

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

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

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				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Winter Peak	2023 Winter Peak	2028 Winter Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	
31104 CARLOTTA 60.0 31108 SWNS FLT 60.0 1 1	P2-1:A1:21:_HUMBOLDT BAY 60KV [7100] (HMBLT BY-EEL RIVR)	P2	Line Section w/o fault	25	32	24	106	9	103	54	57	32	59	47	Non-BES facility
	P2-2:A1:1:_HUMBOLDT 115KV SECTION MA	P2	Bus	76	77	61	23	43	39	46	13	86	6	151	Sensitivity only
	P2-3:A1:1:_HUMBOLDT - MA 115KV & HUMBOLDT LINE	P2	Non-bus-tie breaker	78	79	61	28	43	48	50	14	89	7	163	Sensitivity only
31108 SWNS FLT 60.0 31110 BRDGVILLE 60.0 1 1	P1-2:A1:2:_HUMBOLDT 115KV [1810]	P1	N-1	92	89	85	43	60	36	30	3	110	4	107	Sensitivity only
	P2-1:A1:21:_HUMBOLDT BAY 60KV [7100] (HMBLT BY-EEL RIVR)	P2	Line Section w/o fault	25	31	23	106	8	104	53	57	32	58	47	Non-BES facility
	P2-2:A1:1:_HUMBOLDT 115KV SECTION MA	P2	Bus	75	76	60	23	43	39	46	13	86	6	150	Sensitivity only
	P2-3:A1:1:_HUMBOLDT - MA 115KV & HUMBOLDT LINE	P2	Non-bus-tie breaker	77	79	61	28	42	48	49	14	89	7	162	Sensitivity only
31110 BRDGVILLE 60.0 31120 FRUTLDJT 60.0 1 1	Base Case	P0	N-0	93	95	96	70	69	66	17	5	111	8	73	Sensitivity only
	P1-2:A1:14:_HUMBOLDT 60KV [7130] MOAS OPENED ON HUMBOLDT_MPLE CRK	P1	N-1	86	87	88	67	68	64	16	4	102	7	68	Sensitivity only
	P1-2:A1:15:_HMBLT BY-HARRIS 60KV [0] MOAS OPENED ON HARRIS_HARRISST	P1	N-1	88	90	89	69	70	65	17	4	104	7	67	Sensitivity only
	P1-2:A1:3:_HUMBOLDT 115KV [1820]	P1	N-1	93	94	94	69	70	65	17	7	113	10	82	Sensitivity only
	P1-2:A1:4:_BRIDGEVILLE-COTTONWOOD 115KV [1110]	P1	N-1	99	99	98	68	72	63	19	9	120	11	91	Sensitivity only
	P1-4:A1:4:_HUMBOLDT 60.00KV ID=7H & HUMBOLDT 60.00KV ID=5H & HUMBOLDT 60.00KV ID=1H & HUMBOLDT 60.00KV ID=V SHUNT DEVICES	P1	N-1	85	86	88	70	66	65	15	3	102	4	67	Sensitivity only
	P2-1:A1:1:_HUMBOLDT 115KV [1820] (HUMBOLDT-TRINITY)	P2	Line Section w/o fault	93	93	93	70	70	65	17	7	112	10	80	Sensitivity only
	P2-1:A1:2:_BRIDGEVILLE-COTTONWOOD 115KV [1110] (FRSTGLEN-LOW GAP1)	P2	Line Section w/o fault	98	98	96	67	71	62	20	10	119	13	92	Sensitivity only
	P2-2:A1:3:_LOW GAP1 115KV SECTION 1D	P2	Bus	99	99	98	68	72	63	18	9	120	11	91	Sensitivity only
	P2-3:A1:10:_HMBLT BY 60KV - MIDDLE BREAKER BAY 3	P2	Non-bus-tie breaker	91	91	91	70	71	66	19	3	105	1	69	Sensitivity only
	P2-3:A1:16:_BRDGVILLE 115KV - RING R3 & R2	P2	Non-bus-tie breaker	87	87	87	59	62	50	21	2	105	2	84	Sensitivity only
	P2-3:A1:18:_BRDGVILLE 115KV - RING R1 & R3	P2	Non-bus-tie breaker	87	87	87	59	62	50	21	2	105	2	84	Sensitivity only

