APPENDIX A

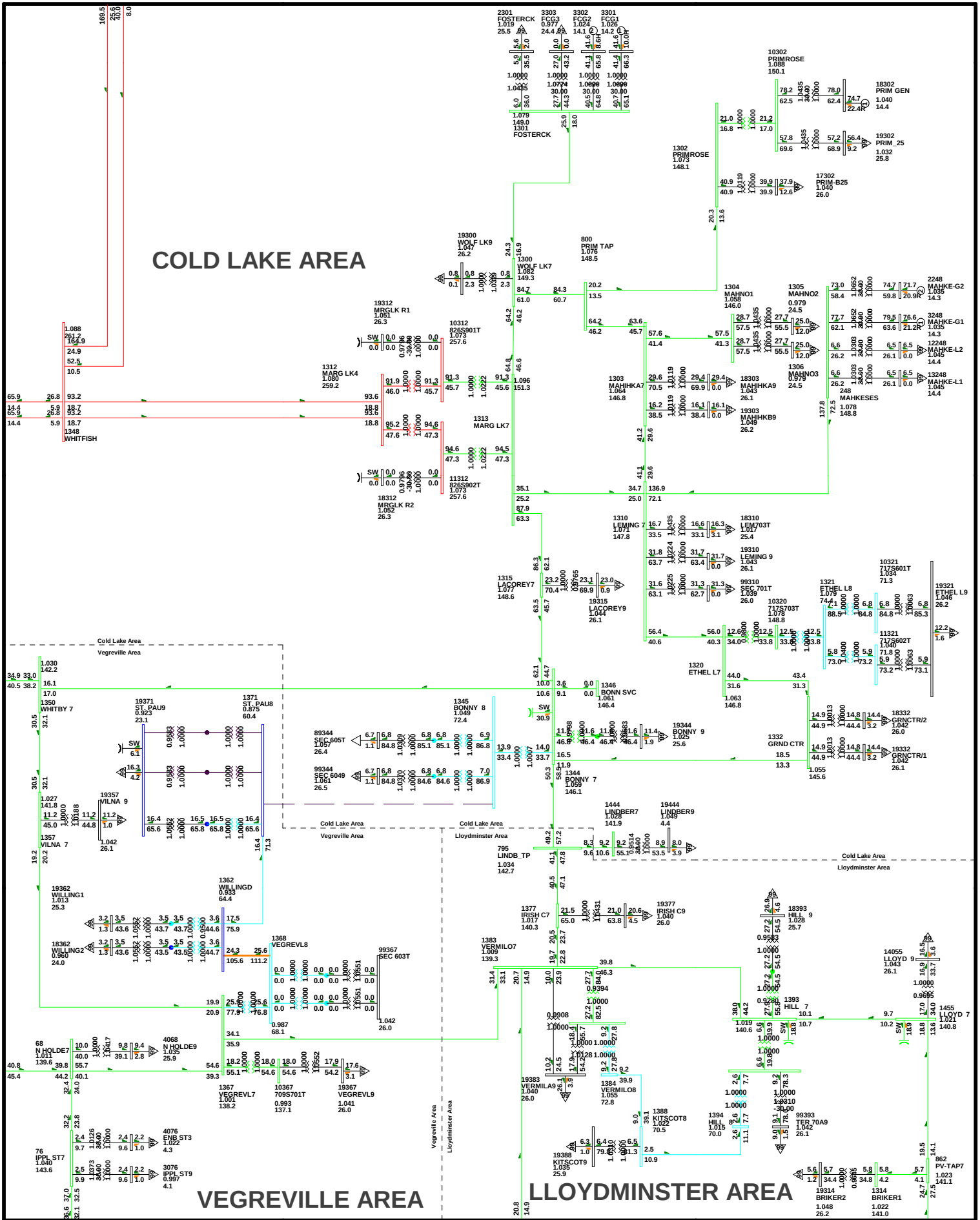
Existing System Power Flow Plots

2009 Load Flow Diagrams

2009 Winter Peak

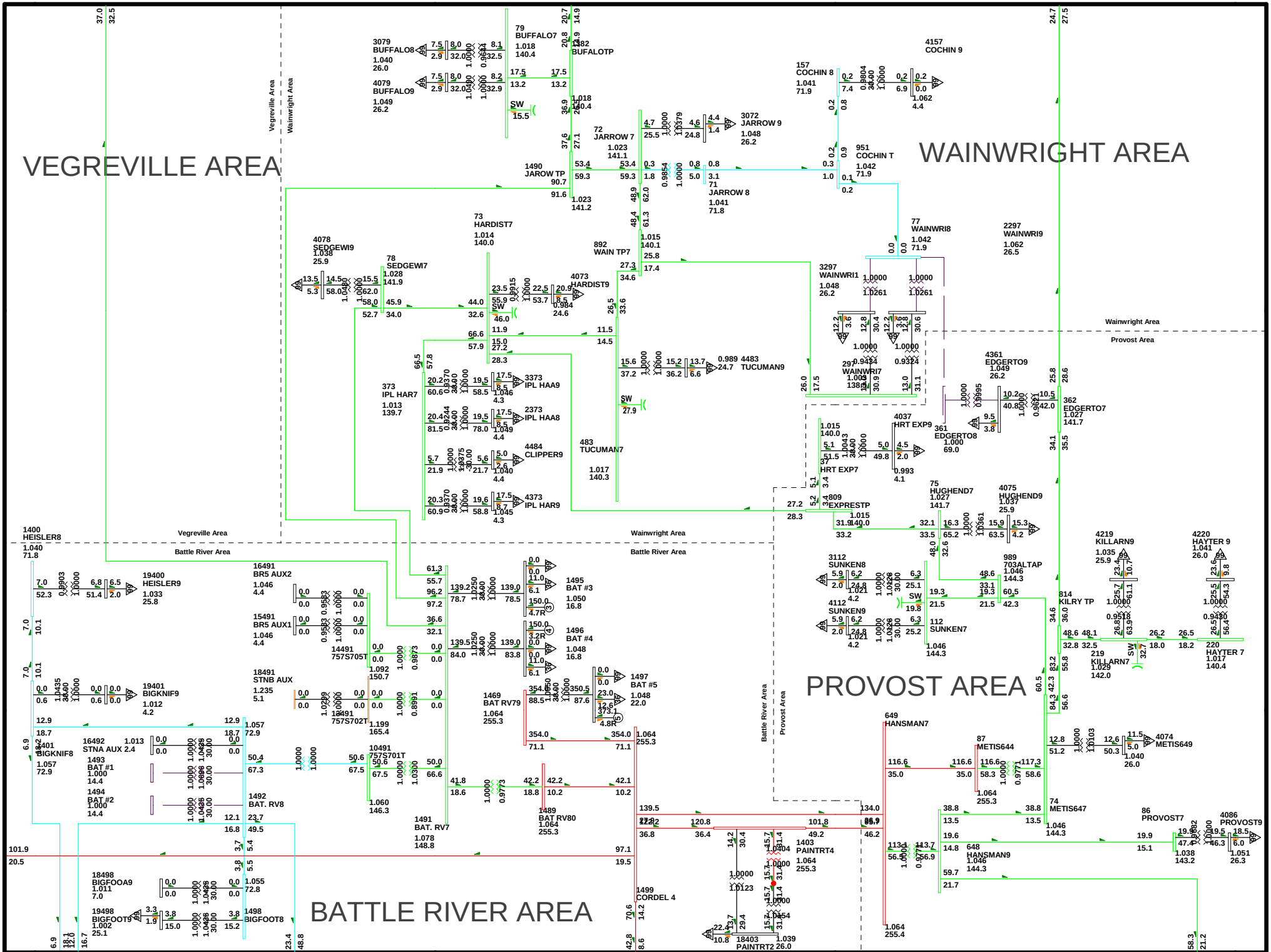
Figure Number	2009 WP Contingency	Overloaded Element	Transmission Voltage Violation
A-2009-11	Many Area Contingencies. Worst overload contingency is 702L/7L702 Battle River 757S to Hardisty 377S	7L50 Battle River 757S to Jarrow tap	NONE
A-2009-8	Vegreville 144-72kV tie transformer	6L82 Bonnyville 700S to St. Paul 707S	Voltage drops below 90% at Willingdon 711S
A-2009-2	6L82 Bonnyville 700S to St. Paul 707S	6L79 Vegreville 709S to Willingdon 711S	Voltage collapse (below 85%) at St. Paul 707S and below 90% at Willingdon 711S
A-2009-45	6L79 Vegreville 709S to Willingdon 711S	6L82 Bonnyville 700S to St. Paul 707S	Voltage below 90% at St. Paul 707S and Willingdon 711S
A-2009-65	Marguerite Lake 240-144kV 901T	Marguerite Lake 240-144kV 902T	NONE
	Marguerite Lake 240-144kV 902T	Marguerite Lake 240-144kV 901T	
A-2009-20	Ethel Lake 601T	Ethel Lake 602T	
	Ethel Lake 602T	Ethel Lake 601T	
A-2009-51	7L83 Mahihkan 837S to Leming Lake 715S	7L87 Marguerite Lake 826S to Wolf Lake 822S	
		7L74 Wolf Lake 822S to Primrose tap	
A-2009-52	7L89 Marguerite Lake 826S to La Corey 721S	7L74 Wolf Lake 822S to Primrose tap	
		7L87 Marguerite Lake 826S to Wolf Lake 822S	
		7L50 Battle River 757S to Jarrow tap	
A-2009-60	7L91 Marguerite Lake 826S to Leming Lake 715S	7L74 Wolf Lake 822S to Primrose tap	
		7L87 Marguerite Lake 826S to Wolf Lake 822S	
A-2009-16	7L95 Leming Lake 715S to Makeses 889S	7L74 Wolf Lake 822S to Primrose tap	
A-2009-12	7L14 Vermilion 710S to Hill 751S	Vermilion 144-72-25kV 701T *(Worst overload)*	
A-2009-44		6L06 Vermliion 710S to Kitscoty 705S	
A-2009-25	Vermilion 144-25kV 703T	Vermilion 144-72-25kV 701T	
A-2009-4	749L Metiskow 648S to Edgerton 899S	Vermilion 144-72-25kV 701T	
A-2009-59	7L749 Lloydminster 716S to Edgerton 899S	Vermilion 144-72-25kV 701T	
A-2009-17	954L Hansman Lake 650S to Metiskow 648S	Hansman 240-138kV transformer	
A-2009-22	Metiskow 240-138kV transformer	Hansman 240-138kV transformer	
A-2009-24	Hansman 240-138kV transformer	Metiskow 240-138kV transformer	
A-2009-7	Battle River 144-72kV 701T		Voltage below 90% at Heisler 764S, Bigknife Creek 843S, Mannix Mine 765S and Bigfoot 756S.

NOTE: BLACK text indicates N-1 violations;
RED text indicates additional violations under Battle River N-G-1;
BLUE text indicates additional violations under Primrose N-G-1;
MAROON text indicates additional violations under Battle River or Primrose N-G-1.



TASMO MODEL; OUTPUT GENERATED 2008-08-11 15:22:22
SWINGBUS 1520 FOR FC-2007-4:2010-04-02:18:44--1--1-0-0
FRI, MAR 27 2009 10:38

Figure A-2009-2-a



TASMO MODEL; OUTPUT GENERATED 2008-08-11 15:22:22
SWINGBUS 1520 FOR FC-2007-4:2010-04-02:18:44--1--1-0-0
FRI, MAR 27 2009 10:39

Figure A-2009-2-b

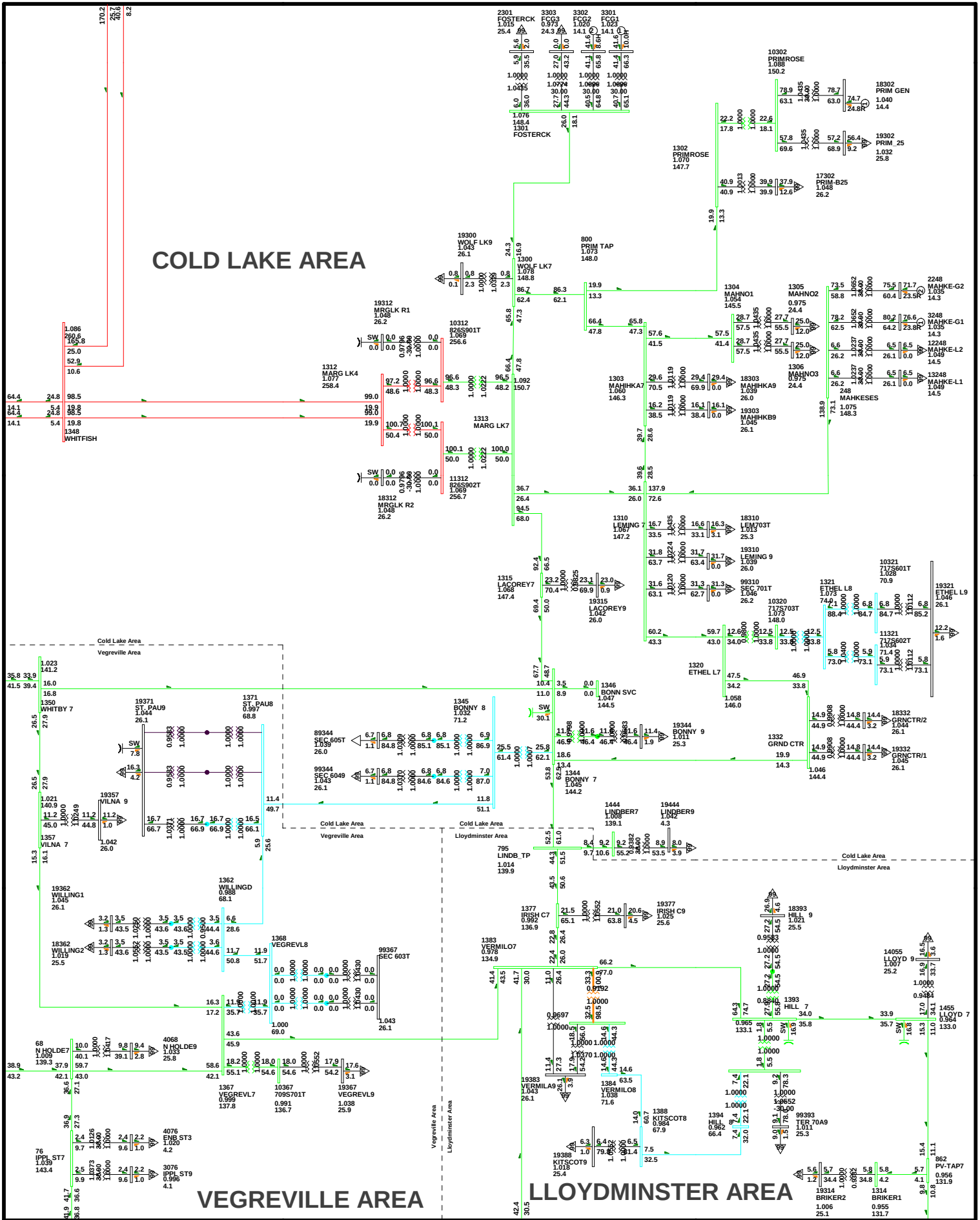


Figure A-2009-4-a

TASMO MODEL; OUTPUT GENERATED 2008-08-11 15:22:22
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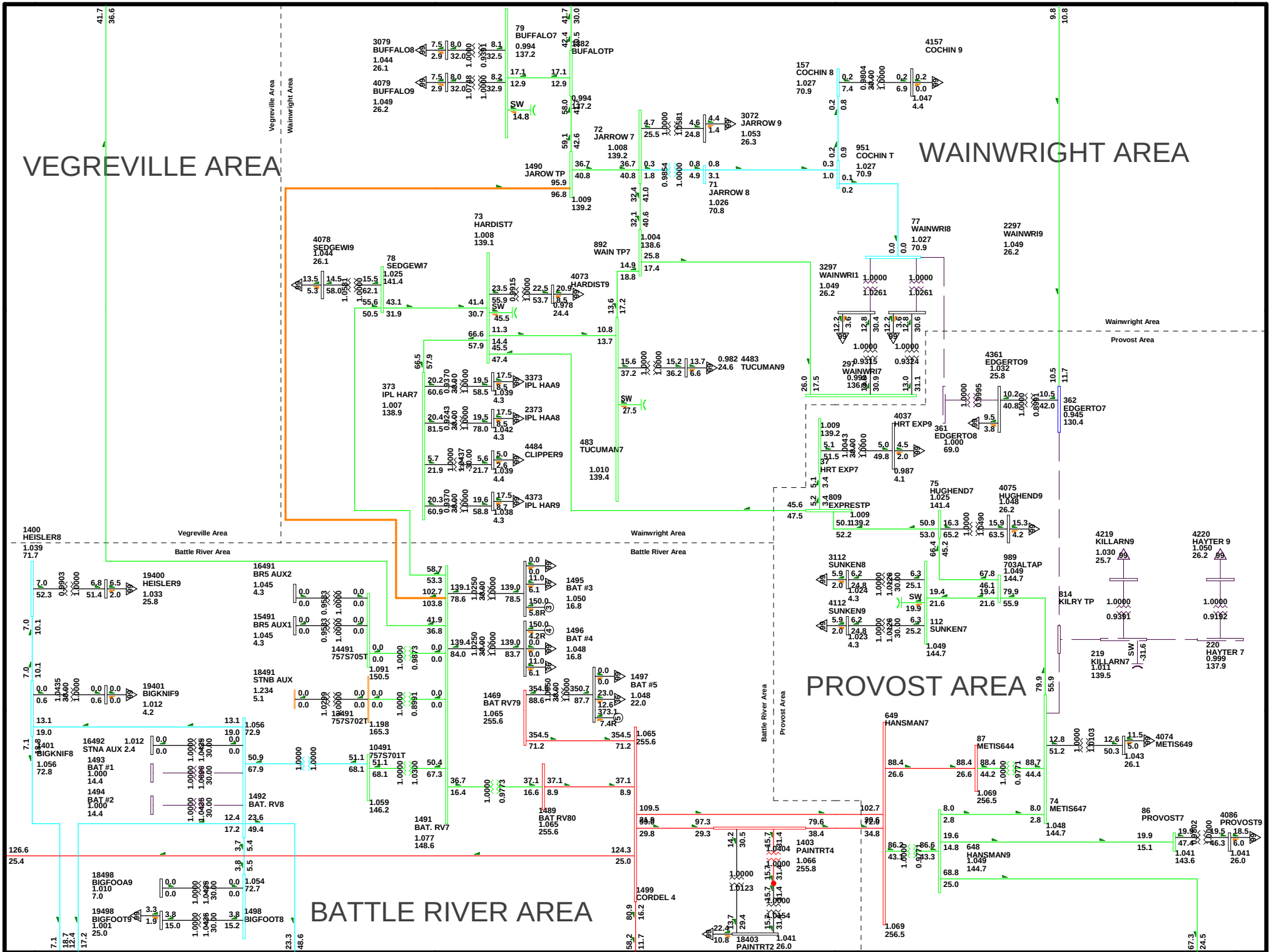
THU, MAR 26 2009 16:33



TASMO MODEL; OUTPUT GENERATED 2008-08-11 15:22:22
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THU, MAR 26 2009 16:34

Figure A-2009-4-b

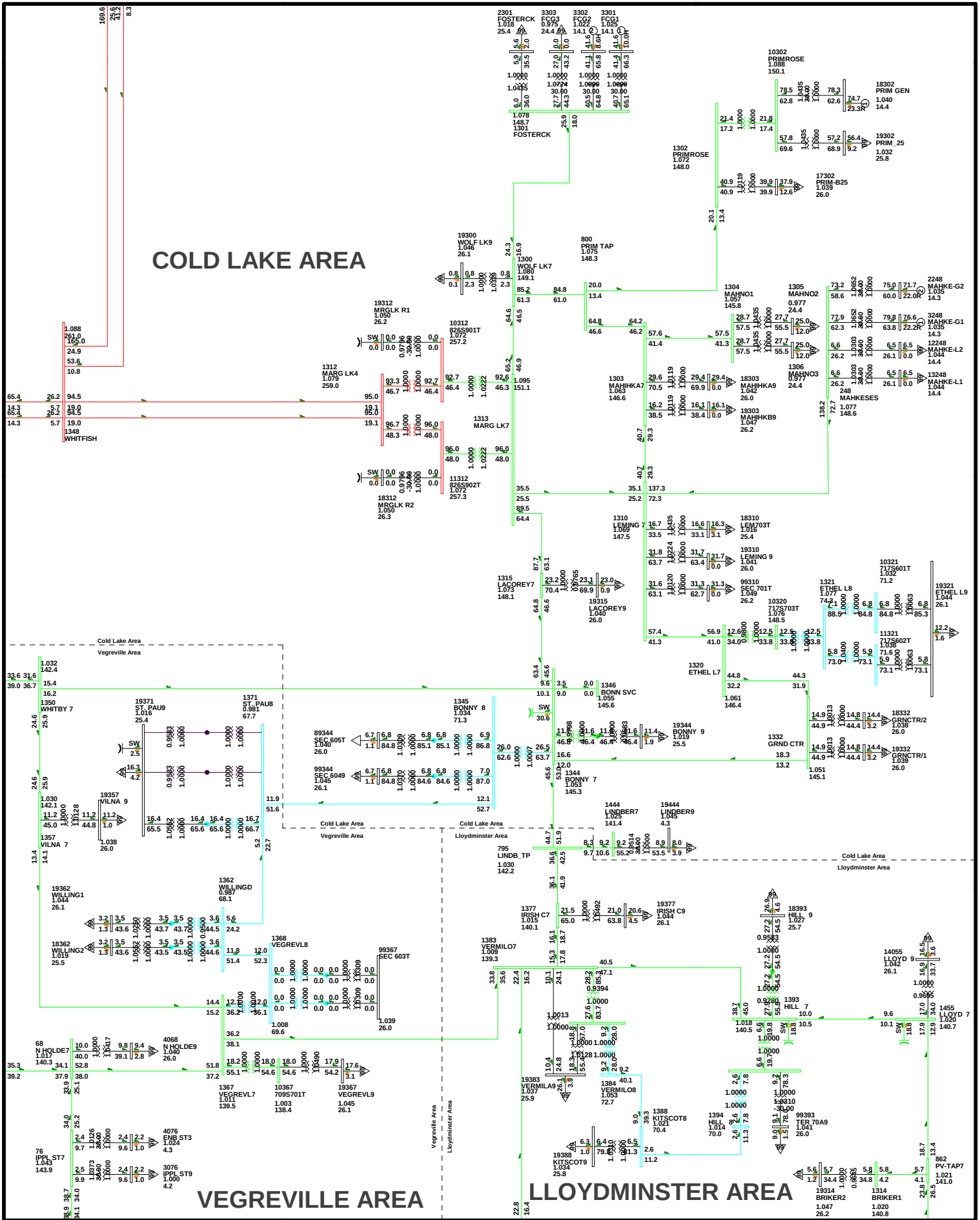

Figure A-2009-7-a

TASMO MODEL; OUTPUT GENERATED 2008-08-11 15:22:22
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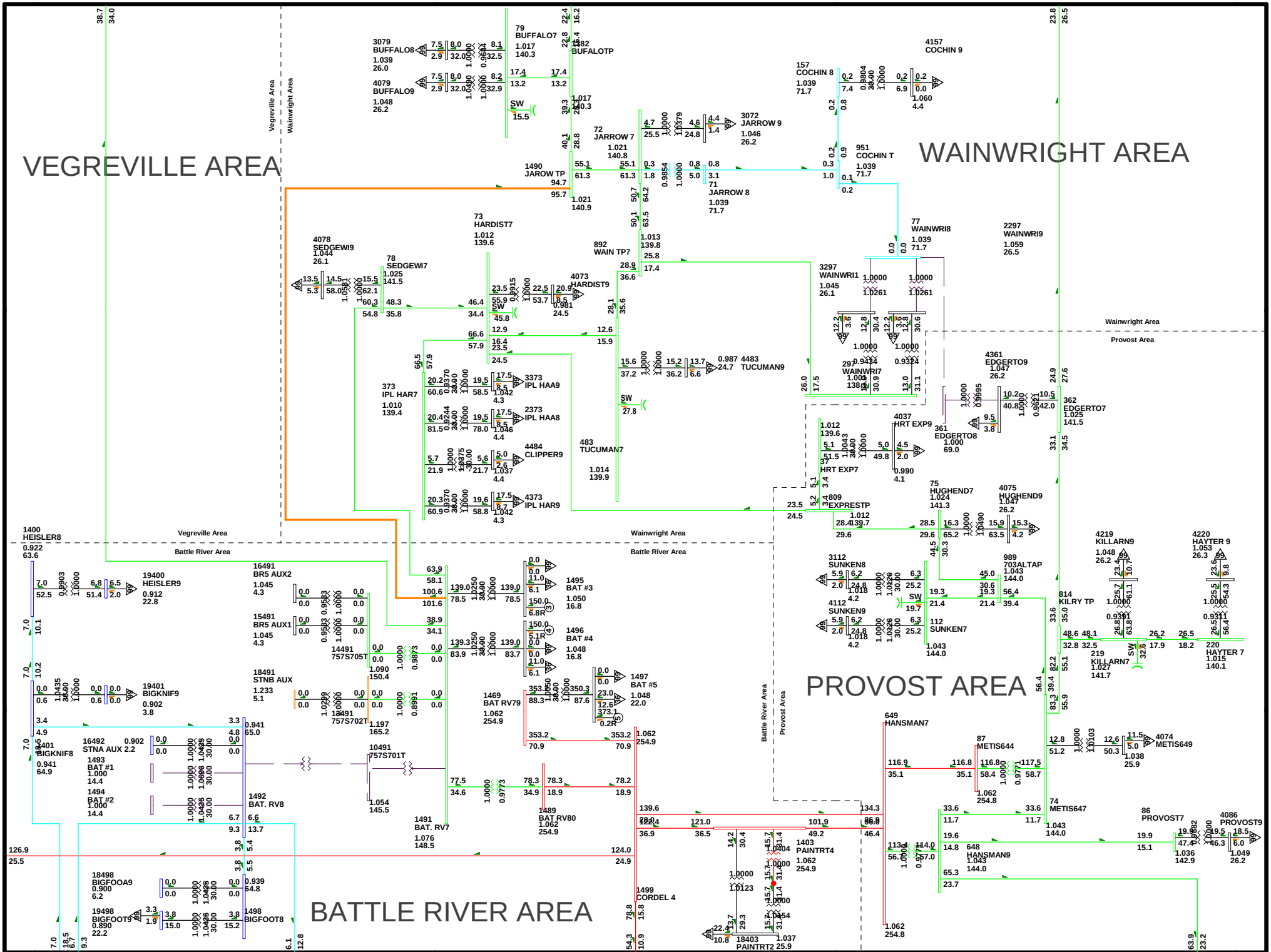
FRI, MAR 27 2009 13:34



TASMO MODEL; OUTPUT GENERATED 2008-08-11 15:22:22
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FRI, MAR 27 2009 13:34

Figure A-2009-7-b

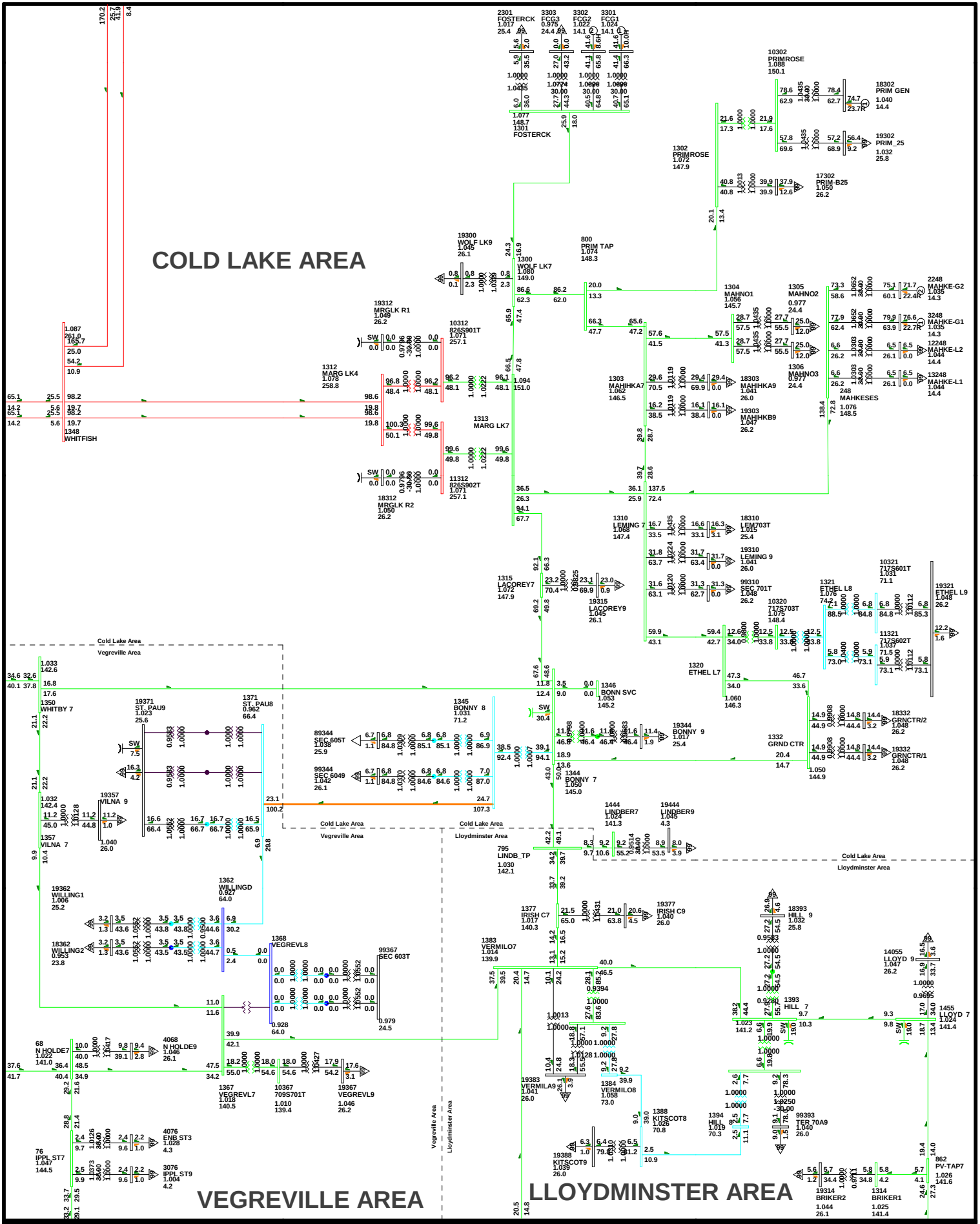

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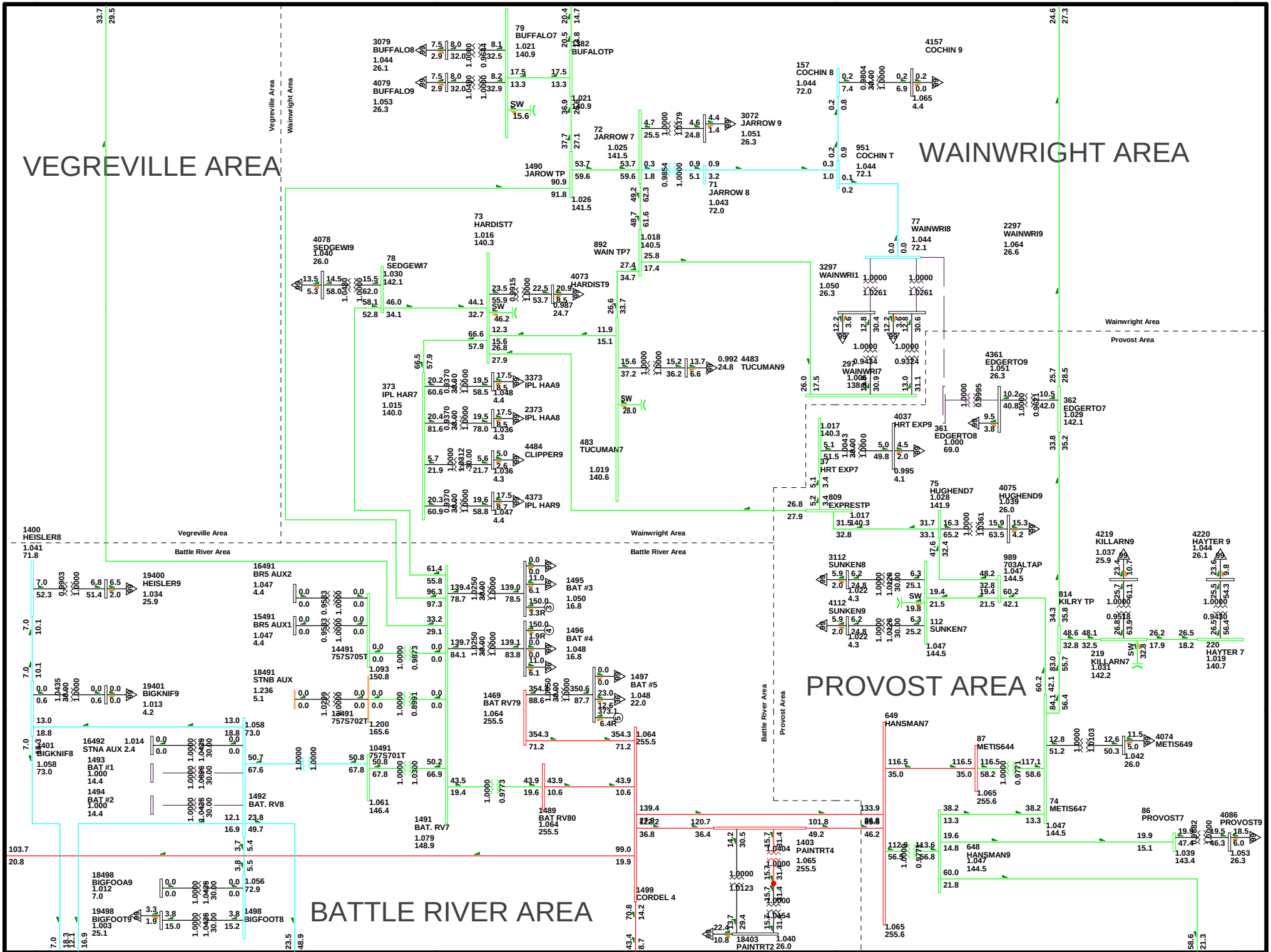
Figure A-2009-8-a



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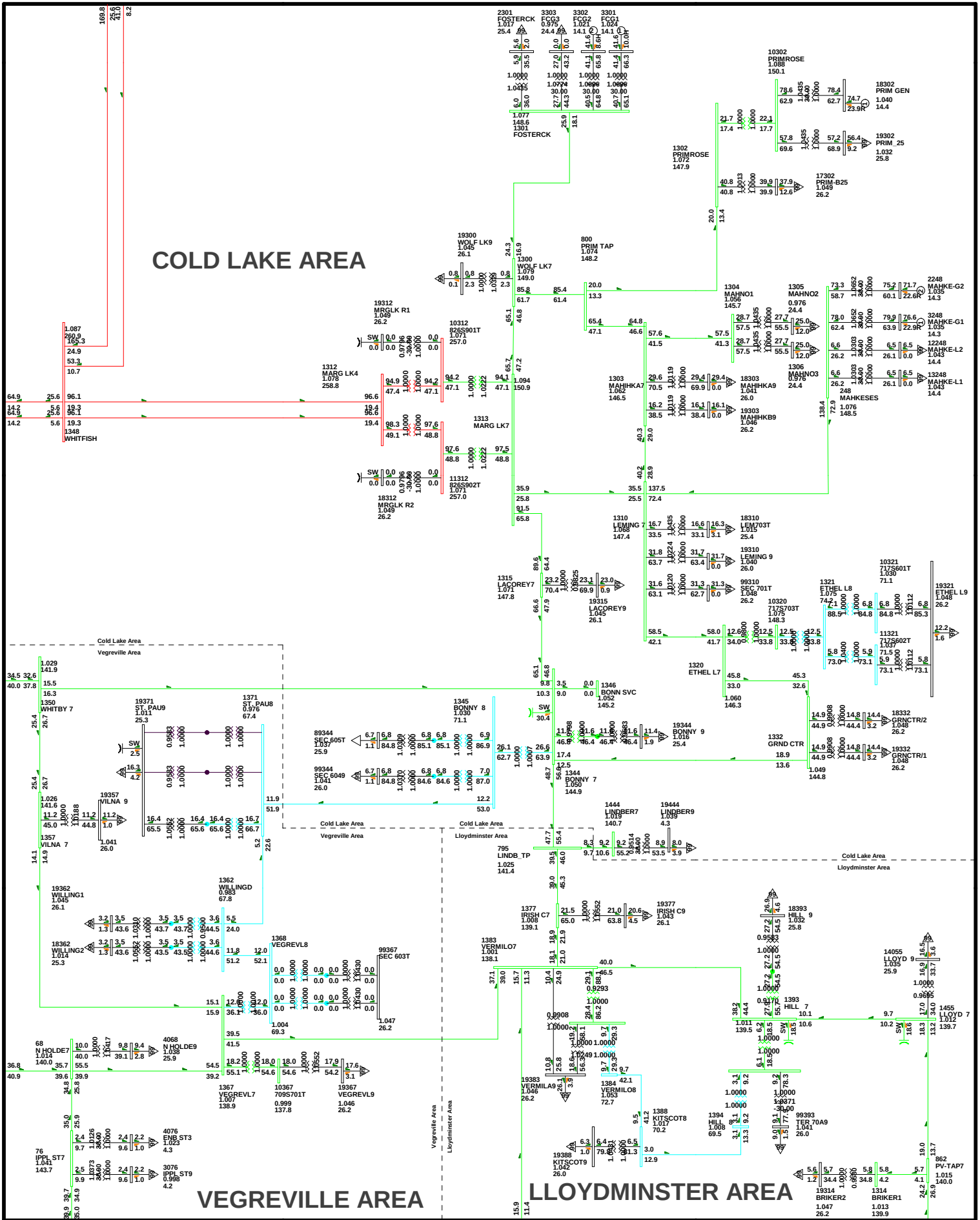
FRI, MAR 27 2009 10:33

Figure A-2009-8-b



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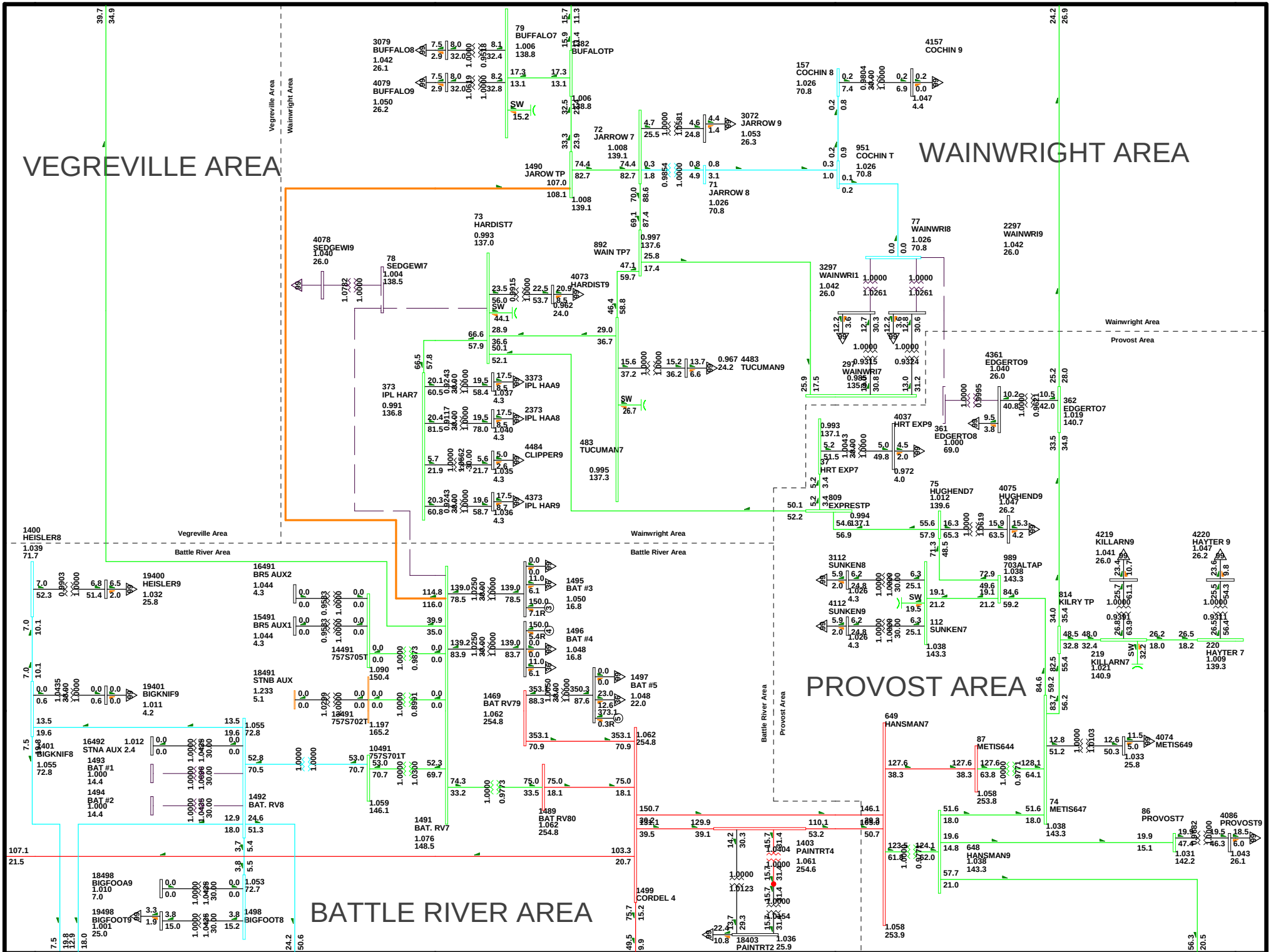
FRI, MAR 27 2009 11:59

Figure A-2009-11-a



TASMO MODEL; OUTPUT GENERATED 2008-08-11 15:22:22
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FRI, MAR 27 2009 12:00

Figure A-2009-11-b

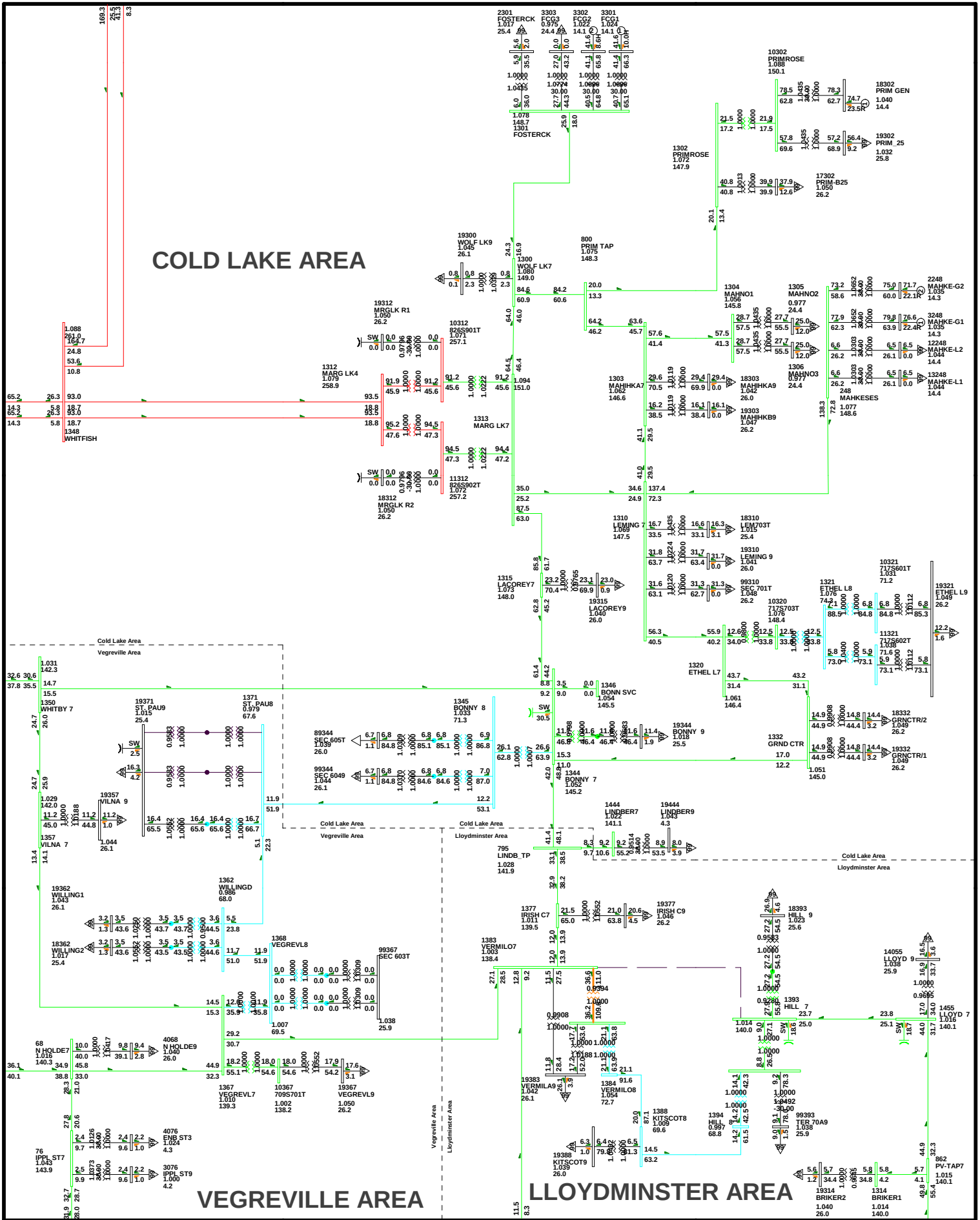

Figure A-2009-12-a

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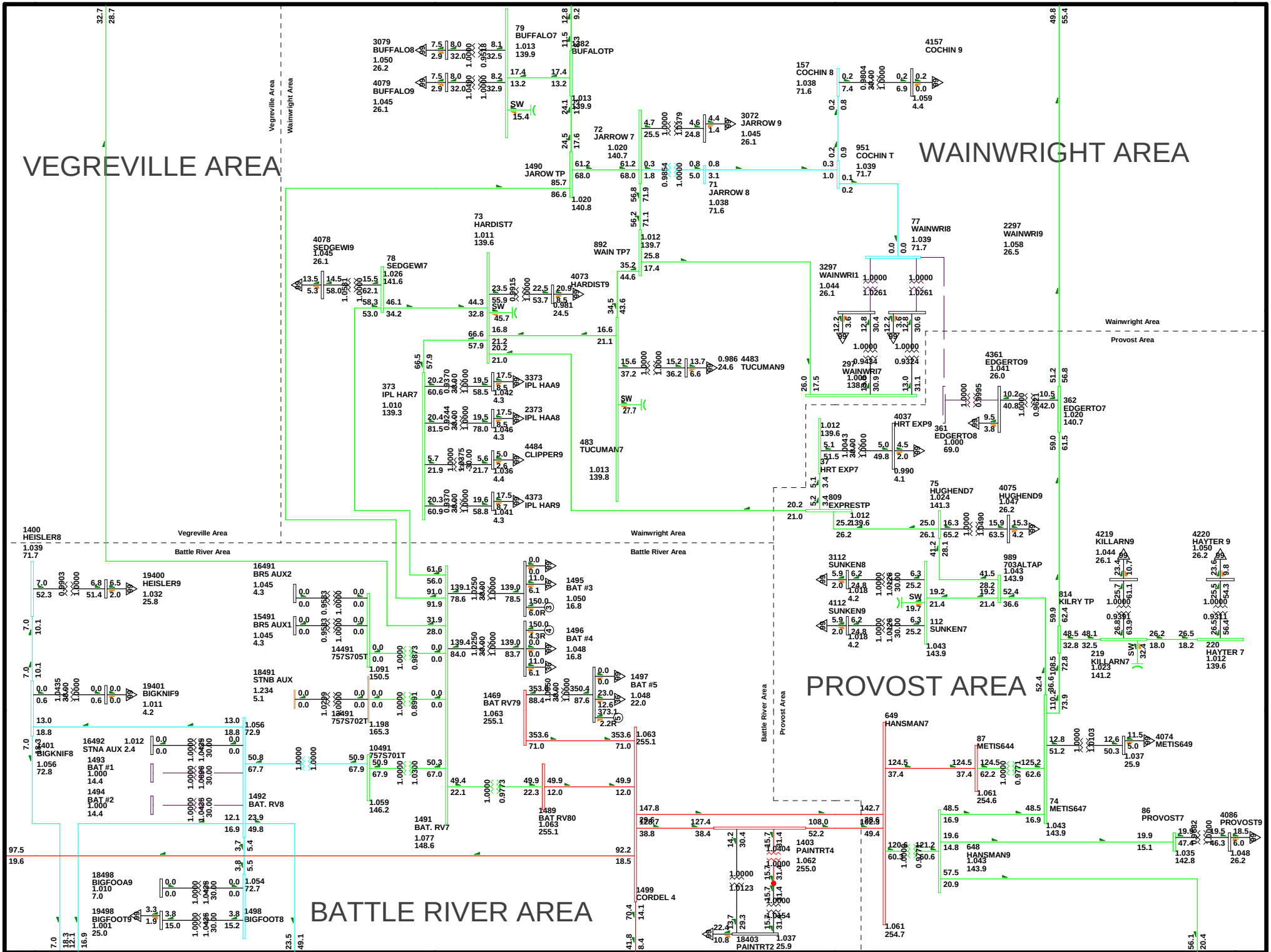
FRI, MAR 27 2009 13:07



TASMO MODEL; OUTPUT GENERATED 2008-08-11 15:22:22
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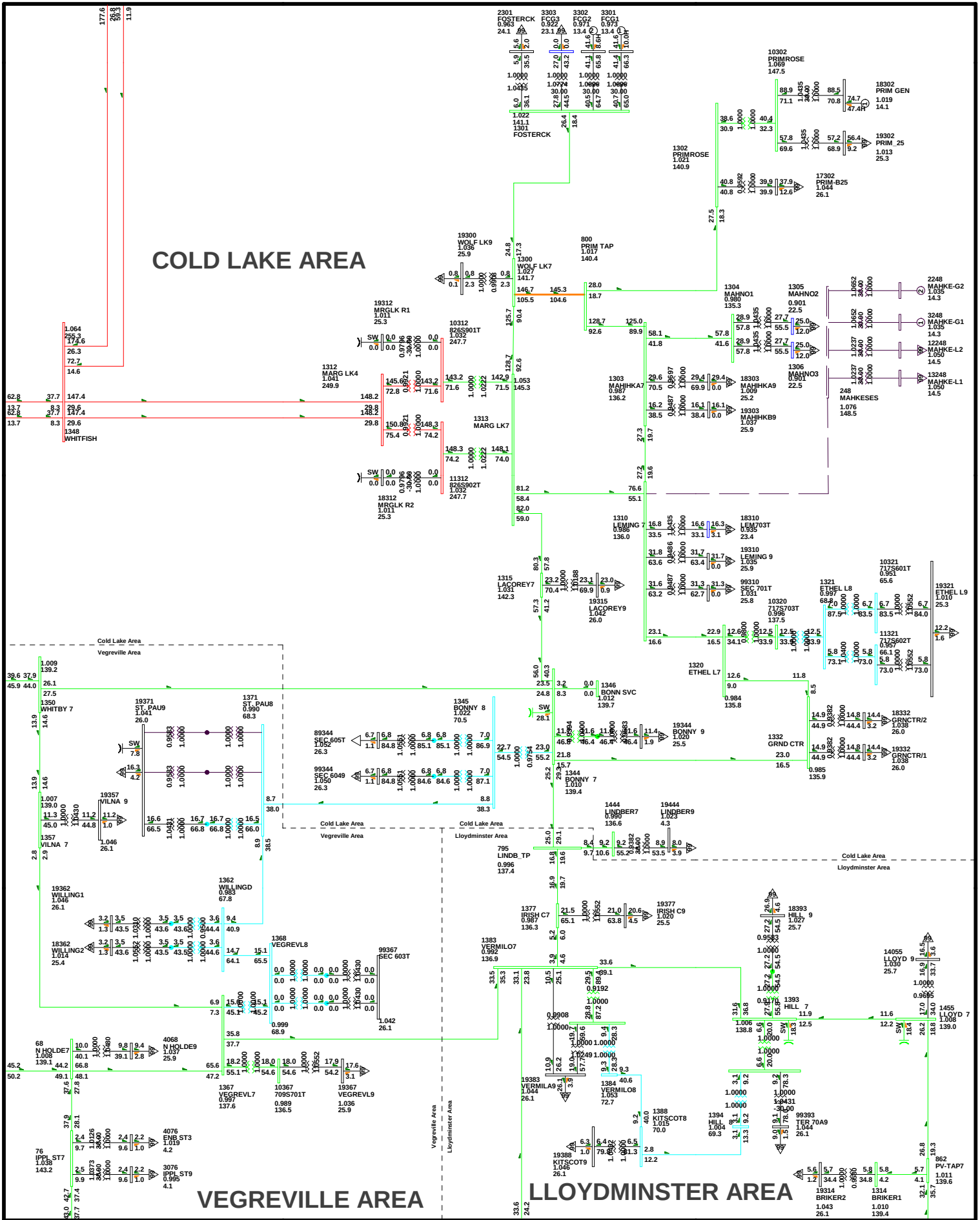
FRI, MAR 27 2009 13:07

