Engineering Connection Assessment

P2034 Lindbergh Cogeneration Power Plant Alteration Connection

Strathcona Resources Ltd.

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NOTE:

The conclusions and recommendations in this report are based on the results presented in *Attachment A: Engineering Connection Assessment: Study Results*, which was prepared by a third party consultant in accordance with the AESO Connection Process.

The AESO has reviewed the *Engineering Connection Assessment: Study Results*, and finds it acceptable for the purpose of assessing the potential impacts of the proposed connection on the performance of the Alberta interconnected electric system.

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Attachment B: Engineering Connection Assessment Results

1 Introduction

This Alberta Electric System Operator (AESO) Engineering Connection Assessment describes the engineering studies that were completed to assess the impact of the Project (as defined below) on the performance of the Alberta interconnected electric system (AIES). This report also provides the AESO's conclusions and recommendations based on the results of the engineering studies.

Attached to this Engineering Connection Assessment are the results of the engineering studies (see Attachment B) and the scope and methodology used to perform the studies (see Attachment B-A1). These attachments provide details regarding the technical criteria, assumptions, and methods for performing these engineering studies, and the results of the engineering studies.

1.1 Project Overview

Strathcona Resources Ltd. (Market Participant) has submitted a request for system access service to the AESO to connect its approved Lindbergh SAGD Project Cogeneration Power Plant Alteration[1] (Facility) to the AIES. The Facility includes an approved substation, designated as the Garnier Lake 1064S substation. The Facility also has an approved Industrial System Designation.[2]

The Market Participant's request includes: a request for a new system access service in the area, with a Rate STS, *Supply Transmission Service*, contract capacity of 72 MW and a Rate DTS, *Demand Transmission Service*, contract capacity of 3 MW; and a request for transmission development (collectively, the Project).

The scheduled in-service date (ISD) for the Project is August 1, 2027.

[1] Power Plant Approval 28753-D02-2024 *Lindbergh SAGD Project Cogeneration Power Plant Alteration*, Substation Permit and Licence 28753-D03-2024 *Garnier Lake 1064S Substation*.

[2] Industrial System Designation Order 28753-D04-2024 *Lindbergh SAGD Industrial System Designation Amendment*, Appendix 3 to Decision 28753-D01-2024.

2 Assessment Scope

2.1 Objectives

The objectives of the AESO Engineering Connection Assessment are as follows:

- Assess the impact of the Project on the performance of the AIES.
- Evaluate Project connection alternatives and identify the AESO's preferred alternative.
- Recommend mitigation measures, if required, to reliably connect the Project to the AIES.
- Identify Project dependencies, including any TFO projects or AESO plans to expand or enhance the transmission system that must be completed prior to connection.

2.2 Existing System

Geographically, the Project is located in the AESO planning area of Cold Lake (Area 28), which is part of the AESO Central planning region. Cold Lake (Area 28) is surrounded by the planning areas of Athabasca/Lac La Biche (Area 27), Vegreville (Area 56) and Lloydminster (Area 13).

From a transmission system perspective, Cold Lake (Area 28) consists primarily of a 144 kV and 240 kV transmission system. Cold Lake (Area 28) is connected to Lac La Biche (Area 27) via a double circuit 240 kV transmission line; Vegreville (Area 56) via multiple 144 kV transmission lines, and Fort Saksatchewan (Area 33) via a double circuit 240 kV transmission line.

2.3 Study Area

The Study Area consists of the AESO Planning areas of Cold Lake (Area 28), Lloydminster (Area 13), Wainwright (Area 32), Provost (Area 37), Alliance/Battle River (Area 36), Vegreville (Area 56), including the tie lines connecting these planning areas to the rest of the AIES. All transmission facilities within the Study Area will be studied and monitored for violations of the Reliability Criteria (defined in Section 3.1 of Attachment B-A1).

3 Connection Alternatives

3.1 Overview

The AESO, in consultation with the TFO in the Study Area and the Market Participant, examined five transmission alternatives to meet the Market Particpant's request for system access service, as detailed in Section 3.2.

3.2 Connection Alternatives Examined

Below is a description of the developments associated with the transmission alternatives that were examined for the Project.

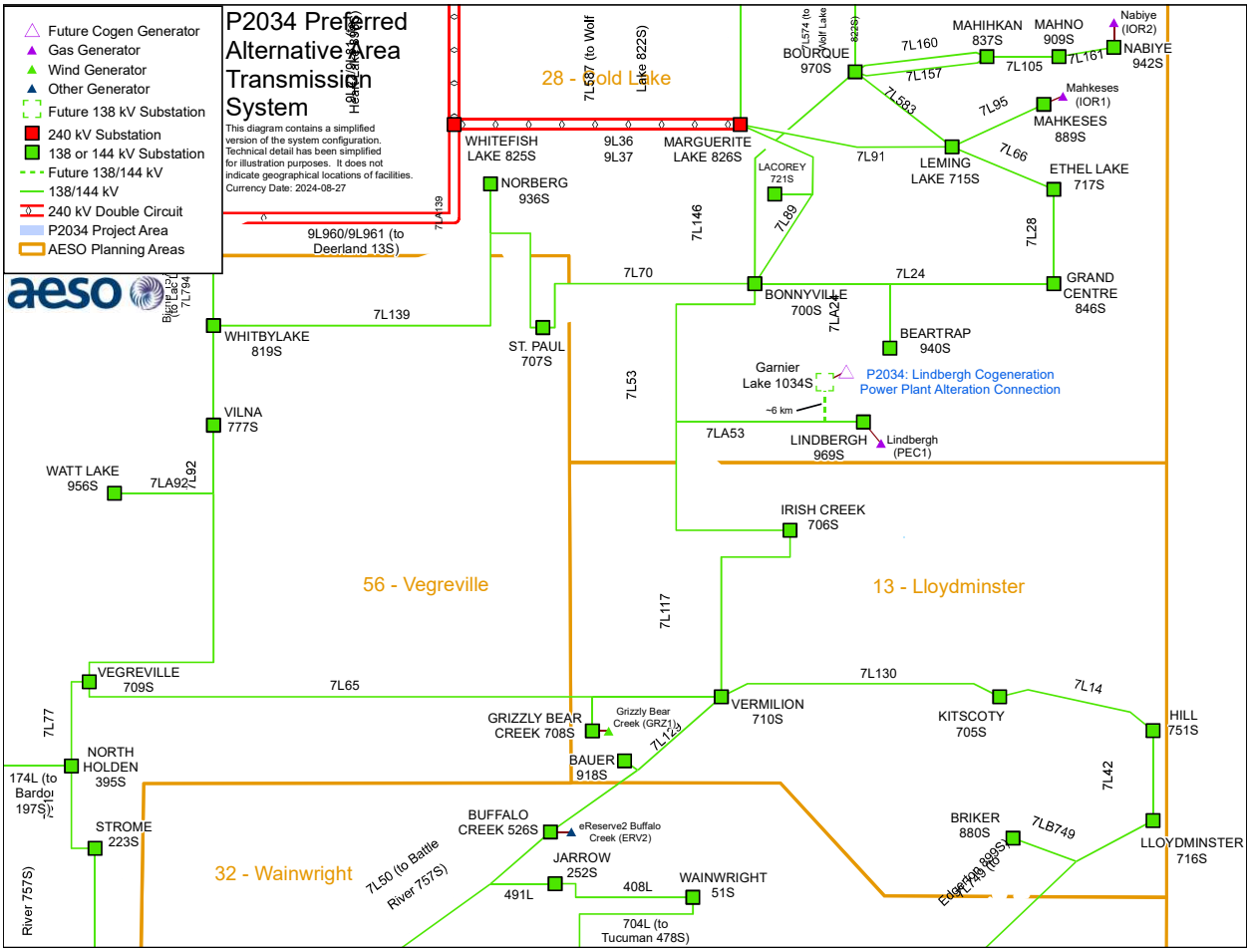
Alternative 1 – T-tap Connection to the 144 kV Transmission Line 7LA53

This alternative includes the following developments:

- Add one 144 kV circuit, approximately 6 km in length, to connect the Facility to the existing 144 kV transmission line 7LA53 using a T-tap configuration; and
- Add or modify associated equipment as required for the above transmission developments.

The proposed connection configuration is shown in **Error! Reference source not found.**.

Figure 3-1: Connection Alternative 1



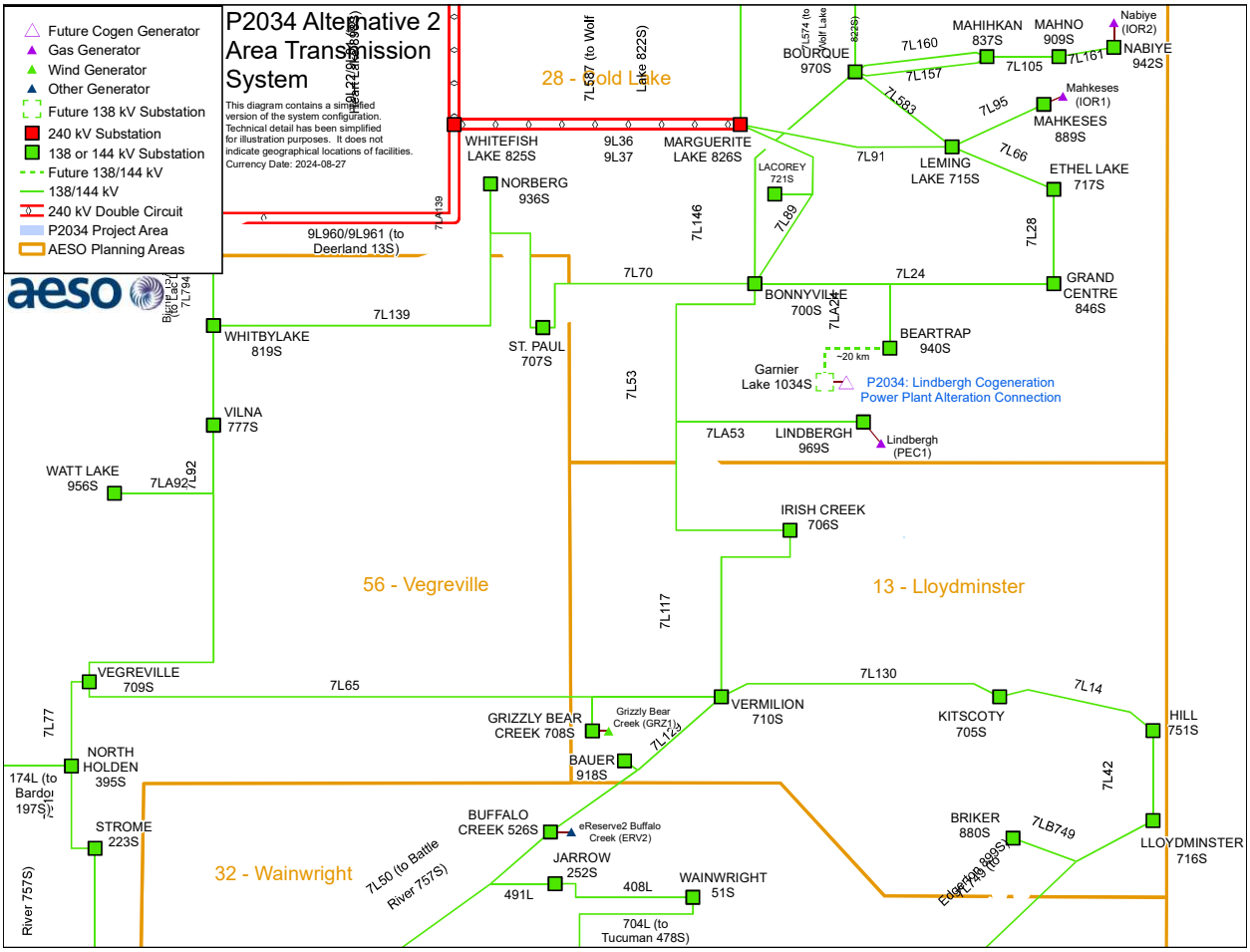
Alternative 2 – Radial connection to the Bear Trap 940S substation

This alternative includes the following developments:

- Add one 240 kV circuit, approximately 20 km in length, to connect the Facility to the existing Bear Trap 940S substation;
- Add one 240 kV circuit breaker at Bear Trap 940S substation; and
- Add or modify associated equipment as required for the above transmission developments.

The proposed connection configuration is shown in Figure 3-2.

Figure 3-2: Connection Alternative 2



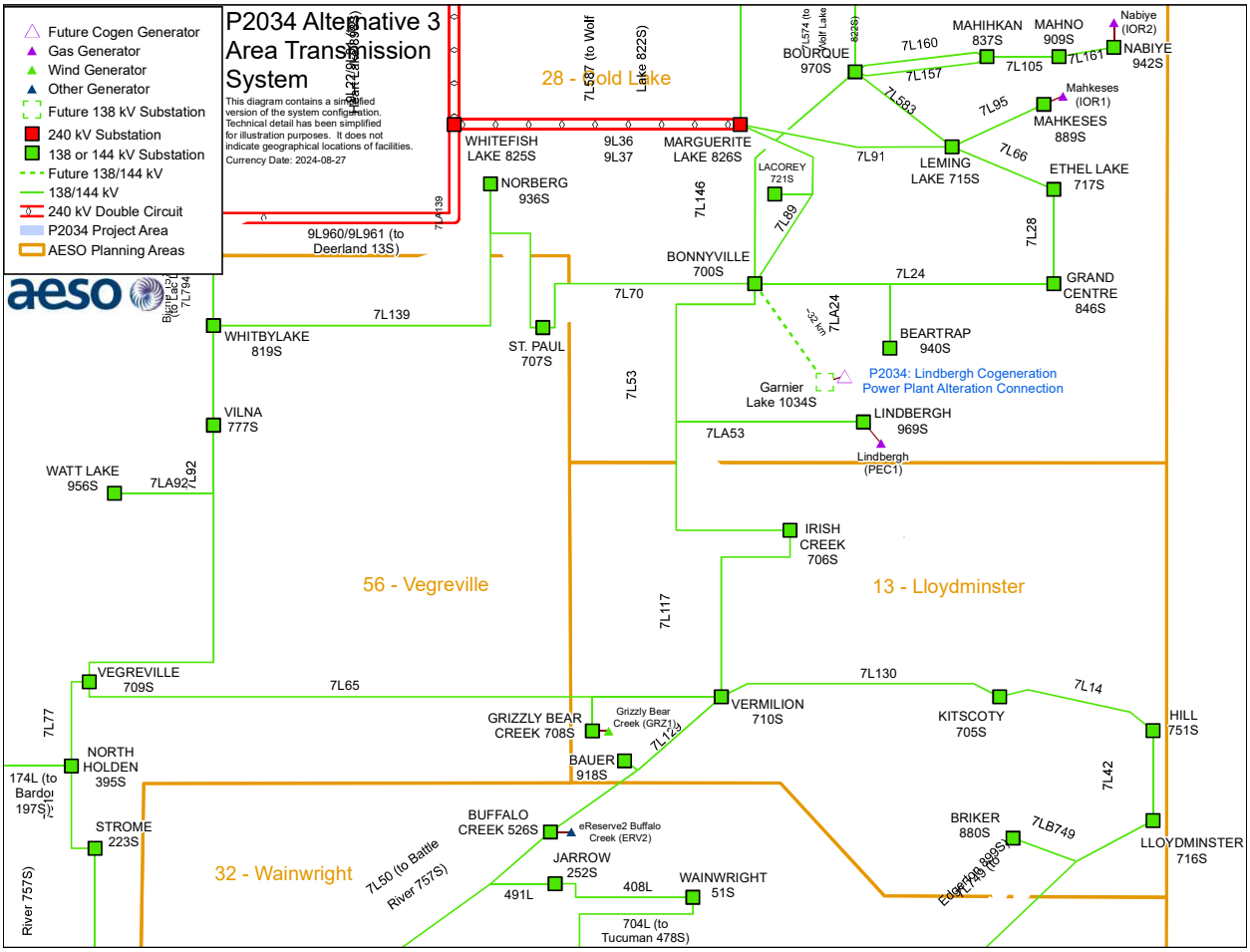
Alternative 3 – Radial Connection to the Bonnyville 700S substation

This alternative includes the following developments:

- Add one 240 kV circuit, approximately 32 km in length, to connect the Facility to the existing Bonnyville 700S substation;
- Add one 240 kV circuit breaker at Bonnyville 700S substation; and
- Add or modify associated equipment as required for the above transmission developments.

The proposed connection configuration is shown in Figure 3-3.

Figure 3-3: Connection Alternative 3



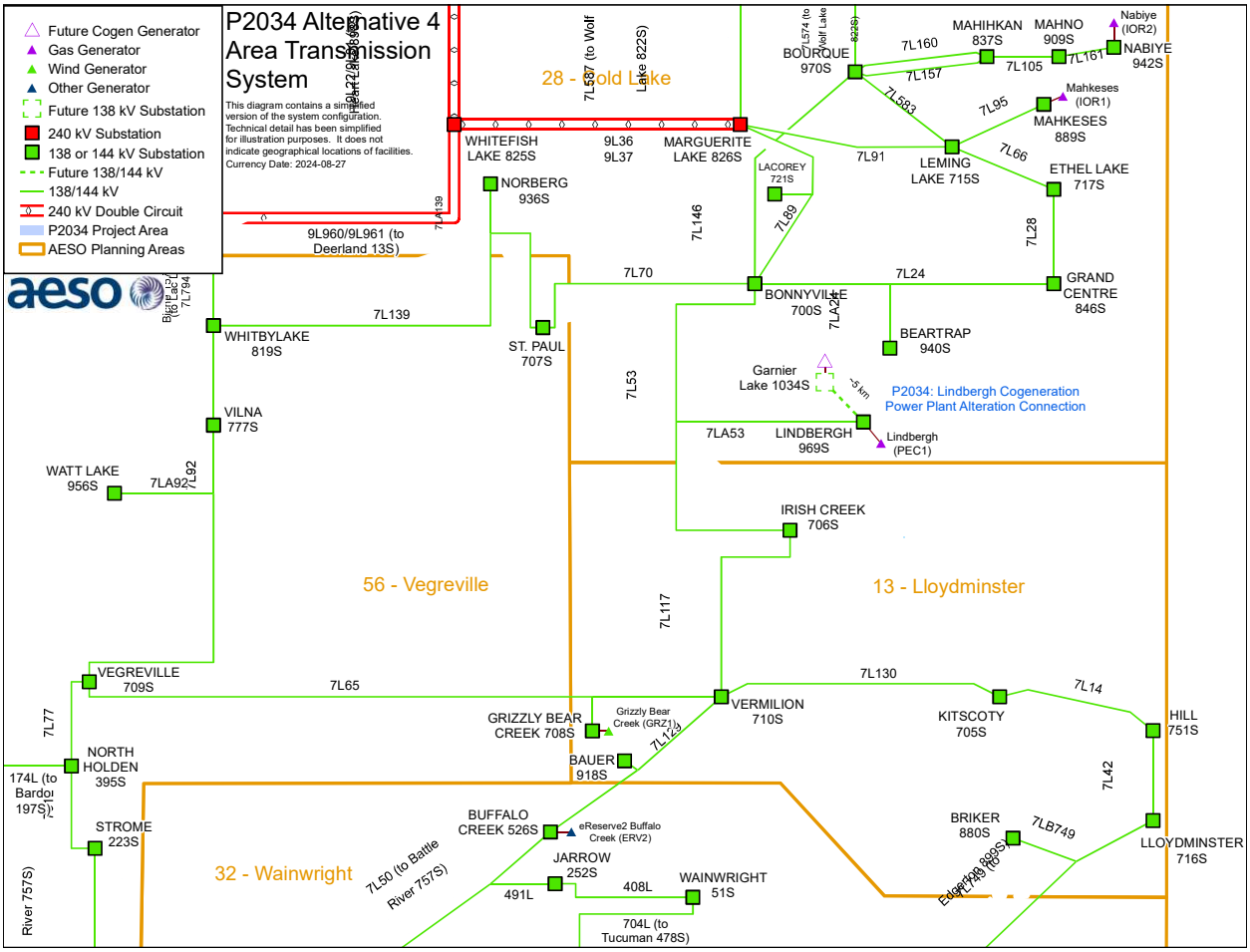
Alternative 4 – Radial Connection to the Lindbergh 969S substation

This alternative includes the following developments:

- Add one 144 kV circuit, approximately 5 km in length, to connect the Facility to the existing Lindbergh 969S substation;
- Add one 144 kV circuit breaker at Lindbergh 969S substation; and
- Add or modify associated equipment as required for the above transmission developments.

The proposed connection configuration is shown in Figure 3-4.

Figure 3-4: Connection Alternative 4



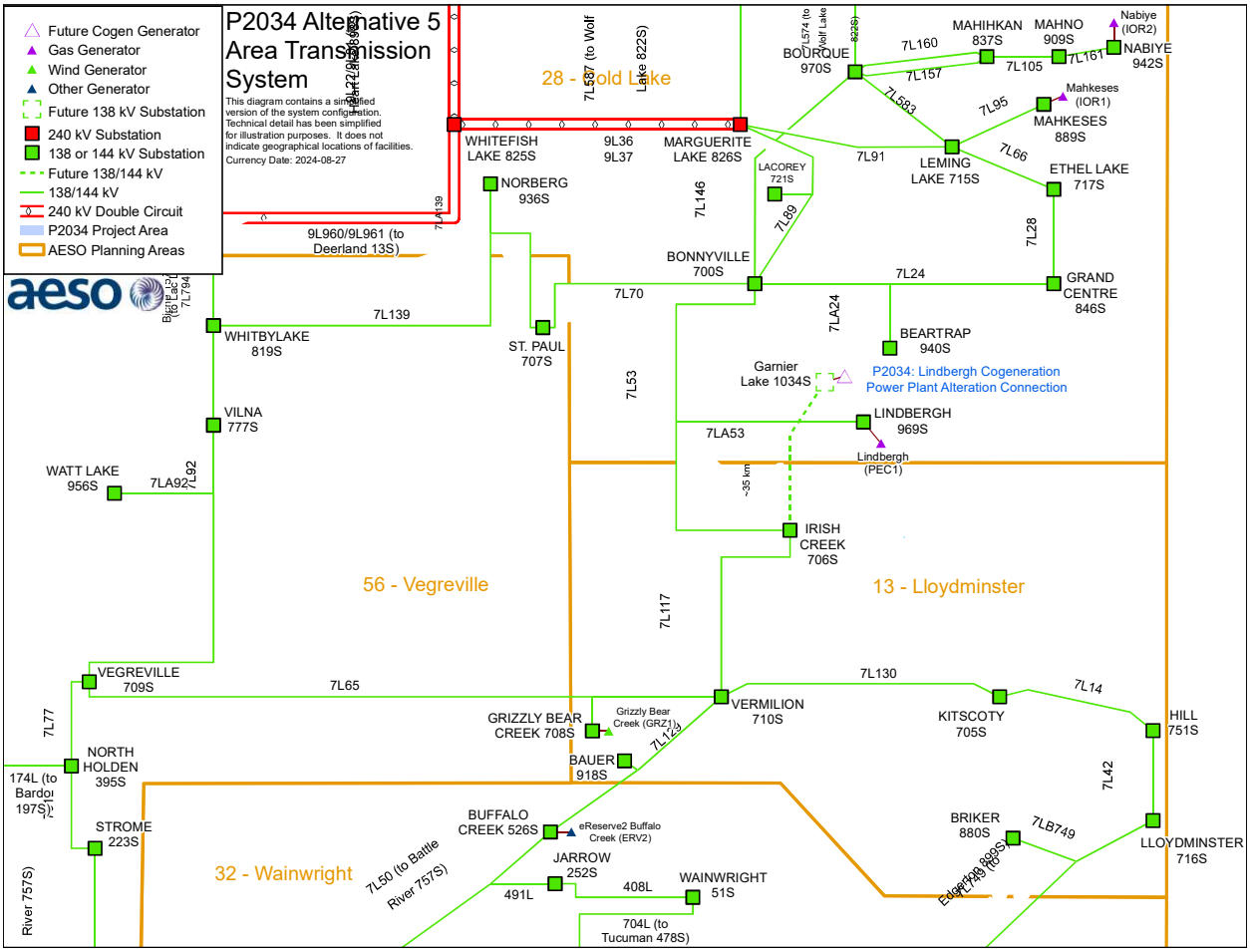
Alternative 5 – Radial Connection to the Irish Creek 706S substation

This alternative includes the following developments:

- Add one 240 kV circuit, approximately 35 km in length, to connect the Facility to the existing Irish Creek 706S substation;
- Add one 240 kV circuit breaker at Lindbergh 969S substation; and
- Add or modify associated equipment as required for the above transmission developments.

The proposed connection configuration is shown in Figure 3-5.

Figure 3-5: Connection Alternative 5



3.3 Connection Alternatives Selected for Further Study

Alternative 1 is considered technically feasible and was selected for further study.

3.4 Connection Alternatives Not Selected for Further Study

Alternatives 2, 3, and 5 will require substantially longer line lengths resulting in increased transmission development and hence increased cost compared to Alternative 1. Therefore, Alternatives 2, 3, and 5 are ruled out.

Alternative 1 and Alternative 4 are expected to have similar system performance. However, Alternative 4 will require modifications to Lindbergh 969S substation which is expected to involve increased transmission development, and hence increased cost, compared with Alternative 1. Therefore, Alternative 4 was ruled out.

4 Assessment Approach

4.1 Standards, Criteria and Assumptions

A detailed description of the standards, criteria, and assumptions that were used for the connection assessment is provided in Attachment B (see Attachment B-A1).

4.2 Studies Performed

At the time of the study, the scheduled ISD for the Project was April 1, 2025. Studies were performed using scenarios for 2028 Summer Light (SL), 2028 Summer Peak (SP), and 2028 Winter Peak (WP). After completion of the studies, the ISD of the Project was changed from April 1, 2025 to August 1, 2027. The AESO determined that the ISD change would not have material impact on the connection alternative, the mitigation measures and the conclusions for the scenario studies conducted.

Stage 1 of the approved Central East Transfer-out Transmission (CETO) project[3] was included in all studied scenarios reported herein.

Short-circuit studies were performed using the 2028 WP and 2031 WP scenario.

Table 4-1 lists the study scenarios. Post-Project scenarios reflect the requested Rate STS contract capacity of 72 MW at the Garnier Lake 1064S substation.

[3] Decision 25469-D01-2021, Alberta Electric System Operator, Needs Identification Document Application, *Central East Transfer-out Transmission Development*.

Table 4-1: Connection Study Scenarios

Scenario No.	Year/Season	System Generation Dispatch Conditions	Scenario Name	Project Load (MW)	Project Generation (MW)
Pre-Project					
1	2028 Summer Peak (SP)	High Generation (HG)	2028 SP Pre-Project	0	0
2	2028 Summer Light (SL)	HG	2028 SL Pre-Project	0	0
3	2028 Winter Peak (WP)	HG	2028 WP Pre-Project	0	0
Post-Project					
4	2028 SL	HG	2028 SP Post-Project	0	72
5	2028 SP	HG	2028 SL Post-Project	0	72
6	2028 WP	HG	2028 WP Post-Project	0	72
7	2031 WP	All study area generation in-service	2031 WP Post-Project	0	72

The AESO Planning Region load forecasts used for the connection studies were based on the *AESO's Preliminary 2023 Long-Term Outlook* (2023 LTO).

While the AESO has updated its regional forecasts since the connection studies were performed, the use of the current AESO forecast, the *preliminary 2023 Long-Term Outlook* (2023 LTO) would not materially alter the connection study results or affect the conclusions and recommendations in this report.

4.2.1 Power Flow Studies

The purpose of the power flow studies is to identify and quantify any thermal and voltage criteria violations in the Study Area.

Power flow studies were performed for 2028 SL, 2028 SP and 2028 WP pre-Project scenarios, and for 2028 SL, 2028 SP and 2028 WP post-Project scenarios.

4.2.2 Transient Stability Studies

The purpose of the transient stability studies is to assess the post-Project stability of the transmission system after three-phase to ground faults are applied on select transmission lines in the Study Area.

Transient stability studies were performed for 2028 SP, 2028 SL and 2028 WP post-Project scenarios.

4.2.3 Short-Circuit Current Level Studies

The purpose of short-circuit current level studies is to determine the expected system short-circuit current levels in the vicinity of the Project.

Short circuit studies were performed for the 2028 WP pre-Project scenario and for 2028 WP and 2031 WP post-Project scenarios.

4.3 Mitigation Measure Development and Evaluation

As explained in Section 6 of Attachment B-A1, mitigation measures were developed to address system performance issues that were identified in the post-Project scenarios. Studies performed to assess the effectiveness of mitigation measures are briefly outlined below.

4.3.1 Post-Mitigation Studies

Power flow and transient stability studies were performed to assess the impact of the Project on the performance of the AIES following implementation of the AESO's proposed mitigation measures.

4.3.2 Constraint Effectiveness Factor Studies

Constraint effective factor studies were used to determine the generator and load constraint effective factors and to identify the most effective generators or loads to manage thermal criteria violations that were observed under Category A and Category B conditions.

5 Interpretation of Results

5.1 Results Overview

This section provides an assessment of the impact of the Project on the performance of the AIES. The Reliability Criteria violations observed during the connection assessment studies for Category A and the proposed mitigation measures are summarized in

Table 5-1. Reliability Criteria violations observed during the connection assessment studies for Category B and the proposed mitigation measures are summarized in Attachment A.

- Section 5.2 includes an overview of the pre-Project studies results.
- Section 5.3 includes an overview of the post-Project studies results.
- Section 5.4 includes a description of the proposed mitigation measures to address observed Reliability Criteria violations.

Detailed study results are provided in Attachment B.

Table 5-1: Summary of Category A Reliability Criteria Violations, Project Impact and Mitigation Measures

Scenario	Type of Reliability Criteria Violation		Details of Violation	Project Impact	Pre-Project Mitigation Measures	Post-Project Mitigation Measures
	Pre-Project	Post-Project				
2028 SP	Thermal - above normal rating	Thermal - above normal rating	472L (Hughenden 213S - Tap 472AL)	No impact	Real-time operational practices (RTOP)	RTOP
2028 SP	Thermal - above normal rating	Thermal - above normal rating	715L (Hansman Lake 650S - Tap 715AL)	No impact	RTOP	RTOP
2028 SP	Thermal - above normal rating	Thermal - above emergency rating	749AL (P2460 Tap - Tap 749L)	No impact	RTOP	RTOP
2028 SP	Thermal - above emergency rating	Thermal - above emergency rating	715L (P2540 Tap - Tap 715L)	No impact	RTOP	RTOP
2028 WP	Thermal - above normal rating	Thermal - above normal rating	749AL (P2460 Tap - Tap 749L)	No impact	RTOP	RTOP

5.2 Pre-Project Study Results

5.2.1 Category A Conditions

As shown in Table 5-1, with the inclusion of additional projects planning to connect in the Central region, the pre-Project power flow studies identified several thermal criteria violations under Category A conditions (i.e., all elements in service) including the 138/144 kV transmission lines 472L, 715L, and 749AL.

The short-circuit fault levels were found to be within the typical capabilities of the nearby facilities.

5.2.2 Category B Conditions

To mitigate the observed thermal criteria violations identified in Category A, the generation profile in the Central region was reduced[4] from the dispatches provided in the ECA Study scope in Attachment B and were applied for the Category B power flow, short circuit, and transient stability studies.

The pre-Project power flow studies identified several thermal criteria violations under Category B conditions (i.e., loss of a single system element); see Attachment A for details.

No voltage deviations were observed that were beyond the limits listed in Table 3-1 of Attachment B-A1 (hereafter referred to as point of delivery (POD) bus voltage deviations) under Category B conditions.

5.3 Post-Project Study Results

5.3.1 Category A Conditions

The post-Project power flow studies identified all of the same thermal criteria violations under the Category A condition that were observed in pre-project scenarios. Following the connection of the Project and with the inclusion of additional projects planning to connect in the Central region, the thermal criteria violations observed in the pre-Project scenarios were also observed in the post-Project scenarios as shown in Table 5-1. No new thermal criterial violations were observed post-project.

A summary of thermal criteria violations observed under N-0 system conditions is shown in Table 5-2.

Table 5-2: Thermal Criteria Violations under the N-0 Condition in the Post-Project scenario

Scenario	Details of Violation (Violation Observed On)	Normal Rating (MVA)	Emergency Rating (MVA)	Pre-Project Results		Post-Project Results		% Loading Difference (Post-Pre)
				Observed Power Flow (MVA)	% Loading	Observed Power Flow (MVA)	% Loading	
2028 SP	138kV Line 472L (from Metiskow 648S to Tap 472AL)	121.0	133.0	123.0	102%	122.9	102%	-0.1%

[4] The generation dispatch of the following facilities were decreased from their original dispatch assumptions for the main SP, and WP scenarios: P2540 Cache Rising Sun MPC Solar, and P2460 ABO Fox Meadows Wind.

	138kV Line 472L (Hughenden 213S - Tap 472AL)	84.0	92.0	86.2	103%	86.1	103%	-0.1%
	138kV Line 715L (Hansman Lake 650S - Tap 715AL)	98.0	135.0	115.7	118%	116.8	119%	1.1%
	138kV Line 749AL (P2460 Tap - Tap 749L)	120.9	133.0	131.6	109%	130.7	108%	-0.8%
	138kV Line 715L (P2540 Tap - Tap 715L)	98.0	108.0	115.9	118%	116.9	119%	1.1%
2028 WP	138kV Line 749AL (P2460 Tap - Tap 749L)	148.0	161.0	157.5	106%	156.3	106%	-0.8%

Table 5-2 indicates that the project has no impact on the majority of the N-0 thermal criteria violations in the Study Area following the inclusion of the Project and additional projects planning to connect in the Central region.The Post-Project short circuit levels were found to be within the designed capabilities of the nearby facilities.

5.3.2 Category B Conditions

To mitigate the observed thermal criteria violations identified in Category A, the generation profile in the Central region was reduced[5] from the dispatches provided in the ECA Study scope in Attachment B and were applied for the Category B power flow, short circuit, and transient stability studies.

The post-Project power flow studies identified several thermal under Category B conditions. Following the connection of the Project, most thermal criteria violations observed in the pre-Project scenarios were exacerbated, and new thermal criteria violations were observed.

No voltage Criteria violations or POD bus voltage deviations were observed under Category B conditions.

Results did not indicate any transient stability concerns, and the system showed acceptable dynamic response to all Category B conditions studied.

5.4 Mitigation Measures

This section discusses the AESO's proposed mitigation measures to address the system performance issues that were identified in the pre-Project and post-Project scenarios.

5.4.1 Pre-Project

The Category A thermal reliability criteria violations observed in pre-Project scenarios can be managed by applying Section 302.1 of the ISO rules, *Real-Time Transmission Constraint Management* (TCM Rule) to curtail generation until such a time that system developments are in place to alleviate congestion. If

[5]The generation dispatch of the following facilities were decreased from their original dispatch assumptions for the main SP, and WP scenarios: P2540 Cache Rising Sun MPC Solar, and P2460 ABO Fox Meadows Wind.

necessary, the AESO will file an application for an "exception" under Section 15(2) of the *Transmission Regulation* (TReg).

Prior to connection of the Project, all of the observed Category B thermal criteria violations can be mitigated using RTOPs.

5.4.2 Post-Project

The Category A thermal reliability criteria violations observed in post-Project scenarios can be managed by applying the TCM Rule to curtail generation until such a time that system developments are in place to alleviate congestion. If necessary, the AESO will file an application for an "exception" under Section 15(2) of the *Transmission Regulation* (TReg).

After connection of the Project, some of the thermal criteria violations observed under Category B conditions can be mitigated using RTOPs. The remaining thermal criteria violations can be mitigated by modifying planned RAS 134, by including the Project in the RAS logic. In addition, a few remaining thermal criteria violations were observed on transmission lines 174L, 701L, 9L20, 704L, and 9L16 can be mitigated using RTOPs following RAS actions.

With the addition of the Project, the total amount of generation tied to planned RAS 134 exceeds the MSSC limit. The post-Project studies indicate that in order to mitigate the thermal criteria violations following certain major contingencies (i.e. 912L and CETO) may result in generation curtailment in excess of the MSSC limit. Pre-contingency generation curtailment under normal (Category A) conditions may be required using RTOPs to prevent generation curtailment by RAS action above the MSSC limit. The probability of pre-curtailment being required would be dependent on generation profiles and operating conditions.

After the connection of the Project, no voltage criteria violations were observed under Category B conditions for any post-Project scenarios.

6 Project Dependencies

The Project does not require the completion of any other AESO plans to expand or enhance the transmission system prior to connection.

7 Conclusions and Recommendations

Based on the study results, Alternative 1 is technically viable. The connection assessment identified a number of pre-Project and post-Project system performance issues.

The connection assessment uses credible worst-case conditions to assess the impact of the Facility connecting on the AIES. Category A thermal criteria violations were observed, exacerbating pre-Project violations under these credible worst-case load and generation forecast conditions. The probability of Category A thermal criteria violations materializing is highly dependent upon the production profile of the Facility and the energization of other generation facilities in the area. The AESO will continue to monitor the pace of generation development and will notify Market Participants if it determines that it is necessary to obtain approval for a Section 15(2) exception.

The total amount of generation tied to planned RAS 134 exceeds the MSSC limit of 466 MW. Pre-contingency generation curtailment under the Category A condition may be required using real-time operational practices to prevent generation curtailment by RAS action above the MSSC level. The probability of pre-curtailment being required would be dependent on generation profiles and operating conditions.

With implementation of these mitigation measures, connecting the project with the preferred alternative does not adversely affect the performance of the AIES.

The AESO recommends proceeding with the Project using Alternative 1 as the preferred alternative to respond to the Market Participant's request for system access service. Alternative 1 involves adding one 144 kV circuit, connect the Facility to the existing transmission line 7LA53 using a T-tap configuration.

The new 144 kV circuit connecting the facility to the grid should have a minimum thermal rating of 110MVA to meet the Market Participant's requested STS contract capacity and minimum conductor sizes used in Alberta for 138/144 kV transmission lines.