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

Study Area: PG&E Humboldt

High/Low Voltages



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

Study Area: PG&E Humboldt

High/Low Voltages



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

Study Area: PG&E Humboldt

High/Low Voltages



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

Study Area: PG&E Humboldt

High/Low Voltages



Substation	Contingency (All and Worst P6)	Category	Category Description	Post Cont. Voltage Deviation % (Baseline Scenarios)								t Cont. Voltage Deviation % (Sensitivity Scenar			Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Winter Peak	2023 Winter Peak	2028 Winter Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	
MPLE CRK 60kV	HUMBOLDT 60KV [7130] (HUMBOLDT-MPLE CRK)	P2	Line Section w/o fault	0.86	0.84	0.87	0.90	0.87	0.86	1.05	1.03	0.83	1.04	0.99	Load power factor correction and voltage support if needed
RDGE CBN 60kV	HUMBOLDT 60KV [7130] (HUMBOLDT-MPLE CRK)	P2	Line Section w/o fault	0.90	0.88	0.91	0.94	0.91	0.90	1.06	1.04	0.88	1.05	1.01	Load power factor correction and voltage support if needed
RUSS RCH 60kV	HUMBOLDT 60KV [7130] (HUMBOLDT-MPLE CRK)	P2	Line Section w/o fault	0.85	0.83	0.86	0.89	0.86	0.85	1.04	1.03	0.82	1.04	0.99	Load power factor correction and voltage support if needed
WILLWCRK 60kV	HUMBOLDT 60KV [7130] (HUMBOLDT-MPLE CRK)	P2	Line Section w/o fault	0.82	0.79	0.83	0.86	0.82	0.82	1.03	1.02	0.78	1.03	0.98	Load power factor correction and voltage support if needed
BRDGVLLE 115kV	BRIDGEVILLE-COTTONWOOD 115KV [1110] (FRSTGLEN-LOW GAP1)	P2	Line Section w/o fault	1.06	1.05	1.06	1.08	1.06	1.04	1.12	1.10	1.07	1.10	1.08	Load power factor correction and voltage support if needed
LOW GAP1 115kV	BRIDGEVILLE-COTTONWOOD 115KV [1110] (FRSTGLEN-LOW GAP1)	P2	Line Section w/o fault	1.06	1.06	1.06	1.08	1.06	1.04	1.13	1.10	1.07	1.11	1.08	Load power factor correction and voltage support if needed
CARLOTTA 60kV	HUMBOLDT BAY 60KV [7100] (HMBLT BY-EEL RIVR)	P2	Line Section w/o fault	1.04	1.00	1.02	0.71	1.04	0.73	1.05	1.03	1.00	1.03	1.04	Load power factor correction and voltage support if needed
EEL RIVR 60kV	HUMBOLDT BAY 60KV [7100] (HMBLT BY-EEL RIVR)	P2	Line Section w/o fault	1.03	0.97	1.00	0.65	1.03	0.69	1.04	1.02	0.97	1.02	1.04	Load power factor correction and voltage support if needed
NEWBURG 60kV	HUMBOLDT BAY 60KV [7100] (HMBLT BY-EEL RIVR)	P2	Line Section w/o fault	1.03	0.98	1.00	0.66	1.03	0.69	1.04	1.02	0.98	1.02	1.04	Load power factor correction and voltage support if needed
PCLUMBER 60kV	HUMBOLDT BAY 60KV [7100] (HMBLT BY-EEL RIVR)	P2	Line Section w/o fault	1.04	1.00	1.02	0.71	1.04	0.73	1.05	1.03	1.00	1.03	1.04	Load power factor correction and voltage support if needed
RIO DELL 60kV	HUMBOLDT BAY 60KV [7100] (HMBLT BY-EEL RIVR)	P2	Line Section w/o fault	1.05	1.02	1.03	0.67	1.05	0.69	1.06	1.04	1.02	1.04	1.05	Load power factor correction and voltage support if needed
RIODLLTP 60kV	HUMBOLDT BAY 60KV [7100] (HMBLT BY-EEL RIVR)	P2	Line Section w/o fault	1.04	1.00	1.02	0.70	1.04	0.72	1.05	1.03	1.00	1.03	1.04	Load power factor correction and voltage support if needed

