



Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading % (Baseline Scenarios)								Loading % (Sensitivity Scenarios)					ISO Approved Projects & Potential Mitigation Solutions
				2021 Summer Peak	2024 Summer Peak	2029 Summer Peak	2021 Spring Off-Peak	2024 Spring Off-Peak	2021 Winter Peak	2024 Winter Peak	2029 Winter Peak	2024 SP High CEC Forecast	2021 SP Heavy Renewable & Min Gas Gen	2024 SpOP Hi Renew & Min Gas Gen	2029 Retirement of QF Generation s	2029 Summer Peak High SVP Forecasted Load	
AMES-Mountain View 115 kV	MONTA VISTA 115kV BAAH BUS #1 (FAILURE OF NON-REDUNDENT RELAY)	P5	Non-Redundant Relay	138	138	152	72	70	90	104	97	142	115	65	153	158	Protection upgrade
AMES-Whisman 115 kV	MONTA VISTA 115kV BAAH BUS #1 (FAILURE OF NON-REDUNDENT RELAY)	P5	Non-Redundant Relay	144	144	159	70	67	92	107	100	149	116	61	160	165	Protection upgrade
Cayetano-Lone Tree (Lone Tree-USWP) 230kV Line	C.COSTAPPF 230kV - Section 2F & 1F	P2	Bus-Tie-Breaker	93	90	102	17	10	58	59	63	91	53	20	101	97	Continue to monitor future load forecast
	MORAGA 230kV - Section 2D & 1D	P2	Bus-Tie-Breaker	97	97	112	29	26	64	68	70	101	71	30	113	112	Continue to monitor future load forecast
	NEWARK D 230kV Section 1D	P2	Bus	85	88	102	22	22	55	58	61	90	60	24	103	106	Continue to monitor future load forecast
	NEWARK D Section 1D & NEWARK E Section 1E 230kV	P2	Bus-Tie-Breaker	84	93	106	20	20	53	57	68	95	58	22	107	110	Continue to monitor future load forecast
	RUSEL GEN UNITS & CONTRA COSTA-LAS POSITAS 230kV	P3	G-1/N-1	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	101	Sensitivity only
	LAS POSITAS-NEWARK 230kV & PPASSJCT-NEWARK E #2 230kV	P6	N-1-1	<100	<100	101	<100	<100	<100	<100	<100	<100	<100	<100	<100	101	Continue to monitor future load forecast
	Contra Costa-Moraga Nos. 1 & 2 230 kV lines	P7	DCTL	<100	<100	106	<100	<100	<100	<100	68	<100	<100	<100	106	106	Continue to monitor future load forecast
Cayetano-Lone Tree (USWP-Cayetano) 230kV Line	Tesla-Newark No.1 and Tesla-Ravenswood 230 kV lines	P7	DCTL	88	86	99	28	29	59	63	66	91	66	29	100	102	Sensitivity only
	C.COSTAPPF 230kV - Section 2F & 1F	P2	Bus-Tie-Breaker	102	99	102	27	10	60	61	64	100	69	32	101	97	Contra Costa 230 kV bus upgrade or Contra Costa area generation redispatch
	MORAGA 230kV - Section 2D & 1D	P2	Bus-Tie-Breaker	106	106	112	39	26	67	70	71	110	86	42	113	111	Moraga 230 kV bus upgrade or Contra Costa area generation redispatch
	NEWARK D 230kV Section 1D	P2	Bus	94	97	102	32	22	57	60	62	99	76	36	102	106	Continue to monitor future load forecast
	NEWARK D Section 1D & NEWARK E Section 1E 230kV	P2	Bus-Tie-Breaker	92	101	106	31	21	56	59	69	104	74	35	107	110	Continue to monitor future load forecast
	LAS POSITAS-NEWARK 230kV & PPASSJCT-NEWARK E #2 230kV	P6	N-1-1	<100	<100	101	<100	<100	<100	<100	<100	103	<100	<100	<100	101	Continue to monitor future load forecast
	Contra Costa-Moraga Nos. 1 & 2 230 kV lines	P7	DCTL	<100	<100	106	<100	<100	<100	<100	69	<100	<100	<100	106	105	Continue to monitor future load forecast
Christie-Sobrante (Oleum-Sobrante) 115kV Line	Tesla-Newark No.1 and Tesla-Ravenswood 230 kV lines	P7	DCTL	97	95	99	39	29	62	65	67	99	81	41	100	102	Sensitivity only
	SOBRANTE-G #1 115kV & SOBRANTE-G #2 115kV	P6	N-1-1	101	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	Project: Christie - Sobrante 115 kV Line Reconductor In-service date: 12/22 Short term: Action Plan
Contra Costa-Las Positas 230kV Line	C.COSTAPPE 230kV - Section 2E & 1E	P2	Bus-Tie-Breaker	104	100	109	35	18	72	71	72	102	86	38	112	100	Contra Costa 230 kV bus upgrade or Contra Costa area generation redispatch
Eastshore 230/115kV Transformer #1	E. SHORE 230kV - Middle Breaker Bay 3	P2	Non-Bus-Tie Breaker	107	108	113	9	10	102	104	114	109	54	10	111	100	Reconfigure E. Shore 230 kV bus connections
	EVRGRN 115kV Section 1D	P2	Bus	60	66	71	59	65	60	71	64	68	63	57	73	104	Sensitivity only



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El Patio-San Jose Sta. 'A' 115 kV Line	MTCALF E 115kV - Section 1E & 2E	P2	Bus-Tie-Breaker	93	102	111	73	80	84	106	95	106	88	66	113	150	Continue to monitor future load forecast
	MTCALF E 115kV Section 1X	P2	Non-Bus-Tie Breaker	59	72	76	52	57	57	69	62	75	59	49	79	109	Sensitivity only
	MTCALF E 115kV Section 1Y	P2	Non-Bus-Tie Breaker	60	72	76	52	57	57	70	62	75	59	49	78	109	Sensitivity only
	MTCALF E 115kV Section 2E	P2	Bus	64	70	77	54	59	61	74	67	73	63	51	79	106	Sensitivity only
	NRS 400 115 kV bus tie breaker to NRS 300 115 kV bus	P2	Bus-Tie-Breaker	68	73	78	50	55	60	70	66	75	65	49	80	119	Sensitivity only
	EVRGRN 115kV Section 1D	P2	Bus	60	66	71	59	65	60	71	64	67	63	57	73	104	Sensitivity only
	DVR Gen Units (SVP) & SAN JOSE B-STONE-EVERGREEN 115kV	P3	G-1/N-1	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	104	Sensitivity only
	LOS ESTEROS 115kV BAAH BUS #2 (FAILURE OF NON-REDUNDENT RELAY)	P5	Non-Redundant Relay	72	78	84	47	52	66	78	73	80	69	45	86	108	Sensitivity only
	LOS ESTEROS 230 kV BAAH BUS #1 (FAILURE OF NON-REDUNDENT RELAY)	P5	Non-Redundant Relay	69	74	82	56	62	59	70	66	77	67	54	84	119	Sensitivity only
	LOS ESTEROS 230 kV BAAH BUS #2 (FAILURE OF NON-REDUNDENT RELAY)	P5	Non-Redundant Relay	74	80	88	63	69	64	76	70	82	71	61	91	127	Sensitivity only
	MONTA VISTA 115kV BAAH BUS #1 (FAILURE OF NON-REDUNDENT RELAY)	P5	Non-Redundant Relay	59	64	72	49	55	58	68	62	66	58	45	74	101	Sensitivity only
	PALO ALTO SW. STA. 115kV DBDB BUS #1 (FAILURE OF NON-REDUNDENT RELAY)	P5	Non-Redundant Relay	72	78	85	46	52	66	79	74	81	70	45	86	112	Sensitivity only
	NEWARK E-F BUS TIE 230kV & LOS ESTEROS-METCALF 230kV	P6	N-1-1	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	131	Sensitivity only
	Metcalf - Evergreen #1 and #2 115 kV Lines	P7	DCTL	85	91	99	65	71	77	93	84	94	82	61	102	135	Sensitivity only
	Newark - Los Esteros & Los Esteros - Metcalf 230 kV Lines	P7	DCTL	74	80	88	63	69	64	76	70	82	71	61	91	127	Sensitivity only
	Tesla - Newark No.2 and Metcalf - Los Esteros 230 kV lines	P7	DCTL	60	66	74	55	60	59	69	63	68	61	51	76	104	Sensitivity only
Evergreen-Almaden 60 kV Line	MONTA VISTA-LOS GATOS 60kV	P1	N-1	112	111	124	68	58	88	104	96	117	88	54	124	128	Disable automatic load pickup
FMC-San Jose 'B' 115 kV Line	NRS 400 115 kV bus tie breaker to NRS 300 115 kV bus	P2	Bus-Tie-Breaker	80	83	90	40	48	65	69	74	83	77	45	91	156	Sensitivity only
	LOS ESTEROS-NORTECH 115kV & SSS-NRS 230kV (SVP)	P6	N-1-1	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	108	Sensitivity only
Kifer-Duane 115 kV Line	FMC-SAN JOSE B 115kV & NEWARK F-ZANKER-KRS 115kV	P6	N-1-1	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	106	Sensitivity only
	NRS 400 115 kV bus (SVP)	P2	Bus	36	42	45	33	43	44	43	46	41	40	40	47	104	Sensitivity only

Study Area: PG&E Greater Bay Area
Thermal Overloads



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				2021 Summer Peak	2024 Summer Peak	2029 Summer Peak	2021 Spring Off-Peak	2024 Spring Off-Peak	2021 Winter Peak	2024 Winter Peak	2029 Winter Peak	2024 SP High CEC Forecast	2021 SP Heavy Renewable & Min Gas Gen	2024 SpOP Hi Renew & Min Gas Gen	2029 Retirement of QF Generation s	2029 Summer Peak High SVP Forecasted Load	
Kifer-FMC 115 kV Line	NRS 400 115 kV bus tie breaker to NRS 300 115 kV bus	P2	Bus-Tie-Breaker	97	102	109	44	58	87	90	98	102	94	54	112	215	SVP planned breaker upgrade project In-service date: 12/20 Short term: Action plan
	LOS ESTEROS-NORTECH 115kV & SSS-NRS 230kV (SVP)	P6	N-1-1	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	137	Sensitivity only
Las Positas-Newark 230kV Line	C.COSTAPPE 230kV - Section 2E & 1E	P2	Bus-Tie-Breaker	138	132	146	37	11	59	57	60	133	117	48	150	128	Contra Costa 230 kV bus upgrade or Contra Costa area generation redispatch
	C.COSTAPPE Section 2E & C.COSTAPPF Section 2F 230kV	P2	Bus-Tie-Breaker	107	107	114	25	11	48	50	52	108	75	33	114	109	Contra Costa 230 kV bus upgrade or Contra Costa area generation redispatch
	MORAGA 230kV - Section 2D & 1D	P2	Bus-Tie-Breaker	97	100	107	32	19	45	48	49	101	79	39	108	105	Continue to monitor future load forecast
Lawrence - Monta Vista 115 kV	NEWARK F 115kV Section 2Z	P2	Bus	<100	68	78	<100	40	<100	48	44	71	<100	39	79	101	Sensitivity only
Llagas-CHSR 115 kV Line	LLAGAS 115kV - Section 1F & 1E	P2	Bus-Tie-Breaker	<100	145	79	<100	99	<100	136	84	143	<100	3	79	101	Sensitivity only
Llagas-Gilroy Foods 115 kV Line	DVR Gen Units (SVP) & OLEUM-CHRISTIE-NRTH TWR 115kV	P3	G-1/N-1	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	Sensitivity only
	CONTRA COSTA-LAS POSITAS 230kV & OLEUM-CHRISTIE-NRTH TWR 115kV	P6	N-1-1	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	Sensitivity only
Los Esteros-Metcalf 230 kV Line	NEWARK D Section 1D & NEWARK E Section 1E 230kV	P2	Bus-Tie-Breaker	70	73	81	51	54	57	63	60	76	62	49	83	103	Sensitivity only
	NEWARK E 230kV - Section 1E & 2E	P2	Bus-Tie-Breaker	71	74	81	49	52	57	63	59	76	62	47	83	104	Sensitivity only
	NEWARK E-F BUS TIE 230kV & LECEF GEN UNITS	P6	N-1-1	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	106	Sensitivity only
Los Esteros-Montague 115 kV Line	LOS ESTEROS-NORTECH 115kV & LOS ESTEROS-TRIMBLE 115kV	P6	N-1-1	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	108	Sensitivity only
Los Esteros-Nortech 115 kV Line	SSS 230/230kV TB 1	P1	N-1	85	90	97	30	34	58	63	68	91	74	34	97	116	Sensitivity only
	SSS-NRS 230kV (SVP)	P1	N-1	86	91	98	30	33	58	64	68	92	75	34	97	117	Sensitivity only
	LS ESTRS 230kV - Middle Breaker Bay 8	P2	Non-Bus-Tie Breaker	85	90	97	30	34	58	63	68	91	74	34	97	116	Sensitivity only
	NEWARK F 115kV - Section 2F & 1F	P2	Bus-Tie-Breaker	55	61	69	13	15	44	51	56	62	62	17	69	101	Sensitivity only
	NRS 400 115 kV bus (SVP)	P2	Bus	93	99	107	31	36	61	68	73	100	82	37	107	136	SVP planned breaker upgrade project In-service date: 12/20 Short term: Action plan
	DVR Gen Units (SVP) & FMC-SAN JOSE B 115kV	P3	G-1/N-1	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	107	Sensitivity only
	FMC-SAN JOSE B 115kV & SSS-NRS 230kV (SVP)	P6	N-1-1	<100	100	100	<100	<100	<100	<100	<100	<100	<100	<100	<100	136	Continue to monitor future load forecast
	Los Esteros - Trimble & Los Esteros - Montague 115 kV	P7	DCTL	76	81	89	23	23	57	65	68	83	76	26	88	102	Sensitivity only
	Newark - Kifer & FMC - Kifer 115 kV Lines	P7	DCTL	51	57	65	12	18	45	51	56	58	59	17	64	101	Sensitivity only
	Newark - Northern #1 & #2 115 kV Lines	P7	DCTL	56	63	70	12	15	44	52	57	64	65	17	70	106	Sensitivity only
	Newark-Northern Nos. 1 & 2 115 kV lines	P7	DCTL	56	63	70	12	15	44	52	57	64	65	17	70	106	Sensitivity only