Attachment A: Summary of Category B Reliability Criteria Violations, Project Impact and Mitigation Measures- All Scenarios

Table A-1: Summary of Category B Reliability Criteria Violations, Project Impact and Mitigation Measures

Scenario	Type of Reliability Criteria Violation		Contingency (System Element Lost)	Details of Violation	Project Impact	Pre-Project Mitigation Measures	Post-Project Mitigation Measures
	Pre-Project	Post-Project					
2028 SP	Thermal - above emergency rating	Thermal - above emergency rating	CETO 962L (87S Gaetz - 972S Tinchebray)	138kV Line 174L (Bardo 197S - North Holden 395S)	Materially increased violation	Real Time Operating Procedure (RTOP)	Modified RAS 134 and RTOP
2028 SP	Thermal - above normal rating	Thermal - above emergency rating		138kV Line 701L (North Holden 395S - Strome 223S)	Marginally reduced violation	RTOP	Modified RAS 134 and RTOP
2028 SP	Thermal - above normal rating	Thermal - above emergency rating		240kV Line 9L20 (Nevis 766S - Cordel 755S)	Marginally increased violation	RTOP	Modified RAS 134 and RTOP
2028 SP	Thermal - above normal rating	None		138kV Line 749AL (P2460 Tap - Tap 749L)	Violation is mitigated	RTOP	None
2028 SP	Thermal - above normal rating	None	953L (574S Nilrem - 755S Cordel)	138kV Line 704L (Wainwright 51S - Tucuman 478S)	Violation is mitigated	RTOP	None
2028 SP	Thermal - above normal rating	Thermal - above normal rating	1047L (574S Nilrem - P2566 Eastervale Solar - 650S Hansman Lake)	138kV Line 703L (Hardisty 377S - 703BL Tap 703BL Tap)	Marginally reduced violation	RTOP	RTOP
2028 SP	Thermal - above emergency rating	Thermal - above emergency rating		138kV Line 472L (Metiskow 648S - Tap 472AL)	Marginally reduced violation	RTOP	RTOP
2028 SP	Thermal - above normal rating	Thermal - above normal rating		138kV Line 703L (Hughenden 213S - 703BL Tap 703BL Tap)	Marginally reduced violation	RTOP	RTOP
2028 SP	Thermal - above emergency rating	Thermal - above emergency rating		138kV Line 472L (Hughenden 213S - Tap 472AL)	Marginally reduced violation	RTOP	RTOP
2028 SP	Thermal - above normal rating	None		138kV Line 749AL (P2460 Tap - Tap 749L)	Violation is mitigated	RTOP	None
2028 SP	Thermal - above normal rating	Thermal - above normal rating	9L966 (650S Hansman Lake - 932S Pemukan)	138kV Line 7L224 (Hansman Lake 650S - Monitor 774S)	Marginally reduced violation	RTOP	RTOP
2028 SP	Thermal - above normal rating	Thermal - above normal rating	9L27 (863S Paintearth - 755S Cordel)	138kV Line 472L (Metiskow 648S - Tap 472AL)	Marginally reduced violation	RTOP	RTOP
2028 SP	Thermal - above emergency rating	Thermal - above emergency		138kV Line 472L (Hughenden 213S - Tap 472AL)	Marginally reduced violation	RTOP	RTOP
2028 SP	Thermal - above normal rating	None		138kV Line 749AL (P2460 Tap - Tap 749L)	Violation is mitigated	RTOP	None
2028 SP	Thermal - above emergency rating	Thermal - above normal rating	885L (648S Metiskow - 650S Hansman Lake)	138kV Line 749AL (P2460 Tap - Tap 749L)	Marginally reduced violation	RTOP	RTOP
2028 SP	Thermal - above emergency rating	Thermal - above emergency	715L (650S Hansman Lake - P2540 Cache Rising Sun - 545S Provost)	138kV Line 749AL (P2460 Tap - Tap 749L)	Marginally reduced violation	RTOP	RTOP
2028 SP	Thermal - above normal rating	None	7L749 (899S Edgerton - 716S Lloydminster - 880S Briker)	138kV Line 472L (Metiskow 648S - Tap 472AL)	Violation is mitigated	RTOP	RTOP
2028 SP	Thermal - above emergency rating	None		138kV Line 472L (Hughenden 213S - Tap 472AL)	Violation is mitigated	RTOP	RTOP
2028 SP	Thermal - above normal rating	None	7L117 (706S Irish Creek - 710S Vermilion)	144kV Line 7L65 (7LA65 Tap - Vegreville 709S)	Violation is mitigated	RTOP	RTOP
2028 SP	Thermal - above normal rating	None	7L65 (709S Vegreville - 710S Vermilion - 708S Grizzly Bear)	138kV Line 749AL (P2460 Tap - Tap 749L)	Violation is mitigated	RTOP	RTOP
2028 SP	Thermal - above normal rating	None	7L129 (710S Vermilion - 918S Bauer - 526S Buffalo Creek)	138kV Line 749AL (P2460 Tap - Tap 749L)	Violation is mitigated	RTOP	RTOP
2028 SP	Thermal - above normal rating	None	7L50 (526S Buffalo Creek - 757S Battle River - 252S Jarrow)	138kV Line 749AL (P2460 Tap - Tap 749L)	Violation is mitigated	RTOP	RTOP
2028 SP	None	Thermal - above normal rating	701L (395S North Holden - 223S Strome)	144kV Line 7L65 (7LA65 Tap - Vegreville 709S)	New violation	RTOP	RTOP
2028 SP	None	Thermal - above normal rating	701L (223S Strome - 757S Battle River - 764S Heisler)	144kV Line 7L65 (7LA65 Tap - Vegreville 709S)	New violation	RTOP	RTOP
2028 SL	Thermal - above normal rating	Thermal - above normal rating	CETO 962L (87S Gaetz - 972S Tinchebray)	138kV Line 704L (Wainwright 51S - Tucuman 478S)	Materially decreased violation	RTOP	RTOP
2028 SL	Thermal - above normal rating	Thermal - above normal rating		240kV Line 9L20 (Nevis 766S - Cordel 755S)	Mariginally increased violation	RTOP	RTOP
2028 SL	Thermal - above normal rating	Thermal - above normal rating	9L80 (757S Battle River - 755S Cordel)	138kV Line 704L (Wainwright 51S - Tucuman 478S)	Materially decreased violation	RTOP	RTOP
2028 SL	Thermal - above normal rating	None	953L (574S Nilrem - 755S Cordel)	138kV Line 408L (Jarrow 252S - Wainwright 51S)	Violation is mitigated	RTOP	RTOP
2028 SL	Thermal - above normal rating	Thermal - above normal rating	953L (574S Nilrem - 755S Cordel)	138kV Line 704L (Wainwright 51S - Tucuman 478S)	Materially decreased violation	RTOP	RTOP
2028 SL	Thermal - above normal rating	Thermal - above normal rating	1047L (574S Nilrem - P2566 Eastervale Solar - 650S Hansman Lake	138kV Line 703L (Hardisty 377S - 703BL Tap)	No impact	RTOP	RTOP
2028 SL	Thermal - above emergency rating	Thermal - above emergency rating		138kV Line 472L (Metiskow 648S - Tap 472AL)	No impact	RTOP	RTOP
2028 SL	Thermal - above normal rating	Thermal - above normal rating		138kV Line 703L (Hughenden 213S - 703BL Tap)	No impact	RTOP	RTOP
2028 SL	Thermal - above emergency rating	Thermal - above emergency rating		138kV Line 472L (Hughenden 213S - Tap 472AL)	No impact	RTOP	RTOP

2028 SL	Thermal - above emergency rating	Thermal - above normal rating	9L27 (863S Paintearth - 755S Cordel)	138kV Line 472L (Hughenden 213S - Tap 472AL)	Mariginally increased violation	RTOP	RTOP
2028 SL	Thermal - above normal rating	None		138kV Line 704L (Wainwright 51S - Tucuman 478S)	Violation is mitigated	RTOP	RTOP
2028 SL	Thermal - above normal rating	Thermal - above normal rating	681L (377S Hardisty - 478S Tucuman)	138kV Line 472L (Hughenden 213S - Tap 472AL)	Materially increased violation	RTOP	RTOP
2028 SL	Thermal - above normal rating	None	749L (648S Metiskow - 267S Killarney Lake - P2460 Fox Meadows Wind - 899S Edgerton)	138kV Line 472L (Hughenden 213S - Tap 472AL)	Violation is mitigated	RTOP	RTOP
2028 SL	Thermal - above emergency rating	Thermal - above normal rating		138kV Line 704L (Wainwright 51S - Tucuman 478S)	Materially decreased violation	RTOP	RTOP
2028 SL	Thermal - above normal rating	Thermal - above normal rating		138kV Line 715L (Hansman Lake 650S - Tap 715AL)	No impact	RTOP	RTOP
2028 SL	Thermal - above normal rating	Thermal - above normal rating		138kV Line 715L (P2540 Tap - Tap 715L)	No impact	RTOP	RTOP
2028 SL	Thermal - above normal rating	Thermal - above normal rating	7L749 (899S Edgerton - 716S Lloydminster - 880S Briker)	138kV Line 472L (Hughenden 213S - Tap 472AL)	Mariginally decreased violation	RTOP	RTOP
2028 SL	Thermal - above emergency rating	Thermal - above normal rating		138kV Line 704L (Wainwright 51S - Tucuman 478S)	Materially increased violation	RTOP	RTOP
2028 SL	Thermal - above normal rating	Thermal - above normal rating	7L42 (751S Hill - 716S Lloydminster)	138kV Line 472L (Hughenden 213S - Tap 472AL)	Marginally decreased violation	RTOP	RTOP
2028 SL	Thermal - above normal rating	None		138kV Line 704L (Wainwright 51S - Tucuman 478S)	Violation is mitigated	RTOP	RTOP
2028 SL	Thermal - above normal rating	None	Battle River T2	138kV Line 704L (Wainwright 51S - Tucuman 478S)	Violation is mitigated	RTOP	RTOP
2028 WP	Thermal - above normal rating	Thermal - above emergency rating	CETO 962L (87S Gaetz - 972S Tinchebray)	138kV Line 174L (Bardo 197S - North Holden 395S)	Materially increased violation	RTOP	Modified RAS 134 and RTOP
2028 WP	Thermal - above normal rating	Thermal - above normal rating		138kV Line 701L (North Holden 395S - Strome 223S)	Marginally reduced violation	RTOP	Modified RAS 134 and RTOP
2028 WP	Thermal - above emergency rating	Thermal - above normal rating		138kV Line 704L (Wainwright 51S - Tucuman 478S)	Marginally reduced violation	RTOP	Modified RAS 134 and RTOP
2028 WP	Thermal - above emergency rating	Thermal - above emergency rating		240kV Line 9L20 (Nevis 766S - Cordel 755S)	Marginally increased violation	RTOP	Modified RAS 134 and RTOP
2028 WP	Thermal - above emergency rating	Thermal - above emergency rating		240kV Line 9L16 (Cordel 755S - Tap 916L)	Marginally reduced violation	RTOP	Modified RAS 134 and RTOP
2028 WP	Thermal - above emergency rating	Thermal - above emergency rating	9L20 (766S Nevis - 755S Cordel)	240kV Line CETO 962L (Gaetz 87S - Tinchebray 972S)	Marginally increased violation	RTOP	RTOP
2028 WP	Thermal - above normal rating	Thermal - above normal rating	9L80 (757S Battle River - 755S Cordel)	138kV Line 704L (Wainwright 51S - Tucuman 478S)	Materially reduced violation	RTOP	RTOP
2028 WP	Thermal - above emergency rating	Thermal - above emergency rating	953L (574S Nilrem - 755S Cordel)	138kV Line 704L (Wainwright 51S - Tucuman 478S)	Materially reduced violation	RTOP	RTOP
2028 WP	Thermal - above emergency rating	Thermal - above emergency rating	1047L (574S Nilrem - P2566 Eastervale Solar - 650S Hansman Lake	138kV Line 703L (Hardisty 377S - 703BL Tap)	Marginally reduced violation	RTOP	RTOP
2028 WP	Thermal - above emergency rating	Thermal - above emergency rating		138kV Line 472L (Metiskow 648S - Tap 472AL)	No impact	RTOP	RTOP
2028 WP	Thermal - above normal rating	Thermal - above normal rating		138kV Line 703L (Hughenden 213S - 703BL Tap)	No impact	RTOP	RTOP
2028 WP	Thermal - above emergency rating	Thermal - above emergency rating		138kV Line 472L (Hughenden 213S - Tap 472AL)	No impact	RTOP	RTOP
2028 WP	Thermal - above emergency rating	Thermal - above emergency rating	9L966 (650S Hansman Lake - 932S Pemukan)	138kV Line 7L224 (Hansman Lake 650S - Monitor 774S)	Marginally reduced violation	RTOP	RTOP
2028 WP	Thermal - above normal rating	Thermal - above normal rating	9L27 (863S Paintearth - 755S Cordel)	138kV Line 703L (Hardisty 377S - 703BL Tap)	Marginally increased violation	RTOP	RTOP
2028 WP	Thermal - above normal rating	None		138kV Line 704L (Wainwright 51S - Tucuman 478S)	Violation is mitigated	RTOP	RTOP
2028 WP	Thermal - above emergency rating	Thermal - above normal rating	885L (648S Metiskow - 650S Hansman Lake)	138kV Line 749AL (P2460 Tap - Tap 749L)	Materially reduced violation	RTOP	RTOP
2028 WP	Thermal - above emergency rating	Thermal - above emergency rating	715L (650S Hansman Lake - P2540 Cache Rising Sun - 545S Provost)	138kV Line 749AL (P2460 Tap - Tap 749L)	Materially reduced violation	RTOP	RTOP
2028 WP	Thermal - above emergency rating	Thermal - above normal rating	749L (648S Metiskow - 267S Killarney Lake - P2460 Fox Meadows Wind - 899S Edgerton)	138kV Line 704L (Wainwright 51S - Tucuman 478S)	Materially reduced violation	RTOP	RTOP
2028 WP	Thermal - above emergency rating	Thermal - above normal rating	7L749 (899S Edgerton - 716S Lloydminster - 880S Briker)	138kV Line 704L (Wainwright 51S - Tucuman 478S)	Materially reduced violation	RTOP	RTOP
2028 WP	Thermal - above normal rating	None	7L42 (751S Hill - 716S Lloydminster)	138kV Line 704L (Wainwright 51S - Tucuman 478S)	Violation is mitigated	RTOP	RTOP
2028 WP	Thermal - above normal rating	None	7L65 (709S Vegreville - 710S Vermilion - 708S Grizzly Bear)	138kV Line 704L (Wainwright 51S - Tucuman 478S)	Violation is mitigated	RTOP	RTOP
2028 WP	Thermal - above normal rating	None	Battle River T2	138kV Line 704L (Wainwright 51S - Tucuman 478S)	Violation is mitigated	RTOP	RTOP

Notes:

- Marginally increased (or marginally decreased) refers to a percent loading difference (post-Project percent loading minus pre-Project percent loading) between 0% and 3% (or -3%).
- Materially increased (or materially decreased) refers to a percent loading difference (post-Project percent loading minus pre-Project percent loading) above or equal to 3% (or below or equal to -3%).
- RAS 134 is an existing RAS (see Section 1.2.2 of Attachment A1). In the P2034 study, only P2034 was tripped as part of RAS 134 to monitor the impact of the RAS.
- In this table, "Modifed" refers to adding the Project to the logic of the respective RAS
- Pursuant to forthcoming AESO operation planning studies with consideration of CETO phase 1 and phase 2, new RAS(s) might be proposed. The Market Participant shall receive notification in the event that Project P2034 necessitates inclusion in any additional RAS(s).

Attachment B:
Engineering Connection Assessment Results

Engineering Connection Assessment: Study Results

P2034 Lindbergh Cogeneration Power Plant Alteration Connection

Strathcona Resources Ltd.

Date: September 6, 2024

Version: V2

Role	Name	Date	Signature
Prepared	Paul Kos, P. Eng.	Sept 8, 2024	
Reviewed	Paul Kos, P. Eng.	Sept 8, 2024	
Approved	Paul Kos, P. Eng.	Sept 8, 2024	

PERMIT TO PRACTICE
Power System Solutions Inc.
RM SIGNATURE:
RM APEGA ID #: 52296
DATE: September 8, 2024
PERMIT NUMBER: P07293
The Association of Professional Engineers and Geoscientists of Alberta (APEGA)

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September 8, 2024

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1 Introduction

This report presents the results of the engineering studies that were completed by Power System Solutions International Inc. (the Studies Consultant) to assess the impact of the Project (as defined in Attachment A1: AESO Engineering Connection Assessment Scope) on the performance of the Alberta interconnected electric system (AIES). The studies were performed in accordance with Attachment A1: AESO Engineering Connection Assessment: Study Scope titled “Study Scope Amendment – P2034 Cold Lake Area Cogen”, dated January 16, 2024, Version V1, prepared by the AESO. Table 1-1 shall replace Table 4-1 of the Study Scope in Attachment A1 and Table 1-2 shall replace Table 5-1 of the Study Scope in Attachment A1. The sensitivity scenarios (that examine the system without CETO in-service) previously included in Attachment A1 was removed due to the Project in-service date change to August 1, 2027 which is after the CETO expected in-service date of 2026.

The power system network analysis tool that was used for the studies in this connection assessment was PSS/E.

Table 1-1: Connection Study Scenarios

Scenario No.	Year/Season	System Generation Dispatch Conditions	Scenario Name	Project Load (MW)	Project Generation (MW)
Pre-Project					
1	2028 Summer Peak (SP)	High Generation (HG)	2028 SP Pre-Project	0	0
2	2028 Summer Light (SL)		2028 SL Pre-Project	0	0
3	2028 Winter Peak (WP)		2028 WP Pre-Project	0	0
Post-Project					
4	2028 SP	HG	2028 SP Post-Project	0	72
5	2028 SL		2028 SL Post-Project	0	72
6	2028 WP		2028 WP Post-Project	0	72
7	2031 WP	All study area generation in-service	2031 WP Post-Project	0	72

Table 1-2: Summary of the Studies to be Performed

Scenario No. and Name		Power Flow		Voltage Stability		Transient Stability		Motor Starting		Short Circuit
		Category		Category		Category		Category		Category A
		A	B	A	B	A	B	A	B	
Pre-Project										
1	2028 SP Pre-Project	X	X			X*	X*			
2	2028 SL Pre-Project	X	X			X*	X*			
3	2028 WP Pre-Project	X	X			X*	X*			X
Post-Project										
4	2028 SP Post-Project	X	X			X	X			
5	2028 SL Post-Project	X	X			X	X			
6	2024 WP Post-Project	X	X			X	X			X
7	2031 WP Post-Project									X

*Only required if post-Project studies show potential transient stability issues

2 Pre-Project Study Results

This section describes the results of the pre-Project power flow studies.

2.1 Power Flow Studies

Power flow diagrams illustrating the pre-Project power flow studies results for Category A and Category B conditions are provided in Attachment A2.

2.1.1 Scenario 1: 2028 Summer Peak Pre-Project

Category A Conditions

Thermal criteria violations were observed under Category A conditions as shown in Table 2-1. The generation effective factors result under the Category A conditions are provided in Attachment A9.

Table 2-1: Thermal Criteria Violations under Category A Conditions for Scenario 1

Violation Location Details	Thermal Ratings[a] (MVA)		Pre-Project Results	
	Normal Rating	Emergency Rating	Power Flow[b] (MVA)	% Loading[c]
138kV Line 472L (from Metiskow 648S to Tap 472AL)	121.0	133.0	123.0	102%
138kV Line 472L (Hughenden 213S - Tap 472AL)	84.0	92.0	86.2	103%
138kV Line 715L (Hansman Lake 650S - Tap 715AL)	98.0	135.0	115.7	118%
138kV Line 749AL (P2460 Tap - Tap 749L)	120.9	133.0	131.6	109%
138kV Line 715L (P2540 Tap - Tap 715L)	98.0	108.0	115.9	118%

Notes:

[a] The facility ratings shown in the AESO's Study Scope have been adjusted from a [72/144] kV voltage base to a [69/138] kV voltage base, as is used by the power system network analysis tool.

[b] Power flow (MVA) is current expressed as MVA (i.e., $S = \sqrt{3} \times V_{base} \times I_{actual}$)

[c] Reported as a percentage of the power flow (in MVA, i.e., $S = \sqrt{3} \times V_{base} \times I_{actual}$) relative to the transmission line's Normal Rating (also in MVA), as shown in the AESO's Study Scope.

To mitigate the observed thermal criteria violations, the generation profile in the study area was reduced from the dispatches provided in the AESOs Study Scope based on the most effective generator as determined by AESO. The dispatch was reduced in sequence provided by AESO as detailed below:

- P2540 Cache Rising Sun MPC Solar reduced by 98MW, from 98MW to 0MW and generator placed out of service.
- P2460 ABO Fox Meadows Wind reduced by 10MW, from 106MW to 96MW.

After reducing generation the resulting line loading is shown in Table 2-2.

Table 2-2: Thermal Loading after Modified Dispatch for Scenario 1

Violation Location Details	Thermal Ratings[a] (MVA)		Loading after Generation Reduction	
	Normal Rating	Emergency Rating	Power Flow[b] (MVA)	% Loading[c]
138kV Line 472L (from Metiskow 648S to Tap 472AL)	121.0	133.0	110.8	87.9%
138kV Line 472L (Hughenden 213S - Tap 472AL)	84.0	92.0	72.6	83.0%
138kV Line 715L (Hansman Lake 650S - Tap 715AL)	98.0	135.0	35.6	34.9%
138kV Line 749AL (P2460 Tap - Tap 749L)	120.9	133.0	120.1	95.5%
138kV Line 715L (P2540 Tap - Tap 715L)	98.0	108.0	35.6	34.9%

Category B Conditions

Thermal Criteria Violations

Thermal criteria violations were observed under certain Category B conditions as shown in Table 2-3.

Table 2-3: Thermal Criteria Violations under Category B Conditions for Scenario 1

Contingency (System Element Lost)	Violation Location Details	Thermal Ratings[a] (MVA)		Pre-Project Results	
		Normal Rating	Emergency Rating	Power Flow[b] (MVA)	% Loading[c]
CETO 962L (87S Gaetz - 972S Tinchebray)	138kV Line 174L (Bardo 197S - North Holden 395S)	121.0	133.0	140.2	115.9
	138kV Line 701L (North Holden 395S - Strome 223S)	119.0	131.0	128.3	107.8
	138kV Line 749AL (P2460 Tap - Tap 749L)	120.9	133.0	121.1	100.1
	240kV Line 9L20 (Nevis 766S - Cordel 755S)	429.0	624.0	622.5	145.1
953L (574S Nilrem - 755S Cordel)	138kV Line 704L (Wainwright 51S - Tucuman 478S)	75.0	83.0	77.8	103.7
1047L (574S Nilrem - P2566 Eastervale Solar - 650S Hansman Lake)	138kV Line 703L (Hardisty 377S - 703BL Tap 703BL Tap)	96.0	133.0	126.3	131.5
	138kV Line 472L (Metiskow 648S - Tap 472AL)	121.0	133.0	170.4	140.8
	138kV Line 703L (Hughenden 213S - 703BL Tap 703BL Tap)	121.0	133.0	129.3	106.9
	138kV Line 472L (Hughenden 213S - Tap 472AL)	84.0	92.0	133.2	158.6

Contingency (System Element Lost)	Violation Location Details	Thermal Ratings[a] (MVA)		Pre-Project Results	
		Normal Rating	Emergency Rating	Power Flow[b] (MVA)	% Loading[c]
	138kV Line 749AL (P2460 Tap - Tap 749L)	120.9	133.0	121.0	100.0
9L966 (650S Hansman Lake - 932S Pemukan)	138kV Line 7L224 (Hansman Lake 650S - Monitor 774S)	108.3	119.8	114.4	105.6
9L27 (863S Paintearth - 755S Cordel)	138kV Line 472L (Metiskow 648S - Tap 472AL)	121.0	133.0	131.1	108.3
	138kV Line 472L (Hughenden 213S - Tap 472AL)	84.0	92.0	94.2	112.2
	138kV Line 749AL (P2460 Tap - Tap 749L)	120.9	133.0	121.5	100.5
885L (648S Metiskow - 650S Hansman Lake)	138kV Line 749AL (P2460 Tap - Tap 749L)	120.9	133.0	133.4	110.3
715L (650S Hansman Lake - P2540 Cache Rising Sun - 545S Provost)	138kV Line 749AL (P2460 Tap - Tap 749L)	120.9	133.0	153.7	127.1
7L749 (899S Edgerton - 716S Lloydminster - 880S Briker)	138kV Line 472L (Metiskow 648S - Tap 472AL)	121.0	133.0	121.9	100.7
	138kV Line 472L (Hughenden 213S - Tap 472AL)	84.0	92.0	85.4	101.6
7L117 (706S Irish Creek - 710S Vermilion)	144kV Line 7L65 (7LA65 Tap - Vegreville 709S)	109.3	121.7	111.8	102.2
7L65 (709S Vegreville - 710S Vermilion - 708S Grizzly Bear)	138kV Line 749AL (P2460 Tap - Tap 749L)	120.9	133.0	121.0	100.1
7L129 (710S Vermilion - 918S Bauer - 526S Buffalo Creek)	138kV Line 749AL (P2460 Tap - Tap 749L)	120.9	133.0	121.1	100.1
7L50 (526S Buffalo Creek - 757S Battle River - 252S Jarrow)	138kV Line 749AL (P2460 Tap - Tap 749L)	120.9	133.0	121.4	100.3

Notes:

[a] The facility ratings shown in the AESO's Study Scope have been adjusted from a [72/144] kV voltage base to a [69/138] kV voltage base, as is used by the power system network analysis tool.

[b] Power flow (MVA) is current expressed as MVA (i.e., $S = \sqrt{3} \times V_{base} \times I_{actual}$)

[c] Reported as a percentage of the power flow (in MVA, i.e., $S = \sqrt{3} \times V_{base} \times I_{actual}$) relative to the transmission line's Normal Rating (also in MVA), as shown in the AESO's Study Scope.

Voltage Criteria Violations

No voltage criteria violations were observed under Category B conditions.

POD Bus Voltage Deviations

No POD bus voltage deviations were observed under Category B conditions.

2.1.2 Scenario 2: 2028 Summer Light Pre-Project

Category A Conditions

No Reliability Criteria (as defined in the AESO's Study Scope) violations were observed under Category A conditions.

Category B Conditions

Thermal Criteria Violations

Thermal criteria violations were observed under certain Category B conditions as shown in Table 2-4.

Table 2-4: Thermal Criteria Violations under Category B Conditions for Scenario 2

Contingency (System Element Lost)	Violation Location Details	Thermal Ratings[a] (MVA)		Pre-Project Results	
		Normal Rating	Emergency Rating	Power Flow[b] (MVA)	% Loading[c]
CETO 962L (87S Gaetz - 972S Tinchebray)	138kV Line 704L (Wainwright 51S - Tucuman 478S)	75.0	83.0	79.3	105.8
	240kV Line 9L20 (Nevis 766S - Cordel 755S)	429.0	624.0	555.2	129.4
9L80 (757S Battle River - 755S Cordel)	138kV Line 704L (Wainwright 51S - Tucuman 478S)	75.0	83.0	77.6	103.5
953L (574S Nilrem - 755S Cordel)	138kV Line 408L (Jarrow 252S - Wainwright 51S)	75.0	83.0	76.9	102.6
	138kV Line 704L (Wainwright 51S - Tucuman 478S)	75.0	83.0	93.3	124.3
1047L (574S Nilrem - P2566 Eastervale Solar - 650S Hansman Lake)	138kV Line 703L (Hardisty 377S - 703BL Tap)	96.0	133.0	123.9	129.1
	138kV Line 472L (Metiskow 648S - Tap 472AL)	121.0	133.0	146.6	121.2
	138kV Line 703L (Hughenden 213S - 703BL Tap)	121.0	133.0	126.6	104.7
	138kV Line 472L (Hughenden 213S - Tap 472AL)	84.0	92.0	137.0	163.1

Contingency (System Element Lost)	Violation Location Details	Thermal Ratings[a] (MVA)		Pre-Project Results	
		Normal Rating	Emergency Rating	Power Flow[b] (MVA)	% Loading[c]
9L27 (863S Paintearth - 755S Cordel)	138kV Line 472L (Hughenden 213S - Tap 472AL)	84.0	92.0	97.9	116.6
	138kV Line 704L (Wainwright 51S - Tucuman 478S)	75.0	83.0	76.9	102.6
681L (377S Hardisty - 478S Tucuman)	138kV Line 472L (Hughenden 213S - Tap 472AL)	84.0	92.0	85.6	102.0
749L (648S Metiskow - 267S Killarney Lake - P2460 Fox Meadows Wind - 899S Edgerton)	138kV Line 472L (Hughenden 213S - Tap 472AL)	84.0	92.0	84.2	100.2
	138kV Line 704L (Wainwright 51S - Tucuman 478S)	75.0	83.0	84.4	112.5
	138kV Line 715L (Hansman Lake 650S - Tap 715AL)	98.0	135.0	102.4	104.5
	138kV Line 715L (P2540 Tap - Tap 715L)	98.0	108.0	102.5	104.6
7L749 (899S Edgerton - 716S Lloydminster - 880S Briker)	138kV Line 472L (Hughenden 213S - Tap 472AL)	84.0	92.0	91.0	108.3
	138kV Line 704L (Wainwright 51S - Tucuman 478S)	75.0	83.0	84.3	112.5
7L42 (751S Hill - 716S Lloydminster)	138kV Line 472L (Hughenden 213S - Tap 472AL)	84.0	92.0	86.8	103.4
	138kV Line 704L (Wainwright 51S - Tucuman 478S)	75.0	83.0	79.8	106.4
Battle River T2	138kV Line 704L (Wainwright 51S - Tucuman 478S)	75.0	83.0	76.9	102.5

Notes:

[a] The facility ratings shown in the AESO's Study Scope have been adjusted from a [72/144] kV voltage base to a [69/138] kV voltage base, as is used by the power system network analysis tool.

[b] Power flow (MVA) is current expressed as MVA (i.e., $S = \sqrt{3} \times V_{base} \times I_{actual}$)

[c] Reported as a percentage of the power flow (in MVA, i.e., $S = \sqrt{3} \times V_{base} \times I_{actual}$) relative to the transmission line's Normal Rating (also in MVA), as shown in the AESO's Study Scope.

Voltage Criteria Violations

No voltage criteria violations were observed under Category B conditions.

POD Bus Voltage Deviations

No POD bus voltage deviations were observed under Category B conditions.

2.1.3 Scenario 3: 2028 Winter Peak Pre-Project

Category A Conditions

Thermal criteria violations were observed under Category A conditions as shown in Table 2-5. The generation effective factors result under the Category A conditions are provided in Attachment A9.

Table 2-5: Thermal Criteria Violations under Category A Conditions for Scenario 3 (Original Dispatch)

Violation Location Details	Thermal Ratings[a] (MVA)		Pre-Project Results	
	Normal Rating	Emergency Rating	Power Flow[b] (MVA)	% Loading[c]
138kV Line 749AL (P2460 Tap - Tap 749L)	148.0	161.0	157.5	106%

Notes:

[a] The facility ratings shown in the AESO's Study Scope have been adjusted from a [72/144] kV voltage base to a [69/138] kV voltage base, as is used by the power system network analysis tool.

[b] Power flow (MVA) is current expressed as MVA (i.e., $S = \sqrt{3} \times V_{base} \times I_{actual}$)

[c] Reported as a percentage of the power flow (in MVA, i.e., $S = \sqrt{3} \times V_{base} \times I_{actual}$) relative to the transmission line's Normal Rating (also in MVA), as shown in the AESO's Study Scope.

To mitigate the observed thermal criteria violations, the generation profile in the study area was reduced from the dispatches provided in the AESOs Study Scope based on the most effective generator as determined by AESO. The dispatch was reduced in sequence provided by AESO as detailed below:

- P2540 Cache Rising Sun MPC Solar reduced by 53.7MW, from 53.7MW to 0MW and generator placed out of service.P2460 ABO Fox Meadows Wind reduced by 18.5MW, from 128.5MW to 110MW.

After reducing generation the resulting line loading is shown in Table 2-6.

Table 2-6: Thermal Loading after Modified Dispatch for Scenario 3

Violation Location Details	Thermal Ratings[a] (MVA)		Loading after Generation Reduction	
	Normal Rating	Emergency Rating	Power Flow[b] (MVA)	% Loading[c]
138kV Line 749L (P2460 Tap - Tap 749L)	148.0	161.0	142.5	95.4

Category B Conditions

Thermal Criteria Violations

Thermal criteria violations were observed under certain Category B conditions as shown in Table 2-7

Table 2-7: Thermal Criteria Violations under Category B Conditions for Scenario 3

Contingency (System Element Lost)	Violation Location Details	Thermal Ratings[a] (MVA)		Pre-Project Results	
		Normal Rating	Emergency Rating	Power Flow[b] (MVA)	% Loading[c]
CETO 962L (87S Gaetz - 972S Tinchebray)	138kV Line 174L (Bardo 197S - North Holden 395S)	149.0	164.0	155.7	104.5
	138kV Line 701L (North Holden 395S - Strome 223S)	146.0	161.0	158.9	108.8
	138kV Line 704L (Wainwright 51S - Tucuman 478S)	79.0	87.0	87.8	111.1
	240kV Line 9L20 (Nevis 766S - Cordel 755S)	540.0	624.0	776.7	143.8
	240kV Line 9L16 (Cordel 755S - Tap 916L)	499.0	499.0	526.4	105.5
9L20 (766S Nevis - 755S Cordel)	240kV Line CETO 962L (Gaetz 87S - Tinchebray 972S)	831.4	831.4	978.1	117.7
9L80 (757S Battle River - 755S Cordel)	138kV Line 704L (Wainwright 51S - Tucuman 478S)	79.0	87.0	85.2	107.8
953L (574S Nilrem - 755S Cordel)	138kV Line 704L (Wainwright 51S - Tucuman 478S)	79.0	87.0	91.6	116.0
1047L (574S Nilrem - P2566 Eastervale Solar - 650S Hansman Lake)	138kV Line 703L (Hardisty 377S - 703BL Tap)	96.0	143.0	148.2	154.3
	138kV Line 472L (Metiskow 648S - Tap 472AL)	150.0	153.0	194.4	129.6
	138kV Line 703L (Hughenden 213S - 703BL Tap)	145.0	160.0	153.5	105.9
	138kV Line 472L (Hughenden 213S - Tap 472AL)	125.0	136.0	157.6	126.1
9L966 (650S Hansman Lake - 932S Pemukan)	138kV Line 7L224 (Hansman Lake 650S - Monitor 774S)	143.8	163.9	170.1	118.3
9L27 (863S Paintearth - 755S Cordel)	138kV Line 703L (Hardisty 377S - 703BL Tap)	96.0	143.0	100.0	104.2
	138kV Line 704L (Wainwright 51S - Tucuman 478S)	79.0	87.0	80.7	102.2
885L (648S Metiskow - 650S Hansman Lake)	138kV Line 749AL (P2460 Tap - Tap 749L)	148.0	161.0	161.2	109.0
715L (650S Hansman Lake - P2540	138kV Line 749AL (P2460 Tap - Tap 749L)	148.0	161.0	179.5	121.3

Contingency (System Element Lost)	Violation Location Details	Thermal Ratings[a] (MVA)		Pre-Project Results	
		Normal Rating	Emergency Rating	Power Flow[b] (MVA)	% Loading[c]
Cache Rising Sun - 545S Provost)					
749L (648S Metiskow - 267S Killarney Lake - P2460 Fox Meadows Wind - 899S Edgerton)	138kV Line 704L (Wainwright 51S - Tucuman 478S)	79.0	87.0	88.6	112.2
7L749 (899S Edgerton - 716S Lloydminster - 880S Briker)	138kV Line 704L (Wainwright 51S - Tucuman 478S)	79.0	87.0	91.5	115.8
7L42 (751S Hill - 716S Lloydminster)	138kV Line 704L (Wainwright 51S - Tucuman 478S)	79.0	87.0	85.3	108.0
7L65 (709S Vegreville - 710S Vermilion - 708S Grizzly Bear)	138kV Line 704L (Wainwright 51S - Tucuman 478S)	79.0	87.0	79.3	100.4
Battle River T2	138kV Line 704L (Wainwright 51S - Tucuman 478S)	79.0	87.0	84.6	107.1

Notes:

[a] The facility ratings shown in the AESO's Study Scope have been adjusted from a [72/144] kV voltage base to a [69/138] kV voltage base, as is used by the power system network analysis tool.

[b] Power flow (MVA) is current expressed as MVA (i.e., $S = \sqrt{3} \times V_{base} \times I_{actual}$)

[c] Reported as a percentage of the power flow (in MVA, i.e., $S = \sqrt{3} \times V_{base} \times I_{actual}$) relative to the transmission line's Normal Rating (also in MVA), as shown in the AESO's Study Scope.

Voltage Criteria Violations

No voltage criteria violations were observed under Category B conditions.

POD Bus Voltage Deviations

No POD bus voltage deviations were observed under Category B conditions.

3 Post-Project Study Results

This section describes the results of the post-Project power flow studies and transient stability studies.

3.1 Power Flow Studies

Power flow diagrams illustrating the post-Project power flow studies results for Category A and Category B conditions are included in Attachment A3.

The following Post-Project scenarios use the same generation profile as the Pre-Project Modified Dispatch scenarios.

3.1.1 Scenario 4: 2028 Summer Peak Post-Project

Category A Conditions

Thermal criteria violations were observed under certain Category A conditions as shown in Table 3-1.

Table 3-1: Thermal Criteria Violations under Category A Conditions for Scenario 4

Details of Violation (Violation Observed On)	Normal Rating (MVA)	Emergency Rating (MVA)	Pre-Project Results		Post-Project Results		% Loading Difference (Post-Pre)
			Observed Power Flow (MVA)	% Loading	Observed Power Flow (MVA)	% Loading	
138kV Line 472L (from Metiskow 648S to Tap 472AL)	121.0	133.0	123.0	102%	122.9	102%	-0.1%
138kV Line 472L (Hughenden 213S - Tap 472AL)	84.0	92.0	86.2	103%	86.1	103%	-0.1%
138kV Line 715L (Hansman Lake 650S - Tap 715AL)	98.0	135.0	115.7	118%	116.8	119%	1.1%
138kV Line 749AL (P2460 Tap - Tap 749L)	120.9	133.0	131.6	109%	130.7	108%	-0.8%
138kV Line 715L (P2540 Tap - Tap 715L)	98.0	108.0	115.9	118%	116.9	119%	1.1%

To mitigate the observed thermal criteria violations, the generation profile in the study area was reduced from the dispatches provided in the AESOs Study Scope based on the most effective generator as determined by AESO. The dispatch was reduced in sequence provided by AESO as detailed below:

- P2540 Cache Rising Sun MPC Solar reduced by 98MW, from 98MW to 0MW and generator placed out of service.
- P2460 ABO Fox Meadows Wind reduced by 10MW, from 106MW to 96MW.

After reducing generation the resulting line loading is shown in Table 3-2.

Table 3-2: Thermal Loading after Modified Dispatch for Scenario 4

Violation Location Details	Thermal Ratings[a] (MVA)		Loading after Generation Reduction	
	Normal Rating	Emergency Rating	Power Flow[b] (MVA)	% Loading[c]
138kV Line 472L (from Metiskow 648S to Tap 472AL)	121.0	133.0	110.8	88%
138kV Line 472L (Hughenden 213S - Tap 472AL)	84.0	92.0	72.5	83%
138kV Line 715L (Hansman Lake 650S - Tap 715AL)	98.0	135.0	36.7	36%
138kV Line 749AL (P2460 Tap - Tap 749L)	120.9	133.0	119.1	95%
138kV Line 715L (P2540 Tap - Tap 715L)	98.0	108.0	37.0	36%

Category B Conditions

Thermal criteria violations were observed under certain Category B conditions as shown in Table 3-3.

Table 3-3: Thermal Criteria Violations under Category B Conditions for Scenario 4

Contingency (System Element Lost)	Details of Violation (Violation Observed On)	Normal Rating (MVA)	Emergency Rating (MVA)	Pre-Project Results		Post-Project Results		% Loading Difference (Post-Pre)
				Observed Power Flow (MVA)	% Loading	Observed Power Flow (MVA)	% Loading	
CETO 962L (87S Gaetz - 972S Tinchebray)	138kV Line 174L (Bardo 197S - North Holden 395S)	121.0	133.0	140.2	115.9	148.3	122.6	6.7
	138kV Line 701L (North Holden 395S - Strome 223S)	119.0	131.0	128.3	107.8	126.4	106.2	-1.6
	240kV Line 9L20 (Nevis 766S - Cordel 755S)	429.0	624.0	622.5	145.1	633.4	147.6	2.5
1047L (574S Nilrem - P2566 Eastervale Solar - 650S Hansman Lake)	138kV Line 703L (Hardisty 377S - 703BL Tap)	96.0	133.0	126.3	131.5	126.0	131.3	-0.2
	138kV Line 472L (Metiskow 648S - Tap 472AL)	121.0	133.0	170.4	140.8	170.3	140.7	-0.1
	138kV Line 703L (Hughenden 213S - 703BL Tap)	121.0	133.0	129.3	106.9	129.1	106.7	-0.2
	138kV Line 472L (Hughenden 213S - Tap 472AL)	84.0	92.0	133.2	158.6	133.0	158.3	-0.2
9L966 (650S Hansman Lake - 932S Pemukan)	138kV Line 7L224 (Hansman Lake 650S - Monitor 774S)	108.3	119.8	114.4	105.6	111.9	103.3	-2.3
9L27 (863S Paintearth - 755S Cordel)	138kV Line 472L (Metiskow 648S - Tap 472AL)	121.0	133.0	131.1	108.3	131.3	108.5	0.1
	138kV Line 472L (Hughenden 213S - Tap 472AL)	84.0	92.0	94.2	112.2	94.3	112.3	0.1

Contingency (System Element Lost)	Details of Violation (Violation Observed On)	Normal Rating (MVA)	Emergency Rating (MVA)	Pre-Project Results		Post-Project Results		% Loading Difference (Post-Pre)
				Observed Power Flow (MVA)	% Loading	Observed Power Flow (MVA)	% Loading	
701L (395S North Holden - 223S Strome)	144kV Line 7L65 (7LA65 Tap - Vegreville 709S)	109.3	121.7	104.4	95.5	112.6	103.0	7.5
701L (223S Strome - 757S Battle River - 764S Heisler)	144kV Line 7L65 (7LA65 Tap - Vegreville 709S)	109.3	121.7	106.6	97.5	114.8	105.0	7.5
885L (648S Metiskow - 650S Hansman Lake)	138kV Line 749AL (P2460 Tap - Tap 749L)	120.9	133.0	133.4	110.3	130.3	107.7	-2.6
715L (650S Hansman Lake - P2540 Cache Rising Sun - 545S Provost)	138kV Line 749AL (P2460 Tap - Tap 749L)	120.9	133.0	153.7	127.1	151.0	124.9	-2.2

Voltage Criteria Violations

No voltage criteria violations were observed under Category B conditions.

POD Bus Voltage Deviations

No POD bus voltage deviations were observed under Category B conditions.

3.1.2 Scenario 5: 2028 Summer Light Post-Project

Category A Conditions

No Reliability Criteria violations were observed under Category A conditions.

