Study Area: **PG&E North Coast & North Bay - Summer Peak**

California ISO
Shaping a Renewed Future

Thermal Overloads

ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					2015 Summer Peak	2018 Summer Peak	2023 Summer Peak	
NCNB-SP-T-1	Clear Lake - Konocti 60kV Line	Geyser # 3 - Cloverdale 115kV Line (Between Cloverdale 115KV to MPE tap1)	B	L-1	<95%	98%	103%	Reconductor the Line by 2023
NCNB-SP-T-2	Clear Lake - Hopland 60kV line (between Clearlake - Granite)	Konocti - Eagle Rock 60kV Line	B	L-1	105%	<95%	<95%	Middletown 115 kV Project. In interim, open CB22 at Clear Lake and close NO CB at Middletown
NCNB-SP-T-3	Clear Lake - Hopland 60kV line (between Granite - Hopland JCT)		B	L-1	110%	<95%	<95%	
NCNB-SP-T-4	Monte Rio - Fulton 60kV (between TRNTN JT - FULTON)	Fulton- Molino- Cotati 60 kV(Molino sub 60 kV to Molino Jct 60kV)	B	L-1	<95%	<95%	102%	Existing scheme to close the Molino - Trenton Jct section for the loss of Fulton-Molino-Cotati line. Line will not overload if load is not transferred.
NCNB-SP-T-5	Monte Rio - Fulton 60kV (between MOLINO - TRNTN_JC)		B	L-1	91%	96%	106%	
NCNB-SP-T-6	Tulucay - Napa 60kV line #1 (between TULCAY1 - TULCY JT)	Tulucay - Napa #2 60 kV (Tulucay 60 kV to Basalt 60 kV)	B	L-1	110%	<95%	<95%	Napa - Tulucay No. 1 60kV line updgrade will mitigate the overload
NCNB-SP-T-7	Clear Lake - Konocti 60kV Line	Bus Fault at Cloverdale 115kV	C1	Bus	<95%	97%	100%	Reconductor the Line by 2023
NCNB-SP-T-8	Clear Lake - Hopland 60kV line (between Clearlake - Granite)	Bus Fault at Eagle Rock 115kV	C1	Bus	111%	<95%	<95%	Middletown 115 kV Project. In interim, open CB22 at Clear Lake and close NO CB at Middletown
NCNB-SP-T-9	Clear Lake - Hopland 60kV line (between Granite - Hopland JCT)		C1	Bus	117%	<95%	<95%	

Study Area: **PG&E North Coast & North Bay - Summer Peak**

Thermal Overloads

ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					2015 Summer Peak	2018 Summer Peak	2023 Summer Peak	
NCNB-SP-T-10	Bridgeville - Garberville 60kV line (Between Bridgeville - Fruitland JCT)	Geyser # 3 - Cloverdale 115KV (Cloverdale 115KV to MPE tap1) & Cortina - Mendocino No.1 115 kV (Mendocino Sub 115kV to Lucern Jct1)	C3	L-1-1	107%	111%	<95%	New Bridgeville - Garberville 115kVline will mitigate the overload. Adjust generation at Humboldt bay in the interim
NCNB-SP-T-11	Garberville - Laytonville 60kV line (between Garberville - Kekawaka Jct)		C3	L-1-1	<95%	<95%	113%	Adjust Humboldt Bay generation
NCNB-SP-T-12	Bridgeville - Garberville 60kV line (Between Fruitland JCT - Fort Seward Jct)		C3	L-1-1	109%	112%	<95%	New Bridgeville - Garberville 115kVline will mitigate the overload. Adjust generation at Humboldt bay in the interim
NCNB-SP-T-13	Bridgeville - Garberville 60kV line (Between Fort Seward JCT - Garberville)		C3	L-1-1	107%	110%	<95%	
NCNB-SP-T-14	Mendocino - Redbud 115kV line (Between REDBUDJ1 - REDBUD)		C3	L-1-1	108%	105%	111%	Disable the flip flop scheme at Lucerne. Drop load at Cloverdale, Ukiah and City of Ukiah as necessary if overload persists.
NCNB-SP-T-15	Eagle Rock - Redbud 115kV line (between HGHLNDJ1 - CACHE J2)		C3	L-1-1	102%	100%	107%	
NCNB-SP-T-16	Eagle Rock - Redbud 115kV line (between REDBUDJ2 - REDBUD)		C3	L-1-1	120%	118%	125%	
NCNB-SP-T-17	Eagle Rock - Redbud 115kV line (between CACHE J2 - REDBUDJ2)		C3	L-1-1	109%	107%	114%	
NCNB-SP-T-18	Eagle Rock - Redbud 115kV line (between LWRLAKEJ - HGHLNDJ1)		C3	L-1-1	120%	118%	125%	

Study Area: **PG&E North Coast & North Bay - Summer Peak**

Thermal Overloads

ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					2015 Summer Peak	2018 Summer Peak	2023 Summer Peak	
NCNB-SP-T-19	Konocti - Eagle Rock 60kV Line	Geyser # 3 - Cloverdale 115KV (Cloverdale 115KV to MPE tap1) & Eagle Rock- Redbud 115 kV (Eagle Rock 115kV to Lower Lake 115kV Jct)	C3	L-1-1	126%	<95%	98%	Middletown 115kV project
NCNB-SP-T-20	Eagle Rock 115 / 60kV Transformer		C3	L-1-1	103%	<95%	<95%	
NCNB-SP-T-21	Clear Lake - Konocti 60kV Line	Geyser # 3 - Cloverdale 115KV (Cloverdale 115KV to MPE tap1) & Eagle Rock- Redbud 115 kV (Eagle Rock 115kV to Lower Lake)	C3	L-1-1	133%	159%	174%	Middletown 115kV project. Open CB22 at Clear Lake and close NO CB at Middletown, trip load at Clear Lake 60 kV with second contingency if overload persists.
NCNB-SP-T-22	Clear Lake - Hopland 60kV line (between Granite - Hopland JCT)	Geyser #3 - Eagle Rock 115 kv & Ukiah-Hopland-Cloverdale 115 kV (Ukiah sub 115kv to City of Ukiah sub 115kv)	C3	L-1-1	100%	<95%	<95%	Drop Load at Granite
NCNB-SP-T-23	Clear Lake - Hopland 60kV line (between Clearlake - Granite)	Mendocino - Redbud 115 KV (Mendocino Sub to Lucern Jct2) & Konocti - Eagle Rock 60kV	C3	L-1-1	110%	<95%	<95%	Middletown 115kV project
NCNB-SP-T-24	Clear Lake - Hopland 60kV line (between Granite - Hopland JCT)		C3	L-1-1	115%	<95%	<95%	
NCNB-SP-T-25	Fulton - Hopland 60kV (between Hopland JT - Cloverdale JT)	Ukiah-Hopland-Cloverdale 115 kV (Ukiah sub 115kv to City o & Eagle Rock- Fulton- Silverado 115 kv (Eagle rock sub to Rincon Jct 2 115kV)	C3	L-1-1	104%	109%	110%	Drop Load at Ukaih
NCNB-SP-T-26	Fulton #1 60kV line (between CLVRDLJT - Geysers Jct)		C3	L-1-1	98%	102%	103%	Drop Load at Ukaih
NCNB-SP-T-27	Fulton #1 60kV line (between Geysers Jct - Fitch Mtn Tap)		C3	L-1-1	98%	103%	104%	Drop Load at Ukaih