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Los Esteros-Silicon Switching Station 230 kV Line	LOS ESTEROS-NORTECH 115kV	P1	N-1	93	94	95	50	51	60	61	63	94	61	51	95	100	Sensitivity only
	LS ESTRS 115kV - Middle Breaker Bay 1	P2	Non-Bus-Tie Breaker	93	94	95	50	51	60	61	63	94	61	51	95	100	Sensitivity only
	DVR Gen Units (SVP) & NORTECH-NORTHERN RECEIVING STATION 115kV	P3	G-1/N-1	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	103	Sensitivity only
	LOS ESTEROS 115kV BAAH BUS #2 (FAILURE OF NON-REDUNDENT RELAY)	P5	Non-Redundant Relay	97	98	100	54	54	64	66	67	99	68	55	100	108	Continue to monitor future load forecast
	PALO ALTO SW. STA. 115kV DBDB BUS #1 (FAILURE OF NON-REDUNDENT RELAY)	P5	Non-Redundant Relay	99	100	101	55	55	65	68	68	101	69	56	101	110	Continue to monitor future load forecast
	LOS ESTEROS-NORTECH 115kV & FMC-SAN JOSE B 115kV	P6	N-1-1	<100	<100	101	<100	<100	<100	<100	<100	100	<100	<100	101	113	Continue to monitor future load forecast
Metcalf 230/115 kV Trans No. 1	METCALF 230kV - Section 2D & 2E	P2	Bus-Tie-Breaker	94	95	119	53	56	95	89	86	99	95	58	120	125	Continue to monitor future load forecast
	METCALF 230/115kV TB 4 & METCALF 230/115kV TB 2	P6	N-1-1	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	103	Sensitivity only
Metcalf 230/115 kV Trans No. 2	METCALF 230kV - Section 1D & 1E	P2	Bus-Tie-Breaker	92	92	110	50	52	91	85	83	96	86	53	111	116	Continue to monitor future load forecast
	METCALF 230/115kV TB 4 & METCALF 230/115kV TB 3	P6	N-1-1	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	105	Sensitivity only
Metcalf 230/115 kV Trans No. 3	METCALF 230kV - Section 2D & 2E	P2	Bus-Tie-Breaker	94	95	118	53	56	94	89	86	99	95	58	120	125	Continue to monitor future load forecast
	METCALF 230/115kV TB 4 & METCALF 230/115kV TB 2	P6	N-1-1	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	103	Sensitivity only
Metcalf 230/115 kV Trans No. 4	METCALF 230kV - Section 1D & 1E	P2	Bus-Tie-Breaker	92	92	111	50	52	92	85	83	96	87	53	112	116	Continue to monitor future load forecast
	METCALF 230/115kV TB 1 & METCALF 230/115kV TB 2	P6	N-1-1	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	103	Sensitivity only
Metcalf 500/230 kV Trans No. 11	METCALF 500/230kV TB 13 & METCALF 500/230kV TB 12	P6	N-1-1	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	108	Sensitivity only
Metcalf 500/230 kV Trans No. 12	METCALF 500/230kV TB 13 & METCALF 500/230kV TB 11	P6	N-1-1	<100	<100	102	<100	<100	<100	<100	<100	<100	<100	<100	102	110	Continue to monitor future load forecast
Metcalf 500/230 kV Trans No. 13	METCALF 500/230kV TB 12 & METCALF 500/230kV TB 11	P6	N-1-1	<100	<100	104	<100	<100	<100	<100	<100	<100	<100	<100	104	113	Continue to monitor future load forecast
Metcalf-El Patio No. 1 115 kV Line	MTCALF D Section 2D & MTCALF E Section 2E 115kV	P2	Bus-Tie-Breaker	76	81	85	53	58	60	76	67	84	71	47	87	109	Sensitivity only
	MTCALF E 115kV - Section 1E & 2E	P2	Bus-Tie-Breaker	77	81	88	52	56	61	76	67	84	72	46	89	110	Sensitivity only
	DVR Gen Units (SVP) & METCALF-EL PATIO #2 115kV	P3	G-1/N-1	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	100	Sensitivity only
	SSS-NRS 230kV (SVP) & METCALF-EL PATIO #2 115kV	P6	N-1-1	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	105	Sensitivity only
	Metcalf - Evergreen #1 and #2 115 kV Lines	P7	DCTL	72	75	82	47	51	57	69	62	78	68	43	83	102	Sensitivity only



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Metcalf-El Patio No. 2 115 kV Line	MTCALF D - 1D 115kV & MTCALF D-LLAGAS line	P2	Non-Bus-Tie Breaker	68	80	83	46	50	56	68	61	82	66	43	85	106	Sensitivity only
	MTCALF D - 1D 115kV & MTCALF D-ST TRESA line	P2	Non-Bus-Tie Breaker	70	81	85	48	51	58	69	62	84	67	44	86	108	Sensitivity only
	MTCALF D 115kV Section 1D	P2	Bus	68	79	83	46	50	57	68	61	82	66	43	85	106	Sensitivity only
	MTCALF D Section 1D & MTCALF E Section 1E 115kV	P2	Bus-Tie-Breaker	88	96	104	57	62	73	86	77	99	83	54	106	127	Continue to monitor future load forecast
	MTCALF E 115kV - Section 1E & 2E	P2	Bus-Tie-Breaker	77	81	88	52	56	62	77	69	84	72	46	89	110	Sensitivity only
	MTCALF D - 1D 115kV & MTCALF D-LLAGAS line	P2	Non-Bus-Tie Breaker	68	80	83	46	50	55	66	60	82	66	43	85	106	Sensitivity only
	MTCALF D - 1D 115kV & MTCALF D-ST TRESA line	P2	Non-Bus-Tie Breaker	70	81	85	48	51	56	67	61	84	67	44	86	108	Sensitivity only
	DVR Gen Units (SVP) & METCALF-EL PATIO #1 115kV	P3	G-1/N-1	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	100	Sensitivity only
	SSS-NRS 230kV (SVP) & METCALF-EL PATIO #1 115kV	P6	N-1-1	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	105	Sensitivity only
	Metcalf - Evergreen #1 and #2 115 kV Lines	P7	DCTL	72	75	82	47	51	57	69	62	78	68	43	83	101	Sensitivity only
Metcalf-Evergreen No. 1 115 kV Line	EL PATIO-SAN JOSE A 115kV & EVRGRN 1-MTCALF E #2 115kV	P6	N-1-1	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	107	Sensitivity only
Metcalf-Evergreen No. 2 115 kV Line	MTCALF D Section 1D & MTCALF E Section 1E 115kV	P2	Bus-Tie-Breaker	<100	81	91	<100	53	<100	77	70	84	<100	46	92	108	Sensitivity only
	EL PATIO-SAN JOSE A 115kV & METCALF-EVERGREEN #1 115kV	P6	N-1-1	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	108	Sensitivity only
Metcalf-Hicks 230 kV Line	METCALF 230kV - Section 1D & 1E	P2	Bus-Tie-Breaker	85	88	93	69	73	83	89	79	91	79	68	94	102	Sensitivity only
	Metcalf-Monta Vista No. 3 & Monta Vista-Coyote Sw. Sta. 230 kV Line	P7	DCTL	85	88	92	70	75	84	90	80	91	78	70	93	102	Sensitivity only
Monta Vista 230/115 kV Trans No. 2	MONTAVIS 230/115kV TB 4 & MONTAVIS 230/115kV TB 3	P6	N-1-1	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	106	Sensitivity only
Monta Vista 230/115 kV Trans No. 3	MONTAVIS 230kV - Section 1D & 2D	P2	Bus-Tie-Breaker	78	82	92	75	79	77	86	73	84	72	73	94	108	Sensitivity only
	MONTAVIS 230/115kV TB 2 & MONTAVIS 230/115kV TB 4	P6	N-1-1	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	102	Sensitivity only
Monta Vista 230/115 kV Trans No. 4	MONTAVIS 230/115kV TB 2 & MONTAVIS 230/115kV TB 3	P6	N-1-1	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	106	Sensitivity only
Monta Vista-Hicks 230 kV Line	METCALF 230kV - Section 1D & 1E	P2	Bus-Tie-Breaker	85	89	96	80	88	90	97	85	92	84	82	97	107	Sensitivity only
	Metcalf-Monta Vista No. 3 & Monta Vista-Coyote Sw. Sta. 230 kV Line	P7	DCTL	85	90	95	81	91	91	98	86	93	83	85	96	107	Sensitivity only
Monta Vista-Wolfe 115 kV Line	STELLING-MONTA VISTA 115kV	P1	N-1	98	99	104	54	53	65	76	68	102	86	49	104	104	Continue to monitor future load forecast
	MNTA VSA 115kV - Middle Breaker Bay 2	P2	Non-Bus-Tie Breaker	<100	98	104	<100	53	<100	76	68	101	<100	49	104	105	Continue to monitor future load forecast
	CLARMNT - 2D 115kV & SOBRANTE-GRIZZLY-CLAREMONT #1 line	P2	Non-Bus-Tie Breaker	109	92	99	68	55	97	96	102	50	73	51	99	99	Project: Oakland Clean Energy Initiative In-service date: 8/22 Load forecast in Northern Oakland area is under review.



Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading % (Baseline Scenarios)								Loading % (Sensitivity Scenarios)					ISO Approved Projects & Potential Mitigation Solutions
				2021 Summer Peak	2024 Summer Peak	2029 Summer Peak	2021 Spring Off-Peak	2024 Spring Off-Peak	2021 Winter Peak	2024 Winter Peak	2029 Winter Peak	2024 SP High CEC Forecast	2021 SP Heavy Renewable & Min Gas Gen	2024 SpOP Hi Renew & Min Gas Gen	2029 Retirement of QF Generation s	2029 Summer Peak High SVP Forecasted Load	
Moraga-Claremont #1 115kV Line	CLARMNT - 2D 115kV & SOBRANTE-GRIZZLY-CLAREMONT #2 line	P2	Non-Bus-Tie Breaker	109	92	99	68	55	97	96	102	50	73	51	99	99	Project: Oakland Clean Energy Initiative In-service date: 8/22 Load forecast in Northern Oakland area is under review.
	CLARMNT 115kV Section 2D	P2	Bus	109	92	99	68	55	97	96	102	50	73	51	99	99	Project: Oakland Clean Energy Initiative In-service date: 8/22 Load forecast in Northern Oakland area is under review.
	C-X #2 & #3 115kV	P6	N-1-1	103	91	100	72	54	94	99	92	73	82	45	100	100	Project: Oakland Clean Energy Initiative In-service date: 8/22 Load forecast in Northern Oakland area is under review.
	SOBRANTE 230kV - Section 2D & 1D	P2	Bus-Tie-Breaker	101	87	104	69	60	83	92	94	73	82	45	104	104	Project: Oakland Clean Energy Initiative In-service date: 8/22 Load forecast in Northern Oakland area is under review.
	STATIN X 115kV - Section 2D & 1D	P2	Bus-Tie-Breaker	113	NA	NA	77	NA	102	NA	NA	65	79	54	NA	NA	Project: Oakland Clean Energy Initiative In-service date: 8/22 Load forecast in Northern Oakland area is under review.
Moraga-Claremont #2 115kV Line	C-X #2 & #3 115kV	P6	N-1-1	103	91	100	72	55	94	99	92	73	82	45	100	100	Project: Oakland Clean Energy Initiative In-service date: 8/22 Load forecast in Northern Oakland area is under review.
	SOBRANTE 230kV - Section 2D & 1D	P2	Bus-Tie-Breaker	102	87	104	69	60	83	92	94	73	82	45	104	104	Project: Oakland Clean Energy Initiative In-service date: 8/22 Load forecast in Northern Oakland area is under review.
	STATIN X 115kV - Section 2D & 1D	P2	Bus-Tie-Breaker	113	NA	NA	78	NA	102	NA	NA	65	79	54	NA	NA	Project: Oakland Clean Energy Initiative In-service date: 8/22 Load forecast in Northern Oakland area is under review.
Moraga-Oakland X #1 115kV Line	CLARMNT 115kV - Section 2D & 1D	P2	Bus-Tie-Breaker	106	106	114	68	<100	93	<100	<100	48	70	<100	114	114	Project: Oakland Clean Energy Initiative In-service date: 8/22 Load forecast in Northern Oakland area is under review.
	K-D #1 & #2 115kV	P6	N-1-1	107	106	114	67	<100	93	<100	<100	47	<100	<100	114	114	Project: Oakland Clean Energy Initiative In-service date: 8/22 Load forecast in Northern Oakland area is under review.
Moraga-Oakland X #2 115kV Line	CLARMNT 115kV - Section 2D & 1D	P2	Bus-Tie-Breaker	106	106	114	68	<100	93	<100	<100	<100	<100	<100	114	114	Project: Oakland Clean Energy Initiative In-service date: 8/22 Load forecast in Northern Oakland area is under review.
	K-D #1 & #2 115kV	P6	N-1-1	107	106	114	67	<100	93	<100	<100	48	70	<100	114	114	Project: Oakland Clean Energy Initiative In-service date: 8/22 Load forecast in Northern Oakland area is under review.



Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading % (Baseline Scenarios)								Loading % (Sensitivity Scenarios)					ISO Approved Projects & Potential Mitigation Solutions
				2021 Summer Peak	2024 Summer Peak	2029 Summer Peak	2021 Spring Off-Peak	2024 Spring Off-Peak	2021 Winter Peak	2024 Winter Peak	2029 Winter Peak	2024 SP High CEC Forecast	2021 SP Heavy Renewable & Min Gas Gen	2024 SpOP Hi Renew & Min Gas Gen	2029 Retirement of QF Generation s	2029 Summer Peak High SVP Forecasted Load	
	MORAGA 115kV - Section 1D & 1E	P2	Bus-Tie-Breaker	103	NA	NA	66	NA	91	NA	NA	47	<100	NA	NA	NA	Project: Oakland Clean Energy Initiative In-service date: 8/22 Load forecast in Northern Oakland area is under review.
Moraga-Oakland X #3 115kV Line	CLARMNT 115kV - Section 2D & 1D	P2	Bus-Tie-Breaker	106	106	114	68	<100	93	<100	<100	<100	<100	<100	114	114	Project: Oakland Clean Energy Initiative In-service date: 8/22 Load forecast in Northern Oakland area is under review.
	K-D #1 & #2 115kV	P6	N-1-1	107	106	114	67	<100	93	<100	<100	48	70	<100	114	114	Project: Oakland Clean Energy Initiative In-service date: 8/22 Load forecast in Northern Oakland area is under review.
	MORAGA 115kV - Section 1D & 2D	P2	Bus-Tie-Breaker	119	NA	NA	79	NA	113	NA	NA	47	<100	NA	NA	NA	Project: Oakland Clean Energy Initiative In-service date: 8/22 Load forecast in Northern Oakland area is under review.
Moraga-Oakland X #4 115kV Line	CLARMNT 115kV - Section 2D & 1D	P2	Bus-Tie-Breaker	106	106	114	68	<100	93	<100	<100	<100	105	<100	114	114	Project: Oakland Clean Energy Initiative In-service date: 8/22 Load forecast in Northern Oakland area is under review.
	K-D #1 & #2 115kV	P6	N-1-1	107	106	114	67	<100	93	<100	<100	<100	<100	<100	114	114	Project: Oakland Clean Energy Initiative In-service date: 8/22 Load forecast in Northern Oakland area is under review.
	MORAGA 115kV - Section 1D & 1E	P2	Bus-Tie-Breaker	103	NA	NA	66	NA	91	NA	NA	48	70	NA	NA	NA	Project: Oakland Clean Energy Initiative In-service date: 8/22 Load forecast in Northern Oakland area is under review.
	MORAGA 115kV - Section 1D & 2D	P2	Bus-Tie-Breaker	119	NA	NA	79	NA	113	NA	NA	47	<100	NA	NA	NA	Project: Oakland Clean Energy Initiative In-service date: 8/22 Load forecast in Northern Oakland area is under review.
Moraga-San Leandro #1 115kV Line	MORAGA-SAN LEANDRO #2 115kV & MORAGA-SAN LEANDRO #3 115kV	P6	N-1-1	111	<100	113	<100	<100	<100	<100	<100	<100	<100	<100	114	116	Project: East Shore - Oakland J 115 kV Reconductoring Project Load increase in later years under review
Moraga-San Leandro #2 115kV Line	MORAGA 115kV - Section 1D & 1E	P2	Bus-Tie-Breaker	114	NA	NA	61	NA	85	NA	NA	NA	96	NA	NA	NA	Project: Oakland Clean Energy Initiative In-service date: 8/22 Load forecast in Northern Oakland area is under review.
	MORAGA 115kV Section 1E	P2	Bus	115	NA	NA	62	NA	87	NA	NA	NA	95	NA	NA	NA	Project: Oakland Clean Energy Initiative In-service date: 8/22 Load forecast in Northern Oakland area is under review.
	MORAGA-SAN LEANDRO #1 115kV & MORAGA-SAN LEANDRO #3 115kV	P6	N-1-1	111	<100	114	<100	<100	<100	<100	<100	<100	<100	<100	115	116	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)					ISO Approved Projects & Potential Mitigation Solutions
				2021 Summer Peak	2024 Summer Peak	2029 Summer Peak	2021 Spring Off-Peak	2024 Spring Off-Peak	2021 Winter Peak	2024 Winter Peak	2029 Winter Peak	2024 SP High CEC Forecast	2021 SP Heavy Renewable & Min Gas Gen	2024 SpOP Hi Renew & Min Gas Gen	2029 Retirement of QF Generation s	2029 Summer Peak High SVP Forecasted Load	
Morgan Hill-Llagas 115 kV Line #2	LLAGAS - 1F 115kV & MTCALF D-LLAGAS line	P2	Non-Bus-Tie Breaker	115	61	27	90	47	19	59	34	60	43	5	27	38	Project: Metcalf - Morgan Hill - Watsonville Area Reinforcement In-service date: 7/21 Short term: Action plan
	MORGAN HILL-LLAGAS 115kV_270 & OLEUM-CHRISTIE-NRTH TWR 115kV	P6	N-1-1	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	Sensitivity only
MOSSLNSW-LASAGUILASS #2 230KV	TESLA-METCALF 500kV & MOSSLAND-LOSBANOS 500kV	P6	N-1-1	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	115	Sensitivity only
Mountain View-Monta Vista 115 kV Line	MTCALF E 115kV - Section 1E & 2E	P2	Bus-Tie-Breaker	67	73	82	75	82	68	75	63	76	64	73	84	101	Sensitivity only
	DVR Gen Units (SVP) & WHISMAN-MTN VIEW 115kV	P3	G-1/N-1	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	101	Sensitivity only
	RAVENSWOOD 230 kV BAAH BUS #2 (FAILURE OF NON-REDUNDENT RELAY)	P5	Non-Redundant Relay	70	73	84	69	75	68	72	66	77	66	68	86	102	Sensitivity only
	NRS-SRS #1 115kV (SVP) & WHISMAN-MTN VIEW 115kV	P6	N-1-1	<100	<100	100	<100	<100	<100	<100	<100	<100	<100	<100	100	112	Continue to monitor future load forecast
	Britton-Monta Vista & Lawrence-Monta Vista 115 kV Lines	P7	DCTL	67	73	82	80	87	68	74	62	76	66	80	84	102	Sensitivity only
	Monta Vista-Jefferson 230 kV Lines No. 1 & 2	P7	DCTL	71	76	84	80	91	75	80	69	79	69	83	87	101	Sensitivity only
	Monta Vista-Jefferson Nos. 1 & 2 230 kV lines	P7	DCTL	71	76	84	79	91	75	80	69	79	69	83	87	101	Sensitivity only
	Newark-Ravenswood 230 kV and Tesla-Ravenswood 230 kV lines	P7	DCTL	73	77	85	81	89	73	78	68	80	74	81	88	102	Sensitivity only
Newark 230/115kV Transformer #11	NEWARK D Section 1D & NEWARK E Section 1E 230kV	P2	Bus-Tie-Breaker	106	117	122	39	29	70	73	97	121	93	38	121	134	Newark 230 kV bus upgrade
	NEWARK E 230kV Section 1E	P2	Bus	77	98	104	29	25	51	55	60	100	69	31	102	114	Newark 230 kV bus upgrade
	NEWARK D 230/115kV TB 7 & NEWARK E-F BUS TIE 230kV	P6	N-1-1	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	103	Sensitivity only
Newark-Applied Materials 115kV Line	NEWARK F-LAWRENCE-LOCKHD 1 115kV & BRITTON-MONTA VISTA 115kV	P6	N-1-1	<100	101	102	<100	<100	<100	<100	<100	104	<100	<100	102	105	Continue to monitor future load forecast
	PIERCY-METCALF 115kV	P1	N-1	107	74	82	47	29	73	63	57	77	82	25	82	84	Project: Metcalf - Piercy & Swift and Newark - Dixon Landing 115 kV Upgrade In-service date: 4/22 Short term: Action plan
	MTCALF D Section 2D & MTCALF E Section 2E 115kV	P2	Bus-Tie-Breaker	107	74	82	47	29	73	63	57	77	82	25	82	84	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	108	74	83	47	29	73	63	58	78	83	25	84	86	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)					ISO Approved Projects & Potential Mitigation Solutions
				2021 Summer Peak	2024 Summer Peak	2029 Summer Peak	2021 Spring Off-Peak	2024 Spring Off-Peak	2021 Winter Peak	2024 Winter Peak	2029 Winter Peak	2024 SP High CEC Forecast	2021 SP Heavy Renewable & Min Gas Gen	2024 SpOP Hi Renew & Min Gas Gen	2029 Retirement of QF Generation s	2029 Summer Peak High SVP Forecasted Load	
Newark-Dixon Landing 115kV Line	MTCALF E 115kV Section 2E	P2	Bus	107	74	82	47	29	73	63	57	77	82	25	82	84	Project: Metcalf - Piercy & Swift and Newark - Dixon Landing 115 kV Upgrade In-service date: 4/22 Short term: Action plan
	MTCALF E 115kV Section 2X	P2	Non-Bus-Tie Breaker	107	74	82	47	29	73	63	57	77	82	25	82	84	Project: Metcalf - Piercy & Swift and Newark - Dixon Landing 115 kV Upgrade In-service date: 4/22 Short term: Action plan
	MTCALF E 115kV Section 2Y	P2	Non-Bus-Tie Breaker	107	74	82	47	29	73	63	57	77	82	25	82	84	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	108	74	83	47	29	73	63	57	77	82	25	83	85	Project: Metcalf - Piercy & Swift and Newark - Dixon Landing 115 kV Upgrade In-service date: 4/22 Short term: Action plan
Newark-Kifer 115kV Line	NEWARK E-F BUS TIE 230kV	P1	N-1	45	48	51	7	12	22	29	35	48	49	16	50	103	Sensitivity only
	SSS 230/230kV TB 1	P1	N-1	48	52	56	14	21	29	35	38	53	49	22	54	102	Sensitivity only
	SSS-NRS 230kV (SVP)	P1	N-1	49	53	57	15	21	29	35	39	53	50	23	55	103	Sensitivity only
	NRS 400 115 kV bus (SVP)	P2	Bus	69	73	78	20	28	40	48	53	73	68	30	81	134	Sensitivity only
	Internal breaker fault at Duane Duane-SRS 115 kV and KRS-Duane 115 kV and DVR	P2	Non-Bus-Tie Breaker	59	57	62	17	19	37	40	45	58	61	22	60	101	Sensitivity only
	LS ESTRS 230kV - Middle Breaker Bay 8	P2	Non-Bus-Tie Breaker	48	52	56	14	21	29	35	38	53	49	22	54	102	Sensitivity only
	NEWARK E 230kV Section 1E	P2	Bus	44	48	52	7	12	22	29	35	49	49	16	51	104	Sensitivity only
	NRS 400 115 kV bus (SVP)	P2	Bus	70	75	80	21	29	42	50	55	75	70	31	79	145	Sensitivity only
	NRS 400 115 kV bus tie breaker to NRS 300 115 kV bus	P2	Bus-Tie-Breaker	123	126	136	32	41	76	86	96	127	117	44	135	249	SVP planned breaker upgrade project In-service date: 12/20 Short term: Action plan
	DVR Gen Units (SVP) & LOS ESTEROS-NORTECH 115kV	P3	G-1/N-1	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	117	Sensitivity only
	LOS ESTEROS 115kV BAAH BUS #2 (FAILURE OF NON-REDUNDENT RELAY)	P5	Non-Redundant Relay	45	50	57	3	11	31	39	44	51	52	12	56	106	Sensitivity only
	LOS ESTEROS 230 kV BAAH BUS #1 (FAILURE OF NON-REDUNDENT RELAY)	P5	Non-Redundant Relay	68	72	77	27	34	39	47	51	73	69	36	76	136	Sensitivity only
	LOS ESTEROS 230 kV BAAH BUS #2 (FAILURE OF NON-REDUNDENT RELAY)	P5	Non-Redundant Relay	62	66	72	24	31	35	43	47	67	66	34	71	137	Sensitivity only
	PALO ALTO SW. STA. 115kV DBDB BUS #1 (FAILURE OF NON-REDUNDENT RELAY)	P5	Non-Redundant Relay	52	57	65	6	13	35	44	48	58	58	14	63	114	Sensitivity only
	SSS-NRS 230kV (SVP) & LOS ESTEROS-NORTECH 115kV	P6	N-1-1	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	149	Sensitivity only

Study Area: PG&E Greater Bay Area
Thermal Overloads



Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading % (Baseline Scenarios)								Loading % (Sensitivity Scenarios)					ISO Approved Projects & Potential Mitigation Solutions
				2021 Summer Peak	2024 Summer Peak	2029 Summer Peak	2021 Spring Off-Peak	2024 Spring Off-Peak	2021 Winter Peak	2024 Winter Peak	2029 Winter Peak	2024 SP High CEC Forecast	2021 SP Heavy Renewable & Min Gas Gen	2024 SpOP Hi Renew & Min Gas Gen	2029 Retirement of QF Generation s	2029 Summer Peak High SVP Forecasted Load	
	Newark - Los Esteros & Los Esteros - Metcalf 230 kV Lines	P7	DCTL	62	66	72	24	31	35	43	47	67	66	34	71	137	Sensitivity only
	Newark - Northern #1 & #2 115 kV Lines	P7	DCTL	38	45	48	6	12	23	33	37	45	53	14	47	119	Sensitivity only
	Newark-Northern Nos. 1 & 2 115 kV lines	P7	DCTL	38	45	48	6	12	23	33	37	45	53	14	47	119	Sensitivity only
	NRS - Scott #1 and #2 115 kV Lines	P7	DCTL	73	73	78	14	20	45	50	56	73	74	23	77	139	Sensitivity only
Newark-Milpitas #2 115kV Line	SWIFT-METCALF 115kV & NEWARK-MILPITAS #1 115kV	P6	N-1-1	<100	<100	102	<100	<100	<100	<100	<100	<100	<100	<100	103	105	Continue to monitor future load forecast
Newark-Newark Dist 230kV section	MOSSLAND-LOSBANOS 500kV & TESLA-METCALF 500kV	P6	N-1-1	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	104	Sensitivity only
Newark-Northern Receiving Station #1 115kV Line	NEWARK E-F BUS TIE 230kV	P1	N-1	56	59	59	8	12	25	34	42	60	61	20	60	107	Sensitivity only
	SSS 230/230kV TB 1	P1	N-1	60	64	65	18	24	33	41	46	64	58	28	65	104	Sensitivity only
	SSS-NRS 230kV (SVP)	P1	N-1	60	65	66	18	24	33	42	46	65	59	29	66	106	Sensitivity only
	LS ESTRS 230kV - Middle Breaker Bay 8	P2	Non-Bus-Tie Breaker	60	64	65	18	24	33	41	46	64	58	28	65	104	Sensitivity only
	NEWARK E 230kV - Section 1E & 2E	P2	Bus-Tie-Breaker	57	60	61	9	13	25	35	43	61	63	22	62	108	Sensitivity only
	NEWARK E 230kV Section 1E	P2	Bus	56	55	54	8	12	24	34	42	55	61	20	55	102	Sensitivity only
	NEWARK F 115kV - Section 2F & 1F	P2	Bus-Tie-Breaker	45	51	55	8	10	21	35	41	52	61	15	57	123	Sensitivity only
	NEWARK F 115kV Section 2Z	P2	Bus	<100	61	64	<100	13	<100	41	47	61	<100	18	65	114	Sensitivity only
	DVR Gen Units (SVP) & LOS ESTEROS-NORTECH 115kV	P3	G-1/N-1	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	121	Sensitivity only
	LOS ESTEROS 115kV BAAH BUS #2 (FAILURE OF NON-REDUNDENT RELAY)	P5	Non-Redundant Relay	55	62	67	2	9	37	49	56	63	64	14	67	109	Sensitivity only
	LOS ESTEROS 230 kV BAAH BUS #1 (FAILURE OF NON-REDUNDENT RELAY)	P5	Non-Redundant Relay	90	94	97	36	43	49	61	65	95	89	48	98	155	Sensitivity only
	LOS ESTEROS 230 kV BAAH BUS #2 (FAILURE OF NON-REDUNDENT RELAY)	P5	Non-Redundant Relay	81	84	88	32	38	42	54	59	86	84	44	90	153	Sensitivity only
	PALO ALTO SW. STA. 115kV DBDB BUS #1 (FAILURE OF NON-REDUNDENT RELAY)	P5	Non-Redundant Relay	66	72	77	6	13	42	56	60	73	73	17	78	121	Sensitivity only
	SSS-NRS 230kV (SVP) & LOS ESTEROS-NORTECH 115kV	P6	N-1-1	<100	102	108	<100	<100	<100	<100	<100	104	<100	<100	108	173	Continue to monitor future load forecast
	Newark - Kifer & FMC - Kifer 115 kV Lines	P7	DCTL	33	39	40	7	13	22	31	36	39	48	17	40	101	Sensitivity only
	Newark - Los Esteros & Los Esteros - Metcalf 230 kV Lines	P7	DCTL	81	84	88	32	38	42	54	59	86	84	44	90	153	Sensitivity only



Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading % (Baseline Scenarios)								Loading % (Sensitivity Scenarios)					ISO Approved Projects & Potential Mitigation Solutions
				2021 Summer Peak	2024 Summer Peak	2029 Summer Peak	2021 Spring Off-Peak	2024 Spring Off-Peak	2021 Winter Peak	2024 Winter Peak	2029 Winter Peak	2024 SP High CEC Forecast	2021 SP Heavy Renewable & Min Gas Gen	2024 SpOP Hi Renew & Min Gas Gen	2029 Retirement of QF Generation s	2029 Summer Peak High SVP Forecasted Load	
Newark-Northern Receiving Station #2 115kV Line	SSS-NRS 230kV (SVP)	P1	N-1	46	51	55	17	24	27	34	37	51	48	26	56	101	Sensitivity only
	NRS 300 115 kV bus (SVP)	P2	Bus	50	61	67	16	28	37	49	55	62	54	28	67	112	Sensitivity only
	NRS 400 115 kV bus (SVP)	P2	Bus	57	64	69	20	29	32	42	46	64	59	32	70	131	Sensitivity only
	NRS 400 115 kV bus tie breaker to NRS 300 115 kV bus	P2	Bus-Tie-Breaker	90	109	117	31	46	61	78	87	109	87	48	118	205	SVP planned breaker upgrade project In-service date: 12/20 Short term: Action plan
	DVR Gen Units (SVP) & SSS 230/230kV TB 1	P3	G-1/N-1	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	116	Sensitivity only
	LOS ESTEROS 230 kV BAAH BUS #1 (FAILURE OF NON-REDUNDENT RELAY)	P5	Non-Redundant Relay	72	77	83	32	41	41	51	54	78	75	43	85	146	Sensitivity only
	LOS ESTEROS 230 kV BAAH BUS #2 (FAILURE OF NON-REDUNDENT RELAY)	P5	Non-Redundant Relay	62	68	75	30	38	34	45	49	69	71	41	77	145	Sensitivity only
	PALO ALTO SW. STA. 115kV DBDB BUS #1 (FAILURE OF NON-REDUNDENT RELAY)	P5	Non-Redundant Relay	47	54	62	3	12	33	44	48	55	57	12	64	112	Sensitivity only
	SSS-NRS 230kV (SVP) & LOS ESTEROS-NORTECH 115kV	P6	N-1-1	<100	<100	106	<100	<100	<100	<100	<100	<100	<100	<100	106	168	Continue to monitor future load forecast
	Newark - Kifer & FMC - Kifer 115 kV Lines	P7	DCTL	23	29	32	11	14	18	26	29	29	40	16	33	103	Sensitivity only
	Newark - Los Esteros & Los Esteros - Metcalf 230 kV Lines	P7	DCTL	62	68	75	30	38	34	45	49	69	71	41	77	145	Sensitivity only
Newark-Trimble 115kV Line	LOS ESTEROS 230 kV BAAH BUS #2 (FAILURE OF NON-REDUNDENT RELAY)	P5	Non-Redundant Relay	59	59	63	37	38	22	29	28	61	53	42	65	100	Sensitivity only
	LOS ESTEROS-METCALF 230kV & NEWARK E-F BUS TIE 230kV	P6	N-1-1	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	101	Sensitivity only
	Newark - Los Esteros & Los Esteros - Metcalf 230 kV Lines	P7	DCTL	59	59	63	37	38	22	29	28	61	53	42	65	100	Sensitivity only
Nortech-NRS 115 kV Line	SSS 230/230kV TB 1	P1	N-1	76	80	85	26	29	61	65	71	80	66	30	84	104	Sensitivity only
	SSS-NRS 230kV (SVP)	P1	N-1	77	80	85	25	28	61	65	71	81	67	29	85	105	Sensitivity only
	LS ESTRS 230kV - Middle Breaker Bay 8	P2	Non-Bus-Tie Breaker	76	80	85	26	29	61	65	71	80	66	30	84	104	Sensitivity only
	NRS 400 115 kV bus (SVP)	P2	Bus	84	89	95	26	30	64	71	77	90	75	32	94	125	Sensitivity only
	SSS-NRS 230kV (SVP) & FMC-SAN JOSE B 115kV	P6	N-1-1	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	124	Sensitivity only
North Dublin-Cayetano 230kV Cable	MORAGA 230kV - Section 2D & 1D	P2	Bus-Tie-Breaker	101	101	106	39	26	72	75	77	105	84	42	107	105	Moraga 230 kV bus upgrade or Contra Costa area generation redispatch
	NEWARK D Section 1D & NEWARK E Section 1E 230kV	P2	Bus-Tie-Breaker	87	96	100	32	23	60	63	74	98	72	36	101	103	Continue to monitor future load forecast
	Contra Costa-Moraga Nos. 1 & 2 230 kV lines	P7	DCTL	<100	<100	100	<100	<100	<100	<100	74	<100	<100	<100	101	99	Continue to monitor future load forecast



Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading % (Baseline Scenarios)								Loading % (Sensitivity Scenarios)					ISO Approved Projects & Potential Mitigation Solutions
				2021 Summer Peak	2024 Summer Peak	2029 Summer Peak	2021 Spring Off-Peak	2024 Spring Off-Peak	2021 Winter Peak	2024 Winter Peak	2029 Winter Peak	2024 SP High CEC Forecast	2021 SP Heavy Renewable & Min Gas Gen	2024 SpOP Hi Renew & Min Gas Gen	2029 Retirement of QF Generation s	2029 Summer Peak High SVP Forecasted Load	
NRS 230/115kV TB 1	DVR Gen Units (SVP) & LOS ESTEROS-NORTECH 115kV	P3	G-1/N-1	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	102	Sensitivity only
	LOS ESTEROS 115kV BAAH BUS #2 (FAILURE OF NON-REDUNDENT RELAY)	P5	Non-Redundant Relay	96	97	98	54	55	64	66	67	97	68	55	97	104	Sensitivity only
	PALO ALTO SW. STA. 115kV DBDB BUS #1 (FAILURE OF NON-REDUNDENT RELAY)	P5	Non-Redundant Relay	98	99	99	55	55	65	68	68	99	69	56	99	105	Sensitivity only
	LOS ESTEROS-NORTECH 115kV & FMC-SAN JOSE B 115kV	P6	N-1-1	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	108	Sensitivity only
NRS-Scott No. 1 115 kV Line	NRS-SRS #2 115kV (SVP)	P1	N-1	85	83	87	24	25	53	56	61	84	70	27	86	113	Sensitivity only
	NRS 300 115 kV bus (SVP)	P2	Bus	92	95	98	35	39	53	59	64	95	68	41	98	118	Sensitivity only
	DVR Gen Units (SVP) & NRS-SRS #2 115kV (SVP)	P3	G-1/N-1	<100	<100	101	<100	<100	<100	<100	<100	100	<100	<100	101	121	SVP local generation redispatch following first contingency
	NRS-SRS #2 115kV (SVP) & NRS-MISSION 60kV (SVP)	P6	N-1-1	104	112	115	<100	<100	<100	<100	<100	113	<100	<100	115	171	SVP local generation redispatch following first contingency
	Newark - Kifer & FMC - Kifer 115 kV Lines	P7	DCTL	56	58	61	17	23	41	44	48	58	54	23	61	104	Sensitivity only
NRS-Scott No. 2 115 kV Line	NRS-SRS #1 115kV (SVP)	P1	N-1	85	83	86	24	25	53	56	61	84	70	27	86	112	Sensitivity only
	NRS 400 115 kV bus (SVP)	P2	Bus	76	73	77	18	18	52	53	58	73	69	21	77	112	Sensitivity only
	DVR Gen Units (SVP) & NRS-SRS #1 115kV (SVP)	P3	G-1/N-1	<100	<100	101	<100	<100	<100	<100	<100	<100	<100	<100	101	121	SVP local generation redispatch following first contingency
	NRS-SRS #1 115kV (SVP) & NRS-MISSION 60kV (SVP)	P6	N-1-1	104	112	115	<100	<100	<100	<100	<100	113	<100	<100	115	172	SVP local generation redispatch following first contingency
	Newark - Kifer & FMC - Kifer 115 kV Lines	P7	DCTL	55	57	61	17	22	41	44	48	57	53	22	61	103	Sensitivity only
Oakland C - Oakland L #1 115kV Cable	CLARMNT 115kV - Section 2D & 1D	P2	Bus-Tie-Breaker	99	101	109	57	60	111	114	123	105	77	56	109	109	Project: Oakland Clean Energy Initiative In-service date: 8/22 Load forecast in Northern Oakland area is under review.
	K-D #1 & #2 115kV	P6	N-1-1	99	101	109	57	59	111	114	123	105	77	56	109	109	Project: Oakland Clean Energy Initiative In-service date: 8/22 Load forecast in Northern Oakland area is under review.
Oakland C - Oakland X #2 115kV Cable	CLARMNT 115kV - Section 2D & 1D	P2	Bus-Tie-Breaker	114	114	121	76	73	123	123	130	42	76	70	121	121	Project: Oakland Clean Energy Initiative In-service date: 8/22 Load forecast in Northern Oakland area is under review.
	C-X #3 115kV & D-L #1 115kV	P6	N-1-1	121	120	127	80	77	121	121	127	<100	<100	<100	127	127	Project: Oakland Clean Energy Initiative In-service date: 8/22 Load forecast in Northern Oakland area is under review.
	OAK C115 - ME 115kV & OAKLAND C-MARITIME line	P2	Non-Bus-Tie Breaker	94	96	105	54	54	93	97	104	67	70	52	105	105	Project: Oakland Clean Energy Initiative In-service date: 8/22 Load forecast in Northern Oakland area is under review.



Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading % (Baseline Scenarios)								Loading % (Sensitivity Scenarios)					ISO Approved Projects & Potential Mitigation Solutions
				2021 Summer Peak	2024 Summer Peak	2029 Summer Peak	2021 Spring Off-Peak	2024 Spring Off-Peak	2021 Winter Peak	2024 Winter Peak	2029 Winter Peak	2024 SP High CEC Forecast	2021 SP Heavy Renewable & Min Gas Gen	2024 SpOP Hi Renew & Min Gas Gen	2029 Retirement of QF Generation s	2029 Summer Peak High SVP Forecasted Load	
Oakland D - Oakland L 115kV Cable	MORAGA 230kV - Section 2D & 1D	P2	Bus-Tie-Breaker	85	92	101	55	59	76	79	89	64	68	49	101	101	Project: Oakland Clean Energy Initiative In-service date: 8/22 Load forecast in Northern Oakland area is under review.
	STATIN X 115kV - Section 2D & 1D	P2	Bus-Tie-Breaker	133	NA	NA	92	NA	134	NA	NA	NA	NA	NA	NA	NA	Project: Oakland Clean Energy Initiative In-service date: 8/22 Load forecast in Northern Oakland area is under review.
	OAK C115 115kV Section ME	P2	Bus	91	94	105	54	54	91	94	104	67	70	52	105	105	Project: Oakland Clean Energy Initiative In-service date: 8/22 Load forecast in Northern Oakland area is under review.
	C-X #2 & #3 115kV	P6	N-1-1	120	120	128	79	76	121	120	127	<100	<100	<100	128	127	Project: Oakland Clean Energy Initiative In-service date: 8/22 Load forecast in Northern Oakland area is under review.
Oleum-Christie 115kV Line	UNION CH 9.11kV Gen Unit 1 & CHRISTIE-SOBRANTE 115kV	P3	G-1/N-1	109	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	Project: North Tower 115 kV Looping Project In-service date: 12/21 Short term: Action Plan
	Sobrante-G Nos. 1 & 2 115 kV lines	P7	DCTL	<100	<100	87	<100	<100	<100	<100	54	<100	<100	<100	114	86	Sensitivity only
San Jose B bus tie	NEWARK E-F BUS TIE 230kV & LOS ESTEROS-METCALF 230kV	P6	N-1-1	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	103	Sensitivity only
San Jose 'B'-Stone-Evergreen 115 kV Line	Metcalf - El Patio No. 1 & 2 115 kV Lines	P7	DCTL	66	71	77	66	72	58	67	60	73	74	65	80	110	Sensitivity only
San Jose Sta 'A'-'B' 115 kV Line	EVRGRN 115kV Section 1D	P2	Bus	55	61	67	61	69	52	61	54	63	60	61	69	104	Sensitivity only
	MTCALF E 115kV - Section 1E & 2E	P2	Bus-Tie-Breaker	92	102	111	77	86	75	95	85	106	88	70	114	155	Continue to monitor future load forecast
	MTCALF E 115kV Section 1X	P2	Non-Bus-Tie Breaker	54	69	72	53	59	48	59	53	71	55	51	75	109	Sensitivity only
	MTCALF E 115kV Section 1Y	P2	Non-Bus-Tie Breaker	55	68	72	53	60	48	59	53	71	55	51	75	109	Sensitivity only
	MTCALF E 115kV Section 2E	P2	Bus	60	66	73	55	62	52	63	57	69	60	53	76	106	Sensitivity only
	NRS 400 115 kV bus tie breaker to NRS 300 115 kV bus	P2	Bus-Tie-Breaker	65	70	74	51	57	51	59	56	71	62	52	77	119	Sensitivity only
	DVR Gen Units (SVP) & SAN JOSE B-STONE-EVERGREEN 115kV	P3	G-1/N-1	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	103	Sensitivity only
	LOS ESTEROS 115kV BAAH BUS #2 (FAILURE OF NON-REDUNDENT RELAY)	P5	Non-Redundant Relay	68	75	81	47	54	57	68	63	77	66	47	83	107	Sensitivity only
	LOS ESTEROS 230 kV BAAH BUS #1 (FAILURE OF NON-REDUNDENT RELAY)	P5	Non-Redundant Relay	65	71	79	57	65	50	59	56	73	65	57	82	120	Sensitivity only
	LOS ESTEROS 230 kV BAAH BUS #2 (FAILURE OF NON-REDUNDENT RELAY)	P5	Non-Redundant Relay	71	77	86	66	73	55	65	61	80	69	66	89	129	Sensitivity only
	PALO ALTO SW. STA. 115kV DBDB BUS #1 (FAILURE OF NON-REDUNDENT RELAY)	P5	Non-Redundant Relay	68	75	81	47	54	57	68	64	78	67	47	83	112	Sensitivity only



Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading % (Baseline Scenarios)								Loading % (Sensitivity Scenarios)					ISO Approved Projects & Potential Mitigation Solutions
				2021 Summer Peak	2024 Summer Peak	2029 Summer Peak	2021 Spring Off-Peak	2024 Spring Off-Peak	2021 Winter Peak	2024 Winter Peak	2029 Winter Peak	2024 SP High CEC Forecast	2021 SP Heavy Renewable & Min Gas Gen	2024 SpOP Hi Renew & Min Gas Gen	2029 Retirement of QF Generation s	2029 Summer Peak High SVP Forecasted Load	
	NEWARK E-F BUS TIE 230kV & LOS ESTEROS-METCALF 230kV	P6	N-1-1	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	133	Sensitivity only
	Metcalf - Evergreen #1 and #2 115 kV Lines	P7	DCTL	83	90	98	68	76	69	83	75	93	81	65	101	138	Sensitivity only
	Newark - Los Esteros & Los Esteros - Metcalf 230 kV Lines	P7	DCTL	71	77	86	66	73	55	65	61	80	69	66	89	129	Sensitivity only
	Tesla - Newark No.2 and Metcalf - Los Esteros 230 kV lines	P7	DCTL	55	61	70	56	63	51	58	54	64	57	54	73	103	Sensitivity only
San Leandro - Oakland J #1 115kV Line	GRANT-EDES 115kV & MORAGA-OAKLAND J 115kV	P6	N-1-1	101	<100	<100	<100	<100	101	101	101	<100	<100	<100	<100	<100	Project: East Shore - Oakland J 115 kV Reconductoring Project In-service date: 4/21 Short term: Action plan
San Mateo-Belmont 115kV Line	RAVENSWD 230/115kV TB 1 & RAVENSWD 230/115kV TB 2	P6	N-1-1	<100	<100	100	<100	<100	<100	<100	<100	100	<100	<100	<100	107	Continue to monitor future load forecast
Saratoga-Vasona 230 kV Line	Metcalf-Monta Vista No. 3 & Monta Vista-Coyote Sw. Sta. 230 kV Line	P7	DCTL	84	88	92	74	82	78	85	76	91	79	76	94	104	Sensitivity only
Scott-Duane 115 kV Line	NRS 400 115 kV bus tie breaker to NRS 300 115 kV bus	P2	Bus-Tie-Breaker	66	77	82	32	44	55	67	72	78	64	43	83	141	Sensitivity only
Sobrante-El Cerrito STA G #2 115kV Line	SOBRANTE - 1D 115kV & SOBRANTE-G #1 line	P2	Non-Bus-Tie Breaker	<100	61	82	<100	54	<100	65	56	65	<100	51	103	82	Sensitivity only
	SOBRANTE - 1D 115kV & SOBRANTE-GRIZZLY-CLAREMONT #1 line	P2	Non-Bus-Tie Breaker	<100	61	82	<100	55	<100	65	56	65	<100	52	103	82	Sensitivity only
	SOBRANTE - 1D 115kV & SOBRANTE-NRTH TWR line	P2	Non-Bus-Tie Breaker	<100	61	82	<100	54	<100	65	56	65	<100	51	103	82	Sensitivity only
	SOBRANTE - 1D 115kV & SOBRANTE-R #1 line	P2	Non-Bus-Tie Breaker	<100	61	82	<100	55	<100	65	56	65	<100	52	103	82	Sensitivity only
	SOBRANTE - 1D 115kV & SOBRANTE-SAN PBLO-STD. OIL line	P2	Non-Bus-Tie Breaker	<100	61	82	<100	54	<100	65	56	65	<100	51	103	82	Sensitivity only
	SOBRANTE 115kV - Section 1D & 2D	P2	Bus-Tie-Breaker	97	65	87	63	56	65	69	60	69	88	53	108	86	Sensitivity only
Sobrante-Grizzly-Claremont #2 115kV Line (Hillside-Grizzly JCT)	MORAGA 230kV - Section 2D & 1D	P2	Bus-Tie-Breaker	84	94	109	51	56	59	66	76	65	62	55	109	109	Continue to monitor future load forecast
Trimble-San Jose 'B' 115 kV Line	NRS 400 115 kV bus tie breaker to NRS 300 115 kV bus	P2	Bus-Tie-Breaker	81	80	86	25	20	52	55	66	81	68	29	85	109	Sensitivity only
Whisman-Monta Vista 115 kV Line	MNTA VSA 115kV - Middle Breaker Bay 4	P2	Non-Bus-Tie Breaker	<100	81	92	<100	<100	<100	84	71	83	<100	98	95	117	Sensitivity only

