

Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading % (Baseline Scenarios)								Loading % (Sensitivity Scenarios)			Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Winter Peak	2023 Winter Peak	2028 Winter Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	
31000 HUMBOLDT 115 31015 BRDGVILLE 115 1 1	HUMBOLDT 60KV [7130] MOAS OPENED ON HUMBOLDT_MPLE CRK & 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	BRIDGEVILLE-GARBERVILLE 60KV [6220] MOAS OPENED ON BRDGVILLE_FRUTLDJT & BRIDGEVILLE-COTTONWOOD 115KV [1110]	P6	N-1-1	81	75	73	<100	100	<100	<100	<100	100	<100	100	Sensitivity only
	GARBERVILLE 60KV [8365] & BRIDGEVILLE-COTTONWOOD 115KV [1110]	P6	N-1-1	<100	<100	<100	<100	100	<100	<100	<100	89	<100	100	Operating solution
	BRIDGEVILLE-GARBERVILLE 60KV [6220] MOAS OPENED ON FTSWRDJT_GRBRVLL & 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	HUMBOLDT BAY 60KV [7090]	P1	N-1	100	110	100	74	100	71	64	15	120	126	15	Non-BES facility
	HMBLT BY-HARRIS 60KV [0] MOAS OPENED ON HARRIS_HARRISST	P1	N-1	86	96	89	64	82	63	54	14	104	103	15	Sensitivity only
	HUMBOLDT BAY 60KV [7070] (EUREKA-HMBLT BY)	P2	Line Section w/o fault	88	97	90	65	82	64	54	15	105	103	15	Non-BES facility
	HMBLT BY 60KV - MIDDLE BREAKER BAY 3	P2	Non-bus-tie breaker	100	109	103	93	90	97	45	5	121	110	5	Non-BES facility
	HUMBOLDT 60KV - MIDDLE BREAKER BAY 2	P2	Non-bus-tie breaker	96	106	94	66	98	65	61	12	115	122	13	Non-BES facility
	HUMBOLDT BAY 60KV [7070] MOAS OPENED ON HUMBOLDT_HARRIS & HUMBOLDT BAY 60KV [7090]	P6	N-1-1	96	98	87	86	101	74	<100	<100	100	<100	100	Non-BES facility
	HUMBOLDT BAY 60KV [7090] & HMBLT BY-HARRIS 60KV [0] MOAS OPENED ON HARRIS_HARRISST	P6	N-1-1	99	99	99	101	101	100	90	<100	98	<100	100	Non-BES facility
	RIO DELL JCT 60KV [7850] MOAS OPENED ON CARLOTTA_SWNS FLT & HUMBOLDT BAY 60KV [7090]	P6	N-1-1	100	100	100	82	100	76	<100	<100	100	<100	100	Non-BES facility
	BRIDGEVILLE-GARBERVILLE 60KV [6220] MOAS OPENED ON FTSWRDJT_GRBRVLL & HUMBOLDT BAY 60KV [7090]	P6	N-1-1	82	90	83	78	101	74	<100	<100	99	<100	100	Non-BES facility
	HUMBOLDT BAY & HUMBOLDT BAY LINES	P7	DCTL	106	116	106	77	128	64	79	105	15	130	15	Non-BES facility
31086 EUREKA 60.0 31090 HMBLT BY 60.0 1 1	HUMBOLDT BAY 60KV [7090]	P1	N-1	99	98	90	74	86	64	59	17	105	106	18	Sensitivity only
	HUMBOLDT 60KV - MIDDLE BREAKER BAY 2	P2	Non-bus-tie breaker	97	96	90	69	85	63	57	16	103	103	17	Non-BES facility
	HMBLT BY 60KV - MIDDLE BREAKER BAY 4	P2	Non-bus-tie breaker	80	89	74	50	90	40	26	30	105	110	31	Non-BES facility
	HUMBOLDT BAY-HUMBOLDT #1 60KV [7080] & HUMBOLDT BAY 60KV [7090]	P6	N-1-1	100	101	100	100	101	100	89	<100	100	<100	101	Non-BES facility
	HUMBOLDT BAY 60KV [7090] & HUMBOLDT BAY-HUMBOLDT #1 60KV [7080]	P6	N-1-1	100	101	100	101	100	100	89	<100	100	<100	99	Non-BES facility
	HUMBOLDT BAY & HUMBOLDT BAY LINES	P7	DCTL	103	101	94	69	111	59	78	90	17	109	17	Non-BES facility

Overloaded Facility	Contingency (All and Worst P6)	Category	Category Description	Loading % (Baseline Scenarios)								Loading % (Sensitivity Scenarios)			Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Winter Peak	2023 Winter Peak	2028 Winter Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	
31104 CARLOTTA 60.0 31105 RIODLLTP 60.0 1 1	HUMBOLDT 115KV [1810]	P1	N-1	96	94	88	50	92	39	34	2	115	111	4	Sensitivity only
	HUMBOLDT BAY 60KV [7100] (HMBLT BY-EEL RIVR)	P2	Line Section w/o fault	29	37	26	103	35	97	57	57	37	51	59	Non-BES facility
	HUMBOLDT 115KV SECTION MA	P2	Bus	80	81	63	20	111	34	49	12	91	154	6	Operating solution
	HUMBOLDT - MA 115KV & HUMBOLDT LINE	P2	Non-bus-tie breaker	82	84	64	24	118	44	53	14	94	165	7	Operating solution
	BRDGVILLE 115KV - RING R1 & R3	P2	Non-bus-tie breaker	86	87	84	65	70	54	24	3	103	82	1	Sensitivity only
	HUMBOLDT 115KV [1810] & HUMBOLDT 115KV [1820]	P6	N-1-1	100	101	101	79	100	<100	<100	<100	100	<100	100	System upgrade or preferred resource
	HUMBOLDT 115/60KV TB 2 & HUMBOLDT 115/60KV TB 1	P6	N-1-1	<100	<100	<100	<100	101	<100	<100	<100	<100	<100	101	Non-BES facility
31104 CARLOTTA 60.0 31108 SWNS FLT 60.0 1 1	HUMBOLDT 115KV [1810]	P1	N-1	92	90	85	44	90	36	31	4	111	108	5	Sensitivity only
	HUMBOLDT BAY 60KV [7100] (HMBLT BY-EEL RIVR)	P2	Line Section w/o fault	25	32	24	106	32	103	54	57	32	47	59	Non-BES facility
	HUMBOLDT 115KV SECTION MA	P2	Bus	76	77	61	23	108	39	46	13	86	151	6	Operating solution
	HUMBOLDT - MA 115KV & HUMBOLDT LINE	P2	Non-bus-tie breaker	78	79	61	28	115	48	50	14	89	163	7	Operating solution
31108 SWNS FLT 60.0 31110 BRDGVILLE 60.0 1 1	HUMBOLDT 115KV [1810]	P1	N-1	92	89	85	43	89	36	30	3	110	107	4	Sensitivity only
	HUMBOLDT BAY 60KV [7100] (HMBLT BY-EEL RIVR)	P2	Line Section w/o fault	25	31	23	106	32	104	53	57	32	47	58	Non-BES facility
	HUMBOLDT 115KV SECTION MA	P2	Bus	75	76	60	23	108	39	46	13	86	150	6	Operating solution
	HUMBOLDT - MA 115KV & HUMBOLDT LINE	P2	Non-bus-tie breaker	77	79	61	28	115	48	49	14	89	162	7	Operating solution
31110 BRDGVILLE 60.0 31120 FRUTLDJT 60.0 1 1	Base Case	P0	N-0	93	95	96	70	60	66	17	5	111	73	8	Sensitivity only
	HUMBOLDT 60KV [7130] MOAS OPENED ON HUMBOLDT_MPLE CRK	P1	N-1	86	87	88	67	59	64	16	4	102	68	7	Sensitivity only
	HMBLT BY-HARRIS 60KV [0] MOAS OPENED ON HARRIS_HARRISST	P1	N-1	88	90	89	69	59	65	17	4	104	67	7	Sensitivity only
	HUMBOLDT 115KV [1820]	P1	N-1	93	94	94	69	69	65	17	7	113	82	10	Sensitivity only
	BRIDGEVILLE-COTTONWOOD 115KV [1110]	P1	N-1	99	99	98	68	77	63	19	9	120	91	11	Sensitivity only
