

Study Area: PG&E Humboldt

Thermal Overloads



ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)								Potential Mitigation Solutions
					2017 Spring Off-Peak	2020 Spring Light Load	2017 Summer Peak	2020 Summer Peak	2025 Summer Peak	2017 Winter Peak	2020 Winter Peak	2025 Winter Peak	
HUMB-T-1	31102 NEWBURG 60.0 31105 RIODLLTP 60.0 1	BUS FAULT AT 31080 HUMBOLDT 60.00	P2-2	Bus Fault	96.22	112.78	80.99	74.60	66.24	107.83	102.88	99.54	Adjust Humboldt Bay generation
HUMB-T-2	31102 NEWBURG 60.0 31105 RIODLLTP 60.0 1	BUS-TIE BREAKER FAULT AT 31080 HUMBOLDT 60.00	P2-4	Bus Tie Breaker	96.22	112.78	80.99	74.60	66.24	107.83	102.88	99.54	Adjust Humboldt Bay generation
HUMB-T-3	31104 CARLOTTA 60.0 31105 RIODLLTP 60.0 1	BUS FAULT AT 31080 HUMBOLDT 60.00	P2-2	Bus Fault	54.69	82.21	102.44	95.54	86.96	136.88	131.12	127.87	Adjust Humboldt Bay generation
HUMB-T-4	31104 CARLOTTA 60.0 31105 RIODLLTP 60.0 1	BUS-TIE BREAKER FAULT AT 31080 HUMBOLDT 60.00	P2-4	Bus Tie Breaker	54.69	82.21	102.44	95.54	86.96	136.88	131.12	127.87	Adjust Humboldt Bay generation
HUMB-T-5	31104 CARLOTTA 60.0 31108 SWNS FLT 60.0 1	BUS FAULT AT 31080 HUMBOLDT 60.00	P2-2	Bus Fault	<100	<100	<100	<100	<100	134.85	129.13	126.01	Adjust Humboldt Bay generation
HUMB-T-6	31104 CARLOTTA 60.0 31108 SWNS FLT 60.0 1	BUS-TIE BREAKER FAULT AT 31080 HUMBOLDT 60.00	P2-4	Bus Tie Breaker	<100	<100	<100	<100	<100	134.85	129.13	126.01	Adjust Humboldt Bay generation
HUMB-T-7	31108 SWNS FLT 60.0 31110 BRDGVLE 60.0 1	BUS FAULT AT 31080 HUMBOLDT 60.00	P2-2	Bus Fault	<100	<100	<100	<100	<100	134.52	128.81	125.68	Adjust Humboldt Bay generation
HUMB-T-8	31108 SWNS FLT 60.0 31110 BRDGVLE 60.0 1	BUS-TIE BREAKER FAULT AT 31080 HUMBOLDT 60.00	P2-4	Bus Tie Breaker	<100	<100	<100	<100	<100	134.52	128.81	125.68	Adjust Humboldt Bay generation
HUMB-T-9	31080 HUMBOLDT 60.0 31088 HMBLT JT 60.0 1	Humboldt Bay - Eureka 60 kV Line and Humboldt Bay - Humboldt No.2 60 kV Line	P6	L-1-1	<100	101.05	100.98	100.70	101.06	18.87	100.71	<100	Adjust Humboldt Bay generation
HUMB-T-10	31080 HUMBOLDT 60.0 31088 HMBLT JT 60.0 1	Humboldt - Eureka 60 kV Line (HUMBOLDT-HARRIS) and Humboldt Bay - Humboldt No.2 60 kV Line	P6	L-1-1	<100	<100	<100	99.01	<100	<100	100.20	<100	Adjust Humboldt Bay generation
HUMB-T-11	31086 EUREKA 60.0 31090 HMBLT BY 60.0 1	Humboldt Bay - Humboldt No.1 60 kV Line (HUMBOLDT-HMBLT JT) and Humboldt Bay - Humboldt No.2 60 kV Line	P6	L-1-1	<100	100.95	100.79	100.62	101.30	15.36	100.89	<100	Adjust Humboldt Bay generation
HUMB-T-12	31102 NEWBURG 60.0 31105 RIODLLTP 60.0 1	Humboldt 115/60 No.1 Transformer and Humboldt 115/60 No.2 Transformer	P6	T-1-1	98.51	<100	<100	<100	<100	110.55	<100	<100	Adjust Humboldt Bay generation
HUMB-T-13	31104 CARLOTTA 60.0 31105 RIODLLTP 60.0 1	Humboldt 115/60 No.1 Transformer and Humboldt - Bridgeville 115 kV Line	P6	T-1/L-1	<100	<100	<100	<100	99.93	16.67	<100	<100	Adjust Humboldt Bay generation
HUMB-T-14	31104 CARLOTTA 60.0 31105 RIODLLTP 60.0 1	GRBRVLE 60.00 SVD ID v and Humboldt - Bridgeville 115 kV Line	P6	SD-1 / L-1	<100	<100	<100	<100	100.10	99.66	<100	<100	Adjust Humboldt Bay generation
HUMB-T-15	31104 CARLOTTA 60.0 31105 RIODLLTP 60.0 1	Humboldt - Bridgeville 115 kV Line and Humboldt - Trinity 115 kV Line	P6	L-1-1	<100	<100	<100	<100	100.10	58.07	<100	<100	Adjust Humboldt Bay generation
HUMB-T-16	31116 GRBRVLE 60.0 31118 KEKAWAKA 60.0 1	GRBRVLE 60.00 SVD ID v and Bridgeville - Garberville 60 kV Line (BRDGVLE-FRUTLDJT)	P6	SD-1 / L-1	<100	<100	113.81	<100	<100	<100	<100	<100	New Bridgeville - garberville 115kV line
HUMB-T-17	31116 GRBRVLE 60.0 31118 KEKAWAKA 60.0 1	Bridgeville- Garberville 115 kV Line (New) and Bridgeville - Garberville 60 kV Line (BRDGVLE-FRUTLDJT)	P6	L-1-1	<100	<100	<100	117.24	<100	<100	<100	<100	New Bridgeville - garberville 115kV line
HUMB-T-18	31116 GRBRVLE 60.0 31118 KEKAWAKA 60.0 1	Bridgeville - Cottonwood 115 kV Line (LOW GAP1-BRDGVLE) and Humboldt - Trinity 115 kV Line	P6	L-1-1	<100	<100	<100	<100	<100	<100	101.27	<100	New Bridgeville - garberville 115kV line

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HUMB-T-19	31120 FRUTLDJT 60.0 31122 FTSWRDJT 60.0 1	Humboldt Bay - Rio Dell Jct 60 kV Line (NEWBURG - RIO DELL JCT) and Bridgeville - Cottonwood 115 kV Line (LOW GAP1-BRDGVLLE)	P6	L-1-1	<100	<100	<100	<100	100.43	2.90	<100	<100	Backdown humboldt bay generation
HUMB-T-20	31306 WILLITS 60.0 31308 LYTNVLLE 60.0 1	GRBRVLLE 60.00 SVD ID v and Bridgeville - Garberville 60 kV Line (BRDGVLLE-FRUTLDJT)	P6	SD-1 / L-1	<100	<100	126.29	<100	<100	<100	<100	<100	New Bridgeville - garberville 115kV line
HUMB-T-21	31306 WILLITS 60.0 31308 LYTNVLLE 60.0 1	Bridgeville- Garberville 115 kV Line (New) and Bridgeville - Garberville 60 kV Line (BRDGVLLE-FRUTLDJT)	P6	L-1-1	<100	<100	<100	136.02	<100	<100	<100	<100	New Bridgeville - garberville 115kV line

