newfoundland labrador hydro
a nalcor energy company

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February 20, 2015

The Board of Commissioners of Public Utilities
Prince Charles Building
120 Torbay Road, P.O. Box 21040
St. John's, Newfoundland & Labrador
A1A 5B2

Attention: Ms. Cheryl Blundon
Director Corporate Services & Board Secretary

Dear Ms. Blundon:

Re: Newfoundland and Labrador Hydro - the Board's Investigation and Hearing into Supply Issues and Power Outages on the Island Interconnected System – System Losses Guide

Further to Hydro's Reply Submission of February 5, 2015 and in accordance with the Liberty Report Recommendations dated December 17, 2014, item 2.3 wherein Hydro is required to "provide the Board with the guide on system losses under various configurations and any instructions for their use", please find enclosed the original plus 12 copies of Hydro's report entitled *Transmission Losses for Abnormal Generation/Transmission,* dated January 2015.

We trust the foregoing is satisfactory. If you have any questions or comments, please contact the undersigned.

Yours truly,

NEWFOUNDLAND AND LABRADOR HYDRO

Tracey L. Pennell
Legal Counsel

TLP/jc

cc: Gerard Hayes – Newfoundland Power
Paul Coxworthy – Stewart McKelvey Stirling Scales
Sheryl Nisenbaum – Praxair Canada Inc.
ecc: Roberta Frampton Benefiel – Grand Riverkeeper Labrador
Thomas Johnson – Consumer Advocate
Thomas O' Reilly – Cox & Palmer
Danny Dumaresque

R. Collett	2015-02-19
Approved for Release	Date

Transmission Losses for Abnormal Generation/Transmission

Date: January 2015

System Planning Department

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Table of Contents

1. Introduction

An analysis has been performed to investigate transmission losses in Newfoundland and Labrador Hydro's (Hydro's) Transmission System. The objective of the investigation is to assess the impact of generation and transmission contingencies and the resulting variation in transmission losses. The results of this study shall be used as an input to improve the accuracy of demand forecasts generated by Nostradamus Software.

2. Study Scope

The scope of the study is to investigate transmission system losses for 2015[1]. The analysis includes a review of the impact of transmission and generation contingencies for a set of base cases. These base cases reflect system conditions ranging from peak load to light load in 50 MW increments. The study was performed using Version 32 of PSS®E software from Siemens PTI.

3. Base Cases

A 2015 peak load case was developed in accordance with Hydro's Operating Interconnected Island Load Forecast from June of 2014. The forecast is summarized in Table 1.

Generation dispatches used for each base case are summarized in Tables 2 and 3. It should be noted that the new combustion turbine at Holyrood (HRD) is offline under normal system conditions while combustion turbines at Hardwoods (HWD) and Stephenville (SVL) are in operation as synchronous condensers. Non-utility generators (NUGS) include Star Lake, Rattle Brook, Corner Brook Cogeneration, Exploits River, Buchans, and wind farms at St. Lawrence and Fermeuse. Wind generation at Fermeuse and St. Lawrence is assumed to be offline for the purposes of this investigation.

Load flow plots for the base cases are provided in Appendix A.

[1] The study results shall be updated annually.

Table 1 – 2015 Operating Interconnected Island Load Forecast

Newfoundland Power System Peak Demand	
Peak Demand	1295 MW
Coincident Peak Demand	1287 MW
Hydro Rural System	
Peak Demand	95.2 MW
Coincident Peak Demand	92 MW
Industrial Demand	
Maximum Firm Demand	81.5 MW
Coincident Peak Demand	74 MW
Transmission Loss	64 MW
Holyrood Station Service	24 MW
Island Coincident Demand	1731 MW

Table 2 – Base Case Demand Summary

Base Case	NF Power Demand (MW)	Hydro Rural System Demand (MW)	Industrial Demand (MW)	Holyrood Station Service (MW)	Losses (MW)	Island Demand (MW)
1	1287	92	74	24	64	1731
2	1240	89	74	24	57	1673
3	1194	85	74	24	50	1617
4	1147	82	74	24	45	1561
5	1101	79	74	24	40	1507
6	1054	75	74	24	37	1453
7	1007	72	74	24	33	1400
8	960	69	74	24	30	1347
9	913	65	74	24	28	1294
10	866	62	74	24	26	1242
11	819	59	74	17	31	1191
12	773	55	74	17	29	1138
13	726	52	74	17	26	1085
14	679	49	74	9	36	1038
15	632	45	74	9	32	984
16	585	42	74	9	29	931
17	539	39	74	9	27	878
18	492	35	74	1	40	833
19	445	32	74	1	36	779
20	398	29	74	1	32	726
21	352	25	74	1	30	673

Table 3 – Base Case Dispatch Summary

Base Case	HRD Unit 1 (MW)	HRD Unit 2 (MW)	HRD Unit 3 (MW)	Total HRD (MW)	Hydraulic (MW)	Total Hydro (MW)	NUGS (MW)	NF Power (MW)	Industrial (MW)	Island Demand (MW)
1	170	170	150	490	922	1412	111	94	114	1731
2	170	170	150	490	864	1408	111	94	114	1673
3	170	170	150	490	808	1298	111	94	114	1617
4	170	170	150	490	752	1242	111	94	114	1561
5	170	170	150	490	698	1188	111	94	114	1507
6	170	170	150	490	644	1134	111	94	114	1453
7	170	170	150	490	591	1081	111	94	114	1400
8	170	170	150	490	538	1028	111	94	114	1347
9	170	170	150	490	485	975	111	94	114	1294
10	170	170	150	490	433	923	111	94	114	1242
11	170	170	0	340	532	872	111	94	114	1191
12	170	170	0	340	479	819	111	94	114	1138
13	170	170	0	340	426	766	111	94	114	1085
14	170	0	0	170	549	719	111	94	114	1038
15	170	0	0	170	495	665	111	94	114	984
16	170	0	0	170	442	612	111	94	114	931
17	170	0	0	170	389	559	111	94	114	878
18	0	0	0	0	514	514	111	94	114	833
19	0	0	0	0	460	460	111	94	114	779
20	0	0	0	0	407	407	111	94	114	726
21	0	0	0	0	354	354	111	94	114	673

4. Contingencies

Contingencies considered for the purposes of this investigation include the loss of generation at HRD, the loss of hydraulic generation, and the loss of 230 kV transmission lines. It should be noted that single contingencies were considered for this investigation, with the exception of the loss of multiple units at HRD.

Contingencies and their respective corrective actions are summarized in Appendix B.

5. Loss of Generation at HRD

Load flow analysis included the loss of one or multiple units at HRD. For the loss of a single unit, it should be noted that active power provided by gas turbines at HRD and HWD would effectively replace lost generation, resulting in a negligible change in system losses. For the purposes of this investigation, corrective actions were developed to reflect worst-case incremental losses.

Table 4 provides the incremental transmission losses for contingencies at Holyrood.

6. Loss of Hydraulic Generation

Analysis was performed to assess the incremental losses associated with the loss of hydraulic generation. Results of the analysis indicate that redispatch of the system following these contingencies does not result a variation in system losses that exceeds 5 MW and would not have an appreciable impact on demand forecasting.

Table 4 – Incremental Losses for Contingencies at Holyrood

Base Case	Island Demand (MW)	Loss of One Unit Incremental Losses (MW)	Loss of Two Units Incremental Losses (MW)	Loss of Three Units Incremental Losses (MW)
1	1731	22	35	Insufficient System Capacity
2	1673	18	28	
3	1617	15	24	
4	1561	13	21	
5	1507	12	18	56
6	1453	11	16	47
7	1400	10	15	40
8	1347	9	14	35
9	1294	8	13	34
10	1242	8	13	30
11	1191	14	21	Tripping Additional Units Not Applicable
12	1138	13	19	
13	1085	12	18	
14	1038	20		
15	984	19		
16	931	17		
17	878	16		
18	833			
19	779			
20	726			
21	673			

7. Transmission Line Contingencies

A review of transmission line contingencies indicated that appreciable incremental losses are present if a redispatch of generation is require. Such redistpaches serve to prevent the overloading of transmission lines or to compensate for the loss of generation connected via radial lines.

Results of the analysis are provided in Table 5. All 230 kV transmission line contingencies were considered for this analysis, but only those that resulted in appreciable incremental losses (a net change greater than 5 MW) are provided. It should be noted that redispatches associated with certain contingencies resulted in a net reduction in

system losses. This is due to increased generation near load centres, particularly on the Avalon Peninsula. Negative incremental losses are indicated for these cases. Shaded cells indicate that incremental losses for a particular case are less than 5 MW.

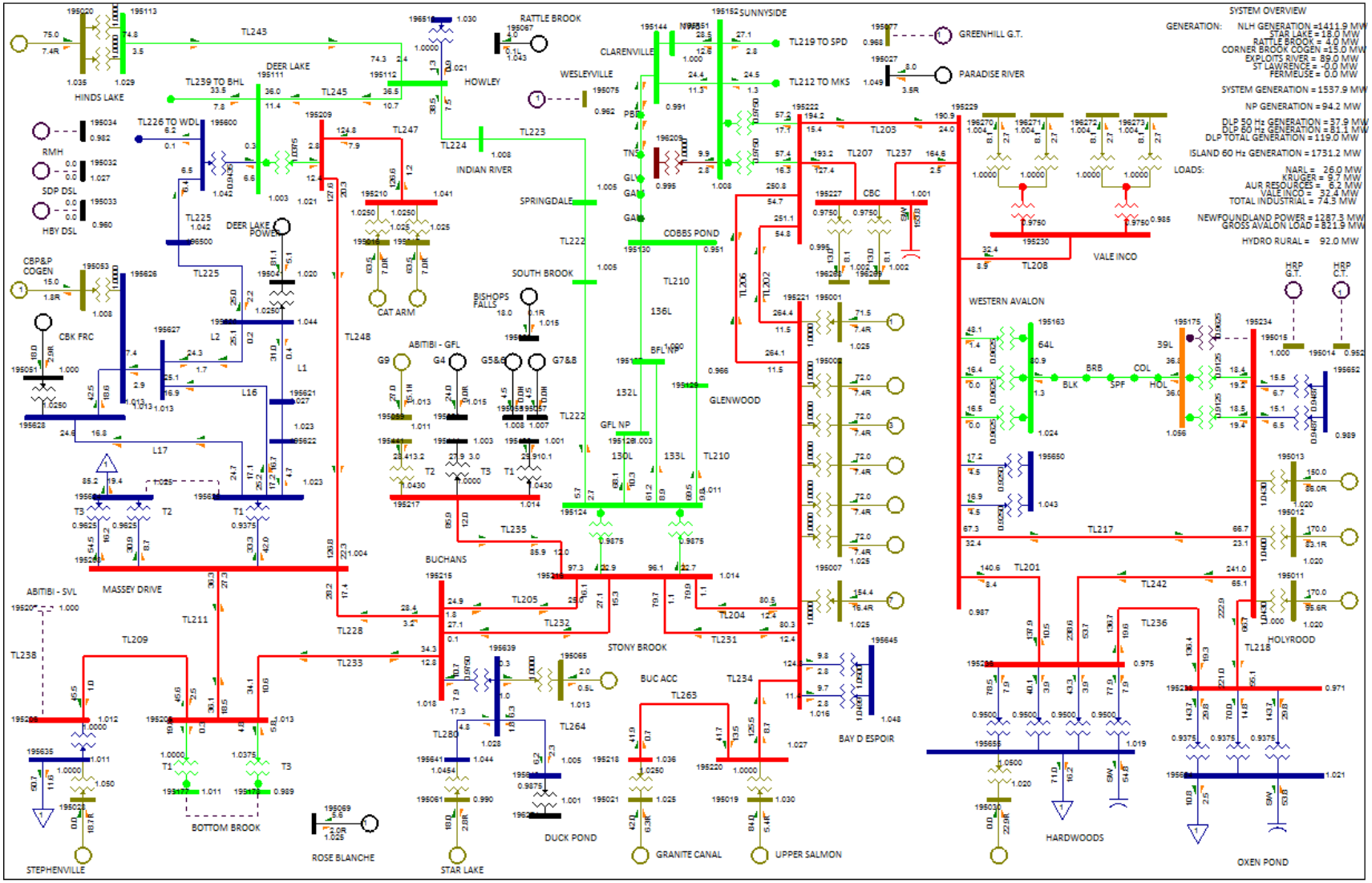
Table 5 – Incremental Losses for 230 kV Line Contingencies

Base Case	Island Demand (MW)	Loss of TL202 or TL206 Incremental Losses (MW)	Loss of TL207 Incremental Losses (MW)	Loss of TL237 Incremental Losses (MW)	Loss of TL234 Incremental Losses (MW)
1	1735	-13	-8	-15	
2	1675	-12	-7	-13	
3	1620	-10	-6	-11	
4	1565	-9		-9	
5	1510	-8		-8	
6	1455	-7		-6	
7	1400	-6			
8	1350				
9	1295				
10	1245				
11	1195	-7		-7	
12	1140	-6		-6	
13	1090				
14	1040	-10	-6	-9	6
15	985	-9	-6	-8	7
16	930	-7		-6	7
17	880	-6		-5	7
18	835	-13	-7	-10	8
19	780	-11	-6	-9	8
20	730	-9	-5	-8	9
21	675	-8		-6	10

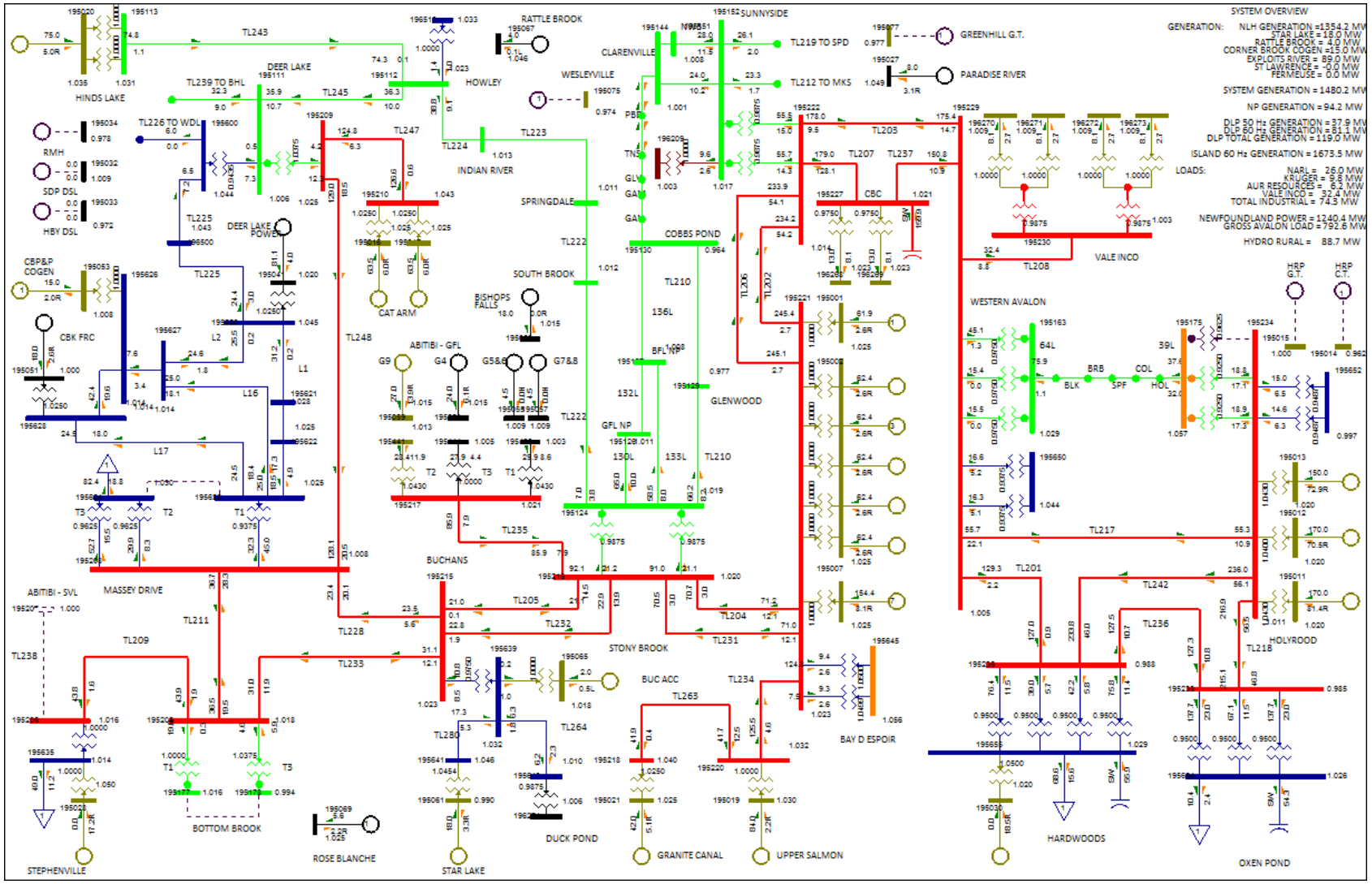
8. Conclusion

An analysis has been performed to investigate the impact of generation and transmission contingencies and the resulting incremental transmission losses. The results of this study shall be updated annually and shall be used as an input to improve the accuracy of demand forecasts generated by Nostradamus Software.