	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	58	65	15	3	102	67	4	Sensitivity only
	HUMBOLDT 115KV [1820] (HUMBOLDT-TRINITY)	P2	Line Section w/o fault	93	93	93	70	68	65	17	7	112	80	10	Sensitivity only
	BRIDGEVILLE-COTTONWOOD 115KV [1110] (FRSTGLEN-LOW GAP1)	P2	Line Section w/o fault	98	98	96	67	76	62	20	10	119	92	13	Sensitivity only
	LOW GAP1 115KV SECTION 1D	P2	Bus	99	99	98	68	77	63	18	9	120	91	11	Sensitivity only
	HMBLT BY 60KV - MIDDLE BREAKER BAY 3	P2	Non-bus-tie breaker	91	91	91	70	60	66	19	3	105	69	1	Non-BES facility
	BRDGVILLE 115KV - RING R3 & R2	P2	Non-bus-tie breaker	87	87	87	59	69	50	21	2	105	84	2	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	
	BRIDGEVILLE-COTTONWOOD 115KV [1110] & HUMBOLDT 115KV [1820]	P6	N-1-1	101	101	100	83	100	70	<100	<100	100	<100	99	System upgrade or preferred resource
	HUMBOLDT #1 & ESSEX JCT-ARCATA-FAIRHAVEN LINES	P7	DCTL	88	90	89	66	104	17	70	60	4	68	6	Operating solution
	ARCATA-HUMBOLDT & FAIRHAVEN-HUMBOLDT & HUMBOLDT #1 LINES	P7	DCTL	87	88	87	68	103	19	73	59	6	65	8	Operating solution
31120 FRUTLDJT 60.0 31122 FTSWRDJT 60.0 1 1	BRIDGEVILLE-COTTONWOOD 115KV [1110]	P1	N-1	86	86	88	61	73	59	16	12	105	80	14	Sensitivity only
	BRIDGEVILLE-COTTONWOOD 115KV [1110] (FRSTGLEN-LOW GAP1)	P2	Line Section w/o fault	85	85	86	60	72	58	18	13	104	82	15	Sensitivity only
	LOW GAP1 115KV SECTION 1D	P2	Bus	86	86	88	61	73	59	16	12	105	80	14	Sensitivity only
31122 FTSWRDJT 60.0 31116 GRBRVLL 60.0 1 1	Base Case	P0	N-0	85	85	90	60	55	60	16	11	100	67	14	Sensitivity only
	HUMBOLDT 115KV [1820]	P1	N-1	86	85	89	60	65	59	15	12	104	77	15	Sensitivity only
	BRIDGEVILLE-COTTONWOOD 115KV [1110]	P1	N-1	92	90	93	59	72	58	17	14	111	86	17	Sensitivity only
	HUMBOLDT 115KV [1820] (HUMBOLDT-TRINITY)	P2	Line Section w/o fault	86	84	88	61	63	60	16	13	102	75	15	Sensitivity only
	BRIDGEVILLE-COTTONWOOD 115KV [1110] (FRSTGLEN-LOW GAP1)	P2	Line Section w/o fault	91	89	91	58	72	57	19	16	109	87	18	Sensitivity only
	LOW GAP1 115KV SECTION 1D	P2	Bus	92	90	93	59	72	58	17	14	111	86	17	Sensitivity only

Study Area: PG&E Humboldt

High/Low Voltages



Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)								Voltage PU (Sensitivity Scenarios)			Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 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 60 kV	Base Case	P0	Base case	1.04	1.03	1.03	1.05	1.03	1.03	1.07	1.05	1.04	1.04	1.05	Load power factor correction and voltage support if needed
BRDGVLLE 115 kV	Base Case	P0	Base case	1.06	1.05	1.06	1.07	1.06	1.04	1.10	1.08	1.06	1.07	1.08	Load power factor correction and voltage support if needed
FRUITLND 60 kV	Base Case	P0	Base case	1.03	1.03	1.02	1.04	1.03	1.02	1.05	1.04	1.03	1.04	1.05	Load power factor correction and voltage support if needed
HMBLDT B 115 kV	Base Case	P0	Base case	1.06	1.05	1.06	1.08	1.06	1.05	1.12	1.09	1.07	1.08	1.10	Load power factor correction and voltage support if needed
HUMB_BS1 115 kV	Base Case	P0	Base case	1.06	1.05	1.06	1.08	1.06	1.05	1.12	1.09	1.07	1.08	1.10	Load power factor correction and voltage support if needed
HUMBOLDT 115 kV	Base Case	P0	Base case	1.06	1.05	1.06	1.08	1.06	1.05	1.12	1.09	1.07	1.08	1.10	Load power factor correction and voltage support if needed
LOW GAP1 115 kV	Base Case	P0	Base case	1.06	1.05	1.05	1.07	1.05	1.04	1.10	1.07	1.06	1.06	1.08	Load power factor correction and voltage support if needed
RDGE CBN 60 kV	Base Case	P0	Base case	1.02	1.02	1.03	1.03	1.03	1.03	1.05	1.04	1.02	1.03	1.04	Load power factor correction and voltage support if needed
RIO DELL 60 kV	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 60 kV	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 60 kV	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 60 kV	Base Case	P0	Base case	1.04	1.03	1.03	1.03	1.03	1.02	1.07	1.05	1.03	1.04	1.05	Load power factor correction and voltage support if needed
HMBLDT B 115 kV	HUMB_G1 13.80KV UNITS 1 2 3 AND 4	P1	N-1	1.07	1.06	1.07	1.08	1.09	1.05	1.12	1.09	1.09	1.10	1.10	Load power factor correction and voltage support if needed
HUMB_BS1 115 kV	HUMB_G1 13.80KV UNITS 1 2 3 AND 4	P1	N-1	1.07	1.06	1.07	1.08	1.09	1.05	1.12	1.09	1.09	1.10	1.10	Load power factor correction and voltage support if needed
HUMBOLDT 115 kV	HUMB_G1 13.80KV UNITS 1 2 3 AND 4	P1	N-1	1.07	1.06	1.07	1.08	1.09	1.05	1.12	1.09	1.09	1.10	1.10	Load power factor correction and voltage support if needed
HMBLDT B 115 kV	HUMB_G2 13.80KV UNITS 5 6 AND 7	P1	N-1	1.07	1.05	1.06	1.08	1.09	1.04	1.11	1.09	1.08	1.11	1.10	Load power factor correction and voltage support if needed
HUMBOLDT 115 kV	HUMB_G2 13.80KV UNITS 5 6 AND 7	P1	N-1	1.07	1.05	1.06	1.08	1.09	1.04	1.11	1.09	1.08	1.12	1.10	Load power factor correction and voltage support if needed
HMBLDT B 115 kV	HUMB_G3 13.80KV UNITS 8 9 AND 10	P1	N-1	1.07	1.05	1.06	1.08	1.09	1.04	1.12	1.09	1.08	1.11	1.10	Load power factor correction and voltage support if needed
HUMB_BS1 115 kV	HUMB_G3 13.80KV UNITS 8 9 AND 10	P1	N-1	1.07	1.05	1.06	1.08	1.09	1.04	1.12	1.09	1.08	1.11	1.10	Load power factor correction and voltage support if needed
HUMBOLDT 115 kV	HUMB_G3 13.80KV UNITS 8 9 AND 10	P1	N-1	1.07	1.05	1.06	1.08	1.09	1.04	1.12	1.09	1.08	1.12	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	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	
HUMBOLDT 115 kV	HUMBOLDT BAY 115KV [7090]	P1	N-1	1.07	1.06	1.07	1.09	1.09	1.05	1.12	1.09	1.09	1.10	1.10	Load power factor correction and voltage support if needed