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Voltage Deviations



ID	Substation	Worst Contingency	Category	Category Description	Post Cont. Voltage Deviation %								Potential Mitigation Solutions
					2017 Spring Off-Peak	2020 Spring Light Load	2017 Summer Peak	2020 Summer Peak	2025 Summer Peak	2017 Winter Peak	2020 Winter Peak	2025 Winter Peak	
HUMB-VD-1	COVELO6 60 kV	Bridgeville - Garberville 60 kV Line (BRDGVLLE-FRUTLDJT)	P1-2	Line	0.154	4.367	3.474	9.484	Cont not found	-0.861	1.795	Cont not found	New Bridgeville-Garberville 115kV line
HUMB-VD-2	FRT SWRD 60 kV	Bridgeville - Garberville 60 kV Line (BRDGVLLE-FRUTLDJT)	P1-2	Line	-0.89	8.3	2.548	16.265	Cont not found	-2.386	2.872	Cont not found	New Bridgeville-Garberville 115kV line
HUMB-VD-3	FRUITLND 60 kV	Bridgeville - Garberville 60 kV Line (BRDGVLLE-FRUTLDJT)	P1-2	Line	-0.599	8.617	2.951	17.058	Cont not found	-1.962	2.87	Cont not found	New Bridgeville-Garberville 115kV line
HUMB-VD-4	GRBRVLLE 60 kV	Bridgeville - Garberville 60 kV Line (BRDGVLLE-FRUTLDJT)	P1-2	Line	-1.319	7.848	2.321	15.478	Cont not found	-2.542	3.274	Cont not found	New Bridgeville-Garberville 115kV line
HUMB-VD-5	KEKAWAKA 60 kV	Bridgeville - Garberville 60 kV Line (BRDGVLLE-FRUTLDJT)	P1-2	Line	-0.832	7.26	3.084	14.815	Cont not found	-2.16	3.075	Cont not found	New Bridgeville-Garberville 115kV line
HUMB-VD-6	LYTNVLLE 60 kV	Bridgeville - Garberville 60 kV Line (BRDGVLLE-FRUTLDJT)	P1-2	Line	0.155	4.345	3.446	9.402	Cont not found	-0.859	1.792	Cont not found	New Bridgeville-Garberville 115kV line
HUMB-VD-7	GRBRVLLE 60 kV	Garberville - Laytonville 60 kV Line (GRBRVLLE-KEKAWAKA)	P1-2	Line	2.485	2.54	-1.836	-5.151	Cont not found	-2.55	-2.939	Cont not found	New Bridgeville-Garberville 115kV line
HUMB-VD-8	BRDGVLLE 115 kV	Humboldt 115/60 No.2 Transformer	P1-3	Transformer	-4.771	-6.746	-0.48	-0.773	-0.847	0.943	0.623	1.263	Turn on humboldt bay generation during light load conditions for voltage support
HUMB-VD-9	HMBLDT B 115 kV	Humboldt 115/60 No.2 Transformer	P1-3	Transformer	-5.769	-9.5	-0.498	-0.86	-0.962	0.996	0.633	0.858	Turn on humboldt bay generation during light load conditions for voltage support
HUMB-VD-10	HUMBOLDT 115 kV	Humboldt 115/60 No.2 Transformer	P1-3	Transformer	-6.211	-9.517	-0.637	-1.099	-1.23	1.276	0.811	1.098	Turn on humboldt bay generation during light load conditions for voltage support
HUMB-VD-11	BRDGVLLE 60 kV	Bridgeville 60/12 kV Transformer	P1-3	Transformer	2.375	2.493	5.485	5.654	1.147	4.101	4.05	0.215	New Bridgeville-Garberville 115kV line
HUMB-VD-12	FRT SWRD 60 kV	GRBRVLLE 60.00 SVD ID v	P1-4	Shunt Device	4.142	4.186	8.051	7.965	4.014	5.948	7.899	3.821	New Bridgeville-Garberville 115kV line
HUMB-VD-13	FRUITLND 60 kV	GRBRVLLE 60.00 SVD ID v	P1-4	Shunt Device	3.39	3.446	6.491	6.421	3.546	4.744	6.301	3.332	New Bridgeville-Garberville 115kV line
HUMB-VD-14	GRBRVLLE 60 kV	GRBRVLLE 60.00 SVD ID v	P1-4	Shunt Device	5.254	5.303	10.461	10.353	4.705	7.756	10.299	4.504	New Bridgeville-Garberville 115kV line
HUMB-VD-15	KEKAWAKA 60 kV	GRBRVLLE 60.00 SVD ID v	P1-4	Shunt Device	4.543	4.594	9.18	9.055	4.175	6.889	9.041	3.966	New Bridgeville-Garberville 115kV line
HUMB-VD-16	GRBRVLLE 60 kV	GRBRVLLE-KEKAWAKA #1 60 kV	P2-1	Line Section Open	2.485	2.539	-1.836	-5.151	Cont not found	-2.55	-2.939	Cont not found	New Bridgeville-Garberville 115kV line
HUMB-VD-17	GRBRVLLE 60 kV	KEKAWAKA-LYTNVLLE #1 60 kV	P2-1	Line Section Open	2.285	2.336	-2.065	-5.393	Cont not found	-2.764	-3.165	Cont not found	New Bridgeville-Garberville 115kV line
HUMB-VD-18	KEKAWAKA 60 kV	KEKAWAKA-LYTNVLLE #1 60 kV	P2-1	Line Section Open	1.731	1.759	-2.729	-5.873	Cont not found	-3.219	-3.802	Cont not found	New Bridgeville-Garberville 115kV line
HUMB-VD-19	BRDGVLLE 60 kV	BUS FAULT AT 31015 BRDGVLLE 115.00	P2-2	Bus	2.639	2.871	4.53	5.955	7.649	6.105	5.607	5.999	Turn on Kekawaka unit
HUMB-VD-20	FRT SWRD 60 kV	BUS FAULT AT 31015 BRDGVLLE 115.00	P2-2	Bus	2.414	2.545	0.869	1.802	9.293	1.998	3.202	6.728	Turn on Kekawaka unit
HUMB-VD-21	FRUITLND 60 kV	BUS FAULT AT 31015 BRDGVLLE 115.00	P2-2	Bus	2.48	2.625	1.689	2.717	9.215	3.13	3.877	6.961	Turn on Kekawaka unit
HUMB-VD-22	GRBRVLLE 60 kV	BUS FAULT AT 31015 BRDGVLLE 115.00	P2-2	Bus	2.315	2.447	-0.253	0.579	9.099	0.155	2.07	5.821	Turn on Kekawaka unit
HUMB-VD-23	GRBRVLLE 115 kV	BUS FAULT AT 31015 BRDGVLLE 115.00	P2-2	Bus					8.801			5.477	Turn on Kekawaka unit
HUMB-VD-24	KEKAWAKA 60 kV	BUS FAULT AT 31015 BRDGVLLE 115.00	P2-2	Bus	2.17	2.313	-0.321	0.388	7.436	0.06	1.732	4.269	Turn on Kekawaka unit

