV & KERN-MAGUNDEN-WITCO line	P2	Non-bus-tie breaker fault	40	41	41	24	0	48	41	50	30	129	Scope under review : North East Conversion (Semitropic-Wasco-Famoso-Kern 70 kV)
	KERN PWR 115kV - Section 1E & 2E	P2	Non-bus-tie breaker	105	113	122	28	17	127	110	142	80	233	Scope under review : North East Conversion (Semitropic-Wasco-Famoso-Kern 70 kV)
	KERN PWR 115kV Section 2E	P2	Non-bus-tie breaker	105	113	122	23	17	127	110	143	80	239	Scope under review : North East Conversion (Semitropic-Wasco-Famoso-Kern 70 kV)
	KERN-LIVE OAK 115kV [1960] & KERN-MAGUNDEN-WITCO 115kV [1970]	P6	N-1-1	<90	<90	<90	<90	<90	<90	<90	<90	<90	127	Scope under review : North East Conversion (Semitropic-Wasco-Famoso-Kern 70 kV)
34719 POSOMTJT 115 34718 KERN OIL 115 1 1	7TH STANDARD-KERN 115kV [1981] & KERN-MAGUNDEN-WITCO 115kV [1970]	P6	N-1-1	<90	<90	<90	<90	<90	<90	<90	<90	<90	131	Scope under review : North East Conversion (Semitropic-Wasco-Famoso-Kern 70 kV)
34720 DSCVRYTP 115 34744 GODN_BER 115 1 1	7TH STANDARD-KERN 115kV [1981] & KERN-LIVE OAK 115kV [1960]	P6	N-1-1	<90	<90	<90	<90	<90	<90	<90	<90	<90	154	Scope under review : North East Conversion (Semitropic-Wasco-Famoso-Kern 70 kV)
34724 KRN OL J 115 34736 MAGUNDEN 115 1 1	MIDWAY 230kV - Section 1E & 1D	P2	Bus-tie breaker fault	61	69	79	5	13	76	64	90	50	NConv	Scope Under Review: Kern PP 115 kV reinforcement project.
34724 KRN OL J 115 34744 GODN_BER 115 1 1	KERN-LIVE OAK 115kV [1960] & 7TH STANDARD-KERN 115kV [1981]	P6	N-1-1	<90	<90	<90	<90	<90	<90	<90	<90	<90	154	Scope under review : North East Conversion (Semitropic-Wasco-Famoso-Kern 70 kV)
	7STNDRD 115kV - Ring R1 & R2	P2	Non-bus-tie breaker fault	65	69	74	21	6	78	67	87	42	125	Scope Under Review: Kern PP 115 kV reinforcement project.
	7STNDRD 115kV - Ring R1 & R4	P2	Non-bus-tie breaker fault	84	89	94	20	14	99	87	109	61	148	Scope Under Review: Kern PP 115 kV reinforcement project.
	7TH STANDARD-KERN 115kV [1981]	P1	N-1(Transmission Line)	81	86	92	20	6	97	85	107	52	145	Scope Under Review: Kern PP 115 kV reinforcement project.
	7TH STANDARD-KERN 115kV [1981] & KERN-LIVE OAK 115kV [1960]	P6	N-1-1	105	111	118	<90	<90	125	109	139	<90	210	Scope Under Review: Kern PP 115 kV reinforcement project.

Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading % (Baseline Scenarios)					Loading % (Sensitivity Scenarios)					Project & Potential Mitigation Solutions
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022 SP High CEC Forecast	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations	
34724 KRN OL J 115 34798 KERNWATR 115 1 1	Base Case	P0	Basecase	63	67	72	19	8	75	65	83	44	111	Scope Under Review: Kern PP 115 kV reinforcement project.
	KERN PWR - 2D 115kV & KERN-KERN FRONT line	P2	Non-bus-tie breaker fault	82	87	92	20	8	97	85	107	52	147	Scope Under Review: Kern PP 115 kV reinforcement project.
	KERN PWR - 2D 115kV & KERN-TEVIS-STOCKDALE-LAMONT line	P2	Non-bus-tie breaker fault	81	86	91	20	9	96	84	107	52	146	Scope Under Review: Kern PP 115 kV reinforcement project.
	KERN PWR 115kV - Section 2D & 1D	P2	Bus-tie breaker fault	82	86	92	18	10	97	85	107	51	150	Scope Under Review: Kern PP 115 kV reinforcement project.
	KERN-LIVE OAK 115kV [1960]	P1	N-1(Transmission Line)	60	64	69	19	5	72	62	81	40	119	Scope Under Review: Kern PP 115 kV reinforcement project.
	Lerdo-Kern Oil-7th Standard 115 kV Line & Kern-Live Oak 115 kV Lines	P7	N-2(Common structure)	69	73	79	24	9	82	71	93	51	141	Scope Under Review: Kern PP 115 kV reinforcement project.
	LIVE OAK 115kV Section 1D	P2	Bus Section Fault	79	84	89	24	22	92	82	101	60	119	Scope Under Review: Kern PP 115 kV reinforcement project.
	Live Oak-Kern Oil & Lerdo-Kern Oil-7th Standard 115 kV Line	P7	N-2(Common structure)	71	76	83	17	15	84	74	95	56	109	Scope Under Review: Kern PP 115 kV reinforcement project.
	LIVE OAK-KERN OIL 115kV [2140] (PTRL JCT-LIVE OAK)	P2	Line section w/o fault	79	84	89	23	22	92	82	101	60	119	Scope Under Review: Kern PP 115 kV reinforcement project.
	Midway-Kern No. 3 & Midway-Kern No. 4 230 kV Lines	P7	N-2(Common structure)	54	58	63	13	7	65	56	71	38	106	Scope Under Review: Kern PP 115 kV reinforcement project.
	VEDDER TAP 115kV [2141] (PTRL JCT-POSOMTJT)	P2	Line section w/o fault	79	84	89	23	22	92	82	101	60	119	Scope Under Review: Kern PP 115 kV reinforcement project.
34726 PTRL JCT 115 34719 POSOMTJT 115 1 1	7TH STANDARD-KERN 115kV [1981] & KERN-MAGUNDEN-WITCO 115kV [1970]	P6	N-1-1	<90	<90	<90	<90	<90	107	<90	112	<90	165	Scope under review : North East Conversion (Semitropic-Wasco-Famoso-Kern 70 kV)
34726 PTRL JCT 115 34728 LIVE OAK 115 1 1	KERN-MAGUNDEN-WITCO 115kV [1970] & 7TH STANDARD-KERN 115kV [1981]	P6	N-1-1	<90	<90	<90	<90	<90	108	<90	113	<90	165	Scope under review : North East Conversion (Semitropic-Wasco-Famoso-Kern 70 kV)
34728 LIVE OAK 115 34752 KERN PWR 115 1 1	7TH STANDARD-KERN 115kV [1981] & KERN-MAGUNDEN-WITCO 115kV [1970]	P6	N-1-1	<90	101	102	<90	<90	117	102	125	<90	254	Scope under review : North East Conversion (Semitropic-Wasco-Famoso-Kern 70 kV)
	KERN-MAGUNDEN-WITCO 115kV [1970] (KERN PWR-KERNWATR)	P2	Line section w/o fault	54	58	63	22	7	67	57	75	35	128	Scope under review : North East Conversion (Semitropic-Wasco-Famoso-Kern 70 kV)

Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading % (Baseline Scenarios)					Loading % (Sensitivity Scenarios)					Project & Potential Mitigation Solutions
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022 SP High CEC Forecast	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations	
34749 TPMNTP1 115 34750 TUPMAN 115 1 1	MIDWAY - 2E 115kV & SMYRNA-SEMITROPIC-MIDWAY line	P2	Non-bus-tie breaker fault	111	130	139	39	46	140	118	156	98	139	System upgrade or preferred resource
	MIDWAY 115kV - Section 1E & 2E	P2	Bus-tie breaker fault	111	131	139	39	46	141	118	157	98	139	System upgrade or preferred resource
	MIDWAY 115kV Section 2E	P2	Bus Section Fault	111	130	139	39	46	140	118	156	98	139	System upgrade or preferred resource
34751 TPMNTP2 115 34750 TUPMAN 115 1 1	MIDWAY - 2E 115kV & SMYRNA-SEMITROPIC-MIDWAY line	P2	Non-bus-tie breaker fault	89	100	108	27	30	108	89	122	74	109	System upgrade or preferred resource
	MIDWAY 115kV - Section 1E & 2E	P2	Bus-tie breaker fault	88	100	108	27	30	108	89	122	74	109	System upgrade or preferred resource
	MIDWAY 115kV Section 2E	P2	Bus Section Fault	89	100	108	27	30	108	89	122	74	109	System upgrade or preferred resource
34752 KERN PWR 115 30945 KERN PP 230 3 1	KERN PP 230/115kV TB 4 & KERN PP 230/115kV TB 5	P6	N-1-1	<90	104	<90	<90	<90	<90	121	135	<90	192	Review Kern Bank SPS
	KERN PWR 115kV - Section 2D & 1D	P2	Bus-tie breaker fault	87	92	98	16	12	104	90	114	49	144	Review Kern Bank SPS
34752 KERN PWR 115 30945 KERN PP 230 4 1	KERN PP 230/115kV TB 5 & KERN PP 230/115kV TB 3	P6	N-1-1	<90	100	<90	<90	<90	117	101	130	<90	185	Review Kern Bank SPS
34752 KERN PWR 115 30945 KERN PP 230 5 1	KERN PP 230/115kV TB 3 & KERN PP 230/115kV TB 4	P6	N-1-1	<90	104	<90	<90	<90	121	<90	135	<90	192	Review Kern Bank SPS
	KERN PWR 115kV - Section 2D & 2E	P2	Bus-tie breaker fault	83	93	97	28	31	104	88	113	28	110	Review Kern Bank SPS
34752 KERN PWR 115 34753 TEVISJ1 115 1 1	KERN PWR - 2D 115kV & KERN-KERN FRONT line	P2	Non-bus-tie breaker fault	78	98	101	51	76	108	85	114	35	103	Scope Under Review: Kern PP 115 kV reinforcement project.
	KERN PWR 115kV - Section 2D & 2E	P2	Bus-tie breaker fault	78	97	100	49	76	108	86	116	32	102	Scope Under Review: Kern PP 115 kV reinforcement project.
	KERN-TEVIS-STOCKDALE-LAMONT 115kV [1940] (KERN PWR-TEVISJ2)	P2	Line section w/o fault	78	97	100	52	76	108	85	115	35	101	Scope Under Review: Kern PP 115 kV reinforcement project.
34752 KERN PWR 115 34755 TEVISJ2 115 1 1	KERN PWR 115kV - Section 1E & 1D	P2	Bus-tie breaker fault	79	100	103	50	75	111	86	119	33	107	Scope Under Review: Kern PP 115 kV reinforcement project.
	KERN-TEVIS-STOCKDALE 115kV [1990] (KERN PWR-TEVISJ1)	P2	Line section w/o fault	79	99	102	50	76	110	86	118	34	105	Scope Under Review: Kern PP 115 kV reinforcement project.

Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading % (Baseline Scenarios)					Loading % (Sensitivity Scenarios)					Project & Potential Mitigation Solutions
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022 SP High CEC Forecast	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations	
7STNDRD 115kV - Ring R1 & R2		P2	Non-bus-tie breaker fault	69	73	77	23	9	82	71	90	45	129	Scope Under Review: Kern PP 115 kV reinforcement project.
7STNDRD 115kV - Ring R1 & R4		P2	Non-bus-tie breaker fault	87	92	97	23	17	102	90	113	64	152	Scope Under Review: Kern PP 115 kV reinforcement project.
7STNDRD 115kV - Ring R3 & R2		P2	Non-bus-tie breaker fault	60	63	68	20	16	70	62	78	47	103	Scope Under Review: Kern PP 115 kV reinforcement project.
7STNDRD 115kV - Ring R3 & R4		P2	Non-bus-tie breaker fault	60	63	68	20	16	70	62	78	47	103	Scope Under Review: Kern PP 115 kV reinforcement project.
7TH STANDARD-KERN 115kV [1981]		P1	N-1(Transmission Line)	85	90	95	23	10	100	88	110	55	149	Scope Under Review: Kern PP 115 kV reinforcement project.
7TH STANDARD-KERN 115kV [1981] & KERN-LIVE OAK 115kV [1960]		P6	N-1-1	108	114	<90	<90	<90	129	112	143	<90	214	Scope Under Review: Kern PP 115 kV reinforcement project.
Base Case		P0	Basecase	66	71	76	21	13	79	69	87	48	115	Scope Under Review: Kern PP 115 kV reinforcement project.
KERN OIL-LIVE OAK-POSO MT 115kV [0] MOAS OPENED on KRNFRNTT_POZO MT		P1	N-1(Transmission Line)	64	69	74	17	10	76	67	85	46	102	Scope Under Review: Kern PP 115 kV reinforcement project.
KERN PP 230kV - Middle Breaker Bay 1		P2	Non-bus-tie breaker fault	<90	60	65	<90	10	67	<90	74	41	100	Scope Under Review: Kern PP 115 kV reinforcement project.
KERN PP 230kV - Middle Breaker Bay 3		P2	Non-bus-tie breaker fault	<90	61	65	<90	10	67	<90	74	41	102	Scope Under Review: Kern PP 115 kV reinforcement project.
KERN PP 230kV - Middle Breaker Bay 4		P2	Non-bus-tie breaker fault	<90	60	65	<90	10	67	<90	75	41	100	Scope Under Review: Kern PP 115 kV reinforcement project.
KERN PWR - 2D 115kV & KERN-KERN FRONT line		P2	Non-bus-tie breaker fault	85	90	95	22	11	100	88	111	55	151	Scope Under Review: Kern PP 115 kV reinforcement project.
KERN PWR - 2D 115kV & KERN-TEVIS-STOCKDALE-LAMONT line		P2	Non-bus-tie breaker fault	84	90	95	23	12	100	88	110	55	150	Scope Under Review: Kern PP 115 kV reinforcement project.
KERN PWR 115kV - Section 1E & 1D		P2	Bus-tie breaker fault	57	60	65	17	10	67	59	74	41	100	Scope Under Review: Kern PP 115 kV reinforcement project.

Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading % (Baseline Scenarios)					Loading % (Sensitivity Scenarios)					Project & Potential Mitigation Solutions
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022 SP High CEC Forecast	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations	
34752 KERN PWR 115 34798 KERNWATR 115 1 1	KERN PWR 115kV - Section 2D & 1D	P2	Bus-tie breaker fault	85	90	95	21	13	100	88	110	55	154	Scope Under Review: Kern PP 115 kV reinforcement project.
	KERN-LIVE OAK 115kV [1960]	P1	N-1(Transmission Line)	63	67	72	21	9	75	66	84	43	122	Scope Under Review: Kern PP 115 kV reinforcement project.
	LERDO - 1D 115kV & LERDO-KERN OIL-7TH STANDARD line	P2	Non-bus-tie breaker fault	60	64	68	20	16	70	62	78	47	103	Scope Under Review: Kern PP 115 kV reinforcement project.
	Lerdo-Kern Oil-7th Standard 115 kV Line & Kern-Live Oak 115 kV Lines	P7	N-2(Common structure)	72	76	83	26	13	86	74	96	55	145	Scope Under Review: Kern PP 115 kV reinforcement project.
	LERDO-KERN OIL-7TH STANDARD 115kV [1950]	P1	N-1(Transmission Line)	60	64	68	20	16	70	62	78	47	103	Scope Under Review: Kern PP 115 kV reinforcement project.
	LIVE OAK - 1D 115kV & KERN OIL-LIVE OAK-POSO MT line	P2	Non-bus-tie breaker fault	64	69	74	17	10	76	67	85	46	102	Scope Under Review: Kern PP 115 kV reinforcement project.
	LIVE OAK 115kV Section 1D	P2	Bus Section Fault	82	87	92	26	25	96	85	104	63	122	Scope Under Review: Kern PP 115 kV reinforcement project.
	Live Oak-Kern Oil & Lerdo-Kern Oil-7th Standard 115 kV Line	P7	N-2(Common structure)	74	79	86	19	18	88	77	98	59	113	Scope Under Review: Kern PP 115 kV reinforcement project.
	LIVE OAK-KERN OIL 115kV [2140] (PTL JCT-LIVE OAK)	P2	Line section w/o fault	82	87	92	26	25	96	85	104	63	122	Scope Under Review: Kern PP 115 kV reinforcement project.
	MIDWAY - 1D 230kV & MIDWAY-WHEELER RIDGE #1 line	P2	Non-bus-tie breaker fault	57	61	65	17	10	67	59	75	41	101	Scope Under Review: Kern PP 115 kV reinforcement project.
	MIDWAY 230kV - Section 2F & 2E	P2	Bus-tie breaker fault	<90	<90	65	<90	<90	<90	<90	74	<90	104	Scope Under Review: Kern PP 115 kV reinforcement project.
	MIDWAY 230kV Section 1D	P2	Bus Section Fault	57	61	65	17	10	68	59	75	41	104	Scope Under Review: Kern PP 115 kV reinforcement project.
	MIDWAY 230kV Section 2E	P2	Bus Section Fault	58	61	65	15	10	68	60	74	41	101	Scope Under Review: Kern PP 115 kV reinforcement project.
	MIDWAY-KERN #3 230kV [5160]	P1	N-1(Transmission Line)	<90	60	65	<90	10	67	<90	74	41	100	Scope Under Review: Kern PP 115 kV reinforcement project.
MIDWAY-KERN #4 230kV [5170]	P1	N-1(Transmission Line)	<90	<90	65	<90	<90	<90	<90	<90	<90	100	Scope Under Review: Kern PP 115 kV reinforcement project.	

Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading % (Baseline Scenarios)					Loading % (Sensitivity Scenarios)					Project & Potential Mitigation Solutions
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022 SP High CEC Forecast	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations	
	Midway-Kern No. 1 & Midway-Kern No. 4 230 kV Lines	P7	N-2(Common structure)	57	60	65	16	10	67	60	74	41	101	Scope Under Review: Kern PP 115 kV reinforcement project.
	Midway-Kern No. 3 & Midway-Kern No. 1 230 kV Lines	P7	N-2(Common structure)	57	61	65	15	10	68	60	74	41	101	Scope Under Review: Kern PP 115 kV reinforcement project.
	Midway-Kern No. 3 & Midway-Kern No. 4 230 kV Lines	P7	N-2(Common structure)	57	61	66	15	10	68	60	74	41	110	Scope Under Review: Kern PP 115 kV reinforcement project.
	VEDDER TAP 115kV [2141] (PTRL JCT-POSOMTJT)	P2	Line section w/o fault	82	87	92	26	25	96	85	104	63	122	Scope Under Review: Kern PP 115 kV reinforcement project.
34766 SHAFTER 115 34774 MIDWAY 115 1 1	MIDWAY-TUPMAN-RIO BRAVO-RENFRO 115kV [2600] (MIDWAY-RIOBRVTM)	P2	Line section w/o fault	75	84	89	25	26	90	76	100	62	89	Sensitivity only
34775 RENFRJCT 115 34760 RIO BRVO 115 1 1	MIDWAY - 2E 115kV & SMYRNA-SEMITROPIC-MIDWAY line	P2	Non-bus-tie breaker fault	74	90	98	26	36	96	78	111	70	98	Sensitivity only
	MIDWAY 115kV - Section 1E & 2E	P2	Bus-tie breaker fault	74	90	98	26	36	96	78	111	70	98	Sensitivity only
	MIDWAY 115kV Section 2E	P2	Bus Section Fault	74	90	98	26	36	96	78	111	70	98	Sensitivity only
	MIDWAY-SHAFTER 115kV [2610]	P1	N-1(Transmission Line)	73	85	93	26	36	91	75	105	67	93	Sensitivity only
34777 FELLOWSG 115 34800 SANTA FE SUB 115 1 1	MARICOPA-CADET 70kV [0] & MIDWAY-TAFT 115kV [2620]	P6	N-1-1	102	102	<90	114	113	101	102	<90	108	102	System upgrade or preferred resource
	MIDWAY - 2D 115kV & MIDWAY-RENFRO-TUPMAN line	P2	Non-bus-tie breaker fault	59	58	60	73	97	51	59	50	131	60	Sensitivity only
	MIDWAY - 2D 115kV & MIDWAY-TEMBLOR line	P2	Non-bus-tie breaker fault	59	58	60	73	97	51	59	50	131	60	Sensitivity only
	MIDWAY 115kV - Section 2D & 2E	P2	Bus-tie breaker fault	59	58	61	73	97	52	60	51	131	61	Sensitivity only
	MIDWAY 115kV Section 2D	P2	Bus Section Fault	59	58	60	73	97	51	59	50	131	60	Sensitivity only
	MIDWAY-TAFT 115kV [2620]	P1	N-1(Transmission Line)	59	58	60	73	97	51	60	50	131	60	Sensitivity only

Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading % (Baseline Scenarios)					Loading % (Sensitivity Scenarios)					Project & Potential Mitigation Solutions
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022 SP High CEC Forecast	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations	
	TAFT 115kV - Ring R2 & R1	P2	Non-bus-tie breaker fault	72	71	74	76	98	65	72	66	139	74	Sensitivity only
	TAFT 115kV - Ring R2 & R3	P2	Non-bus-tie breaker fault	58	58	60	75	97	51	59	50	131	60	Sensitivity only
34777 FELLOWSG 115 39070 AEVICTORYJT 115 1 1	MIDWAY - 2D 115kV & MIDWAY-RENFRO-TUPMAN line	P2	Non-bus-tie breaker fault	NA	62	48	NA	90	54	NA	53	122	64	Sensitivity only
	MIDWAY - 2D 115kV & MIDWAY-TEMBLOR line	P2	Non-bus-tie breaker fault	NA	62	48	NA	90	54	NA	53	122	64	Sensitivity only
	MIDWAY 115kV - Section 2D & 2E	P2	Bus-tie breaker fault	NA	62	48	NA	90	54	NA	53	122	65	Sensitivity only
	MIDWAY 115kV Section 2D	P2	Bus Section Fault	NA	62	48	NA	90	54	NA	53	122	64	Sensitivity only
	MIDWAY-TAFT 115kV [2620]	P1	N-1(Transmission Line)	NA	62	48	NA	90	54	NA	53	122	64	Sensitivity only
	MIDWAY-TAFT 115kV [2620] & MARICOPA-CADET 70kV [0]	P6	N-1-1	<90	100	<90	<90	107	100	<90	<90	<90	100	Redispatch Generation
	TAFT 115kV - Ring R2 & R1	P2	Non-bus-tie breaker fault	NA	75	62	NA	91	68	NA	69	130	78	Sensitivity only
	TAFT 115kV - Ring R2 & R3	P2	Non-bus-tie breaker fault	NA	62	48	NA	90	54	NA	53	122	64	Sensitivity only
34779 MIDSUN 115 34777 FELLOWSG 115 1 1	MIDWAY-TAFT 115kV [2620] & MARICOPA-CADET 70kV [0]	P6	N-1-1	100	<90	<90	106	<90	<90	100	<90	<90	<90	System upgrade or preferred resource
34794 TEMBLOR 115 34796 CARRIZO 115 1 1	MIDWAY 230kV - Section 1E & 1F	P2	Bus-tie breaker fault	NA	48	44	NA	105	58	NA	55	5	38	Redispatch Generation
	MIDWAY - 2D 115kV & MIDWAY-RENFRO-TUPMAN line	P2	Non-bus-tie breaker fault	51	50	52	63	83	44	51	43	113	52	Sensitivity only
	MIDWAY - 2D 115kV & MIDWAY-TEMBLOR line	P2	Non-bus-tie breaker fault	51	50	52	63	83	44	51	43	113	52	Sensitivity only
	MIDWAY 115kV - Section 2D & 2E	P2	Bus-tie breaker fault	51	50	52	63	84	44	52	44	113	52	Sensitivity only

2017-2018 ISO Reliability Assessment - Study Results

Study Area: PG&E Kern

Thermal Overloads



Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading % (Baseline Scenarios)					Loading % (Sensitivity Scenarios)					Project & Potential Mitigation Solutions
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022 SP High CEC Forecast	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations	
34800 SANTA FE SUB 115 34802 MIDSET 115 1 1	MIDWAY 115kV Section 2D	P2	Bus Section Fault	51	50	52	63	83	44	51	43	113	52	Sensitivity only
	MIDWAY-TAFT 115kV [2620]	P1	N-1(Transmission Line)	51	50	52	63	83	44	51	43	113	52	Sensitivity only
	TAFT 115kV - Ring R2 & R1	P2	Non-bus-tie breaker fault	62	61	64	65	84	56	62	57	120	64	Sensitivity only
	TAFT 115kV - Ring R2 & R3	P2	Non-bus-tie breaker fault	50	50	52	65	83	44	51	43	113	52	Sensitivity only
34802 MIDSET 115 34776 TAFT 115 1 1	TAFT 115kV - Ring R2 & R1	P2	Non-bus-tie breaker fault	39	39	43	40	64	34	42	35	102	43	Sensitivity only
34860 TAFT A 70.0 34881 TAFT_SW_TAFM 70.0 1 1	FELLOWS-MIDSUN 115kV [1570] & MIDWAY-TAFT 115kV [2620]	P6	N-1-1	<90	<90	<90	172	<90	<90	<90	<90	<90	<90	Mitigation Under Review (Extend the Summer Setup)
34861 TAFT A_J 70.0 34863 MOCO_JCT 70.0 1 1	MIDWAY-TAFT 115kV [2620] & FELLOWS-MIDSUN 115kV [1570]	P6	N-1-1	<90	<90	<90	189	<90	<90	<90	<90	<90	<90	Mitigation Under Review (Extend the Summer Setup)
34862 MARICOPA 70.0 34867 GARDNR T 70.0 1 1	FELLOWS-MIDSUN 115kV [1570] & MIDWAY-TAFT 115kV [2620]	P6	N-1-1	<90	<90	<90	184	<90	<90	<90	<90	<90	<90	Mitigation Under Review (Extend the Summer Setup)
34863 MOCO_JCT 70.0 34862 MARICOPA 70.0 1 1	MIDWAY-TAFT 115kV [2620] & FELLOWS-MIDSUN 115kV [1570]	P6	N-1-1	<90	<90	<90	133	<90	<90	<90	<90	<90	<90	Mitigation Under Review (Extend the Summer Setup)
34867 GARDNR T 70.0 34875 Q620TP 70.0 1 1	FELLOWS-MIDSUN 115kV [1570] & MIDWAY-TAFT 115kV [2620]	P6	N-1-1	<90	<90	<90	183	<90	<90	<90	<90	<90	<90	Mitigation Under Review (Extend the Summer Setup)
34868 COPUS_D 70.0 34887 S_KERN_TP 70.0 1 1	FELLOWS-MIDSUN 115kV [1570] & MIDWAY-TAFT 115kV [2620]	P6	N-1-1	<90	<90	<90	173	<90	<90	<90	<90	<90	<90	Mitigation Under Review (Extend the Summer Setup)
34874 WHEELER 70.0 34756 WHEELER 115 2 1	MIDWAY-WHEELER RIDGE #1 230kV [5190] & Q946SWSTA-MIDWAY 230kV [0]	P6	N-1-1	<90	<90	<90	187	<90	<90	<90	<90	<90	<90	Scope Under Review: Wheeler Ridge Junction Project
34882 SAN EMDO 70.0 34904 OLD RIVR 70.0 1 1	FELLOWS-MIDSUN 115kV [1570] & MIDWAY-TAFT 115kV [2620]	P6	N-1-1	<90	<90	<90	166	<90	<90	<90	<90	<90	<90	Mitigation Under Review (Extend the Summer Setup)
34887 S_KERN_TP 70.0 34882 SAN EMDO 70.0 1 1	FELLOWS-MIDSUN 115kV [1570] & MIDWAY-TAFT 115kV [2620]	P6	N-1-1	<90	<90	<90	166	<90	<90	<90	<90	<90	<90	Mitigation Under Review (Extend the Summer Setup)
34890 WEEDPATCH 70.0 34874 WHEELER 70 1 1	Kern Canyon PH & Rio Bravo PH	P3	G-1-1	95	96	101	<90	<90	104	<90	110	91	101	Scope Under Review: Wheeler Ridge-Weedpatch 70 kV Line Reconductor Project
365550 Q946SWSTA 230 38645 WHLR RJ2 230 2 1	MIDWAY 230kV - Section 1E & 1D	P2	Bus-tie breaker fault	93	126	153	55	99	129	95	134	111	NConv	Scope Under Review: Wheeler Ridge Junction Project
	MIDWAY 230kV Section 1D	P2	Bus Section Fault	93	125	150	54	98	127	94	131	109	160	Scope Under Review: Wheeler Ridge Junction Project
38600 BUENAVJ1 230 30970 MIDWAY 230 1 1	Q946SWSTA-MIDWAY 230kV [0] & Q946-Q946SWSTA #1 230kV [0]	P6	N-1-1	<90	117	136	<90	<90	119	<90	123	106	137	Scope Under Review: Wheeler Ridge Junction Project

Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading % (Baseline Scenarios)					Loading % (Sensitivity Scenarios)					Project & Potential Mitigation Solutions
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022 SP High CEC Forecast	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations	
38600 BUENAVJ1 230 38640 WHLR RJ1 230 1 1	MIDWAY - 2D 230kV & MIDWAY-MIDWAY-R12 #1 line	P2	Non-bus-tie breaker fault	86	113	136	55	66	115	87	119	77	139	Scope Under Review: Wheeler Ridge Junction Project
	MIDWAY - 2D 230kV & Q946SWSTA-MIDWAY line	P2	Non-bus-tie breaker fault	74	98	115	47	55	100	75	103	64	117	Scope Under Review: Wheeler Ridge Junction Project
	MIDWAY 230kV - Section 2D & 2E	P2	Bus-tie breaker fault	87	115	140	58	67	118	88	121	77	NConv	Scope Under Review: Wheeler Ridge Junction Project
	MIDWAY 230kV Section 2D	P2	Bus Section Fault	86	113	136	55	66	115	87	119	77	139	Scope Under Review: Wheeler Ridge Junction Project
	Q946-Q946SWSTA #1 230kV [0] & Q946SWSTA-MIDWAY 230kV [0]	P6	N-1-1	<90	106	124	<90	<90	108	<90	111	<90	126	Scope Under Review: Wheeler Ridge Junction Project
	Q946SWSTA-MIDWAY 230kV [0]	P1	N-1(Transmission Line)	73	97	114	47	54	100	74	102	63	115	Scope Under Review: Wheeler Ridge Junction Project
	Q946SWSTA-WHLR RJ2 230kV [0] No Fault	P2	Line section w/o fault	82	107	125	47	84	109	83	112	95	127	Scope Under Review: Wheeler Ridge Junction Project
38640 WHLR RJ1 230 38650 WND GPJ1 230 1 1	MIDWAY - 2D 230kV & MIDWAY-MIDWAY-R12 #1 line	P2	Non-bus-tie breaker fault	78	102	123	48	56	104	80	108	66	126	Scope Under Review: Wheeler Ridge Junction Project
	MIDWAY - 2D 230kV & Q946SWSTA-MIDWAY line	P2	Non-bus-tie breaker fault	66	87	103	40	45	90	67	92	54	104	Scope Under Review: Wheeler Ridge Junction Project
	MIDWAY 230kV - Section 2D & 2E	P2	Bus-tie breaker fault	80	104	127	51	57	107	81	110	66	NConv	Scope Under Review: Wheeler Ridge Junction Project
	MIDWAY 230kV Section 2D	P2	Bus Section Fault	78	102	123	48	56	104	80	108	66	126	Scope Under Review: Wheeler Ridge Junction Project
	Q946SWSTA-MIDWAY 230kV [0]	P1	N-1(Transmission Line)	66	87	102	40	44	89	67	92	53	103	Scope Under Review: Wheeler Ridge Junction Project
	Q946SWSTA-MIDWAY 230kV [0] & Q946-Q946SWSTA #1 230kV [0]	P6	N-1-1	<90	<90	112	<90	<90	<90	<90	101	<90	113	Scope Under Review: Wheeler Ridge Junction Project
	Q946SWSTA-WHLR RJ2 230kV [0] No Fault	P2	Line section w/o fault	74	96	113	40	74	99	75	102	84	114	Scope Under Review: Wheeler Ridge Junction Project

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Study Area: **PG&E Kern**

High/Low Voltages



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
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022 SP High CEC Forecast	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations	
3EMIDIO 70kV	MIDWAY 230kV - Section 1E & 1D	P2	Bus-tie breaker fault	1.02	0.94	0.85	1.02	1.01	0.93	1.01	0.91	0.94	<0.90	Short Term: No issue; Long Term : Monitor the 27 Peak
3EMIDIO 70kV	MIDWAY 230kV - Section 2D & 2E	P2	Bus-tie breaker fault	1.03	0.95	0.88	1.02	1.01	0.95	1.02	0.94	0.99	<0.90	Short Term: No issue; Long Term : Monitor the 27 Peak
3EMIDIO 70kV	MIDWAY 230kV Section 1D	P2	Bus Section Fault	1.03	0.95	0.88	1.02	1.02	0.95	1.02	0.93	0.96	<0.90	Short Term: No issue; Long Term : Monitor the 27 Peak
7STNDRD 115kV	Base Case	P0	Basecase	1.06	1.03	1.03	1.07	1.04	1.03	1.03	1.03	1.02	1.00	Load power factor correction and voltage support if needed
7STNDRD 115kV	Midway-Kern No. 3 & Midway-Kern No. 4 230 kV Lines	P7	N-2(Common structure)	1.04	1.01	1.00	1.06	1.04	1.01	1.02	1.02	1.01	0.89	Sensitivity Only
ARVIN 70kV	MIDWAY - 2D 230kV & MIDWAY-MIDWAY-R12 #1 line	P2	Non-bus-tie breaker fault	1.02	0.99	0.92	1.03	1.03	0.98	1.02	0.97	1.01	0.90	Sensitivity Only
ARVIN 70kV	MIDWAY 230kV - Section 1E & 1D	P2	Bus-tie breaker fault	1.02	0.95	0.86	1.03	1.02	0.94	1.02	0.92	0.97	<0.90	Short Term: No issue; Long Term : Monitor the 27 Peak
ARVIN 70kV	MIDWAY 230kV - Section 2D & 2E	P2	Bus-tie breaker fault	1.02	0.96	0.89	1.03	1.03	0.96	1.02	0.95	1.01	<0.90	Short Term: No issue; Long Term : Monitor the 27 Peak
ARVIN 70kV	MIDWAY 230kV Section 1D	P2	Bus Section Fault	1.02	0.96	0.88	1.03	1.03	0.95	1.02	0.94	0.98	0.83	Short Term: No issue; Long Term : Monitor the 27 Peak and QF sensitivity scenario
ARVIN 70kV	MIDWAY 230kV Section 2D	P2	Bus Section Fault	1.02	0.99	0.92	1.03	1.03	0.98	1.02	0.97	1.01	0.90	Sensitivity Only
ARVIN_ED 115kV	Base Case	P0	Basecase	1.06	1.02	1.02	1.07	1.03	1.02	1.02	1.01	1.01	1.00	Load power factor correction and voltage support if needed
ARVIN_ED 115kV	Midway-Kern No. 3 & Midway-Kern No. 4 230 kV Lines	P7	N-2(Common structure)	1.04	1.00	0.99	1.06	1.03	0.99	1.00	1.01	1.00	0.89	Sensitivity Only
ARVINJ1 115kV	Base Case	P0	Basecase	1.06	1.02	1.02	1.07	1.04	1.02	1.03	1.02	1.01	1.00	Load power factor correction and voltage support if needed

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Study Area: **PG&E Kern**

High/Low Voltages



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
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022 SP High CEC Forecast	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations	
ARVINJ1 115kV	Midway-Kern No. 3 & Midway-Kern No. 4 230 kV Lines	P7	N-2(Common structure)	1.04	1.00	0.99	1.06	1.03	1.00	1.01	1.01	1.01	0.90	Sensitivity Only
ARVINJ2 115kV	Base Case	P0	Basecase	1.06	1.02	1.02	1.07	1.03	1.02	1.03	1.02	1.01	1.00	Load power factor correction and voltage support if needed
ARVINJ2 115kV	Midway-Kern No. 3 & Midway-Kern No. 4 230 kV Lines	P7	N-2(Common structure)	1.04	1.00	0.99	1.06	1.03	0.99	1.01	1.01	1.00	0.89	Sensitivity Only
BEAR MTN 115kV	Base Case	P0	Basecase	1.05	1.03	1.03	1.07	1.04	1.03	1.03	1.03	1.02	1.00	Load power factor correction and voltage support if needed
BEAR MTN 115kV	Midway-Kern No. 3 & Midway-Kern No. 4 230 kV Lines	P7	N-2(Common structure)	1.04	1.01	1.00	1.06	1.04	1.01	1.02	1.02	1.01	0.89	Sensitivity Only
BEAR TAP 115kV	Base Case	P0	Basecase	1.05	1.03	1.03	1.07	1.04	1.03	1.03	1.02	1.02	1.00	Load power factor correction and voltage support if needed
BEAR TAP 115kV	Midway-Kern No. 3 & Midway-Kern No. 4 230 kV Lines	P7	N-2(Common structure)	1.04	1.01	1.00	1.06	1.03	1.00	1.01	1.02	1.01	0.89	Sensitivity Only
BKRSFLDA 230kV	Midway-Kern No. 3 & Midway-Kern No. 4 230 kV Lines	P7	N-2(Common structure)	0.98	0.96	0.96	1.01	0.99	0.96	0.97	0.98	0.96	0.90	Sensitivity Only
BOLTHSE 115kV	Midway-Kern No. 3 & Midway-Kern No. 4 230 kV Lines	P7	N-2(Common structure)	1.03	1.00	0.99	1.05	1.03	0.99	1.00	1.01	1.00	0.88	Sensitivity Only
BRY_PTLM 70kV	Base Case	P0	Basecase	1.05	1.03	1.03	1.07	1.03	1.03	1.04	1.03	1.02	1.03	Load power factor correction and voltage support if needed
BSCL_PLD 70kV	Base Case	P0	Basecase	1.04	1.02	1.02	1.06	1.02	1.02	1.02	1.02	1.02	1.02	Load power factor correction and voltage support if needed
BSCSCH T 70kV	Base Case	P0	Basecase	1.04	1.02	1.02	1.06	1.02	1.02	1.02	1.02	1.02	1.02	Load power factor correction and voltage support if needed
BUENAVJ1 230kV	MIDWAY - 2D 230kV & MIDWAY-MIDWAY-R12 #1 line	P2	Non-bus-tie breaker fault	0.98	0.93	0.91	1.01	0.97	0.93	0.97	0.93	0.92	0.89	Sensitivity Only

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Study Area: **PG&E Kern**

High/Low Voltages



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
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022 SP High CEC Forecast	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations	
BUENAVJ1 230kV	MIDWAY 230kV - Section 1E & 1D	P2	Bus-tie breaker fault	0.92	0.83	0.76	1.00	0.89	0.83	0.91	0.81	0.83	<0.90	Scope Under Review: Wheelerridge voltage support project.
BUENAVJ1 230kV	MIDWAY 230kV - Section 2D & 2E	P2	Bus-tie breaker fault	0.96	0.92	0.89	1.01	0.96	0.92	0.96	0.91	0.92	0.42	Scope Under Review: Wheelerridge voltage support project.
BUENAVJ1 230kV	MIDWAY 230kV Section 1D	P2	Bus Section Fault	0.92	0.84	0.78	1.01	0.90	0.84	0.92	0.83	0.85	0.73	Scope Under Review: Wheelerridge voltage support project.
BUENAVJ1 230kV	MIDWAY 230kV Section 2D	P2	Bus Section Fault	0.98	0.93	0.91	1.01	0.97	0.93	0.97	0.93	0.92	0.89	Sensitivity Only
BUENAVJ2 230kV	MIDWAY - 2D 230kV & MIDWAY-MIDWAY-R12 #1 line	P2	Non-bus-tie breaker fault	0.94	0.87	0.81	1.00	0.94	0.87	0.93	0.86	0.88	0.79	Scope Under Review: Wheelerridge voltage support project.
BUENAVJ2 230kV	MIDWAY 230kV - Section 1E & 1D	P2	Bus-tie breaker fault	0.96	0.91	0.88	1.01	0.94	0.91	0.96	0.90	0.90	<0.90	Scope Under Review: Wheelerridge voltage support project.
BUENAVJ2 230kV	MIDWAY 230kV - Section 2D & 2E	P2	Bus-tie breaker fault	0.92	0.85	0.79	0.99	0.93	0.84	0.92	0.84	0.88	<0.90	Scope Under Review: Wheelerridge voltage support project.
BUENAVJ2 230kV	MIDWAY 230kV Section 1D	P2	Bus Section Fault	0.97	0.92	0.89	1.01	0.95	0.92	0.96	0.91	0.91	0.85	Scope Under Review: Wheelerridge voltage support project.
BUENAVJ2 230kV	MIDWAY 230kV Section 2D	P2	Bus Section Fault	0.94	0.87	0.81	1.00	0.94	0.87	0.93	0.86	0.88	0.79	Scope Under Review: Wheelerridge voltage support project.
BUENAVT1 230kV	MIDWAY - 2D 230kV & MIDWAY-MIDWAY-R12 #1 line	P2	Non-bus-tie breaker fault	0.98	0.93	0.91	1.01	0.97	0.93	0.97	0.93	0.92	0.89	Sensitivity Only
BUENAVT1 230kV	MIDWAY 230kV - Section 1E & 1D	P2	Bus-tie breaker fault	0.92	0.83	0.76	1.00	0.89	0.83	0.91	0.81	0.83	<0.90	Scope Under Review: Wheelerridge voltage support project.
BUENAVT1 230kV	MIDWAY 230kV - Section 2D & 2E	P2	Bus-tie breaker fault	0.96	0.92	0.89	1.01	0.96	0.92	0.96	0.91	0.92	<0.90	Scope Under Review: Wheelerridge voltage support project.