HOOPA 60 kV	HUMBOLDT 60KV [7130] MOAS OPENED ON HUMBOLDT_MPLE CRK	P1	N-1	0.80	0.77	0.81	0.84	0.95	0.81	1.03	1.02	0.76	0.97	1.03	Voltage support, UVLS and/ or SPS
MPLC CRK 60 kV	HUMBOLDT 60KV [7130] MOAS OPENED ON HUMBOLDT_MPLE CRK	P1	N-1	0.86	0.84	0.87	0.90	0.98	0.86	1.05	1.03	0.83	0.99	1.04	Voltage support, UVLS and/ or SPS
RDGE CBN 60 kV	HUMBOLDT 60KV [7130] MOAS OPENED ON HUMBOLDT_MPLE CRK	P1	N-1	0.90	0.88	0.91	0.94	0.99	0.90	1.06	1.04	0.88	1.01	1.05	Voltage support, UVLS and/ or SPS
RUSS RCH 60 kV	HUMBOLDT 60KV [7130] MOAS OPENED ON HUMBOLDT_MPLE CRK	P1	N-1	0.85	0.83	0.86	0.89	0.97	0.85	1.04	1.03	0.82	0.99	1.04	Voltage support, UVLS and/ or SPS
WILLWCRK 60 kV	HUMBOLDT 60KV [7130] MOAS OPENED ON HUMBOLDT_MPLE CRK	P1	N-1	0.82	0.79	0.83	0.86	0.96	0.82	1.03	1.02	0.78	0.98	1.03	Voltage support, UVLS and/ or SPS
CARLOTTA 60 kV	HUMBOLDT BAY 60KV [7100] MOAS OPENED ON EEL RIVR_NEWBURG	P1	N-1	1.03	1.03	1.03	0.91	1.04	0.86	1.05	1.03	1.03	1.04	1.03	Load power factor correction and voltage support if needed
NEWBURG 60 kV	HUMBOLDT BAY 60KV [7100] MOAS OPENED ON EEL RIVR_NEWBURG	P1	N-1	1.02	1.02	1.02	0.89	1.03	0.85	1.04	1.02	1.02	1.03	1.02	Load power factor correction and voltage support if needed
RIO DELL 60 kV	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	1.05	1.04	Load power factor correction and voltage support if needed
RIODLLTP 60 kV	HUMBOLDT BAY 60KV [7100] MOAS OPENED ON EEL RIVR_NEWBURG	P1	N-1	1.03	1.03	1.03	0.90	1.04	0.86	1.05	1.03	1.03	1.04	1.03	Load power factor correction and voltage support if needed
SCOTIATP 60 kV	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	1.05	1.04	Load power factor correction and voltage support if needed
SCTIATP2 60 kV	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	1.05	1.04	Load power factor correction and voltage support if needed
HMBLDT B 115 kV	HUMB_BS3-HMBLT BY #1 60KV [0]	P1	N-1	1.07	1.05	1.06	1.08	1.09	1.04	1.12	1.09	1.08	1.11	1.10	Load power factor correction and voltage support if needed
HUMB_BS1 115 kV	HUMB_BS3-HMBLT BY #1 60KV [0]	P1	N-1	1.07	1.05	1.06	1.08	1.09	1.04	1.12	1.09	1.08	1.11	1.10	Load power factor correction and voltage support if needed
HUMBOLDT 115 kV	HUMB_BS3-HMBLT BY #1 60KV [0]	P1	N-1	1.07	1.05	1.06	1.08	1.09	1.04	1.12	1.09	1.08	1.12	1.10	Load power factor correction and voltage support if needed
HMBLDT B 115 kV	HUMBOLDT 115KV [1810]	P1	N-1	1.06	1.05	1.07	1.13	1.06	1.05	1.16	1.10	1.08	1.12	1.11	Load power factor correction and voltage support if needed
HUMB_BS1 115 kV	HUMBOLDT 115KV [1810]	P1	N-1	1.06	1.05	1.07	1.13	1.06	1.05	1.16	1.10	1.08	1.12	1.11	Load power factor correction and voltage support if needed
HUMBOLDT 115 kV	HUMBOLDT 115KV [1810]	P1	N-1	1.06	1.05	1.07	1.14	1.06	1.05	1.16	1.10	1.09	1.12	1.11	Load power factor correction and voltage support if needed
HMBLDT B 115 kV	HUMB_BS2-HMBLT BY #1 60KV [0]	P1	N-1	1.07	1.05	1.06	1.08	1.09	1.04	1.11	1.09	1.08	1.11	1.10	Load power factor correction and voltage support if needed
HUMB_BS1 115 kV	HUMB_BS2-HMBLT BY #1 60KV [0]	P1	N-1	1.07	1.05	1.06	1.08	1.09	1.04	1.11	1.09	1.08	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	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	
HUMBOLDT 115 kV	HUMB_BS2-HMBLT BY #1 60KV [0]	P1	N-1	1.07	1.05	1.06	1.08	1.09	1.04	1.11	1.09	1.08	1.12	1.10	Load power factor correction and voltage support if needed
HMBLDT B 115 kV	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	1.08	1.10	Load power factor correction and voltage support if needed
HUMB_BS1 115 kV	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	1.08	1.10	Load power factor correction and voltage support if needed
HUMBOLDT 115 kV	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	1.08	1.10	Load power factor correction and voltage support if needed
HMBLDT B 115 kV	HUMB_BS1 115/13.8KV TB 1	P1	N-1	1.07	1.06	1.07	1.09	1.09	1.05	1.12	1.09	1.09	1.10	1.10	Load power factor correction and voltage support if needed
HUMBOLDT 115 kV	HUMB_BS1 115/13.8KV TB 1	P1	N-1	1.07	1.06	1.07	1.09	1.09	1.05	1.12	1.09	1.09	1.10	1.10	Load power factor correction and voltage support if needed
BRDGVLLE 115 kV	BRDGVLLE 115/60KV TB 1	P1	N-1	1.06	1.05	1.07	1.09	1.06	1.05	1.13	1.09	1.07	1.08	1.09	Load power factor correction and voltage support if needed
HMBLDT B 115 kV	HUMB_BS3 60/13.8KV TB 2	P1	N-1	1.07	1.05	1.06	1.08	1.09	1.04	1.12	1.09	1.08	1.11	1.10	Load power factor correction and voltage support if needed
HUMB_BS1 115 kV	HUMB_BS3 60/13.8KV TB 2	P1	N-1	1.07	1.05	1.06	1.08	1.09	1.04	1.12	1.09	1.08	1.11	1.10	Load power factor correction and voltage support if needed
HUMBOLDT 115 kV	HUMB_BS3 60/13.8KV TB 2	P1	N-1	1.07	1.05	1.06	1.08	1.09	1.04	1.12	1.09	1.08	1.12	1.10	Load power factor correction and voltage support if needed
HMBLDT B 115 kV	HUMB_BS2 60/13.8KV TB 1	P1	N-1	1.07	1.05	1.06	1.08	1.09	1.04	1.11	1.09	1.08	1.11	1.10	Load power factor correction and voltage support if needed
HUMB_BS1 115 kV	HUMB_BS2 60/13.8KV TB 1	P1	N-1	1.07	1.05	1.06	1.08	1.09	1.04	1.11	1.09	1.08	1.11	1.10	Load power factor correction and voltage support if needed
HUMBOLDT 115 kV	HUMB_BS2 60/13.8KV TB 1	P1	N-1	1.07	1.05	1.06	1.08	1.09	1.04	1.11	1.09	1.08	1.12	1.10	Load power factor correction and voltage support if needed
HOOPA 60 kV	HUMBOLDT 60KV [7130] (HUMBOLDT-MPLE CRK)	P2	Line Section w/o fault	0.80	0.77	0.81	0.84	0.95	0.81	1.03	1.02	0.76	0.97	1.03	Load power factor correction and voltage support if needed