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HUMB-VD-25	SWNS FLT 60 kV	BUS FAULT AT 31015 BRDGVLL 115.00	P2-2	Bus	2.187	2.422	4.004	5.203	6.638	5.42	4.982	5.317	Turn on Kekawaka unit
HUMB-VD-26	CARLOTTA 60 kV	BUS FAULT AT 31080 HUMBOLDT 60.00	P2-2	Bus	6.602	8.236	1.661	1.296	1.182	3.278	3.143	3.068	Turn on some humboldt bay generation during light load for voltage support
HUMB-VD-27	EEL RIVR 60 kV	BUS FAULT AT 31080 HUMBOLDT 60.00	P2-2	Bus	10.965	12.758	1.05	0.866	0.822	2.184	2.122	2.102	Turn on some humboldt bay generation during light load for voltage support
HUMB-VD-28	EUREKA 60 kV	BUS FAULT AT 31080 HUMBOLDT 60.00	P2-2	Bus	16.361	17.752	1.85	1.881	1.992	1.857	1.931	1.969	Turn on some humboldt bay generation during light load for voltage support
HUMB-VD-29	EUREKA A 60 kV	BUS FAULT AT 31080 HUMBOLDT 60.00	P2-2	Bus	16.368	17.757	1.851	1.882	1.993	1.858	1.932	1.971	Turn on some humboldt bay generation during light load for voltage support
HUMB-VD-30	HARRIS 60 kV	BUS FAULT AT 31080 HUMBOLDT 60.00	P2-2	Bus	17.414	18.73	2.81	2.878	3.038	2.676	2.785	2.827	Turn on some humboldt bay generation during light load for voltage support
HUMB-VD-31	HMBLT BY 60 kV	BUS FAULT AT 31080 HUMBOLDT 60.00	P2-2	Bus	14.743	16.33	0.435	0.415	0.452	0.611	0.634	0.661	Turn on some humboldt bay generation during light load for voltage support
HUMB-VD-32	HOOPA 60 kV	BUS FAULT AT 31080 HUMBOLDT 60.00	P2-2	Bus	2.964	-2.645	8.671	-0.251	-0.093	-1.158	7.406	-1.596	New Bridgeville-Garberville 115kV line
HUMB-VD-33	HRCSCOTIA 60 kV	BUS FAULT AT 31080 HUMBOLDT 60.00	P2-2	Bus	4.995	6.653	1.037	0.809	0.738	2.069	1.985	1.936	New Bridgeville-Garberville 115kV line
HUMB-VD-34	MPLE CRK 60 kV	BUS FAULT AT 31080 HUMBOLDT 60.00	P2-2	Bus	2.858	-2.596	8.218	-0.238	-0.042	-1.082	7.038	-1.501	New Bridgeville-Garberville 115kV line
HUMB-VD-35	NEWBURG 60 kV	BUS FAULT AT 31080 HUMBOLDT 60.00	P2-2	Bus	9.313	11.172	1.034	0.796	0.732	2.239	2.158	2.1	Turn on some humboldt bay generation during light load for voltage support
HUMB-VD-36	PCLUMBER 60 kV	BUS FAULT AT 31080 HUMBOLDT 60.00	P2-2	Bus	6.602	8.236	1.661	1.296	1.182	3.278	3.143	3.068	Turn on some humboldt bay generation during light load for voltage support
HUMB-VD-37	RDGE CBN 60 kV	BUS FAULT AT 31080 HUMBOLDT 60.00	P2-2	Bus	2.168	-2.239	6.72	0.279	0.408	-0.556	5.631	-0.775	New Bridgeville-Garberville 115kV line
HUMB-VD-38	RIO DELL 60 kV	BUS FAULT AT 31080 HUMBOLDT 60.00	P2-2	Bus	5.135	6.791	1.07	0.835	0.761	2.137	2.05	1.999	Turn on some humboldt bay generation during light load for voltage support
HUMB-VD-39	RUSS RCH 60 kV	BUS FAULT AT 31080 HUMBOLDT 60.00	P2-2	Bus	2.878	-2.605	8.304	-0.241	-0.05	-1.096	7.109	-1.519	New Bridgeville-Garberville 115kV line
HUMB-VD-40	WILLWCRK 60 kV	BUS FAULT AT 31080 HUMBOLDT 60.00	P2-2	Bus	2.935	-2.632	8.556	-0.247	-0.076	-1.138	7.318	-1.571	New Bridgeville-Garberville 115kV line
HUMB-VD-41	COVELO6 60 kV	BUS FAULT AT 31110 BRDGVLL 60.00	P2-2	Bus	0.154	4.367	3.477	9.438	-0.62	-0.862	1.794	-0.272	New Bridgeville-Garberville 115kV line
HUMB-VD-42	FRT SWRD 60 kV	BUS FAULT AT 31110 BRDGVLL 60.00	P2-2	Bus	-0.891	8.299	2.553	16.186	-1.269	-2.387	2.871	-0.785	New Bridgeville-Garberville 115kV line
HUMB-VD-43	FRUITLND 60 kV	BUS FAULT AT 31110 BRDGVLL 60.00	P2-2	Bus	-0.599	8.617	2.957	16.979	-1.339	-1.964	2.87	-1.138	New Bridgeville-Garberville 115kV line
HUMB-VD-44	GRBRVLL 60 kV	BUS FAULT AT 31110 BRDGVLL 60.00	P2-2	Bus	-1.32	7.847	2.326	15.401	-1.153	-2.544	3.273	-0.232	New Bridgeville-Garberville 115kV line
HUMB-VD-45	KEKAWAKA 60 kV	BUS FAULT AT 31110 BRDGVLL 60.00	P2-2	Bus	-0.832	7.259	3.088	14.745	-1.061	-2.161	3.074	-0.279	New Bridgeville-Garberville 115kV line
HUMB-VD-46	LYTNVLL 60 kV	BUS FAULT AT 31110 BRDGVLL 60.00	P2-2	Bus	0.155	4.345	3.449	9.357	-0.616	-0.86	1.791	-0.272	New Bridgeville-Garberville 115kV line
HUMB-VD-47	BRDGVLL 115 kV	NON-BUS-TIE BREAKER CB6422 FAULT AT 31080 HUMBOLDT 60.00	P2-3	Breaker	-4.496	-6.602	-0.541	-0.938	-0.896	0.853	0.525	1.178	Turn on some humboldt bay generation during light load for voltage support
HUMB-VD-48	HMBLDT B 115 kV	NON-BUS-TIE BREAKER CB6422 FAULT AT 31080 HUMBOLDT 60.00	P2-3	Breaker	-5.524	-9.344	-0.565	-0.964	-1.019	0.901	0.529	0.766	Turn on some humboldt bay generation during light load for voltage support
HUMB-VD-49	HUMBOLDT 115 kV	NON-BUS-TIE BREAKER CB6422 FAULT AT 31080 HUMBOLDT 60.00	P2-3	Breaker	-5.967	-9.361	-0.722	-1.232	-1.303	1.155	0.677	0.98	Turn on some humboldt bay generation during light load for voltage support

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Voltage Deviations



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HUMB-VD-50	HOOPA 60 kV	NON-BUS-TIE BREAKER CB6622 FAULT AT 31080 HUMBOLDT 60.00	P2-3	Breaker	3.642	-1.68	-0.202	-0.163	0.07	-0.964	7.665	-1.579	New Bridgeville-Garberville 115kV line
HUMB-VD-51	MPLE CRK 60 kV	NON-BUS-TIE BREAKER CB6622 FAULT AT 31080 HUMBOLDT 60.00	P2-3	Breaker	3.559	-1.649	-0.192	-0.155	0.113	-0.897	7.284	-1.485	New Bridgeville-Garberville 115kV line
HUMB-VD-52	RDGE CBN 60 kV	NON-BUS-TIE BREAKER CB6622 FAULT AT 31080 HUMBOLDT 60.00	P2-3	Breaker	2.793	-1.306	0.327	0.357	0.552	-0.383	5.863	-0.759	New Bridgeville-Garberville 115kV line
HUMB-VD-53	RUSS RCH 60 kV	NON-BUS-TIE BREAKER CB6622 FAULT AT 31080 HUMBOLDT 60.00	P2-3	Breaker	3.575	-1.655	-0.194	-0.157	0.106	-0.909	7.357	-1.502	New Bridgeville-Garberville 115kV line
HUMB-VD-54	WILLWCRK 60 kV	NON-BUS-TIE BREAKER CB6622 FAULT AT 31080 HUMBOLDT 60.00	P2-3	Breaker	3.624	-1.672	-0.199	-0.161	0.085	-0.946	7.573	-1.554	New Bridgeville-Garberville 115kV line
HUMB-VD-55	BRDGVLLE 60 kV	BUS-TIE BREAKER FAULT AT 31015 BRDGVLLE 115.00	P2-4	Bus Tie Breaker	2.639	2.871	4.53	5.955	7.649	6.105	5.607	5.999	Mendocino area may need additional reactive support in the 5-10 year timeframe
HUMB-VD-56	FRT SWRD 60 kV	BUS-TIE BREAKER FAULT AT 31015 BRDGVLLE 115.00	P2-4	Bus Tie Breaker	2.414	2.545	0.869	1.802	9.293	1.998	3.202	6.728	Mendocino area may need additional reactive support in the 5-10 year timeframe
HUMB-VD-57	FRUITLND 60 kV	BUS-TIE BREAKER FAULT AT 31015 BRDGVLLE 115.00	P2-4	Bus Tie Breaker	2.48	2.625	1.689	2.717	9.215	3.13	3.877	6.961	Mendocino area may need additional reactive support in the 5-10 year timeframe
HUMB-VD-58	GRBRVLE 60 kV	BUS-TIE BREAKER FAULT AT 31015 BRDGVLLE 115.00	P2-4	Bus Tie Breaker	2.315	2.447	-0.253	0.579	9.099	0.155	2.07	5.821	Mendocino area may need additional reactive support in the 5-10 year timeframe
HUMB-VD-59	KEKAWAKA 60 kV	BUS-TIE BREAKER FAULT AT 31015 BRDGVLLE 115.00	P2-4	Bus Tie Breaker	2.17	2.313	-0.321	0.388	7.436	0.06	1.732	4.269	Mendocino area may need additional reactive support in the 5-10 year timeframe
HUMB-VD-60	SWNS FLT 60 kV	BUS-TIE BREAKER FAULT AT 31015 BRDGVLLE 115.00	P2-4	Bus Tie Breaker	2.187	2.422	4.004	5.203	6.638	5.42	4.982	5.317	Mendocino area may need additional reactive support in the 5-10 year timeframe
HUMB-VD-61	CARLOTTA 60 kV	BUS-TIE BREAKER FAULT AT 31080 HUMBOLDT 60.00	P2-4	Bus Tie Breaker	6.602	8.236	1.661	1.296	1.182	3.278	3.143	3.068	Turn on some humboldt bay generation during light load for voltage support
HUMB-VD-62	EEL RIVR 60 kV	BUS-TIE BREAKER FAULT AT 31080 HUMBOLDT 60.00	P2-4	Bus Tie Breaker	10.965	12.758	1.05	0.866	0.822	2.184	2.122	2.102	Turn on some humboldt bay generation during light load for voltage support
HUMB-VD-63	EUREKA 60 kV	BUS-TIE BREAKER FAULT AT 31080 HUMBOLDT 60.00	P2-4	Bus Tie Breaker	16.361	17.752	1.85	1.881	1.992	1.857	1.931	1.969	Turn on some humboldt bay generation during light load for voltage support
HUMB-VD-64	EUREKA A 60 kV	BUS-TIE BREAKER FAULT AT 31080 HUMBOLDT 60.00	P2-4	Bus Tie Breaker	16.368	17.757	1.851	1.882	1.993	1.858	1.932	1.971	Turn on some humboldt bay generation during light load for voltage support
HUMB-VD-65	HARRIS 60 kV	BUS-TIE BREAKER FAULT AT 31080 HUMBOLDT 60.00	P2-4	Bus Tie Breaker	17.414	18.73	2.81	2.878	3.038	2.676	2.785	2.827	Turn on some humboldt bay generation during light load for voltage support
HUMB-VD-66	HMBLT BY 60 kV	BUS-TIE BREAKER FAULT AT 31080 HUMBOLDT 60.00	P2-4	Bus Tie Breaker	14.743	16.33	0.435	0.415	0.452	0.611	0.634	0.661	Turn on some humboldt bay generation during light load for voltage support
HUMB-VD-67	HOOPA 60 kV	BUS-TIE BREAKER FAULT AT 31080 HUMBOLDT 60.00	P2-4	Bus Tie Breaker	2.964	-2.645	8.671	-0.251	-0.093	-1.158	7.406	-1.596	Maple Creek reactive support project
HUMB-VD-68	HRCSCOTIA 60 kV	BUS-TIE BREAKER FAULT AT 31080 HUMBOLDT 60.00	P2-4	Bus Tie Breaker	4.995	6.653	1.037	0.809	0.738	2.069	1.985	1.936	Turn on some humboldt bay generation during light load for voltage support
HUMB-VD-69	MPLE CRK 60 kV	BUS-TIE BREAKER FAULT AT 31080 HUMBOLDT 60.00	P2-4	Bus Tie Breaker	2.858	-2.596	8.218	-0.238	-0.042	-1.082	7.038	-1.501	New Bridgeville-Garberville 115kV line
HUMB-VD-70	NEWBURG 60 kV	BUS-TIE BREAKER FAULT AT 31080 HUMBOLDT 60.00	P2-4	Bus Tie Breaker	9.313	11.172	1.034	0.796	0.732	2.239	2.158	2.1	Turn on some humboldt bay generation during light load for voltage support
HUMB-VD-71	PCLUMBER 60 kV	BUS-TIE BREAKER FAULT AT 31080 HUMBOLDT 60.00	P2-4	Bus Tie Breaker	6.602	8.236	1.661	1.296	1.182	3.278	3.143	3.068	Turn on some humboldt bay generation during light load for voltage support
HUMB-VD-72	RDGE CBN 60 kV	BUS-TIE BREAKER FAULT AT 31080 HUMBOLDT 60.00	P2-4	Bus Tie Breaker	2.168	-2.239	6.72	0.279	0.408	-0.556	5.631	-0.775	Maple Creek reactive support project
HUMB-VD-73	RIO DELL 60 kV	BUS-TIE BREAKER FAULT AT 31080 HUMBOLDT 60.00	P2-4	Bus Tie Breaker	5.135	6.791	1.07	0.835	0.761	2.137	2.05	1.999	Turn on some humboldt bay generation during light load for voltage support
HUMB-VD-74	RUSS RCH 60 kV	BUS-TIE BREAKER FAULT AT 31080 HUMBOLDT 60.00	P2-4	Bus Tie Breaker	2.878	-2.605	8.304	-0.241	-0.05	-1.096	7.109	-1.519	Maple Creek reactive support project