Category B Conditions

Thermal criteria violations were observed under certain Category B conditions as shown in Table 3-4

Table 3-4: Thermal Criteria Violations under Category B Conditions for Scenario 5

Contingency (System Element Lost)	Details of Violation (Violation Observed On)	Normal Rating (MVA)	Emergency Rating (MVA)	Pre-Project Results		Post-Project Results		% Loading Difference (Post-Pre)
				Observed Power Flow (MVA)	% Loading	Observed Power Flow (MVA)	% Loading	
CETO 962L (87S Gaetz - 972S Tinchebray)	138kV Line 704L (Wainwright 51S - Tucuman 478S)	75.0	83.0	79.3	105.8	75.3	100.4	-5.3
	240kV Line 9L20 (Nevis 766S - Cordel 755S)	429.0	624.0	555.2	129.4	564.2	131.5	2.1
953L (574S Nilrem - 755S Cordel)	138kV Line 704L (Wainwright 51S - Tucuman 478S)	75.0	83.0	93.3	124.3	89.5	119.4	-5.0
1047L (574S Nilrem - P2566 Eastervale Solar - 650S Hansman Lake)	138kV Line 703L (Hardisty 377S - 703BL Tap)	96.0	133.0	123.9	129.1	123.9	129.1	0.0
	138kV Line 472L (Metiskow 648S - Tap 472AL)	121.0	133.0	146.6	121.2	146.5	121.1	-0.1
	138kV Line 703L (Hughenden 213S - 703BL Tap)	121.0	133.0	126.6	104.7	126.6	104.6	0.0
	138kV Line 472L (Hughenden 213S - Tap 472AL)	84.0	92.0	137.0	163.1	136.9	163.0	-0.1
9L27 (863S Paintearth - 755S Cordel)	138kV Line 472L (Hughenden 213S - Tap 472AL)	84.0	92.0	97.9	116.6	98.1	116.8	0.2
681L (377S Hardisty - 478S Tucuman)	138kV Line 472L (Hughenden 213S - Tap 472AL)	84.0	92.0	85.6	102.0	91.0	108.3	6.4
749L (648S Metiskow - 267S Killarney Lake	138kV Line 704L (Wainwright 51S -	75.0	83.0	84.4	112.5	79.0	105.4	-7.1

- P2460 Fox Meadows Wind - 899S Edgerton)	Tucuman 478S)							
	138kV Line 715L (Hansman Lake 650S - Tap 715AL)	98.0	135.0	102.4	104.5	102.4	104.5	0.0
	138kV Line 715L (P2540 Tap - Tap 715L)	98.0	108.0	102.5	104.6	102.5	104.6	0.0
7L749 (899S Edgerton - 716S Lloydminster - 880S Briker)	138kV Line 472L (Hughenden 213S - Tap 472AL)	84.0	92.0	91.0	108.3	89.8	107.0	-1.4
	138kV Line 704L (Wainwright 51S - Tucuman 478S)	75.0	83.0	84.3	112.5	79.0	105.4	-7.1
7L42 (751S Hill - 716S Lloydminster)	138kV Line 472L (Hughenden 213S - Tap 472AL)	84.0	92.0	86.8	103.4	85.7	102.0	-1.4

Voltage Criteria Violations

No voltage criteria violations were observed under Category B conditions.

POD Bus Voltage Deviations

No POD bus voltage deviations were observed under Category B conditions.

3.1.3 Scenario 6: 2028 Winter Peak Post-Project

Category A Conditions

Thermal criteria violations were observed under certain Category A conditions as shown in Table 3-5.

Table 3-5: Thermal Criteria Violations under Category A Conditions for Scenario 6

Details of Violation (Violation Observed On)	Normal Rating (MVA)	Emergency Rating (MVA)	Pre-Project Results		Post-Project Results		% Loading Difference (Post-Pre)
			Observed Power Flow (MVA)	% Loading	Observed Power Flow (MVA)	% Loading	
138kV Line 749AL (P2460 Tap - Tap 749L)	148.0	161.0	157.5	106%	156.3	106%	-0.8%

To alleviate these pre-Project Category A thermal violations the following actions were taken to reduce transmission line loading to approximately 95% of the Normal Rating, as advised by the AESO.

- P2540 Cache Rising Sun MPC Solar reduced by 53.7MW, from 53.7MW to 0MW and generator placed out of service.
- P2460 ABO Fox Meadows Wind reduced by 18.5MW, from 128.5MW to 110MW.

After reducing generation the resulting line loading is shown in Table 3-6.

Table 3-6: Thermal Loading after Modified Dispatch for Scenario 6

Violation Location Details	Thermal Ratings[a] (MVA)		Loading after Generation Reduction	
	Normal Rating	Emergency Rating	Power Flow[b] (MVA)	% Loading[c]
138kV Line 749AL (P2460 Tap - Tap 749L)	148.0	161.0	141.4	95%

Category B Conditions

Thermal criteria violations were observed under certain Category B conditions as shown in Table 3-7.

Table 3-7: Thermal Criteria Violations under Category B Conditions for Scenario 6

Contingency (System Element Lost)	Details of Violation (Violation Observed On)	Normal Rating (MVA)	Emergency Rating (MVA)	Pre-Project Results		Post-Project Results		% Loading Difference (Post-Pre)
				Observed Power Flow (MVA)	% Loading	Observed Power Flow (MVA)	% Loading	
CETO 962L (87S Gaetz - 972S Tinchebray)	138kV Line 174L (Bardo 197S - North Holden 395S)	149.0	164.0	155.7	104.5	164.1	110.1	5.6
	138kV Line 701L (North Holden 395S - Strome 223S)	146.0	161.0	158.9	108.8	157.4	107.8	-1.0
	138kV Line 704L (Wainwright 51S - Tucuman 478S)	79.0	87.0	87.8	111.1	84.0	106.3	-4.8
	240kV Line 9L20 (Nevis 766S - Cordel 755S)	540.0	624.0	776.7	143.8	785.9	145.5	1.7
	240kV Line 9L16 (Cordel 755S - Tap 916L))	499.0	499.0	526.4	105.5	523.2	104.9	-0.6
9L20 (766S Nevis - 755S Cordel)	240kV Line CETO 962L (Gaetz 87S - Tinchebray 972S)	831.4	831.4	978.1	117.7	990.5	119.1	1.5
9L80 (757S Battle River - 755S Cordel)	138kV Line 704L (Wainwright 51S - Tucuman 478S)	79.0	87.0	85.2	107.8	79.2	100.3	-7.5
953L (574S Nilrem - 755S Cordel)	138kV Line 704L (Wainwright 51S - Tucuman 478S)	79.0	87.0	91.6	116.0	87.6	110.9	-5.1
	138kV Line 703L (Hardisty 377S - 703BL Tap)	96.0	143.0	148.2	154.3	148.1	154.3	-0.1

Contingency (System Element Lost)	Details of Violation (Violation Observed On)	Normal Rating (MVA)	Emergency Rating (MVA)	Pre-Project Results		Post-Project Results		% Loading Difference (Post-Pre)
				Observed Power Flow (MVA)	% Loading	Observed Power Flow (MVA)	% Loading	
1047L (574S Nilrem - P2566 Eastervale Solar - 650S Hansman Lake)	138kV Line 472L (Metiskow 648S - Tap 472AL)	150.0	153.0	194.4	129.6	194.3	129.6	0.0
	138kV Line 703L (Hughenden 213S - 703BL Tap)	145.0	160.0	153.5	105.9	153.5	105.9	0.0
	138kV Line 472L (Hughenden 213S - Tap 472AL)	125.0	136.0	157.6	126.1	157.6	126.1	0.0
9L966 (650S Hansman Lake - 932S Pemukan)	138kV Line 7L224 (Hansman Lake 650S - Monitor 774S)	143.8	163.9	170.1	118.3	167.3	116.3	-2.0
9L27 (863S Paintearth - 755S Cordel)	138kV Line 703L (Hardisty 377S - 703BL Tap)	96.0	143.0	100.0	104.2	100.1	104.2	0.0
885L (648S Metiskow - 650S Hansman Lake)	138kV Line 749AL (P2460 - Tap 749L)	148.0	161.0	161.2	109.0	148.9	100.7	-8.3
715L (650S Hansman Lake - P2540 Cache Rising Sun - 545S Provost)	138kV Line 749AL (P2460 - Tap 749L)	148.0	161.0	179.5	121.3	165.3	111.7	-9.6
749L (648S Metiskow - 267S Killarney Lake - P2460 Fox Meadows Wind - 899S Edgerton)	138kV Line 704L (Wainwright 51S - Tucuman 478S)	79.0	87.0	88.6	112.2	81.3	102.9	-9.3

Contingency (System Element Lost)	Details of Violation (Violation Observed On)	Normal Rating (MVA)	Emergency Rating (MVA)	Pre-Project Results		Post-Project Results		% Loading Difference (Post-Pre)
				Observed Power Flow (MVA)	% Loading	Observed Power Flow (MVA)	% Loading	
7L749 (899S Edgerton - 716S Lloydminster - 880S Briker)	138kV Line 704L (Wainwright 51S - Tucuman 478S)	79.0	87.0	91.5	115.8	84.2	106.6	-9.2

Voltage Criteria Violations

No voltage criteria violations were observed under Category B conditions.

POD Bus Voltage Deviations

No POD bus voltage deviations were observed under Category B conditions.

3.2 Transient Stability Studies

Transient stability studies were completed for Scenarios 4, 5 and 6. The dynamic data and assumptions of all equipment proposed for the Facility are provided in Attachment A7. The post-Project transient stability plots are provided in Attachment A5.

3.2.1 Scenario 4: 2028 Summer Peak Post-Project

The results did not indicate any transient stability concerns, and the system showed acceptable dynamic response to all Category B conditions studied, as shown in Table 3-8.

Table 3-8: Transient Stability Study Results under Category B Conditions for Scenario 4

Studied Contingency	Fault Description and Location	Results
7L24 (Bonnyville 700S – Grande Centre 846S)	3-phase fault at Bonnyville 700S	Stable
	3-phase fault at Grande Centre 846S	Stable
7L53 (Bonnyville 700S – Irish Creek 706S)	3-phase fault at Bonnyville 700S	Stable
	3-phase fault at Irish Creek 706S	Stable
7L70 (Bonnyville 700S – St. Paul 707S)	3-phase fault at Bonnyville 700S	Stable
	3-phase fault at St. Paul 707S	Stable
7L89 (Bonnyville 700S - Marguerite Lake 826S)	3-phase fault at Bonnyville 700S	Stable
	3-phase fault at Marguerite Lake 826S	Stable

7L92 (Vegreville 709S – Whitby Lake 819S)	3-phase fault at Vegreville 709S	Stable
	3-phase fault at Whitby Lake 819S	Stable
7L117 (Irish Creek 706S - Vermilion 710S)	3-phase fault at Irish Creek 706S	Stable
	3-phase fault at Vermilion 710S	Stable
7L139 (St. Paul 707S – Whitby Lake 819S)	3-phase fault at St. Paul 707S	Stable
	3-phase fault at Whitby Lake 819S	Stable
7L146 (Bonnyville 700S – Bourque 970S)	3-phase fault at Bonnyville 700S	Stable
	3-phase fault at Bourque 970S	Stable
9L36 (Whitefish Lake 825S – Marguerite Lake 826S)	3-phase fault at Whitefish Lake 825S	Stable
	3-phase fault at Marguerite Lake 826S	Stable
9L37 (Whitefish Lake 825S – Marguerite Lake 826S)	3-phase fault at Whitefish Lake 825S	Stable
	3-phase fault at Marguerite Lake 826S	Stable

3.2.2 Scenario 5: 2028 Summer Light Post-Project

The results did not indicate any transient stability concerns, and the system showed acceptable dynamic response to all Category B conditions studied, as shown in Table 3-9.

Table 3-9: Transient Stability Study Results under Category B Conditions for Scenario 5

Studied Contingency	Fault Description and Location	Results
7L24 (Bonnyville 700S – Grande Centre 846S)	3-phase fault at Bonnyville 700S	Stable
	3-phase fault at Grande Centre 846S	Stable
7L53 (Bonnyville 700S – Irish Creek 706S)	3-phase fault at Bonnyville 700S	Stable
	3-phase fault at Irish Creek 706S	Stable
7L70 (Bonnyville 700S – St. Paul 707S)	3-phase fault at Bonnyville 700S	Stable
	3-phase fault at St. Paul 707S	Stable
7L89 (Bonnyville 700S - Marguerite Lake 826S)	3-phase fault at Bonnyville 700S	Stable
	3-phase fault at Marguerite Lake 826S	Stable
7L92 (Vegreville 709S – Whitby Lake 819S)	3-phase fault at Vegreville 709S	Stable
	3-phase fault at Whitby Lake 819S	Stable
7L117 (Irish Creek 706S - Vermilion 710S)	3-phase fault at Irish Creek 706S	Stable
	3-phase fault at Vermilion 710S	Stable
7L139 (St. Paul 707S – Whitby Lake 819S)	3-phase fault at St. Paul 707S	Stable
	3-phase fault at Whitby Lake 819S	Stable
7L146 (Bonnyville 700S – Bourque 970S)	3-phase fault at Bonnyville 700S	Stable
	3-phase fault at Bourque 970S	Stable
9L36 (Whitefish Lake 825S – Marguerite Lake 826S)	3-phase fault at Whitefish Lake 825S	Stable
	3-phase fault at Marguerite Lake 826S	Stable

9L37 (Whitefish Lake 825S – Marguerite Lake 826S)	3-phase fault at Whitefish Lake 825S	Stable
	3-phase fault at Marguerite Lake 826S	Stable

3.2.3 Scenario 6: 2028 Winter Peak Post-Project

The results did not indicate any transient stability concerns, and the system showed acceptable dynamic response to all Category B conditions studied, as shown in Table 3-10.

Table 3-10: Transient Stability Study Results under Category B Conditions for Scenario 6

Studied Contingency	Fault Description and Location	Results
7L24 (Bonnyville 700S – Grande Centre 846S)	3-phase fault at Bonnyville 700S	Stable
	3-phase fault at Grande Centre 846S	Stable
7L53 (Bonnyville 700S – Irish Creek 706S)	3-phase fault at Bonnyville 700S	Stable
	3-phase fault at Irish Creek 706S	Stable
7L70 (Bonnyville 700S – St. Paul 707S)	3-phase fault at Bonnyville 700S	Stable
	3-phase fault at St. Paul 707S	Stable
7L89 (Bonnyville 700S - Marguerite Lake 826S)	3-phase fault at Bonnyville 700S	Stable
	3-phase fault at Marguerite Lake 826S	Stable
7L92 (Vegreville 709S – Whitby Lake 819S)	3-phase fault at Vegreville 709S	Stable
	3-phase fault at Whitby Lake 819S	Stable
7L117 (Irish Creek 706S - Vermilion 710S)	3-phase fault at Irish Creek 706S	Stable
	3-phase fault at Vermilion 710S	Stable
7L139 (St. Paul 707S – Whitby Lake 819S)	3-phase fault at St. Paul 707S	Stable
	3-phase fault at Whitby Lake 819S	Stable
7L146 (Bonnyville 700S – Bourque 970S)	3-phase fault at Bonnyville 700S	Stable
	3-phase fault at Bourque 970S	Stable
9L36 (Whitefish Lake 825S – Marguerite Lake 826S)	3-phase fault at Whitefish Lake 825S	Stable
	3-phase fault at Marguerite Lake 826S	Stable
9L37 (Whitefish Lake 825S – Marguerite Lake 826S)	3-phase fault at Whitefish Lake 825S	Stable
	3-phase fault at Marguerite Lake 826S	Stable

4 Short Circuit Studies

4.1 Pre-Project Results

Pre-Project short-circuit current levels are provided in Table 4-1[1].

Table 4-1: Pre-Project Short-Circuit Current Levels for Scenario 3 2028 WP

Substation Name and Number	Base Voltage (kV)	Pre-Fault Voltage (kV)	3-Φ Fault (kA)	Positive Sequence Thevenin Source Impedance (R1+jX1) (pu)	1-Φ Fault (kA)	Zero Sequence Thevenin Source Impedance (R0+jX0) (pu)
969S Lindbergh 144kV	138	146.4	2.2	0.086190+j 0.184983	1.5	0.119532+j 0.480920
700S Bonnyville 144kV	138	148.7	6.5	0.023857+j 0.066316	6.0	0.016990+j 0.086232
940S Bear Trap 144kV	138	147.4	3.1	0.056178+j 0.131940	3.0	0.023764+j 0.163865
28S Irish Creek 144kV	138	144.6	3.1	0.064589+j 0.129879	2.8	0.026695+j 0.186710
710S Vermilion 144kV	138	145.6	4.3	0.047383+j 0.091866	4.4	0.010115+j 0.101700

4.2 Post-Project Results

4.2.1 Scenario 6: 2028 Winter Peak Post-Project

Post-Project short-circuit current levels for Scenario 6, post-Project 2028 WP, are provided in Table 4-2.

Table 4-2: Post-Project Short-Circuit Current Levels for Scenario 6 2028 WP

Substation Name and Number	Base Voltage (kV)	Pre-Fault Voltage (kV)	3-Φ Fault (kA)	Positive Sequence Thevenin Source Impedance (R1+jX1) (pu)	1-Φ Fault (kA)	Zero Sequence Thevenin Source Impedance (R0+jX0) (pu)
969S Lindbergh 144kV	138	148.5	2.4	0.073183+j 0.173289	2.1	0.088268+j 0.330382
700S Bonnyville 144kV	138	148.4	6.5	0.022976+j 0.065298	6.3	0.016694+j 0.082237
940S Bear Trap 144kV	138	147.1	3.2	0.055481+j 0.131149	3.1	0.023884+j 0.163122
28S Irish Creek 144kV	138	146.1	3.2	0.060843+j 0.126965	3.2	0.026426+j 0.163456
710S Vermilion 144kV	138	146.6	4.4	0.046500+j 0.091374	4.5	0.010272+j 0.101327
P2034 Project 144kV	138	148.7	2.4	0.071276+j 0.172382,	3.9	0.014033+j 0.064305

[1] Short-circuit current studies were based on modeling information provided to the AESO by third parties. The authenticity of the modeling information has not been validated. Fault levels could change as a result of system developments, new customer connections, or additional generation in the area. It is recommended that these changes be monitored and fault levels reviewed to ensure that the fault levels are within equipment operating limits. The information provided in this study should not be used as the sole source of information for electrical equipment specifications or for the design of safety-grounding systems.

4.2.2 Scenario 7: 2031 Winter Peak Post-Project

Post-Project short-circuit current levels for Scenario 7, post-Project 2031 WP, are provided in Table 4-3.

Table 4-3: Post-Project Short-Circuit Current Levels for Scenario 7

Substation Name and Number	Base Voltage (kV)	Pre-Fault Voltage (kV)	3-Φ Fault (kA)	Positive Sequence Thevenin Source Impedance (R1+jX1) (pu)	1-Φ Fault (kA)	Zero Sequence Thevenin Source Impedance (R0+jX0) (pu)
969S Lindbergh 144kV	138	148.6	2.7	0.058529+j 0.154348	2.1	0.088353+j 0.330589
700S Bonnyville 144kV	138	148.7	6.7	0.021654+j 0.063716	6.7	0.012409+j 0.069626
940S Bear Trap 144kV	138	147.9	3.2	0.053654+j 0.131232	3.1	0.023652+j 0.160628
28S Irish Creek 144kV	138	148.8	3.3	0.056470+j 0.124095	3.1	0.029629+j 0.169660
710S Vermilion 144kV	138	146.7	4.7	0.039424+j 0.087050	4.9	0.010818+j 0.085469
P2034 Project 144kV	138	148.9	2.8	0.054412+j 0.151060,	3.9	0.014039+j 0.064306

5 Mitigation Measure Development and Evaluation

The Studies Consultant, in consultation with the AESO, developed mitigation measures to address the system performance issues that were identified in the post-Project scenarios.

As per AESO direction, mitigation measures beyond reducing Project generation were not included in the analysis. Remaining thermal overloads were designated as Real Time Operating Practice (RTOP).

Existing remedial action schemes (RASs) are described in Section 1.2.2 of Attachment A1.

5.1 Pre-Project

Pre-Project (with Modified Dispatch) mitigation measures are summarized in Table 5-1.

Table 5-1: Pre-Project Mitigation Measures

Mitigation Measure	Location of Observed Violation	Contingency
RTOP	138kV Line 174L (Bardo 197S - North Holden 395S)	CETO 962L (87S Gaetz - 972S Tinchebray)
	138kV Line 701L (North Holden 395S - Strome 223S)	
	138kV Line 749AL (P2460 Tap - Tap 749L)	
	240kV Line 9L20 (Nevis 766S - Cordel 755S)	
	240kV Line 9L16 (Cordel 755S – Tap 916L)	
	138kV Line 704L (Wainwright 51S - Tucuman 478S)	
RTOP	240kV Line CETO 962L (Gaetz 87S - Tinchebray 972S)	9L20 (766S Nevis - 755S Cordel)
RTOP	138kV Line 704L (Wainwright 51S - Tucuman 478S)	9L80 (757S Battle River - 755S Cordel)
RTOP	138kV Line 408L (Jarrow 252S - Wainwright 51S)	953L (574S Nilrem - 755S Cordel)
	138kV Line 704L (Wainwright 51S - Tucuman 478S)	
RTOP	138kV Line 703L (Hardisty 377S - 703BL Tap)	1047L (574S Nilrem - P2566 Eastervale Solar - 650S Hansman Lake)
	138kV Line 472L (Metiskow 648S - Tap 472AL)	
	138kV Line 703L (Hughenden 213S - 703BL Tap)	
	138kV Line 472L (Hughenden 213S - Tap 472AL)	
	138kV Line 749AL (P2460 Tap - Tap 749L)	

RTOP	138kV Line 7L224 (Hansman Lake 650S - Monitor 774S)	9L966 (650S Hansman Lake - 932S Pemukan)
RTOP	138kV Line 472L (Metiskow 648S - Tap 472AL)	9L27 (863S Paintearth - 755S Cordel)
	138kV Line 472L (Hughenden 213S - Tap 472AL)	
	138kV Line 749AL (P2460 Tap - Tap 749L)	
	138kV Line 704L (Wainwright 51S - Tucuman 478S)	
	138kV Line 703L (Hardisty 377S - 703BL Tap)	
RTOP	138kV Line 472L (Hughenden 213S - Tap 472AL)	681L (377S Hardisty - 478S Tucuman)
RTOP	138kV Line 749AL (P2460 Tap - Tap 749L)	885L (648S Metiskow - 650S Hansman Lake)
RTOP	138kV Line 749AL (P2460 Tap - Tap 749L)	715L (650S Hansman Lake - P2540 Cache Rising Sun - 545S Provost)
RTOP	138kV Line 472L (Hughenden 213S - Tap 472AL)	749L (648S Metiskow - 267S Killarney Lake - P2460 Fox Meadows Wind - 899S Edgerton)
	138kV Line 704L (Wainwright 51S - Tucuman 478S)	
	138kV Line 715L (Hansman Lake 650S - Tap 715AL)	
	138kV Line 715L (P2540 Tap - Tap 715L)	
RTOP	138kV Line 472L (Metiskow 648S - Tap 472AL)	7L749 (899S Edgerton - 716S Lloydminster - 880S Briker)
	138kV Line 472L (Hughenden 213S - Tap 472AL)	
	138kV Line 704L (Wainwright 51S - Tucuman 478S)	
RTOP	138kV Line 472L (Hughenden 213S - Tap 472AL)	7L42 (751S Hill - 716S Lloydminster)
	138kV Line 704L (Wainwright 51S - Tucuman 478S)	
RTOP	144kV Line 7L65 (7LA65 Tap - Vegreville 709S)	7L117 (706S Irish Creek - 710S Vermilion)
RTOP	138kV Line 749AL (P2460 Tap - Tap 749L)	7L65 (709S Vegreville - 710S Vermilion - 708S Grizzly Bear)
	138kV Line 704L (Wainwright 51S - Tucuman 478S)	
RTOP	138kV Line 749AL (P2460 Tap - Tap 749L)	7L129 (710S Vermilion - 918S Bauer - 526S Buffalo Creek)
RTOP	138kV Line 749AL (P2460 Tap - Tap 749L)	7L50 (526S Buffalo Creek - 757S Battle River - 252S Jarrow)

RTOP	138kV Line 704L (Wainwright 51S - Tucuman 478S)	Battle River T2

5.2 Post-Project

Post-Project mitigation measures are summarized in Table 5-2.

Table 5-2: Post-Project Mitigation Measures

Mitigation Measure	Location of Observed Violation	Contingency
Modify Planned RAS 134 and RTOP[2,3]	138kV Line 174L (Bardo 197S - North Holden 395S)	CETO 962L (87S Gaetz - 972S Tinchebray)
	138kV Line 701L (North Holden 395S - Strome 223S)	
	240kV Line 9L20 (Nevis 766S - Cordel 755S)	
	138kV Line 704L (Wainwright 51S - Tucuman 478S)	
	240kV Line 9L16 (Cordel 755S - Tap 916L)	
RTOP	240kV Line CETO 962L (Gaetz 87S - Tinchebray 972S)	9L20 (766S Nevis - 755S Cordel)
RTOP	138kV Line 704L (Wainwright 51S - Tucuman 478S)	9L80 (757S Battle River - 755S Cordel)
RTOP	138kV Line 704L (Wainwright 51S - Tucuman 478S)	953L (574S Nilrem - 755S Cordel)
RTOP	138kV Line 703L (Hardisty 377S - 703BL Tap)	1047L (574S Nilrem - P2566 Eastervale Solar - 650S Hansman Lake)
	138kV Line 472L (Metiskow 648S - Tap 472AL)	
	138kV Line 703L (Hughenden 213S - 703BL Tap)	
	138kV Line 472L (Hughenden 213S - Tap 472AL)	
RTOP	138kV Line 7L224 (Hansman Lake 650S - Monitor 774S)	9L966 (650S Hansman Lake - 932S Pemukan)
RTOP	138kV Line 472L (Metiskow 648S - Tap 472AL)	9L27 (863S Paintearth - 755S Cordel)
	138kV Line 472L (Hughenden 213S - Tap 472AL)	

[2] The total amount of generation tied to existing RAS 134 is expected to exceed the Most Severe Single Contingency (MSSC) limit of 466MW. Pre-contingency generation curtailment under the Category A condition may be required using real-time operational practices to prevent generation curtailment by RAS action above the MSSC level.

[3] "Modify" refers to adding the Project to the logic of the planned RAS.

	138kV Line 703L (Hardisty 377S - 703BL Tap)	
RTOP	144kV Line 7L65 (7LA65 Tap - Vegreville 709S)	701L (395S North Holden - 223S Strome)
RTOP	144kV Line 7L65 (7LA65 Tap - Vegreville 709S)	701L (223S Strome - 757S Battle River - 764S Heisler)
RTOP	138kV Line 472L (Hughenden 213S - Tap 472AL)	681L (377S Hardisty - 478S Tucuman)
RTOP	138kV Line 749AL (P2460 Tap - Tap 749L)	885L (648S Metiskow - 650S Hansman Lake)
RTOP	138kV Line 749AL (P2460 Tap - Tap 749L)	715L (650S Hansman Lake - P2540 Cache Rising Sun - 545S Provost)
RTOP	138kV Line 704L (Wainwright 51S - Tucuman 478S)	749L (648S Metiskow - 267S Killarney Lake - P2460 Fox Meadows Wind - 899S Edgerton)
	138kV Line 715L (Hansman Lake 650S - Tap 715AL)	
	138kV Line 715L (P2540 Tap - Tap 715L)	
RTOP	138kV Line 472L (Hughenden 213S - Tap 472AL)	7L749 (899S Edgerton - 716S Lloydminster - 880S Briker)
	138kV Line 704L (Wainwright 51S - Tucuman 478S)	
RTOP	138kV Line 472L (Hughenden 213S - Tap 472AL)	7L42 (751S Hill - 716S Lloydminster)

Notes:

"Modify" refers to adding the Project to the logic of the existing RAS 134.

5.3 Evaluation of Mitigation Measures

This section describes the results of the power flow studies that were performed to assess the impact of the Project on the performance of the AIES following the implementation of proposed mitigation measures.

The post-mitigation measures studies were performed under Category B conditions for Summer Peak, Summer Light, and Winter Peak using Alternative 1 and the mitigation actions described in the previous section.

The post-mitigation power flow diagrams for selected Category B conditions are provided in Attachment A8. Post-mitigation power flow diagrams present only those post-Project contingencies that result in thermal criteria violations that require RAS mitigation. Post-Project contingencies that result in thermal criteria violations that can be mitigated by real-time operational practices or TFO capital maintenance projects were not studied.

As per the AESO direction, subsequent mitigation actions to tripping the Project were not studied and the results below show the remaining thermal loading on transmission lines that are impacted by the Project.

5.3.1 Scenario 4: 2028 Summer Peak Post-Project

Category B Conditions

Thermal violations observed under certain Category B conditions in the post-Project studies were mitigated by actions as shown in Table 5-3.

After reducing the Project's generation as a result of the RAS action, additional mitigation actions are required to fully alleviate certain thermal criteria violations observed on 174L, 701L and 9L20.

Table 5-3: Post-RAS Power Flow Study Results for Scenario 4

Contingency (System Element Lost)	Details of Violation (Violation Observed On)	Seasonal Continuous Rating (MVA)	Short-term (Emergency) Rating (MVA)	Post-Project Results		Post-RAS Action Results	
				Power Flow (MVA)	% Loading	Power Flow (MVA)	% Loading
CETO 962L (87S Gaetz - 972S Tinchebray)	138kV Line 174L (Bardo 197S - North Holden 395S)	121.0	133.0	148.3	122.6	141.8	117
	138kV Line 701L (North Holden 395S - Strome 223S)	119.0	131.0	126.4	106.2	130.0	109
	240kV Line 9L20 (Nevis 766S - Cordel 755S)	429.0	624.0	633.4	147.6	625.8	146

5.3.2 Scenario 5: 2028 Summer Light Post-Project

Category B Conditions

Thermal violations observed under Scenario 5 did not exceed emergency rating for lines impacted by the Project and were mitigated through real-time operating practices. These mitigation actions were not analyzed for the Summer Light Post-Project scenario.

5.3.3 Scenario 6: 2028 Winter Peak Post-Project

Category B Conditions

Thermal violations observed under certain Category B conditions in the post-Project studies were mitigated by actions shown in in Table 5-4.

After reducing the Project's generation as a result of the RAS action,, additional mitigation actions are required to fully alleviate certain thermal criteria violations observed on 174L, 701L, 704L , 9L16 and 9L20.

Table 5-4: Post-RAS Power Flow Study Results for Scenario 6

Contingency (System Element Lost)	Details of Violation	Seasonal Continuous	Short-term (Emergency)	Post-Project Results	Post-RAS Action Results

	(Violation Observed On)	Rating (MVA)	Rating (MVA)	Power Flow (MVA)	% Loading	Power Flow (MVA)	% Loading
CETO 962L (87S Gaetz - 972S Tinchebray)	138kV Line 174L (Bardo 197S - North Holden 395S)	149.0	164.0	164.1	110.1	156.7	105
	138kV Line 701L (North Holden 395S - Strome 223S)	146.0	161.0	157.4	107.8	161.0	110
	138kV Line 704L (Wainwright 51S - Tucuman 478S)	79.0	87.0	84.0	106.3	90.6	115
	240kV Line 9L20 (Nevis 766S - Cordel 755S)	540.0	624.0	785.9	145.5	776.6	144
	240kV Line 9L16 (Cordel 755S - Tap 916L)	499.0	499.0	523.2	104.9	531.6	107

5.4 Constraint Effective Factor Studies

Constraint effective factor studies were conducted for all post-Project scenarios. The constraint effective factors were calculated for all Category A and Category B conditions when the loadings of the monitored transmission elements in the Study Area exceeded 100% (i.e., for all of the contingencies that resulted in thermal criteria violations). The results of the generator effectiveness tables are provided in Attachment A9.

Attachment A1
Engineering Connection Assessment: Study Scope

Study Scope Amendment

P2034 Cold Lake Area Cogen

Strathcona Resources Ltd.

Date: January 16, 2024

Version: V2

Classification: Public

Company Name	Name and Credentials	Date	Signature
Power System Solutions International Inc.	Paul Kos, P. Eng.	Jan.16,2024	
AESO	Lin Li, P.Eng.	Jan 18, 2024	
ATCO	Vijitha Wijetilleke, P.Eng.	Jan 18,2024	V. Wijetilleke
Strathcona Resources Ltd.	Jason DeJong	Jan 18, 2024	

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Attachments

Attachment A: Transmission Planning Criteria – Basis and Assumptions

1 Introduction

This Study Scope provides an overview of the engineering studies to be completed by Power System Solutions International Inc. (the Studies Consultant) to assess the impact of the Project (as defined in section 1.1) on the performance of the Alberta interconnected electric system (AIES). Technical criteria, assumptions and methods for performing these engineering studies are provided in this document.

1.1 Project Overview

Project overview is provided in Table 1-1.

Table 1-1: Project Overview

Market Participant	Type of Project	In-service Date (ISD)
Strathcona Resources Ltd.	Connection	April 1, 2025

Load and generation components of the Project are listed in Table 1-2.

Table 1-2: Project Load and Generation Details

Project Component		Description
Load	Existing Rate DTS, *Demand Transmission Service,* contract capacity	No existing contract
	Requested Rate DTS	3 MW
	Type	Industrial
	Motors (number and size)	None
	Power factor	0.9 pf lagging
	Future load expansion plans	No
Generation	Generation type	Cogen
	Existing Rate STS, *Supply Transmission Service,* contract capacity	No existing contract
	Requested Rate STS	72 MW
	Number and size of generating units	Not applicable
	Maximum authorized real power (MARP)	72 MW
	Maximum capability (MC)	72 MW
	Reactive power capability	0.95 pf absorbing)
		0.9 pf producing

Project Component		Description
	Future generation expansion plans	No

Note:

MARP and MC are defined in the AESO's *Consolidated Authoritative Document Glossary*, which can be found on the AESO's website.

1.2 Existing System Overview

1.2.1 Study Area

Geographically, the Project is located in the AESO planning area of Cold Lake (Area 28) and in the Central region.

The Study Area consists of the Cold Lake (Area 28), Lloydminster (Area 13), Wainwright (Area 32), Provost (Area 37), Alliance/Battle River (Area 36), Vegreville (Area 56), including the tie lines connecting these planning areas to the rest of the AIES.

The existing transmission system in the Study Area is shown in Figure 1-1.

1.2.2 Existing Constraints

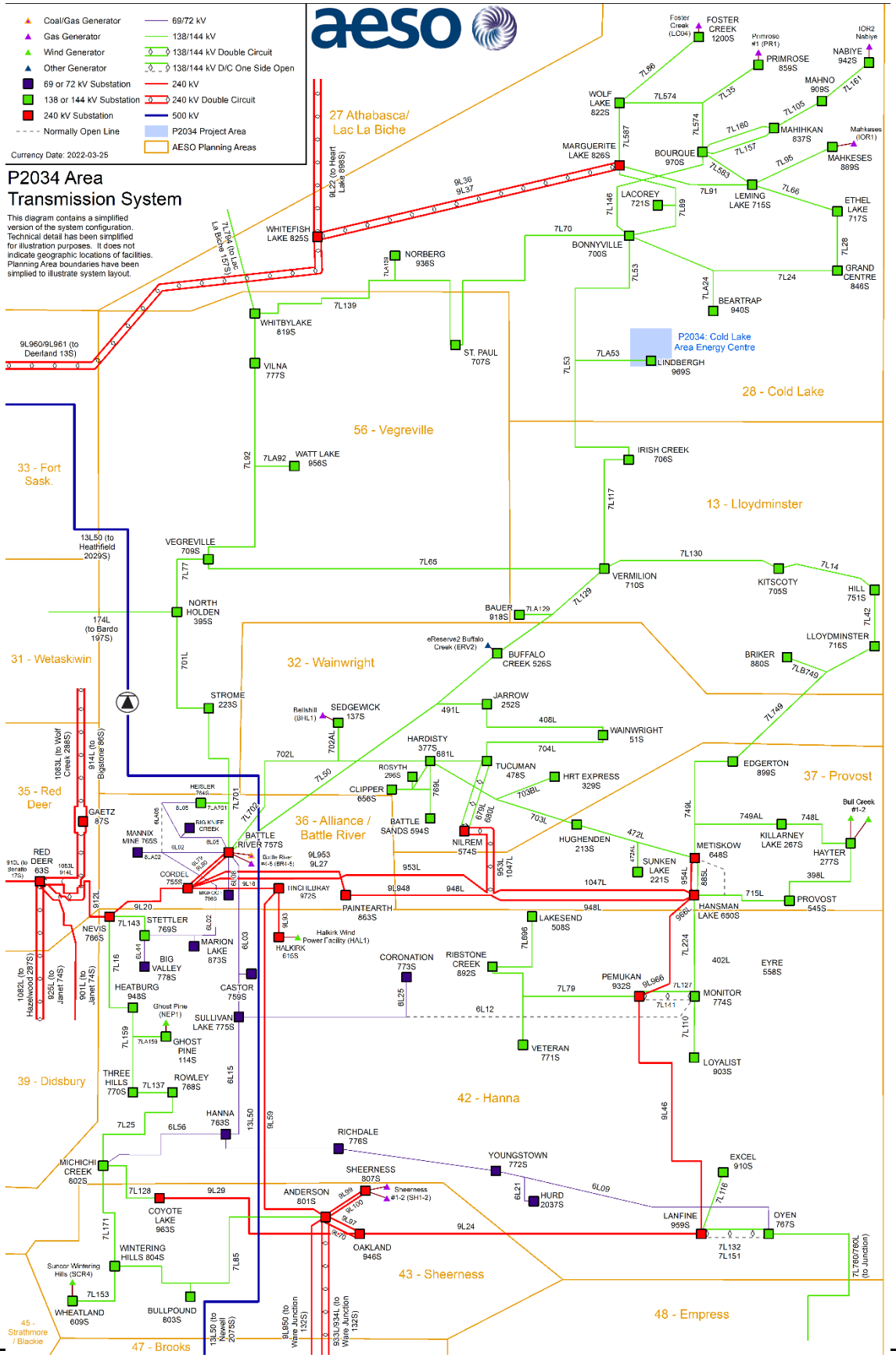
Existing constraints in the Study Area are managed in accordance with the procedures set out in Section 302.1 of the ISO rules, *Real Time Transmission Constraint Management* (TCM Rule).

There are a number of constraints in the Study Area that are mitigated by existing remedial action schemes (RASs) and/or other protection schemes.