Study Area: **PG&E North Coast & North Bay - Summer Peak**

Thermal Overloads

ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					2015 Summer Peak	2018 Summer Peak	2023 Summer Peak	
NCNB-SP-T-28	Bridgeville - Garberville 60kV line (Between Bridgeville - Fruitland JCT)	Eagle Rock-Cortina 115kV Lines & Cortina-Mendocino No.1 115	C5	L-2	98%	105%	<95%	New Bridgeville - Garberville 115kVline will mitigate the overload. Adjust generation at Humboldt bay in the interim
NCNB-SP-T-29	Garberville - Laytonville 60kV line (between Garberville - Kekawaka Jct)		C5	L-2	<95%	<95%	104%	Adjust Humboldt Generation
NCNB-SP-T-30	Bridgeville - Garberville 60kV line (Between Fruitland JCT - Fort Seward Jct)		C5	L-2	100%	106%	<95%	New Bridgeville - Garberville 115kVline will mitigate the overload. Adjust generation at Humboldt bay in the interim
NCNB-SP-T-31	Bridgeville - Garberville 60kV line (Between Fort Seward JCT - Garberville)		C5	L-2	98%	104%	<95%	
NCNB-SP-T-32	Geyser # 3 - Cloverdale 115KV (between Cloverdale - MPE tap)	Eagle Rock-Redbud & Cortina-Mendocino No.1 115kV	C5	L-2	98%	98%	100%	Adjust Geysers generation
NCNB-SP-T-33	Clear Lake - Konocti 60kV Line		C5	L-2	<95%	110%	112%	Open CB22 at Clear Lake
NCNB-SP-T-34	Ignacio - San Rafael #.3 115 kV (between Ignacio and Las Gallinas)	Ignacio-San Rafael #2 & Ignacio-San Rafael #1 115kV Lines	C5	L-2	<95%	113%	117%	The line is overloaded after the Ignacio-Alto Voltage conversion project is in Service. Reconductor the line to mitigate the overload.
NCNB-SP-T-35	Ignacio-San Rafael 115 kV # 2	Ignacio-San Rafael #1 & Ignacio-Las Gallinas #1 115kV Line	C5	L-2	<95%	129%	133%	Select a higher conductor size for this new line that is being built as a part of the Ignacio - Alto Voltage conversion project

Study Area: **PG&E North Coast & North Bay - Summer Peak**

Thermal Overloads

ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					2015 Summer Peak	2018 Summer Peak	2023 Summer Peak	
NCNB-SP-T-36	Ignacio-San Rafael 60 kV # 1 (Between Ignacio and San Rafael)	Ignacio-Alto-Sausalito #2 & #1 60kV Lines	C5	L-2	134%	<95%	<95%	Ignacia - Alto Voltage Conversion Project
NCNB-SP-T-37	Ignacio - Alto 60 kV Line #1 (Between SAN RFLJ - GREENBRE 60 kV)		C5	L-2	134%	<95%	<95%	
NCNB-SP-T-38	Tulucay - Napa 60kV line #1 (between TULCAY1 - TULCY JT)	Tulacay-Napa #2 & Basalt #1 60kV Lines	C5	L-2	110%	<95%	<95%	Napa - Tulucay No. 1 60kV line updgrade will mitigate the overload

Study Area: **PG&E North Coast & North Bay- Winter Peak**

Thermal Overloads

ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					2015 Winter Peak	2018 Winter Peak	2023 Winter Peak	
NCNB-WP-T-1	Monte Rio - Fulton 60kV (between MOLINO - TRNTN_JC)	Fulton- Molino- Cotati 60 kV(Molino sub 60 kV to Molino Jct)	B	L-1	101%	104%	110%	Existing scheme to close the Molino - Trenton Jct section for the loss of Fulton-Molino-Cotati line. Line will not overload if load is not transferred
NCNB-WP-T-2	Clear Lake - Konocti 60kV Line	Geyser # 3 - Cloverdale 115KV (Cloverdale 115KV to MPE tap1) & Eagle Rock- Redbud 115 kV (Eagle Rock 115kV to Lower Lake 115kV Jct)	C3	L-1-1	98%	116%	115%	Reconductor the line by 2023. In the interim, open CB22 at Clear Lake and close NO CB at Middletown, trip load at Clear Lake 60 kV with second contingency if overload persists.
NCNB-WP-T-3	Ignacio-San Rafael 115 kV # 2	Ignacio-San Rafael #1 & Ignacio-Las Gallinas #1 115kV Line	C5	L-2	<95%	108%	111%	Select a higher conductor size for this new line that is being built as a part of the Ignacio - Alto Voltage conversion project
NCNB-WP-T-4	Ignacio - San Rafael #.3 115 kV (between Ignacio and Las Gallinas)	Ignacio-San Rafael #2 & Ignacio-San Rafael #1 115kV Lines	C5	L-2	<95%	113%	115%	The line is overloaded after the Ignacio-Alto Voltage conversion project is in Service. Reconductor the line to mitigate the overload.
NCNB-WP-T-5	Ignacio - San Rafael #.3 115 kV (between Las Gallinas and San Rafael)		C5	L-2	<95%	111%	113%	
NCNB-WP-T-6	Ignacio - Alto 60 kV Line #1 (Between Ignacio and San Rafael)	Ignacio-Alto-Sausalito #2 & #1 60kV Lines	C5	L-2	151%	<95%	<95%	Ignacio - Alto Voltage conversion project
NCNB-WP-T-7	Ignacio - Alto 60 kV Line #1 (Between SAN RFLJ - GREENBRE 60 kV)		C5	L-2	151%	<95%	<95%	

Study Area: **PG&E North Coast & North Bay- Summer Off-Peak & Summer Light Load**

Thermal Overloads

ID	Overloaded Facility	Worst Contingency	Category	Category Description	Loading (%)			Potential Mitigation Solutions
					2015 Summer Off-Peak	2018 Summer Light Load	N/A	
NCNB-NP-T-1	Clear Lake - Hopland 60kV line (between Clearlake - Granite)	Geyser #3 - Eagle Rock 115 kv & Ukiah-Hopland-Cloverdale 115 kV (Ukiah sub 115kv to City of Ukaiah)	C3	L-1-1	101%	102%		Middletown 115 kV Project. In interim, open CB22 at Clear Lake and close NO CB at Middletown
NCNB-NP-T-2	Clear Lake - Hopland 60kV line (between Granite - Hopland JCT)		C3	L-1-1	103%	104%		
NCNB-NP-T-3	Fulton - Hopland 60kV (between Hopland JT - Cloverdale JT)		C3	L-1-1	92%	108%		
NCNB-NP-T-4	Fulton #1 60kV line (between CLVRDLJT - Geysers Jct)		C3	L-1-1	< 95%	102%		
NCNB-NP-T-5	Fulton #1 60kV line (between Geysers Jct - Fitch Mtn Tap)		C3	L-1-1	< 95%	103%		
NCNB-NP-T-6	Eagle Rock - Cortina 115kV line (between EGLE RCK - HOMSTKTP)	Ukiah-Hopland-Cloverdale 115 kV (Ukiah sub 115kv to Hopland Jct 115kv & Eagle Rock-Fulton- Silverado 115 kv (Eagle rock sub to Rincon Jct)	C3	L-1-1	107%	117%		Adjust generation at Geysers
NCNB-NP-T-7	Eagle Rock - Cortina 115kV line (between HOMSTKTP - HGHLNDJ2)		C3	L-1-1	106%	112%		Adjust generation at Geysers
NCNB-NP-T-8	Eagle Rock - Cortina 115kV line (between EGLE RCK - HOMSTKTP)	Fulton-Hopland 60kv & Geysers #17-Fulton 230kv & Eagle Roc	C5	L-2	98%	107%		Adjust generation at Geysers
NCNB-NP-T-9	Eagle Rock - Cortina 115kV line (between HOMSTKTP - HGHLNDJ2)	Fulton-Hopland 60kv & Geysers #17-Fulton 230kv & Eagle Roc	C5	L-2	97%	107%		Adjust generation at Geysers

