

# **APPENDIX C: Reliability Assessment Study Results**

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Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading % (Baseline Scenarios)							Loading % (Sensitivity Scenarios)			Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2028 Spring Off-Peak	2028 Winter Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	
<b>500 kV LINES</b>														
MALIN-ROUND MTN # 2 500 kV	Captain Jack-Olinda 500 kV and Diablo unit	P3	G-1/L-1	99%	99%	N/A	<95%	<95%	N/A	N/A	102%	<95%	105%	Sensitivity Only
	Malin-Round Mtn # 1 500 kV and Diablo unit	P3	G-1/L-1	98%	98%	N/A	<95%	<95%	N/A	N/A	107%	<95%	111%	
ROUND MTN –TABLE MTN #1 or #2 500 kV	Rnd Mtn –Table Mtn #2 or # 1 500 kV	P1	L-1	98%	100%	102%	<95%	<95%	<95%	<95%	102%	<95%	103%	Reduce COI flow according to seasonal nomogram or bypass ser caps on the remaining Round Mtn-Table Mtn 500 kV line if overload
ROUND MTN-TABLE MTN # 2 or # 1 500 KV	Round Mtn-Table Mtn # 1 or # 2 and Table Mtn 500/230 kV	P6	L-1/T-1	100%	102%	101%	<95%	<95%	<95%	<95%	105%	<95%	104%	
ROUND MTN-TABLE MTN # 1 500 KV	Round Mtn-Table Mtn # 2 and Table Mtn 500/230 kV	P2	BRK	100%	102%	102%	<95%	<95%	<95%	<95%	105%	<95%	104%	
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	110%	112%	N/A	<95%	<95%	<95%	<95%	111%	<95%	117%	
CAPTAIN JACK-OLINDA 500 kV	Malin- Round Mtn #1 and #2 500 kV	P7	L-2	105%	105%	104%	<95%	<95%	<95%	<95%	108%	<95%	108%	Reduce COI flow according to seasonal nomogram
	Round Mtn-Table Mtn # 1 & # 2 500 kV	P7	L-2	105%	105%	105%	<95%	<95%	<95%	<95%	109%	<95%	109%	
	Round Mtn-Table Mtn # 2 & Round Mtn-Malin # 2 or # 1 500 kV	P6	L-1/L-1	105%	105%	105%	<95%	<95%	<95%	<95%	109%	<95%	109%	
MIDWAY-VINCENT # 1 500 kV	Midway-Vincent # 2 and Midway-Whirlwind	P6	L-1/L-1	<95%	<95%	<95%	112%	<95%	<95%	<95%	<95%	119%	117%	Reduce flow on Path 26
MIDWAY-VINCENT # 2 500 kV	Midway-Vincent # 1 and Midway-Whirlwind	P6	L-1/L-1	98%	<95%	<95%	114%	<95%	<95%	<95%	96%	121%	119%	
MIDWAY-WHIRLWIND # 3 500 kV	Midway-Vincent 1 and # 2 500 kV	P7	L-2	<95%	<95%	<95%	105%	<95%	<95%	<95%	<95%	112%	110%	
<b>500/230 kV TRANSFORMERS</b>														
OLINDA 500/230 kV x-former	Table Mtn 500/230 kV and Round Mtn 500/230 kV	P6	T-1/T-1	<95%	<95%	<95%	98%	97%	100%	100%	<95%	96%	<95%	Trip or reduce area generation
	Olinda-Tracy 500 kV and Round Mtn 500/230 kV	P6	L-1/T-1	<95%	<95%	<95%	100%	<95%	<95%	<95%	<95%	<95%	<95%	
	Olinda-Tracy 500 kV and Cottonwood-Round Mtn # 1, 2 or 3 230 kV	P6	L-1/L-1	<95%	<95%	<95%	<95%	<95%	<95%	<95%	<95%	109%	<95%	
	Malin-Round Mtn # 1 and # 2 500 kV	P7	L-2	<95%	<95%	<95%	104%	100%	97%	<95%	<95%	117%	<95%	
TABLE MTN 500/230 kV x-former	Table Mtn-Vac Dix and Table Mtn-Tesla 500 kV	P7	L-2	<95%	<95%	<95%	<95%	<95%	<95%	<95%	<95%	105%	<95%	Continue to monitor in longer term, generation redispatch to mitigate
	Malin-Round Mtn 500 kV #1 or 2 or Round Mtn 500/230 kV and Eight Mile-Lodi 230 kV	P6	L-1/L-1	<95%	<95%	<95%	<95%	<95%	<95%	101%	<95%	<95%	<95%	
METCALF 500/230 kV x-former #11, 12 or 13	Metcalfe 500/230 kV Transformers #11 & #12 or #13	P6	T-1/T-1	<95%	<95%	103%	<95%	<95%	<95%	<95%	<95%	<95%	103%	Continue to monitor in longer term, generation redispatch to mitigate
GATES 500/230 kV # 1 or 2 x-former	Gates 500/230 kV # 1 or 2 x-former	P1	T-1	<95%	<95%	<95%	<95%	<95%	96%	<95%	<95%	104%	<95%	Continue to monitor in longer term, generation redispatch to mitigate
	Gates 500/230 kV # 1 or 2 and Los Banos 500/230 kV	P6	T-1/T-1	<95%	<95%	<95%	<95%	<95%	107%	<95%	<95%	117%	<95%	
	Gates 500/230 kV # 1 or 2 and Midway #11,12 or 13 500/230 kV	P6	T-1/T-1	<95%	<95%	<95%	<95%	<95%	101%	<95%	<95%	111%	<95%	
	Diablo-Gates 500 kV and Gates 500/230 kV # 1 or 2	P6	L-1/T-1	<95%	<95%	<95%	<95%	<95%	95%	<95%	<95%	107%	<95%	

Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading % (Baseline Scenarios)							Loading % (Sensitivity Scenarios)			Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2028 Spring Off-Peak	2028 Winter Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	
<b>230 kV LINES</b>														
COTTONWD E-ROUND MTN 230kV #3	Captain Jack-Olinda 500 kV and Diablo unit	P3	G-1/L-1	<95%	<95%	<95%	<95%	<95%	<95%	<95%	103%	<95%	<95%	Reduce COI flow according to seasonal nomogram, or upgrade the line if economic
	Tbl Mtn-Vaca Dix 500 kV and Cottonwood-Round Mtn # 1 or #2 230 kV	P6	L-1/L-1	<95%	105%	112%	<95%	<95%	<95%	<95%	115%	<95%	108%	
	Capt Jack-Olinda 500 kV and Cottonwood-Round Mtn # 1 or #2 230 kV	P6	L-1/L-1	<95%	102%	114%	<95%	<95%	<95%	<95%	110%	<95%	104%	
	Tbl Mtn-Tesla and Tbl Mtn-Vaca Dix 500 kV	P7	L-2	102%	111%	116%	<95%	<95%	<95%	<95%	124%	<95%	110%	
	Olinda 500/230 kV and Cottonwood-Round Mtn 230 kV # 1 or # 2	P6	T-1/L-1	<95%	<95%	<95%	<95%	103%	<95%	<95%	<95%	105%	<95%	flow from Cottonwood to Round Mtn, reduce Colusa generation if overload
COTTONWD E-ROUND MTN 230kV #2	Tbl Mtn-Tesla and Tbl Mtn-Vaca Dix 500 kV	P7	L-2	<95%	100%	105%	<95%	<95%	<95%	<95%	113%	<95%	100%	Reduce COI flow according to seasonal nomogram
	Capt Jack-Olinda 500 kV and Cottonwood-Round Mtn # 1 or #3 230 kV	P6	L-1/L-1	<95%	96%	101%	<95%	<95%	<95%	<95%	98%	<95%	<95%	
	Tbl Mtn-Vaca Dix 500 kV and Cottonwood-Round Mtn # 1 or #3 230 kV	P6	L-1/L-1	<95%	<95%	100%	<95%	<95%	<95%	<95%	103%	<95%	96%	
COTTONWD E-ROUND MTN 230kV #1	Capt Jack-Olinda 500 kV and Cottonwood-Round Mtn # 2 or #3 230 kV	P6	L-1/L-1	<95%	<95%	101%	<95%	<95%	<95%	<95%	97%	<95%	<95%	Reduce COI flow according to seasonal nomogram
	Tbl Mtn-Tesla and Tbl Mtn-Vaca Dix 500 kV	P7	L-2	<95%	97%	102%	<95%	<95%	<95%	<95%	109%	<95%	97%	
	Tbl Mtn-Vaca Dix 500 kV and Cottonwood-Round Mtn # 2 or #3 230 kV	P6	L-1/L-1	<95%	<95%	98%	<95%	<95%	<95%	<95%	101%	<95%	<95%	
CAYETANO- LONETREE 230 kV	Tesla-Metcalf and MossIndg-Los Banos 500 kV	P6	L-1/L-1	<95%	95%	101%	<95%	<95%	<95%	<95%	98%	<95%	<95%	Continue to monitor in longer term
	Tesla-Metcalf 500 kV and C. Costa-Las Positas 230 kV	P6	L-1/L-1	<95%	105%	109%	<95%	<95%	<95%	<95%	109%	<95%	<95%	
	Tesla-Metcalf 500 kV and ADCC-Newark 230 kV	P6	L-1/L-1	<95%	100%	104%	<95%	<95%	<95%	<95%	105%	<95%	<95%	
	Vaca Dix-Tesla 500 kV and C. Costa-Las Positas 230 kV	P6	L-1/L-1	<95%	102%	106%	<95%	<95%	<95%	<95%	104%	<95%	<95%	
LAS POSITAS-NEWARK 230 kV	Tesla-Metcalf 500 kV and CONTRA COSTA-LONE TREE 230kV	P6	L-1/L-1	<95%	101%	101%	<95%	<95%	<95%	<95%	104%	<95%	<95%	Continue to monitor in longer term
	Tesla-Metcalf 500 kV and NORTH DUBLIN-CAYETANO 230kV	P6	L-1/L-1	<95%	100%	101%	<95%	<95%	<95%	<95%	103%	<95%	<95%	
	Tesla-Metcalf 500 kV and LONE TREE-CAYETANO 230kV	P6	L-1/L-1	<95%	100%	101%	<95%	<95%	<95%	<95%	102%	<95%	<95%	
CAYETANO- N. DUBLIN 230 kV	Tesla-Metcalf 500 kV and C. Costa-Las Positas 230 kV	P6	L-1/L-1	<95%	99%	102%	<95%	<95%	<95%	<95%	102%	<95%	<95%	reduce generation in Contra Costa area, if overload
GOLD HILL-LODI 230 kV	Table Mtn 500/230 kV and Gold Hill-Eight Mile 230 kV	P6	T-1/L-1	<95%	<95%	<95%	<95%	110%	112%	<95%	<95%	114%	<95%	Generation redispatch
GOLD HILL-EIGHT MILE 230 kV	Table Mtn 500/230 kV and Eight Mille-Lodi 230 kV	P6	T-1/L-1	<95%	<95%	<95%	<95%	113%	115%	102%	<95%	117%	<95%	Generation redispatch
	Table Mtn 500/230 kV and Goldhill-Lodi Stig 230 kV	P6	T-1/L-1	<95%	<95%	<95%	<95%	110%	111%	<95%	<95%	113%	<95%	

Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading % (Baseline Scenarios)							Loading % (Sensitivity Scenarios)			Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2028 Spring Off-Peak	2028 Winter Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	
RANCHO SECO-BELLOTA 230 kV # 1 or # 2	RANCHO SECO-BELLOTA 230 kV #2 or # 1 and Tracy 500/230 kV	P6	T-1/L-1	<95%	<95%	<95%	<95%	<95%	<95%	<95%	<95%	<95%	104%	Sensitivity Only
	RANCHO SECO-BELLOTA 230 kV #2 or # 1 and Gates 500/230 kV	P6	T-1/L-1	<95%	<95%	<95%	<95%	<95%	<95%	<95%	<95%	<95%	104%	
	RANCHO SECO-BELLOTA 230 kV #2 or # 1 and other 500 kV facilities	P6	L-1/L-1	<95%	<95%	<95%	<95%	<95%	<95%	<95%	<95%	<95%	>100%	
BELLOTA-WEBER 230 kV	Table Mtn 500/230 kV and Bellota-Tesla 230 kV	P6	T-1/L-1	<95%	<95%	<95%	<95%	<95%	<95%	<95%	117%	<95%	<95%	Continue to monitor in longer term, generation reduction to mitigate
	Table Mtn -Vaca Dix 500 kV and Bellota-Tesla 230 kV	P6	L-1/L-1	<95%	<95%	<95%	<95%	<95%	<95%	<95%	107%	<95%	<95%	
	Table Mtn -Tesla 500 kV and Bellota-Tesla 230 kV	P6	L-1/L-1	<95%	<95%	<95%	<95%	<95%	<95%	<95%	105%	<95%	<95%	
	Olinda 500/230 kV and Bellota-Tesla 230 kV	P6	T-1/L-1	<95%	<95%	<95%	<95%	<95%	<95%	<95%	103%	<95%	<95%	
WEBER-TESLA 230 kV	Table Mtn 500/230 kV and Bellota-Tesla 230 kV	P6	T-1/L-1	<95%	<95%	<95%	<95%	<95%	101%	<95%	<95%	<95%	<95%	Continue to monitor in longer term
BELLOTA-TESLA 230 kV	Table Mtn 500/230 kV and Bellota-Weber 230 kV	P6	T-1/L-1	<95%	<95%	<95%	<95%	<95%	<95%	100%	111%	<95%	<95%	Continue to monitor in longer term
	Table Mtn 500/230 kV and Tesla-Weber 230 kV	P6	T-1/L-1	<95%	<95%	<95%	<95%	<95%	<95%	101%	107%	<95%	<95%	
	Table Mtn -Vaca Dix 500 kV and Bellota-Weber 230 kV	P6	L-1/L-1	<95%	<95%	<95%	<95%	<95%	<95%	<95%	101%	<95%	<95%	
	Table Mtn - Vaca Dix 500 kV and Tesla-Weber 230 kV	P6	L-1/L-1	<95%	<95%	<95%	<95%	<95%	<95%	<95%	103%	<95%	<95%	
BELLOTA-WARNERVILLE 230 kV	Table Mtn 500/230 kV and Cottle-Melones 230 kV	P6	T-1/L-1	<95%	<95%	<95%	<95%	<95%	<95%	<95%	<95%	<95%	103%	Sensitivity Only
	Tesla 500/230 kV and Cottle-Melones 230 kV	P6	T-1/L-1	<95%	<95%	<95%	<95%	<95%	<95%	<95%	<95%	<95%	111%	
	Tesla 500/230 kV and Bellota-Cottle 230 kV	P6	T-1/L-1	<95%	<95%	<95%	<95%	<95%	<95%	<95%	<95%	<95%	107%	
	other 500 kV facilities and 230 kV lines between Bellota and Melones	P6	T-1, L-1/L-1	<95%	<95%	<95%	<95%	<95%	<95%	<95%	<95%	<95%	>100%	
RANCHO SECO-CAMANACHE-BELLOTA 230 kV (Bellota-Rancho Seco # 2)	Rancho Seco-Bellota 230 kV and Capt Jack-Olinda 500 kV	P6	L-1/L-1	<95%	<95%	<95%	<95%	<95%	<95%	<95%	<95%	<95%	105%	Sensitivity Only
	Rancho Seco-Bellota 230 kV and Tracy 500/230 kV	P6	L-1/T-1	<95%	<95%	<95%	<95%	<95%	<95%	<95%	<95%	<95%	104%	
	other 500 kV facilities and Rancho Seco-Bellota 230 kV	P6	T-1, L-1/L-1	<95%	<95%	<95%	<95%	<95%	<95%	<95%	<95%	<95%	>100%	
WARNERVILLE-WILSON 230 kV	Gates 500/230 kV and Cottle-Melones 230 kV	P6	T-1/L-1	<95%	<95%	<95%	<95%	<95%	<95%	<95%	<95%	<95%	106%	Sensitivity Only
	Tesla 500/230 kV and Cottle-Melones 230 kV	P6	T-1/L-1	<95%	<95%	<95%	<95%	<95%	<95%	<95%	<95%	<95%	106%	
	other 500 kV facilities and Cottle-Melones 230 kV	P6	T-1, L-1/L-1	<95%	<95%	<95%	<95%	<95%	<95%	<95%	<95%	<95%	>100%	
EIGHT MILE-TESLA 230 kV	Table Mtn 500/230 kV and Stagg-Eight Mile 230 kV	P6	T-1/L-1	<95%	<95%	<95%	112%	136%	138%	118%	<95%	141%	<95%	Generation redispatch
	Table Mtn 500/230 kV and Stagg-Tesla 230 kV, or Stagg BRK	P6	T-1/L-1	<95%	<95%	<95%	103%	131%	136%	111%	<95%	137%	<95%	
	Table Mtn - Vac Dix 500 kV and Stagg-Eight Mile 230 kV	P6	L-1/L-1	<95%	<95%	<95%	<95%	<95%	<95%	<95%	104%	<95%	<95%	
	Table Mtn - Tesla 500 kV and Stagg-Eight Mile 230 kV	P6	L-1/L-1	<95%	<95%	<95%	<95%	<95%	<95%	<95%	101%	<95%	<95%	

Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading % (Baseline Scenarios)								Loading % (Sensitivity Scenarios)			Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2028 Spring Off-Peak	2028 Winter Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen		
STAGG-EIGHT MILE 230 kV	Table Mtn 500/230 kV and Eight Mile-Tesla 230 kV	P6	T-1/L-1	<95%	<95%	<95%	101%	122%	123%	122%	<95%	125%	<95%	Generation redispatch	
	Table Mtn -Vaca Dix 500 kV and Eight Mile-Tesla 230 kV	P6	L-1/L-1	<95%	<95%	<95%	<95%	<95%	<95%	102%	101%	<95%	<95%		
STAGG H - STAGG F BRK 230 kV	Table Mtn 500/230 kV and Eight Mile-Tesla 230 kV	P6	T-1/L-1	<95%	<95%	<95%	<95%	<95%	<95%	121%	<95%	<95%	<95%	Continue to monitor in longer term	
	Table Mtn -Vaca Dix 500 kV and Eight Mile-Tesla 230 kV	P6	L-1/L-1	<95%	<95%	<95%	<95%	<95%	<95%	105%	<95%	<95%	<95%		
	Table Mtn -Tesla 500 kV and Eight Mile-Tesla 230 kV	P6	L-1/L-1	<95%	<95%	<95%	<95%	<95%	<95%	102%	<95%	<95%	<95%		
STAGG D - STAGG F BRK 230 kV	Table Mtn 500/230 kV and Eight Mile-Tesla 230 kV	P6	T-1/L-1	<95%	<95%	<95%	<95%	<95%	<95%	118%	<95%	<95%	<95%		
	Table Mtn -Vaca Dix 500 kV and Eight Mile-Tesla 230 kV	P6	L-1/L-1	<95%	<95%	<95%	<95%	<95%	<95%	105%	<95%	<95%	<95%		
	Table Mtn -Tesla 500 kV and Eight Mile-Tesla 230 kV	P6	L-1/L-1	<95%	<95%	<95%	<95%	<95%	<95%	103%	<95%	<95%	<95%		
STAGG-TESLA E 230 kV	Table Mtn 500/230 kV and Eight Mile-Tesla 230 kV	P6	T-1/L-1	<95%	<95%	<95%	<95%	115%	120%	110%	<95%	120%	<95%	Generation redispatch	
PANOCHÉ DS AMIGO 230 kV	Gates 500/230 kV # 1 and 2	P6	T-1/T-1	<95%	<95%	<95%	<95%	<95%	97%	<95%	<95%	111%	<95%	Sensitivity Only	
LOS BANOS-PANOCHÉ #1 230 kV	Gates 500/230 kV # 1 and 2	P6	T-1/T-1	<95%	<95%	<95%	<95%	<95%	<95%	<95%	<95%	111%	<95%		
LOS BANOS-PANOCHÉ #2 230 kV	Gates 500/230 kV # 1 and 2	P6	T-1/T-1	<95%	<95%	<95%	<95%	<95%	<95%	<95%	<95%	103%	<95%		
MOSSLANDING-LAS AGUILAS 230 kV	Mosslanding-Los Banos 500 kV & Tesla-Metcalf 500 kV	P6	L-1/L-1	<95%	<95%	<95%	<95%	<95%	<95%	<95%	<95%	<95%	105%	Sensitivity Only	
	Los Banos 500/230kV and Westley-Quinto 230 kV	P6	T-1/L-1	<95%	<95%	<95%	<95%	<95%	<95%	<95%	<95%	103%	<95%	Sensitivity Only	
MOSSLANDING-METCALF 230 kV # 1 or 2	Mosslanding 500/230 kV and Mosslanding-Metcalf 230 kV # 2 or 1	P6	T-1/L-1	<95%	<95%	<95%	112%	<95%	<95%	<95%	<95%	<95%	<95%	Generation redispatch	
BORDEN-GREGG 230 kV # 1	Borden-Gregg 230 kV # 2 and Gates 500/230 kV	P6	L-1/L-1, T-1	<95%	103%	<95%	<95%	<95%	<95%	<95%	<95%	<95%	123%	Generation redispatch	
	Borden-Gregg 230 kV # 2 and Tesla 500/230 kV	P6	L-1/L-1, T-1	<95%	104%	<95%	<95%	<95%	<95%	<95%	<95%	<95%	119%		
	Borden-Gregg 230 kV # 2 and other 500 kV facilities	P6	L-1/L-1, T-1	<95%	>100%	<95%	<95%	<95%	<95%	<95%	<95%	<95%	>100%		
BORDEN-GREGG 230 kV # 2	Borden-Gregg 230 kV # 1 and Gates 500/230 kV	P6	L-1/L-1, T-1	<95%	<95%	<95%	<95%	<95%	<95%	<95%	<95%	<95%	114%	Sensitivity Only	
	Borden-Gregg 230 kV # 1 and Tesla 500/230 kV	P6	L-1/L-1, T-1	<95%	<95%	<95%	<95%	<95%	<95%	<95%	<95%	<95%	114%		
	Borden-Gregg 230 kV # 1 and other 500 kV facilities	P6	L-1/L-1, T-1	<95%	<95%	<95%	<95%	<95%	<95%	<95%	<95%	<95%	>100%		
<b>230/115 kV TRANSFORMERS and 230/70 kV</b>															
HENRIETTA 230/115 kV	Mustang-Mc Call 230 kV and Los Banos 500/230 kV	P6	L-1/T-1	<95%	<95%	<95%	<95%	<95%	103%	<95%	<95%	105%	<95%	Continue to monitor, generation redispatch to mitigate	
	Mustang-Mc Call 230 kV and Diablo unit	P3	L-1/G-1	<95%	<95%	<95%	<95%	<95%	N/A	<95%	<95%	104%	<95%		
	Mustang-Mc Call 230 kV and Midway 500/230 kV	P6	L-1/T-1	<95%	<95%	<95%	<95%	<95%	102%	<95%	<95%	103%	<95%		



Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading % (Baseline Scenarios)							Loading % (Sensitivity Scenarios)			Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2028 Spring Off-Peak	2028 Winter Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	
CORTINA 230/60 kV	Olinda-Tracy 500 kV and Cortina 230/115 kV	P6	L-1/T-1	97%	114%	149%	<95%	<95%	124%	<95%	119%	122%	<95%	Existing operating procedure
	Table Mtn-Vaca Dix 500 kV and Cortina 230/115 kV	P6	L-1/T-1	<95%	111%	142%	<95%	<95%	122%	<95%	117%	121%	<95%	
	Table Mtn-Tesla 500 kV, also other 500 kV lines and Cortina 230/115 kV	P6	L-1/T-1	<95%	109%	142%	<95%	<95%	121%	<95%	114%	121%	<95%	
<b>115 kV LINES</b>														
DELTA - CASCADE 115 kV	Malin- Round Mtn #1 and #2 500 kV	P7	L-2	105%	105%	99%	<95%	<95%	<95%	<95%	104%	<95%	105%	adjust Weed Phase Shifter or limit COI flow within seasonal nomogram
	Round Mtn-Table Mtn # 2 & Round Mtn-Malin # 2 500 kV	P6	L-1/L-1	96%	<95%	<95%	<95%	<95%	<95%	<95%	102%	<95%	<95%	
PEASE-E.MRSVLE-OLIVH 115 kV	Tbl Mtn-Tesla and Tbl Mtn-Vaca Dix 500 kV	P7	L-2	102%	<95%	<95%	<95%	<95%	<95%	<95%	<95%	<95%	<95%	Project: South of Palermoject. 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	106%	<95%	<95%	<95%	<95%	<95%	<95%	<95%	<95%	<95%	
	Tbl Mtn-Vaca Dix 500 kV and Table Mtn-Rio Oso 230 kV	P6	L-1/L-1	106%	<95%	<95%	<95%	<95%	<95%	<95%	<95%	<95%	<95%	
PALERMO-WYANDET 115 kV	normal conditions	P0	normal	99%	99%	101%	<95%	<95%	<95%	<95%	99%	<95%	<95%	Continue to monitor, may require future line upgrade in local area assessments
DRUM-BRUNSWICK -RIO OSO 115 kV	Round Mtn-Table Mtn # 2 & Round Mtn-Malin # 2 or # 1 500 kV	P6	L-1/L-1	<95%	99%	<95%	<95%	<95%	<95%	<95%	98%	<95%	109%	Sensitivity Only
	Malin-Round Mtn # 1 and 2 500 kV	P7	L-2	<95%	<95%	<95%	<95%	<95%	<95%	<95%	<95%	<95%	104%	
	Round Mtn-Table Mtn # 1 and 2 500 kV	P7	L-2	<95%	99%	<95%	<95%	<95%	<95%	<95%	98%	<95%	110%	
DRUM-BRUNSWICK -Dutch Flat 115 kV	Round Mtn-Table Mtn # 2 & Round Mtn-Malin # 2 or # 1 500 kV	P6	L-1/L-1	<95%	<95%	<95%	<95%	<95%	<95%	<95%	<95%	<95%	101%	
	Round Mtn-Table Mtn # 1 and 2 500 kV	P7	L-2	<95%	<95%	<95%	<95%	<95%	<95%	<95%	<95%	<95%	101%	
NEWARK-NRS 115 kV	Tesla-Metcalf 500 kV and Newark E-F 230 kV bus tie	P6	L-1/BRK	<95%	111%	115%	<95%	<95%	<95%	112%	133%	<95%	<95%	Continue to monitor future load forecast
	Tesla-Metcalf 500 kV and Newark -Los Esteros 230 kV	P6	L-1/L-1	<95%	104%	107%	<95%	<95%	<95%	109%	126%	<95%	<95%	
	Metcalf 500/230 kV and Newark E-F 230 kV bus tie	P6	T-1/BRK	<95%	96%	101%	<95%	<95%	<95%	100%	106%	<95%	<95%	
WILSON-LE GRAND 115 kV	normal conditions	P0	normal	<95%	<95%	<95%	110%	<95%	<95%	<95%	<95%	<95%	<95%	Project: Wilson-Le Grand 115 kV upgrade In-Service Date: Short term: Action plan
	Gates 500/230 kV # 1 and 2	P6	T-1/T-1	<95%	<95%	<95%	106%	<95%	<95%	<95%	<95%	<95%	<95%	
	Tesla-Los Banos and Tracy-Los Banos 500 kV	P6	L-1/L-1	<95%	<95%	<95%	103%	<95%	<95%	<95%	<95%	<95%	<95%	
	Mosslanding and Los Banos 500/230 kV	P6	T-1/T-1	<95%	<95%	<95%	102%	<95%	<95%	<95%	<95%	<95%	<95%	
	Gates 500/230 kV # 1 or 2 and Los Banos 500/230kV	P6	T-1/T-1	<95%	<95%	<95%	101%	<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%	100%	<95%	<95%	<95%	<95%	<95%	<95%	
	Tesla (or Tracy)-Los Banos 500 kV and Los Banos 500/230 kV	P6	L-1/T-1	<95%	<95%	<95%	100%	<95%	<95%	<95%	<95%	<95%	<95%	
Los Banos 500/230 and Westely-Quinto 230 kV	P6	T-1/L-1	<95%	<95%	<95%	118%	<95%	<95%	<95%	<95%	<95%	<95%		

Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading % (Baseline Scenarios)							Loading % (Sensitivity Scenarios)			Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2028 Spring Off-Peak	2028 Winter Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	
	Los Banos 500/230 and Los Banos-Quinto 230 kV	P6	T-1/L-1	<95%	<95%	<95%	114%	<95%	<95%	<95%	<95%	<95%	<95%	
	Los Banos 500/230 and Herndon-Kearney 230 kV	P6	T-1/L-1	<95%	<95%	<95%	112%	<95%	<95%	<95%	<95%	<95%	<95%	
	other 500 kV and 230 kV contingencies	P6	T-1, L-1/L-1	<95%	<95%	<95%	>100%	<95%	<95%	<95%	<95%	<95%	<95%	
SMYRNA- ATWELL ISL 115 kV	normal conditions	P0	normal	<95%	<95%	<95%	101%	98%	<95%	<95%	<95%	98%	<95%	Generation redispatch
HENRIETTA-LEPRINO JCT 115 kV	Mustang-Mc Call 230 kV and Diablo unit	P3	L-1/G-1	<95%	<95%	<95%	<95%	<95%	<95%	<95%	<95%	101%	<95%	Sensitivity Only
	Mustang -Mc Call 230 kV and Midway 500/230 kV # 11,12 or 13	P3	L-1/T-1	<95%	<95%	<95%	<95%	<95%	<95%	<95%	<95%	100%	<95%	
<b>70 kV LINES</b>														
BLACKWELL-LOST HILLS 70 kV	normal conditions	P0	normal	<95%	<95%	<95%	128%	134%	136%	<95%	<95%	141%	110%	reduce generation at Blackwell and Carneros if overload. Radial lines, non-BES
ARCO-TWISSELMAN JCT 70 kV	normal conditions	P0	normal	<95%	<95%	<95%	105%	108%	112%	<95%	<95%	113%	<95%	
KETTLEMAN-GATES 70 kV	normal conditions	P0	normal	<95%	<95%	<95%	149%	138%	143%	<95%	<95%	141%	130%	reduce generation at Suncity and Sunddrag. Radial from Gates, non-BES
AVENAL- AVENAL PARK 70 kV	normal conditions	P0	normal	<95%	<95%	<95%	104%	<95%	<95%	<95%	<95%	<95%	100%	
GIFFEN-GIFFEN JCT (Helm-Westland) 70 kV	normal conditions	P0	normal	<95%	<95%	<95%	108%	<95%	129%	<95%	<95%	<95%	100%	reduce generation from Giffen. Radial system, non-BES
GUERSNEY-JACOBS CORNER 70 kV	normal conditions	P0	normal	<95%	<95%	<95%	<95%	<95%	115%	<95%	<95%	<95%	<95%	reduce distributed gen from Guersney. Radial system, non-BES
HELM-STROUD 70 kV	normal conditions	P0	normal	<95%	<95%	<95%	<95%	<95%	107%	<95%	<95%	101%	<95%	reduce distributed gen from Stroud. Radial system, non-BES
<b>60 kV LINES</b>														
CASCADE-OREGON TRAIL 60 kV	normal conditions	P0	normal	<95%	101%	99%	<95%	<95%	<95%	<95%	<95%	<95%	<95%	limit COI within seasonal nomogram
	Captain Jack-Olinda 500 kV and Diablo unit	P3	G-1/L-1	<95%	100%	N/A	<95%	<95%	<95%	<95%	99%	<95%	<95%	
	Malin- Round Mtn #1 and #2 500 kV	P7	L-2	106%	110%	108%	<95%	<95%	<95%	<95%	101%	<95%	<95%	
	Round Mtn-Table Mtn # 1 & # 2 500 kV	P7	L-2	101%	104%	102%	<95%	<95%	<95%	<95%	101%	<95%	<95%	
	Round Mtn-Table Mtn # 2 & Round Mtn-Malin # 2 or # 1 500 kV	P6	L-1/L-1	101%	104%	102%	<95%	<95%	<95%	<95%	107%	<95%	<95%	
FITCH MTN-HELDSBURG 60 kV	normal conditions	P0	normal	<95%	<95%	<95%	<95%	<95%	<95%	<95%	101%	<95%	<95%	Sensitivity Only
PLAIN FIELD-WINTERS 60 kV	normal conditions	P0	normal	<95%	105%	108%	<95%	<95%	<95%	<95%	113%	<95%	<95%	Load forecast in under review.
VACA DIX-WINTERS 60 kV	normal conditions	P0	normal	<95%	99%	101%	<95%	<95%	<95%	<95%	104%	<95%	<95%	
COLONY-LODI 60 kV	normal conditions	P0	normal	107%	103%	98%	<95%	<95%	<95%	<95%	109%	<95%	102%	Lockeford-Lodi 230 kV Project
ROGH-RDY- STOCKTON 60 kV	normal conditions	P0	normal	<95%	<95%	<95%	<95%	<95%	<95%	<95%	102%	<95%	<95%	Sensitivity Only
MORMON-WEBER 60 kV	normal conditions	P0	normal	<95%	<95%	<95%	<95%	<95%	<95%	<95%	103%	<95%	<95%	Sensitivity Only





Substation	Contingency (All and Worst P6)	Category	Category Description	Post Cont. Voltage, kV (Baseline Scenarios)							Post Cont. Voltage, kV (Sensitivity Scenarios)			Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2028 Spring Off-Peak	2028 Winter Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	
MAXWELL 500 kV	Normal Conditions	P0	normal	<540	<540	<540	<540	547	<540	540	<540	542	<540	Install reactive support in the north of the 500 kV system to produce and absorb VARs. Turn off shunt reactors on the Captain Jack-Olinda and Olinda-Maxwell lines
	Round Mtn-Table Mnt #1 and # 2 500 kV	P7	L-2	487	491	>500	>500<540	>500<540	>500<540	>500<540	488	>500<540	488	
	Malin-Round Mtn # 1 and # 2 500 kV	P7	L-2	500	497	>500	>500<540	>500<540	>500<540	>500<540	498	>500<540	499	
	Malin-Round Mtn # 1 or 2 and Diablo unit	P3	L-1/G-1	<550	<550	<550	<550	<550	NA	NA	<550	553	<550	
VACA DIXON 500 kV	Normal Conditions	P0	normal	<540	<540	<540	<540	<540	<540	<540	<540	540	<540	
TRACY 500 kV	Normal Conditions	P0	normal	<540	<540	<540	540	542	<540	<540	<540	543	<540	turn off shunt at Olinda, doesn't bring voltage below 540 kV
GATES 500 kV	Normal Conditions	P0	normal	546	546	548	542	544	547	548	542	544	<540	install reactive support to absorb VARs on Gates or Diablo
	Los Banos 500/230 kV	P1	T-1	<550	<550	<550	<550	<550	550	<550	<550	<550	<550	
	Moss Lndg-Los Banos 500 kV and Los Banos 500/230 kV	P6	L-1/T-1	<550	<550	<550	<550	<550	552	<550	<550	<550	<550	
	Tesla-Los Banos 500 kV and Los Banos 500/230 kV	P6	L-1/T-1	<550	<550	550	<550	<550	551	<550	<550	<550	<550	
	Tesla or Tracy 500/230 kV and Los Banos 500/230 kV	P6	T-1/T-1	<550	<550	<550	<550	<550	551	<550	<550	<550	<550	
	Moss Lndg 500/230 kV and Los Banos 500/230 kV	P6	T-1/T-1	<550	<550	<550	<550	<550	551	<550	<550	<550	<550	
	Gates 500/230 kV # 1 or 2 and Metcalf 500/230 kV # 11,12 or 13	P6	T-1/T-1	<550	<550	551	<550	<550	550	<550	<550	<550	<550	
DIABLO 500 kV	Normal Conditions	P0	normal	<540	<540	551	<540	<540	552	552	<540	<540	<540	install reactive support to absorb VARs on Diablo or Gates
	Diablo-Midway # 2 or # 3 500 kV	P1	L-1	<550	<550	<550	<550	<550	554	552	<550	<550	<550	
	Captain Jack-Olinda	P1	L-1	<550	<550	<550	<550	<550	554	<550	<550	<550	<550	
	Los Banos-Tracy 500 kV and Los Banos 500/230 kV	P6	L-1/T-1	<550	<550	<550	<550	<550	555	<550	<550	<550	<550	
	Metcalf-Moss Lndg 500 kV and Moss Lndg 500/230 kV	P6	L-1/T-1	<550	<550	<550	<550	<550	553	<550	<550	<550	<550	
	Los Banos-Midway 500 kV and Los Banos 500/230 kV	P6	L-1/T-1	<550	<550	<550	<550	<550	554	<550	<550	<550	<550	
	Malin-Round Mtn # 1 and 2 500 kV	P7	L-2	<550	<550	<550	<550	<550	553	<550	<550	<550	<550	
	Metcalf-Mosslng and Mosslang-Los Banos 500 kV and other 500 kV L-1/L-1	P6	L-1/L-1	<550	<550	<550	<550	<550	553	<550	<550	<550	<550	
	Diablo-Midway # 1 and # 2 500 kV	P7	L-2	<550	<550	<550	<550	<550	553	553	<550	<550	<550	
MIDWAY 500 kV	Normal Conditions	P0	normal	<540	<540	541	<540	<540	542	542	<540	<540	<540	

High voltages in the 115/70 kV system in Fresno and Kern under normal conditions in all off-peak cases and cases with high renewables



Substation	Contingency (All and Worst P6)	Category	Category Description	Post Cont. Voltage, kV (Baseline Scenarios)						Post Cont. Voltage, kV (Sensitivity Scenarios)			Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2028 Spring Off-Peak	2028 Winter Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	
High voltages in the 115 kV system around Vaca Dixon for area contingencies in the 2023 Spring off-peak case with high renewables													

Study Area: **PG&E Bulk**

Voltage Deviation



Substation	Contingency (All and Worst P6)	Category	Category Description	Post Cont. Voltage Deviation % (Baseline Scenarios)						Post Cont. Voltage Deviation % (Sensitivity Scenarios)				Project & Potential Mitigation Solutions	
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Winter Peak	2023 Winter Peak	2028 Winter Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen		2020 SP Heavy Renewable & Min Gas Gen
NONE over 8%															

**Transient Stability**



Transient Stability Performance (Number of voltage and frequency violations)

Generator/Load	Contingency	Category	Category Description	Contingencies			Sensitivity		Potential Mitigation Solutions
				2020 Summer Peak	2028 Summer Peak	2023 Spring Off-Peak	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	
<b>Tripped Generation</b>									
renewable generator bus 365534 Q954 0.27 at Gates 230 kV bus	3 phase fault on DIABLO 500 kV generator or Diablo-Gates 500 kV outage, or 1 phase fault on GATES or MIDWAY 500KV BUS with delayed clearing	P1 or P2	G-1, or bus section	not tripped with these contingencies	not tripped with these contingencies	tripped due to high voltage >1.2 p.u with fault, 147.5 MW	tripped due to high voltage >1.2 p.u with fault, 147.5 MW	tripped due to high voltage >1.2 p.u with fault, 149 MW	tripping with fault may be a numerical issue. Need to adjust the models and protection settings
	3 phase fault on LOS BANOS 500 kV	P1	L-1, T-1	tripped due to high voltage >1.2 p.u with fault, 13.5 MW	tripped due to high voltage >1.2 p.u with fault, 1.5 MW	tripped due to high voltage >1.2 p.u with fault, 147.5 MW	tripped due to high voltage >1.2 p.u with fault, 147.5 MW	tripped due to high voltage >1.2 p.u with fault, 149 MW	
	3 phase fault on LOS BANOS, GATES, or MIDWAY 500 kV	P1, P6,P7	any	tripped due to high voltage >1.2 p.u with fault, 13.5 MW	tripped due to high voltage >1.2 p.u with fault, 1.5 MW	tripped due to high voltage >1.2 p.u with fault, 147.5 MW	tripped due to high voltage >1.2 p.u with fault, 147.5 MW	tripped due to high voltage >1.2 p.u with fault, 149 MW	
	3 phase fault on VACA DIX, METCALF, TRACY, TESLA, or MOSSLANDING 500 kV	P1, P6,P7	any	not tripped with these contingencies	not tripped with these contingencies	tripped due to high voltage >1.2 p.u with fault, 147.5 MW	tripped due to high voltage >1.2 p.u with fault, 147.5 MW	not tripped with these contingencies	
renewable generator bus 365554 Q946 0.27 on Midway-Wheeler Ridge 230 kV line	1 Phase fault on MIDWAY 500KV BUS - delayed clearing	P2	bus section	not tripped with these contingencies		tripped due to high voltage >1.2 p.u. with fault, 98.5 MW	tripped due to high voltage >1.2 p.u. with fault, 98.5 MW	not tripped with these contingencies	tripping with fault may be a numerical issue. Need to adjust the models and protection settings
	3 Phase Fault LOS BANOS, GATES 500 kV	P1-P7	any	not tripped with these contingencies	tripped due to high voltage >1.2 p.u. with fault, 1 MW	tripped due to high voltage >1.2 p.u. with fault, 98.5 MW	tripped due to high voltage >1.2 p.u. with fault, 98.5 MW		
	3 Phase Fault MIDWAY 500 kV	P1-P7	any	not tripped with these contingencies		tripped due to high voltage >1.2 p.u. with fault, 98.5 MW	tripped due to high voltage >1.2 p.u. with fault, 98.5 MW		
renewable generator bus 34683 Q643W 0.38 at Mustang 230 kV bus	1 Phase fault on TESLA or MOSSLANDING 500KV BUS - delayed clearing	P2	bus section	not tripped with these contingencies	not tripped with these contingencies	tripped due to high voltage >1.1 p.u. with fault , 100.5 MW	tripped due to high voltage >1.1 p.u. with fault , 100.5 MW	not tripped with these contingencies	need to investigate and check relay settings
	3 Phase fault on TESLA 500 kV BUS, Tesla-Table Mtn 500 kV outage	P1	L-1	not tripped with these contingencies	not tripped with these contingencies	tripped due to high voltage >1.1 p.u. with fault , 100.5 MW	not tripped with these contingencies	not tripped with these contingencies	
	3 Phase fault on TESLA 500 KV, Table Mtn-Tesla and Vaca Dix-Tesla	P7	L-2	tripped for low freq after 4 sec, 9.2 MW	Tripped for low freq after 4 sec, 1 MW	not tripped for these contingencies	not tripped with these contingencies	not tripped with these contingencies	

Transient Stability



Transient Stability Performance (Number of voltage and frequency violations)

Generator/Load	Contingency	Category	Category Description	Contingencies			Sensitivity		Potential Mitigation Solutions
				2020 Summer Peak	2028 Summer Peak	2023 Spring Off-Peak	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	
renewable generator bus 365524 Q1036S 0.36 at Mustang 230 kV bus	1 Phase fault on TESLA or MOSSLANDING 500KV BUS - delayed clearing	P2	bus section	not tripped with these contingencies	not tripped with these contingencies	tripped due to high voltage >1.1 p.u. with fault, 153.1 MW	tripped due to high voltage >1.1 p.u. with fault, 153.1 MW	tripped due to high voltage >1.1 p.u. with fault, 154.6 MW	tripping with fault may be a numerical issue. Need to adjust the models and protection settings and investigate tripping after 4 sec
	1 Phase fault on LOS BANOS 500KV BUS - delayed clearing	P2	bus section	not tripped with these contingencies	not tripped with these contingencies	not tripped with these contingencies	not tripped with these contingencies	tripped due to high voltage >1.1 p.u. with fault, 154.6 MW	
	3 Phase fault on ROUND MTN or OLINDA 500 kV	P1, P6, P7	any	not tripped with these contingencies	not tripped with these contingencies	not tripped with these contingencies	not tripped with these contingencies	tripped due to high voltage >1.1 p.u. with fault, 154.6 MW	
	3 Phase fault on TESLA 500 kV BUS, Tesla-Table Mtn 500 kV outage	P1	L-1	not tripped with this contingency	not tripped with these contingencies	tripped due to high voltage >1.1 p.u. with fault, 153.1 MW	not tripped with these contingencies	not tripped with this contingency	
	3 Phase fault on TESLA 500 kV BUS	P6	L-1/L-1	not tripped with these contingencies	not tripped with these contingencies	not tripped with these contingencies	not tripped with these contingencies	tripped due to low frequency after 4 sec, 154.6 MW	
	3 Phase fault on TESLA 500 kV, Table Mtn-Tesla and Vaca Dix-Tesla	P7	L-2	Tripped for low freq after 4 sec, 14.1 MW	Tripped for low freq after 4 sec, 1.6 MW	not tripped with this contingency	not tripped with this contingency	tripped due to low frequency after 4 sec, 154.6 MW	
renewable generators # 1 and 2 bus 365585 [Q829P12SPV] 0.42 at Las Aguilas 230 kV bus	3 phase fault on ROUND MTN or MALIN 500 kV	P1,P6, P7	L-1\1	not tripped for these contingencies	not tripped for these contingencies	tripped due to low freq <57 Hz with fault, 122 MW	not tripped for these contingencies	tripped for low frequency <57 Hz with fault, 123.2 MW	tripping with fault may be a numerical issue. Need to adjust the models and protection settings
	3 phase fault on METCALF, TRACY, TESLA, MOSSLANDING, LOS BANOS, GATES, or MIDWAY 500 kV	P1, P3, P6, P7	any	not tripped with these contingencies	not tripped with these contingencies	tripped due to high voltage >1.2 p.u. with fault, 122 MW	tripped due to high voltage >1.2 p.u. with fault, 122 MW	not tripped with these contingencies	
	3 phase fault on OLINDA, or TABLE MTN 500 kV	P1, P3, P6, P7	any	not tripped with these contingencies	not tripped with these contingencies	tripped due to low freq <57 Hz with fault, 122 MW	not tripped for these contingencies	not tripped with these contingencies	
	3 phase fault on METCALF or MIDWAY 500 kV	P1, P3, P6, P7	any	not tripped with these contingencies	not tripped with these contingencies	tripped due to high voltage >1.2 p.u. with fault, 117.1 MW	not tripped for these contingencies	not tripped for these contingencies	

Transient Stability



Transient Stability Performance (Number of voltage and frequency violations)

Generator/Load	Contingency	Category	Category Description	Contingencies			Sensitivity		Potential Mitigation Solutions
				2020 Summer Peak	2028 Summer Peak	2023 Spring Off-Peak	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	
renewable generator #3 bus 365586 [Q829P3SPV] 0.42 at Las Aguilas 230 kV bus	3 phase fault on TRACY, TESLA, MOSSLANDING, LOS BANOS, GATES, 500 kV	P1, P3, P6, P7	any	not tripped with these contingencies	not tripped with these contingencies	tripped due to high voltage >1.2 p.u. with fault, 117.1 MW	tripped due to high voltage >1.2 p.u. with fault, 117.1 MW	not tripped for these contingencies	tripping with fault may be a numerical issue. Need to adjust the models and protection settings
	3 phase fault on OLINDA, ROUND MTN, CAPT JACK, or MALIN 500 kV	P1, P3, P6, P7	any	not tripped with these contingencies	not tripped with these contingencies	tripped due to low freq <57 Hz with fault, 122 MW	tripped due to low freq <57 Hz with fault, 117.1 MW	tripped due to low freq <57 Hz with fault, 118.3 MW	
	3 phase fault on TABLE MTN 500 kV	P1, P3, P6, P7	any	not tripped with these contingencies	not tripped with these contingencies	not tripped with these contingencies	tripped due to low freq <57 Hz with fault, 117.1 MW	not tripped with these contingencies	
renewable generator bus 34694 KENT_S 0.80 at Henrietta 70 kV bus	3 Phase Fault LOS BANOS 500 kV	P1-P7	any	not tripped with these contingencies	not tripped with these contingencies	tripped due to high freq >60.5 Hz with fault, 19.6 MW	tripped due to high freq >60.5 Hz with fault, 19.6 MW	not tripped with these contingencies	tripping with fault may be a numerical issue. Need to adjust the models and protection settings
	3 Phase Fault GATES or MIDWAY 500 kV	P1-P7	any	not tripped with these contingencies	not tripped with these contingencies	not tripped with these contingencies	tripped due to high freq >60.5 Hz with fault, 19.6 MW	not tripped with these contingencies	
renewable generator bus 35019 REGULUS 0.38 at Lamont 115 kV bus	3 Phase Fault GATES 500 kV	P1-P7	any	not tripped with these contingencies	not tripped with these contingencies	tripped due to high freq >60.5 Hz with fault, 59.3 MW	not tripped with these contingencies	not tripped with these contingencies	tripping with fault may be a numerical issue. Need to adjust the models and protection settings
	3 Phase Fault MIDWAY 500 kV with two 500 kV lines out	P6, P7	L-1/L-2, L-2	not tripped with these contingencies	not tripped with these contingencies	not tripped with these contingencies	tripped due to high freq >60.5 Hz with fault, 59.3 MW	not tripped with these contingencies	
renewable generator bus 33102 COLUMBIA 0.36 (East Bay)	3 Phase Fault TRACY, TESLA, VACA DIX, 500 kV	P1, P6-7	any	tripped due to high voltage >1.1 p.u after 10 sec, 1.7 MW	tripped due to high voltage >1.1 p.u after 9 sec, 0.2 MW	modeled off in this case	tripped due to high voltage >1.1 p.u at 8.6 sec, 18.8 MW	tripped due to high voltage >1.1 p.u after 10 sec, 19 MW	high voltage (1.09 pu) in the base cases. Turn off shunt capacitor. Consider installing reactors due to high voltages in the area
	3 Phase Fault METCALF 500 kV, line outages	P1, P6	any	tripped due to high voltage >1.1 p.u after 10 sec, 1.7 MW	not tripped with these contingencies	modeled off in this case	not tripped with these contingencies	not tripped with these contingencies	
	3 Phase Fault MOSSLANDING 500 kV, transformer outages	P1	T-1	tripped due to high voltage >1.1 p.u after 10 sec, 1.7 MW	not tripped with these contingencies	modeled off in this case	tripped due to high voltage >1.1 p.u at 8.6 sec, 18.8 MW	not tripped with these contingencies	
	3 phase fault MIDWAY 500 kV, Midway-Gates and Midway-Los Banos 500kV out	P7	L-2	tripped for low voltage <0.9 p.u at 4.1 sec, 22 MW	tripped for low voltage <0.9 p.u at 4.1 sec, 2.5 MW	not tripped with these contingencies	tripped due to low voltage <0.9 p.u at 4.1 sec, 240.1 MW	tripped for low voltage <0.9 p.u at 4.1 sec, 246.2 MW	



Transient Stability



Transient Stability Performance (Number of voltage and frequency violations)

Generator/Load	Contingency	Category	Category Description	Contingencies			Sensitivity		Potential Mitigation Solutions
				2020 Summer Peak	2028 Summer Peak	2023 Spring Off-Peak	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	
renewable generator bus TOPAZ B2 0.69 kV	3 Phase fault GATES 500 kV	P1, P6, P7	L-1, T-1, L-1/L-1	not tripped with these contingencies	not tripped with these contingencies	not tripped with these contingencies	not tripped with these contingencies	tripped for low voltage <0.9 p.u at 4.1 sec, 246.2 MW	low voltages due to stalling of induction motor load. High voltages due to high generation and low load. Installing SVS capable of absorbing VARs in the area (Gates 500 kV substation) may help also for these issues
	3 Phase fault MIDWAY 500 kV	P1, P6, P7	L-1, T-1, L-1/L-1	tripped for low voltage <0.9 p.u at 4.1 sec, 22 MW	tripped for low voltage <0.9 p.u at 4.1 sec, 2.5 MW	not tripped with these contingencies	not tripped with these contingencies	tripped for low voltage <0.9 p.u at 4.1 sec, 246.2 MW	
renewable generator bus TOPAZ B1 0.69 kV	3 Phase fault MIDWAY 500 kV	P1, P6, P7	L-1, T-1, L-1/L-1	not tripped with these contingencies	tripped for low voltage <0.9 p.u at 4.1 sec, total TOPAZ 5.6 MW	not tripped with these contingencies	not tripped with these contingencies	tripped for low voltage <0.9 p.u at 4.1 sec, 35.6 MW	
TOPAZ A1, A2 0.69 kV or 0.32 kV	3 Phase fault MIDWAY 500 kV	P1, P6, P7	L-1, T-1, L-1/L-1	not tripped with these contingencies	tripped for low voltage <0.9 p.u at 4.1 sec, total TOPAZ 5.6 MW	not tripped with these contingencies	not tripped with these contingencies	not tripped with these contingencies	
renewable generator bus 365563 Q885 0.36 kV at S. KERN	3 Phase fault MIDWAY 500 kV	P1-P7	L-1, T-1, L-1/L-1	modeled off in this case	tripped for low voltage <0.9 p.u at 4.1 sec, 0.1 MW	not tripped with these contingencies	not tripped with these contingencies	not tripped with these contingencies	
generator 31847 ROARMONG 13.8 kV	3 phase fault ROUND MTN 500 kV	P6, P7	L-2	went out of step, 2.5 MW	went out of step, 2.5 MW	not tripped with these contingencies	went out of step, 2.5 MW	went out of step, 2.5 MW, also for P1	small unit at Cove Road, 2.5 MW, underexcitation due to high voltage
	3 phase fault on TRACY or TESLA 500 kV	P1, P6	L-1, T-1, L-1/-1	went out of step, 2.5 MW	went out of step, 2.5 MW	not tripped with these contingencies	not tripped with these contingencies	went out of step, 2.5 MW	
	3 phase fault on OLINDA, 500 kV	P6	L-1/-1	went out of step, 2.5 MW	went out of step, 2.5 MW	not tripped with these contingencies	not tripped with these contingencies	went out of step, 2.5 MW	
GUERNSEY_D 1 and 2 distributed gen	3 phase fault on GATES, LOS BANOS	P1, P6, P7	any	tripped for low voltage <0.88 p.u after 3 sec, 1.8 MW	tripped for low voltage <0.88 p.u after 3 sec, 0.2 MW	not tripped with these contingencies	not tripped with these contingencies	tripped for low voltage <0.88 p.u after 3 sec, 19.8 MW	low voltages due to stalling of induction motor load. Installing SVS in the area (Gates 500 kV substation) may help also for these issues
	3 phase fault on MIDWAY	P1	L-1, T-1	not tripped with these contingencies	tripped for low voltage <0.88 p.u after 3 sec, 0.2 MW	not tripped with these contingencies	not tripped with these contingencies	tripped for low voltage <0.88 p.u after 3 sec, 19.8 MW	
	3 phase fault on MIDWAY	P6, P7	L-2	tripped for low voltage <0.88 p.u after 3 sec, 1.8 MW	tripped for low voltage <0.88 p.u after 3 sec, 0.2 MW	not tripped with these contingencies	not tripped with these contingencies	tripped for low voltage <0.88 p.u after 3 sec, 19.8 MW	
HURON_D 1 and 2 distributed gen	3 Phase fault MIDWAY 500 kV, outage of 2 lines	P6, P7	L-2	not tripped with these contingencies	tripped for low voltage <0.88 p.u after 4 sec, 0.2 MW	not tripped with these contingencies	not tripped with these contingencies	not tripped with these contingencies	
GATES 1 and 2 distributed gen	3 Phase fault MIDWAY 500 kV, outage of 2 lines	P6, P7	L-2	not tripped with these contingencies	tripped for low voltage <0.88 p.u after 4 sec, 0.3 MW	not tripped with these contingencies	not tripped with these contingencies	not tripped with these contingencies	

**Transient Stability**



Transient Stability Performance (Number of voltage and frequency violations)

Generator/Load	Contingency	Category	Category Description	Contingencies			Sensitivity		Potential Mitigation Solutions
				2020 Summer Peak	2028 Summer Peak	2023 Spring Off-Peak	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	
generator 35024 DEXEL 13.8 kV	3 Phase fault on MIDWAY 500 kV, contingencies between Midway and Vincent	P1,P6	L-1, L-1/-1	tripped by branch overcurrent relay after 6 sec, 20.3 MW		not tripped with these contingencies		ripped by branch overcurrent relay after 6 sec, 20.3 MW	need to investigate and check relay settings
generator 30532 0162-WD 21 kV from Cayetano	3 Phase fault on TESLA 500 kV Tesla-Metcalf or P6 outages from Tesla	P1, P6	L-1, L-1/-1	not tripped with these contingencies	tripped for overcurrent, 4.3 MW	not tripped with these contingencies	not tripped with these contingencies	tripped for overcurrent, 4.3 MW	small unit, may be modeling issue
	3 Phase fault on TESLA 500 kV Table Mtn-Tesla and Tesla-Metcalf outage	P6	L-1/L-1	tripped for overcurrent, 4.3 MW	tripped for overcurrent, 4.3 MW	not tripped with these contingencies	not tripped with these contingencies	tripped for overcurrent, 4.3 MW	
hydro generator 32510 CHILI BAR 4.2 kV	3 Phase fault on TESLA 500 kV	P1, P6, P7	L-1/L-1 (T-1)	not tripped with these contingencies	went out of step, 2.4 MW	not tripped with these contingencies	not tripped with these contingencies	went out of step, 2.4 MW	high voltages, underexcitation
generator 35861 SJ-SCL W 4.2 kV, at ZANKER 115 kV	3 Phase fault on TESLA 500 kV	P1, P6, P7	L-1/L-1 (T-1)	not tripped with these contingencies	tripped for over-volt after 9 sec, 6.5 MW	not tripped with these contingencies	not tripped with these contingencies	tripped for over-volt after 11 sec, 6.5 MW	high voltage due to reduction of load by composite load model
renewable 35098 Q557 0.48 on Atwell-Alpaugh 115 kV	3 Phase fault on MIDWAY 500 kV	P1, P6, P7	L-1/L-1 (T-1)	not tripped with these contingencies	tripped for hi volt >1.1 after 9 sec, 0.2 MW	not tripped with these contingencies	not tripped with these contingencies	tripped for hi volt >1.1 after 9 sec, 20.1 MW, only for P6,7	High voltages due to Diablo retirement and large amount of distributed generation. Installing SVS capable of absorbing VARs in the area (Gates 500 kV substation) may help also for these issues
renewable generator bus 365568 Q557BESS 0.48 at Atwell-Alpaugh 115 kV	3 Phase fault on MIDWAY 500 kV	P1, P6, P7	L-1/L-1 (T-1)	tripped for hi volt after 8 sec, 2MW	not tripped with these contingencies	not tripped with these contingencies	not tripped with these contingencies	tripped for hi volt after 8 sec, 2MW	high voltage due to reduction of load by composite load model
generator 31840 BLACKBUTT 9.1 kV	3 Phase fault on TABLE MTN, OLINDA, TRACY 500 kV	P1, P6, P7	L-1/L-1 (T-1)	not tripped with these contingencies	tripped for over-current, 3.5 MW	not tripped with these contingencies	not tripped with these contingencies	tripped for over-current, 3.5 MW	small unit, may be modeling issue
	3 Phase fault on TESLA 500 kV	P1, P6, P7	L-1/L-1 (T-1)	went out of step, 3.5 MW	tripped for over-current, 3.5 MW	not tripped with these contingencies	not tripped with these contingencies	tripped for over-current, 3.5 MW	
	3 Phase fault on ROUND MTN, or MALIN 500 kV	P6, P7	L-1/L-1	went out of step, 3.5 MW	tripped for over-current, 3.5 MW	not tripped with these contingencies	not tripped with these contingencies	tripped for over-current, 3.5 MW	
	3 Phase fault on TABLE MTN, OLINDA, TRACY 500 kV	P6, P7	L-1/L-1	not tripped with these contingencies	tripped for over-current, 3.5 MW	not tripped with these contingencies	not tripped with these contingencies	tripped for over-current, 3.5 MW	
renewable 38380 MTHSE_G 0.34 kV from Tracy 69 kV	3 Phase fault on TESLA or TRACY 500 kV	P1, P6	L-1, T-1, L-1/-1	tripped for low volt <0.88 after 3 sec, 19 MW	tripped for low volt <0.88 after 3 sec, 19 MW	not tripped with these contingencies	not tripped with these contingencies	tripped for low volt <0.88 after 3 sec, 19 MW	low voltages due to stalling of induction motor load. Installing dynamic reactive support in the area may help also for these issues
renewable 33868 Q709RPWRP2 0.69 from Tesla 115 kV	3 Phase fault on TESLA or TRACY 500 kV	P1, P6	L-1, T-1, L-1/-1	tripped for hi volt >1.1 after 7 sec 17.5 MW	tripped for hi volt >1.1 after 10 sec, 30.8 MW	not tripped with these contingencies	not tripped with these contingencies	not tripped with these contingencies	High voltages due to Diablo retirement and large amount of distributed generation. Installing SVS capable of absorbing VARs in the area (Gates 500 kV substation) may help also for these issues

**Transient Stability**



Transient Stability Performance (Number of voltage and frequency violations)

Generator/Load	Contingency	Category	Category Description	Contingencies			Sensitivity		Potential Mitigation Solutions
				2020 Summer Peak	2028 Summer Peak	2023 Spring Off-Peak	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	
generator 31828 KILARC 9.1 kV, 2 units	3 Phase fault on TESLA 500 kV, Tesla-Los Banos, or Metcalf or double outages	P1, P6, P7	L-1/L-1 (T-1)	not tripped with these contingencies	went out of step, 2.2 MW	not tripped with these contingencies	not tripped with these contingencies	went out of step, 3.2 MW	small unit, may be modeling issue
generator 31856 COW CREEK, 2 units	3 Phase fault on TESLA 500 kV, Tesla-Los Banos, or Metcalf or double outages	P1, P6, P7	L-1/L-1 (T-1)	not tripped with these contingencies	went out of step, 1 MW	not tripped with these contingencies	not tripped with these contingencies	went out of step, 1.8 MW	small unit, may be modeling issue
generator 31872 CLOVER 9.1	3 Phase fault on TESLA or TRACY 500 kV	P6	L-1/L-1	not tripped with these contingencies	went out of step, 0.4 MW	not tripped with these contingencies	not tripped with these contingencies	went out of step, 0.4 MW	small unit, may be modeling issue
<b>Tripped load, load reduced by composite load model not included</b>									
45070 BRYANT 69.00	3 phase fault ROUND MTN, MALIN, CAPT JACK 500 kV	P1, P6, P7	L-1, T-1, L-1/-1	under-vlt load shedding	under-vlt load shedding	not tripped with these contingencies	not tripped with these contingencies	under-vlt load shedding	Low voltage due to stalling of induction motors. Installation of dynamic reactive support at Round Mtn 500 kV substation may also help for these issues
45070 BRYANT 69.00	3 phase fault TABLE MTN 500 kV	P1, P6, P7	L-1, T-1, L-1/-1	under-vlt load shedding	not tripped with these contingencies	not tripped with these contingencies	not tripped with these contingencies	under-vlt load shedding	
45016 BELKNAP 69.00	3 phase fault ROUND MTN, MALIN, CAPT JACK 500 kV	P1, P6, P7	L-1, T-1, L-1/-1	under-vlt load shedding	under-vlt load shedding	not tripped with these contingencies	not tripped with these contingencies	under-vlt load shedding	
45407 MERLIN 115.00	3 phase fault ROUND MTN, MALIN, CAPT JACK 500 kV	P1, P6, P7	L-1, T-1, L-1/-1	under-vlt load shedding	under-vlt load shedding	not tripped with these contingencies	not tripped with these contingencies	under-vlt load shedding	
45389 EASY VLY 115.00	3 phase fault ROUND MTN, MALIN, CAPT JACK 500 kV	P1, P6, P7	L-1, T-1, L-1/-1	under-vlt load shedding	under-vlt load shedding	not tripped with these contingencies	not tripped with these contingencies	under-vlt load shedding	
45271 SAGEROAD 115.00	3 phase fault ROUND MTN, MALIN, CAPT JACK 500 kV	P1, P6, P7	L-1, T-1, L-1/-1	under-vlt load shedding	under-vlt load shedding	not tripped with these contingencies	not tripped with these contingencies	under-vlt load shedding	
45533 WINCHSTR 115.00	3 Phase fault Malin-Round Mtn 500 kV # 1 or 2, or Capt Jack-Olinda	P1	L-1	not tripped with these contingencies	under-vlt load shedding	not tripped with these contingencies	not tripped with these contingencies	under-vlt load shedding	
36012 WTSNVILLE 60.00	3 phase fault on METCALF, TRACY or TESLA 500 kV	P1, P6, P7	L-1, T-1, L-1/-1	under-vlt load shedding	under-vlt load shedding	not tripped with these contingencies	not tripped with these contingencies	under-vlt load shedding	Low voltage due to stalling of induction motors. Consider installation of dynamic reactive support
	3 phase fault on LOS BANOS 500 kV	P6, P7	L-1/-1	under-vlt load shedding	not tripped with these contingencies	not tripped with these contingencies	not tripped with these contingencies	under-vlt load shedding	
	3 phase fault on MOSS LANDING 500 kV	P1	L-1, T-1	under-vlt load shedding	not tripped with these contingencies	not tripped with these contingencies	not tripped with these contingencies	not tripped with these contingencies	
38086 HARDROCK 60 kV, 38078 BASLN 60 kV, 38072 FTHILL 60 kV, 38070 PARKEAST 60 kV,	3 phase fault ROUND MTN 500 kV	P1, P6, P7	L-1, T-1, L-1/-1	under-vlt load shedding	not tripped with these contingencies	not tripped with these contingencies	not tripped with these contingencies	not tripped with these contingencies	Low voltage due to stalling of induction motors. Installation of dynamic reactive support at Round Mtn 500 kV substation may also help for these issues
	3 phase fault METCALF, GATES, MIDWAY or TRACY 500 kV	P1, P6, P7	L-1, T-1, L-1/-1	not tripped with these contingencies	not tripped with these contingencies	not tripped with these contingencies	not tripped with these contingencies	under-vlt load shedding	
36890 Walsh 60.00	3 phase fault on TRACY 500 kV	P1, P6, P7	L-1, T-1, L-1/-1	UFLS	UFLS	not tripped with these contingencies	not tripped with these contingencies	UFLS	
Kenneth 60 kV	3 phase fault on TRACY 500 kV	P1, P6, P7	L-1, T-1, L-1/-1	UFLS	UFLS	not tripped with these contingencies	not tripped with these contingencies	UFLS	possible modeling error due to renewale generation in the area. Need

Study Area: **PG&E Bulk**

**Transient Stability**



Transient Stability Performance (Number of voltage and frequency violations)

Generator/Load	Contingency	Category	Category Description	Contingencies			Sensitivity		Potential Mitigation Solutions
				2020 Summer Peak	2028 Summer Peak	2023 Spring Off-Peak	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	
Palm 60 kV	3 phase fault on TRACY 500 kV	P1, P6, P7	L-1, T-1, L-1/-1	not tripped	UFLS	not tripped with these contingencies	not tripped with these contingencies	UFLS	to check UFLS relay settings
Mission 60 kV	3 phase fault on TRACY 500 kV	P1, P6, P7	L-1, T-1, L-1/-1	not tripped	UFLS	not tripped with these contingencies	not tripped with these contingencies	UFLS	
<b>Criteria Violaions</b>									
NONE									

Study Area: **PG&E Bulk**



*Single Contingency Load Drop*

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

Study Area: **PG&E Bulk**



*Single Source Substation with more than 100 MW Load*

Substation	Load Served (MW)										Potential Mitigation Solutions
	Select..	Select..	Select..	Select..	Select..	Select..	Select..	Select..	Select..	Select..	
N/A											



Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading % (Baseline Scenarios)								Loading % (Sensitivity Scenarios)			Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Winter Peak	2023 Winter Peak	2028 Winter Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	
31000 HUMBOLDT 115 31015 BRDGVILLE 115 1 1	P1-2:A1:14:_HUMBOLDT 60KV [7130] MOAS OPENED ON HUMBOLDT_MPLE CRK & P1-2:A1:3:_HUMBOLDT 115KV [1820]	P6	N-1-1	82	77	75	<100	<100	<100	<100	<100	100	<100	100	Sensitivity only
31000 HUMBOLDT 115 31452 TRINITY 115 1 1	P1-2:A1:24:_BRIDGEVILLE-GARBERVILLE 60KV [6220] MOAS OPENED ON BRDGVILLE_FRUTLDJT & P1-2:A1:4:_BRIDGEVILLE-COTTONWOOD 115KV [1110]	P6	N-1-1	81	75	73	<100	<100	<100	<100	<100	100	<100	100	Sensitivity only
	P1-2:A1:25:_GARBERVILLE 60KV [8365] & P1-2:A1:4:_BRIDGEVILLE-COTTONWOOD 115KV [1110]	P6	N-1-1	<100	<100	<100	<100	<100	<100	<100	<100	89	<100	100	Sensitivity only
	P1-2:A1:26:_BRIDGEVILLE-GARBERVILLE 60KV [6220] MOAS OPENED ON FTSWRDJT_GRBRVLE & P1-2:A1:4:_BRIDGEVILLE-COTTONWOOD 115KV [1110]	P6	N-1-1	79	73	71	<100	<100	<100	<100	<100	99	<100	100	Sensitivity only
31080 HUMBOLDT 60.0 31088 HMBLT JT 60.0 1 1	P1-2:A1:13:_HUMBOLDT BAY 60KV [7090]	P1	N-1	100	110	100	74	79	71	64	15	120	15	126	Non-BES facility
	P1-2:A1:15:_HMBLT BY-HARRIS 60KV [0] MOAS OPENED ON HARRIS_HARRISST	P1	N-1	86	96	89	64	68	63	54	14	104	15	103	Sensitivity only
	P2-1:A1:19:_HUMBOLDT BAY 60KV [7070] (EUREKA-HMBLT BY)	P2	Line Section w/o fault	88	97	90	65	69	64	54	15	105	15	103	Sensitivity only
	P2-3:A1:10:_HMBLT BY 60KV - MIDDLE BREAKER BAY 3	P2	Non-bus-tie breaker	100	109	103	93	82	97	45	5	121	5	110	Non-BES facility
	P2-3:A1:8:_HUMBOLDT 60KV - MIDDLE BREAKER BAY 2	P2	Non-bus-tie breaker	96	106	94	66	78	65	61	12	115	13	122	Non-BES facility
	P1-2:A1:11:_HUMBOLDT BAY 60KV [7070] MOAS OPENED ON HUMBOLDT_HARRIS & P1-2:A1:13:_HUMBOLDT BAY 60KV [7090]	P6	N-1-1	96	98	87	86	94	74	<100	<100	100	<100	100	Sensitivity only
	P1-2:A1:13:_HUMBOLDT BAY 60KV [7090] & P1-2:A1:15:_HMBLT BY-HARRIS 60KV [0] MOAS OPENED ON HARRIS_HARRISST	P6	N-1-1	99	99	99	101	100	100	90	<100	98	<100	100	Non-BES facility
	P1-2:A1:15:_HMBLT BY-HARRIS 60KV [0] MOAS OPENED ON HARRIS_HARRISST & P1-2:A1:13:_HUMBOLDT BAY 60KV [7090]	P6	N-1-1	100	100	100	100	101	100	90	<100	100	<100	100	Non-BES facility

Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading % (Baseline Scenarios)								Loading % (Sensitivity Scenarios)			Project & Potential Mitigation Solutions	
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Winter Peak	2023 Winter Peak	2028 Winter Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen		
	P1-2:A1:22:_RIO DELL JCT 60KV [7850] MOAS OPENED ON CARLOTTA_SWNS FLT & P1-2:A1:13:_HUMBOLDT BAY 60KV [7090]	P6	N-1-1	100	100	100	82	100	76	<100	<100	100	<100	100	Non-BES facility	
	P7-1:A1:2:_HUMBOLDT BAY & HUMBOLDT BAY LINES	P7	DCTL	106	116	106	79	83	77	64	15	128	15	130	Non-BES facility	
31086 EUREKA 60.0 31090 HMBLT BY 60.0 1 1	P1-2:A1:13:_HUMBOLDT BAY 60KV [7090]	P1	N-1	99	98	90	74	78	64	59	17	105	18	106	Sensitivity only	
	P2-3:A1:8:_HUMBOLDT 60KV - MIDDLE BREAKER BAY 2	P2	Non-bus-tie breaker	97	96	90	69	78	63	57	16	103	17	103	Sensitivity only	
	P2-3:A1:9:_HMBLT BY 60KV - MIDDLE BREAKER BAY 4	P2	Non-bus-tie breaker	80	89	74	50	64	40	26	30	105	31	110	Sensitivity only	
	P1-2:A1:12:_HUMBOLDT BAY-HUMBOLDT #1 60KV [7080] & P1-2:A1:13:_HUMBOLDT BAY 60KV [7090]	P6	N-1-1	100	101	100	100	101	100	89	<100	100	<100	101	Non-BES facility	
	P1-2:A1:13:_HUMBOLDT BAY 60KV [7090] & P1-2:A1:12:_HUMBOLDT BAY-HUMBOLDT #1 60KV [7080]	P6	N-1-1	100	101	100	101	101	100	89	<100	100	<100	99	Non-BES facility	
	P7-1:A1:2:_HUMBOLDT BAY & HUMBOLDT BAY LINES	P7	DCTL	103	101	94	78	82	69	59	17	111	17	109	Non-BES facility	
31104 CARLOTTA 60.0 31105 RIODLLTP 60.0 1 1	P1-2:A1:2:_HUMBOLDT 115KV [1810]	P1	N-1	96	94	88	50	66	39	34	2	115	4	111	Sensitivity only	
	P2-1:A1:21:_HUMBOLDT BAY 60KV [7100] (HMBLT BY-EEL RIVR)	P2	Line Section w/o fault	29	37	26	103	15	97	57	57	37	59	51	Non-BES facility	
	P2-2:A1:1:_HUMBOLDT 115KV SECTION MA	P2	Bus	80	81	63	20	49	34	49	12	91	6	154	Sensitivity only	
	P2-3:A1:1:_HUMBOLDT - MA 115KV & HUMBOLDT LINE	P2	Non-bus-tie breaker	82	84	64	24	48	44	53	14	94	7	165	Sensitivity only	
	P2-3:A1:16:_BRDGVILLE 115KV - RING R3 & R2	P2	Non-bus-tie breaker	86	87	84	65	68	54	24	3	103	1	82	Sensitivity only	
	P2-3:A1:17:_BRDGVILLE 115KV - RING R1 & R2	P2	Non-bus-tie breaker	86	86	83	65	68	54	24	2	103	1	80	Sensitivity only	
	P2-3:A1:18:_BRDGVILLE 115KV - RING R1 & R3	P2	Non-bus-tie breaker	86	87	84	65	68	54	24	3	103	1	82	Sensitivity only	
	P1-2:A1:2:_HUMBOLDT 115KV [1810] & P1-2:A1:3:_HUMBOLDT 115KV [1820]	P6	N-1-1	100	101	101	79	99	<100	<100	<100	100	<100	100	System upgrade or preferred resource	
	P1-3:A1:1:_HUMBOLDT 115/60KV TB 2 & P1-3:A1:3:_HUMBOLDT 115/60KV TB 1	P6	N-1-1	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	101	Sensitivity only
	P1-3:A1:3:_HUMBOLDT 115/60KV TB 1 & P1-3:A1:1:_HUMBOLDT 115/60KV TB 2	P6	N-1-1	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	101	Sensitivity only
P1-2:A1:2:_HUMBOLDT 115KV [1810]	P1	N-1	92	90	85	44	60	36	31	4	111	5	108	Sensitivity only		

Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading % (Baseline Scenarios)								Loading % (Sensitivity Scenarios)			Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Winter Peak	2023 Winter Peak	2028 Winter Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	
31104 CARLOTTA 60.0 31108 SWNS FLT 60.0 1 1	P2-1:A1:21:_HUMBOLDT BAY 60KV [7100] (HMBLT BY-EEL RIVR)	P2	Line Section w/o fault	25	32	24	106	9	103	54	57	32	59	47	Non-BES facility
	P2-2:A1:1:_HUMBOLDT 115KV SECTION MA	P2	Bus	76	77	61	23	43	39	46	13	86	6	151	Sensitivity only
	P2-3:A1:1:_HUMBOLDT - MA 115KV & HUMBOLDT LINE	P2	Non-bus-tie breaker	78	79	61	28	43	48	50	14	89	7	163	Sensitivity only
31108 SWNS FLT 60.0 31110 BRDGVILLE 60.0 1 1	P1-2:A1:2:_HUMBOLDT 115KV [1810]	P1	N-1	92	89	85	43	60	36	30	3	110	4	107	Sensitivity only
	P2-1:A1:21:_HUMBOLDT BAY 60KV [7100] (HMBLT BY-EEL RIVR)	P2	Line Section w/o fault	25	31	23	106	8	104	53	57	32	58	47	Non-BES facility
	P2-2:A1:1:_HUMBOLDT 115KV SECTION MA	P2	Bus	75	76	60	23	43	39	46	13	86	6	150	Sensitivity only
31110 BRDGVILLE 60.0 31120 FRUTLDJT 60.0 1 1	Base Case	P0	N-0	93	95	96	70	69	66	17	5	111	8	73	Sensitivity only
	P1-2:A1:14:_HUMBOLDT 60KV [7130] MOAS OPENED ON HUMBOLDT_MPLE CRK	P1	N-1	86	87	88	67	68	64	16	4	102	7	68	Sensitivity only
	P1-2:A1:15:_HMBLT BY-HARRIS 60KV [0] MOAS OPENED ON HARRIS_HARRISST	P1	N-1	88	90	89	69	70	65	17	4	104	7	67	Sensitivity only
	P1-2:A1:3:_HUMBOLDT 115KV [1820]	P1	N-1	93	94	94	69	70	65	17	7	113	10	82	Sensitivity only
	P1-2:A1:4:_BRIDGEVILLE-COTTONWOOD 115KV [1110]	P1	N-1	99	99	98	68	72	63	19	9	120	11	91	Sensitivity only
	P1-4:A1:4:_HUMBOLDT 60.00KV ID=7H & HUMBOLDT 60.00KV ID=5H & HUMBOLDT 60.00KV ID=1H & HUMBOLDT 60.00KV ID=V SHUNT DEVICES	P1	N-1	85	86	88	70	66	65	15	3	102	4	67	Sensitivity only
	P2-1:A1:1:_HUMBOLDT 115KV [1820] (HUMBOLDT-TRINITY)	P2	Line Section w/o fault	93	93	93	70	70	65	17	7	112	10	80	Sensitivity only
	P2-1:A1:2:_BRIDGEVILLE-COTTONWOOD 115KV [1110] (FRSTGLEN-LOW GAP1)	P2	Line Section w/o fault	98	98	96	67	71	62	20	10	119	13	92	Sensitivity only
	P2-2:A1:3:_LOW GAP1 115KV SECTION 1D	P2	Bus	99	99	98	68	72	63	18	9	120	11	91	Sensitivity only
	P2-3:A1:10:_HMBLT BY 60KV - MIDDLE BREAKER BAY 3	P2	Non-bus-tie breaker	91	91	91	70	71	66	19	3	105	1	69	Sensitivity only
P2-3:A1:16:_BRDGVILLE 115KV - RING R3 & R2	P2	Non-bus-tie breaker	87	87	87	59	62	50	21	2	105	2	84	Sensitivity only	
P2-3:A1:18:_BRDGVILLE 115KV - RING R1 & R3	P2	Non-bus-tie breaker	87	87	87	59	62	50	21	2	105	2	84	Sensitivity only	

Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading % (Baseline Scenarios)								Loading % (Sensitivity Scenarios)			Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Winter Peak	2023 Winter Peak	2028 Winter Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	
	P1-2:A1:4_BRIDGEVILLE-COTTONWOOD 115KV [1110] & P1-2:A1:3:_HUMBOLDT 115KV [1820]	P6	N-1-1	101	101	100	83	95	70	<100	<100	100	<100	99	System upgrade or preferred resource
	P7-1:A1:3:_HUMBOLDT #1 & ESSEX JCT-ARCATA-FAIRHAVEN LINES	P7	DCTL	88	90	89	70	71	66	17	4	104	6	68	Sensitivity only
	P7-1:A2:1:_ARCATA-HUMBOLDT & FAIRHAVEN-HUMBOLDT & HUMBOLDT #1 LINES	P7	DCTL	87	88	87	73	72	68	19	6	103	8	65	Sensitivity only
31120 FRUTLDJT 60.0 31122 FTSWRDJT 60.0 1 1	P1-2:A1:4_BRIDGEVILLE-COTTONWOOD 115KV [1110]	P1	N-1	86	86	88	61	65	59	16	12	105	14	80	Sensitivity only
	P2-1:A1:2_BRIDGEVILLE-COTTONWOOD 115KV [1110] (FRSTGLEN-LOW GAP1)	P2	Line Section w/o fault	85	85	86	60	64	58	18	13	104	15	82	Sensitivity only
	P2-2:A1:3:_LOW GAP1 115KV SECTION 1D	P2	Bus	86	86	88	61	65	59	16	12	105	14	80	Sensitivity only
31122 FTSWRDJT 60.0 31116 GRBRVLE 60.0 1 1	Base Case	P0	N-0	85	85	90	60	61	60	16	11	100	14	67	Sensitivity only
	P1-2:A1:3:_HUMBOLDT 115KV [1820]	P1	N-1	86	85	89	60	63	59	15	12	104	15	77	Sensitivity only
	P1-2:A1:4_BRIDGEVILLE-COTTONWOOD 115KV [1110]	P1	N-1	92	90	93	59	64	58	17	14	111	17	86	Sensitivity only
	P2-1:A1:1:_HUMBOLDT 115KV [1820] (HUMBOLDT-TRINITY)	P2	Line Section w/o fault	86	84	88	61	62	60	16	13	102	15	75	Sensitivity only
	P2-1:A1:2_BRIDGEVILLE-COTTONWOOD 115KV [1110] (FRSTGLEN-LOW GAP1)	P2	Line Section w/o fault	91	89	91	58	63	57	19	16	109	18	87	Sensitivity only
	P2-2:A1:3:_LOW GAP1 115KV SECTION 1D	P2	Bus	92	90	93	59	64	58	17	14	111	17	86	Sensitivity only

Substation	Contingency (All and Worst P6)	Category	Category Description	Post Cont. Voltage Deviation % (Baseline Scenarios)								t Cont. Voltage Deviation % (Sensitivity Scenar			Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Winter Peak	2023 Winter Peak	2028 Winter Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	
BRDGVLL 60kV	Base Case	P0	Base case	1.04	1.03	1.03	1.05	1.04	1.03	1.07	1.05	1.04	1.05	1.04	Load power factor correction and voltage support if needed
BRDGVLL 115kV	Base Case	P0	Base case	1.06	1.05	1.06	1.07	1.06	1.04	1.10	1.08	1.06	1.08	1.07	Load power factor correction and voltage support if needed
FRUITLND 60kV	Base Case	P0	Base case	1.03	1.03	1.02	1.04	1.03	1.02	1.05	1.04	1.03	1.05	1.04	Load power factor correction and voltage support if needed
HMBLDT B 115kV	Base Case	P0	Base case	1.06	1.05	1.06	1.08	1.06	1.05	1.12	1.09	1.07	1.10	1.08	Load power factor correction and voltage support if needed
HUMB_BS1 115kV	Base Case	P0	Base case	1.06	1.05	1.06	1.08	1.06	1.05	1.12	1.09	1.07	1.10	1.08	Load power factor correction and voltage support if needed
HUMBOLDT 115kV	Base Case	P0	Base case	1.06	1.05	1.06	1.08	1.06	1.05	1.12	1.09	1.07	1.10	1.08	Load power factor correction and voltage support if needed
LOW GAP1 115kV	Base Case	P0	Base case	1.06	1.05	1.05	1.07	1.06	1.04	1.10	1.07	1.06	1.08	1.06	Load power factor correction and voltage support if needed
RDGE CBN 60kV	Base Case	P0	Base case	1.02	1.02	1.03	1.03	1.03	1.03	1.05	1.04	1.02	1.04	1.03	Load power factor correction and voltage support if needed
RIO DELL 60kV	Base Case	P0	Base case	1.05	1.04	1.04	0.97	1.05	0.97	1.06	1.05	1.04	1.05	1.05	Load power factor correction and voltage support if needed
SCOTIATP 60kV	Base Case	P0	Base case	1.05	1.04	1.04	0.97	1.05	0.97	1.06	1.05	1.04	1.05	1.05	Load power factor correction and voltage support if needed
SCTIATP2 60kV	Base Case	P0	Base case	1.05	1.04	1.04	0.97	1.05	0.96	1.06	1.05	1.04	1.05	1.05	Load power factor correction and voltage support if needed
SWNS FLT 60kV	Base Case	P0	Base case	1.04	1.03	1.03	1.03	1.04	1.02	1.07	1.05	1.03	1.05	1.04	Load power factor correction and voltage support if needed
HMBLDT B 115kV	HUMB_G1 13.80KV UNITS 1 2 3 AND 4	P1	N-1	1.07	1.06	1.07	1.08	1.07	1.05	1.12	1.09	1.09	1.10	1.10	Load power factor correction and voltage support if needed
HUMB_BS1 115kV	HUMB_G1 13.80KV UNITS 1 2 3 AND 4	P1	N-1	1.07	1.06	1.07	1.08	1.07	1.05	1.12	1.09	1.09	1.10	1.10	Load power factor correction and voltage support if needed
HUMBOLDT 115kV	HUMB_G1 13.80KV UNITS 1 2 3 AND 4	P1	N-1	1.07	1.06	1.07	1.08	1.07	1.05	1.12	1.09	1.09	1.10	1.10	Load power factor correction and voltage support if needed
HMBLDT B 115kV	HUMB_G2 13.80KV UNITS 5 6 AND 7	P1	N-1	1.07	1.05	1.06	1.08	1.06	1.04	1.11	1.09	1.08	1.10	1.11	Load power factor correction and voltage support if needed
HUMB_BS1 115kV	HUMB_G2 13.80KV UNITS 5 6 AND 7	P1	N-1	1.07	1.05	1.06	1.08	1.06	1.04	1.11	1.09	1.08	1.10	1.11	Load power factor correction and voltage support if needed
HUMBOLDT 115kV	HUMB_G2 13.80KV UNITS 5 6 AND 7	P1	N-1	1.07	1.05	1.06	1.08	1.06	1.04	1.11	1.09	1.08	1.10	1.12	Load power factor correction and voltage support if needed
HMBLDT B 115kV	HUMB_G3 13.80KV UNITS 8 9 AND 10	P1	N-1	1.07	1.05	1.06	1.08	1.06	1.04	1.12	1.09	1.08	1.10	1.11	Load power factor correction and voltage support if needed

Substation	Contingency (All and Worst P6)	Category	Category Description	Post Cont. Voltage Deviation % (Baseline Scenarios)								t Cont. Voltage Deviation % (Sensitivity Scenar			Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Winter Peak	2023 Winter Peak	2028 Winter Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	
HUMB_BS1 115kV	HUMB_G3 13.80KV UNITS 8 9 AND 10	P1	N-1	1.07	1.05	1.06	1.08	1.06	1.04	1.12	1.09	1.08	1.10	1.11	Load power factor correction and voltage support if needed
HUMBOLDT 115kV	HUMB_G3 13.80KV UNITS 8 9 AND 10	P1	N-1	1.07	1.05	1.06	1.08	1.06	1.04	1.12	1.09	1.08	1.10	1.12	Load power factor correction and voltage support if needed
HUMBOLDT 115kV	HUMBOLDT BAY 115KV [7090]	P1	N-1	1.07	1.06	1.07	1.09	1.07	1.05	1.12	1.09	1.09	1.10	1.10	Load power factor correction and voltage support if needed
HOOPA 60kV	HUMBOLDT 60KV [7130] MOAS OPENED ON HUMBOLDT_MPLE CRK	P1	N-1	0.80	0.77	0.81	0.84	0.81	0.81	1.03	1.02	0.76	1.03	0.97	Voltage support, UVLS and/ or SPS
MPLER 60kV	HUMBOLDT 60KV [7130] MOAS OPENED ON HUMBOLDT_MPLE CRK	P1	N-1	0.86	0.84	0.87	0.90	0.87	0.86	1.05	1.03	0.83	1.04	0.99	Voltage support, UVLS and/ or SPS
RDGE CBN 60kV	HUMBOLDT 60KV [7130] MOAS OPENED ON HUMBOLDT_MPLE CRK	P1	N-1	0.90	0.88	0.91	0.94	0.91	0.90	1.06	1.04	0.88	1.05	1.01	Voltage support, UVLS and/ or SPS
RUSS RCH 60kV	HUMBOLDT 60KV [7130] MOAS OPENED ON HUMBOLDT_MPLE CRK	P1	N-1	0.85	0.83	0.86	0.89	0.86	0.85	1.04	1.03	0.82	1.04	0.99	Voltage support, UVLS and/ or SPS
WILLWCRK 60kV	HUMBOLDT 60KV [7130] MOAS OPENED ON HUMBOLDT_MPLE CRK	P1	N-1	0.82	0.79	0.83	0.86	0.82	0.82	1.03	1.02	0.78	1.03	0.98	Voltage support, UVLS and/ or SPS
CARLOTTA 60kV	HUMBOLDT BAY 60KV [7100] MOAS OPENED ON EEL RIVR_NEWBURG	P1	N-1	1.03	1.03	1.03	0.91	1.03	0.86	1.05	1.03	1.03	1.03	1.04	Load power factor correction and voltage support if needed
NEWBURG 60kV	HUMBOLDT BAY 60KV [7100] MOAS OPENED ON EEL RIVR_NEWBURG	P1	N-1	1.02	1.02	1.02	0.89	1.02	0.85	1.04	1.02	1.02	1.02	1.03	Load power factor correction and voltage support if needed
PCLUMBER 60kV	HUMBOLDT BAY 60KV [7100] MOAS OPENED ON EEL RIVR_NEWBURG	P1	N-1	1.03	1.03	1.03	0.91	1.03	0.86	1.05	1.03	1.03	1.03	1.04	Load power factor correction and voltage support if needed
RIO DELL 60kV	HUMBOLDT BAY 60KV [7100] MOAS OPENED ON EEL RIVR_NEWBURG	P1	N-1	1.04	1.04	1.04	0.88	1.05	0.84	1.06	1.04	1.04	1.04	1.05	Load power factor correction and voltage support if needed
RIODLLTP 60kV	HUMBOLDT BAY 60KV [7100] MOAS OPENED ON EEL RIVR_NEWBURG	P1	N-1	1.03	1.03	1.03	0.90	1.03	0.86	1.05	1.03	1.03	1.03	1.04	Load power factor correction and voltage support if needed
SCOTIATP 60kV	HUMBOLDT BAY 60KV [7100] MOAS OPENED ON EEL RIVR_NEWBURG	P1	N-1	1.04	1.04	1.04	0.88	1.05	0.84	1.06	1.04	1.04	1.04	1.05	Load power factor correction and voltage support if needed
SCTIATP2 60kV	HUMBOLDT BAY 60KV [7100] MOAS OPENED ON EEL RIVR_NEWBURG	P1	N-1	1.04	1.04	1.04	0.88	1.05	0.84	1.06	1.04	1.04	1.04	1.05	Load power factor correction and voltage support if needed
HMBLDT B 115kV	HUMB_BS3-HMBLDT BY #1 60KV [0]	P1	N-1	1.07	1.05	1.06	1.08	1.06	1.04	1.12	1.09	1.08	1.10	1.11	Load power factor correction and voltage support if needed
HUMB_BS1 115kV	HUMB_BS3-HMBLDT BY #1 60KV [0]	P1	N-1	1.07	1.05	1.06	1.08	1.06	1.04	1.12	1.09	1.08	1.10	1.11	Load power factor correction and voltage support if needed
HUMBOLDT 115kV	HUMB_BS3-HMBLDT BY #1 60KV [0]	P1	N-1	1.07	1.05	1.06	1.08	1.06	1.04	1.12	1.09	1.08	1.10	1.12	Load power factor correction and voltage support if needed
HMBLDT B 115kV	HUMBOLDT 115KV [1810]	P1	N-1	1.06	1.05	1.07	1.13	1.06	1.05	1.16	1.10	1.08	1.11	1.12	Load power factor correction and voltage support if needed



Substation	Contingency (All and Worst P6)	Category	Category Description	Post Cont. Voltage Deviation % (Baseline Scenarios)								t Cont. Voltage Deviation % (Sensitivity Scenar			Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Winter Peak	2023 Winter Peak	2028 Winter Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	
HUMB_BS1 115kV	HUMBOLDT 115KV [1810]	P1	N-1	1.06	1.05	1.07	1.13	1.06	1.05	1.16	1.10	1.08	1.11	1.12	Load power factor correction and voltage support if needed
HUMBOLDT 115kV	HUMBOLDT 115KV [1810]	P1	N-1	1.06	1.05	1.07	1.14	1.06	1.05	1.16	1.10	1.09	1.11	1.12	Load power factor correction and voltage support if needed
HMBLDT B 115kV	HUMB_BS2-HMBLT BY #1 60KV [0]	P1	N-1	1.07	1.05	1.06	1.08	1.06	1.04	1.11	1.09	1.08	1.10	1.11	Load power factor correction and voltage support if needed
HUMB_BS1 115kV	HUMB_BS2-HMBLT BY #1 60KV [0]	P1	N-1	1.07	1.05	1.06	1.08	1.06	1.04	1.11	1.09	1.08	1.10	1.11	Load power factor correction and voltage support if needed
HUMBOLDT 115kV	HUMB_BS2-HMBLT BY #1 60KV [0]	P1	N-1	1.07	1.05	1.06	1.08	1.06	1.04	1.11	1.09	1.08	1.10	1.12	Load power factor correction and voltage support if needed
HMBLDT B 115kV	HUMBOLDT #1 60KV [7113] MOAS OPENED ON ARCTAJT1_LP_FLKBD	P1	N-1	1.06	1.05	1.07	1.10	1.06	1.07	1.12	1.09	1.07	1.10	1.08	Load power factor correction and voltage support if needed
HUMB_BS1 115kV	HUMBOLDT #1 60KV [7113] MOAS OPENED ON ARCTAJT1_LP_FLKBD	P1	N-1	1.06	1.05	1.07	1.10	1.06	1.07	1.12	1.09	1.07	1.10	1.08	Load power factor correction and voltage support if needed
HUMBOLDT 115kV	HUMBOLDT #1 60KV [7113] MOAS OPENED ON ARCTAJT1_LP_FLKBD	P1	N-1	1.06	1.05	1.07	1.10	1.06	1.07	1.12	1.09	1.07	1.10	1.08	Load power factor correction and voltage support if needed
HMBLDT B 115kV	HUMB_BS1 115/13.8KV TB 1	P1	N-1	1.07	1.06	1.07	1.09	1.07	1.05	1.12	1.09	1.09	1.10	1.10	Load power factor correction and voltage support if needed
HUMBOLDT 115kV	HUMB_BS1 115/13.8KV TB 1	P1	N-1	1.07	1.06	1.07	1.09	1.07	1.05	1.12	1.09	1.09	1.10	1.10	Load power factor correction and voltage support if needed
BRDGVILLE 115kV	HUMB_BS1 115/13.8KV TB 1	P1	N-1	1.06	1.05	1.07	1.09	1.06	1.05	1.13	1.09	1.07	1.09	1.08	Load power factor correction and voltage support if needed
HMBLDT B 115kV	HUMB_BS3 60/13.8KV TB 2	P1	N-1	1.07	1.05	1.06	1.08	1.06	1.04	1.12	1.09	1.08	1.10	1.11	Load power factor correction and voltage support if needed
HUMB_BS1 115kV	HUMB_BS3 60/13.8KV TB 2	P1	N-1	1.07	1.05	1.06	1.08	1.06	1.04	1.12	1.09	1.08	1.10	1.11	Load power factor correction and voltage support if needed
HUMBOLDT 115kV	HUMB_BS3 60/13.8KV TB 2	P1	N-1	1.07	1.05	1.06	1.08	1.06	1.04	1.12	1.09	1.08	1.10	1.12	Load power factor correction and voltage support if needed
HMBLDT B 115kV	HUMB_BS2 60/13.8KV TB 1	P1	N-1	1.07	1.05	1.06	1.08	1.06	1.04	1.11	1.09	1.08	1.10	1.11	Load power factor correction and voltage support if needed
HUMB_BS1 115kV	HUMB_BS2 60/13.8KV TB 1	P1	N-1	1.07	1.05	1.06	1.08	1.06	1.04	1.11	1.09	1.08	1.10	1.11	Load power factor correction and voltage support if needed
HUMBOLDT 115kV	HUMB_BS2 60/13.8KV TB 1	P1	N-1	1.07	1.05	1.06	1.08	1.06	1.04	1.11	1.09	1.08	1.10	1.12	Load power factor correction and voltage support if needed
HOOPA 60kV	HUMBOLDT 60KV [7130] (HUMBOLDT-MPLE CRK)	P2	Line Section w/o fault	0.80	0.77	0.81	0.84	0.81	0.81	1.03	1.02	0.76	1.03	0.97	Load power factor correction and voltage support if needed

Substation	Contingency (All and Worst P6)	Category	Category Description	Post Cont. Voltage Deviation % (Baseline Scenarios)								t Cont. Voltage Deviation % (Sensitivity Scenar			Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Winter Peak	2023 Winter Peak	2028 Winter Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	
MPLE CRK 60kV	HUMBOLDT 60KV [7130] (HUMBOLDT-MPLE CRK)	P2	Line Section w/o fault	0.86	0.84	0.87	0.90	0.87	0.86	1.05	1.03	0.83	1.04	0.99	Load power factor correction and voltage support if needed
RDGE CBN 60kV	HUMBOLDT 60KV [7130] (HUMBOLDT-MPLE CRK)	P2	Line Section w/o fault	0.90	0.88	0.91	0.94	0.91	0.90	1.06	1.04	0.88	1.05	1.01	Load power factor correction and voltage support if needed
RUSS RCH 60kV	HUMBOLDT 60KV [7130] (HUMBOLDT-MPLE CRK)	P2	Line Section w/o fault	0.85	0.83	0.86	0.89	0.86	0.85	1.04	1.03	0.82	1.04	0.99	Load power factor correction and voltage support if needed
WILLWCRK 60kV	HUMBOLDT 60KV [7130] (HUMBOLDT-MPLE CRK)	P2	Line Section w/o fault	0.82	0.79	0.83	0.86	0.82	0.82	1.03	1.02	0.78	1.03	0.98	Load power factor correction and voltage support if needed
BRDGVILLE 115kV	BRIDGEVILLE-COTTONWOOD 115KV [1110] (FRSTGLEN-LOW GAP1)	P2	Line Section w/o fault	1.06	1.05	1.06	1.08	1.06	1.04	1.12	1.10	1.07	1.10	1.08	Load power factor correction and voltage support if needed
LOW GAP1 115kV	BRIDGEVILLE-COTTONWOOD 115KV [1110] (FRSTGLEN-LOW GAP1)	P2	Line Section w/o fault	1.06	1.06	1.06	1.08	1.06	1.04	1.13	1.10	1.07	1.11	1.08	Load power factor correction and voltage support if needed
CARLOTTA 60kV	HUMBOLDT BAY 60KV [7100] (HMBLT BY-EEL RIVR)	P2	Line Section w/o fault	1.04	1.00	1.02	0.71	1.04	0.73	1.05	1.03	1.00	1.03	1.04	Load power factor correction and voltage support if needed
EEL RIVR 60kV	HUMBOLDT BAY 60KV [7100] (HMBLT BY-EEL RIVR)	P2	Line Section w/o fault	1.03	0.97	1.00	0.65	1.03	0.69	1.04	1.02	0.97	1.02	1.04	Load power factor correction and voltage support if needed
NEWBURG 60kV	HUMBOLDT BAY 60KV [7100] (HMBLT BY-EEL RIVR)	P2	Line Section w/o fault	1.03	0.98	1.00	0.66	1.03	0.69	1.04	1.02	0.98	1.02	1.04	Load power factor correction and voltage support if needed
PCLUMBER 60kV	HUMBOLDT BAY 60KV [7100] (HMBLT BY-EEL RIVR)	P2	Line Section w/o fault	1.04	1.00	1.02	0.71	1.04	0.73	1.05	1.03	1.00	1.03	1.04	Load power factor correction and voltage support if needed
RIO DELL 60kV	HUMBOLDT BAY 60KV [7100] (HMBLT BY-EEL RIVR)	P2	Line Section w/o fault	1.05	1.02	1.03	0.67	1.05	0.69	1.06	1.04	1.02	1.04	1.05	Load power factor correction and voltage support if needed
RIODLLTP 60kV	HUMBOLDT BAY 60KV [7100] (HMBLT BY-EEL RIVR)	P2	Line Section w/o fault	1.04	1.00	1.02	0.70	1.04	0.72	1.05	1.03	1.00	1.03	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)								t Cont. Voltage Deviation % (Sensitivity Scenar			Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Winter Peak	2023 Winter Peak	2028 Winter Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	
SCOTIATP 60kV	HUMBOLDT BAY 60KV [7100] (HMBLT BY-EEL RIVR)	P2	Line Section w/o fault	1.05	1.02	1.03	0.67	1.05	0.69	1.06	1.04	1.02	1.04	1.05	Load power factor correction and voltage support if needed
SCTIATP2 60kV	HUMBOLDT BAY 60KV [7100] (HMBLT BY-EEL RIVR)	P2	Line Section w/o fault	1.05	1.02	1.03	0.67	1.05	0.69	1.06	1.04	1.02	1.04	1.05	Load power factor correction and voltage support if needed
SWNS FLT 60kV	HUMBOLDT BAY 60KV [7100] (HMBLT BY-EEL RIVR)	P2	Line Section w/o fault	1.04	1.02	1.03	0.91	1.05	0.90	1.06	1.04	1.03	1.04	1.04	Load power factor correction and voltage support if needed
HMBLDT B 115kV	HUMB_BS3-HMBLT BY 60KV [0] NO FAULT	P2	Line Section w/o fault	1.07	1.05	1.06	1.08	1.06	1.04	1.12	1.09	1.08	1.10	1.11	Load power factor correction and voltage support if needed
HUMB_BS1 115kV	HUMB_BS3-HMBLT BY 60KV [0] NO FAULT	P2	Line Section w/o fault	1.07	1.05	1.06	1.08	1.06	1.04	1.12	1.09	1.08	1.10	1.11	Load power factor correction and voltage support if needed
HUMBOLDT 115kV	HUMB_BS3-HMBLT BY 60KV [0] NO FAULT	P2	Line Section w/o fault	1.07	1.05	1.06	1.08	1.06	1.04	1.12	1.09	1.08	1.10	1.12	Load power factor correction and voltage support if needed
HMBLDT B 115kV	HUMB_BS3-HMBLT BY 60KV [0] NO FAULT	P2	Line Section w/o fault	1.07	1.05	1.06	1.08	1.06	1.04	1.11	1.09	1.08	1.10	1.11	Load power factor correction and voltage support if needed
HUMB_BS1 115kV	HUMB_BS3-HMBLT BY 60KV [0] NO FAULT	P2	Line Section w/o fault	1.07	1.05	1.06	1.08	1.06	1.04	1.11	1.09	1.08	1.10	1.11	Load power factor correction and voltage support if needed
HUMBOLDT 115kV	HUMB_BS3-HMBLT BY 60KV [0] NO FAULT	P2	Line Section w/o fault	1.07	1.05	1.06	1.08	1.06	1.04	1.11	1.09	1.08	1.10	1.12	Load power factor correction and voltage support if needed
CARLOTTA 60kV	HUMBOLDT BAY 60KV [7100] (EEL RIVR-NEWBURG)	P2	Line Section w/o fault	1.03	1.03	1.03	0.90	1.03	0.87	1.05	1.03	1.03	1.03	1.04	Load power factor correction and voltage support if needed
NEWBURG 60kV	HUMBOLDT BAY 60KV [7100] (EEL RIVR-NEWBURG)	P2	Line Section w/o fault	1.02	1.02	1.02	0.89	1.02	0.85	1.04	1.02	1.02	1.02	1.04	Load power factor correction and voltage support if needed
PCLUMBER 60kV	HUMBOLDT BAY 60KV [7100] (EEL RIVR-NEWBURG)	P2	Line Section w/o fault	1.03	1.03	1.03	0.90	1.03	0.87	1.05	1.03	1.03	1.03	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)								t Cont. Voltage Deviation % (Sensitivity Scenar			Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Winter Peak	2023 Winter Peak	2028 Winter Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	
RIO DELL 60kV	HUMBOLDT BAY 60KV [7100] (EEL RIVR-NEWBURG)	P2	Line Section w/o fault	1.04	1.04	1.04	0.88	1.05	0.84	1.06	1.04	1.04	1.04	1.05	Load power factor correction and voltage support if needed
RIODLLTP 60kV	HUMBOLDT BAY 60KV [7100] (EEL RIVR-NEWBURG)	P2	Line Section w/o fault	1.03	1.03	1.03	0.90	1.03	0.86	1.05	1.03	1.03	1.03	1.04	Load power factor correction and voltage support if needed
SCOTIATP 60kV	HUMBOLDT BAY 60KV [7100] (EEL RIVR-NEWBURG)	P2	Line Section w/o fault	1.04	1.04	1.04	0.88	1.05	0.84	1.06	1.04	1.04	1.04	1.05	Load power factor correction and voltage support if needed
SCTIATP2 60kV	HUMBOLDT BAY 60KV [7100] (EEL RIVR-NEWBURG)	P2	Line Section w/o fault	1.04	1.04	1.04	0.88	1.05	0.84	1.06	1.04	1.04	1.04	1.05	Load power factor correction and voltage support if needed
HMBLDT B 115kV	HUMBOLDT BAY 115KV [7090] (HUMB_BS1-HMBLDT B)	P2	Line Section w/o fault	1.07	1.06	1.07	1.09	1.07	1.05	1.12	1.09	1.09	1.10	1.10	Load power factor correction and voltage support if needed
HUMBOLDT 115kV	HUMBOLDT BAY 115KV [7090] (HUMB_BS1-HMBLDT B)	P2	Line Section w/o fault	1.07	1.06	1.07	1.09	1.07	1.05	1.12	1.09	1.09	1.10	1.10	Load power factor correction and voltage support if needed
HMBLDT B 115kV	PACIFIC LUMBER (SCOTIA) TAP 60KV [7852] (SCTIATP2-SCOTIATP)	P2	Line Section w/o fault	1.07	1.05	1.06	1.10	1.06	1.06	1.12	1.08	1.07	1.09	1.11	Load power factor correction and voltage support if needed
HUMB_BS1 115kV	PACIFIC LUMBER (SCOTIA) TAP 60KV [7852] (SCTIATP2-SCOTIATP)	P2	Line Section w/o fault	1.07	1.05	1.06	1.10	1.06	1.06	1.12	1.08	1.07	1.09	1.11	Load power factor correction and voltage support if needed
HUMBOLDT 115kV	PACIFIC LUMBER (SCOTIA) TAP 60KV [7852] (SCTIATP2-SCOTIATP)	P2	Line Section w/o fault	1.07	1.05	1.06	1.10	1.06	1.06	1.12	1.08	1.07	1.09	1.11	Load power factor correction and voltage support if needed
HMBLDT B 115kV	HUMBOLDT #1 60KV [7113] (ARCTAJT1-LP_FLKBD)	P2	Line Section w/o fault	1.06	1.05	1.07	1.10	1.06	1.07	1.12	1.09	1.07	1.10	1.08	Load power factor correction and voltage support if needed
HUMB_BS1 115kV	HUMBOLDT #1 60KV [7113] (ARCTAJT1-LP_FLKBD)	P2	Line Section w/o fault	1.06	1.05	1.07	1.10	1.06	1.07	1.12	1.09	1.07	1.10	1.08	Load power factor correction and voltage support if needed
HUMBOLDT 115kV	HUMBOLDT #1 60KV [7113] (ARCTAJT1-LP_FLKBD)	P2	Line Section w/o fault	1.06	1.05	1.07	1.10	1.06	1.07	1.12	1.09	1.07	1.10	1.08	Load power factor correction and voltage support if needed
HMBLDT B 115kV	HUMB_G1 13.8KV SECTION 1D	P2	Bus	1.07	1.06	1.07	1.09	1.07	1.05	1.12	1.09	1.09	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)								t Cont. Voltage Deviation % (Sensitivity Scenar			Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Winter Peak	2023 Winter Peak	2028 Winter Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	
HUMB_BS1 115kV	HUMB_G1 13.8KV SECTION 1D	P2	Bus	1.07	1.06	1.07	1.09	1.07	1.05	1.12	1.09	1.09	1.10	1.10	Load power factor correction and voltage support if needed
HUMBOLDT 115kV	HUMB_G1 13.8KV SECTION 1D	P2	Bus	1.07	1.06	1.07	1.09	1.07	1.05	1.12	1.09	1.09	1.10	1.10	Load power factor correction and voltage support if needed
HMBLDT B 115kV	HUMB_G2 13.8KV SECTION 1D	P2	Bus	1.07	1.05	1.06	1.08	1.06	1.04	1.11	1.09	1.08	1.10	1.11	Load power factor correction and voltage support if needed
HUMB_BS1 115kV	HUMB_G2 13.8KV SECTION 1D	P2	Bus	1.07	1.05	1.06	1.08	1.06	1.04	1.11	1.09	1.08	1.10	1.11	Load power factor correction and voltage support if needed
HUMBOLDT 115kV	HUMB_G2 13.8KV SECTION 1D	P2	Bus	1.07	1.05	1.06	1.08	1.06	1.04	1.11	1.09	1.08	1.10	1.12	Load power factor correction and voltage support if needed
HMBLDT B 115kV	HUMB_G3 13.8KV SECTION 1D	P2	Bus	1.07	1.05	1.06	1.08	1.06	1.04	1.12	1.09	1.08	1.10	1.11	Load power factor correction and voltage support if needed
HUMB_BS1 115kV	HUMB_G3 13.8KV SECTION 1D	P2	Bus	1.07	1.05	1.06	1.08	1.06	1.04	1.12	1.09	1.08	1.10	1.11	Load power factor correction and voltage support if needed
HUMBOLDT 115kV	HUMB_G3 13.8KV SECTION 1D	P2	Bus	1.07	1.05	1.06	1.08	1.06	1.04	1.12	1.09	1.08	1.10	1.12	Load power factor correction and voltage support if needed
HUMBOLDT 115kV	HMBLDT B 115KV SECTION 1D	P2	Bus	1.07	1.06	1.07	1.09	1.07	1.05	1.12	1.09	1.09	1.10	1.10	Load power factor correction and voltage support if needed
CARLOTTA 60kV	HMBL BY 60KV - MIDDLE BREAKER BAY 3	P2	Non-bus-tie breaker	1.03	1.03	1.03	0.90	1.03	0.86	1.05	1.03	1.03	1.03	1.04	Load power factor correction and voltage support if needed
NEWBURG 60kV	HMBL BY 60KV - MIDDLE BREAKER BAY 3	P2	Non-bus-tie breaker	1.02	1.02	1.03	0.89	1.02	0.85	1.05	1.02	1.02	1.03	1.03	Load power factor correction and voltage support if needed
PCLUMBER 60kV	HMBL BY 60KV - MIDDLE BREAKER BAY 3	P2	Non-bus-tie breaker	1.03	1.03	1.03	0.90	1.03	0.86	1.05	1.03	1.03	1.03	1.04	Load power factor correction and voltage support if needed
RIO DELL 60kV	HMBL BY 60KV - MIDDLE BREAKER BAY 3	P2	Non-bus-tie breaker	1.04	1.04	1.05	0.88	1.04	0.84	1.06	1.04	1.04	1.04	1.05	Load power factor correction and voltage support if needed
RIODLLTP 60kV	HMBL BY 60KV - MIDDLE BREAKER BAY 3	P2	Non-bus-tie breaker	1.03	1.03	1.03	0.90	1.03	0.86	1.05	1.03	1.03	1.03	1.04	Load power factor correction and voltage support if needed
SCOTIATP 60kV	HMBL BY 60KV - MIDDLE BREAKER BAY 3	P2	Non-bus-tie breaker	1.04	1.04	1.05	0.88	1.04	0.84	1.06	1.04	1.04	1.04	1.05	Load power factor correction and voltage support if needed
SCTIATP2 60kV	HMBL BY 60KV - MIDDLE BREAKER BAY 3	P2	Non-bus-tie breaker	1.04	1.04	1.05	0.88	1.05	0.84	1.06	1.04	1.04	1.05	1.05	Load power factor correction and voltage support if needed
HMBLDT B 115kV	HMBL BY 60KV - MIDDLE BREAKER BAY 5	P2	Non-bus-tie breaker	1.07	1.05	1.06	1.08	1.06	1.04	1.12	1.10	1.07	1.10	1.11	Load power factor correction and voltage support if needed
HUMB_BS1 115kV	HMBL BY 60KV - MIDDLE BREAKER BAY 5	P2	Non-bus-tie breaker	1.07	1.05	1.06	1.08	1.06	1.04	1.12	1.10	1.07	1.10	1.11	Load power factor correction and voltage support if needed
HUMBOLDT 115kV	HMBL BY 60KV - MIDDLE BREAKER BAY 5	P2	Non-bus-tie breaker	1.07	1.05	1.07	1.08	1.06	1.04	1.12	1.09	1.08	1.10	1.11	Load power factor correction and voltage support if needed



Substation	Contingency (All and Worst P6)	Category	Category Description	Post Cont. Voltage Deviation % (Baseline Scenarios)								t Cont. Voltage Deviation % (Sensitivity Scenar			Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Winter Peak	2023 Winter Peak	2028 Winter Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	
HMBLDT B 115kV	BRDGVLE 115KV - RING R3 & R2	P2	Non-bus-tie breaker	1.06	1.05	1.07	1.11	1.05	1.04	1.16	1.10	1.07	1.11	1.08	Load power factor correction and voltage support if needed
HUMB_BS1 115kV	BRDGVLE 115KV - RING R3 & R2	P2	Non-bus-tie breaker	1.06	1.05	1.07	1.11	1.05	1.04	1.16	1.10	1.07	1.11	1.08	Load power factor correction and voltage support if needed
HUMBOLDT 115kV	BRDGVLE 115KV - RING R3 & R2	P2	Non-bus-tie breaker	1.06	1.05	1.07	1.11	1.06	1.05	1.16	1.10	1.07	1.11	1.08	Load power factor correction and voltage support if needed
BRDGVLE 115kV	BRDGVLE 115KV - RING R1 & R2	P2	Non-bus-tie breaker	1.06	1.06	1.10	1.13	1.06	1.05	1.17	1.12	1.10	1.13	1.11	Load power factor correction and voltage support if needed
HMBLDT B 115kV	BRDGVLE 115KV - RING R1 & R2	P2	Non-bus-tie breaker	1.06	1.05	1.09	1.13	1.06	1.05	1.17	1.11	1.09	1.13	1.11	Load power factor correction and voltage support if needed
HUMB_BS1 115kV	BRDGVLE 115KV - RING R1 & R2	P2	Non-bus-tie breaker	1.06	1.05	1.09	1.13	1.06	1.05	1.17	1.11	1.09	1.13	1.11	Load power factor correction and voltage support if needed
HUMBOLDT 115kV	BRDGVLE 115KV - RING R1 & R2	P2	Non-bus-tie breaker	1.06	1.05	1.09	1.13	1.06	1.05	1.17	1.11	1.09	1.13	1.11	Load power factor correction and voltage support if needed
HMBLDT B 115kV	BRDGVLE 115KV - RING R1 & R3	P2	Non-bus-tie breaker	1.06	1.05	1.07	1.10	1.05	1.04	1.16	1.10	1.07	1.11	1.08	Load power factor correction and voltage support if needed
HUMB_BS1 115kV	BRDGVLE 115KV - RING R1 & R3	P2	Non-bus-tie breaker	1.06	1.05	1.07	1.10	1.05	1.04	1.16	1.10	1.07	1.11	1.08	Load power factor correction and voltage support if needed
HUMBOLDT 115kV	BRDGVLE 115KV - RING R1 & R3	P2	Non-bus-tie breaker	1.06	1.05	1.07	1.11	1.06	1.05	1.16	1.10	1.07	1.11	1.08	Load power factor correction and voltage support if needed
HMBLDT B 115kV	HUMBOLDT 60KV - MIDDLE BREAKER BAY 6	P2	Non-bus-tie breaker	1.06	1.05	1.07	1.10	1.06	1.07	1.12	1.09	1.07	1.10	1.08	Load power factor correction and voltage support if needed
HOOPA 60kV	HUMBOLDT 60KV - MIDDLE BREAKER BAY 6	P2	Non-bus-tie breaker	0.79	0.77	0.81	0.84	0.80	0.81	1.03	1.02	0.76	1.03	0.97	Load power factor correction and voltage support if needed
HUMB_BS1 115kV	HUMBOLDT 60KV - MIDDLE BREAKER BAY 6	P2	Non-bus-tie breaker	1.06	1.05	1.07	1.10	1.06	1.07	1.12	1.09	1.07	1.10	1.08	Load power factor correction and voltage support if needed
HUMBOLDT 115kV	HUMBOLDT 60KV - MIDDLE BREAKER BAY 6	P2	Non-bus-tie breaker	1.06	1.05	1.07	1.10	1.06	1.07	1.12	1.09	1.07	1.10	1.08	Load power factor correction and voltage support if needed
MPLC CRK 60kV	HUMBOLDT 60KV - MIDDLE BREAKER BAY 6	P2	Non-bus-tie breaker	0.85	0.84	0.87	0.90	0.86	0.86	1.05	1.03	0.83	1.04	0.99	Load power factor correction and voltage support if needed
RDGE CBN 60kV	HUMBOLDT 60KV - MIDDLE BREAKER BAY 6	P2	Non-bus-tie breaker	0.90	0.88	0.91	0.94	0.91	0.91	1.06	1.04	0.88	1.05	1.00	Load power factor correction and voltage support if needed
RUSS RCH 60kV	HUMBOLDT 60KV - MIDDLE BREAKER BAY 6	P2	Non-bus-tie breaker	0.84	0.82	0.86	0.89	0.85	0.85	1.04	1.03	0.82	1.04	0.99	Load power factor correction and voltage support if needed
WILLWCRK 60kV	HUMBOLDT 60KV - MIDDLE BREAKER BAY 6	P2	Non-bus-tie breaker	0.81	0.79	0.83	0.86	0.82	0.82	1.03	1.02	0.78	1.03	0.97	Load power factor correction and voltage support if needed
HMBLDT B 115kV	HUMBOLDT 60KV - MIDDLE BREAKER BAY 5	P2	Non-bus-tie breaker	1.08	1.07	1.09	1.11	1.07	1.10	1.14	1.11	1.09	1.11	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)								t Cont. Voltage Deviation % (Sensitivity Scenar			Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Winter Peak	2023 Winter Peak	2028 Winter Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	
HUMB_BS1 115kV	HUMBOLDT 60KV - MIDDLE BREAKER BAY 5	P2	Non-bus-tie breaker	1.08	1.07	1.09	1.11	1.07	1.10	1.14	1.11	1.09	1.11	1.10	Load power factor correction and voltage support if needed
HUMBOLDT 115kV	HUMBOLDT 60KV - MIDDLE BREAKER BAY 5	P2	Non-bus-tie breaker	1.08	1.07	1.09	1.11	1.07	1.10	1.14	1.11	1.09	1.11	1.10	Load power factor correction and voltage support if needed
HMBLDT B 115kV	HMBL BY 60KV - MIDDLE BREAKER BAY 4	P2	Non-bus-tie breaker	1.07	1.05	1.06	1.09	1.05	1.04	1.11	1.09	1.07	1.10	1.11	Load power factor correction and voltage support if needed
HUMB_BS1 115kV	HMBL BY 60KV - MIDDLE BREAKER BAY 4	P2	Non-bus-tie breaker	1.07	1.05	1.06	1.09	1.05	1.04	1.11	1.09	1.07	1.10	1.11	Load power factor correction and voltage support if needed
HUMBOLDT 115kV	HMBL BY 60KV - MIDDLE BREAKER BAY 4	P2	Non-bus-tie breaker	1.07	1.05	1.06	1.09	1.06	1.04	1.11	1.09	1.08	1.10	1.11	Load power factor correction and voltage support if needed
HOOPA 60kV	PAC.LUMB 13.80KV GEN UNIT 1 & HUMBOLDT 60KV [7130] MOAS OPENED ON HUMBOLDT_MPLE CRK	P3	G1/N1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	0.80	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	Load power factor correction and voltage support if needed
MPL CRK 60kV	PAC.LUMB 13.80KV GEN UNIT 1 & HUMBOLDT 60KV [7130] MOAS OPENED ON HUMBOLDT_MPLE CRK	P3	G1/N1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	0.86	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	Load power factor correction and voltage support if needed
RDGE CBN 60kV	PAC.LUMB 13.80KV GEN UNIT 1 & HUMBOLDT 60KV [7130] MOAS OPENED ON HUMBOLDT_MPLE CRK	P3	G1/N1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	0.90	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	Load power factor correction and voltage support if needed
RUSS RCH 60kV	PAC.LUMB 13.80KV GEN UNIT 1 & HUMBOLDT 60KV [7130] MOAS OPENED ON HUMBOLDT_MPLE CRK	P3	G1/N1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	0.85	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	Load power factor correction and voltage support if needed
WILLWCRK 60kV	PAC.LUMB 13.80KV GEN UNIT 1 & HUMBOLDT 60KV [7130] MOAS OPENED ON HUMBOLDT_MPLE CRK	P3	G1/N1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	0.81	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	Load power factor correction and voltage support if needed
HMBLDT B 115kV	HUMB_G1 13.80KV UNITS 1 2 3 AND 4 & HUMBOLDT 115KV [1810]	P3	G1/N1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	1.15	>0.9, <1.1	1.16	Load power factor correction and voltage support if needed
HUMB_BS1 115kV	HUMB_G1 13.80KV UNITS 1 2 3 AND 4 & HUMBOLDT 115KV [1810]	P3	G1/N1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	1.15	>0.9, <1.1	1.16	Load power factor correction and voltage support if needed
HUMBOLDT 115kV	HUMB_G1 13.80KV UNITS 1 2 3 AND 4 & HUMBOLDT 115KV [1810]	P3	G1/N1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	1.15	>0.9, <1.1	1.16	Load power factor correction and voltage support if needed
BRDGVILLE 115kV	HUMB_G2 13.80KV UNITS 5 6 AND 7 & BRIDGEVILLE-COTTONWOOD 115KV [1110]	P3	G1/N1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	1.12	Load power factor correction and voltage support if needed
HMBLDT B 115kV	LP SAMOA 12.47KV GEN UNIT 1 & HUMBOLDT 115KV [1810]	P3	G1/N1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	1.12	>0.9, <1.1	Load power factor correction and voltage support if needed
HUMB_BS1 115kV	LP SAMOA 12.47KV GEN UNIT 1 & HUMBOLDT 115KV [1810]	P3	G1/N1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	1.12	>0.9, <1.1	Load power factor correction and voltage support if needed



Substation	Contingency (All and Worst P6)	Category	Category Description	Post Cont. Voltage Deviation % (Baseline Scenarios)								t Cont. Voltage Deviation % (Sensitivity Scenar			Project & Potential Mitigation Solutions	
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Winter Peak	2023 Winter Peak	2028 Winter Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen		
HUMBOLDT 115kV	LP SAMOA 12.47KV GEN UNIT 1 & HUMBOLDT 115KV [1810]	P3	G1/N1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	1.12	>0.9, <1.1	Load power factor correction and voltage support if needed	
HMBLDT B 115kV	HUMB_G1 13.80KV GEN UNIT 1 & HUMBOLDT 115KV [1810]	P3	G1/N1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	1.16	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	1.13	>0.9, <1.1	1.15	Load power factor correction and voltage support if needed
HUMB_BS1 115kV	HUMB_G1 13.80KV GEN UNIT 1 & HUMBOLDT 115KV [1810]	P3	G1/N1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	1.16	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	1.13	>0.9, <1.1	1.15	Load power factor correction and voltage support if needed
HUMBOLDT 115kV	HUMB_G1 13.80KV GEN UNIT 1 & HUMBOLDT 115KV [1810]	P3	G1/N1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	1.16	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	1.13	>0.9, <1.1	1.15	Load power factor correction and voltage support if needed
BRDGVILLE 115kV	HUMB_G1 13.80KV GEN UNIT 1 & BRDGVILLE 115/60KV TB 1	P3	G1/N1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	1.10	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	Load power factor correction and voltage support if needed
HOOPA 60kV	HUMBOLDT 60KV [7130] MOAS OPENED ON HUMBOLDT_MPLE CRK	P6	N-1-1	0.57	0.54	0.54	0.56	0.55	0.54	>0.9, <1.1	>0.9, <1.1	0.53	>0.9, <1.1	>0.9, <1.1	Voltage support, UVLS and/ or SPS	
MPLER CRK 60kV	HUMBOLDT 60KV [7130] MOAS OPENED ON HUMBOLDT_MPLE CRK	P6	N-1-1	0.64	0.62	0.62	0.64	0.63	0.61	>0.9, <1.1	>0.9, <1.1	0.61	>0.9, <1.1	>0.9, <1.1	Voltage support, UVLS and/ or SPS	
RDGE CBN 60kV	HUMBOLDT 60KV [7130] MOAS OPENED ON HUMBOLDT_MPLE CRK	P6	N-1-1	0.70	0.68	0.68	0.69	0.69	0.67	>0.9, <1.1	>0.9, <1.1	0.67	>0.9, <1.1	>0.9, <1.1	Voltage support, UVLS and/ or SPS	
RUSS RCH 60kV	HUMBOLDT 60KV [7130] MOAS OPENED ON HUMBOLDT_MPLE CRK	P6	N-1-1	0.63	0.60	0.61	0.62	0.61	0.60	>0.9, <1.1	>0.9, <1.1	0.60	>0.9, <1.1	>0.9, <1.1	Voltage support, UVLS and/ or SPS	
WILLWCRK 60kV	HUMBOLDT 60KV [7130] MOAS OPENED ON HUMBOLDT_MPLE CRK	P6	N-1-1	0.59	0.56	0.56	0.58	0.57	0.56	>0.9, <1.1	>0.9, <1.1	0.55	>0.9, <1.1	>0.9, <1.1	Voltage support, UVLS and/ or SPS	
HMBLDT B 115kV	HMBLT BY-HARRIS 60KV [0] MOAS OPENED ON HARRIS_HARRISST	P6	N-1-1	1.11	>0.9, <1.1	1.13	1.16	>0.9, <1.1	1.12	1.17	>0.9, <1.1	1.14	1.12	>0.9, <1.1	Load power factor correction and voltage support if needed	
HUMB_BS1 115kV	HMBLT BY-HARRIS 60KV [0] MOAS OPENED ON HARRIS_HARRISST	P6	N-1-1	1.11	>0.9, <1.1	1.13	1.16	>0.9, <1.1	1.12	1.17	>0.9, <1.1	1.14	1.12	>0.9, <1.1	Voltage support, UVLS and/ or SPS	
HUMBOLDT 115kV	HMBLT BY-HARRIS 60KV [0] MOAS OPENED ON HARRIS_HARRISST	P6	N-1-1	1.11	>0.9, <1.1	1.13	1.16	>0.9, <1.1	1.12	1.17	>0.9, <1.1	1.14	1.12	>0.9, <1.1	Load power factor correction and voltage support if needed	
BRDGVILLE 60kV	HUMBOLDT BAY 60KV [7100] MOAS OPENED ON EEL RIVR_NEWBURG	P6	N-1-1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	0.38	>0.9, <1.1	0.33	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	Voltage support, UVLS and/ or SPS	
FRT SWRD 60kV	HUMBOLDT BAY 60KV [7100] MOAS OPENED ON EEL RIVR_NEWBURG	P6	N-1-1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	0.50	>0.9, <1.1	0.45	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	Voltage support, UVLS and/ or SPS	
FRUITLND 60kV	HUMBOLDT BAY 60KV [7100] MOAS OPENED ON EEL RIVR_NEWBURG	P6	N-1-1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	0.47	>0.9, <1.1	0.41	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	Voltage support, UVLS and/ or SPS	
FRUTLDJT 60kV	HUMBOLDT BAY 60KV [7100] MOAS OPENED ON EEL RIVR_NEWBURG	P6	N-1-1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	0.47	>0.9, <1.1	0.42	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	Voltage support, UVLS and/ or SPS	
FTSWRDJT 60kV	HUMBOLDT BAY 60KV [7100] MOAS OPENED ON EEL RIVR_NEWBURG	P6	N-1-1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	0.50	>0.9, <1.1	0.45	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	Voltage support, UVLS and/ or SPS	
GRBRVILLE 60kV	HUMBOLDT BAY 60KV [7100] MOAS OPENED ON EEL RIVR_NEWBURG	P6	N-1-1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	0.54	>0.9, <1.1	0.50	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	Voltage support, UVLS and/ or SPS	

Substation	Contingency (All and Worst P6)	Category	Category Description	Post Cont. Voltage Deviation % (Baseline Scenarios)								t Cont. Voltage Deviation % (Sensitivity Scenar			Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Winter Peak	2023 Winter Peak	2028 Winter Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	
KEKAWAKA 60kV	HUMBOLDT BAY 60KV [7100] MOAS OPENED ON EEL RIVR_NEWBURG	P6	N-1-1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	0.59	>0.9, <1.1	0.55	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	Voltage support, UVLS and/ or SPS
LOW GAP1 115kV	HUMBOLDT BAY 60KV [7100] MOAS OPENED ON EEL RIVR_NEWBURG	P6	N-1-1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	1.10	>0.9, <1.1	>0.9, <1.1	1.13	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	Voltage support, UVLS and/ or SPS
NEWBURG 60kV	HUMBOLDT BAY 60KV [7100] MOAS OPENED ON EEL RIVR_NEWBURG	P6	N-1-1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	0.28	>0.9, <1.1	0.25	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	Voltage support, UVLS and/ or SPS
SWNS FLT 60kV	HUMBOLDT BAY 60KV [7100] MOAS OPENED ON EEL RIVR_NEWBURG	P6	N-1-1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	0.35	>0.9, <1.1	0.31	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	Voltage support, UVLS and/ or SPS
HMBLDT B 115kV	HUMBOLDT 115KV [1810]	P6	N-1-1	>0.9, <1.1	>0.9, <1.1	1.14	>0.9, <1.1	>0.9, <1.1	1.12	>0.9, <1.1	>0.9, <1.1	1.14	>0.9, <1.1	>0.9, <1.1	Load power factor correction and voltage support if needed
HUMB_BS1 115kV	HUMBOLDT 115KV [1810]	P6	N-1-1	>0.9, <1.1	>0.9, <1.1	1.14	>0.9, <1.1	>0.9, <1.1	1.12	>0.9, <1.1	>0.9, <1.1	1.14	>0.9, <1.1	>0.9, <1.1	Load power factor correction and voltage support if needed
HUMBOLDT 115kV	HUMBOLDT 115KV [1810]	P6	N-1-1	>0.9, <1.1	>0.9, <1.1	1.14	>0.9, <1.1	>0.9, <1.1	1.12	>0.9, <1.1	>0.9, <1.1	1.14	>0.9, <1.1	>0.9, <1.1	Load power factor correction and voltage support if needed
HMBLDT B 115kV	HUMBOLDT 115KV [1810]	P6	N-1-1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	1.16	>0.9, <1.1	1.11	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	Load power factor correction and voltage support if needed
HUMB_BS1 115kV	HUMBOLDT 115KV [1810]	P6	N-1-1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	1.16	>0.9, <1.1	1.11	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	Load power factor correction and voltage support if needed
HUMBOLDT 115kV	HUMBOLDT 115KV [1810]	P6	N-1-1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	1.16	>0.9, <1.1	1.11	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	Load power factor correction and voltage support if needed
FRUITLND 60kV	BRIDGEVILLE-GARBERVILLE 60KV [6220] MOAS OPENED ON BRDGVILLE_FRUTLDJT	P6	N-1-1	0.86	>0.9, <1.1	0.78	0.89	0.86	0.69	>0.9, <1.1	>0.9, <1.1	0.89	>0.9, <1.1	>0.9, <1.1	Voltage support, UVLS and/ or SPS
GRBRVLE 60kV	BRIDGEVILLE-GARBERVILLE 60KV [6220] MOAS OPENED ON BRDGVILLE_FRUTLDJT	P6	N-1-1	0.86	0.90	0.79	0.88	0.86	0.70	>0.9, <1.1	>0.9, <1.1	0.88	>0.9, <1.1	>0.9, <1.1	Voltage support, UVLS and/ or SPS
KEKAWAKA 60kV	BRIDGEVILLE-GARBERVILLE 60KV [6220] MOAS OPENED ON BRDGVILLE_FRUTLDJT	P6	N-1-1	0.87	>0.9, <1.1	0.81	0.90	0.87	0.73	>0.9, <1.1	>0.9, <1.1	0.90	>0.9, <1.1	>0.9, <1.1	Voltage support, UVLS and/ or SPS
FRUTLDJT 60kV	BRIDGEVILLE-GARBERVILLE 60KV [6220] MOAS OPENED ON FTSWRDJT_GRBRVLE	P6	N-1-1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	1.12	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	Voltage support, UVLS and/ or SPS
FTSWRDJT 60kV	BRIDGEVILLE-GARBERVILLE 60KV [6220] MOAS OPENED ON FTSWRDJT_GRBRVLE	P6	N-1-1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	1.12	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	Voltage support, UVLS and/ or SPS
SWNS FLT 60kV	BRIDGEVILLE-GARBERVILLE 60KV [6220] MOAS OPENED ON FTSWRDJT_GRBRVLE	P6	N-1-1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	1.11	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	Voltage support, UVLS and/ or SPS

Substation	Contingency (All and Worst P6)	Category	Category Description	Post Cont. Voltage Deviation % (Baseline Scenarios)								t Cont. Voltage Deviation % (Sensitivity Scenar			Project & Potential Mitigation Solutions	
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Winter Peak	2023 Winter Peak	2028 Winter Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen		
BRDGVILLE 60kV	BRIDGEVILLE-GARBERVILLE 60KV [6220] MOAS OPENED ON FTSWRDJT_GRBRVLL	P6	N-1-1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	1.11	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	Voltage support, UVLS and/ or SPS
FRUITLND 60kV	BRIDGEVILLE-GARBERVILLE 60KV [6220] MOAS OPENED ON FTSWRDJT_GRBRVLL	P6	N-1-1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	1.12	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	Voltage support, UVLS and/ or SPS
HOOPA 60kV	HUMBOLDT 115KV [1820]	P6	N-1-1	0.55	0.54	0.55	0.60	0.54	0.54	>0.9, <1.1	>0.9, <1.1	0.53	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	Voltage support, UVLS and/ or SPS
MPLE CRK 60kV	HUMBOLDT 115KV [1820]	P6	N-1-1	0.62	0.62	0.62	0.67	0.61	0.61	>0.9, <1.1	>0.9, <1.1	0.61	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	Voltage support, UVLS and/ or SPS
RUSS RCH 60kV	HUMBOLDT 115KV [1820]	P6	N-1-1	0.61	0.61	0.61	0.65	0.60	0.60	>0.9, <1.1	>0.9, <1.1	0.60	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	Voltage support, UVLS and/ or SPS
WILLWCRK 60kV	HUMBOLDT 115KV [1820]	P6	N-1-1	0.57	0.56	0.57	0.61	0.56	0.56	>0.9, <1.1	>0.9, <1.1	0.55	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	Voltage support, UVLS and/ or SPS
HMBLDT B 115kV	HUMBOLDT 115KV [1820]	P6	N-1-1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	1.16	>0.9, <1.1	>0.9, <1.1	1.18	1.17	>0.9, <1.1	1.18	1.18	Load power factor correction and voltage support if needed	
HUMB_BS1 115kV	HUMBOLDT 115KV [1820]	P6	N-1-1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	1.16	>0.9, <1.1	>0.9, <1.1	1.18	1.17	>0.9, <1.1	1.18	1.18	Voltage support, UVLS and/ or SPS	
HUMBOLDT 115kV	HUMBOLDT 115KV [1820]	P6	N-1-1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	1.16	>0.9, <1.1	>0.9, <1.1	1.18	1.17	>0.9, <1.1	1.18	1.18	Load power factor correction and voltage support if needed	
LOW GAP1 115kV	HUMBOLDT 115KV [1820]	P6	N-1-1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	1.13	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	1.11	Voltage support, UVLS and/ or SPS	
BRDGVILLE 60kV	BRIDGEVILLE-COTTONWOOD 115KV [1110]	P6	N-1-1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	1.10	Load power factor correction and voltage support if needed
SWNS FLT 60kV	BRIDGEVILLE-COTTONWOOD 115KV [1110]	P6	N-1-1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	1.10	Voltage support, UVLS and/ or SPS
BRDGVILLE 115kV	BRIDGEVILLE-COTTONWOOD 115KV [1110]	P6	N-1-1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	1.13	>0.9, <1.1	>0.9, <1.1	1.17	1.12	1.16	1.13	1.17	Load power factor correction and voltage support if needed	
HMBLDT B 115kV	BRIDGEVILLE-COTTONWOOD 115KV [1110]	P6	N-1-1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	1.13	>0.9, <1.1	>0.9, <1.1	1.17	>0.9, <1.1	1.15	1.13	1.17	Load power factor correction and voltage support if needed	
HUMB_BS1 115kV	BRIDGEVILLE-COTTONWOOD 115KV [1110]	P6	N-1-1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	1.13	>0.9, <1.1	>0.9, <1.1	1.17	>0.9, <1.1	1.15	1.13	1.17	Voltage support, UVLS and/ or SPS	
HUMBOLDT 115kV	BRIDGEVILLE-COTTONWOOD 115KV [1110]	P6	N-1-1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	1.13	>0.9, <1.1	>0.9, <1.1	1.17	>0.9, <1.1	1.15	1.13	1.17	Load power factor correction and voltage support if needed	
CARLOTTA 60kV	BRDGVILLE 115/60KV TB 1	P6	N-1-1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	0.30	>0.9, <1.1	0.24	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	Voltage support, UVLS and/ or SPS
PCLUMBER 60kV	BRDGVILLE 115/60KV TB 1	P6	N-1-1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	0.30	>0.9, <1.1	0.24	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	Voltage support, UVLS and/ or SPS
RIO DELL 60kV	BRDGVILLE 115/60KV TB 1	P6	N-1-1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	0.28	>0.9, <1.1	0.23	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	Voltage support, UVLS and/ or SPS
RIODLLTP 60kV	BRDGVILLE 115/60KV TB 1	P6	N-1-1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	0.29	>0.9, <1.1	0.24	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	Voltage support, UVLS and/ or SPS
SCOTIATP 60kV	BRDGVILLE 115/60KV TB 1	P6	N-1-1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	0.28	>0.9, <1.1	0.23	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	Voltage support, UVLS and/ or SPS
SCTIATP2 60kV	BRDGVILLE 115/60KV TB 1	P6	N-1-1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	0.28	>0.9, <1.1	0.23	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	Voltage support, UVLS and/ or SPS
SWNS FLT 60kV	BRDGVILLE 115/60KV TB 1	P6	N-1-1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	0.37	>0.9, <1.1	0.30	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	Voltage support, UVLS and/ or SPS

Substation	Contingency (All and Worst P6)	Category	Category Description	Post Cont. Voltage Deviation % (Baseline Scenarios)								t Cont. Voltage Deviation % (Sensitivity Scenar			Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Winter Peak	2023 Winter Peak	2028 Winter Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	
FRT SWRD 60kV	GRBRVLE 60.00KV ID=7H & GRBRVLE 60.00KV ID=5H & GRBRVLE 60.00KV ID=8H & GRBRVLE 60.00KV ID=V SHUNT DEVICES	P6	N-1-1	0.85	0.90	0.80	0.90	0.85	0.69	>0.9, <1.1	>0.9, <1.1	0.89	>0.9, <1.1	>0.9, <1.1	Voltage support, UVLS and/ or SPS
FRUTLDJT 60kV	GRBRVLE 60.00KV ID=7H & GRBRVLE 60.00KV ID=5H & GRBRVLE 60.00KV ID=8H & GRBRVLE 60.00KV ID=V SHUNT DEVICES	P6	N-1-1	0.86	0.90	0.79	>0.9, <1.1	0.86	0.69	>0.9, <1.1	>0.9, <1.1	0.89	>0.9, <1.1	>0.9, <1.1	Voltage support, UVLS and/ or SPS
FTSWRDJT 60kV	GRBRVLE 60.00KV ID=7H & GRBRVLE 60.00KV ID=5H & GRBRVLE 60.00KV ID=8H & GRBRVLE 60.00KV ID=V SHUNT DEVICES	P6	N-1-1	0.86	0.90	0.80	0.90	0.85	0.69	>0.9, <1.1	>0.9, <1.1	0.89	>0.9, <1.1	>0.9, <1.1	Voltage support, UVLS and/ or SPS
KEKAWAKA 60kV	GRBRVLE 60.00KV ID=7H & GRBRVLE 60.00KV ID=5H & GRBRVLE 60.00KV ID=8H & GRBRVLE 60.00KV ID=V SHUNT DEVICES	P6	N-1-1	0.88	0.90	0.86	0.90	0.89	0.82	>0.9, <1.1	>0.9, <1.1	0.89	>0.9, <1.1	>0.9, <1.1	Voltage support, UVLS and/ or SPS
HMBLDT B 115kV	HUMBOLDT #1 & ESSEX JCT-ARCATA-FAIRHAVEN LINES	P7	DCTL	1.06	1.05	1.07	1.10	1.06	1.09	1.12	1.09	1.07	1.10	1.08	Load power factor correction and voltage support if needed
HUMB_BS1 115kV	HUMBOLDT #1 & ESSEX JCT-ARCATA-FAIRHAVEN LINES	P7	DCTL	1.06	1.05	1.07	1.10	1.06	1.09	1.12	1.09	1.07	1.10	1.08	Voltage support, UVLS and/ or SPS
HUMBOLDT 115kV	HUMBOLDT #1 & ESSEX JCT-ARCATA-FAIRHAVEN LINES	P7	DCTL	1.06	1.05	1.07	1.11	1.06	1.09	1.12	1.09	1.07	1.10	1.08	Load power factor correction and voltage support if needed
HMBLDT B 115kV	ESSEX JCT-ARCATA-FAIRHAVEN & FAIRHAVEN-HUMBOLDT LINES	P7	DCTL	1.07	1.06	1.08	1.10	1.07	1.08	1.14	1.11	1.08	1.11	1.10	Load power factor correction and voltage support if needed
HUMB_BS1 115kV	ESSEX JCT-ARCATA-FAIRHAVEN & FAIRHAVEN-HUMBOLDT LINES	P7	DCTL	1.07	1.06	1.08	1.10	1.07	1.08	1.14	1.11	1.08	1.11	1.10	Voltage support, UVLS and/ or SPS
HUMBOLDT 115kV	ESSEX JCT-ARCATA-FAIRHAVEN & FAIRHAVEN-HUMBOLDT LINES	P7	DCTL	1.07	1.07	1.08	1.10	1.07	1.08	1.14	1.11	1.09	1.11	1.10	Load power factor correction and voltage support if needed
HMBLDT B 115kV	ARCATA-HUMBOLDT & FAIRHAVEN-HUMBOLDT & HUMBOLDT #1 LINES	P7	DCTL	1.07	1.07	1.10	1.13	1.06	1.12	1.14	1.11	1.09	1.11	1.09	Load power factor correction and voltage support if needed
HUMB_BS1 115kV	ARCATA-HUMBOLDT & FAIRHAVEN-HUMBOLDT & HUMBOLDT #1 LINES	P7	DCTL	1.07	1.07	1.10	1.13	1.06	1.12	1.14	1.11	1.09	1.11	1.09	Voltage support, UVLS and/ or SPS
HUMBOLDT 115kV	ARCATA-HUMBOLDT & FAIRHAVEN-HUMBOLDT & HUMBOLDT #1 LINES	P7	DCTL	1.07	1.07	1.10	1.13	1.06	1.12	1.14	1.11	1.09	1.11	1.09	Load power factor correction and voltage support if needed

Study Area: **PG&E Humboldt**

Voltage Deviation



Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)								Voltage PU (Sensitivity Scenarios)			Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Winter Peak	2023 Winter Peak	2028 Winter Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	
HOOPA 60kV	P1-2:A1:14:_HUMBOLDT 60KV [7130] MOAS OPENED ON HUMBOLDT_MPLE CRK	P1	N-1	17	19	16	13	16	16	1	0	20	1	4	Load power factor correction and voltage support if needed
MPLE CRK 60kV	P1-2:A1:14:_HUMBOLDT 60KV [7130] MOAS OPENED ON HUMBOLDT_MPLE CRK	P1	N-1	16	18	15	12	15	16	1	0	18	1	4	Load power factor correction and voltage support if needed
RDGE CBN 60kV	P1-2:A1:14:_HUMBOLDT 60KV [7130] MOAS OPENED ON HUMBOLDT_MPLE CRK	P1	N-1	12	14	12	10	12	12	1	0	14	0	3	Load power factor correction and voltage support if needed
RUSS RCH 60kV	P1-2:A1:14:_HUMBOLDT 60KV [7130] MOAS OPENED ON HUMBOLDT_MPLE CRK	P1	N-1	16	18	15	12	15	16	1	0	18	1	4	Load power factor correction and voltage support if needed
WILLWCRK 60kV	P1-2:A1:14:_HUMBOLDT 60KV [7130] MOAS OPENED ON HUMBOLDT_MPLE CRK	P1	N-1	16	19	16	13	16	16	1	0	19	1	4	Load power factor correction and voltage support if needed
CARLOTTA 60kV	P1-2:A1:16:_HUMBOLDT BAY 60KV [7100] MOAS OPENED ON EEL RIVR_NEWBURG	P1	N-1	1	0	0	9	1	12	0	1	0	1	0	Load power factor correction and voltage support if needed
NEWBURG 60kV	P1-2:A1:16:_HUMBOLDT BAY 60KV [7100] MOAS OPENED ON EEL RIVR_NEWBURG	P1	N-1	1	0	0	10	1	14	0	0	0	0	1	Load power factor correction and voltage support if needed
PCLUMBER 60kV	P1-2:A1:16:_HUMBOLDT BAY 60KV [7100] MOAS OPENED ON EEL RIVR_NEWBURG	P1	N-1	1	0	0	9	1	12	0	1	0	1	0	Load power factor correction and voltage support if needed
RIO DELL 60kV	P1-2:A1:16:_HUMBOLDT BAY 60KV [7100] MOAS OPENED ON EEL RIVR_NEWBURG	P1	N-1	1	0	0	9	1	13	0	0	0	0	0	Load power factor correction and voltage support if needed
RIODLLTP 60kV	P1-2:A1:16:_HUMBOLDT BAY 60KV [7100] MOAS OPENED ON EEL RIVR_NEWBURG	P1	N-1	1	0	0	9	1	13	0	0	0	0	0	Load power factor correction and voltage support if needed
SCOTIATP 60kV	P1-2:A1:16:_HUMBOLDT BAY 60KV [7100] MOAS OPENED ON EEL RIVR_NEWBURG	P1	N-1	1	0	0	9	1	13	0	0	0	0	0	Load power factor correction and voltage support if needed
SCTIATP2 60kV	P1-2:A1:16:_HUMBOLDT BAY 60KV [7100] MOAS OPENED ON EEL RIVR_NEWBURG	P1	N-1	1	0	0	9	1	13	0	0	0	0	0	Load power factor correction and voltage support if needed
BRDGVILLE 60kV	P1-3:A1:4:_BRDGVILLE 115/60KV TB 1	P1	N-1	2	2	3	8	2	7	3	1	4	2	1	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		
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Winter Peak	2023 Winter Peak	2028 Winter Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast		2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen
FRT SWRD 60kV	P1-4:A1:5:_GRBRVLE 60.00KV ID=7H & GRBRVLE 60.00KV ID=5H & GRBRVLE 60.00KV ID=8H & GRBRVLE 60.00KV ID=V SHUNT DEVICES	P1	N-1	7	6	8	6	6	9	1	0	7	0	4	Continue to monitor future load forecast
GRBRVLE 60kV	P1-4:A1:5:_GRBRVLE 60.00KV ID=7H & GRBRVLE 60.00KV ID=5H & GRBRVLE 60.00KV ID=8H & GRBRVLE 60.00KV ID=V SHUNT DEVICES	P1	N-1	9	8	11	7	8	12	1	0	10	0	5	Load power factor correction and voltage support if needed
KEKAWAKA 60kV	P1-4:A1:5:_GRBRVLE 60.00KV ID=7H & GRBRVLE 60.00KV ID=5H & GRBRVLE 60.00KV ID=8H & GRBRVLE 60.00KV ID=V SHUNT DEVICES	P1	N-1	8	7	10	6	7	11	1	0	9	0	5	Load power factor correction and voltage support if needed
HOOPA 60 kV	P1-1:A1:1:_PAC.LUMB 13.80KV GEN UNIT 1 & P1-2:A1:14:_HUMBOLDT 60KV [7130] MOAS OPENED ON HUMBOLDT_MPLE CRK	P3	G1/N1	<8	<8	<8	<8	<8	17	<8	<8	<8	<8	<8	Continue to monitor future load forecast
MPLE CRK 60 kV	P1-1:A1:1:_PAC.LUMB 13.80KV GEN UNIT 1 & P1-2:A1:14:_HUMBOLDT 60KV [7130] MOAS OPENED ON HUMBOLDT_MPLE CRK	P3	G1/N1	<8	<8	<8	<8	<8	16	<8	<8	<8	<8	<8	Continue to monitor future load forecast
RUSS RCH 60 kV	P1-1:A1:1:_PAC.LUMB 13.80KV GEN UNIT 1 & P1-2:A1:14:_HUMBOLDT 60KV [7130] MOAS OPENED ON HUMBOLDT_MPLE CRK	P3	G1/N1	<8	<8	<8	<8	<8	16	<8	<8	<8	<8	<8	Continue to monitor future load forecast
FRT SWRD 60 kV	P1-1:A1:4:_BLUELKPP 12.47KV GEN UNIT 1 & P1-4:A1:5:_GRBRVLE 60.00KV ID=7H & GRBRVLE 60.00KV ID=5H & GRBRVLE 60.00KV ID=8H & GRBRVLE 60.00KV ID=V SHUNT DEVICES	P3	G1/N1	<8	<8	9	<8	<8	<8	<8	<8	<8	<8	<8	Continue to monitor future load forecast
GRBRVLE 60 kV	P1-1:A1:4:_BLUELKPP 12.47KV GEN UNIT 1 & P1-4:A1:5:_GRBRVLE 60.00KV ID=7H & GRBRVLE 60.00KV ID=5H & GRBRVLE 60.00KV ID=8H & GRBRVLE 60.00KV ID=V SHUNT DEVICES	P3	G1/N1	<8	<8	11	<8	<8	<8	<8	<8	<8	<8	<8	Continue to monitor future load forecast



Study Area: **PG&E Humboldt**

*Voltage Deviation*



Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)						Voltage PU (Sensitivity Scenarios)			Project & Potential Mitigation Solutions		
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Winter Peak	2023 Winter Peak	2028 Winter Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast		2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen
RDGE CBN 60 kV	P1-1:A1:5:_LP SAMOA 12.47KV GEN UNIT 1 & P1-2:A1:14:_HUMBOLDT 60KV [7130] MOAS OPENED ON HUMBOLDT_MPLE CRK	P3	G1/N1	<8	<8	<8	<8	<8	13	<8	<8	<8	<8	<8	Continue to monitor future load forecast
WILLWCRK 60 kV	P1-1:A1:5:_LP SAMOA 12.47KV GEN UNIT 1 & P1-2:A1:14:_HUMBOLDT 60KV [7130] MOAS OPENED ON HUMBOLDT_MPLE CRK	P3	G1/N1	<8	<8	<8	<8	<8	17	<8	<8	<8	<8	<8	Continue to monitor future load forecast

Study Area: **PG&E Humboldt**

*Transient Stability*



Contingency	Category	Category Description	Transient Stability Performance					Potential Mitigation Solutions
			Baseline Scenarios			Sensitivity Scenarios		
			2020 Summer Peak	2028 Summer Peak	2023 Spring Off-Peak	2020 SP Heavy Renewable & Min Gas Gen	2023 SpOP Hi Renew & Min Gas Gen	
LP SAMOA Unit 1 (Bus #31158)	P1-1	N-1	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
HMBLDT B - HUMB_BS1 115 kV Line	P1-2	N-1	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
HUMB_BS1/HUMB_G1 115/13.8 kV No.1 Transformer	P1-3	N-1	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Bus Fault at HUMBOLDT 115 kV	P2-2	Bus	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Internal fault at Non-bus-tie-breaker #182 at HUMBOLDT 115 kV	P2-3	Non-Bus-Tie Breaker	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
LP SAMOA Unit 1 and HUMB_G1 Unit 1	P3-1	G-1/N-1	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
LP SAMOA Unit 1 and HUMBOLDT -HMBLDT B 115 kV No.1 Line	P3-2	G-1/N-1	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
LP SAMOA Unit 1 and HUMB_BS1/HUMB_G1 115/13.8 kV No.1 Transformer	P3-3	G-1/N-1	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
LP SAMOA Unit 1 and HUMBOLDT 60 kV ID v SVD	P3-4	G-1/N-1	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Breaker stuck for CB #182 protecting HUMBOLDT-BRDGVILLE 115 kV No.1 Line	P4-2	Stuck Breaker	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Breaker stuck for CB #322 protecting HUMBOLDT/HUMBOLDT 60/115 kV No.2 Transformer	P4-3	Stuck Breaker	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Close-in fault on Humboldt 60kV SVC with Humboldt CB 6222 failing to clear the fault.	P4-4	Stuck Breaker	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Breaker stuck for CB #172 protecting Bus Section HUMBOLDT 115 kV	P4-5	Stuck Breaker	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Breaker stuck for CB #BAE071 protecting HUMB_G1 Unit 1	P4-1	Stuck Breaker	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
HUMB_G1 Unit 1	P5-1	Non-Redundant Relay	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
HUMBOLDT -HMBLDT B 115 kV No.1 Line	P5-2	Non-Redundant Relay	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
HUMBOLDT/HUMBOLDT 115/60 kV No.2 Transformer	P5-3	Non-Redundant Relay	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
HUMBOLDT 60 kV ID v SVD	P5-4	Non-Redundant Relay	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
HUMBOLDT -BRDGVILLE 115 kV No.1 Line and HUMBOLDT -TRINITY 115kV Line	P6-1	N-1-1	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	<b>WECC criteria not met</b>	Stable/WECC criteria met	Sensitivity only.
HUMBOLDT -HMBLDT B 115 kV No.1 Line and HUMBOLDT/HUMBOLDT 115/60 kV No.2 Transformer	P6-2	N-1-1	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation

Study Area: **PG&E 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	
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Peak	2020 Winter Peak	2023 Winter Peak	2028 Winter Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations		
30435 LAKEVILLE 230 30445 IGNACIO 230 2 1	LAKEVILLE - IGNACIO #1 & LAKEVILLE - SOBRANTE #2 LINES	P7	DCTL	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	102	Operating Solution or SPS	
	LAKEVILLE-IGNACIO #1 & LAKEVILLE-SOBRANTE #2 230KV LINES	P7	DCTL	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	101	Operating Solution or SPS
30435 LAKEVILLE 230 30460 VACA-DIX 230 2 1	LAKEVILLE 230KV - SECTION 2E & 2D	P2	Bus-tie Breaker	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	119	Bus Upgrade
	GEYSERS #12-FULTON & GEYSERS #9-LAKEVILLE LINES	P7	DCTL	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	105	Operating Solution or SPS
31200 MENDOCNO 115 31260 MNDNO M 115 1 1	UKIAH-HOPLAND-CLOVERDALE 115KV & CORTINA 115KV [1330] MOAS OPENED ON LUCERNJ1_LUCERNE	P6	N-1-1	<100	<100	<100	<100	<100	<100	<100	<100	102	<100	<100	<100	<100	Operating Solution or SPS
31224 INDIN VL 115 31215 LUCERNJ1 115 1 1	EGLER RCK - MA 115KV & EGLER RCK-FULTON-SILVERDO LINE	P2	Non-bus-tie Breaker	<100	<100	113	<100	<100	<100	103	108	<100	<100	<100	<100	102	Operating Solution or SPS
	EGLER RCK 115/60KV TB 1 & GEYSERS #3 115KV MOAS OPENED ON MPE TAP_MPE	P6	N-1-1	<100	102	111	<100	<100	<100	100	105	<100	<100	<100	<100	102	Operating Solution or SPS
31225 HGLNDJ1 115 31262 CACHE J2 115 1 1	CORTINA 115KV MOAS OPENED ON LUCERNJ1_LUCERNE & GEYSERS #3 115KV MOAS OPENED ON MPE TAP_MPE	P6	N-1-1	<100	<100	103	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	Operating Solution or SPS
31236 FULTON 115 31238 MONROE1 115 1 1	FULTON 115KV & CORONA-LAKEVILLE 115KV	P6	N-1-1	111	117	129	<100	<100	119	119	133	114	<100	<100	<100	128	SPS per 2017-2018 TPP Mitigation Plan
31236 FULTON 115 31239 MONROE2 115 1 1	FULTON 115KV [1620] & CORONA-LAKEVILLE 115KV	P6	N-1-1	110	117	128	<100	<100	119	119	132	114	<100	<100	<100	127	SPS per 2017-2018 TPP Mitigation Plan
31240 SNTA RSA 115 31242 STNY PTP 115 1 1	FULTON 230 KV BAAH BUS #1 (FAILURE OF NON-REDUNDANT RELAY)	P5	Non-Redundant Relay	<100	<100	109	<100	<100	<100	<100	110	<100	<100	<100	<100	122	SPS per 2017-2018 TPP Mitigation Plan
31242 STNY PTP 115 31246 BELLVUE 115 1 1	FULTON 230 KV BAAH BUS #1 (FAILURE OF NON-REDUNDANT RELAY)	P5	Non-Redundant Relay	<100	<100	112	<100	<100	<100	<100	112	<100	<100	<100	<100	124	SPS per 2017-2018 TPP Mitigation Plan
31246 BELLVUE 115 31248 PENNGRVE 115 1 1	FULTON 115KV - SECTION 2D & 1D	P2	Bus/Breaker	110	115	128	<100	<100	111	110	123	111	<100	<100	<100	128	SPS per 2017-2018 TPP Mitigation Plan
	FULTON 230 KV BAAH BUS #1 (FAILURE OF NON-REDUNDANT RELAY)	P5	Non-Redundant Relay	101	124	141	<100	<100	102	100	143	119	<100	<100	<100	154	SPS per 2017-2018 TPP Mitigation Plan
	FULTON 230/115KV TB 9 & FULTON 230/115KV TB 4	P6	N-1-1	<100	110	128	<100	<100	<100	<100	138	105	<100	<100	<100	139	Operating Solution or SPS
	FULTON-SANTA ROSA #1 & FULTON-SANTA ROSA #2 LINES	P7	DCTL	110	115	128	<100	<100	111	111	123	110	<100	<100	<100	128	Operating Solution or SPS
31248 PENNGRVE 115 31254 CORONA 115 1 1	FULTON 115KV - SECTION 2D & 1D	P2	Bus/Breaker	114	119	134	<100	<100	115	115	129	115	<100	<100	<100	134	SPS per 2017-2018 TPP Mitigation Plan
	FULTON 230 KV BAAH BUS #1 (FAILURE OF NON-REDUNDANT RELAY)	P5	Non-Redundant Relay	105	129	147	<100	<100	106	105	149	124	<100	<100	<100	160	SPS per 2017-2018 TPP Mitigation Plan
	FULTON 115KV & P1-2:A2:27:_FULTON 115KV	P6	N-1-1	107	112	125	<100	<100	114	115	130	108	<100	<100	<100	125	SPS per 2017-2018 TPP Mitigation Plan
	FULTON-SANTA ROSA #1 & FULTON-SANTA ROSA #2 LINES	P7	DCTL	114	119	134	<100	<100	114	114	130	115	<100	<100	<100	134	SPS per 2017-2018 TPP Mitigation Plan
31254 CORONA 115 31255 LAKEVILLE 115 1 1	FULTON 115KV - SECTION 2D & 1D	P2	Bus/Breaker	108	114	127	<100	<100	121	122	137	110	<100	<100	<100	127	SPS per 2017-2018 TPP Mitigation Plan
	FULTON 230 KV BAAH BUS #1 (FAILURE OF NON-REDUNDANT RELAY)	P5	Non-Redundant Relay	101	122	138	<100	<100	113	113	156	117	<100	<100	<100	149	SPS per 2017-2018 TPP Mitigation Plan
	FULTON 115KV [1620] & FULTON 115KV	P6	N-1-1	113	119	132	<100	<100	121	122	138	115	<100	<100	<100	132	SPS per 2017-2018 TPP Mitigation Plan
	FULTON 230/115KV TB 9 & FULTON 230/115KV TB 4	P6	N-1-1	100	121	140	<100	<100	108	106	152	117	<100	<100	<100	151	SPS per 2017-2018 TPP Mitigation Plan
	FULTON-SANTA ROSA #1 & FULTON-SANTA ROSA #2 LINES	P7	DCTL	108	114	126	<100	<100	121	121	138	110	<100	<100	<100	126	SPS per 2017-2018 TPP Mitigation Plan

Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading % (Baseline Scenarios)						Loading % (Sensitivity Scenarios)				Project & Potential Mitigation Solutions		
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Peak	2020 Winter Peak	2023 Winter Peak	2028 Winter Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen		2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations
31258 SONOMA 115 32564 PUEBLO 115 1 1	FULTON 230 KV BAAH BUS #1 (FAILURE OF NON-REDUNDANT RELAY)	P5	Non-Redundant Relay	<100	116	130	<100	<100	<100	<100	121	110	<100	<100	141	Protection Upgrade
31262 CACHE J2 115 31229 REDBUDJ2 115 1 1	CORTINA 115KV [1330] MOAS OPENED ON LUCERNJ1_LUCERNE & GEYSERS #3 115KV [1650] MOAS OPENED ON MPE TAP_MPE	P6	N-1-1	<100	<100	103	<100	<100	<100	<100	<100	<100	<100	<100	<100	Operating Solution or SPS
31265 STHELNJ1 115 32562 PUEBLOJT 115 1 1	LAKEVILLE 115KV - SECTION 1D & 2D	P2	Bus/Breaker	<100	<100	119	<100	<100	<100	<100	<100	<100	<100	<100	116	Bus Upgrade
	LAKEVILLE-SONOMA #1 & LAKEVILLE-SONOMA #2 LINES	P7	DCTL	<100	<100	114	<100	<100	<100	<100	<100	<100	<100	<100	112	Operating Solution or SPS
31300 MENDOCNO 60.0 31260 MNDCNO M 115 1 1	UKIAH-HOPLAND-CLOVERDALE 115KV & GYSR78TP 115/13.8KV TB 1	P6	N-1-1	<100	<100	<100	<100	<100	107	<100	<100	<100	<100	<100	<100	Operating Solution or SPS
31300 MENDOCNO 60.0 31330 UPPR LKE 60.0 1 1	KONOCTI 60KV	P1	N-1	<100	119	145	<100	<100	<100	<100	140	128	<100	<100	140	Operating Solution or SPS
	EGLERCK 115/60KV TB 1	P1	N-1	<100	119	146	<100	<100	<100	<100	140	128	<100	<100	140	Operating Solution or SPS
	KONOCTI 60KV (KONOCTI6-EGLERCK)	P2	Line Section w/o Fault	<100	119	145	<100	<100	<100	<100	140	128	<100	<100	140	Operating Solution or SPS
	EGLERCK 115KV SECTION MA	P2	Bus	<100	115	151	<100	<100	<100	<100	144	126	<100	<100	150	Operating Solution or SPS
	GEO.ENGY 9.11KV GEN UNIT 1 & KONOCTI 60KV	P3	G1/N1	<100	101	124	<100	<100	<100	141	109	<100	<100	<100	<100	Operating Solution or SPS
	GEYSR5-6 13.80KV GEN UNIT 1 & EGLERCK 115/60KV TB 1	P3	G1/N1	<100	102	125	<100	<100	<100	<100	<100	<100	<100	<100	123	Operating Solution or SPS
31326 PHLO JCT 60.0 31336 HPLND JT 60.0 1 1	GEYSERS #3 115KV MOAS OPENED ON MPE TAP_MPE & MENDOCINO 115KV MOAS OPENED ON MENDOCNO_CALPELLA	P6	N-1-1	118	129	138	<100	<100	<100	<100	<100	<100	<100	<100	134	Operating Solution or SPS
31330 UPPR LKE 60.0 31332 HARTLEY 60.0 1 1	EGLERCK - MA 115KV & EAGLE ROCK LINE	P2	Non-bus-tie Breaker	<100	114	135	<100	<100	<100	<100	129	148	<100	<100	135	Disable automatics at and above a predetermined load
	GEYSER11 13.80KV GEN UNIT 1 & KONOCTI 60KV	P3	G1/N1	<100	<100	118	<100	<100	<100	133	<100	<100	<100	<100	116	Operating Solution or SPS
31332 HARTLEY 60.0 31334 CLER LKE 60.0 1 1	CLEAR LAKE-HOPLAND 60KV MOAS OPENED ON GRANITE_HPLND JT & EGLERCK 115/60KV TB 1	P6	N-1-1	132	135	120	<100	<100	153	<100	<100	135	<100	<100	120	Operating Solution or SPS
31334 CLER LKE 60.0 31335 GRANITE 60.0 1 1	EGLERCK - MA 115KV & EAGLE ROCK-REDBUD LINE	P2	Non-bus-tie Breaker	119	<100	<100	<100	<100	104	106	<100	<100	<100	<100	<100	Project: Clear Lake - Hopland reconductoring In-service date: 2022
	POTTRVLY 2.40KV GEN UNIT 1 & EGLERCK 115/60KV TB 1	P3	G1/N1	<100	<100	<100	<100	104	104	<100	<100	<100	<100	<100	<100	Project: Clear Lake - Hopland reconductoring In-service date: 2022
	INDIAN V 9.11KV GEN UNIT 1 & KONOCTI 60KV	P3	G1/N1	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	101	Operating Solution or SPS
	MENDOCINO 60KV & KONOCTI 60KV	P6	N-1-1	141	<100	125	<100	<100	168	168	128	<100	<100	<100	<100	Project: Clear Lake - Hopland reconductoring In-service date: 2022
	KONOCTI 60KV & MENDOCINO 60KV	P6	N-1-1	142	136	125	<100	<100	168	166	129	138	<100	<100	125	Operating Solution or SPS
	GEYSERS #3 115KV & KONOCTI 60KV	P6	N-1-1	<100	<100	<100	<100	<100	<100	<100	115	<100	<100	<100	101	Operating Solution or SPS
31334 CLER LKE 60.0 31338 KONOCTI6 60.0 1 1	EGLERCK - MA 115KV & EGLERCK-FULTON-SILVERDO LINE	P2	Non-bus-tie Breaker	120	<100	<100	<100	<100	104	106	<100	<100	<100	<100	<100	Disable automatics at and above a predetermined load
31334 CLER LKE 60.0 31338 KONOCTI6 60.0 1 1	KONOCTI 60KV	P1	N-1	118	<100	<100	<100	<100	103	105	<100	<100	<100	<100	<100	Project: Clear Lake - Hopland reconductoring In-service date: 2022
	EGLERCK 115/60KV TB 1	P1	N-1	118	<100	<100	<100	<100	103	105	<100	<100	<100	<100	<100	Project: Clear Lake - Hopland reconductoring In-service date: 2022
	KONOCTI 60KV (KONOCTI6-EGLERCK)	P2	Line Section w/o Fault	119	<100	<100	<100	<100	104	106	<100	<100	<100	<100	<100	Project: Clear Lake - Hopland reconductoring In-service date: 2022



Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading % (Baseline Scenarios)								Loading % (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Peak	2020 Winter Peak	2023 Winter Peak	2028 Winter Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations	
31335 GRANITE 60.0 31336 HPLND JT 60.0 1 1	EGLERCK - MA 115KV & EGLERCK-FULTON-SILVERDO LINE	P2	Non-bus-tie Breaker	120	<100	<100	<100	<100	104	106	<100	<100	<100	<100	<100	Project: Clear Lake - Hopland reconductoring In-service date: 2022
	INDIAN V 9.11KV GEN UNIT 1 & KONOCTI 60KV	P3	G1/N1	<100	<100	<100	<100	104	104	<100	<100	<100	<100	<100	<100	Operating Solution or SPS
	KONOCTI 60KV & MENDOCINO 60KV	P6	N-1-1	142	136	125	<100	<100	168	166	129	138	<100	<100	124	Operating Solution or SPS
	EGLERCK 115/60KV TB 1 & MENDOCINO 60KV	P6	N-1-1	142	136	125	<100	<100	168	165	129	137	<100	<100	124	Operating Solution or SPS
31336 HPLND JT 60.0 31370 CLVRDLJT 60.0 1 1	FULTON 230/115KV TB 9 & EGLERCK-FULTON-SILVERDO 115KV	P6	N-1-1	<100	<100	114	<100	<100	106	100	113	100	<100	<100	<100	Disable automatics at and above a predetermined load
	FULTON 115/60KV TB 1 & FULTON 115/60KV TB 2	P6	N-1-1	158	Diverge	Diverge	<100	<100	167	168	Diverge	Diverge	<100	102	Diverge	Disable automatics at and above a predetermined load
	GEYSERS #17-FULTON & EAGLE ROCK-FULTON-SILVERADO LINES	P7	DCTL	<100	100	119	<100	100	<100	<100	<100	104	101	102	<100	Operating Solution or SPS
	GEYSERS #9-LAKEVILLE & EAGLE ROCK-FULTON-SILVERADO LINES	P7	DCTL	108	110	132	<100	110	<100	<100	<100	114	111	112	<100	Operating Solution or SPS
31338 KONOCTI6 60.0 31344 EGLERCK 60.0 1 1	GEYSERS #3 115KV MOAS OPENED ON MPE TAP_MPE & EAGLE ROCK-REDBUD 115KV	P6	N-1-1	105	107	109	<100	<100	111	<100	108	103	<100	<100	111	Operating Solution or SPS
	CORTINA 115KV & GEYSERS #3 115KV MOAS OPENED ON MPE TAP_MPE	P6	N-1-1	101	103	105	<100	<100	109	102	106	<100	<100	<100	103	Operating Solution or SPS
31344 EGLERCK 60.0 31220 EGLERCK 115 1 1	FULTON 115/60KV TB 1 & FULTON 115/60KV TB 2	P6	N-1-1	<100	Diverge	Diverge	<100	<100	<100	<100	Diverge	Diverge	<100	<100	Diverge	Operating Solution or SPS
31366 MLNO JCT 60.0 31385 LAGUNATP 60.0 1 1	LAKEVILLE #2 60KV MOAS OPENED ON PETLMA A_LKVLE JT & LAKEVILLE 60KV	P6	N-1-1	Diverge	<100	<100	<100	<100	Diverge	Diverge	<100	<100	<100	<100	<100	Project: Lakeville 60 kV Area Reinforcement In-service date: December 2021 Short term: Action plan
	LAKEVILLE 230/60KV TB 3 & LAKEVILLE 230/60KV TB 5	P6	N-1-1	235	<100	<100	<100	<100	251	248	<100	<100	<100	<100	<100	Project: Lakeville 60 kV Area Reinforcement In-service date: December 2021 Short term: Action plan
	EAGLE ROCK-FULTON-SILVERADO 115KV (EGLERCK-ERFT5_25)	P2	Bus/Breaker	<100	<100	114	<100	<100	<100	<100	<100	100	<100	<100	<100	Bus Upgrade
	FULTON - 2D 115KV & EGLERCK-FULTON-SILVERADO LINE	P2	Bus/Breaker	<100	<100	112	<100	<100	<100	<100	<100	<100	<100	<100	<100	Bus Upgrade
31370 CLVRDLJT 60.0 31374 GYSRJCT1 60.0 1 1	FULTON 230 KV BAAH BUS #1 (FAILURE OF NON-REDUNDANT RELAY)	P5	Non-Redundant Relay	<100	<100	106	<100	<100	<100	<100	<100	<100	<100	<100	<100	Bus Upgrade
	FULTON 115/60KV TB 1 & FULTON 115/60KV TB 2	P6	N-1-1	158	Diverge	Diverge	<100	<100	167	168	Diverge	Diverge	<100	102	Diverge	Bus Upgrade
	EAGLE ROCK-FULTON-SILVERADO & FULTON-PUEBLO LINES	P7	DCTL	<100	<100	102	<100	<100	<100	<100	<100	<100	<100	<100	<100	Operating Solution or SPS
	GEYSERS #9-LAKEVILLE & EAGLE ROCK-FULTON-SILVERADO LINES	P7	DCTL	108	110	132	<100	110	<100	<100	<100	114	111	112	<100	Operating Solution or SPS
31377 FCHMNT2 60.0 31380 FTCH MTN 60.0 1 1	FULTON-WINDSOR #1 60KV	P1	N-1	181	185	184	<100	<100	141	146	145	174	<100	116	182	Operating Solution or SPS
	WINDSOR-FCHMNT2 60KV NO FAULT	P2	Line Section w/o Fault	104	106	102	<100	<100	<100	<100	<100	<100	<100	<100	102	Operating Solution or SPS
	WINDSOR 60KV SECTION 1D	P2	Bus	103	106	102	<100	<100	<100	<100	<100	<100	<100	<100	101	Operating Solution or SPS
	GEYSER17 13.80KV GEN UNIT 1 & FULTON-WINDSOR #1 60KV	P3	G1/N1	146	150	148	<100	142	146	145	141	<100	<100	<100	148	Operating Solution or SPS
	FULTON 230 KV BAAH BUS #1 (FAILURE OF NON-REDUNDANT RELAY)	P5	Non-Redundant Relay	<100	<100	116	<100	<100	<100	<100	<100	<100	<100	<100	113	Protection Upgrade

Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading % (Baseline Scenarios)						Loading % (Sensitivity Scenarios)				Project & Potential Mitigation Solutions		
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Peak	2020 Winter Peak	2023 Winter Peak	2028 Winter Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen		2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations
	EGLERCK-FULTON-SILVERDO 115KV [0] & FULTON-WINDSOR #1 60KV [0]	P6	N-1-1	147	151	149	<100	<100	144	146	147	142	<100	<100	148	Operating Solution or SPS
	FULTON 115/60KV TB 1 & FULTON 115/60KV TB 2	P6	N-1-1	<100	Diverge	Diverge	<100	<100	<100	<100	Diverge	Diverge	<100	<100	Diverge	Operating Solution or SPS
31378 FULTON 60.0 32650 ST.HELNA 60.0 1 1	LAKEVILLE #1 60KV [7360]	P1	N-1	106	112	117	<100	<100	<100	<100	<100	<100	<100	<100	116	Operating Solution or SPS
	LAKEVILLE - 2D 60KV & LAKEVILLE #1 LINE	P2	Bus/Breaker	106	112	117	<100	<100	<100	<100	<100	<100	<100	<100	116	Bus Upgrade
31379 HDSBGTP2 60.0 31377 FCHMNT2 60.0 1 1	FULTON 230 KV BAAH BUS #1 (FAILURE OF NON-REDUNDANT RELAY)	P5	Non-Redundant Relay	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	117	Protection Upgrade
31380 FTCH MTN 60.0 31381 HDSBGTP1 60.0 1 1	FULTON 115/60KV TB 1 & FULTON 115/60KV TB 2	P6	N-1-1	<100	Diverge	Diverge	<100	<100	<100	<100	Diverge	Diverge	<100	<100	Diverge	Operating Solution or SPS
31384 COTATI 60.0 31389 PETC_JCT 60.0 1 1	LAKEVILLE 115KV - SECTION 1D & 2D	P2	Bus-tie Breaker	102	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	Project: Lakeville 60 kV Area Reinforcement In-service date: December 2021 Short term: Action plan
	FULTON 230 KV BAAH BUS #1 (FAILURE OF NON-REDUNDANT RELAY)	P5	Non-Redundant Relay	181	<100	<100	<100	<100	145	144	<100	<100	<100	<100	<100	Project: Lakeville 60 kV Area Reinforcement In-service date: December 2021 Short term: Action plan
	FULTON-IGNACIO #1 & FULTON-LAKEVILLE LINES	P7	DCTL	111	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	Project: Lakeville 60 kV Area Reinforcement In-service date: December 2021 Short term: Action plan
31384 COTATI 60.0 31391 SNMA TAP 60.0 1 1	FULTON 115/60KV TB 2 & FULTON 115/60KV TB 1	P6	N-1-1	219	<100	<100	<100	<100	224	216	<100	<100	<100	116	<100	Project: Lakeville 60 kV Area Reinforcement In-service date: December 2021 Short term: Action plan
31389 PETC_JCT 60.0 31390 PETLMA A 60.0 1 1	LAKEVILLE 60KV	P1	N-1	110	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	Project: Lakeville 60 kV Area Reinforcement In-service date: December 2021 Short term: Action plan
	LAKEVILLE - 1D 60KV & LAKEVILLE LINE	P2	Bus/Breaker	103	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	Project: Lakeville 60 kV Area Reinforcement In-service date: December 2021 Short term: Action plan
	FULTON 115/60KV TB 2 & FULTON 115/60KV TB 1	P6	N-1-1	182	<100	<100	<100	<100	202	197	<100	<100	<100	<100	<100	Operating Solution or SPS
31390 PETLMA A 60.0 31394 LKVL JT 60.0 1 1	LAKEVILLE 60KV [7350]	P1	N-1	114	<100	<100	<100	<100	118	119	<100	<100	<100	<100	<100	Project: Lakeville 60 kV Area Reinforcement In-service date: December 2021 Short term: Action plan
	LAKEVILLE - 1D 60KV & LAKEVILLE LINE	P2	Bus/Breaker	107	<100	<100	<100	<100	111	111	<100	<100	<100	<100	<100	Project: Lakeville 60 kV Area Reinforcement In-service date: December 2021 Short term: Action plan
	SONMA LF 9.11KV GEN UNIT 1 & LAKEVILLE 60KV	P3	G1/N1	110	<100	<100	<100	122	115	<100	<100	<100	<100	<100	<100	Project: Lakeville 60 kV Area Reinforcement In-service date: December 2021 Short term: Action plan
	FULTON 230 KV BAAH BUS #1 (FAILURE OF NON-REDUNDANT RELAY)	P5	Non-Redundant Relay	126	<100	<100	<100	<100	127	126	<100	<100	<100	<100	<100	Project: Lakeville 60 kV Area Reinforcement In-service date: December 2021 Short term: Action plan
	FULTON 115/60KV TB 1 & FULTON 115/60KV TB 2	P6	N-1-1	238	<100	<100	<100	<100	262	256	<100	<100	<100	122	<100	Project: Lakeville 60 kV Area Reinforcement In-service date: December 2021 Short term: Action plan
31391 SNMA TAP 60.0 31395 LAJUNATP 60.0 1 1	FULTON 230 KV BAAH BUS #1 (FAILURE OF NON-REDUNDANT RELAY)	P5	Non-Redundant Relay	128	<100	<100	<100	<100	103	101	<100	<100	<100	<100	<100	Project: Lakeville 60 kV Area Reinforcement In-service date: December 2021 Short term: Action plan

Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading % (Baseline Scenarios)						Loading % (Sensitivity Scenarios)				Project & Potential Mitigation Solutions			
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Peak	2020 Winter Peak	2023 Winter Peak	2028 Winter Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen		2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations	
31391 SNMA TAP 60.0 31365 LAGUNA 60.0 1 1	FULTON 115/60KV TB 1 & FULTON 115/60KV TB 2	P6	N-1-1	229	<100	<100	<100	<100	<100	235	231	<100	<100	<100	<100	<100	Project: Lakeville 60 kV Area Reinforcement In-service date: December 2021 Short term: Action plan
31392 LAKEVILLE 60.0 30435 LAKEVILLE 230 3 1	LAKEVILLE 230KV - SECTION 1E & 1D	P2	Bus/Breaker	<100	<100	<100	<100	<100	<100	100	100	<100	<100	<100	<100	<100	Non-BES Facility
	FULTON 115/60KV TB 2 & FULTON 115/60KV TB 1	P6	N-1-1	<100	<100	<100	<100	<100	<100	106	104	<100	<100	<100	<100	<100	Non-BES Facility
31392 LAKEVILLE 60.0 31394 LKVL JT 60.0 1 1	LAKEVILLE 60KV [7350]	P1	N-1	107	<100	<100	<100	<100	<100	102	103	<100	<100	<100	<100	<100	Project: Lakeville 60 kV Area Reinforcement In-service date: December 2021 Short term: Action plan
	LAKEVILLE - 1D 60KV & LAKEVILLE LINE	P2	Bus/Breaker	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	Project: Lakeville 60 kV Area Reinforcement In-service date: December 2021 Short term: Action plan
	SONMA LF 9.11KV GEN UNIT 1 & LAKEVILLE 60KV [7350]	P3	G1/N1	<100	<100	<100	<100	<100	106	<100	<100	<100	<100	<100	<100	<100	Project: Lakeville 60 kV Area Reinforcement In-service date: December 2021 Short term: Action plan
	FULTON 230 KV BAAH BUS #1 (FAILURE OF NON-REDUNDANT RELAY)	P5	Non-Redundant Relay	118	<100	<100	<100	<100	<100	110	109	<100	<100	<100	<100	<100	Project: Lakeville 60 kV Area Reinforcement In-service date: December 2021 Short term: Action plan
	LAKEVILLE 60KV [7350] & FULTON 60KV [6910] MOAS OPENED ON SNMA TAP_SNMALDFL	P6	N-1-1	<100	106	112	<100	<100	<100	<100	111	123	107	<100	<100	112	Non-BES Facility
	FULTON 115/60KV TB 1 & FULTON 115/60KV TB 2	P6	N-1-1	206	<100	<100	<100	<100	<100	227	222	<100	<100	<100	106	<100	Non-BES Facility
32562 PUEBLOJT 115 32564 PUEBLO 115 1 1	LAKEVILLE 115KV - SECTION 1D & 2D	P2	Bus-tie Breaker	<100	<100	119	<100	<100	<100	<100	<100	<100	<100	<100	<100	116	Bus Upgrade
	LAKEVILLE-SONOMA #1 & LAKEVILLE-SONOMA #2 LINES	P7	DCTL	<100	<100	114	<100	<100	<100	<100	<100	<100	<100	<100	<100	112	Operating Solution or SPS
32568 IGNACIO 115 32574 SAN RAFL 115 1 1	IGNACIO 115KV [1860] MOAS OPENED ON IGNACIO_LS GLLNS	P1	N-1	<100	104	<100	<100	<100	<100	<100	101	<100	<100	<100	<100	<100	Project: Ignacio Area Reinforcement In-service date: 2023
	IGNACIO 115KV [1860] (IGNACIO-LS GLLNS)	P2	Line Section w/o Fault	<100	104	<100	<100	<100	<100	<100	101	<100	<100	<100	<100	<100	Project: Ignacio Area Reinforcement In-service date: 2023
	GEYSER16 13.80KV GEN UNIT 1 & IGNACIO 115KV [1860] MOAS OPENED ON IGNACIO_LS GLLNS	P3	G1/N1	<100	105	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	Project: Ignacio Area Reinforcement In-service date: 2023
	IGNACIO 115KV [1840] MOAS OPENED ON IGNACIO_SKGGS J2 & IGNACIO 115KV [1860] MOAS OPENED ON IGNACIO_LS GLLNS	P6	N-1-1	<100	104	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	Project: Ignacio Area Reinforcement In-service date: 2023
32618 NTWRJCT1 115 32020 JMSN JCT 115 1 1	NRTH TWR - 1D 115KV & NRTH TWR-SOBRANTE LINE	P2	Non-bus-tie Breaker	<100	<100	Diverge	<100	<100	<100	<100	Diverge	Diverge	<100	<100	<100	Diverge	Disable automatics at and above a predetermined load
	NRTH TWR - 1D 115KV & NRTH TWR-MARTNZ D LINE	P2	Non-bus-tie Breaker	<100	<100	Diverge	<100	<100	<100	<100	Diverge	Diverge	<100	<100	<100	Diverge	Disable automatics at and above a predetermined load
32655 TULCAY1 60.0 32662 TULCY JT 60.0 1 1	TULUCAY 60KV [8190]	P1	N-1	<100	102	110	<100	<100	<100	<100	<100	104	<100	<100	<100	108	Disable automatics at and above a predetermined load
	NAPA 60KV SECTION 1D	P2	Bus	<100	102	110	<100	<100	<100	<100	<100	104	<100	<100	<100	108	Operating Solution or SPS
	GEYSER17 13.80KV GEN UNIT 1 & TULUCAY 60KV [8190]	P3	G1/N1	<100	<100	111	<100	<100	<100	<100	105	<100	<100	<100	<100	108	Operating Solution or SPS
	TULUCAY 230/60KV TB 1 & TULUCAY 60KV [8190]	P6	N-1-1	<100	<100	110	<100	<100	<100	<100	<100	104	<100	<100	<100	108	Operating Solution or SPS

Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading % (Baseline Scenarios)						Loading % (Sensitivity Scenarios)				Project & Potential Mitigation Solutions		
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Peak	2020 Winter Peak	2023 Winter Peak	2028 Winter Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen		2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations
	TULUCAY-NAPA #2 & BASALT #1 60 KV LINES	P7	DCTL	<100	102	110	<100	<100	<100	<100	104	<100	<100	<100	108	Operating Solution or SPS
32656 NAPA 60.0 32662 TULCY JT 60.0 1 1	TULUCAY 60KV [8190]	P1	N-1	<100	<100	104	<100	<100	<100	<100	<100	<100	<100	<100	103	Disable automatics at and above a predetermined load
	NAPA 60KV SECTION 1D	P2	Bus	<100	<100	105	<100	<100	<100	<100	<100	<100	<100	<100	103	Operating Solution or SPS
	GEYSER17 13.80KV GEN UNIT 1 & TULUCAY 60KV [8190]	P3	G1/N1	<100	<100	105	<100	<100	<100	100	<100	<100	<100	<100	103	Operating Solution or SPS
	IGNACIO 230KV [4920] & TULUCAY 60KV [8190]	P6	N-1-1	<100	<100	105	<100	<100	<100	<100	100	<100	<100	<100	103	Operating Solution or SPS
	TULUCAY-NAPA #2 & BASALT #1 60 KV LINES	P7	DCTL	<100	<100	104	<100	<100	<100	<100	<100	<100	<100	<100	103	Operating Solution or SPS
32667 IG JCT 60.0 32678 SAN_RFLJ 60.0 1 1	IGNACIO-ALTO-SAUSALITO #2 & IGNACIO-ALTO-SAUSALITO #1 LINES	P7	DCTL	101	108	<100	<100	<100	106	110	<100	108	<100	<100	<100	Project: Ignacio Area Reinforcement In-service date: 2023
	IGNACIO 60KV [7170] & IGNACIO 60KV [7160]	P6	N-1-1	<100	100	<100	<100	<100	106	110	<100	<100	<100	<100	<100	Project: Ignacio Area Reinforcement In-service date: 2023
32678 SAN_RFLJ 60.0 32680 GREENBRE 60.0 1 1	IGNACIO-ALTO-SAUSALITO #2 & IGNACIO-ALTO-SAUSALITO #1 LINES	P7	DCTL	<100	108	<100	<100	<100	<100	<100	<100	108	<100	<100	<100	Project: Ignacio Area Reinforcement In-service date: 2023



Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)									Voltage PU (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Peak	2020 Winter Peak	2023 Winter Peak	2028 Winter Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations		
ALTO 60 kV	Base Case	P0	Base case	1.01	1.02	0.97	1.07	1.08	1.01	1.04	0.98	1.01	1.04	1.08	0.97	Load power factor correction and voltage support if needed	
ALTOJT1 60 kV	Base Case	P0	Base case	1.01	1.02	0.97	1.07	1.08	1.01	1.04	0.98	1.01	1.04	1.08	0.97	Load power factor correction and voltage support if needed	
ALTOJT2 60 kV	Base Case	P0	Base case	1.01	1.02	0.97	1.07	1.08	1.01	1.04	0.98	1.01	1.04	1.08	0.97	Load power factor correction and voltage support if needed	
ANNAPOLS 60 kV	Base Case	P0	Base case	0.99	0.99	1.00	1.04	1.06	0.97	0.99	0.98	0.99	1.02	1.06	1.00	Load power factor correction and voltage support if needed	
BAHIA 230 kV	Base Case	P0	Base case	1.01	1.02	0.97	1.06	1.05	1.00	1.02	1.00	1.01	1.02	1.06	0.97	Load power factor correction and voltage support if needed	
BELLVUE 115 kV	Base Case	P0	Base case	1.04	1.06	1.00	1.07	1.07	1.06	1.05	1.01	1.06	1.05	1.06	1.00	Load power factor correction and voltage support if needed	
BOLINAS 60 kV	Base Case	P0	Base case	1.04	1.05	0.98	1.09	1.09	1.03	1.06	1.00	1.04	1.06	1.09	0.98	Load power factor correction and voltage support if needed	
CACHE J1 115 kV	Base Case	P0	Base case	1.05	1.04	1.02	1.09	1.07	1.04	1.06	1.04	1.03	1.06	1.07	1.02	Load power factor correction and voltage support if needed	
CACHE J2 115 kV	Base Case	P0	Base case	1.04	1.04	1.03	1.06	1.06	1.04	1.04	1.04	1.03	1.04	1.06	1.03	Load power factor correction and voltage support if needed	
CALISTGA 60 kV	Base Case	P0	Base case	0.95	0.95	0.95	1.04	1.05	0.96	0.98	0.96	0.95	1.00	1.05	0.95	Load power factor correction and voltage support if needed	
CALPELLA 115 kV	Base Case	P0	Base case	1.04	1.05	1.04	1.07	1.07	1.05	1.05	1.06	1.04	1.04	1.07	1.04	Load power factor correction and voltage support if needed	
CARQUINZ 115 kV	Base Case	P0	Base case	1.05	1.07	0.99	1.10	1.10	1.04	1.06	1.00	1.07	1.07	1.11	0.99	Load power factor correction and voltage support if needed	
CLER LKE 60 kV	Base Case	P0	Base case	1.02	1.01	0.99	1.04	1.05	1.03	1.03	0.99	1.01	1.03	1.05	0.99	Load power factor correction and voltage support if needed	
CLOVRDLE 115 kV	Base Case	P0	Base case	1.03	1.03	1.03	1.06	1.06	1.04	1.04	1.04	1.03	1.04	1.06	1.03	Load power factor correction and voltage support if needed	
CRQNZTP1 115 kV	Base Case	P0	Base case	1.05	1.07	0.99	1.10	1.10	1.04	1.06	1.00	1.07	1.07	1.11	0.99	Load power factor correction and voltage support if needed	
CRQNZTP2 115 kV	Base Case	P0	Base case	1.00	1.01	0.96	1.08	1.08	0.99	1.03	0.97	1.00	1.03	1.08	0.96	Load power factor correction and voltage support if needed	
EGLE RCK 115 kV	Base Case	P0	Base case	1.04	1.04	1.03	1.06	1.06	1.04	1.05	1.04	1.04	1.04	1.06	1.03	Load power factor correction and voltage support if needed	
EGLE RCK 60 kV	Base Case	P0	Base case	1.05	1.05	1.05	1.05	1.06	1.06	1.05	1.05	1.06	1.04	1.06	1.05	Load power factor correction and voltage support if needed	
ER_FTNJT 115 kV	Base Case	P0	Base case	1.05	1.06	1.01	1.09	1.08	1.06	1.06	1.02	1.06	1.06	1.08	1.01	Load power factor correction and voltage support if needed	
ERFT5_25 115 kV	Base Case	P0	Base case	1.04	1.04	1.02	1.07	1.06	1.04	1.05	1.03	1.04	1.05	1.06	1.02	Load power factor correction and voltage support if needed	
FORT RSS 60 kV	Base Case	P0	Base case	1.00	1.00	1.00	1.04	1.06	0.98	1.00	0.99	0.99	1.02	1.06	1.00	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
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Peak	2020 Winter Peak	2023 Winter Peak	2028 Winter Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations		
FULTON 115 kV	Base Case	P0	Base case	1.06	1.06	1.02	1.08	1.08	1.06	1.06	1.03	1.06	1.06	1.08	1.02	Load power factor correction and voltage support if needed	
FULTON 60 kV	Base Case	P0	Base case	1.04	1.05	1.05	1.05	1.05	1.04	1.05	1.04	1.04	1.04	1.05	1.05	Load power factor correction and voltage support if needed	
GARCIA 60 kV	Base Case	P0	Base case	1.04	1.04	1.04	1.05	1.05	1.04	1.05	1.04	1.04	1.05	1.05	1.04	Load power factor correction and voltage support if needed	
GARCIA J 60 kV	Base Case	P0	Base case	1.04	1.04	1.04	1.05	1.05	1.04	1.05	1.04	1.04	1.05	1.05	1.04	Load power factor correction and voltage support if needed	
GEYSERS34 115 kV	Base Case	P0	Base case	1.04	1.04	1.03	1.06	1.06	1.04	1.05	1.04	1.04	1.04	1.06	1.03	Load power factor correction and voltage support if needed	
GEYSERS56 115 kV	Base Case	P0	Base case	1.04	1.04	1.03	1.06	1.06	1.04	1.05	1.04	1.04	1.04	1.06	1.03	Load power factor correction and voltage support if needed	
GEYSR11 115 kV	Base Case	P0	Base case	1.04	1.04	1.03	1.06	1.06	1.04	1.05	1.04	1.04	1.04	1.06	1.03	Load power factor correction and voltage support if needed	
GRANITE 60 kV	Base Case	P0	Base case	1.02	1.02	1.00	1.05	1.05	1.03	1.04	1.00	1.02	1.03	1.06	1.00	Load power factor correction and voltage support if needed	
GREENBRE 60 kV	Base Case	P0	Base case	1.01	1.02	0.98	1.07	1.08	1.00	1.03	0.99	1.01	1.04	1.08	0.98	Load power factor correction and voltage support if needed	
GUALALA 60 kV	Base Case	P0	Base case	0.98	0.98	0.99	1.04	1.06	0.96	0.98	0.97	0.98	1.01	1.06	0.99	Load power factor correction and voltage support if needed	
GYSR78TP 115 kV	Base Case	P0	Base case	1.04	1.04	1.03	1.06	1.06	1.04	1.05	1.04	1.04	1.04	1.06	1.03	Load power factor correction and voltage support if needed	
HIGHLAND 115 kV	Base Case	P0	Base case	1.04	1.04	1.02	1.08	1.07	1.03	1.06	1.03	1.03	1.05	1.07	1.02	Load power factor correction and voltage support if needed	
HGHLNDJ1 115 kV	Base Case	P0	Base case	1.04	1.04	1.03	1.06	1.06	1.04	1.05	1.04	1.04	1.04	1.06	1.03	Load power factor correction and voltage support if needed	
HGHLNDJ2 115 kV	Base Case	P0	Base case	1.04	1.04	1.02	1.08	1.07	1.03	1.06	1.03	1.03	1.05	1.07	1.02	Load power factor correction and voltage support if needed	
HGHWY J1 115 kV	Base Case	P0	Base case	1.05	1.06	1.00	1.10	1.10	1.04	1.06	1.01	1.06	1.06	1.10	1.00	Load power factor correction and voltage support if needed	
HGHWY J2 115 kV	Base Case	P0	Base case	1.01	1.02	0.96	1.08	1.09	0.99	1.03	0.97	1.01	1.03	1.09	0.96	Load power factor correction and voltage support if needed	
HighWAY 115 kV	Base Case	P0	Base case	1.00	1.01	0.96	1.08	1.09	0.99	1.03	0.97	1.01	1.03	1.09	0.96	Load power factor correction and voltage support if needed	
HOMGRND 115 kV	Base Case	P0	Base case	1.04	1.04	1.02	1.08	1.07	1.03	1.06	1.03	1.03	1.05	1.07	1.02	Load power factor correction and voltage support if needed	
HOMPROC 115 kV	Base Case	P0	Base case	1.04	1.04	1.02	1.08	1.07	1.03	1.06	1.03	1.03	1.05	1.07	1.02	Load power factor correction and voltage support if needed	
HOMSTKTP 115 kV	Base Case	P0	Base case	1.04	1.04	1.03	1.08	1.07	1.03	1.06	1.03	1.03	1.05	1.07	1.03	Load power factor correction and voltage support if needed	
HPLND JT 115 kV	Base Case	P0	Base case	1.03	1.03	1.03	1.06	1.06	1.04	1.04	1.04	1.03	1.04	1.06	1.03	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
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Peak	2020 Winter Peak	2023 Winter Peak	2028 Winter Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations	
HPLND JT 60 kV	Base Case	P0	Base case	1.03	1.03	1.03	1.05	1.06	1.04	1.04	1.04	1.03	1.03	1.06	1.03	Load power factor correction and voltage support if needed
IG JCT 60 kV	Base Case	P0	Base case	1.04	1.05	1.00	1.09	1.09	1.04	1.06	1.01	1.05	1.06	1.09	1.00	Load power factor correction and voltage support if needed
IGNACIO 115 kV	Base Case	P0	Base case	1.05	1.05	1.01	1.09	1.09	1.04	1.06	1.02	1.05	1.06	1.09	1.00	Load power factor correction and voltage support if needed
IGNACO A 60 kV	Base Case	P0	Base case	1.04	1.05	1.00	1.09	1.09	1.04	1.06	1.01	1.05	1.06	1.09	1.00	Load power factor correction and voltage support if needed
IGNACO B 60 kV	Base Case	P0	Base case	1.04	1.05	1.00	1.09	1.09	1.04	1.06	1.01	1.05	1.06	1.09	1.00	Load power factor correction and voltage support if needed
INDIN VL 115 kV	Base Case	P0	Base case	1.06	1.05	1.03	1.09	1.08	1.05	1.07	1.05	1.04	1.07	1.08	1.03	Load power factor correction and voltage support if needed
JCPMPJCT 115 kV	Base Case	P0	Base case	1.05	1.07	0.99	1.10	1.10	1.04	1.06	1.01	1.06	1.07	1.10	0.99	Load power factor correction and voltage support if needed
JMSCNPMP 115 kV	Base Case	P0	Base case	1.05	1.07	0.99	1.10	1.10	1.04	1.06	1.01	1.06	1.07	1.10	0.99	Load power factor correction and voltage support if needed
KONOCI6 60 kV	Base Case	P0	Base case	1.03	1.04	1.02	1.06	1.06	1.05	1.05	1.02	1.04	1.03	1.07	1.02	Load power factor correction and voltage support if needed
LAKEVI&1 230 kV	Base Case	P0	Base case	1.02	1.02	0.99	1.05	1.05	1.02	1.03	1.01	1.01	1.02	1.05	0.99	Load power factor correction and voltage support if needed
LOWR LKE 60 kV	Base Case	P0	Base case	1.02	1.03	1.01	1.06	1.07	1.06	1.05	1.01	1.04	1.03	1.07	1.01	Load power factor correction and voltage support if needed
LS GLLNS 115 kV	Base Case	P0	Base case	1.04	1.05	0.99	1.09	1.09	1.04	1.06	1.01	1.04	1.06	1.09	0.99	Load power factor correction and voltage support if needed
LUCERNE 115 kV	Base Case	P0	Base case	1.05	1.04	1.03	1.08	1.08	1.04	1.06	1.05	1.03	1.05	1.08	1.03	Load power factor correction and voltage support if needed
LUCERNJ1 115 kV	Base Case	P0	Base case	1.05	1.04	1.03	1.08	1.08	1.04	1.06	1.05	1.03	1.05	1.08	1.03	Load power factor correction and voltage support if needed
LUCERNJ2 115 kV	Base Case	P0	Base case	1.04	1.04	1.04	1.07	1.07	1.04	1.04	1.05	1.04	1.04	1.07	1.04	Load power factor correction and voltage support if needed
LWRLAKEJ 115 kV	Base Case	P0	Base case	1.04	1.04	1.03	1.08	1.07	1.03	1.06	1.03	1.03	1.05	1.07	1.03	Load power factor correction and voltage support if needed
MENDOCNO 115 kV	Base Case	P0	Base case	1.05	1.05	1.04	1.07	1.07	1.06	1.05	1.06	1.04	1.05	1.07	1.04	Load power factor correction and voltage support if needed
MEYERS 115 kV	Base Case	P0	Base case	1.05	1.07	0.99	1.10	1.10	1.04	1.06	1.00	1.07	1.07	1.11	0.99	Load power factor correction and voltage support if needed
MEYERTP1 115 kV	Base Case	P0	Base case	1.05	1.07	0.99	1.10	1.10	1.04	1.06	1.00	1.07	1.07	1.11	0.99	Load power factor correction and voltage support if needed
MEYERTP2 115 kV	Base Case	P0	Base case	1.00	1.01	0.96	1.08	1.08	0.99	1.03	0.97	1.00	1.03	1.08	0.96	Load power factor correction and voltage support if needed
MIDDLTWN 60 kV	Base Case	P0	Base case	1.00	1.03	1.01	1.07	1.08	1.07	1.05	0.99	1.03	1.02	1.09	1.01	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
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Peak	2020 Winter Peak	2023 Winter Peak	2028 Winter Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations		
MIRABEL 60 kV	Base Case	P0	Base case	1.03	1.03	1.04	1.05	1.05	1.03	1.03	1.03	1.03	1.03	1.04	1.05	1.03	Load power factor correction and voltage support if needed
MIRBELTP 60 kV	Base Case	P0	Base case	1.03	1.03	1.04	1.05	1.05	1.03	1.03	1.03	1.03	1.03	1.04	1.05	1.03	Load power factor correction and voltage support if needed
MNTCLOJ1 115 kV	Base Case	P0	Base case	1.04	1.05	1.01	1.07	1.07	1.04	1.05	1.02	1.05	1.05	1.05	1.07	1.01	Load power factor correction and voltage support if needed
MNTCLOJ2 115 kV	Base Case	P0	Base case	1.04	1.05	1.00	1.09	1.09	1.06	1.06	1.01	1.05	1.06	1.06	1.09	1.00	Load power factor correction and voltage support if needed
MNTCLOPH 115 kV	Base Case	P0	Base case	1.04	1.05	1.00	1.09	1.09	1.06	1.06	1.01	1.05	1.06	1.06	1.09	1.00	Load power factor correction and voltage support if needed
MOLINO 60 kV	Base Case	P0	Base case	1.02	1.01	1.02	1.04	1.05	1.02	1.02	1.01	1.01	1.03	1.03	1.05	1.01	Load power factor correction and voltage support if needed
MONROE1 115 kV	Base Case	P0	Base case	1.05	1.06	1.01	1.08	1.08	1.07	1.06	1.01	1.06	1.06	1.06	1.08	1.00	Load power factor correction and voltage support if needed
MONROE2 115 kV	Base Case	P0	Base case	1.05	1.06	1.00	1.08	1.08	1.07	1.06	1.01	1.06	1.06	1.06	1.08	1.00	Load power factor correction and voltage support if needed
MONTCLO 115 kV	Base Case	P0	Base case	1.04	1.05	1.00	1.09	1.09	1.06	1.06	1.01	1.05	1.06	1.06	1.09	1.00	Load power factor correction and voltage support if needed
MONTE RO 60 kV	Base Case	P0	Base case	1.01	1.02	1.02	1.04	1.06	1.00	1.01	1.01	1.01	1.03	1.03	1.06	1.01	Load power factor correction and voltage support if needed
MPE 115 kV	Base Case	P0	Base case	1.04	1.04	1.03	1.06	1.06	1.04	1.04	1.04	1.04	1.04	1.04	1.06	1.03	Load power factor correction and voltage support if needed
MPE TAP 115 kV	Base Case	P0	Base case	1.04	1.04	1.03	1.06	1.06	1.04	1.04	1.04	1.04	1.04	1.04	1.06	1.03	Load power factor correction and voltage support if needed
MREIS JC 115 kV	Base Case	P0	Base case	1.05	1.07	0.99	1.10	1.10	1.04	1.06	1.00	1.06	1.07	1.07	1.10	0.99	Load power factor correction and voltage support if needed
MTCLPHJ1 115 kV	Base Case	P0	Base case	1.04	1.05	1.01	1.07	1.07	1.04	1.05	1.02	1.05	1.05	1.05	1.07	1.01	Load power factor correction and voltage support if needed
MTCLPHJ2 115 kV	Base Case	P0	Base case	1.04	1.05	1.00	1.09	1.09	1.06	1.06	1.01	1.05	1.06	1.06	1.09	1.00	Load power factor correction and voltage support if needed
NOVATO 60 kV	Base Case	P0	Base case	1.04	1.05	1.00	1.09	1.09	1.04	1.06	1.01	1.05	1.06	1.06	1.09	1.00	Load power factor correction and voltage support if needed
NRTH TWR 115 kV	Base Case	P0	Base case	1.03	1.04	1.01	1.05	1.06	1.02	1.03	1.02	1.04	1.03	1.03	1.06	1.01	Load power factor correction and voltage support if needed
NTWR ALT 115 kV	Base Case	P0	Base case	1.00	1.01	0.96	1.08	1.08	0.99	1.03	0.97	1.01	1.03	1.03	1.08	0.96	Load power factor correction and voltage support if needed
NTWRJCT1 115 kV	Base Case	P0	Base case	1.05	1.06	1.00	1.11	1.11	1.06	1.06	1.04	1.05	1.06	1.06	1.11	1.00	Load power factor correction and voltage support if needed
NTWRJCT2 115 kV	Base Case	P0	Base case	1.03	1.04	1.01	1.05	1.06	1.02	1.03	1.02	1.04	1.03	1.03	1.06	1.01	Load power factor correction and voltage support if needed
NVTO JCT 60 kV	Base Case	P0	Base case	1.04	1.05	1.00	1.09	1.09	1.04	1.06	1.01	1.05	1.06	1.06	1.09	1.00	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
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Peak	2020 Winter Peak	2023 Winter Peak	2028 Winter Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations	
OLEMA 60 kV	Base Case	P0	Base case	1.04	1.04	0.97	1.09	1.09	1.02	1.05	0.99	1.04	1.06	1.09	0.97	Load power factor correction and voltage support if needed
PARKWAY 230 kV	Base Case	P0	Base case	1.01	1.01	0.97	1.06	1.06	1.00	1.02	0.99	1.00	1.02	1.06	0.97	Load power factor correction and voltage support if needed
PENNGRVE 115 kV	Base Case	P0	Base case	1.04	1.05	1.00	1.06	1.06	1.05	1.04	1.02	1.05	1.04	1.06	1.00	Load power factor correction and voltage support if needed
PNT ARNA 60 kV	Base Case	P0	Base case	1.04	1.04	1.04	1.05	1.05	1.04	1.05	1.04	1.04	1.05	1.05	1.04	Load power factor correction and voltage support if needed
PUEBLO 115 kV	Base Case	P0	Base case	1.02	1.03	0.99	1.05	1.06	1.02	1.03	1.00	1.03	1.03	1.05	0.99	Load power factor correction and voltage support if needed
PUEBLOJT 115 kV	Base Case	P0	Base case	1.04	1.05	1.01	1.07	1.07	1.04	1.05	1.02	1.05	1.05	1.07	1.01	Load power factor correction and voltage support if needed
REDBUD 115 kV	Base Case	P0	Base case	1.03	1.04	1.03	1.06	1.06	1.04	1.04	1.04	1.03	1.04	1.07	1.03	Load power factor correction and voltage support if needed
REDBUDJ1 115 kV	Base Case	P0	Base case	1.03	1.04	1.03	1.06	1.06	1.04	1.04	1.04	1.03	1.04	1.07	1.03	Load power factor correction and voltage support if needed
REDBUDJ2 115 kV	Base Case	P0	Base case	1.03	1.04	1.03	1.06	1.06	1.04	1.04	1.04	1.03	1.04	1.07	1.03	Load power factor correction and voltage support if needed
RINCON 115 kV	Base Case	P0	Base case	1.05	1.06	1.01	1.09	1.08	1.06	1.06	1.02	1.06	1.06	1.08	1.01	Load power factor correction and voltage support if needed
RINCONJ1 115 kV	Base Case	P0	Base case	1.05	1.06	1.02	1.08	1.08	1.06	1.06	1.02	1.06	1.06	1.08	1.01	Load power factor correction and voltage support if needed
RINCONJ2 115 kV	Base Case	P0	Base case	1.05	1.06	1.01	1.09	1.08	1.06	1.06	1.02	1.06	1.06	1.08	1.01	Load power factor correction and voltage support if needed
SAN RAFL 115 kV	Base Case	P0	Base case	1.04	1.05	0.99	1.09	1.09	1.03	1.06	1.00	1.04	1.06	1.09	0.99	Load power factor correction and voltage support if needed
SAN_RFLJ 60 kV	Base Case	P0	Base case	1.02	1.02	0.99	1.08	1.08	1.01	1.04	1.00	1.02	1.04	1.08	0.98	Load power factor correction and voltage support if needed
SAUSALTO 60 kV	Base Case	P0	Base case	1.01	1.01	0.96	1.07	1.07	1.00	1.03	0.97	1.00	1.04	1.08	0.96	Load power factor correction and voltage support if needed
SILVERDO 115 kV	Base Case	P0	Base case	1.04	1.05	1.00	1.09	1.08	1.06	1.06	1.01	1.05	1.06	1.09	1.00	Load power factor correction and voltage support if needed
SILVRDJ1 115 kV	Base Case	P0	Base case	1.04	1.05	1.01	1.07	1.07	1.04	1.05	1.02	1.05	1.05	1.07	1.01	Load power factor correction and voltage support if needed
SILVRDJ2 115 kV	Base Case	P0	Base case	1.04	1.05	1.00	1.09	1.08	1.06	1.06	1.01	1.05	1.06	1.09	1.00	Load power factor correction and voltage support if needed
SKAGGS 115 kV	Base Case	P0	Base case	1.05	1.06	1.00	1.09	1.09	1.04	1.06	1.01	1.05	1.06	1.09	1.00	Load power factor correction and voltage support if needed
SKGGS J1 115 kV	Base Case	P0	Base case	1.05	1.06	1.00	1.09	1.09	1.04	1.06	1.01	1.05	1.06	1.09	1.00	Load power factor correction and voltage support if needed
SKGGS J2 115 kV	Base Case	P0	Base case	1.02	1.03	0.98	1.09	1.09	1.01	1.04	0.99	1.02	1.04	1.09	0.98	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
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Peak	2020 Winter Peak	2023 Winter Peak	2028 Winter Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations	
SLMN CRK 60 kV	Base Case	P0	Base case	0.99	1.00	1.00	1.04	1.06	0.98	1.00	0.99	0.99	1.02	1.06	1.00	Load power factor correction and voltage support if needed
SLMN JCT 60 kV	Base Case	P0	Base case	1.00	1.00	1.01	1.04	1.06	0.99	1.00	1.00	1.00	1.02	1.06	1.01	Load power factor correction and voltage support if needed
SNTA RSA 115 kV	Base Case	P0	Base case	1.05	1.06	1.00	1.08	1.08	1.07	1.06	1.01	1.06	1.06	1.08	1.00	Load power factor correction and voltage support if needed
ST.HELNA 60 kV	Base Case	P0	Base case	0.99	1.00	1.00	1.04	1.05	1.00	1.01	1.00	0.99	1.02	1.05	1.00	Load power factor correction and voltage support if needed
STAF_JCT 60 kV	Base Case	P0	Base case	1.05	1.05	0.98	1.09	1.09	1.03	1.06	0.99	1.05	1.07	1.09	0.98	Load power factor correction and voltage support if needed
STAFFORD 60 kV	Base Case	P0	Base case	1.05	1.05	0.98	1.09	1.09	1.03	1.06	0.99	1.05	1.07	1.09	0.98	Load power factor correction and voltage support if needed
STHELNJ1 115 kV	Base Case	P0	Base case	1.04	1.05	1.01	1.07	1.07	1.04	1.05	1.02	1.05	1.05	1.07	1.01	Load power factor correction and voltage support if needed
STHELNJ2 115 kV	Base Case	P0	Base case	1.04	1.05	1.00	1.09	1.08	1.06	1.06	1.01	1.05	1.06	1.09	1.00	Load power factor correction and voltage support if needed
STNY PTP 115 kV	Base Case	P0	Base case	1.05	1.06	1.00	1.07	1.07	1.06	1.05	1.01	1.06	1.05	1.07	1.00	Load power factor correction and voltage support if needed
STONY PT 115 kV	Base Case	P0	Base case	1.05	1.06	1.00	1.07	1.07	1.06	1.05	1.01	1.06	1.05	1.07	1.00	Load power factor correction and voltage support if needed
TOCA_JCT 60 kV	Base Case	P0	Base case	1.04	1.05	0.98	1.09	1.09	1.02	1.06	0.99	1.04	1.06	1.09	0.98	Load power factor correction and voltage support if needed
TOCALOMA 60 kV	Base Case	P0	Base case	1.04	1.05	0.98	1.09	1.09	1.02	1.06	0.99	1.04	1.06	1.09	0.98	Load power factor correction and voltage support if needed
TRNTN JT 60 kV	Base Case	P0	Base case	1.03	1.04	1.04	1.05	1.05	1.03	1.03	1.04	1.04	1.04	1.05	1.04	Load power factor correction and voltage support if needed
TRNTN_JC 60 kV	Base Case	P0	Base case	1.03	1.04	1.04	1.05	1.05	1.03	1.03	1.04	1.04	1.04	1.05	1.04	Load power factor correction and voltage support if needed
TULUCA&1 230 kV	Base Case	P0	Base case	1.01	1.02	0.99	1.05	1.05	1.02	1.02	1.01	1.01	1.02	1.05	0.99	Load power factor correction and voltage support if needed
TULUCAY 230 kV	Base Case	P0	Base case	1.01	1.02	0.99	1.05	1.05	1.01	1.02	1.01	1.01	1.02	1.05	0.99	Load power factor correction and voltage support if needed
TWR2_19 60 kV	Base Case	P0	Base case	1.04	1.05	1.00	1.09	1.08	1.03	1.05	1.01	1.04	1.06	1.08	1.00	Load power factor correction and voltage support if needed
TWR2_20 60 kV	Base Case	P0	Base case	1.04	1.05	1.00	1.09	1.08	1.03	1.05	1.01	1.04	1.06	1.08	1.00	Load power factor correction and voltage support if needed
UKIAH 115 kV	Base Case	P0	Base case	1.03	1.04	1.03	1.06	1.06	1.05	1.04	1.05	1.03	1.04	1.07	1.03	Load power factor correction and voltage support if needed
WHLR JCT 60 kV	Base Case	P0	Base case	1.03	1.03	1.04	1.05	1.05	1.03	1.03	1.03	1.03	1.04	1.05	1.03	Load power factor correction and voltage support if needed
WHLR TAP 60 kV	Base Case	P0	Base case	1.03	1.04	1.04	1.05	1.05	1.03	1.03	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
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Peak	2020 Winter Peak	2023 Winter Peak	2028 Winter Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations		
WOHLER 60 kV	Base Case	P0	Base case	1.03	1.04	1.04	1.05	1.05	1.03	1.03	1.04	1.03	1.04	1.05	1.04	Load power factor correction and voltage support if needed	
WOODACRE 60 kV	Base Case	P0	Base case	1.04	1.05	0.99	1.09	1.09	1.03	1.05	1.00	1.04	1.06	1.09	0.99	Load power factor correction and voltage support if needed	
ALTO 60kV	IGNACIO SVD=R	P1	N-1	1.03	1.04	1.00	1.10	1.10	1.03	1.06	1.00	1.03	1.06	1.10	0.99	Switch off cap bank at Greenbrae	
ALTOJT1 60kV	IGNACIO SVD=R	P1	N-1	1.03	1.04	1.00	1.10	1.10	1.03	1.06	1.00	1.03	1.06	1.10	0.99	Switch off cap bank at Greenbrae	
ALTOJT2 60kV	IGNACIO SVD=R	P1	N-1	1.03	1.04	1.00	1.10	1.10	1.03	1.06	1.01	1.03	1.06	1.10	1.00	Switch off cap bank at Greenbrae	
BOLINAS 60kV	IGNACIO SVD=R	P1	N-1	1.06	1.07	1.01	1.12	1.12	1.05	1.07	1.02	1.06	1.08	1.12	1.00	Switch off cap bank at Greenbrae	
CALISTGA 60kV	LAKEVILLE #1 60KV [7360]	P1	N-1	0.88	0.87	0.86	1.04	1.06	0.87	0.93	0.87	0.86	0.99	1.07	0.86	Project: Fulton 230/115 kv Bank alternative In-service date: 2023 Short Term: Open line between Cotatiand Petaluma Long Term: Continue to monitor future load forecast	
CARQUINZ 115kV	IGNACIO SVD=R	P1	N-1	1.07	1.09	1.01	1.13	1.13	1.06	1.08	1.02	1.09	1.09	1.13	1.01	Switch off cap bank at Greenbrae	
CLER LKE 60kV	KONOCITI 60KV [6861]	P1	N-1	0.95	0.89	0.78	1.04	1.06	0.97	1.00	0.72	0.87	1.00	1.06	0.77	Short Term: Middletown UVLS Long Term: Installs a new 115/60 kV bank at Middletown Sub or increase the planned voltage support (10-15MVAR) at Middle Town	
CLER LKE 60kV	EGLE RCK 115/60KV TB 1	P1	N-1	0.95	0.89	0.78	1.04	1.06	0.97	1.00	0.72	0.87	1.00	1.06	0.78	Short Term: Middletown UVLS Long Term: Installs a new 115/60 kV bank at Middletown Sub or increase the planned voltage support (10-15MVAR) at Middle Town	
CORONA 115kV	CORONA-LAKEVILLE 115KV [4311]	P1	N-1	1.06	1.08	0.96	1.10	1.10	1.07	1.07	0.97	1.08	1.08	1.10	0.96	Add reactor	
CRQNZTP1 115kV	IGNACIO SVD=R	P1	N-1	1.07	1.09	1.01	1.13	1.13	1.06	1.08	1.02	1.08	1.09	1.13	1.01	Switch off cap bank at Greenbrae	
CRQNZTP2 115kV	IGNACIO SVD=R	P1	N-1	1.02	1.03	0.98	1.11	1.11	1.02	1.05	0.99	1.03	1.05	1.11	0.98	Switch off cap bank at Greenbrae	
DUNBAR 60kV	LAKEVILLE #1 60KV [7360]	P1	N-1	0.90	0.89	0.88	1.05	1.07	0.88	0.95	0.89	0.88	1.00	1.08	0.88	Project: Fulton 230/115 kv Bank alternative In-service date: 2023 Short Term: Open line between Cotatiand Petaluma Long Term: Continue to monitor future load forecast	
EGLE RCK 60kV	EGLE RCK 115/60KV TB 1	P1	N-1	0.91	0.86	0.70	1.05	1.07	0.95	0.99	0.62	0.83	0.98	1.08	0.70	Short Term: Middletown UVLS Long Term: Installs a new 115/60 kV bank at Middletown Sub or increase the planned voltage support (10-15MVAR) at Middle Town	
GRANITE 60kV	KONOCITI 60KV [6861]	P1	N-1	0.96	0.91	0.83	1.04	1.06	0.98	1.01	0.78	0.90	1.00	1.06	0.83	Short Term: Middletown UVLS Long Term: Installs a new 115/60 kV bank at Middletown Sub or increase the planned voltage support (10-15MVAR) at Middle Town	





Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)									Voltage PU (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Peak	2020 Winter Peak	2023 Winter Peak	2028 Winter Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations		
GRANITE 60kV	EGLE RCK 115/60KV TB 1	P1	N-1	0.96	0.91	0.83	1.04	1.06	0.98	1.01	0.78	0.90	1.00	1.06	0.83	Short Term: Middletown UVLS Long Term: Installs a new 115/60 kV bank at Middletown Sub or increase the planned voltage support (10-15MVAR) at Middle Town	
GREENBRE 60kV	IGNACIO SVD=R	P1	N-1	1.03	1.04	1.00	1.10	1.10	1.03	1.05	1.01	1.03	1.06	1.10	1.00	Switch off cap bank at Greenbrae	
HARTLEY 60kV	KONOCTI 60KV [6861]	P1	N-1	0.96	0.90	0.80	1.03	1.05	0.97	1.00	0.75	0.89	1.00	1.05	0.80	Short Term: Middletown UVLS Long Term: Installs a new 115/60 kV bank at Middletown Sub or increase the planned voltage support (10-15MVAR) at Middle Town	
HARTLEY 60kV	EGLE RCK 115/60KV TB 1	P1	N-1	0.96	0.90	0.80	1.03	1.05	0.97	1.00	0.76	0.89	1.00	1.06	0.80	Short Term: Middletown UVLS Long Term: Installs a new 115/60 kV bank at Middletown Sub or increase the planned voltage support (10-15MVAR) at Middle Town	
HGHWY J1 115kV	IGNACIO SVD=R	P1	N-1	1.07	1.08	1.02	1.12	1.12	1.06	1.08	1.03	1.08	1.08	1.12	1.02	Switch off cap bank at Greenbrae	
HGHWY J2 115kV	IGNACIO SVD=R	P1	N-1	1.03	1.04	0.98	1.11	1.11	1.02	1.05	0.99	1.03	1.05	1.11	0.98	Switch off cap bank at Greenbrae	
HighWAY 115kV	IGNACIO SVD=R	P1	N-1	1.03	1.04	0.98	1.11	1.11	1.02	1.05	0.99	1.03	1.05	1.11	0.98	Switch off cap bank at Greenbrae	
IG JCT 60kV	IGNACIO SVD=R	P1	N-1	1.06	1.07	1.02	1.11	1.11	1.06	1.08	1.03	1.07	1.08	1.11	1.02	Switch off cap bank at Greenbrae	
IGNACIO 115kV	IGNACIO SVD=R	P1	N-1	1.07	1.07	1.03	1.11	1.11	1.07	1.08	1.04	1.07	1.08	1.11	1.02	Switch off cap bank at Greenbrae	
IGNACO A 60kV	IGNACIO SVD=R	P1	N-1	1.06	1.07	1.02	1.11	1.11	1.06	1.08	1.03	1.07	1.08	1.11	1.02	Switch off cap bank at Greenbrae	
IGNACO B 60kV	IGNACIO SVD=R	P1	N-1	1.06	1.07	1.02	1.11	1.11	1.06	1.08	1.03	1.07	1.08	1.11	1.02	Switch off cap bank at Greenbrae	
JCPMPJCT 115kV	IGNACIO SVD=R	P1	N-1	1.07	1.09	1.01	1.12	1.13	1.06	1.08	1.03	1.08	1.09	1.13	1.01	Switch off cap bank at Greenbrae	
JMSCNPMP 115kV	IGNACIO SVD=R	P1	N-1	1.07	1.09	1.01	1.12	1.13	1.06	1.08	1.03	1.08	1.09	1.13	1.01	Switch off cap bank at Greenbrae	
KONOCTI6 60kV	KONOCTI 60KV [6861]	P1	N-1	0.91	0.86	0.70	1.05	1.07	0.95	0.99	0.62	0.83	0.97	1.08	0.69	Short Term: Middletown UVLS Long Term: Installs a new 115/60 kV bank at Middletown Sub or increase the planned voltage support (10-15MVAR) at Middle Town	
KONOCTI6 60kV	EGLE RCK 115/60KV TB 1	P1	N-1	0.91	0.86	0.70	1.05	1.07	0.95	0.99	0.62	0.83	0.98	1.08	0.70	Short Term: Middletown UVLS Long Term: Installs a new 115/60 kV bank at Middletown Sub or increase the planned voltage support (10-15MVAR) at Middle Town	
LOWR LKE 60kV	KONOCTI 60KV [6861]	P1	N-1	0.89	0.86	0.67	1.06	1.08	0.96	0.99	0.59	0.83	0.97	1.08	0.67	Short Term: Middletown UVLS Long Term: Installs a new 115/60 kV bank at Middletown Sub or increase the planned voltage support (10-15MVAR) at Middle Town	
LOWR LKE 60kV	EGLE RCK 115/60KV TB 1	P1	N-1	0.89	0.86	0.67	1.06	1.07	0.96	0.99	0.59	0.83	0.97	1.09	0.67	Short Term: Middletown UVLS Long Term: Installs a new 115/60 kV bank at Middletown Sub or increase the planned voltage support (10-15MVAR) at Middle Town	
LS GLLNS 115kV	IGNACIO SVD=R	P1	N-1	1.06	1.07	1.01	1.11	1.11	1.06	1.08	1.03	1.06	1.08	1.11	1.01	Switch off cap bank at Greenbrae	
MEYERS 115kV	IGNACIO SVD=R	P1	N-1	1.07	1.09	1.01	1.13	1.13	1.06	1.08	1.02	1.09	1.09	1.13	1.01	Switch off cap bank at Greenbrae	
MEYERTP1 115kV	IGNACIO SVD=R	P1	N-1	1.07	1.09	1.01	1.13	1.13	1.06	1.08	1.02	1.09	1.09	1.13	1.01	Switch off cap bank at Greenbrae	
MEYERTP2 115kV	IGNACIO SVD=R	P1	N-1	1.02	1.03	0.98	1.11	1.11	1.02	1.05	0.99	1.03	1.05	1.11	0.98	Switch off cap bank at Greenbrae	





Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)									Voltage PU (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Peak	2020 Winter Peak	2023 Winter Peak	2028 Winter Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations		
MIDDLTWN 60kV	KONOCTI 60KV [6861]	P1	N-1	0.87	0.86	0.63	1.06	1.09	0.97	0.99	0.54	0.83	0.96	1.10	0.63	Short Term: Middletown UVLS Long Term: Instsall a new 115/60 kV bank at Middletown Sub or increase the planned voltage support (10-15MVAR) at Middle Town	
MIDDLTWN 60kV	EGLE RCK 115/60KV TB 1	P1	N-1	0.87	0.86	0.63	1.06	1.09	0.97	0.99	0.54	0.83	0.96	1.10	0.63	Short Term: Middletown UVLS Long Term: Instsall a new 115/60 kV bank at Middletown Sub or increase the planned voltage support (10-15MVAR) at Middle Town	
MREIS JC 115kV	IGNACIO SVD=R	P1	N-1	1.07	1.09	1.01	1.13	1.13	1.06	1.08	1.02	1.08	1.09	1.13	1.01	Switch off cap bank at Greenbrae	
NOVATO 60kV	IGNACIO SVD=R	P1	N-1	1.06	1.07	1.02	1.11	1.11	1.06	1.08	1.03	1.07	1.08	1.11	1.02	Switch off cap bank at Greenbrae	
NTWR ALT 115kV	IGNACIO SVD=R	P1	N-1	1.02	1.03	0.98	1.11	1.11	1.02	1.05	0.99	1.03	1.05	1.11	0.98	Switch off cap bank at Greenbrae	
NVTO JCT 60kV	IGNACIO SVD=R	P1	N-1	1.06	1.07	1.02	1.11	1.11	1.06	1.08	1.03	1.07	1.08	1.11	1.02	Switch off cap bank at Greenbrae	
OLEMA 60kV	IGNACIO SVD=R	P1	N-1	1.06	1.06	1.00	1.11	1.12	1.05	1.07	1.01	1.06	1.08	1.12	0.99	Switch off cap bank at Greenbrae	
SAN RAFL 115kV	IGNACIO SVD=R	P1	N-1	1.06	1.07	1.01	1.11	1.11	1.06	1.07	1.03	1.06	1.08	1.11	1.01	Switch off cap bank at Greenbrae	
SAN_RFLJ 60kV	IGNACIO SVD=R	P1	N-1	1.04	1.04	1.01	1.10	1.10	1.04	1.06	1.02	1.04	1.06	1.11	1.01	Switch off cap bank at Greenbrae	
SAUSALTO 60kV	IGNACIO SVD=R	P1	N-1	1.03	1.03	0.99	1.10	1.10	1.02	1.05	0.99	1.03	1.06	1.10	0.99	Switch off cap bank at Greenbrae	
SKAGGS 115kV	IGNACIO SVD=R	P1	N-1	1.07	1.08	1.02	1.12	1.12	1.07	1.08	1.03	1.07	1.08	1.12	1.02	Switch off cap bank at Greenbrae	
SKGGS J1 115kV	IGNACIO SVD=R	P1	N-1	1.07	1.08	1.02	1.12	1.12	1.07	1.08	1.03	1.07	1.08	1.12	1.02	Switch off cap bank at Greenbrae	
SKGGS J2 115kV	IGNACIO SVD=R	P1	N-1	1.04	1.05	1.00	1.11	1.11	1.04	1.06	1.01	1.04	1.06	1.11	1.00	Switch off cap bank at Greenbrae	
STAF_JCT 60kV	IGNACIO SVD=R	P1	N-1	1.07	1.07	1.00	1.12	1.12	1.05	1.08	1.01	1.07	1.09	1.12	1.00	Switch off cap bank at Greenbrae	
STAFFORD 60kV	IGNACIO SVD=R	P1	N-1	1.07	1.07	1.00	1.12	1.12	1.05	1.08	1.01	1.07	1.09	1.12	1.00	Switch off cap bank at Greenbrae	
TOCA_JCT 60kV	IGNACIO SVD=R	P1	N-1	1.06	1.07	1.00	1.12	1.12	1.05	1.08	1.01	1.06	1.08	1.12	1.00	Switch off cap bank at Greenbrae	
TOCALOMA 60kV	IGNACIO SVD=R	P1	N-1	1.06	1.07	1.00	1.12	1.12	1.05	1.08	1.01	1.06	1.08	1.12	1.00	Switch off cap bank at Greenbrae	
TWR2_19 60kV	IGNACIO SVD=R	P1	N-1	1.06	1.07	1.02	1.11	1.11	1.06	1.07	1.03	1.06	1.08	1.11	1.02	Switch off cap bank at Greenbrae	
TWR2_20 60kV	IGNACIO SVD=R	P1	N-1	1.06	1.07	1.02	1.11	1.11	1.06	1.07	1.03	1.06	1.08	1.11	1.02	Switch off cap bank at Greenbrae	
UPPR LKE 60kV	KONOCTI 60KV [6861]	P1	N-1	0.97	0.92	0.85	1.03	1.04	0.97	1.00	0.81	0.91	1.00	1.04	0.85	Short Term: Middletown UVLS Long Term: Instsall a new 115/60 kV bank at Middletown Sub or increase the planned voltage support (10-15MVAR) at Middle Town	
UPPR LKE 60kV	EGLE RCK 115/60KV TB 1	P1	N-1	0.97	0.92	0.85	1.03	1.04	0.98	1.00	0.81	0.91	1.00	1.05	0.85	Short Term: Middletown UVLS Long Term: Instsall a new 115/60 kV bank at Middletown Sub or increase the planned voltage support (10-15MVAR) at Middle Town	
WOODACRE 60kV	IGNACIO SVD=R	P1	N-1	1.06	1.07	1.01	1.11	1.11	1.06	1.07	1.02	1.06	1.08	1.12	1.01	Switch off cap bank at Greenbrae	
ALTO 60 kV	IGNACIO 230KV SECTION 2D	P2	Bus	1.03	1.03	0.98	1.05	0.99	1.10	1.10	1.02	1.03	1.06	1.10	0.98	Switch off cap bank at Greenbrae	
BELLVUE 115 kV	LAKEVILLE 115KV - SECTION 1D & 2D	P2	Bus-tie Breaker	1.05	1.07	0.94	1.07	0.95	1.10	1.10	1.06	1.07	1.08	1.10	0.94	Load power factor correction and voltage support if needed	
BELLVUE 115 kV	FULTON 115KV - SECTION 2D & 1D	P2	Bus-tie Breaker	0.99	1.02	0.88	1.01	0.87	1.03	1.04	1.04	1.02	1.02	1.04	0.88	Load power factor correction and voltage support if needed	
BIG RIVR 60 kV	EGLE RCK - MA 115KV & EAGLE ROCK LINE	P2	Non-bus-tie Breaker	1.03	1.03	0.93	1.03	0.97	1.03	1.03	1.03	0.86	1.03	1.03	0.92	Middletown UVLS	

Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)									Voltage PU (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Peak	2020 Winter Peak	2023 Winter Peak	2028 Winter Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations		
BOLINAS 60 kV	IGNACIO 60KV [7180] (IGNACO B-STAF_JCT)	P2	Line Section w/o Fault	1.00	0.99	0.85	1.03	0.86	1.09	1.09	0.94	0.98	1.06	1.10	0.85	Load power factor correction and voltage support if needed	
BOLINAS 60 kV	IGNACIO 60KV [7140] (IGNACO B-WOODACRE)	P2	Line Section w/o Fault	0.98	0.97	0.89	1.01	0.87	1.09	1.10	0.94	0.96	1.05	1.11	0.87	Load power factor correction and voltage support if needed	
BOLINAS 60 kV	IGNACIO 230KV SECTION 2D	P2	Bus	1.05	1.06	0.99	1.07	1.01	1.12	1.12	1.04	1.05	1.08	1.12	0.99	Switch off cap bank at Greenbrae	
CALISTGA 60 kV	LAKEVILLE - 2D 60KV & LAKEVILLE #1 LINE	P2	Non-bus-tie Breaker	0.87	0.87	0.86	0.93	0.87	1.04	1.06	0.87	0.86	0.99	1.07	0.86	Load power factor correction and voltage support if needed	
CALPELLA 115 kV	EGLE RCK - MA 115KV & EAGLE ROCK LINE	P2	Non-bus-tie Breaker	1.01	0.97	0.82	1.03	0.86	1.07	1.06	1.00	0.81	1.00	1.07	0.82	Middletown UVLS	
CLER LKE 60 kV	KONOCI 60KV [6861] (KONOCI6-EGLE RCK)	P2	Line Section w/o Fault	0.95	0.89	0.78	1.00	0.72	1.04	1.06	0.97	0.87	1.00	1.06	0.77	Middletown UVLS	
CLER LKE 60 kV	EGLE RCK 115KV SECTION MA	P2	Bus	0.95	0.88	0.72	0.99	0.70	1.04	1.06	0.97	0.88	0.99	1.06	0.72	Middletown UVLS	
CLER LKE 60 kV	KONOCI6 60KV SECTION 1E	P2	Bus	0.96	0.94	0.85	1.01	0.80	1.04	1.05	0.98	0.93	1.00	1.06	0.86	Middletown UVLS	
CLER LKE 60 kV	EGLE RCK 60KV SECTION 1D	P2	Bus	0.95	0.89	0.78	1.00	0.72	1.04	1.06	0.97	0.87	1.00	1.06	0.77	Middletown UVLS	
CLER LKE 60 kV	EGLE RCK - MA 115KV & EAGLE ROCK LINE	P2	Non-bus-tie Breaker	0.94	0.87	0.62	1.00	0.62	1.04	1.06	0.95	0.63	0.98	1.06	0.61	Middletown UVLS	
CLER LKE 60 kV	EGLE RCK - MA 115KV & EAGLE ROCK-REDBUD LINE	P2	Non-bus-tie Breaker	0.95	0.88	0.72	0.99	0.70	1.04	1.06	0.97	0.88	0.99	1.06	0.72	Middletown UVLS	
CLER LKE 60 kV	EGLE RCK - MA 115KV & EAGLE RCK-FULTON-SILVERDO LINE	P2	Non-bus-tie Breaker	0.95	0.88	0.72	0.99	0.70	1.04	1.06	0.97	0.88	0.99	1.06	0.72	Middletown UVLS	
CLER LKE 60 kV	KONOCI6 - 1E 60KV & KONOCI LINE	P2	Non-bus-tie Breaker	0.96	0.94	0.85	1.01	0.80	1.04	1.05	0.98	0.93	1.00	1.06	0.86	Middletown UVLS	
CORONA 115 kV	LAKEVILLE 115KV SECTION 1D	P2	Bus	1.06	1.08	0.96	1.07	0.97	1.10	1.10	1.07	1.08	1.08	1.10	0.96	Switch off cap bank at Middletown	
CORONA 115 kV	LAKEVILLE 115KV - SECTION 1D & 2D	P2	Bus-tie Breaker	1.05	1.08	0.93	1.07	0.94	1.11	1.11	1.06	1.07	1.08	1.11	0.93	Load power factor correction and voltage support if needed	
COVELO6 60 kV	EGLE RCK - MA 115KV & EAGLE ROCK LINE	P2	Non-bus-tie Breaker	0.98	0.97	0.81	1.01	0.89	1.02	1.03	1.01	0.82	1.01	1.03	0.81	Middletown UVLS	
DUNBAR 60 kV	LAKEVILLE - 2D 60KV & LAKEVILLE #1 LINE	P2	Non-bus-tie Breaker	0.90	0.89	0.88	0.95	0.89	1.05	1.07	0.88	0.88	1.00	1.08	0.88	Load power factor correction and voltage support if needed	
EGLE RCK 60 kV	EGLE RCK 115KV SECTION MA	P2	Bus	0.91	0.85	0.63	0.98	0.59	1.05	1.07	0.95	0.84	0.97	1.08	0.63	Middletown UVLS	
EGLE RCK 60 kV	EGLE RCK - MA 115KV & EAGLE ROCK LINE	P2	Non-bus-tie Breaker	0.90	0.83	0.54	0.99	0.53	1.05	1.07	0.93	0.56	0.96	1.08	0.54	Middletown UVLS	
EGLE RCK 60 kV	EGLE RCK - MA 115KV & EAGLE ROCK-REDBUD LINE	P2	Non-bus-tie Breaker	0.91	0.85	0.63	0.98	0.59	1.05	1.07	0.95	0.84	0.97	1.08	0.63	Middletown UVLS	
EGLE RCK 60 kV	EGLE RCK - MA 115KV & EAGLE RCK-FULTON-SILVERDO LINE	P2	Non-bus-tie Breaker	0.91	0.85	0.63	0.98	0.59	1.05	1.07	0.95	0.84	0.97	1.08	0.63	Middletown UVLS	
ELK 60 kV	EGLE RCK - MA 115KV & EAGLE ROCK LINE	P2	Non-bus-tie Breaker	1.03	1.03	0.91	1.04	0.95	1.04	1.05	1.02	0.86	1.04	1.05	0.91	Middletown UVLS	
FRT BRGG 60 kV	EGLE RCK - MA 115KV & EAGLE ROCK LINE	P2	Non-bus-tie Breaker	1.02	1.01	0.90	1.02	0.94	1.03	1.03	1.02	0.84	1.02	1.03	0.90	Middletown UVLS	
GARCIA 60 kV	EGLE RCK - MA 115KV & EAGLE ROCK LINE	P2	Non-bus-tie Breaker	1.03	1.03	0.92	1.04	0.95	1.04	1.05	1.03	0.86	1.04	1.05	0.91	Middletown UVLS	



Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)									Voltage PU (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Peak	2020 Winter Peak	2023 Winter Peak	2028 Winter Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations		
GRANITE 60 kV	KONOCTI 60KV [6861] (KONOCTI6-EGLE RCK)	P2	Line Section w/o Fault	0.96	0.91	0.83	1.01	0.78	1.04	1.06	0.98	0.90	1.00	1.06	0.83	Middletown UVLS	
GRANITE 60 kV	EGLE RCK 115KV SECTION MA	P2	Bus	0.96	0.90	0.77	1.00	0.75	1.04	1.06	0.98	0.90	1.00	1.06	0.77	Middletown UVLS	
GRANITE 60 kV	KONOCTI6 60KV SECTION 1E	P2	Bus	0.98	0.95	0.89	1.01	0.85	1.04	1.05	1.00	0.94	1.01	1.06	0.89	Middletown UVLS	
GRANITE 60 kV	EGLE RCK 60KV SECTION 1D	P2	Bus	0.96	0.91	0.83	1.01	0.78	1.04	1.06	0.98	0.90	1.00	1.06	0.83	Middletown UVLS	
GRANITE 60 kV	EGLE RCK - MA 115KV & EAGLE ROCK LINE	P2	Non-bus-tie Breaker	0.95	0.89	0.67	1.00	0.68	1.04	1.05	0.96	0.67	0.99	1.06	0.67	Middletown UVLS	
GRANITE 60 kV	EGLE RCK - MA 115KV & EAGLE ROCK-REDBUD LINE	P2	Non-bus-tie Breaker	0.96	0.90	0.77	1.00	0.75	1.04	1.06	0.98	0.90	1.00	1.06	0.77	Middletown UVLS	
GRANITE 60 kV	EGLE RCK - MA 115KV & EAGLE RCK-FULTON-SILVERDO LINE	P2	Non-bus-tie Breaker	0.96	0.90	0.77	1.00	0.75	1.04	1.06	0.98	0.90	1.00	1.06	0.77	Middletown UVLS	
GRANITE 60 kV	KONOCTI6 - 1E 60KV & KONOCTI LINE	P2	Non-bus-tie Breaker	0.98	0.95	0.89	1.01	0.85	1.04	1.05	1.00	0.94	1.01	1.06	0.89	Middletown UVLS	
GREENBRE 60 kV	IGNACIO 230KV SECTION 2D	P2	Bus	1.02	1.03	0.99	1.05	1.00	1.10	1.10	1.02	1.02	1.06	1.10	0.99	Switch off cap bank at Greenbrae	
HARTLEY 60 kV	EGLE RCK 115KV SECTION MA	P2	Bus	0.96	0.89	0.75	0.99	0.73	1.03	1.05	0.97	0.89	0.99	1.06	0.75	Middletown UVLS	
HARTLEY 60 kV	KONOCTI6 60KV SECTION 1E	P2	Bus	0.97	0.94	0.87	1.00	0.82	1.03	1.05	0.99	0.93	1.00	1.05	0.87	Middletown UVLS	
HARTLEY 60 kV	EGLE RCK 60KV SECTION 1D	P2	Bus	0.96	0.90	0.80	1.00	0.75	1.03	1.05	0.97	0.89	1.00	1.05	0.80	Middletown UVLS	
HARTLEY 60 kV	EGLE RCK - MA 115KV & EAGLE ROCK LINE	P2	Non-bus-tie Breaker	0.95	0.88	0.64	1.00	0.65	1.03	1.05	0.96	0.66	0.99	1.06	0.64	Middletown UVLS	
HARTLEY 60 kV	EGLE RCK - MA 115KV & EAGLE ROCK-REDBUD LINE	P2	Non-bus-tie Breaker	0.96	0.89	0.75	0.99	0.73	1.03	1.05	0.97	0.89	0.99	1.06	0.75	Middletown UVLS	
HARTLEY 60 kV	EGLE RCK - MA 115KV & EAGLE RCK-FULTON-SILVERDO LINE	P2	Non-bus-tie Breaker	0.96	0.89	0.75	0.99	0.73	1.03	1.05	0.97	0.89	0.99	1.05	0.75	Middletown UVLS	
HARTLEY 60 kV	KONOCTI6 - 1E 60KV & KONOCTI LINE	P2	Non-bus-tie Breaker	0.97	0.94	0.87	1.00	0.82	1.03	1.05	0.99	0.93	1.00	1.05	0.87	Middletown UVLS	
HIGHLAND 115 kV	EAGLE ROCK 115KV [1470] (EGLE RCK-LWRLAKEJ)	P2	Line Section w/o Fault	1.05	1.03	1.01	1.08	1.03	1.13	1.09	1.02	1.02	1.07	1.09	1.01	Switch off cap bank at Middletown	
HIGHLAND 115 kV	EGLE RCK 115KV SECTION MA	P2	Bus	1.05	1.02	0.98	1.08	1.01	1.13	1.09	1.02	1.02	1.07	1.09	0.98	Switch off cap bank at Middletown	
HIGHLAND 115 kV	EGLE RCK - MA 115KV & EAGLE ROCK LINE	P2	Non-bus-tie Breaker	0.95	0.89	0.75	0.99	0.79	1.09	1.05	0.89	0.71	0.95	1.06	0.75	Middletown UVLS	
HIGHLAND 115 kV	EGLE RCK - MA 115KV & EAGLE ROCK-REDBUD LINE	P2	Non-bus-tie Breaker	1.05	1.02	0.98	1.08	1.01	1.13	1.09	1.01	1.01	1.07	1.09	0.98	Switch off cap bank at Middletown	
HIGHLAND 115 kV	EGLE RCK - MA 115KV & EAGLE RCK-FULTON-SILVERDO LINE	P2	Non-bus-tie Breaker	1.05	1.02	0.98	1.08	1.01	1.13	1.09	1.02	1.02	1.07	1.09	0.98	Switch off cap bank at Middletown	
HighWAY 115 kV	IGNACIO 230KV SECTION 2D	P2	Bus	1.02	1.03	0.97	1.04	0.98	1.11	1.11	1.01	1.02	1.05	1.11	0.97	Switch off cap bank at Greenbrae	
HPLND JT 60 kV	EGLE RCK - MA 115KV & EAGLE ROCK LINE	P2	Non-bus-tie Breaker	1.00	0.97	0.86	1.03	0.89	1.05	1.05	1.00	0.84	1.01	1.06	0.86	Middletown UVLS	
IGNACIO 115 kV	IGNACIO 230KV SECTION 2D	P2	Bus	1.06	1.07	1.01	1.07	1.03	1.11	1.11	1.06	1.06	1.07	1.11	1.01	Switch off cap bank at Greenbrae	
IGNACO A 60 kV	IGNACIO 230KV SECTION 2D	P2	Bus	1.06	1.06	1.01	1.07	1.02	1.11	1.11	1.05	1.06	1.07	1.11	1.01	Switch off cap bank at Greenbrae	
IGNACO B 60 kV	IGNACIO 230KV SECTION 2D	P2	Bus	1.06	1.07	1.01	1.07	1.02	1.11	1.11	1.05	1.06	1.07	1.11	1.01	Switch off cap bank at Greenbrae	
KONOCTI6 60 kV	EGLE RCK 115KV SECTION MA	P2	Bus	0.91	0.85	0.63	0.98	0.59	1.05	1.07	0.95	0.84	0.97	1.08	0.63	Middletown UVLS	
KONOCTI6 60 kV	KONOCTI6 60KV SECTION 1E	P2	Bus	0.93	0.93	0.81	1.00	0.74	1.04	1.06	0.98	0.91	0.99	1.07	0.82	Middletown UVLS	

Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)									Voltage PU (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Peak	2020 Winter Peak	2023 Winter Peak	2028 Winter Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations		
KONOCI6 60 kV	EGLERCK - MA 115KV & EAGLE ROCK LINE	P2	Non-bus-tie Breaker	0.90	0.83	0.54	0.99	0.53	1.05	1.07	0.93	0.56	0.96	1.08	0.54	Middletown UVLS	
KONOCI6 60 kV	EGLERCK - MA 115KV & EAGLE ROCK-REDBUD LINE	P2	Non-bus-tie Breaker	0.91	0.85	0.63	0.98	0.59	1.05	1.07	0.95	0.84	0.97	1.08	0.63	Middletown UVLS	
KONOCI6 60 kV	KONOCI6 60KV - SECTION 1D & 1E	P2	Bus-tie Breaker	0.99	0.94	0.90	1.01	0.90	1.03	1.04	0.98	0.94	1.01	1.04	0.91	Load power factor correction and voltage support if needed	
LOWR LKE 60 kV	KONOCI6 60KV [6861] (KONOCI6-EGLERCK)	P2	Line Section w/o Fault	0.89	0.86	0.67	0.99	0.59	1.06	1.08	0.96	0.83	0.97	1.08	0.67	Middletown UVLS	
LOWR LKE 60 kV	EGLERCK 115KV SECTION MA	P2	Bus	0.89	0.85	0.60	0.98	0.56	1.06	1.08	0.96	0.84	0.96	1.09	0.60	Middletown UVLS	
LOWR LKE 60 kV	KONOCI6 60KV SECTION 1E	P2	Bus	0.92	0.93	0.80	1.00	0.70	1.05	1.07	0.98	0.91	0.98	1.08	0.80	Middletown UVLS	
LOWR LKE 60 kV	EGLERCK 60KV SECTION 1D	P2	Bus	0.89	0.86	0.67	0.99	0.59	1.06	1.08	0.96	0.83	0.97	1.08	0.67	Middletown UVLS	
LOWR LKE 60 kV	EGLERCK - MA 115KV & EAGLE ROCK LINE	P2	Non-bus-tie Breaker	0.88	0.83	0.51	0.99	0.50	1.06	1.08	0.94	0.55	0.96	1.09	0.51	Middletown UVLS	
LOWR LKE 60 kV	EGLERCK - MA 115KV & EAGLE ROCK-REDBUD LINE	P2	Non-bus-tie Breaker	0.89	0.85	0.60	0.98	0.56	1.06	1.08	0.96	0.84	0.96	1.09	0.60	Middletown UVLS	
LOWR LKE 60 kV	EGLERCK - MA 115KV & EGLERCK-FULTON-SILVERDO LINE	P2	Non-bus-tie Breaker	0.89	0.85	0.60	0.98	0.56	1.06	1.08	0.96	0.84	0.96	1.09	0.60	Middletown UVLS	
LOWR LKE 60 kV	KONOCI6 - 1E 60KV & KONOCI6 LINE	P2	Non-bus-tie Breaker	0.92	0.93	0.80	1.00	0.70	1.05	1.07	0.98	0.91	0.98	1.08	0.80	Middletown UVLS	
LUCERNE 115 kV	MENDOCNO 115KV SECTION 1D	P2	Bus	1.05	1.04	1.04	1.09	1.02	1.12	1.11	1.04	1.02	1.09	1.11	1.04	Switch off cap bank at Middletown	
LUCERNE 115 kV	MENDOCNO - 1D 115KV & MENDOCINO LINE	P2	Non-bus-tie Breaker	1.05	1.04	1.04	1.09	1.02	1.12	1.11	1.04	1.02	1.09	1.11	1.04	Switch off cap bank at Middletown	
LUCERNE 115 kV	MENDOCNO - 1D 115KV & MENDOCINO LINE (2)	P2	Non-bus-tie Breaker	1.05	1.04	1.04	1.09	1.02	1.12	1.11	1.04	1.02	1.09	1.11	1.04	Switch off cap bank at Middletown	
LUCERNE 115 kV	EGLERCK - MA 115KV & EAGLE ROCK LINE	P2	Non-bus-tie Breaker	1.01	0.96	0.84	1.04	0.89	1.09	1.08	0.98	0.83	1.03	1.08	0.84	Middletown UVLS	
LYTNVLE 60 kV	EGLERCK - MA 115KV & EAGLE ROCK LINE	P2	Non-bus-tie Breaker	0.99	0.97	0.82	1.01	0.90	1.02	1.03	1.01	0.83	1.01	1.03	0.82	Middletown UVLS	
LYTNVLE 60 kV	MENDOCNO - MA 60KV & MENDOCINO LINE (2)_Dup1	P2	Non-bus-tie Breaker	1.03	1.01	0.95	1.03	0.80	1.03	1.02	1.03	1.01	1.04	1.03	0.96	Middletown UVLS	
MENDOCNO 115 kV	MENDOCNO 115KV SECTION 1D	P2	Bus	1.05	1.05	1.06	1.10	1.02	1.13	1.13	1.06	1.03	1.10	1.13	1.06	Switch off cap bank at Middletown	
MENDOCNO 115 kV	MENDOCNO - 1D 115KV & MENDOCINO LINE	P2	Non-bus-tie Breaker	1.05	1.05	1.06	1.10	1.02	1.13	1.13	1.06	1.03	1.10	1.13	1.06	Switch off cap bank at Middletown	
MENDOCNO 115 kV	MENDOCNO - 1D 115KV & MENDOCINO LINE (2)	P2	Non-bus-tie Breaker	1.05	1.05	1.06	1.10	1.02	1.13	1.13	1.06	1.03	1.10	1.13	1.06	Switch off cap bank at Middletown	
MENDOCNO 115 kV	EGLERCK - MA 115KV & EAGLE ROCK LINE	P2	Non-bus-tie Breaker	1.01	0.96	0.81	1.04	0.86	1.08	1.07	1.00	0.80	1.00	1.07	0.81	Middletown UVLS	
MENDOCNO 60 kV	EGLERCK - MA 115KV & EAGLE ROCK LINE	P2	Non-bus-tie Breaker	1.01	1.01	0.88	1.02	0.93	1.02	1.02	1.01	0.87	1.01	1.02	0.88	Middletown UVLS	
MEYERS 115 kV	IGNACIO 230KV SECTION 2D	P2	Bus	1.07	1.08	1.00	1.07	1.01	1.13	1.13	1.05	1.08	1.09	1.13	1.00	Switch off cap bank at Greenbrae	
MIDDLTWN 60 kV	KONOCI6 60KV [6861] (KONOCI6-EGLERCK)	P2	Line Section w/o Fault	0.87	0.86	0.63	0.99	0.54	1.06	1.09	0.97	0.83	0.96	1.10	0.63	Middletown UVLS	





Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)									Voltage PU (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Peak	2020 Winter Peak	2023 Winter Peak	2028 Winter Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations		
MIDDLTWN 60 kV	EGLE RCK 115KV SECTION MA	P2	Bus	0.86	0.85	0.56	0.98	0.52	1.06	1.09	0.97	0.84	0.95	1.10	0.56	Middletown UVLS	
MIDDLTWN 60 kV	KONOCTI6 60KV SECTION 1E	P2	Bus	0.89	0.94	0.77	1.01	0.66	1.06	1.08	1.00	0.92	0.97	1.09	0.77	Middletown UVLS	
MIDDLTWN 60 kV	EGLE RCK 60KV SECTION 1D	P2	Bus	0.87	0.86	0.63	0.99	0.54	1.06	1.09	0.97	0.83	0.96	1.10	0.63	Middletown UVLS	
MIDDLTWN 60 kV	EGLE RCK - MA 115KV & EAGLE ROCK LINE	P2	Non-bus-tie Breaker	0.86	0.83	0.48	0.99	0.46	1.06	1.09	0.95	0.54	0.94	1.10	0.48	Middletown UVLS	
MIDDLTWN 60 kV	EGLE RCK - MA 115KV & EAGLE ROCK-REDBUD LINE	P2	Non-bus-tie Breaker	0.86	0.85	0.56	0.98	0.52	1.06	1.09	0.97	0.84	0.95	1.10	0.56	Middletown UVLS	
MIDDLTWN 60 kV	EGLE RCK - MA 115KV & EGLE RCK-FULTON-SILVERDO LINE	P2	Non-bus-tie Breaker	0.86	0.85	0.56	0.98	0.52	1.06	1.09	0.97	0.84	0.95	1.10	0.56	Middletown UVLS	
MIDDLTWN 60 kV	KONOCTI6 - 1E 60KV & KONOCTI LINE	P2	Non-bus-tie Breaker	0.89	0.94	0.77	1.01	0.66	1.06	1.08	1.00	0.92	0.97	1.09	0.77	Middletown UVLS	
NOVATO 60 kV	IGNACIO 60KV [7150] (IGNACO A-IG JCT)	P2	Line Section w/o Fault	0.96	0.97	0.88	1.00	0.90	1.07	1.08	0.95	0.96	1.03	1.08	0.88	Load power factor correction and voltage support if needed	
NOVATO 60 kV	IGNACIO 230KV SECTION 2D	P2	Bus	1.06	1.06	1.01	1.07	1.02	1.11	1.11	1.05	1.06	1.07	1.11	1.01	Switch off cap bank at Greenbrae	
NRTH TWR 115 kV	NRTH TWR 115KV SECTION 1D	P2	Bus	1.01	1.03	-6.44	1.03	0.95	1.11	1.11	-6.62	1.02	1.04	1.11	-6.47	Middletown UVLS	
OLEMA 60 kV	IGNACIO 60KV [7180] (IGNACO B-STAF_JCT)	P2	Line Section w/o Fault	0.91	0.90	0.68	0.97	0.68	1.08	1.10	0.82	0.88	1.03	1.11	0.68	Load power factor correction and voltage support if needed	
OLEMA 60 kV	IGNACIO 230KV SECTION 2D	P2	Bus	1.05	1.06	0.98	1.07	1.00	1.11	1.12	1.04	1.05	1.08	1.12	0.98	Switch off cap bank at Greenbrae	
PENNGRVE 115 kV	LAKEVILLE 115KV - SECTION 1D & 2D	P2	Bus-tie Breaker	1.05	1.07	0.94	1.07	0.94	1.10	1.10	1.06	1.07	1.08	1.10	0.93	Load power factor correction and voltage support if needed	
PHILO 60 kV	EGLE RCK - MA 115KV & EAGLE ROCK LINE	P2	Non-bus-tie Breaker	1.01	1.01	0.89	1.03	0.93	1.04	1.05	1.01	0.85	1.03	1.05	0.89	Middletown UVLS	
PTTR VLY 60 kV	EGLE RCK - MA 115KV & EAGLE ROCK LINE	P2	Non-bus-tie Breaker	1.03	1.02	0.89	1.03	0.94	1.03	1.02	1.03	0.88	1.02	1.02	0.89	Middletown UVLS	
PUEBLO 115 kV	LAKEVILLE 115KV - SECTION 1D & 2D	P2	Bus-tie Breaker	0.95	1.00	0.80	1.03	0.82	1.11	1.12	0.93	0.99	1.04	1.12	0.79	Load power factor correction and voltage support if needed	
REDBUD 115 kV	EGLE RCK - MA 115KV & EAGLE ROCK LINE	P2	Non-bus-tie Breaker	0.95	0.90	0.76	0.99	0.80	1.09	1.05	0.91	0.72	0.96	1.06	0.76	Middletown UVLS	
SAN RAFL 115 kV	IGNACIO 230KV SECTION 2D	P2	Bus	1.05	1.06	1.00	1.07	1.01	1.11	1.11	1.05	1.06	1.07	1.11	1.00	Switch off cap bank at Greenbrae	
SAN_RFLJ 60 kV	IGNACIO 60KV [7150] (IGNACO A-IG JCT)	P2	Line Section w/o Fault	0.96	0.97	0.90	1.00	0.92	1.07	1.07	0.95	0.96	1.02	1.08	0.90	Load power factor correction and voltage support if needed	
SAN_RFLJ 60 kV	IGNACIO 230KV SECTION 2D	P2	Bus	1.03	1.04	0.99	1.06	1.01	1.10	1.10	1.03	1.03	1.06	1.11	0.99	Switch off cap bank at Greenbrae	
SAUSALTO 60 kV	IGNACIO 230KV SECTION 2D	P2	Bus	1.02	1.03	0.97	1.05	0.98	1.10	1.10	1.01	1.02	1.05	1.10	0.97	Switch off cap bank at Greenbrae	
SKAGGS 115 kV	IGNACIO 230KV SECTION 2D	P2	Bus	1.06	1.07	1.01	1.07	1.02	1.12	1.12	1.06	1.07	1.08	1.12	1.01	Switch off cap bank at Greenbrae	
SNTA RSA 115 kV	LAKEVILLE 115KV - SECTION 1D & 2D	P2	Bus-tie Breaker	1.05	1.07	0.95	1.07	0.96	1.10	1.10	1.06	1.06	1.08	1.10	0.95	Load power factor correction and voltage support if needed	
SNTA RSA 115 kV	FULTON 115KV - SECTION 2D & 1D	P2	Bus-tie Breaker	0.99	1.02	0.85	1.01	0.85	1.03	1.04	1.04	1.03	1.02	1.04	0.85	Load power factor correction and voltage support if needed	
SONOMA 115 kV	LAKEVILLE 115KV - SECTION 1D & 2D	P2	Bus-tie Breaker	0.93	0.99	0.76	1.02	0.79	1.12	1.13	0.91	0.98	1.04	1.13	0.76	Load power factor correction and voltage support if needed	
STAFFORD 60 kV	IGNACIO 60KV [7180] (IGNACO B-STAF_JCT)	P2	Line Section w/o Fault	0.90	0.89	0.58	0.96	0.58	1.08	1.10	0.78	0.86	1.04	1.11	0.58	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
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Peak	2020 Winter Peak	2023 Winter Peak	2028 Winter Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations		
STAFFORD 60 kV	IGNACIO 230KV SECTION 2D	P2	Bus	1.06	1.07	0.99	1.08	1.00	1.12	1.12	1.04	1.06	1.08	1.12	0.99	Switch off cap bank at Greenbrae	
STONY PT 115 kV	LAKEVILLE 115KV - SECTION 1D & 2D	P2	Bus-tie Breaker	1.05	1.07	0.94	1.07	0.95	1.10	1.10	1.06	1.06	1.08	1.10	0.94	Load power factor correction and voltage support if needed	
STONY PT 115 kV	FULTON 115KV - SECTION 2D & 1D	P2	Bus-tie Breaker	0.99	1.02	0.87	1.01	0.87	1.03	1.04	1.04	1.02	1.02	1.04	0.87	Load power factor correction and voltage support if needed	
TOCALOMA 60 kV	IGNACIO 60KV [7180] (IGNACO B-STAF_JCT)	P2	Line Section w/o Fault	0.90	0.88	0.62	0.96	0.62	1.08	1.10	0.79	0.86	1.04	1.11	0.62	Load power factor correction and voltage support if needed	
TOCALOMA 60 kV	IGNACIO 230KV SECTION 2D	P2	Bus	1.06	1.06	0.99	1.07	1.00	1.12	1.12	1.04	1.05	1.08	1.12	0.99	Switch off cap bank at Greenbrae	
UKIAH 115 kV	EGLE RCK - MA 115KV & EAGLE ROCK LINE	P2	Non-bus-tie Breaker	1.00	0.96	0.83	1.03	0.87	1.07	1.06	1.00	0.82	1.00	1.06	0.83	Middletown UVLS	
UKIAH JT 60 kV	EGLE RCK - MA 115KV & EAGLE ROCK LINE	P2	Non-bus-tie Breaker	1.01	1.00	0.87	1.02	0.91	1.03	1.04	1.01	0.86	1.01	1.04	0.87	Middletown UVLS	
UPPR LKE 60 kV	KONOCTI 60KV [6861] (KONOCTI6-EGLE RCK)	P2	Line Section w/o Fault	0.97	0.92	0.85	1.00	0.81	1.03	1.04	0.97	0.91	1.00	1.04	0.85	Middletown UVLS	
UPPR LKE 60 kV	EGLE RCK 115KV SECTION MA	P2	Bus	0.97	0.92	0.80	0.99	0.79	1.03	1.04	0.98	0.92	1.00	1.05	0.80	Middletown UVLS	
UPPR LKE 60 kV	KONOCTI6 60KV SECTION 1E	P2	Bus	0.98	0.95	0.90	1.00	0.86	1.02	1.04	0.99	0.95	1.00	1.04	0.90	Middletown UVLS	
UPPR LKE 60 kV	EGLE RCK 60KV SECTION 1D	P2	Bus	0.97	0.92	0.85	1.00	0.81	1.03	1.04	0.97	0.91	1.00	1.04	0.85	Middletown UVLS	
UPPR LKE 60 kV	EGLE RCK - MA 115KV & EAGLE ROCK LINE	P2	Non-bus-tie Breaker	0.96	0.91	0.69	1.00	0.71	1.03	1.04	0.97	0.70	0.99	1.05	0.69	Middletown UVLS	
UPPR LKE 60 kV	EGLE RCK - MA 115KV & EAGLE ROCK-REDBUD LINE	P2	Non-bus-tie Breaker	0.97	0.92	0.80	0.99	0.79	1.03	1.04	0.98	0.92	1.00	1.05	0.80	Middletown UVLS	
UPPR LKE 60 kV	EGLE RCK - MA 115KV & EAGLE RCK-FULTON-SILVERDO LINE	P2	Non-bus-tie Breaker	0.97	0.92	0.80	0.99	0.79	1.03	1.04	0.98	0.92	1.00	1.05	0.80	Middletown UVLS	
UPPR LKE 60 kV	KONOCTI6 - 1E 60KV & KONOCTI LINE	P2	Non-bus-tie Breaker	0.98	0.95	0.90	1.00	0.86	1.02	1.04	0.99	0.95	1.00	1.04	0.90	Middletown UVLS	
WILLITS 60 kV	EGLE RCK - MA 115KV & EAGLE ROCK LINE	P2	Non-bus-tie Breaker	1.01	1.00	0.86	1.02	0.91	1.02	1.02	1.01	0.85	1.01	1.02	0.86	Middletown UVLS	
WILLITS 60 kV	MENDOCNO - MA 60KV & MENDOCINO LINE (2)_Dup1	P2	Non-bus-tie Breaker	1.04	1.01	0.94	1.04	0.78	1.02	1.01	1.04	1.01	1.04	1.02	0.95	Middletown UVLS	
WOODACRE 60 kV	IGNACIO 60KV [7140] (IGNACO B-WOODACRE)	P2	Line Section w/o Fault	0.97	0.96	0.88	1.00	0.86	1.09	1.10	0.92	0.94	1.04	1.11	0.86	Load power factor correction and voltage support if needed	
WOODACRE 60 kV	IGNACIO 230KV SECTION 2D	P2	Bus	1.05	1.06	1.00	1.07	1.01	1.11	1.11	1.05	1.05	1.07	1.12	1.00	Switch off cap bank at Greenbrae	
CALISTGA 60 kV	GEYSER16 13.80KV GEN UNIT 1 & LAKEVILLE #1 60KV [7360]	P3	G1/N1	0.87	0.87	0.86	>0.9, <1.1	0.87	>0.9, <1.1	>0.9, <1.1	0.86	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	Middletown UVLS	
CALPELLA 115 kV	GEYSER11 13.80KV GEN UNIT 1 & MENDOCINO 115KV [2420] MOAS OPENED ON CALPELLA_UKIAH	P3	G1/N1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	1.10	>0.9, <1.1	Switch off cap bank at Middletown	
CLER LKE 60 kV	GEYSER16 13.80KV GEN UNIT 1 & EGLE RCK 115/60KV TB 1	P3	G1/N1	>0.9, <1.1	0.89	0.76	>0.9, <1.1	0.72	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	0.76	Middletown UVLS	
CLER LKE 60 kV	GEYSER11 13.80KV GEN UNIT 1 & KONOCTI 60KV [6861]	P3	G1/N1	>0.9, <1.1	0.89	0.75	>0.9, <1.1	0.72	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	0.75	Middletown UVLS	





Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)									Voltage PU (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Peak	2020 Winter Peak	2023 Winter Peak	2028 Winter Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations		
CORONA 115 kV	GEYSER11 13.80KV GEN UNIT 1 & CORONA LAKEVILLE 115KV [4311]	P3	G1/N1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	1.10	1.10	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	1.11	>0.9, <1.1	Switch off cap bank at Middletown
DUNBAR 60 kV	GEYSER16 13.80KV GEN UNIT 1 & LAKEVILLE #1 60KV [7360]	P3	G1/N1	0.90	0.89	0.88	>0.9, <1.1	0.89	>0.9, <1.1	>0.9, <1.1	0.88	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	Middletown UVLS
EGLE RCK 60 kV	GEYSER16 13.80KV GEN UNIT 1 & EGLE RCK 115/60KV TB 1	P3	G1/N1	>0.9, <1.1	0.86	0.67	>0.9, <1.1	0.62	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	0.67	Middletown UVLS
GRANITE 60 kV	SMUDGE01 13.80KV GEN UNIT 1 & KONOCTI 60KV [6861]	P3	G1/N1	>0.9, <1.1	>0.9, <1.1	0.81	>0.9, <1.1	0.78	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	0.81	Middletown UVLS
GRANITE 60 kV	SMUDGE01 13.80KV GEN UNIT 1 & EGLE RCK 115/60KV TB 1	P3	G1/N1	>0.9, <1.1	>0.9, <1.1	0.82	>0.9, <1.1	0.78	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	0.81	Middletown UVLS
HARTLEY 60 kV	GEYSER11 13.80KV GEN UNIT 1 & KONOCTI 60KV [6861]	P3	G1/N1	>0.9, <1.1	0.90	0.78	>0.9, <1.1	0.75	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	0.78	Middletown UVLS
HARTLEY 60 kV	GEYSER11 13.80KV GEN UNIT 1 & EGLE RCK 115/60KV TB 1	P3	G1/N1	>0.9, <1.1	0.90	0.78	>0.9, <1.1	0.75	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	0.78	Middletown UVLS
KONOCTI6 60 kV	GEYSER16 13.80KV GEN UNIT 1 & EGLE RCK 115/60KV TB 1	P3	G1/N1	>0.9, <1.1	0.86	0.67	>0.9, <1.1	0.62	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	0.67	Middletown UVLS
KONOCTI6 60 kV	GEYSER78 13.80KV GEN UNIT 1 & KONOCTI 60KV [6861]	P3	G1/N1	>0.9, <1.1	0.85	0.67	>0.9, <1.1	0.62	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	0.67	Middletown UVLS
LOWR LKE 60 kV	GEYSER11 13.80KV GEN UNIT 1 & KONOCTI 60KV [6861]	P3	G1/N1	0.89	0.85	0.64	>0.9, <1.1	0.58	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	0.64	Middletown UVLS
LOWR LKE 60 kV	GEYSER11 13.80KV GEN UNIT 1 & EGLE RCK 115/60KV TB 1	P3	G1/N1	0.89	0.85	0.64	>0.9, <1.1	0.58	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	0.64	Middletown UVLS
MENDOCNO 115 kV	GEYSER11 13.80KV GEN UNIT 1 & MENDOCINO 115KV [2420] MOAS OPENED ON MENDOCNO_CALPELLA	P3	G1/N1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	1.10	1.10	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	1.10	>0.9, <1.1	Switch off cap bank at Middletown
MIDDLTWN 60 kV	GEYSER11 13.80KV GEN UNIT 1 & KONOCTI 60KV [6861]	P3	G1/N1	0.86	0.85	0.59	>0.9, <1.1	0.53	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	0.59	Middletown UVLS
MIDDLTWN 60 kV	GEYSER11 13.80KV GEN UNIT 1 & EGLE RCK 115/60KV TB 1	P3	G1/N1	0.87	0.85	0.59	>0.9, <1.1	0.53	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	0.59	Middletown UVLS
PENNGRVE 115 kV	GEYSER11 13.80KV GEN UNIT 1 & CORONA LAKEVILLE 115KV [4311]	P3	G1/N1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	1.10	1.10	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	1.10	>0.9, <1.1	Switch off cap bank at Middletown
UPPR LKE 60 kV	GEYSER11 13.80KV GEN UNIT 1 & KONOCTI 60KV [6861]	P3	G1/N1	>0.9, <1.1	0.92	0.83	>0.9, <1.1	0.81	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	0.83	Middletown UVLS
UPPR LKE 60 kV	MONTICLO 9.11KV GEN UNIT 3 & EGLE RCK 115/60KV TB 1	P3	G1/N1	>0.9, <1.1	>0.9, <1.1	0.83	>0.9, <1.1	0.80	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	0.84	Middletown UVLS
ANNAPOLS 60 kV	FULTON 230 KV BAAH BUS #1 (FAILURE OF NON-REDUNDENT RELAY)	P5	Non-Redundant Relay	0.95	0.94	0.80	0.98	0.75	1.03	1.05	0.94	0.93	1.01	1.05	0.79	Protection Upgrade	
CALISTGA 60 kV	FULTON 230 KV BAAH BUS #1 (FAILURE OF NON-REDUNDENT RELAY)	P5	Non-Redundant Relay	0.90	0.90	0.74	0.97	0.72	1.03	1.04	0.93	0.88	1.00	1.05	0.73	Protection Upgrade	
COTATI 60 kV	FULTON 230 KV BAAH BUS #1 (FAILURE OF NON-REDUNDENT RELAY)	P5	Non-Redundant Relay	0.99	0.94	0.81	1.00	0.77	1.02	1.03	0.98	0.93	1.02	1.04	0.79	Protection Upgrade	



Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)									Voltage PU (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Peak	2020 Winter Peak	2023 Winter Peak	2028 Winter Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations		
FORT RSS 60 kV	FULTON 230 KV BAAH BUS #1 (FAILURE OF NON-REDUNDENT RELAY)	P5	Non-Redundant Relay	0.95	0.95	0.81	0.99	0.76	1.03	1.05	0.95	0.93	1.01	1.05	0.80	Protection Upgrade	
FTCH MTN 60 kV	FULTON 230 KV BAAH BUS #1 (FAILURE OF NON-REDUNDENT RELAY)	P5	Non-Redundant Relay	0.96	0.96	0.84	1.01	0.82	1.02	1.03	0.99	0.95	1.01	1.03	0.83	Protection Upgrade	
FULTON 60 kV	FULTON 230 KV BAAH BUS #1 (FAILURE OF NON-REDUNDENT RELAY)	P5	Non-Redundant Relay	1.00	1.00	0.87	1.03	0.84	1.04	1.04	1.02	0.99	1.04	1.04	0.86	Protection Upgrade	
GUALALA 60 kV	FULTON 230 KV BAAH BUS #1 (FAILURE OF NON-REDUNDENT RELAY)	P5	Non-Redundant Relay	0.94	0.93	0.79	0.97	0.73	1.03	1.05	0.93	0.91	1.00	1.05	0.78	Protection Upgrade	
GYSRVLE 60 kV	FULTON 230 KV BAAH BUS #1 (FAILURE OF NON-REDUNDENT RELAY)	P5	Non-Redundant Relay	0.95	0.95	0.83	1.00	0.81	1.02	1.03	0.98	0.93	1.01	1.03	0.82	Protection Upgrade	
LAGUNA 60 kV	FULTON 230 KV BAAH BUS #1 (FAILURE OF NON-REDUNDENT RELAY)	P5	Non-Redundant Relay	0.98	0.95	0.82	1.00	0.78	1.03	1.03	0.98	0.94	1.02	1.04	0.80	Protection Upgrade	
LAGUNATP 60 kV	FULTON 230 KV BAAH BUS #1 (FAILURE OF NON-REDUNDENT RELAY)	P5	Non-Redundant Relay	0.98	0.95	0.82	1.00	0.78	1.03	1.04	0.98	0.94	1.02	1.04	0.80	Protection Upgrade	
MIRABEL 60 kV	FULTON 230 KV BAAH BUS #1 (FAILURE OF NON-REDUNDENT RELAY)	P5	Non-Redundant Relay	0.99	0.98	0.85	1.02	0.82	1.04	1.04	1.00	0.97	1.03	1.04	0.84	Protection Upgrade	
MOLINO 60 kV	FULTON 230 KV BAAH BUS #1 (FAILURE OF NON-REDUNDENT RELAY)	P5	Non-Redundant Relay	0.97	0.96	0.82	1.00	0.79	1.03	1.04	0.98	0.95	1.02	1.04	0.81	Protection Upgrade	
MONTE RO 115 kV	FULTON 230 KV BAAH BUS #1 (FAILURE OF NON-REDUNDENT RELAY)	P5	Non-Redundant Relay	0.97	0.97	0.82	1.00	0.78	1.04	1.05	0.96	0.95	1.02	1.05	0.81	Protection Upgrade	
PENNGRVE 115 kV	FULTON 230 KV BAAH BUS #1 (FAILURE OF NON-REDUNDENT RELAY)	P5	Non-Redundant Relay	0.97	0.97	0.90	0.99	0.89	1.04	1.04	0.99	0.97	1.01	1.04	0.89	Protection Upgrade	
PUEBLO 115 kV	FULTON 230 KV BAAH BUS #1 (FAILURE OF NON-REDUNDENT RELAY)	P5	Non-Redundant Relay	0.96	0.96	0.89	0.98	0.88	1.03	1.04	0.96	0.95	1.00	1.04	0.89	Protection Upgrade	
ST.HELNA 115 kV	FULTON 230 KV BAAH BUS #1 (FAILURE OF NON-REDUNDENT RELAY)	P5	Non-Redundant Relay	0.95	0.94	0.80	1.00	0.78	1.03	1.04	0.97	0.93	1.02	1.04	0.79	Protection Upgrade	
WINDSOR 60 kV	FULTON 230 KV BAAH BUS #1 (FAILURE OF NON-REDUNDENT RELAY)	P5	Non-Redundant Relay	0.97	0.97	0.84	1.01	0.82	1.03	1.03	0.99	0.96	1.02	1.03	0.83	Protection Upgrade	
ALTO 60 kV	GEYSR18-LAKEVILE-GEYSR20-GEYSR13 230KV [0] MOAS OPENED ON G13TT1_8_SNTAFE & IGNACIO SVD=R	P6	N-1-1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	1.11	1.11	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	1.11	>0.9, <1.1	Load power factor correction and voltage support if needed	
ALTO 60 kV	IGNACIO 60KV [7160] & IGNACIO 60KV [7150] MOAS OPENED ON SAN_RFLJ_GREENBRE	P6	N-1-1	>0.9, <1.1	>0.9, <1.1	0.86	>0.9, <1.1	0.85	>0.9, <1.1	>0.9, <1.1	0.89	0.89	>0.9, <1.1	>0.9, <1.1	0.86	Load power factor correction and voltage support if needed	
ANNAPOLS 60 kV	FULTON 230/115KV TB 4 & FULTON 230/115KV TB 9	P6	N-1-1	>0.9, <1.1	>0.9, <1.1	0.80	>0.9, <1.1	0.75	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	0.79	Load power factor correction and voltage support if needed	
ANNAPOLS 60 kV	FULTON 115/60KV TB 1 & FULTON 115/60KV TB 2	P6	N-1-1	0.42	>0.9, <1.1	>0.9, <1.1	0.45	>0.9, <1.1	>0.9, <1.1	0.87	0.37	>0.9, <1.1	0.68	>0.9, <1.1	>0.9, <1.1	Load power factor correction and voltage support if needed	
BELLVUE 115 kV	FULTON 115KV [1620] & FULTON 115KV [1630]	P6	N-1-1	>0.9, <1.1	>0.9, <1.1	0.87	>0.9, <1.1	0.87	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	0.88	Load power factor correction and voltage support if needed	
BELLVUE 115 kV	LAKEVILE 230/115KV TB 1 & LAKEVILE 230/115KV TB 2	P6	N-1-1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	1.11	1.11	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	1.11	>0.9, <1.1	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
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Peak	2020 Winter Peak	2023 Winter Peak	2028 Winter Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations		
BIG RIVR 60 kV	FORT BRAGG 60KV [2060] MOAS OPENED ON BIG RIVR_ELK & BIG RIVR 60.00KV ID=7H & BIG RIVR 60.00KV ID=5H & BIG RIVR 60.00KV ID=8H & BIG RIVR 60.00KV ID=V SHUNT DEVICES	P6	N-1-1	0.88	0.83	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	0.81	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	Fort Bragg UVLS	
BIG RIVR 60 kV	BIG RIVR 60.00KV ID=7H & BIG RIVR 60.00KV ID=5H & BIG RIVR 60.00KV ID=8H & BIG RIVR 60.00KV ID=V SHUNT DEVICES & FORT BRAGG 60KV [2060] MOAS OPENED ON BIG RIVR_ELK	P6	N-1-1	0.88	0.83	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	0.82	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	Load power factor correction and voltage support if needed	
BOLINAS 60 kV	GEYSR18-LAKEVILLE-GEYSR20-GEYSR13 230KV [0] MOAS OPENED ON G13TT1_8_SNTAFE & IGNACIO SVD=R	P6	N-1-1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	1.12	1.12	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	1.13	>0.9, <1.1	Load power factor correction and voltage support if needed	
CALISTGA 60 kV	FULTON-GEYSR16-GEYSR12-GEYSR14 230KV [0] MOAS OPENED ON G16T0_2_WSFDFLT & LAKEVILLE #1 60KV [7360]	P6	N-1-1	0.87	0.87	>0.9, <1.1	>0.9, <1.1	0.87	>0.9, <1.1	>0.9, <1.1	0.87	0.86	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	Load power factor correction and voltage support if needed	
CALISTGA 60 kV	GEYSR17 230/13.8KV TB 1 & LAKEVILLE #1 60KV [7360]	P6	N-1-1	>0.9, <1.1	0.86	0.86	>0.9, <1.1	0.87	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	0.86	Load power factor correction and voltage support if needed	
CALISTGA 60 kV	FULTON 230/115KV TB 4 & FULTON 230/115KV TB 9	P6	N-1-1	>0.9, <1.1	>0.9, <1.1	0.74	>0.9, <1.1	0.72	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	0.88	>0.9, <1.1	>0.9, <1.1	0.73	Load power factor correction and voltage support if needed	
CALISTGA 60 kV	FULTON 115/60KV TB 2 & FULTON 115/60KV TB 1	P6	N-1-1	0.39	>0.9, <1.1	>0.9, <1.1	0.45	>0.9, <1.1	>0.9, <1.1	0.87	0.37	>0.9, <1.1	0.66	>0.9, <1.1	>0.9, <1.1	Load power factor correction and voltage support if needed	
CALPELLA 115 kV	MENDOCINO 115KV [2420] MOAS OPENED ON MENDOCNO_CALPELLA & GEYSERS #3 115KV [1650] MOAS OPENED ON MPE TAP_MPE	P6	N-1-1	0.80	0.83	0.77	>0.9, <1.1	0.87	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	0.81	>0.9, <1.1	>0.9, <1.1	0.77	Load power factor correction and voltage support if needed	
CALPELLA 115 kV	MENDOCINO 115KV [2410] & MENDOCINO 115KV [2420] MOAS OPENED ON CALPELLA_UKIAH	P6	N-1-1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	1.11	>0.9, <1.1	1.12	1.12	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	1.12	>0.9, <1.1	Switch off cap bank at Middletown	
CARQUINZ 115 kV	GEYSR18-LAKEVILLE-GEYSR20-GEYSR13 230KV [0] MOAS OPENED ON G13TT1_8_SNTAFE & IGNACIO SVD=R	P6	N-1-1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	1.14	1.14	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	1.14	>0.9, <1.1	Load power factor correction and voltage support if needed	
CLER LKE 60 kV	MENDOCINO 60KV [7510] & EGLE RCK 115/60KV TB 1	P6	N-1-1	0.90	0.51	0.49	>0.9, <1.1	0.46	>0.9, <1.1	1.11	>0.9, <1.1	0.50	>0.9, <1.1	1.12	0.49	Middletown UVLS	
CLER LKE 60 kV	CLEAR LAKE-HOPLAND 60KV [6390] MOAS OPENED ON CLER LKE_GRANITE & EGLE RCK 115/60KV TB 1	P6	N-1-1	0.59	0.55	0.52	0.77	0.49	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	0.54	0.86	>0.9, <1.1	0.52	Middletown UVLS	
CLER LKE 60 kV	KONOCI 60KV [6861] & CLEAR LAKE-HOPLAND 60KV [6390] MOAS OPENED ON GRANITE_HPLND JT	P6	N-1-1	0.59	0.55	0.52	0.77	0.49	>0.9, <1.1	>0.9, <1.1	0.50	0.54	0.85	>0.9, <1.1	0.52	Middletown UVLS	



Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)									Voltage PU (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Peak	2020 Winter Peak	2023 Winter Peak	2028 Winter Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations		
CLOVRDLE 115 kV	GEYSERS #3 115KV [1650] MOAS OPENED ON MPE TAP_MPE & MENDOCINO 115KV [2420] MOAS OPENED ON MENDOCNO_CALPELLA	P6	N-1-1	0.80	0.83	0.78	>0.9, <1.1	0.88	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	0.80	>0.9, <1.1	>0.9, <1.1	0.78	Load power factor correction and voltage support if needed	
CLOVRDLE 115 kV	KONOCTI 60KV [6861] & GEYSERS #3 115KV [1650] MOAS OPENED ON MPE TAP_MPE	P6	N-1-1	>0.9, <1.1	>0.9, <1.1	0.81	>0.9, <1.1	0.85	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	0.81	>0.9, <1.1	>0.9, <1.1	0.81	Middletown UVLS	
CLVRDLJT 60 kV	GEYSERS #3 115KV [1650] MOAS OPENED ON MPE TAP_MPE & MENDOCINO 115KV [2420] MOAS OPENED ON MENDOCNO_CALPELLA	P6	N-1-1	0.90	>0.9, <1.1	0.88	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	0.89	>0.9, <1.1	>0.9, <1.1	0.88	Load power factor correction and voltage support if needed	
CLVRDLJT 60 kV	KONOCTI 60KV [6861] & GEYSERS #3 115KV [1650] MOAS OPENED ON MPE TAP_MPE	P6	N-1-1	>0.9, <1.1	>0.9, <1.1	0.89	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	0.89	>0.9, <1.1	>0.9, <1.1	0.89	Middletown UVLS	
CLVRDLJT 60 kV	FULTON 115/60KV TB 1 & FULTON 115/60KV TB 2	P6	N-1-1	0.74	>0.9, <1.1	>0.9, <1.1	0.76	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	0.73	>0.9, <1.1	0.87	>0.9, <1.1	>0.9, <1.1	Load power factor correction and voltage support if needed	
CORONA 115 kV	LAKEVILLE 230/115KV TB 1 & LAKEVILLE 230/115KV TB 2	P6	N-1-1	>0.9, <1.1	>0.9, <1.1	0.90	>0.9, <1.1	>0.9, <1.1	1.12	1.12	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	1.12	0.90	Load power factor correction and voltage support if needed	
COTATI 60 kV	FULTON 230/115KV TB 9 & FULTON 230/115KV TB 4	P6	N-1-1	>0.9, <1.1	>0.9, <1.1	0.80	>0.9, <1.1	0.77	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	0.79	Load power factor correction and voltage support if needed	
COTATI 60 kV	FULTON 115/60KV TB 1 & FULTON 115/60KV TB 2	P6	N-1-1	0.73	>0.9, <1.1	>0.9, <1.1	0.74	>0.9, <1.1	>0.9, <1.1	0.86	0.70	>0.9, <1.1	0.87	>0.9, <1.1	>0.9, <1.1	Load power factor correction and voltage support if needed	
COVELO6 60 kV	GEYSR18-LAKEVILLE-GEYSR20-GEYSR13 230KV [0] MOAS OPENED ON G13TT1_8_SNTAFE & MENDOCINO 60KV [7550] MOAS OPENED ON FRT BRGG_BIG RIVR	P6	N-1-1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	0.83	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	Load power factor correction and voltage support if needed	
COVELO6 60 kV	KONOCTI 60KV [6861] & GEYSERS #3 115KV [1650] MOAS OPENED ON MPE TAP_MPE	P6	N-1-1	>0.9, <1.1	>0.9, <1.1	0.85	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	0.89	>0.9, <1.1	>0.9, <1.1	0.85	Middletown UVLS	
DUNBAR 60 kV	GEYSERS #17 230KV [4770] & LAKEVILLE #1 60KV [7360]	P6	N-1-1	0.90	>0.9, <1.1	0.87	>0.9, <1.1	0.88	>0.9, <1.1	>0.9, <1.1	0.88	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	0.87	Load power factor correction and voltage support if needed	
DUNBAR 60 kV	FULTON 60KV [6890] MOAS OPENED ON HDSBGTP1_FTCHMTNP & LAKEVILLE #1 60KV [7360]	P6	N-1-1	>0.9, <1.1	0.89	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	0.88	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	Load power factor correction and voltage support if needed	
DUNBAR 60 kV	GEYSR17 230/13.8KV TB 1 & LAKEVILLE #1 60KV [7360]	P6	N-1-1	>0.9, <1.1	0.89	0.88	>0.9, <1.1	0.89	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	0.88	Load power factor correction and voltage support if needed	
DUNBAR 60 kV	LAKEVILLE 230/60KV TB 3 & LAKEVILLE 230/60KV TB 5	P6	N-1-1	0.55	>0.9, <1.1	>0.9, <1.1	0.69	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	0.50	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	Load power factor correction and voltage support if needed	
EGLE RCK 60 kV	MENDOCINO 60KV [7510] & EGLE RCK 115/60KV TB 1	P6	N-1-1	0.85	0.46	0.43	>0.9, <1.1	0.39	>0.9, <1.1	1.12	>0.9, <1.1	0.45	>0.9, <1.1	1.14	0.43	Middletown UVLS	



Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)									Voltage PU (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Peak	2020 Winter Peak	2023 Winter Peak	2028 Winter Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations		
EGLERCK 60 kV	EGLERCK 115/60KV TB 1 & CLEAR LAKE-HOPLAND 60KV [6390] MOAS OPENED ON CLERLKE_GRANITE	P6	N-1-1	0.53	0.49	0.46	0.75	0.42	>0.9, <1.1	>0.9, <1.1	0.46	0.48	0.83	>0.9, <1.1	0.46	Middletown UVLS	
FORTRSS 60 kV	FULTON 230/115KV TB 9 & FULTON 230/115KV TB 4	P6	N-1-1	>0.9, <1.1	>0.9, <1.1	0.81	>0.9, <1.1	0.76	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	0.80	Load power factor correction and voltage support if needed	
FORTRSS 60 kV	FULTON 115/60KV TB 2 & FULTON 115/60KV TB 1	P6	N-1-1	0.43	>0.9, <1.1	>0.9, <1.1	0.46	>0.9, <1.1	>0.9, <1.1	0.87	0.38	>0.9, <1.1	0.68	>0.9, <1.1	>0.9, <1.1	Load power factor correction and voltage support if needed	
FRTBRGG 60 kV	FORT BRAGG 60KV [2060] MOAS OPENED ON BIG RIVR_ELK & BIG RIVR 60.00KV ID=7H & BIG RIVR 60.00KV ID=5H & BIG RIVR 60.00KV ID=8H & BIG RIVR 60.00KV ID=V SHUNT DEVICES	P6	N-1-1	0.89	0.85	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	0.83	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	Fort Bragg UVLS	
FTCHMTN 60 kV	FULTON 230/115KV TB 9 & FULTON 230/115KV TB 4	P6	N-1-1	>0.9, <1.1	>0.9, <1.1	0.83	>0.9, <1.1	0.81	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	0.82	Load power factor correction and voltage support if needed	
FTCHMTN 60 kV	FULTON 115/60KV TB 1 & FULTON 115/60KV TB 2	P6	N-1-1	0.47	>0.9, <1.1	>0.9, <1.1	0.51	>0.9, <1.1	>0.9, <1.1	0.87	0.45	>0.9, <1.1	0.71	>0.9, <1.1	>0.9, <1.1	Load power factor correction and voltage support if needed	
FULTON 115 kV	FULTON 230/115KV TB 9 & FULTON 230/115KV TB 4	P6	N-1-1	>0.9, <1.1	>0.9, <1.1	0.82	>0.9, <1.1	0.80	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	0.81	Load power factor correction and voltage support if needed	
FULTON 60 kV	FULTON 115/60KV TB 1 & FULTON 115/60KV TB 2	P6	N-1-1	0.49	>0.9, <1.1	>0.9, <1.1	0.53	>0.9, <1.1	>0.9, <1.1	0.87	0.46	>0.9, <1.1	0.73	>0.9, <1.1	>0.9, <1.1	Load power factor correction and voltage support if needed	
GARCIA 60 kV	MENDOCINO 60KV [7520] MOAS OPENED ON PHLOJCT_HPLNDJT & BIG RIVR 60.00KV ID=7H & BIG RIVR 60.00KV ID=5H & BIG RIVR 60.00KV ID=8H & BIG RIVR 60.00KV ID=V SHUNT DEVICES	P6	N-1-1	>0.9, <1.1	0.87	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	0.83	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	Middletown UVLS	
GRANITE 60 kV	MENDOCINO 60KV [7510] & EGLERCK 115/60KV TB 1	P6	N-1-1	>0.9, <1.1	0.59	0.59	>0.9, <1.1	0.57	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	0.58	>0.9, <1.1	1.11	0.59	Middletown UVLS	
GRANITE 60 kV	KONOCTI 60KV [6861] & CLEAR LAKE-HOPLAND 60KV [6390] MOAS OPENED ON GRANITE_HPLNDJT	P6	N-1-1	0.59	0.55	0.52	0.77	0.49	>0.9, <1.1	>0.9, <1.1	0.50	0.54	0.85	>0.9, <1.1	0.52	Middletown UVLS	
GREENBRE 60 kV	GEYSR18-LAKEVILE-GEYSR20-GEYSR13 230KV [0] MOAS OPENED ON G13TT1_8_SNTAFE & IGNACIO SVD=R	P6	N-1-1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	1.11	1.11	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	1.11	>0.9, <1.1	Load power factor correction and voltage support if needed	
GREENBRE 60 kV	IGNACIO 60KV [7150] MOAS OPENED ON SAN_RFLJ_GREENBRE & IGNACIO 60KV [7170]	P6	N-1-1	0.90	0.89	0.86	>0.9, <1.1	0.85	>0.9, <1.1	>0.9, <1.1	0.88	0.87	>0.9, <1.1	>0.9, <1.1	0.86	Load power factor correction and voltage support if needed	
GUALALA 60 kV	FULTON 230/115KV TB 4 & FULTON 230/115KV TB 9	P6	N-1-1	>0.9, <1.1	>0.9, <1.1	0.78	>0.9, <1.1	0.73	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	0.77	Load power factor correction and voltage support if needed	
GUALALA 60 kV	FULTON 115/60KV TB 2 & FULTON 115/60KV TB 1	P6	N-1-1	0.41	>0.9, <1.1	>0.9, <1.1	0.44	>0.9, <1.1	>0.9, <1.1	0.87	0.36	>0.9, <1.1	0.67	>0.9, <1.1	>0.9, <1.1	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
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Peak	2020 Winter Peak	2023 Winter Peak	2028 Winter Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations		
GYSRVLL 60 kV	FULTON 115/60KV TB 2 & FULTON 115/60KV TB 1	P6	N-1-1	0.45	>0.9, <1.1	>0.9, <1.1	0.51	>0.9, <1.1	>0.9, <1.1	0.87	0.44	>0.9, <1.1	0.70	>0.9, <1.1	>0.9, <1.1	Load power factor correction and voltage support if needed	
HARTLEY 60 kV	CLEAR LAKE-HOPLAND 60KV [6390] MOAS OPENED ON CLER LKE GRANITE & KONOCTI 60KV [6861]	P6	N-1-1	0.65	0.61	0.58	0.79	0.56	>0.9, <1.1	>0.9, <1.1	0.56	0.60	0.88	>0.9, <1.1	0.58	Middletown UVLS	
HARTLEY 60 kV	EGLE RCK 115/60KV TB 1 & MENDOCINO 60KV [7510]	P6	N-1-1	0.90	0.50	0.47	>0.9, <1.1	0.45	>0.9, <1.1	1.11	>0.9, <1.1	0.49	>0.9, <1.1	1.12	0.47	Middletown UVLS	
HighWAY 115 kV	GEYSR18-LAKEVILE-GEYSR20-GEYSR13 230KV [0] MOAS OPENED ON G13TT1_8_SNTAFE & IGNACIO SVD=R	P6	N-1-1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	1.12	1.12	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	1.12	>0.9, <1.1	Load power factor correction and voltage support if needed	
HPLND JT 60 kV	KONOCTI 60KV [6861] & GEYSERS #3 115KV [1650] MOAS OPENED ON MPE TAP_MPE	P6	N-1-1	>0.9, <1.1	>0.9, <1.1	0.81	>0.9, <1.1	0.85	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	0.82	>0.9, <1.1	>0.9, <1.1	0.81	Middletown UVLS	
IGNACIO 115 kV	GEYSR18-LAKEVILE-GEYSR20-GEYSR13 230KV [0] MOAS OPENED ON G13TT1_8_SNTAFE & IGNACIO SVD=R	P6	N-1-1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	1.12	1.12	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	1.12	>0.9, <1.1	Load power factor correction and voltage support if needed	
KONOCTI6 60 kV	MENDOCINO 60KV [7510] & EGLE RCK 115/60KV TB 1	P6	N-1-1	0.85	0.46	0.43	>0.9, <1.1	0.39	>0.9, <1.1	1.12	>0.9, <1.1	0.45	>0.9, <1.1	1.14	0.43	Middletown UVLS	
KONOCTI6 60 kV	CLEAR LAKE-HOPLAND 60KV [6390] MOAS OPENED ON CLER LKE GRANITE & KONOCTI 60KV [6861]	P6	N-1-1	0.53	0.50	0.45	0.75	0.42	>0.9, <1.1	>0.9, <1.1	0.45	0.48	0.83	>0.9, <1.1	0.45	Middletown UVLS	
LAGUNA 60 kV	FULTON 230/115KV TB 9 & FULTON 230/115KV TB 4	P6	N-1-1	>0.9, <1.1	>0.9, <1.1	0.82	>0.9, <1.1	0.78	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	0.80	Load power factor correction and voltage support if needed	
LAGUNA 60 kV	FULTON 115/60KV TB 1 & FULTON 115/60KV TB 2	P6	N-1-1	0.63	>0.9, <1.1	>0.9, <1.1	0.65	>0.9, <1.1	>0.9, <1.1	0.86	0.60	>0.9, <1.1	0.81	>0.9, <1.1	>0.9, <1.1	Load power factor correction and voltage support if needed	
LAKEVILLE 115 kV	LAKEVILE 230/115KV TB 2 & LAKEVILE 230/115KV TB 1	P6	N-1-1	>0.9, <1.1	>0.9, <1.1	0.89	>0.9, <1.1	0.90	1.12	1.12	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	1.13	0.89	Load power factor correction and voltage support if needed	
LAKEVILLE 60 kV	LAKEVILE 230/60KV TB 3 & LAKEVILE 230/60KV TB 5	P6	N-1-1	0.59	>0.9, <1.1	>0.9, <1.1	0.72	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	0.55	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	Load power factor correction and voltage support if needed	
LOWR LKE 60 kV	MENDOCINO 60KV [7510] & EGLE RCK 115/60KV TB 1	P6	N-1-1	0.84	0.45	0.41	>0.9, <1.1	0.37	>0.9, <1.1	1.13	>0.9, <1.1	0.43	>0.9, <1.1	1.14	0.41	Middletown UVLS	
LOWR LKE 60 kV	CLEAR LAKE-HOPLAND 60KV [6390] MOAS OPENED ON CLER LKE GRANITE & KONOCTI 60KV [6861]	P6	N-1-1	0.51	0.48	0.43	0.75	0.40	>0.9, <1.1	>0.9, <1.1	0.45	0.47	0.82	>0.9, <1.1	0.43	Middletown UVLS	
LUCERNE 115 kV	MENDOCINO 115KV [2410] & MENDOCINO 115KV [2420] MOAS OPENED ON MENDOCNO_CALPELLA	P6	N-1-1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	1.11	1.11	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	1.11	>0.9, <1.1	Switch off cap bank at Middletown	
LUCERNE 115 kV	KONOCTI 60KV [6861] & GEYSERS #3 115KV [1650] MOAS OPENED ON MPE TAP_MPE	P6	N-1-1	>0.9, <1.1	>0.9, <1.1	0.87	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	0.89	>0.9, <1.1	>0.9, <1.1	0.87	Middletown UVLS	





Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)									Voltage PU (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Peak	2020 Winter Peak	2023 Winter Peak	2028 Winter Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations		
LYTNVLE 60 kV	KONOCTI 60KV [6861] & GEYSERS #3 115KV [1650] MOAS OPENED ON MPE TAP_MPE	P6	N-1-1	>0.9, <1.1	>0.9, <1.1	0.86	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	0.90	>0.9, <1.1	>0.9, <1.1	0.86	Middletown UVLS
LYTNVLE 60 kV	LAKEVILLE 230KV [4970] & MENDOCINO 60KV [7550] MOAS OPENED ON FRT BRGG_BIG RIVR	P6	N-1-1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	0.84	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	Load power factor correction and voltage support if needed
MASONITE 60 kV	KONOCTI 60KV [6861] & GEYSERS #3 115KV [1650] MOAS OPENED ON MPE TAP_MPE	P6	N-1-1	>0.9, <1.1	>0.9, <1.1	0.86	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	0.87	>0.9, <1.1	>0.9, <1.1	0.86	Middletown UVLS
MENDOCNO 115 kV	MENDOCINO 115KV [2410] & MENDOCINO 115KV [2420] MOAS OPENED ON MENDOCNO_CALPELLA	P6	N-1-1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	1.10	>0.9, <1.1	1.12	1.12	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	1.12	>0.9, <1.1	Switch off cap bank at Middletown
MENDOCNO 115 kV	KONOCTI 60KV [6861] & GEYSERS #3 115KV [1650] MOAS OPENED ON MPE TAP_MPE	P6	N-1-1	>0.9, <1.1	>0.9, <1.1	0.83	>0.9, <1.1	0.87	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	0.84	>0.9, <1.1	>0.9, <1.1	0.83	Middletown UVLS
MEYERS 115 kV	GEYSR18-LAKEVILLE-GEYSR20-GEYSR13 230KV [0] MOAS OPENED ON G13TT1_8_SNTAFE & IGNACIO SVD=R	P6	N-1-1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	1.14	1.14	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	1.14	>0.9, <1.1	Load power factor correction and voltage support if needed
MIDDLTWN 60 kV	MENDOCINO 60KV [7510] & EGGLE RCK 115/60KV TB 1	P6	N-1-1	0.81	0.44	0.38	>0.9, <1.1	0.34	>0.9, <1.1	1.14	>0.9, <1.1	0.42	>0.9, <1.1	1.16	0.38	Middletown UVLS	
MIDDLTWN 60 kV	CLEAR LAKE-HOPLAND 60KV [6390] MOAS OPENED ON CLER LKE GRANITE & KONOCTI 60KV [6861]	P6	N-1-1	0.48	0.47	0.40	0.75	0.36	>0.9, <1.1	>0.9, <1.1	0.45	0.46	0.81	>0.9, <1.1	0.40	Middletown UVLS	
MIRABEL 60 kV	FULTON 230/115KV TB 4 & FULTON 230/115KV TB 9	P6	N-1-1	>0.9, <1.1	>0.9, <1.1	0.85	>0.9, <1.1	0.82	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	0.84	Load power factor correction and voltage support if needed
MIRABEL 60 kV	FULTON 115/60KV TB 2 & FULTON 115/60KV TB 1	P6	N-1-1	0.47	>0.9, <1.1	>0.9, <1.1	0.51	>0.9, <1.1	>0.9, <1.1	0.87	0.43	>0.9, <1.1	0.72	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	Load power factor correction and voltage support if needed
MOLINO 60 kV	FULTON 230/115KV TB 9 & FULTON 230/115KV TB 4	P6	N-1-1	>0.9, <1.1	>0.9, <1.1	0.82	>0.9, <1.1	0.79	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	0.81	Load power factor correction and voltage support if needed
MOLINO 60 kV	FULTON 115/60KV TB 2 & FULTON 115/60KV TB 1	P6	N-1-1	0.53	>0.9, <1.1	>0.9, <1.1	0.57	>0.9, <1.1	>0.9, <1.1	0.87	0.50	>0.9, <1.1	0.76	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	Load power factor correction and voltage support if needed
MONROE1 115 kV	LAKEVILLE 230/115KV TB 1 & LAKEVILLE 230/115KV TB 2	P6	N-1-1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	1.10	1.10	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	1.10	>0.9, <1.1	Load power factor correction and voltage support if needed
MONTCLLO 115 kV	FULTON 230/115KV TB 9 & FULTON 230/115KV TB 4	P6	N-1-1	>0.9, <1.1	>0.9, <1.1	0.83	>0.9, <1.1	0.81	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	0.82	Load power factor correction and voltage support if needed
MONTE RO 60 kV	FULTON 230/115KV TB 9 & FULTON 230/115KV TB 4	P6	N-1-1	>0.9, <1.1	>0.9, <1.1	0.82	>0.9, <1.1	0.78	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	0.81	Load power factor correction and voltage support if needed
MONTE RO 60 kV	FULTON 115/60KV TB 1 & FULTON 115/60KV TB 2	P6	N-1-1	0.45	>0.9, <1.1	>0.9, <1.1	0.47	>0.9, <1.1	>0.9, <1.1	0.87	0.40	>0.9, <1.1	0.70	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	Load power factor correction and voltage support if needed
NOVATO 60 kV	GEYSR18-LAKEVILLE-GEYSR20-GEYSR13 230KV [0] MOAS OPENED ON G13TT1_8_SNTAFE & IGNACIO SVD=R	P6	N-1-1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	1.12	1.12	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	1.12	>0.9, <1.1	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
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Peak	2020 Winter Peak	2023 Winter Peak	2028 Winter Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations		
NRTH TWR 115 kV	IGNACIO SVD=R & NRTH TWR-OLEUM-CHRISTIE 115KV [0]	P6	N-1-1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	1.11	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	Load power factor correction and voltage support if needed
OLEMA 60 kV	GEYSR18-LAKEVILE-GEYSR20-GEYSR13 230KV [0] MOAS OPENED ON G13TT1_8_SNTAFE & IGNACIO SVD=R	P6	N-1-1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	1.12	1.12	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	1.13	>0.9, <1.1	Load power factor correction and voltage support if needed
PENNGRVE 115 kV	FULTON 230/115KV TB 9 & FULTON 230/115KV TB 4	P6	N-1-1	>0.9, <1.1	>0.9, <1.1	0.90	>0.9, <1.1	0.89	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	0.89	Load power factor correction and voltage support if needed
PENNGRVE 115 kV	LAKEVILE 230/115KV TB 1 & LAKEVILE 230/115KV TB 2	P6	N-1-1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	1.11	1.11	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	1.12	>0.9, <1.1	Load power factor correction and voltage support if needed
PHILO 60 kV	MENDOCINO 60KV [7520] MOAS OPENED ON PHLO JCT_HPLND JT & BIG RIVR 60.00KV ID=7H & BIG RIVR 60.00KV ID=5H & BIG RIVR 60.00KV ID=8H & BIG RIVR 60.00KV ID=V SHUNT DEVICES	P6	N-1-1	>0.9, <1.1	0.87	>0.9, <1.1	>0.9, <1.1	0.90	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	0.82	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	Middletown UVLS
PHILO 60 kV	KONOCI 60KV [6861] & GEYSERS #3 115KV [1650] MOAS OPENED ON MPE TAP_MPE	P6	N-1-1	>0.9, <1.1	>0.9, <1.1	0.88	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	0.87	>0.9, <1.1	>0.9, <1.1	0.88	Middletown UVLS
PUEBLO 115 kV	LAKEVILLE 115KV [2063] & LAKEVILLE 115KV [2070]	P6	N-1-1	>0.9, <1.1	>0.9, <1.1	0.82	>0.9, <1.1	0.84	1.10	1.11	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	1.11	0.82	Load power factor correction and voltage support if needed
REDBUD 115 kV	EAGLE ROCK-REDBUD 115KV [1480] & MENDOCINO 115KV [2420] MOAS OPENED ON MENDOCNO_CALPELLA	P6	N-1-1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	1.10	1.12	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	1.12	>0.9, <1.1	Load power factor correction and voltage support if needed
RINCON 115 kV	FULTON 230/115KV TB 9 & FULTON 230/115KV TB 4	P6	N-1-1	>0.9, <1.1	>0.9, <1.1	0.83	>0.9, <1.1	0.82	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	0.83	Load power factor correction and voltage support if needed
SAN RAFL 115 kV	GEYSR18-LAKEVILE-GEYSR20-GEYSR13 230KV [0] MOAS OPENED ON G13TT1_8_SNTAFE & IGNACIO SVD=R	P6	N-1-1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	1.12	1.12	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	1.12	>0.9, <1.1	Load power factor correction and voltage support if needed
SAN_RFLJ 60 kV	GEYSR18-LAKEVILE-GEYSR20-GEYSR13 230KV [0] MOAS OPENED ON G13TT1_8_SNTAFE & IGNACIO SVD=R	P6	N-1-1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	1.11	1.11	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	1.12	>0.9, <1.1	Load power factor correction and voltage support if needed
SAUSALTO 60 kV	GEYSR18-LAKEVILE-GEYSR20-GEYSR13 230KV [0] MOAS OPENED ON G13TT1_8_SNTAFE & IGNACIO SVD=R	P6	N-1-1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	1.11	1.11	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	1.11	>0.9, <1.1	Load power factor correction and voltage support if needed
SAUSALTO 60 kV	IGNACIO 60KV [7160] & IGNACIO 60KV [7150] MOAS OPENED ON SAN_RFLJ_GREENBRE	P6	N-1-1	>0.9, <1.1	0.90	0.85	>0.9, <1.1	0.84	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	0.88	0.88	>0.9, <1.1	>0.9, <1.1	0.85	Load power factor correction and voltage support if needed
SILVERDO 115 kV	FULTON 230/115KV TB 4 & FULTON 230/115KV TB 9	P6	N-1-1	>0.9, <1.1	>0.9, <1.1	0.83	>0.9, <1.1	0.82	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	0.82	Load power factor correction and voltage support if needed
SKAGGS 115 kV	GEYSR18-LAKEVILE-GEYSR20-GEYSR13 230KV [0] MOAS OPENED ON G13TT1_8_SNTAFE & IGNACIO SVD=R	P6	N-1-1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	1.13	1.13	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	1.13	>0.9, <1.1	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
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Peak	2020 Winter Peak	2023 Winter Peak	2028 Winter Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations		
SNTA RSA 115 kV	FULTON 230/115KV TB 9 & FULTON 230/115KV TB 4	P6	N-1-1	>0.9, <1.1	>0.9, <1.1	0.82	>0.9, <1.1	0.81	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	0.82	Load power factor correction and voltage support if needed	
SNTA RSA 115 kV	LAKEVILLE 230/115KV TB 1 & LAKEVILLE 230/115KV TB 2	P6	N-1-1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	1.10	1.10	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	1.11	>0.9, <1.1	Load power factor correction and voltage support if needed	
SONOMA 115 kV	LAKEVILLE 115KV [2063] & LAKEVILLE 115KV [2070]	P6	N-1-1	>0.9, <1.1	>0.9, <1.1	0.79	>0.9, <1.1	0.81	1.11	1.12	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	1.12	0.79	Load power factor correction and voltage support if needed	
SONOMA 115 kV	LAKEVILLE 230/115KV TB 2 & LAKEVILLE 230/115KV TB 1	P6	N-1-1	>0.9, <1.1	>0.9, <1.1	0.89	>0.9, <1.1	0.89	1.12	1.12	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	1.13	0.89	Load power factor correction and voltage support if needed	
ST.HELNA 60 kV	FULTON 230/115KV TB 4 & FULTON 230/115KV TB 9	P6	N-1-1	>0.9, <1.1	>0.9, <1.1	0.80	>0.9, <1.1	0.78	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	0.79	Load power factor correction and voltage support if needed	
ST.HELNA 60 kV	FULTON 115/60KV TB 2 & FULTON 115/60KV TB 1	P6	N-1-1	0.44	>0.9, <1.1	>0.9, <1.1	0.48	>0.9, <1.1	>0.9, <1.1	0.87	0.41	>0.9, <1.1	0.69	>0.9, <1.1	>0.9, <1.1	Load power factor correction and voltage support if needed	
STAFFORD 60 kV	GEYSR18-LAKEVILLE-GEYSR20-GEYSR13 230KV [0] MOAS OPENED ON G13TT1_8_SNTAFE & IGNACIO SVD=R	P6	N-1-1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	1.12	1.12	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	1.13	>0.9, <1.1	Load power factor correction and voltage support if needed	
STONY PT 115 kV	FULTON 230/115KV TB 9 & FULTON 230/115KV TB 4	P6	N-1-1	>0.9, <1.1	>0.9, <1.1	0.84	>0.9, <1.1	0.83	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	0.84	Load power factor correction and voltage support if needed	
TOCALOMA 60 kV	GEYSR18-LAKEVILLE-GEYSR20-GEYSR13 230KV [0] MOAS OPENED ON G13TT1_8_SNTAFE & IGNACIO SVD=R	P6	N-1-1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	1.12	1.12	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	1.13	>0.9, <1.1	Load power factor correction and voltage support if needed	
UKIAH 115 kV	GEYSERS #3 115KV [1650] MOAS OPENED ON MPE TAP_MPE & MENDOCINO 115KV [2420] MOAS OPENED ON MENDOCNO_CALPELLA	P6	N-1-1	0.79	0.83	0.76	>0.9, <1.1	0.87	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	0.80	>0.9, <1.1	>0.9, <1.1	0.76	Load power factor correction and voltage support if needed	
UPPR LKE 60 kV	EGLER RCK 115/60KV TB 1 & CLEAR LAKE-HOPLAND 60KV [6390] MOAS OPENED ON CLER LKE_GRANITE	P6	N-1-1	0.72	0.68	0.68	0.83	0.66	>0.9, <1.1	>0.9, <1.1	0.65	0.68	>0.9, <1.1	>0.9, <1.1	0.68	Middletown UVLS	
WILLITS 60 kV	KONOCI 60KV [6861] & GEYSERS #3 115KV [1650] MOAS OPENED ON MPE TAP_MPE	P6	N-1-1	>0.9, <1.1	>0.9, <1.1	0.87	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	0.90	>0.9, <1.1	>0.9, <1.1	0.88	Middletown UVLS	
WINDSOR 60 kV	FULTON 230/115KV TB 9 & FULTON 230/115KV TB 4	P6	N-1-1	>0.9, <1.1	>0.9, <1.1	0.84	>0.9, <1.1	0.82	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	0.83	Load power factor correction and voltage support if needed	
WINDSOR 60 kV	FULTON 115/60KV TB 1 & FULTON 115/60KV TB 2	P6	N-1-1	0.47	>0.9, <1.1	>0.9, <1.1	0.51	>0.9, <1.1	>0.9, <1.1	0.87	0.45	>0.9, <1.1	0.71	>0.9, <1.1	>0.9, <1.1	Load power factor correction and voltage support if needed	
WOHLER 60 kV	FULTON 230/115KV TB 9 & FULTON 230/115KV TB 4	P6	N-1-1	>0.9, <1.1	>0.9, <1.1	0.85	>0.9, <1.1	0.83	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	0.84	Load power factor correction and voltage support if needed	
WOHLER 60 kV	FULTON 115/60KV TB 1 & FULTON 115/60KV TB 2	P6	N-1-1	0.48	>0.9, <1.1	>0.9, <1.1	0.51	>0.9, <1.1	>0.9, <1.1	0.87	0.44	>0.9, <1.1	0.72	>0.9, <1.1	>0.9, <1.1	Load power factor correction and voltage support if needed	
WOODACRE 60 kV	GEYSR18-LAKEVILLE-GEYSR20-GEYSR13 230KV [0] MOAS OPENED ON G13TT1_8_SNTAFE & IGNACIO SVD=R	P6	N-1-1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	1.12	1.12	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	1.12	>0.9, <1.1	Load power factor correction and voltage support if needed	

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

High/Low Voltages



Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)									Voltage PU (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Peak	2020 Winter Peak	2023 Winter Peak	2028 Winter Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations		
BELLVUE 115 kV	FULTON-SANTA ROSA #1 & FULTON-SANTA ROSA #2 LINES	P7	DCTL	0.99	1.02	0.87	1.01	0.87	1.03	1.04	1.04	1.02	1.02	1.04	0.88	Load power factor correction and voltage support if needed	
PUEBLO 115 kV	LAKEVILLE-SONOMA #1 & LAKEVILLE-SONOMA #2 LINES	P7	DCTL	0.95	0.99	0.82	1.02	0.84	1.10	1.11	0.93	0.98	1.03	1.11	0.82	Load power factor correction and voltage support if needed	
SNTA RSA 115 kV	FULTON-SANTA ROSA #1 & FULTON-SANTA ROSA #2 LINES	P7	DCTL	0.99	1.03	0.85	1.01	0.85	1.03	1.04	1.05	1.03	1.02	1.04	0.85	Load power factor correction and voltage support if needed	
SONOMA 115 kV	LAKEVILLE-SONOMA #1 & LAKEVILLE-SONOMA #2 LINES	P7	DCTL	0.93	0.98	0.79	1.01	0.81	1.11	1.12	0.91	0.97	1.03	1.12	0.79	Load power factor correction and voltage support if needed	
STONY PT 115 kV	FULTON-SANTA ROSA #1 & FULTON-SANTA ROSA #2 LINES	P7	DCTL	0.99	1.02	0.86	1.01	0.86	1.03	1.04	1.04	1.02	1.02	1.04	0.87	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
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Peak	2020 Winter Peak	2023 Winter Peak	2028 Winter Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations		
CLER LKE 60 kV	KONOCI 60KV [6861]	P1	N-1	7	12	22	0	0	6	3	27	14	3	1	22	Load power factor correction and voltage support if needed	
GRANITE 60 kV	KONOCI 60KV [6861]	P1	N-1	6	11	18	0	0	5	3	22	12	2	1	18	Load power factor correction and voltage support if needed	
HARTLEY 60 kV	KONOCI 60KV [6861]	P1	N-1	6	11	18	0	0	5	3	23	12	3	1	18	Load power factor correction and voltage support if needed	
KONOCI6 60 kV	KONOCI 60KV [6861]	P1	N-1	12	18	33	1	0	10	6	40	20	6	1	33	Load power factor correction and voltage support if needed	
LOWR LKE 60 kV	KONOCI 60KV [6861]	P1	N-1	13	18	35	1	0	10	6	42	20	6	1	35	Load power factor correction and voltage support if needed	
MIDDLTWN 60 kV	KONOCI 60KV [6861]	P1	N-1	13	18	38	1	0	10	6	45	20	6	1	38	Load power factor correction and voltage support if needed	
UPPR LKE 60 kV	KONOCI 60KV [6861]	P1	N-1	5	9	14	0	0	4	2	18	10	2	0	14	Load power factor correction and voltage support if needed	
CALISTGA 60 kV	LAKEVILLE #1 60KV [7360]	P1	N-1	7	8	9	0	1	9	5	9	9	2	2	9	Load power factor correction and voltage support if needed	
DUNBAR 60 kV	LAKEVILLE #1 60KV [7360]	P1	N-1	9	10	10	2	4	11	5	10	11	0	4	10	Load power factor correction and voltage support if needed	
ST.HELNA 60 kV	LAKEVILLE #1 60KV [7360]	P1	N-1	7	8	9	0	1	9	5	8	8	2	2	9	Load power factor correction and voltage support if needed	
CLER LKE 60 kV	EGLE RCK 115/60KV TB 1	P1	N-1	7	12	21	0	0	6	3	27	14	3	1	21	Load power factor correction and voltage support if needed	
EGLE RCK 60 kV	EGLE RCK 115/60KV TB 1	P1	N-1	14	20	35	0	1	10	6	43	22	7	2	36	Load power factor correction and voltage support if needed	
GRANITE 60 kV	EGLE RCK 115/60KV TB 1	P1	N-1	6	10	17	0	0	5	3	22	12	2	1	17	Load power factor correction and voltage support if needed	
HARTLEY 60 kV	EGLE RCK 115/60KV TB 1	P1	N-1	6	11	18	0	0	5	3	23	12	2	1	18	Load power factor correction and voltage support if needed	
KONOCI6 60 kV	EGLE RCK 115/60KV TB 1	P1	N-1	12	18	32	1	0	10	6	40	20	6	1	32	Load power factor correction and voltage support if needed	
LOWR LKE 60 kV	EGLE RCK 115/60KV TB 1	P1	N-1	12	18	34	1	0	10	6	42	20	6	1	34	Load power factor correction and voltage support if needed	
MIDDLTWN 60 kV	EGLE RCK 115/60KV TB 1	P1	N-1	13	17	37	1	0	10	6	45	20	6	1	38	Load power factor correction and voltage support if needed	
UPPR LKE 60 kV	EGLE RCK 115/60KV TB 1	P1	N-1	4	9	14	0	0	4	2	18	10	2	0	14	Load power factor correction and voltage support if needed	
BIG RIVR 60 kV	BIG RIVR 60.00KV ID=7H & BIG RIVR 60.00KV ID=5H & BIG RIVR 60.00KV ID=8H & BIG RIVR 60.00KV ID=V SHUNT DEVICES	P1	N-1	7	8	5	2	1	4	5	6	9	4	1	5	Load power factor correction and voltage support if needed	
KONOCI6 60 kV	SANTA FE 13.80KV GEN UNIT 1 & EGLE RCK 115/60KV TB 1	P3	G1/N1	<8	<8	35	<8	<8	<8	<8	40	<8	<8	<8	34	Load power factor correction and voltage support if needed	
CALISTGA 60 kV	GEYSER16 13.80KV GEN UNIT 1 & LAKEVILLE #1 60KV [7360]	P3	G1/N1	8	8	9	<8	<8	9	<8	9	<8	<8	<8	<8	Load power factor correction and voltage support if needed	



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
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Peak	2020 Winter Peak	2023 Winter Peak	2028 Winter Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations		
DUNBAR 60 kV	GEYSER16 13.80KV GEN UNIT 1 & LAKEVILLE #1 60KV [7360]	P3	G1/N1	9	10	10	<8	<8	11	<8	11	<8	<8	<8	<8	<8	Load power factor correction and voltage support if needed
ST.HELNA 60 kV	GEYSER16 13.80KV GEN UNIT 1 & LAKEVILLE #1 60KV [7360]	P3	G1/N1	<8	8	8	<8	<8	9	<8	8	<8	<8	<8	<8	<8	Load power factor correction and voltage support if needed
CALISTGA 60 kV	GEYSER17 13.80KV GEN UNIT 1 & LAKEVILLE #1 60KV [7360]	P3	G1/N1	<8	<8	9	<8	<8	<8	<8	8	<8	<8	<8	<8	9	Load power factor correction and voltage support if needed
BIG RIVR 60 kV	GEYSER17 13.80KV GEN UNIT 1 & BIG RIVR 60.00KV ID=7H & BIG RIVR 60.00KV ID=5H & BIG RIVR 60.00KV ID=8H & BIG RIVR 60.00KV ID=V SHUNT DEVICES	P3	G1/N1	<8	<8	<8	<8	<8	<8	<8	<8	9	<8	<8	<8	<8	Load power factor correction and voltage support if needed
KONOCTI6 60 kV	POTTRVLY 2.40KV GEN UNIT 1 & PKONOCTI 60KV [6861]	P3	G1/N1	<8	18	34	<8	<8	10	<8	<8	<8	<8	<8	<8	35	Load power factor correction and voltage support if needed
LOWR LKE 60 kV	POTTRVLY 2.40KV GEN UNIT 1 & PKONOCTI 60KV [6861]	P3	G1/N1	<8	18	37	<8	<8	10	<8	<8	<8	<8	<8	<8	37	Load power factor correction and voltage support if needed
MIDDLTWN 60 kV	POTTRVLY 2.40KV GEN UNIT 1 & PKONOCTI 60KV [6861]	P3	G1/N1	13	18	40	<8	<8	10	<8	<8	<8	<8	<8	<8	40	Load power factor correction and voltage support if needed
LOWR LKE 60 kV	POTTRVLY 2.40KV GEN UNIT 1 & PEGLE RCK 115/60KV TB 1	P3	G1/N1	<8	18	37	<8	<8	10	<8	42	<8	<8	<8	<8	37	Load power factor correction and voltage support if needed
MIDDLTWN 60 kV	POTTRVLY 2.40KV GEN UNIT 1 & PEGLE RCK 115/60KV TB 1	P3	G1/N1	13	18	40	<8	<8	10	<8	46	<8	<8	<8	<8	41	Load power factor correction and voltage support if needed
UPPR LKE 60 kV	POTTRVLY 2.40KV GEN UNIT 1 & PEGLE RCK 115/60KV TB 1	P3	G1/N1	<8	<8	15	<8	<8	<8	<8	18	<8	<8	<8	<8	15	Load power factor correction and voltage support if needed
EGLE RCK 60 kV	GEO. ENGY 9.11KV GEN UNIT 1 & PEGLE RCK 115/60KV TB 1	P3	G1/N1	<8	<8	38	<8	<8	<8	<8	44	<8	<8	<8	<8	38	Load power factor correction and voltage support if needed
GRANITE 60 kV	GEO. ENGY 9.11KV GEN UNIT 2 & PKONOCTI 60KV [6861]	P3	G1/N1	<8	<8	19	<8	<8	<8	<8	22	<8	<8	<8	<8	19	Load power factor correction and voltage support if needed
LOWR LKE 60 kV	GEO. ENGY 9.11KV GEN UNIT 2 & PKONOCTI 60KV [6861]	P3	G1/N1	<8	<8	37	<8	<8	<8	<8	42	<8	<8	<8	<8	37	Load power factor correction and voltage support if needed
MIDDLTWN 60 kV	GEO. ENGY 9.11KV GEN UNIT 2 & PKONOCTI 60KV [6861]	P3	G1/N1	<8	<8	41	<8	<8	<8	<8	45	<8	<8	<8	<8	41	Load power factor correction and voltage support if needed
BIG RIVR 60 kV	GEYSR5-6 13.80KV GEN UNIT 1 & BIG RIVR 60.00KV ID=7H & BIG RIVR 60.00KV ID=5H & BIG RIVR 60.00KV ID=8H & BIG RIVR 60.00KV ID=V SHUNT DEVICES	P3	G1/N1	<8	9	<8	<8	<8	<8	<8	<8	9	<8	<8	<8	<8	Load power factor correction and voltage support if needed
GRANITE 60 kV	GEYSER11 13.80KV GEN UNIT 1 & KONOCTI 60KV [6861]	P3	G1/N1	<8	11	19	<8	<8	<8	<8	22	<8	<8	<8	<8	19	Load power factor correction and voltage support if needed
HARTLEY 60 kV	GEYSER11 13.80KV GEN UNIT 1 & KONOCTI 60KV [6861]	P3	G1/N1	<8	11	20	<8	<8	<8	<8	22	<8	<8	<8	<8	20	Load power factor correction and voltage support if needed
KONOCTI6 60 kV	GEYSER11 13.80KV GEN UNIT 1 & KONOCTI 60KV [6861]	P3	G1/N1	12	18	35	<8	<8	<8	<8	40	<8	<8	<8	<8	35	Load power factor correction and voltage support if needed
LOWR LKE 60 kV	GEYSER11 13.80KV GEN UNIT 1 & KONOCTI 60KV [6861]	P3	G1/N1	13	18	37	<8	<8	<8	<8	42	<8	<8	<8	<8	37	Load power factor correction and voltage support if needed



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
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Peak	2020 Winter Peak	2023 Winter Peak	2028 Winter Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations		
MIDDLTWN 60 kV	GEYSER11 13.80KV GEN UNIT 1 & KONOCTI 60KV [6861]	P3	G1/N1	13	18	40	<8	<8	<8	<8	45	<8	<8	<8	40	Load power factor correction and voltage support if needed	
UPPR LKE 60 kV	GEYSER11 13.80KV GEN UNIT 1 & KONOCTI 60KV [6861]	P3	G1/N1	<8	9	15	<8	<8	<8	<8	17	<8	<8	<8	15	Load power factor correction and voltage support if needed	
EGLE RCK 60 kV	GEYSER11 13.80KV GEN UNIT 1 & EGLE RCK 115/60KV TB 1	P3	G1/N1	14	20	38	<8	<8	<8	<8	43	<8	<8	<8	38	Load power factor correction and voltage support if needed	
CALISTGA 60 kV	GEYSER12 13.80KV GEN UNIT 1 & LAKEVILLE #1 60KV [7360]	P3	G1/N1	7	<8	10	<8	<8	<8	<8	9	9	<8	<8	10	Load power factor correction and voltage support if needed	
DUNBAR 60 kV	GEYSER12 13.80KV GEN UNIT 1 & LAKEVILLE #1 60KV [7360]	P3	G1/N1	9	<8	10	<8	<8	<8	<8	10	12	<8	<8	10	Load power factor correction and voltage support if needed	
ST.HELNA 60 kV	GEYSER12 13.80KV GEN UNIT 1 & LAKEVILLE #1 60KV [7360]	P3	G1/N1	<8	<8	9	<8	<8	<8	<8	8	8	<8	<8	9	Load power factor correction and voltage support if needed	

Contingency	Category	Category Description	Transient Stability Performance					Potential Mitigation Solutions
			Baseline Scenarios			Sensitivity Scenarios		
			2020 Summer Peak	2028 Summer Peak	2023 Spring Off-Peak	2020 SP Heavy Renewable & Min Gas Gen	2023 SpOP Hi Renew & Min Gas Gen	
Bus fault at LAKEVILLE 230kV	P2-2	Bus	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Internal fault at Non-bus-tie-breaker #222 at LAKEVILLE 230kV	P2-3	Non-Bus-Tie Breaker	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Internal fault at Bus-tie-breaker #422 at LAKEVILLE 230kV	P2-4	Bus-Tie Breaker	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
GEYSER11 Unit 1 and LAKEVILLE -CR2T3_18 230kV No.1 Line	P3-2	G-1/N-1	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Breaker stuck for CB #212 protecting LAKEVILLE-CR2T3_18 230kV #1 Line	P4-2	Stuck Breaker	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Breaker stuck for CB #282 protecting LAKEVILLE/LAKEVILLE 115/230kV No.2 Transformer	P4-3	Stuck Breaker	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Breaker stuck for CB #202 protecting LAKEVILLE 230 kV Bus #2 SEC E	P4-5	Stuck Breaker	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Breaker stuck for CB #422 protecting LAKEVILLE 230kV Bus #2 SEC E	P4-6	Stuck Breaker	Stable/WECC criteria met	WECC criteria not met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Mitigation under study
LAKEVILLE -CR2T3_18 230kV No.1 Line	P5-2	Non-Redundant Relay	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
LAKEVILLE/LAKEVILLE 230/115 kV No.1 Transformer	P5-3	Non-Redundant Relay	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
LAKEVILLE 230kV SEC E	P5-5	Non-Redundant Relay	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
LAKEVILLE -CR2T3_18 230kV No.1 Line and TULUCAY-VACA-DIX 230kV No.1 Line	P6-1	N-1-1	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
LAKEVILLE -CR2T3_18 230kV No.1 Line and IGNACIO/IGNACIO 230/115 kV No.6 Transformer	P6-2	N-1-1	Stable/WECC criteria met	WECC criteria not met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Mitigation under study
IGNACIO/IGNACIO 230/115 kV No.6 Transformer	P1-3	N-1	Stable/WECC criteria met	WECC criteria not met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Mitigation under study
PUEBLO 115kV ID. v SVD	P1-4	N-1	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
LP SAMOA Unit 1 and HUMB_BS1/HUMB_G1 115/13.8 kV No.1 Transformer	P3-3	G-1/N-1	Stable/WECC criteria met	WECC criteria not met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Mitigation under study
GEYSER11 Unit 1 and PUEBLO 115 kV ID v SVD	P3-4	G-1/N-1	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
PUEBLO 115 kV ID v SVD and BIG RIVR 60 kV ID v SVD	P6-3	N-1-1	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Breaker stuck for CB #366 protecting MENDOCNO 115 kV ID v SVD	P4-4	Stuck Breaker	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
MENDOCNO 115 kV ID v SVD	P5-4	Non-Redundant Relay	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Breaker stuck for CB #182 protecting GEYSER78 Unit 1	P4-1	Stuck Breaker	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
GEYSER78 Unit 1	P5-1	Non-Redundant Relay	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
GEYSER11 Unit 1	P1-1	N-1	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
GEYSER11 Unit 1 and GEYSER13 Unit 1	P3-1	G-1/N-1	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Successful reclose on fault on Fulton - Lakeville 230 kV Line and Geysers 9 - Lakeville 230 kV Line	P7-1	DCTL	WECC criteria not met	WECC criteria not met	Stable/WECC criteria met	WECC criteria not met	Stable/WECC criteria met	Mitigation under study
Failed reclose on fault on Fulton - Lakeville 230 kV Line and Geysers 9 - Lakeville 230 kV Line	P7-1	DCTL	Stable/WECC criteria met	WECC criteria not met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Mitigation under study

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



*Single Contingency Load Drop*

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

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
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations	
30300 TBL MT D 230 30325 PALERMO 230 1 1	BUS TIE 230KV [9999] & TABLE MTN-RIO OSO 230KV [5700]	P6	N-1-1	<100	<100	<100	91	<100	103	<100	<100	<100	Sensitivity only
30300 TBL MT D 230 30330 RIO OSO 230 1 1	BUS TIE 230KV [9999] & TABLE MTN-PALERMO 230KV [5690] MOAS OPENED ON TBL MT D_PALERMO	P6	N-1-1	<100	<100	<100	112	<100	99	<100	<100	<100	Project: Rio Oso Transformer Upgrade and Voltage Support projects In-Service Date: June 2022 Short term: Action plan
31464 COTWDPGE 115 30104 COTWD_E2 230 1 1	DE SABLA 6.90KV GEN UNIT 1 & COTWD_F2 230/115KV TB 4	P3	G-1/N-1	<100	<100	<100	100	<100	<100	<100	79.2	<100	Generator dispatch
	COTWD_F2 230/115KV TB 4	P1	N-1	70	20	20	101	26	17	28	101	11	Generator dispatch
	BRNY_FST 230/13.2KV TB 1 & COTWD_F2 230/115KV TB 4	P6	N-1-1	<100	<100	<100	100	<100	<100	<100	72	<100	Continue to monitor future load forecast. Potential future mitigation are preferred resources or line rerate/upgrade
	COTWD_F2 230KV SECTION 2F	P2-2	Bus	68	19	18	101	26	17	28	96	11	Generator dispatch
	COTWDPGE 115KV SECTION 2F	P2-2	Bus	70	20	20	101	26	17	28	101	11	Generator dispatch
	COTWD_F2 - 2F 230KV & PIT #1-COTTONWOOD LINE	P2-3	Non-Bus-Tie Breaker	68	19	19	101	26	17	28	97	10	Generator dispatch
	COTWD_F SECTION 1F & COTWD_F2 SECTION 2F 230KV	P2-4	Bus-Tie Breaker	69	19	18	101	26	17	28	97	10	Generator dispatch
31464 COTWDPGE 115 31466 JESSUPJ1 115 1 1	COTWD_E2 230/60KV TB 2 & COTWD_E 230/60KV TB 3	P6	N-1-1	<100	<100	<100	100	101	<100	100	<100	94	Generator dispatch
31478 TBLM JCT 115 31494 BIGBENTP 115 1 1	TABLE MTN-BUTTE #2 115KV [3920] & BUTTE-CHICO B-TBLE MTN 115KV [3910]	P6	N-1-1	114	116	135	<100	<100	121	<100	<100	135	SPS recommended in 2017-2018 TPP
	TBLE MTN 115KV SECTION 1D	P2-2	Bus	114	117	135	14	10	121	13	85	135	SPS recommended in 2017-2018 TPP
	TBLE MTN - 1D 115KV & BUTTE-CHICO B-TBLE MTN LINE	P2-3	Non-Bus-Tie Breaker	114	116	135	13	10	121	13	85	135	SPS recommended in 2017-2018 TPP
	Sycamore Creek-Notre Dame-Table Mountain and Table Mountain-Butte No.2 115 kV Lines	P7	DCTL	100	102	118	11	8	106	11	73	117	SPS recommended in 2017-2018 TPP
31480 WYANDTTE 115 31518 WYANDJT1 115 1 1	Base Case	P0	Base Case	98	100	109	13	8	103	11	79	109	Continue to monitor future load forecast. Potential future mitigation are preferred resources or line rerate/upgrade
31482 PALERMO 115 31516 WYANDJT2 115 2 1	CARIBOU-TABLE MTN 230KV [4440] & PALERMO-WYANDOTTE 115KV [4315]	P6	N-1-1	102	110	140	<100	<100	118	<100	<100	139	Existing SPS under review
	CARIBOU-TABLE MTN 230KV [4440] (BELDENTP-TBL MT D)	P2-1	Line Section w/o Fault	Diverge	Diverge	Diverge	35	43	Diverge	44	Diverge	Diverge	Existing SPS under review
	TBL MT D 230KV SECTION 1D	P2-2	Bus	Diverge	Diverge	Diverge	35	43	Diverge	44	Diverge	Diverge	Existing SPS under review
	TBL MT D SECTION 1D & TBL MT E SECTION 1E 230KV	P2-4	Bus-Tie Breaker	Diverge	Diverge	Diverge	36	43	Diverge	44	Diverge	Diverge	Existing SPS under review
	TBL MT D 230KV - SECTION 1D & 2D	P2-4	Bus-Tie Breaker	Diverge	N/A	N/A	30	N/A	N/A	N/A	Diverge		Existing SPS under review
31486 CARIBOU 115 31488 GRIZ JCT 115 1 1	TABLE MT 500/230KV TB 1 & CARIBOU 230/230KV TB 11	P6	N-1-1	99	99	100	<100	<100	100	<100	100	<100	Existing SPS under review
	CARIBOU-TABLE MTN 230KV [4440] (BELDENTP-TBL MT D)	P2-1	Line Section w/o Fault	Diverge	Diverge	Diverge	13	20	Diverge	21	Diverge	Diverge	Existing SPS under review
	TBL MT D 230KV SECTION 1D	P2-2	Bus	Diverge	Diverge	Diverge	13	20	Diverge	20	Diverge	Diverge	Existing SPS under review
	TBL MT D SECTION 1D & TBL MT E SECTION 1E 230KV	P2-4	Bus-Tie Breaker	Diverge	Diverge	Diverge	15	20	Diverge	21	Diverge	Diverge	Existing SPS under review
	TBL MT D 230KV - SECTION 1D & 2D	P2-4	Bus-Tie Breaker	Diverge	N/A	N/A	10	N/A	N/A	N/A	Diverge		Existing SPS under review
31488 GRIZ JCT 115 31512 BIG BEND 115 1 1	TABLE MT 500/230KV TB 1 & CARIBOU 230/230KV TB 11	P6	N-1-1	105	105	106	<100	<100	106	<100	106	<100	Existing SPS under review
	CARIBOU-TABLE MTN 230KV [4440] (BELDENTP-TBL MT D)	P2-1	Line Section w/o Fault	Diverge	Diverge	Diverge	36	44	Diverge	45	Diverge	Diverge	Existing SPS under review
	TBL MT D 230KV SECTION 1D	P2-2	Bus	Diverge	Diverge	Diverge	36	43	Diverge	44	Diverge	Diverge	Existing SPS under review
	TBL MT D SECTION 1D & TBL MT E SECTION 1E 230KV	P2-4	Bus-Tie Breaker	Diverge	Diverge	Diverge	38	44	Diverge	45	Diverge	Diverge	Existing SPS under review

Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading % (Baseline Scenarios)					Loading % (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations	
	TBL MT D 230KV - SECTION 1D & 2D	P2-4	Bus-Tie Breaker	Diverge	N/A	N/A	31.83	N/A	N/A	N/A	Diverge		Existing SPS under review
31497 NDAME J 115 31498 SYCAMORE 115 1 1	NOTRE DAME-BUTTE 115KV [4312] & BUTTE-SYCAMORE CREEK 115KV [1190] MOAS OPENED ON NORD 1_CHICOTP2	P6	N-1-1	<100	<100	119	<100	<100	<100	<100	<100	119	SPS recommended in 2017-2018 TPP
	BUTTE-SYCAMORE CREEK 115KV [1190] MOAS OPENED ON NORD 1_CHICOTP2	P1	N-1	97	102	115	12	14	106	19	69	115	Significant increase in load in base cases compared to last year. Load forecast under review.
	BUTTE-SYCAMORE CREEK 115KV [1190] (NORD 1-CHICOTP2)	P2-1	Line Section w/o Fault	97	102	115	12	14	106	19	69	114	SPS recommended in 2017-2018 TPP
	BUTTE 115KV SECTION MD	P2-2	Bus	98	103	115	13	15	107	20	70	115	SPS recommended in 2017-2018 TPP
	BUTTE - MD 115KV & BUTTE-CHICO B-TBLE MTN LINE	P2-3	Non-Bus-Tie Breaker	129	136	150	19	18	140	23	96	150	SPS recommended in 2017-2018 TPP
	BUTTE - MD 115KV & BUTTE-SYCAMORE CREEK LINE	P2-3	Non-Bus-Tie Breaker	98	103	115	12	14	106	19	69	115	SPS recommended in 2017-2018 TPP
	BUTTE 115KV - SECTION ME & MD	P2-4	Bus-Tie Breaker	98	103	119	13	15	107	19	69	119	SPS recommended in 2017-2018 TPP
31500 BUTTE 115 31501 CHICOTP1 115 1 1	TABLE MTN-BUTTE #2 115KV [3920] & SYCAMORE CREEK-NOTRE DAME-TABLE MTN 115KV [4314]	P6	N-1-1	115	118	139	<100	<100	122	<100	<100	140	SPS recommended in 2017-2018 TPP
	Sycamore Creek-Notre Dame-Table Mountain and Table Mountain-Butte No.2 115 kV Lines	P7	DCTL	115	118	139	10	13	123	19	81	139	SPS recommended in 2017-2018 TPP
31500 BUTTE 115 31504 TBLE MTN 115 2 1	BUTTE-CHICO B-TBLE MTN 115KV [3910] & SYCAMORE CREEK-NOTRE DAME-TABLE MTN 115KV [4314]	P6	N-1-1	132	135	161	<100	<100	141	<100	95	160	SPS recommended in 2017-2018 TPP
	TBLE MTN - 2D 115KV & SYCAMORE CREEK-NOTRE DAME-TABLE MTN LINE	P2-3	Non-Bus-Tie Breaker	85	87	100	8	9	91	12	62	100	SPS recommended in 2017-2018 TPP
31501 CHICOTP1 115 31504 TBLE MTN 115 1 1	TABLE MTN-BUTTE #2 115KV [3920] & SYCAMORE CREEK-NOTRE DAME-TABLE MTN 115KV [4314]	P6	N-1-1	135	138	160	<100	<100	143	<100	98	161	SPS recommended in 2017-2018 TPP
	TBLE MTN 115KV SECTION 2D	P2-2	Bus	101	103	117	12	11	107	14	75	117	SPS recommended in 2017-2018 TPP
	TBLE MTN - 2D 115KV & PARADISE-TABLE MTN LINE	P2-3	Non-Bus-Tie Breaker	101	103	117	12	11	107	14	75	117	SPS recommended in 2017-2018 TPP
	TBLE MTN - 2D 115KV & SYCAMORE CREEK-NOTRE DAME-TABLE MTN LINE	P2-3	Non-Bus-Tie Breaker	101	104	118	12	11	108	14	76	118	SPS recommended in 2017-2018 TPP
	Sycamore Creek-Notre Dame-Table Mountain and Table Mountain-Butte No.2 115 kV Lines	P7	DCTL	135	138	161	15	15	143	20	98	160	SPS recommended in 2017-2018 TPP
31503 CHICOTP2 115 31500 BUTTE 115 1 1	BUTTE-CHICO B-TBLE MTN 115KV [3910] & SYCAMORE CREEK-NOTRE DAME-TABLE MTN 115KV [4314]	P6	N-1-1	93	97	113	<100	<100	100	<100	<100	112	SPS recommended in 2017-2018 TPP
31504 TBLE MTN 115 31497 NDAME J 115 1 1	BUTTE-CHICO B-TBLE MTN 115KV [3910] & TABLE MTN-BUTTE #2 115KV [3920]	P6	N-1-1	98	101	118	<100	<100	104	<100	<100	119	SPS recommended in 2017-2018 TPP
	TBLE MTN 115KV SECTION 1D	P2-2	Bus	98	100	118	11	11	104	15	71	118	SPS recommended in 2017-2018 TPP
	TBLE MTN - 1D 115KV & BUTTE-CHICO B-TBLE MTN LINE	P2-3	Non-Bus-Tie Breaker	98	100	118	10	11	104	15	71	118	SPS recommended in 2017-2018 TPP
31514 PARADSE 115 31494 BIGBENTP 115 1 1	BUTTE-CHICO B-TBLE MTN 115KV [3910] & TABLE MTN-BUTTE #2 115KV [3920]	P6	N-1-1	98	101	116	<100	<100	104	<100	<100	117	SPS recommended in 2017-2018 TPP
	TBLE MTN 115KV SECTION 1D	P2-2	Bus	99	101	117	11	8	105	11	74	117	SPS recommended in 2017-2018 TPP
	TBLE MTN - 1D 115KV & BUTTE-CHICO B-TBLE MTN LINE	P2-3	Non-Bus-Tie Breaker	99	101	117	11	8	104	11	73	117	SPS recommended in 2017-2018 TPP
	Sycamore Creek-Notre Dame-Table Mountain and Table Mountain-Butte No.2 115 kV Lines	P7	DCTL	86	88	102	9	6	92	9	63	101	SPS recommended in 2017-2018 TPP
31516 WYANDJT2 115 31512 BIG BEND 115 2 1	TABLE MT 500/230KV TB 1 & CARIBOU 230/230KV TB 11	P6	N-1-1	105	105	106	<100	<100	106	<100	106	<100	Existing SPS under review
	CARIBOU-TABLE MTN 230KV [4440] (BELDENTP-TBL MT D)	P2-1	Line Section w/o Fault	Diverge	Diverge	Diverge	35	43	Diverge	44	Diverge	Diverge	Existing SPS under review
	TBL MT D 230KV SECTION 1D	P2-2	Bus	Diverge	Diverge	Diverge	36	43	Diverge	44	Diverge	Diverge	Existing SPS under review



Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading % (Baseline Scenarios)					Loading % (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations	
	TBL MT D SECTION 1D & TBL MT E SECTION 1E 230KV	P2-4	Bus-Tie Breaker	Diverge	Diverge	Diverge	37	44	Diverge	44	Diverge	Diverge	Existing SPS under review
	TBL MT D 230KV - SECTION 1D & 2D	P2-4	Bus-Tie Breaker	Diverge	N/A	N/A	31	N/A	N/A	N/A	Diverge	N/A	Existing SPS under review
31556 TRINITY 60.0 31564 FRNCHGLH 60.0 1 1	COTWDPGE 115KV - SECTION 2D & 1D	P2-4	Bus-Tie Breaker	146	142	141	20	52	138	41	162	115	Substation upgrade or SPS
31564 FRNCHGLH 60.0 31566 KESWICK 60.0 1 1	COTWDPGE 115KV - SECTION 2D & 1D	P2-4	Bus-Tie Breaker	145	142	139	20	53	137	42	161	113	Substation upgrade or SPS
31566 KESWICK 60.0 31582 STILLWATR 60.0 1 1	COTWDPGE 115KV - SECTION 2D & 1D	P2-4	Bus-Tie Breaker	160	158	152	22	61	153	48	180	121	Substation upgrade or SPS
	COTWD_E 230/60KV TB 3 & COTWD_E2 230/60KV TB 2	P6	N-1-1	<100	<100	127	<100	<100	91	<100	<100	124	SPS
31570 BENTON 60.0 31572 GIRVAN 60.0 1 1	COTWD_F2 SECTION 2F & COTWD_E2 SECTION 2E 230KV	P2-4	Bus-Tie Breaker	78	77	67	95	94	71	102	102	23	Sensitivity only
	COTWD_F2 230/115KV TB 4 & COTWD_E2 230/115KV TB 1	P6	N-1-1	<100	<100	<100	73	102	<100	107	<100	<100	Generator dispatch
31572 GIRVAN 60.0 31574 ANDERSON 60.0 1 1	COTWD_F2 SECTION 2F & COTWD_E2 SECTION 2E 230KV	P2-4	Bus-Tie Breaker	45	43	40	95	98	36	109	81	33	Sensitivity only
31574 ANDERSON 60.0 31604 COTTONWD 60.0 1 1	COTWD_F2 SECTION 2F & COTWD_E2 SECTION 2E 230KV	P2-4	Bus-Tie Breaker	22	22	49	84	90	22	102	51	82	Sensitivity only
	NEO REDB 13.80KV GEN UNIT 1 & CASCADE-COTTONWOOD 115KV [1240]	P3	G-1/N-1	<100	<100	<100	94	100	<100	101	<100	<100	Sensitivity only
	COTWD_F2 230/115KV TB 4 & COTWD_E2 230/115KV TB 1	P6	N-1-1	36	33	38	147	200	32	210	69	<100	Generator dispatch
	CASCADE-COTTONWOOD 115KV [1240] (COTWDPGE-JESSUPJ1)	P2-1	Line Section w/o Fault	32	25	24	117	129	14	137	69	52	Generator dispatch
31576 WNTU PMS 60.0 31570 BENTON 60.0 1 1	COTWDPGE 115KV SECTION 2D	P2-2	Bus	37	29	29	119	129	18	138	76	54	Generator dispatch
	COTWDPGE - 2D 115KV & BRIDGEVILLE-COTTONWOOD LINE	P2-3	Non-Bus-Tie Breaker	37	29	29	119	129	18	137	76	55	Generator dispatch
	COTWD_F2 SECTION 2F & COTWD_E2 SECTION 2E 230KV	P2-4	Bus-Tie Breaker	123	119	105	191	194	106	214	184	50	Substation upgrade or SPS
	COTWDPGE 115KV - SECTION 2D & 1D	P2-4	Bus-Tie Breaker	79	68	75	145	137	55	151	127	80	Generator dispatch
	NEO REDB 13.80KV GEN UNIT 1 & CASCADE-COTTONWOOD 115KV [1240]	P3	G-1/N-1	<100	<100	<100	100	106	<100	106	<100	<100	Generator dispatch
	COTWD_F2 230/115KV TB 4 & COTWD_E2 230/115KV TB 1	P6	N-1-1	43	39	42	153	206	38	216	75	<100	Generator dispatch
	CASCADE-COTTONWOOD 115KV [1240] (COTWDPGE-JESSUPJ1)	P2-1	Line Section w/o Fault	39	31	24	123	135	21	143	76	49	Generator dispatch
31576 WNTU PMS 60.0 31578 LOMS JCT 60.0 1 1	COTWDPGE 115KV SECTION 2D	P2-2	Bus	43	35	30	125	135	25	144	82	52	Generator dispatch
	COTWDPGE - 2D 115KV & BRIDGEVILLE-COTTONWOOD LINE	P2-3	Non-Bus-Tie Breaker	43	35	30	125	135	25	143	82	52	Generator dispatch
	COTWD_F2 SECTION 2F & COTWD_E2 SECTION 2E 230KV	P2-4	Bus-Tie Breaker	129	125	110	197	200	112	219	190	48	Substation upgrade or SPS
	COTTONWD 60KV - SECTION 1D & 1E	P2-4	Bus-Tie Breaker	N/A	Diverge	Diverge	N/A	12	Diverge	11	N/A	Diverge	Non-BES Facility
	COTWDPGE 115KV - SECTION 2D & 1D	P2-4	Bus-Tie Breaker	84	73	77	150	143	61	157	132	79	Generator dispatch
31578 LOMS JCT 60.0 31592 DESCHUTS 60.0 1 1	COTTONWD 60KV - SECTION 1D & 1E	P2-4	Bus-Tie Breaker	N/A	Diverge	Diverge	N/A	37	Diverge	26	N/A	Diverge	Non-BES Facility
	Base Case	P0	Base Case	85	95	106	44	40	109	57	72	71	Significant increase in load in base cases compared to last year. Load forecast under review.
	COLEMAN 6.60KV GEN UNIT 1 & CASCADE-COTTONWOOD 115KV [1240]	P3	G-1/N-1	101	100	100	98	98	103	101	102	100	Significant increase in load in base cases compared to last year. Load forecast under review.
	NEO REDB 13.80KV GEN UNIT 1	P1	N-1	82	93	102	45	41	104	49	71	71	Significant increase in load in base cases compared to last year. Load forecast under review.

Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading % (Baseline Scenarios)					Loading % (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations	
31580 CASCADE 60.0 31581 OREGNTRL 60.0 1 1	CASCADE-COTTONWOOD 115KV [1240]	P1	N-1	111	112	112	100	100	115	112	108	100	Significant increase in load in base cases compared to last year. Load forecast under review.
	COTWD_E2 230/60KV TB 2	P1	N-1	81	92	108	31	25	108	47	64	75	Significant increase in load in base cases compared to last year. Load forecast under review.
	COTWD_E 230/60KV TB 3	P1	N-1	81	92	107	31	24	108	46	64	75	Significant increase in load in base cases compared to last year. Load forecast under review.
	COTWD_E 230/60KV TB 3 & COTWD_E2 230/60KV TB 2	P6	N-1-1	232	239	339	<100	<100	255	<100	<100	306	Substation upgrade or SPS
	NEO REDT 60/13.8KV TB 1	P1	N-1	82	93	101	45	41	104	49	71	70	Significant increase in load in base cases compared to last year. Load forecast under review.
	CASCADE-COTTONWOOD 115KV [1240] (COTWDPGE-JESSUPJ1)	P2-1	Line Section w/o Fault	97	94	89	143	152	96	169	117	55	Generator dispatch
	COTWDPGE 115KV SECTION 2D	P2-2	Bus	105	102	95	146	152	103	170	126	62	Generator dispatch for off peak cases. Significant increase in load in base cases compared to last year. Load forecast under review in peak cases.
	COTTONWD 60KV SECTION MA	P2-2	Bus	Diverge	N/A	N/A	23	N/A	N/A	N/A	153	N/A	Non-BES Facility
	COTTONWD 60KV SECTION 1D	P2-2	Bus	N/A	117	141	N/A	21	135	39	N/A	108	Non-BES Facility
	COTTONWD - 1D 60KV & COTTONWOOD-RED BLUFF LINE	P2-3	Non-Bus-Tie Breaker	N/A	117	141	N/A	21	135	39	N/A	108	Non-BES Facility
	COTWDPGE - 2D 115KV & BRIDGEVILLE-COTTONWOOD LINE	P2-3	Non-Bus-Tie Breaker	105	102	96	146	151	103	169	126	62	Generator dispatch
	COTWDPGE - 2D 115KV & CASCADE-COTTONWOOD LINE	P2-3	Non-Bus-Tie Breaker	120	120	119	104	100	123	113	118	106	Significant increase in load in base cases compared to last year. Load forecast under review.
	COTTONWD - MA 60KV & COTTONWOOD-RED BLUFF LINE	P2-3	Non-Bus-Tie Breaker	Diverge	N/A	N/A	23	N/A	N/A	N/A	153	N/A	Non-BES Facility
	COTTONWD - MA 60KV & COTTONWOOD #2 LINE	P2-3	Non-Bus-Tie Breaker	Diverge	N/A	N/A	23	N/A	N/A	N/A	153	N/A	Non-BES Facility
	COTTONWD - MA 60KV & COTTONWOOD #1 LINE	P2-3	Non-Bus-Tie Breaker	240	N/A	N/A	36	N/A	N/A	N/A	117	N/A	Non-BES Facility
	COTTONWD - MA 60KV & RED BLFF-COTTONWD LINE	P2-3	Non-Bus-Tie Breaker	240	N/A	N/A	36	N/A	N/A	N/A	117	N/A	Non-BES Facility
	COTWD_F2 SECTION 2F & COTWD_E2 SECTION 2E 230KV	P2-4	Bus-Tie Breaker	220	223	212	243	238	222	271	272	61	Substation upgrade or SPS
	COTTONWD 60KV - SECTION 1D & 1E	P2-4	Bus-Tie Breaker	N/A	Diverge	Diverge	N/A	57	Diverge	55	N/A	Diverge	Non-BES Facility
COTWDPGE 115KV - SECTION 2D & 1D	P2-4	Bus-Tie Breaker	164	157	153	180	162	157	187	200	109	Substation upgrade or SPS	
31580 CASCADE 60.0 31582 STILLWATR 60.0 1 1	COTWDPGE 115KV - SECTION 2D & 1D	P2-4	Bus-Tie Breaker	116	115	119	23	51	109	40	137	88	Substation upgrade or SPS
31581 OREGNTRL 60.0 31578 LOMS JCT 60.0 1 1	NEO REDB 13.80KV GEN UNIT 1 & CASCADE-COTTONWOOD 115KV [1240]	P3	G-1/N-1	84	84	79	100	102	82	109	89	86	Generator dispatch
	CASCADE-COTTONWOOD 115KV [1240]	P1	N-1	95	95	98	103	102	98	115	96	87	Generator dispatch
	COTWD_F2 230/115KV TB 4 & COTWD_E2 230/115KV TB 1	P6	N-1-1	86	84	86	197	252	85	272	104	<100	Generator dispatch
	CASCADE-COTTONWOOD 115KV [1240] (COTWDPGE-JESSUPJ1)	P2-1	Line Section w/o Fault	82	78	75	145	154	80	172	106	53	Generator dispatch
	COTWDPGE 115KV SECTION 2D	P2-2	Bus	89	85	82	148	155	86	174	116	59	Generator dispatch
	COTTONWD 60KV SECTION MA	P2-2	Bus	Diverge	N/A	N/A	24	N/A	N/A	N/A	142	N/A	Non-BES Facility
	COTTONWD 60KV SECTION 1D	P2-2	Bus	N/A	101	126	N/A	20	119	40	N/A	93	Non-BES Facility
	COTTONWD - 1D 60KV & COTTONWOOD-RED BLUFF LINE	P2-3	Non-Bus-Tie Breaker	N/A	101	126	N/A	20	119	40	N/A	93	Significant increase in load in base cases compared to last year. Load forecast under review.
	COTWDPGE - 2D 115KV & BRIDGEVILLE-COTTONWOOD LINE	P2-3	Non-Bus-Tie Breaker	89	85	82	148	154	86	173	115	60	Generator dispatch

Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading % (Baseline Scenarios)					Loading % (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations	
	COTWDPGE - 2D 115KV & CASCADE-COTTONWOOD LINE	P2-3	Non-Bus-Tie Breaker	103	103	106	106	102	106	116	106	93	Significant increase in load in base cases compared to last year. Load forecast under review.
	COTTONWD - MA 60KV & COTTONWOOD-RED BLUFF LINE	P2-3	Non-Bus-Tie Breaker	Diverge	N/A	N/A	24	N/A	N/A	N/A	142	N/A	Non-BES Facility
	COTTONWD - MA 60KV & COTTONWOOD #2 LINE	P2-3	Non-Bus-Tie Breaker	Diverge	N/A	N/A	24	N/A	N/A	N/A	142	N/A	Non-BES Facility
	COTTONWD - MA 60KV & COTTONWOOD #1 LINE	P2-3	Non-Bus-Tie Breaker	224	N/A	N/A	38	N/A	N/A	N/A	107	N/A	Non-BES Facility
	COTTONWD - MA 60KV & RED BLFF-COTTONWD LINE	P2-3	Non-Bus-Tie Breaker	224	N/A	N/A	37	N/A	N/A	N/A	107	N/A	Non-BES Facility
	COTWD_F2 SECTION 2F & COTWD_E2 SECTION 2E 230KV	P2-4	Bus-Tie Breaker	204	206	198	245	241	205	275	261	56	Substation upgrade or SPS
	COTTONWD 60KV - SECTION 1D & 1E	P2-4	Bus-Tie Breaker	N/A	Diverge	Diverge	N/A	53	Diverge	49	N/A	Diverge	Non-BES Facility
	COTWDPGE 115KV - SECTION 2D & 1D	P2-4	Bus-Tie Breaker	145	139	141	182	165	138	191	186	104	Substation upgrade or SPS
31592 DESCHUTS 60.0 31594 VOLTA 60.0 1 1	COTTONWD 60KV - SECTION 1D & 1E	P2-4	Bus-Tie Breaker	N/A	Diverge	Diverge	N/A	47	Diverge	22	N/A	Diverge	Non-BES Facility
31594 VOLTA 60.0 31596 SOUTH 60.0 1 1	VOLTA1-2 9.11KV GEN UNIT 1 & CASCADE-BENTON-DESCHUTES 60KV [6310]	P3	G-1/N-1	102	104	117	<100	<100	108	<100	<100	<100	Significant increase in load in base cases compared to last year. Load forecast under review.
	CASCADE-BENTON-DESCHUTES 60KV [6310]	P1	N-1	68	79	108	36	42	104	35	27	41	Continue to monitor future load forecast. Potential future mitigation are preferred resources or line rerate/upgrade
	COLEMAN-COTTONWOOD 60KV [6430] & COLEMAN-RED BLFF 60KV [6640]	P6	N-1-1	110	100	100	<100	<100	100	<100	100	<100	Project: Cottonwood-Red Bluff Reconductoring In-Service Date: May 2021 Short term: Action plan Continue to monitor future load forecast.
	CASCADE-BENTON-DESCHUTES 60KV [6310] (LOMS JCT-DESCHUTS)	P2-1	Line Section w/o Fault	68	79	108	36	43	105	35	27	41	Continue to monitor future load forecast. Potential future mitigation are preferred resources or line rerate/upgrade
	COTTONWD 60KV SECTION MA	P2-2	Bus	Diverge	N/A	N/A	18	N/A	N/A	N/A	76	N/A	Non-BES Facility
	BENTON - 1D 60KV & CASCADE-BENTON-DESCHUTES LINE	P2-3	Non-Bus-Tie Breaker	68	79	108	36	42	105	35	27	41	Non-BES Facility
	CASCADE - MA 60KV & CASCADE-BENTON-DESCHUTES LINE	P2-3	Non-Bus-Tie Breaker	68	79	108	36	42	104	35	27	41	Non-BES Facility
	COTTONWD - MA 60KV & COLEMAN-COTTONWOOD LINE	P2-3	Non-Bus-Tie Breaker	Diverge	N/A	N/A	32	N/A	N/A	N/A	55	N/A	Non-BES Facility
	COTTONWD - MA 60KV & COTTONWOOD-RED BLUFF LINE	P2-3	Non-Bus-Tie Breaker	Diverge	N/A	N/A	18	N/A	N/A	N/A	76	N/A	Non-BES Facility
	COTTONWD - MA 60KV & COTTONWOOD #2 LINE	P2-3	Non-Bus-Tie Breaker	Diverge	N/A	N/A	18	N/A	N/A	N/A	76	N/A	Non-BES Facility
	COTTONWD - MA 60KV & COTTONWOOD #1 LINE	P2-3	Non-Bus-Tie Breaker	106	N/A	N/A	23	N/A	N/A	N/A	32	N/A	Non-BES Facility
	COTTONWD 60KV - SECTION 1D & 1E	P2-4	Bus-Tie Breaker	N/A	Diverge	Diverge	N/A	42	Diverge	26	N/A	Diverge	Non-BES Facility
31602 COLEMAN 60.0 31606 CLMN JCT 60.0 1 1	COLEMAN 6.60KV GEN UNIT 1 & RED BLFF-COTTONWD 60KV [6660] MOAS OPENED ON COTTONWD_RED B JT	P3	G-1/N-1	136	<100	<100	<100	<100	<100	<100	<100	<100	Project: Red Bluff-Coleman 60 kV Reinforcement In-Service Date: Dec 2021 Short term: Action plan
	COLEMAN-COTTONWOOD 60KV [6430] & RED BLFF-COTTONWD 60KV [6660] MOAS OPENED ON COTTONWD_RED B JT	P6	N-1-1	137	<100	<100	<100	<100	<100	<100	<100	<100	Project: Red Bluff-Coleman 60 kV Reinforcement In-Service Date: Dec 2021 Short term: Action plan
	RED BLFF-COTTONWD 60KV [6660] MOAS OPENED ON COTTONWD_RED B JT	P1	N-1	136	56	65	29	13	58	15	93	66	Project: Red Bluff-Coleman 60 kV Reinforcement In-Service Date: Dec 2021 Short term: Action plan
	COTTONWD 60KV SECTION MA	P2-2	Bus	Diverge	N/A	N/A	23	N/A	N/A	N/A	121	N/A	Non-BES Facility
	COTTONWD - MA 60KV & COLEMAN-COTTONWOOD LINE	P2-3	Non-Bus-Tie Breaker	Diverge	N/A	N/A	22	N/A	N/A	N/A	120	N/A	Non-BES Facility

Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading % (Baseline Scenarios)					Loading % (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations	
	COTTONWD - MA 60KV & COTTONWOOD-RED BLUFF LINE	P2-3	Non-Bus-Tie Breaker	Diverge	N/A	N/A	23	N/A	N/A	N/A	121	N/A	Non-BES Facility
	COTTONWD - MA 60KV & COTTONWOOD #2 LINE	P2-3	Non-Bus-Tie Breaker	Diverge	N/A	N/A	23	N/A	N/A	N/A	121	N/A	Non-BES Facility
	COTTONWD - MA 60KV & RED BLFF-COTTONWD LINE	P2-3	Non-Bus-Tie Breaker	142	N/A	N/A	27	N/A	N/A	N/A	93	N/A	Non-BES Facility
	Cottonwood-Benton No.1 and Cottonwood-Red Bluff 60 kV Lines	P7	DCTL	136	56	65	29	13	58	15	93	65	Project: Red Bluff-Coleman 60 kV Reinforcement In-Service Date: Dec 2021 Short term: Action plan
31604 COTTONWD 60.0 31607 RED B JT 60.0 1 1	COLEMAN-RED BLUFF 60KV [6440] (COLEMAN-CLMN JCT)	P2-1	Line Section w/o Fault	134	56	64	30	13	58	15	93	64	Project: Cottonwood-Red Bluff Reconductoring In-Service Date: May 2021 Short term: Action plan
	COLEMAN 60KV SECTION 1D	P2-2	Bus	134	56	64	30	13	58	15	93	64	Project: Cottonwood-Red Bluff Reconductoring In-Service Date: May 2021 Short term: Action plan
	COLEMAN - 1D 60KV & COLEMAN-COTTONWOOD LINE	P2-3	Non-Bus-Tie Breaker	134	56	64	30	13	58	15	93	64	Non-BES Facility
31604 COTTONWD 60.0 31611 RASN JNT 60.0 2 1	BELDEN 13.80KV GEN UNIT 1 & NEO REDB 13.80KV GEN UNIT 1	P3	G-1/N-1	<100	<100	107	<100	<100	93	<100	<100	107	Continue to monitor future load forecast. Potential future mitigation are preferred resources or line rerate/upgrade
	NEO REDB 13.80KV GEN UNIT 1	P1	N-1	89	92	107	37	36	94	33	74	107	Continue to monitor future load forecast. Potential future mitigation are preferred resources or line rerate/upgrade
	KILARC 60/9.11KV TB 1 & NEO REDB 13.80KV GEN UNIT 1	P6	N-1-1	<100	<100	107	<100	<100	93	<100	<100	107	Continue to monitor future load forecast. Potential future mitigation are preferred resources or line rerate/upgrade
	NEO REDT 60/13.8KV TB 1	P1	N-1	88	91	106	37	36	94	33	74	106	Continue to monitor future load forecast. Potential future mitigation are preferred resources or line rerate/upgrade
	COTTONWOOD #2 60KV [6630] (NEO REDT-RASN JNT)	P2-1	Line Section w/o Fault	88	91	106	37	36	94	33	74	106	Continue to monitor future load forecast. Potential future mitigation are preferred resources or line rerate/upgrade
31604 COTTONWD 60.0 31614 RWSN J2 60.0 1 1	COTTONWOOD-RED BLUFF 60KV [6660] MOAS OPENED ON COTTONWD_RED B JT & COLEMAN-RED BLFF 60KV [6640]	P6	N-1-1	<100	<100	102	<100	<100	<100	<100	<100	103	Disable Automatics
31606 CLMN JCT 60.0 31608 RED BLFF 60.0 1 1	COLEMAN 6.60KV GEN UNIT 1 & RED BLFF-COTTONWD 60KV [6660] MOAS OPENED ON COTTONWD_RED B JT	P3	G-1/N-1	101	<100	<100	<100	<100	<100	<100	<100	<100	Project: Red Bluff-Coleman 60 kV Reinforcement In-Service Date: Dec 2021 Short term: Action plan
	COLEMAN-COTTONWOOD 60KV [6430] & RED BLFF-COTTONWD 60KV [6660] MOAS OPENED ON COTTONWD_RED B JT	P6	N-1-1	102	<100	<100	<100	<100	<100	<100	<100	<100	Project: Red Bluff-Coleman 60 kV Reinforcement In-Service Date: Dec 2021 Short term: Action plan
	RED BLFF-COTTONWD 60KV [6660] MOAS OPENED ON COTTONWD_RED B JT	P1	N-1	101	42	48	24	8	43	9	72	49	Project: Red Bluff-Coleman 60 kV Reinforcement In-Service Date: Dec 2021 Short term: Action plan
	COTTONWD 60KV SECTION MA	P2-2	Bus	Diverge	N/A	N/A	20	N/A	N/A	N/A	100	N/A	Non-BES Facility
	COTTONWD - MA 60KV & COLEMAN-COTTONWOOD LINE	P2-3	Non-Bus-Tie Breaker	Diverge	N/A	N/A	19	N/A	N/A	N/A	99	N/A	Non-BES Facility
	COTTONWD - MA 60KV & COTTONWOOD-RED BLUFF LINE	P2-3	Non-Bus-Tie Breaker	Diverge	N/A	N/A	20	N/A	N/A	N/A	100	N/A	Non-BES Facility
	COTTONWD - MA 60KV & COTTONWOOD #2 LINE	P2-3	Non-Bus-Tie Breaker	Diverge	N/A	N/A	20	N/A	N/A	N/A	100	N/A	Non-BES Facility
COTTONWD - MA 60KV & COTTONWOOD #1 LINE	P2-3	Non-Bus-Tie Breaker	106	N/A	N/A	23	N/A	N/A	N/A	72	N/A	Non-BES Facility	

Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading % (Baseline Scenarios)					Loading % (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations	
	Cottonwood-Benton No.1 and Cottonwood-Red Bluff 60 kV Lines	P7	DCTL	101	42	48	24	8	43	9	72	48	Project: Red Bluff-Coleman 60 kV Reinforcement In-Service Date: Dec 2021 Short term: Action plan
31607 RED B JT 60.0 31608 RED BLFF 60.0 1 1	COLEMAN-RED BLFF 60KV [6640] & COTTONWOOD-RED BLUFF 60KV [6660] MOAS OPENED ON COTTONWD_RED B JT	P6	N-1-1	101	<100	<100	<100	<100	<100	<100	<100	<100	Project: Cottonwood-Red Bluff Reconductoring In-Service Date: May 2021 Short term: Action plan
	COLEMAN-RED BLUFF 60KV [6440] (COLEMAN-CLMN JCT)	P2-1	Line Section w/o Fault	134	56	64	29	13	58	15	92	64	Project: Cottonwood-Red Bluff Reconductoring In-Service Date: May 2021 Short term: Action plan
	COLEMAN 60KV SECTION 1D	P2-2	Bus	134	56	64	29	13	58	15	92	64	Project: Cottonwood-Red Bluff Reconductoring In-Service Date: May 2021 Short term: Action plan
	COLEMAN - 1D 60KV & COLEMAN-COTTONWOOD LINE	P2-3	Non-Bus-Tie Breaker	134	56	64	29	13	58	15	92	64	Non-BES Facility
31607 RED B JT 60.0 31614 RWSN J2 60.0 1 1	COLEMAN-RED BLFF 60KV [6640] & COTTONWOOD-RED BLUFF 60KV [6660] MOAS OPENED ON COTTONWD_RED B JT	P6	N-1-1	101	102	121	<100	<100	105	<100	<100	122	Disable Automatics
31626 CORNING 60.0 31729 CORNSWCH 60.0 4 1	Base Case	P0	Base Case	92	94	103	13	15	97	18	71	103	Continue to monitor future load forecast. Potential future mitigation are preferred resources or line rerate/upgrade
31677 GRS F JT 60.0 31689 ELIZ TWN 60.0 1 1	CARIBOU-TABLE MTN 230KV [4440] (BELDENTP-TBL MT D)	P2-1	Line Section w/o Fault	Diverge	Diverge	Diverge	5	5	Diverge	6	Diverge	Diverge	Existing SPS under review
	TBL MT D 230KV SECTION 1D	P2-2	Bus	Diverge	Diverge	Diverge	5	5	Diverge	6	Diverge	Diverge	Existing SPS under review
	TBL MT D SECTION 1D & TBL MT E SECTION 1E 230KV	P2-4	Bus-Tie Breaker	Diverge	Diverge	Diverge	4	6	Diverge	6	Diverge	Diverge	Existing SPS under review
31683 EST Q1 60.0 31688 SPIQUINCYJCT 60.0 1 1	CARIBOU-TABLE MTN 230KV [4440] (BELDENTP-TBL MT D)	P2-1	Line Section w/o Fault	Diverge	Diverge	Diverge	4	4	Diverge	5	Diverge	Diverge	Existing SPS under review
	TBL MT D 230KV SECTION 1D	P2-2	Bus	Diverge	Diverge	Diverge	3	4	Diverge	5	Diverge	Diverge	Existing SPS under review
	TBL MT D SECTION 1D & TBL MT E SECTION 1E 230KV	P2-4	Bus-Tie Breaker	Diverge	Diverge	Diverge	2	5	Diverge	5	Diverge	Diverge	Existing SPS under review
	CARIBOU-TABLE MTN 230KV [4440] (BELDENTP-TBL MT D)	P2-1	Line Section w/o Fault	Diverge	Diverge	Diverge	5	5	Diverge	6	Diverge	Diverge	Existing SPS under review
	TBL MT D 230KV SECTION 1D	P2-2	Bus	Diverge	Diverge	Diverge	5	5	Diverge	6	Diverge	Diverge	Existing SPS under review
31688 SPIQUINCYJCT 60.0 38056 PLMS-SRA 60.0 1 1	TBL MT D SECTION 1D & TBL MT E SECTION 1E 230KV	P2-4	Bus-Tie Breaker	Diverge	Diverge	Diverge	4	6	Diverge	6	Diverge	Diverge	Existing SPS under review
	CARIBOU-TABLE MTN 230KV [4440] (BELDENTP-TBL MT D)	P2-1	Line Section w/o Fault	Diverge	Diverge	Diverge	22	25	Diverge	24	Diverge	Diverge	Existing SPS under review
	TBL MT D 230KV SECTION 1D	P2-2	Bus	Diverge	Diverge	Diverge	21	25	Diverge	24	Diverge	Diverge	Existing SPS under review
31690 CARIBOU 60.0 31677 GRS F JT 60.0 1 1	TBL MT D SECTION 1D & TBL MT E SECTION 1E 230KV	P2-4	Bus-Tie Breaker	Diverge	Diverge	Diverge	20	24	Diverge	23	Diverge	Diverge	Existing SPS under review
	CARIBOU-TABLE MTN 230KV [4440] (BELDENTP-TBL MT D)	P2-1	Line Section w/o Fault	Diverge	Diverge	Diverge	6	7	Diverge	7	Diverge	Diverge	Existing SPS under review
	TBL MT D 230KV SECTION 1D	P2-2	Bus	Diverge	Diverge	Diverge	6	7	Diverge	7	Diverge	Diverge	Existing SPS under review
31722 GLENN 60.0 31725 ORL B JT 60.0 1 1	TBL MT D SECTION 1D & TBL MT E SECTION 1E 230KV	P2-4	Bus-Tie Breaker	Diverge	Diverge	Diverge	5	7	Diverge	7	Diverge	Diverge	Existing SPS under review
	GLENN #5 60KV [8427]	P1	N-1	84	89	100	5	10	92	15	57	101	Continue to monitor future load forecast. Potential future mitigation are preferred resources or line rerate/upgrade
	GLENN #5 60KV [8427] & ELKCREEK 60/9.11KV TB 1	P6	N-1-1	<100	<100	100	<100	<100	91	<100	<100	101	Continue to monitor future load forecast. Potential future mitigation are preferred resources or line rerate/upgrade
31722 GLENN 60.0 31729 CORNSWCH 60.0 4 1	Base Case	P0	Base Case	92	94	103	13	15	97	18	71	103	Continue to monitor future load forecast. Potential future mitigation are preferred resources or line rerate/upgrade
31722 GLENN 60.0 31733 CAPYSWCH 60.0 3 1	Base Case	P0	Base Case	84	87	102	7	22	90	30	50	102	Continue to monitor future load forecast. Potential future mitigation are preferred resources or line rerate/upgrade





Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading % (Baseline Scenarios)					Loading % (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations	
31733 CAPYSWCH 60.0 31731 CAPAYJCT 60.0 3 1	Base Case	P0	Base Case	84	87	102	7	22	90	30	50	102	Continue to monitor future load forecast. Potential future mitigation are preferred resources or line rerate/upgrade
31735 CHICO JT 60.0 31738 ANITA 60.0 3 1	Base Case	P0	Base Case	87	91	106	10	25	93	33	51	107	Continue to monitor future load forecast. Potential future mitigation are preferred resources or line rerate/upgrade



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



High/Low Voltages

Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)					Voltage PU (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations	
ANITA 60 kv	Base Case	P0	Base Case	0.99	1.00	0.98	1.06	1.07	1.00	1.07	1.01	0.98	Load power factor correction and voltage support if needed
APT ORVC 60 kv	Base Case	P0	Base Case	1.02	1.02	1.02	1.06	1.04	1.02	1.04	1.02	1.01	Load power factor correction and voltage support if needed
BCKS CRK 230 kv	Base Case	P0	Base Case	1.03	1.04	1.03	1.07	1.05	1.04	1.05	1.03	1.03	Load power factor correction and voltage support if needed
BELDEN 230 kv	Base Case	P0	Base Case	1.03	1.04	1.03	1.07	1.06	1.04	1.05	1.03	1.03	Load power factor correction and voltage support if needed
BENTON 60 kv	Base Case	P0	Base Case	1.03	1.04	1.02	1.06	1.05	1.04	1.05	1.03	1.01	Load power factor correction and voltage support if needed
BIG BAR 60 kv	Base Case	P0	Base Case	1.03	1.02	1.02	1.07	1.05	1.03	1.05	1.04	1.02	Load power factor correction and voltage support if needed
BIG BEND 115 kv	Base Case	P0	Base Case	1.03	1.04	1.02	1.07	1.05	1.03	1.05	1.03	1.02	Load power factor correction and voltage support if needed
BTTE CRK 60 kv	Base Case	P0	Base Case	1.03	1.03	1.03	1.06	1.06	1.03	1.06	1.04	1.01	Load power factor correction and voltage support if needed
BURNEY 60 kv	Base Case	P0	Base Case	1.07	1.07	1.04	1.06	1.06	1.07	1.12	1.07	1.04	Load power factor correction and voltage support if needed
BURNEYQF 60 kv	Base Case	P0	Base Case	1.07	1.07	1.04	1.06	1.06	1.07	1.12	1.07	1.04	Load power factor correction and voltage support if needed
BURNYJCT 60 kv	Base Case	P0	Base Case	1.07	1.07	1.04	1.06	1.06	1.07	1.12	1.07	1.04	Load power factor correction and voltage support if needed
CAPAY 60 kv	Base Case	P0	Base Case	1.03	1.04	1.04	1.06	1.06	1.05	1.06	1.04	1.04	Load power factor correction and voltage support if needed
CAPAYJCT 60 kv	Base Case	P0	Base Case	1.03	1.04	1.04	1.06	1.06	1.05	1.06	1.04	1.04	Load power factor correction and voltage support if needed
CAPYSWCH 60 kv	Base Case	P0	Base Case	1.04	1.05	1.05	1.06	1.06	1.06	1.06	1.04	1.05	Load power factor correction and voltage support if needed
CARBOU M 230 kv	Base Case	P0	Base Case	1.04	1.04	1.03	1.05	1.04	1.04	1.04	1.04	1.03	Load power factor correction and voltage support if needed
CASCADE 115 kv	Base Case	P0	Base Case	1.04	1.04	1.02	1.06	1.05	1.04	1.05	1.04	1.01	Load power factor correction and voltage support if needed
CASCADE 60 kv	Base Case	P0	Base Case	1.04	1.04	1.02	1.06	1.05	1.04	1.05	1.04	1.01	Load power factor correction and voltage support if needed
CEDR CRK 60 kv	Base Case	P0	Base Case	1.07	1.06	1.01	1.10	1.09	1.06	1.10	1.09	1.07	Load power factor correction and voltage support if needed
CHALLENGE 60 kv	Base Case	P0	Base Case	1.04	1.05	1.03	1.09	1.07	1.05	1.07	1.04	1.03	Load power factor correction and voltage support if needed
CHICO JT 60 kv	Base Case	P0	Base Case	1.01	1.02	1.01	1.06	1.06	1.03	1.06	1.03	1.01	Load power factor correction and voltage support if needed
CLMN FSH 60 kv	Base Case	P0	Base Case	1.04	1.04	1.03	1.05	1.05	1.04	1.05	1.03	1.03	Load power factor correction and voltage support if needed
CLMN JCT 60 kv	Base Case	P0	Base Case	1.02	1.05	1.01	1.06	1.06	1.05	1.06	1.03	1.01	Load power factor correction and voltage support if needed
CLMN TAP 60 kv	Base Case	P0	Base Case	1.04	1.04	1.03	1.05	1.05	1.04	1.05	1.04	1.03	Load power factor correction and voltage support if needed
CLOV TAP 60 kv	Base Case	P0	Base Case	1.07	1.06	1.01	1.10	1.09	1.06	1.10	1.09	1.08	Load power factor correction and voltage support if needed
CNTRVLE 60 kv	Base Case	P0	Base Case	1.03	1.03	1.02	1.05	1.05	1.03	1.05	1.03	1.01	Load power factor correction and voltage support if needed
COLEMAN 60 kv	Base Case	P0	Base Case	1.04	1.04	1.03	1.05	1.05	1.04	1.05	1.04	1.02	Load power factor correction and voltage support if needed
CORNING 60 kv	Base Case	P0	Base Case	1.02	1.03	1.02	1.07	1.07	1.03	1.08	1.03	1.01	Load power factor correction and voltage support if needed
CORNSWCH 60 kv	Base Case	P0	Base Case	1.04	1.05	1.05	1.06	1.06	1.06	1.06	1.04	1.05	Load power factor correction and voltage support if needed
COTWDPGE 115 kv	Base Case	P0	Base Case	1.04	1.03	1.03	1.07	1.04	1.04	1.04	1.04	1.03	Cottonwood 230/115 kV Transformer Replacement
COWCK TP 60 kv	Base Case	P0	Base Case	1.06	1.05	1.01	1.09	1.08	1.05	1.08	1.07	1.05	Load power factor correction and voltage support if needed
CRESTA 230 kv	Base Case	P0	Base Case	1.03	1.04	1.03	1.07	1.05	1.04	1.05	1.03	1.03	Load power factor correction and voltage support if needed
DE SABLE 60 kv	Base Case	P0	Base Case	1.03	1.03	1.03	1.06	1.06	1.03	1.06	1.04	1.01	Load power factor correction and voltage support if needed
DESHUTS 60 kv	Base Case	P0	Base Case	1.04	1.04	1.01	1.07	1.06	1.04	1.06	1.04	1.00	Load power factor correction and voltage support if needed
DIRYVLE 60 kv	Base Case	P0	Base Case	1.01	1.04	0.99	1.06	1.06	1.04	1.07	1.03	0.99	Load power factor correction and voltage support if needed
ELGN JCT 60 kv	Base Case	P0	Base Case	1.02	1.02	1.02	1.06	1.04	1.02	1.04	1.02	1.01	Load power factor correction and voltage support if needed
ELKCREEK 60 kv	Base Case	P0	Base Case	0.95	0.96	0.98	1.05	1.05	0.96	1.06	0.96	0.98	Load power factor correction and voltage support if needed
ELKCRKJT 60 kv	Base Case	P0	Base Case	0.98	0.99	1.00	1.05	1.06	0.99	1.06	0.99	1.00	Load power factor correction and voltage support if needed
FRBSTNTP 115 kv	Base Case	P0	Base Case	1.05	1.05	1.04	1.08	1.06	1.05	1.06	1.05	1.04	Load power factor correction and voltage support if needed
FRNCHGLH 60 kv	Base Case	P0	Base Case	1.03	1.03	1.02	1.08	1.05	1.04	1.06	1.04	1.02	Load power factor correction and voltage support if needed
FRSTGLEN 115 kv	Base Case	P0	Base Case	1.05	1.04	1.04	1.10	1.07	1.06	1.07	1.06	1.04	Load power factor correction and voltage support if needed
GIRVAN 60 kv	Base Case	P0	Base Case	1.03	1.03	1.01	1.06	1.05	1.04	1.05	1.03	1.01	Load power factor correction and voltage support if needed

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High/Low Voltages

Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)					Voltage PU (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations	
GLENN 60 kv	Base Case	P0	Base Case	1.04	1.05	1.05	1.06	1.06	1.06	1.06	1.04	1.05	Load power factor correction and voltage support if needed
GRIZ JCT 115 kv	Base Case	P0	Base Case	1.04	1.04	1.03	1.06	1.05	1.04	1.05	1.04	1.03	Load power factor correction and voltage support if needed
GRIZZLY1 115 kv	Base Case	P0	Base Case	1.04	1.04	1.03	1.06	1.05	1.04	1.05	1.04	1.03	Load power factor correction and voltage support if needed
GROUSCRK 60 kv	Base Case	P0	Base Case	1.02	1.02	1.02	1.06	1.05	1.03	1.05	1.04	1.02	Load power factor correction and voltage support if needed
HAMILTON 60 kv	Base Case	P0	Base Case	1.02	1.03	1.02	1.07	1.08	1.03	1.08	1.03	1.02	Load power factor correction and voltage support if needed
HAT CRK1 60 kv	Base Case	P0	Base Case	1.06	1.06	1.04	1.06	1.06	1.06	1.12	1.06	1.04	Load power factor correction and voltage support if needed
HAT CRK2 60 kv	Base Case	P0	Base Case	1.07	1.07	1.04	1.07	1.07	1.06	1.12	1.06	1.04	Load power factor correction and voltage support if needed
HATLOSCK 60 kv	Base Case	P0	Base Case	1.06	1.07	1.05	1.08	1.07	1.07	1.08	1.07	1.05	Load power factor correction and voltage support if needed
HEADGATE 60 kv	Base Case	P0	Base Case	1.02	1.03	1.03	1.06	1.06	1.04	1.06	1.03	1.02	Load power factor correction and voltage support if needed
HMLTN JT 60 kv	Base Case	P0	Base Case	1.02	1.03	1.02	1.07	1.08	1.03	1.08	1.03	1.02	Load power factor correction and voltage support if needed
HONC JT1 115 kv	Base Case	P0	Base Case	1.05	1.05	1.03	1.11	1.07	1.04	1.07	1.04	1.03	Load power factor correction and voltage support if needed
HONC JT3 115 kv	Base Case	P0	Base Case	1.05	1.05	1.04	1.10	1.06	1.05	1.06	1.04	1.04	Load power factor correction and voltage support if needed
HONCUT 115 kv	Base Case	P0	Base Case	1.05	1.05	1.04	1.10	1.06	1.05	1.06	1.04	1.04	Load power factor correction and voltage support if needed
HT CRKRG 60 kv	Base Case	P0	Base Case	1.06	1.07	1.05	1.08	1.07	1.07	1.08	1.07	1.05	Load power factor correction and voltage support if needed
HYAMPOM 60 kv	Base Case	P0	Base Case	1.02	1.02	1.02	1.06	1.05	1.03	1.05	1.03	1.02	Load power factor correction and voltage support if needed
HYMPOMJT 60 kv	Base Case	P0	Base Case	1.02	1.02	1.02	1.06	1.05	1.03	1.05	1.04	1.02	Load power factor correction and voltage support if needed
INSKIP 60 kv	Base Case	P0	Base Case	1.04	1.04	1.03	1.05	1.04	1.04	1.05	1.04	1.03	Load power factor correction and voltage support if needed
JACINTO 60 kv	Base Case	P0	Base Case	0.99	1.01	0.99	1.08	1.09	1.01	1.10	1.01	0.99	Load power factor correction and voltage support if needed
JESSTAP 115 kv	Base Case	P0	Base Case	1.04	1.03	1.03	1.07	1.04	1.04	1.04	1.04	1.03	Load power factor correction and voltage support if needed
JESSUP 115 kv	Base Case	P0	Base Case	1.04	1.04	1.03	1.07	1.04	1.04	1.04	1.04	1.02	Load power factor correction and voltage support if needed
JESSUPJ1 115 kv	Base Case	P0	Base Case	1.04	1.04	1.03	1.07	1.04	1.04	1.04	1.04	1.02	Load power factor correction and voltage support if needed
KANAKAJT 115 kv	Base Case	P0	Base Case	1.05	1.05	1.04	1.09	1.06	1.05	1.06	1.05	1.04	Load power factor correction and voltage support if needed
KESWICK 60 kv	Base Case	P0	Base Case	1.03	1.03	1.01	1.07	1.05	1.04	1.05	1.04	1.01	Load power factor correction and voltage support if needed
KILARC 60 kv	Base Case	P0	Base Case	1.07	1.06	1.02	1.10	1.09	1.06	1.10	1.09	1.08	Load power factor correction and voltage support if needed
KLLY RDE 60 kv	Base Case	P0	Base Case	1.03	1.03	1.03	1.06	1.04	1.03	1.04	1.03	1.02	Load power factor correction and voltage support if needed
LOMS JCT 60 kv	Base Case	P0	Base Case	1.04	1.04	1.01	1.06	1.05	1.04	1.06	1.04	1.01	Load power factor correction and voltage support if needed
LS ML JT 60 kv	Base Case	P0	Base Case	1.01	1.04	0.99	1.07	1.07	1.04	1.08	1.03	0.98	Load power factor correction and voltage support if needed
LS MLNSJ 60 kv	Base Case	P0	Base Case	1.01	1.04	0.98	1.07	1.07	1.04	1.08	1.03	0.98	Load power factor correction and voltage support if needed
LSNA PCC 60 kv	Base Case	P0	Base Case	1.02	1.02	1.02	1.06	1.04	1.02	1.04	1.02	1.01	Load power factor correction and voltage support if needed
OLSEN JT 60 kv	Base Case	P0	Base Case	1.06	1.06	1.01	1.10	1.09	1.06	1.09	1.09	1.08	Load power factor correction and voltage support if needed
OREGNTRL 115 kv	Base Case	P0	Base Case	1.04	1.04	1.02	1.07	1.05	1.04	1.05	1.04	1.01	Load power factor correction and voltage support if needed
OREGNTRL 60 kv	Base Case	P0	Base Case	1.04	1.05	1.02	1.07	1.05	1.05	1.06	1.04	1.01	Load power factor correction and voltage support if needed
ORL B JT 60 kv	Base Case	P0	Base Case	1.02	1.03	1.04	1.06	1.06	1.04	1.06	1.03	1.03	Load power factor correction and voltage support if needed
ORLAND B 60 kv	Base Case	P0	Base Case	1.03	1.04	1.04	1.06	1.06	1.04	1.06	1.04	1.03	Load power factor correction and voltage support if needed
ORLND JT 60 kv	Base Case	P0	Base Case	1.04	1.05	1.05	1.06	1.06	1.05	1.06	1.04	1.04	Load power factor correction and voltage support if needed
OROVILLE 60 kv	Base Case	P0	Base Case	1.02	1.02	1.01	1.06	1.04	1.02	1.04	1.02	1.01	Load power factor correction and voltage support if needed
OROVLENRG 60 kv	Base Case	P0	Base Case	1.02	1.02	1.02	1.06	1.04	1.02	1.04	1.02	1.01	Load power factor correction and voltage support if needed
OROVLENRGJCT 60 kv	Base Case	P0	Base Case	1.02	1.02	1.02	1.06	1.04	1.02	1.04	1.02	1.01	Load power factor correction and voltage support if needed
OWID 115 kv	Base Case	P0	Base Case	1.05	1.05	1.04	1.09	1.06	1.05	1.06	1.05	1.04	Load power factor correction and voltage support if needed
PALERMO 115 kv	Base Case	P0	Base Case	1.05	1.06	1.04	1.10	1.07	1.05	1.07	1.05	1.04	Load power factor correction and voltage support if needed
PALERMO 60 kv	Base Case	P0	Base Case	1.03	1.03	1.02	1.06	1.04	1.02	1.04	1.03	1.02	Load power factor correction and voltage support if needed

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High/Low Voltages

Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)					Voltage PU (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations	
PANRAMA 115 kv	Base Case	P0	Base Case	1.04	1.03	1.03	1.07	1.04	1.04	1.04	1.04	1.03	Load power factor correction and voltage support if needed
PIT 1 60 kv	Base Case	P0	Base Case	1.06	1.06	1.05	1.07	1.07	1.06	1.12	1.06	1.05	Load power factor correction and voltage support if needed
POE 230 kv	Base Case	P0	Base Case	1.03	1.04	1.03	1.08	1.06	1.04	1.06	1.02	1.03	Load power factor correction and voltage support if needed
RED B JT 60 kv	Base Case	P0	Base Case	1.02	1.05	1.01	1.06	1.06	1.05	1.06	1.03	1.00	Load power factor correction and voltage support if needed
RED BLFF 60 kv	Base Case	P0	Base Case	1.02	1.05	1.01	1.06	1.06	1.05	1.06	1.03	1.00	Load power factor correction and voltage support if needed
RK C JT1 230 kv	Base Case	P0	Base Case	1.03	1.04	1.03	1.07	1.06	1.04	1.06	1.03	1.03	Load power factor correction and voltage support if needed
RK C JT2 230 kv	Base Case	P0	Base Case	1.03	1.04	1.03	1.07	1.05	1.04	1.05	1.03	1.03	Load power factor correction and voltage support if needed
ROCKCK 1 230 kv	Base Case	P0	Base Case	1.03	1.04	1.03	1.07	1.06	1.04	1.06	1.03	1.03	Load power factor correction and voltage support if needed
ROCKCK 2 230 kv	Base Case	P0	Base Case	1.03	1.04	1.03	1.07	1.05	1.04	1.05	1.03	1.03	Load power factor correction and voltage support if needed
SLYCREEK 115 kv	Base Case	P0	Base Case	1.05	1.06	1.04	1.09	1.06	1.05	1.06	1.05	1.04	Load power factor correction and voltage support if needed
SMPSN-AN 115 kv	Base Case	P0	Base Case	1.04	1.03	1.03	1.07	1.04	1.04	1.04	1.04	1.03	Load power factor correction and voltage support if needed
SOUTH 60 kv	Base Case	P0	Base Case	1.04	1.05	1.03	1.05	1.04	1.04	1.05	1.04	1.03	Load power factor correction and voltage support if needed
SPI_AND 115 kv	Base Case	P0	Base Case	1.04	1.04	1.03	1.07	1.04	1.04	1.04	1.04	1.02	Load power factor correction and voltage support if needed
SPIAND2 115 kv	Base Case	P0	Base Case	1.04	1.04	1.03	1.07	1.04	1.04	1.04	1.04	1.02	Load power factor correction and voltage support if needed
SPIQUINCY 60 kv	Base Case	P0	Base Case	1.03	1.03	0.95	1.04	1.04	1.03	1.04	1.03	0.95	Load power factor correction and voltage support if needed
SPIQUINCYJCT 60 kv	Base Case	P0	Base Case	1.03	1.03	0.95	1.04	1.04	1.03	1.04	1.03	0.95	Load power factor correction and voltage support if needed
STLLWATR 60 kv	Base Case	P0	Base Case	1.04	1.04	1.01	1.07	1.05	1.04	1.05	1.04	1.01	Load power factor correction and voltage support if needed
SYCAMORE 115 kv	Base Case	P0	Base Case	1.02	1.03	1.01	1.05	1.05	1.02	1.05	1.02	1.01	Load power factor correction and voltage support if needed
TAP 65 60 kv	Base Case	P0	Base Case	1.03	1.03	1.03	1.09	1.06	1.04	1.06	1.04	1.03	Load power factor correction and voltage support if needed
TKO TAP 60 kv	Base Case	P0	Base Case	1.06	1.05	1.01	1.09	1.08	1.05	1.08	1.07	1.05	Load power factor correction and voltage support if needed
TRINITY 115 kv	Base Case	P0	Base Case	1.03	1.03	1.03	1.09	1.06	1.04	1.06	1.04	1.03	Load power factor correction and voltage support if needed
TRINITY 60 kv	Base Case	P0	Base Case	1.03	1.03	1.03	1.09	1.06	1.04	1.06	1.04	1.03	Load power factor correction and voltage support if needed
VINA 60 kv	Base Case	P0	Base Case	1.01	1.04	0.98	1.07	1.07	1.03	1.08	1.02	0.98	Load power factor correction and voltage support if needed
VOLTA 60 kv	Base Case	P0	Base Case	1.04	1.05	1.03	1.06	1.05	1.04	1.06	1.05	1.03	Load power factor correction and voltage support if needed
WHEELBR 115 kv	Base Case	P0	Base Case	1.04	1.03	1.03	1.07	1.04	1.04	1.04	1.04	1.03	Load power factor correction and voltage support if needed
WHITMORE 60 kv	Base Case	P0	Base Case	1.06	1.06	1.01	1.10	1.08	1.05	1.09	1.08	1.07	Load power factor correction and voltage support if needed
WILDWOOD 115 kv	Base Case	P0	Base Case	1.05	1.04	1.04	1.09	1.06	1.05	1.06	1.05	1.04	Load power factor correction and voltage support if needed
WILLOWS 60 kv	Base Case	P0	Base Case	0.98	0.99	1.00	1.05	1.06	0.99	1.06	0.99	1.00	Load power factor correction and voltage support if needed
WNTU PMS 60 kv	Base Case	P0	Base Case	1.03	1.04	1.02	1.06	1.05	1.04	1.06	1.04	1.01	Load power factor correction and voltage support if needed
WODLF TP 115 kv	Base Case	P0	Base Case	1.05	1.05	1.04	1.08	1.06	1.05	1.06	1.05	1.04	Load power factor correction and voltage support if needed
WYANDJT1 115 kv	Base Case	P0	Base Case	1.05	1.05	1.03	1.10	1.07	1.05	1.07	1.05	1.03	Load power factor correction and voltage support if needed
WYANDJT2 115 kv	Base Case	P0	Base Case	1.05	1.06	1.04	1.09	1.07	1.05	1.06	1.05	1.04	Load power factor correction and voltage support if needed
WYANDTTE 115 kv	Base Case	P0	Base Case	1.05	1.05	1.03	1.10	1.07	1.05	1.07	1.05	1.03	Load power factor correction and voltage support if needed
CANAL TP 60 kv	NEO REDB 13.80KV GEN UNIT 1	P1	N-1	0.91	0.91	0.86	0.98	0.96	0.91	0.97	0.93	0.86	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
CR CANAL 60 kv	NEO REDB 13.80KV GEN UNIT 1	P1	N-1	0.91	0.91	0.86	0.98	0.96	0.91	0.97	0.93	0.86	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
NEO REDT 60 kv	NEO REDB 13.80KV GEN UNIT 1	P1	N-1	0.92	0.91	0.86	0.98	0.96	0.91	0.97	0.93	0.86	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
RASN JNT 60 kv	NEO REDB 13.80KV GEN UNIT 1	P1	N-1	0.92	0.91	0.86	0.98	0.96	0.91	0.97	0.93	0.86	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations

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



High/Low Voltages

Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)					Voltage PU (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations	
TYLER 60 kv	NEO REDB 13.80KV GEN UNIT 1	P1	N-1	0.91	0.91	0.86	0.98	0.96	0.91	0.97	0.93	0.86	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
TRINITY 115 kv	TRINITY-COTTONWOOD 115KV [4040]	P1	N-1	1.04	1.03	1.03	1.11	1.09	1.05	1.09	1.06	1.03	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
HONC JT1 115 kv	PALERMO-PEASE 115KV [3220] MOAS OPENED ON PALERMO_HONC JT1	P1	N-1	1.03	1.03	1.00	1.14	1.06	1.03	1.07	0.99	1.00	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
CEDR CRK 60 kv	CASCADE-BENTON-DESCHUTES 60KV [6310]	P1	N-1	1.04	1.04	0.88	1.14	1.13	1.02	1.16	1.09	1.02	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
CLOV TAP 60 kv	CASCADE-BENTON-DESCHUTES 60KV [6310]	P1	N-1	1.04	1.04	0.88	1.14	1.13	1.02	1.15	1.09	1.03	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
COWCK TP 60 kv	CASCADE-BENTON-DESCHUTES 60KV [6310]	P1	N-1	1.03	1.03	0.88	1.13	1.12	1.01	1.14	1.07	1.00	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
DESCHUTS 60 kv	CASCADE-BENTON-DESCHUTES 60KV [6310]	P1	N-1	1.01	1.01	0.88	1.11	1.10	1.00	1.12	1.04	0.94	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
KILARC 60 kv	CASCADE-BENTON-DESCHUTES 60KV [6310]	P1	N-1	1.04	1.04	0.89	1.14	1.13	1.02	1.15	1.09	1.03	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
OLSEN JT 60 kv	CASCADE-BENTON-DESCHUTES 60KV [6310]	P1	N-1	1.04	1.04	0.88	1.14	1.13	1.02	1.15	1.08	1.02	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
TKO TAP 60 kv	CASCADE-BENTON-DESCHUTES 60KV [6310]	P1	N-1	1.03	1.03	0.88	1.13	1.12	1.01	1.14	1.07	1.00	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
WHITMORE 60 kv	CASCADE-BENTON-DESCHUTES 60KV [6310]	P1	N-1	1.04	1.03	0.88	1.14	1.13	1.02	1.15	1.08	1.02	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
FRNCHGLH 60 kv	KESWICK-CASCADE 60KV [7260] MOAS OPENED ON CASCADE_STLLWATR	P1	N-1	1.00	0.99	0.96	1.10	1.07	1.00	1.08	1.02	0.97	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
KESWICK 60 kv	KESWICK-CASCADE 60KV [7260] MOAS OPENED ON CASCADE_STLLWATR	P1	N-1	0.99	0.97	0.93	1.11	1.07	0.98	1.08	1.02	0.93	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
STLLWATR 60 kv	KESWICK-CASCADE 60KV [7260] MOAS OPENED ON CASCADE_STLLWATR	P1	N-1	0.99	0.97	0.92	1.11	1.08	0.98	1.08	1.02	0.92	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
ELIZ TWN 60 kv	CARIBOU #2 60KV [6280] MOAS OPENED ON CARIBOU_GRS F JT	P1	N-1	1.04	1.04	0.48	1.05	1.05	1.04	1.05	1.04	0.48	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
EST Q JT 60 kv	CARIBOU #2 60KV [6280] MOAS OPENED ON CARIBOU_GRS F JT	P1	N-1	1.04	1.04	0.48	1.05	1.05	1.04	1.05	1.04	0.48	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
EST Q1 60 kv	CARIBOU #2 60KV [6280] MOAS OPENED ON CARIBOU_GRS F JT	P1	N-1	1.04	1.04	0.48	1.05	1.05	1.04	1.05	1.04	0.48	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
EST QNCY 60 kv	CARIBOU #2 60KV [6280] MOAS OPENED ON CARIBOU_GRS F JT	P1	N-1	1.04	1.04	0.48	1.05	1.05	1.04	1.05	1.04	0.48	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
GRS F JT 60 kv	CARIBOU #2 60KV [6280] MOAS OPENED ON CARIBOU_GRS F JT	P1	N-1	1.04	1.04	0.48	1.05	1.05	1.04	1.05	1.04	0.48	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
PLMS JCT 60 kv	CARIBOU #2 60KV [6280] MOAS OPENED ON CARIBOU_GRS F JT	P1	N-1	1.04	1.04	0.48	1.05	1.05	1.04	1.05	1.04	0.48	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations



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



High/Low Voltages

Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)					Voltage PU (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations	
SPIQUINCY 60 kv	CARIBOU #2 60KV [6280] MOAS OPENED ON CARIBOU_GRS F JT	P1	N-1	1.04	1.04	0.48	1.05	1.05	1.04	1.05	1.04	0.48	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
SPIQUINCYJCT 60 kv	CARIBOU #2 60KV [6280] MOAS OPENED ON CARIBOU_GRS F JT	P1	N-1	1.04	1.04	0.48	1.05	1.05	1.04	1.05	1.04	0.48	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
BURNEY 60 kv	PIT 1 230/11KV TB 1	P1	N-1	1.11	1.11	1.07	1.10	1.10	1.11	1.12	1.11	1.06	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
BURNEYQF 60 kv	PIT 1 230/11KV TB 1	P1	N-1	1.11	1.11	1.07	1.10	1.10	1.10	1.12	1.11	1.06	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
BURNYJCT 60 kv	PIT 1 230/11KV TB 1	P1	N-1	1.11	1.11	1.07	1.10	1.10	1.10	1.12	1.11	1.06	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
HAT CRK1 60 kv	PIT 1 230/11KV TB 1	P1	N-1	1.10	1.09	1.07	1.10	1.10	1.09	1.12	1.10	1.07	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
HAT CRK2 60 kv	PIT 1 230/11KV TB 1	P1	N-1	1.10	1.10	1.07	1.10	1.10	1.10	1.12	1.10	1.07	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
PIT 1 60 kv	PIT 1 230/11KV TB 1	P1	N-1	1.10	1.10	1.08	1.10	1.10	1.10	1.12	1.10	1.07	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
FRBSTNTP 115 kv	TABLE MT 500/230KV TB 1	P1	N-1	1.04	1.05	1.03	1.12	1.07	1.03	1.06	1.04	1.03	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
HONC JT1 115 kv	TABLE MT 500/230KV TB 1	P1	N-1	1.04	1.05	1.01	1.13	1.07	1.03	1.07	1.03	1.01	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
HONC JT3 115 kv	TABLE MT 500/230KV TB 1	P1	N-1	1.04	1.05	1.02	1.13	1.07	1.03	1.07	1.04	1.02	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
HONCUT 115 kv	TABLE MT 500/230KV TB 1	P1	N-1	1.04	1.05	1.02	1.13	1.07	1.03	1.07	1.04	1.02	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
KANAKAJT 115 kv	TABLE MT 500/230KV TB 1	P1	N-1	1.04	1.05	1.03	1.12	1.07	1.03	1.07	1.04	1.03	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
OWID 115 kv	TABLE MT 500/230KV TB 1	P1	N-1	1.04	1.05	1.03	1.12	1.07	1.03	1.07	1.04	1.03	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
PALERMO 115 kv	TABLE MT 500/230KV TB 1	P1	N-1	1.04	1.05	1.02	1.13	1.08	1.03	1.07	1.04	1.02	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
SLYCREEK 115 kv	TABLE MT 500/230KV TB 1	P1	N-1	1.05	1.05	1.04	1.12	1.07	1.04	1.07	1.05	1.04	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
WODLF TP 115 kv	TABLE MT 500/230KV TB 1	P1	N-1	1.05	1.05	1.03	1.12	1.07	1.04	1.07	1.05	1.03	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
WYANDJT1 115 kv	TABLE MT 500/230KV TB 1	P1	N-1	1.04	1.05	1.01	1.13	1.08	1.03	1.08	1.04	1.01	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
WYANDJT2 115 kv	TABLE MT 500/230KV TB 1	P1	N-1	1.04	1.06	1.02	1.13	1.08	1.03	1.07	1.05	1.02	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
WYANDTTE 115 kv	TABLE MT 500/230KV TB 1	P1	N-1	1.04	1.05	1.01	1.13	1.08	1.03	1.08	1.04	1.01	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations

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



High/Low Voltages

Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)					Voltage PU (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations	
ANITA 60 kv	GLENN 230/60KV TB 2	P1	N-1	1.01	0.99	0.96	1.22	1.23	0.99	1.23	1.03	0.96	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
CAPAY 60 kv	GLENN 230/60KV TB 2	P1	N-1	1.05	1.03	1.02	1.22	1.22	1.03	1.22	1.06	1.02	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
CAPAYJCT 60 kv	GLENN 230/60KV TB 2	P1	N-1	1.05	1.03	1.02	1.22	1.22	1.03	1.22	1.06	1.02	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
CAPYSWCH 60 kv	GLENN 230/60KV TB 2	P1	N-1	1.06	1.04	1.03	1.22	1.22	1.04	1.22	1.07	1.03	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
CHICO JT 60 kv	GLENN 230/60KV TB 2	P1	N-1	1.03	1.01	1.00	1.22	1.22	1.01	1.23	1.05	1.00	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
CORNING 60 kv	GLENN 230/60KV TB 2	P1	N-1	1.04	1.03	1.00	1.23	1.23	1.03	1.24	1.05	1.00	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
CORNSWCH 60 kv	GLENN 230/60KV TB 2	P1	N-1	1.06	1.04	1.03	1.22	1.22	1.04	1.22	1.07	1.03	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
ELKCREEK 60 kv	GLENN 230/60KV TB 2	P1	N-1	0.97	0.94	0.96	1.21	1.22	0.95	1.22	0.99	0.96	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
ELKCRKJT 60 kv	GLENN 230/60KV TB 2	P1	N-1	1.00	0.98	0.98	1.22	1.22	0.98	1.22	1.02	0.99	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
GLENN 60 kv	GLENN 230/60KV TB 2	P1	N-1	1.06	1.04	1.03	1.22	1.22	1.04	1.22	1.07	1.03	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
HAMILTON 60 kv	GLENN 230/60KV TB 2	P1	N-1	1.03	1.02	1.00	1.23	1.24	1.02	1.25	1.05	1.00	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
HEADGATE 60 kv	GLENN 230/60KV TB 2	P1	N-1	1.04	1.02	1.01	1.22	1.22	1.03	1.22	1.06	1.01	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
HMLTN JT 60 kv	GLENN 230/60KV TB 2	P1	N-1	1.03	1.02	1.00	1.23	1.24	1.02	1.25	1.05	1.00	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
JACINTO 60 kv	GLENN 230/60KV TB 2	P1	N-1	1.01	1.00	0.97	1.24	1.25	1.00	1.26	1.03	0.98	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
ORL B JT 60 kv	GLENN 230/60KV TB 2	P1	N-1	1.04	1.02	1.02	1.22	1.22	1.02	1.22	1.05	1.02	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
ORLAND B 60 kv	GLENN 230/60KV TB 2	P1	N-1	1.05	1.03	1.02	1.22	1.22	1.03	1.22	1.06	1.02	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
ORLND JT 60 kv	GLENN 230/60KV TB 2	P1	N-1	1.06	1.04	1.03	1.22	1.22	1.04	1.22	1.06	1.03	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
WILLOWS 60 kv	GLENN 230/60KV TB 2	P1	N-1	1.00	0.98	0.98	1.22	1.22	0.98	1.22	1.02	0.98	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
ANTLER 60 kv	CASCADE 115/60KV TB 1	P1	N-1	0.97	0.97	0.90	1.02	1.02	0.97	1.03	0.98	0.91	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
CASCADE 115 kv	CASCADE 115/60KV TB 1	P1	N-1	N/A	0.99	0.93	N/A	1.04	0.99	1.05	N/A	0.94	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations



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



High/Low Voltages

Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)					Voltage PU (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations	
CASCADE 60 kv	CASCADE 115/60KV TB 1	P1	N-1	0.99	0.99	0.93	1.04	1.04	0.99	1.05	1.00	0.94	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
MTN GATE 60 kv	CASCADE 115/60KV TB 1	P1	N-1	0.97	0.97	0.91	1.02	1.02	0.97	1.03	0.98	0.91	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
OREGNTRL 60 kv	CASCADE 115/60KV TB 1	P1	N-1	0.99	1.00	0.94	1.04	1.04	0.99	1.05	1.01	0.94	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
PPL 60 kv	CASCADE 115/60KV TB 1	P1	N-1	0.97	0.97	0.90	1.02	1.02	0.97	1.03	0.98	0.91	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
STLLWATR 60 kv	CASCADE 115/60KV TB 1	P1	N-1	0.99	0.99	0.93	1.04	1.04	0.99	1.05	1.00	0.94	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
CANAL TP 60 kv	NEO REDT 60/13.8KV TB 1	P1	N-1	0.91	0.91	0.86	0.98	0.96	0.91	0.97	0.93	0.86	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
CR CANAL 60 kv	NEO REDT 60/13.8KV TB 1	P1	N-1	0.91	0.91	0.86	0.98	0.96	0.91	0.97	0.93	0.86	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
NEO REDT 60 kv	NEO REDT 60/13.8KV TB 1	P1	N-1	0.92	0.91	0.86	0.98	0.96	0.91	0.97	0.93	0.86	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
RASN JNT 60 kv	NEO REDT 60/13.8KV TB 1	P1	N-1	0.92	0.91	0.86	0.98	0.96	0.91	0.97	0.93	0.86	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
TYLER 60 kv	NEO REDT 60/13.8KV TB 1	P1	N-1	0.91	0.91	0.86	0.98	0.96	0.91	0.97	0.93	0.86	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
FRBSTNTP 115 kv	TB MT 1T SVD=V	P1	N-1	1.05	1.05	1.04	1.11	1.07	1.05	1.07	1.05	1.04	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
HONC JT1 115 kv	TB MT 1T SVD=V	P1	N-1	1.05	1.05	1.02	1.13	1.08	1.04	1.08	1.04	1.03	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
HONC JT3 115 kv	TB MT 1T SVD=V	P1	N-1	1.05	1.05	1.04	1.12	1.08	1.05	1.08	1.04	1.04	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
HONCUT 115 kv	TB MT 1T SVD=V	P1	N-1	1.05	1.05	1.03	1.12	1.08	1.05	1.08	1.04	1.04	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
KANAKAJT 115 kv	TB MT 1T SVD=V	P1	N-1	1.05	1.05	1.04	1.11	1.07	1.05	1.07	1.05	1.04	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
OWID 115 kv	TB MT 1T SVD=V	P1	N-1	1.05	1.05	1.04	1.11	1.07	1.05	1.07	1.05	1.04	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
PALERMO 115 kv	TB MT 1T SVD=V	P1	N-1	1.05	1.05	1.04	1.12	1.08	1.05	1.08	1.05	1.04	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
SLYCREEK 115 kv	TB MT 1T SVD=V	P1	N-1	1.05	1.05	1.04	1.11	1.07	1.05	1.07	1.05	1.04	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
WODLF TP 115 kv	TB MT 1T SVD=V	P1	N-1	1.05	1.05	1.04	1.11	1.07	1.05	1.07	1.05	1.04	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
WYANDJT1 115 kv	TB MT 1T SVD=V	P1	N-1	1.05	1.05	1.03	1.12	1.08	1.05	1.08	1.05	1.03	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations

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



High/Low Voltages

Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)					Voltage PU (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations	
WYANDJT2 115 kv	TB MT 1T SVD=V	P1	N-1	1.05	1.05	1.04	1.12	1.08	1.05	1.08	1.05	1.04	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
WYANDTTE 115 kv	TB MT 1T SVD=V	P1	N-1	1.05	1.05	1.03	1.12	1.08	1.05	1.08	1.05	1.03	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
ELIZ TWN 60 kv	CARIBOU-PLUMAS JCT 60KV [6290] (GRS F JT-ELIZ TWN)	P2-1	Line Section w/o Fault	1.03	1.04	0.48	1.05	1.05	1.04	1.05	1.03	0.49	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
EST Q JT 60 kv	CARIBOU-PLUMAS JCT 60KV [6290] (GRS F JT-ELIZ TWN)	P2-1	Line Section w/o Fault	1.03	1.04	0.48	1.05	1.05	1.04	1.05	1.03	0.49	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
EST Q1 60 kv	CARIBOU-PLUMAS JCT 60KV [6290] (GRS F JT-ELIZ TWN)	P2-1	Line Section w/o Fault	1.03	1.04	0.48	1.05	1.05	1.04	1.05	1.03	0.49	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
EST QNCY 60 kv	CARIBOU-PLUMAS JCT 60KV [6290] (GRS F JT-ELIZ TWN)	P2-1	Line Section w/o Fault	1.03	1.04	0.48	1.05	1.05	1.04	1.05	1.03	0.49	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
PLMS JCT 60 kv	CARIBOU-PLUMAS JCT 60KV [6290] (GRS F JT-ELIZ TWN)	P2-1	Line Section w/o Fault	1.03	1.04	0.48	1.05	1.05	1.04	1.05	1.03	0.49	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
SPIQUINCY 60 kv	CARIBOU-PLUMAS JCT 60KV [6290] (GRS F JT-ELIZ TWN)	P2-1	Line Section w/o Fault	1.04	1.04	0.48	1.05	1.05	1.04	1.05	1.04	0.49	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
SPIQUINCYJCT 60 kv	CARIBOU-PLUMAS JCT 60KV [6290] (GRS F JT-ELIZ TWN)	P2-1	Line Section w/o Fault	1.03	1.04	0.48	1.05	1.05	1.04	1.05	1.03	0.49	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
EST Q JT 60 kv	CARIBOU-PLUMAS JCT 60KV [6290] (EST Q1-ELIZ TWN)	P2-1	Line Section w/o Fault	1.03	1.04	0.48	1.05	1.05	1.04	1.05	1.03	0.48	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
EST Q1 60 kv	CARIBOU-PLUMAS JCT 60KV [6290] (EST Q1-ELIZ TWN)	P2-1	Line Section w/o Fault	1.03	1.04	0.48	1.05	1.05	1.04	1.05	1.03	0.48	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
EST QNCY 60 kv	CARIBOU-PLUMAS JCT 60KV [6290] (EST Q1-ELIZ TWN)	P2-1	Line Section w/o Fault	1.03	1.04	0.48	1.05	1.05	1.04	1.05	1.03	0.48	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
PLMS JCT 60 kv	CARIBOU-PLUMAS JCT 60KV [6290] (EST Q1-ELIZ TWN)	P2-1	Line Section w/o Fault	1.03	1.04	0.48	1.05	1.05	1.04	1.05	1.03	0.48	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
SPIQUINCY 60 kv	CARIBOU-PLUMAS JCT 60KV [6290] (EST Q1-ELIZ TWN)	P2-1	Line Section w/o Fault	1.03	1.04	0.48	1.05	1.05	1.04	1.05	1.03	0.48	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
SPIQUINCYJCT 60 kv	CARIBOU-PLUMAS JCT 60KV [6290] (EST Q1-ELIZ TWN)	P2-1	Line Section w/o Fault	1.03	1.04	0.48	1.05	1.05	1.04	1.05	1.03	0.48	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
ELIZ TWN 60 kv	CARIBOU #2 60KV [6280] (CARIBOU-GRS F JT)	P2-1	Line Section w/o Fault	1.04	1.04	0.48	1.05	1.05	1.04	1.05	1.04	0.48	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
EST Q JT 60 kv	CARIBOU #2 60KV [6280] (CARIBOU-GRS F JT)	P2-1	Line Section w/o Fault	1.04	1.04	0.48	1.05	1.05	1.04	1.05	1.04	0.48	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
EST Q1 60 kv	CARIBOU #2 60KV [6280] (CARIBOU-GRS F JT)	P2-1	Line Section w/o Fault	1.04	1.04	0.48	1.05	1.05	1.04	1.05	1.04	0.48	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
EST QNCY 60 kv	CARIBOU #2 60KV [6280] (CARIBOU-GRS F JT)	P2-1	Line Section w/o Fault	1.04	1.04	0.48	1.05	1.05	1.04	1.05	1.04	0.48	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
GRS F JT 60 kv	CARIBOU #2 60KV [6280] (CARIBOU-GRS F JT)	P2-1	Line Section w/o Fault	1.04	1.04	0.48	1.05	1.05	1.04	1.05	1.04	0.48	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations

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



High/Low Voltages

Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)					Voltage PU (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations	
PLMS JCT 60 kv	CARIBOU #2 60KV [6280] (CARIBOU-GRS F JT)	P2-1	Line Section w/o Fault	1.04	1.04	0.48	1.05	1.05	1.04	1.05	1.04	0.48	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
SPIQUINCY 60 kv	CARIBOU #2 60KV [6280] (CARIBOU-GRS F JT)	P2-1	Line Section w/o Fault	1.04	1.04	0.48	1.05	1.05	1.04	1.05	1.04	0.48	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
SPIQUINCYJCT 60 kv	CARIBOU #2 60KV [6280] (CARIBOU-GRS F JT)	P2-1	Line Section w/o Fault	1.04	1.04	0.48	1.05	1.05	1.04	1.05	1.04	0.48	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
FRSTGLEN 115 kv	BRIDGEVILLE-COTTONWOOD 115KV [1110] (WILDWOOD-FRSTGLEN)	P2-1	Line Section w/o Fault	1.06	1.05	1.05	1.13	1.10	1.08	1.11	1.09	1.05	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
FRSTGLEN 115 kv	BRIDGEVILLE-COTTONWOOD 115KV [1110] (WILDWOOD-COTWDPGE)	P2-1	Line Section w/o Fault	1.06	1.06	1.05	1.14	1.11	1.08	1.12	1.10	1.05	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
WILDWOOD 115 kv	BRIDGEVILLE-COTTONWOOD 115KV [1110] (WILDWOOD-COTWDPGE)	P2-1	Line Section w/o Fault	1.06	1.06	1.05	1.14	1.11	1.08	1.12	1.10	1.05	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
TRINITY 115 kv	TRINITY-COTTONWOOD 115KV [4040] (TRINITY-JESSTAP)	P2-1	Line Section w/o Fault	1.04	1.03	1.03	1.11	1.09	1.05	1.09	1.06	1.03	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
HONC JT1 115 kv	PALERMO-PEASE 115KV [3220] (PALERMO-HONC JT1)	P2-1	Line Section w/o Fault	1.03	1.03	1.00	1.14	1.06	1.03	1.07	0.99	1.00	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
CEDR CRK 60 kv	CASCADE-BENTON-DESCHUTES 60KV [6310] (LOMS JCT-DESCHUTS)	P2-1	Line Section w/o Fault	1.04	1.04	0.88	1.14	1.13	1.02	1.15	1.09	1.02	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
CLOV TAP 60 kv	CASCADE-BENTON-DESCHUTES 60KV [6310] (LOMS JCT-DESCHUTS)	P2-1	Line Section w/o Fault	1.04	1.04	0.88	1.14	1.13	1.02	1.15	1.09	1.03	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
COWCK TP 60 kv	CASCADE-BENTON-DESCHUTES 60KV [6310] (LOMS JCT-DESCHUTS)	P2-1	Line Section w/o Fault	1.03	1.03	0.88	1.13	1.12	1.01	1.14	1.07	1.00	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
DESCHUTS 60 kv	CASCADE-BENTON-DESCHUTES 60KV [6310] (LOMS JCT-DESCHUTS)	P2-1	Line Section w/o Fault	1.01	1.01	0.87	1.11	1.10	1.00	1.11	1.04	0.94	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
KILARC 60 kv	CASCADE-BENTON-DESCHUTES 60KV [6310] (LOMS JCT-DESCHUTS)	P2-1	Line Section w/o Fault	1.04	1.04	0.88	1.14	1.13	1.02	1.15	1.09	1.03	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
OLSEN JT 60 kv	CASCADE-BENTON-DESCHUTES 60KV [6310] (LOMS JCT-DESCHUTS)	P2-1	Line Section w/o Fault	1.04	1.04	0.88	1.14	1.13	1.02	1.15	1.08	1.02	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
TKO TAP 60 kv	CASCADE-BENTON-DESCHUTES 60KV [6310] (LOMS JCT-DESCHUTS)	P2-1	Line Section w/o Fault	1.03	1.03	0.88	1.13	1.12	1.01	1.14	1.07	1.00	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
WHITMORE 60 kv	CASCADE-BENTON-DESCHUTES 60KV [6310] (LOMS JCT-DESCHUTS)	P2-1	Line Section w/o Fault	1.04	1.03	0.88	1.14	1.12	1.02	1.14	1.08	1.02	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
FRNCHGLH 60 kv	KESWICK-CASCADE 60KV [7260] (CASCADE-STLLWATR)	P2-1	Line Section w/o Fault	1.00	0.99	0.96	1.10	1.07	1.00	1.08	1.02	0.97	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
KESWICK 60 kv	KESWICK-CASCADE 60KV [7260] (CASCADE-STLLWATR)	P2-1	Line Section w/o Fault	0.99	0.97	0.93	1.11	1.07	0.98	1.08	1.02	0.93	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
STLLWATR 60 kv	KESWICK-CASCADE 60KV [7260] (CASCADE-STLLWATR)	P2-1	Line Section w/o Fault	0.99	0.97	0.92	1.11	1.08	0.98	1.08	1.02	0.92	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
CANAL TP 60 kv	COTTONWOOD #2 60KV [6630] (NEO REDT-RASN JNT)	P2-1	Line Section w/o Fault	0.91	0.91	0.86	0.98	0.96	0.91	0.97	0.93	0.86	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations

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



High/Low Voltages

Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)					Voltage PU (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations	
CR CANAL 60 kv	COTTONWOOD #2 60KV [6630] (NEO REDT-RASN JNT)	P2-1	Line Section w/o Fault	0.91	0.91	0.86	0.98	0.96	0.91	0.97	0.93	0.86	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
RASN JNT 60 kv	COTTONWOOD #2 60KV [6630] (NEO REDT-RASN JNT)	P2-1	Line Section w/o Fault	0.92	0.91	0.86	0.98	0.96	0.91	0.97	0.93	0.86	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
TYLER 60 kv	COTTONWOOD #2 60KV [6630] (NEO REDT-RASN JNT)	P2-1	Line Section w/o Fault	0.91	0.91	0.86	0.98	0.96	0.91	0.97	0.93	0.86	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
FRBSTNTP 115 kv	TBL MTX1 230KV SECTION NA	P2-2	Bus	1.04	1.05	1.03	1.12	1.07	1.03	1.06	1.04	1.03	Load power factor correction and voltage support if needed
HONC JT1 115 kv	TBL MTX1 230KV SECTION NA	P2-2	Bus	1.04	1.05	1.01	1.13	1.07	1.03	1.07	1.03	1.01	Load power factor correction and voltage support if needed
HONC JT3 115 kv	TBL MTX1 230KV SECTION NA	P2-2	Bus	1.04	1.05	1.02	1.13	1.07	1.03	1.07	1.04	1.02	Load power factor correction and voltage support if needed
HONCUT 115 kv	TBL MTX1 230KV SECTION NA	P2-2	Bus	1.04	1.05	1.02	1.13	1.07	1.03	1.07	1.04	1.02	Load power factor correction and voltage support if needed
KANAKAJT 115 kv	TBL MTX1 230KV SECTION NA	P2-2	Bus	1.04	1.05	1.03	1.12	1.07	1.03	1.07	1.04	1.03	Load power factor correction and voltage support if needed
OWID 115 kv	TBL MTX1 230KV SECTION NA	P2-2	Bus	1.04	1.05	1.03	1.12	1.07	1.03	1.07	1.04	1.03	Load power factor correction and voltage support if needed
PALERMO 115 kv	TBL MTX1 230KV SECTION NA	P2-2	Bus	1.04	1.05	1.02	1.13	1.08	1.03	1.07	1.04	1.02	Load power factor correction and voltage support if needed
SLYCREEK 115 kv	TBL MTX1 230KV SECTION NA	P2-2	Bus	1.05	1.05	1.04	1.12	1.07	1.04	1.07	1.05	1.04	Load power factor correction and voltage support if needed
WODLF TP 115 kv	TBL MTX1 230KV SECTION NA	P2-2	Bus	1.05	1.05	1.03	1.12	1.07	1.04	1.07	1.05	1.03	Load power factor correction and voltage support if needed
WYANDJT1 115 kv	TBL MTX1 230KV SECTION NA	P2-2	Bus	1.04	1.05	1.01	1.13	1.08	1.03	1.08	1.04	1.01	Load power factor correction and voltage support if needed
WYANDJT2 115 kv	TBL MTX1 230KV SECTION NA	P2-2	Bus	1.04	1.06	1.02	1.13	1.08	1.03	1.07	1.05	1.02	Load power factor correction and voltage support if needed
WYANDTTE 115 kv	TBL MTX1 230KV SECTION NA	P2-2	Bus	1.04	1.05	1.01	1.13	1.08	1.03	1.08	1.04	1.01	Load power factor correction and voltage support if needed
FRSTGLEN 115 kv	COTWDPGE 115KV SECTION 2D	P2-2	Bus	1.06	1.06	1.05	1.13	1.11	1.08	1.11	1.09	1.05	Load power factor correction and voltage support if needed
WILDWOOD 115 kv	COTWDPGE 115KV SECTION 2D	P2-2	Bus	1.06	1.06	1.05	1.13	1.11	1.08	1.11	1.10	1.05	Load power factor correction and voltage support if needed
BIG BAR 60 kv	COTWDPGE 115KV SECTION 1D	P2-2	Bus	1.04	1.04	1.04	1.10	1.08	1.05	1.09	1.06	1.04	Load power factor correction and voltage support if needed
FRNCHGLH 60 kv	COTWDPGE 115KV SECTION 1D	P2-2	Bus	1.03	1.03	1.02	1.10	1.08	1.04	1.08	1.05	1.02	Load power factor correction and voltage support if needed
JESSTAP 115 kv	COTWDPGE 115KV SECTION 1D	P2-2	Bus	1.05	1.05	1.04	1.13	1.11	1.07	1.11	1.08	1.05	Load power factor correction and voltage support if needed
TAP 65 60 kv	COTWDPGE 115KV SECTION 1D	P2-2	Bus	1.05	1.05	1.04	1.12	1.10	1.07	1.10	1.08	1.04	Load power factor correction and voltage support if needed
TRINITY 115 kv	COTWDPGE 115KV SECTION 1D	P2-2	Bus	1.05	1.04	1.04	1.13	1.10	1.06	1.11	1.07	1.04	Load power factor correction and voltage support if needed
TRINITY 60 kv	COTWDPGE 115KV SECTION 1D	P2-2	Bus	1.05	1.05	1.04	1.12	1.10	1.07	1.10	1.08	1.04	Load power factor correction and voltage support if needed
ANTLER 60 kv	CASCADE 115KV SECTION 1D	P2-2	Bus	0.97	0.97	0.90	1.02	1.02	0.97	1.03	0.98	0.91	Continue to monitor future load forecast
PPL 60 kv	CASCADE 115KV SECTION 1D	P2-2	Bus	0.97	0.97	0.90	1.02	1.02	0.97	1.03	0.98	0.91	Continue to monitor future load forecast
HONC JT1 115 kv	PALERMO 115KV SECTION 1D	P2-2	Bus	1.03	1.03	1.00	1.14	1.06	1.03	1.07	0.99	1.00	Load power factor correction and voltage support if needed
HONC JT3 115 kv	PALERMO 115KV SECTION 1D	P2-2	Bus	1.04	1.04	1.03	1.13	1.05	1.04	1.05	1.02	1.03	Load power factor correction and voltage support if needed
HONCUT 115 kv	PALERMO 115KV SECTION 1D	P2-2	Bus	1.04	1.04	1.03	1.13	1.05	1.04	1.05	1.02	1.03	Load power factor correction and voltage support if needed
FRNCHGLH 60 kv	CASCADE 60KV SECTION MA	P2-2	Bus	1.01	0.99	0.97	1.11	1.07	1.00	1.08	1.03	0.97	Load power factor correction and voltage support if needed
KESWICK 60 kv	CASCADE 60KV SECTION MA	P2-2	Bus	0.99	0.97	0.93	1.11	1.08	0.98	1.08	1.02	0.93	Load power factor correction and voltage support if needed
STLLWATR 60 kv	CASCADE 60KV SECTION MA	P2-2	Bus	0.99	0.97	0.92	1.12	1.08	0.98	1.08	1.02	0.92	Load power factor correction and voltage support if needed
CEDR CRK 60 kv	COTTONWD 60KV SECTION MA	P2-2	Bus	0.94	N/A	N/A	1.12	N/A	N/A	N/A	1.09	N/A	Non BES Facility
CLMN JCT 60 kv	COTTONWD 60KV SECTION MA	P2-2	Bus	0.48	N/A	N/A	1.11	N/A	N/A	N/A	0.97	N/A	Non BES Facility
CLOV TAP 60 kv	COTTONWD 60KV SECTION MA	P2-2	Bus	0.94	N/A	N/A	1.12	N/A	N/A	N/A	1.09	N/A	Non BES Facility
COWCK TP 60 kv	COTTONWD 60KV SECTION MA	P2-2	Bus	0.92	N/A	N/A	1.11	N/A	N/A	N/A	1.07	N/A	Non BES Facility
DIRYVILLE 60 kv	COTTONWD 60KV SECTION MA	P2-2	Bus	0.47	N/A	N/A	1.11	N/A	N/A	N/A	0.97	N/A	Non BES Facility
GERBER 60 kv	COTTONWD 60KV SECTION MA	P2-2	Bus	0.39	N/A	N/A	1.10	N/A	N/A	N/A	0.92	N/A	Non BES Facility
GRBR JCT 60 kv	COTTONWD 60KV SECTION MA	P2-2	Bus	0.41	N/A	N/A	1.10	N/A	N/A	N/A	0.93	N/A	Non BES Facility



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



High/Low Voltages

Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)					Voltage PU (Sensitivity Scenarios)				Project & Potential Mitigation Solutions	
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations		
KILARC 60 kv	COTTONWD 60KV SECTION MA	P2-2	Bus	0.94	N/A	N/A	1.12	N/A	N/A	N/A	N/A	1.09	N/A	Non BES Facility
LP FB SP 60 kv	COTTONWD 60KV SECTION MA	P2-2	Bus	0.41	N/A	N/A	1.10	N/A	N/A	N/A	N/A	0.93	N/A	Non BES Facility
LS ML JT 60 kv	COTTONWD 60KV SECTION MA	P2-2	Bus	0.46	N/A	N/A	1.11	N/A	N/A	N/A	N/A	0.97	N/A	Non BES Facility
LS MLNSJ 60 kv	COTTONWD 60KV SECTION MA	P2-2	Bus	0.46	N/A	N/A	1.11	N/A	N/A	N/A	N/A	0.97	N/A	Non BES Facility
OLSEN JT 60 kv	COTTONWD 60KV SECTION MA	P2-2	Bus	0.93	N/A	N/A	1.12	N/A	N/A	N/A	N/A	1.08	N/A	Non BES Facility
RED B JT 60 kv	COTTONWD 60KV SECTION MA	P2-2	Bus	0.43	N/A	N/A	1.11	N/A	N/A	N/A	N/A	0.94	N/A	Non BES Facility
RED BLFF 60 kv	COTTONWD 60KV SECTION MA	P2-2	Bus	0.43	N/A	N/A	1.11	N/A	N/A	N/A	N/A	0.95	N/A	Non BES Facility
RWSN J2 60 kv	COTTONWD 60KV SECTION MA	P2-2	Bus	0.42	N/A	N/A	1.10	N/A	N/A	N/A	N/A	0.93	N/A	Non BES Facility
TKO TAP 60 kv	COTTONWD 60KV SECTION MA	P2-2	Bus	0.92	N/A	N/A	1.11	N/A	N/A	N/A	N/A	1.07	N/A	Non BES Facility
TYLERJT 60 kv	COTTONWD 60KV SECTION MA	P2-2	Bus	0.41	N/A	N/A	1.10	N/A	N/A	N/A	N/A	0.93	N/A	Non BES Facility
VINA 60 kv	COTTONWD 60KV SECTION MA	P2-2	Bus	0.46	N/A	N/A	1.11	N/A	N/A	N/A	N/A	0.96	N/A	Non BES Facility
WHITMORE 60 kv	COTTONWD 60KV SECTION MA	P2-2	Bus	0.93	N/A	N/A	1.12	N/A	N/A	N/A	N/A	1.08	N/A	Non BES Facility
ELIZ TWN 60 kv	CARIBOU 60KV SECTION 1D	P2-2	Bus	1.04	1.04	0.48	1.05	1.05	1.04	1.05	1.04	1.04	0.48	Non BES Facility
EST Q JT 60 kv	CARIBOU 60KV SECTION 1D	P2-2	Bus	1.04	1.04	0.48	1.05	1.05	1.04	1.05	1.04	1.04	0.48	Non BES Facility
EST Q1 60 kv	CARIBOU 60KV SECTION 1D	P2-2	Bus	1.04	1.04	0.48	1.05	1.05	1.04	1.05	1.04	1.04	0.48	Non BES Facility
EST QNCY 60 kv	CARIBOU 60KV SECTION 1D	P2-2	Bus	1.04	1.04	0.48	1.05	1.05	1.04	1.05	1.04	1.04	0.48	Non BES Facility
GRS F JT 60 kv	CARIBOU 60KV SECTION 1D	P2-2	Bus	1.04	1.04	0.48	1.05	1.05	1.04	1.05	1.04	1.04	0.48	Non BES Facility
PLMS JCT 60 kv	CARIBOU 60KV SECTION 1D	P2-2	Bus	1.04	1.04	0.48	1.05	1.05	1.04	1.05	1.04	1.04	0.48	Non BES Facility
SPIQUINCY 60 kv	CARIBOU 60KV SECTION 1D	P2-2	Bus	1.04	1.04	0.48	1.05	1.05	1.04	1.05	1.04	1.04	0.48	Non BES Facility
SPIQUINCYJCT 60 kv	CARIBOU 60KV SECTION 1D	P2-2	Bus	1.04	1.04	0.48	1.05	1.05	1.04	1.05	1.04	1.04	0.48	Non BES Facility
GLENN 60 kv	GLENN 60KV SECTION ME	P2-2	Bus	1.08	1.06	1.05	1.21	1.21	1.06	1.21	1.08	1.05	1.05	Non BES Facility
HAMILTON 60 kv	GLENN 60KV SECTION ME	P2-2	Bus	1.06	1.04	1.01	1.23	1.24	1.04	1.24	1.06	1.01	1.01	Non BES Facility
HMLTN JT 60 kv	GLENN 60KV SECTION ME	P2-2	Bus	1.06	1.04	1.01	1.23	1.24	1.04	1.24	1.06	1.01	1.01	Non BES Facility
JACINTO 60 kv	GLENN 60KV SECTION ME	P2-2	Bus	1.04	1.02	0.99	1.24	1.25	1.02	1.25	1.05	0.99	0.99	Non BES Facility
ORLAND B 60 kv	GLENN 60KV SECTION ME	P2-2	Bus	1.07	1.05	1.03	1.21	1.21	1.05	1.22	1.07	1.03	1.03	Non BES Facility
ORLND JT 60 kv	GLENN 60KV SECTION ME	P2-2	Bus	1.08	1.05	1.04	1.21	1.21	1.06	1.21	1.08	1.04	1.04	Non BES Facility
BURNEY 60 kv	PIT 1 U1 11KV SECTION 1D	P2-2	Bus	1.11	1.11	1.07	1.10	1.10	1.11	1.12	1.11	1.06	1.06	Non BES Facility
BURNEYQF 60 kv	PIT 1 U1 11KV SECTION 1D	P2-2	Bus	1.11	1.11	1.07	1.10	1.10	1.10	1.12	1.11	1.06	1.06	Non BES Facility
BURNYJCT 60 kv	PIT 1 U1 11KV SECTION 1D	P2-2	Bus	1.11	1.11	1.07	1.10	1.10	1.10	1.12	1.11	1.06	1.06	Non BES Facility
HAT CRK1 60 kv	PIT 1 U1 11KV SECTION 1D	P2-2	Bus	1.10	1.09	1.07	1.10	1.10	1.09	1.12	1.10	1.07	1.07	Non BES Facility
HAT CRK2 60 kv	PIT 1 U1 11KV SECTION 1D	P2-2	Bus	1.10	1.10	1.07	1.10	1.10	1.10	1.12	1.10	1.07	1.07	Non BES Facility
PIT 1 60 kv	PIT 1 U1 11KV SECTION 1D	P2-2	Bus	1.10	1.10	1.08	1.10	1.10	1.10	1.12	1.10	1.07	1.07	Non BES Facility
BURNEY 60 kv	PIT 1 U1 11KV SECTION 1F	P2-2	Bus	1.11	1.11	1.07	1.10	1.10	1.11	1.12	1.11	1.06	1.06	Non BES Facility
BURNEYQF 60 kv	PIT 1 U1 11KV SECTION 1F	P2-2	Bus	1.11	1.11	1.07	1.10	1.10	1.10	1.12	1.11	1.06	1.06	Non BES Facility
BURNYJCT 60 kv	PIT 1 U1 11KV SECTION 1F	P2-2	Bus	1.11	1.11	1.07	1.10	1.10	1.10	1.12	1.11	1.06	1.06	Non BES Facility
HAT CRK1 60 kv	PIT 1 U1 11KV SECTION 1F	P2-2	Bus	1.10	1.09	1.07	1.10	1.10	1.09	1.12	1.10	1.07	1.07	Non BES Facility
HAT CRK2 60 kv	PIT 1 U1 11KV SECTION 1F	P2-2	Bus	1.10	1.10	1.07	1.10	1.10	1.10	1.12	1.10	1.07	1.07	Non BES Facility
PIT 1 60 kv	PIT 1 U1 11KV SECTION 1F	P2-2	Bus	1.10	1.10	1.08	1.10	1.10	1.10	1.12	1.10	1.07	1.07	Non BES Facility
DIRYVLE 60 kv	COTTONWD 60KV SECTION 1D	P2-2	Bus	N/A	1.00	0.89	N/A	1.07	0.99	1.08	N/A	0.89	0.89	Non BES Facility
GERBER 60 kv	COTTONWD 60KV SECTION 1D	P2-2	Bus	N/A	0.97	0.83	N/A	1.06	0.97	1.07	N/A	0.83	0.83	Non BES Facility
GRBR JCT 60 kv	COTTONWD 60KV SECTION 1D	P2-2	Bus	N/A	0.99	0.85	N/A	1.06	0.98	1.07	N/A	0.85	0.85	Non BES Facility

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



High/Low Voltages

Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)					Voltage PU (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations	
LP FB SP 60 kv	COTTONWD 60KV SECTION 1D	P2-2	Bus	N/A	0.99	0.85	N/A	1.06	0.98	1.07	N/A	0.85	Non BES Facility
LS ML JT 60 kv	COTTONWD 60KV SECTION 1D	P2-2	Bus	N/A	1.00	0.88	N/A	1.07	0.99	1.08	N/A	0.88	Non BES Facility
LS MLNSJ 60 kv	COTTONWD 60KV SECTION 1D	P2-2	Bus	N/A	1.00	0.87	N/A	1.07	0.99	1.08	N/A	0.88	Non BES Facility
RED B JT 60 kv	COTTONWD 60KV SECTION 1D	P2-2	Bus	N/A	1.00	0.87	N/A	1.06	1.00	1.07	N/A	0.87	Non BES Facility
RED BLFF 60 kv	COTTONWD 60KV SECTION 1D	P2-2	Bus	N/A	1.00	0.87	N/A	1.06	1.00	1.07	N/A	0.87	Non BES Facility
RWSN J2 60 kv	COTTONWD 60KV SECTION 1D	P2-2	Bus	N/A	0.99	0.86	N/A	1.06	0.98	1.07	N/A	0.86	Non BES Facility
TYLERJT 60 kv	COTTONWD 60KV SECTION 1D	P2-2	Bus	N/A	0.99	0.85	N/A	1.06	0.98	1.07	N/A	0.85	Non BES Facility
VINA 60 kv	COTTONWD 60KV SECTION 1D	P2-2	Bus	N/A	1.00	0.87	N/A	1.07	0.99	1.08	N/A	0.87	Non BES Facility
GLENN 60 kv	GLENN - ME 60KV & GLENN-ELKCRKJT LINE	P2-3	Non-Bus-Tie Breaker	1.08	1.06	1.05	1.21	1.21	1.06	1.21	1.08	1.05	Non BES Facility
HAMILTON 60 kv	GLENN - ME 60KV & GLENN-ELKCRKJT LINE	P2-3	Non-Bus-Tie Breaker	1.06	1.04	1.01	1.23	1.24	1.04	1.24	1.06	1.01	Non BES Facility
HMLTN JT 60 kv	GLENN - ME 60KV & GLENN-ELKCRKJT LINE	P2-3	Non-Bus-Tie Breaker	1.06	1.04	1.01	1.23	1.24	1.04	1.24	1.06	1.01	Non BES Facility
JACINTO 60 kv	GLENN - ME 60KV & GLENN-ELKCRKJT LINE	P2-3	Non-Bus-Tie Breaker	1.04	1.02	0.99	1.24	1.25	1.02	1.25	1.05	0.99	Non BES Facility
ORLAND B 60 kv	GLENN - ME 60KV & GLENN-ELKCRKJT LINE	P2-3	Non-Bus-Tie Breaker	1.07	1.05	1.03	1.21	1.21	1.05	1.22	1.07	1.03	Non BES Facility
ORLND JT 60 kv	GLENN - ME 60KV & GLENN-ELKCRKJT LINE	P2-3	Non-Bus-Tie Breaker	1.08	1.05	1.04	1.21	1.21	1.06	1.21	1.08	1.04	Non BES Facility
GLENN 60 kv	GLENN - ME 60KV & GLENN #4 LINE	P2-3	Non-Bus-Tie Breaker	1.08	1.06	1.05	1.21	1.21	1.06	1.21	1.08	1.05	Non BES Facility
HAMILTON 60 kv	GLENN - ME 60KV & GLENN #4 LINE	P2-3	Non-Bus-Tie Breaker	1.06	1.04	1.01	1.23	1.24	1.04	1.24	1.06	1.01	Non BES Facility
HMLTN JT 60 kv	GLENN - ME 60KV & GLENN #4 LINE	P2-3	Non-Bus-Tie Breaker	1.06	1.04	1.01	1.23	1.24	1.04	1.24	1.06	1.01	Non BES Facility
JACINTO 60 kv	GLENN - ME 60KV & GLENN #4 LINE	P2-3	Non-Bus-Tie Breaker	1.04	1.02	0.99	1.24	1.25	1.02	1.25	1.05	0.99	Non BES Facility
ORLAND B 60 kv	GLENN - ME 60KV & GLENN #4 LINE	P2-3	Non-Bus-Tie Breaker	1.07	1.05	1.03	1.21	1.21	1.05	1.22	1.07	1.03	Non BES Facility
ORLND JT 60 kv	GLENN - ME 60KV & GLENN #4 LINE	P2-3	Non-Bus-Tie Breaker	1.08	1.05	1.04	1.21	1.21	1.06	1.21	1.08	1.04	Non BES Facility
GLENN 60 kv	GLENN - ME 60KV & GLENN #3 LINE	P2-3	Non-Bus-Tie Breaker	1.08	1.06	1.05	1.21	1.21	1.06	1.21	1.08	1.05	Non BES Facility
HAMILTON 60 kv	GLENN - ME 60KV & GLENN #3 LINE	P2-3	Non-Bus-Tie Breaker	1.06	1.04	1.01	1.23	1.24	1.04	1.24	1.06	1.01	Non BES Facility
HMLTN JT 60 kv	GLENN - ME 60KV & GLENN #3 LINE	P2-3	Non-Bus-Tie Breaker	1.06	1.04	1.01	1.23	1.24	1.04	1.24	1.06	1.01	Non BES Facility
JACINTO 60 kv	GLENN - ME 60KV & GLENN #3 LINE	P2-3	Non-Bus-Tie Breaker	1.04	1.02	0.99	1.24	1.25	1.02	1.25	1.05	0.99	Non BES Facility
ORLAND B 60 kv	GLENN - ME 60KV & GLENN #3 LINE	P2-3	Non-Bus-Tie Breaker	1.07	1.05	1.03	1.21	1.21	1.05	1.22	1.07	1.03	Non BES Facility
ORLND JT 60 kv	GLENN - ME 60KV & GLENN #3 LINE	P2-3	Non-Bus-Tie Breaker	1.08	1.05	1.04	1.21	1.21	1.06	1.21	1.08	1.04	Non BES Facility
DIRYVLE 60 kv	COTTONWD - 1D 60KV & COTTONWOOD-BENTON #1 LINE	P2-3	Non-Bus-Tie Breaker	N/A	1.00	0.89	N/A	1.06	1.00	1.07	N/A	0.89	Non BES Facility
GERBER 60 kv	COTTONWD - 1D 60KV & COTTONWOOD-BENTON #1 LINE	P2-3	Non-Bus-Tie Breaker	N/A	0.97	0.84	N/A	1.06	0.97	1.07	N/A	0.84	Non BES Facility
GRBR JCT 60 kv	COTTONWD - 1D 60KV & COTTONWOOD-BENTON #1 LINE	P2-3	Non-Bus-Tie Breaker	N/A	0.99	0.85	N/A	1.06	0.98	1.07	N/A	0.86	Non BES Facility
LP FB SP 60 kv	COTTONWD - 1D 60KV & COTTONWOOD-BENTON #1 LINE	P2-3	Non-Bus-Tie Breaker	N/A	0.99	0.85	N/A	1.05	0.98	1.06	N/A	0.86	Non BES Facility
LS ML JT 60 kv	COTTONWD - 1D 60KV & COTTONWOOD-BENTON #1 LINE	P2-3	Non-Bus-Tie Breaker	N/A	1.00	0.88	N/A	1.07	0.99	1.08	N/A	0.88	Non BES Facility
LS MLNSJ 60 kv	COTTONWD - 1D 60KV & COTTONWOOD-BENTON #1 LINE	P2-3	Non-Bus-Tie Breaker	N/A	1.00	0.88	N/A	1.07	0.99	1.08	N/A	0.88	Non BES Facility
RED B JT 60 kv	COTTONWD - 1D 60KV & COTTONWOOD-BENTON #1 LINE	P2-3	Non-Bus-Tie Breaker	N/A	1.00	0.87	N/A	1.06	1.00	1.07	N/A	0.87	Non BES Facility



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



High/Low Voltages

Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)					Voltage PU (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations	
RED BLFF 60 kv	COTTONWD - 1D 60KV & COTTONWOOD-BENTON #1 LINE	P2-3	Non-Bus-Tie Breaker	N/A	1.00	0.87	N/A	1.06	1.00	1.07	N/A	0.87	Non BES Facility
RWSN J2 60 kv	COTTONWD - 1D 60KV & COTTONWOOD-BENTON #1 LINE	P2-3	Non-Bus-Tie Breaker	N/A	0.99	0.86	N/A	1.06	0.99	1.07	N/A	0.86	Non BES Facility
TYLERJT 60 kv	COTTONWD - 1D 60KV & COTTONWOOD-BENTON #1 LINE	P2-3	Non-Bus-Tie Breaker	N/A	0.99	0.86	N/A	1.06	0.98	1.06	N/A	0.86	Non BES Facility
VINA 60 kv	COTTONWD - 1D 60KV & COTTONWOOD-BENTON #1 LINE	P2-3	Non-Bus-Tie Breaker	N/A	1.00	0.88	N/A	1.07	0.99	1.08	N/A	0.88	Non BES Facility
DIRYVLE 60 kv	COTTONWD - 1D 60KV & COTTONWOOD-RED BLUFF LINE	P2-3	Non-Bus-Tie Breaker	N/A	1.00	0.89	N/A	1.07	0.99	1.08	N/A	0.89	Non BES Facility
GERBER 60 kv	COTTONWD - 1D 60KV & COTTONWOOD-RED BLUFF LINE	P2-3	Non-Bus-Tie Breaker	N/A	0.97	0.83	N/A	1.06	0.97	1.07	N/A	0.83	Non BES Facility
GRBR JCT 60 kv	COTTONWD - 1D 60KV & COTTONWOOD-RED BLUFF LINE	P2-3	Non-Bus-Tie Breaker	N/A	0.99	0.85	N/A	1.06	0.98	1.07	N/A	0.85	Non BES Facility
LP FB SP 60 kv	COTTONWD - 1D 60KV & COTTONWOOD-RED BLUFF LINE	P2-3	Non-Bus-Tie Breaker	N/A	0.99	0.85	N/A	1.06	0.98	1.07	N/A	0.85	Non BES Facility
LS ML JT 60 kv	COTTONWD - 1D 60KV & COTTONWOOD-RED BLUFF LINE	P2-3	Non-Bus-Tie Breaker	N/A	1.00	0.88	N/A	1.07	0.99	1.08	N/A	0.88	Non BES Facility
LS MLNSJ 60 kv	COTTONWD - 1D 60KV & COTTONWOOD-RED BLUFF LINE	P2-3	Non-Bus-Tie Breaker	N/A	1.00	0.87	N/A	1.07	0.99	1.08	N/A	0.88	Non BES Facility
RED B JT 60 kv	COTTONWD - 1D 60KV & COTTONWOOD-RED BLUFF LINE	P2-3	Non-Bus-Tie Breaker	N/A	1.00	0.87	N/A	1.06	1.00	1.07	N/A	0.87	Non BES Facility
RED BLFF 60 kv	COTTONWD - 1D 60KV & COTTONWOOD-RED BLUFF LINE	P2-3	Non-Bus-Tie Breaker	N/A	1.00	0.87	N/A	1.06	1.00	1.07	N/A	0.87	Non BES Facility
RWSN J2 60 kv	COTTONWD - 1D 60KV & COTTONWOOD-RED BLUFF LINE	P2-3	Non-Bus-Tie Breaker	N/A	0.99	0.86	N/A	1.06	0.98	1.07	N/A	0.86	Non BES Facility
TYLERJT 60 kv	COTTONWD - 1D 60KV & COTTONWOOD-RED BLUFF LINE	P2-3	Non-Bus-Tie Breaker	N/A	0.99	0.85	N/A	1.06	0.98	1.07	N/A	0.85	Non BES Facility
VINA 60 kv	COTTONWD - 1D 60KV & COTTONWOOD-RED BLUFF LINE	P2-3	Non-Bus-Tie Breaker	N/A	1.00	0.87	N/A	1.07	0.99	1.08	N/A	0.87	Non BES Facility
FRBSTNTP 115 kv	TBL MT E - 1E 230KV & BUS TIE LINE	P2-3	Non-Bus-Tie Breaker	1.04	1.05	1.03	1.11	1.07	1.03	1.06	1.04	1.03	Load power factor correction and voltage support if needed
HONC JT1 115 kv	TBL MT E - 1E 230KV & BUS TIE LINE	P2-3	Non-Bus-Tie Breaker	1.04	1.05	1.01	1.13	1.07	1.02	1.07	1.03	1.01	Load power factor correction and voltage support if needed
HONC JT3 115 kv	TBL MT E - 1E 230KV & BUS TIE LINE	P2-3	Non-Bus-Tie Breaker	1.04	1.05	1.02	1.13	1.07	1.02	1.07	1.04	1.02	Load power factor correction and voltage support if needed
HONCUT 115 kv	TBL MT E - 1E 230KV & BUS TIE LINE	P2-3	Non-Bus-Tie Breaker	1.04	1.05	1.02	1.13	1.07	1.02	1.07	1.04	1.02	Load power factor correction and voltage support if needed
KANAKAJT 115 kv	TBL MT E - 1E 230KV & BUS TIE LINE	P2-3	Non-Bus-Tie Breaker	1.04	1.05	1.03	1.12	1.07	1.03	1.07	1.04	1.03	Load power factor correction and voltage support if needed
OWID 115 kv	TBL MT E - 1E 230KV & BUS TIE LINE	P2-3	Non-Bus-Tie Breaker	1.04	1.05	1.03	1.12	1.07	1.03	1.07	1.04	1.03	Load power factor correction and voltage support if needed
PALERMO 115 kv	TBL MT E - 1E 230KV & BUS TIE LINE	P2-3	Non-Bus-Tie Breaker	1.04	1.05	1.02	1.13	1.07	1.02	1.07	1.04	1.02	Load power factor correction and voltage support if needed
SLYCREEK 115 kv	TBL MT E - 1E 230KV & BUS TIE LINE	P2-3	Non-Bus-Tie Breaker	1.05	1.05	1.04	1.12	1.07	1.04	1.07	1.05	1.04	Load power factor correction and voltage support if needed
WODLF TP 115 kv	TBL MT E - 1E 230KV & BUS TIE LINE	P2-3	Non-Bus-Tie Breaker	1.05	1.05	1.03	1.12	1.07	1.03	1.06	1.05	1.03	Load power factor correction and voltage support if needed
WYANDJT1 115 kv	TBL MT E - 1E 230KV & BUS TIE LINE	P2-3	Non-Bus-Tie Breaker	1.04	1.05	1.01	1.13	1.08	1.02	1.07	1.04	1.01	Load power factor correction and voltage support if needed
WYANDJT2 115 kv	TBL MT E - 1E 230KV & BUS TIE LINE	P2-3	Non-Bus-Tie Breaker	1.04	1.05	1.02	1.12	1.07	1.03	1.07	1.04	1.02	Load power factor correction and voltage support if needed

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



High/Low Voltages

Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)					Voltage PU (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations	
WYANDTTE 115 kv	TBL MT E - 1E 230KV & BUS TIE LINE	P2-3	Non-Bus-Tie Breaker	1.04	1.05	1.01	1.13	1.08	1.02	1.08	1.04	1.01	Load power factor correction and voltage support if needed
FRSTGLEN 115 kv	COTWDPGE - 2D 115KV & CASCADE-COTTONWOOD LINE	P2-3	Non-Bus-Tie Breaker	1.06	1.06	1.05	1.14	1.11	1.08	1.12	1.09	1.05	Load power factor correction and voltage support if needed
WILDWOOD 115 kv	COTWDPGE - 2D 115KV & CASCADE-COTTONWOOD LINE	P2-3	Non-Bus-Tie Breaker	1.06	1.06	1.05	1.14	1.11	1.08	1.12	1.10	1.05	Load power factor correction and voltage support if needed
BIG BAR 60 kv	COTWDPGE - 1D 115KV & COTTONWOOD-PANORAMA LINE	P2-3	Non-Bus-Tie Breaker	1.04	1.04	1.04	1.10	1.08	1.05	1.09	1.06	1.04	Load power factor correction and voltage support if needed
FRNCHGLH 60 kv	COTWDPGE - 1D 115KV & COTTONWOOD-PANORAMA LINE	P2-3	Non-Bus-Tie Breaker	1.03	1.03	1.02	1.10	1.08	1.04	1.08	1.05	1.02	Load power factor correction and voltage support if needed
JESSTAP 115 kv	COTWDPGE - 1D 115KV & COTTONWOOD-PANORAMA LINE	P2-3	Non-Bus-Tie Breaker	1.05	1.05	1.04	1.13	1.11	1.07	1.11	1.08	1.05	Load power factor correction and voltage support if needed
TAP 65 60 kv	COTWDPGE - 1D 115KV & COTTONWOOD-PANORAMA LINE	P2-3	Non-Bus-Tie Breaker	1.05	1.05	1.04	1.12	1.10	1.07	1.10	1.08	1.04	Load power factor correction and voltage support if needed
TRINITY 115 kv	COTWDPGE - 1D 115KV & COTTONWOOD-PANORAMA LINE	P2-3	Non-Bus-Tie Breaker	1.05	1.04	1.04	1.13	1.10	1.06	1.11	1.07	1.04	Load power factor correction and voltage support if needed
TRINITY 60 kv	COTWDPGE - 1D 115KV & COTTONWOOD-PANORAMA LINE	P2-3	Non-Bus-Tie Breaker	1.05	1.05	1.04	1.12	1.10	1.07	1.10	1.08	1.04	Load power factor correction and voltage support if needed
TAP 65 60 kv	COTWDPGE - 1D 115KV & TRINITY-COTTONWOOD LINE	P2-3	Non-Bus-Tie Breaker	1.04	1.04	1.03	1.11	1.08	1.06	1.09	1.06	1.03	Load power factor correction and voltage support if needed
TRINITY 115 kv	COTWDPGE - 1D 115KV & TRINITY-COTTONWOOD LINE	P2-3	Non-Bus-Tie Breaker	1.04	1.03	1.03	1.11	1.09	1.05	1.09	1.06	1.03	Load power factor correction and voltage support if needed
TRINITY 60 kv	COTWDPGE - 1D 115KV & TRINITY-COTTONWOOD LINE	P2-3	Non-Bus-Tie Breaker	1.04	1.04	1.03	1.11	1.08	1.06	1.09	1.06	1.03	Load power factor correction and voltage support if needed
HONC JT1 115 kv	PALERMO - 1D 115KV & WOODLEAF-PALERMO LINE	P2-3	Non-Bus-Tie Breaker	1.03	1.03	1.00	1.14	1.06	1.03	1.07	0.99	1.00	Load power factor correction and voltage support if needed
HONC JT3 115 kv	PALERMO - 1D 115KV & WOODLEAF-PALERMO LINE	P2-3	Non-Bus-Tie Breaker	1.04	1.04	1.03	1.13	1.05	1.04	1.05	1.02	1.03	Load power factor correction and voltage support if needed
HONCUT 115 kv	PALERMO - 1D 115KV & WOODLEAF-PALERMO LINE	P2-3	Non-Bus-Tie Breaker	1.04	1.04	1.03	1.13	1.05	1.04	1.05	1.02	1.03	Load power factor correction and voltage support if needed
HONC JT1 115 kv	PALERMO - 1D 115KV & PALERMO-PEASE LINE	P2-3	Non-Bus-Tie Breaker	1.03	1.03	1.00	1.14	1.06	1.03	1.07	0.99	1.00	Load power factor correction and voltage support if needed
HONC JT3 115 kv	PALERMO - 1D 115KV & PALERMO-PEASE LINE	P2-3	Non-Bus-Tie Breaker	1.04	1.04	1.03	1.13	1.05	1.04	1.05	1.02	1.03	Load power factor correction and voltage support if needed
HONCUT 115 kv	PALERMO - 1D 115KV & PALERMO-PEASE LINE	P2-3	Non-Bus-Tie Breaker	1.04	1.04	1.03	1.13	1.05	1.04	1.05	1.02	1.03	Load power factor correction and voltage support if needed
HONC JT1 115 kv	PALERMO - 1D 115KV & PALERMO-BOGUE LINE	P2-3	Non-Bus-Tie Breaker	1.03	1.03	1.00	1.14	1.06	1.03	1.07	0.99	1.00	Load power factor correction and voltage support if needed
HONC JT3 115 kv	PALERMO - 1D 115KV & PALERMO-BOGUE LINE	P2-3	Non-Bus-Tie Breaker	1.04	1.04	1.03	1.13	1.05	1.04	1.05	1.02	1.03	Load power factor correction and voltage support if needed
HONCUT 115 kv	PALERMO - 1D 115KV & PALERMO-BOGUE LINE	P2-3	Non-Bus-Tie Breaker	1.04	1.04	1.03	1.13	1.05	1.04	1.05	1.02	1.03	Load power factor correction and voltage support if needed
HONC JT1 115 kv	PALERMO - 1D 115KV & CARIBOU-PALERMO LINE	P2-3	Non-Bus-Tie Breaker	1.03	1.03	1.00	1.14	1.06	1.03	1.07	0.99	1.00	Load power factor correction and voltage support if needed
HONC JT3 115 kv	PALERMO - 1D 115KV & CARIBOU-PALERMO LINE	P2-3	Non-Bus-Tie Breaker	1.04	1.04	1.03	1.13	1.05	1.04	1.05	1.02	1.03	Load power factor correction and voltage support if needed
HONCUT 115 kv	PALERMO - 1D 115KV & CARIBOU-PALERMO LINE	P2-3	Non-Bus-Tie Breaker	1.04	1.04	1.03	1.13	1.05	1.04	1.05	1.02	1.03	Load power factor correction and voltage support if needed
HONC JT1 115 kv	PALERMO - 1D 115KV & PALERMO-NICOLAUS LINE	P2-3	Non-Bus-Tie Breaker	1.03	1.03	1.00	1.14	1.06	1.03	1.07	0.99	1.00	Load power factor correction and voltage support if needed
HONC JT3 115 kv	PALERMO - 1D 115KV & PALERMO-NICOLAUS LINE	P2-3	Non-Bus-Tie Breaker	1.04	1.04	1.03	1.13	1.05	1.04	1.05	1.02	1.03	Load power factor correction and voltage support if needed
HONCUT 115 kv	PALERMO - 1D 115KV & PALERMO-NICOLAUS LINE	P2-3	Non-Bus-Tie Breaker	1.04	1.04	1.03	1.13	1.05	1.04	1.05	1.02	1.03	Load power factor correction and voltage support if needed
HONC JT1 115 kv	PALERMO - 1D 115KV & PALERMO-WYANDOTTE LINE	P2-3	Non-Bus-Tie Breaker	1.03	1.03	1.00	1.14	1.06	1.03	1.07	0.99	1.00	Load power factor correction and voltage support if needed
HONC JT3 115 kv	PALERMO - 1D 115KV & PALERMO-WYANDOTTE LINE	P2-3	Non-Bus-Tie Breaker	1.04	1.04	1.03	1.13	1.05	1.04	1.05	1.02	1.03	Load power factor correction and voltage support if needed
HONCUT 115 kv	PALERMO - 1D 115KV & PALERMO-WYANDOTTE LINE	P2-3	Non-Bus-Tie Breaker	1.04	1.04	1.03	1.13	1.05	1.04	1.05	1.02	1.03	Load power factor correction and voltage support if needed

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



High/Low Voltages

Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)					Voltage PU (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations	
HONC JT3 115 kv	PALERMO - 1D 115KV & PALERMO-PEASE LINE (2)	P2-3	Non-Bus-Tie Breaker	1.04	1.04	1.03	1.13	1.05	1.04	1.05	1.02	1.03	Load power factor correction and voltage support if needed
HONCUT 115 kv	PALERMO - 1D 115KV & PALERMO-PEASE LINE (2)	P2-3	Non-Bus-Tie Breaker	1.04	1.04	1.03	1.13	1.05	1.04	1.05	1.02	1.03	Load power factor correction and voltage support if needed
CEDR CRK 60 kv	BENTON - 1D 60KV & CASCADE-BENTON-DESCHUTES LINE	P2-3	Non-Bus-Tie Breaker	1.04	1.04	0.88	1.14	1.13	1.02	1.15	1.09	1.02	Non BES Facility
CLOV TAP 60 kv	BENTON - 1D 60KV & CASCADE-BENTON-DESCHUTES LINE	P2-3	Non-Bus-Tie Breaker	1.04	1.04	0.88	1.14	1.13	1.02	1.15	1.09	1.03	Non BES Facility
COWCK TP 60 kv	BENTON - 1D 60KV & CASCADE-BENTON-DESCHUTES LINE	P2-3	Non-Bus-Tie Breaker	1.03	1.03	0.88	1.13	1.12	1.01	1.14	1.07	1.00	Non BES Facility
DESCHUTS 60 kv	BENTON - 1D 60KV & CASCADE-BENTON-DESCHUTES LINE	P2-3	Non-Bus-Tie Breaker	1.01	1.01	0.88	1.11	1.10	1.00	1.12	1.04	0.94	Non BES Facility
KILARC 60 kv	BENTON - 1D 60KV & CASCADE-BENTON-DESCHUTES LINE	P2-3	Non-Bus-Tie Breaker	1.04	1.04	0.89	1.14	1.13	1.02	1.15	1.09	1.03	Non BES Facility
OLSEN JT 60 kv	BENTON - 1D 60KV & CASCADE-BENTON-DESCHUTES LINE	P2-3	Non-Bus-Tie Breaker	1.04	1.04	0.88	1.14	1.13	1.02	1.15	1.08	1.02	Non BES Facility
TKO TAP 60 kv	BENTON - 1D 60KV & CASCADE-BENTON-DESCHUTES LINE	P2-3	Non-Bus-Tie Breaker	1.03	1.03	0.88	1.13	1.12	1.01	1.14	1.07	1.00	Non BES Facility
WHITMORE 60 kv	BENTON - 1D 60KV & CASCADE-BENTON-DESCHUTES LINE	P2-3	Non-Bus-Tie Breaker	1.04	1.03	0.88	1.14	1.13	1.02	1.15	1.08	1.02	Non BES Facility
CEDR CRK 60 kv	CASCADE - MA 60KV & CASCADE-BENTON-DESCHUTES LINE	P2-3	Non-Bus-Tie Breaker	1.04	1.04	0.88	1.14	1.13	1.02	1.16	1.09	1.02	Non BES Facility
CLOV TAP 60 kv	CASCADE - MA 60KV & CASCADE-BENTON-DESCHUTES LINE	P2-3	Non-Bus-Tie Breaker	1.04	1.04	0.88	1.14	1.13	1.02	1.16	1.09	1.03	Non BES Facility
COWCK TP 60 kv	CASCADE - MA 60KV & CASCADE-BENTON-DESCHUTES LINE	P2-3	Non-Bus-Tie Breaker	1.03	1.03	0.88	1.13	1.12	1.01	1.14	1.07	1.00	Non BES Facility
DESCHUTS 60 kv	CASCADE - MA 60KV & CASCADE-BENTON-DESCHUTES LINE	P2-3	Non-Bus-Tie Breaker	1.01	1.01	0.88	1.11	1.10	1.00	1.12	1.04	0.94	Non BES Facility
FRNCHGLH 60 kv	CASCADE - MA 60KV & CASCADE-BENTON-DESCHUTES LINE	P2-3	Non-Bus-Tie Breaker	1.01	0.99	0.97	1.11	1.07	1.00	1.08	1.03	0.97	Non BES Facility
KESWICK 60 kv	CASCADE - MA 60KV & CASCADE-BENTON-DESCHUTES LINE	P2-3	Non-Bus-Tie Breaker	0.99	0.97	0.93	1.11	1.08	0.98	1.08	1.02	0.93	Non BES Facility
KILARC 60 kv	CASCADE - MA 60KV & CASCADE-BENTON-DESCHUTES LINE	P2-3	Non-Bus-Tie Breaker	1.04	1.04	0.89	1.14	1.13	1.02	1.15	1.09	1.03	Non BES Facility
OLSEN JT 60 kv	CASCADE - MA 60KV & CASCADE-BENTON-DESCHUTES LINE	P2-3	Non-Bus-Tie Breaker	1.04	1.04	0.88	1.14	1.13	1.02	1.15	1.08	1.02	Non BES Facility
STLLWATR 60 kv	CASCADE - MA 60KV & CASCADE-BENTON-DESCHUTES LINE	P2-3	Non-Bus-Tie Breaker	0.99	0.97	0.92	1.12	1.08	0.98	1.08	1.02	0.92	Non BES Facility
TKO TAP 60 kv	CASCADE - MA 60KV & CASCADE-BENTON-DESCHUTES LINE	P2-3	Non-Bus-Tie Breaker	1.03	1.03	0.88	1.13	1.12	1.01	1.14	1.07	1.00	Non BES Facility
WHITMORE 60 kv	CASCADE - MA 60KV & CASCADE-BENTON-DESCHUTES LINE	P2-3	Non-Bus-Tie Breaker	1.04	1.04	0.88	1.14	1.13	1.02	1.15	1.08	1.02	Non BES Facility
FRNCHGLH 60 kv	CASCADE - MA 60KV & KESWICK-CASCADE LINE	P2-3	Non-Bus-Tie Breaker	1.01	0.99	0.97	1.11	1.07	1.00	1.08	1.03	0.97	Non BES Facility

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



High/Low Voltages

Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)					Voltage PU (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations	
KESWICK 60 kv	CASCADE - MA 60KV & KESWICK-CASCADE LINE	P2-3	Non-Bus-Tie Breaker	0.99	0.97	0.93	1.11	1.08	0.98	1.08	1.02	0.93	Non BES Facility
STLLWATR 60 kv	CASCADE - MA 60KV & KESWICK-CASCADE LINE	P2-3	Non-Bus-Tie Breaker	0.99	0.97	0.92	1.12	1.08	0.98	1.08	1.02	0.92	Non BES Facility
CEDR CRK 60 kv	COTTONWD - MA 60KV & COLEMAN-COTTONWOOD LINE	P2-3	Non-Bus-Tie Breaker	0.98	N/A	N/A	1.13	N/A	N/A	N/A	1.09	N/A	Non BES Facility
CLMN JCT 60 kv	COTTONWD - MA 60KV & COLEMAN-COTTONWOOD LINE	P2-3	Non-Bus-Tie Breaker	0.61	N/A	N/A	1.13	N/A	N/A	N/A	0.98	N/A	Non BES Facility
CLOV TAP 60 kv	COTTONWD - MA 60KV & COLEMAN-COTTONWOOD LINE	P2-3	Non-Bus-Tie Breaker	0.98	N/A	N/A	1.13	N/A	N/A	N/A	1.09	N/A	Non BES Facility
COLEMAN 60 kv	COTTONWD - MA 60KV & COLEMAN-COTTONWOOD LINE	P2-3	Non-Bus-Tie Breaker	0.73	N/A	N/A	1.12	N/A	N/A	N/A	1.02	N/A	Non BES Facility
COWCK TP 60 kv	COTTONWD - MA 60KV & COLEMAN-COTTONWOOD LINE	P2-3	Non-Bus-Tie Breaker	0.96	N/A	N/A	1.11	N/A	N/A	N/A	1.07	N/A	Non BES Facility
DIRYVLE 60 kv	COTTONWD - MA 60KV & COLEMAN-COTTONWOOD LINE	P2-3	Non-Bus-Tie Breaker	0.59	N/A	N/A	1.13	N/A	N/A	N/A	0.97	N/A	Non BES Facility
GERBER 60 kv	COTTONWD - MA 60KV & COLEMAN-COTTONWOOD LINE	P2-3	Non-Bus-Tie Breaker	0.52	N/A	N/A	1.13	N/A	N/A	N/A	0.93	N/A	Non BES Facility
GRBR JCT 60 kv	COTTONWD - MA 60KV & COLEMAN-COTTONWOOD LINE	P2-3	Non-Bus-Tie Breaker	0.54	N/A	N/A	1.13	N/A	N/A	N/A	0.94	N/A	Non BES Facility
INSKIP 60 kv	COTTONWD - MA 60KV & COLEMAN-COTTONWOOD LINE	P2-3	Non-Bus-Tie Breaker	0.77	N/A	N/A	1.12	N/A	N/A	N/A	1.03	N/A	Non BES Facility
KILARC 60 kv	COTTONWD - MA 60KV & COLEMAN-COTTONWOOD LINE	P2-3	Non-Bus-Tie Breaker	0.98	N/A	N/A	1.12	N/A	N/A	N/A	1.09	N/A	Non BES Facility
LP FB SP 60 kv	COTTONWD - MA 60KV & COLEMAN-COTTONWOOD LINE	P2-3	Non-Bus-Tie Breaker	0.54	N/A	N/A	1.13	N/A	N/A	N/A	0.94	N/A	Non BES Facility
LS ML JT 60 kv	COTTONWD - MA 60KV & COLEMAN-COTTONWOOD LINE	P2-3	Non-Bus-Tie Breaker	0.59	N/A	N/A	1.14	N/A	N/A	N/A	0.97	N/A	Non BES Facility
LS MLNSJ 60 kv	COTTONWD - MA 60KV & COLEMAN-COTTONWOOD LINE	P2-3	Non-Bus-Tie Breaker	0.59	N/A	N/A	1.14	N/A	N/A	N/A	0.97	N/A	Non BES Facility
OLSEN JT 60 kv	COTTONWD - MA 60KV & COLEMAN-COTTONWOOD LINE	P2-3	Non-Bus-Tie Breaker	0.97	N/A	N/A	1.12	N/A	N/A	N/A	1.08	N/A	Non BES Facility
RED B JT 60 kv	COTTONWD - MA 60KV & COLEMAN-COTTONWOOD LINE	P2-3	Non-Bus-Tie Breaker	0.56	N/A	N/A	1.13	N/A	N/A	N/A	0.95	N/A	Non BES Facility
RED BLFF 60 kv	COTTONWD - MA 60KV & COLEMAN-COTTONWOOD LINE	P2-3	Non-Bus-Tie Breaker	0.56	N/A	N/A	1.13	N/A	N/A	N/A	0.95	N/A	Non BES Facility
RWSN J2 60 kv	COTTONWD - MA 60KV & COLEMAN-COTTONWOOD LINE	P2-3	Non-Bus-Tie Breaker	0.54	N/A	N/A	1.13	N/A	N/A	N/A	0.94	N/A	Non BES Facility
SOUTH 60 kv	COTTONWD - MA 60KV & COLEMAN-COTTONWOOD LINE	P2-3	Non-Bus-Tie Breaker	0.80	N/A	N/A	1.11	N/A	N/A	N/A	1.03	N/A	Non BES Facility
TKO TAP 60 kv	COTTONWD - MA 60KV & COLEMAN-COTTONWOOD LINE	P2-3	Non-Bus-Tie Breaker	0.96	N/A	N/A	1.11	N/A	N/A	N/A	1.07	N/A	Non BES Facility

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



High/Low Voltages

Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)					Voltage PU (Sensitivity Scenarios)				Project & Potential Mitigation Solutions	
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations		
TYLERJT 60 kv	COTTONWD - MA 60KV & COLEMAN-COTTONWOOD LINE	P2-3	Non-Bus-Tie Breaker	0.54	N/A	N/A	1.13	N/A	N/A	N/A	N/A	0.94	N/A	Non BES Facility
VINA 60 kv	COTTONWD - MA 60KV & COLEMAN-COTTONWOOD LINE	P2-3	Non-Bus-Tie Breaker	0.58	N/A	N/A	1.14	N/A	N/A	N/A	N/A	0.97	N/A	Non BES Facility
VOLTA 60 kv	COTTONWD - MA 60KV & COLEMAN-COTTONWOOD LINE	P2-3	Non-Bus-Tie Breaker	0.84	N/A	N/A	1.11	N/A	N/A	N/A	N/A	1.04	N/A	Non BES Facility
WHITMORE 60 kv	COTTONWD - MA 60KV & COLEMAN-COTTONWOOD LINE	P2-3	Non-Bus-Tie Breaker	0.97	N/A	N/A	1.12	N/A	N/A	N/A	N/A	1.08	N/A	Non BES Facility
CEDR CRK 60 kv	COTTONWD - MA 60KV & COTTONWOOD-RED BLUFF LINE	P2-3	Non-Bus-Tie Breaker	0.94	N/A	N/A	1.12	N/A	N/A	N/A	N/A	1.09	N/A	Non BES Facility
CLMN JCT 60 kv	COTTONWD - MA 60KV & COTTONWOOD-RED BLUFF LINE	P2-3	Non-Bus-Tie Breaker	0.48	N/A	N/A	1.11	N/A	N/A	N/A	N/A	0.97	N/A	Non BES Facility
CLOV TAP 60 kv	COTTONWD - MA 60KV & COTTONWOOD-RED BLUFF LINE	P2-3	Non-Bus-Tie Breaker	0.94	N/A	N/A	1.12	N/A	N/A	N/A	N/A	1.09	N/A	Non BES Facility
COWCK TP 60 kv	COTTONWD - MA 60KV & COTTONWOOD-RED BLUFF LINE	P2-3	Non-Bus-Tie Breaker	0.92	N/A	N/A	1.11	N/A	N/A	N/A	N/A	1.07	N/A	Non BES Facility
DIRYVLE 60 kv	COTTONWD - MA 60KV & COTTONWOOD-RED BLUFF LINE	P2-3	Non-Bus-Tie Breaker	0.47	N/A	N/A	1.11	N/A	N/A	N/A	N/A	0.97	N/A	Non BES Facility
GERBER 60 kv	COTTONWD - MA 60KV & COTTONWOOD-RED BLUFF LINE	P2-3	Non-Bus-Tie Breaker	0.39	N/A	N/A	1.10	N/A	N/A	N/A	N/A	0.92	N/A	Non BES Facility
GRBR JCT 60 kv	COTTONWD - MA 60KV & COTTONWOOD-RED BLUFF LINE	P2-3	Non-Bus-Tie Breaker	0.41	N/A	N/A	1.10	N/A	N/A	N/A	N/A	0.93	N/A	Non BES Facility
KILARC 60 kv	COTTONWD - MA 60KV & COTTONWOOD-RED BLUFF LINE	P2-3	Non-Bus-Tie Breaker	0.94	N/A	N/A	1.12	N/A	N/A	N/A	N/A	1.09	N/A	Non BES Facility
LP FB SP 60 kv	COTTONWD - MA 60KV & COTTONWOOD-RED BLUFF LINE	P2-3	Non-Bus-Tie Breaker	0.41	N/A	N/A	1.10	N/A	N/A	N/A	N/A	0.93	N/A	Non BES Facility
LS ML JT 60 kv	COTTONWD - MA 60KV & COTTONWOOD-RED BLUFF LINE	P2-3	Non-Bus-Tie Breaker	0.46	N/A	N/A	1.11	N/A	N/A	N/A	N/A	0.97	N/A	Non BES Facility
LS MLNSJ 60 kv	COTTONWD - MA 60KV & COTTONWOOD-RED BLUFF LINE	P2-3	Non-Bus-Tie Breaker	0.46	N/A	N/A	1.11	N/A	N/A	N/A	N/A	0.97	N/A	Non BES Facility
OLSEN JT 60 kv	COTTONWD - MA 60KV & COTTONWOOD-RED BLUFF LINE	P2-3	Non-Bus-Tie Breaker	0.93	N/A	N/A	1.12	N/A	N/A	N/A	N/A	1.08	N/A	Non BES Facility
RED B JT 60 kv	COTTONWD - MA 60KV & COTTONWOOD-RED BLUFF LINE	P2-3	Non-Bus-Tie Breaker	0.43	N/A	N/A	1.11	N/A	N/A	N/A	N/A	0.94	N/A	Non BES Facility
RED BLFF 60 kv	COTTONWD - MA 60KV & COTTONWOOD-RED BLUFF LINE	P2-3	Non-Bus-Tie Breaker	0.43	N/A	N/A	1.11	N/A	N/A	N/A	N/A	0.95	N/A	Non BES Facility
RWSN J2 60 kv	COTTONWD - MA 60KV & COTTONWOOD-RED BLUFF LINE	P2-3	Non-Bus-Tie Breaker	0.42	N/A	N/A	1.10	N/A	N/A	N/A	N/A	0.93	N/A	Non BES Facility
TKO TAP 60 kv	COTTONWD - MA 60KV & COTTONWOOD-RED BLUFF LINE	P2-3	Non-Bus-Tie Breaker	0.92	N/A	N/A	1.11	N/A	N/A	N/A	N/A	1.07	N/A	Non BES Facility



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



High/Low Voltages

Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)					Voltage PU (Sensitivity Scenarios)				Project & Potential Mitigation Solutions	
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations		
TYLERJT 60 kv	COTTONWD - MA 60KV & COTTONWOOD-RED BLUFF LINE	P2-3	Non-Bus-Tie Breaker	0.41	N/A	N/A	1.10	N/A	N/A	N/A	N/A	0.93	N/A	Non BES Facility
VINA 60 kv	COTTONWD - MA 60KV & COTTONWOOD-RED BLUFF LINE	P2-3	Non-Bus-Tie Breaker	0.46	N/A	N/A	1.11	N/A	N/A	N/A	N/A	0.96	N/A	Non BES Facility
WHITMORE 60 kv	COTTONWD - MA 60KV & COTTONWOOD-RED BLUFF LINE	P2-3	Non-Bus-Tie Breaker	0.93	N/A	N/A	1.12	N/A	N/A	N/A	N/A	1.08	N/A	Non BES Facility
CEDR CRK 60 kv	COTTONWD - MA 60KV & COTTONWOOD #2 LINE	P2-3	Non-Bus-Tie Breaker	0.94	N/A	N/A	1.12	N/A	N/A	N/A	N/A	1.09	N/A	Non BES Facility
CLMN JCT 60 kv	COTTONWD - MA 60KV & COTTONWOOD #2 LINE	P2-3	Non-Bus-Tie Breaker	0.48	N/A	N/A	1.11	N/A	N/A	N/A	N/A	0.97	N/A	Non BES Facility
CLOV TAP 60 kv	COTTONWD - MA 60KV & COTTONWOOD #2 LINE	P2-3	Non-Bus-Tie Breaker	0.94	N/A	N/A	1.12	N/A	N/A	N/A	N/A	1.09	N/A	Non BES Facility
COWCK TP 60 kv	COTTONWD - MA 60KV & COTTONWOOD #2 LINE	P2-3	Non-Bus-Tie Breaker	0.92	N/A	N/A	1.11	N/A	N/A	N/A	N/A	1.07	N/A	Non BES Facility
DIRYVLE 60 kv	COTTONWD - MA 60KV & COTTONWOOD #2 LINE	P2-3	Non-Bus-Tie Breaker	0.47	N/A	N/A	1.11	N/A	N/A	N/A	N/A	0.97	N/A	Non BES Facility
GERBER 60 kv	COTTONWD - MA 60KV & COTTONWOOD #2 LINE	P2-3	Non-Bus-Tie Breaker	0.39	N/A	N/A	1.10	N/A	N/A	N/A	N/A	0.92	N/A	Non BES Facility
GRBR JCT 60 kv	COTTONWD - MA 60KV & COTTONWOOD #2 LINE	P2-3	Non-Bus-Tie Breaker	0.41	N/A	N/A	1.10	N/A	N/A	N/A	N/A	0.93	N/A	Non BES Facility
KILARC 60 kv	COTTONWD - MA 60KV & COTTONWOOD #2 LINE	P2-3	Non-Bus-Tie Breaker	0.94	N/A	N/A	1.12	N/A	N/A	N/A	N/A	1.09	N/A	Non BES Facility
LP FB SP 60 kv	COTTONWD - MA 60KV & COTTONWOOD #2 LINE	P2-3	Non-Bus-Tie Breaker	0.41	N/A	N/A	1.10	N/A	N/A	N/A	N/A	0.93	N/A	Non BES Facility
LS ML JT 60 kv	COTTONWD - MA 60KV & COTTONWOOD #2 LINE	P2-3	Non-Bus-Tie Breaker	0.46	N/A	N/A	1.11	N/A	N/A	N/A	N/A	0.97	N/A	Non BES Facility
LS MLNSJ 60 kv	COTTONWD - MA 60KV & COTTONWOOD #2 LINE	P2-3	Non-Bus-Tie Breaker	0.46	N/A	N/A	1.11	N/A	N/A	N/A	N/A	0.97	N/A	Non BES Facility
OLSEN JT 60 kv	COTTONWD - MA 60KV & COTTONWOOD #2 LINE	P2-3	Non-Bus-Tie Breaker	0.93	N/A	N/A	1.12	N/A	N/A	N/A	N/A	1.08	N/A	Non BES Facility
RED B JT 60 kv	COTTONWD - MA 60KV & COTTONWOOD #2 LINE	P2-3	Non-Bus-Tie Breaker	0.43	N/A	N/A	1.11	N/A	N/A	N/A	N/A	0.94	N/A	Non BES Facility
RED BLFF 60 kv	COTTONWD - MA 60KV & COTTONWOOD #2 LINE	P2-3	Non-Bus-Tie Breaker	0.43	N/A	N/A	1.11	N/A	N/A	N/A	N/A	0.95	N/A	Non BES Facility
RWSN J2 60 kv	COTTONWD - MA 60KV & COTTONWOOD #2 LINE	P2-3	Non-Bus-Tie Breaker	0.42	N/A	N/A	1.10	N/A	N/A	N/A	N/A	0.93	N/A	Non BES Facility
TKO TAP 60 kv	COTTONWD - MA 60KV & COTTONWOOD #2 LINE	P2-3	Non-Bus-Tie Breaker	0.92	N/A	N/A	1.11	N/A	N/A	N/A	N/A	1.07	N/A	Non BES Facility
TYLERJT 60 kv	COTTONWD - MA 60KV & COTTONWOOD #2 LINE	P2-3	Non-Bus-Tie Breaker	0.41	N/A	N/A	1.10	N/A	N/A	N/A	N/A	0.93	N/A	Non BES Facility
VINA 60 kv	COTTONWD - MA 60KV & COTTONWOOD #2 LINE	P2-3	Non-Bus-Tie Breaker	0.46	N/A	N/A	1.11	N/A	N/A	N/A	N/A	0.96	N/A	Non BES Facility
WHITMORE 60 kv	COTTONWD - MA 60KV & COTTONWOOD #2 LINE	P2-3	Non-Bus-Tie Breaker	0.93	N/A	N/A	1.12	N/A	N/A	N/A	N/A	1.08	N/A	Non BES Facility
ANDERSON 60 kv	COTTONWD - MA 60KV & COTTONWOOD #1 LINE	P2-3	Non-Bus-Tie Breaker	0.97	N/A	N/A	1.10	N/A	N/A	N/A	N/A	1.01	N/A	Non BES Facility
CEDR CRK 60 kv	COTTONWD - MA 60KV & COTTONWOOD #1 LINE	P2-3	Non-Bus-Tie Breaker	1.04	N/A	N/A	1.14	N/A	N/A	N/A	N/A	1.09	N/A	Non BES Facility
CLMN FSH 60 kv	COTTONWD - MA 60KV & COTTONWOOD #1 LINE	P2-3	Non-Bus-Tie Breaker	0.99	N/A	N/A	1.16	N/A	N/A	N/A	N/A	1.04	N/A	Non BES Facility
CLMN JCT 60 kv	COTTONWD - MA 60KV & COTTONWOOD #1 LINE	P2-3	Non-Bus-Tie Breaker	0.95	N/A	N/A	1.18	N/A	N/A	N/A	N/A	1.03	N/A	Non BES Facility
CLMN TAP 60 kv	COTTONWD - MA 60KV & COTTONWOOD #1 LINE	P2-3	Non-Bus-Tie Breaker	0.99	N/A	N/A	1.16	N/A	N/A	N/A	N/A	1.04	N/A	Non BES Facility
CLOV TAP 60 kv	COTTONWD - MA 60KV & COTTONWOOD #1 LINE	P2-3	Non-Bus-Tie Breaker	1.04	N/A	N/A	1.14	N/A	N/A	N/A	N/A	1.09	N/A	Non BES Facility
COLEMAN 60 kv	COTTONWD - MA 60KV & COTTONWOOD #1 LINE	P2-3	Non-Bus-Tie Breaker	0.99	N/A	N/A	1.16	N/A	N/A	N/A	N/A	1.04	N/A	Non BES Facility
COWCK TP 60 kv	COTTONWD - MA 60KV & COTTONWOOD #1 LINE	P2-3	Non-Bus-Tie Breaker	1.03	N/A	N/A	1.13	N/A	N/A	N/A	N/A	1.07	N/A	Non BES Facility
DESCHUTS 60 kv	COTTONWD - MA 60KV & COTTONWOOD #1 LINE	P2-3	Non-Bus-Tie Breaker	1.01	N/A	N/A	1.11	N/A	N/A	N/A	N/A	1.04	N/A	Non BES Facility
DIRYVLE 60 kv	COTTONWD - MA 60KV & COTTONWOOD #1 LINE	P2-3	Non-Bus-Tie Breaker	0.94	N/A	N/A	1.18	N/A	N/A	N/A	N/A	1.02	N/A	Non BES Facility
GIRVAN 60 kv	COTTONWD - MA 60KV & COTTONWOOD #1 LINE	P2-3	Non-Bus-Tie Breaker	0.98	N/A	N/A	1.10	N/A	N/A	N/A	N/A	1.02	N/A	Non BES Facility
INSKIP 60 kv	COTTONWD - MA 60KV & COTTONWOOD #1 LINE	P2-3	Non-Bus-Tie Breaker	1.00	N/A	N/A	1.15	N/A	N/A	N/A	N/A	1.04	N/A	Non BES Facility
KILARC 60 kv	COTTONWD - MA 60KV & COTTONWOOD #1 LINE	P2-3	Non-Bus-Tie Breaker	1.04	N/A	N/A	1.14	N/A	N/A	N/A	N/A	1.09	N/A	Non BES Facility
LS ML JT 60 kv	COTTONWD - MA 60KV & COTTONWOOD #1 LINE	P2-3	Non-Bus-Tie Breaker	0.93	N/A	N/A	1.19	N/A	N/A	N/A	N/A	1.02	N/A	Non BES Facility
LS MLNSJ 60 kv	COTTONWD - MA 60KV & COTTONWOOD #1 LINE	P2-3	Non-Bus-Tie Breaker	0.93	N/A	N/A	1.19	N/A	N/A	N/A	N/A	1.02	N/A	Non BES Facility
OLSEN JT 60 kv	COTTONWD - MA 60KV & COTTONWOOD #1 LINE	P2-3	Non-Bus-Tie Breaker	1.04	N/A	N/A	1.14	N/A	N/A	N/A	N/A	1.09	N/A	Non BES Facility

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



High/Low Voltages

Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)					Voltage PU (Sensitivity Scenarios)				Project & Potential Mitigation Solutions	
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations		
RED B JT 60 kv	COTTONWD - MA 60KV & COTTONWOOD #1 LINE	P2-3	Non-Bus-Tie Breaker	0.93	N/A	N/A	1.19	N/A	N/A	N/A	N/A	1.02	N/A	Non BES Facility
RED BLFF 60 kv	COTTONWD - MA 60KV & COTTONWOOD #1 LINE	P2-3	Non-Bus-Tie Breaker	0.93	N/A	N/A	1.19	N/A	N/A	N/A	N/A	1.02	N/A	Non BES Facility
RWSN J2 60 kv	COTTONWD - MA 60KV & COTTONWOOD #1 LINE	P2-3	Non-Bus-Tie Breaker	0.93	N/A	N/A	1.19	N/A	N/A	N/A	N/A	1.02	N/A	Non BES Facility
SOUTH 60 kv	COTTONWD - MA 60KV & COTTONWOOD #1 LINE	P2-3	Non-Bus-Tie Breaker	1.00	N/A	N/A	1.15	N/A	N/A	N/A	N/A	1.04	N/A	Non BES Facility
TKO TAP 60 kv	COTTONWD - MA 60KV & COTTONWOOD #1 LINE	P2-3	Non-Bus-Tie Breaker	1.03	N/A	N/A	1.13	N/A	N/A	N/A	N/A	1.07	N/A	Non BES Facility
VINA 60 kv	COTTONWD - MA 60KV & COTTONWOOD #1 LINE	P2-3	Non-Bus-Tie Breaker	0.93	N/A	N/A	1.19	N/A	N/A	N/A	N/A	1.02	N/A	Non BES Facility
VOLTA 60 kv	COTTONWD - MA 60KV & COTTONWOOD #1 LINE	P2-3	Non-Bus-Tie Breaker	1.01	N/A	N/A	1.14	N/A	N/A	N/A	N/A	1.05	N/A	Non BES Facility
WHITMORE 60 kv	COTTONWD - MA 60KV & COTTONWOOD #1 LINE	P2-3	Non-Bus-Tie Breaker	1.04	N/A	N/A	1.13	N/A	N/A	N/A	N/A	1.08	N/A	Non BES Facility
ANDERSON 60 kv	COTTONWD - MA 60KV & RED BLFF-COTTONWD LINE	P2-3	Non-Bus-Tie Breaker	0.97	N/A	N/A	1.10	N/A	N/A	N/A	N/A	1.01	N/A	Non BES Facility
CEDR CRK 60 kv	COTTONWD - MA 60KV & RED BLFF-COTTONWD LINE	P2-3	Non-Bus-Tie Breaker	1.04	N/A	N/A	1.14	N/A	N/A	N/A	N/A	1.09	N/A	Non BES Facility
CLMN FSH 60 kv	COTTONWD - MA 60KV & RED BLFF-COTTONWD LINE	P2-3	Non-Bus-Tie Breaker	0.99	N/A	N/A	1.16	N/A	N/A	N/A	N/A	1.04	N/A	Non BES Facility
CLMN JCT 60 kv	COTTONWD - MA 60KV & RED BLFF-COTTONWD LINE	P2-3	Non-Bus-Tie Breaker	0.94	N/A	N/A	1.18	N/A	N/A	N/A	N/A	1.03	N/A	Non BES Facility
CLMN TAP 60 kv	COTTONWD - MA 60KV & RED BLFF-COTTONWD LINE	P2-3	Non-Bus-Tie Breaker	0.99	N/A	N/A	1.16	N/A	N/A	N/A	N/A	1.04	N/A	Non BES Facility
CLOV TAP 60 kv	COTTONWD - MA 60KV & RED BLFF-COTTONWD LINE	P2-3	Non-Bus-Tie Breaker	1.04	N/A	N/A	1.14	N/A	N/A	N/A	N/A	1.09	N/A	Non BES Facility
COLEMAN 60 kv	COTTONWD - MA 60KV & RED BLFF-COTTONWD LINE	P2-3	Non-Bus-Tie Breaker	0.99	N/A	N/A	1.16	N/A	N/A	N/A	N/A	1.04	N/A	Non BES Facility
COWCK TP 60 kv	COTTONWD - MA 60KV & RED BLFF-COTTONWD LINE	P2-3	Non-Bus-Tie Breaker	1.03	N/A	N/A	1.13	N/A	N/A	N/A	N/A	1.07	N/A	Non BES Facility
DESCHUTS 60 kv	COTTONWD - MA 60KV & RED BLFF-COTTONWD LINE	P2-3	Non-Bus-Tie Breaker	1.01	N/A	N/A	1.11	N/A	N/A	N/A	N/A	1.04	N/A	Non BES Facility
DIRYVLE 60 kv	COTTONWD - MA 60KV & RED BLFF-COTTONWD LINE	P2-3	Non-Bus-Tie Breaker	0.94	N/A	N/A	1.18	N/A	N/A	N/A	N/A	1.02	N/A	Non BES Facility
GIRVAN 60 kv	COTTONWD - MA 60KV & RED BLFF-COTTONWD LINE	P2-3	Non-Bus-Tie Breaker	0.98	N/A	N/A	1.10	N/A	N/A	N/A	N/A	1.02	N/A	Non BES Facility
INSKIP 60 kv	COTTONWD - MA 60KV & RED BLFF-COTTONWD LINE	P2-3	Non-Bus-Tie Breaker	1.00	N/A	N/A	1.15	N/A	N/A	N/A	N/A	1.04	N/A	Non BES Facility
KILARC 60 kv	COTTONWD - MA 60KV & RED BLFF-COTTONWD LINE	P2-3	Non-Bus-Tie Breaker	1.04	N/A	N/A	1.14	N/A	N/A	N/A	N/A	1.09	N/A	Non BES Facility
LS ML JT 60 kv	COTTONWD - MA 60KV & RED BLFF-COTTONWD LINE	P2-3	Non-Bus-Tie Breaker	0.93	N/A	N/A	1.18	N/A	N/A	N/A	N/A	1.02	N/A	Non BES Facility
LS MLNSJ 60 kv	COTTONWD - MA 60KV & RED BLFF-COTTONWD LINE	P2-3	Non-Bus-Tie Breaker	0.93	N/A	N/A	1.19	N/A	N/A	N/A	N/A	1.02	N/A	Non BES Facility
OLSEN JT 60 kv	COTTONWD - MA 60KV & RED BLFF-COTTONWD LINE	P2-3	Non-Bus-Tie Breaker	1.04	N/A	N/A	1.14	N/A	N/A	N/A	N/A	1.09	N/A	Non BES Facility

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



High/Low Voltages

Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)					Voltage PU (Sensitivity Scenarios)				Project & Potential Mitigation Solutions	
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations		
RED BLFF 60 kv	COTTONWD - MA 60KV & RED BLFF-COTTONWD LINE	P2-3	Non-Bus-Tie Breaker	0.93	N/A	N/A	1.19	N/A	N/A	N/A	N/A	1.02	N/A	Non BES Facility
SOUTH 60 kv	COTTONWD - MA 60KV & RED BLFF-COTTONWD LINE	P2-3	Non-Bus-Tie Breaker	1.00	N/A	N/A	1.14	N/A	N/A	N/A	N/A	1.04	N/A	Non BES Facility
TKO TAP 60 kv	COTTONWD - MA 60KV & RED BLFF-COTTONWD LINE	P2-3	Non-Bus-Tie Breaker	1.03	N/A	N/A	1.13	N/A	N/A	N/A	N/A	1.07	N/A	Non BES Facility
VINA 60 kv	COTTONWD - MA 60KV & RED BLFF-COTTONWD LINE	P2-3	Non-Bus-Tie Breaker	0.93	N/A	N/A	1.18	N/A	N/A	N/A	N/A	1.02	N/A	Non BES Facility
VOLTA 60 kv	COTTONWD - MA 60KV & RED BLFF-COTTONWD LINE	P2-3	Non-Bus-Tie Breaker	1.01	N/A	N/A	1.14	N/A	N/A	N/A	N/A	1.05	N/A	Non BES Facility
WHITMORE 60 kv	COTTONWD - MA 60KV & RED BLFF-COTTONWD LINE	P2-3	Non-Bus-Tie Breaker	1.04	N/A	N/A	1.13	N/A	N/A	N/A	N/A	1.08	N/A	Non BES Facility
ELIZ TWN 60 kv	CARIBOU - 1D 60KV & CARIBOU-WESTWOOD LINE	P2-3	Non-Bus-Tie Breaker	1.04	1.04	0.48	1.05	1.05	1.04	1.05	1.05	1.04	0.48	Non BES Facility
EST Q JT 60 kv	CARIBOU - 1D 60KV & CARIBOU-WESTWOOD LINE	P2-3	Non-Bus-Tie Breaker	1.04	1.04	0.48	1.05	1.05	1.04	1.05	1.05	1.04	0.48	Non BES Facility
EST Q1 60 kv	CARIBOU - 1D 60KV & CARIBOU-WESTWOOD LINE	P2-3	Non-Bus-Tie Breaker	1.04	1.04	0.48	1.05	1.05	1.04	1.05	1.05	1.04	0.48	Non BES Facility
EST QNCY 60 kv	CARIBOU - 1D 60KV & CARIBOU-WESTWOOD LINE	P2-3	Non-Bus-Tie Breaker	1.04	1.04	0.48	1.05	1.05	1.04	1.05	1.05	1.04	0.48	Non BES Facility
GRS F JT 60 kv	CARIBOU - 1D 60KV & CARIBOU-WESTWOOD LINE	P2-3	Non-Bus-Tie Breaker	1.04	1.04	0.48	1.05	1.05	1.04	1.05	1.05	1.04	0.48	Non BES Facility
PLMS JCT 60 kv	CARIBOU - 1D 60KV & CARIBOU-WESTWOOD LINE	P2-3	Non-Bus-Tie Breaker	1.04	1.04	0.48	1.05	1.05	1.04	1.05	1.05	1.04	0.48	Non BES Facility
SPIQUINCY 60 kv	CARIBOU - 1D 60KV & CARIBOU-WESTWOOD LINE	P2-3	Non-Bus-Tie Breaker	1.04	1.04	0.48	1.05	1.05	1.04	1.05	1.05	1.04	0.48	Non BES Facility
SPIQUINCYJCT 60 kv	CARIBOU - 1D 60KV & CARIBOU-WESTWOOD LINE	P2-3	Non-Bus-Tie Breaker	1.04	1.04	0.48	1.05	1.05	1.04	1.05	1.05	1.04	0.48	Non BES Facility
ELIZ TWN 60 kv	CARIBOU - 1D 60KV & CARIBOU #2 LINE	P2-3	Non-Bus-Tie Breaker	1.04	1.04	0.48	1.05	1.05	1.04	1.05	1.05	1.04	0.48	Non BES Facility
EST Q JT 60 kv	CARIBOU - 1D 60KV & CARIBOU #2 LINE	P2-3	Non-Bus-Tie Breaker	1.04	1.04	0.48	1.05	1.05	1.04	1.05	1.05	1.04	0.48	Non BES Facility
EST Q1 60 kv	CARIBOU - 1D 60KV & CARIBOU #2 LINE	P2-3	Non-Bus-Tie Breaker	1.04	1.04	0.48	1.05	1.05	1.04	1.05	1.05	1.04	0.48	Non BES Facility
EST QNCY 60 kv	CARIBOU - 1D 60KV & CARIBOU #2 LINE	P2-3	Non-Bus-Tie Breaker	1.04	1.04	0.48	1.05	1.05	1.04	1.05	1.05	1.04	0.48	Non BES Facility
GRS F JT 60 kv	CARIBOU - 1D 60KV & CARIBOU #2 LINE	P2-3	Non-Bus-Tie Breaker	1.04	1.04	0.48	1.05	1.05	1.04	1.05	1.05	1.04	0.48	Non BES Facility
PLMS JCT 60 kv	CARIBOU - 1D 60KV & CARIBOU #2 LINE	P2-3	Non-Bus-Tie Breaker	1.04	1.04	0.48	1.05	1.05	1.04	1.05	1.05	1.04	0.48	Non BES Facility
SPIQUINCY 60 kv	CARIBOU - 1D 60KV & CARIBOU #2 LINE	P2-3	Non-Bus-Tie Breaker	1.04	1.04	0.48	1.05	1.05	1.04	1.05	1.05	1.04	0.48	Non BES Facility
SPIQUINCYJCT 60 kv	CARIBOU - 1D 60KV & CARIBOU #2 LINE	P2-3	Non-Bus-Tie Breaker	1.04	1.04	0.48	1.05	1.05	1.04	1.05	1.05	1.04	0.48	Non BES Facility
ELIZ TWN 60 kv	CARIBOU - 1D 60KV & CARIBOU #2 LINE (2)	P2-3	Non-Bus-Tie Breaker	1.04	1.04	0.48	1.05	1.05	1.04	1.05	1.05	1.04	0.48	Non BES Facility
EST Q JT 60 kv	CARIBOU - 1D 60KV & CARIBOU #2 LINE (2)	P2-3	Non-Bus-Tie Breaker	1.04	1.04	0.48	1.05	1.05	1.04	1.05	1.05	1.04	0.48	Non BES Facility
EST Q1 60 kv	CARIBOU - 1D 60KV & CARIBOU #2 LINE (2)	P2-3	Non-Bus-Tie Breaker	1.04	1.04	0.48	1.05	1.05	1.04	1.05	1.05	1.04	0.48	Non BES Facility
EST QNCY 60 kv	CARIBOU - 1D 60KV & CARIBOU #2 LINE (2)	P2-3	Non-Bus-Tie Breaker	1.04	1.04	0.48	1.05	1.05	1.04	1.05	1.05	1.04	0.48	Non BES Facility
GRS F JT 60 kv	CARIBOU - 1D 60KV & CARIBOU #2 LINE (2)	P2-3	Non-Bus-Tie Breaker	1.04	1.04	0.48	1.05	1.05	1.04	1.05	1.05	1.04	0.48	Non BES Facility
PLMS JCT 60 kv	CARIBOU - 1D 60KV & CARIBOU #2 LINE (2)	P2-3	Non-Bus-Tie Breaker	1.04	1.04	0.48	1.05	1.05	1.04	1.05	1.05	1.04	0.48	Non BES Facility
SPIQUINCY 60 kv	CARIBOU - 1D 60KV & CARIBOU #2 LINE (2)	P2-3	Non-Bus-Tie Breaker	1.04	1.04	0.48	1.05	1.05	1.04	1.05	1.05	1.04	0.48	Non BES Facility
SPIQUINCYJCT 60 kv	CARIBOU - 1D 60KV & CARIBOU #2 LINE (2)	P2-3	Non-Bus-Tie Breaker	1.04	1.04	0.48	1.05	1.05	1.04	1.05	1.05	1.04	0.48	Non BES Facility
COTWD_E2 230 kv	COTWD_F2 SECTION 2F & COTWD_E2 SECTION 2E 230KV	P2-4	Bus-Tie Breaker	0.99	0.97	0.95	1.03	1.05	0.97	1.05	1.05	1.00	0.88	Non BES Facility
FRSTGLEN 115 kv	COTWD_F2 SECTION 2F & COTWD_E2 SECTION 2E 230KV	P2-4	Bus-Tie Breaker	1.04	1.03	1.02	1.10	1.10	1.05	1.10	1.06	0.99	Non BES Facility	
CEDR CRK 60 kv	COTTONWD 60KV - SECTION 1D & 1E	P2-4	Bus-Tie Breaker	N/A	0.92	0.78	N/A	1.10	0.92	1.13	N/A	0.97	Non BES Facility	

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



High/Low Voltages

Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)					Voltage PU (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations	
CLMN FSH 60 kv	COTTONWD 60KV - SECTION 1D & 1E	P2-4	Bus-Tie Breaker	N/A	0.54	0.44	N/A	1.09	0.58	1.16	N/A	0.57	Non BES Facility
CLMN JCT 60 kv	COTTONWD 60KV - SECTION 1D & 1E	P2-4	Bus-Tie Breaker	N/A	0.48	0.35	N/A	1.10	0.53	1.18	N/A	0.48	Non BES Facility
CLMN TAP 60 kv	COTTONWD 60KV - SECTION 1D & 1E	P2-4	Bus-Tie Breaker	N/A	0.54	0.44	N/A	1.09	0.58	1.16	N/A	0.57	Non BES Facility
CLOV TAP 60 kv	COTTONWD 60KV - SECTION 1D & 1E	P2-4	Bus-Tie Breaker	N/A	0.92	0.79	N/A	1.10	0.92	1.13	N/A	0.98	Non BES Facility
COLEMAN 60 kv	COTTONWD 60KV - SECTION 1D & 1E	P2-4	Bus-Tie Breaker	N/A	0.54	0.44	N/A	1.09	0.58	1.16	N/A	0.57	Non BES Facility
COWCK TP 60 kv	COTTONWD 60KV - SECTION 1D & 1E	P2-4	Bus-Tie Breaker	N/A	0.91	0.78	N/A	1.08	0.91	1.12	N/A	0.94	Non BES Facility
DIRYVILLE 60 kv	COTTONWD 60KV - SECTION 1D & 1E	P2-4	Bus-Tie Breaker	N/A	0.47	0.33	N/A	1.11	0.52	1.19	N/A	0.46	Non BES Facility
GERBER 60 kv	COTTONWD 60KV - SECTION 1D & 1E	P2-4	Bus-Tie Breaker	N/A	0.43	0.29	N/A	1.10	0.49	1.18	N/A	0.41	Non BES Facility
GRBR JCT 60 kv	COTTONWD 60KV - SECTION 1D & 1E	P2-4	Bus-Tie Breaker	N/A	0.45	0.30	N/A	1.10	0.50	1.18	N/A	0.43	Non BES Facility
INSKIP 60 kv	COTTONWD 60KV - SECTION 1D & 1E	P2-4	Bus-Tie Breaker	N/A	0.61	0.50	N/A	1.09	0.63	1.15	N/A	0.63	Non BES Facility
KILARC 60 kv	COTTONWD 60KV - SECTION 1D & 1E	P2-4	Bus-Tie Breaker	N/A	0.92	0.79	N/A	1.09	0.92	1.13	N/A	0.98	Non BES Facility
LP FB SP 60 kv	COTTONWD 60KV - SECTION 1D & 1E	P2-4	Bus-Tie Breaker	N/A	0.45	0.30	N/A	1.10	0.50	1.18	N/A	0.43	Non BES Facility
LS ML JT 60 kv	COTTONWD 60KV - SECTION 1D & 1E	P2-4	Bus-Tie Breaker	N/A	0.46	0.32	N/A	1.11	0.52	1.19	N/A	0.45	Non BES Facility
LS MLNSJ 60 kv	COTTONWD 60KV - SECTION 1D & 1E	P2-4	Bus-Tie Breaker	N/A	0.46	0.32	N/A	1.11	0.52	1.19	N/A	0.45	Non BES Facility
OLSEN JT 60 kv	COTTONWD 60KV - SECTION 1D & 1E	P2-4	Bus-Tie Breaker	N/A	0.92	0.79	N/A	1.09	0.91	1.13	N/A	0.97	Non BES Facility
RED B JT 60 kv	COTTONWD 60KV - SECTION 1D & 1E	P2-4	Bus-Tie Breaker	N/A	0.47	0.32	N/A	1.11	0.52	1.18	N/A	0.44	Non BES Facility
RED BLFF 60 kv	COTTONWD 60KV - SECTION 1D & 1E	P2-4	Bus-Tie Breaker	N/A	0.47	0.32	N/A	1.11	0.52	1.18	N/A	0.44	Non BES Facility
RWSN J2 60 kv	COTTONWD 60KV - SECTION 1D & 1E	P2-4	Bus-Tie Breaker	N/A	0.45	0.30	N/A	1.10	0.51	1.18	N/A	0.43	Non BES Facility
SOUTH 60 kv	COTTONWD 60KV - SECTION 1D & 1E	P2-4	Bus-Tie Breaker	N/A	0.64	0.53	N/A	1.09	0.65	1.15	N/A	0.66	Non BES Facility
TKO TAP 60 kv	COTTONWD 60KV - SECTION 1D & 1E	P2-4	Bus-Tie Breaker	N/A	0.91	0.78	N/A	1.08	0.91	1.12	N/A	0.94	Non BES Facility
TYLERJT 60 kv	COTTONWD 60KV - SECTION 1D & 1E	P2-4	Bus-Tie Breaker	N/A	0.45	0.30	N/A	1.10	0.50	1.18	N/A	0.43	Non BES Facility
VINA 60 kv	COTTONWD 60KV - SECTION 1D & 1E	P2-4	Bus-Tie Breaker	N/A	0.46	0.32	N/A	1.11	0.52	1.19	N/A	0.45	Non BES Facility
VOLTA 60 kv	COTTONWD 60KV - SECTION 1D & 1E	P2-4	Bus-Tie Breaker	N/A	0.71	0.59	N/A	1.08	0.71	1.14	N/A	0.71	Non BES Facility
WHITMORE 60 kv	COTTONWD 60KV - SECTION 1D & 1E	P2-4	Bus-Tie Breaker	N/A	0.92	0.78	N/A	1.09	0.91	1.13	N/A	0.97	Non BES Facility
ANTLER 60 kv	COTWDPGE 115KV - SECTION 2D & 1D	P2-4	Bus-Tie Breaker	0.98	0.99	0.92	1.05	1.06	0.99	1.06	0.98	0.87	Sensitivity only
BIG BAR 60 kv	COTWDPGE 115KV - SECTION 2D & 1D	P2-4	Bus-Tie Breaker	0.99	1.00	0.98	1.11	1.11	1.01	1.12	1.00	0.99	Load power factor correction and voltage support if needed
FRNCHGLH 60 kv	COTWDPGE 115KV - SECTION 2D & 1D	P2-4	Bus-Tie Breaker	0.95	0.96	0.92	1.11	1.10	0.98	1.11	0.95	0.92	Load power factor correction and voltage support if needed
FRSTGLEN 115 kv	COTWDPGE 115KV - SECTION 2D & 1D	P2-4	Bus-Tie Breaker	1.03	1.04	1.02	1.16	1.15	1.06	1.16	1.06	1.04	Load power factor correction and voltage support if needed
JESSTAP 115 kv	COTWDPGE 115KV - SECTION 2D & 1D	P2-4	Bus-Tie Breaker	0.99	0.99	0.98	1.15	1.14	1.02	1.15	1.00	0.99	Load power factor correction and voltage support if needed
JESSUP 115 kv	COTWDPGE 115KV - SECTION 2D & 1D	P2-4	Bus-Tie Breaker	1.01	1.01	0.95	1.06	1.07	1.02	1.07	1.02	0.89	Sensitivity only
JESSUPJ1 115 kv	COTWDPGE 115KV - SECTION 2D & 1D	P2-4	Bus-Tie Breaker	1.01	1.01	0.95	1.06	1.07	1.02	1.07	1.02	0.89	Sensitivity only
KESWICK 60 kv	COTWDPGE 115KV - SECTION 2D & 1D	P2-4	Bus-Tie Breaker	0.97	0.98	0.92	1.08	1.08	0.99	1.09	0.97	0.90	Sensitivity only
MTN GATE 60 kv	COTWDPGE 115KV - SECTION 2D & 1D	P2-4	Bus-Tie Breaker	0.98	0.99	0.92	1.05	1.06	0.99	1.06	0.98	0.88	Sensitivity only
OREGNTRL 115 kv	COTWDPGE 115KV - SECTION 2D & 1D	P2-4	Bus-Tie Breaker	1.01	1.01	0.95	1.06	1.07	1.02	1.07	1.02	0.90	Sensitivity only
PPL 60 kv	COTWDPGE 115KV - SECTION 2D & 1D	P2-4	Bus-Tie Breaker	0.98	0.99	0.92	1.05	1.06	0.99	1.06	0.98	0.87	Sensitivity only
SPL_AND 115 kv	COTWDPGE 115KV - SECTION 2D & 1D	P2-4	Bus-Tie Breaker	1.02	1.01	0.95	1.06	1.07	1.02	1.07	1.02	0.89	Sensitivity only
SPIAND2 115 kv	COTWDPGE 115KV - SECTION 2D & 1D	P2-4	Bus-Tie Breaker	1.02	1.01	0.95	1.06	1.07	1.02	1.07	1.02	0.89	Sensitivity only
STLLWATR 60 kv	COTWDPGE 115KV - SECTION 2D & 1D	P2-4	Bus-Tie Breaker	0.99	1.00	0.93	1.07	1.08	1.00	1.08	0.99	0.90	Sensitivity only
TAP 65 60 kv	COTWDPGE 115KV - SECTION 2D & 1D	P2-4	Bus-Tie Breaker	0.99	1.00	0.98	1.14	1.13	1.02	1.14	1.00	0.98	Load power factor correction and voltage support if needed
TRINITY 115 kv	COTWDPGE 115KV - SECTION 2D & 1D	P2-4	Bus-Tie Breaker	0.98	0.99	0.97	1.14	1.13	1.01	1.14	0.99	0.98	Load power factor correction and voltage support if needed
TRINITY 60 kv	COTWDPGE 115KV - SECTION 2D & 1D	P2-4	Bus-Tie Breaker	0.99	1.00	0.98	1.14	1.13	1.02	1.14	1.00	0.98	Load power factor correction and voltage support if needed



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



High/Low Voltages

Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)					Voltage PU (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations	
WILDWOOD 115 kv	COTWDPGE 115KV - SECTION 2D & 1D	P2-4	Bus-Tie Breaker	1.03	1.04	1.02	1.16	1.15	1.06	1.16	1.06	1.04	Load power factor correction and voltage support if needed
CEDR CRK 60 kv	SPIAND2 12.50KV GEN UNIT 1 & CASCADE-BENTON-DESCHUTES 60KV [6310]	P3	G-1/N-1	<1.1	<1.1	<1.1	1.18	1.14	<1.1	<1.1	<1.1	<1.1	Load power factor correction and voltage support if needed
CLOV TAP 60 kv	SPIAND2 12.50KV GEN UNIT 1 & CASCADE-BENTON-DESCHUTES 60KV [6310]	P3	G-1/N-1	<1.1	<1.1	<1.1	1.18	1.14	<1.1	<1.1	<1.1	<1.1	Load power factor correction and voltage support if needed
COWCK TP 60 kv	SPIAND2 12.50KV GEN UNIT 1 & CASCADE-BENTON-DESCHUTES 60KV [6310]	P3	G-1/N-1	<1.1	<1.1	<1.1	1.15	1.13	<1.1	<1.1	<1.1	<1.1	Load power factor correction and voltage support if needed
DESCHUTS 60 kv	SPIAND2 12.50KV GEN UNIT 1 & CASCADE-BENTON-DESCHUTES 60KV [6310]	P3	G-1/N-1	<1.1	<1.1	<1.1	1.12	1.10	<1.1	<1.1	<1.1	<1.1	Load power factor correction and voltage support if needed
KILARC 60 kv	SPIAND2 12.50KV GEN UNIT 1 & CASCADE-BENTON-DESCHUTES 60KV [6310]	P3	G-1/N-1	<1.1	<1.1	<1.1	1.17	1.14	<1.1	<1.1	<1.1	<1.1	Load power factor correction and voltage support if needed
OLSEN JT 60 kv	SPIAND2 12.50KV GEN UNIT 1 & CASCADE-BENTON-DESCHUTES 60KV [6310]	P3	G-1/N-1	<1.1	<1.1	<1.1	1.17	1.14	<1.1	<1.1	<1.1	<1.1	Load power factor correction and voltage support if needed
TKO TAP 60 kv	SPIAND2 12.50KV GEN UNIT 1 & CASCADE-BENTON-DESCHUTES 60KV [6310]	P3	G-1/N-1	<1.1	<1.1	<1.1	1.16	1.13	<1.1	<1.1	<1.1	<1.1	Load power factor correction and voltage support if needed
WHITMORE 60 kv	SPIAND2 12.50KV GEN UNIT 1 & CASCADE-BENTON-DESCHUTES 60KV [6310]	P3	G-1/N-1	<1.1	<1.1	<1.1	1.17	1.13	<1.1	<1.1	<1.1	<1.1	Load power factor correction and voltage support if needed
SOUTH 60 kv	SPIAND2 12.50KV GEN UNIT 1 & COLEMAN-SOUTH 60KV [6450]	P3	G-1/N-1	<1.1	<1.1	<1.1	1.11	<1.1	<1.1	<1.1	<1.1	<1.1	Load power factor correction and voltage support if needed
ELKCREEK 60 kv	SPIAND2 12.50KV GEN UNIT 1 & GLENN 230/60KV TB 2	P3	G-1/N-1	<1.1	<1.1	<1.1	1.25	<1.1	<1.1	<1.1	<1.1	<1.1	Load power factor correction and voltage support if needed
WILLOWS 60 kv	SPIAND2 12.50KV GEN UNIT 1 & GLENN 230/60KV TB 2	P3	G-1/N-1	<1.1	<1.1	<1.1	1.22	<1.1	<1.1	<1.1	<1.1	<1.1	Load power factor correction and voltage support if needed
CEDR CRK 60 kv	JBBLACK1 13.80KV GEN UNIT 1 & CASCADE-BENTON-DESCHUTES 60KV [6310]	P3	G-1/N-1	<1.1	<1.1	<1.1	1.18	<1.1	<1.1	<1.1	<1.1	<1.1	Load power factor correction and voltage support if needed
CLOV TAP 60 kv	JBBLACK1 13.80KV GEN UNIT 1 & CASCADE-BENTON-DESCHUTES 60KV [6310]	P3	G-1/N-1	<1.1	<1.1	<1.1	1.18	<1.1	<1.1	<1.1	<1.1	<1.1	Load power factor correction and voltage support if needed
COWCK TP 60 kv	JBBLACK1 13.80KV GEN UNIT 1 & CASCADE-BENTON-DESCHUTES 60KV [6310]	P3	G-1/N-1	<1.1	<1.1	<1.1	1.15	<1.1	<1.1	<1.1	<1.1	<1.1	Load power factor correction and voltage support if needed
DESCHUTS 60 kv	JBBLACK1 13.80KV GEN UNIT 1 & CASCADE-BENTON-DESCHUTES 60KV [6310]	P3	G-1/N-1	<1.1	<1.1	<1.1	1.12	<1.1	<1.1	<1.1	<1.1	<1.1	Load power factor correction and voltage support if needed
KILARC 60 kv	JBBLACK1 13.80KV GEN UNIT 1 & CASCADE-BENTON-DESCHUTES 60KV [6310]	P3	G-1/N-1	<1.1	<1.1	<1.1	1.17	<1.1	<1.1	<1.1	<1.1	<1.1	Load power factor correction and voltage support if needed
OLSEN JT 60 kv	JBBLACK1 13.80KV GEN UNIT 1 & CASCADE-BENTON-DESCHUTES 60KV [6310]	P3	G-1/N-1	<1.1	<1.1	<1.1	1.17	<1.1	<1.1	<1.1	<1.1	<1.1	Load power factor correction and voltage support if needed
TKO TAP 60 kv	JBBLACK1 13.80KV GEN UNIT 1 & CASCADE-BENTON-DESCHUTES 60KV [6310]	P3	G-1/N-1	<1.1	<1.1	<1.1	1.15	<1.1	<1.1	<1.1	<1.1	<1.1	Load power factor correction and voltage support if needed
WHITMORE 60 kv	JBBLACK1 13.80KV GEN UNIT 1 & CASCADE-BENTON-DESCHUTES 60KV [6310]	P3	G-1/N-1	<1.1	<1.1	<1.1	1.17	<1.1	<1.1	<1.1	<1.1	<1.1	Load power factor correction and voltage support if needed
BIG BEND 115 kv	CRBU 4-5 13.80KV GEN UNIT 1 & TABLE MT 500/230KV TB 1	P3	G-1/N-1	<1.1	<1.1	<1.1	1.10	<1.1	<1.1	<1.1	<1.1	<1.1	Load power factor correction and voltage support if needed