Study Area: PG&E Humboldt

High/Low Voltages



Substation	Contingency (All and Worst P6)	Category	Category Description	Post Cont. Voltage Deviation % (Baseline Scenarios)								t Cont. Voltage Deviation % (Sensitivity Scenar			Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Winter Peak	2023 Winter Peak	2028 Winter Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	
SCOTIATP 60kV	HUMBOLDT BAY 60KV [7100] (HMBLT BY-EEL RIVR)	P2	Line Section w/o fault	1.05	1.02	1.03	0.67	1.05	0.69	1.06	1.04	1.02	1.04	1.05	Load power factor correction and voltage support if needed
SCTIATP2 60kV	HUMBOLDT BAY 60KV [7100] (HMBLT BY-EEL RIVR)	P2	Line Section w/o fault	1.05	1.02	1.03	0.67	1.05	0.69	1.06	1.04	1.02	1.04	1.05	Load power factor correction and voltage support if needed
SWNS FLT 60kV	HUMBOLDT BAY 60KV [7100] (HMBLT BY-EEL RIVR)	P2	Line Section w/o fault	1.04	1.02	1.03	0.91	1.05	0.90	1.06	1.04	1.03	1.04	1.04	Load power factor correction and voltage support if needed
HMBLDT B 115kV	HUMB_BS3-HMBLT BY 60KV [0] NO FAULT	P2	Line Section w/o fault	1.07	1.05	1.06	1.08	1.06	1.04	1.12	1.09	1.08	1.10	1.11	Load power factor correction and voltage support if needed
HUMB_BS1 115kV	HUMB_BS3-HMBLT BY 60KV [0] NO FAULT	P2	Line Section w/o fault	1.07	1.05	1.06	1.08	1.06	1.04	1.12	1.09	1.08	1.10	1.11	Load power factor correction and voltage support if needed
HUMBOLDT 115kV	HUMB_BS3-HMBLT BY 60KV [0] NO FAULT	P2	Line Section w/o fault	1.07	1.05	1.06	1.08	1.06	1.04	1.12	1.09	1.08	1.10	1.12	Load power factor correction and voltage support if needed
HMBLDT B 115kV	HUMB_BS3-HMBLT BY 60KV [0] NO FAULT	P2	Line Section w/o fault	1.07	1.05	1.06	1.08	1.06	1.04	1.11	1.09	1.08	1.10	1.11	Load power factor correction and voltage support if needed
HUMB_BS1 115kV	HUMB_BS3-HMBLT BY 60KV [0] NO FAULT	P2	Line Section w/o fault	1.07	1.05	1.06	1.08	1.06	1.04	1.11	1.09	1.08	1.10	1.11	Load power factor correction and voltage support if needed
HUMBOLDT 115kV	HUMB_BS3-HMBLT BY 60KV [0] NO FAULT	P2	Line Section w/o fault	1.07	1.05	1.06	1.08	1.06	1.04	1.11	1.09	1.08	1.10	1.12	Load power factor correction and voltage support if needed
CARLOTTA 60kV	HUMBOLDT BAY 60KV [7100] (EEL RIVR-NEWBURG)	P2	Line Section w/o fault	1.03	1.03	1.03	0.90	1.03	0.87	1.05	1.03	1.03	1.03	1.04	Load power factor correction and voltage support if needed
NEWBURG 60kV	HUMBOLDT BAY 60KV [7100] (EEL RIVR-NEWBURG)	P2	Line Section w/o fault	1.02	1.02	1.02	0.89	1.02	0.85	1.04	1.02	1.02	1.02	1.04	Load power factor correction and voltage support if needed
PCLUMBER 60kV	HUMBOLDT BAY 60KV [7100] (EEL RIVR-NEWBURG)	P2	Line Section w/o fault	1.03	1.03	1.03	0.90	1.03	0.87	1.05	1.03	1.03	1.03	1.04	Load power factor correction and voltage support if needed