Study Area: **PG&E North Coast & North Bay - Summer Peak**

Voltage Deviations

ID	Substation	Worst Contingency	Category	Category Description	Post Cont. Voltage Deviation %			Potential Mitigation Solutions
					2015 Summer Peak	2018 Summer Peak	2023 Summer Peak	
NCNB-SP-VD-1	FRT SWRD 60	GARBERVILLE - LAYTONVILLE 60KV (Kekawaka JCt to Laytonville)	B	L-1	-6.43%	-8.39%	< 5%	Bridgeville - Garberville 115kV line project
NCNB-SP-VD-2	FRUITLND 60		B	L-1	-5.09%	-6.79%	< 5%	
NCNB-SP-VD-3	GRBRVLLE 60		B	L-1	-8.12%	-10.47%	< 5%	
NCNB-SP-VD-4	CLOVRDLE 115	GEYSER # 3 - CLOVERDALE 115K (CLOVERDALE 115KV to MPE TAP1)	B	L-1	5.94%	5.74%	7.12%	Adjust generation at Geysers
NCNB-SP-VD-5	HPLND JT 60		B	L-1	< 5%	< 5%	5.31%	
NCNB-SP-VD-6	HPLND JT 115		B	L-1	< 5%	< 5%	5.73%	
NCNB-SP-VD-7	GRANITE 60	Konocti - Eagle Rock 60kV	B	L-1	8.21%	< 5%	< 5%	Middletown 115kV project
NCNB-SP-VD-8	HARTLEY 60		B	L-1	8.57%	< 5%	< 5%	
NCNB-SP-VD-9	CLER LKE 60		B	L-1	9.88%	< 5%	< 5%	
NCNB-SP-VD-10	KONOCTI6 60		B	L-1	17.01%	< 5%	5.36%	
NCNB-SP-VD-11	LOWR LKE 60		B	L-1	17.41%	< 5%	< 5%	
NCNB-SP-VD-12	MIDDLTWN 60		B	L-1	17.99%	< 5%	< 5%	
NCNB-SP-VD-13	UPPR LKE 60		B	L-1	7.12%	< 5%	< 5%	
NCNB-SP-VD-14	GUALALA 60	Monte Rio- Fulton 60 KV(Wohler Jct 60 Kv to Monte Rio Sub)	B	L-1	< 5%	< 5%	-5.42%	Install reactive support near Annapolis / Fort Ross

Study Area: **PG&E North Coast & North Bay - Summer Peak**

Voltage Deviations

ID	Substation	Worst Contingency	Category	Category Description	Post Cont. Voltage Deviation %			Potential Mitigation Solutions
					2015 Summer Peak	2018 Summer Peak	2023 Summer Peak	
NCNB-SP-VD-15	DUNBAR 60	LAKEVILLE #1 60 kV(Lakeville sub 60 kV to Dunbar Sub 60 kV)	B	L-1	5.92%	6.67%	6.80%	Middletown 115kV project
NCNB-SP-VD-16	CALISTGA 60		B	L-1	6.53%	7.01%	7.82%	
NCNB-SP-VD-17	ST.HELNA 60		B	L-1	6.32%	6.77%	7.55%	
NCNB-SP-VD-18	MEYERS 115	Ignacio - Mare Island No.2 (Ignacio sub to Hamilton Wetland)	B	L-1	5.65%	< 5%	< 5%	Ignacio - Alto Voltage conversion project
NCNB-SP-VD-19	CARQUINZ 115		B	L-1	5.65%	< 5%	< 5%	
NCNB-SP-VD-20	LOWR LKE 60	Middle Town - HomeStake 115kV (Middltwn to Homsttp 115kV)	B	L-1	< 5%	5.10%	5.71%	Adjust generation at Geysers
NCNB-SP-VD-21	MIDDLTWN 60		B	L-1	< 5%	9.63%	10.75%	
NCNB-SP-VD-22	MIDDLTWN 115		B	L-1	< 5%	14.16%	14.51%	
NCNB-SP-VD-23	EGLE RCK 60	EAGLE ROCK 115/60 KV BANK NO.1	B	L-1	11.08%	5.70%	7.02%	open Eagle Rock-Konocti 60 kV line for Eagle Rock bank outage

Study Area: **PG&E North Coast & North Bay - Summer Peak**

Voltage Deviations

ID	Substation	Worst Contingency	Category	Category Description	Post Cont. Voltage Deviation %			Potential Mitigation Solutions
					2015 Summer Peak	2018 Summer Peak	2023 Summer Peak	
NCNB-SP-VD-24	GRANITE 60	BUS FAULT AT EGLE RCK 115.00	C1	Bus	10.42%	< 10%	< 10%	Adjust generation at Geysers
NCNB-SP-VD-25	HARTLEY 60		C1	Bus	10.95%	< 10%	< 10%	
NCNB-SP-VD-26	CLER LKE 60		C1	Bus	12.16%	< 10%	< 10%	
NCNB-SP-VD-27	EGLE RCK 60		C1	Bus	22.45%	< 10%	< 10%	
NCNB-SP-VD-28	KONOCTI6 60		C1	Bus	19.24%	< 10%	< 10%	
NCNB-SP-VD-29	LOWR LKE 60		C1	Bus	19.58%	< 10%	< 10%	
NCNB-SP-VD-30	MIDDLTWN 60		C1	Bus	20.07%	< 10%	< 10%	
NCNB-SP-VD-31	MIDDLTWN 115	BUS FAULT AT HOMSTKTP 115.00	C1	Bus	< 10%	13.83%	14.16%	
NCNB-SP-VD-32	GRBRVLLE 60	BUS FAULT AT LYTNVLLE 60.00	C1	Bus	-8.36%	-10.72%	< 10%	Bridgeville - Garberville 115kV line
NCNB-SP-VD-33	KEKAWAKA 60		C1	Bus	-9.28%	-11.84%	< 10%	
NCNB-SP-VD-34	PUEBLO 115	Lakeville 115 kV CB102 stuck	C2	Breaker	< 10%	< 10%	10.20%	Adjust Monticello Ph generation
NCNB-SP-VD-35	SONOMA 115		C2	Breaker	12.10%	12.12%	13.32%	