Figure A-2009-12-b



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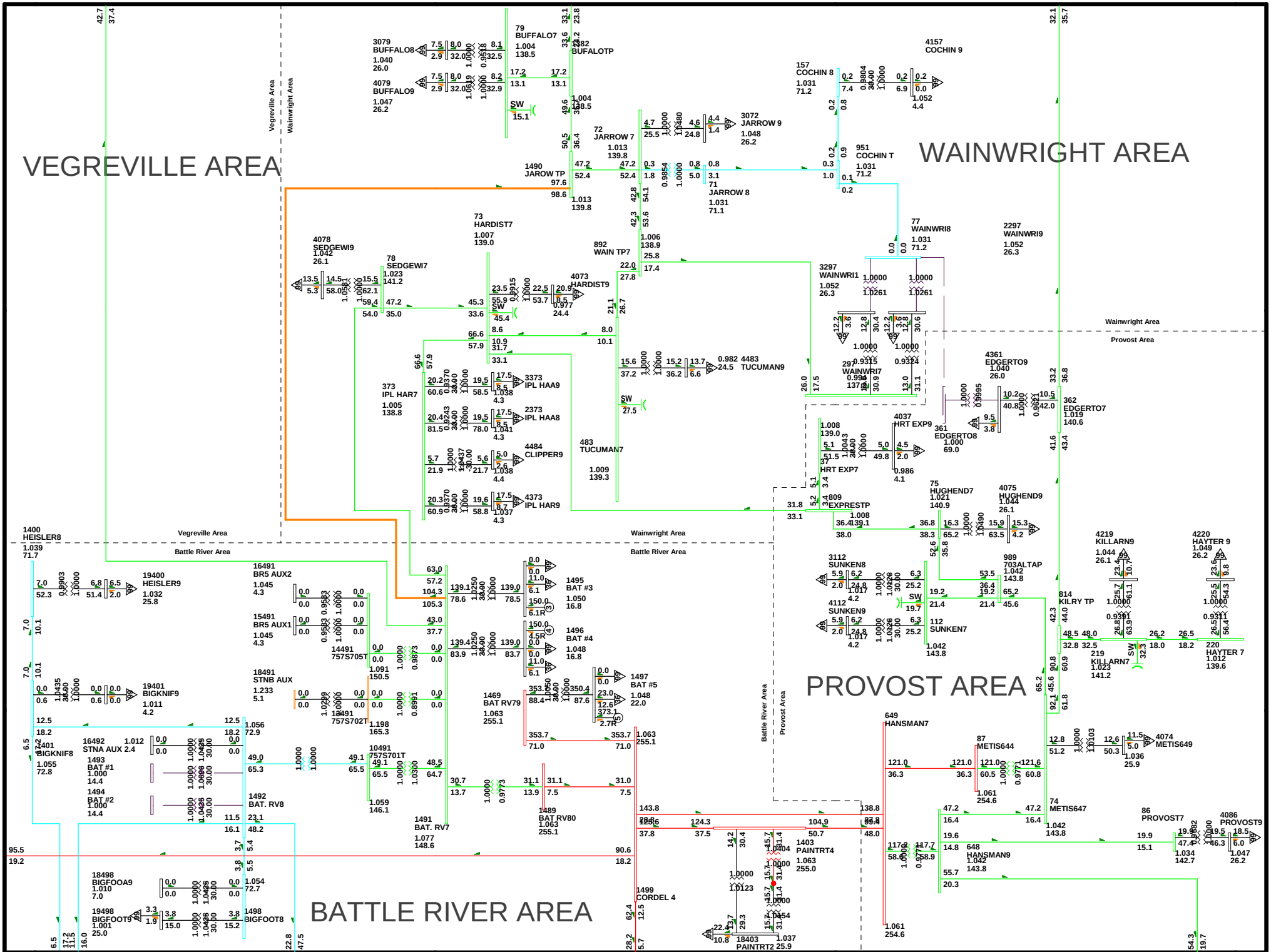
FRI, MAR 27 2009 12:52

Figure A-2009-16-a



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FRI, MAR 27 2009 12:53

Figure A-2009-16-b

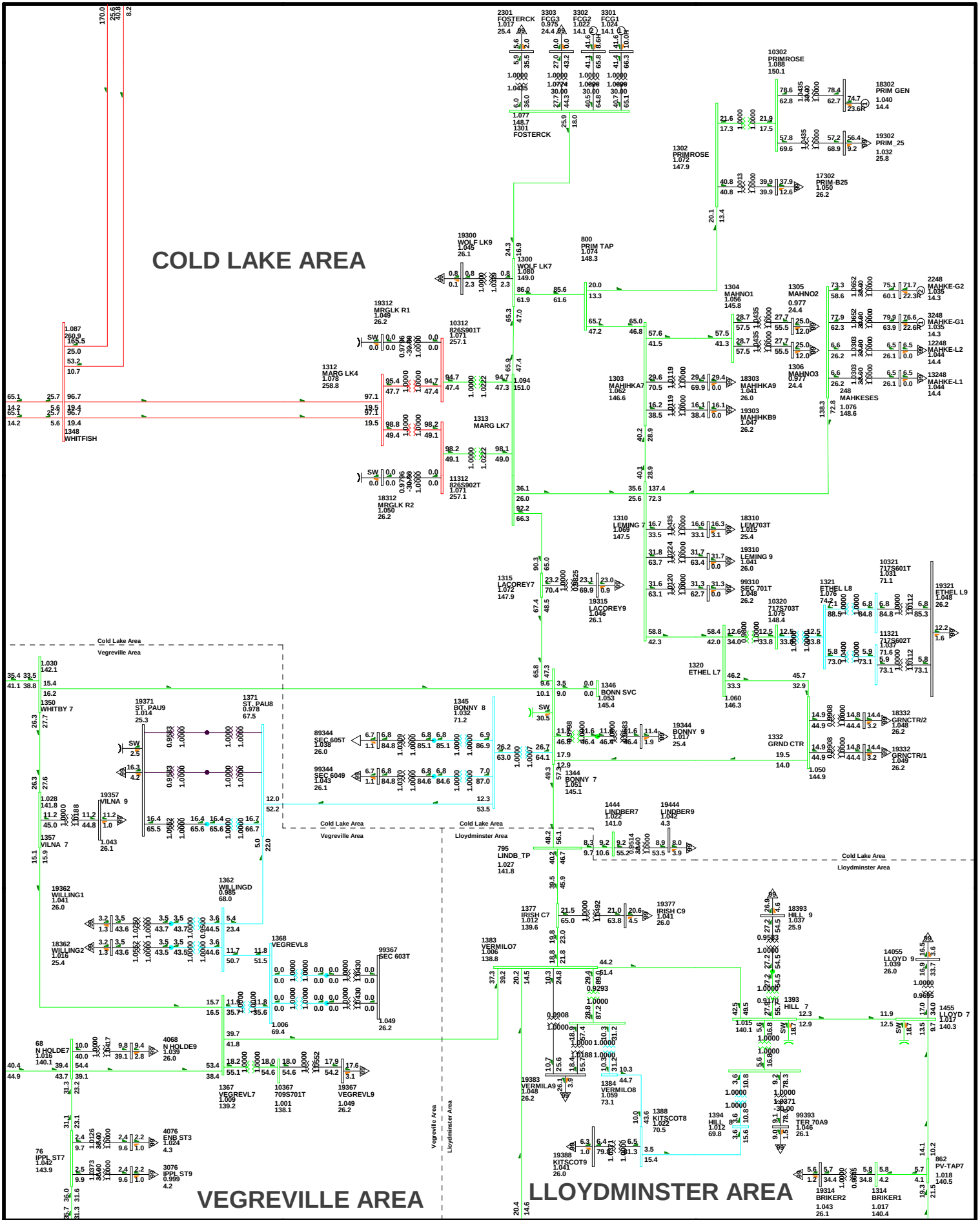

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Figure A-2009-17-a

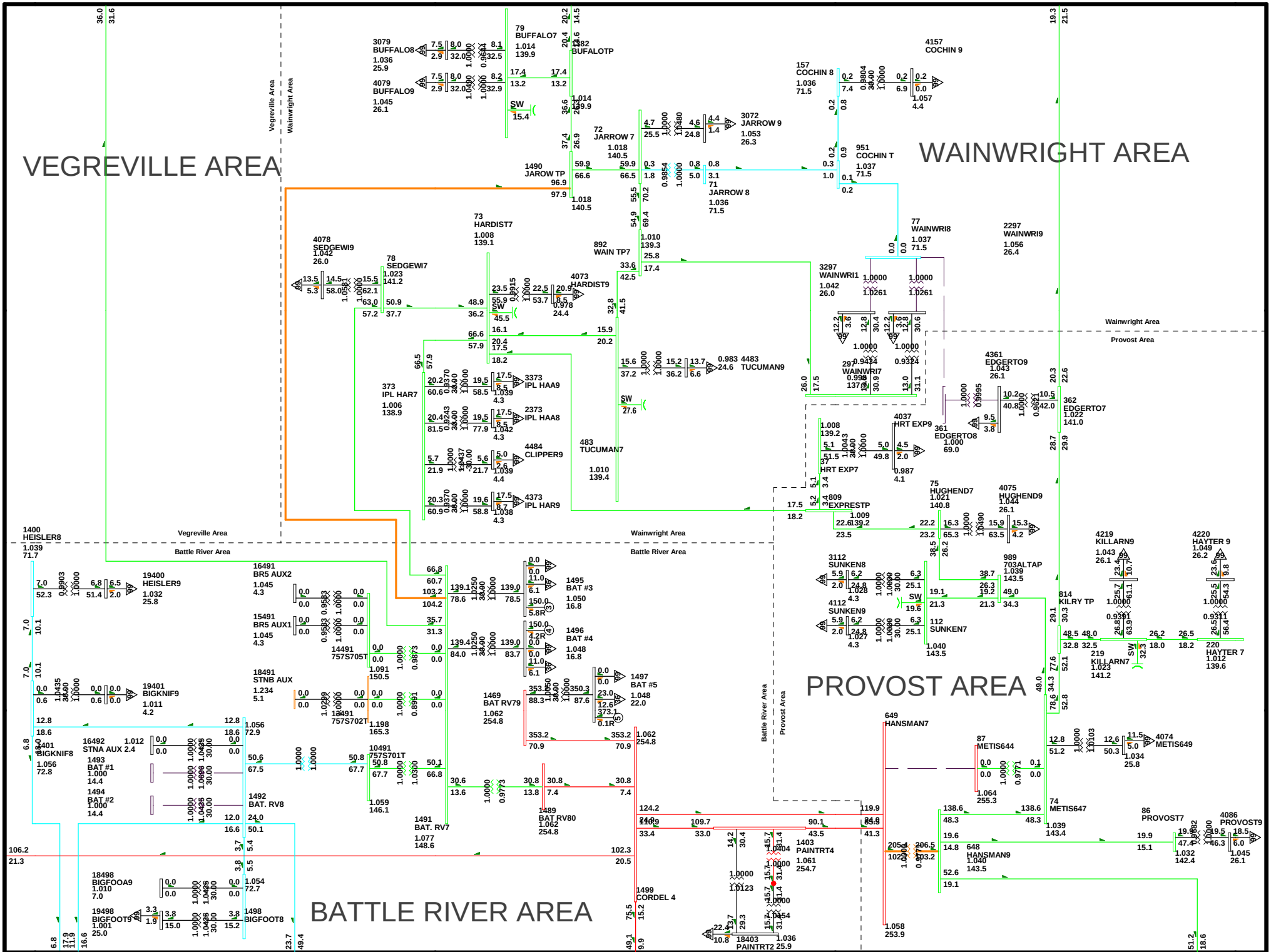

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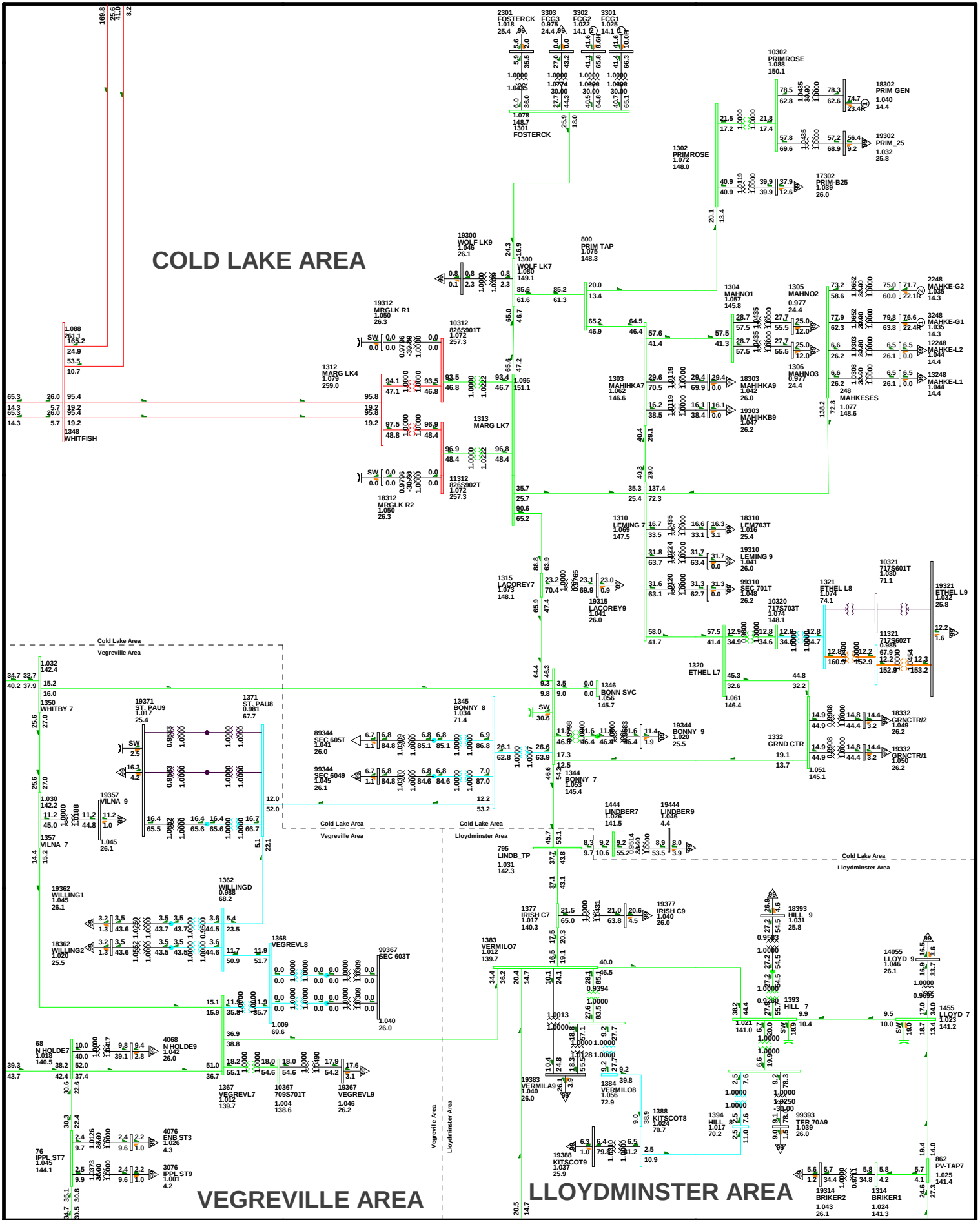
Figure A-2009-17-b



TASMO MODEL; OUTPUT GENERATED 2008-08-11 15:22:22
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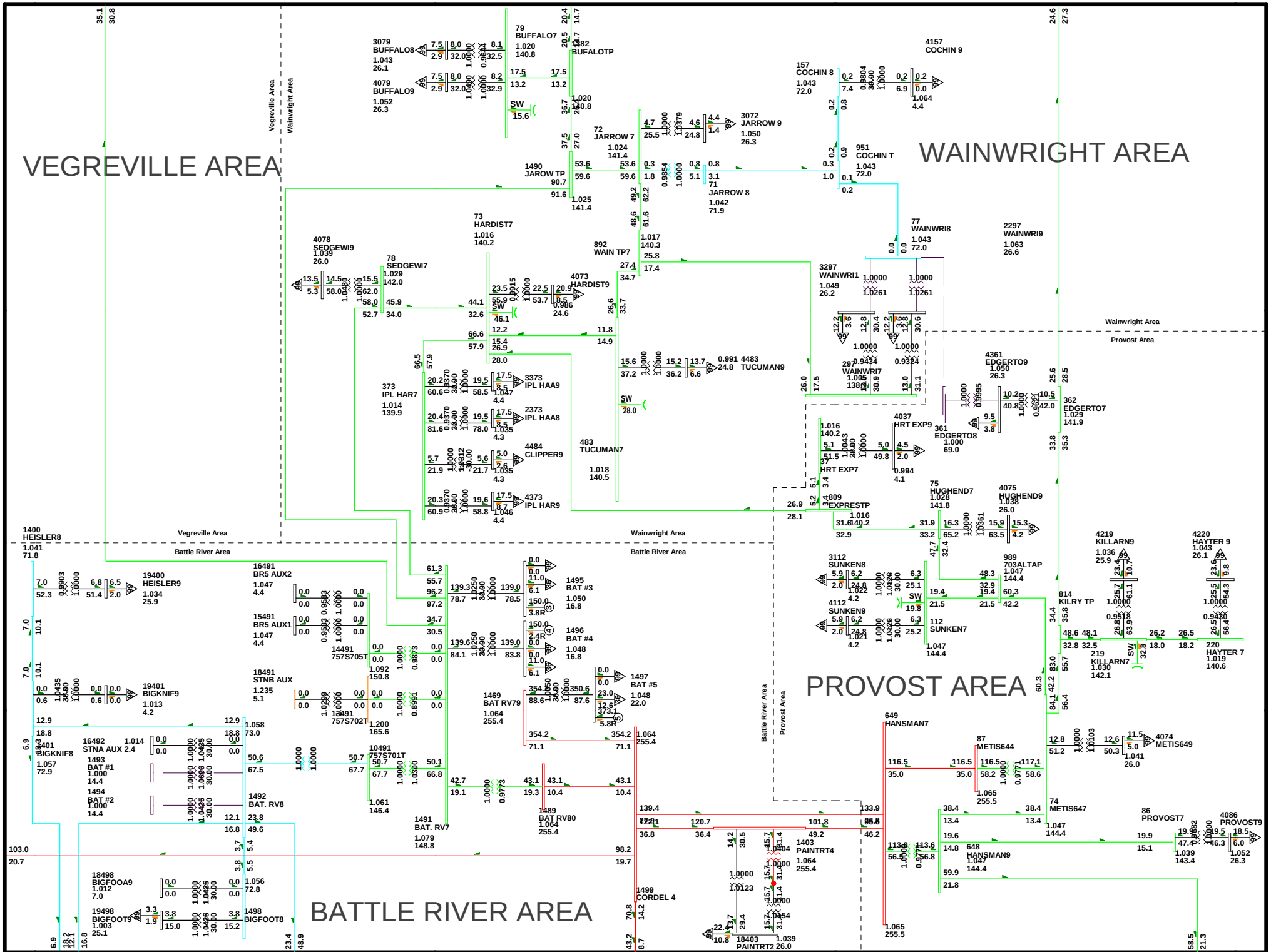
FRI, MAR 27 2009 10:48

Figure A-2009-20-a



TASMO MODEL; OUTPUT GENERATED 2008-08-11 15:22:22
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Figure A-2009-20-b

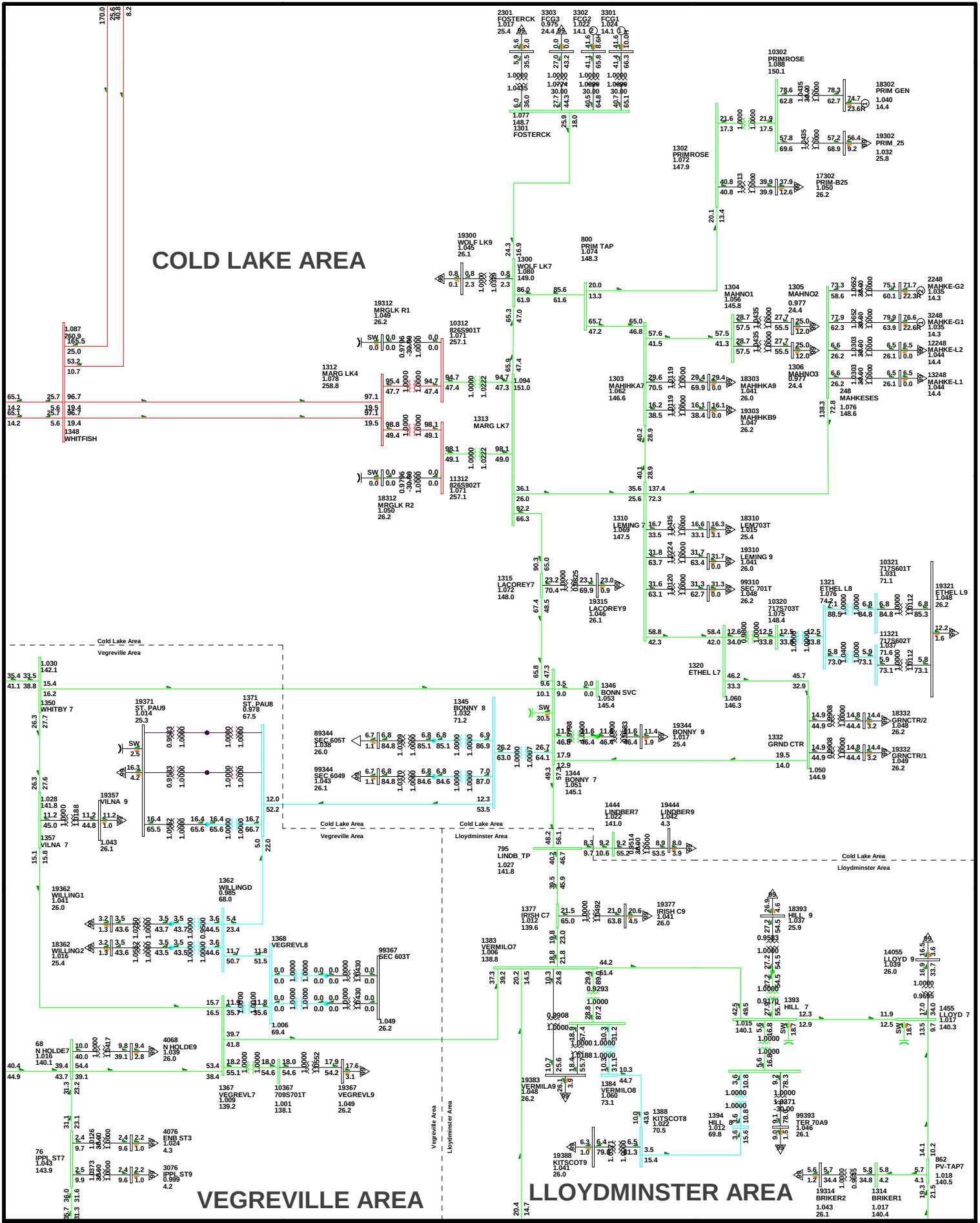

Figure A-2009-22-a

TASMO MODEL; OUTPUT GENERATED 2008-08-11 15:22:22
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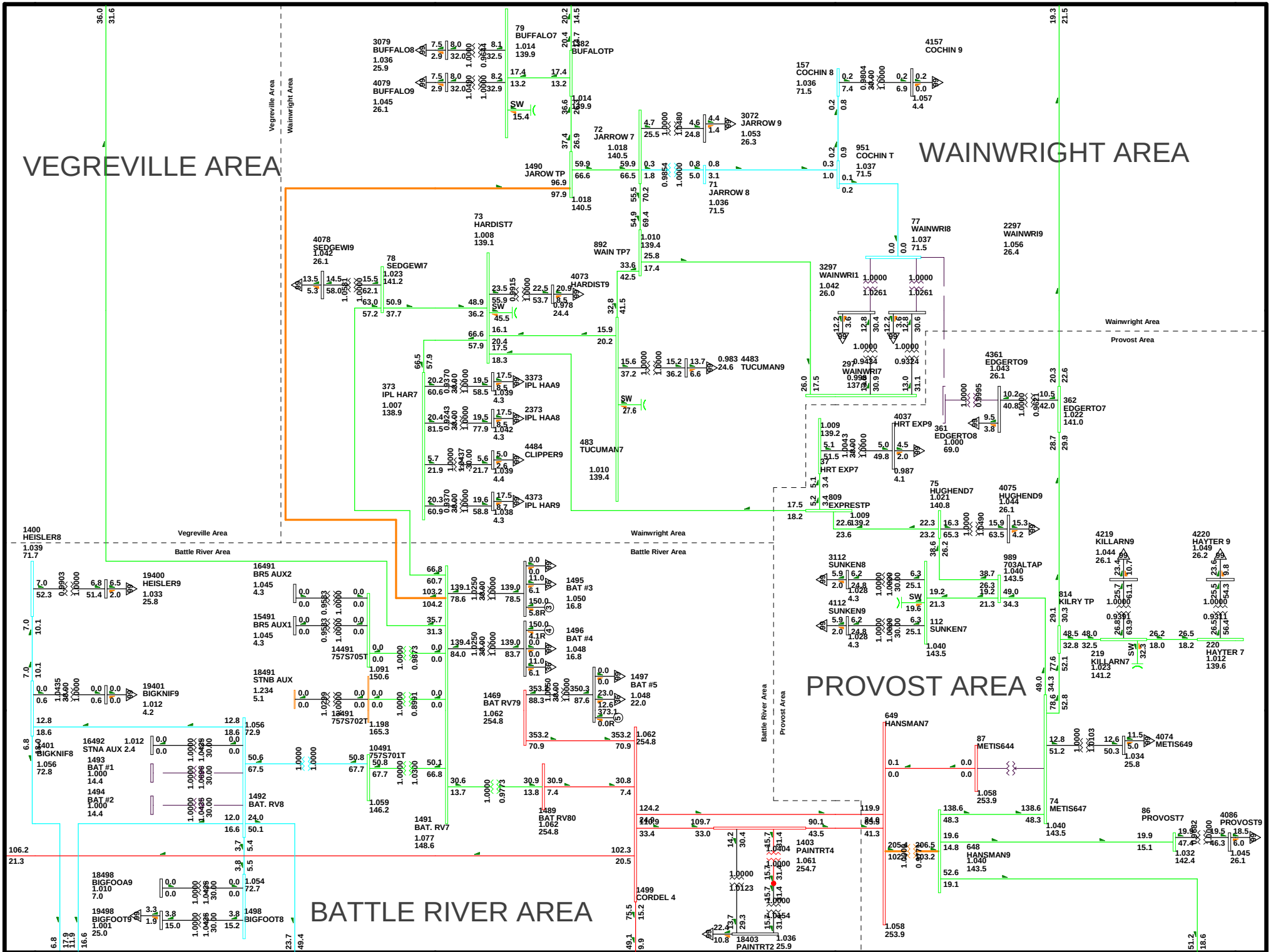
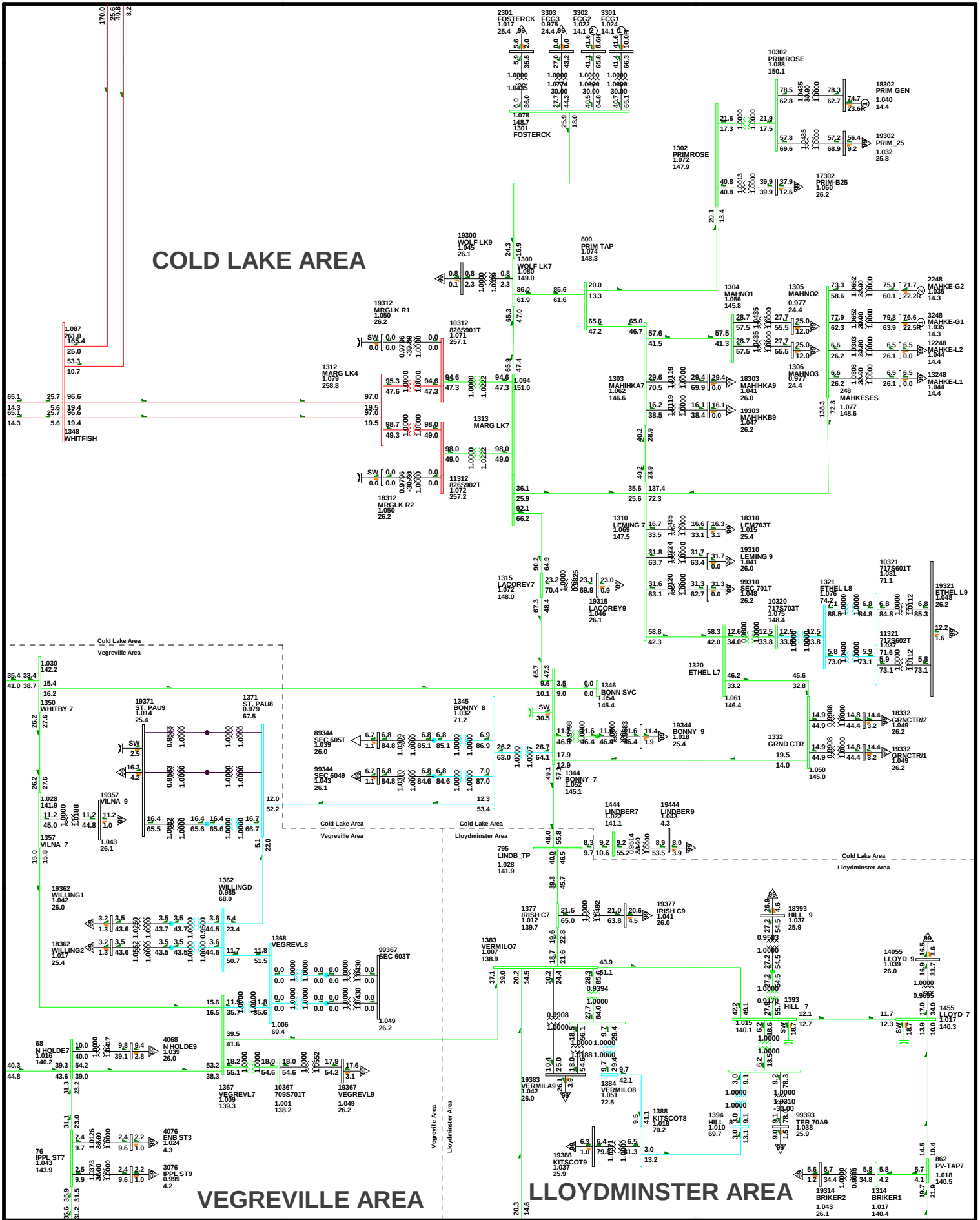
FRI, MAR 27 2009 13:30



TASMO MODEL; OUTPUT GENERATED 2008-08-11 15:22:22
SWINGBUS 1520 FOR FC-2007-4:2010-04-02:18:44--1--1-0-0
FRI, MAR 27 2009 13:31

Figure A-2009-22-b



TASMO MODEL; OUTPUT GENERATED 2008-08-11 15:22:22
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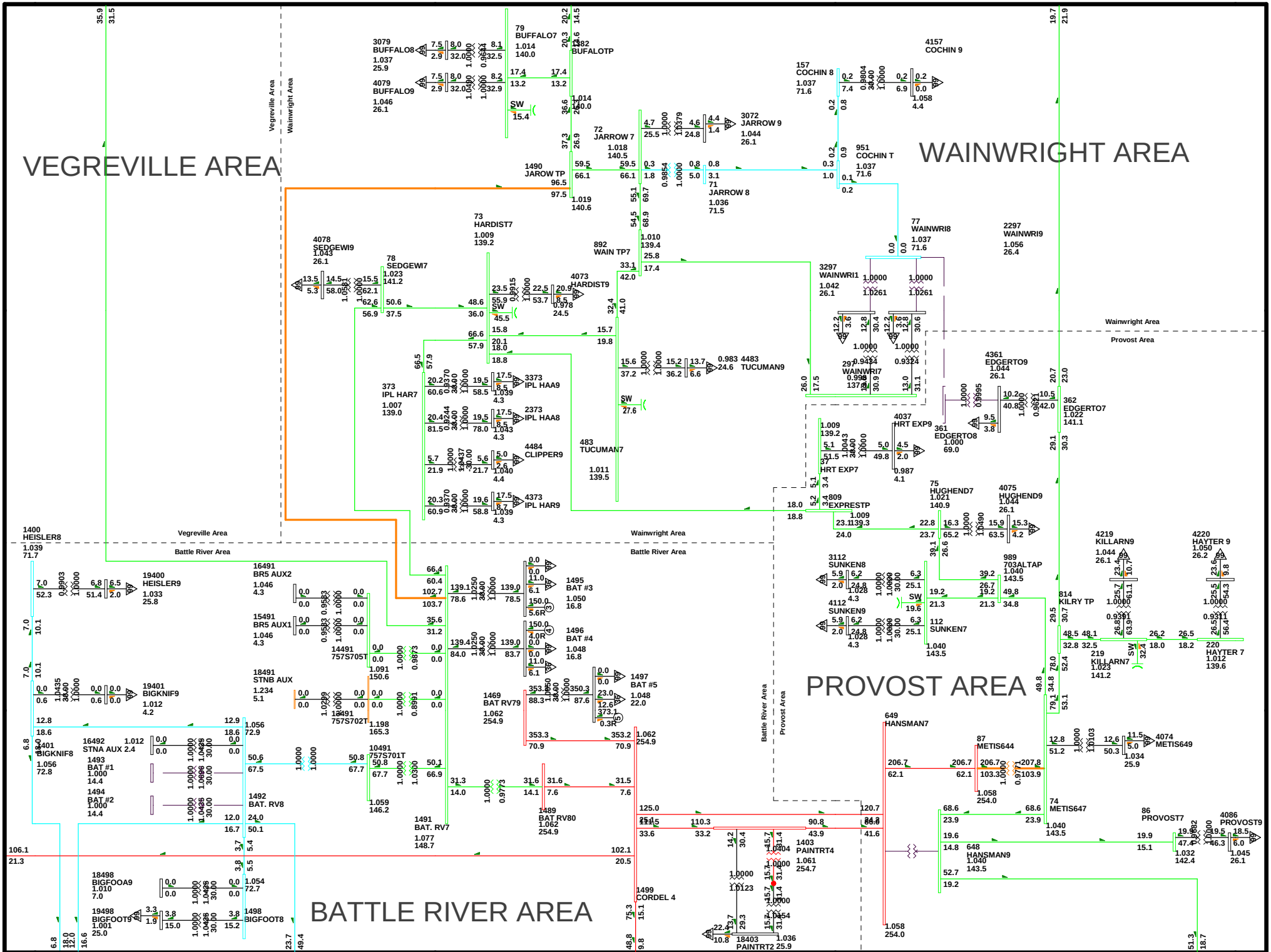
FRI, MAR 27 2009 13:31

Figure A-2009-24-a



TASMO MODEL; OUTPUT GENERATED 2008-08-11 15:22:22
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FRI, MAR 27 2009 13:32

Figure A-2009-24-b

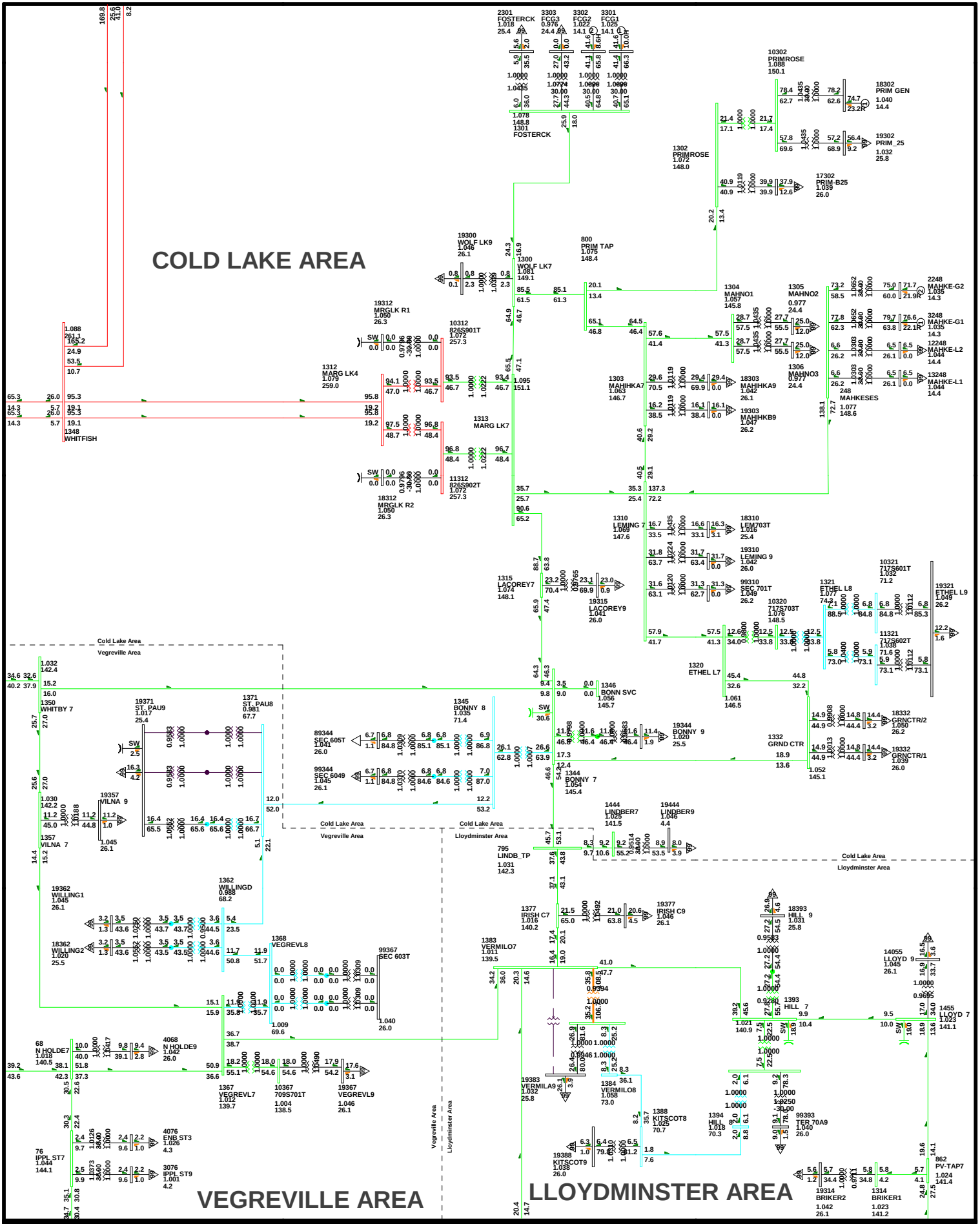

Figure A-2009-25-a

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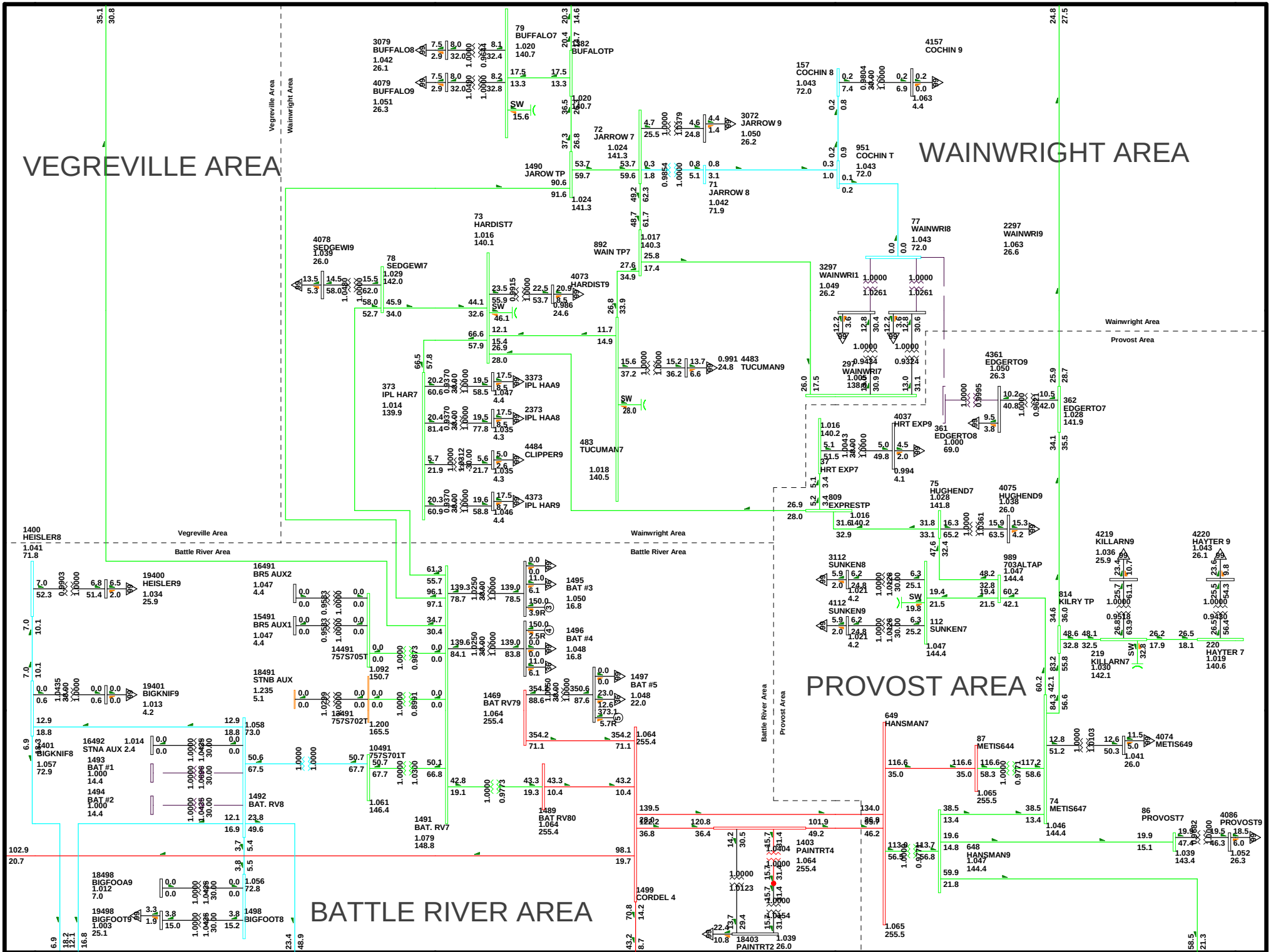
FRI, MAR 27 2009 13:12



TASMO MODEL; OUTPUT GENERATED 2008-08-11 15:22:22
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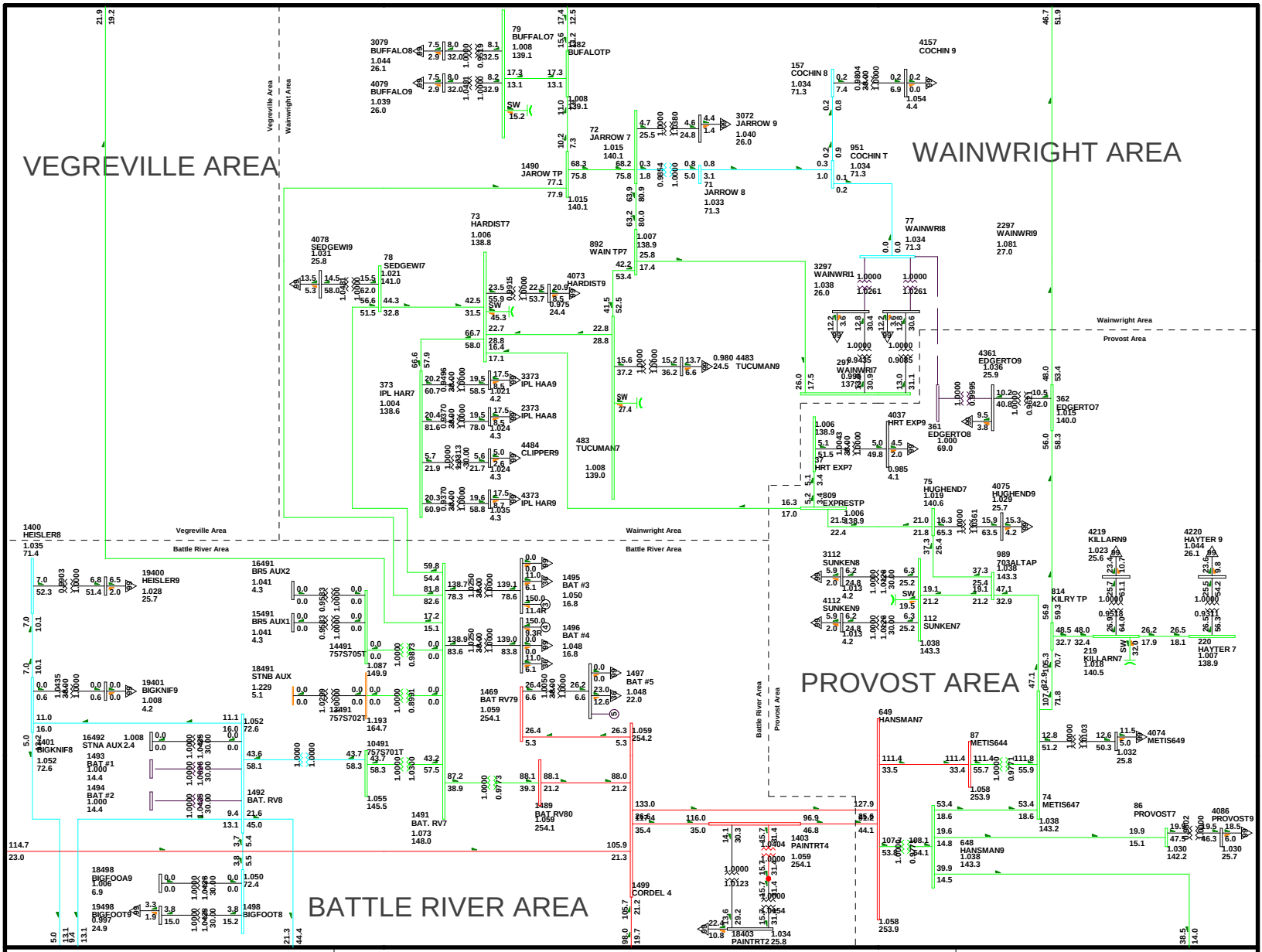
FRI, MAR 27 2009 13:13

Figure A-2009-25-b



TASMO MODEL; OUTPUT GENERATED 2008-08-11 15:22:22
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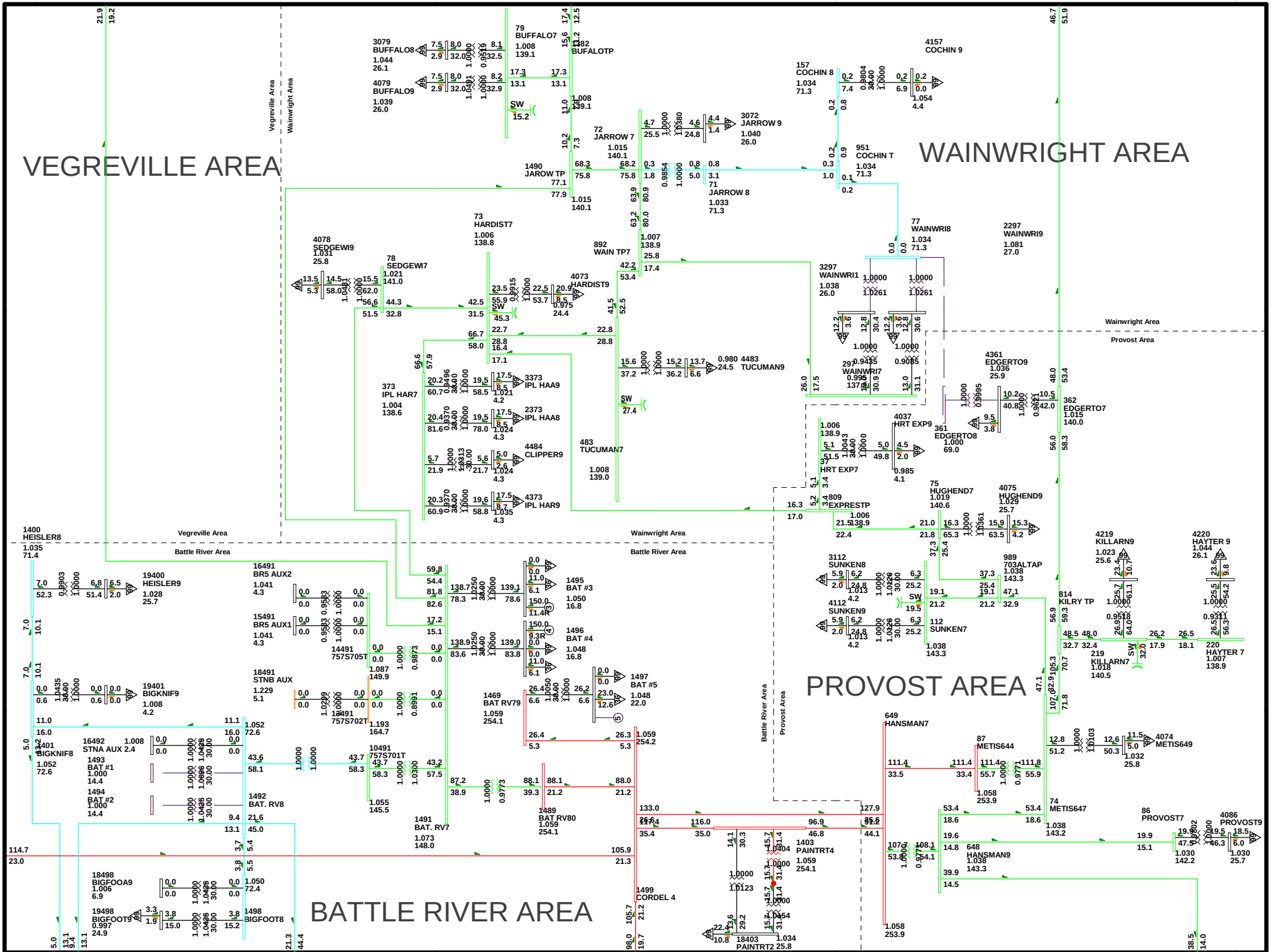
FRI, MAR 27 2009 13:09