Study Area: PG&E Humboldt

High/Low Voltages



Substation	Contingency (All and Worst P6)	Category	Category Description	Post Cont. Voltage Deviation % (Baseline Scenarios)								t Cont. Voltage Deviation % (Sensitivity Scenar			Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Winter Peak	2023 Winter Peak	2028 Winter Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	
RIO DELL 60kV	HUMBOLDT BAY 60KV [7100] (EEL RIVR-NEWBURG)	P2	Line Section w/o fault	1.04	1.04	1.04	0.88	1.05	0.84	1.06	1.04	1.04	1.04	1.05	Load power factor correction and voltage support if needed
RIODLLTP 60kV	HUMBOLDT BAY 60KV [7100] (EEL RIVR-NEWBURG)	P2	Line Section w/o fault	1.03	1.03	1.03	0.90	1.03	0.86	1.05	1.03	1.03	1.03	1.04	Load power factor correction and voltage support if needed
SCOTIATP 60kV	HUMBOLDT BAY 60KV [7100] (EEL RIVR-NEWBURG)	P2	Line Section w/o fault	1.04	1.04	1.04	0.88	1.05	0.84	1.06	1.04	1.04	1.04	1.05	Load power factor correction and voltage support if needed
SCTIATP2 60kV	HUMBOLDT BAY 60KV [7100] (EEL RIVR-NEWBURG)	P2	Line Section w/o fault	1.04	1.04	1.04	0.88	1.05	0.84	1.06	1.04	1.04	1.04	1.05	Load power factor correction and voltage support if needed
HMBLDT B 115kV	HUMBOLDT BAY 115KV [7090] (HUMB_BS1-HMBLDT B)	P2	Line Section w/o fault	1.07	1.06	1.07	1.09	1.07	1.05	1.12	1.09	1.09	1.10	1.10	Load power factor correction and voltage support if needed
HUMBOLDT 115kV	HUMBOLDT BAY 115KV [7090] (HUMB_BS1-HMBLDT B)	P2	Line Section w/o fault	1.07	1.06	1.07	1.09	1.07	1.05	1.12	1.09	1.09	1.10	1.10	Load power factor correction and voltage support if needed
HMBLDT B 115kV	PACIFIC LUMBER (SCOTIA) TAP 60KV [7852] (SCTIATP2-SCOTIATP)	P2	Line Section w/o fault	1.07	1.05	1.06	1.10	1.06	1.06	1.12	1.08	1.07	1.09	1.11	Load power factor correction and voltage support if needed
HUMB_BS1 115kV	PACIFIC LUMBER (SCOTIA) TAP 60KV [7852] (SCTIATP2-SCOTIATP)	P2	Line Section w/o fault	1.07	1.05	1.06	1.10	1.06	1.06	1.12	1.08	1.07	1.09	1.11	Load power factor correction and voltage support if needed
HUMBOLDT 115kV	PACIFIC LUMBER (SCOTIA) TAP 60KV [7852] (SCTIATP2-SCOTIATP)	P2	Line Section w/o fault	1.07	1.05	1.06	1.10	1.06	1.06	1.12	1.08	1.07	1.09	1.11	Load power factor correction and voltage support if needed
HMBLDT B 115kV	HUMBOLDT #1 60KV [7113] (ARCTAJT1-LP_FLKBD)	P2	Line Section w/o fault	1.06	1.05	1.07	1.10	1.06	1.07	1.12	1.09	1.07	1.10	1.08	Load power factor correction and voltage support if needed
HUMB_BS1 115kV	HUMBOLDT #1 60KV [7113] (ARCTAJT1-LP_FLKBD)	P2	Line Section w/o fault	1.06	1.05	1.07	1.10	1.06	1.07	1.12	1.09	1.07	1.10	1.08	Load power factor correction and voltage support if needed
HUMBOLDT 115kV	HUMBOLDT #1 60KV [7113] (ARCTAJT1-LP_FLKBD)	P2	Line Section w/o fault	1.06	1.05	1.07	1.10	1.06	1.07	1.12	1.09	1.07	1.10	1.08	Load power factor correction and voltage support if needed
HMBLDT B 115kV	HUMB_G1 13.8KV SECTION 1D	P2	Bus	1.07	1.06	1.07	1.09	1.07	1.05	1.12	1.09	1.09	1.10	1.10	Load power factor correction and voltage support if needed