The following existing RASs and/or other protection schemes are used to manage constraints in the area:

- RAS 134: Central East Transfer Out Overload Mitigation Scheme
- RAS 151: 223S Strome Low Voltage Mitigation
- RAS 159: 936S Norberg Under Voltage Mitigation
- RAS 200: 901T-801S Anderson Overload Mitigation
- RAS 202: 7L171-804S Overload Mitigation
- RAS 2057: Heart Lake (898S) 9L22 Overvoltage Protection
- RAS 2064: Cordel (755S) 9L59 Overvoltage Protection
- RAS 2065: Whitefish Lake (825S) 9L22 Overvoltage Protection
- RAS 2066: Whitefish Lake (825S) 9L990 Overvoltage Protection
- RAS 2080: Anderson (801S) 9L59 Overvoltage Protection

Figure 1-1: Transmission System in the Study Area


Coal/Gas Generator
Gas Generator
Wind Generator
Other Generator
69 or 72 kV Substation
138 or 144 kV Substation
240 kV Substation
Normally Open Line
69/72 kV
138/144 kV
138/144 kV Double Circuit
138/144 kV D/C One Side Open
240 kV
240 kV Double Circuit
500 kV
P2034 Project Area
AESO Planning Areas
Currency Date: 2022-03-25
P2034 Area Transmission System
This diagram contains a simplified version of the system configuration. Technical detail has been simplified for illustration purposes. It does not indicate geographic locations of facilities. Planning Area boundaries have been simplied to illustrate system layout.
27 Athabasca/ Lac La Biche
28 - Cold Lake
56 - Vegreville
33 - Fort Sask.
13 - Lloydminster
31 - Wetaskiwin
32 - Wainwright
37 - Provost
35 - Red Deer
36 - Alliance / Battle River
39 - Didsbury
42 - Hanna
43 - Sheerness
48 - Empress
47 - Brooks
45 - Strathmore / Blackie
P2034: Cold Lake Area Energy Centre
FOSTER CREEK 1200S
PRIMROSE 859S
NABIYE 942S
WOLF LAKE 822S
MAHNO 909S
MAHIHKAN 837S
MAHKESES 889S
MARQUERITE LAKE 826S
BOURQUE 970S
LACOREY 721S
LEMING LAKE 716S
ETHEL LAKE 717S
WHITEFISH LAKE 825S
NORBERG 936S
BONNYVILLE 700S
GRAND CENTRE 846S
BEARTRAP 940S
WHITBYLAKE 819S
ST. PAUL 707S
VILNA 777S
LINDBERGH 989S
IRISH CREEK 706S
WATT LAKE 956S
VEGREVILLE 709S
VERMILION 710S
KITSCOTY 705S
HILL 751S
NORTH HOLDEN 395S
BAUER 918S
LLOYDMINSTER 716S
BRIKER 880S
BUFFALO CREEK 526S
STROME 223S
SEDGEWICK 137S
JARROW 252S
WAINWRIGHT 51S
HARDISTY 377S
TUCUMAN 478S
HRT EXPRESS 329S
EDGERTON 899S
ROSYTH 296S
CLIPPER 656S
BATTLE SANDS 594S
NILREM 574S
HUGHENDEN 213S
METISKOW 648S
KILLARNEY LAKE 267S
HAYTER 277S
SUNKEN LAKE 221S
PROVOST 545S
HANSMAN LAKE 650S
HEISLER 764S
GAETZ 87S
MANNIX MINE 765S
BIG KNIFF CREEK
BATTLE RIVER 757S
RED DEER 63S
CORDEL 755S
TINCHILDRAY 972S
PAINTEARTH 863S
LAKESEND 508S
STETTLER 769S
NEVIS 766S
MARION LAKE 873S
HALKIRK 615S
Halkirk Wind Power Facility (HAL1)
BIG VALLEY 778S
CORONATION 773S
RIBSTONE CREEK 892S
HEATBURG 948S
CASTOR 759S
PEMUKAN 932S
MONITOR 774S
Ghost Pine (NEP1)
SULLIVAN LAKE 775S
VETERAN 771S
LOYALIST 903S
GHOST PINE 114S
THREE HILLS 770S
ROWLEY 768S
HANNA 763S
RICHDALE 776S
YOUNGSTOWN 772S
EXCEL 910S
MICHICHI CREEK 802S
SHEERNESS 807S
ANDERSON 801S
Sheerness #1-2 (SH1-2)
HURD 2037S
LANFINE 959S
OYEN 767S
COYOTE LAKE 963S
OAKLAND 946S
WINTERING HILLS 804S
Suncor Wintering Hills (SCR4)
WHEATLAND 609S
BULLPOUND 803S
EYRE 558S
9L960/9L961 (to Deerland 13S)
9L22 (to Heart Lake 898S)
9L36
9L37
13L50 (to Heathfield 2029S)
174L (to Bardo 197S)
1083L (to Wolf Creek 288S)
914L (to Bigstone 86S)
912L (to Seratio 17S)
1082L (to Hazeldwood 297S)
926L (to Janet 74S)
901L (to Janet 74S)
9L953
9L27
9L20
9L948
9L93
9L99
9L100
9L97
9L70
9L59
9L46
13L50
6L12
6L25
6L56
6L15
6L09
6L21
7L25
7L128
9L29
9L24
7L132
7L151
7L760/780L (to Junction)
9L950 (to Ware Junction 132S)
953L/934L (to Ware Junction 132S)
13L50 (to Newell 207SS)

2 Connection Alternative for Stage 3 to be Studied

The following alternative will be studied:

2.1 Alternative 1 – T-tap Connection to the Existing 144 kV Transmission Line 7LA53

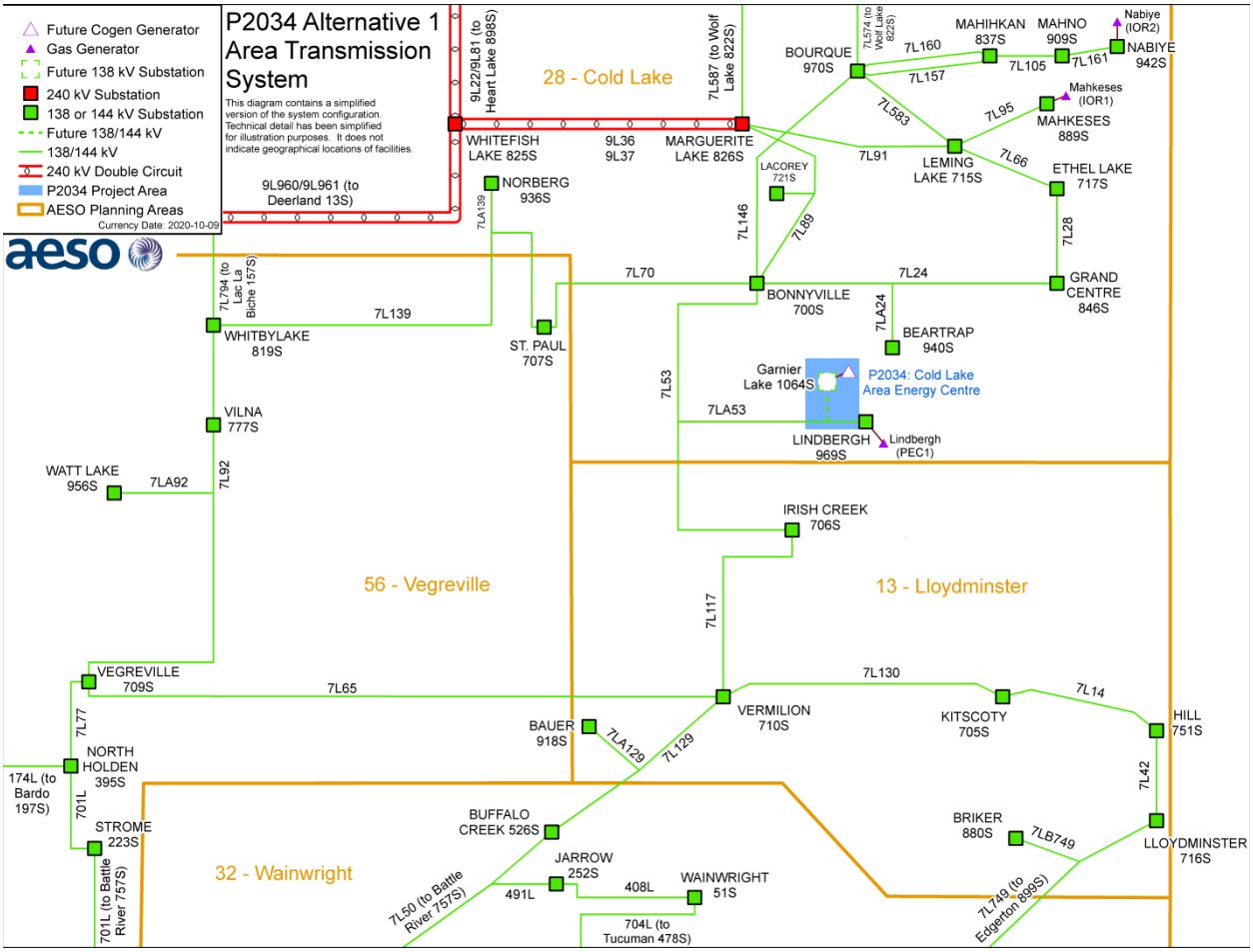
This alternative included the following developments:

- Add a 144 kV circuit, approximately 6 kilometres (km) in length[1], to connect the proposed Facility to the existing 144 kV transmission line 7LA53 using a T-tap configuration.
- Add or modify associated equipment as required for the above transmission developments.

The proposed connection configuration is shown in Figure 2-1.

[1] The exact line length to be determined by the TFO

Figure 2-1: Connection Alternative 1



3 Criteria, Standards and Requirements

3.1 AESO Reliability Criteria

The Transmission Planning (TPL) Standards, which are included in the Alberta Reliability Standards, and *Transmission Planning Criteria – Basis and Assumptions (see Attachment A),* (collectively, the Reliability Criteria) will be applied to evaluate system performance under Category A system conditions (i.e., all elements in-service) and following Category B contingencies (i.e., single element outage), prior to and following the studied alternatives. Below is a summary of Category A and Category B system conditions.

Category A, often referred to as the N-0 condition, represents a normal system with no contingencies and all facilities in service. Under this condition, the system must be able to supply all firm load and firm transfers to other areas. All equipment must operate within its applicable rating, voltages must be within their applicable range, and the system must be stable with no cascading outages.

Category B events, often referred to as an N-1 or N-G-1 with the most critical generator out of service, result in the loss of any single specified system element under specified fault conditions with normal clearing. These elements are a generator, a transmission circuit, a transformer, or a single pole of a DC transmission line. The acceptable impact on the system is the same as Category A. Planned or controlled interruptions of electric supply to radial customers or some local network customers, connected to or supplied by the faulted element or by the affected area, may occur in certain areas without impacting the overall reliability of the interconnected transmission systems. To prepare for the next contingency, system adjustments are permitted, including curtailments of contracted firm (non-recallable reserved) transmission service electric power transfers.

The TPL standards, TPL-001-AB-0 and TPL-002-AB1-0, have referenced Applicable Ratings when specifying the required system performance under Category A and Category B events. For the purpose of applying the TPL standards to the studies documented in this report, Applicable Ratings are defined as follows:

- Normal thermal rating of the line's loading limits for each season;
- The highest specified loading limits for transformers;
- For Category A conditions: Voltage range under normal operating condition per AESO Information Document #2010-007RS, *General Operating Practices – Voltage Control* (ID #2010-007RS). For the busses not listed in ID #2010-007RS, Table 2-1 in the *Transmission Planning Criteria – Basis and Assumptions* applies;
- For Category B conditions: The extreme voltage range values per Table 2-1 in the *Transmission Planning Criteria – Basis and Assumptions; and*
- Desired post-contingency voltage deviation limits for three defined post-event timeframes as provided in Table 3-1.

Table 3-1: Post-Contingency Voltage Deviation Guidelines for Low Voltage Busses

Parameter and reference point	Time Period		
	Post Transient (up to 30 sec)	Post Auto Control (30 sec to 5 min)	Post Manual Control (Steady State)
Voltage deviation from steady state at point of delivery (POD) low voltage bus.	±10%	±7%	±5%

3.2 ISO Rules and Information Documents

ID #2010-007RS will be used to establish system normal (i.e., pre-contingency) voltage profiles for the Study Area.

The TCM Rule will be followed to set up the study scenarios and assess the impact of the Project. In addition, due regard will be given to the following:

- The AESO's *Connection Study Requirements*;
- Section 502.1 of the ISO rules, *Aggregated Generating Facilities Technical Requirements*;
- Section 502.16 of the ISO rules, *Aggregated Generating Facilities Operating Requirements*;

4 Scenarios and Assumptions

4.1 Scenarios

The following section describes the scenarios to be studied and the assumptions to be used in the studies.

Connection scenarios must be studied as outlined in Table 4-1.

Table 4-1: Connection Study Scenarios Assumptions

Scenario No.	Year/Season	System Generation Dispatch Conditions	Scenario Name	Project Load (MW)	Project Generation (MW)
Pre-Project					
1	2028 Summer Light (SL)	High Generation (HG)	2028 SL HG Pre-Project	0	0
2	2028 Summer Peak (SP)	HG	2028 SP HG Pre-Project	0	0
3	2028 Winter Peak (WP)	HG	2028 WP HG Pre-Project	0	0
Post-Project					
4	2028 SL	HG	2028 SL HG Post-Project	0	72
5	2028 SP	HG	2028 SP HG Post-Project	0	72
6	2028 WP	HG	2028 WP HG Post-Project	0	72
7	2033 WP	All study area generation in-service	2033 WP Post-Project	0	72
Post-Project Sensitivity without CETO online					
8	2028 SP	HG	2028 SP HG Post-Project Sensitivity	0	72

4.1.1 System Project Assumptions

Table 4-2 lists the system transmission projects that will be included in the studies.

Table 4-2: Planned System Transmission Projects to be Included in the Studies

AESO Project No.	Project Name/Description	Scheduled ISD	AUC NID Decision No.
CETO (ph1)[1]	Central East Transfer-out Transmission Development	2026	25469-D01-2021

[1] The CETO Transmission Development phase 1 is considered in the study. Phase 1 includes one 240-kilovolt (kV) circuit between the Tinchebray 972S and Gaetz 87S substations.

4.1.2 Load Assumptions

The load forecast to be used for the studies is shown in Table 4-3 and is a forecast for the AESO Central region based on the AESO's Preliminary 2023 Long-term Outlook (2023 LTO).

Table 4-3: Forecast Load in Central Region

AESO Planning Region Name	Forecast Peak Load by Year/Season (MW)		
	2028 SP High Generation (HG)	2028 SL HG	2028 WP HG
Central Planning Region [2]	1,848	1,736	2,081
AIES	11,106	9,709	11,534

Note:
[2] The Central Region comprises the following AESO planning areas: Lloydminster (Area 13), Cold Lake (Area 28), Hinton/Edson (Area 29), Drayton Valley (Area 30), Wainwright (Area 32), Abraham Lake (Area 34), Red Deer (Area 35), Alliance/Battle River (Area 36), Provost (Area 37), Caroline (Area 38), Didsbury (Area 39), Hanna (Area 42) and Vegreville (Area 56).

4.1.3 Generation Assumptions

The generation forecast to be used for the studies is based on the Preliminary 2023 LTO with modifications to incorporate the latest forecast intelligence. The generation assumptions for the studies will assume high Central generation dispatch for STS studies.

The existing generation (excluding wind and solar) dispatch conditions for the study scenarios are described in Table 4-4.

Table 4-4: Existing Generation (excluding Wind and Solar) Dispatch Conditions in the Central Region

Facility Name	Unit No.	Bus No.	MC (MW)	AESO Planning Area No.	Unit Net Generation[a] (MW) by Scenario		
					2028 SP HG	2028 SL HG	2028 WP HG
Battle River #4 (BR4)	4	1496	155	36	31	31	31
Battle River #5 (BR5)	G5	1497	385	36	94.8	94.8	94.8
Sheerness #1 (SH1)	G1	1482	400	43	140	140	140
Sheerness #2 (SH2)	G2	1487	390	43	140	140	140

Notes:
[a] MC refers to maximum capability of the generating unit(s).
[b] SP HG or LG refers to Summer Peak High Generation or Low Generation (Low Wind) Scenarios.
[c] SL HG refers to Summer Light High Generation Scenario.
[d] WP HG or LG refers to Winter Peak High Generation or Low Generation (Low Wind) Scenarios.

Using this value, the wind and solar generation facilities will be dispatched to yield the credible worst-case generation dispatches for the Central region. Pre- and post-Project dispatch levels for the existing and planned[2] wind and solar generation facilities are shown in Table 4-5 and Table 4-6.

Table 4-5: Dispatch Conditions for Existing and Planned Wind Generation Facilities in the Central Region

Project Name	AESO Planning Area No.	Bus No.	MC (MW)	2028 SP HG	2028 SL HG	2028 WP HG
Fortis Bull Creek Phases 1 and 2 (BUL1 & BUL2)	37	550003	29	10	2.9	10.2
		550004		11	5	13.7
Garden Plain (GDP1)	42	565002	130	130	85.3	130
Ghost Pine (NEP1)	42	2621	82	15	3.6	14.8
		2622		15	3.6	14.8
		2623		11	2.7	11.1
		2624		15	3.6	14.8
		2625		19	4.5	18.5
Grizzly Bear Creek (GRZ1)	13	67308	152	45	29.9	45
Halkirk (HAL1)	42	66435	150	69	53.9	70.2
		67435		72	56.1	73
Hand Hills (HHW1)	42	560045	145	115	57.1	92
Lanfine Wind (LAN1)	42	60996	151	138	103	145
EDPR Sharp Hills Wind Farm	42	60831	248.4	196	121.5	195.6
		60832		92	57.2	92.1
Paintearth Wind Power / Paintearth Wind Power Phase 2	42	61418	99	99	99	99
		62418	99	91	46.9	91
Lone Pine MPC Wind	42	561103	466	212	158.9	233
		561104		212	158.9	233
RESC Oyen MPC Wind	42	560032	250	250	192	250
Capital Power Halkirk 2 Wind	36	60467	150	141	110	143.2
ABO Fox Meadows Wind	37	560039	150	106	47	128.5
CP Rolling Hills MPC Wind	37	560235	190	135	59.5	162.7
BluEarth Prairie Yarrow MPC Wind	37	560273	222	53	23.5	64.2

Note:
[a] MC refers to maximum capability of the generating unit(s).
[b] SP HG or LG refers to Summer Peak High Generation or Low Generation (Low Wind) Scenarios.
[c] SL HG refers to Summer Light High Generation Scenario.
[d] WP HG or LG refers to Winter Peak High Generation or Low Generation (Low Wind) Scenarios.

[2] Planned generations refers to the projects which met inclusion criteria.

Table 4-6: Dispatch Conditions for Existing and Planned Solar Generation Facilities in the Central Region

Project Name	AESO Planning Area No.	Bus No.	MC (MW)	2028 SP HG	2028 SL HG	2028 WP HG
Empress Solar Park (EMP1)	39	4366	21	18	17.7	9.7
		4266		13	12.8	7
Innisfail (INF1)	39	557120	22	8	7.7	6.2
Kneehill Solar (TRH1)	42	19433	25	0	0	0
		552433				
Michichi Creek (MCH1)	42	557448	13.5	11	0	5.9
Michichi Solar (MIC1)	42	554448	25	25	25	10.9
Youngstown Solar (YNG1)	42	19476	6	5	4.8	2.6
ATCO Michichi DER Solar	42	552448	75	19	22	16.4
		553448		22	22	16.4
		552450		16	11.3	0
ATCO Vilna 777S DER Solar	56	19357	5	0	0	0
RESC Big Sky Solar	56	560051	140	0	0	60.2
ATCO Oyen 767S DER Solar	42	19474	15	12	12.1	6.5
FortisAlberta Metiskow 648S DER Solar	37	557074	22.5	11	18.4	8.7
Phoenix MPC Solar	35	560362	299	72	119.7	56.6
		560365		72	119.7	56.6
Cache Rising Sun MPC Solar	37	562046	125	98	97.7	53.7
Kneehill MPC Solar	42	560106	450	176	175.9	96.7
		560103		176	175.9	96.7
Dolcy Solar Battery	37	567158	200	32	53.4	25.2
		567157		32	53.4	25.2
		567156		32	53.4	25.2
Eastervale Solar Battery	37	564092	300	48	80.1	37.9
		563092		48	80.1	37.9
		562092		48	80.1	37.9
Fortis Aura Provost DER Solar	37	4086	22.5	11	18	8.5
UK Solar East MPC	42	561042	401	156	156.8	89.1
		562042		156	156.8	89.1
Sundre 575S DER Solar	38	4107	14.6	12	12.1	6.5
Mannix MPC Solar Battery	36	566011	59	0	0	0
Harvest Sky MPC Solar Battery	42	566013	15	0	0	0
		566014		0	0	0

Springbrook MPC Solar	35	568204	300	73	120.1	56.8
		568207		73	120.1	56.8
FortisAlberta Killarney Lake 267S DER Solar/Battery Storage	37	4219	22.5	11	18	8.5
FortisAlberta Joffre 535S DER Solar 1	35	2886	25	0	0	0
FortisAlberta Joffre 535S DER Solar 2	35	2383	22	0	0	0
Fortis Moon Lake DER Solar	30	4028	18.4	9	14.7	7

Note:
[a] MC refers to generating unit maximum capability.
[b] SP HG or LG refers to Summer Peak High Generation or Low Generation (Low Wind) Scenarios.
[c] SL HG refers to Summer Light High Generation Scenario.
[d] WP HG or LG refers to Winter Peak High Generation or Low Generation (Low Wind) Scenarios.

4.1.4 Intertie Flow Assumptions

The intertie flow assumptions for the Alberta-British Columbia (AB-BC), Alberta-Saskatchewan (AB-SK), and Alberta-Montana (MATL) interties are shown in Table 4-7.

Table 4-7: Intertie Flows for all Study Scenarios

Scenario Name	Import (-) / Export (+) (MW) by Intertie		
	AB-BC	AB-SK	MATL
2028 SL HG	+868	0	+186
2028 SP HG	+851	+150	+186
2028 WP HG	+1091	+151	+186

4.1.5 HVDC Power Order Assumptions

The Western Alberta Transmission Line (WATL) and the Eastern Alberta Transmission Line (EATL) are high-voltage direct current (HVDC) transmission lines. The HVDC power order assumptions for the studies will be set to minimize losses for the pre-Project and post-Project study scenarios.

4.1.6 Protection Fault Clearing Times

The transient stability studies will be performed using the actual fault clearing times for the selected contingencies, as provided by the TFO or TFOs and as shown in Table 4-8. Only those contingencies shown in Table 4-8 will be studied for transient stability studies. If the TFO or TFOs did not specify the fault clearing times (e.g. for new transmission lines) for a selected contingency, then the studies for that contingency will be performed using the standard fault clearing times that are specified in Table 2-3 of the AESO's *Transmission Planning Criteria – Basis and Assumptions*.

Table 4-8: Protection Fault Clearing Times

Contingency (System Element Lost)	Fault Location	Clearing Times (Cycles)

		Near End	Far End
7L24 (Bonnyville 700S – Grande Centre 846S)	Bonnyville (700S)	6	24
	Grande Centre (846S)	6	24
7L53 (Bonnyville 700S – Irish Creek 706S)	Bonnyville 700S	6	8
	Irish Creek 706S	6	8
7L70 (Bonnyville 700S – St. Paul 707S)	Bonnyville 700S	6	24
	St. Paul 707S	6	24
7L89 (Bonnyville 700S – Marguerite Lake 826S)	Bonnyville 700S	6	24
	Marguerite Lake 826S	6	24
7L92 (Vegreville 709S – Whitby Lake 819S)	Vegreville 709S	6	24
	Whitby Lake 819S	6	42
7L117 (Irish Creek 706S – Vermilion 710S)	Irish Creek 706S	6	24
	Vermilion 710S	6	24
7L139 (St. Paul 707S – Whitby Lake 819S)	St. Paul 707S	6	24
	Whitby Lake 819S	6	24
7L146 (Bonnyville 700S – Bourque 970S)	Bonnyville 700S	6	8
	Boutque 970S	6	8
9L36 (Whitefish Lake 825S – Marguerite Lake 826S)	Whitefish Lake 825S	5	6
	Marguerite Lake 826S	5	6
9L37 (Whitefish Lake 825S – Marguerite Lake 826S)	Whitefish Lake 825S	5	6
	Marguerite Lake 826S	5	6

4.1.7 Project Dynamic Data

Dynamic data for the Project can be found in Attachment A7.

4.1.8 Voltage Profile Assumption

ID #2010-007RS will be used to establish system normal (i.e., pre-contingency) voltage profiles for key area busses prior to commencing any studies. Table 2-1 of the *Transmission Planning Criteria – Basis and Assumptions* applies for the busses not included in ID #2010-007RS. These voltages will be used to set the voltage profile for the study base cases prior to the power flow studies.

5 Study Methodology

The studies to be performed for this connection assessment are identified in Table 5-1.

Table 5-1: Summary of the Studies to be Performed

Scenario No. and Name		Power Flow		Voltage Stability		Transient Stability		Motor Starting		Short Circuit
		Category		Category		Category		Category		Category A
		A	B	A	B	A	B	A	B	
Pre-Project										
1	2028 SL HG Pre-Project	X	X			X*	X*			
2	2028 SP HG Pre-Project	X	X			X*	X*			
3	2028 WP HG Pre-Project	X	X			X*	X*			X
Post-Project										
4	2028 SL HG Post-Project	X	X			X	X			
5	2028 SP HG Post-Project	X	X			X	X			
6	2024 WP HG Post-Project	X	X			X	X			X
7	2031 WP Post-Project									X
Post-Project Sensitivity										
8	2028 SP HG Post-Project Sensitivity	X	X							

Note: X* Only required if post-Project studies show potential transient stability issues.

For the engineering studies, all transmission facilities [69 kV and above, OR, 69 kV and 144/138 kV, OR specify other as applicable], within the Study Area and the transmission lines connecting [this/these] [planning area or planning areas] to neighboring planning areas will be studied and monitored to assess the impact of the Project on the performance of the AIES, including any violations of the Reliability Criteria (as defined in Section 3.1).

5.1 Study Case Validation

The study will be conducted on the AIES system model using the AESO's planning base cases. The seasonal light/peak scenarios will be studied as required. The base cases will be modified by the AESO to include the corresponding load and generation forecast information. The resulting cases, or seed cases, will be provided by the AESO to the Studies Consultant. These cases are provided in PSS/E v34. Upon request, the AESO can provide RAW and SEQ files. Software used by the Studies Consultant must be able to read and write these file types. Manual adjustments may be required to ensure full alignment with the details outlined in this Study Scope, as described in the process outlined below. The AESO will provide guidance to the Studies Consultant with regard to the setup of the study cases should any questions arise.

The expected process for the creation of acceptable study cases is as follows:

1. The AESO provides seed cases and any other applicable information required to the Studies Consultant.
2. If the cases show N-0 violations, AESO will work with the Studies Consultants to address the issues. The Studies Consultant verifies and makes adjustments as required to ensure the study cases represent the assumptions outlined within the Study Scope.
3. Upon creating the study cases, all the study cases are forwarded to the AESO for approval.
4. The Studies Consultant proceeds with the required engineering studies only after the study cases are approved by the AESO.

5.2 Power Flow Studies

Power flow studies will be performed to identify thermal and voltage criteria violations as per the Reliability Criteria, and any deviations from the limits listed in Table 3-1.

For information purposes, the Studies Consultant must also provide, as a separate file, a list of any transmission elements where the thermal loading exceeds 95% of the element's normal rating under Category A and Category B conditions.

For the Category B power flow studies, the transformer taps and switched shunt reactive compensating devices such as shunt capacitors and reactors will be locked and continuous shunt devices will be enabled.

Voltage deviations at point-of-delivery (POD) low voltage busses will also be assessed for both the pre-Project and post-Project networks by first locking all tap changers and area shunt reactive compensating devices to identify any post-transient voltage deviations above 10%. Second, tap changers will be allowed to move while shunt reactive compensating devices remained locked to determine if any voltage deviations above 7% would occur in the area. Third, all the taps and shunt reactive compensating devices will be allowed to adjust, and voltage deviations above 5% will be reported.

The scenarios to be studied are shown in Table 5-1.

5.2.1 Contingencies to be Studied

Power flow studies will be performed for the Category A and all Category B conditions in the Study Area.

5.3 Transient Stability Studies

The Keephills generator #3 in Wabamun (Area 40) will be used as the reference for the studies.

The report presenting the results of the transient stability studies must provide response plots for several variables, including rotor angle, and active and reactive power output for the Battle River 4&5, Foster Creek (EC04), Primrose #1 (PR1), Mahkeses & Nabiye (IOR1), Lindbergh (PEC1) and P2279 CNRL Primrose East 641S Gas. The results report must also provide the 500 kV, 240 kV and 138 kV bus voltage levels for substations near the point of connection. Other busses will be monitored and will be reported as determined by the results. The results report must also provide the key branch active and reactive power flow surrounding the Facility.

Transient stability studies will be performed for the post-Project scenarios as shown in Table 5-1. If any transient stability issues are observed, transient stability analysis will be performed for the corresponding pre-Project scenarios.

5.3.1 Contingencies to be Studied

Transient stability studies will be performed for the contingencies shown in Table 4-8.

5.4 Short-Circuit Current Level Studies

A maximum fault level must be provided for the substations in the vicinity of the Project assuming normal system operation with all transmission elements in service and generation dispatched. Three-phase faults and single line-to-ground faults will be simulated. Polar coordinates and per-unit values will be used for reporting the results.

Winter peak scenarios will be used for the short-circuit studies.

Estimated maximum three-phase faults and single line-to-ground short-circuit current levels will be reported for the following substations:

- Lindbergh 969S
- Bear Trap 940S
- Bonnyville 700S
- Irish Creek 706S
- Vermilion 710S
- Garnier Lake 1034 (including in post-Project studies only)

Further sensitivity studies, in consultation with the TFO, may be required if the primary short-circuit analysis indicates a potential to exceed or approach the existing fault rating of the transmission facilities.

The scenarios to be studied are as shown in Table 5-1.

6 Mitigation Measures

6.1 Development

Mitigation measures may be required if the post-Project study results identify system performance issues. Mitigation measures for the Project may involve modifying or adding real-time operational practices and/or remedial action schemes (RASs).

The Studies Consultant must notify the AESO of any system performance issues in a timely manner, following which the AESO Studies Engineer may instruct the Studies Consultant as follows:

- Develop tables showing the constraint effective factors[3] for generation or load based on thermal criteria violations that are observed.
- Collaborate with the AESO to propose changes, if any, to the connection alternatives that could remove the requirement for a RAS.
- Collaborate with the AESO to study modifications to existing and/or planned RASs, proposed by the AESO, to ensure the coordination of existing protection schemes with the addition of any proposed protection schemes.
- Collaborate with the AESO to identify and study new RASs, if any, that may be required to ensure system reliability is maintained after connecting the Project to the AIES.

The AESO Studies Engineer will work closely with the Studies Consultant and guide the development and/or modifications of the proposed mitigation measures to ensure system reliability, security and compliance with AESO ID #2018-018T, *Provision of System Access Service and the Connection Process*.

6.2 Evaluation

6.2.1 Post-Mitigation Studies

Studies to evaluate the effectiveness of mitigation measures, if required, will be performed in accordance with the technical criteria, assumptions, and methods provided in this Study Scope and in accordance with further instructions from the AESO.

6.2.2 Constraint Effective Factor Studies

Constraint effective factor analysis are used to determine the generator- and load- constraint effective factors and to identify the most effective generators or loads to manage the thermal criteria violations, if any, that are observed under Category A and/or Category B conditions.

[3] Constraint effective factor studies are performed to determine the generator- and load- constraint effective factors. Constraint effective factors are used to estimate the ability of generators and loads to manage transmission constraints. A generator's or load's constraint effective factor is defined as the change in power flow over a specific transmission line following a change in the generator's energy production or in the load's energy consumption. The greater the constraint effective factor, the more effective a generator or load can be in managing a thermal criteria violation on the specific transmission line.

7 Changes to Study Assumptions

This study will utilize the AESO's planning base cases, which are based on the AESO's current corporate forecast (Preliminary 2023 LTO) with modifications to incorporate the latest forecast intelligence. Sensitivity studies or restudy may be required in the event of revisions to the AESO's corporate forecast, forecast intelligence, or other study assumptions. Additional engineering studies may also be required to assess new connection alternatives, changes to project ISD, or delays in proposed system developments. Any additional or revised study requirements shall be captured in a signed Study Scope Amendment document.

Attachment A: Transmission Planning Criteria – Basis and Assumptions

APPENDIX G AESO TRANSMISSION PLANNING CRITERIA – BASIS AND ASSUMPTIONS

Transmission Planning Criteria - Basis and Assumptions

Version 1.0

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1. Introduction

This document presents the reliability standards, criteria, and assumptions to be used as the basis for planning the Alberta Transmission System. The criteria, standards and assumptions identified in this document supersede those previously established.

2. Transmission Reliability Standards and Criteria[1]

The AESO applies the following Alberta Reliability Standards to ensure that the transmission system is planned to meet applicable performance requirements under a defined set of system conditions and contingencies. A brief description of each of these standards is given below:

1. **TPL-001-AB-0: System Performance Under Normal Conditions**
   Category A represents a normal system condition with all elements in service (N-0). All equipment must be within its applicable rating, voltages must be within their applicable ratings and the system must be stable with no cascading outages. Under Category A, electric supply to load cannot be interrupted and generating units cannot be removed from service.

2. **TPL-002-AB-0: System Performance Following Loss of a Single BES Element**
   Category B events result in the loss of any single element (N-1) under specified fault conditions with normal clearing. The specified elements are a generating unit, a transmission circuit, a transformer or a single pole of a direct current transmission line. The acceptable impact on the system is the same as Category A with the exception that radial customers or some local network customers, including loads or generating units, are allowed to be disconnected from the system if they are connected through the faulted element. The loss of opportunity load or opportunity interchanges is allowed. No cascading can occur.

3. **TPL-003-AB-0: System Performance Following Loss of Two or More BES Elements**
   Category C events result in the loss of two or more bulk electric system elements (sequential, N-1-1 or concurrent, N-2) under specified fault conditions and include both normal and delayed fault clearing. All of the system limits for Category A and B events apply with the exception that planned and controlled loss of firm load, firm transfers and/or generation is acceptable provided there is no cascading.

4. **TPL-004-AB-0: System Performance Following Extreme BES Events**
   Category D represents a wide variety of extreme, rare and unpredictable events, which may result in the loss of load and generation in widespread areas. The system may not be able to reach a new stable steady state, which means a blackout is a possible outcome. The AESO needs to evaluate these events, at its discretion, for risks and consequences prior to creating mitigation plans.

5. **FAC-014-AB-2: Establishing and Communicating System Operating Limits**
   The AESO is required to establish system operating limits where a contingency is not mitigated through construction of transmission facilities.

[1] A complete description of these standards are given in: AESO. *Alberta Reliability Standards*. Available from http://www.aeso.ca/rulesprocedures/17004.html

2.1 Thermal Loading Criteria

The AESO Thermal Loading Criteria require that the continuous thermal rating of any transmission element is not exceeded under normal and post-contingency operating conditions. Thermal limits are assumed to be 100% of the respective normal summer and winter ratings. Emergency limits are not considered in the planning evaluations.

2.2 Voltage Range and Voltage Stability Criteria

The normal minimum and maximum voltage limits as specified in the following table are used to identify Category A system voltage violations, while the extreme minimum and maximum limits are used to identify Category B and C system violations. Table 2-1 presents the acceptable steady state and contingency state voltage ranges for the AIES. Table 2-2 provides voltage stability criteria used to test the system performance.

Table 2-1: Acceptable Range of Steady State Voltage (kV)

Nominal Voltage	Extreme Minimum	Normal Minimum	Normal Maximum	Extreme Maximum
500	475	500	525	550
240	216	234	252	264
260 (Northeast & Northwest)*	234	247	266	275
144	130	137	151	155
138	124	135	145	152
72	65	68.5	75.5	79
69	62	65.5	72.5	76

Table 2-2: Voltage Stability Criteria

Performance Level	Disturbance (1)(2)(3)(4) Initiated by: Fault or No fault DC Disturbance	MW Margin (P-V method) (5)(6)(7)	MVAr Margin (V-Q method) (6)(7)
A	Any element such as: One Generator One Circuit One Transformer One Reactive Power Source One DC Monopole	≥ 5%	Worst Case Scenario(8)
B	Bus Section	≥ 5%	50% of Margin Requirement in Level A

Performance Level	Disturbance (1)(2)(3)(4) Initiated by: Fault or No fault DC Disturbance	MW Margin (P-V method) (5)(6)(7)	MVAr Margin (V-Q method) (6)(7)
C	Any combination of two elements such as: A Line and a Generator A Line and a Reactive Power Source Two Generators Two Circuits Two Transformers Two Reactive Power Sources DC Bipole	≥ 2.5%	50% of Margin Requirement in Level A
D	Any combination of three or more elements. i.e.: Three or More Circuits on ROW Entire Substation Entire Plant Including Switchyard	> 0	> 0

2.3 Transient Stability Analysis Assumptions

Standard fault clearing times as shown in Table 2-3 are used for the new facilities or when the actual clearing times are not available for the existing facilities. Double line-to-ground faults are applied for the Category C5 events with normal clearing times. Single line-to-ground faults are applied for Category C6 to C9 events with delayed clearing times as depicted in Table 2-4 and Table 2-5.