Study Area: **PG&E Humboldt**

Voltage Deviations



ID	Substation	Worst Contingency	Category	Category Description	Post Cont. Voltage Deviation %								Potential Mitigation Solutions
					2017 Spring Off-Peak	2020 Spring Light Load	2017 Summer Peak	2020 Summer Peak	2025 Summer Peak	2017 Winter Peak	2020 Winter Peak	2025 Winter Peak	
HUMB-VD-75	WILLWCRK 60 kV	BUS-TIE BREAKER FAULT AT 31080 HUMBOLDT 60.00	P2-4	Bus Tie Breaker	2.935	-2.632	8.556	-0.247	-0.076	-1.138	7.318	-1.571	Maple Creek reactive support project
HUMB-VD-76	COVELO6 60 kV	BUS-TIE BREAKER FAULT AT 31110 BRDGVLL 60.00	P2-4	Bus Tie Breaker	0.154	4.367	3.477	9.438	-0.62	-0.862	1.794	-0.272	New Bridgeville-Garberville 115kV line
HUMB-VD-77	FRT SWRD 60 kV	BUS-TIE BREAKER FAULT AT 31110 BRDGVLL 60.00	P2-4	Bus Tie Breaker	-0.891	8.299	2.553	16.186	-1.269	-2.387	2.871	-0.785	New Bridgeville-Garberville 115kV line
HUMB-VD-78	FRUITLND 60 kV	BUS-TIE BREAKER FAULT AT 31110 BRDGVLL 60.00	P2-4	Bus Tie Breaker	-0.599	8.617	2.957	16.979	-1.339	-1.964	2.87	-1.138	New Bridgeville-Garberville 115kV line
HUMB-VD-79	GRBRVLL 60 kV	BUS-TIE BREAKER FAULT AT 31110 BRDGVLL 60.00	P2-4	Bus Tie Breaker	-1.32	7.847	2.326	15.401	-1.153	-2.544	3.273	-0.232	New Bridgeville-Garberville 115kV line
HUMB-VD-80	KEKAWAKA 60 kV	BUS-TIE BREAKER FAULT AT 31110 BRDGVLL 60.00	P2-4	Bus Tie Breaker	-0.832	7.259	3.088	14.745	-1.061	-2.161	3.074	-0.279	New Bridgeville-Garberville 115kV line
HUMB-VD-81	LYTNVLL 60 kV	BUS-TIE BREAKER FAULT AT 31110 BRDGVLL 60.00	P2-4	Bus Tie Breaker	0.155	4.345	3.449	9.357	-0.616	-0.86	1.791	-0.272	New Bridgeville-Garberville 115kV line
HUMB-VD-82	ARCATA 60 kV	Humboldt No.1 60 kV and Arcata - Humboldt 60 kV Lines	P7-1	DCTL	0.964	0.986	3.813	5.081	5.298	3.001	3.549	4.055	Arcata pocket may need additional reactive support in the 5-10 year time frame
HUMB-VD-83	BCHIPMIL 60 kV	Humboldt No.1 60 kV and Arcata - Humboldt 60 kV Lines	P7-1	DCTL	1.011	1.026	3.939	5.336	5.527	3.102	3.659	4.145	Arcata pocket may need additional reactive support in the 5-10 year time frame
HUMB-VD-84	BIG_LAGN 60 kV	Humboldt No.1 60 kV and Arcata - Humboldt 60 kV Lines	P7-1	DCTL	1.048	1.063	4.009	5.401	5.601	3.169	3.729	4.221	Arcata pocket may need additional reactive support in the 5-10 year time frame
HUMB-VD-85	BLUE LKE 60 kV	Humboldt No.1 60 kV and Arcata - Humboldt 60 kV Lines	P7-1	DCTL	0.922	0.936	3.862	5.325	5.508	3.007	3.576	4.071	Arcata pocket may need additional reactive support in the 5-10 year time frame
HUMB-VD-86	BLUELKPP 60 kV	Humboldt No.1 60 kV and Arcata - Humboldt 60 kV Lines	P7-1	DCTL	0.897	0.911	3.838	5.317	5.497	2.979	3.551	4.047	Arcata pocket may need additional reactive support in the 5-10 year time frame
HUMB-VD-87	JANS CRK 60 kV	Humboldt No.1 60 kV and Arcata - Humboldt 60 kV Lines	P7-1	DCTL	0.965	1.192	4.394	5.895	6.024	3.391	4.025	4.564	Arcata pocket may need additional reactive support in the 5-10 year time frame
HUMB-VD-88	ORICK 60 kV	Humboldt No.1 60 kV and Arcata - Humboldt 60 kV Lines	P7-1	DCTL	1.049	1.064	4.014	5.41	5.611	3.173	3.735	4.228	Arcata pocket may need additional reactive support in the 5-10 year time frame
HUMB-VD-89	SIMPSON 60 kV	Humboldt No.1 60 kV and Arcata - Humboldt 60 kV Lines	P7-1	DCTL	0.911	0.925	3.854	5.325	5.507	2.995	3.567	4.062	Arcata pocket may need additional reactive support in the 5-10 year time frame
HUMB-VD-90	TRINIDAD 60 kV	Humboldt No.1 60 kV and Arcata - Humboldt 60 kV Lines	P7-1	DCTL	1.047	1.062	4.003	5.394	5.592	3.165	3.724	4.214	Arcata pocket may need additional reactive support in the 5-10 year time frame