Figure A-2009-44-a



TASMO MODEL; OUTPUT GENERATED 2008-08-11 15:22:22
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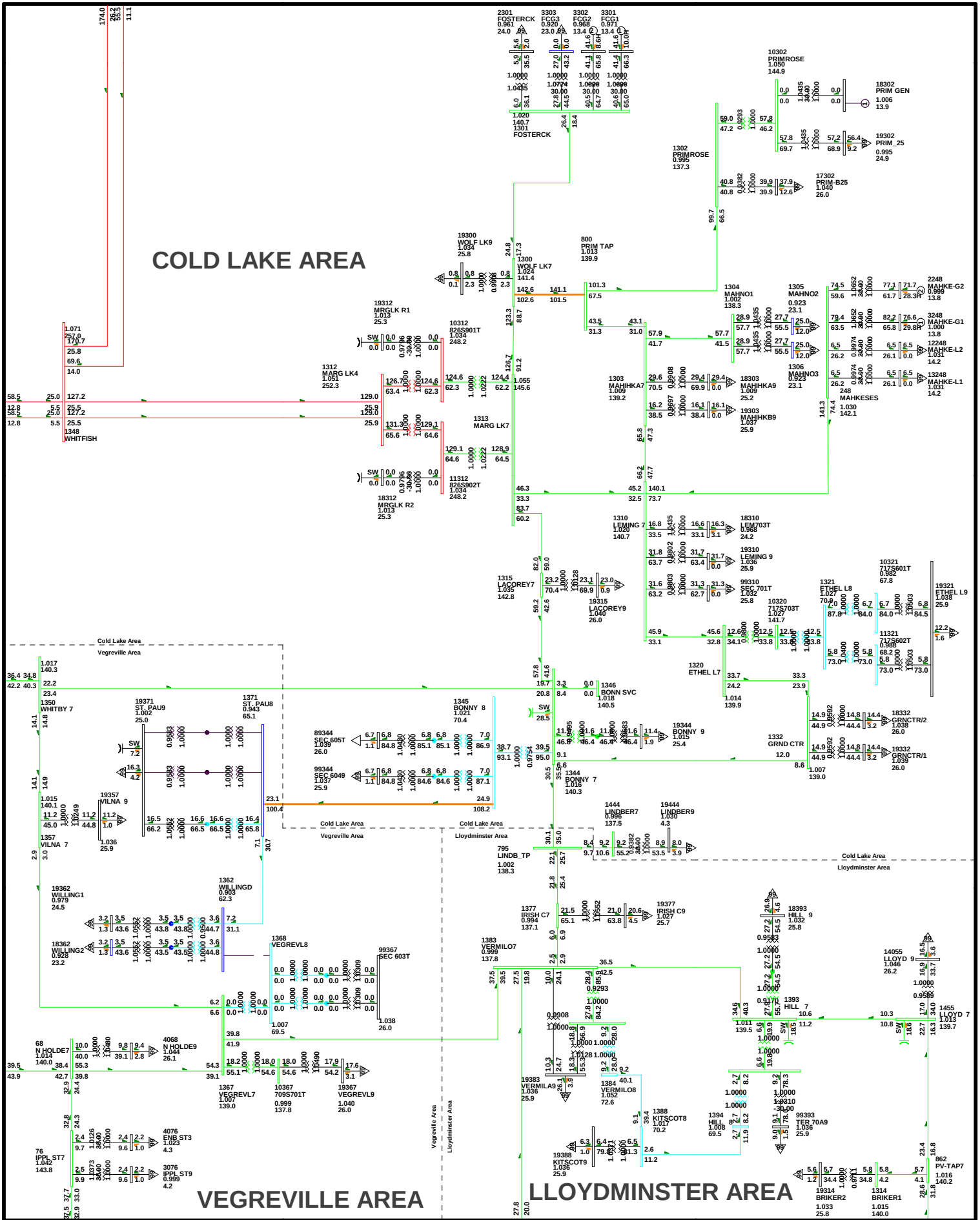
FRI, MAR 27 2009 13:09

Figure A-2009-44-b



TASMO MODEL; OUTPUT GENERATED 2008-08-11 15:22:22
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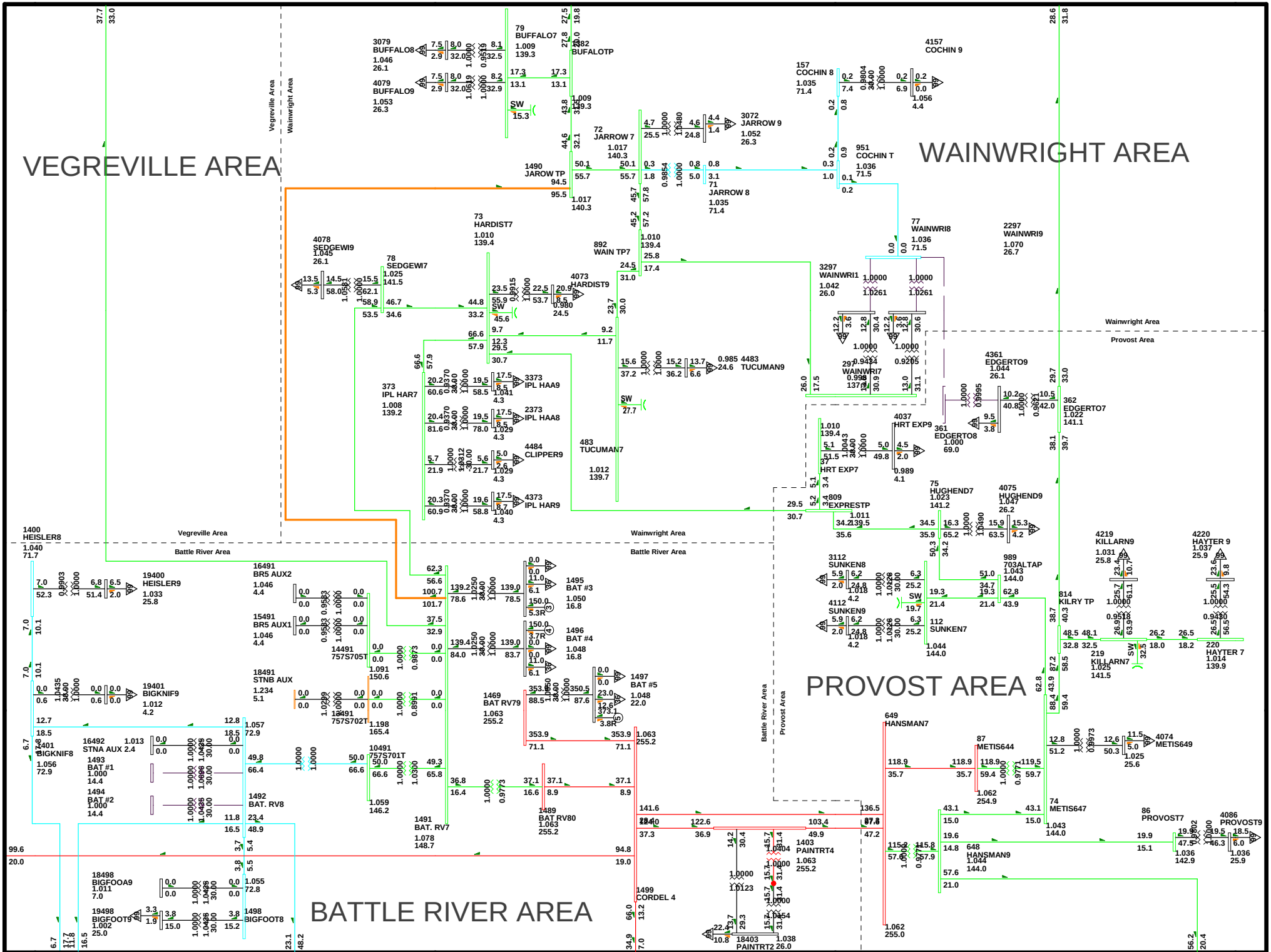
FRI, MAR 27 2009 10:44

Figure A-2009-45-a



TASMO MODEL; OUTPUT GENERATED 2008-08-11 15:22:22
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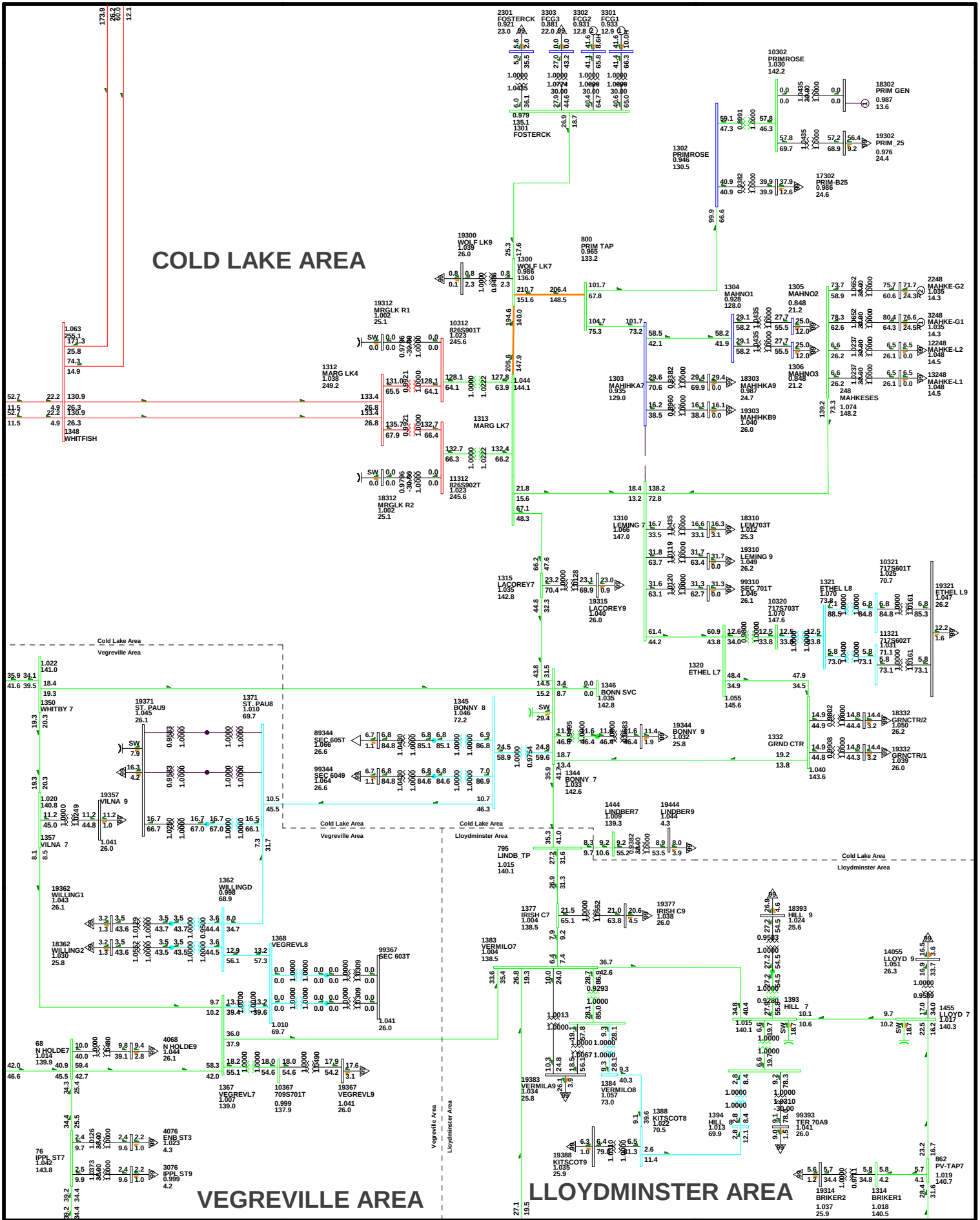
FRI, MAR 27 2009 10:45

Figure A-2009-45-b



TASMO MODEL; OUTPUT GENERATED 2008-08-11 15:22:22
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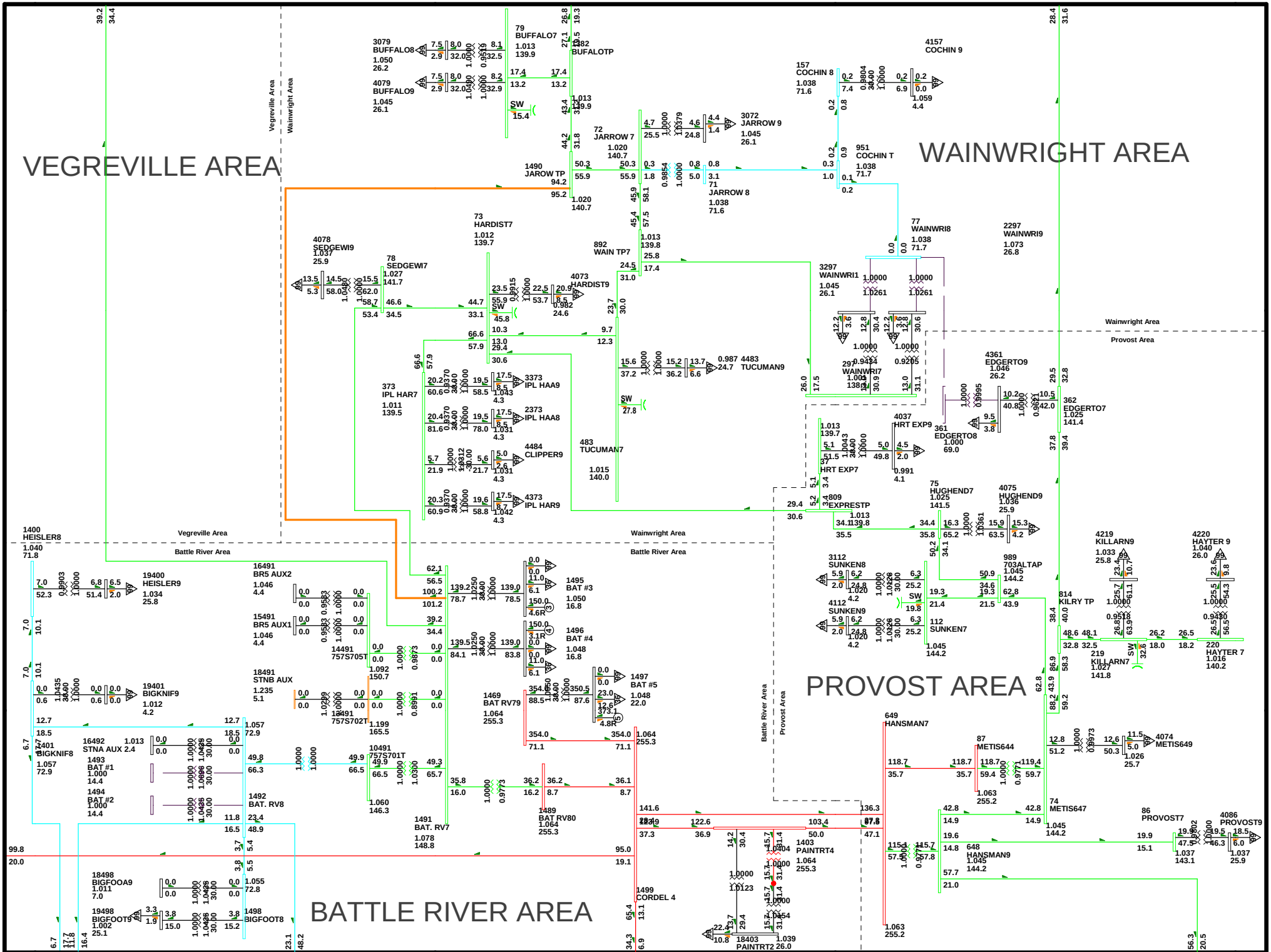
Figure A-2009-51-a



TASMO MODEL; OUTPUT GENERATED 2008-08-11 15:22:22
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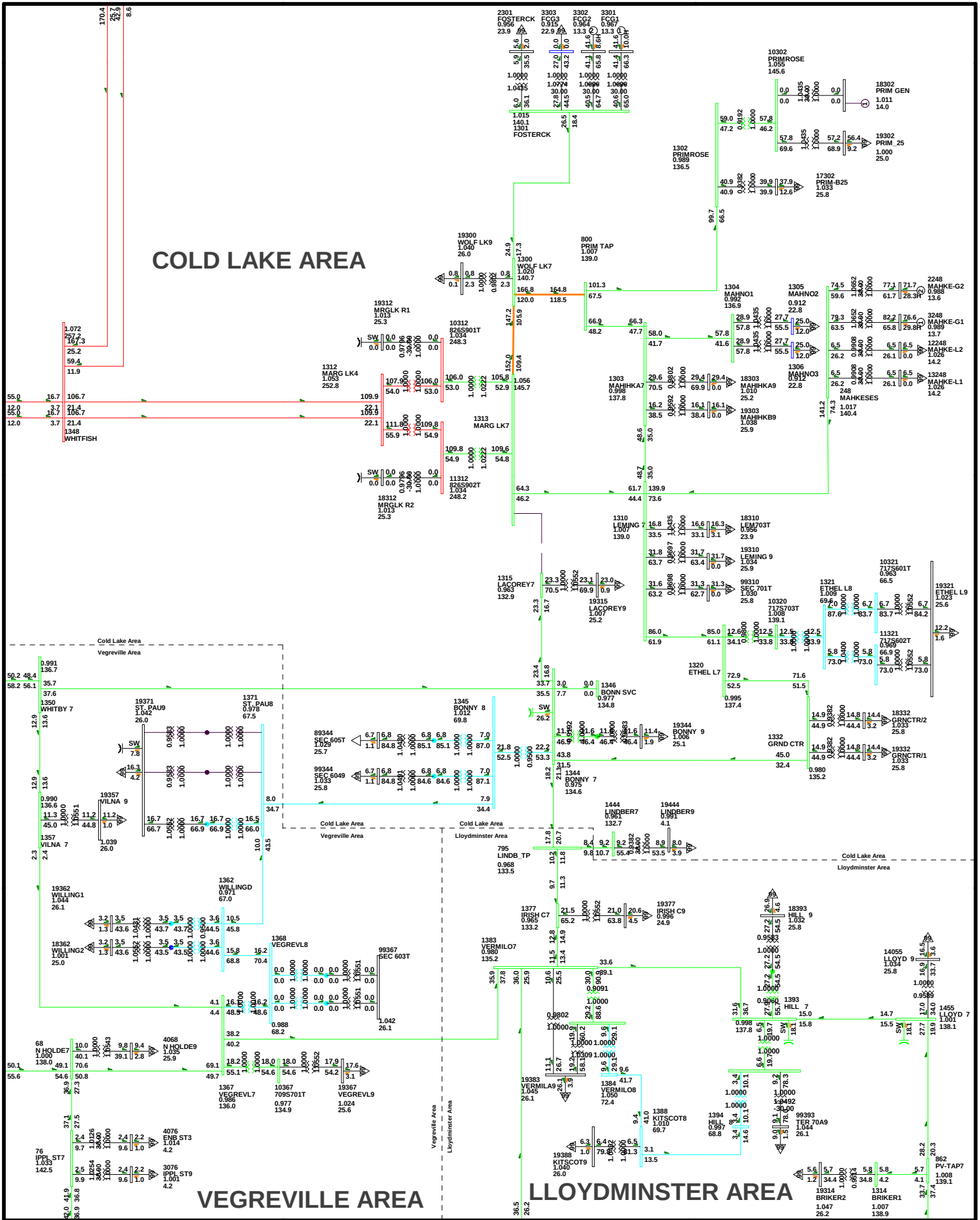
FRI, MAR 27 2009 10:58

Figure A-2009-51-b



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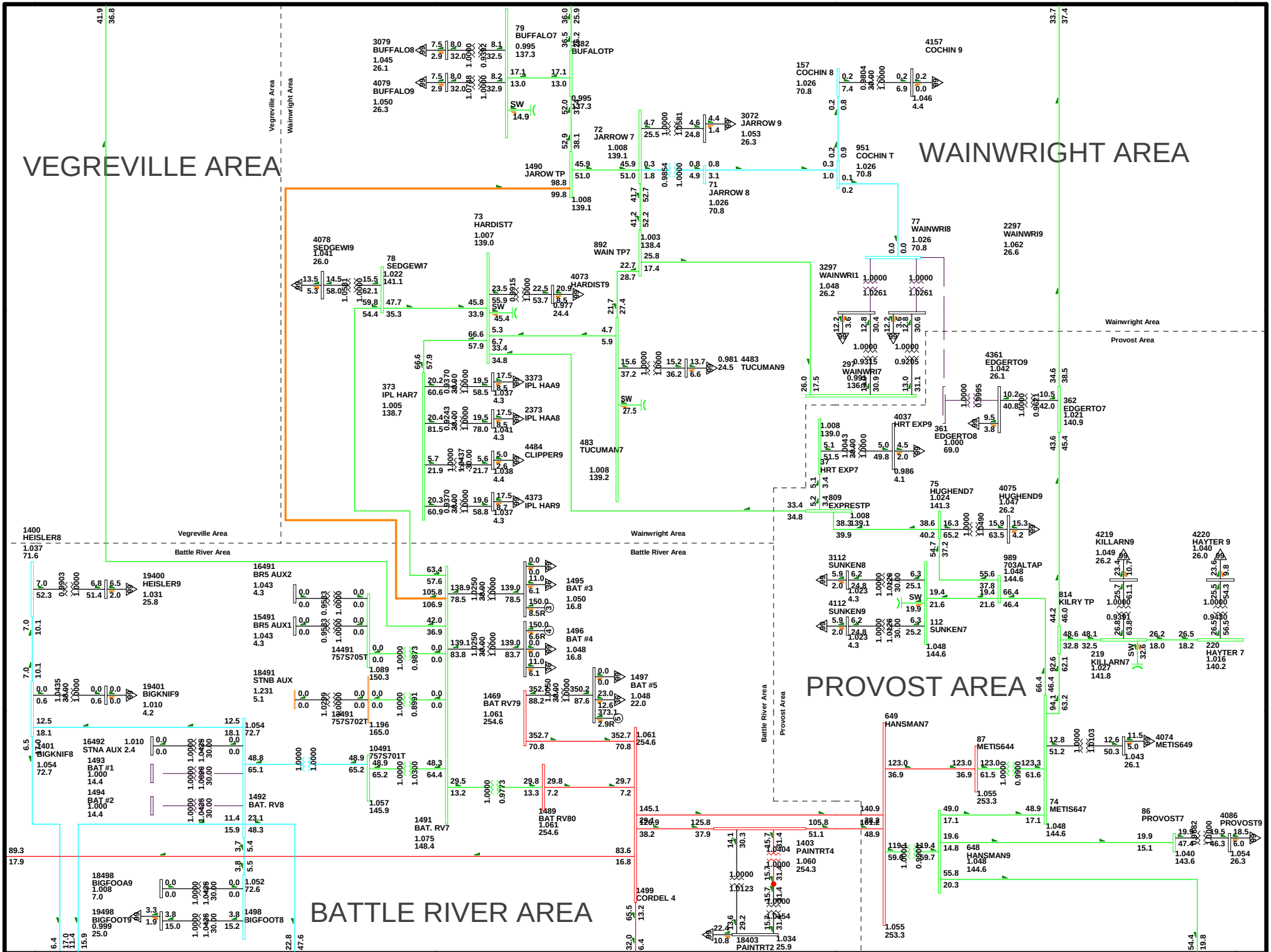
FRI, MAR 27 2009 12:04

Figure A-2009-52-a



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FRI, MAR 27 2009 12:05

Figure A-2009-52-b

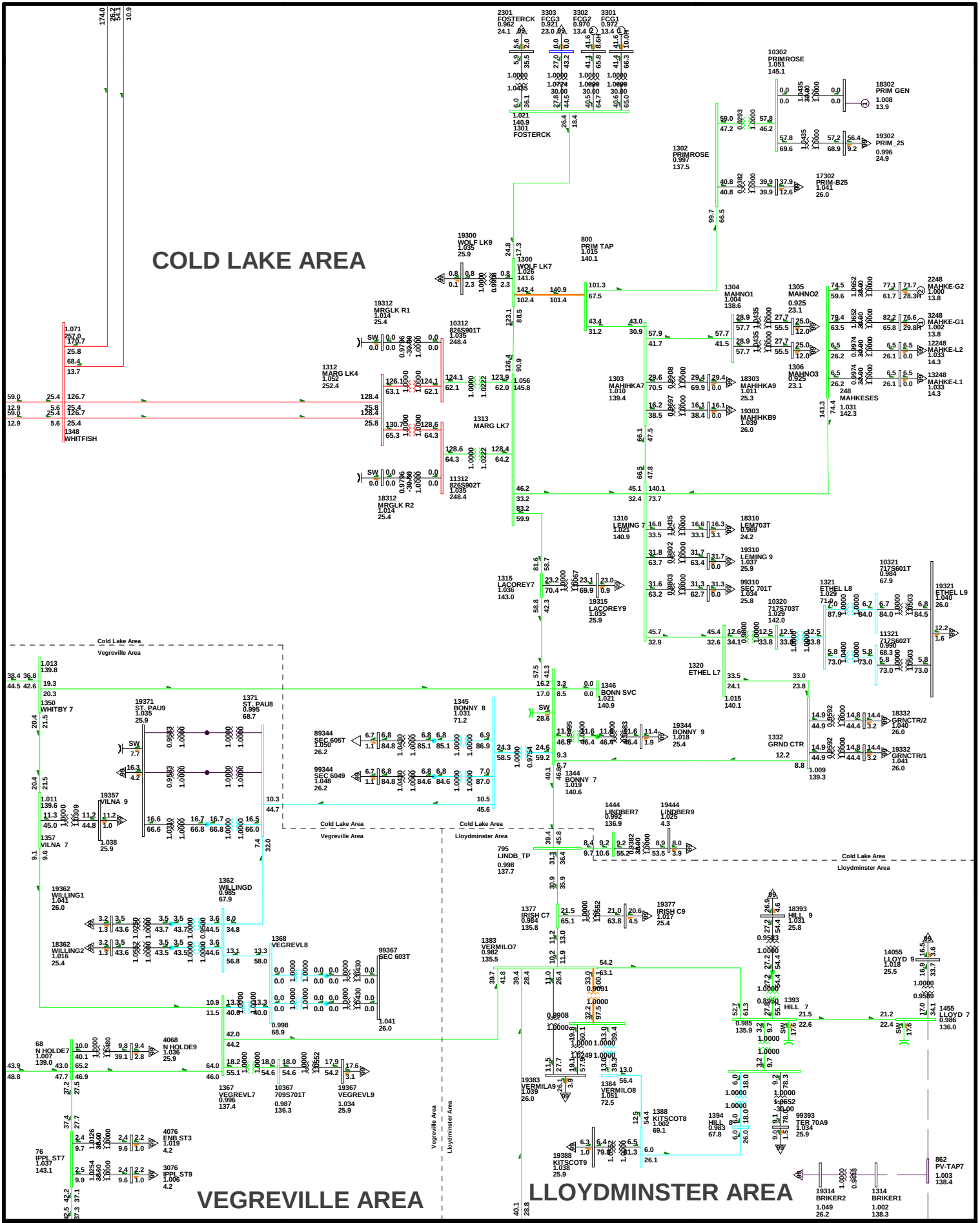

Figure A-2009-59-a

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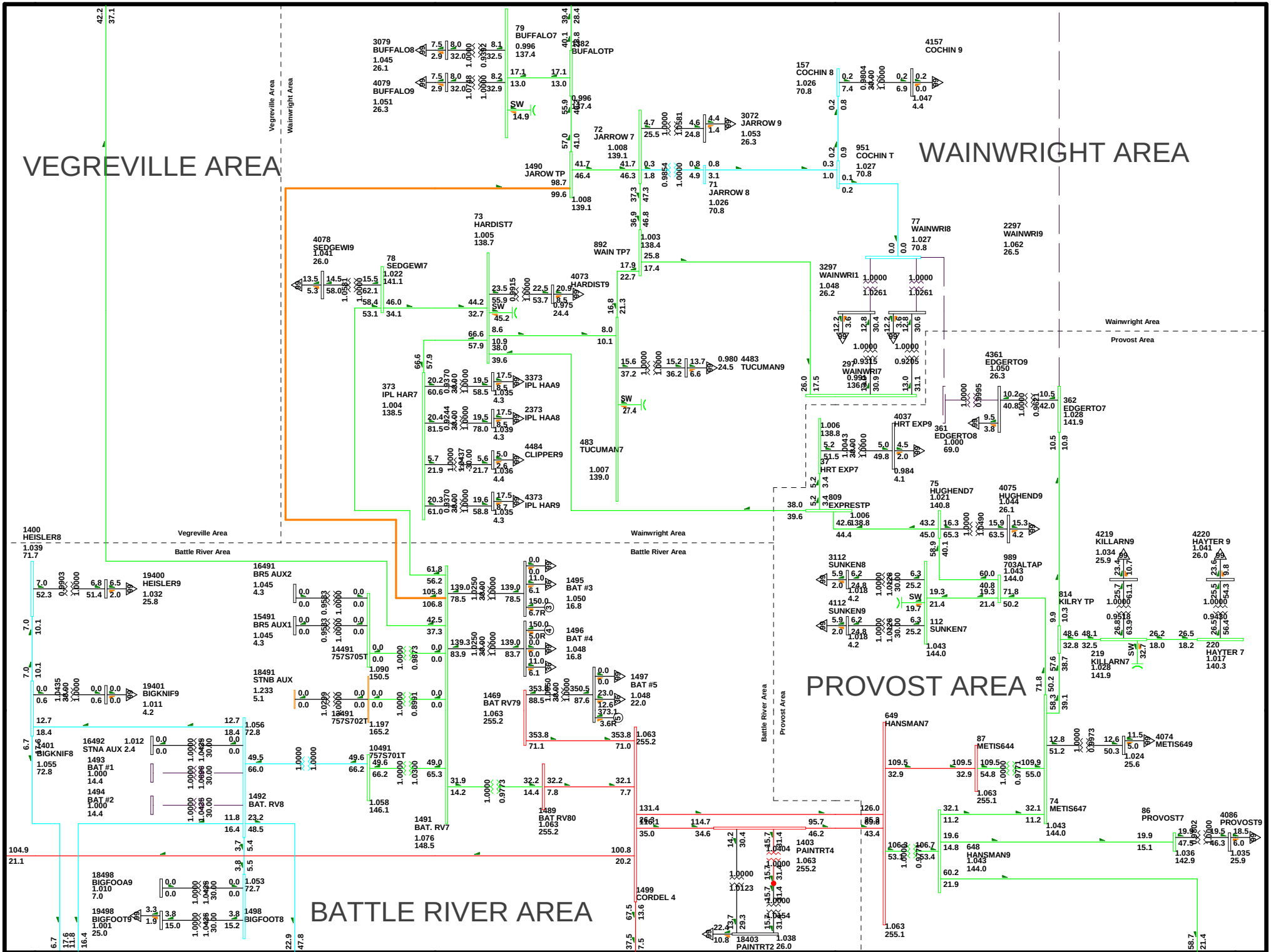
FRI, MAR 27 2009 13:24



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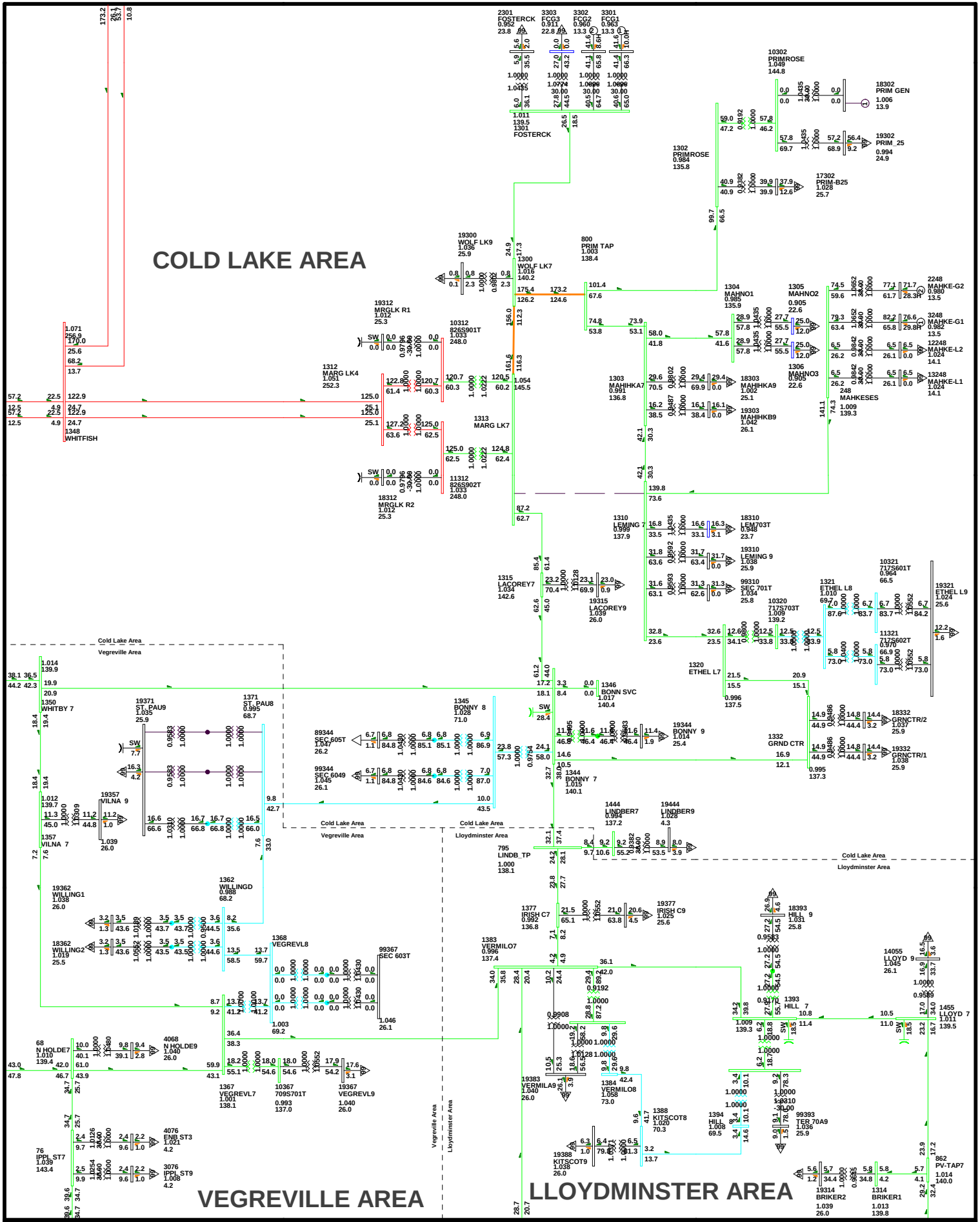
FRI, MAR 27 2009 13:25

Figure A-2009-59-b



TASMO MODEL; OUTPUT GENERATED 2008-08-11 15:22:22
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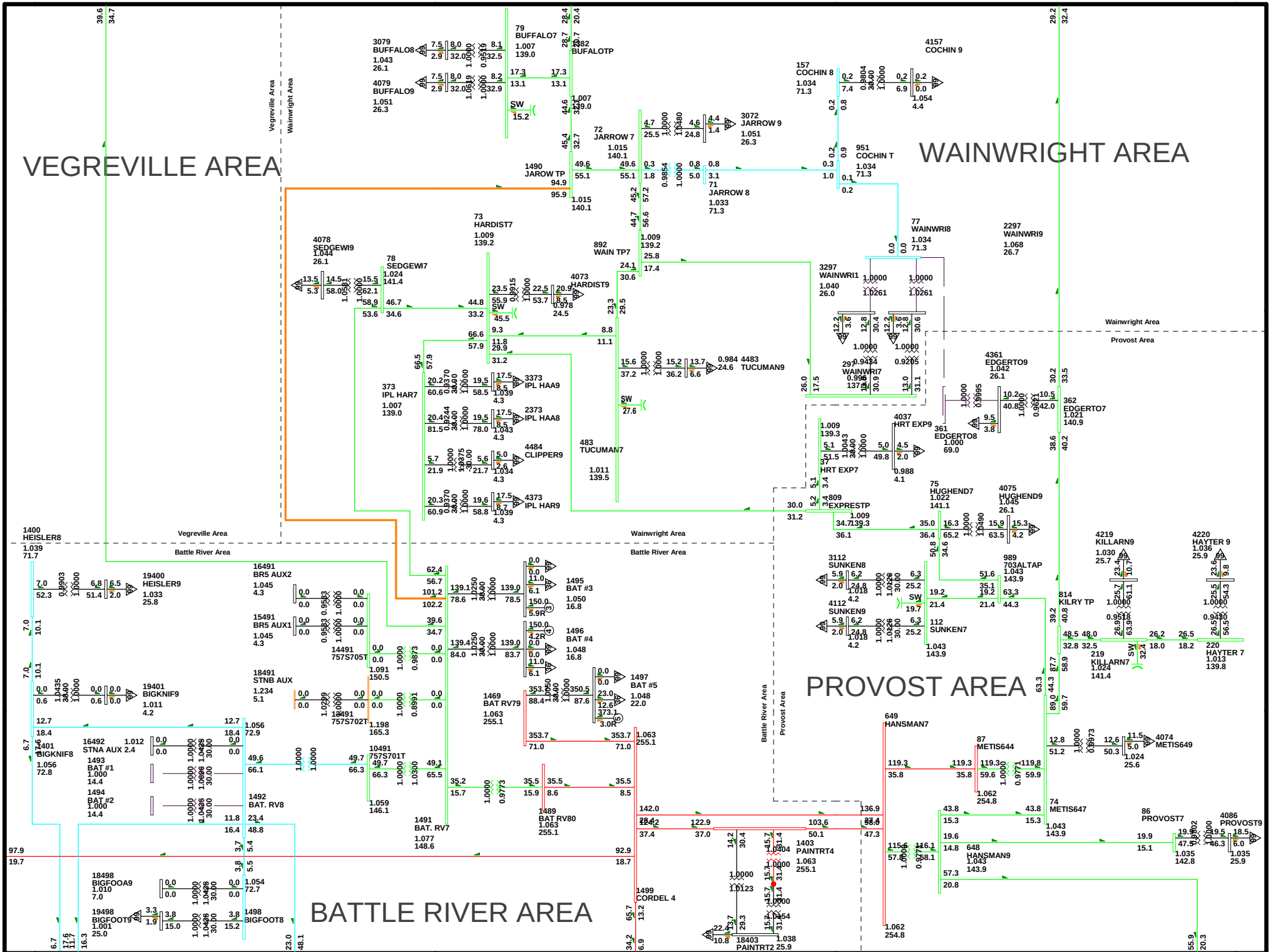
FRI, MAR 27 2009 12:08

Figure A-2009-60-a



TASMO MODEL; OUTPUT GENERATED 2008-08-11 15:22:22
SWINGBUS 1520 FOR FC-2007-4:2010-04-02:18:44--1--1-0-0
FRI, MAR 27 2009 12:08

Figure A-2009-60-b

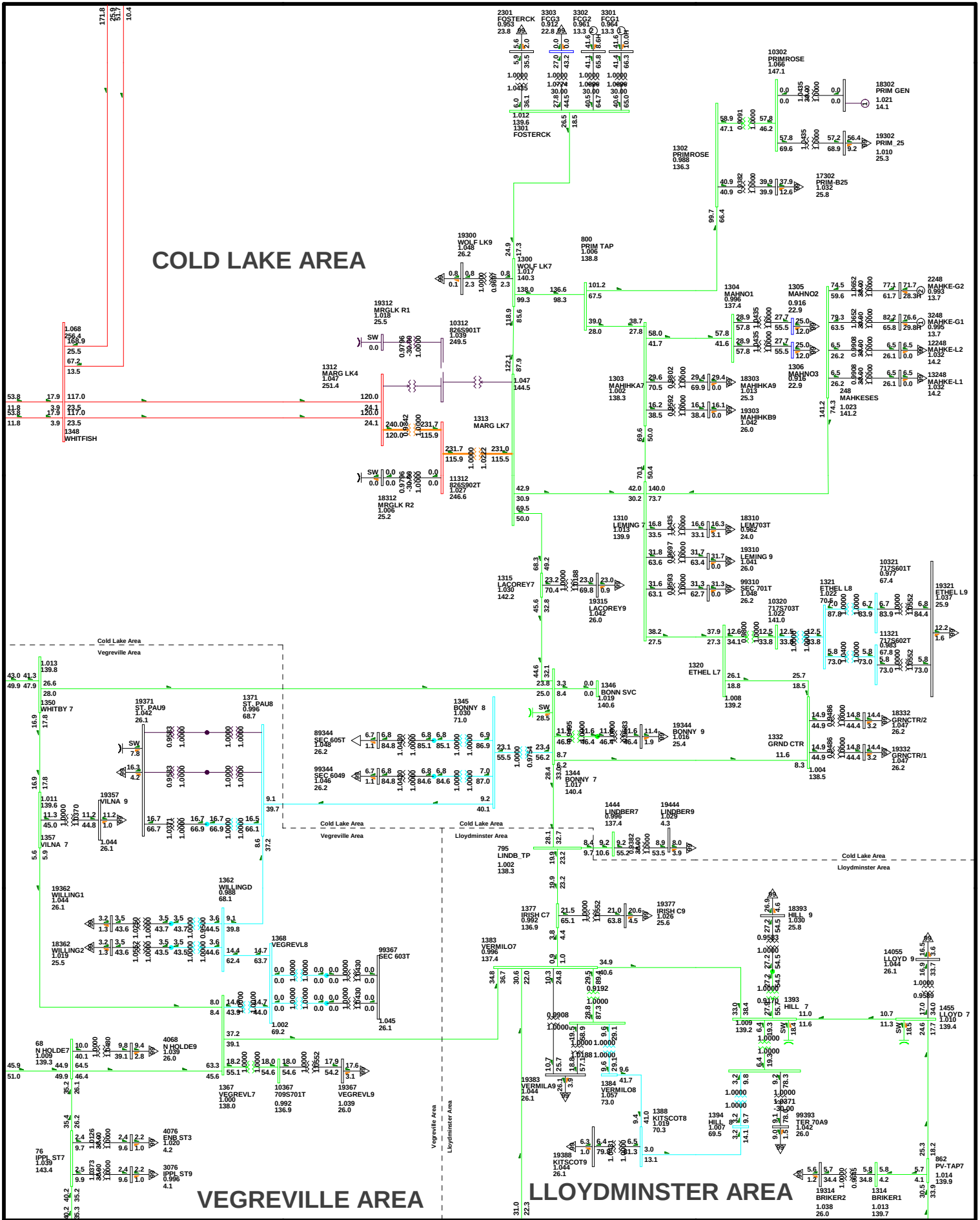
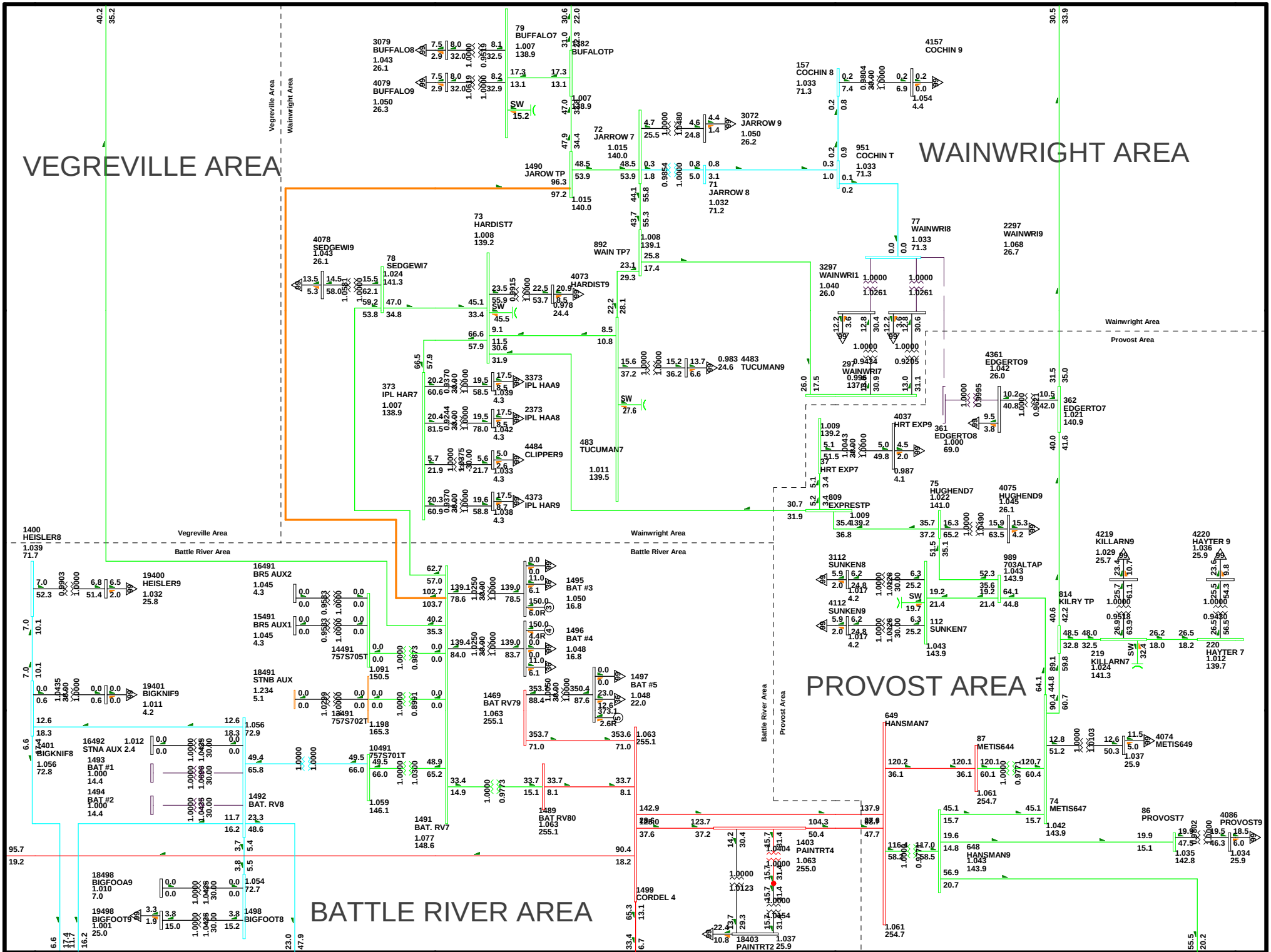


Figure A-2009-65-a

TASMO MODEL; OUTPUT GENERATED 2008-08-11 15:22:22
SWINGBUS 1520 FOR FC-2007-4:2010-04-02:18:44--1--1-0-0
FRI, MAR 27 2009 10:24



TASMO MODEL; OUTPUT GENERATED 2008-08-11 15:22:22
SWINGBUS 1520 FOR FC-2007-4:2010-04-02:18:44--1--1-0-0
FRI, MAR 27 2009 10:24

Figure A-2009-65-b

2012 Load Flow Diagrams

2012 Summer Peak

2012 Winter Peak

Figure Number	2012sp Contingency	Overloaded Element	Transmission Voltage Violation
	NOTE: RED lettering indicates additional violation under N-G-1		
	NOTE: Italized print means new or changed from winter peak listing		
A-2012-08	**Base Case**	7L53 Bonnyville 700S to tap (PR-out)	
A-2012-10	7L50 Battle River 757S to Buffalo Creek 526S	Multiple line overloads including 9L27 Cordel 755S to Paintearth 863S and 7L53 Bonnyville (700S) to Irish Creek (706S)	Voltage drops more than 90% from nominal on the 144kV buses at Irish Creek 706S, Vermilion 710S, Vermilion tap sub.
VOLTAGE COLLAPSE	Bonnyville 144-72kV tie transformer	* Non-converged contingency due to voltage collapse on the 72kV network between Bonnyville and Vegreville affecting the towns of St. Paul 707S and	
A-2012-14	6L82 Bonnyville 700S to St. Paul 707S	6L79 Vegreville 709S to Willingdon 711S	(NOTE: With all 25kV capacitors on at St. Paul, no voltage violations.)
A-2012-12	6L79 Vegreville 709S to Willingdon 711S	6L82 Bonnyville 700S to St. Paul 707S Bonnyville 144-72kV tie transformer	Voltage below 90% at Willingdon 711S and borderline at St. Paul 707S with all 25kV capacitors on
A-2012-17	*7L24 Bonnyville 700S to Grande Centre 846S*	*7L89 Marguerite Lake 826S to La Corey 721S*	
A-2012-18	*7L28 Ethel Lake 717S to Grande Centre 846S*	*7L89 Marguerite Lake 826S to La Corey 721S*	
A-2012-20	7L66 Leming Lake 715S to Ethel Lake 717S	7L89 Marguerite Lake 826S to La Corey 721S and La Corey 721S to Bonnyville 700S	
A-2012-24	*7L89 Marguerite Lake 826S to La Corey 721S*	*7L28 Ethel Lake 717S to Grande Centre 846S* *7L66 Leming Lake 715S to Ethel Lake 717S*	
A-2012-79	7L14 Vermilion 710S to Hill 751S	Vermilion 144-72kV Tie transformer 701T 6L06 Vermilion 710S to Kitscoty 705S	
A-2012-76	*7L701 Battle River 757S to Strome 223S*	*7L89 Marguerite Lake 826S to La Corey 721S*	
A-2012-16	*749L Metiskow 648S to Edgerton 899S*	*7L14 Vermilion 710S to Hill 751S*	
A-2012-70	*9L27 Cordel 755S to Paintearth Creek 863S*	*7L53 Bonnyville 700S to Vermillion 710S*	
A-2012-33	Vegreville 144-72kV tie transformer	6L82 Bonnyville 700S to St. Paul 707S Bonnyville 144-72kV tie transformer	Voltage drops more than 90% from nominal at at St. Paul 707S and Willingdon 711S

NOTE: BLACK text indicates N-1 violations;
RED text indicates additional violations under Battle River N-G-1;
BLUE text indicates additional violations under Primrose N-G-1;
MAROON text indicates additional violations under Battle River or Primrose N-G-1.