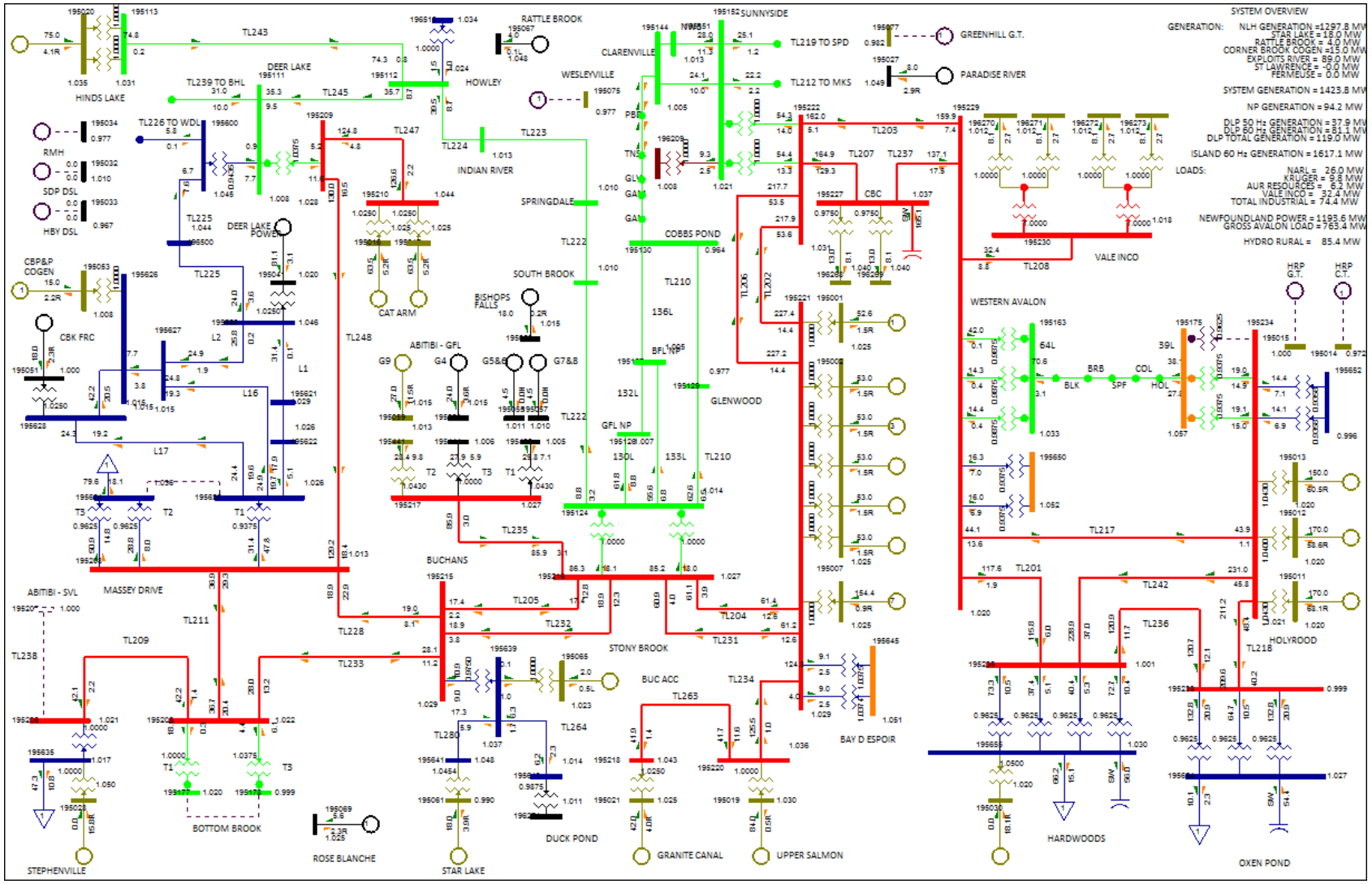
9. Appendix A – Load Flow Plots


SYSTEM OVERVIEW
GENERATION: NLH GENERATION =1411.9 MW
STAR LAKE = 18.0 MW
RATTLE BROOK = 4.0 MW
CORNER BROOK COGEN =15.0 MW
EXPLOITS RIVER = 89.0 MW
ST LAWRENCE = 0.0 MW
FERMEUSE = 0.0 MW
SYSTEM GENERATION = 1537.9 MW
NP GENERATION = 94.2 MW
DLP 50 Hz GENERATION = 37.9 MW
DLP 60 Hz GENERATION = 81.1 MW
DLP TOTAL GENERATION = 119.0 MW
ISLAND 60 Hz GENERATION = 1731.2 MW
LOADS:
NARL = 26.0 MW
KRUGER = 9.7 MW
AUR RESOURCES = 6.2 MW
VALE INCO = 32.4 MW
TOTAL INDUSTRIAL = 74.5 MW
NEWFOUNDLAND POWER = 1287.3 MW
GROSS AVALON LOAD = 821.9 MW
HYDRO RURAL = 92.0 MW
HINDS LAKE
DEER LAKE
HOWLEY
RATTLE BROOK
SUNNYSIDE
CLARENVILLE
WESLEYVILLE
GREENHILL G.T.
PARADISE RIVER
TL219 TO SPD
TL212 TO MKS
TL239 TO BHL
TL226 TO WDL
RMH
SDP DSL
HBY DSL
INDIAN RIVER
SPRINGDALE
COBBS POND
SOUTH BROOK
CAT ARM
DEER LAKE POWER
CBP&P COGEN
CBK FRC
BISHOPS FALLS
ABITIBI - GFL
GLENWOOD
BUCHANS
STONY BROOK
BUC ACC
BAY D ESPOIR
ABITIBI - 5VL
MASSEY DRIVE
BOTTOM BROOK
STEPHENVILLE
ROSE BLANCHE
STAR LAKE
DUCK POND
GRANITE CANAL
UPPER SALMON
VALE INCO
WESTERN AVALON
HARDWOODS
HOLYROOD
OXEN POND
HRP G.T.
HRP C.T.

Base Case 1


SYSTEM OVERVIEW
GENERATION:
NLH GENERATION =1354.2 MW
STAR LAKE = 18.0 MW
RATTLE BROOK = 4.0 MW
CORNER BROOK COGEN =15.0 MW
EXPLOITS RIVER = 89.0 MW
ST LAWRENCE = 0.0 MW
FERMEUSE = 0.0 MW
SYSTEM GENERATION = 1480.2 MW
NP GENERATION = 94.2 MW
DLP 50 Hz GENERATION = 37.9 MW
DLP 60 Hz GENERATION = 81.1 MW
DLP TOTAL GENERATION = 119.0 MW
ISLAND 60 Hz GENERATION = 1673.5 MW
LOADS:
NARL = 26.0 MW
KRUGER = 9.8 MW
AUR RESOURCES = 6.2 MW
VALE INCO = 32.4 MW
TOTAL INDUSTRIAL = 74.3 MW
NEWFOUNDLAND POWER = 1240.4 MW
GROSS AVALON LOAD = 792.6 MW
HYDRO RURAL = 88.7 MW
HINDS LAKE
DEER LAKE
TL243
TL239 TO BHL
TL245
TL226 TO WDL
RMH
SDP DSL
HBY DSL
TL225
DEER LAKE POWER
CBP&P COGEN
CBK FRC
TL247
TL224
HOWLEY
INDIAN RIVER
TL223
RATTLE BROOK
WESLEYVILLE
CLARENVILLE
SUNNYSIDE
TL219 TO SPD
TL212 TO MKS
GREENHILL G.T.
PARADISE RIVER
SPRINGDALE
TL222
SOUTH BROOK
BISHOPS FALLS
CAT ARM
TL248
ABITIBI - GFL
COBBS POND
136L
132L
130L
133L
TL210
GLENWOOD
GFL NP
BFL NP
TL203
TL207
TL237
CBC
VALE INCO
TL208
WESTERN AVALON
64L
39L
BRB
BLK
SPF
CDL
HOL
HRP G.T.
HRP C.T.
TL206
TL202
TL217
TL201
TL242
TL236
TL218
HOLYROOD
TL205
TL232
TL204
TL231
STONY BROOK
BUCHANS
TL235
TL228
TL233
TL211
TL209
TL238
ABITIBI - SVL
MASSEY DRIVE
BOTTOM BROOK
STEPHENVILLE
ROSE BLANCHE
STAR LAKE
DUCK POND
BUC ACC
TL263
TL264
TL234
BAY D ESPOIR
GRANITE CANAL
UPPER SALMON
HARDWOODS
OXEN POND

Base Case 2


SYSTEM OVERVIEW
GENERATION:
NLH GENERATION =1297.8 MW
STAR LAKE = 18.0 MW
RATTLE BROOK = 4.0 MW
CORNER BROOK COGEN =15.0 MW
EXPLOITS RIVER = 89.0 MW
ST LAWRENCE = 0.0 MW
FERMEUSE = 0.0 MW
SYSTEM GENERATION = 1423.8 MW
NP GENERATION = 94.2 MW
DLP 50 Hz GENERATION = 37.9 MW
DLP 60 Hz GENERATION = 81.1 MW
DLP TOTAL GENERATION = 119.0 MW
ISLAND 60 Hz GENERATION = 1617.1 MW
LOADS:
NARL = 26.0 MW
KRUGER = 9.8 MW
AUR RESOURCES = 6.2 MW
VALE INCO = 32.4 MW
TOTAL INDUSTRIAL = 74.4 MW
NEWFOUNDLAND POWER = 1193.6 MW
GROSS AVALON LOAD = 763.4 MW
HYDRO RURAL = 85.4 MW
HINDS LAKE
DEER LAKE
HOWLEY
RATTLE BROOK
SUNNYSIDE
GREENHILL G.T.
PARADISE RIVER
TL219 TO SPD
TL212 TO MKS
TL239 TO BHL
TL226 TO WDL
TL243
TL245
TL247
TL223
TL224
INDIAN RIVER
CLARENVILLE
WESLEYVILLE
RMH
SDP DSL
HBY DSL
DEER LAKE POWER
TL225
CBP&P COGEN
CBK FRC
CAT ARM
SPRINGDALE
SOUTH BROOK
BISHOPS FALLS
COBBS POND
TL222
TL210
136L
132L
130L
133L
GLENWOOD
GFL NP
ABITIBI - GFL
TL248
TL207
TL203
TL237
CBC
VALE INCO
TL208
WESTERN AVALON
HRP G.T.
HRP C.T.
64L
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BRB
BLK
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OXEN POND
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BUC ACC
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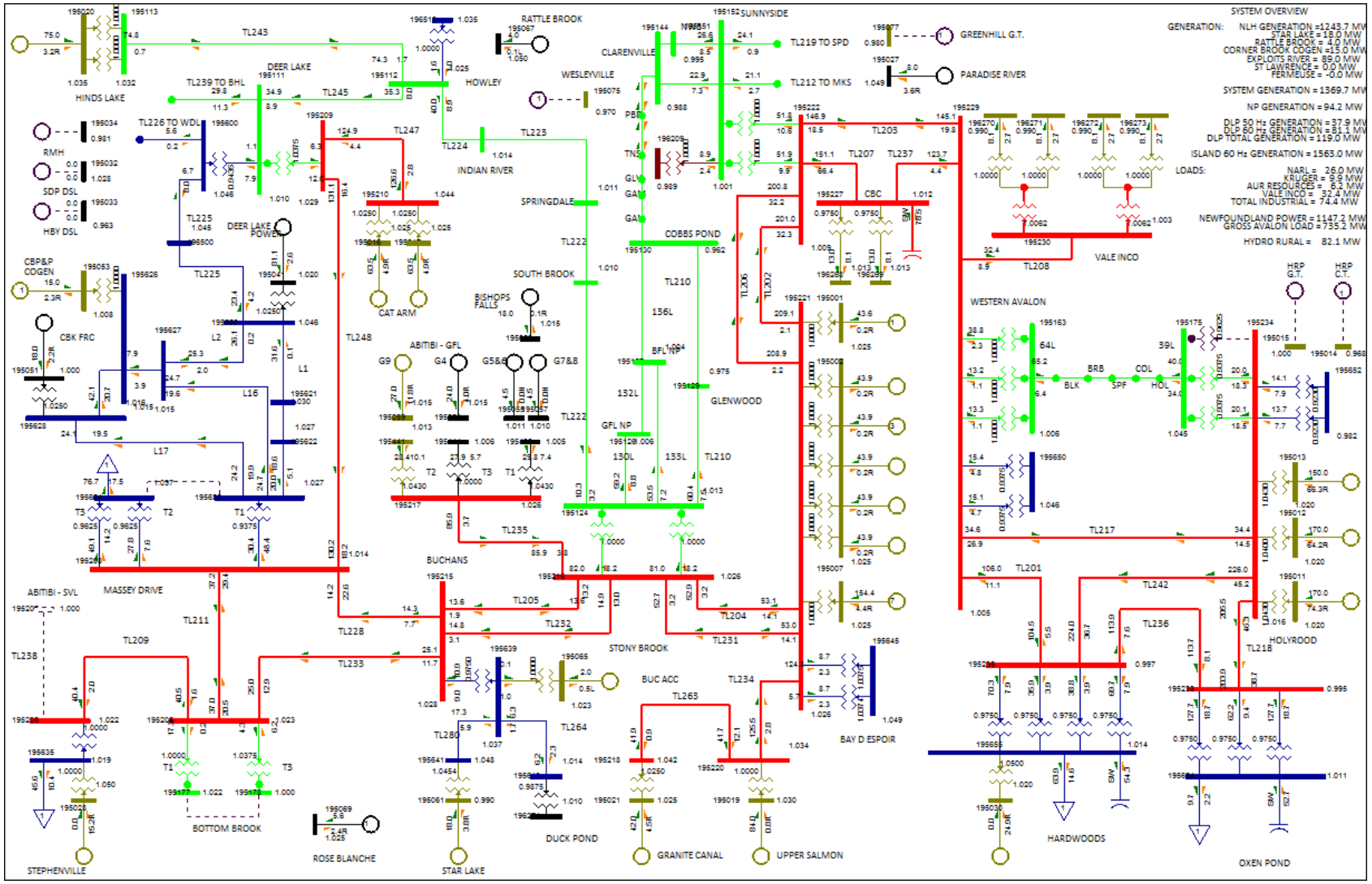
DUCK POND
GRANITE CANAL
UPPER SALMON

Base Case 3


SYSTEM OVERVIEW
GENERATION:
NLH GENERATION =1243.7 MW
STAR LAKE = 18.0 MW
RATTLE BROOK = 4.0 MW
CORNER BROOK COGEN =15.0 MW
EXPLOITS RIVER = 89.0 MW
ST LAWRENCE = 0.0 MW
FERMEUSE = -0.0 MW
SYSTEM GENERATION = 1369.7 MW
NP GENERATION = 94.2 MW
DLP 50 Hz GENERATION = 37.9 MW
DLP 60 Hz GENERATION = 81.1 MW
DLP TOTAL GENERATION = 119.0 MW
ISLAND 60 Hz GENERATION = 1563.0 MW
LOADS:
NARL = 26.0 MW
KRUGER = 9.9 MW
AUR RESOURCES = 6.2 MW
VALE INCO = 32.4 MW
TOTAL INDUSTRIAL = 74.4 MW
NEWFOUNDLAND POWER = 1147.2 MW
GROSS AVALON LOAD = 795.2 MW
HYDRO RURAL = 82.1 MW
HINDS LAKE
TL243
DEER LAKE
TL239 TO BHL
TL245
HOWLEY
RATTLE BROOK
WESLEYVILLE
CLARENVILLE
SUNNYSIDE
TL219 TO SPD
TL212 TO MKS
GREENHILL G.T.
PARADISE RIVER
TL226 TO WDL
RMH
SDP DSL
HBY DSL
TL247
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TL223
INDIAN RIVER
SPRINGDALE
TL222
COBBS POND
TL210
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132L
130L
133L
GLENWOOD
GFL NP
TL203
TL207
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CBC
VALE INCO
TL208
TL225
DEER LAKE POWER
CBP&P COGEN
CBK FRC
TL248
CAT ARM
SOUTH BROOK
BISHOPS FALLS
ABITIBI - GFL
WESTERN AVALON
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39L
BRB
BLK
SPF
CDL
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HRP C.T.
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L17
MASSEY DRIVE
ABITIBI - SVL
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TL233
BUCHANS
TL235
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TL232
TL204
TL231
STONY BROOK
BUC ACC
TL263
TL234
TL264
TL280
BAY D ESPOIR
BOTTOM BROOK
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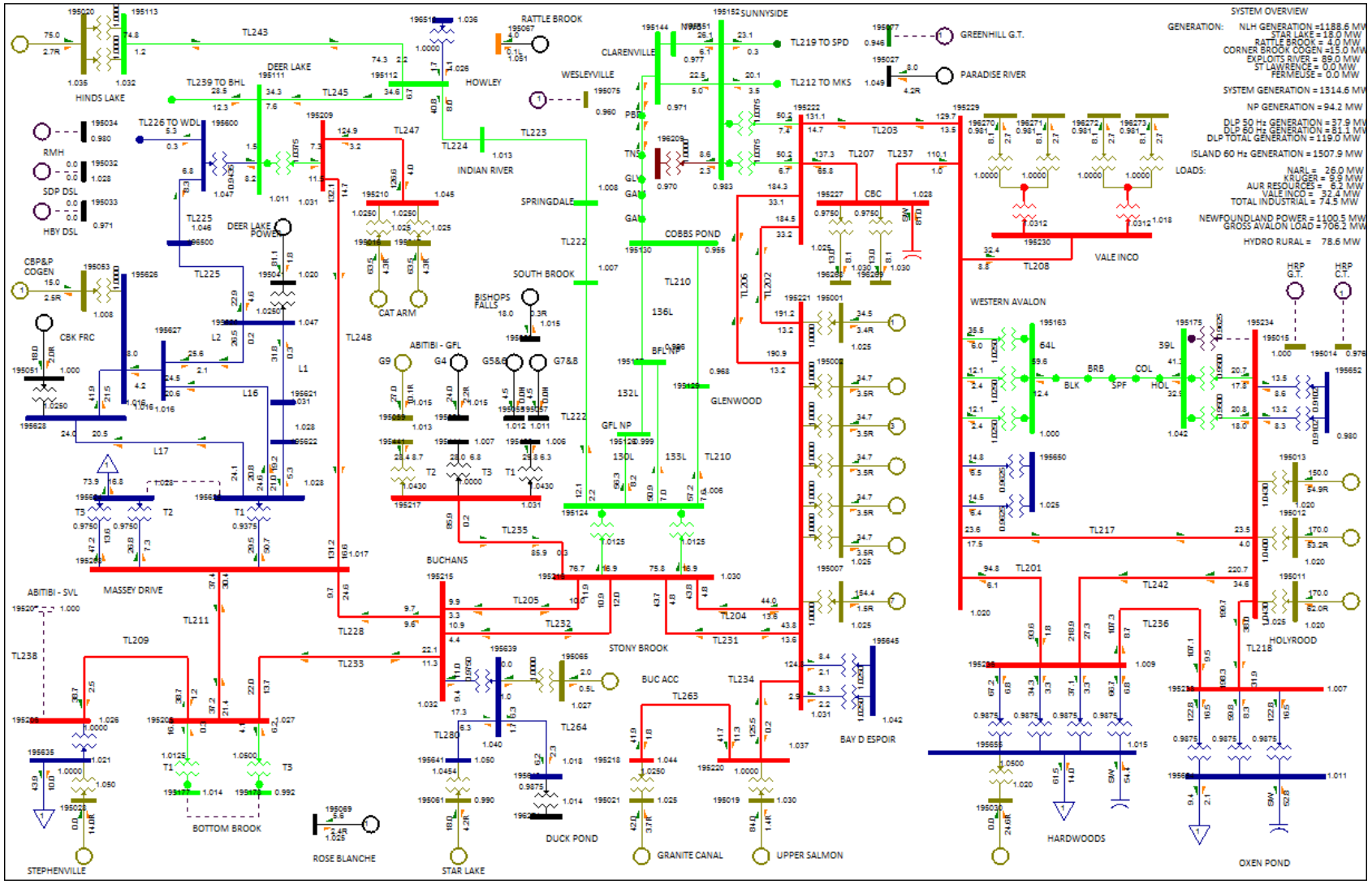
STAR LAKE
DUCK POND
GRANITE CANAL
UPPER SALMON
STEPHENVILLE
HARDWOODS
OXEN POND