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)					ISO Approved Projects & Potential Mitigation Solutions
				2021 Summer Peak	2024 Summer Peak	2029 Summer Peak	2021 Spring Off-Peak	2024 Spring Off-Peak	2021 Winter Peak	2024 Winter Peak	2029 Winter Peak	2024 SP High CEC Forecast	2021 SP Heavy Renewable & Min Gas Gen	2024 SpOP Hi Renew & Min Gas Gen	2029 Retirement of QF Generations	2029 Summer Peak High SVP Forecasted Load	
A100US 115 kV	Base Case	P0	Base Case	1.04	1.05	1.04	1.06	1.07	1.05	1.05	1.04	1.04	1.05	1.07	1.05	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	1.07	1.07	1.05	1.05	1.03	1.05	1.05	1.07	1.00	1.02	Load power factor correction and voltage support if needed
ALMADEN 60 kV	Base Case	P0	Base Case	1.00	1.00	0.95	1.14	1.12	1.05	1.03	0.99	1.00	1.02	1.14	0.95	0.93	Load power factor correction and voltage support if needed
ALTAMONT 60 kV	Base Case	P0	Base Case	1.03	1.03	1.03	1.06	1.05	1.04	1.04	1.04	1.03	1.03	1.06	1.04	1.03	Load power factor correction and voltage support if needed
AMES BS1 115 kV	Base Case	P0	Base Case	1.03	1.03	1.02	1.06	1.06	1.04	1.04	1.02	1.03	1.04	1.06	1.02	1.01	Load power factor correction and voltage support if needed
AMES BS2 115 kV	Base Case	P0	Base Case	1.03	1.03	1.02	1.06	1.06	1.04	1.04	1.02	1.03	1.04	1.06	1.02	1.01	Load power factor correction and voltage support if needed
AMES DST 115 kV	Base Case	P0	Base Case	1.03	1.03	1.02	1.06	1.06	1.04	1.04	1.02	1.03	1.04	1.06	1.02	1.01	Load power factor correction and voltage support if needed
BAIR 60 kV	Base Case	P0	Base Case	1.03	1.03	1.02	1.06	1.07	1.04	1.04	1.01	1.03	1.04	1.07	1.02	1.02	Load power factor correction and voltage support if needed
BAIR 115 kV	Base Case	P0	Base Case	1.03	1.03	1.02	1.07	1.08	1.03	1.04	1.02	1.03	1.04	1.09	1.02	1.02	Load power factor correction and voltage support if needed
BARTLP 115 kV	Base Case	P0	Base Case	1.02	1.03	1.00	1.09	1.09	1.06	1.06	1.02	1.03	1.03	1.10	1.00	0.99	Load power factor correction and voltage support if needed
BARTRC 115 kV	Base Case	P0	Base Case	1.03	1.03	1.01	1.07	1.07	1.04	1.04	1.02	1.03	1.04	1.08	1.01	0.99	Load power factor correction and voltage support if needed
BAY MDWS 115 kV	Base Case	P0	Base Case	1.02	1.03	1.01	1.09	1.10	1.04	1.05	1.02	1.03	1.04	1.11	1.02	1.02	Load power factor correction and voltage support if needed
BAYSHOR1 115 kV	Base Case	P0	Base Case	1.03	1.05	1.02	1.11	1.13	1.05	1.07	1.03	1.04	1.05	1.14	1.03	1.05	Load power factor correction and voltage support if needed
BAYSHOR2 115 kV	Base Case	P0	Base Case	1.03	1.05	1.02	1.11	1.13	1.05	1.07	1.03	1.04	1.04	1.14	1.03	1.05	Load power factor correction and voltage support if needed
BELMONT 115 kV	Base Case	P0	Base Case	1.02	1.03	1.01	1.08	1.09	1.03	1.04	1.02	1.03	1.04	1.09	1.02	1.02	Load power factor correction and voltage support if needed
BERESFRD 60 kV	Base Case	P0	Base Case	1.03	1.04	1.02	1.09	1.11	1.04	1.05	1.02	1.04	1.04	1.11	1.02	1.03	Load power factor correction and voltage support if needed
BIXLER 60 kV	Base Case	P0	Base Case	1.02	1.02	1.02	1.06	1.06	1.04	1.04	1.04	1.02	1.02	1.06	1.02	1.01	Load power factor correction and voltage support if needed
BOLLMAN 115 kV	Base Case	P0	Base Case	1.05	1.05	1.03	1.08	1.08	1.05	1.05	1.04	1.05	1.05	1.08	1.01	1.02	Load power factor correction and voltage support if needed
BURLNGME 115 kV	Base Case	P0	Base Case	1.03	1.04	1.02	1.09	1.11	1.04	1.05	1.02	1.04	1.04	1.11	1.02	1.03	Load power factor correction and voltage support if needed
CAL MEC 230 kV	Base Case	P0	Base Case	1.03	1.03	1.01	1.07	1.07	1.04	1.03	1.02	1.02	1.03	1.07	1.01	1.00	Load power factor correction and voltage support if needed
CAL_TAP3 115 kV	Base Case	P0	Base Case	1.03	1.03	1.02	1.06	1.06	1.04	1.03	1.02	1.03	1.04	1.06	1.02	1.00	Load power factor correction and voltage support if needed
CAL_TAP4 115 kV	Base Case	P0	Base Case	1.03	1.03	1.02	1.06	1.06	1.04	1.03	1.02	1.03	1.04	1.06	1.02	1.00	Load power factor correction and voltage support if needed
CALEVRAS 115 kV	Base Case	P0	Base Case	1.03	1.03	1.02	1.06	1.06	1.04	1.03	1.02	1.03	1.04	1.06	1.02	1.00	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)					ISO Approved Projects & Potential Mitigation Solutions
				2021 Summer Peak	2024 Summer Peak	2029 Summer Peak	2021 Spring Off-Peak	2024 Spring Off-Peak	2021 Winter Peak	2024 Winter Peak	2029 Winter Peak	2024 SP High CEC Forecast	2021 SP Heavy Renewable & Min Gas Gen	2024 SpOP Hi Renew & Min Gas Gen	2029 Retirement of QF Generations	2029 Summer Peak High SVP Forecasted Load	
CALMAT60 60 kV	Base Case	P0	Base Case	1.04	1.05	1.00	1.08	1.08	1.05	1.05	1.01	1.05	1.05	1.09	0.99	0.98	Load power factor correction and voltage support if needed
CALTRAINSSF 115 kV	Base Case	P0	Base Case	1.02	1.03	1.01	1.09	1.11	1.03	1.05	1.02	1.03	1.03	1.12	1.02	1.03	Load power factor correction and voltage support if needed
CALTRAINSSJ 115 kV	Base Case	P0	Base Case	1.01	1.01	0.99	1.07	1.07	1.04	1.03	1.01	1.01	1.02	1.08	0.99	0.96	Load power factor correction and voltage support if needed
CAROLD1 60 kV	Base Case	P0	Base Case	1.04	1.04	1.02	1.09	1.12	1.04	1.05	1.03	1.04	1.04	1.13	1.02	1.02	Load power factor correction and voltage support if needed
CAROLD2 60 kV	Base Case	P0	Base Case	1.04	1.05	1.02	1.10	1.14	1.05	1.06	1.03	1.05	1.05	1.15	1.02	1.02	Load power factor correction and voltage support if needed
CAROLNDS 60 kV	Base Case	P0	Base Case	1.03	1.04	1.02	1.09	1.12	1.04	1.05	1.03	1.04	1.04	1.13	1.02	1.02	Load power factor correction and voltage support if needed
CASTROVL 230 kV	Base Case	P0	Base Case	1.01	1.01	0.99	1.06	1.06	1.02	1.02	1.00	1.01	1.01	1.06	0.98	0.97	Load power factor correction and voltage support if needed
CHRISTIE 115 kV	Base Case	P0	Base Case	1.04	1.04	1.01	1.06	1.06	1.04	1.04	1.02	1.04	1.04	1.06	1.00	1.01	Load power factor correction and voltage support if needed
CHSR04A 115 kV	Base Case	P0	Base Case	0.00	1.04	1.02	0.00	1.07	0.00	1.04	1.03	1.04	0.00	1.10	1.02	1.01	Load power factor correction and voltage support if needed
CHSR04B 115 kV	Base Case	P0	Base Case	0.00	1.04	1.02	0.00	1.07	0.00	1.04	1.03	1.04	0.00	1.10	1.02	1.01	Load power factor correction and voltage support if needed
CHSR04SWSTA 115 kV	Base Case	P0	Base Case	0.00	1.04	1.02	0.00	1.08	0.00	1.04	1.03	1.04	0.00	1.10	1.02	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	1.09	1.09	1.06	1.07	1.04	1.06	1.05	1.10	1.02	1.02	Load power factor correction and voltage support if needed
CLMBIAHS 115 kV	Base Case	P0	Base Case	1.06	1.06	1.03	1.09	1.09	1.06	1.06	1.05	1.06	1.05	1.10	1.03	1.03	Load power factor correction and voltage support if needed
CLMBIAPV 115 kV	Base Case	P0	Base Case	1.06	1.06	1.03	1.09	1.09	1.06	1.06	1.05	1.06	1.05	1.10	1.03	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	1.08	1.09	1.04	1.05	1.03	1.04	1.05	1.10	1.03	1.02	Load power factor correction and voltage support if needed
CON25 115 kV	Base Case	P0	Base Case	1.05	1.05	1.01	1.06	1.06	1.04	1.04	1.02	1.05	1.05	1.06	1.00	1.01	Load power factor correction and voltage support if needed
CRYOGEN 115 kV	Base Case	P0	Base Case	1.04	1.04	1.00	1.07	1.06	1.04	1.03	1.01	1.04	1.05	1.07	1.00	0.98	Load power factor correction and voltage support if needed
CRYSTLSG 60 kV	Base Case	P0	Base Case	1.04	1.05	1.02	1.10	1.14	1.05	1.06	1.03	1.05	1.05	1.15	1.02	1.02	Load power factor correction and voltage support if needed
CV BART 230 kV	Base Case	P0	Base Case	1.01	1.01	0.99	1.06	1.06	1.02	1.02	1.00	1.01	1.01	1.06	0.98	0.97	Load power factor correction and voltage support if needed
CYTE PMP 115 kV	Base Case	P0	Base Case	1.06	1.06	1.04	1.11	1.10	1.07	1.06	1.05	1.05	1.06	1.11	1.04	1.02	Load power factor correction and voltage support if needed
DALY CTY 115 kV	Base Case	P0	Base Case	1.03	1.04	1.02	1.11	1.13	1.04	1.06	1.02	1.04	1.04	1.14	1.03	1.04	Load power factor correction and voltage support if needed
DIXON LD 115 kV	Base Case	P0	Base Case	1.03	1.03	1.01	1.08	1.07	1.05	1.04	1.02	1.03	1.03	1.08	1.01	0.99	Load power factor correction and voltage support if needed
DLY CTYP 115 kV	Base Case	P0	Base Case	1.03	1.04	1.02	1.11	1.13	1.05	1.06	1.03	1.04	1.04	1.14	1.03	1.04	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)					ISO Approved Projects & Potential Mitigation Solutions
				2021 Summer Peak	2024 Summer Peak	2029 Summer Peak	2021 Spring Off-Peak	2024 Spring Off-Peak	2021 Winter Peak	2024 Winter Peak	2029 Winter Peak	2024 SP High CEC Forecast	2021 SP Heavy Renewable & Min Gas Gen	2024 SpOP Hi Renew & Min Gas Gen	2029 Retirement of QF Generations	2029 Summer Peak High SVP Forecasted Load	
DUMBARTN 115 kV	Base Case	P0	Base Case	1.04	1.04	1.03	1.06	1.07	1.04	1.04	1.03	1.04	1.04	1.07	1.03	1.02	Load power factor correction and voltage support if needed
DYERWND 60 kV	Base Case	P0	Base Case	1.03	1.03	1.03	1.06	1.05	1.04	1.04	1.04	1.03	1.04	1.06	1.04	1.03	Load power factor correction and voltage support if needed
E DUBLIN 60 kV	Base Case	P0	Base Case	1.04	1.04	1.00	1.08	1.08	1.05	1.05	1.01	1.04	1.04	1.09	0.99	0.99	Load power factor correction and voltage support if needed
E. SHORE 230 kV	Base Case	P0	Base Case	1.03	1.03	1.01	1.07	1.08	1.03	1.04	1.01	1.03	1.03	1.08	1.01	1.00	Load power factor correction and voltage support if needed
EASTSHRE 115 kV	Base Case	P0	Base Case	1.04	1.05	1.04	1.05	1.07	1.05	1.05	1.04	1.05	1.05	1.07	1.05	1.04	Load power factor correction and voltage support if needed
EBMUDGRY 115 kV	Base Case	P0	Base Case	1.06	1.06	1.01	1.09	1.09	1.06	1.06	1.03	1.06	1.06	1.09	1.01	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	1.10	1.10	1.07	1.06	1.04	1.05	1.06	1.11	1.03	1.02	Load power factor correction and voltage support if needed
EDES 115 kV	Base Case	P0	Base Case	1.05	1.05	1.02	1.05	1.06	1.05	1.05	1.03	1.05	1.05	1.06	1.03	1.02	Load power factor correction and voltage support if needed
EDS GRNT 115 kV	Base Case	P0	Base Case	1.05	1.05	1.02	1.05	1.06	1.05	1.05	1.03	1.05	1.05	1.06	1.03	1.02	Load power factor correction and voltage support if needed
EGBERT 230 kV	Base Case	P0	Base Case	0.00	1.04	1.01	0.00	1.12	0.00	1.05	1.02	1.04	0.00	1.13	1.02	1.03	Load power factor correction and voltage support if needed
EL CRRTO 115 kV	Base Case	P0	Base Case	1.04	1.04	1.01	1.06	1.05	1.04	1.04	1.02	1.04	1.04	1.06	1.00	1.01	Load power factor correction and voltage support if needed
EL PATIO 115 kV	Base Case	P0	Base Case	1.02	1.02	1.00	1.09	1.08	1.05	1.04	1.02	1.02	1.03	1.09	1.00	0.97	Load power factor correction and voltage support if needed
EMBRCDRD 230 kV	Base Case	P0	Base Case	1.02	1.04	1.01	1.09	1.12	1.03	1.05	1.02	1.03	1.03	1.13	1.02	1.03	Load power factor correction and voltage support if needed
EMRLD LE 60 kV	Base Case	P0	Base Case	1.05	1.05	1.02	1.10	1.14	1.05	1.06	1.03	1.05	1.06	1.15	1.02	1.02	Load power factor correction and voltage support if needed
EST GRND 115 kV	Base Case	P0	Base Case	1.02	1.03	1.01	1.09	1.11	1.03	1.05	1.02	1.03	1.03	1.12	1.02	1.03	Load power factor correction and voltage support if needed
EVERGREN 60 kV	Base Case	P0	Base Case	1.02	1.02	0.98	1.12	1.11	1.06	1.04	1.01	1.01	1.03	1.12	0.98	0.96	Load power factor correction and voltage support if needed
EVRGRN 1 115 kV	Base Case	P0	Base Case	1.02	1.02	1.00	1.09	1.09	1.06	1.04	1.02	1.02	1.03	1.10	1.00	0.97	Load power factor correction and voltage support if needed
FMC 115 kV	Base Case	P0	Base Case	1.01	1.01	0.99	1.07	1.07	1.04	1.03	1.01	1.01	1.02	1.08	0.99	0.96	Load power factor correction and voltage support if needed
FOREBAYWIND 60 kV	Base Case	P0	Base Case	1.04	1.05	1.01	1.09	1.09	1.05	1.05	1.02	1.04	1.05	1.09	1.00	0.99	Load power factor correction and voltage support if needed
FREMNT 115 kV	Base Case	P0	Base Case	1.03	1.03	1.01	1.07	1.07	1.04	1.04	1.02	1.03	1.04	1.07	1.01	0.99	Load power factor correction and voltage support if needed
FRICKWND 60 kV	Base Case	P0	Base Case	1.04	1.05	1.01	1.09	1.09	1.05	1.05	1.02	1.04	1.05	1.09	1.00	0.99	Load power factor correction and voltage support if needed
GILROY 115 kV	Base Case	P0	Base Case	1.04	1.04	1.02	1.07	1.07	1.05	1.04	1.03	1.04	1.04	1.10	1.02	1.02	Load power factor correction and voltage support if needed
GILROY F 115 kV	Base Case	P0	Base Case	1.04	1.04	1.02	1.07	1.07	1.05	1.04	1.03	1.04	1.04	1.10	1.02	1.02	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)					ISO Approved Projects & Potential Mitigation Solutions
				2021 Summer Peak	2024 Summer Peak	2029 Summer Peak	2021 Spring Off-Peak	2024 Spring Off-Peak	2021 Winter Peak	2024 Winter Peak	2029 Winter Peak	2024 SP High CEC Forecast	2021 SP Heavy Renewable & Min Gas Gen	2024 SpOP Hi Renew & Min Gas Gen	2029 Retirement of QF Generations	2029 Summer Peak High SVP Forecasted Load	
GILROYPK 115 kV	Base Case	P0	Base Case	1.04	1.04	1.02	1.07	1.07	1.05	1.04	1.03	1.04	1.04	1.10	1.02	1.02	Load power factor correction and voltage support if needed
GILROYTP 115 kV	Base Case	P0	Base Case	1.04	1.04	1.02	1.07	1.07	1.05	1.04	1.03	1.04	1.04	1.10	1.02	1.02	Load power factor correction and voltage support if needed
GRANT 115 kV	Base Case	P0	Base Case	1.05	1.05	1.03	1.05	1.06	1.05	1.05	1.03	1.05	1.05	1.07	1.04	1.03	Load power factor correction and voltage support if needed
HICKS 230 kV	Base Case	P0	Base Case	1.03	1.04	1.01	1.09	1.09	1.04	1.04	1.02	1.03	1.04	1.10	1.01	0.99	Load power factor correction and voltage support if needed
HILDAL47 60 kV	Base Case	P0	Base Case	1.04	1.05	1.02	1.10	1.14	1.05	1.06	1.03	1.05	1.05	1.15	1.02	1.02	Load power factor correction and voltage support if needed
HILDAL49 60 kV	Base Case	P0	Base Case	1.04	1.05	1.02	1.09	1.12	1.05	1.06	1.03	1.04	1.05	1.13	1.03	1.02	Load power factor correction and voltage support if needed
HILLSDLE 60 kV	Base Case	P0	Base Case	1.03	1.04	1.02	1.09	1.11	1.04	1.05	1.03	1.04	1.04	1.12	1.02	1.02	Load power factor correction and voltage support if needed
HLF MNBY 60 kV	Base Case	P0	Base Case	1.04	1.05	1.03	1.09	1.12	1.04	1.06	1.03	1.04	1.04	1.13	1.03	1.03	Load power factor correction and voltage support if needed
HLLSDLJT 60 kV	Base Case	P0	Base Case	1.04	1.05	1.02	1.09	1.12	1.05	1.06	1.03	1.04	1.05	1.13	1.03	1.02	Load power factor correction and voltage support if needed