Study Area: PG&E North Coast & North Bay - Summer Peak

Voltage Deviations

ID	Substation	Worst Contingency	Category	Category Description	Post Cont. Voltage Deviation %			Potential Mitigation Solutions
					2015 Summer Peak	2018 Summer Peak	2023 Summer Peak	
NCNB-SP-VD-36	ELK 60	Mendocino 60 kV CB42 stuck	C2	Breaker	Not Solved	Not Solved	Not Solved	Case not solved due to voltage collapse. Problem is seen with Big river and Garberville SVCs. Install additional reactive support in the Mendocino area.
NCNB-SP-VD-37	PHILO 60		C2	Breaker	Not Solved	Not Solved	Not Solved	
NCNB-SP-VD-38	GARCIA 60		C2	Breaker	Not Solved	Not Solved	Not Solved	
NCNB-SP-VD-39	COVELO6 60		C2	Breaker	Not Solved	Not Solved	Not Solved	
NCNB-SP-VD-40	WILLITS 60		C2	Breaker	Not Solved	Not Solved	Not Solved	
NCNB-SP-VD-41	BIG RIVR 60		C2	Breaker	Not Solved	Not Solved	Not Solved	
NCNB-SP-VD-42	FRT BRGG 60		C2	Breaker	Not Solved	Not Solved	Not Solved	
NCNB-SP-VD-43	FRT SWRD 60		C2	Breaker	Not Solved	Not Solved	Not Solved	
NCNB-SP-VD-44	FRUITLND 60		C2	Breaker	Not Solved	Not Solved	Not Solved	
NCNB-SP-VD-45	GRBRVLLE 60		C2	Breaker	Not Solved	Not Solved	Not Solved	
NCNB-SP-VD-46	KEKAWAKA 60		C2	Breaker	Not Solved	Not Solved	Not Solved	
NCNB-SP-VD-47	LYTNVLLE 60		C2	Breaker	Not Solved	Not Solved	Not Solved	
NCNB-SP-VD-48	PNT ARNA 60		C2	Breaker	Not Solved	Not Solved	Not Solved	
NCNB-SP-VD-49	PTTR VLY 60		C2	Breaker	Not Solved	Not Solved	Not Solved	

Study Area: **PG&E North Coast & North Bay - Summer Peak**

Voltage Deviations

ID	Substation	Worst Contingency	Category	Category Description	Post Cont. Voltage Deviation %			Potential Mitigation Solutions
					2015 Summer Peak	2018 Summer Peak	2023 Summer Peak	
NCNB-SP-VD-50	MENDOCNO 60	BUS FAULT AT 31200 MENDOCNO CB102 stuck 115.00	C2	Breaker	< 10%	< 10%	10.74%	Install a series breaker to 115kV CB102 at Mendocino
NCNB-SP-VD-51	MNDCNO M 115		C2	Breaker	< 10%	< 10%	10.65%	
NCNB-SP-VD-52	CLER LKE 60	GARBERVILLE - LAYTONVILLE 60KV (Kekawaka JCt to Laytonville) & Konocti - Eagle Rock 60kV	C3	L-1-1	10.00%	< 10%	< 10%	Middletown 115kV project
NCNB-SP-VD-53	KONOCTI6 60		C3	L-1-1	17.19%	< 10%	< 10%	
NCNB-SP-VD-54	LOWR LKE 60		C3	L-1-1	17.58%	< 10%	< 10%	
NCNB-SP-VD-55	MIDDLTWN 60		C3	L-1-1	18.16%	< 10%	< 10%	
NCNB-SP-VD-56	PHILO 60	Mendocno- Ukiah 115 kV(Mendocino 115kV to CALPELLA 115kV) & GEYSER # 3 - CLOVERDALE 115K (CLOVERDALE 115KV to MPE TAP1)	C3	L-1-1	< 10%	< 10%	10.48%	Adjust generation at Geysers
NCNB-SP-VD-57	GRANITE 60		C3	L-1-1	11.95%	11.53%	12.98%	
NCNB-SP-VD-58	HARTLEY 60		C3	L-1-1	9.12%	< 10%	10.06%	
NCNB-SP-VD-59	CLER LKE 60		C3	L-1-1	< 10%	< 10%	10.77%	
NCNB-SP-VD-60	MASONITE 60		C3	L-1-1	< 10%	< 10%	11.36%	

Study Area: **PG&E North Coast & North Bay - Summer Peak**

Voltage Deviations

ID	Substation	Worst Contingency	Category	Category Description	Post Cont. Voltage Deviation %			Potential Mitigation Solutions
					2015 Summer Peak	2018 Summer Peak	2023 Summer Peak	
NCNB-SP-VD-61	CLER LKE 60	Mendocno- Ukiah 115 kV(Mendocino 115kV to CALPELLA 115kV) & Konocti - Eagle Rock 60kV	C3	L-1-1	10.22%	< 10%	< 10%	Middletown 115kV project
NCNB-SP-VD-62	KONOCTI6 60		C3	L-1-1	17.60%	< 10%	< 10%	
NCNB-SP-VD-63	LOWR LKE 60		C3	L-1-1	17.94%	< 10%	< 10%	
NCNB-SP-VD-64	MIDDLTWN 60		C3	L-1-1	18.43%	< 10%	< 10%	
NCNB-SP-VD-65	ELK 60		C3	L-1-1	< 10%	< 10%	19.29%	
NCNB-SP-VD-66	PHILO 60		C3	L-1-1	< 10%	< 10%	18.84%	
NCNB-SP-VD-67	UKIAH 115		C3	L-1-1	11.10%	10.80%	17.91%	
NCNB-SP-VD-68	GARCIA 60		C3	L-1-1	< 10%	< 10%	19.50%	
NCNB-SP-VD-69	COVELO6 60		C3	L-1-1	10.29%	10.02%	14.89%	
NCNB-SP-VD-70	GRANITE 60		C3	L-1-1	< 10%	< 10%	14.14%	
NCNB-SP-VD-71	HARTLEY 60		C3	L-1-1	< 10%	< 10%	14.05%	
NCNB-SP-VD-72	LUCERNE 115		C3	L-1-1	< 10%	< 10%	12.34%	
NCNB-SP-VD-73	WILLITS 60		C3	L-1-1	10.01%	< 10%	17.71%	
NCNB-SP-VD-74	BIG RIVR 60		C3	L-1-1	< 10%	< 10%	18.85%	
NCNB-SP-VD-75	CALPELLA 115		C3	L-1-1	10.88%	10.58%	17.55%	

Study Area: **PG&E North Coast & North Bay - Summer Peak**

Voltage Deviations

ID	Substation	Worst Contingency	Category	Category Description	Post Cont. Voltage Deviation %			Potential Mitigation Solutions
					2015 Summer Peak	2018 Summer Peak	2023 Summer Peak	
NCNB-SP-VD-76	CLER LKE 60	MENDOCINO - REDBUD 115 KV (MENDOCINO SUB TO LUCERN JCT2) & GEYSER # 3 - CLOVERDALE 115K (CLOVERDALE 115KV to MPE TAP1)	C3	L-1-1	< 10%	< 10%	12.95%	In addition to Big River and Garberville SVCs, install additional voltage support in the mendocino coast area.
NCNB-SP-VD-77	CLOVRDLE 115		C3	L-1-1	12.75%	12.40%	20.09%	
NCNB-SP-VD-78	FRT BRGG 60		C3	L-1-1	< 10%	< 10%	19.37%	
NCNB-SP-VD-79	HPLND JT 60		C3	L-1-1	11.02%	10.70%	17.12%	
NCNB-SP-VD-80	HPLND JT 115		C3	L-1-1	11.47%	11.15%	18.38%	
NCNB-SP-VD-81	LYTNVLLE 60		C3	L-1-1	10.18%	< 10%	14.65%	
NCNB-SP-VD-82	MASONITE 60		C3	L-1-1	10.31%	10.05%	17.66%	
NCNB-SP-VD-83	MENDOCNO 60		C3	L-1-1	10.58%	10.32%	17.38%	
NCNB-SP-VD-84	MENDOCNO 115		C3	L-1-1	10.70%	10.41%	17.26%	
NCNB-SP-VD-85	MNDCNO M 115		C3	L-1-1	10.54%	10.28%	17.35%	
NCNB-SP-VD-86	PNT ARNA 60		C3	L-1-1	< 10%	< 10%	19.49%	
NCNB-SP-VD-87	PTTR VLY 60		C3	L-1-1	< 10%	< 10%	16.92%	
NCNB-SP-VD-88	UPPR LKE 60		C3	L-1-1	< 10%	< 10%	14.91%	