Base Case 4


SYSTEM OVERVIEW
GENERATION:
NLH GENERATION =1188.6 MW
STAR LAKE = 18.0 MW
RATTLE BROOK = 4.0 MW
CORNER BROOK COGEN =15.0 MW
EXPLOITS RIVER = 89.0 MW
ST LAWRENCE = 0.0 MW
FERMEUSE = 0.0 MW
SYSTEM GENERATION = 1314.6 MW
NP GENERATION = 94.2 MW
DLP 50 Hz GENERATION = 37.9 MW
DLP 60 Hz GENERATION = 81.1 MW
DLP TOTAL GENERATION = 119.0 MW
ISLAND 60 Hz GENERATION = 1507.9 MW
LOADS:
NARL = 26.0 MW
KRUGER = 9.9 MW
AUR RESOURCES = 6.2 MW
VALE INCO = 32.4 MW
TOTAL INDUSTRIAL = 74.5 MW
NEWFOUNDLAND POWER = 1100.5 MW
GROSS AVALON LOAD = 706.2 MW
HYDRO RURAL = 78.6 MW
HINDS LAKE
DEER LAKE
HOWLEY
RATTLE BROOK
SUNNYSIDE
GREENHILL G.T.
PARADISE RIVER
WESLEYVILLE
CLARENVILLE
INDIAN RIVER
SPRINGDALE
SOUTH BROOK
BISHOPS FALLS
CAT ARM
COBBS POND
GLENWOOD
GFL NP
ABITIBI - GFL
ABITIBI - SVL
MASSEY DRIVE
BUCHANS
STONY BROOK
BUC ACC
BAY D ESPOIR
VALE INCO
WESTERN AVALON
HRP G.T.
HRP C.T.
HOLYROOD
HARDWOODS
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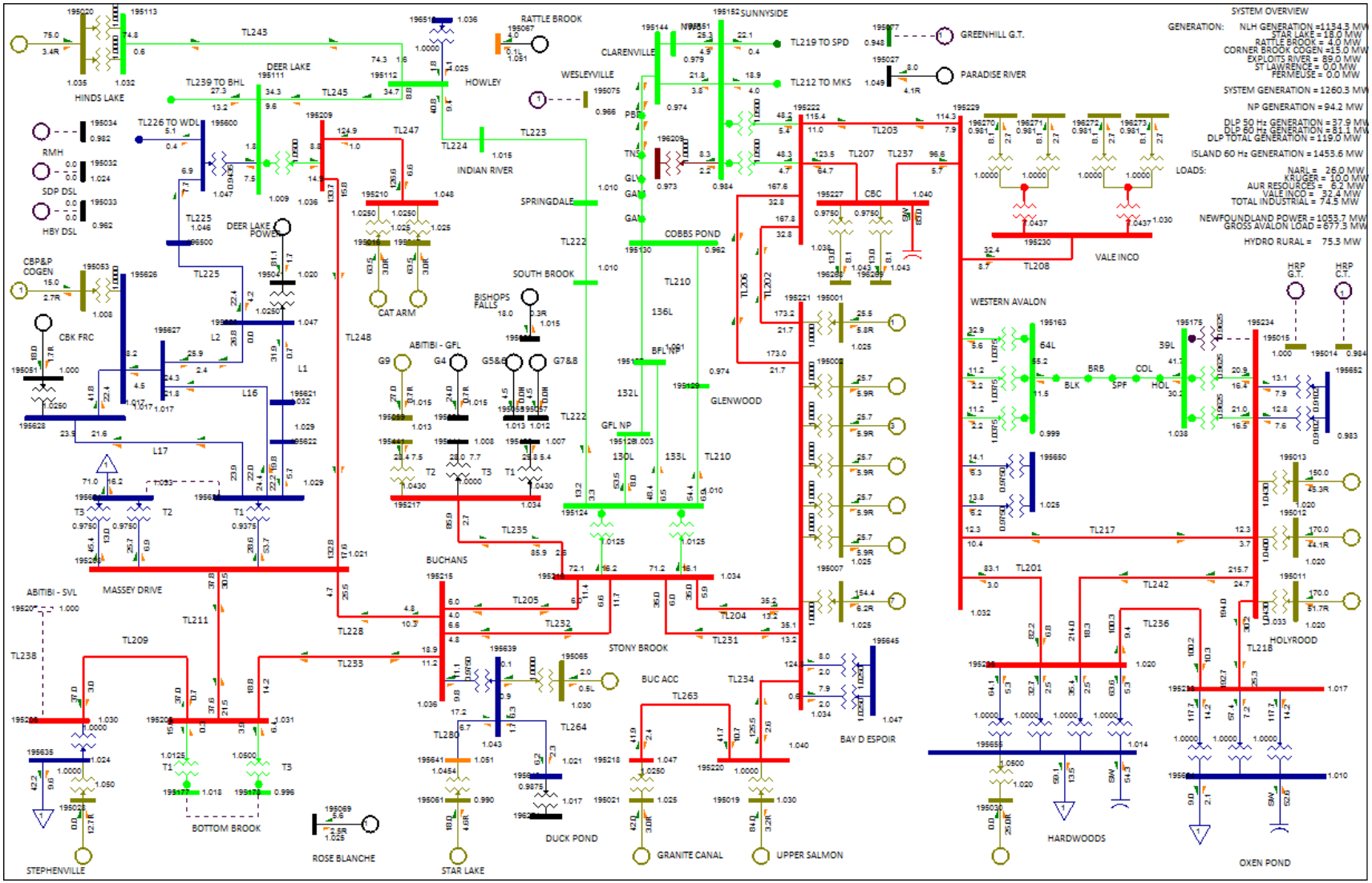
STAR LAKE
DUCK POND
GRANITE CANAL
UPPER SALMON

Base Case 5


SYSTEM OVERVIEW
GENERATION:
NLH GENERATION =1134.3 MW
STAR LAKE = 18.0 MW
RATTLE BROOK = 4.0 MW
CORNER BROOK COGEN =15.0 MW
EXPLOITS RIVER = 89.0 MW
ST LAWRENCE = 0.0 MW
PERMEUSE = 0.0 MW
SYSTEM GENERATION = 1260.3 MW
NP GENERATION = 94.2 MW
DLP 50 Hz GENERATION = 37.9 MW
DLP 60 Hz GENERATION = 81.1 MW
DLP TOTAL GENERATION = 119.0 MW
ISLAND 60 Hz GENERATION = 1453.6 MW
LOADS:
NARL = 26.0 MW
KRUGER = 100.0 MW
AUR RESOURCES = 6.2 MW
VALE INCO = 32.4 MW
TOTAL INDUSTRIAL = 74.5 MW
NEWFOUNDLAND POWER = 1053.7 MW
GROSS AVALON LOAD = 677.5 MW
HYDRO RURAL = 75.3 MW
HINDS LAKE
DEER LAKE
HOWLEY
RATTLE BROOK
SUNNYSIDE
CLARENVILLE
WESLEYVILLE
GREENHILL G.T.
PARADISE RIVER
RMH
SDP DSL
HBY DSL
INDIAN RIVER
SPRINGDALE
SOUTH BROOK
COBBS POND
GLENWOOD
CBP&P COGEN
CBK FRC
DEER LAKE POWER
CAT ARM
BISHOPS FALLS
ABITIBI - GFL
VALE INCO
WESTERN AVALON
HRP G.T.
HRP C.T.
BUCHANS
MASSEY DRIVE
ABITIBI - 5VL
STONY BROOK
BUC ACC
BAY D ESPOIR
HOLYROOD
BOTTOM BROOK
ROSE BLANCHE
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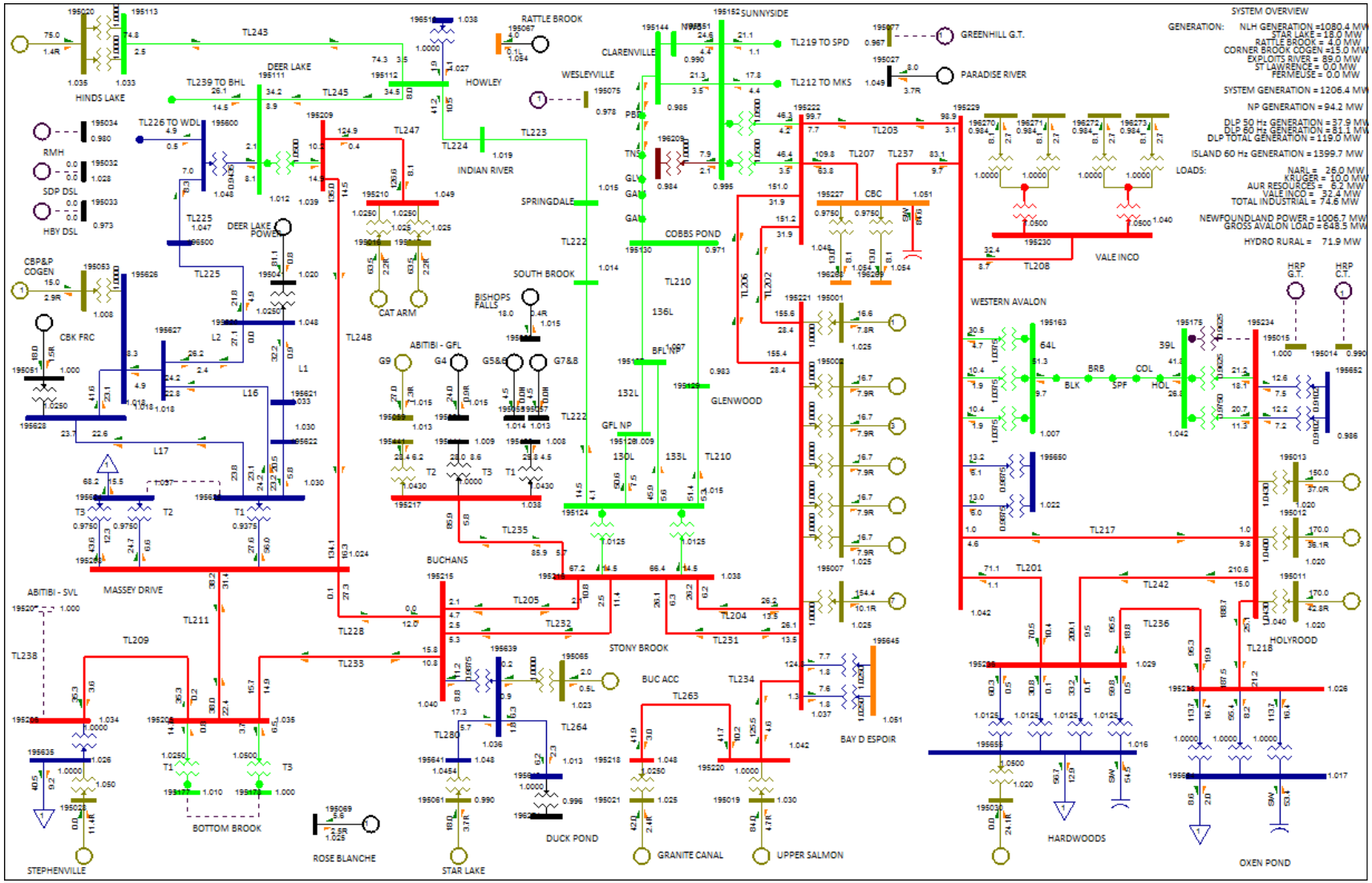
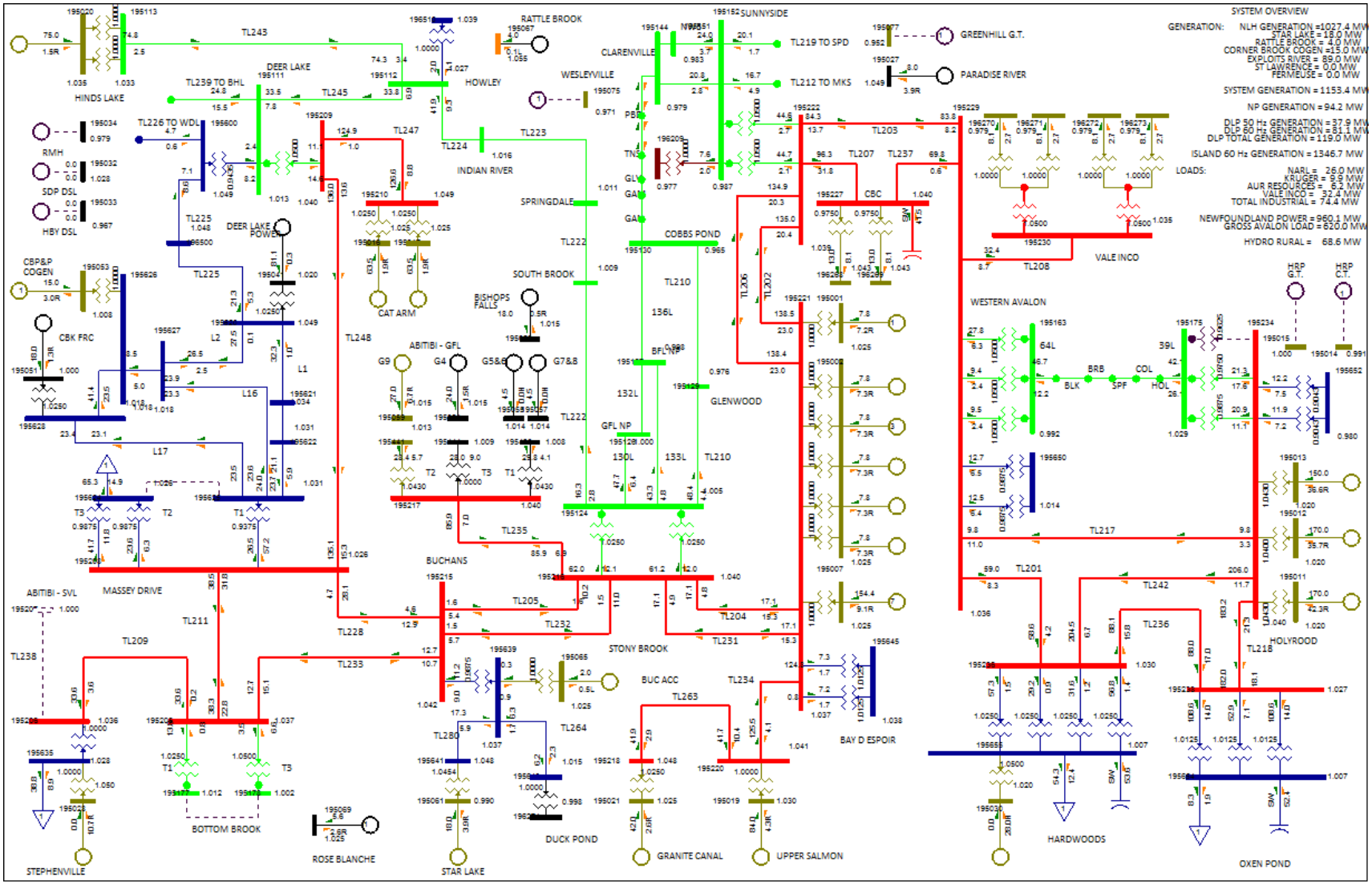
DUCK POND
GRANITE CANAL
UPPER SALMON
HARDWOODS
OXEN POND
STEPHENVILLE