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Study Area: **PG&E Kern**

High/Low Voltages



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
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022 SP High CEC Forecast	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations	
BUENAVT1 230kV	MIDWAY 230kV Section 1D	P2	Bus Section Fault	0.92	0.84	0.78	1.01	0.90	0.84	0.92	0.83	0.85	0.73	Scope Under Review: Wheelerridge voltage support project.
BUENAVT1 230kV	MIDWAY 230kV Section 2D	P2	Bus Section Fault	0.98	0.93	0.91	1.01	0.97	0.93	0.97	0.93	0.92	0.89	Sensitivity Only
BUENAVT2 230kV	MIDWAY - 2D 230kV & MIDWAY-MIDWAY-R12 #1 line	P2	Non-bus-tie breaker fault	0.94	0.87	0.81	1.00	0.94	0.87	0.93	0.86	0.88	0.79	Scope Under Review: Wheelerridge voltage support project.
BUENAVT2 230kV	MIDWAY 230kV - Section 1E & 1D	P2	Bus-tie breaker fault	0.96	0.91	0.87	1.01	0.94	0.91	0.96	0.90	0.90	<0.90	Scope Under Review: Wheelerridge voltage support project.
BUENAVT2 230kV	MIDWAY 230kV - Section 2D & 2E	P2	Bus-tie breaker fault	0.92	0.85	0.78	0.99	0.93	0.84	0.92	0.84	0.88	<0.90	Scope Under Review: Wheelerridge voltage support project.
BUENAVT2 230kV	MIDWAY 230kV Section 1D	P2	Bus Section Fault	0.96	0.92	0.89	1.01	0.95	0.92	0.96	0.91	0.91	0.85	Scope Under Review: Wheelerridge voltage support project.
BUENAVT2 230kV	MIDWAY 230kV Section 2D	P2	Bus Section Fault	0.94	0.87	0.81	1.00	0.94	0.87	0.93	0.86	0.88	0.79	Scope Under Review: Wheelerridge voltage support project.
CADET 70kV	Base Case	P0	Basecase	1.05	1.03	1.02	1.06	1.03	1.03	1.03	1.03	1.02	1.02	Load power factor correction and voltage support if needed
CALWATER 115kV	Base Case	P0	Basecase	1.05	1.03	1.03	1.07	1.04	1.03	1.03	1.02	1.02	1.00	Load power factor correction and voltage support if needed
CALWATER 115kV	Midway-Kern No. 3 & Midway-Kern No. 4 230 kV Lines	P7	N-2(Common structure)	1.04	1.01	1.00	1.06	1.04	1.00	1.02	1.02	1.01	0.89	Sensitivity Only
CALWTRTP 115kV	Base Case	P0	Basecase	1.05	1.03	1.03	1.07	1.04	1.03	1.03	1.02	1.02	1.00	Load power factor correction and voltage support if needed
CALWTRTP 115kV	Midway-Kern No. 3 & Midway-Kern No. 4 230 kV Lines	P7	N-2(Common structure)	1.04	1.01	1.00	1.06	1.04	1.00	1.02	1.02	1.01	0.89	Sensitivity Only
CASTAC 70kV	MIDWAY - 2D 230kV & MIDWAY-MIDWAY-R12 #1 line	P2	Non-bus-tie breaker fault	1.01	0.97	0.90	1.02	1.01	0.96	1.00	0.95	0.98	0.88	Sensitivity Only

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Study Area: **PG&E Kern**

High/Low Voltages



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
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022 SP High CEC Forecast	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations	
CASTAC 70kV	MIDWAY 230kV - Section 1E & 1D	P2	Bus-tie breaker fault	1.00	0.93	0.84	1.01	1.00	0.92	1.00	0.90	0.93	<0.90	Short Term: No issue; Long Term : Monitor the 27 Peak
CASTAC 70kV	MIDWAY 230kV - Section 2D & 2E	P2	Bus-tie breaker fault	1.00	0.94	0.87	1.02	1.01	0.94	1.00	0.93	0.98	<0.90	Short Term: No issue; Long Term : Monitor the 27 Peak
CASTAC 70kV	MIDWAY 230kV Section 1D	P2	Bus Section Fault	1.00	0.94	0.86	1.01	1.01	0.93	1.00	0.92	0.95	0.81	Short Term: No issue; Long Term : Monitor the 27 Peak and QF sensitivity scenario
CASTAC 70kV	MIDWAY 230kV Section 2D	P2	Bus Section Fault	1.01	0.97	0.90	1.02	1.01	0.96	1.00	0.95	0.98	0.88	Sensitivity Only
CAWELO C 115kV	Base Case	P0	Basecase	1.04	1.03	1.03	1.05	1.04	1.03	1.03	1.03	1.03	0.98	Load power factor correction and voltage support if needed
CAWELO C 115kV	KERN PWR 115kV Section 2E	P2	Non-bus-tie breaker	1.04	1.03	1.02	1.05	1.04	1.02	1.03	1.02	1.03	0.88	Sensitivity Only
CAWELO C 115kV	Midway-Kern No. 3 & Midway-Kern No. 4 230 kV Lines	P7	N-2(Common structure)	1.04	1.02	1.01	1.05	1.04	1.02	1.02	1.03	1.02	0.87	Sensitivity Only
CELERON 70kV	Base Case	P0	Basecase	1.05	1.03	1.02	1.07	1.02	1.03	1.03	1.03	1.01	1.02	Load power factor correction and voltage support if needed
CHARKA 115kV	Base Case	P0	Basecase	1.03	1.02	1.02	1.05	1.03	1.02	1.03	1.01	1.00	1.01	Load power factor correction and voltage support if needed
COLUMBUS 115kV	Base Case	P0	Basecase	1.05	1.03	1.02	1.07	1.04	1.02	1.03	1.02	1.01	1.00	Load power factor correction and voltage support if needed
COLUMBUS 115kV	Midway-Kern No. 3 & Midway-Kern No. 4 230 kV Lines	P7	N-2(Common structure)	1.04	1.01	0.99	1.06	1.03	1.00	1.01	1.02	1.01	0.89	Sensitivity Only
COPUS_D 70kV	Base Case	P0	Basecase	1.04	1.02	1.02	1.06	1.02	1.02	1.02	1.02	1.02	1.02	Load power factor correction and voltage support if needed
COPUS_E 70kV	Base Case	P0	Basecase	1.04	1.02	1.02	1.06	1.02	1.02	1.02	1.02	1.02	1.02	Load power factor correction and voltage support if needed
CUYAMA 70kV	Base Case	P0	Basecase	1.04	1.02	1.02	1.07	1.04	1.02	1.03	1.02	1.04	1.02	Load power factor correction and voltage support if needed
CUYAMA2 70kV	Base Case	P0	Basecase	1.05	1.00	0.99	1.07	1.02	0.99	1.00	0.99	0.98	0.99	Load power factor correction and voltage support if needed

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Study Area: **PG&E Kern**

High/Low Voltages



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
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022 SP High CEC Forecast	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations	
CYMRIC 115kV	Base Case	P0	Basecase	1.04	1.03	1.03	1.06	1.03	1.03	1.04	1.03	1.01	1.03	Load power factor correction and voltage support if needed
DEXZEL 115kV	Base Case	P0	Basecase	1.05	1.03	1.03	1.06	1.04	1.03	1.03	1.03	1.02	0.99	Load power factor correction and voltage support if needed
DEXZEL 115kV	KERN PWR 115kV - Section 1E & 2E	P2	Non-bus-tie breaker	1.04	1.02	1.01	1.05	1.04	1.01	1.02	1.01	1.02	0.89	Sensitivity Only
DEXZEL 115kV	KERN PWR 115kV Section 2E	P2	Non-bus-tie breaker	1.04	1.02	1.01	1.05	1.04	1.01	1.02	1.00	1.02	0.87	Sensitivity Only
DEXZEL 115kV	Midway-Kern No. 3 & Midway-Kern No. 4 230 kV Lines	P7	N-2(Common structure)	1.04	1.01	1.00	1.06	1.04	1.01	1.02	1.02	1.01	0.89	Sensitivity Only
DISCOVER 115kV	Base Case	P0	Basecase	1.05	1.03	1.03	1.06	1.04	1.03	1.04	1.03	1.02	0.99	Load power factor correction and voltage support if needed
DISCOVER 115kV	KERN PWR 115kV - Section 1E & 2E	P2	Non-bus-tie breaker	1.04	1.02	1.02	1.05	1.04	1.02	1.02	1.01	1.02	0.89	Sensitivity Only
DISCOVER 115kV	KERN PWR 115kV Section 2E	P2	Non-bus-tie breaker	1.04	1.02	1.01	1.05	1.04	1.01	1.02	1.00	1.02	0.87	Sensitivity Only
DISCOVER 115kV	Midway-Kern No. 3 & Midway-Kern No. 4 230 kV Lines	P7	N-2(Common structure)	1.04	1.02	1.00	1.06	1.04	1.01	1.02	1.02	1.02	0.89	Sensitivity Only
DOUBLECJ 115kV	Base Case	P0	Basecase	1.05	1.03	1.03	1.07	1.04	1.03	1.04	1.03	1.03	1.02	Load power factor correction and voltage support if needed
DSCVRYTP 115kV	Base Case	P0	Basecase	1.05	1.03	1.03	1.06	1.04	1.03	1.03	1.03	1.02	0.99	Load power factor correction and voltage support if needed
DSCVRYTP 115kV	KERN PWR 115kV - Section 1E & 2E	P2	Non-bus-tie breaker	1.04	1.02	1.01	1.05	1.04	1.01	1.02	1.00	1.02	0.89	Sensitivity Only
DSCVRYTP 115kV	KERN PWR 115kV Section 2E	P2	Non-bus-tie breaker	1.04	1.01	1.01	1.05	1.04	1.01	1.02	1.00	1.02	0.87	Sensitivity Only
DSCVRYTP 115kV	Midway-Kern No. 3 & Midway-Kern No. 4 230 kV Lines	P7	N-2(Common structure)	1.04	1.01	1.00	1.06	1.04	1.01	1.02	1.02	1.01	0.89	Sensitivity Only

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Study Area: **PG&E Kern**

High/Low Voltages



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
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022 SP High CEC Forecast	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations	
EANDB 115kV	Base Case	P0	Basecase	1.05	1.03	1.03	1.07	1.04	1.03	1.04	1.03	1.02	1.01	Load power factor correction and voltage support if needed
EANDBJT 115kV	Base Case	P0	Basecase	1.05	1.03	1.03	1.07	1.04	1.03	1.04	1.03	1.02	1.02	Load power factor correction and voltage support if needed
ELK HLLS 70kV	Base Case	P0	Basecase	1.02	1.00	1.00	1.06	1.02	1.00	1.00	1.00	0.99	1.00	Load power factor correction and voltage support if needed
EMDO JCT 70kV	MIDWAY - 2D 230kV & MIDWAY-MIDWAY-R12 #1 line	P2	Non-bus-tie breaker fault	1.03	0.98	0.92	1.03	1.02	0.98	1.02	0.97	1.00	0.90	Short Term: No issue; Long Term : Wheeler Ridge Voltage Support (San Emdo SVD)/Monitor the sensitivity scenario
EMDO JCT 70kV	MIDWAY 230kV - Section 1E & 1D	P2	Bus-tie breaker fault	1.03	0.95	0.86	1.03	1.01	0.94	1.02	0.92	0.95	<0.90	Short Term: No issue; Long Term : Wheeler Ridge Voltage Support (San Emdo SVD)/Monitor the sensitivity scenario
EMDO JCT 70kV	MIDWAY 230kV - Section 2D & 2E	P2	Bus-tie breaker fault	1.03	0.96	0.89	1.03	1.02	0.96	1.02	0.95	1.00	<0.90	Short Term: No issue; Long Term : Wheeler Ridge Voltage Support (San Emdo SVD)/Monitor the sensitivity scenario
EMDO JCT 70kV	MIDWAY 230kV Section 1D	P2	Bus Section Fault	1.03	0.95	0.88	1.02	1.02	0.95	1.02	0.94	0.97	0.83	Short Term: No issue; Long Term : Wheeler Ridge Voltage Support (San Emdo SVD)/Monitor the sensitivity scenario
EMDO JCT 70kV	MIDWAY 230kV Section 2D	P2	Bus Section Fault	1.03	0.98	0.92	1.03	1.02	0.98	1.02	0.97	1.00	0.90	Short Term: No issue; Long Term : Wheeler Ridge Voltage Support (San Emdo SVD)/Monitor the sensitivity scenario
FAMOSO 115kV	Base Case	P0	Basecase	1.03	1.01	1.01	1.05	1.03	1.01	1.03	1.01	1.00	1.01	Load power factor correction and voltage support if needed
FELLOWSG 115kV	Base Case	P0	Basecase	1.04	1.03	1.03	1.05	1.03	1.03	1.04	1.03	1.01	1.03	Load power factor correction and voltage support if needed
FRITO LY 115kV	Base Case	P0	Basecase	1.05	1.03	1.04	1.06	1.04	1.04	1.04	1.03	1.01	1.03	Load power factor correction and voltage support if needed
FRTLYTP 115kV	Base Case	P0	Basecase	1.06	1.03	1.04	1.06	1.04	1.04	1.04	1.03	1.01	1.03	Load power factor correction and voltage support if needed
GANSO 115kV	Base Case	P0	Basecase	1.05	1.03	1.04	1.06	1.03	1.04	1.05	1.03	1.01	1.03	Load power factor correction and voltage support if needed
GARDNER 70kV	Base Case	P0	Basecase	1.05	1.02	1.02	1.06	1.02	1.02	1.03	1.02	1.03	1.02	Load power factor correction and voltage support if needed
GARDNR T 70kV	Base Case	P0	Basecase	1.05	1.02	1.02	1.06	1.02	1.02	1.03	1.02	1.03	1.02	Load power factor correction and voltage support if needed

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Study Area: **PG&E Kern**

High/Low Voltages



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
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022 SP High CEC Forecast	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations	
GODN_BER 115kV	Base Case	P0	Basecase	1.05	1.03	1.03	1.06	1.04	1.03	1.03	1.02	1.02	1.00	Load power factor correction and voltage support if needed
GODN_BER 115kV	KERN PWR 115kV - Section 1E & 2E	P2	Non-bus-tie breaker	1.04	1.01	1.01	1.05	1.04	1.01	1.02	1.00	1.01	0.89	Sensitivity Only
GODN_BER 115kV	KERN PWR 115kV Section 2E	P2	Non-bus-tie breaker	1.04	1.01	1.01	1.05	1.04	1.01	1.02	1.00	1.01	0.87	Sensitivity Only
GODN_BER 115kV	Midway-Kern No. 3 & Midway-Kern No. 4 230 kV Lines	P7	N-2(Common structure)	1.04	1.01	1.00	1.06	1.04	1.01	1.02	1.02	1.01	0.89	Sensitivity Only
GOSE_LKE 115kV	Base Case	P0	Basecase	1.04	1.03	1.03	1.06	1.05	1.03	1.03	1.03	1.02	1.03	Load power factor correction and voltage support if needed
GRAPEVNE 70kV	MIDWAY - 2D 230kV & MIDWAY-MIDWAY-R12 #1 line	P2	Non-bus-tie breaker fault	1.01	0.97	0.91	1.02	1.01	0.97	1.01	0.95	0.98	0.88	Sensitivity Only
GRAPEVNE 70kV	MIDWAY 230kV - Section 1E & 1D	P2	Bus-tie breaker fault	1.01	0.93	0.85	1.02	1.00	0.92	1.00	0.90	0.94	<0.90	Short Term: No issue; Long Term : Monitor the 27 Peak
GRAPEVNE 70kV	MIDWAY 230kV - Section 2D & 2E	P2	Bus-tie breaker fault	1.01	0.95	0.88	1.02	1.01	0.94	1.00	0.93	0.98	<0.90	Short Term: No issue; Long Term : Monitor the 27 Peak
GRAPEVNE 70kV	MIDWAY 230kV Section 1D	P2	Bus Section Fault	1.01	0.94	0.87	1.02	1.01	0.94	1.01	0.92	0.95	0.81	Short Term: No issue; Long Term : Monitor the 27 Peak and QF sensitivity scenario
GRAPEVNE 70kV	MIDWAY 230kV Section 2D	P2	Bus Section Fault	1.01	0.97	0.91	1.02	1.01	0.97	1.01	0.95	0.98	0.88	Sensitivity Only
GRIMWAY 115kV	Base Case	P0	Basecase	1.06	1.02	1.02	1.07	1.03	1.02	1.02	1.01	1.01	1.00	Load power factor correction and voltage support if needed
GRIMWAY 115kV	Midway-Kern No. 3 & Midway-Kern No. 4 230 kV Lines	P7	N-2(Common structure)	1.05	1.00	0.98	1.07	1.03	0.99	1.00	1.00	1.00	0.89	Sensitivity Only
GRMMWY T 70kV	Base Case	P0	Basecase	1.06	1.00	1.00	1.04	1.00	1.00	1.00	0.99	1.00	0.99	Load power factor correction and voltage support if needed
GRMWY_SM 70kV	Base Case	P0	Basecase	1.06	1.00	0.99	1.04	1.00	0.99	1.00	0.99	1.00	0.99	Load power factor correction and voltage support if needed

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Study Area: **PG&E Kern**

High/Low Voltages



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
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022 SP High CEC Forecast	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations	
HIGHSRA 115kV	Base Case	P0	Basecase	1.05	1.03	1.03	1.07	1.04	1.03	1.04	1.03	1.03	1.02	Load power factor correction and voltage support if needed
INERGY 115kV	Base Case	P0	Basecase	1.05	1.03	1.03	1.06	1.04	1.03	1.04	1.03	1.00	1.02	Load power factor correction and voltage support if needed
INERGYT1 12.47kV	Base Case	P0	Basecase	1.05	1.03	1.03	1.06	1.04	1.03	1.04	1.03	1.00	1.02	Load power factor correction and voltage support if needed
INERGYT2 12.47kV	Base Case	P0	Basecase	1.05	1.03	1.03	1.06	1.03	1.03	1.04	1.03	1.00	1.02	Load power factor correction and voltage support if needed
KELLEY 70kV	MIDWAY - 2D 230kV & MIDWAY-MIDWAY-R12 #1 line	P2	Non-bus-tie breaker fault	1.02	0.97	0.91	1.02	1.01	0.97	1.02	0.96	0.99	0.89	Sensitivity Only
KELLEY 70kV	MIDWAY 230kV - Section 1E & 1D	P2	Bus-tie breaker fault	1.02	0.94	0.85	1.02	1.00	0.93	1.01	0.91	0.94	<0.90	Short Term: No issue; Long Term : Monitor the 27 Peak
KELLEY 70kV	MIDWAY 230kV - Section 2D & 2E	P2	Bus-tie breaker fault	1.02	0.95	0.88	1.02	1.01	0.95	1.01	0.94	0.99	<0.90	Short Term: No issue; Long Term : Monitor the 27 Peak
KELLEY 70kV	MIDWAY 230kV Section 1D	P2	Bus Section Fault	1.02	0.94	0.87	1.02	1.01	0.94	1.01	0.93	0.96	0.81	Short Term: No issue; Long Term : Monitor the 27 Peak and QF sensitivity scenario
KELLEY 70kV	MIDWAY 230kV Section 2D	P2	Bus Section Fault	1.02	0.97	0.91	1.02	1.01	0.97	1.02	0.96	0.99	0.89	Sensitivity Only
KERN OIL 115kV	Base Case	P0	Basecase	1.05	1.03	1.03	1.06	1.04	1.03	1.03	1.02	1.02	0.99	Load power factor correction and voltage support if needed
KERN OIL 115kV	KERN PWR 115kV - Section 1E & 2E	P2	Non-bus-tie breaker	1.04	1.02	1.01	1.05	1.04	1.01	1.02	1.01	1.02	0.89	Sensitivity Only
KERN OIL 115kV	KERN PWR 115kV Section 2E	P2	Non-bus-tie breaker	1.04	1.01	1.01	1.05	1.04	1.01	1.02	1.00	1.02	0.87	Sensitivity Only
KERN OIL 115kV	Midway-Kern No. 3 & Midway-Kern No. 4 230 kV Lines	P7	N-2(Common structure)	1.04	1.01	1.00	1.06	1.04	1.01	1.02	1.02	1.01	0.89	Sensitivity Only
KERN PP 230kV	Midway-Kern No. 3 & Midway-Kern No. 4 230 kV Lines	P7	N-2(Common structure)	0.98	0.97	0.96	1.01	0.99	0.96	0.97	0.98	0.96	0.88	Sensitivity Only

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Study Area: **PG&E Kern**

High/Low Voltages



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	
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022 SP High CEC Forecast	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations		
KERN PWR 115kV	Base Case	P0	Basecase	1.06	1.04	1.03	1.07	1.04	1.04	1.04	1.04	1.03	1.02	1.02	Load power factor correction and voltage support if needed
KERN1 T 13.2kV	Midway-Kern No. 3 & Midway-Kern No. 4 230 kV Lines	P7	N-2(Common structure)	1.00	0.97	0.96	1.02	1.00	0.97	0.98	0.98	0.97	0.87	Sensitivity Only	
KERN2 T 13.2kV	Midway-Kern No. 3 & Midway-Kern No. 4 230 kV Lines	P7	N-2(Common structure)	1.00	0.97	0.96	1.02	1.00	0.97	0.98	0.98	0.97	0.87	Sensitivity Only	
KERNFRNT 115kV	Base Case	P0	Basecase	1.04	1.02	1.02	1.05	1.03	1.02	1.02	1.02	1.01	0.99	Load power factor correction and voltage support if needed	
KERNFRNT 115kV	KERN PWR 115kV - Section 1E & 2E	P2	Non-bus-tie breaker	1.03	1.01	1.00	1.04	1.03	1.00	1.01	1.00	1.01	0.88	Sensitivity Only	
KERNFRNT 115kV	KERN PWR 115kV Section 2E	P2	Non-bus-tie breaker	1.03	1.01	1.00	1.05	1.03	1.00	1.01	0.99	1.01	0.86	Sensitivity Only	
KERNFRNT 115kV	Midway-Kern No. 3 & Midway-Kern No. 4 230 kV Lines	P7	N-2(Common structure)	1.03	1.00	0.99	1.05	1.03	1.00	1.01	1.01	1.00	0.88	Sensitivity Only	
KERNRDGE 115kV	Midsun-Midway & Midway-Temblor 115 kV Lines	P7	N-2(Common structure)	1.03	0.94	0.95	0.85	0.93	0.93	1.03	0.93	0.92	0.93	Scope Under Review: Midway-Temblor 115 kV Line Reconductor and Voltage Support	
KERNRDGE 115kV	MIDWAY - 2D 115kV & MIDWAY-TEMBLOR line	P2	Non-bus-tie breaker fault	1.03	0.94	0.95	0.85	0.93	0.93	1.03	0.93	0.92	0.93	Scope Under Review: Midway-Temblor 115 kV Line Reconductor and Voltage Support	
KERNRDGE 115kV	MIDWAY-TEMBLOR 115kV [2630]	P1	N-1	1.03	0.94	0.95	0.85	0.93	0.93	1.03	0.93	0.92	0.93	Scope Under Review: Midway-Temblor 115 kV Line Reconductor and Voltage Support	
KERNRDGE 115kV	MIDWAY-TEMBLOR 115kV [2630] (TEMBLOR-PSE MCKJ)	P2	Bus Section Fault	1.03	0.94	0.95	0.85	0.93	0.93	1.03	0.93	0.92	0.93	Scope Under Review: Midway-Temblor 115 kV Line Reconductor and Voltage Support	
KERNWATR 115kV	Base Case	P0	Basecase	1.05	1.03	1.03	1.07	1.04	1.03	1.03	1.03	1.02	1.00	Load power factor correction and voltage support if needed	

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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
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022 SP High CEC Forecast	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations	
KERNWATR 115kV	KERN PWR 115kV - Section 1E & 2E	P2	Non-bus-tie breaker	1.04	1.01	1.01	1.05	1.04	1.01	1.02	1.00	1.01	0.88	Sensitivity Only
KERNWATR 115kV	KERN PWR 115kV Section 2E	P2	Non-bus-tie breaker	1.04	1.01	1.00	1.05	1.04	1.00	1.01	1.00	1.01	0.86	Sensitivity Only
KERNWATR 115kV	Midway-Kern No. 3 & Midway-Kern No. 4 230 kV Lines	P7	N-2(Common structure)	1.04	1.01	1.00	1.06	1.04	1.01	1.02	1.02	1.01	0.89	Sensitivity Only
KNG_ELIS 70kV	Base Case	P0	Basecase	1.05	1.03	1.02	1.07	1.03	1.03	1.03	1.03	1.01	1.02	Load power factor correction and voltage support if needed
KRN CNYN 70kV	Base Case	P0	Basecase	1.06	1.03	1.03	1.04	1.03	1.03	1.03	1.03	1.03	1.03	Load power factor correction and voltage support if needed
KRN OLJ 115kV	Base Case	P0	Basecase	1.05	1.03	1.03	1.06	1.04	1.03	1.03	1.02	1.02	1.00	Load power factor correction and voltage support if needed
KRN OLJ 115kV	KERN PWR 115kV - Section 1E & 2E	P2	Non-bus-tie breaker	1.04	1.01	1.01	1.05	1.04	1.01	1.02	1.00	1.01	0.88	Sensitivity Only
KRN OLJ 115kV	KERN PWR 115kV Section 2E	P2	Non-bus-tie breaker	1.04	1.01	1.01	1.05	1.04	1.01	1.01	1.00	1.01	0.86	Sensitivity Only
KRN OLJ 115kV	Midway-Kern No. 3 & Midway-Kern No. 4 230 kV Lines	P7	N-2(Common structure)	1.04	1.01	1.00	1.06	1.04	1.00	1.02	1.02	1.01	0.89	Sensitivity Only
KRNFRNTT 115kV	Base Case	P0	Basecase	1.05	1.03	1.02	1.06	1.04	1.02	1.03	1.02	1.02	0.99	Load power factor correction and voltage support if needed
KRNFRNTT 115kV	KERN PWR 115kV - Section 1E & 2E	P2	Non-bus-tie breaker	1.03	1.01	1.01	1.05	1.03	1.01	1.02	1.00	1.01	0.89	Sensitivity Only
KRNFRNTT 115kV	KERN PWR 115kV Section 2E	P2	Non-bus-tie breaker	1.04	1.01	1.01	1.05	1.03	1.01	1.02	1.00	1.01	0.87	Sensitivity Only
KRNFRNTT 115kV	Midway-Kern No. 3 & Midway-Kern No. 4 230 kV Lines	P7	N-2(Common structure)	1.03	1.01	1.00	1.05	1.03	1.00	1.01	1.01	1.01	0.88	Sensitivity Only
KTL_SF_J1 115kV	Base Case	P0	Basecase	1.06	1.03	1.03	1.07	1.04	1.03	1.03	1.02	1.01	1.01	Load power factor correction and voltage support if needed

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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
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022 SP High CEC Forecast	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations	
KTL_SF_J1 115kV	Midway-Kern No. 3 & Midway-Kern No. 4 230 kV Lines	P7	N-2(Common structure)	1.04	1.01	0.99	1.06	1.04	1.00	1.01	1.01	1.01	0.90	Sensitivity Only
LAKEVIEW 70kV	MIDWAY - 2D 230kV & MIDWAY-MIDWAY-R12 #1 line	P2	Non-bus-tie breaker fault	1.03	0.98	0.92	1.03	1.02	0.98	1.02	0.97	1.00	0.90	Sensitivity Only
LAKEVIEW 70kV	MIDWAY 230kV - Section 1E & 1D	P2	Bus-tie breaker fault	1.03	0.95	0.86	1.02	1.01	0.94	1.02	0.92	0.95	<0.90	Scope Under Review: Wheelerridge voltage support project.
LAKEVIEW 70kV	MIDWAY 230kV - Section 2D & 2E	P2	Bus-tie breaker fault	1.03	0.96	0.89	1.03	1.02	0.96	1.02	0.95	1.00	<0.90	Scope Under Review: Wheelerridge voltage support project.
LAKEVIEW 70kV	MIDWAY 230kV Section 1D	P2	Bus Section Fault	1.03	0.95	0.88	1.02	1.02	0.95	1.02	0.94	0.97	0.83	Scope Under Review: Wheelerridge voltage support project.
LAKEVIEW 70kV	MIDWAY 230kV Section 2D	P2	Bus Section Fault	1.03	0.98	0.92	1.03	1.02	0.98	1.02	0.97	1.00	0.90	Sensitivity Only
LAMONT 115kV	Base Case	P0	Basecase	1.06	1.02	1.02	1.07	1.04	1.02	1.03	1.02	1.01	1.00	Load power factor correction and voltage support if needed
LAMONT 115kV	Midway-Kern No. 3 & Midway-Kern No. 4 230 kV Lines	P7	N-2(Common structure)	1.04	1.00	0.99	1.07	1.03	0.99	1.01	1.01	1.00	0.89	Sensitivity Only
LEBEC 70kV	MIDWAY - 2D 230kV & MIDWAY-MIDWAY-R12 #1 line	P2	Non-bus-tie breaker fault	1.00	0.97	0.90	1.01	1.00	0.96	1.00	0.95	0.98	0.88	Sensitivity Only
LEBEC 70kV	MIDWAY 230kV - Section 1E & 1D	P2	Bus-tie breaker fault	1.00	0.93	0.84	1.01	1.00	0.92	1.00	0.90	0.93	<0.90	Scope Under Review: Wheelerridge voltage support project.
LEBEC 70kV	MIDWAY 230kV - Section 2D & 2E	P2	Bus-tie breaker fault	1.00	0.94	0.87	1.01	1.00	0.94	1.00	0.93	0.98	<0.90	Short Term: No issue; Long Term : Monitor the 27 Peak
LEBEC 70kV	MIDWAY 230kV Section 1D	P2	Bus Section Fault	1.00	0.93	0.86	1.01	1.01	0.93	1.00	0.92	0.95	0.80	Short Term: No issue; Long Term : Monitor the 27 Peak and QF sensitivity scenario

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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
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022 SP High CEC Forecast	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations	
LEBEC 70kV	MIDWAY 230kV Section 2D	P2	Bus Section Fault	1.00	0.97	0.90	1.01	1.00	0.96	1.00	0.95	0.98	0.88	Sensitivity Only
LERDO 115kV	Base Case	P0	Basecase	1.04	1.03	1.03	1.06	1.04	1.02	1.03	1.02	1.02	0.99	Load power factor correction and voltage support if needed
LERDO 115kV	KERN PWR 115kV Section 2E	P2	Non-bus-tie breaker	1.04	1.02	1.02	1.05	1.04	1.02	1.02	1.01	1.02	0.89	Sensitivity Only
LERDO 115kV	Midway-Kern No. 3 & Midway-Kern No. 4 230 kV Lines	P7	N-2(Common structure)	1.03	1.01	1.00	1.05	1.04	1.01	1.02	1.02	1.01	0.88	Sensitivity Only
LIVE OAK 115kV	Base Case	P0	Basecase	1.05	1.03	1.03	1.06	1.04	1.03	1.04	1.03	1.02	1.00	Load power factor correction and voltage support if needed
LIVE OAK 115kV	KERN PWR 115kV - Section 1E & 2E	P2	Non-bus-tie breaker	1.04	1.02	1.02	1.05	1.04	1.02	1.02	1.01	1.02	0.89	Sensitivity Only
LIVE OAK 115kV	KERN PWR 115kV Section 2E	P2	Non-bus-tie breaker	1.04	1.02	1.02	1.05	1.04	1.02	1.02	1.01	1.02	0.87	Sensitivity Only
LIVE OAK 115kV	Midway-Kern No. 3 & Midway-Kern No. 4 230 kV Lines	P7	N-2(Common structure)	1.04	1.02	1.01	1.06	1.04	1.01	1.02	1.02	1.01	0.89	Sensitivity Only
LRDO JCT 115kV	Base Case	P0	Basecase	1.05	1.03	1.03	1.06	1.04	1.03	1.03	1.03	1.02	1.00	Load power factor correction and voltage support if needed
LRDO JCT 115kV	KERN PWR 115kV Section 2E	P2	Non-bus-tie breaker	1.05	1.02	1.02	1.06	1.04	1.02	1.02	1.01	1.02	0.90	Sensitivity Only
LRDO JCT 115kV	Midway-Kern No. 3 & Midway-Kern No. 4 230 kV Lines	P7	N-2(Common structure)	1.04	1.01	1.00	1.06	1.04	1.01	1.02	1.02	1.01	0.89	Sensitivity Only
MAGNDN J 70kV	Base Case	P0	Basecase	1.06	1.03	1.03	1.04	1.03	1.03	1.03	1.03	1.03	1.03	Load power factor correction and voltage support if needed
MAGUDN J 115kV	Base Case	P0	Basecase	1.05	1.02	1.02	1.06	1.03	1.02	1.02	1.02	1.01	0.99	Load power factor correction and voltage support if needed

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Study Area: **PG&E Kern**

High/Low Voltages



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
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022 SP High CEC Forecast	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations	
MAGUDN J 115kV	Midway-Kern No. 3 & Midway-Kern No. 4 230 kV Lines	P7	N-2(Common structure)	1.03	1.00	0.99	1.06	1.03	0.99	1.01	1.01	1.00	0.88	Sensitivity Only
MAGUNDEN 70kV	Base Case	P0	Basecase	1.05	1.03	1.03	1.04	1.03	1.03	1.03	1.03	1.03	1.03	Load power factor correction and voltage support if needed
MAGUNDEN 115kV	Base Case	P0	Basecase	1.04	1.02	1.01	1.06	1.04	1.01	1.02	1.01	1.01	0.98	Load power factor correction and voltage support if needed
MAGUNDEN 115kV	KERN PWR 115kV - Section 1E & 2E	P2	Non-bus-tie breaker	1.03	1.00	0.99	1.05	1.03	0.99	1.00	0.98	1.00	0.87	Sensitivity Only
MAGUNDEN 115kV	KERN PWR 115kV Section 2E	P2	Non-bus-tie breaker	1.03	1.00	0.99	1.06	1.03	0.99	1.00	0.98	1.00	0.85	Sensitivity Only
MAGUNDEN 115kV	Midway-Kern No. 3 & Midway-Kern No. 4 230 kV Lines	P7	N-2(Common structure)	1.03	1.00	0.98	1.06	1.03	0.99	1.00	1.00	1.00	0.87	Sensitivity Only
MARICOPA 70kV	Base Case	P0	Basecase	1.05	1.03	1.02	1.06	1.03	1.03	1.03	1.03	1.02	1.02	Load power factor correction and voltage support if needed
MCKIBBEN 115kV	Base Case	P0	Basecase	1.04	1.02	1.02	1.05	1.04	1.02	1.04	1.02	1.01	1.02	Load power factor correction and voltage support if needed
MCKTTRCK 70kV	Base Case	P0	Basecase	1.05	1.03	1.03	1.08	1.03	1.03	1.04	1.03	1.02	1.03	Load power factor correction and voltage support if needed
MDWY_P_S 70kV	Base Case	P0	Basecase	1.05	1.03	1.03	1.08	1.03	1.03	1.04	1.03	1.02	1.03	Load power factor correction and voltage support if needed
MIDSET 115kV	Base Case	P0	Basecase	1.04	1.03	1.03	1.05	1.03	1.03	1.04	1.03	1.01	1.03	Load power factor correction and voltage support if needed
MIDSUN 115kV	Base Case	P0	Basecase	1.04	1.03	1.03	1.06	1.02	1.03	1.03	1.03	1.01	1.03	Load power factor correction and voltage support if needed
MIDWAY 115kV	Base Case	P0	Basecase	1.06	1.05	1.05	1.07	1.04	1.05	1.06	1.05	1.02	1.05	Load power factor correction and voltage support if needed
MOCO 70kV	Base Case	P0	Basecase	1.05	1.03	1.02	1.06	1.03	1.03	1.03	1.03	1.02	1.02	Load power factor correction and voltage support if needed
MOCO_JCT 70kV	Base Case	P0	Basecase	1.05	1.03	1.02	1.06	1.03	1.03	1.03	1.03	1.02	1.02	Load power factor correction and voltage support if needed
NORCO 115kV	Base Case	P0	Basecase	1.05	1.03	1.03	1.06	1.04	1.03	1.04	1.03	1.00	1.03	Load power factor correction and voltage support if needed
NORCO_TA 115kV	Base Case	P0	Basecase	1.05	1.03	1.03	1.06	1.04	1.03	1.04	1.03	1.00	1.03	Load power factor correction and voltage support if needed