Study Area: **PG&E North Coast & North Bay - Summer Peak**

Voltage Deviations

ID	Substation	Worst Contingency	Category	Category Description	Post Cont. Voltage Deviation %			Potential Mitigation Solutions
					2015 Summer Peak	2018 Summer Peak	2023 Summer Peak	
NCNB-SP-VD-89	CLER LKE 60	MENDOCINO - REDBUD 115 KV (MENDOCINO SUB TO LUCERN JCT2 11 & Konocti - Eagle Rock 60kV	C3	L-1-1	10.66%	< 10%	< 10%	Middletown 115kV project
NCNB-SP-VD-90	KONOCTI6 60		C3	L-1-1	18.00%	< 10%	< 10%	
NCNB-SP-VD-91	LOWR LKE 60		C3	L-1-1	18.36%	< 10%	< 10%	
NCNB-SP-VD-92	MIDDLTWN 60		C3	L-1-1	18.89%	< 10%	< 10%	
NCNB-SP-VD-93	REDBUD 115	Ukiah-Hopland-Cloverdale 115 kV (Ukiah sub 115kv to Hoplan & Eagle Rock- Redbud 115 kV (Eagle Rock 115kV to Lower Lake	C3	L-1-1	< 10%	12.44%	11.58%	In addition to Big River and Garberville SVCs, install additional voltage support in the mendocino coast area.
NCNB-SP-VD-94	GRANITE 60	Ukiah-Hopland-Cloverdale 115 kV (Ukiah sub 115kv to Hopland) & Konocti - Eagle Rock 60kV	C3	L-1-1	14.66%	< 10%	< 10%	Middletown 115kV project
NCNB-SP-VD-95	HARTLEY 60		C3	L-1-1	14.60%	< 10%	< 10%	
NCNB-SP-VD-96	CLER LKE 60		C3	L-1-1	16.30%	< 10%	< 10%	
NCNB-SP-VD-97	HPLND JT 60		C3	L-1-1	10.06%	< 10%	< 10%	
NCNB-SP-VD-98	UPPR LKE 60		C3	L-1-1	12.64%	< 10%	< 10%	
NCNB-SP-VD-99	MIDDLTWN 60	Eagle Rock-Cortina 115kV Lines & Cortina-Mendocino No.1 115	C5	L-2	< 10%	10.21%	11.58%	Adjust generation at Geysers
NCNB-SP-VD-100	MIDDLTWN 115		C5	L-2	< 10%	14.63%	15.21%	

Study Area: **PG&E North Coast & North Bay - Summer Peak**

Voltage Deviations

ID	Substation	Worst Contingency	Category	Category Description	Post Cont. Voltage Deviation %			Potential Mitigation Solutions
					2015 Summer Peak	2018 Summer Peak	2023 Summer Peak	
NCNB-SP-VD-101	REDBUD 115	Eagle Rock-Redbud & Cortina-Mendocino No.1 115kV	C5	L-2	< 10%	< 10%	12.05%	
NCNB-SP-VD-103	LUCERNE 115		C5	L-2	< 10%	< 10%	11.79%	
NCNB-SP-VD-104	ALTO 60	Ignacio-Alto-Sausalito #2 & #1 60kV Lines	C5	L-2	12.05%	< 10%	< 10%	Ignacio - Alto Voltage conversion project
NCNB-SP-VD-105	GREENBRE 60		C5	L-2	10.46%	< 10%	< 10%	
NCNB-SP-VD-106	SONOMA 115	Lakeville-Sonoma #1 & #2 115kV Lines	C5	L-2	11.20%	11.41%	12.51%	Trip load at Pueblo by existing SPS

Study Area: **PG&E North Coast & North Bay- Winter Peak**

Voltage Deviations

ID	Substation	Worst Contingency	Category	Category Description	Post Cont. Voltage Deviation %			Potential Mitigation Solutions
					2015 Winter Peak	2018 Winter Peak	2023 Winter Peak	
NCNB-WP-VD-1	HARTLEY 60 kV	Konocti - Eagle Rock 60kV	B	L-1	5.12%	<5%	<5%	Middle town 115kV project
NCNB-WP-VD-2	CLER LKE 60 kV		B	L-1	5.98%	<5%	<5%	
NCNB-WP-VD-3	KONOCTI6 60 kV		B	L-1	10.80%	<5%	<5%	
NCNB-WP-VD-4	LOWR LKE 60 kV		B	L-1	10.93%	<5%	<5%	
NCNB-WP-VD-5	MIDDLTWN 60 kV		B	L-1	11.11%	<5%	<5%	
NCNB-WP-VD-6	CALISTGA 60 kV	LAKEVILLE #1 60 kV(Lakeville sub 60 kV to Dunbar Sub 60 kV)	B	L-1	5.60%	5.89%	6.42%	
NCNB-WP-VD-7	ST.HELNA 60 kV		B	L-1	5.47%	5.75%	6.26%	
NCNB-WP-VD-8	SAUSALTO 60 kV	Ignacio - Alto - Saulsalito # 2 60 kV (IGNACO A 60.00 to	B	L-1	4.69%	<5%	<5%	Ignacia - Alto Voltage conversion project
NCNB-WP-VD-9	GREENBRE 60 kV	Ignacio _Alto 60 kV (Ignacio A 60kv to Ignacio Jct 60 kV)	B	L-1	5.60%	<5%	<5%	
NCNB-WP-VD-10	MIDDLTWN 60 kV	Middle Town - HomeStake 115kV (Middltwn to Homsttp 115kV)	B	L-1	<5%	5.07%	6.25%	Adjust generation at Geysers
NCNB-WP-VD-11	MIDDLTWN 115 kV		B	L-1	<5%	11.33%	11.72%	
NCNB-WP-VD-12	EGLE RCK 60 kV	EAGLE ROCK 115/60 KV BANK NO.1	B	L-1	9.35%	<5%	<5%	open Eagle Rock-Konocti 60 kV line for Eagle Rock bank outage

Study Area: **PG&E North Coast & North Bay- Winter Peak**

Voltage Deviations

ID	Substation	Worst Contingency	Category	Category Description	Post Cont. Voltage Deviation %			Potential Mitigation Solutions
					2015 Winter Peak	2018 Winter Peak	2023 Winter Peak	
NCNB-WP-VD-13	EGLE RCK 60 kV	BUS FAULT AT 31220 EGLE RCK 115.00	C1	Bus	14.14%	< 10%	< 10%	Middle town 115kV project
NCNB-WP-VD-14	KONOCTI6 60 kV		C1	Bus	11.89%	< 10%	< 10%	
NCNB-WP-VD-15	LOWR LKE 60 kV		C1	Bus	12.03%	< 10%	< 10%	
NCNB-WP-VD-16	MIDDLTWN 60 kV		C1	Bus	12.24%	< 10%	< 10%	
NCNB-WP-VD-17	ELK 60 kV	Mendocino 60 kV CB42 stuck	C2	Breaker	< 10%	15.40%	< 10%	Install additional reactive support in the Mendocino area
NCNB-WP-VD-18	PHILO 60 kV		C2	Breaker	< 10%	12.82%	< 10%	
NCNB-WP-VD-19	GARCIA 60 kV		C2	Breaker	< 10%	15.45%	< 10%	
NCNB-WP-VD-20	COVELO6 60 kV		C2	Breaker	13.13%	23.49%	< 10%	
NCNB-WP-VD-21	WILLITS 60 kV		C2	Breaker	11.87%	23.36%	10.74%	
NCNB-WP-VD-22	BIG RIVR 60 kV		C2	Breaker	< 10%	15.50%	< 10%	
NCNB-WP-VD-23	FRT BRGG 60 kV		C2	Breaker	< 10%	17.82%	< 10%	
NCNB-WP-VD-24	FRT SWRD 60 kV		C2	Breaker	10.02%	16.74%	< 10%	
NCNB-WP-VD-25	FRUITLND 60 kV		C2	Breaker	< 10%	14.25%	< 10%	
NCNB-WP-VD-26	GRBRVLLE 60 kV		C2	Breaker	11.59%	19.65%	< 10%	
NCNB-WP-VD-27	KEKAWAKA 60 kV		C2	Breaker	11.93%	20.34%	< 10%	