Study Area: **PG&E Humboldt**

High/Low Voltage



ID	Substation	Worst Contingency	Category	Category Description	Voltage (PU)								Potential Mitigation Solutions
					2017 Spring Off-Peak	2020 Spring Light Load	2017 Summer Peak	2020 Summer Peak	2025 Summer Peak	2017 Winter Peak	2020 Winter Peak	2025 Winter Peak	
HUMB-V-1	BRDGVLE 115 kV	P1-2:A1:3:_Humboldt - Bridgeville 115 kV Line	P1-2	Line	1.0902	1.1057	1.0214	1.0152	Cont not found	0.9785	0.9999	Cont not found	Turn on some Humboldt bay generation during light load conditions for reactive support.
HUMB-V-2	LOW GAP1 115 kV	P1-2:A1:3:_Humboldt - Bridgeville 115 kV Line	P1-2	Line	1.0915	1.1069	1.0256	1.0209	Cont not found	0.992	1.0103	Cont not found	Turn on some Humboldt bay generation during light load conditions for reactive support.
HUMB-V-3	COVELO6 60 kV	P1-2:A1:30:_Bridgeville - Garberville 60 kV Line (BRDGVLE-FRUTLDJT)	P1-2	Line	1.0076	0.9659	0.9587	0.8903	Cont not found	1.0109	0.995	Cont not found	New Bridgeville-Garberville 60kV line
HUMB-V-4	FRT SWRD 60 kV	P1-2:A1:30:_Bridgeville - Garberville 60 kV Line (BRDGVLE-FRUTLDJT)	P1-2	Line	1.0449	0.9574	0.9958	0.8459	Cont not found	1.031	0.9951	Cont not found	New Bridgeville-Garberville 60kV line
HUMB-V-5	FRUITLND 60 kV	P1-2:A1:30:_Bridgeville - Garberville 60 kV Line (BRDGVLE-FRUTLDJT)	P1-2	Line	1.0413	0.9516	0.9897	0.8387	Cont not found	1.0313	0.9956	Cont not found	New Bridgeville-Garberville 60kV line
HUMB-V-6	GRBRVLE 60 kV	P1-2:A1:30:_Bridgeville - Garberville 60 kV Line (BRDGVLE-FRUTLDJT)	P1-2	Line	1.0501	0.9625	1.0052	0.8573	Cont not found	1.0407	1.0051	Cont not found	New Bridgeville-Garberville 60kV line
HUMB-V-7	KEKAWAKA 60 kV	P1-2:A1:30:_Bridgeville - Garberville 60 kV Line (BRDGVLE-FRUTLDJT)	P1-2	Line	1.0398	0.9628	0.9911	0.8593	Cont not found	1.0325	1.0009	Cont not found	New Bridgeville-Garberville 60kV line
HUMB-V-8	LYTNVLE 60 kV	P1-2:A1:30:_Bridgeville - Garberville 60 kV Line (BRDGVLE-FRUTLDJT)	P1-2	Line	1.0111	0.9713	0.9653	0.8975	Cont not found	1.0115	0.9954	Cont not found	New Bridgeville-Garberville 60kV line
HUMB-V-9	BRDGVLE 115 kV	P1-3:A1:1:_Humboldt 115/60 No.2 Transformer	P1-3	Transformer	1.1044	1.1339	1.0451	1.045	1.0539	1.024	1.0331	1.037	Turn on some Humboldt bay generation during light load conditions for reactive support.
HUMB-V-10	HMBLDT B 115 kV	P1-3:A1:1:_Humboldt 115/60 No.2 Transformer	P1-3	Transformer	1.1039	1.1469	1.0535	1.0562	1.0578	1.0406	1.045	1.043	Turn on some Humboldt bay generation during light load conditions for reactive support.
HUMB-V-11	HUMBOLDT 115 kV	P1-3:A1:1:_Humboldt 115/60 No.2 Transformer	P1-3	Transformer	1.1078	1.1468	1.0522	1.0556	1.0577	1.0338	1.0395	1.0379	Turn on some Humboldt bay generation during light load conditions for reactive support.
HUMB-V-12	LOW GAP1 115 kV	P1-3:A1:1:_Humboldt 115/60 No.2 Transformer	P1-3	Transformer	1.1028	1.1297	1.0449	1.0451	1.0518	1.0265	1.0351	1.0382	Turn on some Humboldt bay generation during light load conditions for reactive support.
HUMB-V-13	LOW GAP1 115 kV	P2-1:A1:4:_LOW GAP1-BRDGVLE #1 115 kV	P2-1	Line section open	1.0954	1.1108	1.0409	1.0428	Cont not found	1.0441	1.0495	Cont not found	Turn on some Humboldt bay generation during light load conditions for reactive support.
HUMB-V-14	LOW GAP1 115 kV	P2-2:A1:2:_BUS FAULT AT 31015 BRDGVLE 115.00	P2-2	Bus	1.0954	1.1107	1.0402	1.0423	1.0408	1.0432	1.0487	1.0399	Turn on some Humboldt bay generation during light load conditions for reactive support.
HUMB-V-15	EUREKA 60 kV	P2-2:A1:4:_BUS FAULT AT 31080 HUMBOLDT 60.00	P2-2	Bus	0.865	0.8582	1.013	1.0121	1.0104	1.0133	1.0123	1.0118	Turn on some Humboldt bay generation during light load conditions for reactive support.
HUMB-V-16	EUREKA A 60 kV	P2-2:A1:4:_BUS FAULT AT 31080 HUMBOLDT 60.00	P2-2	Bus	0.8646	0.8578	1.0124	1.0115	1.0098	1.0126	1.0116	1.0111	Turn on some Humboldt bay generation during light load conditions for reactive support.
HUMB-V-17	HARRIS 60 kV	P2-2:A1:4:_BUS FAULT AT 31080 HUMBOLDT 60.00	P2-2	Bus	0.8595	0.8525	1.0056	1.0045	1.0025	1.0063	1.0052	1.0047	Turn on some Humboldt bay generation during light load conditions for reactive support.
HUMB-V-18	HMBLT BY 60 kV	P2-2:A1:4:_BUS FAULT AT 31080 HUMBOLDT 60.00	P2-2	Bus	0.8832	0.8729	1.0375	1.0373	1.0363	1.0372	1.0367	1.0361	Turn on some Humboldt bay generation during light load conditions for reactive support.
HUMB-V-19	COVELO6 60 kV	P2-2:A1:8:_BUS FAULT AT 31110 BRDGVLE 60.00	P2-2	Bus	1.0077	0.9659	0.9587	0.8907	1.0032	1.011	0.995	1.0155	New Bridgeville-Garberville 60kV line
HUMB-V-20	FRT SWRD 60 kV	P2-2:A1:8:_BUS FAULT AT 31110 BRDGVLE 60.00	P2-2	Bus	1.0449	0.9574	0.9957	0.8467	1.063	1.031	0.9951	1.062	New Bridgeville-Garberville 60kV line