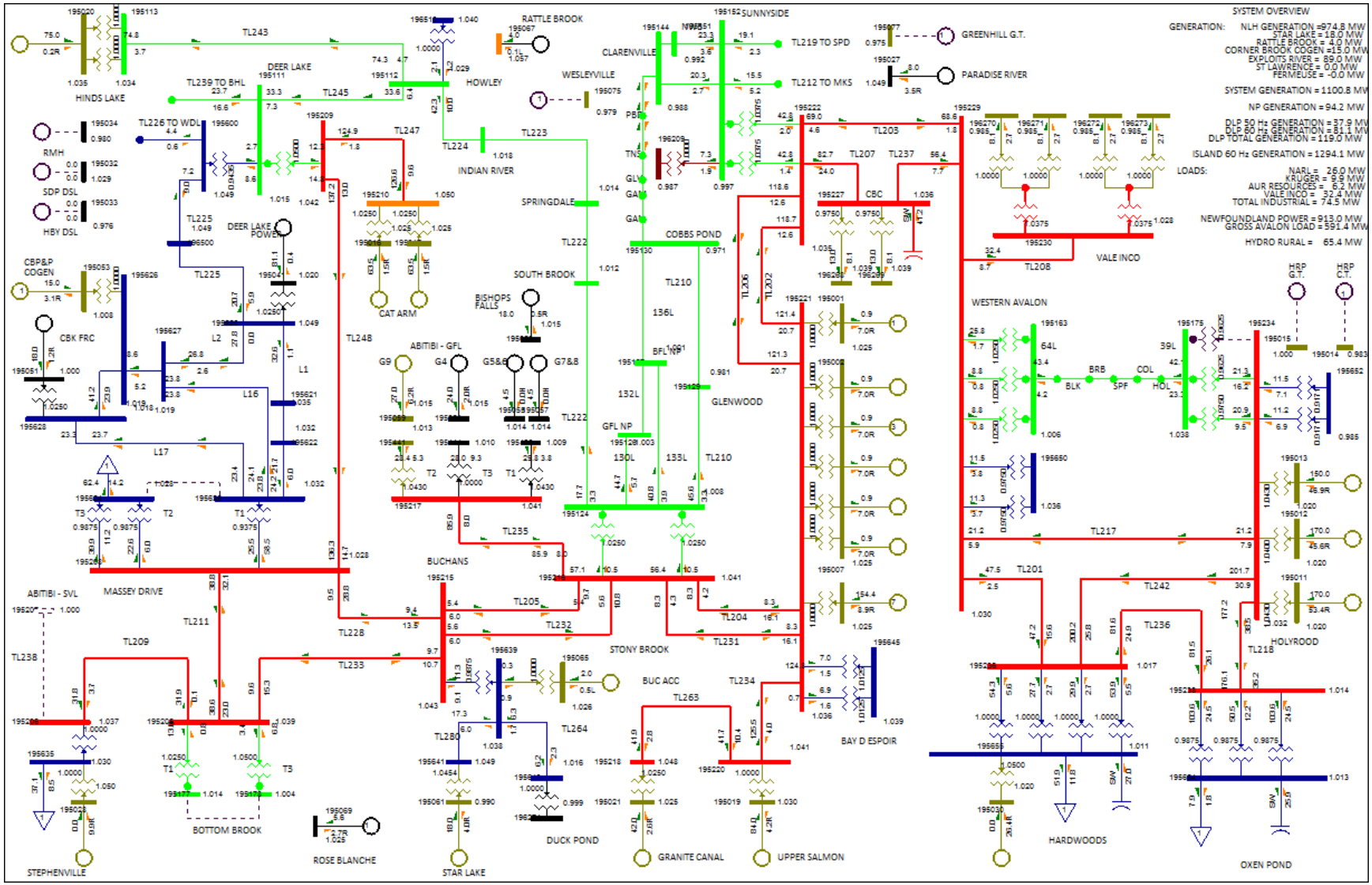
Base Case 6


SYSTEM OVERVIEW
GENERATION:
NLH GENERATION =1080.4 MW
STAR LAKE = 18.0 MW
RATTLE BROOK = 4.0 MW
CORNER BROOK COGEN =15.0 MW
EXPLOITS RIVER = 89.0 MW
ST LAWRENCE = 0.0 MW
FERMEUSE = 0.0 MW
SYSTEM GENERATION = 1206.4 MW
NP GENERATION = 94.2 MW
DLP 50 Hz GENERATION = 37.9 MW
DLP 60 Hz GENERATION = 81.1 MW
DLP TOTAL GENERATION = 119.0 MW
ISLAND 60 Hz GENERATION = 1399.7 MW
LOADS:
NARL = 26.0 MW
KRUGER = 10.0 MW
AUR RESOURCES = 6.2 MW
VALE INCO = 32.4 MW
TOTAL INDUSTRIAL = 74.6 MW
NEWFOUNDLAND POWER = 1006.7 MW
GROSS AVALON LOAD = 648.5 MW
HYDRO RURAL = 71.9 MW
HINDS LAKE
DEER LAKE
HOWLEY
RATTLE BROOK
SUNNYSIDE
GREENHILL G.T.
PARADISE RIVER
CLARENVILLE
WESLEYVILLE
TL219 TO SPD
TL212 TO MKS
TL239 TO BHL
TL226 TO WDL
RMH
SDP DSL
HBY DSL
INDIAN RIVER
SPRINGDALE
DEER LAKE POWER
CBP&P COGEN
CBK FRC
CAT ARM
BISHOPS FALLS
SOUTH BROOK
COBBS POND
ABITIBI - GFL
GLENWOOD
GFL NP
BFL NP
CBC
VALE INCO
WESTERN AVALON
HRP G.T.
HRP C.T.
BUCHANS
STONY BROOK
MASSEY DRIVE
ABITIBI - SVL
BUC ACC
BAY D ESPOIR
HOLYROOD
BOTTOM BROOK
STEPHENVILLE
ROSE BLANCHE
STAR LAKE
DUCK POND
GRANITE CANAL
UPPER SALMON
HARDWOODS
OXEN POND

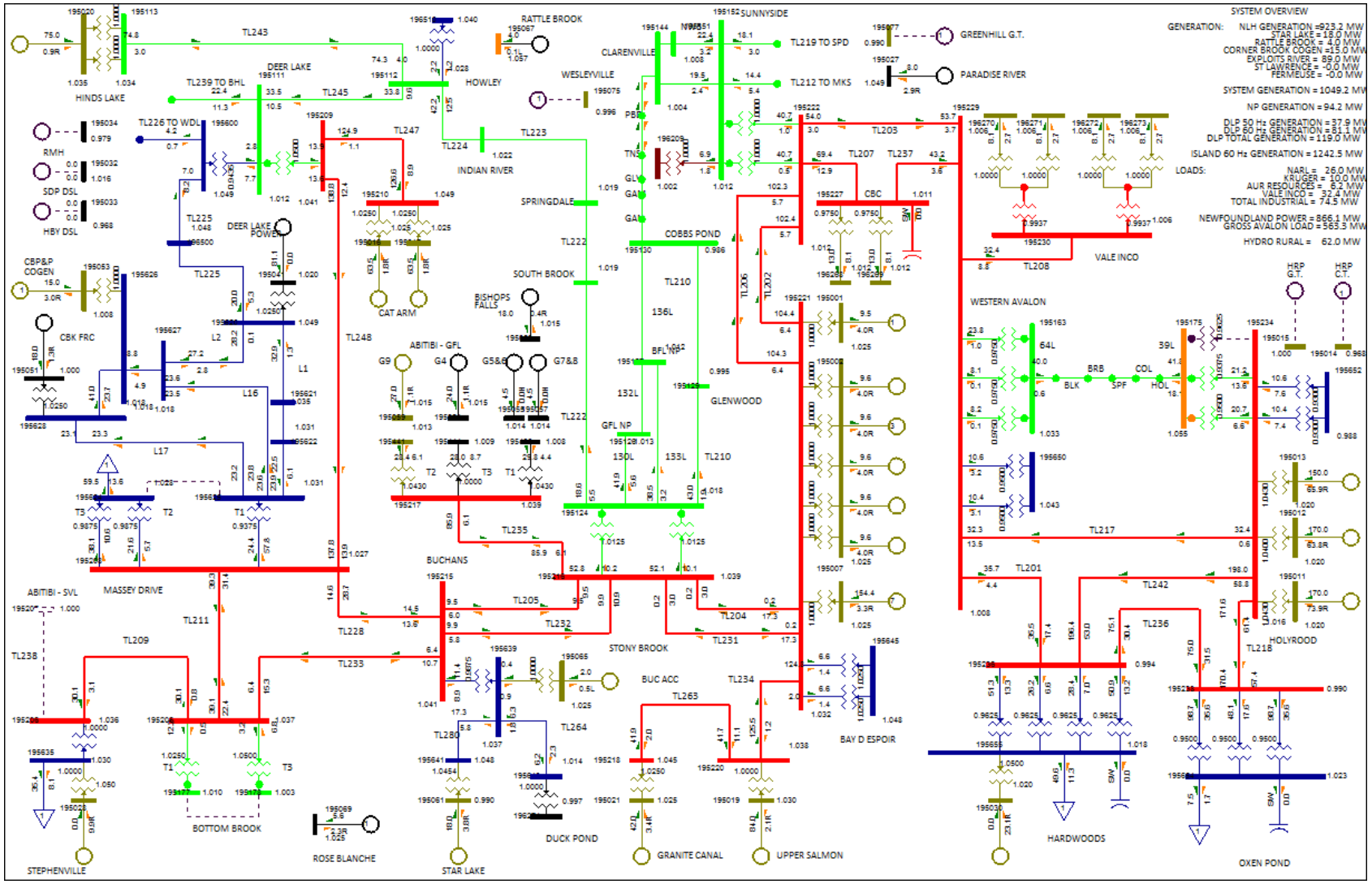
Base Case 7


SYSTEM OVERVIEW
GENERATION:
NLH GENERATION =1027.4 MW
STAR LAKE = 18.0 MW
RATTLE BROOK = 4.0 MW
CORNER BROOK COGEN =15.0 MW
EXPLOITS RIVER = 89.0 MW
ST LAWRENCE = 0.0 MW
PERMEUSE = 0.0 MW
SYSTEM GENERATION = 1153.4 MW
NP GENERATION = 94.2 MW
DLP 50 Hz GENERATION = 37.9 MW
DLP 60 Hz GENERATION = 81.1 MW
DLP TOTAL GENERATION = 119.0 MW
ISLAND 60 Hz GENERATION = 1346.7 MW
LOADS:
NARL = 26.0 MW
KRUGER = 9.9 MW
AUR RESOURCES = 6.2 MW
VALE INCO = 32.4 MW
TOTAL INDUSTRIAL = 74.4 MW
NEWFOUNDLAND POWER = 960.1 MW
GROSS AVALON LOAD = 620.0 MW
HYDRO RURAL = 68.6 MW
HINDS LAKE
DEER LAKE
HOWLEY
RATTLE BROOK
SUNNYSIDE
GREENHILL G.T.
PARADISE RIVER
RMH
SDP DSL
HBY DSL
INDIAN RIVER
SPRINGDALE
CLARENVILLE
WESLEYVILLE
COBBS POND
GLENWOOD
SOUTH BROOK
CAT ARM
BISHOPS FALLS
CBP&P COGEN
CBK FRC
DEER LAKE POWER
ABITIBI - GFL
BUCHANS
STONY BROOK
MASSEY DRIVE
ABITIBI - 5VL
BUC ACC
BAY D ESPOIR
DUCK POND
GRANITE CANAL
UPPER SALMON
STEPHENVILLE
BOTTOM BROOK
ROSE BLANCHE
STAR LAKE
VALE INCO
WESTERN AVALON
HRP G.T.
HRP C.T.
HOLYROOD
HARDWOODS
OXEN POND

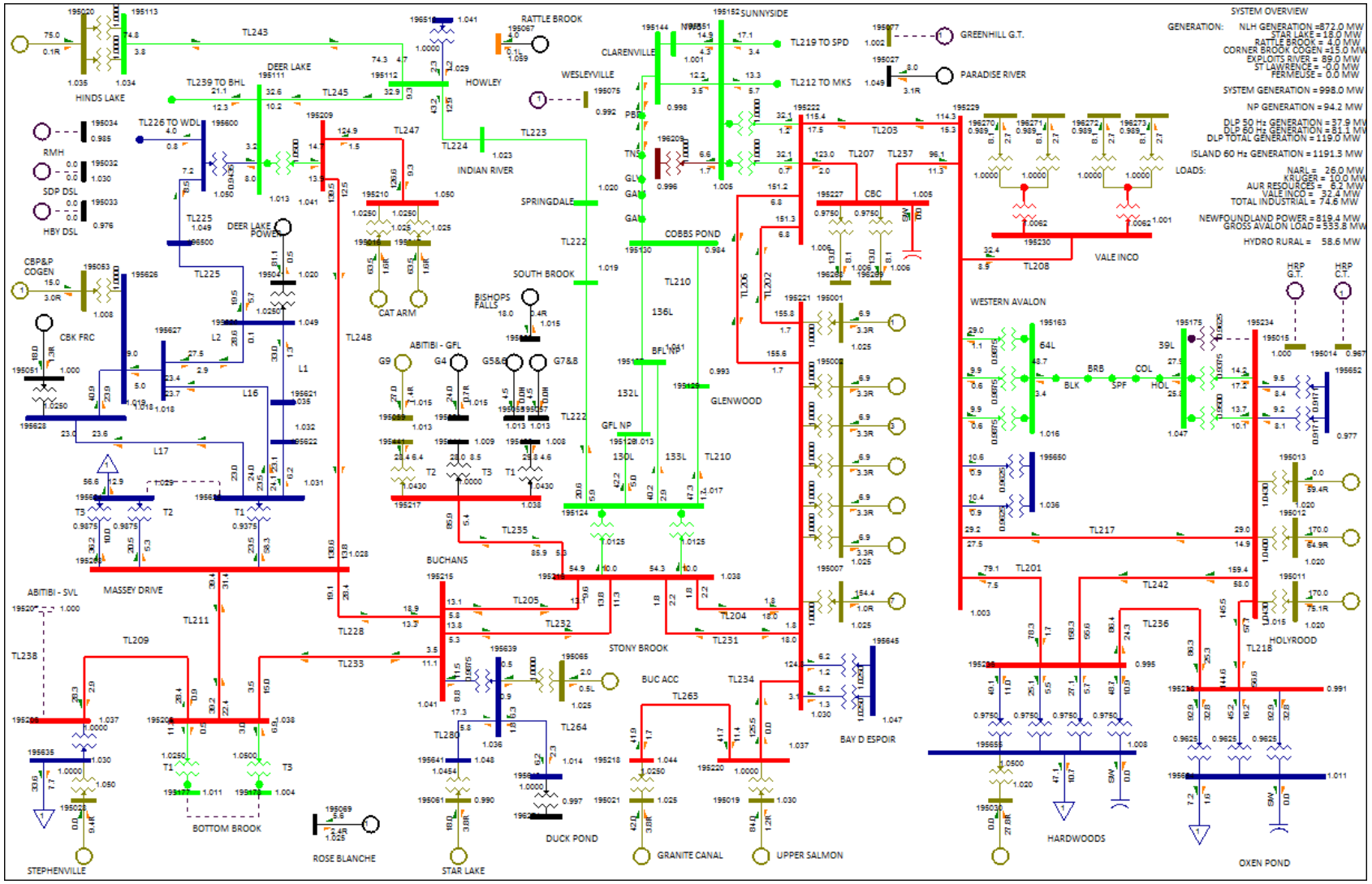
Base Case 8


SYSTEM OVERVIEW
GENERATION:
NLH GENERATION =974.8 MW
STAR LAKE = 18.0 MW
RATTLE BROOK = 4.0 MW
CORNER BROOK COGEN =15.0 MW
EXPLOITS RIVER = 89.0 MW
ST LAWRENCE = 0.0 MW
FERMEUSE = -0.0 MW
SYSTEM GENERATION = 1100.8 MW
NP GENERATION = 94.2 MW
DLP 50 Hz GENERATION = 37.9 MW
DLP 60 Hz GENERATION = 81.1 MW
DLP TOTAL GENERATION = 119.0 MW
ISLAND 60 Hz GENERATION = 1294.1 MW
LOADS:
NARL = 26.0 MW
KRUGER = 9.9 MW
AUR RESOURCES = 5.2 MW
VALE INCO = 32.4 MW
TOTAL INDUSTRIAL = 74.5 MW
NEWFOUNDLAND POWER = 913.0 MW
GROSS AVALON LOAD = 991.4 MW
HYDRO RURAL = 65.4 MW
HINDS LAKE
DEER LAKE
RATTLE BROOK
HOWLEY
INDIAN RIVER
WESLEYVILLE
SUNNYSIDE
CLARENVILLE
GREENHILL G.T.
PARADISE RIVER
TL219 TO SPD
TL212 TO MKS
TL239 TO BHL
TL226 TO WDL
TL243
TL245
TL247
TL224
TL223
RMH
SDP DSL
HBY DSL
TL225
DEER LAKE POWER
SPRINGDALE
TL222
SOUTH BROOK
COBBS POND
TL210
CBP&P COGEN
CBK FRC
CAT ARM
BISHOPS FALLS
ABITIBI - GFL
G9
G4
G5&6
G7&8
TL248
136L
132L
130L
133L
GFL NP
GLENWOOD
TL206
TL202
TL203
TL207
TL237
CBC
VALE INCO
TL208
WESTERN AVALON
HRP G.T.
HRP C.T.
64L
39L
BLK
BRB
SPF
CDL
HOL
TL217
TL201
TL242
TL236
TL218
HOLYROOD
OXEN POND
HARDWOODS
L1
L2
L16
L17
MASSEY DRIVE
ABITIBI - SVL
TL238
TL209
TL211
TL228
TL233
BUCHANS
TL205
TL232
TL235
STONY BROOK
TL204
TL231
BUC ACC
TL234
TL263
TL264
TL280
BAY D ESPOIR
BOTTOM BROOK
STEPHENVILLE
ROSE BLANCHE
STAR LAKE
DUCK POND
GRANITE CANAL
UPPER SALMON