Study Area: **PG&E North Coast & North Bay- Winter Peak**

Voltage Deviations

ID	Substation	Worst Contingency	Category	Category Description	Post Cont. Voltage Deviation %			Potential Mitigation Solutions
					2015 Winter Peak	2018 Winter Peak	2023 Winter Peak	
NCNB-WP-VD-28	LYTNVLLE 60 kV		C2	Breaker	13.00%	23.29%	< 10%	
NCNB-WP-VD-29	PNT ARNA 60 kV		C2	Breaker	< 10%	15.45%	< 10%	
NCNB-WP-VD-30	PTTR VLY 60 kV		C2	Breaker	11.20%	22.49%	10.25%	
NCNB-WP-VD-31	CLER LKE 60 kV	Ukiah-Hopland-Cloverdale 115 kV (Ukiah sub 115kv to Hopland) & Konocti - Eagle Rock 60kV	C3	L-1-1	10.03%	< 10%	< 10%	Middletown 115kV project
NCNB-WP-VD-32	KONOCTI6 60 kV		C3	L-1-1	15.70%	< 10%	< 10%	
NCNB-WP-VD-33	LOWR LKE 60 kV		C3	L-1-1	15.89%	< 10%	< 10%	
NCNB-WP-VD-34	MIDDLTWN 60 kV		C3	L-1-1	16.18%	< 10%	< 10%	
NCNB-WP-VD-35	EGLE RCK 60 kV	Ukiah-Hopland-Cloverdale 115 kV (Ukiah sub 115kv to Hopland) & EAGLE ROCK 115/60 KV BANK NO.1	C3	L-1-1	13.17%	< 10%	< 10%	open Eagle Rock-Konocti 60 kV line for Eagle Rock bank outage
NCNB-WP-VD-36	ALTO 60 kV	Ignacio-Alto-Sausalito #2 & #1 60kV Lines	C5	L-2	18.07%	< 10%	< 10%	Ignacio - Alto voltage conversion project
NCNB-WP-VD-37	GREENBRE 60 kV		C5	L-2	15.98%	< 10%	< 10%	
NCNB-WP-VD-38	SAN RFLJ 60 kV		C5	L-2	13.36%	< 10%	< 10%	

Study Area: **PG&E North Coast & North Bay- Summer Off-Peak & Summer Light Load**

Voltage Deviations

ID	Substation	Worst Contingency	Category	Category Description	Post Cont. Voltage Deviation %			Potential Mitigation Solutions
					2015 Summer Off-Peak	2018 Summer Light Load	N/A	

No violations reported

Study Area: **PG&E North Coast & North Bay - Summer Peak**

High/Low Voltage

ID	Substation	Worst Contingency	Category	Category Description	Voltage (PU)			Potential Mitigation Solutions
					2015 Summer Peak	2018 Winter Peak	2023 Summer Peak	
NCNB-SP-V-1	FRT SWRD 60 kV	GARBERVILLE - LAYTONVILLE 60KV (Kekawaka JCt to Laytonville)	B	L-1	1.09	1.13	> 0.9	Bridgeville - Garberville 115kV line
NCNB-SP-V-2	FRUITLND 60 kV		B	L-1	1.08	1.10	> 0.9	
NCNB-SP-V-3	GRBRVLLE 60 kV		B	L-1	1.12	1.16	> 0.9	
NCNB-SP-V-4	CLER LKE 60 kV	Konocti - Eagle Rock 60kV	B	L-1	0.90	> 0.9	> 0.9	Middletown 115kV project
NCNB-SP-V-5	KONOCTI6 60 kV		B	L-1	0.84	> 0.9	0.98	
NCNB-SP-V-6	LOWR LKE 60 kV		B	L-1	0.82	> 0.9	> 0.9	
NCNB-SP-V-7	MIDDLTWN 60 kV		B	L-1	0.78	> 0.9	> 0.9	
NCNB-SP-V-8	GRANITE 60 kV	BUS FAULT AT 31220 EGLE RCK 115.00	C1	Bus	0.90	> 0.9	> 0.9	Middletown 115kV project
NCNB-SP-V-9	HARTLEY 60 kV		C1	Bus	0.88	> 0.9	> 0.9	
NCNB-SP-V-10	CLER LKE 60 kV		C1	Bus	0.88	> 0.9	> 0.9	
NCNB-SP-V-11	EGLE RCK 60 kV		C1	Bus	0.82	> 0.9	> 0.9	
NCNB-SP-V-12	KONOCTI6 60 kV		C1	Bus	0.82	> 0.9	> 0.9	
NCNB-SP-V-13	LOWR LKE 60 kV		C1	Bus	0.80	> 0.9	> 0.9	
NCNB-SP-V-14	MIDDLTWN 60 kV		C1	Bus	0.76	> 0.9	> 0.9	

Study Area: **PG&E North Coast & North Bay - Summer Peak**

High/Low Voltage

ID	Substation	Worst Contingency	Category	Category Description	Voltage (PU)			Potential Mitigation Solutions
					2015 Summer Peak	2018 Winter Peak	2023 Summer Peak	
NCNB-SP-V-15	FRT SWRD 60 kV	BUS FAULT AT 31308 LYTNVLLE 60.00	C1	Bus	> 0.9	1.13	> 0.9	Bridgeville - Garberville 115kV line
NCNB-SP-V-16	FRUITLND 60 kV		C1	Bus	> 0.9	1.10	> 0.9	
NCNB-SP-V-17	GRBRVLLE 60 kV		C1	Bus	1.12	1.16	> 0.9	
NCNB-SP-V-18	KEKAWAKA 60 kV		C1	Bus	1.12	1.16	> 0.9	
NCNB-SP-V-19	ELK 60 kV	Mendocino 60 kV CB42 stuck	C2	Breaker	0.87	0.82	0.81	Install additional reactive support near Mendocino area
NCNB-SP-V-20	PHILO 60 kV		C2	Breaker	0.90	0.87	0.86	
NCNB-SP-V-21	GARCIA 60 kV		C2	Breaker	0.86	0.82	0.80	
NCNB-SP-V-22	COVELO6 60 kV		C2	Breaker	0.74	0.71	0.74	
NCNB-SP-V-23	WILLITS 60 kV		C2	Breaker	0.75	0.71	0.70	
NCNB-SP-V-24	BIG RIVR 60 kV		C2	Breaker	0.86	0.80	0.78	
NCNB-SP-V-25	FRT BRGG 60 kV		C2	Breaker	0.82	0.77	0.75	
NCNB-SP-V-26	FRT SWRD 60 kV		C2	Breaker	0.87	0.86	> 0.9	
NCNB-SP-V-27	FRUITLND 60 kV		C2	Breaker	0.89	0.88	> 0.9	
NCNB-SP-V-28	GRBRVLLE 60 kV		C2	Breaker	0.84	0.83	> 0.9	
NCNB-SP-V-29	KEKAWAKA 60 kV		C2	Breaker	0.81	0.80	> 0.9	