MPLE CRK 60 kV	HUMBOLDT 60KV [7130] (HUMBOLDT-MPLE CRK)	P2	Line Section w/o fault	0.86	0.84	0.87	0.90	0.98	0.86	1.05	1.03	0.83	0.99	1.04	Load power factor correction and voltage support if needed
RDGE CBN 60 kV	HUMBOLDT 60KV [7130] (HUMBOLDT-MPLE CRK)	P2	Line Section w/o fault	0.90	0.88	0.91	0.94	0.99	0.90	1.06	1.04	0.88	1.01	1.05	Load power factor correction and voltage support if needed
RUSS RCH 60 kV	HUMBOLDT 60KV [7130] (HUMBOLDT-MPLE CRK)	P2	Line Section w/o fault	0.85	0.83	0.86	0.89	0.97	0.85	1.04	1.03	0.82	0.99	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	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	
WILLWCRK 60 kV	HUMBOLDT 60KV [7130] (HUMBOLDT-MPLE CRK)	P2	Line Section w/o fault	0.82	0.79	0.83	0.86	0.96	0.82	1.03	1.02	0.78	0.98	1.03	Load power factor correction and voltage support if needed
BRDGVLLE 115 kV	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	1.08	1.10	Load power factor correction and voltage support if needed
LOW GAP1 115 kV	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	1.08	1.11	Load power factor correction and voltage support if needed
CARLOTTA 60 kV	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	1.04	1.03	Load power factor correction and voltage support if needed
EEL RIVR 60 kV	HUMBOLDT BAY 60KV [7100] (HMBLT BY-EEL RIVR)	P2	Line Section w/o fault	1.03	0.97	1.00	0.65	1.04	0.69	1.04	1.02	0.97	1.04	1.02	Load power factor correction and voltage support if needed
NEWBURG 60 kV	HUMBOLDT BAY 60KV [7100] (HMBLT BY-EEL RIVR)	P2	Line Section w/o fault	1.03	0.98	1.00	0.66	1.04	0.69	1.04	1.02	0.98	1.04	1.02	Load power factor correction and voltage support if needed
PCLUMBER 60 kV	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	1.04	1.03	Load power factor correction and voltage support if needed
RIO DELL 60 kV	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	1.05	1.04	Load power factor correction and voltage support if needed
RIODLLTP 60 kV	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	1.04	1.03	Load power factor correction and voltage support if needed
SCOTIATP 60 kV	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	1.05	1.04	Load power factor correction and voltage support if needed
SCTIATP2 60 kV	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	1.05	1.04	Load power factor correction and voltage support if needed
SWNS FLT 60 kV	HUMBOLDT BAY 60KV [7100] (HMBLT BY-EEL RIVR)	P2	Line Section w/o fault	1.04	1.02	1.03	0.91	1.04	0.90	1.06	1.04	1.03	1.04	1.04	Load power factor correction and voltage support if needed
HMBLDT B 115 kV	HUMB_BS3-HMBLT BY 60KV [0] NO FAULT	P2	Line Section w/o fault	1.07	1.05	1.06	1.08	1.09	1.04	1.12	1.09	1.08	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	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	
HUMB_BS1 115 kV	HUMB_BS3-HMBLT BY 60KV [0] NO FAULT	P2	Line Section w/o fault	1.07	1.05	1.06	1.08	1.09	1.04	1.12	1.09	1.08	1.11	1.10	Load power factor correction and voltage support if needed
HUMBOLDT 115 kV	HUMB_BS3-HMBLT BY 60KV [0] NO FAULT	P2	Line Section w/o fault	1.07	1.05	1.06	1.08	1.09	1.04	1.12	1.09	1.08	1.12	1.10	Load power factor correction and voltage support if needed
HMBLDT B 115 kV	HUMB_BS2-HMBLT BY 60KV [0] NO FAULT	P2	Line Section w/o fault	1.07	1.05	1.06	1.08	1.09	1.04	1.11	1.09	1.08	1.11	1.10	Load power factor correction and voltage support if needed
HUMBOLDT 115 kV	HUMB_BS2-HMBLT BY 60KV [0] NO FAULT	P2	Line Section w/o fault	1.07	1.05	1.06	1.08	1.09	1.04	1.11	1.09	1.08	1.12	1.10	Load power factor correction and voltage support if needed
CARLOTTA 60 kV	HUMBOLDT BAY 60KV [7100] (EEL RIVR-NEWBURG)	P2	Line Section w/o fault	1.03	1.03	1.03	0.90	1.04	0.87	1.05	1.03	1.03	1.04	1.03	Load power factor correction and voltage support if needed
PCLUMBER 60 kV	HUMBOLDT BAY 60KV [7100] (EEL RIVR-NEWBURG)	P2	Line Section w/o fault	1.03	1.03	1.03	0.90	1.04	0.87	1.05	1.03	1.03	1.04	1.03	Load power factor correction and voltage support if needed
RIO DELL 60 kV	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	1.05	1.04	Load power factor correction and voltage support if needed
RIODLLTP 60 kV	HUMBOLDT BAY 60KV [7100] (EEL RIVR-NEWBURG)	P2	Line Section w/o fault	1.03	1.03	1.03	0.90	1.04	0.86	1.05	1.03	1.03	1.04	1.03	Load power factor correction and voltage support if needed
SCOTIATP 60 kV	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	1.05	1.04	Load power factor correction and voltage support if needed
SCTIATP2 60 kV	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	1.05	1.04	Load power factor correction and voltage support if needed
HMBLDT B 115 kV	HUMBOLDT BAY 115KV [7090] (HUMB_BS1-HMBLDT B)	P2	Line Section w/o fault	1.07	1.06	1.07	1.09	1.09	1.05	1.12	1.09	1.09	1.10	1.10	Load power factor correction and voltage support if needed
HUMBOLDT 115 kV	HUMBOLDT BAY 115KV [7090] (HUMB_BS1-HMBLDT B)	P2	Line Section w/o fault	1.07	1.06	1.07	1.09	1.09	1.05	1.12	1.09	1.09	1.10	1.10	Load power factor correction and voltage support if needed
HMBLDT B 115 kV	PACIFIC LUMBER (SCOTIA) TAP 60KV [7852] (SCTIATP2-SCOTIATP)	P2	Line Section w/o fault	1.07	1.05	1.06	1.10	1.08	1.06	1.12	1.08	1.07	1.11	1.09	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	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	
HUMB_BS1 115 kV	PACIFIC LUMBER (SCOTIA) TAP 60KV [7852] (SCTIATP2-SCOTIATP)	P2	Line Section w/o fault	1.07	1.05	1.06	1.10	1.08	1.06	1.12	1.08	1.07	1.11	1.09	Load power factor correction and voltage support if needed