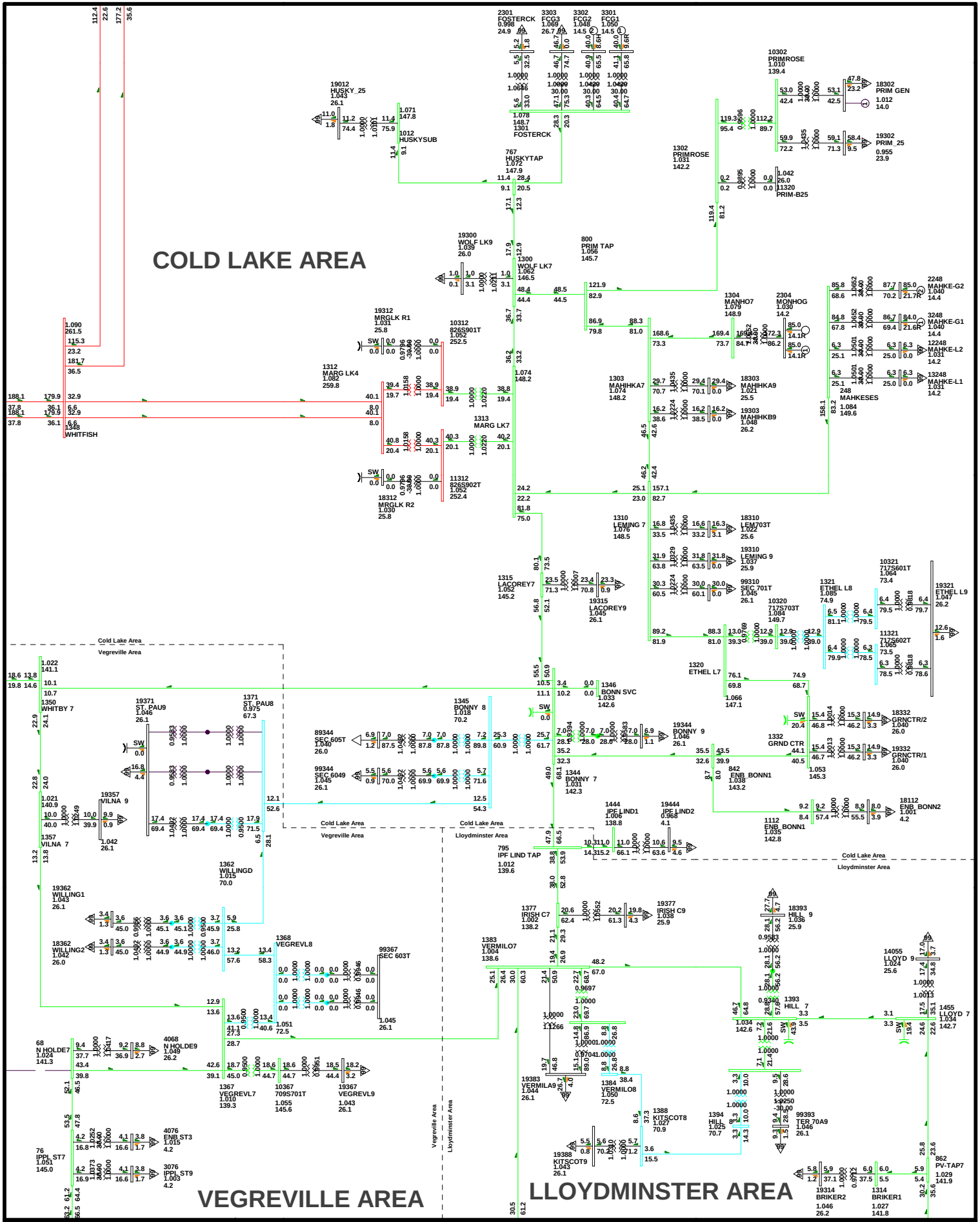
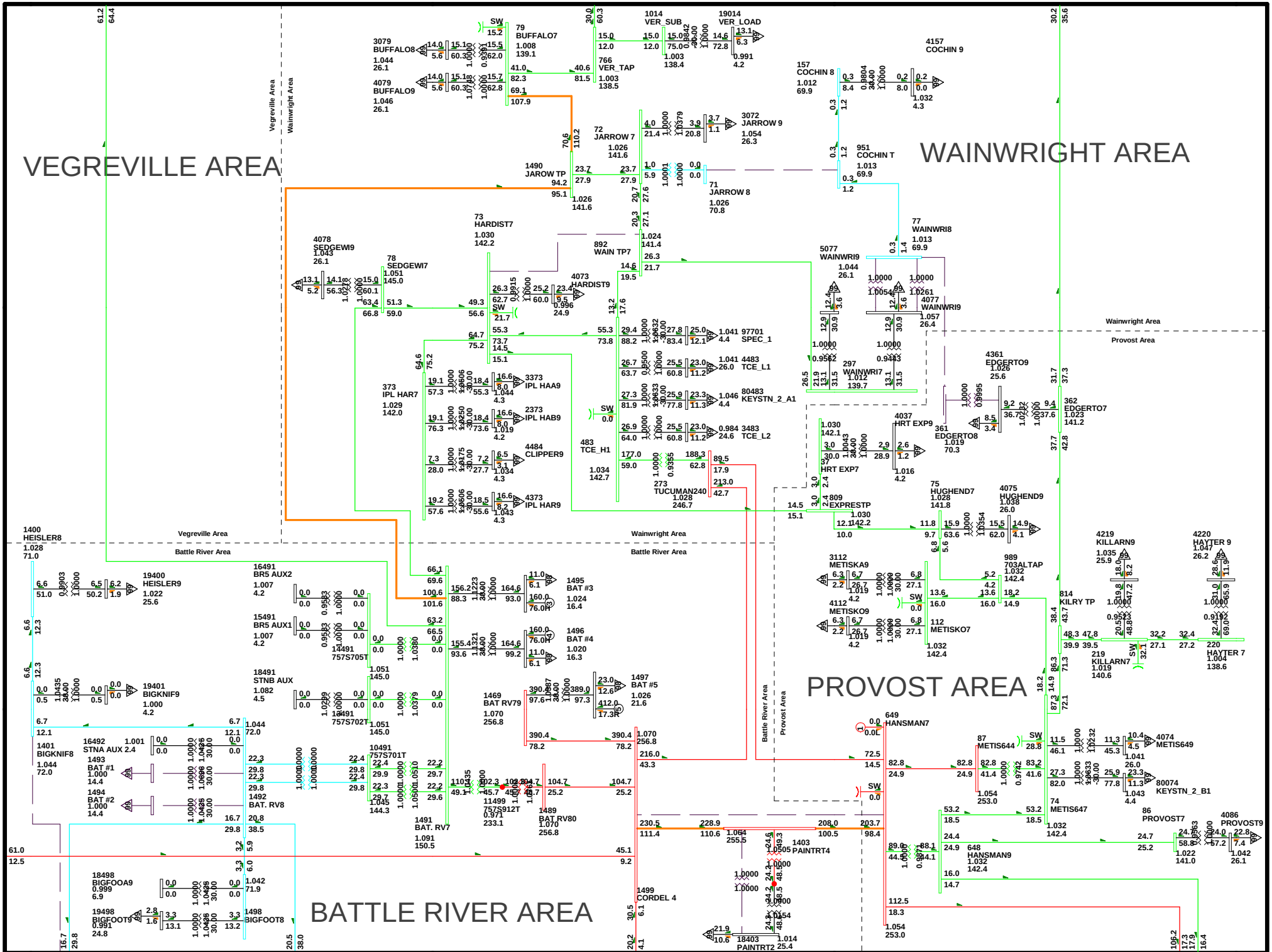


Figure A-2012-08-a

CENTRAL AREA STUDY
2012 SUMMER PEAK BASE CASE REVISION 7.2.1
MON, MAR 23 2009 15:31



CENTRAL AREA STUDY
2012 SUMMER PEAK BASE CASE REVISION 7.2.1
MON, MAR 23 2009 15:32

Figure A-2012-08-b

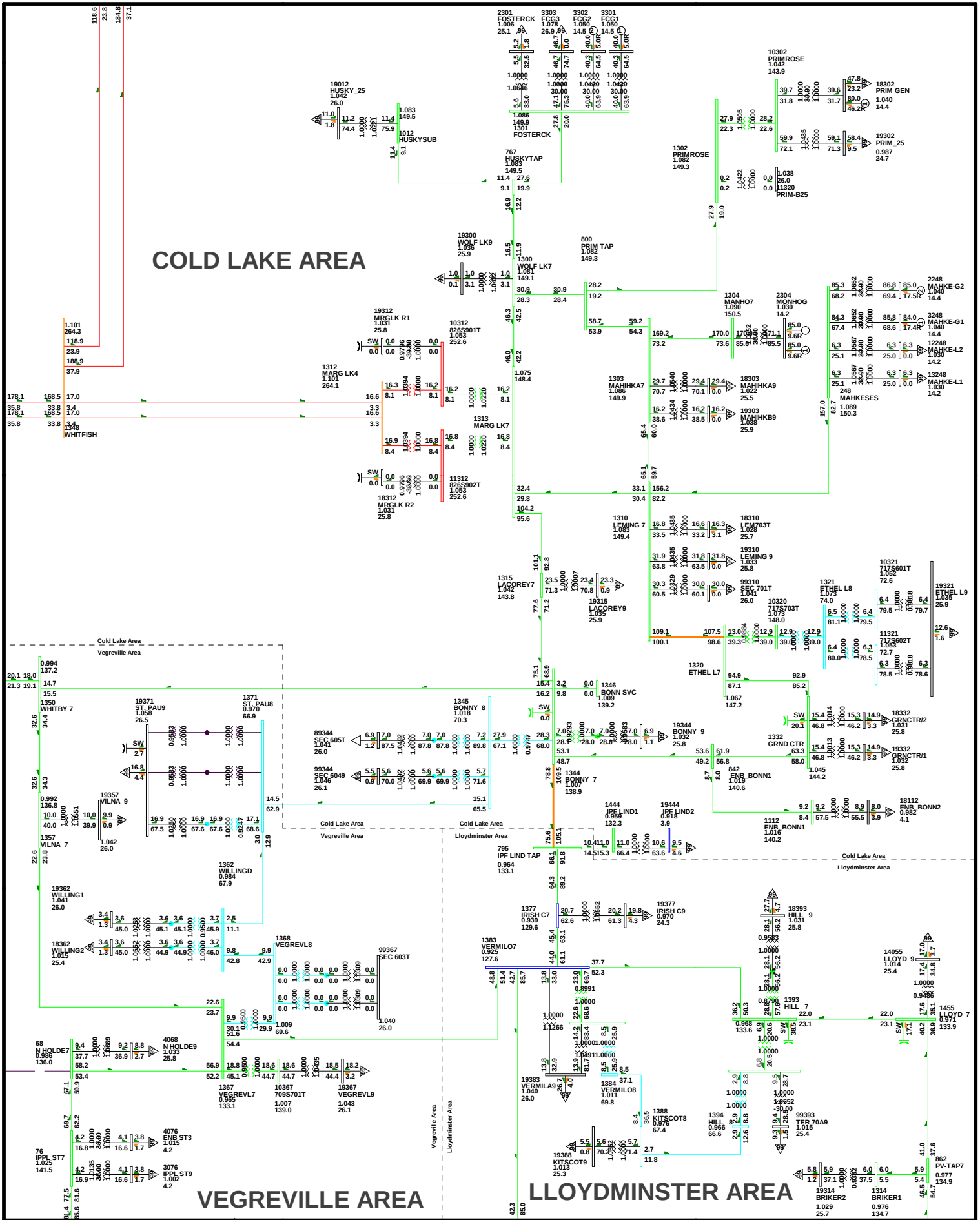
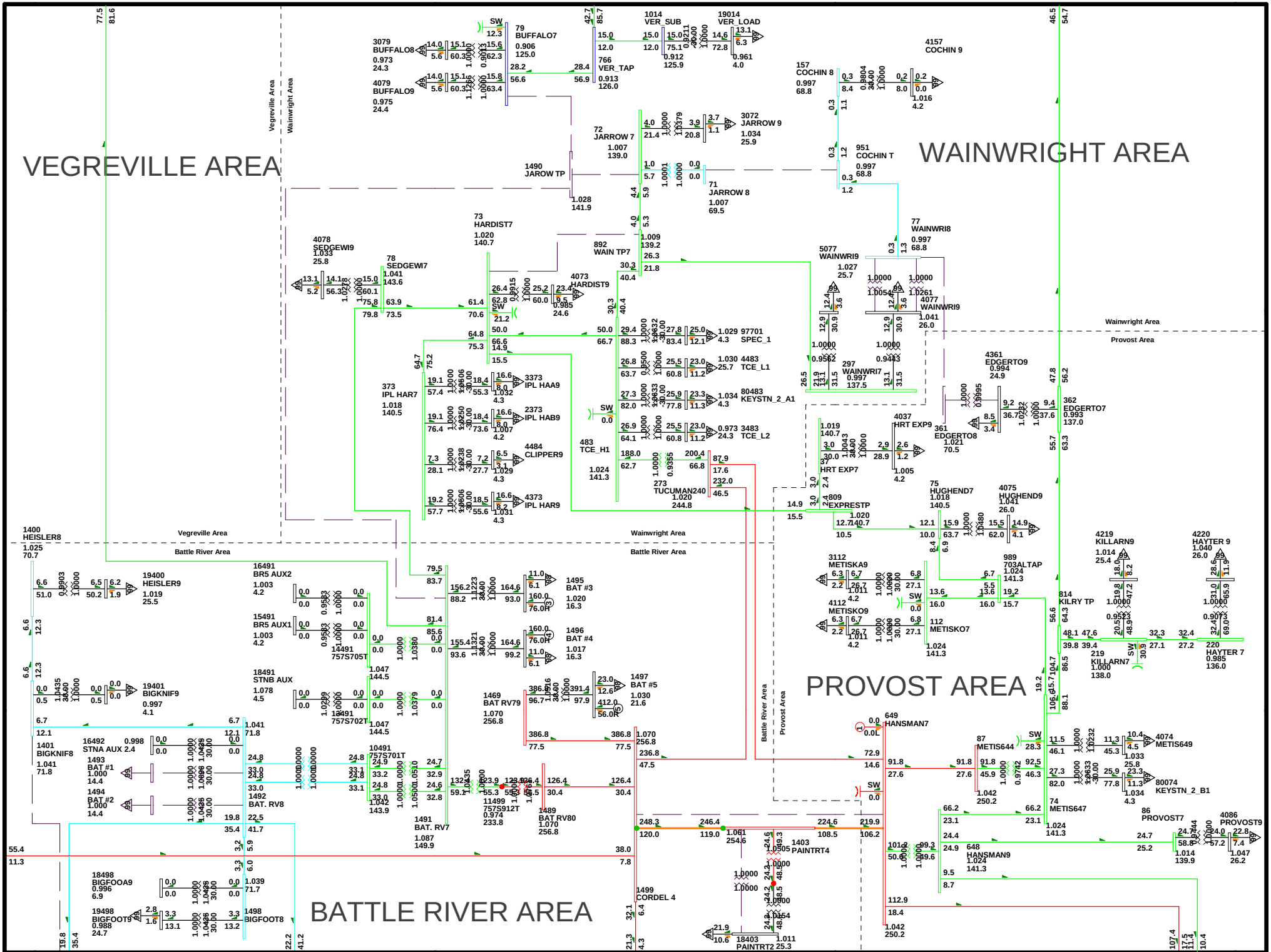


Figure A-2012-10-a

CENTRAL AREA STUDY
2012 SUMMER PEAK BASE CASE REVISION 7.2.1
WED, MAR 18 2009 18:08

Bus - VOLTAGE (KV/PU)
Branch - MVA/% OF RATE A
Equipment - MW/MVAR
100.0%RATEA
1.100OV 0.950UV
KV: >0.000<=35.000 <=69.000 <=138.000 <=240.000



CENTRAL AREA STUDY
2012 SUMMER PEAK BASE CASE REVISION 7.2.1
WED, MAR 18 2009 18:07

Figure A-2012-10-b

Bus - VOLTAGE (KV/PU)
Branch - MVA/% OF RATE A
Equipment - MW/MVAR
100.0%RATEA
1.100OV0.950UV
KV: >0.000<=35.000 <=69.000 <=138.000 <=240.000

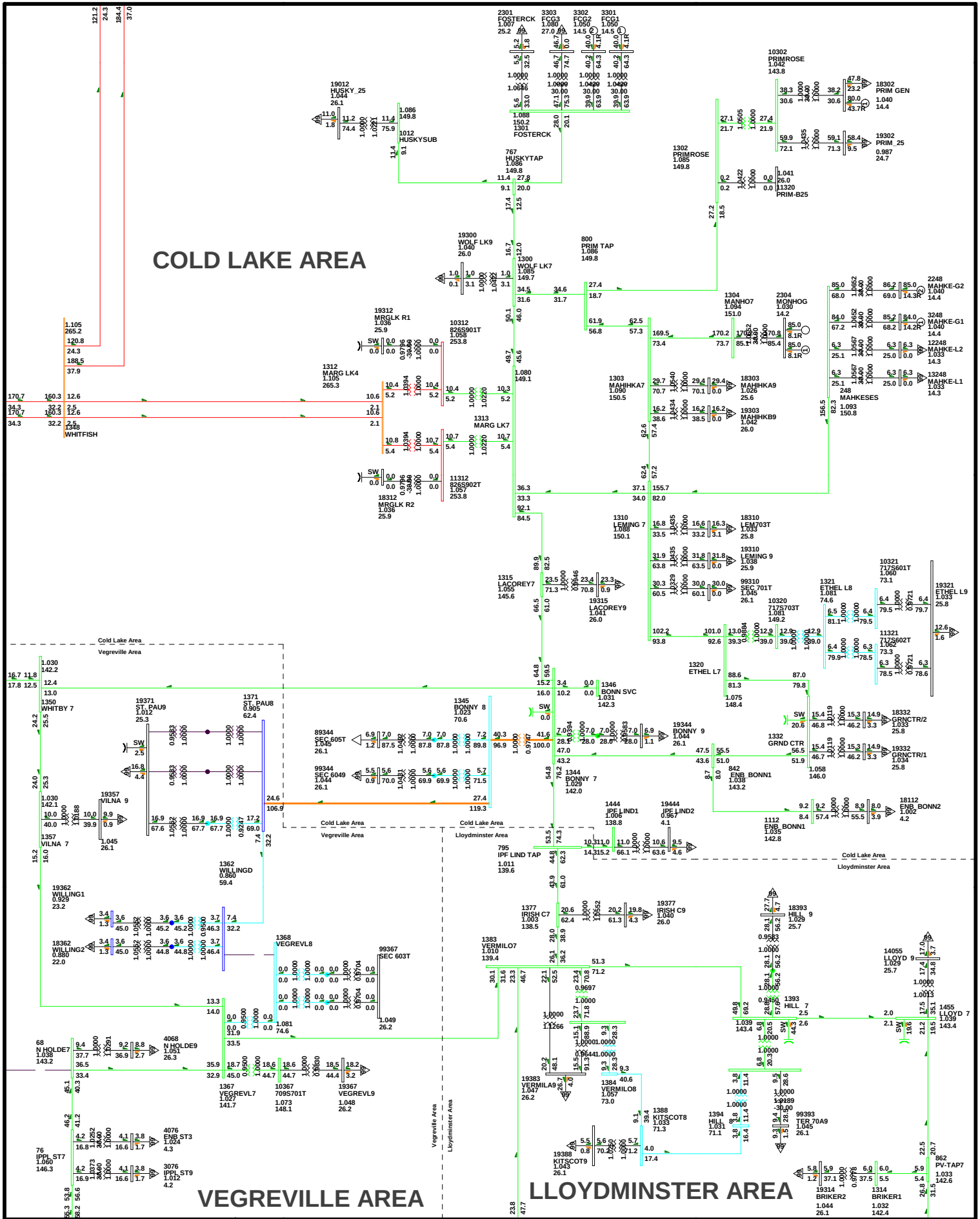
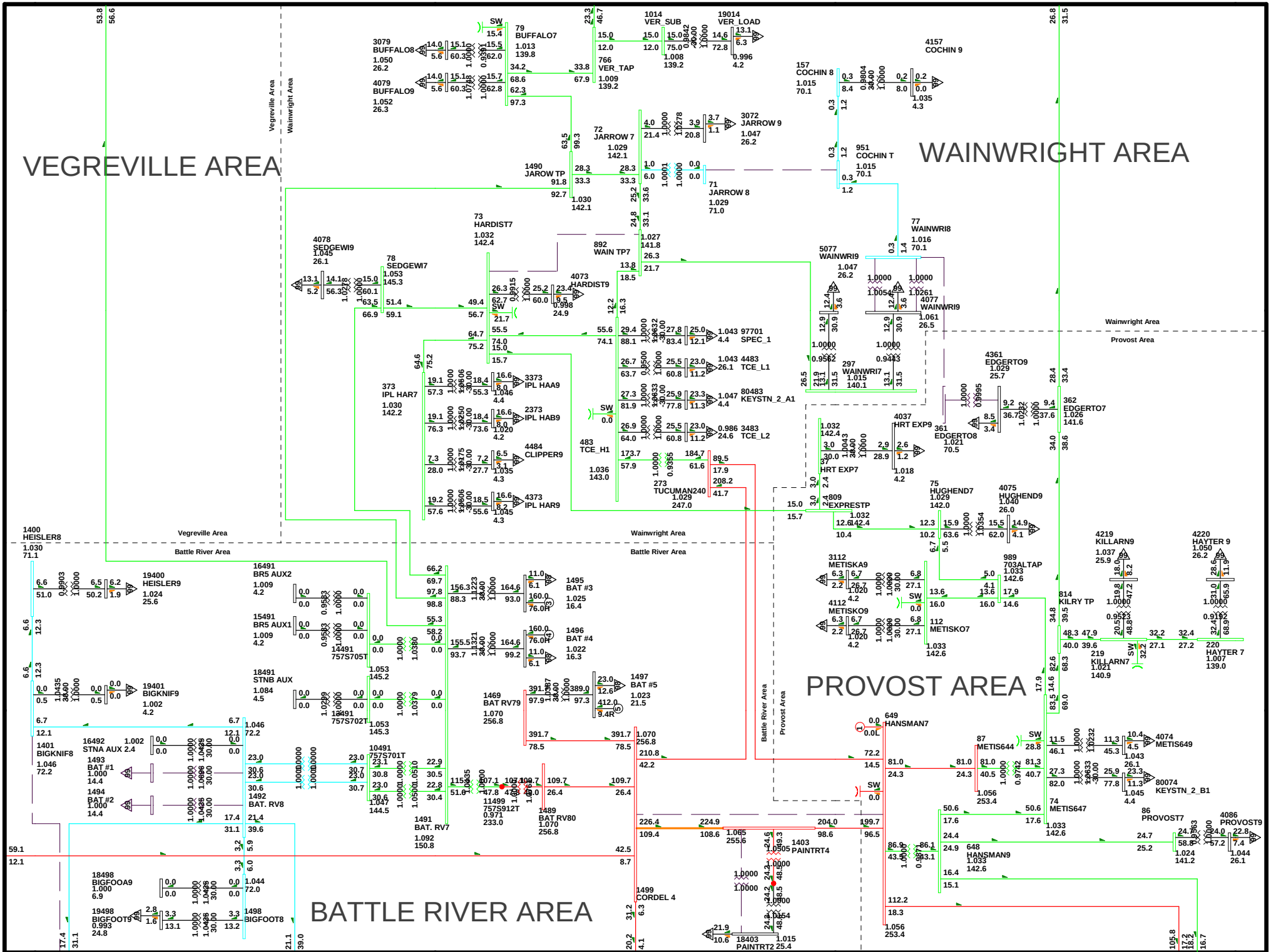


Figure A-2012-12-a

CENTRAL AREA STUDY
2012 SUMMER PEAK BASE CASE REVISION 7.2.1
WED, MAR 18 2009 18:12

Bus - VOLTAGE (KV/PU)
Branch - MVA/% OF RATE A
Equipment - MW/MVAR
100.0%RATEA
1.100OV 0.950UV
KV: >0.000<=35.000 <=69.000 <=138.000 <=240.000



CENTRAL AREA STUDY
2012 SUMMER PEAK BASE CASE REVISION 7.2.1
WED, MAR 18 2009 18:11

Figure A-2012-12-b

Bus - VOLTAGE (KV/PU)
Branch - MVA/% OF RATE A
Equipment - MW/MVAR
100.0%RATEA
1.100OV 0.950UV
KV: >0.000<=35.000 <=69.000 <=138.000 <=240.000

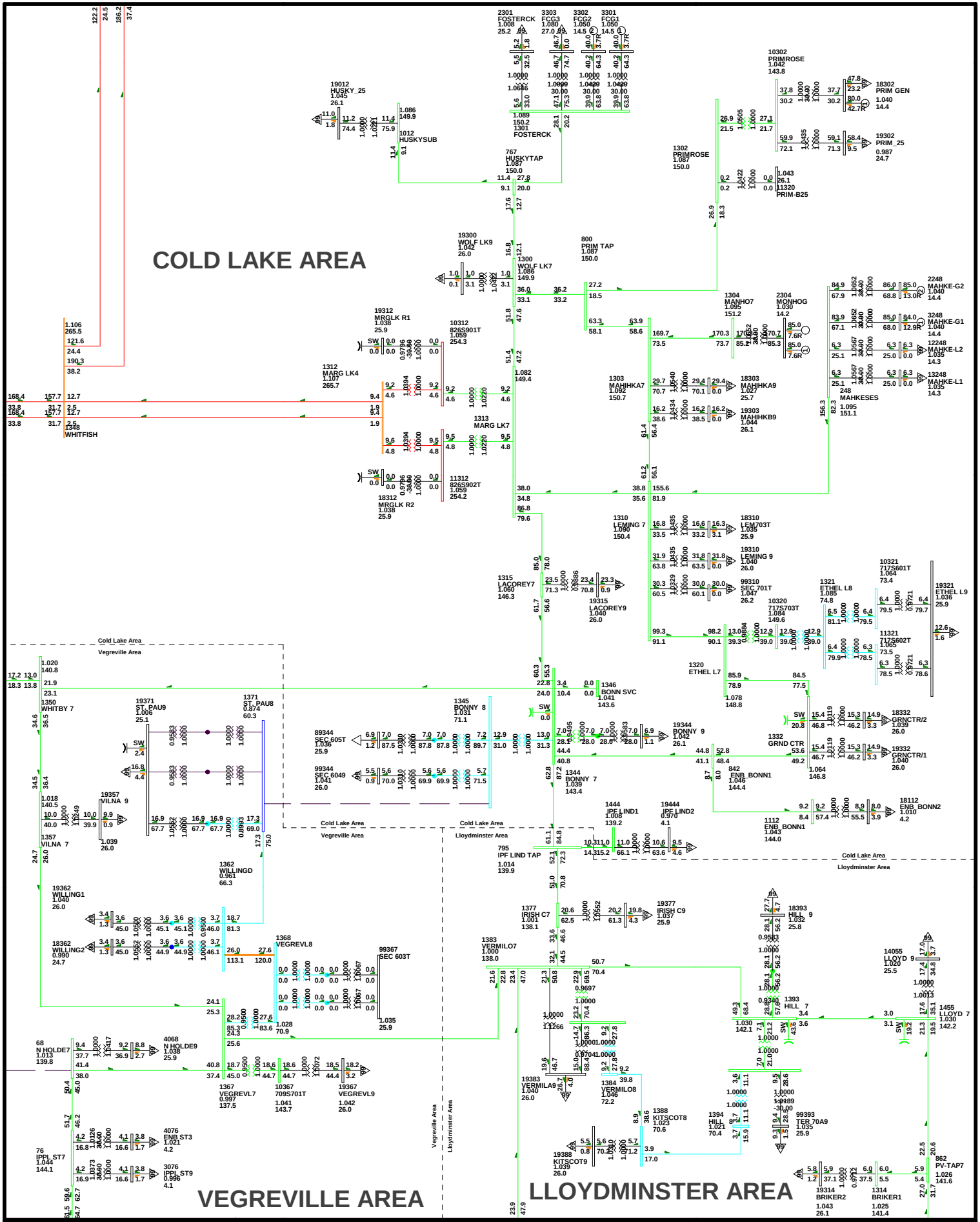
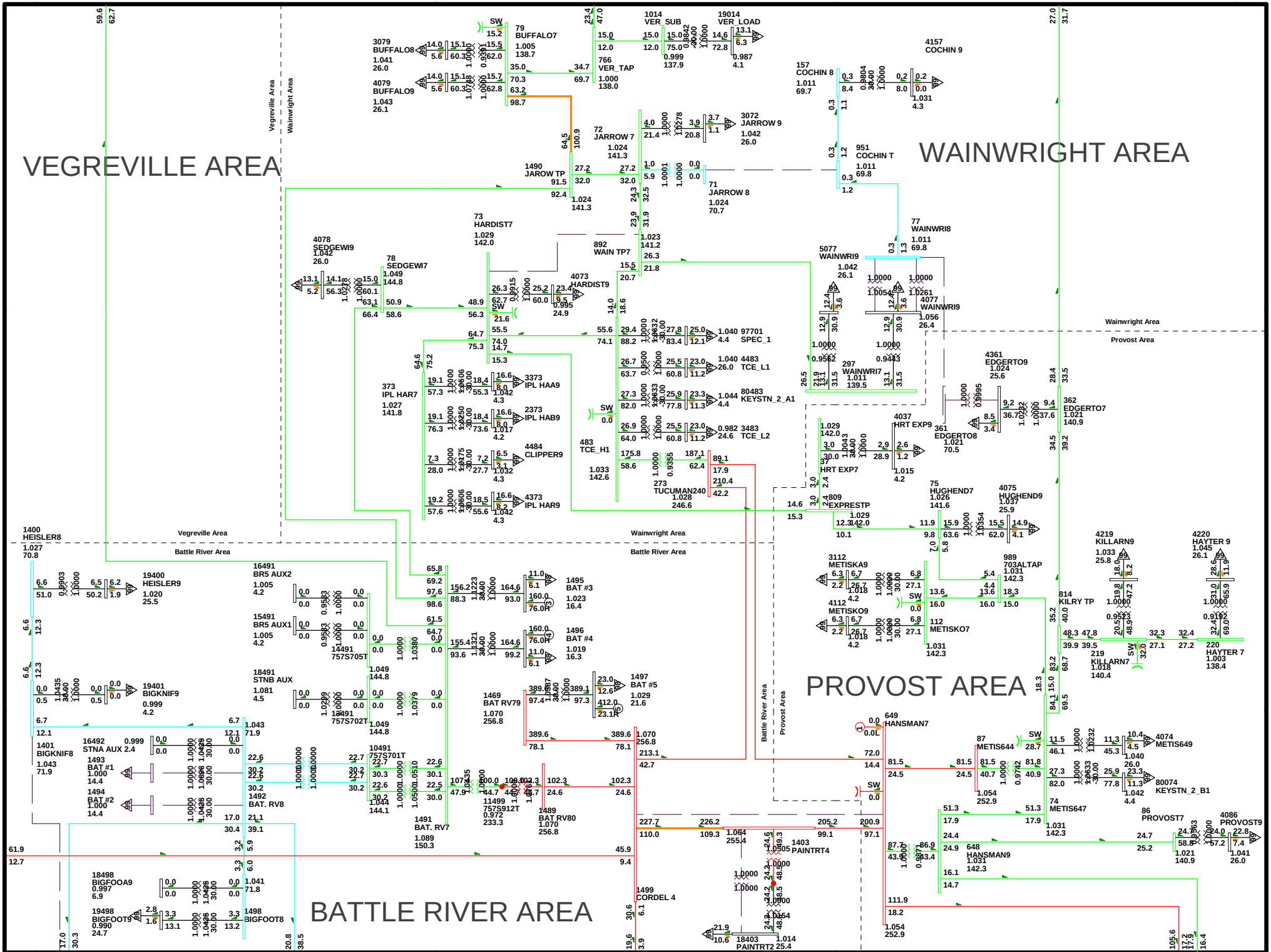


Figure A-2012-14-a

CENTRAL AREA STUDY
2012 SUMMER PEAK BASE CASE REVISION 7.2.1
WED, MAR 18 2009 18:14

Bus - VOLTAGE (KV/PU)
Branch - MVA/% OF RATE A
Equipment - MW/MVAR
100.0%RATEA
1.100OV 0.950UV
KV: >0.000<=35.000 <=69.000 <=138.000 <=240.000



CENTRAL AREA STUDY
2012 SUMMER PEAK BASE CASE REVISION 7.2.1
WED, MAR 18 2009 18:13

Figure A-2012-14-b

Bus - VOLTAGE (KV/PU)
Branch - MVA/% OF RATE A
Equipment - MW/MVAR
100.0%RATEA
1.100OV 0.950UV
KV: >0.000<=35.000 <=69.000 <=138.000 <=240.000

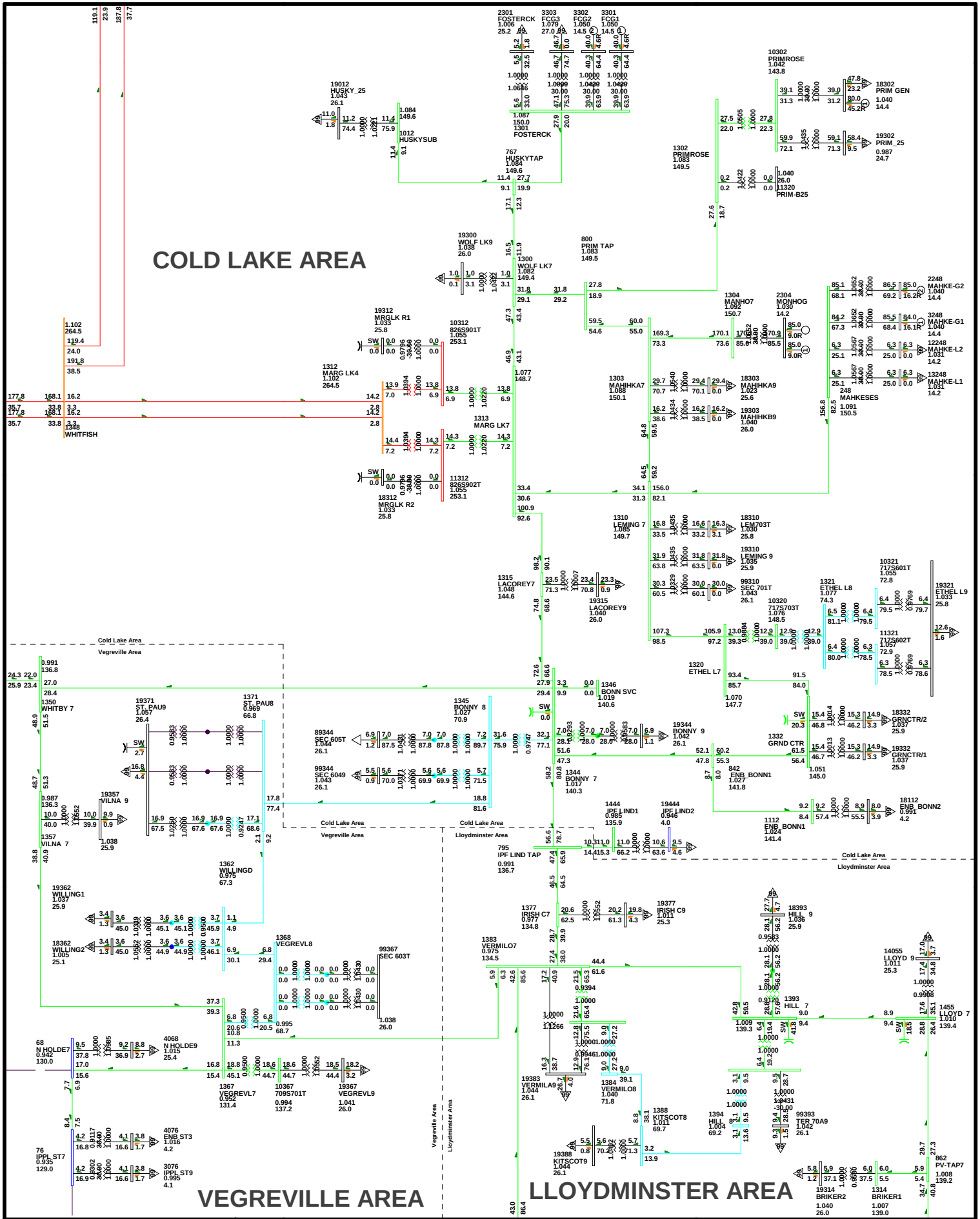
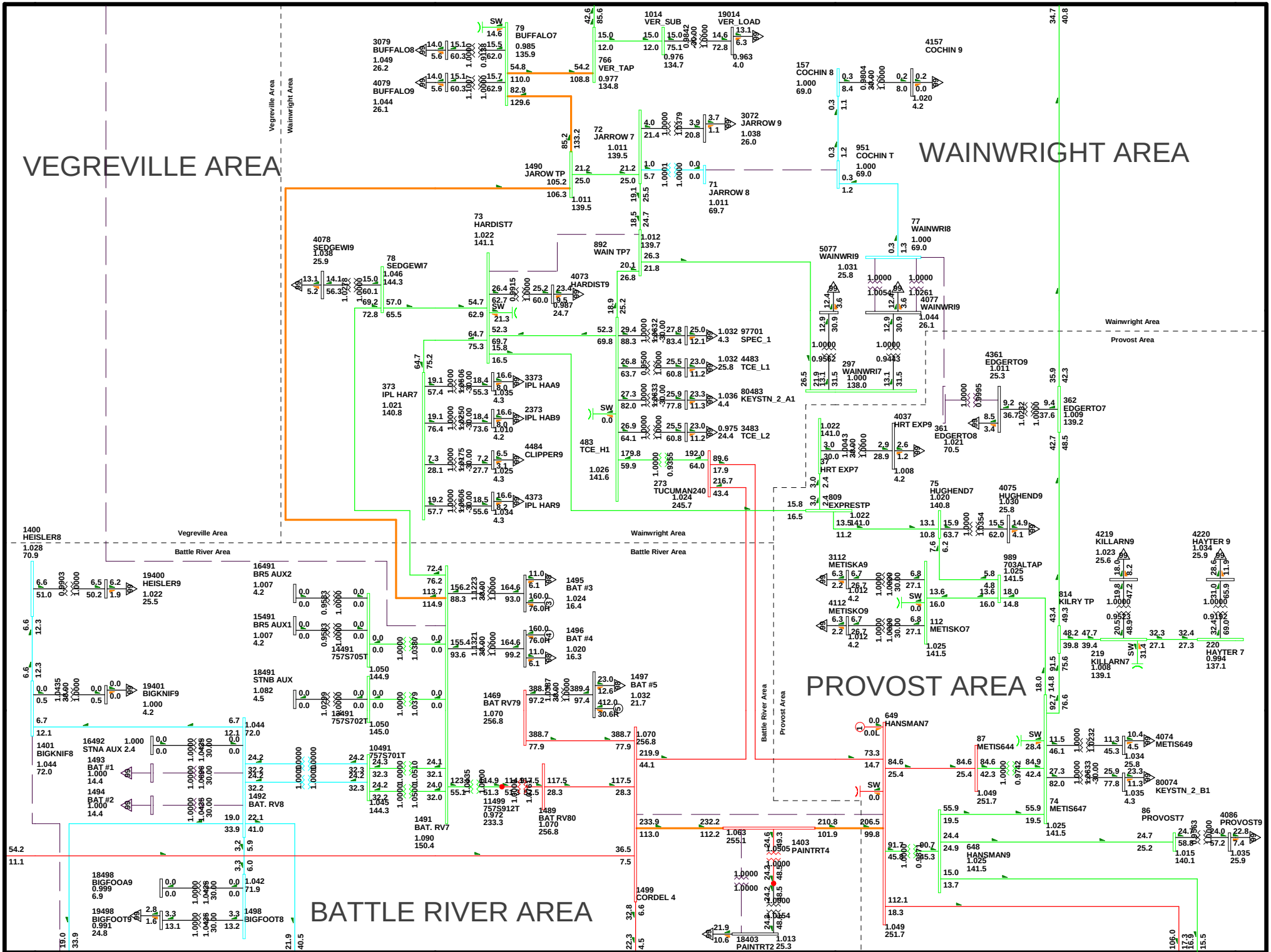


Figure A-2012-15-a

CENTRAL AREA STUDY
2012 SUMMER PEAK BASE CASE REVISION 7.2.1
WED, MAR 18 2009 18:14

Bus - VOLTAGE (KV/PU)
Branch - MVA/% OF RATE A
Equipment - MW/MVAR
100.0%RATEA
1.100OV 0.950UV
KV: >0.000<=35.000 <=69.000 <=138.000 <=240.000



CENTRAL AREA STUDY
2012 SUMMER PEAK BASE CASE REVISION 7.2.1
WED, MAR 18 2009 18:14

Figure A-2012-15-b

Bus - VOLTAGE (KV/PU)
Branch - MVA/% OF RATE A
Equipment - MW/MVAR
100.0%RATEA
1.100OV0.950UV
KV: >0.000<=35.000 <=69.000 <=138.000 <=240.000

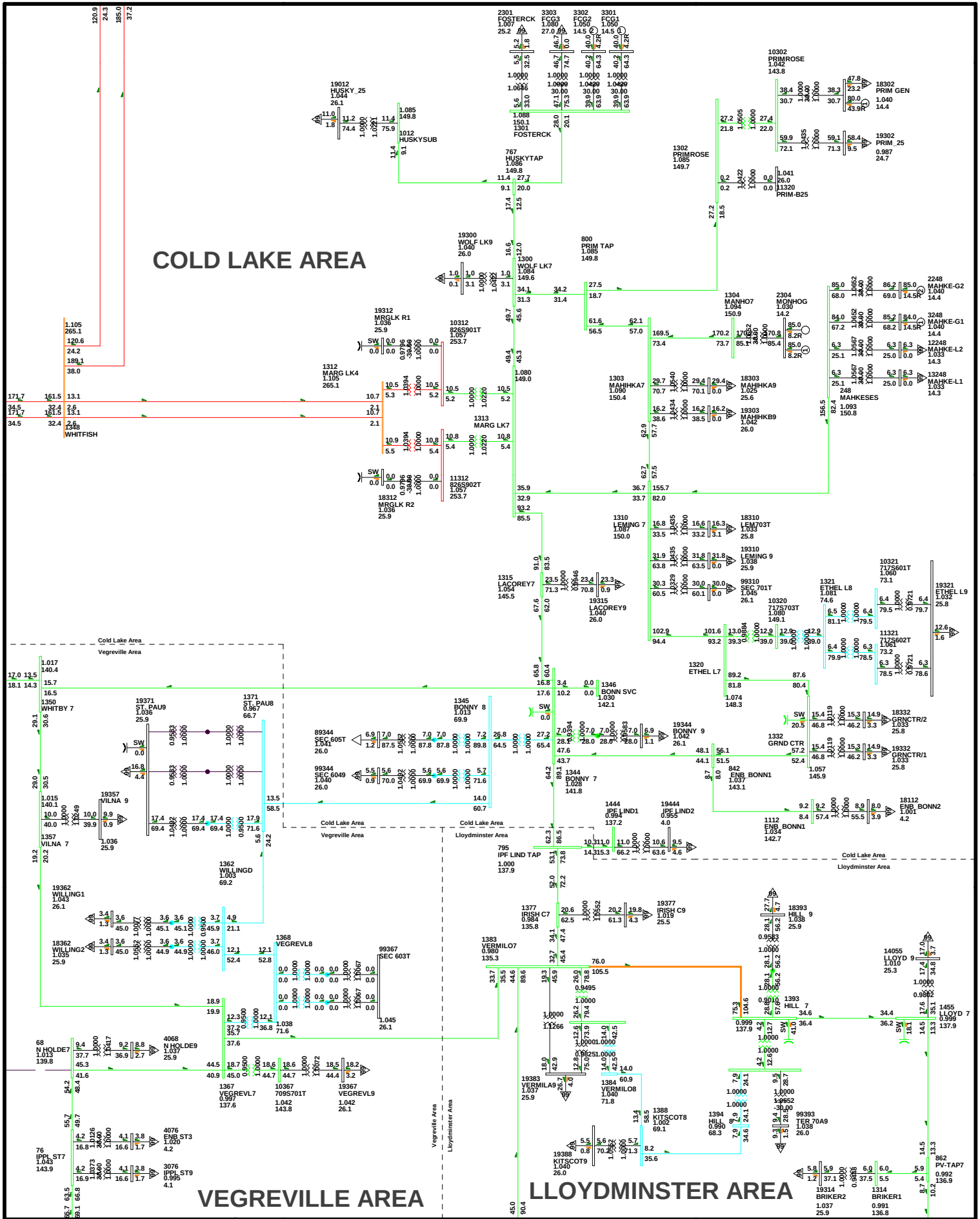
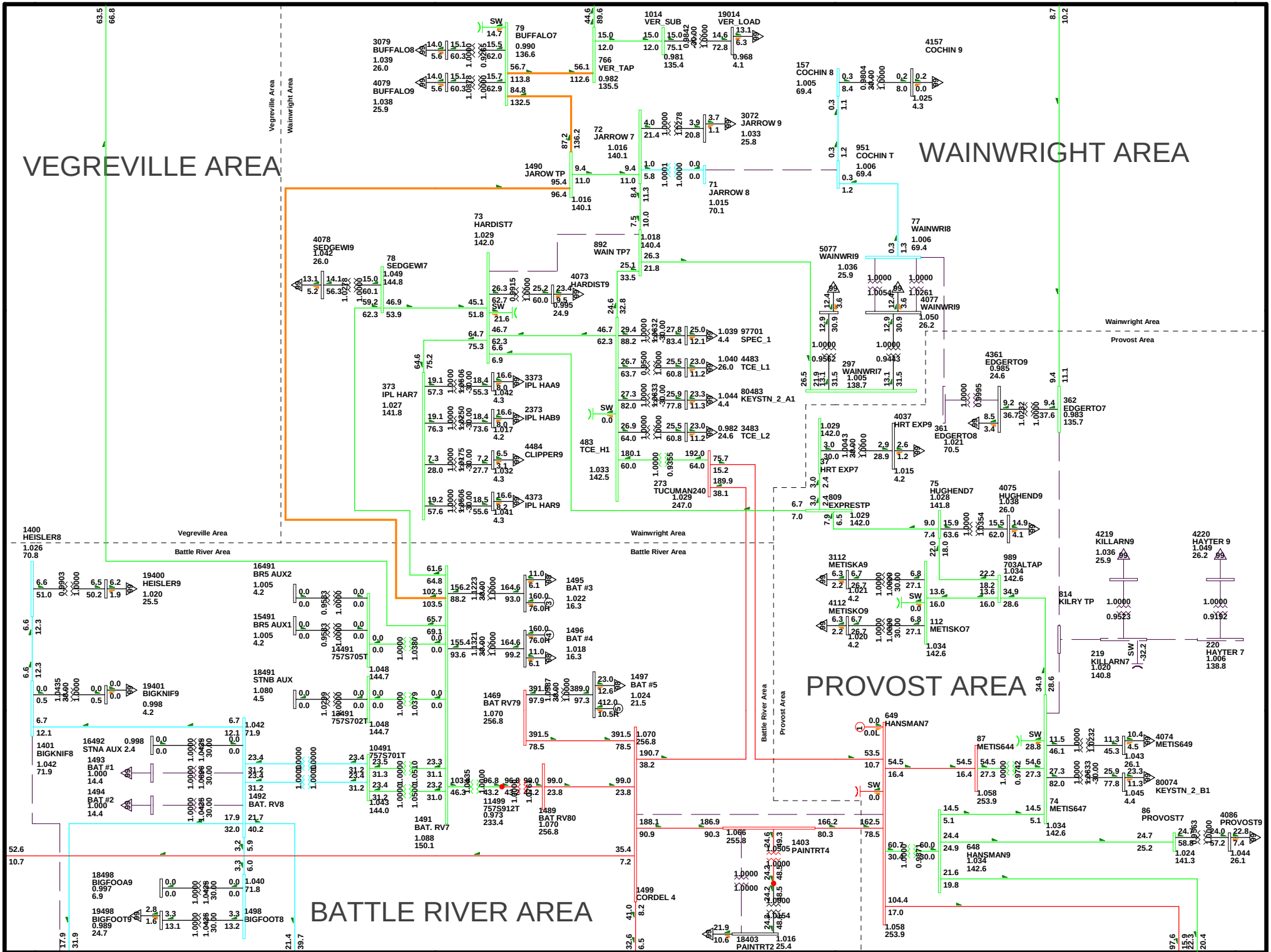


Figure A-2012-16-a

CENTRAL AREA STUDY
2012 SUMMER PEAK BASE CASE REVISION 7.2.1
WED, MAR 18 2009 18:15

Bus - VOLTAGE (KV/PU)
Branch - MVA/% OF RATE A
Equipment - MW/MVAR
100.0%RATEA
1.100OV 0.950UV
KV: >0.000<=35.000 <=69.000 <=138.000 <=240.000



CENTRAL AREA STUDY
2012 SUMMER PEAK BASE CASE REVISION 7.2.1
WED, MAR 18 2009 18:15

Figure A-2012-16-b

Bus - VOLTAGE (KV/PU)
Branch - MVA/% OF RATE A
Equipment - MW/MVAR
100.0%RATEA
1.100OV 0.950UV
KV: >0.000<=35.000 <=69.000 <=138.000 <=240.000

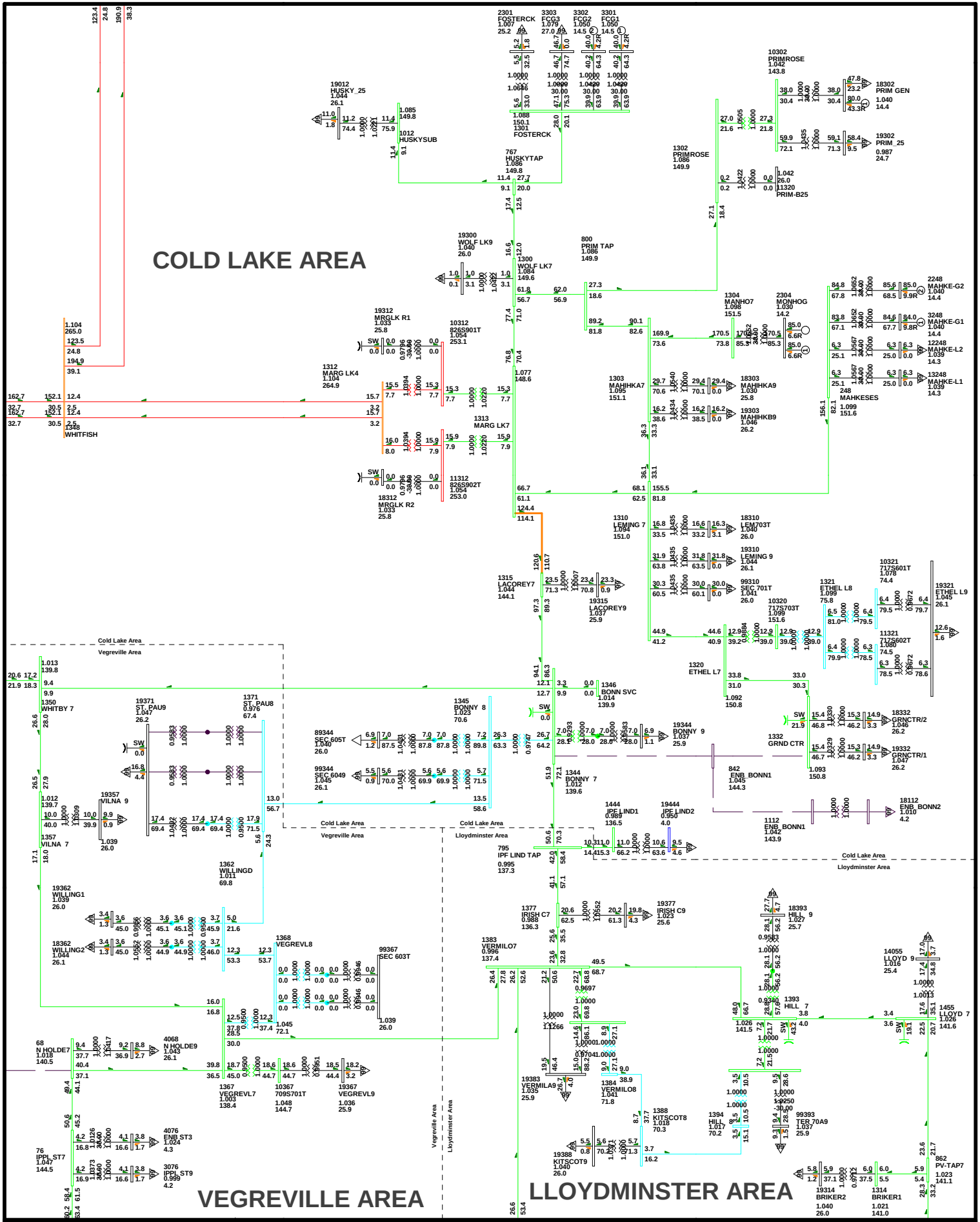
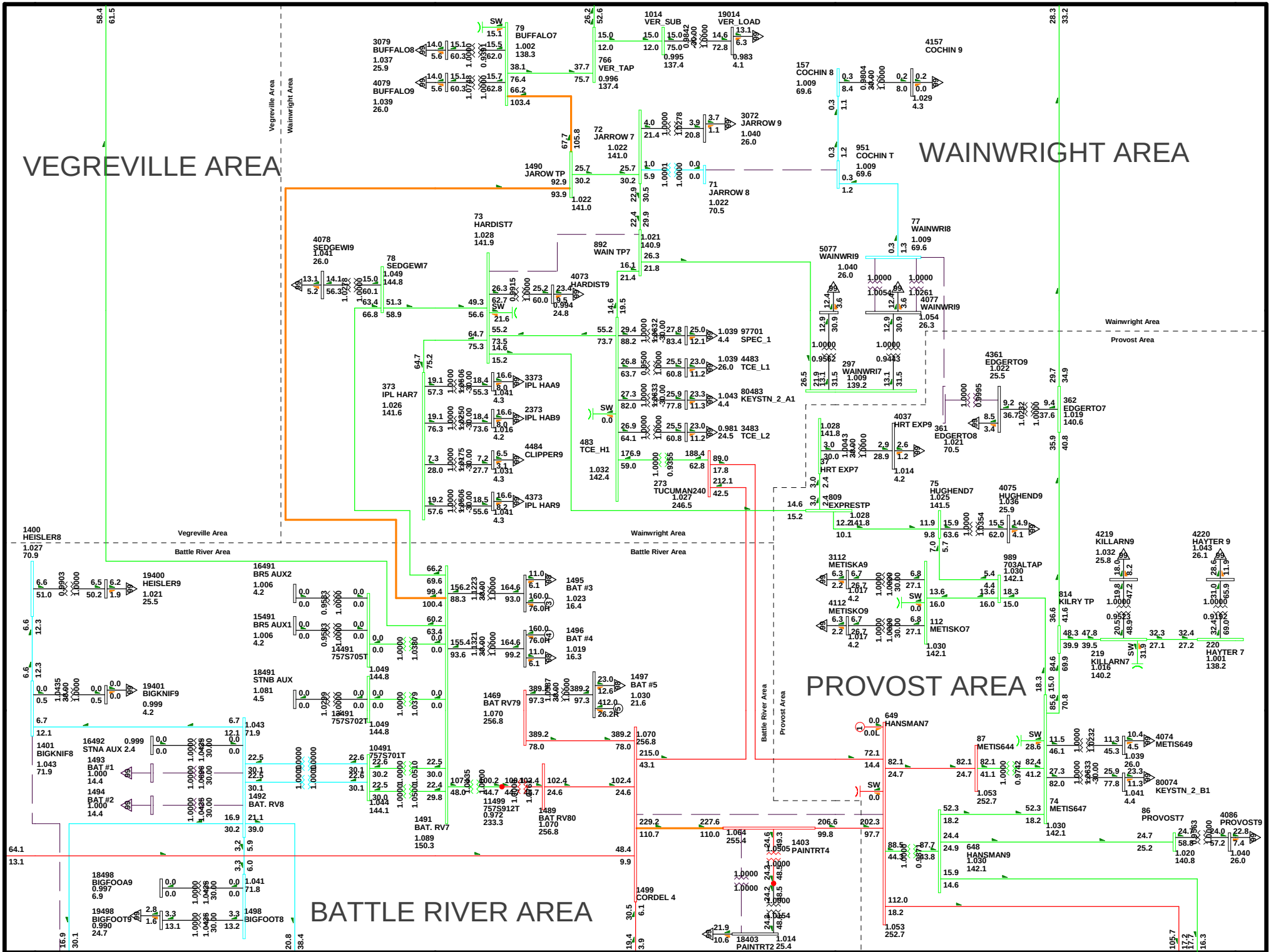