Study Area: PG&E Humboldt

High/Low Voltages



Substation	Contingency (All and Worst P6)	Category	Category Description	Post Cont. Voltage Deviation % (Baseline Scenarios)								t Cont. Voltage Deviation % (Sensitivity Scenar			Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Winter Peak	2023 Winter Peak	2028 Winter Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	
HUMB_BS1 115kV	HUMB_G1 13.8KV SECTION 1D	P2	Bus	1.07	1.06	1.07	1.09	1.07	1.05	1.12	1.09	1.09	1.10	1.10	Load power factor correction and voltage support if needed
HUMBOLDT 115kV	HUMB_G1 13.8KV SECTION 1D	P2	Bus	1.07	1.06	1.07	1.09	1.07	1.05	1.12	1.09	1.09	1.10	1.10	Load power factor correction and voltage support if needed
HMBLDT B 115kV	HUMB_G2 13.8KV SECTION 1D	P2	Bus	1.07	1.05	1.06	1.08	1.06	1.04	1.11	1.09	1.08	1.10	1.11	Load power factor correction and voltage support if needed
HUMB_BS1 115kV	HUMB_G2 13.8KV SECTION 1D	P2	Bus	1.07	1.05	1.06	1.08	1.06	1.04	1.11	1.09	1.08	1.10	1.11	Load power factor correction and voltage support if needed
HUMBOLDT 115kV	HUMB_G2 13.8KV SECTION 1D	P2	Bus	1.07	1.05	1.06	1.08	1.06	1.04	1.11	1.09	1.08	1.10	1.12	Load power factor correction and voltage support if needed
HMBLDT B 115kV	HUMB_G3 13.8KV SECTION 1D	P2	Bus	1.07	1.05	1.06	1.08	1.06	1.04	1.12	1.09	1.08	1.10	1.11	Load power factor correction and voltage support if needed
HUMB_BS1 115kV	HUMB_G3 13.8KV SECTION 1D	P2	Bus	1.07	1.05	1.06	1.08	1.06	1.04	1.12	1.09	1.08	1.10	1.11	Load power factor correction and voltage support if needed
HUMBOLDT 115kV	HUMB_G3 13.8KV SECTION 1D	P2	Bus	1.07	1.05	1.06	1.08	1.06	1.04	1.12	1.09	1.08	1.10	1.12	Load power factor correction and voltage support if needed
HUMBOLDT 115kV	HMBLDT B 115KV SECTION 1D	P2	Bus	1.07	1.06	1.07	1.09	1.07	1.05	1.12	1.09	1.09	1.10	1.10	Load power factor correction and voltage support if needed
CARLOTTA 60kV	HMBLT BY 60KV - MIDDLE BREAKER BAY 3	P2	Non-bus-tie breaker	1.03	1.03	1.03	0.90	1.03	0.86	1.05	1.03	1.03	1.03	1.04	Load power factor correction and voltage support if needed
NEWBURG 60kV	HMBLT BY 60KV - MIDDLE BREAKER BAY 3	P2	Non-bus-tie breaker	1.02	1.02	1.03	0.89	1.02	0.85	1.05	1.02	1.02	1.03	1.03	Load power factor correction and voltage support if needed
PCLUMBER 60kV	HMBLT BY 60KV - MIDDLE BREAKER BAY 3	P2	Non-bus-tie breaker	1.03	1.03	1.03	0.90	1.03	0.86	1.05	1.03	1.03	1.03	1.04	Load power factor correction and voltage support if needed
RIO DELL 60kV	HMBLT BY 60KV - MIDDLE BREAKER BAY 3	P2	Non-bus-tie breaker	1.04	1.04	1.05	0.88	1.04	0.84	1.06	1.04	1.04	1.04	1.05	Load power factor correction and voltage support if needed
RIODLLTP 60kV	HMBLT BY 60KV - MIDDLE BREAKER BAY 3	P2	Non-bus-tie breaker	1.03	1.03	1.03	0.90	1.03	0.86	1.05	1.03	1.03	1.03	1.04	Load power factor correction and voltage support if needed
SCOTIATP 60kV	HMBLT BY 60KV - MIDDLE BREAKER BAY 3	P2	Non-bus-tie breaker	1.04	1.04	1.05	0.88	1.04	0.84	1.06	1.04	1.04	1.04	1.05	Load power factor correction and voltage support if needed
SCTIATP2 60kV	HMBLT BY 60KV - MIDDLE BREAKER BAY 3	P2	Non-bus-tie breaker	1.04	1.04	1.05	0.88	1.05	0.84	1.06	1.04	1.04	1.05	1.05	Load power factor correction and voltage support if needed
HMBLDT B 115kV	HMBLT BY 60KV - MIDDLE BREAKER BAY 5	P2	Non-bus-tie breaker	1.07	1.05	1.06	1.08	1.06	1.04	1.12	1.10	1.07	1.10	1.11	Load power factor correction and voltage support if needed
HUMB_BS1 115kV	HMBLT BY 60KV - MIDDLE BREAKER BAY 5	P2	Non-bus-tie breaker	1.07	1.05	1.06	1.08	1.06	1.04	1.12	1.10	1.07	1.10	1.11	Load power factor correction and voltage support if needed
HUMBOLDT 115kV	HMBLT BY 60KV - MIDDLE BREAKER BAY 5	P2	Non-bus-tie breaker	1.07	1.05	1.07	1.08	1.06	1.04	1.12	1.09	1.08	1.10	1.11	Load power factor correction and voltage support if needed