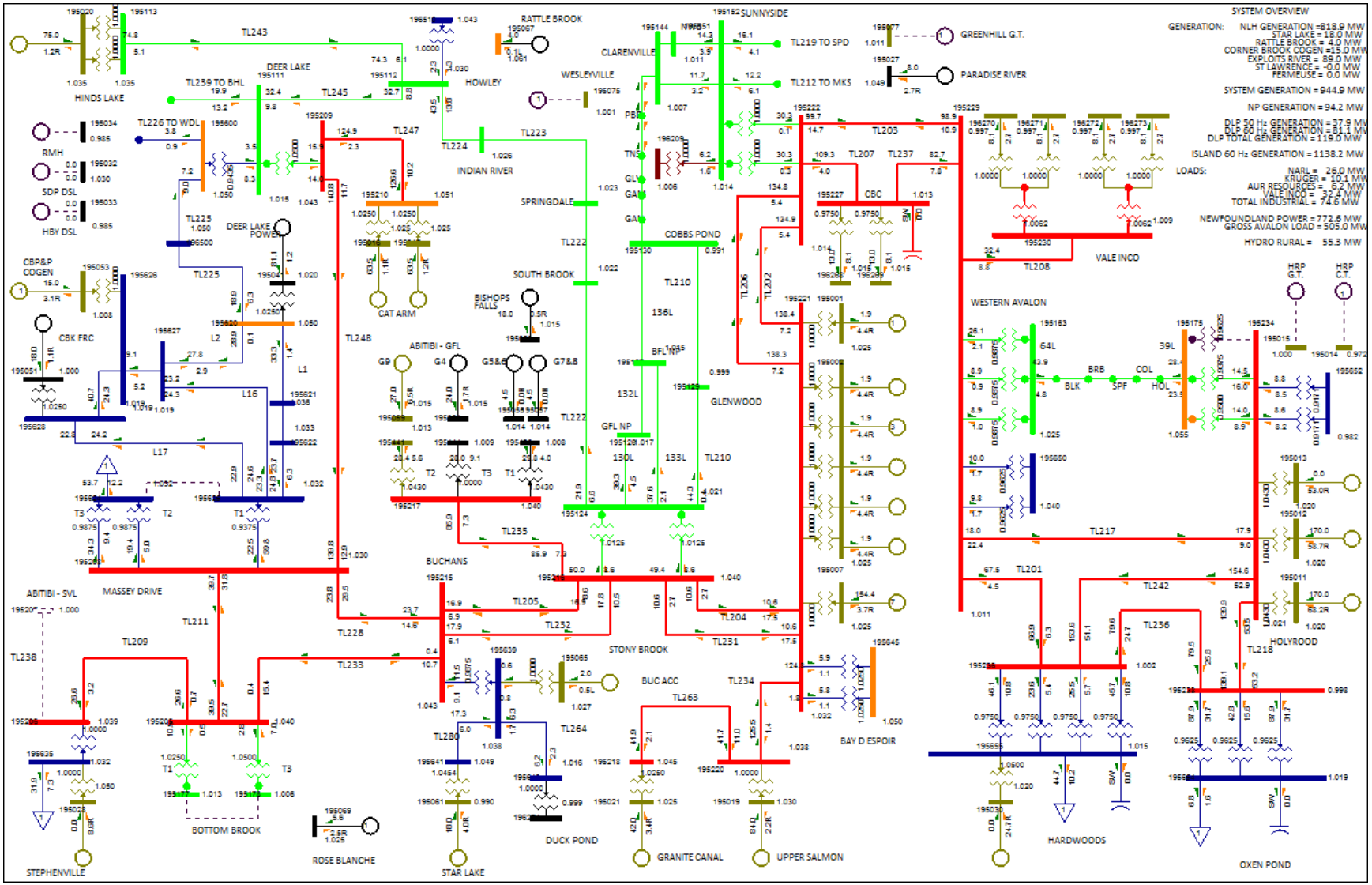
Base Case 9


SYSTEM OVERVIEW
GENERATION:
NLH GENERATION =923.2 MW
STAR LAKE = 18.0 MW
RATTLE BROOK = 4.0 MW
CORNER BROOK COGEN =15.0 MW
EXPLOITS RIVER = 89.0 MW
ST LAWRENCE = -0.0 MW
FERMEUSE = -0.0 MW
SYSTEM GENERATION = 1049.2 MW
NP GENERATION = 94.2 MW
DLP 50 Hz GENERATION = 37.9 MW
DLP 60 Hz GENERATION = 81.1 MW
DLP TOTAL GENERATION = 119.0 MW
ISLAND 60 Hz GENERATION = 1242.5 MW
LOADS:
NARL = 26.0 MW
KRUGER = 10.0 MW
AUR RESOURCES = 6.2 MW
VALE INCO = 32.4 MW
TOTAL INDUSTRIAL = 74.5 MW
NEWFOUNDLAND POWER = 866.1 MW
GROSS AVALON LOAD = 963.5 MW
HYDRO RURAL = 62.0 MW
HINDS LAKE
DEER LAKE
TL239 TO BHL
TL243
TL245
TL226 TO WDL
RMH
SDP DSL
HBY DSL
TL225
DEER LAKE POWER
CBP&P COGEN
CBK FRC
TL247
TL224
HOWLEY
INDIAN RIVER
TL223
RATTLE BROOK
WESLEYVILLE
CLARENVILLE
SUNNYSIDE
TL219 TO SPD
TL212 TO MKS
GREENHILL G.T.
PARADISE RIVER
TL203
TL207
TL237
CBC
VALE INCO
TL208
WESTERN AVALON
HRP G.T.
HRP C.T.
SPRINGDALE
SOUTH BROOK
BISHOPS FALLS
CAT ARM
TL222
TL210
COBBS POND
136L
132L
130L
133L
GFL NP
BFL NP
GLENWOOD
TL206
TL202
TL248
ABITIBI - GFL
G9
G4
G5&6
G7&8
L1
L2
L16
L17
T1
T2
T3
BUCHANS
TL235
TL205
TL232
TL204
TL231
STONY BROOK
TL228
TL233
TL211
TL209
TL238
ABITIBI - SVL
MASSEY DRIVE
BUC ACC
TL263
TL234
TL264
TL280
BAY D ESPOIR
TL201
TL242
TL236
TL217
HOLYROOD
TL218
BOTTOM BROOK
ROSE BLANCHE
STAR LAKE
DUCK POND
GRANITE CANAL
UPPER SALMON
HARDWOODS
OXEN POND
STEPHENVILLE

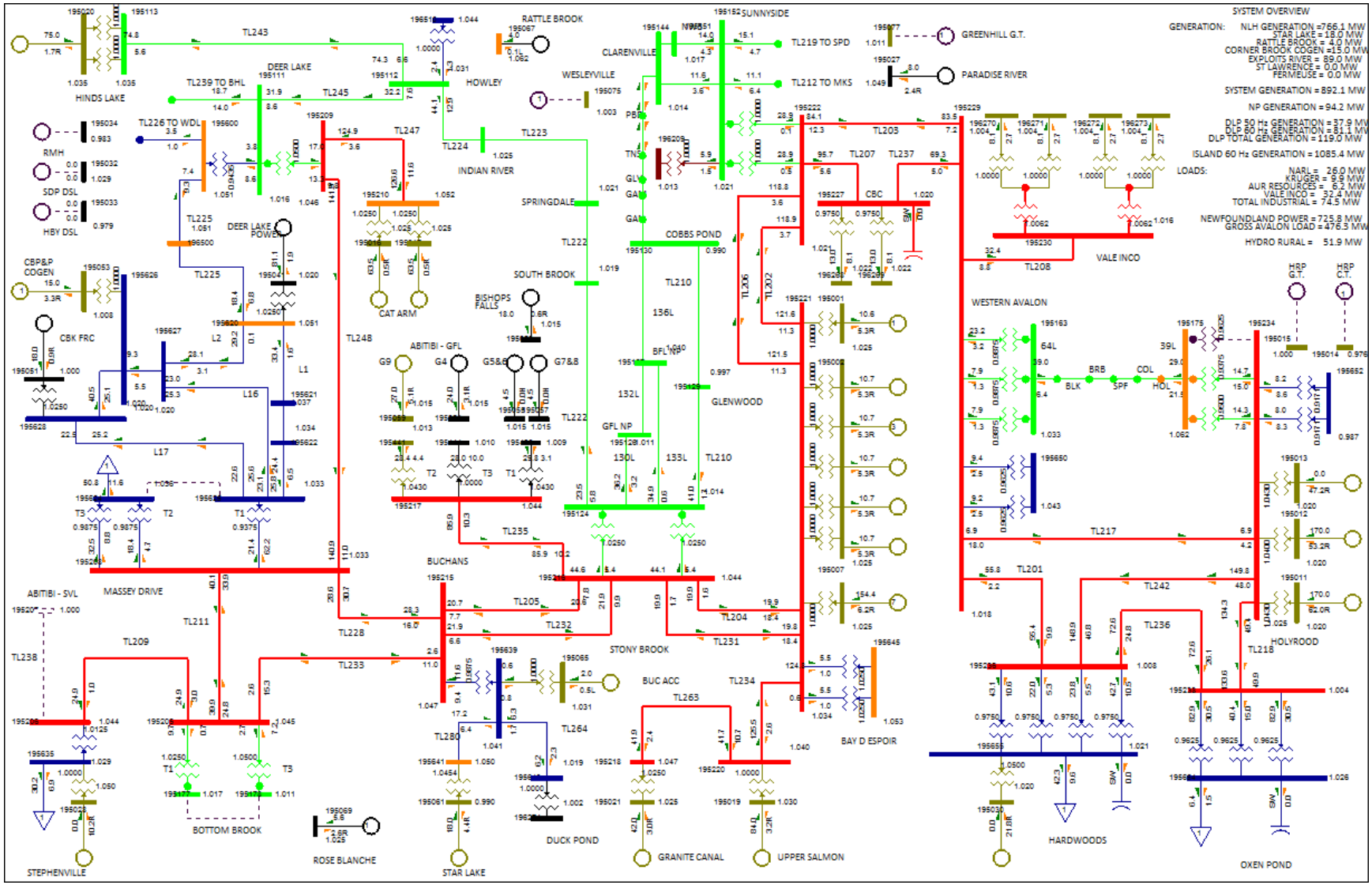
Base Case 10


SYSTEM OVERVIEW
GENERATION:
NLH GENERATION =872.0 MW
STAR LAKE = 18.0 MW
RATTLE BROOK = 4.0 MW
CORNER BROOK COGEN =15.0 MW
EXPLOITS RIVER = 89.0 MW
ST LAWRENCE = 0.0 MW
FERMEUSE = 0.0 MW
SYSTEM GENERATION = 998.0 MW
NP GENERATION = 94.2 MW
DLP 50 Hz GENERATION = 37.9 MW
DLP 60 Hz GENERATION = 81.1 MW
DLP TOTAL GENERATION = 119.0 MW
ISLAND 60 Hz GENERATION = 1191.3 MW
LOADS:
NARL = 26.0 MW
KRUGER = 10.0 MW
AUR RESOURCES = 6.2 MW
VALE INCO = 32.4 MW
TOTAL INDUSTRIAL = 74.6 MW
NEWFOUNDLAND POWER = 819.4 MW
GROSS AVALON LOAD = 933.8 MW
HYDRO RURAL = 58.6 MW
HINDS LAKE
TL243
TL239 TO BHL
DEER LAKE
TL245
HOWLEY
RATTLE BROOK
WESLEYVILLE
CLARENVILLE
SUNNYSIDE
TL219 TO SPD
TL212 TO MKS
GREENHILL G.T.
PARADISE RIVER
TL226 TO WDL
RMH
SDP DSL
HBY DSL
TL247
TL224
TL223
INDIAN RIVER
SPRINGDALE
TL222
COBBS POND
TL210
136L
132L
130L
133L
GLENWOOD
GFL NP
BFL NP
TL203
TL207
TL237
CBC
VALE INCO
TL208
TL225
DEER LAKE POWER
CBP&P COGEN
CBK FRC
TL248
CAT ARM
SOUTH BROOK
BISHOPS FALLS
ABITIBI - GFL
G9
G4
G5&6
G7&8
L1
L2
L16
L17
T1
T2
T3
BUCHANS
TL235
TL205
TL232
TL204
TL231
STONY BROOK
TL228
TL211
TL209
TL238
TL233
ABITIBI - SVL
MASSEY DRIVE
BUC ACC
TL234
TL263
TL264
TL280
BAY D ESPOIR
DUCK POND
GRANITE CANAL
UPPER SALMON
STEPHENVILLE
BOTTOM BROOK
ROSE BLANCHE
STAR LAKE
WESTERN AVALON
64L
39L
BRB
BLK
SPF
CDL
HOL
TL217
TL201
TL242
TL236
TL218
HOLYROOD
HARDWOODS
OXEN POND
HRP G.T.
HRP C.T.

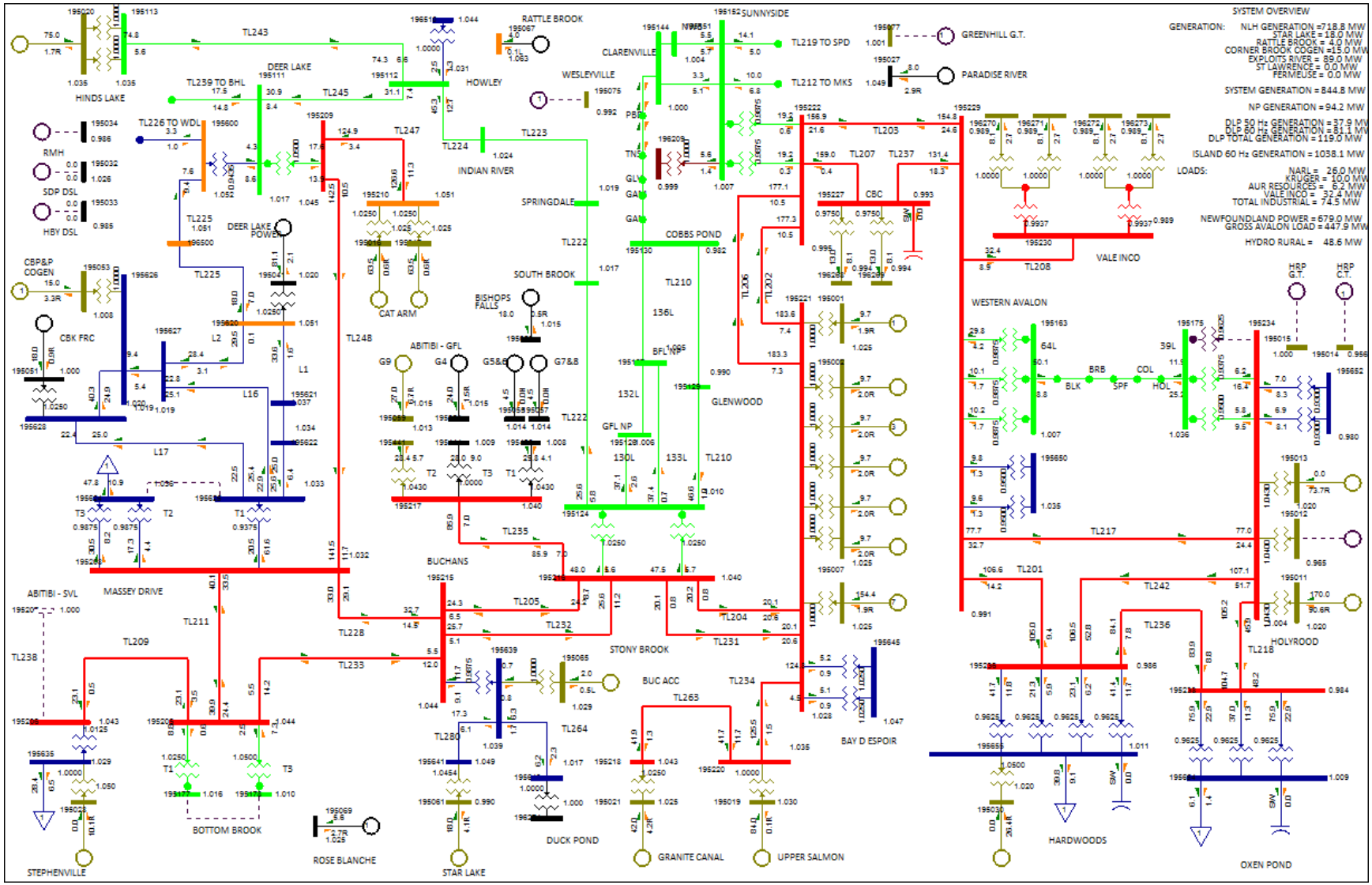
Base Case 11


SYSTEM OVERVIEW
GENERATION:
NLH GENERATION =818.9 MW
STAR LAKE = 18.0 MW
RATTLE BROOK = 4.0 MW
CORNER BROOK COGEN =15.0 MW
EXPLOITS RIVER = 89.0 MW
ST LAWRENCE = 0.0 MW
FERMEUSE = 0.0 MW
SYSTEM GENERATION = 944.9 MW
NP GENERATION = 94.2 MW
DLP 50 Hz GENERATION = 37.9 MW
DLP 60 Hz GENERATION = 81.1 MW
DLP TOTAL GENERATION = 119.0 MW
ISLAND 60 Hz GENERATION = 1138.2 MW
LOADS:
NARL = 26.0 MW
KRUGER = 10.1 MW
AUR RESOURCES = 5.2 MW
VALE INCO = 32.4 MW
TOTAL INDUSTRIAL = 74.6 MW
NEWFOUNDLAND POWER = 772.6 MW
GROSS AVALON LOAD = 505.0 MW
HYDRO RURAL = 55.3 MW
HINDS LAKE
DEER LAKE
TL243
TL239 TO BHL
TL245
TL226 TO WDL
TL247
TL224
TL223
INDIAN RIVER
HOWLEY
RATTLE BROOK
SUNNYSIDE
CLARENVILLE
WESLEYVILLE
TL219 TO SPD
TL212 TO MKS
GREENHILL G.T.
PARADISE RIVER
RMH
SDP DSL
HBY DSL
TL225
DEER LAKE POWER
CBP&P COGEN
CBK FRC
L1
L2
L16
L17
TL248
CAT ARM
SPRINGDALE
TL222
SOUTH BROOK
BISHOPS FALLS
ABITIBI - GFL
G9
G4
G5&6
G7&8
COBBS POND
TL210
136L
132L
130L
133L
GFL NP
GLENWOOD
TL202
TL206
TL203
TL207
TL237
CBC
VALE INCO
TL208
WESTERN AVALON
64L
39L
BLK
BRB
SPF
CDL
HOL
TL217
TL201
TL242
TL236
TL218
HOLYROOD
HRP G.T.
HRP C.T.
MASSEY DRIVE
ABITIBI - SVL
TL238
TL209
TL211
TL228
TL233
TL235
BUCHANS
TL205
TL232
STONY BROOK
TL204
TL231
BUC ACC
TL234
TL263
TL264
TL280
BAY D ESPOIR
STEPHENVILLE
BOTTOM BROOK
ROSE BLANCHE
STAR LAKE
DUCK POND
GRANITE CANAL
UPPER SALMON
HARDWOODS
OXEN POND