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Study Area: **PG&E Kern**

High/Low Voltages



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
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022 SP High CEC Forecast	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations	
NORTHMWY 70kV	Base Case	P0	Basecase	1.05	1.03	1.03	1.08	1.03	1.03	1.04	1.03	1.02	1.03	Load power factor correction and voltage support if needed
OGLE JCT 115kV	Base Case	P0	Basecase	1.04	1.03	1.03	1.05	1.04	1.03	1.03	1.03	1.03	0.98	Load power factor correction and voltage support if needed
OGLE JCT 115kV	KERN PWR 115kV Section 2E	P2	Non-bus-tie breaker	1.04	1.03	1.03	1.05	1.04	1.02	1.03	1.02	1.03	0.88	Sensitivity Only
OGLE JCT 115kV	Midway-Kern No. 3 & Midway-Kern No. 4 230 kV Lines	P7	N-2(Common structure)	1.04	1.02	1.01	1.05	1.04	1.02	1.02	1.03	1.02	0.87	Sensitivity Only
OGLE TAP 115kV	Base Case	P0	Basecase	1.04	1.03	1.03	1.05	1.04	1.03	1.03	1.03	1.03	0.98	Load power factor correction and voltage support if needed
OGLE TAP 115kV	KERN PWR 115kV Section 2E	P2	Non-bus-tie breaker	1.04	1.03	1.03	1.05	1.04	1.03	1.03	1.02	1.03	0.88	Sensitivity Only
OGLE TAP 115kV	Midway-Kern No. 3 & Midway-Kern No. 4 230 kV Lines	P7	N-2(Common structure)	1.04	1.02	1.01	1.05	1.04	1.02	1.03	1.03	1.03	0.87	Sensitivity Only
ORION 70kV	MIDWAY - 2D 230kV & MIDWAY-MIDWAY-R12 #1 line	P2	Non-bus-tie breaker fault	1.02	0.99	0.92	1.03	1.03	0.98	1.02	0.97	1.01	0.90	Sensitivity Only
ORION 70kV	MIDWAY 230kV - Section 1E & 1D	P2	Bus-tie breaker fault	1.02	0.95	0.86	1.03	1.02	0.94	1.02	0.92	0.97	<0.90	Short Term: No issue; Long Term : Monitor the 27 Peak
ORION 70kV	MIDWAY 230kV - Section 2D & 2E	P2	Bus-tie breaker fault	1.02	0.96	0.89	1.03	1.03	0.96	1.02	0.95	1.01	<0.90	Short Term: No issue; Long Term : Monitor the 27 Peak
ORION 70kV	MIDWAY 230kV Section 1D	P2	Bus Section Fault	1.02	0.96	0.89	1.03	1.03	0.95	1.02	0.94	0.98	0.83	Short Term: No issue; Long Term : Monitor the 27 Peak and QF sensitivity scenario
ORION 70kV	MIDWAY 230kV Section 2D	P2	Bus Section Fault	1.02	0.99	0.92	1.03	1.03	0.98	1.02	0.97	1.01	0.90	Sensitivity Only
ORIONC1 34.5kV	MIDWAY 230kV - Section 1E & 1D	P2	Bus-tie breaker fault	1.03	0.96	0.88	1.03	1.02	0.96	1.03	0.94	1.01	<0.90	Short Term: No issue; Long Term : Monitor the 27 Peak

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Study Area: **PG&E Kern**

High/Low Voltages



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
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022 SP High CEC Forecast	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations	
ORIONC1 34.5kV	MIDWAY 230kV Section 1D	P2	Bus Section Fault	1.03	0.97	0.90	1.03	1.03	0.97	1.03	0.95	1.01	0.84	Short Term: No issue; Long Term : Monitor the 27 Peak and QF sensitivity scenario
ORIONC2 34.5kV	MIDWAY 230kV - Section 1E & 1D	P2	Bus-tie breaker fault	1.03	0.96	0.88	1.03	1.03	0.96	1.03	0.94	1.01	<0.90	Short Term: No issue; Long Term : Monitor the 27 Peak
ORIONC2 34.5kV	MIDWAY 230kV Section 1D	P2	Bus Section Fault	1.03	0.97	0.90	1.03	1.03	0.97	1.03	0.95	1.01	0.84	Sensitivity Only
ORIONTP 70kV	MIDWAY - 2D 230kV & MIDWAY-MIDWAY-R12 #1 line	P2	Non-bus-tie breaker fault	1.02	0.99	0.92	1.03	1.03	0.98	1.02	0.97	1.01	0.90	Sensitivity Only
ORIONTP 70kV	MIDWAY 230kV - Section 1E & 1D	P2	Bus-tie breaker fault	1.02	0.95	0.86	1.03	1.02	0.94	1.02	0.92	0.97	<0.90	Short Term: No issue; Long Term : Monitor the 27 Peak
ORIONTP 70kV	MIDWAY 230kV - Section 2D & 2E	P2	Bus-tie breaker fault	1.02	0.96	0.89	1.03	1.03	0.96	1.02	0.95	1.01	<0.90	Short Term: No issue; Long Term : Monitor the 27 Peak
ORIONTP 70kV	MIDWAY 230kV Section 1D	P2	Bus Section Fault	1.02	0.96	0.88	1.03	1.03	0.95	1.02	0.94	0.98	0.83	Short Term: No issue; Long Term : Monitor the 27 Peak and QF sensitivity scenario
ORIONTP 70kV	MIDWAY 230kV Section 2D	P2	Bus Section Fault	1.02	0.99	0.92	1.03	1.03	0.98	1.02	0.97	1.01	0.90	Sensitivity Only
PACI_PIP 70kV	MIDWAY - 2D 230kV & MIDWAY-MIDWAY-R12 #1 line	P2	Non-bus-tie breaker fault	1.01	0.97	0.91	1.02	1.01	0.97	1.01	0.96	0.98	0.88	Sensitivity Only
PACI_PIP 70kV	MIDWAY 230kV - Section 1E & 1D	P2	Bus-tie breaker fault	1.01	0.93	0.85	1.02	1.00	0.93	1.00	0.91	0.94	<0.90	Short Term: No issue; Long Term : Monitor the 27 Peak
PACI_PIP 70kV	MIDWAY 230kV - Section 2D & 2E	P2	Bus-tie breaker fault	1.01	0.95	0.88	1.02	1.01	0.94	1.00	0.93	0.98	<0.90	Short Term: No issue; Long Term : Monitor the 27 Peak
PACI_PIP 70kV	MIDWAY 230kV Section 1D	P2	Bus Section Fault	1.01	0.94	0.87	1.02	1.01	0.94	1.01	0.92	0.95	0.81	Short Term: No issue; Long Term : Monitor the 27 Peak and QF sensitivity scenario

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High/Low Voltages



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
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022 SP High CEC Forecast	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations	
PACI_PIP 70kV	MIDWAY 230kV Section 2D	P2	Bus Section Fault	1.01	0.97	0.91	1.02	1.01	0.97	1.01	0.96	0.98	0.88	Sensitivity Only
PONDROAD 115kV	Base Case	P0	Basecase	1.04	1.02	1.02	1.05	1.04	1.02	1.04	1.02	1.02	1.02	Load power factor correction and voltage support if needed
POSO MT 115kV	Base Case	P0	Basecase	1.04	1.02	1.02	1.06	1.04	1.02	1.03	1.02	1.01	0.99	Load power factor correction and voltage support if needed
POSO MT 115kV	KERN PWR 115kV - Section 1E & 2E	P2	Non-bus-tie breaker	1.03	1.01	1.01	1.04	1.03	1.01	1.01	1.00	1.01	0.88	Sensitivity Only
POSO MT 115kV	KERN PWR 115kV Section 2E	P2	Non-bus-tie breaker	1.03	1.01	1.00	1.05	1.03	1.00	1.01	1.00	1.01	0.86	Sensitivity Only
POSO MT 115kV	Midway-Kern No. 3 & Midway-Kern No. 4 230 kV Lines	P7	N-2(Common structure)	1.03	1.00	0.99	1.05	1.03	1.00	1.01	1.01	1.00	0.88	Sensitivity Only
POSOMTJT 115kV	Base Case	P0	Basecase	1.05	1.03	1.03	1.06	1.04	1.03	1.03	1.02	1.02	0.99	Load power factor correction and voltage support if needed
POSOMTJT 115kV	KERN PWR 115kV - Section 1E & 2E	P2	Non-bus-tie breaker	1.04	1.02	1.01	1.05	1.04	1.01	1.02	1.01	1.02	0.89	Sensitivity Only
POSOMTJT 115kV	KERN PWR 115kV Section 2E	P2	Non-bus-tie breaker	1.04	1.01	1.01	1.05	1.04	1.01	1.02	1.00	1.02	0.87	Sensitivity Only
POSOMTJT 115kV	Midway-Kern No. 3 & Midway-Kern No. 4 230 kV Lines	P7	N-2(Common structure)	1.04	1.01	1.00	1.06	1.04	1.01	1.02	1.02	1.01	0.89	Sensitivity Only
PSE-3 115kV	Base Case	P0	Basecase	1.05	1.03	1.03	1.07	1.04	1.03	1.04	1.03	1.03	1.02	Load power factor correction and voltage support if needed
PTRL JCT 115kV	Base Case	P0	Basecase	1.05	1.03	1.03	1.06	1.04	1.03	1.03	1.03	1.02	1.00	Load power factor correction and voltage support if needed
PTRL JCT 115kV	KERN PWR 115kV - Section 1E & 2E	P2	Non-bus-tie breaker	1.04	1.02	1.01	1.05	1.04	1.01	1.02	1.01	1.02	0.89	Sensitivity Only
PTRL JCT 115kV	KERN PWR 115kV Section 2E	P2	Non-bus-tie breaker	1.04	1.02	1.01	1.05	1.04	1.01	1.02	1.00	1.02	0.87	Sensitivity Only

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Study Area: **PG&E Kern**

High/Low Voltages



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
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022 SP High CEC Forecast	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations	
PTRL JCT 115kV	Midway-Kern No. 3 & Midway-Kern No. 4 230 kV Lines	P7	N-2(Common structure)	1.04	1.01	1.00	1.06	1.04	1.01	1.02	1.02	1.01	0.89	Sensitivity Only
Q356 70kV	Base Case	P0	Basecase	1.04	1.03	1.03	1.07	1.05	1.03	1.03	1.03	1.04	1.03	Load power factor correction and voltage support if needed
Q356TP 70kV	Base Case	P0	Basecase	1.04	1.03	1.03	1.07	1.05	1.03	1.03	1.03	1.04	1.03	Load power factor correction and voltage support if needed
Q482 115kV	Base Case	P0	Basecase	1.04	1.02	1.02	1.05	1.05	1.02	1.04	1.02	1.03	1.02	Load power factor correction and voltage support if needed
Q557 115kV	Base Case	P0	Basecase	1.04	1.02	1.02	1.05	1.05	1.02	1.04	1.02	1.03	1.02	Load power factor correction and voltage support if needed
Q620 70kV	Base Case	P0	Basecase	1.05	1.02	1.02	1.06	1.02	1.02	1.03	1.02	1.03	1.02	Load power factor correction and voltage support if needed
Q620C1 13.8kV	Base Case	P0	Basecase	1.04	1.02	1.02	1.06	1.02	1.02	1.02	1.02	1.01	1.01	Load power factor correction and voltage support if needed
Q620C2 13.8kV	Base Case	P0	Basecase	1.04	1.02	1.02	1.06	1.02	1.02	1.02	1.02	1.01	1.02	Load power factor correction and voltage support if needed
Q620TP 70kV	Base Case	P0	Basecase	1.05	1.02	1.02	1.06	1.02	1.02	1.03	1.02	1.03	1.02	Load power factor correction and voltage support if needed
Q622BSS 115kV	Base Case	P0	Basecase	1.06	1.03	1.03	1.05	1.04	1.03	1.04	1.03	1.02	1.01	Load power factor correction and voltage support if needed
Q653EAC2 34.5kV	Base Case	P0	Basecase	1.03	1.03	1.03	1.06	1.07	1.03	1.03	1.03	1.06	1.03	Load power factor correction and voltage support if needed
Q744 115kV	Base Case	P0	Basecase	1.06	1.02	1.02	1.07	1.04	1.02	1.03	1.02	1.02	1.00	Load power factor correction and voltage support if needed
Q744 115kV	Midway-Kern No. 3 & Midway-Kern No. 4 230 kV Lines	P7	N-2(Common structure)	1.05	1.00	0.99	1.07	1.03	0.99	1.01	1.01	1.01	0.90	Sensitivity Only
Q946SWSTA 230kV	MIDWAY - 2D 230kV & MIDWAY-MIDWAY-R12 #1 line	P2	Non-bus-tie breaker fault	0.94	0.87	0.81	1.00	0.94	0.87	0.93	0.86	0.88	0.79	Scope Under Review: Wheelerridge voltage support project.
Q946SWSTA 230kV	MIDWAY - 2D 230kV & Q946SWSTA-MIDWAY line	P2	Non-bus-tie breaker fault	0.96	0.90	0.86	1.02	0.95	0.90	0.95	0.89	0.90	0.85	Scope Under Review: Wheelerridge voltage support project.

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Study Area: **PG&E Kern**

High/Low Voltages



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
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022 SP High CEC Forecast	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations	
Q946SWSTA 230kV	MIDWAY 230kV - Section 1E & 1D	P2	Bus-tie breaker fault	0.96	0.91	0.86	1.01	0.94	0.90	0.96	0.89	0.90	<0.90	Scope Under Review: Wheelerridge voltage support project.
Q946SWSTA 230kV	MIDWAY 230kV - Section 2D & 2E	P2	Bus-tie breaker fault	0.93	0.85	0.79	0.99	0.93	0.84	0.92	0.84	0.88	<0.90	Scope Under Review: Wheelerridge voltage support project.
Q946SWSTA 230kV	MIDWAY 230kV Section 1D	P2	Bus Section Fault	0.96	0.91	0.88	1.01	0.95	0.91	0.96	0.90	0.91	0.84	Scope Under Review: Wheelerridge voltage support project.
Q946SWSTA 230kV	MIDWAY 230kV Section 2D	P2	Bus Section Fault	0.94	0.87	0.81	1.00	0.94	0.87	0.93	0.86	0.88	0.79	Scope Under Review: Wheelerridge voltage support project.
Q946SWSTA 230kV	Q946SWSTA-MIDWAY 230kV [0]	P1	N-1(Transmission Line)	0.96	0.90	0.87	1.02	0.96	0.90	0.95	0.90	0.91	0.86	Scope Under Review: Wheelerridge voltage support project.
Q988 70kV	Base Case	P0	Basecase	1.05	1.02	1.02	1.06	1.02	1.02	1.03	1.02	1.03	1.02	Load power factor correction and voltage support if needed
RASMSNTP 115kV	Base Case	P0	Basecase	1.05	1.03	1.03	1.06	1.04	1.03	1.04	1.03	1.02	0.99	Load power factor correction and voltage support if needed
RASMSNTP 115kV	KERN PWR 115kV - Section 1E & 2E	P2	Non-bus-tie breaker	1.04	1.02	1.02	1.05	1.04	1.02	1.02	1.01	1.02	0.89	Sensitivity Only
RASMSNTP 115kV	KERN PWR 115kV Section 2E	P2	Non-bus-tie breaker	1.04	1.02	1.01	1.05	1.04	1.01	1.02	1.00	1.02	0.87	Sensitivity Only
RASMSNTP 115kV	Midway-Kern No. 3 & Midway-Kern No. 4 230 kV Lines	P7	N-2(Common structure)	1.04	1.02	1.00	1.06	1.04	1.01	1.02	1.02	1.01	0.89	Sensitivity Only
RASMUSEN 115kV	Base Case	P0	Basecase	1.05	1.03	1.03	1.06	1.04	1.03	1.04	1.03	1.02	0.99	Load power factor correction and voltage support if needed
RASMUSEN 115kV	KERN PWR 115kV - Section 1E & 2E	P2	Non-bus-tie breaker	1.04	1.02	1.02	1.05	1.04	1.02	1.02	1.01	1.02	0.89	Sensitivity Only
RASMUSEN 115kV	KERN PWR 115kV Section 2E	P2	Non-bus-tie breaker	1.04	1.02	1.01	1.05	1.04	1.01	1.02	1.00	1.02	0.87	Sensitivity Only

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Study Area: **PG&E Kern**

High/Low Voltages



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
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022 SP High CEC Forecast	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations	
RASMUSEN 115kV	Midway-Kern No. 3 & Midway-Kern No. 4 230 kV Lines	P7	N-2(Common structure)	1.04	1.02	1.00	1.06	1.04	1.01	1.02	1.02	1.01	0.89	Sensitivity Only
REGULUS 115kV	Base Case	P0	Basecase	1.06	1.02	1.02	1.07	1.04	1.02	1.03	1.02	1.01	1.00	Load power factor correction and voltage support if needed
REGULUS 115kV	Midway-Kern No. 3 & Midway-Kern No. 4 230 kV Lines	P7	N-2(Common structure)	1.04	1.00	0.99	1.07	1.03	0.99	1.01	1.01	1.00	0.89	Sensitivity Only
RENRJCT 115kV	Base Case	P0	Basecase	1.06	1.03	1.03	1.06	1.04	1.03	1.04	1.03	1.01	1.03	Load power factor correction and voltage support if needed
RENFRO 115kV	Base Case	P0	Basecase	1.05	1.03	1.03	1.07	1.04	1.03	1.04	1.03	1.00	1.02	Load power factor correction and voltage support if needed
RENFRO2 115kV	Base Case	P0	Basecase	1.06	1.03	1.03	1.06	1.04	1.03	1.04	1.02	1.00	1.02	Load power factor correction and voltage support if needed
RIO BRVO 115kV	Base Case	P0	Basecase	1.05	1.03	1.03	1.06	1.04	1.03	1.04	1.03	1.00	1.02	Load power factor correction and voltage support if needed
RIOBRVQF 70kV	Base Case	P0	Basecase	1.06	1.03	1.03	1.04	1.03	1.03	1.03	1.03	1.03	1.03	Load power factor correction and voltage support if needed
RIOBRVTM 115kV	Base Case	P0	Basecase	1.06	1.04	1.04	1.06	1.04	1.05	1.05	1.04	1.01	1.04	Load power factor correction and voltage support if needed
RNFROTP1 115kV	Base Case	P0	Basecase	1.05	1.03	1.03	1.06	1.04	1.03	1.04	1.03	1.00	1.02	Load power factor correction and voltage support if needed
RNFROTP2 115kV	Base Case	P0	Basecase	1.06	1.03	1.03	1.06	1.04	1.03	1.04	1.02	1.00	1.02	Load power factor correction and voltage support if needed
ROSE 70kV	MIDWAY - 2D 230kV & MIDWAY-MIDWAY-R12 #1 line	P2	Non-bus-tie breaker fault	1.02	0.98	0.92	1.02	1.02	0.97	1.02	0.96	0.99	0.89	Sensitivity Only
ROSE 70kV	MIDWAY 230kV - Section 1E & 1D	P2	Bus-tie breaker fault	1.02	0.94	0.86	1.02	1.01	0.93	1.01	0.91	0.95	<0.90	Scope Under Review: Wheelerridge voltage support project.
ROSE 70kV	MIDWAY 230kV - Section 2D & 2E	P2	Bus-tie breaker fault	1.02	0.96	0.89	1.02	1.02	0.95	1.01	0.94	0.99	<0.90	Scope Under Review: Wheelerridge voltage support project.
ROSE 70kV	MIDWAY 230kV Section 1D	P2	Bus Section Fault	1.02	0.95	0.88	1.02	1.02	0.95	1.02	0.93	0.96	0.82	Scope Under Review: Wheelerridge voltage support project.

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Study Area: **PG&E Kern**

High/Low Voltages



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
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022 SP High CEC Forecast	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations	
ROSE 70kV	MIDWAY 230kV Section 2D	P2	Bus Section Fault	1.02	0.98	0.92	1.02	1.02	0.97	1.02	0.96	0.99	0.89	Sensitivity Only
ROSEDAL 115kV	Base Case	P0	Basecase	1.06	1.04	1.04	1.07	1.04	1.04	1.04	1.03	1.02	1.02	Load power factor correction and voltage support if needed
S_KERN 70kV	Base Case	P0	Basecase	1.03	1.03	1.03	1.05	1.07	1.03	1.03	1.03	1.06	1.03	Load power factor correction and voltage support if needed
S_KERN_TP 70kV	Base Case	P0	Basecase	1.03	1.03	1.03	1.05	1.07	1.03	1.03	1.03	1.06	1.03	Load power factor correction and voltage support if needed
SAN EMDO 70kV	Base Case	P0	Basecase	1.03	1.03	1.02	1.05	1.05	1.03	1.03	1.02	1.04	1.02	Scope Under Review: Wheelerridge voltage support project.
SANTA FE SUB 115kV	Base Case	P0	Basecase	1.04	1.03	1.03	1.05	1.03	1.03	1.04	1.03	1.01	1.03	Load power factor correction and voltage support if needed
SEMI_TAP 115kV	Base Case	P0	Basecase	1.04	1.03	1.03	1.06	1.04	1.03	1.04	1.03	1.02	1.03	Load power factor correction and voltage support if needed
SEMITR&1 115kV	Base Case	P0	Basecase	1.04	1.02	1.03	1.06	1.03	1.03	1.04	1.02	1.01	1.02	Load power factor correction and voltage support if needed
SEMITROPIC_D 115kV	Base Case	P0	Basecase	1.04	1.02	1.03	1.06	1.03	1.03	1.04	1.02	1.01	1.02	Load power factor correction and voltage support if needed
SEMITROPIC_E 115kV	Base Case	P0	Basecase	1.04	1.03	1.03	1.06	1.04	1.03	1.04	1.03	1.02	1.03	Load power factor correction and voltage support if needed
SEMITRPJ 115kV	Base Case	P0	Basecase	1.04	1.03	1.03	1.06	1.03	1.03	1.04	1.02	1.01	1.02	Load power factor correction and voltage support if needed
SHAFTER 115kV	Base Case	P0	Basecase	1.05	1.03	1.03	1.06	1.04	1.03	1.04	1.03	1.00	1.02	Load power factor correction and voltage support if needed
SLR_TANH 70kV	Base Case	P0	Basecase	1.05	1.03	1.03	1.07	1.03	1.03	1.04	1.03	1.02	1.03	Load power factor correction and voltage support if needed
SM1T013141 115kV	Base Case	P0	Basecase	1.04	1.03	1.03	1.06	1.04	1.03	1.04	1.03	1.02	1.03	Load power factor correction and voltage support if needed
SMTRPCWS 115kV	Base Case	P0	Basecase	1.04	1.03	1.03	1.06	1.04	1.03	1.04	1.03	1.02	1.03	Load power factor correction and voltage support if needed
SMYRNA 115kV	Base Case	P0	Basecase	1.04	1.02	1.02	1.05	1.04	1.02	1.04	1.02	1.02	1.02	Load power factor correction and voltage support if needed
SN BRNRD 70kV	MIDWAY 230kV - Section 1E & 1D	P2	Bus-tie breaker fault	1.02	0.95	0.87	1.03	1.01	0.94	1.02	0.92	0.96	<0.90	Short Term: No issue; Long Term : Monitor the 27 Peak
SN BRNRD 70kV	MIDWAY 230kV - Section 2D & 2E	P2	Bus-tie breaker fault	1.02	0.96	0.89	1.03	1.02	0.96	1.02	0.95	1.00	<0.90	Short Term: No issue; Long Term : Monitor the 27 Peak

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Study Area: **PG&E Kern**

High/Low Voltages



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
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022 SP High CEC Forecast	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations	
SN BRNRD 70kV	MIDWAY 230kV Section 1D	P2	Bus Section Fault	1.02	0.96	0.89	1.03	1.02	0.96	1.02	0.94	0.97	0.83	Short Term: No issue; Long Term : Monitor the 27 Peak and QF sensitivity scenario
STALIONJ 70kV	MIDWAY - 2D 230kV & MIDWAY-MIDWAY-R12 #1 line	P2	Non-bus-tie breaker fault	1.02	0.99	0.92	1.03	1.03	0.98	1.02	0.97	1.01	0.90	Sensitivity Only
STALIONJ 70kV	MIDWAY 230kV - Section 1E & 1D	P2	Bus-tie breaker fault	1.02	0.95	0.86	1.03	1.02	0.94	1.02	0.92	0.96	<0.90	Short Term: No issue; Long Term : Monitor the 27 Peak
STALIONJ 70kV	MIDWAY 230kV - Section 2D & 2E	P2	Bus-tie breaker fault	1.02	0.96	0.89	1.03	1.02	0.96	1.02	0.95	1.00	<0.90	Short Term: No issue; Long Term : Monitor the 27 Peak
STALIONJ 70kV	MIDWAY 230kV Section 1D	P2	Bus Section Fault	1.02	0.96	0.89	1.03	1.03	0.96	1.02	0.94	0.98	0.83	Short Term: No issue; Long Term : Monitor the 27 Peak and QF sensitivity scenario
STALIONJ 70kV	MIDWAY 230kV Section 2D	P2	Bus Section Fault	1.02	0.99	0.92	1.03	1.03	0.98	1.02	0.97	1.01	0.90	Sensitivity Only
STALLION 70kV	MIDWAY - 2D 230kV & MIDWAY-MIDWAY-R12 #1 line	P2	Non-bus-tie breaker fault	1.02	0.99	0.92	1.03	1.03	0.98	1.02	0.97	1.01	0.90	Sensitivity Only
STALLION 70kV	MIDWAY 230kV - Section 1E & 1D	P2	Bus-tie breaker fault	1.02	0.95	0.86	1.03	1.02	0.94	1.02	0.92	0.96	<0.90	Short Term: No issue; Long Term : Monitor the 27 Peak
STALLION 70kV	MIDWAY 230kV - Section 2D & 2E	P2	Bus-tie breaker fault	1.02	0.96	0.89	1.03	1.02	0.96	1.02	0.95	1.00	<0.90	Short Term: No issue; Long Term : Monitor the 27 Peak
STALLION 70kV	MIDWAY 230kV Section 1D	P2	Bus Section Fault	1.02	0.96	0.89	1.03	1.03	0.96	1.02	0.94	0.98	0.83	Short Term: No issue; Long Term : Monitor the 27 Peak and QF sensitivity scenario
STALLION 70kV	MIDWAY 230kV Section 2D	P2	Bus Section Fault	1.02	0.99	0.92	1.03	1.03	0.98	1.02	0.97	1.01	0.90	Sensitivity Only
STCKDLEA 230kV	Midway-Kern No. 3 & Midway-Kern No. 4 230 kV Lines	P7	N-2(Common structure)	0.98	0.97	0.95	1.01	0.99	0.96	0.97	0.98	0.96	0.88	Sensitivity Only

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Study Area: **PG&E Kern**

High/Low Voltages



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
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022 SP High CEC Forecast	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations	
STCKDLEB 230kV	Midway-Kern No. 3 & Midway-Kern No. 4 230 kV Lines	P7	N-2(Common structure)	0.98	0.97	0.95	1.01	0.99	0.96	0.97	0.98	0.96	0.88	Sensitivity Only
STCKDLJ 115kV	Base Case	P0	Basecase	1.05	1.03	1.03	1.07	1.04	1.03	1.03	1.02	1.01	1.01	Load power factor correction and voltage support if needed
STOCKDLE 115kV	Base Case	P0	Basecase	1.06	1.02	1.02	1.07	1.04	1.02	1.03	1.02	1.01	1.01	Load power factor correction and voltage support if needed
STOCKDLE 115kV	Midway-Kern No. 3 & Midway-Kern No. 4 230 kV Lines	P7	N-2(Common structure)	1.04	1.00	0.99	1.06	1.03	1.00	1.01	1.01	1.01	0.90	Sensitivity Only
TAFT 115kV	Base Case	P0	Basecase	1.04	1.03	1.03	1.05	1.03	1.03	1.03	1.03	1.01	1.03	Load power factor correction and voltage support if needed
TAFT A 70kV	Base Case	P0	Basecase	1.06	1.04	1.04	1.07	1.04	1.04	1.04	1.04	1.02	1.04	Load power factor correction and voltage support if needed
TAFT A_J 70kV	Base Case	P0	Basecase	1.05	1.04	1.03	1.07	1.03	1.04	1.04	1.04	1.02	1.03	Load power factor correction and voltage support if needed
TAFT_SW_TAFC 70kV	Base Case	P0	Basecase	1.06	1.04	1.04	1.07	1.04	1.04	1.04	1.04	1.02	1.04	Load power factor correction and voltage support if needed
TAFT_SW_TAFM 70kV	Base Case	P0	Basecase	1.06	1.04	1.04	1.07	1.04	1.04	1.04	1.04	1.02	1.04	Load power factor correction and voltage support if needed
TECUYA 70kV	MIDWAY - 2D 230kV & MIDWAY-MIDWAY-R12 #1 line	P2	Non-bus-tie breaker fault	1.02	0.98	0.92	1.03	1.02	0.98	1.02	0.97	0.99	0.89	Sensitivity Only
TECUYA 70kV	MIDWAY 230kV - Section 1E & 1D	P2	Bus-tie breaker fault	1.02	0.94	0.86	1.02	1.01	0.94	1.02	0.92	0.95	<0.90	Short Term: No issue; Long Term : Monitor the 27 Peak
TECUYA 70kV	MIDWAY 230kV - Section 2D & 2E	P2	Bus-tie breaker fault	1.02	0.96	0.89	1.03	1.02	0.95	1.02	0.94	0.99	<0.90	Short Term: No issue; Long Term : Monitor the 27 Peak
TECUYA 70kV	MIDWAY 230kV Section 1D	P2	Bus Section Fault	1.02	0.95	0.88	1.02	1.02	0.95	1.02	0.94	0.96	0.82	Short Term: No issue; Long Term : Monitor the 27 Peak and QF sensitivity scenario
TECUYA 70kV	MIDWAY 230kV Section 2D	P2	Bus Section Fault	1.02	0.98	0.92	1.03	1.02	0.98	1.02	0.97	0.99	0.89	Sensitivity Only

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High/Low Voltages



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
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022 SP High CEC Forecast	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations	
TECUYA T 70kV	MIDWAY - 2D 230kV & MIDWAY-MIDWAY-R12 #1 line	P2	Non-bus-tie breaker fault	1.02	0.98	0.92	1.03	1.02	0.98	1.02	0.97	0.99	0.90	Sensitivity Only
TECUYA T 70kV	MIDWAY 230kV - Section 1E & 1D	P2	Bus-tie breaker fault	1.02	0.95	0.86	1.03	1.01	0.94	1.02	0.92	0.95	<0.90	Short Term: No issue; Long Term : Monitor the 27 Peak
TECUYA T 70kV	MIDWAY 230kV - Section 2D & 2E	P2	Bus-tie breaker fault	1.02	0.96	0.89	1.03	1.02	0.95	1.02	0.95	0.99	<0.90	Short Term: No issue; Long Term : Monitor the 27 Peak
TECUYA T 70kV	MIDWAY 230kV Section 1D	P2	Bus Section Fault	1.02	0.95	0.88	1.02	1.02	0.95	1.02	0.94	0.96	0.83	Short Term: No issue; Long Term : Monitor the 27 Peak and QF sensitivity scenario
TECUYA T 70kV	MIDWAY 230kV Section 2D	P2	Bus Section Fault	1.02	0.98	0.92	1.03	1.02	0.98	1.02	0.97	0.99	0.90	Sensitivity Only
TEJON 70kV	MIDWAY - 2D 230kV & MIDWAY-MIDWAY-R12 #1 line	P2	Non-bus-tie breaker fault	1.02	0.98	0.92	1.03	1.02	0.98	1.02	0.97	0.99	0.90	Sensitivity Only
TEJON 70kV	MIDWAY 230kV - Section 1E & 1D	P2	Bus-tie breaker fault	1.02	0.94	0.86	1.03	1.01	0.94	1.02	0.92	0.95	<0.90	Short Term: No issue; Long Term : Monitor the 27 Peak
TEJON 70kV	MIDWAY 230kV - Section 2D & 2E	P2	Bus-tie breaker fault	1.02	0.96	0.89	1.03	1.02	0.95	1.02	0.94	0.99	<0.90	Short Term: No issue; Long Term : Monitor the 27 Peak
TEJON 70kV	MIDWAY 230kV Section 1D	P2	Bus Section Fault	1.02	0.95	0.88	1.02	1.02	0.95	1.02	0.94	0.96	0.82	Short Term: No issue; Long Term : Monitor the 27 Peak and QF sensitivity scenario
TEJON 70kV	MIDWAY 230kV Section 2D	P2	Bus Section Fault	1.02	0.98	0.92	1.03	1.02	0.98	1.02	0.97	0.99	0.90	Sensitivity Only
TEMBLOR 70kV	Base Case	P0	Basecase	1.05	1.03	1.03	1.07	1.03	1.03	1.03	1.03	1.01	1.03	Load power factor correction and voltage support if needed
TEMBLOR 115kV	Midsun-Midway & Midway-Temblor 115 kV Lines	P7	N-2(Common structure)	1.03	0.94	0.95	0.86	0.93	0.93	1.03	0.93	0.92	0.94	Scope Under Review: Midway-Temblor 115 kV Line Reconductor and Voltage Support

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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
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022 SP High CEC Forecast	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations	
TEMBLOR 115kV	MIDWAY - 2D 115kV & MIDWAY-TEMBLOR line	P2	Non-bus-tie breaker fault	1.03	0.94	0.95	0.86	0.93	0.93	1.03	0.93	0.92	0.94	Scope Under Review: Midway-Temblor 115 kV Line Reconductor and Voltage Support
TEMBLOR 115kV	MIDWAY-TEMBLOR 115kV [2630]	P1	N-1(Transmission Line)	1.03	0.94	0.95	0.86	0.93	0.93	1.03	0.93	0.92	0.93	Scope Under Review: Midway-Temblor 115 kV Line Reconductor and Voltage Support
TEMBLOR 115kV	MIDWAY-TEMBLOR 115kV [2630] (TEMBLOR-PSE MCKJ)	P2	Bus Section Fault	1.03	0.94	0.95	0.86	0.93	0.93	1.03	0.93	0.92	0.94	Scope Under Review: Midway-Temblor 115 kV Line Reconductor and Voltage Support
TEVIS 115kV	Base Case	P0	Basecase	1.06	1.02	1.02	1.07	1.04	1.02	1.03	1.02	1.01	1.00	Load power factor correction and voltage support if needed
TEVIS 115kV	Midway-Kern No. 3 & Midway-Kern No. 4 230 kV Lines	P7	N-2(Common structure)	1.04	1.00	0.99	1.06	1.04	1.00	1.01	1.01	1.01	0.90	Sensitivity Only
TEVIS2 115kV	Base Case	P0	Basecase	1.05	1.03	1.03	1.07	1.04	1.03	1.03	1.02	1.01	1.01	Load power factor correction and voltage support if needed
TEVISJ1 115kV	Base Case	P0	Basecase	1.06	1.03	1.03	1.07	1.04	1.03	1.03	1.02	1.01	1.01	Load power factor correction and voltage support if needed
TEVISJ2 115kV	Base Case	P0	Basecase	1.05	1.03	1.03	1.07	1.04	1.03	1.03	1.03	1.01	1.01	Load power factor correction and voltage support if needed
TEXCO_NM 115kV	Base Case	P0	Basecase	1.04	1.03	1.03	1.06	1.03	1.03	1.04	1.03	1.01	1.03	Load power factor correction and voltage support if needed
TPMNT1 115kV	Base Case	P0	Basecase	1.05	1.03	1.03	1.06	1.04	1.03	1.04	1.03	1.01	1.03	Load power factor correction and voltage support if needed
TPMNT2 115kV	Base Case	P0	Basecase	1.05	1.03	1.03	1.06	1.04	1.03	1.04	1.03	1.01	1.03	Load power factor correction and voltage support if needed
TUPMAN 115kV	Base Case	P0	Basecase	1.05	1.03	1.03	1.06	1.04	1.03	1.04	1.03	1.01	1.03	Load power factor correction and voltage support if needed
TX_BV_HL 70kV	Base Case	P0	Basecase	1.03	1.02	1.01	1.07	1.02	1.01	1.02	1.01	1.00	1.01	Load power factor correction and voltage support if needed
TX_ROSDL 115kV	Base Case	P0	Basecase	1.06	1.04	1.04	1.07	1.04	1.04	1.04	1.03	1.02	1.02	Load power factor correction and voltage support if needed
UNIVRSTY 115kV	Base Case	P0	Basecase	1.04	1.03	1.03	1.05	1.03	1.03	1.03	1.03	1.02	1.03	Load power factor correction and voltage support if needed
VALPREDO 70kV	MIDWAY - 2D 230kV & MIDWAY-MIDWAY-R12 #1 line	P2	Non-bus-tie breaker fault	1.03	0.98	0.92	1.02	1.02	0.98	1.02	0.96	0.99	0.89	Sensitivity Only

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Study Area: **PG&E Kern**

High/Low Voltages



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
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022 SP High CEC Forecast	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations	
VALPREDO 70kV	MIDWAY 230kV - Section 1E & 1D	P2	Bus-tie breaker fault	1.03	0.94	0.86	1.02	1.01	0.94	1.02	0.91	0.95	<0.90	Short Term: No issue; Long Term : Monitor the 27 Peak
VALPREDO 70kV	MIDWAY 230kV - Section 2D & 2E	P2	Bus-tie breaker fault	1.03	0.96	0.89	1.02	1.02	0.95	1.02	0.94	0.99	<0.90	Short Term: No issue; Long Term : Monitor the 27 Peak
VALPREDO 70kV	MIDWAY 230kV Section 1D	P2	Bus Section Fault	1.03	0.95	0.88	1.02	1.02	0.95	1.02	0.93	0.96	0.82	Short Term: No issue; Long Term : Monitor the 27 Peak and QF sensitivity scenario
VALPREDO 70kV	MIDWAY 230kV Section 2D	P2	Bus Section Fault	1.03	0.98	0.92	1.02	1.02	0.98	1.02	0.96	0.99	0.89	Sensitivity Only
VEDDER 115kV	Base Case	P0	Basecase	1.04	1.02	1.02	1.06	1.04	1.02	1.03	1.02	1.01	0.99	Load power factor correction and voltage support if needed
VEDDER 115kV	KERN PWR 115kV - Section 1E & 2E	P2	Non-bus-tie breaker	1.03	1.01	1.01	1.04	1.03	1.00	1.01	1.00	1.01	0.88	Sensitivity Only
VEDDER 115kV	KERN PWR 115kV Section 2E	P2	Non-bus-tie breaker	1.03	1.01	1.00	1.05	1.03	1.00	1.01	1.00	1.01	0.86	Sensitivity Only
VEDDER 115kV	Midway-Kern No. 3 & Midway-Kern No. 4 230 kV Lines	P7	N-2(Common structure)	1.03	1.00	0.99	1.05	1.03	1.00	1.01	1.01	1.00	0.88	Sensitivity Only
WEEDPATCH_SF 70kV	Base Case	P0	Basecase	1.06	1.01	1.00	1.04	1.01	1.01	1.01	1.00	1.01	1.00	Load power factor correction and voltage support if needed
WEEDPTCH 70kV	MIDWAY - 2D 230kV & MIDWAY-MIDWAY-R12 #1 line	P2	Non-bus-tie breaker fault	1.00	0.96	0.89	1.03	1.02	0.95	1.00	0.94	0.98	0.87	Short Term: No issue; Long Term : Monitor the 27 Peak and QF sensitivity scenario
WEEDPTCH 70kV	MIDWAY 230kV - Section 1E & 1D	P2	Bus-tie breaker fault	1.00	0.92	0.83	1.03	1.01	0.91	1.00	0.89	0.93	<0.90	Short Term: No issue; Long Term : Monitor the 27 Peak
WEEDPTCH 70kV	MIDWAY 230kV - Section 2D & 2E	P2	Bus-tie breaker fault	1.00	0.93	0.86	1.03	1.01	0.93	1.00	0.91	0.98	<0.90	Short Term: No issue; Long Term : Monitor the 27 Peak
WEEDPTCH 70kV	MIDWAY 230kV Section 1D	P2	Bus Section Fault	1.00	0.93	0.85	1.03	1.02	0.92	1.00	0.91	0.95	0.79	Short Term: No issue; Long Term : Monitor the 27 Peak and QF sensitivity scenario

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Study Area: **PG&E Kern**

High/Low Voltages



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
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022 SP High CEC Forecast	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations	
WEEDPTCH 70kV	MIDWAY 230kV Section 2D	P2	Bus Section Fault	1.00	0.96	0.89	1.03	1.02	0.95	1.00	0.94	0.98	0.87	Short Term: No issue; Long Term : Monitor the 27 Peak and QF sensitivity scenario
WELLFILD 70kV	Base Case	P0	Basecase	1.06	1.00	0.99	1.04	1.00	0.99	1.00	0.99	1.00	0.99	Load power factor correction and voltage support if needed
WESTPARK 115kV	Base Case	P0	Basecase	1.06	1.03	1.03	1.07	1.04	1.03	1.04	1.03	1.02	1.01	Load power factor correction and voltage support if needed
WESTPLAT 115kV	Base Case	P0	Basecase	1.05	1.03	1.04	1.06	1.04	1.04	1.04	1.03	1.01	1.03	Load power factor correction and voltage support if needed
WHEELER 230kV	Base Case	P0	Basecase	0.99	0.97	0.97	1.02	0.98	0.97	0.99	0.97	0.95	0.96	Sensitivity Only
WHEELER 70kV	MIDWAY 230kV - Section 1E & 1D	P2	Bus-tie breaker fault	1.03	0.95	0.87	1.03	1.02	0.95	1.03	0.93	0.96	<0.90	Short Term: No issue; Long Term : Monitor the 27 Peak
WHEELER 70kV	MIDWAY 230kV - Section 2D & 2E	P2	Bus-tie breaker fault	1.03	0.97	0.90	1.03	1.02	0.96	1.03	0.95	1.00	<0.90	Short Term: No issue; Long Term : Monitor the 27 Peak
WHEELER 70kV	MIDWAY 230kV Section 1D	P2	Bus Section Fault	1.03	0.96	0.89	1.03	1.03	0.96	1.03	0.95	0.97	0.84	Short Term: No issue; Long Term : Monitor the 27 Peak and QF sensitivity scenario
WHEELER 115kV	MIDWAY - 2D 230kV & MIDWAY-MIDWAY-R12 #1 line	P2	Non-bus-tie breaker fault	1.02	0.98	0.92	1.03	1.02	0.98	1.02	0.97	0.99	0.90	Sensitivity Only
WHEELER 115kV	MIDWAY 230kV - Section 1E & 1D	P2	Bus-tie breaker fault	1.02	0.95	0.86	1.03	1.01	0.94	1.02	0.92	0.95	<0.90	Short Term: No issue; Long Term : Monitor the 27 Peak
WHEELER 115kV	MIDWAY 230kV - Section 2D & 2E	P2	Bus-tie breaker fault	1.02	0.96	0.89	1.03	1.02	0.96	1.02	0.95	0.99	<0.90	Short Term: No issue; Long Term : Monitor the 27 Peak
WHEELER 115kV	MIDWAY 230kV Section 1D	P2	Bus Section Fault	1.02	0.95	0.88	1.03	1.02	0.95	1.02	0.94	0.96	0.83	Short Term: No issue; Long Term : Monitor the 27 Peak and QF sensitivity scenario
WHEELER 115kV	MIDWAY 230kV Section 2D	P2	Bus Section Fault	1.02	0.98	0.92	1.03	1.02	0.98	1.02	0.97	0.99	0.90	Sensitivity Only
WHEELER 230kV	MIDWAY - 2D 230kV & MIDWAY-MIDWAY-R12 #1 line	P2	Non-bus-tie breaker fault	0.94	0.87	0.82	1.00	0.94	0.87	0.93	0.86	0.88	0.80	Scope Under Review: Wheelerridge voltage support project.