Table 2-3: Fault Clearing Times

Nominal	Near End	Far End
kV	**Cycles**	**Cycles**
500	4	5
240	5	6
144/138 with telecommunications	6	8
144/138 without telecommunications	6	30

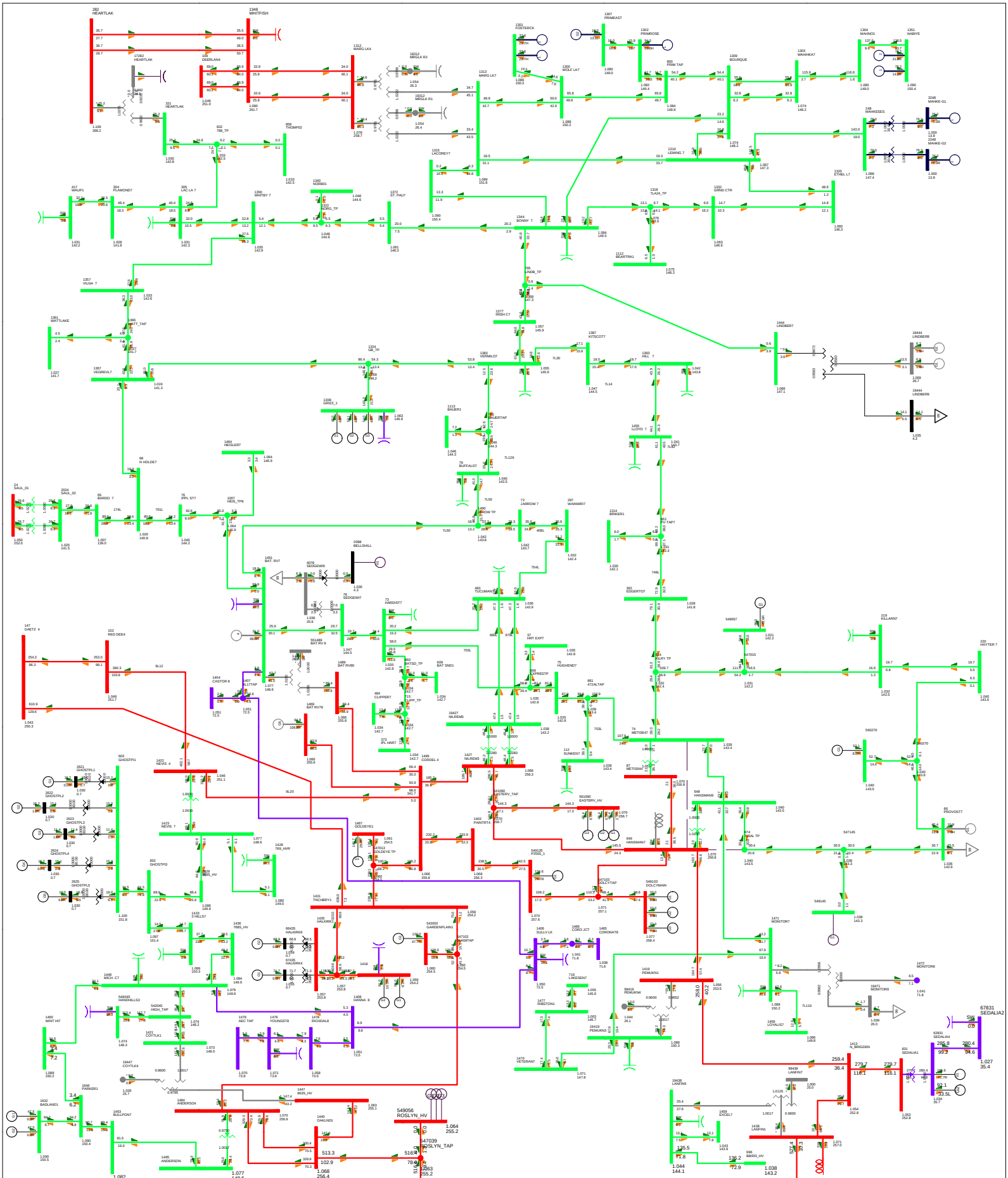
Table 2-4: Stuck Breaker Clearing Times for Lines

Fault Clearing Time			Fault Clearing Time			Fault Clearing Time		
138/144 kV			240 kV			500 kV		
Near End	Far End	2nd Ckt (for C5 and C7 Only)	Near End	Far End	2nd Ckt (for C5 and C7 Only)	Near End	Far End	2nd Ckt (for C5 and C7 Only)
15	24	24	12	6	14	9	5	11

Table 2-5: Stuck Breaker Clearing Times for Transformers

Fault Clearing Time (Cycles)						Fault Clearing Time (Cycles)					
240/138 kV						500/240 kV					
Fault on 240 kV Side			Fault on 138 kV Side			Fault on 500 kV Side			Fault on 240 kV Side		
240 kV Side	138 kV Side	2nd Ckt (for Breaker Fail)	138 kV Side	240 kV Side	2nd Ckt (for Breaker Fail)	500 kV Side	240 kV Side	2nd Ckt (for Breaker Fail)	240 kV Side	500 kV Side	2nd Ckt (for Breaker Fail)
12	6	14	15	5	24	9	5	11	12	4	14

Attachment A2
Pre-Project Power Flow Diagrams



Attachment A2- 1

Contingency

CONT 000: All elements in service

Study Case Description

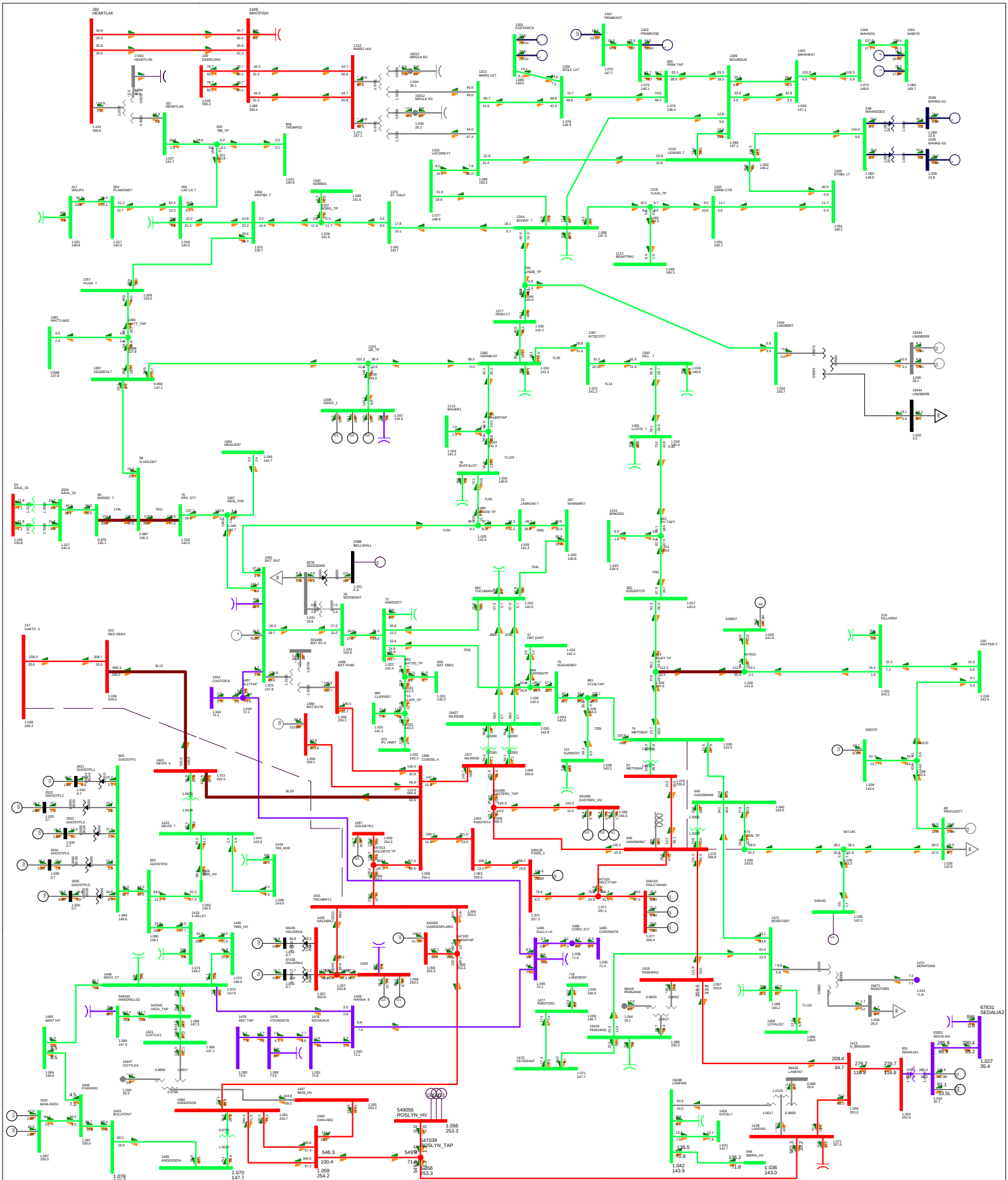
2028SP PRE-PROJ

Base Case

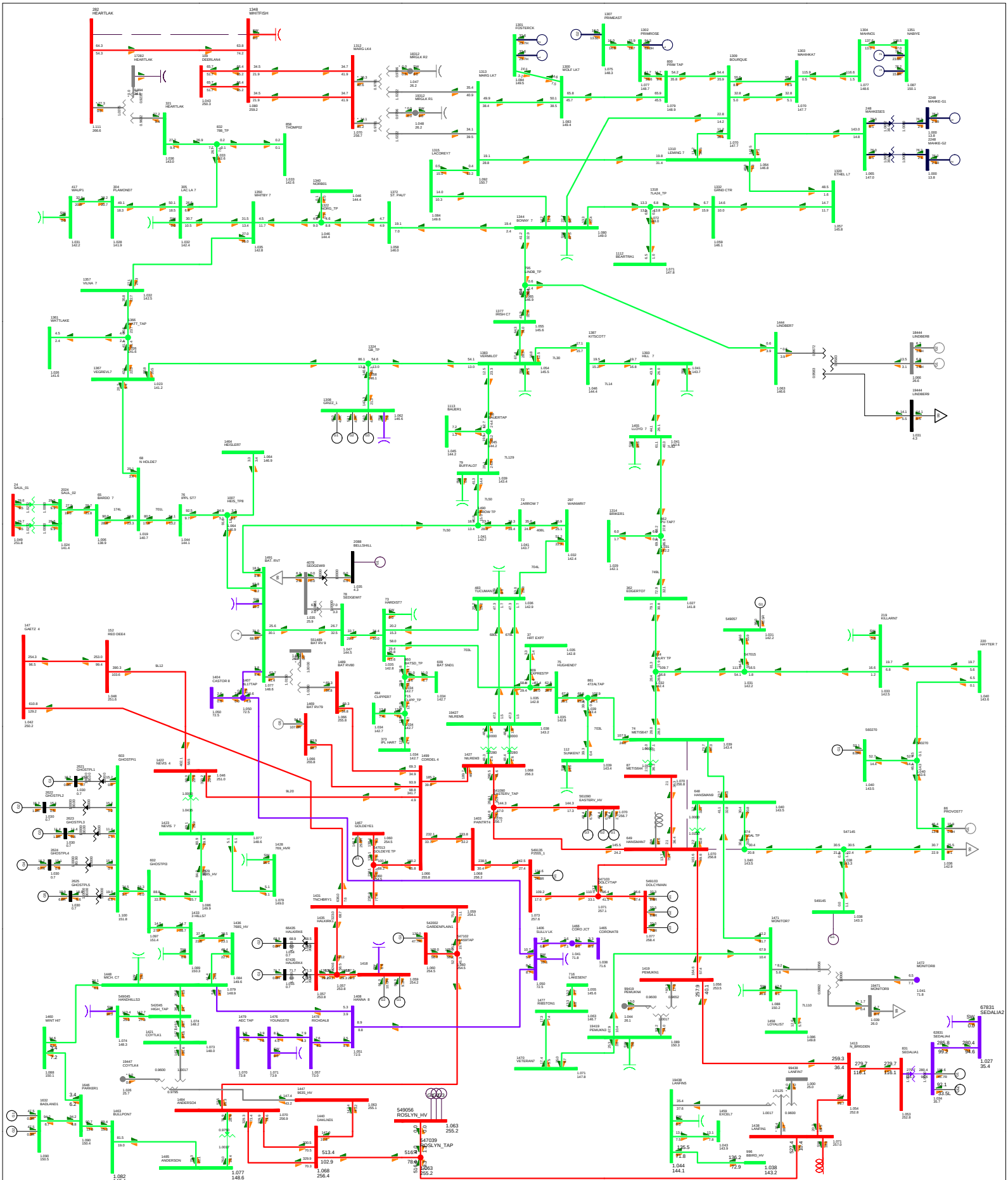
P2034 Cold Lake Area Cogen

Bus - VOLTAGE (kV/PU)
Branch - MW/MVar
Equipment - MW/Mvar

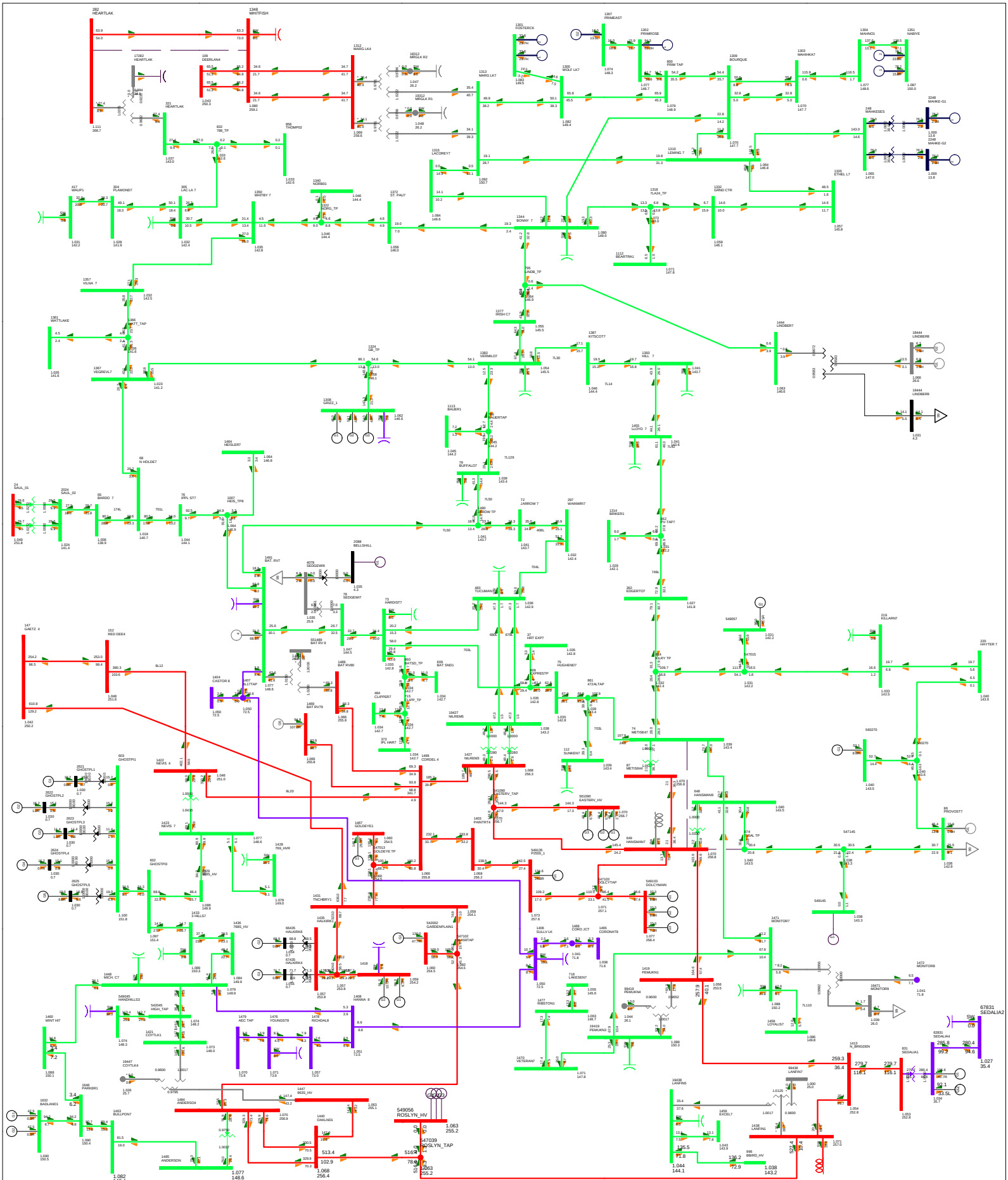
100.0%RATEA
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A2- 1	Contingency	Study Case Description	P2034 Cold Lake Area Cogen
	CONT 001: CETO (87S Gaetz - 972S Tinchebray)	2028SP PRE-PROJ Base Case	Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A2- 1	Contingency	Study Case Description	P2034 Cold Lake Area Cogen
	CONT 010: 9L22 (898S Heart Lake - 825S Whitefish Lake)	2028SP PRE-PROJ Base Case	Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A2- 1

Contingency

CONT 011: 9L81 (898S Heart Lake - 825S Whitefish Lake)

Study Case Description

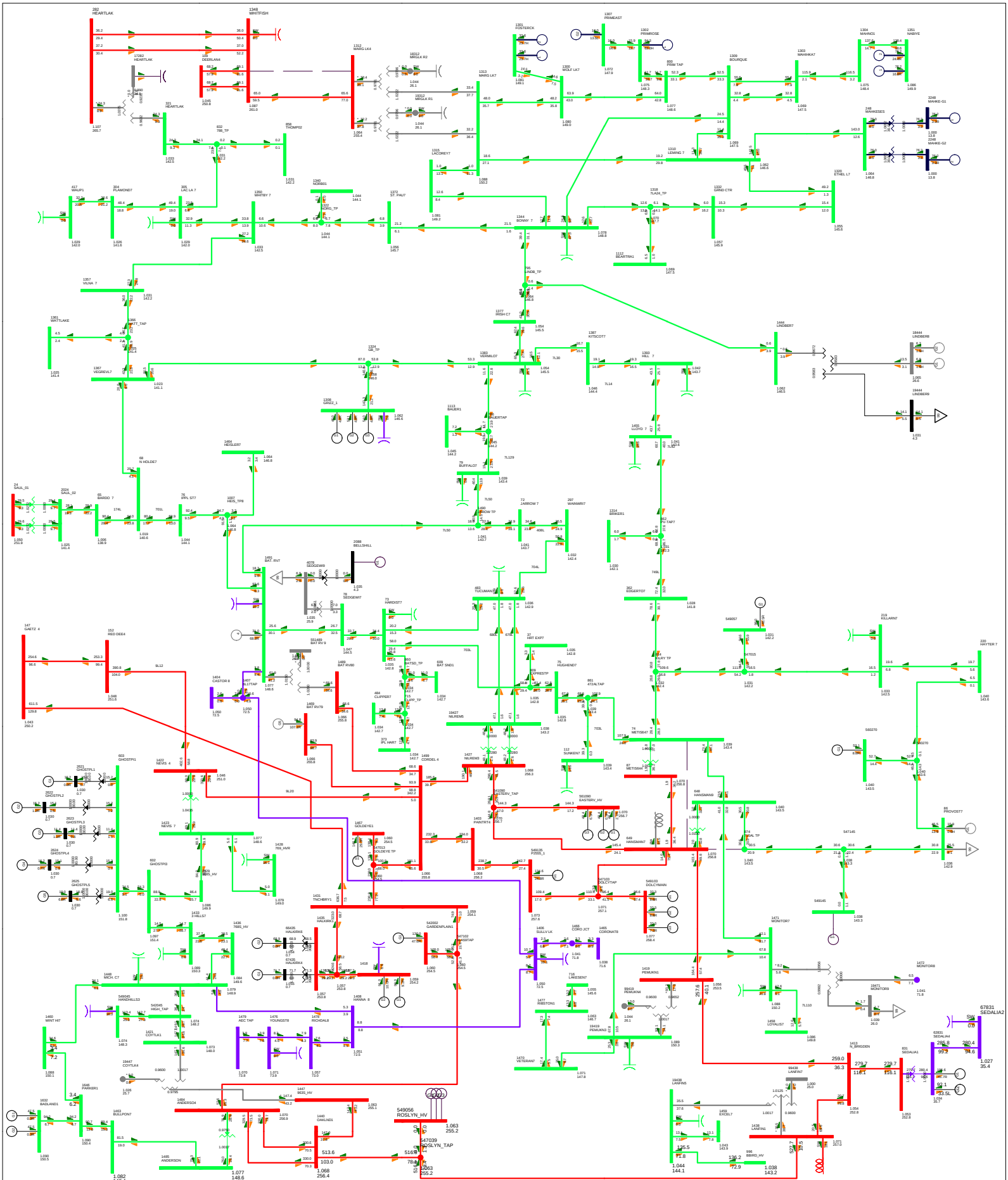
2028SP PRE-PROJ

Base Case

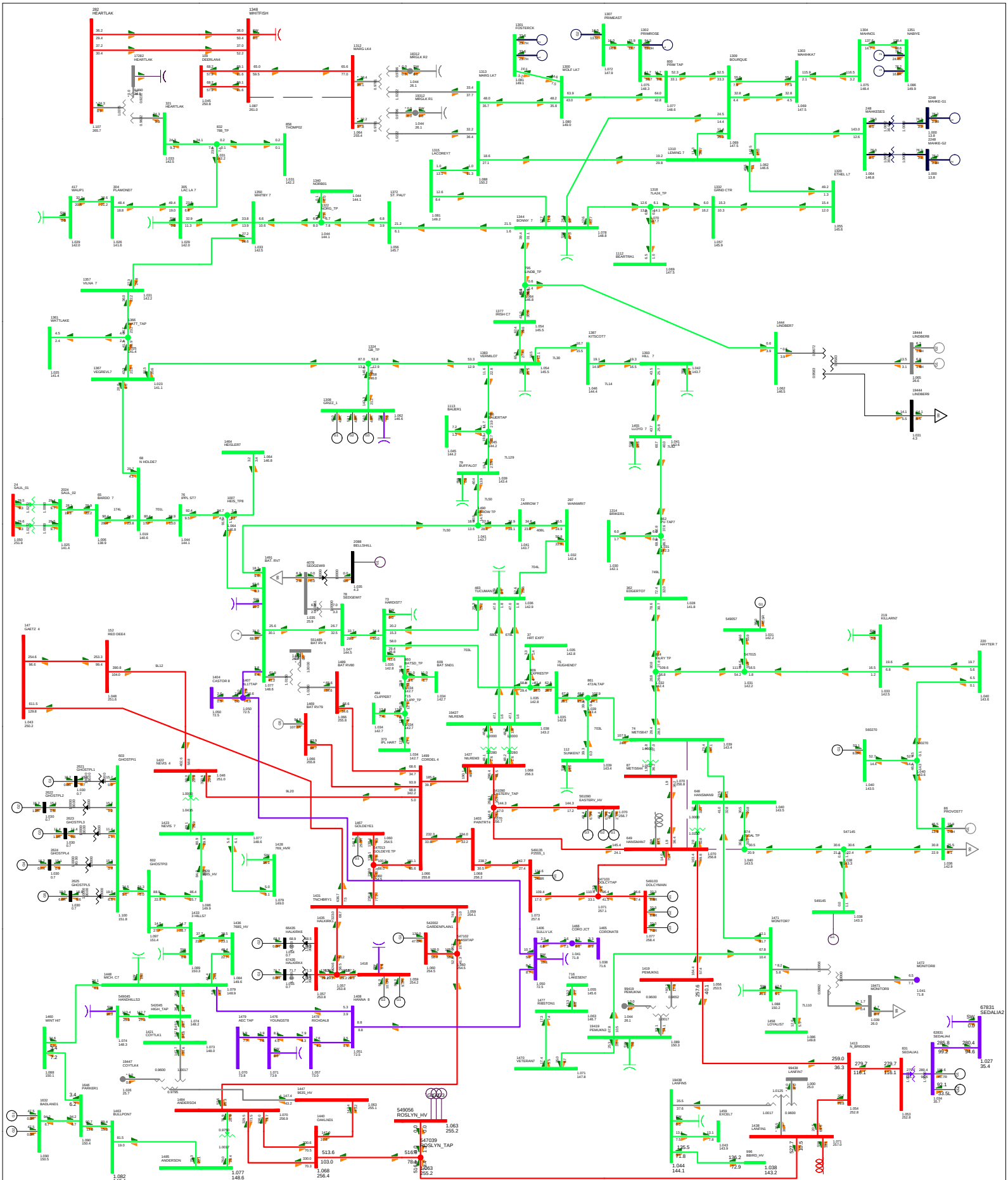
P2034 Cold Lake Area Cogen

Bus - VOLTAGE (kV/PU)
Branch - MW/Mvar
Equipment - MW/Mvar

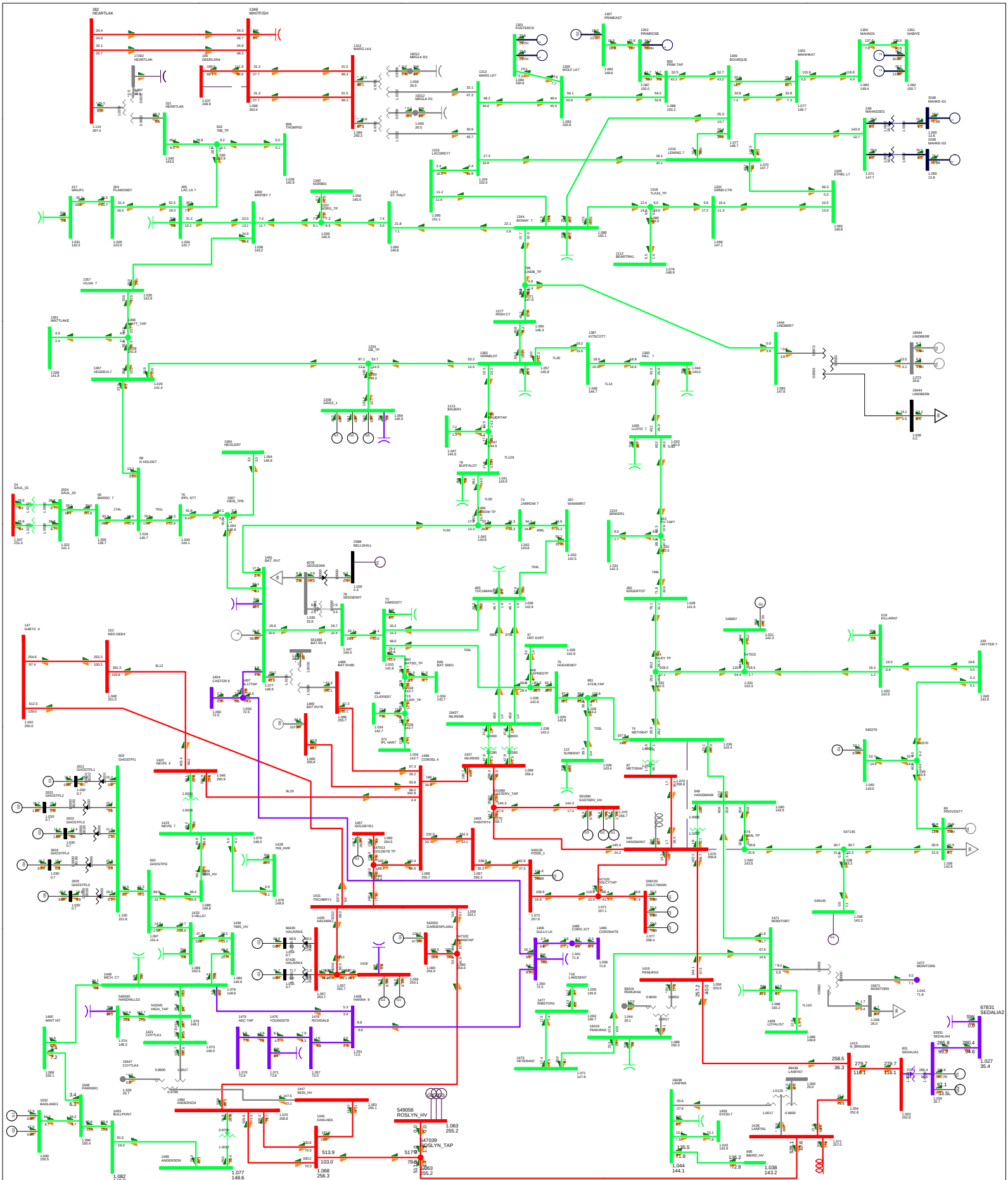
100.0%RATEA
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



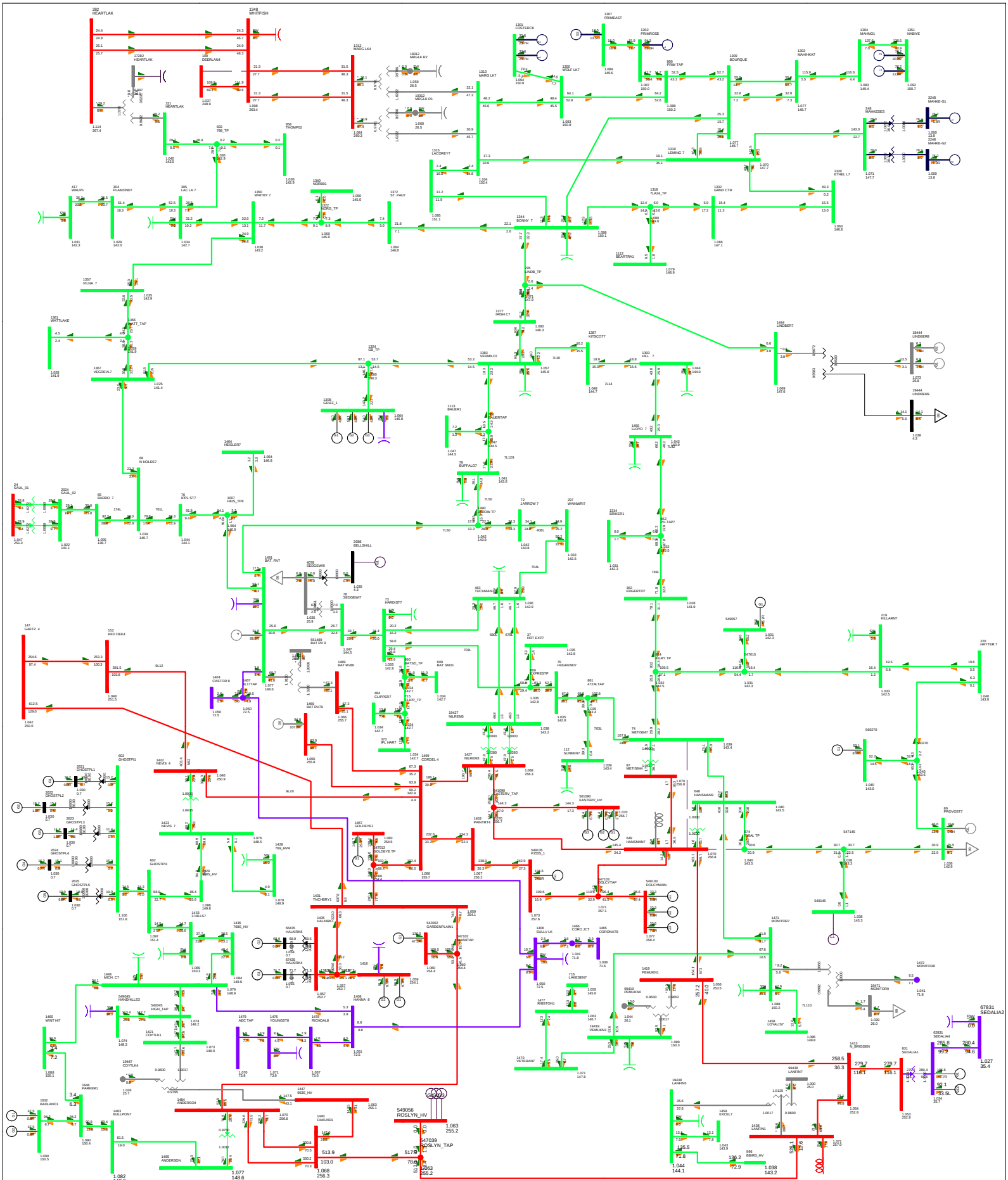
Attachment A2- 1	Contingency	Study Case Description	P2034 Cold Lake Area Cogen
	CONT 012: 9L36 (826S Marguerite Lake - 825S Whitefish Lake)	2028SP PRE-PROJ Base Case	Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



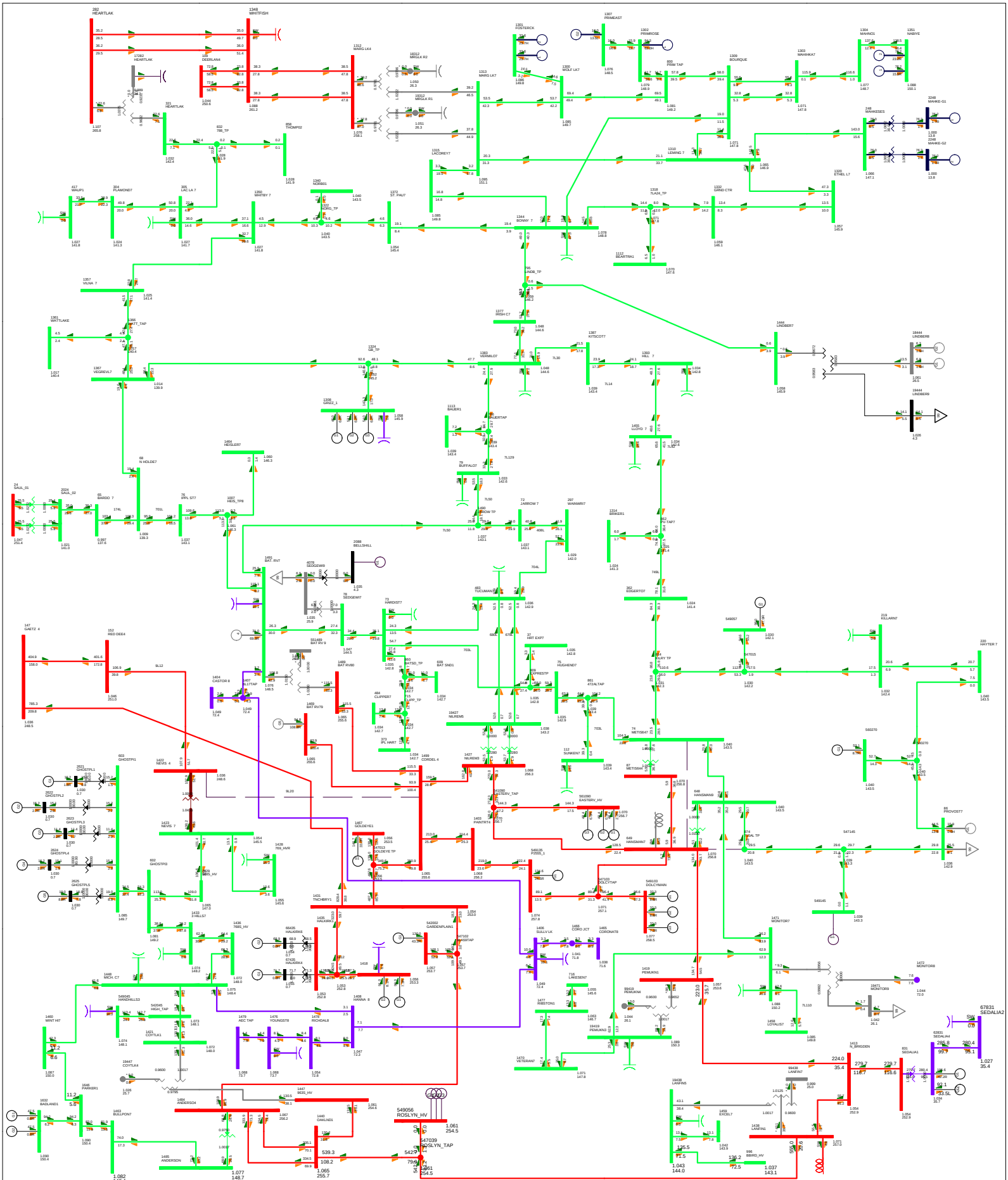
Attachment A2- 1	Contingency	Study Case Description	P2034 Cold Lake Area Cogen
	CONT 013: 9L37 (826S Marguerite Lake - 825S Whitefish Lake)	2028SP PRE-PROJ Base Case	Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A2- 1	Contingency	Study Case Description	P2034 Cold Lake Area Cogen
	CONT 014: 9L960 (13S Deerland - 825S Whitefish Lake)	2028SP PRE-PROJ Base Case	Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A2- 1	Contingency	Study Case Description	P2034 Cold Lake Area Cogen
	CONT 015: 9L961 (13S Deerland - 825S Whitefish Lake)	2028SP PRE-PROJ Base Case	Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A2- 1

Contingency

CONT 016: 9L20 (766S Nevis - 755S Cordel)

Study Case Description

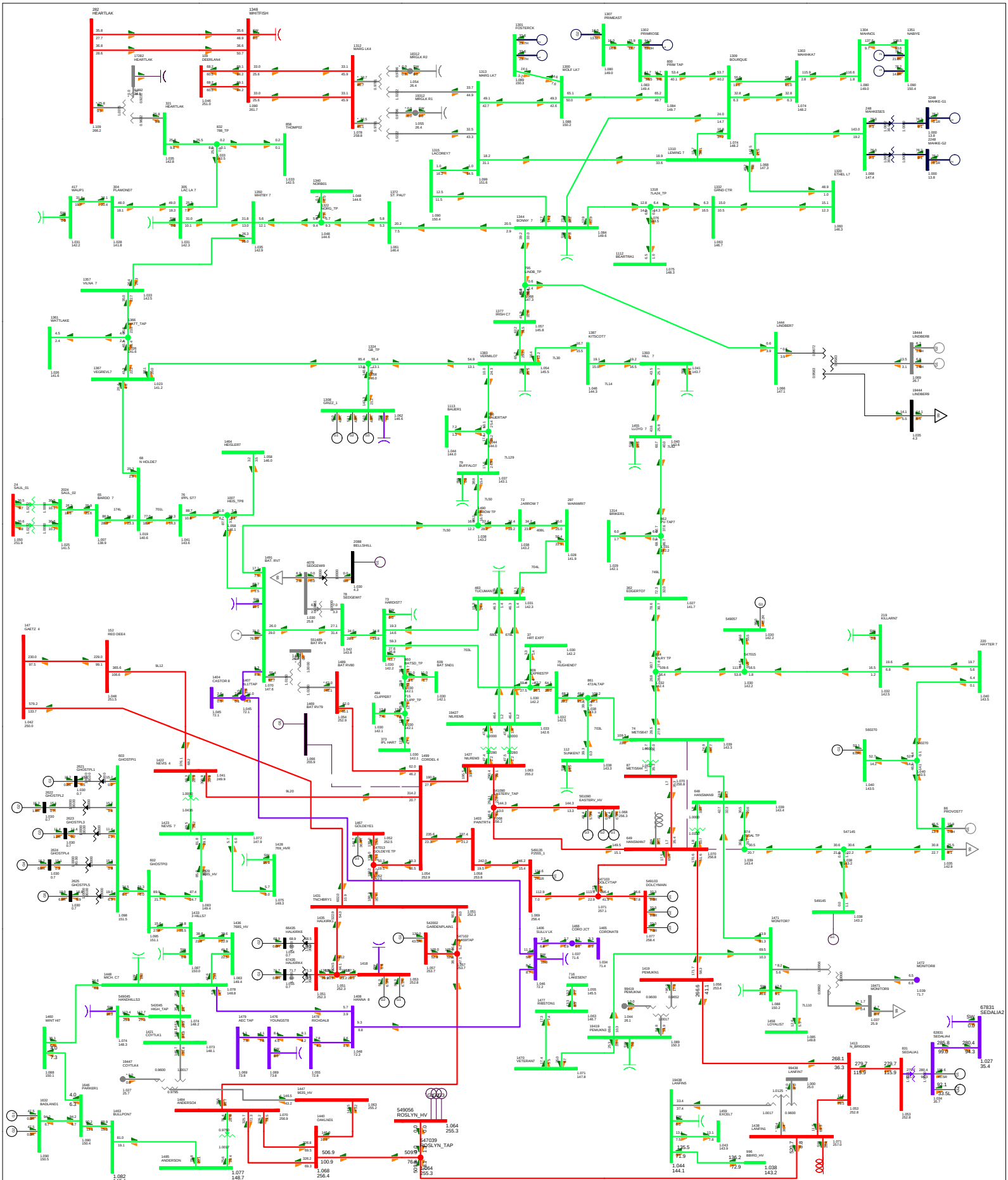
2028SP PRE-PROJ

Base Case

P2034 Cold Lake Area Cogen

Bus - VOLTAGE (kV/PU)
Branch - MW/Mvar
Equipment - MW/Mvar

100.0%RATEA
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A2- 1

Contingency

CONT 017: 9L79 (757S Battle River - 755S Cordel)