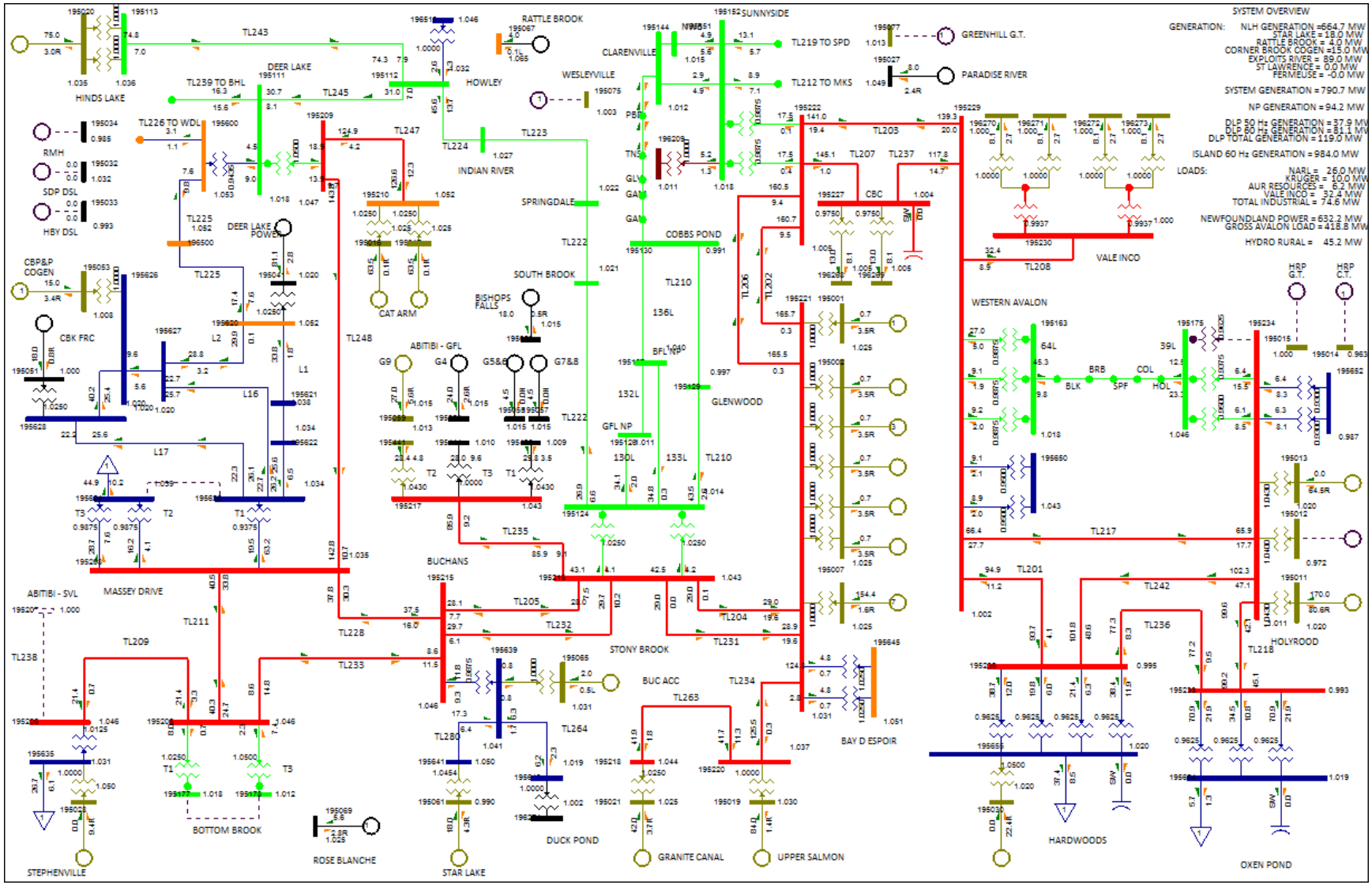
Base Case 12


SYSTEM OVERVIEW
GENERATION:
NLH GENERATION =766.1 MW
STAR LAKE = 18.0 MW
RATTLE BROOK = 4.0 MW
CORNER BROOK COGEN =15.0 MW
EXPLOITS RIVER = 89.0 MW
ST LAWRENCE = 0.0 MW
FERMEUSE = 0.0 MW
SYSTEM GENERATION = 892.1 MW
NP GENERATION = 94.2 MW
DLP 50 Hz GENERATION = 37.9 MW
DLP 60 Hz GENERATION = 81.1 MW
DLP TOTAL GENERATION = 119.0 MW
ISLAND 60 Hz GENERATION = 1085.4 MW
LOADS:
NARL = 26.0 MW
KRUGER = 9.9 MW
AUR RESOURCES = 5.2 MW
VALE INCO = 32.4 MW
TOTAL INDUSTRIAL = 74.5 MW
NEWFOUNDLAND POWER = 725.8 MW
GROSS AVALON LOAD = 476.3 MW
HYDRO RURAL = 51.9 MW
HINDS LAKE
DEER LAKE
TL243
TL239 TO BHL
TL245
TL226 TO WDL
RMH
SDP DSL
HBY DSL
TL225
DEER LAKE POWER
CBP&P COGEN
CBK FRC
TL247
TL224
INDIAN RIVER
CAT ARM
TL223
RATTLE BROOK
HOWLEY
WESLEYVILLE
SPRINGDALE
TL222
SOUTH BROOK
BISHOPS FALLS
TL248
ABITIBI - GFL
G9
G4
G5&6
G7&8
T1
T2
T3
L1
L2
L16
L17
MASSEY DRIVE
ABITIBI - SVL
TL211
TL209
TL238
BOTTOM BROOK
STEPHENVILLE
TL228
TL233
ROSE BLANCHE
BUCHANS
TL235
TL205
TL232
STAR LAKE
TL280
TL264
DUCK POND
STONY BROOK
TL231
TL204
TL234
BUC ACC
TL263
GRANITE CANAL
UPPER SALMON
BAY D ESPOIR
CLARENVILLE
SUNNYSIDE
TL219 TO SPD
TL212 TO MKS
GREENHILL G.T.
PARADISE RIVER
TL203
TL207
TL237
CBC
COBBS POND
136L
132L
130L
133L
TL210
GLENWOOD
GFL NP
TL206
TL202
VALE INCO
TL208
WESTERN AVALON
64L
39L
BLK
SPF
BRB
CDL
HOL
TL217
TL201
TL242
TL236
TL218
HOLYROOD
HARDWOODS
OXEN POND
HRP G.T.
HRP C.T.

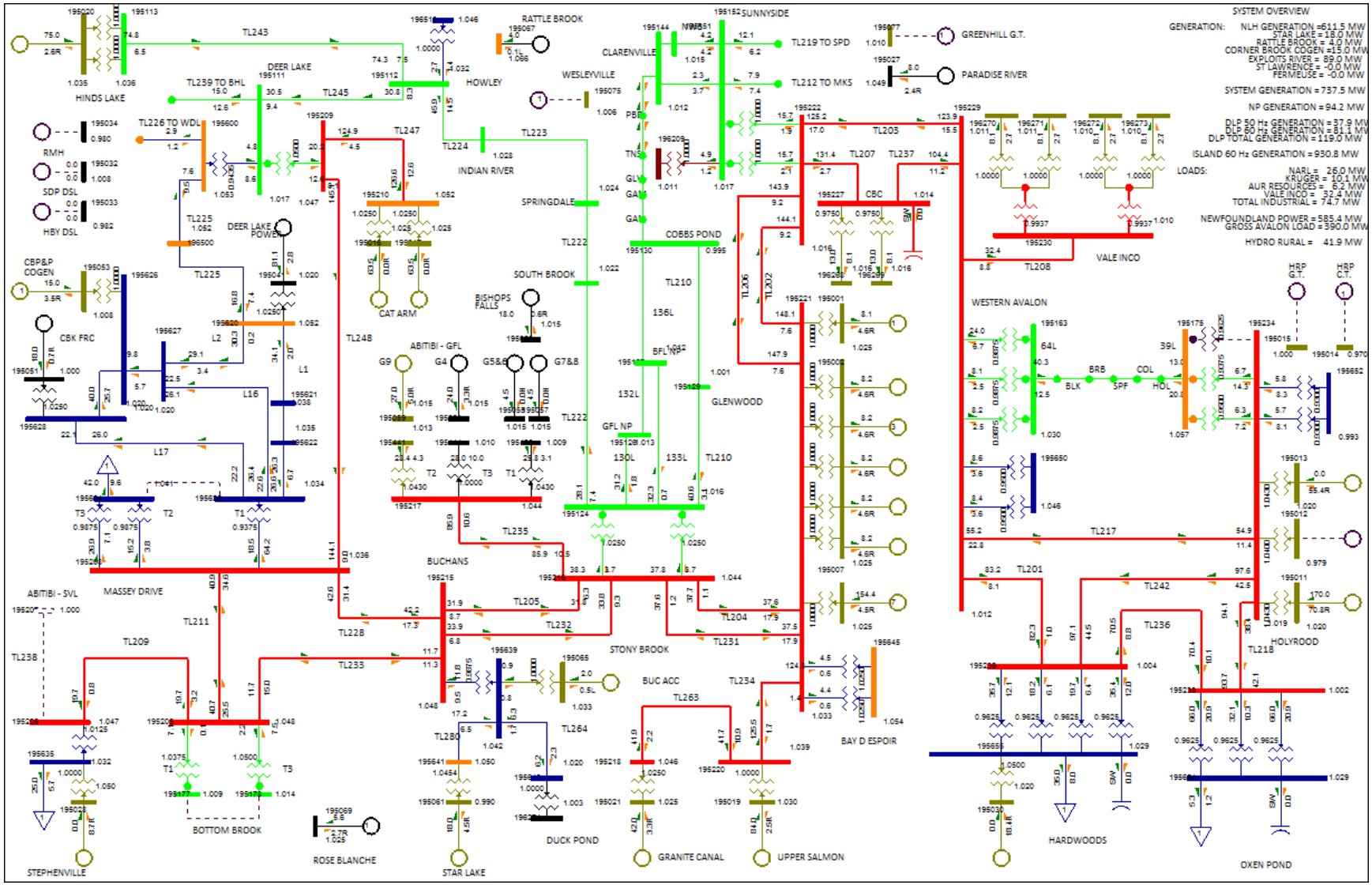
Base Case 13


SYSTEM OVERVIEW
GENERATION:
NLH GENERATION =718.8 MW
STAR LAKE = 18.0 MW
RATTLE BROOK = 4.0 MW
CORNER BROOK COGEN =15.0 MW
EXPLOITS RIVER = 89.0 MW
ST LAWRENCE = 0.0 MW
FERMEUSE = 0.0 MW
SYSTEM GENERATION = 844.8 MW
NP GENERATION = 94.2 MW
DLP 50 Hz GENERATION = 37.9 MW
DLP 60 Hz GENERATION = 81.1 MW
DLP TOTAL GENERATION = 119.0 MW
ISLAND 60 Hz GENERATION = 1038.1 MW
LOADS:
NARL = 26.0 MW
KRUGER = 10.0 MW
AUR RESOURCES = 5.2 MW
VALE INCO = 32.4 MW
TOTAL INDUSTRIAL = 74.5 MW
NEWFOUNDLAND POWER = 679.0 MW
GROSS AVALON LOAD = 447.9 MW
HYDRO RURAL = 48.6 MW
HINDS LAKE
DEER LAKE
TL243
TL239 TO BHL
TL245
TL226 TO WDL
TL247
TL224
TL223
RATTLE BROOK
HOWLEY
INDIAN RIVER
WESLEYVILLE
CLARENVILLE
SUNNYSIDE
TL219 TO SPD
TL212 TO MKS
GREENHILL G.T.
PARADISE RIVER
RMH
SDP DSL
HBY DSL
TL225
DEER LAKE POWER
CBP&P COGEN
CBK FRC
CAT ARM
SPRINGDALE
TL222
SOUTH BROOK
BISHOPS FALLS
TL248
ABITIBI - GFL
G9
G4
G5&6
G7&8
COBBS POND
TL210
136L
132L
130L
133L
GFL NP
GLENWOOD
TL206
TL202
TL203
TL207
TL237
CBC
VALE INCO
TL208
WESTERN AVALON
HRP G.T.
HRP C.T.
64L
39L
BLK
BRB
SPF
CDL
HOL
TL217
TL201
TL242
TL236
TL218
HOLYROOD
HARDWOODS
OXEN POND
L1
L2
L16
L17
MASSEY DRIVE
ABITIBI - SVL
TL209
TL211
TL238
TL228
TL233
TL235
BUCHANS
TL205
TL232
TL204
TL231
STONY BROOK
BUC ACC
TL234
TL263
TL264
TL280
BAY D ESPOIR
BOTTOM BROOK
STEPHENVILLE
ROSE BLANCHE
STAR LAKE
DUCK POND
GRANITE CANAL
UPPER SALMON