Figure A-2012-17-a

CENTRAL AREA STUDY
2012 SUMMER PEAK BASE CASE REVISION 7.2.1
WED, MAR 18 2009 18:18

Bus - VOLTAGE (KV/PU)
Branch - MVA/% OF RATE A
Equipment - MW/MVAR
100.0%RATEA
1.100OV 0.950UV
KV: >0.000<=35.000 <=69.000 <=138.000 <=240.000



CENTRAL AREA STUDY
2012 SUMMER PEAK BASE CASE REVISION 7.2.1
WED, MAR 18 2009 18:17

Figure A-2012-17-b

Bus - VOLTAGE (KV/PU)
Branch - MVA/% OF RATE A
Equipment - MW/MVAR
100.0%RATEA
1.100OV 0.950UV
KV: >0.000<=35.000 <=69.000 <=138.000 <=240.000

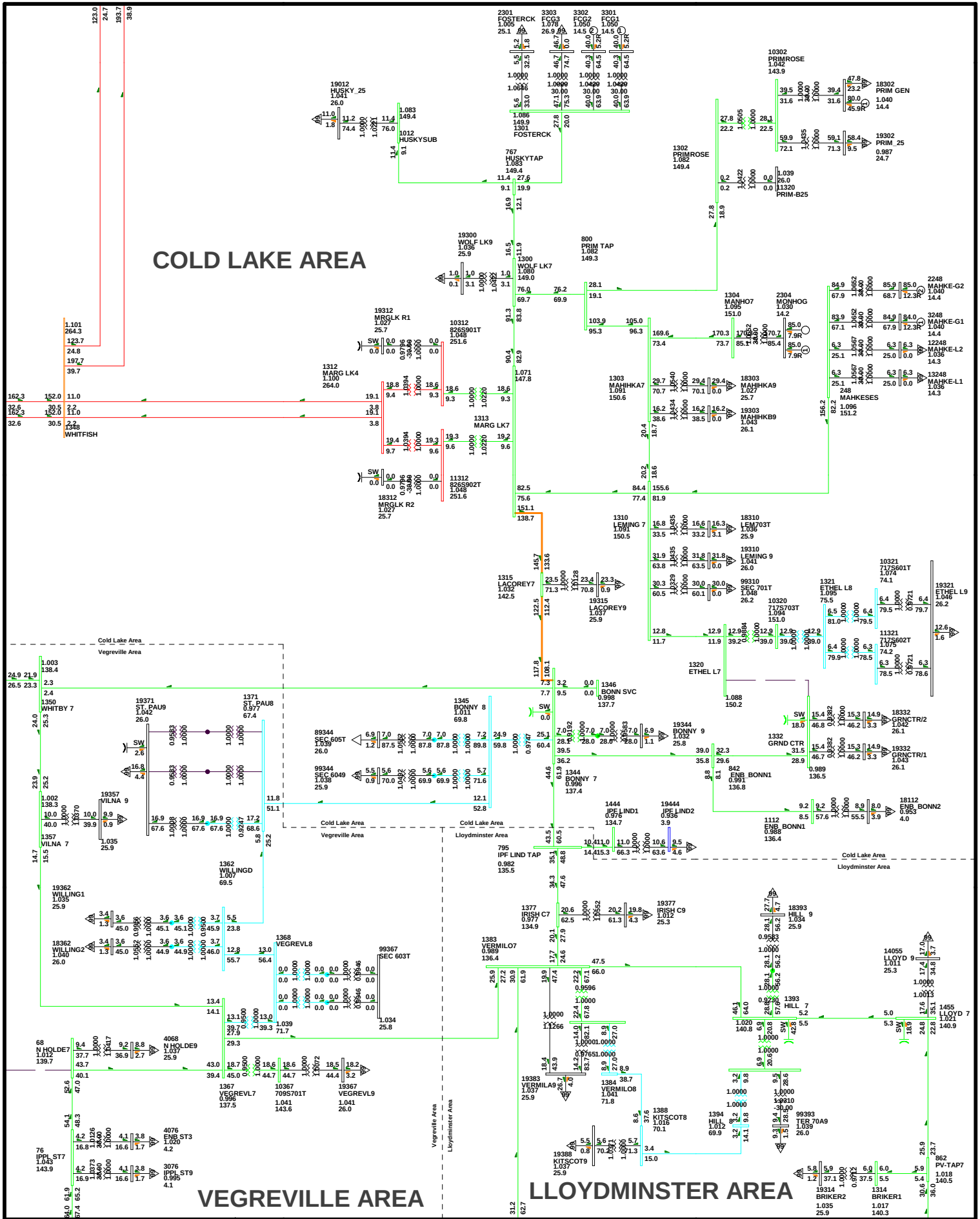
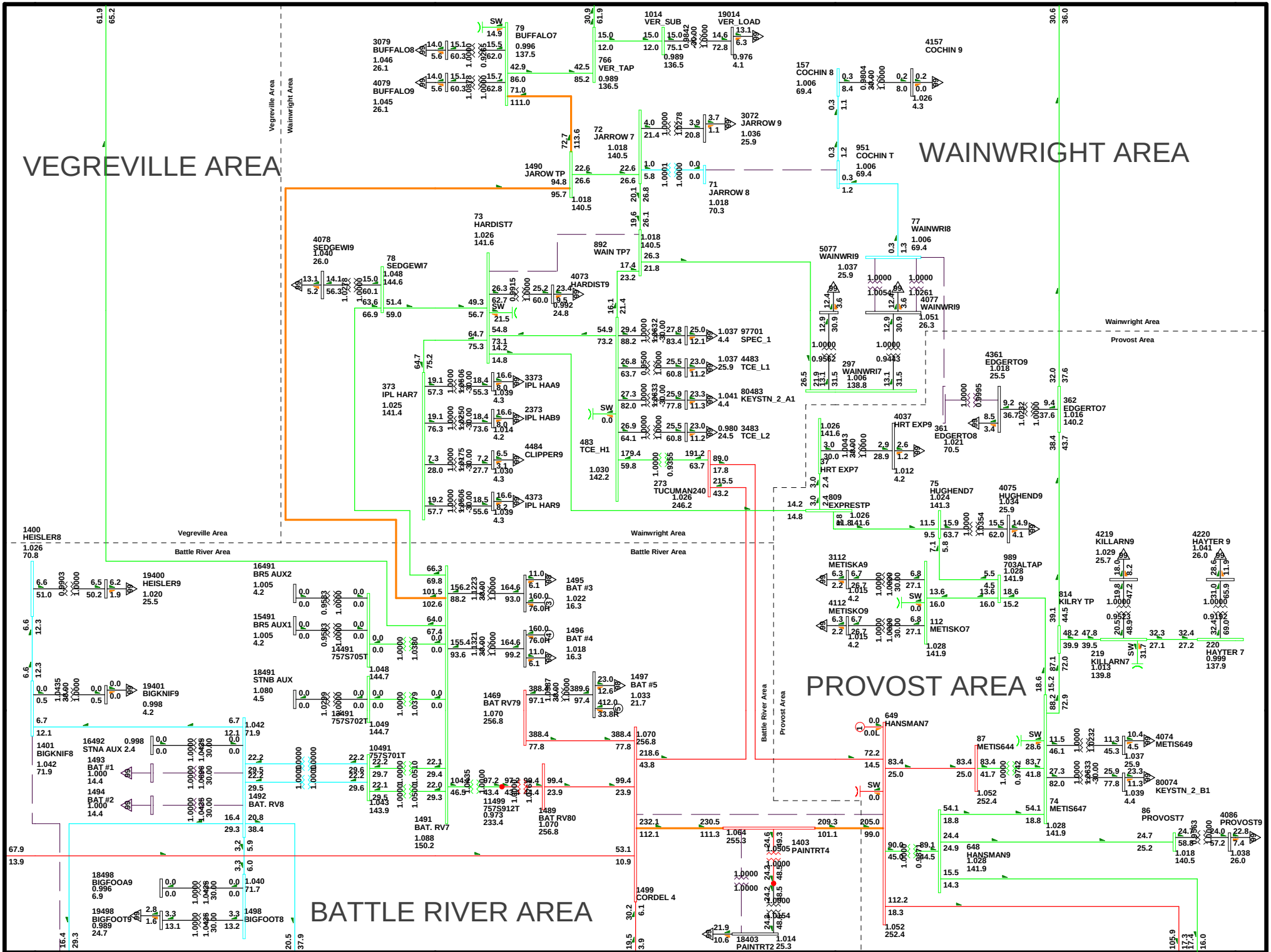


Figure A-2012-18-a

CENTRAL AREA STUDY
2012 SUMMER PEAK BASE CASE REVISION 7.2.1
WED, MAR 18 2009 18:18

Bus - VOLTAGE (KV/PU)
Branch - MVA/% OF RATE A
Equipment - MW/MVAR
100.0%RATEA
1.100OV 0.950UV
KV: >0.000<=35.000 <=69.000 <=138.000 <=240.000



CENTRAL AREA STUDY
2012 SUMMER PEAK BASE CASE REVISION 7.2.1
WED, MAR 18 2009 18:18

Figure A-2012-18-b

Bus - VOLTAGE (KV/PU)
Branch - MVA/% OF RATE A
Equipment - MW/MVAR
100.0%RATEA
1.100OV 0.950UV
KV: >0.000<=35.000 <=69.000 <=138.000 <=240.000

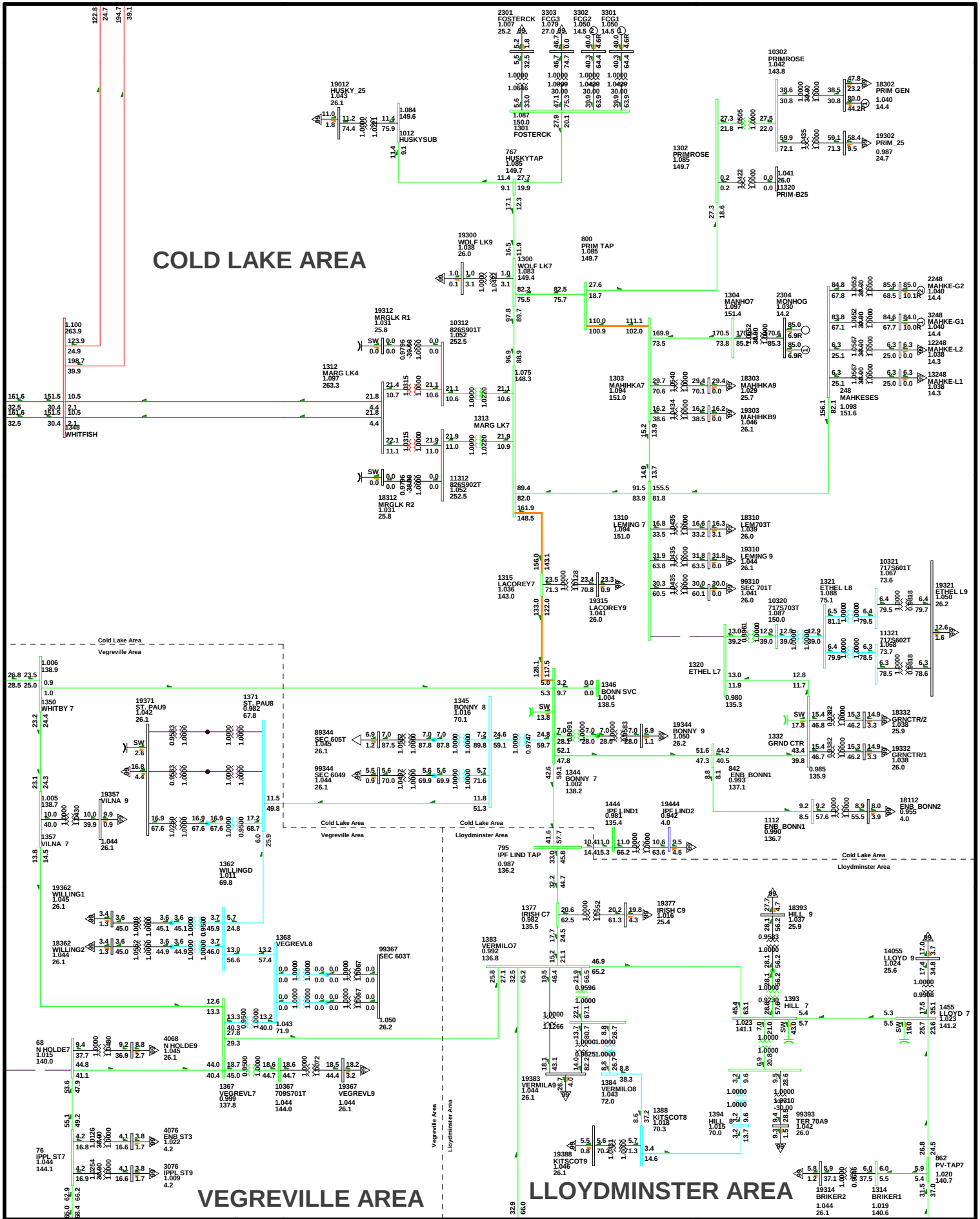
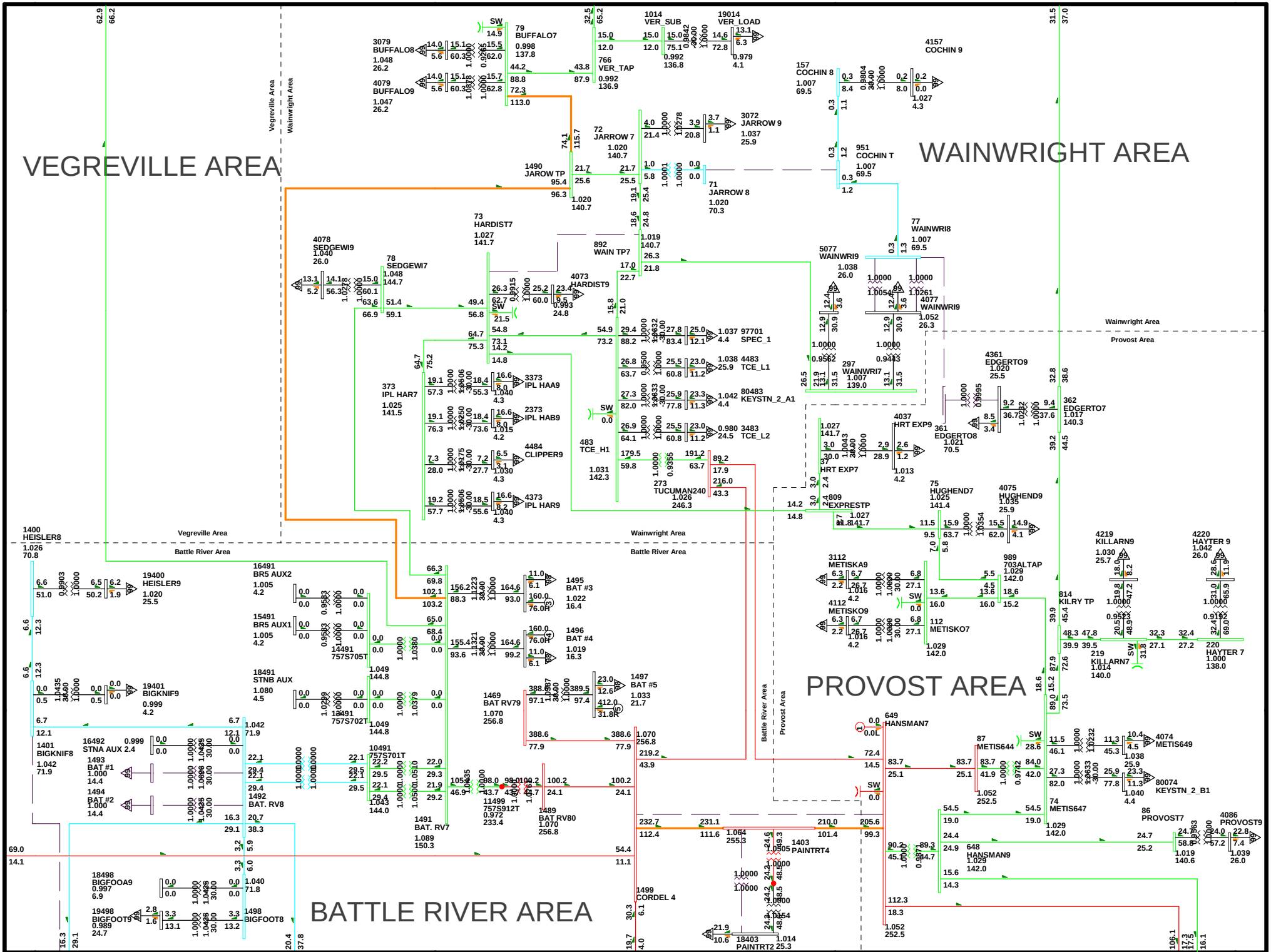


Figure A-2012-20-a

CENTRAL AREA STUDY
2012 SUMMER PEAK BASE CASE REVISION 7.2.1
WED, MAR 18 2009 18:20

Bus - VOLTAGE (KV/PU)
Branch - MVA/% OF RATE A
Equipment - MW/MVAR
100.0%RATEA
1.100OV 0.950UV
KV: >0.000<=35.000 <=69.000 <=138.000 <=240.000



CENTRAL AREA STUDY
2012 SUMMER PEAK BASE CASE REVISION 7.2.1
WED, MAR 18 2009 18:20

Figure A-2012-20-b

Bus - VOLTAGE (KV/PU)
Branch - MVA/% OF RATE A
Equipment - MW/MVAR
100.0%RATEA
1.100OV 0.950UV
KV: >0.000<=35.000 <=69.000 <=138.000 <=240.000

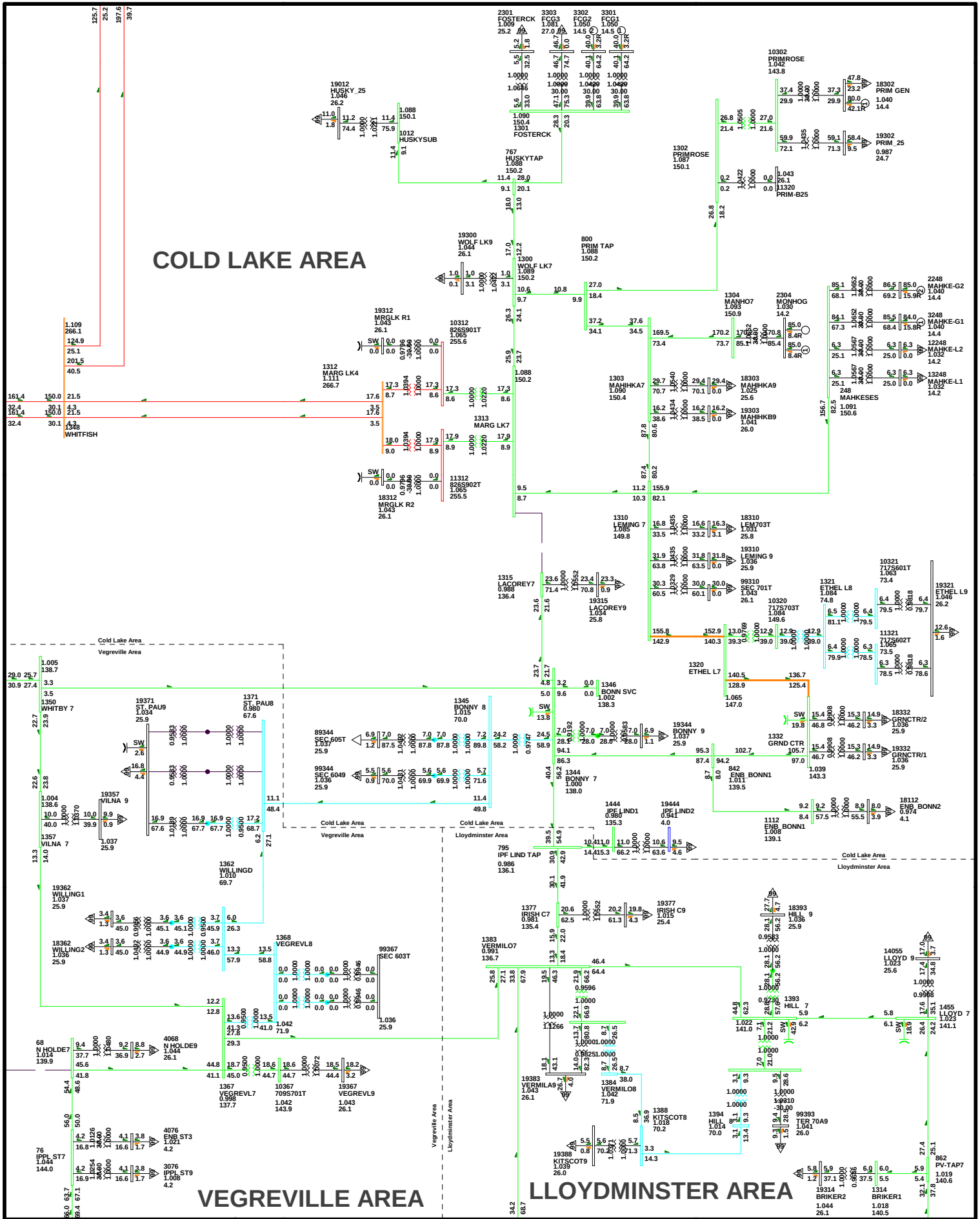
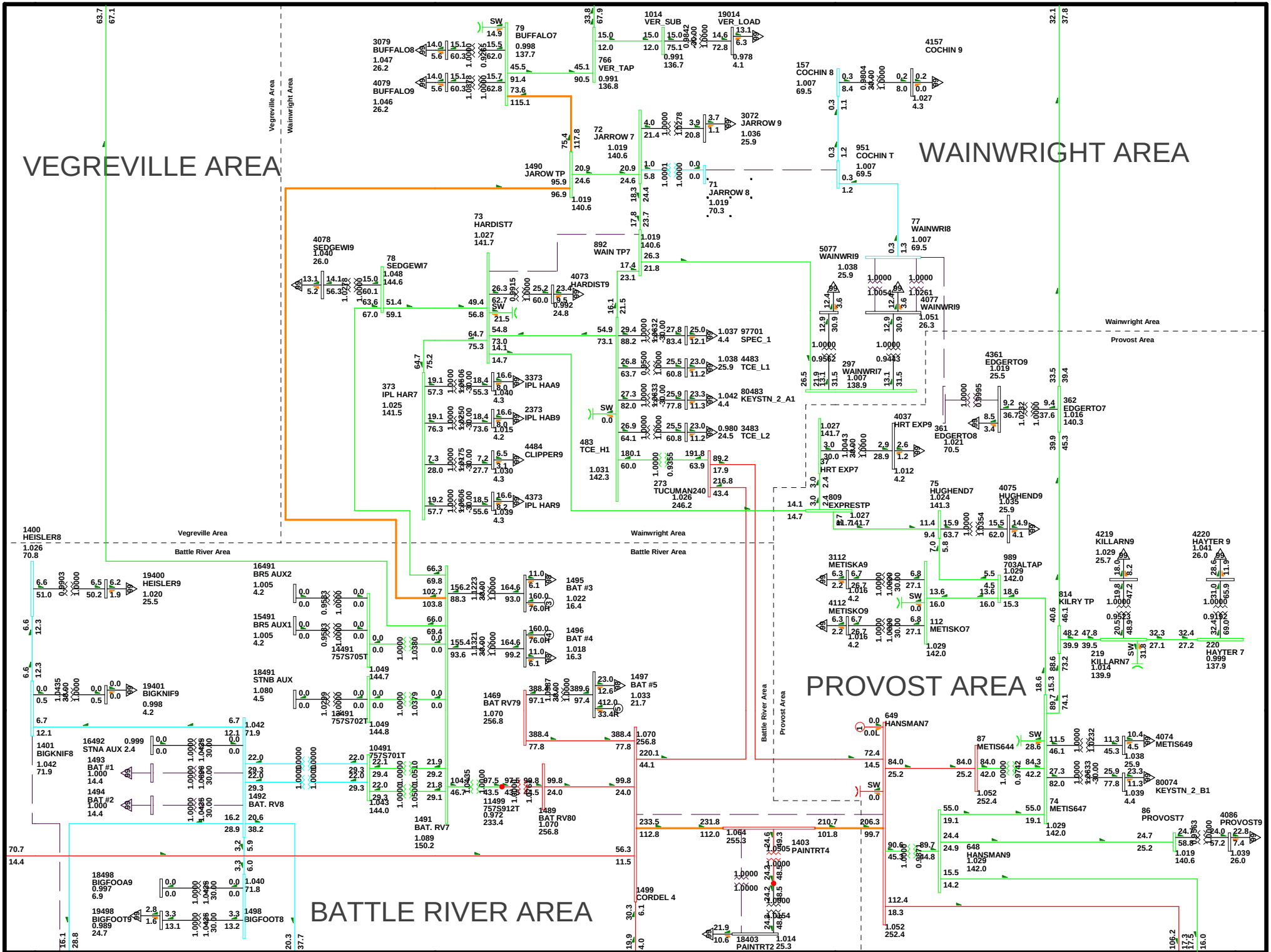


Figure A-2012-24-a

CENTRAL AREA STUDY
2012 SUMMER PEAK BASE CASE REVISION 7.2.1
WED, MAR 18 2009 18:24

Bus - VOLTAGE (KV/PU)
Branch - MVA/% OF RATE A
Equipment - MW/MVAR
100.0%RATEA
1.100OV 0.950UV
KV: >0.000 <=35.000 <=69.000 <=138.000 <=240.000



CENTRAL AREA STUDY
2012 SUMMER PEAK BASE CASE REVISION 7.2.1
WED, MAR 18 2009 18:25

Figure A-2012-24-b

Bus - VOLTAGE (KV/PU)
Branch - MVA/% OF RATE A
Equipment - MW/MVAR
100.0%RATEA
1.100OV0.950UV
KV: >0.000<=35.000 <=69.000 <=138.000 <=240.000

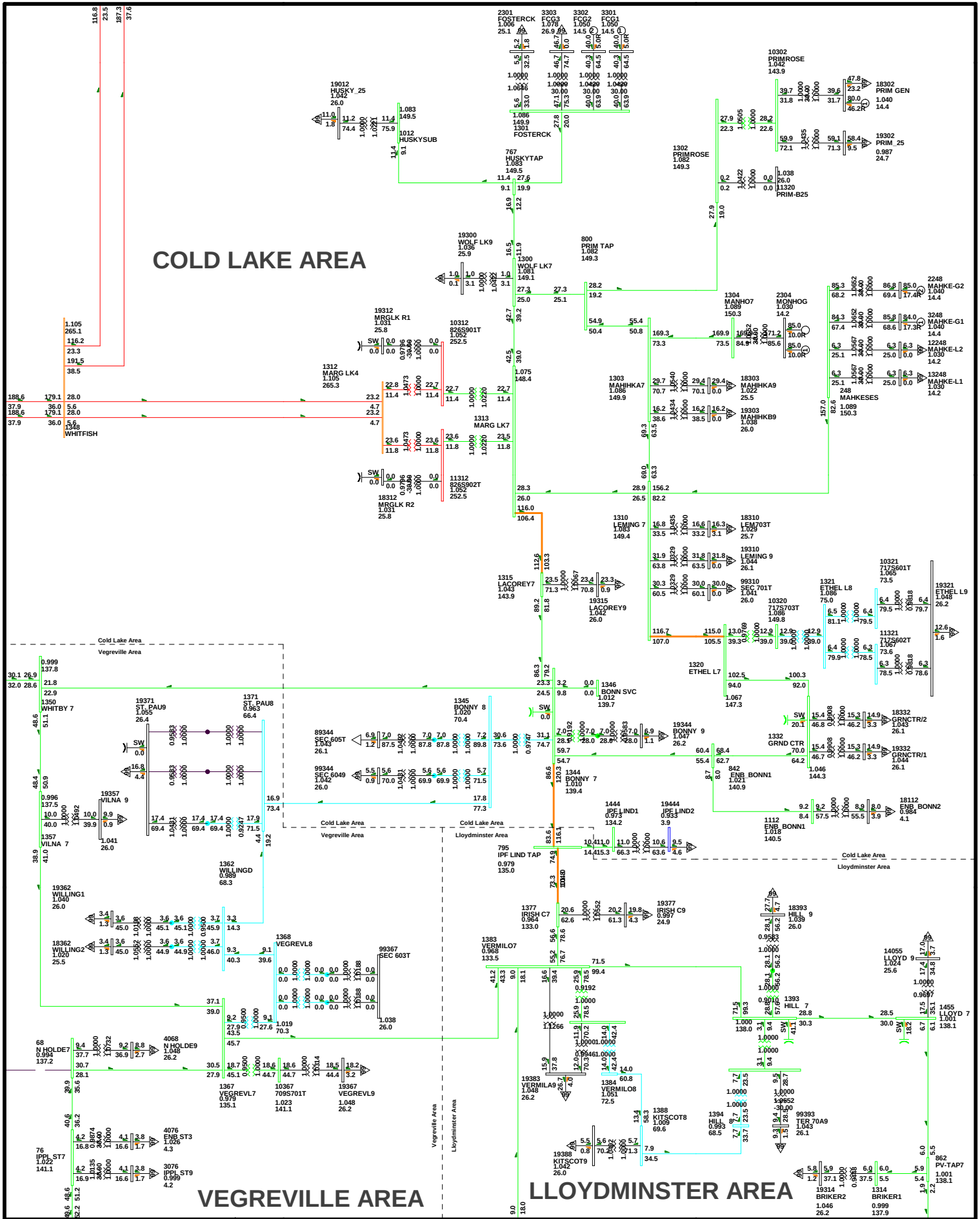
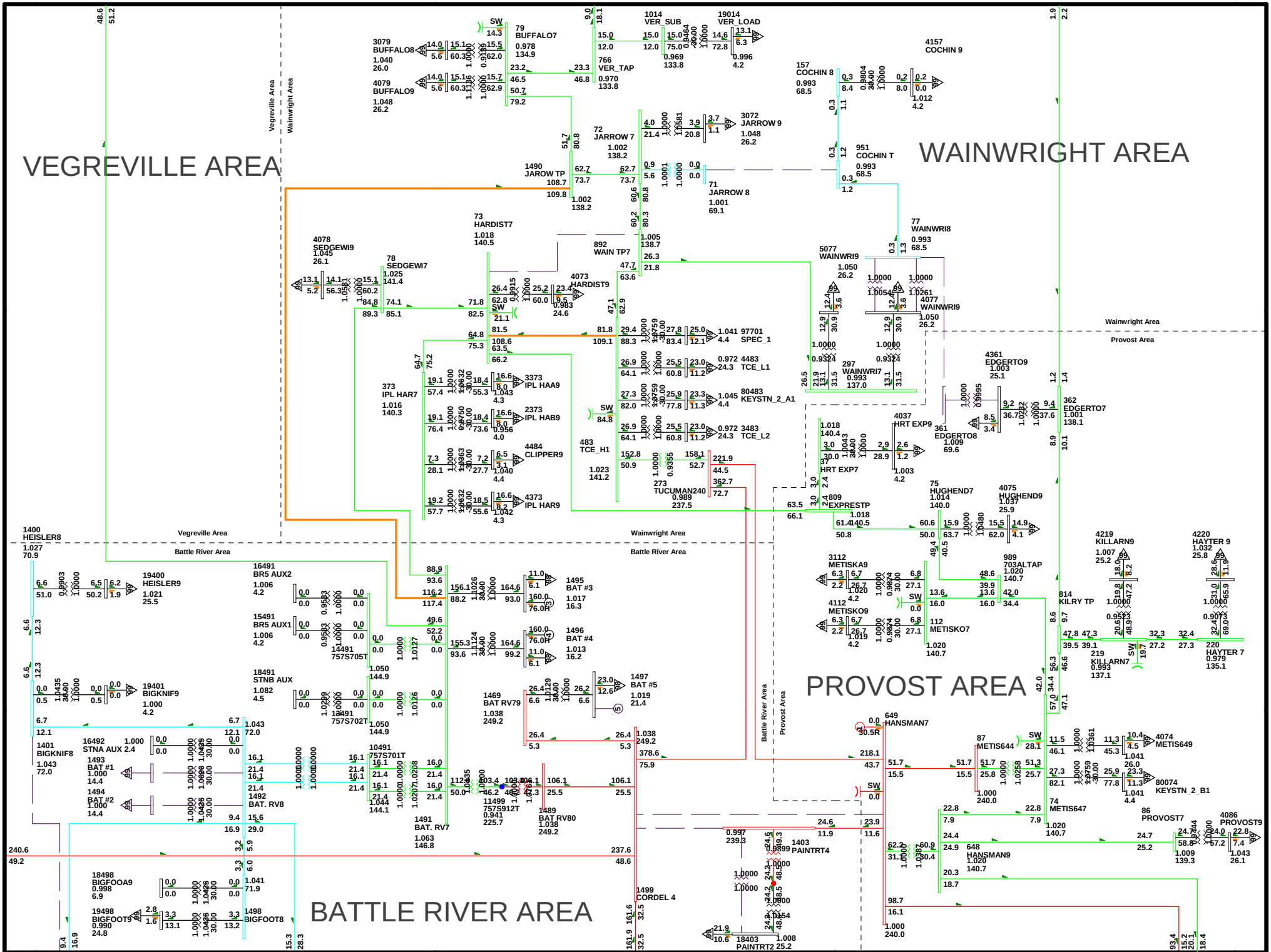


Figure A-2012-70-a

CENTRAL AREA STUDY
2012 SUMMER PEAK BASE CASE REVISION 7.2.1
FRI, MAR 20 2009 16:01

Bus - VOLTAGE (KV/PU)
Branch - MVA/% OF RATE A
Equipment - MW/MVAR
100.0%RATEA
1.100OV 0.950UV
KV: >0.000<=35.000 <=69.000 <=138.000 <=240.000



CENTRAL AREA STUDY
2012 SUMMER PEAK BASE CASE REVISION 7.2.1
FRI, MAR 20 2009 16:01

Figure A-2012-70-b

Bus - VOLTAGE (KV/PU)
Branch - MVA/% OF RATE A
Equipment - MW/MVAR
100.0%RATE A
1.000V 0.950UV
KV: >0.000 <=35.000 <=69.000 <=138.000 <=240.000

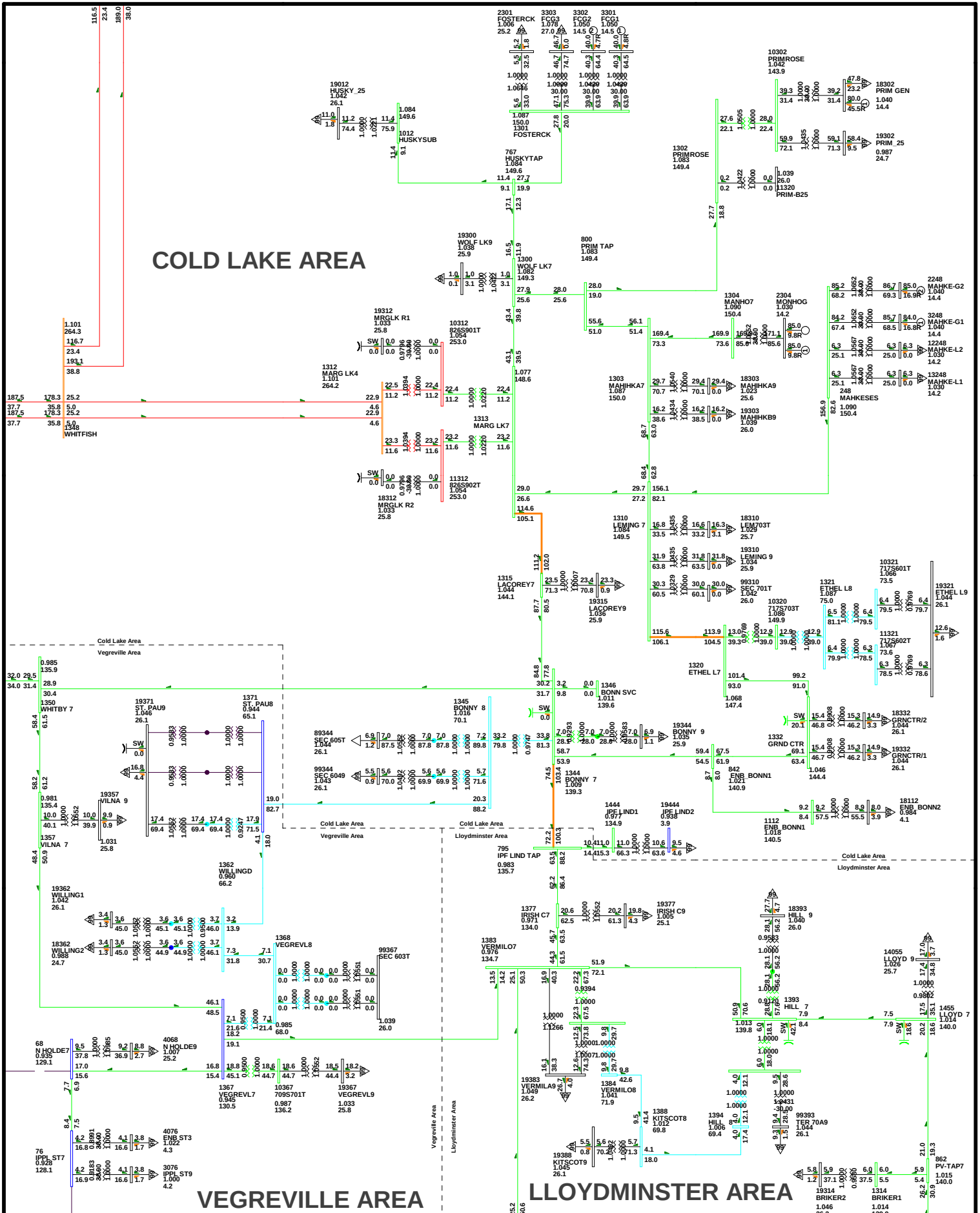
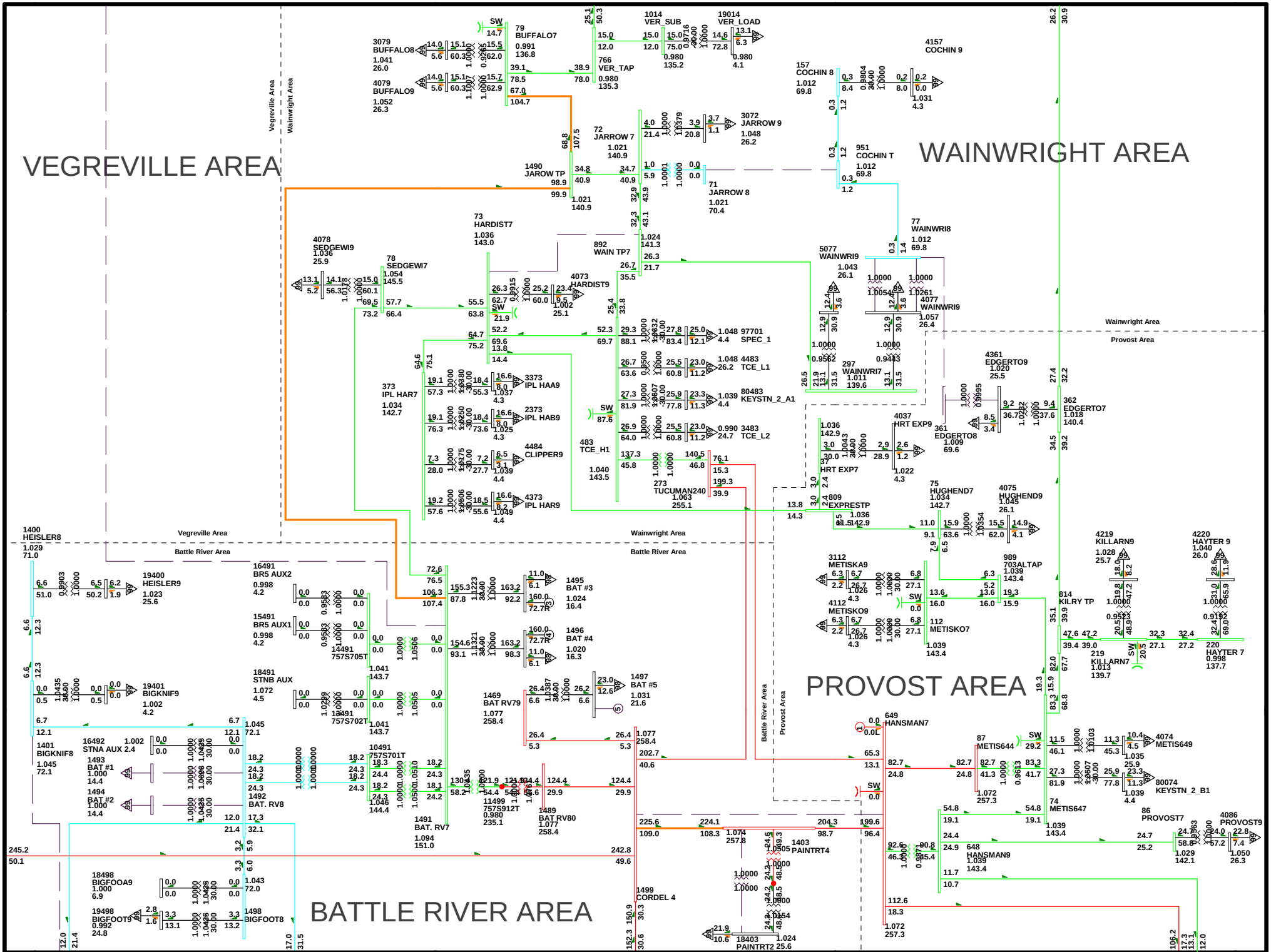


Figure A-2012-76-a

CENTRAL AREA STUDY
2012 SUMMER PEAK BASE CASE REVISION 7.2.1
FRI, MAR 20 2009 16:09

Bus - VOLTAGE (KV/PU)
Branch - MVA/% OF RATE A
Equipment - MW/MVAR
100.0%RATEA
1.100OV 0.950UV
KV: >0.000<=35.000 <=69.000 <=138.000 <=240.000



CENTRAL AREA STUDY
2012 SUMMER PEAK BASE CASE REVISION 7.2.1
FRI, MAR 20 2009 16:09

Figure A-2012-76-b

Bus - VOLTAGE (KV/PU)
Branch - MVA/% OF RATE A
Equipment - MW/MVAR

100.0%RATE A
1.000UV 0.950UV
KV: >0.000 <=35.000 <=69.000 <=138.000 <=240.000

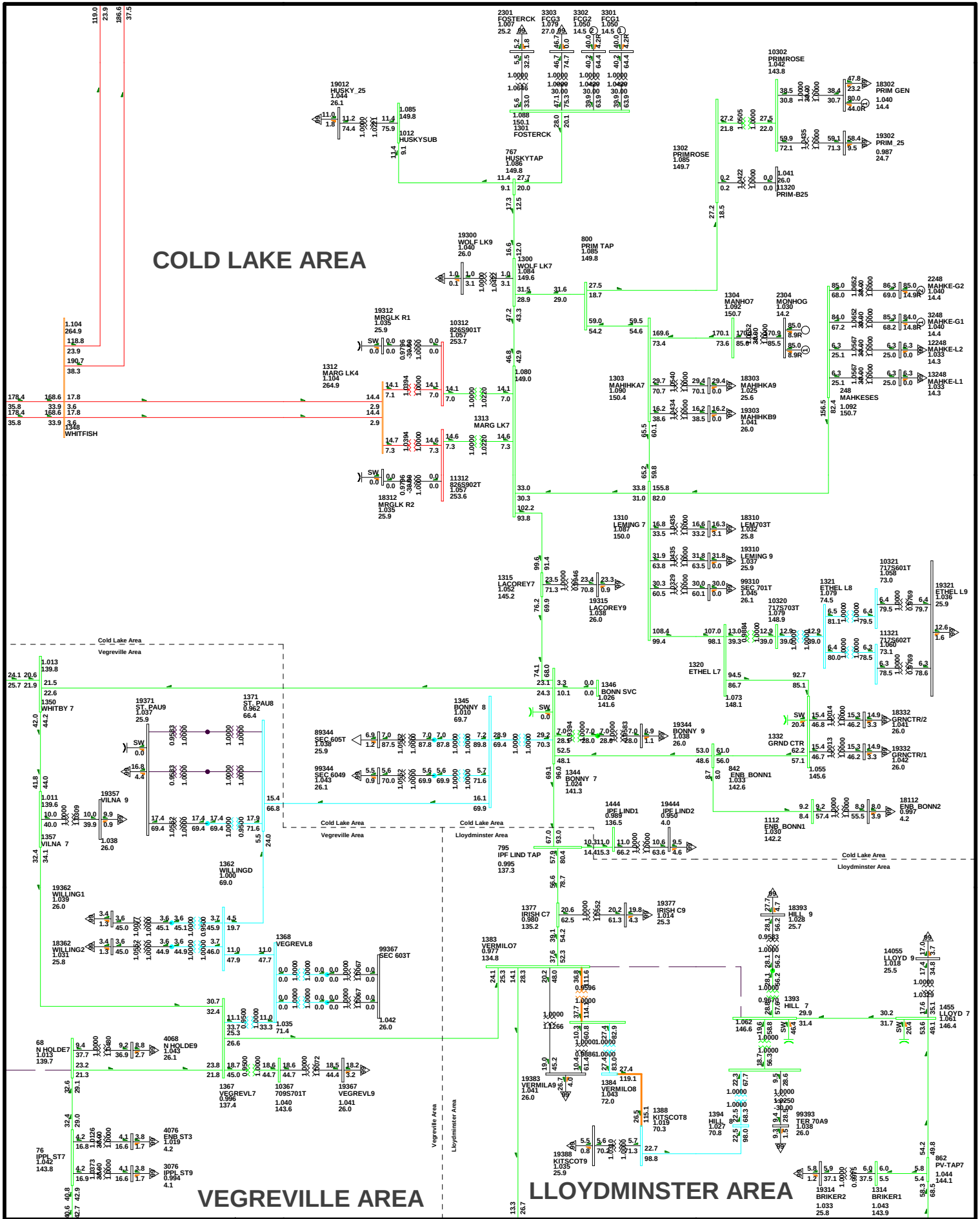
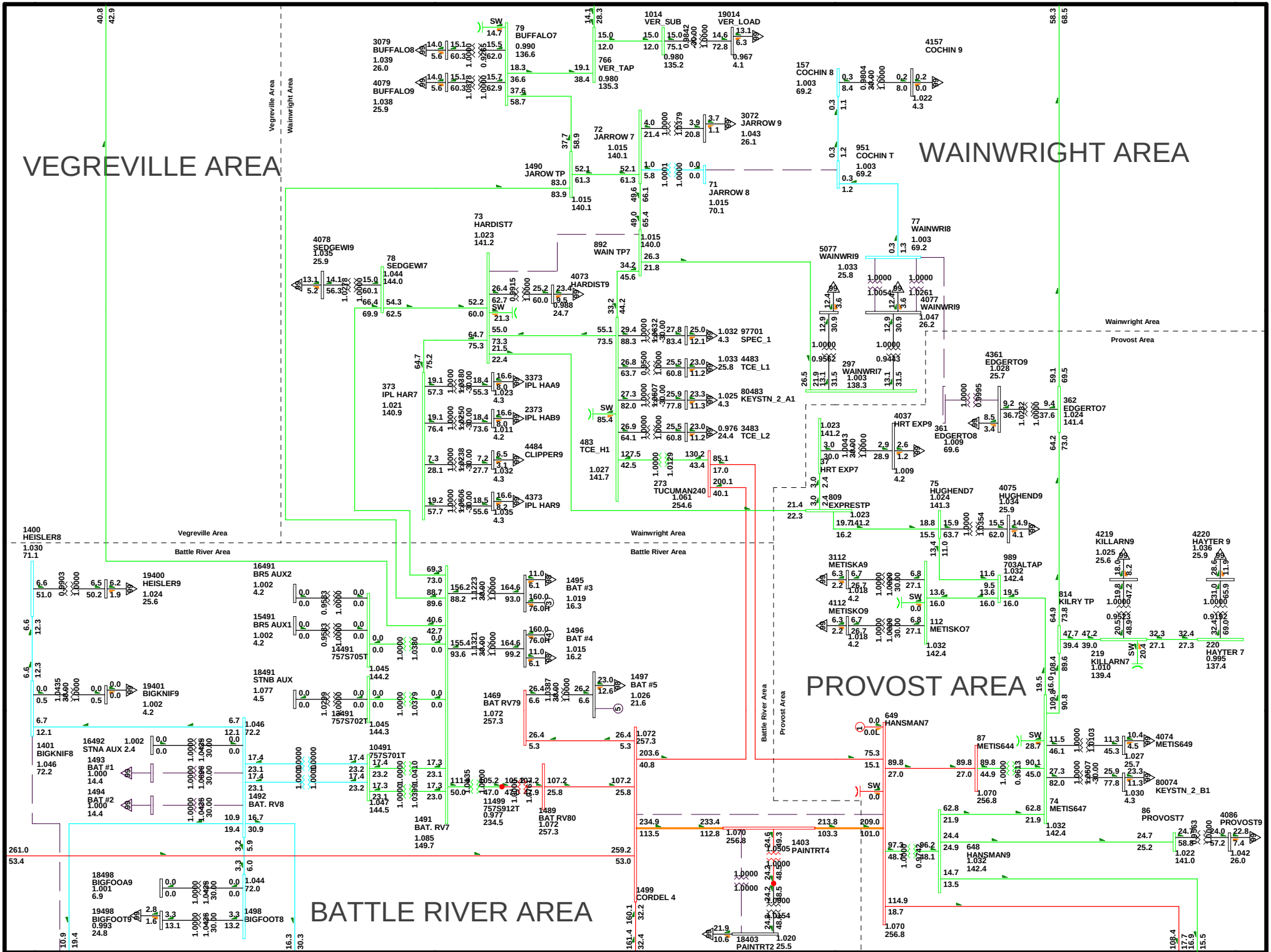