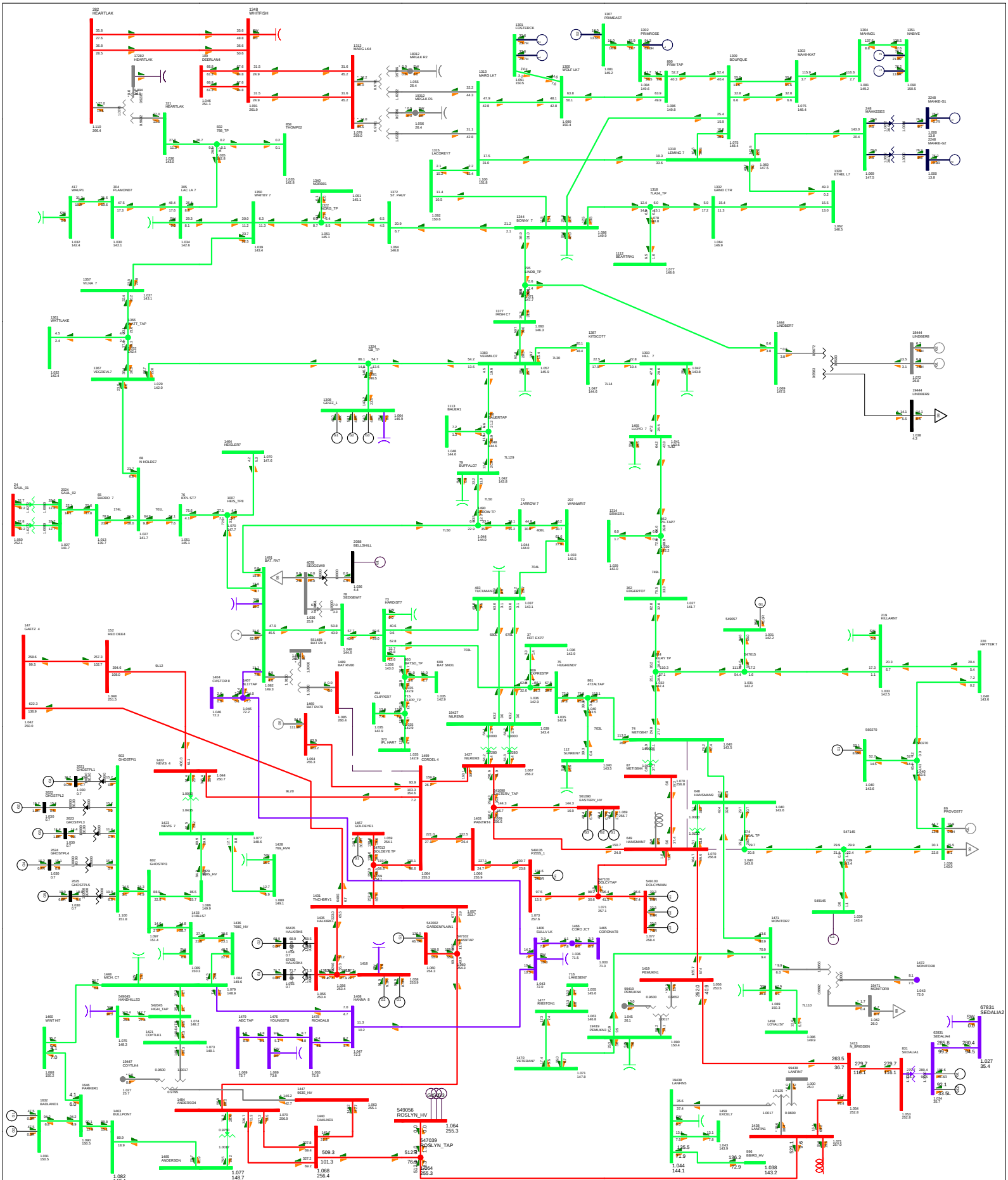
Study Case Description

2028SP PRE-PROJ

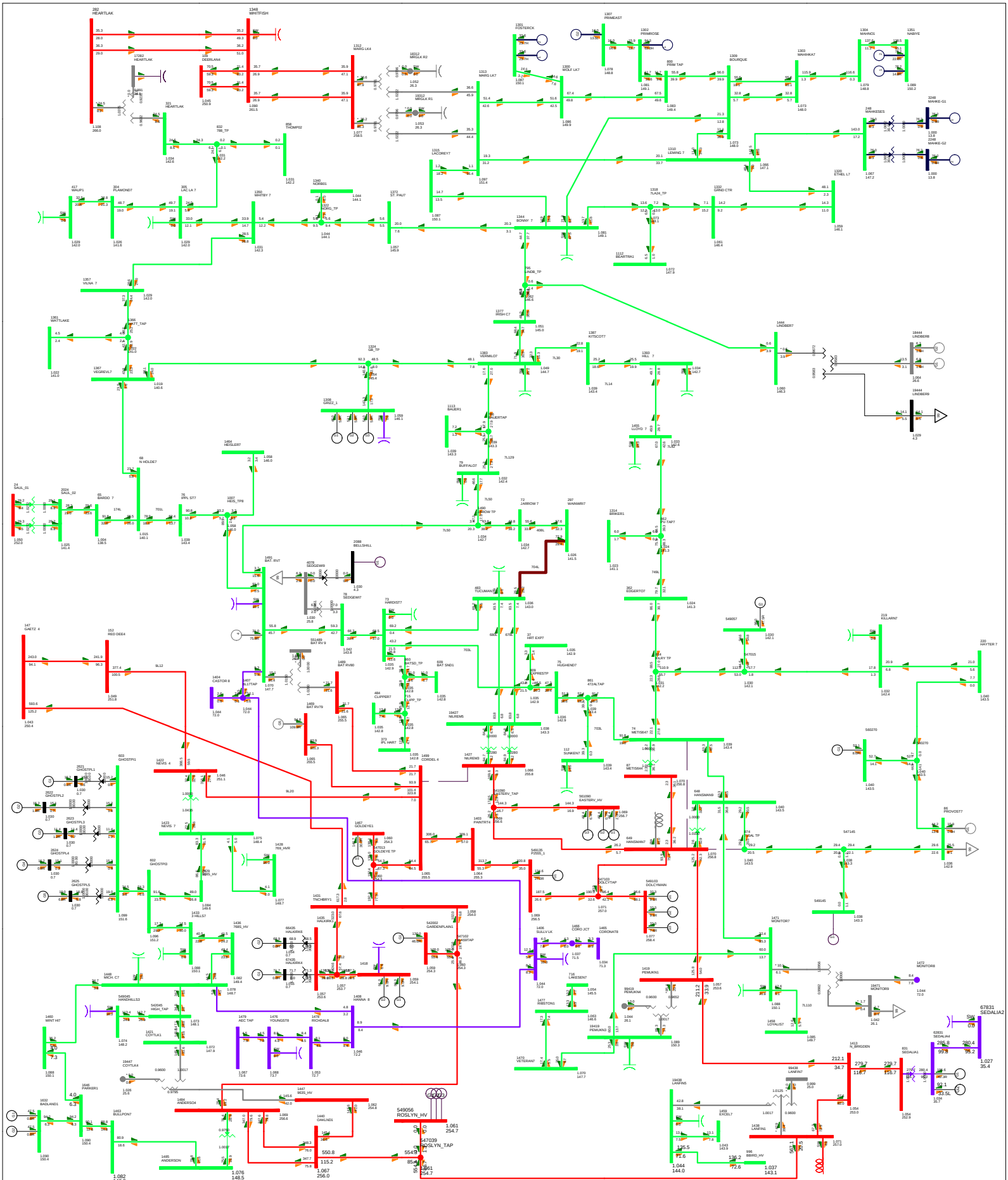
Base Case

P2034 Cold Lake Area Cogen

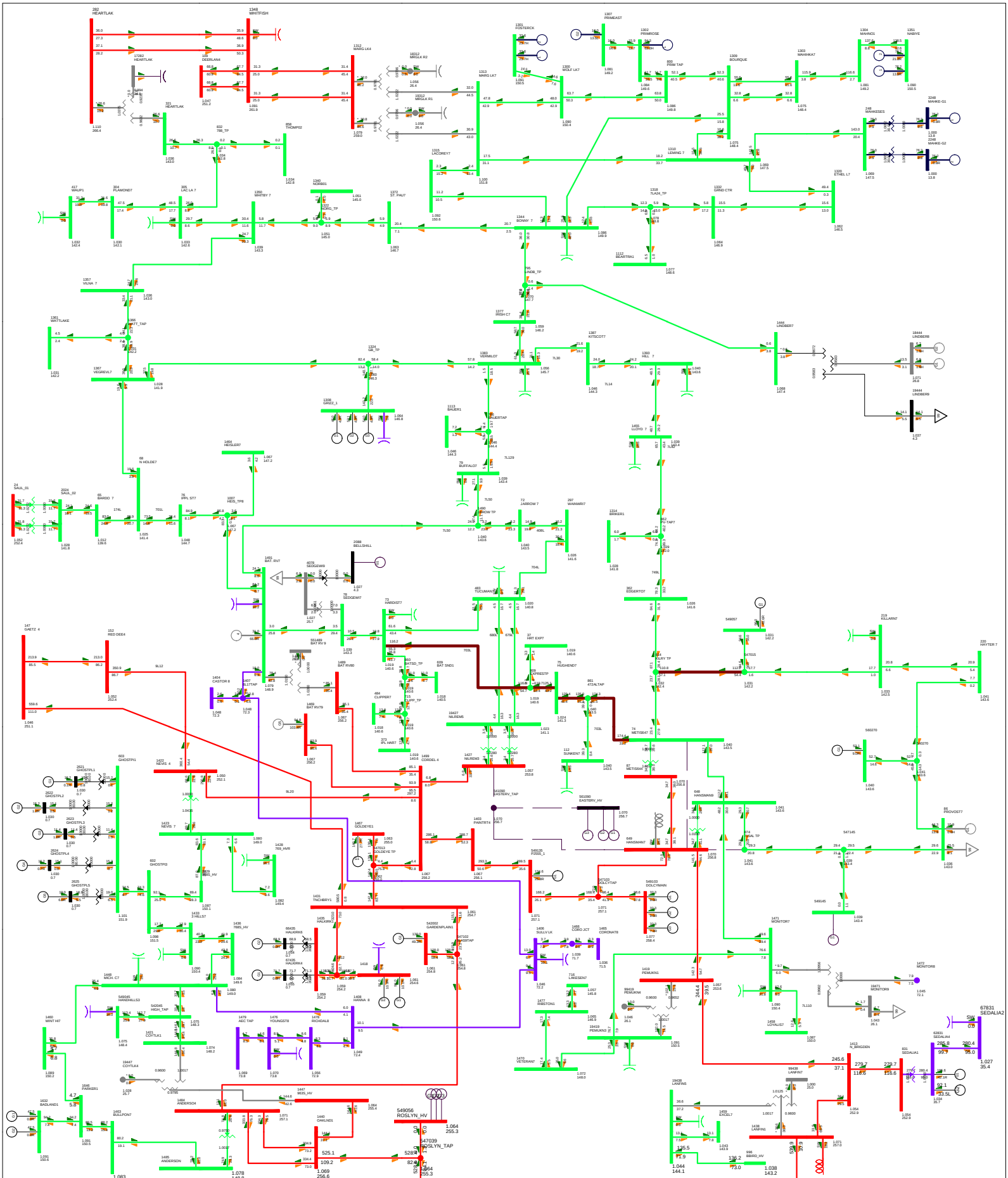
Bus - VOLTAGE (kV/PU)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%RATEA
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A2- 1	Contingency	Study Case Description	P2034 Cold Lake Area Cogen
	CONT 018: 9L80 (757S Battle River - 755S Cordel)	2028SP PRE-PROJ Base Case	Bus - VOLTAGE (kV/PU) Branch - MW/MVar Equipment - MW/Mvar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A2- 1	Contingency	Study Case Description	P2034 Cold Lake Area Cogen
	CONT 019: 953L (574S Nilrem - 755S Cordel)	2028SP PRE-PROJ Base Case	Bus - VOLTAGE (kV/PU) Branch - MW/MVar Equipment - MW/Mvar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A2- 1

Contingency

CONT 020: 1047L (574S Nilrem - P2566 Eastervale Solar - 650S Hansman Lake)

Study Case Description

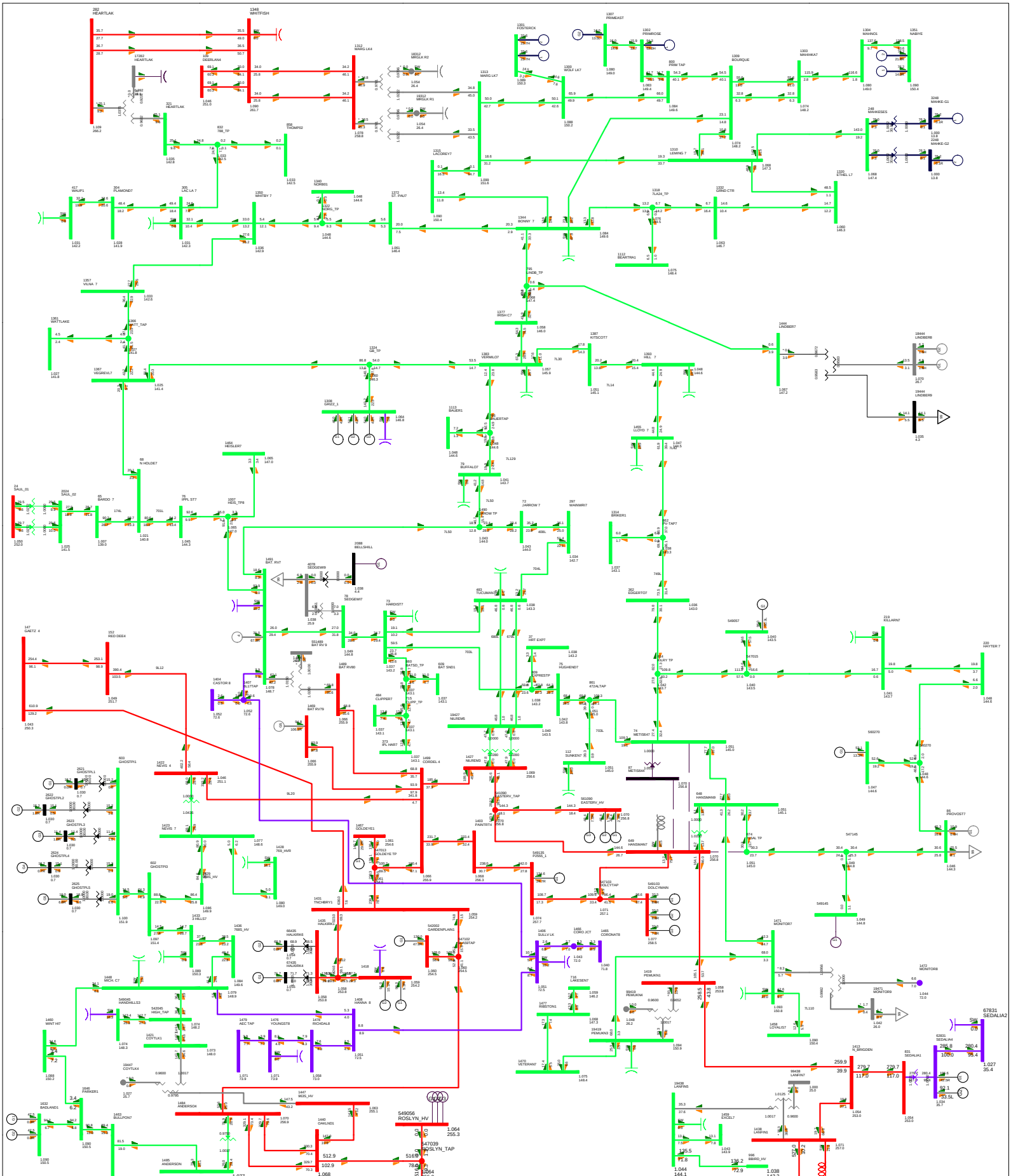
2028SP PRE-PROJ

Base Case

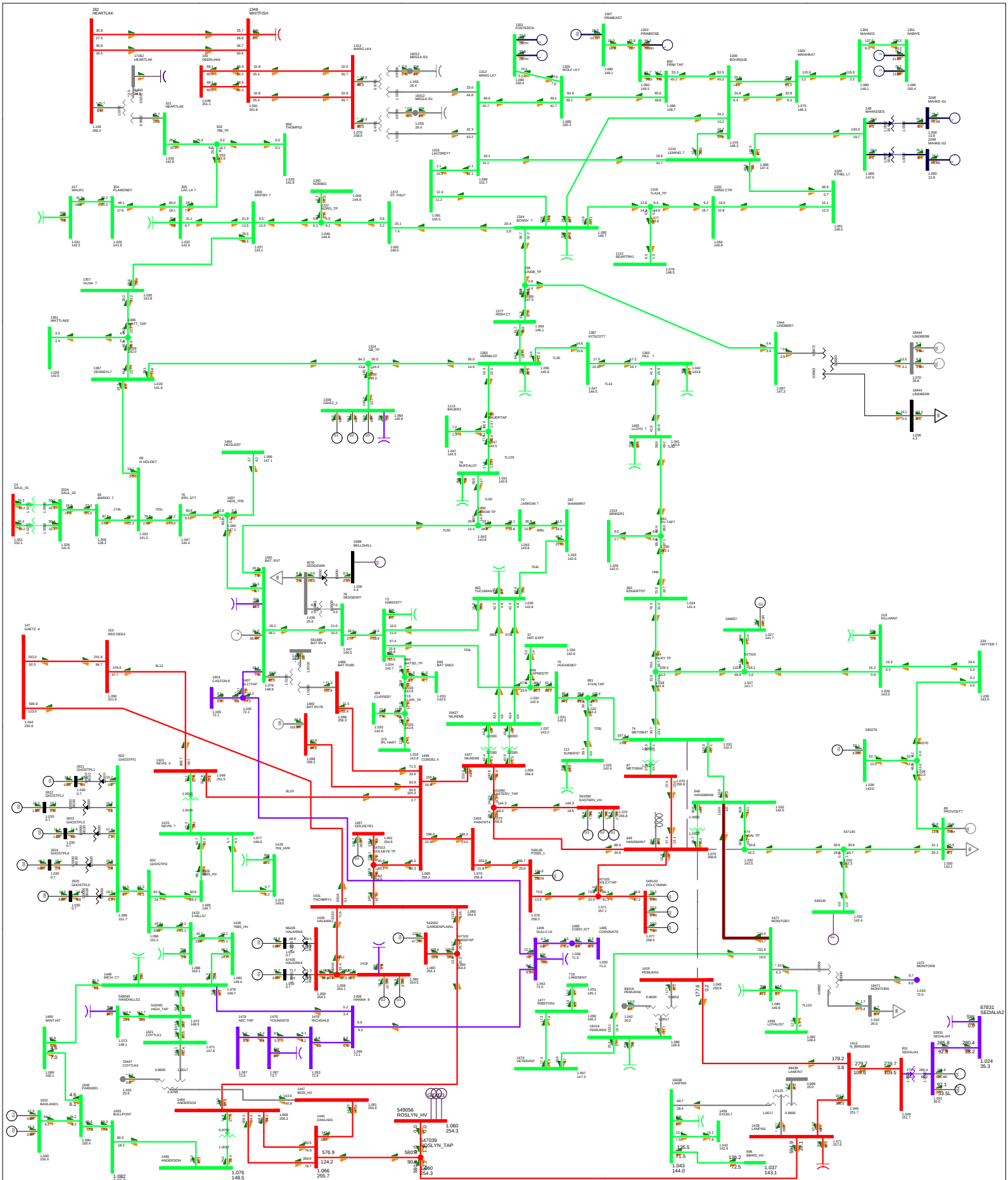
P2034 Cold Lake Area Cogen

Bus - VOLTAGE (kV/PU)
Branch - MW/Mvar
Equipment - MW/Mvar

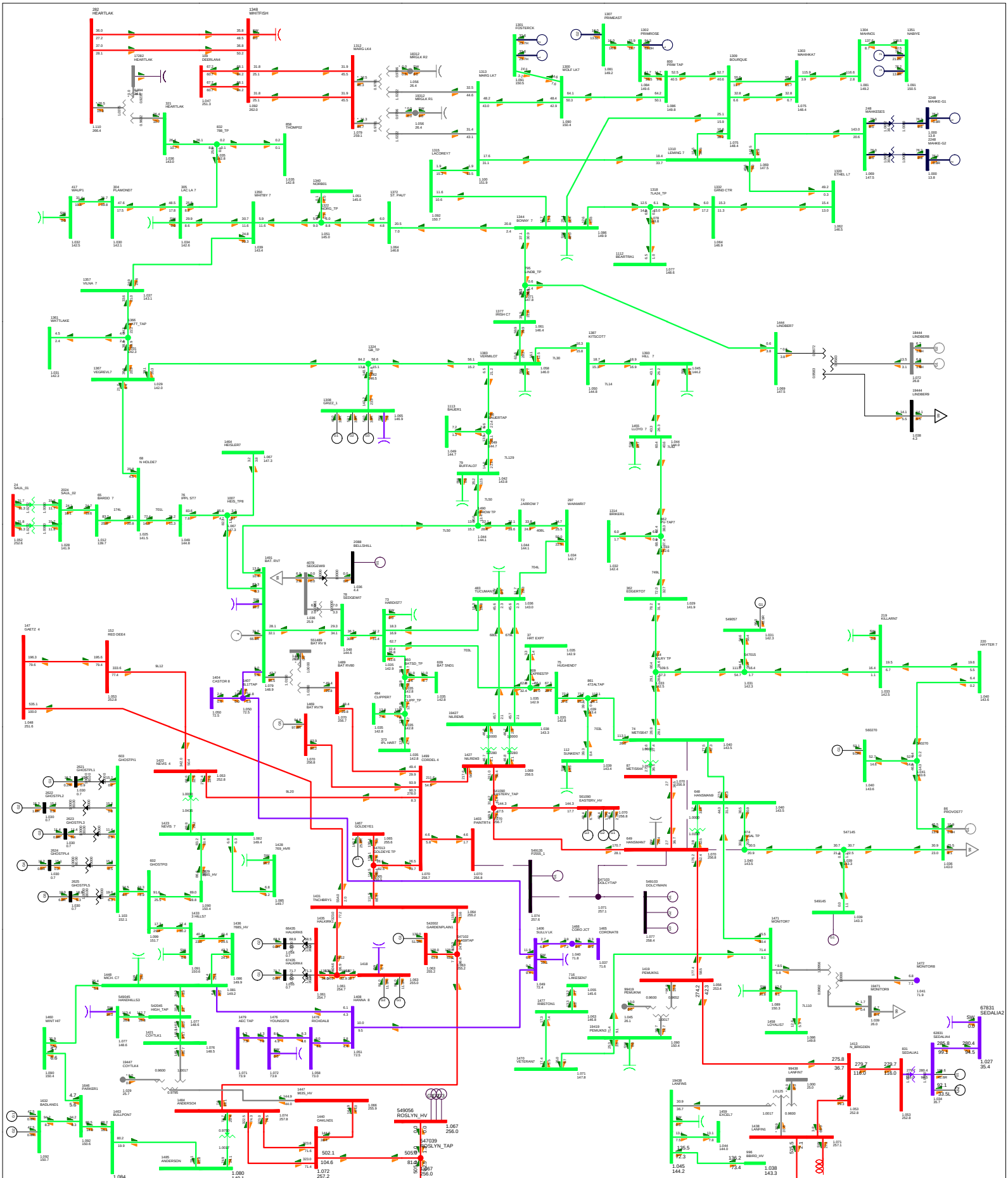
100.0%RATEA
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



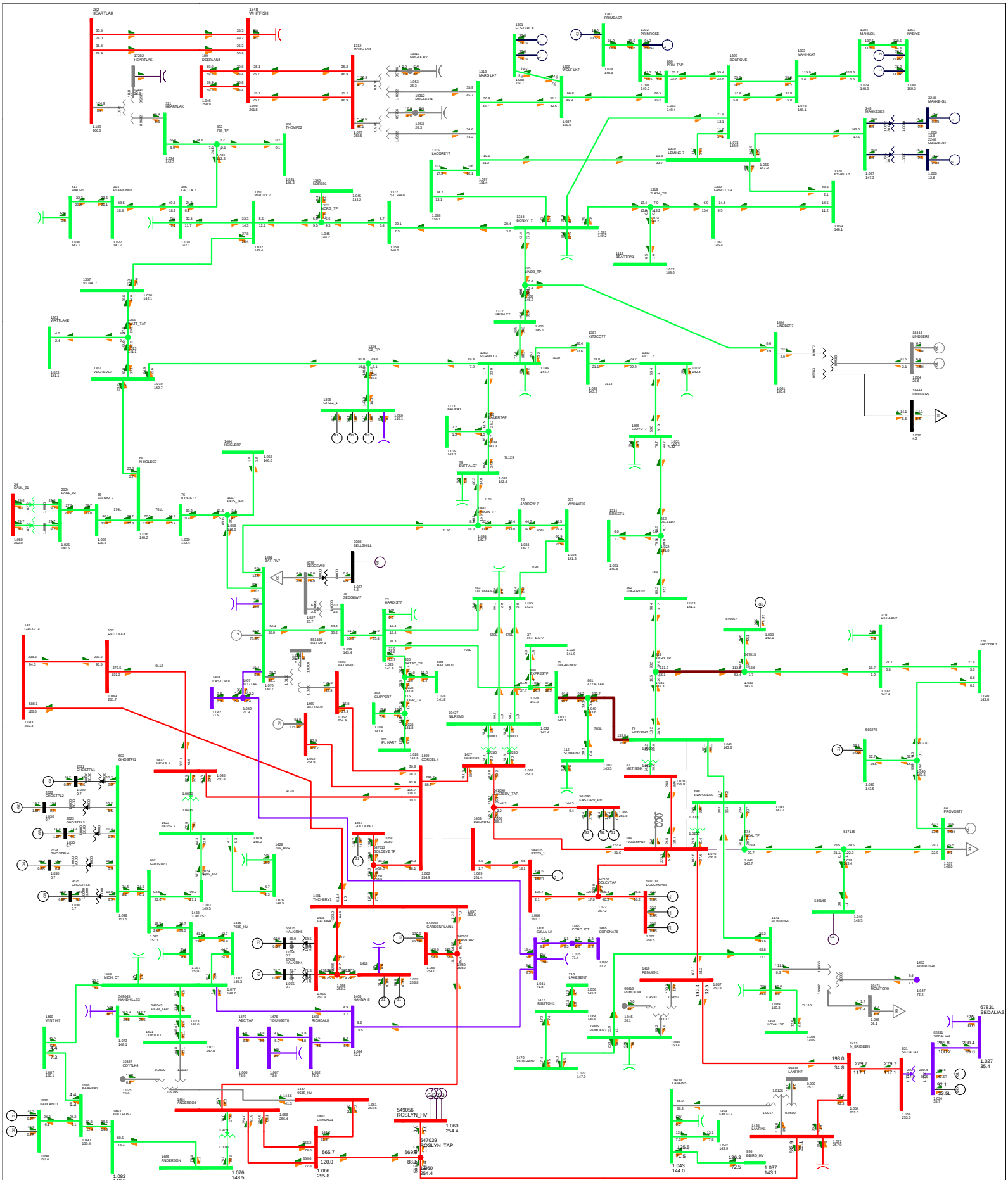
Attachment A2- 1	Contingency	Study Case Description	P2034 Cold Lake Area Cogen
	CONT 021: 954L (648S Metiskow - 650S Hansman Lake)	2028SP PRE-PROJ Base Case	Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



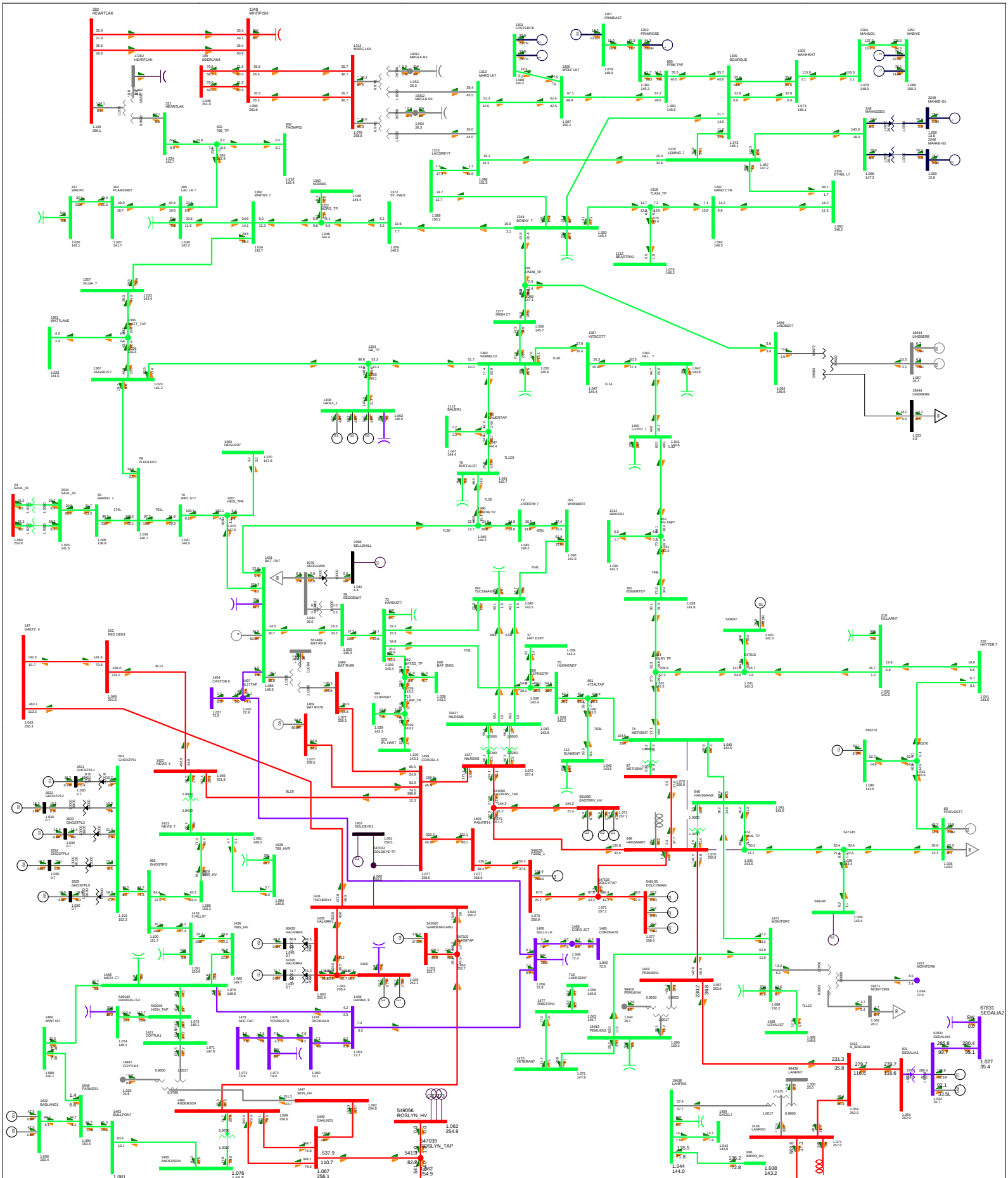
Attachment A2- 1	**Contingency** CONT 022: 9L966 (650S Hansman Lake - 932S Pemukan)	**Study Case Description** 2028SP PRE-PROJ Base Case	**P2034 Cold Lake Area Cogen** Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



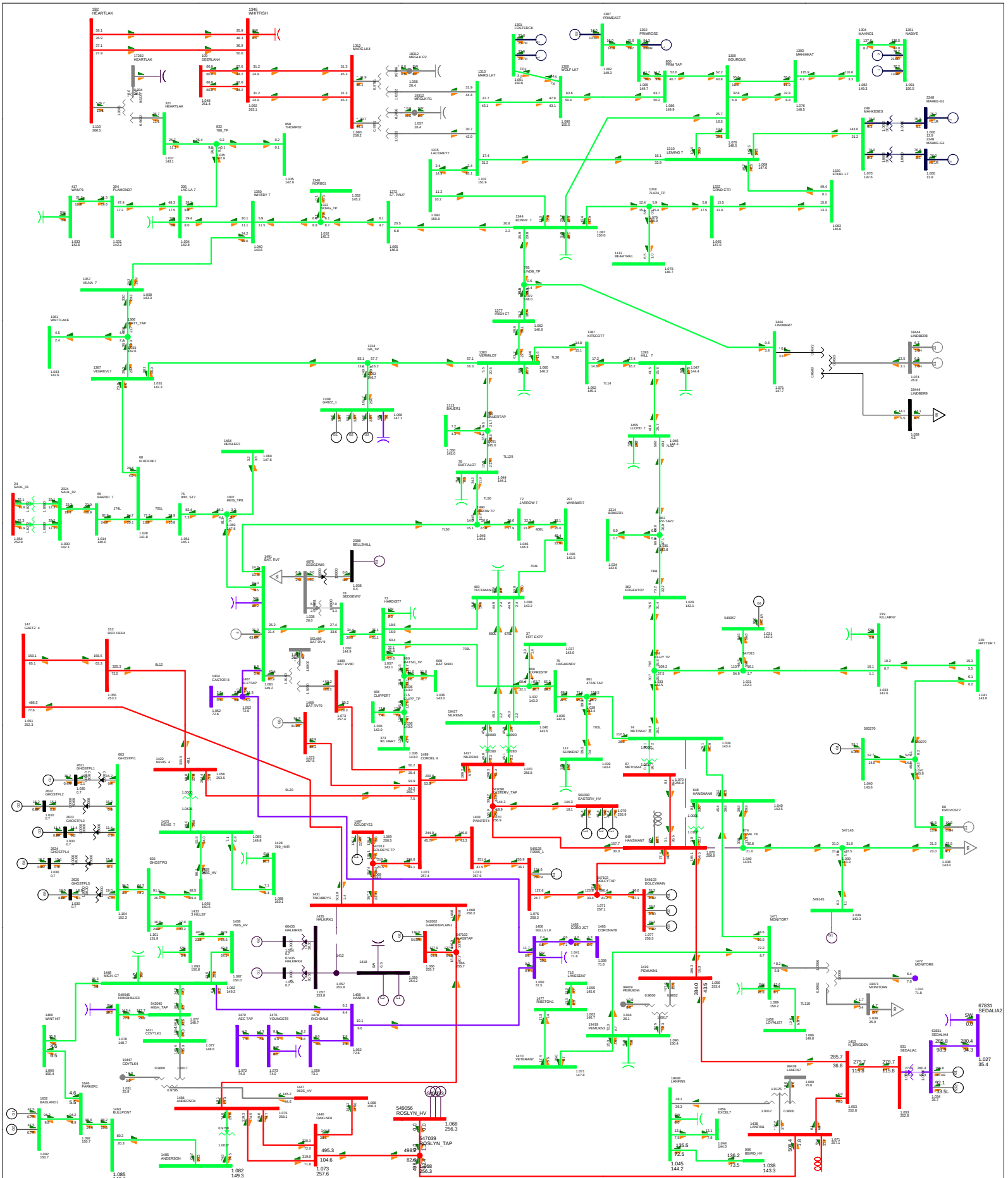
Attachment A2- 1	Contingency	Study Case Description	P2034 Cold Lake Area Cogen
	CONT 023: 948L (650S Hansman Lake - P2553 Dolcy Solar - P2555 Rolling Hills Wind - 8638 [illegible]	Base Case	Bus - VOLTAGE (kV/PU) Branch - MW/MVar Equipment - MW/Mvar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



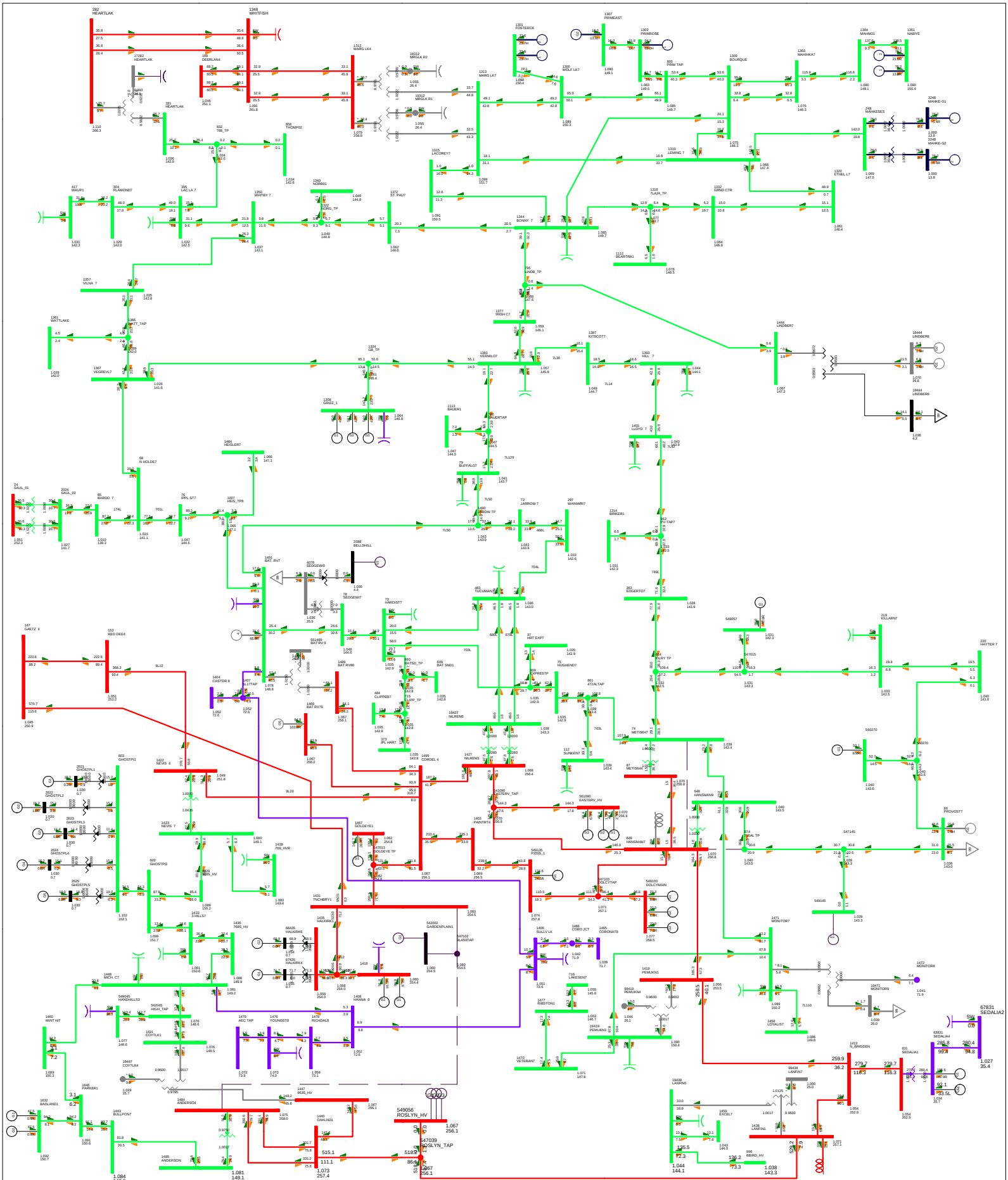
Attachment A2- 1	Contingency	Study Case Description	P2034 Cold Lake Area Cogen
	CONT 024: 9L27 (863S Paintearth - 755S Cordel)	2028SP PRE-PROJ Base Case	Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



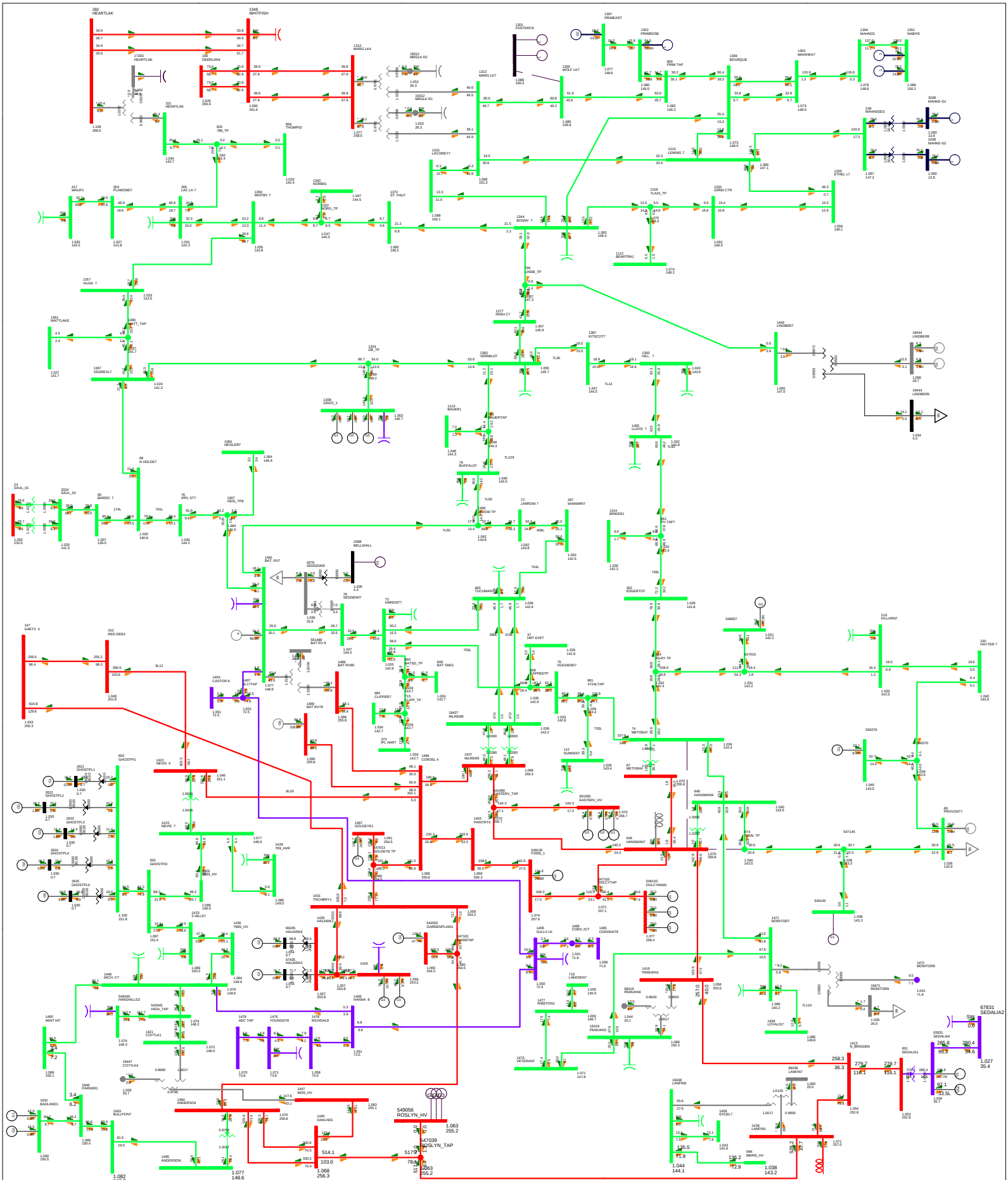
Attachment A2- 1	Contingency	Study Case Description	P2034 Cold Lake Area Cogen
	CONT 025: 9L16 (755S Cordel - P2441 Halkirk 2 Wind - 972S Tinchebray)	2028SP PRE-PROJ Base Case	Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A2- 1	Contingency	Study Case Description	P2034 Cold Lake Area Cogen
	CONT 026: 9L93 (972S Tinchebray - 615S Halkirk - 973S Lanes Lake)	2028SP PRE-PROJ Base Case	Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A2- 1	Contingency	Study Case Description	P2034 Cold Lake Area Cogen
	CONT 027: 9L59 (972S Tinchebray - 1045S Garden Plain - 801S Anderson)	2028SP PRE-PROJ Base Case	Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A2- 1

Contingency

CONT 028: 7L86 (822S Wolf Lake - 877S Foster Creek)