Study Area: **PG&E Humboldt**

High/Low Voltage



ID	Substation	Worst Contingency	Category	Category Description	Voltage (PU)								Potential Mitigation Solutions
					2017 Spring Off-Peak	2020 Spring Light Load	2017 Summer Peak	2020 Summer Peak	2025 Summer Peak	2017 Winter Peak	2020 Winter Peak	2025 Winter Peak	
HUMB-V-21	FRUITLND 60 kV	P2-2:A1:8:_BUS FAULT AT 31110 BRDGVLLE 60.00	P2-2	Bus	1.0413	0.9516	0.9896	0.8395	1.057	1.0314	0.9956	1.0627	New Bridgeville-Garberville 60kV line
HUMB-V-22	GRBRVLLE 60 kV	P2-2:A1:8:_BUS FAULT AT 31110 BRDGVLLE 60.00	P2-2	Bus	1.0501	0.9625	1.0051	0.8581	1.0719	1.0407	1.0051	1.0713	New Bridgeville-Garberville 60kV line
HUMB-V-23	KEKAWAKA 60 kV	P2-2:A1:8:_BUS FAULT AT 31110 BRDGVLLE 60.00	P2-2	Bus	1.0398	0.9628	0.991	0.86	1.0557	1.0325	1.0009	1.055	New Bridgeville-Garberville 60kV line
HUMB-V-24	LYTNVLLE 60 kV	P2-2:A1:8:_BUS FAULT AT 31110 BRDGVLLE 60.00	P2-2	Bus	1.0111	0.9713	0.9653	0.898	1.0094	1.0115	0.9955	1.0155	New Bridgeville-Garberville 60kV line
HUMB-V-25	BRDGVLLE 115 kV	P2-3:A1:7:_NON-BUS-TIE BREAKER CB6422 FAULT AT 31080 HUMBOLDT 60.00	P2-3	Breaker	1.1017	1.1325	1.0457	1.0466	1.0544	1.0249	1.0341	1.0379	Turn on some Humboldt bay generation during light load conditions for reactive support.
HUMB-V-26	HMBLDT B 115 kV	P2-3:A1:7:_NON-BUS-TIE BREAKER CB6422 FAULT AT 31080 HUMBOLDT 60.00	P2-3	Breaker	1.1017	1.1453	1.0542	1.0572	1.0584	1.0416	1.0461	1.044	Turn on some Humboldt bay generation during light load conditions for reactive support.
HUMB-V-27	HUMBOLDT 115 kV	P2-3:A1:7:_NON-BUS-TIE BREAKER CB6422 FAULT AT 31080 HUMBOLDT 60.00	P2-3	Breaker	1.1017	1.1453	1.0531	1.0569	1.0585	1.035	1.0408	1.0391	Turn on some Humboldt bay generation during light load conditions for reactive support.
HUMB-V-28	LOW GAP1 115 kV	P2-3:A1:7:_NON-BUS-TIE BREAKER CB6422 FAULT AT 31080 HUMBOLDT 60.00	P2-3	Breaker	1.1017	1.1285	1.0454	1.0465	1.0522	1.0272	1.0359	1.0389	Turn on some Humboldt bay generation during light load conditions for reactive support.
HUMB-V-29	LOW GAP1 115 kV	P2-4:A1:2:_BUS-TIE BREAKER FAULT AT 31015 BRDGVLLE 115.00	P2-4	Tie-Breaker	1.0954	1.1107	1.0402	1.0423	1.0408	1.0432	1.0487	1.0399	Turn on some Humboldt bay generation during light load conditions for reactive support.
HUMB-V-30	EUREKA 60 kV	P2-4:A1:4:_BUS-TIE BREAKER FAULT AT 31080 HUMBOLDT 60.00	P2-4	Tie-Breaker	0.865	0.8582	1.013	1.0121	1.0104	1.0133	1.0123	1.0118	Turn on some Humboldt bay generation during light load conditions for reactive support.
HUMB-V-31	EUREKA A 60 kV	P2-4:A1:4:_BUS-TIE BREAKER FAULT AT 31080 HUMBOLDT 60.00	P2-4	Tie-Breaker	0.8646	0.8578	1.0124	1.0115	1.0098	1.0126	1.0116	1.0111	Turn on some Humboldt bay generation during light load conditions for reactive support.
HUMB-V-32	HARRIS 60 kV	P2-4:A1:4:_BUS-TIE BREAKER FAULT AT 31080 HUMBOLDT 60.00	P2-4	Tie-Breaker	0.8595	0.8525	1.0056	1.0045	1.0025	1.0063	1.0052	1.0047	Turn on some Humboldt bay generation during light load conditions for reactive support.
HUMB-V-33	HMBLT BY 60 kV	P2-4:A1:4:_BUS-TIE BREAKER FAULT AT 31080 HUMBOLDT 60.00	P2-4	Tie-Breaker	0.8832	0.8729	1.0375	1.0373	1.0363	1.0372	1.0367	1.0361	Turn on some Humboldt bay generation during light load conditions for reactive support.
HUMB-V-34	COVELO6 60 kV	P2-4:A1:8:_BUS-TIE BREAKER FAULT AT 31110 BRDGVLLE 60.00	P2-4	Tie-Breaker	1.0077	0.9659	0.9587	0.8907	1.0032	1.011	0.995	1.0155	New Bridgeville-Garberville 60kV line
HUMB-V-35	FRT SWRD 60 kV	P2-4:A1:8:_BUS-TIE BREAKER FAULT AT 31110 BRDGVLLE 60.00	P2-4	Tie-Breaker	1.0449	0.9574	0.9957	0.8467	1.063	1.031	0.9951	1.062	New Bridgeville-Garberville 60kV line
HUMB-V-36	FRUITLND 60 kV	P2-4:A1:8:_BUS-TIE BREAKER FAULT AT 31110 BRDGVLLE 60.00	P2-4	Tie-Breaker	1.0413	0.9516	0.9896	0.8395	1.057	1.0314	0.9956	1.0627	New Bridgeville-Garberville 60kV line
HUMB-V-37	GRBRVLLE 60 kV	P2-4:A1:8:_BUS-TIE BREAKER FAULT AT 31110 BRDGVLLE 60.00	P2-4	Tie-Breaker	1.0501	0.9625	1.0051	0.8581	1.0719	1.0407	1.0051	1.0713	New Bridgeville-Garberville 60kV line
HUMB-V-38	KEKAWAKA 60 kV	P2-4:A1:8:_BUS-TIE BREAKER FAULT AT 31110 BRDGVLLE 60.00	P2-4	Tie-Breaker	1.0398	0.9628	0.991	0.86	1.0557	1.0325	1.0009	1.055	New Bridgeville-Garberville 60kV line
HUMB-V-39	LYTNVLLE 60 kV	P2-4:A1:8:_BUS-TIE BREAKER FAULT AT 31110 BRDGVLLE 60.00	P2-4	Tie-Breaker	1.0111	0.9713	0.9653	0.898	1.0094	1.0115	0.9955	1.0155	New Bridgeville-Garberville 60kV line
HUMB-V-40	BRDGVLLE 115 kV	P1-2:A1:3:_Humboldt - Bridgeville 115 kV Line	P1-2	Line	1.0902	1.1057	1.0214	1.0152	Cont not found	0.9785	0.9999	Cont not found	Turn on some Humboldt bay generation during light load conditions for reactive support.

Study Area: **PG&E Humboldt**

High/Low Voltage



ID	Substation	Worst Contingency	Category	Category Description	Voltage (PU)								Potential Mitigation Solutions
					2017 Spring Off-Peak	2020 Spring Light Load	2017 Summer Peak	2020 Summer Peak	2025 Summer Peak	2017 Winter Peak	2020 Winter Peak	2025 Winter Peak	
HUMB-V-41	LOW GAP1 115 kV	P1-2:A1:3:_Humboldt - Bridgeville 115 kV Line	P1-2	Line	1.0915	1.1069	1.0256	1.0209	Cont not found	0.992	1.0103	Cont not found	Turn on some Humboldt bay generation during light load conditions for reactive support.
HUMB-V-42	COVELO6 60 kV	P1-2:A1:30:_Bridgeville - Garberville 60 kV Line (BRDGVLLE-FRUTLDJT)	P1-2	Line	1.0076	0.9659	0.9587	0.8903	Cont not found	1.0109	0.995	Cont not found	New Bridgeville-Garberville 60kV line
HUMB-V-43	FRT SWRD 60 kV	P1-2:A1:30:_Bridgeville - Garberville 60 kV Line (BRDGVLLE-FRUTLDJT)	P1-2	Line	1.0449	0.9574	0.9958	0.8459	Cont not found	1.031	0.9951	Cont not found	New Bridgeville-Garberville 60kV line
HUMB-V-44	FRUITLND 60 kV	P1-2:A1:30:_Bridgeville - Garberville 60 kV Line (BRDGVLLE-FRUTLDJT)	P1-2	Line	1.0413	0.9516	0.9897	0.8387	Cont not found	1.0313	0.9956	Cont not found	New Bridgeville-Garberville 60kV line
HUMB-V-45	GRBRVLE 60 kV	P1-2:A1:30:_Bridgeville - Garberville 60 kV Line (BRDGVLLE-FRUTLDJT)	P1-2	Line	1.0501	0.9625	1.0052	0.8573	Cont not found	1.0407	1.0051	Cont not found	New Bridgeville-Garberville 60kV line
HUMB-V-46	KEKAWAKA 60 kV	P1-2:A1:30:_Bridgeville - Garberville 60 kV Line (BRDGVLLE-FRUTLDJT)	P1-2	Line	1.0398	0.9628	0.9911	0.8593	Cont not found	1.0325	1.0009	Cont not found	New Bridgeville-Garberville 60kV line
HUMB-V-47	LYTNVLE 60 kV	P1-2:A1:30:_Bridgeville - Garberville 60 kV Line (BRDGVLLE-FRUTLDJT)	P1-2	Line	1.0111	0.9713	0.9653	0.8975	Cont not found	1.0115	0.9954	Cont not found	New Bridgeville-Garberville 60kV line
HUMB-V-48	BRDGVLE 115 kV	P1-3:A1:1:_Humboldt 115/60 No.2 Transformer	P1-3	Transformer	1.1044	1.1339	1.0451	1.045	1.0539	1.024	1.0331	1.037	Turn on some Humboldt bay generation during light load conditions for reactive support.
HUMB-V-49	HMBLDT B 115 kV	P1-3:A1:1:_Humboldt 115/60 No.2 Transformer	P1-3	Transformer	1.1039	1.1469	1.0535	1.0562	1.0578	1.0406	1.045	1.043	Turn on some Humboldt bay generation during light load conditions for reactive support.
HUMB-V-50	HUMBOLDT 115 kV	P1-3:A1:1:_Humboldt 115/60 No.2 Transformer	P1-3	Transformer	1.1078	1.1468	1.0522	1.0556	1.0577	1.0338	1.0395	1.0379	Turn on some Humboldt bay generation during light load conditions for reactive support.
HUMB-V-51	LOW GAP1 115 kV	P1-3:A1:1:_Humboldt 115/60 No.2 Transformer	P1-3	Transformer	1.1028	1.1297	1.0449	1.0451	1.0518	1.0265	1.0351	1.0382	Turn on some Humboldt bay generation during light load conditions for reactive support.
HUMB-V-52	LOW GAP1 115 kV	P2-1:A1:4:_LOW GAP1-BRDGVLE #1 115 kV	P2-1	Line section open	1.0954	1.1108	1.0409	1.0428	Cont not found	1.0441	1.0495	Cont not found	Turn on some Humboldt bay generation during light load conditions for reactive support.
HUMB-V-53	LOW GAP1 115 kV	P2-2:A1:2:_BUS FAULT AT 31015 BRDGVLE 115.00	P2-2	Bus	1.0954	1.1107	1.0402	1.0423	1.0408	1.0432	1.0487	1.0399	Turn on some Humboldt bay generation during light load conditions for reactive support.
HUMB-V-54	EUREKA 60 kV	P2-2:A1:4:_BUS FAULT AT 31080 HUMBOLDT 60.00	P2-2	Bus	0.865	0.8582	1.013	1.0121	1.0104	1.0133	1.0123	1.0118	Turn on some Humboldt bay generation during light load conditions for reactive support.
HUMB-V-55	EUREKA A 60 kV	P2-2:A1:4:_BUS FAULT AT 31080 HUMBOLDT 60.00	P2-2	Bus	0.8646	0.8578	1.0124	1.0115	1.0098	1.0126	1.0116	1.0111	Turn on some Humboldt bay generation during light load conditions for reactive support.
HUMB-V-56	HARRIS 60 kV	P2-2:A1:4:_BUS FAULT AT 31080 HUMBOLDT 60.00	P2-2	Bus	0.8595	0.8525	1.0056	1.0045	1.0025	1.0063	1.0052	1.0047	Turn on some Humboldt bay generation during light load conditions for reactive support.
HUMB-V-57	HMBLT BY 60 kV	P2-2:A1:4:_BUS FAULT AT 31080 HUMBOLDT 60.00	P2-2	Bus	0.8832	0.8729	1.0375	1.0373	1.0363	1.0372	1.0367	1.0361	Turn on some Humboldt bay generation during light load conditions for reactive support.
HUMB-V-58	COVELO6 60 kV	P2-2:A1:8:_BUS FAULT AT 31110 BRDGVLE 60.00	P2-2	Bus	1.0077	0.9659	0.9587	0.8907	1.0032	1.011	0.995	1.0155	New Bridgeville-Garberville 60kV line
HUMB-V-59	FRT SWRD 60 kV	P2-2:A1:8:_BUS FAULT AT 31110 BRDGVLE 60.00	P2-2	Bus	1.0449	0.9574	0.9957	0.8467	1.063	1.031	0.9951	1.062	New Bridgeville-Garberville 60kV line
HUMB-V-60	FRUITLND 60 kV	P2-2:A1:8:_BUS FAULT AT 31110 BRDGVLE 60.00	P2-2	Bus	1.0413	0.9516	0.9896	0.8395	1.057	1.0314	0.9956	1.0627	New Bridgeville-Garberville 60kV line