Study Area: PG&E Humboldt

High/Low Voltages



Substation	Contingency (All and Worst P6)	Category	Category Description	Post Cont. Voltage Deviation % (Baseline Scenarios)								t Cont. Voltage Deviation % (Sensitivity Scenar			Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Winter Peak	2023 Winter Peak	2028 Winter Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	
HMBLDT B 115kV	BRDGVLE 115KV - RING R3 & R2	P2	Non-bus-tie breaker	1.06	1.05	1.07	1.11	1.05	1.04	1.16	1.10	1.07	1.11	1.08	Load power factor correction and voltage support if needed
HUMB_BS1 115kV	BRDGVLE 115KV - RING R3 & R2	P2	Non-bus-tie breaker	1.06	1.05	1.07	1.11	1.05	1.04	1.16	1.10	1.07	1.11	1.08	Load power factor correction and voltage support if needed
HUMBOLDT 115kV	BRDGVLE 115KV - RING R3 & R2	P2	Non-bus-tie breaker	1.06	1.05	1.07	1.11	1.06	1.05	1.16	1.10	1.07	1.11	1.08	Load power factor correction and voltage support if needed
BRDGVLE 115kV	BRDGVLE 115KV - RING R1 & R2	P2	Non-bus-tie breaker	1.06	1.06	1.10	1.13	1.06	1.05	1.17	1.12	1.10	1.13	1.11	Load power factor correction and voltage support if needed
HMBLDT B 115kV	BRDGVLE 115KV - RING R1 & R2	P2	Non-bus-tie breaker	1.06	1.05	1.09	1.13	1.06	1.05	1.17	1.11	1.09	1.13	1.11	Load power factor correction and voltage support if needed
HUMB_BS1 115kV	BRDGVLE 115KV - RING R1 & R2	P2	Non-bus-tie breaker	1.06	1.05	1.09	1.13	1.06	1.05	1.17	1.11	1.09	1.13	1.11	Load power factor correction and voltage support if needed
HUMBOLDT 115kV	BRDGVLE 115KV - RING R1 & R2	P2	Non-bus-tie breaker	1.06	1.05	1.09	1.13	1.06	1.05	1.17	1.11	1.09	1.13	1.11	Load power factor correction and voltage support if needed
HMBLDT B 115kV	BRDGVLE 115KV - RING R1 & R3	P2	Non-bus-tie breaker	1.06	1.05	1.07	1.10	1.05	1.04	1.16	1.10	1.07	1.11	1.08	Load power factor correction and voltage support if needed
HUMB_BS1 115kV	BRDGVLE 115KV - RING R1 & R3	P2	Non-bus-tie breaker	1.06	1.05	1.07	1.10	1.05	1.04	1.16	1.10	1.07	1.11	1.08	Load power factor correction and voltage support if needed
HUMBOLDT 115kV	BRDGVLE 115KV - RING R1 & R3	P2	Non-bus-tie breaker	1.06	1.05	1.07	1.11	1.06	1.05	1.16	1.10	1.07	1.11	1.08	Load power factor correction and voltage support if needed
HMBLDT B 115kV	HUMBOLDT 60KV - MIDDLE BREAKER BAY 6	P2	Non-bus-tie breaker	1.06	1.05	1.07	1.10	1.06	1.07	1.12	1.09	1.07	1.10	1.08	Load power factor correction and voltage support if needed
HOOPA 60kV	HUMBOLDT 60KV - MIDDLE BREAKER BAY 6	P2	Non-bus-tie breaker	0.79	0.77	0.81	0.84	0.80	0.81	1.03	1.02	0.76	1.03	0.97	Load power factor correction and voltage support if needed
HUMB_BS1 115kV	HUMBOLDT 60KV - MIDDLE BREAKER BAY 6	P2	Non-bus-tie breaker	1.06	1.05	1.07	1.10	1.06	1.07	1.12	1.09	1.07	1.10	1.08	Load power factor correction and voltage support if needed
HUMBOLDT 115kV	HUMBOLDT 60KV - MIDDLE BREAKER BAY 6	P2	Non-bus-tie breaker	1.06	1.05	1.07	1.10	1.06	1.07	1.12	1.09	1.07	1.10	1.08	Load power factor correction and voltage support if needed
MPLE CRK 60kV	HUMBOLDT 60KV - MIDDLE BREAKER BAY 6	P2	Non-bus-tie breaker	0.85	0.84	0.87	0.90	0.86	0.86	1.05	1.03	0.83	1.04	0.99	Load power factor correction and voltage support if needed
RDGE CBN 60kV	HUMBOLDT 60KV - MIDDLE BREAKER BAY 6	P2	Non-bus-tie breaker	0.90	0.88	0.91	0.94	0.91	0.91	1.06	1.04	0.88	1.05	1.00	Load power factor correction and voltage support if needed
RUSS RCH 60kV	HUMBOLDT 60KV - MIDDLE BREAKER BAY 6	P2	Non-bus-tie breaker	0.84	0.82	0.86	0.89	0.85	0.85	1.04	1.03	0.82	1.04	0.99	Load power factor correction and voltage support if needed
WILLWCRK 60kV	HUMBOLDT 60KV - MIDDLE BREAKER BAY 6	P2	Non-bus-tie breaker	0.81	0.79	0.83	0.86	0.82	0.82	1.03	1.02	0.78	1.03	0.97	Load power factor correction and voltage support if needed
HMBLDT B 115kV	HUMBOLDT 60KV - MIDDLE BREAKER BAY 5	P2	Non-bus-tie breaker	1.08	1.07	1.09	1.11	1.07	1.10	1.14	1.11	1.09	1.11	1.10	Load power factor correction and voltage support if needed