Study Case Description

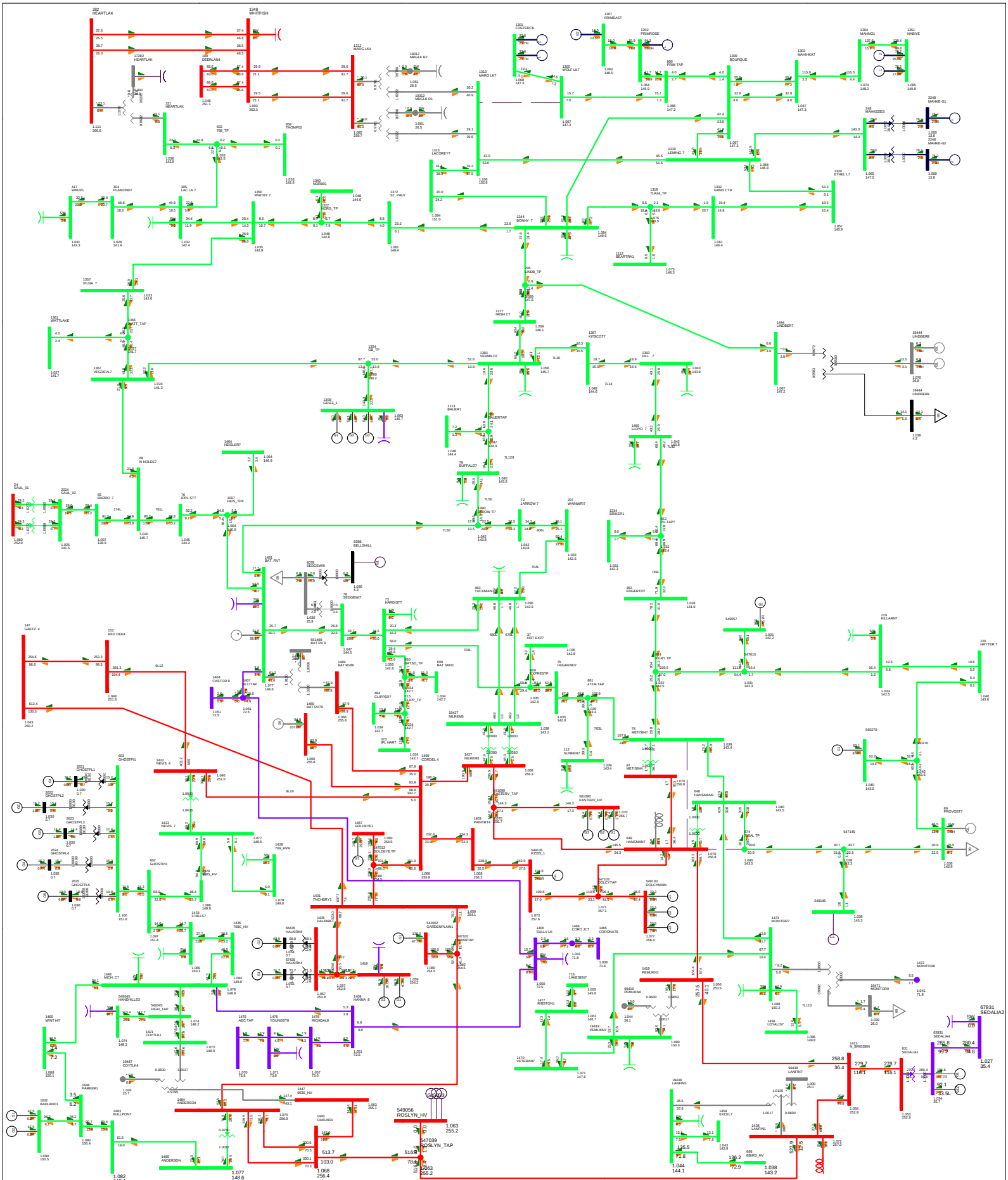
2028SP PRE-PROJ

Base Case

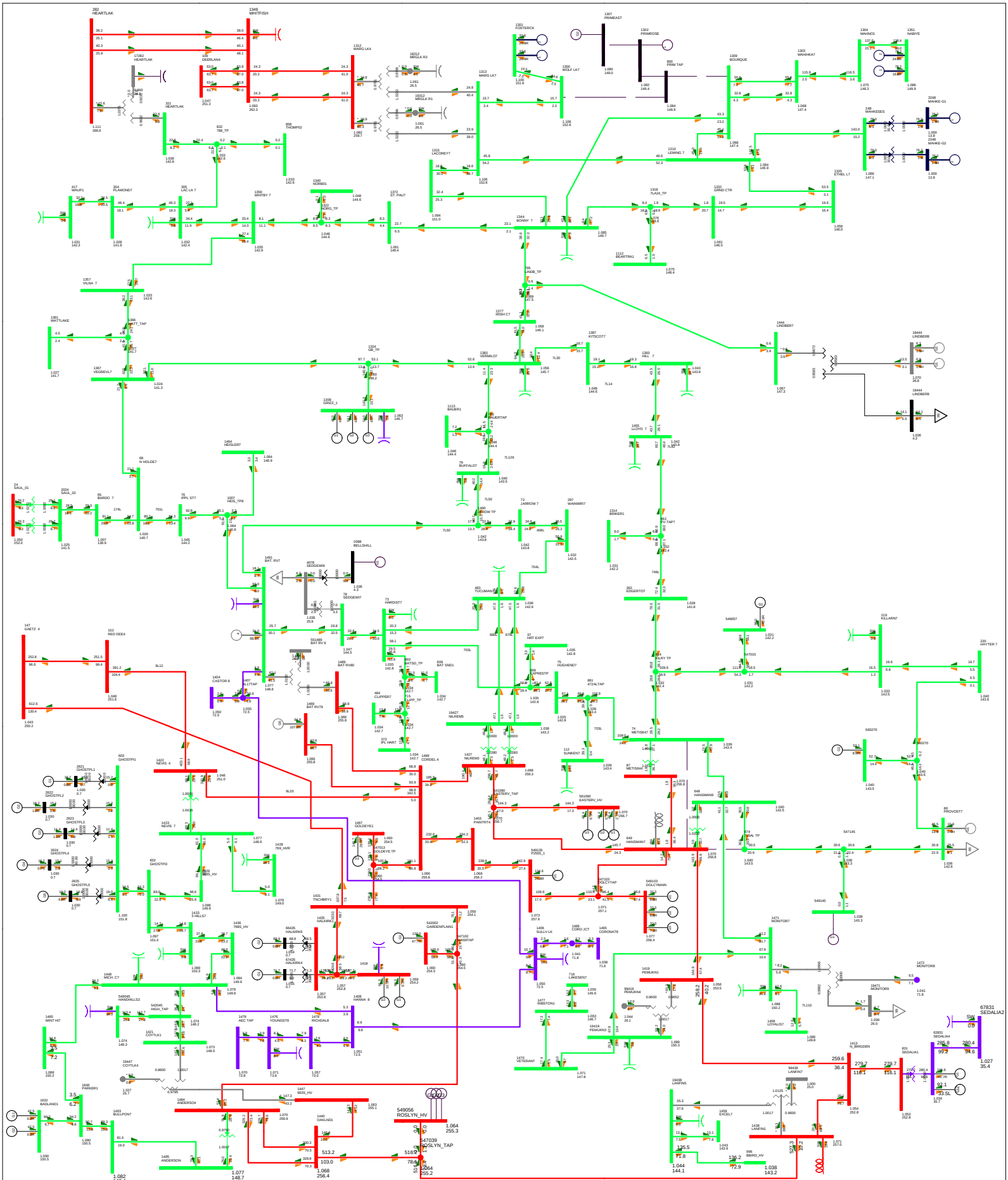
P2034 Cold Lake Area Cogen

Bus - VOLTAGE (kV/PU)
Branch - MW/Mvar
Equipment - MW/Mvar

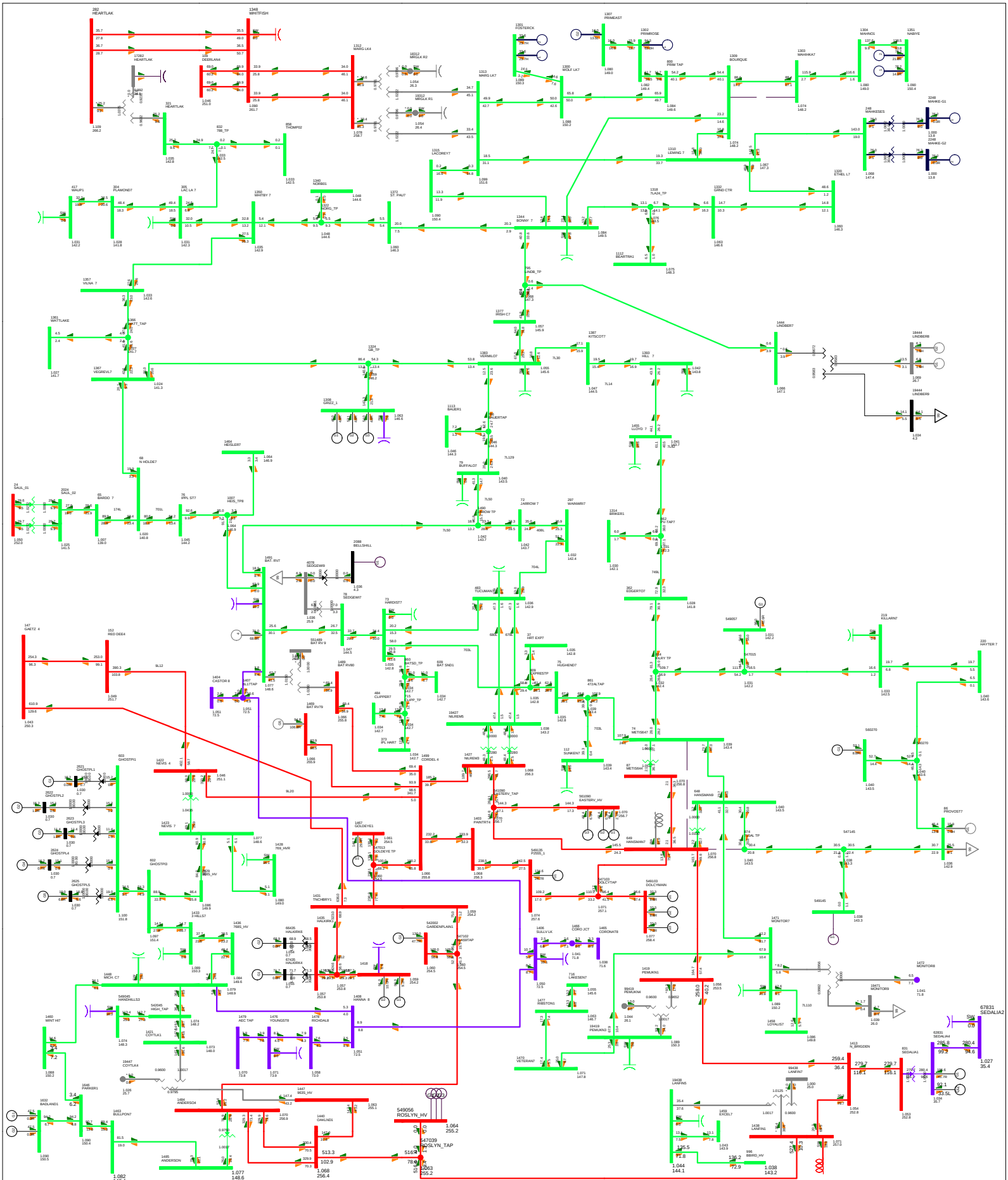
100.0%RATEA
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A2- 1	Contingency	Study Case Description	P2034 Cold Lake Area Cogen
	CONT 029: 7L587 (822S Wolf Lake - 826S Marguerite Lake)	2028SP PRE-PROJ Base Case	Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A2- 1	Contingency	Study Case Description	P2034 Cold Lake Area Cogen
	CONT 030: 7L574 (822S Wolf Lake - 859S Primrose - 970S Bourque)	2028SP PRE-PROJ Base Case	Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A2- 1

Contingency

CONT 031: 7L157 (837S Mahihkan - 970S Bourque)

Study Case Description

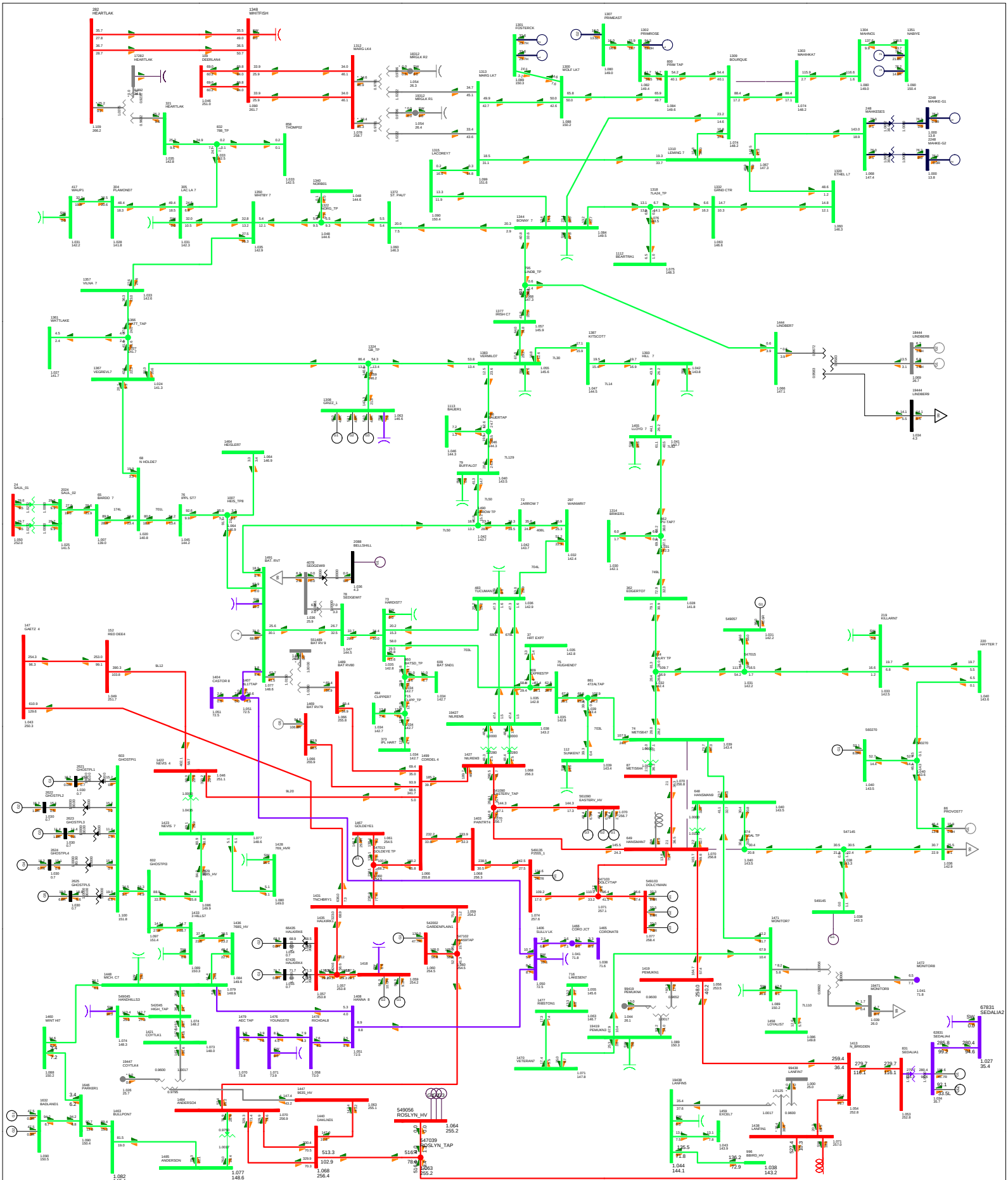
2028SP PRE-PROJ

Base Case

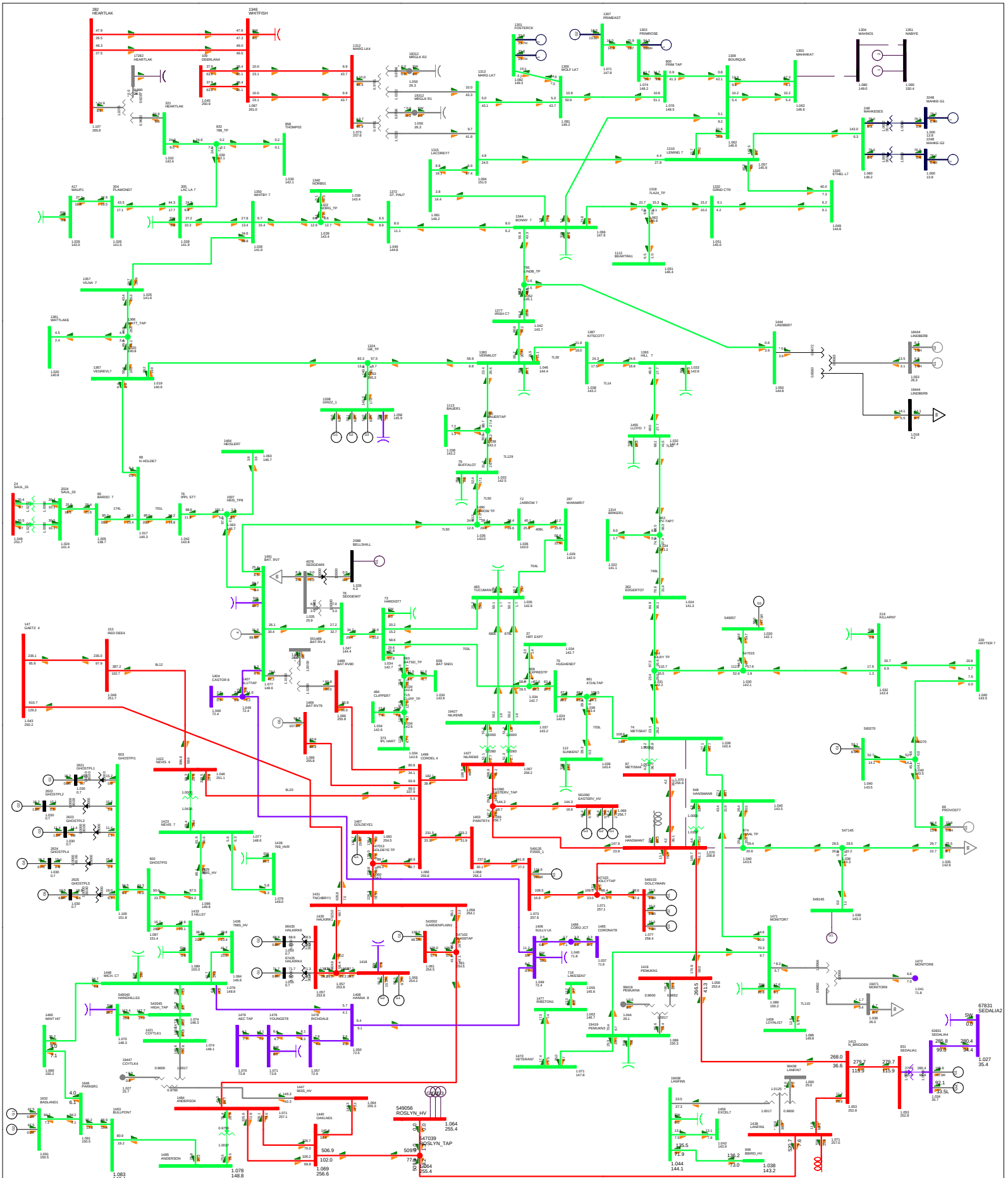
P2034 Cold Lake Area Cogen

Bus - VOLTAGE (kV/PU)
Branch - MW/Mvar
Equipment - MW/Mvar

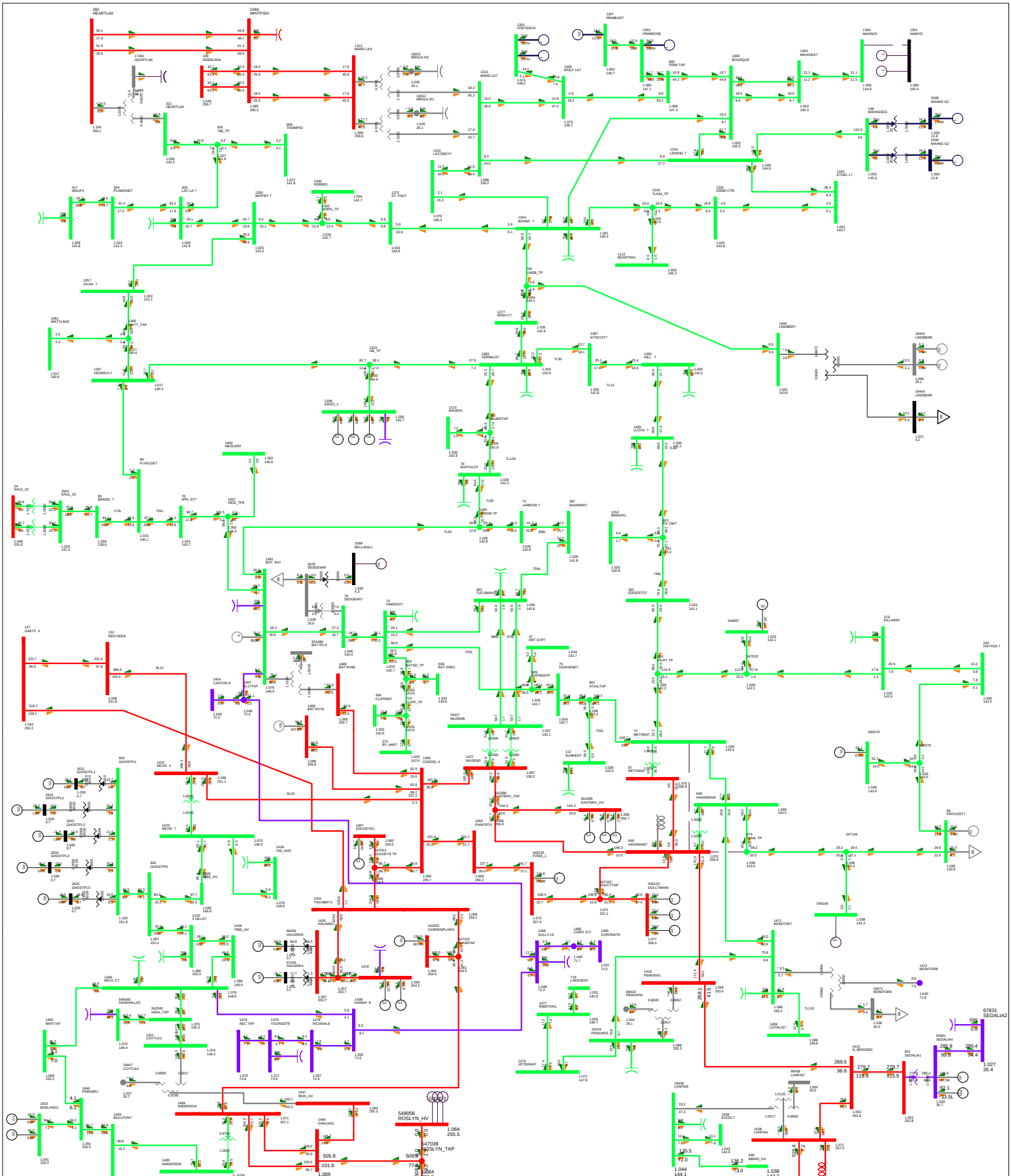
100.0%RATEA
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



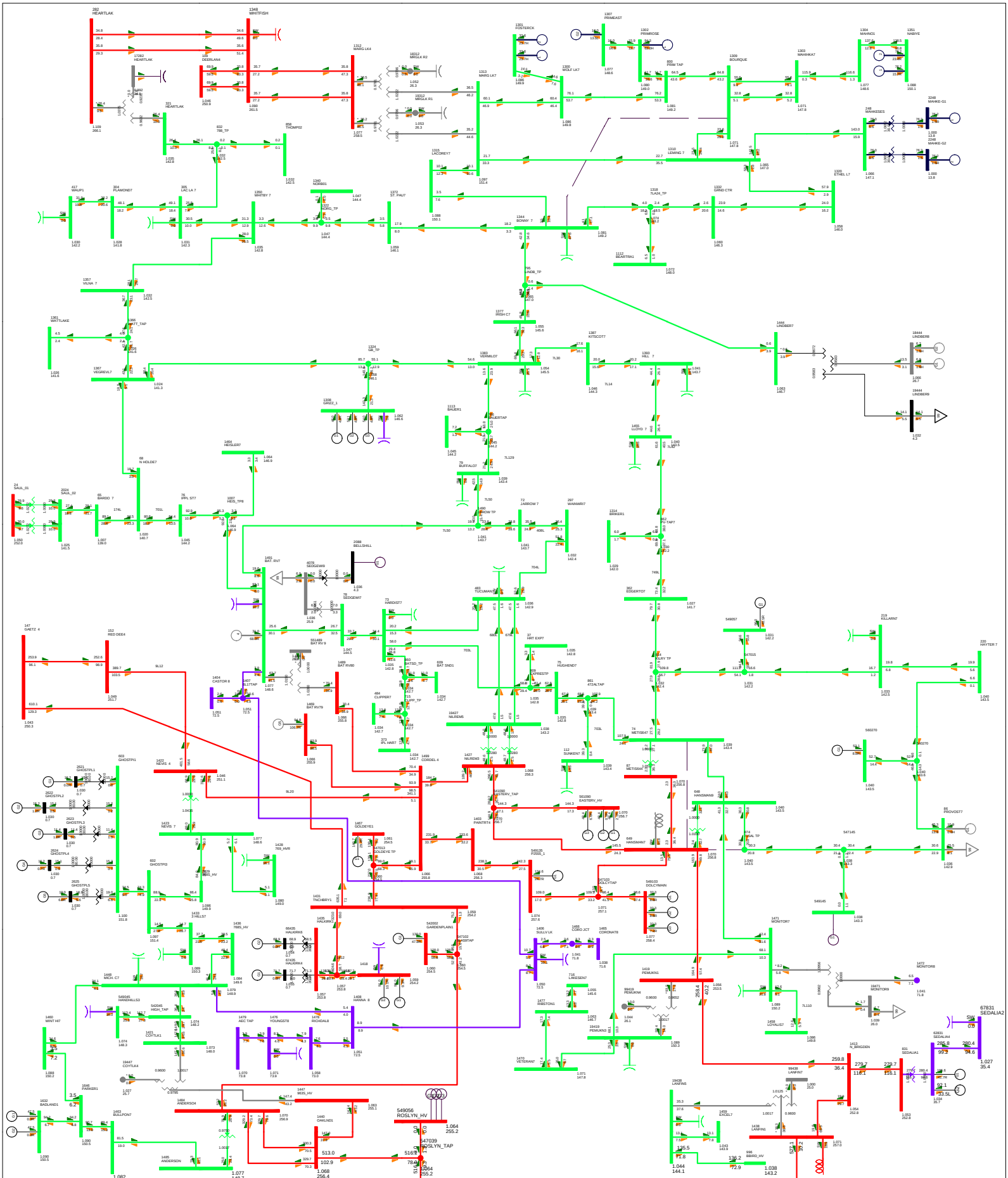
Attachment A2- 1	**Contingency** CONT 032: 7L160 (837S Mahihkan - 970S Bourque)	**Study Case Description** 2028SP PRE-PROJ Base Case	**P2034 Cold Lake Area Cogen** Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



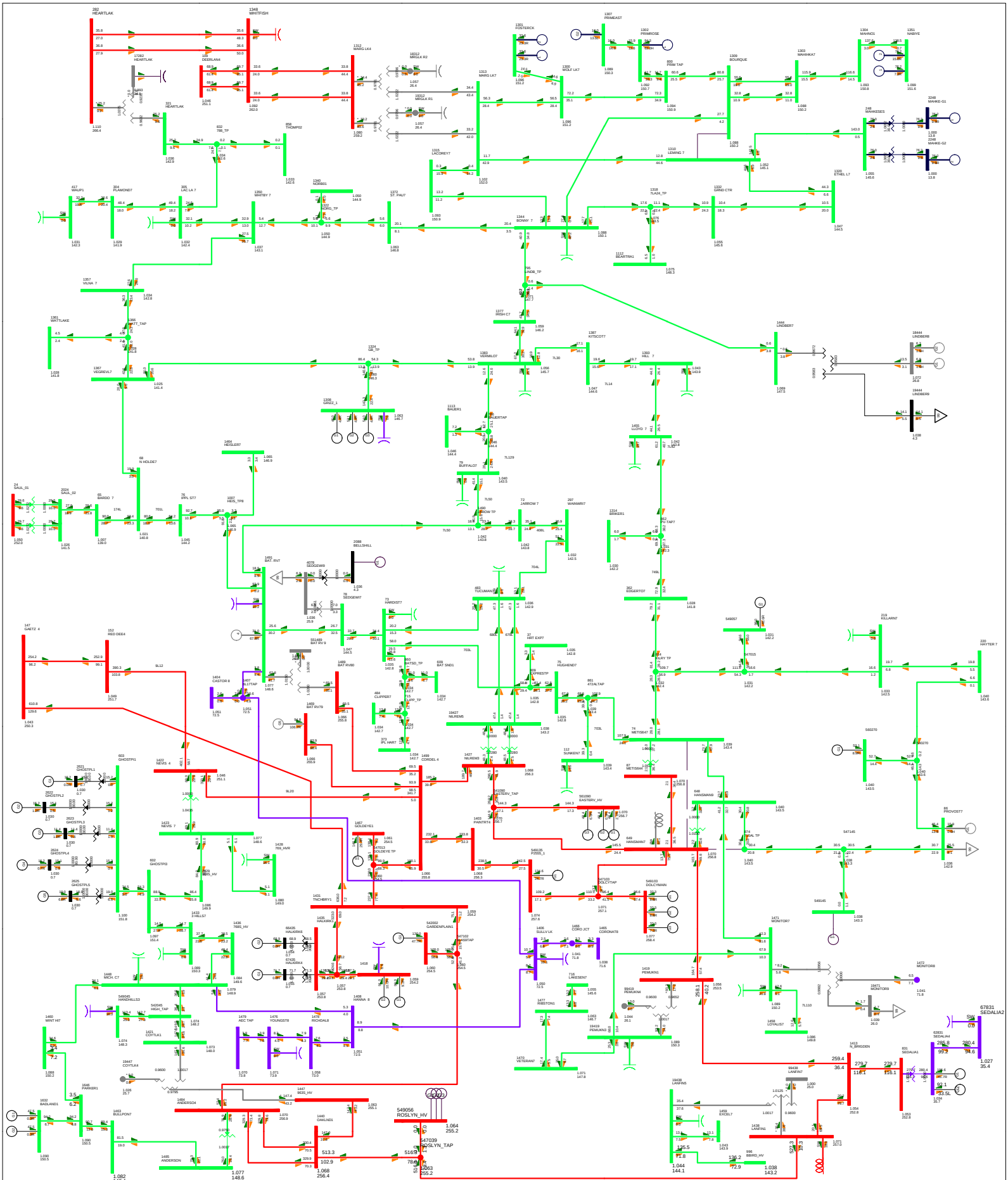
Attachment A2- 1	Contingency	Study Case Description	P2034 Cold Lake Area Cogen
	CONT 033: 7L105 (837S Mahihkan - 909S Mahno)	2028SP PRE-PROJ Base Case	Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



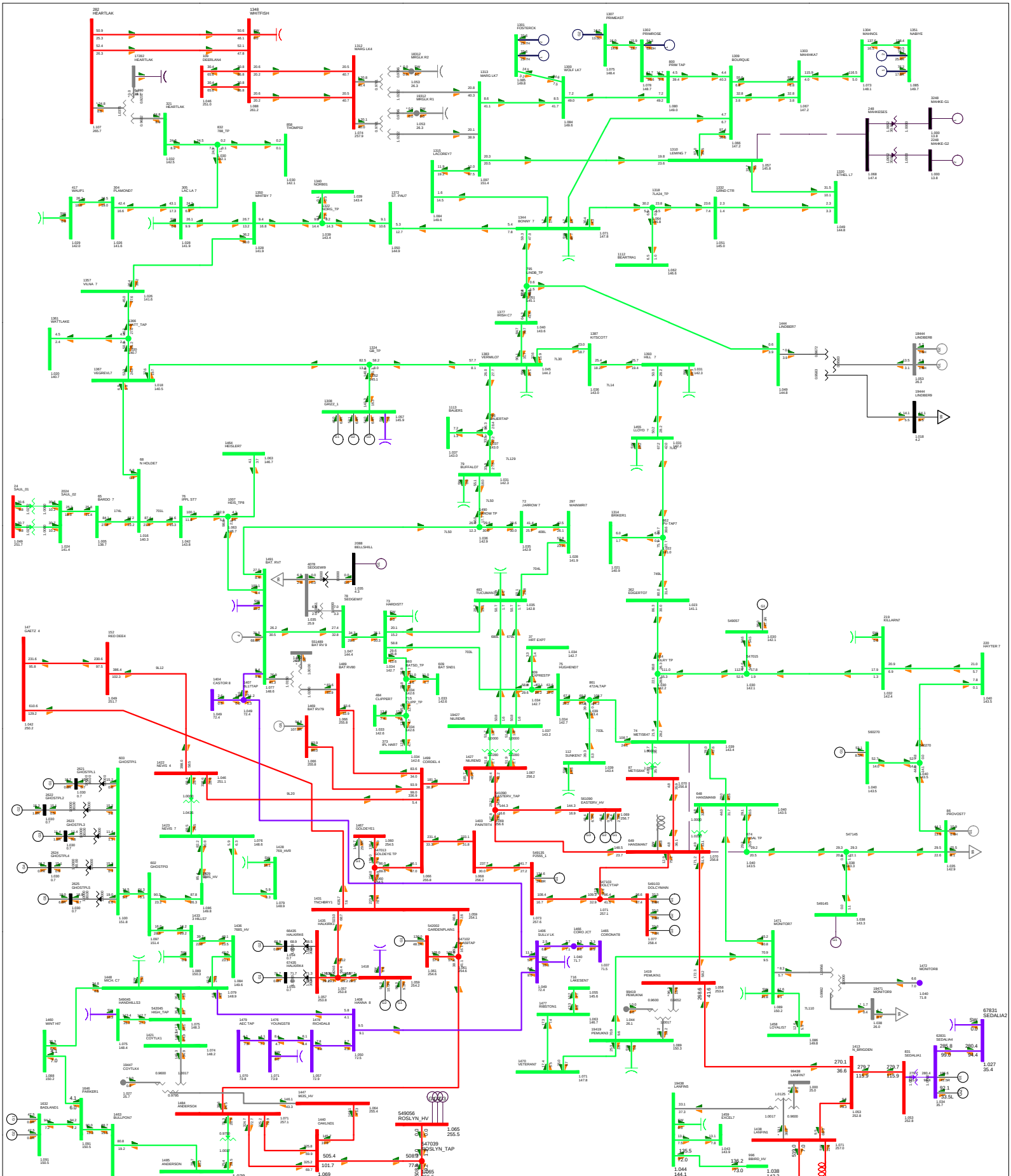
Attachment A2- 1	Contingency	Study Case Description	P2034 Cold Lake Area Cogen
	CONT 034: 7L161 (909S Mahno - 942S Nabiye)	2028SP PRE-PROJ Base Case	Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



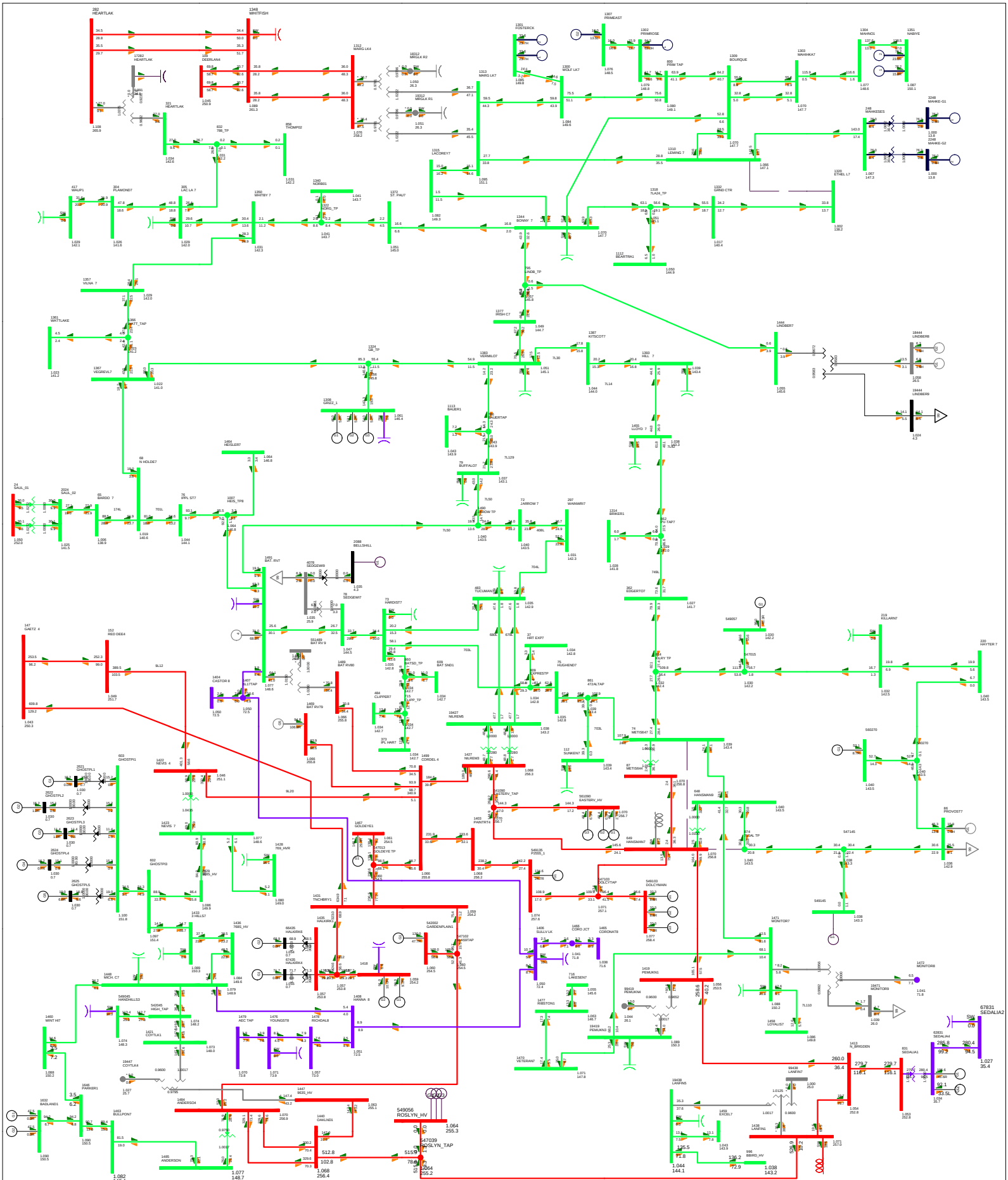
Attachment A2- 1	Contingency	Study Case Description	P2034 Cold Lake Area Cogen
	CONT 035: 7L146 (970S Bourque - 700S Bonnyville)	2028SP PRE-PROJ Base Case	Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



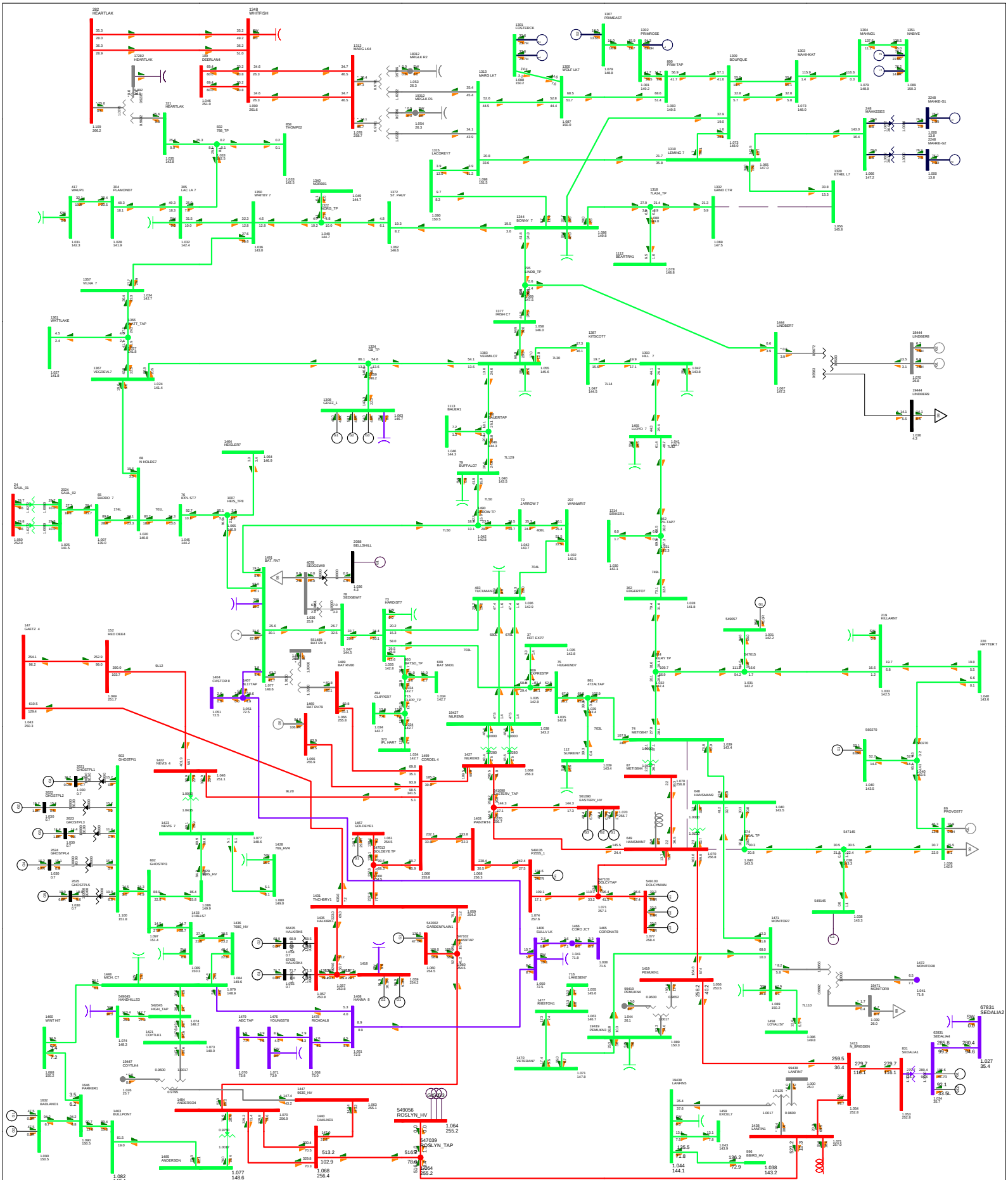
Attachment A2- 1	Contingency	Study Case Description	P2034 Cold Lake Area Cogen
	CONT 036: 7L583 (970S Bourque - 715S Leming Lake)	2028SP PRE-PROJ Base Case	Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