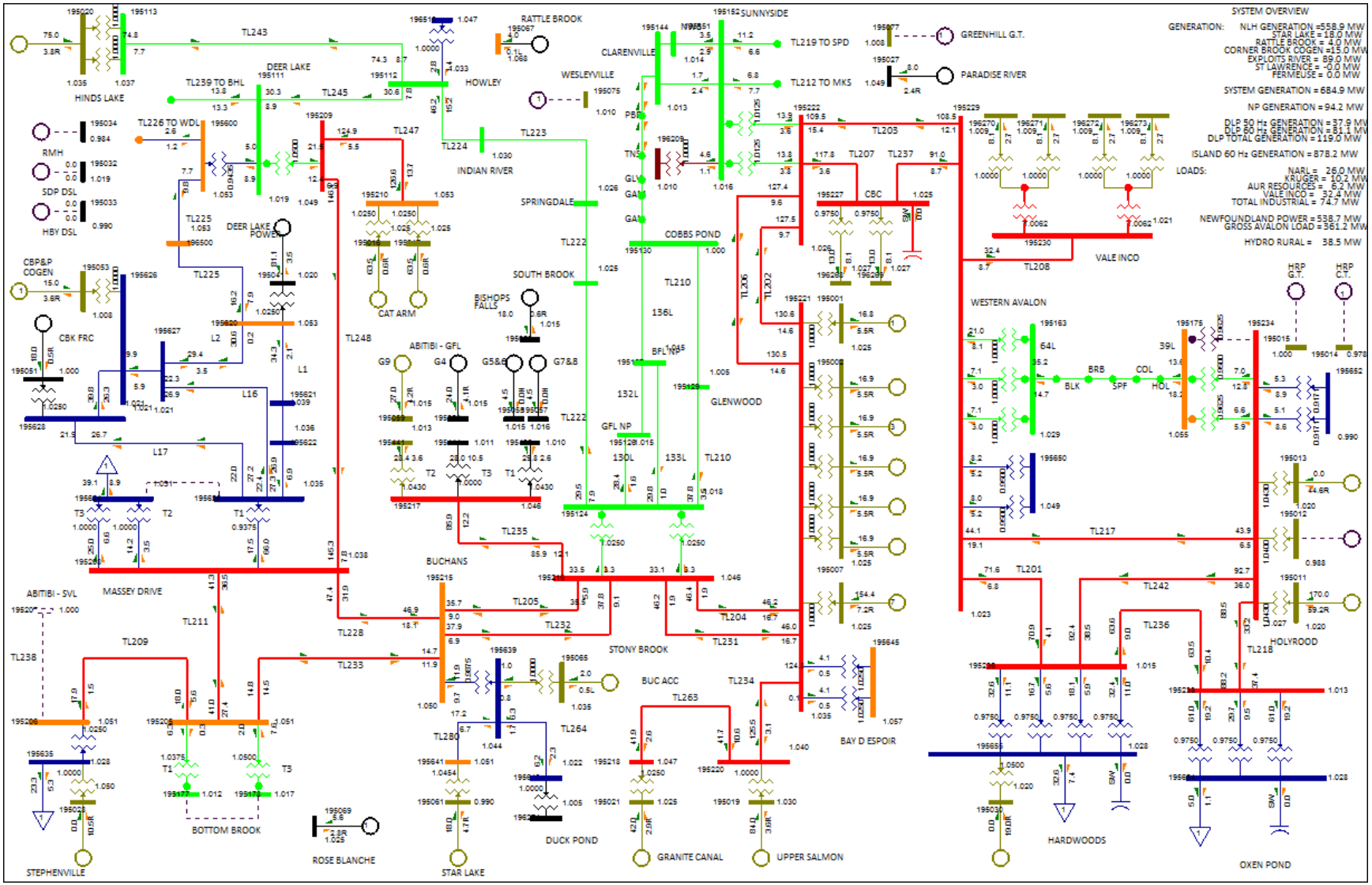
Base Case 14


SYSTEM OVERVIEW
GENERATION:
NLH GENERATION =664.7 MW
STAR LAKE = 18.0 MW
RATTLE BROOK = 4.0 MW
CORNER BROOK COGEN =15.0 MW
EXPLOITS RIVER = 89.0 MW
ST LAWRENCE = 0.0 MW
FERMEUSE = -0.0 MW
SYSTEM GENERATION = 790.7 MW
NP GENERATION = 94.2 MW
DLP 50 Hz GENERATION = 37.9 MW
DLP 60 Hz GENERATION = 81.1 MW
DLP TOTAL GENERATION = 119.0 MW
ISLAND 60 Hz GENERATION = 984.0 MW
LOADS:
NARL = 26.0 MW
KRUGER = 10.0 MW
AUR RESOURCES = 5.2 MW
VALE INCO = 32.4 MW
TOTAL INDUSTRIAL = 74.6 MW
NEWFOUNDLAND POWER = 632.2 MW
GROSS AVALON LOAD = 418.8 MW
HYDRO RURAL = 45.2 MW
HINDS LAKE
DEER LAKE
TL243
TL239 TO BHL
TL245
TL226 TO WDL
TL247
TL224
TL223
HOWLEY
RATTLE BROOK
INDIAN RIVER
SUNNYSIDE
CLARENVILLE
WESLEYVILLE
TL219 TO SPD
TL212 TO MKS
GREENHILL G.T.
PARADISE RIVER
RMH
SDP DSL
HBY DSL
TL225
DEER LAKE POWER
CBP&P COGEN
CBK FRC
CAT ARM
SPRINGDALE
TL222
SOUTH BROOK
BISHOPS FALLS
TL248
ABITIBI - GFL
G9
G4
G5&6
G7&8
COBBS POND
TL210
136L
132L
130L
133L
GLENWOOD
GFL NP
TL206
TL202
TL203
TL207
TL237
CBC
VALE INCO
TL208
WESTERN AVALON
HRP G.T.
HRP C.T.
64L
39L
BLK
BRB
SPF
CDL
HOL
TL217
TL201
TL242
TL236
TL218
HOLYROOD
HARDWOODS
OXEN POND
L1
L2
L16
L17
MASSEY DRIVE
ABITIBI - SVL
TL209
TL211
TL238
TL228
TL233
TL235
TL205
TL232
BUCHANS
STONY BROOK
TL204
TL231
BUC ACC
TL234
TL263
TL264
TL280
BAY D ESPOIR
BOTTOM BROOK
STEPHENVILLE
ROSE BLANCHE
STAR LAKE
DUCK POND
GRANITE CANAL
UPPER SALMON

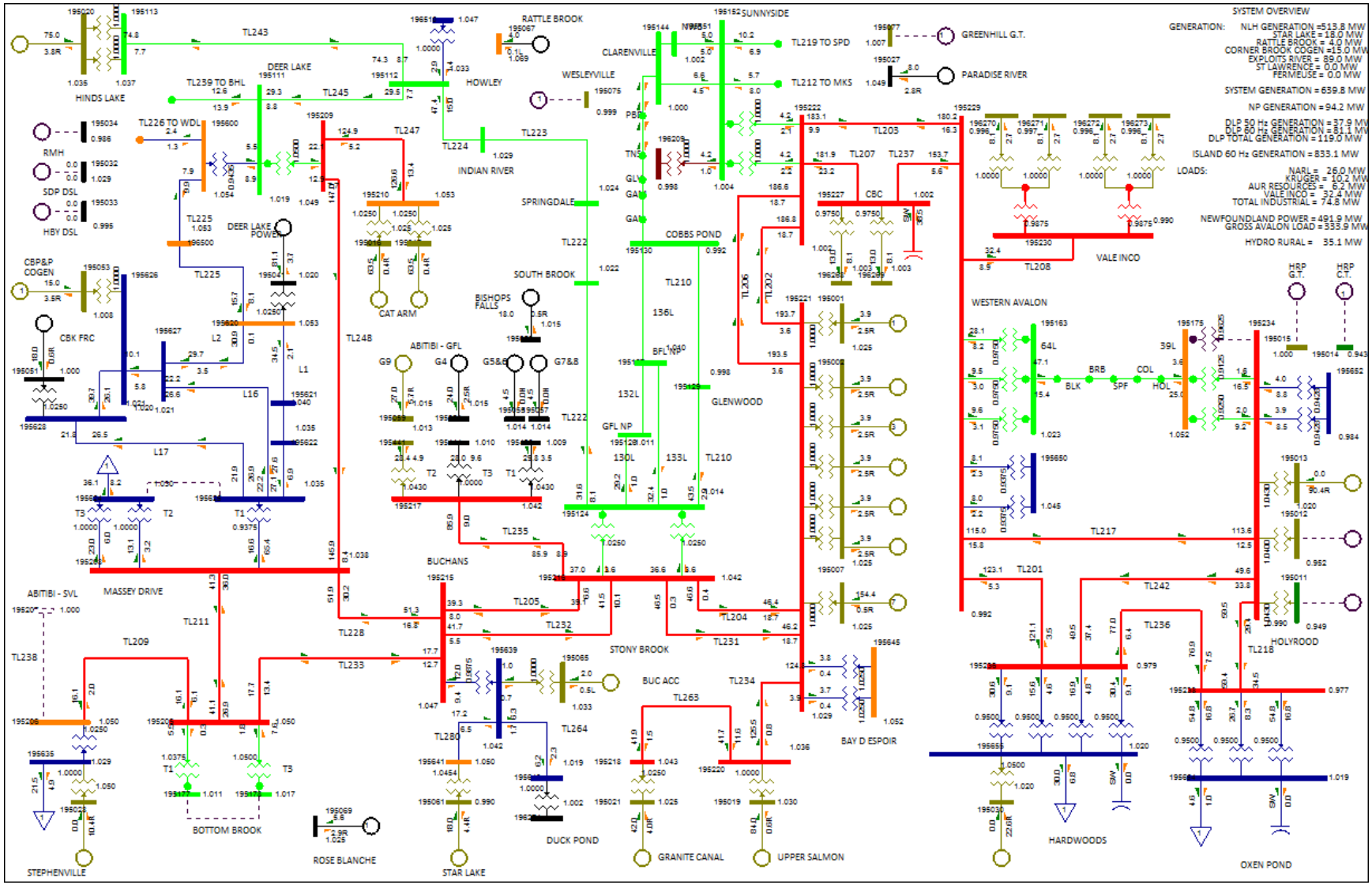
Base Case 15


SYSTEM OVERVIEW
GENERATION:
NLH GENERATION =611.5 MW
STAR LAKE = 18.0 MW
RATTLE BROOK = 4.0 MW
CORNER BROOK COGEN =15.0 MW
EXPLOITS RIVER = 89.0 MW
ST LAWRENCE = -0.0 MW
FERMEUSE = -0.0 MW
SYSTEM GENERATION = 737.5 MW
NP GENERATION = 94.2 MW
DLP 50 Hz GENERATION = 37.9 MW
DLP 60 Hz GENERATION = 81.1 MW
DLP TOTAL GENERATION = 119.0 MW
ISLAND 60 Hz GENERATION = 930.8 MW
LOADS:
NARL = 26.0 MW
KRUGER = 10.1 MW
AUR RESOURCES = 5.2 MW
VALE INCO = 32.4 MW
TOTAL INDUSTRIAL = 74.7 MW
NEWFOUNDLAND POWER = 585.4 MW
GROSS AVALON LOAD = 990.0 MW
HYDRO RURAL = 41.9 MW
HINDS LAKE
DEER LAKE
RMH
SDP DSL
HBY DSL
CBP&P COGEN
CBK FRC
DEER LAKE POWER
CAT ARM
INDIAN RIVER
HOWLEY
RATTLE BROOK
WESLEYVILLE
CLARENVILLE
SUNNYSIDE
GREENHILL G.T.
PARADISE RIVER
SPRINGDALE
SOUTH BROOK
BISHOPS FALLS
COBBS POND
GLENWOOD
STONY BROOK
BUCHANS
MASSEY DRIVE
ABITIBI - SVL
ABITIBI - GFL
BOTTOM BROOK
STEPHENVILLE
ROSE BLANCHE
STAR LAKE
DUCK POND
BUC ACC
GRANITE CANAL
UPPER SALMON
BAY D ESPOIR
WESTERN AVALON
VALE INCO
HARDWOODS
OXEN POND
HOLYROOD
HRP G.T.
HRP C.T.

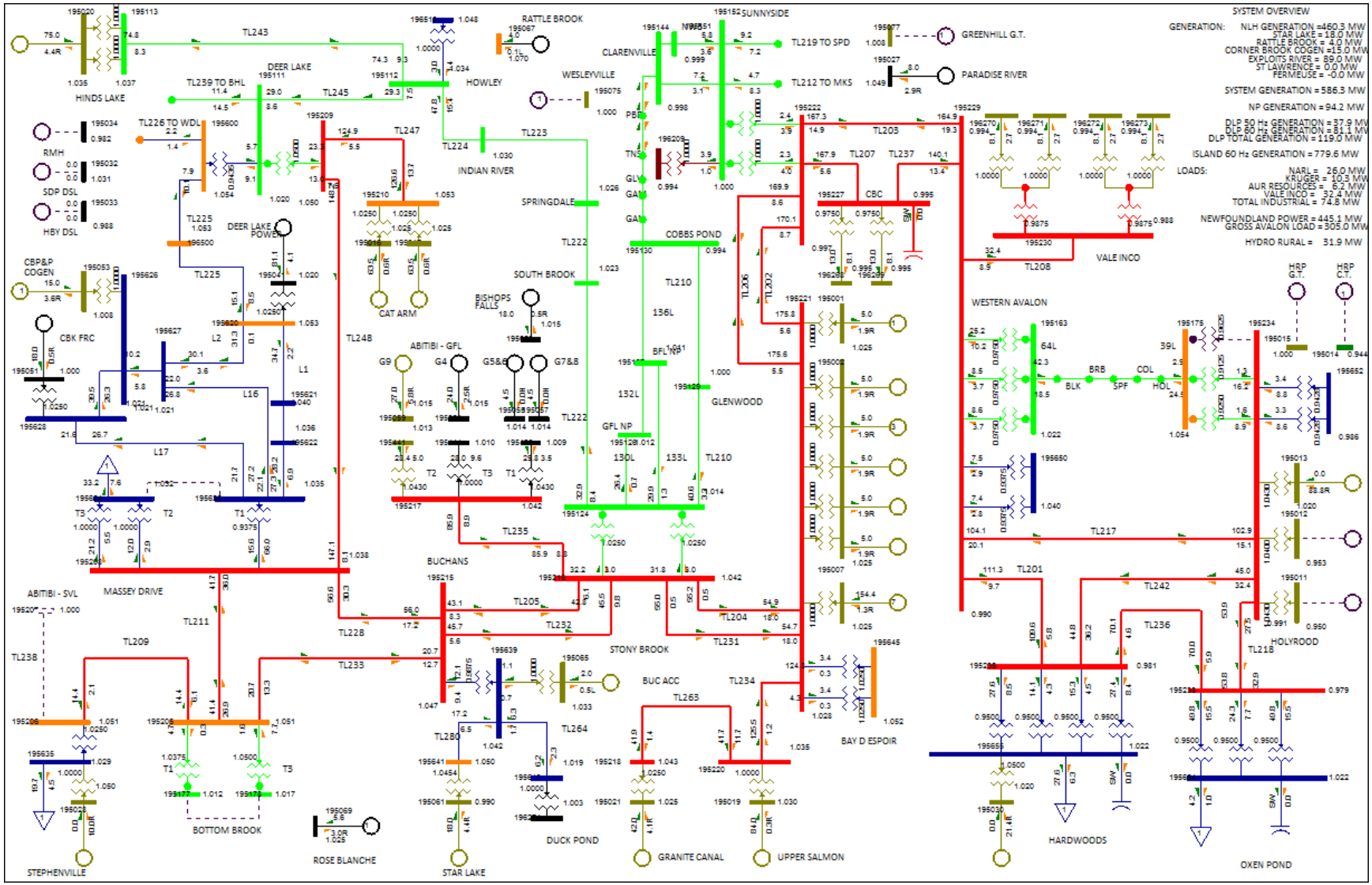
Base Case 16


SYSTEM OVERVIEW
GENERATION: NLH GENERATION =558.9 MW
STAR LAKE = 18.0 MW
RATTLE BROOK = 4.0 MW
CORNER BROOK COGEN =15.0 MW
EXPLOITS RIVER = 89.0 MW
ST LAWRENCE = 0.0 MW
FERMEUSE = 0.0 MW
SYSTEM GENERATION = 684.9 MW
NP GENERATION = 94.2 MW
DLP 50 Hz GENERATION = 37.9 MW
DLP 60 Hz GENERATION = 81.1 MW
DLP TOTAL GENERATION = 119.0 MW
ISLAND 60 Hz GENERATION = 878.2 MW
LOADS: NARL = 26.0 MW
KRUGER = 12.1 MW
AUR RESOURCES = 6.2 MW
VALE INCO = 32.4 MW
TOTAL INDUSTRIAL = 74.7 MW
NEWFOUNDLAND POWER = 538.7 MW
GROSS AVALON LOAD = 361.2 MW
HYDRO RURAL = 38.5 MW
HINDS LAKE
DEER LAKE
TL243
TL239 TO BHL
TL245
TL226 TO WDL
TL247
TL224
TL223
HOWLEY
RATTLE BROOK
INDIAN RIVER
SUNNYSIDE
CLARENVILLE
WESLEYVILLE
TL219 TO SPD
TL212 TO MKS
GREENHILL G.T.
PARADISE RIVER
RMH
SDP DSL
HBY DSL
TL225
DEER LAKE POWER
CBP&P COGEN
CBK FRC
CAT ARM
SPRINGDALE
TL222
SOUTH BROOK
BISHOPS FALLS
COBBS POND
TL210
TL203
TL207
TL237
CBC
VALE INCO
TL208
WESTERN AVALON
TL248
ABITIBI - GFL
G9
G4
G5&6
G7&8
GLENWOOD
GFL NP
136L
132L
130L
133L
L1
L2
L16
L17
MASSEY DRIVE
ABITIBI - SVL
TL211
TL209
TL238
TL228
TL233
TL235
BUCHANS
TL205
TL232
TL204
TL231
STONY BROOK
BUC ACC
TL234
TL263
TL264
TL280
BAY D ESPOIR
BOTTOM BROOK
ROSE BLANCHE
STAR LAKE
DUCK POND
GRANITE CANAL
UPPER SALMON
STEPHENVILLE
HARDWOODS
OXEN POND
HOLYROOD
TL201
TL242
TL236
TL217
TL218
64L
39L
BRB
CDL
HOL
BLK
SPF
HRP G.T.
HRP C.T.