Study Area: **PG&E Humboldt**

High/Low Voltage



ID	Substation	Worst Contingency	Category	Category Description	Voltage (PU)								Potential Mitigation Solutions
					2017 Spring Off-Peak	2020 Spring Light Load	2017 Summer Peak	2020 Summer Peak	2025 Summer Peak	2017 Winter Peak	2020 Winter Peak	2025 Winter Peak	
HUMB-V-61	GRBRVLE 60 kV	P2-2:A1:8:_BUS FAULT AT 31110 BRDGVLE 60.00	P2-2	Bus	1.0501	0.9625	1.0051	0.8581	1.0719	1.0407	1.0051	1.0713	New Bridgeville-Garberville 60kV line
HUMB-V-62	KEKAWAKA 60 kV	P2-2:A1:8:_BUS FAULT AT 31110 BRDGVLE 60.00	P2-2	Bus	1.0398	0.9628	0.991	0.86	1.0557	1.0325	1.0009	1.055	New Bridgeville-Garberville 60kV line
HUMB-V-63	LYTNVLE 60 kV	P2-2:A1:8:_BUS FAULT AT 31110 BRDGVLE 60.00	P2-2	Bus	1.0111	0.9713	0.9653	0.898	1.0094	1.0115	0.9955	1.0155	New Bridgeville-Garberville 60kV line
HUMB-V-64	BRDGVLE 115 kV	P2-3:A1:7:_NON-BUS-TIE BREAKER CB6422 FAULT AT 31080 HUMBOLDT 60.00	P2-3	Breaker	1.1017	1.1325	1.0457	1.0466	1.0544	1.0249	1.0341	1.0379	Turn on some Humboldt bay generation during light load conditions for reactive support.
HUMB-V-65	HMBLDT B 115 kV	P2-3:A1:7:_NON-BUS-TIE BREAKER CB6422 FAULT AT 31080 HUMBOLDT 60.00	P2-3	Breaker	1.1014	1.1453	1.0542	1.0572	1.0584	1.0416	1.0461	1.044	Turn on some Humboldt bay generation during light load conditions for reactive support.
HUMB-V-66	HUMBOLDT 115 kV	P2-3:A1:7:_NON-BUS-TIE BREAKER CB6422 FAULT AT 31080 HUMBOLDT 60.00	P2-3	Breaker	1.1054	1.1453	1.0531	1.0569	1.0585	1.035	1.0408	1.0391	Turn on some Humboldt bay generation during light load conditions for reactive support.
HUMB-V-67	LOW GAP1 115 kV	P2-3:A1:7:_NON-BUS-TIE BREAKER CB6422 FAULT AT 31080 HUMBOLDT 60.00	P2-3	Breaker	1.1005	1.1285	1.0454	1.0465	1.0522	1.0272	1.0359	1.0389	Turn on some Humboldt bay generation during light load conditions for reactive support.
HUMB-V-68	LOW GAP1 115 kV	P2-4:A1:2:_BUS-TIE BREAKER FAULT AT 31015 BRDGVLE 115.00	P2-4	Tie-Breaker	1.0954	1.1107	1.0402	1.0423	1.0408	1.0432	1.0487	1.0399	Turn on some Humboldt bay generation during light load conditions for reactive support.
HUMB-V-69	EUREKA 60 kV	P2-4:A1:4:_BUS-TIE BREAKER FAULT AT 31080 HUMBOLDT 60.00	P2-4	Tie-Breaker	0.865	0.8582	1.013	1.0121	1.0104	1.0133	1.0123	1.0118	Turn on some Humboldt bay generation during light load conditions for reactive support.
HUMB-V-70	EUREKA A 60 kV	P2-4:A1:4:_BUS-TIE BREAKER FAULT AT 31080 HUMBOLDT 60.00	P2-4	Tie-Breaker	0.8646	0.8578	1.0124	1.0115	1.0098	1.0126	1.0116	1.0111	Turn on some Humboldt bay generation during light load conditions for reactive support.
HUMB-V-71	HARRIS 60 kV	P2-4:A1:4:_BUS-TIE BREAKER FAULT AT 31080 HUMBOLDT 60.00	P2-4	Tie-Breaker	0.8595	0.8525	1.0056	1.0045	1.0025	1.0063	1.0052	1.0047	Turn on some Humboldt bay generation during light load conditions for reactive support.
HUMB-V-72	HMBLT BY 60 kV	P2-4:A1:4:_BUS-TIE BREAKER FAULT AT 31080 HUMBOLDT 60.00	P2-4	Tie-Breaker	0.8832	0.8729	1.0375	1.0373	1.0363	1.0372	1.0367	1.0361	Turn on some Humboldt bay generation during light load conditions for reactive support.
HUMB-V-73	COVELO6 60 kV	P2-4:A1:8:_BUS-TIE BREAKER FAULT AT 31110 BRDGVLE 60.00	P2-4	Tie-Breaker	1.0077	0.9659	0.9587	0.8907	1.0032	1.011	0.995	1.0155	New Bridgeville-Garberville 60kV line
HUMB-V-74	FRT SWRD 60 kV	P2-4:A1:8:_BUS-TIE BREAKER FAULT AT 31110 BRDGVLE 60.00	P2-4	Tie-Breaker	1.0449	0.9574	0.9957	0.8467	1.063	1.031	0.9951	1.062	New Bridgeville-Garberville 60kV line
HUMB-V-75	FRUITLND 60 kV	P2-4:A1:8:_BUS-TIE BREAKER FAULT AT 31110 BRDGVLE 60.00	P2-4	Tie-Breaker	1.0413	0.9516	0.9896	0.8395	1.057	1.0314	0.9956	1.0627	New Bridgeville-Garberville 60kV line
HUMB-V-76	GRBRVLE 60 kV	P2-4:A1:8:_BUS-TIE BREAKER FAULT AT 31110 BRDGVLE 60.00	P2-4	Tie-Breaker	1.0501	0.9625	1.0051	0.8581	1.0719	1.0407	1.0051	1.0713	New Bridgeville-Garberville 60kV line
HUMB-V-77	KEKAWAKA 60 kV	P2-4:A1:8:_BUS-TIE BREAKER FAULT AT 31110 BRDGVLE 60.00	P2-4	Tie-Breaker	1.0398	0.9628	0.991	0.86	1.0557	1.0325	1.0009	1.055	New Bridgeville-Garberville 60kV line
HUMB-V-78	LYTNVLE 60 kV	P2-4:A1:8:_BUS-TIE BREAKER FAULT AT 31110 BRDGVLE 60.00	P2-4	Tie-Breaker	1.0111	0.9713	0.9653	0.898	1.0094	1.0115	0.9955	1.0155	New Bridgeville-Garberville 60kV line
HUMB-V-79	COVELO6 60 kV	P1-4:A1:2:_GRBRVLE 60.00 SVD ID v and P1-2:A1:30:_Bridgeville - Garberville 60 kV Line (BRDGVLE-FRUTLDJT)	P6	Overlapping contingencies	>0.9	>0.9	Nconv	Nconv	>0.9	>0.9	0.9156	>0.9	New Bridgeville - Garberville 115kV line