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Study Area: **PG&E Kern**

High/Low Voltages



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
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022 SP High CEC Forecast	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations	
WHEELER 230kV	MIDWAY - 2D 230kV & Q946SWSTA-MIDWAY line	P2	Non-bus-tie breaker fault	0.96	0.90	0.86	1.02	0.95	0.90	0.95	0.89	0.90	0.85	Scope Under Review: Wheelerridge voltage support project.
WHEELER 230kV	MIDWAY 230kV - Section 1E & 1D	P2	Bus-tie breaker fault	0.93	0.84	0.77	1.00	0.89	0.83	0.92	0.82	0.84	<0.90	Scope Under Review: Wheelerridge voltage support project.
WHEELER 230kV	MIDWAY 230kV - Section 2D & 2E	P2	Bus-tie breaker fault	0.93	0.85	0.79	1.00	0.93	0.85	0.92	0.84	0.88	<0.90	Scope Under Review: Wheelerridge voltage support project.
WHEELER 230kV	MIDWAY 230kV Section 1D	P2	Bus Section Fault	0.93	0.85	0.79	1.01	0.90	0.85	0.92	0.83	0.85	0.74	Scope Under Review: Wheelerridge voltage support project.
WHEELER 230kV	MIDWAY 230kV Section 2D	P2	Bus Section Fault	0.94	0.87	0.82	1.00	0.94	0.87	0.93	0.86	0.88	0.80	Scope Under Review: Wheelerridge voltage support project.
WHEELER 230kV	Q946SWSTA-MIDWAY 230kV [0]	P1	N-1(Transmission Line)	0.96	0.90	0.87	1.02	0.95	0.90	0.95	0.90	0.91	0.86	Scope Under Review: Wheelerridge voltage support project.
WHEELER 230kV	Q946SWSTA-WHLR RJ2 230kV [0] No Fault	P2	Line section w/o fault	0.94	0.88	0.85	1.01	0.91	0.88	0.94	0.88	0.87	0.84	Scope Under Review: Wheelerridge voltage support project.
WHLR RJ1 230kV	MIDWAY - 2D 230kV & MIDWAY-MIDWAY-R12 #1 line	P2	Non-bus-tie breaker fault	0.95	0.88	0.83	1.00	0.94	0.88	0.94	0.87	0.89	0.81	Scope Under Review: Wheelerridge voltage support project.
WHLR RJ1 230kV	MIDWAY - 2D 230kV & Q946SWSTA-MIDWAY line	P2	Non-bus-tie breaker fault	0.96	0.91	0.87	1.01	0.95	0.90	0.95	0.90	0.90	0.86	Scope Under Review: Wheelerridge voltage support project.
WHLR RJ1 230kV	MIDWAY 230kV - Section 1E & 1D	P2	Bus-tie breaker fault	0.92	0.84	0.76	1.00	0.89	0.83	0.91	0.81	0.84	<0.90	Scope Under Review: Wheelerridge voltage support project.
WHLR RJ1 230kV	MIDWAY 230kV - Section 2D & 2E	P2	Bus-tie breaker fault	0.93	0.86	0.81	1.00	0.93	0.86	0.92	0.85	0.89	<0.90	Scope Under Review: Wheelerridge voltage support project.
WHLR RJ1 230kV	MIDWAY 230kV Section 1D	P2	Bus Section Fault	0.92	0.84	0.78	1.01	0.90	0.84	0.92	0.83	0.85	0.73	Scope Under Review: Wheelerridge voltage support project.

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Study Area: **PG&E Kern**

High/Low Voltages



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
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022 SP High CEC Forecast	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations	
WHLR RJ1 230kV	MIDWAY 230kV Section 2D	P2	Bus Section Fault	0.95	0.88	0.83	1.00	0.94	0.88	0.94	0.87	0.89	0.81	Scope Under Review: Wheelerridge voltage support project.
WHLR RJ1 230kV	Q946SWSTA-MIDWAY 230kV [0]	P1	N-1(Transmission Line)	0.96	0.91	0.88	1.01	0.96	0.91	0.96	0.90	0.92	0.87	Scope Under Review: Wheelerridge voltage support project.
WHLR RJ1 230kV	Q946SWSTA-WHLR RJ2 230kV [0] No Fault	P2	Line section w/o fault	0.95	0.89	0.86	1.01	0.92	0.89	0.94	0.88	0.87	0.85	Scope Under Review: Wheelerridge voltage support project.
WHLR RJ2 230kV	MIDWAY - 2D 230kV & MIDWAY-MIDWAY-R12 #1 line	P2	Non-bus-tie breaker fault	0.94	0.87	0.81	1.00	0.94	0.87	0.93	0.86	0.88	0.79	Scope Under Review: Wheelerridge voltage support project.
WHLR RJ2 230kV	MIDWAY - 2D 230kV & Q946SWSTA-MIDWAY line	P2	Non-bus-tie breaker fault	0.96	0.90	0.86	1.01	0.95	0.90	0.95	0.89	0.90	0.85	Scope Under Review: Wheelerridge voltage support project.
WHLR RJ2 230kV	MIDWAY 230kV - Section 1E & 1D	P2	Bus-tie breaker fault	0.93	0.85	0.78	1.00	0.90	0.84	0.92	0.83	0.85	<0.90	Scope Under Review: Wheelerridge voltage support project.
WHLR RJ2 230kV	MIDWAY 230kV - Section 2D & 2E	P2	Bus-tie breaker fault	0.93	0.85	0.79	1.00	0.92	0.85	0.92	0.84	0.88	<0.90	Scope Under Review: Wheelerridge voltage support project.
WHLR RJ2 230kV	MIDWAY 230kV Section 1D	P2	Bus Section Fault	0.93	0.86	0.80	1.01	0.91	0.86	0.93	0.84	0.86	0.75	Scope Under Review: Wheelerridge voltage support project.
WHLR RJ2 230kV	MIDWAY 230kV Section 2D	P2	Bus Section Fault	0.94	0.87	0.81	1.00	0.94	0.87	0.93	0.86	0.88	0.79	Scope Under Review: Wheelerridge voltage support project.
WHLR RJ2 230kV	Q946SWSTA-MIDWAY 230kV [0]	P1	N-1(Transmission Line)	0.96	0.90	0.87	1.01	0.95	0.90	0.95	0.89	0.91	0.86	Scope Under Review: Wheelerridge voltage support project.
WHLR RJ2 230kV	Q946SWSTA-WHLR RJ2 230kV [0] No Fault	P2	Line section w/o fault	0.94	0.88	0.84	1.01	0.91	0.88	0.93	0.87	0.86	0.83	Scope Under Review: Wheelerridge voltage support project.
WHLR RT1 230kV	MIDWAY - 2D 230kV & MIDWAY-MIDWAY-R12 #1 line	P2	Non-bus-tie breaker fault	0.94	0.88	0.83	1.00	0.94	0.88	0.94	0.87	0.89	0.81	Scope Under Review: Wheelerridge voltage support project.

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Study Area: **PG&E Kern**

High/Low Voltages



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
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022 SP High CEC Forecast	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations	
WHLR RT1 230kV	MIDWAY - 2D 230kV & Q946SWSTA-MIDWAY line	P2	Non-bus-tie breaker fault	0.96	0.91	0.87	1.01	0.95	0.90	0.95	0.90	0.90	0.86	Scope Under Review: Wheelerridge voltage support project.
WHLR RT1 230kV	MIDWAY 230kV - Section 1E & 1D	P2	Bus-tie breaker fault	0.92	0.84	0.76	1.00	0.89	0.83	0.91	0.81	0.84	<0.90	Scope Under Review: Wheelerridge voltage support project.
WHLR RT1 230kV	MIDWAY 230kV - Section 2D & 2E	P2	Bus-tie breaker fault	0.93	0.86	0.81	1.00	0.93	0.86	0.92	0.85	0.89	<0.90	Scope Under Review: Wheelerridge voltage support project.
WHLR RT1 230kV	MIDWAY 230kV Section 1D	P2	Bus Section Fault	0.92	0.84	0.78	1.01	0.90	0.84	0.92	0.83	0.85	0.73	Scope Under Review: Wheelerridge voltage support project.
WHLR RT1 230kV	MIDWAY 230kV Section 2D	P2	Bus Section Fault	0.94	0.88	0.83	1.00	0.94	0.88	0.94	0.87	0.89	0.81	Scope Under Review: Wheelerridge voltage support project.
WHLR RT1 230kV	Q946SWSTA-MIDWAY 230kV [0]	P1	N-1(Transmission Line)	0.96	0.91	0.88	1.01	0.96	0.91	0.96	0.90	0.91	0.87	Scope Under Review: Wheelerridge voltage support project.
WHLR RT1 230kV	Q946SWSTA-WHLR RJ2 230kV [0] No Fault	P2	Line section w/o fault	0.95	0.89	0.86	1.01	0.92	0.89	0.94	0.88	0.87	0.85	Scope Under Review: Wheelerridge voltage support project.
WHLR RT2 230kV	MIDWAY - 2D 230kV & MIDWAY-MIDWAY-R12 #1 line	P2	Non-bus-tie breaker fault	0.94	0.87	0.81	1.00	0.94	0.87	0.93	0.86	0.88	0.79	Scope Under Review: Wheelerridge voltage support project.
WHLR RT2 230kV	MIDWAY - 2D 230kV & Q946SWSTA-MIDWAY line	P2	Non-bus-tie breaker fault	0.96	0.90	0.86	1.01	0.95	0.89	0.95	0.89	0.89	0.85	Scope Under Review: Wheelerridge voltage support project.
WHLR RT2 230kV	MIDWAY 230kV - Section 1E & 1D	P2	Bus-tie breaker fault	0.93	0.85	0.78	1.00	0.90	0.84	0.92	0.83	0.85	<0.90	Scope Under Review: Wheelerridge voltage support project.
WHLR RT2 230kV	MIDWAY 230kV - Section 2D & 2E	P2	Bus-tie breaker fault	0.92	0.85	0.79	0.99	0.92	0.84	0.92	0.84	0.88	<0.90	Scope Under Review: Wheelerridge voltage support project.
WHLR RT2 230kV	MIDWAY 230kV Section 1D	P2	Bus Section Fault	0.93	0.86	0.80	1.01	0.91	0.86	0.93	0.84	0.86	0.75	Scope Under Review: Wheelerridge voltage support project.

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High/Low Voltages



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
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022 SP High CEC Forecast	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations	
WHLR RT2 230kV	MIDWAY 230kV Section 2D	P2	Bus Section Fault	0.94	0.87	0.81	1.00	0.94	0.87	0.93	0.86	0.88	0.79	Scope Under Review: Wheelerridge voltage support project.
WHLR RT2 230kV	Q946SWSTA-MIDWAY 230kV [0]	P1	N-1(Transmission Line)	0.96	0.90	0.87	1.01	0.95	0.90	0.95	0.89	0.91	0.86	Scope Under Review: Wheelerridge voltage support project.
WHLR RT2 230kV	Q946SWSTA-WHLR RJ2 230kV [0] No Fault	P2	Line section w/o fault	0.94	0.88	0.84	1.01	0.91	0.88	0.93	0.87	0.86	0.83	Scope Under Review: Wheelerridge voltage support project.
WILDWOOD1 115kV	Base Case	P0	Basecase	1.04	1.03	1.03	1.06	1.05	1.03	1.04	1.03	1.02	1.03	Load power factor correction and voltage support if needed
WILDWOOD1TP 115kV	Base Case	P0	Basecase	1.04	1.03	1.03	1.06	1.05	1.03	1.04	1.03	1.02	1.03	Load power factor correction and voltage support if needed
WILDWOOD2 115kV	Base Case	P0	Basecase	1.04	1.03	1.03	1.06	1.05	1.03	1.04	1.03	1.02	1.03	Load power factor correction and voltage support if needed
WND GPJ1 230kV	MIDWAY - 2D 230kV & MIDWAY-MIDWAY-R12 #1 line	P2	Non-bus-tie breaker fault	0.94	0.88	0.83	1.00	0.94	0.88	0.93	0.87	0.89	0.81	Scope Under Review: Wheelerridge voltage support project.
WND GPJ1 230kV	MIDWAY - 2D 230kV & Q946SWSTA-MIDWAY line	P2	Non-bus-tie breaker fault	0.96	0.90	0.87	1.01	0.95	0.90	0.95	0.90	0.90	0.86	Scope Under Review: Wheelerridge voltage support project.
WND GPJ1 230kV	MIDWAY 230kV - Section 1E & 1D	P2	Bus-tie breaker fault	0.92	0.84	0.76	1.00	0.89	0.83	0.92	0.81	0.84	<0.90	Scope Under Review: Wheelerridge voltage support project.
WND GPJ1 230kV	MIDWAY 230kV - Section 2D & 2E	P2	Bus-tie breaker fault	0.93	0.86	0.80	1.00	0.93	0.86	0.92	0.85	0.88	<0.90	Scope Under Review: Wheelerridge voltage support project.
WND GPJ1 230kV	MIDWAY 230kV Section 1D	P2	Bus Section Fault	0.93	0.84	0.78	1.01	0.90	0.84	0.92	0.83	0.85	0.73	Scope Under Review: Wheelerridge voltage support project.
WND GPJ1 230kV	MIDWAY 230kV Section 2D	P2	Bus Section Fault	0.94	0.88	0.83	1.00	0.94	0.88	0.93	0.87	0.89	0.81	Scope Under Review: Wheelerridge voltage support project.
WND GPJ1 230kV	Q946SWSTA-MIDWAY 230kV [0]	P1	N-1(Transmission Line)	0.96	0.91	0.88	1.01	0.96	0.91	0.95	0.90	0.91	0.87	Scope Under Review: Wheelerridge voltage support project.

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Study Area: **PG&E Kern**

High/Low Voltages



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
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022 SP High CEC Forecast	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations	
WND GPJ1 230kV	Q946SWSTA-WHLR RJ2 230kV [0] No Fault	P2	Line section w/o fault	0.95	0.89	0.85	1.01	0.92	0.89	0.94	0.88	0.87	0.84	Scope Under Review: Wheelerridge voltage support project.
WND GPJ2 230kV	MIDWAY - 2D 230kV & MIDWAY-MIDWAY-R12 #1 line	P2	Non-bus-tie breaker fault	0.94	0.87	0.81	1.00	0.94	0.87	0.93	0.86	0.88	0.79	Scope Under Review: Wheelerridge voltage support project.
WND GPJ2 230kV	MIDWAY - 2D 230kV & Q946SWSTA-MIDWAY line	P2	Non-bus-tie breaker fault	0.96	0.90	0.86	1.01	0.95	0.90	0.95	0.89	0.89	0.85	Scope Under Review: Wheelerridge voltage support project.
WND GPJ2 230kV	MIDWAY 230kV - Section 1E & 1D	P2	Bus-tie breaker fault	0.93	0.85	0.78	1.00	0.90	0.84	0.92	0.83	0.85	<0.90	Scope Under Review: Wheelerridge voltage support project.
WND GPJ2 230kV	MIDWAY 230kV - Section 2D & 2E	P2	Bus-tie breaker fault	0.93	0.85	0.79	1.00	0.92	0.85	0.92	0.84	0.88	<0.90	Scope Under Review: Wheelerridge voltage support project.
WND GPJ2 230kV	MIDWAY 230kV Section 1D	P2	Bus Section Fault	0.93	0.85	0.79	1.01	0.91	0.85	0.92	0.84	0.86	0.75	Scope Under Review: Wheelerridge voltage support project.
WND GPJ2 230kV	MIDWAY 230kV Section 2D	P2	Bus Section Fault	0.94	0.87	0.81	1.00	0.94	0.87	0.93	0.86	0.88	0.79	Scope Under Review: Wheelerridge voltage support project.
WND GPJ2 230kV	Q946SWSTA-MIDWAY 230kV [0]	P1	N-1(Transmission Line)	0.96	0.90	0.87	1.01	0.95	0.90	0.95	0.89	0.91	0.86	Scope Under Review: Wheelerridge voltage support project.
WND GPJ2 230kV	Q946SWSTA-WHLR RJ2 230kV [0] No Fault	P2	Line section w/o fault	0.94	0.88	0.84	1.01	0.91	0.88	0.93	0.87	0.86	0.83	Scope Under Review: Wheelerridge voltage support project.
WND GPT1 230kV	MIDWAY - 2D 230kV & MIDWAY-MIDWAY-R12 #1 line	P2	Non-bus-tie breaker fault	0.94	0.88	0.83	1.00	0.94	0.87	0.93	0.87	0.88	0.81	Scope Under Review: Wheelerridge voltage support project.
WND GPT1 230kV	MIDWAY - 2D 230kV & Q946SWSTA-MIDWAY line	P2	Non-bus-tie breaker fault	0.96	0.90	0.87	1.01	0.95	0.90	0.95	0.90	0.90	0.86	Scope Under Review: Wheelerridge voltage support project.

Study Area: **PG&E Kern**

High/Low Voltages



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
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022 SP High CEC Forecast	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations	
WND GPT1 230kV	MIDWAY 230kV - Section 1E & 1D	P2	Bus-tie breaker fault	0.92	0.84	0.76	1.00	0.89	0.83	0.91	0.81	0.84	<0.90	Scope Under Review: Wheelerridge voltage support project.
WND GPT1 230kV	MIDWAY 230kV - Section 2D & 2E	P2	Bus-tie breaker fault	0.93	0.86	0.80	1.00	0.93	0.85	0.92	0.85	0.88	<0.90	Scope Under Review: Wheelerridge voltage support project.
WND GPT1 230kV	MIDWAY 230kV Section 1D	P2	Bus Section Fault	0.92	0.84	0.78	1.01	0.90	0.84	0.92	0.83	0.85	0.73	Scope Under Review: Wheelerridge voltage support project.
WND GPT1 230kV	MIDWAY 230kV Section 2D	P2	Bus Section Fault	0.94	0.88	0.83	1.00	0.94	0.87	0.93	0.87	0.88	0.81	Scope Under Review: Wheelerridge voltage support project.
WND GPT1 230kV	Q946SWSTA-MIDWAY 230kV [0]	P1	N-1(Transmission Line)	0.96	0.91	0.88	1.01	0.95	0.91	0.95	0.90	0.91	0.87	Scope Under Review: Wheelerridge voltage support project.
WND GPT1 230kV	Q946SWSTA-WHLR RJ2 230kV [0] No Fault	P2	Line section w/o fault	0.95	0.89	0.85	1.01	0.92	0.89	0.94	0.88	0.87	0.84	Scope Under Review: Wheelerridge voltage support project.
WND GPT2 230kV	MIDWAY - 2D 230kV & MIDWAY-MIDWAY-R12 #1 line	P2	Non-bus-tie breaker fault	0.94	0.87	0.81	1.00	0.94	0.87	0.93	0.86	0.88	0.79	Scope Under Review: Wheelerridge voltage support project.
WND GPT2 230kV	MIDWAY - 2D 230kV & Q946SWSTA-MIDWAY line	P2	Non-bus-tie breaker fault	0.95	0.90	0.86	1.01	0.95	0.89	0.95	0.89	0.89	0.85	Scope Under Review: Wheelerridge voltage support project.
WND GPT2 230kV	MIDWAY 230kV - Section 1E & 1D	P2	Bus-tie breaker fault	0.93	0.85	0.77	1.00	0.90	0.84	0.92	0.82	0.84	<0.90	Scope Under Review: Wheelerridge voltage support project.
WND GPT2 230kV	MIDWAY 230kV - Section 2D & 2E	P2	Bus-tie breaker fault	0.92	0.85	0.79	0.99	0.92	0.84	0.92	0.84	0.88	<0.90	Scope Under Review: Wheelerridge voltage support project.
WND GPT2 230kV	MIDWAY 230kV Section 1D	P2	Bus Section Fault	0.93	0.85	0.79	1.01	0.91	0.85	0.92	0.84	0.86	0.75	Scope Under Review: Wheelerridge voltage support project.
WND GPT2 230kV	MIDWAY 230kV Section 2D	P2	Bus Section Fault	0.94	0.87	0.81	1.00	0.94	0.87	0.93	0.86	0.88	0.79	Scope Under Review: Wheelerridge voltage support project.

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Study Area: **PG&E Kern**

High/Low Voltages



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
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022 SP High CEC Forecast	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations	
WND GPT2 230kV	Q946SWSTA-MIDWAY 230kV [0]	P1	N-1(Transmission Line)	0.96	0.90	0.87	1.01	0.95	0.90	0.95	0.89	0.91	0.86	Scope Under Review: Wheelerridge voltage support project.
WND GPT2 230kV	Q946SWSTA-WHLR RJ2 230kV [0] No Fault	P2	Line section w/o fault	0.94	0.88	0.84	1.01	0.91	0.88	0.93	0.87	0.86	0.83	Scope Under Review: Wheelerridge voltage support project.
WSCOPRSN 115kV	Base Case	P0	Basecase	1.04	1.02	1.02	1.05	1.03	1.02	1.04	1.02	1.01	1.02	Load power factor correction and voltage support if needed

Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)					Voltage PU (Sensitivity Scenarios)					Project & Potential Mitigation Solutions
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022 SP High CEC Forecast	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations	
CARRIZO 115 kV	MIDWAY-TEMBLOR 115kV [2630]	P1	N-1	1.5	6.6	5.9	12.8	6.8	7.4	1.5	7.4	7.7	7.3	Scope under review : Midway-Temblor 115 kV Line Recondcutor and voltage support project
CARRIZO 115 kV	MIDWAY-TEMBLOR 115kV [2630] (TEMBLOR-PSE MCKJ)	P1	N-1	1.5	6.6	5.9	12.8	7.0	7.4	1.5	7.5	7.7	7.1	Scope under review : Midway-Temblor 115 kV Line Recondcutor and voltage support project
KERNRIDGE 115 kV	MIDWAY-TEMBLOR 115kV [2630]	P1	N-1	1.2	8.7	8.3	18.0	9.9	9.9	1.1	9.9	10.2	9.6	Scope under review : Midway-Temblor 115 kV Line Recondcutor and voltage support project
KERNRIDGE 115 kV	MIDWAY-TEMBLOR 115kV [2630] (TEMBLOR-PSE MCKJ)	P1	N-1	1.2	8.7	8.3	18.0	10.0	9.9	1.1	10.0	10.2	9.4	Scope under review : Midway-Temblor 115 kV Line Recondcutor and voltage support project
TEMBLOR 115 kV	MIDWAY-TEMBLOR 115kV [2630]	P1	N-1	1.5	8.9	8.5	18.1	10.0	10.1	1.6	10.2	10.3	9.8	Scope under review : Midway-Temblor 115 kV Line Recondcutor and voltage support project
TEMBLOR 115 kV	MIDWAY-TEMBLOR 115kV [2630] (TEMBLOR-PSE MCKJ)	P1	N-1	1.6	9.0	8.5	18.1	10.1	10.2	1.6	10.2	10.3	9.6	Scope under review : Midway-Temblor 115 kV Line Recondcutor and voltage support project
TX-LOST 69 kV	MIDWAY-TEMBLOR 115kV [2630]	P1	N-1	0.6	4.2	4.0	8.6	4.7	4.7	0.5	4.8	4.9	4.6	Scope under review : Midway-Temblor 115 kV Line Recondcutor and voltage support project
TX-LOST 69 kV	MIDWAY-TEMBLOR 115kV [2630] (TEMBLOR-PSE MCKJ)	P1	N-1	0.6	4.2	4.0	8.6	4.8	4.8	0.5	4.8	4.9	4.5	Scope under review : Midway-Temblor 115 kV Line Recondcutor and voltage support project
Q946 230 kV	Q946SWSTA-MIDWAY 230kV [0]	P1	N-1	1.5	8.9	8.5	0.5	3.3	9.0	5.2	9.4	5.3	12.1	Scope under review : Wheeler Ridge Voltage Support
Q946 230 kV Switching Station	Q946SWSTA-MIDWAY 230kV [0]	P1	N-1	4.5	8.7	11.6	0.5	3.3	9.0	5.2	9.4	5.3	12.1	Scope under review : Wheeler Ridge Voltage Support
WHEELER 230 kV	Q946SWSTA-MIDWAY 230kV [0]	P1	N-1	3.5	6.9	9.4	0.6	2.4	7.2	4.0	7.5	3.9	9.8	Scope under review : Wheeler Ridge Voltage Support

Study Area: **PG&E Kern**

Transient Stability



Contingency	Category	Category Description	Transient Stability Performance (Number of voltage and frequency violations)										Potential Mitigation Solutions	
			2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	Select..	Select..	Select..	Select..	Select..		
LAPALOMA 3Ø FAULT WITH NORMAL CLEARING.	P1-1		0	0	0	0	0							No violation
ELK HILL 3Ø FAULT WITH NORMAL CLEARING.	P1-1		0	0	0	0	0							No violation
LINE WHLR RJ2 230.0 TO WND GPJ2 230.0 CIRCUIT 1 3Ø FAULT WITH NORMAL CLEARING.	P1-2		0	Nconv	Nconv	0	Nconv							Mitigation under review
MIDWAY 500/230 KV TRANSFORMER 3Ø FAULT WITH NORMAL CLEARING	P1-3		0	0	Nconv	0	0							Mitigation under review
KERN PP 230 KV SLG FAULT WITH NORMAL CLEARING	P2-2		0	0	0	0	0							No violation
FAMOSO 70 KV SLG FAULT WITH NORMAL CLEARING	P2-3		0	0	0	0	0							No violation
MIDWAY 230 KV NON BUS TIE STUCK BREAKER SLG FAULT ALONG WITH THE LOSS OF TRANSMISSION CIRCUIT	P4-2		0	0	0	0	0							No violation
MIDWAY 115 KV NON BUS TIE STUCK BREAKER SLG FAULT WITH THE BUS SECTION FAULT	P4-5		0	0	0	0	0							No violation

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 Load.

Thermal Overloads

Monitored Facility	Cont Name	Category	Category Description	Loading % (Baseline Scenarios)								Loading % (Sensitivity Scenarios)					Project & Potential Mitigation Solutions
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Winter Peak	2022 Winter Peak	2027 Winter Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022 SP High CEC Forecast	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations	
30915 MORROBAY 230 30925 DIABLOCN 230 1 1	P2-4:A20:2:_MORROBAY 230kV - Section 2E & 2D	P2	Bus-tie breaker fault	71.2	75.5	75.0	113.8	114.2	114.9	41.6	55.2	130.0	124.5	129.6	61.3	74.9	Project: Midway-Andrew 230 KV - Scope under review
30925 DIABLOCN 230 30930 MESA PGE 230 1 1	P2-4:A20:2:_MORROBAY 230kV - Section 2E & 2D	P2	Bus-tie breaker fault	69.3	75.2	74.8	115.5	115.9	116.6	39.8	53.1	132.4	128.3	132.0	58.9	74.6	Project: Midway-Andrew 230 KV - Scope under review
34117 KETLMN T 70.0 34552 GATES 70.0 1 1	Base Case	P0	Normal	18.4	25.3	28.5	20.2	20.3	20.4	19.9	97.0	25.0	25.7	25.2	126.6	34.3	Generation Mitigation
35910 CRZY_HRS 115 35913 NTVD SW2 115 1 1	P5-5:A19:49:_Crazy Horse Canyon Sw. Sta. 115kV BAAH Bus #2 (failure of non-redundent relay)	P5	Non-redundant relay (Bus)	82.7	92.4	102.5	46.4	50.3	56.6	31.1	30.7	97.8	87.1	106.7	65.7	102.6	Proposal to reconductor the Crazy Horse-Natividad SW Station #2 115 KV Lines. Protection upgrade
35910 CRZY_HRS 115 35913 NTVD SW2 115 1 1	CRAZY HORSE CANYON-SALINAS-SOLEIDAD #1 115kV & SALINAS-MOSSLSNW-DOLAN RD 115kV	P6	N-1-1	110.71	108.84	107.26	<100	<100	<100	<100	<100	115.2	109.8	111.14	<100	107.31	Proposal to reconductor the Crazy Horse-Natividad SW Station #2 115 KV Lines
	SALINAS-MOSSLSNW-DOLAN RD 115kV & MOSS LANDING-SALINAS #2 115kV	P6	N-1-1	126.05	129.33	128.68	93.2	93.3	98.44	<100	<100	137.35	129.71	134.04	99.23	128.75	Proposal to reconductor the Crazy Horse-Natividad SW Station #2 115 KV Lines
	P7-1:A19:4:_Moss Landing - Salinas #1 and #2 115 kV Lines	P7	DCTL	126.1	129.3	128.7	93.3	93.5	98.8	57.2	74.3	137.4	129.7	134.0	99.3	128.8	Proposal to reconductor the Crazy Horse-Natividad SW Station #2 115 KV Lines
35910 CRZY_HRS 115 35914 NTVD SW1 115 1 1	P7-1:A19:4:_Moss Landing - Salinas #1 and #2 115 kV Lines	P7	DCTL	126.1	129.3	128.7	93.3	93.5	98.8	57.2	74.3	137.4	129.7	134.0	99.3	128.8	Proposal to reconductor the Crazy Horse-Natividad SW Station #1 115 KV Lines
35913 NTVD SW2 115 35920 SALINAS 115 1 1	P5-5:A19:49:_Crazy Horse Canyon Sw. Sta. 115kV BAAH Bus #2 (failure of non-redundent relay)	P5	Non-redundant relay (Bus)	181.7	189.6	206.0	97.7	103.2	115.4	66.4	75.7	199.8	181.8	212.3	133.8	206.2	Proposal to reconductor the Salinas-Natividad SW Station #1 115 KV Lines. Protection upgrade
	SALINAS-MOSSLSNW-DOLAN RD 115kV & MOSS LANDING-SALINAS #2 115kV	P6	N-1-1	103.53	110.17	107.48	<100	<100	90.03	<100	<100	117.67	111.25	113.03	<100	107.53	Proposal to reconductor the Salinas-Natividad SW Station #2 115 KV Lines
	P7-1:A19:4:_Moss Landing - Salinas #1 and #2 115 kV Lines	P7	DCTL	103.5	110.2	107.5	86.6	86.6	90.4	49.8	65.7	117.7	111.3	113.0	87.0	107.5	Proposal to reconductor the Salinas-Natividad SW Station #2 115 KV Lines
	P7-1:A19:6:_Moss Landing - Crazy Horse #1 and #2 115 kV Lines	P7	DCTL	90.8	91.8	99.4	48.1	50.7	56.5	33.8	37.7	96.5	88.2	102.3	65.6	99.4	Project: Watsonville 60 KV to 115 KV Voltage conversion. - Scope under review
	P7-1:A19:4:_Moss Landing - Salinas #1 and #2 115 kV Lines	P7	DCTL	103.5	110.2	107.5	86.6	86.6	90.4	49.8	65.7	117.7	111.3	113.0	87.0	107.5	Proposal to reconductor the Salinas-Natividad SW Station #1 115 KV Lines
	P7-1:A19:6:_Moss Landing - Crazy Horse #1 and #2 115 kV Lines	P7	DCTL	90.8	91.8	99.4	48.1	50.7	56.5	33.8	37.7	96.5	88.2	102.3	65.6	99.4	Project: Watsonville 60 KV to 115 KV Voltage conversion. - Scope under review
36008 GREN VLY 60.0 35901 GRN VLY1 115 1 1	P5-5:A19:55:_Salinas 115kV BAAH Bus #1 (failure of non-redundent relay)	P5	Non-redundant relay (Bus)	NConv	235.0	232.2	224.3	223.5	224.7	144.6	201.8	239.8	231.3	237.8	230.0	232.0	Project: Watsonville 60 KV to 115 KV Voltage conversion. - Scope under review. Protection upgrade - Scope under review
	P5-5:A19:56:_Salinas 115kV BAAH Bus #2 (failure of non-redundent relay)	P5	Non-redundant relay (Bus)	NConv	NConv	NConv	NConv	NConv	NConv	218.2	225.5	NConv	NConv	NConv	250.0	NConv	Project: Watsonville 60 KV to 115 KV Voltage conversion. - Scope under review. Protection upgrade - Scope under review
	SALINAS 115/60kV TB 2 & SALINAS 115/60kV TB 3	P6	N-1-1	NConv	236.47	231.15	223.32	222.51	224.05	144.41	203.67	238.55	230.24	236.58	229.76	230.95	Project: Watsonville 60 KV to 115 KV Voltage conversion. - Scope under review
36008 GREN VLY 60.0 36013 ERTA JCT 60.0 1 1	P5-5:A19:55:_Salinas 115kV BAAH Bus #1 (failure of non-redundent relay)	P5	Non-redundant relay (Bus)	NConv	176.5	173.7	132.2	131.9	132.8	106.0	151.3	180.2	176.0	177.9	169.8	173.6	Project: Watsonville 60 KV to 115 KV Voltage conversion. - Scope under review. Protection upgrade - Scope under review
	P5-5:A19:56:_Salinas 115kV BAAH Bus #2 (failure of non-redundent relay)	P5	Non-redundant relay (Bus)	NConv	NConv	NConv	NConv	NConv	NConv	163.1	169.2	NConv	NConv	NConv	185.2	NConv	Project: Watsonville 60 KV to 115 KV Voltage conversion. - Scope under review. Protection upgrade - Scope under review
	P7-1:A19:1:_Moss Landing - Green Valley #1 and #2 115 kV Lines	P7	DCTL	NConv	NConv	NConv	NConv	NConv	NConv	NConv	121.1	NConv	NConv	NConv	NConv	NConv	Project: Watsonville 60 KV to 115 KV Voltage conversion. - Scope under review
	P5-5:A19:55:_Salinas 115kV BAAH Bus #1 (failure of non-redundent relay)	P5	Non-redundant relay (Bus)	NConv	174.0	171.2	129.7	129.3	130.0	104.7	149.9	177.7	173.6	175.4	168.0	171.1	Project: Watsonville 60 KV to 115 KV Voltage conversion. - Scope under review. Protection upgrade - Scope under review