Study Area: **PG&E North Coast & North Bay - Summer Peak**

High/Low Voltage

ID	Substation	Worst Contingency	Category	Category Description	Voltage (PU)			Potential Mitigation Solutions
					2015 Summer Peak	2018 Winter Peak	2023 Summer Peak	
NCNB-SP-V-30	LYTNVLLE 60 kV		C2	Breaker	0.75	0.72	0.75	
NCNB-SP-V-31	PNT ARNA 60 kV		C2	Breaker	0.86	0.82	0.80	
NCNB-SP-V-32	PTTR VLY 60 kV		C2	Breaker	0.78	0.74	0.73	
NCNB-SP-V-33	COVELO6 60 kV	GARBERVILLE - LAYTONVILLE 60KV (Kekawaka JCt to Laytonvill & GEYSER # 3 - CLOVERDALE 115K (CLOVERDALE 115KV to MPE TAP1)	C3	L-1-1	> 0.9	> 0.9	0.88	Install additional reactive support in the Mendocino area
NCNB-SP-V-34	LYTNVLLE 60 kV		C3	L-1-1	> 0.9	> 0.9	0.90	
NCNB-SP-V-35	CLER LKE 60 kV	GARBERVILLE - LAYTONVILLE 60KV (Kekawaka JCt to Laytonville) & Konocti - Eagle Rock 60kV	C3	L-1-1	0.90	> 0.9	> 0.9	Middletown 115kV project
NCNB-SP-V-36	KONOCTI6 60 kV		C3	L-1-1	0.84	> 0.9	> 0.9	
NCNB-SP-V-37	LOWR LKE 60 kV		C3	L-1-1	0.82	> 0.9	> 0.9	
NCNB-SP-V-38	MIDDLTWN 60 kV		C3	L-1-1	0.78	> 0.9	> 0.9	

Study Area: **PG&E North Coast & North Bay - Summer Peak**

High/Low Voltage

ID	Substation	Worst Contingency	Category	Category Description	Voltage (PU)			Potential Mitigation Solutions
					2015 Summer Peak	2018 Winter Peak	2023 Summer Peak	
NCNB-SP-V-39	ELK 60 kV	MENDOCINO - REDBUD 115 KV (MENDOCINO SUB TO LUCERN JCT2) & GEYSER # 3 - CLOVERDALE 115K (CLOVERDALE 115KV to MPE TAP1)	C3	L-1-1	> 0.9	> 0.9	0.79	Install additional reactive support in the Mendocino area.
NCNB-SP-V-40	PHILO 60 kV		C3	L-1-1	> 0.9	> 0.9	0.80	
NCNB-SP-V-41	UKIAH 115 kV		C3	L-1-1	0.90	0.90	0.82	
NCNB-SP-V-42	GARCIA 60 kV		C3	L-1-1	> 0.9	> 0.9	0.79	
NCNB-SP-V-43	COVELO6 60 kV		C3	L-1-1	0.88	0.89	0.81	
NCNB-SP-V-44	GRANITE 60 kV		C3	L-1-1	> 0.9	> 0.9	0.86	
NCNB-SP-V-45	GUALALA 60 kV		C3	L-1-1	> 0.9	> 0.9	0.89	
NCNB-SP-V-46	HARTLEY 60 kV		C3	L-1-1	> 0.9	> 0.9	0.84	
NCNB-SP-V-47	LUCERNE 115 kV		C3	L-1-1	> 0.9	> 0.9	0.90	
NCNB-SP-V-48	WILLITS 60 kV		C3	L-1-1	0.90	> 0.9	0.80	
NCNB-SP-V-49	BIG RIVR 60 kV		C3	L-1-1	> 0.9	> 0.9	0.81	
NCNB-SP-V-50	CALPELLA 115 kV		C3	L-1-1	0.91	0.91	0.83	
NCNB-SP-V-51	CLER LKE 60 kV		C3	L-1-1	> 0.9	> 0.9	0.86	
NCNB-SP-V-52	CLOVRDLE 115 kV		C3	L-1-1	0.89	0.90	0.82	

Study Area: **PG&E North Coast & North Bay - Summer Peak**

High/Low Voltage

ID	Substation	Worst Contingency	Category	Category Description	Voltage (PU)			Potential Mitigation Solutions
					2015 Summer Peak	2018 Winter Peak	2023 Summer Peak	
NCNB-SP-V-53	FRT BRGG 60 kV		C3	L-1-1	> 0.9	> 0.9	0.79	
NCNB-SP-V-54	HPLND JT 60 kV		C3	L-1-1	0.91	0.91	0.84	
NCNB-SP-V-55	LYTNVLLE 60 kV		C3	L-1-1	0.89	> 0.9	0.82	
NCNB-SP-V-56	MASONITE 60 kV		C3	L-1-1	0.91	0.92	0.83	
NCNB-SP-V-57	MENDOCNO 60 kV		C3	L-1-1	0.92	0.92	0.83	
NCNB-SP-V-58	MENDOCNO 115 kV		C3	L-1-1	0.91	0.92	0.83	
NCNB-SP-V-59	MNDCNO M 115 kV		C3	L-1-1	0.91	0.92	0.83	
NCNB-SP-V-60	PNT ARNA 60 kV		C3	L-1-1	> 0.9	> 0.9	0.79	
NCNB-SP-V-61	PTTR VLY 60 kV		C3	L-1-1	> 0.9	> 0.9	0.83	
NCNB-SP-V-62	UPPR LKE 60 kV		C3	L-1-1	> 0.9	> 0.9	0.84	

Study Area: **PG&E North Coast & North Bay - Summer Peak**

High/Low Voltage

ID	Substation	Worst Contingency	Category	Category Description	Voltage (PU)			Potential Mitigation Solutions
					2015 Summer Peak	2018 Winter Peak	2023 Summer Peak	
NCNB-SP-V-63	GRANITE 60 kV	Ukiah-Hopland-Cloverdale 115 kV (Ukiah sub 115kv to Hopland) & Konocti - Eagle Rock 60kV	C3	L-1-1	0.84	> 0.9	> 0.9	Middletown 115kV Project
NCNB-SP-V-64	HARTLEY 60 kV		C3	L-1-1	0.84	> 0.9	> 0.9	
NCNB-SP-V-65	CLER LKE 60 kV		C3	L-1-1	0.82	> 0.9	> 0.9	
NCNB-SP-V-66	KONOCTI6 60 kV		C3	L-1-1	0.77	> 0.9	> 0.9	
NCNB-SP-V-67	LOWR LKE 60 kV		C3	L-1-1	0.75	> 0.9	> 0.9	
NCNB-SP-V-68	MIDDLTWN 60 kV		C3	L-1-1	0.72	> 0.9	> 0.9	
NCNB-SP-V-69	UPPR LKE 60 kV		C3	L-1-1	0.87	> 0.9	> 0.9	
NCNB-SP-V-70	GUALALA 60 kV	Ukiah-Hopland-Cloverdale 115 kV (Ukiah sub 115kv to Hopland) & Fulton #1 60kV (Geyserville sub 60 kV to Geyserville JCt 6	C3	L-1-1	> 0.9	> 0.9	0.89	Install reactive support in 2022 at Annapolis / Gaulala
NCNB-SP-V-71	EGLE RCK 60 kV	Ukiah-Hopland-Cloverdale 115 kV (Ukiah sub 115kv to Hopland) & EAGLE ROCK 115/60 KV BANK NO.1	C3	L-1-1	0.88	> 0.9	> 0.9	open Eagle Rock-Konocti 60 kV line for Eagle Rock bank outage
NCNB-SP-V-72	COVELO6 60 kV	Eagle Rock-Redbud & Cortina-Mendocino No.1 115kV	C5	L-2	> 0.9	> 0.9	0.89	Install addition reactive support in Mendocino area
NCNB-SP-V-73	LYTNVLLE 60 kV		C5	L-2	> 0.9	> 0.9	0.90	
NCNB-SP-V-74	ALTO 60 kV	Ignacio-Alto-Sausalito #2 & #1 60kV Lines	C5	L-2	0.85	> 0.9	> 0.9	Ignacio - Alto voltage conversion project
NCNB-SP-V-75	GREENBRE 60 kV		C5	L-2	0.87	> 0.9	> 0.9	