HNTRS PT 115 kV	Base Case	P0	Base Case	1.03	1.04	1.02	1.11	1.13	1.05	1.07	1.03	1.04	1.04	1.14	1.03	1.04	Load power factor correction and voltage support if needed
IBM-BALY 115 kV	Base Case	P0	Base Case	1.05	1.05	1.04	1.11	1.10	1.07	1.06	1.05	1.05	1.06	1.11	1.03	1.02	Load power factor correction and voltage support if needed
IBM-CTLE 115 kV	Base Case	P0	Base Case	1.05	1.05	1.03	1.10	1.10	1.07	1.06	1.04	1.05	1.06	1.11	1.03	1.02	Load power factor correction and voltage support if needed
IBM-HR J 115 kV	Base Case	P0	Base Case	1.05	1.05	1.03	1.10	1.10	1.07	1.06	1.04	1.04	1.05	1.11	1.03	1.01	Load power factor correction and voltage support if needed
IBM-HRRS 115 kV	Base Case	P0	Base Case	1.05	1.05	1.03	1.10	1.10	1.07	1.06	1.04	1.05	1.06	1.11	1.03	1.02	Load power factor correction and voltage support if needed
IMHOFF 115 kV	Base Case	P0	Base Case	1.05	1.05	1.03	1.07	1.07	1.05	1.05	1.04	1.05	1.05	1.08	1.01	1.02	Load power factor correction and voltage support if needed
IUKA 60 kV	Base Case	P0	Base Case	1.04	1.04	1.00	1.08	1.08	1.05	1.05	1.01	1.04	1.05	1.08	0.99	0.98	Load power factor correction and voltage support if needed
JARVIS 115 kV	Base Case	P0	Base Case	1.04	1.04	1.00	1.07	1.06	1.04	1.03	1.01	1.04	1.05	1.07	1.00	0.98	Load power factor correction and voltage support if needed
JEFFERSN 230 kV	Base Case	P0	Base Case	1.04	1.05	1.02	1.11	1.13	1.05	1.06	1.03	1.04	1.05	1.13	1.02	1.01	Load power factor correction and voltage support if needed
JEFRSN_D 60 kV	Base Case	P0	Base Case	1.05	1.06	1.02	1.10	1.14	1.06	1.06	1.04	1.05	1.06	1.15	1.02	1.02	Load power factor correction and voltage support if needed
JEFRSN_E 60 kV	Base Case	P0	Base Case	1.05	1.06	1.02	1.10	1.14	1.06	1.06	1.04	1.05	1.06	1.15	1.02	1.02	Load power factor correction and voltage support if needed
JENING J 60 kV	Base Case	P0	Base Case	1.02	1.02	0.98	1.12	1.11	1.06	1.04	1.01	1.01	1.03	1.12	0.98	0.95	Load power factor correction and voltage support if needed
JMDAMCX1 230 kV	Base Case	P0	Base Case	1.04	1.05	1.02	1.11	1.13	1.05	1.06	1.03	1.05	1.05	1.14	1.02	1.02	Load power factor correction and voltage support if needed
JMDAMCX2 230 kV	Base Case	P0	Base Case	1.04	1.05	1.02	1.11	1.13	1.05	1.06	1.03	1.05	1.05	1.14	1.02	1.02	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)					ISO Approved Projects & Potential Mitigation Solutions
				2021 Summer Peak	2024 Summer Peak	2029 Summer Peak	2021 Spring Off-Peak	2024 Spring Off-Peak	2021 Winter Peak	2024 Winter Peak	2029 Winter Peak	2024 SP High CEC Forecast	2021 SP Heavy Renewable & Min Gas Gen	2024 SpOP Hi Renew & Min Gas Gen	2029 Retirement of QF Generations	2029 Summer Peak High SVP Forecasted Load	
JV BART 115 kV	Base Case	P0	Base Case	1.04	1.04	1.00	1.07	1.06	1.04	1.03	1.01	1.04	1.05	1.07	1.00	0.98	Load power factor correction and voltage support if needed
KIRKER 115 kV	Base Case	P0	Base Case	1.06	1.06	1.03	1.10	1.09	1.06	1.06	1.05	1.06	1.05	1.10	1.03	1.03	Load power factor correction and voltage support if needed
LAKEWD-C 115 kV	Base Case	P0	Base Case	1.06	1.06	1.01	1.09	1.09	1.06	1.06	1.03	1.06	1.05	1.09	1.01	1.01	Load power factor correction and voltage support if needed
LAKEWD-M 115 kV	Base Case	P0	Base Case	1.06	1.06	1.01	1.09	1.09	1.06	1.06	1.03	1.06	1.05	1.09	1.01	1.01	Load power factor correction and voltage support if needed
LARKIN D 115 kV	Base Case	P0	Base Case	1.03	1.04	1.02	1.11	1.13	1.05	1.07	1.03	1.04	1.04	1.14	1.03	1.04	Load power factor correction and voltage support if needed
LARKIN E 115 kV	Base Case	P0	Base Case	1.03	1.04	1.02	1.11	1.13	1.05	1.07	1.03	1.04	1.04	1.14	1.03	1.04	Load power factor correction and voltage support if needed
LARKIN F 115 kV	Base Case	P0	Base Case	1.03	1.04	1.02	1.11	1.13	1.05	1.07	1.03	1.04	1.04	1.14	1.03	1.04	Load power factor correction and voltage support if needed
LAS PLGS 60 kV	Base Case	P0	Base Case	1.04	1.05	1.01	1.10	1.14	1.05	1.06	1.02	1.04	1.05	1.15	1.01	1.01	Load power factor correction and voltage support if needed
LIVERMRE 60 kV	Base Case	P0	Base Case	1.05	1.05	1.00	1.09	1.09	1.05	1.05	1.01	1.05	1.05	1.09	1.00	0.99	Load power factor correction and voltage support if needed
LK_REACT 115 kV	Base Case	P0	Base Case	1.04	1.04	1.02	1.05	1.06	1.05	1.05	1.04	1.04	1.04	1.06	1.02	1.02	Load power factor correction and voltage support if needed
LLAGAS 115 kV	Base Case	P0	Base Case	1.04	1.04	1.02	1.08	1.07	1.05	1.04	1.03	1.04	1.04	1.10	1.02	1.01	Load power factor correction and voltage support if needed
LMEC 115 kV	Base Case	P0	Base Case	1.06	1.06	1.04	1.09	1.09	1.06	1.06	1.05	1.06	1.05	1.10	1.03	1.03	Load power factor correction and voltage support if needed
LONESTAR 115 kV	Base Case	P0	Base Case	1.02	1.03	1.02	1.07	1.08	1.03	1.04	1.02	1.03	1.04	1.08	1.02	1.02	Load power factor correction and voltage support if needed
LOS ALTS 60 kV	Base Case	P0	Base Case	1.04	1.04	1.03	1.07	1.06	1.04	1.05	1.02	1.04	1.04	1.07	1.03	1.03	Load power factor correction and voltage support if needed
LOYOLA 60 kV	Base Case	P0	Base Case	1.04	1.04	1.04	1.07	1.05	1.04	1.04	1.03	1.04	1.04	1.06	1.04	1.04	Load power factor correction and voltage support if needed
LPOSTAS 60 kV	Base Case	P0	Base Case	1.04	1.05	1.01	1.09	1.09	1.05	1.05	1.02	1.04	1.05	1.09	1.00	1.00	Load power factor correction and voltage support if needed
LS PSTAS 230 kV	Base Case	P0	Base Case	1.01	1.01	0.99	1.06	1.06	1.03	1.02	1.01	1.01	1.01	1.06	0.99	0.98	Load power factor correction and voltage support if needed
MABURY 60 kV	Base Case	P0	Base Case	1.01	1.01	0.98	1.12	1.11	1.06	1.04	1.00	1.01	1.02	1.12	0.98	0.95	Load power factor correction and voltage support if needed
MABURY 115 kV	Base Case	P0	Base Case	1.02	1.03	1.00	1.09	1.09	1.06	1.06	1.02	1.03	1.03	1.10	1.00	0.99	Load power factor correction and voltage support if needed
MARKHAM 115 kV	Base Case	P0	Base Case	1.02	1.02	0.99	1.08	1.08	1.05	1.03	1.01	1.01	1.02	1.09	0.99	0.97	Load power factor correction and voltage support if needed
MARTIN C 115 kV	Base Case	P0	Base Case	1.03	1.04	1.02	1.11	1.13	1.05	1.06	1.03	1.04	1.04	1.14	1.03	1.04	Load power factor correction and voltage support if needed
MARTIN C 230 kV	Base Case	P0	Base Case	1.02	1.04	1.01	1.09	1.12	1.03	1.05	1.02	1.04	1.03	1.13	1.02	1.03	Load power factor correction and voltage support if needed
MARTN S4 230 kV	Base Case	P0	Base Case	0.00	1.04	1.01	0.00	1.12	0.00	1.05	1.02	1.04	0.00	1.13	1.02	1.03	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)					ISO Approved Projects & Potential Mitigation Solutions
				2021 Summer Peak	2024 Summer Peak	2029 Summer Peak	2021 Spring Off-Peak	2024 Spring Off-Peak	2021 Winter Peak	2024 Winter Peak	2029 Winter Peak	2024 SP High CEC Forecast	2021 SP Heavy Renewable & Min Gas Gen	2024 SpOP Hi Renew & Min Gas Gen	2029 Retirement of QF Generations	2029 Summer Peak High SVP Forecasted Load	
MARTN S5 230 kV	Base Case	P0	Base Case	0.00	1.04	1.01	0.00	1.12	0.00	1.05	1.02	1.04	0.00	1.13	1.02	1.03	Load power factor correction and voltage support if needed
MARTNZ D 115 kV	Base Case	P0	Base Case	1.05	1.05	1.02	1.07	1.07	1.05	1.05	1.03	1.05	1.05	1.07	1.00	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	1.07	1.07	1.05	1.05	1.03	1.05	1.05	1.07	1.00	1.02	Load power factor correction and voltage support if needed
MCKEE 115 kV	Base Case	P0	Base Case	1.03	1.03	1.01	1.10	1.09	1.06	1.05	1.02	1.03	1.04	1.10	1.01	0.99	Load power factor correction and voltage support if needed
MEDW LNE 115 kV	Base Case	P0	Base Case	1.06	1.06	1.01	1.09	1.09	1.06	1.07	1.03	1.06	1.06	1.10	1.01	1.01	Load power factor correction and voltage support if needed
METCALF 230 kV	Base Case	P0	Base Case	1.02	1.03	1.01	1.07	1.07	1.03	1.03	1.02	1.02	1.03	1.07	1.01	1.00	Load power factor correction and voltage support if needed
MILLBRAE 60 kV	Base Case	P0	Base Case	1.01	1.06	1.01	1.12	1.14	1.06	1.08	1.00	1.04	1.06	1.15	1.02	1.03	Load power factor correction and voltage support if needed
MILLBRAE 115 kV	Base Case	P0	Base Case	1.02	1.04	1.02	1.10	1.12	1.04	1.06	1.02	1.03	1.04	1.12	1.02	1.03	Load power factor correction and voltage support if needed
MILPITAS 115 kV	Base Case	P0	Base Case	1.03	1.03	1.01	1.07	1.07	1.05	1.04	1.02	1.03	1.04	1.08	1.01	0.99	Load power factor correction and voltage support if needed
MISSION 115 kV	Base Case	P0	Base Case	1.03	1.04	1.02	1.11	1.13	1.05	1.07	1.03	1.04	1.04	1.14	1.03	1.04	Load power factor correction and voltage support if needed
MLLBRETP 60 kV	Base Case	P0	Base Case	1.00	1.07	1.00	1.13	1.15	1.07	1.09	1.00	1.04	1.07	1.16	1.02	1.03	Load power factor correction and voltage support if needed
MLLBTP97 60 kV	Base Case	P0	Base Case	1.04	1.04	1.02	1.09	1.12	1.04	1.05	1.03	1.04	1.04	1.13	1.02	1.02	Load power factor correction and voltage support if needed
MNTA VSA 60 kV	Base Case	P0	Base Case	1.05	1.05	1.06	1.06	1.05	1.05	1.05	1.04	1.05	1.05	1.05	1.06	1.05	Load power factor correction and voltage support if needed
MONTAVIS 230 kV	Base Case	P0	Base Case	1.04	1.05	1.01	1.11	1.11	1.06	1.06	1.03	1.04	1.05	1.12	1.01	1.00	Load power factor correction and voltage support if needed
MORAGA 230 kV	Base Case	P0	Base Case	1.00	1.01	0.98	1.07	1.06	1.02	1.02	1.00	1.01	1.01	1.06	0.97	0.97	Load power factor correction and voltage support if needed
MRGN HIL 115 kV	Base Case	P0	Base Case	1.04	1.04	1.02	1.09	1.08	1.06	1.05	1.03	1.04	1.05	1.10	1.02	1.01	Load power factor correction and voltage support if needed
MRT RCT2 230 kV	Base Case	P0	Base Case	0.00	1.04	1.01	0.00	1.12	0.00	1.05	1.02	1.04	0.00	1.13	1.02	1.03	Load power factor correction and voltage support if needed
MRT RCTR 230 kV	Base Case	P0	Base Case	1.03	0.00	0.00	1.10	0.00	1.04	0.00	0.00	0.00	1.04	0.00	0.00	0.00	Load power factor correction and voltage support if needed
MT EDEN 115 kV	Base Case	P0	Base Case	1.04	1.05	1.04	1.05	1.07	1.05	1.05	1.04	1.04	1.05	1.07	1.04	1.04	Load power factor correction and voltage support if needed
MTCALF D 115 kV	Base Case	P0	Base Case	1.05	1.06	1.04	1.11	1.10	1.07	1.06	1.05	1.05	1.06	1.11	1.04	1.02	Load power factor correction and voltage support if needed
MTCALF E 115 kV	Base Case	P0	Base Case	1.05	1.06	1.04	1.11	1.10	1.07	1.06	1.05	1.05	1.06	1.11	1.04	1.02	Load power factor correction and voltage support if needed
NASA A 115 kV	Base Case	P0	Base Case	1.03	1.03	1.02	1.06	1.06	1.04	1.04	1.02	1.03	1.04	1.06	1.02	1.01	Load power factor correction and voltage support if needed
NASA B 115 kV	Base Case	P0	Base Case	1.03	1.03	1.02	1.06	1.06	1.04	1.04	1.02	1.03	1.04	1.06	1.02	1.01	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)					ISO Approved Projects & Potential Mitigation Solutions
				2021 Summer Peak	2024 Summer Peak	2029 Summer Peak	2021 Spring Off-Peak	2024 Spring Off-Peak	2021 Winter Peak	2024 Winter Peak	2029 Winter Peak	2024 SP High CEC Forecast	2021 SP Heavy Renewable & Min Gas Gen	2024 SpOP Hi Renew & Min Gas Gen	2029 Retirement of QF Generations	2029 Summer Peak High SVP Forecasted Load	
NEWARK 60 kV	Base Case	P0	Base Case	1.03	1.03	1.00	1.07	1.07	1.04	1.04	1.02	1.03	1.04	1.08	1.00	0.99	Load power factor correction and voltage support if needed
NEWARK D 115 kV	Base Case	P0	Base Case	1.03	1.03	1.02	1.07	1.06	1.04	1.04	1.02	1.03	1.04	1.07	1.02	1.00	Load power factor correction and voltage support if needed
NEWARK E 115 kV	Base Case	P0	Base Case	1.03	1.03	1.01	1.07	1.07	1.04	1.04	1.02	1.03	1.04	1.07	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	1.01	1.07	1.07	1.04	1.04	1.02	1.03	1.04	1.07	1.01	1.00	Load power factor correction and voltage support if needed
NUMMI 115 kV	Base Case	P0	Base Case	1.02	1.03	1.01	1.06	1.06	1.04	1.03	1.02	1.03	1.03	1.06	1.01	0.99	Load power factor correction and voltage support if needed
NWRK 2 M 115 kV	Base Case	P0	Base Case	1.03	1.03	1.01	1.07	1.07	1.04	1.04	1.02	1.03	1.04	1.07	1.01	0.99	Load power factor correction and voltage support if needed
OLEUM 115 kV	Base Case	P0	Base Case	1.05	1.05	1.01	1.06	1.06	1.04	1.04	1.02	1.05	1.05	1.06	1.00	1.01	Load power factor correction and voltage support if needed
ORACLE60 60 kV	Base Case	P0	Base Case	1.02	1.03	1.01	1.07	1.08	1.03	1.04	1.01	1.03	1.04	1.08	1.02	1.02	Load power factor correction and voltage support if needed
OX_MTN60 60 kV	Base Case	P0	Base Case	1.04	1.05	1.03	1.09	1.12	1.05	1.06	1.04	1.05	1.04	1.13	1.03	1.03	Load power factor correction and voltage support if needed
PARKS 60 kV	Base Case	P0	Base Case	1.04	1.04	1.00	1.08	1.08	1.05	1.05	1.01	1.04	1.04	1.09	0.99	0.99	Load power factor correction and voltage support if needed
PIERCY 115 kV	Base Case	P0	Base Case	1.04	1.05	1.02	1.10	1.10	1.07	1.06	1.04	1.04	1.05	1.11	1.02	1.01	Load power factor correction and voltage support if needed
PITSBURG 115 kV	Base Case	P0	Base Case	1.06	1.06	1.03	1.09	1.09	1.06	1.06	1.05	1.06	1.05	1.10	1.03	1.03	Load power factor correction and voltage support if needed
POT_SVC 115 kV	Base Case	P0	Base Case	1.03	1.05	1.02	1.11	1.14	1.05	1.07	1.03	1.04	1.05	1.14	1.03	1.05	Load power factor correction and voltage support if needed
POTRERO 115 kV	Base Case	P0	Base Case	1.03	1.05	1.02	1.11	1.14	1.05	1.07	1.03	1.04	1.05	1.14	1.03	1.05	Load power factor correction and voltage support if needed
POTRERO 230 kV	Base Case	P0	Base Case	1.02	1.04	1.01	1.09	1.12	1.02	1.05	1.02	1.03	1.03	1.12	1.02	1.03	Load power factor correction and voltage support if needed
PP STEEL 115 kV	Base Case	P0	Base Case	1.05	1.05	1.00	1.05	1.04	1.03	1.03	1.01	1.05	1.05	1.04	0.98	1.00	Load power factor correction and voltage support if needed
PRAXAIR 115 kV	Base Case	P0	Base Case	1.06	1.06	1.03	1.09	1.09	1.06	1.06	1.05	1.06	1.05	1.09	1.03	1.03	Load power factor correction and voltage support if needed
PT PINLE 115 kV	Base Case	P0	Base Case	1.05	1.05	1.00	1.05	1.04	1.03	1.03	1.01	1.05	1.05	1.04	0.98	1.00	Load power factor correction and voltage support if needed
PTPNLT2 115 kV	Base Case	P0	Base Case	1.05	1.05	1.00	1.05	1.03	1.03	1.03	1.01	1.05	1.05	1.04	0.97	1.00	Load power factor correction and voltage support if needed
PTR_SHNT 230 kV	Base Case	P0	Base Case	1.02	1.04	1.01	1.09	1.12	1.02	1.05	1.02	1.03	1.03	1.12	1.02	1.03	Load power factor correction and voltage support if needed
RADUM 60 kV	Base Case	P0	Base Case	1.04	1.05	1.00	1.08	1.08	1.05	1.05	1.01	1.04	1.05	1.09	0.99	0.98	Load power factor correction and voltage support if needed