HUMBOLDT 115 kV	PACIFIC LUMBER (SCOTIA) TAP 60KV [7852] (SCTIATP2-SCOTIATP)	P2	Line Section w/o fault	1.07	1.05	1.06	1.10	1.08	1.06	1.12	1.08	1.07	1.11	1.09	Load power factor correction and voltage support if needed
HMBLDT B 115 kV	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	1.08	1.10	Load power factor correction and voltage support if needed
HUMB_BS1 115 kV	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	1.08	1.10	Load power factor correction and voltage support if needed
HUMBOLDT 115 kV	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	1.08	1.10	Load power factor correction and voltage support if needed
HMBLDT B 115 kV	HUMB_G1 13.8KV SECTION 1D	P2	Bus	1.07	1.06	1.07	1.09	1.09	1.05	1.12	1.09	1.09	1.10	1.10	Load power factor correction and voltage support if needed
HUMBOLDT 115 kV	HUMB_G1 13.8KV SECTION 1D	P2	Bus	1.07	1.06	1.07	1.09	1.09	1.05	1.12	1.09	1.09	1.10	1.10	Load power factor correction and voltage support if needed
HMBLDT B 115 kV	HUMB_G2 13.8KV SECTION 1D	P2	Bus	1.07	1.05	1.06	1.08	1.09	1.04	1.11	1.09	1.08	1.11	1.10	Load power factor correction and voltage support if needed
HUMBOLDT 115 kV	HUMB_G2 13.8KV SECTION 1D	P2	Bus	1.07	1.05	1.06	1.08	1.09	1.04	1.11	1.09	1.08	1.12	1.10	Load power factor correction and voltage support if needed
HMBLDT B 115 kV	HUMB_G3 13.8KV SECTION 1D	P2	Bus	1.07	1.05	1.06	1.08	1.09	1.04	1.12	1.09	1.08	1.11	1.10	Load power factor correction and voltage support if needed
HUMB_BS1 115 kV	HUMB_G3 13.8KV SECTION 1D	P2	Bus	1.07	1.05	1.06	1.08	1.09	1.04	1.12	1.09	1.08	1.11	1.10	Load power factor correction and voltage support if needed
HUMBOLDT 115 kV	HUMB_G3 13.8KV SECTION 1D	P2	Bus	1.07	1.05	1.06	1.08	1.09	1.04	1.12	1.09	1.08	1.12	1.10	Load power factor correction and voltage support if needed
HUMBOLDT 115 kV	HMBLDT B 115KV SECTION 1D	P2	Bus	1.07	1.06	1.07	1.09	1.09	1.05	1.12	1.09	1.09	1.10	1.10	Load power factor correction and voltage support if needed
CARLOTTA 60 kV	HMBLT BY 60KV - MIDDLE BREAKER BAY 3	P2	Non-bus-tie breaker	1.03	1.03	1.03	0.90	1.04	0.86	1.05	1.03	1.03	1.04	1.03	Load power factor correction and voltage support if needed
RIO DELL 60 kV	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	1.04	Load power factor correction and voltage support if needed
RIODLLTP 60 kV	HMBLT BY 60KV - MIDDLE BREAKER BAY 3	P2	Non-bus-tie breaker	1.03	1.03	1.03	0.90	1.04	0.86	1.05	1.03	1.03	1.04	1.03	Load power factor correction and voltage support if needed
SCOTIATP 60 kV	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	1.04	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	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	
SCTIATP2 60 kV	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 115 kV	HMBLT BY 60KV - MIDDLE BREAKER BAY 5	P2	Non-bus-tie breaker	1.07	1.05	1.06	1.08	1.09	1.04	1.12	1.10	1.07	1.11	1.10	Load power factor correction and voltage support if needed
HUMB_BS1 115 kV	HMBLT BY 60KV - MIDDLE BREAKER BAY 5	P2	Non-bus-tie breaker	1.07	1.05	1.06	1.08	1.09	1.04	1.12	1.10	1.07	1.11	1.10	Load power factor correction and voltage support if needed
HUMBOLDT 115 kV	HMBLT BY 60KV - MIDDLE BREAKER BAY 5	P2	Non-bus-tie breaker	1.07	1.05	1.07	1.08	1.09	1.04	1.12	1.09	1.08	1.11	1.10	Load power factor correction and voltage support if needed
HMBLDT B 115 kV	BRDGVLLE 115KV - RING R3 & R2	P2	Non-bus-tie breaker	1.06	1.05	1.07	1.11	1.06	1.04	1.16	1.10	1.07	1.08	1.11	Load power factor correction and voltage support if needed
HUMBOLDT 115 kV	BRDGVLLE 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	1.08	1.11	Load power factor correction and voltage support if needed
BRDGVLLE 115 kV	BRDGVLLE 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	1.11	1.13	Load power factor correction and voltage support if needed
HMBLDT B 115 kV	BRDGVLLE 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	1.11	1.13	Load power factor correction and voltage support if needed
HUMB_BS1 115 kV	BRDGVLLE 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	1.11	1.13	Load power factor correction and voltage support if needed
HUMBOLDT 115 kV	BRDGVLLE 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	1.11	1.13	Load power factor correction and voltage support if needed
HMBLDT B 115 kV	BRDGVLLE 115KV - RING R1 & R3	P2	Non-bus-tie breaker	1.06	1.05	1.07	1.10	1.06	1.04	1.16	1.10	1.07	1.08	1.11	Load power factor correction and voltage support if needed
HUMBOLDT 115 kV	BRDGVLLE 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	1.08	1.11	Load power factor correction and voltage support if needed
HMBLDT B 115 kV	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	1.08	1.10	Load power factor correction and voltage support if needed
HOOPA 60 kV	HUMBOLDT 60KV - MIDDLE BREAKER BAY 6	P2	Non-bus-tie breaker	0.79	0.77	0.81	0.84	0.95	0.81	1.03	1.02	0.76	0.97	1.03	Load power factor correction and voltage support if needed
HUMBOLDT 115 kV	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	1.08	1.10	Load power factor correction and voltage support if needed
MPLE CRK 60 kV	HUMBOLDT 60KV - MIDDLE BREAKER BAY 6	P2	Non-bus-tie breaker	0.85	0.84	0.87	0.90	0.97	0.86	1.05	1.03	0.83	0.99	1.04	Load power factor correction and voltage support if needed
RDGE CBN 60 kV	HUMBOLDT 60KV - MIDDLE BREAKER BAY 6	P2	Non-bus-tie breaker	0.90	0.88	0.91	0.94	0.99	0.91	1.06	1.04	0.88	1.00	1.05	Load power factor correction and voltage support if needed