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



High/Low Voltages

Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)					Voltage PU (Sensitivity Scenarios)				Project & Potential Mitigation Solutions	
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations		
CHALLENGE 60 kv	CRBU 4-5 13.80KV GEN UNIT 1 & TABLE MT 500/230KV TB 1	P3	G-1/N-1	<1.1	<1.1	<1.1	1.11	<1.1	<1.1	<1.1	<1.1	<1.1	<1.1	Load power factor correction and voltage support if needed
FRBSTNTP 115 kv	CRBU 4-5 13.80KV GEN UNIT 1 & TABLE MT 500/230KV TB 1	P3	G-1/N-1	<1.1	<1.1	<1.1	1.13	<1.1	<1.1	<1.1	<1.1	<1.1	<1.1	Load power factor correction and voltage support if needed
HONC JT1 115 kv	CRBU 4-5 13.80KV GEN UNIT 1 & TABLE MT 500/230KV TB 1	P3	G-1/N-1	<1.1	<1.1	<1.1	1.14	<1.1	<1.1	<1.1	<1.1	<1.1	<1.1	Load power factor correction and voltage support if needed
HONC JT3 115 kv	CRBU 4-5 13.80KV GEN UNIT 1 & TABLE MT 500/230KV TB 1	P3	G-1/N-1	<1.1	<1.1	<1.1	1.14	<1.1	<1.1	<1.1	<1.1	<1.1	<1.1	Load power factor correction and voltage support if needed
KANAKAJT 115 kv	CRBU 4-5 13.80KV GEN UNIT 1 & TABLE MT 500/230KV TB 1	P3	G-1/N-1	<1.1	<1.1	<1.1	1.13	<1.1	<1.1	<1.1	<1.1	<1.1	<1.1	Load power factor correction and voltage support if needed
KLLY RDE 60 kv	CRBU 4-5 13.80KV GEN UNIT 1 & TABLE MT 500/230KV TB 1	P3	G-1/N-1	<1.1	<1.1	<1.1	1.10	<1.1	<1.1	<1.1	<1.1	<1.1	<1.1	Load power factor correction and voltage support if needed
OWID 115 kv	CRBU 4-5 13.80KV GEN UNIT 1 & TABLE MT 500/230KV TB 1	P3	G-1/N-1	<1.1	<1.1	<1.1	1.13	<1.1	<1.1	<1.1	<1.1	<1.1	<1.1	Load power factor correction and voltage support if needed
PALERMO 115 kv	CRBU 4-5 13.80KV GEN UNIT 1 & TABLE MT 500/230KV TB 1	P3	G-1/N-1	<1.1	<1.1	<1.1	1.14	<1.1	<1.1	<1.1	<1.1	<1.1	<1.1	Load power factor correction and voltage support if needed
PALERMO 60 kv	CRBU 4-5 13.80KV GEN UNIT 1 & TABLE MT 500/230KV TB 1	P3	G-1/N-1	<1.1	<1.1	<1.1	1.10	<1.1	<1.1	<1.1	<1.1	<1.1	<1.1	Load power factor correction and voltage support if needed
WODLF TP 115 kv	CRBU 4-5 13.80KV GEN UNIT 1 & TABLE MT 500/230KV TB 1	P3	G-1/N-1	<1.1	<1.1	<1.1	1.13	<1.1	<1.1	<1.1	<1.1	<1.1	<1.1	Load power factor correction and voltage support if needed
WYANDJT1 115 kv	CRBU 4-5 13.80KV GEN UNIT 1 & TABLE MT 500/230KV TB 1	P3	G-1/N-1	<1.1	<1.1	<1.1	1.14	<1.1	<1.1	<1.1	<1.1	<1.1	<1.1	Load power factor correction and voltage support if needed
TAP 65 60 kv	VOLTA1-2 9.11KV GEN UNIT 1 & TRINITY-COTTONWOOD 115KV [4040]	P3	G-1/N-1	<1.1	<1.1	<1.1	<1.1	<1.1	<1.1	<1.1	<1.1	1.10	<1.1	Sensitivity only
TRINITY 60 kv	VOLTA1-2 9.11KV GEN UNIT 1 & TRINITY-COTTONWOOD 115KV [4040]	P3	G-1/N-1	<1.1	<1.1	<1.1	<1.1	<1.1	<1.1	<1.1	<1.1	1.10	<1.1	Sensitivity only
FRNCHGLH 60 kv	VOLTA1-2 9.11KV GEN UNIT 1 & KESWICK-CASCADE 60KV [7260] MOAS OPENED ON CASCADE_STLLWATR	P3	G-1/N-1	<1.1	<1.1	<1.1	1.10	<1.1	<1.1	<1.1	<1.1	<1.1	<1.1	Load power factor correction and voltage support if needed
KESWICK 60 kv	VOLTA1-2 9.11KV GEN UNIT 1 & KESWICK-CASCADE 60KV [7260] MOAS OPENED ON CASCADE_STLLWATR	P3	G-1/N-1	<1.1	<1.1	<1.1	1.11	<1.1	<1.1	<1.1	<1.1	<1.1	<1.1	Load power factor correction and voltage support if needed
STLLWATR 60 kv	VOLTA1-2 9.11KV GEN UNIT 1 & KESWICK-CASCADE 60KV [7260] MOAS OPENED ON CASCADE_STLLWATR	P3	G-1/N-1	<1.1	<1.1	<1.1	1.11	<1.1	<1.1	<1.1	<1.1	<1.1	<1.1	Load power factor correction and voltage support if needed
APT ORVC 60 kv	OROVLENRG 4.16KV GEN UNIT 1 & TABLE MT 500/230KV TB 1	P3	G-1/N-1	<1.1	<1.1	<1.1	1.10	<1.1	<1.1	<1.1	<1.1	<1.1	<1.1	Load power factor correction and voltage support if needed
ELGN JCT 60 kv	OROVLENRG 4.16KV GEN UNIT 1 & TABLE MT 500/230KV TB 1	P3	G-1/N-1	<1.1	<1.1	<1.1	1.10	<1.1	<1.1	<1.1	<1.1	<1.1	<1.1	Load power factor correction and voltage support if needed
LSNA PCC 60 kv	OROVLENRG 4.16KV GEN UNIT 1 & TABLE MT 500/230KV TB 1	P3	G-1/N-1	<1.1	<1.1	<1.1	1.10	<1.1	<1.1	<1.1	<1.1	<1.1	<1.1	Load power factor correction and voltage support if needed
OROVILLE 60 kv	OROVLENRG 4.16KV GEN UNIT 1 & TABLE MT 500/230KV TB 1	P3	G-1/N-1	<1.1	<1.1	<1.1	1.10	<1.1	<1.1	<1.1	<1.1	<1.1	<1.1	Load power factor correction and voltage support if needed

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



High/Low Voltages

Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)					Voltage PU (Sensitivity Scenarios)				Project & Potential Mitigation Solutions	
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations		
OROVLENRG 60 kv	OROVLENRG 4.16KV GEN UNIT 1 & TABLE MT 500/230KV TB 1	P3	G-1/N-1	<1.1	<1.1	<1.1	1.10	<1.1	<1.1	<1.1	<1.1	<1.1	<1.1	Load power factor correction and voltage support if needed
OROVLENRGJCT 60 kv	OROVLENRG 4.16KV GEN UNIT 1 & TABLE MT 500/230KV TB 1	P3	G-1/N-1	<1.1	<1.1	<1.1	1.10	<1.1	<1.1	<1.1	<1.1	<1.1	<1.1	Load power factor correction and voltage support if needed
HONCUT 115 kv	GRIZZLYG 6.90KV GEN UNIT 1 & TABLE MT 500/230KV TB 1	P3	G-1/N-1	<1.1	<1.1	<1.1	1.13	<1.1	<1.1	<1.1	<1.1	<1.1	<1.1	Load power factor correction and voltage support if needed
SLYCREEK 115 kv	GRIZZLYG 6.90KV GEN UNIT 1 & TABLE MT 500/230KV TB 1	P3	G-1/N-1	<1.1	<1.1	<1.1	1.12	<1.1	<1.1	<1.1	<1.1	<1.1	<1.1	Load power factor correction and voltage support if needed
WYANDJT2 115 kv	GRIZZLYG 6.90KV GEN UNIT 1 & TABLE MT 500/230KV TB 1	P3	G-1/N-1	<1.1	<1.1	<1.1	1.13	<1.1	<1.1	<1.1	<1.1	<1.1	<1.1	Load power factor correction and voltage support if needed
WYANDTTE 115 kv	GRIZZLYG 6.90KV GEN UNIT 1 & TABLE MT 500/230KV TB 1	P3	G-1/N-1	<1.1	<1.1	<1.1	1.13	<1.1	<1.1	<1.1	<1.1	<1.1	<1.1	Load power factor correction and voltage support if needed
CR CANAL 60 kv	HRIDGEGT 34.50KV GEN UNIT 5 & NEO REDT 60/13.8KV TB 1	P3	G-1/N-1	0.91	<1.1	<1.1	<1.1	<1.1	<1.1	<1.1	<1.1	<1.1	<1.1	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
NEO REDT 60 kv	HRIDGEGT 34.50KV GEN UNIT 5 & NEO REDT 60/13.8KV TB 1	P3	G-1/N-1	0.91	<1.1	<1.1	<1.1	<1.1	<1.1	<1.1	<1.1	<1.1	<1.1	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
RASN JNT 60 kv	HRIDGEGT 34.50KV GEN UNIT 5 & NEO REDT 60/13.8KV TB 1	P3	G-1/N-1	0.91	<1.1	<1.1	<1.1	<1.1	<1.1	<1.1	<1.1	<1.1	<1.1	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
TYLER 60 kv	HRIDGEGT 34.50KV GEN UNIT 5 & NEO REDT 60/13.8KV TB 1	P3	G-1/N-1	0.91	<1.1	<1.1	<1.1	<1.1	<1.1	<1.1	<1.1	<1.1	<1.1	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
CR CANAL 60 kv	COLUSGT1 18.00KV & COLUSGT2 18.00KV & COLUSST1 18.00KV GEN UNITS & NEO REDB 13.80KV GEN UNIT 1	P3	G-1/N-1	<1.1	<1.1	<1.1	<1.1	<1.1	<1.1	0.91	<1.1	<1.1	<1.1	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
NEO REDT 60 kv	COLUSGT1 18.00KV & COLUSGT2 18.00KV & COLUSST1 18.00KV GEN UNITS & NEO REDB 13.80KV GEN UNIT 1	P3	G-1/N-1	<1.1	<1.1	<1.1	<1.1	<1.1	<1.1	0.91	<1.1	<1.1	<1.1	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
RASN JNT 60 kv	COLUSGT1 18.00KV & COLUSGT2 18.00KV & COLUSST1 18.00KV GEN UNITS & NEO REDB 13.80KV GEN UNIT 1	P3	G-1/N-1	<1.1	<1.1	<1.1	<1.1	<1.1	<1.1	0.91	<1.1	<1.1	<1.1	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
TYLER 60 kv	COLUSGT1 18.00KV & COLUSGT2 18.00KV & COLUSST1 18.00KV GEN UNITS & NEO REDB 13.80KV GEN UNIT 1	P3	G-1/N-1	<1.1	<1.1	<1.1	<1.1	<1.1	<1.1	0.91	<1.1	<1.1	<1.1	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
CANAL TP 60 kv	COLUSGT1 18.00KV & COLUSGT2 18.00KV & COLUSST1 18.00KV GEN UNITS & NEO REDT 60/13.8KV TB 1	P3	G-1/N-1	<1.1	<1.1	<1.1	<1.1	<1.1	<1.1	0.91	<1.1	<1.1	<1.1	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
TRINITY 115 kv	NEO REDB 13.80KV GEN UNIT 1 & TRINITY-COTTONWOOD 115KV [4040]	P3	G-1/N-1	<1.1	<1.1	<1.1	<1.1	<1.1	<1.1	<1.1	<1.1	1.11	<1.1	Sensitivity only
DESCHUTS 60 kv	NEO REDB 13.80KV GEN UNIT 1 & CASCADE-BENTON-DESCHUTES 60KV [6310]	P3	G-1/N-1	<1.1	<1.1	<1.1	<1.1	1.10	<1.1	<1.1	<1.1	<1.1	<1.1	Voltage adjustment after generator outage
CANAL TP 60 kv	MALCHA 13.80KV GEN UNIT 1 & NEO REDB 13.80KV GEN UNIT 1	P3	G-1/N-1	0.91	<1.1	<1.1	<1.1	<1.1	<1.1	<1.1	<1.1	<1.1	<1.1	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations

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



High/Low Voltages

Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)					Voltage PU (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations	
VOLTA 60 kv	MALCHA 13.80KV GEN UNIT 1 & VOLTA-SOUTH 60KV [8300]	P3	G-1/N-1	<1.1	<1.1	<1.1	1.10	<1.1	<1.1	<1.1	<1.1	<1.1	Load power factor correction and voltage support if needed
ELKCRKJT 60 kv	MALCHA 13.80KV GEN UNIT 1 & GLENN 230/60KV TB 2	P3	G-1/N-1	<1.1	<1.1	<1.1	1.22	<1.1	<1.1	<1.1	<1.1	<1.1	Load power factor correction and voltage support if needed
CEDR CRK 60 kv	SPIAND2 12.50KV GEN UNIT 1 & CASCADE-BENTON-DESCHUTES 60KV [6310]	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.18	1.14	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	Load power factor correction and voltage support if needed
CLOV TAP 60 kv	SPIAND2 12.50KV GEN UNIT 1 & CASCADE-BENTON-DESCHUTES 60KV [6310]	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.18	1.14	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	Load power factor correction and voltage support if needed
KILARC 60 kv	SPIAND2 12.50KV GEN UNIT 1 & CASCADE-BENTON-DESCHUTES 60KV [6310]	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.17	1.14	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	Load power factor correction and voltage support if needed
OLSEN JT 60 kv	SPIAND2 12.50KV GEN UNIT 1 & CASCADE-BENTON-DESCHUTES 60KV [6310]	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.17	1.14	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	Load power factor correction and voltage support if needed
TKO TAP 60 kv	SPIAND2 12.50KV GEN UNIT 1 & CASCADE-BENTON-DESCHUTES 60KV [6310]	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.16	1.13	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	Load power factor correction and voltage support if needed
WHITMORE 60 kv	SPIAND2 12.50KV GEN UNIT 1 & CASCADE-BENTON-DESCHUTES 60KV [6310]	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.17	1.13	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	Load power factor correction and voltage support if needed
VOLTA 60 kv	SPIAND2 12.50KV GEN UNIT 1 & COLEMAN-SOUTH 60KV [6450]	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.10	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	Load power factor correction and voltage support if needed
ELKCRKJT 60 kv	SPIAND2 12.50KV GEN UNIT 1 & GLENN 230/60KV TB 2	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.22	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	Load power factor correction and voltage support if needed
WILLOWS 60 kv	SPIAND2 12.50KV GEN UNIT 1 & GLENN 230/60KV TB 2	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.22	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	Load power factor correction and voltage support if needed
KILARC 60 kv	JBBLACK1 13.80KV GEN UNIT 1 & CASCADE-BENTON-DESCHUTES 60KV [6310]	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.17	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	Load power factor correction and voltage support if needed
OLSEN JT 60 kv	JBBLACK1 13.80KV GEN UNIT 1 & CASCADE-BENTON-DESCHUTES 60KV [6310]	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.17	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	Load power factor correction and voltage support if needed
TKO TAP 60 kv	JBBLACK1 13.80KV GEN UNIT 1 & CASCADE-BENTON-DESCHUTES 60KV [6310]	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.15	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	Load power factor correction and voltage support if needed
WHITMORE 60 kv	JBBLACK1 13.80KV GEN UNIT 1 & CASCADE-BENTON-DESCHUTES 60KV [6310]	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.17	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	Load power factor correction and voltage support if needed
BIG BEND 115 kv	CRBU 4-5 13.80KV GEN UNIT 1 & TABLE MT 500/230KV TB 1	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.10	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	Load power factor correction and voltage support if needed
FRBSTNTP 115 kv	CRBU 4-5 13.80KV GEN UNIT 1 & TABLE MT 500/230KV TB 1	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.13	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	Load power factor correction and voltage support if needed
HONC JT1 115 kv	CRBU 4-5 13.80KV GEN UNIT 1 & TABLE MT 500/230KV TB 1	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.14	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	Load power factor correction and voltage support if needed
HONC JT3 115 kv	CRBU 4-5 13.80KV GEN UNIT 1 & TABLE MT 500/230KV TB 1	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.14	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	Load power factor correction and voltage support if needed
KANAKAJT 115 kv	CRBU 4-5 13.80KV GEN UNIT 1 & TABLE MT 500/230KV TB 1	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.13	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	Load power factor correction and voltage support if needed

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



High/Low Voltages

Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)					Voltage PU (Sensitivity Scenarios)				Project & Potential Mitigation Solutions	
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations		
KLLY RDE 60 kv	CRBU 4-5 13.80KV GEN UNIT 1 & TABLE MT 500/230KV TB 1	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.10	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	Load power factor correction and voltage support if needed
OWID 115 kv	CRBU 4-5 13.80KV GEN UNIT 1 & TABLE MT 500/230KV TB 1	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.13	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	Load power factor correction and voltage support if needed
PALERMO 115 kv	CRBU 4-5 13.80KV GEN UNIT 1 & TABLE MT 500/230KV TB 1	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.14	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	Load power factor correction and voltage support if needed
PALERMO 60 kv	CRBU 4-5 13.80KV GEN UNIT 1 & TABLE MT 500/230KV TB 1	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.10	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	Load power factor correction and voltage support if needed
SLYCREEK 115 kv	CRBU 4-5 13.80KV GEN UNIT 1 & TABLE MT 500/230KV TB 1	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.13	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	Load power factor correction and voltage support if needed
WODLF TP 115 kv	CRBU 4-5 13.80KV GEN UNIT 1 & TABLE MT 500/230KV TB 1	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.13	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	Load power factor correction and voltage support if needed
WYANDJT1 115 kv	CRBU 4-5 13.80KV GEN UNIT 1 & TABLE MT 500/230KV TB 1	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.14	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	Load power factor correction and voltage support if needed
WYANDJT2 115 kv	CRBU 4-5 13.80KV GEN UNIT 1 & TABLE MT 500/230KV TB 1	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.14	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	Load power factor correction and voltage support if needed
WYANDTTE 115 kv	CRBU 4-5 13.80KV GEN UNIT 1 & TABLE MT 500/230KV TB 1	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.14	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	Load power factor correction and voltage support if needed
TRINITY 115 kv	VOLTA1-2 9.11KV GEN UNIT 1 & TRINITY-COTTONWOOD 115KV [4040]	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.11	> .9, < 1.1	Load power factor correction and voltage support if needed
STLLWATR 60 kv	VOLTA1-2 9.11KV GEN UNIT 1 & KESWICK-CASCADE 60KV [7260] MOAS OPENED ON CASCADE_STLLWATR	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.11	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	Load power factor correction and voltage support if needed
APT ORVC 60 kv	OROVLENRG 4.16KV GEN UNIT 1 & TABLE MT 500/230KV TB 1	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.10	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	Load power factor correction and voltage support if needed
ELGN JCT 60 kv	OROVLENRG 4.16KV GEN UNIT 1 & TABLE MT 500/230KV TB 1	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.10	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	Load power factor correction and voltage support if needed
LSNA PCC 60 kv	OROVLENRG 4.16KV GEN UNIT 1 & TABLE MT 500/230KV TB 1	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.10	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	Load power factor correction and voltage support if needed
OROVILLE 60 kv	OROVLENRG 4.16KV GEN UNIT 1 & TABLE MT 500/230KV TB 1	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.10	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	Load power factor correction and voltage support if needed
DESCHUTS 60 kv	GRIZZLYG 6.90KV GEN UNIT 1 & CASCADE-BENTON-DESCHUTES 60KV [6310]	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.12	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	Load power factor correction and voltage support if needed
BURNEY 60 kv	CARIBOU-TABLE MTN 230KV [4440] & PIT 1 230/11KV TB 1	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.11	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	Load power factor correction and voltage support if needed
BURNYJCT 60 kv	CARIBOU-TABLE MTN 230KV [4440] & PIT 1 230/11KV TB 1	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.11	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	Load power factor correction and voltage support if needed
HAT CRK2 60 kv	CARIBOU-TABLE MTN 230KV [4440] & PIT 1 230/11KV TB 1	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.10	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	Load power factor correction and voltage support if needed
PIT 1 60 kv	CARIBOU-TABLE MTN 230KV [4440] & PIT 1 230/11KV TB 1	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.10	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	Load power factor correction and voltage support if needed

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



High/Low Voltages

Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)					Voltage PU (Sensitivity Scenarios)				Project & Potential Mitigation Solutions	
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations		
HONCUT 115 kv	COLGATE-PALERMO 230KV [9999] & TABLE MT 500/230KV TB 1	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.14	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	Load power factor correction and voltage support if needed
BIG BAR 60 kv	HUMBOLDT-TRINITY 115KV [4040] & BRIDGEVILLE-COTTONWOOD 115KV [1110]	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	0.90	Sensitivity only
BIG BAR 60 kv	HUMBOLDT-TRINITY 115KV [4040] & KESWICK-CASCADE 60KV [7260] MOAS OPENED ON CASCADE_STLLWATR	P6	N-1-1	0.85	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	Project: Maple Creek SVC In-Service Date: Dec 2020 Short term: Action Plan
FRNCHGLH 60 kv	HUMBOLDT-TRINITY 115KV [4040] & KESWICK-CASCADE 60KV [7260] MOAS OPENED ON CASCADE_STLLWATR	P6	N-1-1	0.77	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	Project: Maple Creek SVC In-Service Date: Dec 2020 Short term: Action Plan
GROUSCRK 60 kv	HUMBOLDT-TRINITY 115KV [4040] & KESWICK-CASCADE 60KV [7260] MOAS OPENED ON CASCADE_STLLWATR	P6	N-1-1	0.89	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	Project: Maple Creek SVC In-Service Date: Dec 2020 Short term: Action Plan
HYAMPOM 60 kv	HUMBOLDT-TRINITY 115KV [4040] & KESWICK-CASCADE 60KV [7260] MOAS OPENED ON CASCADE_STLLWATR	P6	N-1-1	0.89	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	Project: Maple Creek SVC In-Service Date: Dec 2020 Short term: Action Plan
HYMPOMJT 60 kv	HUMBOLDT-TRINITY 115KV [4040] & KESWICK-CASCADE 60KV [7260] MOAS OPENED ON CASCADE_STLLWATR	P6	N-1-1	0.89	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	Project: Maple Creek SVC In-Service Date: Dec 2020 Short term: Action Plan
KESWICK 60 kv	HUMBOLDT-TRINITY 115KV [4040] & KESWICK-CASCADE 60KV [7260] MOAS OPENED ON CASCADE_STLLWATR	P6	N-1-1	0.76	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	Project: Maple Creek SVC In-Service Date: Dec 2020 Short term: Action Plan
STLLWATR 60 kv	HUMBOLDT-TRINITY 115KV [4040] & KESWICK-CASCADE 60KV [7260] MOAS OPENED ON CASCADE_STLLWATR	P6	N-1-1	0.75	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	Project: Maple Creek SVC In-Service Date: Dec 2020 Short term: Action Plan
TAP 65 60 kv	HUMBOLDT-TRINITY 115KV [4040] & KESWICK-CASCADE 60KV [7260] MOAS OPENED ON CASCADE_STLLWATR	P6	N-1-1	0.81	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	Project: Maple Creek SVC In-Service Date: Dec 2020 Short term: Action Plan
TRINITY 115 kv	HUMBOLDT-TRINITY 115KV [4040] & KESWICK-CASCADE 60KV [7260] MOAS OPENED ON CASCADE_STLLWATR	P6	N-1-1	0.81	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	Project: Maple Creek SVC In-Service Date: Dec 2020 Short term: Action Plan
TRINITY 60 kv	HUMBOLDT-TRINITY 115KV [4040] & KESWICK-CASCADE 60KV [7260] MOAS OPENED ON CASCADE_STLLWATR	P6	N-1-1	0.81	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	Project: Maple Creek SVC In-Service Date: Dec 2020 Short term: Action Plan
TAP 65 60 kv	BRIDGEVILLE-COTTONWOOD 115KV [1110] & TRINITY-COTTONWOOD 115KV [4040]	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.12	> .9, < 1.1	Sensitivity only
TRINITY 60 kv	BRIDGEVILLE-COTTONWOOD 115KV [1110] & TRINITY-COTTONWOOD 115KV [4040]	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.12	> .9, < 1.1	Sensitivity only



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



High/Low Voltages

Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)					Voltage PU (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations	
BIG BAR 60 kv	TRINITY-COTTONWOOD 115KV [4040] & KESWICK-CASCADE 60KV [7260] MOAS OPENED ON CASCADE_STLLWATR	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.12	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	Load power factor correction and voltage support if needed
TAP 65 60 kv	TRINITY-COTTONWOOD 115KV [4040] & KESWICK-CASCADE 60KV [7260] MOAS OPENED ON CASCADE_STLLWATR	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.14	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	Load power factor correction and voltage support if needed
TRINITY 115 kv	TRINITY-COTTONWOOD 115KV [4040] & KESWICK-CASCADE 60KV [7260] MOAS OPENED ON CASCADE_STLLWATR	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.14	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	Load power factor correction and voltage support if needed
TRINITY 60 kv	TRINITY-COTTONWOOD 115KV [4040] & KESWICK-CASCADE 60KV [7260] MOAS OPENED ON CASCADE_STLLWATR	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.14	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	Load power factor correction and voltage support if needed
BELDENTP 230 kv	CASCADE-COTTONWOOD 115KV [1240] & BUS TIE 230KV [9999]	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.11	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	Load power factor correction and voltage support if needed
CARBOU M 230 kv	CASCADE-COTTONWOOD 115KV [1240] & BUS TIE 230KV [9999]	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.11	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	Load power factor correction and voltage support if needed
CARIBOU 230 kv	CASCADE-COTTONWOOD 115KV [1240] & BUS TIE 230KV [9999]	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.11	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	Load power factor correction and voltage support if needed
CHALLENGE 60 kv	CASCADE-COTTONWOOD 115KV [1240] & BUS TIE 230KV [9999]	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.13	1.12	> .9, < 1.1	1.12	> .9, < 1.1	> .9, < 1.1	Load power factor correction and voltage support if needed
FRBSTNTP 115 kv	CASCADE-COTTONWOOD 115KV [1240] & BUS TIE 230KV [9999]	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.14	1.11	> .9, < 1.1	1.11	> .9, < 1.1	> .9, < 1.1	Load power factor correction and voltage support if needed
GRIZ JCT 115 kv	CASCADE-COTTONWOOD 115KV [1240] & BUS TIE 230KV [9999]	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.11	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	Load power factor correction and voltage support if needed
HONC JT1 115 kv	CASCADE-COTTONWOOD 115KV [1240] & BUS TIE 230KV [9999]	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.16	1.10	> .9, < 1.1	1.10	> .9, < 1.1	> .9, < 1.1	Load power factor correction and voltage support if needed
HONCUT 115 kv	CASCADE-COTTONWOOD 115KV [1240] & BUS TIE 230KV [9999]	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.15	> .9, < 1.1	> .9, < 1.1	1.10	> .9, < 1.1	> .9, < 1.1	Load power factor correction and voltage support if needed
KANAKAJT 115 kv	CASCADE-COTTONWOOD 115KV [1240] & BUS TIE 230KV [9999]	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.15	1.11	> .9, < 1.1	1.11	> .9, < 1.1	> .9, < 1.1	Load power factor correction and voltage support if needed
MCNE JCT 60 kv	CASCADE-COTTONWOOD 115KV [1240] & BUS TIE 230KV [9999]	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.10	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	Load power factor correction and voltage support if needed
OWID 115 kv	CASCADE-COTTONWOOD 115KV [1240] & BUS TIE 230KV [9999]	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.15	1.11	> .9, < 1.1	1.11	> .9, < 1.1	> .9, < 1.1	Load power factor correction and voltage support if needed
PALERMO 115 kv	CASCADE-COTTONWOOD 115KV [1240] & BUS TIE 230KV [9999]	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.15	1.11	> .9, < 1.1	1.11	> .9, < 1.1	> .9, < 1.1	Load power factor correction and voltage support if needed
PALERMO 230 kv	CASCADE-COTTONWOOD 115KV [1240] & BUS TIE 230KV [9999]	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.10	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	Load power factor correction and voltage support if needed
TBL MT D 230 kv	CASCADE-COTTONWOOD 115KV [1240] & BUS TIE 230KV [9999]	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.11	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	Load power factor correction and voltage support if needed

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



High/Low Voltages

Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)					Voltage PU (Sensitivity Scenarios)				Project & Potential Mitigation Solutions	
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations		
TBL MT2M 230 kv	CASCADE-COTTONWOOD 115KV [1240] & BUS TIE 230KV [9999]	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.10	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	Load power factor correction and voltage support if needed
TBLE MTN 60 kv	CASCADE-COTTONWOOD 115KV [1240] & BUS TIE 230KV [9999]	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.10	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	Load power factor correction and voltage support if needed
CASCADE 115 kv	CASCADE-COTTONWOOD 115KV [1240] & CASCADE-BENTON-DESCHUTES 60KV [6310]	P6	N-1-1	> .9, < 1.1	1.11	1.10	1.11	> .9, < 1.1	1.13	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	Load power factor correction and voltage support if needed
CASCADE 60 kv	CASCADE-COTTONWOOD 115KV [1240] & CASCADE-BENTON-DESCHUTES 60KV [6310]	P6	N-1-1	> .9, < 1.1	1.11	1.10	1.11	> .9, < 1.1	1.13	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	Load power factor correction and voltage support if needed
MTN GATE 60 kv	CASCADE-COTTONWOOD 115KV [1240] & CASCADE-BENTON-DESCHUTES 60KV [6310]	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.12	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	Load power factor correction and voltage support if needed
PPL 60 kv	CASCADE-COTTONWOOD 115KV [1240] & CASCADE-BENTON-DESCHUTES 60KV [6310]	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.12	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	Load power factor correction and voltage support if needed
STLLWATR 60 kv	CASCADE-COTTONWOOD 115KV [1240] & CASCADE-BENTON-DESCHUTES 60KV [6310]	P6	N-1-1	> .9, < 1.1	1.11	> .9, < 1.1	1.11	> .9, < 1.1	1.13	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	Load power factor correction and voltage support if needed
CHALLNGE 60 kv	CASCADE-COTTONWOOD 115KV [1240] & TABLE MT 500/230KV TB 1	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.12	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	Load power factor correction and voltage support if needed
SLYCREEK 115 kv	CASCADE-COTTONWOOD 115KV [1240] & TABLE MT 500/230KV TB 1	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.14	1.11	> .9, < 1.1	1.11	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	Load power factor correction and voltage support if needed
TBL MT E 230 kv	CASCADE-COTTONWOOD 115KV [1240] & TABLE MT 500/230KV TB 1	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.10	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	Load power factor correction and voltage support if needed
TBL MTX1 230 kv	CASCADE-COTTONWOOD 115KV [1240] & TABLE MT 500/230KV TB 1	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.10	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	Load power factor correction and voltage support if needed
WODLF TP 115 kv	CASCADE-COTTONWOOD 115KV [1240] & TABLE MT 500/230KV TB 1	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.14	1.11	> .9, < 1.1	1.11	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	Load power factor correction and voltage support if needed
WYANDJT1 115 kv	CASCADE-COTTONWOOD 115KV [1240] & TABLE MT 500/230KV TB 1	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.15	1.11	> .9, < 1.1	1.11	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	Load power factor correction and voltage support if needed
WYANDJT2 115 kv	CASCADE-COTTONWOOD 115KV [1240] & TABLE MT 500/230KV TB 1	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.15	1.11	> .9, < 1.1	1.11	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	Load power factor correction and voltage support if needed
WYANDTTE 115 kv	CASCADE-COTTONWOOD 115KV [1240] & TABLE MT 500/230KV TB 1	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.15	1.11	> .9, < 1.1	1.11	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	Load power factor correction and voltage support if needed
ANITA 60 kv	CRAG VIEW-CASCADE 115KV [1350] & GLENN 230/60KV TB 2	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.24	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	Load power factor correction and voltage support if needed
CAPAY 60 kv	CRAG VIEW-CASCADE 115KV [1350] & GLENN 230/60KV TB 2	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.22	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	Load power factor correction and voltage support if needed
CAPAYJCT 60 kv	CRAG VIEW-CASCADE 115KV [1350] & GLENN 230/60KV TB 2	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.22	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	Load power factor correction and voltage support if needed
CAPYSWCH 60 kv	CRAG VIEW-CASCADE 115KV [1350] & GLENN 230/60KV TB 2	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.22	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	Load power factor correction and voltage support if needed
CHICO JT 60 kv	CRAG VIEW-CASCADE 115KV [1350] & GLENN 230/60KV TB 2	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.23	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	Load power factor correction and voltage support if needed

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



High/Low Voltages

Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)					Voltage PU (Sensitivity Scenarios)				Project & Potential Mitigation Solutions	
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations		
CORNING 60 kv	CRAG VIEW-CASCADE 115KV [1350] & GLENN 230/60KV TB 2	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.24	> .9, < 1.1	> .9, < 1.1	Load power factor correction and voltage support if needed
CORNSWCH 60 kv	CRAG VIEW-CASCADE 115KV [1350] & GLENN 230/60KV TB 2	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.22	> .9, < 1.1	> .9, < 1.1	Load power factor correction and voltage support if needed
ELKCREEK 60 kv	CRAG VIEW-CASCADE 115KV [1350] & GLENN 230/60KV TB 2	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.26	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.22	> .9, < 1.1	> .9, < 1.1	Load power factor correction and voltage support if needed
ELKCRKJT 60 kv	CRAG VIEW-CASCADE 115KV [1350] & GLENN 230/60KV TB 2	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.23	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.22	> .9, < 1.1	> .9, < 1.1	Load power factor correction and voltage support if needed
GLENN 60 kv	CRAG VIEW-CASCADE 115KV [1350] & GLENN 230/60KV TB 2	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.22	> .9, < 1.1	> .9, < 1.1	Load power factor correction and voltage support if needed
HAMILTON 60 kv	CRAG VIEW-CASCADE 115KV [1350] & GLENN 230/60KV TB 2	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.25	> .9, < 1.1	> .9, < 1.1	Load power factor correction and voltage support if needed
HEADGATE 60 kv	CRAG VIEW-CASCADE 115KV [1350] & GLENN 230/60KV TB 2	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.23	> .9, < 1.1	> .9, < 1.1	Load power factor correction and voltage support if needed
HMLTN JT 60 kv	CRAG VIEW-CASCADE 115KV [1350] & GLENN 230/60KV TB 2	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.25	> .9, < 1.1	> .9, < 1.1	Load power factor correction and voltage support if needed
JACINTO 60 kv	CRAG VIEW-CASCADE 115KV [1350] & GLENN 230/60KV TB 2	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.26	> .9, < 1.1	> .9, < 1.1	Load power factor correction and voltage support if needed
ORL B JT 60 kv	CRAG VIEW-CASCADE 115KV [1350] & GLENN 230/60KV TB 2	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.22	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.22	> .9, < 1.1	> .9, < 1.1	Load power factor correction and voltage support if needed
ORLAND B 60 kv	CRAG VIEW-CASCADE 115KV [1350] & GLENN 230/60KV TB 2	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.23	> .9, < 1.1	> .9, < 1.1	Load power factor correction and voltage support if needed
ORLND JT 60 kv	CRAG VIEW-CASCADE 115KV [1350] & GLENN 230/60KV TB 2	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.22	> .9, < 1.1	> .9, < 1.1	Load power factor correction and voltage support if needed
WILLOWS 60 kv	CRAG VIEW-CASCADE 115KV [1350] & GLENN 230/60KV TB 2	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.22	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.22	> .9, < 1.1	> .9, < 1.1	Load power factor correction and voltage support if needed
OROVLENRG 60 kv	WOODLEAF-PALERMO 115KV [4220] & TABLE MT 500/230KV TB 1	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.10	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	Load power factor correction and voltage support if needed
OROVLENRGJCT 60 kv	WOODLEAF-PALERMO 115KV [4220] & TABLE MT 500/230KV TB 1	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.10	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	Load power factor correction and voltage support if needed
ELKCREEK 60 kv	WOODLEAF-PALERMO 115KV [4220] & GLENN 230/60KV TB 2	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.25	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	Load power factor correction and voltage support if needed
CLOV TAP 60 kv	CARIBOU-PALERMO 115KV [3190] MOAS OPENED ON WYANDJT2_BIG BEND & CASCADE-BENTON-DESCHUTES 60KV [6310]	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.17	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	Load power factor correction and voltage support if needed
COWCK TP 60 kv	CARIBOU-PALERMO 115KV [3190] MOAS OPENED ON WYANDJT2_BIG BEND & CASCADE-BENTON-DESCHUTES 60KV [6310]	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.15	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	Load power factor correction and voltage support if needed
SYCAMORE 115 kv	SYCAMORE CREEK-NOTRE DAME-TABLE MTN 115KV [4314] & BUTTE-CHICO B-TBLE MTN 115KV [3910]	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	0.89	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	0.89	Load power factor correction and voltage support if needed

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



High/Low Voltages

Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)					Voltage PU (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations	
ANITA 60 kv	COTTONWOOD-GLENN 230KV [4560] & GLENN 230/60KV TB 2	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.23	1.23	> .9, < 1.1	1.24	> .9, < 1.1	> .9, < 1.1	Load power factor correction and voltage support if needed
CAPAY 60 kv	COTTONWOOD-GLENN 230KV [4560] & GLENN 230/60KV TB 2	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.23	1.23	> .9, < 1.1	1.23	> .9, < 1.1	> .9, < 1.1	Load power factor correction and voltage support if needed
CAPAYJCT 60 kv	COTTONWOOD-GLENN 230KV [4560] & GLENN 230/60KV TB 2	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.23	1.23	> .9, < 1.1	1.23	> .9, < 1.1	> .9, < 1.1	Load power factor correction and voltage support if needed
CAPYSWCH 60 kv	COTTONWOOD-GLENN 230KV [4560] & GLENN 230/60KV TB 2	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.23	1.22	> .9, < 1.1	1.22	> .9, < 1.1	> .9, < 1.1	Load power factor correction and voltage support if needed
CHICO JT 60 kv	COTTONWOOD-GLENN 230KV [4560] & GLENN 230/60KV TB 2	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.23	1.23	> .9, < 1.1	1.23	> .9, < 1.1	> .9, < 1.1	Load power factor correction and voltage support if needed
CORNING 60 kv	COTTONWOOD-GLENN 230KV [4560] & GLENN 230/60KV TB 2	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.24	1.24	> .9, < 1.1	1.24	> .9, < 1.1	> .9, < 1.1	Load power factor correction and voltage support if needed
CORNSWCH 60 kv	COTTONWOOD-GLENN 230KV [4560] & GLENN 230/60KV TB 2	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.23	1.22	> .9, < 1.1	1.22	> .9, < 1.1	> .9, < 1.1	Load power factor correction and voltage support if needed
ELKCREEK 60 kv	COTTONWOOD-GLENN 230KV [4560] & GLENN 230/60KV TB 2	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.26	1.22	> .9, < 1.1	1.22	> .9, < 1.1	> .9, < 1.1	Load power factor correction and voltage support if needed
ELKCRKJT 60 kv	COTTONWOOD-GLENN 230KV [4560] & GLENN 230/60KV TB 2	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.23	1.22	> .9, < 1.1	1.23	> .9, < 1.1	> .9, < 1.1	Load power factor correction and voltage support if needed
GLENN 60 kv	COTTONWOOD-GLENN 230KV [4560] & GLENN 230/60KV TB 2	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.23	1.22	> .9, < 1.1	1.22	> .9, < 1.1	> .9, < 1.1	Load power factor correction and voltage support if needed
HAMILTON 60 kv	COTTONWOOD-GLENN 230KV [4560] & GLENN 230/60KV TB 2	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.24	1.25	> .9, < 1.1	1.25	> .9, < 1.1	> .9, < 1.1	Load power factor correction and voltage support if needed
HEADGATE 60 kv	COTTONWOOD-GLENN 230KV [4560] & GLENN 230/60KV TB 2	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.23	1.23	> .9, < 1.1	1.23	> .9, < 1.1	> .9, < 1.1	Load power factor correction and voltage support if needed
HMLTN JT 60 kv	COTTONWOOD-GLENN 230KV [4560] & GLENN 230/60KV TB 2	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.24	1.25	> .9, < 1.1	1.25	> .9, < 1.1	> .9, < 1.1	Load power factor correction and voltage support if needed
JACINTO 60 kv	COTTONWOOD-GLENN 230KV [4560] & GLENN 230/60KV TB 2	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.25	1.26	> .9, < 1.1	1.26	> .9, < 1.1	> .9, < 1.1	Load power factor correction and voltage support if needed
ORL B JT 60 kv	COTTONWOOD-GLENN 230KV [4560] & GLENN 230/60KV TB 2	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.23	1.22	> .9, < 1.1	1.23	> .9, < 1.1	> .9, < 1.1	Load power factor correction and voltage support if needed
ORLAND B 60 kv	COTTONWOOD-GLENN 230KV [4560] & GLENN 230/60KV TB 2	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.23	1.23	> .9, < 1.1	1.23	> .9, < 1.1	> .9, < 1.1	Load power factor correction and voltage support if needed
ORLND JT 60 kv	COTTONWOOD-GLENN 230KV [4560] & GLENN 230/60KV TB 2	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.23	1.23	> .9, < 1.1	1.23	> .9, < 1.1	> .9, < 1.1	Load power factor correction and voltage support if needed
WILLOWS 60 kv	COTTONWOOD-GLENN 230KV [4560] & GLENN 230/60KV TB 2	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.23	1.22	> .9, < 1.1	1.23	> .9, < 1.1	> .9, < 1.1	Load power factor correction and voltage support if needed
CEDR CRK 60 kv	COTTONWOOD-BENTON #1 60KV [6640] & CASCADE-BENTON-DESCHUTES 60KV [6310]	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.19	> .9, < 1.1	> .9, < 1.1	Sensitivity only
CLOV TAP 60 kv	COTTONWOOD-BENTON #1 60KV [6640] & CASCADE-BENTON-DESCHUTES 60KV [6310]	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.19	> .9, < 1.1	> .9, < 1.1	Sensitivity only



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



High/Low Voltages

Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)					Voltage PU (Sensitivity Scenarios)				Project & Potential Mitigation Solutions		
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations			
COWCK TP 60 kv	COTTONWOOD-BENTON #1 60KV [6640] & CASCADE-BENTON-DESCHUTES 60KV [6310]	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.17	> .9, < 1.1	> .9, < 1.1	Sensitivity only	
DESCHUTS 60 kv	COTTONWOOD-BENTON #1 60KV [6640] & CASCADE-BENTON-DESCHUTES 60KV [6310]	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.13	> .9, < 1.1	> .9, < 1.1	Sensitivity only	
KILARC 60 kv	COTTONWOOD-BENTON #1 60KV [6640] & CASCADE-BENTON-DESCHUTES 60KV [6310]	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.19	> .9, < 1.1	> .9, < 1.1	Sensitivity only	
WHITMORE 60 kv	COTTONWOOD-BENTON #1 60KV [6640] & CASCADE-BENTON-DESCHUTES 60KV [6310]	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.18	> .9, < 1.1	> .9, < 1.1	Sensitivity only	
ANTLER 60 kv	COTTONWOOD-BENTON #2 60KV [6650] & CASCADE 115/60KV TB 1	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	0.86	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	0.86	Continue to monitor future load forecast
CASCADE 115 kv	COTTONWOOD-BENTON #2 60KV [6650] & CASCADE 115/60KV TB 1	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	0.89	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	0.89	Continue to monitor future load forecast
OREGNTRL 60 kv	COTTONWOOD-BENTON #2 60KV [6650] & CASCADE 115/60KV TB 1	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	0.89	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	Continue to monitor future load forecast
STLLWATR 60 kv	COTTONWOOD-BENTON #2 60KV [6650] & CASCADE 115/60KV TB 1	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	0.89	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	0.89	Continue to monitor future load forecast
CEDR CRK 60 kv	CASCADE-BENTON-DESCHUTES 60KV [6310] & VOLTA1-2 9.11KV GEN UNIT 1	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	0.89	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	Non BES Facility
CLOV TAP 60 kv	CASCADE-BENTON-DESCHUTES 60KV [6310] & VOLTA1-2 9.11KV GEN UNIT 1	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	0.89	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	Non BES Facility
COWCK TP 60 kv	CASCADE-BENTON-DESCHUTES 60KV [6310] & VOLTA1-2 9.11KV GEN UNIT 1	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	0.89	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	Non BES Facility
DESCHUTS 60 kv	CASCADE-BENTON-DESCHUTES 60KV [6310] & VOLTA1-2 9.11KV GEN UNIT 1	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	0.87	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	Non BES Facility
KILARC 60 kv	CASCADE-BENTON-DESCHUTES 60KV [6310] & VOLTA1-2 9.11KV GEN UNIT 1	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	0.90	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	Non BES Facility
TKO TAP 60 kv	CASCADE-BENTON-DESCHUTES 60KV [6310] & VOLTA1-2 9.11KV GEN UNIT 1	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	0.89	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	Non BES Facility
FRBSTNTP 115 kv	CASCADE-BENTON-DESCHUTES 60KV [6310] & BUS TIE 230KV [9999]	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.11	> .9, < 1.1	> .9, < 1.1	Sensitivity only	
HONC JT1 115 kv	CASCADE-BENTON-DESCHUTES 60KV [6310] & BUS TIE 230KV [9999]	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.10	> .9, < 1.1	> .9, < 1.1	Sensitivity only	
KANAKAJT 115 kv	CASCADE-BENTON-DESCHUTES 60KV [6310] & BUS TIE 230KV [9999]	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.11	> .9, < 1.1	> .9, < 1.1	Sensitivity only	
WODLF TP 115 kv	CASCADE-BENTON-DESCHUTES 60KV [6310] & BUS TIE 230KV [9999]	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.11	> .9, < 1.1	> .9, < 1.1	Sensitivity only	
WYANDJT2 115 kv	CASCADE-BENTON-DESCHUTES 60KV [6310] & BUS TIE 230KV [9999]	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.11	> .9, < 1.1	> .9, < 1.1	Sensitivity only	
ANTLER 60 kv	CASCADE-BENTON-DESCHUTES 60KV [6310] & CASCADE-COTTONWOOD 115KV [1240]	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.11	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	Sensitivity only	



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



High/Low Voltages

Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)					Voltage PU (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations	
CASCADE 115 kv	CASCADE-BENTON-DESCHUTES 60KV [6310] & CASCADE-COTTONWOOD 115KV [1240]	P6	N-1-1	> .9, < 1.1	1.12	> .9, < 1.1	1.10	> .9, < 1.1	1.13	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	Voltage adjustment after first outage
CASCADE 60 kv	CASCADE-BENTON-DESCHUTES 60KV [6310] & CASCADE-COTTONWOOD 115KV [1240]	P6	N-1-1	> .9, < 1.1	1.12	> .9, < 1.1	1.11	> .9, < 1.1	1.13	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	Voltage adjustment after first outage
MTN GATE 60 kv	CASCADE-BENTON-DESCHUTES 60KV [6310] & CASCADE-COTTONWOOD 115KV [1240]	P6	N-1-1	> .9, < 1.1	1.10	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.11	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	Voltage adjustment after first outage
CEDR CRK 60 kv	CASCADE-BENTON-DESCHUTES 60KV [6310] & COLEMAN-COTTONWOOD 60KV [6430]	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	0.88	1.21	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	Non BES Facility
CLOV TAP 60 kv	CASCADE-BENTON-DESCHUTES 60KV [6310] & COLEMAN-COTTONWOOD 60KV [6430]	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	0.89	1.21	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	Non BES Facility
COLEMAN 60 kv	CASCADE-BENTON-DESCHUTES 60KV [6310] & COLEMAN-COTTONWOOD 60KV [6430]	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.13	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	Non BES Facility
COWCK TP 60 kv	CASCADE-BENTON-DESCHUTES 60KV [6310] & COLEMAN-COTTONWOOD 60KV [6430]	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	0.88	1.20	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	Non BES Facility
DESCHUTS 60 kv	CASCADE-BENTON-DESCHUTES 60KV [6310] & COLEMAN-COTTONWOOD 60KV [6430]	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	0.86	1.18	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	Non BES Facility
INSKIP 60 kv	CASCADE-BENTON-DESCHUTES 60KV [6310] & COLEMAN-COTTONWOOD 60KV [6430]	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.13	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	Non BES Facility
KILARC 60 kv	CASCADE-BENTON-DESCHUTES 60KV [6310] & COLEMAN-COTTONWOOD 60KV [6430]	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	0.89	1.21	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	Non BES Facility
LS ML JT 60 kv	CASCADE-BENTON-DESCHUTES 60KV [6310] & COLEMAN-COTTONWOOD 60KV [6430]	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.11	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	Non BES Facility
LS MLNSJ 60 kv	CASCADE-BENTON-DESCHUTES 60KV [6310] & COLEMAN-COTTONWOOD 60KV [6430]	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.11	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	Non BES Facility
OLSEN JT 60 kv	CASCADE-BENTON-DESCHUTES 60KV [6310] & COLEMAN-COTTONWOOD 60KV [6430]	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	0.89	1.21	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	Non BES Facility
TKO TAP 60 kv	CASCADE-BENTON-DESCHUTES 60KV [6310] & COLEMAN-COTTONWOOD 60KV [6430]	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	0.88	1.20	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	Non BES Facility
VINA 60 kv	CASCADE-BENTON-DESCHUTES 60KV [6310] & COLEMAN-COTTONWOOD 60KV [6430]	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.11	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	Non BES Facility
WHITMORE 60 kv	CASCADE-BENTON-DESCHUTES 60KV [6310] & COLEMAN-COTTONWOOD 60KV [6430]	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	0.88	1.21	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	Non BES Facility
COWCK TP 60 kv	CASCADE-BENTON-DESCHUTES 60KV [6310] & RED BLFF-COTTONWD 60KV [6660] MOAS OPENED ON COTTONWD_RED B JT	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	0.89	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	Non BES Facility
OLSEN JT 60 kv	CASCADE-BENTON-DESCHUTES 60KV [6310] & RED BLFF-COTTONWD 60KV [6660] MOAS OPENED ON COTTONWD_RED B JT	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	0.90	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	Non BES Facility
WHITMORE 60 kv	CASCADE-BENTON-DESCHUTES 60KV [6310] & RED BLFF-COTTONWD 60KV [6660] MOAS OPENED ON COTTONWD_RED B JT	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	0.90	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	Non BES Facility

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



High/Low Voltages

Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)					Voltage PU (Sensitivity Scenarios)				Project & Potential Mitigation Solutions	
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations		
OWID 115 kv	CASCADE-BENTON-DESCHUTES 60KV [6310] & TABLE MT 500/230KV TB 1	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.11	> .9, < 1.1	> .9, < 1.1	Sensitivity only
PALERMO 115 kv	CASCADE-BENTON-DESCHUTES 60KV [6310] & TABLE MT 500/230KV TB 1	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.11	> .9, < 1.1	> .9, < 1.1	Sensitivity only
SLYCREEK 115 kv	CASCADE-BENTON-DESCHUTES 60KV [6310] & TABLE MT 500/230KV TB 1	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.11	> .9, < 1.1	> .9, < 1.1	Sensitivity only
WYANDJT1 115 kv	CASCADE-BENTON-DESCHUTES 60KV [6310] & TABLE MT 500/230KV TB 1	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.11	> .9, < 1.1	> .9, < 1.1	Sensitivity only
WYANDTTE 115 kv	CASCADE-BENTON-DESCHUTES 60KV [6310] & TABLE MT 500/230KV TB 1	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.11	> .9, < 1.1	> .9, < 1.1	Sensitivity only
KESWICK 60 kv	KESWICK-CASCADE 60KV [7260] MOAS OPENED ON CASCADE_STLLWATR & TRINITY-COTTONWOOD 115KV [4040]	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.11	> .9, < 1.1	> .9, < 1.1	Sensitivity only
FRNCHGLH 60 kv	MTN GATE JCT-CASCADE 60KV [7640] & KESWICK-CASCADE 60KV [7260] MOAS OPENED ON CASCADE_STLLWATR	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.11	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	Non BES Facility
KESWICK 60 kv	MTN GATE JCT-CASCADE 60KV [7640] & KESWICK-CASCADE 60KV [7260] MOAS OPENED ON CASCADE_STLLWATR	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.11	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	Non BES Facility
CLMN JCT 60 kv	COLEMAN-COTTONWOOD 60KV [6430] & RED BLFF-COTTONWD 60KV [6660] MOAS OPENED ON COTTONWD_RED B JT	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.16	1.14	> .9, < 1.1	> .9, < 1.1	1.19	> .9, < 1.1	> .9, < 1.1	Non BES Facility
INSKIP 60 kv	COLEMAN-COTTONWOOD 60KV [6430] & RED BLFF-COTTONWD 60KV [6660] MOAS OPENED ON COTTONWD_RED B JT	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.13	1.11	> .9, < 1.1	> .9, < 1.1	1.16	> .9, < 1.1	> .9, < 1.1	Non BES Facility
LS ML JT 60 kv	COLEMAN-COTTONWOOD 60KV [6430] & RED BLFF-COTTONWD 60KV [6660] MOAS OPENED ON COTTONWD_RED B JT	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.17	1.15	> .9, < 1.1	> .9, < 1.1	1.20	> .9, < 1.1	> .9, < 1.1	Non BES Facility
LS MLNSJ 60 kv	COLEMAN-COTTONWOOD 60KV [6430] & RED BLFF-COTTONWD 60KV [6660] MOAS OPENED ON COTTONWD_RED B JT	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.17	1.15	> .9, < 1.1	> .9, < 1.1	1.20	> .9, < 1.1	> .9, < 1.1	Non BES Facility
RED BLFF 60 kv	COLEMAN-COTTONWOOD 60KV [6430] & RED BLFF-COTTONWD 60KV [6660] MOAS OPENED ON COTTONWD_RED B JT	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.17	1.15	> .9, < 1.1	> .9, < 1.1	1.20	> .9, < 1.1	> .9, < 1.1	Non BES Facility
SOUTH 60 kv	COLEMAN-COTTONWOOD 60KV [6430] & RED BLFF-COTTONWD 60KV [6660] MOAS OPENED ON COTTONWD_RED B JT	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.13	1.11	> .9, < 1.1	> .9, < 1.1	1.16	> .9, < 1.1	> .9, < 1.1	Non BES Facility
VINA 60 kv	COLEMAN-COTTONWOOD 60KV [6430] & RED BLFF-COTTONWD 60KV [6660] MOAS OPENED ON COTTONWD_RED B JT	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.17	1.15	> .9, < 1.1	> .9, < 1.1	1.20	> .9, < 1.1	> .9, < 1.1	Non BES Facility

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



High/Low Voltages

Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)					Voltage PU (Sensitivity Scenarios)				Project & Potential Mitigation Solutions	
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations		
VOLTA 60 kv	COLEMAN-COTTONWOOD 60KV [6430] & RED BLFF-COTTONWD 60KV [6660] MOAS OPENED ON COTTONWD_RED B JT	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.12	1.10	> .9, < 1.1	1.14	> .9, < 1.1	> .9, < 1.1	Non BES Facility	
RED BLFF 60 kv	COLEMAN-RED BLFF 60KV [6640] & COTTONWOOD-RED BLUFF 60KV [6660] MOAS OPENED ON COTTONWD_RED B JT	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	0.85	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	0.85 Non BES Facility	
RWSN J2 60 kv	COLEMAN-RED BLFF 60KV [6640] & COTTONWOOD-RED BLUFF 60KV [6660] MOAS OPENED ON COTTONWD_RED B JT	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	0.89	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	0.88 Non BES Facility	
SOUTH 60 kv	COTTONWOOD #2 60KV [6630] & COLEMAN-SOUTH 60KV [6450]	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.11	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	Non BES Facility	
CLMN JCT 60 kv	RED BLFF-COTTONWD 60KV [6660] MOAS OPENED ON COTTONWD_RED B JT & COLEMAN-COTTONWOOD 60KV [6430]	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.17	1.16	> .9, < 1.1	1.19	> .9, < 1.1	> .9, < 1.1	0.57 Non BES Facility	
COLEMAN 60 kv	RED BLFF-COTTONWD 60KV [6660] MOAS OPENED ON COTTONWD_RED B JT & COLEMAN-COTTONWOOD 60KV [6430]	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.14	1.14	> .9, < 1.1	1.17	> .9, < 1.1	> .9, < 1.1	0.65 Non BES Facility	
DIRYVLE 60 kv	RED BLFF-COTTONWD 60KV [6660] MOAS OPENED ON COTTONWD_RED B JT & COLEMAN-COTTONWOOD 60KV [6430]	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.17	1.16	> .9, < 1.1	1.20	> .9, < 1.1	> .9, < 1.1	0.54 Non BES Facility	
SOUTH 60 kv	RED BLFF-COTTONWD 60KV [6660] MOAS OPENED ON COTTONWD_RED B JT & COLEMAN-COTTONWOOD 60KV [6430]	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.13	1.13	> .9, < 1.1	1.16	> .9, < 1.1	> .9, < 1.1	0.74 Non BES Facility	
VOLTA 60 kv	RED BLFF-COTTONWD 60KV [6660] MOAS OPENED ON COTTONWD_RED B JT & COLEMAN-COTTONWOOD 60KV [6430]	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.12	1.11	> .9, < 1.1	1.13	> .9, < 1.1	> .9, < 1.1	0.79 Non BES Facility	
OWID 115 kv	PALERMO-OROVILLE 60KV [7730] & TABLE MT 500/230KV TB 1	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.12	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	Voltage adjustment after first outage
ELIZ TWN 60 kv	TABLE MT 500/230KV TB 1 & CARIBOU #2 60KV [6280] MOAS OPENED ON CARIBOU_GRS F JT	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	0.49 Sensitivity only	
EST Q JT 60 kv	TABLE MT 500/230KV TB 1 & CARIBOU #2 60KV [6280] MOAS OPENED ON CARIBOU_GRS F JT	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	0.49 Sensitivity only	
EST Q1 60 kv	TABLE MT 500/230KV TB 1 & CARIBOU #2 60KV [6280] MOAS OPENED ON CARIBOU_GRS F JT	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	0.49 Sensitivity only	
EST QNCY 60 kv	TABLE MT 500/230KV TB 1 & CARIBOU #2 60KV [6280] MOAS OPENED ON CARIBOU_GRS F JT	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	0.49 Sensitivity only	
GRS F JT 60 kv	TABLE MT 500/230KV TB 1 & CARIBOU #2 60KV [6280] MOAS OPENED ON CARIBOU_GRS F JT	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	0.49 Sensitivity only	
PLMS JCT 60 kv	TABLE MT 500/230KV TB 1 & CARIBOU #2 60KV [6280] MOAS OPENED ON CARIBOU_GRS F JT	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	0.49 Sensitivity only	

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



High/Low Voltages

Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)					Voltage PU (Sensitivity Scenarios)				Project & Potential Mitigation Solutions	
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations		
SPIQUINCY 60 kv	TABLE MT 500/230KV TB 1 & CARIBOU #2 60KV [6280] MOAS OPENED ON CARIBOU_GRS F JT	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	0.49	Sensitivity only
SPIQUINCYJCT 60 kv	TABLE MT 500/230KV TB 1 & CARIBOU #2 60KV [6280] MOAS OPENED ON CARIBOU_GRS F JT	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	0.49	Sensitivity only
BURNEYQF 60 kv	TABLE MT 500/230KV TB 1 & PIT 1 230/11KV TB 1	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.11	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	Sensitivity only
BUTTVLLY 115 kv	CARIBOU 230/230KV TB 11 & TABLE MT 500/230KV TB 1	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.14	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	Load power factor correction and voltage support if needed
CARIBOU 115 kv	CARIBOU 230/230KV TB 11 & TABLE MT 500/230KV TB 1	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.14	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	Load power factor correction and voltage support if needed
GRIZZLY1 115 kv	CARIBOU 230/230KV TB 11 & TABLE MT 500/230KV TB 1	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.14	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	Load power factor correction and voltage support if needed
FRSTGLEN 115 kv	COTWD_E2 230/115KV TB 1 & COTWD_F2 230/115KV TB 4	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.10	> .9, < 1.1	1.11	1.12	> .9, < 1.1	> .9, < 1.1	Sensitivity only
TAP 65 60 kv	COTWD_E2 230/115KV TB 1 & COTWD_F2 230/115KV TB 4	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.10	1.11	> .9, < 1.1	> .9, < 1.1	Sensitivity only
TRINITY 115 kv	COTWD_E2 230/115KV TB 1 & COTWD_F2 230/115KV TB 4	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.10	1.11	> .9, < 1.1	> .9, < 1.1	Sensitivity only
TRINITY 60 kv	COTWD_E2 230/115KV TB 1 & COTWD_F2 230/115KV TB 4	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.10	1.11	> .9, < 1.1	> .9, < 1.1	Sensitivity only
WILDWOOD 115 kv	COTWD_E2 230/115KV TB 1 & COTWD_F2 230/115KV TB 4	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	1.10	1.11	> .9, < 1.1	> .9, < 1.1	Sensitivity only
ELIZ TWN 60 kv	PALERMO 230/115KV TB 2 & CARIBOU-TABLE MTN 230KV [4440]	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	0.90	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	Continue to monitor future load forecast
EST Q JT 60 kv	PALERMO 230/115KV TB 2 & CARIBOU-TABLE MTN 230KV [4440]	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	0.89	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	Continue to monitor future load forecast
EST Q1 60 kv	PALERMO 230/115KV TB 2 & CARIBOU-TABLE MTN 230KV [4440]	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	0.89	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	Continue to monitor future load forecast
EST QNCY 60 kv	PALERMO 230/115KV TB 2 & CARIBOU-TABLE MTN 230KV [4440]	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	0.89	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	Continue to monitor future load forecast
PLMS JCT 60 kv	PALERMO 230/115KV TB 2 & CARIBOU-TABLE MTN 230KV [4440]	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	0.89	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	Continue to monitor future load forecast
SPIQUINCY 60 kv	PALERMO 230/115KV TB 2 & CARIBOU-TABLE MTN 230KV [4440]	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	0.89	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	Continue to monitor future load forecast
SPIQUINCYJCT 60 kv	PALERMO 230/115KV TB 2 & CARIBOU-TABLE MTN 230KV [4440]	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	0.89	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	Continue to monitor future load forecast
ANDERSON 60 kv	COTWD_E2 230/60KV TB 2 & COTWD_E 230/60KV TB 3	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	0.79	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	0.80	Continue to monitor future load forecast
CANAL TP 60 kv	COTWD_E2 230/60KV TB 2 & COTWD_E 230/60KV TB 3	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	0.87	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	0.88	Continue to monitor future load forecast
CLMN FSH 60 kv	COTWD_E2 230/60KV TB 2 & COTWD_E 230/60KV TB 3	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	0.80	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	0.81	Continue to monitor future load forecast

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



High/Low Voltages

Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)					Voltage PU (Sensitivity Scenarios)				Project & Potential Mitigation Solutions	
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations		
CLMN JCT 60 kv	COTWD_E2 230/60KV TB 2 & COTWD_E 230/60KV TB 3	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	0.77	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	0.78	Continue to monitor future load forecast
COLEMAN 60 kv	COTWD_E2 230/60KV TB 2 & COTWD_E 230/60KV TB 3	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	0.80	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	0.81	Continue to monitor future load forecast
COTTONWD 60 kv	COTWD_E2 230/60KV TB 2 & COTWD_E 230/60KV TB 3	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	0.79	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	0.81	Continue to monitor future load forecast
CR CANAL 60 kv	COTWD_E2 230/60KV TB 2 & COTWD_E 230/60KV TB 3	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	0.87	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	0.88	Continue to monitor future load forecast
DIRYVLE 60 kv	COTWD_E2 230/60KV TB 2 & COTWD_E 230/60KV TB 3	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	0.74	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	0.76	Continue to monitor future load forecast
GIRVAN 60 kv	COTWD_E2 230/60KV TB 2 & COTWD_E 230/60KV TB 3	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	0.81	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	0.82	Continue to monitor future load forecast
LOMS JCT 60 kv	COTWD_E2 230/60KV TB 2 & COTWD_E 230/60KV TB 3	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	0.88	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	0.89	Continue to monitor future load forecast
NEO REDT 60 kv	COTWD_E2 230/60KV TB 2 & COTWD_E 230/60KV TB 3	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	0.88	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	0.89	Continue to monitor future load forecast
RASN JNT 60 kv	COTWD_E2 230/60KV TB 2 & COTWD_E 230/60KV TB 3	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	0.87	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	0.89	Continue to monitor future load forecast
SOUTH 60 kv	COTWD_E2 230/60KV TB 2 & COTWD_E 230/60KV TB 3	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	0.83	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	0.84	Continue to monitor future load forecast
TYLER 60 kv	COTWD_E2 230/60KV TB 2 & COTWD_E 230/60KV TB 3	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	0.87	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	0.88	Continue to monitor future load forecast
VOLTA 60 kv	COTWD_E2 230/60KV TB 2 & COTWD_E 230/60KV TB 3	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	0.85	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	0.86	Continue to monitor future load forecast
WNTU PMS 60 kv	COTWD_E2 230/60KV TB 2 & COTWD_E 230/60KV TB 3	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	0.86	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	0.87	Continue to monitor future load forecast
FRNCHGLH 60 kv	CASCADE 115/60KV TB 1 & HUMBOLDT-TRINITY 115KV [4040]	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	0.90	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	0.90	Continue to monitor future load forecast
KESWICK 60 kv	CASCADE 115/60KV TB 1 & HUMBOLDT-TRINITY 115KV [4040]	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	0.90	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	0.90	Continue to monitor future load forecast
CASCADE 60 kv	CASCADE 115/60KV TB 1 & COTTONWOOD-BENTON #2 60KV [6650]	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	0.88	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	0.89	Continue to monitor future load forecast
CASCADE 115 kv	CASCADE 115/60KV TB 1 & VOLTA-DESCHUTES 60KV [8290]	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	0.90	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	Continue to monitor future load forecast
BENTON 60 kv	COTWD_E 230/60KV TB 3 & COTWD_E2 230/60KV TB 2	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	0.83	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	0.84	Continue to monitor future load forecast
CLMN TAP 60 kv	COTWD_E 230/60KV TB 3 & COTWD_E2 230/60KV TB 2	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	0.80	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	0.81	Continue to monitor future load forecast
GERBER 60 kv	COTWD_E 230/60KV TB 3 & COTWD_E2 230/60KV TB 2	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	0.72	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	0.73	Continue to monitor future load forecast



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



High/Low Voltages

Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)					Voltage PU (Sensitivity Scenarios)				Project & Potential Mitigation Solutions	
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations		
GRBR JCT 60 kv	COTWD_E 230/60KV TB 3 & COTWD_E2 230/60KV TB 2	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	0.74	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	0.75	Continue to monitor future load forecast
INSKIP 60 kv	COTWD_E 230/60KV TB 3 & COTWD_E2 230/60KV TB 2	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	0.82	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	0.83	Continue to monitor future load forecast
LP FB SP 60 kv	COTWD_E 230/60KV TB 3 & COTWD_E2 230/60KV TB 2	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	0.74	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	0.75	Continue to monitor future load forecast
LS ML JT 60 kv	COTWD_E 230/60KV TB 3 & COTWD_E2 230/60KV TB 2	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	0.73	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	0.74	Continue to monitor future load forecast
LS MLNSJ 60 kv	COTWD_E 230/60KV TB 3 & COTWD_E2 230/60KV TB 2	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	0.73	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	0.74	Continue to monitor future load forecast
RED B JT 60 kv	COTWD_E 230/60KV TB 3 & COTWD_E2 230/60KV TB 2	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	0.76	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	0.77	Continue to monitor future load forecast
TYLERJT 60 kv	COTWD_E 230/60KV TB 3 & COTWD_E2 230/60KV TB 2	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	0.74	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	0.76	Continue to monitor future load forecast
VINA 60 kv	COTWD_E 230/60KV TB 3 & COTWD_E2 230/60KV TB 2	P6	N-1-1	> .9, < 1.1	> .9, < 1.1	0.73	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	> .9, < 1.1	0.74	Continue to monitor future load forecast
CHALLENGE 60 kv	Palermo-Colgate 230 kV Line and Table Mountain(D)-Rio Oso 230 kV Line	P7	DCTL	1.02	1.05	1.02	1.11	1.07	1.05	1.07	1.02	1.02	1.02	Voltage adjustment after first outage

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

Voltage Deviation



Substation	Contingency (All and Worst P6)	Category	Category Description	Post Cont. Voltage Deviation % (Baseline Scenarios)					Post Cont. Voltage Deviation % (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations	
CANAL TP 60 kv	NEO REDB 13.80KV GEN UNIT 1	P1	N-1	12	12	16	6	7	12	0	10	16	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
CR CANAL 60 kv	NEO REDB 13.80KV GEN UNIT 1	P1	N-1	12	12	16	6	7	12	0	10	16	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
NEO REDT 60 kv	NEO REDB 13.80KV GEN UNIT 1	P1	N-1	12	13	16	6	7	12	0	10	16	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
RASN JNT 60 kv	NEO REDB 13.80KV GEN UNIT 1	P1	N-1	12	12	16	6	7	12	0	10	16	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
TYLER 60 kv	NEO REDB 13.80KV GEN UNIT 1	P1	N-1	12	12	16	6	7	12	0	10	16	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
CEDR CRK 60 kv	CASCADE-BENTON-DESCHUTES 60KV [6310]	P1	N-1	2	2	13	-4	-4	3	-5	0	5	Continue to monitor future load forecast
CLOV TAP 60 kv	CASCADE-BENTON-DESCHUTES 60KV [6310]	P1	N-1	2	2	13	-4	-4	3	-5	0	5	Continue to monitor future load forecast
COWCK TP 60 kv	CASCADE-BENTON-DESCHUTES 60KV [6310]	P1	N-1	3	2	13	-4	-4	4	-6	0	5	Continue to monitor future load forecast
DESCHUTS 60 kv	CASCADE-BENTON-DESCHUTES 60KV [6310]	P1	N-1	3	3	13	-4	-4	4	-6	0	6	Continue to monitor future load forecast
KILARC 60 kv	CASCADE-BENTON-DESCHUTES 60KV [6310]	P1	N-1	2	2	13	-4	-4	4	-5	0	5	Continue to monitor future load forecast
OLSEN JT 60 kv	CASCADE-BENTON-DESCHUTES 60KV [6310]	P1	N-1	3	2	13	-4	-4	4	-5	0	5	Continue to monitor future load forecast
TKO TAP 60 kv	CASCADE-BENTON-DESCHUTES 60KV [6310]	P1	N-1	3	2	13	-4	-4	4	-6	0	5	Continue to monitor future load forecast
WHITMORE 60 kv	CASCADE-BENTON-DESCHUTES 60KV [6310]	P1	N-1	3	2	13	-4	-4	4	-5	0	5	Continue to monitor future load forecast
KESWICK 60 kv	KESWICK-CASCADE 60KV [7260] MOAS OPENED ON CASCADE_STLLWATR	P1	N-1	4	6	8	-4	-3	5	-3	2	8	Continue to monitor future load forecast
STLLWATR 60 kv	KESWICK-CASCADE 60KV [7260] MOAS OPENED ON CASCADE_STLLWATR	P1	N-1	5	7	10	-4	-3	6	-3	2	9	Continue to monitor future load forecast
ELIZ TWN 60 kv	CARIBOU #2 60KV [6280] MOAS OPENED ON CARIBOU_GRS F JT	P1	N-1	-1	-2	47	-1	-1	-2	-1	-1	48	Continue to monitor future load forecast
EST Q JT 60 kv	CARIBOU #2 60KV [6280] MOAS OPENED ON CARIBOU_GRS F JT	P1	N-1	-1	-2	47	-1	-1	-2	-1	-1	47	Continue to monitor future load forecast
EST Q1 60 kv	CARIBOU #2 60KV [6280] MOAS OPENED ON CARIBOU_GRS F JT	P1	N-1	-1	-2	47	-1	-1	-2	-1	-1	47	Continue to monitor future load forecast
EST QNCY 60 kv	CARIBOU #2 60KV [6280] MOAS OPENED ON CARIBOU_GRS F JT	P1	N-1	-1	-2	47	-1	-1	-2	-1	-1	47	Continue to monitor future load forecast
GRS F JT 60 kv	CARIBOU #2 60KV [6280] MOAS OPENED ON CARIBOU_GRS F JT	P1	N-1	-1	-2	50	-1	-2	-2	-2	-1	50	Continue to monitor future load forecast
PLMS JCT 60 kv	CARIBOU #2 60KV [6280] MOAS OPENED ON CARIBOU_GRS F JT	P1	N-1	-1	-2	47	-1	-1	-2	-1	-1	47	Continue to monitor future load forecast
SPIQUINCY 60 kv	CARIBOU #2 60KV [6280] MOAS OPENED ON CARIBOU_GRS F JT	P1	N-1	-1	-1	47	-1	-1	-2	-1	-1	47	Continue to monitor future load forecast
SPIQUINCYJCT 60 kv	CARIBOU #2 60KV [6280] MOAS OPENED ON CARIBOU_GRS F JT	P1	N-1	-1	-2	47	-1	-1	-2	-1	-1	47	Continue to monitor future load forecast
ANTLER 60 kv	VOLTA1-2 9.11KV GEN UNIT 1 & CASCADE 115/60KV TB 1	P3	G1/N1	<8	<8	<8	<8	<8	<8	<8	<8	8	Sensitivity only

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

Voltage Deviation



Substation	Contingency (All and Worst P6)	Category	Category Description	Post Cont. Voltage Deviation % (Baseline Scenarios)					Post Cont. Voltage Deviation % (Sensitivity Scenarios)				Project & Potential Mitigation Solutions	
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations		
CASCADE 60 kv	VOLTA1-2 9.11KV GEN UNIT 1 & CASCADE 115/60KV TB 1	P3	G1/N1	<8	<8	<8	<8	<8	<8	<8	<8	<8	8	Sensitivity only
CASCADE 115 kv	VOLTA1-2 9.11KV GEN UNIT 1 & CASCADE 115/60KV TB 1	P3	G1/N1	<8	<8	<8	<8	<8	<8	<8	<8	<8	8	Sensitivity only
MTN GATE 60 kv	VOLTA1-2 9.11KV GEN UNIT 1 & CASCADE 115/60KV TB 1	P3	G1/N1	<8	<8	<8	<8	<8	<8	<8	<8	<8	8	Sensitivity only
PPL 60 kv	VOLTA1-2 9.11KV GEN UNIT 1 & CASCADE 115/60KV TB 1	P3	G1/N1	<8	<8	<8	<8	<8	<8	<8	<8	<8	8	Sensitivity only
CR CANAL 60 kv	HRIDGEGT 34.50KV GEN UNIT 5 & NEO REDT 60/13.8KV TB 1	P3	G1/N1	12	<8	<8	<8	<8	<8	<8	<8	<8	<8	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
NEO REDT 60 kv	HRIDGEGT 34.50KV GEN UNIT 5 & NEO REDT 60/13.8KV TB 1	P3	G1/N1	12	<8	<8	<8	<8	<8	<8	<8	<8	<8	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
RASN JNT 60 kv	HRIDGEGT 34.50KV GEN UNIT 5 & NEO REDT 60/13.8KV TB 1	P3	G1/N1	12	<8	<8	<8	<8	<8	<8	<8	<8	<8	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations
TYLER 60 kv	HRIDGEGT 34.50KV GEN UNIT 5 & NEO REDT 60/13.8KV TB 1	P3	G1/N1	12	<8	<8	<8	<8	<8	<8	<8	<8	<8	Potential mitigation: 2 x 10 Mvar capacitor bank at Tyler or Rawson substations

Contingency	Category	Category Description	Transient Stability Performance					Potential Mitigation Solutions
			Baseline Scenarios			Sensitivity Scenarios		
			2020 Summer Peak	2028 Summer Peak	2023 Spring Off-Peak	2020 SP Heavy Renewable & Min Gas Gen	2023 SpOP Hi Renew & Min Gas Gen	
Colusa gas turbine fault plus relay failure	P5-1	Non-Redundant Relay	Stable/WECC criteria met	Numerical Issue	Stable/WECC criteria met	Numerical Issue	Stable/WECC criteria met	PG&E to provide actual data. Result will be updated in draft TP.
Colusa Generator fault (steam unit)	P1-1	N-1	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No Violation
Colusa generator out and Delevan SVD fault	P3-4	G-1/N-2	Stable/WECC criteria met	Numerical Issue	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	PG&E to provide actual data. Result will be updated in draft TP.
Colusa generator out and Round Mountain 500/230 kV Transformer	P3-3	G-1/N-1	Stable/WECC criteria met	Numerical Issue	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	PG&E to provide actual data. Result will be updated in draft TP.
Colusa steam and gas units fault + stuck breaker	P4-1	Stuck Breaker	Stable/WECC criteria met	Numerical Issue	Stable/WECC criteria met	Numerical Issue	Stable/WECC criteria met	PG&E to provide actual data. Result will be updated in draft TP.
Colusa steam unit out and gas unit fault	P3-1	G-1/G-1	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Numerical Issue	Stable/WECC criteria met	PG&E to provide actual data. Result will be updated in draft TP.
Colusa steam unit out and Table Mountain to Thermalito 230 kV line fault	P3-2	G-1/N-1	Stable/WECC criteria met	Numerical Issue	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	PG&E to provide actual data. Result will be updated in draft TP.
Delevan and Cottonwood SVD faults	P6-3	N-1-1	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No Violation
Delevan SVD fault	P1-4	N-1	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No Violation
Delevan SVD fault plus relay failure	P5-4	Non-Redundant Relay	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No Violation
Delevan SVD fault plus stuck breaker	P4-4	Stuck Breaker	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No Violation
Palermo-Pease and Palermo-Rio Oso 115 kV lines - Permanent DCTL fault	P7-1	DCTL	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No Violation
Palermo-Pease and Palermo-Rio Oso 115 kV lines - Temporary DCTL fault	P7-1	DCTL	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No Violation
Round Mountain 230 kV Bus Section fault	P2-2	Bus	Numerical Issue	Numerical Issue	Numerical Issue	Numerical Issue	Numerical Issue	PG&E to provide actual data. Result will be updated in draft TP.
Round Mountain 230 kV Bus section fault plus relay failure	P5-5	Non-Redundant Relay	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No Violation
Round Mountain 230 kV bus-tie breaker fault	P2-4	Bus-Tie Breaker	Numerical Issue	Numerical Issue	Numerical Issue	Numerical Issue	Numerical Issue	PG&E to provide actual data. Result will be updated in draft TP.
Round Mountain 230 kV non-bus-tie breaker fault	P2-3	Non-Bus-Tie Breaker	Numerical Issue	Numerical Issue	Numerical Issue	Numerical Issue	Numerical Issue	PG&E to provide actual data. Result will be updated in draft TP.
Round Mountain 500/230 kV Transformer fault	P1-3	N-1	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No Violation
Round Mountain 500/230 kV Transformer fault plus relay failure	P5-3	Non-Redundant Relay	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No Violation
Round Mountain and Table Mountain transformer faults	P6-2	N-1-1	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No Violation
Round Mountain bus section fault plus stuck breaker (bus-tie breaker)	P4-6	Stuck Breaker	Numerical Issue	Numerical Issue	Numerical Issue	Numerical Issue	Numerical Issue	PG&E to provide actual data. Result will be updated in draft TP.
Round Mountain bus section fault plus stuck breaker (non-bus-tie breaker)	P4-5	Stuck Breaker	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No Violation
Round Mountain transformer and Round Mountain - Cottonwood 230 kV lines + stuck breaker	P4-3	Stuck Breaker	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No Violation

Contingency	Category	Category Description	Transient Stability Performance					Potential Mitigation Solutions
			Baseline Scenarios			Sensitivity Scenarios		
			2020 Summer Peak	2028 Summer Peak	2023 Spring Off-Peak	2020 SP Heavy Renewable & Min Gas Gen	2023 SpOP Hi Renew & Min Gas Gen	
Round Mountain Transformer and Round Mountain - Thermalito and Hyatt 230 kV lines	P6-1	N-1-1	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No Violation
Table Mountain - Rio Oso 230 kV line fault plus relay failure	P5-2	Non-Redundant Relay	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No Violation
Table Mountain -Rio Oso and Table Mountain-Palermo 230 kV line fault + stuck breaker	P4-2	Stuck Breaker	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No Violation
Table Mountain to Thermalito 230 kV line fault	P1-2	N-1	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No Violation
Tesla 230 kV Bus section fault plus relay failure	P5-5	Non-Redundant Relay	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No Violation







Study Area: **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.

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



*Single Source Substation with more than 100 MW Load*

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

No single 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	
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations		
31690 CARIBOU 60.0 31677 GRS F JT 60.0 1 1	RIO OSO-KNIGHTLD-WOODLD 115KV [3460] & TABLE MTN-RIO OSO 230KV [5700]	P6	N-1-1	<100	<100	<100	<100	<100	<100	<100	<100	<100	100	Sensitivity only
31960 MOBILCHE 115 31966 WODLNDJ1 115 1 1	WEST SACRAMENTO-DAVIS 115KV [4120] & RIO OSO-WOODLAND #2 115KV [3470]	P6	N-1-1	<100	<100	<100	<100	<100	<100	<100	<100	<100	101	Sensitivity only
31960 MOBILCHE 115 31970 WOODLD 115 1 1	WEST SACRAMENTO-DAVIS 115KV [4120] & RIO OSO-WOODLAND #2 115KV [3470]	P6	N-1-1	<100	<100	<100	<100	<100	<100	<100	<100	<100	100	Sensitivity only
31962 WOODLANDTP 115 31970 WOODLD 115 1 1	BRIGHTN-UCD_TP2-BRKR SLG 115KV [1141] MOAS OPENED ON BRKRJCT_UCD_TP2 & WEST SACRAMENTO-DAVIS 115KV [4120]	P6	N-1-1	102	<100	<100	<100	<100	<100	<100	<100	<100	<100	Project: Vaca Dixon Area Reinforcement In-Service Date: Dec 2021 Short term: Action plan
31962 WOODLANDTP 115 365506 Q653FJCT 115 1 1	DAVIS-UCD_TP2 115KV [6680] MOAS OPENED ON BRKRJCT_UCD_TP2 & WEST SACRAMENTO-DAVIS 115KV [4120]	P6	N-1-1	124	<100	<100	<100	<100	<100	<100	<100	<100	<100	Project: Vaca Dixon Area Reinforcement In-Service Date: Dec 2021 Short term: Action plan
31964 KNIGHT2 115 31968 WODLNDJ2 115 2 1	WEST SACRAMENTO-DAVIS 115KV [4120] & RIO OSO-KNIGHTLD-WOODLD 115KV [3460]	P6	N-1-1	<100	<100	<100	<100	<100	<100	<100	<100	<100	110	Sensitivity only
31965 KNIGHT1 115 31966 WODLNDJ1 115 1 1	WEST SACRAMENTO-DAVIS 115KV [4120] & RIO OSO-WOODLAND #2 115KV [3470]	P6	N-1-1	<100	<100	<100	<100	<100	<100	<100	<100	<100	100	Sensitivity only
31978 DPWT_TP2 115 31984 BRIGHTN 115 1 1	WOODLAND-DAVIS 115KV [4210] & BRIGHTN-UCD_TP2-BRKR SLG 115KV [1141] MOAS OPENED ON BRKRJCT_UCD_TP2	P6	N-1-1	112	110	119	<100	<100	<100	109	<100	<100	119	Project: Vaca Dixon Area Reinforcement. In-Service Date: Dec 2021 Short term: Action plan. An SPS is recommended in the project to address P6 issues.
31980 DPWTR_TP 115 31986 W.SCRMNO 115 1 1	BRIGHTN-UCD_TP2-BRKR SLG 115KV [1141] MOAS OPENED ON BRKRJCT_UCD_TP2 & WOODLAND-DAVIS 115KV [4210]	P6	N-1-1	<100	<100	108	<100	<100	<100	<100	<100	<100	107	Continue to monitor future load forecast
31980 DPWTR_TP 115 31990 DAVIS 115 1 1	BRIGHTN-UCD_TP2-BRKR SLG 115KV [1141] MOAS OPENED ON BRKRJCT_UCD_TP2 & WOODLAND-DAVIS 115KV [4210]	P6	N-1-1	<100	<100	107	<100	<100	<100	<100	<100	<100	107	Continue to monitor future load forecast
31984 BRIGHTN 115 30348 BRIGHTON 230 9 1	BRIGHTON 230/115KV TB 10 & WOODLAND-DAVIS 115KV [4210]	P6	N-1-1	<100	<100	101	<100	<100	<100	<100	<100	<100	101	Continue to monitor future load forecast
31984 BRIGHTN 115 31993 BRKRJCT 115 1 1	WOODLAND-DAVIS 115KV [4210] & WEST SACRAMENTO-DAVIS 115KV [4120]	P6	N-1-1	126	129	145	<100	<100	<100	119	<100	<100	145	Project: Vaca Dixon Area Reinforcement. In-Service Date: Dec 2021 Short term: Action plan. An SPS is recommended in the project to address P6 issues.
31993 BRKRJCT 115 32001 UCD_TP2 115 1 1	WOODLAND-DAVIS 115KV [4210] & WEST SACRAMENTO-DAVIS 115KV [4120]	P6	N-1-1	124	127	144	<100	<100	<100	118	<100	<100	144	Project: Vaca Dixon Area Reinforcement. In-Service Date: Dec 2021 Short term: Action plan. An SPS is recommended in the project to address P6 issues.
31998 VACA-DIX 115 30460 VACA-DIX 230 3 1	WOLFSKIL 13.80KV GEN UNIT 1 & VACA-DIX 230/115KV TB 4	P3	G-1/N-1	<100	<100	102	<100	<100	<100	<100	<100	<100	102	Continue to monitor future load forecast
	VACA-DIX 230/115KV TB 4 & WOLFSKIL 13.80KV GEN UNIT 1	P6	N-1-1	<100	<100	102	<100	<100	<100	<100	<100	<100	102	Continue to monitor future load forecast
	WOLFSKIL 13.80KV GEN UNIT 1 & VACA-DIX 230/115KV TB 3	P3	G-1/N-1	<100	<100	102	<100	<100	<100	<100	<100	<100	102	Continue to monitor future load forecast



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

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

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

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

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



Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading % (Baseline Scenarios)					Loading % (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations	
32082 PLFLDJCT 60.0 32090 WINTERS 60.0 1 1	Base Case	P0	Base Case	98	116	117	29	17	119	18	68	117	Significant increase in load in base cases compared to last year. Load forecast under review.
	PLAINFLD SVD=V	P1	N-1	<100	91	109	<100	15	94	15	<100	109	Significant increase in load in base cases compared to last year. Load forecast under review.
	VACA-DIX 230KV SECTION 1E	P2-2	Bus	<100	101	104	<100	15	103	15	<100	103	Significant increase in load in base cases compared to last year. Load forecast under review.
	VACA-DIX 230KV - SECTION 1E & 1F	P2-4	Bus-Tie Breaker	<100	101	105	<100	15	104	15	<100	104	Significant increase in load in base cases compared to last year. Load forecast under review.
	VACA-DIX 230KV - SECTION 1E & 2E	P2-4	Bus-Tie Breaker	<100	101	104	<100	15	103	15	<100	104	Significant increase in load in base cases compared to last year. Load forecast under review.
	VACA-DIX 230KV - SECTION 1F & 2F	P2-4	Bus-Tie Breaker	<100	101	104	<100	15	103	15	<100	104	Significant increase in load in base cases compared to last year. Load forecast under review.
	VACA-DIX 230KV - SECTION 2F & 2E	P2-4	Bus-Tie Breaker	<100	101	103	<100	15	103	15	<100	103	Significant increase in load in base cases compared to last year. Load forecast under review.
32082 PLFLDJCT 60.0 32092 PLAINFLD 60.0 1 1	Base Case	P0	Base Case	99	117	118	28	16	120	16	69	118	Significant increase in load in base cases compared to last year. Load forecast under review.
	PLAINFLD SVD=V	P1	N-1	<100	92	110	<100	14	95	14	<100	110	Significant increase in load in base cases compared to last year. Load forecast under review.
	VACA-DIX 230KV SECTION 1E	P2-2	Bus	<100	101	105	<100	14	104	14	<100	104	Significant increase in load in base cases compared to last year. Load forecast under review.
	VACA-DIX 230KV - SECTION 1E & 1F	P2-4	Bus-Tie Breaker	<100	102	106	<100	14	104	14	<100	106	Significant increase in load in base cases compared to last year. Load forecast under review.
	VACA-DIX 230KV - SECTION 1E & 2E	P2-4	Bus-Tie Breaker	<100	101	105	<100	14	104	14	<100	105	Significant increase in load in base cases compared to last year. Load forecast under review.
	VACA-DIX 230KV - SECTION 1F & 2F	P2-4	Bus-Tie Breaker	<100	102	105	<100	14	104	14	<100	105	Significant increase in load in base cases compared to last year. Load forecast under review.
	VACA-DIX 230KV - SECTION 2F & 2E	P2-4	Bus-Tie Breaker	<100	101	104	<100	14	104	14	<100	104	Significant increase in load in base cases compared to last year. Load forecast under review.
32088 VACA-DXN 60.0 31998 VACA-DIX 115 5 1	VACA-DIX 115/60KV TB 9	P1	N-1	105	44	47	33	11	46	9	84	47	Project: Vierra 115 kV Looping Project In-Service Date: Jan 2023 Short term: Action plan
32088 VACA-DXN 60.0 32090 WINTERS 60.0 1 1	Base Case	P0	Base Case	95	108	111	23	13	111	14	65	111	Significant increase in load in base cases compared to last year. Load forecast under review.
	PLAINFLD SVD=V	P1	N-1	<100	87	102	<100	11	90	12	<100	102	Significant increase in load in base cases compared to last year. Load forecast under review.
32088 VACA-DXN 60.0 32094 VACA-JT2 60.0 2 1	DIXON-VACA #1 60KV [6730] (VACA-DXN-VACA-JT1)	P2-1	Line Section w/o Fault	<100	98	109	<100	37	103	34	<100	109	Continue to monitor future load forecast
32100 DIXONDC 60.0 32101 DIXON_L2 60.0 2 1	DIXON-VACA #1 60KV [6730] MOAS OPENED ON DIXONCAN_DIXON-J1	P1	N-1	117	55	62	17	4	57	2	91	62	Project: Vierra 115 kV Looping Project In-Service Date: Jan 2023 Short term: Action plan

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

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

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



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



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

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

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

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

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



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

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

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

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

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



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

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

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

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

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



Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)					Voltage PU (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations	
VACA-CB 115 kV	Base Case	P0	Base case	1.08	1.08	1.05	1.12	1.11	1.08	1.11	1.08	1.05	Load power factor correction and voltage support if needed
VACA-D&1 115 kV	Base Case	P0	Base case	1.05	1.06	1.01	1.10	1.10	1.06	1.10	1.05	1.02	Load power factor correction and voltage support if needed
VACA-DIX 115 kV	Base Case	P0	Base case	1.06	1.07	1.03	1.11	1.10	1.06	1.10	1.07	1.03	Load power factor correction and voltage support if needed
VACA-DIX 230 kV	Base Case	P0	Base case	1.02	1.02	0.99	1.05	1.05	1.01	1.05	1.02	0.99	Load power factor correction and voltage support if needed
VACA-DXN 60 kV	Base Case	P0	Base case	1.06	1.07	1.03	1.11	1.11	1.07	1.11	1.07	1.03	Load power factor correction and voltage support if needed
VACA-JT1 60 kV	Base Case	P0	Base case	1.05	1.06	1.01	1.10	1.10	1.06	1.10	1.06	1.02	Load power factor correction and voltage support if needed
VACA-JT2 60 kV	Base Case	P0	Base case	1.05	1.07	1.02	1.11	1.10	1.06	1.10	1.06	1.02	Load power factor correction and voltage support if needed
VACAVLL1 115 kV	Base Case	P0	Base case	1.06	1.07	1.02	1.11	1.10	1.06	1.10	1.07	1.02	Load power factor correction and voltage support if needed
VACAVLL2 115 kV	Base Case	P0	Base case	1.06	1.06	1.02	1.11	1.10	1.06	1.10	1.06	1.02	Load power factor correction and voltage support if needed
VALLY HM 115 kV	Base Case	P0	Base case	1.01	1.01	0.99	1.07	1.06	1.01	1.06	1.01	0.99	Load power factor correction and voltage support if needed
VCVLE1J 115 kV	Base Case	P0	Base case	1.06	1.07	1.02	1.11	1.10	1.06	1.10	1.07	1.03	Load power factor correction and voltage support if needed
VCVLE2J 115 kV	Base Case	P0	Base case	1.06	1.06	1.02	1.11	1.10	1.06	1.10	1.07	1.02	Load power factor correction and voltage support if needed
VIERATP2 115 kV	Base Case	P0	Base case	NA	1.03	1.00	NA	1.06	1.02	1.06	NA	1.00	Load power factor correction and voltage support if needed
W.SCRMNO 115 kV	Base Case	P0	Base case	1.04	1.03	1.03	1.07	1.05	1.04	1.05	1.04	1.03	Load power factor correction and voltage support if needed
WDLND_BM 115 kV	Base Case	P0	Base case	1.02	1.02	1.01	1.09	1.05	1.03	1.05	1.03	1.00	Load power factor correction and voltage support if needed
WEC 115 kV	Base Case	P0	Base case	1.05	1.06	1.01	1.10	1.10	1.06	1.10	1.05	1.01	Load power factor correction and voltage support if needed
WEMR SWS 60 kV	Base Case	P0	Base case	1.01	1.01	1.00	1.06	1.04	1.01	1.04	1.01	1.00	Load power factor correction and voltage support if needed

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

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

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

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



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

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

High/Low Voltages



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

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

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

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



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

High/Low Voltages



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

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

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

High/Low Voltages



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

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

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



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

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

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

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

High/Low Voltages



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



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



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

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

High/Low Voltages



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

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

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

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



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

High/Low Voltages



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

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

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

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

High/Low Voltages



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

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



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

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

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

Voltage Deviation



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

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*Transient Stability*



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

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



*Single Contingency Load Drop*

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

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



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



*Single Source Substation with more than 100 MW Load*

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

No single substation with more than 100 MW load

Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading % (Baseline Scenarios)									Loading % (Sensitivity Scenarios)			Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Peak	2020 Winter Peak	2023 Winter Peak	2028 Winter Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations	
AMES-Mountain View 115 kV	Montavis 230kV - Section 1D & 2D	P2	Bus-Tie Breaker	113	43	39	53	20	81	29	37	46	30	83	39	Project: Monta Vista 230 kV Bus Upgrade In-service date: 8/20 Short term: Action plan
	Monta Vista 115kV Baah Bus #1 (Failure Of Non-Redundant Relay)	P5	Non-Redundant Relay	82	135	149	39	54	102	58	107	139	49	57	148	Protection upgrade
AMES-Whisman 115 kV	Montavis 230kV - Section 1D & 2D	P2	Bus-Tie Breaker	118	43	40	52	24	82	26	35	47	35	82	40	Project: Monta Vista 230 kV Bus Upgrade In-service date: 8/20 Short term: Action plan
	Monta Vista 115kV Baah Bus #1 (Failure Of Non-Redundant Relay)	P5	Non-Redundant Relay	84	142	156	36	53	104	56	109	146	48	54	156	Protection upgrade
Bair 115/60kV Transformer #1	Cly Lndg 60kV - Section 1D & 2D	P2	Bus-Tie Breaker	109	115	126	57	53	112	80	128	118	48	65	126	Non-BES facility
	Cly Lndg 60kV Section 1D	P2	Bus	109	115	125	57	53	111	80	128	117	48	65	126	Non-BES facility
	Cly Lnd2 115/60kV Tb 2 & Cly Lnd 115/60kV Tb 1	P6	N-1-1	148	155	172	<100	<100	157	112	182	160	<100	<100	173	Non-BES facility
Bair-Cooley Landing #1 60kV Line	Bair-Cooley Landing #1 60kV [6200] (Blhvntp1-Cly Lndg)	P2	Line Section w/o Fault	95	102	99	44	39	88	58	94	105	36	51	99	Non-BES facility
	Cly Lndg 60kV - Section 1D & 2D	P2	Bus-Tie Breaker	95	102	101	44	39	89	58	96	105	35	51	101	Non-BES facility
	Cly Lndg 60kV Section 1D	P2	Bus	96	102	102	44	39	89	58	97	105	35	51	102	Non-BES facility
	Cly Lnd 115/60kV Tb 1 & Cly Lnd2 115/60kV Tb 2	P6	N-1-1	125	132	145	<100	<100	122	<100	144	136	<100	<100	146	Project: Jefferson - Stanford #2 60 kV Line In-service date: TBD Short term: Operating solution
Bair-Cooley Landing #2 60kV Line	Cly Lnd 115/60kV Tb 1 & Cly Lnd2 115/60kV Tb 2	P6	N-1-1	119	127	142	<100	<100	<100	<100	113	131	<100	<100	143	Project: Jefferson - Stanford #2 60 kV Line In-service date: TBD Short term: Operating solution
Cayetano-Lone Tree (Lone Tree-USWP) 230kV Line	C.Costa 230kV - Section 2F & 1F	P2	Bus-Tie Breaker	84	93	98	13	14	39	68	69	107	23	40	99	Continue to monitor future load forecast
	Moraga 230kV - Section 2D & 1D	P2	Bus-Tie Breaker	88	98	110	18	23	55	66	76	106	27	46	110	Continue to monitor future load forecast
	Newark D 230kV Section 1D	P2	Bus	84	91	108	24	24	59	64	74	102	21	54	108	Continue to monitor future load forecast
	Newark D Section 1D & Newark E Section 1E 230kV	P2	Bus-Tie Breaker	88	96	113	26	26	60	68	77	107	23	58	113	Continue to monitor future load forecast
	Contra Costa-Moraga Nos. 1 & 2 230 kV Lines	P7	DCTL	85	95	106	17	21	52	64	74	103	25	43	106	Continue to monitor future load forecast
	Tesla-Newark No.1 And Tesla-Ravenswood 230 kV Lines	P7	DCTL	82	90	105	24	26	60	60	74	99	26	47	105	Continue to monitor future load forecast
Cayetano-Lone Tree (USWP-Cayetano) 230kV Line	Contra Costa-Las Positas 230kV [4510]	P1	N-1	88	101	99	19	20	49	68	71	101	34	57	99	Continue to monitor future load forecast
	C.Costa 230kV - Section 2F & 1F	P2	Bus-Tie Breaker	91	105	98	15	15	39	75	69	108	35	53	99	Continue to monitor future load forecast
	Moraga 230kV - Section 2D & 1D	P2	Bus-Tie Breaker	95	110	110	20	24	55	73	76	108	40	59	110	Continue to monitor future load forecast
	Newark D 230kV Section 1D	P2	Bus	91	103	108	26	25	59	70	74	103	34	66	108	Continue to monitor future load forecast
	Newark D Section 1D & Newark E Section 1E 230kV	P2	Bus-Tie Breaker	95	108	113	28	27	61	74	77	109	36	71	113	Continue to monitor future load forecast
	Contra Costa-Moraga Nos. 1 & 2 230 kV Lines	P7	DCTL	92	106	106	19	22	52	71	74	104	38	56	106	Continue to monitor future load forecast

Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading % (Baseline Scenarios)									Loading % (Sensitivity Scenarios)			Project & Potential Mitigation Solutions	
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Peak	2020 Winter Peak	2023 Winter Peak	2028 Winter Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations		
	Tesla-Newark No.1 And Tesla-Ravenswood 230 kV Lines	P7	DCTL	89	102	105	25	27	60	66	75	100	38	60	105	Continue to monitor future load forecast	
Christie-Sobrante (Oleum-Sobrante) 115kV Line	Sobrante-G #1 115kV [3720] & Sobrante-G #2 115kV [3730]	P6	N-1-1	141	112	121	<100	<100	122	<100	107	111	<100	<100	130	Rerate, reconductor or preferred resource	
	Sobrante-G Nos. 1 & 2 115 kV Lines	P7	DCTL	141	114	124	57	56	122	103	109	115	56	92	131	Rerate, reconductor or preferred resource	
Eastshore 230/115kV Transformer #1	E. Shore 230kV - Middle Breaker Bay 3	P2	Bus-Tie Breaker	97	107	78	26	17	56	92	106	114	10	38	78	Continue to monitor future load forecast	
El Patio-San Jose Sta. 'A' 115 kV Line	NRS 400 115 kV Bus Tie Breaker To NRS 300 115 kV Bus	P2	Bus-Tie Breaker	64	91	113	37	45	58	59	77	92	45	63	113	Continue to monitor future load forecast	
	Evgrn 2 Section 2D & Evgrn 1 Section 1D 115kV	P2	Bus-Tie Breaker	56	85	103	38	48	52	49	65	84	50	57	103	Continue to monitor future load forecast	
	Mtcal E - 1E 115kV & Metcalf-Coyote Pumping Plant Line	P2	Bus-Tie Breaker	58	87	106	33	41	51	53	69	86	42	52	105	Continue to monitor future load forecast	
	Mtcal E 115kV - Section 1E & 2E	P2	Bus-Tie Breaker	89	124	151	47	54	80	79	101	123	54	76	151	Continue to monitor future load forecast	
	Mtcal E 115kV Section 1E	P2	Bus	58	87	106	33	41	51	53	69	86	42	52	105	Continue to monitor future load forecast	
	Mtcal E 115kV Section 2E	P2	Bus	59	88	106	34	41	52	53	70	86	42	53	106	Continue to monitor future load forecast	
	Dvragt1 13.80kV & Dvrbgt2 13.80kV & Dvrast3 13.80kV Gen Units & San Jose B-Stone-Evergreen 115kV [1550]	P3	G1/N1	<100	<100	103	<100	<100	<100	<100	<100	<100	<100	<100	<100	103	Continue to monitor future load forecast
	Los Esteros 115kV Baah Bus #2 (Failure Of Non-Redundant Relay)	P5	Non-Redundant Relay	69	85	104	32	38	63	61	79	87	87	38	56	104	Protection upgrade
	Los Esteros 230 kV Baah Bus #1 (Failure Of Non-Redundant Relay)	P5	Non-Redundant Relay	65	101	122	41	48	58	56	75	101	47	70	122	Protection upgrade	
	Los Esteros 230 kV Baah Bus #2 (Failure Of Non-Redundant Relay)	P5	Non-Redundant Relay	69	107	130	47	53	64	60	80	107	55	75	130	Protection upgrade	
	Palo Alto Sw. Sta. 115kV DBDB Bus #1 (Failure Of Non-Redundant Relay)	P5	Non-Redundant Relay	69	86	106	31	38	63	61	80	87	38	56	106	Protection upgrade	
	Metcalf - Evergreen #1 And #2 115 kV Lines	P7	DCTL	72	102	123	42	49	67	63	82	102	50	68	123	Continue to monitor future load forecast	
	Newark - Los Esteros & Los Esteros - Metcalf 230 kV Lines	P7	DCTL	69	107	130	47	53	64	60	80	107	55	75	130	Continue to monitor future load forecast	
Tesla - Newark No.2 And Metcalf - Los Esteros 230 kV Lines	P7	DCTL	58	84	105	36	44	57	49	67	82	45	56	105	Continue to monitor future load forecast		
Fibergla-Walsh 60 kV (SVP)	SRS-Fairview 60 kV & KRS-Duane 115 kV	P6	N-1-1	<100	<100	<100	<100	<100	<100	<100	<100	103	<100	<100	<100	Non-BES facility	
FMC-San Jose 'B' 115 kV Line	NRS 400 115 kV Bus Tie Breaker To NRS 300 115 kV Bus	P2	Bus-Tie Breaker	67	95	131	33	48	57	66	94	100	47	70	132	Continue to monitor future load forecast	
Jefferson-Hillsdale JCT 60kV Line	Jeffersn 230/60kV Tb 1 & Jeffersn 230/60kV Tb 2	P6	N-1-1	143	143	148	<100	<100	169	128	179	140	<100	101	148	Non-BES facility	
	Jefferson 230 kV Baah Bus #1 (Failure Of Non-Redundant Relay)	P5	Non-Redundant Relay	143	143	148	90	78	170	128	177	140	70	101	148	Protection upgrade	
	Jefferson 230 kV Baah Bus #2 (Failure Of Non-Redundant Relay)	P5	Non-Redundant Relay	146	143	154	91	78	172	130	183	141	71	102	153	Protection upgrade	

Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading % (Baseline Scenarios)									Loading % (Sensitivity Scenarios)			Project & Potential Mitigation Solutions	
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Peak	2020 Winter Peak	2023 Winter Peak	2028 Winter Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations		
	Monta Vista-Jefferson Nos. 1 & 2 230 kV Lines	P7	DCTL	147	143	154	89	77	172	131	183	141	71	102	153	Project: Jefferson - Stanford #2 60 kV Line In-service date: TBD Short term: Operating solution	
Jefferson-Stanford #1 60kV Line	Jefferson 230 kV Baah Bus #2 (Failure Of Non-Redundant Relay)	P5	Non-Redundant Relay	94	92	97	76	76	100	90	102	87	74	82	97	Protection upgrade	
	Monta Vista-Jefferson Nos. 1 & 2 230 kV Lines	P7	DCTL	95	92	97	76	75	101	91	102	87	74	82	97	Project: Jefferson - Stanford #2 60 kV Line In-service date: TBD Short term: Operating solution	
Kifer-FMC 115 kV Line	NRS 400 115 kV Bus Tie Breaker To NRS 300 115 kV Bus	P2	Bus-Tie Breaker	92	125	179	49	62	86	100	134	132	63	101	180	Continue to monitor future load forecast	
	Los Esteros-Nortech 115kV [4032] & SSS-NRS 230 kV	P6	N-1-1	<100	<100	114	<100	<100	<100	<100	<100	<100	<100	<100	116	Continue to monitor future load forecast	
Las Positas-Newark 230kV Line	C.Costa 230kV - Section 1E & 2E	P2	Bus-Tie Breaker	84	99	102	16	20	33	59	59	104	36	50	102	Continue to monitor future load forecast	
	C.Costa 230kV - Section 2F & 1F	P2	Bus-Tie Breaker	79	95	89	13	14	16	61	50	105	39	47	90	Continue to monitor future load forecast	
	C.Costa 230kV - Section 2F & 2E	P2	Bus-Tie Breaker	94	111	111	18	21	32	68	63	118	43	57	111	Continue to monitor future load forecast	
	Moraga 230kV - Section 2D & 1D	P2	Bus-Tie Breaker	83	101	104	17	24	35	58	57	103	44	54	104	Continue to monitor future load forecast	
Los Esteros-Metcalf 230 kV Line	Newark D Section 1D & Newark E Section 1E 230kV	P2	Bus-Tie Breaker	63	88	101	41	41	61	52	65	87	40	65	101	Continue to monitor future load forecast	
	Newark E 230kV - Section 1E & 2E	P2	Bus-Tie Breaker	64	88	101	41	40	60	53	65	88	38	66	101	Continue to monitor future load forecast	
Los Esteros-Nortech 115 kV Line	SSS 230/230kV Tb 1	P1	N-1	81	79	101	31	35	60	64	80	86	34	62	101	Continue to monitor future load forecast	
	SSS-NRS 230 kV	P1	N-1	81	79	102	30	34	60	64	81	87	34	62	102	Continue to monitor future load forecast	
	Ls Estrs 230kV - Middle Breaker Bay 8	P2	Bus-Tie Breaker	81	79	101	31	35	60	64	80	86	34	62	101	Continue to monitor future load forecast	
	NRS 400 115 kV Bus	P2	Bus	88	92	118	34	39	63	70	89	100	38	71	118	Continue to monitor future load forecast	
	Dvragt1 13.80kV & Dvrbgt2 13.80kV & Dvrast3 13.80kV Gen Units & SSS-NRS 230 kV	P3	G1/N1	<100	<100	124	<100	<100	<100	<100	<100	<100	<100	<100	<100	126	Continue to monitor future load forecast
	SSS-NRS 230 kV & FMC-San Jose B 115kV [2021]	P6	N-1-1	<100	<100	<100	<100	<100	<100	<100	<100	<100	107	<100	<100	<100	Sensitivity only
Los Esteros-Silicon Switching Station 230 kV Line	FMC-San Jose B 115kV [2021] & Los Esteros-Nortech 115kV [4032]	P6	N-1-1	<100	<100	104	<100	<100	<100	<100	<100	<100	<100	<100	104	Continue to monitor future load forecast	
	Los Esteros 115kV Baah Bus #2 (Failure Of Non-Redundant Relay)	P5	Non-Redundant Relay	83	92	101	57	59	77	81	91	96	60	79	101	Protection upgrade	
	Palo Alto Sw. Sta. 115kV DBDB Bus #1 (Failure Of Non-Redundant Relay)	P5	Non-Redundant Relay	85	93	101	58	60	79	83	91	97	61	81	101	Protection upgrade	
Martinez-Oleum 115kV Line	Pitsbg D 230kV - Section 2D & 1D	P2	Bus-Tie Breaker	18	24	62	112	31	44	13	20	20	35	42	45	Reduce Pittsburg 115 kV area gen	
	Pitsbg D 230kV Section 1D	P2	Bus	63	45	23	125	40	48	45	55	45	76	78	42	Reduce Pittsburg 115 kV area gen	
	Pitsbg D 230kV Section 2D	P2	Bus	111	95	77	181	22	85	75	96	91	26	121	93	Project: North Tower 115 kV Looping Project In-service date: 12/21 Short term: Action Plan	
	Pitsbg D Section 1D & Pitsbg E Section 1E 230kV	P2	Bus-Tie Breaker	60	42	21	122	41	47	44	54	39	78	73	40	Reduce Pittsburg 115 kV area gen	
	Sobrante 115kV - Section 1D & 2D	P2	Bus-Tie Breaker	270	208	220	138	94	215	155	179	216	83	167	267	Sobrante bus upgrade	

Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading % (Baseline Scenarios)									Loading % (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Peak	2020 Winter Peak	2023 Winter Peak	2028 Winter Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations		
	Sobrante-G Nos. 1 & 2 115 kV Lines	P7	DCTL	112	82	81	80	42	95	61	73	88	31	71	96	Project: North Tower 115 kV Looping Project In-service date: 12/21 Short term: Action Plan	
Martinez-Sobrante 115kV Line	Pitsbg D 230kV Section 2D	P2	Bus	82	102	88	151	17	64	65	100	99	20	100	99	Reduce Pittsburg 115 kV area gen	
Martin-Larkin (HY-1) 115kV Cable	A-Y #1 (Underground Idle) 115kV [9952] & X-Y #1 115kV [9960]	P6	N-1-1	118	123	129	<100	<100	117	<100	125	122	<100	<100	129	Larkin bus upgrade (PG&E maintenance project)	
Martin-Sneath Lane 60kV Line	Martin-Millbrae #1 115kV [2230] & Millbrae-San Mateo #1 115kV [2640]	P6	N-1-1	116	116	107	<100	<100	101	<100	<100	135	<100	<100	119	Project: Jefferson - Stanford #2 60 kV Line In-service date: TBD Short term: Operating solution	
Metcalf 230/115 kV Trans No. 1	Metcalf 230kV - Section 2D & 2E	P2	Bus-Tie Breaker	99	100	115	58	48	113	79	90	101	46	96	115	Metcalf bus upgrade or preferred resource	
	Mtcalf D 115kV Section 1X	P2	Bus	82	69	77	53	37	105	59	66	71	39	90	76	Metcalf bus upgrade or preferred resource	
Metcalf 230/115 kV Trans No. 2	Metcalf 230kV - Section 1D & 1E	P2	Bus-Tie Breaker	95	93	104	52	42	105	77	85	95	40	87	104	Metcalf bus upgrade or preferred resource	
	Metcalf 230kV - Section 1D & 2D	P2	Bus-Tie Breaker	106	108	121	60	49	118	86	96	109	47	98	121	Metcalf bus upgrade or preferred resource	
	Mtcalf E 115kV Section 1Y	P2	Bus	94	108	122	46	44	93	82	96	109	42	76	121	Metcalf bus upgrade or preferred resource	
	Metcalf 230/115kV Tb 1 & Metcalf 230/115kV Tb 4	P6	N-1-1	<100	<100	100	<100	<100	<100	<100	<100	<100	<100	<100	<100	100	Metcalf bus upgrade or preferred resource
Metcalf 230/115 kV Trans No. 3	Metcalf 230kV - Section 1D & 2D	P2	Bus-Tie Breaker	103	105	117	58	48	114	83	93	106	45	95	117	Metcalf bus upgrade or preferred resource	
	Metcalf 230kV - Section 2D & 2E	P2	Bus-Tie Breaker	98	100	115	57	48	111	79	90	101	46	95	115	Metcalf bus upgrade or preferred resource	
	Mtcalf E 115kV Section 2X	P2	Bus	93	107	120	45	43	92	82	95	108	42	76	120	Metcalf bus upgrade or preferred resource	
Metcalf 230/115 kV Trans No. 4	Metcalf 230kV - Section 1D & 1E	P2	Bus-Tie Breaker	95	93	104	52	42	106	77	85	95	41	88	104	Metcalf bus upgrade or preferred resource	
	Metcalf 230kV - Section 1E & 2E	P2	Bus-Tie Breaker	90	87	100	51	41	102	72	81	89	40	87	99	Metcalf bus upgrade or preferred resource	
	Mtcalf D 115kV Section 2Y	P2	Bus	80	67	75	51	37	102	58	65	70	38	88	75	Metcalf bus upgrade or preferred resource	
Metcalf-EI Patio No. 1 115 kV Line	Mtcalf D - 2D 115kV & Metcalf-EI Patio #2 Line	P2	Non-Bus-Tie Breaker	70	90	105	32	34	55	59	69	91	32	56	104	Continue to monitor future load forecast	
	Mtcalf D 115kV Section 2D	P2	Bus	70	90	104	32	34	55	59	69	91	32	56	104	Continue to monitor future load forecast	
	Mtcalf E 115kV - Section 1E & 2E	P2	Bus-Tie Breaker	72	91	108	33	34	59	59	71	92	32	58	108	Continue to monitor future load forecast	
	Mtcalf D - 2D 115kV & Metcalf-EI Patio #2 Line	P2	Non-Bus-Tie Breaker	70	90	104	32	34	55	59	69	91	32	56	104	Continue to monitor future load forecast	
	Mtcalf D 115kV Section 2D	P2	Bus	70	90	104	32	34	55	59	69	91	32	56	104	Continue to monitor future load forecast	
	Mtcalf E 115kV - Section 1E & 2E	P2	Bus-Tie Breaker	72	91	108	33	34	59	59	71	91	32	58	108	Continue to monitor future load forecast	
Metcalf-EI Patio No. 2 115 kV Line	Mtcalf D - 1D 115kV & Metcalf-Edenvale #1 Line	P2	Non-Bus-Tie Breaker	78	95	109	36	37	63	67	75	96	34	62	109	Continue to monitor future load forecast	
	Mtcalf D - 1D 115kV & Metcalf-Edenvale #2 Line	P2	Non-Bus-Tie Breaker	78	95	109	36	37	63	67	75	96	34	62	109	Continue to monitor future load forecast	
	Mtcalf D - 1D 115kV & Metcalf-EI Patio #1 Line	P2	Non-Bus-Tie Breaker	78	95	109	36	37	63	67	75	96	34	62	109	Continue to monitor future load forecast	
	Mtcalf D - 1D 115kV & Mtcalf D-Llagas Line	P2	Non-Bus-Tie Breaker	78	95	109	36	37	63	67	75	96	34	62	109	Continue to monitor future load forecast	
	Mtcalf D 115kV Section 1D	P2	Bus	78	95	109	36	37	63	67	75	96	34	62	109	Continue to monitor future load forecast	
	Mtcalf D Section 1D & Mtcalf E Section 1E 115kV	P2	Bus-Tie Breaker	87	106	123	40	41	71	74	84	107	38	69	122	Continue to monitor future load forecast	



Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading % (Baseline Scenarios)									Loading % (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Peak	2020 Winter Peak	2023 Winter Peak	2028 Winter Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations		
Millbrae-Sneath Lane 60kV Line	Martin-Millbrae #1 115kV [2230] & Millbrae-San Mateo #1 115kV [2640]	P6	N-1-1	<100	<100	<100	<100	<100	<100	<100	<100	<100	117	<100	<100	103	Sensitivity only
Monta Vista 230/115 kV Trans No. 2	Montavis 230kV - Section 2E & 2D	P2	Bus-Tie Breaker	NA	83	106	NA	55	NA	53	75	83	59	NA	105	Project: Monta Vista 230 kV Bus Upgrade In-service date: 8/20 Short term: Action plan	
Monta Vista 230/115 kV Trans No. 3	Montavis 230kV - Section 1D & 2D	P2	Bus-Tie Breaker	NA	83	102	NA	55	NA	54	73	84	60	NA	102	Project: Monta Vista 230 kV Bus Upgrade In-service date: 8/20 Short term: Action plan	
Monta Vista 230/60 kV Trans No. 5	Monta Vista 115kV Baah Bus #1 (Failure Of Non-Redundent Relay)	P5	Non-Redundant Relay	113	NA	NA	60	NA	NA	96	NA	NA	NA	88	0	Protection upgrade	
Monta Vista-Hicks 230 kV Line	Metcalf 230kV - Section 1D & 1E	P2	Bus-Tie Breaker	86	92	103	43	39	91	69	87	92	57	65	103	Continue to monitor future load forecast	
Monta Vista-Wolfe 115 kV Line	Stelling-Monta Vista 115kV [1000]	P1	N-1	100	104	104	48	41	74	68	76	107	37	71	103	Continue to monitor future load forecast	
	Mnta Vsa 115kV - Middle Breaker Bay 4	P2	Bus-Tie Breaker	100	104	104	48	41	74	68	76	107	37	71	103	Continue to monitor future load forecast	
Moraga-Oakland X #3 115kV Line	Moraga 115KV - Section 2D & 1D	P2	Bus-Tie Breaker	91	NA	NA	22	NA	106	NA	NA	NA	NA	29	NA	Project: Oakland Clean Energy Initiative In-service date: 8/22 Short term: Generation	
Moraga-Oakland X #4 115kV Line	Moraga 115KV - Section 2D & 1D	P2	Bus-Tie Breaker	91	NA	NA	22	NA	106	NA	NA	NA	NA	29	NA	Project: Oakland Clean Energy Initiative In-service date: 8/22 Short term: Generation	
Moraga-San Leandro #1 115kV Line	Moraga 115kV - Section 2E & 2D	P2	Bus-Tie Breaker	115	81	93	56	38	106	85	71	92	41	75	93	Project: East Shore - Oakland J 115 kV Reconductoring Project In-service date: 4/21 Short term: Action plan	
	Moraga 115kV Section 2E	P2	Bus	116	80	92	56	37	107	85	70	91	40	75	92	Project: East Shore - Oakland J 115 kV Reconductoring Project In-service date: 4/21 Short term: Action plan	
	Moraga-San Leandro #2 115kV [2780] & Moraga-San Leandro #3 115kV [2790]	P6	N-1-1	134	102	100	<100	<100	122	<100	<100	103	<100	<100	<100	Project: East Shore - Oakland J 115 kV Reconductoring Project In-service date: 4/21 Short term: Action plan	
	Moraga-Oakland J 115 kV And Moraga-San Leandro No. 3 115 kV Lines	P7	DCTL	121	86	99	58	38	111	88	75	97	42	78	99	Project: East Shore - Oakland J 115 kV Reconductoring Project In-service date: 4/21 Short term: Action plan	
Moraga 115kV - Section 1E & 1D	Moraga 115kV - Section 1E & 1D	P2	Bus-Tie Breaker	135	105	120	62	43	123	99	90	118	47	87	119	Project: East Shore - Oakland J 115 kV Reconductoring Project Load increase in later years under review	
	Moraga 115kV Section 1E	P2	Bus	134	106	121	63	46	122	99	92	119	49	87	121	Project: East Shore - Oakland J 115 kV Reconductoring Project Load increase in later years under review	

Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading % (Baseline Scenarios)									Loading % (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Peak	2020 Winter Peak	2023 Winter Peak	2028 Winter Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations		
Moraga-San Leandro #2 115kV Line	Sn Lndro 115kV Section 1E	P2	Bus	129	103	118	58	43	118	94	89	116	46	82	118	Project: East Shore - Oakland J 115 kV Reconductoring Project Load increase in later years under review	
	Moraga-San Leandro #1 115kV [2780] & Moraga-San Leandro #3 115kV [2790]	P6	N-1-1	134	103	100	<100	<100	122	<100	<100	104	<100	<100	<100	Project: East Shore - Oakland J 115 kV Reconductoring Project Load increase in later years under review	
	Moraga-Oakland J 115 kV And Moraga-San Leandro No. 3 115 kV Lines	P7	DCTL	122	87	100	58	39	112	89	76	98	42	79	100	Project: East Shore - Oakland J 115 kV Reconductoring Project Load increase in later years under review	
Moraga-San Leandro #3 115kV Line	Moraga-San Leandro #1 115kV [2770] & Moraga-San Leandro #2 115kV [2780]	P6	N-1-1	108	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	Project: East Shore - Oakland J 115 kV Reconductoring Project In-service date: 4/21 Short term: Action plan	
	Moraga-San Leandro Nos. 1 & 2 115 kV Lines	P7	DCTL	108	86	99	51	37	99	80	76	97	40	70	98	Project: East Shore - Oakland J 115 kV Reconductoring Project In-service date: 4/21 Short term: Action plan	
Mountain View-Monta Vista 115 kV Line	Ravenswd 230/115kV Tb 2 & Whisman-Mtn View 115kV [4150]	P6	N-1-1	<100	<100	104	<100	<100	<100	<100	<100	102	<100	<100	105	Continue to monitor future load forecast	
Newark-Dixon Landing 115kV Line	Piercy-Metcalf 115kV [4318]	P1	N-1	114	80	88	42	22	88	90	69	82	19	80	88	Project: Metcalf - Piercy & Swift and Newark - Dixon Landing 115 kV Upgrade In-service date: 4/22 Short term: Action plan	
	Mtcal E - 2E 115kV & Stone-Evergreen-Metcalf Line	P2	Non-Bus-Tie Breaker	114	80	88	42	22	88	90	69	82	19	80	88	Project: Metcalf - Piercy & Swift and Newark - Dixon Landing 115 kV Upgrade In-service date: 4/22 Short term: Action plan	
	Mtcal E 115kV - Section 1E & 2E	P2	Bus-Tie Breaker	115	80	90	42	22	88	91	70	83	19	80	90	Project: Metcalf - Piercy & Swift and Newark - Dixon Landing 115 kV Upgrade In-service date: 4/22 Short term: Action plan	
	Mtcal E 115kV Section 2E	P2	Bus	114	80	88	42	22	88	90	69	82	19	80	88	Project: Metcalf - Piercy & Swift and Newark - Dixon Landing 115 kV Upgrade In-service date: 4/22 Short term: Action plan	
	Swift - Metcalf & Piercy - Metcalf 115 kV Lines	P7	DCTL	114	80	89	42	22	88	90	70	82	19	80	89	Project: Metcalf - Piercy & Swift and Newark - Dixon Landing 115 kV Upgrade In-service date: 4/22 Short term: Action plan	
NRS 400 115 kV Bus	NRS 400 115 kV Bus Tie Breaker To NRS 300 115 kV Bus	P2	Bus-Tie Breaker	111	149	205	47	56	78	107	136	161	54	119	204	Continue to monitor future load forecast	
	NRS 400 115 kV Bus	P2	Bus	64	97	128	32	39	43	64	80	104	37	78	125	Continue to monitor future load forecast	

Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading % (Baseline Scenarios)									Loading % (Sensitivity Scenarios)			Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Peak	2020 Winter Peak	2023 Winter Peak	2028 Winter Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations	
Newark-Kifer 115kV Line	Dvragt1 13.80kV & Dvrbgt2 13.80kV & Dvrast3 13.80kV Gen Units & SSS-NRS 230 kV	P3	G1/N1	<100	<100	106	<100	<100	<100	<100	<100	<100	<100	<100	102	Continue to monitor future load forecast
	SSS-NRS 230 kV & Los Esteros-Nortech 115kV [4032]	P6	N-1-1	<100	<100	126	<100	<100	<100	<100	<100	102	<100	<100	126	Continue to monitor future load forecast
	Los Esteros 230 kV Baah Bus #1 (Failure Of Non-Redundent Relay)	P5	Non-Redundant Relay	62	103	130	34	40	42	58	73	108	39	82	128	Protection upgrade
	Los Esteros 230 kV Baah Bus #2 (Failure Of Non-Redundent Relay)	P5	Non-Redundant Relay	58	103	132	33	37	37	54	69	107	36	80	129	Protection upgrade
	Newark-Northern Nos. 1 & 2 115 kV Lines	P7	DCTL	36	74	104	14	19	16	40	55	80	16	56	107	Continue to monitor future load forecast
	Northern - Scott #1 And #2 115 kV Lines	P7	DCTL	68	93	124	24	30	44	65	79	101	29	75	127	Continue to monitor future load forecast
	Newark - Los Esteros & Los Esteros - Metcalf 230 kV Lines	P7	DCTL	58	103	132	33	37	37	54	69	107	36	80	129	Continue to monitor future load forecast
Newark-Northern Receiving Station #1 115kV Line	Newark-Northern Nos. 1 & 2 115 kV Lines	P7	DCTL	38	76	107	15	20	18	41	57	82	18	58	104	Continue to monitor future load forecast
	Newark E-F Bus Tie 230kV [4640]	P1	N-1	53	93	106	26	31	25	51	63	101	33	70	106	Continue to monitor future load forecast
	SSS-NRS 230 kV	P1	N-1	56	85	100	31	37	35	55	68	92	37	66	100	Continue to monitor future load forecast
	Newark E 230kV - Section 1E & 2E	P2	Bus-Tie Breaker	53	95	110	26	33	24	51	64	102	35	69	109	Continue to monitor future load forecast
	Newark E 230kV Section 1E	P2	Bus	48	88	101	23	31	20	48	59	95	33	64	100	Continue to monitor future load forecast
	Newark F 115kV - Section 1F & 2F	P2	Bus-Tie Breaker	46	90	119	16	23	19	50	64	98	21	66	119	Continue to monitor future load forecast
	Newark F 115kV Section 2Z	P2	Bus	58	92	111	22	27	29	57	69	101	27	68	111	Continue to monitor future load forecast
	Dvragt1 13.80kV & Dvrbgt2 13.80kV & Dvrast3 13.80kV Gen Units & SSS-NRS 230 kV	P3	G1/N1	<100	<100	109	<100	<100	<100	<100	<100	<100	<100	<100	108	Continue to monitor future load forecast
	SSS-NRS 230 kV & Los Esteros-Nortech 115kV [4032]	P6	N-1-1	<100	116	147	<100	<100	<100	<100	<100	121	<100	101	<100	Continue to monitor future load forecast
	Los Esteros 230 kV Baah Bus #1 (Failure Of Non-Redundent Relay)	P5	Non-Redundant Relay	83	135	156	50	56	55	76	94	142	56	105	156	Protection upgrade
Los Esteros 230 kV Baah Bus #2 (Failure Of Non-Redundent Relay)	P5	Non-Redundant Relay	76	132	157	46	51	46	70	86	139	51	101	156	Protection upgrade	
Palo Alto Sw. Sta. 115kV DBDB Bus #1 (Failure Of Non-Redundent Relay)	P5	Non-Redundant Relay	64	83	105	17	23	39	59	78	92	23	59	106	Protection upgrade	
Newark - Los Esteros & Los Esteros - Metcalf 230 kV Lines	P7	DCTL	76	132	157	46	51	46	70	86	139	51	101	156	Continue to monitor future load forecast	
Newark-Northern Receiving Station #2 115kV Line	NRS 400 115 kV Bus Tie Breaker To NRS 300 115 kV Bus	P2	Bus-Tie Breaker	81	124	171	41	55	63	81	119	133	52	90	172	Continue to monitor future load forecast
	NRS 300 115 kV Bus	P2	Bus	48	74	101	23	31	36	49	72	80	29	56	101	Continue to monitor future load forecast
	NRS 400 115 kV Bus	P2	Bus	52	91	120	31	38	33	53	70	97	37	73	120	Continue to monitor future load forecast
	Dvragt1 13.80kV & Dvrbgt2 13.80kV & Dvrast3 13.80kV Gen Units & SSS-NRS 230 kV	P3	G1/N1	<100	<100	105	<100	<100	<100	<100	<100	<100	<100	<100	103	Continue to monitor future load forecast
	SSS-NRS 230 kV & Los Esteros-Nortech 115kV [4032]	P6	N-1-1	<100	111	145	<100	<100	<100	<100	103	119	<100	<100	145	Continue to monitor future load forecast

Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading % (Baseline Scenarios)									Loading % (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Peak	2020 Winter Peak	2023 Winter Peak	2028 Winter Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations		
	Los Esteros 230 kV Baah Bus #1 (Failure Of Non-Redundant Relay)	P5	Non-Redundant Relay	66	118	147	40	47	45	61	79	121	45	94	146	Protection upgrade	
	Los Esteros 230 kV Baah Bus #2 (Failure Of Non-Redundant Relay)	P5	Non-Redundant Relay	58	115	147	38	43	37	54	71	119	42	89	147	Protection upgrade	
	Newark - Los Esteros & Los Esteros - Metcalf 230 kV Lines	P7	DCTL	58	115	147	38	43	37	54	71	119	42	89	147	Continue to monitor future load forecast	
Newark-Trimble 115kV Line	Los Esteros 230 kV Baah Bus #2 (Failure Of Non-Redundant Relay)	P5	Non-Redundant Relay	49	95	108	42	42	30	41	46	96	42	77	107	Protection upgrade	
	Newark - Los Esteros & Los Esteros - Metcalf 230 kV Lines	P7	DCTL	49	95	108	42	42	30	41	46	96	42	77	107	Continue to monitor future load forecast	
Nortech-NRS 115 kV Line	NRS 400 115 kV Bus	P2	Bus	79	82	107	29	35	67	75	96	90	34	63	107	Continue to monitor future load forecast	
	Dvragt1 13.80kV & Dvrbgt2 13.80kV & Dvrast3 13.80kV Gen Units & SSS-NRS 230 kV	P3	G1/N1	<100	<100	114	<100	<100	<100	<100	<100	<100	<100	<100	115	Continue to monitor future load forecast	
	Newark-Northern Receiving Station #1 115kV [3100] & SSS-NRS 230 kV	P6	N-1-1	<100	<100	127	<100	<100	<100	<100	<100	<100	<100	<100	127	Continue to monitor future load forecast	
North Dublin-Cayetano 230kV Cable	C.Costa 230kV - Section 2F & 1F	P2	Bus-Tie Breaker	85	98	92	17	18	39	81	73	102	36	51	92	Continue to monitor future load forecast	
	Moraga 230kV - Section 2D & 1D	P2	Bus-Tie Breaker	89	104	104	21	25	58	78	81	101	40	57	103	Continue to monitor future load forecast	
	Newark D 230kV Section 1D	P2	Bus	85	96	102	27	27	62	75	79	96	36	63	102	Continue to monitor future load forecast	
	Newark D Section 1D & Newark E Section 1E 230kV	P2	Bus-Tie Breaker	89	101	107	29	29	64	79	83	102	38	68	107	Continue to monitor future load forecast	
	Contra Costa-Moraga Nos. 1 & 2 230 kV Lines	P7	DCTL	86	100	99	20	23	54	76	79	98	38	53	99	Continue to monitor future load forecast	
NRS 230/115kV TB 1	FMC-San Jose B 115kV [2021] & Los Esteros-Nortech 115kV [4032]	P6	N-1-1	<100	<100	101	<100	<100	<100	<100	<100	<100	<100	<100	101	Continue to monitor future load forecast	
NRS-Scott No. 1 115 kV Line	NRS-SRS#2 115 kV	P1	N-1	78	87	105	32	35	59	73	84	94	35	70	105	Continue to monitor future load forecast	
	NRS 300 115 kV Bus	P2	Bus	81	96	111	45	49	63	75	90	102	50	76	111	Continue to monitor future load forecast	
	Dvragt1 13.80kV & Dvrbgt2 13.80kV & Dvrast3 13.80kV Gen Units & NRS-SRS#2 115 kV	P3	G1/N1	<100	106	130	<100	<100	<100	<100	<100	111	<100	<100	131	Continue to monitor future load forecast	
	FMC-San Jose B 115kV [2021] & NRS-SRS#2 115 kV	P6	N-1-1	<100	108	<100	<100	<100	<100	<100	<100	114	<100	<100	<100	Continue to monitor future load forecast	
NRS-Scott No. 2 115 kV Line	NRS-SRS#1 115 kV	P1	N-1	78	87	105	32	35	59	72	84	94	35	70	105	Continue to monitor future load forecast	
	Dvragt1 13.80kV & Dvrbgt2 13.80kV & Dvrast3 13.80kV Gen Units & NRS-SRS#1 115 kV	P3	G1/N1	<100	106	130	<100	<100	<100	<100	<100	111	<100	<100	131	Continue to monitor future load forecast	
	FMC-San Jose B 115kV [2021] & NRS-SRS#1 115 kV	P6	N-1-1	<100	108	<100	<100	<100	<100	<100	<100	114	<100	<100	<100	Continue to monitor future load forecast	
Oakland C - Oakland I #1 115kV Cable	Clarmnt 115kV - Section 2D & 1D	P2	Bus-Tie Breaker	87	89	94	38	29	94	63	102	92	24	41	94	Project: Oakland Clean Energy Initiative In-service date: 8/22 Short term: Generation	

Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading % (Baseline Scenarios)									Loading % (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Peak	2020 Winter Peak	2023 Winter Peak	2028 Winter Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations		
Oakland C - Oakland L #1 115kV Cable	Moraga-Claremont Nos. 1 & 2 115 kV Lines	P7	DCTL	87	89	94	38	29	94	63	102	92	24	41	94	Project: Oakland Clean Energy Initiative In-service date: 8/22 Short term: Generation	
Oakland C - Oakland X #2 115kV Cable	C-X #3 & D-L 115KV [9925]	P6	N-1-1	<100	<100	<100	<100	<100	104	<100	101	<100	<100	<100	<100	Project: Oakland Clean Energy Initiative In-service date: 8/22 Short term: Generation	
Oakland D - Oakland L 115kV Cable	Station X 115KV - Section 2D & 1D	P2	Bus-Tie Breaker	96	NA	NA	37	NA	104	NA	NA	NA	NA	54	NA	Project: Oakland Clean Energy Initiative In-service date: 8/22 Short term: Generation	
Oleum - North Tower-Christie 115 kV ( North tower sub to North Tower Jt2)	Martinez-Sobrante 115kV [2270] (Martnz D-Alhampt1)	P2	Line Section w/o Fault	75	107	110	30	30	61	44	81	110	26	51	111	Continue to monitor future load forecast	
	Martnz D - 1D 115kV & Oleum-Martinez Line	P2	Non-Bus-Tie Breaker	76	107	110	30	30	62	44	81	110	26	51	111	Continue to monitor future load forecast	
	Martnz D 115kV Section 1D	P2	Bus	76	107	110	30	30	62	44	81	110	26	51	111	Continue to monitor future load forecast	
	Martnz E - 1E 115kV & Pittsburg-Martinez #2 Line	P2	Non-Bus-Tie Breaker	76	98	99	30	26	61	44	70	103	19	51	101	Continue to monitor future load forecast	
	Martnz E Section 1E & Martnz D Section 1D 115kV	P2	Bus-Tie Breaker	76	107	110	30	30	62	44	81	110	26	51	111	Continue to monitor future load forecast	
	Pitsbg D 230kV - Section 2D & 1D	P2	Bus-Tie Breaker	76	91	133	30	8	61	44	36	88	62	51	107	Continue to monitor future load forecast	
	Pittsburg 115kV - Section 2E & 1E	P2	Bus-Tie Breaker	76	119	121	30	31	61	44	83	125	21	51	126	Continue to monitor future load forecast	
	LMEC & DEC	P3	G1/N1	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	101	Continue to monitor future load forecast
	Pittsburg-Martinez #1 115kV [3320] & Pittsburg-Martinez #2 115kV [3330]	P6	N-1-1	<100	<100	<100	<100	<100	<100	<100	<100	103	<100	<100	102	Continue to monitor future load forecast	
	Christie-Sobrante 115 kV And Martinez-Sobrante 115 kV Lines	P7	DCTL	76	77	110	30	27	62	44	81	79	25	51	111	Continue to monitor future load forecast	
Pittsburg-Martinez Nos. 1 & 2 115 kV Lines	P7	DCTL	76	98	100	30	26	61	44	71	103	17	51	102	Continue to monitor future load forecast		
Oleum-Christie 115kV Line	Christie-Sobrante 115kV [1260]	P1	N-1	126	55	57	63	33	109	80	53	57	30	89	78	Project: North Tower 115 kV Looping Project In-service date: 12/21 Short term: Action Plan	
	Sobrante - 1D 115kV & Sobrante-G #1 Line	P2	Non-Bus-Tie Breaker	126	55	57	63	32	109	80	53	57	30	89	78	Project: North Tower 115 kV Looping Project In-service date: 12/21 Short term: Action Plan	
	Sobrante - 1D 115kV & Sobrante-Grizzly-Claremont #1 Line	P2	Non-Bus-Tie Breaker	126	55	57	63	32	109	80	53	57	30	89	78	Project: North Tower 115 kV Looping Project In-service date: 12/21 Short term: Action Plan	
	Sobrante - 1D 115kV & Sobrante-R #1 Line	P2	Non-Bus-Tie Breaker	126	55	57	63	32	109	80	53	57	30	89	78	Project: North Tower 115 kV Looping Project In-service date: 12/21 Short term: Action Plan	
	Sobrante 115kV - Section 1D & 1E	P2	Bus-Tie Breaker	126	55	57	63	32	109	80	54	57	30	89	79	Project: North Tower 115 kV Looping Project In-service date: 12/21 Short term: Action Plan	



Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading % (Baseline Scenarios)									Loading % (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Peak	2020 Winter Peak	2023 Winter Peak	2028 Winter Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations		
Oleum-Christie 115kV Line	Sobrante 115kV - Section 1D & 2D	P2	Bus-Tie Breaker	129	56	59	62	32	114	81	56	58	29	89	90	Project: North Tower 115 kV Looping Project In-service date: 12/21 Short term: Action Plan	
	Sobrante 115kV Section 1D	P2	Bus	126	55	57	63	32	109	80	53	57	30	89	78	Project: North Tower 115 kV Looping Project In-service date: 12/21 Short term: Action Plan	
	Union Ch 9.11kV Gen Unit 1 & Christie-Sobrante 115kV [1260]	P3	G1/N1	141	<100	<100	<100	<100	123	<100	<100	<100	<100	103	<100	Project: North Tower 115 kV Looping Project In-service date: 12/21 Short term: Action Plan	
	Sobrante-G #1 115kV [3720] & Sobrante-G #2 115kV [3730]	P6	N-1-1	<100	<100	100	<100	<100	<100	<100	<100	<100	<100	<100	<100	Rerate, reconductor or preferred resource	
	Christie-Sobrante 115 kV And Martinez-Sobrante 115 kV Lines	P7	DCTL	126	55	57	63	33	109	80	53	57	30	89	77	Project: North Tower 115 kV Looping Project In-service date: 12/21 Short term: Action Plan	
	Sobrante-G Nos. 1 & 2 115 kV Lines	P7	DCTL	55	94	103	15	41	34	44	74	94	45	30	92	Rerate, reconductor or preferred resource	
Oleum-Martinez 115kV Line	Pitsbg D 230kV - Section 2D & 1D	P2	Bus-Tie Breaker	19	25	62	112	31	49	15	22	21	35	42	45	Project: North Tower 115 kV Looping Project In-service date: 12/21 Short term: Action Plan	
	Pitsbg D 230kV Section 1D	P2	Bus	63	45	23	125	40	53	50	61	45	76	78	42	Project: North Tower 115 kV Looping Project In-service date: 12/21 Short term: Action Plan	
	Pitsbg D 230kV Section 2D	P2	Bus	111	95	77	181	22	95	83	106	91	27	121	93	Project: North Tower 115 kV Looping Project In-service date: 12/21 Short term: Action Plan	
	Pitsbg D Section 1D & Pitsbg E Section 1E 230kV	P2	Bus-Tie Breaker	60	42	21	122	41	52	49	60	39	78	73	41	Project: North Tower 115 kV Looping Project In-service date: 12/21 Short term: Action Plan	
	Sobrante 115kV - Section 1D & 2D	P2	Bus-Tie Breaker	270	208	220	137	94	239	172	199	216	83	167	267	Sobrante bus upgrade	
	Sobrante-G #1 115kV [3720] & Sobrante-G #2 115kV [3730]	P6	N-1-1	114	<100	<100	100	<100	106	<100	<100	<100	<100	<100	<100	Project: North Tower 115 kV Looping Project In-service date: 12/21 Short term: Action Plan	
	Sobrante-G Nos. 1 & 2 115 kV Lines	P7	DCTL	112	82	81	80	42	106	67	81	88	32	71	96	Project: North Tower 115 kV Looping Project In-service date: 12/21 Short term: Action Plan	
Newark-Dixon Landing 115kV [2990]	Newark-Dixon Landing 115kV [2990]	P1	N-1	105	78	87	38	21	84	87	69	81	18	72	87	Project: Metcalf - Piercy & Swift and Newark - Dixon Landing 115 kV Upgrade In-service date: 4/22 Short term: Action plan	
	Newark F - 2F 115kV & Newark F-Lockhd 2-App Mat Line	P2	Non-Bus-Tie Breaker	105	78	87	38	21	84	87	69	81	18	72	87	Project: Metcalf - Piercy & Swift and Newark - Dixon Landing 115 kV Upgrade In-service date: 4/22 Short term: Action plan	

Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading % (Baseline Scenarios)									Loading % (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Peak	2020 Winter Peak	2023 Winter Peak	2028 Winter Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations		
Piercy-Metcalf 115 kV Line	Newark F - 2F 115kV & Newark-Nummi Line	P2	Non-Bus-Tie Breaker	105	78	87	38	21	84	87	69	81	18	72	87	Project: Metcalf - Piercy & Swift and Newark - Dixon Landing 115 kV Upgrade In-service date: 4/22 Short term: Action plan	
	Newark F - 2F 115kV & Newark-Trimble Line	P2	Non-Bus-Tie Breaker	105	78	87	38	21	84	87	69	81	18	72	87	Project: Metcalf - Piercy & Swift and Newark - Dixon Landing 115 kV Upgrade In-service date: 4/22 Short term: Action plan	
	Newark F 115kV - Section 1F & 2F	P2	Bus-Tie Breaker	105	78	88	38	21	84	87	69	81	17	72	88	Project: Metcalf - Piercy & Swift and Newark - Dixon Landing 115 kV Upgrade In-service date: 4/22 Short term: Action plan	
	Newark F 115kV Section 2F	P2	Bus	105	78	87	38	21	84	87	69	81	18	72	87	Project: Metcalf - Piercy & Swift and Newark - Dixon Landing 115 kV Upgrade In-service date: 4/22 Short term: Action plan	
	Newark - Dixon Landing & Newark - Milpitas #1 115 kV Lines	P7	DCTL	105	78	87	38	21	84	87	69	81	18	72	87	Project: Metcalf - Piercy & Swift and Newark - Dixon Landing 115 kV Upgrade In-service date: 4/22 Short term: Action plan	
	Newark-Dixon Landing 115 kV And Newark-Milpitas No. 1 115 kV Lines	P7	DCTL	105	78	87	38	21	84	87	69	81	18	72	87	Project: Metcalf - Piercy & Swift and Newark - Dixon Landing 115 kV Upgrade In-service date: 4/22 Short term: Action plan	
Pittsburg 230/115kV Transformer #13	Lmcc2 18.00kV & Lmcc1 18.00kV & Lmcc1 18.00kV Gen Units & Pitsbg D 230/115kV Tb 12	P3	G1/N1	109	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	Project: Pittsburg 230/115 kV Transformer Capacity Increase In-service date: 5/22 Short term: Action plan	
Potrero-Larkin #1 (AY-1) 115kV Cable	H-Y #1 115kV [9956] & X-Y #1 115kV [9960]	P6	N-1-1	123	129	136	<100	<100	123	<100	131	128	<100	<100	134	Larkin bus upgrade (PG&E maintenance project)	
Potrero-Larkin #2 (AY-2) 115kV Cable	A-Y #1 (Underground Idle) 115kV [9952] & A-X #1 115kV [9951]	P6	N-1-1	<100	<100	101	<100	<100	<100	<100	<100	<100	<100	<100	101	Project: TBC runback scheme modification and SF 115 kV cable upgrade Short term: Action plan	
Potrero-Mission (AX) 115kV Cable	P-X #2 (Underground) 115kV [9959] & P-X #1 115kV [9958]	P6	N-1-1	<100	<100	102	<100	<100	103	<100	109	<100	<100	<100	101	Project: TBC runback scheme modification and SF 115 kV cable upgrade Short term: Action plan	
Ravenswood 230/115kV Transformer #1	Ravenswd 230/115kV Tb 2	P1	N-1	94	97	99	55	53	93	80	101	102	54	72	99	Upgrade limiting equipment	
	Ravenswd 230kV - Middle Breaker Bay 2	P2	Bus-Tie Breaker	99	103	107	57	55	101	81	108	107	55	76	107	Upgrade limiting equipment	
	Mec Ctg1 18.00kV & Mec Ctg2 18.00kV & Mec Stg1 18.00kV Gen Units & Ravenswd 230/115kV Tb 2	P3	G1/N1	<100	<100	<100	<100	<100	<100	<100	<100	103	<100	<100	<100	Upgrade limiting equipment	

Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading % (Baseline Scenarios)									Loading % (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Peak	2020 Winter Peak	2023 Winter Peak	2028 Winter Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations		
	30040 Tesla 500 30042 Metcalf 500 1 1 & Ravenswd 230/115kV Tb 2	P6	N-1-1	103	107	109	<100	<100	<100	<100	111	109	<100	<100	109	Upgrade limiting equipment	
Ravenswood-Ames #1 115 kV Line	Newark-Ravenswood 230 kV And Tesla-Ravenswood 230 kV Lines	P7	DCTL	76	79	103	40	42	95	37	84	76	45	49	103	Continue to monitor future load forecast	
Ravenswood-Ames #2 115kV Line	Newark-Ravenswood 230 kV And Tesla-Ravenswood 230 kV Lines	P7	DCTL	76	79	103	40	42	95	37	84	76	45	49	103	Continue to monitor future load forecast	
Ravenswood-Bair #1 115kV Line	San Mateo-Belmont 115kV [3570] & Bair-Rvnswd D-Lonestar 115kV [0]	P6	N-1-1	<100	<100	<100	<100	<100	<100	<100	102	<100	<100	<100	<100	Continue to monitor future load forecast	
Ravenswood-Cooley Landing #1 115kV Line	Rvnswd E 115kV Section 1X	P2	Bus	108	87	90	60	44	67	99	79	96	45	97	90	Project: Ravenswood - Cooley Landing 115 kV Line Reconductor In-service date: 12/20 Short term: Action plan	
Ravenswood-Cooley Landing #2 115kV Line	Rvnswd D 115kV Section 1Y	P2	Bus	107	81	88	54	36	83	69	84	83	30	66	88	Project: Ravenswood - Cooley Landing 115 kV Line Reconductor In-service date: 12/20 Short term: Action plan	
San Jose 'B'-Stone-Evergreen 115 kV Line	Metcalf - El Patio No. 1 & 2 115 kV Lines	P7	DCTL	58	86	106	38	46	46	42	57	85	48	57	105	Continue to monitor future load forecast	
	Metcalf - El Patio No. 1 & 2 115 kV Lines	P7	DCTL	61	90	109	42	50	49	46	60	88	51	61	109	Continue to monitor future load forecast	
San Jose Sta 'A'-B' 115 kV Line	NRS 400 115 kV Bus Tie Breaker To NRS 300 115 kV Bus	P2	Bus-Tie Breaker	57	87	110	37	47	46	47	64	88	48	60	110	Continue to monitor future load forecast	
	Mtcalf E - 1E 115kV & Metcalf-Coyote Pumping Plant Line	P2	Non-Bus-Tie Breaker	51	83	103	33	43	40	41	57	82	45	49	102	Continue to monitor future load forecast	
	Mtcalf E 115kV - Section 1E & 2E	P2	Bus-Tie Breaker	85	124	153	47	57	69	67	89	123	58	75	153	Continue to monitor future load forecast	
	Mtcalf E 115kV Section 1E	P2	Bus	51	83	103	33	43	40	41	57	82	45	49	102	Continue to monitor future load forecast	
	Mtcalf E 115kV Section 2E	P2	Bus	51	84	104	33	43	41	42	57	82	45	49	103	Continue to monitor future load forecast	
	Newark E-F Bus Tie 230kV [4640] & Los Esteros-Metcalf 230kV [5353]	P6	N-1-1	<100	<100	105	<100	<100	<100	<100	<100	<100	<100	<100	<100	106	Continue to monitor future load forecast
	Los Esteros 115kV Baah Bus #2 (Failure Of Non-Redundant Relay)	P5	Non-Redundant Relay	63	81	100	30	39	51	49	66	82	40	53	100	Protection upgrade	
	Los Esteros 230 kV Baah Bus #1 (Failure Of Non-Redundant Relay)	P5	Non-Redundant Relay	58	99	121	40	50	47	45	63	98	50	68	121	Protection upgrade	
	Los Esteros 230 kV Baah Bus #2 (Failure Of Non-Redundant Relay)	P5	Non-Redundant Relay	63	106	130	47	56	52	49	68	104	59	73	130	Protection upgrade	
	Palo Alto Sw. Sta. 115kV DBDB Bus #1 (Failure Of Non-Redundant Relay)	P5	Non-Redundant Relay	62	81	102	30	39	51	49	67	82	40	52	102	Protection upgrade	
	Metcalf - Evergreen #1 And #2 115 kV Lines	P7	DCTL	66	100	122	42	52	55	52	70	99	54	66	122	Continue to monitor future load forecast	
	Newark - Los Esteros & Los Esteros - Metcalf 230 kV Lines	P7	DCTL	63	106	130	47	56	52	49	68	104	59	73	130	Continue to monitor future load forecast	
Tesla - Newark No.2 And Metcalf - Los Esteros 230 kV Lines	P7	DCTL	50	80	101	36	46	46	38	55	77	48	53	102	Continue to monitor future load forecast		
Cly Lndg 60kV - Section 1D & 2D	P2	Bus-Tie Breaker	96	102	105	56	52	83	72	96	107	47	64	105	Non-BES facility		

Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading % (Baseline Scenarios)									Loading % (Sensitivity Scenarios)			Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Peak	2020 Winter Peak	2023 Winter Peak	2028 Winter Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations	
San Mateo-Bair 60kV Line	Cly Lndg 60kV Section 1D	P2	Bus	98	103	107	57	52	84	73	98	108	48	65	107	Non-BES facility
	Cly Lnd 115/60kV Tb 1 & Cly Lnd2 115/60kV Tb 2	P6	N-1-1	130	136	146	<100	<100	119	<100	140	141	<100	<100	147	Non-BES facility
San Mateo-Belmont 115kV Line	Ravenswd 230/115kV Tb 1 & Ravenswd 230/115kV Tb 2	P6	N-1-1	<100	100	104	<100	<100	<100	<100	<100	109	<100	<100	104	Continue to monitor future load forecast
	Ravenswood 230 kV Baah Bus #2 (Failure Of Non-Redundant Relay)	P5	Non-Redundant Relay	92	95	92	52	45	72	83	84	103	49	76	92	Protection upgrade
	Ravenswood-Bair Nos. 1 & 2 115 kV Lines	P7	DCTL	93	97	97	50	44	84	67	92	102	44	62	96	Sensitivity only
San Mateo-Hillsdale JCT 60kV Line	Jeffersn 230/60kV Tb 1 & Jeffersn 230/60kV Tb 2	P6	N-1-1	163	163	169	<100	<100	195	143	211	162	<100	104	169	Non-BES facility
	Jefferson 230 kV Baah Bus #1 (Failure Of Non-Redundant Relay)	P5	Non-Redundant Relay	168	163	169	97	77	201	148	209	162	65	109	169	Protection upgrade
	Jefferson 230 kV Baah Bus #2 (Failure Of Non-Redundant Relay)	P5	Non-Redundant Relay	170	162	175	98	77	202	148	216	162	67	109	174	Protection upgrade
	Monta Vista-Jefferson Nos. 1 & 2 230 kV Lines	P7	DCTL	171	162	175	99	79	202	150	216	162	67	109	174	Project: Jefferson - Stanford #2 60 kV Line In-service date: TBD Short term: Operating solution
San Mateo-Hillsdale JCT 60kV Line (Beresford-Hillsdale)	Jeffersn 230/60kV Tb 1 & Jeffersn 230/60kV Tb 2	P6	N-1-1	184	184	190	106	<100	222	162	239	182	<100	118	190	Non-BES facility
	Jefferson 230 kV Baah Bus #1 (Failure Of Non-Redundant Relay)	P5	Non-Redundant Relay	190	184	190	111	89	228	168	237	182	76	124	190	Protection upgrade
	Jefferson 230 kV Baah Bus #2 (Failure Of Non-Redundant Relay)	P5	Non-Redundant Relay	193	183	197	112	89	229	168	244	183	78	124	196	Protection upgrade
	Monta Vista-Jefferson Nos. 1 & 2 230 kV Lines	P7	DCTL	194	183	197	112	91	230	170	244	183	78	124	196	Project: Jefferson - Stanford #2 60 kV Line In-service date: TBD Short term: Operating solution
San Mateo-Hillsdale JCT 60kV Line (Hillsdale-Hillsdale JCT)	Jeffersn 230/60kV Tb 1 & Jeffersn 230/60kV Tb 2	P6	N-1-1	177	178	184	103	<100	214	156	229	176	<100	116	183	Non-BES facility
	Jefferson 230 kV Baah Bus #1 (Failure Of Non-Redundant Relay)	P5	Non-Redundant Relay	184	178	184	109	88	220	162	226	176	76	121	183	Protection upgrade
	Jefferson 230 kV Baah Bus #2 (Failure Of Non-Redundant Relay)	P5	Non-Redundant Relay	187	177	190	109	89	222	163	234	176	78	122	189	Protection upgrade
	Monta Vista-Jefferson Nos. 1 & 2 230 kV Lines	P7	DCTL	188	177	190	110	90	222	164	234	176	78	122	189	Project: Jefferson - Stanford #2 60 kV Line In-service date: TBD Short term: Operating solution
Scott-Duane 115 kV Line	NRS 400 115 kV Bus Tie Breaker To NRS 300 115 kV Bus	P2	Bus-Tie Breaker	67	95	126	39	50	59	70	97	100	48	71	126	Continue to monitor future load forecast
Sobrante-El Cerrito STA G #1 115kV Lin	Sobrante-G #2 115kV [3730] & Christie-Sobrante 115kV [1260]	P6	N-1-1	105	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	Project: North Tower 115 kV Looping Project In-service date: 12/21 Short term: Action Plan
	Sobrante - 1D 115kV & Sobrante-G #1 Line	P2	Non-Bus-Tie Breaker	106	101	108	42	46	84	71	86	101	47	67	111	Sobrante bus upgrade

Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading % (Baseline Scenarios)									Loading % (Sensitivity Scenarios)			Project & Potential Mitigation Solutions	
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Peak	2020 Winter Peak	2023 Winter Peak	2028 Winter Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations		
Sobrante-El Cerrito STA G #2 115kV Line	Sobrante - 1D 115kV & Sobrante-Grizzly-Claremont #1 Line	P2	Non-Bus-Tie Breaker	106	101	108	42	46	84	71	86	101	47	67	111	Sobrante bus upgrade	
	Sobrante - 1D 115kV & Sobrante-Nrth Twr Line	P2	Non-Bus-Tie Breaker	NA	101	108	NA	46	NA	58	86	101	47	NA	111	Sobrante bus upgrade	
	Sobrante - 1D 115kV & Sobrante-R #1 Line	P2	Non-Bus-Tie Breaker	106	101	108	42	46	84	71	86	101	47	67	111	Sobrante bus upgrade	
	Sobrante - 1D 115kV & Sobrante-Standard Oil Sw Sta #1 Line	P2	Non-Bus-Tie Breaker	106	101	108	42	46	84	71	86	101	47	67	111	Sobrante bus upgrade	
	Sobrante 115kV - Section 1D & 1E	P2	Bus-Tie Breaker	101	94	101	40	43	80	68	81	95	44	64	104	Sobrante bus upgrade	
	Sobrante 115kV Section 1D	P2	Bus	106	101	108	42	46	84	71	86	101	47	67	111	Sobrante bus upgrade	
	Sobrante-G #1 115kV [3720] & Christie-Sobrante 115kV [1260]	P6	N-1-1	105	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	Project: North Tower 115 kV Looping Project In-service date: 12/21 Short term: Action Plan
Sobrante-Moraga 115kV Line	Moraga 230kV - Section 2D & 1D	P2	Bus-Tie Breaker	124	89	107	45	38	71	59	51	73	34	74	106	Moraga bus upgrade	
	Sobrante - 1D 230kV & Ignacio-Sobrante Line	P2	Non-Bus-Tie Breaker	100	106	114	39	51	81	71	92	99	50	65	123	Sobrante bus upgrade	
	Sobrante 230kV - Section 2D & 1D	P2	Bus-Tie Breaker	103	109	118	41	55	80	74	93	101	55	69	126	Sobrante bus upgrade	
	Sobrante 230kV Section 1D	P2	Bus	100	106	114	39	51	81	71	92	99	50	65	123	Sobrante bus upgrade	
	Sobrante 230/115kV Tb 2 & Sobrante 230/115kV Tb 1	P6	N-1-1	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	104	Sensitivity only
Stone-Evergreen-Metcalf 115kV Line	Metcalf D Section 1D & Metcalf E Section 1E 115kV	P2	Bus-Tie Breaker	0	90	104	0	34	0	0	70	91	31	0	104	Continue to monitor future load forecast	
	El Patio-San Jose A 115kV [1520] & Metcalf-Evergreen #1 115kV [2520]	P6	N-1-1	<100	<100	106	<100	<100	<100	<100	<100	<100	<100	<100	<100	106	Continue to monitor future load forecast
Whisman-Monta Vista 115 kV Line	Ravenswd 230/115kV Tb 2 & Mtn View-Monta Vista 115kV [2920]	P6	N-1-1	<100	<100	101	<100	<100	<100	<100	<100	<100	<100	<100	<100	102	Continue to monitor future load forecast



Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)									Voltage PU (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Peak	2020 Winter Peak	2023 Winter Peak	2028 Winter Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations		
0162-Wd 230 kV	Base Case	P0	Base case	1.03	1.03	1.00	1.05	1.04	1.02	1.02	1.02	1.01	1.06	1.02	1.00	Load power factor correction and voltage support if needed	
0354-Wd 230 kV	Base Case	P0	Base case	1.02	1.02	1.00	1.05	1.05	1.02	1.03	1.02	1.02	1.06	1.02	1.00	Load power factor correction and voltage support if needed	
Highway 115 kV	Base Case	P0	Base case	1.01	1.02	0.97	1.07	1.07	0.99	1.03	0.97	1.01	1.09	1.03	0.96	Load power factor correction and voltage support if needed	
A100Us 115 kV	Base Case	P0	Base case	<1.05	1.04	1.05	<1.05	1.05	<1.05	<1.05	1.05	1.04	1.07	<1.05	1.05	Load power factor correction and voltage support if needed	
Aera_Eng 60 kV	Base Case	P0	Base case	1.05	1.05	1.04	1.05	1.06	1.05	1.05	1.04	1.04	1.06	1.05	1.04	Load power factor correction and voltage support if needed	
Aera_Mtr 60 kV	Base Case	P0	Base case	1.05	1.05	1.04	1.05	1.06	1.05	1.05	1.04	1.04	1.06	1.05	1.04	Load power factor correction and voltage support if needed	
Aera_Tp1 60 kV	Base Case	P0	Base case	1.05	1.05	1.04	1.05	1.06	1.05	1.05	1.04	1.04	1.06	1.05	1.04	Load power factor correction and voltage support if needed	
Aera_Tp2 60 kV	Base Case	P0	Base case	1.05	1.05	1.04	1.05	1.06	1.05	1.05	1.04	1.04	1.06	1.05	1.04	Load power factor correction and voltage support if needed	
Aera_Tp3 60 kV	Base Case	P0	Base case	1.05	1.05	1.04	1.05	1.06	1.05	1.05	1.04	1.04	1.06	1.05	1.04	Load power factor correction and voltage support if needed	
Agnew 115 kV	Base Case	P0	Base case	1.03	1.02	0.99	1.04	1.04	1.04	1.04	1.03	1.01	1.06	1.02	0.99	Load power factor correction and voltage support if needed	
Agrilink 60 kV	Base Case	P0	Base case	1.02	1.03	1.04	1.06	1.08	1.05	1.05	1.04	1.02	1.08	1.03	1.04	Load power factor correction and voltage support if needed	
Alhambra 115 kV	Base Case	P0	Base case	<1.05	1.05	1.02	<1.05	1.05	<1.05	<1.05	1.03	1.04	1.07	<1.05	1.01	Load power factor correction and voltage support if needed	
Almaden 60 kV	Base Case	P0	Base case	1.04	1.02	0.95	1.10	1.10	1.05	1.05	0.99	1.02	1.14	1.05	0.95	Load power factor correction and voltage support if needed	
Altamont 60 kV	Base Case	P0	Base case	1.04	1.03	1.04	1.08	1.08	1.06	1.04	1.06	1.03	1.10	1.03	1.03	Load power factor correction and voltage support if needed	
Alto 60 kV	Base Case	P0	Base case	1.01	1.02	0.98	1.06	1.06	1.01	1.04	0.98	1.02	1.08	1.04	0.98	Load power factor correction and voltage support if needed	
Ames Bs1 115 kV	Base Case	P0	Base case	1.03	1.02	1.01	1.05	1.05	1.03	1.05	1.03	1.02	1.07	1.04	1.02	Load power factor correction and voltage support if needed	
Ames Bs2 115 kV	Base Case	P0	Base case	1.03	1.02	1.01	1.05	1.05	1.03	1.05	1.03	1.02	1.07	1.04	1.02	Load power factor correction and voltage support if needed	
Ames Dst 115 kV	Base Case	P0	Base case	1.03	1.02	1.01	1.05	1.05	1.03	1.05	1.03	1.02	1.07	1.04	1.01	Load power factor correction and voltage support if needed	
App Mat 115 kV	Base Case	P0	Base case	1.03	1.02	1.00	1.05	1.04	1.02	1.04	1.02	1.01	1.05	1.04	1.01	Load power factor correction and voltage support if needed	
Ba Food1 60 kV	Base Case	P0	Base case	1.05	1.04	1.03	1.04	1.05	1.05	1.05	1.03	1.04	1.06	1.05	1.03	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		
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Peak	2020 Winter Peak	2023 Winter Peak	2028 Winter Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen		2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations
Ba Food2 60 kV	Base Case	P0	Base case	1.05	1.04	1.03	1.04	1.05	1.05	1.04	1.04	1.04	1.06	1.05	1.03	Load power factor correction and voltage support if needed
Baily J1 115 kV	Base Case	P0	Base case	1.06	1.05	1.03	1.09	1.10	1.06	1.07	1.05	1.05	1.14	1.07	1.03	Load power factor correction and voltage support if needed
Baily J2 115 kV	Base Case	P0	Base case	1.06	1.05	1.03	1.09	1.10	1.06	1.07	1.05	1.05	1.14	1.07	1.03	Load power factor correction and voltage support if needed
Baily J3 115 kV	Base Case	P0	Base case	1.06	1.05	1.03	1.09	1.10	1.06	1.06	1.05	1.05	1.14	1.06	1.03	Load power factor correction and voltage support if needed
Bair 60 kV	Base Case	P0	Base case	1.03	1.02	1.02	1.04	1.04	1.03	1.03	1.03	1.02	1.06	1.02	1.02	Load power factor correction and voltage support if needed
Bair 115 kV	Base Case	P0	Base case	<1.05	1.02	1.02	<1.05	1.05	<1.05	<1.05	1.03	1.02	1.08	<1.05	1.02	Load power factor correction and voltage support if needed
Bartlp 115 kV	Base Case	P0	Base case	1.03	1.03	0.99	1.07	1.08	1.03	1.04	1.02	1.03	1.11	1.04	0.99	Load power factor correction and voltage support if needed
Bartrc 115 kV	Base Case	P0	Base case	1.03	1.03	1.00	1.07	1.06	1.04	1.04	1.02	1.03	1.09	1.04	1.00	Load power factor correction and voltage support if needed
Bay Mdws 115 kV	Base Case	P0	Base case	<1.05	1.02	1.02	<1.05	1.04	<1.05	<1.05	1.02	1.02	1.08	<1.05	1.02	Load power factor correction and voltage support if needed
Bayshor1 115 kV	Base Case	P0	Base case	<1.05	1.03	1.04	<1.05	1.04	<1.05	<1.05	1.03	1.03	1.08	<1.05	1.04	Load power factor correction and voltage support if needed
Bayshor2 115 kV	Base Case	P0	Base case	<1.05	1.03	1.04	<1.05	1.04	<1.05	<1.05	1.03	1.03	1.08	<1.05	1.04	Load power factor correction and voltage support if needed
Belmont 115 kV	Base Case	P0	Base case	<1.05	1.02	1.02	<1.05	1.05	<1.05	<1.05	1.02	1.02	1.08	<1.05	1.02	Load power factor correction and voltage support if needed
Beresfrd 60 kV	Base Case	P0	Base case	<1.05	1.03	1.03	<1.05	1.04	<1.05	<1.05	1.03	1.03	1.09	<1.05	1.03	Load power factor correction and voltage support if needed
Big Basn 60 kV	Base Case	P0	Base case	1.04	1.03	1.04	1.09	1.06	1.04	1.06	1.04	1.03	1.06	1.05	1.05	Load power factor correction and voltage support if needed
Bixler 60 kV	Base Case	P0	Base case	1.02	1.01	1.02	1.06	1.07	1.04	1.03	1.04	1.01	1.09	1.01	1.02	Load power factor correction and voltage support if needed
Bolinas 60 kV	Base Case	P0	Base case	1.04	1.05	0.99	1.08	1.08	1.03	1.06	1.00	1.04	1.09	1.06	0.99	Load power factor correction and voltage support if needed
Bollman 115 kV	Base Case	P0	Base case	1.05	1.05	1.02	1.06	1.06	1.05	1.06	1.03	1.05	1.08	1.05	1.02	Load power factor correction and voltage support if needed
Brentwod 230 kV	Base Case	P0	Base case	1.02	1.02	1.00	1.05	1.05	1.03	1.03	1.02	1.02	1.07	1.02	1.00	Load power factor correction and voltage support if needed
Brittn 115 kV	Base Case	P0	Base case	1.03	1.02	1.00	1.05	1.04	1.02	1.04	1.02	1.01	1.05	1.04	1.01	Load power factor correction and voltage support if needed
Burlngme 115 kV	Base Case	P0	Base case	<1.05	1.03	1.03	<1.05	1.04	<1.05	<1.05	1.03	1.02	1.08	<1.05	1.03	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		
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Peak	2020 Winter Peak	2023 Winter Peak	2028 Winter Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen		2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations
Burns 60 kV	Base Case	P0	Base case	1.04	1.03	1.04	1.09	1.07	1.04	1.06	1.03	1.03	1.06	1.05	1.04	Load power factor correction and voltage support if needed
Bxlr_Tap 60 kV	Base Case	P0	Base case	1.02	1.02	1.02	1.06	1.07	1.04	1.03	1.05	1.01	1.09	1.01	1.02	Load power factor correction and voltage support if needed
C&H 230 kV	Base Case	P0	Base case	1.03	1.03	1.00	1.04	1.04	1.02	1.03	1.01	1.02	1.05	1.03	1.00	Load power factor correction and voltage support if needed
C.Costa 230 kV	Base Case	P0	Base case	1.02	1.02	1.00	1.05	1.05	1.02	1.03	1.02	1.02	1.06	1.02	1.00	Load power factor correction and voltage support if needed
Cal Mec 230 kV	Base Case	P0	Base case	1.02	1.02	1.00	1.05	1.06	1.02	1.03	1.02	1.02	1.10	1.03	1.00	Load power factor correction and voltage support if needed
Calevras 115 kV	Base Case	P0	Base case	1.03	1.03	1.01	1.05	1.05	1.03	1.04	1.03	1.02	1.07	1.03	1.01	Load power factor correction and voltage support if needed
Calmat60 60 kV	Base Case	P0	Base case	1.05	1.07	0.99	1.08	1.07	1.04	1.05	1.01	1.06	1.10	1.06	0.99	Load power factor correction and voltage support if needed
Caltrainssf 115 kV	Base Case	P0	Base case	<1.05	1.02	1.02	<1.05	1.04	<1.05	<1.05	1.02	1.02	1.08	<1.05	1.03	Load power factor correction and voltage support if needed
Caltrainssj 115 kV	Base Case	P0	Base case	<1.05	1.01	0.97	<1.05	1.06	<1.05	<1.05	1.01	1.00	1.09	<1.05	0.97	Load power factor correction and voltage support if needed
Carold1 60 kV	Base Case	P0	Base case	<1.05	1.03	1.02	<1.05	1.05	<1.05	<1.05	1.03	1.03	1.11	<1.05	1.02	Load power factor correction and voltage support if needed
Carold2 60 kV	Base Case	P0	Base case	1.03	1.03	1.01	1.04	1.05	1.03	1.04	1.02	1.03	1.13	1.04	1.01	Load power factor correction and voltage support if needed
Carolnds 60 kV	Base Case	P0	Base case	<1.05	1.03	1.02	<1.05	1.05	<1.05	<1.05	1.03	1.03	1.11	<1.05	1.02	Load power factor correction and voltage support if needed
Carquinz 115 kV	Base Case	P0	Base case	1.05	1.07	1.00	1.09	1.09	1.04	1.06	1.00	1.07	1.11	1.07	1.00	Load power factor correction and voltage support if needed
Castrovl 230 kV	Base Case	P0	Base case	1.01	1.01	0.97	1.05	1.05	1.00	1.02	0.99	1.01	1.07	1.02	0.97	Load power factor correction and voltage support if needed
Cayetano 230 kV	Base Case	P0	Base case	1.03	1.03	1.00	1.05	1.04	1.02	1.02	1.02	1.01	1.06	1.02	1.00	Load power factor correction and voltage support if needed
Cc Sub 230 kV	Base Case	P0	Base case	1.02	1.02	1.00	1.05	1.05	1.02	1.03	1.02	1.02	1.06	1.02	1.00	Load power factor correction and voltage support if needed
Christie 115 kV	Base Case	P0	Base case	1.03	1.03	1.01	1.04	1.04	1.02	1.03	1.02	1.03	1.05	1.04	1.00	Load power factor correction and voltage support if needed
Chsr04A 115 kV	Base Case	P0	Base case	<1.05	1.04	1.02	<1.05	1.09	<1.05	<1.05	1.03	1.04	1.12	<1.05	1.03	Load power factor correction and voltage support if needed
Chsr04B 115 kV	Base Case	P0	Base case	<1.05	1.04	1.03	<1.05	1.09	<1.05	<1.05	1.03	1.04	1.12	<1.05	1.03	Load power factor correction and voltage support if needed
Chsr04Swsta 115 kV	Base Case	P0	Base case	<1.05	1.04	1.03	<1.05	1.09	<1.05	<1.05	1.03	1.04	1.12	<1.05	1.03	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
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Peak	2020 Winter Peak	2023 Winter Peak	2028 Winter Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations		
Chvsanardo 60 kV	Base Case	P0	Base case	1.05	1.05	1.04	1.05	1.06	1.05	1.05	1.04	1.04	1.06	1.05	1.04	Load power factor correction and voltage support if needed	
Clarmnt 115 kV	Base Case	P0	Base case	1.03	1.03	1.02	1.03	1.03	1.03	1.04	1.03	1.03	1.05	1.03	1.01	Load power factor correction and voltage support if needed	
Claytn 115 kV	Base Case	P0	Base case	1.06	1.06	1.02	1.06	1.07	1.06	1.06	1.04	1.06	1.10	1.06	1.02	Load power factor correction and voltage support if needed	
Clmbiahs 115 kV	Base Case	P0	Base case	1.06	1.06	1.04	1.06	1.07	1.05	1.06	1.05	1.06	1.10	1.06	1.03	Load power factor correction and voltage support if needed	
Clmbiapv 115 kV	Base Case	P0	Base case	1.06	1.06	1.04	1.06	1.07	1.05	1.06	1.05	1.06	1.10	1.06	1.03	Load power factor correction and voltage support if needed	
Cly Lnd 115 kV	Base Case	P0	Base case	1.04	1.04	1.03	1.06	1.06	1.04	1.05	1.04	1.03	1.09	1.04	1.03	Load power factor correction and voltage support if needed	
Cmp Evrs 115 kV	Base Case	P0	Base case	1.03	1.03	1.03	1.04	1.07	1.03	1.03	1.04	1.03	1.06	1.03	1.03	Load power factor correction and voltage support if needed	
Coburn 60 kV	Base Case	P0	Base case	1.05	1.05	1.03	1.04	1.06	1.05	1.05	1.03	1.04	1.07	1.05	1.03	Load power factor correction and voltage support if needed	
Con25 115 kV	Base Case	P0	Base case	1.04	1.04	1.01	1.04	1.04	1.03	1.04	1.02	1.03	1.05	1.04	1.00	Load power factor correction and voltage support if needed	
Cp Lecef 115 kV	Base Case	P0	Base case	<1.05	1.01	0.99	<1.05	1.04	<1.05	<1.05	1.03	1.01	1.07	<1.05	0.99	Load power factor correction and voltage support if needed	
Crockett 230 kV	Base Case	P0	Base case	1.02	1.03	1.00	1.04	1.04	1.02	1.03	1.01	1.02	1.05	1.03	1.00	Load power factor correction and voltage support if needed	
Crusher 60 kV	Base Case	P0	Base case	1.03	1.02	1.04	1.09	1.07	1.03	1.05	1.03	1.02	1.06	1.05	1.04	Load power factor correction and voltage support if needed	
Cryogen 115 kV	Base Case	P0	Base case	1.03	1.02	0.99	1.05	1.05	1.03	1.04	1.02	1.02	1.08	1.03	0.99	Load power factor correction and voltage support if needed	
Crystlsg 60 kV	Base Case	P0	Base case	1.03	1.03	1.01	1.04	1.05	1.03	1.04	1.02	1.03	1.13	1.04	1.01	Load power factor correction and voltage support if needed	
Cv Bart 230 kV	Base Case	P0	Base case	1.01	1.01	0.97	1.05	1.05	1.00	1.02	0.99	1.01	1.07	1.02	0.97	Load power factor correction and voltage support if needed	
Cyte Pmp 115 kV	Base Case	P0	Base case	1.06	1.05	1.03	1.09	1.10	1.06	1.06	1.05	1.05	1.14	1.07	1.03	Load power factor correction and voltage support if needed	
Daly Cty 115 kV	Base Case	P0	Base case	<1.05	1.03	1.03	<1.05	1.04	<1.05	<1.05	1.03	1.03	1.08	<1.05	1.04	Load power factor correction and voltage support if needed	
Dcto Jct 60 kV	Base Case	P0	Base case	1.04	1.04	0.99	1.07	1.06	1.03	1.04	1.02	1.04	1.09	1.04	0.99	Load power factor correction and voltage support if needed	
Dec Ptsg 230 kV	Base Case	P0	Base case	1.03	1.03	1.01	1.04	1.04	1.02	1.03	1.02	1.02	1.06	1.03	1.01	Load power factor correction and voltage support if needed	
Dixon Ld 115 kV	Base Case	P0	Base case	1.03	1.02	0.99	1.06	1.06	1.03	1.04	1.02	1.02	1.09	1.03	1.00	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
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Peak	2020 Winter Peak	2023 Winter Peak	2028 Winter Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations		
Dly Ctyp 115 kV	Base Case	P0	Base case	<1.05	1.03	1.04	<1.05	1.04	<1.05	<1.05	1.03	1.03	1.08	<1.05	1.04	Load power factor correction and voltage support if needed	
Dmtar_SI 115 kV	Base Case	P0	Base case	1.02	1.03	1.02	1.03	1.04	1.03	1.03	1.03	1.03	1.06	1.03	1.02	Load power factor correction and voltage support if needed	
Dumbartn 115 kV	Base Case	P0	Base case	<1.05	1.04	1.03	<1.05	1.05	<1.05	<1.05	1.04	1.03	1.07	<1.05	1.03	Load power factor correction and voltage support if needed	
Dyerwnd 60 kV	Base Case	P0	Base case	1.04	1.04	1.04	1.08	1.08	1.06	1.04	1.06	1.04	1.10	1.03	1.04	Load power factor correction and voltage support if needed	
E Dublin 60 kV	Base Case	P0	Base case	1.05	1.06	0.99	1.08	1.07	1.04	1.05	1.01	1.06	1.09	1.06	0.99	Load power factor correction and voltage support if needed	
E. Shore 230 kV	Base Case	P0	Base case	1.03	1.02	1.00	1.05	1.04	1.03	1.03	1.01	1.02	1.08	1.02	1.00	Load power factor correction and voltage support if needed	
Eastshre 115 kV	Base Case	P0	Base case	<1.05	1.04	1.05	<1.05	1.05	<1.05	<1.05	1.05	1.04	1.07	<1.05	1.05	Load power factor correction and voltage support if needed	
Ebmudgry 115 kV	Base Case	P0	Base case	1.05	1.06	1.01	1.06	1.07	1.05	1.06	1.03	1.05	1.09	1.05	1.01	Load power factor correction and voltage support if needed	
Edenvale 115 kV	Base Case	P0	Base case	1.05	1.05	1.03	1.09	1.10	1.06	1.07	1.05	1.05	1.14	1.06	1.03	Load power factor correction and voltage support if needed	
Edes 115 kV	Base Case	P0	Base case	<1.05	1.03	1.03	<1.05	1.04	<1.05	<1.05	1.04	1.03	1.07	<1.05	1.03	Load power factor correction and voltage support if needed	
Eds Grnt 115 kV	Base Case	P0	Base case	<1.05	1.03	1.03	<1.05	1.04	<1.05	<1.05	1.04	1.03	1.07	<1.05	1.03	Load power factor correction and voltage support if needed	
Egbert 230 kV	Base Case	P0	Base case	<1.05	1.00	1.01	<1.05	1.02	<1.05	<1.05	1.01	1.00	1.07	<1.05	1.01	Load power factor correction and voltage support if needed	
El Crrto 115 kV	Base Case	P0	Base case	1.03	1.03	1.01	1.04	1.04	1.03	1.04	1.02	1.03	1.05	1.04	1.00	Load power factor correction and voltage support if needed	
El Patio 115 kV	Base Case	P0	Base case	1.03	1.02	0.98	1.07	1.08	1.04	1.04	1.02	1.02	1.11	1.04	0.98	Load power factor correction and voltage support if needed	
Embrcdrd 230 kV	Base Case	P0	Base case	1.01	1.00	1.01	1.02	1.02	1.01	1.01	1.00	1.00	1.06	1.01	1.01	Load power factor correction and voltage support if needed	
Emrld Le 60 kV	Base Case	P0	Base case	1.04	1.03	1.02	1.04	1.06	1.03	1.04	1.03	1.03	1.14	1.04	1.02	Load power factor correction and voltage support if needed	
Erta 60 kV	Base Case	P0	Base case	1.03	1.04	1.04	1.07	1.08	1.06	1.05	1.05	1.03	1.09	1.04	1.04	Load power factor correction and voltage support if needed	
Est Grnd 115 kV	Base Case	P0	Base case	<1.05	1.02	1.02	<1.05	1.04	<1.05	<1.05	1.02	1.02	1.08	<1.05	1.03	Load power factor correction and voltage support if needed	
Est Prtl 115 kV	Base Case	P0	Base case	1.03	1.03	1.01	1.03	1.03	1.03	1.03	1.02	1.03	1.05	1.03	1.01	Load power factor correction and voltage support if needed	
Evergren 60 kV	Base Case	P0	Base case	1.04	1.03	0.97	1.09	1.09	1.05	1.05	1.01	1.02	1.13	1.05	0.97	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		
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Peak	2020 Winter Peak	2023 Winter Peak	2028 Winter Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen		2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations
Flowind1 60 kV	Base Case	P0	Base case	1.06	1.07	1.00	1.08	<1.05	1.05	1.06	1.02	1.07	<1.05	1.06	1.00	Load power factor correction and voltage support if needed
FMC 115 kV	Base Case	P0	Base case	1.02	1.01	0.97	1.06	1.06	1.03	1.03	1.01	1.00	1.09	1.03	0.97	Load power factor correction and voltage support if needed
Forebaywind 60 kV	Base Case	P0	Base case	1.06	1.07	1.00	1.08	1.08	1.05	1.06	1.02	1.07	1.10	1.06	1.00	Load power factor correction and voltage support if needed
Fremnt 115 kV	Base Case	P0	Base case	1.04	1.03	1.00	1.06	1.05	1.03	1.04	1.02	1.02	1.08	1.04	1.00	Load power factor correction and voltage support if needed
Frickwnd 60 kV	Base Case	P0	Base case	1.06	1.07	1.00	1.08	1.08	1.05	1.06	1.02	1.07	1.10	1.06	1.00	Load power factor correction and voltage support if needed
Gateway 230 kV	Base Case	P0	Base case	1.02	1.02	1.00	1.05	1.05	1.02	1.03	1.02	1.02	1.06	1.02	1.00	Load power factor correction and voltage support if needed
Gilroy 115 kV	Base Case	P0	Base case	1.04	1.04	1.03	1.09	1.09	1.05	1.05	1.03	1.04	1.12	1.06	1.03	Load power factor correction and voltage support if needed
Gilroy F 115 kV	Base Case	P0	Base case	1.04	1.04	1.03	1.09	1.09	1.05	1.05	1.03	1.04	1.12	1.06	1.03	Load power factor correction and voltage support if needed
Gilroypk 115 kV	Base Case	P0	Base case	1.04	1.04	1.03	1.09	1.09	1.05	1.05	1.04	1.04	1.12	1.06	1.03	Load power factor correction and voltage support if needed
Grant 115 kV	Base Case	P0	Base case	<1.05	1.04	1.04	<1.05	1.05	<1.05	<1.05	1.04	1.03	1.07	<1.05	1.04	Load power factor correction and voltage support if needed
Greenbre 60 kV	Base Case	P0	Base case	1.01	1.02	0.99	1.06	1.06	1.00	1.03	0.99	1.02	1.08	1.04	0.98	Load power factor correction and voltage support if needed
Gren Vly 60 kV	Base Case	P0	Base case	1.04	1.04	1.05	1.07	1.09	1.06	1.06	1.05	1.04	1.09	1.04	1.05	Load power factor correction and voltage support if needed
Grn Vly 115 kV	Base Case	P0	Base case	1.02	1.03	1.02	1.04	1.06	1.03	1.03	1.03	1.02	1.06	1.02	1.02	Load power factor correction and voltage support if needed
Hicks 230 kV	Base Case	P0	Base case	1.03	1.03	1.00	1.05	1.07	1.03	1.04	1.02	1.02	1.12	1.03	1.00	Load power factor correction and voltage support if needed
Hillsdle 60 kV	Base Case	P0	Base case	<1.05	1.03	1.03	<1.05	1.05	<1.05	<1.05	1.03	1.03	1.10	<1.05	1.03	Load power factor correction and voltage support if needed
Hlf Mnby 60 kV	Base Case	P0	Base case	1.04	1.04	1.03	1.04	1.05	1.04	1.04	1.03	1.04	1.10	1.05	1.03	Load power factor correction and voltage support if needed
Hllsdjlt 60 kV	Base Case	P0	Base case	1.04	1.03	1.03	1.04	1.05	1.03	1.04	1.03	1.03	1.11	1.04	1.03	Load power factor correction and voltage support if needed
Hntrs Pt 115 kV	Base Case	P0	Base case	<1.05	1.03	1.04	<1.05	1.04	<1.05	<1.05	1.03	1.03	1.08	<1.05	1.04	Load power factor correction and voltage support if needed
Hph1_1 230 kV	Base Case	P0	Base case	<1.05	1.02	0.98	<1.05	1.03	<1.05	<1.05	1.02	1.02	1.06	<1.05	0.98	Load power factor correction and voltage support if needed
Hph2_2 230 kV	Base Case	P0	Base case	<1.05	1.02	0.98	<1.05	1.03	<1.05	<1.05	1.02	1.02	1.06	<1.05	0.98	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
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Peak	2020 Winter Peak	2023 Winter Peak	2028 Winter Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations		
Ibm-Baly 115 kV	Base Case	P0	Base case	1.06	1.05	1.03	1.09	1.10	1.06	1.07	1.05	1.05	1.14	1.07	1.03	Load power factor correction and voltage support if needed	
Ibm-Hr J 115 kV	Base Case	P0	Base case	1.05	1.04	1.02	1.09	1.09	1.06	1.06	1.04	1.04	1.13	1.06	1.02	Load power factor correction and voltage support if needed	
Ibm-Hrrs 115 kV	Base Case	P0	Base case	1.06	1.05	1.03	1.09	1.10	1.06	1.07	1.05	1.05	1.14	1.06	1.03	Load power factor correction and voltage support if needed	
Ignacio 115 kV	Base Case	P0	Base case	1.05	1.05	1.01	1.08	1.07	1.04	1.06	1.02	1.05	1.09	1.06	1.01	Load power factor correction and voltage support if needed	
Imhoff 115 kV	Base Case	P0	Base case	1.05	1.05	1.03	1.05	1.06	1.04	1.05	1.03	1.05	1.07	1.05	1.02	Load power factor correction and voltage support if needed	
Intake 230 kV	Base Case	P0	Base case	<1.05	1.02	0.98	<1.05	1.03	<1.05	<1.05	1.02	1.02	1.06	<1.05	0.98	Load power factor correction and voltage support if needed	
Iuka 60 kV	Base Case	P0	Base case	1.05	1.06	0.99	1.08	1.07	1.04	1.05	1.01	1.06	1.10	1.06	0.99	Load power factor correction and voltage support if needed	
Jarvis 115 kV	Base Case	P0	Base case	1.03	1.02	0.99	1.05	1.05	1.03	1.04	1.02	1.02	1.08	1.03	0.99	Load power factor correction and voltage support if needed	
Jeffersn 230 kV	Base Case	P0	Base case	<1.05	1.03	1.01	<1.05	1.05	<1.05	<1.05	1.02	1.03	1.13	<1.05	1.01	Load power factor correction and voltage support if needed	
Jennings 60 kV	Base Case	P0	Base case	1.04	1.02	0.97	1.09	1.09	1.05	1.05	1.01	1.02	1.13	1.05	0.97	Load power factor correction and voltage support if needed	
Jmscnpmp 115 kV	Base Case	P0	Base case	1.05	1.07	1.00	1.09	1.09	1.04	1.06	1.01	1.07	1.10	1.07	1.00	Load power factor correction and voltage support if needed	
Jolon 60 kV	Base Case	P0	Base case	1.05	1.05	1.02	1.05	1.07	1.05	1.06	1.02	1.04	1.08	1.07	1.02	Load power factor correction and voltage support if needed	
Jv Bart 115 kV	Base Case	P0	Base case	1.03	1.02	0.99	1.05	1.05	1.03	1.04	1.02	1.02	1.08	1.03	0.99	Load power factor correction and voltage support if needed	
King Cty 60 kV	Base Case	P0	Base case	1.05	1.04	1.02	1.04	1.06	1.05	1.05	1.03	1.04	1.07	1.05	1.02	Load power factor correction and voltage support if needed	
Kirker 115 kV	Base Case	P0	Base case	1.06	1.07	1.03	1.07	1.07	1.06	1.07	1.04	1.06	1.10	1.06	1.03	Load power factor correction and voltage support if needed	
Kph1_9 230 kV	Base Case	P0	Base case	<1.05	1.02	0.98	<1.05	1.03	<1.05	<1.05	1.02	1.02	1.06	<1.05	0.98	Load power factor correction and voltage support if needed	
Lakewd-C 115 kV	Base Case	P0	Base case	1.05	1.06	1.02	1.06	1.06	1.05	1.06	1.03	1.05	1.09	1.05	1.01	Load power factor correction and voltage support if needed	
Lakewd-M 115 kV	Base Case	P0	Base case	1.05	1.06	1.02	1.06	1.06	1.05	1.06	1.03	1.05	1.09	1.05	1.01	Load power factor correction and voltage support if needed	
Larkin D 115 kV	Base Case	P0	Base case	<1.05	1.03	1.04	<1.05	1.04	<1.05	<1.05	1.03	1.03	1.08	<1.05	1.04	Load power factor correction and voltage support if needed	
Larkin E 115 kV	Base Case	P0	Base case	<1.05	1.03	1.04	<1.05	1.04	<1.05	<1.05	1.03	1.03	1.08	<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
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Peak	2020 Winter Peak	2023 Winter Peak	2028 Winter Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations		
Larkin F 115 kV	Base Case	P0	Base case	<1.05	1.03	1.04	<1.05	1.04	<1.05	<1.05	1.03	1.03	1.08	<1.05	1.04	Load power factor correction and voltage support if needed	
Las Plgs 60 kV	Base Case	P0	Base case	1.03	1.03	1.01	1.04	1.05	1.02	1.04	1.01	1.03	1.14	1.04	1.01	Load power factor correction and voltage support if needed	
Lawrence 115 kV	Base Case	P0	Base case	1.03	1.01	1.00	1.05	1.03	1.02	1.04	1.02	1.01	1.05	1.03	1.01	Load power factor correction and voltage support if needed	
Livermre 60 kV	Base Case	P0	Base case	1.05	1.07	1.00	1.08	1.08	1.04	1.06	1.02	1.06	1.10	1.06	1.00	Load power factor correction and voltage support if needed	
Lk_React 115 kV	Base Case	P0	Base case	1.04	1.04	1.02	1.04	1.04	1.05	1.04	1.04	1.04	1.06	1.04	1.02	Load power factor correction and voltage support if needed	
Llagas 115 kV	Base Case	P0	Base case	1.04	1.04	1.03	1.09	1.09	1.05	1.05	1.03	1.04	1.12	1.06	1.03	Load power factor correction and voltage support if needed	
Lmec 115 kV	Base Case	P0	Base case	1.06	1.06	1.04	1.06	1.07	1.06	1.06	1.05	1.06	1.10	1.06	1.03	Load power factor correction and voltage support if needed	
Lockhd 1 115 kV	Base Case	P0	Base case	1.02	1.01	1.00	1.05	1.04	1.02	1.03	1.02	1.01	1.06	1.03	1.00	Load power factor correction and voltage support if needed	
Lockhd 2 115 kV	Base Case	P0	Base case	1.03	1.02	1.00	1.05	1.04	1.03	1.04	1.02	1.01	1.06	1.03	1.00	Load power factor correction and voltage support if needed	
Lone Str 60 kV	Base Case	P0	Base case	1.04	1.02	1.04	1.09	1.06	1.03	1.06	1.03	1.03	1.06	1.05	1.04	Load power factor correction and voltage support if needed	
Lonestar 115 kV	Base Case	P0	Base case	<1.05	1.02	1.02	<1.05	1.05	<1.05	<1.05	1.03	1.02	1.08	<1.05	1.02	Load power factor correction and voltage support if needed	
Lonetree 230 kV	Base Case	P0	Base case	1.03	1.02	1.00	1.05	1.05	1.02	1.03	1.02	1.02	1.06	1.02	1.00	Load power factor correction and voltage support if needed	
Los Alts 60 kV	Base Case	P0	Base case	1.03	1.02	1.03	1.09	1.07	1.02	1.05	1.03	1.02	1.06	1.05	1.03	Load power factor correction and voltage support if needed	
Los Cchs 60 kV	Base Case	P0	Base case	1.06	1.06	1.02	1.04	1.07	1.06	1.06	1.02	1.05	1.08	1.06	1.02	Load power factor correction and voltage support if needed	
Los Gats 60 kV	Base Case	P0	Base case	1.03	1.04	1.03	1.08	1.06	1.04	1.07	1.02	1.04	1.06	1.05	1.03	Load power factor correction and voltage support if needed	
Los Osts 60 kV	Base Case	P0	Base case	1.04	1.04	1.02	1.03	1.06	1.06	1.06	1.02	1.04	1.07	1.04	1.02	Load power factor correction and voltage support if needed	
Loyola 60 kV	Base Case	P0	Base case	1.04	1.02	1.04	1.08	1.06	1.03	1.05	1.03	1.02	1.05	1.05	1.04	Load power factor correction and voltage support if needed	
Lpostas 60 kV	Base Case	P0	Base case	1.05	1.07	1.00	1.08	1.08	1.05	1.06	1.02	1.06	1.10	1.06	1.00	Load power factor correction and voltage support if needed	
Ls Estrs 115 kV	Base Case	P0	Base case	<1.05	1.01	0.99	<1.05	1.04	<1.05	<1.05	1.03	1.01	1.07	<1.05	0.99	Load power factor correction and voltage support if needed	
Ls Estrs 230 kV	Base Case	P0	Base case	1.01	1.00	0.98	1.03	1.03	1.02	1.02	1.01	1.00	1.06	1.01	0.98	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
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Peak	2020 Winter Peak	2023 Winter Peak	2028 Winter Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations		
Ls Gilns 115 kV	Base Case	P0	Base case	1.04	1.05	1.00	1.08	1.07	1.04	1.06	1.01	1.05	1.09	1.06	1.00	Load power factor correction and voltage support if needed	
Ls Pstas 230 kV	Base Case	P0	Base case	1.02	1.02	0.99	1.05	1.05	1.02	1.02	1.01	1.02	1.07	1.02	0.99	Load power factor correction and voltage support if needed	
M 115 kV	Base Case	P0	Base case	1.03	1.03	1.03	1.04	1.07	1.03	1.03	1.03	1.03	1.06	1.03	1.03	Load power factor correction and voltage support if needed	
Mabury 60 kV	Base Case	P0	Base case	1.04	1.02	0.97	1.09	1.09	1.04	1.05	1.00	1.02	1.13	1.05	0.97	Load power factor correction and voltage support if needed	
Mabury 115 kV	Base Case	P0	Base case	1.03	1.03	0.99	1.07	1.08	1.03	1.04	1.02	1.03	1.11	1.04	0.99	Load power factor correction and voltage support if needed	
Markham 115 kV	Base Case	P0	Base case	1.03	1.01	0.97	1.07	1.07	1.04	1.04	1.01	1.01	1.10	1.03	0.98	Load power factor correction and voltage support if needed	
Martin 60 kV	Base Case	P0	Base case	1.06	1.06	1.14	1.00	1.06	1.05	1.04	1.13	0.98	1.19	0.99	1.06	Load power factor correction and voltage support if needed	
Martin C 115 kV	Base Case	P0	Base case	<1.05	1.03	1.04	<1.05	1.04	<1.05	<1.05	1.03	1.03	1.08	<1.05	1.04	Load power factor correction and voltage support if needed	
Martin C 230 kV	Base Case	P0	Base case	<1.05	1.00	1.01	<1.05	1.02	<1.05	<1.05	1.01	1.00	1.07	<1.05	1.01	Load power factor correction and voltage support if needed	
Martnz D 115 kV	Base Case	P0	Base case	1.05	1.05	1.02	1.05	1.05	1.04	1.05	1.03	1.04	1.07	1.05	1.02	Load power factor correction and voltage support if needed	
Martnz E 115 kV	Base Case	P0	Base case	1.05	1.05	1.02	1.05	1.05	1.04	1.05	1.03	1.04	1.07	1.05	1.02	Load power factor correction and voltage support if needed	
Mckee 115 kV	Base Case	P0	Base case	1.03	1.04	1.00	1.08	1.08	1.04	1.05	1.02	1.03	1.11	1.04	1.00	Load power factor correction and voltage support if needed	
Medw Lne 115 kV	Base Case	P0	Base case	1.05	1.06	1.01	1.06	1.07	1.06	1.06	1.03	1.06	1.10	1.06	1.01	Load power factor correction and voltage support if needed	
Metcalf 230 kV	Base Case	P0	Base case	1.02	1.02	1.00	1.05	1.06	1.02	1.03	1.02	1.02	1.10	1.03	1.00	Load power factor correction and voltage support if needed	
Meyers 115 kV	Base Case	P0	Base case	1.05	1.07	1.00	1.09	1.09	1.04	1.06	1.00	1.07	1.11	1.07	1.00	Load power factor correction and voltage support if needed	
Mft.Fd J 115 kV	Base Case	P0	Base case	1.02	1.01	1.00	1.05	1.04	1.02	1.04	1.02	1.01	1.06	1.03	1.00	Load power factor correction and voltage support if needed	
Millbrae 60 kV	Base Case	P0	Base case	1.04	1.03	1.05	1.03	1.04	1.03	1.03	1.05	1.01	1.11	1.02	1.03	Load power factor correction and voltage support if needed	
Millbrae 115 kV	Base Case	P0	Base case	<1.05	1.02	1.03	<1.05	1.04	<1.05	<1.05	1.03	1.02	1.08	<1.05	1.03	Load power factor correction and voltage support if needed	
Milpitas 115 kV	Base Case	P0	Base case	1.04	1.03	1.00	1.07	1.07	1.04	1.05	1.02	1.03	1.10	1.04	1.00	Load power factor correction and voltage support if needed	
Misson 115 kV	Base Case	P0	Base case	<1.05	1.03	1.04	<1.05	1.04	<1.05	<1.05	1.03	1.03	1.08	<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
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Peak	2020 Winter Peak	2023 Winter Peak	2028 Winter Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations		
Mllbtp97 60 kV	Base Case	P0	Base case	<1.05	1.03	1.02	<1.05	1.05	<1.05	<1.05	1.03	1.03	1.11	<1.05	1.02	Load power factor correction and voltage support if needed	
Mnta Vsa 60 kV	Base Case	P0	Base case	1.05	1.04	1.06	1.08	1.06	1.05	1.07	1.05	1.04	1.05	1.06	1.06	Load power factor correction and voltage support if needed	
Mnta Vsa 115 kV	Base Case	P0	Base case	1.03	1.02	1.03	1.05	1.02	1.03	1.05	1.03	1.01	1.03	1.04	1.03	Load power factor correction and voltage support if needed	
Mntclop 115 kV	Base Case	P0	Base case	1.04	1.06	1.01	1.08	1.08	1.06	1.06	1.01	1.05	1.09	1.06	1.01	Load power factor correction and voltage support if needed	
Moccasin 115 kV	Base Case	P0	Base case	1.05	1.04	1.01	1.05	1.05	1.05	1.05	1.05	1.04	1.06	1.05	1.01	Load power factor correction and voltage support if needed	
Moft.Fld 115 kV	Base Case	P0	Base case	1.02	1.01	1.00	1.05	1.04	1.02	1.04	1.02	1.01	1.06	1.03	1.00	Load power factor correction and voltage support if needed	
Montague 115 kV	Base Case	P0	Base case	<1.05	1.01	0.98	<1.05	1.04	<1.05	<1.05	1.02	1.01	1.07	<1.05	0.98	Load power factor correction and voltage support if needed	
Montavis 230 kV	Base Case	P0	Base case	1.04	1.04	1.00	1.05	1.07	1.04	1.05	1.02	1.04	1.14	1.04	1.00	Load power factor correction and voltage support if needed	
Montcilo 115 kV	Base Case	P0	Base case	1.04	1.06	1.00	1.08	1.08	1.06	1.06	1.01	1.05	1.09	1.06	1.01	Load power factor correction and voltage support if needed	
Moraga 115 kV	Base Case	P0	Base case	1.04	1.04	1.03	1.03	1.03	1.04	1.04	1.04	1.03	1.05	1.03	1.03	Load power factor correction and voltage support if needed	
Moraga 230 kV	Base Case	P0	Base case	1.00	1.01	0.96	1.05	1.05	0.99	1.02	0.98	1.01	1.07	1.02	0.96	Load power factor correction and voltage support if needed	
Mrgn Hil 115 kV	Base Case	P0	Base case	1.05	1.04	1.02	1.09	1.08	1.06	1.06	1.03	1.04	1.11	1.06	1.02	Load power factor correction and voltage support if needed	
Mt Eden 115 kV	Base Case	P0	Base case	<1.05	1.04	1.05	<1.05	1.05	<1.05	<1.05	1.05	1.04	1.07	<1.05	1.05	Load power factor correction and voltage support if needed	
Mt View 115 kV	Base Case	P0	Base case	1.03	1.02	1.01	1.05	1.04	1.03	1.05	1.02	1.02	1.06	1.04	1.02	Load power factor correction and voltage support if needed	
Mtcal D 115 kV	Base Case	P0	Base case	1.06	1.05	1.03	1.09	1.10	1.06	1.07	1.05	1.05	1.14	1.07	1.03	Load power factor correction and voltage support if needed	
Mtcal E 115 kV	Base Case	P0	Base case	1.06	1.05	1.03	1.09	1.10	1.06	1.07	1.05	1.05	1.14	1.07	1.03	Load power factor correction and voltage support if needed	
Nasa A 115 kV	Base Case	P0	Base case	1.03	1.02	1.01	1.05	1.05	1.03	1.05	1.03	1.02	1.07	1.03	1.02	Load power factor correction and voltage support if needed	
Nasa B 115 kV	Base Case	P0	Base case	1.03	1.02	1.01	1.05	1.05	1.03	1.05	1.03	1.02	1.07	1.03	1.02	Load power factor correction and voltage support if needed	
Ndublin 230 kV	Base Case	P0	Base case	1.03	1.03	1.00	1.05	1.04	1.02	1.02	1.02	1.01	1.06	1.02	1.00	Load power factor correction and voltage support if needed	
Newark 60 kV	Base Case	P0	Base case	1.04	1.03	1.00	1.06	1.06	1.04	1.04	1.02	1.03	1.08	1.04	1.00	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		
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Peak	2020 Winter Peak	2023 Winter Peak	2028 Winter Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen		2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations
Newark D 115 kV	Base Case	P0	Base case	1.03	1.03	1.01	1.06	1.05	1.04	1.04	1.03	1.02	1.08	1.03	1.01	Load power factor correction and voltage support if needed
Newark D 230 kV	Base Case	P0	Base case	1.02	1.01	1.00	1.04	1.04	1.02	1.02	1.02	1.01	1.06	1.01	1.00	Load power factor correction and voltage support if needed
Newark E 115 kV	Base Case	P0	Base case	1.04	1.03	1.00	1.06	1.05	1.03	1.04	1.03	1.02	1.08	1.04	1.01	Load power factor correction and voltage support if needed
Newark E 230 kV	Base Case	P0	Base case	1.02	1.01	1.00	1.04	1.04	1.02	1.02	1.02	1.01	1.06	1.01	1.00	Load power factor correction and voltage support if needed
Newark F 115 kV	Base Case	P0	Base case	1.03	1.03	1.00	1.06	1.05	1.03	1.04	1.03	1.02	1.08	1.03	1.01	Load power factor correction and voltage support if needed
Nortech 115 kV	Base Case	P0	Base case	<1.05	1.01	0.98	<1.05	1.04	<1.05	<1.05	1.03	1.01	1.07	<1.05	0.99	Load power factor correction and voltage support if needed
Novato 60 kV	Base Case	P0	Base case	1.04	1.05	1.01	1.08	1.07	1.04	1.06	1.01	1.05	1.09	1.06	1.01	Load power factor correction and voltage support if needed
Ntwr Alt 115 kV	Base Case	P0	Base case	1.00	1.02	0.96	1.07	1.07	0.99	1.03	0.97	1.01	1.08	1.03	0.96	Load power factor correction and voltage support if needed
Nummi 115 kV	Base Case	P0	Base case	1.03	1.02	1.00	1.05	1.05	1.03	1.04	1.02	1.02	1.07	1.03	1.00	Load power factor correction and voltage support if needed
Nwk Dist 230 kV	Base Case	P0	Base case	1.02	1.01	1.00	1.04	1.04	1.02	1.02	1.02	1.01	1.06	1.01	1.00	Load power factor correction and voltage support if needed
Nwrk 2 M 115 kV	Base Case	P0	Base case	1.03	1.03	1.00	1.06	1.06	1.04	1.04	1.02	1.03	1.08	1.03	1.00	Load power factor correction and voltage support if needed
Oilflds 60 kV	Base Case	P0	Base case	1.05	1.05	1.04	1.05	1.06	1.05	1.05	1.04	1.04	1.06	1.05	1.04	Load power factor correction and voltage support if needed
Olema 60 kV	Base Case	P0	Base case	1.04	1.04	0.98	1.08	1.08	1.02	1.05	0.99	1.04	1.09	1.06	0.98	Load power factor correction and voltage support if needed
Oleum 115 kV	Base Case	P0	Base case	1.04	1.04	1.01	1.04	1.04	1.03	1.04	1.02	1.03	1.05	1.04	1.00	Load power factor correction and voltage support if needed
Oracle60 60 kV	Base Case	P0	Base case	<1.05	1.02	1.02	<1.05	1.04	<1.05	<1.05	1.02	1.01	1.07	<1.05	1.02	Load power factor correction and voltage support if needed
Ox_Mtn60 60 kV	Base Case	P0	Base case	1.04	1.04	1.04	1.05	1.05	1.04	1.05	1.03	1.04	1.10	1.05	1.04	Load power factor correction and voltage support if needed
Pacifica 60 kV	Base Case	P0	Base case	1.04	1.04	1.08	1.02	1.05	1.03	1.03	1.07	1.00	1.13	1.01	1.04	Load power factor correction and voltage support if needed
Parks 60 kV	Base Case	P0	Base case	1.05	1.06	0.99	1.08	1.07	1.04	1.05	1.01	1.06	1.10	1.06	0.99	Load power factor correction and voltage support if needed
Paul Swt 115 kV	Base Case	P0	Base case	1.03	1.03	1.03	1.04	1.07	1.03	1.03	1.03	1.03	1.06	1.03	1.03	Load power factor correction and voltage support if needed
Permnnte 60 kV	Base Case	P0	Base case	1.05	1.03	1.05	1.08	1.06	1.04	1.06	1.04	1.04	1.05	1.06	1.05	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
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Peak	2020 Winter Peak	2023 Winter Peak	2028 Winter Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations		
Phillips 115 kV	Base Case	P0	Base case	1.03	1.01	1.00	1.05	1.03	1.02	1.04	1.02	1.01	1.05	1.03	1.01	Load power factor correction and voltage support if needed	
Piercy 115 kV	Base Case	P0	Base case	1.04	1.05	1.01	1.08	1.09	1.05	1.06	1.04	1.04	1.13	1.06	1.01	Load power factor correction and voltage support if needed	
Pitsbg D 230 kV	Base Case	P0	Base case	1.02	1.03	1.00	1.04	1.04	1.02	1.03	1.02	1.02	1.06	1.03	1.00	Load power factor correction and voltage support if needed	
Pitsbg E 230 kV	Base Case	P0	Base case	1.02	1.03	1.00	1.04	1.04	1.02	1.03	1.02	1.02	1.06	1.03	1.00	Load power factor correction and voltage support if needed	
Pitsburg 115 kV	Base Case	P0	Base case	1.06	1.06	1.04	1.06	1.07	1.06	1.06	1.05	1.06	1.10	1.06	1.03	Load power factor correction and voltage support if needed	
Pot_Svc 115 kV	Base Case	P0	Base case	<1.05	1.03	1.04	<1.05	1.04	<1.05	<1.05	1.03	1.03	1.08	<1.05	1.04	Load power factor correction and voltage support if needed	
Potrero 115 kV	Base Case	P0	Base case	<1.05	1.03	1.04	<1.05	1.04	<1.05	<1.05	1.03	1.03	1.08	<1.05	1.04	Load power factor correction and voltage support if needed	
Potrero 230 kV	Base Case	P0	Base case	1.01	1.00	1.01	1.02	1.02	1.00	1.01	1.00	1.00	1.06	1.01	1.01	Load power factor correction and voltage support if needed	
Praxair 115 kV	Base Case	P0	Base case	1.06	1.06	1.03	1.06	1.07	1.05	1.06	1.05	1.06	1.10	1.06	1.03	Load power factor correction and voltage support if needed	
Pt Mrtti 60 kV	Base Case	P0	Base case	1.03	1.02	1.04	1.09	1.07	1.03	1.05	1.03	1.02	1.06	1.05	1.04	Load power factor correction and voltage support if needed	
Ptr_Shnt 230 kV	Base Case	P0	Base case	1.01	1.00	1.01	1.02	1.02	1.00	1.01	1.00	1.00	1.06	1.01	1.01	Load power factor correction and voltage support if needed	
Radum 60 kV	Base Case	P0	Base case	1.05	1.07	0.99	1.08	1.07	1.04	1.05	1.01	1.06	1.10	1.06	0.99	Load power factor correction and voltage support if needed	
Ralston 60 kV	Base Case	P0	Base case	1.03	1.03	1.01	1.04	1.05	1.03	1.04	1.02	1.03	1.13	1.04	1.01	Load power factor correction and voltage support if needed	
Ravenswd 230 kV	Base Case	P0	Base case	1.02	1.01	1.01	1.03	1.03	1.02	1.02	1.02	1.01	1.06	1.01	1.01	Load power factor correction and voltage support if needed	
Redwood 60 kV	Base Case	P0	Base case	1.03	1.02	1.02	1.03	1.04	1.03	1.03	1.02	1.01	1.06	1.02	1.02	Load power factor correction and voltage support if needed	
Research 230 kV	Base Case	P0	Base case	1.03	1.03	0.99	1.05	1.04	1.02	1.03	1.01	1.02	1.07	1.03	0.99	Load power factor correction and voltage support if needed	
Richmond 115 kV	Base Case	P0	Base case	1.03	1.03	1.01	1.04	1.03	1.02	1.03	1.02	1.03	1.05	1.03	1.00	Load power factor correction and voltage support if needed	
Rivrbank 115 kV	Base Case	P0	Base case	<1.05	1.01	1.00	<1.05	1.03	<1.05	<1.05	1.01	1.01	1.08	<1.05	1.00	Load power factor correction and voltage support if needed	
Rlstr35 60 kV	Base Case	P0	Base case	1.04	1.03	1.02	1.04	1.05	1.03	1.04	1.03	1.03	1.12	1.04	1.02	Load power factor correction and voltage support if needed	
Rlstr45 60 kV	Base Case	P0	Base case	1.03	1.03	1.01	1.04	1.05	1.03	1.04	1.02	1.03	1.13	1.04	1.01	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
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Peak	2020 Winter Peak	2023 Winter Peak	2028 Winter Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations		
Rob Roy 115 kV	Base Case	P0	Base case	1.03	1.03	1.03	1.04	1.06	1.03	1.03	1.03	1.03	1.03	1.06	1.03	1.03	Load power factor correction and voltage support if needed
Rossmoor 230 kV	Base Case	P0	Base case	1.01	1.01	0.97	1.05	1.05	1.00	1.02	0.98	1.01	1.01	1.07	1.02	0.97	Load power factor correction and voltage support if needed
Ruselcty 230 kV	Base Case	P0	Base case	1.03	1.02	1.00	1.05	1.04	1.03	1.03	1.01	1.02	1.02	1.08	1.02	1.00	Load power factor correction and voltage support if needed
Rvnswd D 115 kV	Base Case	P0	Base case	1.04	1.04	1.03	1.06	1.06	1.04	1.05	1.04	1.03	1.03	1.09	1.04	1.03	Load power factor correction and voltage support if needed
Rvnswd E 115 kV	Base Case	P0	Base case	1.04	1.04	1.03	1.06	1.06	1.04	1.05	1.04	1.03	1.03	1.09	1.04	1.03	Load power factor correction and voltage support if needed
S.L.A.C. 60 kV	Base Case	P0	Base case	1.01	1.01	1.00	1.03	1.05	1.01	1.02	1.01	1.01	1.01	1.13	1.02	1.00	Load power factor correction and voltage support if needed
S.L.A.C. 230 kV	Base Case	P0	Base case	1.03	1.03	1.01	1.03	1.05	1.03	1.04	1.02	1.03	1.03	1.13	1.04	1.01	Load power factor correction and voltage support if needed
Saln Rvr 60 kV	Base Case	P0	Base case	1.05	1.05	1.04	1.05	1.06	1.05	1.05	1.04	1.04	1.04	1.06	1.05	1.04	Load power factor correction and voltage support if needed
San Ardo 60 kV	Base Case	P0	Base case	1.04	1.04	1.03	1.03	1.05	1.04	1.05	1.03	1.04	1.04	1.06	1.05	1.03	Load power factor correction and voltage support if needed
San Crls 60 kV	Base Case	P0	Base case	1.03	1.02	1.02	1.03	1.04	1.02	1.03	1.02	1.01	1.01	1.06	1.02	1.02	Load power factor correction and voltage support if needed
San Mato 60 kV	Base Case	P0	Base case	<1.05	1.03	1.03	<1.05	1.04	<1.05	<1.05	1.03	1.02	1.02	1.08	<1.05	1.03	Load power factor correction and voltage support if needed
San Rafi 115 kV	Base Case	P0	Base case	1.04	1.05	1.00	1.08	1.07	1.03	1.06	1.00	1.05	1.05	1.09	1.06	1.00	Load power factor correction and voltage support if needed
San Ramn 60 kV	Base Case	P0	Base case	1.05	1.06	1.00	1.08	1.07	1.03	1.05	1.02	1.06	1.06	1.09	1.06	0.99	Load power factor correction and voltage support if needed
Sanmateo 115 kV	Base Case	P0	Base case	<1.05	1.02	1.03	<1.05	1.04	<1.05	<1.05	1.03	1.02	1.02	1.08	<1.05	1.03	Load power factor correction and voltage support if needed
Sanmateo 230 kV	Base Case	P0	Base case	<1.05	1.02	1.02	<1.05	1.04	<1.05	<1.05	1.02	1.01	1.01	1.07	<1.05	1.02	Load power factor correction and voltage support if needed
Sanpaula 115 kV	Base Case	P0	Base case	<1.05	1.02	1.03	<1.05	1.04	<1.05	<1.05	1.03	1.02	1.02	1.08	<1.05	1.03	Load power factor correction and voltage support if needed
Sanramon 230 kV	Base Case	P0	Base case	1.02	1.03	0.97	1.05	1.04	1.00	1.02	0.99	1.03	1.03	1.07	1.03	0.97	Load power factor correction and voltage support if needed
Saratoga 230 kV	Base Case	P0	Base case	1.03	1.03	1.00	1.05	1.07	1.03	1.04	1.02	1.03	1.03	1.14	1.04	1.00	Load power factor correction and voltage support if needed
Sarg Cyn 60 kV	Base Case	P0	Base case	1.05	1.05	1.04	1.05	1.06	1.05	1.05	1.04	1.04	1.04	1.06	1.05	1.04	Load power factor correction and voltage support if needed
Sausalito 60 kV	Base Case	P0	Base case	1.01	1.02	0.97	1.06	1.06	1.00	1.03	0.97	1.01	1.01	1.08	1.04	0.97	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		
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Peak	2020 Winter Peak	2023 Winter Peak	2028 Winter Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen		2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations
Senter 60 kV	Base Case	P0	Base case	1.04	1.03	0.97	1.09	1.09	1.05	1.05	1.01	1.02	1.13	1.05	0.97	Load power factor correction and voltage support if needed
Serrmnte 115 kV	Base Case	P0	Base case	<1.05	1.03	1.04	<1.05	1.04	<1.05	<1.05	1.03	1.03	1.08	<1.05	1.04	Load power factor correction and voltage support if needed
Sfia 115 kV	Base Case	P0	Base case	<1.05	1.02	1.03	<1.05	1.04	<1.05	<1.05	1.03	1.02	1.08	<1.05	1.03	Load power factor correction and voltage support if needed
Shawroad 115 kV	Base Case	P0	Base case	<1.05	1.03	1.03	<1.05	1.04	<1.05	<1.05	1.03	1.03	1.08	<1.05	1.03	Load power factor correction and voltage support if needed
Shredder 115 kV	Base Case	P0	Base case	<1.05	1.02	1.02	<1.05	1.05	<1.05	<1.05	1.03	1.02	1.08	<1.05	1.02	Load power factor correction and voltage support if needed
Silverdo 115 kV	Base Case	P0	Base case	1.04	1.06	1.01	1.08	1.08	1.06	1.06	1.01	1.05	1.09	1.06	1.01	Load power factor correction and voltage support if needed
Sjb Dg 115 kV	Base Case	P0	Base case	1.02	1.01	0.97	1.06	1.06	1.03	1.04	1.01	1.01	1.10	1.03	0.97	Load power factor correction and voltage support if needed
SJB EF 115 kV	Base Case	P0	Base case	1.03	1.01	0.97	1.06	1.07	1.03	1.04	1.01	1.01	1.10	1.03	0.97	Load power factor correction and voltage support if needed
Skaggs 115 kV	Base Case	P0	Base case	1.05	1.06	1.01	1.08	1.08	1.04	1.06	1.01	1.06	1.09	1.06	1.01	Load power factor correction and voltage support if needed
Smateo3M 115 kV	Base Case	P0	Base case	<1.05	1.02	1.03	<1.05	1.04	<1.05	<1.05	1.03	1.02	1.08	<1.05	1.03	Load power factor correction and voltage support if needed
Sn Brnot 60 kV	Base Case	P0	Base case	1.05	1.04	1.08	1.02	1.05	1.03	1.03	1.07	1.00	1.13	1.01	1.04	Load power factor correction and voltage support if needed
Sn Jse A 115 kV	Base Case	P0	Base case	1.03	1.01	0.97	1.07	1.07	1.04	1.04	1.01	1.01	1.10	1.03	0.97	Load power factor correction and voltage support if needed
Sn Lndro 115 kV	Base Case	P0	Base case	1.02	1.03	1.02	1.03	1.04	1.03	1.03	1.03	1.02	1.05	1.03	1.02	Load power factor correction and voltage support if needed
Snandres 60 kV	Base Case	P0	Base case	1.04	1.04	1.07	1.02	1.05	1.03	1.03	1.06	1.01	1.12	1.01	1.04	Load power factor correction and voltage support if needed
Snth Lne 60 kV	Base Case	P0	Base case	1.05	1.04	1.08	1.02	1.05	1.03	1.03	1.07	1.00	1.13	1.01	1.04	Load power factor correction and voltage support if needed
Sobrante 230 kV	Base Case	P0	Base case	1.03	1.03	1.01	1.04	1.04	1.03	1.04	1.02	1.03	1.06	1.03	1.01	Load power factor correction and voltage support if needed
Stafford 60 kV	Base Case	P0	Base case	1.05	1.06	0.99	1.08	1.08	1.03	1.06	0.99	1.05	1.09	1.07	0.99	Load power factor correction and voltage support if needed
Stanford 60 kV	Base Case	P0	Base case	1.01	1.01	1.00	1.03	1.05	1.01	1.02	1.01	1.01	1.13	1.02	1.00	Load power factor correction and voltage support if needed
Statin D 115 kV	Base Case	P0	Base case	1.03	1.03	1.02	1.03	1.03	1.03	1.03	1.03	1.03	1.05	1.03	1.01	Load power factor correction and voltage support if needed
Statin J 115 kV	Base Case	P0	Base case	1.02	1.03	1.03	1.03	1.04	1.03	1.03	1.04	1.03	1.06	1.03	1.03	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
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Peak	2020 Winter Peak	2023 Winter Peak	2028 Winter Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations		
Statin L 115 kV	Base Case	P0	Base case	1.03	1.03	1.02	1.03	1.03	1.03	1.03	1.03	1.03	1.03	1.05	1.03	1.01	Load power factor correction and voltage support if needed
Statin X 115 kV	Base Case	P0	Base case	1.03	1.03	1.02	1.03	1.03	1.04	1.03	1.04	1.03	1.03	1.05	1.03	1.02	Load power factor correction and voltage support if needed
Stone 115 kV	Base Case	P0	Base case	1.03	1.02	0.98	1.07	1.08	1.04	1.04	1.01	1.01	1.01	1.12	1.04	0.98	Load power factor correction and voltage support if needed
Sunol 60 kV	Base Case	P0	Base case	1.04	1.05	0.99	1.07	1.07	1.03	1.04	1.01	1.04	1.04	1.09	1.04	0.99	Load power factor correction and voltage support if needed
Swift 115 kV	Base Case	P0	Base case	1.04	1.05	1.01	1.08	1.09	1.05	1.06	1.03	1.04	1.04	1.12	1.05	1.01	Load power factor correction and voltage support if needed
Tassajar 230 kV	Base Case	P0	Base case	1.03	1.03	0.99	1.05	1.04	1.02	1.04	1.01	1.02	1.02	1.07	1.03	0.99	Load power factor correction and voltage support if needed
Tesoro 230 kV	Base Case	P0	Base case	1.03	1.03	1.01	1.04	1.04	1.02	1.03	1.02	1.03	1.03	1.06	1.03	1.00	Load power factor correction and voltage support if needed
Tidewatr 230 kV	Base Case	P0	Base case	1.03	1.03	1.01	1.04	1.04	1.02	1.03	1.02	1.03	1.03	1.06	1.03	1.00	Load power factor correction and voltage support if needed
Tocaloma 60 kV	Base Case	P0	Base case	1.04	1.05	0.99	1.08	1.08	1.02	1.06	0.99	1.05	1.05	1.09	1.06	0.98	Load power factor correction and voltage support if needed
Tran230A 230 kV	Base Case	P0	Base case	<1.05	1.03	1.02	<1.05	1.05	<1.05	<1.05	1.02	1.03	1.03	1.13	<1.05	1.02	Load power factor correction and voltage support if needed
Tran230B 230 kV	Base Case	P0	Base case	<1.05	1.03	1.02	<1.05	1.05	<1.05	<1.05	1.02	1.03	1.03	1.12	<1.05	1.02	Load power factor correction and voltage support if needed
Tran-60 60 kV	Base Case	P0	Base case	<1.05	1.03	1.02	<1.05	1.05	<1.05	<1.05	1.03	1.03	1.03	1.11	<1.05	1.02	Load power factor correction and voltage support if needed
Tres Vaq 230 kV	Base Case	P0	Base case	1.02	1.02	1.01	1.05	1.05	1.03	1.03	1.02	1.02	1.02	1.07	1.03	1.01	Load power factor correction and voltage support if needed
Trimble 115 kV	Base Case	P0	Base case	<1.05	1.01	0.98	<1.05	1.05	<1.05	<1.05	1.02	1.01	1.01	1.07	<1.05	0.98	Load power factor correction and voltage support if needed
Twr2_19 60 kV	Base Case	P0	Base case	1.04	1.05	1.00	1.08	1.07	1.03	1.05	1.01	1.04	1.04	1.08	1.06	1.00	Load power factor correction and voltage support if needed
Twr2_20 60 kV	Base Case	P0	Base case	1.04	1.05	1.00	1.08	1.07	1.03	1.05	1.01	1.04	1.04	1.08	1.06	1.00	Load power factor correction and voltage support if needed
Unitedsp 115 kV	Base Case	P0	Base case	1.06	1.07	1.03	1.07	1.07	1.06	1.07	1.04	1.04	1.06	1.10	1.06	1.03	Load power factor correction and voltage support if needed
Unocal2 115 kV	Base Case	P0	Base case	1.04	1.04	1.01	1.04	1.04	1.03	1.04	1.02	1.03	1.03	1.05	1.04	1.00	Load power factor correction and voltage support if needed
Uswp-Jrw 230 kV	Base Case	P0	Base case	1.03	1.03	1.00	1.05	1.05	1.02	1.02	1.02	1.01	1.01	1.06	1.02	1.00	Load power factor correction and voltage support if needed
Vallects 60 kV	Base Case	P0	Base case	1.04	1.05	0.99	1.07	1.07	1.03	1.05	1.01	1.05	1.05	1.09	1.05	0.99	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		
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Peak	2020 Winter Peak	2023 Winter Peak	2028 Winter Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen		2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations
Vally Vw 115 kV	Base Case	P0	Base case	1.04	1.04	1.01	1.04	1.04	1.03	1.04	1.02	1.03	1.05	1.04	1.00	Load power factor correction and voltage support if needed
Vasco 60 kV	Base Case	P0	Base case	1.06	1.07	1.00	1.08	1.08	1.05	1.06	1.02	1.06	1.10	1.06	1.00	Load power factor correction and voltage support if needed
Vasona 230 kV	Base Case	P0	Base case	1.03	1.03	1.00	1.05	1.07	1.03	1.04	1.02	1.03	1.13	1.04	1.00	Load power factor correction and voltage support if needed
Vineyard 60 kV	Base Case	P0	Base case	1.05	1.07	0.99	1.08	1.07	1.04	1.05	1.01	1.06	1.10	1.06	0.99	Load power factor correction and voltage support if needed
Vineyard 230 kV	Base Case	P0	Base case	1.03	1.02	1.00	1.04	1.04	1.02	1.01	1.02	1.01	1.06	1.01	1.00	Load power factor correction and voltage support if needed
W.P.Bart 115 kV	Base Case	P0	Base case	1.06	1.06	1.03	1.06	1.06	1.05	1.06	1.04	1.06	1.09	1.06	1.02	Load power factor correction and voltage support if needed
Warnervl 230 kV	Base Case	P0	Base case	1.01	1.02	0.99	1.02	1.03	1.02	1.01	1.01	1.01	1.07	1.00	0.99	Load power factor correction and voltage support if needed
Watrshed 60 kV	Base Case	P0	Base case	1.04	1.04	1.02	1.04	1.05	1.03	1.04	1.03	1.03	1.12	1.04	1.02	Load power factor correction and voltage support if needed
Westrn_D 115 kV	Base Case	P0	Base case	1.03	1.02	1.00	1.05	1.05	1.03	1.04	1.02	1.02	1.08	1.03	1.00	Load power factor correction and voltage support if needed
Whisman 115 kV	Base Case	P0	Base case	1.03	1.02	1.01	1.05	1.04	1.03	1.05	1.03	1.02	1.06	1.04	1.02	Load power factor correction and voltage support if needed
Wnd Mstr 230 kV	Base Case	P0	Base case	1.02	1.02	1.00	1.04	1.04	1.02	1.02	1.02	1.02	1.06	1.01	1.00	Load power factor correction and voltage support if needed
Wolfe 115 kV	Base Case	P0	Base case	1.03	1.02	1.02	1.05	1.02	1.02	1.05	1.02	1.01	1.03	1.04	1.02	Load power factor correction and voltage support if needed
Woodacre 60 kV	Base Case	P0	Base case	1.04	1.05	1.00	1.08	1.08	1.03	1.05	1.00	1.04	1.09	1.06	1.00	Load power factor correction and voltage support if needed
Woodside 60 kV	Base Case	P0	Base case	1.03	1.03	1.01	1.04	1.06	1.03	1.04	1.01	1.03	1.14	1.04	1.01	Load power factor correction and voltage support if needed
Wrrnvlle 115 kV	Base Case	P0	Base case	<1.05	1.02	1.00	<1.05	1.03	<1.05	<1.05	1.01	1.01	1.07	<1.05	1.00	Load power factor correction and voltage support if needed
Wtsnvlle 60 kV	Base Case	P0	Base case	1.02	1.02	1.04	1.06	1.07	1.05	1.04	1.04	1.01	1.08	1.02	1.04	Load power factor correction and voltage support if needed
Zanker 115 kV	Base Case	P0	Base case	1.03	1.01	0.98	1.05	1.05	1.03	1.03	1.02	1.01	1.08	1.02	0.98	Load power factor correction and voltage support if needed
Zondwd 60 kV	Base Case	P0	Base case	1.06	1.07	1.00	1.08	1.08	1.05	1.06	1.02	1.07	1.10	1.06	1.00	Load power factor correction and voltage support if needed
El Patio 115 kV	El Patio-San Jose A 115kV [1520]	P1	N-1	1.06	1.06	1.01	1.10	1.11	1.06	1.07	1.03	1.06	<1.10	1.07	1.01	Load power factor correction and voltage support if needed
Caltrainssj 115 kV	Ls Estrs Svd=R	P1	N-1	<1.10	1.02	0.98	<1.10	1.08	<1.10	<1.10	1.01	1.01	1.11	<1.10	0.98	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
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Peak	2020 Winter Peak	2023 Winter Peak	2028 Winter Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations		
FMC 115 kV	Ls Estrs Svd=R	P1	N-1	1.03	1.02	0.98	1.07	1.08	1.04	1.04	1.01	1.01	1.11	1.04	0.98	Load power factor correction and voltage support if needed	
Sjb Dg 115 kV	Ls Estrs Svd=R	P1	N-1	1.03	1.02	0.98	1.08	1.08	1.04	1.04	1.02	1.02	1.12	1.04	0.98	Load power factor correction and voltage support if needed	
SJB EF 115 kV	Ls Estrs Svd=R	P1	N-1	1.03	1.02	0.99	1.08	1.08	1.04	1.05	1.02	1.02	1.12	1.04	0.98	Load power factor correction and voltage support if needed	
Mckee 115 kV	Mabury-Dixon Ld-Mckee 115kV [0]	P1	N-1	1.06	1.06	1.01	1.11	1.11	1.06	1.07	1.03	1.06	<1.10	1.07	1.01	Load power factor correction and voltage support if needed	
Millbrae 60 kV	Millbrae 115/60kV Tb 5	P1	N-1	1.06	1.06	1.15	1.08	1.17	1.04	1.07	1.14	1.06	<1.10	1.07	1.05	Load power factor correction and voltage support if needed	
Sn Brnot 60 kV	Millbrae 115/60kV Tb 5	P1	N-1	1.09	1.08	1.16	1.12	1.17	1.04	1.11	1.14	1.09	<1.10	1.11	1.05	Load power factor correction and voltage support if needed	
Snandres 60 kV	Millbrae 115/60kV Tb 5	P1	N-1	1.06	1.06	1.15	1.11	1.17	1.04	1.08	1.14	1.08	1.09	1.08	1.05	Load power factor correction and voltage support if needed	
Snth Lne 60 kV	Millbrae 115/60kV Tb 5	P1	N-1	1.09	1.08	1.16	1.12	1.17	1.05	1.11	1.14	1.09	<1.10	1.12	1.06	Load power factor correction and voltage support if needed	
Pacifica 60 kV	Millbrae-Sneath Lane 60kV [7570]	P1	N-1	1.09	1.08	1.16	1.12	1.17	1.04	1.11	1.14	1.09	<1.10	1.11	1.05	Load power factor correction and voltage support if needed	
Swift 115 kV	Milpitas-Swift 115kV [2650]	P1	N-1	1.06	1.06	1.02	1.10	1.11	1.06	1.08	1.04	1.06	<1.10	1.07	1.02	Load power factor correction and voltage support if needed	
Mrgn Hil 115 kV Area	Mrgn Hil-Grn Vily #1 115kV [0]	P1	N-1	<1.10	1.05	1.02	<1.10	1.11	<1.10	<1.10	1.04	1.05	<1.10	<1.10	1.02	Load power factor correction and voltage support if needed	
Dixon Ld 115 kV	Newark-Dixon Landing 115kV [2990]	P1	N-1	0.99	1.01	0.94	1.08	1.09	1.00	1.01	0.98	1.00	1.14	1.02	0.94	Load power factor correction and voltage support if needed	
San Francisco / Peninsula Area	Pot_Svc Svd=V	P1	N-1	1.15	1.13	1.04	1.18	1.17	1.13	1.17	1.01	1.15	1.08	1.17	1.09	Load power factor correction and voltage support if needed	
Sn Jse A 115 kV	San Jose A-San Jose B 115kV [3510]	P1	N-1	1.05	1.05	1.00	1.09	1.11	1.06	1.07	1.03	1.05	<1.10	1.07	1.00	Load power factor correction and voltage support if needed	
Evergren 60 kV	San Jose B-Stone-Evergreen 115kV [1550]	P1	N-1	1.05	1.05	0.99	1.11	1.12	1.06	1.07	1.02	1.04	<1.10	1.07	0.99	Load power factor correction and voltage support if needed	
Jennings 60 kV	San Jose B-Stone-Evergreen 115kV [1550]	P1	N-1	1.05	1.05	0.99	1.11	1.12	1.06	1.07	1.02	1.04	<1.10	1.07	0.99	Load power factor correction and voltage support if needed	
Mabury 60 kV	San Jose B-Stone-Evergreen 115kV [1550]	P1	N-1	1.05	1.05	0.99	1.11	1.12	1.06	1.07	1.02	1.04	<1.10	1.07	0.99	Load power factor correction and voltage support if needed	
Senter 60 kV	San Jose B-Stone-Evergreen 115kV [1550]	P1	N-1	1.05	1.05	0.99	1.11	1.12	1.06	1.07	1.02	1.04	<1.10	1.07	0.99	Load power factor correction and voltage support if needed	
Stone 115 kV	San Jose B-Stone-Evergreen 115kV [1550]	P1	N-1	1.04	1.04	1.00	1.10	1.11	1.05	1.06	1.02	1.03	<1.10	1.06	1.00	Load power factor correction and voltage support if needed	
Bair 60 kV	Bair - Ma 60kV & Bair-Cooley Landing #2 Line	P2	Non-Bus-Tie Breaker	1.06	1.06	1.05	1.08	1.08	1.06	1.07	1.06	1.06	1.11	1.06	1.05	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		
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Peak	2020 Winter Peak	2023 Winter Peak	2028 Winter Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen		2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations
Blle Hvn 60 kV	Cly Lndg - 1D 60kV & Bair-Cooley Landing #2 Line	P2	Non-Bus-Tie Breaker	1.06	1.06	0.99	1.08	1.08	1.06	1.04	1.00	1.06	1.12	1.06	0.99	Load power factor correction and voltage support if needed
San Crls 60 kV	Cly Lndg - 1D 60kV & Bair-Cooley Landing #2 Line	P2	Non-Bus-Tie Breaker	1.05	1.05	1.01	1.07	1.07	1.05	1.04	1.02	1.05	1.10	1.05	1.01	Load power factor correction and voltage support if needed
Bartlp 115 kV	Dixon Ld 115kV Section 1D	P2	Bus	1.04	1.05	1.00	1.10	1.11	1.05	1.06	1.02	1.05	<1.10	1.06	1.00	Load power factor correction and voltage support if needed
Mabury 115 kV	Dixon Ld 115kV Section 1D	P2	Bus	1.04	1.05	1.00	1.10	1.11	1.05	1.06	1.02	1.05	<1.10	1.06	1.00	Load power factor correction and voltage support if needed
Mckee 115 kV	Dixon Ld 115kV Section 1D	P2	Bus	1.06	1.06	1.03	1.11	1.11	1.06	1.07	1.05	1.06	<1.10	1.08	1.03	Load power factor correction and voltage support if needed
Eastshre 115 kV	Eastshre 115kV - Section Me & Md	P2	Bus-Tie Breaker	1.04	1.04	1.10	1.02	1.03	1.04	1.03	1.08	1.04	1.05	1.03	1.10	Load power factor correction and voltage support if needed
Egbert 230 kV	Egbert 230kV - Middle Breaker Bay 1	P2	Bus-Tie Breaker	<1.10	1.06	1.01	<1.10	1.07	<1.10	<1.10	1.04	1.06	1.17	<1.10	1.01	Load power factor correction and voltage support if needed
Bollman 115 kV	Martnz E 115kV Section 1E	P2	Bus	1.06	1.07	1.03	1.07	1.08	1.06	1.07	1.04	1.07	1.11	1.07	1.03	Load power factor correction and voltage support if needed
Imhoff 115 kV	Martnz E 115kV Section 1E	P2	Bus	1.06	1.07	1.04	1.07	1.07	1.06	1.06	1.05	1.06	1.11	1.06	1.04	Load power factor correction and voltage support if needed
W.P.Bart 115 kV	Martnz E 115kV Section 1E	P2	Bus	1.06	1.07	1.03	1.07	1.08	1.06	1.07	1.04	1.07	1.12	1.07	1.03	Load power factor correction and voltage support if needed
Martin 60 kV	Millbrae 115kV - Section 1F & 1E	P2	Bus-Tie Breaker	1.15	1.13	1.01	1.18	1.18	1.15	1.15	0.93	1.15	<1.10	1.15	1.10	Load power factor correction and voltage support if needed
Millbrae 60 kV	Millbrae 115kV - Section 1F & 1E	P2	Bus-Tie Breaker	1.06	1.07	1.16	1.17	1.18	1.04	1.07	1.14	1.01	<1.10	1.07	1.08	Load power factor correction and voltage support if needed
Pacifica 60 kV	Millbrae 115kV - Section 1F & 1E	P2	Bus-Tie Breaker	1.07	1.07	1.17	1.17	1.18	1.05	1.09	1.15	1.00	<1.10	1.10	1.09	Load power factor correction and voltage support if needed
Sn Brnot 60 kV	Millbrae 115kV - Section 1F & 1E	P2	Bus-Tie Breaker	1.06	1.07	1.16	1.17	1.18	1.04	1.09	1.14	1.00	<1.10	1.09	1.08	Load power factor correction and voltage support if needed
Snandres 60 kV	Millbrae 115kV - Section 1F & 1E	P2	Bus-Tie Breaker	1.06	1.07	1.16	1.17	1.18	1.04	1.08	1.14	1.00	<1.10	1.08	1.08	Load power factor correction and voltage support if needed
Snth Lne 60 kV	Millbrae 115kV - Section 1F & 1E	P2	Bus-Tie Breaker	1.07	1.07	1.18	1.17	1.18	1.06	1.09	1.17	1.00	<1.10	1.10	1.10	Load power factor correction and voltage support if needed
Lk_React 115 kV	Moraga 115kV Section 1D	P2	Bus	1.05	1.06	1.01	1.07	1.08	1.06	1.06	1.03	1.06	1.11	1.06	1.01	Load power factor correction and voltage support if needed
Chsr04A 115 kV	Mrgn Hil 115kV - Middle Breaker Bay 3	P2	Bus-Tie Breaker	<1.10	1.04	1.03	<1.10	1.11	<1.10	<1.10	1.04	1.04	<1.10	<1.10	1.03	Load power factor correction and voltage support if needed
Chsr04B 115 kV	Mrgn Hil 115kV - Middle Breaker Bay 3	P2	Bus-Tie Breaker	<1.10	1.04	1.03	<1.10	1.11	<1.10	<1.10	1.04	1.04	<1.10	<1.10	1.03	Load power factor correction and voltage support if needed
Gilroy 115 kV	Mrgn Hil 115kV - Middle Breaker Bay 3	P2	Bus-Tie Breaker	1.04	1.04	1.03	1.09	1.11	1.04	1.05	1.04	1.04	<1.10	1.04	1.03	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
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Peak	2020 Winter Peak	2023 Winter Peak	2028 Winter Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations		
Gilroy F 115 kV	Mrgn Hil 115kV - Middle Breaker Bay 3	P2	Bus-Tie Breaker	1.04	1.04	1.03	1.09	1.11	1.04	1.05	1.04	1.04	<1.10	1.04	1.03	Load power factor correction and voltage support if needed	
Gilroypk 115 kV	Mrgn Hil 115kV - Middle Breaker Bay 3	P2	Bus-Tie Breaker	1.04	1.04	1.03	1.09	1.11	1.04	1.05	1.04	1.04	<1.10	1.04	1.03	Load power factor correction and voltage support if needed	
Llagas 115 kV	Mrgn Hil 115kV - Middle Breaker Bay 3	P2	Bus-Tie Breaker	1.04	1.04	1.03	1.09	1.11	1.04	1.05	1.04	1.04	<1.10	1.04	1.03	Load power factor correction and voltage support if needed	
Mrgn Hil 115 kV	Mrgn Hil 115kV - Middle Breaker Bay 3	P2	Bus-Tie Breaker	<1.10	1.05	1.02	<1.10	1.11	<1.10	1.06	1.04	1.05	<1.10	<1.10	1.02	Load power factor correction and voltage support if needed	
Bartrc 115 kV	Newark F 115kV - Section 1F & 2F	P2	Bus-Tie Breaker	1.03	1.04	0.96	1.11	1.12	1.05	1.05	0.99	1.04	1.16	1.05	0.96	Load power factor correction and voltage support if needed	
Dixon Ld 115 kV	Newark F 115kV - Section 1F & 2F	P2	Bus-Tie Breaker	0.99	1.01	0.94	1.09	1.10	1.00	1.01	0.98	1.00	1.14	1.03	0.94	Load power factor correction and voltage support if needed	
Milpitas 115 kV	Newark F 115kV - Section 1F & 2F	P2	Bus-Tie Breaker	1.03	1.05	0.96	1.11	1.12	1.05	1.05	0.99	1.04	1.16	1.05	0.96	Load power factor correction and voltage support if needed	
Swift 115 kV	Newark F 115kV - Section 1F & 2F	P2	Bus-Tie Breaker	1.06	1.06	1.02	1.10	1.12	1.07	1.08	1.04	1.06	<1.10	1.07	1.02	Load power factor correction and voltage support if needed	
Rvnswd E 115 kV	Rvnswd E 115kV - Section 1E & 2E	P2	Bus-Tie Breaker	1.06	1.06	1.06	1.08	1.08	1.07	1.06	1.07	1.06	1.12	1.06	1.06	Load power factor correction and voltage support if needed	
Beresfrd 60 kV	San Mato 60kV - Section 2D & 1D	P2	Bus-Tie Breaker	1.04	1.04	1.02	1.04	1.06	1.04	1.05	1.02	1.04	1.14	1.05	1.02	Load power factor correction and voltage support if needed	
Hillsdle 60 kV	San Mato 60kV - Section 2D & 1D	P2	Bus-Tie Breaker	1.04	1.04	1.02	1.04	1.06	1.04	1.05	1.03	1.04	1.14	1.05	1.02	Load power factor correction and voltage support if needed	
Markham 115 kV	Sjb Dg Section 1D & SJB EF Section 1F 115kV	P2	Bus-Tie Breaker	1.05	1.05	1.01	1.10	1.12	1.06	1.07	1.03	1.05	<1.10	1.07	1.01	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	1.06	1.06	1.01	1.10	1.12	1.07	1.07	1.04	1.06	<1.10	1.08	1.01	Load power factor correction and voltage support if needed	
Evergren 60 kV	SJB EF - 1F 115kV & San Jose B-Stone-Evergreen Line	P2	Non-Bus-Tie Breaker	1.06	1.05	1.00	1.12	1.13	1.07	1.08	1.02	1.05	<1.10	1.08	1.00	Load power factor correction and voltage support if needed	
Ibm-Hr J 115 kV	SJB EF - 1F 115kV & San Jose B-Stone-Evergreen Line	P2	Non-Bus-Tie Breaker	1.06	1.06	1.03	1.10	1.11	1.07	1.07	1.05	1.06	<1.10	1.08	1.03	Load power factor correction and voltage support if needed	
Jennings 60 kV	SJB EF - 1F 115kV & San Jose B-Stone-Evergreen Line	P2	Non-Bus-Tie Breaker	1.06	1.05	1.00	1.12	1.13	1.07	1.08	1.02	1.05	<1.10	1.08	1.00	Load power factor correction and voltage support if needed	
Mabury 60 kV	SJB EF - 1F 115kV & San Jose B-Stone-Evergreen Line	P2	Non-Bus-Tie Breaker	1.06	1.05	0.99	1.12	1.13	1.07	1.07	1.02	1.05	<1.10	1.08	0.99	Load power factor correction and voltage support if needed	
Senter 60 kV	SJB EF - 1F 115kV & San Jose B-Stone-Evergreen Line	P2	Non-Bus-Tie Breaker	1.06	1.05	1.00	1.12	1.13	1.07	1.08	1.02	1.05	<1.10	1.08	1.00	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	1.06	1.06	1.00	1.10	1.12	1.07	1.07	1.02	1.06	1.16	1.08	1.00	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	1.06	1.06	1.01	1.10	1.12	1.07	1.07	1.03	1.06	<1.10	1.08	1.01	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
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Peak	2020 Winter Peak	2023 Winter Peak	2028 Winter Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations		
Stone 115 kV	SJB EF - 1F 115kV & San Jose B-Stone-Evergreen Line	P2	Non-Bus-Tie Breaker	1.05	1.04	1.01	1.11	1.12	1.06	1.06	1.04	1.04	1.09	1.07	1.01	Load power factor correction and voltage support if needed	
Almaden 60 kV	Mtcal E 115kV - Section 1E & 2E	P2	Bus-Tie Breaker	1.00	0.97	0.86	1.08	1.08	1.01	1.03	0.94	0.97	>0.9	1.02	0.86	Continue to monitor future load forecast	
Jennings 60 kV	Mtcal E 115kV - Section 1E & 2E	P2	Bus-Tie Breaker	1.00	0.98	0.88	1.07	1.07	1.01	1.02	0.96	0.98	>0.9	1.02	0.88	Continue to monitor future load forecast	
Mabury 60 kV	Mtcal E 115kV - Section 1E & 2E	P2	Bus-Tie Breaker	1.00	0.98	0.88	1.07	1.07	1.01	1.02	0.96	0.97	>0.9	1.02	0.88	Continue to monitor future load forecast	
Stone 115 kV	Mtcal E 115kV - Section 1E & 2E	P2	Bus-Tie Breaker	0.99	0.97	0.89	1.06	1.06	1.01	1.01	0.96	0.97	1.09	1.01	0.89	Continue to monitor future load forecast	
Claytn 115 kV	Pitsburg 115kV - Section 2D & 2E	P2	Bus-Tie Breaker	0.93	0.96	0.54	1.06	1.06	1.03	0.99	0.86	0.95	1.08	0.99	0.53	Continue to monitor future load forecast	
Ebmudgry 115 kV	Pitsburg 115kV - Section 2D & 2E	P2	Bus-Tie Breaker	0.93	0.96	0.53	1.06	1.06	1.03	0.99	0.86	0.95	1.08	0.99	0.52	Continue to monitor future load forecast	
Lakewd-C 115 kV	Pitsburg 115kV - Section 2D & 2E	P2	Bus-Tie Breaker	0.93	0.96	0.59	1.06	1.06	1.03	0.99	0.89	0.95	1.08	0.99	0.59	Continue to monitor future load forecast	
Lakewd-M 115 kV	Pitsburg 115kV - Section 2D & 2E	P2	Bus-Tie Breaker	0.94	0.96	0.60	1.06	1.06	1.03	0.99	0.89	0.95	1.08	0.99	0.59	Continue to monitor future load forecast	
Medw Lne 115 kV	Pitsburg 115kV - Section 2D & 2E	P2	Bus-Tie Breaker	0.93	0.97	0.52	1.06	1.06	1.04	0.99	0.85	0.95	1.08	0.99	0.52	Continue to monitor future load forecast	
Con25 115 kV	Sobrante 115kV - Section 1D & 2D	P2	Bus-Tie Breaker	1.02	1.02	0.98	1.05	1.05	0.98	1.03	0.97	1.02	1.06	1.04	0.87	Sensitivity only	
El Crrto 115 kV	Sobrante 115kV - Section 1D & 2D	P2	Bus-Tie Breaker	1.01	1.01	0.95	1.04	1.05	0.96	1.02	0.94	1.01	1.06	1.04	0.84	Sensitivity only	
Franklin 60 kV	Sobrante 115kV - Section 1D & 2D	P2	Bus-Tie Breaker	1.02	1.01	1.01	1.02	1.03	1.01	1.02	1.00	1.01	1.03	1.02	0.88	Sensitivity only	
Prt Csta 60 kV	Sobrante 115kV - Section 1D & 2D	P2	Bus-Tie Breaker	1.02	1.01	1.02	1.02	1.02	1.01	1.01	1.01	1.01	1.03	1.03	0.89	Sensitivity only	
Sfpp Cnc 60 kV	Sobrante 115kV - Section 1D & 2D	P2	Bus-Tie Breaker	1.03	0.99	1.01	1.01	1.01	1.00	1.00	1.01	1.00	1.01	1.03	0.88	Sensitivity only	
Urich 60 kV	Sobrante 115kV - Section 1D & 2D	P2	Bus-Tie Breaker	1.03	1.00	1.01	1.01	1.01	1.00	1.00	1.01	1.00	1.02	1.03	0.88	Sensitivity only	
Vally Vw 115 kV	Sobrante 115kV - Section 1D & 2D	P2	Bus-Tie Breaker	1.01	1.01	0.96	1.04	1.05	0.96	1.02	0.95	1.01	1.07	1.04	0.85	Sensitivity only	
Area-Wide Low Voltage	Mec Ctg1 18.00kV & Mec Ctg2 18.00kV & Mec Stg1 18.00kV Gen Units & Dec Stg1 24.00kV & Dec Ctg1 18.00kV & Dec Ctg2 18.00kV & Dec Ctg3 18.00kV Gen Units	P3	G1/N1	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	0.86	Continue to monitor future load forecast	
Egbert 230 kV	Martin-Egbert 230kV [998] & H-Z #1 230kV [9981]	P6	N-1-1	NA	<1.10	<1.10	NA	<1.10	NA	<1.10	<1.10	<1.10	1.17	NA	<1.10	Load power factor correction and voltage support if needed	
Blle Hvn 60 kV	Cly Lnd 115/60kV Tb 1 & Cly Lnd2 115/60kV Tb 2	P6	N-1-1	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	1.11	<1.10	<1.10	Load power factor correction and voltage support if needed	
Glenwood 60 kV	Cly Lnd 115/60kV Tb 1 & Cly Lnd2 115/60kV Tb 2	P6	N-1-1	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	0.90	<1.10	1.11	<1.10	0.90	Continue to monitor future load forecast	
Nrthgrum 60 kV	Cly Lnd 115/60kV Tb 1 & Cly Lnd2 115/60kV Tb 2	P6	N-1-1	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	0.90	<1.10	1.10	<1.10	<1.10	Continue to monitor future load forecast	
S.R.I. 60 kV	Cly Lnd 115/60kV Tb 1 & Cly Lnd2 115/60kV Tb 2	P6	N-1-1	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	1.11	<1.10	<1.10	Load power factor correction and voltage support if needed	
Menlo 60 kV	Cly Lnd 115/60kV Tb 1 & Cly Lnd2 115/60kV Tb 2	P6	N-1-1	>0.9	>0.9	0.90	>0.9	>0.9	>0.9	>0.9	0.89	>0.9	1.11	>0.9	0.89	Continue to monitor future load forecast	
Lonetree 230 kV	Contra Costa-Lone Tree 230kV [4535] & Vineyard Svd=V	P6	N-1-1	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	1.11	<1.10	<1.10	Load power factor correction and voltage support if needed	
Uswp-Jrw 230 kV	Contra Costa-Lone Tree 230kV [4535] & Vineyard Svd=V	P6	N-1-1	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	1.11	<1.10	<1.10	Load power factor correction and voltage support if needed	
Markham 115 kV	FMC-San Jose B 115kV [2021] & Trimble-San Jose B 115kV [4030]	P6	N-1-1	<1.10	<1.10	<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	



Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)									Voltage PU (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Peak	2020 Winter Peak	2023 Winter Peak	2028 Winter Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations		
Crystlsg 60 kV	Jeffersn 230/60kV Tb 1 & Jeffersn 230/60kV Tb 2	P6	N-1-1	0.89	0.89	0.86	>0.9	>0.9	0.81	0.90	0.78	0.89	>0.9	>0.9	0.86	Project: Jefferson - Stanford #2 60 kV Line Review Stanford 60 kV system configuration	
Emrld Le 60 kV	Jeffersn 230/60kV Tb 1 & Jeffersn 230/60kV Tb 2	P6	N-1-1	0.90	0.89	0.87	>0.9	>0.9	0.81	0.90	0.79	0.90	>0.9	>0.9	0.87	Project: Jefferson - Stanford #2 60 kV Line Review Stanford 60 kV system configuration	
Las Plgs 60 kV	Jeffersn 230/60kV Tb 1 & Jeffersn 230/60kV Tb 2	P6	N-1-1	0.89	0.89	0.85	>0.9	>0.9	0.80	0.89	0.76	0.89	>0.9	>0.9	0.85	Project: Jefferson - Stanford #2 60 kV Line Review Stanford 60 kV system configuration	
Ralston 60 kV	Jeffersn 230/60kV Tb 1 & Jeffersn 230/60kV Tb 2	P6	N-1-1	0.89	0.89	0.86	>0.9	>0.9	0.81	0.90	0.78	0.89	>0.9	>0.9	0.86	Project: Jefferson - Stanford #2 60 kV Line Review Stanford 60 kV system configuration	
Stanford 60 kV	Jeffersn 230/60kV Tb 1 & Jeffersn 230/60kV Tb 2	P6	N-1-1	0.86	0.86	0.84	>0.9	>0.9	0.78	0.87	0.76	0.87	>0.9	>0.9	0.85	Project: Jefferson - Stanford #2 60 kV Line Review Stanford 60 kV system configuration	
Watrshed 60 kV	Jeffersn 230/60kV Tb 1 & Jeffersn 230/60kV Tb 2	P6	N-1-1	>0.9	>0.9	0.90	>0.9	>0.9	0.85	>0.9	0.83	>0.9	>0.9	>0.9	0.90	Project: Jefferson - Stanford #2 60 kV Line Review Stanford 60 kV system configuration	
Woodside 60 kV	Jeffersn 230/60kV Tb 1 & Jeffersn 230/60kV Tb 2	P6	N-1-1	0.89	0.89	0.85	>0.9	>0.9	0.80	0.90	0.77	0.90	>0.9	>0.9	0.86	Project: Jefferson - Stanford #2 60 kV Line Review Stanford 60 kV system configuration	
Agnew 115 kV	Ls Estrs Svd=R & Newark E-F Bus Tie 230kV [4640]	P6	N-1-1	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	1.12	<1.10	<1.10	Load power factor correction and voltage support if needed	
Cp Lecef 115 kV	Ls Estrs Svd=R & Newark E-F Bus Tie 230kV [4640]	P6	N-1-1	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	1.12	<1.10	<1.10	Load power factor correction and voltage support if needed	
Ls Estrs 115 kV	Ls Estrs Svd=R & Newark E-F Bus Tie 230kV [4640]	P6	N-1-1	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	1.12	<1.10	<1.10	Load power factor correction and voltage support if needed	
Ls Estrs 230 kV	Ls Estrs Svd=R & Newark E-F Bus Tie 230kV [4640]	P6	N-1-1	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	1.13	<1.10	<1.10	Load power factor correction and voltage support if needed	
Montague 115 kV	Ls Estrs Svd=R & Newark E-F Bus Tie 230kV [4640]	P6	N-1-1	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	1.12	<1.10	<1.10	Load power factor correction and voltage support if needed	
Nortech 115 kV	Ls Estrs Svd=R & Newark E-F Bus Tie 230kV [4640]	P6	N-1-1	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	1.12	<1.10	<1.10	Load power factor correction and voltage support if needed	
NRS 230 kV	Ls Estrs Svd=R & Newark E-F Bus Tie 230kV [4640]	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	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
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Peak	2020 Winter Peak	2023 Winter Peak	2028 Winter Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations		
Nwk Dist 230 kV	Ls Estrs Svd=R & Newark E-F Bus Tie 230kV [4640]	P6	N-1-1	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	1.13	<1.10	<1.10	Load power factor correction and voltage support if needed
SSS 230 kV	Ls Estrs Svd=R & Newark E-F Bus Tie 230kV [4640]	P6	N-1-1	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	1.11	<1.10	<1.10	Load power factor correction and voltage support if needed
Trimble 115 kV	Ls Estrs Svd=R & Newark E-F Bus Tie 230kV [4640]	P6	N-1-1	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	1.12	<1.10	<1.10	Load power factor correction and voltage support if needed
Calmat60 60 kV	Ls Pstas 230/60kV Tb 4 & Newark D 115/60kV Tb 1	P6	N-1-1	<1.10	1.10	0.87	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	1.11	<1.10	<1.10	0.88	Continue to monitor future load forecast
Flowind1 60 kV	Ls Pstas 230/60kV Tb 4 & Newark D 115/60kV Tb 1	P6	N-1-1	<1.10	1.13	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	1.14	<1.10	1.12	<1.10	Load power factor correction and voltage support if needed
Forebaywind 60 kV	Ls Pstas 230/60kV Tb 4 & Newark D 115/60kV Tb 1	P6	N-1-1	<1.10	1.13	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	1.14	<1.10	1.11	<1.10	Load power factor correction and voltage support if needed
Frickwnd 60 kV	Ls Pstas 230/60kV Tb 4 & Newark D 115/60kV Tb 1	P6	N-1-1	<1.10	1.13	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	1.13	<1.10	1.12	<1.10	Load power factor correction and voltage support if needed
luka 60 kV	Ls Pstas 230/60kV Tb 4 & Newark D 115/60kV Tb 1	P6	N-1-1	<1.10	1.12	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	1.12	<1.10	<1.10	<1.10	Load power factor correction and voltage support if needed
Livermre 60 kV	Ls Pstas 230/60kV Tb 4 & Newark D 115/60kV Tb 1	P6	N-1-1	<1.10	1.13	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	1.13	<1.10	<1.10	<1.10	Load power factor correction and voltage support if needed
Lpostas 60 kV	Ls Pstas 230/60kV Tb 4 & Newark D 115/60kV Tb 1	P6	N-1-1	<1.10	1.13	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	1.13	1.17	1.11	<1.10	Load power factor correction and voltage support if needed
Newark 60 kV	Ls Pstas 230/60kV Tb 4 & Newark D 115/60kV Tb 1	P6	N-1-1	<1.10	1.12	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	1.12	<1.10	<1.10	<1.10	Load power factor correction and voltage support if needed
Parks 60 kV	Ls Pstas 230/60kV Tb 4 & Newark D 115/60kV Tb 1	P6	N-1-1	<1.10	1.10	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	1.11	<1.10	<1.10	<1.10	Load power factor correction and voltage support if needed
Radum 60 kV	Ls Pstas 230/60kV Tb 4 & Newark D 115/60kV Tb 1	P6	N-1-1	<1.10	1.12	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	1.12	<1.10	<1.10	<1.10	Load power factor correction and voltage support if needed
Sunol 60 kV	Ls Pstas 230/60kV Tb 4 & Newark D 115/60kV Tb 1	P6	N-1-1	<1.10	1.11	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	1.11	<1.10	<1.10	<1.10	Load power factor correction and voltage support if needed
Vallects 60 kV	Ls Pstas 230/60kV Tb 4 & Newark D 115/60kV Tb 1	P6	N-1-1	<1.10	1.12	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	1.11	<1.10	<1.10	<1.10	Load power factor correction and voltage support if needed
Vasco 60 kV	Ls Pstas 230/60kV Tb 4 & Newark D 115/60kV Tb 1	P6	N-1-1	<1.10	1.13	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	1.13	<1.10	1.10	<1.10	Load power factor correction and voltage support if needed
Vineyard 60 kV	Ls Pstas 230/60kV Tb 4 & Newark D 115/60kV Tb 1	P6	N-1-1	<1.10	1.12	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	1.12	<1.10	<1.10	<1.10	Load power factor correction and voltage support if needed
Zondwd 60 kV	Ls Pstas 230/60kV Tb 4 & Newark D 115/60kV Tb 1	P6	N-1-1	<1.10	1.13	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	1.14	<1.10	1.11	<1.10	Load power factor correction and voltage support if needed
Milpitas 115 kV	Newark-Milpitas #1 115kV [3070] & Newark-Milpitas #2 115kV [3080]	P6	N-1-1	<1.10	<1.10	<1.10	1.11	1.12	<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
San Ramn 60 kV	Sanramon 230/60kV Tb 1 & Ls Pstas 230/60kV Tb 4	P6	N-1-1	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	1.11	<1.10	<1.10	<1.10	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
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Peak	2020 Winter Peak	2023 Winter Peak	2028 Winter Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations		
0162-Wd 230 kV	Vineyard Svd=V & Contra Costa-Lone Tree 230kV [4535]	P6	N-1-1	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	1.11	<1.10	<1.10	Load power factor correction and voltage support if needed
Cayetano 230 kV	Vineyard Svd=V & Contra Costa-Lone Tree 230kV [4535]	P6	N-1-1	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	1.11	<1.10	<1.10	Load power factor correction and voltage support if needed
Vineyard 230 kV	Vineyard Svd=V & Vineyard-Newark 230kV [9938]	P6	N-1-1	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	<1.10	1.11	<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			
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Peak	2020 Winter Peak	2023 Winter Peak	2028 Winter Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen		2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations	
Pacifica 60 kV	Martin C Svd=V	P1	N-1	1	5	12	3	1	1	1	1	10	4	0	3	9	Load power factor correction and voltage support if needed
Piercy 115 kV	Piercy-Metcalf 115kV [4318]	P1	N-1	5	4	9	2	3	5	4	4	7	4	4	4	8	Load power factor correction and voltage support if needed
Sn Brnot 60 kV	Martin C Svd=V	P1	N-1	2	5	12	3	1	2	2	2	9	4	0	3	9	Load power factor correction and voltage support if needed
Snandres 60 kV	Martin C Svd=V	P1	N-1	2	4	10	4	2	2	2	2	8	5	3	4	8	Load power factor correction and voltage support if needed
Snth Lne 60 kV	Martin C Svd=V	P1	N-1	4	5	12	3	1	4	4	4	10	4	0	4	9	Load power factor correction and voltage support if needed
Area-Wide High Voltage Deviation	Mec Ctg1 18.00kV & Mec Ctg2 18.00kV & Mec Stg1 18.00kV Gen Units & Dec Stg1 24.00kV & Dec Ctg1 18.00kV & Dec Ctg2 18.00kV & Dec Ctg3 18.00kV Gen Units	P3	G1/N1	<8	<8	<8	<8	<8	<8	<8	<8	<8	<8	<8	<8	14	Sensitivity only

Study Area:

PG&E Greater Bay Area

Transient Stability



Contingency	Category	Category Description	Transient Stability Performance					Potential Mitigation Solutions
			Baseline Scenarios			Sensitivity Scenarios		
			2020 Summer Peak	2028 Summer Peak	2023 Spring Off-Peak	2020 SP Heavy Renewable & Min Gas Gen	2023 SpOP Hi Renew & Min Gas Gen	
Metcalf 500/230 kV #13 Transformer 3Ø fault with normal clearing.	P1-3	N-1	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	WECC criteria not met	Stable/WECC criteria met	Sensitivity only.
Metcalf 500/230 kV #13 Transformer 3Ø fault with normal clearing with LMEC offline in the base case.	P3-3	G-1/N-1	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	WECC criteria not met	Stable/WECC criteria met	Sensitivity only.
Metcalf 500/230 kV #13 Transformer SLG fault with delayed clearing.	P5-3	Non-Redundant Relay	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Tesla-Newark 230 kV line 3Ø fault with normal clearing with Metcalf 500/230 kV #13 Transformer offline in the base case.	P6-1	N-1-1	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	WECC criteria not met	Stable/WECC criteria met	Sensitivity only.
Metcalf 230 kV bus 3Ø fault with normal clearing with Metcalf 500/230 kV #13 Transformer offline in the base case.	P6-2	N-1-1	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	WECC criteria not met	Stable/WECC criteria met	Sensitivity only.
Contra Costa-Gateway 230 kV SLG fault with delayed clearing.	P5-2	Non-Redundant Relay	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Contra Costa-Gateway 230 kV SLG fault expanded to elements lost due to stuck breaker and clear fault from remote breakers with normal clearing time.	P4-2	Stuck Breaker	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
TBC SLG fault with normal clearing.	P1-5	N-1	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Diverge	Stable/WECC criteria met	Sensitivity only. Numerical issue.
TBC SLG fault with normal clearing with LMEC offline in the base case.	P3-5	G-1/N-1	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Diverge	Stable/WECC criteria met	Sensitivity only. Numerical issue.
TBC SLG fault with normal clearing with Tesla-Newark 230 kV line offline in the base case.	P6-4	N-1-1	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Diverge	Stable/WECC criteria met	Sensitivity only. Numerical issue.
Newark 230 kV 3Ø fault with normal clearing.	P1-2	N-1	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Tesla-Newark 230 kV line 3Ø fault with normal clearing with LMEC offline in the base case.	P3-2	G-1/N-1	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	WECC criteria not met	Stable/WECC criteria met	Sensitivity only.
Monta Vista 230 kV SVD 3Ø fault with normal clearing.	P1-4	N-1	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	WECC criteria not met	Stable/WECC criteria met	Sensitivity only.
Monta Vista 230 kV SVD 3Ø fault with normal clearing with LMEC offline in the base case.	P3-4	G-1/N-1	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	WECC criteria not met	Stable/WECC criteria met	Sensitivity only.
Monta Vista 230 kV SVD SLG fault expanded to elements lost due to stuck breaker and clear fault from remote breakers with normal clearing time.	P4-4	Stuck Breaker	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Monta Vista 230 kV SVD SLG fault with delayed clearing.	P5-4	Non-Redundant Relay	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Ravenswood 230 kV SVD 3Ø fault with normal clearing with Monta Vista 230 kV SVD offline in the base case.	P6-3	N-1-1	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	WECC criteria not met	Stable/WECC criteria met	Sensitivity only.
Metcalf 230 kV bus SLG fault with normal clearing.	P2-2	Bus	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Metcalf 230 kV line breaker SLG fault with normal clearing.	P2-3	Non-Bus-Tie Breaker	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	WECC criteria not met	Stable/WECC criteria met	Sensitivity only.
Metcalf 230 kV bus-tie breaker SLG fault with normal clearing.	P2-4	Bus-Tie Breaker	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	WECC criteria not met	Stable/WECC criteria met	Sensitivity only.
Metcalf 500/230 kV #13 Transformer SLG fault expanded to elements lost due to stuck breaker and clear fault from remote breakers with normal clearing time.	P4-3	Stuck Breaker	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Crocket 3Ø fault with normal clearing with LMEC offline in the base case.	P3-1	G-1/N-1	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
LMEC 3Ø fault with normal clearing.	P1-1	N-1	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation



Contingency	Category	Category Description	Transient Stability Performance					Potential Mitigation Solutions
			Baseline Scenarios			Sensitivity Scenarios		
			2020 Summer Peak	2028 Summer Peak	2023 Spring Off-Peak	2020 SP Heavy Renewable & Min Gas Gen	2023 SpOP Hi Renew & Min Gas Gen	
DEC 3Ø fault with normal clearing.	P1-1	N-1	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Metcalfe 115 kV bus SVD SLG fault expanded to elements lost due to stuck breaker and clear fault from remote breakers with normal clearing time.	P4-5	Stuck Breaker	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Metcalfe 115 kV bus-tie breaker SVD SLG fault expanded to elements lost due to stuck breaker and clear fault from remote breakers with normal clearing time.	P4-6	Stuck Breaker	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Metcalfe 115 kV bus SLG fault with delayed clearing.	P5-5	Non-Redundant Relay	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Los Esteros SLG fault expanded to elements lost due to stuck breaker and clear fault from remote breakers with normal clearing time.	P4-1	Stuck Breaker	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Los Esteros SLG fault with delayed clearing.	P5-1	Non-Redundant Relay	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Contra Costa-Moraga # 1 & 2 230 kV lines SLG fault with successful high speed reclose.	P7-1	DCTL	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Contra Costa-Moraga # 1 & 2 230 kV lines SLG fault with unsuccessful high speed reclose.	P7-1	DCTL	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Tesla-Newark & Tesla-Ravenswood 230 kV lines SLG fault with successful high speed reclose.	P7-1	DCTL	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Diverge	Stable/WECC criteria met	Sensitivity only.
Tesla-Newark & Tesla-Ravenswood 230 kV lines SLG fault with unsuccessful high speed reclose.	P7-1	DCTL	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation

Study Area: **PG&E 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
	2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	Select..	Select..	Select..	Select..	Select..	Select..	Select..	
Kirker	102	102	103								Mitigation under development

Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading % (Baseline Scenarios)					Loading % (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations	
30500 BELLOTA 230 30515 WARNERVL 230 1 1	MUSTANGSS-GATES #1 230KV [0] & MUSTANGSS-GATES #2 230KV [0]	P7	DCTL	3	22	3	86	74	52	102	98	4	Sensitivity Only
30515 WARNERVL 230 30516 WILSONRCTR 230 1 1	GREGG 230 KV BAAH BUS #1 (FAILURE OF NON-REDUNDENT RELAY)	P5	Non-Redundent Relay	117	145	128	50	58	122	76	22	129	Protection Upgrade
	MUSTANGSS-GATES #1 230KV [0] & MUSTANGSS-GATES #2 230KV [0]	P7	DCTL	32	59.56	42	69	79	34.5	111	97	43	Sensitivity Only
30765 LOSBANOS 230 30790 PANOCH 230 1 1	PANOCH 230KV Section 2E	P2	Bus/Breaker	21	15	23	92	82	19	115	96	24	Sensitivity Only
	PANOCH 230KV - Section 2D & 2E	P2	Bus/Breaker	10	15	14	119	104	14	118	82	14	Generation re-dispatch
	LOS BANOS-PANOCH #2 230KV [5040] & LOS BANOS-DOS AMIGOS 230KV [5020]	P7	DCTL	15	10	18	86	75	14	108	89	19	Sensitivity Only
30765 LOSBANOS 230 30790 PANOCH 230 2 1	LOSBANOS 230KV Section 2D	P2	Bus/Breaker	15	10	17	82	72	13	104	85	18	Sensitivity Only
30790 PANOCH 230 30791 PNCHE 1M 230 1 1	ADAMS_E 12kV Gen Unit 1 & PANOCH 230/115kV TB 2	P3	G1/N1	<100	<100	<100	<100	<100	<100	100	<100	<100	Sensitivity Only
30835 HERNDON 230 30840 FGRDN T1 230 1 1	GREGG 230 KV BAAH BUS #2 (FAILURE OF NON-REDUNDENT RELAY)	P5	Non-Redundent Relay	92	97	65	39	41	100	41	73	66	Sensitivity Only
30835 HERNDON 230 30840 FGRDN T1 230 1 1	GREGG-HERNDON #1 230kV [4830] & GREGG-HERNDON #2 230kV [4840]	P6	N-1-1	<100	<100	<100	<100	<100	<100	104	<100	<100	Sensitivity Only
30840 FGRDN T1 230 30850 ASHLAN 230 1 1	GREGG-HERNDON #1 230kV [4830] & GREGG-HERNDON #2 230kV [4840]	P6	N-1-1	<100	<100	<100	<100	<100	<100	104	<100	<100	Sensitivity Only
30875 MC CALL 230 30877 MCCALL2M 115 2 1	MC CALL 230KV - Section 1D & 2D	P2	Bus/Breaker	N/A	99	103	N/A	29	105	25	N/A	103	Monitor future load forecast
	MC CALL 115kV - Middle Breaker Bay 3	P2	Bus/Breaker	N/A	105	108	N/A	16	113	11	N/A	109	Bus Upgrade or Short Term rating Action Plan
30875 MC CALL 230 30878 MCCALL3M	MCCALL 115KV BAAH BUS #2 (FAILURE OF NON-REDUNDENT RELAY)	P5	Non-Redundent Relay	91	95	98	20	15	103	11	58	99	Sensitivity Only
34104 ATWATER 115 34110 ATWATR J 115 1 1	EL CAPITAN-WILSON 115kV [1510] & WILSON-ATWATER #2 115kV [4160]	P7	N-1-1	143	127	134	<100	<100	133	<100	<100	134	Atwater SPS
	WILSON A Section 1D & WILSON B Section 2D 115kV	P2	Bus/Breaker	Diverge	N/A	N/A	13	N/A	N/A	N/A	Diverge	N/A	Project: Wilson 115kV Reinforcement Project In-service date: 12/20 Short term: Action plan
	EL CAPITAN-WILSON 115KV [1510] & WILSON-ATWATER #2 115KV [4160]	P7	DCTL	144	127	134	13	10	133	13	94	134	Atwater SPS
34105 CERTANJ1 115 34100 CHWCHLLA 115 1 1	WILSON-LE GRAND 115kV [4170] & PANOCH-MENDOTA 115kV [3230]	P6	N-1-1	<100	<100	<100	<100	<100	<100	109	<100	<100	Sensitivity Only

Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading % (Baseline Scenarios)					Loading % (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations	
34105 CERTANJ1 115 34121 SHARON T 115 1 1	WILSON-LE GRAND 115kV [4170] & PANOCHE-MENDOTA 115kV [3230]	P6	N-1-1	<100	<100	<100	<100	<100	<100	140	<100	<100	Sensitivity Only
	WILSON A Section 1D & WILSON B Section 2D 115kV	P2	Bus/Breaker	Diverge	N/A	N/A	53	N/A	N/A	N/A	Diverge	N/A	Project: Wilson 115kV Reinforcement Project In-service date: 12/20 Short term: Action plan
	GREGG 230 KV BAAH BUS #2 (FAILURE OF NON-REDUNDENT RELAY)	P5	Non-Redundent Relay	92	104	92	41	66	105	63	48	119	Protection Upgrade
34110 ATWATR J 115 34144 MERCED 115 1 1	EL CAPITAN-WILSON 115kV [1510] & WILSON-ATWATER #2 115kV [4160]	P7	N-1-1	128	115	119	<100	<100	120	<100	<100	119	Atwater SPS
	WILSON A Section 1D & WILSON B Section 2D 115kV	P2	Bus/Breaker	Diverge	N/A	N/A	11	N/A	N/A	N/A	Diverge	N/A	Project: Wilson 115kV Reinforcement Project In-service date: 12/20 Short term: Action plan
	EL CAPITAN-WILSON 115KV [1510] & WILSON-ATWATER #2 115KV [4160]	P7	DCTL	128	115	119	11	7	120	9	87	119	Atwater SPS
34112 EXCHEQUR 115 34116 LE GRAND 115 1 1	WILSON-ATWATER #2 115kV [4160] & EXCHEQUR 70/115kV TB 1	P6	N-1-1	101	<100	100	<100	<100	<100	<100	<100	100	Generation Re-dispatch
	STAR_GT2 14kV Gen Unit 2 & MERCED 115/70kV TB 2	P3	G1/N1	<100	<100	<100	<100	<100	<100	101	<100	<100	Sensitivity Only
	WILSON A Section 1D & WILSON B Section 2D 115kV	P2	Bus/Breaker	Diverge	N/A	N/A	43	N/A	N/A	N/A	Diverge	N/A	Project: Wilson 115kV Reinforcement Project In-service date: 12/20 Short term: Action plan
34112 EXCHEQUR 115 34232 EXCHEQUR 70.0 1 1	WILSON A Section 1D & WILSON B Section 2D 115kV	P2	Bus/Breaker	Diverge	N/A	N/A	5	N/A	N/A	N/A	Diverge	N/A	Project: Wilson 115kV Reinforcement Project In-service date: 12/20 Short term: Action plan
34113 ARBURU T 70.0 34108 WRIGHT T 70.0 1 1	LOS BANOS-LIVINGSTON JCT-CANAL 70kV [8940] (CHEVPIPE-LOS BANS)	P2	L1 w/o fault	N/A	84	110	N/A	19	88	22	N/A	110	Monitor future load forecast
34115 AVENAL T 70.0 34249 AVNLPARK 70.0 1 1	Base Case	P0	Base case	24	24	25	69	68	25	96	100	25	Sensitivity Only
34116 LE GRAND 115 34134 WILSON A 115 1 1	QUINTO SW STA-WESTLEY 230kV [5070] & LOSBANOS 500/230kV TB 1	P6	N-1-1	<100	<100	<100	100	<100	<100	<100	<100	<100	
	WILSON 230/115kV TB 1 & WILSON 230/115kV TB 2	P6	N-1-1	0	<100	<100	<100	<100	<100	<100	157	<100	
	GREGG 230kV - Middle Breaker Bay 1	P2	Bus/Breaker	63	41	19	39	11	43	26	133	19	
	SANGER - MD 115kV & KERCKHOFF-CLOVIS-SANGER #1 line	P2	Bus/Breaker	38	N/A	N/A	122	N/A	N/A	N/A	101	N/A	
	HERNDON - 2D 115kV & HERNDON-WOODWARD line	P2	Bus/Breaker	25	N/A	N/A	100	N/A	N/A	N/A	59	N/A	
	PANOCHE 230kV - Section 1E & 2E	P2	Bus/Breaker	33	6	6	101	27	7	40	87	6	Project: Wilson-Legrand 115kV Reconductoring In-service date: 12/20
	HERNDON 230kV - Section 1D & 2D	P2	Bus/Breaker	54	N/A	N/A	107	N/A	N/A	N/A	35	N/A	



Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading % (Baseline Scenarios)					Loading % (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations	
WILSON A 115 1 1	HERNDON 115kV - Section 1D & 2D	P2	Bus/Breaker	39	N/A	N/A	121	N/A	N/A	N/A	41	N/A	Short term: Action Plan
	GREGG 230 KV BAAH BUS #2 (FAILURE OF NON-REDUNDENT RELAY)	P5	Non-Redundent Relay	66	21	17	119	33	22	46	18	22	
	BORDEN-GREGG 230KV #1 & #2 [4400]	P7	DCTL	63	41	19	39	11	43	26	133	19	
	WILSON-BORDEN 230KV #1 & #2 [9001]	P7	DCTL	31	N/A	N/A	50	N/A	N/A	N/A	118	N/A	
	KERCKHOFF-CLOVIS-SANGER #1 115KV [1890] & KERCKHOFF-CLOVIS-SANGER #2 115KV [1900]	P7	DCTL	37	9	9	121	30	8	43	78	9	
34117 KETLMN T 70.0 34552 GATES 70.0 1 1	Base Case	P0	Base case	60	61	63	99	99	63	141	130	63	Sensitivity Only
	AVENAL_1 21kV Gen Unit EW	P1	N-1	51	53	55	85	85	54	113	77	55	Sensitivity Only
	AVENAL P 12kV Gen Unit 1	P1	N-1	51	53	55	72	73	54	108	98	55	Sensitivity Only
	ARCO-TULARE LAKE 70kV [8451]	P1	N-1	N/A	80	83	N/A	89	83	126	N/A	83	Sensitivity Only
	GATES-TULARE LAKE 70kV [8700] (AVENAL T-CHEVPL T)	P2	L1 w/o fault	49	50	52	88	88	52	123	114	52	Sensitivity Only
	TLRE LKE 70kV Section MA	P2	Bus/Breaker	N/A	80	83	N/A	89	83	126	N/A	83	Sensitivity Only
	TLRE LKE - MA 70kV & ARCO-TULARE LAKE line	P2	Bus/Breaker	N/A	80	83	N/A	89	83	126	N/A	83	Sensitivity Only
34121 SHARON T 115 34128 OAKH_JCT 115 1 1	WILSON-LE GRAND 115kV [4170] & PANOCHE-MENDOTA 115kV [3230]	P6	N-1-1	<100	<100	<100	<100	<100	<100	136	<100	<100	Sensitivity Only
	WILSON A Section 1D & WILSON B Section 2D 115kV	P2	Bus/Breaker	Diverge	N/A	N/A	50	N/A	N/A	N/A	Diverge	N/A	Project: Wilson 115kV Reinforcement Project In-service date: 12/20 Short term: Action plan
	GREGG 230 KV BAAH BUS #2 (FAILURE OF NON-REDUNDENT RELAY)	P5	Non-Redundent Relay	88	110.92	89	44	70	101	66	44	116	Protection Upgrade
34134 WILSON A 115 34104 ATWATER 115 1 1	EL CAPITAN-WILSON 115kV [1510] & ATWATER-LIVNGSTN-MERCED 115kV [1030]	P6	N-1-1	126	116	118	<100	<100	119	<100	<100	118	Operation Switching and monitor future load forecast
34134 WILSON A 115 34138 EL CAPTN 115 1 1	WILSON-ATWATER #2 115kV [4160] & ATWATER-LIVNGSTN-MERCED 115kV [1030]	P6	N-1-1	<100	121	125	<100	<100	126	<100	<100	125	Operation Switching and monitor future load forecast
34134 WILSON A 115 34144 MERCED 115 1 1	WILSON-ATWATER #2 115kV [4160] & EL CAPITAN-WILSON 115kV [1510]	P6	N-1-1	123	128	136	<100	<100	134	<100	<100	137	Atwater SPS
	WILSON B 115kV Section 2D	P2	Bus/Breaker	115	N/A	N/A	12	N/A	N/A	N/A	72	N/A	Project: Wilson 115kV Reinforcement Project In-service date: 12/20 Short term: Action plan
	WILSON B - 2D 115kV & WILSON-ORO LOMA line	P2	Bus/Breaker	115	N/A	N/A	12	N/A	N/A	N/A	72	N/A	Project: Wilson 115kV Reinforcement Project In-service date: 12/20 Short term: Action plan
	EL CAPITAN-WILSON 115KV [1510] & WILSON-ATWATER #2 115KV [4160]	P7	DCTL	127	130	139	9	15	136	21	82	139	Atwater SPS

Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading % (Baseline Scenarios)					Loading % (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations	
34134 WILSON A 115 34144 MERCED 115 2 1	WILSON-ATWATER #2 115kV [4160] & EL CAPITAN-WILSON 115kV [1510]	P6	N-1-1	<100	122	130	<100	<100	127	<100	<100	130	Atwater SPS
	EL CAPITAN-WILSON 115kV [1510] & WILSON-ATWATER #2 115kV [4160]	P7	DCTL	121	123	132	8	15	129	20	77	132	Atwater SPS
34136 WILSON B 115 34138 EL CAPTN 115 1 1	ATWATER-LIVNGSTN-MERCED 115kV [1030] & WILSON-ATWATER #2 115kV [4160]	P6	N-1-1	115	<100	<100	<100	<100	<100	<100	<100	<100	Project: Wilson 115kV Reinforcement Project In-service date: 12/20 Short term: Action plan
	WILSON-ATWATER #2 115kV [4160] & ATWATER-LIVNGSTN-MERCED 115kV [1030]	P6	N-1-1	115	<100	<100	<100	<100	<100	<100	<100	<100	Project: Wilson 115kV Reinforcement Project In-service date: 12/20 Short term: Action plan
34136 WILSON B 115 34144 MERCED 115 2 1	EL CAPITAN-WILSON 115kV [1510] & WILSON-ATWATER #2 115kV [4160]	P6	N-1-1	117	<100	<100	<100	<100	<100	<100	<100	<100	Atwater SPS
	WILSON A 115kV Section 1D	P2	Bus/Breaker	112	N/A	N/A	18	N/A	N/A	N/A	64	N/A	Project: Wilson 115kV Reinforcement Project In-service date: 12/20 Short term: Action plan
34144 MERCED 115 34146 MERCED M 115 2 1	WILSON-LE GRAND 115kV [4170] & DAIRYLAND-MENDOTA 115kV [1360]	P6	N-1-1	<100	<100	<100	<100	<100	<100	102	<100	<100	Sensitivity Only
34144 MERCED 115 34146 MERCED M 115 2 1	WILSON A Section 1D & WILSON B Section 2D 115kV	P2	Bus/Breaker	Diverge	N/A	N/A	41	N/A	N/A	N/A	Diverge	N/A	Project: Wilson 115kV Reinforcement Project In-service date: 12/20 Short term: Action plan
34149 CHENYT 115 34158 PANOCH2 115 1 1	GATES 230/70kV TB 5 & PANOCH1-EXCELSIORSS 115kV [0]	P6	N-1-1	<100	<100	<100	100	100	<100	201	162	<100	Generation Re-dispatch
	GATES 230/70kV TB 5	P1	N-1	24	26	28	100	94	26	112	89	28	Generation re-dispatch
	PANOCH1 115kV Section 1D	P2	Bus/Breaker	27	29	34	104	98	31	109	82	34	Generation re-dispatch
	GATES 230kV Section 2D	P2	Bus/Breaker	22	24	26	105	99	24	117	92	27	Generation re-dispatch
	PANOCH1 - 1D 115kV & PANOCH1-CAL PEAK-STARWOOD line	P2	Bus/Breaker	27	29	34	104	98	31	109	82	34	Generation re-dispatch
	PANOCH1 - 1D 115kV & PANOCH1-MENDOTA line	P2	Bus/Breaker	27	29	34	104	98	31	109	82	34	Generation re-dispatch
34149 CHENYT 115 34393 EXCELSIORSS 115 2 1	PANOCH1-SCHINDLER #1 115kV [3250] (PANOCH1-KAMM)	P2	L1 w/o fault	N/A	27	30	N/A	98	28	109	N/A	31	Sensitivity Only
	GATES 230/70kV TB 5 & PANOCH1-EXCELSIORSS 115kV [0]	P6	N-1-1	<100	<100	<100	<100	<100	<100	189	154	<100	Sensitivity Only
	GATES 230/70kV TB 5	P1	N-1	37	36	35	86	89	37	106	84	36	Sensitivity Only
	PANOCH1-SCHINDLER #1 115kV [3250] (PANOCH1-KAMM)	P2	L1 w/o fault	N/A	40	38	N/A	93	38	103	N/A	39	Sensitivity Only
	PANOCH1 115kV Section 1D	P2	Bus/Breaker	36	36	34	88	93	34	103	78	35	Sensitivity Only
GATES 230kV Section 2D	P2	Bus/Breaker	N/A	40	38	N/A	93	41	110	N/A	39	Sensitivity Only	

Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading % (Baseline Scenarios)					Loading % (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations	
	PANOCHÉ1 - 1D 115kV & PANOCHÉ-CAL PEAK-STARWOOD line	P2	Bus/Breaker	N/A	36	34	N/A	93	34	103	N/A	35	Sensitivity Only
	PANOCHÉ1 - 1D 115kV & PANOCHÉ-MENDOTA line	P2	Bus/Breaker	N/A	36	34	N/A	93	34	103	N/A	35	Sensitivity Only
34155 PANOCHÉ1 115 34350 KAMM 115 1 1	GATES 230kV Section 2D	P2	Bus/Breaker	47	45	43	103	104	47	124	96	45	Generation re-dispatch
	EXCELSIORSS 115kV - Middle Breaker Bay 1	P2	Bus/Breaker	N/A	42	40	N/A	100	40	111	N/A	40	Generation re-dispatch
	GATES 230/70kV TB 5 & EXCELSIORSS-PANOCHÉ2 115kV [3231]	P6	N-1-1	<100	<100	<100	<100	<100	<100	215	168	<100	Sensitivity Only
	EXCELSIORSS-PANOCHÉ2 115kV [3231]	P1	N-1	N/A	42	40	N/A	100	40	111	N/A	40	Generation re-dispatch
	GATES 230/70kV TB 5	P1	N-1	43	41	40	98	99	43	119	93	41	Sensitivity Only
	PANOCHÉ2 115kV Section 2D	P2	Bus/Breaker	15	15	18	87	97	13	108	80	18	Sensitivity Only
	PANOCHÉ2 - 2D 115kV & EXCELSIORSS-PANOCHÉ2 line	P2	Bus/Breaker	N/A	45	42	N/A	97	43	108	N/A	43	Sensitivity Only
	PANOCHÉ2 - 2D 115kV & PANOCHÉ-ORO LOMA line	P2	Bus/Breaker	N/A	15	18	N/A	97	13	108	N/A	18	Sensitivity Only
34169 TORNDO J 70.0 34174 PENZIR J 70.0 1 1	GATES 230/70kV TB 5 & SCHINDLR 115/70kV TB 1	P6	N-1-1	132	103	112	<100	<100	127	<100	<100	130	Operating Solution
34169 TORNDO J 70.0 34574 COLNGA 1 70.0 1 1	SCHINDLR 115/70kV TB 1 & GATES 230/70kV TB 5	P6	N-1-1	<100	<100	<100	<100	<100	<100	172	143	<100	Sensitivity Only
	PANOCHÉ1 Section 1D & PANOCHÉ2 Section 2D 115kV	P2	Bus/Breaker	48	49	52	92	90	47	104	103	50	Sensitivity Only
	PANOCHÉ-SCHINDLER #1 115kV [3250] & EXCELSIORSS-PANOCHÉ2 115kV [3231]	P7	DCTL	29	33	37	92	90	31	104	103	35	Sensitivity Only
34202 MERCED 70.0 34230 MRCDFLLS 70.0 1 1	PANOCHÉ-MENDOTA 115kV [3230] & WILSON-LE GRAND 115kV [4170]	P6	N-1-1	<100	<100	<100	<100	<100	<100	105	<100	<100	Sensitivity Only
	WILSON-LE GRAND 115kV [4170] & DAIRYLAND-MENDOTA 115kV [1360]	P6	N-1-1	<100	<100	<100	<100	<100	<100	111	<100	<100	Sensitivity Only
	WILSON A Section 1D & WILSON B Section 2D 115kV	P2	Bus/Breaker	Diverge	N/A	N/A	35	N/A	N/A	N/A	Diverge	N/A	Project: Wilson 115kV Reinforcement Project In-service date: 12/20 Short term: Action plan
34202 MERCED 70.0 34146 MERCED M 115 2 1	WILSON A Section 1D & WILSON B Section 2D 115kV	P2	Bus/Breaker	Diverge	N/A	N/A	38	N/A	N/A	N/A	Diverge	N/A	Project: Wilson 115kV Reinforcement Project In-service date: 12/20 Short term: Action plan
34214 LOS BANS 70.0 34231 PCHCOWND 70.0 1 1	LOS BANOS-LIVINGSTON JCT-CANAL 70kV [8940] (CHEVPIPE-LOS BANS)	P2	L1 w/o fault	102	106	136	13	21	109	25	51	137	Non-BES
34231 PCHCOWND 70.0 34108 WRIGHT T 70.0 1 1	LOS BANOS-LIVINGSTON JCT-CANAL 70kV [8940] (CHEVPIPE-LOS BANS)	P2	L1 w/o fault	N/A	93	119	N/A	18	95	22	N/A	119	Non-BES
34237 CANANDGA 70.0 34255 TRIGO J 70.0 1 1	BORDEN-MADERA #1 70kV [8710] & BORDEN-MADERA #2 70kV [8520]	P6	N-1-1	174	171	173	<100	<100	176	<100	132	173	Non-BES
34240 GLASS 70.0 34237 CANANDGA 70.0 1 1	BORDEN-MADERA #1 70kV [8710] & BORDEN-MADERA #2 70kV [8520]	P6	N-1-1	104	<100	101	<100	<100	101	<100	<100	101	Non-BES

Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading % (Baseline Scenarios)					Loading % (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations	
34240 GLASS 70.0 34256 BORDEN 70.0 1 1	BORDEN-MADERA #1 70kV [8710] & BORDEN-MADERA #2 70kV [8520]	P6	N-1-1	114	105	109	<100	<100	108	<100	<100	109	Non-BES
34256 BORDEN 70.0 30805 BORDEN 230 1 1	EL CAPITAN-WILSON 115kV [1510] & BORDEN 230/70kV TB 4	P6	N-1-1	<100	<100	<100	<100	<100	101	<100	<100	<100	Sensitivity Only
34258 MERCYSPRINGSS 70.0 34113 ARBURU T 70.0 1 1	LOS BANOS-LIVINGSTON JCT-CANAL 70kV [8940] (CHEVPIPE-LOS BANS)	P2	L1 w/o fault	N/A	92	122	N/A	25	96	29	N/A	122	Non-BES
34321 MCSWAINJ 70.0 34230 MRCDFLLS 70.0 1 1	WILSON-LE GRAND 115kV [4170] & DAIRYLAND-MENDOTA 115kV [1360]	P6	N-1-1	<100	<100	<100	<100	<100	<100	100	<100	<100	Sensitivity Only
	WILSON A Section 1D & WILSON B Section 2D 115kV	P2	Bus/Breaker	Diverge	N/A	N/A	27	N/A	N/A	N/A	Diverge	N/A	Project: Wilson 115kV Reinforcement Project In-service date: 12/20 Short term: Action plan
34321 MCSWAINJ 70.0 34232 EXCHEQR 70.0 1 1	WILSON-LE GRAND 115kV [4170] & DAIRYLAND-MENDOTA 115kV [1360]	P6	N-1-1	<100	<100	<100	<100	<100	<100	114	<100	<100	Sensitivity Only
	WILSON A Section 1D & WILSON B Section 2D 115kV	P2	Bus/Breaker	Diverge	N/A	N/A	32	N/A	N/A	N/A	Diverge	N/A	Project: Wilson 115kV Reinforcement Project In-service date: 12/20 Short term: Action plan
34350 KAMM 115 34352 CANTUA 115 1 1	GATES 230/70kV TB 5 & EXCELSIORSS-PANOCHE2 115kV [3231]	P6	N-1-1	<100	<100	<100	<100	<100	<100	205	161	<100	Sensitivity Only
	EXCELSIORSS-PANOCHE2 115kV [3231]	P1	N-1	N/A	36	34	N/A	97	34	108	N/A	35	Sensitivity Only
	GATES 230/70kV TB 5	P1	N-1	37	36	34	95	96	37	115	91	36	Sensitivity Only
	PANOCHE2 115kV Section 2D	P2	Bus/Breaker	11	11	16	84	94	9	104	78	16	Sensitivity Only
	GATES 230kV Section 2D	P2	Bus/Breaker	N/A	40	38	N/A	101	41	120	N/A	39	Generation re-dispatch
	PANOCHE2 - 2D 115kV & EXCELSIORSS-PANOCHE2 line	P2	Bus/Breaker	N/A	39	37	N/A	94	37	104	N/A	37	Sensitivity Only
	PANOCHE2 - 2D 115kV & PANOCHE-ORO LOMA line	P2	Bus/Breaker	N/A	11	16	N/A	94	9	104	N/A	16	Sensitivity Only
34352 CANTUA 115 34432 WESTLND 115 1 1	GATES 230/70kV TB 5 & EXCELSIORSS-PANOCHE2 115kV [3231]	P6	N-1-1	<100	<100	<100	<100	<100	<100	187	152	<100	Sensitivity Only
	GATES 230kV Section 2D	P2	Bus/Breaker	N/A	31	30	N/A	88	32	101	N/A	31	Sensitivity Only
34358 KERCKHF2 115 34360 WWARD JT 115 1 1	CHOWCHILLA-KERCKHOFF 115kV [1250] & KERCKHOFF-CLOVIS-SANGER #2 115kV [1900]	P6	N-1-1	107	107	113	<100	<100	109	<100	107	113	Kerckhoff SPS
34365 CLOVISJ2 115 34358 KERCKHF2 115 1 1	CHOWCHILLA-KERCKHOFF 115kV [1250] & KERCKHOFF-CLOVIS-SANGER #1 115kV [1890]	P6	N-1-1	108	107	113	<100	<100	109	<100	107	113	Kerckhoff SPS
34359 AIRWAYJ2 115 34408 BARTON 115 1 1	HERNDON 115kV Section 2D	P2	Bus/Breaker	N/A	33	32	N/A	95	27	101	N/A	31	Sensitivity Only
	HERNDON - 2D 115kV & HERNDON-BULLARD #2 line	P2	Bus/Breaker	N/A	33	32	N/A	95	27	101	N/A	31	Sensitivity Only
	HERNDON - 2D 115kV & HERNDON-WOODWARD line	P2	Bus/Breaker	N/A	32	31	N/A	95	27	101	N/A	30	Sensitivity Only

Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading % (Baseline Scenarios)					Loading % (Sensitivity Scenarios)				Project & Potential Mitigation Solutions	
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations		
34366 SANGER 115 34359 AIRWAYJ2 115 1 1	HERNDON 230kV - Section 1D & 2D	P2	Bus/Breaker	106	N/A	N/A	11	N/A	N/A	N/A	N/A	73	N/A	Project: Northern Fresno 115kV Area Reinforcement In-service date: 12/20 Short term: Action Plan
34370 MC CALL 115 34385 KINGS J1 115 1 1	HENRIETTA-LEPRINO SW STA 115kV [1737] & MCCALL-KINGSBURG #2 115kV [2301]	P6	N-1-1	<100	<100	<100	<100	<100	<100	<100	162	<100	<100	Sensitivity Only
34370 MC CALL 115 30877 MCCALL2M 115 2 1	MC CALL 230kV - Section 1D & 2D	P2	Bus/Breaker	N/A	98	100	N/A	29	104	25	N/A	101	101	Monitor future load forecast
34370 MC CALL 115 30878 MCCALL3M 115 3 1	MC CALL 115kV - Middle Breaker Bay 3	P2	Bus/Breaker	N/A	103	106	N/A	15	111	8	N/A	107	107	Bus Upgrade or Short Term rating Action Plan
	MCCALL 115KV BAAH BUS #2 (FAILURE OF NON-REDUNDENT RELAY)	P5	Non-Redundent Relay	89	93	96	19	13	100	9	57	97	97	Sensitivity Only
34382 WAHTOKE 115 34380 REEDLEY 115 1 1	KINGS RIVER-SANGER-REEDLEY 115kV [2030] & SANGER-REEDLEY 115kV [9140]	P6	N-1-1	102	106	110	<100	<100	111	<100	<100	110	110	Project: Reedley 70 kV Reinforcement (Dinuba Battery Energy Storage) In-service date: 05/21 Short term: Action Plan
34390 DANISHCM 115 34370 MC CALL 115 1 1	MCCALL-WEST FRESNO #2 115kV [2370] & SANGER-CALIFORNIA AVE 115kV [9130]	P6	N-1-1	<100	<100	107	<100	<100	<100	<100	<100	<100	109	Monitor future load forecast
34393 EXCELSIORSS 115 34354 SCHINDLR 115 1 1	EXCELSIORSS-SCHINDLR #2 115kV [0] & GATES 230/70kV TB 5	P6	N-1-1	<100	<100	<100	<100	<100	<100	<100	142	109	109	Sensitivity Only
	EXCELSIORSS-SCHINDLR #1 115kV [0] & GATES 230/70kV TB 5	P6	N-1-1	<100	<100	<100	<100	<100	<100	<100	142	109	<100	Sensitivity Only
34402 CAL AVE 115 34366 SANGER 115 1 1	CALIFORNIA AVE-MCCALL 115kV [2360] & MCCALL-WEST FRESNO #2 115kV [2370]	P6	N-1-1	<100	<100	102	<100	<100	<100	<100	<100	<100	102	Monitor future load forecast
	CALIFORNIA AVE-MCCALL 115kV [2360] & MCCALL-WEST FRESNO #2 115kV [2370]	P7	DCTL	91	93	102	3	4	97	8	63	102	102	Monitor future load forecast
	MCCALL 115KV BAAH BUS #2 (FAILURE OF NON-REDUNDENT RELAY)	P5	Non-Redundent Relay	93	95	104	3	4	98	8	64	105	105	Protection Upgrade
34402 CAL AVE 115 34390 DANISHCM 115 1 1	MCCALL-WEST FRESNO #2 115kV [2370] & SANGER-CALIFORNIA AVE 115kV [9130]	P6	N-1-1	<100	<100	103	<100	<100	<100	<100	<100	<100	103	Monitor future load forecast
34408 BARTON 115 34412 HERNDON 115 1 1	HERNDON-MANCHESTER 115kV [1780] & HERNDON-WOODWARD 115kV [1790]	P6	N-1-1	<100	<100	<100	<100	100	<100	<100	<100	<100	<100	Generation Re-dispatch
	HERNDON 115kV Section 2D	P2	Bus/Breaker	89	87	89	100	106	82	114	55	87	87	Generation Re-dispatch
	MUSTANGSS 230kV - Middle Breaker Bay 3	P2	Bus/Breaker	50	48	52	85	91	49	109	10	51	51	Generation Re-dispatch
	HERNDON - 2D 115kV & HERNDON-BULLARD #2 line	P2	Bus/Breaker	89	N/A	N/A	100	N/A	N/A	N/A	55	N/A	N/A	Generation Re-dispatch
	HERNDON - 2D 115kV & HERNDON-BULLARD #2 line	P2	Bus/Breaker	N/A	87	89	N/A	106	82	114	N/A	87	87	Generation Re-dispatch
HERNDON - 2D 115kV & HERNDON-WOODWARD line	P2	Bus/Breaker	89	N/A	N/A	100	N/A	N/A	N/A	54	N/A	N/A	Generation Re-dispatch	



Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading % (Baseline Scenarios)					Loading % (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations	
	HERNDON - 2D 115kV & HERNDON-WOODWARD line	P2	Bus/Breaker	N/A	87	88	N/A	107	82	114	N/A	87	Generation Re-dispatch
34409 PNDLJ2 115 34416 BULLARD 115 1 1	HERNDON-BULLARD #1 115kV [1760] (HERNDON-PNDLJ1)	P2	L1 w/o fault	115	N/A	N/A	15	N/A	N/A	N/A	87	N/A	Project: Herndon-Bullard Reconductoring Project In-service date: 01/21 Short term: Action Plan
	HERNDON 115kV Section 1D	P2	Bus/Breaker	115	N/A	N/A	15	N/A	N/A	N/A	87	N/A	Project: Herndon-Bullard Reconductoring Project In-service date: 01/21 Short term: Action Plan
34410 MANCHSTR 115 34368 LASPALMS 115 1 1	HERNDON-BARTON 115kV [1750] & HERNDON-WOODWARD 115kV [1790]	P6	N-1-1	<100	<100	<100	<100	100	<100	<100	<100	<100	Generation Re-dispatch
	MUSTANGSS 230kV - Middle Breaker Bay 3	P2	Bus/Breaker	9	9	12	85	87	8	103	38	12	Sensitivity Only
34414 WOODWARD 115 34422 CHLDHOSP 115 1 1	HERNDON-BARTON 115KV [1750] & MANCHESTER-AIRWAYS-SANGER 115KV [2180]	P7	DCTL	63	62	65	90	93	59	101	27	64	Sensitivity Only
	BARTON-AIRWAYS-SANGER 115KV [1060] & MANCHESTER-AIRWAYS-SANGER 115KV [2180]	P7	DCTL	43	41	43	92	94	37	101	12	42	Sensitivity Only
34418 KINGSBURGD 115 34419 KINGSBURGE 115 1 1	HENRIETTA-LEPRINO SW STA 115kV [1737] & MC CALL-SUNMAID-KNGSCOGN-KINGSBURGD 115kV [2290]	P6	N-1-1	<100	<100	<100	<100	<100	<100	134	<100	109	Sensitivity Only
34418 KINGSBURGD 115 34434 WAUKENA_SS 115 2 1	CORCORAN 115/70kV TB 1 & KINGSBURG-CORCORAN #1 115kV [2040]	P6	N-1-1	<100	<100	<100	<100	<100	<100	<100	108	109	Sensitivity Only
	KINGSBURG-CORCORAN #1 115kV [2040] (KINGSBURGE-Q529TP)	P2	L1 w/o fault	60	N/A	N/A	100	N/A	N/A	N/A	101	N/A	Sensitivity Only
34418 KINGSBURGD 115 364621 JACKSONSWSTA 115 2 1	HENRIETTA-LEPRINO SW STA 115kV [1737] & KINGSBURGD-JACKSONSWSTA #3 115kV [0]	P6	N-1-1	<100	<100	<100	<100	<100	<100	125	<100	<100	Sensitivity Only
34419 KINGSBURGE 115 364621 JACKSONSWSTA 115 1 1	HENRIETTA-LEPRINO SW STA 115kV [1737] & KINGSBURGD-JACKSONSWSTA #3 115kV [0]	P6	N-1-1	<100	<100	<100	<100	<100	<100	128	<100	109	Sensitivity Only
34419 KINGSBURGE 115 34436 Q529TP 115 1 1	CORCORAN 115/70kV TB 1 & KINGSBURG-WAUKENA SW STA 115kV [2050]	P6	N-1-1	<100	<100	<100	<100	<100	<100	<100	108	109	Sensitivity Only
	KINGSBURG-WAUKENA SW STA 115kV [2050]	P1	N-1	60	N/A	N/A	100	N/A	N/A	N/A	101	N/A	Sensitivity Only
	KINGSBURGD 115kV Section 1D	P2	Bus/Breaker	60	N/A	N/A	100	N/A	N/A	N/A	100	N/A	Sensitivity Only
	KINGSBURGD - 1D 115kV & MC CALL-SUNMAID-KNGSCOGN-KINGSBURGD line	P2	Bus/Breaker	60	N/A	N/A	100	N/A	N/A	N/A	100	N/A	Sensitivity Only
	KINGSBURGD - 1D 115kV & GWF-KINGSBURG line	P2	Bus/Breaker	60	N/A	N/A	100	N/A	N/A	N/A	100	N/A	Sensitivity Only
34423 GAURD J1 115 34370 MC CALL 115 2 1	JACKSONSWSTA-GWF_HEP 115kV [1743] & MC CALL-SUNMAID-KNGSCOGN-KINGSBURGD 115kV [2290]	P6	N-1-1	<100	<100	109	N/A	<100	102	<100	N/A	109	Monitor future load forecast

Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading % (Baseline Scenarios)					Loading % (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations	
34429 GWF_HEP 115 34428 CONTADNA 115 1 1	GREGG 230 KV BAAH BUS #1 (FAILURE OF NON-REDUNDENT RELAY)	P5	Non-Redundent Relay	67	96	94	21	32	102	45	28	96	Sensitivity Only
	GREGG 230 KV BAAH BUS #2 (FAILURE OF NON-REDUNDENT RELAY)	P5	Non-Redundent Relay	75	94	96	26	39	99	53	32	104	Sensitivity Only
34430 HENRETTA 115 30881 HENRIETA 230 3 1	MC CALL-CHSR09SWSTA #1 230kV [0] & TRANQUILLITY SW STA-HELM 230kV [5370]	P6	N-1-1	<100	<100	<100	<100	116	<100	117	<100	<100	FRTSPS drops pumps
	CHSR09SWSTA-MUSTANGSS 230kV [4710]	P1	N-1	N/A	32	28	N/A	94	39	111	N/A	27	Sensitivity Only
	MUSTANGSS 230kV - Middle Breaker Bay 2	P2	Bus/Breaker	N/A	32	28	N/A	94	39	111	N/A	27	Sensitivity Only
	PANOCH 230kV - Section 2D & 1D	P2	Bus/Breaker	18	36	31	86	101	43	116	63	30	FRTSPS drops pumps
	HERNDON 230kV - Section 1E & 2E	P2	Bus/Breaker	N/A	52	50	N/A	92	56	107	N/A	49	Sensitivity Only
	HERNDON 115kV - Section 1D & 2D	P2	Bus/Breaker	N/A	49	46	N/A	94	53	108	N/A	45	Sensitivity Only
	KINGSBURGD Section 1D & KINGSBURGE Section 1E 115kV	P2	Bus/Breaker	N/A	7	13	N/A	91	6	107	N/A	15	Sensitivity Only
	GREGG 230 KV BAAH BUS #2 (FAILURE OF NON-REDUNDENT RELAY)	P5	Non-Redundent Relay	47	66	61	79	91	71	107	22	67	Sensitivity Only
	MCCALL 115KV BAAH BUS #1 (FAILURE OF NON-REDUNDENT RELAY)	P5	Non-Redundent Relay	17	63	60	60	92	68	111	46	57	Sensitivity Only
	PANOCH-TRANQTYSS #1 230KV [0] & PANOCH-TRANQTYSS #2 230KV [0]	P7	DCTL	20	38	32	85	101	44	115	63	31	FRTSPS drops pumps
MCCALL-KINGSBURG #1 115KV [2290] & MCCALL-KINGSBURG #2 115KV [2301]	P7	DCTL	62	63	59	86	92	68	111	47	57	Sensitivity Only	
HELM-MCCALL 230KV [4860] & HENTAP2-MUSTANGSS #1 230KV [0]	P7	DCTL	30	50	43	98	117	58	136	55	43	FRTSPS drops pumps	
TRANQTYSS-HELM #1 230KV [0] & TRANQTYSS-MCMULLN1 #1 230KV [0]	P7	DCTL	20	38	32	75	89	43	104	50	31	Sensitivity Only	
34430 HENRETTA 115 30881 HENRIETA 230 3 1	MC CALL-CHSR09SWSTA #1 230kV [0] & TRANQUILLITY SW STA-HELM 230kV [5370]	P6	N-1-1	<100	<100	<100	<100	115	<100	114	<100	<100	FRTSPS drops pumps
	CHSR09SWSTA-MUSTANGSS 230kV [4710]	P1	N-1	N/A	32	28	N/A	93	39	108	N/A	27	Sensitivity Only
	MUSTANGSS 230kV - Middle Breaker Bay 2	P2	Bus/Breaker	N/A	32	28	N/A	93	39	108	N/A	27	Sensitivity Only
	PANOCH 230kV - Section 2D & 1D	P2	Bus/Breaker	18	36	30	85	100	43	114	63	30	FRTSPS drops pumps
	HERNDON 230kV - Section 1E & 2E	P2	Bus/Breaker	N/A	51	50	N/A	92	56	105	N/A	49	Sensitivity Only
	HERNDON 115kV - Section 1D & 2D	P2	Bus/Breaker	N/A	49	46	N/A	93	53	106	N/A	45	Sensitivity Only
	KINGSBURGD Section 1D & KINGSBURGE Section 1E 115kV	P2	Bus/Breaker	N/A	5	11	N/A	90	3	104	N/A	14	Sensitivity Only

Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading % (Baseline Scenarios)					Loading % (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations	
34430 HENRETTA 115 34519 LPRNJCTSS 115 1 1	GREGG 230 KV BAAH BUS #2 (FAILURE OF NON-REDUNDENT RELAY)	P5	Non-Redundent Relay	47	66	60	78	91	71	104	22	65	Sensitivity Only
	MCCALL 115KV BAAH BUS #1 (FAILURE OF NON-REDUNDENT RELAY)	P5	Non-Redundent Relay	16	63	59	59	90	67	108	46	56	Sensitivity Only
	PANOCHÉ-TRANQLTYSS #1 230KV [0] & PANOCHÉ-TRANQLTYSS #2 230KV [0]	P7	DCTL	20	37	32	85	101	44	113	62	31	FRTSPS drops pumps
	MCCALL-KINGSBURG #1 115KV [2290] & MCCALL-KINGSBURG #2 115KV [2301]	P7	DCTL	62	63	59	84	90	67	108	47	56	Sensitivity Only
	HELM-MCCALL 230KV [4860] & HENTAP2-MUSTANGSS #1 230KV [0]	P7	DCTL	29	50	43	96	116	58	133	55	43	FRTSPS drops pumps
	TRANQLTYSS-HELM #1 230KV [0] & TRANQLTYSS-MCMULLN1 #1 230KV [0]	P7	DCTL	20	37	32	75	88	43	102	49	31	Sensitivity Only
34432 WESTLND 115 34393 EXCELSIORSS 115 1 1	GATES 230/70kV TB 5 & EXCELSIORSS-PANOCHÉ2 115kV [3231]	P6	N-1-1	<100	<100	<100	<100	<100	<100	189	154	<100	Sensitivity Only
	CANTUA_DIST 12kV Gen Unit 1 & GATES 230/70kV TB 5	P3	G1/N1	<100	<100	<100	<100	<100	<100	101	<100	<100	Sensitivity Only
	GATES 230kV Section 2D	P2	Bus/Breaker	N/A	29	28	N/A	90	30	104	N/A	29	Sensitivity Only
34436 Q529TP 115 34420 CORCORAN 115 1 1	JACKSONSWSTA-WAUKENA_SS #1 115kV [0] & CORCORAN 115/70kV TB 1	P6	N-1-1	<100	<100	<100	<100	<100	<100	141	<100	<100	Sensitivity Only
	JACKSONSWSTA-WAUKENA_SS #1 115kV [0]	P1	N-1	N/A	63	80	N/A	99	66	137	N/A	80	Sensitivity Only
	JACKSONSWSTA 115kV - Middle Breaker Bay 2	P2	Bus/Breaker	N/A	63	80	N/A	99	66	137	N/A	80	Sensitivity Only
34469 GFFNJCT 70.0 34470 GIFFEN 70.0 1 1	Base Case	P0	Base case	36	36	35	100	76	39	68	101	36	Sensitivity Only
34474 HELM 70.0 34473 SNJQTP 70.0 1 1	Base Case	P0	Base case	24	21	27	88	43	19	101	43	37	Sensitivity Only
34492 REEDLEY 70.0 34380 REEDLEY 115 2 1	DNUBAEGY 70/13.8kV TB 1 & REEDLEY 115/70kV TB 4	P6	N-1-1	104	108	108	<100	<100	112	<100	<100	108	Project: Reedley 70 kV Reinforcement (Dinuba Battery Energy Storage) In-service date: 05/21 Short term: Action Plan
	DINUBA E 14kV Gen Unit 1 & REEDLEY 115/70kV TB 4	P3	G1/N1	104	108	108	<100	<100	112	<100	<100	108	Project: Reedley 70 kV Reinforcement (Dinuba Battery Energy Storage) In-service date: 05/21 Short term: Action Plan
	REEDLEY 115/70kV TB 4	P1	N-1	94	97	98	8	19	101	25	67	98	Sensitivity Only
	REEDLEY 115kV - Ring R3 & R4	P2	Bus/Breaker	N/A	97	98	N/A	19	101	25	N/A	98	Sensitivity Only
	REEDLEY 115kV - Ring R5 & R4	P2	Bus/Breaker	N/A	97	99	N/A	19	101	25	N/A	99	Sensitivity Only

Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading % (Baseline Scenarios)					Loading % (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations	
34492 REEDLEY 70.0 34497 DNUBAJCT 70.0 1 1	DNUBAEGY 70/13.8kV TB 1 & REEDLEY-OROSI 70kV [9061]	P6	N-1-1	<100	108	112	<100	<100	112	<100	<100	112	Project: Reedley 70 kV Reinforcement (Dinuba Battery Energy Storage) In-service date: 05/21 Short term: Summer Setup in Place
	DINUBA E 14kV Gen Unit 1 & REEDLEY-OROSI 70kV [9061]	P3	G1/N1	<100	108	112	<100	<100	112	<100	<100	112	Project: Reedley 70 kV Reinforcement (Dinuba Battery Energy Storage) In-service date: 05/21 Short term: Summer Setup in Place
	REEDLEY-OROSI 70kV [9060] (REEDLEY-ORSI JCT)	P2	L1 w/o fault	46	104	110	14	20	109	25	28	110	Project: Reedley 70 kV Reinforcement (Dinuba Battery Energy Storage) In-service date: 05/21 Short term: Summer Setup in Place
34492 REEDLEY 70.0 34526 ORSI JCT 70.0 1 1	REEDLEY-DINUBA #1 70kV [9050] & MCCALL-REEDLEY 115kV [2320]	P6	N-1-1	<100	<100	112	<100	<100	<100	<100	<100	112	Project: Reedley 70 kV Reinforcement (Dinuba Battery Energy Storage) In-service date: 05/21 Short term: Summer Setup in Place
	REEDLEY-DINUBA #1 70kV [9050] & REEDLEY 115/70kV TB 2	P6	N-1-1	<100	107	109	<100	<100	112	<100	<100	<100	Project: Reedley 70 kV Reinforcement (Dinuba Battery Energy Storage) In-service date: 05/21 Short term: Summer Setup in Place
	REEDLEY-DINUBA #1 70kV [9050]	P1	N-1	N/A	104	109	N/A	7	108	11	N/A	109	Project: Reedley 70 kV Reinforcement (Dinuba Battery Energy Storage) In-service date: 05/21 Short term: Summer Setup in Place
	REEDLEY-DINUBA #1 70kV [9050] (DNUBAJCT-DINUBA)	P2	L1 w/o fault	N/A	103	108	N/A	7	107	11	N/A	108	Project: Reedley 70 kV Reinforcement (Dinuba Battery Energy Storage) In-service date: 05/21 Short term: Summer Setup in Place
34496 STCRRL J 70.0 34500 DINUBA 70.0 1 1	REEDLEY-DINUBA #1 70kV [9050] & MCCALL-REEDLEY 115kV [2320]	P6	N-1-1	<100	<100	110	<100	<100	<100	<100	<100	110	Monitor future load forecast
	REEDLEY-DINUBA #1 70kV [9050] & REEDLEY 115/70kV TB 2	P6	N-1-1	<100	105	107	<100	<100	110	<100	<100	<100	Project: Reedley 70 kV Reinforcement (Dinuba Battery Energy Storage) In-service date: 05/21 Short term: Summer Setup in Place
	REEDLEY-DINUBA #1 70kV [9050]	P1	N-1	N/A	102	107	N/A	12	107	17	N/A	107	Project: Reedley 70 kV Reinforcement (Dinuba Battery Energy Storage) In-service date: 05/21 Short term: Summer Setup in Place

Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading % (Baseline Scenarios)					Loading % (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations	
	REEDLEY-DINUBA #1 70kV [9050] (DNUBAJCT-DINUBA)	P2	L1 w/o fault	N/A	101	106	N/A	12	106	17	N/A	106	Project: Reedley 70 kV Reinforcement (Dinuba Battery Energy Storage) In-service date: 05/21 Short term: Summer Setup in Place
34497 DNUBAJCT 70.0 34500 DINUBA 70.0 1 1	REEDLEY-OROSI 70kV [9061]	P1	N-1	N/A	107	111	N/A	9	111	14	N/A	111	Project: Reedley 70 kV Reinforcement (Dinuba Battery Energy Storage) In-service date: 05/21 Short term: Summer Setup in Place
	REEDLEY-OROSI 70kV [9060] (REEDLEY-ORSI JCT)	P2	L1 w/o fault	59	119	125	2	8	123	13	41	125	Project: Reedley 70 kV Reinforcement (Dinuba Battery Energy Storage) In-service date: 05/21 Short term: Summer Setup in Place
	REEDLEY-OROSI 70kV [9060] (ORSI-ORSI JCT)	P2	L1 w/o fault	N/A	107	111	N/A	9	111	14	N/A	111	Project: Reedley 70 kV Reinforcement (Dinuba Battery Energy Storage) In-service date: 05/21 Short term: Summer Setup in Place
34502 OROSI 70.0 34526 ORSI JCT 70.0 1 1	REEDLEY-DINUBA #1 70kV [9050] & MCCALL-REEDLEY 115kV [2320]	P6	N-1-1	<100	<100	119	<100	<100	<100	<100	<100	119	Project: Reedley 70 kV Reinforcement (Dinuba Battery Energy Storage) In-service date: 05/21 Short term: Summer Setup in Place
	REEDLEY-DINUBA #1 70kV [9050] & REEDLEY 115/70kV TB 2	P6	N-1-1	<100	114	116	<100	<100	119	<100	<100	<100	Project: Reedley 70 kV Reinforcement (Dinuba Battery Energy Storage) In-service date: 05/21 Short term: Summer Setup in Place
	REEDLEY-DINUBA #1 70kV [9050]	P1	N-1	N/A	110	116	N/A	9	115	14	N/A	116	Project: Reedley 70 kV Reinforcement (Dinuba Battery Energy Storage) In-service date: 05/21 Short term: Summer Setup in Place
	REEDLEY-DINUBA #1 70kV [9050] (DNUBAJCT-DINUBA)	P2	L1 w/o fault	N/A	110	115	N/A	9	114	14	N/A	115	Project: Reedley 70 kV Reinforcement (Dinuba Battery Energy Storage) In-service date: 05/21 Short term: Summer Setup in Place
34552 GATES 70.0 30900 GATES 230 5 1	PANOCH1 Section 1D & PANOCH2 Section 2D 115kV	P2	Bus/Breaker	24	22	21	105	105	25	130	102	22	Short term rating followed by a redispatch
	EXCELSIORSS-PANOCH1 115KV [3250] & EXCELSIORSS-PANOCH2 115KV [3231]	P7	DCTL	40	38	37	99	101	40	123	99	38	Short term rating followed by a redispatch
	PANOCH1-SCHINDLER #1 115KV [3250] & EXCELSIORSS-PANOCH2 115KV [3231]	P7	DCTL	45	45	43	105	105	47	130	102	44	Short term rating followed by a redispatch



Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading % (Baseline Scenarios)					Loading % (Sensitivity Scenarios)				Project & Potential Mitigation Solutions	
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations		
	EXCELSIORSS-PANOCHÉ1 115kV [3250] & EXCELSIORSS-PANOCHÉ2 115kV [3231]	P6	N-1-1	<100	<100	<100	<100	<100	<100	<100	123	<100	<100	Sensitivity Only
34552 GATES 70.0 34555 JAYNESWSTA 70.0 1 1	GATES 230/70kV TB 5 & SCHINDLR 115/70kV TB 1	P6	N-1-1	<100	<100	<100	<100	<100	<100	<100	108	<100	<100	Sensitivity Only
34552 GATES 70.0 34559 HURONJ 70.0 2 1	EXCELSIORSS-PANOCHÉ2 115kV [3231] & GATES-HURON 70kV [8690]	P6	N-1-1	<100	<100	<100	<100	<100	<100	<100	105	<100	<100	Sensitivity Only
	PANOCHÉ1 Section 1D & PANOCHÉ2 Section 2D 115kV	P2	Bus/Breaker	N/A	3	5	N/A	86	5	101	N/A	5	5	Sensitivity Only
	PANOCHÉ-SCHINDLER #1 115KV [3250] & EXCELSIORSS-PANOCHÉ2 115KV [3231]	P7	DCTL	28	26	24	84	86	28	101	77	25	25	Sensitivity Only
34555 JAYNESWSTA 70.0 34578 JACALITO 70.0 1 1	GATES 230/70kV TB 5 & SCHINDLR 115/70kV TB 1	P6	N-1-1	<100	<100	<100	<100	<100	<100	<100	108	103	<100	Sensitivity Only
34559 HURONJ 70.0 34560 CALFLAX 70.0 1 1	PANOCHÉ 230/115kV TB 2 & PANOCHÉ 230/115kV TB 1	P6	N-1-1	<100	<100	<100	<100	100	<100	<100	153	<100	<100	Short term rating followed by a redispatch
	PANOCHÉ1 Section 1D & PANOCHÉ2 Section 2D 115kV	P2	Bus/Breaker	11	15	19	177	177	12	214	169	19	19	Short term rating followed by a redispatch
	EXCELSIORSS-PANOCHÉ1 115KV [3250] & EXCELSIORSS-PANOCHÉ2 115KV [3231]	P7	DCTL	41	36	35	160	166	39	197	161	36	36	Short term rating followed by a redispatch
	PANOCHÉ-SCHINDLER #1 115KV [3250] & EXCELSIORSS-PANOCHÉ2 115KV [3231]	P7	DCTL	55	54	47	175	177	57	215	168	49	49	Short term rating followed by a redispatch
	PANOCHÉ1-EXCELSIORSS 115kV [0] & EXCELSIORSS-PANOCHÉ2 115kV [3231]	P6	N-1-1	<100	<100	<100	<100	<100	<100	<100	197	161	<100	Sensitivity Only
	HURON_DIST 12kV Gen Unit 1 & EXCELSIORSS-PANOCHÉ2 115kV [3231]	P3	G1/N1	<100	<100	<100	<100	<100	<100	<100	100	<100	<100	Sensitivity Only
	EXCELSIORSS 115kV - Middle Breaker Bay 2	P2	Bus/Breaker	N/A	29	27	N/A	96	32	130	N/A	28	28	Sensitivity Only
34561 Q526TP 70.0 34566 PLSNTVLY 70.0 1 1	PANOCHÉ1 Section 1D & PANOCHÉ2 Section 2D 115kV	P2	Bus/Breaker	25	26	27	135	129	24	156	141	28	28	Short term rating followed by a redispatch
	EXCELSIORSS-PANOCHÉ1 115KV [3250] & EXCELSIORSS-PANOCHÉ2 115KV [3231]	P7	DCTL	13	11	11	122	121	12	143	135	11	11	Short term rating followed by a redispatch
	PANOCHÉ-SCHINDLER #1 115KV [3250] & EXCELSIORSS-PANOCHÉ2 115KV [3231]	P7	DCTL	18	22	17	133	129	23	156	141	16	16	Short term rating followed by a redispatch
	EXCELSIORSS-PANOCHÉ1 115kV [3250] & EXCELSIORSS-PANOCHÉ2 115kV [3231]	P6	N-1-1	<100	<100	<100	<100	<100	<100	<100	143	135	<100	Sensitivity Only
34562 SCHINDLR 70.0 34564	PANOCHÉ1 Section 1D & PANOCHÉ2 Section 2D 115kV	P2	Bus/Breaker	20	18	20	138	139	16	152	126	20	20	Short term rating followed by a redispatch
	EXCELSIORSS-PANOCHÉ1 115KV [3250] & EXCELSIORSS-PANOCHÉ2 115KV [3231]	P7	DCTL	19	21	20	123	129	22	137	120	20	20	Short term rating followed by a redispatch

Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading % (Baseline Scenarios)					Loading % (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations	
34562 SCHINDLER 70.0 34561 SCHINDLR 115 1 1	PANOCHÉ-SCHINDLER #1 115KV [3250] & EXCELSIORSS-PANOCHÉ2 115KV [3231]	P7	DCTL	31	37	32	137	139	39	152	126	32	Short term rating followed by a redispatch
	COALINGA #1-SAN MIGUEL 70kV [8580] & GATES 230/70kV TB 5	P6	N-1-1	<100	<100	<100	<100	<100	<100	143	116	<100	Sensitivity Only
	GATES 230kV Section 2D	P2	Bus/Breaker	N/A	59	56	N/A	77	59	105	N/A	59	Sensitivity Only
34562 SCHLNDLR 70.0 34561 Q526TP 70.0 1 1	PANOCHÉ1 Section 1D & PANOCHÉ2 Section 2D 115kV	P2	Bus/Breaker	25	27	27	103	115	25	122	103	29	Short term rating followed by a redispatch
	EXCELSIORSS-PANOCHÉ1 115KV [3250] & EXCELSIORSS-PANOCHÉ2 115KV [3231]	P7	DCTL	9	7	7	90	106	8	110	101	7	Short term rating followed by a redispatch
	PANOCHÉ-SCHINDLER #1 115KV [3250] & EXCELSIORSS-PANOCHÉ2 115KV [3231]	P7	DCTL	16	19	15	101	115	20	123	104	13	Short term rating followed by a redispatch
	SCHLNDLR-FIVEPOINTSSS #1 70kV [0] & GATES 230/70kV TB 5	P6	N-1-1	<100	<100	<100	<100	<100	<100	138	104	<100	Sensitivity Only
34562 SCHLNDLR 70.0 34567 FIVEPOINTSSS 70.0 1 1	PANOCHÉ1 Section 1D & PANOCHÉ2 Section 2D 115kV	P2	Bus/Breaker	14	10	13	155	144	8	159	127	13	Short term rating followed by a redispatch
	EXCELSIORSS-PANOCHÉ1 115KV [3250] & EXCELSIORSS-PANOCHÉ2 115KV [3231]	P7	DCTL	28	32	31	139	134	33	143	120	32	Short term rating followed by a redispatch
	PANOCHÉ-SCHINDLER #1 115KV [3250] & EXCELSIORSS-PANOCHÉ2 115KV [3231]	P7	DCTL	41	48	44	153	144	51	159	127	45	Short term rating followed by a redispatch
	PANOCHÉ1-EXCELSIORSS 115kV [0] & EXCELSIORSS-PANOCHÉ2 115KV [3231]	P6	N-1-1	<100	<100	<100	<100	<100	<100	142	120	<100	Sensitivity Only
	Q678 0kV Gen Unit 1 & GATES 230/70kV TB 5	P3	G1/N1	<100	<100	<100	<100	<100	<100	106	<100	<100	Sensitivity Only
	GATES 230/70kV TB 5	P1	N-1	51	44	43	58	73	45	101	79	45	Sensitivity Only
	GATES 230kV Section 2D	P2	Bus/Breaker	N/A	51	49	N/A	82	52	110	N/A	51	Sensitivity Only
34566 PLSNTVLY 70.0 34570 COLNGA 2 70.0 1 1	PANOCHÉ1 Section 1D & PANOCHÉ2 Section 2D 115kV	P2	Bus/Breaker	5	8	6	111	107	8	132	116	7	Short term rating followed by a redispatch
	PANOCHÉ-SCHINDLER #1 115KV [3250] & EXCELSIORSS-PANOCHÉ2 115KV [3231]	P7	DCTL	43	42	40	110	107	45	133	116	39	Short term rating followed by a redispatch
	PANOCHÉ1-EXCELSIORSS 115kV [0] & EXCELSIORSS-PANOCHÉ2 115KV [3231]	P6	N-1-1	<100	<100	<100	<100	<100	<100	120	111	<100	Sensitivity Only
	EXCELSIORSS-PANOCHÉ1 115KV [3250] & EXCELSIORSS-PANOCHÉ2 115KV [3231]	P7	DCTL	31	29	28	99	99	31	120	111	27	Sensitivity Only
34567 FIVEPOINTSSS 70.0 34560 CALIF AX 70.0 1 1	EXCELSIORSS 115kV - Middle Breaker Bay 2	P2	Bus/Breaker	N/A	27	26	N/A	87	29	117	N/A	28	Short term rating followed by a redispatch
	PANOCHÉ1 Section 1D & PANOCHÉ2 Section 2D 115kV	P2	Bus/Breaker	16	12	16	163	160	11	194	163	15	Short term rating followed by a redispatch
	EXCELSIORSS-PANOCHÉ1 115KV [3250] & EXCELSIORSS-PANOCHÉ2 115KV [3231]	P7	DCTL	30	34	33	148	150	35	179	156	34	Short term rating followed by a redispatch

Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading % (Baseline Scenarios)					Loading % (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations	
34574 COLNGA 1 70.0 34578 JACALITO 70.0 1 1	PANOCHESCHINDLER #1 115KV [3250] & EXCELSIORSS-PANOCHES2 115KV [3231]	P7	DCTL	42	50	45	162	160	52	195	163	46	Short term rating followed by a redispatch
	PANOCHES1-EXCELSIORSS 115kv [0] & EXCELSIORSS-PANOCHES2 115kv [3231]	P6	N-1-1	<100	<100	<100	<100	<100	<100	178	156	<100	Sensitivity Only
34574 COLNGA 1 70.0 34578 JACALITO 70.0 1 1	GATES 230/70kv TB 5 & SCHINDLER 115/70kv TB 1	P6	N-1-1	<100	<100	<100	<100	<100	<100	103	102	<100	Sensitivity Only
36354 SAN MIGL 70.0 34574 COLNGA 1 70.0 1 1	Q877PH3 0kv Gen Unit 3 & GATES 230/70kv TB 5	P3	G1/N1	<100	<100	<100	<100	<100	<100	132	117	<100	Sensitivity Only
	GATES 230/70kv TB 5	P1	N-1	2	4	3	100	87	5	116	113	5	Generation re-dispatch
	GATES 230kv Section 2D	P2	Bus/Breaker	18	N/A	N/A	78	N/A	N/A	N/A	101	N/A	Sensitivity Only
36354 SAN MIGL 70.0 36353 ESTRELLA 70.0 1 1	GATES 230/70kv TB 5 & SCHINDLER 115/70kv TB 1	P6	N-1-1	220	185	195	<100	<100	217	<100	<100	212	Operating Solution
364621 JACKSONSWSTA 115 34434 WAUKENA_SS 115 1 1	JACKSONSWSTA-CORCORAN 115kv [2040] & CORCORAN 115/70kv TB 1	P6	N-1-1	<100	<100	<100	<100	<100	<100	142	<100	<100	Sensitivity Only
	JACKSONSWSTA-CORCORAN 115kv [2040]	P1	N-1	N/A	63	80	N/A	100	66	137	N/A	80	Sensitivity Only
	JACKSONSWSTA-Q529TP 115kv [0] No Fault	P2	L1 w/o fault	N/A	57	56	N/A	100	60	138	N/A	56	Sensitivity Only
	KINGSBURG-CORCORAN #1 115kv [2040] (Q529TP-CORCORAN)	P2	L1 w/o fault	N/A	63	80	N/A	100	66	137	N/A	80	Sensitivity Only
	JACKSONSWSTA 115kv - Middle Breaker Bay 1	P2	Bus/Breaker	N/A	63	80	N/A	100	66	137	N/A	80	Sensitivity Only
	Q529TP-Q529 #1 115KV [0] & KINGSBURG-WAUKENA SW STA 115KV [2050]	P7	DCTL	N/A	63	80	N/A	100	66	137	N/A	80	Sensitivity Only
364621 JACKSONSWSTA 115 34436 Q529TP 115 1 1	JACKSONSWSTA-WAUKENA_SS #1 115kv [0] & CORCORAN 115/70kv TB 1	P6	N-1-1	<100	<100	<100	<100	<100	<100	141	<100	<100	Sensitivity Only
	JACKSONSWSTA-WAUKENA_SS #1 115kv [0]	P1	N-1	N/A	57	56	N/A	100	60	137	N/A	56	Sensitivity Only
	JACKSONSWSTA 115kv - Middle Breaker Bay 2	P2	Bus/Breaker	N/A	57	56	N/A	100	60	137	N/A	56	Sensitivity Only
364621 JACKSONSWSTA 115 34428 CONTADNA 115 1 1	GREGG 230 KV BAAH BUS #2 (FAILURE OF NON-REDUNDENT RELAY)	P5	Non-Redundent Relay	N/A	91	93	N/A	42	96	56	N/A	101	Sensitivity Only
38615 DS AMIGO 230 30790 PANOCHES 230 1 1	GATES 230/12.47kv TB 4 & GATES 500/230kv TB 11	P6	N-1-1	<100	<100	<100	<100	<100	<100	100	<100	<100	Sensitivity Only
	PANOCHES 230kv - Section 1E & 1D	P2	Bus/Breaker	25	20	26	87	78	22	104	79	27	Sensitivity Only
30805 BORDEN 230 30810 GREGG 230 2 1	GREGG 230 KV BAAH BUS #2 (FAILURE OF NON-REDUNDENT RELAY)	P5	Non-Redundent Relay	148	148	155	103	97	153	99	148	157	Protection Upgrade

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

High/Low Voltages



Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)					Voltage PU (Sensitivity Scenarios)				Project & Potential Mitigation Solutions	
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations		
ADAMS_E 70kV	Base Case	P0	Base case	<1.05	<1.05	<1.05	1.05	<1.05	<1.05	<1.05	<1.05	<1.05	Project: Wilson Voltage Support (Wilson 115 kV STATCOM) In-service date: 12/20 Short term: Action plan	
ADAMS_E TP 70kV	Base Case	P0	Base case	<1.05	<1.05	<1.05	1.05	<1.05	<1.05	<1.05	<1.05	<1.05		
AIRPROD 115kV	Base Case	P0	Base case	<1.05	<1.05	<1.05	1.06	<1.05	<1.05	<1.05	<1.05	<1.05		
AIRWAYJ2 115kV	Base Case	P0	Base case	<1.05	<1.05	<1.05	1.05	<1.05	<1.05	<1.05	<1.05	<1.05		
AIRWAYS 115kV	Base Case	P0	Base case	<1.05	<1.05	<1.05	1.05	<1.05	<1.05	<1.05	<1.05	<1.05		
ALPAUGH 115kV	Base Case	P0	Base case	<1.05	<1.05	<1.05	1.06	<1.05	<1.05	<1.05	1.06	<1.05		
ALPAUGHN_20P 115kV	Base Case	P0	Base case	<1.05	<1.05	<1.05	1.06	<1.05	<1.05	<1.05	1.06	<1.05		
ALPAUGHN_50P 115kV	Base Case	P0	Base case	<1.05	<1.05	<1.05	1.06	<1.05	<1.05	<1.05	1.06	<1.05		
ALPAUGHN_JCT 115kV	Base Case	P0	Base case	<1.05	<1.05	<1.05	1.06	<1.05	<1.05	<1.05	1.06	<1.05		
ALPAUGHNRTH 115kV	Base Case	P0	Base case	<1.05	<1.05	<1.05	1.06	<1.05	<1.05	<1.05	1.06	<1.05		
AMSTG SW 70kV	Base Case	P0	Base case	<1.05	<1.05	<1.05	1.06	<1.05	<1.05	<1.05	<1.05	<1.05		
ANGIOLA 70kV	Base Case	P0	Base case	<1.05	<1.05	<1.05	1.09	<1.05	<1.05	<1.05	1.06	<1.05		
ANTELOPE 70kV	Base Case	P0	Base case	<1.05	<1.05	<1.05	1.05	<1.05	<1.05	<1.05	<1.05	<1.05		
ANTLP JC 70kV	Base Case	P0	Base case	<1.05	<1.05	<1.05	1.05	<1.05	<1.05	<1.05	<1.05	<1.05		
ARBURU T 70kV	Base Case	P0	Base case	<1.05	<1.05	<1.05	<1.05	<1.05	<1.05	1.05	<1.05	<1.05	Under Review	
ARMSTRNG 70kV	Base Case	P0	Base case	<1.05	<1.05	<1.05	1.06	<1.05	<1.05	<1.05	<1.05	<1.05	Project: Wilson Voltage Support (Wilson 115 kV STATCOM) In-service date: 12/20 Short term: Action plan	
ARVIN 70kV	Base Case	P0	Base case	<1.05	<1.05	<1.05	1.05	<1.05	<1.05	<1.05	<1.05	<1.05	Under Review	
ATWATER 115kV	Base Case	P0	Base case	<1.05	<1.05	<1.05	1.07	<1.05	<1.05	<1.05	1.09	<1.05	<1.05	Under Review
ATWATR J 115kV	Base Case	P0	Base case	<1.05	<1.05	<1.05	1.07	<1.05	<1.05	<1.05	1.09	<1.05	<1.05	Under Review
ATWELL&1 115kV	Base Case	P0	Base case	<1.05	<1.05	<1.05	1.05	<1.05	<1.05	<1.05	<1.05	<1.05	<1.05	Project: Wilson Voltage Support (Wilson 115 kV STATCOM)
ATWELL_ISL 115kV	Base Case	P0	Base case	<1.05	<1.05	<1.05	1.06	<1.05	<1.05	<1.05	1.06	<1.05		
ATWELL_JCT 115kV	Base Case	P0	Base case	<1.05	<1.05	<1.05	1.06	<1.05	<1.05	<1.05	1.06	<1.05		
AUBERRY 70kV	Base Case	P0	Base case	<1.05	<1.05	<1.05	1.06	<1.05	<1.05	<1.05	<1.05	<1.05		
AUBRYTP 70kV	Base Case	P0	Base case	<1.05	<1.05	<1.05	1.06	<1.05	<1.05	<1.05	<1.05	<1.05		
BALCH 115kV	Base Case	P0	Base case	<1.05	<1.05	<1.05	1.06	<1.05	<1.05	<1.05	<1.05	<1.05		
BELRDG B 115kV	Base Case	P0	Base case	1.05	<1.05	<1.05	1.06	<1.05	<1.05	<1.05	1.06	<1.05		
BELRDG J 115kV	Base Case	P0	Base case	1.05	<1.05	<1.05	1.06	<1.05	<1.05	<1.05	1.06	<1.05		
BELRDG T 115kV	Base Case	P0	Base case	1.05	<1.05	<1.05	1.06	<1.05	<1.05	<1.05	1.06	<1.05		
BELRIDGE 115kV	Base Case	P0	Base case	1.05	<1.05	<1.05	1.06	<1.05	<1.05	<1.05	1.06	<1.05		
BLUSTNPP 70kV	Base Case	P0	Base case	<1.05	<1.05	<1.05	1.06	<1.05	<1.05	<1.05	<1.05	<1.05		

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Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)					Voltage PU (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations	
BOSWELL 70kV	Base Case	P0	Base case	<1.05	<1.05	<1.05	1.09	<1.05	<1.05	<1.05	1.06	<1.05	In-service date: 12/20 Short term: Action plan
BRRNDA A 70kV	Base Case	P0	Base case	<1.05	<1.05	<1.05	1.05	<1.05	<1.05	<1.05	<1.05	<1.05	
BRRNDA C 70kV	Base Case	P0	Base case	<1.05	<1.05	<1.05	1.05	<1.05	<1.05	<1.05	<1.05	<1.05	
BSWLL TP 70kV	Base Case	P0	Base case	<1.05	<1.05	<1.05	1.09	<1.05	<1.05	<1.05	1.06	<1.05	
CAL AVE 115kV	Base Case	P0	Base case	<1.05	<1.05	<1.05	1.06	<1.05	<1.05	<1.05	<1.05	<1.05	
CAL_TAP3 115kV	Base Case	P0	Base case	<1.05	<1.05	<1.05	1.05	<1.05	<1.05	<1.05	<1.05	<1.05	
CAL_TAP4 115kV	Base Case	P0	Base case	<1.05	<1.05	<1.05	1.05	<1.05	<1.05	<1.05	<1.05	<1.05	
CALEVRAS 115kV	Base Case	P0	Base case	<1.05	<1.05	<1.05	1.05	<1.05	<1.05	<1.05	<1.05	<1.05	
CAMDEN 70kV	Base Case	P0	Base case	<1.05	<1.05	<1.05	1.07	<1.05	<1.05	<1.05	<1.05	<1.05	
CARRIZO 115kV	Base Case	P0	Base case	<1.05	<1.05	<1.05	1.06	<1.05	<1.05	<1.05	<1.05	<1.05	
CARUTHRS 70kV	Base Case	P0	Base case	1.06	<1.05	<1.05	<1.05	<1.05	<1.05	<1.05	1.06	<1.05	
CASTLE 115kV	Base Case	P0	Base case	<1.05	<1.05	<1.05	1.07	<1.05	<1.05	<1.05	1.09	<1.05	Under Review
CAWELO C 115kV	Base Case	P0	Base case	<1.05	<1.05	<1.05	1.05	<1.05	<1.05	<1.05	<1.05	<1.05	Project: Wilson Voltage Support (Wilson 115 kV STATCOM) In-service date: 12/20 Short term: Action plan
CERTAN T 115kV	Base Case	P0	Base case	<1.05	<1.05	<1.05	1.05	<1.05	<1.05	<1.05	1.06	<1.05	Under Review
CERTANJ1 115kV	Base Case	P0	Base case	<1.05	<1.05	<1.05	1.05	<1.05	<1.05	<1.05	1.06	<1.05	Under Review
CERTANJ2 115kV	Base Case	P0	Base case	<1.05	<1.05	<1.05	1.05	<1.05	<1.05	<1.05	1.06	<1.05	Under Review
CERTTEED 115kV	Base Case	P0	Base case	<1.05	<1.05	<1.05	1.05	<1.05	<1.05	<1.05	1.06	<1.05	Under Review
CHLME JT 70kV	Base Case	P0	Base case	<1.05	<1.05	<1.05	1.05	<1.05	<1.05	<1.05	<1.05	<1.05	Project: Wilson Voltage Support (Wilson 115 kV STATCOM) In-service date: 12/20 Short term: Action plan
CHOLAME 70kV	Base Case	P0	Base case	<1.05	<1.05	<1.05	1.06	<1.05	<1.05	<1.05	<1.05	<1.05	Short term: Action plan
CHWCGN 115kV	Base Case	P0	Base case	<1.05	<1.05	<1.05	1.06	<1.05	<1.05	<1.05	1.07	<1.05	Under Review
CHWCGNJT 115kV	Base Case	P0	Base case	<1.05	<1.05	<1.05	1.06	<1.05	<1.05	<1.05	1.06	<1.05	Under Review
CHWCHLA2 115kV	Base Case	P0	Base case	<1.05	<1.05	<1.05	1.06	<1.05	<1.05	<1.05	1.07	<1.05	Under Review
CHWCHLASLR 115kV	Base Case	P0	Base case	<1.05	<1.05	<1.05	1.05	<1.05	<1.05	<1.05	<1.05	<1.05	Project: Wilson Voltage Support (Wilson 115 kV STATCOM) In-service date: 12/20 Short term: Action plan
CHWCHLASLRJT 115kV	Base Case	P0	Base case	<1.05	<1.05	<1.05	1.05	<1.05	<1.05	<1.05	<1.05	<1.05	Short term: Action plan



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Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)					Voltage PU (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations	
CHWCHLLA 115kV	Base Case	P0	Base case	<1.05	<1.05	<1.05	1.05	<1.05	<1.05	1.06	<1.05	<1.05	Under Review
CLOVIS-1 115kV	Base Case	P0	Base case	<1.05	<1.05	<1.05	1.05	<1.05	<1.05	<1.05	<1.05	<1.05	Project: Wilson Voltage Support (Wilson 115 kV STATCOM) In-service date: 12/20 Short term: Action plan
CLOVIS-2 115kV	Base Case	P0	Base case	<1.05	<1.05	<1.05	1.06	<1.05	<1.05	<1.05	<1.05	<1.05	
CLOVISJ1 115kV	Base Case	P0	Base case	<1.05	<1.05	<1.05	1.05	<1.05	<1.05	<1.05	<1.05	<1.05	
CLOVISJ2 115kV	Base Case	P0	Base case	<1.05	<1.05	<1.05	1.06	<1.05	<1.05	<1.05	<1.05	<1.05	
CMDN JCT 70kV	Base Case	P0	Base case	1.06	<1.05	<1.05	<1.05	<1.05	<1.05	<1.05	1.07	<1.05	
CORCORAN 70kV	Base Case	P0	Base case	<1.05	<1.05	<1.05	1.10	<1.05	<1.05	<1.05	1.07	<1.05	
CORCORAN 115kV	Base Case	P0	Base case	<1.05	<1.05	<1.05	1.08	<1.05	<1.05	<1.05	<1.05	<1.05	
CORCORANPV_P 115kV	Base Case	P0	Base case	<1.05	<1.05	<1.05	1.08	<1.05	<1.05	<1.05	<1.05	<1.05	
CORSGOLD 115kV	Base Case	P0	Base case	<1.05	<1.05	<1.05	1.06	1.06	<1.05	1.07	<1.05	<1.05	Under Review
CRESSEY 115kV	Base Case	P0	Base case	<1.05	<1.05	<1.05	1.07	<1.05	<1.05	<1.05	<1.05	<1.05	Project: Wilson Voltage Support (Wilson 115 kV STATCOM) In-service date: 12/20 Short term: Action plan
DANISHCM 115kV	Base Case	P0	Base case	<1.05	<1.05	<1.05	1.06	<1.05	<1.05	<1.05	<1.05	<1.05	
DEVLDNPP 70kV	Base Case	P0	Base case	<1.05	<1.05	<1.05	1.05	<1.05	<1.05	<1.05	<1.05	<1.05	
DEXZEL 115kV	Base Case	P0	Base case	<1.05	<1.05	<1.05	1.06	<1.05	<1.05	<1.05	<1.05	<1.05	
DINUBA 70kV	Base Case	P0	Base case	<1.05	<1.05	<1.05	1.08	<1.05	<1.05	<1.05	<1.05	<1.05	
DISCOVER 115kV	Base Case	P0	Base case	<1.05	<1.05	<1.05	1.06	<1.05	<1.05	<1.05	<1.05	<1.05	
DNUBAEGY 70kV	Base Case	P0	Base case	<1.05	<1.05	<1.05	1.08	<1.05	<1.05	<1.05	<1.05	<1.05	
DNUBAJCT 70kV	Base Case	P0	Base case	<1.05	<1.05	<1.05	1.08	<1.05	<1.05	<1.05	<1.05	<1.05	
DSCVRYTP 115kV	Base Case	P0	Base case	<1.05	<1.05	<1.05	1.06	<1.05	<1.05	<1.05	<1.05	<1.05	
DUNLAP 70kV	Base Case	P0	Base case	<1.05	<1.05	<1.05	1.07	<1.05	<1.05	<1.05	<1.05	<1.05	
EL CAPTN 115kV	Base Case	P0	Base case	<1.05	<1.05	<1.05	1.07	<1.05	<1.05	<1.05	<1.05	<1.05	
EL NIDO 115kV	Base Case	P0	Base case	<1.05	<1.05	<1.05	1.07	<1.05	<1.05	<1.05	<1.05	<1.05	
GALLO 115kV	Base Case	P0	Base case	<1.05	<1.05	<1.05	1.06	<1.05	<1.05	1.09	<1.05	<1.05	Under Review
GATES 115kV	Base Case	P0	Base case	1.10	<1.05	<1.05	1.11	<1.05	<1.05	<1.05	1.10	<1.05	Project: Wilson Voltage Support (Wilson 115 kV STATCOM) In-service date: 12/20 Short term: Action plan
GAURD J1 115kV	Base Case	P0	Base case	<1.05	<1.05	<1.05	1.06	<1.05	<1.05	<1.05	<1.05	<1.05	
GAURD J2 115kV	Base Case	P0	Base case	<1.05	<1.05	<1.05	1.06	<1.05	<1.05	<1.05	<1.05	<1.05	
GIFFEN 70kV	Base Case	P0	Base case	<1.05	<1.05	<1.05	1.07	<1.05	<1.05	<1.05	1.05	<1.05	
GODN_BER 115kV	Base Case	P0	Base case	<1.05	<1.05	<1.05	1.06	<1.05	<1.05	<1.05	<1.05	<1.05	
GRDNGLS1WB 115kV	Base Case	P0	Base case	<1.05	<1.05	<1.05	1.06	<1.05	<1.05	<1.05	<1.05	<1.05	
GRDNGLS2EB 115kV	Base Case	P0	Base case	<1.05	<1.05	<1.05	1.06	<1.05	<1.05	<1.05	<1.05	<1.05	
GUERNSEY 70kV	Base Case	P0	Base case	<1.05	<1.05	<1.05	1.06	<1.05	<1.05	<1.05	<1.05	<1.05	
GUR3TPT 70kV	Base Case	P0	Base case	<1.05	<1.05	<1.05	1.06	<1.05	<1.05	<1.05	<1.05	<1.05	
HARDWICK 70kV	Base Case	P0	Base case	<1.05	<1.05	<1.05	1.06	<1.05	<1.05	<1.05	<1.05	<1.05	