Figure A-2012-79-a

CENTRAL AREA STUDY
2012 SUMMER PEAK BASE CASE REVISION 7.2.1
FRI, MAR 20 2009 16:11

Bus - VOLTAGE (KV/PU)
Branch - MVA/% OF RATE A
Equipment - MW/MVAR
100.0%RATEA
1.100OV 0.950UV
KV: >0.000<=35.000 <=69.000 <=138.000 <=240.000

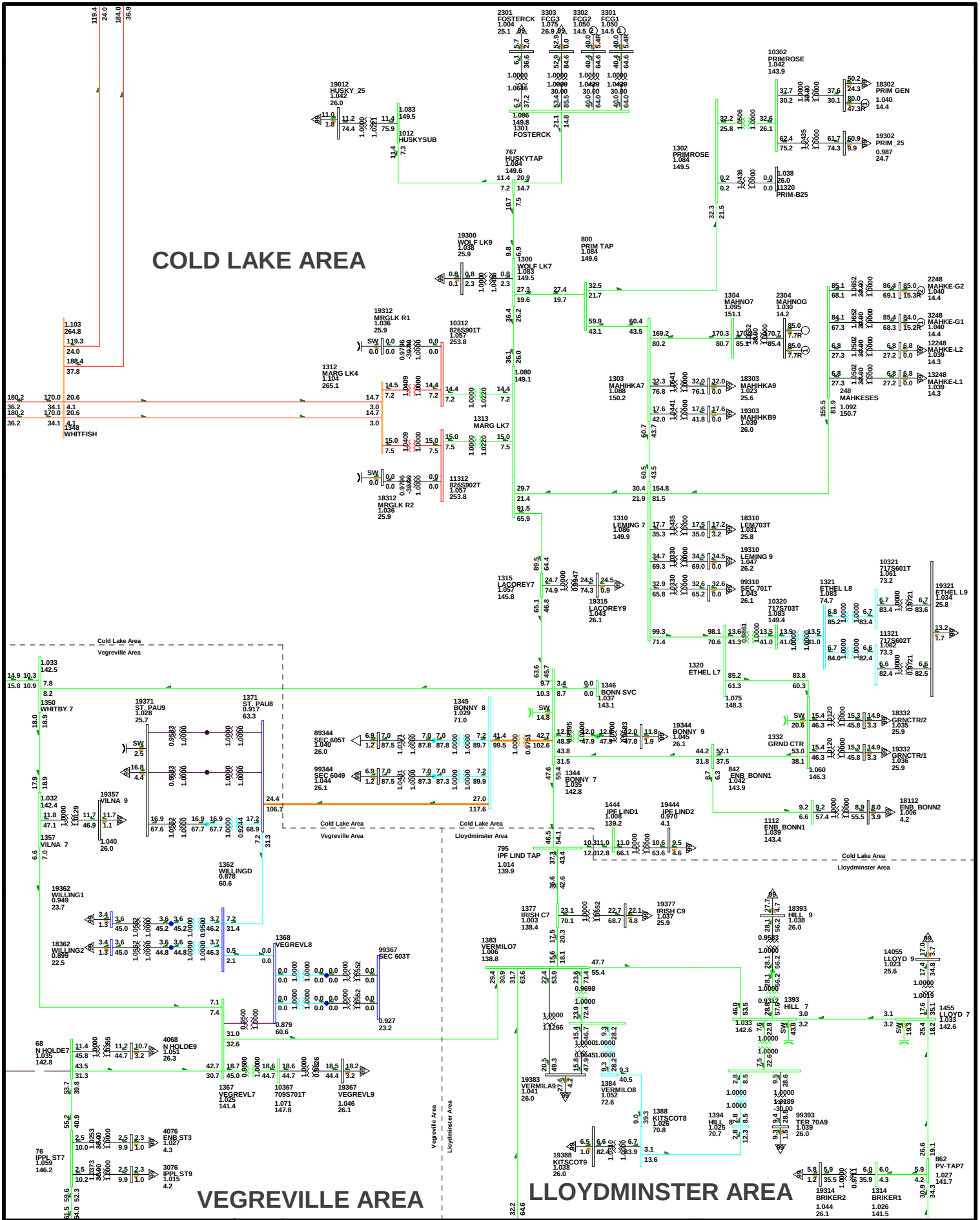


CENTRAL AREA STUDY
2012 SUMMER PEAK BASE CASE REVISION 7.2.1
FRI, MAR 20 2009 16:11

Figure A-2012-79-b

Bus - VOLTAGE (KV/PU)
Branch - MVA/% OF RATE A
Equipment - MW/MVAR

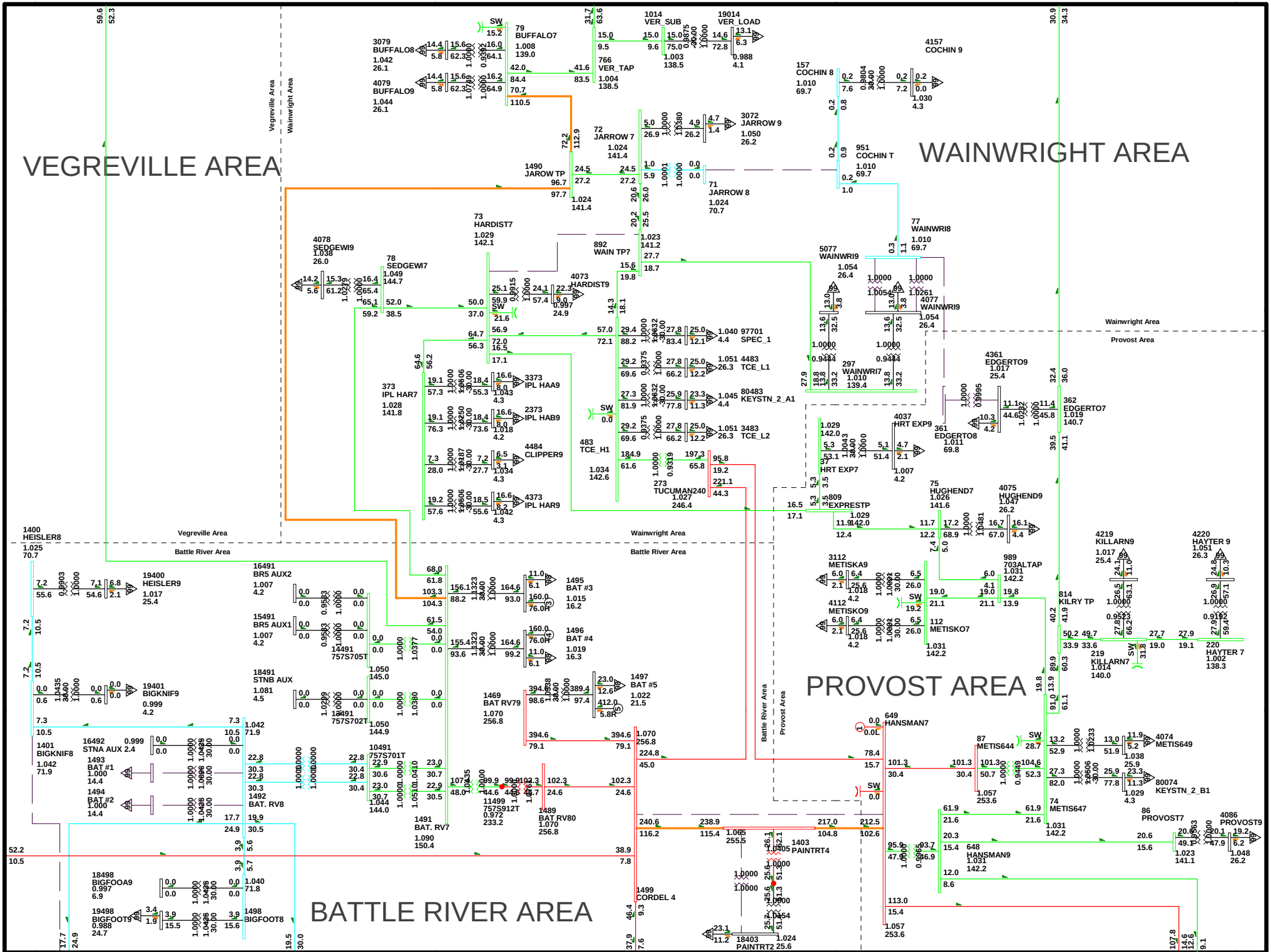
100.0%RATE A
1.0000V 0.950UV
KV: >0.000 <=35.000 <=69.000 <=138.000 <=240.000



CENTRAL AREA STUDY
2012 WINTER PEAK BASE CASE REVISION 7.2.1
THU, MAR 19 2009 11:30

Figure A-2012-33-a

Bus - VOLTAGE (KV/PU)
Branch - MVA/% OF RATE B
Equipment - MW/MVAR
100.0%RATEB
1.100OV 0.950UV
KV: >0.000<=35.000 <=69.000 <=138.000 <=240.000



CENTRAL AREA STUDY
2012 WINTER PEAK BASE CASE REVISION 7.2.1
THU, MAR 19 2009 11:30

Figure A-2012-33-b

Bus - VOLTAGE (KV/PU)
Branch - MVA/% OF RATE B
Equipment - MW/MVAR
100.0%RATEB
1.100OV 0.950UV
KV: >0.000 <=35.000 <=69.000 <=138.000 <=240.000

2017 Load Flow Diagrams

2017 Summer Peak

2017 Winter Peak

Figure Number	2017sp Contingency	Overloaded Element	Transmission Voltage Violation
	NOTE: RED lettering indicates additional violation under N-G-1		
	NOTE: Italized print means new or changed from winter peak listing.		
A-2017-13	Vegreville 144-72kV tie transformer	6L82 Bonnyville 700S to St. Paul 707S Bonnyville 144-72kV Tie Transformer	Voltage collapse (below 85%) at Willingdon 711S. Voltage below 90% at St. Paul 707S
A-2017-9	6L79 Vegreville 709S to Willingdon 711S	6L82 Bonnyville 700S to St. Paul 707S Bonnyville 144-72kV Tie Transformer	Voltage collapse (below 85%) at Willingdon 711S. Voltage below 90% at St. Paul 707S
A-2017-106	*7L24 Bonnyville 700S to Grande Centre 846S*	*7L89 Marguerite Lake 826S to La Corey 721S*	
A-2017-107	7L28 Ethel Lake 717S to Grande Centre 846S	7L89 Marguerite Lake 826S to La Corey 721S *and 7L89 Bonnyville 700S to La Corey 721S*	
A-2017-22	7L66 Leming Lake 715S to Ethel Lake 717S	7L89 Marguerite Lake 826S to La Corey 721S	
A-2017-27	7L89 Marguerite Lake 826S to La Corey 721S	7L28 Ethel Lake 717S to Grande Centre 846S 7L66 Leming Lake 715S to Ethel Lake 717S	
A-2017-95	7L53 Bonnyville 700S to Irish Creek 706S		Voltage drops below 90% at Irish Creek 706S and Vermilion 710S. Borderline voltages at 90% for Vermilion tapped sub
A-2017-12	Hill 144-72-25kV Tie Transformer		Voltage collapse (below 85%) at Kitscoty 705S
A-2017-91	7L701 Battle River 757S to Strome 223S		*Voltages below at 90% at Vegreville 709S and borderline at 90% for Kitscoty 705S and Hill 751S 72kV bus*
A-2017-19	*7L702 Battle River 757S to Hardisty 377S*	*Tucuman 240-138kV Tie Transformer*	
A-2017-171	*703L Metiskow 648S to Hardisty 377S (Primrose G out)*	*Tucuman 240-138kV Tie Transformer*	
A-2017-10	749L Metiskow 648S to Edgerton 899S		Voltages below 90% at Hill 751S (72kV)and Kitscoty 705S
A-2017-31	*Hansman Lake 240-138kV Tie Transformer*	*Metiskow 240-138kV Tie Transformer*	
A-2017-33	Metiskow 240-138kV Tie Transformer	Hansman Lake 240-138kV Tie Transformer	
A-2017-34	954L Metiskow 648S to Hansman Lake 650S	Hansman Lake 240-138kV Tie Transformer	
A-2017-98	*9L59 Cordel 755S to Halkirk*		*Voltage drops below 90% on 240kV at Battle River 757S*
A-2017-47	6L82 Bonnyville 700S to St. Paul 707S	6L79 Vegreville 709S to Willingdon 711S	(NOTE: With all 25kV capacitors on at St. Paul, no voltage violations.)

NOTE: For many 240kV contingencies (e.g. 9L20 Cordel to Nevis and Cordel to Halkirk, etc.) the future Hansman Lake Hansman Lake SVC is operating to prevent voltage collapse.

NOTE: BLACK text indicates N-1 violations;
RED text indicates additional violations under Battle River N-G-1;
BLUE text indicates additional violations under Primrose N-G-1;
MAROON text indicates additional violations under Battle River or Primrose N-G-1.

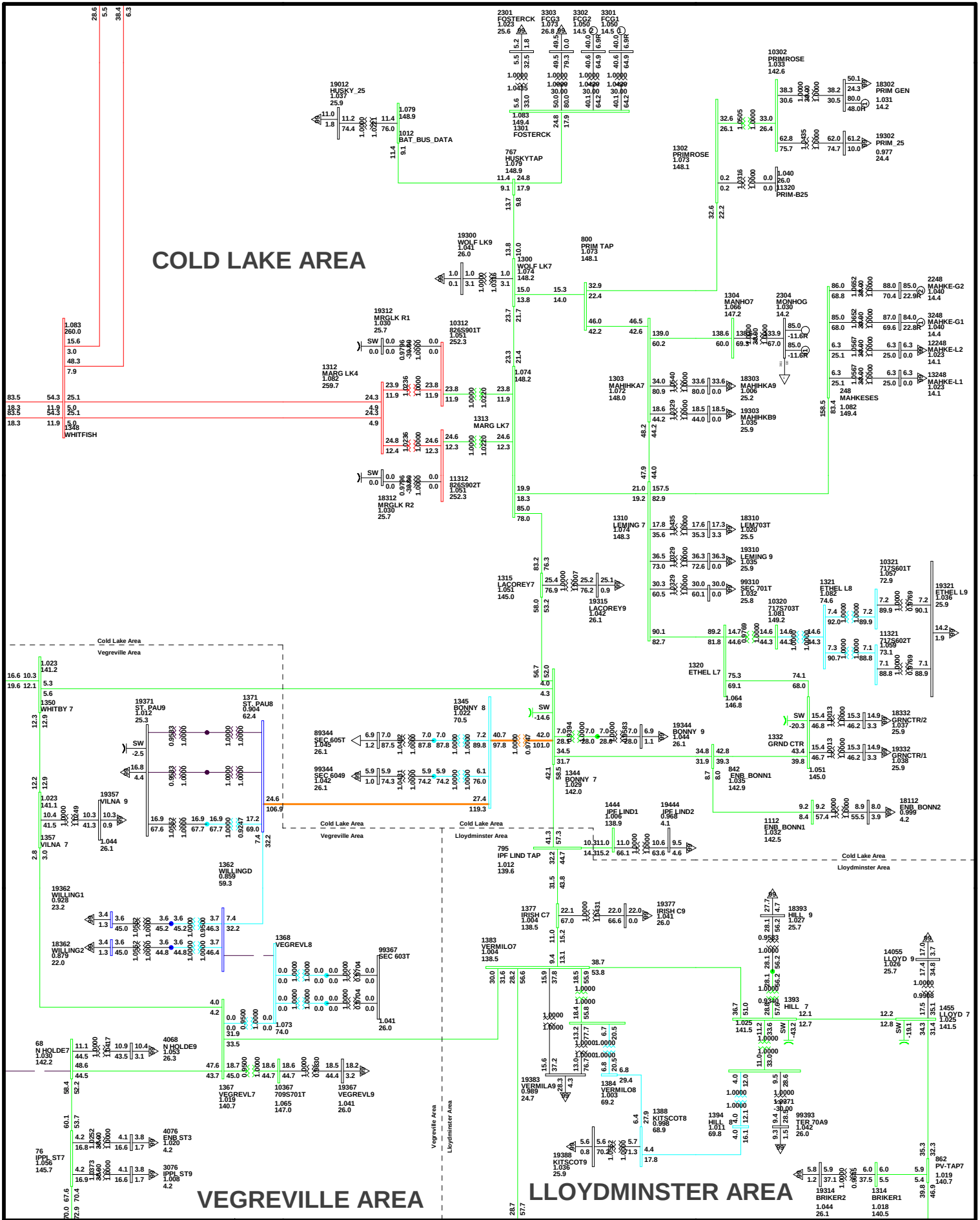
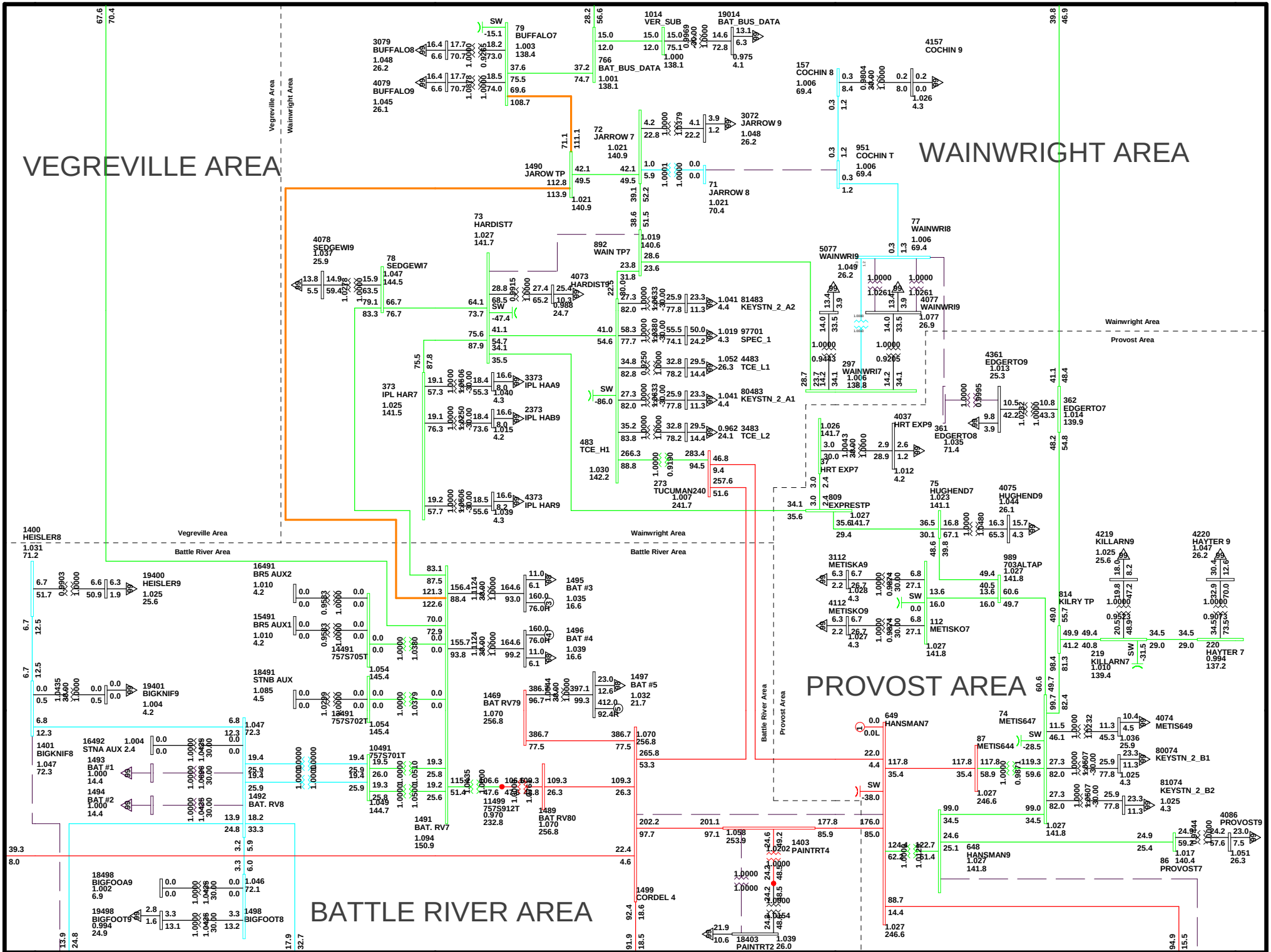


Figure A-2017-9-a

CENTRAL AREA STUDY
2017 SUMMER PEAK BASE CASE REVISION 7.2
THU, MAR 19 2009 16:02

Bus - VOLTAGE (KV/PU)
Branch - MVA/% OF RATE A
Equipment - MW/MVAR
100.0%RATEA
1.100OV 0.950UV
KV: >0.000 <=35.000 <=69.000 <=138.000 <=240.000


VEGREVILLE AREA
WAINWRIGHT AREA
PROVOST AREA
BATTLE RIVER AREA
Vegreville Area
Wainwright Area
Provost Area
Battle River Area
79 BUFFALO7
3079 BUFFALO8
4079 BUFFALO9
1014 VER_SUB
19014 BAT_BUS_DATA
766 BAT_BUS_DATA
72 JAROW 7
1490 JAROW TP
3072 JARROW 9
71 JARROW 8
951 COCHIN T
157 COCHIN 8
4157 COCHIN 9
73 HARDIST7
892 WAIN TP7
4078 SEDGEWI9
78 SEDGEWI7
4073 HARDIST9
81483 KEYSTN_2_A2
97701 SPEC_1
4483 TCE_L1
80483 KEYSTN_2_A1
3483 TCE_L2
483 TCE_H1
273 TUCUMAN240
373 IPL HAR7
3373 IPL HAA9
2373 IPL HAB9
4373 IPL HAR9
77 WAINWRI8
5077 WAINWRI9
4077 WAINWRI9
297 WAINWRI7
4361 EDGERTO9
362 EDGERTO7
361 EDGERTO8
4037 HRT EXP9
HRT EXP7
809 EXPRESTP
75 HUGHEND7
4075 HUGHEND9
1400 HEISLER8
19400 HEISLER9
19401 BIGKNIF9
1401 BIGKNIF8
16492 STNA AUX
18498 BIGFOOA9
19498 BIGFOOT9
1498 BIGFOOT8
16491 BR5 AUX2
15491 BR5 AUX1
14491 757S705T
18491 STNB AUX
13491 757S702T
10491 757S701T
1493 BAT #1
1494 BAT #2
1492 BAT. RV8
1491 BAT. RV7
11499 757S912T
1495 BAT #3
1496 BAT #4
1497 BAT #5
1469 BAT RV79
1489 BAT RV80
1499 CORDEL 4
18403 PAINTRT2
1403 PAINTRT4
649 HANSMAN7
648 HANSMAN9
74 METIS647
87 METIS644
4074 METIS649
80074 KEYSTN_2_B1
81074 KEYSTN_2_B2
4086 PROVOST9
86 PROVOST7
3112 METISKA9
4112 METISKO9
112 METISKO7
989 703ALTAP
814 KILRY TP
4219 KILLARN9
219 KILLARN7
4220 HAYTER 9
220 HAYTER 7
SW
Figure A-2017-9-b
CENTRAL AREA STUDY
2017 SUMMER PEAK BASE CASE REVISION 7.2
THU, MAR 19 2009 16:02
Bus - VOLTAGE (KV/PU)
Branch - MVA/% OF RATE A
Equipment - MW/MVAR
100.0%RATEA
1.100OV0.950UV
KV: >0.000<=35.000 <=69.000 <=138.000 <=240.000

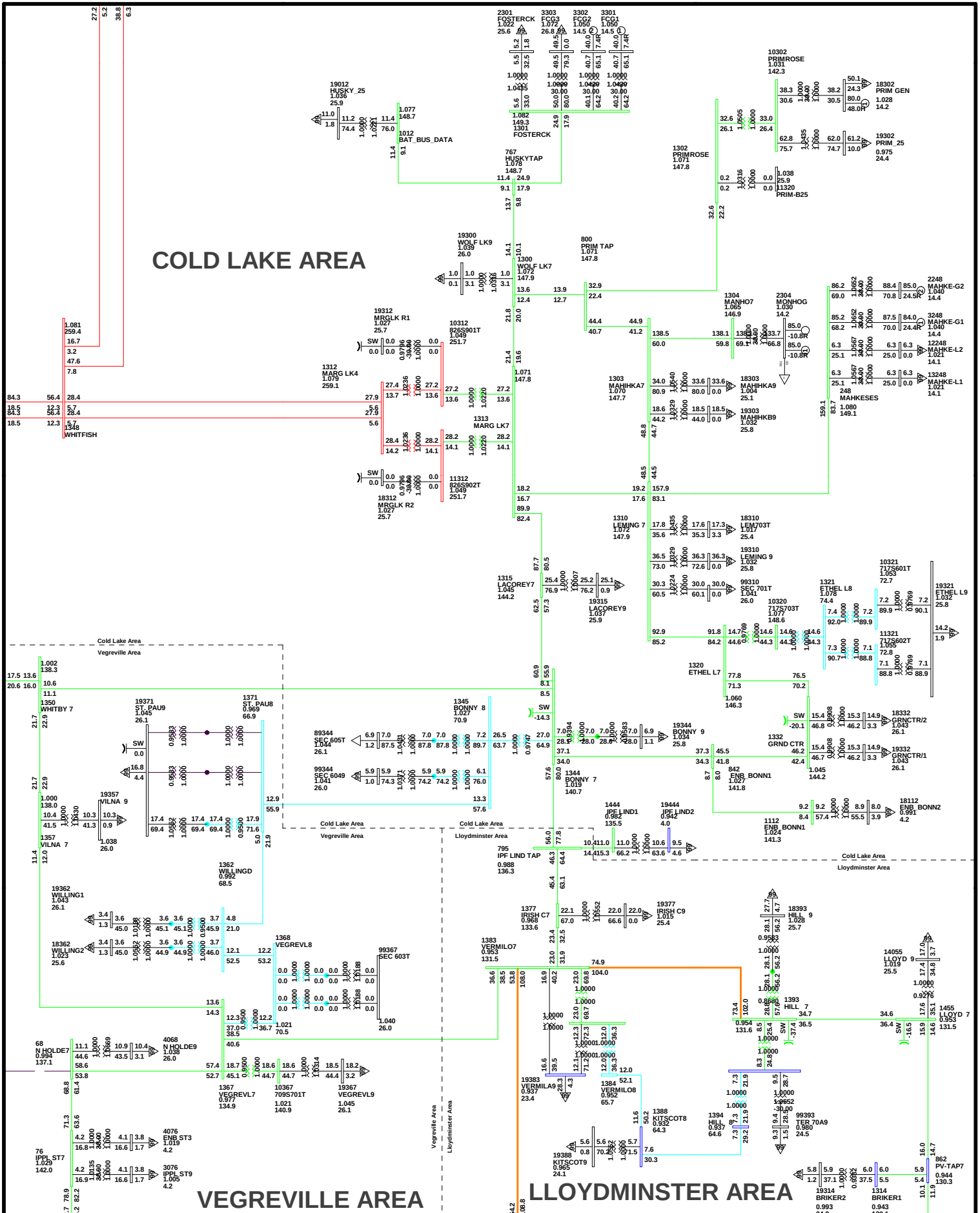
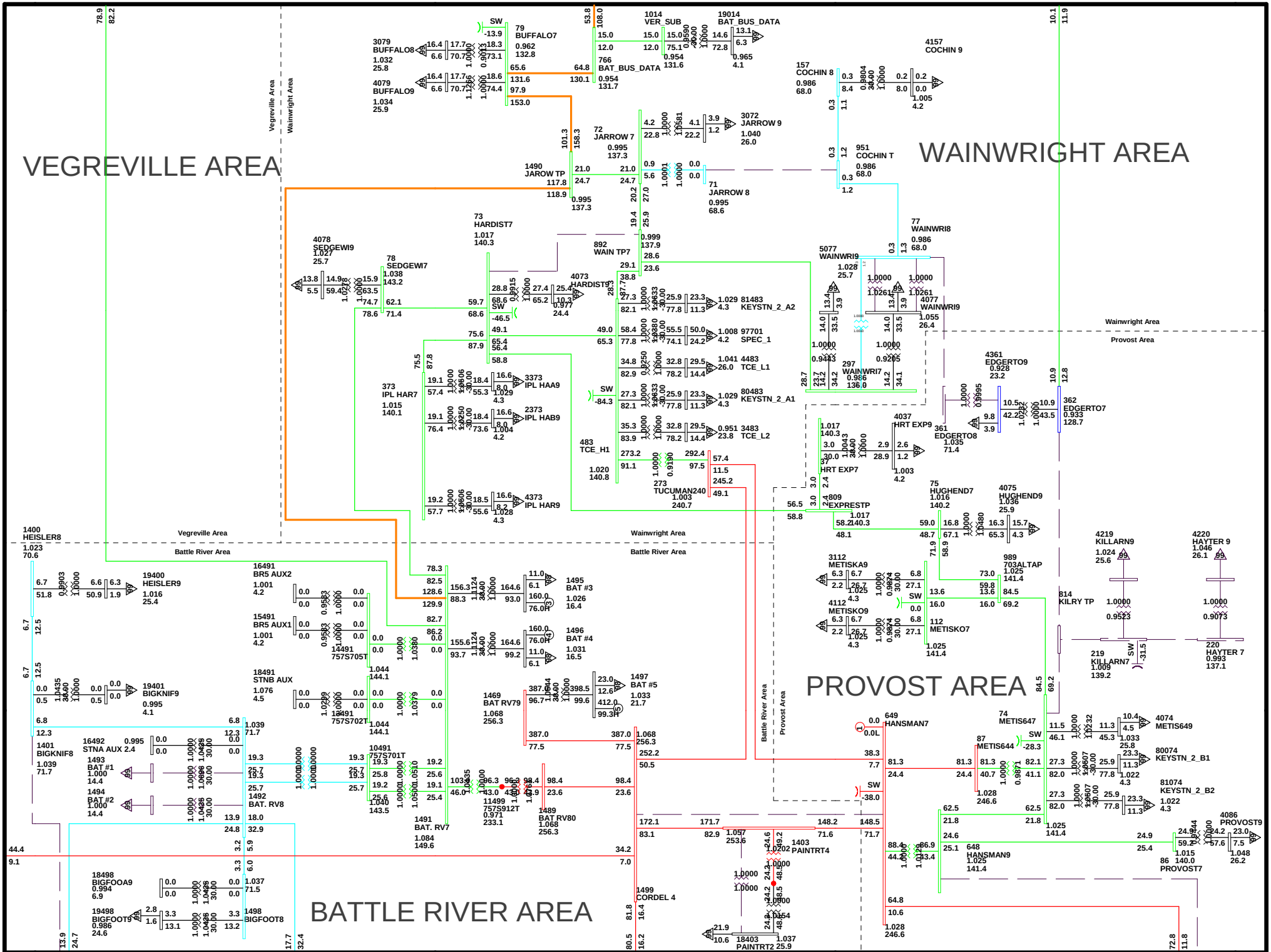


Figure A-2017-10-a

CENTRAL AREA STUDY
2017 SUMMER PEAK BASE CASE REVISION 7.2
THU, MAR 19 2009 16:03

Bus - VOLTAGE (KV/PU)
Branch - MVA/% OF RATE A
Equipment - MW/MVAR
100.0%RATEA
1.100OV 0.950UV
KV: >0.000 <=35.000 <=69.000 <=138.000 <=240.000



CENTRAL AREA STUDY
2017 SUMMER PEAK BASE CASE REVISION 7.2
THU, MAR 19 2009 16:03

Figure A-2017-10-b

Bus - VOLTAGE (KV/PU)
Branch - MVA/% OF RATE A
Equipment - MW/MVAR
100.0%RATEA
1.100OV0.950UV
KV: >0.000<=35.000 <=69.000 <=138.000 <=240.000

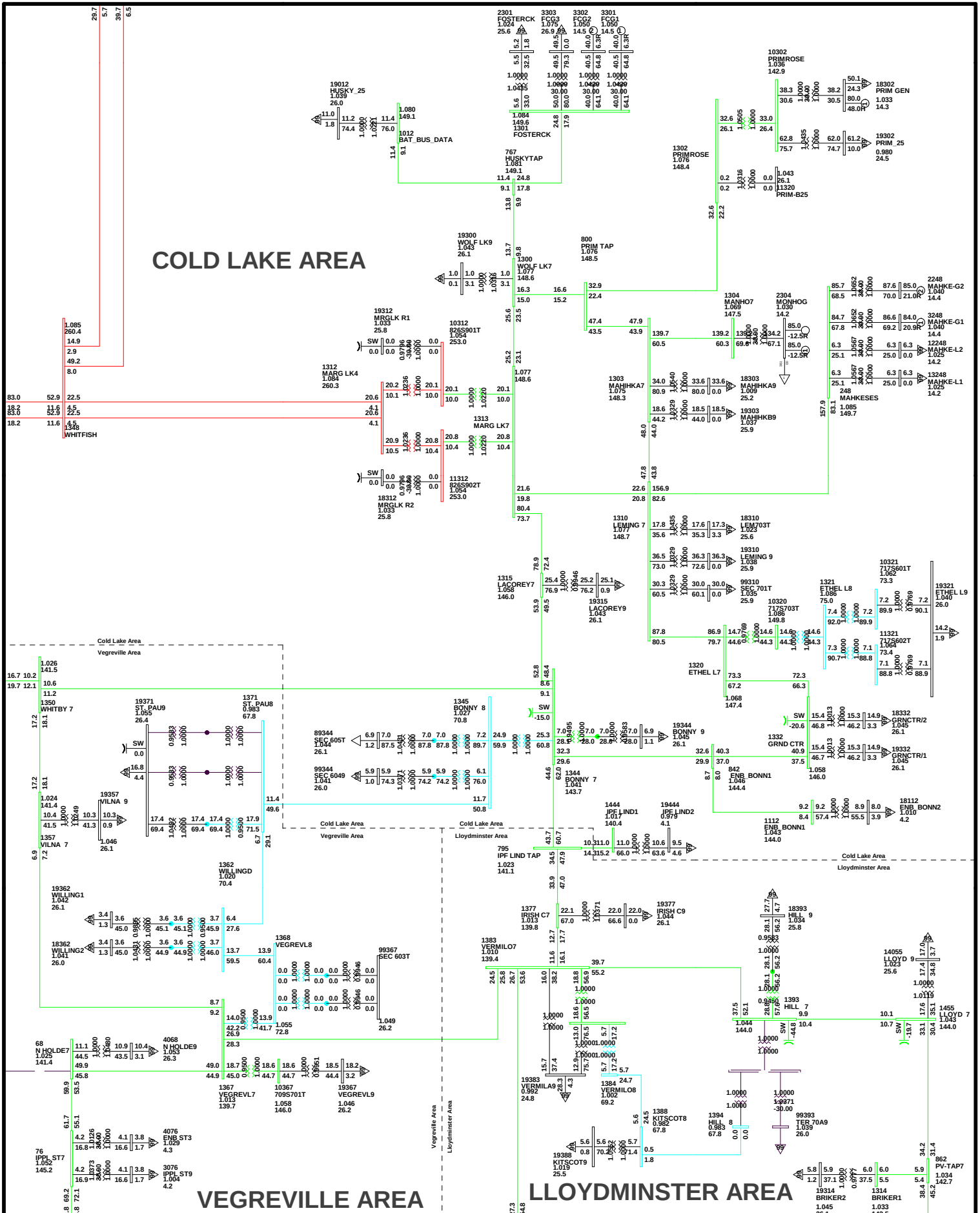
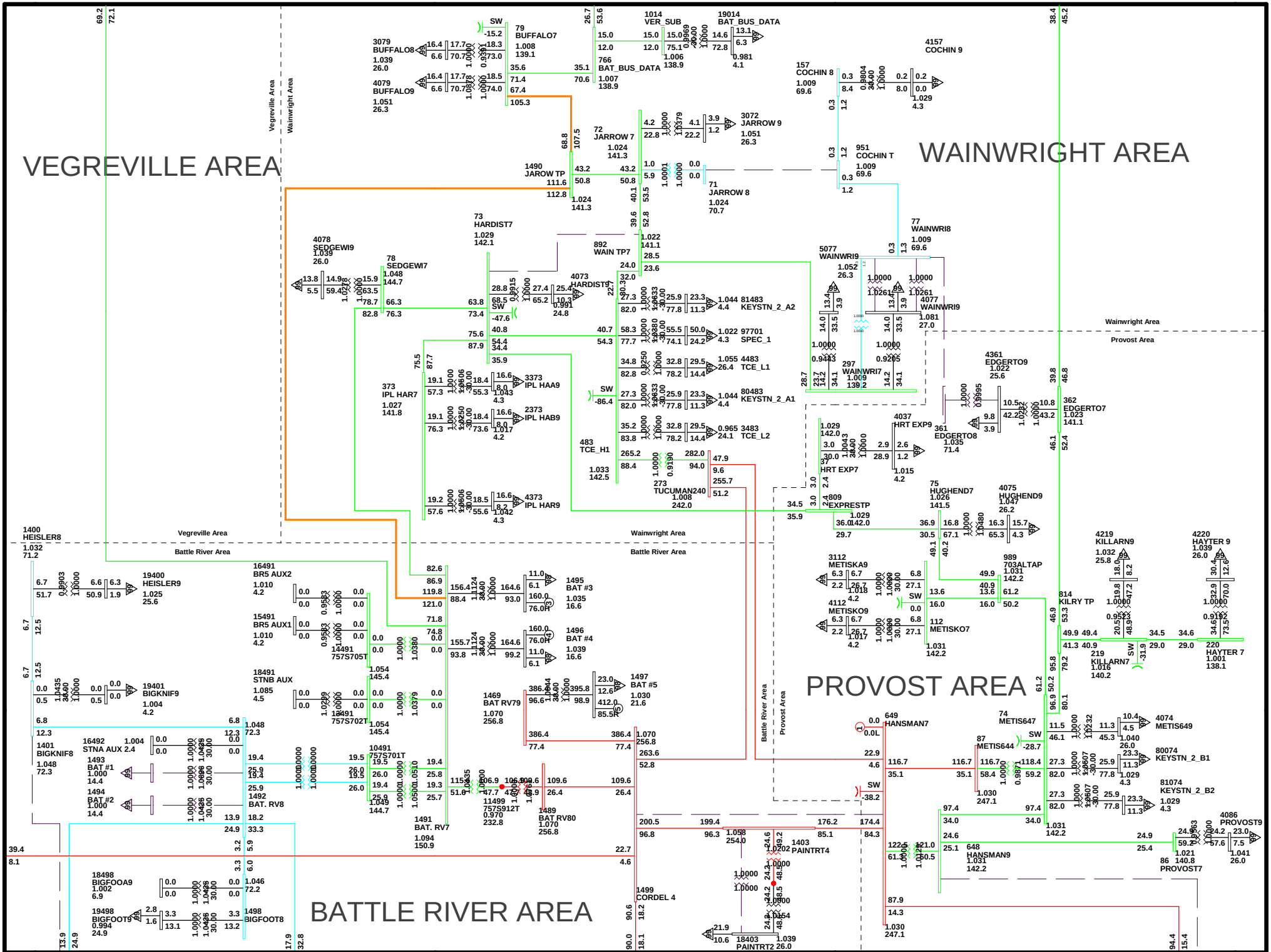


Figure A-2017-12-a

CENTRAL AREA STUDY
2017 SUMMER PEAK BASE CASE REVISION 7.2
THU, MAR 19 2009 16:12

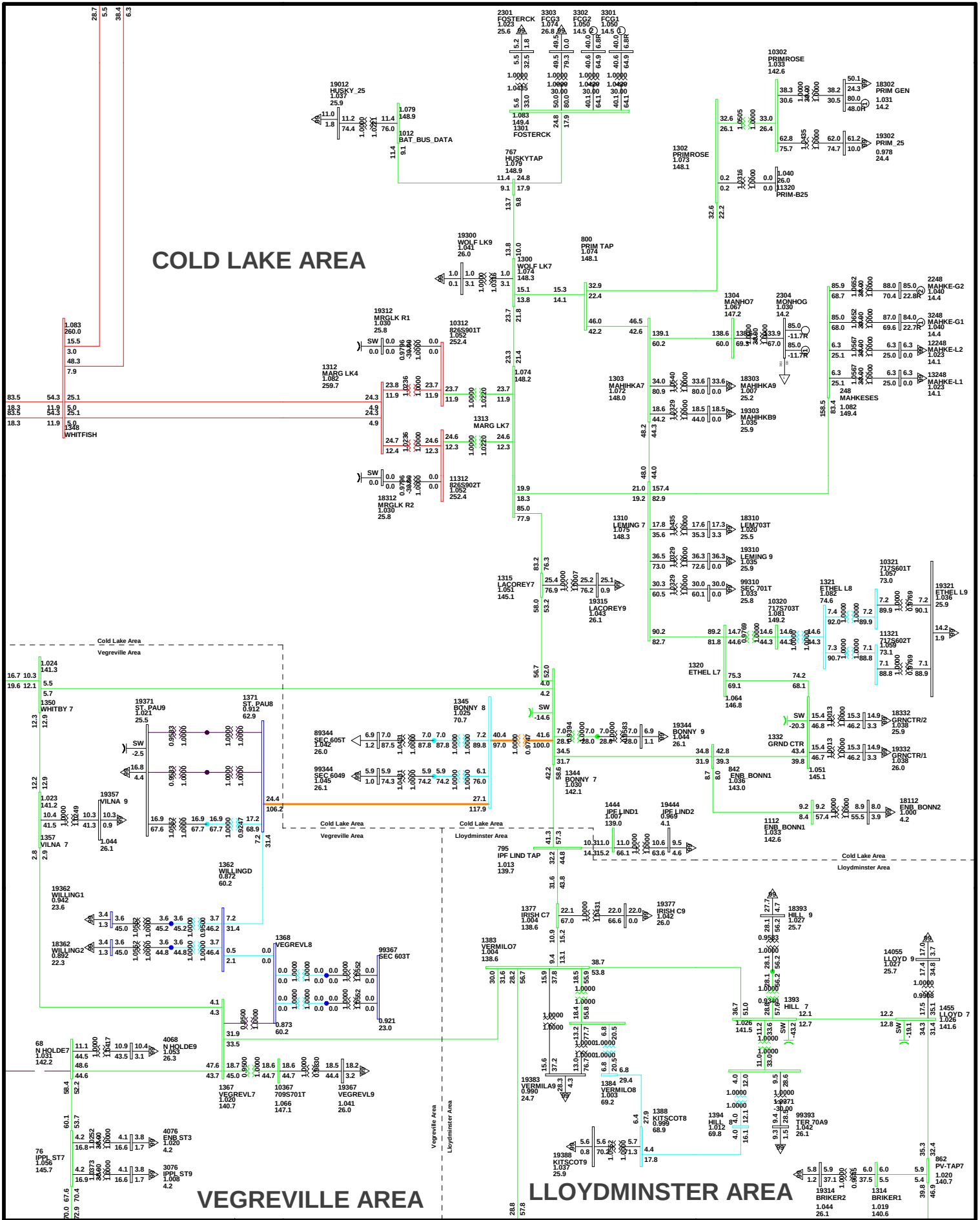
Bus - VOLTAGE (KV/PU)
Branch - MVA/% OF RATE A
Equipment - MW/MVAR
100.0%RATEA
1.100OV 0.950UV
KV: >0.000 <=35.000 <=69.000 <=138.000 <=240.000



CENTRAL AREA STUDY
2017 SUMMER PEAK BASE CASE REVISION 7.2
THU, MAR 19 2009 16:13

Figure A-2017-12-b

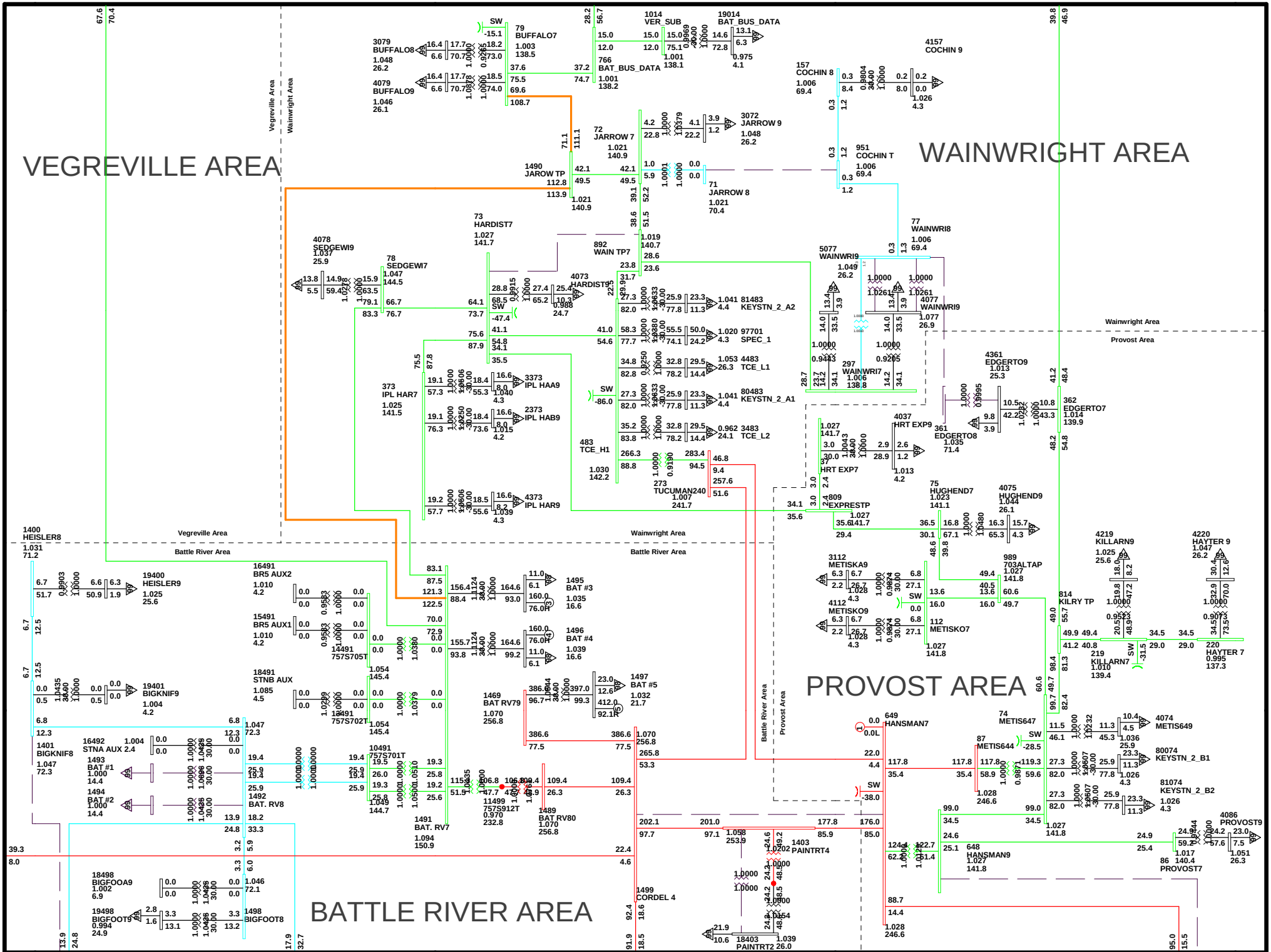
Bus - VOLTAGE (KV/PU)
Branch - MVA/% OF RATE A
Equipment - MW/MVAR
100.0%RATEA
1.100OV0.950UV
KV: >0.000<=35.000 <=69.000 <=138.000 <=240.000



CENTRAL AREA STUDY
2017 SUMMER PEAK BASE CASE REVISION 7.2
THU, MAR 19 2009 16:13

Figure A-2017-13-a

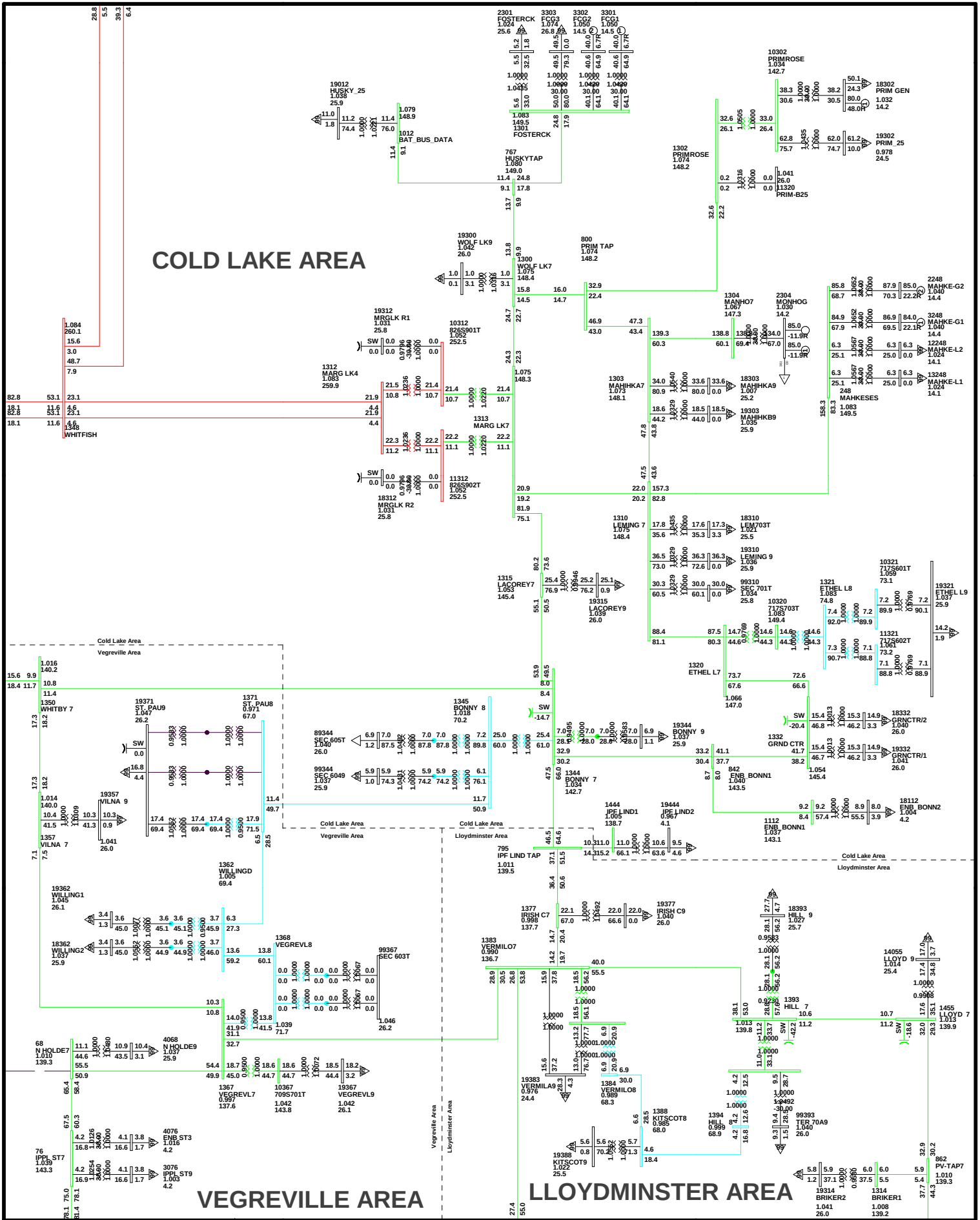
Bus - VOLTAGE (KV/PU)
Branch - MVA/% OF RATE A
Equipment - MW/MVAR
100.0%RATEA
1.100OV 0.950UV
KV: >0.000 <=35.000 <=69.000 <=138.000 <=240.000



