

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-Redundent 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-Redundent 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



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	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
	Mtcalf 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
	Mtcalf 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
	Mtcalf E 115kV Section 1E	P2	Bus	58	87	106	33	41	51	53	69	86	42	52	105	Continue to monitor future load forecast
	Mtcalf 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	103	Continue to monitor future load forecast
	Los Esteros 115kV Baah Bus #2 (Failure Of Non-Redundent Relay)	P5	Non-Redundant Relay	69	85	104	32	38	63	61	79	87	38	56	104	Protection upgrade
	Los Esteros 230 kV Baah Bus #1 (Failure Of Non-Redundent 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-Redundent 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-Redundent 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
Fibergla-Walsh 60 kV (SVP)	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-Redundent 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-Redundent Relay)	P5	Non-Redundant Relay	146	143	154	91	78	172	130	183	141	71	102	153	Protection upgrade

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	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-Redudent 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	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	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-Redudent 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-Redudent 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
	Sobrannte 115kV - Section 1D & 2D	P2	Bus-Tie Breaker	270	208	220	138	94	215	155	179	216	83	167	267	Sobrannte bus upgrade

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	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	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



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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	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	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
	Mtcalf 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
	Mtcalf 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
	Mtcalf 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 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 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-Northern Receiving Station #1 115kV Line	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-Redundent 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-Redundent 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-Redundent 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	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]	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	Lmecct2 18.00kV & Lmecct1 18.00kV & Lmecst1 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	103	<100	<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	106	Continue to monitor future load forecast
	Los Esteros 115kV Baah Bus #2 (Failure Of Non-Redundent 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-Redundent 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-Redundent 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-Redundent 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-Redundent 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-Redundent 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-Redundent 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-Redundent 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-Redundent 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-Redundent 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-Redundent 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	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	104	Sensitivity only
Stone-Evergreen-Metcalf 115kV Line	Mtcalf D Section 1D & Mtcalf 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	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	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	1.05	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



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				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 Gllns 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	
Mntcloph 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	
Montclo 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	
Mtcalf 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	
Mtcalf 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	



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				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
Pittsburg 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
Rlstn35 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
Rlstn45 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	1.06	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	1.07	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	1.08	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	1.09	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	1.09	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	1.13	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	1.13	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	1.06	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	1.06	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	1.06	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	1.08	<1.05	1.03	Load power factor correction and voltage support if needed	
San Rafl 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	1.09	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	1.09	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	1.08	<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	1.07	<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	1.08	<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	1.07	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	1.14	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	1.06	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	1.08	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	1.05	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	1.05	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	1.12	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	1.09	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	1.12	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	1.07	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	1.06	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	1.06	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	1.09	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	1.13	<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	1.12	<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	1.11	<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	1.07	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	1.07	<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	1.08	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	1.08	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	1.06	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	1.05	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	1.06	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	1.09	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
Wmrnvlle 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

Study Area: PG&E Greater Bay Area

High/Low Voltages



Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)								Voltage PU (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				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

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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 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

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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 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	Mtcalf 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	Mtcalf 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	Mtcalf 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	Mtcalf 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	Pittsburg 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	Pittsburg 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	Pittsburg 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	Pittsburg 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	Pittsburg 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

Study Area: PG&E Greater Bay Area

High/Low Voltages



Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)								Voltage PU (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				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	1.13	<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	1.11	<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	1.12	<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	1.11	<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	1.14	<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	1.14	<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	1.13	<1.10	1.12	<1.10	Load power factor correction and voltage support if needed
Iuka 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	1.12	<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	1.13	<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	1.13	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	1.12	<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	1.11	<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	1.12	<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	1.11	<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	1.11	<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	1.13	<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	1.12	<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	1.14	<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	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	1.11	<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

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Voltage Deviation



Substation	Contingency (All and Worst P6)	Category	Category Description	Post Cont. Voltage Deviation % (Baseline Scenarios)								Post Cont. Voltage Deviation % (Sensitivity Scenarios)				Project & Potential Mitigation Solutions
				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	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	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	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	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	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	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
Metcalf 115 kV bus SVD SLG fault expanded to elements lost due to stuck breaker and clear fault from remote breakers with normal clearing time.	P4-5	Stuck Breaker	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Metcalf 115 kV bus-tie breaker SVD SLG fault expanded to elements lost due to stuck breaker and clear fault from remote breakers with normal clearing time.	P4-6	Stuck Breaker	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	No violation
Metcalf 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