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Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)					Voltage PU (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations	
HNFRD SW 70kV	Base Case	P0	Base case	<1.05	<1.05	<1.05	1.06	<1.05	<1.05	<1.05	<1.05	<1.05	
HRDWK TP 70kV	Base Case	P0	Base case	<1.05	<1.05	<1.05	1.06	<1.05	<1.05	<1.05	<1.05	<1.05	
JGBSWLL 70kV	Base Case	P0	Base case	<1.05	<1.05	<1.05	1.09	<1.05	<1.05	<1.05	1.06	<1.05	
JR WOOD 115kV	Base Case	P0	Base case	<1.05	<1.05	<1.05	1.07	<1.05	<1.05	1.09	<1.05	<1.05	Under Review
JRWD GEN 115kV	Base Case	P0	Base case	<1.05	<1.05	<1.05	1.07	<1.05	<1.05	1.09	<1.05	<1.05	Under Review
K1-JCT 115kV	Base Case	P0	Base case	<1.05	<1.05	<1.05	1.05	1.06	<1.05	1.06	<1.05	<1.05	Under Review
KERCKHF1 115kV	Base Case	P0	Base case	<1.05	<1.05	<1.05	1.05	<1.05	<1.05	<1.05	<1.05	<1.05	Project: Wilson Voltage Support (Wilson 115 kV STATCOM) In-service date: 12/20 Short term: Action plan
KERCKHF2 115kV	Base Case	P0	Base case	<1.05	<1.05	<1.05	1.05	<1.05	<1.05	<1.05	<1.05	<1.05	
KERN OIL 115kV	Base Case	P0	Base case	<1.05	<1.05	<1.05	1.06	<1.05	<1.05	<1.05	<1.05	<1.05	
KERN PWR 115kV	Base Case	P0	Base case	<1.05	<1.05	<1.05	1.06	<1.05	<1.05	<1.05	<1.05	<1.05	
KERNFRNT 115kV	Base Case	P0	Base case	<1.05	<1.05	<1.05	1.05	<1.05	<1.05	<1.05	<1.05	<1.05	
KERNRDGE 115kV	Base Case	P0	Base case	1.06	<1.05	<1.05	1.07	<1.05	<1.05	<1.05	1.06	<1.05	
KERNWATR 115kV	Base Case	P0	Base case	<1.05	<1.05	<1.05	1.06	<1.05	<1.05	<1.05	<1.05	<1.05	
KINGS J1 115kV	Base Case	P0	Base case	<1.05	<1.05	<1.05	1.06	<1.05	<1.05	<1.05	<1.05	<1.05	
KINGS J2 115kV	Base Case	P0	Base case	<1.05	<1.05	<1.05	1.06	<1.05	<1.05	<1.05	<1.05	<1.05	
KINGSBURGD 115kV	Base Case	P0	Base case	<1.05	<1.05	<1.05	1.06	<1.05	<1.05	<1.05	<1.05	<1.05	
KINGSBURGE 115kV	Base Case	P0	Base case	<1.05	<1.05	<1.05	1.06	<1.05	<1.05	<1.05	<1.05	<1.05	
KNGLOBUS 70kV	Base Case	P0	Base case	<1.05	<1.05	<1.05	1.06	<1.05	<1.05	<1.05	<1.05	<1.05	
KNGSCOGN 115kV	Base Case	P0	Base case	<1.05	<1.05	<1.05	1.06	<1.05	<1.05	<1.05	<1.05	<1.05	
KNGSRVR1 115kV	Base Case	P0	Base case	<1.05	<1.05	<1.05	1.06	<1.05	<1.05	<1.05	<1.05	<1.05	
KNSBGCGNJCT 115kV	Base Case	P0	Base case	<1.05	<1.05	<1.05	1.06	<1.05	<1.05	<1.05	<1.05	<1.05	
KRCDP 115kV	Base Case	P0	Base case	<1.05	<1.05	<1.05	1.06	<1.05	<1.05	<1.05	<1.05	<1.05	
KRN OL J 115kV	Base Case	P0	Base case	<1.05	<1.05	<1.05	1.06	<1.05	<1.05	<1.05	<1.05	<1.05	
KRNFRNTT 115kV	Base Case	P0	Base case	<1.05	<1.05	<1.05	1.05	<1.05	<1.05	<1.05	<1.05	<1.05	
LE GRAND 115kV	Base Case	P0	Base case	<1.05	<1.05	<1.05	1.06	<1.05	<1.05	1.07	<1.05	<1.05	Under Review
LE GRNDJ 115kV	Base Case	P0	Base case	<1.05	<1.05	<1.05	1.07	<1.05	<1.05	1.10	<1.05	<1.05	Under Review
LERDO 115kV	Base Case	P0	Base case	<1.05	<1.05	<1.05	1.05	<1.05	<1.05	<1.05	<1.05	<1.05	Project: Wilson Voltage Support (Wilson 115 kV STATCOM) In-service date: 12/20 Short term: Action plan
LIVE OAK 115kV	Base Case	P0	Base case	<1.05	<1.05	<1.05	1.06	<1.05	<1.05	<1.05	<1.05	<1.05	
LIVNGSTN 70kV	Base Case	P0	Base case	<1.05	<1.05	<1.05	1.05	<1.05	<1.05	<1.05	<1.05	<1.05	Under Review
LIVNGSTN 115kV	Base Case	P0	Base case	<1.05	<1.05	<1.05	1.06	<1.05	<1.05	1.09	<1.05	<1.05	
LOSBANOS 230kV	Base Case	P0	Base case	<1.05	<1.05	<1.05	<1.05	<1.05	<1.05	1.06	<1.05	<1.05	Under Review

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

High/Low Voltages



Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)					Voltage PU (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations	
LRDO JCT 115kV	Base Case	P0	Base case	<1.05	<1.05	<1.05	1.06	<1.05	<1.05	<1.05	<1.05	<1.05	Project: Wilson Voltage Support (Wilson 115 kV STATCOM) In-service date: 12/20 Short term: Action plan
MAGUNDEN 115kV	Base Case	P0	Base case	<1.05	<1.05	<1.05	1.05	<1.05	<1.05	<1.05	<1.05	<1.05	
MALAGA 115kV	Base Case	P0	Base case	<1.05	<1.05	<1.05	1.06	<1.05	<1.05	<1.05	<1.05	<1.05	
MALAGATP 115kV	Base Case	P0	Base case	<1.05	<1.05	<1.05	1.06	<1.05	<1.05	<1.05	<1.05	<1.05	
MANCHSTR 115kV	Base Case	P0	Base case	<1.05	<1.05	<1.05	1.05	<1.05	<1.05	<1.05	<1.05	<1.05	
MC CALL 115kV	Base Case	P0	Base case	<1.05	<1.05	<1.05	1.06	<1.05	<1.05	<1.05	1.05	<1.05	
MERCED 115kV	Base Case	P0	Base case	<1.05	<1.05	<1.05	1.07	<1.05	<1.05	<1.05	<1.05	<1.05	
MIDWAY 115kV	Base Case	P0	Base case	1.05	1.05	<1.05	<1.05	<1.05	1.05	1.05	<1.05	<1.05	Under Review
MOCCASIN 115kV	Base Case	P0	Base case	<1.05	<1.05	<1.05	1.05	<1.05	<1.05	<1.05	<1.05	<1.05	Project: Wilson Voltage Support (Wilson 115 kV STATCOM) In-service date: 12/20 Short term: Action plan
NRTHFORK 70kV	Base Case	P0	Base case	<1.05	<1.05	<1.05	1.07	<1.05	<1.05	<1.05	<1.05	<1.05	
OAKH_JCT 115kV	Base Case	P0	Base case	<1.05	<1.05	<1.05	1.05	1.06	<1.05	1.06	<1.05	<1.05	Under Review
OAKHURST 115kV	Base Case	P0	Base case	<1.05	<1.05	<1.05	1.05	1.06	<1.05	1.07	<1.05	<1.05	Under Review
OGLE JCT 115kV	Base Case	P0	Base case	<1.05	<1.05	<1.05	1.05	<1.05	<1.05	<1.05	<1.05	<1.05	Project: Wilson Voltage Support (Wilson 115 kV STATCOM) In-service date: 12/20 Short term: Action plan
OGLE TAP 115kV	Base Case	P0	Base case	<1.05	<1.05	<1.05	1.05	<1.05	<1.05	<1.05	<1.05	<1.05	
OLIVE_SS 115kV	Base Case	P0	Base case	<1.05	<1.05	<1.05	1.06	<1.05	<1.05	<1.05	1.06	<1.05	
ORION 70kV	Base Case	P0	Base case	<1.05	<1.05	<1.05	1.05	<1.05	<1.05	<1.05	<1.05	<1.05	
ORIONTP 70kV	Base Case	P0	Base case	<1.05	<1.05	<1.05	1.05	<1.05	<1.05	<1.05	<1.05	<1.05	
ORO LOMAJ1 115kV	Base Case	P0	Base case	<1.05	<1.05	<1.05	1.08	<1.05	<1.05	<1.05	<1.05	<1.05	
OROSI 70kV	Base Case	P0	Base case	<1.05	<1.05	<1.05	1.08	<1.05	<1.05	<1.05	<1.05	<1.05	
ORSI JCT 70kV	Base Case	P0	Base case	<1.05	<1.05	<1.05	1.08	<1.05	<1.05	<1.05	<1.05	<1.05	
PARLIER 115kV	Base Case	P0	Base case	<1.05	<1.05	<1.05	1.06	<1.05	<1.05	<1.05	<1.05	<1.05	
PIEDRA 1 115kV	Base Case	P0	Base case	<1.05	<1.05	<1.05	1.06	<1.05	<1.05	<1.05	<1.05	<1.05	
PIEDRA 2 115kV	Base Case	P0	Base case	<1.05	<1.05	<1.05	1.06	<1.05	<1.05	<1.05	<1.05	<1.05	
POLPASPP 70kV	Base Case	P0	Base case	<1.05	<1.05	<1.05	1.06	<1.05	<1.05	<1.05	<1.05	<1.05	
PONDROAD 115kV	Base Case	P0	Base case	<1.05	<1.05	<1.05	1.05	<1.05	<1.05	<1.05	<1.05	<1.05	
POSO J2 70kV	Base Case	P0	Base case	<1.05	<1.05	<1.05	1.05	<1.05	<1.05	<1.05	<1.05	<1.05	
POSO MT 115kV	Base Case	P0	Base case	<1.05	<1.05	<1.05	1.05	<1.05	<1.05	<1.05	<1.05	<1.05	
POSOMTJT 115kV	Base Case	P0	Base case	<1.05	<1.05	<1.05	1.06	<1.05	<1.05	<1.05	<1.05	<1.05	
PPG 115kV	Base Case	P0	Base case	<1.05	<1.05	<1.05	1.06	<1.05	<1.05	<1.05	<1.05	<1.05	
PSE MCKJ 115kV	Base Case	P0	Base case	1.06	<1.05	<1.05	1.06	<1.05	<1.05	<1.05	1.06	<1.05	
PSE MCKT 115kV	Base Case	P0	Base case	1.05	<1.05	<1.05	1.06	<1.05	<1.05	<1.05	1.05	<1.05	

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

High/Low Voltages



Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)					Voltage PU (Sensitivity Scenarios)				Project & Potential Mitigation Solutions	
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations		
PTRL JCT 115kV	Base Case	P0	Base case	<1.05	<1.05	<1.05	1.06	<1.05	<1.05	<1.05	<1.05	<1.05		
PUMPJACK 115kV	Base Case	P0	Base case	1.05	<1.05	<1.05	1.06	<1.05	<1.05	<1.05	1.06	<1.05		
PUMPJACK_TP 115kV	Base Case	P0	Base case	1.05	<1.05	<1.05	1.06	<1.05	<1.05	<1.05	1.06	<1.05		
Q482 115kV	Base Case	P0	Base case	<1.05	<1.05	<1.05	1.06	<1.05	<1.05	<1.05	1.06	<1.05		
Q529 115kV	Base Case	P0	Base case	<1.05	<1.05	<1.05	1.08	<1.05	<1.05	<1.05	<1.05	<1.05		
Q529TP 115kV	Base Case	P0	Base case	<1.05	<1.05	<1.05	1.08	<1.05	<1.05	<1.05	<1.05	<1.05		
Q557 115kV	Base Case	P0	Base case	<1.05	<1.05	<1.05	1.06	<1.05	<1.05	<1.05	1.06	<1.05		
Q558 115kV	Base Case	P0	Base case	<1.05	<1.05	<1.05	1.08	<1.05	<1.05	<1.05	<1.05	<1.05		
Q577 230kV	Base Case	P0	Base case	<1.05	<1.05	<1.05	<1.05	<1.05	<1.05	1.06	<1.05	<1.05	Under Review	
Q632B 70kV	Base Case	P0	Base case	1.05	<1.05	<1.05	<1.05	<1.05	<1.05	<1.05	1.06	<1.05	Project: Wilson Voltage Support (Wilson 115 kV STATCOM) In-service date: 12/20 Short term: Action plan	
Q679 70kV	Base Case	P0	Base case	<1.05	<1.05	<1.05	1.07	<1.05	<1.05	<1.05	1.05	<1.05		
Q972 115kV	Base Case	P0	Base case	1.05	<1.05	<1.05	1.06	<1.05	<1.05	<1.05	1.06	<1.05		
QUEBEC 115kV	Base Case	P0	Base case	<1.05	<1.05	<1.05	1.06	<1.05	<1.05	<1.05	1.05	<1.05		
QUEBECTP 115kV	Base Case	P0	Base case	<1.05	<1.05	<1.05	1.06	<1.05	<1.05	<1.05	1.06	<1.05		
QUINTO_SS 230kV	Base Case	P0	Base case	<1.05	<1.05	<1.05	<1.05	<1.05	<1.05	1.06	<1.05	<1.05	Under Review	
RAINBW 115kV	Base Case	P0	Base case	<1.05	<1.05	<1.05	1.06	<1.05	<1.05	<1.05	<1.05	<1.05	Project: Wilson Voltage Support (Wilson 115 kV STATCOM) In-service date: 12/20 Short term: Action plan	
RAINBWTP 115kV	Base Case	P0	Base case	<1.05	<1.05	<1.05	1.06	<1.05	<1.05	<1.05	<1.05	<1.05		
RANCHRS 115kV	Base Case	P0	Base case	<1.05	<1.05	<1.05	1.06	<1.05	<1.05	<1.05	<1.05	<1.05		
RASMSNTP 115kV	Base Case	P0	Base case	<1.05	<1.05	<1.05	1.06	<1.05	<1.05	<1.05	<1.05	<1.05		
RASMUSEN 115kV	Base Case	P0	Base case	<1.05	<1.05	<1.05	1.06	<1.05	<1.05	<1.05	<1.05	<1.05		
REEDLEY 70kV	Base Case	P0	Base case	<1.05	<1.05	<1.05	1.08	<1.05	<1.05	<1.05	<1.05	<1.05		
REEDLEY 115kV	Base Case	P0	Base case	<1.05	<1.05	<1.05	1.06	<1.05	<1.05	<1.05	<1.05	<1.05		
RESERVE 70kV	Base Case	P0	Base case	<1.05	<1.05	<1.05	1.06	<1.05	<1.05	<1.05	<1.05	<1.05		
RIOBRAVO1 115kV	Base Case	P0	Base case	1.05	<1.05	<1.05	1.06	<1.05	<1.05	<1.05	1.06	<1.05		
ROSEDAL 115kV	Base Case	P0	Base case	<1.05	<1.05	<1.05	1.06	<1.05	<1.05	<1.05	<1.05	<1.05		
S_KERN 70kV	Base Case	P0	Base case	<1.05	<1.05	<1.05	1.06	<1.05	<1.05	<1.05	1.06	<1.05		
S_KERN_TP 70kV	Base Case	P0	Base case	<1.05	<1.05	<1.05	1.06	<1.05	<1.05	<1.05	1.06	<1.05		
SAN EMDO 70kV	Base Case	P0	Base case	<1.05	<1.05	<1.05	1.05	<1.05	<1.05	<1.05	<1.05	<1.05		
SANDCRK 70kV	Base Case	P0	Base case	<1.05	<1.05	<1.05	1.07	<1.05	<1.05	<1.05	<1.05	<1.05		
SANGER 115kV	Base Case	P0	Base case	<1.05	<1.05	<1.05	1.06	<1.05	<1.05	<1.05	<1.05	<1.05		
SCWAX 115kV	Base Case	P0	Base case	<1.05	<1.05	<1.05	1.06	<1.05	<1.05	<1.05	<1.05	<1.05		
SCWAXJCT 115kV	Base Case	P0	Base case	<1.05	<1.05	<1.05	1.06	<1.05	<1.05	<1.05	<1.05	<1.05		
SESWTF 115kV	Base Case	P0	Base case	<1.05	<1.05	<1.05	1.05	<1.05	<1.05	<1.05	<1.05	<1.05		

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Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)					Voltage PU (Sensitivity Scenarios)				Project & Potential Mitigation Solutions	
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations		
SESWTFTP 115kV	Base Case	P0	Base case	<1.05	<1.05	<1.05	1.05	<1.05	<1.05	<1.05	<1.05	<1.05		
SHARON 115kV	Base Case	P0	Base case	<1.05	<1.05	<1.05	1.05	<1.05	<1.05	<1.05	1.06	<1.05	<1.05	Under Review
SHARON T 115kV	Base Case	P0	Base case	<1.05	<1.05	<1.05	1.05	<1.05	<1.05	<1.05	1.06	<1.05	<1.05	Under Review
SJNO2 70kV	Base Case	P0	Base case	<1.05	<1.05	<1.05	1.07	<1.05	<1.05	<1.05	<1.05	<1.05	<1.05	
SJNO3 70kV	Base Case	P0	Base case	<1.05	<1.05	<1.05	1.08	<1.05	<1.05	<1.05	<1.05	<1.05	<1.05	
SMYRNA 115kV	Base Case	P0	Base case	<1.05	<1.05	<1.05	1.05	<1.05	<1.05	<1.05	<1.05	<1.05	<1.05	
SNGRCOGN 115kV	Base Case	P0	Base case	<1.05	<1.05	<1.05	1.06	<1.05	<1.05	<1.05	<1.05	<1.05	<1.05	
SNGRJCT 115kV	Base Case	P0	Base case	<1.05	<1.05	<1.05	1.06	<1.05	<1.05	<1.05	<1.05	<1.05	<1.05	
STALIONJ 70kV	Base Case	P0	Base case	<1.05	<1.05	<1.05	1.05	<1.05	<1.05	<1.05	<1.05	<1.05	<1.05	
STALLION 70kV	Base Case	P0	Base case	<1.05	<1.05	<1.05	1.05	<1.05	<1.05	<1.05	<1.05	<1.05	<1.05	
STCKDLJ 115kV	Base Case	P0	Base case	<1.05	<1.05	<1.05	1.05	<1.05	<1.05	<1.05	<1.05	<1.05	<1.05	
STCRRL J 70kV	Base Case	P0	Base case	<1.05	<1.05	<1.05	1.08	<1.05	<1.05	<1.05	<1.05	<1.05	<1.05	
STOCKDLE 115kV	Base Case	P0	Base case	<1.05	<1.05	<1.05	1.06	<1.05	<1.05	<1.05	<1.05	<1.05	<1.05	
STONCRRL 70kV	Base Case	P0	Base case	<1.05	<1.05	<1.05	1.08	<1.05	<1.05	<1.05	<1.05	<1.05	<1.05	
STRD JCT 70kV	Base Case	P0	Base case	1.05	<1.05	<1.05	<1.05	<1.05	<1.05	<1.05	<1.05	1.05	<1.05	
STROUD 70kV	Base Case	P0	Base case	1.06	<1.05	<1.05	<1.05	<1.05	<1.05	<1.05	<1.05	1.06	<1.05	
SUNMAID 115kV	Base Case	P0	Base case	<1.05	<1.05	<1.05	1.06	<1.05	<1.05	<1.05	<1.05	<1.05	<1.05	Project: Wilson Voltage Support (Wilson 115 kV STATCOM)
SUNMAIDJCT 115kV	Base Case	P0	Base case	<1.05	<1.05	<1.05	1.06	<1.05	<1.05	<1.05	<1.05	<1.05	<1.05	In-service date: 12/20
SW85 J1 70kV	Base Case	P0	Base case	<1.05	<1.05	<1.05	1.05	<1.05	<1.05	<1.05	<1.05	<1.05	<1.05	Short term: Action plan
SW85 J2 70kV	Base Case	P0	Base case	<1.05	<1.05	<1.05	1.06	<1.05	<1.05	<1.05	<1.05	<1.05	<1.05	
TAFT A 70kV	Base Case	P0	Base case	<1.05	<1.05	<1.05	1.05	<1.05	<1.05	<1.05	<1.05	<1.05	<1.05	
TAFT_SW_TAFC 70kV	Base Case	P0	Base case	<1.05	<1.05	<1.05	1.05	<1.05	<1.05	<1.05	<1.05	<1.05	<1.05	
TAFT_SW_TAFM 70kV	Base Case	P0	Base case	<1.05	<1.05	<1.05	1.05	<1.05	<1.05	<1.05	<1.05	<1.05	<1.05	
TEMBLOR 115kV	Base Case	P0	Base case	1.06	<1.05	<1.05	1.06	<1.05	<1.05	<1.05	<1.05	1.06	<1.05	
TEVIS 115kV	Base Case	P0	Base case	<1.05	<1.05	<1.05	1.06	<1.05	<1.05	<1.05	<1.05	<1.05	<1.05	
TEVIS2 115kV	Base Case	P0	Base case	<1.05	<1.05	<1.05	1.06	<1.05	<1.05	<1.05	<1.05	<1.05	<1.05	
TEVISJ1 115kV	Base Case	P0	Base case	<1.05	<1.05	<1.05	1.06	<1.05	<1.05	<1.05	<1.05	<1.05	<1.05	
TEVISJ2 115kV	Base Case	P0	Base case	<1.05	<1.05	<1.05	1.05	<1.05	<1.05	<1.05	<1.05	<1.05	<1.05	
TVY VLLY 70kV	Base Case	P0	Base case	<1.05	<1.05	<1.05	1.07	<1.05	<1.05	<1.05	<1.05	<1.05	<1.05	
TX_ROSDL 115kV	Base Case	P0	Base case	<1.05	<1.05	<1.05	1.06	<1.05	<1.05	<1.05	<1.05	<1.05	<1.05	
ULTPWRJ 115kV	Base Case	P0	Base case	<1.05	<1.05	<1.05	1.06	<1.05	<1.05	<1.05	<1.05	<1.05	<1.05	
VEDDER 115kV	Base Case	P0	Base case	<1.05	<1.05	<1.05	1.05	<1.05	<1.05	<1.05	<1.05	<1.05	<1.05	
WAHTOKE 115kV	Base Case	P0	Base case	<1.05	<1.05	<1.05	1.06	<1.05	<1.05	<1.05	<1.05	<1.05	<1.05	



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Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)					Voltage PU (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations	
WARNERVL 230kV	Base Case	P0	Base case	<1.05	<1.05	<1.05	<1.05	<1.05	<1.05	1.07	<1.05	<1.05	Under Review
WAUKENA_SS 115kV	Base Case	P0	Base case	<1.05	<1.05	<1.05	1.08	<1.05	<1.05	<1.05	<1.05	<1.05	Project: Wilson Voltage Support (Wilson 115 kV STATCOM) In-service date: 12/20 Short term: Action plan
WEEDPTCH 70kV	Base Case	P0	Base case	<1.05	<1.05	<1.05	1.05	<1.05	<1.05	<1.05	<1.05	<1.05	
WESTPARK 115kV	Base Case	P0	Base case	<1.05	<1.05	<1.05	1.05	<1.05	<1.05	<1.05	<1.05	<1.05	
WHITERIVER_P 115kV	Base Case	P0	Base case	<1.05	<1.05	<1.05	1.06	<1.05	<1.05	<1.05	1.06	<1.05	Under Review
WILSON A 115kV	Base Case	P0	Base case	1.05	<1.05	<1.05	1.06	<1.05	<1.05	1.09	<1.05	<1.05	Project: Wilson Voltage Support (Wilson 115 kV STATCOM) In-service date: 12/20 Short term: Action plan
WILSON B 115kV	Base Case	P0	Base case	1.05	<1.05	<1.05	1.06	<1.05	<1.05	<1.05	<1.05	<1.05	
WISHON 70kV	Base Case	P0	Base case	<1.05	<1.05	<1.05	1.06	<1.05	<1.05	<1.05	<1.05	<1.05	
WRIGHT T 70kV	Base Case	P0	Base case	<1.05	<1.05	<1.05	<1.05	<1.05	<1.05	1.05	<1.05	<1.05	Under Review
WST FRSO 115kV	Base Case	P0	Base case	<1.05	<1.05	<1.05	1.06	<1.05	<1.05	<1.05	<1.05	<1.05	Project: Wilson Voltage Support (Wilson 115 kV STATCOM) In-service date: 12/20 Short term: Action plan
BER VLLY 70kV	EXCHEQUR 70/115kV TB 1	P1	N-1	<1.1	<1.1	<1.1	<1.1	<1.1	<1.1	1.11	<1.1	<1.1	Under Review
BRCEBG J 70kV	EXCHEQUR 70/115kV TB 1	P1	N-1	<1.1	<1.1	<1.1	<1.1	<1.1	<1.1	1.11	<1.1	<1.1	Under Review
CANAL 70kV	LOS BANOS-LIVINGSTON JCT-CANAL 70kV [8940]	P1	N-1	>0.9	>0.9	0.89	>0.9	>0.9	>0.9	>0.9	>0.9	0.89	Monitor future load forecast
DINUBA 70kV	REEDLEY-DINUBA #1 70kV [9050]	P1	N-1	>0.9	0.92	0.91	>0.9	>0.9	0.92	>0.9	>0.9	0.91	Project: Reedley 70 kV Reinforcement (Dinuba Battery Energy Storage) Turn On Battery In-service date: 05/21
EXCHEQUR 70kV	EXCHEQUR 70/115kV TB 1	P1	N-1	<1.1	<1.1	<1.1	<1.1	<1.1	<1.1	1.11	<1.1	<1.1	Under Review
EXCHEQUR 115kV	EXCHEQUER-LE GRAND 115kV [1560]	P1	N-1	<1.1	<1.1	<1.1	<1.1	<1.1	<1.1	1.11	<1.1	<1.1	Under Review
INDN FLT 70kV	EXCHEQUR 70/115kV TB 1	P1	N-1	<1.1	<1.1	<1.1	<1.1	<1.1	<1.1	1.11	<1.1	<1.1	Under Review
MARIPOS2 70kV	EXCHEQUR 70/115kV TB 1	P1	N-1	<1.1	<1.1	<1.1	<1.1	<1.1	<1.1	1.12	<1.1	<1.1	Under Review
MC SWAIN 70kV	EXCHEQUR 70/115kV TB 1	P1	N-1	<1.1	<1.1	<1.1	<1.1	<1.1	<1.1	1.10	<1.1	<1.1	Under Review
MCSWAINJ 70kV	EXCHEQUR 70/115kV TB 1	P1	N-1	<1.1	<1.1	<1.1	<1.1	<1.1	<1.1	1.10	<1.1	<1.1	Under Review
MENDOTA 115kV	PANOCHÉ-MENDOTA 115kV [3230]	P1	N-1	>0.9	>0.9	0.92	>0.9	>0.9	>0.9	>0.9	>0.9	0.91	Monitor future load forecast
MRCDFLLS 70kV	EXCHEQUR 70/115kV TB 1	P1	N-1	<1.1	<1.1	<1.1	<1.1	<1.1	<1.1	1.10	<1.1	<1.1	Under Review
NORTHSTAR 115kV	PANOCHÉ-MENDOTA 115kV [3230]	P1	N-1	>0.9	>0.9	0.92	>0.9	>0.9	>0.9	>0.9	>0.9	0.91	Under Review
SAXONCRK 70kV	EXCHEQUR 70/115kV TB 1	P1	N-1	<1.1	<1.1	<1.1	<1.1	<1.1	<1.1	1.11	<1.1	<1.1	Under Review

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

High/Low Voltages



Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)					Voltage PU (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations	
YOSEMITE 70kV	EXCHEQUR 70/115kV TB 1	P1	N-1	<1.1	<1.1	<1.1	<1.1	<1.1	<1.1	1.11	<1.1	<1.1	Under Review
ARBURU T 70kV	LOS BANOS-LIVINGSTON JCT-CANAL 70kV [8940] (CHEVPIPE-LOS BANS)	P2	Bus/Breaker	NA	0.98	0.86	NA	>0.9	0.98	>0.9	NA	0.86	Monitor future load forecast
ARBURUA 70kV	LOS BANOS-LIVINGSTON JCT-CANAL 70kV [8940] (CHEVPIPE-LOS BANS)	P2	Bus/Breaker	NA	0.98	0.86	NA	>0.9	0.97	>0.9	NA	0.86	Monitor future load forecast
CANAL 70kV	LOS BANOS-LIVINGSTON JCT-CANAL 70kV [8940] (CANAL-LVNGSTNT)	P2	Bus/Breaker	NA	>0.9	>0.9	NA	>0.9	>0.9	>0.9	NA	>0.9	Under Review
CANAL 70kV	LOS BANOS-LIVINGSTON JCT-CANAL 70kV [8940] (CHEVPIPE-LOS BANS)	P2	Bus/Breaker	NA	0.97	0.78	NA	>0.9	0.96	>0.9	NA	0.78	Monitor future load forecast
CANAL 70kV	LOS BANOS-LIVINGSTON JCT-CANAL 70kV [8940] (SNTA NLA-LVNGSTNT)	P2	Bus/Breaker	NA	>0.9	>0.9	NA	>0.9	>0.9	>0.9	NA	>0.9	Under Review
CHEVPIPE 70kV	LOS BANOS-LIVINGSTON JCT-CANAL 70kV [8940] (CHEVPIPE-LOS BANS)	P2	Bus/Breaker	NA	0.94	0.77	NA	>0.9	0.93	>0.9	NA	0.77	Monitor future load forecast
LIVNGSTN 70kV	LOS BANOS-LIVINGSTON JCT-CANAL 70kV [8940] (CHEVPIPE-LOS BANS)	P2	Bus/Breaker	NA	0.97	0.78	NA	>0.9	0.96	>0.9	NA	0.78	Monitor future load forecast
LIVNGSTN 70kV	LOS BANOS-LIVINGSTON JCT-CANAL 70kV [8940] (SNTA NLA-LVNGSTNT)	P2	Bus/Breaker	NA	>0.9	>0.9	NA	>0.9	>0.9	>0.9	NA	>0.9	Under Review
LVNGSTNT 70kV	LOS BANOS-LIVINGSTON JCT-CANAL 70kV [8940] (CHEVPIPE-LOS BANS)	P2	Bus/Breaker	NA	0.96	0.78	NA	>0.9	0.96	>0.9	NA	0.78	Under Review
LVNGSTNT 70kV	LOS BANOS-LIVINGSTON JCT-CANAL 70kV [8940] (SNTA NLA-LVNGSTNT)	P2	Bus/Breaker	NA	>0.9	>0.9	NA	>0.9	>0.9	>0.9	NA	>0.9	Under Review
MERCYSPRNGSS70kV	LOS BANOS-LIVINGSTON JCT-CANAL 70kV [8940] (CHEVPIPE-LOS BANS)	P2	Bus/Breaker	NA	0.98	0.84	NA	>0.9	0.97	>0.9	NA	0.84	Monitor future load forecast
MRCYSPRS 70kV	LOS BANOS-LIVINGSTON JCT-CANAL 70kV [8940] (CHEVPIPE-LOS BANS)	P2	Bus/Breaker	NA	0.98	0.83	NA	>0.9	0.97	>0.9	NA	0.83	Monitor future load forecast
ORTIGA 70kV	LOS BANOS-LIVINGSTON JCT-CANAL 70kV [8940] (CHEVPIPE-LOS BANS)	P2	Bus/Breaker	NA	0.98	0.81	NA	>0.9	0.97	>0.9	NA	0.81	Monitor future load forecast
SNTA NLA 70kV	LOS BANOS-LIVINGSTON JCT-CANAL 70kV [8940] (CHEVPIPE-LOS BANS)	P2	Bus/Breaker	NA	0.94	0.77	NA	>0.9	0.93	>0.9	NA	0.77	Monitor future load forecast
VEGA 70kV	LOS BANOS-LIVINGSTON JCT-CANAL 70kV [8940] (CHEVPIPE-LOS BANS)	P2	Bus/Breaker	NA	0.98	0.84	NA	>0.9	0.97	>0.9	NA	0.84	Monitor future load forecast
BER VLLY 70 kV	LE GRAND 115kV Section MA	P2	Bus/Breaker	NA	1.02	1.00	NA	1.11	1.02	1.12	NA	1.00	Under Review

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

High/Low Voltages



Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)					Voltage PU (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations	
BRCEBG J 70 kV	LE GRAND 115kV Section MA	P2	Bus/Breaker	NA	1.02	1.00	NA	1.11	1.01	1.12	NA	1.00	Under Review
EXCHEQUR 70 kV	LE GRAND 115kV Section MA	P2	Bus/Breaker	NA	1.03	1.01	NA	1.11	1.02	1.12	NA	1.01	Under Review
EXCHEQUR 115 kV	LE GRAND 115kV Section MA	P2	Bus/Breaker	NA	1.03	1.01	NA	1.12	1.03	1.12	NA	1.01	Under Review
INDN FLT 70 kV	LE GRAND 115kV Section MA	P2	Bus/Breaker	NA	1.01	0.99	NA	1.11	1.01	1.12	NA	0.99	Under Review
MARIPOS2 70 kV	LE GRAND 115kV Section MA	P2	Bus/Breaker	NA	1.02	0.99	NA	1.12	1.01	1.13	NA	0.99	Under Review
MC SWAIN 70 kV	LE GRAND 115kV Section MA	P2	Bus/Breaker	NA	1.04	1.02	NA	1.11	1.04	1.11	NA	1.02	Under Review
MCSWAINJ 70 kV	LE GRAND 115kV Section MA	P2	Bus/Breaker	NA	1.04	1.02	NA	1.11	1.03	1.11	NA	1.02	Under Review
MRCDFLLS 70 kV	LE GRAND 115kV Section MA	P2	Bus/Breaker	NA	1.04	1.02	NA	1.11	1.03	1.11	NA	1.02	Under Review
SAXONCRK 70 kV	LE GRAND 115kV Section MA	P2	Bus/Breaker	NA	1.02	1.00	NA	1.11	1.01	1.12	NA	1.00	Under Review
YOSEMITE 70 kV	LE GRAND 115kV Section MA	P2	Bus/Breaker	NA	1.01	0.98	NA	1.11	1.00	1.12	NA	0.98	Under Review
ATWATER 115 kV	GREGG 230kV - Middle Breaker Bay 1	P2	Bus/Breaker	0.98	0.89	0.95	1.10	1.12	0.87	1.12	1.00	0.95	Under Review
ATWATR J 115 kV	GREGG 230kV - Middle Breaker Bay 1	P2	Bus/Breaker	0.98	0.89	0.95	1.10	1.12	0.87	1.12	1.00	0.95	Under Review
BORDEN 230 kV	GREGG 230kV - Middle Breaker Bay 1	P2	Bus/Breaker	0.93	0.87	0.91	1.05	1.07	0.85	1.07	0.95	0.91	Under Review
CASTLE 115 kV	GREGG 230kV - Middle Breaker Bay 1	P2	Bus/Breaker	0.98	0.90	0.95	1.10	1.12	0.87	1.12	1.00	0.95	Under Review
CHSR06A 115 kV	GREGG 230kV - Middle Breaker Bay 1	P2	Bus/Breaker	>0.9, <1.1	0.91	0.95	>0.9, <1.1	1.12	0.89	1.12	>0.9, <1.1	0.95	Under Review
CHSR06B 115 kV	GREGG 230kV - Middle Breaker Bay 1	P2	Bus/Breaker	>0.9, <1.1	0.91	0.95	>0.9, <1.1	1.12	0.89	1.12	>0.9, <1.1	0.95	Under Review

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

High/Low Voltages



Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)					Voltage PU (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations	
CHSR07A 230 kV	GREGG 230kV - Middle Breaker Bay 1	P2	Bus/Breaker	>0.9, <1.1	0.88	0.93	>0.9, <1.1	1.07	0.86	1.07	>0.9, <1.1	0.93	Under Review
CHSR07B 230 kV	GREGG 230kV - Middle Breaker Bay 1	P2	Bus/Breaker	>0.9, <1.1	0.88	0.93	>0.9, <1.1	1.07	0.86	1.07	>0.9, <1.1	0.93	Under Review
CHSR08A 230 kV	GREGG 230kV - Middle Breaker Bay 1	P2	Bus/Breaker	>0.9, <1.1	0.87	0.92	>0.9, <1.1	1.07	0.85	1.07	>0.9, <1.1	0.92	Under Review
CHSR08B 230 kV	GREGG 230kV - Middle Breaker Bay 1	P2	Bus/Breaker	>0.9, <1.1	0.87	0.92	>0.9, <1.1	1.07	0.85	1.07	>0.9, <1.1	0.92	Under Review
CRESSEY 115 kV	GREGG 230kV - Middle Breaker Bay 1	P2	Bus/Breaker	0.97	0.88	0.95	1.10	1.12	0.86	1.12	0.99	0.95	Under Review
EL CAPTN 115 kV	GREGG 230kV - Middle Breaker Bay 1	P2	Bus/Breaker	0.99	0.90	0.96	1.10	1.12	0.88	1.12	1.01	0.96	Under Review
EL NIDO 115 kV	GREGG 230kV - Middle Breaker Bay 1	P2	Bus/Breaker	0.99	0.91	0.95	1.11	1.12	0.89	1.12	1.02	0.95	Under Review
GALLO 115 kV	GREGG 230kV - Middle Breaker Bay 1	P2	Bus/Breaker	0.97	0.88	0.95	1.10	1.11	0.85	1.11	0.99	0.95	Under Review
JR WOOD 115 kV	GREGG 230kV - Middle Breaker Bay 1	P2	Bus/Breaker	0.98	0.89	0.95	1.10	1.12	0.87	1.12	1.00	0.95	Under Review
JRWD GEN 115 kV	GREGG 230kV - Middle Breaker Bay 1	P2	Bus/Breaker	0.98	0.89	0.95	1.10	1.12	0.87	1.12	1.00	0.95	Under Review
LE GRNDJ 115 kV	GREGG 230kV - Middle Breaker Bay 1	P2	Bus/Breaker	0.99	0.91	0.96	1.10	1.12	0.89	1.12	1.02	0.96	Under Review
LIVNGSTN 115 kV	GREGG 230kV - Middle Breaker Bay 1	P2	Bus/Breaker	0.97	0.88	0.95	1.10	1.11	0.86	1.12	0.99	0.95	Under Review
MERCED 115 kV	GREGG 230kV - Middle Breaker Bay 1	P2	Bus/Breaker	0.99	0.91	0.96	1.10	1.11	0.89	1.11	1.01	0.96	Under Review
ORO LOMAJ1 115 kV	GREGG 230kV - Middle Breaker Bay 1	P2	Bus/Breaker	0.97	0.89	0.93	1.11	1.13	0.86	1.13	1.01	0.93	Under Review
STOREY 230 kV	GREGG 230kV - Middle Breaker Bay 1	P2	Bus/Breaker	>0.9, <1.1	0.87	0.92	>0.9, <1.1	1.07	0.85	1.07	>0.9, <1.1	0.92	Under Review
WILSON 230 kV	GREGG 230kV - Middle Breaker Bay 1	P2	Bus/Breaker	0.96	0.88	0.93	1.05	1.07	0.86	1.07	0.98	0.93	Under Review

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High/Low Voltages



Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)					Voltage PU (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations	
WILSON A 115 kV	GREGG 230kV - Middle Breaker Bay 1	P2	Bus/Breaker	1.00	0.92	0.97	1.10	1.11	0.90	1.11	1.02	0.97	Under Review
BER VLLY 70kV	LE GRAND - MA 115kV & LE GRAND-CHOWCHILLA line	P2	Bus/Breaker	NA	1.02	1.00	NA	<1.1	1.02	1.12	NA	1.00	Under Review
BRCEBG J 70kV	LE GRAND - MA 115kV & LE GRAND-CHOWCHILLA line	P2	Bus/Breaker	NA	1.02	1.00	NA	<1.1	1.01	1.12	NA	0.99	Under Review
EXCHEQUR 70kV	LE GRAND - MA 115kV & LE GRAND-CHOWCHILLA line	P2	Bus/Breaker	NA	1.03	1.01	NA	<1.1	1.02	1.12	NA	1.01	Under Review
EXCHEQUR 115kV	LE GRAND - MA 115kV & LE GRAND-CHOWCHILLA line	P2	Bus/Breaker	NA	1.04	1.01	NA	<1.1	1.03	1.12	NA	1.01	Under Review
INDN FLT 70kV	LE GRAND - MA 115kV & LE GRAND-CHOWCHILLA line	P2	Bus/Breaker	NA	1.01	0.99	NA	<1.1	1.01	1.12	NA	0.99	Under Review
MARIPOS2 70kV	LE GRAND - MA 115kV & LE GRAND-CHOWCHILLA line	P2	Bus/Breaker	NA	1.02	<1.1	NA	<1.1	1.01	1.13	NA	<1.1	Under Review
MC SWAIN 70kV	LE GRAND - MA 115kV & LE GRAND-CHOWCHILLA line	P2	Bus/Breaker	NA	1.04	1.02	NA	<1.1	1.04	1.11	NA	1.02	Under Review
MCSWAINJ 70kV	LE GRAND - MA 115kV & LE GRAND-CHOWCHILLA line	P2	Bus/Breaker	NA	1.04	1.02	NA	<1.1	1.04	1.11	NA	1.02	Under Review
MRCDFLLS 70kV	LE GRAND - MA 115kV & LE GRAND-CHOWCHILLA line	P2	Bus/Breaker	NA	1.04	1.02	NA	<1.1	1.04	1.11	NA	1.02	Under Review
SAXONCRK 70kV	LE GRAND - MA 115kV & LE GRAND-CHOWCHILLA line	P2	Bus/Breaker	NA	1.02	0.99	NA	<1.1	1.01	1.12	NA	0.99	Under Review
YOSEMITE 70kV	LE GRAND - MA 115kV & LE GRAND-CHOWCHILLA line	P2	Bus/Breaker	NA	1.01	0.98	NA	<1.1	1.00	1.12	NA	0.98	Under Review
ATWATER 115 kV	WILSON A Section 1D & WILSON B Section 2D 115kV	P2	Bus/Breaker	Diverge	NA	NA	1.19	NA	NA	NA	Diverge	NA	Project: Wilson 115kV Reinforcement Project In-service date: 12/20 Short term: Action plan
ATWATR J 115 kV	WILSON A Section 1D & WILSON B Section 2D 115kV	P2	Bus/Breaker	Diverge	NA	NA	1.19	NA	NA	NA	Diverge	NA	Project: Wilson 115kV Reinforcement Project In-service date: 12/20 Short term: Action plan
CASTLE 115 kV	WILSON A Section 1D & WILSON B Section 2D 115kV	P2	Bus/Breaker	Diverge	NA	NA	1.19	NA	NA	NA	Diverge	NA	Project: Wilson 115kV Reinforcement Project In-service date: 12/20 Short term: Action plan



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High/Low Voltages



Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)					Voltage PU (Sensitivity Scenarios)				Project & Potential Mitigation Solutions	
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations		
CRESSEY 115 kV	WILSON A Section 1D & WILSON B Section 2D 115kV	P2	Bus/Breaker	Diverge	NA	NA	1.19	NA	NA	NA	NA	Diverge	NA	Project: Wilson 115kV Reinforcement Project In-service date: 12/20 Short term: Action plan
EL CAPTN 115 kV	WILSON A Section 1D & WILSON B Section 2D 115kV	P2	Bus/Breaker	Diverge	NA	NA	1.19	NA	NA	NA	NA	Diverge	NA	Project: Wilson 115kV Reinforcement Project In-service date: 12/20 Short term: Action plan
GALLO 115 kV	WILSON A Section 1D & WILSON B Section 2D 115kV	P2	Bus/Breaker	Diverge	NA	NA	1.18	NA	NA	NA	NA	Diverge	NA	Project: Wilson 115kV Reinforcement Project In-service date: 12/20 Short term: Action plan
JR WOOD 115 kV	WILSON A Section 1D & WILSON B Section 2D 115kV	P2	Bus/Breaker	Diverge	NA	NA	1.19	NA	NA	NA	NA	Diverge	NA	Project: Wilson 115kV Reinforcement Project In-service date: 12/20 Short term: Action plan
JRWD GEN 115 kV	WILSON A Section 1D & WILSON B Section 2D 115kV	P2	Bus/Breaker	Diverge	NA	NA	1.19	NA	NA	NA	NA	Diverge	NA	Project: Wilson 115kV Reinforcement Project In-service date: 12/20 Short term: Action plan
LIVNGSTN 115 kV	WILSON A Section 1D & WILSON B Section 2D 115kV	P2	Bus/Breaker	Diverge	NA	NA	1.19	NA	NA	NA	NA	Diverge	NA	Project: Wilson 115kV Reinforcement Project In-service date: 12/20 Short term: Action plan
MERCED 70 kV	WILSON A Section 1D & WILSON B Section 2D 115kV	P2	Bus/Breaker	Diverge	NA	NA	1.10	NA	NA	NA	NA	Diverge	NA	Project: Wilson 115kV Reinforcement Project In-service date: 12/20 Short term: Action plan
MERCED 115 kV	WILSON A Section 1D & WILSON B Section 2D 115kV	P2	Bus/Breaker	Diverge	NA	NA	1.18	NA	NA	NA	NA	Diverge	NA	Project: Wilson 115kV Reinforcement Project In-service date: 12/20 Short term: Action plan
POSO J2 70 kV	WILSON A Section 1D & WILSON B Section 2D 115kV	P2	Bus/Breaker	Diverge	NA	NA	1.10	NA	NA	NA	NA	Diverge	NA	Project: Wilson 115kV Reinforcement Project In-service date: 12/20 Short term: Action plan
ANGIOLA 70 kV	Q558 0kV Gen Unit 1 & JACKSONSWSTA-GWF_HEP 115kV [1743]	P3	G1/N1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	1.10	>0.9, <1.1	>0.9, <1.1	Under Review
BOSWELL 70 kV	Q558 0kV Gen Unit 1 & JACKSONSWSTA-GWF_HEP 115kV [1743]	P3	G1/N1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	1.10	>0.9, <1.1	>0.9, <1.1	Under Review

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High/Low Voltages



Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)					Voltage PU (Sensitivity Scenarios)				Project & Potential Mitigation Solutions	
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations		
BSWLL TP 70 kV	Q558 0kV Gen Unit 1 & JACKSONSWSTA-GWF_HEP 115kV [1743]	P3	G1/N1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	1.10	>0.9, <1.1	>0.9, <1.1	Under Review
CORCORAN 70 kV	Q558 0kV Gen Unit 1 & JACKSONSWSTA-GWF_HEP 115kV [1743]	P3	G1/N1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	1.10	>0.9, <1.1	>0.9, <1.1	1.10	>0.9, <1.1	>0.9, <1.1	Under Review
JGBSWLL 70 kV	Q558 0kV Gen Unit 1 & JACKSONSWSTA-GWF_HEP 115kV [1743]	P3	G1/N1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	1.10	>0.9, <1.1	>0.9, <1.1	Under Review
MENDOTA 115 kV	BIO PWR 9kV Gen Unit 1 & PANOCHE-MENDOTA 115kV [3230]	P3	G1/N1	>0.9, <1.1	>0.9, <1.1	0.89	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	0.89	Monitor future load forecast
NORTHSTAR 115 kV	BIO PWR 9kV Gen Unit 1 & PANOCHE-MENDOTA 115kV [3230]	P3	G1/N1	>0.9, <1.1	>0.9, <1.1	0.89	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	0.89	Monitor future load forecast
ASHLAN 230kV	GREGG 230 KV BAAH BUS #2 (FAILURE OF NON-REDUNDENT RELAY)	P5	Non-Redundent Relay	1.00	1.00	0.94	<1.1	<1.1	1.00	1.10	<1.1	0.92	Protection Upgrade	
ATWATER 115kV	GREGG 230 KV BAAH BUS #1 (FAILURE OF NON-REDUNDENT RELAY)	P5	Non-Redundent Relay	0.99	0.99	0.94	<1.1	<1.1	0.98	1.12	1.02	0.94	Protection Upgrade	
ATWATR J 115kV	GREGG 230 KV BAAH BUS #1 (FAILURE OF NON-REDUNDENT RELAY)	P5	Non-Redundent Relay	0.99	0.99	0.94	<1.1	<1.1	0.98	1.12	1.02	0.94	Protection Upgrade	
BULLARD 115kV	GREGG 230 KV BAAH BUS #2 (FAILURE OF NON-REDUNDENT RELAY)	P5	Non-Redundent Relay	<1.1	<1.1	<1.1	<1.1	1.11	<1.1	1.12	<1.1	<1.1	Protection Upgrade	
CASTLE 115kV	GREGG 230 KV BAAH BUS #1 (FAILURE OF NON-REDUNDENT RELAY)	P5	Non-Redundent Relay	1.00	0.99	0.94	<1.1	<1.1	0.98	1.12	1.02	0.94	Protection Upgrade	
CHLDHOSP 115kV	GREGG 230 KV BAAH BUS #2 (FAILURE OF NON-REDUNDENT RELAY)	P5	Non-Redundent Relay	1.02	1.03	0.97	<1.1	1.10	1.02	1.11	1.04	0.96	Protection Upgrade	

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

High/Low Voltages



Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)					Voltage PU (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations	
CHSR06A 115kV	GREGG 230 KV BAAH BUS #1 (FAILURE OF NON-REDUNDENT RELAY)	P5	Non-Redundent Relay	<1.1	1.00	0.93	<1.1	<1.1	1.00	1.12	<1.1	0.93	Protection Upgrade
CHSR06B 115kV	GREGG 230 KV BAAH BUS #1 (FAILURE OF NON-REDUNDENT RELAY)	P5	Non-Redundent Relay	<1.1	1.00	0.93	<1.1	<1.1	1.00	1.12	<1.1	0.93	Protection Upgrade
CRESSEY 115kV	GREGG 230 KV BAAH BUS #1 (FAILURE OF NON-REDUNDENT RELAY)	P5	Non-Redundent Relay	0.98	0.98	0.93	<1.1	<1.1	0.97	1.12	1.01	0.93	Protection Upgrade
EL CAPTN 115kV	GREGG 230 KV BAAH BUS #1 (FAILURE OF NON-REDUNDENT RELAY)	P5	Non-Redundent Relay	1.00	1.00	0.94	<1.1	<1.1	0.99	1.12	1.03	0.94	Protection Upgrade
EL NIDO 115kV	GREGG 230 KV BAAH BUS #1 (FAILURE OF NON-REDUNDENT RELAY)	P5	Non-Redundent Relay	1.00	1.00	0.93	<1.1	<1.1	1.00	1.12	1.03	0.93	Protection Upgrade
GALLO 115kV	GREGG 230 KV BAAH BUS #1 (FAILURE OF NON-REDUNDENT RELAY)	P5	Non-Redundent Relay	0.98	0.97	0.93	<1.1	<1.1	0.97	1.12	1.01	0.93	Protection Upgrade
HERNDON 115kV	GREGG 230 KV BAAH BUS #2 (FAILURE OF NON-REDUNDENT RELAY)	P5	Non-Redundent Relay	<1.1	<1.1	<1.1	<1.1	1.11	<1.1	1.11	<1.1	<1.1	Protection Upgrade
JR WOOD 115kV	GREGG 230 KV BAAH BUS #1 (FAILURE OF NON-REDUNDENT RELAY)	P5	Non-Redundent Relay	0.99	0.98	0.94	<1.1	<1.1	0.98	1.12	1.02	0.93	Protection Upgrade
JRWD GEN 115kV	GREGG 230 KV BAAH BUS #1 (FAILURE OF NON-REDUNDENT RELAY)	P5	Non-Redundent Relay	0.99	0.98	0.94	<1.1	<1.1	0.98	1.12	1.02	0.93	Protection Upgrade
LE GRNDJ 115kV	GREGG 230 KV BAAH BUS #1 (FAILURE OF NON-REDUNDENT RELAY)	P5	Non-Redundent Relay	1.01	1.00	0.94	<1.1	<1.1	1.00	1.12	1.03	0.94	Protection Upgrade
LIVNGSTN 115kV	GREGG 230 KV BAAH BUS #1 (FAILURE OF NON-REDUNDENT RELAY)	P5	Non-Redundent Relay	0.98	0.97	0.93	<1.1	<1.1	0.97	1.12	1.01	0.93	Protection Upgrade

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

High/Low Voltages



Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)					Voltage PU (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations	
MERCED 115kV	GREGG 230 KV BAAH BUS #1 (FAILURE OF NON-REDUNDENT RELAY)	P5	Non-Redundent Relay	1.01	1.00	0.95	<1.1	<1.1	1.00	1.12	1.03	0.94	Protection Upgrade
ORO LOMAJ1 115kV	GREGG 230 KV BAAH BUS #1 (FAILURE OF NON-REDUNDENT RELAY)	P5	Non-Redundent Relay	0.98	0.98	0.91	<1.1	<1.1	0.98	1.13	1.03	0.91	Protection Upgrade
PNDLJ1 115kV	GREGG 230 KV BAAH BUS #2 (FAILURE OF NON-REDUNDENT RELAY)	P5	Non-Redundent Relay	<1.1	<1.1	<1.1	<1.1	1.11	<1.1	1.11	<1.1	<1.1	Protection Upgrade
PNDLJ2 115kV	GREGG 230 KV BAAH BUS #2 (FAILURE OF NON-REDUNDENT RELAY)	P5	Non-Redundent Relay	<1.1	<1.1	<1.1	<1.1	1.11	<1.1	1.11	<1.1	<1.1	Protection Upgrade
PNEDLE 115kV	GREGG 230 KV BAAH BUS #2 (FAILURE OF NON-REDUNDENT RELAY)	P5	Non-Redundent Relay	<1.1	<1.1	<1.1	<1.1	1.11	<1.1	1.11	<1.1	<1.1	Protection Upgrade
PNEDLE2 115kV	GREGG 230 KV BAAH BUS #2 (FAILURE OF NON-REDUNDENT RELAY)	P5	Non-Redundent Relay	<1.1	<1.1	<1.1	<1.1	1.11	<1.1	1.11	<1.1	<1.1	Protection Upgrade
WILSON A 115kV	GREGG 230 KV BAAH BUS #1 (FAILURE OF NON-REDUNDENT RELAY)	P5	Non-Redundent Relay	1.01	1.01	0.95	<1.1	<1.1	1.01	1.11	1.03	0.95	Protection Upgrade
WOODWARD 115kV	GREGG 230 KV BAAH BUS #2 (FAILURE OF NON-REDUNDENT RELAY)	P5	Non-Redundent Relay	1.02	1.03	0.97	<1.1	1.10	1.03	1.10	1.03	0.96	Protection Upgrade
EL CAPTN 115 kV	EL CAPITAN-WILSON 115KV [1510] & WILSON-ATWATER #2 115KV [4160]	P7	DCTL	0.94	0.92	0.90	1.09	1.11	0.92	1.11	0.96	0.90	Atwater SPS
ANGIOLA 70kV	KINGSBURGD-JACKSONSWSTA #3 115kV [0] & JACKSONSWSTA-GWF_HEP 115kV [1743]	P6	N-1-1	<1.1	<1.1	<1.1	<1.1	1.10	<1.1	1.11	<1.1	<1.1	Under Review
ATWATER 115kV	STOREY-BORDEN #1 230kV [0] & BORDEN-STOREY #2 230kV [0]	P6	N-1-1	<1.1	<1.1	<1.1	<1.1	<1.1	<1.1	1.13	<1.1	<1.1	Sensitivity Only
ATWATR J 115kV	STOREY-BORDEN #1 230kV [0] & BORDEN-STOREY #2 230kV [0]	P6	N-1-1	<1.1	<1.1	<1.1	<1.1	<1.1	<1.1	1.13	<1.1	<1.1	Sensitivity Only

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

High/Low Voltages



Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)					Voltage PU (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations	
AVENAL 70kV	GATES 230/70kV TB 5 & SCHINDLR 115/70kV TB 1	P6	N-1-1	Diverge	0.70	Diverge	>0.9	>0.9	Diverge	>0.9	>0.9	Diverge	Short term rating followed by a redispatch/Summer Setup
AVENAL T 70kV	GATES 230/70kV TB 5 & SCHINDLR 115/70kV TB 1	P6	N-1-1	Diverge	0.71	Diverge	>0.9	>0.9	Diverge	>0.9	>0.9	Diverge	Short term rating followed by a redispatch/Summer Setup
AVNLPARK 70kV	GATES 230/70kV TB 5 & SCHINDLR 115/70kV TB 1	P6	N-1-1	Diverge	0.70	Diverge	>0.9	>0.9	Diverge	>0.9	>0.9	Diverge	Short term rating followed by a redispatch/Summer Setup
BER VLLY 70kV	PANOCH 230/115kV TB 2 & EXCHEOUR 70/115kV TB 1	P6	N-1-1	>0.9,<1.1	>0.9,<1.1	>0.9,<1.1	>0.9,<1.1	>0.9,<1.1	Diverge	1.15	>0.9,<1.1	>0.9,<1.1	Sensitivity Only
BIOMSJCT 70kV	ANOCH 115kV [3230]	P6	N-1-1	>0.9,<1.1	>0.9,<1.1	>0.9,<1.1	>0.9,<1.1	>0.9,<1.1	Diverge	>0.9,<1.1	>0.9,<1.1	0.90	Sensitivity Only
BOSWELL 70kV	HERNDON-WOODWARD 115kV [1790] & JACKSONSWSTA-GWF_HEP 115kV [1743]	P6	N-1-1	>0.9,<1.1	>0.9,<1.1	>0.9,<1.1	>0.9,<1.1	>0.9,<1.1	Diverge	1.10	>0.9,<1.1	>0.9,<1.1	Sensitivity Only
BRCEBG J 70kV	PANOCH 230/115kV TB 1 & EXCHEOUR 70/115kV TB 1	P6	N-1-1	>0.9,<1.1	>0.9,<1.1	>0.9,<1.1	>0.9,<1.1	>0.9,<1.1	Diverge	1.15	>0.9,<1.1	>0.9,<1.1	Sensitivity Only
BSWLL TP 70kV	KINGSBURGD-JACKSONSWSTA #3 115kV [0] & JACKSONSWSTA-GWF_HEP 115kV [1743]	P6	N-1-1	>0.9,<1.1	>0.9,<1.1	>0.9,<1.1	>0.9,<1.1	1.10	Diverge	1.11	>0.9,<1.1	>0.9,<1.1	Under Review
CAL AVE 115kV	MCCALL-WEST FRESNO #2 115kV [2370] & SANGER-CALIFORNIA AVE 115kV [9130]	P6	N-1-1	>0.9,<1.1	>0.9,<1.1	0.85	>0.9,<1.1	>0.9,<1.1	Diverge	>0.9,<1.1	>0.9,<1.1	0.85	Monitor future load forecast
CALFLAX 70kV	GATES 230/70kV TB 5 & SCHINDLR 115/70kV TB 1	P6	N-1-1	Diverge	0.73	Diverge	>0.9,<1.1	>0.9,<1.1	Diverge	>0.9,<1.1	>0.9,<1.1	0.58	Short term rating followed by a redispatch
CASTLE 115kV	STOREY-BORDEN #1 230kV [0] & BORDEN-STOREY #2 230kV [0]	P6	N-1-1	>0.9,<1.1	>0.9,<1.1	>0.9,<1.1	>0.9,<1.1	>0.9,<1.1	Diverge	1.13	>0.9,<1.1	>0.9,<1.1	Sensitivity Only
CERTAN T 115kV	ANOCH 115kV [3230]	P6	N-1-1	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	0.89	Sensitivity Only
CERTANJ1 115kV	ANOCH 115kV [3230]	P6	N-1-1	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	0.89	Sensitivity Only
CERTANJ2 115kV	ANOCH 115kV [3230]	P6	N-1-1	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	0.89	Sensitivity Only
CERTTEED 115kV	ANOCH 115kV [3230]	P6	N-1-1	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	0.89	Sensitivity Only
CHEVPL T 70kV	GATES 230/70kV TB 5 & SCHINDLR 115/70kV TB 1	P6	N-1-1	Diverge	0.71	Diverge	>0.9	>0.9	Diverge	>0.9	>0.9	Diverge	Short term rating followed by a redispatch
CHEVPLIN 70kV	GATES 230/70kV TB 5 & SCHINDLR 115/70kV TB 1	P6	N-1-1	Diverge	0.71	Diverge	>0.9	>0.9	Diverge	>0.9	>0.9	Diverge	Short term rating followed by a redispatch



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

High/Low Voltages



Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)					Voltage PU (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations	
CHSR06A 115kV	STOREY-BORDEN #1 230kV [0] & BORDEN-STOREY #2 230kV [0]	P6	N-1-1	<1.1	<1.1	<1.1	<1.1	<1.1	<1.1	1.14	<1.1	<1.1	Sensitivity Only
CHSR06B 115kV	STOREY-BORDEN #1 230kV [0] & BORDEN-STOREY #2 230kV [0]	P6	N-1-1	<1.1	<1.1	<1.1	<1.1	<1.1	<1.1	1.14	<1.1	<1.1	Sensitivity Only
CHWCGN 115kV	ANOCHE-MENDOTA 115kV [3230]	P6	N-1-1	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	0.90	Sensitivity Only
CHWCGNJT 115kV	ANOCHE-MENDOTA 115kV [3230]	P6	N-1-1	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	0.89	Sensitivity Only
CHWCHLA2 115kV	ANOCHE-MENDOTA 115kV [3230]	P6	N-1-1	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	0.90	Sensitivity Only
CHWCHLASLR 115kV	ANOCHE-MENDOTA 115kV [3230]	P6	N-1-1	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	0.85	Sensitivity Only
CHWCHLASLRJT 115kV	ANOCHE-MENDOTA 115kV [3230]	P6	N-1-1	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	0.85	Sensitivity Only
CHWCHLLA 115kV	ANOCHE-MENDOTA 115kV [3230]	P6	N-1-1	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	0.89	Sensitivity Only
COLCGN T 70kV	GATES 230/70kV TB 5 & SCHINDLR 115/70kV TB 1	P6	N-1-1	Diverge	0.78	0.73	>0.9	>0.9	Diverge	>0.9	>0.9	0.64	Short term rating followed by a redispatch
COLNGA 1 70kV	GATES 230/70kV TB 5 & SCHINDLR 115/70kV TB 1	P6	N-1-1	Diverge	0.75	0.69	>0.9	>0.9	Diverge	>0.9	>0.9	0.61	Short term rating followed by a redispatch
COLNGA 2 70kV	GATES 230/70kV TB 5 & SCHINDLR 115/70kV TB 1	P6	N-1-1	Diverge	0.75	0.69	>0.9	>0.9	Diverge	>0.9	>0.9	0.61	Short term rating followed by a redispatch
CORCORAN 70kV	CORCORAN-ANGIOLA 70kV [8600] & WAUKENA SW STA-CORCORAN 115kV [8773]	P6	N-1-1	<1.1	<1.1	<1.1	1.12	<1.1	<1.1	<1.1	<1.1	<1.1	Project: Wilson Voltage Support (Wilson 115 kV STATCOM) In-service date: 12/20 Short term: Action plan
CORCORAN 70kV	HERNDON-WOODWARD 115kV [1790] & JACKSONSWSTA-GWF_HEP 115kV [1743]	P6	N-1-1	<1.1	<1.1	<1.1	<1.1	1.10	<1.1	1.11	<1.1	<1.1	Project: Wilson Voltage Support (Wilson 115 kV STATCOM) In-service date: 12/20 Short term: Action plan
CRESSEY 115kV	STOREY-BORDEN #1 230kV [0] & BORDEN-STOREY #2 230kV [0]	P6	N-1-1	<1.1	<1.1	<1.1	<1.1	<1.1	<1.1	1.13	<1.1	<1.1	Sensitivity Only
DAIRYLND 115kV	ANOCHE-MENDOTA 115kV [3230]	P6	N-1-1	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	0.84	Sensitivity Only
DANISHCM 115kV	SANGER-CALIFORNIA AVE 115kV [9130] & MCCALL-WEST FRESNO #2 115kV [2370]	P6	N-1-1	>0.9	>0.9	0.86	>0.9	>0.9	>0.9	>0.9	>0.9	0.85	Monitor future load forecast
DERRCK T 70kV	GATES 230/70kV TB 5 & SCHINDLR 115/70kV TB 1	P6	N-1-1	Diverge	0.75	0.70	>0.9	>0.9	Diverge	>0.9	>0.9	Diverge	Short term rating followed by a redispatch

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

High/Low Voltages



Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)					Voltage PU (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations	
DINUBA 70kV	REEDLEY 115/70kV TB 2 & REEDLEY-DINUBA #1 70kV [9050]	P6	N-1-1	>0.9	0.90	0.89	>0.9	>0.9	0.89	>0.9	>0.9	0.89	Monitor future load forecast
EL CAPTN 115kV	WILSON-ATWATER #2 115kV [4160] & EL CAPITAN-WILSON 115kV [1510]	P6	N-1-1	>0.9	>0.9	0.90	>0.9	>0.9	>0.9	>0.9	>0.9	0.90	Sensitivity Only
EL NIDO 115kV	STOREY-BORDEN #1 230kV [0] & BORDEN-STOREY #2 230kV [0]	P6	N-1-1	<1.1	<1.1	<1.1	<1.1	<1.1	<1.1	1.14	<1.1	<1.1	Sensitivity Only
ELNIDOTP 70kV	PANOCHÉ 230/115kV TB 2 & EXCHEQUER-LE GRAND 115kV [1560]	P6	N-1-1	<1.1	<1.1	<1.1	<1.1	<1.1	<1.1	1.12	<1.1	<1.1	Sensitivity Only
EXCHEQUR 115kV	PANOCHÉ 230/115kV TB 1 & EXCHEQUER-LE GRAND 115kV [1560]	P6	N-1-1	<1.1	<1.1	<1.1	<1.1	<1.1	<1.1	1.15	<1.1	<1.1	Sensitivity Only
FIVEPOINTSSS 70kV	SCHINDLR 115/70kV TB 1 & GATES 230/70kV TB 5	P6	N-1-1	Diverge	0.73	0.71	>0.9	>0.9	Diverge	>0.9	>0.9	Diverge	Short term rating followed by a redispatch
GALLO 115kV	STOREY-BORDEN #1 230kV [0] & BORDEN-STOREY #2 230kV [0]	P6	N-1-1	<1.1	<1.1	<1.1	<1.1	<1.1	<1.1	1.13	<1.1	<1.1	Sensitivity Only
GATES 70kV	SCHINDLR 115/70kV TB 1 & GATES 230/70kV TB 5	P6	N-1-1	Diverge	0.73	0.70	>0.9	>0.9	Diverge	>0.9	>0.9	Diverge	Short term rating followed by a redispatch
GATS2_TP 70kV	SCHINDLR 115/70kV TB 1 & GATES 230/70kV TB 5	P6	N-1-1	Diverge	0.73	0.71	>0.9	>0.9	Diverge	>0.9	>0.9	Diverge	Short term rating followed by a redispatch
GILLRAN 115kV	PANOCHÉ-MENDOTA 115kV [3230] & WILSON-LE GRAND 115kV [4170]	P6	N-1-1	>0.9	>0.9	0.89	>0.9	>0.9	>0.9	>0.9	>0.9	0.80	Monitor future load forecast
GILLTAP 115kV	ANOCHÉ-MENDOTA 115kV [3230]	P6	N-1-1	>0.9	>0.9	0.89	>0.9	>0.9	>0.9	>0.9	>0.9	0.80	Monitor future load forecast
HENRIETA 230kV	MUSTANG SW STA-GREGG 230kV [4700] & MUSTANG SW STA-MCCALL 230kV [4710]	P6	N-1-1	0.89	0.89	0.87	>0.9	>0.9	0.90	>0.9	0.88	0.87	FRTSPS
HENTAP2 230kV	MUSTANG SW STA-GREGG 230kV [4700] & MUSTANG SW STA-MCCALL 230kV [4710]	P6	N-1-1	0.89	0.89	0.87	>0.9	>0.9	0.90	>0.9	0.88	0.87	FRTSPS
HURON 70kV	SCHINDLR 115/70kV TB 1 & GATES 230/70kV TB 5	P6	N-1-1	Diverge	0.73	0.70	>0.9	>0.9	Diverge	>0.9	>0.9	Diverge	Short term rating followed by a redispatch
HURONJ 70kV	SCHINDLR 115/70kV TB 1 & GATES 230/70kV TB 5	P6	N-1-1	Diverge	0.73	0.70	>0.9	>0.9	Diverge	>0.9	>0.9	Diverge	Short term rating followed by a redispatch
INDN FLT 70kV	PANOCHÉ 230/115kV TB 2 & EXCHEQUER-LE GRAND 115kV [1560]	P6	N-1-1	<1.1	<1.1	<1.1	<1.1	<1.1	<1.1	1.14	<1.1	<1.1	Sensitivity Only

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

High/Low Voltages



Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)					Voltage PU (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations	
JACALITO 70kV	SCHINDLR 115/70kV TB 1 & GATES 230/70kV TB 5	P6	N-1-1	Diverge	0.74	0.71	>0.9	>0.9	Diverge	>0.9	>0.9	Diverge	Short term rating followed by a redispatch
JAYNESWSTA 70kV	SCHINDLR 115/70kV TB 1 & GATES 230/70kV TB 5	P6	N-1-1	Diverge	0.73	0.71	>0.9	>0.9	Diverge	>0.9	>0.9	Diverge	Short term rating followed by a redispatch
JGBSWLL 70kV	KINGSBURGD-JACKSONSWSTA #3 115kV [0] & JACKSONSWSTA-GWF_HEP 115kV [1743]	P6	N-1-1	<1.1	<1.1	<1.1	<1.1	1.10	<1.1	1.10	<1.1	<1.1	Under Review
JRWD GEN 115kV	STOREY-BORDEN #1 230kV [0] & BORDEN-STOREY #2 230kV [0]	P6	N-1-1	<1.1	<1.1	<1.1	<1.1	<1.1	<1.1	1.13	<1.1	<1.1	Sensitivity Only
KETLMN T 70kV	SCHINDLR 115/70kV TB 1 & GATES 230/70kV TB 5	P6	N-1-1	Diverge	0.71	0.68	>0.9	>0.9	Diverge	>0.9	>0.9	Diverge	Short term rating followed by a redispatch
KETTLEMN 70kV	SCHINDLR 115/70kV TB 1 & GATES 230/70kV TB 5	P6	N-1-1	Diverge	0.71	0.67	>0.9	>0.9	Diverge	>0.9	>0.9	Diverge	Short term rating followed by a redispatch
KPH3_11 230kV	PANOCHÉ 230/115kV TB 2 & WARNERVILLE-WILSON 230kV [5870]	P6	N-1-1	<1.1	<1.1	<1.1	<1.1	<1.1	<1.1	1.12	<1.1	<1.1	Sensitivity Only
LE GRAND 115kV	ANOCHÉ-MENDOTA 115kV [3230]	P6	N-1-1	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	0.87	Sensitivity Only
LE GRNDJ 115kV	STOREY-BORDEN #1 230kV [0] & BORDEN-STOREY #2 230kV [0]	P6	N-1-1	<1.1	<1.1	<1.1	<1.1	<1.1	<1.1	1.13	<1.1	<1.1	Sensitivity Only
LIVNGSTN 115kV	ATWATER-LIVNGSTN-MERCED 115kV [1030] & WILSON-ATWATER #2 115kV [4160]	P6	N-1-1	>0.9	>0.9	>0.9	>0.9	>0.9	0.90	>0.9	>0.9	>0.9	Sensitivity Only
MADERAPR 115kV	PANOCHÉ-MENDOTA 115kV [3230] & WILSON-LE GRAND 115kV [4170]	P6	N-1-1	>0.9	>0.9	0.89	>0.9	>0.9	>0.9	>0.9	>0.9	0.80	Monitor future load forecast
MARIPOS2 70kV	PANOCHÉ 230/115kV TB 1 & EXCHEOUR 70/115kV TB 1	P6	N-1-1	<1.1	<1.1	<1.1	<1.1	<1.1	<1.1	1.16	<1.1	<1.1	Sensitivity Only
MC SWAIN 70kV	PANOCHÉ 230/115kV TB 2 & EXCHEQUER-LE GRAND 115kV [1560]	P6	N-1-1	<1.1	<1.1	<1.1	<1.1	<1.1	<1.1	1.14	<1.1	<1.1	Sensitivity Only
MCSWAINJ 70kV	PANOCHÉ 230/115kV TB 1 & EXCHEOUR 70/115kV TB 1	P6	N-1-1	<1.1	<1.1	<1.1	<1.1	<1.1	<1.1	1.14	<1.1	<1.1	Sensitivity Only
MENDOTA 115kV	ANOCHÉ-MENDOTA 115kV [3230]	P6	N-1-1	>0.9	>0.9	0.89	>0.9	>0.9	>0.9	>0.9	>0.9	0.80	Monitor future load forecast
MERCED 115kV	STOREY-BORDEN #1 230kV [0] & BORDEN-STOREY #2 230kV [0]	P6	N-1-1	<1.1	<1.1	<1.1	<1.1	<1.1	<1.1	1.13	<1.1	<1.1	Sensitivity Only

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

High/Low Voltages



Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)					Voltage PU (Sensitivity Scenarios)				Project & Potential Mitigation Solutions	
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations		
MERCYSRNGSS 70kV	LOS BANOS-LIVINGSTON JCT-CANAL 70kV [8940] & LOSBANOS 230/70kV TB 3	P6	N-1-1	>0.9	>0.9	0.89	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	0.89	Monitor future load forecast
MRCDFLLS 70kV	PANOCH 230/115kV TB 1 & EXCHEOUR 70/115kV TB 1	P6	N-1-1	<1.1	<1.1	<1.1	<1.1	<1.1	<1.1	<1.1	1.14	<1.1	<1.1	Sensitivity Only
MRCYSPRS 70kV	LOS BANOS-LIVINGSTON JCT-CANAL 70kV [8940] & LOSBANOS 230/70kV TB 3	P6	N-1-1	>0.9	>0.9	0.89	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	0.89	Monitor future load forecast
NEWHALL 115kV	ANOCH 115kV [3230]	P6	N-1-1	>0.9	>0.9	0.89	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	0.81	Monitor future load forecast
NORTHSTAR 115kV	ANOCH 115kV [3230]	P6	N-1-1	>0.9	>0.9	0.89	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	0.80	Monitor future load forecast
OIL CITYT 70kV	SCHINDLR 115/70kV TB 1 & GATES 230/70kV TB 5	P6	N-1-1	Diverge	0.75	0.73	>0.9	>0.9	Diverge	>0.9	>0.9	>0.9	Diverge	Short term rating followed by a redispatch
ORO LOMAJ1 115kV	STOREY-BORDEN #1 230kV [0] & BORDEN-STOREY #2 230kV [0]	P6	N-1-1	<1.1	<1.1	<1.1	<1.1	<1.1	<1.1	<1.1	1.14	<1.1	<1.1	Sensitivity Only
ORTIGA 70kV	LOS BANOS-LIVINGSTON JCT-CANAL 70kV [8940] & LOSBANOS 230/70kV TB 3	P6	N-1-1	>0.9	>0.9	0.88	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	0.88	Monitor future load forecast
PENNZIER 70kV	SCHINDLR 115/70kV TB 1 & GATES 230/70kV TB 5	P6	N-1-1	Diverge	0.75	0.73	>0.9	>0.9	Diverge	>0.9	>0.9	>0.9	Diverge	Short term rating followed by a redispatch
PENZIR J 70kV	SCHINDLR 115/70kV TB 1 & GATES 230/70kV TB 5	P6	N-1-1	Diverge	0.75	0.73	>0.9	>0.9	Diverge	>0.9	>0.9	>0.9	Diverge	Short term rating followed by a redispatch
PLSNTVLY 70kV	SCHINDLR 115/70kV TB 1 & GATES 230/70kV TB 5	P6	N-1-1	Diverge	0.73	0.71	>0.9	>0.9	Diverge	>0.9	>0.9	>0.9	Diverge	Short term rating followed by a redispatch
PMTFMPP 115kV	PANOCH 115kV [3230] & WILSON-LE GRAND 115kV [4170]	P6	N-1-1	>0.9	>0.9	0.89	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	0.80	Monitor future load forecast
PMTFMPPJT 115kV	ANOCH 115kV [3230]	P6	N-1-1	>0.9	>0.9	0.89	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	0.80	Monitor future load forecast
POSO J2 70kV	GATES 230/12.47kV TB 4 & EXCHEOUR 70/115kV TB 1	P6	N-1-1	<1.1	<1.1	<1.1	<1.1	<1.1	<1.1	<1.1	1.12	<1.1	<1.1	Sensitivity Only
Q526 70kV	SCHINDLR 115/70kV TB 1 & GATES 230/70kV TB 5	P6	N-1-1	Diverge	0.74	0.71	>0.9	>0.9	Diverge	>0.9	>0.9	>0.9	Diverge	Short term rating followed by a redispatch
Q526TP 70kV	SCHINDLR 115/70kV TB 1 & GATES 230/70kV TB 5	P6	N-1-1	Diverge	0.74	0.71	>0.9	>0.9	Diverge	>0.9	>0.9	>0.9	Diverge	Short term rating followed by a redispatch
Q532 70kV	SCHINDLR 115/70kV TB 1 & GATES 230/70kV TB 5	P6	N-1-1	Diverge	0.73	0.71	>0.9	>0.9	Diverge	>0.9	>0.9	>0.9	Diverge	Short term rating followed by a redispatch
Q633 70kV	SCHINDLR 115/70kV TB 1 & GATES 230/70kV TB 5	P6	N-1-1	Diverge	0.73	0.71	>0.9	>0.9	Diverge	>0.9	>0.9	>0.9	Diverge	Short term rating followed by a redispatch

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

High/Low Voltages



Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)					Voltage PU (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations	
SAXONCRK 70kV	PANOCHÉ 230/115kV TB 1 & EXCHEOUR 70/115kV TB 1	P6	N-1-1	<1.1	<1.1	<1.1	<1.1	<1.1	<1.1	1.15	<1.1	<1.1	Sensitivity Only
SCHLNDLR 70kV	SCHINDLR 115/70kV TB 1 & GATES 230/70kV TB 5	P6	N-1-1	Diverge	0.73	0.71	>0.9	>0.9	Diverge	>0.9	>0.9	Diverge	Short term rating followed by a redispatch
SHARON 115kV	ANOCHE-MENDOTA 115kV [3230]	P6	N-1-1	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	0.90	Sensitivity Only
SHARON T 115kV	ANOCHE-MENDOTA 115kV [3230]	P6	N-1-1	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	0.90	Sensitivity Only
SUN CITY 70kV	SCHINDLR 115/70kV TB 1 & GATES 230/70kV TB 5	P6	N-1-1	Diverge	0.70	0.67	>0.9	>0.9	Diverge	>0.9	>0.9	Diverge	Short term rating followed by a redispatch
TOMATAK 70kV	ANOCHE-MENDOTA 115kV [3230]	P6	N-1-1	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	0.88	Sensitivity Only
TORNADO 70kV	SCHINDLR 115/70kV TB 1 & GATES 230/70kV TB 5	P6	N-1-1	Diverge	0.77	0.75	>0.9	>0.9	Diverge	>0.9	>0.9	Diverge	Short term rating followed by a redispatch
TORND J 70kV	SCHINDLR 115/70kV TB 1 & GATES 230/70kV TB 5	P6	N-1-1	Diverge	0.76	0.74	>0.9	>0.9	Diverge	>0.9	>0.9	Diverge	Short term rating followed by a redispatch
TORND T 70kV	SCHINDLR 115/70kV TB 1 & GATES 230/70kV TB 5	P6	N-1-1	Diverge	0.77	0.75	>0.9	>0.9	Diverge	>0.9	>0.9	Diverge	Short term rating followed by a redispatch
VEGA 70kV	LOSBANOS 230/70kV TB 3 & LOS BANOS-LIVINGSTON JCT-CANAL 70kV [8940]	P6	N-1-1	>0.9	>0.9	0.89	>0.9	>0.9	>0.9	>0.9	>0.9	0.89	Monitor future load forecast
WARNERVL 230kV	PANOCHÉ 230/115kV TB 2 & WARNERVILLE-WILSON 230kV [5870]	P6	N-1-1	<1.1	<1.1	<1.1	<1.1	<1.1	<1.1	1.11	<1.1	<1.1	Sensitivity Only
WILSON A 115kV	STOREY-BORDEN #1 230kV [0] & BORDEN-STOREY #2 230kV [0]	P6	N-1-1	<1.1	<1.1	<1.1	<1.1	<1.1	<1.1	1.13	<1.1	<1.1	Sensitivity Only
WST FRSO 115kV	SANGER-CALIFORNIA AVE 115kV [9130] & MCCALL-WEST FRESNO #2 115kV [2370]	P6	N-1-1	>0.9	>0.9	0.84	>0.9	>0.9	0.89	>0.9	>0.9	0.83	Monitor future load forecast
YOSEMITE 70kV	PANOCHÉ 230/115kV TB 1 & EXCHEOUR 70/115kV TB 1	P6	N-1-1	<1.1	<1.1	<1.1	<1.1	<1.1	<1.1	1.15	<1.1	<1.1	Sensitivity Only



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

Voltage Deviation



Substation	Contingency (All and Worst P6)	Category	Category Description	Post Cont. Voltage Deviation % (Baseline Scenarios)					Post Cont. Voltage Deviation % (Sensitivity Scenarios)				Project & Potential Mitigation Solutions	
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations		
MENDOTA 115 kV	PANOCHÉ-MENDOTA 115kV [3230]	P1	N-1	<8	<8	9	<8	<8	<8	<8	<8	<8	10	Monitor future load forecast
NORTHSTAR 115 kV	PANOCHÉ-MENDOTA 115kV [3230]	P1	N-1	<8	<8	9	<8	<8	<8	<8	<8	<8	10	Monitor future load forecast
CANAL 70 kV	LOS BANOS-LIVINGSTON JCT-CANAL 70kV [8940]	P1	N-1	<8	<8	9	<8	<8	<8	<8	<8	<8	9	Monitor future load forecast
DINUBA 70 kV	REEDLEY-DINUBA #1 70kV [9050]	P1	N-1	<8	8	9	<8	<8	9	<8	<8	<8	9	Project: Reedley 70 kV Reinforcement (Dinuba Battery Energy Storage) In-service date: 05/21 Turn On Battery
MENDOTA 115 kV	BIO PWR 9kV Gen Unit 1 & PANOCHÉ-MENDOTA 115kV [3230]	P3	G1/N1	<8	<8	12	<8	<8	<8	<8	<8	<8	12	Monitor future load forecast
NORTHSTAR 115 kV	BIO PWR 9kV Gen Unit 1 & PANOCHÉ-MENDOTA 115kV [3230]	P3	G1/N1	<8	<8	12	<8	<8	<8	<8	<8	<8	12	Monitor future load forecast

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

*Transient Stability*



Contingency	Category	Category Description	Transient Stability Performance					Potential Mitigation Solutions
			Baseline Scenarios			Sensitivity Scenarios		
			2020 Summer Peak	2028 Summer Peak	2023 Spring Off-Peak	2020 SP Heavy Renewable & Min Gas Gen	2023 SpOP Hi Renew & Min Gas Gen	
Helms unit 1	P1-1	N-1	Stable/WECC Criteria Met	Stable/WECC Criteria Met	Stable/WECC Criteria Met	Stable/WECC Criteria Met	Stable/WECC Criteria Met	No Violation
Gates 500/230kV Transformer #11	P1-3	T-1	Stable/WECC Criteria Met	Stable/WECC Criteria Not Met	Stable/WECC Criteria Met	Stable/WECC Criteria Not Met	Stable/WECC Criteria Met	Modeling of VER under review
Gates 500/230kV Transformer #12	P1-3	T-1	Stable/WECC Criteria Met	Stable/WECC Criteria Not Met	Stable/WECC Criteria Met	Stable/WECC Criteria Not Met	Stable/WECC Criteria Met	Modeling of VER under review
Wilson 230/115kV TB #1	P1-3	T-2	Stable/WECC Criteria Met	Stable/WECC Criteria Met	Stable/WECC Criteria Met	Stable/WECC Criteria Met	Stable/WECC Criteria Met	No Violation
Gates 230kV Bus	P2-4	Bus Breaker	Stable/WECC Criteria Not Met	Stable/WECC Criteria Not Met	Stable/WECC Criteria Met	Stable/WECC Criteria Not Met	Stable/WECC Criteria Met	Modeling of VER under review
McCall 230kV Bus	P2-4	Bus Breaker	Stable/WECC Criteria Met	Stable/WECC Criteria Met	Stable/WECC Criteria Met	Stable/WECC Criteria Met	Stable/WECC Criteria Met	No Violation
Borden 230kV Bus	P2-4	Bus Breaker	Stable/WECC Criteria Met	Stable/WECC Criteria Met	Stable/WECC Criteria Met	Stable/WECC Criteria Met	Stable/WECC Criteria Met	No Violation
McCall 115kV Middle breaker	P2-4	Bus Breaker	Stable/WECC Criteria Met	Stable/WECC Criteria Met	Stable/WECC Criteria Met	Stable/WECC Criteria Met	Stable/WECC Criteria Met	No Violation
McCall 230kV TB plus Helms unit 1	P3-3	G-1/T-1	Stable/WECC Criteria Met	Stable/WECC Criteria Met	Stable/WECC Criteria Met	Stable/WECC Criteria Met	Stable/WECC Criteria Met	No Violation
GREGG 230 KV BAAH BUS #2 with delayed clearing time	P5	Non-Redundant Relay	Stable/WECC Criteria Not Met	Stable/WECC Criteria Not Met	Stable/WECC Criteria Met	Stable/WECC Criteria Not Met	Stable/WECC Criteria Met	Protection Upgrade
Wilson 230/115kV TB #1 & #2	P6	N-1-1	Stable/WECC Criteria Met	Stable/WECC Criteria Met	Stable/WECC Criteria Met	Stable/WECC Criteria Met	Stable/WECC Criteria Met	No Violation
Bellota-Warnerville 230kV and Warnerville-Wilson 230kV lines	P7-1	DCTL	Stable/WECC Criteria Met	Stable/WECC Criteria Met	Stable/WECC Criteria Met	Stable/WECC Criteria Met	Stable/WECC Criteria Met	No Violation
Panoche-Tranquility #1 and #2 230kV Lines	P7-1	DCTL	Stable/WECC Criteria Met	Stable/WECC Criteria Met	Stable/WECC Criteria Met	Stable/WECC Criteria Met	Stable/WECC Criteria Met	No Violation
Gates-McCall 230kV and Helms-McCall 230kV Lines	P7-1	DCTL	Stable/WECC Criteria Met	Stable/WECC Criteria Met	Stable/WECC Criteria Met	Stable/WECC Criteria Met	Stable/WECC Criteria Met	No Violation
Gregg-Helms #1 and #2 230kV Lines Temporary	P7-1	DCTL	Stable/WECC Criteria Met	Stable/WECC Criteria Met	Stable/WECC Criteria Met	Stable/WECC Criteria Met	Stable/WECC Criteria Met	No Violation
Gregg-Helms #1 and #2 230kV Lines Permanent	P7-1	DCTL	Stable/WECC Criteria Met	Stable/WECC Criteria Met	Stable/WECC Criteria Met	Stable/WECC Criteria Met	Stable/WECC Criteria Met	No Violation
Gates-Mustang #1 and #2	P7-1	DCTL	Stable/WECC Criteria Met	Stable/WECC Criteria Met	Stable/WECC Criteria Met	Stable/WECC Criteria Met	Stable/WECC Criteria Met	No Violation
Herndon-Barton 115kV Line and Sanger-Manchester 115kV line	P7-1	DCTL	Stable/WECC Criteria Met	Stable/WECC Criteria Met	Stable/WECC Criteria Met	Stable/WECC Criteria Met	Stable/WECC Criteria Met	No Violation
McCall-Reedley 115kV Line and McCall- Sanger #1 115kV Line	P7-1	DCTL	Stable/WECC Criteria Met	Stable/WECC Criteria Met	Stable/WECC Criteria Met	Stable/WECC Criteria Met	Stable/WECC Criteria Met	No Violation

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



*Single Contingency Load Drop*

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

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

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



*Single Source Substation with more than 100 MW Load*

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

No single 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	
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations		
30945 KERN PP 230 30943 STCKDLJ2 230 1 1	MIDWAY 230kV - Section 2F & 2E	P2	Bus-tie Breaker	111	N/A	N/A	43	N/A	N/A	N/A	N/A	47	N/A	Project : Midway-Kern PP 230 kV line capacity increase project and Midway-Kern PP #2 230kV Line project ;Phase 1(Tap Removal) In-Service Date : 03/2021; Phase 2: Line reconductor (03/2023) Short term: Action Plan
30970 MIDWAY 230 30942 STCKDLJ1 230 1 1	KERN PP-BKRSFLDB-MIDWAY 230kV [0] AND STCKDLEB-KERN PP-MIDWAY 230kV [0]	P6	N-1-1	112	<100	<100	<100	<100	<100	<100	<100	<100	<100	Project : Midway-Kern PP 230 kV line capacity increase project and Midway-Kern PP #2 230kV Line project ;Phase 1(Tap Removal) In-Service Date : 03/2021; Phase 2: Line reconductor (03/2023) Short term: Action Plan
	Midway-Kern No. 3 & Midway-Kern No. 4 230 kV Lines	P7	DCTL	113	N/A	N/A	40	N/A	N/A	N/A	N/A	51	N/A	Project : Midway-Kern PP 230 kV line capacity increase project and Midway-Kern PP #2 230kV Line project ;Phase 1(Tap Removal) In-Service Date : 03/2021; Phase 2: Line reconductor (03/2023) Short term: Action Plan
34129 MCFRLD T 70.0 34932 WASCO 70.0 1 1	SMYRNA-SEMITROPIC-MIDWAY 115kV [3710] MOAS OPENED on GANSO_MIDWAY	P1	N-1	130	174	193	16	18	200	17	89	193	Utilize Summer Setup for summer and non-summer months	
	SMYRNA-SEMITROPIC-MIDWAY 115kV [3710] (GANSO-MIDWAY)	P2	Line Section w/o fault	279	276	266	278	276	278	283	149	265	Utilize Summer Setup for summer and non-summer months	
	SMYRNA-SEMITROPIC-MIDWAY 115kV [3710] (SEMITRPJ-GANSO)	P2	Line Section w/o fault	262	261	256	276	271	265	276	163	256	Utilize Summer Setup for summer and non-summer months	
	MIDWAY 115kV Section 2E	P2	Bus	279	276	266	278	276	278	283	149	265	Utilize Summer Setup for summer and non-summer months	
	MIDWAY 115kV - Section 1E & 2E	P2	Bus-tie Breaker	279	275	265	278	276	278	283	149	265	Utilize Summer Setup for summer and non-summer months	
	MIDWAY 115kV - Section 2D & 2E	P2	Bus-tie Breaker	279	275	265	278	276	278	283	149	265	Utilize Summer Setup for summer and non-summer months	
	KERN PP 230kV - Section 1D & 2D	P2	Bus-tie Breaker	Diverge	N/A	N/A	291	N/A	N/A	N/A	N/A	145	N/A	Utilize Summer Setup for summer and non-summer months



Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading % (Baseline Scenarios)					Loading % (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations	
	PSE-BEAR 13.80kV Gen Unit 1 AND SMYRNA-SEMITROPIC-MIDWAY 115kV [3710] MOAS OPENED on GANSO_MIDWAY	P3	G1/N1	131	173	194	<100	<100	200	<100	<100	193	Utilize Summer Setup for summer and non-summer months
	KERN PW1 70/115kV TB 1 AND KERN PW2 70/115kV TB 1	P6	N-1-1	273	275	280	80	84	277	107	<100	282	Remove Semitropic Shoefly and close Semitropic D to Semitropic E section
34225 BELRDG J 115 34774 MIDWAY 115 1 1	PSEMCKIT 9.11kV Gen Unit 1	P1	N-1	101	64	62	21	14	64	15	20	61	Project : Midway-Temblor 115 kV Line Reconductor and Voltage Support Project; In-Service Date : 12/2022 Short term: Action Plan
	PSE MCKT 115/9.11kV TB 1	P1	N-1	100	64	62	21	14	64	15	20	61	Project : Midway-Temblor 115 kV Line Reconductor and Voltage Support Project; In-Service Date : 12/2022 Short term: Action Plan
	PSE MCKITTRICK TAP 115kV [2632] (PSE MCKJ-PSE MCKT)	P2	Line Section w/o fault	100	64	62	20	14	64	15	20	61	Project : Midway-Temblor 115 kV Line Reconductor and Voltage Support Project; In-Service Date : 12/2022 Short term: Action Plan
	MIDWAY-TEMBLOR 115kV [2630] (TEMBLOR-PSE MCKJ)	P2	Line Section w/o fault	40	24	25	104	64	24	64	103	25	Project : Midway-Temblor 115 kV Line Reconductor and Voltage Support Project; In-Service Date : 12/2022 Short term: Action Plan
	TEMBLOR 115kV Section 1D	P2	Bus	40	24	25	104	64	24	64	103	25	Project : Midway-Temblor 115 kV Line Reconductor and Voltage Support Project; In-Service Date : 12/2022 Short term: Action Plan
	TEMBLOR - 1D 115kV & TEMBLOR-KERNRIDGE line	P2	Non bus-tie Breaker	40	24	25	104	64	24	64	103	25	Project : Midway-Temblor 115 kV Line Reconductor and Voltage Support Project; In-Service Date : 12/2022 Short term: Action Plan
	TEMBLOR - 1D 115kV & TEMBLOR-SAN LUIS OBISPO line	P2	Non bus-tie Breaker	40	24	25	104	64	24	64	103	25	Project : Midway-Temblor 115 kV Line Reconductor and Voltage Support Project; In-Service Date : 12/2022 Short term: Action Plan

Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading % (Baseline Scenarios)					Loading % (Sensitivity Scenarios)				Project & Potential Mitigation Solutions	
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations		
	CALIENTE SW STA-MIDWAY #2 230kV [5226] AND CALIENTE SW STA-MIDWAY #1 230kV [5216]	P6	N-1-1	<100	<100	<100	100	<100	<100	<100	<100	100	<100	Project : Midway-Temblor 115 kV Line Reconductor and Voltage Support Project; In-Service Date : 12/2022 Short term: Action Plan
	Caliente Sw Sta - Midway #1 & #2 230 kV Lines	P7	DCTL	82	52	53	106	62	54	74	103	52	Project : Midway-Temblor 115 kV Line Reconductor and Voltage Support Project; In-Service Date : 12/2022 Short term: Action Plan	
34582 ARCO 70.0 34243 TWSL J2 70.0 1 1	Base Case	P0	Base case	35	35	35	88	88	37	112	95	35	Sensitivity Only/ Redispatch Generation	
	PRMTFMTP 70/21kV TB 1	P1	N-1	20	21	20	81	81	22	101	87	20	Sensitivity Only/ Redispatch Generation	
34706 WESTPARK 115 34752 KERN PWR 115 1 1	PSE-BEAR 13.80kV Gen Unit 1 AND KERN-WESTPARK #2 115kV [2010]	P3	G1/N1	115	119	<100	<100	<100	123	<100	100	<100	Wheeler Ridge Junction Station Project & Kern 115 kV Area Reinforcement Project . Short Term: Action Plan/Rerate to 4fps	
34706 WESTPARK 115 34752 KERN PWR 115 2 1	PSE-BEAR 13.80kV Gen Unit 1 AND KERN-WESTPARK #1 115kV [2000]	P3	G1/N1	115	119	<100	<100	<100	123	<100	100	<100	Wheeler Ridge Junction Station Project & Kern 115 kV Area Reinforcement Project . Short Term: Action Plan/Rerate to 4fps	
34724 KRN OL J 115 34798 KERNWATR 115 1 1	MT POSO 13.80kV Gen Unit 1 AND 7TH STANDARD-KERN 115kV [1981]	P3	G1/N1	90	96	<100	<100	<100	101	<100	<100	<100	Sensitivity Only/ Kern 115 kV Area reinforcement project.	
34728 LIVE OAK 115 34752 KERN PWR 115 1 1	7TH STANDARD-KERN 115kV [1981] AND KERN-MAGUNDEN-WITCO 115kV [1970]	P6	N-1-1	<100	<100	<100	<100	99	<100	117	<100	<100	Sensitivity Only	
34741 STCKDLJ 115 34807 ARVINJ2 115 1 1	KERN PP 230kV - Section 1D & 2D	P2	Bus-tie Breaker	Diverge	N/A	N/A	101	N/A	N/A	N/A	59	N/A	Contingency not valid in future years. Project :Kern PP 230 kV bus conversion (BAAH) will be done as part of Kern PP 230 kV area reinforcement project. (12/2020) Short Term: Action Plan	
	MIDWAY-WHEELER RIDGE #1 230kV [5190] AND BITTERWATRSS-MIDWAY 230kV [0]	P6	N-1-1	Diverge	Diverge	<100	<100	<100	Diverge	<100	<100	<100	Project : Wheeler Ridge Junction Station Project; In-Service Date:05/2024 Short term: Action Plan	
	Midway-Wheeler Ridge #1 & #2 230 kV Lines	P7	DCTL	136	Diverge	N/A	45	49	Diverge	52	8	N/A	Project : Wheeler Ridge Junction Station Project; In-Service Date:05/2024 Short term: Action Plan	
	SMYRNA-SEMITROPIC-MIDWAY 115kV [3710] (GANSO-MIDWAY)	P2	Line Section w/o fault	60	65	65	137	134	65	135	108	66	Remove Semitropic Shoefly and close Semitropic D to Semitropic E section	

Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading % (Baseline Scenarios)					Loading % (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations	
34742 SEMITRPJ 115 34704 SEMITROPIC_D 115 1 1	SMYRNA-SEMITROPIC-MIDWAY 115kV [3710] (SEMITRPJ-GANSO)	P2	Line Section w/o fault	48	55	56	136	132	56	132	115	56	Remove Semitropic Shoefly and close Semitropic D to Semitropic E section
	MIDWAY 115kV Section 2E	P2	Bus	60	65	66	137	134	65	135	108	66	Remove Semitropic Shoefly and close Semitropic D to Semitropic E section
	MIDWAY 115kV - Section 1E & 2E	P2	Bus-tie Breaker	60	65	66	137	134	65	135	108	63	Remove Semitropic Shoefly and close Semitropic D to Semitropic E section
	MIDWAY 115kV - Section 2D & 2E	P2	Bus-tie Breaker	60	65	66	137	134	65	135	108	66	Remove Semitropic Shoefly and close Semitropic D to Semitropic E section
	KERN PP 230kV - Section 1D & 2D	P2	Bus-tie Breaker	Diverge	N/A	N/A	135	N/A	N/A	N/A	106	N/A	Contingency not valid in future years. Project :Kern PP 230 kV bus conversion (BAAH) will be done as part of Kern PP 230 kV area reinforcement project. (12/2020) Short Term: Action Plan
	KERN PW2 70/115kV TB 1 AND KERN PW1 70/115kV TB 1	P6	N-1-1	175	185	191	<100	<100	189	<100	<100	192	Remove Semitropic Shoefly and close Semitropic D to Semitropic E section
34742 SEMITRPJ 115 34704 SEMITROPIC_D 115 BP 2	KERN PP 230kV - Section 1D & 2D	P2	Bus-tie Breaker	Diverge	N/A	N/A	55	N/A	N/A	N/A	43	N/A	Contingency not valid in future years. Project :Kern PP 230 kV bus conversion (BAAH) will be done as part of Kern PP 230 kV area reinforcement project. (12/2020) Short Term: Action Plan
34742 SEMITRPJ 115 34746 GANSO 115 1 1(P2)	KERN PP 230kV - Section 1D & 2D	P2	Bus-tie Breaker	Diverge	N/A	N/A	154	N/A	N/A	N/A	11	N/A	Contingency not valid in future years. Project :Kern PP 230 kV bus conversion (BAAH) will be done as part of Kern PP 230 kV area reinforcement project. (12/2020) Short Term: Action Plan
	KERN PW1 70/115kV TB 1 AND KERN PW2 70/115kV TB 1	P6	N-1-1	129	143	149	99	99	146	107	<100	149	Remove Semitropic Shoefly and close Semitropic D to Semitropic E section
34746 GANSO 115 34774 MIDWAY 115 1 1(P2)	KERN PP 230kV - Section 1D & 2D	P2	Bus-tie Breaker	Diverge	N/A	N/A	155	N/A	N/A	N/A	5	N/A	Contingency not valid in future years. Project :Kern PP 230 kV bus conversion (BAAH) will be done as part of Kern PP 230 kV area reinforcement project. (12/2020) Short Term: Action Plan
	KERN PW2 70/115kV TB 1 AND KERN PW1 70/115kV TB 1	P6	N-1-1	133	147	158	100	100	151	109	<100	158	Remove Semitropic Shoefly and close Semitropic D to Semitropic E section
34749 TPMNTP1 115 34750 TUPMAN 115 1 1	MIDWAY 115kV - Section 1E & 2E	P2	Bus-tie Breaker	121	129	144	8	3	133	10	82	144	Utilize Summer Setup proposed in 17-18 TP

Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading % (Baseline Scenarios)					Loading % (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations	
34751 TPMNTP2 115 34750 TUPMAN 115 1 1	MIDWAY 115kV - Section 1E & 2E	P2	Bus-tie Breaker	91	95	106	9	5	99	7	61	106	Utilize Summer Setup proposed in 17-18 TP
34752 KERN PWR 115 30945 KERN PP 230 3 1	KERN PP 230/115kV TB 4 AND KERN PP 230/115kV TB 5	P6	N-1-1	103	108	<100	<100	<100	114	93	<100	<100	Project : Wheeler Ridge Junction Station Project; In-Service Date:05/2024 Short term: Action Plan/Original SPS proposed as part of Kern 230 kV Reinforcement project
34752 KERN PWR 115 30945 KERN PP 230 4 1	KERN PP 230/115kV TB 5 AND KERN PP 230/115kV TB 3	P6	N-1-1	105	108	<100	<100	<100	114	93	<100	<100	Project : Wheeler Ridge Junction Station Project; In-Service Date:05/2024 Short term: Action Plan/Original SPS proposed as part of Kern 230 kV Reinforcement project
34752 KERN PWR 115 30945 KERN PP 230 5 1	KERN PP 230/115kV TB 3 AND KERN PP 230/115kV TB 4	P6	N-1-1	103	108	<100	<100	<100	114	93	<100	<100	Project : Wheeler Ridge Junction Station Project; In-Service Date:05/2024 Short term: Action Plan/Original SPS proposed as part of Kern 230 kV Reinforcement project
34752 KERN PWR 115 34755 TEVISJ2 115 1 1	KERN-TEVIS-STOCKDALE 115kV [1990]	P1	N-1	130	132	90	4	8	136	19	49	90	Project : Wheeler Ridge Junction Station Project; In-Service Date:05/2024 Short term: Action Plan
	STOCKDLE 115kV Section 1D	P2	Bus	106	107	28	8	10	110	19	39	28	Project : Wheeler Ridge Junction Station Project; In-Service Date:05/2024 Short term: Action Plan
	TEVIS 115kV Section 1D	P2	Bus	99	101	51	10	12	104	23	23	51	Project : Wheeler Ridge Junction Station Project; In-Service Date:05/2024 Short term: Action Plan
	STOCKDLE - 1D 115kV & KERN-TEVIS-STOCKDALE line	P2	Non bus-tie Breaker	130	132	57	4	8	136	19	49	58	Project : Wheeler Ridge Junction Station Project; In-Service Date:05/2024 Short term: Action Plan
	TEVIS - 1D 115kV & KERN-TEVIS-STOCKDALE line	P2	Non bus-tie Breaker	130	132	90	4	8	136	19	49	90	Project : Wheeler Ridge Junction Station Project; In-Service Date:05/2024 Short term: Action Plan
	KERN PWR - 1D 115kV & KERN-TEVIS-STOCKDALE line	P2	Non bus-tie Breaker	129	N/A	N/A	4	N/A	N/A	N/A	48	N/A	Contingency not valid in future years(Kern 115 kV Bus upgrade). Short Term: Action Plan
	KERN PWR 115kV - Middle Breaker Bay 1	P2	Non bus-tie Breaker	N/A	132	90	N/A	8	136	19	<100	90	Project : Wheeler Ridge Junction Station Project; In-Service Date:05/2024 Short term: Action Plan

Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading % (Baseline Scenarios)					Loading % (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations	
	KERN PP 230kV - Section 1D & 2D	P2	Bus-tie Breaker	Diverge	N/A	N/A	100	N/A	N/A	N/A	42	N/A	Contingency not valid in future years. Project :Kern PP 230 kV bus conversion (BAAH) will be done as part of Kern PP 230 kV area reinforcement project. (12/2020) Short Term: Action Plan
	KERNFRNT 9.11kV Gen Unit 1 AND KERN-TEVIS-STOCKDALE 115kV [1990]	P3	G1/N1	<100	<100	<100	<100	<100	135	<100	<100	<100	Project : Wheeler Ridge Junction Station Project; In-Service Date:05/2024 Short term: Action Plan
	BITTERWATRSS-MIDWAY 230kV [0] AND KERN-TEVIS-STOCKDALE 115kV [1990]	P6	N-1-1	147	149	<100	<100	<100	154	<100	<100	<100	Project : Wheeler Ridge Junction Station Project; In-Service Date:05/2024 Short term: Action Plan
	BITTERWATRSS-MIDWAY 230kV [0] AND MIDWAY-WHEELER RIDGE #1 230kV [5190]	P6	N-1-1	Diverge	Diverge	<100	<100	<100	Diverge	<100	<100	<100	Project : Wheeler Ridge Junction Station Project; In-Service Date:05/2024 Short term: Action Plan
	Midway-Wheeler Ridge #1 & #2 230 kV Lines	P7	DCTL	174	Diverge	44	43	48	Diverge	53	23	44	Project : Wheeler Ridge Junction Station Project; In-Service Date:05/2024 Short term: Action Plan
34752 KERN PWR 115 34798 KERNWATR 115 1 1	MT POSO 13.80kV Gen Unit 1 AND 7TH STANDARD-KERN 115kV [1981]	P3	G1/N1	93	98	<100	<100	<100	103	<100	<100	<100	Sensitivity Only
	KERN OIL-LIVE OAK-POSO MT 115kV [0] MOAS OPENED on KRNFRNTT_POSO MT AND 7TH STANDARD-KERN 115kV [1981]	P6	N-1-1	94	101	<100	<100	<100	108	<100	<100	<100	Project : Kern 115 kV Area Reinforcement Project Short Term : Action Plan
34755 TEVISJ2 115 34741 STCKDLJ 115 1 1	MIDWAY-WHEELER RIDGE #1 230kV [5190] AND BITTERWATRSS-MIDWAY 230kV [0]	P6	N-1-1	Diverge	Diverge	<100	<100	<100	Diverge	<100	<100	<100	Project : Wheeler Ridge Junction Station Project; In-Service Date:05/2024 Short term: Action Plan
	Midway-Wheeler Ridge #1 & #2 230 kV Lines	P7	DCTL	136	Diverge	N/A	45	49	Diverge	52	8	N/A	Project : Wheeler Ridge Junction Station Project; In-Service Date:05/2024 Short term: Action Plan
34758 LAMONT 115 34805 ARVINJ1 115 1 1	KERN PWR 115kV Section 2D	P2	Bus	103	N/A	N/A	26	N/A	N/A	N/A	15	N/A	Contingency not valid in future years(Kern 115 kV Bus upgrade). Short Term: Action Plan
	KERN PWR 115kV - Section 2D & 2E	P2	Bus-tie Breaker	103	N/A	N/A	26	N/A	N/A	N/A	15	N/A	Contingency not valid in future years(Kern 115 kV Bus upgrade). Short Term: Action Plan
	KERN-TEVIS-STOCKDALE-LAMONT 115kV [1940] (KERN PWR-TEVISJ2)	P2	Line Section w/o fault	103	110	24	26	29	112	43	15	24	Project : Wheeler Ridge Junction Station Project; In-Service Date:05/2024 Short term: Action Plan



Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading % (Baseline Scenarios)					Loading % (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations	
	KERN PWR 115kV - Section 2D & 1D	P2	Bus-tie Breaker	103	N/A	N/A	26	N/A	N/A	N/A	15	N/A	Contingency not valid in future years(Kern 115 kV Bus upgrade). Short Term: Action Plan
34774 MIDWAY 115 30970 MIDWAY 230 2 1	MIDWAY 230kV - Section 1E & 1D	P2	Bus-tie Breaker	85	93	102	56	60	93	70	21	103	Continue to monitor future load forecast
34776 TAFT 115 34860 TAFT A 70.0 2 1	SLR-TANN 9.11kV Gen Unit 1 AND TAFT 115/70kV TB 1	P3	G1/N1	122	109	103	<100	<100	114	<100	<100	103	Potential Mitigation Required ( System Upgrade/ Preferred Resources)
34777 FELLOWSG 115 34800 SANTA FE SUB 115 1 1	MIDWAY-TAFT 115kV [2620]	P1	N-1	28	36	38	98	109	33	118	108	38	Operating Solution
	MIDWAY 115kV Section 2D	P2	Bus	28	36	38	98	109	32	118	107	38	Operating Solution
	TAFT 115kV - Ring R2 & R1	P2	Non bus-tie Breaker	51	60	63	97	105	56	113	120	63	Operating Solution
	TAFT 115kV - Ring R2 & R3	P2	Non bus-tie Breaker	28	36	38	97	109	32	118	107	38	Operating Solution
	MIDWAY - 2D 115kV & MIDWAY-RENFRO-TUPMAN line	P2	Non bus-tie Breaker	28	36	38	98	109	32	118	107	38	Operating Solution
	MIDWAY - 2D 115kV & MIDWAY-TEMBLOR line	P2	Non bus-tie Breaker	28	36	38	98	109	33	119	108	38	Operating Solution
	MIDWAY 115kV - Section 2D & 2E	P2	Bus-tie Breaker	28	36	38	98	109	32	118	107	38	Operating Solution
	CHEV.USA 9.11kV Gen Unit 1 AND MIDWAY-TAFT 115kV [2620]	P3	G1/N1	<100	<100	<100	<100	<100	<100	116	105	<100	Operating Solution
	MIDWAY-TAFT 115kV [2620] AND TAFT-CUYAMA #2 70kV [9210]	P6	N-1-1	<100	<100	<100	<100	111	<100	120	117	<100	Operating Solution
34777 FELLOWSG 115 39070 AEVICTORYJT 115 1 1	MIDWAY-TAFT 115kV [2620]	P1	N-1	17	25	28	100	113	37	124	103	28	Operating Solution
	MIDWAY 115kV Section 2D	P2	Bus	17	26	29	100	113	37	124	103	29	Operating Solution
	TAFT 115kV - Ring R2 & R1	P2	Non bus-tie Breaker	39	48	52	99	110	60	119	115	52	Operating Solution
	TAFT 115kV - Ring R2 & R3	P2	Non bus-tie Breaker	16	25	28	100	113	37	123	102	28	Operating Solution
	MIDWAY - 2D 115kV & MIDWAY-RENFRO-TUPMAN line	P2	Non bus-tie Breaker	17	26	29	100	113	37	124	103	29	Operating Solution
	MIDWAY - 2D 115kV & MIDWAY-TEMBLOR line	P2	Non bus-tie Breaker	17	26	29	100	113	37	124	103	29	Operating Solution
	MIDWAY 115kV - Section 2D & 2E	P2	Bus-tie Breaker	18	26	29	100	113	37	124	103	29	Operating Solution



Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading % (Baseline Scenarios)					Loading % (Sensitivity Scenarios)				Project & Potential Mitigation Solutions	
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations		
	CHEV.USA 9.11kV Gen Unit 1 AND MIDWAY-TAFT 115kV [2620]	P3	G1/N1	<100	<100	<100	<100	<100	<100	<100	122	<100	<100	Operating Solution
	CARNERAS-TAFT 70kV [8540] AND MIDWAY-TAFT 115kV [2620]	P6	N-1-1	<100	<100	<100	<100	118	<100	<100	128	109	<100	Operating Solution
34800 SANTA FE SUB 115 34802 MIDSET 115 1 1	MIDWAY-TAFT 115kV [2620]	P1	N-1	28	36	38	98	109	33	118	108	38	Operating Solution	
	MIDWAY 115kV Section 2D	P2	Bus	28	36	38	98	109	32	118	107	38	Operating Solution	
	TAFT 115kV - Ring R2 & R1	P2	Non bus-tie Breaker	51	60	63	97	105	56	113	120	63	Operating Solution	
	TAFT 115kV - Ring R2 & R3	P2	Non bus-tie Breaker	28	36	38	97	109	32	118	107	38	Operating Solution	
	MIDWAY - 2D 115kV & MIDWAY-RENFRO-TUPMAN line	P2	Non bus-tie Breaker	28	36	38	98	109	32	118	107	38	Operating Solution	
	MIDWAY - 2D 115kV & MIDWAY-TEMBLOR line	P2	Non bus-tie Breaker	28	36	38	98	109	33	119	108	38	Operating Solution	
	MIDWAY 115kV - Section 2D & 2E	P2	Bus-tie Breaker	28	36	38	98	109	32	118	107	38	Operating Solution	
	CHEV.USA 9.11kV Gen Unit 1 AND MIDWAY-TAFT 115kV [2620]	P3	G1/N1	<100	<100	<100	<100	<100	<100	<100	116	105	<100	Operating Solution
	CARNERAS-TAFT 70kV [8540] AND MIDWAY-TAFT 115kV [2620]	P6	N-1-1	<100	<100	<100	<100	114	<100	<100	123	113	<100	Operating Solution
34805 ARVINJ1 115 34764 Q622BSS 115 1 1	MIDWAY-WHEELER RIDGE #1 230kV [5190] AND BITTERWATRSS-WHEELER 230kV [0]	P6	N-1-1	136	<100	<100	<100	<100	<100	<100	<100	<100	<100	Project : Wheeler Ridge Junction Station Project; In-Service Date:05/2024 Short term: Action Plan
34805 ARVINJ1 115 34764 Q622BSS 115 1 1	Midway-Wheeler Ridge #1 & #2 230 kV Lines	P7	DCTL	136	Diverge	N/A	25	29	Diverge	13	34	N/A	Project : Wheeler Ridge Junction Station Project; In-Service Date:05/2024 Short term: Action Plan	
34849 TAFT_SW_TAFC 70.0 34943 Q356JCT 70.0 1 1	TAFT-CUYAMA #1 70kV [9200] (Q356JCT-CUYAMA)	P2	Line Section w/o fault	2	2	2	2	2	2	2	2	108	2	Sensitivity Only
34860 TAFT A 70.0 34849 TAFT_SW_TAFC 70.0 1 1	TAFT-CUYAMA #1 70kV [9200] (Q356JCT-CUYAMA)	P2	Line Section w/o fault	2	2	2	2	2	2	2	2	107	2	Sensitivity Only
34873 LOSTHILLTP 70.0 34850 BLACKWLL 70.0 1 1	Base Case	P0	Base case	37	39	40	99	99	40	141	111	40	Sensitivity Only	
	ARCO-CARNERAS 70kV [8430] (Q705JCT-CARNERAS)	P2	Line Section w/o fault	13	16	11	92	91	17	127	115	11	Sensitivity Only	
	CARNERAS 70kV Section 1D	P2	Bus	13	16	11	92	91	17	127	115	11	Sensitivity Only	

Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading % (Baseline Scenarios)					Loading % (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations	
34874 WHEELER 70.0 34756 WHEELER 115 2 1	KERN-TEVIS-STOCKDALE-LAMONT 115kV [1940]	P1	N-1	88	92	0	100	102	96	101	100	0	Project : Wheeler Ridge Junction Station Project; In-Service Date:05/2024 Short term: Action Plan
	TEVIS2 - 1E 115kV & KERN-TEVIS-STOCKDALE-LAMONT line	P2	Non bus-tie Breaker	88	92	0	100	102	96	101	100	0	Project : Wheeler Ridge Junction Station Project; In-Service Date:05/2024 Short term: Action Plan
	KERN PWR 115kV - Middle Breaker Bay 2	P2	Non bus-tie Breaker	N/A	92	0	N/A	101	96	101	N/A	0	Project : Wheeler Ridge Junction Station Project; In-Service Date:05/2024 Short term: Action Plan
	Kern-Tevis-Stockdale-Lamont & Kern-Tevis-Stockdale 115 kV Lines	P7	DCTL	88	92	0	100	101	96	101	101	0	Project : Wheeler Ridge Junction Station Project; In-Service Date:05/2024 Short term: Action Plan
34918 KERN PW2 70.0 34914 KERN PW1 70.0 1 1	KERN PP 230kV - Section 1D & 2D	P2	Bus-tie Breaker	Diverge	N/A	N/A	80	N/A	N/A	N/A	20	N/A	Contingency not valid in future years. Project :Kern PP 230 kV bus conversion (BAAH) will be done as part of Kern PP 230 kV area reinforcement project. (12/2020) Short Term : Utilize Summer Setup and if needed replace the limiting equipment
	SMYRNA-SEMITROPIC-MIDWAY 115kV [3710] MOAS OPENED on GANSO_MIDWAY AND KERN PW2 70/115kV TB 1	P6	N-1-1	128	156	175	<100	<100	171	<100	<100	174	Utilize Summer Setup and if needed replace the limiting equipment
	SMYRNA-SEMITROPIC-MIDWAY 115kV [3710] MOAS OPENED on GANSO_MIDWAY	P1	N-1	183	233	265	24	28	263	26	130	265	Utilize Summer Setup for summer and non-summer months
	SMYRNA-SEMITROPIC-MIDWAY 115kV [3710] (GANSO-MIDWAY)	P2	Line Section w/o fault	350	343	336	267	267	345	276	114	335	Utilize Summer Setup for summer and non-summer months
	SMYRNA-SEMITROPIC-MIDWAY 115kV [3710] (SEMITRPJ-GANSO)	P2	Line Section w/o fault	331	330	329	265	262	333	268	128	330	Utilize Summer Setup for summer and non-summer months
	SMYRNA-SEMITROPIC-MIDWAY 115kV [3710] (SEMITRPJ-SEMITROPIC_D)	P2	Line Section w/o fault	183	226	265	24	28	263	26	130	265	Utilize Summer Setup for summer and non-summer months
	MIDWAY 115kV Section 2E	P2	Bus	350	343	336	267	267	345	276	114	335	Utilize Summer Setup for summer and non-summer months
	SMYRNA - 1D 115kV & SMYRNA-SEMITROPIC-MIDWAY line	P2	Non bus-tie Breaker	183	233	265	24	28	263	26	130	265	Utilize Summer Setup for summer and non-summer months

Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading % (Baseline Scenarios)					Loading % (Sensitivity Scenarios)				Project & Potential Mitigation Solutions	
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations		
34918 KERN PW2 70.0 34922 KRN OL J 70.0 1 1	MIDWAY - 2E 115kV & SMYRNA-SEMITROPIC-MIDWAY line	P2	Non bus-tie Breaker	183	229	265	24	28	263	26	130	265	Utilize Summer Setup for summer and non-summer months	
	MIDWAY 115kV - Section 1E & 2E	P2	Bus-tie Breaker	350	342	335	267	267	345	276	114	335	Utilize Summer Setup for summer and non-summer months	
	MIDWAY 115kV - Section 2D & 2E	P2	Bus-tie Breaker	349	342	336	267	267	345	276	114	336	Utilize Summer Setup for summer and non-summer months	
	KERN PP 230kV - Section 1D & 2D	P2	Bus-tie Breaker	Diverge	N/A	N/A	308	N/A	N/A	N/A	109	N/A	Contingency not valid in future years. Project :Kern PP 230 kV bus conversion (BAAH) will be done as part of Kern PP 230 kV area reinforcement project. (12/2020) Short Term : Utilize Summer Setup for summer and non-summer months	
	PSE-BEAR 13.80kV Gen Unit 1 AND SMYRNA-SEMITROPIC-MIDWAY 115kV [3710] MOAS OPENED on GANSO_MIDWAY	P3	G1/N1		184	232	265	<100	<100	263	<100	131	266	Utilize Summer Setup for summer and non-summer months
	ELKHIL3G 18/230kV TB 1 AND SMYRNA-SEMITROPIC-MIDWAY 115kV [3710] MOAS OPENED on GANSO_MIDWAY	P6	N-1-1		183	237	266	<100	<100	263	<100	130	265	Utilize Summer Setup for summer and non-summer months
24022 KRN OL J 70.0 24121 CAML OP	SMYRNA-SEMITROPIC-MIDWAY 115kV [3710] MOAS OPENED on GANSO_MIDWAY	P1	N-1		134	171	195	18	21	193	19	95	195	Utilize Summer Setup for summer and non-summer months
	SMYRNA-SEMITROPIC-MIDWAY 115kV [3710] (GANSO-MIDWAY)	P2	Line Section w/o fault		257	252	247	196	196	253	202	84	246	Utilize Summer Setup for summer and non-summer months
	SMYRNA-SEMITROPIC-MIDWAY 115kV [3710] (SEMITRPJ-GANSO)	P2	Line Section w/o fault		243	242	241	194	192	245	197	94	242	Utilize Summer Setup for summer and non-summer months
	MIDWAY 115kV Section 2E	P2	Bus		257	252	247	196	196	253	202	84	246	Utilize Summer Setup for summer and non-summer months
	MIDWAY 115kV - Section 1E & 2E	P2	Bus-tie Breaker		257	251	246	196	196	253	202	83	246	Utilize Summer Setup for summer and non-summer months
	MIDWAY 115kV - Section 2D & 2E	P2	Bus-tie Breaker		256	251	247	196	196	253	202	84	247	Utilize Summer Setup for summer and non-summer months

Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading % (Baseline Scenarios)					Loading % (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations	
34922 KRN 0EJ 70.0 34151 CAWLOD T 70.0 1 1	KERN PP 230kV - Section 1D & 2D	P2	Bus-tie Breaker	Diverge	N/A	N/A	226	N/A	N/A	N/A	80	N/A	Contingency not valid in future years. Project :Kern PP 230 kV bus conversion (BAAH) will be done as part of Kern PP 230 kV area reinforcement project. (12/2020) Short Term : Utilize Summer Setup for summer and non-summer months
	PSE-BEAR 13.80kV Gen Unit 1 AND SMYRNA-SEMITROPIC-MIDWAY 115kV [3710] MOAS OPENED on GANSO_MIDWAY	P3	G1/N1	135	170	195	<100	<100	193	<100	96	195	Utilize Summer Setup for summer and non-summer months
	MIDWAY-KERN #1 230kV [5150] AND SMYRNA-SEMITROPIC-MIDWAY 115kV [3710] MOAS OPENED on GANSO_MIDWAY	P6	N-1-1	<100	171	195	<100	<100	193	<100	<100	194	Utilize Summer Setup for summer and non-summer months
34926 FAMOSO 70.0 34129 MCFRLD T 70.0 1 1	SMYRNA-SEMITROPIC-MIDWAY 115kV [3710] MOAS OPENED on GANSO_MIDWAY	P1	N-1	90	115	132	10	13	130	12	63	132	Utilize Summer Setup for summer and non-summer months
	SMYRNA-SEMITROPIC-MIDWAY 115kV [3710] (GANSO-MIDWAY)	P2	Line Section w/o fault	174	171	168	137	137	172	142	60	167	Utilize Summer Setup for summer and non-summer months
	SMYRNA-SEMITROPIC-MIDWAY 115kV [3710] (SEMITRPJ-GANSO)	P2	Line Section w/o fault	165	164	164	136	135	166	138	66	164	Utilize Summer Setup for summer and non-summer months
	MIDWAY 115kV Section 2E	P2	Bus	174	171	168	137	137	172	142	60	167	Utilize Summer Setup for summer and non-summer months
	MIDWAY 115kV - Section 1E & 2E	P2	Bus-tie Breaker	174	171	167	137	137	172	142	59	167	Utilize Summer Setup for summer and non-summer months
	MIDWAY 115kV - Section 2D & 2E	P2	Bus-tie Breaker	174	171	168	137	137	172	142	59	168	Utilize Summer Setup for summer and non-summer months
	KERN PP 230kV - Section 1D & 2D	P2	Bus-tie Breaker	Diverge	N/A	N/A	154	N/A	N/A	N/A	57	N/A	Contingency not valid in future years. Project :Kern PP 230 kV bus conversion (BAAH) will be done as part of Kern PP 230 kV area reinforcement project. (12/2020) Short Term : Utilize Summer Setup for summer and non-summer months



Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading % (Baseline Scenarios)					Loading % (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations	
	PSE-BEAR 13.80kV Gen Unit 1 AND SMYRNA-SEMITROPIC-MIDWAY 115kV [3710] MOAS OPENED on GANSO_MIDWAY	P3	G1/N1	<100	<100	132	<100	<100	130	<100	<100	132	Utilize Summer Setup for summer and non-summer months
	ELKHIL3G 18/230kV TB 1 AND SMYRNA-SEMITROPIC-MIDWAY 115kV [3710] MOAS OPENED on GANSO_MIDWAY	P6	N-1-1	<100	117	132	<100	<100	130	<100	<100	132	Utilize Summer Setup for summer and non-summer months
34926 FAMOSO 70.0 34131 CAWLOB T 70.0 1 1	SMYRNA-SEMITROPIC-MIDWAY 115kV [3710] MOAS OPENED on GANSO_MIDWAY	P1	N-1	194	248	283	21	29	281	27	136	283	Utilize Summer Setup for summer and non-summer months
	SMYRNA-SEMITROPIC-MIDWAY 115kV [3710] (GANSO-MIDWAY)	P2	Line Section w/o fault	375	368	361	296	296	370	305	128	360	Utilize Summer Setup for summer and non-summer months
	SMYRNA-SEMITROPIC-MIDWAY 115kV [3710] (SEMITRPJ-GANSO)	P2	Line Section w/o fault	355	354	353	293	290	357	297	143	354	Utilize Summer Setup for summer and non-summer months
	SMYRNA-SEMITROPIC-MIDWAY 115kV [3710] (SEMITRPJ-SEMITROPIC_D)	P2	Line Section w/o fault	194	240	283	21	29	281	27	136	283	Utilize Summer Setup for summer and non-summer months
	MIDWAY 115kV Section 2E	P2	Bus	375	368	361	296	296	370	305	128	360	Utilize Summer Setup for summer and non-summer months
	SMYRNA - 1D 115kV & SMYRNA-SEMITROPIC-MIDWAY line	P2	Non bus-tie Breaker	194	248	283	21	29	281	27	136	283	Utilize Summer Setup for summer and non-summer months
	MIDWAY - 2E 115kV & SMYRNA-SEMITROPIC-MIDWAY line	P2	Non bus-tie Breaker	194	244	283	21	29	281	27	136	283	Utilize Summer Setup for summer and non-summer months
	MIDWAY 115kV - Section 1E & 2E	P2	Bus-tie Breaker	375	367	360	296	296	370	305	128	360	Utilize Summer Setup for summer and non-summer months
	MIDWAY 115kV - Section 2D & 2E	P2	Bus-tie Breaker	375	367	361	296	296	370	305	128	361	Utilize Summer Setup for summer and non-summer months
	KERN PP 230kV - Section 1D & 2D	P2	Bus-tie Breaker	Diverge	N/A	N/A	331	N/A	N/A	N/A	N/A	123	N/A
PSE-BEAR 13.80kV Gen Unit 1 AND SMYRNA-SEMITROPIC-MIDWAY 115kV [3710] MOAS OPENED on GANSO_MIDWAY	P3	G1/N1	195	247	283	<100	<100	280	<100	137	284	Utilize Summer Setup for summer and non-summer months	

Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading % (Baseline Scenarios)					Loading % (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations	
	MIDWAY-KERN #1 230kV [5150] AND SMYRNA-SEMITROPIC-MIDWAY 115kV [3710] MOAS OPENED on GANSO_MIDWAY	P6	N-1-1	<100	249	284	<100	<100	281	<100	<100	283	Utilize Summer Setup for summer and non-summer months
34932 WASCO 70.0 34934 SEMITRPC 70.0 1 1	SMYRNA-SEMITROPIC-MIDWAY 115kV [3710] MOAS OPENED on GANSO_MIDWAY	P1	N-1	100	135	146	14	16	155	15	66	147	Utilize Summer Setup for summer and non-summer months
	SMYRNA-SEMITROPIC-MIDWAY 115kV [3710] (GANSO-MIDWAY)	P2	Line Section w/o fault	240	239	230	285	280	240	286	170	229	Utilize Summer Setup for summer and non-summer months
	SMYRNA-SEMITROPIC-MIDWAY 115kV [3710] (SEMITRPJ-GANSO)	P2	Line Section w/o fault	221	223	217	282	275	225	279	184	218	Utilize Summer Setup for summer and non-summer months
	MIDWAY 115kV Section 2E	P2	Bus	240	239	230	285	280	240	286	170	229	Utilize Summer Setup for summer and non-summer months
	MIDWAY 115kV - Section 1E & 2E	P2	Bus-tie Breaker	240	238	229	285	280	240	286	170	229	Utilize Summer Setup for summer and non-summer months
	MIDWAY 115kV - Section 2D & 2E	P2	Bus-tie Breaker	240	238	230	285	280	240	286	170	230	Utilize Summer Setup for summer and non-summer months
	KERN PP 230kV - Section 1D & 2D	P2	Bus-tie Breaker	Diverge	N/A	N/A	289	N/A	N/A	N/A	167	N/A	Contingency not valid in future years. Project :Kern PP 230 kV bus conversion (BAAH) will be done as part of Kern PP 230 kV area reinforcement project. (12/2020) Short Term : Utilize Summer Setup for summer and non-summer months
	PSE-BEAR 13.80kV Gen Unit 1 AND SMYRNA-SEMITROPIC-MIDWAY 115kV [3710] MOAS OPENED on GANSO_MIDWAY	P3	G1/N1	<100	134	147	<100	<100	155	<100	<100	146	Utilize Summer Setup for summer and non-summer months
KERN PW1 70/115kV TB 1 AND KERN PW2 70/115kV TB 1	P6	N-1-1	308	311	320	77	83	315	107	100	321	Utilize Summer Setup for summer and non-summer months	
	SMYRNA-SEMITROPIC-MIDWAY 115kV [3710] (GANSO-MIDWAY)	P2	Line Section w/o fault	52	45	39	128	129	44	131	80	39	Utilize Summer Setup for summer and non-summer months
	SMYRNA-SEMITROPIC-MIDWAY 115kV [3710] (SEMITRPJ-GANSO)	P2	Line Section w/o fault	50	44	40	127	127	44	128	86	40	Utilize Summer Setup for summer and non-summer months
	MIDWAY 115kV Section 2E	P2	Bus	52	45	39	128	129	44	131	80	39	Utilize Summer Setup for summer and non-summer months

Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading % (Baseline Scenarios)					Loading % (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations	
34934 SEMITRPC 70.0 34704 SEMITROPIC_D 115 2 1	MIDWAY 115kV - Section 1E & 2E	P2	Bus-tie Breaker	51	45	39	128	129	44	131	80	39	Utilize Summer Setup for summer and non-summer months
	MIDWAY 115kV - Section 2D & 2E	P2	Bus-tie Breaker	52	45	39	128	129	44	131	80	39	Utilize Summer Setup for summer and non-summer months
	KERN PP 230kV - Section 1D & 2D	P2	Bus-tie Breaker	Diverge	N/A	N/A	132	N/A	N/A	N/A	79	N/A	Contingency not valid in future years. Project :Kern PP 230 kV bus conversion (BAAH) will be done as part of Kern PP 230 kV area reinforcement project. (12/2020) Short Term : Action Plan
	KERN PW1 70/115kV TB 1 AND KERN PW2 70/115kV TB 1	P6	N-1-1	135	135	136	<100	<100	137	<100	<100	137	Utilize Summer Setup for summer and non-summer months
365550 BITTERWATRSS 230 38645 WHLR RJ2 230 2 1	MIDWAY 230kV Section 1D	P2	Bus	105	101	60	58	58	102	60	80	61	Project : Wheeler Ridge Junction Station Project; In-Service Date:05/2024 Short term: Action Plan
	MIDWAY - 1D 230kV & STCKDLEB-KERN PP-MIDWAY line	P2	Non bus-tie Breaker	105	N/A	N/A	58	N/A	N/A	N/A	80	N/A	Contingency not valid in future years. Project : Midway-Kern PP 230 kV Line capacity increase project and Midway-Kern PP # 2 230 kV line project. Short Term:Action Plan
	MIDWAY 230kV Section 1D & MIDWAY-MIDWAY-R12 #1 line	P2	Non bus-tie Breaker	105	101	60	59	58	103	66	81	61	Project : Wheeler Ridge Junction Station Project; In-Service Date:05/2024 Short term: Action Plan
	MIDWAY 230kV - Section 1E & 1D	P2	Bus-tie Breaker	105	103	66	58	57	104	59	81	67	Project : Wheeler Ridge Junction Station Project; In-Service Date:05/2024 Short term: Action Plan
	BITTERWATRSS-MIDWAY 230kV [0]	P1	N-1	100	101	60	35	38	102	39	53	60	Project : Wheeler Ridge Junction Station Project; In-Service Date:05/2024 Short term: Action Plan
	BITTERWATRSS-WHLR RJ2 230kV [0] No Fault	P2	Line Section w/o fault	101	101	59	58	58	102	60	79	60	Project : Wheeler Ridge Junction Station Project; In-Service Date:05/2024 Short term: Action Plan
	MIDWAY 230kV Section 2D	P2	Bus	113	110	63	44	46	111	48	63	64	Project : Wheeler Ridge Junction Station Project; In-Service Date:05/2024 Short term: Action Plan

Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading % (Baseline Scenarios)					Loading % (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations	
38600 BUENAVJ1 230 30970 MIDWAY 230 1 1	MIDWAY - 2D 230kV & BITTERWATRSS-MIDWAY line	P2	Non bus-tie Breaker	101	101	60	35	38	102	40	54	60	Project : Wheeler Ridge Junction Station Project; In-Service Date:05/2024 Short term: Action Plan
	MIDWAY - 2D 230kV & MIDWAY-MIDWAY-R12 #1 line	P2	Non bus-tie Breaker	113	110	63	44	46	111	48	64	64	Project : Wheeler Ridge Junction Station Project; In-Service Date:05/2024 Short term: Action Plan
	MIDWAY 230kV - Section 2D & 2E	P2	Bus-tie Breaker	116	112	71	44	46	113	47	64	72	Project : Wheeler Ridge Junction Station Project; In-Service Date:05/2024 Short term: Action Plan
	ELKHIL1G 18.00kV & ELKHIL2G 18.00kV & ELKHIL3G 18.00kV Gen Units AND BITTERWATRSS-MIDWAY 230kV [0]	P3	G1/N1	102	102	<100	<100	<100	103	<100	<100	<100	Project : Wheeler Ridge Junction Station Project; In-Service Date:05/2024 Short term: Action Plan
	BITTERWATRSS-MIDWAY line & WHEELER-WHEELER Jn 230 kV line	P6	N-1-1	110	110	110	<100	<100	<100	<100	<100	<100	Project : Wheeler Ridge Junction Station Project; In-Service Date:05/2024 Short term: Action Plan/SPS
	KERN-TEVIS-STOCKDALE-LAMONT 115kV [1940] AND BITTERWATRSS-MIDWAY 230kV [0]	P6	N-1-1	130	124	<100	<100	<100	126	<100	<100	<100	Project : Wheeler Ridge Junction Station Project; In-Service Date:05/2024 Short term: Action Plan
38600 BUENAVJ1 230 38640 WHLR RJ1 230 1 1	MIDWAY 230kV Section 2D	P2	Bus	103	100	52	34	36	101	38	53	53	Project : Wheeler Ridge Junction Station Project; In-Service Date:05/2024 Short term: Action Plan
	MIDWAY - 2D 230kV & MIDWAY-MIDWAY-R12 #1 line	P2	Non bus-tie Breaker	103	100	52	35	37	101	38	54	53	Project : Wheeler Ridge Junction Station Project; In-Service Date:05/2024 Short term: Action Plan
	MIDWAY 230kV - Section 2D & 2E	P2	Bus-tie Breaker	105	102	60	34	36	103	37	54	61	Project : Wheeler Ridge Junction Station Project; In-Service Date:05/2024 Short term: Action Plan
	KERN-TEVIS-STOCKDALE-LAMONT 115kV [1940] AND BITTERWATRSS-MIDWAY 230kV [0]	P6	N-1-1	120	114	<100	<100	<100	116	<100	<100	<100	Project : Wheeler Ridge Junction Station Project; In-Service Date:05/2024 Short term: Action Plan
	MIDWAY 230kV Section 1D	P2	Bus	115	112	70	44	44	113	46	65	71	Project : Wheeler Ridge Junction Station Project; In-Service Date:05/2024 Short term: Action Plan

Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading % (Baseline Scenarios)					Loading % (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations	
38605 BUENAVJ2 230 30970 MIDWAY 230 1 1	MIDWAY - 1D 230kV & STCKDLEB-KERN PP-MIDWAY line	P2	Non bus-tie Breaker	115	N/A	N/A	44	N/A	N/A	N/A	65	N/A	Contingency not valid in future years. Project : Midway-Kern PP 230 kV Line capacity increase project and Midway-Kern PP # 2 230 kV line project. Short Term:Action Plan
	MIDWAY 230kV Section 1D & MIDWAY-MIDWAY-R12 #1 line	P2	Non bus-tie Breaker	116	112	70	44	44	113	54	66	71	Project : Wheeler Ridge Junction Station Project; In-Service Date:05/2024 Short term: Action Plan
	MIDWAY 230kV - Section 1E & 1D	P2	Bus-tie Breaker	115	113	77	44	43	114	45	65	78	Project : Wheeler Ridge Junction Station Project; In-Service Date:05/2024 Short term: Action Plan
38605 BUENAVJ2 230 365550 BITTERWATRSS 230 2 1	MIDWAY 230kV Section 1D	P2	Bus	104	101	60	33	34	103	35	54	61	Project : Wheeler Ridge Junction Station Project; In-Service Date:05/2024 Short term: Action Plan
	MIDWAY - 1D 230kV & STCKDLEB-KERN PP-MIDWAY line	P2	Non bus-tie Breaker	105	N/A	N/A	33	N/A	N/A	N/A	55	N/A	Contingency not valid in future years. Project : Midway-Kern PP 230 kV Line capacity increase project and Midway-Kern PP # 2 230 kV line project. Short Term:Action Plan
	MIDWAY 230kV Section 1D & MIDWAY-MIDWAY-R12 #1 line	P2	Non bus-tie Breaker	105	102	60	34	34	103	46	55	61	Project : Wheeler Ridge Junction Station Project; In-Service Date:05/2024 Short term: Action Plan
	MIDWAY 230kV - Section 1E & 1D	P2	Bus-tie Breaker	105	103	66	33	33	104	35	55	67	Project : Wheeler Ridge Junction Station Project; In-Service Date:05/2024 Short term: Action Plan
38640 WHLR RJ1 230 38650 WND GPJ1 230 1 1	BITTERWATRSS-MIDWAY 230kV [0] AND KERN-TEVIS-STOCKDALE-LAMONT 115kV [1940]	P6	N-1-1	111	105	<100	<100	<100	107	<100	<100	<100	Project : Wheeler Ridge Junction Station Project; In-Service Date:05/2024 Short term: Action Plan



Study Area: **PG&E Kern**



High/Low Voltages

Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)					Voltage PU (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations	
7STNDRD 115 kV	Base Case	P0	Base case	1.04	1.04	1.04	1.06	1.06	1.04	1.06	1.03	1.04	Load power factor correction and voltage support if needed
ANTELOPE 70 kV	Base Case	P0	Base case	1.03	1.02	1.02	1.05	1.05	1.02	1.05	1.03	1.02	Load power factor correction and voltage support if needed
ARVIN 70 kV	Base Case	P0	Base case	1.03	1.01	1.02	1.05	1.04	1.01	1.05	1.04	1.03	Load power factor correction and voltage support if needed
ATWELL_ISL 115 kV	Base Case	P0	Base case	1.03	1.02	1.00	1.06	1.06	1.02	1.06	1.06	1.00	Load power factor correction and voltage support if needed
BRY_PTLM 70 kV	Base Case	P0	Base case	1.03	1.03	1.03	1.05	1.05	1.03	1.05	1.02	1.03	Load power factor correction and voltage support if needed
CAWELO C 115 kV	Base Case	P0	Base case	1.04	1.04	1.04	1.05	1.06	1.04	1.06	1.03	1.04	Load power factor correction and voltage support if needed
CHARKA 115 kV	Base Case	P0	Base case	1.04	1.02	1.00	1.04	1.05	1.02	1.06	1.04	1.01	Load power factor correction and voltage support if needed
CHSR12SWSTA 115 kV	Base Case	P0	Base case	N/A	1.02	1.00	N/A	1.05	1.02	1.06	N/A	1.01	Load power factor correction and voltage support if needed
DEVLDNPP 70 kV	Base Case	P0	Base case	1.03	1.03	1.03	1.05	1.04	1.03	1.04	1.03	1.03	Load power factor correction and voltage support if needed
DEXZEL 115 kV	Base Case	P0	Base case	1.04	1.04	1.04	1.06	1.06	1.04	1.06	1.03	1.03	Load power factor correction and voltage support if needed
DISCOVER 115 kV	Base Case	P0	Base case	1.04	1.04	1.04	1.06	1.06	1.04	1.06	1.03	1.03	Load power factor correction and voltage support if needed
DOUBLECJ 115 kV	Base Case	P0	Base case	1.04	1.04	1.04	1.05	1.05	1.04	1.05	1.03	1.04	Load power factor correction and voltage support if needed
DSCVRYTP 115 kV	Base Case	P0	Base case	1.04	1.04	1.04	1.06	1.06	1.04	1.06	1.03	1.03	Load power factor correction and voltage support if needed
EANDB 115 kV	Base Case	P0	Base case	1.04	1.04	1.04	1.05	1.05	1.04	1.05	1.03	1.04	Load power factor correction and voltage support if needed
EANDBJT 115 kV	Base Case	P0	Base case	1.04	1.04	1.04	1.05	1.05	1.04	1.05	1.03	1.04	Load power factor correction and voltage support if needed
ELK HLLS 70 kV	Base Case	P0	Base case	1.01	1.03	1.03	1.04	1.06	1.03	1.07	1.01	1.02	Load power factor correction and voltage support if needed
FAMOSO 115 kV	Base Case	P0	Base case	1.04	1.02	1.00	1.04	1.06	1.02	1.06	1.05	1.00	Load power factor correction and voltage support if needed

Study Area: **PG&E Kern**

High/Low Voltages



Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)					Voltage PU (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations	
FRITO LY 115 kV	Base Case	P0	Base case	1.03	1.04	1.03	1.04	1.05	1.04	1.05	1.03	1.03	Load power factor correction and voltage support if needed
FRTLYTP 115 kV	Base Case	P0	Base case	1.03	1.04	1.03	1.04	1.05	1.04	1.05	1.03	1.03	Load power factor correction and voltage support if needed
GODN_BER 115 kV	Base Case	P0	Base case	1.04	1.04	1.04	1.06	1.06	1.04	1.06	1.03	1.03	Load power factor correction and voltage support if needed
GOSE LKE 115 kV	Base Case	P0	Base case	1.04	1.04	1.02	1.05	1.05	1.04	1.05	1.04	1.02	Load power factor correction and voltage support if needed
HighSRA 115 kV	Base Case	P0	Base case	1.04	1.04	1.04	1.05	1.05	1.04	1.05	1.03	1.04	Load power factor correction and voltage support if needed
INERGY 115 kV	Base Case	P0	Base case	1.03	1.03	1.02	1.04	1.05	1.03	1.06	1.03	1.02	Load power factor correction and voltage support if needed
KERN OIL 115 kV	Base Case	P0	Base case	1.04	1.04	1.04	1.06	1.06	1.04	1.06	1.03	1.03	Load power factor correction and voltage support if needed
KERN PWR 115 kV	Base Case	P0	Base case	1.04	1.04	1.05	1.06	1.06	1.04	1.06	1.02	1.04	Load power factor correction and voltage support if needed
KERNFRNT 115 kV	Base Case	P0	Base case	1.04	1.04	1.03	1.05	1.06	1.04	1.06	1.03	1.03	Load power factor correction and voltage support if needed
KERNRDGE 115 kV	Base Case	P0	Base case	1.06	1.06	1.03	1.07	1.07	1.06	1.07	1.06	1.03	Load power factor correction and voltage support if needed
KERNWATR 115 kV	Base Case	P0	Base case	1.04	1.04	1.04	1.06	1.06	1.04	1.06	1.03	1.04	Load power factor correction and voltage support if needed
KRN OL J 115 kV	Base Case	P0	Base case	1.04	1.04	1.04	1.06	1.06	1.04	1.06	1.03	1.04	Load power factor correction and voltage support if needed
KRNFRNTT 115 kV	Base Case	P0	Base case	1.04	1.04	1.03	1.05	1.06	1.04	1.06	1.03	1.03	Load power factor correction and voltage support if needed
LERDO 115 kV	Base Case	P0	Base case	1.04	1.04	1.03	1.05	1.06	1.04	1.06	1.03	1.03	Load power factor correction and voltage support if needed
LIVE OAK 115 kV	Base Case	P0	Base case	1.04	1.04	1.04	1.06	1.06	1.04	1.06	1.03	1.04	Load power factor correction and voltage support if needed
LRDO JCT 115 kV	Base Case	P0	Base case	1.04	1.04	1.04	1.06	1.06	1.04	1.06	1.03	1.03	Load power factor correction and voltage support if needed
MAGUNDEN 115 kV	Base Case	P0	Base case	1.03	1.03	1.03	1.05	1.06	1.03	1.06	1.02	1.03	Load power factor correction and voltage support if needed

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High/Low Voltages

Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)					Voltage PU (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations	
MCKIBBEN 115 kV	Base Case	P0	Base case	1.04	1.03	1.01	1.05	1.05	1.03	1.06	1.04	1.01	Load power factor correction and voltage support if needed
MIDWAY 115 kV	Base Case	P0	Base case	1.05	1.05	1.04	1.05	1.05	1.05	1.05	1.04	1.04	Load power factor correction and voltage support if needed
NORCO 115 kV	Base Case	P0	Base case	1.03	1.03	1.02	1.04	1.05	1.03	1.06	1.03	1.02	Load power factor correction and voltage support if needed
NORCO_TA 115 kV	Base Case	P0	Base case	1.03	1.03	1.02	1.04	1.05	1.03	1.06	1.03	1.02	Load power factor correction and voltage support if needed
OGLE JCT 115 kV	Base Case	P0	Base case	1.04	1.04	1.04	1.05	1.06	1.04	1.06	1.04	1.04	Load power factor correction and voltage support if needed
OGLE TAP 115 kV	Base Case	P0	Base case	1.04	1.04	1.04	1.05	1.06	1.04	1.06	1.04	1.04	Load power factor correction and voltage support if needed
OLD RIVR 70 kV	Base Case	P0	Base case	1.02	1.01	1.02	1.04	1.05	1.01	1.05	1.02	1.02	Load power factor correction and voltage support if needed
ORION 70 kV	Base Case	P0	Base case	1.03	1.01	1.02	1.05	1.04	1.01	1.05	1.04	1.03	Load power factor correction and voltage support if needed
ORIONTP 70 kV	Base Case	P0	Base case	1.03	1.01	1.02	1.05	1.04	1.01	1.05	1.04	1.03	Load power factor correction and voltage support if needed
POLPASPP 70 kV	Base Case	P0	Base case	1.02	1.02	1.01	1.06	1.03	1.02	1.03	1.02	1.01	Load power factor correction and voltage support if needed
PONDROAD 115 kV	Base Case	P0	Base case	1.03	1.02	1.00	1.05	1.06	1.02	1.06	1.05	1.00	Load power factor correction and voltage support if needed
POSO MT 115 kV	Base Case	P0	Base case	1.04	1.04	1.03	1.05	1.06	1.04	1.06	1.03	1.03	Load power factor correction and voltage support if needed
POSOMTJT 115 kV	Base Case	P0	Base case	1.04	1.04	1.04	1.06	1.06	1.04	1.06	1.03	1.03	Load power factor correction and voltage support if needed
PSE-3 115 kV	Base Case	P0	Base case	1.04	1.04	1.04	1.05	1.05	1.04	1.05	1.03	1.04	Load power factor correction and voltage support if needed
PTRL JCT 115 kV	Base Case	P0	Base case	1.04	1.04	1.04	1.06	1.06	1.04	1.06	1.03	1.03	Load power factor correction and voltage support if needed
PUMPJACK 115 kV	Base Case	P0	Base case	1.05	1.06	1.04	1.06	1.06	1.06	1.06	1.06	1.03	Load power factor correction and voltage support if needed
Q482 115 kV	Base Case	P0	Base case	1.03	1.02	1.00	1.06	1.06	1.02	1.06	1.06	1.00	Load power factor correction and voltage support if needed

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High/Low Voltages



Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)					Voltage PU (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations	
Q557 115 kV	Base Case	P0	Base case	1.03	1.01	1.00	1.06	1.06	1.01	1.07	1.06	1.00	Load power factor correction and voltage support if needed
Q972 115 kV	Base Case	P0	Base case	1.05	1.06	1.04	1.06	1.06	1.06	1.07	1.06	1.03	Load power factor correction and voltage support if needed
RASMSNTP 115 kV	Base Case	P0	Base case	1.04	1.04	1.04	1.06	1.06	1.04	1.06	1.03	1.03	Load power factor correction and voltage support if needed
RASMUSEN 115 kV	Base Case	P0	Base case	1.04	1.04	1.04	1.06	1.06	1.04	1.06	1.03	1.03	Load power factor correction and voltage support if needed
RENFRJCT 115 kV	Base Case	P0	Base case	1.03	1.03	1.02	1.05	1.05	1.03	1.06	1.03	1.02	Load power factor correction and voltage support if needed
RENFRO 115 kV	Base Case	P0	Base case	1.03	1.03	1.02	1.04	1.05	1.03	1.06	1.03	1.02	Load power factor correction and voltage support if needed
RENFRO2 115 kV	Base Case	P0	Base case	1.03	1.03	1.02	1.05	1.05	1.03	1.06	1.03	1.01	Load power factor correction and voltage support if needed
RIO BRVO 115 kV	Base Case	P0	Base case	1.03	1.03	1.02	1.05	1.05	1.03	1.06	1.03	1.02	Load power factor correction and voltage support if needed
RIOBRVTM 115 kV	Base Case	P0	Base case	1.04	1.04	1.03	1.05	1.05	1.04	1.05	1.04	1.03	Load power factor correction and voltage support if needed
RNFROTP1 115 kV	Base Case	P0	Base case	1.03	1.03	1.02	1.04	1.05	1.03	1.06	1.03	1.02	Load power factor correction and voltage support if needed
RNFROTP2 115 kV	Base Case	P0	Base case	1.03	1.03	1.02	1.05	1.05	1.03	1.06	1.03	1.02	Load power factor correction and voltage support if needed
ROSEDAL 115 kV	Base Case	P0	Base case	1.04	1.05	1.05	1.06	1.06	1.04	1.06	1.02	1.04	Load power factor correction and voltage support if needed
S_KERN 70 kV	Base Case	P0	Base case	1.02	1.02	1.02	1.06	1.08	1.02	1.08	1.06	1.02	Load power factor correction and voltage support if needed
S_KERN_TP 70 kV	Base Case	P0	Base case	1.02	1.02	1.02	1.06	1.08	1.02	1.08	1.06	1.02	Load power factor correction and voltage support if needed
SAN EMDO 70 kV	Base Case	P0	Base case	1.02	1.02	1.02	1.05	1.07	1.01	1.07	1.04	1.02	Load power factor correction and voltage support if needed
SEMTR&1 115 kV	Base Case	P0	Base case	1.04	1.03	1.01	1.04	1.05	1.03	1.05	1.04	1.01	Load power factor correction and voltage support if needed
SEMITROPIC_D 115 kV	Base Case	P0	Base case	1.04	1.03	1.01	1.04	1.05	1.03	1.05	1.04	1.01	Load power factor correction and voltage support if needed

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High/Low Voltages

Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)					Voltage PU (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations	
SEMITRPJ 115 kV	Base Case	P0	Base case	1.04	1.03	1.01	1.04	1.05	1.03	1.05	1.04	1.01	Load power factor correction and voltage support if needed
SHAFTER 115 kV	Base Case	P0	Base case	1.03	1.03	1.02	1.05	1.05	1.03	1.06	1.03	1.02	Load power factor correction and voltage support if needed
SLR_TANH 70 kV	Base Case	P0	Base case	1.03	1.03	1.03	1.05	1.05	1.03	1.05	1.02	1.03	Load power factor correction and voltage support if needed
SMYRNA 115 kV	Base Case	P0	Base case	1.03	1.02	1.00	1.05	1.06	1.02	1.06	1.05	1.00	Load power factor correction and voltage support if needed
STALIONJ 70 kV	Base Case	P0	Base case	1.03	1.02	1.02	1.05	1.04	1.01	1.05	1.04	1.03	Load power factor correction and voltage support if needed
STALLION 70 kV	Base Case	P0	Base case	1.03	1.02	1.02	1.05	1.04	1.01	1.05	1.04	1.03	Load power factor correction and voltage support if needed
STCKDLJ 115 kV	Base Case	P0	Base case	1.03	1.04	1.04	1.05	1.06	1.03	1.05	1.02	1.04	Load power factor correction and voltage support if needed
STOCKDLE 115 kV	Base Case	P0	Base case	1.03	1.03	1.04	1.06	1.06	1.03	1.06	1.01	1.04	Load power factor correction and voltage support if needed
TAFT A 70 kV	Base Case	P0	Base case	1.04	1.04	1.04	1.05	1.05	1.04	1.06	1.03	1.04	Load power factor correction and voltage support if needed
TAFT A_J 70 kV	Base Case	P0	Base case	1.03	1.03	1.03	1.05	1.05	1.03	1.05	1.02	1.03	Load power factor correction and voltage support if needed
TAFT_SW_TAFC 70 kV	Base Case	P0	Base case	1.04	1.04	1.04	1.05	1.05	1.04	1.06	1.03	1.04	Load power factor correction and voltage support if needed
TAFT_SW_TAFM 70 kV	Base Case	P0	Base case	1.04	1.04	1.04	1.05	1.05	1.04	1.06	1.03	1.04	Load power factor correction and voltage support if needed
TEMBLOR 115 kV	Base Case	P0	Base case	1.05	1.06	1.04	1.06	1.06	1.06	1.06	1.06	1.03	Load power factor correction and voltage support if needed
TEVIS 115 kV	Base Case	P0	Base case	1.03	1.04	1.04	1.06	1.07	1.04	1.06	1.02	1.04	Load power factor correction and voltage support if needed
TEVIS2 115 kV	Base Case	P0	Base case	1.02	1.03	1.04	1.06	1.06	1.03	1.06	1.01	1.04	Load power factor correction and voltage support if needed
TEVISJ1 115 kV	Base Case	P0	Base case	1.03	1.04	1.04	1.06	1.06	1.04	1.06	1.02	1.04	Load power factor correction and voltage support if needed
TEVISJ2 115 kV	Base Case	P0	Base case	1.03	1.04	1.04	1.05	1.06	1.03	1.06	1.02	1.04	Load power factor correction and voltage support if needed



Study Area: **PG&E Kern**



High/Low Voltages

Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)					Voltage PU (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations	
TPMNTP1 115 kV	Base Case	P0	Base case	1.03	1.03	1.02	1.04	1.05	1.03	1.06	1.03	1.02	Load power factor correction and voltage support if needed
TPMNTP2 115 kV	Base Case	P0	Base case	1.03	1.03	1.02	1.04	1.05	1.03	1.06	1.03	1.02	Load power factor correction and voltage support if needed
TUPMAN 115 kV	Base Case	P0	Base case	1.03	1.03	1.02	1.04	1.05	1.03	1.06	1.03	1.02	Load power factor correction and voltage support if needed
TX_BV_HL 70 kV	Base Case	P0	Base case	1.02	1.04	1.03	1.04	1.06	1.04	1.06	1.01	1.03	Load power factor correction and voltage support if needed
TX_ROSDL 115 kV	Base Case	P0	Base case	1.04	1.05	1.05	1.06	1.06	1.04	1.06	1.02	1.04	Load power factor correction and voltage support if needed
VEDDER 115 kV	Base Case	P0	Base case	1.04	1.04	1.03	1.05	1.06	1.04	1.06	1.03	1.03	Load power factor correction and voltage support if needed
WEEDPTCH 70 kV	Base Case	P0	Base case	1.02	1.01	1.00	1.05	1.04	1.00	1.05	1.03	1.02	Load power factor correction and voltage support if needed
WESTPARK 115 kV	Base Case	P0	Base case	1.03	1.04	1.04	1.05	1.06	1.04	1.06	1.02	1.04	Load power factor correction and voltage support if needed
WESTPLAT 115 kV	Base Case	P0	Base case	1.03	1.04	1.03	1.04	1.05	1.04	1.05	1.03	1.03	Load power factor correction and voltage support if needed
WILDWOOD1 115 kV	Base Case	P0	Base case	1.04	1.04	1.02	1.05	1.05	1.04	1.05	1.04	1.02	Load power factor correction and voltage support if needed
WILDWOOD1TP 115 kV	Base Case	P0	Base case	1.04	1.04	1.02	1.05	1.05	1.04	1.05	1.04	1.02	Load power factor correction and voltage support if needed
WILDWOOD2 115 kV	Base Case	P0	Base case	1.04	1.04	1.02	1.05	1.05	1.04	1.06	1.04	1.02	Load power factor correction and voltage support if needed
WSCOPRSN 115 kV	Base Case	P0	Base case	1.04	1.03	1.01	1.04	1.05	1.03	1.05	1.04	1.01	Load power factor correction and voltage support if needed
KERNRDGE 115 kV	MIDWAY-TEMBLOR 115kV [2630]	P1	N-1	1.05	1.05	1.03	1.10	1.11	1.06	1.12	1.06	1.03	Load Power Factor correction and voltage support if needed; Project: Midway-Temblor 115 kV Line Reconductor and Voltage Support
CHARKA 115 kV	SMYRNA-SEMITROPIC-MIDWAY 115kV [3710] MOAS OPENED on GANSO_MIDWAY	P1	N-1	0.87	0.67	0.58	1.03	1.10	0.60	1.11	0.96	0.58	Remove Semitropic Shoefly and close Semitropic D to Semitropic E section

Study Area: **PG&E Kern**

High/Low Voltages



Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)					Voltage PU (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations	
FAMOSO 115 kV	SMYRNA-SEMITROPIC-MIDWAY 115kV [3710] MOAS OPENED on GANSO_MIDWAY	P1	N-1	0.87	0.67	0.57	1.03	1.11	0.59	1.11	0.96	0.57	Remove Semitropic Shoefly and close Semitropic D to Semitropic E section
FAMOSO 70 kV	SMYRNA-SEMITROPIC-MIDWAY 115kV [3710] MOAS OPENED on GANSO_MIDWAY	P1	N-1	0.90	0.79	0.73	1.03	1.07	0.75	1.08	0.97	0.73	Utilize Summer Setup for summer and non-summer months
MC FRLND 70 kV	SMYRNA-SEMITROPIC-MIDWAY 115kV [3710] MOAS OPENED on GANSO_MIDWAY	P1	N-1	0.88	0.76	0.68	1.03	1.07	0.71	1.08	0.95	0.69	Utilize Summer Setup for summer and non-summer months
SEMITROPIC_D 115 kV	SMYRNA-SEMITROPIC-MIDWAY 115kV [3710] MOAS OPENED on GANSO_MIDWAY	P1	N-1	0.87	0.68	0.59	1.03	1.10	0.61	1.11	0.96	0.59	Remove Semitropic Shoefly and close Semitropic D to Semitropic E section
SEMITRPC 70 kV	SMYRNA-SEMITROPIC-MIDWAY 115kV [3710] MOAS OPENED on GANSO_MIDWAY	P1	N-1	0.85	0.68	0.59	1.02	1.08	0.61	1.09	0.94	0.59	Utilize Summer Setup for summer and non-summer months
WASCO 70 kV	SMYRNA-SEMITROPIC-MIDWAY 115kV [3710] MOAS OPENED on GANSO_MIDWAY	P1	N-1	0.87	0.72	0.64	1.03	1.08	0.66	1.08	0.95	0.64	Utilize Summer Setup for summer and non-summer months
WSCOPRSN 115 kV	SMYRNA-SEMITROPIC-MIDWAY 115kV [3710] MOAS OPENED on GANSO_MIDWAY	P1	N-1	0.87	0.68	0.59	1.03	1.10	0.61	1.11	0.96	0.59	Remove Semitropic Shoefly and close Semitropic D to Semitropic E section
ARVIN_ED 115 kV	KERN PWR - 2D 115kV & KERN-KERN FRONT line	P2	Non Bus-tie Breaker	0.48	N/A	N/A	1.04	N/A	N/A	N/A	0.97	N/A	Contingency not valid in future years. Short Term: Action Plan
GRIMWAY 115 kV	KERN PWR - 2D 115kV & KERN-KERN FRONT line	P2	Non Bus-tie Breaker	0.50	N/A	N/A	1.03	N/A	N/A	N/A	0.98	N/A	Contingency not valid in future years. Short Term: Action Plan
LAMONT 115 kV	KERN PWR - 2D 115kV & KERN-KERN FRONT line	P2	Non Bus-tie Breaker	0.50	N/A	N/A	1.04	N/A	N/A	N/A	0.98	N/A	Contingency not valid in future years. Short Term: Action Plan
Q622BSS 115 kV	KERN PWR - 2D 115kV & KERN-KERN FRONT line	P2	Non Bus-tie Breaker	0.89	N/A	N/A	1.03	N/A	N/A	N/A	1.02	N/A	Contingency not valid in future years. Short Term: Action Plan
Q744 115 kV	KERN PWR - 2D 115kV & KERN-KERN FRONT line	P2	Non Bus-tie Breaker	0.50	N/A	N/A	1.04	N/A	N/A	N/A	0.99	N/A	Contingency not valid in future years. Short Term: Action Plan
REGULUS 115 kV	KERN PWR - 2D 115kV & KERN-KERN FRONT line	P2	Non Bus-tie Breaker	0.50	N/A	N/A	1.04	N/A	N/A	N/A	0.98	N/A	Contingency not valid in future years. Short Term: Action Plan
STCKDLJ 115 kV	KERN PWR - 2D 115kV & KERN-KERN FRONT line	P2	Non Bus-tie Breaker	0.46	N/A	N/A	1.04	N/A	N/A	N/A	0.95	N/A	Contingency not valid in future years. Short Term: Action Plan

Study Area: **PG&E Kern**



High/Low Voltages

Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)					Voltage PU (Sensitivity Scenarios)				Project & Potential Mitigation Solutions	
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations		
TEVIS2 115 kV	KERN PWR - 2D 115kV & KERN-KERN FRONT line	P2	Non Bus-tie Breaker	0.45	N/A	N/A	1.04	N/A	N/A	N/A	N/A	0.94	N/A	Contingency not valid in future years. Short Term: Action Plan
ARVIN_ED 115 kV	KERN PWR 115kV - Section 2D & 1D	P2	Bus-tie Breaker	0.49	N/A	N/A	1.04	N/A	N/A	N/A	N/A	0.97	N/A	Contingency not valid in future years. Short Term: Action Plan
ARVINJ1 115 kV	KERN PWR 115kV - Section 2D & 1D	P2	Bus-tie Breaker	0.52	N/A	N/A	1.04	N/A	N/A	N/A	N/A	0.98	N/A	Contingency not valid in future years. Short Term: Action Plan
ARVINJ2 115 kV	KERN PWR 115kV - Section 2D & 1D	P2	Bus-tie Breaker	0.49	N/A	N/A	1.04	N/A	N/A	N/A	N/A	0.97	N/A	Contingency not valid in future years. Short Term: Action Plan
GRIMWAY 115 kV	KERN PWR 115kV - Section 2D & 1D	P2	Bus-tie Breaker	0.50	N/A	N/A	1.03	N/A	N/A	N/A	N/A	0.98	N/A	Contingency not valid in future years. Short Term: Action Plan
LAMONT 115 kV	KERN PWR 115kV - Section 2D & 1D	P2	Bus-tie Breaker	0.50	N/A	N/A	1.04	N/A	N/A	N/A	N/A	0.98	N/A	Contingency not valid in future years. Short Term: Action Plan
Q622BSS 115 kV	KERN PWR 115kV - Section 2D & 1D	P2	Bus-tie Breaker	0.89	N/A	N/A	1.03	N/A	N/A	N/A	N/A	1.02	N/A	Contingency not valid in future years. Short Term: Action Plan
Q744 115 kV	KERN PWR 115kV - Section 2D & 1D	P2	Bus-tie Breaker	0.50	N/A	N/A	1.04	N/A	N/A	N/A	N/A	0.99	N/A	Contingency not valid in future years. Short Term: Action Plan
REGULUS 115 kV	KERN PWR 115kV - Section 2D & 1D	P2	Bus-tie Breaker	0.50	N/A	N/A	1.04	N/A	N/A	N/A	N/A	0.98	N/A	Contingency not valid in future years. Short Term: Action Plan
STCKDLJ 115 kV	KERN PWR 115kV - Section 2D & 1D	P2	Bus-tie Breaker	0.46	N/A	N/A	1.04	N/A	N/A	N/A	N/A	0.95	N/A	Contingency not valid in future years. Short Term: Action Plan
TEVIS2 115 kV	KERN PWR 115kV - Section 2D & 1D	P2	Bus-tie Breaker	0.45	N/A	N/A	1.04	N/A	N/A	N/A	N/A	0.94	N/A	Contingency not valid in future years. Short Term: Action Plan
TEVISJ2 115 kV	KERN PWR 115kV - Section 2D & 1D	P2	Bus-tie Breaker	0.46	N/A	N/A	1.04	N/A	N/A	N/A	N/A	0.94	N/A	Contingency not valid in future years. Short Term: Action Plan
ARVIN_ED 115 kV	KERN PWR 115kV - Section 2D & 2E	P2	Bus-tie Breaker	0.48	N/A	N/A	1.04	N/A	N/A	N/A	N/A	0.97	N/A	Contingency not valid in future years. Short Term: Action Plan
GRIMWAY 115 kV	KERN PWR 115kV - Section 2D & 2E	P2	Bus-tie Breaker	0.50	N/A	N/A	1.04	N/A	N/A	N/A	N/A	0.98	N/A	Contingency not valid in future years. Short Term: Action Plan
LAMONT 115 kV	KERN PWR 115kV - Section 2D & 2E	P2	Bus-tie Breaker	0.50	N/A	N/A	1.04	N/A	N/A	N/A	N/A	0.98	N/A	Contingency not valid in future years. Short Term: Action Plan
Q622BSS 115 kV	KERN PWR 115kV - Section 2D & 2E	P2	Bus-tie Breaker	0.89	N/A	N/A	1.03	N/A	N/A	N/A	N/A	1.02	N/A	Contingency not valid in future years. Short Term: Action Plan
Q744 115 kV	KERN PWR 115kV - Section 2D & 2E	P2	Bus-tie Breaker	0.50	N/A	N/A	1.04	N/A	N/A	N/A	N/A	0.99	N/A	Contingency not valid in future years. Short Term: Action Plan

Study Area: **PG&E Kern**

High/Low Voltages



Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)					Voltage PU (Sensitivity Scenarios)				Project & Potential Mitigation Solutions	
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations		
REGULUS 115 kV	KERN PWR 115kV - Section 2D & 2E	P2	Bus-tie Breaker	0.50	N/A	N/A	1.04	N/A	N/A	N/A	N/A	0.98	N/A	Contingency not valid in future years. Short Term: Action Plan
TEVIS2 115 kV	KERN PWR 115kV - Section 2D & 2E	P2	Bus-tie Breaker	0.45	N/A	N/A	1.04	N/A	N/A	N/A	N/A	0.94	N/A	Contingency not valid in future years. Short Term: Action Plan
ARVIN_ED 115 kV	KERN PWR 115kV Section 2D	P2	Bus	0.48	N/A	N/A	1.04	N/A	N/A	N/A	N/A	0.97	N/A	Contingency not valid in future years. Short Term: Action Plan
GRIMWAY 115 kV	KERN PWR 115kV Section 2D	P2	Bus	0.50	N/A	N/A	1.03	N/A	N/A	N/A	N/A	0.98	N/A	Contingency not valid in future years. Short Term: Action Plan
LAMONT 115 kV	KERN PWR 115kV Section 2D	P2	Bus	0.50	N/A	N/A	1.04	N/A	N/A	N/A	N/A	0.98	N/A	Contingency not valid in future years. Short Term: Action Plan
Q622BSS 115 kV	KERN PWR 115kV Section 2D	P2	Bus	0.89	N/A	N/A	1.03	N/A	N/A	N/A	N/A	1.02	N/A	Contingency not valid in future years. Short Term: Action Plan
Q744 115 kV	KERN PWR 115kV Section 2D	P2	Bus	0.50	N/A	N/A	1.04	N/A	N/A	N/A	N/A	0.99	N/A	Contingency not valid in future years. Short Term: Action Plan
REGULUS 115 kV	KERN PWR 115kV Section 2D	P2	Bus	0.50	N/A	N/A	1.04	N/A	N/A	N/A	N/A	0.98	N/A	Contingency not valid in future years. Short Term: Action Plan
TEVIS2 115 kV	KERN PWR 115kV Section 2D	P2	Bus	0.45	N/A	N/A	1.04	N/A	N/A	N/A	N/A	0.94	N/A	Contingency not valid in future years. Short Term: Action Plan
ARVIN_ED 115 kV	KERN-TEVIS-STOCKDALE-LAMONT 115kV [1940] (KERN PWR-TEVISJ2)	P2	Line Section w/o fault	0.48	0.52	1.03	1.04	1.04	0.51	1.04	0.97	1.04	1.04	Project : Wheeler Ridge Junction Station Project; In-Service Date:05/2024 Short term: Action Plan (Potentially open the 115 kV line between Wheeler and Q622)
GRIMWAY 115 kV	KERN-TEVIS-STOCKDALE-LAMONT 115kV [1940] (KERN PWR-TEVISJ2)	P2	Line Section w/o fault	0.50	0.53	1.03	1.03	1.03	0.52	1.03	0.98	1.04	1.04	Project : Wheeler Ridge Junction Station Project; In-Service Date:05/2024 Short term: Action Plan (Potentially open the 115 kV line between Wheeler and Q622)
LAMONT 115 kV	KERN-TEVIS-STOCKDALE-LAMONT 115kV [1940] (KERN PWR-TEVISJ2)	P2	Line Section w/o fault	0.50	0.53	1.03	1.04	1.04	0.52	1.04	0.98	1.04	1.04	Project : Wheeler Ridge Junction Station Project; In-Service Date:05/2024 Short term: Action Plan (Potentially open the 115 kV line between Wheeler and Q622)
Q622BSS 115 kV	KERN-TEVIS-STOCKDALE-LAMONT 115kV [1940] (KERN PWR-TEVISJ2)	P2	Line Section w/o fault	0.89	0.91	1.02	1.03	1.03	0.91	1.01	1.02	1.04	1.04	Project : Wheeler Ridge Junction Station Project; In-Service Date:05/2024 Short term: Action Plan (Potentially open the 115 kV line between Wheeler and Q622)

Study Area: **PG&E Kern**

High/Low Voltages



Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)					Voltage PU (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations	
Q744 115 kV	KERN-TEVIS-STOCKDALE-LAMONT 115kV [1940] (KERN PWR-TEVISJ2)	P2	Line Section w/o fault	0.50	0.53	1.03	1.04	1.03	0.52	1.03	0.99	1.04	Project : Wheeler Ridge Junction Station Project; In-Service Date:05/2024 Short term: Action Plan (Potentially open the 115 kV line between Wheeler and Q622)
REGULUS 115 kV	KERN-TEVIS-STOCKDALE-LAMONT 115kV [1940] (KERN PWR-TEVISJ2)	P2	Line Section w/o fault	0.50	0.53	1.03	1.04	1.04	0.52	1.04	0.98	1.04	Project : Wheeler Ridge Junction Station Project; In-Service Date:05/2024 Short term: Action Plan (Potentially open the 115 kV line between Wheeler and Q622)
STCKDLJ 115 kV	KERN-TEVIS-STOCKDALE-LAMONT 115kV [1940] (KERN PWR-TEVISJ2)	P2	Line Section w/o fault	0.46	0.50	1.03	1.04	1.04	0.48	1.04	0.95	1.03	Project : Wheeler Ridge Junction Station Project; In-Service Date:05/2024 Short term: Action Plan (Potentially open the 115 kV line between Wheeler and Q622)
TEVIS2 115 kV	KERN-TEVIS-STOCKDALE-LAMONT 115kV [1940] (KERN PWR-TEVISJ2)	P2	Line Section w/o fault	0.45	0.49	1.03	1.04	1.04	0.48	1.04	0.94	1.03	Project : Wheeler Ridge Junction Station Project; In-Service Date:05/2024 Short term: Action Plan (Potentially open the 115 kV line between Wheeler and Q622)
BUENAVJ1 230 kV	MIDWAY - 1D 230kV & STCKDLEB-KERN PP-MIDWAY line	P2	Non Bus-tie Breaker	0.90	N/A	N/A	0.96	N/A	N/A	N/A	0.91	N/A	Contingency not valid in future years. Short Term: Action Plan
BUENAVT1 230 kV	MIDWAY - 1D 230kV & STCKDLEB-KERN PP-MIDWAY line	P2	Non Bus-tie Breaker	0.90	N/A	N/A	0.96	N/A	N/A	N/A	0.91	N/A	Contingency not valid in future years. Short Term: Action Plan
WHLR RJ1 230 kV	MIDWAY - 1D 230kV & STCKDLEB-KERN PP-MIDWAY line	P2	Non Bus-tie Breaker	0.90	N/A	N/A	0.96	N/A	N/A	N/A	0.91	N/A	Contingency not valid in future years. Short Term: Action Plan
WHLR RT1 230 kV	MIDWAY - 1D 230kV & STCKDLEB-KERN PP-MIDWAY line	P2	Non Bus-tie Breaker	0.90	N/A	N/A	0.96	N/A	N/A	N/A	0.91	N/A	Contingency not valid in future years. Short Term: Action Plan
WND GPJ1 230 kV	MIDWAY - 1D 230kV & STCKDLEB-KERN PP-MIDWAY line	P2	Non Bus-tie Breaker	0.90	N/A	N/A	0.96	N/A	N/A	N/A	0.91	N/A	Contingency not valid in future years. Short Term: Action Plan
WND GPT1 230 kV	MIDWAY - 1D 230kV & STCKDLEB-KERN PP-MIDWAY line	P2	Non Bus-tie Breaker	0.90	N/A	N/A	0.96	N/A	N/A	N/A	0.91	N/A	Contingency not valid in future years. Short Term: Action Plan
KERNRDGE 115 kV	MIDWAY - 2D 115kV & MIDWAY-RENFRO-TUPMAN line	P2	Non Bus-tie Breaker	1.08	1.08	1.03	1.10	1.11	1.09	1.10	1.09	1.02	Load Power Factor correction and voltage support if needed; Project: Midway-Temblor 115 kV Line Reconductor and Voltage Support