Thermal Overloads

Monitored Facility	Cont Name	Category	Category Description	Loading % (Baseline Scenarios)								Loading % (Sensitivity Scenarios)				Project & Potential Mitigation Solutions		
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Winter Peak	2022 Winter Peak	2027 Winter Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022 SP High CEC Forecast	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP Heavy Renewable & Min Gas Gen		2027 Retirement of QF Generations	
36011 CIC JCT 60.0 36013 ERTA JCT 60.0 1 1	P5-5:A19:56:_Salinas 115kV BAAH Bus #2 (failure of non-redundent relay)	P5	Non-redundant relay (Bus)	NConv	NConv	NConv	NConv	NConv	NConv	NConv	161.5	167.9	NConv	NConv	NConv	183.4	NConv	Project: Watsonville 60 KV to 115 KV Voltage conversion. - Scope under review. Protection upgrade - Scope under review
	SALINAS 115/60kV TB 2 & SALINAS 115/60kV TB 3	P6	N-1-1	NConv	174.4	170.82	129.5	129.08	129.82	104.65	150.32	177.33	173.35	175.01	167.91	170.76		Project: Watsonville 60 KV to 115 KV Voltage conversion. - Scope under review
	P7-1:A19:1:_Moss Landing - Green Valley #1 and #2 115 kV Lines	P7	DCTL	NConv	NConv	NConv	NConv	NConv	NConv	NConv	NConv	122.9	NConv	NConv	NConv	NConv	NConv	Project: Watsonville 60 KV to 115 KV Voltage conversion. - Scope under review
36011 CIC JCT 60.0 36016 AGRILINK 60.0 1 1	P5-5:A19:55:_Salinas 115kV BAAH Bus #1 (failure of non-redundent relay)	P5	Non-redundant relay (Bus)	NConv	174.0	171.2	129.7	129.3	130.0	104.7	149.9	177.8	173.6	175.4	168.0	171.1		Project: Watsonville 60 KV to 115 KV Voltage conversion. - Scope under review. Protection upgrade - Scope under review
	P5-5:A19:56:_Salinas 115kV BAAH Bus #2 (failure of non-redundent relay)	P5	Non-redundant relay (Bus)	NConv	NConv	NConv	NConv	NConv	NConv	161.5	167.9	NConv	NConv	NConv	183.4	NConv	Project: Watsonville 60 KV to 115 KV Voltage conversion. - Scope under review. Protection upgrade - Scope under review	
	P7-1:A19:1:_Moss Landing - Green Valley #1 and #2 115 kV Lines	P7	DCTL	NConv	NConv	NConv	NConv	NConv	NConv	NConv	122.8	NConv	NConv	NConv	NConv	NConv	NConv	Project: Watsonville 60 KV to 115 KV Voltage conversion. - Scope under review
36012 WTSNVILLE 60.0 36014 GRANT JT 60.0 1 1	P5-5:A19:55:_Salinas 115kV BAAH Bus #1 (failure of non-redundent relay)	P5	Non-redundant relay (Bus)	NConv	214.8	213.2	163.0	162.5	162.9	132.5	191.7	217.4	212.9	215.6	207.8	213.2		Project: Watsonville 60 KV to 115 KV Voltage conversion. - Scope under review. Protection upgrade - Scope under review
	P5-5:A19:56:_Salinas 115kV BAAH Bus #2 (failure of non-redundent relay)	P5	Non-redundant relay (Bus)	NConv	NConv	NConv	NConv	NConv	NConv	216.9	216.2	NConv	NConv	NConv	228.9	NConv	Project: Watsonville 60 KV to 115 KV Voltage conversion. - Scope under review. Protection upgrade - Scope under review	
	SALINAS 115/60kV TB 2 & SALINAS 115/60kV TB 3	P6	N-1-1	NConv	215.49	212.75	162.65	162.06	162.55	132.35	192.32	216.68	212.63	215.28	207.61	212.65	Project: Watsonville 60 KV to 115 KV Voltage conversion. - Scope under review	
	P7-1:A19:1:_Moss Landing - Green Valley #1 and #2 115 kV Lines	P7	DCTL	NConv	NConv	NConv	NConv	NConv	NConv	NConv	183.6	NConv	NConv	NConv	NConv	NConv	NConv	Project: Watsonville 60 KV to 115 KV Voltage conversion. - Scope under review
36012 WTSNVILLE 60.0 36016 AGRILINK 60.0 1 1	P5-5:A19:55:_Salinas 115kV BAAH Bus #1 (failure of non-redundent relay)	P5	Non-redundant relay (Bus)	NConv	173.5	170.7	129.4	129.0	129.7	104.4	149.5	177.3	173.2	175.0	167.6	170.7		Project: Watsonville 60 KV to 115 KV Voltage conversion. - Scope under review. Protection upgrade - Scope under review
	P5-5:A19:56:_Salinas 115kV BAAH Bus #2 (failure of non-redundent relay)	P5	Non-redundant relay (Bus)	NConv	NConv	NConv	NConv	NConv	NConv	161.4	167.5	NConv	NConv	NConv	183.0	NConv	Project: Watsonville 60 KV to 115 KV Voltage conversion. - Scope under review. Protection upgrade - Scope under review	
	MOSS LANDING-GREEN VALLEY #1 115kV & MOSS LANDING-GREEN VALLEY #2 115kV	P6	N-1-1	NConv	NConv	NConv	NConv	NConv	NConv	NConv	119.93	NConv	NConv	NConv	NConv	NConv	Project: Watsonville 60 KV to 115 KV Voltage conversion. - Scope under review	
	SALINAS 115/60kV TB 2 & SALINAS 115/60kV TB 3	P6	N-1-1	NConv	174	170.41	129.18	128.76	129.5	104.39	149.95	176.92	172.92	174.6	167.51	170.35	Project: Watsonville 60 KV to 115 KV Voltage conversion. - Scope under review	
	P7-1:A19:1:_Moss Landing - Green Valley #1 and #2 115 kV Lines	P7	DCTL	NConv	NConv	NConv	NConv	NConv	NConv	NConv	123.3	NConv	NConv	NConv	NConv	NConv	NConv	Project: Watsonville 60 KV to 115 KV Voltage conversion. - Scope under review
36018 BRIGTANO 60.0 36014 GRANT JT 60.0 1 1	P5-5:A19:55:_Salinas 115kV BAAH Bus #1 (failure of non-redundent relay)	P5	Non-redundant relay (Bus)	NConv	192.5	191.3	146.0	145.5	145.8	125.8	171.9	195.0	190.5	193.1	187.0	191.2		Project: Watsonville 60 KV to 115 KV Voltage conversion. - Scope under review. Protection upgrade - Scope under review
	P5-5:A19:56:_Salinas 115kV BAAH Bus #2 (failure of non-redundent relay)	P5	Non-redundant relay (Bus)	NConv	NConv	NConv	NConv	NConv	NConv	202.3	194.1	NConv	NConv	NConv	207.1	NConv	Project: Watsonville 60 KV to 115 KV Voltage conversion. - Scope under review. Protection upgrade - Scope under review	
	SALINAS 115/60kV TB 2 & SALINAS 115/60kV TB 3	P6	N-1-1	NConv	193.16	190.73	145.44	144.82	145.28	125.77	172.64	194.15	190.53	192.68	186.54	190.62	Project: Watsonville 60 KV to 115 KV Voltage conversion. - Scope under review	
	P7-1:A19:1:_Moss Landing - Green Valley #1 and #2 115 kV Lines	P7	DCTL	NConv	NConv	NConv	NConv	NConv	NConv	NConv	204.9	NConv	NConv	NConv	NConv	NConv	NConv	Project: Watsonville 60 KV to 115 KV Voltage conversion. - Scope under review
36018 BRIGTANO 60.0 36022 LGNSTAP 60.0 1 1	P5-5:A19:55:_Salinas 115kV BAAH Bus #1 (failure of non-redundent relay)	P5	Non-redundant relay (Bus)	NConv	211.1	209.9	160.6	159.9	160.4	140.3	188.6	213.9	209.0	212.4	205.7	209.7		Project: Watsonville 60 KV to 115 KV Voltage conversion. - Scope under review. Protection upgrade - Scope under review
	P5-5:A19:56:_Salinas 115kV BAAH Bus #2 (failure of non-redundent relay)	P5	Non-redundant relay (Bus)	NConv	NConv	NConv	NConv	NConv	NConv	231.3	213.0	NConv	NConv	NConv	228.2	NConv	Project: Watsonville 60 KV to 115 KV Voltage conversion. - Scope under review. Protection upgrade - Scope under review	
36018 BRIGTANO 60.0 36022 LGNSTAP 60.0 1 1	MOSS LANDING-GREEN VALLEY #1 115kV & MOSS LANDING-GREEN VALLEY #2 115kV	P6	N-1-1	NConv	NConv	NConv	NConv	NConv	NConv	NConv	243.94	NConv	NConv	NConv	NConv	NConv	Project: Watsonville 60 KV to 115 KV Voltage conversion. - Scope under review	

Thermal Overloads

Monitored Facility	Cont Name	Category	Category Description	Loading % (Baseline Scenarios)								Loading % (Sensitivity Scenarios)					Project & Potential Mitigation Solutions
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Winter Peak	2022 Winter Peak	2027 Winter Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022 SP High CEC Forecast	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations	
	P7-1:A20:16: _Morro Bay-Mesa and Morro Bay-Diablo 230 kV Lines	P7	DCTL	133.8	131.7	131.7	107.6	108.5	110.6	57.0	116.6	137.0	130.3	136.9	102.6	131.7	Project: Midway-Andrew 230 KV - Scope under review
	P7-1:A20:17: _Morro Bay-Mesa and Diablo-Mesa 230 kV Lines	P7	DCTL	113.3	113.8	130.0	106.6	107.6	109.9	54.8	114.1	135.4	128.2	135.2	100.9	130.0	Project: Midway-Andrew 230 KV - Scope under review
36310 TEMPL7 70.0 36316 TEMPL J2 70.0 1 1	P2-4:A20:2: _MORROBAY 230kV - Section 2E & 2D	P2	Bus-tie breaker fault	64.5	66.5	66.1	135.7	137.5	139.4	39.6	35.9	142.6	135.3	143.8	55.6	65.6	Project: Midway-Andrew 230 KV - Scope under review
36316 TEMPL J2 70.0 36358 ATASCDRO 70.0 1 1	P2-4:A20:2: _MORROBAY 230kV - Section 2E & 2D	P2	Bus-tie breaker fault	64.5	66.5	66.1	135.7	137.5	139.4	39.6	35.9	142.5	135.3	143.9	55.6	65.6	Project: Midway-Andrew 230 KV - Scope under review
36358 ATASCDRO 70.0 36362 CACOS J2 70.0 1 1	P2-4:A20:2: _MORROBAY 230kV - Section 2E & 2D	P2	Bus-tie breaker fault	55.4	56.8	54.9	113.5	116.4	117.1	41.6	40.1	130.7	121.8	130.0	48.7	54.5	Project: Midway-Andrew 230 KV - Scope under review
36362 CACOS J2 70.0 36364 CAYUCOS 70.0 1 1	P2-4:A20:2: _MORROBAY 230kV - Section 2E & 2D	P2	Bus-tie breaker fault	55.1	56.6	54.7	113.4	116.4	117.1	41.3	39.9	130.7	121.8	130.0	48.4	54.2	Project: Midway-Andrew 230 KV - Scope under review

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High/Low Voltages

Substation	Cont Name	Category	Category Description	Loading % (Baseline Scenarios)								Loading % (Sensitivity Scenarios)					Project & Potential Mitigation Solutions	
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Winter Peak	2022 Winter Peak	2027 Winter Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022 SP High CEC Forecast	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generations		
WAHTOKE 115	Base Case	P0	Normal	1.06	1.03	1.03	1.04	1.04	1.04	1.04	1.06	1.05	1.03	1.04	1.03	1.03	1.03	Load power factor correction and voltage support if needed
WAUKENA_SS 115	Base Case	P0	Normal	1.04	1.03	1.03	1.03	1.03	1.04	1.04	1.06	1.05	1.02	1.02	1.03	1.04	1.03	Load power factor correction and voltage support if needed
WHITERIVER_P115	Base Case	P0	Normal	1.05	1.03	1.04	1.03	1.03	1.03	1.03	1.05	1.05	1.03	1.05	1.03	1.03	1.03	Load power factor correction and voltage support if needed
WISHON 70	Base Case	P0	Normal	1.04	1.03	1.03	1.04	1.04	1.04	1.04	1.05	1.04	1.04	1.04	1.03	1.04	1.03	Load power factor correction and voltage support if needed
WOODWARD 115	Base Case	P0	Normal	1.04	1.03	1.03	1.04	1.04	1.04	1.04	1.06	1.04	1.03	1.03	1.03	1.03	1.03	Load power factor correction and voltage support if needed
WST FRSO 115	Base Case	P0	Normal	1.07	1.02	1.02	1.04	1.04	1.04	1.04	1.07	1.05	1.02	1.03	1.02	1.02	1.02	Load power factor correction and voltage support if needed
WTSNVLL 60	Base Case	P0	Normal	1.06	1.04	1.04	1.03	1.04	1.03	1.03	1.06	1.05	1.04	1.03	1.04	1.05	1.04	Load power factor correction and voltage support if needed
WWARD JT 115	Base Case	P0	Normal	1.05	1.03	1.03	1.04	1.04	1.04	1.04	1.06	1.05	1.03	1.04	1.04	1.03	1.03	Load power factor correction and voltage support if needed

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Voltage Deviations

Substation	Cont Name	Category	Category Description	Loading % (Baseline Scenarios)								Loading % (Sensitivity Scenarios)					Project & Potential Mitigation Solutions	
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Winter Peak	2022 Winter Peak	2027 Winter Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022 SP High CEC Forecast	2019 SP Peak-Shift	2027 SP Peak-Shift	2022 SP Heavy Renewable & Min Gas Gen	2027 Retirement of QF Generation s		
AERA_ENG 60	P1-2:A19:53:_COBURN-OIL FIELDS #1 60kV [6410]	P1	N-1	<8.0	<8.0	<8.0	<8.0	<8.0	<8.0	<8.0	<8.0	<8.0	<8.0	<8.0	<8.0	<8.0	8.168	Sensitivity
AERA_MTR 60	P1-2:A19:53:_COBURN-OIL FIELDS #1 60kV [6410]	P1	N-1	<8.0	<8.0	<8.0	<8.0	<8.0	<8.0	<8.0	<8.0	<8.0	<8.0	<8.0	<8.0	<8.0	8.164	Sensitivity
AERA_TP1 60	P1-2:A19:53:_COBURN-OIL FIELDS #1 60kV [6410]	P1	N-1	<8.0	<8.0	<8.0	<8.0	<8.0	<8.0	<8.0	<8.0	<8.0	<8.0	<8.0	<8.0	<8.0	8.163	Sensitivity
AERA_TP2 60	P1-2:A19:53:_COBURN-OIL FIELDS #1 60kV [6410]	P1	N-1	<8.0	<8.0	<8.0	<8.0	<8.0	<8.0	<8.0	<8.0	<8.0	<8.0	<8.0	<8.0	<8.0	8.163	Sensitivity
AERA_TP3 60	P1-2:A19:53:_COBURN-OIL FIELDS #1 60kV [6410]	P1	N-1	<8.0	<8.0	<8.0	<8.0	<8.0	<8.0	<8.0	<8.0	<8.0	<8.0	<8.0	<8.0	<8.0	8.163	Sensitivity
CHVSANARDO 60	P1-2:A19:53:_COBURN-OIL FIELDS #1 60kV [6410]	P1	N-1	<8.0	<8.0	<8.0	<8.0	<8.0	<8.0	<8.0	<8.0	<8.0	<8.0	<8.0	<8.0	<8.0	8.211	Sensitivity
ERTA 60	P1-3:A19:14:_GRN VLY1 115/60kV TB 1	P1	N-1	<8.0	13.951	13.581	<8.0	12.845	13.379	<8.0	12.204	14.494	<8.0	14.076	13.125	13.604	13.604	Project: Watsonville 60 KV to 115 KV Voltage conversion.
ERTA JCT 60	P1-3:A19:14:_GRN VLY1 115/60kV TB 1	P1	N-1	<8.0	13.951	13.581	<8.0	12.845	13.379	<8.0	12.204	14.494	<8.0	14.076	13.125	13.604	13.604	Project: Watsonville 60 KV to 115 KV Voltage conversion.
GREN VLY 60	P1-3:A19:14:_GRN VLY1 115/60kV TB 1	P1	N-1	<8.0	14.466	14.088	<8.0	13.331	13.88	<8.0	12.678	15.021	<8.0	14.592	13.609	14.111	14.111	Project: Watsonville 60 KV to 115 KV Voltage conversion.
OILFLDS 60	P1-2:A19:53:_COBURN-OIL FIELDS #1 60kV [6410]	P1	N-1	<8.0	<8.0	<8.0	<8.0	<8.0	<8.0	<8.0	<8.0	<8.0	<8.0	<8.0	<8.0	<8.0	8.163	Sensitivity
SALN RVR 60	P1-2:A19:53:_COBURN-OIL FIELDS #1 60kV [6410]	P1	N-1	<8.0	<8.0	<8.0	<8.0	<8.0	<8.0	<8.0	<8.0	<8.0	<8.0	<8.0	<8.0	<8.0	8.192	Sensitivity
SARG CYN 60	P1-2:A19:53:_COBURN-OIL FIELDS #1 60kV [6410]	P1	N-1	<8.0	<8.0	<8.0	<8.0	<8.0	<8.0	<8.0	<8.0	<8.0	<8.0	<8.0	<8.0	<8.0	8.165	Sensitivity
TEXCO J2 60	P1-2:A19:53:_COBURN-OIL FIELDS #1 60kV [6410]	P1	N-1	<8.0	<8.0	<8.0	<8.0	<8.0	<8.0	<8.0	<8.0	<8.0	<8.0	<8.0	<8.0	<8.0	8.13	Sensitivity

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Transient Stability

Contingency	Category	Category Description	Transient Stability Performance (Number of voltage and frequency violations)										Potential Mitigation Solutions	
			2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	Select..	Select..	Select..	Select..	Select..		
Mosslanding Sw Station 3Ø fault with normal clearing.	P1-2		0	0	0	0	0							No violation
Mosslanding Sw Station 230/115 kV Bank #4 3Ø fault with normal clearing.	P1-3		0	0	0	0	0							No violation
Mosslanding Sw Sta 230 kV line breaker SLG fault with normal clearing.	P2-3		80	80	80	80	80	0						Under review with PTO .
Mosslndswsta 230/115 kVBank # 4 3Ø fault with normal clearing with Diablo Unit #2 offline in the base case.	P3-3		0	0	0	0	0	0						No violation
Mosslndswsta-Lasaguilas 230 kV line 3Ø fault with normal clearing with Diablo Unit #2 offline in the base case.	P3-2		0	0	0	0	0	0						No violation
Mosslanding Switching Station SLG fault wih stuck breaker	P4-1		0	0	0	80	80	0						Under review with PTO .
Mosslanding Switching Station SLG fault wih stuck breaker expanded o Mosslndsw-Duke Moss and Mosslndsw-Mecalf	P4-2		80	80	80	80	80	0						Under review with PTO .
Mosslanding Switching Station SLG fault wih stuck breaker	P4-3		0	0	0	0	0	16						Under review with PTO .
Duke Moss #6 unit with delayed clearing	P5-1		0	0	0	0	0	0						No violation
Mosslanding Switching Station -Duke Moss 230 KV line SLG Fault with delayed clearing	P5-2		0	0	0	80	80	0						Under review with PTO .
Mosslanding Switching Station 230/115 KV Transformer Bank # 4 SLG fault with delayed clearing.	P5-3		88	91	84	93	93	0						Under review with PTO .
Mesa 115 KV SVD SLG fault with delayed clearing.	P5-4		0	0	0	0	0	0						No violation
Mosslanding Switching Station /115 KV Bus SLG fault with delayed clearing.	P5-5		0	0	0	0	0	0						No violation

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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 Load.



ID	Overloaded Facility	Worst Contingencies	Category	Category Description	Loading (%)									Potential Mitigation Solutions	
					2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022SP Heavy Renewables & Min Gas Gen	2022 Summer Off-Peak with Maximum PV Output	N/A	N/A		N/A
T-1	Lugo-Victorville 500 kV line	Eldorado-Lugo & Colorado River-Paloverde 500 kV lines with RAS	P6	L-1/L-1	110%	<100	<100	<100	<100	<100	<100				Approved Lugo-Victorville line rating increase project

ID	Substation	Worst Contingencies	Category	Category Description	Post Cont. Voltage Deviation %							Potential Mitigation Solutions			
					2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022SP Heavy Renewables & Min Gas Gen	2022 Summer Off-Peak with Maximum PV Output		N/A	N/A	N/A

No voltage deviation issues were identified.

ID	Substation	Worst Contingencies	Category	Category Description	Voltage (PU)									Potential Mitigation Solutions	
					2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022SP Heavy Renewables & Min Gas Gen	2022 Summer Off-Peak with Maximum PV Output	N/A	N/A		N/A

No high/low voltage issues identified

ID	Contingency	Category	Category Description	Transient Stability Performance							Potential Mitigation Solutions
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022SP Heavy Renewables & Min Gas Gen	2022 Summer Off-Peak with Maximum PV Output	
TS-1	Imperial Valley–N.Gila 500 kV; 3-Phase fault @ Imperial Valley, normal clearing	P1	L-1	Stable	Stable	Stable	Stable	Stable	Stable	N/A	
TS-2	Lugo–Victorville 500 kV; 3-Phase fault @ Lugo, normal clearing	P1	L-1	Stable	Stable	Stable	Stable	Stable	Stable	N/A	
TS-3	Paloverde–Colorado River 500 kV; 3-Phase fault @ Paloverde, normal clearing	P1	L-1	Stable	Stable	Stable	Stable	Stable	Stable	N/A	
TS-4	PDCI Monopole; 3-Phase fault @ Sylmar, normal clearing	P1	L-1	Stable	Stable	Stable	Stable	Stable	Stable	N/A	
TS-5	Serrano–Valley 500 kV; 3-Phase fault @ Valley, normal clearing	P1	L-1	Stable	Stable	Stable	Stable	Stable	Stable	N/A	
TS-6	Palo Verde G-1; 3-Phase fault @ 500 kV, normal clearing	P1	G-1	Stable	Stable	Stable	Stable	Stable	Stable	N/A	
TS-7	Devers-Valley No.1 500 kV & Serrano-Valley 500 kV; 3-Phase fault @ Valley, normal clearing	P6	L-1/L-1	Stable	Stable	Stable	Stable	Stable	Stable	N/A	
TS-8	Lugo–Eldorado & Lugo–Mohave 500 kV; 3-Phase fault @ Lugo, normal clearing	P6	L-1/L-1	Stable	Stable	Stable	Stable	Stable	Stable	N/A	
TS-9	Colorado River–Paloverde & Imperial Valley–N.Gila 500 kV; 3-Phase fault @ Paloverde, normal clearing	P6	L-1/L-1	Stable	Stable	Stable	Stable	Stable	Stable	N/A	
TS-10	Sunrise & SWPL 500 kV; 3-Phase fault @ Suncrest, normal clearing	P6	L-1/L-1	Stable	Stable	Stable	Stable	Stable	Stable	N/A	
TS-11	Midway–Vincent # 1 & Midway - Whirlwind #3 500 kV with RAS; 3-Phase fault @ Midway, normal clearing	P7	L-2	Stable	Stable	Stable	Stable	Stable	Stable	N/A	
TS-12	Midway - Vincent No. 1 & 2 500 kV with RAS; 3-Phase fault @ Midway, normal clearing	P7	L-2	Stable	Stable	Stable	Stable	Stable	Stable	N/A	
TS-13	Vincent–Miraloma & Lugo–Rancho Vista 500 kV; 3-Phase fault @ Mira Loma, normal clearing	P7	L-2	Stable	Stable	Stable	Stable	Stable	Stable	N/A	
TS-14	Colorado River–Red Bluff 500kV #1 & #2; 3-Phase fault @ Red Bluff, normal clearing	P7	L-2	Stable	Stable	Stable	Stable	Stable	Stable	N/A	
TS-15	Devers–Red Bluff 500 kV #1 & #2; 3-Phase fault @ Devers, normal clearing	P7	L-2	Stable	Stable	Stable	Stable	Stable	Stable	N/A	
TS-16	Lugo–Vincent 500 KV #1 & #2; 3-Phase fault @ Vincent, normal clearing	P7	L-2	Stable	Stable	Stable	Stable	Stable	Stable	N/A	
TS-17	Antelope–Vincent #1 & #2 500 kV; 3-Phase fault @ Vincent, normal clearing	P7	L-2	Stable	Stable	Stable	Stable	Stable	Stable	N/A	
TS-18	Loss of PDCI Bipole Converters; 3-Phase fault @ Sylmar, normal clearing	P7	L-2	Stable	Stable	Stable	Stable	Stable	Stable	N/A	
TS-19	Loss of IPPDC Bipole; 3-Phase fault @ Adelanto, normal clearing	P7	L-2	Stable	Stable	Stable	Stable	Stable	Stable	N/A	
TS-20	Lugo–Miraloma & Lugo–Rancho Vista 500 kV; 3-Phase fault @ Lugo, normal clearing	P7	L-2	Stable	Stable	Stable	Stable	Stable	Stable	N/A	
TS-21	Serrano–Mira Loma & Serrano–Rancho Vista 500 kV; 3-Phase fault @ Serrano, normal clearing	P7	L-2	Stable	Stable	Stable	Stable	Stable	Stable	N/A	

ID	Worst Contingencies	Category	Category Description	Amount of Load Drop (MW)									Potential Mitigation Solutions	
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022SP Heavy Renewables & Min Gas Gen	2022 Summer Off-Peak with Maximum PV Output	N/A	N/A		N/A

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

Single Source Substation with more than 100 MW Load

ID	Substation	Load Served (MW)									Potential Mitigation Solutions	
		2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022SP Heavy Renewables & Min Gas Gen	2022 Summer Off-Peak with Maximum PV Output	N/A	N/A		N/A

No single source substation with more than 100 MW Load

ID	Overloaded Facility	Worst Contingencies	Category	Category Description	Loading (%)											Potential Mitigation Solutions	
					B- 2019 Summer Peak	B- 2022 Summer Peak	B- 2027 Summer Peak	B- 2019 Spring Light Load	B- 2022 Spring Off-Peak	S- 2019SP CEC Peak Shift	S- 2022SP High CEC Load & Peak Shift	S- 2022SP Heavy Renewables & Min Gas Gen	S- 2022SP Low Hydro	S- 2027SP CEC Peak Shift	S- 2022 Summer Off-Peak with Maximum PV Output		
BC&T-T-1	MAGUNDEN-PASTORIA 230kV 1(or2)	MAGUNDEN-PASTORIA 230kV 2(or1) and 3 (with RAS)	P6	N-1-1										<100			Big Creek RAS
BC&T-T-2	MAGUNDEN-PASTORIA 230kV 1(or2)	N-2 MAGUNDEN-PASTORIA 230kV 2(or1) and 3 (with RAS)	P7	N-2										<100			Big Creek RAS
BC&T-T-3	MAGUNDEN-SPRINGVL 230 kV 1	MAGUNDEN-VESTAL 230kV 1 and 2 (with RAS)	P6	N-1-1								<100		<100			Big Creek RAS
BC&T-T-4	MAGUNDEN-SPRINGVL 230 kV 1 & 2	RECTOR-VESTAL 230 kV 1 and 2 (with RAS)	P7	N-2										<100			Big Creek RAS
BC&T-T-5	MAGUNDEN-SPRINGVL 230 kV 2	MAGUNDEN-SPRINGVL 230 kV 1 and EASTWOOD 13.80 Unit ID 1	P3	N-1/G-1										104.27			System adjustments after initial contingency
BC&T-T-6	MAGUNDEN-SPRINGVL 230 kV 2	MAGUNDEN-SPRINGVL 230 kV 1 and BIG CRK1-EASTWOOD 230kV 1	P6	N-1-1										102.52			System adjustments after initial contingency
BC&T-T-7	MAGUNDEN-SPRINGVL 230 kV 2	MAGUNDEN-SPRINGVL 230 kV 1 and MAMMOTH-BIG CRK3 230kV 1	P6	N-1-1										104.28			System adjustments after initial contingency
BC&T-T-8	MAGUNDEN-SPRINGVL 230 kV 2	MAGUNDEN-VESTAL 230kV 1 and 2 (with RAS)	P6	N-1-1	<100	<100	<100				<100	<100	<100	<100	<100		System adjustments after initial contingency
BC&T-T-9	MAGUNDEN-SPRINGVL 230 kV 2	MAGUNDEN-SPRINGVL 230 kV 1(or) 2 and MAGUNDEN-VESTAL 230kV 1(or)2 (with RAS)	P6	N-1-1										<100			Big Creek RAS
BC&T-T-10	MAGUNDEN-SPRINGVL 230 kV 2	MAGUNDEN-SPRINGVL 230 kV 1(or) 2 and RECTOR-VESTAL 230 kV 1(or)2 (with RAS)	P6	N-1-1										<100			Big Creek RAS
BC&T-T-11	MAGUNDEN-VESTAL 230kV 1 or 2	MAGUNDEN-SPRINGVL 230 kV 1(or) 2 and MAGUNDEN-VESTAL 230kV 1(or)2 (with RAS)	P6	N-1-1										<100			Big Creek RAS
BC&T-T-12	MAGUNDEN-VESTAL 230kV 1 or 2	MAGUNDEN-SPRINGVL 230 kV 1(or) 2 and RECTOR-VESTAL 230 kV 1(or)2 (with RAS)	P6	N-1-1										<100			Big Creek RAS
BC&T-T-13	SPRINGVL-RECTOR 230 kV 1	MAGUNDEN-VESTAL 230kV 1 and 2 (with RAS)	P6	N-1-1								<100		<100			Big Creek RAS
BC&T-T-14	SPRINGVL-RECTOR 230 kV 1	RECTOR-VESTAL 230 kV 1 and 2 (with RAS)	P7	N-2										<100			Big Creek RAS

ID	Overloaded Facility	Worst Contingencies	Category	Category Description	Loading (%)										Potential Mitigation Solutions		
					B- 2019 Summer Peak	B- 2022 Summer Peak	B- 2027 Summer Peak	B- 2019 Spring Light Load	B- 2022 Spring Off-Peak	S- 2019SP CEC Peak Shift	S- 2022SP High CEC Load & Peak Shift	S- 2022SP Heavy Renewables & Min Gas Gen	S- 2022SP Low Hydro	S- 2027SP CEC Peak Shift		S- 2022 Summer Off-Peak with Maximum PV Output	
BC&T-T-15*	BIG CRK2-BIG CRK3 230kV 1	BIG CRK1-RECTOR 230kV and BIG CRK3-BIG CRK8 230kV	P6	N-1-1						<100							Big Creek RAS
BC&T-T-16*	BIG CRK2-BIG CRK8 230kV 1	BIG CRK1-RECTOR 230kV and BIG CRK2-BIG CRK3 230kV	P6	N-1-1						<100							Big Creek RAS
BC&T-T-17																	
BC&T-T-18																	
BC&T-T-19																	
BC&T-T-20																	
Note	BC&T-T-15* and BC&T-T-16*	These scenarios were run on 2022 Spring Off peak base case with high (maximum) Big Creek Hydro output															

ID	Substation	Worst Contingencies	Category	Category Description	Post Cont. Voltage Deviation %											Potential Mitigation Solutions
					B- 2019 Summer Peak	B- 2022 Summer Peak	B- 2027 Summer Peak	B- 2019 Spring Light Load	B- 2022 Spring Off-Peak	S- 2019SP CEC Peak Shift	S- 2022SP High CEC Load & Peak Shift	S- 2022SP Heavy Renewables & Min Gas Gen	S- 2022SP Low Hydro	S- 2027SP CEC Peak Shift	S- 2022 Summer Off-Peak with Maximum PV Output	
BC&T-VD-1	No Voltage Deviation violations were identified during the studies															
X-VD-2																

ID	Substation	Worst Contingencies	Category	Category Description	Voltage (PU)											Potential Mitigation Solutions
					B- 2019 Summer Peak	B- 2022 Summer Peak	B- 2027 Summer Peak	B- 2019 Spring Light Load	B- 2022 Spring Off-Peak	S- 2019SP CEC Peak Shift	S- 2022SP High CEC Load & Peak Shift	S- 2022SP Heavy Renewables & Min Gas Gen	S- 2022SP Low Hydro	S- 2027SP CEC Peak Shift	S- 2022 Summer Off-Peak with Maximum PV Output	
BC&T-V-1	BAILEY 230kV	PARDEE-BAILEY 230kV and BAILEY-PASTORIA 230kV	P6	N-1-1	0.823	0.813	0.824	-	-	0.815	0.8	0.84	0.813	0.8055	-	Operating Procedure 46
BC&T-V-2																
X-V-3																
X-V-4																
X-V-5																
X-V-6																
X-V-7																
X-V-8																
X-V-9																
X-V-10																
X-V-11																
X-V-12																
X-V-13																
X-V-14																
X-V-15																
X-V-16																
X-V-17																
X-V-18																
X-V-19																

ID	Contingency	Category	Category Description	Transient Stability Performance											Potential Mitigation Solutions	
				B- 2019 Summer Peak	B- 2022 Summer Peak	B- 2027 Summer Peak	B- 2019 Spring Light Load	B- 2022 Spring Off-Peak	S- 2019SP CEC Peak Shift	S- 2022SP High CEC Load & Peak Shift	S- 2022SP Heavy Renewables & Min Gas Gen	S- 2022SP Low Hydro	S- 2027SP CEC Peak Shift	S- 2022 Summer Off-Peak with Maximum PV Output		
BC&T-TS-1	Big Creek 1-Big Creek 2 230 kV line	P5	N-1				local area instability	local area instability								Protection Project- OD of 12/31/2019
BC&T-TS-2	Big Creek 3 (Bus) NRBD	P5	Non-redundant bus-differential	local area instability	local area instability	local area instability	local area instability	local area instability					local area instability			System Adjustment
BC&T-TS-3	Mangunden NRBD	P5	Non-redundant bus-differential	local area instability	local area instability	local area instability	local area instability	local area instability					local area instability			Zone 251 islanded
BC&T-TS-4	Springville NRBD	P5	Non-redundant bus-differential	No Violations												
BC&T-TS-5	Big Creek 1-Rector & Rector-Vestal No.1	P4	1 Phase	No Violations												
BC&T-TS-5b*	Big Creek 1-Rector & Rector-Vestal No.1	P4	1 Phase					local area instability								Big Creek RAS
BC&T-TS-6	Big Creek 3-Rector No.1 & Rector-Vestal No.2	P4	1 Phase	No Violations												
BC&T-TS-7	Big Creek 4-Springville & Magunden-Springville No.2	P6	3 Phase	No Violations												
BC&T-TS-8	Big Creek 1-Rector & Big Creek 3-Rector No.1	P6	3 Phase	No Violations												
BC&T-TS-9	Big Creek 3-Rector No.2 & Big Creek 4-Springville	P6	3 Phase	No Violations												
BC&T-TS-9b*	Big Creek 3-Rector No.2 & Big Creek 4-Springville	P6	3 Phase					local area instability								Big Creek generation runback. Modify Big Creek RAS
BC&T-TS-10	Big Creek 4-Springville & Rector-Springville	P6	3 Phase	No Violations												
BC&T-TS-11	Rector-Vestal No.1 & Rector-Vestal No.2	P6	3 Phase	No Violations												
BC&T-TS-12	Magunden-Springville No.1 & Magunden-Springville No.2	P6	3 Phase	No Violations												
BC&T-TS-13	Magunden-Vestal No.1 & Magunden-Vestal No.2	P6	3 Phase	No Violations												
BC&T-TS-14	Big Creek 3-Rector No.2 & Rector-Springville	P7	1 Phase	No Violations												
BC&T-TS-15	Magunden-Pastoria No. 1 & Bailey-Pastoria	P4	1 Phase	No Violations												

ID	Contingency	Category	Category Description	Transient Stability Performance											Potential Mitigation Solutions
				B- 2019 Summer Peak	B- 2022 Summer Peak	B- 2027 Summer Peak	B- 2019 Spring Light Load	B- 2022 Spring Off-Peak	S- 2019SP CEC Peak Shift	S- 2022SP High CEC Load & Peak Shift	S- 2022SP Heavy Renewables & Min Gas Gen	S- 2022SP Low Hydro	S- 2027SP CEC Peak Shift	S- 2022 Summer Off-Peak with Maximum PV Output	
BC&T-TS-16	Magunden-Pastoria No. 2 & Pardee-Pastoria	P4	1 Phase	No Violations											
BC&T-TS-17	Magunden-Pastoria No. 3 & Pardee-Pastoria-Warne	P4	1 Phase	No Violations											
BC&T-TS-18	Pardee-Pastoria & Pardee-Vincent No.2	P4	1 Phase	No Violations											
BC&T-TS-19	Bailey-Pardee & Pardee-Vincent No.1	P4	1 Phase	No Violations											
BC&T-TS-20	Pardee-Pastoria-Warne & Pardee-Santa clara	P4	1 Phase	No Violations											
BC&T-TS-21	Mesa-Vincent No.2 & Santa Clara-Vincent	P4	1 Phase	No Violations											
BC&T-TS-22	Magunden-Pastoria No. 1 & Magunden-Pastoria No. 2	P6	3 Phase	No Violations											
BC&T-TS-23	Magunden-Pastoria No. 1 & Magunden-Pastoria No. 3	P6	3 Phase	No Violations											
BC&T-TS-24	Magunden-Pastoria No. 2 & Magunden-Pastoria No. 3	P6	3 Phase	No Violations											
BC&T-TS-25	Bailey-Pastoria & Pardee-Pastoria	P6	3 Phase	No Violations											
BC&T-TS-26	Bailey-Pastoria & Pardee-Pastoria-Warne	P6	3 Phase	No Violations											
BC&T-TS-27	Pardee-Pastoria & Pardee-Pastoria-Warne	P6	3 Phase	No Violations											
BC&T-TS-28	Pardee-Pastoria & Bailey-Pardee	P6	3 Phase	No Violations											
BC&T-TS-29	Pardee-Pastoria-Warne & Bailey-Pardee	P6	3 Phase	No Violations											
BC&T-TS-30	Antelope-Magunden No. 1 & Antelope-Magunden No. 2	P6	3 Phase	No Violations											
BC&T-TS-31	Pardee-Vincent No. 1 & Pardee-Vincent No. 2	P6	3 Phase	No Violations											
Note	BC&T-TS-5b* and BC&T-TS-9b*	These scenarios were run on 2022 Spring Off peak base case with high (maximum) Big Creek Hydro output													

Single Contingency Load Drop

ID	Worst Contingencies	Category	Category Description	Amount of Load Drop (MW)										Potential Mitigation Solutions
				Select..	Select..	Select..	Select..	Select..	Select..	Select..	Select..	Select..	Select..	
X-SLD-1														

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

Single Source Substation with more than 100 MW Load

ID	Substation	Load Served (MW)										Potential Mitigation Solutions
		Select..	Select..	Select..	Select..	Select..	Select..	Select..	Select..	Select..	Select..	
X-SS-1												