Study Area: **PG&E Humboldt**

High/Low Voltage



ID	Substation	Worst Contingency	Category	Category Description	Voltage (PU)								Potential Mitigation Solutions
					2017 Spring Off-Peak	2020 Spring Light Load	2017 Summer Peak	2020 Summer Peak	2025 Summer Peak	2017 Winter Peak	2020 Winter Peak	2025 Winter Peak	
HUMB-V-80	FRT SWRD 60 kV	P1-4:A1:2:_GRBRVLE 60.00 SVD ID v and P1-2:A1:30:_Bridgeville - Garberville 60 kV Line (BRDGVLE-FRUTLDJT)	P6	Overlapping contingencies	>0.9	>0.9	Nconv	Nconv	>0.9	>0.9	0.7836	>0.9	New Bridgeville - Garberville 115kV line
HUMB-V-81	FRUITLND 60 kV	P1-4:A1:2:_GRBRVLE 60.00 SVD ID v and P1-2:A1:30:_Bridgeville - Garberville 60 kV Line (BRDGVLE-FRUTLDJT)	P6	Overlapping contingencies	>0.9	>0.9	Nconv	Nconv	>0.9	>0.9	0.7842	>0.9	New Bridgeville - Garberville 115kV line
HUMB-V-82	GRBRVLE 60 kV	P1-4:A1:2:_GRBRVLE 60.00 SVD ID v and P1-2:A1:30:_Bridgeville - Garberville 60 kV Line (BRDGVLE-FRUTLDJT)	P6	Overlapping contingencies	>0.9	>0.9	Nconv	Nconv	>0.9	>0.9	0.7969	>0.9	New Bridgeville - Garberville 115kV line
HUMB-V-83	GRBRVLE 60 kV	P1-4:A1:2:_GRBRVLE 60.00 SVD ID v and P1-2:A1:33:_Garberville - Laytonville 60 kV Line (FRUITLND - FTSWD)	P6	Overlapping contingencies	>0.9	>0.9	Nconv	Nconv	>0.9	>0.9	0.8839	>0.9	New Bridgeville - Garberville 115kV line
HUMB-V-84	KEKAWAKA 60 kV	P1-4:A1:2:_GRBRVLE 60.00 SVD ID v and P1-2:A1:30:_Bridgeville - Garberville 60 kV Line (BRDGVLE-FRUTLDJT)	P6	Overlapping contingencies	>0.9	>0.9	Nconv	Nconv	>0.9	>0.9	0.8228	>0.9	New Bridgeville - Garberville 115kV line
HUMB-V-85	LYTNVLE 60 kV	P1-4:A1:2:_GRBRVLE 60.00 SVD ID v and P1-2:A1:30:_Bridgeville - Garberville 60 kV Line (BRDGVLE-FRUTLDJT)	P6	Overlapping contingencies	>0.9	>0.9	Nconv	Nconv	>0.9	>0.9	0.9162	>0.9	New Bridgeville - Garberville 115kV line
HUMB-V-86	COVELO6 60 kV	P1-4:A1:2:_GRBRVLE 60.00 SVD ID v and P1-2:A1:30:_Bridgeville - Garberville 60 kV Line (BRDGVLE-FRUTLDJT)	P6	Overlapping contingencies	>0.9	>0.9	Nconv	Nconv	>0.9	>0.9	0.9156	>0.9	New Bridgeville - Garberville 115kV line
HUMB-V-87	FRT SWRD 60 kV	P1-4:A1:2:_GRBRVLE 60.00 SVD ID v and P1-2:A1:30:_Bridgeville - Garberville 60 kV Line (BRDGVLE-FRUTLDJT)	P6	Overlapping contingencies	>0.9	>0.9	Nconv	Nconv	>0.9	>0.9	0.7836	>0.9	New Bridgeville - Garberville 115kV line
HUMB-V-89	GRBRVLE 60 kV	P1-4:A1:2:_GRBRVLE 60.00 SVD ID v and P1-2:A1:30:_Bridgeville - Garberville 60 kV Line (BRDGVLE-FRUTLDJT)	P6	Overlapping contingencies	>0.9	>0.9	Nconv	Nconv	>0.9	>0.9	0.7969	>0.9	New Bridgeville - Garberville 115kV line
HUMB-V-90	GRBRVLE 60 kV	P1-4:A1:2:_GRBRVLE 60.00 SVD ID v and P1-2:A1:33:_Garberville - Laytonville 60 kV Line (FRUITLND - FTSWD)	P6	Overlapping contingencies	>0.9	>0.9	Nconv	Nconv	>0.9	>0.9	0.8839	>0.9	New Bridgeville - Garberville 115kV line
HUMB-V-91	KEKAWAKA 60 kV	P1-4:A1:2:_GRBRVLE 60.00 SVD ID v and P1-2:A1:30:_Bridgeville - Garberville 60 kV Line (BRDGVLE-FRUTLDJT)	P6	Overlapping contingencies	>0.9	>0.9	Nconv	Nconv	>0.9	>0.9	0.8228	>0.9	New Bridgeville - Garberville 115kV line
HUMB-V-92	LYTNVLE 60 kV	P1-4:A1:2:_GRBRVLE 60.00 SVD ID v and P1-2:A1:30:_Bridgeville - Garberville 60 kV Line (BRDGVLE-FRUTLDJT)	P6	Overlapping contingencies	>0.9	>0.9	Nconv	Nconv	>0.9	>0.9	0.9162	>0.9	New Bridgeville - Garberville 115kV line

Study Area: **PG&E Humboldt**

Transient Stability



ID	Contingency	Category	Category Description	Transient Stability Performance								Potential Mitigation Solutions
				2017 Spring Off-Peak	2020 Spring Light Load	2017 Summer Peak	2020 Summer Peak	2025 Summer Peak	2017 Winter Peak	2020 Winter Peak	2025 Winter Peak	
HUMB-TS-1	Humboldt 115/60 No.2 Transformer	P1-3	Transformer			voltage dip >30%. frequency dip below 59.6 for 6 cycles.	voltage dip >30%. frequency dip below 59.6 for 6 cycles.	voltage dip >30%. frequency dip below 59.6 for 6 cycles.				Reassess with actual fault clearing times and SLG fault impedances where applicable.
HUMB-TS-2	HUMBOLDT 60.00 SVD ID v	P1-4	Shunt Device			voltage dip >30%. frequency dip below 59.6 for 6 cycles.	voltage dip >30%. frequency dip below 59.6 for 6 cycles.	voltage dip >30%. frequency dip below 59.6 for 6 cycles.				Reassess with actual fault clearing times and SLG fault impedances where applicable.
HUMB-TS-3	BUS FAULT AT 31000 HUMBOLDT 115.00	P2-2	Bus			voltage dip >30%. frequency dip below 59.6 for 6 cycles.	voltage dip >30%. frequency dip below 59.6 for 6 cycles.	voltage dip >30%. frequency dip below 59.6 for 6 cycles.				Reassess with actual fault clearing times and SLG fault impedances where applicable.
HUMB-TS-4	NON-BUS-TIE BREAKER CB6522 FAULT AT 31080 HUMBOLDT 60.00	P2-3	Breaker			Load Bus Voltage Dip> 30%; Load Bus Voltage Dip 20% for 40 Cycles; Frequency Dip below 59.0 Hz for 6 Cycles.	Load Bus Voltage Dip> 30%; Load Bus Voltage Dip 20% for 40 Cycles; Frequency Dip below 59.0 Hz for 6 Cycles.	Load Bus Voltage Dip> 30%; Load Bus Voltage Dip 20% for 40 Cycles; Frequency Dip below 59.0 Hz for 6 Cycles.				Reassess with actual fault clearing times and SLG fault impedances where applicable.
HUMB-TS-5	BUS-TIE BREAKER FAULT AT 31000 HUMBOLDT 115.00	P2-4	Tie-Breaker			voltage dip >30%. frequency dip below 59.6 for 6 cycles.	voltage dip >30%. frequency dip below 59.6 for 6 cycles.	voltage dip >30%. frequency dip below 59.6 for 6 cycles.				Reassess with actual fault clearing times and SLG fault impedances where applicable.
HUMB-TS-6	Humb - Humb Bay No.1 and Humb-Bridg 115 kV Lines	P6-1-1	L-1-1			voltage dip >30%.	voltage dip >30%.	voltage dip >30%.				Reassess with actual fault clearing times and SLG fault impedances where applicable.

Study Area: PG&E Humboldt



Single Contingency Load Drop

ID	Worst Contingency	Category	Category Description	Amount of Load Drop (MW)								Potential Mitigation Solutions
				Select..	Select..	Select..	Select..	Select..	Select..	Select..	Select..	
X-SLD-1												

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

ID	Substation	Load Served (MW)								Potential Mitigation Solutions
		Select..	Select..	Select..	Select..	Select..	Select..	Select..	Select..	
X-SS-1										

No single source substation with more than 100 MW Load