RUSS RCH 60 kV	HUMBOLDT 60KV - MIDDLE BREAKER BAY 6	P2	Non-bus-tie breaker	0.84	0.82	0.86	0.89	0.97	0.85	1.04	1.03	0.82	0.99	1.04	Load power factor correction and voltage support if needed
WILLWCRK 60 kV	HUMBOLDT 60KV - MIDDLE BREAKER BAY 6	P2	Non-bus-tie breaker	0.81	0.79	0.83	0.86	0.95	0.82	1.03	1.02	0.78	0.97	1.03	Load power factor correction and voltage support if needed
HMBLDT B 115 kV	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	1.10	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	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	
HUMB_BS1 115 kV	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	1.10	1.11	Load power factor correction and voltage support if needed
HUMBOLDT 115 kV	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	1.10	1.11	Load power factor correction and voltage support if needed
HMBLDT B 115 kV	HMBLT BY 60KV - MIDDLE BREAKER BAY 4	P2	Non-bus-tie breaker	1.07	1.05	1.06	1.09	1.08	1.04	1.11	1.09	1.07	1.11	1.10	Load power factor correction and voltage support if needed
HUMB_BS1 115 kV	HMBLT BY 60KV - MIDDLE BREAKER BAY 4	P2	Non-bus-tie breaker	1.07	1.05	1.06	1.09	1.08	1.04	1.11	1.09	1.07	1.11	1.10	Load power factor correction and voltage support if needed
HUMBOLDT 115 kV	HMBLT BY 60KV - MIDDLE BREAKER BAY 4	P2	Non-bus-tie breaker	1.07	1.05	1.06	1.09	1.08	1.04	1.11	1.09	1.08	1.11	1.10	Load power factor correction and voltage support if needed
HOOPA 60 kV	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 60 kV	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 60 kV	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 60 kV	HUMB_G2 13.80KV GEN UNIT 7 & 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
HMBLDT B 115 kV	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	1.14	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	1.15	1.16	>0.9, <1.1	Load power factor correction and voltage support if needed
HUMB_BS1 115 kV	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	1.14	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	1.15	1.16	>0.9, <1.1	Load power factor correction and voltage support if needed
HUMBOLDT 115 kV	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	1.14	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	1.15	1.16	>0.9, <1.1	Load power factor correction and voltage support if needed
BRDGVILLE 115 kV	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	1.12	>0.9, <1.1	Load power factor correction and voltage support if needed
WILLWCRK 60 kV	HUMB_G3 13.80KV UNITS 8 9 AND 10 & 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	0.82	>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 115 kV	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	>0.9, <1.1	1.12	Load power factor correction and voltage support if needed
HUMB_BS1 115 kV	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	>0.9, <1.1	1.12	Load power factor correction and voltage support if needed
HUMBOLDT 115 kV	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	>0.9, <1.1	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	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	
HMBLDT B 115 kV	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	1.15	>0.9, <1.1	Load power factor correction and voltage support if needed
HUMB_BS1 115 kV	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	1.15	>0.9, <1.1	Load power factor correction and voltage support if needed
HUMBOLDT 115 kV	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	1.15	>0.9, <1.1	Load power factor correction and voltage support if needed
BRDGVLL 115 kV	HUMB_G1 13.80KV GEN UNIT 1 & BRDGVLL 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 60 kV	HUMBOLDT 60KV [7130] MOAS OPENED ON HUMBOLDT_MPLE CRK	P6	N-1-1	0.57	0.54	0.54	0.56	>0.9, <1.1	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
MPL 60 kV	HUMBOLDT 60KV [7130] MOAS OPENED ON HUMBOLDT_MPLE CRK	P6	N-1-1	0.64	0.62	0.62	0.64	>0.9, <1.1	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 60 kV	HUMBOLDT 60KV [7130] MOAS OPENED ON HUMBOLDT_MPLE CRK	P6	N-1-1	0.70	0.68	0.68	0.69	>0.9, <1.1	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
WILLWCRK 60 kV	HUMBOLDT 60KV [7130] MOAS OPENED ON HUMBOLDT_MPLE CRK	P6	N-1-1	0.59	0.56	0.56	0.58	>0.9, <1.1	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 115 kV	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	>0.9, <1.1	1.12	Load power factor correction and voltage support if needed
HUMB_BS1 115 kV	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	>0.9, <1.1	1.12	Voltage support, UVLS and/ or SPS
HUMBOLDT 115 kV	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	>0.9, <1.1	1.12	Load power factor correction and voltage support if needed
FRT SWRD 60 kV	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 60 kV	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
FTSWRDJT 60 kV	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
GRBRVLL 60 kV	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
LOW GAP1 115 kV	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 60 kV	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 60 kV	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 115 kV	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 115 kV	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

Study Area: PG&E Humboldt

High/Low Voltages