No single source substation with more than 100 MW Load



ID	Overloaded Facility	Worst Contingencies	Category	Category Description	Loading (%)						Potential Mitigation Solutions
					2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022SP Heavy Renewables & Min Gas Gen	
NOL-T-1	Lugo-Pisgah 230	Lugo 500/230kV Nos. 1 & 2 transformer banks	P6	Two overlapping singles	<95	102.59	102.96	Nconv	Nconv	<95	Mojave Desert RAS
NOL-T-2	Pisgah-Calcite 230	Lugo 500/230kV Nos. 1 & 2 transformer banks	P6	Two overlapping singles	<95	118.31	118.55	Nconv	Nconv	108.26	Mojave Desert RAS
NOL-T-3	Pisgah-Cimat-Eldorado 230 No.1	Lugo 500/230kV Nos. 1 & 2 transformer banks	P6	Two overlapping singles	<95	110.81	111.15	Nconv	Nconv	<95	Mojave Desert RAS
NOL-T-4	Pisgah-Cimat-Eldorado 230 No.2	Lugo 500/230kV Nos. 1 & 2 transformer banks	P6	Two overlapping singles	<95	110.06	110.33	Nconv	Nconv	<95	Mojave Desert RAS
NOL-T-5	Victor-Kramer 115kV Line	Kramer-Victor Nos. 1&2 230kV lines	P7	Common structure	<95	<95	<95	104.47	<95	121.20	Mojave Desert RAS
NOL-T-6	Kramer-Roadway 115kV Line	Kramer-Victor Nos. 1&2 230kV lines	P7	Common structure	<95	<95	<95	105.62	97.38	124.16	Mojave Desert RAS
NOL-T-7	Case Diverge	Kramer-Cool Water and Kramer-Tortilla 115kV lines	P6	Two overlapping singles	Nconv	Nconv	Nconv	<95	<95	<95	SCE Operating Procedure 127, separating Kramer 115kV system from the Cool Water 115kV system
NOL-T-8	Case Diverge	Ivanpah-Eldorado & Ivanpah-Primm 230kV lines	P7	Common structure	Nconv	Nconv	Nconv	<95	Nconv	Nconv	Ivanpah RAS
NOL-T-9	Case Diverge	Ivanpah-Eldorado & Primm-Eldorado 230kV lines	P7	Common structure	Nconv	Nconv	Nconv	<95	Nconv	Nconv	Ivanpah RAS
NOL-T-10	Inyo 115kV Phase Shifter	Line INYOKERN - KRAMER 115.0 ck 1 line KRAMER-INYOKERN-RANDB 115 ck 1	P6	Two overlapping singles	<95	<95	<95	119.98	<95	<95	Apply 2 hour emergency rating, followed by congestion management
NOL-T-11	Inyo 115kV Phase Shifter	Line OXBOW B - CONTROL 115.0 ck 1	P1	Single contingency	<95	103.07	113.84	<95	<95	<95	Apply 2 hour emergency rating, followed by congestion management



ID	Overloaded Facility	Worst Contingencies	Category	Category Description	Loading (%)						Potential Mitigation Solutions
					2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022SP Heavy Renewables & Min Gas Gen	

Study Area: **SCE North of Lugo**

Voltage Deviations



ID	Substation	Worst Contingencies	Category	Category Description	Post Cont. Voltage Deviation %						Potential Mitigation Solutions
					2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022SP Heavy Renewables & Min Gas Gen	
NOL-VD-1											
NOL-VD-2											
X-VD-3											
X-VD-4											
X-VD-5											
X-VD-6											
X-VD-7											
X-VD-8											
X-VD-9											
X-VD-10											
X-VD-11											
X-VD-12											
X-VD-13											
X-VD-14											
X-VD-15											
X-VD-16											
X-VD-17											
X-VD-18											
X-VD-19											
X-VD-20											
X-VD-21											
X-VD-22											
X-VD-23											
X-VD-24											
X-VD-25											
X-VD-26											
X-VD-27											
X-VD-28											
X-VD-29											
X-VD-30											
X-VD-31											
X-VD-32											



ID	Substation	Worst Contingencies	Category	Category Description	Post Cont. Voltage Deviation %						Potential Mitigation Solutions
					2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022SP Heavy Renewables & Min Gas Gen	
X-VD-33											
X-VD-34											
X-VD-35											

ID	Substation	Worst Contingencies	Category	Category Description	Voltage (PU)						Potential Mitigation Solutions
					2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022SP Heavy Renewables & Min Gas Gen	
NOL-V-1	Control 115	Control WEST BUS: INYO PHASE SHIFTER (CONTROL-INYO) CONTROL-CASA DIABLO- SHERWIN 115 kV CONTROL-HAIWEE-INYOKREN CONTRO	P2	Bus fault	>0.9	0.8882	>0.9	>0.9	>0.9	>0.9	Adjust voltage schedules, drop distribution load at Control Substation, add shunt capacitors
NOL-V-2	DSRTSTLN 230	Line IVANPAH - ELDORDO2 230.0 ck 1 Line PRIMM - IVANPAH 230.0 ck 1	P7	Common Structure	<1.1	<1.1	<1.1	1.1553	<1.1	<1.1	Ivanpah RAS
		Line IVANPAH - ELDORDO2 230.0 ck 1 Line PRIMM - IVANPAH 230.0 ck 1	P7	Common Structure	<1.1	<1.1	<1.1	1.2916	<1.1	<1.1	Ivanpah RAS
NOL-V-3	Ivanpah 230	Line IVANPAH - ELDORDO2 230.0 ck 1 Line PRIMM - IVANPAH 230.0 ck 1	P7	Common Structure	<1.1	<1.1	<1.1	1.1551	<1.1	<1.1	Ivanpah RAS
		Line IVANPAH - ELDORDO2 230.0 ck 1 Line PRIMM - IVANPAH 230.0 ck 1	P7	Common Structure	<1.1	<1.1	<1.1	1.2914	<1.1	<1.1	Ivanpah RAS
NOL-V-4	Primm 230	Line IVANPAH - ELDORDO2 230.0 ck 1 Line PRIMM - ELDORDO2 230.0 ck 1	P7	Common Structure	<1.1	<1.1	<1.1	1.2935	<1.1	<1.1	Ivanpah RAS
NOL-V-5	SILVERST 230	Line IVANPAH - ELDORDO2 230.0 ck 1 Line PRIMM - ELDORDO2 230.0 ck 1	P7	Common Structure	<1.1	<1.1	<1.1	1.2936	<1.1	<1.1	Ivanpah RAS
NOL-V-6	Cool Water 115	Kramer-Cool Water and Cool Water-TAP705 115kV lines	P6	Two overlapping singles	>0.9	>0.9	>0.9	>0.9	0.86	>0.9	Mojave Desert RAS
NOL-V-7	Cool Water 115	Kramer-Cool Water and Kramer-Tortilla 115kV lines	P6	Two overlapping singles	>0.9	>0.9	>0.9	>0.9	>0.9	0.828	SCE Operating Procedure 127, separating Kramer 115kV system from the Cool Water 115kV system
NOL-V-8											
NOL-V-9											
NOL-V-10											
NOL-V-11											
NOL-V-12											
NOL-V-13											
NOL-V-14											
NOL-V-15											

ID	Substation	Worst Contingencies	Category	Category Description	Voltage (PU)						Potential Mitigation Solutions
					2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022SP Heavy Renewables & Min Gas Gen	
NOL-V-16											
NOL-V-17											

ID	Contingency	Category	Category Description	Transient Stability Performance						Potential Mitigation Solutions
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022SP Heavy Renewables & Min Gas Gen	
NOL-TS-1	Control-Casa Diablo 1150kV (Fault 20% from Control)	P4.2	Stuck Breaker	Inyo, Oxbow B buses voltages fails to recover	Inyo, Oxbow B buses voltages fails to recover	Inyo, Oxbow B buses voltages fails to recover	Inyo, Oxbow B buses voltages fails to recover	Inyo, Oxbow B buses voltages fails to recover	Inyo, Oxbow B buses voltages fails to recover	Install Local Breaker Failure Backup (LBFB) scheme
NOL-TS-2	Control-Casa Diablo 1150kV (Fault 20% from Casa Diablo)	P4.2	Stuck Breaker	Stable	Stable	Stable	Stable	Stable	Stable	
NOL-TS-3	Control-Coso-Haiwee-Inyokern 115kV (Fault 20% from Inyokern)	P4.2	Stuck Breaker	Stable	Stable	Stable	Stable	Stable	Stable	
NOL-TS-4	Control-Coso-Haiwee-Inyokern 115kV (Fault 20% from Control)	P4.2	Stuck Breaker	Stable	Stable	Stable	Stable	Stable	Stable	
NOL-TS-5	Control-Inyo 115kV (Fault 20% from Control)	P4.2	Stuck Breaker	Stable	Stable	Stable	Stable	Stable	Stable	
NOL-TS-6	Inyokern-Downs 115kV (Fault 20% from Inyokern)	P4.2	Stuck Breaker	Stable	Stable	Stable	Stable	Stable	Stable	
NOL-TS-7	Inyokern-McGen-Searles 15kV (Fault 20% from Inyokern)	P4.2	Stuck Breaker	Stable	Stable	Stable	Stable	Stable	Stable	
NOL-TS-8	Kramer-Roadway 115kV (Fault 20% from Kramer)	P4.2	Stuck Breaker	Stable	Stable	Stable	Stable	Stable	Stable	
NOL-TS-9	Kramer-Roadway 115kV (Fault 20% from Roadway)	P4.2	Stuck Breaker	Stable	Stable	Stable	Stable	Stable	Stable	
NOL-TS-10	Kramer-Victor 115kV (Fault 20% from Kramer)	P4.2	Stuck Breaker	Stable	Stable	Stable	Stable	Stable	Stable	
NOL-TS-11	Kramer-Victor 115kV (Fault 20% from Victor)	P4.2	Stuck Breaker	Stable	Stable	Stable	Stable	Stable	Stable	
NOL-TS-12	Control 115/55kV Transforemer Banks	P6	Normal clearing	Stable	Stable	Stable	Stable	Stable	Stable	
NOL-TS-13	Kramer 230/115kV Transformer Banks	P6	Normal clearing	Stable	Stable	Stable	Stable	Stable	Stable	
NOL-TS-14	Lugo 500/230kV Transformer Banks no RAS	P6	Normal clearing	Diverge	Diverge	Diverge	Diverge	Diverge	Diverge	Mojave RAS

ID	Contingency	Category	Category Description	Transient Stability Performance						Potential Mitigation Solutions
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022SP Heavy Renewables & Min Gas Gen	
NOL-TS-15	Lugo 500/230kV Transformer Banks RAS	P6	Normal clearing	Stable	Stable	Stable	Stable	Stable	Stable	
NOL-TS-16	Kramer-Inyokern-Randsburg Nos.1 & 3 115kV	P6	Normal clearing	Stable	Stable	Stable	Stable	Stable	Stable	
NOL-TS-17	Coolwater-Kramer & Coolwater-Seg2-Tortilla 115kV (Fault at Coolwater)	P6	Normal clearing	Voltage dips violation at Coolwater and Tortilla	Voltage dips violation at Coolwater and Tortilla	Voltage dips violation at Coolwater and Tortilla	Voltage dips violation at Coolwater and Tortilla	Voltage dips violation at Coolwater and Tortilla	Voltage dips violation at Coolwater and Tortilla	Operating Procedure 127: open Ivanpah-Mountain Pass line
NOL-TS-18	Coolwater-Kramer & Coolwater-Seg2-Tortilla 115kV_OP (Fault at Coolwater)	P6	Normal clearing	Stable	Stable	Stable	Stable	Stable	Stable	
NOL-TS-19	Coolwater-Kramer & Kramer-Tortilla 115kV (Fault at Kramer)	P6	Normal clearing	Diverge	Diverge	Diverge	Diverge	Diverge	Diverge	Operating Procedure 127: open Ivanpah-Mountain Pass line
NOL-TS-20	Coolwater-Kramer & Kramer-Tortilla 115kV_OP (Fault at Kramer)	P6	Normal clearing	Stable	Stable	Stable	Stable	Stable	Stable	
NOL-TS-21	Kramer-Victor 230kV Nos.1 & 2 no RAS	P7	Normal clearing	Stable	Stable	Stable	Stable	Stable	Stable	
NOL-TS-22	Kramer-Victor 230kV Nos.1 & 2 RAS	P7	Normal clearing	Stable	Stable	Stable	Stable	Stable	Stable	
NOL-TS-23	Lugo-Victor 230kV Nos.1 & 2 no RAS	P7	Normal clearing	Stable	Stable	Stable	Stable	Stable	Stable	
NOL-TS-24	Lugo-Victor 230kV Nos.1 & 2 RAS	P7	Normal clearing	Stable	Stable	Stable	Stable	Stable	Stable	
NOL-TS-25	Control-Coso-Haiwee-Inyokern & Control-Haiwee-Inyokern 115kV no RAS	P7	Normal clearing	Stable	Stable	Stable	Stable	Stable	Stable	
NOL-TS-26	Control-Coso-Haiwee-Inyokern & Control-Haiwee-Inyokern 115kV RAS	P7	Normal clearing	Stable	Stable	Stable	Stable	Stable	Stable	

ID	Contingency	Category	Category Description	Transient Stability Performance						Potential Mitigation Solutions
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022SP Heavy Renewables & Min Gas Gen	
NOL-TS-27	Kramer-Victor & Roadway-Victor 115kV	P7	Normal clearing	Stable	Stable	Stable	Stable	Stable	Stable	
NOL-TS-28	Kramer-Victor & Kramer-Roadway 115kV	P7	Normal clearing	Stable	Stable	Stable	Stable	Stable	Stable	
NOL-TS-29										
NOL-TS-30										
NOL-TS-31										

Single Contingency Load Drop

ID	Worst Contingencies	Category	Category Description	Amount of Load Drop (MW)										Potential Mitigation Solutions
				Select..	Select..	Select..	Select..	Select..	Select..	Select..	Select..	Select..	Select..	
X-SLD-1														

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

Single Source Substation with more than 100 MW Load

ID	Substation	Load Served (MW)										Potential Mitigation Solutions
		Select..	Select..	Select..	Select..	Select..	Select..	Select..	Select..	Select..	Select..	
X-SS-1												

No single source substation with more than 100 MW Load

ID	Overloaded Facility	Worst Contingencies	Category	Category Description	Loading (%)						Potential Mitigation Solutions
					2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022SP Heavy Renewables & Min Gas Gen	
EOL-T-1	System diverge	Eldorado 500/230kV Transformer No.5	P1	Single contingency	Nconv	Nconv	Nconv	<95	Nconv	<95	Ivanpah RAS
EOL-T-2	Ivanpah 230/115kV Transformer No.1	Ivanpah 230/115kV Transformer No.2 & Ivanpah-Mountain Pass 115kV line	P6	Two overlapping singles	<95	<95	<95	<95	109.91	109.10	Ivanpah RAS
EOL-T-3	Ivanpah 230/115kV Transformer No.2	Ivanpah 230/115kV Transformer No.1 & Ivanpah-Mountain Pass 115kV line	P6	Two overlapping singles	<95	<95	<95	<95	109.91	109.10	Ivanpah RAS
EOL-T-4	Ivanpah-Mountain Pass 115kV Line	Ivanpah 230/115kV Transformer Nos. 1&2	P6	Two overlapping singles	133.94	134.56	134.21	<95	<95	Nconv	Ivanpah RAS
EOL-T-5	System diverge	Eldorado N/S bus Section A	P5	Fault plus relay failure to operate	Nconv	Nconv	Nconv	<95	Nconv	Nconv	Install redundant relay
EOL-T-6	System diverge	Lugo E/W Bus	P5	Fault plus relay failure to operate	Nconv	Nconv	Nconv	<95	Nconv	Nconv	Install redundant relay
EOL-T-7	System diverge	Ivanpah-Eldorado & Primm-Eldorado 230kV lines	P6	Two overlapping singles	Nconv	Nconv	Nconv	<95	Nconv	Nconv	Ivanpah RAS



ID	Substation	Worst Contingencies	Category	Category Description	Post Cont. Voltage Deviation %						Potential Mitigation Solutions
					2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022SP Heavy Renewables & Min Gas Gen	
EOL-VD-1											



ID	Substation	Worst Contingencies	Category	Category Description	Voltage (PU)						Potential Mitigation Solutions
					2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022SP Heavy Renewables & Min Gas Gen	
EOL-V-1											
EOL-V-2											
X-V-3											
X-V-4											
X-V-5											
X-V-6											
X-V-7											
X-V-8											
X-V-9											
X-V-10											
X-V-11											
X-V-12											
X-V-13											
X-V-14											
X-V-15											
X-V-16											
X-V-17											
X-V-18											
X-V-19											

Study Area: **SCE East of Lugo**

Transient Stability



ID	Contingency	Category	Category Description	Transient Stability Performance						Potential Mitigation Solutions
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022SP Heavy Renewables & Min Gas Gen	
EOL-TS-1	Bulk_P1_EIDorado_5AA_RAS	P1	Normal clearing	Stable	Stable	Stable	Stable	Stable	Stable	
EOL-TS-2	Main_P5-5_Eldorado230	P5.5	Non-redundant relay failure	Stable	Stable	Stable	Stable	Stable	Stable	
EOL-TS-3	Main_P5-5_EldoradoB230	P5.5	Non-redundant relay failure	Stable	Stable	Stable	Stable	Stable	Stable	
EOL-TS-4	Bulk_EOL_Lugo-EID-Mh-500_RAS	P7	Normal clearing	Stable	Stable	Stable	Stable	Stable	Stable	
EOL-TS-5										
EOL-TS-6										
EOL-TS-7										
EOL-TS-8										
EOL-TS-9										
EOL-TS-10										
EOL-TS-11										
EOL-TS-12										
EOL-TS-13										
EOL-TS-14										
EOL-TS-15										
EOL-TS-16										
EOL-TS-17										
EOL-TS-18										
EOL-TS-19										
EOL-TS-20										
EOL-TS-21										
EOL-TS-22										
EOL-TS-23										
EOL-TS-24										
EOL-TS-25										
EOL-TS-26										
EOL-TS-27										
EOL-TS-28										
EOL-TS-29										
EOL-TS-30										
EOL-TS-31										

Single Contingency Load Drop

ID	Worst Contingencies	Category	Category Description	Amount of Load Drop (MW)										Potential Mitigation Solutions
				Select..	Select..	Select..	Select..	Select..	Select..	Select..	Select..	Select..	Select..	
X-SLD-1														

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

Single Source Substation with more than 100 MW Load

ID	Substation	Load Served (MW)										Potential Mitigation Solutions
		Select..	Select..	Select..	Select..	Select..	Select..	Select..	Select..	Select..	Select..	
X-SS-1												

No single source substation with more than 100 MW Load



ID	Overloaded Facility	Worst Contingencies	Category	Category Description	Loading (%)								Potential Mitigation Solutions		
					2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022SP Heavy Renewables & Min Gas Gen	2022 Summer Off-Peak with Maximum PV Output				
Eastern-T-1	Line 24086 LUGO 500 kV to 26105 VICTORVILLE 500 kV	Line PALO VERDE 500 to COLORADO RIVER 500 Circuit 1 AND Line N. GILA 500 to IMPERIAL VALLEY 500 Circuit 1	P6	N-1-1	125.18	<100	<100	<100	<100	<100	<100				Congestion Management and generation re-dispatch in the LA Basin area after the first contingency. The overload will be relieved after the Lugo-Victorville upgrade is completed and the Delaney-Colorado River 500 kV is in service.
Eastern-T-2	Line 25406 J HINDS 230 kV to 24806 MIRAGE 230 kV	Line PALO VERDE 500 to COLORADO RIVER 500 Circuit 1 AND Line N. GILA 500 to IMPERIAL VALLEY 500 Circuit 1	P6	N-1-1	145.68	<100	<100	<100	<100	<100	<100				The Blythe SPS is triggered to turn off all 3 Blythe units, further overloading Lugo-Victorville 500 kV and reaching diverged condition. Congestion Management and generation re-dispatch in the LA Basin area are needed after the first contingency. The overload will be relieved after the Lugo-Victorville upgrade is completed and the Delaney-Colorado River 500 kV is in service.
Eastern-T-3	Transformer DEVERS 500/230 kV # 1	LINE ALBERHILL 500 to VALLEYS 500 Circuit 1 AND Transformer DEVERS 500/230 #2	P6	N-1, T-1	<100	<100	<100	<100	<100	<100	125.47				Congestion Management, Generation Re-dispatch after 1st contingency

ID	Substation	Worst Contingencies	Category	Category Description	Post Cont. Voltage Deviation %								Potential Mitigation Solutions		
					2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022SP Heavy Renewables & Min Gas Gen	2022 Summer Off-Peak with Maximum PV Output				
	None	None													

ID	Substation	Worst Contingencies	Category	Category Description	Voltage (PU)								Potential Mitigation Solutions		
					2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022SP Heavy Renewables & Min Gas Gen	2022 Summer Off-Peak with Maximum PV Output				
	None	None													

ID	Contingency	Category	Category Description	Transient Stability Performance										Potential Mitigation Solutions
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022SP Heavy Renewables & Min Gas Gen					
Eastern-TS-1	3-Phase Line Fault on Eagle Mountain - Iron Mountain 230 kV line at Iron Mountain End	P1	N-1	Unstable	Unstable	Unstable	Stable	Stable	Unstable					Install Redundant Relay, Check status with SCE/MWD Protection Team
Eastern-TS-2	Eagle Mountain SLG Fault with stuck breaker CB407 at Eagle Mountain, no LBFB and fault not cleared	P4.2	Breaker Failure	Unstable	Unstable	Unstable	Stable	Unstable	Unstable					Install LBFB, Check status with SCE/MWD Protection Team
Eastern-TS-3	Eagle Mountain SLG Fault with stuck breaker CB405 at Eagle Mountain, no LBFB and fault not cleared	P4.2	Breaker Failure	Unstable	Unstable	Unstable	Stable	Stable	Unstable					Install LBFB, Check status with SCE/MWD Protection Team
Eastern-TS-4	3 Phase fault at Etiwanda 230 kV, Etiwanda-San Bernardino & Etiwanda-Vista 230 kVtrip (With Mountain View Generators turned on to Pmax)	P7.1	N-2	Stable	Stable	Stable	Unstable	Stable	Stable					Install interim RAS to reduce Mountain View generation
Eastern-TS-5	3 Phase fault at Devers 500 kV, Devers - Red Bluff 500 kV #1 trip	P1	N-1	Stable										
Eastern-TS-6	3 Phase fault at Valley 500 kV, Devers - Valley 500 kV #1 trip	P1	N-1	Stable										
Eastern-TS-7	3 Phase fault at San Bernardino 230 kV, Devers - San Bernardino 230 kV trip	P1	N-1	Stable										
Eastern-TS-8	3 Phase fault at Vista 230 kV, Devers - Vista 230 kV # 1 trip	P1	N-1	Stable										

ID	Contingency	Category	Category Description	Transient Stability Performance										Potential Mitigation Solutions	
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022SP Heavy Renewables & Min Gas Gen						
Eastern-TS-9	3 Phase fault at El Casco 230 kV, Devers - El Casco 230 kV trip	P1	N-1	Stable											
Eastern-TS-10	3 Phase fault at San Bernardino 230 kV, El Casco - San Bernardino 230 kV trip	P1	N-1	Stable											
Eastern-TS-11	3 Phase fault at Etiwanda 230 kV, Etiwanda - San Bernardino 230 kV trip	P1	N-1	Stable											
Eastern-TS-12	3 Phase fault at San Bernardino 230 kV, Etiwanda - San Bernardino 230 kV trip	P1	N-1	Stable											
Eastern-TS-13	3 Phase fault at Etiwanda 230 kV, Etiwanda - Vista 230 kV trip	P1	N-1	Stable											
Eastern-TS-14	3 Phase fault at San Bernardino 230 kV, San Bernardino - Vista 230 kV trip	P1	N-1	Stable											
Eastern-TS-15	3 Phase fault at Devers 230 kV, Devers - Mirage 230 kV trip	P1	N-1	Stable											
Eastern-TS-16	SLG fault at Devers 500 kV, Devers - Red Bluff 500 kV #1 with stuck breaker follow by Devers-Valley 500 kV #1 trip	P4.2	Breaker Failure	Stable											

ID	Contingency	Category	Category Description	Transient Stability Performance										Potential Mitigation Solutions			
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022SP Heavy Renewables & Min Gas Gen								
Eastern-TS-17	SLG fault at Devers 500 kV, Devers - Red Bluff 500 kV #2 with stuck breaker follow by Devers 1AA bank trip	P4.2	Breaker Failure														
Eastern-TS-18	SLG fault at Valley 500 kV, Valley-Serrano 500 kV with stuck breaker follow by Valley 4AA Bank trip	P4.2	Breaker Failure														
Eastern-TS-19	SLG fault at Mirage 230 kV, Devers-Mirage 230 kV with stuck breaker follow by Coachell Valley-Mirage 230 kV trip	P4.2	Breaker Failure														
Eastern-TS-20	SLG fault at Devers 230 kV, Devers - Vista 230 kV # 1 with stuck breaker follow by Devers 3A bank trip	P4.2	Breaker Failure														
Eastern-TS-21	SLG fault at Devers 230 kV, Devers - Vista 230 kV # 1 with stuck breaker follow by Devers-San Bernardino 230 kV trip	P4.2	Breaker Failure														
Eastern-TS-22	SLG fault at El Casco 230 kV, Devers - El Casco 230 kV with stuck breaker follow by El Casco 2A bank trip	P4.2	Breaker Failure														

ID	Contingency	Category	Category Description	Transient Stability Performance										Potential Mitigation Solutions			
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022SP Heavy Renewables & Min Gas Gen								
Eastern-TS-23	SLG fault at Mirage 230 kV, Mirage-J.Hinids 230 kV with stuck breaker follow by Mirage-Ramon 230 kV trip	P4.2	Breaker Failure														
Eastern-TS-24	3 Phase fault at Rud Bed Bulff 500 kV, Colorado River - Red Bluff 500 kV #1 & #2 trip	P6.1	N-1-1														
Eastern-TS-25	3 Phase fault at Devers 500 kV, Devers - Red Bluff 500 kV #1 & #2 trip	P6.1	N-1-1														
Eastern-TS-26	3 Phase fault at Valley 500 kV, Devers Valley 500 kV #1 & #2 trip	P6.1	N-1-1														
Eastern-TS-27	3 Phase fault at Mirage 230 kV, CVSUB230-Mirage & Ramon-Mirage 230 kV trip	P7.1	N-2														
Eastern-TS-28	3 Phase fault at San Bernardino 230 kV, Devers-San Bernardino & Etiwanda-San Bernardino 230 kV trip	P7.1	N-2														
Eastern-TS-29	3 Phase fault at Vista 230 kV, Devers - Vista 230 kV # 1 & #2 trip	P7.1	N-2														
Eastern-TS-30	3 Phase fault at San Bernardino 230 kV, El Casco-San Bernardino & San Bernardino-Vista230 kV trip	P7.1	N-2														

ID	Contingency	Category	Category Description	Transient Stability Performance										Potential Mitigation Solutions	
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022SP Heavy Renewables & Min Gas Gen						
Eastern-TS-31	3 Phase fault at El Casco 230 kV, El Casco-San Bernardino & Devers-San Bernardino #2 230 kV trip	P7.1	N-2	Stable											
Eastern-TS-32	3 Phase fault at Etiwanda 230 kV, Etiwanda-San Bernardino & Devers-San Bernardino #2 230 kV trip	P7.1	N-2	Stable											
Eastern-TS-33	3 Phase fault at San Bernardino 230 kV, Etiwanda-San Bernardino & San Bernardino-Vista 230 kV trip	P7.1	N-2	Stable											
Eastern-TS-34	3 Phase fault at Etiwanda 230 kV, Etiwanda-San Bernardino & Etiwanda-Vista 230 kV trip	P7.1	N-2	Stable											
Eastern-TS-35	3 Phase fault at Devers 230 kV, Devers - Mirage #1 & #2 230 kV trip	P7.1	N-2	Stable											
Eastern-TS-36	3 Phase fault at BlytheSCE 230 Bus, BlytheSCE-BlytheWALC 161 kV trip	P1	N-1	Stable											
Eastern-TS-37	3 Phase fault at Camino 230 kV, Camino-IronMTN-Gene-Mead 230 kV trip	P1	N-1	Stable											

ID	Contingency	Category	Category Description	Transient Stability Performance										Potential Mitigation Solutions			
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022SP Heavy Renewables & Min Gas Gen								
Eastern-TS-38	3 Phase fault at Camino 230 kV , Camino-IronMTN- Gene-Mead 230 kV & Blythe 1CT trip	P1	N-1														
Eastern-TS-39	3 Phase fault at EagleMTN 161 kV Bus, EagleMTN 230/161 kV Transformer #5 trip	P1	N-1														
Eastern-TS-40	3 Phase fault at EagleMTN 161 kV Bus, BlytheSCE- EagleMTN 161 kV trip	P1	N-1														
Eastern-TS-41	3 Phase fault at EagleMTN 161 kV Bus, BlytheSCE- EagleMTN 161 kV & Blythe 1CT trip (RAS) trip	P1	N-1														
Eastern-TS-42	3 Phase fault at EagleMTN 230 kV Bus, EagleMTN- IronMTN 230 kV trip	P1	N-1														
Eastern-TS-43	3 Phase fault at 20% from Gene 230 kV Bus, Gene- Parker 230 kV trip	P1	N-1														
Eastern-TS-44	3 Phase fault at 20% from Paker 230 kV Bus, Gene- Parker 230 kV trip	P1	N-1														
Eastern-TS-45	3 Phase fault at Julian Hinds 230 kV Bus, Julian Hinds-EagleMTN 230 kV trip	P1	N-1														

ID	Contingency	Category	Category Description	Transient Stability Performance										Potential Mitigation Solutions			
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022SP Heavy Renewables & Min Gas Gen								
Eastern-TS-46	3 Phase fault at Julian Hinds 230 kV Bus, Julian Hinds-EagleMTN 230 kV & Blythe 1CT trip	P1	N-1														
Eastern-TS-47	3 Phase fault at Julian Hinds 230 kV Bus, Julian Hinds-Mirage 230 kV trip	P1	N-1														
Eastern-TS-48	3 Phase fault at Julian Hinds 230 kV Bus, Julian Hinds-Mirage 230 kV & Blythe 1CT trip	P1	N-1														
Eastern-TS-49	3 Phase fault at Palo Verde 500 kV Bus, Colorado River-Palo Verde 500 kV trip	P1	N-1														
Eastern-TS-50	3 Phase fault at Palo Verde 500 kV Bus, Colorado River-Palo Verde 500 kV & Blythe 1CT trip	P1	N-1														
Eastern-TS-51	3 Phase fault at Palo Verde 500 kV Bus, Colorado River-Palo Verde 500 kV & Blythe All trip	P1	N-1														
Eastern-TS-52	SLG fault at Julian Hinds 230 kV Bus, Bus tie CB fault	P2.4	Breaker Fault														

ID	Contingency	Category	Category Description	Transient Stability Performance							Potential Mitigation Solutions							
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022SP Heavy Renewables & Min Gas Gen									
Eastern-TS-53	SLG fault at Gene 230 kV Bus, Gene Bus fault, loss Gene-Parker and Camino-IronMTN-Gene-Mead 230 kV lines	P2.4	Delay Clearing															
Eastern-TS-54	SLG fault at Camino 230 kV , Camino-IronMTN-Gene-Mead 230 kV, CB 307 stuck (close to Iron)	P4.2	Breaker Failure															
Eastern-TS-55	SLG fault at Camino 230 kV , Camino-IronMTN-Gene-Mead 230 kV, CB 208 stuck (close to Gene)	P4.2	Breaker Failure															
Eastern-TS-56	SLG fault at Blythe 161 kV, BlytheSCE-EagleMTN 161 kV, CB 872 stuck at Blythe	P4.2	Breaker Failure															
Eastern-TS-57	SLG fault at Blythe 161 kV, BlytheSCE-EagleMTN 161 kV, CB 872 stuck at Blythe & Blythe 1CT trip (RAS)	P4.2	Breaker Failure															
Eastern-TS-58	SLG fault at EagleMTN 161 kV , BlytheSCE-EagleMTN 161 kV, CB 70 stuck at EagleMTN	P4.2	Breaker Failure															
Eastern-TS-59	SLG fault at EagleMTN 161 kV , BlytheSCE-EagleMTN 161 kV, CB 70 stuck at EagleMTN	P4.2	Breaker Failure															

ID	Contingency	Category	Category Description	Transient Stability Performance										Potential Mitigation Solutions			
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022SP Heavy Renewables & Min Gas Gen								
Eastern-TS-60	SLG fault at EagleMTN 230 kV Bus, EagleMTN-IronMTN 230 kV, CB 407 stuck at EagleMTN	P4.2	Breaker Failure														
Eastern-TS-61	SLG fault at EagleMTN 230 kV Bus, EagleMTN-IronMTN 230 kV, CB 407 stuck at EagleMTN & Blythe 1CT trip	P4.2	Breaker Failure														
Eastern-TS-62	SLG fault at IronMTN 230 kV Bus, EagleMTN-IronMTN 230 kV, CB 307 stuck (close to Iron)	P4.2	Breaker Failure														
Eastern-TS-63	SLG fault at Gene 230 kV , Gene-Parker 230 kV, CB 207 stuck (close to Gene)	P4.2	Breaker Failure														
Eastern-TS-64	SLG fault at EagleMTN 230 kV Bus, Julian Hinds-EagleMTN 230 kV, CB 405 stuck at EagleMTN	P4.2	Breaker Failure														
Eastern-TS-65	SLG fault at EagleMTN 230 kV Bus, Julian Hinds-EagleMTN 230 kV, CB 405 stuck at EagleMTN & Blythe 1CT trip	P4.2	Breaker Failure														
Eastern-TS-66	SLG fault at Julian Hinds 230 kV Bus, Julian Hinds-Mirage 230 kV, Stuck CB at J.Hinds	P4.2	Breaker Failure														

ID	Contingency	Category	Category Description	Transient Stability Performance										Potential Mitigation Solutions			
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022SP Heavy Renewables & Min Gas Gen								
Eastern-TS-67	SLG fault at EagleMTN 230 kV Bus, EagleMTN 230/161 kV Transformer #5	P4.3	Breaker Failure														
Eastern-TS-68	SLG fault at 20% from BlytheSCE 161 Bus, BlytheSCE-EagleMTN 161 kV, non-redundant pilot relay fail	P5.2	Pilot Relay Fail														
Eastern-TS-69	SLG fault at 20% from EagleMTN 161 kV Bus, BlytheSCE-EagleMTN 161 kV, non-redundant pilot relay fail	P5.2	Pilot Relay Fail														
Eastern-TS-70	SLG fault at 20% from EagleMTN 230 kV Bus, EagleMTN-IronMTN 230 kV, pilot relay fail	P5.2	Pilot Relay Fail														
Eastern-TS-71	SLG fault at 20% from IronMTN 230 kV Bus, EagleMTN-IronMTN 230 kV, pilot relay fail	P5.2	Pilot Relay Fail														
Eastern-TS-72	SLG fault at EagleMTN 230 kV Bus, EagleMTN Bus, non-redundant relayfail	P5.5	Bus Relay Failure														
Eastern-TS-73	SLG fault at EagleMTN 230 kV Bus, EagleMTN Bus & Blythe 1CT trip, non-redundant relay fail	P5.5	Bus Relay Failure														
Eastern-TS-74	SLG fault at 20% from EagleMTN 230 kV Bus, Julian Hinds-EagleMTN 230 kV, pilot relay fail	P5.2	Pilot Relay Fail														

ID	Contingency	Category	Category Description	Transient Stability Performance										Potential Mitigation Solutions			
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022SP Heavy Renewables & Min Gas Gen								
Eastern-TS-75	SLG fault at 20% from EagleMTN 230 kV Bus, Julian Hinds-EagleMTN 230 kV & Blythe 1CT trip, pilot relay fail	P5.2	Pilot Relay Fail														
Eastern-TS-76	SLG fault at 20% from Julian Hinds 230 kV Bus, Julian Hinds-EagleMTN 230 kV, pilot relay fail	P5.2	Pilot Relay Fail														
Eastern-TS-77	SLG fault at 20% from Julian Hinds 230 kV Bus, Julian Hinds-EagleMTN 230 kV & Blythe 1CT trip, pilot relay fail	P5.2	Pilot Relay Fail														
Eastern-TS-78	SLG fault at 20% from Julian Hinds 230 kV Bus, Julian Hinds-Mirage 230 kV, , pilot relay fail	P5.2	Pilot Relay Fail														
Eastern-TS-79	SLG fault at 20% from Julian Hinds 230 kV Bus, Julian Hinds-Mirage 230 kV & Blythe 1CT trip, , pilot relay fail	P5.2	Pilot Relay Fail														
Eastern-TS-80	SLG fault at 20% from Mirage 230 kV Bus, Julian Hinds-Mirage 230 kV, , pilot relay fail	P5.2	Pilot Relay Fail														

ID	Contingency	Category	Category Description	Transient Stability Performance										Potential Mitigation Solutions				
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022SP Heavy Renewables & Min Gas Gen									
Eastern-TS-81	SLG fault at 20% from Mirage 230 kV Bus, Julian Hinds-Mirage 230 kV & Blythe 1CT trip, , pilot relay fail	P5.2	Pilot Relay Fail															
Eastern-TS-82	3 Phase fault at Julian Hinds 230 kV Bus, Julian Hinds-EagleMTN & Gene-Parker 230 kV trip	P6.1	N-1-1															
Eastern-TS-83	3 Phase fault at Julian Hinds 230 kV Bus, Julian Hinds-EagleMTN & Gene-Parker 230 kV & Blythe 1CT trip	P6.1	N-1-1															
Eastern-TS-84	3 Phase fault at Julian Hinds 230 kV Bus, Julian Hinds-Mirage & Camino-IronMTN-Gene-Mead 230 kV trip	P6.1	N-1-1															
Eastern-TS-85	3 Phase fault at Julian Hinds 230 kV Bus, Julian Hinds-Mirage & Camino-IronMTN-Gene-Mead 230 kV & Blythe 1CT trip	P6.1	N-1-1															
Eastern-TS-86	3 Phase fault at Julian Hinds 230 kV Bus, Julian Hinds-Mirage & Camino-IronMTN-Gene-Mead 230 kV & Blythe 2CTs trip	P6.1	N-1-1															

ID	Contingency	Category	Category Description	Transient Stability Performance										Potential Mitigation Solutions			
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022SP Heavy Renewables & Min Gas Gen								
Eastern-TS-87	3 Phase fault at Julian Hinds 230 kV Bus, Julian Hinds-Mirage & EagleMTN-IronMTN 230 kV & Blythe 1CT trip	P6.1	N-1-1														
Eastern-TS-88	3 Phase fault at Julian Hinds 230 kV Bus, Julian Hinds-Mirage & EagleMTN-IronMTN 230 kV trip	P6.1	N-1-1														
Eastern-TS-89	3 Phase fault at Julian Hinds 230 kV Bus, Julian Hinds-Mirage & EagleMTN-IronMTN 230 kV & Blythe 2CTs trip	P6.1	N-1-1														
Eastern-TS-90	3 Phase fault at Julian Hinds 230 kV Bus, Julian Hinds-Mirage & Gene-Parker 230 kV trip	P6.1	N-1-1														
Eastern-TS-91	3 Phase fault at Julian Hinds 230 kV Bus, Julian Hinds-Mirage & Gene-Parker 230 kV & Blythe 1CT trip	P6.1	N-1-1														

Study Area: **SCE Eastern area**



Single Contingency Load Drop

ID	Worst Contingencies	Category	Category Description	Amount of Load Drop (MW)										Potential Mitigation Solutions
				Select..	Select..	Select..	Select..	Select..	Select..	Select..	Select..	Select..	Select..	
X-SLD-1														

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

Single Source Substation with more than 100 MW Load

ID	Substation	Load Served (MW)										Potential Mitigation Solutions
		Select..	Select..	Select..	Select..	Select..	Select..	Select..	Select..	Select..	Select..	
X-SS-1												

No single source substation with more than 100 MW Load



ID	Overloaded Facility	Worst Contingencies	Category	Category Description	Loading (%)										Potential Mitigation Solutions
					2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2019SP CEC Peak Shift	2022SP High CEC Load & Peak Shift	2022SP Heavy Renewables & Min Gas Gen	2027SP CEC Peak Shift	2022 Summer Off-Peak with Maximum PV Output	
T-1	Pardee - Sylmar 230 kV #1	Pardee - Sylmar 230 kV #2 & Victorville - Lugo 500 kV	P6	L-1/L-1	<100	<100	124	<100	<100	102	<100	<100	139	<100	System adjustments after initial contingency
T-2	Pardee - Sylmar 230 kV #2	Pardee - Sylmar 230 kV #1 & Victorville Lugo 500 kV	P6	L-1/L-1	<100	<100	124	<100	<100	102	<100	<100	139	<100	System adjustments after initial contingency
T-3	Serrano 500/230 kV Transformer #2	Serrano 500/230 kV Transformer #1 & #3	P6	T-1/T-1	122	<100	<100	<100	<100	124	105	<100	<100	<100	System adjustments after initial or second contingency
T-4	Serrano 500/230 kV Transformer #1	Serrano 500/230 kV Transformer #2 & #3	P6	T-1/T-1	120	<100	<100	<100	<100	122	103	<100	<100	<100	System adjustments after initial or second contingency
T-5	Serrano 500/230 kV Transformer #3	Serrano 500/230 kV Transformer #1 & #2	P6	T-1/T-1	118	<100	<100	<100	<100	120	102	<100	<100	<100	System adjustments after initial or second contingency
T-6	Mira Loma 500/230 kV Transformer #4	Lugo - Rancho Vista & Miara Loma - Serrano 500 kV lines	P6	L-1/L-1	117	<100	<100	<100	<100	120	<100	<100	<100	<100	System adjustments after initial or second contingency
T-7	Mira Loma 500/230 kV Transformer #1	Mira Loma - Serrano 500 kV & Mira Loma 500/230 kV Transformer #2	P6	L-1/T-1	106	<100	<100	<100	<100	108	<100	<100	<100	<100	System adjustments after initial or second contingency
T-8	Mira Loma 500/230 kV Transformer #2	Mira Loma - Serrano 500 kV & Mira Loma 500/230 kV Transformer #1	P6	L-1/T-1	105	<100	<100	<100	<100	106	<100	<100	<100	<100	System adjustments after initial or second contingency
T-9	Eagle Rock - Gould 230 kV	Gould - Sylmar 230 kV & Victorville - Lugo 500 kV	P6	L-1/L-1	105	<100	<100	<100	<100	107	<100	<100	<100	<100	System adjustments after initial contingency
T-10	Mesa - Laguna Bell 230 kV #1	Mesa - Redondo & Mesa - Lighthipe 230 kV lines	P6	L-1/L-1	<100	<100	<100	<100	<100	<100	102	<100	<100	<100	System adjustments after initial contingency

ID	Substation	Worst Contingencies	Category	Category Description	Post Cont. Voltage Deviation %										Potential Mitigation Solutions	
					2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2019SP CEC Peak Shift	2022SP High CEC Load & Peak Shift	2022SP Heavy Renewables & Min Gas Gen	2027SP CEC Peak Shift	2022 Summer Off-Peak with Maximum PV Output		

No voltage deviation issues were identified.