Study Area: **PG&E Kern**



High/Low Voltages

Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)					Voltage PU (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations	
Q972 115 kV	MIDWAY - 2D 115kV & MIDWAY-RENFRO-TUPMAN line	P2	Non Bus-tie Breaker	1.07	1.07	1.03	1.10	1.10	1.08	1.10	1.09	1.02	Load Power Factor correction and voltage support if needed; Project: Midway-Temblor 115 kV Line Reconductor and Voltage Support
RIOBRAVO1 115 kV	MIDWAY - 2D 115kV & MIDWAY-RENFRO-TUPMAN line	P2	Non Bus-tie Breaker	1.07	1.07	1.03	1.10	1.10	1.08	1.10	1.09	1.02	Load Power Factor correction and voltage support if needed; Project: Midway-Temblor 115 kV Line Reconductor and Voltage Support
KERNRDGE 115 kV	MIDWAY - 2D 115kV & MIDWAY-TEMBLOR line	P2	Non Bus-tie Breaker	1.05	1.06	1.03	1.10	1.11	1.06	1.12	1.06	1.03	Load Power Factor correction and voltage support if needed; Project: Midway-Temblor 115 kV Line Reconductor and Voltage Support
TEMBLOR 115 kV	MIDWAY - 2D 115kV & MIDWAY-TEMBLOR line	P2	Non Bus-tie Breaker	1.05	1.05	1.03	1.09	1.10	1.06	1.11	1.06	1.04	Load Power Factor correction and voltage support if needed; Project: Midway-Temblor 115 kV Line Reconductor and Voltage Support
CHARKA 115 kV	MIDWAY - 2E 115kV & SMYRNA-SEMITROPIC-MIDWAY line	P2	Non Bus-tie Breaker	0.87	0.69	0.58	1.03	1.10	0.60	1.11	0.96	0.58	Remove Semitropic Shoefly and close Semitropic D to Semitropic E section
CHSR12SWSTA 115 kV	MIDWAY - 2E 115kV & SMYRNA-SEMITROPIC-MIDWAY line	P2	Non Bus-tie Breaker	>.9, < 1.1	0.69	0.58	>.9, < 1.1	1.10	0.60	1.11	>.9, < 1.1	0.58	Remove Semitropic Shoefly and close Semitropic D to Semitropic E section
FAMOSO 115 kV	MIDWAY - 2E 115kV & SMYRNA-SEMITROPIC-MIDWAY line	P2	Non Bus-tie Breaker	0.87	0.68	0.57	1.03	1.11	0.59	1.11	0.96	0.57	Remove Semitropic Shoefly and close Semitropic D to Semitropic E section
FAMOSO 70 kV	MIDWAY - 2E 115kV & SMYRNA-SEMITROPIC-MIDWAY line	P2	Non Bus-tie Breaker	0.90	0.80	0.73	1.03	1.07	0.75	1.08	0.97	0.73	Utilize Summer Setup for summer and non-summer months
MC FRLND 70 kV	MIDWAY - 2E 115kV & SMYRNA-SEMITROPIC-MIDWAY line	P2	Non Bus-tie Breaker	0.88	0.77	0.68	1.03	1.07	0.71	1.08	0.95	0.69	Utilize Summer Setup for summer and non-summer months
SEMITR&1 115 kV	MIDWAY - 2E 115kV & SMYRNA-SEMITROPIC-MIDWAY line	P2	Non Bus-tie Breaker	0.87	0.70	0.59	1.03	1.10	0.61	1.11	0.96	0.59	Remove Semitropic Shoefly and close Semitropic D to Semitropic E section
SEMITROPIC_D 115 kV	MIDWAY - 2E 115kV & SMYRNA-SEMITROPIC-MIDWAY line	P2	Non Bus-tie Breaker	0.87	0.70	0.59	1.03	1.10	0.61	1.11	0.96	0.59	Remove Semitropic Shoefly and close Semitropic D to Semitropic E section
SEMITRPC 70 kV	MIDWAY - 2E 115kV & SMYRNA-SEMITROPIC-MIDWAY line	P2	Non Bus-tie Breaker	0.85	0.69	0.59	1.02	1.08	0.61	1.09	0.94	0.59	Utilize Summer Setup for summer and non-summer months
WASCO 70 kV	MIDWAY - 2E 115kV & SMYRNA-SEMITROPIC-MIDWAY line	P2	Non Bus-tie Breaker	0.87	0.73	0.64	1.03	1.08	0.66	1.08	0.95	0.64	Utilize Summer Setup for summer and non-summer months

Study Area: **PG&E Kern**

High/Low Voltages



Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)					Voltage PU (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations	
WSCOPRSN 115 kV	MIDWAY - 2E 115kV & SMYRNA-SEMITROPIC-MIDWAY line	P2	Non Bus-tie Breaker	0.87	0.69	0.59	1.03	1.10	0.61	1.11	0.96	0.59	Remove Semitropic Shoefly and close Semitropic D to Semitropic E section
ATWELL_ISL 115 kV	MIDWAY 115kV - Section 1E & 2E	P2	Bus-tie Breaker	0.46	0.40	0.34	1.02	1.03	0.39	1.03	1.05	0.34	Remove Semitropic Shoefly and close Semitropic D to Semitropic E section
CAWELO B 70 kV	MIDWAY 115kV - Section 1E & 2E	P2	Bus-tie Breaker	0.86	0.86	0.85	0.97	0.98	0.85	0.98	1.02	0.85	Remove Semitropic Shoefly and close Semitropic D to Semitropic E section
CHARKA 115 kV	MIDWAY 115kV - Section 1E & 2E	P2	Bus-tie Breaker	0.47	0.40	0.35	0.98	1.01	0.39	1.01	1.04	0.35	Remove Semitropic Shoefly and close Semitropic D to Semitropic E section
CHSR12SWSTA 115 kV	MIDWAY 115kV - Section 1E & 2E	P2	Bus-tie Breaker	>.9, < 1.1	0.40	0.35	>.9, < 1.1	1.01	0.39	1.01	>.9, < 1.1	0.35	Remove Semitropic Shoefly and close Semitropic D to Semitropic E section
FAMOSO 115 kV	MIDWAY 115kV - Section 1E & 2E	P2	Bus-tie Breaker	0.47	0.40	0.35	0.98	1.01	0.39	1.01	1.04	0.35	Remove Semitropic Shoefly and close Semitropic D to Semitropic E section
FAMOSO 70 kV	MIDWAY 115kV - Section 1E & 2E	P2	Bus-tie Breaker	0.63	0.61	0.59	0.93	0.95	0.61	0.94	1.00	0.59	Remove Semitropic Shoefly and close Semitropic D to Semitropic E section
GANSO 115 kV	MIDWAY 115kV - Section 1E & 2E	P2	Bus-tie Breaker	0.47	0.41	0.36	0.99	1.01	0.40	1.01	1.04	0.36	Remove Semitropic Shoefly and close Semitropic D to Semitropic E section
MC FRLND 70 kV	MIDWAY 115kV - Section 1E & 2E	P2	Bus-tie Breaker	0.59	0.57	0.54	0.93	0.95	0.56	0.94	0.99	0.54	Remove Semitropic Shoefly and close Semitropic D to Semitropic E section
MCKIBBEN 115 kV	MIDWAY 115kV - Section 1E & 2E	P2	Bus-tie Breaker	0.47	0.41	0.36	0.99	1.01	0.40	1.01	1.04	0.36	Remove Semitropic Shoefly and close Semitropic D to Semitropic E section
PONDROAD 115 kV	MIDWAY 115kV - Section 1E & 2E	P2	Bus-tie Breaker	0.46	0.40	0.35	1.00	1.02	0.39	1.02	1.04	0.35	Remove Semitropic Shoefly and close Semitropic D to Semitropic E section
Q482 115 kV	MIDWAY 115kV - Section 1E & 2E	P2	Bus-tie Breaker	0.46	0.40	0.34	1.02	1.03	0.39	1.03	1.05	0.34	Remove Semitropic Shoefly and close Semitropic D to Semitropic E section
Q557 115 kV	MIDWAY 115kV - Section 1E & 2E	P2	Bus-tie Breaker	0.46	0.39	0.34	1.02	1.04	0.38	1.03	1.05	0.34	Remove Semitropic Shoefly and close Semitropic D to Semitropic E section
SEMITROPIC_D 115 kV	MIDWAY 115kV - Section 1E & 2E	P2	Bus-tie Breaker	0.47	0.41	0.36	0.99	1.01	0.40	1.00	1.04	0.36	Remove Semitropic Shoefly and close Semitropic D to Semitropic E section
SEMITRPC 70 kV	MIDWAY 115kV - Section 1E & 2E	P2	Bus-tie Breaker	0.46	0.41	0.37	0.98	1.00	0.40	0.99	1.03	0.37	Remove Semitropic Shoefly and close Semitropic D to Semitropic E section
SMYRNA 115 kV	MIDWAY 115kV - Section 1E & 2E	P2	Bus-tie Breaker	0.46	0.40	0.35	1.00	1.02	0.39	1.02	1.04	0.35	Remove Semitropic Shoefly and close Semitropic D to Semitropic E section
WASCO 70 kV	MIDWAY 115kV - Section 1E & 2E	P2	Bus-tie Breaker	0.52	0.49	0.46	0.94	0.96	0.48	0.96	1.01	0.45	Remove Semitropic Shoefly and close Semitropic D to Semitropic E section

Study Area: **PG&E Kern**

High/Low Voltages



Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)					Voltage PU (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations	
WSCOPRSN 115 kV	MIDWAY 115kV - Section 1E & 2E	P2	Bus-tie Breaker	0.47	0.41	0.36	0.98	1.01	0.40	1.01	1.04	0.36	Remove Semitropic Shoefly and close Semitropic D to Semitropic E section
KERNRDGE 115 kV	MIDWAY 115kV - Section 2D & 1D	P2	Bus-tie Breaker	1.08	1.08	1.03	1.10	1.11	1.09	1.10	1.09	1.01	Load Power Factor correction and voltage support if needed; Project: Midway-Temblor 115 kV Line Reconductor and Voltage Support
Q972 115 kV	MIDWAY 115kV - Section 2D & 1D	P2	Bus-tie Breaker	1.07	1.07	1.03	1.10	1.10	1.08	1.10	1.09	1.02	Load Power Factor correction and voltage support if needed; Project: Midway-Temblor 115 kV Line Reconductor and Voltage Support
RIOBRAVO1 115 kV	MIDWAY 115kV - Section 2D & 1D	P2	Bus-tie Breaker	1.07	1.07	1.03	1.10	1.10	1.08	1.10	1.09	1.02	Load Power Factor correction and voltage support if needed; Project: Midway-Temblor 115 kV Line Reconductor and Voltage Support
ATWELL_ISL 115 kV	MIDWAY 115kV - Section 2D & 2E	P2	Bus-tie Breaker	0.46	0.40	0.34	1.02	1.03	0.39	1.03	1.05	0.34	Remove Semitropic Shoefly and close Semitropic D to Semitropic E section
CAWELO B 70 kV	MIDWAY 115kV - Section 2D & 2E	P2	Bus-tie Breaker	0.86	0.85	0.85	0.97	0.98	0.85	0.98	1.02	0.85	Remove Semitropic Shoefly and close Semitropic D to Semitropic E section
CHARKA 115 kV	MIDWAY 115kV - Section 2D & 2E	P2	Bus-tie Breaker	0.47	0.40	0.35	0.98	1.01	0.39	1.01	1.04	0.35	Remove Semitropic Shoefly and close Semitropic D to Semitropic E section
CHSR12SWSTA 115 kV	MIDWAY 115kV - Section 2D & 2E	P2	Bus-tie Breaker	>.9, < 1.1	0.40	0.35	>.9, < 1.1	1.01	0.39	1.01	>.9, < 1.1	0.35	Remove Semitropic Shoefly and close Semitropic D to Semitropic E section
FAMOSO 115 kV	MIDWAY 115kV - Section 2D & 2E	P2	Bus-tie Breaker	0.47	0.40	0.35	0.98	1.01	0.39	1.01	1.04	0.35	Remove Semitropic Shoefly and close Semitropic D to Semitropic E section
FAMOSO 70 kV	MIDWAY 115kV - Section 2D & 2E	P2	Bus-tie Breaker	0.63	0.61	0.59	0.93	0.95	0.61	0.94	1.00	0.59	Remove Semitropic Shoefly and close Semitropic D to Semitropic E section
GANSO 115 kV	MIDWAY 115kV - Section 2D & 2E	P2	Bus-tie Breaker	0.47	0.41	0.36	0.99	1.01	0.40	1.01	1.04	0.36	Remove Semitropic Shoefly and close Semitropic D to Semitropic E section
KERNRDGE 115 kV	MIDWAY 115kV - Section 2D & 2E	P2	Bus-tie Breaker	1.07	1.07	1.03	1.10	1.10	1.08	1.10	1.09	1.01	Load Power Factor correction and voltage support if needed; Project: Midway-Temblor 115 kV Line Reconductor and Voltage Support
MC FRLND 70 kV	MIDWAY 115kV - Section 2D & 2E	P2	Bus-tie Breaker	0.59	0.57	0.54	0.93	0.95	0.56	0.95	0.99	0.54	Utilize Summer Setup for summer and non-summer months

Study Area: **PG&E Kern**

High/Low Voltages



Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)					Voltage PU (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations	
MCKIBBEN 115 kV	MIDWAY 115kV - Section 2D & 2E	P2	Bus-tie Breaker	0.47	0.41	0.36	0.99	1.01	0.40	1.01	1.04	0.36	Remove Semitropic Shoefly and close Semitropic D to Semitropic E section
PONDROAD 115 kV	MIDWAY 115kV - Section 2D & 2E	P2	Bus-tie Breaker	0.46	0.40	0.35	1.00	1.02	0.39	1.02	1.04	0.35	Remove Semitropic Shoefly and close Semitropic D to Semitropic E section
Q482 115 kV	MIDWAY 115kV - Section 2D & 2E	P2	Bus-tie Breaker	0.46	0.40	0.34	1.02	1.03	0.39	1.03	1.05	0.34	Remove Semitropic Shoefly and close Semitropic D to Semitropic E section
Q557 115 kV	MIDWAY 115kV - Section 2D & 2E	P2	Bus-tie Breaker	0.46	0.39	0.34	1.02	1.04	0.38	1.04	1.05	0.34	Remove Semitropic Shoefly and close Semitropic D to Semitropic E section
Q972 115 kV	MIDWAY 115kV - Section 2D & 2E	P2	Bus-tie Breaker	1.07	1.07	1.03	1.10	1.10	1.08	1.10	1.09	1.02	Load Power Factor correction and voltage support if needed; Project: Midway-Temblor 115 kV Line Reconductor and Voltage Support
RIOBRAVO1 115 kV	MIDWAY 115kV - Section 2D & 2E	P2	Bus-tie Breaker	1.07	1.07	1.03	1.10	1.10	1.08	1.10	1.09	1.02	Load Power Factor correction and voltage support if needed; Project: Midway-Temblor 115 kV Line Reconductor and Voltage Support
SEMITRPC 70 kV	MIDWAY 115kV - Section 2D & 2E	P2	Bus-tie Breaker	0.46	0.41	0.37	0.98	1.00	0.40	0.99	1.03	0.37	Utilize Summer Setup for summer and non-summer months
SEMITRPJ 115 kV	MIDWAY 115kV - Section 2D & 2E	P2	Bus-tie Breaker	0.47	0.41	0.36	0.99	1.01	0.40	1.01	1.04	0.36	Remove Semitropic Shoefly and close Semitropic D to Semitropic E section
SMYRNA 115 kV	MIDWAY 115kV - Section 2D & 2E	P2	Bus-tie Breaker	0.46	0.40	0.35	1.00	1.02	0.39	1.02	1.04	0.35	Remove Semitropic Shoefly and close Semitropic D to Semitropic E section
WASCO 70 kV	MIDWAY 115kV - Section 2D & 2E	P2	Bus-tie Breaker	0.52	0.49	0.46	0.94	0.96	0.48	0.96	1.01	0.46	Utilize Summer Setup for summer and non-summer months
WSCOPRSN 115 kV	MIDWAY 115kV - Section 2D & 2E	P2	Bus-tie Breaker	0.47	0.41	0.36	0.98	1.01	0.40	1.01	1.04	0.36	Remove Semitropic Shoefly and close Semitropic D to Semitropic E section
KERNRDGE 115 kV	MIDWAY 115kV Section 2D	P2	Bus	1.08	1.08	1.03	1.10	1.11	1.08	1.10	1.09	1.02	Load Power Factor correction and voltage support if needed; Project: Midway-Temblor 115 kV Line Reconductor and Voltage Support
Q972 115 kV	MIDWAY 115kV Section 2D	P2	Bus	1.07	1.07	1.03	1.10	1.10	1.08	1.10	1.09	1.02	Load Power Factor correction and voltage support if needed; Project: Midway-Temblor 115 kV Line Reconductor and Voltage Support

Study Area: **PG&E Kern**



High/Low Voltages

Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)					Voltage PU (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations	
ATWELL_ISL 115 kV	MIDWAY 115kV Section 2E	P2	Bus	0.46	0.40	0.35	1.02	1.03	0.39	1.03	1.05	0.34	Remove Semitropic Shoefly and close Semitropic D to Semitropic E section
CHARKA 115 kV	MIDWAY 115kV Section 2E	P2	Bus	0.47	0.40	0.35	0.98	1.01	0.39	1.01	1.04	0.35	Remove Semitropic Shoefly and close Semitropic D to Semitropic E section
CHSR12SWSTA 115 kV	MIDWAY 115kV Section 2E	P2	Bus	>.9, < 1.1	0.40	0.35	>.9, < 1.1	1.01	0.39	1.01	>.9, < 1.1	0.35	Remove Semitropic Shoefly and close Semitropic D to Semitropic E section
FAMOSO 115 kV	MIDWAY 115kV Section 2E	P2	Bus	0.47	0.40	0.35	0.98	1.01	0.39	1.01	1.04	0.35	Remove Semitropic Shoefly and close Semitropic D to Semitropic E section
FAMOSO 70 kV	MIDWAY 115kV Section 2E	P2	Bus	0.63	0.62	0.59	0.93	0.95	0.61	0.94	1.00	0.59	Remove Semitropic Shoefly and close Semitropic D to Semitropic E section
GANSO 115 kV	MIDWAY 115kV Section 2E	P2	Bus	0.47	0.41	0.36	0.99	1.01	0.40	1.00	1.04	0.36	Remove Semitropic Shoefly and close Semitropic D to Semitropic E section
MC FRLND 70 kV	MIDWAY 115kV Section 2E	P2	Bus	0.59	0.57	0.54	0.93	0.95	0.56	0.94	0.99	0.54	Remove Semitropic Shoefly and close Semitropic D to Semitropic E section
MCKIBBEN 115 kV	MIDWAY 115kV Section 2E	P2	Bus	0.47	0.41	0.36	0.99	1.01	0.40	1.01	1.04	0.36	Remove Semitropic Shoefly and close Semitropic D to Semitropic E section
PONDROAD 115 kV	MIDWAY 115kV Section 2E	P2	Bus	0.46	0.40	0.35	1.00	1.02	0.39	1.02	1.04	0.35	Remove Semitropic Shoefly and close Semitropic D to Semitropic E section
Q482 115 kV	MIDWAY 115kV Section 2E	P2	Bus	0.46	0.40	0.35	1.02	1.03	0.39	1.03	1.05	0.34	Remove Semitropic Shoefly and close Semitropic D to Semitropic E section
Q557 115 kV	MIDWAY 115kV Section 2E	P2	Bus	0.46	0.39	0.34	1.02	1.04	0.38	1.03	1.05	0.34	Remove Semitropic Shoefly and close Semitropic D to Semitropic E section
SEMITR&1 115 kV	MIDWAY 115kV Section 2E	P2	Bus	0.47	0.41	0.36	0.99	1.01	0.40	1.00	1.04	0.36	Remove Semitropic Shoefly and close Semitropic D to Semitropic E section
SEMITROPIC_D 115 kV	MIDWAY 115kV Section 2E	P2	Bus	0.47	0.41	0.36	0.99	1.01	0.40	1.00	1.04	0.36	Remove Semitropic Shoefly and close Semitropic D to Semitropic E section
SEMITRPC 70 kV	MIDWAY 115kV Section 2E	P2	Bus	0.46	0.41	0.37	0.98	1.00	0.40	0.99	1.03	0.37	Remove Semitropic Shoefly and close Semitropic D to Semitropic E section
SEMITRPJ 115 kV	MIDWAY 115kV Section 2E	P2	Bus	0.47	0.41	0.36	0.99	1.01	0.40	1.00	1.04	0.36	Remove Semitropic Shoefly and close Semitropic D to Semitropic E section
SMYRNA 115 kV	MIDWAY 115kV Section 2E	P2	Bus	0.46	0.40	0.35	1.00	1.02	0.39	1.02	1.04	0.35	Remove Semitropic Shoefly and close Semitropic D to Semitropic E section
WASCO 70 kV	MIDWAY 115kV Section 2E	P2	Bus	0.52	0.49	0.46	0.94	0.96	0.48	0.96	1.01	0.45	Remove Semitropic Shoefly and close Semitropic D to Semitropic E section



Study Area: **PG&E Kern**



High/Low Voltages

Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)					Voltage PU (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations	
WSCOPRSN 115 kV	MIDWAY 115kV Section 2E	P2	Bus	0.47	0.41	0.36	0.98	1.01	0.40	1.00	1.04	0.36	Remove Semitropic Shoefly and close Semitropic D to Semitropic E section
BUENAVJ1 230 kV	MIDWAY 230kV - Section 1E & 1D	P2	Bus-tie Breaker	0.90	1.03	1.01	0.96	1.03	1.02	1.02	0.91	1.01	Project : Wheeler Ridge Voltage Support Project In Service Date: 12/2020 Short term: Action Plan
BUENAVT1 230 kV	MIDWAY 230kV - Section 1E & 1D	P2	Bus-tie Breaker	0.90	1.03	1.01	0.96	1.03	1.02	1.02	0.91	1.01	Project : Wheeler Ridge Voltage Support Project In Service Date: 12/2020 Short term: Action Plan
WHEELER 230 kV	MIDWAY 230kV - Section 1E & 1D	P2	Bus-tie Breaker	0.90	1.03	1.02	0.96	1.03	1.03	1.02	0.91	1.01	Project : Wheeler Ridge Voltage Support Project In Service Date: 12/2020 Short term: Action Plan
WHLR RJ1 230 kV	MIDWAY 230kV - Section 1E & 1D	P2	Bus-tie Breaker	0.90	1.03	1.02	0.96	1.03	1.02	1.02	0.91	1.01	Project : Wheeler Ridge Voltage Support Project In Service Date: 12/2020 Short term: Action Plan
WHLR RT1 230 kV	MIDWAY 230kV - Section 1E & 1D	P2	Bus-tie Breaker	0.90	1.03	1.01	0.96	1.03	1.02	1.02	0.91	1.01	Project : Wheeler Ridge Voltage Support Project In Service Date: 12/2020 Short term: Action Plan
WND GPJ1 230 kV	MIDWAY 230kV - Section 1E & 1D	P2	Bus-tie Breaker	0.90	1.03	1.02	0.96	1.03	1.03	1.02	0.91	1.01	Project : Wheeler Ridge Voltage Support Project In Service Date: 12/2020 Short term: Action Plan
WND GPT1 230 kV	MIDWAY 230kV - Section 1E & 1D	P2	Bus-tie Breaker	0.90	1.03	1.01	0.96	1.03	1.02	1.02	0.91	1.01	Project : Wheeler Ridge Voltage Support Project In Service Date: 12/2020 Short term: Action Plan
BITTERWATRSS 230 kV	MIDWAY 230kV - Section 2D & 2E	P2	Bus-tie Breaker	0.89	1.03	1.02	0.98	1.04	1.03	1.03	0.94	1.02	Project : Wheeler Ridge Voltage Support Project In Service Date: 12/2020 Short term: Action Plan

Study Area: **PG&E Kern**

High/Low Voltages



Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)					Voltage PU (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations	
BUENAVJ2 230 kV	MIDWAY 230kV - Section 2D & 2E	P2	Bus-tie Breaker	0.89	1.03	1.02	0.98	1.04	1.02	1.03	0.94	1.02	Project : Wheeler Ridge Voltage Support Project In Service Date: 12/2020 Short term: Action Plan
BUENAVT2 230 kV	MIDWAY 230kV - Section 2D & 2E	P2	Bus-tie Breaker	0.89	1.03	1.02	0.98	1.04	1.02	1.03	0.94	1.02	Project : Wheeler Ridge Voltage Support Project In Service Date: 12/2020 Short term: Action Plan
Q946 230 kV	MIDWAY 230kV - Section 2D & 2E	P2	Bus-tie Breaker	0.89	1.03	1.02	0.98	1.04	1.03	1.03	0.94	1.02	Project : Wheeler Ridge Voltage Support Project In Service Date: 12/2020 Short term: Action Plan
WHEELER 230 kV	MIDWAY 230kV - Section 2D & 2E	P2	Bus-tie Breaker	0.90	1.03	1.02	0.98	1.04	1.03	1.03	0.94	1.02	Project : Wheeler Ridge Voltage Support Project In Service Date: 12/2020 Short term: Action Plan
WHLR RJ2 230 kV	MIDWAY 230kV - Section 2D & 2E	P2	Bus-tie Breaker	0.89	1.03	1.02	0.98	1.04	1.03	1.03	0.94	1.02	Project : Wheeler Ridge Voltage Support Project In Service Date: 12/2020 Short term: Action Plan
WHLR RT2 230 kV	MIDWAY 230kV - Section 2D & 2E	P2	Bus-tie Breaker	0.89	1.03	1.02	0.98	1.04	1.02	1.03	0.94	1.02	Project : Wheeler Ridge Voltage Support Project In Service Date: 12/2020 Short term: Action Plan
WND GPJ2 230 kV	MIDWAY 230kV - Section 2D & 2E	P2	Bus-tie Breaker	0.89	1.03	1.02	0.98	1.04	1.03	1.03	0.94	1.02	Project : Wheeler Ridge Voltage Support Project In Service Date: 12/2020 Short term: Action Plan
WND GPT2 230 kV	MIDWAY 230kV - Section 2D & 2E	P2	Bus-tie Breaker	0.89	1.03	1.02	0.98	1.04	1.02	1.03	0.94	1.02	Project : Wheeler Ridge Voltage Support Project In Service Date: 12/2020 Short term: Action Plan

Study Area: **PG&E Kern**



High/Low Voltages

Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)					Voltage PU (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations	
BUENAVJ1 230 kV	MIDWAY 230kV Section 1D & MIDWAY-MIDWAY-R12 #1 line	P2	Non Bus-tie Breaker	0.89	1.03	1.02	0.96	1.02	1.02	1.09	0.90	1.02	Project : Wheeler Ridge Voltage Support Project In Service Date: 12/2020 Short term: Action Plan
BUENAVT1 230 kV	MIDWAY 230kV Section 1D & MIDWAY-MIDWAY-R12 #1 line	P2	Non Bus-tie Breaker	0.89	1.03	1.02	0.96	1.02	1.02	1.09	0.90	1.02	Project : Wheeler Ridge Voltage Support Project In Service Date: 12/2020 Short term: Action Plan
WHEELER 230 kV	MIDWAY 230kV Section 1D & MIDWAY-MIDWAY-R12 #1 line	P2	Non Bus-tie Breaker	0.90	1.03	1.02	0.96	1.03	1.03	1.09	0.90	1.02	Project : Wheeler Ridge Voltage Support Project In Service Date: 12/2020 Short term: Action Plan
WHLR RJ1 230 kV	MIDWAY 230kV Section 1D & MIDWAY-MIDWAY-R12 #1 line	P2	Non Bus-tie Breaker	0.90	1.03	1.02	0.96	1.02	1.03	1.09	0.90	1.02	Project : Wheeler Ridge Voltage Support Project In Service Date: 12/2020 Short term: Action Plan
WHLR RT1 230 kV	MIDWAY 230kV Section 1D & MIDWAY-MIDWAY-R12 #1 line	P2	Non Bus-tie Breaker	0.90	1.03	1.02	0.96	1.02	1.03	1.09	0.90	1.02	Project : Wheeler Ridge Voltage Support Project In Service Date: 12/2020 Short term: Action Plan
WND GPJ1 230 kV	MIDWAY 230kV Section 1D & MIDWAY-MIDWAY-R12 #1 line	P2	Non Bus-tie Breaker	0.90	1.03	1.02	0.96	1.02	1.03	1.09	0.90	1.02	Project : Wheeler Ridge Voltage Support Project In Service Date: 12/2020 Short term: Action Plan
WND GPT1 230 kV	MIDWAY 230kV Section 1D & MIDWAY-MIDWAY-R12 #1 line	P2	Non Bus-tie Breaker	0.90	1.03	1.02	0.96	1.02	1.03	1.09	0.90	1.02	Project : Wheeler Ridge Voltage Support Project In Service Date: 12/2020 Short term: Action Plan
KERNRDGE 115 kV	MIDWAY-TEMBLOR 115kV [2630] (BELRDG J-MIDWAY)	P2	Line Section w/o fault	1.08	1.08	1.03	1.10	1.11	1.08	1.10	1.09	1.02	Load Power Factor correction and voltage support if needed; Project: Midway-Temblor 115 kV Line Reconductor and Voltage Support

Study Area: **PG&E Kern**

High/Low Voltages



Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)					Voltage PU (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations	
RIOBRAVO1 115 kV	MIDWAY-TEMBLOR 115kV [2630] (BELRDG J-MIDWAY)	P2	Line Section w/o fault	1.07	1.07	1.03	1.10	1.10	1.08	1.10	1.09	1.02	Load Power Factor correction and voltage support if needed; Project: Midway-Temblor 115 kV Line Reconductor and Voltage Support
KERNRDGE 115 kV	MIDWAY-TEMBLOR 115kV [2630] (PSE MCKJ-BELRDG J)	P2	Line Section w/o fault	1.07	1.07	1.03	1.11	1.13	1.08	1.13	1.08	1.02	Load Power Factor correction and voltage support if needed; Project: Midway-Temblor 115 kV Line Reconductor and Voltage Support
TEMBLOR 115 kV	MIDWAY-TEMBLOR 115kV [2630] (PSE MCKJ-BELRDG J)	P2	Line Section w/o fault	1.07	1.07	1.03	1.11	1.12	1.08	1.12	1.07	1.02	Load Power Factor correction and voltage support if needed; Project: Midway-Temblor 115 kV Line Reconductor and Voltage Support
KERNRDGE 115 kV	MIDWAY-TEMBLOR 115kV [2630] (TEMBLOR-PSE MCKJ)	P2	Line Section w/o fault	1.05	1.05	1.03	1.10	1.11	1.06	1.12	1.06	1.03	Load Power Factor correction and voltage support if needed; Project: Midway-Temblor 115 kV Line Reconductor and Voltage Support
TEMBLOR 115 kV	MIDWAY-TEMBLOR 115kV [2630] (TEMBLOR-PSE MCKJ)	P2	Line Section w/o fault	1.05	1.05	1.03	1.09	1.10	1.06	1.11	1.06	1.04	Load Power Factor correction and voltage support if needed; Project: Midway-Temblor 115 kV Line Reconductor and Voltage Support
KERNRDGE 115 kV	PUMPJACK - 1D 115kV & line	P2	Non Bus-tie Breaker	1.05	1.05	1.03	1.10	1.11	1.06	1.12	1.06	1.03	Load Power Factor correction and voltage support if needed; Project: Midway-Temblor 115 kV Line Reconductor and Voltage Support
TEMBLOR 115 kV	PUMPJACK - 1D 115kV & line	P2	Non Bus-tie Breaker	1.05	1.05	1.03	1.09	1.10	1.06	1.11	1.06	1.04	Load Power Factor correction and voltage support if needed; Project: Midway-Temblor 115 kV Line Reconductor and Voltage Support
CHARKA 115 kV	SMYRNA - 1D 115kV & SMYRNA-SEMITROPIC-MIDWAY line	P2	Non Bus-tie Breaker	0.87	0.67	0.58	1.03	1.10	0.60	1.11	0.96	0.58	Remove Semitropic Shoefly and close Semitropic D to Semitropic E section
CHSR12SWSTA 115 kV	SMYRNA - 1D 115kV & SMYRNA-SEMITROPIC-MIDWAY line	P2	Non Bus-tie Breaker	>.9, < 1.1	0.67	0.58	>.9, < 1.1	1.10	0.60	1.11	>.9, < 1.1	0.58	Remove Semitropic Shoefly and close Semitropic D to Semitropic E section
FAMOSO 115 kV	SMYRNA - 1D 115kV & SMYRNA-SEMITROPIC-MIDWAY line	P2	Non Bus-tie Breaker	0.87	0.67	0.57	1.03	1.11	0.59	1.11	0.96	0.57	Remove Semitropic Shoefly and close Semitropic D to Semitropic E section

Study Area: **PG&E Kern**

High/Low Voltages



Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)					Voltage PU (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations	
FAMOSO 70 kV	SMYRNA - 1D 115kV & SMYRNA-SEMITROPIC-MIDWAY line	P2	Non Bus-tie Breaker	0.90	0.80	0.73	1.03	1.07	0.75	1.08	0.97	0.73	Utilize Summer Setup for summer and non-summer months
MC FRLND 70 kV	SMYRNA - 1D 115kV & SMYRNA-SEMITROPIC-MIDWAY line	P2	Non Bus-tie Breaker	0.88	0.76	0.68	1.03	1.07	0.71	1.08	0.95	0.69	Utilize Summer Setup for summer and non-summer months
SEMITROPIC_D 115 kV	SMYRNA - 1D 115kV & SMYRNA-SEMITROPIC-MIDWAY line	P2	Non Bus-tie Breaker	0.87	0.69	0.59	1.03	1.10	0.61	1.11	0.96	0.59	Remove Semitropic Shoefly and close Semitropic D to Semitropic E section
SEMITRPC 70 kV	SMYRNA - 1D 115kV & SMYRNA-SEMITROPIC-MIDWAY line	P2	Non Bus-tie Breaker	0.85	0.68	0.59	1.02	1.08	0.61	1.09	0.94	0.59	Utilize Summer Setup for summer and non-summer months
WASCO 70 kV	SMYRNA - 1D 115kV & SMYRNA-SEMITROPIC-MIDWAY line	P2	Non Bus-tie Breaker	0.87	0.72	0.64	1.03	1.08	0.66	1.08	0.95	0.64	Utilize Summer Setup for summer and non-summer months
WSCOPRSN 115 kV	SMYRNA - 1D 115kV & SMYRNA-SEMITROPIC-MIDWAY line	P2	Non Bus-tie Breaker	0.87	0.68	0.59	1.03	1.10	0.61	1.11	0.96	0.59	Remove Semitropic Shoefly and close Semitropic D to Semitropic E section
ATWELL_ISL 115 kV	SMYRNA-SEMITROPIC-MIDWAY 115kV [3710] (GANSO-MIDWAY)	P2	Line Section w/o fault	0.46	0.40	0.35	1.02	1.03	0.39	1.03	1.05	0.34	Remove Semitropic Shoefly and close Semitropic D to Semitropic E section
CAWELO B 70 kV	SMYRNA-SEMITROPIC-MIDWAY 115kV [3710] (GANSO-MIDWAY)	P2	Line Section w/o fault	0.86	0.86	0.85	0.97	0.98	0.85	0.98	1.02	0.85	Utilize Summer Setup for summer and non-summer months
CHARKA 115 kV	SMYRNA-SEMITROPIC-MIDWAY 115kV [3710] (GANSO-MIDWAY)	P2	Line Section w/o fault	0.47	0.40	0.35	0.98	1.01	0.39	1.01	1.04	0.35	Remove Semitropic Shoefly and close Semitropic D to Semitropic E section
CHSR12SWSTA 115 kV	SMYRNA-SEMITROPIC-MIDWAY 115kV [3710] (GANSO-MIDWAY)	P2	Line Section w/o fault	>.9, < 1.1	0.40	0.35	>.9, < 1.1	1.01	0.39	1.01	>.9, < 1.1	0.35	Remove Semitropic Shoefly and close Semitropic D to Semitropic E section
FAMOSO 115 kV	SMYRNA-SEMITROPIC-MIDWAY 115kV [3710] (GANSO-MIDWAY)	P2	Line Section w/o fault	0.47	0.40	0.35	0.98	1.01	0.39	1.01	1.04	0.35	Remove Semitropic Shoefly and close Semitropic D to Semitropic E section
FAMOSO 70 kV	SMYRNA-SEMITROPIC-MIDWAY 115kV [3710] (GANSO-MIDWAY)	P2	Line Section w/o fault	0.63	0.62	0.59	0.93	0.95	0.61	0.94	1.00	0.59	Utilize Summer Setup for summer and non-summer months
GANSO 115 kV	SMYRNA-SEMITROPIC-MIDWAY 115kV [3710] (GANSO-MIDWAY)	P2	Line Section w/o fault	0.47	0.41	0.36	0.99	1.01	0.40	1.00	1.04	0.36	Remove Semitropic Shoefly and close Semitropic D to Semitropic E section
MC FRLND 70 kV	SMYRNA-SEMITROPIC-MIDWAY 115kV [3710] (GANSO-MIDWAY)	P2	Line Section w/o fault	0.59	0.57	0.54	0.93	0.95	0.56	0.94	0.99	0.54	Utilize Summer Setup for summer and non-summer months
MCKIBBEN 115 kV	SMYRNA-SEMITROPIC-MIDWAY 115kV [3710] (GANSO-MIDWAY)	P2	Line Section w/o fault	0.47	0.41	0.36	0.99	1.01	0.40	1.01	1.04	0.36	Remove Semitropic Shoefly and close Semitropic D to Semitropic E section
PONDROAD 115 kV	SMYRNA-SEMITROPIC-MIDWAY 115kV [3710] (GANSO-MIDWAY)	P2	Line Section w/o fault	0.46	0.40	0.35	1.00	1.02	0.39	1.02	1.04	0.35	Remove Semitropic Shoefly and close Semitropic D to Semitropic E section
Q482 115 kV	SMYRNA-SEMITROPIC-MIDWAY 115kV [3710] (GANSO-MIDWAY)	P2	Line Section w/o fault	0.46	0.40	0.35	1.02	1.03	0.39	1.03	1.05	0.34	Remove Semitropic Shoefly and close Semitropic D to Semitropic E section



Study Area: **PG&E Kern**

High/Low Voltages



Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)					Voltage PU (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations	
Q557 115 kV	SMYRNA-SEMITROPIC-MIDWAY 115kV [3710] (GANSO-MIDWAY)	P2	Line Section w/o fault	0.46	0.39	0.34	1.02	1.04	0.38	1.03	1.05	0.34	Remove Semitropic Shoefly and close Semitropic D to Semitropic E section
SEMITROPIC_D 115 kV	SMYRNA-SEMITROPIC-MIDWAY 115kV [3710] (GANSO-MIDWAY)	P2	Line Section w/o fault	0.47	0.41	0.36	0.99	1.01	0.40	1.00	1.04	0.36	Remove Semitropic Shoefly and close Semitropic D to Semitropic E section
SEMITRPC 70 kV	SMYRNA-SEMITROPIC-MIDWAY 115kV [3710] (GANSO-MIDWAY)	P2	Line Section w/o fault	0.46	0.41	0.37	0.98	1.00	0.40	0.99	1.03	0.37	Utilize Summer Setup for summer and non-summer months
SEMITRPJ 115 kV	SMYRNA-SEMITROPIC-MIDWAY 115kV [3710] (GANSO-MIDWAY)	P2	Line Section w/o fault	0.47	0.41	0.36	0.99	1.01	0.40	1.00	1.04	0.36	Remove Semitropic Shoefly and close Semitropic D to Semitropic E section
SMYRNA 115 kV	SMYRNA-SEMITROPIC-MIDWAY 115kV [3710] (GANSO-MIDWAY)	P2	Line Section w/o fault	0.46	0.40	0.35	1.00	1.02	0.39	1.02	1.04	0.35	Remove Semitropic Shoefly and close Semitropic D to Semitropic E section
WASCO 70 kV	SMYRNA-SEMITROPIC-MIDWAY 115kV [3710] (GANSO-MIDWAY)	P2	Line Section w/o fault	0.52	0.49	0.46	0.94	0.96	0.48	0.96	1.01	0.46	Utilize Summer Setup for summer and non-summer months
WSCOPRSN 115 kV	SMYRNA-SEMITROPIC-MIDWAY 115kV [3710] (GANSO-MIDWAY)	P2	Line Section w/o fault	0.47	0.41	0.36	0.98	1.01	0.40	1.00	1.04	0.36	Remove Semitropic Shoefly and close Semitropic D to Semitropic E section
CAWELO B 70 kV	SMYRNA-SEMITROPIC-MIDWAY 115kV [3710] (SEMITRPJ-GANSO)	P2	Line Section w/o fault	0.87	0.86	0.86	0.97	0.98	0.86	0.98	1.01	0.86	Utilize Summer Setup for summer and non-summer months
CHARKA 115 kV	SMYRNA-SEMITROPIC-MIDWAY 115kV [3710] (SEMITRPJ-GANSO)	P2	Line Section w/o fault	0.50	0.42	0.39	0.98	1.01	0.41	1.01	1.02	0.39	Remove Semitropic Shoefly and close Semitropic D to Semitropic E section
CHSR12SWSTA 115 kV	SMYRNA-SEMITROPIC-MIDWAY 115kV [3710] (SEMITRPJ-GANSO)	P2	Line Section w/o fault	>.9, < 1.1	0.42	0.39	>.9, < 1.1	1.01	0.41	1.01	>.9, < 1.1	0.39	Remove Semitropic Shoefly and close Semitropic D to Semitropic E section
FAMOSO 115 kV	SMYRNA-SEMITROPIC-MIDWAY 115kV [3710] (SEMITRPJ-GANSO)	P2	Line Section w/o fault	0.50	0.42	0.38	0.98	1.01	0.41	1.01	1.03	0.38	Remove Semitropic Shoefly and close Semitropic D to Semitropic E section
FAMOSO 70 kV	SMYRNA-SEMITROPIC-MIDWAY 115kV [3710] (SEMITRPJ-GANSO)	P2	Line Section w/o fault	0.66	0.63	0.61	0.93	0.95	0.63	0.95	0.99	0.61	Utilize Summer Setup for summer and non-summer months
MC FRLND 70 kV	SMYRNA-SEMITROPIC-MIDWAY 115kV [3710] (SEMITRPJ-GANSO)	P2	Line Section w/o fault	0.62	0.59	0.56	0.93	0.95	0.58	0.95	0.98	0.56	Utilize Summer Setup for summer and non-summer months
MCKIBBEN 115 kV	SMYRNA-SEMITROPIC-MIDWAY 115kV [3710] (SEMITRPJ-GANSO)	P2	Line Section w/o fault	0.50	0.43	0.39	0.99	1.01	0.42	1.01	1.03	0.39	Remove Semitropic Shoefly and close Semitropic D to Semitropic E section
PONDROAD 115 kV	SMYRNA-SEMITROPIC-MIDWAY 115kV [3710] (SEMITRPJ-GANSO)	P2	Line Section w/o fault	0.49	0.42	0.38	1.00	1.02	0.41	1.02	1.03	0.38	Remove Semitropic Shoefly and close Semitropic D to Semitropic E section
Q482 115 kV	SMYRNA-SEMITROPIC-MIDWAY 115kV [3710] (SEMITRPJ-GANSO)	P2	Line Section w/o fault	0.49	0.41	0.38	1.02	1.03	0.40	1.03	1.04	0.38	Remove Semitropic Shoefly and close Semitropic D to Semitropic E section
Q557 115 kV	SMYRNA-SEMITROPIC-MIDWAY 115kV [3710] (SEMITRPJ-GANSO)	P2	Line Section w/o fault	0.49	0.41	0.37	1.02	1.04	0.40	1.04	1.05	0.38	Remove Semitropic Shoefly and close Semitropic D to Semitropic E section

Study Area: **PG&E Kern**

High/Low Voltages



Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)					Voltage PU (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations	
SEMITR&1 115 kV	SMYRNA-SEMITROPIC-MIDWAY 115kV [3710] (SEMITRPJ-GANSO)	P2	Line Section w/o fault	0.50	0.43	0.39	0.99	1.01	0.42	1.01	1.02	0.40	Remove Semitropic Shoefly and close Semitropic D to Semitropic E section
SEMITROPIC_D 115 kV	SMYRNA-SEMITROPIC-MIDWAY 115kV [3710] (SEMITRPJ-GANSO)	P2	Line Section w/o fault	0.50	0.43	0.39	0.99	1.01	0.42	1.01	1.02	0.40	Remove Semitropic Shoefly and close Semitropic D to Semitropic E section
SEMITRPJ 115 kV	SMYRNA-SEMITROPIC-MIDWAY 115kV [3710] (SEMITRPJ-GANSO)	P2	Line Section w/o fault	0.50	0.43	0.39	0.99	1.01	0.42	1.01	1.02	0.40	Remove Semitropic Shoefly and close Semitropic D to Semitropic E section
SMYRNA 115 kV	SMYRNA-SEMITROPIC-MIDWAY 115kV [3710] (SEMITRPJ-GANSO)	P2	Line Section w/o fault	0.49	0.42	0.38	1.00	1.02	0.41	1.02	1.03	0.38	Remove Semitropic Shoefly and close Semitropic D to Semitropic E section
WSCOPRSN 115 kV	SMYRNA-SEMITROPIC-MIDWAY 115kV [3710] (SEMITRPJ-GANSO)	P2	Line Section w/o fault	0.50	0.43	0.39	0.98	1.01	0.42	1.01	1.02	0.39	Remove Semitropic Shoefly and close Semitropic D to Semitropic E section
CAWELO B 70 kV	SMYRNA-SEMITROPIC-MIDWAY 115kV [3710] (SEMITRPJ-SEMITROPIC_D)	P2	Line Section w/o fault	0.97	0.94	0.90	1.04	1.06	0.91	1.05	1.00	0.90	Utilize Summer Setup for summer and non-summer months
CHARKA 115 kV	SMYRNA-SEMITROPIC-MIDWAY 115kV [3710] (SEMITRPJ-SEMITROPIC_D)	P2	Line Section w/o fault	0.87	0.70	0.58	1.03	1.11	0.60	1.11	0.96	0.58	Remove Semitropic Shoefly and close Semitropic D to Semitropic E section
CHSR12SWSTA 115 kV	SMYRNA-SEMITROPIC-MIDWAY 115kV [3710] (SEMITRPJ-SEMITROPIC_D)	P2	Line Section w/o fault	>.9, < 1.1	0.70	0.58	>.9, < 1.1	1.11	0.60	1.11	>.9, < 1.1	0.58	Remove Semitropic Shoefly and close Semitropic D to Semitropic E section
FAMOSO 115 kV	SMYRNA-SEMITROPIC-MIDWAY 115kV [3710] (SEMITRPJ-SEMITROPIC_D)	P2	Line Section w/o fault	0.87	0.69	0.57	1.03	1.11	0.59	1.11	0.96	0.57	Remove Semitropic Shoefly and close Semitropic D to Semitropic E section
FAMOSO 70 kV	SMYRNA-SEMITROPIC-MIDWAY 115kV [3710] (SEMITRPJ-SEMITROPIC_D)	P2	Line Section w/o fault	0.90	0.81	0.73	1.03	1.07	0.75	1.07	0.96	0.73	Utilize Summer Setup for summer and non-summer months
MC FRLND 70 kV	SMYRNA-SEMITROPIC-MIDWAY 115kV [3710] (SEMITRPJ-SEMITROPIC_D)	P2	Line Section w/o fault	0.88	0.78	0.68	1.03	1.08	0.71	1.08	0.95	0.68	Utilize Summer Setup for summer and non-summer months
SEMITR&1 115 kV	SMYRNA-SEMITROPIC-MIDWAY 115kV [3710] (SEMITRPJ-SEMITROPIC_D)	P2	Line Section w/o fault	0.87	0.71	0.59	1.03	1.10	0.61	1.11	0.96	0.59	Remove Semitropic Shoefly and close Semitropic D to Semitropic E section
SEMITROPIC_D 115 kV	SMYRNA-SEMITROPIC-MIDWAY 115kV [3710] (SEMITRPJ-SEMITROPIC_D)	P2	Line Section w/o fault	0.87	0.71	0.59	1.03	1.10	0.61	1.11	0.96	0.59	Remove Semitropic Shoefly and close Semitropic D to Semitropic E section

Study Area: **PG&E Kern**

High/Low Voltages



Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)					Voltage PU (Sensitivity Scenarios)				Project & Potential Mitigation Solutions	
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations		
SEMITRPC 70 kV	SMYRNA-SEMITROPIC-MIDWAY 115kV [3710] (SEMITRPJ-SEMITROPIC_D)	P2	Line Section w/o fault	0.85	0.70	0.59	1.02	1.09	0.61	1.09	0.94	0.59	Utilize Summer Setup for summer and non-summer months	
WASCO 70 kV	SMYRNA-SEMITROPIC-MIDWAY 115kV [3710] (SEMITRPJ-SEMITROPIC_D)	P2	Line Section w/o fault	0.87	0.74	0.64	1.02	1.08	0.66	1.08	0.95	0.64	Utilize Summer Setup for summer and non-summer months	
WSCOPRSN 115 kV	SMYRNA-SEMITROPIC-MIDWAY 115kV [3710] (SEMITRPJ-SEMITROPIC_D)	P2	Line Section w/o fault	0.87	0.71	0.59	1.03	1.11	0.61	1.11	0.96	0.59	Remove Semitropic Shoefly and close Semitropic D to Semitropic E section	
CHARKA 115 kV	DEXEL + 13.80kV Gen Unit 1 AND SMYRNA-SEMITROPIC-MIDWAY 115kV [3710] MOAS OPENED on GANSO_MIDWAY	P3	G1/N1	0.86	>.9	>.9	>.9	>.9	>.9	>.9	>.9	0.95	0.58	Remove Semitropic Shoefly and close Semitropic D to Semitropic E section
CHARKA 115 kV	DISCOVERY 13.80kV Gen Unit 1 AND SMYRNA-SEMITROPIC-MIDWAY 115kV [3710] MOAS OPENED on GANSO_MIDWAY	P3	G1/N1	>.9	0.67	>.9	>.9	>.9	>.9	>.9	>.9	0.95	>.9	Remove Semitropic Shoefly and close Semitropic D to Semitropic E section
CHSR12SWSTA 115 kV	DOUBLE C 13.80kV Gen Unit 1 AND SMYRNA-SEMITROPIC-MIDWAY 115kV [3710] MOAS OPENED on GANSO_MIDWAY	P3	G1/N1	>.9	>.9	>.9	>.9	>.9	>.9	>.9	>.9	>.9	0.58	Sensitivity Only
FAMOSO 115 kV	DOUBLE C 13.80kV Gen Unit 1 AND SMYRNA-SEMITROPIC-MIDWAY 115kV [3710] MOAS OPENED on GANSO_MIDWAY	P3	G1/N1	0.86	>.9	>.9	>.9	>.9	>.9	>.9	>.9	>.9	0.57	Remove Semitropic Shoefly and close Semitropic D to Semitropic E section
FAMOSO 70 kV	DOUBLE C 13.80kV Gen Unit 1 AND SMYRNA-SEMITROPIC-MIDWAY 115kV [3710] MOAS OPENED on GANSO_MIDWAY	P3	G1/N1	0.90	>.9	>.9	>.9	>.9	>.9	>.9	>.9	>.9	0.73	Utilize Summer Setup for summer and non-summer months
MC FRLND 70 kV	DOUBLE C 13.80kV Gen Unit 1 AND SMYRNA-SEMITROPIC-MIDWAY 115kV [3710] MOAS OPENED on GANSO_MIDWAY	P3	G1/N1	0.88	>.9	>.9	>.9	>.9	>.9	>.9	>.9	>.9	0.68	Utilize Summer Setup for summer and non-summer months

Study Area: **PG&E Kern**

High/Low Voltages



Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)					Voltage PU (Sensitivity Scenarios)				Project & Potential Mitigation Solutions	
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations		
SEMITROPIC_D 115 kV	DOUBLE C 13.80kV Gen Unit 1 AND SMYRNA-SEMITROPIC-MIDWAY 115kV [3710] MOAS OPENED on GANSO_MIDWAY	P3	G1/N1	0.86	>.9	>.9	>.9	>.9	>.9	>.9	>.9	>.9	0.59	Remove Semitropic Shoefly and close Semitropic D to Semitropic E section
SEMITRPC 70 kV	DOUBLE C 13.80kV Gen Unit 1 AND SMYRNA-SEMITROPIC-MIDWAY 115kV [3710] MOAS OPENED on GANSO_MIDWAY	P3	G1/N1	0.85	>.9	>.9	>.9	>.9	>.9	>.9	>.9	>.9	0.59	Utilize Summer Setup for summer and non-summer months
WASCO 70 kV	DOUBLE C 13.80kV Gen Unit 1 AND SMYRNA-SEMITROPIC-MIDWAY 115kV [3710] MOAS OPENED on GANSO_MIDWAY	P3	G1/N1	0.86	>.9	>.9	>.9	>.9	>.9	>.9	>.9	>.9	0.64	Utilize Summer Setup for summer and non-summer months
WSCOPRSN 115 kV	DOUBLE C 13.80kV Gen Unit 1 AND SMYRNA-SEMITROPIC-MIDWAY 115kV [3710] MOAS OPENED on GANSO_MIDWAY	P3	G1/N1	0.86	>.9	>.9	>.9	>.9	>.9	>.9	>.9	>.9	0.59	Remove Semitropic Shoefly and close Semitropic D to Semitropic E section
CAWELO B 70 kV	ELKHIL1G 18.00kV & ELKHIL2G 18.00kV & ELKHIL3G 18.00kV Gen Units AND SMYRNA-SEMITROPIC-MIDWAY 115kV [3710] MOAS OPENED on GANSO_MIDWAY	P3	G1/N1	>.9	0.93	>.9	>.9	>.9	0.91	>.9	>.9	>.9	0.90	Utilize Summer Setup for summer and non-summer months
CHSR12SWSTA 115 kV	ELKHIL1G 18.00kV & ELKHIL2G 18.00kV & ELKHIL3G 18.00kV Gen Units AND SMYRNA-SEMITROPIC-MIDWAY 115kV [3710] MOAS OPENED on GANSO_MIDWAY	P3	G1/N1	>.9	0.67	>.9	>.9	>.9	0.60	>.9	>.9	>.9	0.58	Remove Semitropic Shoefly and close Semitropic D to Semitropic E section
FAMOSO 115 kV	ELKHIL1G 18.00kV & ELKHIL2G 18.00kV & ELKHIL3G 18.00kV Gen Units AND SMYRNA-SEMITROPIC-MIDWAY 115kV [3710] MOAS OPENED on GANSO_MIDWAY	P3	G1/N1	>.9	0.66	>.9	>.9	>.9	>.9	>.9	>.9	>.9	0.57	Remove Semitropic Shoefly and close Semitropic D to Semitropic E section

Study Area: **PG&E Kern**

High/Low Voltages



Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)					Voltage PU (Sensitivity Scenarios)				Project & Potential Mitigation Solutions	
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations		
FAMOSO 70 kV	ELKHIL1G 18.00kV & ELKHIL2G 18.00kV & ELKHIL3G 18.00kV Gen Units AND SMYRNA-SEMITROPIC-MIDWAY 115kV [3710] MOAS OPENED on GANSO_MIDWAY	P3	G1/N1	>.9	0.79	>.9	>.9	>.9	>.9	0.75	>.9	>.9	0.73	Utilize Summer Setup for summer and non-summer months
MC FRLND 70 kV	ELKHIL1G 18.00kV & ELKHIL2G 18.00kV & ELKHIL3G 18.00kV Gen Units AND SMYRNA-SEMITROPIC-MIDWAY 115kV [3710] MOAS OPENED on GANSO_MIDWAY	P3	G1/N1	>.9	0.76	>.9	>.9	>.9	>.9	0.71	>.9	>.9	0.68	Utilize Summer Setup for summer and non-summer months
SEMITROPIC_D 115 kV	ELKHIL1G 18.00kV & ELKHIL2G 18.00kV & ELKHIL3G 18.00kV Gen Units AND SMYRNA-SEMITROPIC-MIDWAY 115kV [3710] MOAS OPENED on GANSO_MIDWAY	P3	G1/N1	>.9	0.68	>.9	>.9	>.9	>.9	0.61	>.9	>.9	0.59	Remove Semitropic Shoefly and close Semitropic D to Semitropic E section
SEMITRPC 70 kV	ELKHIL1G 18.00kV & ELKHIL2G 18.00kV & ELKHIL3G 18.00kV Gen Units AND SMYRNA-SEMITROPIC-MIDWAY 115kV [3710] MOAS OPENED on GANSO_MIDWAY	P3	G1/N1	>.9	0.67	>.9	>.9	>.9	>.9	0.61	>.9	>.9	0.59	Utilize Summer Setup for summer and non-summer months
WASCO 70 kV	ELKHIL1G 18.00kV & ELKHIL2G 18.00kV & ELKHIL3G 18.00kV Gen Units AND SMYRNA-SEMITROPIC-MIDWAY 115kV [3710] MOAS OPENED on GANSO_MIDWAY	P3	G1/N1	>.9	0.72	>.9	>.9	>.9	>.9	0.66	>.9	>.9	0.64	Utilize Summer Setup for summer and non-summer months
WSCOPRSN 115 kV	ELKHIL1G 18.00kV & ELKHIL2G 18.00kV & ELKHIL3G 18.00kV Gen Units AND SMYRNA-SEMITROPIC-MIDWAY 115kV [3710] MOAS OPENED on GANSO_MIDWAY	P3	G1/N1	>.9	0.67	>.9	>.9	>.9	>.9	0.61	>.9	>.9	0.58	Remove Semitropic Shoefly and close Semitropic D to Semitropic E section
CHSR12SWSTA 115 kV	FELLOWS 21.00kV Gen Unit QF AND SMYRNA-SEMITROPIC-MIDWAY 115kV [3710] MOAS OPENED on GANSO_MIDWAY	P3	G1/N1	>.9	0.68	>.9	>.9	>.9	>.9	0.60	>.9	>.9	>.9	Remove Semitropic Shoefly and close Semitropic D to Semitropic E section



Study Area: **PG&E Kern**

High/Low Voltages



Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)					Voltage PU (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations	
FAMOSO 115 kV	FELLOWS 21.00kV Gen Unit QF AND SMYRNA-SEMITROPIC-MIDWAY 115kV [3710] MOAS OPENED on GANSO_MIDWAY	P3	G1/N1	>.9	0.67	>.9	>.9	>.9	0.59	>.9	>.9	>.9	Remove Semitropic Shoefly and close Semitropic D to Semitropic E section
FAMOSO 70 kV	FELLOWS 21.00kV Gen Unit QF AND SMYRNA-SEMITROPIC-MIDWAY 115kV [3710] MOAS OPENED on GANSO_MIDWAY	P3	G1/N1	>.9	>.9	>.9	>.9	>.9	0.74	>.9	>.9	>.9	Utilize Summer Setup for summer and non-summer months
MC FRLND 70 kV	FELLOWS 21.00kV Gen Unit QF AND SMYRNA-SEMITROPIC-MIDWAY 115kV [3710] MOAS OPENED on GANSO_MIDWAY	P3	G1/N1	>.9	>.9	>.9	>.9	>.9	0.71	>.9	>.9	>.9	Utilize Summer Setup for summer and non-summer months
SEMITROPIC_D 115 kV	FELLOWS 21.00kV Gen Unit QF AND SMYRNA-SEMITROPIC-MIDWAY 115kV [3710] MOAS OPENED on GANSO_MIDWAY	P3	G1/N1	>.9	0.69	>.9	>.9	>.9	0.61	>.9	>.9	>.9	Remove Semitropic Shoefly and close Semitropic D to Semitropic E section
SEMITRPC 70 kV	FELLOWS 21.00kV Gen Unit QF AND SMYRNA-SEMITROPIC-MIDWAY 115kV [3710] MOAS OPENED on GANSO_MIDWAY	P3	G1/N1	>.9	0.68	>.9	>.9	>.9	0.61	>.9	>.9	>.9	Utilize Summer Setup for summer and non-summer months
WASCO 70 kV	FELLOWS 21.00kV Gen Unit QF AND SMYRNA-SEMITROPIC-MIDWAY 115kV [3710] MOAS OPENED on GANSO_MIDWAY	P3	G1/N1	>.9	>.9	>.9	>.9	>.9	0.66	>.9	>.9	>.9	Utilize Summer Setup for summer and non-summer months
WSCOPRSN 115 kV	FELLOWS 21.00kV Gen Unit QF AND SMYRNA-SEMITROPIC-MIDWAY 115kV [3710] MOAS OPENED on GANSO_MIDWAY	P3	G1/N1	>.9	0.68	>.9	>.9	>.9	0.61	>.9	>.9	>.9	Remove Semitropic Shoefly and close Semitropic D to Semitropic E section
CHSR12SWSTA 115 kV	FRITOLAY 9.11kV Gen Unit 1 AND SMYRNA-SEMITROPIC-MIDWAY 115kV [3710] MOAS OPENED on GANSO_MIDWAY	P3	G1/N1	>.9	>.9	>.9	>.9	>.9	0.60	>.9	>.9	>.9	Remove Semitropic Shoefly and close Semitropic D to Semitropic E section

Study Area: **PG&E Kern**



High/Low Voltages

Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)					Voltage PU (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations	
FAMOSO 115 kV	FRITOLAY 9.11kV Gen Unit 1 AND SMYRNA-SEMITROPIC-MIDWAY 115kV [3710] MOAS OPENED on GANSO_MIDWAY	P3	G1/N1	>.9	>.9	>.9	>.9	>.9	<b>0.59</b>	>.9	>.9	>.9	Remove Semitropic Shoefly and close Semitropic D to Semitropic E section
FAMOSO 70 kV	FRITOLAY 9.11kV Gen Unit 1 AND SMYRNA-SEMITROPIC-MIDWAY 115kV [3710] MOAS OPENED on GANSO_MIDWAY	P3	G1/N1	>.9	>.9	>.9	>.9	>.9	<b>0.75</b>	>.9	>.9	>.9	Utilize Summer Setup for summer and non-summer months
SEMITROPIC_D 115 kV	FRITOLAY 9.11kV Gen Unit 1 AND SMYRNA-SEMITROPIC-MIDWAY 115kV [3710] MOAS OPENED on GANSO_MIDWAY	P3	G1/N1	>.9	>.9	>.9	>.9	>.9	<b>0.61</b>	>.9	>.9	>.9	Remove Semitropic Shoefly and close Semitropic D to Semitropic E section
SEMITRPC 70 kV	FRITOLAY 9.11kV Gen Unit 1 AND SMYRNA-SEMITROPIC-MIDWAY 115kV [3710] MOAS OPENED on GANSO_MIDWAY	P3	G1/N1	>.9	>.9	>.9	>.9	>.9	<b>0.61</b>	>.9	>.9	>.9	Utilize Summer Setup for summer and non-summer months
WSCOPRSN 115 kV	FRITOLAY 9.11kV Gen Unit 1 AND SMYRNA-SEMITROPIC-MIDWAY 115kV [3710] MOAS OPENED on GANSO_MIDWAY	P3	G1/N1	>.9	>.9	>.9	>.9	>.9	<b>0.61</b>	>.9	>.9	>.9	Remove Semitropic Shoefly and close Semitropic D to Semitropic E section
CHSR12SWSTA 115 kV	HISIERRA 13.80kV Gen Unit 1 AND SMYRNA-SEMITROPIC-MIDWAY 115kV [3710] MOAS OPENED on GANSO_MIDWAY	P3	G1/N1	>.9	<b>0.67</b>	>.9	>.9	>.9	>.9	>.9	>.9	<b>0.58</b>	Remove Semitropic Shoefly and close Semitropic D to Semitropic E section
FAMOSO 70 kV	HISIERRA 13.80kV Gen Unit 1 AND SMYRNA-SEMITROPIC-MIDWAY 115kV [3710] MOAS OPENED on GANSO_MIDWAY	P3	G1/N1	>.9	<b>0.79</b>	>.9	>.9	>.9	>.9	>.9	>.9	<b>0.73</b>	Utilize Summer Setup for summer and non-summer months
MC FRLND 70 kV	HISIERRA 13.80kV Gen Unit 1 AND SMYRNA-SEMITROPIC-MIDWAY 115kV [3710] MOAS OPENED on GANSO_MIDWAY	P3	G1/N1	>.9	<b>0.76</b>	>.9	>.9	>.9	>.9	>.9	>.9	<b>0.68</b>	Utilize Summer Setup for summer and non-summer months

Study Area: **PG&E Kern**

High/Low Voltages



Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)					Voltage PU (Sensitivity Scenarios)				Project & Potential Mitigation Solutions	
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations		
SEMITROPIC_D 115 kV	HISIERRA 13.80kV Gen Unit 1 AND SMYRNA-SEMITROPIC-MIDWAY 115kV [3710] MOAS OPENED on GANSO_MIDWAY	P3	G1/N1	>.9	0.68	>.9	>.9	>.9	>.9	>.9	>.9	>.9	0.59	Remove Semitropic Shoefly and close Semitropic D to Semitropic E section
SEMITRPC 70 kV	HISIERRA 13.80kV Gen Unit 1 AND SMYRNA-SEMITROPIC-MIDWAY 115kV [3710] MOAS OPENED on GANSO_MIDWAY	P3	G1/N1	>.9	0.67	>.9	>.9	>.9	>.9	>.9	>.9	>.9	0.59	Utilize Summer Setup for summer and non-summer months
WASCO 70 kV	HISIERRA 13.80kV Gen Unit 1 AND SMYRNA-SEMITROPIC-MIDWAY 115kV [3710] MOAS OPENED on GANSO_MIDWAY	P3	G1/N1	>.9	0.72	>.9	>.9	>.9	>.9	>.9	>.9	>.9	0.64	Utilize Summer Setup for summer and non-summer months
WSCOPRSN 115 kV	HISIERRA 13.80kV Gen Unit 1 AND SMYRNA-SEMITROPIC-MIDWAY 115kV [3710] MOAS OPENED on GANSO_MIDWAY	P3	G1/N1	>.9	0.67	>.9	>.9	>.9	>.9	>.9	>.9	>.9	0.59	Remove Semitropic Shoefly and close Semitropic D to Semitropic E section
CAWELO B 70 kV	KERNFRNT 9.11kV Gen Unit 1 AND SMYRNA-SEMITROPIC-MIDWAY 115kV [3710] MOAS OPENED on GANSO_MIDWAY	P3	G1/N1	>.9	>.9	>.9	>.9	>.9	>.9	>.9	>.9	>.9	0.90	Utilize Summer Setup for summer and non-summer months
CHARKA 115 kV	SEKR 9.11kV Gen Unit 1 AND SMYRNA-SEMITROPIC-MIDWAY 115kV [3710] MOAS OPENED on GANSO_MIDWAY	P3	G1/N1	>.9	0.68	>.9	>.9	>.9	>.9	>.9	>.9	>.9	>.9	Remove Semitropic Shoefly and close Semitropic D to Semitropic E section
CHARKA 115 kV	TEXSUN1G 18.00kV & TEXSUN2G 18.00kV & TEXSUNST 18.00kV Gen Units AND SMYRNA-SEMITROPIC-MIDWAY 115kV [3710] MOAS OPENED on GANSO_MIDWAY	P3	G1/N1	0.86	0.67	>.9	>.9	>.9	0.60	>.9	>.9	>.9	>.9	Remove Semitropic Shoefly and close Semitropic D to Semitropic E section
CHARKA 115 kV	TX MIDST 9.11kV Gen Unit 1 AND SMYRNA-SEMITROPIC-MIDWAY 115kV [3710] MOAS OPENED on GANSO_MIDWAY	P3	G1/N1	>.9	>.9	>.9	>.9	>.9	0.60	>.9	>.9	>.9	>.9	Remove Semitropic Shoefly and close Semitropic D to Semitropic E section

Study Area: **PG&E Kern**

High/Low Voltages



Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)					Voltage PU (Sensitivity Scenarios)				Project & Potential Mitigation Solutions	
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations		
CHARKA 115 kV	WASCO-LV 12.47kV Gen Unit RN AND SMYRNA-SEMITROPIC-MIDWAY 115kV [3710] MOAS OPENED on GANSO_MIDWAY	P3	G1/N1	>.9	>.9	>.9	>.9	>.9	>.9	>.9	>.9	0.95	>.9	Remove Semitropic Shoefly and close Semitropic D to Semitropic E section
WHLR RJ2 230 kV	BITTERWATRSS-MIDWAY 230kV [0] AND KERN-TEVIS-STOCKDALE-LAMONT 115kV [1940]	P6	N-1-1	0.89	>.9	>.9	>.9	>.9	>.9	>.9	>.9	>.9	>.9	Project : Wheeler Ridge Voltage Support Project In Service Date: 12/2020 Short term: Action Plan
WHLR RT1 230 kV	BITTERWATRSS-MIDWAY 230kV [0] AND KERN-TEVIS-STOCKDALE-LAMONT 115kV [1940]	P6	N-1-1	0.90	>.9	>.9	>.9	>.9	>.9	>.9	>.9	>.9	>.9	Project : Wheeler Ridge Voltage Support Project In Service Date: 12/2020 Short term: Action Plan
WND GPJ1 230 kV	BITTERWATRSS-MIDWAY 230kV [0] AND KERN-TEVIS-STOCKDALE-LAMONT 115kV [1940]	P6	N-1-1	0.90	>.9	>.9	>.9	>.9	>.9	>.9	>.9	>.9	>.9	Project : Wheeler Ridge Voltage Support Project In Service Date: 12/2020 Short term: Action Plan
WND GPT1 230 kV	BITTERWATRSS-MIDWAY 230kV [0] AND KERN-TEVIS-STOCKDALE-LAMONT 115kV [1940]	P6	N-1-1	0.90	>.9	>.9	>.9	>.9	>.9	>.9	>.9	>.9	>.9	Project : Wheeler Ridge Voltage Support Project In Service Date: 12/2020 Short term: Action Plan
WHEELER 230 kV	BITTERWATRSS-WHEELER 230kV [0] AND MIDWAY-WHEELER RIDGE #1 230kV [5190]	P6	N-1-1	0.46	>.9	>.9	>.9	>.9	>.9	>.9	>.9	>.9	>.9	Project : Wheeler Ridge Voltage Support Project In Service Date: 12/2020 Short term: Action Plan
FAMOSO 115 kV	DISCOVER 115/13.8kV TB 1 AND SMYRNA-SEMITROPIC-MIDWAY 115kV [3710] MOAS OPENED on GANSO_MIDWAY	P6	N-1-1	>.9	0.67	>.9	>.9	>.9	>.9	>.9	>.9	>.9	>.9	Remove Semitropic Shoefly and close Semitropic D to Semitropic E section
SEMITROPIC_D 115 kV	DISCOVER 115/13.8kV TB 1 AND SMYRNA-SEMITROPIC-MIDWAY 115kV [3710] MOAS OPENED on GANSO_MIDWAY	P6	N-1-1	>.9	0.69	>.9	>.9	>.9	>.9	>.9	>.9	>.9	>.9	Remove Semitropic Shoefly and close Semitropic D to Semitropic E section

Study Area: **PG&E Kern**



High/Low Voltages

Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)					Voltage PU (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations	
SEMITRPC 70 kV	DISCOVER 115/13.8kV TB 1 AND SMYRNA-SEMITROPIC-MIDWAY 115kV [3710] MOAS OPENED on GANSO_MIDWAY	P6	N-1-1	>.9	0.68	>.9	>.9	>.9	>.9	>.9	>.9	>.9	Utilize Summer Setup for summer and non-summer months
WASCO 70 kV	DISCOVER 115/13.8kV TB 1 AND SMYRNA-SEMITROPIC-MIDWAY 115kV [3710] MOAS OPENED on GANSO_MIDWAY	P6	N-1-1	>.9	0.72	>.9	>.9	>.9	>.9	>.9	>.9	>.9	Utilize Summer Setup for summer and non-summer months
WSCOPRSN 115 kV	DISCOVER 115/13.8kV TB 1 AND SMYRNA-SEMITROPIC-MIDWAY 115kV [3710] MOAS OPENED on GANSO_MIDWAY	P6	N-1-1	>.9	0.68	>.9	>.9	>.9	>.9	>.9	>.9	>.9	Remove Semitropic Shoefly and close Semitropic D to Semitropic E section
CHARKA 115 kV	DOUBLE C 13.80kV Gen Unit 1 AND SMYRNA-SEMITROPIC-MIDWAY 115kV [3710] MOAS OPENED on GANSO_MIDWAY	P6	N-1-1	0.86	>.9	>.9	>.9	>.9	>.9	>.9	>.9	0.58	Remove Semitropic Shoefly and close Semitropic D to Semitropic E section
CHSR12SWSTA 115 kV	DOUBLE C 13.80kV Gen Unit 1 AND SMYRNA-SEMITROPIC-MIDWAY 115kV [3710] MOAS OPENED on GANSO_MIDWAY	P6	N-1-1	>.9	>.9	>.9	>.9	>.9	>.9	>.9	>.9	0.58	Remove Semitropic Shoefly and close Semitropic D to Semitropic E section
FAMOSO 115 kV	DOUBLECJ 115/13.8kV TB 1 AND SMYRNA-SEMITROPIC-MIDWAY 115kV [3710] MOAS OPENED on GANSO_MIDWAY	P6	N-1-1	0.86	>.9	>.9	>.9	>.9	>.9	>.9	>.9	0.57	Remove Semitropic Shoefly and close Semitropic D to Semitropic E section
SEMITROPIC_D 115 kV	DOUBLECJ 115/13.8kV TB 1 AND SMYRNA-SEMITROPIC-MIDWAY 115kV [3710] MOAS OPENED on GANSO_MIDWAY	P6	N-1-1	0.86	>.9	>.9	>.9	>.9	>.9	>.9	>.9	0.59	Remove Semitropic Shoefly and close Semitropic D to Semitropic E section
SEMITRPC 70 kV	DOUBLECJ 115/13.8kV TB 1 AND SMYRNA-SEMITROPIC-MIDWAY 115kV [3710] MOAS OPENED on GANSO_MIDWAY	P6	N-1-1	0.85	>.9	>.9	>.9	>.9	>.9	>.9	>.9	0.59	Utilize Summer Setup for summer and non-summer months



Study Area: **PG&E Kern**

High/Low Voltages



Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)					Voltage PU (Sensitivity Scenarios)				Project & Potential Mitigation Solutions	
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations		
WASCO 70 kV	DOUBLECJ 115/13.8kV TB 1 AND SMYRNA-SEMITROPIC-MIDWAY 115kV [3710] MOAS OPENED on GANSO_MIDWAY	P6	N-1-1	0.86	>.9	>.9	>.9	>.9	>.9	>.9	>.9	>.9	0.64	Utilize Summer Setup for summer and non-summer months
WSCOPRSN 115 kV	DOUBLECJ 115/13.8kV TB 1 AND SMYRNA-SEMITROPIC-MIDWAY 115kV [3710] MOAS OPENED on GANSO_MIDWAY	P6	N-1-1	0.86	>.9	>.9	>.9	>.9	>.9	>.9	>.9	>.9	0.59	Remove Semitropic Shoefly and close Semitropic D to Semitropic E section
CHARKA 115 kV	ELKHIL1G 18.00kV & ELKHIL2G 18.00kV & ELKHIL3G 18.00kV Gen Units AND SMYRNA-SEMITROPIC-MIDWAY 115kV [3710] MOAS OPENED on GANSO_MIDWAY	P6	N-1-1	>.9	0.67	>.9	>.9	>.9	0.60	>.9	>.9	>.9	0.58	Remove Semitropic Shoefly and close Semitropic D to Semitropic E section
CHSR12SWSTA 115 kV	ELKHIL1G 18.00kV & ELKHIL2G 18.00kV & ELKHIL3G 18.00kV Gen Units AND SMYRNA-SEMITROPIC-MIDWAY 115kV [3710] MOAS OPENED on GANSO_MIDWAY	P6	N-1-1	>.9	0.67	>.9	>.9	>.9	0.60	>.9	>.9	>.9	0.58	Remove Semitropic Shoefly and close Semitropic D to Semitropic E section
FAMOSO 115 kV	ELKHIL2G 18/230kV TB 1 AND SMYRNA SEMITROPIC-MIDWAY 115kV [3710] MOAS OPENED on GANSO_MIDWAY	P6	N-1-1	0.87	0.66	>.9	>.9	>.9	0.59	>.9	>.9	>.9	>.9	Remove Semitropic Shoefly and close Semitropic D to Semitropic E section
MC FRLND 70 kV	ELKHIL2G 18/230kV TB 1 AND SMYRNA SEMITROPIC-MIDWAY 115kV [3710] MOAS OPENED on GANSO_MIDWAY	P6	N-1-1	0.88	0.75	>.9	>.9	>.9	0.71	>.9	>.9	>.9	>.9	Utilize Summer Setup for summer and non-summer months
SEMITROPIC_D 115 kV	ELKHIL2G 18/230kV TB 1 AND SMYRNA SEMITROPIC-MIDWAY 115kV [3710] MOAS OPENED on GANSO_MIDWAY	P6	N-1-1	0.87	0.67	>.9	>.9	>.9	0.61	>.9	>.9	>.9	>.9	Remove Semitropic Shoefly and close Semitropic D to Semitropic E section
SEMITRPC 70 kV	ELKHIL2G 18/230kV TB 1 AND SMYRNA SEMITROPIC-MIDWAY 115kV [3710] MOAS OPENED on GANSO_MIDWAY	P6	N-1-1	0.85	0.67	>.9	>.9	>.9	0.61	>.9	>.9	>.9	>.9	Utilize Summer Setup for summer and non-summer months

Study Area: **PG&E Kern**



High/Low Voltages

Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)					Voltage PU (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations	
WASCO 70 kV	ELKHIL2G 18/230kV TB 1 AND SMYRNA SEMITROPIC-MIDWAY 115kV [3710] MOAS OPENED on GANSO_MIDWAY	P6	N-1-1	0.87	0.71	>.9	>.9	>.9	0.66	>.9	>.9	>.9	Utilize Summer Setup for summer and non-summer months
WSCOPRSN 115 kV	ELKHIL2G 18/230kV TB 1 AND SMYRNA SEMITROPIC-MIDWAY 115kV [3710] MOAS OPENED on GANSO_MIDWAY	P6	N-1-1	0.87	0.67	>.9	>.9	>.9	0.61	>.9	>.9	>.9	Remove Semitropic Shoefly and close Semitropic D to Semitropic E section
CHSR12SWSTA 115 kV	ELKHIL3G 18/230kV TB 1 AND SMYRNA SEMITROPIC-MIDWAY 115kV [3710] MOAS OPENED on GANSO_MIDWAY	P6	N-1-1	>.9	0.66	0.58	>.9	>.9	0.60	>.9	>.9	>.9	Remove Semitropic Shoefly and close Semitropic D to Semitropic E section
FAMOSO 115 kV	ELKHIL3G 18/230kV TB 1 AND SMYRNA SEMITROPIC-MIDWAY 115kV [3710] MOAS OPENED on GANSO_MIDWAY	P6	N-1-1	0.87	0.66	0.57	>.9	>.9	0.59	>.9	>.9	>.9	Remove Semitropic Shoefly and close Semitropic D to Semitropic E section
FAMOSO 70 kV	ELKHIL3G 18/230kV TB 1 AND SMYRNA SEMITROPIC-MIDWAY 115kV [3710] MOAS OPENED on GANSO_MIDWAY	P6	N-1-1	>.9	0.79	0.72	>.9	>.9	0.74	>.9	>.9	>.9	Utilize Summer Setup for summer and non-summer months
MC FRLND 70 kV	ELKHIL3G 18/230kV TB 1 AND SMYRNA SEMITROPIC-MIDWAY 115kV [3710] MOAS OPENED on GANSO_MIDWAY	P6	N-1-1	>.9	0.75	0.68	>.9	>.9	0.71	>.9	>.9	>.9	Utilize Summer Setup for summer and non-summer months
SEMITROPIC_D 115 kV	ELKHIL3G 18/230kV TB 1 AND SMYRNA SEMITROPIC-MIDWAY 115kV [3710] MOAS OPENED on GANSO_MIDWAY	P6	N-1-1	0.87	0.67	0.59	>.9	>.9	0.61	>.9	>.9	>.9	Remove Semitropic Shoefly and close Semitropic D to Semitropic E section
SEMITRPC 70 kV	ELKHIL3G 18/230kV TB 1 AND SMYRNA SEMITROPIC-MIDWAY 115kV [3710] MOAS OPENED on GANSO_MIDWAY	P6	N-1-1	0.85	0.67	0.59	>.9	>.9	0.61	>.9	>.9	>.9	Utilize Summer Setup for summer and non-summer months

Study Area: **PG&E Kern**

High/Low Voltages



Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)					Voltage PU (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations	
WASCO 70 kV	ELKHIL3G 18/230kV TB 1 AND SMYRNA SEMITROPIC-MIDWAY 115kV [3710] MOAS OPENED on GANSO_MIDWAY	P6	N-1-1	0.87	0.71	0.64	>.9	>.9	0.66	>.9	>.9	>.9	Utilize Summer Setup for summer and non-summer months
WSCOPRSN 115 kV	ELKHIL3G 18/230kV TB 1 AND SMYRNA SEMITROPIC-MIDWAY 115kV [3710] MOAS OPENED on GANSO_MIDWAY	P6	N-1-1	0.87	0.67	0.58	>.9	>.9	0.61	>.9	>.9	>.9	Remove Semitropic Shoefly and close Semitropic D to Semitropic E section
CHARKA 115 kV	FELLOWS 21.00kV Gen Unit QF AND SMYRNA-SEMITROPIC-MIDWAY 115kV [3710] MOAS OPENED on GANSO_MIDWAY	P6	N-1-1	>.9	0.68	>.9	>.9	>.9	0.60	>.9	>.9	>.9	Remove Semitropic Shoefly and close Semitropic D to Semitropic E section
CHSR12SWSTA 115 kV	FELLOWS 21.00kV Gen Unit QF AND SMYRNA-SEMITROPIC-MIDWAY 115kV [3710] MOAS OPENED on GANSO_MIDWAY	P6	N-1-1	>.9	0.68	>.9	>.9	>.9	0.60	>.9	>.9	>.9	Remove Semitropic Shoefly and close Semitropic D to Semitropic E section
CHARKA 115 kV	FRITOLAY 9.11kV Gen Unit 1 AND SMYRNA-SEMITROPIC-MIDWAY 115kV [3710] MOAS OPENED on GANSO_MIDWAY	P6	N-1-1	>.9	>.9	>.9	>.9	>.9	0.60	>.9	>.9	>.9	Remove Semitropic Shoefly and close Semitropic D to Semitropic E section
CHSR12SWSTA 115 kV	FRITOLAY 9.11kV Gen Unit 1 AND SMYRNA-SEMITROPIC-MIDWAY 115kV [3710] MOAS OPENED on GANSO_MIDWAY	P6	N-1-1	>.9	>.9	>.9	>.9	>.9	0.60	>.9	>.9	>.9	Remove Semitropic Shoefly and close Semitropic D to Semitropic E section
FAMOSO 70 kV	HighSRA 115/13.8kV TB 1 AND SMYRNA-SEMITROPIC-MIDWAY 115kV [3710] MOAS OPENED on GANSO_MIDWAY	P6	N-1-1	>.9	0.79	>.9	>.9	>.9	>.9	>.9	>.9	0.73	Utilize Summer Setup for summer and non-summer months
MC FRLND 70 kV	HighSRA 115/13.8kV TB 1 AND SMYRNA-SEMITROPIC-MIDWAY 115kV [3710] MOAS OPENED on GANSO_MIDWAY	P6	N-1-1	>.9	0.76	>.9	>.9	>.9	>.9	>.9	>.9	0.68	Utilize Summer Setup for summer and non-summer months

Study Area: **PG&E Kern**

High/Low Voltages



Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)					Voltage PU (Sensitivity Scenarios)				Project & Potential Mitigation Solutions	
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations		
CHARKA 115 kV	HISIERRA 13.80kV Gen Unit 1 AND SMYRNA-SEMITROPIC-MIDWAY 115kV [3710] MOAS OPENED on GANSO_MIDWAY	P6	N-1-1	>.9	0.67	>.9	>.9	>.9	>.9	>.9	>.9	>.9	0.58	Remove Semitropic Shoefly and close Semitropic D to Semitropic E section
CHSR12SWSTA 115 kV	HISIERRA 13.80kV Gen Unit 1 AND SMYRNA-SEMITROPIC-MIDWAY 115kV [3710] MOAS OPENED on GANSO_MIDWAY	P6	N-1-1	>.9	0.67	>.9	>.9	>.9	>.9	>.9	>.9	>.9	0.58	Remove Semitropic Shoefly and close Semitropic D to Semitropic E section
FAMOSO 70 kV	KERN PP 230/115kV TB 3 AND SMYRNA-SEMITROPIC-MIDWAY 115kV [3710] MOAS OPENED on GANSO_MIDWAY	P6	N-1-1	0.90	>.9	>.9	>.9	>.9	>.9	>.9	>.9	>.9	>.9	Utilize Summer Setup for summer and non-summer months
MC FRLND 70 kV	KERN PP 230/115kV TB 3 AND SMYRNA-SEMITROPIC-MIDWAY 115kV [3710] MOAS OPENED on GANSO_MIDWAY	P6	N-1-1	0.88	>.9	>.9	>.9	>.9	>.9	>.9	>.9	>.9	>.9	Utilize Summer Setup for summer and non-summer months
CAWELO B 70 kV	KERN PW1 70/115kV TB 1 AND KERN PW2 70/115kV TB 1	P6	N-1-1	0.51	0.49	0.45	>.9	>.9	0.49	>.9	>.9	>.9	0.45	Utilize Summer Setup for summer and non-summer months
EISEN 70 kV	KERN PW1 70/115kV TB 1 AND KERN PW2 70/115kV TB 1	P6	N-1-1	0.45	0.43	0.39	>.9	>.9	0.43	>.9	>.9	>.9	0.39	Utilize Summer Setup for summer and non-summer months
KERN PW2 70 kV	KERN PW1 70/115kV TB 1 AND KERN PW2 70/115kV TB 1	P6	N-1-1	0.44	0.42	0.37	>.9	>.9	0.41	>.9	>.9	>.9	0.37	Utilize Summer Setup for summer and non-summer months
MAGUNDEN 70 kV	KERN PW1 70/115kV TB 1 AND KERN PW2 70/115kV TB 1	P6	N-1-1	0.48	0.46	0.42	>.9	>.9	0.45	>.9	>.9	>.9	0.42	Utilize Summer Setup for summer and non-summer months
MC FRLND 70 kV	KERN PW1 70/115kV TB 1 AND KERN PW2 70/115kV TB 1	P6	N-1-1	0.66	0.64	0.59	>.9	>.9	0.64	>.9	>.9	>.9	0.59	Utilize Summer Setup for summer and non-summer months
RIOBRVQF 70 kV	KERN PW1 70/115kV TB 1 AND KERN PW2 70/115kV TB 1	P6	N-1-1	0.49	0.47	0.44	>.9	>.9	0.47	>.9	>.9	>.9	0.44	Utilize Summer Setup for summer and non-summer months
S_KERN_TP 70 kV	KERN PW1 70/115kV TB 1 AND KERN PW2 70/115kV TB 1	P6	N-1-1	0.41	0.38	0.35	>.9	>.9	0.37	>.9	>.9	>.9	0.35	Utilize Summer Setup for summer and non-summer months
SEMITRPC 70 kV	KERN PW1 70/115kV TB 1 AND KERN PW2 70/115kV TB 1	P6	N-1-1	>.9	>.9	0.89	>.9	>.9	>.9	>.9	>.9	>.9	0.89	Utilize Summer Setup for summer and non-summer months
WELLFILD 70 kV	KERN PW1 70/115kV TB 1 AND KERN PW2 70/115kV TB 1	P6	N-1-1	0.45	0.43	0.40	>.9	>.9	0.42	>.9	>.9	>.9	0.40	Utilize Summer Setup for summer and non-summer months

Study Area: **PG&E Kern**



High/Low Voltages

Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)					Voltage PU (Sensitivity Scenarios)				Project & Potential Mitigation Solutions	
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations		
CAWELO B 70 kV	KERN PW1 70/115kV TB 1 AND SMYRNA-SEMITROPIC-MIDWAY 115kV [3710] MOAS OPENED on GANSO_MIDWAY	P6	N-1-1	>.9	>.9	>.9	>.9	>.9	>.9	>.9	>.9	>.9	0.90	Sensitivity Only
MC FRLND 70 kV	KERN PW1 70/115kV TB 1 AND SMYRNA-SEMITROPIC-MIDWAY 115kV [3710] MOAS OPENED on GANSO_MIDWAY	P6	N-1-1	>.9	>.9	>.9	>.9	>.9	>.9	0.71	>.9	>.9	0.68	Utilize Summer Setup for summer and non-summer months
BAKRSFLD 70 kV	KERN PW2 70/115kV TB 1 AND KERN PW1 70/115kV TB 1	P6	N-1-1	0.46	0.43	0.39	>.9	>.9	0.43	>.9	>.9	>.9	0.39	Utilize Summer Setup for summer and non-summer months
CARNATIO 70 kV	KERN PW2 70/115kV TB 1 AND KERN PW1 70/115kV TB 1	P6	N-1-1	0.42	0.40	0.36	>.9	>.9	0.39	>.9	>.9	>.9	0.36	Utilize Summer Setup for summer and non-summer months
FAMOSO 70 kV	KERN PW2 70/115kV TB 1 AND KERN PW1 70/115kV TB 1	P6	N-1-1	0.66	0.64	0.61	>.9	>.9	0.64	>.9	>.9	>.9	0.61	Utilize Summer Setup for summer and non-summer months
FRUITVLE 70 kV	KERN PW2 70/115kV TB 1 AND KERN PW1 70/115kV TB 1	P6	N-1-1	0.44	0.41	0.37	>.9	>.9	0.41	>.9	>.9	>.9	0.37	Utilize Summer Setup for summer and non-summer months
GRMMWY T 70 kV	KERN PW2 70/115kV TB 1 AND KERN PW1 70/115kV TB 1	P6	N-1-1	0.45	0.43	0.40	>.9	>.9	0.42	>.9	>.9	>.9	0.40	Utilize Summer Setup for summer and non-summer months
GRMWY_SM 70 kV	KERN PW2 70/115kV TB 1 AND KERN PW1 70/115kV TB 1	P6	N-1-1	0.45	0.43	0.40	>.9	>.9	0.42	>.9	>.9	>.9	0.40	Utilize Summer Setup for summer and non-summer months
KERN PW1 70 kV	KERN PW2 70/115kV TB 1 AND KERN PW1 70/115kV TB 1	P6	N-1-1	0.44	0.41	0.37	>.9	>.9	0.41	>.9	>.9	>.9	0.37	Utilize Summer Setup for summer and non-summer months
KRN CNYN 70 kV	KERN PW2 70/115kV TB 1 AND KERN PW1 70/115kV TB 1	P6	N-1-1	0.49	0.48	0.44	>.9	>.9	0.47	>.9	>.9	>.9	0.44	Utilize Summer Setup for summer and non-summer months
MAGNDN J 70 kV	KERN PW2 70/115kV TB 1 AND KERN PW1 70/115kV TB 1	P6	N-1-1	0.48	0.46	0.43	>.9	>.9	0.46	>.9	>.9	>.9	0.43	Utilize Summer Setup for summer and non-summer months
OLD RIVR 70 kV	KERN PW2 70/115kV TB 1 AND KERN PW1 70/115kV TB 1	P6	N-1-1	0.40	0.38	0.35	>.9	>.9	0.37	>.9	>.9	>.9	0.35	Utilize Summer Setup for summer and non-summer months
OLD_RVR1 70 kV	KERN PW2 70/115kV TB 1 AND KERN PW1 70/115kV TB 1	P6	N-1-1	0.41	0.38	0.35	>.9	>.9	0.37	>.9	>.9	>.9	0.35	Utilize Summer Setup for summer and non-summer months
PANAMA 70 kV	KERN PW2 70/115kV TB 1 AND KERN PW1 70/115kV TB 1	P6	N-1-1	0.41	0.39	0.35	>.9	>.9	0.38	>.9	>.9	>.9	0.35	Utilize Summer Setup for summer and non-summer months
S_KERN 70 kV	KERN PW2 70/115kV TB 1 AND KERN PW1 70/115kV TB 1	P6	N-1-1	0.41	0.38	0.35	>.9	>.9	0.37	>.9	>.9	>.9	0.35	Utilize Summer Setup for summer and non-summer months



Study Area: **PG&E Kern**

High/Low Voltages



Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)					Voltage PU (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations	
SAN EMDO 70 kV	KERN PW2 70/115kV TB 1 AND KERN PW1 70/115kV TB 1	P6	N-1-1	0.41	0.38	0.35	>.9	>.9	0.37	>.9	>.9	0.35	Utilize Summer Setup for summer and non-summer months
WEEDPATCH_SF 70 kV	KERN PW2 70/115kV TB 1 AND KERN PW1 70/115kV TB 1	P6	N-1-1	0.46	0.44	0.41	>.9	>.9	0.43	>.9	>.9	0.41	Utilize Summer Setup for summer and non-summer months
FAMOSO 70 kV	KERN PW2 70/115kV TB 1 AND SMYRNA-SEMITROPIC-MIDWAY 115kV [3710] MOAS OPENED on GANSO_MIDWAY	P6	N-1-1	>.9	>.9	>.9	>.9	>.9	0.74	>.9	>.9	0.72	Utilize Summer Setup for summer and non-summer months
CHARKA 115 kV	KERNFRNT 9.11kV Gen Unit 1 AND SMYRNA-SEMITROPIC-MIDWAY 115kV [3710] MOAS OPENED on GANSO_MIDWAY	P6	N-1-1	>.9	>.9	>.9	>.9	>.9	>.9	>.9	>.9	0.58	Remove Semitropic Shoefly and close Semitropic D to Semitropic E section
CHARKA 115 kV	KERNRDGE 9.11kV Gen Unit 1 AND SMYRNA-SEMITROPIC-MIDWAY 115kV [3710] MOAS OPENED on GANSO_MIDWAY	P6	N-1-1	0.86	>.9	>.9	>.9	>.9	>.9	>.9	>.9	>.9	Remove Semitropic Shoefly and close Semitropic D to Semitropic E section
BITTERWATRSS 230 kV	KERN-TEVIS-STOCKDALE-LAMONT 115kV [1940] AND P1-2:A15:8:_BITTERWATRSS-MIDWAY 230kV [0]	P6	N-1-1	0.89	>.9	>.9	>.9	>.9	>.9	>.9	>.9	>.9	Project : Wheeler Ridge Voltage Support Project In Service Date: 12/2020 Short term: Action Plan
Q946 230 kV	KERN-TEVIS-STOCKDALE-LAMONT 115kV [1940] AND P1-2:A15:8:_BITTERWATRSS-MIDWAY 230kV [0]	P6	N-1-1	0.89	>.9	>.9	>.9	>.9	>.9	>.9	>.9	>.9	Project : Wheeler Ridge Voltage Support Project In Service Date: 12/2020 Short term: Action Plan
WHLR RJ1 230 kV	KERN-TEVIS-STOCKDALE-LAMONT 115kV [1940] AND P1-2:A15:8:_BITTERWATRSS-MIDWAY 230kV [0]	P6	N-1-1	0.90	>.9	>.9	>.9	>.9	>.9	>.9	>.9	>.9	Project : Wheeler Ridge Voltage Support Project In Service Date: 12/2020 Short term: Action Plan
WHLR RT2 230 kV	KERN-TEVIS-STOCKDALE-LAMONT 115kV [1940] AND P1-2:A15:8:_BITTERWATRSS-MIDWAY 230kV [0]	P6	N-1-1	0.89	>.9	>.9	>.9	>.9	>.9	>.9	>.9	>.9	Project : Wheeler Ridge Voltage Support Project In Service Date: 12/2020 Short term: Action Plan

Study Area: **PG&E Kern**

High/Low Voltages



Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)					Voltage PU (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations	
WND GPJ2 230 kV	KERN-TEVIS-STOCKDALE-LAMONT 115kV [1940] AND P1-2:A15:8:_BITTERWATRSS-MIDWAY 230kV [0]	P6	N-1-1	0.89	>.9	>.9	>.9	>.9	>.9	>.9	>.9	>.9	Project : Wheeler Ridge Voltage Support Project In Service Date: 12/2020 Short term: Action Plan
WND GPT2 230 kV	KERN-TEVIS-STOCKDALE-LAMONT 115kV [1940] AND P1-2:A15:8:_BITTERWATRSS-MIDWAY 230kV [0]	P6	N-1-1	0.89	>.9	>.9	>.9	>.9	>.9	>.9	>.9	>.9	Project : Wheeler Ridge Voltage Support Project In Service Date: 12/2020 Short term: Action Plan
FAMOSO 70 kV	MIDWAY-LAPALOMA #2 230kV [0] AND SMYRNA-SEMITROPIC-MIDWAY 115kV [3710] MOAS OPENED on GANSO_MIDWAY	P6	N-1-1	0.90	0.79	>.9	>.9	>.9	0.74	>.9	>.9	0.73	Utilize Summer Setup for summer and non-summer months
3EMIDIO 70 kV	MIDWAY-WHEELER RIDGE #1 230kV [5190] AND P1-2:A15:9:_BITTERWATRSS-WHEELER 230kV [0]	P6	N-1-1	0.48	>.9	>.9	>.9	>.9	>.9	>.9	>.9	>.9	Project : Wheeler Ridge Voltage Support Project In Service Date: 12/2020 Short term: Action Plan
EMDO JCT 70 kV	MIDWAY-WHEELER RIDGE #1 230kV [5190] AND P1-2:A15:9:_BITTERWATRSS-WHEELER 230kV [0]	P6	N-1-1	0.49	>.9	>.9	>.9	>.9	>.9	>.9	>.9	>.9	Project : Wheeler Ridge Voltage Support Project In Service Date: 12/2020 Short term: Action Plan
GRAPEVNE 70 kV	MIDWAY-WHEELER RIDGE #1 230kV [5190] AND P1-2:A15:9:_BITTERWATRSS-WHEELER 230kV [0]	P6	N-1-1	0.47	>.9	>.9	>.9	>.9	>.9	>.9	>.9	>.9	Project : Wheeler Ridge Voltage Support Project In Service Date: 12/2020 Short term: Action Plan
KELLEY 70 kV	MIDWAY-WHEELER RIDGE #1 230kV [5190] AND P1-2:A15:9:_BITTERWATRSS-WHEELER 230kV [0]	P6	N-1-1	0.48	>.9	>.9	>.9	>.9	>.9	>.9	>.9	>.9	Project : Wheeler Ridge Voltage Support Project In Service Date: 12/2020 Short term: Action Plan
LAKEVIEW 70 kV	MIDWAY-WHEELER RIDGE #1 230kV [5190] AND P1-2:A15:9:_BITTERWATRSS-WHEELER 230kV [0]	P6	N-1-1	0.49	>.9	>.9	>.9	>.9	>.9	>.9	>.9	>.9	Project : Wheeler Ridge Voltage Support Project In Service Date: 12/2020 Short term: Action Plan

Study Area: **PG&E Kern**

High/Low Voltages



Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)					Voltage PU (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations	
Q622BSS 115 kV	MIDWAY-WHEELER RIDGE #1 230kV [5190] AND P1-2:A15:9:_BITTERWATRSS-WHEELER 230kV [0]	P6	N-1-1	0.52	>.9	>.9	>.9	>.9	>.9	>.9	>.9	>.9	Project : Wheeler Ridge Voltage Support Project In Service Date: 12/2020 Short term: Action Plan
ARVIN 70 kV	WHEELER 230/70kV TB 5 AND WHEELER 230/70kV TB 4	P6	N-1-1	0.47	>.9	>.9	>.9	>.9	>.9	>.9	>.9	>.9	Utilize Summer Setup for summer and non-summer months
ARVINJ1 115 kV	WHEELER 230/70kV TB 5 AND WHEELER 230/70kV TB 4	P6	N-1-1	0.85	>.9	>.9	>.9	>.9	>.9	>.9	>.9	>.9	Project : Wheeler Ridge Voltage Support Project In Service Date: 12/2020 Short term: Action Plan
CASTAC 70 kV	WHEELER 230/70kV TB 5 AND WHEELER 230/70kV TB 4	P6	N-1-1	0.46	>.9	>.9	>.9	>.9	>.9	>.9	>.9	>.9	Project : Wheeler Ridge Voltage Support Project In Service Date: 12/2020 Short term: Action Plan
GRIMWAY 115 kV	WHEELER 230/70kV TB 5 AND WHEELER 230/70kV TB 4	P6	N-1-1	0.87	>.9	>.9	>.9	>.9	>.9	>.9	>.9	>.9	Project : Wheeler Ridge Voltage Support Project In Service Date: 12/2020 Short term: Action Plan
LAMONT 115 kV	WHEELER 230/70kV TB 5 AND WHEELER 230/70kV TB 4	P6	N-1-1	0.88	>.9	>.9	>.9	>.9	>.9	>.9	>.9	>.9	Project : Wheeler Ridge Voltage Support Project In Service Date: 12/2020 Short term: Action Plan
LEBEC 70 kV	WHEELER 230/70kV TB 5 AND WHEELER 230/70kV TB 4	P6	N-1-1	0.46	>.9	>.9	>.9	>.9	>.9	>.9	>.9	>.9	Project : Wheeler Ridge Voltage Support Project In Service Date: 12/2020 Short term: Action Plan
ORION 70 kV	WHEELER 230/70kV TB 5 AND WHEELER 230/70kV TB 4	P6	N-1-1	0.47	>.9	>.9	>.9	>.9	>.9	>.9	>.9	>.9	Project : Wheeler Ridge Voltage Support Project In Service Date: 12/2020 Short term: Action Plan
ORIONTP 70 kV	WHEELER 230/70kV TB 5 AND WHEELER 230/70kV TB 4	P6	N-1-1	0.47	>.9	>.9	>.9	>.9	>.9	>.9	>.9	>.9	Project : Wheeler Ridge Voltage Support Project In Service Date: 12/2020 Short term: Action Plan

Study Area: **PG&E Kern**

High/Low Voltages



Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)					Voltage PU (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations	
PACI_PIP 70 kV	WHEELER 230/70kV TB 5 AND WHEELER 230/70kV TB 4	P6	N-1-1	0.47	>.9	>.9	>.9	>.9	>.9	>.9	>.9	>.9	Project : Wheeler Ridge Voltage Support Project In Service Date: 12/2020 Short term: Action Plan
Q744 115 kV	WHEELER 230/70kV TB 5 AND WHEELER 230/70kV TB 4	P6	N-1-1	0.88	>.9	>.9	>.9	>.9	>.9	>.9	>.9	>.9	Project : Wheeler Ridge Voltage Support Project In Service Date: 12/2020 Short term: Action Plan
REGULUS 115 kV	WHEELER 230/70kV TB 5 AND WHEELER 230/70kV TB 4	P6	N-1-1	0.88	>.9	>.9	>.9	>.9	>.9	>.9	>.9	>.9	Project : Wheeler Ridge Voltage Support Project In Service Date: 12/2020 Short term: Action Plan
ROSE 70 kV	WHEELER 230/70kV TB 5 AND WHEELER 230/70kV TB 4	P6	N-1-1	0.48	>.9	>.9	>.9	>.9	>.9	>.9	>.9	>.9	Project : Wheeler Ridge Voltage Support Project In Service Date: 12/2020 Short term: Action Plan
SN BRNRD 70 kV	WHEELER 230/70kV TB 5 AND WHEELER 230/70kV TB 4	P6	N-1-1	0.48	>.9	>.9	>.9	>.9	>.9	>.9	>.9	>.9	Project : Wheeler Ridge Voltage Support Project In Service Date: 12/2020 Short term: Action Plan
STALIONJ 70 kV	WHEELER 230/70kV TB 5 AND WHEELER 230/70kV TB 4	P6	N-1-1	0.47	>.9	>.9	>.9	>.9	>.9	>.9	>.9	>.9	Project : Wheeler Ridge Voltage Support Project In Service Date: 12/2020 Short term: Action Plan
STALLION 70 kV	WHEELER 230/70kV TB 5 AND WHEELER 230/70kV TB 4	P6	N-1-1	0.47	>.9	>.9	>.9	>.9	>.9	>.9	>.9	>.9	Project : Wheeler Ridge Voltage Support Project In Service Date: 12/2020 Short term: Action Plan
TECUYA 70 kV	WHEELER 230/70kV TB 5 AND WHEELER 230/70kV TB 4	P6	N-1-1	0.48	>.9	>.9	>.9	>.9	>.9	>.9	>.9	>.9	Project : Wheeler Ridge Voltage Support Project In Service Date: 12/2020 Short term: Action Plan

Study Area: **PG&E Kern**

High/Low Voltages



Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)					Voltage PU (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations	
TECUYA T 70 kV	WHEELER 230/70kV TB 5 AND WHEELER 230/70kV TB 4	P6	N-1-1	0.48	>.9	>.9	>.9	>.9	>.9	>.9	>.9	>.9	Project : Wheeler Ridge Voltage Support Project In Service Date: 12/2020 Short term: Action Plan
TEJON 70 kV	WHEELER 230/70kV TB 5 AND WHEELER 230/70kV TB 4	P6	N-1-1	0.48	>.9	>.9	>.9	>.9	>.9	>.9	>.9	>.9	Project : Wheeler Ridge Voltage Support Project In Service Date: 12/2020 Short term: Action Plan
VALPRED0 70 kV	WHEELER 230/70kV TB 5 AND WHEELER 230/70kV TB 4	P6	N-1-1	0.48	>.9	>.9	>.9	>.9	>.9	>.9	>.9	>.9	Project : Wheeler Ridge Voltage Support Project In Service Date: 12/2020 Short term: Action Plan
WEEDPTCH 70 kV	WHEELER 230/70kV TB 5 AND WHEELER 230/70kV TB 4	P6	N-1-1	0.46	>.9	>.9	>.9	>.9	>.9	>.9	>.9	>.9	Project : Wheeler Ridge Voltage Support Project In Service Date: 12/2020 Short term: Action Plan
WHEELER 115 kV	WHEELER 230/70kV TB 5 AND WHEELER 230/70kV TB 4	P6	N-1-1	0.51	>.9	>.9	>.9	>.9	>.9	>.9	>.9	>.9	Project : Wheeler Ridge Voltage Support Project In Service Date: 12/2020 Short term: Action Plan
WHEELER 70 kV	WHEELER 230/70kV TB 5 AND WHEELER 230/70kV TB 4	P6	N-1-1	0.49	>.9	>.9	>.9	>.9	>.9	>.9	>.9	>.9	Project : Wheeler Ridge Voltage Support Project In Service Date: 12/2020 Short term: Action Plan
KERNRDGE 115 kV	Midsun-Midway & Midway-Temblor 115 kV Lines	P7	DCTL	1.05	1.06	1.03	1.10	1.11	1.06	1.12	1.06	1.03	Load Power Factor correction and voltage support if needed; Project: Midway-Temblor 115 kV Line Reconductor and Voltage Support
3EMIDIO 70 kV	Midway-Wheeler Ridge #1 & #2 230 kV Lines	P7	DCTL	0.48	0.58	1.04	1.05	1.05	0.79	1.04	0.99	1.03	Project : Wheeler Ridge Junction Station Project In Service Date: 05/2024 Short term: Action Plan



Study Area: **PG&E Kern**

High/Low Voltages



Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)					Voltage PU (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations	
ARVIN 70 kV	Midway-Wheeler Ridge #1 & #2 230 kV Lines	P7	DCTL	0.47	0.56	1.04	1.06	1.06	0.77	1.05	0.99	1.04	Project : Wheeler Ridge Junction Station Project In Service Date: 05/2024 Short term: Action Plan
ARVINJ1 115 kV	Midway-Wheeler Ridge #1 & #2 230 kV Lines	P7	DCTL	0.85	0.84	1.04	1.04	1.04	0.88	1.04	1.02	1.04	Project : Wheeler Ridge Junction Station Project In Service Date: 05/2024 Short term: Action Plan
CASTAC 70 kV	Midway-Wheeler Ridge #1 & #2 230 kV Lines	P7	DCTL	0.46	0.56	1.03	1.04	1.04	0.78	1.03	0.97	1.02	Project : Wheeler Ridge Junction Station Project In Service Date: 05/2024 Short term: Action Plan
EMDO JCT 70 kV	Midway-Wheeler Ridge #1 & #2 230 kV Lines	P7	DCTL	0.49	0.59	1.04	1.05	1.06	0.80	1.05	0.99	1.04	Project : Wheeler Ridge Junction Station Project In Service Date: 05/2024 Short term: Action Plan
GRAPEVNE 70 kV	Midway-Wheeler Ridge #1 & #2 230 kV Lines	P7	DCTL	0.47	0.57	1.03	1.04	1.04	0.78	1.03	0.98	1.03	Project : Wheeler Ridge Junction Station Project In Service Date: 05/2024 Short term: Action Plan
GRIMWAY 115 kV	Midway-Wheeler Ridge #1 & #2 230 kV Lines	P7	DCTL	0.87	0.87	1.03	1.04	1.04	0.90	1.04	1.02	1.03	Project : Wheeler Ridge Junction Station Project In Service Date: 05/2024 Short term: Action Plan
KELLEY 70 kV	Midway-Wheeler Ridge #1 & #2 230 kV Lines	P7	DCTL	0.48	0.57	1.03	1.05	1.05	0.79	1.04	0.98	1.03	Project : Wheeler Ridge Junction Station Project In Service Date: 05/2024 Short term: Action Plan
LAKEVIEW 70 kV	Midway-Wheeler Ridge #1 & #2 230 kV Lines	P7	DCTL	0.49	0.59	1.04	1.06	1.06	0.80	1.05	1.00	1.04	Project : Wheeler Ridge Junction Station Project In Service Date: 05/2024 Short term: Action Plan

Study Area: **PG&E Kern**

High/Low Voltages



Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)					Voltage PU (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations	
LAMONT 115 kV	Midway-Wheeler Ridge #1 & #2 230 kV Lines	P7	DCTL	0.88	0.87	1.04	1.04	1.04	0.90	1.04	1.03	1.04	Project : Wheeler Ridge Junction Station Project In Service Date: 05/2024 Short term: Action Plan
LEBEC 70 kV	Midway-Wheeler Ridge #1 & #2 230 kV Lines	P7	DCTL	0.46	0.56	1.02	1.04	1.04	0.77	1.03	0.97	1.02	Project : Wheeler Ridge Junction Station Project In Service Date: 05/2024 Short term: Action Plan
ORION 70 kV	Midway-Wheeler Ridge #1 & #2 230 kV Lines	P7	DCTL	0.47	0.56	1.04	1.06	1.06	0.77	1.05	1.00	1.04	Project : Wheeler Ridge Junction Station Project In Service Date: 05/2024 Short term: Action Plan
ORIONTP 70 kV	Midway-Wheeler Ridge #1 & #2 230 kV Lines	P7	DCTL	0.47	0.56	1.04	1.06	1.06	0.77	1.05	0.99	1.04	Project : Wheeler Ridge Junction Station Project In Service Date: 05/2024 Short term: Action Plan
PACI_PIP 70 kV	Midway-Wheeler Ridge #1 & #2 230 kV Lines	P7	DCTL	0.47	0.57	1.03	1.04	1.05	0.78	1.04	0.98	1.03	Project : Wheeler Ridge Junction Station Project In Service Date: 05/2024 Short term: Action Plan
Q622BSS 115 kV	Midway-Wheeler Ridge #1 & #2 230 kV Lines	P7	DCTL	0.52	0.56	1.04	1.05	1.05	0.72	1.04	0.99	1.04	Project : Wheeler Ridge Junction Station Project In Service Date: 05/2024 Short term: Action Plan
Q744 115 kV	Midway-Wheeler Ridge #1 & #2 230 kV Lines	P7	DCTL	0.88	0.87	1.04	1.04	1.04	0.90	1.03	1.03	1.04	Project : Wheeler Ridge Junction Station Project In Service Date: 05/2024 Short term: Action Plan
REGULUS 115 kV	Midway-Wheeler Ridge #1 & #2 230 kV Lines	P7	DCTL	0.88	0.87	1.04	1.04	1.04	0.90	1.04	1.03	1.04	Project : Wheeler Ridge Junction Station Project In Service Date: 05/2024 Short term: Action Plan

Study Area: **PG&E Kern**

High/Low Voltages



Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)					Voltage PU (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations	
ROSE 70 kV	Midway-Wheeler Ridge #1 & #2 230 kV Lines	P7	DCTL	0.48	0.58	1.04	1.05	1.05	0.79	1.04	0.99	1.03	Project : Wheeler Ridge Junction Station Project In Service Date: 05/2024 Short term: Action Plan
SN BRNRD 70 kV	Midway-Wheeler Ridge #1 & #2 230 kV Lines	P7	DCTL	0.48	0.57	1.04	1.06	1.06	0.79	1.05	0.99	1.04	Project : Wheeler Ridge Junction Station Project In Service Date: 05/2024 Short term: Action Plan
STALIONJ 70 kV	Midway-Wheeler Ridge #1 & #2 230 kV Lines	P7	DCTL	0.47	0.56	1.04	1.06	1.06	0.78	1.05	0.99	1.04	Project : Wheeler Ridge Junction Station Project In Service Date: 05/2024 Short term: Action Plan
STALLION 70 kV	Midway-Wheeler Ridge #1 & #2 230 kV Lines	P7	DCTL	0.47	0.56	1.04	1.06	1.06	0.78	1.05	0.99	1.04	Project : Wheeler Ridge Junction Station Project In Service Date: 05/2024 Short term: Action Plan
TECUYA 70 kV	Midway-Wheeler Ridge #1 & #2 230 kV Lines	P7	DCTL	0.48	0.58	1.04	1.05	1.05	0.80	1.04	0.99	1.04	Project : Wheeler Ridge Junction Station Project In Service Date: 05/2024 Short term: Action Plan
TECUYA T 70 kV	Midway-Wheeler Ridge #1 & #2 230 kV Lines	P7	DCTL	0.48	0.58	1.04	1.05	1.05	0.80	1.04	0.99	1.04	Project : Wheeler Ridge Junction Station Project In Service Date: 05/2024 Short term: Action Plan
TEJON 70 kV	Midway-Wheeler Ridge #1 & #2 230 kV Lines	P7	DCTL	0.48	0.58	1.04	1.05	1.05	0.80	1.04	0.99	1.04	Project : Wheeler Ridge Junction Station Project In Service Date: 05/2024 Short term: Action Plan
VALPREDO 70 kV	Midway-Wheeler Ridge #1 & #2 230 kV Lines	P7	DCTL	0.48	0.58	1.04	1.05	1.05	0.79	1.04	0.99	1.04	Project : Wheeler Ridge Junction Station Project In Service Date: 05/2024 Short term: Action Plan

Study Area: **PG&E Kern**



High/Low Voltages

Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)					Voltage PU (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations	
WEEDPTCH 70 kV	Midway-Wheeler Ridge #1 & #2 230 kV Lines	P7	DCTL	0.46	0.55	1.03	1.06	1.06	0.76	1.06	0.98	1.02	Project : Wheeler Ridge Junction Station Project In Service Date: 05/2024 Short term: Action Plan
WHEELER 115 kV	Midway-Wheeler Ridge #1 & #2 230 kV Lines	P7	DCTL	0.51	0.55	1.04	1.05	1.05	0.73	1.04	0.99	1.04	Project : Wheeler Ridge Junction Station Project In Service Date: 05/2024 Short term: Action Plan
WHEELER 230 kV	Midway-Wheeler Ridge #1 & #2 230 kV Lines	P7	DCTL	0.46	0.54	1.03	1.00	1.13	0.74	1.12	0.92	1.03	Project : Wheeler Ridge Junction Station Project In Service Date: 05/2024 Short term: Action Plan
WHEELER 70 kV	Midway-Wheeler Ridge #1 & #2 230 kV Lines	P7	DCTL	0.49	0.59	1.05	1.06	1.06	0.80	1.05	0.99	1.05	Project : Wheeler Ridge Junction Station Project In Service Date: 05/2024 Short term: Action Plan

Study Area: **PG&E Kern**

Voltage Deviation



Substation	Contingency (All and Worst P6)	Category	Category Description	Post Cont. Voltage Deviation % (Baseline Scenarios)					Post Cont. Voltage Deviation % (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations	
PANAMA 70 kV	KERN PW2-PANMJCT2 70kV [0] MOAS OPENED on PANMJCT2_CARNAT T	P1	N-1	7	9	10	0	-1	9	-1	4	10	Utilize Summer Setup for summer and non-summer months
CAWELO B 70 kV	SMYRNA-SEMITROPIC-MIDWAY 115kV [3710] MOAS OPENED on GANSO_MIDWAY	P1	N-1	6	10	12	0	-1	12	-1	3	12	Utilize Summer Setup for summer and non-summer months
CHARKA 115 kV	SMYRNA-SEMITROPIC-MIDWAY 115kV [3710] MOAS OPENED on GANSO_MIDWAY	P1	N-1	17	35	43	1	-5	42	-6	9	43	Remove Semitropic Shoefly and close Semitropic D to Semitropic E section
CHSR12A 115 kV	SMYRNA-SEMITROPIC-MIDWAY 115kV [3710] MOAS OPENED on GANSO_MIDWAY	P1	N-1	<8	35	43	<8	-5	42	-6	<8	43	Remove Semitropic Shoefly and close Semitropic D to Semitropic E section
CHSR12B 115 kV	SMYRNA-SEMITROPIC-MIDWAY 115kV [3710] MOAS OPENED on GANSO_MIDWAY	P1	N-1	<8	35	43	<8	-5	42	-6	<8	43	Remove Semitropic Shoefly and close Semitropic D to Semitropic E section
CHSR12SWSTA 115 kV	SMYRNA-SEMITROPIC-MIDWAY 115kV [3710] MOAS OPENED on GANSO_MIDWAY	P1	N-1	<8	35	43	<8	-5	42	-6	<8	43	Remove Semitropic Shoefly and close Semitropic D to Semitropic E section
FAMOSO 115 kV	SMYRNA-SEMITROPIC-MIDWAY 115kV [3710] MOAS OPENED on GANSO_MIDWAY	P1	N-1	17	35	43	1	-5	42	-6	9	43	Remove Semitropic Shoefly and close Semitropic D to Semitropic E section
FAMOSO 70 kV	SMYRNA-SEMITROPIC-MIDWAY 115kV [3710] MOAS OPENED on GANSO_MIDWAY	P1	N-1	11	22	27	1	-3	27	-3	6	27	Utilize Summer Setup for summer and non-summer months
KRN OL J 70 kV	SMYRNA-SEMITROPIC-MIDWAY 115kV [3710] MOAS OPENED on GANSO_MIDWAY	P1	N-1	4	7	9	0	-1	9	-1	2	9	Utilize Summer Setup for summer and non-summer months
MC FRLND 70 kV	SMYRNA-SEMITROPIC-MIDWAY 115kV [3710] MOAS OPENED on GANSO_MIDWAY	P1	N-1	12	24	29	1	-3	29	-3	6	29	Utilize Summer Setup for summer and non-summer months
SEMITROPIC_D 115 kV	SMYRNA-SEMITROPIC-MIDWAY 115kV [3710] MOAS OPENED on GANSO_MIDWAY	P1	N-1	17	34	42	1	-5	42	-6	9	42	Remove Semitropic Shoefly and close Semitropic D to Semitropic E section
SEMITRPC 70 kV	SMYRNA-SEMITROPIC-MIDWAY 115kV [3710] MOAS OPENED on GANSO_MIDWAY	P1	N-1	17	34	41	1	-5	41	-5	9	41	Utilize Summer Setup for summer and non-summer months



Study Area: **PG&E Kern**

Voltage Deviation



Substation	Contingency (All and Worst P6)	Category	Category Description	Post Cont. Voltage Deviation % (Baseline Scenarios)					Post Cont. Voltage Deviation % (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations	
WASCO 70 kV	SMYRNA-SEMITROPIC-MIDWAY 115kV [3710] MOAS OPENED on GANSO_MIDWAY	P1	N-1	15	29	35	1	-4	35	-4	7	35	Utilize Summer Setup for summer and non-summer months
WSCOPRSN 115 kV	SMYRNA-SEMITROPIC-MIDWAY 115kV [3710] MOAS OPENED on GANSO_MIDWAY	P1	N-1	17	35	42	1	-5	42	-6	9	42	Remove Semitropic Shoefly and close Semitropic D to Semitropic E section
MC FRLND 70 kV	DEXEL + 13.80kV Gen Unit 1 AND SMYRNA-SEMITROPIC-MIDWAY 115kV [3710] MOAS OPENED on GANSO_MIDWAY	P3	G1/N1	12	<8	<8	<8	<8	<8	<8	<8	29	Utilize Summer Setup for summer and non-summer months
SEMITROPIC_D 115 kV	DEXEL + 13.80kV Gen Unit 1 AND SMYRNA-SEMITROPIC-MIDWAY 115kV [3710] MOAS OPENED on GANSO_MIDWAY	P3	G1/N1	17	<8	<8	<8	<8	<8	<8	9	42	Remove Semitropic Shoefly and close Semitropic D to Semitropic E section
SEMITRPC 70 kV	DEXEL + 13.80kV Gen Unit 1 AND SMYRNA-SEMITROPIC-MIDWAY 115kV [3710] MOAS OPENED on GANSO_MIDWAY	P3	G1/N1	17	<8	<8	<8	<8	<8	<8	9	41	Utilize Summer Setup for summer and non-summer months
WASCO 70 kV	DEXEL + 13.80kV Gen Unit 1 AND SMYRNA-SEMITROPIC-MIDWAY 115kV [3710] MOAS OPENED on GANSO_MIDWAY	P3	G1/N1	15	<8	<8	<8	<8	<8	<8	<8	35	Utilize Summer Setup for summer and non-summer months
WSCOPRSN 115 kV	DEXEL + 13.80kV Gen Unit 1 AND SMYRNA-SEMITROPIC-MIDWAY 115kV [3710] MOAS OPENED on GANSO_MIDWAY	P3	G1/N1	17	<8	<8	<8	<8	<8	<8	9	42	Remove Semitropic Shoefly and close Semitropic D to Semitropic E section
MC FRLND 70 kV	DISCOVERY 13.80kV Gen Unit 1 AND SMYRNA-SEMITROPIC-MIDWAY 115kV [3710] MOAS OPENED on GANSO_MIDWAY	P3	G1/N1	<8	23	<8	<8	<8	<8	<8	<8	<8	Utilize Summer Setup for summer and non-summer months
MCFRLD T 70 kV	DISCOVERY 13.80kV Gen Unit 1 AND SMYRNA-SEMITROPIC-MIDWAY 115kV [3710] MOAS OPENED on GANSO_MIDWAY	P3	G1/N1	<8	23	<8	<8	<8	<8	<8	<8	<8	Utilize Summer Setup for summer and non-summer months

Study Area: **PG&E Kern**

Voltage Deviation



Substation	Contingency (All and Worst P6)	Category	Category Description	Post Cont. Voltage Deviation % (Baseline Scenarios)					Post Cont. Voltage Deviation % (Sensitivity Scenarios)				Project & Potential Mitigation Solutions	
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations		
SEMITR&1 115 kV	DISCOVERY 13.80kV Gen Unit 1 AND SMYRNA-SEMITROPIC-MIDWAY 115kV [3710] MOAS OPENED on GANSO_MIDWAY	P3	G1/N1	<8	34	<8	<8	<8	<8	<8	<8	9	<8	Remove Semitropic Shoefly and close Semitropic D to Semitropic E section
SEMITROPIC_D 115 kV	DISCOVERY 13.80kV Gen Unit 1 AND SMYRNA-SEMITROPIC-MIDWAY 115kV [3710] MOAS OPENED on GANSO_MIDWAY	P3	G1/N1	<8	34	<8	<8	<8	<8	<8	<8	9	<8	Remove Semitropic Shoefly and close Semitropic D to Semitropic E section
SEMITRPC 70 kV	DISCOVERY 13.80kV Gen Unit 1 AND SMYRNA-SEMITROPIC-MIDWAY 115kV [3710] MOAS OPENED on GANSO_MIDWAY	P3	G1/N1	<8	34	<8	<8	<8	<8	<8	<8	9	<8	Utilize Summer Setup for summer and non-summer months
WASCO 70 kV	DISCOVERY 13.80kV Gen Unit 1 AND SMYRNA-SEMITROPIC-MIDWAY 115kV [3710] MOAS OPENED on GANSO_MIDWAY	P3	G1/N1	<8	29	<8	<8	<8	<8	<8	<8	<8	<8	Utilize Summer Setup for summer and non-summer months
WSCOPRSN 115 kV	DISCOVERY 13.80kV Gen Unit 1 AND SMYRNA-SEMITROPIC-MIDWAY 115kV [3710] MOAS OPENED on GANSO_MIDWAY	P3	G1/N1	<8	35	<8	<8	<8	<8	<8	<8	9	<8	Remove Semitropic Shoefly and close Semitropic D to Semitropic E section
FAMOSO 70 kV	DOUBLE C 13.80kV Gen Unit 1 AND SMYRNA-SEMITROPIC-MIDWAY 115kV [3710] MOAS OPENED on GANSO_MIDWAY	P3	G1/N1	12	<8	<8	<8	<8	<8	<8	<8	<8	27	Utilize Summer Setup for summer and non-summer months
FAMOSO 70 kV	ELKHIL1G 18.00kV & ELKHIL2G 18.00kV & ELKHIL3G 18.00kV Gen Units AND SMYRNA-SEMITROPIC-MIDWAY 115kV [3710] MOAS OPENED on GANSO_MIDWAY	P3	G1/N1	<8	22	<8	<8	<8	<8	27	<8	<8	27	Utilize Summer Setup for summer and non-summer months
KRN OL J 70 kV	PSE-BEAR 13.80kV Gen Unit 1 AND SMYRNA-SEMITROPIC-MIDWAY 115kV [3710] MOAS OPENED on GANSO_MIDWAY	P3	G1/N1	<8	<8	<8	<8	<8	<8	9	<8	<8	9	Utilize Summer Setup for summer and non-summer months
MC FRLND 70 kV	SEKR 9.11kV Gen Unit 1 AND SMYRNA-SEMITROPIC-MIDWAY 115kV [3710] MOAS OPENED on GANSO_MIDWAY	P3	G1/N1	<8	23	<8	<8	<8	<8	<8	<8	<8	<8	Utilize Summer Setup for summer and non-summer months

Study Area: **PG&E Kern**

Voltage Deviation



Substation	Contingency (All and Worst P6)	Category	Category Description	Post Cont. Voltage Deviation % (Baseline Scenarios)					Post Cont. Voltage Deviation % (Sensitivity Scenarios)				Project & Potential Mitigation Solutions	
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations		
CAWEL0 B 70 kV	TEXSUN1G 18.00kV & TEXSUN2G 18.00kV & TEXSUNST 18.00kV Gen Units AND SMYRNA-SEMITROPIC-MIDWAY 115kV [3710] MOAS OPENED on GANSO_MIDWAY	P3	G1/N1	<8	11	<8	<8	<8	<8	13	<8	<8	<8	Utilize Summer Setup for summer and non-summer months
CHARKA 115 kV	TEXSUN1G 18.00kV & TEXSUN2G 18.00kV & TEXSUNST 18.00kV Gen Units AND SMYRNA-SEMITROPIC-MIDWAY 115kV [3710] MOAS OPENED on GANSO_MIDWAY	P3	G1/N1	18	36	<8	<8	<8	<8	43	<8	<8	<8	Remove Semitropic Shoefly and close Semitropic D to Semitropic E section
CHSR12A 115 kV	TEXSUN1G 18.00kV & TEXSUN2G 18.00kV & TEXSUNST 18.00kV Gen Units AND SMYRNA-SEMITROPIC-MIDWAY 115kV [3710] MOAS OPENED on GANSO_MIDWAY	P3	G1/N1	<8	36	<8	<8	<8	<8	43	<8	<8	<8	Remove Semitropic Shoefly and close Semitropic D to Semitropic E section
CHSR12B 115 kV	TEXSUN1G 18.00kV & TEXSUN2G 18.00kV & TEXSUNST 18.00kV Gen Units AND SMYRNA-SEMITROPIC-MIDWAY 115kV [3710] MOAS OPENED on GANSO_MIDWAY	P3	G1/N1	<8	36	<8	<8	<8	<8	43	<8	<8	<8	Remove Semitropic Shoefly and close Semitropic D to Semitropic E section
CHSR12SWSTA 115 kV	TEXSUN1G 18.00kV & TEXSUN2G 18.00kV & TEXSUNST 18.00kV Gen Units AND SMYRNA-SEMITROPIC-MIDWAY 115kV [3710] MOAS OPENED on GANSO_MIDWAY	P3	G1/N1	<8	36	<8	<8	<8	<8	43	<8	<8	<8	Remove Semitropic Shoefly and close Semitropic D to Semitropic E section
FAMOS0 115 kV	TEXSUN1G 18.00kV & TEXSUN2G 18.00kV & TEXSUNST 18.00kV Gen Units AND SMYRNA-SEMITROPIC-MIDWAY 115kV [3710] MOAS OPENED on GANSO_MIDWAY	P3	G1/N1	18	36	<8	<8	<8	<8	43	<8	<8	<8	Remove Semitropic Shoefly and close Semitropic D to Semitropic E section
FAMOS0 70 kV	TEXSUN1G 18.00kV & TEXSUN2G 18.00kV & TEXSUNST 18.00kV Gen Units AND SMYRNA-SEMITROPIC-MIDWAY 115kV [3710] MOAS OPENED on GANSO_MIDWAY	P3	G1/N1	12	23	<8	<8	<8	<8	27	<8	<8	<8	Utilize Summer Setup for summer and non-summer months

Study Area: **PG&E Kern**

Voltage Deviation



Substation	Contingency (All and Worst P6)	Category	Category Description	Post Cont. Voltage Deviation % (Baseline Scenarios)					Post Cont. Voltage Deviation % (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations	
KRN OL J 70 kV	TEXSUN1G 18.00kV & TEXSUN2G 18.00kV & TEXSUNST 18.00kV Gen Units AND SMYRNA-SEMITROPIC-MIDWAY 115kV [3710] MOAS OPENED on GANSO_MIDWAY	P3	G1/N1	<8	8	<8	<8	<8	10	<8	<8	<8	Utilize Summer Setup for summer and non-summer months
MC FRLND 70 kV	TEXSUN1G 18.00kV & TEXSUN2G 18.00kV & TEXSUNST 18.00kV Gen Units AND SMYRNA-SEMITROPIC-MIDWAY 115kV [3710] MOAS OPENED on GANSO_MIDWAY	P3	G1/N1	13	25	<8	<8	<8	29	<8	<8	<8	Utilize Summer Setup for summer and non-summer months
SEMITR&1 115 kV	TEXSUN1G 18.00kV & TEXSUN2G 18.00kV & TEXSUNST 18.00kV Gen Units AND SMYRNA-SEMITROPIC-MIDWAY 115kV [3710] MOAS OPENED on GANSO_MIDWAY	P3	G1/N1	18	36	<8	<8	<8	42	<8	<8	<8	Remove Semitropic Shoefly and close Semitropic D to Semitropic E section
SEMITROPIC_D 115 kV	TEXSUN1G 18.00kV & TEXSUN2G 18.00kV & TEXSUNST 18.00kV Gen Units AND SMYRNA-SEMITROPIC-MIDWAY 115kV [3710] MOAS OPENED on GANSO_MIDWAY	P3	G1/N1	18	36	<8	<8	<8	42	<8	<8	<8	Remove Semitropic Shoefly and close Semitropic D to Semitropic E section
SEMITRPC 70 kV	TEXSUN1G 18.00kV & TEXSUN2G 18.00kV & TEXSUNST 18.00kV Gen Units AND SMYRNA-SEMITROPIC-MIDWAY 115kV [3710] MOAS OPENED on GANSO_MIDWAY	P3	G1/N1	18	35	<8	<8	<8	41	<8	<8	<8	Utilize Summer Setup for summer and non-summer months
WASCO 70 kV	TEXSUN1G 18.00kV & TEXSUN2G 18.00kV & TEXSUNST 18.00kV Gen Units AND SMYRNA-SEMITROPIC-MIDWAY 115kV [3710] MOAS OPENED on GANSO_MIDWAY	P3	G1/N1	15	30	<8	<8	<8	36	<8	<8	<8	Utilize Summer Setup for summer and non-summer months
WSCOPRSN 115 kV	TEXSUN1G 18.00kV & TEXSUN2G 18.00kV & TEXSUNST 18.00kV Gen Units AND SMYRNA-SEMITROPIC-MIDWAY 115kV [3710] MOAS OPENED on GANSO_MIDWAY	P3	G1/N1	18	36	<8	<8	<8	43	<8	<8	<8	Remove Semitropic Shoefly and close Semitropic D to Semitropic E section

Study Area: **PG&E Kern**

Voltage Deviation



Substation	Contingency (All and Worst P6)	Category	Category Description	Post Cont. Voltage Deviation % (Baseline Scenarios)					Post Cont. Voltage Deviation % (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations	
MC FRLND 70 kV	TX MIDST 9.11kV Gen Unit 1 AND SMYRNA-SEMITROPIC-MIDWAY 115kV [3710] MOAS OPENED on GANSO_MIDWAY	P3	G1/N1	<8	<8	<8	<8	<8	29	<8	<8	<8	Utilize Summer Setup for summer and non-summer months
SEMITROPIC_D 115 kV	TX MIDST 9.11kV Gen Unit 1 AND SMYRNA-SEMITROPIC-MIDWAY 115kV [3710] MOAS OPENED on GANSO_MIDWAY	P3	G1/N1	<8	<8	<8	<8	<8	42	<8	<8	<8	Remove Semitropic Shoefly and close Semitropic D to Semitropic E section
WASCO 70 kV	TX MIDST 9.11kV Gen Unit 1 AND SMYRNA-SEMITROPIC-MIDWAY 115kV [3710] MOAS OPENED on GANSO_MIDWAY	P3	G1/N1	<8	<8	<8	<8	<8	35	<8	<8	<8	Utilize Summer Setup for summer and non-summer months
WSCOPRSN 115 kV	TX MIDST 9.11kV Gen Unit 1 AND SMYRNA-SEMITROPIC-MIDWAY 115kV [3710] MOAS OPENED on GANSO_MIDWAY	P3	G1/N1	<8	<8	<8	<8	<8	42	<8	<8	<8	Remove Semitropic Shoefly and close Semitropic D to Semitropic E section
SEMITR&1 115 kV	WASCO-LV 12.47kV Gen Unit RN AND SMYRNA-SEMITROPIC-MIDWAY 115kV [3710] MOAS OPENED on GANSO_MIDWAY	P3	G1/N1	<8	<8	<8	<8	<8	<8	<8	10	<8	Remove Semitropic Shoefly and close Semitropic D to Semitropic E section
SEMITRPC 70 kV	WASCO-LV 12.47kV Gen Unit RN AND SMYRNA-SEMITROPIC-MIDWAY 115kV [3710] MOAS OPENED on GANSO_MIDWAY	P3	G1/N1	<8	<8	<8	<8	<8	<8	<8	10	<8	Utilize Summer Setup for summer and non-summer months





Contingency	Category	Category Description	Transient Stability Performance					Potential Mitigation Solutions
			Baseline Scenarios			Sensitivity Scenarios		
			2020 Summer Peak	2028 Summer Peak	2023 Spring Off-Peak	2020 SP Heavy Renewable & Min Gas Gen	2023 SpOP Hi Renew & Min Gas Gen	
Midway 230/115 Bank Transformer 3Ø fault with normal clearing.	P1-3	N-1	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Kern PP 230/115 kV #13 Transformer 3Ø fault with normal clearing.	P1-3	N-1	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Wheeler 230 kV Cap Bank 3Ø fault with normal clearing.	P1-4	N-1	NA	Stable/WECC criteria met	Stable/WECC criteria met	NA	Stable/WECC criteria met	No violation (Shunt Device in-service 12/2020)
Midway 230 kV bus SLG fault with normal clearing.	P2-2	Bus	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Midway 230 kV bus-tie breaker SLG fault with normal clearing.	P2-4	Bus-Tie Breaker	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Kern Power to 7 Standard 115 kV line fault with normal clearing with MT Poso offline in the base case.	P3-2	G-1/N-1	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Tx Sunset SLG fault expanded to elements lost due to stuck breaker and clear fault from remote breakers with normal clearing time.	P4-1	Stuck Breaker	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Kern Power to 7 Standard 115 kv line expanded to elements lost due to stuck breaker and clear fault from remote breakers with normal clearing time.	P4-2	Stuck Breaker	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
La Paloma SLG Fault with delayed clearing	P5-1	Non-Redundant Relay	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Midway-Wheeler Ridge #1 & #2 230 kV Lines SLG fault with successful high speed reclose.	P7-1	DCTL	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation

Study Area: **PG&E Kern**



*Single Contingency Load Drop*

Worst Contingency	Category	Category Description	Amount of Load Drop (MW)										Potential Mitigation Solutions
			2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	Select..	Select..	Select..	Select..	Select..	Select..	Select..	

No single source substation with of more than 100 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 of more than 100 MW

Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading % (Baseline Scenarios)									Loading % (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2020 Winter Peak	2023 Winter Peak	2028 Winter Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations		
30915 MORROBAY 230 30916 SOLARSS 230 1 1	CALIENTE SW STA-MIDWAY #1 230kV [5216] & CALIENTE SW STA-MIDWAY #2 230kV [5226]	P6	N-1-1	<100	<100	<100	100	99	<100	<100	<100	<100	99	101	<100	Sensitivity Only	
	CALIENTE SW STA-MIDWAY #2 230kV [5226] & CALIENTE SW STA-MIDWAY #1 230kV [5216]	P6	N-1-1	<100	<100	<100	100	99	<100	<100	<100	<100	99	101	<100	Sensitivity Only	
35910 CRZY_HRS 115 35913 NTVD SW2 115 1 1	SALINAS-MOSSLNSW-DOLAN RD 115kV [0] & MOSS LANDING-SALINAS #2 115kV [2890]	P6	N-1-1	127	129	138	<100	<100	90	<100	101	134	<100	<100	138	New SPS	
	MOSS LANDING-SALINAS #2 115kV [2890] & SALINAS-MOSSLNSW-DOLAN RD 115kV [0]	P6	N-1-1	127	129	138	<100	<100	90	<100	101	134	<100	<100	138	New SPS	
35913 NTVD SW2 115 35920 SALINAS 115 1 1	SALINAS-MOSSLNSW-DOLAN RD 115kV [0] & MOSS LANDING-SALINAS #2 115kV [2890]	P6	N-1-1	113	114	120	<100	<100	<100	<100	<100	119	<100	<100	120	New SPS	
	SALINAS-MOSSLNSW-DOLAN RD 115kV [0] & MOSS LANDING-SALINAS #2 115kV [2890]	P6	N-1-1	113	114	120	<100	<100	<100	<100	<100	119	<100	<100	120	New SPS	
36008 GREN VLY 60.0 35901 GRN VLLY 115 1 1	SALINAS 115/60kV TB 2 & SALINAS 115/60kV TB 3	P6	N-1-1	245	254	242	176	166	245	235	250	262	152	234	243	Modify existing UVLS or operating solution	
	Salinas 115kV BAAH Bus #1 (failure of non-redundent relay)	P5	Non-Redundent Relay	215	221	221	176	166	222	214	224	228	156	205	221	Protection Upgrade	
	Salinas 115kV BAAH Bus #2 (failure of non-redundent relay)	P5	Non-Redundent Relay	Diverge	Diverge	Diverge	186	181	Diverge	232	Diverge	Diverge	171	221	Diverge	Protection Upgrade	
36008 GREN VLY 60.0 36013 ERTA JCT 60.0 1 1	MOSS LANDING-GREEN VALLEY #1 115kV [2850] & MOSS LANDING-GREEN VALLEY #2 115kV [2860]	P6	N-1-1	Diverge	<100	<100	<100	<100	Diverge	Diverge	<100	<100	<100	127	<100	Project: Morgan Hill - Scope under review	
	SALINAS 115/60kV TB 3 & SALINAS 115/60kV TB 2	P6	N-1-1	186	190	181	128	118	144	138	144	193	108	175	181	Modify existing UVLS or operating solution	
	Salinas 115kV BAAH Bus #1 (failure of non-redundent relay)	P5	Non-Redundent Relay	162	164	164	128	118	130	125	128	167	111	153	164	Protection Upgrade	
	Salinas 115kV BAAH Bus #2 (failure of non-redundent relay)	P5	Non-Redundent Relay	Diverge	Diverge	Diverge	136	130	Diverge	135	Diverge	Diverge	121	166	Diverge	Protection Upgrade	
36011 CIC JCT 60.0 36013 ERTA JCT 60.0 1 1	MOSS LANDING-GREEN VALLEY #1 115kV [2850] & MOSS LANDING-GREEN VALLEY #2 115kV [2860]	P6	N-1-1	Diverge	<100	<100	<100	<100	Diverge	Diverge	<100	<100	<100	128	<100	Project: Morgan Hill - Scope under review	
	SALINAS 115/60kV TB 3 & SALINAS 115/60kV TB 2	P6	N-1-1	185	188	179	128	118	143	137	142	192	108	175	179	Modify existing UVLS or operating solution	
	Salinas 115kV BAAH Bus #1 (failure of non-redundent relay)	P5	Non-Redundent Relay	160	162	162	128	118	128	124	127	166	111	151	163	Protection Upgrade	
	Salinas 115kV BAAH Bus #2 (failure of non-redundent relay)	P5	Non-Redundent Relay	Diverge	Diverge	Diverge	136	129	Diverge	134	Diverge	Diverge	121	164	Diverge	Protection Upgrade	
36011 CIC JCT 60.0 36016 AGRILINK 60.0 1 1	MOSS LANDING-GREEN VALLEY #2 115kV [2860] & MOSS LANDING-GREEN VALLEY #1 115kV [2850]	P6	N-1-1	Diverge	<100	<100	<100	<100	Diverge	Diverge	<100	<100	<100	128	<100	Project: Morgan Hill - Scope under review	
	SALINAS 115/60kV TB 2 & SALINAS 115/60kV TB 3	P6	N-1-1	185	188	179	128	118	143	137	142	192	108	174	179	Modify existing UVLS or operating solution	
	Salinas 115kV BAAH Bus #1 (failure of non-redundent relay)	P5	Non-Redundent Relay	160	162	162	128	118	128	124	127	166	111	151	163	Protection Upgrade	
	Salinas 115kV BAAH Bus #2 (failure of non-redundent relay)	P5	Non-Redundent Relay	Diverge	Diverge	Diverge	136	129	Diverge	134	Diverge	Diverge	121	164	Diverge	Protection Upgrade	
MOSS LANDING-GREEN VALLEY #1 115kV [2850] & MOSS LANDING-GREEN VALLEY #2 115kV [2860]	P6	N-1-1	Diverge	<100	<100	<100	<100	Diverge	Diverge	<100	<100	<100	207	<100	Project: Morgan Hill - Scope under review		

Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading % (Baseline Scenarios)									Loading % (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2020 Winter Peak	2023 Winter Peak	2028 Winter Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations		
36012 WTSNVILLE 60.0 36014 GRANT JT 60.0 1 1	SALINAS 115/60kV TB 3 & SALINAS 115/60kV TB 2	P6	N-1-1	206	210	217	166	155	172	167	172	214	142	196	217	Modify existing UVLS or operating solution	
	Salinas 115kV BAAH Bus #1 (failure of non-redundent relay)	P5	Non-Redundent Relay	216	219	220	166	155	176	169	175	222	146	205	221	Protection Upgrade	
	Salinas 115kV BAAH Bus #2 (failure of non-redundent relay)	P5	Non-Redundent Relay	Diverge	Diverge	Diverge	185	171	Diverge	184	Diverge	Diverge	161	223	Diverge	Protection Upgrade	
36012 WTSNVILLE 60.0 36016 AGRILINK 60.0 1 1	MOSS LANDING-GREEN VALLEY #1 115kV [2850] & MOSS LANDING-GREEN VALLEY #2 115kV [2860]	P6	N-1-1	Diverge	<100	<100	<100	<100	Diverge	Diverge	<100	<100	<100	128	<100	Project: Morgan Hill - Scope under review	
	SALINAS 115/60kV TB 3 & SALINAS 115/60kV TB 2	P6	N-1-1	185	188	179	127	118	142	137	142	191	107	174	179	Modify existing UVLS or operating solution	
	Salinas 115kV BAAH Bus #1 (failure of non-redundent relay)	P5	Non-Redundent Relay	160	162	162	127	118	128	124	127	165	110	151	162	Protection Upgrade	
	Salinas 115kV BAAH Bus #2 (failure of non-redundent relay)	P5	Non-Redundent Relay	Diverge	Diverge	Diverge	135	129	Diverge	134	Diverge	Diverge	121	164	Diverge	Protection Upgrade	
36018 BRIGTANO 60.0 36014 GRANT JT 60.0 1 1	MOSS LANDING-GREEN VALLEY #1 115kV [2850] & MOSS LANDING-GREEN VALLEY #2 115kV [2860]	P6	N-1-1	Diverge	<100	<100	<100	<100	Diverge	Diverge	<100	<100	<100	220	<100	Project: Morgan Hill - Scope under review	
	SALINAS 115/60kV TB 3 & SALINAS 115/60kV TB 2	P6	N-1-1	194	198	202	154	145	161	156	160	202	132	184	203	Modify existing UVLS or operating solution	
	Salinas 115kV BAAH Bus #1 (failure of non-redundent relay)	P5	Non-Redundent Relay	205	208	206	154	144	165	158	164	210	136	194	206	Protection Upgrade	
	Salinas 115kV BAAH Bus #2 (failure of non-redundent relay)	P5	Non-Redundent Relay	Diverge	Diverge	Diverge	173	160	Diverge	173	Diverge	Diverge	150	210	Diverge	Protection Upgrade	
36018 BRIGTANO 60.0 36022 LGNSTAP 60.0 1 1	MOSS LANDING-GREEN VALLEY #1 115kV [2850] & MOSS LANDING-GREEN VALLEY #2 115kV [2860]	P6	N-1-1	Diverge	<100	<100	97	<100	Diverge	Diverge	<100	<100	<100	268	<100	Project: Morgan Hill - Scope under review	
	SALINAS 115/60kV TB 3 & SALINAS 115/60kV TB 2	P6	N-1-1	212	217	223	170	159	177	171	177	221	145	201	223	Modify existing UVLS or operating solution	
	Salinas 115kV BAAH Bus #1 (failure of non-redundent relay)	P5	Non-Redundent Relay	225	229	228	170	159	181	175	181	232	150	213	228	Protection Upgrade	
	Salinas 115kV BAAH Bus #2 (failure of non-redundent relay)	P5	Non-Redundent Relay	Diverge	Diverge	Diverge	190	176	Diverge	191	Diverge	Diverge	166	231	Diverge	Protection Upgrade	
36022 LGNSTAP 60.0 36025 SALINAS2 60.0 1 1	MOSS LANDING-GREEN VALLEY #1 115kV [2850] & MOSS LANDING-GREEN VALLEY #2 115kV [2860]	P6	N-1-1	Diverge	<100	<100	98	<100	Diverge	Diverge	<100	<100	<100	266	<100	Project: Morgan Hill - Scope under review	
	SALINAS 115/60kV TB 3 & SALINAS 115/60kV TB 2	P6	N-1-1	215	219	228	170	159	178	173	179	223	145	203	227	Modify existing UVLS or operating solution	
	Salinas 115kV BAAH Bus #1 (failure of non-redundent relay)	P5	Non-Redundent Relay	225	229	228	170	159	182	175	181	232	149	213	228	Protection Upgrade	
	Salinas 115kV BAAH Bus #2 (failure of non-redundent relay)	P5	Non-Redundent Relay	Diverge	Diverge	Diverge	191	176	Diverge	191	Diverge	Diverge	166	231	Diverge	Protection Upgrade	
36025 SALINAS2 60.0 36027 SALINAS1 60.0 1 1	Salinas 115kV BAAH Bus #2 (failure of non-redundent relay)	P5	Non-Redundent Relay	Diverge	Diverge	Diverge	59	59	Diverge	52	Diverge	Diverge	59	68	Diverge	Protection Upgrade	
36027 SALINAS1 60.0 36054 SNBRN JT 60.0 1 1	SALINAS-FIRESTONE #1 60kV [7900] (SALINAS1-FREXP JT)	P2	Line Section w/o Fault	98	99	99	42	38	68	70	75	103	37	81	99	Sensitivity Only	



Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading % (Baseline Scenarios)						Loading % (Sensitivity Scenarios)				Project & Potential Mitigation Solutions		
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2020 Winter Peak	2023 Winter Peak	2028 Winter Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen		2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations
36048 B.VSTA J 60.0 36050 FIRESTNE 60.0 1 1	SALINAS-FIRESTONE #1 60kV [7900] (SALINAS1-FREXP JT)	P2	Line Section w/o Fault	116	115	118	46	40	82	82	90	121	38	89	118	Non BES facility
	SALINAS-FIRESTONE #2 60kV [7910] (SALINAS1-SNBRN JT)	P2	Line Section w/o Fault	102	102	100	49	46	77	76	79	107	45	91	100	Non BES facility
36050 FIRESTNE 60.0 36052 SPNCE J2 60.0 1 1	SALINAS-FIRESTONE #1 60kV [7900] (SALINAS1-FREXP JT)	P2	Line Section w/o Fault	116	116	119	49	44	82	82	90	123	42	91	119	Non BES facility
36051 SPNCE J1 60.0 36053 SPENCE 60.0 1 1	SALINAS-FIRESTONE #1 60kV [7900] (SALINAS1-FREXP JT)	P2	Line Section w/o Fault	216	216	218	93	85	154	157	169	227	82	179	218	Non BES facility
36051 SPNCE J1 60.0 36054 SNBRN JT 60.0 1 1	SALINAS-FIRESTONE #1 60kV [7900] (SALINAS1-FREXP JT)	P2	Line Section w/o Fault	216	216	218	93	85	154	157	169	227	82	179	218	Non BES facility
36052 SPNCE J2 60.0 36053 SPENCE 60.0 1 1	SALINAS-FIRESTONE #1 60kV [7900] (SALINAS1-FREXP JT)	P2	Line Section w/o Fault	124	123	127	52	47	87	88	96	131	44	97	126	Non BES facility
36079 S ARDOJ2 60.0 36081 TEXCO J2 60.0 1 1	COBURN-OIL FIELDS #1 60kV [6410] (S ARDOJ1-TEXCO J1)	P2	Line Section w/o Fault	32	32	34	103	50	77	29	31	32	52	45	27	Non BES facility
36080 S ARDOJ1 60.0 36083 TEXCO J1 60.0 1 1	COBURN-OIL FIELDS #2 60kV [6420] (S ARDOJ2-TEXCO J2)	P2	Line Section w/o Fault	32	32	34	103	50	77	29	31	32	52	45	27	Non BES facility
	OILFLDS 60kV Section 1E	P2	Bus	32	32	34	103	50	77	29	31	32	52	45	27	Non BES facility
36081 TEXCO J2 60.0 36084 OILFLDS 60.0 1 1	COBURN-OIL FIELDS #1 60kV [6410] (S ARDOJ1-TEXCO J1)	P2	Line Section w/o Fault	32	32	34	103	50	65	25	26	32	52	45	27	Non BES facility
	COBURN-OIL FIELDS #2 60kV [6420] (S ARDOJ2-TEXCO J2)	P2	Line Section w/o Fault	32	32	34	103	50	65	25	26	32	52	45	27	Non BES facility
	OILFLDS 60kV Section 1E	P2	Bus	32	32	34	103	50	65	25	26	32	52	45	27	Non BES facility
36251 FTHILTP2 115 36254 SN LS OB 115 1 1	MORRO BAY-DIABLO 230kV [5260] & MORRO BAY-MESA 230kV [5290]	P6	N-1-1	107	113	108	<100	<100	<100	<100	<100	111	<100	<100	109	Project: Midway-Andrew 230 KV - Scope under review
	MORROBAY 230kV - Section 2E & 1E	P2	Bus-tie Breaker	111	Diverge	110	27	30	Diverge	60	83	Diverge	23	61	111	Project: Midway-Andrew 230 KV - Scope under review
36252 MORRO BY 115 30915 MORROBAY 230 6 1	MORRO BAY-MESA 230kV [5290] & MORRO BAY-DIABLO 230kV [5260]	P6	N-1-1	166	175	165	<100	<100	114	103	128	171	<100	97	166	Project: Midway-Andrew 230 KV - Scope under review
	MESA_PGE 115kV - Section 2D & 1D	P2	Bus-tie Breaker	114	124	124	50	35	75	68	96	122	41	Diverge	126	Project: Midway-Andrew 230 KV - Scope under review
	MORROBAY 230kV - Section 2E & 1E	P2	Bus-tie Breaker	152	Diverge	149	46	48	Diverge	99	114	Diverge	37	102	149	Project: Midway-Andrew 230 KV - Scope under review
36252 MORRO BY 115 36303 GLDTRJC1 115 1 1	MORRO BAY-DIABLO 230kV [5260] & MORRO BAY-MESA 230kV [5290]	P6	N-1-1	113	120	115	<100	<100	92	<100	113	117	<100	<100	116	Project: Midway-Andrew 230 KV - Scope under review
	MORROBAY 230kV - Section 2E & 1E	P2	Bus-tie Breaker	118	Diverge	118	29	31	Diverge	82	115	Diverge	24	64	119	Project: Midway-Andrew 230 KV - Scope under review
36252 MORRO BY 115 36304 GLDTRJC2 115 1 1	MORRO BAY-DIABLO 230kV [5260] & MORRO BAY-MESA 230kV [5290]	P6	N-1-1	112	118	114	<100	<100	<100	<100	<100	116	<100	<100	114	Project: Midway-Andrew 230 KV - Scope under review
	MORROBAY 230kV - Section 2E & 1E	P2	Bus-tie Breaker	117	Diverge	117	29	31	Diverge	63	88	Diverge	24	64	118	Project: Midway-Andrew 230 KV - Scope under review
36253 FTHILTP1 115 36254 SN LS OB 115 1 1	MORRO BAY-DIABLO 230kV [5260] & MORRO BAY-MESA 230kV [5290]	P6	N-1-1	109	115	110	<100	<100	<100	<100	107	112	<100	<100	110	Project: Midway-Andrew 230 KV - Scope under review
	MORROBAY 230kV - Section 2E & 1E	P2	Bus-tie Breaker	113	Diverge	112	28	30	Diverge	78	108	Diverge	24	62	113	Project: Midway-Andrew 230 KV - Scope under review
36254 SN LS OB 115 34796 CARRIZO 115 1 1	MORRO BAY-DIABLO 230kV [5260] & MORRO BAY-MESA 230kV [5290]	P6	N-1-1	108	118	114	<100	<100	<100	<100	<100	115	<100	<100	115	Project: Midway-Andrew 230 KV - Scope under review
	MORROBAY 230kV - Section 2E & 1E	P2	Bus-tie Breaker	3	Diverge	2	41	45	Diverge	2	1	Diverge	32	47	2	Project: Midway-Andrew 230 KV - Scope under review

Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading % (Baseline Scenarios)						Loading % (Sensitivity Scenarios)				Project & Potential Mitigation Solutions		
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2020 Winter Peak	2023 Winter Peak	2028 Winter Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen		2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations
36254 SN LS OB 115 36266 SNTA MRA 115 1 1	MORRO BAY-DIABLO 230kV [5260] & MORRO BAY-MESA 230kV [5290]	P6	N-1-1	255	273	251	<100	<100	181	160	224	263	<100	123	250	Project: Midway-Andrew 230 KV - Scope under review
	MESA_PGE 115kV - Section 2D & 1D	P2	Bus-tie Breaker	209	241	241	98	67	143	122	214	237	93	Diverge	240	Project: Midway-Andrew 230 KV - Scope under review
	MORROBAY 230kV - Section 2E & 1E	P2	Bus-tie Breaker	187	Diverge	181	72	83	Diverge	118	162	Diverge	63	144	180	Project: Midway-Andrew 230 KV - Scope under review
36254 SN LS OB 115 36278 OCEANO 115 1 1	MORRO BAY-MESA 230kV [5290] & MORRO BAY-DIABLO 230kV [5260]	P6	N-1-1	187	201	187	<100	<100	125	111	159	195	<100	90	190	Project: Midway-Andrew 230 KV - Scope under review
	MORROBAY 230kV - Section 2E & 1E	P2	Bus-tie Breaker	167	Diverge	155	52	58	Diverge	102	132	Diverge	44	105	158	Project: Midway-Andrew 230 KV - Scope under review
36256 MESA_PGE 115 36267 SNTAMRTP 115 1 1	DIVIDE-CABRILLO #1 115kV [1380] & MESA-SISQUOC 115kV [2460]	P6	N-1-1	<100	93	104	<100	<100	<100	<100	100	100	<100	<100	104	Project: Midway-Andrew 230 KV - Scope under review
36256 MESA_PGE 115 36280 UNION OL 115 1 1	MORRO BAY-MESA 230kV [5290] & MORRO BAY-DIABLO 230kV [5260]	P6	N-1-1	187	201	175	<100	<100	123	109	137	190	<100	94	167	Project: Midway-Andrew 230 KV - Scope under review
	MORROBAY 230kV - Section 2D & 2E	P2	Bus-tie Breaker	32	26	110	7	5	22	19	34	31	6	15	150	Project: Midway-Andrew 230 KV - Scope under review
	MORROBAY 230kV - Section 2E & 1E	P2	Bus-tie Breaker	152	Diverge	144	57	70	Diverge	98	113	Diverge	52	115	136	Project: Midway-Andrew 230 KV - Scope under review
36258 S.M.ASSO 115 36260 SISQUOC 115 1 1	MORROBAY 230kV - Section 2D & 2E	P2	Bus-tie Breaker	22	26	104	8	10	16	14	21	27	9	15	130	Project: Midway-Andrew 230 KV - Scope under review
36260 SISQUOC 115 36286 PALMR 115 1 1	MESA-DIVIDE #2 115kV [2440] & MESA-DIVIDE #1 115kV [2430]	P6	N-1-1	153	155	154	<100	<100	121	107	121	182	<100	95	154	Project: Midway-Andrew 230 KV - Scope under review
	DIVIDE-CABRILLO #1 115kV [1380] (SURF JCT-PURSMJ2)	P2	Line Section w/o Fault	85	94	98	38	42	63	57	74	104	40	61	98	Sensitivity Only
	DIVIDE-CABRILLO #1 115kV [1380] (DIVIDE-PURSMJ2)	P2	Line Section w/o Fault	85	94	98	38	42	63	57	74	104	40	61	98	Sensitivity Only
	MESA_PGE 115kV - Section 2D & 1D	P2	Bus-tie Breaker	114	137	124	62	37	65	55	95	130	69	Diverge	124	Project: Midway-Andrew 230 KV - Scope under review
	MORROBAY 230kV - Section 2D & 2E	P2	Bus-tie Breaker	39	55	114	18	28	31	28	43	58	25	29	135	Project: Midway-Andrew 230 KV - Scope under review
	MORROBAY 230kV - Section 2E & 1E	P2	Bus-tie Breaker	91	Diverge	103	20	29	Diverge	49	79	Diverge	27	30	101	Project: Midway-Andrew 230 KV - Scope under review
36264 S.YNZ JT 115 36288 ZACA 115 1 1	MESA-DIVIDE #1 115kV [2430] & MESA-DIVIDE #2 115kV [2440]	P6	N-1-1	162	147	145	<100	<100	129	115	115	178	<100	99	145	Project: Midway-Andrew 230 KV - Scope under review
	MESA_PGE 115kV - Section 2D & 1D	P2	Bus-tie Breaker	108	106	97	65	22	61	52	74	106	59	Diverge	97	Project: Midway-Andrew 230 KV - Scope under review
	MORROBAY 230kV - Section 2D & 2E	P2	Bus-tie Breaker	30	31	91	14	12	24	22	23	37	9	22	106	Sensitivity Only
36266 SNTA MRA 115 36267 SNTAMRTP 115 1 1	DIVIDE-CABRILLO #1 115kV [1380] & MESA-SISQUOC 115kV [2460]	P6	N-1-1	98	106	122	<100	<100	<100	<100	116	117	<100	<100	122	Project: Midway-Andrew 230 KV - Scope under review
36266 SNTA MRA 115 36269 FRWAYTP 115 1 1	DIVIDE-CABRILLO #1 115kV [1380] & MESA-SISQUOC 115kV [2460]	P6	N-1-1	<100	93	98	<100	<100	<100	<100	93	102	<100	<100	98	Sensitivity Only
	MESA_PGE 115kV - Section 2D & 1D	P2	Bus-tie Breaker	123	145	134	57	35	89	76	129	139	60	Diverge	133	Project: Midway-Andrew 230 KV - Scope under review
36278 OCEANO 115 36280 UNION OL 115 1 1	MORRO BAY-MESA 230kV [5290] & MORRO BAY-DIABLO 230kV [5260]	P6	N-1-1	183	197	169	<100	<100	122	108	133	186	<100	90	175	Project: Midway-Andrew 230 KV - Scope under review
	MORROBAY 230kV - Section 2D & 2E	P2	Bus-tie Breaker	33	29	113	11	7	21	18	36	34	9	17	142	Project: Midway-Andrew 230 KV - Scope under review

Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading % (Baseline Scenarios)									Loading % (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2020 Winter Peak	2023 Winter Peak	2028 Winter Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations		
	MORROBAY 230kV - Section 2E & 1E	P2	Bus-tie Breaker	148	Diverge	136	53	66	Diverge	97	107	Diverge	49	115	143	Project: Midway-Andrew 230 KV - Scope under review	
36286 PALMR 115 36287 AECCEORTP 115 1 1	MESA-DIVIDE #1 115kV [2430] & MESA-DIVIDE #2 115kV [2440]	P6	N-1-1	<100	149	148	<100	<100	<100	<100	116	177	<100	<100	148	Project: Midway-Andrew 230 KV - Scope under review	
	MESA_PGE 115kV - Section 2D & 1D	P2	Bus-tie Breaker	N/A	127	115	N/A	34	N/A	N/A	88	122	67	N/A	115	Project: Midway-Andrew 230 KV - Scope under review	
	MORROBAY 230kV - Section 2D & 2E	P2	Bus-tie Breaker	N/A	49	106	N/A	25	N/A	N/A	38	53	22	N/A	126	Project: Midway-Andrew 230 KV - Scope under review	
36286 PALMR 115 36288 ZACA 115 1 1	MESA-DIVIDE #2 115kV [2440] & MESA-DIVIDE #1 115kV [2430]	P6	N-1-1	148	<100	<100	<100	<100	117	104	<100	<100	<100	91	<100	Project: Midway-Andrew 230 KV - Scope under review	
	MESA_PGE 115kV - Section 2D & 1D	P2	Bus-tie Breaker	106	N/A	N/A	59	N/A	60	51	N/A	N/A	N/A	Diverge	N/A	Project: Midway-Andrew 230 KV - Scope under review	
	MESA-DIVIDE #1 115kV [2430] & MESA-DIVIDE #2 115kV [2440]	P6	N-1-1	<100	134	133	<100	<100	<100	<100	105	161	<100	<100	133	Project: Midway-Andrew 230 KV - Scope under review	
	MORROBAY 230kV - Section 2D & 2E	P2	Bus-tie Breaker	N/A	35	89	N/A	12	N/A	N/A	26	39	9	N/A	104	Sensitivity Only	
36303 GLDTRJC1 115 36251 FTHILTP2 115 1 1	MORRO BAY-MESA 230kV [5290] & MORRO BAY-DIABLO 230kV [5260]	P6	N-1-1	107	113	108	<100	<100	<100	<100	<100	111	<100	<100	109	Project: Midway-Andrew 230 KV - Scope under review	
	MORROBAY 230kV - Section 2E & 1E	P2	Bus-tie Breaker	111	Diverge	110	27	30	Diverge	60	83	Diverge	23	61	111	Project: Midway-Andrew 230 KV - Scope under review	
36304 GLDTRJC2 115 36253 FTHILTP1 115 1 1	MORRO BAY-MESA 230kV [5290] & MORRO BAY-DIABLO 230kV [5260]	P6	N-1-1	112	118	114	<100	<100	<100	<100	<100	116	<100	<100	114	Project: Midway-Andrew 230 KV - Scope under review	
	MORROBAY 230kV - Section 2E & 1E	P2	Bus-tie Breaker	117	Diverge	117	29	30	Diverge	63	88	Diverge	23	63	118	Project: Midway-Andrew 230 KV - Scope under review	
36310 TEMPL7 70.0 36316 TEMPL J2 70.0 1 1	MORROBAY 230kV - Section 2D & 2E	P2	Bus-tie Breaker	65	70	106	22	21	58	54	63	71	17	47	142	Project: Midway-Andrew 230 KV - Scope under review	
36316 TEMPL J2 70.0 36358 ATASCDRO 70.0 1 1	MORROBAY 230kV - Section 2D & 2E	P2	Bus-tie Breaker	65	70	106	22	21	58	54	63	70	17	47	142	Project: Midway-Andrew 230 KV - Scope under review	
36353 ESTRELLA 70.0 36356 PSA RBLS 70.0 1 1	MORRO BAY-TEMPLETON 230kV [5933] & TEMPLETON-GATES 230kV [5934]	P6	N-1-1	111	115	107	<100	<100	<100	<100	<100	119	<100	<100	107	Modify existing UVLS or operating solution	
	MORROBAY 230kV - Section 2D & 2E	P2	Bus-tie Breaker	78	83	90	29	26	54	51	55	83	24	61	103	Sensitivity Only	
36354 SAN MIGL 70.0 34574 COLNGA 1 70.0 1 1	ESTRELLA 230/70kV TB 1 & PASO ROBLES-TEMPLETON 70kV [9400]	P6	N-1-1	231	303	221	104	<100	168	166	157	301	<100	205	221	Modify existing UVLS or operating solution	
36354 SAN MIGL 70.0 36353 ESTRELLA 70.0 1 1	PASO ROBLES-TEMPLETON 70kV [9400] & ESTRELLA 230/70kV TB 1	P6	N-1-1	201	<100	195	90	<100	173	172	164	<100	<100	182	194	Modify existing UVLS or operating solution	
36358 ATASCDRO 70.0 36362 CACOS J2 70.0 1 1	MORROBAY 230kV - Section 2D & 2E	P2	Bus-tie Breaker	52	57	92	23	21	41	38	44	56	18	42	126	Sensitivity Only	
36362 CACOS J2 70.0 36364 CAYUCOS 70.0 1 1	MORROBAY 230kV - Section 2D & 2E	P2	Bus-tie Breaker	52	56	92	23	21	40	38	44	56	18	42	126	Sensitivity Only	
36372 MUSTNG J 70.0 36376 SN LS OB 70.0 1 1	TEMPLETON-ATASCADERO 70kV [9410] & ATASCADERO-SAN LUIS OBISPO 70kV [8490]	P6	N-1-1	96	99	109	<100	<100	<100	<100	<100	102	<100	<100	109	Non BES facility	



Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)									Voltage PU (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2020 Winter Peak	2023 Winter Peak	2028 Winter Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations		
1257-RD 70 kv	Base Case	P0	Base case	> 0.9, < 1.05	1.02	1.04	> 0.9, < 1.05	1.06	> 0.9, < 1.05	> 0.9, < 1.05	1.03	1.02	1.05	> 0.9, < 1.05	1.04	Load power factor correction and voltage support if needed	
AERA_ENG 60 kv	Base Case	P0	Base case	1.05	1.05	1.04	1.05	1.06	1.05	1.05	1.04	1.02	1.06	1.05	1.02	Load power factor correction and voltage support if needed	
AERA_MTR 60 kv	Base Case	P0	Base case	1.05	1.05	1.04	1.05	1.06	1.05	1.05	1.04	1.02	1.06	1.05	1.02	Load power factor correction and voltage support if needed	
AERA_TP1 60 kv	Base Case	P0	Base case	1.05	1.05	1.04	1.05	1.06	1.05	1.05	1.04	1.02	1.06	1.05	1.02	Load power factor correction and voltage support if needed	
AERA_TP2 60 kv	Base Case	P0	Base case	1.05	1.05	1.04	1.05	1.06	1.05	1.05	1.04	1.02	1.06	1.05	1.02	Load power factor correction and voltage support if needed	
AERA_TP3 60 kv	Base Case	P0	Base case	1.05	1.05	1.04	1.05	1.06	1.05	1.05	1.04	1.02	1.06	1.05	1.02	Load power factor correction and voltage support if needed	
AGRILINK 60 kv	Base Case	P0	Base case	1.02	1.03	1.03	1.06	1.08	1.05	1.05	1.04	1.03	1.08	1.03	1.04	Load power factor correction and voltage support if needed	
BA FOOD1 60 kv	Base Case	P0	Base case	1.05	1.05	1.03	1.04	1.06	1.05	1.05	1.03	1.03	1.06	1.05	1.03	Load power factor correction and voltage support if needed	
BA FOOD2 60 kv	Base Case	P0	Base case	1.05	1.05	1.03	1.04	1.06	1.05	1.05	1.04	1.03	1.06	1.05	1.03	Load power factor correction and voltage support if needed	
BIG BASN 60 kv	Base Case	P0	Base case	1.04	1.02	1.04	1.15	1.05	1.04	1.06	1.04	1.03	1.06	1.05	1.04	Load power factor correction and voltage support if needed	
BURNS 60 kv	Base Case	P0	Base case	1.03	1.02	1.04	1.15	1.05	1.04	1.06	1.03	1.02	1.06	1.05	1.04	Load power factor correction and voltage support if needed	
BURNS J1 60 kv	Base Case	P0	Base case	1.03	1.02	1.04	1.15	1.05	1.04	1.06	1.03	1.02	1.06	1.05	1.04	Load power factor correction and voltage support if needed	
BURNS J2 60 kv	Base Case	P0	Base case	1.03	1.02	1.04	1.15	1.05	1.04	1.06	1.03	1.02	1.06	1.05	1.04	Load power factor correction and voltage support if needed	
CHOLAME 70 kv	Base Case	P0	Base case	1.03	1.02	1.02	1.05	1.05	1.04	1.03	1.00	1.02	1.05	1.03	1.02	Load power factor correction and voltage support if needed	
CHVSANARDO 60 kv	Base Case	P0	Base case	1.05	1.05	1.04	1.05	1.06	1.05	1.05	1.04	1.02	1.06	1.05	1.02	Load power factor correction and voltage support if needed	
CIC JCT 60 kv	Base Case	P0	Base case	1.02	1.03	1.04	1.06	1.08	1.05	1.05	1.04	1.04	1.08	1.03	1.04	Load power factor correction and voltage support if needed	
CMP EVRS 115 kv	Base Case	P0	Base case	1.03	1.03	1.03	1.04	1.06	1.03	1.03	1.04	1.05	1.06	1.03	1.03	Load power factor correction and voltage support if needed	
COBURN 230 kv	Base Case	P0	Base case	1.03	1.03	1.02	1.03	1.05	1.03	1.03	1.02	1.02	1.05	1.02	1.02	Load power factor correction and voltage support if needed	
COBURN 60 kv	Base Case	P0	Base case	1.05	1.05	1.03	1.04	1.07	1.05	1.05	1.03	1.03	1.07	1.05	1.03	Load power factor correction and voltage support if needed	
COBURN J 60 kv	Base Case	P0	Base case	1.05	1.05	1.03	1.04	1.07	1.05	1.05	1.03	1.03	1.07	1.05	1.03	Load power factor correction and voltage support if needed	
CRUSHER 60 kv	Base Case	P0	Base case	1.03	1.02	1.04	1.15	1.06	1.03	1.05	1.03	1.02	1.06	1.05	1.04	Load power factor correction and voltage support if needed	
DIVIDE 70 kv	Base Case	P0	Base case	1.02	1.03	1.04	1.05	1.06	1.03	1.03	1.03	1.03	1.05	1.03	1.04	Load power factor correction and voltage support if needed	
DUKE ML1 230 kv	Base Case	P0	Base case	1.02	1.02	1.01	1.04	1.08	1.02	1.02	1.02	1.02	1.08	1.02	1.01	Load power factor correction and voltage support if needed	
DUKE ML2 230 kv	Base Case	P0	Base case	1.02	1.02	1.01	1.04	1.08	1.02	1.02	1.02	1.02	1.08	1.02	1.01	Load power factor correction and voltage support if needed	
ERTA 60 kv	Base Case	P0	Base case	1.03	1.04	1.04	1.07	1.09	1.06	1.05	1.05	1.04	1.09	1.04	1.04	Load power factor correction and voltage support if needed	
ERTA JCT 60 kv	Base Case	P0	Base case	1.03	1.04	1.04	1.07	1.09	1.06	1.05	1.05	1.04	1.09	1.04	1.04	Load power factor correction and voltage support if needed	
GREN VLY 60 kv	Base Case	P0	Base case	1.04	1.04	1.05	1.07	1.09	1.06	1.06	1.05	1.05	1.09	1.04	1.05	Load power factor correction and voltage support if needed	
GRN VLLY 115 kv	Base Case	P0	Base case	1.02	1.03	1.02	1.04	1.06	1.03	1.03	1.03	1.03	1.06	1.02	1.02	Load power factor correction and voltage support if needed	
JOLON 60 kv	Base Case	P0	Base case	1.05	1.05	1.02	1.05	1.08	1.05	1.06	1.02	1.02	1.08	1.07	1.02	Load power factor correction and voltage support if needed	
JOLON TP 60 kv	Base Case	P0	Base case	1.05	1.05	1.02	1.04	1.07	1.05	1.06	1.03	1.02	1.07	1.05	1.03	Load power factor correction and voltage support if needed	
KCTY_TAP 60 kv	Base Case	P0	Base case	1.05	1.05	1.03	1.04	1.06	1.05	1.05	1.04	1.03	1.06	1.05	1.03	Load power factor correction and voltage support if needed	
KING CTY 60 kv	Base Case	P0	Base case	1.05	1.05	1.02	1.04	1.07	1.05	1.05	1.03	1.02	1.07	1.05	1.03	Load power factor correction and voltage support if needed	
L.STAR J 60 kv	Base Case	P0	Base case	1.03	1.02	1.04	1.15	1.05	1.03	1.06	1.03	1.02	1.06	1.05	1.04	Load power factor correction and voltage support if needed	
LCCHS J1 60 kv	Base Case	P0	Base case	1.06	1.06	1.02	1.04	1.08	1.06	1.06	1.02	1.04	1.08	1.06	1.02	Load power factor correction and voltage support if needed	
LCCHS J2 60 kv	Base Case	P0	Base case	1.04	1.04	1.02	1.04	1.07	1.06	1.06	1.02	1.01	1.07	1.04	1.02	Load power factor correction and voltage support if needed	
LONE STR 60 kv	Base Case	P0	Base case	1.03	1.02	1.04	1.15	1.05	1.03	1.06	1.03	1.02	1.06	1.05	1.04	Load power factor correction and voltage support if needed	
LOS CCHS 60 kv	Base Case	P0	Base case	1.06	1.06	1.01	1.04	1.08	1.06	1.06	1.02	1.04	1.08	1.06	1.02	Load power factor correction and voltage support if needed	
LOS OSTS 60 kv	Base Case	P0	Base case	1.04	1.04	1.02	1.04	1.07	1.06	1.06	1.02	1.01	1.07	1.04	1.02	Load power factor correction and voltage support if needed	
M 115 kv	Base Case	P0	Base case	1.03	1.03	1.03	1.03	1.06	1.03	1.03	1.03	1.05	1.06	1.03	1.03	Load power factor correction and voltage support if needed	
MOSSLNSW 230 kv	Base Case	P0	Base case	1.02	1.02	1.01	1.04	1.08	1.02	1.02	1.02	1.02	1.08	1.02	1.01	Load power factor correction and voltage support if needed	
OILFLDS 60 kv	Base Case	P0	Base case	1.05	1.05	1.04	1.05	1.06	1.05	1.05	1.04	1.02	1.06	1.05	1.02	Load power factor correction and voltage support if needed	
ORCHRD J 60 kv	Base Case	P0	Base case	1.05	1.05	1.03	1.04	1.07	1.05	1.06	1.03	1.02	1.07	1.05	1.03	Load power factor correction and voltage support if needed	
PAUL SWT 115 kv	Base Case	P0	Base case	1.03	1.03	1.03	1.03	1.06	1.03	1.03	1.03	1.05	1.06	1.03	1.03	Load power factor correction and voltage support if needed	
PT MRTTI 60 kv	Base Case	P0	Base case	1.03	1.02	1.04	1.15	1.06	1.03	1.05	1.03	1.02	1.06	1.05	1.04	Load power factor correction and voltage support if needed	
ROB ROY 115 kv	Base Case	P0	Base case	1.02	1.03	1.03	1.04	1.06	1.03	1.03	1.03	1.04	1.06	1.03	1.03	Load power factor correction and voltage support if needed	
S ARDOJ1 60 kv	Base Case	P0	Base case	1.05	1.05	1.03	1.04	1.06	1.04	1.05	1.03	1.02	1.06	1.05	1.03	Load power factor correction and voltage support if needed	
S ARDOJ2 60 kv	Base Case	P0	Base case	1.05	1.05	1.03	1.04	1.06	1.04	1.05	1.03	1.02	1.06	1.05	1.03	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
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2020 Winter Peak	2023 Winter Peak	2028 Winter Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations		
SALN RVR 60 kv	Base Case	P0	Base case	1.05	1.05	1.04	1.05	1.06	1.05	1.05	1.04	1.02	1.06	1.05	1.02	Load power factor correction and voltage support if needed	
SAN ARDO 60 kv	Base Case	P0	Base case	1.05	1.05	1.03	1.04	1.06	1.04	1.05	1.03	1.02	1.06	1.05	1.03	Load power factor correction and voltage support if needed	
SARG CYN 60 kv	Base Case	P0	Base case	1.05	1.05	1.04	1.05	1.06	1.05	1.05	1.04	1.02	1.06	1.05	1.02	Load power factor correction and voltage support if needed	
TEXCO J1 60 kv	Base Case	P0	Base case	1.05	1.05	1.04	1.05	1.06	1.05	1.05	1.04	1.02	1.06	1.05	1.02	Load power factor correction and voltage support if needed	
TEXCO J2 60 kv	Base Case	P0	Base case	1.05	1.05	1.04	1.05	1.06	1.05	1.05	1.04	1.02	1.06	1.05	1.02	Load power factor correction and voltage support if needed	
VAFB A-N 70 kv	Base Case	P0	Base case	1.02	1.02	1.04	1.05	1.06	1.02	1.03	1.03	1.03	1.05	1.04	1.05	Load power factor correction and voltage support if needed	
VAFB SSA 70 kv	Base Case	P0	Base case	1.02	1.02	1.04	1.05	1.06	1.02	1.03	1.03	1.02	1.05	1.03	1.04	Load power factor correction and voltage support if needed	
VAFB SSB 70 kv	Base Case	P0	Base case	1.02	1.02	1.04	1.05	1.06	1.02	1.03	1.03	1.02	1.05	1.03	1.04	Load power factor correction and voltage support if needed	
WTSNVLLE 60 kv	Base Case	P0	Base case	1.02	1.02	1.03	1.06	1.08	1.05	1.04	1.04	1.03	1.08	1.02	1.03	Load power factor correction and voltage support if needed	
GRENVLY 60 kv	GREEN VALLEY-WATSONVILLE 60kV [6970]	P1	N-1	1.07	1.08	1.07	1.08	1.11	1.08	1.07	1.07	1.09	1.12	1.07	1.07	Load power factor correction and voltage support if needed	
AGRILINK 60 kv	WTSNVLLE-SALINAS2 60kV [0]	P1	N-1	1.04	1.04	1.06	1.08	1.11	1.07	1.07	1.06	1.05	1.11	1.04	1.06	Load power factor correction and voltage support if needed	
ERTA 60 kv	WTSNVLLE-SALINAS2 60kV [0]	P1	N-1	1.04	1.05	1.06	1.08	1.11	1.07	1.07	1.07	1.06	1.11	1.05	1.06	Load power factor correction and voltage support if needed	
GRENVLY 60 kv	WTSNVLLE-SALINAS2 60kV [0]	P1	N-1	1.05	1.05	1.06	1.08	1.11	1.07	1.07	1.07	1.06	1.11	1.05	1.06	Load power factor correction and voltage support if needed	
WTSNVLLE 60 kv	WTSNVLLE-SALINAS2 60kV [0]	P1	N-1	1.04	1.04	1.06	1.08	1.11	1.07	1.07	1.06	1.05	1.11	1.04	1.06	Load power factor correction and voltage support if needed	
ERTA 60 kv	GREEN VALLEY-WATSONVILLE 60kV [6970] (WTSNVLLE-AGRILINK)	P2	Line Section w/o Fault	1.07	1.07	1.07	1.08	1.11	1.08	1.07	1.07	1.09	1.12	1.07	1.07	Load power factor correction and voltage support if needed	
ERTA 60 kv	CIC TAP 60kV [6971] (CIC JCT-ERTA JCT)	P2	Line Section w/o Fault	1.07	1.07	1.07	1.08	1.11	1.08	1.07	1.07	1.09	1.12	1.07	1.07	Load power factor correction and voltage support if needed	
BNA VSTA 60 kv	SALINAS-FIRESTONE #1 60kV [7900] (SALINAS1-FREXP JT)	P2	Line Section w/o Fault	0.84	0.84	0.84	0.95	0.95	0.91	0.86	0.85	0.83	0.95	0.87	0.84	Operating Solution	
FIRESTONE 60 kv	SALINAS-FIRESTONE #1 60kV [7900] (SALINAS1-FREXP JT)	P2	Line Section w/o Fault	0.86	0.87	0.86	0.96	0.96	0.92	0.88	0.87	0.85	0.96	0.89	0.86	Operating Solution	
FRSHXPRS 60 kv	SALINAS-FIRESTONE #1 60kV [7900] (SALINAS1-FREXP JT)	P2	Line Section w/o Fault	0.84	0.84	0.83	0.95	0.95	0.91	0.86	0.85	0.83	0.95	0.87	0.84	Operating Solution	
SPENCE 60 kv	SALINAS-FIRESTONE #1 60kV [7900] (SALINAS1-FREXP JT)	P2	Line Section w/o Fault	0.87	0.88	0.87	0.97	0.96	0.93	0.89	0.88	0.87	0.96	0.90	0.87	Operating Solution	
WTSNVLLE 60 kv	SALINAS-LAGUNITAS 60kV [7920] (LGNSTAP-SALINAS2)	P2	Line Section w/o Fault	1.03	1.03	1.05	1.07	1.10	1.06	1.06	1.05	1.04	1.11	1.03	1.05	Load power factor correction and voltage support if needed	
ERTA 60 kv	WATSONVILLE-SALINAS 60kV [8310] (BRIGTANO-GRANT JT)	P2	Line Section w/o Fault	1.04	1.05	1.05	1.08	1.11	1.07	1.06	1.06	1.05	1.11	1.04	1.06	Load power factor correction and voltage support if needed	
WTSNVLLE 60 kv	WATSONVILLE-SALINAS 60kV [8310] (BRIGTANO-GRANT JT)	P2	Line Section w/o Fault	1.03	1.04	1.05	1.07	1.10	1.06	1.06	1.06	1.04	1.11	1.03	1.05	Load power factor correction and voltage support if needed	
WTSNVLLE 60 kv	WATSONVILLE-SALINAS 60kV [8310] (BRIGTANO-LGNSTAP)	P2	Line Section w/o Fault	1.02	1.03	1.04	1.07	1.10	1.05	1.05	1.05	1.04	1.10	1.03	1.04	Sensitivity Only	
ERTA 60 kv	WATSONVILLE-SALINAS 60kV [8310] (WTSNVLLE-GRANT JT)	P2	Line Section w/o Fault	1.04	1.05	1.06	1.08	1.11	1.07	1.07	1.07	1.06	1.11	1.05	1.06	Load power factor correction and voltage support if needed	
WTSNVLLE 60 kv	WATSONVILLE-SALINAS 60kV [8310] (WTSNVLLE-GRANT JT)	P2	Line Section w/o Fault	1.04	1.04	1.06	1.08	1.11	1.07	1.07	1.06	1.05	1.11	1.04	1.06	Load power factor correction and voltage support if needed	
WTSNVLLE 60 kv	SALINAS2 60kV Section 2E	P2	Bus	1.03	1.03	1.05	1.07	1.10	1.06	1.06	1.05	1.04	1.11	1.03	1.05	Load power factor correction and voltage support if needed	
ERTA 60 kv	WTSNVLLE 60kV Section 1D	P2	Bus	1.07	1.07	1.07	1.08	1.11	1.08	1.08	1.07	1.09	1.12	1.07	1.07	Load power factor correction and voltage support if needed	
WTSNVLLE 60 kv	SALINAS2 - 2E 60kV & SALINAS-LAGUNITAS line	P2	Non Bus-tie Breaker	1.03	1.03	1.05	1.07	1.10	1.06	1.06	1.05	1.04	1.11	1.03	1.05	Load power factor correction and voltage support if needed	
ERTA 60 kv	SALINAS2 - 2E 60kV & WTSNVLLE-SALINAS2 line	P2	Non Bus-tie Breaker	1.04	1.05	1.06	1.08	1.11	1.07	1.07	1.07	1.06	1.11	1.05	1.06	Load power factor correction and voltage support if needed	
WTSNVLLE 60 kv	SALINAS2 - 2E 60kV & WTSNVLLE-SALINAS2 line	P2	Non Bus-tie Breaker	1.04	1.04	1.06	1.08	1.11	1.07	1.07	1.06	1.05	1.11	1.04	1.06	Load power factor correction and voltage support if needed	
ERTA 60 kv	WTSNVLLE - 1D 60kV & WTSNVLLE-SALINAS2 line	P2	Non Bus-tie Breaker	1.07	1.07	1.07	1.08	1.11	1.08	1.08	1.07	1.09	1.12	1.07	1.07	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
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2020 Winter Peak	2023 Winter Peak	2028 Winter Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations		
ERTA 60 kv	SALINAS2 60kV - Section 2E & 2D	P2	Bus-tie Breaker	1.04	1.04	1.05	1.08	1.11	1.06	1.06	1.06	1.05	1.11	1.04	1.05	Load power factor correction and voltage support if needed	
WTSNVLL 60 kv	SALINAS2 60kV - Section 2E & 2D	P2	Bus-tie Breaker	1.03	1.03	1.05	1.07	1.10	1.06	1.06	1.05	1.04	1.11	1.03	1.05	Load power factor correction and voltage support if needed	
AECCEOR 115 kv	MESA_PGE 115kV - Section 2D & 1D	P2	Bus-tie Breaker	N/A	0.58	0.51	N/A	0.99	N/A	N/A	0.52	0.53	0.97	N/A	0.51	Project: Midway-Andrew 230 KV - Scope under review	
BUELLTON 115 kv	MESA_PGE 115kV - Section 2D & 1D	P2	Bus-tie Breaker	0.59	0.56	0.49	0.96	0.99	0.80	0.84	0.50	0.50	0.96	0.42	0.49	Project: Midway-Andrew 230 KV - Scope under review	
CABRILLO 115 kv	MESA_PGE 115kV - Section 2D & 1D	P2	Bus-tie Breaker	0.59	0.56	0.49	0.96	0.99	0.80	0.84	0.50	0.50	0.96	0.35	0.49	Project: Midway-Andrew 230 KV - Scope under review	
FOOTHILL 115 kv	MESA_PGE 115kV - Section 2D & 1D	P2	Bus-tie Breaker	0.93	0.91	0.87	1.03	1.04	0.98	1.00	0.88	0.90	1.03	0.92	0.87	Project: Midway-Andrew 230 KV - Scope under review	
GOLDTREE 115 kv	MESA_PGE 115kV - Section 2D & 1D	P2	Bus-tie Breaker	> 0.9, < 1.1	0.91	0.88	> 0.9, < 1.1	1.04	> 0.9, < 1.1	> 0.9, < 1.1	0.88	0.90	1.03	> 0.9, < 1.1	0.87	Project: Midway-Andrew 230 KV - Scope under review	
OCEANO 115 kv	MESA_PGE 115kV - Section 2D & 1D	P2	Bus-tie Breaker	0.90	0.89	0.83	1.03	1.03	0.96	0.99	0.83	0.87	1.03	0.90	0.82	Project: Midway-Andrew 230 KV - Scope under review	
PALMR 115 kv	MESA_PGE 115kV - Section 2D & 1D	P2	Bus-tie Breaker	0.66	0.60	0.52	0.98	0.99	0.84	0.87	0.53	0.55	0.97	0.55	0.52	Project: Midway-Andrew 230 KV - Scope under review	
SISQUOC 115 kv	MESA_PGE 115kV - Section 2D & 1D	P2	Bus-tie Breaker	0.68	0.62	0.54	0.98	0.99	0.85	0.88	0.55	0.57	0.97	0.58	0.54	Project: Midway-Andrew 230 KV - Scope under review	
SN LS OB 115 kv	MESA_PGE 115kV - Section 2D & 1D	P2	Bus-tie Breaker	0.91	0.89	0.85	1.03	1.04	0.97	0.99	0.85	0.88	1.03	0.90	0.85	Project: Midway-Andrew 230 KV - Scope under review	
SNTA MRA 115 kv	MESA_PGE 115kV - Section 2D & 1D	P2	Bus-tie Breaker	0.71	0.65	0.58	0.98	1.00	0.86	0.89	0.59	0.62	0.98	0.65	0.58	Project: Midway-Andrew 230 KV - Scope under review	
SNTA YNZ 115 kv	MESA_PGE 115kV - Section 2D & 1D	P2	Bus-tie Breaker	0.59	0.56	0.48	0.96	0.99	0.80	0.84	0.50	0.49	0.96	0.41	0.48	Project: Midway-Andrew 230 KV - Scope under review	
UNION OL 115 kv	MESA_PGE 115kV - Section 2D & 1D	P2	Bus-tie Breaker	0.90	0.89	0.83	1.03	1.03	0.96	0.99	0.83	0.87	1.03	0.90	0.81	Project: Midway-Andrew 230 KV - Scope under review	
ZACA 115 kv	MESA_PGE 115kV - Section 2D & 1D	P2	Bus-tie Breaker	0.61	0.58	0.50	0.97	0.99	0.81	0.85	0.51	0.52	0.97	0.45	0.50	Project: Midway-Andrew 230 KV - Scope under review	
AECCEOR 115 kv	MORROBAY 230kV - Section 2D & 2E	P2	Bus-tie Breaker	> 0.9, < 1.1	1.01	0.81	> 0.9, < 1.1	1.03	> 0.9, < 1.1	> 0.9, < 1.1	0.96	1.00	1.02	> 0.9, < 1.1	0.56	Project: Midway-Andrew 230 KV - Scope under review	
ATASCDRO 70 kv	MORROBAY 230kV - Section 2D & 2E	P2	Bus-tie Breaker	1.01	1.02	0.95	1.04	1.03	1.02	1.03	1.00	1.02	1.03	1.02	0.77	Sensitivity Only	
BAYWOOD 70 kv	MORROBAY 230kV - Section 2D & 2E	P2	Bus-tie Breaker	1.00	1.00	0.90	1.02	1.02	1.01	1.01	0.99	1.00	1.02	1.00	0.68	Project: Midway-Andrew 230 KV - Scope under review	
BUELLTON 115 kv	MORROBAY 230kV - Section 2D & 2E	P2	Bus-tie Breaker	1.01	1.00	0.79	1.02	1.02	1.02	1.02	0.96	0.98	1.02	1.01	0.53	Project: Midway-Andrew 230 KV - Scope under review	
CABRILLO 115 kv	MORROBAY 230kV - Section 2D & 2E	P2	Bus-tie Breaker	1.01	1.01	0.79	1.02	1.03	1.02	1.02	0.97	1.00	1.02	1.01	0.53	Project: Midway-Andrew 230 KV - Scope under review	
CAMBRIA 70 kv	MORROBAY 230kV - Section 2D & 2E	P2	Bus-tie Breaker	0.99	0.99	0.89	1.02	1.02	1.00	1.00	0.97	0.98	1.02	0.99	0.68	Project: Midway-Andrew 230 KV - Scope under review	
CAYUCOS 70 kv	MORROBAY 230kV - Section 2D & 2E	P2	Bus-tie Breaker	0.99	1.00	0.90	1.02	1.02	1.00	1.00	0.98	1.00	1.02	1.00	0.69	Sensitivity Only	
DIABLOCN 230 kv	MORROBAY 230kV - Section 2D & 2E	P2	Bus-tie Breaker	1.01	1.01	0.91	1.03	1.03	1.02	1.03	0.96	1.00	1.03	1.01	0.79	Sensitivity Only	
FAIRWAY 115 kv	MORROBAY 230kV - Section 2D & 2E	P2	Bus-tie Breaker	1.03	1.02	0.91	1.03	1.03	1.03	1.04	0.97	1.02	1.03	1.02	0.69	Sensitivity Only	
FOOTHILL 115 kv	MORROBAY 230kV - Section 2D & 2E	P2	Bus-tie Breaker	0.99	0.99	0.82	1.03	1.04	1.01	1.01	0.94	0.99	1.04	1.01	0.59	Project: Midway-Andrew 230 KV - Scope under review	
GOLDTREE 115 kv	MORROBAY 230kV - Section 2D & 2E	P2	Bus-tie Breaker	0.99	0.99	0.82	1.03	1.04	1.01	1.01	0.94	0.98	1.04	1.01	0.59	Project: Midway-Andrew 230 KV - Scope under review	
MESA PGE 230 kv	MORROBAY 230kV - Section 2D & 2E	P2	Bus-tie Breaker	1.00	1.01	0.86	1.03	1.03	1.01	1.03	0.92	0.97	1.03	1.02	0.67	Project: Midway-Andrew 230 KV - Scope under review	
MORRO BY 115 kv	MORROBAY 230kV - Section 2D & 2E	P2	Bus-tie Breaker	0.99	0.99	0.82	1.03	1.04	1.02	1.01	0.94	0.98	1.03	1.01	0.59	Project: Midway-Andrew 230 KV - Scope under review	
OCEANO 115 kv	MORROBAY 230kV - Section 2D & 2E	P2	Bus-tie Breaker	1.01	1.01	0.86	1.03	1.03	1.02	1.03	0.96	1.01	1.03	1.02	0.62	Project: Midway-Andrew 230 KV - Scope under review	
PALMR 115 kv	MORROBAY 230kV - Section 2D & 2E	P2	Bus-tie Breaker	1.02	1.01	0.82	1.03	1.03	1.03	1.03	0.97	1.00	1.02	1.02	0.57	Project: Midway-Andrew 230 KV - Scope under review	
PERRY 70 kv	MORROBAY 230kV - Section 2D & 2E	P2	Bus-tie Breaker	0.99	0.99	0.89	1.02	1.02	1.00	1.00	0.97	0.98	1.02	0.99	0.68	Project: Midway-Andrew 230 KV - Scope under review	
SISQUOC 115 kv	MORROBAY 230kV - Section 2D & 2E	P2	Bus-tie Breaker	1.03	1.02	0.84	1.03	1.03	1.04	1.04	0.97	1.01	1.02	1.02	0.59	Project: Midway-Andrew 230 KV - Scope under review	
SN LS OB 115 kv	MORROBAY 230kV - Section 2D & 2E	P2	Bus-tie Breaker	0.99	0.99	0.82	1.03	1.04	1.01	1.02	0.94	0.99	1.04	1.01	0.59	Project: Midway-Andrew 230 KV - Scope under review	
SNTA MRA 115 kv	MORROBAY 230kV - Section 2D & 2E	P2	Bus-tie Breaker	1.03	1.02	0.82	1.03	1.03	1.04	1.04	0.98	1.02	1.03	1.02	0.58	Project: Midway-Andrew 230 KV - Scope under review	
SNTA YNZ 115 kv	MORROBAY 230kV - Section 2D & 2E	P2	Bus-tie Breaker	1.01	1.00	0.79	1.02	1.02	1.02	1.02	0.96	0.98	1.02	1.00	0.53	Project: Midway-Andrew 230 KV - Scope under review	
TEMPLETN 230 kv	MORROBAY 230kV - Section 2D & 2E	P2	Bus-tie Breaker	1.00	1.00	0.93	1.03	1.03	1.01	1.02	0.98	1.00	1.02	1.01	0.86	Sensitivity Only	
UNION OL 115 kv	MORROBAY 230kV - Section 2D & 2E	P2	Bus-tie Breaker	1.02	1.01	0.87	1.03	1.03	1.03	1.03	0.97	1.01	1.03	1.02	0.64	Project: Midway-Andrew 230 KV - Scope under review	
ZACA 115 kv	MORROBAY 230kV - Section 2D & 2E	P2	Bus-tie Breaker	1.01	1.01	0.80	1.02	1.03	1.02	1.03	0.96	0.99	1.02	1.01	0.55	Project: Midway-Andrew 230 KV - Scope under review	
AECCEOR 115 kv	MORROBAY 230kV - Section 2E & 1E	P2	Bus-tie Breaker	> 0.9, < 1.1	0.44	0.42	> 0.9, < 1.1	1.06	> 0.9, < 1.1	> 0.9, < 1.1	0.43	0.47	1.02	> 0.9, < 1.1	0.41	Project: Midway-Andrew 230 KV - Scope under review	
ATASCDRO 70 kv	MORROBAY 230kV - Section 2E & 1E	P2	Bus-tie Breaker	0.83	0.80	0.79	1.04	1.04	0.88	1.01	0.79	0.87	1.03	1.03	0.78	Project: Midway-Andrew 230 KV - Scope under review	
BAYWOOD 70 kv	MORROBAY 230kV - Section 2E & 1E	P2	Bus-tie Breaker	0.76	0.72	0.72	1.03	1.03	0.81	0.99	0.72	0.80	1.02	1.01	0.71	Project: Midway-Andrew 230 KV - Scope under review	
BUELLTON 115 kv	MORROBAY 230kV - Section 2E & 1E	P2	Bus-tie Breaker	0.46	0.42	0.41	1.03	1.06	0.48	0.94	0.41	0.45	1.02	1.11	0.40	Project: Midway-Andrew 230 KV - Scope under review	
CABRILLO 115 kv	MORROBAY 230kV - Section 2E & 1E	P2	Bus-tie Breaker	0.46	0.42	0.41	1.03	1.06	0.49	0.94	0.41	0.47	1.02	1.12	0.40	Project: Midway-Andrew 230 KV - Scope under review	
CAMBRIA 70 kv	MORROBAY 230kV - Section 2E & 1E	P2	Bus-tie Breaker	0.76	0.73	0.72	1.03	1.03	0.81	0.98	0.72	0.79	1.02	1.00	0.71	Project: Midway-Andrew 230 KV - Scope under review	
CAYUCOS 70 kv	MORROBAY 230kV - Section 2E & 1E	P2	Bus-tie Breaker	0.77	0.74	0.73	1.03	1.04	0.82	0.99	0.73	0.81	1.02	1.01	0.73	Project: Midway-Andrew 230 KV - Scope under review	

Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)									Voltage PU (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2020 Winter Peak	2023 Winter Peak	2028 Winter Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations		
DIABLOCN 230 kv	MORROBAY 230kV - Section 2E & 1E	P2	Bus-tie Breaker	0.53	0.51	0.46	1.02	1.04	0.51	1.04	0.46	0.51	1.02	1.24	0.45	Project: Midway-Andrew 230 KV - Scope under review	
DIVIDE 70 kv	MORROBAY 230kV - Section 2E & 1E	P2	Bus-tie Breaker	N/A	N/A	N/A	1.04	1.08	0.50	N/A	N/A	0.49	1.03	1.14	N/A	Project: Midway-Andrew 230 KV - Scope under review	
ESTRELLA 70 kv	MORROBAY 230kV - Section 2E & 1E	P2	Bus-tie Breaker	0.89	0.87	0.86	1.04	1.04	0.92	1.00	0.86	0.91	1.03	1.02	0.86	Project: Midway-Andrew 230 KV - Scope under review	
FAIRWAY 115 kv	MORROBAY 230kV - Section 2E & 1E	P2	Bus-tie Breaker	0.56	0.50	0.48	1.03	1.06	0.52	1.02	0.48	0.50	1.02	1.12	0.46	Project: Midway-Andrew 230 KV - Scope under review	
FOOTHILL 115 kv	MORROBAY 230kV - Section 2E & 1E	P2	Bus-tie Breaker	0.70	0.65	0.66	1.04	1.05	0.74	0.98	0.66	0.72	1.04	1.06	0.65	Project: Midway-Andrew 230 KV - Scope under review	
GOLDTREE 115 kv	MORROBAY 230kV - Section 2E & 1E	P2	Bus-tie Breaker	0.70	0.66	0.66	1.04	1.05	0.74	0.98	0.67	0.73	1.04	1.06	0.66	Project: Midway-Andrew 230 KV - Scope under review	
MANVILLE 115 kv	MORROBAY 230kV - Section 2E & 1E	P2	Bus-tie Breaker	N/A	N/A	N/A	1.01	1.05	0.48	N/A	N/A	0.47	1.01	1.11	N/A	Project: Midway-Andrew 230 KV - Scope under review	
MESA PGE 230 kv	MORROBAY 230kV - Section 2E & 1E	P2	Bus-tie Breaker	0.53	0.48	0.45	1.02	1.03	0.49	1.03	0.45	0.48	1.02	1.23	0.44	Project: Midway-Andrew 230 KV - Scope under review	
MORRO BY 115 kv	MORROBAY 230kV - Section 2E & 1E	P2	Bus-tie Breaker	0.75	0.72	0.73	1.04	1.05	0.80	0.98	0.73	0.78	1.04	1.05	0.72	Project: Midway-Andrew 230 KV - Scope under review	
OCEANO 115 kv	MORROBAY 230kV - Section 2E & 1E	P2	Bus-tie Breaker	0.60	0.55	0.53	1.04	1.06	0.59	1.00	0.53	0.58	1.03	1.11	0.52	Project: Midway-Andrew 230 KV - Scope under review	
PALMR 115 kv	MORROBAY 230kV - Section 2E & 1E	P2	Bus-tie Breaker	0.51	0.45	0.44	1.03	1.06	0.51	0.97	0.44	0.48	1.02	1.12	0.42	Project: Midway-Andrew 230 KV - Scope under review	
PERRY 70 kv	MORROBAY 230kV - Section 2E & 1E	P2	Bus-tie Breaker	0.76	0.73	0.72	1.03	1.03	0.81	0.98	0.72	0.79	1.02	1.00	0.72	Project: Midway-Andrew 230 KV - Scope under review	
PSA RBL5 70 kv	MORROBAY 230kV - Section 2E & 1E	P2	Bus-tie Breaker	0.89	0.87	0.86	1.04	1.04	0.93	1.00	0.86	0.92	1.04	1.02	0.86	Project: Midway-Andrew 230 KV - Scope under review	
PURISIMA 115 kv	MORROBAY 230kV - Section 2E & 1E	P2	Bus-tie Breaker	N/A	N/A	N/A	1.02	1.06	0.48	N/A	N/A	0.47	1.01	1.12	N/A	Project: Midway-Andrew 230 KV - Scope under review	
SAN MIGL 70 kv	MORROBAY 230kV - Section 2E & 1E	P2	Bus-tie Breaker	0.89	0.87	0.87	1.04	1.03	0.92	0.99	0.87	0.91	1.03	1.02	0.87	Project: Midway-Andrew 230 KV - Scope under review	
SISQUOC 115 kv	MORROBAY 230kV - Section 2E & 1E	P2	Bus-tie Breaker	0.53	0.46	0.45	1.03	1.06	0.52	0.98	0.45	0.49	1.02	1.12	0.44	Project: Midway-Andrew 230 KV - Scope under review	
SN LS OB 115 kv	MORROBAY 230kV - Section 2E & 1E	P2	Bus-tie Breaker	0.68	0.63	0.63	1.04	1.06	0.71	0.98	0.64	0.70	1.04	1.07	0.62	Project: Midway-Andrew 230 KV - Scope under review	
SNTA MRA 115 kv	MORROBAY 230kV - Section 2E & 1E	P2	Bus-tie Breaker	0.53	0.46	0.46	1.03	1.06	0.52	0.96	0.46	0.51	1.02	1.12	0.45	Project: Midway-Andrew 230 KV - Scope under review	
SNTA YNZ 115 kv	MORROBAY 230kV - Section 2E & 1E	P2	Bus-tie Breaker	0.46	0.42	0.40	1.03	1.06	0.48	0.94	0.41	0.44	1.02	1.11	0.39	Project: Midway-Andrew 230 KV - Scope under review	
SURF 115 kv	MORROBAY 230kV - Section 2E & 1E	P2	Bus-tie Breaker	N/A	N/A	N/A	1.02	1.06	0.49	N/A	N/A	0.47	1.02	1.12	N/A	Project: Midway-Andrew 230 KV - Scope under review	
TEMPLETN 230 kv	MORROBAY 230kV - Section 2E & 1E	P2	Bus-tie Breaker	0.84	0.82	0.83	1.03	1.03	0.87	0.99	0.83	0.86	1.03	1.02	0.83	Project: Midway-Andrew 230 KV - Scope under review	
UNION OL 115 kv	MORROBAY 230kV - Section 2E & 1E	P2	Bus-tie Breaker	0.59	0.53	0.52	1.03	1.06	0.57	1.01	0.51	0.56	1.03	1.11	0.50	Project: Midway-Andrew 230 KV - Scope under review	
VAFB SSA 70 kv	MORROBAY 230kV - Section 2E & 1E	P2	Bus-tie Breaker	N/A	N/A	N/A	1.04	1.08	0.50	N/A	N/A	0.50	1.04	1.14	N/A	Project: Midway-Andrew 230 KV - Scope under review	
ZACA 115 kv	MORROBAY 230kV - Section 2E & 1E	P2	Bus-tie Breaker	0.48	0.43	0.42	1.03	1.06	0.49	0.95	0.42	0.47	1.02	1.12	0.41	Project: Midway-Andrew 230 KV - Scope under review	
BNA VSTA 60 kv	Salinas 115kV BAAH Bus #1 (failure of non-redundent relay)	P5	Non-Redundent Relay	0.29	0.29	0.29	0.52	0.58	0.31	0.31	0.30	0.29	0.61	0.35	0.29	Protection Upgrade	
WTSNVLL 60 kv	Salinas 115kV BAAH Bus #2 (failure of non-redundent relay)	P5	Non-Redundent Relay	-3.31	-3.08	-2.87	0.91	0.94	-2.13	0.82	-1.78	-3.31	0.96	0.83	-2.85	Protection Upgrade	
JOLON 60 kv	COBURN-BASIC ENERGY 60kV [6400] & COBURN-LASAGUILASS #1 230kV [0]	P6	N-1-1	> 0.9, < 1.1	> 0.9, < 1.1	> 0.9, < 1.1	> 0.9, < 1.1	1.12	> 0.9, < 1.1	> 0.9, < 1.1	> 0.9, < 1.1	> 0.9, < 1.1	1.13	> 0.9, < 1.1	> 0.9, < 1.1	Load power factor correction and voltage support if needed	
LOS CCHS 60 kv	COBURN-BASIC ENERGY 60kV [6400] & COBURN-LASAGUILASS #1 230kV [0]	P6	N-1-1	> 0.9, < 1.1	> 0.9, < 1.1	> 0.9, < 1.1	> 0.9, < 1.1	1.12	> 0.9, < 1.1	> 0.9, < 1.1	> 0.9, < 1.1	> 0.9, < 1.1	1.12	> 0.9, < 1.1	> 0.9, < 1.1	Load power factor correction and voltage support if needed	
SAN ARDO 60 kv	COBURN-BASIC ENERGY 60kV [6400] & COBURN-LASAGUILASS #1 230kV [0]	P6	N-1-1	> 0.9, < 1.1	> 0.9, < 1.1	> 0.9, < 1.1	> 0.9, < 1.1	> 0.9, < 1.1	> 0.9, < 1.1	> 0.9, < 1.1	> 0.9, < 1.1	> 0.9, < 1.1	1.10	> 0.9, < 1.1	> 0.9, < 1.1	Sensitivity Only	
BA FOOD1 60 kv	COBURN-LASAGUILASS #1 230kV [0] & COBURN 230/60kV TB 1	P6	N-1-1	> 0.9, < 1.1	> 0.9, < 1.1	> 0.9, < 1.1	> 0.9, < 1.1	> 0.9, < 1.1	> 0.9, < 1.1	> 0.9, < 1.1	> 0.9, < 1.1	> 0.9, < 1.1	1.11	> 0.9, < 1.1	> 0.9, < 1.1	Sensitivity Only	
KING CTY 60 kv	COBURN-LASAGUILASS #1 230kV [0] & COBURN 230/60kV TB 1	P6	N-1-1	> 0.9, < 1.1	> 0.9, < 1.1	> 0.9, < 1.1	> 0.9, < 1.1	> 0.9, < 1.1	> 0.9, < 1.1	> 0.9, < 1.1	> 0.9, < 1.1	> 0.9, < 1.1	1.11	> 0.9, < 1.1	> 0.9, < 1.1	Sensitivity Only	
LOS OST5 60 kv	COBURN-LASAGUILASS #1 230kV [0] & COBURN 230/60kV TB 1	P6	N-1-1	> 0.9, < 1.1	> 0.9, < 1.1	> 0.9, < 1.1	> 0.9, < 1.1	> 0.9, < 1.1	> 0.9, < 1.1	> 0.9, < 1.1	> 0.9, < 1.1	> 0.9, < 1.1	1.11	> 0.9, < 1.1	> 0.9, < 1.1	Sensitivity Only	
AECCEOR 115 kv	DIABLO-MESA 230kV [4620] & MORRO BAY-MESA 230kV [5290]	P6	N-1-1	> 0.9, < 1.1	0.89	0.50	> 0.9, < 1.1	> 0.9, < 1.1	> 0.9, < 1.1	> 0.9, < 1.1	0.50	0.53	> 0.9, < 1.1	> 0.9, < 1.1	0.49	Project: Midway-Andrew 230 KV - Scope under review	
BAYWOOD 70 kv	DIABLO-MESA 230kV [4620] & MORRO BAY-MESA 230kV [5290]	P6	N-1-1	> 0.9, < 1.1	> 0.9, < 1.1	0.85	> 0.9, < 1.1	> 0.9, < 1.1	> 0.9, < 1.1	> 0.9, < 1.1	0.85	0.88	> 0.9, < 1.1	> 0.9, < 1.1	0.84	Project: Midway-Andrew 230 KV - Scope under review	
BUELLTON 115 kv	DIABLO-MESA 230kV [4620] & MORRO BAY-MESA 230kV [5290]	P6	N-1-1	0.87	0.88	0.48	> 0.9, < 1.1	> 0.9, < 1.1	> 0.9, < 1.1	> 0.9, < 1.1	0.48	0.50	> 0.9, < 1.1	> 0.9, < 1.1	0.47	Project: Midway-Andrew 230 KV - Scope under review	
CABRILLO 115 kv	DIABLO-MESA 230kV [4620] & MORRO BAY-MESA 230kV [5290]	P6	N-1-1	0.87	0.88	0.48	> 0.9, < 1.1	> 0.9, < 1.1	> 0.9, < 1.1	> 0.9, < 1.1	0.48	0.50	> 0.9, < 1.1	> 0.9, < 1.1	0.47	Project: Midway-Andrew 230 KV - Scope under review	



Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)									Voltage PU (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2020 Winter Peak	2023 Winter Peak	2028 Winter Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations		
CAMBRIA 70 kv	DIABLO-MESA 230kv [4620] & MORRO BAY-MESA 230kv [5290]	P6	N-1-1	> 0.9, < 1.1	> 0.9, < 1.1	0.85	> 0.9, < 1.1	> 0.9, < 1.1	> 0.9, < 1.1	> 0.9, < 1.1	0.85	0.87	> 0.9, < 1.1	> 0.9, < 1.1	0.84	Project: Midway-Andrew 230 KV - Scope under review	
CAYUCOS 70 kv	DIABLO-MESA 230kv [4620] & MORRO BAY-MESA 230kv [5290]	P6	N-1-1	> 0.9, < 1.1	> 0.9, < 1.1	0.86	> 0.9, < 1.1	> 0.9, < 1.1	> 0.9, < 1.1	> 0.9, < 1.1	0.86	0.89	> 0.9, < 1.1	> 0.9, < 1.1	0.85	Project: Midway-Andrew 230 KV - Scope under review	
FAIRWAY 115 kv	DIABLO-MESA 230kv [4620] & MORRO BAY-MESA 230kv [5290]	P6	N-1-1	> 0.9, < 1.1	> 0.9, < 1.1	0.55	> 0.9, < 1.1	> 0.9, < 1.1	> 0.9, < 1.1	> 0.9, < 1.1	0.56	0.62	> 0.9, < 1.1	> 0.9, < 1.1	0.54	Project: Midway-Andrew 230 KV - Scope under review	
FOOTHILL 115 kv	DIABLO-MESA 230kv [4620] & MORRO BAY-MESA 230kv [5290]	P6	N-1-1	> 0.9, < 1.1	> 0.9, < 1.1	0.78	> 0.9, < 1.1	> 0.9, < 1.1	> 0.9, < 1.1	> 0.9, < 1.1	0.78	0.81	> 0.9, < 1.1	> 0.9, < 1.1	0.77	Project: Midway-Andrew 230 KV - Scope under review	
GOLDTREE 115 kv	DIABLO-MESA 230kv [4620] & MORRO BAY-MESA 230kv [5290]	P6	N-1-1	> 0.9, < 1.1	> 0.9, < 1.1	0.78	> 0.9, < 1.1	> 0.9, < 1.1	> 0.9, < 1.1	> 0.9, < 1.1	0.79	0.81	> 0.9, < 1.1	> 0.9, < 1.1	0.77	Project: Midway-Andrew 230 KV - Scope under review	
MESA PGE 230 kv	DIABLO-MESA 230kv [4620] & MORRO BAY-MESA 230kv [5290]	P6	N-1-1	> 0.9, < 1.1	0.89	0.52	> 0.9, < 1.1	> 0.9, < 1.1	> 0.9, < 1.1	> 0.9, < 1.1	0.53	0.58	> 0.9, < 1.1	> 0.9, < 1.1	0.51	Project: Midway-Andrew 230 KV - Scope under review	
MORRO BY 115 kv	DIABLO-MESA 230kv [4620] & MORRO BAY-MESA 230kv [5290]	P6	N-1-1	> 0.9, < 1.1	> 0.9, < 1.1	0.85	> 0.9, < 1.1	> 0.9, < 1.1	> 0.9, < 1.1	> 0.9, < 1.1	0.86	0.87	> 0.9, < 1.1	> 0.9, < 1.1	0.85	Project: Midway-Andrew 230 KV - Scope under review	
PALMR 115 kv	DIABLO-MESA 230kv [4620] & MORRO BAY-MESA 230kv [5290]	P6	N-1-1	> 0.9, < 1.1	0.90	0.51	> 0.9, < 1.1	> 0.9, < 1.1	> 0.9, < 1.1	> 0.9, < 1.1	0.52	0.55	> 0.9, < 1.1	> 0.9, < 1.1	0.50	Project: Midway-Andrew 230 KV - Scope under review	
PERRY 70 kv	DIABLO-MESA 230kv [4620] & MORRO BAY-MESA 230kv [5290]	P6	N-1-1	> 0.9, < 1.1	> 0.9, < 1.1	0.85	> 0.9, < 1.1	> 0.9, < 1.1	> 0.9, < 1.1	> 0.9, < 1.1	0.85	0.88	> 0.9, < 1.1	> 0.9, < 1.1	0.84	Project: Midway-Andrew 230 KV - Scope under review	
SISQUOC 115 kv	DIABLO-MESA 230kv [4620] & MORRO BAY-MESA 230kv [5290]	P6	N-1-1	> 0.9, < 1.1	> 0.9, < 1.1	0.53	> 0.9, < 1.1	> 0.9, < 1.1	> 0.9, < 1.1	> 0.9, < 1.1	0.53	0.58	> 0.9, < 1.1	> 0.9, < 1.1	0.52	Project: Midway-Andrew 230 KV - Scope under review	
SNTA MRA 115 kv	DIABLO-MESA 230kv [4620] & MORRO BAY-MESA 230kv [5290]	P6	N-1-1	> 0.9, < 1.1	0.90	0.54	> 0.9, < 1.1	> 0.9, < 1.1	> 0.9, < 1.1	> 0.9, < 1.1	0.55	0.59	> 0.9, < 1.1	> 0.9, < 1.1	0.53	Project: Midway-Andrew 230 KV - Scope under review	
SNTA YNZ 115 kv	DIABLO-MESA 230kv [4620] & MORRO BAY-MESA 230kv [5290]	P6	N-1-1	0.87	0.87	0.47	> 0.9, < 1.1	> 0.9, < 1.1	> 0.9, < 1.1	> 0.9, < 1.1	0.48	0.49	> 0.9, < 1.1	> 0.9, < 1.1	0.46	Project: Midway-Andrew 230 KV - Scope under review	
ZACA 115 kv	DIABLO-MESA 230kv [4620] & MORRO BAY-MESA 230kv [5290]	P6	N-1-1	0.89	0.89	0.49	> 0.9, < 1.1	> 0.9, < 1.1	> 0.9, < 1.1	> 0.9, < 1.1	0.50	0.52	> 0.9, < 1.1	> 0.9, < 1.1	0.48	Project: Midway-Andrew 230 KV - Scope under review	
ESTRELLA 70 kv	ESTRELLA-PSA RBLS #1 70kv [0] & ESTRELLA 230/70kv TB 1	P6	N-1-1	0.81	0.78	0.72	> 0.9, < 1.1	> 0.9, < 1.1	0.81	> 0.9, < 1.1	0.76	0.77	> 0.9, < 1.1	0.87	0.73	Operating Solution	
CAMBRIA 70 kv	ATASCADERO-SAN LUIS OBISPO 70kv [8490] & TEMPLETON-ATASCADERO 70kv [9410]	P6	N-1-1	> 0.9, < 1.1	> 0.9, < 1.1	0.89	> 0.9, < 1.1	> 0.9, < 1.1	> 0.9, < 1.1	> 0.9, < 1.1	> 0.9, < 1.1	> 0.9, < 1.1	> 0.9, < 1.1	> 0.9, < 1.1	0.89	Operating Solution	
PERRY 70 kv	ATASCADERO-SAN LUIS OBISPO 70kv [8490] & TEMPLETON-ATASCADERO 70kv [9410]	P6	N-1-1	> 0.9, < 1.1	> 0.9, < 1.1	0.90	> 0.9, < 1.1	> 0.9, < 1.1	> 0.9, < 1.1	> 0.9, < 1.1	> 0.9, < 1.1	> 0.9, < 1.1	> 0.9, < 1.1	> 0.9, < 1.1	0.89	Operating Solution	
MANVILLE 115 kv	MESA-DIVIDE #2 115kv [2440] & MESA-DIVIDE #1 115kv [2430]	P6	N-1-1	> 0.9, < 1.1	0.89	> 0.9, < 1.1	> 0.9, < 1.1	> 0.9, < 1.1	> 0.9, < 1.1	> 0.9, < 1.1	0.90	> 0.9, < 1.1	> 0.9, < 1.1	0.90	> 0.9, < 1.1	Project: Midway-Andrew 230 KV - Scope under review	
PURISIMA 115 kv	MESA-DIVIDE #2 115kv [2440] & MESA-DIVIDE #1 115kv [2430]	P6	N-1-1	> 0.9, < 1.1	0.89	> 0.9, < 1.1	> 0.9, < 1.1	> 0.9, < 1.1	> 0.9, < 1.1	> 0.9, < 1.1	> 0.9, < 1.1	> 0.9, < 1.1	> 0.9, < 1.1	> 0.9, < 1.1	> 0.9, < 1.1	Project: Midway-Andrew 230 KV - Scope under review	
AECCEOR 115 kv	MESA-SISQUOC 115kv [2460] & MESA_PGE-SNTA MRA 115kv [0]	P6	N-1-1	> 0.9, < 1.1	> 0.9, < 1.1	> 0.9, < 1.1	> 0.9, < 1.1	> 0.9, < 1.1	> 0.9, < 1.1	> 0.9, < 1.1	> 0.9, < 1.1	> 0.9, < 1.1	> 0.9, < 1.1	> 0.9, < 1.1	0.90	Sensitivity Only	
FAIRWAY 115 kv	MESA-SISQUOC 115kv [2460] & MESA_PGE-SNTA MRA 115kv [0]	P6	N-1-1	> 0.9, < 1.1	> 0.9, < 1.1	0.89	> 0.9, < 1.1	> 0.9, < 1.1	> 0.9, < 1.1	> 0.9, < 1.1	0.89	> 0.9, < 1.1	> 0.9, < 1.1	> 0.9, < 1.1	0.88	Project: Midway-Andrew 230 KV - Scope under review	
SISQUOC 115 kv	MESA-SISQUOC 115kv [2460] & MESA_PGE-SNTA MRA 115kv [0]	P6	N-1-1	> 0.9, < 1.1	> 0.9, < 1.1	0.89	> 0.9, < 1.1	> 0.9, < 1.1	> 0.9, < 1.1	> 0.9, < 1.1	0.89	> 0.9, < 1.1	> 0.9, < 1.1	> 0.9, < 1.1	0.89	Project: Midway-Andrew 230 KV - Scope under review	
SNTA MRA 115 kv	MESA-SISQUOC 115kv [2460] & MESA_PGE-SNTA MRA 115kv [0]	P6	N-1-1	> 0.9, < 1.1	> 0.9, < 1.1	0.89	> 0.9, < 1.1	> 0.9, < 1.1	> 0.9, < 1.1	> 0.9, < 1.1	0.89	> 0.9, < 1.1	> 0.9, < 1.1	> 0.9, < 1.1	0.88	Project: Midway-Andrew 230 KV - Scope under review	
BUELLTON 115 kv	MESA-SISQUOC 115kv [2460] & SANTA MARIA-SISQUOC 115kv [3610]	P6	N-1-1	> 0.9, < 1.1	> 0.9, < 1.1	> 0.9, < 1.1	> 0.9, < 1.1	> 0.9, < 1.1	> 0.9, < 1.1	> 0.9, < 1.1	> 0.9, < 1.1	0.89	> 0.9, < 1.1	> 0.9, < 1.1	> 0.9, < 1.1	Sensitivity Only	
SISQUOC 115 kv	MESA-SISQUOC 115kv [2460] & SANTA MARIA-SISQUOC 115kv [3610]	P6	N-1-1	> 0.9, < 1.1	> 0.9, < 1.1	> 0.9, < 1.1	> 0.9, < 1.1	> 0.9, < 1.1	> 0.9, < 1.1	> 0.9, < 1.1	> 0.9, < 1.1	0.87	> 0.9, < 1.1	> 0.9, < 1.1	> 0.9, < 1.1	Sensitivity Only	



High/Low Voltages

Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)									Voltage PU (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2020 Winter Peak	2023 Winter Peak	2028 Winter Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations		
SNTA YNZ 115 kv	MESA-SISQUOC 115kV [2460] & SANTA MARIA-SISQUOC 115kV [3610]	P6	N-1-1	> 0.9, < 1.1	> 0.9, < 1.1	> 0.9, < 1.1	> 0.9, < 1.1	> 0.9, < 1.1	> 0.9, < 1.1	> 0.9, < 1.1	> 0.9, < 1.1	> 0.9, < 1.1	0.88	> 0.9, < 1.1	> 0.9, < 1.1	> 0.9, < 1.1	Sensitivity Only
ZACA 115 kv	MESA-SISQUOC 115kV [2460] & SANTA MARIA-SISQUOC 115kV [3610]	P6	N-1-1	> 0.9, < 1.1	> 0.9, < 1.1	> 0.9, < 1.1	> 0.9, < 1.1	> 0.9, < 1.1	> 0.9, < 1.1	> 0.9, < 1.1	> 0.9, < 1.1	> 0.9, < 1.1	0.88	> 0.9, < 1.1	> 0.9, < 1.1	> 0.9, < 1.1	Sensitivity Only
BUELLTON 115 kv	MORRO BAY-DIABLO 230kV [5260] & MORRO BAY-MESA 230kV [5290]	P6	N-1-1	> 0.9, < 1.1	0.87	0.47	> 0.9, < 1.1	> 0.9, < 1.1	> 0.9, < 1.1	> 0.9, < 1.1	> 0.9, < 1.1	0.47	0.50	> 0.9, < 1.1	> 0.9, < 1.1	0.46	Project: Midway-Andrew 230 KV - Scope under review
CABRILLO 115 kv	MORRO BAY-DIABLO 230kV [5260] & MORRO BAY-MESA 230kV [5290]	P6	N-1-1	> 0.9, < 1.1	0.87	0.47	> 0.9, < 1.1	> 0.9, < 1.1	> 0.9, < 1.1	> 0.9, < 1.1	> 0.9, < 1.1	0.47	0.49	> 0.9, < 1.1	> 0.9, < 1.1	0.46	Project: Midway-Andrew 230 KV - Scope under review
DIABLOCN 230 kv	MORRO BAY-DIABLO 230kV [5260] & MORRO BAY-MESA 230kV [5290]	P6	N-1-1	> 0.9, < 1.1	> 0.9, < 1.1	0.53	> 0.9, < 1.1	> 0.9, < 1.1	> 0.9, < 1.1	> 0.9, < 1.1	> 0.9, < 1.1	0.53	0.63	> 0.9, < 1.1	> 0.9, < 1.1	0.52	Project: Midway-Andrew 230 KV - Scope under review
MESA PGE 230 kv	MORRO BAY-DIABLO 230kV [5260] & MORRO BAY-MESA 230kV [5290]	P6	N-1-1	> 0.9, < 1.1	> 0.9, < 1.1	0.52	> 0.9, < 1.1	> 0.9, < 1.1	> 0.9, < 1.1	> 0.9, < 1.1	> 0.9, < 1.1	0.52	0.60	> 0.9, < 1.1	> 0.9, < 1.1	0.51	Project: Midway-Andrew 230 KV - Scope under review
SISQUOC 115 kv	MORRO BAY-DIABLO 230kV [5260] & MORRO BAY-MESA 230kV [5290]	P6	N-1-1	> 0.9, < 1.1	0.90	0.52	> 0.9, < 1.1	> 0.9, < 1.1	> 0.9, < 1.1	> 0.9, < 1.1	> 0.9, < 1.1	0.52	0.57	> 0.9, < 1.1	> 0.9, < 1.1	0.51	Project: Midway-Andrew 230 KV - Scope under review
SNTA YNZ 115 kv	MORRO BAY-DIABLO 230kV [5260] & MORRO BAY-MESA 230kV [5290]	P6	N-1-1	> 0.9, < 1.1	0.86	0.47	> 0.9, < 1.1	> 0.9, < 1.1	> 0.9, < 1.1	> 0.9, < 1.1	> 0.9, < 1.1	0.47	0.49	> 0.9, < 1.1	> 0.9, < 1.1	0.46	Project: Midway-Andrew 230 KV - Scope under review
ZACA 115 kv	MORRO BAY-DIABLO 230kV [5260] & MORRO BAY-MESA 230kV [5290]	P6	N-1-1	> 0.9, < 1.1	0.88	0.48	> 0.9, < 1.1	> 0.9, < 1.1	> 0.9, < 1.1	> 0.9, < 1.1	> 0.9, < 1.1	0.49	0.52	> 0.9, < 1.1	> 0.9, < 1.1	0.47	Project: Midway-Andrew 230 KV - Scope under review
ESTRELLA 70 kv	PASO ROBLES-TEMPLETON 70kV [9400] & ESTRELLA 230/70kV TB 1	P6	N-1-1	0.51	0.49	0.49	> 0.9, < 1.1	> 0.9, < 1.1	0.53	0.55	0.52	0.48	> 0.9, < 1.1	0.68	0.49	Operating Solution	
PSA RBLS 70 kv	PASO ROBLES-TEMPLETON 70kV [9400] & ESTRELLA 230/70kV TB 1	P6	N-1-1	0.51	0.49	0.49	> 0.9, < 1.1	> 0.9, < 1.1	0.53	0.55	0.52	0.47	> 0.9, < 1.1	0.68	0.49	Operating Solution	
PALMR 115 kv	SANTA MARIA-SISQUOC 115kV [3610] & MESA-SISQUOC 115kV [2460]	P6	N-1-1	> 0.9, < 1.1	> 0.9, < 1.1	> 0.9, < 1.1	> 0.9, < 1.1	> 0.9, < 1.1	> 0.9, < 1.1	> 0.9, < 1.1	> 0.9, < 1.1	0.88	> 0.9, < 1.1	> 0.9, < 1.1	> 0.9, < 1.1	Sensitivity Only	
ATASCDRO 70 kv	TEMPLETON-ATASCADERO 70kV [9410] & ATASCADERO-SAN LUIS OBISPO 70kV [8490]	P6	N-1-1	> 0.9, < 1.1	> 0.9, < 1.1	0.84	> 0.9, < 1.1	> 0.9, < 1.1	> 0.9, < 1.1	> 0.9, < 1.1	> 0.9, < 1.1	0.86	> 0.9, < 1.1	> 0.9, < 1.1	> 0.9, < 1.1	0.84	Operating Solution
BNA VSTA 60 kv	SALINAS 115/60kV TB 2 & SALINAS 115/60kV TB 3	P6	N-1-1	0.29	0.29	0.29	0.52	0.58	0.31	0.31	0.30	0.29	0.63	0.35	0.29	Operating Solution	
BRIGTANO 60 kv	SALINAS 115/60kV TB 2 & SALINAS 115/60kV TB 3	P6	N-1-1	0.61	0.62	0.61	0.76	0.81	0.61	0.62	0.62	0.62	0.84	0.65	0.61	Operating Solution	
FIRESTNE 60 kv	SALINAS 115/60kV TB 2 & SALINAS 115/60kV TB 3	P6	N-1-1	0.28	0.29	0.28	0.51	0.57	0.30	0.30	0.29	0.28	0.62	0.34	0.28	Operating Solution	
FRSHXPRS 60 kv	SALINAS 115/60kV TB 2 & SALINAS 115/60kV TB 3	P6	N-1-1	0.29	0.30	0.29	0.52	0.58	0.31	0.31	0.30	0.29	0.63	0.35	0.29	Operating Solution	
GRANT RK 60 kv	SALINAS 115/60kV TB 2 & SALINAS 115/60kV TB 3	P6	N-1-1	0.61	0.62	0.61	0.76	0.81	0.61	0.62	0.62	0.62	0.84	0.66	0.62	Operating Solution	
LAURELES 60 kv	SALINAS 115/60kV TB 2 & SALINAS 115/60kV TB 3	P6	N-1-1	0.27	0.27	0.28	0.51	0.58	0.30	0.29	0.29	0.26	0.63	0.33	0.28	Operating Solution	
SPENCE 60 kv	SALINAS 115/60kV TB 2 & SALINAS 115/60kV TB 3	P6	N-1-1	0.28	0.28	0.28	0.51	0.57	0.30	0.30	0.29	0.28	0.62	0.34	0.28	Operating Solution	
BORONDA 60 kv	SALINAS 115/60kV TB 3 & SALINAS 115/60kV TB 2	P6	N-1-1	0.30	0.30	0.30	0.53	0.59	0.32	0.32	0.31	0.30	0.64	0.36	0.30	Operating Solution	
ERTA 60 kv	SALINAS 115/60kV TB 3 & SALINAS 115/60kV TB 2	P6	N-1-1	0.89	0.90	0.89	> 0.9, < 1.1	> 0.9, < 1.1	0.89	0.89	> 0.9, < 1.1	> 0.9, < 1.1	> 0.9, < 1.1	> 0.9, < 1.1	> 0.9, < 1.1	0.90	Operating Solution
GABILAN 60 kv	SALINAS 115/60kV TB 3 & SALINAS 115/60kV TB 2	P6	N-1-1	0.29	0.30	0.29	0.52	0.59	0.31	0.31	0.30	0.29	0.64	0.36	0.29	Operating Solution	
IND.ACRE 60 kv	SALINAS 115/60kV TB 3 & SALINAS 115/60kV TB 2	P6	N-1-1	0.30	0.30	0.30	0.53	0.59	0.32	0.32	0.30	0.29	0.64	0.36	0.30	Operating Solution	

Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)									Voltage PU (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2020 Winter Peak	2023 Winter Peak	2028 Winter Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations		
LGNTS J1 60 kv	SALINAS 115/60kV TB 3 & SALINAS 115/60kV TB 2	P6	N-1-1	0.29	0.30	0.29	0.52	0.59	0.31	0.31	0.30	0.29	0.64	0.35	0.29	Operating Solution	
OTTER 60 kv	SALINAS 115/60kV TB 3 & SALINAS 115/60kV TB 2	P6	N-1-1	0.26	0.27	0.27	0.51	0.58	0.29	0.29	0.28	0.26	0.63	0.33	0.28	Operating Solution	
RSVTN RD 60 kv	SALINAS 115/60kV TB 3 & SALINAS 115/60kV TB 2	P6	N-1-1	0.28	0.29	0.29	0.52	0.59	0.31	0.31	0.30	0.28	0.64	0.35	0.29	Operating Solution	
WTSNVLL 60 kv	SALINAS 115/60kV TB 3 & SALINAS 115/60kV TB 2	P6	N-1-1	0.83	0.85	0.84	> 0.9, < 1.1	> 0.9, < 1.1	0.83	0.84	0.85	0.85	> 0.9, < 1.1	0.86	0.84	Operating Solution	
BA FOOD1 60 kv	COBURN 230/60kV TB 1 & COBURN-LASAGUILASS #1 230kV [0]	P6	N-1-1	> 0.9, < 1.1	> 0.9, < 1.1	> 0.9, < 1.1	> 0.9, < 1.1	1.11	> 0.9, < 1.1	> 0.9, < 1.1	> 0.9, < 1.1	> 0.9, < 1.1	1.11	> 0.9, < 1.1	> 0.9, < 1.1	Load power factor correction and voltage support if needed	
KING CTY 60 kv	COBURN 230/60kV TB 1 & COBURN-LASAGUILASS #1 230kV [0]	P6	N-1-1	> 0.9, < 1.1	> 0.9, < 1.1	> 0.9, < 1.1	> 0.9, < 1.1	1.11	> 0.9, < 1.1	> 0.9, < 1.1	> 0.9, < 1.1	> 0.9, < 1.1	1.11	> 0.9, < 1.1	> 0.9, < 1.1	Load power factor correction and voltage support if needed	
LOS OST 60 kv	COBURN 230/60kV TB 1 & COBURN-LASAGUILASS #1 230kV [0]	P6	N-1-1	> 0.9, < 1.1	> 0.9, < 1.1	> 0.9, < 1.1	> 0.9, < 1.1	1.11	> 0.9, < 1.1	> 0.9, < 1.1	> 0.9, < 1.1	> 0.9, < 1.1	1.11	> 0.9, < 1.1	> 0.9, < 1.1	Load power factor correction and voltage support if needed	
SAN MIGL 70 kv	ESTRELLA 230/70kV TB 1 & PASO ROBLES-TEMPLETON 70kV [9400]	P6	N-1-1	0.53	0.51	0.51	> 0.9, < 1.1	> 0.9, < 1.1	0.55	0.56	0.54	0.50	> 0.9, < 1.1	0.70	0.51	Operating Solution	
PALMR 115 kv	MESA PGE 230/115kV TB 2 & MESA PGE 230/115kV TB 3	P6	N-1-1	> 0.9, < 1.1	> 0.9, < 1.1	0.56	> 0.9, < 1.1	> 0.9, < 1.1	> 0.9, < 1.1	> 0.9, < 1.1	0.57	0.68	> 0.9, < 1.1	> 0.9, < 1.1	0.55	Project: Midway-Andrew 230 KV - Scope under review	
AECCEOR 115 kv	MESA PGE 230/115kV TB 3 & MESA PGE 230/115kV TB 2	P6	N-1-1	> 0.9, < 1.1	> 0.9, < 1.1	0.55	> 0.9, < 1.1	> 0.9, < 1.1	> 0.9, < 1.1	> 0.9, < 1.1	0.56	0.66	> 0.9, < 1.1	> 0.9, < 1.1	0.53	Project: Midway-Andrew 230 KV - Scope under review	
BAYWOOD 70 kv	MESA PGE 230/115kV TB 3 & MESA PGE 230/115kV TB 2	P6	N-1-1	> 0.9, < 1.1	> 0.9, < 1.1	0.88	> 0.9, < 1.1	> 0.9, < 1.1	> 0.9, < 1.1	> 0.9, < 1.1	0.89	> 0.9, < 1.1	> 0.9, < 1.1	> 0.9, < 1.1	0.87	Project: Midway-Andrew 230 KV - Scope under review	
BUELLTON 115 kv	MESA PGE 230/115kV TB 3 & MESA PGE 230/115kV TB 2	P6	N-1-1	> 0.9, < 1.1	> 0.9, < 1.1	0.53	> 0.9, < 1.1	> 0.9, < 1.1	> 0.9, < 1.1	> 0.9, < 1.1	0.54	0.62	> 0.9, < 1.1	> 0.9, < 1.1	0.51	Project: Midway-Andrew 230 KV - Scope under review	
CABRILLO 115 kv	MESA PGE 230/115kV TB 3 & MESA PGE 230/115kV TB 2	P6	N-1-1	> 0.9, < 1.1	> 0.9, < 1.1	0.52	> 0.9, < 1.1	> 0.9, < 1.1	> 0.9, < 1.1	> 0.9, < 1.1	0.53	0.62	> 0.9, < 1.1	> 0.9, < 1.1	0.51	Project: Midway-Andrew 230 KV - Scope under review	
CAMBRIA 70 kv	MESA PGE 230/115kV TB 3 & MESA PGE 230/115kV TB 2	P6	N-1-1	> 0.9, < 1.1	> 0.9, < 1.1	0.88	> 0.9, < 1.1	> 0.9, < 1.1	> 0.9, < 1.1	> 0.9, < 1.1	0.88	> 0.9, < 1.1	> 0.9, < 1.1	> 0.9, < 1.1	0.87	Project: Midway-Andrew 230 KV - Scope under review	
CAYUCOS 70 kv	MESA PGE 230/115kV TB 3 & MESA PGE 230/115kV TB 2	P6	N-1-1	> 0.9, < 1.1	> 0.9, < 1.1	0.89	> 0.9, < 1.1	> 0.9, < 1.1	> 0.9, < 1.1	> 0.9, < 1.1	0.89	> 0.9, < 1.1	> 0.9, < 1.1	> 0.9, < 1.1	0.88	Project: Midway-Andrew 230 KV - Scope under review	
MORRO BY 115 kv	MESA PGE 230/115kV TB 3 & MESA PGE 230/115kV TB 2	P6	N-1-1	> 0.9, < 1.1	> 0.9, < 1.1	0.88	> 0.9, < 1.1	> 0.9, < 1.1	> 0.9, < 1.1	> 0.9, < 1.1	0.88	> 0.9, < 1.1	> 0.9, < 1.1	> 0.9, < 1.1	0.87	Project: Midway-Andrew 230 KV - Scope under review	
OCEANO 115 kv	MESA PGE 230/115kV TB 3 & MESA PGE 230/115kV TB 2	P6	N-1-1	> 0.9, < 1.1	> 0.9, < 1.1	0.68	> 0.9, < 1.1	> 0.9, < 1.1	> 0.9, < 1.1	> 0.9, < 1.1	0.69	0.81	> 0.9, < 1.1	> 0.9, < 1.1	0.66	Project: Midway-Andrew 230 KV - Scope under review	
PERRY 70 kv	MESA PGE 230/115kV TB 3 & MESA PGE 230/115kV TB 2	P6	N-1-1	> 0.9, < 1.1	> 0.9, < 1.1	0.88	> 0.9, < 1.1	> 0.9, < 1.1	> 0.9, < 1.1	> 0.9, < 1.1	0.88	> 0.9, < 1.1	> 0.9, < 1.1	> 0.9, < 1.1	0.87	Project: Midway-Andrew 230 KV - Scope under review	
SN LS OB 115 kv	MESA PGE 230/115kV TB 3 & MESA PGE 230/115kV TB 2	P6	N-1-1	> 0.9, < 1.1	> 0.9, < 1.1	0.78	> 0.9, < 1.1	> 0.9, < 1.1	> 0.9, < 1.1	> 0.9, < 1.1	0.79	0.87	> 0.9, < 1.1	> 0.9, < 1.1	0.77	Project: Midway-Andrew 230 KV - Scope under review	
SNTA YNZ 115 kv	MESA PGE 230/115kV TB 3 & MESA PGE 230/115kV TB 2	P6	N-1-1	> 0.9, < 1.1	> 0.9, < 1.1	0.52	> 0.9, < 1.1	> 0.9, < 1.1	> 0.9, < 1.1	> 0.9, < 1.1	0.53	0.61	> 0.9, < 1.1	> 0.9, < 1.1	0.51	Project: Midway-Andrew 230 KV - Scope under review	
UNION OL 115 kv	MESA PGE 230/115kV TB 3 & MESA PGE 230/115kV TB 2	P6	N-1-1	> 0.9, < 1.1	> 0.9, < 1.1	0.66	> 0.9, < 1.1	> 0.9, < 1.1	> 0.9, < 1.1	> 0.9, < 1.1	0.67	0.80	> 0.9, < 1.1	> 0.9, < 1.1	0.64	Project: Midway-Andrew 230 KV - Scope under review	
ZACA 115 kv	MESA PGE 230/115kV TB 3 & MESA PGE 230/115kV TB 2	P6	N-1-1	> 0.9, < 1.1	> 0.9, < 1.1	0.54	> 0.9, < 1.1	> 0.9, < 1.1	> 0.9, < 1.1	> 0.9, < 1.1	0.55	0.65	> 0.9, < 1.1	> 0.9, < 1.1	0.53	Project: Midway-Andrew 230 KV - Scope under review	
MESA PGE 230 kv	MESA_PGE SVD=v & MORRO BAY-MESA 230kV [5290]	P6	N-1-1	> 0.9, < 1.1	> 0.9, < 1.1	> 0.9, < 1.1	> 0.9, < 1.1	> 0.9, < 1.1	> 0.9, < 1.1	> 0.9, < 1.1	0.90	> 0.9, < 1.1	> 0.9, < 1.1	> 0.9, < 1.1	> 0.9, < 1.1	Project: Midway-Andrew 230 KV - Scope under review	
GRENVLY 60 kv	GREEN VALLEY-WATSONVILLE 60kV [6970]	P7	DCTL	1.07	1.08	1.07	1.08	1.11	1.08	1.07	1.07	1.09	1.12	1.07	1.07	Load power factor correction and voltage support if needed	
AGRILINK 60 kv	WTSNVLL-SALINAS2 60kV [0]	P7	DCTL	1.04	1.04	1.06	1.08	1.11	1.07	1.07	1.06	1.05	1.11	1.04	1.06	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
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2020 Winter Peak	2023 Winter Peak	2028 Winter Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations		
ERTA 60 kv	WTSNVLLE-SALINAS2 60kV [0]	P7	DCTL	1.04	1.05	1.06	1.08	1.11	1.07	1.07	1.07	1.06	1.11	1.05	1.06	Load power factor correction and voltage support if needed	
GREN VLY 60 kv	WTSNVLLE-SALINAS2 60kV [0]	P7	DCTL	1.05	1.05	1.06	1.08	1.11	1.07	1.07	1.07	1.06	1.11	1.05	1.06	Load power factor correction and voltage support if needed	
WTSNVLLE 60 kv	WTSNVLLE-SALINAS2 60kV [0]	P7	DCTL	1.04	1.04	1.06	1.08	1.11	1.07	1.07	1.06	1.05	1.11	1.04	1.06	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		
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2020 Winter Peak	2023 Winter Peak	2028 Winter Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen		2020 SP Heavy Renewable & Min Gas Gen	2028 Retirement of QF Generations
BRIGTANO 60 kv	GREEN VALLEY-WATSONVILLE 60kV [6970]	P1	N-1	3	3	8	6	7	8	8	9	3	7	3	8	Load power factor correction and voltage support if needed
GRANT RK 60 kv	GREEN VALLEY-WATSONVILLE 60kV [6970]	P1	N-1	3	3	8	6	7	8	8	9	3	7	3	8	Load power factor correction and voltage support if needed
WTSNVILLE 60 kv	GREEN VALLEY-WATSONVILLE 60kV [6970]	P1	N-1	4	4	12	8	11	11	12	13	5	11	4	12	Load power factor correction and voltage support if needed
BRIGTANO 60 kv	GRN VLLY 115/60kV TB 1	P1	N-1	3	3	4	6	7	8	8	4	4	7	3	4	Load power factor correction and voltage support if needed
ERTA 60 kv	GRN VLLY 115/60kV TB 1	P1	N-1	6	6	8	9	12	13	13	8	7	11	6	8	Load power factor correction and voltage support if needed
GRANT RK 60 kv	GRN VLLY 115/60kV TB 1	P1	N-1	3	3	5	6	7	8	8	4	4	7	3	5	Load power factor correction and voltage support if needed
GREN VLY 60 kv	GRN VLLY 115/60kV TB 1	P1	N-1	7	7	8	9	12	13	13	8	8	12	6	8	Load power factor correction and voltage support if needed
WTSNVILLE 60 kv	GRN VLLY 115/60kV TB 1	P1	N-1	5	5	7	8	11	12	12	7	6	11	5	7	Load power factor correction and voltage support if needed



Transient Stability

Contingency	Category	Category Description	Transient Stability Performance					Potential Mitigation Solutions
			Baseline Scenarios			Sensitivity Scenarios		
			2020 Summer Peak	2028 Summer Peak	2023 Spring Off-Peak	2020 SP Heavy Renewable & Min Gas Gen	2023 SpOP Hi Renew & Min Gas Gen	
Diablo 3Ø fault with normal clearing.	P1-1	N-1	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No Violation
Mosslanding Sw Station 3Ø fault with normal clearing.	P1-2	N-1	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No Violation
Mosslanding Sw Station 230/115 kV Bank #4 3Ø fault with normal clearing.	P1-3	N-1	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No Violation
Mesa 115 kv SVD 3Ø fault with normal clearing.	P1-4	N-1	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No Violation
Mosslanding Sw Sta 230 kV line breaker SLG fault with normal clearing.	P2-3	Non-Bus-Tie Breaker	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No Violation
Diablo 1 3Ø fault with normal clearing with Diablo 2 offline in the base case.	P3-1	G-1/N-1	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No Violation
Mosslndswsta-Lasaguilas 230 kV line 3Ø fault with normal clearing with Diablo Unit #2 offline in the base case.	P3-2	G-1/N-1	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No Violation
Mosslndswsta 230/115 kVBank # 4 3Ø fault with normal clearing with Diablo Unit #2 offline in the base case.	P3-3	G-1/N-1	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No Violation
Mesa 115 kV SVD 3Ø fault with normal clearing with Diablo offline in the base case.	P3-4	G-1/N-1	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No Violation
Duke Moss SLG fault expanded to elements lost due to stuck breaker and clear fault from remote breakers with normal clearing time.	P4-1	Stuck Breaker	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No Violation
Mosslanding Switching Station SLG fault with stuck breaker expanded o Mosslnsw-Duke Moss and Mosslndsw-Mecalf	P4-2	Stuck Breaker	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No Violation
Mosslanding Switching Station #4 115/230 kv transformer SLG fault with stuck breaker	P4-3	Stuck Breaker	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No Violation
Mesa 115 kV SVD SLG fault expanded to elements lost due to stuck breaker and clear fault from remote breakers with normal clearing time.	P4-4	Stuck Breaker	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No Violation
Mosslanding Sw Station 115 kV bus SVD SLG fault expanded to elements lost due to stuck breaker and clear fault from remote breakers with normal clearing time.	P4-5	Stuck Breaker	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No Violation
Mosslanding Sw Station 115 kV bus-tie breaker SVD SLG fault expanded to elements lost due to stuck breaker and clear fault from remote breakers with normal clearing time.	P4-6	Stuck Breaker	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	<b>WECC criteria not met</b>	Sensitivity Only



Transient Stability

Contingency	Category	Category Description	Transient Stability Performance					Potential Mitigation Solutions
			Baseline Scenarios			Sensitivity Scenarios		
			2020 Summer Peak	2028 Summer Peak	2023 Spring Off-Peak	2020 SP Heavy Renewable & Min Gas Gen	2023 SpOP Hi Renew & Min Gas Gen	
Duke Moss #6 unit with delayed clearing	P5-1	Non-Redundant Relay	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No Violation
Mosslanding Switching Station -Duke Moss 230 KV line SLG Fault with delayed clearing	P5-2	Non-Redundant Relay	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No Violation
Mosslanding Switching Station 230/115 KV Transformer Bank # 4 SLG fault with delayed clearing.	P5-3	Non-Redundant Relay	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No Violation
Mesa 115 KV SVD SLG fault with delayed clearing.	P5-4	Non-Redundant Relay	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No Violation
Moss Landing #1 or #2 115 kV bus fault. Delayed clearing due to failure of a non-redundant relay.	P5-5	Non-Redundant Relay	WECC criteria not met	WECC criteria not met	Stable/WECC criteria met	WECC criteria not met	Stable/WECC criteria met	Add Redundant Relay
MossIndswsta-Coburn 230 kV line 3Ø fault with normal clearing with Metcalf 500/230 kV #13 Transformer offline in the base case.	P6-1	N-1-1	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No Violation
MossIndswsta 230 kV bus 3Ø fault with normal clearing with MossIndswsta 500/230 kV #9 Transformer offline in the base case.	P6-2	N-1-1	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No Violation
Diablo 230 kV SVD 3Ø fault with normal clearing with Mesa 115 kV SVD offline in the base case.	P6-3	N-1-1	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No Violation

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



*Single Contingency Load Drop*

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

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



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



*Single Source Substation with more than 100 MW Load*

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

No single source substation with of more than 100 MW



Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading % (Baseline Scenarios)					Loading % (Sensitivity Scenarios)			Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	
Lugo - Victorville 500kV	Delany - Colorado River 500kV 1 and Paloverde - Colorado River 500kV 1	P6	N-1-1	104%	<100	<100	<100	<100	<100	<100	<100	Project: Lugo-Victorville line upgrade In-Service Date: 6/2021 Short Term: System re-dispatch
	Devers - Redbluff 500kV 1 and 2	P7	N-2	112%	<100	<100	<100	<100	<100	<100	113%	
	Colorado River - Redbluff 500kV 1 and 2	P7	N-2	107%	<100	<100	<100	<100	<100	<100	104%	
	Mohave - Eldorado & Colorado River-Paloverde 500kV	P6	N-1-1	<100	<100	<100	<100	<100	<100	<100	<100	
	Lugo - Mohave & Colorado River-Paloverde 500kV	P6	N-1-1	<100	<100	<100	<100	<100	<100	<100	<100	

Study Area: **SCE Bulk**

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
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	
				No High/low Voltage issues identified								

Study Area: **SCE Bulk**

Voltage Deviation



Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)					Voltage PU (Sensitivity Scenarios)			Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	
				No voltage deviation issues identified								

Study Area:

SCE Bulk

Transient Stability



Contingency	Category	Category Description	Transient Stability Performance (Number of voltage and frequency violations)								Potential Mitigation Solutions
			2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	
Imperial Valley–N.Gila 500 kV; 3-Phase fault @ Imperial Valley, normal clearing	P1	N-1	Stable	-	Stable	-	Stable	-	Stable	Stable	
Lugo–Victorville 500 kV; 3-Phase fault @ Lugo, normal clearing	P1	N-1	Stable	-	Stable	-	Stable	-	Stable	Stable	
Paloverde–Colorado River 500 kV; 3-Phase fault @ Paloverde, normal clearing	P1	N-1	Stable	-	Stable	-	Stable	-	Stable	Stable	
PDCI Monopole; 3-Phase fault @ Sylmar, normal clearing	P1	N-1	Stable	-	Stable	-	Stable	-	Stable	Stable	
Serrano–Valley 500 kV; 3-Phase fault @ Valley, normal clearing	P1	N-1	Stable	-	Stable	-	Stable	-	Stable	Stable	
Palo Verde G-1; 3-Phase fault @ 500 kV, normal clearing	P1	G-1	Stable	-	Stable	-	Stable	-	Stable	Stable	
Devers-Valley No.1 500 kV & Serrano-Valley 500 kV; 3-Phase fault @ Valley, normal clearing	P6	N-1-1	Stable	-	Stable	-	Stable	-	Stable	Stable	
Lugo–Eldorado & Lugo–Mohave 500 kV; 3-Phase fault @ Lugo, normal clearing	P6	N-1-1	Stable	-	Stable	-	Stable	-	Stable	Stable	
Colorado River–Paloverde & Imperial Valley–N.Gila 500 kV; 3-Phase fault @ Paloverde, normal clearing	P6	N-1-1	Stable	-	Stable	-	Stable	-	Stable	Stable	
Sunrise & SWPL 500 kV; 3-Phase fault @ Suncrest, normal clearing	P6	N-1-1	Stable	-	Stable	-	Stable	-	Stable	Stable	
Midway–Vincent # 1 & Midway - Whirlwind #3 500 kV with RAS; 3-Phase fault @ Midway, normal clearing	P7	N-2	Stable	-	Stable	-	Stable	-	Stable	Stable	
Midway - Vincent No. 1 & 2 500 kV with RAS; 3-Phase fault @ Midway, normal clearing	P7	N-2	Stable	-	Stable	-	Stable	-	Stable	Stable	
Vincent–Miraloma & Lugo–Rancho Vista 500 kV; 3-Phase fault @ Mira Loma, normal clearing	P7	N-2	Stable	-	Stable	-	Stable	-	Stable	Stable	
Colorado River–Red Bluff 500kV #1 & #2; 3-Phase fault @ Red Bluff, normal clearing	P7	N-2	Stable	-	Stable	-	Stable	-	Stable	Stable	
Devers–Red Bluff 500 kV #1 & #2; 3-Phase fault @ Devers, normal clearing	P7	N-2	Stable	-	Stable	-	Stable	-	Stable	Stable	
Lugo–Vincent 500 kV #1 & #2; 3-Phase fault @ Vincent, normal clearing	P7	N-2	Stable	-	Stable	-	Stable	-	Stable	Stable	
Antelope–Vincent #1 & #2 500 kV; 3-Phase fault @ Vincent, normal clearing	P7	N-2	Stable	-	Stable	-	Stable	-	Stable	Stable	
Loss of PDCI Bipole Converters; 3-Phase fault @ Sylmar, normal clearing	P7	N-2	Stable	-	Stable	-	Stable	-	Stable	Stable	
Loss of IPPDC Bipole; 3-Phase fault @ Adelanto, normal clearing	P7	N-2	Stable	-	Stable	-	Stable	-	Stable	Stable	
Lugo–Miraloma & Lugo–Rancho Vista 500 kV; 3-Phase fault @ Lugo, normal clearing	P7	N-2	Stable	-	Stable	-	Stable	-	Stable	Stable	
Serrano–Mira Loma & Serrano–Rancho Vista 500 kV; 3-Phase fault @ Serrano, normal clearing	P7	N-2	Stable	-	Stable	-	Stable	-	Stable	Stable	





Study Area: **SCE Bulk**



*Single Contingency Load Drop*

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

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

Study Area: **SCE Bulk**



*Single Source Substation with more than 100 MW Load*

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

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
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	
MAGUNDEN-PASTORIA 230kV 1(or2)	MAGUNDEN-PASTORIA 230kV 2(or1) and 3(or 2) (with RAS)	P7	N-2	-	-	-	-	-	-	<100	-	Generation Re-dispatch
MAGUNDEN-SPRINGVL 230 kV 1 or 2	MAGUNDEN-VESTAL 230kV 1 and 2 (with RAS)	P7	N-2	<100	<100	<100	-	-	-	-	-	Big Creek RAS
MAGUNDEN-SPRINGVL 230 kV 2	RECTOR-VESTAL 230 kV 1 and 2 (with RAS)	P7	N-2	<100	<100	<100	-	-	-	-	-	Big Creek RAS
	MAGUNDEN-SPRINGVL 230 kV 1 and MAGUNDEN-VESTAL 230kV 1(or)2 (with RAS)	P6	N-1-1	<100	<100	<100	-	-	-	-	-	Big Creek RAS
	MAGUNDEN-SPRINGVL 230 kV 1 and RECTOR-VESTAL 230 kV 1(or)2 (with RAS)	P6	N-1-1	<100	<100	<100	-	-	-	-	-	Big Creek RAS
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	<100	<100	-	-	-	-	-	Big Creek RAS
SPRINGVL-RECTOR 230 kV 1	MAGUNDEN-VESTAL 230kV 1 and 2 (with RAS)	P6	N-1-1	<100	<100	<100	-	-	-	-	-	Big Creek RAS
BIG CRK 3 - RECTOR 230 kV 1	RECTOR - BIG CRK 3 and BIG CRK 1 - RECTOR	P7	N-2	-	-	-	-	-	<100	-	-	Big Creek RAS- Generation Runback
SPRINGVL- BIG CRK 4 230 kV 1	RECTOR 1- BIG CRK 3 & RECTOR 2 - BIG CRK 3	P7	N-2	-	-	-	-	-	-	-	<100	Big Creek RAS- Generation Runback

Study Area: **SCE Tehachapi & Big Creek Corridor**

*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
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	
No Voltage Deviation violations were identified during the studies												



Study Area: **SCE Tehachapi & Big Creek Corridor**

Voltage Deviation



Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)					Voltage PU (Sensitivity Scenarios)			Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	
BAILEY 230kV	PARDEE-BAILEY 230kV and BAILEY-PASTORIA 230kV	P6	N-1-1	0.88	0.88	0.86	0.85	0.847	0.87	0.846	0.88	Operating Procedure 46

Study Area:

SCE Tehachapi & Big Creek Corridor

Transient Stability



Contingency	Category	Category Description	Transient Stability Performance (Number of voltage and frequency violations)								Potential Mitigation Solutions
			2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	
Big Creek 1-Big Creek 2 230 kV line	P5	N-1	Stable	-	Stable	-	local area instability	-	Stable	Stable	Project: Protection project In-Service Date: 12/31/2019 Short term: system re-dispatch
Big Creek 3 (Bus) NRBD	P5	Non-redundant bus-differential	Stable	-	Stable	-	local area instability	-	Stable	Stable	Redundant bus differential being considered
Mangunden NRBD	P5	Non-redundant bus-differential	local area instability	-	local area instability	-	local area instability	-	local area instability	local area instability	Redundant bus differential being considered
Pastoria NRBD	P5	Non-redundant bus-differential	Stable	-	Stable	-	local area instability	-	local area instability	Stable	Redundant bus differential being considered
Springville NRBD	P5	Non-redundant bus-differential	Stable	-	Stable	-	Stable	-	Stable	Stable	
Big Creek 1-Rector & Rector-Vestal No.1	P4	1 Phase	Stable	-	Stable	-	Stable	-	Stable	Stable	
Big Creek 3-Rector No.1 & Rector-Vestal No.2	P4	1 Phase	Stable	-	Stable	-	Stable	-	Stable	Stable	
Big Creek 4-Springville & Magunden-Springville No.2	P6	3 Phase	Stable	-	Stable	-	Stable	-	Stable	Stable	
Big Creek 1-Rector & Big Creek 3-Rector No.1	P6	3 Phase	Stable	-	Stable	-	Stable	-	Stable	Stable	
Big Creek 3-Rector No.2 & Big Creek 4-Springville	P6	3 Phase	Stable	-	Stable	-	Stable	-	Stable	Stable	
Big Creek 4-Springville & Rector-Springville	P6	3 Phase	Stable	-	Stable	-	Stable	-	Stable	Stable	
Rector-Vestal No.1 & Rector-Vestal No.2	P6	3 Phase	Stable	-	Stable	-	Stable	-	Stable	Stable	Big Creek RAS
Magunden-Springville No.1 & Magunden-Springville No.2	P6	3 Phase	Stable	-	Stable	-	Stable	-	Stable	Stable	Big Creek RAS
Magunden-Vestal No.1 & Magunden-Vestal No.2	P6	3 Phase	Stable	-	Stable	-	Stable	-	Stable	Stable	Big Creek RAS
Big Creek 3-Rector No.2 & Rector-Springville	P7	1 Phase	Stable	-	Stable	-	Stable	-	Stable	Stable	
Magunden-Pastoria No. 1 & Bailey-Pastoria	P4	1 Phase	Stable	-	Stable	-	Stable	-	Stable	Stable	
Magunden-Pastoria No. 2 & Pardee-Pastoria	P4	1 Phase	Stable	-	Stable	-	Stable	-	Stable	Stable	
Magunden-Pastoria No. 3 & Pardee-Pastoria-Warne	P4	1 Phase	Stable	-	Stable	-	Stable	-	Stable	Stable	
Pardee-Pastoria & Pardee-Vincent No.2	P4	1 Phase	Stable	-	Stable	-	Stable	-	Stable	Stable	
Bailey-Pardee & Pardee-Vincent No.1	P4	1 Phase	Stable	-	Stable	-	Stable	-	Stable	Stable	
Pardee-Pastoria-Warne & Pardee-Santa clara	P4	1 Phase	Stable	-	Stable	-	Stable	-	Stable	Stable	
Mesa-Vincent No.2 & Santa Clara-Vincent	P4	1 Phase	Stable	-	Stable	-	Stable	-	Stable	Stable	
Magunden-Pastoria No. 1 & Magunden-Pastoria No. 2	P6	3 Phase	Stable	-	Stable	-	Stable	-	Stable	Stable	
Magunden-Pastoria No. 1 & Magunden-Pastoria No. 3	P6	3 Phase	Stable	-	Stable	-	Stable	-	Stable	Stable	
Magunden-Pastoria No. 2 & Magunden-Pastoria No. 3	P6	3 Phase	Stable	-	Stable	-	Stable	-	Stable	Stable	
Bailey-Pastoria & Pardee-Pastoria	P6	3 Phase	Stable	-	Stable	-	Stable	-	Stable	Stable	
Bailey-Pastoria & Pardee-Pastoria-Warne	P6	3 Phase	Stable	-	Stable	-	Stable	-	Stable	Stable	
Pardee-Pastoria & Pardee-Pastoria-Warne	P6	3 Phase	Stable	-	Stable	-	Stable	-	Stable	Stable	
Pardee-Pastoria & Bailey-Pardee	P6	3 Phase	Stable	-	Stable	-	Stable	-	Stable	Stable	
Pardee-Pastoria-Warne & Bailey-Pardee	P6	3 Phase	Stable	-	Stable	-	Stable	-	Stable	Stable	
Antelope-Magunden No. 1 & Antelope-Magunden No. 2	P6	3 Phase	Stable	-	Stable	-	Stable	-	Stable	Stable	
Pardee-Vincent No. 1 & Pardee-Vincent No. 2	P6	3 Phase	Stable	-	Stable	-	Stable	-	Stable	Stable	

Study Area: **SCE Tehachapi & Big Creek Corridor**



*Single Contingency Load Drop*

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

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

Study Area: **SCE Tehachapi & Big Creek Corridor**



*Single Source Substation with more than 100 MW Load*

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

No single source substation with more than 100 MW Load



Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading % (Baseline Scenarios)					Loading % (Sensitivity Scenarios)			Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	
24701 KRAMER 230 24601 VICTOR 230 1 1	ROADWAY - KRAMER 115.0 ck 1 KRAMER - VICTOR 230.0 ck 2	P6	Two overlapping singles	<100	<100	111.31	104.07	<100	<100	105.36	<100	Congestion management. Modify existing Mojave RAS to monitor flow and status of Kramer-Vicor 230kV lines as well
24701 KRAMER 230 24601 VICTOR 230 2 1	ROADWAY - KRAMER 115.0 ck 1 KRAMER - VICTOR 230.0 ck 1	P6	Two overlapping singles	<100	<100	111.31	104.07	<100	<100	105.36	<100	Congestion management. Modify existing Mojave RAS to monitor flow and status of Kramer-Vicor 230kV lines as well
24723 CONTROL 115 24728 INYO 115 1 1	INYOKERN - KRAMER 115.0 ck 1 KRAMER-INYOKERN-RANDBS 115 ck 1	P6	Two overlapping singles	132.8	<100	143.89	184.98	117.33	<100	146.79	<100	Operating Procedure 7690
24723 CONTROL 115 24731 INYOKERN 115 1 1	CONTROL - INYO 115.0 ck 1 CONTROL-COSO-INYOKERN 115 ck 2	P6	Two overlapping singles	105.75	<100	111.78	<100	<100	<100	<100	<100	Bishop RAS
24728 INYO 115 24730 INYO PS 115 1 1	INYOKERN - KRAMER 115.0 ck 1 KRAMER-INYOKERN-RANDBS 115 ck 1	P6	Two overlapping singles	174.69	<100	177.29	217.18	154.4	<100	185.6	<100	Operating Procedure 7690
Case Diverge	KRAMER - COLWATER 115.0 ck 1 KRAMER - TORTILLA 115.0 ck 1	P6	Two overlapping singles	<100	Nconv	<100	<100	Nconv	Nconv	<100	<100	SCE Operating Procedure 127, separating Kramer 115kV system from the Cool Water 115kV system
Case Diverge	Control 115/55kV Nos.1&2 transformers	P6	Two overlapping singles	<100	Nconv	<100	<100	<100	<100	<100	<100	SCE Operating Procedure SOB-4, dispatching generation



Study Area: **SCE North of Lugo**

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
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	
Baker 115kV	KRAMER - COLWATER 115.0 ck 1 KRAMER-TORTILLA 115.0 ck 1	P6	Two overlapping singles	0.86	0.86	>0.9	>0.9	0.82	0.85	>0.9	>0.9	SCE Operating Procedure 127, separating Kramer 115kV system from the Cool Water 115kV system
Coolwater 115kV	KRAMER - COLWATER 115.0 ck 1 KRAMER-TORTILLA 115.0 ck 1	P6	Two overlapping singles	0.71	0.76	>0.9	>0.9	0.62	0.75	>0.9	>0.9	SCE Operating Procedure 127, separating Kramer 115kV system from the Cool Water 115kV system
Control 115kV	INYOKERN - KRAMER 115.0 ck 1 KRAMER-INYOKERN-RANDB 115 ck 1	P6	Two overlapping singles	>0.9	>0.9	0.88	0.84	>0.9	>0.9	>0.9	>0.9	Generation redispatch, reduce Oxbow B output

Study Area: **SCE North of Lugo**

Voltage Deviation



Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)					Voltage PU (Sensitivity)	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak				
None												

Contingency	Category	Category Description	Transient Stability Performance (Number of voltage and frequency violations)								Potential Mitigation Solutions
			2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	
Control-Casa Diablo 1150kV (1PH fault at Control)	P4.2	Stuck Breaker	WECC Criteira not Met	NA	WECC Criteira not Met	NA	WECC Criteira not Met	NA	WECC Criteira not Met	WECC Criteira not Met	
Control-Casa Diablo 1150kV (1PH fault at Casa Diablo)	P4.2	Stuck Breaker	Stable	NA	Stable	NA	Stable	NA	Stable	Stable	
Control-Coso-Haiwee-Inyokern 115kV (1PH fault at Inyokern)	P4.2	Stuck Breaker	Stable	NA	Stable	NA	Stable	NA	Stable	Stable	
Control-Coso-Haiwee-Inyokern 115kV (1PH fault at Control)	P4.2	Stuck Breaker	Stable	NA	Stable	NA	Stable	NA	Stable	Stable	
Control-Haiwee-Inyokern (Fault at Control)	P4.2	Stuck Breaker	Stable	NA	Stable	NA	Stable	NA	Stable	Stable	
Control-Haiwee-Inyokern (Fault at Inyokern)	P4.2	Stuck Breaker	Stable	NA	Stable	NA	Stable	NA	Stable	Stable	
Control-Inyo 115kV (Fault at Control)	P4.2	Stuck Breaker	Stable	NA	Stable	NA	Stable	NA	Stable	Stable	
Inyokern-Downs 115kV (Fault at Inyokern)	P4.2	Stuck Breaker	Stable	NA	Stable	NA	Stable	NA	Stable	Stable	
Inyokern-McGen-Searles 15kV (Fault at Inyokern)	P4.2	Stuck Breaker	Stable	NA	Stable	NA	Stable	NA	Stable	Stable	
Kramer-Roadway 115kV (Fault 20% from Kramer)	P4.2	Stuck Breaker	Stable	NA	Stable	NA	Stable	NA	Stable	Stable	
Kramer-Roadway 115kV (Fault 20% from Roadway)	P4.2	Stuck Breaker	Stable	NA	Stable	NA	Stable	NA	Stable	stable	
Kramer-Victor 115kV (Fault 20% from Kramer)	P4.2	Stuck Breaker	Stable	NA	Stable	NA	Stable	NA	Stable	Stable	
Kramer-Victor 115kV (Fault 20% from Victor)	P4.2	Stuck Breaker	Stable	NA	Stable	NA	Stable	NA	Stable	Stable	
Control 115/55kV Transforemer Banks	P6	Normal clearing	Stable	NA	Stable	NA	Stable	NA	Stable	Stable	
Kramer 230/115kV Transformer Banks	P6	Normal clearing	Stable	NA	Stable	NA	Stable	NA	Stable	Stable	
Lugo 500/230kV Transformer Banks no RAS	P6	Normal clearing	Unstable	NA	Unstable	NA	Unstable	NA	Unstable	Unstable	
Lugo 500/230kV Transformer Banks RAS	P6	Normal clearing	WECC Criteira not Met	NA	WECC Criteira not Met	NA	WECC Criteira not Met	NA	Stable	WECC Criteira not Met	Review the RAS scheme
Kramer-Inyokern-Randsburg Nos.1 & 3 115kV	P6	Normal clearing	Stable	NA	Stable	NA	Stable	NA	Stable	Stable	
Coolwater-Kramer & Coolwater-Seg2-Tortilla 115kV (Fault at Coolwater)	P6	Normal clearing	Stable	NA	Stable	NA	NA	NA	NA	Stable	
Coolwater-Kramer & Coolwater-Seg2-Tortilla 115kV_OP (Fault at Coolwater)	P6	Normal clearing	NA	NA	NA	NA	Stable	NA	Stable	NA	
Coolwater-Kramer & Kramer-Tortilla 115kV (Fault at Kramer)	P6	Normal clearing	Stable	NA	Stable	NA	NA	NA	NA	Stable	

Study Area: **SCE North of Lugo**

*Transient Stability*



Contingency	Category	Category Description	Transient Stability Performance (Number of voltage and frequency violations)								Potential Mitigation Solutions
			2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	
Coolwater-Kramer & Kramer-Tortilla 115kV_OP (Fault at Kramer)	P6	Normal clearing	NA	NA	NA	NA	Stable	NA	Stable	NA	
Kramer-Victor 230kV Nos.1 & 2 no RAS	P7	Normal clearing	Unstable	NA	Unstable	NA	Unstable	NA	Unstable	Unstable	Mojave Desert RAS
Kramer-Victor 230kV Nos.1 & 2 RAS	P7	Normal clearing	Stable	NA	Stable	NA	Stable	NA	Stable	Stable	
Lugo-Victor 230kV Nos.1 & 2 no RAS	P7	Normal clearing	Stable	NA	Stable	NA	Stable	NA	Stable	Stable	
Lugo-Victor 230kV Nos.1 & 2 RAS	P7	Normal clearing	Stable	NA	Stable	NA	Stable	NA	Stable	Stable	
Control-Coso-Inyokern & Control-Inyokern 115kV no RAS	P7	Normal clearing	Stable	NA	Stable	NA	Stable	NA	Stable	Stable	Bishop RAS
Control-Coso-Inyokern & Control-Inyokern 115kV RAS	P7	Normal clearing	Stable	NA	Stable	NA	Stable	NA	Stable	Stable	
Kramer-Victor & Roadway-Victor 115kV	P7	Normal clearing	Stable	NA	Stable	NA	Stable	NA	Stable	Stable	
Kramer-Victor & Kramer-Roadway 115kV	P7	Normal clearing	Stable	NA	Stable	NA	Stable	NA	Stable	Stable	
Kramer 230kV Sub with RAS	Extreme	Normal clearing	Stable	NA	Stable	NA	Stable	NA	Stable	Stable	

Study Area: **SCE North of Lugo**



*Single Contingency Load Drop*

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

Study Area: **SCE North of Lugo**



*Single Source Substation with more than 100 MW Load*

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





Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading % (Baseline Scenarios)					Loading % (Sensitivity Scenarios)			Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	
Bob SS-Mead 230kV Line	Eldorado 500/230kV Transformer No.5	P1	Single outage	<100	<100	<100	184.9	<100	<100	<100	182.87	Bob-Mead upgrade. Interium solution utilizes Ivanpah RAS
Eldorado-Merchant 230kV No.2 Line	Eldorado-Merchant 230kV No.1 Line	P1	Single outage	<100	<100	<100	<100	<100	<100	102.46	<100	Reduce generation output at Merchant
System Diverge	Eldorado-Mohave & Lugo-Mohave 500kV	P6	Two overlapping singles	Nconv	Nconv	Nconv	Nconv	Nconv	Nconv	Nconv	Nconv	NVEnergy protection scheme to radialize Laughlin 69kV system

Study Area: **SCE East of Lugo**

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
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	
None												

Study Area: **SCE East of Lugo**

Voltage Deviation



Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)					Voltage PU (Sensitivity Scenarios)			Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	
None												

Study Area: **SCE East of Lugo**

*Transient Stability*



Contingency	Category	Category Description	Transient Stability Performance (Number of voltage and frequency violations)								Potential Mitigation Solutions
			2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	
EIDorado_5AA_RAS	P1	Normal clearing	Stable	NA	Stable	NA	Stable	NA	Stable	Stable	
EIDorado_5AA_noRAS	P1	Normal clearing	Stable	NA	Stable	NA	Stable	NA	Stable	Stable	
Eldorado-Mohave & Lugo-Mohave 500kV	P6	Normal clearing	Stable	NA	Stable	NA	Stable	NA	Stable	Stable	
Eldorado-Lugo & Eldorado-Mohave 500kV	P6	Normal clearing	Stable	NA	Stable	NA	Stable	NA	Stable	Stable	

Study Area: **SCE East of Lugo**



*Single Contingency Load Drop*

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

Study Area: **SCE East of Lugo**



*Single Source Substation with more than 100 MW Load*

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





Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading % (Baseline Scenarios)					Loading % (Sensitivity Scenarios)			Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	
Line 24804 DEVERS 230 kV to 24944 Vista2LR 230 kV	Line DEVERS 500.0 to VALLEYSC 500.0 Circuit 1 AND Line DEVERS 500.0 to VALLEYSC 500.0 Circuit 2	P7	L-2	144.15	<100	<100	<100	<100	<100	<100	142.49	Existing West of Devers SPS, Congestion Management and Curtailment
Line 24944 Vista2LR 230 kV to 24901 VSTA 230 kV	Line DEVERS 500.0 to VALLEYSC 500.0 Circuit 1 AND Line DEVERS 500.0 to VALLEYSC 500.0 Circuit 2	P7	L-2	144.15	<100	<100	<100	<100	<100	<100	142.49	Existing West of Devers SPS, Congestion Management and Curtailment
Line 24804 DEVERS 230 kV to 24941 EICascoLR 230 kV	Line DEVERS 500.0 to VALLEYSC 500.0 Circuit 1 AND Line DEVERS 500.0 to VALLEYSC 500.0 Circuit 2	P7	L-2	131.21	<100	<100	<100	<100	<100	<100	138.33	Existing West of Devers SPS, Congestion Management and Curtailment
Line 24941 EICascoLR 230 kV to 25666 EL CASCO 230 kV	Line DEVERS 500.0 to VALLEYSC 500.0 Circuit 1 AND Line DEVERS 500.0 to VALLEYSC 500.0 Circuit 2	P7	L-2	131.21	<100	<100	<100	<100	<100	<100	138.33	Existing West of Devers SPS, Congestion Management and Curtailment
Line 24804 DEVERS 230 kV to 24943 Vista1LR 230 kV	Line DEVERS 500.0 to VALLEYSC 500.0 Circuit 1 AND Line DEVERS 500.0 to VALLEYSC 500.0 Circuit 2	P7	L-2	123.12	<100	<100	<100	<100	<100	<100	121.71	Existing West of Devers SPS, Congestion Management and Curtailment
Line 24943 Vista1LR 230 kV to 24901 VSTA 230 kV	Line DEVERS 500.0 to VALLEYSC 500.0 Circuit 1 AND Line DEVERS 500.0 to VALLEYSC 500.0 Circuit 2	P7	L-2	123.12	<100	<100	<100	<100	<100	<100	121.71	Existing West of Devers SPS, Congestion Management and Curtailment

Study Area: **SCE Eastern 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
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	
None	None											

Study Area: **SCE Eastern area**

Voltage Deviation



Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)					Voltage PU (Sensitivity Scenarios)			Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	
None	None											

Study Area: **SCE Eastern area**

Transient Stability



Contingency	Category	Category Description	Transient Stability Performance (Number of voltage and frequency violations)								Potential Mitigation Solutions	
			2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen		
3-Phase fault at EagleMTN 161 kV Bus, tripping EagleMTN 230/161 kV Transformer #5	P1	Normal Clearing	Stable	Stable	Stable	Stable	Stable	Stable	Stable	Stable	Stable	
3-Phase fault at EagleMTN 161 kV Bus, tripping BlytheSCE-EagleMTN 161 kV	P1	Normal Clearing	Stable	Stable	Stable	Stable	Stable	Stable	Stable	Stable	Stable	
3-Phase fault at EagleMTN 161 kV Bus, tripping BlytheSCE-EagleMTN 161 kV & Blythe 1CT trip (RAS)	P1	Normal Clearing	Stable	Stable	Stable	Stable	Stable	Stable	Stable	Stable	Stable	
3-Phase fault at EagleMTN 230 kV Bus, tripping EagleMTN-IronMTN 230 kV	P1	Normal Clearing	Stable	Stable	Stable	Stable	Stable	Stable	Stable	Stable	Stable	
3-Phase fault at Julian Hinds 230 kV Bus, tripping Julian Hinds-EagleMTN 230 kV	P1	Normal Clearing	Stable	Stable	Stable	Stable	Stable	Stable	Stable	Stable	Stable	
3-Phase fault at Julian Hinds 230 kV Bus, tripping Julian Hinds-EagleMTN 230 kV & Blythe 1CT trip	P1	Normal Clearing	Stable	Stable	Stable	Stable	Stable	Stable	Stable	Stable	Stable	
3-Phase fault at Julian Hinds 230 kV Bus, tripping Julian Hinds-Mirage 230 kV	P1	Normal Clearing	Stable	Stable	Stable	Stable	Stable	Unstable	Stable	Unstable	Stable	Existing Blythe SPS to trip generation, Stable when Blythe 1CT is tripped
3-Phase fault at Julian Hinds 230 kV Bus, tripping Julian Hinds-Mirage 230 kV & Blythe 1CT trip	P1	Normal Clearing	Stable	Stable	Stable	Stable	Stable	Stable	Stable	Stable	Stable	
3-Phase fault at Palo Verde 500 kV Bus, tripping Colorado River-Palo Verde 500 kV	P1	Normal Clearing	Stable	Stable	Stable	Stable	Stable	Stable	Stable	Stable	Stable	
SLG fault at Julian Hinds 230 kV Bus, loss CB513, loss J.Hinds	P2.4	Breaker Fault	Stable	Stable	Stable	Stable	Stable	Stable	Stable	Stable	Stable	
SLG fault at Devers 500 kV, tripping Devers - Red Bluff 500 kV #1 with stuck breaker follow by Devers-Valley 500 kV #1	P4.2	Delayed Clearing	Stable	Stable	Stable	Stable	Stable	Stable	Stable	Stable	Stable	
SLG fault at Devers 500 kV, tripping Devers - Red Bluff 500 kV #2 with stuck breaker follow by Devers 1AA bank	P4.2	Delayed Clearing	Stable	Stable	Stable	Stable	Stable	Stable	Stable	Stable	Stable	
SLG fault at Valley 500 kV, tripping Valley-Serrano 500 kV with stuck breaker follow by Valley 4AA Bank	P4.2	Delayed Clearing	Stable	Stable	Stable	Stable	Stable	Stable	Stable	Stable	Stable	

Study Area: **SCE Eastern area**

*Transient Stability*



Contingency	Category	Category Description	Transient Stability Performance (Number of voltage and frequency violations)								Potential Mitigation Solutions	
			2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen		
SLG fault at Mirage 230 kV, tripping Devers-Mirage 230 kV with stuck breaker follow by Coachell Valley-Mirage 230 kV	P4.2	Delayed Clearing	Stable	Stable	Stable	Stable	Stable	Stable	Stable	Stable	Stable	
SLG fault at Devers 230 kV, tripping Devers - Vista 230 kV # 1 with stuck breaker follow by Devers 3A bank	P4.2	Delayed Clearing	Stable	Stable	Stable	Stable	Stable	Stable	Stable	Stable	Stable	
SLG fault at Devers 230 kV, tripping Devers - Vista 230 kV # 1 with stuck breaker follow by Devers-San Bernardino 230 kV	P4.2	Delayed Clearing	Stable	Stable	Stable	Stable	Stable	Stable	Stable	Stable	Stable	
SLG fault at El Casco 230 kV, tripping Devers - El Casco 230 kV with stuck breaker follow by El Casco 2A bank	P4.2	Delayed Clearing	Stable	Stable	Stable	Stable	Stable	Stable	Stable	Stable	Stable	
SLG fault at Mirage 230 kV, tripping Mirage-J.Hinids 230 kV with stuck breaker follow by Mirage-Ramon 230 kV	P4.2	Delayed Clearing	Stable	Stable	Stable	Stable	Stable	Unstable	Stable	Unstable	Stable	Existing Blythe SPS to trip generation, Stable when Blythe 1CT is tripped
SLG fault at Mirage 230 kV, tripping Mirage-J.Hinids 230 kV with stuck breaker follow by Mirage-Ramon 230 kV, Blythe 1CT trip (RAS)	P4.2	Delayed Clearing	Stable	Stable	Stable	Stable	Stable	Stable	Stable	Stable	Stable	
SLG fault at Blythe 161 kV, tripping BlytheSCE-EagleMTN 161 kV, CB 872 stuck at Blythe	P4.2	Breaker Failure	Stable	Stable	Stable	Stable	Stable	Stable	Stable	Stable	Stable	
SLG fault at Blythe 161 kV, tripping BlytheSCE-EagleMTN 161 kV, CB 872 stuck at Blythe & Blythe 1CT trip (RAS)	P4.2	Breaker Failure	Stable	Stable	Stable	Stable	Stable	Stable	Stable	Stable	Stable	
SLG fault at EagleMTN 161 kV, tripping BlytheSCE-EagleMTN 161 kV, CB 70 stuck at EagleMTN	P4.2	Breaker Failure	Stable	Stable	Stable	Stable	Stable	Stable	Stable	Stable	Stable	
SLG fault at EagleMTN 161 kV, tripping BlytheSCE-EagleMTN 161 kV, CB 70 stuck at EagleMTN	P4.2	Breaker Failure	Stable	Stable	Stable	Stable	Stable	Stable	Stable	Stable	Stable	
SLG fault at EagleMTN 230 kV Bus, tripping EagleMTN-IronMTN 230 kV, CB 407 stuck at EagleMTN	P4.2	Breaker Failure	Stable	Stable	Stable	Stable	Stable	Stable	Stable	Stable	Stable	

Study Area: **SCE Eastern area**

Transient Stability



Contingency	Category	Category Description	Transient Stability Performance (Number of voltage and frequency violations)								Potential Mitigation Solutions	
			2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen		
SLG fault at EagleMTN 230 kV Bus, tripping EagleMTN-IronMTN 230 kV, CB 407 stuck at EagleMTN & Blythe 1CT trip	P4.2	Breaker Failure	Stable	Stable	Stable	Stable	Stable	Stable	Stable	Stable	Stable	
SLG fault at IronMTN 230 kV Bus, tripping EagleMTN-IronMTN 230 kV, CB 307 stuck (close to Iron)	P4.2	Breaker Failure	Stable	Stable	Stable	Stable	Stable	Stable	Stable	Stable	Stable	
SLG fault at EagleMTN 230 kV Bus, tripping Julian Hinds-EagleMTN 230 kV, CB 405 stuck at EagleMTN	P4.2	Breaker Failure	Stable	Stable	Stable	Stable	Stable	Stable	Stable	Stable	Stable	
SLG fault at EagleMTN 230 kV Bus, tripping Julian Hinds-EagleMTN 230 kV, CB 405 stuck at EagleMTN & Blythe 1CT trip	P4.2	Breaker Failure	Stable	Stable	Stable	Stable	Stable	Stable	Stable	Stable	Stable	
SLG fault at Julian Hinds 230 kV Bus, tripping Julian Hinds-Mirage 230 kV, Stuck CB at J.Hinds	P4.2	Breaker Failure	Stable	Stable	Stable	Stable	Stable	Stable	Stable	Stable	Stable	
SLG fault at EagleMTN 230 kV Bus, tripping EagleMTN 230/161 kV Transformer #5	P4.3	Breaker Failure	Stable	Stable	Stable	Stable	Stable	Stable	Stable	Stable	Stable	
SLG fault at 20% from BlytheSCE 161 Bus, tripping BlytheSCE-EagleMTN 161 kV, non-redundant pilot relay fail	P5.2	pilot relay fail	Stable	Stable	Stable	Stable	Stable	Stable	Stable	Stable	Stable	
SLG fault at 20% from EagleMTN 161 kV Bus, tripping BlytheSCE-EagleMTN 161 kV, non-redundant pilot relay fail	P5.2	pilot relay fail	Stable	Stable	Stable	Stable	Stable	Stable	Stable	Stable	Stable	
SLG fault at 20% from EagleMTN 230 kV Bus, tripping EagleMTN-IronMTN 230 kV, pilot relay fail	P5.2	pilot relay fail	Stable	Stable	Stable	Stable	Stable	Stable	Stable	Stable	Stable	
SLG fault at 20% from IronMTN 230 kV Bus, tripping EagleMTN-IronMTN 230 kV, pilot relay fail	P5.2	pilot relay fail	Stable	Stable	Stable	Stable	Stable	Stable	Stable	Stable	Stable	
SLG fault at EagleMTN 230 kV Bus, tripping EagleMTN Bus, non-redundant relayfail	P5.5	Bus relay Failure	Stable	Stable	Stable	Stable	Stable	Stable	Stable	Stable	Stable	
SLG fault at EagleMTN 230 kV Bus, tripping EagleMTN Bus & Blythe 1CT trip, non-redundant relay fail	P5.5	Bus relay Failure	Stable	Stable	Stable	Stable	Stable	Stable	Stable	Stable	Stable	



Study Area: **SCE Eastern area**

Transient Stability



Contingency	Category	Category Description	Transient Stability Performance (Number of voltage and frequency violations)								Potential Mitigation Solutions
			2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	
SLG fault at 20% from EagleMTN 230 kV Bus, tripping Julian Hinds-EagleMTN 230 kV, pilot relay fail	P5.2	pilot relay fail	Stable	Stable	Stable	Stable	Unstable	Stable	Unstable	Stable	Existing Blythe SPS to trip generation, Stable when Blythe 1CT is tripped
SLG fault at 20% from EagleMTN 230 kV Bus, tripping Julian Hinds-EagleMTN 230 kV & Blythe 1CT trip, pilot relay fail	P5.2	pilot relay fail	Stable	Stable	Stable	Stable	Stable	Stable	Stable	Stable	
SLG fault at 20% from Julian Hinds 230 kV Bus, tripping Julian Hinds-EagleMTN 230 kV, pilot relay fail	P5.2	pilot relay fail	Stable	Stable	Stable	Stable	Stable	Stable	Stable	Stable	
SLG fault at 20% from Julian Hinds 230 kV Bus, tripping Julian Hinds-EagleMTN 230 kV & Blythe 1CT trip, pilot relay fail	P5.2	pilot relay fail	Stable	Stable	Stable	Stable	Stable	Stable	Stable	Stable	
SLG fault at 20% from Julian Hinds 230 kV Bus, tripping Julian Hinds-Mirage 230 kV, pilot relay fail	P5.2	pilot relay fail	Stable	Stable	Stable	Stable	Unstable	Stable	Unstable	Stable	Existing Blythe SPS to trip generation, Stable when Blythe 1CT is tripped
SLG fault at 20% from Julian Hinds 230 kV Bus, tripping Julian Hinds-Mirage 230 kV & Blythe 1CT trip, pilot relay fail	P5.2	pilot relay fail	Stable	Stable	Stable	Stable	Stable	Stable	Stable	Stable	
SLG fault at 20% from Mirage 230 kV Bus, tripping Julian Hinds-Mirage 230 kV, pilot relay fail	P5.2	pilot relay fail	Stable	Stable	Stable	Stable	Unstable	Unstable	Unstable	Stable	Existing Blythe SPS to trip generation, Stable when Blythe 1CT is tripped or Eagle Mountain cap bank is on
SLG fault at 20% from Mirage 230 kV Bus, tripping Julian Hinds-Mirage 230 kV & Blythe 1CT trip, pilot relay fail	P5.2	pilot relay fail	Stable	Stable	Stable	Stable	Stable	Stable	Stable	Stable	
3-Phase fault at Julian Hinds 230 kV Bus, tripping Julian Hinds-Mirage & EagleMTN-IronMTN 230 kV	P6.1	Normal Clearing	Unstable	Unstable	Unstable	Stable	Unstable	Unstable	Unstable	Unstable	Existing Blythe SPS to trip generation, Stable when Blythe 1CT is tripped; Otherwise, Operation Procedure GCC128 to open Eagle Mountain-Blythe 161 kV
3-Phase fault at Julian Hinds 230 kV Bus, tripping Julian Hinds-Mirage & EagleMTN-IronMTN 230 kV & Blythe 1CT trip	P6.1	Normal Clearing	Stable	Unstable	Stable	Stable	Unstable	Unstable	Unstable	Unstable	Existing Blythe SPS to trip generation, Stable when Blythe 1CT is tripped; Otherwise, Operation Procedure GCC128 to open Eagle Mountain-Blythe 161 kV
3-Phase fault at Julian Hinds 230 kV Bus, tripping Julian Hinds-Mirage & EagleMTN-IronMTN 230 kV & Blythe 2CTs trip (RAS)	P6.1	Normal Clearing	Stable	Unstable	Stable	Stable	Stable	Unstable	Stable	Unstable	Existing Operation Procedure GCC128 to open Eagle Mountain-Blythe 161 kV

Study Area: **SCE Eastern area**

Transient Stability



Contingency	Category	Category Description	Transient Stability Performance (Number of voltage and frequency violations)								Potential Mitigation Solutions	
			2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen		
3-Phase fault at Rud Bed Bluff 500 kV, tripping Colorado River - Red Bluff 500 kV #1 & #2	P6.1	Normal Clearing	Stable	Stable	Stable	Stable	Stable	Stable	Stable	Stable	Stable	
3-Phase fault at Devers 500 kV, tripping Devers - Red Bluff 500 kV #1 & #2	P6.1	Normal Clearing	Stable	Stable	Stable	Stable	Stable	Stable	Stable	Stable	Stable	
3-Phase fault at Valley 500 kV, tripping Devers Valley 500 kV #1 & #2	P6.1	Normal Clearing	Stable	Stable	Stable	Stable	Stable	Stable	Stable	Stable	Stable	
3-Phase fault at El Casco 230 kV, tripping Etiwanda-San Bernardino & Devers-El Casco 230 kV	P6.1	Normal Clearing	Stable	Stable	Stable	Stable	Stable	Stable	Stable	Stable	Stable	
3-Phase fault at San Bernardino 230 kV, tripping Etiwanda-San Bernardino & El Casco-San Bernardino 230 kV	P6.1	Normal Clearing	Stable	Stable	Stable	Stable	Stable	Stable	Stable	Stable	Stable	
3-Phase fault at El Casco 230 kV, tripping San Bernardino-Vista & Devers-El Casco 230 kV	P6.1	Normal Clearing	Stable	Stable	Stable	Stable	Stable	Stable	Stable	Stable	Stable	
3-Phase fault at San Bernardino 230 kV, tripping San Bernardino-Vista & Devers-San Bernardino 230 kV	P6.1	Normal Clearing	Stable	Stable	Stable	Stable	Stable	Stable	Stable	Stable	Stable	
3-Phase fault at San Bernardino 230 kV, tripping Etiwanda-San Bernardino & San Bernardino-Vista 230 kV	P7.1	Normal Clearing	Stable	Stable	Stable	Stable	Stable	Stable	Stable	Stable	Stable	
3-Phase fault at Devers 230 kV, tripping Devers-El Casco & Devers-San Bernardino #2 230 kV	P7.1	Normal Clearing	Stable	Stable	Stable	Stable	Stable	Stable	Stable	Stable	Stable	
3-Phase fault at Vista 230 kV, tripping Devers-Vista 230 kV #1 & #2	P7.1	Normal Clearing	Stable	Stable	Stable	Stable	Stable	Stable	Stable	Stable	Stable	
3-Phase fault at San Bernardino 230 kV, tripping Etiwanda-San Bernardino & Devers-San Bernardino #2 230 kV	P7.1	Normal Clearing	Stable	Stable	Stable	Stable	Stable	Stable	Stable	Stable	Stable	
3-Phase fault at San Bernardino 230 kV, tripping El Casco-San Bernardino & San Bernardino-Vista 230 kV	P7.1	Normal Clearing	Stable	Stable	Stable	Stable	Stable	Stable	Stable	Stable	Stable	
3-Phase fault at Mirage 230 kV, tripping CVSUB230-Mirage & Ramon-Mirage 230 kV	P7.1	Normal Clearing	Stable	Stable	Stable	Stable	Stable	Stable	Stable	Stable	Stable	
3-Phase fault at Devers 230 kV, tripping Devers - Mirage #1 & #2 230 kV	P7.1	Normal Clearing	Stable	Stable	Stable	Stable	Stable	Stable	Stable	Stable	Stable	

Study Area: **SCE Eastern area**



*Single Contingency Load Drop*

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

Study Area: **SCE Eastern area**

*Single Source Substation with more than 100 MW Load*



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



Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading % (Baseline Scenarios)					Loading % (Sensitivity Scenarios)			Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	
Pardee - Sylmar 230 kV #1 or #2	Pardee - Sylmar 230 kV #2 or #1 & Victorville - Lugo 500 kV	P6	L-1/L-1	116	<100	<100	<100	<100	<100	<100	102	System adjustment per OP 7680 after initial contingency
Serrano 500/230 kV Transformers	Two Serrano 500/230 kV Transformers	P6	T-1/T-1	123	109	100	<100	<100	103	<100	124	System adjustment per OP 7590 after initial or second contingency
Mira Loma 500/230 kV Transformer #4	Lugo - Rancho Vista & Mira Loma - Serrano 500 kV lines	P6	L-1/L-1	125	<100	<100	<100	<100	<100	<100	133	System adjustment per OP 7580 after initial or second contingency
Mira Loma 500/230 kV Transformer #1 or #2	Mira Loma - Serrano 500 kV & Mira Loma 500/230 kV Transformer #2 or #1	P6	L-1/T-1	113	<100	<100	<100	<100	<100	<100	118	System adjustment per OP 7580 after initial or second contingency
Vincent 500/230 kV Transformer #2 or #3	Vincent - Mira Loma or PDCI Monopole & Vincent 500/230 kV Transformer #3 or #2	P6	L-1/T-1	103	<100	<100	<100	<100	<100	<100	107	System adjustment per OP 7550 and OP 6410 after initial or second contingency
Rancho Vista 500/230 kV Transformer #3 or #4	Mira Loma 500/230 kV Transformer #4 & Rancho Vista 500/230 kV Transformer #4 or #3	P6	T-1/T-1	<100	<100	<100	<100	<100	<100	<100	106	Redispatch resources after initial or second contingency
Pardee - Moorpark 230 kV #2 or #3	Pardee - Moorpark #1 and Pardee - Moorpark #3 or #2 230 kV lines	P6	L-1/L-1	102	<100	<100	<100	<100	<100	<100	<100	Redispatch resources after initial contingency (short term); approved Pardee - Moorpark #4 230 kV project (longterm)
Mesa - Laguna Bell 230 kV #1	Mesa - Lighthipe & Mesa - Redondo 230 kV lines	P6	L-1/L-1	<100	106	103	<100	<100	106	<100	<100	Redispatch resources after initial contingency
	Mesa - Lighthipe & Mesa - Laguna Bell #2 230 kV lines	P7	L-2	<100	105	101	<100	<100	105	<100	<100	Redispatch resources pre-contingency; monitor economic impact in production simulation

Study Area: **SCE Metro**

High/Low Voltages



Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)					Voltage PU (Sensitivity Scenarios)			Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	
Goleta	All elements in service	P0	N-0	>0.95	<b>0.93</b>	<b>0.94</b>	>0.95	>0.95	<b>0.91</b>	>0.95	>0.95	Pre-2021: Continued operation of Ellwood and Ormond Beach (Note: The owner of these facilities has recently withdrawn its notice to retire the facilities); Post-2020: SCE LCR RFO resources and, if needed, shunt capacitors @ Goleta
	Santa Clara–Goleta #1 or #2 230 kV	P1	L-1	<b>0.89</b>	<b>0.84</b>	<b>0.84</b>	>0.90	>0.90	<b>0.80</b>	>0.90	>0.90	
	Santa Clara 230 kV Shunt Capacitor	P1	N-1	>0.90	>0.90	>0.90	>0.90	>0.90	<b>0.89</b>	>0.90	>0.90	
	Ellwood & Santa Clara–Goleta #1 or #2 230 kV (assuming Ellwood is not retired until 2021)	P3	G-1/L-1	<b>0.89</b>	N/A	N/A	>0.90	N/A	N/A	N/A	>0.90	
	Santa Clara–Goleta #1 or #2 230 kV & Santa Clara 230 kV Shunt Capacitor	P6	N-1/L-1	<b>0.86</b>	<b>0.80</b>	<b>0.80</b>	>0.90	>0.90	<b>0.77</b>	>0.90	<b>0.87</b>	



Study Area: **SCE Metro**

Voltage Deviation



Substation	Contingency (All and Worst P6)	Category	Category Description	Post Cont. Voltage Deviation % (Baseline Scenarios)					Post Cont. Voltage Deviation % (Sensitivity Scenarios)			Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	
Goleta	Santa Clara–Goleta #1 or #2 230 kV	P1	L-1	<8%	9.1%	9.2%	<8%	<8%	11.5%	<8%	<8%	SCE LCR RFO resources and, if needed, shunt capacitors @ Goleta

Study Area:

SCE Metro

Transient Stability



Contingency	Category	Category Description	Transient Stability Performance								Potential Mitigation Solutions
			2020 Summer Peak	2028 Summer Peak	2023 Spring Off-Peak	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	Select..	Select..	Select..	
Chino-Viejo 230 kV & Chino-Serrano 230 kV, 3-PH Fault @ Chino 230 kV, Delayed Clearing	P4.2	Stuck Breaker	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met				No violation
Goodrich-Laguna Bell 230 kV & Goodrich-Gould 230 kV, 3-PH Fault @ Goodrich 230 kV, Delayed Clearing	P4.2	Stuck Breaker	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met				No violation
Lugo-Vincent No.1 500 kV & Lugo-Rancho Vista 500 kV , 1-PH Fault @ Lugo 500 kV, Delayed Clearing	P4.2	Stuck Breaker	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met				No violation
Lugo-Mira Loma No.3 500 kV & Mira Loma 4AA Bank, 3-PH Fault @ Mira Loma 500 kV, Delayed Clearing	P4.2	Stuck Breaker	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met				No violation
Chino-Mira Loma No.2 230 kV & Mira Loma 4AA Bank, 3-PH Fault @ Mira Loma 230 kV, Delayed Clearing	P4.2	Stuck Breaker	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met				No violation
Lugo-Rancho Vista 500 kV & Rancho Vista 4AA Bank, 3-PH Fault @ Rancho Vista 500 kV, Delayed Clearing	P4.2	Stuck Breaker	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met				No violation
Padua-Rancho Vista No.2 230 kV & Rancho Vista 4AA Bank, 1-PH Fault @ Rancho Vista 230 kV, Delayed Clearing	P4.2	Stuck Breaker	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met				No violation
Rancho Vista-Serrano 500 kV & Serrano 1AA Bank, 3-PH Fault @ Serrano 500 kV, Delayed Clearing	P4.2	Stuck Breaker	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met				No violation
Mira Loma-Serrano No.2 500 kV & Serrano 2AA Bank, 3-PH Fault @ Serrano 500 kV, Delayed Clearing	P4.2	Stuck Breaker	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met				No violation
Serrano-Valley 500 kV & Serrano 3AA Bank, 3-PH Fault @ Serrano 500 kV, Delayed Clearing	P4.2	Stuck Breaker	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met				No violation
Chino-Serrano 230 kV & Serrano-Lewis No.1 230 kV, 3-PH Fault @ Serrano 230 kV, Delayed Clearing	P4.2	Stuck Breaker	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met				No violation
Ellis-Santiago 230 kV & San Onofre-Santiago No.2 230 kV , 3-PH Fault @ Santiago 230 kV, Delayed Clearing	P4.2	Stuck Breaker	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met				No violation
Mesa-Vincent No.1 230 kV & Pardee-Vincent No.1 230 kV, 3-PH Fault @ Vincent 230 kV, Delayed Clearing	P4.2	Stuck Breaker	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met				No violation

Study Area:

SCE Metro

Transient Stability



Contingency	Category	Category Description	Transient Stability Performance								Potential Mitigation Solutions
			2020 Summer Peak	2028 Summer Peak	2023 Spring Off-Peak	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	Select..	Select..	Select..	
Pardee-Vincent No.2 230 kV & Vincent 2AA Bank, 1-PH Fault @ Vincent 230 kV, Delayed Clearing	P4.2	Stuck Breaker	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met				No violation
Rio Hondo-Vincent No.2 230 kV & Vincent 3AA Bank, 1-PH Fault @ Vincent 230 kV, Delayed Clearing	P4.2	Stuck Breaker	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met				No violation
Goodrich-Gould 230 kV & Eagle Rock-Gould 230 kV, 3-PH Fault @ Gould 230 kV, Normal Clearing	P6.1	Stuck Breaker	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met				No violation
Mesa-Vincent 500 kV & Mesa-Mira Loma 500 kV , 3-PH Fault @ Mesa 500 kV, Normal Clearing	P6.1	Stuck Breaker	N/A	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	N/A			No violation
Litehipe-Mesa 230 kV & Laguna Bell-Rio Hondo 230 kV , 3-PH Fault @ Mesa 230 kV, Normal Clearing	P6.1	Stuck Breaker	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met				No violation
Vincent-Redondo 230 kV & Laguna Bell-Rio Hondo 230 kV , 3-PH Fault @ Mesa 230 kV, Normal Clearing	P6.1	Stuck Breaker	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met				No violation
Litehipe-Mesa 230 kV & Redondo-Vincent 230 kV , 3-PH Fault @ Mesa 230 kV, Normal Clearing	P6.1	Stuck Breaker	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met				No violation
Mira Loma-Vincent 500 kV & Mira Loma 4AA bank, 3-PH Fault @ Mira Loma 500 kV, Normal Clearing	P6.1	Stuck Breaker	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met				No violation
Mira Loma-Serrano No.2 500 kV & Mira Loma 4AA bank, 3-PH Fault @ Mira Loma 500 kV, Normal Clearing	P6.1	Stuck Breaker	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met				No violation
Rancho Vista-Serrano 500 kV & Lugo-Rancho Vista 500 kV, 3-PH Fault @ Rancho Vista 500 kV, Normal Clearing	P6.1	Stuck Breaker	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met				No violation
Rancho Vista 3AA & 4AA bank, 3-PH Fault @ Rancho Vista 500 kV, Normal Clearing	P6.1	Stuck Breaker	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met				No violation
Serrano-Valley 500 kV & Rancho Vista-Serrano 500 kV, 3-PH Fault @ Serrano 500 kV, Normal Clearing	P6.1	Stuck Breaker	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met				No violation
Serrano-Valley 500 kV & Mira Loma-Serrano No. 2 500 kV, 3-PH Fault @ Serrano 500 kV, Normal Clearing	P6.1	Stuck Breaker	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met				No violation
Serrano 2AA bank & Serrano 3AA bank, 3-PH Fault @ Serrano 500 kV, Normal Clearing	P6.1	Stuck Breaker	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met				No violation

Study Area:

SCE Metro

Transient Stability



Contingency	Category	Category Description	Transient Stability Performance								Potential Mitigation Solutions
			2020 Summer Peak	2028 Summer Peak	2023 Spring Off-Peak	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	Select..	Select..	Select..	
Alamitos-Center 230 kV & Center-Del Amo 230 kV, 3-PH Fault @ Center 230 kV, Normal Clearing	P7.1	DCTL	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met				No violation
Center-Mesa 230 kV & Center-Olinda 230 kV, 3-PH Fault @ Center 230 kV, Normal Clearing	P7.1	DCTL	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met				No violation
Ellis-Santiago 230 kV & Ellis-Johanna 230 kV , 3-PH Fault @ Johanna 230 kV, Normal Clearing	P7.1	DCTL	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met				No violation
Center-Mesa 230 kV & Mesa-Walnut 230 kV Line, 3-PH Fault @ Mesa 230 kV, Normal Clearing	P7.1	DCTL	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met				No violation
Goodrich-Laguna Bell 230 kV & Mesa-Vincent No. 1 230 kV Lines, 3-PH Fault @ Mesa 230 kV, Normal Clearing	P7.1	DCTL	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met				No violation
Center-Olinda 230 kV & Mesa-Walnut 230 kV , 3-PH Fault @ Mesa 230 kV, Normal Clearing	P7.1	DCTL	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met				No violation
Redondo-Vincent 230 kV & Lighthipe-Petrol 230 kV, 3-PH Fault @ Mesa 230 kV, Normal Clearing	P7.1	DCTL	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met				No violation
Redondo-Vincent 230 kV & Petrol-Redondo 230 kV, 3-PH Fault @ Mesa 230 kV, Normal Clearing	P7.1	DCTL	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met				No violation
Redondo-Vincent 230 kV & La Fresa-Laguna Bell 230 kV , 3-PH Fault @ Redondo 230 kV, Normal Clearing	P7.1	DCTL	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met				No violation
La Fresa-Laguna Bell 230 kV & Lighthipe-Mesa 230 kV, 3-PH Fault @ Mesa 230 kV, Normal Clearing	P7.1	DCTL	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met				No violation
Lighthipe-Mesa 230 kV & Del Amo-Laguna Bell 230 kV , 3-PH Fault @ Mesa 230 kV, Normal Clearing	P7.1	DCTL	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met				No violation
Redondo-Vincent 230 kV & Goodrich-Laguna Bell 230 kV , 3-PH Fault @ Laguna Bell 230 kV, Normal Clearing	P7.1	DCTL	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met				No violation
Lighthipe-Mesa 230 kV & Laguna Bell-Rio Hondo 230 kV , 3-PH Fault @ Mesa 230 kV, Normal Clearing	P7.1	DCTL	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met				No violation
Mesa-Rio Hondo No.1 230 kV & Laguna Bell-RioHondo 230 kV , 3-PH Fault @ Mesa 230 kV, Normal Clearing	P7.1	DCTL	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met				No violation

Study Area:

SCE Metro

Transient Stability



Contingency	Category	Category Description	Transient Stability Performance							Potential Mitigation Solutions	
			2020 Summer Peak	2028 Summer Peak	2023 Spring Off-Peak	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	Select..	Select..		Select..
Goodrich-Gould 230 kV & Mesa-Vincent No.2 230 kV , 3-PH Fault @ Mesa 230 kV, Normal Clearing	P7.1	DCTL	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met				No violation
Redondo-Vincent 230 kV & Goodrich-Laguna Bell 230 kV , 3-PH Fault @ Laguna Bell 230 kV, Normal Clearing	P7.1	DCTL	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met				No violation
Mira Loma-Vincent 500 kV & Chino-Mira Loma No.3 230 kV, 3-PH Fault @ Mira Loma 500 kV, Normal Clearing	P7.1	DCTL	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met				No violation
Mira Loma-Walnut 230 kV & Mira Loma-Olinda 230 kV , 3-PH Fault @ Mira Loma 230 kV, Normal Clearing	P7.1	DCTL	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met				No violation
Mira Loma-Rancho Vista No.1 & No.2 230 kV, 3-PH Fault @ Rancho Vista 230 kV, Normal Clearing	P7.1	DCTL	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met				No violation
Ellis-Santiago 230 kV & Johanna-Santiago 230 kV , 3-PH Fault @ Santiago 230 kV, Normal Clearing	P7.1	DCTL	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met				No violation
Mira Loma Serrano No.2 500 kV & Rancho Vista-Serrano 500 kV, 3-PH Fault @ Serrano 500 kV, Normal Clearing	P7.1	DCTL	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met				No violation
Serrano-Villa Park No.1 & No.2 230 kV, 3-PH Fault @ Serrano 230 kV, Normal Clearing	P7.1	DCTL	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met				No violation
San Onofre-Serrano 230 kV & Chino-Viejo 230 kV, 3-PH Fault @ Viejo 230 kV, Normal Clearing	P7.1	DCTL	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met				No violation
Rio Hondo-Vincent No.1 & No.2 230 kV, 3-PH Fault @ Vincent 230 kV, Normal Clearing	P7.1	DCTL	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met				No violation
PDCI Bipole, 3-PH Fault @ Sylmar 230 kV, Normal Clearing	P7.2	Bipolar DC	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met				No violation

Study Area: **SCE Metro**



*Single Contingency Load Drop*

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: **SCE Metro**



*Single Source Substation with more than 100 MW Load*

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

No single source substation with more than 100 MW

Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading % (Baseline Scenarios)					Loading % (Sensitivity Scenarios)			Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2020SP Load Addition & NNESS Reconfiguration*	2023SP Load Addition & NNESS Reconfiguration*	2023OP High Renewable	
Pahrump 230/138kV Transformer No.3	Pahrump 230/138kV Transformer No.4	P1	Single outage	<100	<100	<100	<100	<100	106.2	<100	<100	Operation procedure to switch in Mercury SW-Jackass-Lanthrop line for emergency
	Desert View-Northwest 230kV & Innovation-Mercury SW 138kV lines	P6	Overlapping singles	<100	<100	100.95	<100	<100	<100	<100	<100	Congestion management
	Vissta-Johnnie-Valley TP 138kV & Pahrump 230/138kV Transformer No.4	P6	Overlapping singles	<100	<100	117%	<100	<100	<100	115%	<100	New 230/138kV source at Gamebird
Pahrump 230/138kV Transformer No.4	Pahrump 230/138kV Transformer No.3	P1	Single outage	<100	<100	<100	<100	<100	105.3	<100	<100	Operation procedure to switch in Mercury SW-Jackass-Lanthrop line for emergency
	Vissta-Johnnie-Valley TP 138kV & Pahrump 230/138kV Transformer No.3	P6	Overlapping singles	<100	<100	117%	<100	<100	<100	116%	<100	New 230/138kV source at Gamebird
Innovation 230/138kV Transformer	Innovation-Desert View 230kV & Pahrump-Innovation 230kV lines	P6	Overlapping singles	<100	<100	197.88	<100	<100	<100	<100	<100	Congestion management
Northwest-Mercury SW 138kV loop	Innovation-Desert View 230kV Line	P1	Single outage	<100	<100	134.49	<100	<100	<100	<100	<100	New RAS proposed in GIDAP process
	Innovation-Desert View 230kV & Pahrump-Innovation 230kV lines	P6	Overlapping singles	<100	<100	201.74	<100	<100	<100	<100	<100	New RAS proposed in GIDAP process
Amargosa 230/138kV Transformer	Gamebird-Pahrump 138kV Line	P1	Single outage	<100	102.59	113.57	<100	<100	110.56	137.08	<100	New 230/138kV source at Gamebird; transformer replacement; new Charleston-Vista line
	Pahrump-Bob SS 230kV & Pahrump-Gamebird 138kV lines	P7	Common Structure	<100	102.71	113.57	<100	<100	110.6	136.88	<100	New 230/138kV source at Gamebird; transformer replacement; new Charleston-Vista line
	PAHRUMP-VISTA 138 & PAHRUMP-GAMEBIRD 138; BKR PA222	P4-2	Stuck Breaker	<100	102.6	113.57	<100	<100	110.55	137.07	<100	New 230/138kV source at Gamebird; transformer replacement; new Charleston-Vista line
	PAHRUMP 138/230kV Tran Bnk. 3 & PAHRUMP-GAMEBIRD 138; BKR PA232	P4-3	Stuck Breaker	<100	102.59	113.57	<100	<100	110.45	137.05	<100	New 230/138kV source at Gamebird; transformer replacement; new Charleston-Vista line
Innovation-Mercury SW 138kV Line	Desert View-Northwest 230kV & Pahrump-Innovation 230kV lines	P6	Overlapping singles	<100	<100	111.34	<100	<100	<100	<100	<100	Congestion management
Jackass Flat-Mercury SW 138kV Line	Desert View-Northwest 230kV & Pahrump-Innovation 230kV lines	P6	Overlapping singles	<100	<100	119.67	<100	<100	<100	<100	<100	Congestion management
Jackass - Mercury SW 138kV Line	Vista-Johnnie-ValleyTP 138kV Line	P1	Single contingency	<100	<100	<100	<100	<100	<100	<100	130	New RAS proposed in GIDAP process
Jackass - Mercury SW 138kV Line	Vista-Pahrump 138kV Line	P1	Single contingency	<100	<100	<100	<100	<100	<100	<100	134	New RAS proposed in GIDAP process
System diverge	Pahrump-Bob SS & Pahrump-Innovation 230kV lines	P6	Overlapping singles	<100	<100	<100	<100	<100	Nconv	Nconv	<100	Existing UVLS or operational action plan
System diverge	Innovation-Desert View 230kV & Pahrump-Bob SS 230kV lines	P6	Overlapping singles	Nconv	<100	<100	<100	<100	Nconv	Nconv	<100	Existing UVLS or operational action plan

\* The 2020SP & 2023SP Load Addition & NNESS Reconfiguration sensitivity cases modeled VEA new load service application and the NNESS radial line arrangement

Study Area: **Valley Electric Association**

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
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2020SP High Load*	2023SP High Load*	2023OP High Renewable	
Sandy-Gamebird-Thousandir-Vista 138kV buses	Gamebird-Pahrump 138V line	P1	Single outage	0.81	0.80	0.77	>0.9	0.89	0.77	0.76	>0.9	New 230/138kV source at Gamebird; transformer replacement; new Charleston-Vista line
Pahrump-Vista-Johnnie-Lathrop 138kV buses	Pahrump 230/138kV Bank & Pahrump-Bob SS 230kV line	P6	Overlapping singles	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	0.82	>0.9	Existing UVLS; operation procedure to switch in Mercury SW-Jackass-Lathrop line for emergency
System diverge	Pahrump-Bob SS & Pahrump-Innovation 230kV lines	P6	Overlapping singles	>0.9	>0.9	>0.9	>0.9	>0.9	Nconv	Nconv	>0.9	Existing UVLS
System diverge	Innovation-Desert View 230kV & Pahrump-Bob SS 230kV lines	P6	Overlapping singles	Nconv	>0.9	>0.9	>0.9	>0.9	Nconv	Nconv	>0.9	Existing UVLS

\* The 2020SP & 2023SP Load Addition & NNSR Reconfiguration sensitivity cases modeled VEA new load service application and the NNSR radial line arrangement



Study Area: **Valley Electric Association**

*Transient Stability*



Contingency	Category	Category Description	Transient Stability Performance (Number of voltage and frequency violations)								Potential Mitigation Solutions
			2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2020SP High Load*	2023SP High Load*	2023OP High Renewable	
Innovation-Desert View & Pahrump-Bob SS (Gamebird) 230kV lines	P6	Normal clearing	Stable	Stable	Stable	NA	NA	NA	Stable	NA	
Desert View-Northwest 230kV & Pahrump-Innovation 230kV lines	P6	Normal clearing	Stable	Stable	Stable	NA	NA	NA	Stable	NA	
Pahrump-Innovation and Pahrump-Bob SS (Gamebird) 230kV lines	P6	Normal clearing	Stable	Stable	Stable	NA	NA	NA	Stable	NA	
Pahrump 230kV Sub	Extreme	Normal clearing	Stable	Stable	Stable	NA	NA	NA	Stable	NA	

\* The 2020SP & 2023SP Load Addition & NNS Reconfiguration sensitivity cases modeled VEA new load service application and the NNS radial line arrangement

Study Area: **Valley Electric Association**



*Single Contingency Load Drop*

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



Study Area: **Valley Electric Association**

*Single Source Substation with more than 100 MW Load*



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

Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading % (Baseline Scenarios)					Loading % (Sensitivity Scenarios)			Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	
22886 SUNCREST 230 22832 SYCAMORE 230 Ckt #1 and #2	P1L-50001RAS0_ 22930 ECO - 22468 MIGUEL 500KV &1	P1	N-1	<90	<90	<90	<90	<90	<90	105.8	107.4	The 30-minute rating of the lines can be relied upon in allowing operation actions including generation redispatch and adjustment of the IV phase shifting transformers
	P2/P4_ML8013_ML 8013 CB - BK 80&TL50001	P2/P2/P4	Breaker Fault/Stuck Breaker	<90	<90	<90	<90	<90	<90	105.9	107.5	
	P2/P4_ML8023_ML 8023 CB - BK 81&TL50001	P2/P2/P5	Breaker Fault/Stuck Breaker	<90	<90	<90	<90	<90	<90	105.9	107.5	
	P2/P4_ML7013_ML 7013 CB - BK 80&81	P2/P2/P6	Breaker Fault/Stuck Breaker	<90	<90	<90	<90	<90	<90	105.8	107.4	
	P2/P4_ECO-4T_ECO 4T BK83 & TL50004	P2/P2/P8	Breaker Fault/Stuck Breaker	<90	<90	<90	<90	<90	<90	103.4	105.2	
22886 SUNCREST 230 22832 SYCAMORE 230 Ckt #1 or #2	P1L-50001RAS1-P1_ 22930 ECO - 22468 MIGUEL 500KV &1 - AND - P1L-23055RAS1-P6_ 22886 SUNCREST - 22832 SYCAMORE Ckt #2 or #1 with applicable RAS	P6	N-1-1	112.8	120.8	128.2	<90	135.0	133.5	140.9	151.5	With newly implemented TL23054/TL23055 RAS and the 30-minute ratings of the lines, available demand response and energy storage resources could be relied upon in allowing operation actions including adjustment of the IV phase shifting transformers and generation redispatch to eliminate the overload concerns identified in the baseline scenarios. Further assessment concluded that the preferred resources and the operation actions are adequate to mitigate the overload concerns identified in the summer peak cases of the sensitivity scenarios based on the methodology developed to evaluate local capacity solution.
	P1L-23055RAS1-P1_ 22886 SUNCREST - 22832 SYCAMORE Ckt #2 or #1 - AND - P1L-50001RAS1-P6_ 22930 ECO - 22468 MIGUEL 500KV &1 with applicable RAS	P6	N-1-1	102.0	102.7	111.1	<90	117.1	114.1	126.1	138.6	
22886 SUNCREST 230 22888 SNCRSMP1 500/230KV BK80 or BK81	P1L-50001RAS1-P1_ 22930 ECO - 22468 MIGUEL 500KV &1 - AND - P1T-50022RAS0_ 22885 SUNCREST 500/230KV BK81 or BK80	P6	N-1-1	98.1	102.7	110.5	<90	117.3	114.0	120.2	124.7	The 30-minute rating of the banks can be relied upon in allowing operation actions including generation redispatch and adjustment of the IV phase shifting transformers
22464 MIGUEL 230 22468 MIGUEL 500/230 BK80 or BK81	P1L-50003RAS1-P1_ 23310 OCOTILLO - 22885 SUNCREST 500KV &1 - AND - P1T-50012RAS1-P6_ 22464 MIGUEL 500/230KV BK81 or BK80 with applicable RAS	P6	N-1-1	89.6	95.4	103.0	<90	107.8	106.7	111.3	120.3	

Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading % (Baseline Scenarios)					Loading % (Sensitivity Scenarios)			Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	
22430 SILVERGT 230 22597 OLDTWNTP 230 1 1	P2/P4_SG2-2T_SILVERGT 230 2T CB	P2/P4	Breaker Fault/Stuck Breaker	<90	<90	<90	<90	<90	<90	<b>100.8</b>	<90	The short term emergency ratings of the lines can be relied upon in allowing operation action to re-dispatch generation at Otay Mesa and Pio Pico
	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	98.0	<b>100.2</b>	<b>106.2</b>	93.8	94.2	<b>104.6</b>	<b>124.7</b>	<b>112.1</b>	
	P1L-23011_ 22430 SILVERGT 230 22596 OLD TOWN 230 1 1 - AND - P1L-50003RAS1-P1_ 23310 OCOTILLO - 22885 SUNCREST 500KV &1	P6	N-1-1	91.6	98.8	<b>104.8</b>	<90	95.9	<b>103.5</b>	<90	<90	
22430 SILVERGT 230 22596 OLD TOWN 230 1 1	P1ML-23019_ 22596 MISSION-OLD TOWN-SILVERGT 3T 230 1 1 - AND - P1L-50003RAS1-P1_ 23310 OCOTILLO - 22885 SUNCREST 500KV &1	P6	N-1-1	91.7	98.8	<b>104.8</b>	<90	96.7	<b>103.7</b>	<90	<90	
	P1ML-23019_ 22596 MISSION-OLD TOWN-SILVERGT 3T 230 1 1 - AND - P1L-23033_ 22832 SYCAMORE 230 22652 PENSQTOS 230 1 1	P6	N-1-1	98.7	<b>100.9</b>	<b>106.9</b>	93.9	95.8	<b>105.6</b>	<b>126.0</b>	<b>113.5</b>	
22716 SANLUSRY 230 22232 ENCINA 230 1 1	P1ML-23064_ 22227 ENCINA-SANLUSRY-PEN 3T 230 1 1 - AND - P1L-50002_ 22536 N.GILA - 22360 IMPRLVLY 500KV &1	P6	N-1-1	<90	<90	<90	<b>104.5</b>	<90	<90	<90	<90	
22227 ENCINATP 230 22716 SANLUSRY 230 1 1	P1L-23027_ 22716 SANLUSRY 230 22232 ENCINA 230 1 1 - AND - P1L-50002_ 22536 N.GILA - 22360 IMPRLVLY 500KV &1	P6	N-1-1	<90	<90	<90	<b>109.6</b>	<90	<90	<90	<90	
22844 TALEGA 230 24131 S.ONOFRE 230 1 1	P1ML-23061_ 22846 TALEGA-CAPSTRNO-ESCNDIDO 3T 230 1 1 - AND - P1L-TIE23_ 22113 CAPSTRNO 230 24131 S.ONOFRE 230 1 1	P6	N-1-1	<90	<90	<b>108.3</b>	<90	<90	94.4	<90	<90	The 30-minute rating of the lines can be relied upon in allowing operation action to reduce reactive power output from the synchronous condensers at Talega
	P1L-TIE23_ 22113 CAPSTRNO 230 24131 S.ONOFRE 230 1 1 - AND - P1L-50002_ 22536 N.GILA - 22360 IMPRLVLY 500KV &1	P6	N-1-1	<90	<90	<b>100.8</b>	<90	<90	90.4	<90	<90	
22356 IMPRLVLY 230 21025 ELCENTSW 230 1 1	P1G_TDM_TDM Plant G-1 - AND - P1L-50002_ 22536 N.GILA - 22360 IMPRLVLY 500KV &1	P3	G-1/N-1	<b>102.5</b>	<90	<90	<90	<90	<90	<90	<90	To be mitigated by the S-line upgrade project approved in 2017-18 TP with expected in-service date of December 2021. The ISO operation procedure can be used as an interim solution to eliminate the overload concern until the project is completed

Study Area: **San Diego Main**

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
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	
Suncrest 500 kV Bus	P2/P4 OCOTILLO CB 2T w/o coordination of the Suncrest SVC facility and the existing shunt capacitors/reactors in the Suncrest 500/230 kV substation	P2/P4	Breaker Fault/Stuck Breaker	1.06-1.1	1.05-1.08	1.04-1.08	1.06-1.12	1.05-1.14	1.06-1.1	1.06-1.1	1.05-1.1	NextEra plans implement an autonomous control system to control the Suncrest SVC (Static Var Compensator) in a manner similar to the control systems used for the synchronous condensers in the San Diego area. This control system along with the existing control systems on the existing shunt capacitors and reactors at Suncrest are expected to eliminate the potential high voltage concern.

Study Area: **San Diego Main**

Voltage Deviation



Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)					Voltage PU (Sensitivity Scenarios)			Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	
None	None											

Study Area: **San Diego Main**

Transient Stability



Contingency	Category	Category Description	Transient Stability Performance (Number of voltage and frequency violations)								Potential Mitigation Solutions	
			2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen		
TL50001 ECO-MIGUEL 500 KV line out of service followed by the loss of Ocotillo-Suncrest 500 kV line that triggers 500 kV line TL50003 Gen Drop RAS, with system adjustment between the two events	P6	3-PH Fault @ Suncrest 500 kV	None	None	None	None	None	None	None	None	None	No violation
TL50001 ECO-MIGUEL 500 KV line out of service followed by the loss of Sycamore-Suncrest 230 kV line that triggers newly implemented TL23054/TL23055 RAS, with system adjustment between the two events	P6	3-PH Fault @ Sycamore 230 kV	None	None	None	None	None	None	None	None	None	No violation



Study Area: **San Diego Main**



*Single Contingency Load Drop*

Worst Contingency	Category	Category Description	Amount of Load Drop (MW)							Potential Mitigation Solutions	
			2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen		2020 SP Heavy Renewable & Min Gas Gen
No single contingency resulted in total load drop of more than 250 MW											

Study Area: **San Diego Main**



*Single Source Substation with more than 100 MW Load*

Substation	Load Served (MW)								Potential Mitigation Solutions
	2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	
No single source substation with of more than 100 MW									

Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading % (Baseline Scenarios)					Loading % (Sensitivity Scenarios)			Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	
22020 AVOCADO 69.0 22508 MNSRATTP 69.0 1 1	TL0691_TL0691B C D: AVCDTP-AVCAD-PND-MNSRT ck 1	P1	N-1	<90	<90	<90	94.49	132.51	<90	133.89	<90	Reduce battery charging, potential RAS to trip battery charging
22016 AVCADOTP 69.0 22020 AVOCADO 69.0 1 1	TL0698_TL0698 MONSRATE-AVOCADO-PALA ck 1	P1	N-1	<90	<90	<90	94.16	131.35	<90	132.31	<90	Reduce battery charging, potential RAS to trip battery charging
22884 WARNERS 69.0 22688 RINCON 69.0 1 1	TL0637_SANTYSBL - CREELMAN ck 1	P1	N-1	96.74	99.21	97.56	<90	<90	117.07	<90	<90	Sensitivity Only
22016 AVCADOTP 69.0 22020 AVOCADO 69.0 1 1	TL0698A_TL0698A AVOCADO-MNSRATTP ck 1	P2.1	Line Section w/o Fault	<90	<90	<90	94.21	129.87	<90	131.24	<90	Reduce battery charging, potential RAS to trip battery charging
22020 AVOCADO 69.0 22508 MNSRATTP 69.0 1 1	TL0691D_TL0691D AVOCADO-AVCADOTP ck 1	P2.1	Line Section w/o Fault	<90	<90	<90	94.08	129.31	<90	130.58	<90	Reduce battery charging, potential RAS to trip battery charging
22688 RINCON 69.0 22404 LILAC 69.0 1 1	TL0681B_TL0681B ASH TP-VALCNTR ck 1	P2.1	Line Section w/o Fault	<90	97.62	99.79	<90	<90	104.39	<90	<90	Sensitivity Only
22016 AVCADOTP 69.0 22020 AVOCADO 69.0 1 1	TL0698B_TL0698B MONSRATE-MNSRATTP ck 1	P2.1	Line Section w/o Fault	<90	<90	<90	<90	100.96	<90	97.5	<90	Reduce battery charging, potential RAS to trip battery charging
22440 MELROSE 69.0 22442 MELRSETP 69.0 1 1	ME69-N_Melrose 69kV N Bus	P2	Bus	95.26	98.68	103.82	<90	113.21	106.98	111.33	113.88	Preferred resources, operation procedure
22604 OTAY 69.0 22616 OTAYLKTP 69.0 1 1	ML69-S_Miguel 69kV S Bus	P2	Bus	91.94	<90	<90	<90	98.55	<90	97.55	116.28	30-min rating, Generation Re-dispatch
22884 WARNERS 69.0 22688 RINCON 69.0 1 1	CRE69-E_Creelman 69kV E Bus	P2	Bus	96.72	99.22	97.57	<90	<90	117.07	<90	<90	Sensitivity Only
22208 EL CAJON 69.0 22408 LOSCOCHS 69.0 1 1	MY69-N_Murray 69kV N Bus	P2	Bus	<90	<90	<90	<90	111.36	<90	110.75	116.48	30-min rating, operation procedure
22604 OTAY 69.0 22616 OTAYLKTP 69.0 1 1	Bus_SLT69E_SALT CREEK E 69 kV BUS	P2	Bus	<90	112.81	110.64	<90	<90	107.05	<90	<90	30-min rating, Generation Re-dispatch
22160 DEL MAR 69.0 22644 PENSQTOS 69.0 2 1	Bus_PO69NW_Penasquitos 69kV NW Bus	P2	Bus	<90	101.93	110.15	<90	91.07	109.46	96.87	<90	Operation Procedure to radialize North City and Encinitas after 1st contingency
22306 GARFIELD 69.0 22208 EL CAJON 69.0 1 1	MY69-N_Murray 69kV N Bus	P2	Bus	94.48	100.39	103.43	<90	<90	107.76	<90	94.88	Preferred resources, operation procedure
22200 DUNHILTP 69.0 22188 DOUBLTTP 69.0 1 1	Bus_PO69SE_Penasquitos 69kV SE Bus	P2	Bus	<90	100.26	99.82	<90	<90	107.41	<90	<90	30-min rating, operation procedure
22188 DOUBLTTP 69.0 22164 DELMARTP 69.0 1 1	Bus_PO69SE_Penasquitos 69kV SE Bus	P2	Bus	<90	100.26	99.82	<90	<90	107.41	<90	<90	Preferred resources, operation procedure
22644 PENSQTOS 69.0 22164 DELMARTP 69.0 1 1	Bus_PO69SE_Penasquitos 69kV SE Bus	P2	Bus	<90	100.23	99.8	<90	<90	107.37	<90	<90	30-min rating, operation procedure
22841 LAGNA NL TAP 138 22396 LAGNA NL 138 1 1	PI138-E_Pico 138kV E Bus	P2	Bus	113.2	<90	<90	<90	<90	<90	<90	114.44	SOCRE project as previously approved in transmission plan, Operation Procedure in the interim
22208 EL CAJON 69.0 22408 LOSCOCHS 69.0 1 1	EC69-S_El Cajon 69kV S Bus	P2	Bus	<90	<90	<90	<90	95.91	<90	104.1	93.06	30-min rating, Generation Re-dispatch
22604 OTAY 69.0 22616 OTAYLKTP 69.0 1 1	SYO69-S_San Ysidro 69kV S Bus	P2	Bus	<90	102.12	101.11	<90	<90	100.02	<90	<90	30-min rating, Generation Re-dispatch
22640 PENDLETN 69.0 22708 SANLUSRY 69.0 1 1	ME69-S_Melrose 69kV S Bus	P2	Bus	<90	<90	<90	<90	102.06	<90	99.86	<90	Preferred resources, operation procedure
22664 POMERADO 69.0 22828 SYCAMORE 69.0 2 1	TL06915_TL06915 POMERADO -SYCAMORE ck 1 AND PEN_ALL_PEN_ALL 3 UNITS	P3	G-1/N-1	<90	<90	<90	<90	<90	<90	<90	101.89	Artesen 230/69 kV Transformer to mitigate for long term, re-dispatch generation in the interim
22664 POMERADO 69.0 22828 SYCAMORE 69.0 1 1	TL06915_TL06915 POMERADO -SYCAMORE ck 2 AND PEN_ALL_PEN_ALL 3 UNITS	P3	G-1/N-1	<90	<90	<90	<90	<90	<90	<90	101.89	Artesen 230/69 kV Transformer to mitigate for long term, re-dispatch generation in the interim
22420 SILVERGT 69.0 22868 URBAN 69.0 1 1	TL604_OLD TOWN to VINE SUB 69 ck 1 AND GEN NI_QF	P3	G-1/N-1	101.58	<90	<90	<90	<90	<90	<90	<90	Upgrade Silvergate-Urban 69 kV, as previously approved, in 2021, Generation Re-dispatch, preferred resources and use 30-min rating of 100 MVA in the interim
22841 LAGNA NL TAP 138 22396 LAGNA NL 138 1 1	PI-TCB_PICO TCB 138 kV 13836/46/16/48	P4	Breaker	111.01	<90	<90	<90	<90	<90	<90	112.3	SOCRE project as previously approved in transmission plan, Operation Procedure in the interim
22256 ESCNDIDO 69.0 22260 ESCNDIDO 230 2 1	ES2-2N_ESCNDIDO 230kV 2N CB	P4	Breaker	<90	<90	<90	<90	96.56	<90	<90	104.41	Monitor load growth, generation re-dispatch
N/A	TL0635_CREELMAN - LOSCOCHS ck 1 AND TL06917_TL06917 CREELMAN-SYCAMORE ck 1	P6	N-1-1	Diverge	Diverge	Diverge	<90	Diverge	Diverge	<90	Diverge	Operation Procedure to radialize Creelman after 1st contingency, TL 682 RAS will shed Creelman
22884 WARNERS 69.0 22736 SANTYSBL 69.0 1 1	TL0681_ASH-FELICITA-VALCNTR ck 1 AND TL0683_RINCON-LILAC ck 1	P6	N-1-1	153.32	Diverge	Diverge	<90	122.93	Diverge	<90	<90	Operation Procedure to radialize Valley Center after 1st contingency
N/A	TL0694_TL0694 MONSRATE-MHTAP-MOROHILL-MELROSE ck 1 AND TL06912_TL06912 PENDLETN-SANLUSRY ck 1	P6	N-1-1	<90	<90	<90	<90	Diverge	<90	Diverge	<90	Operation Procedure, Generation Re-dispatch
22668 POWAY 69.0 22676 R.CARMEL 69.0 1 1	TL0689_ESCONDIDO-FELICITA-BERNARDO ck 1 AND TL06920_TL06920 ARTESN-SYCAMORE ck 1	P6	N-1-1	160.07	<90	<90	<90	<90	<90	<90	183.01	Artesen 230/69 kV Transformer to mitigate for long term, Operation Procedure in the interim to radialize Artesan or R. Carmel substation
22604 OTAY 69.0 22616 OTAYLKTP 69.0 1 1	TL0623_IMPEAL BEACH-OTAY-SAN YSIDRO ck 1 AND TL6964_MIGUEL to SALT CREEK 69 ck 1	P6	N-1-1	108.8	104.19	99.61	<90	152.95	92.71	151.35	176.78	Operation Procedure, re-dispatch generation after 1st contingency
22808 STUARTTP 69.0 22400 LASPULGS 69.0 1 1	TL23007_TALEGA - S.ONOFRE ck 1 AND TL23052_TALEGA - S.ONOFRE ck 2	P6	N-1-1	168.4	<90	<90	<90	<90	<90	<90	149.93	Upgrade Las Pulgas - Stuart Tap 69 kV, as previously approved, in 2022, SPS to trip TL 695 in the interim
22768 BAY BLVD 69.0 22352 IMPRLBCH 69.0 1 1	TL0645_BAY BLVD-OTAY ck 1 AND TL0646_BAY BLVD-OTAY ck 2	P6	N-1-1	<90	<90	<90	<90	145.81	<90	141.75	161.79	Operation Procedure to dispatch local generation after 1 st contingency, no overload for 30-minute rating
22524 MORHILTP 69.0 22440 MELROSE 69.0 1 1	TL06912_TL06912 PENDLETN-SANLUSRY ck 1 AND TL06932_TL06932 LILAC -PALA ck 1	P6	N-1-1	<90	<90	<90	<90	147.89	<90	148.4	115.76	Operation Procedure, Generation Re-dispatch
22368 JAP MESA 69.0 22400 LASPULGS 69.0 1 1	TL23007_TALEGA - S.ONOFRE ck 1 AND TL23052_TALEGA - S.ONOFRE ck 2	P6	N-1-1	144.17	<90	<90	<90	<90	<90	<90	125.81	Upgrade Las Pulgas - Jap Mesa 69 kV, as previously approved, in 2020, SPS to trip TL 695 in the interim
22020 AVOCADO 69.0 22508 MNSRATTP 69.0 1 1	TL0691_TL0691B C D: AVCDTP-AVOCADO-PENDLETON-MONSRATE ck 1 AND TL06932_TL06932 LILAC -PALA ck 1	P6	N-1-1	<90	<90	<90	97.66	142.82	<90	144.11	<90	Congestion Management, Generation Re-dispatch
22208 EL CAJON 69.0 22408 LOSCOCHS 69.0 1 1	TLNEWA_TLNEWA GRANITE-LOS COCHES ck 1 AND TLNEWB_TLNEWB GRANITE-LOS COCHES ck 2	P6	N-1-1	<90	<90	<90	<90	134.15	<90	139.53	133.21	Operation Procedure to radialize Granite in the interim, re-configure of load in 2022 and 2027 cases
22856 TOREYPNS 69.0 22864 UCM 69.0 1 1	TL06905_TL06905 GENESEE -PENSQTOS ck 2 AND TL06959_TL06959 MIRASANTO-PENSQTOS ck 1	P6	N-1-1	122.32	129.13	127.35	<90	109.3	138.43	108.62	122.21	Operation Procedure, radialize Genesee substation after 1st contingency
22016 AVCADOTP 69.0 22020 AVOCADO 69.0 1 1	TL0698_TL0698 MONSRATE-AVOCADO-PALA ck 1 AND TL06912_TL06912 PENDLETN-SANLUSRY ck 1	P6	N-1-1	<90	<90	<90	<90	134.86	<90	136.37	<90	Operation Procedure, re-dispatch Pala generators

Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading % (Baseline Scenarios)					Loading % (Sensitivity Scenarios)			Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	
22640 PENDLETN 69.0 22708 SANLUSRY 69.0 1 1	TL0694_TL0694 MONSRATE-MHTAP-MOROHILL-MELROSE ck 1 AND TL06932_TL06932 LILAC -PALA ck 1	P6	N-1-1	<90	<90	<90	<90	134.78	<90	132.22	102.79	Operation Procedure, re-dispatch Pala generators
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	116.85	123.84	122.08	<90	104.63	132.89	103.98	116.76	Operation Procedure, radialize Genesee substation after 1st contingency
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	116.22	122.85	121.13	<90	103.95	131.72	103.3	116.11	Operation Procedure, radialize Genesee substation after 1st contingency
22056 BERNARDO 69.0 22284 FELCTATP 69.0 1 1	TL0648_POWAY-R.CARMEL ck 1 AND TL06920_TL06920 ARTESN-SYCAMORE ck 1	P6	N-1-1	112.93	<90	<90	<90	<90	<90	<90	125.57	Artesen 230/69 kV Transformer to mitigate for long term, Operation Procedure in the interim to radialize Artesan or R. Carmel substation
22708 SANLUSRY 69.0 22582 OCEAN RANCH 69.0 1 1	TL0680_SANLUSRY-MELROSE-SAN MARCOS ck 1 AND TL0693_TL0693 MELROSE - SANLUSRY ck 1	P6	N-1-1	104.19	102.33	107.14	<90	119.17	111.56	117.81	122.72	Operation Procedure, preferred resources after 1st contingency, no overload on 30- min rating
22440 MELROSE 69.0 22708 SANLUSRY 69.0 1 1	TL0680_SANLUSRY-MELROSE-SAN MARCOS ck 1 AND TL6966_OCEAN RANCH to SANLUSRY 69 ck 1	P6	N-1-1	102.42	101.13	106.11	<90	118.68	110.38	117.32	121.25	Operation Procedure, preferred resources and to re-configure systems after 1st contingency
22112 CAPSTRNO 138 22860 TRABUCO 138 1 1	TL13831_TALEGA-R.MSNVJO ck 1 AND TL13833_CAPSTRNO-TRABUCO ck 1	P6	N-1-1	120.21	<90	<90	<90	<90	<90	<90	119.23	SOCRE project as previously approved in transmission plan, Operation Procedure in the interim
22420 SILVERGT 69.0 22868 URBAN 69.0 1 1	OT_BK70_OLD TOWN 69 to OLD TOWN 230 ck 1 AND OT_BK71_OLD TOWN 69 to OLD TOWN 230 ck 2	P6	N-1-1	105.22	<90	<90	<90	<90	<90	<90	116.11	Upgrade Silvergate-Urban 69 kV, as previously approved, in 2021, Generation Re-dispatch, preferred resources and use 30-min rating of 100 MVA in the interim
22160 DEL MAR 69.0 22644 PENSQTOS 69.0 2 1	TL0610_DEL MAR-PENSQTOS ck 1 AND TL06952_TL06952 NORTHCTY-PENSQTOS 69 ck 1	P6	N-1-1	109.72	101.63	109.85	<90	90.65	109.13	96.4	115.02	Operation Procedure to radialize North City and Encinitas after 1st contingency
22640 PENDLETN 69.0 22016 AVCADOTP 69.0 1 1	TL0694_TL0694 MONSRATE-MHTAP-MOROHILL-MELROSE ck 1 AND TL06932_TL06932 LILAC -PALA ck 1	P6	N-1-1	<90	<90	<90	<90	114.94	<90	112.83	<90	Operation Procedure, re-dispatch Pala generators
22664 POMERADO 69.0 22828 SYCAMORE 69.0 2 1	TL06908_TL06908 ESCNDIDO-ESCO ck 1 AND TL06915_TL06915 POMERADO -SYCAMORE ck 1	P6	N-1-1	92.01	<90	<90	<90	<90	<90	<90	114.69	Operation Procedure to radialize Pomerado after the 1st contingency
22664 POMERADO 69.0 22828 SYCAMORE 69.0 1 1	TL06908_TL06908 ESCNDIDO-ESCO ck 1 AND TL06924_TL06924 POMERADO -SYCAMORE ck 2	P6	N-1-1	92.01	<90	<90	<90	<90	<90	<90	114.69	Operation Procedure to radialize Pomerado after the 1st contingency
22841 LAGNA NL TAP 138 22396 LAGNA NL 138 1 1	TL13836_TALEGA-PICO ck 1 AND TL13846_TA TAP33 TALEGA-SM-PICO ck 1	P6	N-1-1	113.02	<90	<90	<90	<90	<90	<90	114.26	SOCRE project as previously approved in transmission plan, Operation Procedure in the interim
22440 MELROSE 69.0 22442 MELRSETP 69.0 1 1	TL0693_TL0693 MELROSE - SANLUSRY ck 1 AND TL6966_OCEAN RANCH to SANLUSRY 69 ck 1	P6	N-1-1	95.26	98.68	103.82	<90	113.22	106.98	111.34	113.88	Operation Procedure, preferred resources and to re-configure systems after 1st contingency
22160 DEL MAR 69.0 22644 PENSQTOS 69.0 1 1	TL0667_DEL MAR-PENSQTOS ck 2 AND TL06952_TL06952 NORTHCTY-PENSQTOS 69 ck 1	P6	N-1-1	107.14	99.22	107.29	<90	<90	106.6	94	112.36	Operation Procedure to radialize North City and Encinitas after 1st contingency
22644 PENSQTOS 69.0 22856 TOREYPNS 69.0 1 1	TL06959_TL06959 MIRASNT0-PENSQTOS ck 1 AND TL0666_TL0666 A-G PENSQTOS-DOUBTTP-DUNHILTP-TOREYPNS ck 1	P6	N-1-1	99.57	104.19	103.9	<90	<90	111.65	<90	99.47	Operation Procedure, preferred resources and to re-configure systems after 1st contingency, monitor load growth
22200 DUNHILTP 69.0 22188 DOUBLTTP 69.0 1 1	TL06905_TL06905 GENESEE -PENSQTOS ck 2 AND TL06959_TL06959 MIRASNT0-PENSQTOS ck 1	P6	N-1-1	96	100.58	99.97	<90	<90	107.8	<90	95.91	Operation procedure to radialize TOREYPNS and MIRASNT0 after 1st contingency
22188 DOUBLTTP 69.0 22164 DELMARTP 69.0 1 1	TL06905_TL06905 GENESEE -PENSQTOS ck 2 AND TL06959_TL06959 MIRASNT0-PENSQTOS ck 1	P6	N-1-1	96	100.58	99.97	<90	<90	107.8	<90	95.91	Operation procedure to radialize TOREYPNS and MIRASNT0 after 1st contingency
22644 PENSQTOS 69.0 22164 DELMARTP 69.0 1 1	TL06905_TL06905 GENESEE -PENSQTOS ck 2 AND TL06959_TL06959 MIRASNT0-PENSQTOS ck 1	P6	N-1-1	95.99	100.55	99.94	<90	<90	107.77	<90	95.9	Operation procedure to radialize TOREYPNS and MIRASNT0 after 1st contingency
22306 GARFIELD 69.0 22208 EL CAJON 69.0 1 1	TL0618_MISSION-MURRAY ck 1 AND TL0619_MISSION-MURRAY ck 2	P6	N-1-1	94.48	100.39	103.43	<90	<90	107.76	<90	94.88	Prefered resources, operation procedure
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	94.08	100.23	98.62	<90	<90	107.49	<90	93.99	Operation Procedure, radialize Genesee and UCM substation after 1st contingency
22372 KEARNY 69.0 22140 CLARMTTP 69.0 1 1	TL0663_KEARNY -MISSION ck 1 AND TL0676_MESAHTGS-MISSION ck 1	P6	N-1-1	103	<90	<90	<90	<90	<90	<90	107.37	Mesa Heights 69 kV loop-in project, as previously approved, in 2021, Operation Procedure in the interim
22256 ESCNDIDO 69.0 22272 ESCO 69.0 1 1	TL06915_TL06915 POMERADO -SYCAMORE ck 1 AND TL06924_TL06924 POMERADO -SYCAMORE ck 2	P6	N-1-1	<90	<90	<90	<90	<90	<90	<90	106.11	Sensitivity Only
22192 DOUBLTTP 138 22300 FRIARS 138 1 1	TL23013_PENSQTOS - OT ck 1 AND TL23071_New SX to PENSQTOS 230 ck 1	P6	N-1-1	<90	<90	<90	<90	<90	<90	102.19	90.13	Sensitivity Only
22808 STUARTTP 69.0 22400 LASPULGS 69.0 1 1	TL23007+52_TALEGA-S.ONOFRE 230KV Ckt 1 & 2	P7	N-2	168.4	<90	<90	<90	<90	<90	<90	149.93	Upgrade Las Pulgas - Stuart Tap 69 kV, as previously approved, in 2022, SPS to trip TL 695 in the interim
22368 JAP MESA 69.0 22400 LASPULGS 69.0 1 1	TL23007+52_TALEGA-S.ONOFRE 230KV Ckt 1 & 2	P7	N-2	144.17	<90	<90	<90	<90	<90	<90	125.81	Upgrade Las Pulgas - Jap Mesa 69 kV, as previously approved, in 2020, SPS to trip TL 695 in the interim
22841 LAGNA NL TAP 138 22396 LAGNA NL 138 1 1	TL13846+13836_PICO-SANMATEO-TALEGA 138KV + PICO-TALEGA 69KV	P7	N-2	113.02	<90	<90	<90	<90	<90	<90	114.26	SOCRE project as previously approved in transmission plan, Operation Procedure in the interim
22256 ESCNDIDO 69.0 22272 ESCO 69.0 1 1	TL6924+6915_POMERADO-SYCAMORE 69KV Ckt 1 & 2	P7	N-2	<90	<90	<90	<90	<90	<90	<90	106.11	Artesen 230/69 kV Transformer to mitigate for long term, pre-contingency re-dispatch generation in the interim
22208 EL CAJON 69.0 22408 LOSCOCHS 69.0 1 1	TL630+624_EL CAJON-JAMACHA + EL CAJON-GRANITE 69KV	P7	N-2	<90	<90	<90	<90	95.86	<90	104.06	93.04	30-min rating, Sensitivity Only
22200 DUNHILTP 69.0 22188 DOUBLTTP 69.0 1 1	TL662+6905_PENSQTOS-TOREYPNS + GENESEE-PENSQTOS 69KV	P7	N-2	<90	93.39	93.01	<90	<90	100.03	<90	<90	30-min rating, Sensitivity Only



Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading % (Baseline Scenarios)					Loading % (Sensitivity Scenarios)			Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	
22188 DOUBLTTP 69.0 22164 DELMARTP 69.0 1 1	TL662+6905_PENSQTOS-TOREYPNS + GENESEE-PENSQTOS 69KV	P7	N-2	<90	93.39	93.01	<90	<90	100.03	<90	<90	Sensitivity Only
22644 PENSQTOS 69.0 22164 DELMARTP 69.0 1 1	TL662+6905_PENSQTOS-TOREYPNS + GENESEE-PENSQTOS 69KV	P7	N-2	<90	93.36	92.98	<90	<90	100	<90	<90	30-min rating, Sensitivity Only

Study Area: **San Diego Sub-Transmission**

*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
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	
None	None											



Study Area: **San Diego Sub-Transmission**

Voltage Deviation



Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)					Voltage PU (Sensitivity Scenarios)			Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	
None	None											

Study Area: **San Diego Sub-Transmission**

*Transient Stability*



Contingency	Category	Category Description	Transient Stability Performance (Number of voltage and frequency violations)								Potential Mitigation Solutions
			2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	
N/A	N/A	N/A									

Study Area: **San Diego Sub-Transmission**



*Single Contingency Load Drop*

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

Study Area: **San Diego Sub-Transmission**

*Single Source Substation with more than 100 MW Load*



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