Substation	Contingency (All and Worst P6)	Category	Category Description	Voltage PU (Baseline Scenarios)								Voltage PU (Sensitivity Scenarios)			Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 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 115 kV	HUMBOLDT 115KV [1810]	P6	N-1-1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	1.15	>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
FRT SWRD 60 kV	BRIDGEVILLE-GARBERVILLE 60KV [6220] MOAS OPENED ON BRDGVLLE_FRUTLDJT	P6	N-1-1	0.85	>0.9, <1.1	0.78	0.89	>0.9, <1.1	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
FRUITLND 60 kV	BRIDGEVILLE-GARBERVILLE 60KV [6220] MOAS OPENED ON BRDGVLLE_FRUTLDJT	P6	N-1-1	0.86	>0.9, <1.1	0.78	0.89	>0.9, <1.1	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 60 kV	BRIDGEVILLE-GARBERVILLE 60KV [6220] MOAS OPENED ON BRDGVLLE_FRUTLDJT	P6	N-1-1	0.86	>0.9, <1.1	0.79	0.89	>0.9, <1.1	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
GRBRVLLE 60 kV	BRIDGEVILLE-GARBERVILLE 60KV [6220] MOAS OPENED ON BRDGVLLE_FRUTLDJT	P6	N-1-1	0.86	0.90	0.79	0.88	>0.9, <1.1	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
FRT SWRD 60 kV	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
FRUITLND 60 kV	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
FTSWRDJT 60 kV	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
KEKAWAKA 60 kV	BRIDGEVILLE-GARBERVILLE 60KV [6220] MOAS OPENED ON FTSWRDJT_GRBRVLLE	P6	N-1-1	0.88	>0.9, <1.1	0.85	0.90	>0.9, <1.1	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
SWNS FLT 60 kV	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
HMBLDT B 115 kV	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 115 kV	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 115 kV	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 115 kV	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	1.11	>0.9, <1.1	Voltage support, UVLS and/ or SPS
MPLE CRK 60 kV	HUMBOLDT 115KV [1820]	P6	N-1-1	0.62	0.62	0.62	0.67	>0.9, <1.1	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 60 kV	HUMBOLDT 115KV [1820]	P6	N-1-1	0.61	0.61	0.61	0.65	>0.9, <1.1	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 60 kV	HUMBOLDT 115KV [1820]	P6	N-1-1	0.57	0.56	0.57	0.61	>0.9, <1.1	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
BRDGVLLE 115 kV	BRIDGEVILLE-COTTONWOOD 115KV [1110]	P6	N-1-1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	1.13	1.12	>0.9, <1.1	1.17	1.12	1.16	1.17	1.13	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	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	
HMBLDT B 115 kV	BRIDGEVILLE-COTTONWOOD 115KV [1110]	P6	N-1-1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	1.13	1.12	>0.9, <1.1	1.17	>0.9, <1.1	1.15	1.17	1.13	Load power factor correction and voltage support if needed
HUMB_BS1 115 kV	BRIDGEVILLE-COTTONWOOD 115KV [1110]	P6	N-1-1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	1.13	1.12	>0.9, <1.1	1.17	>0.9, <1.1	1.15	1.17	1.13	Voltage support, UVLS and/ or SPS
HUMBOLDT 115 kV	BRIDGEVILLE-COTTONWOOD 115KV [1110]	P6	N-1-1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	1.13	1.12	>0.9, <1.1	1.17	>0.9, <1.1	1.15	1.17	1.13	Load power factor correction and voltage support if needed
SWNS FLT 60 kV	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	1.10	>0.9, <1.1	Voltage support, UVLS and/ or SPS
BRDGVLLE 60 kV	BRDGVLLE 115/60KV TB 1	P6	N-1-1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	0.39	>0.9, <1.1	0.32	>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
CARLOTTA 60 kV	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
KEKAWAKA 60 kV	BRDGVLLE 115/60KV TB 1	P6	N-1-1	>0.9, <1.1	>0.9, <1.1	>0.9, <1.1	0.60	>0.9, <1.1	0.56	>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 60 kV	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 60 kV	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 60 kV	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 60 kV	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 60 kV	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 60 kV	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
FRT SWRD 60 kV	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	>0.9, <1.1	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 60 kV	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	>0.9, <1.1	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 60 kV	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	0.89	0.84	0.88	>0.9, <1.1	0.80	>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 60 kV	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	>0.9, <1.1	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 115 kV	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	1.08	1.10	Load power factor correction and voltage support if needed
HUMB_BS1 115 kV	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	1.08	1.10	Voltage support, UVLS and/ or SPS
HUMBOLDT 115 kV	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	1.08	1.10	Load power factor correction and voltage support if needed
HMBLDT B 115 kV	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	1.10	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	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	
HUMB_BS1 115 kV	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	1.10	1.11	Voltage support, UVLS and/ or SPS
HUMBOLDT 115 kV	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	1.10	1.11	Load power factor correction and voltage support if needed