Study Area: PG&E Humboldt

High/Low Voltages



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

Study Area: PG&E Humboldt

High/Low Voltages



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

Study Area: PG&E Humboldt

High/Low Voltages



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

Study Area: PG&E Humboldt

High/Low Voltages



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

Study Area: PG&E Humboldt

High/Low Voltages



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

Study Area: PG&E Humboldt

Voltage Deviation



Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)								Voltage PU (Sensitivity Scenarios)			Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Winter Peak	2023 Winter Peak	2028 Winter Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	
HOOPA 60kV	P1-2:A1:14:_HUMBOLDT 60KV [7130] MOAS OPENED ON HUMBOLDT_MPLE CRK	P1	N-1	17	19	16	13	16	16	1	0	20	1	4	Load power factor correction and voltage support if needed
MPLE CRK 60kV	P1-2:A1:14:_HUMBOLDT 60KV [7130] MOAS OPENED ON HUMBOLDT_MPLE CRK	P1	N-1	16	18	15	12	15	16	1	0	18	1	4	Load power factor correction and voltage support if needed
RDGE CBN 60kV	P1-2:A1:14:_HUMBOLDT 60KV [7130] MOAS OPENED ON HUMBOLDT_MPLE CRK	P1	N-1	12	14	12	10	12	12	1	0	14	0	3	Load power factor correction and voltage support if needed
RUSS RCH 60kV	P1-2:A1:14:_HUMBOLDT 60KV [7130] MOAS OPENED ON HUMBOLDT_MPLE CRK	P1	N-1	16	18	15	12	15	16	1	0	18	1	4	Load power factor correction and voltage support if needed
WILLWCRK 60kV	P1-2:A1:14:_HUMBOLDT 60KV [7130] MOAS OPENED ON HUMBOLDT_MPLE CRK	P1	N-1	16	19	16	13	16	16	1	0	19	1	4	Load power factor correction and voltage support if needed
CARLOTTA 60kV	P1-2:A1:16:_HUMBOLDT BAY 60KV [7100] MOAS OPENED ON EEL RIVR_NEWBURG	P1	N-1	1	0	0	9	1	12	0	1	0	1	0	Load power factor correction and voltage support if needed
NEWBURG 60kV	P1-2:A1:16:_HUMBOLDT BAY 60KV [7100] MOAS OPENED ON EEL RIVR_NEWBURG	P1	N-1	1	0	0	10	1	14	0	0	0	0	1	Load power factor correction and voltage support if needed
PCLUMBER 60kV	P1-2:A1:16:_HUMBOLDT BAY 60KV [7100] MOAS OPENED ON EEL RIVR_NEWBURG	P1	N-1	1	0	0	9	1	12	0	1	0	1	0	Load power factor correction and voltage support if needed
RIO DELL 60kV	P1-2:A1:16:_HUMBOLDT BAY 60KV [7100] MOAS OPENED ON EEL RIVR_NEWBURG	P1	N-1	1	0	0	9	1	13	0	0	0	0	0	Load power factor correction and voltage support if needed
RIODLLTP 60kV	P1-2:A1:16:_HUMBOLDT BAY 60KV [7100] MOAS OPENED ON EEL RIVR_NEWBURG	P1	N-1	1	0	0	9	1	13	0	0	0	0	0	Load power factor correction and voltage support if needed
SCOTIATP 60kV	P1-2:A1:16:_HUMBOLDT BAY 60KV [7100] MOAS OPENED ON EEL RIVR_NEWBURG	P1	N-1	1	0	0	9	1	13	0	0	0	0	0	Load power factor correction and voltage support if needed
SCTIATP2 60kV	P1-2:A1:16:_HUMBOLDT BAY 60KV [7100] MOAS OPENED ON EEL RIVR_NEWBURG	P1	N-1	1	0	0	9	1	13	0	0	0	0	0	Load power factor correction and voltage support if needed
BRDGVLLE 60kV	P1-3:A1:4:_BRDGVLLE 115/60KV TB 1	P1	N-1	2	2	3	8	2	7	3	1	4	2	1	Load power factor correction and voltage support if needed