ID	Substation	Worst Contingencies	Category	Category Description	Voltage (PU)										Potential Mitigation Solutions
					2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2019SP CEC Peak Shift	2022SP High CEC Load & Peak Shift	2022SP Heavy Renewables & Min Gas Gen	2027SP CEC Peak Shift	2022 Summer Off-Peak with Maximum PV Output	

No high/low voltage issues were identified

ID	Contingency	Category	Category Description	Transient Stability Performance							Potential Mitigation Solutions
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022SP High CEC Load & Peak Shift	2022 Summer Off-Peak with Maximum PV Output	
TS-1	Alamitos 230 kV South Bus Section A G-1 with stuck breaker; 1-PH fault @ ALMITOSW 230 kV, Delayed Clearing	P4.5	Stuck breaker	Stable	Stable	Stable	Stable	Stable	Stable	N/A	
TS-2	Alamitos 230 kV South Bus Section B G-1 with stuck breaker; 1-PH fault @ ALMITOSE 230 kV, Delayed Clearing	P4.5	Stuck breaker	Stable	Stable	Stable	Stable	Stable	Stable	N/A	
TS-3	Alamitos 230 kV North Bus Section A L-1 with stuck breaker; 1-PH fault @ ALMITOSW 230 kV, Delayed Clearing	P4.5	Stuck breaker	Stable	Stable	Stable	Stable	Stable	Stable	N/A	
TS-4	Alamitos 230 kV North Bus Section B L-1 with stuck breaker; 1-PH fault @ ALMITOSE 230 kV, Delayed Clearing	P4.5	Stuck breaker	Stable	Stable	Stable	Stable	Stable	Stable	N/A	
TS-5	Redondo 230 kV West Bus G-1 with stuck breaker; 1-PH fault @ REDONDO 230 kV, Delayed Clearing	P4.5	Stuck breaker	Stable	Stable	Stable	Stable	Stable	Stable	N/A	
TS-6	Redondo 230 kV East Bus L-1 with stuck breaker; 1-PH fault @ REDONDO 230 kV, Delayed Clearing	P4.5	Stuck breaker	Stable	Stable	Stable	Stable	Stable	Stable	N/A	
TS-7	Walnut 230 kV North Bus Section A L-2 with stuck breaker ; 1-PH fault @ WALNUTW 230 kV, Delayed Clearing	P4.5	Stuck breaker	Stable	Stable	Stable	Stable	Stable	Stable	N/A	
TS-8	El Segundo 230 kV North Bus L-1&G-1 with stuck breaker ; 1-PH fault @ ELSEGND 230 kV, Delayed Clearing	P4.5	Stuck breaker	Stable	Stable	Stable	Stable	Stable	Stable	N/A	
TS-9	El Segundo 230 kV South Bus L-1&G-1 with stuck breaker; 1-PH fault @ ELSEGND 230 kV, Delayed Clearing	P4.5	Stuck breaker	Stable	Stable	Stable	Stable	Stable	Stable	N/A	
TS-10	Etiwanda North Bus L-1 with stuck breaker; 1-PH fault @ ETIWANDA 230 kV, Delayed Clearing	P4.5	Stuck breaker	Stable	Stable	Stable	Stable	Stable	Stable	N/A	
TS-11	Etiwanda 230 kV South Bus G-1 with stuck breaker; 1-PH fault @ ETIWANDA 230 kV, Delayed Clearing	P4.5	Stuck breaker	Stable	Stable	Stable	Stable	Stable	Stable	N/A	
TS-12	Hinson 230 kV North Bus L-1 with stuck breaker; 1-PH fault @ HINSON 230 kV, Delayed Clearing	P4.5	Stuck breaker	Stable	Stable	Stable	Stable	Stable	Stable	N/A	
TS-13	Ellis 230 kV North Bus L-1 with stuck breaker; 1-PH fault @ ELLIS 230 kV, Delayed Clearing	P4.5	Stuck breaker	Stable	Stable	Stable	Stable	Stable	Stable	N/A	
TS-14	Huntington Beach 230 kV South Bus Section A G-1&L-1 with stuck breaker ; 1-PH fault @ HUNTGBCH 230 kV, Delayed Clearing	P4.5	Stuck breaker	Stable	Stable	Stable	Stable	Stable	Stable	N/A	
TS-15	Alamitos 230 kV North Bus Section A stuck bus-tie breaker; 1-PH fault @ ALMITOSW 230 kV, Delayed Clearing	P4.6	Stuck breaker	Stable	Stable	Stable	Stable	Stable	Stable	N/A	
TS-16	Huntington Beach 230 kV North Bus Section A G-1 stuck bus-tie breaker; 1-PH fault @ HUNTGBCH 230 kV, Delayed Clearing	P4.6	Stuck breaker	Stable	Stable	Stable	Stable	Stable	Stable	N/A	
TS-17	Walnut 230 kV North Bus Section A L-1&T-1 stuck bus-tie breaker; 1-PH fault @ WALNUTW 230 kV, Delayed Clearing	P4.6	Stuck breaker	Stable	Stable	Stable	Stable	Stable	Stable	N/A	
TS-18	Alamitos 230 kV (Sec. "A") station bus differential relay failure; 1-PH fault @ ALMITOSW 230 kV, Delayed clearing	P5.5	Relay failure	Stable	Stable	Stable	Stable	Stable	Stable	N/A	
TS-19	Alamitos 230 kV (Sec. "B") station bus differential relay failure; 1-PH fault @ ALMITOSE 230 kV, Delayed clearing	P5.5	Relay failure	Stable	Stable	Stable	Stable	Stable	Stable	N/A	
TS-20	Barre 230 kV station bus differential relay failure; 1-PH fault @ BARRE 230 kV, Delayed clearing	P5.5	Relay failure	Stable	Stable	Stable	Stable	Stable	Stable	N/A	
TS-21	Center 230 kV station bus differential relay failure; 1-PH fault @ CENTER 230 kV, Delayed clearing	P5.5	Relay failure	Stable	Stable	Stable	Stable	Stable	Stable	N/A	
TS-22	Chino 230 kV station bus differential relay failure; 1-PH fault @ CHINO 230 kV, Delayed clearing	P5.5	Relay failure	Stable	Stable	Stable	Stable	Stable	Stable	N/A	
TS-23	Eagle Rock 230 kV station bus differential relay failure; 1-PH fault @ EAGLROCK 230 kV, Delayed clearing	P5.5	Relay failure	Stable	Stable	Stable	Stable	Stable	Stable	N/A	
TS-24	El Nido 230 kV station bus differential relay failure; 1-PH fault @ EL NIDO 230 kV, Delayed clearing	P5.5	Relay failure	Stable	Stable	Stable	Stable	Stable	Stable	N/A	
TS-25	El Segundo 230 kV station bus differential relay failure; 1-PH fault @ ELSEGND 230 kV, Delayed clearing	P5.5	Relay failure	Stable	Stable	Stable	Stable	Stable	Stable	N/A	
TS-26	Etiwanda 230 kV station bus differential relay failure; 1-PH fault @ ETIWANDA 230 kV, Delayed clearing	P5.5	Relay failure	Stable	Stable	Stable	Stable	Stable	Stable	N/A	
TS-27	Goodrich 230 kV station bus differential relay failure; 1-PH fault @ GOODRICH 230 kV, Delayed clearing	P5.5	Relay failure	Stable	Stable	Stable	Stable	Stable	Stable	N/A	
TS-28	Harboren 230 kV station bus differential relay failure; 1-PH fault @ HARBOR 230 kV, Delayed clearing	P5.5	Relay failure	Stable	Stable	Stable	Stable	Stable	Stable	N/A	
TS-29	Hinson 230 kV station bus differential relay failure; 1-PH fault @ HINSON 230 kV, Delayed clearing	P5.5	Relay failure	Stable	Stable	Stable	Stable	Stable	Stable	N/A	
TS-30	Laguna Bell 230 kV station bus differential relay failure; 1-PH fault @ LAGUBELL 230 kV, Delayed clearing	P5.5	Relay failure	Stable	Stable	Stable	Stable	Stable	Stable	N/A	
TS-31	Lewis 230 kV station bus differential relay failure; 1-PH fault @ LEWIS 230 kV, Delayed clearing	P5.5	Relay failure	Stable	Stable	Stable	Stable	Stable	Stable	N/A	
TS-32	Lighthipe 230 kV station bus differential relay failure; 1-PH fault @ LITEHIPE 230 kV, Delayed clearing	P5.5	Relay failure	Stable	Stable	Stable	Stable	Stable	Stable	N/A	
TS-33	Mesa 230 kV station bus differential relay failure; 1-PH fault @ MESA CAL 230 kV, Delayed clearing	P5.5	Relay failure	Stable	Stable	Stable	Stable	Stable	Stable	N/A	

ID	Contingency	Category	Category Description	Transient Stability Performance							Potential Mitigation Solutions
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022SP High CEC Load & Peak Shift	2022 Summer Off-Peak with Maximum PV Output	
TS-34	Olinda 230 kV station bus differential relay failure; 1-PH fault @ OLINDA 230 kV, Delayed clearing	P5.5	Relay failure	Stable	Stable	Stable	Stable	Stable	Stable	N/A	
TS-35	Redondo 230 kV station bus differential relay failure; 1-PH fault @ REDONDO 230 kV, Delayed clearing	P5.5	Relay failure	Stable	Stable	Stable	Stable	Stable	Stable	N/A	
TS-36	Walnut 230 kV (Sec. "A") station bus differential relay failure; 1-PH fault @ WALNUTW 230 kV, Delayed clearing	P5.5	Relay failure	Stable	Stable	Stable	Stable	Stable	Stable	N/A	
TS-37	Walnut 230 kV (Sec. "B") station bus differential relay failure; 1-PH fault @ WALNUTE 230 kV, Delayed clearing	P5.5	Relay failure	Stable	Stable	Stable	Stable	Stable	Stable	N/A	
TS-38	Sunrise & SWPL 500 kV; 3-PH fault @ Suncrest 500 kV, Normal clearing	P6	L-1/L-1	Stable	Stable	Stable	Stable	Stable	Stable	N/A	
TS-39	Devers-Valley & Serrano-Valley 500 kV; 3-PH fault @ Valley, Normal clearing	P6	L-1/L-1	Stable	Stable	Stable	Stable	Stable	Stable	N/A	
TS-40	La Fresa-Redondo 230 kV #1 & #2; 1-PH fault @ Redondo, Normal clearing	P7	L-2	Stable	Stable	Stable	Stable	Stable	Stable	N/A	

ID	Worst Contingencies	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.

Single Source Substation with more than 100 MW Load

ID	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 Load

ID	Overloaded Facility	Worst Contingencies	Category	Category Description	Loading (%)						Potential Mitigation Solutions
					2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022 Summer Off-Peak with Maximum PV Output	
VEA-T-1	Jackass - Mercury SW 138kV Line	VISTA -JOHNNIE -VALLEYTP 138-kV Line CKT 1	P1	Single contingency	<95	<95	<95	<95	<95	130.63	New RAS proposed in GIDAP process
VEA-T-2	Jackass - Mercury SW 138kV Line	VISTA-CHARLSTN 138 & VISTA-JOHNIE 138; BKR VI242	P4	Fault plus stuck breaker	<95	<95	<95	<95	<95	130.37	New RAS proposed in GIDAP process
VEA-T-3	Jackass - Mercury SW 138kV Line	PAHRUMP-INNOVATION 230 & VISTA-JOHNIE 138	P7	Common structure	<95	<95	<95	<95	<95	130.32	New RAS proposed in GIDAP process
VEA-T-4	Valley - LTHRPWLS 138kV Line	VISTA-CHARLSTN 138 & VISTA-PAHRUMP 138; BKR VI232	P4	Fault plus stuck breaker	<95	<95	<95	<95	<95	108.93	New RAS proposed in GIDAP process
VEA-T-5	LTHRPWLS- JACKASSF 138kV Line	VISTA-CHARLSTN 138 & VISTA-PAHRUMP 138; BKR VI232	P4	Fault plus stuck breaker	<95	<95	<95	<95	<95	106.23	New RAS proposed in GIDAP process
VEA-T-6	Pahrump 230/138kV Transformers Nos.3&4	Bob-Mead 230kV & Eldorado 230/115kV Transformer No.5	P6	Two overlapping singles	<95	Nconv	<95	<95	<95	<95	Ivanpah RAS
VEA-T-7	Pahrump-Vista 138kV Line	VALLEYTP -LTHRPWLS & CHARLSTN -VISTA 138kV lines	P6	Two overlapping singles	<95	<95	<95	<95	<95	110.30	New RAS proposed in GIDAP process
VEA-T-8	Jackass-ValleyNTS-Tweezer 138kV Line	VISTA -JOHNNIE -VALLEYTP & Mercury SW-Jackass Flats 138kV lines	P6	Two overlapping singles	<95	<95	<95	<95	<95	116.87	New RAS proposed in GIDAP process
VEA-T-9	Tweezer-French Flat 138kV Line	VISTA -JOHNNIE -VALLEYTP & Mercury SW-Jackass Flats 138kV lines	P6	Two overlapping singles	<95	<95	<95	<95	<95	111.25	New RAS proposed in GIDAP process

ID	Overloaded Facility	Worst Contingencies	Category	Category Description	Loading (%)						Potential Mitigation Solutions
					2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022 Summer Off-Peak with Maximum PV Output	
VEA-T-10	French Flat-Merc dist 138kV Line	VISTA -JOHNNIE -VALLEYTP & Mercury SW-Jackass Flats 138kV lines	P6	Two overlapping singles	<95	<95	<95	<95	<95	108.56	New RAS proposed in GIDAP process
VEA-T-11	System diverge	Pahrump-Bob SS & Pahrump-Innovation 230kV lines	P6	Two overlapping singles	<95	Nconv	Nconv	<95	<95	<95	Existing UVLS or operational action plan
VEA-T-12											
VEA-T-13											
VEA-T-14											
VEA-T-15											
VEA-T-16											
VEA-T-17											
VEA-T-18											
VEA-T-19											
VEA-T-20											



ID	Substation	Worst Contingencies	Category	Category Description	Post Cont. Voltage Deviation %						Potential Mitigation Solutions
					2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022 Summer Off-Peak with Maximum PV Output	
VEA-VD-1											
VEA-VD-2											
VEA-VD-3											
VEA-VD-4											
VEA-VD-5											
VEA-VD-6											
VEA-VD-7											
VEA-VD-8											
VEA-VD-9											
VEA-VD-10											
VEA-VD-11											
VEA-VD-12											
VEA-VD-13											
VEA-VD-14											
VEA-VD-15											
VEA-VD-16											
VEA-VD-17											
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VEA-VD-23											
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VEA-VD-25											
VEA-VD-26											
VEA-VD-27											
VEA-VD-28											
VEA-VD-29											
VEA-VD-30											
VEA-VD-31											
VEA-VD-32											



ID	Substation	Worst Contingencies	Category	Category Description	Post Cont. Voltage Deviation %						Potential Mitigation Solutions
					2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022 Summer Off-Peak with Maximum PV Output	
VEA-VD-33											
VEA-VD-34											
VEA-VD-35											

ID	Substation	Worst Contingencies	Category	Category Description	Voltage (PU)						Potential Mitigation Solutions
					2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022 Summer Off-Peak with Maximum PV Output	
VEA-V-1	Pahrump 230kV	Pahrump-Innovation & Pahrump-Mead 230kV lines	P6	Two overlapping singles	>0.9	>0.9	>0.9	0.8773	>0.9	>0.9	Existing UVLS
VEA-V-2	System diverge	Desert View-Nwest & Pahrump-Bob SS 230kV lines	P6	Two overlapping singles	>0.9	Nconv	Nconv	>0.9	>0.9	>0.9	Existing UVLS
VEA-V-3	System diverge	Pahrump-Bob SS & Pahrump-Innovation 230kV lines	P6	Two overlapping singles	>0.9	Nconv	Nconv	>0.9	>0.9	>0.9	Existing UVLS
VEA-V-4	Vista, Charlstn and Thsdair 138kV buses	GAMEBIRD -THSND AIR & PAHRUMP - VISTA 138kV lines	P6	Two overlapping singles	0.8983	0.8257	0.8237	>0.9	>0.9	>0.9	Existing UVLS
VEA-V-5											
VEA-V-6											
VEA-V-7											
VEA-V-8											
VEA-V-9											
VEA-V-10											
VEA-V-11											
VEA-V-12											
VEA-V-13											

ID	Contingency	Category	Category Description	Transient Stability Performance						Potential Mitigation Solutions
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022 Summer Off-Peak with Maximum PV Output	
VEA-TS-1	INNOVATION -DESERT VIEW 230.0-kV Line	P1.2	Single contingency	Stable	Stable	Stable	Stable	Stable	Stable	
VEA-TS-2	DESERT VIEW -NWEST 230.0-kV Line	P1.2	Single contingency	Stable	Stable	Stable	Stable	Stable	Stable	
VEA-TS-3	PAHRUMP -BOB 230.0-kV Line CKT 1	P1.2	Single contingency	N/A	Stable	Stable	Stable	Stable	Stable	
VEA-TS-4	MEAD S -BOB 230.0-kV Line CKT 1	P1.2	Single contingency	N/A	Stable	Stable	Stable	Stable	Stable	
VEA-TS-5	ELDORDO2 -BOB 230.0-kV Line CKT 1	P1.2	Single contingency	N/A	Stable	Stable	Stable	Stable	Stable	
VEA-TS-6	PAHRUMP -INNOVATION 230.0-kV Line CKT 1	P1.2	Single contingency	Stable	Stable	Stable	Stable	Stable	Stable	
VEA-TS-7	PAHRUMP 138/230-kV Tran Bnk 3	P1.3	Single contingency	Stable	Stable	Stable	Stable	Stable	Stable	
VEA-TS-8	INNOVATION 138/230-kV Tran Bnk 1	P1.3	Single contingency	Stable	Stable	Stable	Stable	Stable	Stable	
VEA-TS-9	THSNDAIR-CHARLSTN 138 & THSNDAIR-GAMEBIRD 138; BKR TH222	P4.2	Stuck breaker	Stable	Stable	Stable	Stable	Stable	Stable	
VEA-TS-10	PAHRUMP-GAMEBIRD 138 & GAMEBIRD-THSNDAIR 138; BKR GB222	P4.2	Stuck breaker	Stable	Stable	Stable	Stable	Stable	Stable	
VEA-TS-11	PAHRUMP-GAMEBIRD 138 & GAMEBIRD-SANDY 138; BKR GB212"	P4.2	Stuck breaker	Stable	Stable	Stable	Stable	Stable	Stable	
VEA-TS-12	SANDY-GAMEBIRD 138 & GAMEBIRD-THSNDAIR 138; BKR GB232	P4.2	Stuck breaker	Stable	Stable	Stable	Stable	Stable	Stable	
VEA-TS-13	PAHRUMP-VISTA 138 & PAHRUMP-GAMEBIRD 138; BKR PA222	P4.2	Stuck breaker	Stable	Stable	Stable	Stable	Stable	Stable	
VEA-TS-14	BOB SS 230-kV BRKR	P4.2	Stuck breaker	N/A	Stable	Stable	Stable	Stable	Stable	
VEA-TS-15	PAHRUMP 138/230kV Tran Bnk. 3 & PAHRUMP-BOB 230-kV Line; BKR PA112	P4.3	Stuck breaker	N/A	Stable	Stable	Stable	Stable	Stable	
VEA-TS-16	PAHRUMP 138/230kV Tran Bnk. 3 & PAHRUMP-INNOVATION 230; BKR PA132	P4.3	Stuck breaker	Stable	Stable	Stable	Stable	Stable	Stable	
VEA-TS-17	PAHRUMP-MEAD 230 & PAHRUMP-GAMEBIRD 138	P7.1	Normal clearing	Stable	Stable	Stable	Stable	Stable	Stable	



ID	Contingency	Category	Category Description	Transient Stability Performance						Potential Mitigation Solutions
				2019 Summer Peak	2022 Summer Peak	2027 Summer Peak	2019 Spring Light Load	2022 Spring Off-Peak	2022 Summer Off-Peak with Maximum PV Output	
VEA-TS-18	PAHRUMP-BOB 230 & PAHRUMP-GAMEBIRD 138	P7.1	Normal clearing	Stable	Stable	Stable	Stable	Stable	Stable	
VEA-TS-19	PAHRUMP-MEAD 230 & GAMEBIRD -SANDY 138	P7.1	Normal clearing	Stable	Stable	Stable	Stable	Stable	Stable	
VEA-TS-20	PAHRUMP-BOB 230 & GAMEBIRD -SANDY 138	P7.1	Normal clearing	N/A	Stable	Stable	Stable	Stable	Stable	
VEA-TS-21	PAHRUMP-INNOVATION 230 & PAHRUMP-VISTA 138	P7.1	Normal clearing	Stable	Stable	Stable	Stable	Stable	Stable	
VEA-TS-22	PAHRUMP-INNOVATION 230 & VISTA-JOHNIE 138	P7.1	Normal clearing	Stable	Stable	Stable	Stable	Stable	Stable	
VEA-TS-23										
VEA-TS-24										
VEA-TS-25										
VEA-TS-26										
VEA-TS-27										
VEA-TS-28										
VEA-TS-29										
VEA-TS-30										
VEA-TS-31										

Single Contingency Load Drop

ID	Worst Contingencies	Category	Category Description	Amount of Load Drop (MW)										Potential Mitigation Solutions
				Select..	Select..	Select..	Select..	Select..	Select..	Select..	Select..	Select..	Select..	
X-SLD-1														

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

Single Source Substation with more than 100 MW Load

ID	Substation	Load Served (MW)										Potential Mitigation Solutions
		Select..	Select..	Select..	Select..	Select..	Select..	Select..	Select..	Select..	Select..	
X-SS-1												

No single source substation with more than 100 MW Load

ID	Overloaded Facility	Worst Contingencies	Category	Category Description	Loading (%)										Potential Mitigation Solutions	
					B1: 2019 Summer Peak	B2: 2022 Summer Peak	B3: 2027 Summer Peak	B4: 2019 Spring Light Load	B5: 2022 Spring Off-Peak	S1: 22SP High Load & Peak Shift	S2: 19SP Peak Shift	S3: 27SP Peak Shift	S4:22SP High Renewables Output	S5: 22SP Heavy Northbound Flow		
T01	22227 ENCINATP 230 22716 SANLUSRY 230 1 1	P1L-23027_ 22716 SANLUSRY 230 22232 ENCINA 230 1 1	P1	N-1						126.6					107.5	Rely on operation procedure (OP) to mitigate the P6 concerns by reducing northbound flow via north of SONGS switchyard after first level contingency; develop SPS shedding generation or cost-effective solution to mitigate the P1/P4/P7 concerns by improving the transfer capability of 230 kV transmission corridor from Mission to San Luis Rey via Encina substation, including potential mitigations such as system reconfiguration, reconductor, and/or installation of power flow controller
T02		P4-06_ENCINA 230 kV 4T CB	P4	Breaker Fault/Stuck Breaker						126.5					107.8	
T03		P1L-23027_ 22716 SANLUSRY 230 22232 ENCINA 230 1 1 and P1ML-23061_ 22846 TALEGA-CAPSTRNO-ESCNDIDO 3T 230 1 1	P6	N-1-1						144.2					123.5	
T04		P1L-23057_ 22710 SANLUSRY SC 230 22504 MISSION 230 1 1 and P1L-23027_ 22716 SANLUSRY 230 22232 ENCINA 230 1 1	P6	N-1-1						141.6					121.0	
T05		P1L-50002_ 22536 N.GILA 500 22360 IMPRLVLY 500 &1 and P1L-23027_ 22716 SANLUSRY 230 22232 ENCINA 230 1 1	P6	N-1-1						170.1					97.1	
T06	22716 SANLUSRY 230 22232 ENCINA 230 1 1	P1ML-23064_ 22227 ENCINA-SANLUSRY-PEN 3-T 230 1 1	P1	N-1						113.3					95.8	
T07		P1ML-23064_ 22227 ENCINA-SANLUSRY-PEN 3-T 230 1 1 and P1L-50002_ 22536 N.GILA 500 22360 IMPRLVLY 500 &1	P6	N-1-1						154.5						
T08		P1L-23057_ 22710 SANLUSRY SC 230 22504 MISSION 230 1 1 and P1ML-23064_ 22227 ENCINA-SANLUSRY-PEN 3-T 230 1 1	P6	N-1-1						128.1					109.09	
T09		P1ML-23061_ 22846 TALEGA-CAPSTRNO-ESCNDIDO 3T 230 1 1 and P1ML-23064_ 22227 ENCINA-SANLUSRY-PEN 3-T 230 1 1	P6	N-1-1						127.8					109.15	
T10		P7-17_PEN-EA-SA 230KV + BQ-CC-SH-MDWLRKTP 138KV	P7	Common structure						113.3					95.8	
T11	22227 ENCINATP 230 22232 ENCINA 230 1 1	P1L-23027_ 22716 SANLUSRY 230 22232 ENCINA 230 1 1 and P1L-50002_ 22536 N.GILA 500 22360 IMPRLVLY 500 &1	P6	N-1-1						133.8						
T12		P1L-23057_ 22710 SANLUSRY SC 230 22504 MISSION 230 1 1 and P1L-23027_ 22716 SANLUSRY 230 22232 ENCINA 230 1 1	P6	N-1-1						109.0						

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Study Area **SDG&E Main**

Thermal Overload



ID	Overloaded Facility	Worst Contingencies	Category	Category Description	Loading (%)										Potential Mitigation Solutions
					B1: 2019 Summer Peak	B2: 2022 Summer Peak	B3: 2027 Summer Peak	B4: 2019 Spring Light Load	B5: 2022 Spring Off-Peak	S1: 22SP High Load & Peak Shift	S2: 19SP Peak Shift	S3: 27SP Peak Shift	S4: 22SP High Renewables Output	S5: 22SP Heavy Northbound Flow	
T13	22716 SANLUSRY 230 24131 S.ONOFRE 230 3 1	P4-46_SANLUSRY 230 kV 1T CB	P4	Breaker Fault/Stuck Breaker						111.5					Rely on OP to mitigate the P6 concerns by reducing northbound flow via north of SONGS switchyard; develop SPS shedding generation or reconfigure the 230 kV system between San Luis Rey substation and SONGS switchyard to mitigate the P4/P7 concerns
T14		P1L-23093_ 22716 SANLUSRY 230 24131 S.ONOFRE 230 1 1 and P1L-23095_ 22716 SANLUSRY 230 24131 S.ONOFRE 230 3 1	P6	N-1-1						117.9				91.8	
T15		P7-02_SA-SO 2 + SO-SA 3 230KV	P7	Common structure							128.3				
T16	22430 SILVERGT 230 22596 OLD TOWN 230 1 1	P2.1-01_TL23028A SILVERGT-OLDTWNTP TAP A	P2	P2.1						99.1					117.1
T17		P1ML-23019_ 22596 MISSION-OLD TOWN-SILVERGT 3-T 230 1 1 and P1L-23033_ 22832 SYCAMORE 230 22652 PENSQTOS 230 1 1	P6	N-1-1	127.9	108.4	99.4			133.6	108.3	119.8	93.4	93.6	158.2
T18		P1ML-23019_ 22596 MISSION-OLD TOWN-SILVERGT 3-T 230 1 1 and P1L-50002_ 22536 N.GILA 500 22360 IMPRLVLY 500 &1	P6	N-1-1						126.1					
T19	22430 SILVERGT 230 22597 OLDTWNTP 230 1 1	P4-53_SILVERGATE 230 kV 2T CB	P4	Breaker Fault/Stuck Breaker	96.4					104.3		92.7			125.3
T20		P1L-23011_ 22430 SILVERGT 230 22596 OLD TOWN 230 1 1 and P1L-23033_ 22832 SYCAMORE 230 22652 PENSQTOS 230 1 1	P6	N-1-1	126.7	106.6	97.7			133.0	106.7	118.6	91.6	91.9	157.1
T21		P1L-23011_ 22430 SILVERGT 230 22596 OLD TOWN 230 1 1 and P1L-50003RAS1_ 23310 OCOTILLO 500 22885 SUNCREST 500 &1	P6	N-1-1	107.0	91.9					101.2	110.0			
T22		P1L-23014_ 22464 MIGUEL 230 22504 MISSION 230 1 1 and P1L-23011_ 22430 SILVERGT 230 22596 OLD TOWN 230 1 1	P6	N-1-1	106.7	90.3				117.2	95.5	102.2			139.8
T23		P1L-23015_ 22464 MIGUEL 230 22504 MISSION 230 2 1 and P1L-23011_ 22430 SILVERGT 230 22596 OLD TOWN 230 1 1	P6	N-1-1	106.6	90.2				117.0	95.3	102.0			139.7
T24	22430 SILVERGT 230 22771	P1L-23014_ 22464 MIGUEL 230 22504 MISSION 230 1 1 and P1L-23033_ 22832 SYCAMORE 230 22652 PENSQTOS 230 1 1	P6	N-1-1	106.5	96.1	91.7			103.1	100.8	103.0	91.7	90.9	126.8

2017-2018 ISO Reliability Assessment - Study Results

Study Area **SDG&E Main**

Thermal Overload



ID	Overloaded Facility	Worst Contingencies	Category	Category Description	Loading (%)										Potential Mitigation Solutions	
					B1: 2019 Summer Peak	B2: 2022 Summer Peak	B3: 2027 Summer Peak	B4: 2019 Spring Light Load	B5: 2022 Spring Off-Peak	S1: 22SP High Load & Peak Shift	S2: 19SP Peak Shift	S3: 27SP Peak Shift	S4:22SP High Renewables Output	S5: 22SP Heavy Northbound Flow		
T25	BAY BLVD 230 1 1	P1L-23015_ 22464 MIGUEL 230 22504 MISSION 230 2 1 and P1L-23033_ 22832 SYCAMORE 230 22652 PENSQTOS 230 1 1	P6	N-1-1	106.4	96.0	91.6		103.0	100.7	102.9	91.6	90.8	126.7		
T28	22360 IMPRLVLY 500 22361 IV BK80 MP 500 1 1	P1T-50032_ 22356 IMPRLVLY BK81 500/230 1 1 and P1T-50033_ 22356 IMPRLVLY BK82 500/230 1 1	P6	N-1-1	181.4	177.6	203.5		242.4	103.0	109.4	133.1	168.7	211.1	maintenance program to upgrade aged and non-standard IV BK80	
T26	22609 OTAYMESA 230 20149 TJI-230 230 1 1	P1L-50003RAS1_ 23310 OCOTILLO 500 22885 SUNCREST 500 &1 and P1L-50001RAS2_ 22930 ECO 500 22468 MIGUEL 500 &1	P6	N-1-1	99.1	106.2					90.7		112.0	115.2	rely on OP to reduce import level via SDIT while maintaining generation support to avoid the S-line overload and adjust phase angle of IV-PST after the first level contingency;	
T27		P1L-50003RAS2_ 23310 OCOTILLO 500 22885 SUNCREST 500 &1 and P1L-50001RAS1_ 22930 ECO 500 22468 MIGUEL 500 &1	P6	N-1-1	101.4	108.8				96.9	98.2		108.1	114.1		
T29	22468 MIGUEL 500 22472 MIGUELMP 500 1 1	P1T-50012_ 22464 MIGUEL BK81 500/230 2 1	P1	N-1	107.5	108.8	111.9					98.3	109.8		Implement previously proposed operational mitigation that modifies existing Miguel Bank SPS to shed generation and open TL50001 as needed for the P1/P3/P6 events, along with system adjustment to reduce SDIT import and adjust phase angle of IV-PST after first level contingency while maintaining generation support avoiding the S-line overload; as an alternative to the operational mitigation of opening TL50001, procure preferred resources and energy storage to approximate range of 200~300 MW in San Diego County or upgrade Miguel 500/230 kV substation in order to reduce exposure to the loss of Southwest Powerlink	
T30		P1G_OT_OTAY MESA Plant and P1T-50012_ 22464 MIGUEL BK81 500/230 2 1	P3	G-1/L-1	115.3	112.4	118.4			94.1	101.7	110.4	113.3	98.1		
T31		P1G_OT_OTAY MESA Plant and P1T-50012RAS1_ 22464 MIGUEL BK81 500/230 2 1	P3	G-1/L-1	105.1	102.0	108.6			90.7	98.2	106.9	98.1			
T32		P4-25_MIGUEL 230 kV 2T CB	P4	Breaker Fault/Stuck Breaker	106.5	107.8	111.3					97.6	109.1			
T33		P1L-50003RAS1_ 23310 OCOTILLO 500 22885 SUNCREST 500 &1 and P1T-50012_ 22464 MIGUEL BK81 500/230 2 1	P6	N-1-1	144.5	143.2	145.5				122.4	133.6	143.2	135.3		110.2
T34		P1L-50003RAS1_ 23310 OCOTILLO 500 22885 SUNCREST 500 &1 and P1T-50012RAS2_ 22464 MIGUEL BK81 500/230 2 1	P6	N-1-1	128.3	127.0	129.4				106.6	118.0	127.2	125.2		93.4
T35		P1T-50012_ 22464 MIGUEL BK81 500/230 2 1 and P1L-50003RAS1_ 23310 OCOTILLO 500 22885 SUNCREST 500 &1	P6	N-1-1	141.0	140.3	142.4				115.5	127.2	137.3	133.3		107.7
T36		P1T-50012RAS1_ 22464 MIGUEL BK81 500/230 2 1 and P1L-50003RAS2_ 23310 OCOTILLO 500 22885 SUNCREST 500 &1	P6	N-1-1	122.5	121.3	123.6				99.5	111.2	121.3	120.1		

ID	Overloaded Facility	Worst Contingencies	Category	Category Description	Loading (%)										Potential Mitigation Solutions		
					B1: 2019 Summer Peak	B2: 2022 Summer Peak	B3: 2027 Summer Peak	B4: 2019 Spring Light Load	B5: 2022 Spring Off-Peak	S1: 22SP High Load & Peak Shift	S2: 19SP Peak Shift	S3: 27SP Peak Shift	S4:22SP High Renewables Output	S5: 22SP Heavy Northbound Flow			
T37	22885 SUNCREST 500 22888 SNCRSMP1 500 1 1	P1T-50022_ 22885 SUNCREST BK81 500/230 1 1 and P1L-50001RAS1_ 22930 ECO 500 22468 MIGUEL 500 &1	P6	N-1-1	127.9	124.1	125.9				104.3	116.5	122.7	118.5	97.7	Develop 30-minute emergency ratings for Suncrest Bank #80/81 by upgrading bank drops, along with system adjustment to reduce SDIT import and adjust phase angle of IV-PST after first level contingency while maintaining generation support avoiding the S-line overload	
T38		P1T-50022RAS1_ 22885 SUNCREST BK81 500/230 1 1 and P1L-50001RAS2_ 22930 ECO 500 22468 MIGUEL 500 &1	P6	N-1-1	113.2	107.3	109.4					101.4	108.5	107.3			
T39		P1L-50001RAS1_ 22930 ECO 500 22468 MIGUEL 500 &1 and P1T-50022_ 22885 SUNCREST BK81 500/230 1 1	P6	N-1-1	136.0	133.8	134.2					112.6	126.2	132.7	127.2		102.5
T40		P1L-50001RAS1_ 22930 ECO 500 22468 MIGUEL 500 &1 and P1T-50022RAS2_ 22885 SUNCREST BK81 500/230 1 1	P6	N-1-1	123.9	121.6	121.8					99.4	112.6	120.3	120.7		
T41	P1L-23055_ 22886 SUNCREST-SYCAMORE TP2 230 2 1	P1L-23055_ 22886 SUNCREST-SYCAMORE TP2 230 2 1	P1	N-1	107.5	107.2	105.4					91.9	96.4	106.7	93.8	Implement previously proposed TL23054/23055 RAS and OP to shed generation and open TL50003 for the P1/P3/P6 events as needed, along with system adjustment to reduce SDIT import and adjust phase angle of IV-PST after first level contingency while maintaining generation support avoiding the S-line overload; as an alternative to the RAS/OP of opening TL50003, procure preferred resources and energy storage up to 500 MW in San Diego County or upgrade the 230 kV system between Suncrest and Sycamore in order to reduce exposure to the loss of Sunrise Powerlink	
T42		P1G_PEN_PEN Plant and P1L-23055_ 22886 SUNCREST-SYCAMORE TP2 230 2 1	P3	G-1/L-1	114.5		112.1					94.3	101.1	105.7	109.5		103.2
T43		P4-22_ML 7013 CB - BK 80&81	P4	Breaker Fault/Stuck Breaker	107.4	106.4	106.0							96.1	106.3		
T44		P4-23_ML 8013 CB - BK 80&TL50001	P4	Breaker Fault/Stuck Breaker	107.2	106.2	105.6						90.4	96.3	106.5		
T45		P4-56_SYCAMORE 230 kV 22T CB	P4	Breaker Fault/Stuck Breaker	109.6	109.1	106.9						94.0	98.0	108.3		96.7
T46		P1L-23055_ 22886 SUNCREST-SYCAMORE TP2 230 2 1 and P1L-50001RAS1_ 22930 ECO 500 22468 MIGUEL 500 &1	P6	N-1-1	171.3	169.1	168.4			92.1	140.5	153.9	164.7	161.0	131.6		
T47		P1L-50001RAS1_ 22930 ECO 500 22468 MIGUEL 500 &1 and P1L-23055_ 22886 SUNCREST-SYCAMORE TP2 230 2 1	P6	N-1-1	184.4	182.6	182.0			94.0	152.5	167.4	180.2	171.8	137.1		
T48		P1L-50001RAS1_ 22930 ECO 500 22468 MIGUEL 500 &1 and P1L-23055RAS2_ 22886 SUNCREST-SYCAMORE TP2 230 2 1	P6	N-1-1	164.5	161.8	162.0					132.9	148.0	160.4	160.3		117.9