RALSTON 60 kV	Base Case	P0	Base Case	1.04	1.05	1.02	1.10	1.14	1.05	1.06	1.03	1.05	1.05	1.15	1.02	1.02	Load power factor correction and voltage support if needed
RAVENSWD 230 kV	Base Case	P0	Base Case	1.02	1.02	1.01	1.06	1.06	1.02	1.03	1.02	1.02	1.03	1.07	1.01	1.01	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)					ISO Approved Projects & Potential Mitigation Solutions
				2021 Summer Peak	2024 Summer Peak	2029 Summer Peak	2021 Spring Off-Peak	2024 Spring Off-Peak	2021 Winter Peak	2024 Winter Peak	2029 Winter Peak	2024 SP High CEC Forecast	2021 SP Heavy Renewable & Min Gas Gen	2024 SpOP Hi Renew & Min Gas Gen	2029 Retirement of QF Generations	2029 Summer Peak High SVP Forecasted Load	
REDWOOD 60 kV	Base Case	P0	Base Case	1.03	1.03	1.01	1.06	1.06	1.04	1.04	1.01	1.03	1.04	1.07	1.02	1.01	Load power factor correction and voltage support if needed
RESEARCH 230 kV	Base Case	P0	Base Case	1.02	1.02	1.00	1.06	1.06	1.03	1.03	1.01	1.02	1.02	1.06	0.99	0.99	Load power factor correction and voltage support if needed
RLSTN35 60 kV	Base Case	P0	Base Case	1.04	1.05	1.02	1.10	1.13	1.05	1.06	1.03	1.05	1.05	1.14	1.02	1.02	Load power factor correction and voltage support if needed
RLSTN45 60 kV	Base Case	P0	Base Case	1.04	1.05	1.02	1.10	1.14	1.05	1.06	1.03	1.05	1.05	1.15	1.02	1.02	Load power factor correction and voltage support if needed
ROSSMOOR 230 kV	Base Case	P0	Base Case	1.00	1.01	0.98	1.06	1.06	1.02	1.02	1.00	1.01	1.01	1.06	0.97	0.97	Load power factor correction and voltage support if needed
RUSELCTY 230 kV	Base Case	P0	Base Case	1.03	1.03	1.01	1.07	1.08	1.03	1.04	1.01	1.03	1.03	1.08	1.01	1.01	Load power factor correction and voltage support if needed
RVNSWD D 115 kV	Base Case	P0	Base Case	1.04	1.05	1.03	1.08	1.09	1.05	1.05	1.03	1.04	1.05	1.09	1.03	1.03	Load power factor correction and voltage support if needed
RVNSWD E 115 kV	Base Case	P0	Base Case	1.04	1.05	1.03	1.08	1.09	1.05	1.05	1.03	1.04	1.05	1.09	1.03	1.03	Load power factor correction and voltage support if needed
S.L.A.C. 60 kV	Base Case	P0	Base Case	1.04	1.05	1.01	1.03	1.18	1.03	1.04	1.02	1.05	1.06	1.19	1.01	1.01	Load power factor correction and voltage support if needed
S.L.A.C. 230 kV	Base Case	P0	Base Case	1.03	1.04	1.02	1.11	1.12	1.05	1.06	1.03	1.04	1.04	1.13	1.02	1.01	Load power factor correction and voltage support if needed
SAN CRLS 60 kV	Base Case	P0	Base Case	1.02	1.03	1.01	1.06	1.07	1.03	1.04	1.01	1.03	1.04	1.07	1.02	1.01	Load power factor correction and voltage support if needed
SAN MATO 60 kV	Base Case	P0	Base Case	1.03	1.04	1.02	1.09	1.10	1.04	1.05	1.02	1.04	1.04	1.11	1.02	1.03	Load power factor correction and voltage support if needed
SAN RAMN 60 kV	Base Case	P0	Base Case	1.04	1.04	1.00	1.09	1.08	1.04	1.05	1.02	1.04	1.04	1.09	0.99	0.99	Load power factor correction and voltage support if needed
SANMATEO 115 kV	Base Case	P0	Base Case	1.03	1.04	1.02	1.09	1.10	1.04	1.05	1.02	1.03	1.04	1.11	1.02	1.03	Load power factor correction and voltage support if needed
SANMATEO 230 kV	Base Case	P0	Base Case	1.02	1.03	1.02	1.07	1.08	1.03	1.04	1.02	1.03	1.03	1.09	1.02	1.02	Load power factor correction and voltage support if needed
SANPAULA 115 kV	Base Case	P0	Base Case	1.02	1.04	1.02	1.10	1.12	1.04	1.06	1.02	1.03	1.04	1.12	1.02	1.03	Load power factor correction and voltage support if needed
SANRAMON 230 kV	Base Case	P0	Base Case	1.01	1.01	0.98	1.06	1.06	1.01	1.03	1.00	1.01	1.01	1.06	0.97	0.97	Load power factor correction and voltage support if needed
SARATOGA 230 kV	Base Case	P0	Base Case	1.04	1.04	1.01	1.10	1.10	1.05	1.05	1.02	1.04	1.05	1.11	1.01	0.99	Load power factor correction and voltage support if needed
SENER 60 kV	Base Case	P0	Base Case	1.02	1.02	0.98	1.12	1.11	1.06	1.04	1.01	1.01	1.03	1.12	0.98	0.96	Load power factor correction and voltage support if needed
SERRMNTE 115 kV	Base Case	P0	Base Case	1.03	1.04	1.02	1.11	1.13	1.04	1.06	1.02	1.04	1.04	1.14	1.03	1.04	Load power factor correction and voltage support if needed
SFIA 115 kV	Base Case	P0	Base Case	1.03	1.04	1.02	1.10	1.11	1.04	1.06	1.02	1.04	1.04	1.12	1.03	1.03	Load power factor correction and voltage support if needed
SFIA-MA 115 kV	Base Case	P0	Base Case	1.02	1.03	1.01	1.09	1.11	1.03	1.05	1.02	1.03	1.03	1.12	1.02	1.03	Load power factor correction and voltage support if needed
SHAWROAD 115 kV	Base Case	P0	Base Case	1.03	1.04	1.02	1.10	1.12	1.04	1.06	1.02	1.04	1.04	1.12	1.03	1.03	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)					ISO Approved Projects & Potential Mitigation Solutions
				2021 Summer Peak	2024 Summer Peak	2029 Summer Peak	2021 Spring Off-Peak	2024 Spring Off-Peak	2021 Winter Peak	2024 Winter Peak	2029 Winter Peak	2024 SP High CEC Forecast	2021 SP Heavy Renewable & Min Gas Gen	2024 SpOP Hi Renew & Min Gas Gen	2029 Retirement of QF Generations	2029 Summer Peak High SVP Forecasted Load	
SHREDDER 115 kV	Base Case	P0	Base Case	1.02	1.03	1.02	1.07	1.08	1.03	1.04	1.02	1.03	1.04	1.08	1.02	1.02	Load power factor correction and voltage support if needed
SJB DG 115 kV	Base Case	P0	Base Case	1.02	1.02	0.99	1.08	1.07	1.04	1.03	1.01	1.01	1.02	1.08	0.99	0.96	Load power factor correction and voltage support if needed
SJB EF 115 kV	Base Case	P0	Base Case	1.02	1.02	0.99	1.08	1.07	1.05	1.03	1.01	1.01	1.02	1.08	0.99	0.96	Load power factor correction and voltage support if needed
SMATEO3M 115 kV	Base Case	P0	Base Case	1.03	1.04	1.02	1.08	1.10	1.04	1.05	1.02	1.03	1.04	1.11	1.02	1.02	Load power factor correction and voltage support if needed
SN JSE A 115 kV	Base Case	P0	Base Case	1.02	1.02	0.99	1.08	1.08	1.05	1.03	1.01	1.01	1.02	1.08	0.99	0.96	Load power factor correction and voltage support if needed
SNANDRES 60 kV	Base Case	P0	Base Case	1.00	1.07	1.00	1.14	1.16	1.08	1.10	0.99	1.04	1.07	1.17	1.02	1.02	Load power factor correction and voltage support if needed
SNTACLRAWIND 60 kV	Base Case	P0	Base Case	1.04	1.05	1.01	1.09	1.09	1.05	1.05	1.02	1.04	1.05	1.09	1.00	0.99	Load power factor correction and voltage support if needed
ST TRESA 115 kV	Base Case	P0	Base Case	1.05	1.05	1.03	1.10	1.10	1.07	1.06	1.04	1.05	1.06	1.11	1.03	1.02	Load power factor correction and voltage support if needed
STANFORD 60 kV	Base Case	P0	Base Case	1.04	1.05	1.01	1.02	1.19	1.03	1.04	1.02	1.05	1.06	1.20	1.01	1.01	Load power factor correction and voltage support if needed
STATIN J 115 kV	Base Case	P0	Base Case	1.05	1.05	1.02	1.05	1.06	1.05	1.05	1.03	1.05	1.05	1.06	1.02	1.02	Load power factor correction and voltage support if needed
STONE 115 kV	Base Case	P0	Base Case	1.02	1.02	0.99	1.09	1.09	1.06	1.04	1.01	1.01	1.03	1.10	0.99	0.97	Load power factor correction and voltage support if needed
SUNOL 60 kV	Base Case	P0	Base Case	1.03	1.04	1.00	1.08	1.08	1.04	1.04	1.01	1.04	1.04	1.08	0.99	0.98	Load power factor correction and voltage support if needed
SWIFT 115 kV	Base Case	P0	Base Case	1.04	1.04	1.02	1.09	1.09	1.06	1.06	1.03	1.04	1.05	1.10	1.01	1.00	Load power factor correction and voltage support if needed
TASSAJAR 230 kV	Base Case	P0	Base Case	1.02	1.02	0.99	1.06	1.06	1.03	1.03	1.01	1.02	1.02	1.06	0.99	0.99	Load power factor correction and voltage support if needed
TRAN230A 230 kV	Base Case	P0	Base Case	1.04	1.05	1.02	1.11	1.13	1.05	1.06	1.03	1.05	1.05	1.14	1.02	1.02	Load power factor correction and voltage support if needed
TRAN230B 230 kV	Base Case	P0	Base Case	1.04	1.05	1.02	1.11	1.13	1.05	1.06	1.03	1.04	1.05	1.14	1.02	1.03	Load power factor correction and voltage support if needed
TRAN-60 60 kV	Base Case	P0	Base Case	1.04	1.04	1.02	1.09	1.12	1.04	1.05	1.03	1.04	1.04	1.13	1.02	1.02	Load power factor correction and voltage support if needed
TRES VAQ 230 kV	Base Case	P0	Base Case	1.02	1.03	1.01	1.06	1.05	1.03	1.03	1.03	1.02	1.02	1.06	1.01	1.00	Load power factor correction and voltage support if needed
TRIMBLE 115 kV	Base Case	P0	Base Case	1.03	1.03	1.01	1.06	1.06	1.04	1.03	1.02	1.03	1.03	1.06	1.01	0.98	Load power factor correction and voltage support if needed
UNITEDSP 115 kV	Base Case	P0	Base Case	1.06	1.06	1.03	1.10	1.09	1.06	1.06	1.05	1.06	1.05	1.10	1.03	1.03	Load power factor correction and voltage support if needed
UNOCAL2 115 kV	Base Case	P0	Base Case	1.05	1.05	1.01	1.06	1.06	1.04	1.04	1.02	1.05	1.05	1.06	1.00	1.01	Load power factor correction and voltage support if needed
VALLECTS 60 kV	Base Case	P0	Base Case	1.04	1.04	1.00	1.08	1.08	1.05	1.04	1.01	1.04	1.04	1.08	0.99	0.98	Load power factor correction and voltage support if needed
VALLY VW 115 kV	Base Case	P0	Base Case	1.04	1.04	1.01	1.06	1.06	1.04	1.04	1.02	1.04	1.04	1.06	1.00	1.01	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)					ISO Approved Projects & Potential Mitigation Solutions
				2021 Summer Peak	2024 Summer Peak	2029 Summer Peak	2021 Spring Off-Peak	2024 Spring Off-Peak	2021 Winter Peak	2024 Winter Peak	2029 Winter Peak	2024 SP High CEC Forecast	2021 SP Heavy Renewable & Min Gas Gen	2024 SpOP Hi Renew & Min Gas Gen	2029 Retirement of QF Generations	2029 Summer Peak High SVP Forecasted Load	
VASCO 60 kV	Base Case	P0	Base Case	1.04	1.05	1.01	1.09	1.09	1.05	1.05	1.02	1.04	1.05	1.09	1.00	0.99	Load power factor correction and voltage support if needed
VASONA 230 kV	Base Case	P0	Base Case	1.04	1.04	1.01	1.10	1.10	1.05	1.05	1.02	1.04	1.04	1.11	1.01	0.99	Load power factor correction and voltage support if needed
VINEYARD 60 kV	Base Case	P0	Base Case	1.04	1.05	1.00	1.08	1.08	1.05	1.05	1.01	1.04	1.05	1.09	0.99	0.98	Load power factor correction and voltage support if needed
W.P.BART 115 kV	Base Case	P0	Base Case	1.05	1.06	1.03	1.09	1.09	1.06	1.06	1.04	1.05	1.05	1.09	1.02	1.02	Load power factor correction and voltage support if needed
WATRSHED 60 kV	Base Case	P0	Base Case	1.04	1.05	1.02	1.10	1.13	1.05	1.06	1.03	1.05	1.05	1.14	1.02	1.02	Load power factor correction and voltage support if needed
WESTRN_D 115 kV	Base Case	P0	Base Case	1.03	1.03	1.01	1.06	1.06	1.04	1.03	1.02	1.03	1.03	1.06	1.01	0.99	Load power factor correction and voltage support if needed
WHISMAN 115 kV	Base Case	P0	Base Case	1.03	1.03	1.01	1.06	1.06	1.03	1.03	1.02	1.03	1.03	1.06	1.01	1.01	Load power factor correction and voltage support if needed
WOODSIDE 60 kV	Base Case	P0	Base Case	1.04	1.05	1.01	1.10	1.14	1.05	1.06	1.02	1.04	1.05	1.15	1.01	1.01	Load power factor correction and voltage support if needed
WTRSHDTP 60 kV	Base Case	P0	Base Case	1.04	1.05	1.02	1.10	1.13	1.05	1.06	1.03	1.05	1.05	1.14	1.02	1.02	Load power factor correction and voltage support if needed
ZANKER 115 kV	Base Case	P0	Base Case	1.02	1.02	1.00	1.06	1.06	1.04	1.03	1.02	1.02	1.03	1.07	1.00	0.97	Load power factor correction and voltage support if needed
LOS GATS 60 kV	MONTA VISTA-LOS GATOS 60kV	P1	N-1	0.97	0.97	0.90	1.16	1.14	1.04	1.02	0.95	0.96	0.99	1.15	0.90	0.87	Load power factor correction and voltage support if needed
MARTIN 60 kV	MILLBRAE-SNEATH LANE 60kV	P1	N-1	0.95	1.18	0.96	1.25	1.28	1.18	1.20	0.95	1.18	1.18	1.29	0.00	1.17	Load power factor correction and voltage support if needed
PACIFICA 60 kV	MILLBRAE-SNEATH LANE 60kV	P1	N-1	0.95	1.18	0.95	1.25	1.28	1.17	1.19	0.93	1.17	1.18	1.29	1.01	1.16	Load power factor correction and voltage support if needed
SN BRNOT 60 kV	MILLBRAE 115/60kV TB 5	P1	N-1	0.95	1.18	0.94	1.25	1.28	1.17	1.19	0.92	1.17	1.18	1.29	1.01	1.01	Load power factor correction and voltage support if needed
SNTH LNE 60 kV	MILLBRAE-SNEATH LANE 60kV	P1	N-1	0.95	1.18	0.95	1.25	1.28	1.17	1.19	0.93	1.17	1.18	1.29	1.02	1.16	Load power factor correction and voltage support if needed
FMC 115 kV	NRS 400 115 kV bus tie breaker to NRS 300 115 kV bus	P2	Bus-Tie-Breaker	0.99	0.99	0.96	1.07	1.06	1.03	1.01	0.99	0.98	1.00	1.07	0.95	0.86	Sensitivity only
SJB DG 115 kV	NRS 400 115 kV bus tie breaker to NRS 300 115 kV bus	P2	Bus-Tie-Breaker	0.99	0.99	0.96	1.07	1.07	1.03	1.02	0.99	0.99	1.00	1.08	0.96	0.88	Sensitivity only
SJB EF 115 kV	NRS 400 115 kV bus tie breaker to NRS 300 115 kV bus	P2	Bus-Tie-Breaker	0.99	0.99	0.96	1.07	1.07	1.03	1.02	1.00	0.99	1.00	1.08	0.96	0.89	Sensitivity only
SN JSE A 115 kV	NRS 400 115 kV bus tie breaker to NRS 300 115 kV bus	P2	Bus-Tie-Breaker	1.00	1.00	0.97	1.08	1.07	1.04	1.02	1.00	0.99	1.00	1.08	0.96	0.89	Sensitivity only
STONE 115 kV	NRS 400 115 kV bus tie breaker to NRS 300 115 kV bus	P2	Bus-Tie-Breaker	0.97	0.97	0.93	1.08	1.07	1.03	1.01	0.97	0.96	0.98	1.08	0.93	0.88	Sensitivity only
E. SHORE 230 kV	RAVENSWOOD 230 kV BAAH BUS #1 (FAILURE OF NON-REDUNDENT RELAY)	P5	Non-Redundant Relay	1.02	1.03	1.00	1.08	1.10	1.04	1.04	1.01	1.02	1.02	1.11	1.00	1.00	Sensitivity only
JEFFERSN 230 kV	JEFFERSON 230 kV BAAH BUS #2 (FAILURE OF NON-REDUNDENT RELAY)	P5	Non-Redundant Relay	0.94	1.04	1.01	<1.1	1.11	<1.1	1.05	1.03	1.03	0.95	1.12	1.01	0.98	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)					ISO Approved Projects & Potential Mitigation Solutions
				2021 Summer Peak	2024 Summer Peak	2029 Summer Peak	2021 Spring Off-Peak	2024 Spring Off-Peak	2021 Winter Peak	2024 Winter Peak	2029 Winter Peak	2024 SP High CEC Forecast	2021 SP Heavy Renewable & Min Gas Gen	2024 SpOP Hi Renew & Min Gas Gen	2029 Retirement of QF Generations	2029 Summer Peak High SVP Forecasted Load	
MRT RCTR 230 kV	SAN MATEO-MARTIN 230kV & P1-4:A9:9:_MRT RCTR SVD=V	P6	N-1-1	<1.1	<1.1	<1.1	1.14	<1.1	<1.1	<1.1	<1.1	<1.1	<1.1	<1.1	<1.1	<1.1	Load power factor correction and voltage support if needed
NWK DIST 230 kV	P1-2:A16:18:_NEWARK E-F BUS TIE 230kV & P1-4:A18:1:_LS ESTRS SVD=R	P6	N-1-1	<1.1	<1.1	<1.1	1.10	<1.1	<1.1	<1.1	<1.1	<1.1	<1.1	1.11	<1.1	<1.1	Load power factor correction and voltage support if needed
VINEYARD 230 kV	VINEYARD-NEWARK 230kV & P1-4:A16:13:_VINEYARD SVD=V	P6	N-1-1	<1.1	<1.1	<1.1	1.11	<1.1	<1.1	<1.1	<1.1	<1.1	<1.1	<1.1	<1.1	<1.1	Load power factor correction and voltage support if needed
FMC 115 kV	P1-2:A18:49:_LOS ESTEROS-NORTECH 115kV & P1-2:A18:19:_FMC-SAN JOSE B 115kV	P6	N-1-1	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	0.88	Sensitivity only
NORTECH 115 kV	P1-2:A21:1:_SSS-NRS 230kV (SVP) & P1-2:A18:49:_LOS ESTEROS-NORTECH 115kV	P6	N-1-1	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	0.88	Sensitivity only