Study Area: PG&E Humboldt

Voltage Deviation



Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)								Voltage PU (Sensitivity Scenarios)			Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Winter Peak	2023 Winter Peak	2028 Winter Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	
FRT SWRD 60kV	P1-4:A1:5:_GRBRVLL 60.00KV ID=7H & GRBRVLL 60.00KV ID=5H & GRBRVLL 60.00KV ID=8H & GRBRVLL 60.00KV ID=V SHUNT DEVICES	P1	N-1	7	6	8	6	6	9	1	0	7	0	4	Continue to monitor future load forecast
GRBRVLL 60kV	P1-4:A1:5:_GRBRVLL 60.00KV ID=7H & GRBRVLL 60.00KV ID=5H & GRBRVLL 60.00KV ID=8H & GRBRVLL 60.00KV ID=V SHUNT DEVICES	P1	N-1	9	8	11	7	8	12	1	0	10	0	5	Load power factor correction and voltage support if needed
KEKAWAKA 60kV	P1-4:A1:5:_GRBRVLL 60.00KV ID=7H & GRBRVLL 60.00KV ID=5H & GRBRVLL 60.00KV ID=8H & GRBRVLL 60.00KV ID=V SHUNT DEVICES	P1	N-1	8	7	10	6	7	11	1	0	9	0	5	Load power factor correction and voltage support if needed
HOOPA 60 kV	P1-1:A1:1:_PAC.LUMB 13.80KV GEN UNIT 1 & P1-2:A1:14:_HUMBOLDT 60KV [7130] MOAS OPENED ON HUMBOLDT_MPLE CRK	P3	G1/N1	<8	<8	<8	<8	<8	17	<8	<8	<8	<8	<8	Continue to monitor future load forecast
MPL CRK 60 kV	P1-1:A1:1:_PAC.LUMB 13.80KV GEN UNIT 1 & P1-2:A1:14:_HUMBOLDT 60KV [7130] MOAS OPENED ON HUMBOLDT_MPLE CRK	P3	G1/N1	<8	<8	<8	<8	<8	16	<8	<8	<8	<8	<8	Continue to monitor future load forecast
RUSS RCH 60 kV	P1-1:A1:1:_PAC.LUMB 13.80KV GEN UNIT 1 & P1-2:A1:14:_HUMBOLDT 60KV [7130] MOAS OPENED ON HUMBOLDT_MPLE CRK	P3	G1/N1	<8	<8	<8	<8	<8	16	<8	<8	<8	<8	<8	Continue to monitor future load forecast
FRT SWRD 60 kV	P1-1:A1:4:_BLUELKPP 12.47KV GEN UNIT 1 & P1-4:A1:5:_GRBRVLL 60.00KV ID=7H & GRBRVLL 60.00KV ID=5H & GRBRVLL 60.00KV ID=8H & GRBRVLL 60.00KV ID=V SHUNT DEVICES	P3	G1/N1	<8	<8	9	<8	<8	<8	<8	<8	<8	<8	<8	Continue to monitor future load forecast
GRBRVLL 60 kV	P1-1:A1:4:_BLUELKPP 12.47KV GEN UNIT 1 & P1-4:A1:5:_GRBRVLL 60.00KV ID=7H & GRBRVLL 60.00KV ID=5H & GRBRVLL 60.00KV ID=8H & GRBRVLL 60.00KV ID=V SHUNT DEVICES	P3	G1/N1	<8	<8	11	<8	<8	<8	<8	<8	<8	<8	<8	Continue to monitor future load forecast

Study Area: PG&E Humboldt

Voltage Deviation



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

Study Area: PG&E Humboldt

Transient Stability



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

Study Area: PG&E Humboldt



Single Contingency Load Drop

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

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

Study Area: PG&E Humboldt



Single Source Substation with more than 100 MW Load

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

No Single Source Substation with more than 100 MW Load.