CENTRAL AREA STUDY
2017 SUMMER PEAK BASE CASE REVISION 7.2
THU, MAR 19 2009 16:14

Figure A-2017-13-b

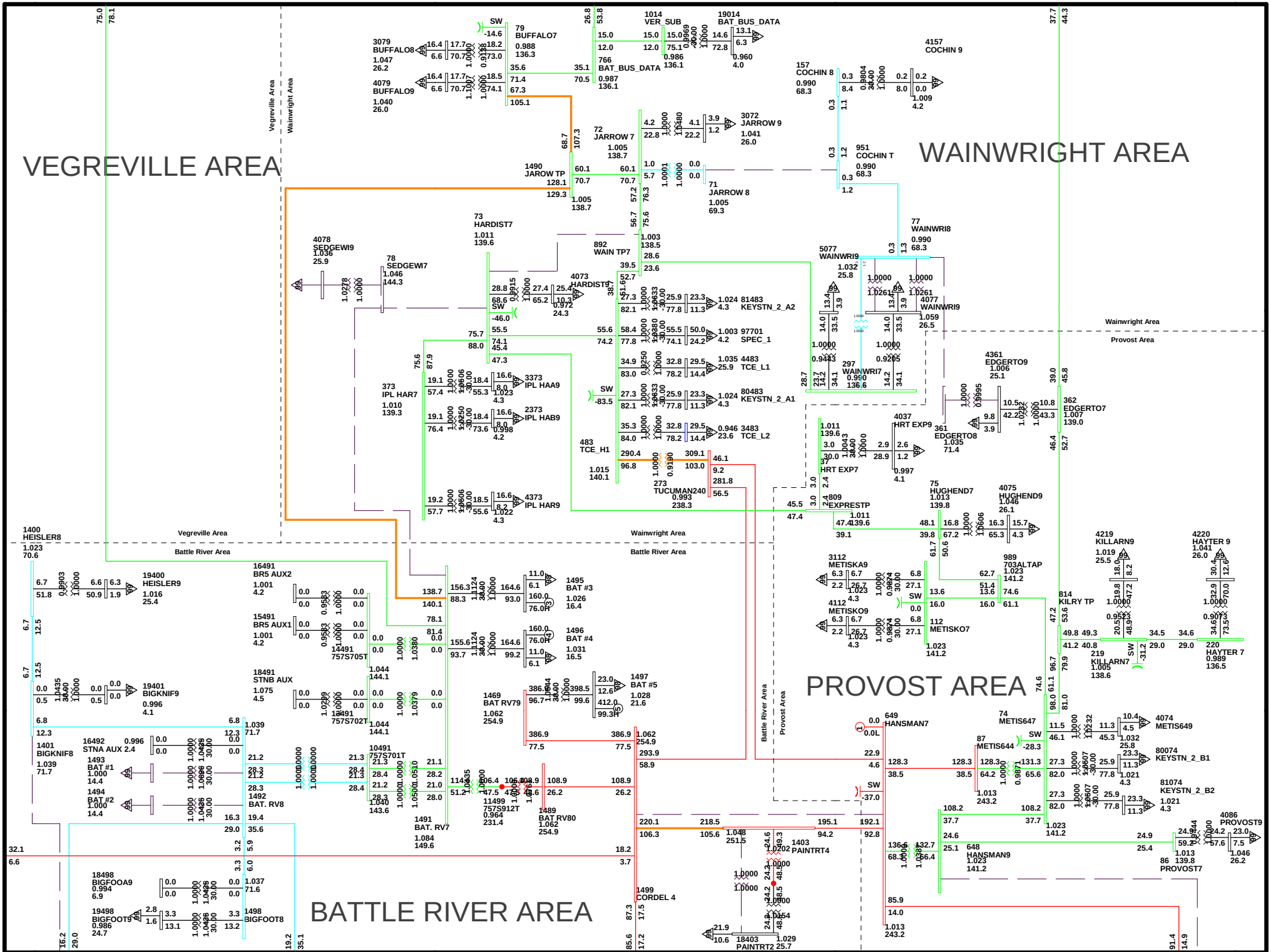
Bus - VOLTAGE (KV/PU)
Branch - MVA/% OF RATE A
Equipment - MW/MVAR
100.0%RATEA
1.100OV0.950UV
KV: >0.000<=35.000 <=69.000 <=138.000 <=240.000



CENTRAL AREA STUDY
2017 SUMMER PEAK BASE CASE REVISION 7.2
THU, MAR 19 2009 16:18

Figure A-2017-19-a

Bus - VOLTAGE (KV/PU)
Branch - MVA/% OF RATE A
Equipment - MW/MVAR
100.0%RATEA
1.100OV 0.950UV
KV: >0.000 <=35.000 <=69.000 <=138.000 <=240.000



CENTRAL AREA STUDY
2017 SUMMER PEAK BASE CASE REVISION 7.2
THU, MAR 19 2009 16:18

Figure A-2017-19-b

Bus - VOLTAGE (KV/PU)
Branch - MVA/% OF RATE A
Equipment - MW/MVAR
100.0%RATEA
1.100OV0.950UV
KV: >0.000<=35.000 <=69.000 <=138.000 <=240.000

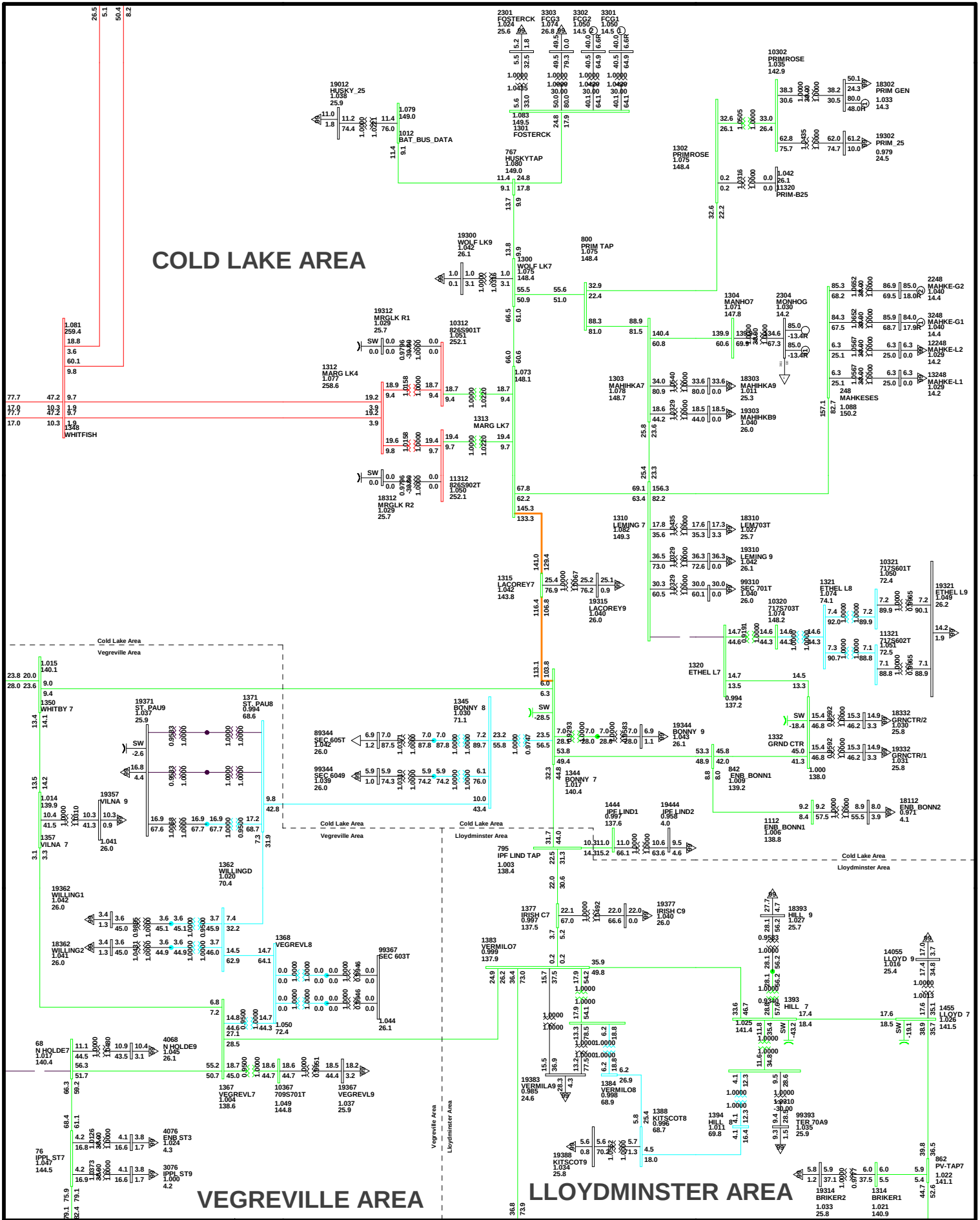
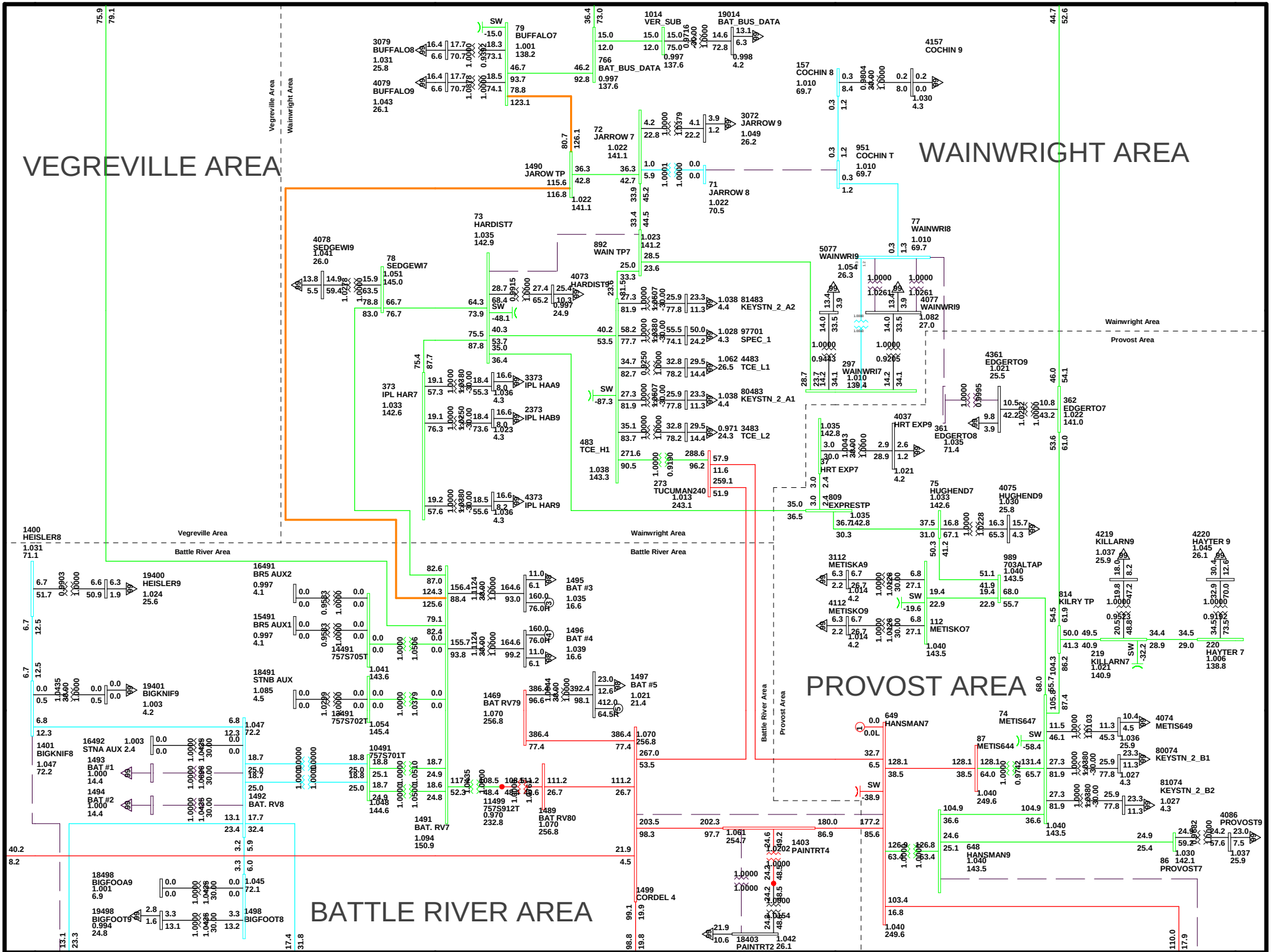


Figure A-2017-22-a

CENTRAL AREA STUDY
2017 SUMMER PEAK BASE CASE REVISION 7.2
THU, MAR 19 2009 16:27

Bus - VOLTAGE (KV/PU)
Branch - MVA/% OF RATE A
Equipment - MW/MVAR
100.0%RATEA
1.100OV 0.950UV
KV: >0.000 <=35.000 <=69.000 <=138.000 <=240.000



CENTRAL AREA STUDY
2017 SUMMER PEAK BASE CASE REVISION 7.2
THU, MAR 19 2009 16:27

Figure A-2017-22-b

Bus - VOLTAGE (KV/PU)
Branch - MVA/% OF RATE A
Equipment - MW/MVAR
100.0%RATEA
1.100OV0.950UV
KV: >0.000<=35.000 <=69.000 <=138.000 <=240.000

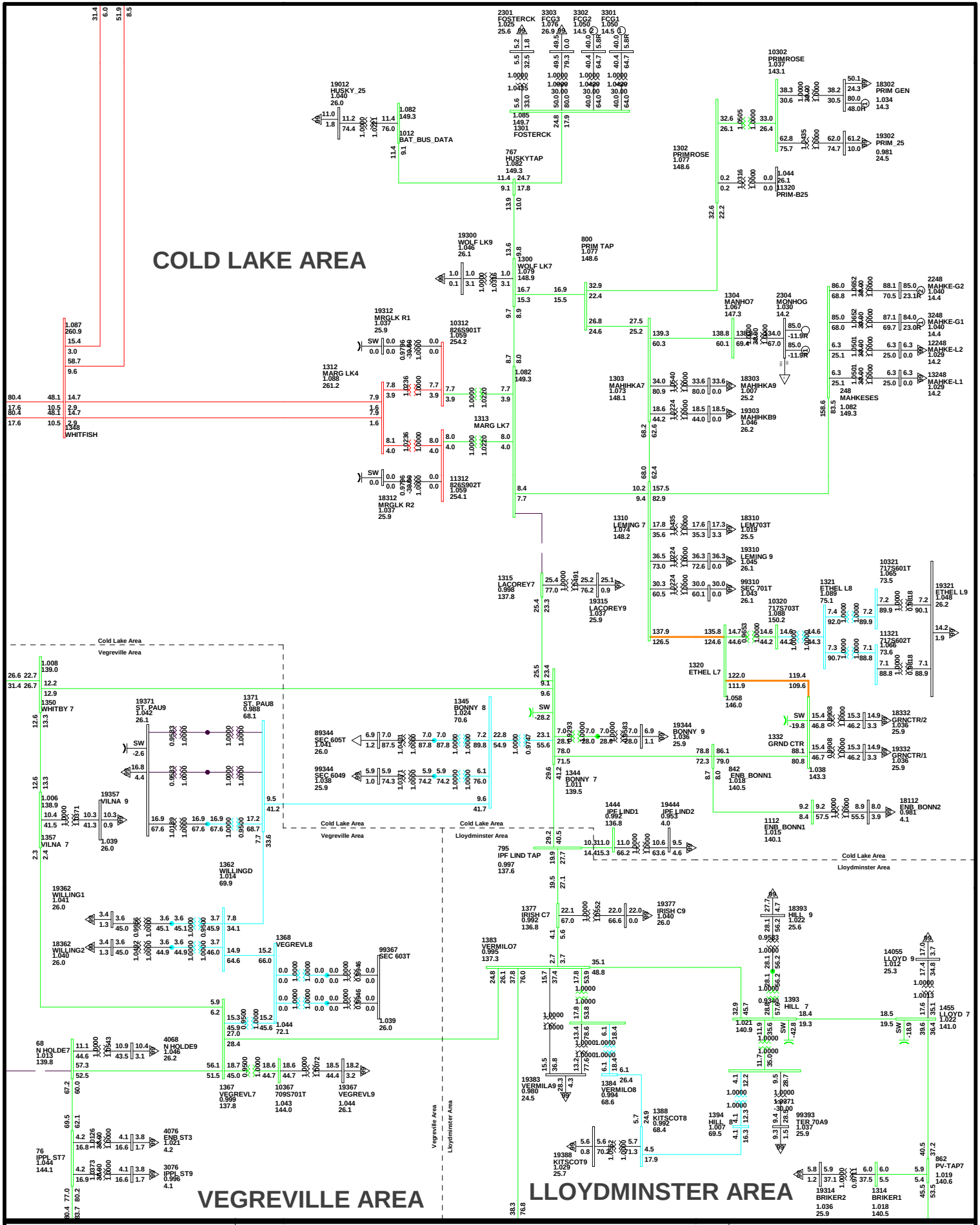
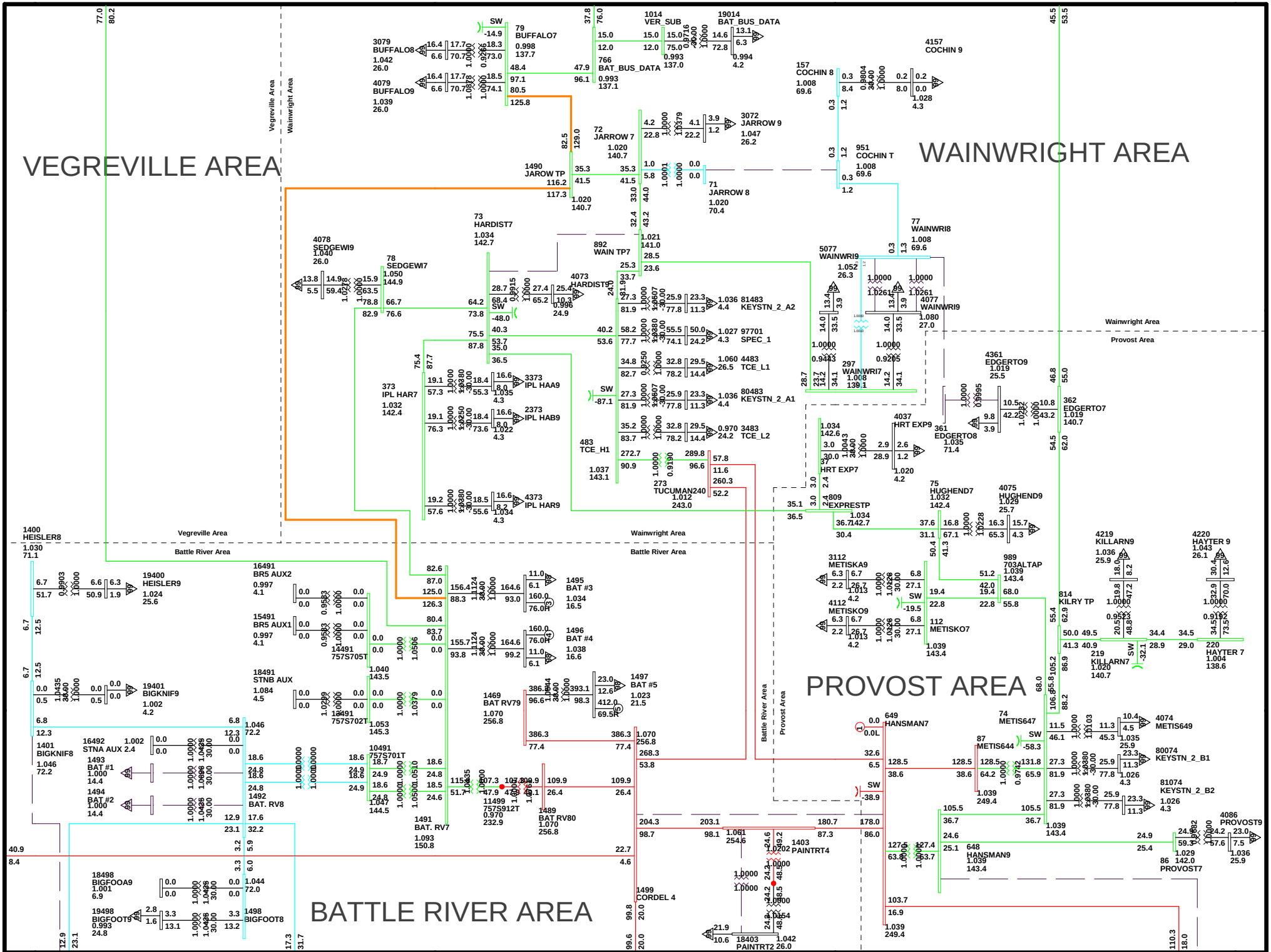


Figure A-2017-27-a

CENTRAL AREA STUDY
2017 SUMMER PEAK BASE CASE REVISION 7.2
THU, MAR 19 2009 16:31

Bus - VOLTAGE (KV/PU)
Branch - MVA/% OF RATE A
Equipment - MW/MVAR
100.0%RATEA
1.100OV 0.950UV
KV: >0.000 <=35.000 <=69.000 <=138.000 <=240.000



CENTRAL AREA STUDY
2017 SUMMER PEAK BASE CASE REVISION 7.2
THU, MAR 19 2009 16:31

Figure A-2017-27-b

Bus - VOLTAGE (KV/PU)
Branch - MVA/% OF RATE A
Equipment - MW/MVAR
100.0%RATEA
1.100OV 0.950UV
KV: >0.000<=35.000 <=69.000 <=138.000 <=240.000

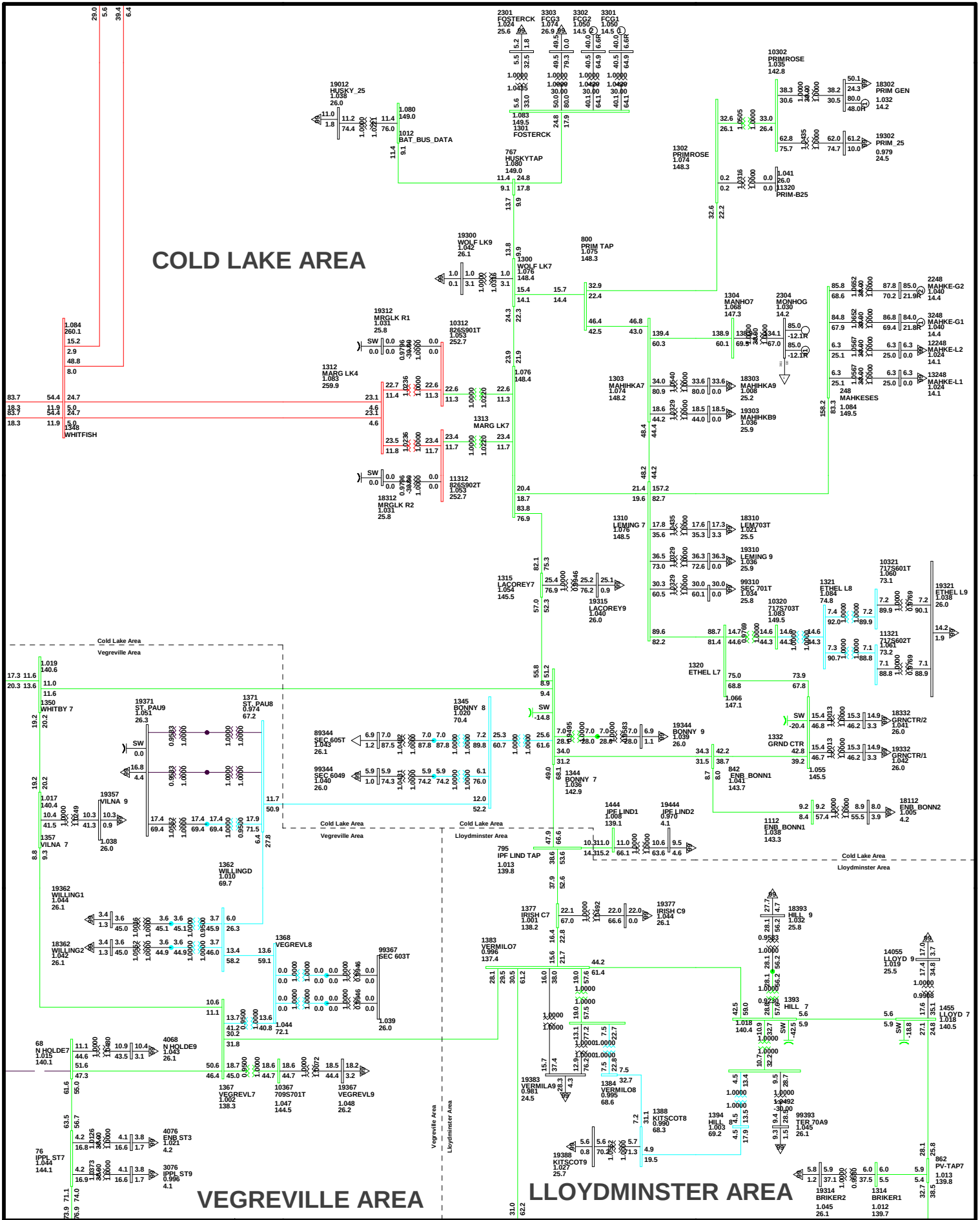
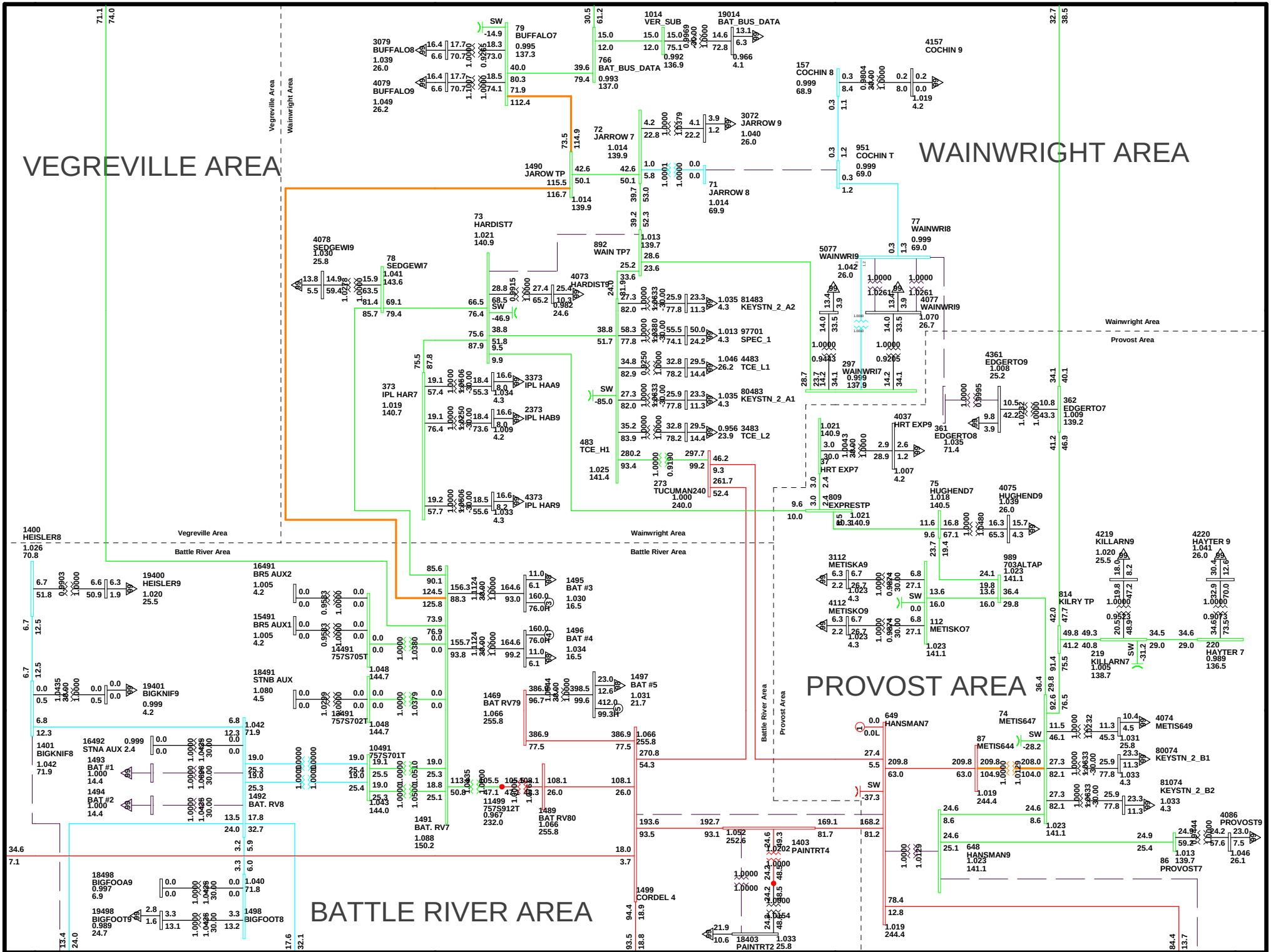


Figure A-2017-31-a

CENTRAL AREA STUDY
2017 SUMMER PEAK BASE CASE REVISION 7.2
THU, MAR 19 2009 16:35

Bus - VOLTAGE (KV/PU)
Branch - MVA/% OF RATE A
Equipment - MW/MVAR
100.0%RATEA
1.100OV 0.950UV
KV: >0.000 <=35.000 <=69.000 <=138.000 <=240.000



CENTRAL AREA STUDY
2017 SUMMER PEAK BASE CASE REVISION 7.2
THU, MAR 19 2009 16:36

Figure A-2017-31-b

Bus - VOLTAGE (KV/PU)
Branch - MVA/% OF RATE A
Equipment - MW/MVAR
100.0%RATEA
1.100OV 0.950UV
KV: >0.000<=35.000 <=69.000 <=138.000 <=240.000

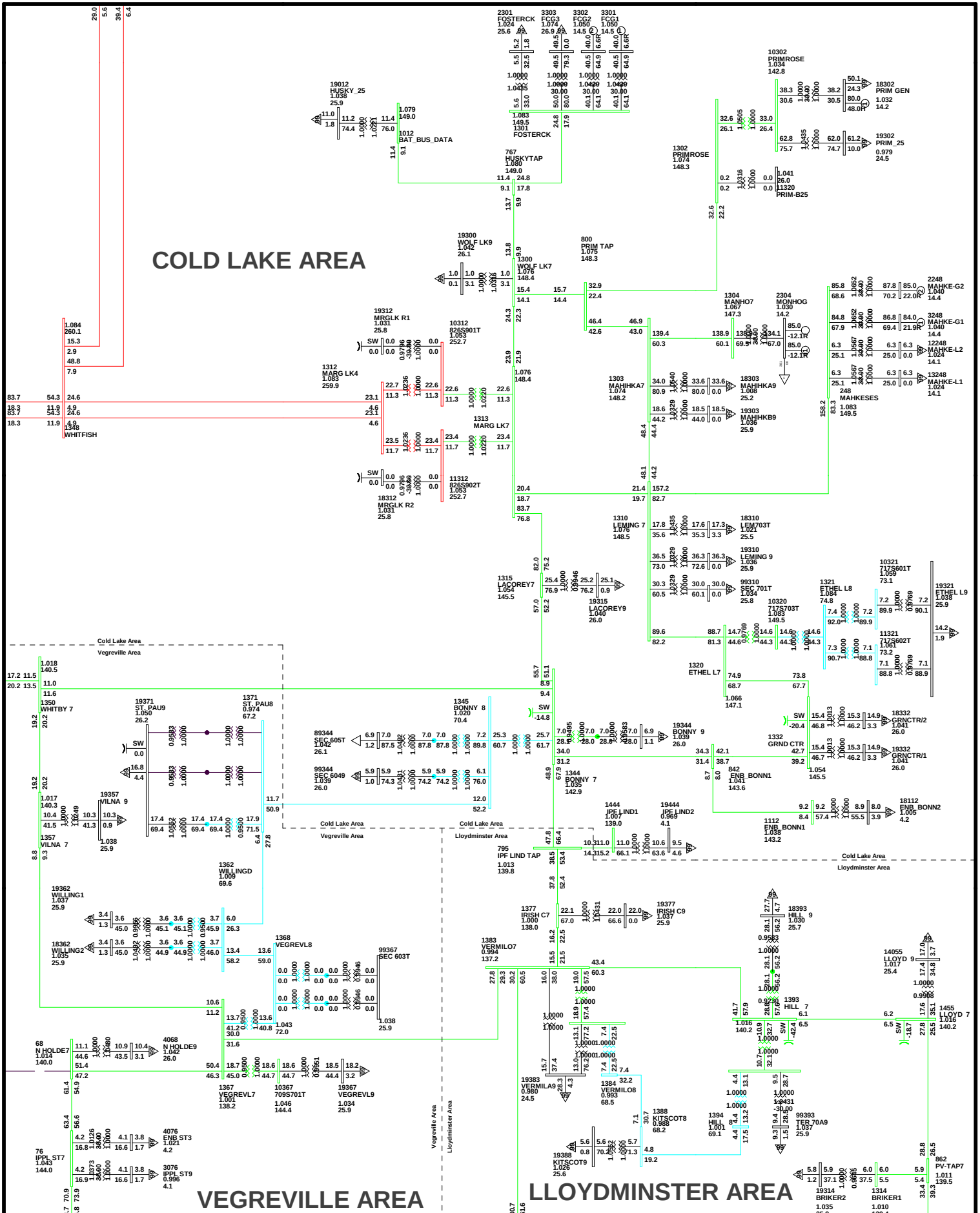
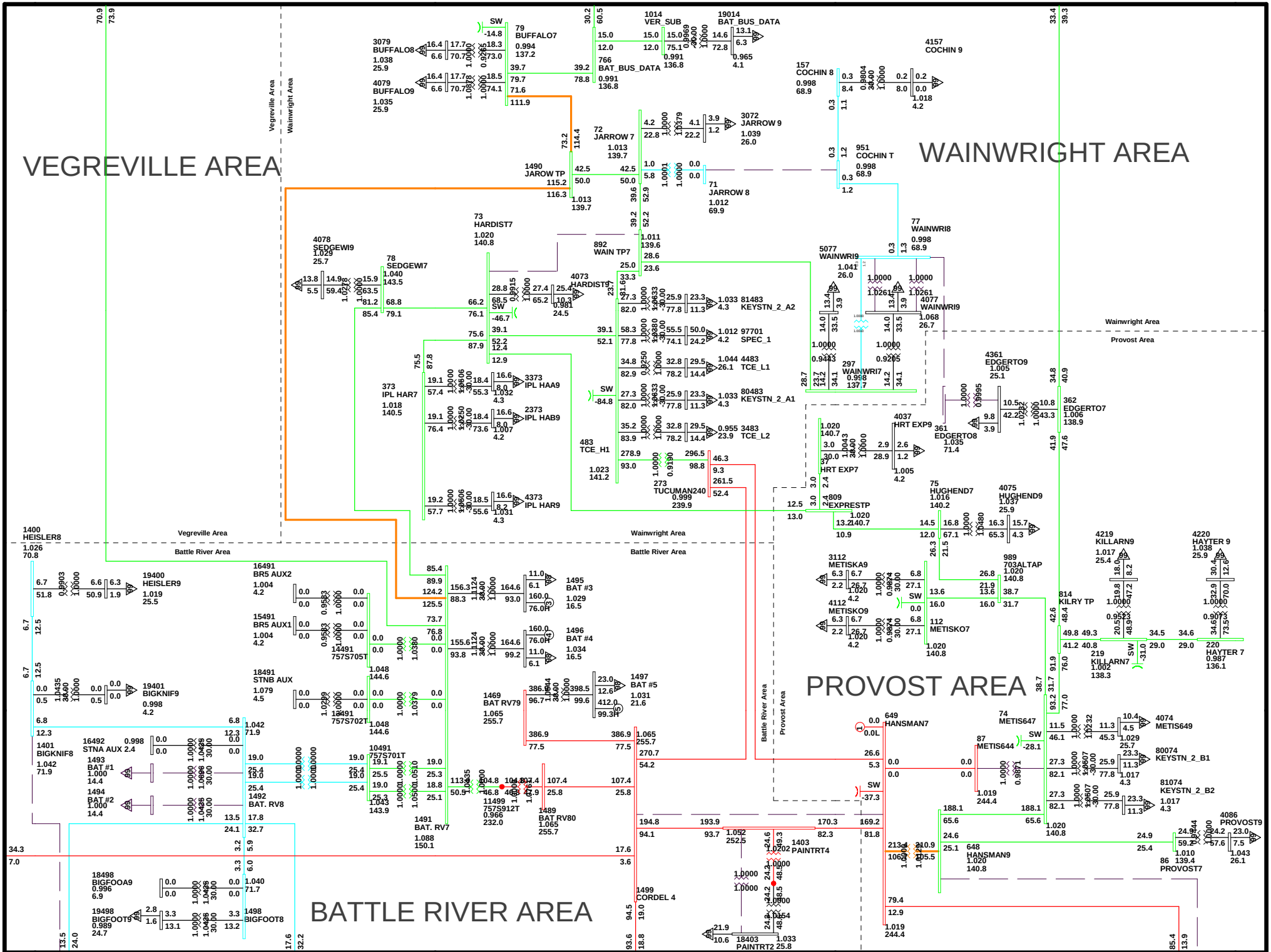


Figure A-2017-33-a

CENTRAL AREA STUDY
2017 SUMMER PEAK BASE CASE REVISION 7.2
THU, MAR 19 2009 16:37

Bus - VOLTAGE (KV/PU)
Branch - MVA/% OF RATE A
Equipment - MW/MVAR
100.0%RATEA
1.100OV 0.950UV
KV: >0.000 <=35.000 <=69.000 <=138.000 <=240.000



CENTRAL AREA STUDY
2017 SUMMER PEAK BASE CASE REVISION 7.2
THU, MAR 19 2009 16:37

Figure A-2017-33-b

Bus - VOLTAGE (KV/PU)
Branch - MVA/% OF RATE A
Equipment - MW/MVAR
100.0%RATEA
1.100OV0.950UV
KV: >0.000<=35.000 <=69.000 <=138.000 <=240.000

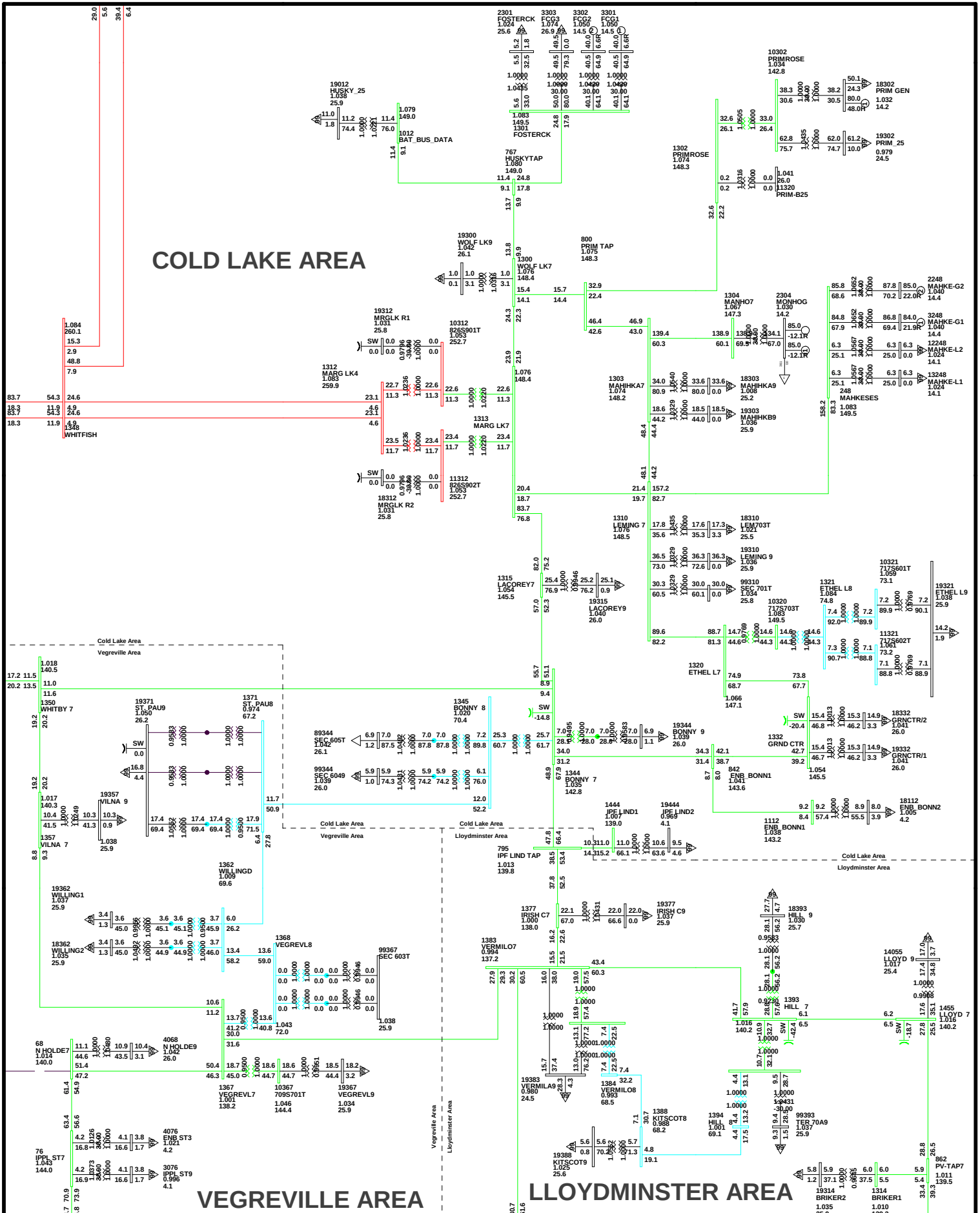
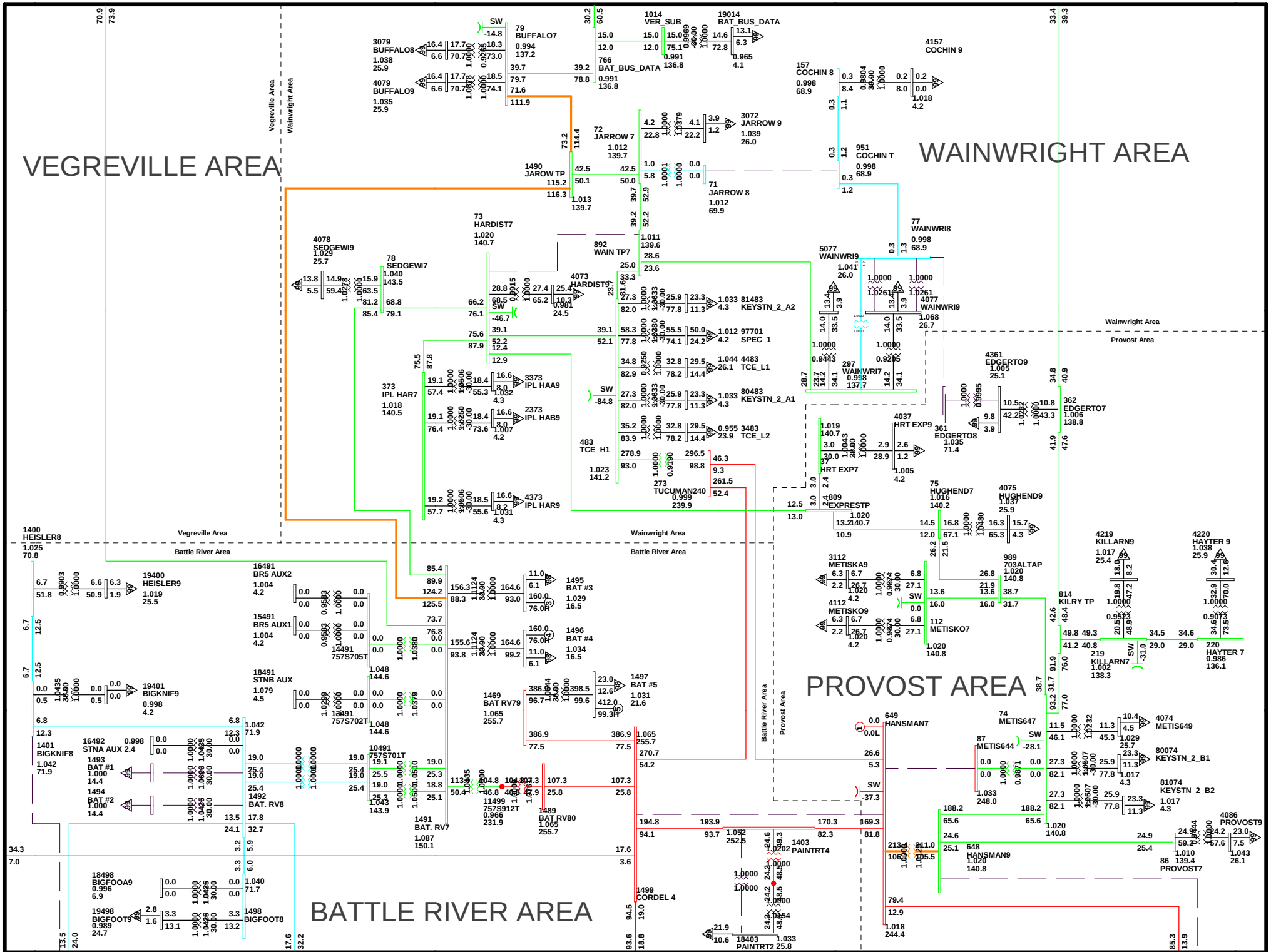


Figure A-2017-34-a

CENTRAL AREA STUDY
2017 SUMMER PEAK BASE CASE REVISION 7.2
THU, MAR 19 2009 16:38

Bus - VOLTAGE (KV/PU)
Branch - MVA/% OF RATE A
Equipment - MW/MVAR
100.0%RATEA
1.100OV 0.950UV
KV: >0.000 <=35.000 <=69.000 <=138.000 <=240.000



CENTRAL AREA STUDY
2017 SUMMER PEAK BASE CASE REVISION 7.2
THU, MAR 19 2009 16:38

Figure A-2017-34-b

Bus - VOLTAGE (KV/PU)
Branch - MVA/% OF RATE A
Equipment - MW/MVAR
100.0%RATEA
1.100OV0.950UV
KV: >0.000<=35.000 <=69.000 <=138.000 <=240.000

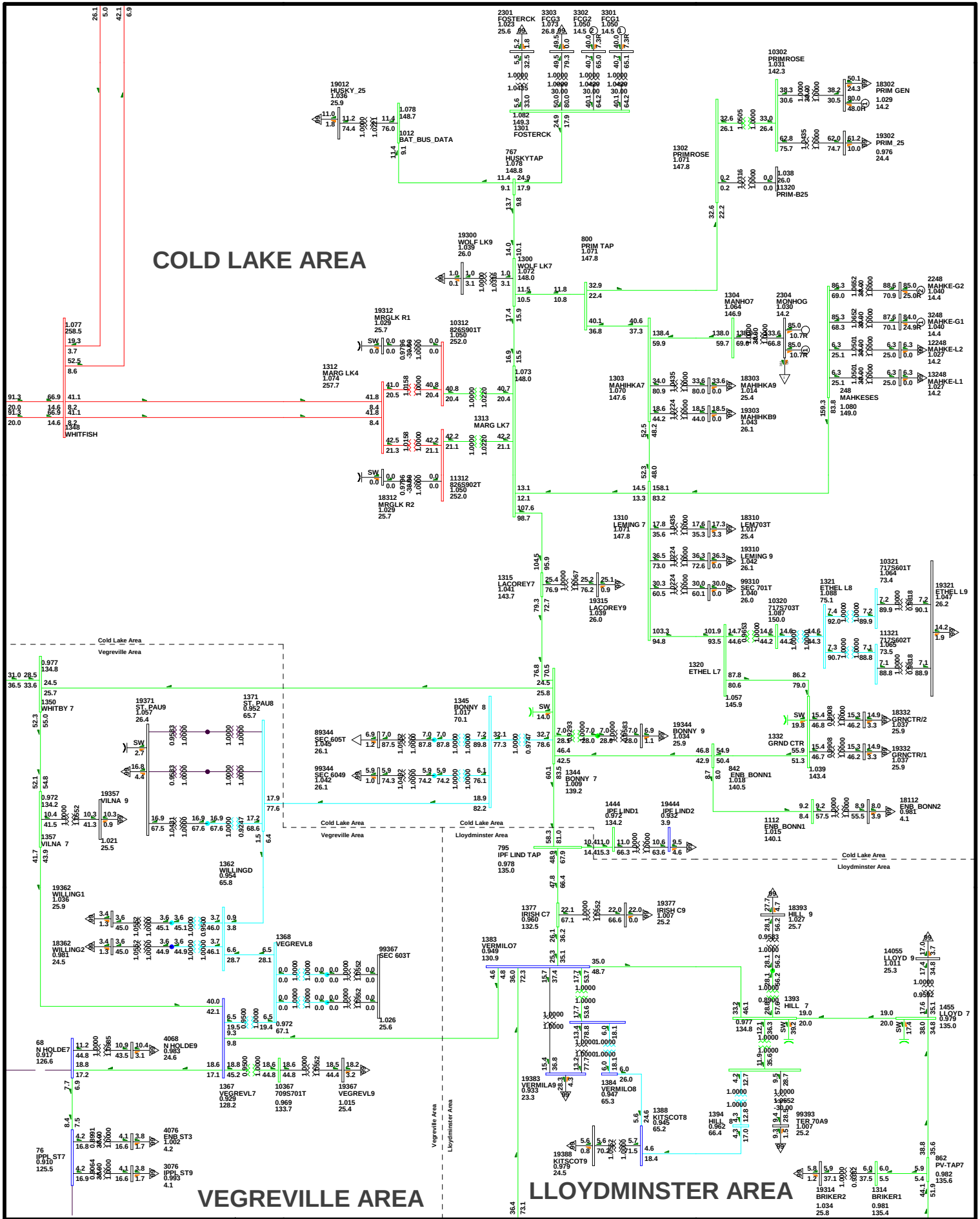
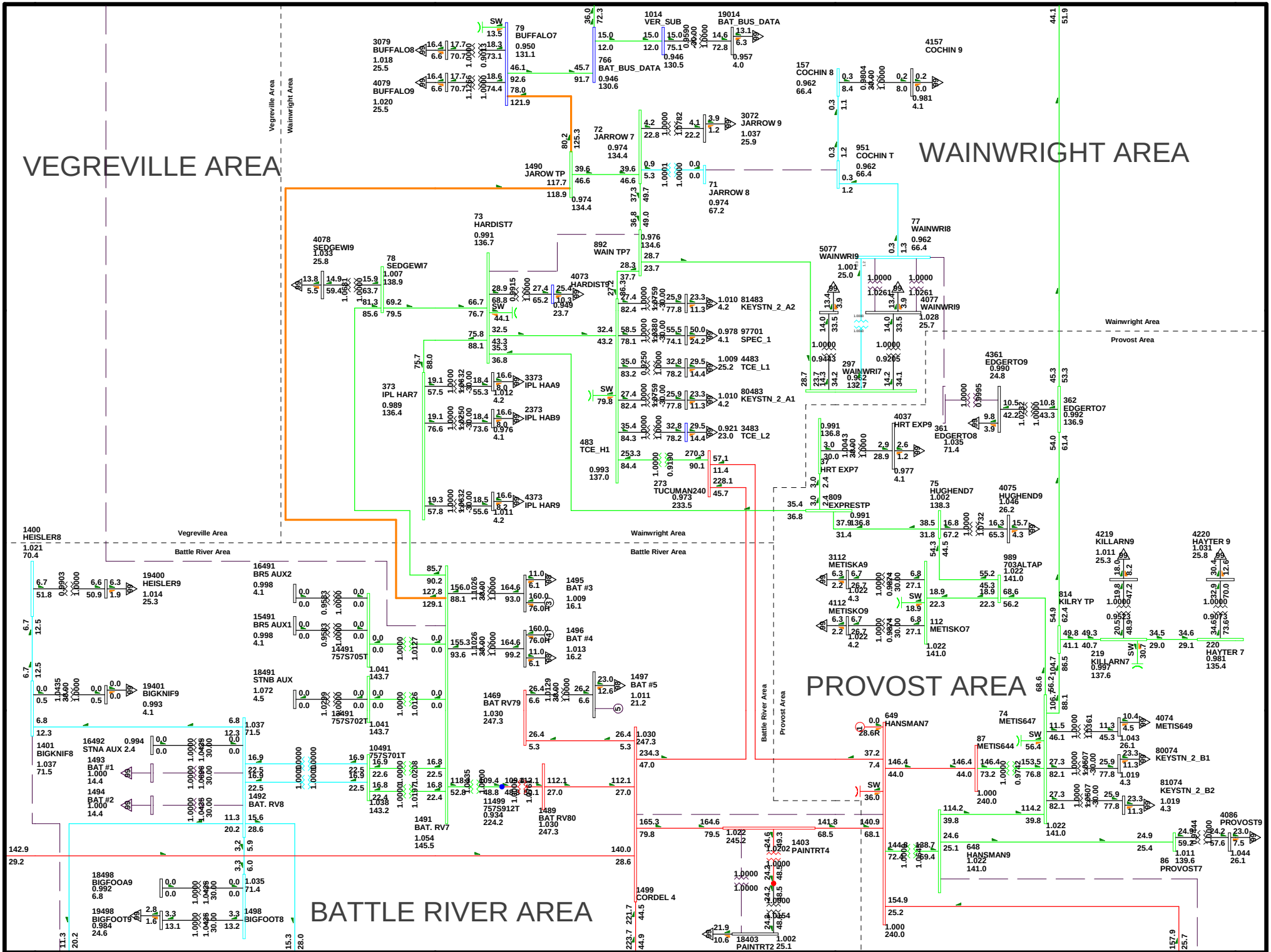