Study Area: PG&E Greater Bay Area

Voltage Deviation



Substation	Contingency (All and Worst P6)	Category	Category Description	Post Cont. Voltage Deviation % (Baseline Scenarios)								Post Cont. Voltage Deviation % (Sensitivity Scenarios)					ISO Approved Projects & Potential Mitigation Solutions
				2021 Summer Peak	2024 Summer Peak	2029 Summer Peak	2021 Spring Off-Peak	2024 Spring Off-Peak	2021 Winter Peak	2024 Winter Peak	2029 Winter Peak	2024 SP High CEC Forecast	2021 SP Heavy Renewable & Min Gas Gen	2024 SpOP Hi Renew & Min Gas Gen	2029 Retirement of QF Generations	2029 Summer Peak High SVP Forecasted Load	
LOS GATS 60 kV	MONTA VISTA-LOS GATOS 60kV	P1	N-1	7	6	13	-9	-9	0	2	7	7	4	-9	13	16	Disable automatic load pickup
PIERCY 115 kV	PIERCY-METCALF 115kV	P1	N-1	6	5	8	2	2	3	2	6	5	5	2	8	9	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		
			2024 Summer Peak	2029 Summer Peak	2024 Spring Off-Peak	2024 SP High CEC Forecast	2024 SpOP Hi Renew & Min Gas Gen	
Metcalf 500/230 kV #13 Transformer 3Ø fault with normal clearing.	P1-3	N-1	No issue	No issue	No issue	No issue	No issue	No mitigation required
Metcalf 500/230 kV #13 Transformer 3Ø fault with normal clearing with LMEC offline in the base case.	P3-3	G-1/N-1	No issue	No issue	No issue	No issue	No issue	No mitigation required
Metcalf 500/230 kV #13 Transformer SLG fault with delayed clearing.	P5-3	Non-Redundant Relay	No issue	No issue	No issue	No issue	No issue	No mitigation required
Tesla-Newark 230 kV line 3Ø fault with normal clearing with Metcalf 500/230 kV #13 Transformer offline in the base case.	P6-1	N-1-1	No issue	No issue	No issue	No issue	No issue	No mitigation required
Metcalf 230 kV bus 3Ø fault with normal clearing with Metcalf 500/230 kV #13 Transformer offline in the base case.	P6-2	N-1-1	No issue	No issue	No issue	No issue	No issue	No mitigation required
Contra Costa-Gateway 230 kV SLG fault with delayed clearing.	P5-2	Non-Redundant Relay	No issue	No issue	No issue	No issue	No issue	No mitigation required
Contra Costa-Gateway 230 kV SLG fault expanded to elements lost due to stuck breaker and clear fault from remote breakers with normal clearing time.	P4-2	Stuck Breaker	No issue	No issue	No issue	No issue	No issue	No mitigation required
TBC SLG fault with normal clearing.	P1-5	N-1	No issue	No issue	No issue	No issue	No issue	No mitigation required
TBC SLG fault with normal clearing with LMEC offline in the base case.	P3-5	G-1/N-1	No issue	No issue	No issue	No issue	No issue	No mitigation required
TBC SLG fault with normal clearing with Tesla-Newark 230 kV line offline in the base case.	P6-4	N-1-1	No issue	No issue	No issue	No issue	No issue	No mitigation required
Newark 230 kV 3Ø fault with normal clearing.	P1-2	N-1	No issue	No issue	No issue	No issue	No issue	No mitigation required
Tesla-Newark 230 kV line 3Ø fault with normal clearing with LMEC offline in the base case.	P3-2	G-1/N-1	No issue	No issue	No issue	No issue	No issue	No mitigation required
Monta Vista 230 kV SVD 3Ø fault with normal clearing.	P1-4	N-1	No issue	No issue	No issue	No issue	No issue	No mitigation required
Monta Vista 230 kV SVD 3Ø fault with normal clearing with LMEC offline in the base case.	P3-4	G-1/N-1	No issue	No issue	No issue	No issue	No issue	No mitigation required
Monta Vista 230 kV SVD SLG fault expanded to elements lost due to stuck breaker and clear fault from remote breakers with normal clearing time.	P4-4	Stuck Breaker	No issue	No issue	No issue	No issue	No issue	No mitigation required
Monta Vista 230 kV SVD SLG fault with delayed clearing.	P5-4	Non-Redundant Relay	No issue	No issue	No issue	No issue	No issue	No mitigation required
Ravenswood 230 kV SVD 3Ø fault with normal clearing with Monta Vista 230 kV SVD offline in the base case.	P6-3	N-1-1	No issue	No issue	No issue	No issue	No issue	No mitigation required
Metcalf 230 kV bus SLG fault with normal clearing.	P2-2	Bus	No issue	No issue	No issue	No issue	No issue	No mitigation required
Metcalf 230 kV line breaker SLG fault with normal clearing.	P2-3	Non-Bus-Tie Breaker	No issue	No issue	No issue	No issue	No issue	No mitigation required
Metcalf 230 kV bus-tie breaker SLG fault with normal clearing.	P2-4	Bus-Tie Breaker	No issue	No issue	No issue	No issue	No issue	No mitigation required

Study Area: PG&E Greater Bay Area

Transient Stability



Contingency	Category	Category Description	Transient Stability Performance					Potential Mitigation Solutions
			Baseline Scenarios			Sensitivity Scenarios		
			2024 Summer Peak	2029 Summer Peak	2024 Spring Off-Peak	2024 SP High CEC Forecast	2024 SpOP Hi Renew & Min Gas Gen	
Metcalf 500/230 kV #13 Transformer SLG fault expanded to elements lost due to stuck breaker and clear fault from remote breakers with normal clearing time.	P4-3	Stuck Breaker	No issue	No issue	No issue	No issue	No issue	No mitigation required
Crocket 3Ø fault with normal clearing with LMEC offline in the base case.	P3-1	G-1/N-1	No issue	No issue	No issue	No issue	No issue	No mitigation required
LMEC 3Ø fault with normal clearing.	P1-1	N-1	No issue	No issue	No issue	No issue	No issue	No mitigation required
DEC 3Ø fault with normal clearing.	P1-1	N-1	No issue	No issue	No issue	No issue	No issue	No mitigation required
Metcalf 115 kV bus SVD SLG fault expanded to elements lost due to stuck breaker and clear fault from remote breakers with normal clearing time.	P4-5	Stuck Breaker	No issue	No issue	No issue	No issue	No issue	No mitigation required
Metcalf 115 kV bus-tie breaker SVD SLG fault expanded to elements lost due to stuck breaker and clear fault from remote breakers with normal clearing time.	P4-6	Stuck Breaker	No issue	No issue	No issue	No issue	No issue	No mitigation required
Metcalf 115 kV bus SLG fault with delayed clearing.	P5-5	Non-Redundant Relay	No issue	No issue	No issue	No issue	No issue	No mitigation required
Los Esteros SLG fault expanded to elements lost due to stuck breaker and clear fault from remote breakers with normal clearing time.	P4-1	Stuck Breaker	No issue	No issue	No issue	No issue	No issue	No mitigation required
Los Esteros SLG fault with delayed clearing.	P5-1	Non-Redundant Relay	No issue	No issue	No issue	No issue	No issue	No mitigation required
Contra Costa-Moraga # 1 & 2 230 kV lines SLG fault with successful high speed reclose.	P7-1	DCTL	No issue	No issue	No issue	No issue	No issue	No mitigation required
Contra Costa-Moraga # 1 & 2 230 kV lines SLG fault with unsuccessful high speed reclose.	P7-1	DCTL	No issue	No issue	No issue	No issue	No issue	No mitigation required
Tesla-Newark & Tesla-Ravenswood 230 kV lines SLG fault with successful high speed reclose.	P7-1	DCTL	No issue	No issue	No issue	No issue	No issue	No mitigation required
Tesla-Newark & Tesla-Ravenswood 230 kV lines SLG fault with unsuccessful high speed reclose.	P7-1	DCTL	No issue	No issue	No issue	No issue	No issue	No mitigation required

Study Area: PG&E Greater Bay Area



Single Contingency Load Drop

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

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

Study Area: PG&E Greater Bay Area



Single Source Substation with more than 100 MW Load

Substation	Load Served (MW)										Potential Mitigation Solutions
	Select..	Select..	Select..	Select..	Select..	Select..	Select..	Select..	Select..	Select..	
Kirker	102	102	103								Mitigation under development