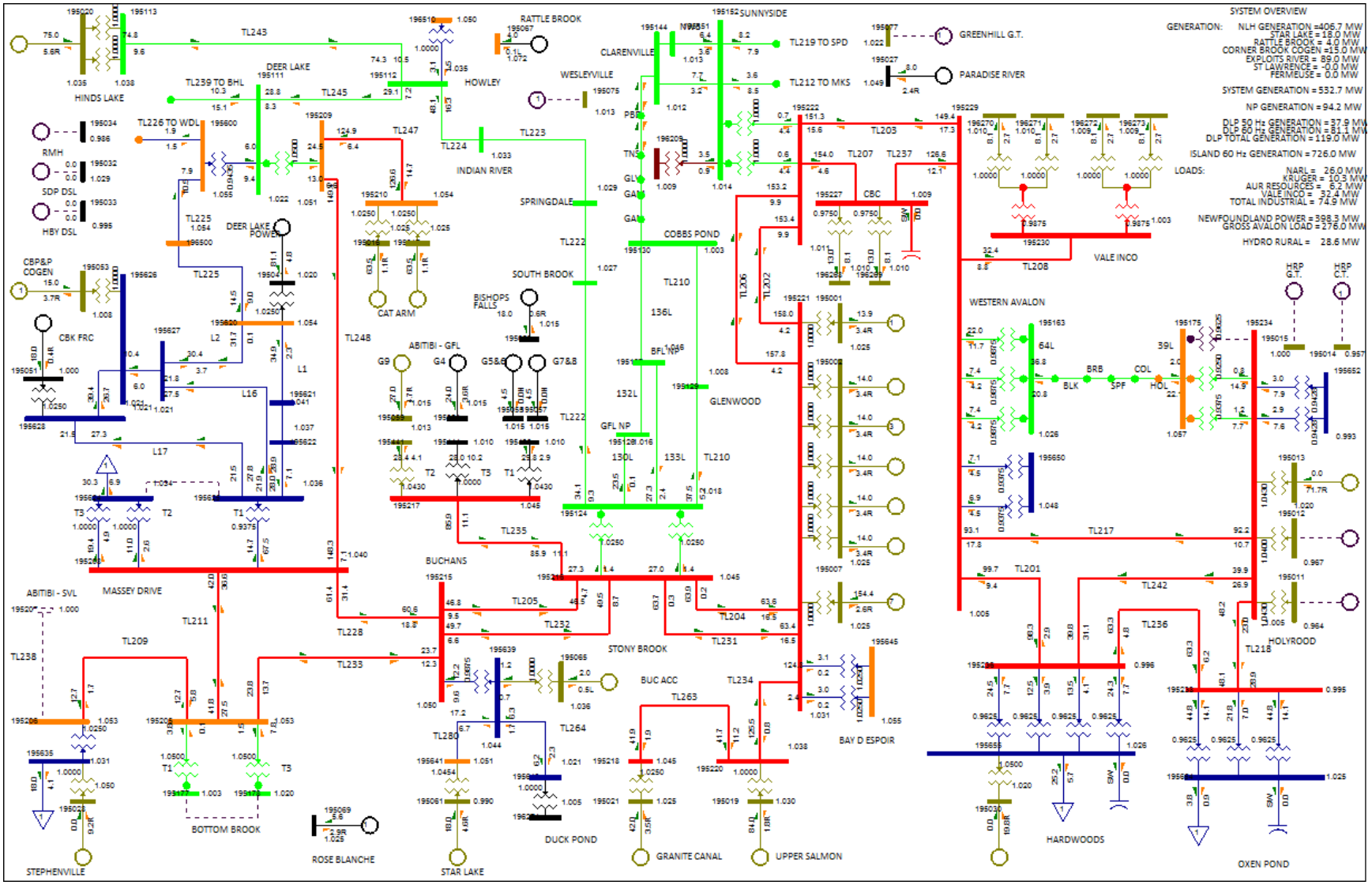
Base Case 17


SYSTEM OVERVIEW
GENERATION: NLH GENERATION =513.8 MW
STAR LAKE = 18.0 MW
RATTLE BROOK = 4.0 MW
CORNER BROOK COGEN =15.0 MW
EXPLOITS RIVER = 89.0 MW
ST LAWRENCE = 0.0 MW
FERMEUSE = 0.0 MW
SYSTEM GENERATION = 639.8 MW
NP GENERATION = 94.2 MW
DLP 50 Hz GENERATION = 37.9 MW
DLP 60 Hz GENERATION = 81.1 MW
DLP TOTAL GENERATION = 119.0 MW
ISLAND 60 Hz GENERATION = 833.1 MW
LOADS: NARL = 26.0 MW
KRUGER = 10.2 MW
AUR RESOURCES = 5.2 MW
VALE INCO = 32.4 MW
TOTAL INDUSTRIAL = 74.8 MW
NEWFOUNDLAND POWER = 491.9 MW
GROSS AVALON LOAD = 333.9 MW
HYDRO RURAL = 35.1 MW
HINDS LAKE
DEER LAKE
TL243
TL239 TO BHL
TL245
TL226 TO WDL
TL247
TL224
TL223
INDIAN RIVER
HOWLEY
RATTLE BROOK
WESLEYVILLE
SUNNYSIDE
CLARENVILLE
TL219 TO SPD
TL212 TO MKS
GREENHILL G.T.
PARADISE RIVER
RMH
SDP DSL
HBY DSL
TL225
DEER LAKE POWER
CBP&P COGEN
CBK FRC
CAT ARM
TL248
SPRINGDALE
TL222
SOUTH BROOK
BISHOPS FALLS
ABITIBI - GFL
G9
G4
G5&6
G7&8
COBBS POND
TL210
136L
132L
130L
133L
GLENWOOD
GFL NP
TL202
TL206
TL203
TL207
TL237
CBC
VALE INCO
TL208
WESTERN AVALON
64L
39L
BLK
BRB
SPF
CDL
HOL
TL217
TL201
TL242
TL236
TL218
HOLYROOD
HRP G.T.
HRP C.T.
MASSEY DRIVE
ABITIBI - SVL
TL211
TL209
TL238
TL228
TL233
TL235
TL205
TL232
BUCHANS
STONY BROOK
TL204
TL231
TL234
BUC ACC
TL263
TL264
TL280
BAY D ESPOIR
BOTTOM BROOK
STEPHENVILLE
ROSE BLANCHE
STAR LAKE
DUCK POND
GRANITE CANAL
UPPER SALMON
HARDWOODS
OXEN POND

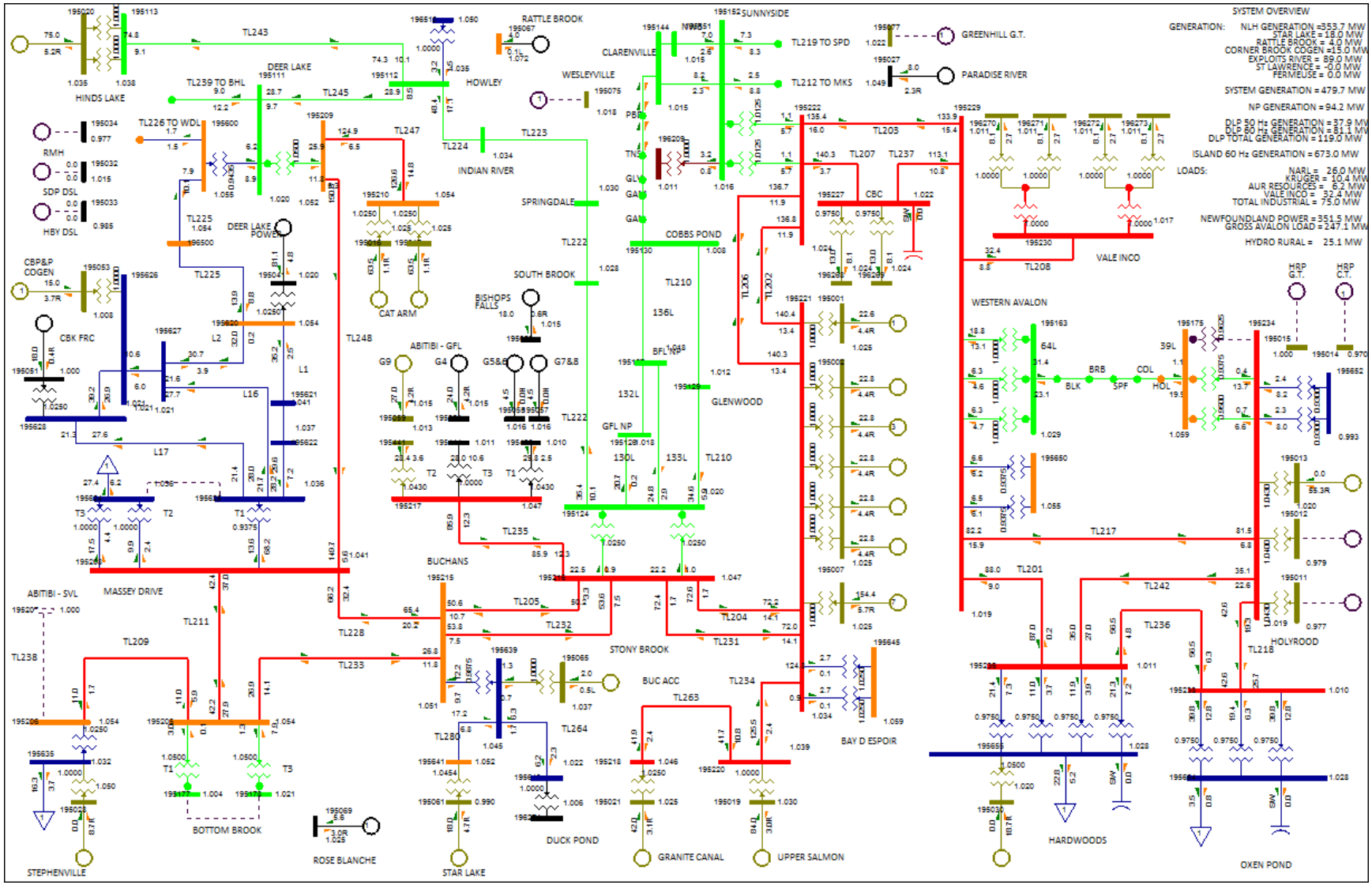
Base Case 18


SYSTEM OVERVIEW
GENERATION:
NLH GENERATION =460.3 MW
STAR LAKE = 18.0 MW
RATTLE BROOK = 4.0 MW
CORNER BROOK COGEN =15.0 MW
EXPLOITS RIVER = 89.0 MW
ST LAWRENCE = 0.0 MW
FERMEUSE = -0.0 MW
SYSTEM GENERATION = 586.3 MW
NP GENERATION = 94.2 MW
DLP 50 Hz GENERATION = 37.9 MW
DLP 60 Hz GENERATION = 81.1 MW
DLP TOTAL GENERATION = 119.0 MW
ISLAND 60 Hz GENERATION = 779.6 MW
LOADS:
NARL = 26.0 MW
KRUGER = 10.5 MW
AUR RESOURCES = 5.2 MW
VALE INCO = 32.4 MW
TOTAL INDUSTRIAL = 74.8 MW
NEWFOUNDLAND POWER = 445.1 MW
GROSS AVALON LOAD = 505.0 MW
HYDRO RURAL = 31.9 MW
HINDS LAKE
DEER LAKE
RMH
SDP DSL
HBY DSL
CBP&P COGEN
CBK FRC
DEER LAKE POWER
CAT ARM
INDIAN RIVER
RATTLE BROOK
HOWLEY
WESLEYVILLE
CLARENVILLE
SUNNYSIDE
TL219 TO SPD
TL212 TO MKS
GREENHILL G.T.
PARADISE RIVER
SPRINGDALE
SOUTH BROOK
BISHOPS FALLS
ABITIBI - GFL
COBBS POND
GLENWOOD
GFL NP
BUCHANS
STONY BROOK
BUC ACC
BAY D ESPOIR
MASSEY DRIVE
ABITIBI - SVL
BOTTOM BROOK
STEPHENVILLE
ROSE BLANCHE
STAR LAKE
DUCK POND
GRANITE CANAL
UPPER SALMON
WESTERN AVALON
VALE INCO
HARDWOODS
OXEN POND
HOLYROOD
HRP G.T.
HRP C.T.

Base Case 19


SYSTEM OVERVIEW
GENERATION: NLH GENERATION =406.7 MW
STAR LAKE = 18.0 MW
RATTLE BROOK = 4.0 MW
CORNER BROOK COGEN =15.0 MW
EXPLOITS RIVER = 89.0 MW
ST LAWRENCE = 0.0 MW
FERMEUSE = 0.0 MW
SYSTEM GENERATION = 532.7 MW
NP GENERATION = 94.2 MW
DLP 50 Hz GENERATION = 37.9 MW
DLP 60 Hz GENERATION = 81.1 MW
DLP TOTAL GENERATION = 119.0 MW
ISLAND 60 Hz GENERATION = 726.0 MW
LOADS:
NARL = 26.0 MW
KRUGER = 10.3 MW
AUR RESOURCES = 6.2 MW
VALE INCO = 32.4 MW
TOTAL INDUSTRIAL = 74.9 MW
NEWFOUNDLAND POWER = 398.3 MW
GROSS AVALON LOAD = 276.0 MW
HYDRO RURAL = 28.6 MW
HINDS LAKE
DEER LAKE
RATTLE BROOK
SUNNYSIDE
GREENHILL G.T.
PARADISE RIVER
HOWLEY
WESLEYVILLE
CLARENVILLE
INDIAN RIVER
SPRINGDALE
COBBS POND
SOUTH BROOK
BISHOPS FALLS
CAT ARM
GLENWOOD
WESTERN AVALON
VALE INCO
HRP G.T.
HRP C.T.
HOLYROOD
OXEN POND
HARDWOODS
MASSEY DRIVE
ABITIBI - SVL
ABITIBI - GFL
BUCHANS
STONY BROOK
BUC ACC
BAY D ESPOIR
GRANITE CANAL
UPPER SALMON
DUCK POND
STAR LAKE
ROSE BLANCHE
BOTTOM BROOK
STEPHENVILLE
CBP&P COGEN
CBK FRC
RMH
SDP DSL
HBY DSL
DEER LAKE POWER
TL243
TL239 TO BHL
TL245
TL226 TO WDL
TL247
TL224
TL223
TL225
TL248
TL222
TL210
TL219 TO SPD
TL212 TO MKS
TL203
TL207
TL237
TL206
TL202
TL208
TL217
TL201
TL242
TL236
TL218
TL211
TL209
TL238
TL228
TL233
TL205
TL232
TL235
TL204
TL231
TL234
TL263
TL264
TL280
L1
L2
L16
L17
136L
132L
133L
64L
39L

Base Case 20


SYSTEM OVERVIEW
GENERATION:
NLH GENERATION =353.7 MW
STAR LAKE = 18.0 MW
RATTLE BROOK = 4.0 MW
CORNER BROOK COGEN =15.0 MW
EXPLOITS RIVER = 89.0 MW
ST LAWRENCE = 0.0 MW
FERMEUSE = 0.0 MW
SYSTEM GENERATION = 479.7 MW
NP GENERATION = 94.2 MW
DLP 50 Hz GENERATION = 37.9 MW
DLP 60 Hz GENERATION = 81.1 MW
DLP TOTAL GENERATION = 119.0 MW
ISLAND 60 Hz GENERATION = 673.0 MW
LOADS:
NARL = 26.0 MW
KRUGER = 10.4 MW
AUR RESOURCES = 5.2 MW
VALE INCO = 32.4 MW
TOTAL INDUSTRIAL = 75.0 MW
NEWFOUNDLAND POWER = 351.5 MW
GROSS AVALON LOAD = 247.1 MW
HYDRO RURAL = 25.1 MW
HINDS LAKE
DEER LAKE
TL243
TL239 TO BHL
TL245
TL226 TO WDL
TL247
TL224
TL223
RATTLE BROOK
HOWLEY
INDIAN RIVER
WESLEYVILLE
CLARENVILLE
SUNNYSIDE
TL219 TO SPD
TL212 TO MKS
GREENHILL G.T.
PARADISE RIVER
RMH
SDP DSL
HBY DSL
TL225
DEER LAKE POWER
CAT ARM
SPRINGDALE
TL222
SOUTH BROOK
BISHOPS FALLS
COBBS POND
TL210
136L
132L
130L
133L
GLENWOOD
GFL NP
BFL NP
TL206
TL202
TL203
TL207
TL237
CBC
VALE INCO
TL208
WESTERN AVALON
CBP&P COGEN
CBK FRC
TL248
ABITIBI - GFL
G9
G4
G5&6
G7&8
L1
L2
L16
L17
MASSEY DRIVE
ABITIBI - SVL
TL238
TL209
TL211
TL228
TL233
BOTTOM BROOK
STEPHENVILLE
ROSE BLANCHE
BUCHANS
TL235
TL205
TL232
TL204
TL231
STONY BROOK
BUC ACC
TL234
TL263
TL264
TL280
DUCK POND
STAR LAKE
GRANITE CANAL
UPPER SALMON
BAY D ESPOIR
64L
39L
BRB
CDL
BLK
SPF
HOL
TL217
TL201
TL242
TL236
TL218
HOLYROOD
HARDWOODS
OXEN POND
HRP G.T.
HRP C.T.

Base Case 21

10. Appendix B – Contingency Corrective Actions

Contingency	Corrective Action(s)
Loss of one HRD unit (170 MW unit)	1- Hardwoods Gas Turbine is set in generation mode at 50 MW 2- Stephenville Gas Turbine is set in generation mode at 50 MW 3- Greenhill Gas Turbine started at 10 MW 4- 60 MW load block is recalled from Kruger
Loss of two HRD units (170 MW units)	1- Holyrood Combustion Turbine is started at 120 MW 2- Hardwoods Gas Turbine is set in generation mode at 50 MW 3- Stephenville Gas Turbine is set in generation mode at 50 MW 4- Greenhill Gas Turbine started at 20 MW 5- Wesleyville Gas Turbine is started at 10 MW 6- 60 MW load block is recalled from Kruger 7- Hawke's Bay Diesels started at 5 MW 8- St. Anthony Diesels started at 8 MW 9- Cat Arm output is increased to 134 MW
Loss of all three HRD units	1- Holyrood Combustion Turbine is started at 120 MW 2- Hardwoods Gas Turbine is set in generation mode at 50 MW 3- Stephenville Gas Turbine is set in generation mode at 50 MW 4- Greenhill Gas Turbine started at 20 MW 5- Wesleyville Gas Turbine is started at 10 MW 6- 60 MW load block is recalled from Kruger 7- Hawke's Bay Diesels started at 5 MW 8- St. Anthony Diesels started at 8 MW 9- Cat Arm output is increased to 134 MW 10- Newfoundland Power's Hydro generation maximized (104 MW)
Loss of TL202 or TL206	1- Holyrood Combustion Turbine is started at 120 MW

	2- Hardwoods Gas Turbine is set in generation mode at 50 MW
Loss of TL207	1- Holyrood Combustion Turbine is started at 120 MW
Loss of TL237	1- Holyrood Combustion Turbine is started at 120 MW
Loss of TL 218	1- Holyrood unit 3 reduced from 150 MW to 100 MW 2- Hardwoods Gas Turbine is set in generation mode at 50 MW
Loss of TL234	1- Stephenville Gas Turbine is set in generation mode at 50 MW 2- 60 MW load block is recalled from Kruger 3- Cat Arm output is increased to 134 MW 4- Hawke's Bay Diesels started at 5 MW 5- St. Anthony Diesels started at 4 MW
Loss of TL235	1- Stephenville Gas Turbine is set in generation mode at 50 MW 2- Greenhill Gas Turbine started at 20 MW 3- Wesleyville Gas Turbine is started at 6 MW 4- St. Anthony Diesels started at 7 MW
Loss of TL243	1- Stephenville Gas Turbine is set in generation mode at 50 MW 2- Wesleyville Gas Turbine is started at 5 MW 3- Hawke's Bay Diesels started at 5 MW 4- St. Anthony Diesels started at 8 MW 5- Cat Arm output is increased to 134 MW
Loss of TL247	1- Stephenville Gas Turbine is set in generation mode at 50 MW 2- 60 MW load block is recalled from Kruger 3- Hawke's Bay Diesels started at 5 MW 4- St. Anthony Diesels started at 8 MW
Loss of TL258	1- Greenhill Gas Turbine started at 8 MW
Loss of TL263	1- Stephenville Gas Turbine is set in generation mode at 21 MW 2- Hardwoods Gas Turbine is set in generation mode at 21 MW
Loss of TL280	1- Stephenville Gas Turbine is set in generation mode at 18 MW