Figure A-2017-91-a

CENTRAL AREA STUDY
2017 SUMMER PEAK BASE CASE REVISION 7.2
SUN, MAR 22 2009 11:54

Bus - VOLTAGE (KV/PU)
Branch - MVA/% OF RATE A
Equipment - MW/MVAR
100.0%RATEA
1.100OV 0.950UV
KV: >0.000 <=35.000 <=69.000 <=138.000 <=240.000



CENTRAL AREA STUDY
2017 SUMMER PEAK BASE CASE REVISION 7.2
SUN, MAR 22 2009 11:54

Figure A-2017-91-b

Bus - VOLTAGE (KV/PU)
Branch - MVA/% OF RATE A
Equipment - MW/MVAR
100.0%RATEA
1.100OV0.950UV
KV: >0.000<=35.000 <=69.000 <=138.000 <=240.000

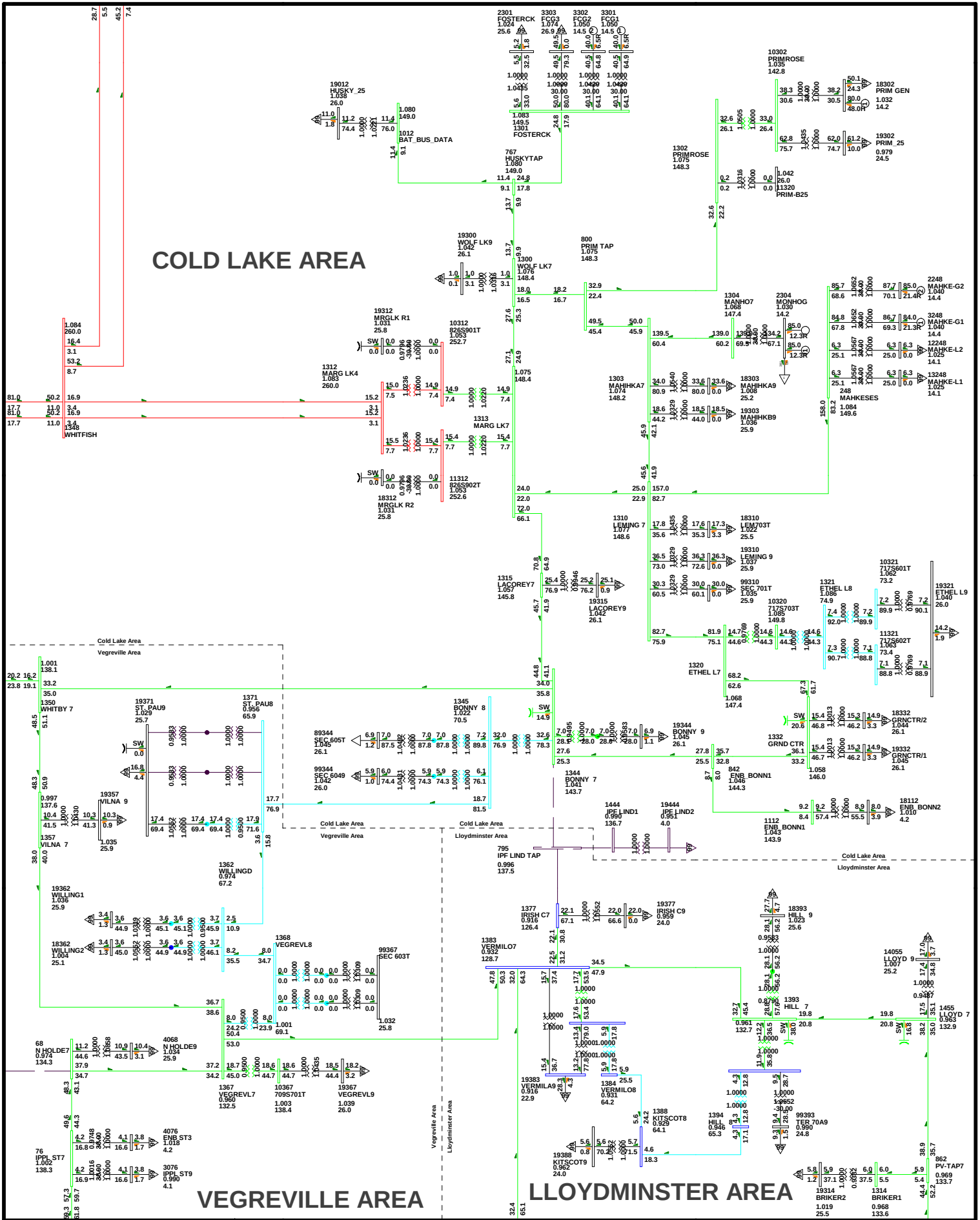
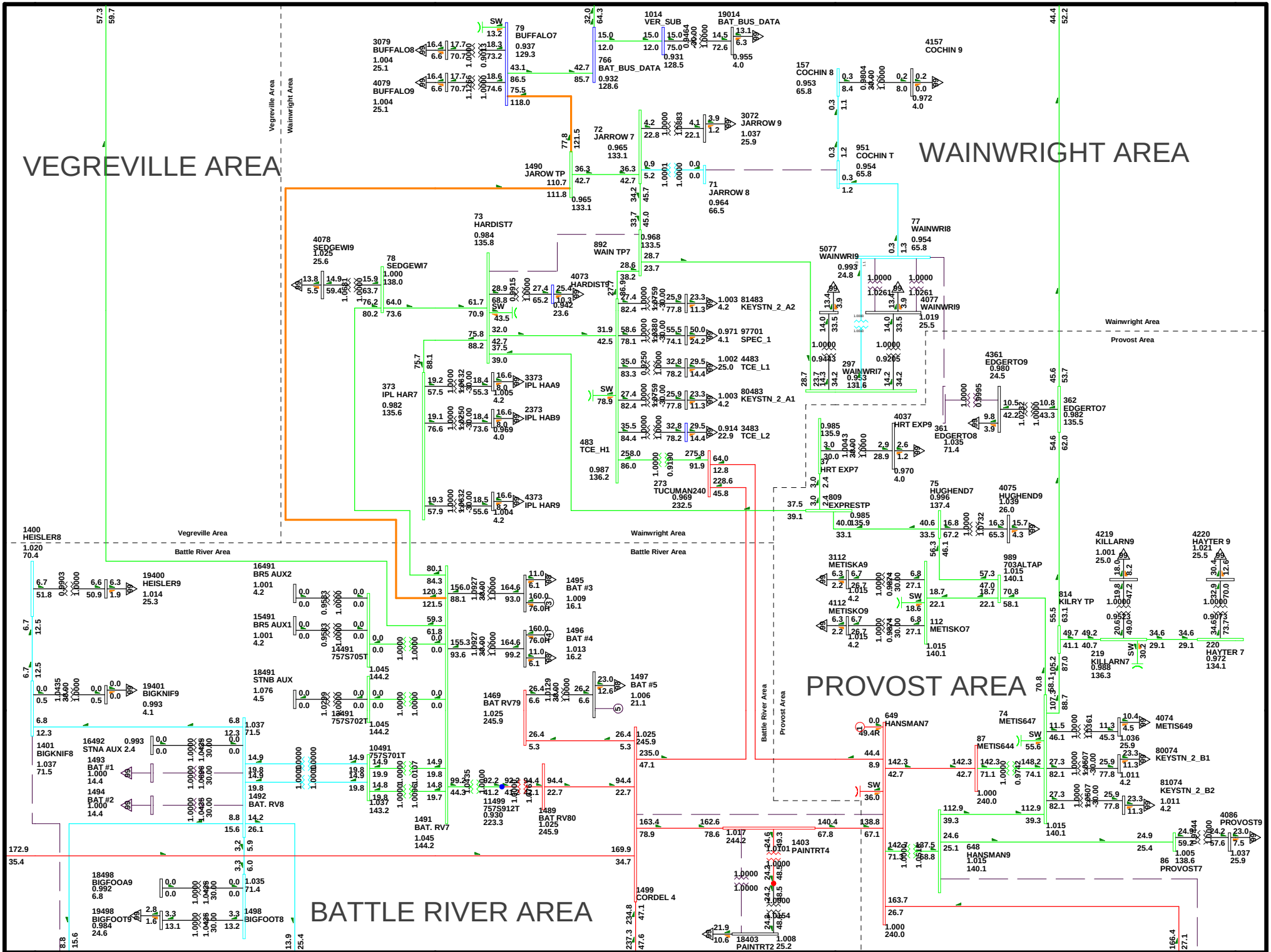


Figure A-2017-95-a

CENTRAL AREA STUDY
2017 SUMMER PEAK BASE CASE REVISION 7.2
MON, MAR 23 2009 14:33



CENTRAL AREA STUDY
2017 SUMMER PEAK BASE CASE REVISION 7.2
MON, MAR 23 2009 14:34

Figure A-2017-95-b

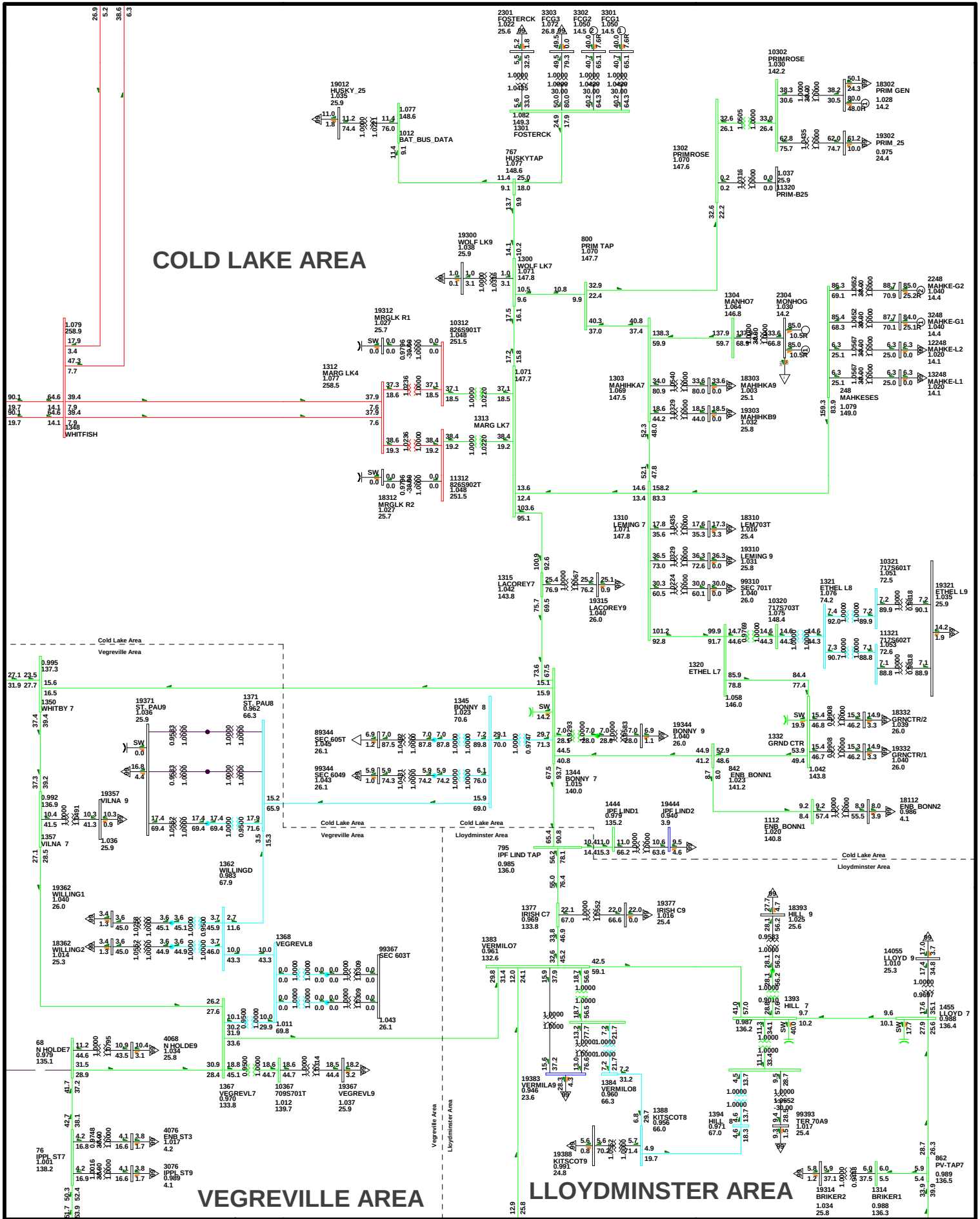
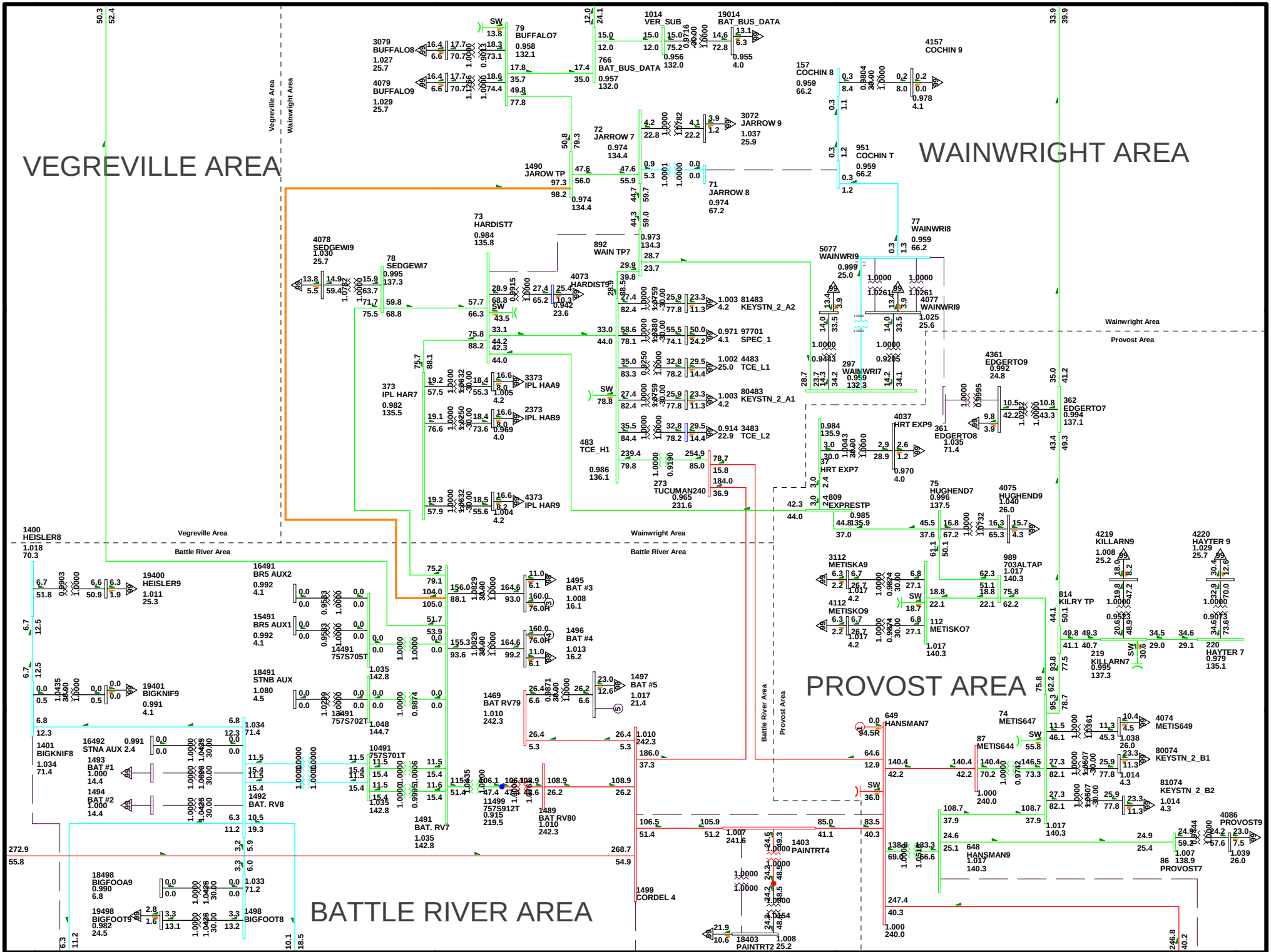


Figure A-2017-98-a

CENTRAL AREA STUDY
2017 SUMMER PEAK BASE CASE REVISION 7.2
SUN, MAR 22 2009 11:57

Bus - VOLTAGE (KV/PU)
Branch - MVA/% OF RATE A
Equipment - MW/MVAR
100.0%RATEA
1.100OV 0.950UV
KV: >0.000 <=35.000 <=69.000 <=138.000 <=240.000



CENTRAL AREA STUDY
2017 SUMMER PEAK BASE CASE REVISION 7.2
SUN, MAR 22 2009 11:57

Figure A-2017-98-b

Bus - VOLTAGE (KV/PU)
Branch - MVA/% OF RATE A
Equipment - MW/MVAR
100.0%RATEA
1.100OV0.950UV
KV: >0.000<=35.000 <=69.000 <=138.000 <=240.000

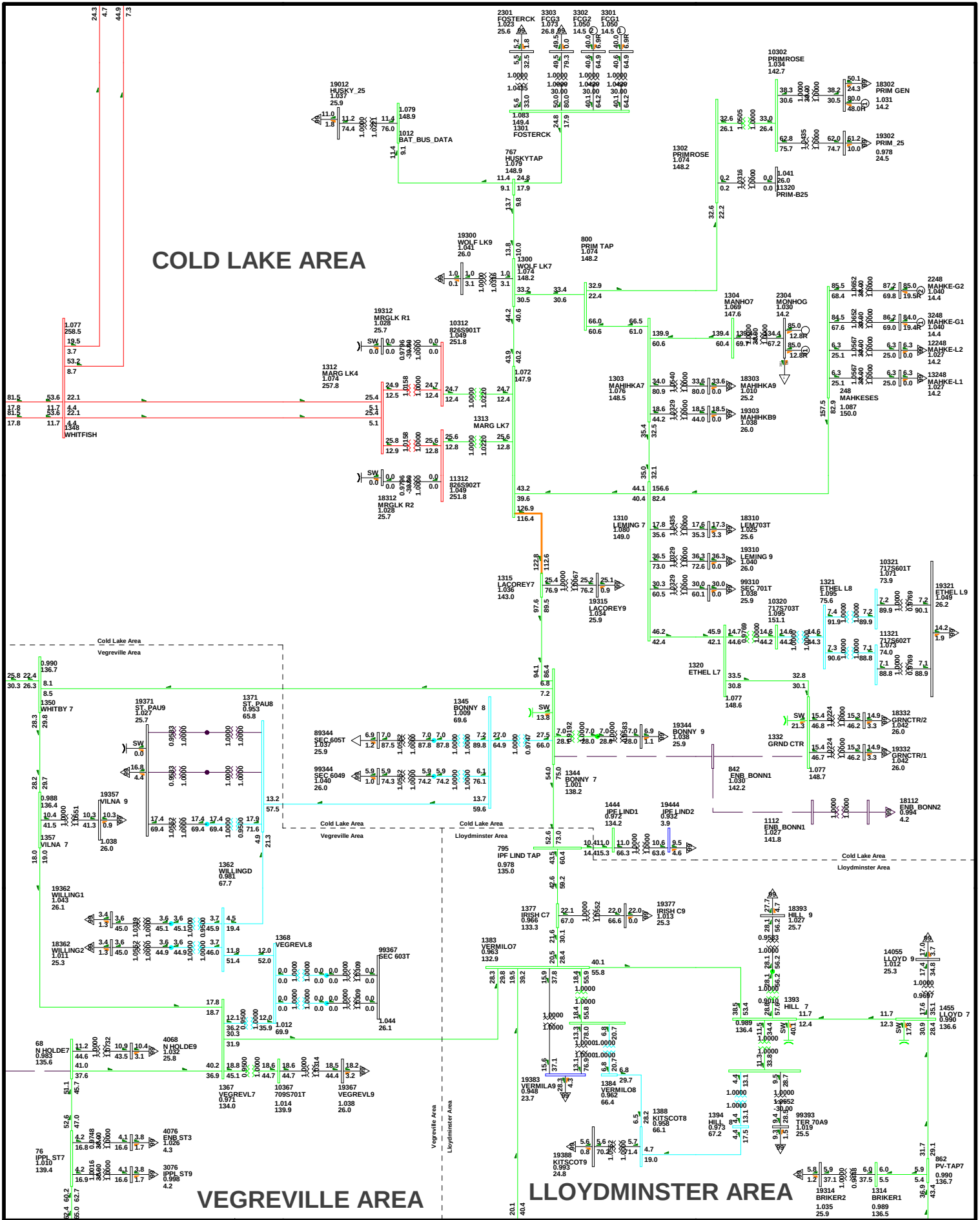
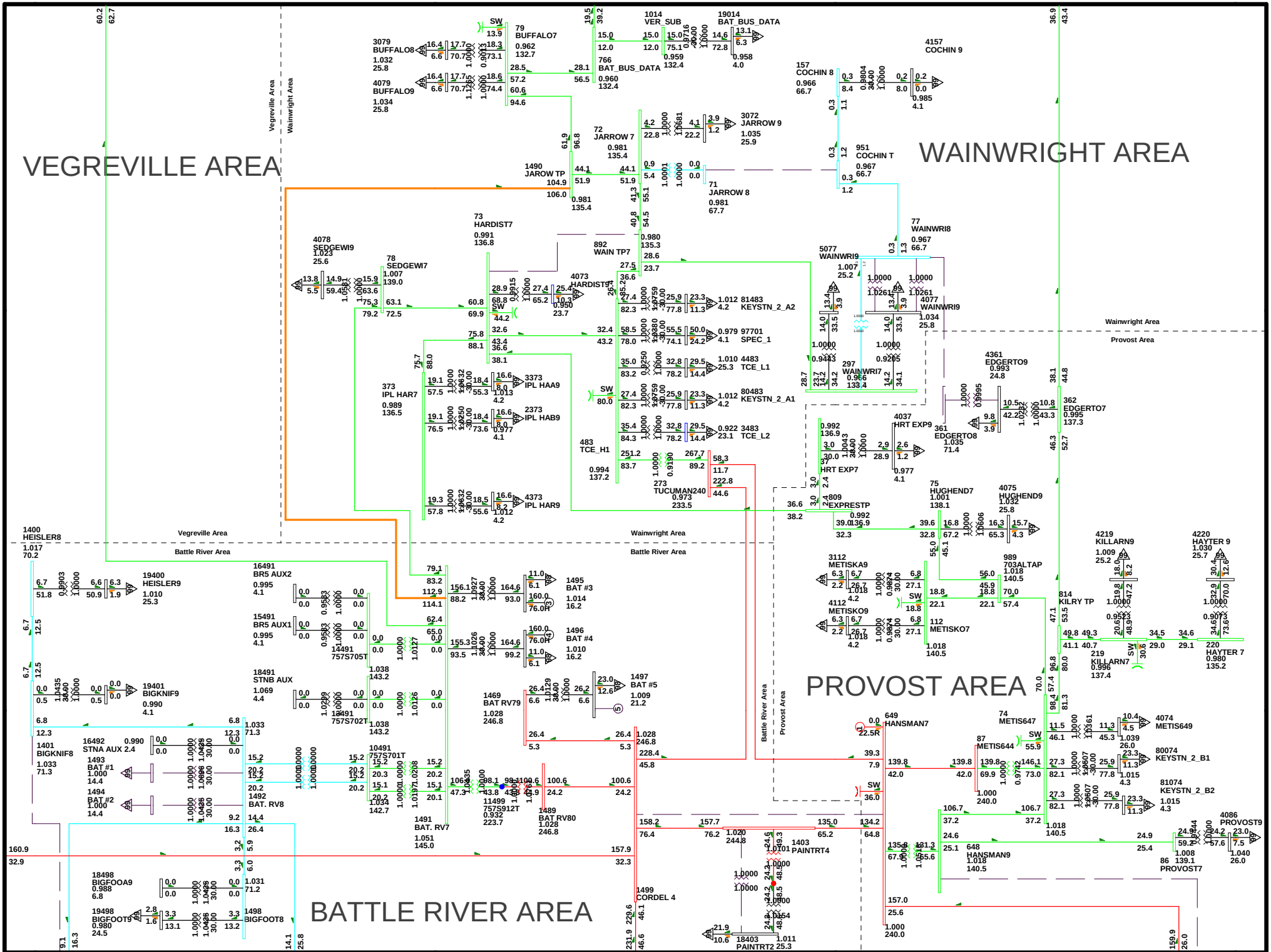


Figure A-2017-106-a

CENTRAL AREA STUDY
2017 SUMMER PEAK BASE CASE REVISION 7.2
SUN, MAR 22 2009 12:02

Bus - VOLTAGE (KV/PU)
Branch - MVA/% OF RATE A
Equipment - MW/MVAR
100.0%RATEA
1.100OV 0.950UV
KV: >0.000 <=35.000 <=69.000 <=138.000 <=240.000



CENTRAL AREA STUDY
2017 SUMMER PEAK BASE CASE REVISION 7.2
SUN, MAR 22 2009 12:02

Figure A-2017-106-b

Bus - VOLTAGE (KV/PU)
Branch - MVA/% OF RATE A
Equipment - MW/MVAR
100.0%RATEA
1.100OV0.950UV
KV: >0.000<=35.000 <=69.000 <=138.000 <=240.000

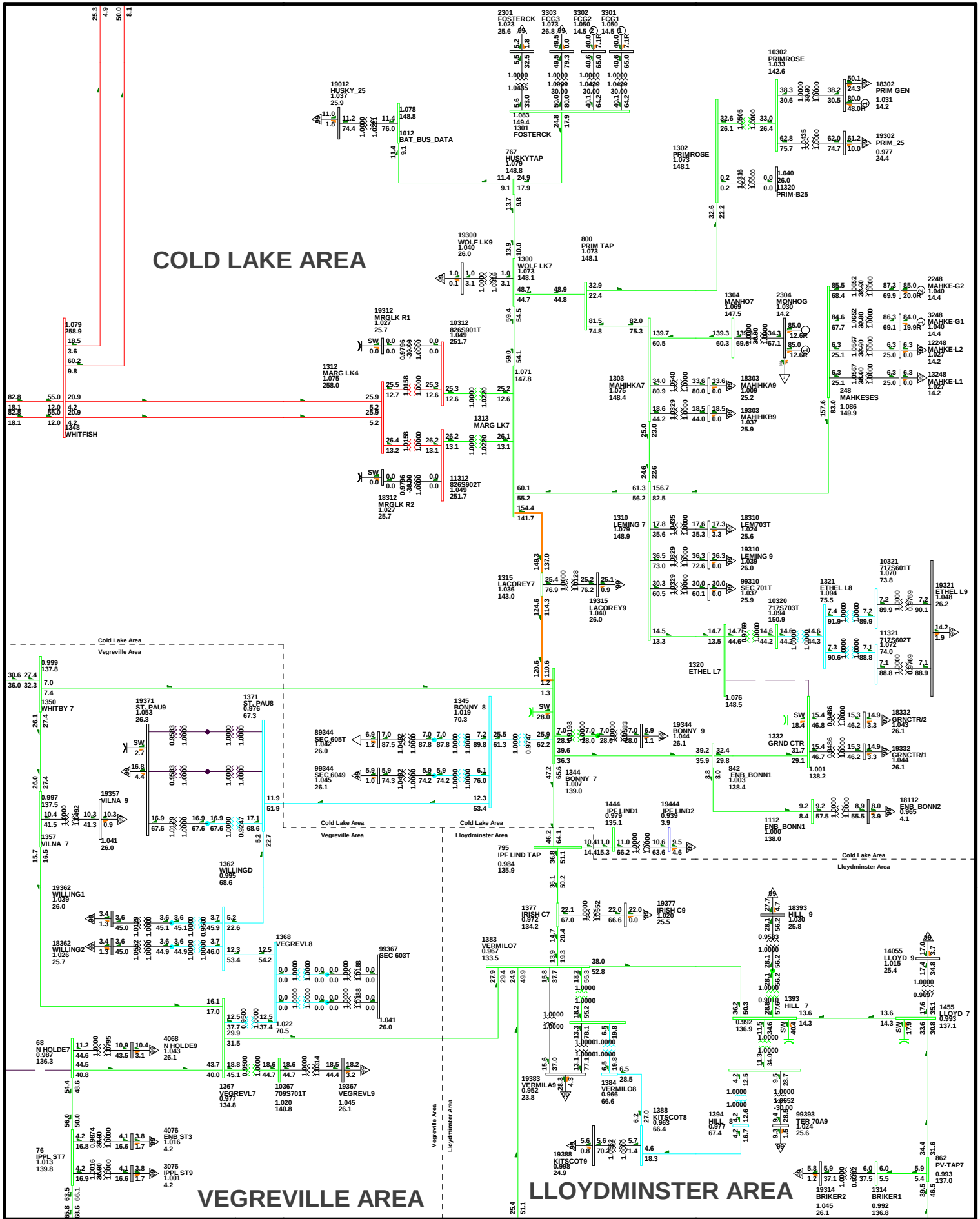
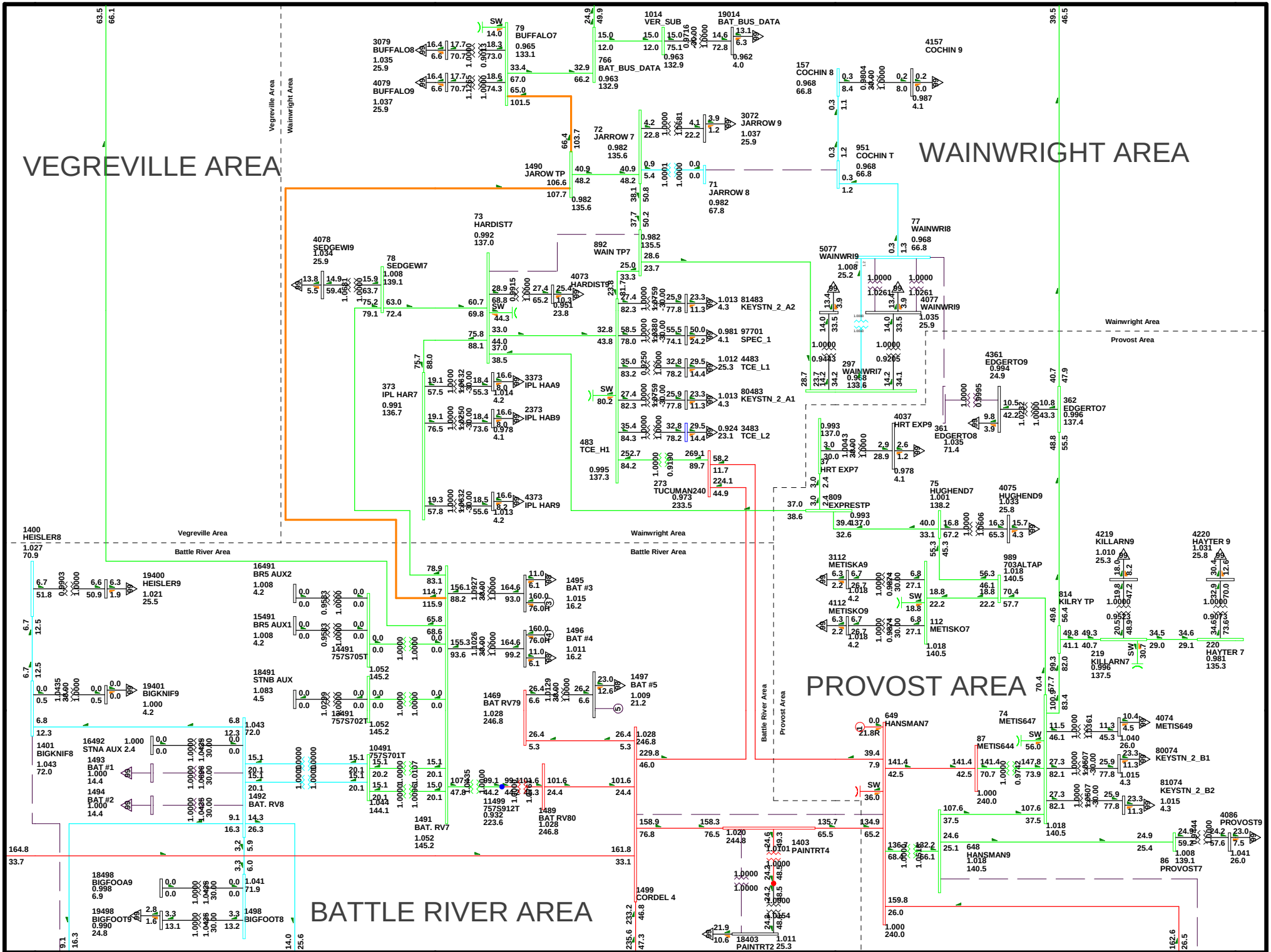


Figure A-2017-107-a

CENTRAL AREA STUDY
2017 SUMMER PEAK BASE CASE REVISION 7.2
SUN, MAR 22 2009 12:03



CENTRAL AREA STUDY
2017 SUMMER PEAK BASE CASE REVISION 7.2
SUN, MAR 22 2009 12:03

Figure A-2017-107-b

Bus - VOLTAGE (KV/PU)
Branch - MVA/% OF RATE A
Equipment - MW/MVAR
100.0%RATEA
1.100OV0.950UV
KV: >0.000<=35.000 <=69.000 <=138.000 <=240.000

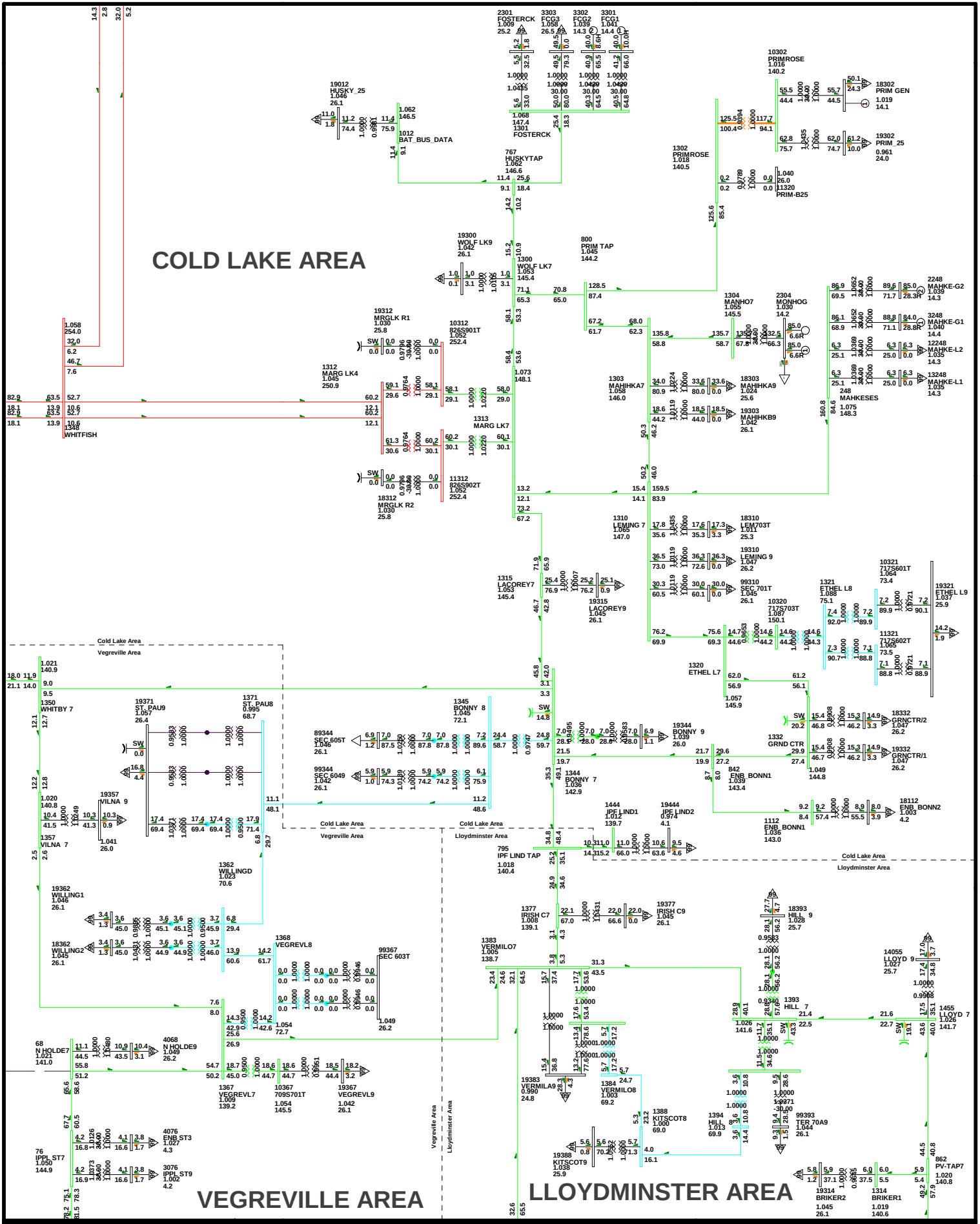
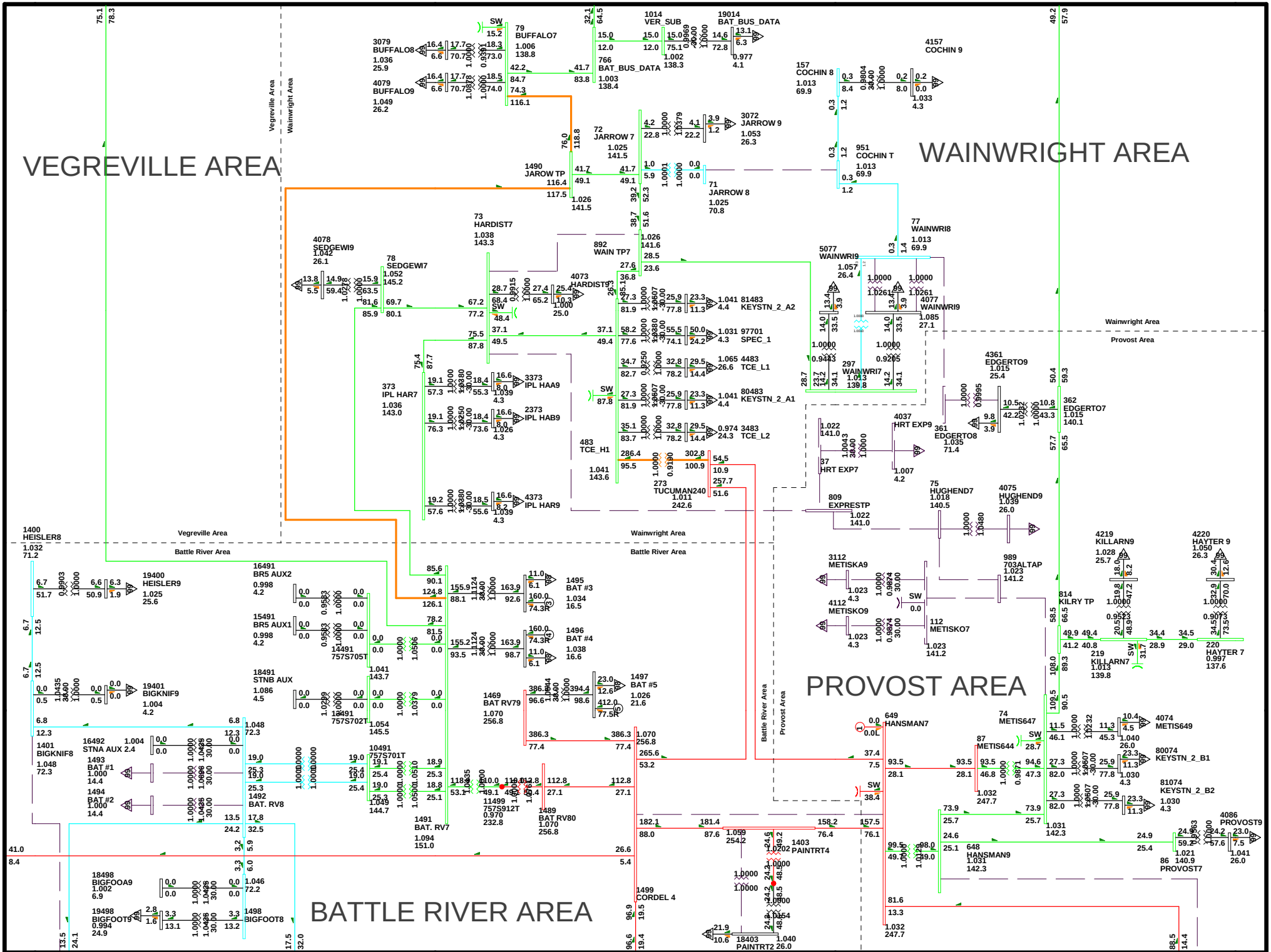


Figure A-2017-171-a

CENTRAL AREA STUDY
2017 SUMMER PEAK BASE CASE REVISION 7.2
SUN, MAR 22 2009 13:06

Bus - VOLTAGE (KV/PU)
Branch - MVA/% OF RATE A
Equipment - MW/MVAR
100.0%RATEA
1.100OV 0.950UV
KV: >0.000 <=35.000 <=69.000 <=138.000 <=240.000



CENTRAL AREA STUDY
2017 SUMMER PEAK BASE CASE REVISION 7.2
SUN, MAR 22 2009 13:06

Figure A-2017-171-b

Bus - VOLTAGE (KV/PU)
Branch - MVA/% OF RATE A
Equipment - MW/MVAR
100.0%RATEA
1.100OV0.950UV
KV: >0.000<=35.000 <=69.000 <=138.000 <=240.000

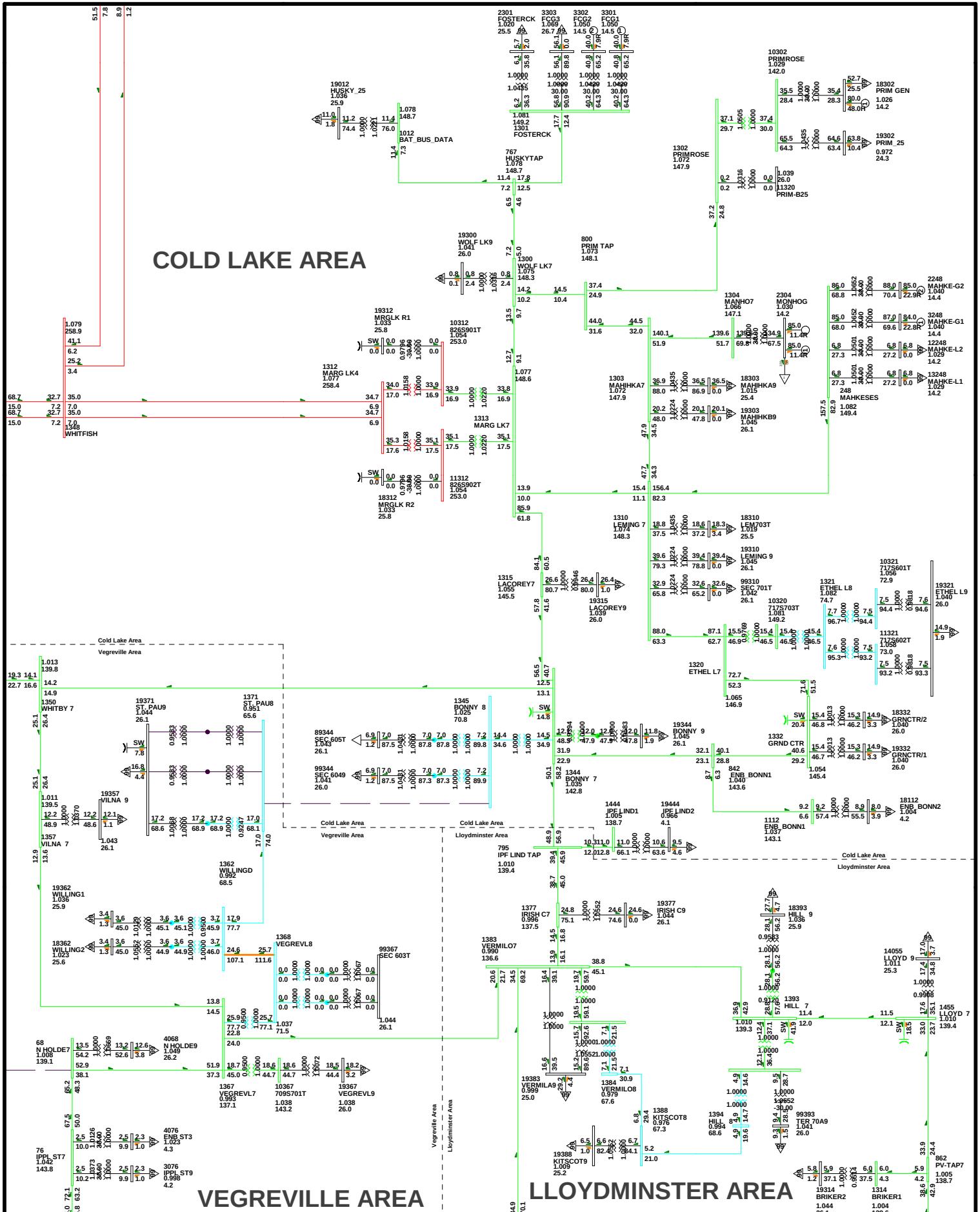
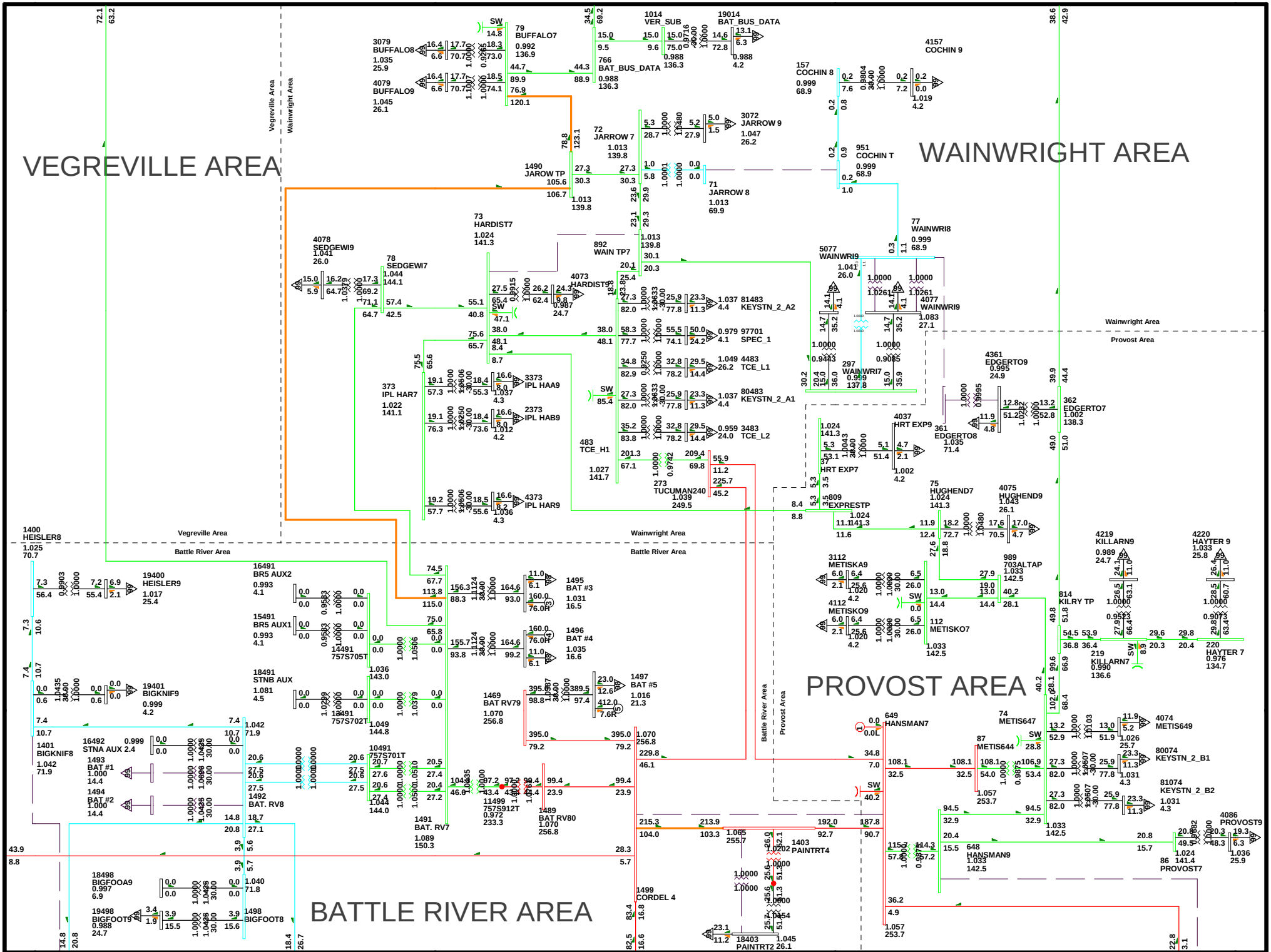


Figure A-2017-47-a

CENTRAL AREA STUDY
2017 WINTER PEAK BASE CASE REVISION 7.2
THU, MAR 19 2009 17:59

Bus - VOLTAGE (KV/PU)
Branch - MVA/% OF RATE B
Equipment - MW/MVAR
100.0%RATEB
1.100OV 0.950UV
KV: >0.000<=35.000 <=69.000 <=138.000 <=240.000



CENTRAL AREA STUDY
2017 WINTER PEAK BASE CASE REVISION 7.2
THU, MAR 19 2009 17:59

Figure A-2017-47-b

Bus - VOLTAGE (KV/PU)
Branch - MVA/% OF RATE B
Equipment - MW/MVAR
100.0%RATEB
1.100OV 0.950UV
KV: >0.000 <=35.000 <=69.000 <=138.000 <=240.000