Study Area: **PG&E North Coast & North Bay - Summer Peak**

High/Low Voltage

ID	Substation	Worst Contingency	Category	Category Description	Voltage (PU)			Potential Mitigation Solutions
					2015 Summer Peak	2018 Winter Peak	2023 Summer Peak	
NCNB-SP-V-76	SAN RFLJ 60 kV		C5	L-2	0.90	> 0.9	> 0.9	
NCNB-SP-V-77	GUALALA 60 kV	Tulucay-Vaca & Vaca-Lakeville 230kV Lines	C5	L-2	> 0.9	> 0.9	0.89	Install reactive support in 2022 at Annapolis / Gaulala

Study Area: **PG&E North Coast & North Bay- Winter Peak**

High/Low Voltage

ID	Substation	Worst Contingency	Category	Category Description	Voltage (PU)			Potential Mitigation Solutions
					2015 Winter Peak	2018 Winter Peak	2023 Winter Peak	
NCNB-WP-V-1	MIDDLTWN 60	Bus Fault at EGLE RCK 115.00	C1	Bus	0.89	> 0.9	> 0.9	Middletown 115kV project
NCNB-WP-V-2	ELK 60	Mendocino 60 kV CB42 stuck	C2	Breaker	Not Solved	Not Solved	Not Solved	Install additional reactive support near Mendocino area.
NCNB-WP-V-3	PHILO 60		C2	Breaker	Not Solved	Not Solved	Not Solved	
NCNB-WP-V-4	GARCIA 60		C2	Breaker	Not Solved	Not Solved	Not Solved	
NCNB-WP-V-5	COVELO6 60		C2	Breaker	Not Solved	Not Solved	Not Solved	
NCNB-WP-V-6	WILLITS 60		C2	Breaker	Not Solved	Not Solved	Not Solved	
NCNB-WP-V-7	BIG RIVR 60		C2	Breaker	Not Solved	Not Solved	Not Solved	
NCNB-WP-V-8	FRT BRGG 60		C2	Breaker	Not Solved	Not Solved	Not Solved	
NCNB-WP-V-9	FRT SWRD 60		C2	Breaker	Not Solved	Not Solved	Not Solved	
NCNB-WP-V-10	FRUITLND 60		C2	Breaker	Not Solved	Not Solved	Not Solved	
NCNB-WP-V-11	GRBRVLLE 60		C2	Breaker	Not Solved	Not Solved	Not Solved	
NCNB-WP-V-12	KEKAWAKA 60		C2	Breaker	Not Solved	Not Solved	Not Solved	
NCNB-WP-V-13	LYTNVLLE 60		C2	Breaker	Not Solved	Not Solved	Not Solved	
NCNB-WP-V-14	PNT ARNA 60		C2	Breaker	Not Solved	Not Solved	Not Solved	
NCNB-WP-V-15	PTTR VLY 60		C2	Breaker	Not Solved	Not Solved	Not Solved	

Study Area: **PG&E North Coast & North Bay- Winter Peak**

High/Low Voltage

ID	Substation	Worst Contingency	Category	Category Description	Voltage (PU)			Potential Mitigation Solutions
					2015 Winter Peak	2018 Winter Peak	2023 Winter Peak	
NCNB-WP-V-16	KONOCTI6 60	Ukiah-Hopland-Cloverdale 115 kV (Ukiah sub 115kv to Hopland) & Konocti - Eagle Rock 60kV	C3	L-1-1	0.87	> 0.9	> 0.9	Middletown 115kV project
NCNB-WP-V-17	LOWR LKE 60		C3	L-1-1	0.86	> 0.9	> 0.9	
NCNB-WP-V-18	MIDDLTWN 60		C3	L-1-1	0.85	> 0.9	> 0.9	
NCNB-WP-V-19	ALTO 60	Ignacio-Alto-Sausalito #2 & #1 60kV Lines	C5	L-2	0.78	> 0.9	> 0.9	Ignacio - Alto voltage conversion project
NCNB-WP-V-20	GREENBRE 60		C5	L-2	0.81	> 0.9	> 0.9	
NCNB-WP-V-21	SAN RFLJ 60		C5	L-2	0.85	> 0.9	> 0.9	

Study Area: **PG&E North Coast & North Bay- Summer Off-Peak & Summer Light Load**

High/Low Voltage

ID	Substation	Worst Contingency	Category	Category Description	Voltage (PU)			Potential Mitigation Solutions
					2015 Summer Off-Peak	2018 Summer Light Load	N/A	

No violations reported

Study Area: **PG&E North Coast & North Bay - Summer Peak**

Transient Stability

ID	Contingency	Category	Category Description	Transient Stability Performance			Potential Mitigation Solutions
				2015 Summer Peak	2018 Summer Peak	2023 Summer Peak	

No violations reported.

Study Area: **PG&E North Coast & North Bay- Winter Peak**

Transient Stability

ID	Contingency	Category	Category Description	Transient Stability Performance			Potential Mitigation Solutions
				2015 Winter Peak	2018 Winter Peak	2023 Winter Peak	

No violations reported.

Study Area: **PG&E North Coast & North Bay- Summer Off-Peak & Summer Light Load**

Transient Stability

ID	Contingency	Category	Category Description	Transient Stability Performance			Potential Mitigation Solutions
				2015 Summer Off-Peak	2018 Summer Light Load	N/A	

No violations reported.

Study Area: **PG&E North Coast & North Bay - Summer Peak**

Single Contingency Load Drop

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

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

Study Area: **PG&E North Coast & North Bay- Winter Peak**

Single Contingency Load Drop

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

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

Study Area: **PG&E North Coast & North Bay- Summer Off-Peak & Summer Light Load**

Single Contingency Load Drop

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

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

Study Area: **PG&E North Coast & North Bay - Summer Peak**

Single Source Substation with more than 100 MW Load

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

No single source substation with more than 100 MW Load

Study Area: **PG&E North Coast & North Bay- Winter Peak**

Single Source Substation with more than 100 MW Load

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

No single source substation with more than 100 MW Load

Study Area: **PG&E North Coast & North Bay- Summer Off-Peak & Summer Light Load**

Single Source Substation with more than 100 MW Load

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

No single source substation with more than 100 MW Load