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Study Area **SDG&E Main**

Thermal Overload



ID	Overloaded Facility	Worst Contingencies	Category	Category Description	Loading (%)										Potential Mitigation Solutions
					B1: 2019 Summer Peak	B2: 2022 Summer Peak	B3: 2027 Summer Peak	B4: 2019 Spring Light Load	B5: 2022 Spring Off-Peak	S1: 22SP High Load & Peak Shift	S2: 19SP Peak Shift	S3: 27SP Peak Shift	S4:22SP High Renewables Output	S5: 22SP Heavy Northbound Flow	
T49		SCE-P1L51_Line PALOVRDE 500 to COLRIVER 500 Ckt 1 and P1L-23055_22886 SUNCREST-SYCAMORE TP2 230 2 1	P6	N-1-1	120.6	109.5	107.6				102.5	99.1	109.1	96.3	
T50	22356 IMPRLVLY 230 21025 ELCENTSW 230 1 1	P1G_TDM_TDM Plant and P1L-50002_22536 N.GILA 500 22360 IMPRLVLY 500 &1	P3	G-1/L-1	103.7	117.1				131.3	135.6	127.6	124.2		Rely on the CAISO market congestion management and operation procedure to manage the reliability of its controlled transmission grid
T51		P1L-23055RAS1_22886 SUNCREST-SYCAMORE TP2 230 2 1 and P1L-50002_22536 N.GILA 500 22360 IMPRLVLY 500 &1	P6	N-1-1	120.1	133.2	99.5			101.5	106.5	97.3	173.3		
T52		P1T-50012RAS1_22464 MIGUEL BK81 500/230 2 1 and P1L-50002_22536 N.GILA 500 22360 IMPRLVLY 500 &1	P6	N-1-1	120.4	133.4	99.7			102.0	107.0	97.6	173.3		
T53		P1T-50022RAS1_22885 SUNCREST BK81 500/230 1 1 and P1L-50002_22536 N.GILA 500 22360 IMPRLVLY 500 &1	P6	N-1-1	121.8	135.0	101.4			103.1	108.2	99.1	174.3		
T54	24044 ELLIS 230 24072 JOHANNA 230 1 1	P1L-50001RAS1_22930 ECO 500 22468 MIGUEL 500 &1 and SCE-P1L22_Line ELLIS 230 to SANTIAGO 230 Ckt 1	P6	N-1-1		101.7				91.6		96.1	109.1		Rely on operation procedure to turn on generation resources in the San Diego and Imperial Valley areas after first level contingency; as an alternative to the OP, procure preferred resources and energy storage up to 250 MW in San Diego and Orange Counties or upgrade the Ellis corridor by replacing terminal equipments and increasing the lines clearance if cost-effective
T55	24044 ELLIS 230 24134 SANTIAGO 230 1 1	P1L-50002_22536 N.GILA 500 22360 IMPRLVLY 500 &1 and SCE-P1L21_Line ELLIS 230 to JOHANNA 230 Ckt 1	P6	N-1-1		100.9				103.3		107.1	106.4		
T56		P1L-50001RAS1_22930 ECO 500 22468 MIGUEL 500 &1 and SCE-P1L21_Line ELLIS 230 to JOHANNA 230 Ckt 1	P6	N-1-1		107.3				95.6		100.7	115.4		
T57		SCE-P1L21_Line ELLIS 230 to JOHANNA 230 Ckt 1 and P1L-50002_22536 N.GILA 500 22360 IMPRLVLY 500 &1	P6	N-1-1		101.1					103.6		107.4	106.8	

ID	Substation	Worst Contingencies	Category	Category Description	Voltage (PU)										Potential Mitigation Solutions
					B1: 2019 Summer Peak	B2: 2022 Summer Peak	B3: 2027 Summer Peak	B4: 2019 Spring Light Load	B5: 2022 Spring Off-Peak	S1: 22SP High Load & Peak Shift	S2: 19SP Peak Shift	S3: 27SP Peak Shift	S4:22SP High Renewables Output	S5: 22SP Heavy Northbound Flow	
V-01	SANLUSRY SC 230 kV	P1L-23028_ 22716 SANLUSRY 230 22710 SANLUSRY SC 230 1 1 and P1L-23029_ 22716 SANLUSRY 230 22710 SANLUSRY SC 230 2 1	P6	N-1-1	1.1244	1.1245	1.1267		1.1273	1.117	1.1231	1.1104	1.121	1.1181	Check San Luis Rey SCs' bus voltage regulation and avoid regulating remote bus voltage
V-02	SANLUSRY SC 230 kV	P1L-23029_ 22716 SANLUSRY 230 22710 SANLUSRY SC 230 2 1 and P1L-23028_ 22716 SANLUSRY 230 22710 SANLUSRY SC 230 1 1	P6	N-1-1	1.1244	1.1245	1.1267		1.1273	1.117	1.1231	1.1104	1.121	1.1181	

ID	Substation	Worst Contingencies	Category	Category Description	Post Cont. Voltage Deviation %										Potential Mitigation Solutions
					B1: 2019 Summer Peak	B2: 2022 Summer Peak	B3: 2027 Summer Peak	B4: 2019 Spring Light Load	B5: 2022 Spring Off-Peak	S1: 22SP High Load & Peak Shift	S2: 19SP Peak Shift	S3: 27SP Peak Shift	S4: 22SP High Renewables Output	S5: 22SP Heavy Northbound Flow	

ID	Contingency	Category	Category Description	Transient Stability Performance										Potential Mitigation Solutions
				B1: 2019 Summer Peak	B2: 2022 Summer Peak	B3: 2027 Summer Peak	B4: 2019 Spring Light Load	B5: 2022 Spring Off-Peak	S1: 22SP High Load & Peak Shift	S2: 19SP Peak Shift	S3: 27SP Peak Shift	S4: 22SP High Renewables Output	S5: 22SP Heavy Northbound Flow	
TS-01	3Ø fault at ECO-Miguel 500 kV line (TL50001) outage with normal clearing	P1	N-1	Stable	Stable	Stable	Stable	Stable	Stable	Stable	Stable	Stable	Stable	
TS-02	3Ø fault at Ocotillo-Suncrest 500 kV line (TI50003) outage with normal clearing	P1	N-1	Stable	Stable	Stable	Stable	Stable	Stable	Stable	Stable	Stable	Stable	
TS-03	SLG fault at Miguel 230 kV bus section with normal clearing	P2	internal breaker fault	Stable	Stable	Stable	Stable	Stable	Stable	Stable	Stable	Stable	Stable	
TS-04	TDM Power Plant out of service by system adjustment, and then a subsequent second 3Ø fault at N.Gila-IV 500 kV line with normal clearing	P3	G-1/L-1	Stable	Stable	Stable	Stable	Stable	Stable	Stable	Stable	Stable	Stable	
TS-05	Otay Mesa Energy Center out of service by system adjustment, and then a subsequent second 3Ø fault at N.Gila-IV 500 kV line with normal clearing	P3	G-1/L-1	Stable	Stable	Stable	Stable	Stable	Stable	Stable	Stable	Stable	Stable	
TS-06	SLG fault at Miguel 230 kV bus section with loss of multiple elements caused by a stuck breaker on attempting to clear the fault	P4	stuck breaker	Stable	Stable	Stable	Stable	Stable	Stable	Stable	Stable	Stable	Stable	
TS-07	SLG fault at Miguel 500 kV bus section with loss of multiple elements caused by a stuck breaker on CB7013 attempting to clear the fault	P4	stuck breaker	Stable	Stable	Stable	Stable	Stable	Stable	Stable	Stable	Stable	Stable	
TS-08	ECO-Miguel 500 kV outage followed by system adjustment, and then a subsequent second 3Ø fault at Ocotillo-Suncrest 500 kV line with normal clearing	P6	N-1-1	Stable	Stable	Stable	Stable	Stable	Stable	Stable	Stable	Stable	Stable	
TS-09	Ocotillo-Suncrest 500 kV outage followed by system adjustment, and then a subsequent second 3Ø fault at ECO-Miguel 500 kV line with normal clearing	P6	N-1-1	Stable	Stable	Stable	Stable	Stable	Stable	Stable	Stable	Stable	Stable	

ID	Contingency	Category	Category Description	Transient Stability Performance										Potential Mitigation Solutions
				B1: 2019 Summer Peak	B2: 2022 Summer Peak	B3: 2027 Summer Peak	B4: 2019 Spring Light Load	B5: 2022 Spring Off-Peak	S1: 22SP High Load & Peak Shift	S2: 19SP Peak Shift	S3: 27SP Peak Shift	S4: 22SP High Renewables Output	S5: 22SP Heavy Northbound Flow	
TS-10	Ocotillo-Suncrest 500 kV outage by system adjustment, and then a subsequent second 3Ø fault at Miguel BK80 with normal clearing	P6	N-1-1	Stable	Stable	Stable	Stable	Stable	Stable	Stable	Stable	Stable	Stable	
TS-11	ECO-Miguel 500 kV line outage followed by system adjustment, and then a subsequent second 3Ø fault at Ellis-Johanna 230 kV line with normal clearing	P6	N-1-1	Stable	Stable	Stable	Stable	Stable	Stable	Stable	Stable	Stable	Stable	
TS-12	N.Gila-IV 500 kV line outage followed by system adjustment, and then a subsequent second 3Ø fault at Ellis-Johanna 230 kV line with normal clearing	P6	N-1-1	Stable	Stable	Stable	Stable	Stable	Stable	Stable	Stable	Stable	Stable	

Single Contingency Load Drop

ID	Worst Contingencies	Category	Category Description	Amount of Load Drop (MW)										Potential Mitigation Solutions
				B1: 2019 Summer Peak	B2: 2022 Summer Peak	B3: 2027 Summer Peak	B4: 2019 Spring Light Load	B5: 2022 Spring Off-Peak	S1: 22SP High Load & Peak Shift	S2: 19SP Peak Shift	S3: 27SP Peak Shift	S4: 22SP High Renewables Output	S5: 22SP Heavy Northbound Flow	
X-SLD-1														

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

Single Source Substation with more than 100 MW Load

ID	Substation	Load Served (MW)										Potential Mitigation Solutions
		B1: 2019 Summer Peak	B2: 2022 Summer Peak	B3: 2027 Summer Peak	B4: 2019 Spring Light Load	B5: 2022 Spring Off-Peak	S1: 22SP High Load & Peak Shift	S2: 19SP Peak Shift	S3: 27SP Peak Shift	S4: 22SP High Renewables Output	S5: 22SP Heavy Northbound Flow	
X-SS-1												

No single source substation with more than 100 MW Load



ID	Overloaded Facility	Worst Contingencies	Category	Category Description	Loading (%)								Potential Mitigation Solutions
					B1: 2019 Summer Peak	B2: 2022 Summer Peak	B3: 2027 Summer Peak	B4: 2019 Spring Light Load	B5: 2022 Spring Off-Peak	S1: 22SP High Load & Peak Shift	S2: 19SP Peak Shift	S3: 27SP Peak Shift	
T01	22884 WARNERS 69.0 22688 RINCON 69.0 1 1	TL0637_TL0637 SANTYSBL - CREELMAN ck 1	P1	N-1						98.93		105.21	Warners SPS to open TL685
T02	22020 AVOCADO 69.0 22508 MNSRATTP 69.0 1 1	TL0698B_TL0698B MONSRATE-MNSRATTP ck 1	P2.1	N-1	90.03					103.54			Congestion Management, Generation Re-dispatch
T03	22740 SANYSYRO 69.0 22616 OTAYLKTP 69.0 1 1	TL0623A_TL0623A OTAY-OTAY TP ck 1	P2.1	N-1	90.62	91.56				100.51	93.43	100.61	Congestion Management, Generation Re-dispatch
T04	22604 OTAY 69.0 22616 OTAYLKTP 69.0 1 1	TL06964_TL06964 MIGUEL-SALT CREEK 69 ck 1 AND CALPK-BD_ CALPK_BD 13.80	P3	N-1, G-1						165.37			Operation Procedure, re-dispatch generation after 1st contingency
T05	22604 OTAY 69.0 22616 OTAYLKTP 69.0 1 1	TL0623_TL0623A B C: IB-OTAY-SYO ck 1 AND CALPK-BD_ CALPK_BD 13.80	P3	N-1, G-1						121.21			Operation Procedure, re-dispatch generation after 1st contingency
T06	22604 OTAY 69.0 22616 OTAYLKTP 69.0 1 1	TL06910_TL06910 SALT CREEK - BORDER ck 1 AND CALPK-BD_ CALPK_BD 13.80	P3	N-1, G-1						113.31			Operation Procedure, re-dispatch generation after 1st contingency
T07	22708 SANLUSRY 69.0 22582 OCEAN RANCH 69.0 1 1	TL0693_TL0693 MELROSE - SANLUSRY ck 1 AND PA_GENS_PA GENS	P3	N-1, G-1						103.94	95.92	101.15	Operation Procedure, preferred resources after 1st contingency, no overload on 30- min rating
T08	22841 LAGNA NL TAP 138 22396 LAGNA NL 138 1 1	PI-TCB_PICO TCB 138 kV 13836/46/16/48	P4	Fault Plus Stuck Breaker	110.59							115.90	SOCRE project as previously approved in transmission plan, Operation Procedure in the interim
T09	22844 TALEGA 230 22840 TALEGA 138 1 1	TA1-5W_TALEGA 138KV 5W CB	P4	Fault Plus Stuck Breaker	99.54							104.23	SOCRE project as previously approved in transmission plan, Operation Procedure in the interim
T10	22841 LAGNA NL TAP 138 22396 LAGNA NL 138 1 1	PI1-CB_PICO 138KV CB	P4	Fault Plus Stuck Breaker	98.93							103.67	SOCRE project as previously approved in transmission plan, Operation Procedure in the interim
T11	22844 TALEGA 230 22840 TALEGA 138 1 1	TA2-4W_TALEGA 230KV 4W CB	P4	Fault Plus Stuck Breaker	98.19							103.45	SOCRE project as previously approved in transmission plan, Operation Procedure in the interim



ID	Overloaded Facility	Worst Contingencies	Category	Category Description	Loading (%)							Potential Mitigation Solutions	
					B1: 2019 Summer Peak	B2: 2022 Summer Peak	B3: 2027 Summer Peak	B4: 2019 Spring Light Load	B5: 2022 Spring Off-Peak	S1: 22SP High Load & Peak Shift	S2: 19SP Peak Shift		S3: 27SP Peak Shift
T12	22844 TALEGA 230 22840 TALEGA 138 3 1	TA1-5W_TALEGA 138KV 5W CB	P4	Fault Plus Stuck Breaker	97.67						102.27		SOCRE project as previously approved in transmission plan, Operation Procedure in the interim
T13	22844 TALEGA 230 22840 TALEGA 138 3 1	TA2-4W_TALEGA 230KV 4W CB	P4	Fault Plus Stuck Breaker	96.35						101.50		SOCRE project as previously approved in transmission plan, Operation Procedure in the interim
T14	N/A	TL0635_TL0635 CREELMAN - LOSCOCHS ck 1 AND TL06917_TL06917 CREELMAN-SYCAMORE ck 1	P6	N-1-1	Diverge	Diverge	Diverge			Diverge	Diverge	Diverge	Operation Procedure to radialize Creelman after 1st contingency, TL 682 RAS will shed Creelman
T15	N/A	TL0681_TL0681A B C: ASH-FE-VC ck 1 AND TL0683_TL0683 RINCON-LILAC ck 1	P6	N-1-1	95.29	96.49	91.85			Diverge	Diverge	Diverge	Operation Procedure to radialize Valley Center after 1st contingency
T16	22604 OTAY 69.0 22616 OTAYLKTP 69.0 1 1	TL06936_TL6936 BORDER-CALPK_BD 69 ck 1 AND TL06964_TL06964 MIGUEL-SALT CREEK 69 ck 1	P6	N-1-1			165.38						Generation Re-dispatch after 1st contingency
T17	22768 BAY BLVD 69.0 22820 SWEETWTR 69.0 1 1	TL23026_TL23026 SILVERGT - BAY BLVD ck 1 AND TL0642_TL642A B C: MONTGMRY-SWEETWTRW-BAY BLVD	P6	N-1-1	110.88	132.17	114.65		96.29	145.56	112.60	137.84	TL 644 Recondutor as previously approved in transmission plan, Operation Procedure in the interim
T18	22856 TOREYPNS 69.0 22864 UCM 69.0 1 1	TL06905_TL06905 GENESEE -PENSQTOS ck 2 AND TL06959_TL06959 MIRASNT0-PENSQTOS ck 1	P6	N-1-1	122.26	122.41	116.90			140.17	128.15	139.30	Operation Procedure, radialize Genesee substation after 1st contingency
T19	22112 CAPSTRNO 138 22860 TRABUCO 138 1 1	TL13831_TL13831 TALEGA-R.MSNVJO ck 1 AND TL13833_TL13833 PICO-TRABUCO ck 1	P6	N-1-1	118.92						124.55		SOCRE project as previously approved in transmission plan, Operation Procedure in the interim
T20	22316 GENESEE 69.0 22644 PENSQTOS 69.0 2 1	TL06943_TL069 TOREYPNS to UCM ck 1 AND TL06959_TL06959 MIRASNT0-PENSQTOS ck 1	P6	N-1-1	117.00	117.25	111.95			134.50	122.71	133.71	Operation Procedure, radialize Genesee substation after 1st contingency
T21	22708 SANLUSRY 69.0 22582 OCEAN RANCH 69.0 1 1	TL0680_TL0680A B C: SA-ME-SM ck 1 AND TL0693_TL0693 MELROSE - SANLUSRY ck 1	P6	N-1-1	97.87	101.26	94.14			134.09	121.42	131.40	Operation Procedure, preferred resources and to re-configure systems after 1st contingency



ID	Overloaded Facility	Worst Contingencies	Category	Category Description	Loading (%)								Potential Mitigation Solutions
					B1: 2019 Summer Peak	B2: 2022 Summer Peak	B3: 2027 Summer Peak	B4: 2019 Spring Light Load	B5: 2022 Spring Off-Peak	S1: 22SP High Load & Peak Shift	S2: 19SP Peak Shift	S3: 27SP Peak Shift	
T22	22331 MIRASNT0 69.0 22644 PENSQTOS 69.0 1 1	TL06905_TL06905 GENESEE -PENSQTOS ck 2 AND TL06943_TL069 TOREYPNS to UCM ck 1	P6	N-1-1	116.19	116.33	111.14			133.23	121.79	132.48	Operation Procedure, radialize Genesee substation after 1st contingency
T23	22160 DEL MAR 69.0 22644 PENSQTOS 69.0 2 1	TL0610_TL0610 DEL MAR-PENSQTOS ck 1 AND TL06952_TL06952 NORTHCTY-PENSQTOS 69 ck 1	P6	N-1-1	103.72	114.09	109.57			127.04	105.81	127.51	Operation Procedure to radialize North City and Encinitas after 1st contingency
T24	22440 MELROSE 69.0 22708 SANLUSRY 69.0 1 1	TL0680_TL0680A B C: SA-ME-SM ck 1 AND TL06966_TL06966 OCEAN RANCH-SANLUSRY 69 ck 1	P6	N-1-1	90.66	94.26				125.61	113.24	123.03	Operation Procedure, preferred resources and to re-configure systems after 1st contingency
T25	22160 DEL MAR 69.0 22644 PENSQTOS 69.0 1 1	TL0667_TL0667 DEL MAR-PENSQTOS ck 2 AND TL06952_TL06952 NORTHCTY-PENSQTOS 69 ck 1	P6	N-1-1	101.13	111.50	107.06			124.33	103.21	124.84	Operation Procedure to radialize North City and Encinitas after 1st contingency
T26	22272 ESCO 69.0 22876 WARCYNTP 69.0 1 1	TL0633_TL0633 BERNARDO-R.CARMEL ck 1 AND TL06913_TL06913 POWAY-POMERADO ck 1	P6	N-1-1	116.25						122.41		Poway-Pomerado Line 2, Operation Procedure in the interim
T27	22440 MELROSE 69.0 22442 MELRSETP 69.0 1 1	TL0693_TL0693 MELROSE - SANLUSRY ck 1 AND TL06966_TL06966 OCEAN RANCH-SANLUSRY 69 ck 1	P6	N-1-1						120.99	108.57	119.02	Operation Procedure, preferred resources and to re-configure systems after 1st contingency
T28	22252 ENCINITAS 69.0 22160 DEL MAR 69.0 1 1	TL0616_TL0616A B C: Lkhodges-BERNARDO-RSF ck 1 AND TL06952_TL06952 NORTHCTY-PENSQTOS 69 ck 1	P6	N-1-1	114.34						120.52		Artesen 230/69 kV Transformer to mitigate for long term, Operation Procedure in the interim to radialize NorthCity and R.SNTTP substation
T29	22841 LAGNA NL TAP 138 22396 LAGNA NL 138 1 1	TL13836_TL13836 TALEGA-PICO ck 1 AND TL13846_TL13846 TA TAP33 TALEGA-SM-PICO ck 1	P6	N-1-1	112.50						117.90		SOCRE project as previously approved in transmission plan, Operation Procedure in the interim
T30	22768 BAY BLVD 69.0 22352 IMPRLBCH 69.0 1 1	TL0645_TL0645 BAY BLVD-OTAY ck 1 AND TL0646_TL0646 BAY BLVD-OTAY ck 2	P6	N-1-1			117.05						Operation Procedure to dispatch local generation after 1 st contingency, no overload for 30-minute rating
T31	22306 GARFIELD 69.0 22208 EL CAJON 69.0 1 1	TL0618_TL0618 MISSION-MURRAY ck 1 AND TL0619_TL0619 MISSION-MURRAY ck 2	P6	N-1-1	102.25	101.20	96.42			116.46	107.41	115.34	Prefered resources, operation procedure



ID	Overloaded Facility	Worst Contingencies	Category	Category Description	Loading (%)								Potential Mitigation Solutions	
					B1: 2019 Summer Peak	B2: 2022 Summer Peak	B3: 2027 Summer Peak	B4: 2019 Spring Light Load	B5: 2022 Spring Off-Peak	S1: 22SP High Load & Peak Shift	S2: 19SP Peak Shift	S3: 27SP Peak Shift		
T32	22420 SILVERGT 69.0 22548 NATNLCTY 69.0 1 1	TL23026_TL23026 SILVERGT - BAY BLVD ck 1 AND TL0603A_TL0603A NSM-SW ck 1	P6	N-1-1		107.82				91.83	115.04		105.49	Operation Procedure to open the Line after 1st contingency
T33	22200 DUNHILTP 69.0 22188 DOUBLTTP 69.0 1 1	TL0662_TL0662 PENSQTOS -TOREYPNS ck 1 AND TL06959_TL06959 MIRASNT0-PENSQTOS ck 1	P6	N-1-1	100.31	99.42	93.96				113.70	105.11	111.79	Operation procedure to radialize TOREYPNS and MIRASNT0 after 1st contingency
T34	22188 DOUBLTTP 69.0 22164 DELMARTP 69.0 1 1	TL0662_TL0662 PENSQTOS -TOREYPNS ck 1 AND TL06959_TL06959 MIRASNT0-PENSQTOS ck 1	P6	N-1-1	100.31	99.42	93.96				113.70	105.11	111.79	Operation procedure to radialize TOREYPNS and MIRASNT0 after 1st contingency
T35	22548 NATNLCTY 69.0 22820 SWEETWTR 69.0 1 1	TL23026_TL23026 SILVERGT - BAY BLVD ck 1 AND TL0603A_TL0603A NSM-SW ck 1	P6	N-1-1		106.49				90.55	113.69		104.30	Operation Procedure to open the Line after 1st contingency
T36	22644 PENSQTOS 69.0 22164 DELMARTP 69.0 1 1	TL0662_TL0662 PENSQTOS -TOREYPNS ck 1 AND TL06959_TL06959 MIRASNT0-PENSQTOS ck 1	P6	N-1-1	100.29	99.38	93.93				113.67	105.09	111.75	Operation procedure to radialize TOREYPNS and MIRASNT0 after 1st contingency
T37	22856 TOREYPNS 69.0 22200 DUNHILTP 69.0 1 1	TL0662_TL0662 PENSQTOS -TOREYPNS ck 1 AND TL06959_TL06959 MIRASNT0-PENSQTOS ck 1	P6	N-1-1	96.49	96.24	92.02				110.07	101.11	109.47	Operation procedure to radialize TOREYPNS and MIRASNT0 after 1st contingency
T38	22056 BERNARDO 69.0 22284 FELCTATP 69.0 1 1	TL0648_TL0648 POWAY-R.CARMEL ck 1 AND TL06920_TL06920 ARTESN-SYCAMORE ck 1	P6	N-1-1	101.10							109.64		Artesen 230/69 kV Transformer to mitigate for long term, Operation Procedure in the interim to radialize Artesan or R. Carmel substation
T39	22331 MIRASNT0 69.0 22316 GENESEE 69.0 1 1	TL06905_TL06905 GENESEE -PENSQTOS ck 2 AND TL06943_TL069 TOREYPNS to UCM ck 1	P6	N-1-1	93.70	94.82	91.84				108.63	98.23	109.52	Operation Procedure, radialize Genesee and UCM substation after 1st contingency
T40	22884 WARNERS 69.0 22688 RINCON 69.0 1 1	TL50001_N-1-1_SPS_ECO to MIGUEL N-1-1 SPS AND TL0637_TL0637 SANTYSBL - CREELMAN ck 1	P6	N-1-1									108.50	Warners SPS to open TL685
T41	22256 ESCNDIDO 69.0 22272 ESCO 69.0 1 1	TL0633_TL0633 BERNARDO-R.CARMEL ck 1 AND TL06913_TL06913 POWAY-POMERADO ck 1	P6	N-1-1	101.71							108.45		Poway-Pomerado Line 2, Operation Procedure in the interim

ID	Overloaded Facility	Worst Contingencies	Category	Category Description	Loading (%)								Potential Mitigation Solutions
					B1: 2019 Summer Peak	B2: 2022 Summer Peak	B3: 2027 Summer Peak	B4: 2019 Spring Light Load	B5: 2022 Spring Off-Peak	S1: 22SP High Load & Peak Shift	S2: 19SP Peak Shift	S3: 27SP Peak Shift	
T42	22316 GENESEE 69.0 22864 UCM 69.0 1 1	TL0662_TL0662 PENSQTOS -TOREYPNS ck 1 AND TL0666_TL0666 A-G PQ-DB-DH-TP ck 1	P6	N-1-1	93.03	93.59	90.43			107.20	97.52	107.80	Operation procedure to radialize TOREYPNS after 1st contingency
T43	22668 POWAY 69.0 22664 POMERADO 69.0 1 1	TL23014_TL23014 PEN-ESCNDIDO ck 1 AND TL23015_TL23015 PEN-ESCNDIDO ck 2	P6	N-1-1	107.55						104.33		Poway-Pomerado Line 2, Operation Procedure in the interim
T44	22208 EL CAJON 69.0 22408 LOSCOCHS 69.0 1 1	TL0624_TL0624 EL CAJON-JAMACHA ck 1 AND TL0632_TL0632A B C: ML-GR-LC ck 1	P6	N-1-1	102.52						107.44		Operation Procedure to radialize Granite in the interim, re-configure of load in 2022 and 2027 cases
T45	22524 MORHILTP 69.0 22440 MELROSE 69.0 1 1	TL0698_TL0698 MN-AV-PA ck 1 AND TL06912_TL06912 PENDLETN-SANLUSRY ck 1	P6	N-1-1	96.72	92.60				106.26	101.42	104.08	Operation Procedure to radialize Pendleton and Avocado
T46	22648 PENSQTOS 138 22644 PENSQTOS 69.0 1 1	PQ51_PQ BK 51 69/138 AND PQ52_PQ BK 52 69/138	P6	N-1-1			93.99					106.14	Generation Re-dispatch after 1st contingency, no overload on 30-min rating
T47	22500 MISSION 138 22496 MISSION 69.0 1 1	MS70_MS BK 70 230/69 AND MS71_MS BK 71 230/69	P6	N-1-1	90.15					98.67	95.49	105.97	Generation Re-dispatch after 1st contingency, no overload on 30-min rating
T48	22192 DOUBLTTP 138 22300 FRIARS 138 1 1	TL23013_TL23013 PENSQTOS - OT ck 1 AND SX-PQ_SX - PQ 230 ck 1	P6	N-1-1	96.60				105.94				Mission-PQ line or flow control device to mitigate, Operation Procedure to re-dispatch Generation in the interim
T49	22024 B 69.0 22420 SILVERGT 69.0 1 1	TL0605_TL0605 SILVERGT-URBAN ck 1 AND TL0699_TL0699 B -SILVERGT ck 2	P6	N-1-1		93.81	93.44			100.79		105.90	Preferred resources, operation procedure after 1st contingency, no overload on 30-min rating
T50	22668 POWAY 69.0 22676 R.CARMEL 69.0 1 1	TL0689_TL0689A C E: ES-FE-BR ck 1 AND TL06920_TL06920 ARTESN-SYCAMORE ck 1	P6	N-1-1	103.51						105.66		Artesen 230/69 kV Transformer to mitigate for long term, Operation Procedure in the interim to radialize Artesan or R. Carmel substation
T51	22592 OLD TOWN 69.0 22871 VINE SUB 69.0 1 1	SG70_SG BK 70 230/69 AND SG72_SG BK 71 230/69	P6	N-1-1						100.63		104.51	Preferred resources, operation procedure after 1st contingency
T52	22844 TALEGA 230 22840 TALEGA 138 1 1	TA61_TA BK 61 230/138 AND TA63_TA BK 63 230/138	P6	N-1-1	98.19						103.45		Operation Procedure to redispatch generation after 1st contingency, no overload in 30-min rating, transformers will be removed in 2022 and 2027 cases
T53	22664 POMERADO 69.0 22828 SYCAMORE 69.0 2 1	TL06915_TL06915 POMERADO -SYCAMORE ck 1 AND AR70_AR BK 70 230/69	P6	N-1-1		96.51	90.56			102.27		98.66	Operation Procedure to radialize Pomerado after the 1st contingency



ID	Overloaded Facility	Worst Contingencies	Category	Category Description	Loading (%)								Potential Mitigation Solutions	
					B1: 2019 Summer Peak	B2: 2022 Summer Peak	B3: 2027 Summer Peak	B4: 2019 Spring Light Load	B5: 2022 Spring Off-Peak	S1: 22SP High Load & Peak Shift	S2: 19SP Peak Shift	S3: 27SP Peak Shift		
T54	22664 POMERADO 69.0 22828 SYCAMORE 69.0 1 1	TL06924_TL06924 POMERADO -SYCAMORE ck 2 AND AR70_AR BK 70 230/69	P6	N-1-1		96.51	90.56				102.27		98.66	Operation Procedure to radialize Pomerado after the 1st contingency
T55	22844 TALEGA 230 22840 TALEGA 138 3 1	TA61_TA BK 61 230/138 AND TA63_TA BK 63 230/138	P6	N-1-1	96.35							101.50		Operation Procedure to redispatch generation after 1st contingency, no overload in 30-min rating, transformers will be removed in 2022 and 2027 cases
T56	22644 PENSQTOS 69.0 22856 TOREYPNS 69.0 1 1	TL06907_TL06907 GENESEE -UCM ck 1 AND TL0666_TL0666 A-G PQ-DB-DH-TP ck 1	P6	N-1-1							100.67	91.76	101.25	Operation Procedure, preferred resources and to re-configure systems after 1st contingency, monitor load growth
T57	22668 POWAY 69.0 22876 WARCYNTP 69.0 1 1	TL0633_TL0633 BERNARDO-R.CARMEL ck 1 AND TL06913_TL06913 POWAY-POMERADO ck 1	P6	N-1-1	95.48							100.53		Poway-Pomerado Line 2, Operation Procedure in the interim
T58	22532 MURRAY 69.0 22306 GARFIELD 69.0 1 1	TL0618_TL0618 MISSION-MURRAY ck 1 AND TL0619_TL0619 MISSION-MURRAY ck 2	P6	N-1-1							100.46	92.31	99.98	Operation Procedure to radialize Murray after 1st contingency, monitor load growth
T59	22808 STUARTTP 69.0 22400 LASPULGS 69.0 1 1	TL23007+52_TA-SO 1 + 2 230KV	P7	N-2	142.64							151.46		Upgrade Las Pulgas - Stuart Tap 69 kV, as previously approved, in 2018, SPS to trip TL 695 in the interim
T60	22442 MELRSETP 69.0 22724 SANMRCOS 69.0 1 1	TL23003+11_SA-EA + PEN-EA-SA 230KV	P7	N-2					140.61					Congestion Management, upgrade Melrose-San Marcos 69 kV or remove Encina Tap 230 kV
T61	22841 LAGNA NL TAP 138 22396 LAGNA NL 138 1 1	TL13846+13836_PI-SMO-TA 138KV + PI-TA 69KV	P7	N-2	112.50							117.90		SOCRE project as previously approved in transmission plan, Operation Procedure in the interim
T62	22256 ESCNDIDO 69.0 22272 ESCO 69.0 1 1	TL6924+6915_POM-SX 1 + 2 69KV	P7	N-2									106.23	Congestion Management, monitor load growth, existing SPS to trip load
T63	22200 DUNHILTP 69.0 22188 DOUBLTTP 69.0 1 1	TL662+6905_PQ-TP + GE-PQ 69KV	P7	N-2	93.34	92.67					105.94	97.79	104.45	Congestion Management, preferred resources, monitor load growth
T64	22188 DOUBLTTP 69.0 22164 DELMARTP 69.0 1 1	TL662+6905_PQ-TP + GE-PQ 69KV	P7	N-2	93.34	92.67					105.93	97.79	104.45	Congestion Management, preferred resources, monitor load growth



ID	Overloaded Facility	Worst Contingencies	Category	Category Description	Loading (%)								Potential Mitigation Solutions	
					B1: 2019 Summer Peak	B2: 2022 Summer Peak	B3: 2027 Summer Peak	B4: 2019 Spring Light Load	B5: 2022 Spring Off-Peak	S1: 22SP High Load & Peak Shift	S2: 19SP Peak Shift	S3: 27SP Peak Shift		
T65	22644 PENSQTOS 69.0 22164 DELMARTP 69.0 1 1	TL662+6905_PQ-TP + GE-PQ 69KV	P7	N-2	93.32	92.63					105.90	97.77	104.42	Congestion Management, preferred resources, no overload on 30-min rating
T66	22841 LAGNA NL TAP 138 22396 LAGNA NL 138 1 1	TL13816+33_PI-CP + TA-TB 138KV	P7	N-2	98.93							103.67		SOCRE project as previously approved in transmission plan, Operation Procedure in the interim
T67	22856 TOREYPNS 69.0 22200 DUNHILTP 69.0 1 1	TL662+6905_PQ-TP + GE-PQ 69KV	P7	N-2							102.30	93.79	102.14	Congestion Management, preferred resources, no overload on 30-min rating

ID	Substation	Worst Contingencies	Category	Category Description	Voltage (PU)										Potential Mitigation Solutions
					B1: 2019 Summer Peak	B2: 2022 Summer Peak	B3: 2027 Summer Peak	B4: 2019 Spring Light Load	B5: 2022 Spring Off-Peak	S1: 22SP High Load & Peak Shift	S2: 19SP Peak Shift	S3: 27SP Peak Shift			
V-01															
V-02															
V-03															
V-04															
V-05															
V-06															
V-07															
V-08															
V-09															
V-10															
V-11															
V-12															
V-13															
V-14															
V-15															
V-16															
V-17															
V-18															
V-19															

ID	Substation	Worst Contingencies	Category	Category Description	Post Cont. Voltage Deviation %										Potential Mitigation Solutions	
					B1: 2019 Summer Peak	B2: 2022 Summer Peak	B3: 2027 Summer Peak	B4: 2019 Spring Light Load	B5: 2022 Spring Off-Peak	S1: 22SP High Load & Peak Shift	S2: 19SP Peak Shift	S3: 27SP Peak Shift				
VD-01																
VD-02																
VD-03																
VD-04																
VD-05																
VD-06																
VD-07																
VD-08																
VD-09																
VD-10																
VD-11																
VD-12																
VD-13																
VD-14																
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VD-27																
VD-28																
VD-29																
VD-30																
VD-31																
VD-32																
VD-33																

ID	Substation	Worst Contingencies	Category	Category Description	Post Cont. Voltage Deviation %										Potential Mitigation Solutions
					B1: 2019 Summer Peak	B2: 2022 Summer Peak	B3: 2027 Summer Peak	B4: 2019 Spring Light Load	B5: 2022 Spring Off-Peak	S1: 22SP High Load & Peak Shift	S2: 19SP Peak Shift	S3: 27SP Peak Shift			
VD-34															
VD-35															

ID	Contingency	Category	Category Description	Transient Stability Performance									Potential Mitigation Solutions	
				B1: 2019 Summer Peak	B2: 2022 Summer Peak	B3: 2027 Summer Peak	B4: 2019 Spring Light Load	B5: 2022 Spring Off-Peak	S1: 22SP High Load & Peak Shift	S2: 19SP Peak Shift	S3: 27SP Peak Shift			
TS-01														
TS-02														
TS-03														
TS-04														
TS-05														
TS-06														
TS-07														
TS-08														
TS-09														
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TS-31														

Single Contingency Load Drop

ID	Worst Contingencies	Category	Category Description	Amount of Load Drop (MW)										Potential Mitigation Solutions	
				B1: 2019 Summer Peak	B2: 2022 Summer Peak	B3: 2027 Summer Peak	B4: 2019 Spring Light Load	B5: 2022 Spring Off-Peak	S1: 22SP High Load & Peak Shift	S2: 19SP Peak Shift	S3: 27SP Peak Shift				
X-SLD-1															

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

Single Source Substation with more than 100 MW Load

ID	Substation	Load Served (MW)									Potential Mitigation Solutions
		B1: 2019 Summer Peak	B2: 2022 Summer Peak	B3: 2027 Summer Peak	B4: 2019 Spring Light Load	B5: 2022 Spring Off-Peak	S1: 22SP High Load & Peak Shift	S2: 19SP Peak Shift	S3: 27SP Peak Shift		
X-SS-1											

No single source substation with more than 100 MW Load