HMBLDT B 115 kV	ARCATA-HUMBOLDT & FAIRHAVEN-HUMBOLDT & HUMBOLDT #1 LINES	P7	DCTL	1.07	1.07	1.10	1.13	1.07	1.12	1.14	1.11	1.09	1.09	1.11	Load power factor correction and voltage support if needed
HUMB_BS1 115 kV	ARCATA-HUMBOLDT & FAIRHAVEN-HUMBOLDT & HUMBOLDT #1 LINES	P7	DCTL	1.07	1.07	1.10	1.13	1.07	1.12	1.14	1.11	1.09	1.09	1.11	Voltage support, UVLS and/ or SPS
HUMBOLDT 115 kV	ARCATA-HUMBOLDT & FAIRHAVEN-HUMBOLDT & HUMBOLDT #1 LINES	P7	DCTL	1.07	1.07	1.10	1.13	1.07	1.12	1.14	1.11	1.09	1.09	1.11	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	Post Cont. Voltage Deviation % (Baseline Scenarios)								Post Cont. Voltage Deviation % (Sensitivity Scenarios)			Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 Winter Peak	2023 Winter Peak	2028 Winter Peak	2020 Spring Off-Peak	2023 Spring Off-Peak	2023 SP High CEC Forecast	2023 SpOP Hi Renew & Min Gas Gen	2020 SP Heavy Renewable & Min Gas Gen	
HOOPA 60 kV	HUMBOLDT 60KV [7130] MOAS OPENED ON HUMBOLDT_MPLE CRK	P1	N-1	17	19	16	13	5	16	1	0	20	4	1	Load power factor correction and voltage support if needed
MPLERK 60 kV	HUMBOLDT 60KV [7130] MOAS OPENED ON HUMBOLDT_MPLE CRK	P1	N-1	16	18	15	12	5	16	1	0	18	4	1	Load power factor correction and voltage support if needed
RDGECBN 60 kV	HUMBOLDT 60KV [7130] MOAS OPENED ON HUMBOLDT_MPLE CRK	P1	N-1	12	14	12	10	4	12	1	0	14	3	0	Load power factor correction and voltage support if needed
RUSSRCH 60 kV	HUMBOLDT 60KV [7130] MOAS OPENED ON HUMBOLDT_MPLE CRK	P1	N-1	16	18	15	12	5	16	1	0	18	4	1	Load power factor correction and voltage support if needed
WILLWCRK 60 kV	HUMBOLDT 60KV [7130] MOAS OPENED ON HUMBOLDT_MPLE CRK	P1	N-1	16	19	16	13	5	16	1	0	19	4	1	Load power factor correction and voltage support if needed
CARLOTTA 60 kV	HUMBOLDT BAY 60KV [7100] MOAS OPENED ON EEL RIVR_NEWBURG	P1	N-1	1	0	0	9	0	12	0	1	0	0	1	Load power factor correction and voltage support if needed
NEWBURG 60 kV	HUMBOLDT BAY 60KV [7100] MOAS OPENED ON EEL RIVR_NEWBURG	P1	N-1	1	0	0	10	1	14	0	0	0	1	0	Load power factor correction and voltage support if needed
PCLUMBER 60 kV	HUMBOLDT BAY 60KV [7100] MOAS OPENED ON EEL RIVR_NEWBURG	P1	N-1	1	0	0	9	0	12	0	1	0	0	1	Load power factor correction and voltage support if needed
RIODELL 60 kV	HUMBOLDT BAY 60KV [7100] MOAS OPENED ON EEL RIVR_NEWBURG	P1	N-1	1	0	0	9	0	13	0	0	0	0	0	Load power factor correction and voltage support if needed
RIODLLTP 60 kV	HUMBOLDT BAY 60KV [7100] MOAS OPENED ON EEL RIVR_NEWBURG	P1	N-1	1	0	0	9	0	13	0	0	0	0	0	Load power factor correction and voltage support if needed
SCOTIATP 60 kV	HUMBOLDT BAY 60KV [7100] MOAS OPENED ON EEL RIVR_NEWBURG	P1	N-1	1	0	0	9	0	13	0	0	0	0	0	Load power factor correction and voltage support if needed
SCTIATP2 60 kV	HUMBOLDT BAY 60KV [7100] MOAS OPENED ON EEL RIVR_NEWBURG	P1	N-1	1	0	0	9	0	13	0	0	0	0	0	Load power factor correction and voltage support if needed
FRTSWRD 60 kV	GRBRVLE 60.00KV ID=7H & GRBRVLE 60.00KV ID=5H & GRBRVLE 60.00KV ID=8H & GRBRVLE 60.00KV ID=V SHUNT DEVICES	P1	N-1	7	6	8	6	5	9	1	0	7	4	0	The long term issue will be monitored and addressed in time
GRBRVLE 60 kV	GRBRVLE 60.00KV ID=7H & GRBRVLE 60.00KV ID=5H & GRBRVLE 60.00KV ID=8H & GRBRVLE 60.00KV ID=V SHUNT DEVICES	P1	N-1	9	8	11	7	7	12	1	0	10	5	0	Load power factor correction and voltage support if needed

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Voltage Deviation



Substation	Contingency (All and Worst P6)	Category	Category Description	Post Cont. Voltage Deviation % (Baseline Scenarios)								Post Cont. Voltage Deviation % (Sensitivity Scenarios)			Project & Potential Mitigation Solutions
				2020 Summer Peak	2023 Summer Peak	2028 Summer Peak	2020 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 60 kV	GRBRVLE 60.00KV ID=7H & GRBRVLE 60.00KV ID=5H & GRBRVLE 60.00KV ID=8H & GRBRVLE 60.00KV ID=V SHUNT DEVICES	P1	N-1	8	7	10	6	6	11	1	0	9	5	0	Load power factor correction and voltage support if needed
FRT SWRD 60 kV	BLUELKPP 12.47KV GEN UNIT 1 & GRBRVLE 60.00KV ID=7H & GRBRVLE 60.00KV ID=5H & GRBRVLE 60.00KV ID=8H & GRBRVLE 60.00KV ID=V SHUNT DEVICES	P3	G1/N1	<8	<8	9	<8	<8	<8	<8	<8	<8	<8	<8	Continue to monitor future load forecast
GRBRVLE 60 kV	BLUELKPP 12.47KV GEN UNIT 1 & GRBRVLE 60.00KV ID=7H & GRBRVLE 60.00KV ID=5H & GRBRVLE 60.00KV ID=8H & GRBRVLE 60.00KV ID=V SHUNT DEVICES	P3	G1/N1	<8	<8	11	<8	<8	<8	<8	<8	<8	<8	<8	Continue to monitor future load forecast
HOOPA 60 kV	PAC.LUMB 13.80KV GEN UNIT 1 & 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
MPLERK 60 kV	PAC.LUMB 13.80KV GEN UNIT 1 & 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
RDGECBN 60 kV	LP SAMOA 12.47KV GEN UNIT 1 & 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
RUSSRCH 60 kV	PAC.LUMB 13.80KV GEN UNIT 1 & 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
WILLWCRK 60 kV	LP SAMOA 12.47KV GEN UNIT 1 & 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-BRDGVLL 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
Breaker stuck for CB #6222 protecting HUMBOLDT 60 kV ID v SVD	P4-4	Stuck Breaker	Stable/WECC criteria met	WECC criteria not met	Stable/WECC criteria met	Stable/WECC criteria met	Stable/WECC criteria met	Under review with PTO
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 -HMBLDT B 115 kV No.1 Line and HUMBOLDT -BRDGVLL 115 kV No.1 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	Under review with PTO
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.