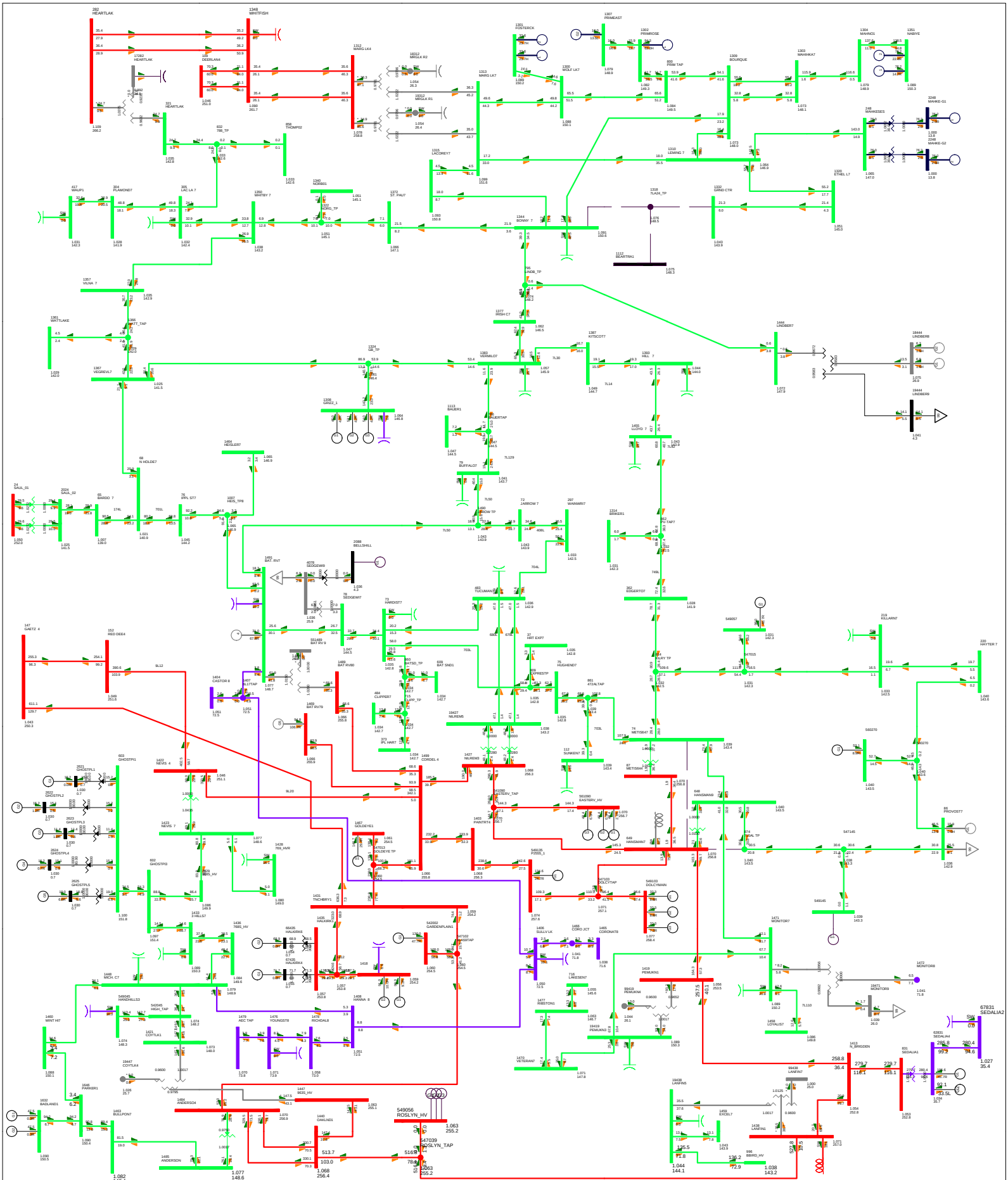
Attachment A2- 1	Contingency	Study Case Description	P2034 Cold Lake Area Cogen
	CONT 037: 7L95 (889S Mahkeses - 715S Leming Lake)	2028SP PRE-PROJ Base Case	Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



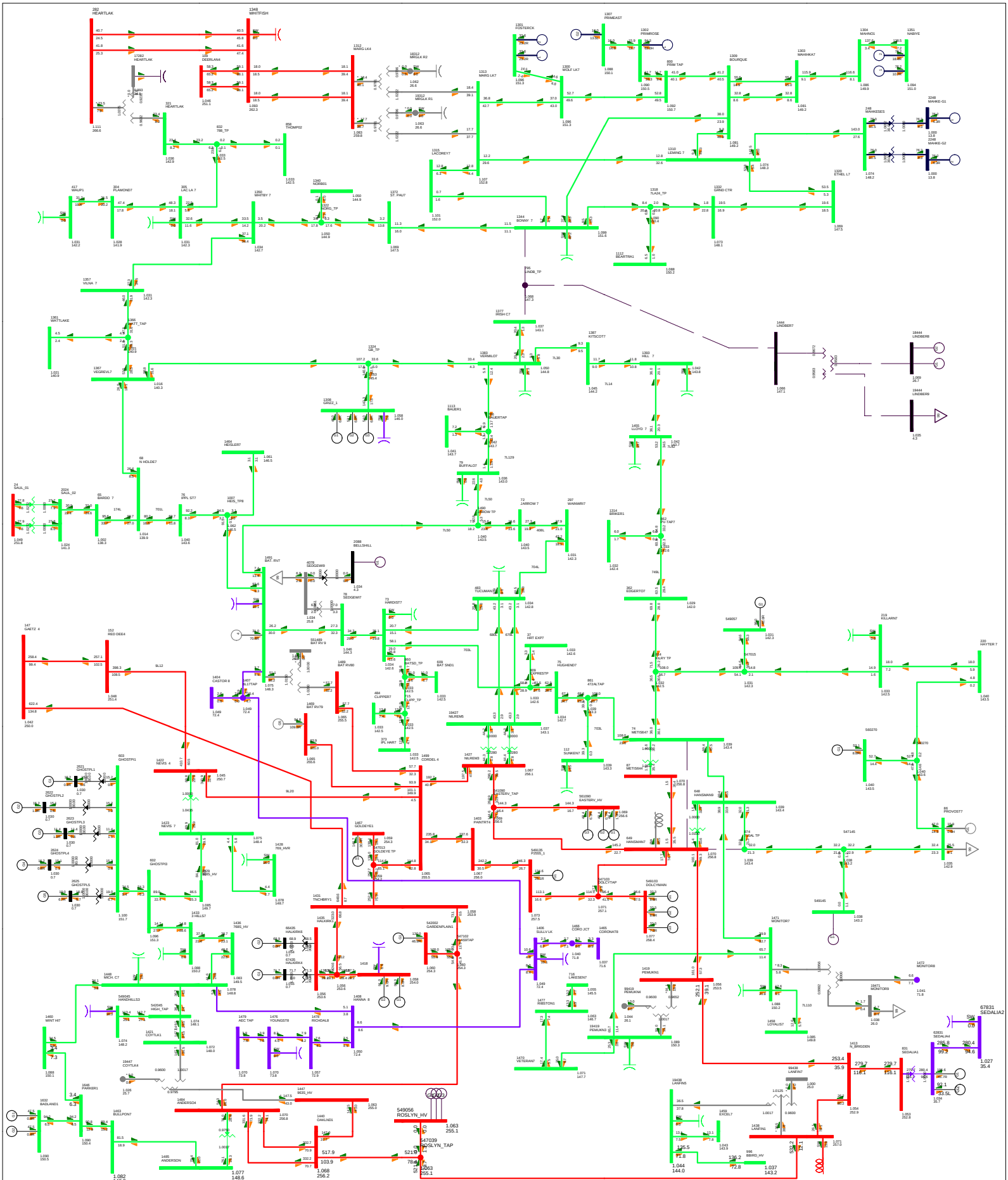
Attachment A2- 1	Contingency	Study Case Description	P2034 Cold Lake Area Cogen
	CONT 038: 7L66 (715S Leming Lake - 717S Ethel Lake)	2028SP PRE-PROJ Base Case	Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



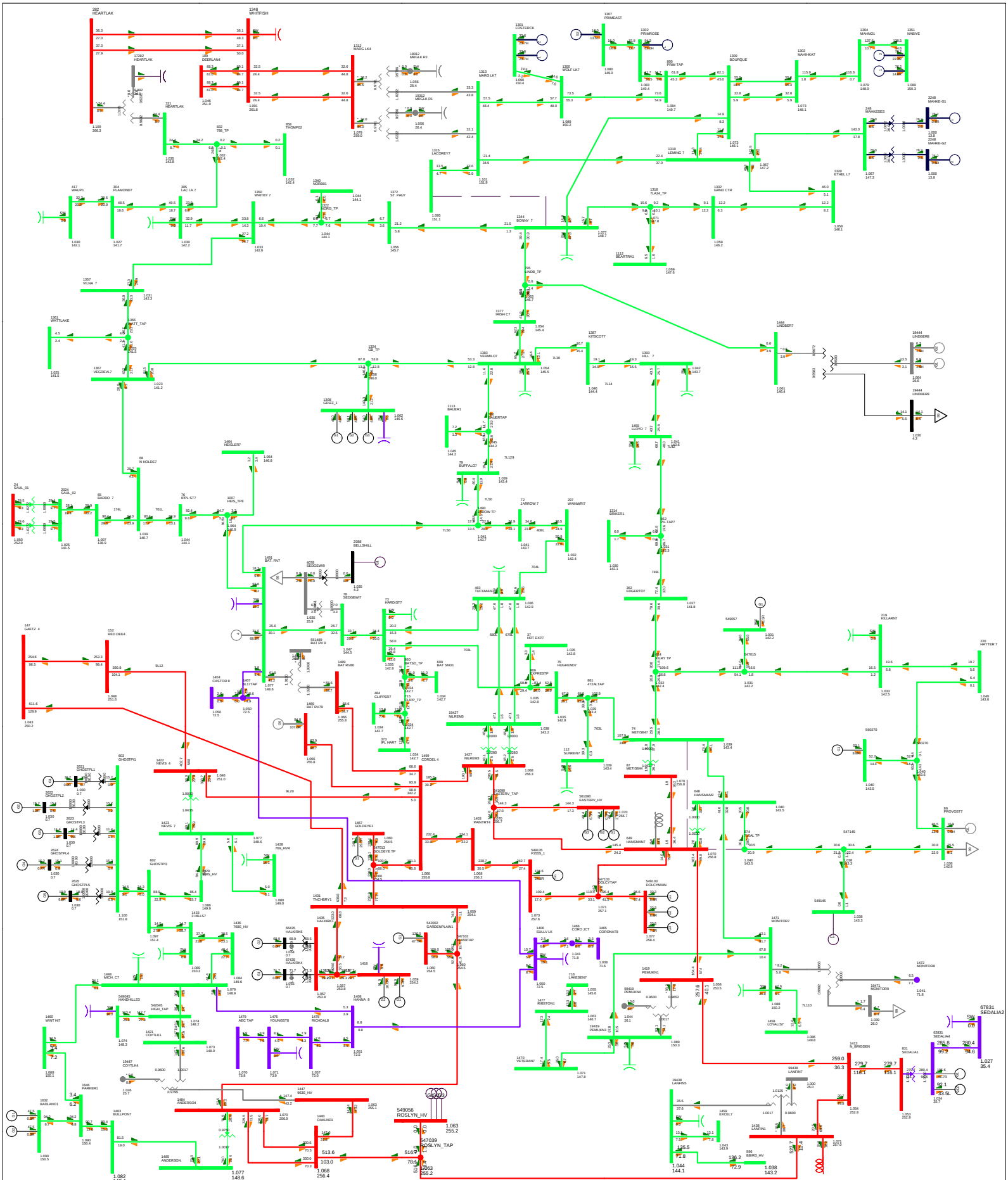
Attachment A2- 1	Contingency	Study Case Description	P2034 Cold Lake Area Cogen
	CONT 039: 7L28 (717S Ethel Lake - 846S Grand Centre)	2028SP PRE-PROJ Base Case	Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A2- 1	Contingency	Study Case Description	P2034 Cold Lake Area Cogen
	CONT 040: 7L24 (846S Grand Centre - 700S Bonnyville - 940S Beartrap)	2028SP PRE-PROJ Base Case	Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A2- 1	Contingency	Study Case Description	P2034 Cold Lake Area Cogen
	CONT 041: 7L53 (700S Bonnyville - 706S Irish Creek - 969S Lindbergh)	2028SP PRE-PROJ Base Case	Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A2- 1

Contingency

CONT 042: 7L89 (721S Lacorey - 700S Bonnyville)

Study Case Description

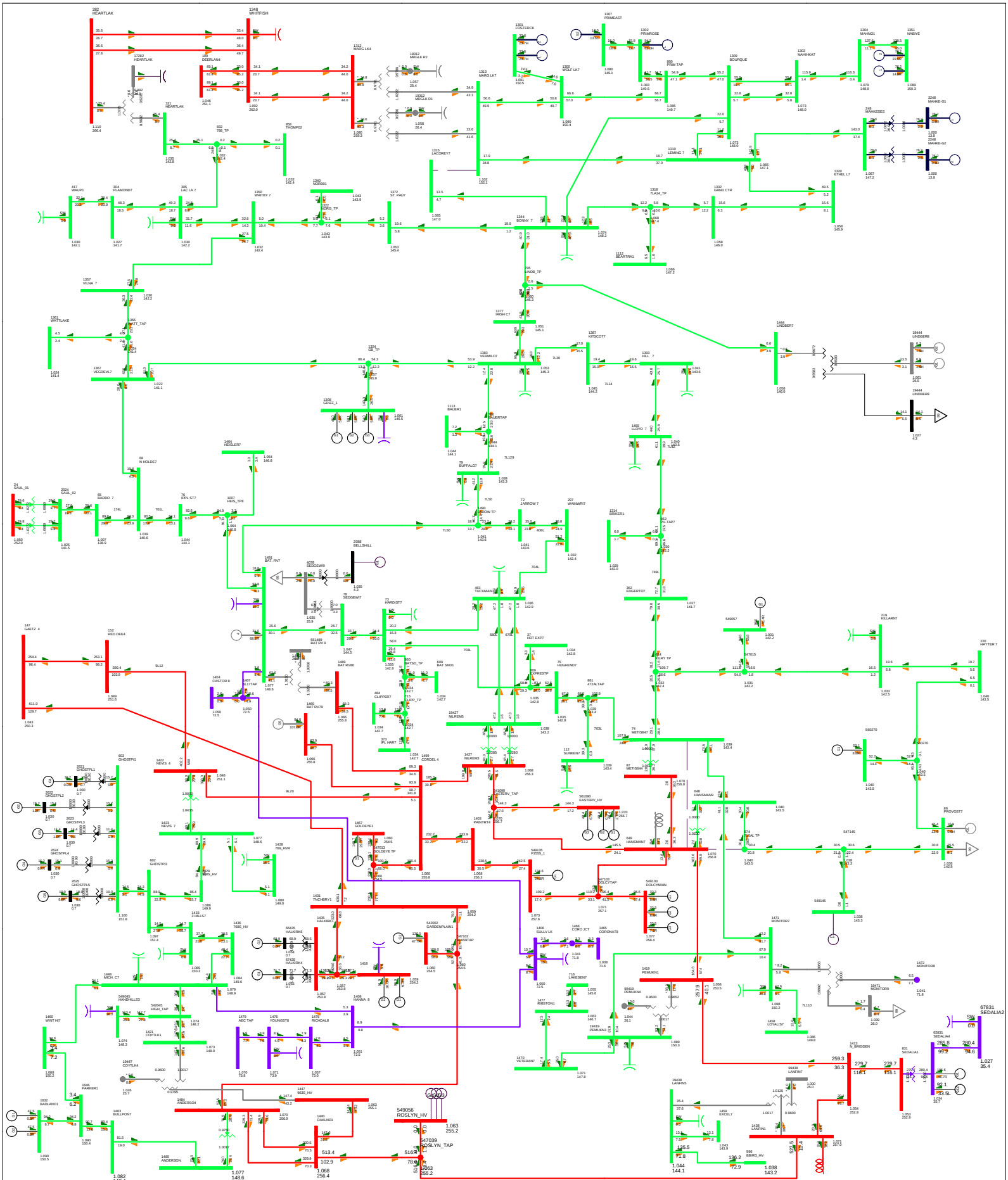
2028SP PRE-PROJ

Base Case

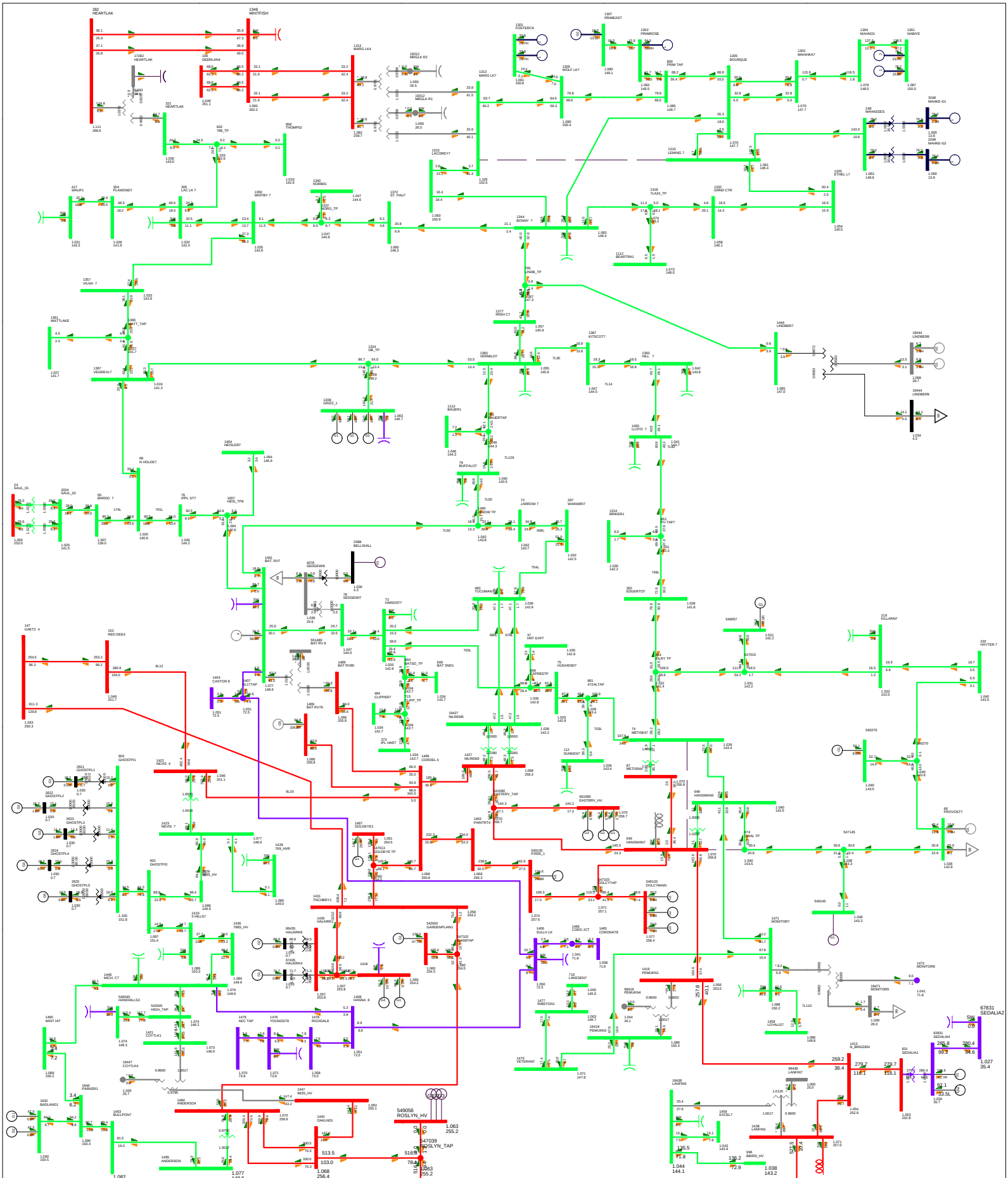
P2034 Cold Lake Area Cogen

Bus - VOLTAGE (kV/PU)
Branch - MW/MVar
Equipment - MW/Mvar

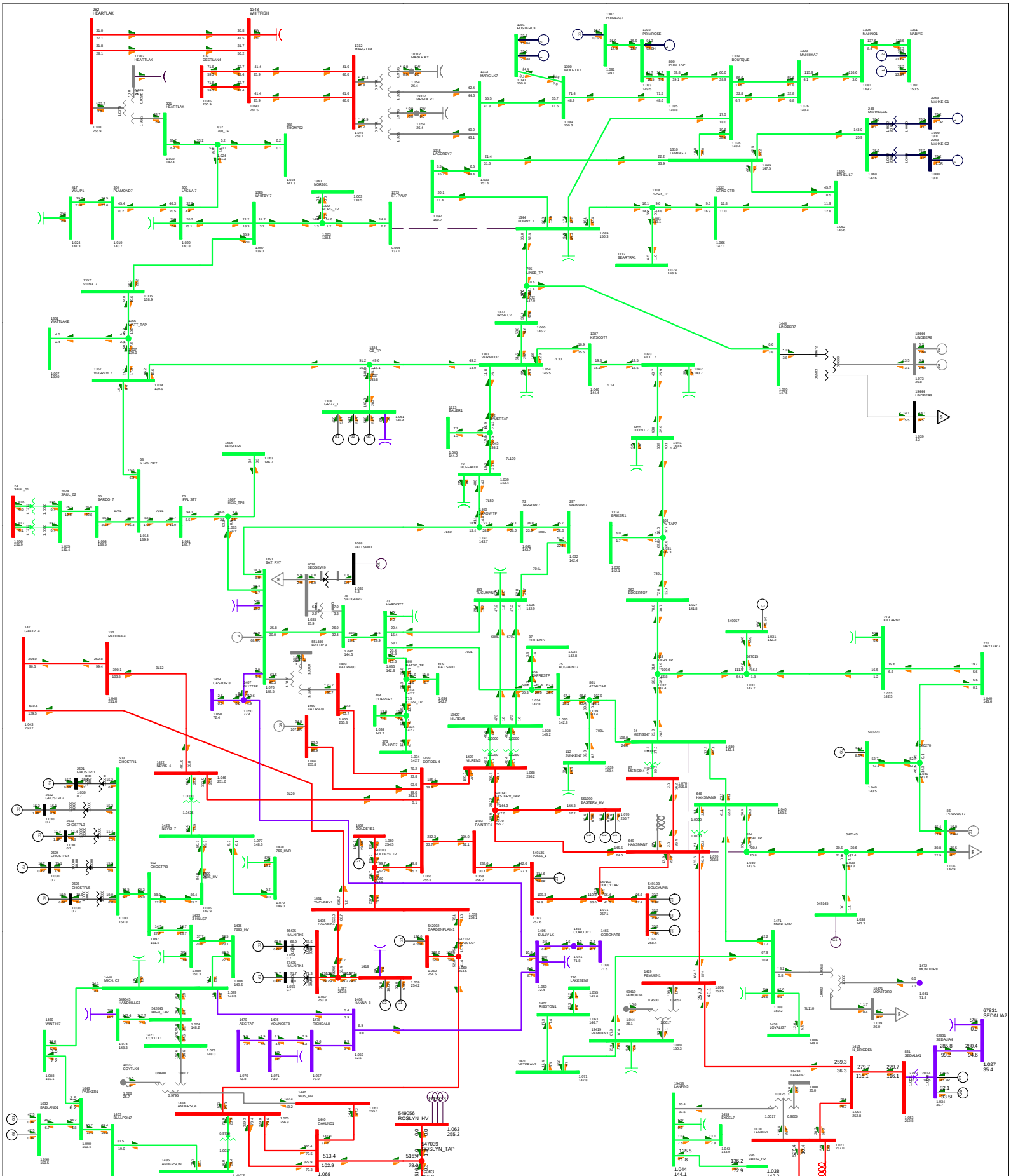
100.0%RATEA
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



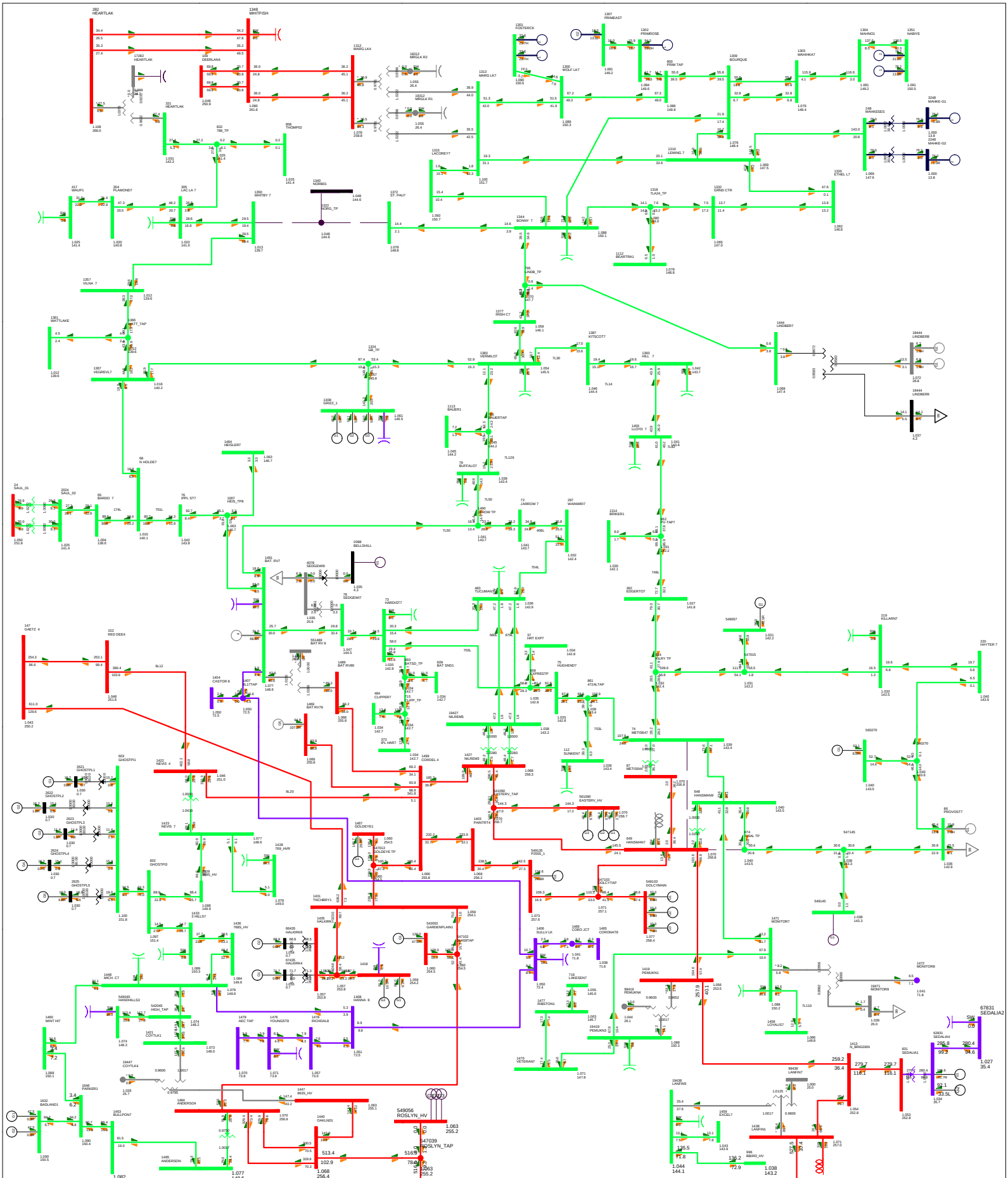
Attachment A2- 1	Contingency	Study Case Description	P2034 Cold Lake Area Cogen
	CONT 043: 7L89 (826S Marguerite Lake - 721S Lacorey)	2028SP PRE-PROJ Base Case	Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



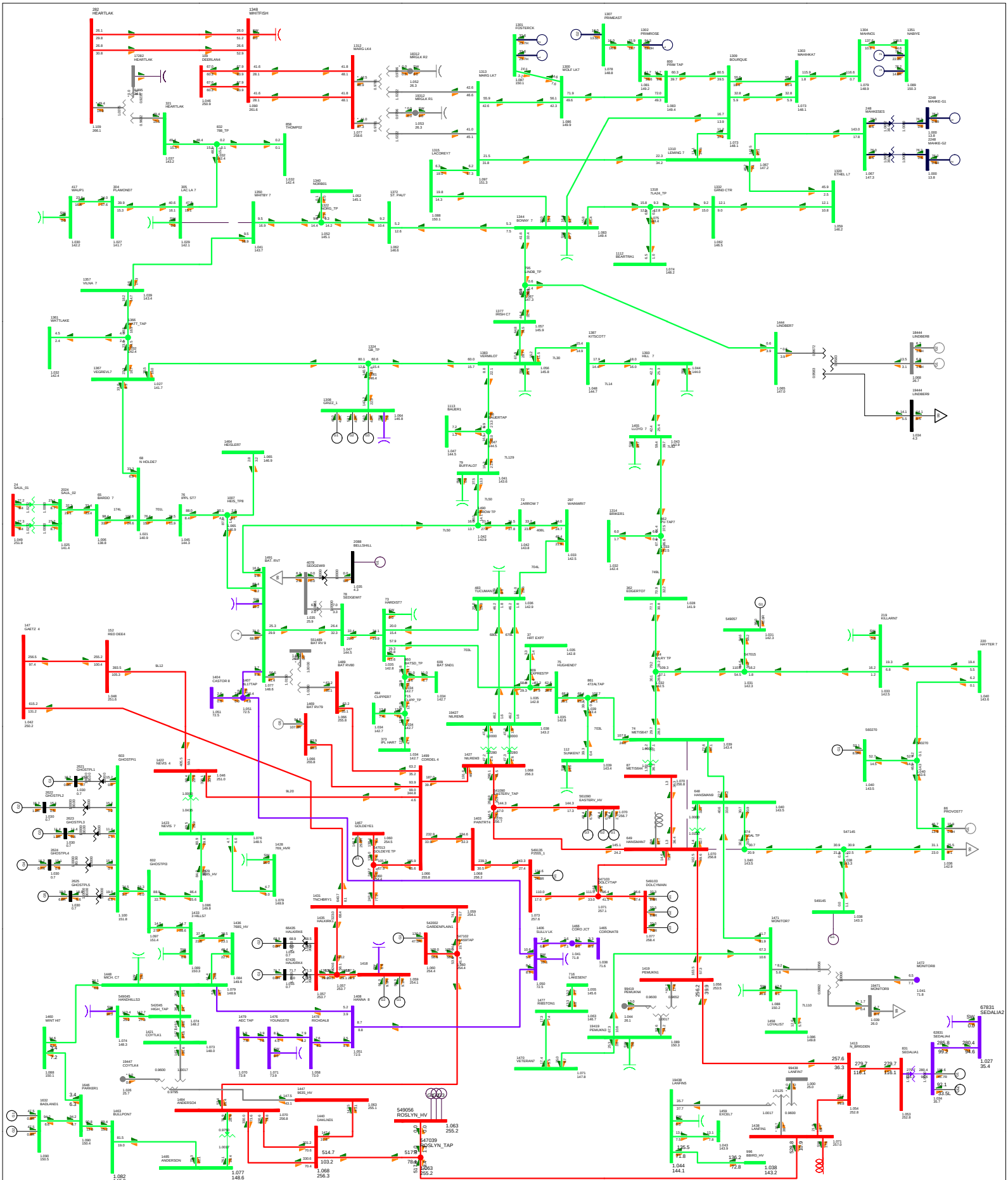
Attachment A2- 1	Contingency	Study Case Description	P2034 Cold Lake Area Cogen
	CONT 044: 7L91 (715S Leming Lake - 826S Marguerite Lake)	2028SP PRE-PROJ Base Case	Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



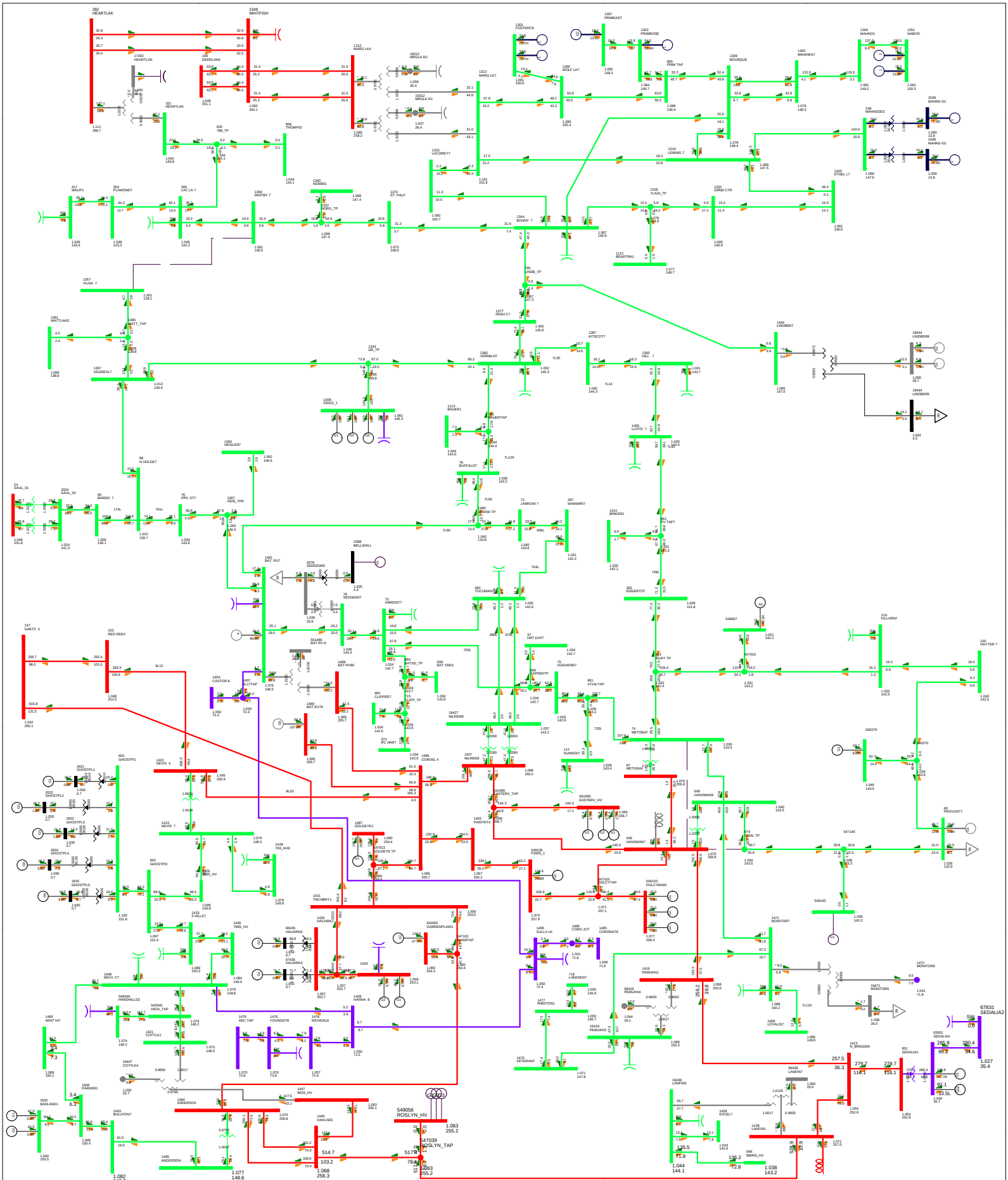
Attachment A2- 1	Contingency	Study Case Description	P2034 Cold Lake Area Cogen
	CONT 045: 7L70 (700S Bonnyville - 707S St.Paul)	2028SP PRE-PROJ Base Case	Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



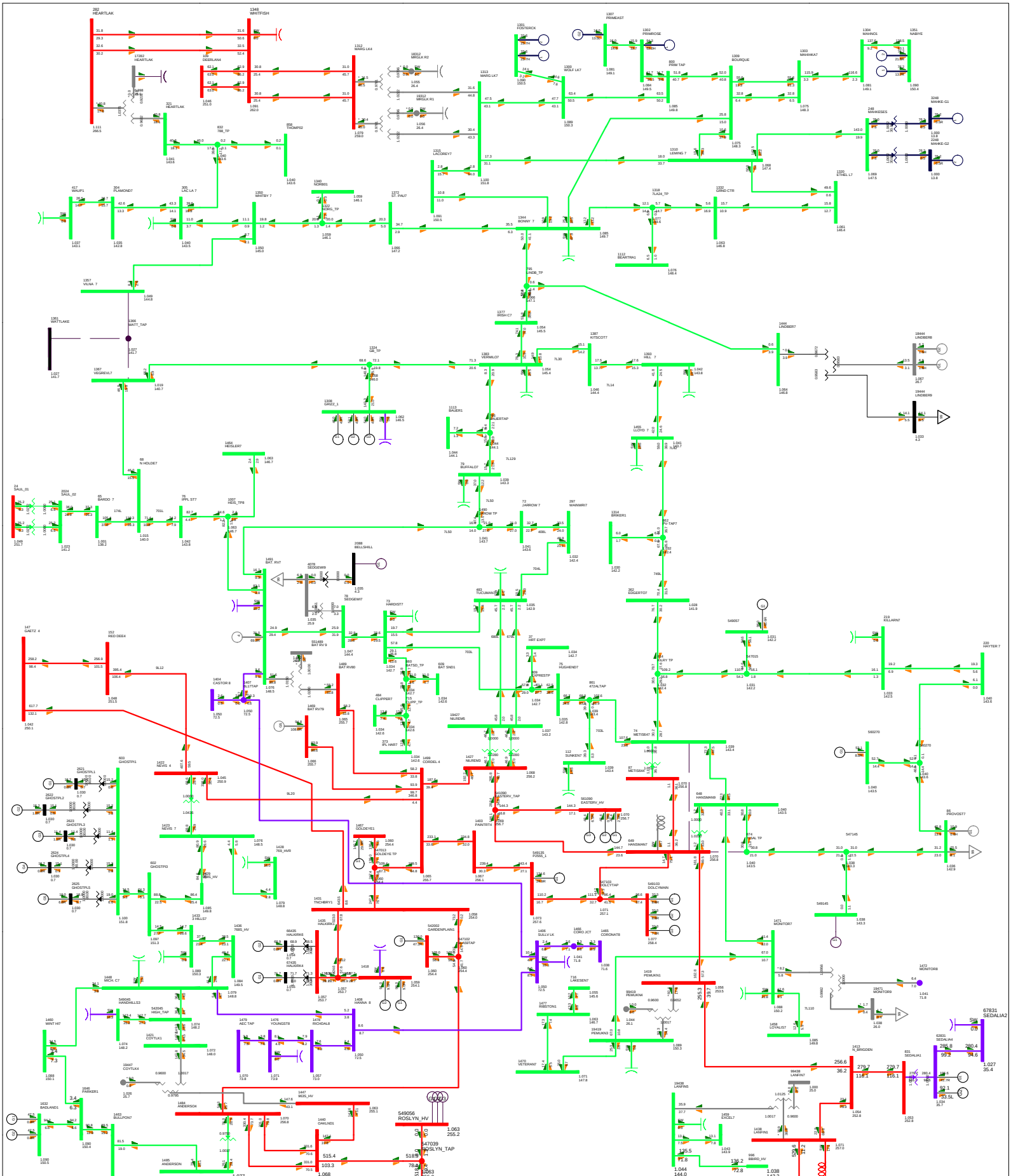
Attachment A2- 1	Contingency	Study Case Description	P2034 Cold Lake Area Cogen
	CONT 046: 7L139 (819S Whitbylake - 707S St.Paul - 936S Norberg)	2028SP PRE-PROJ Base Case	Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



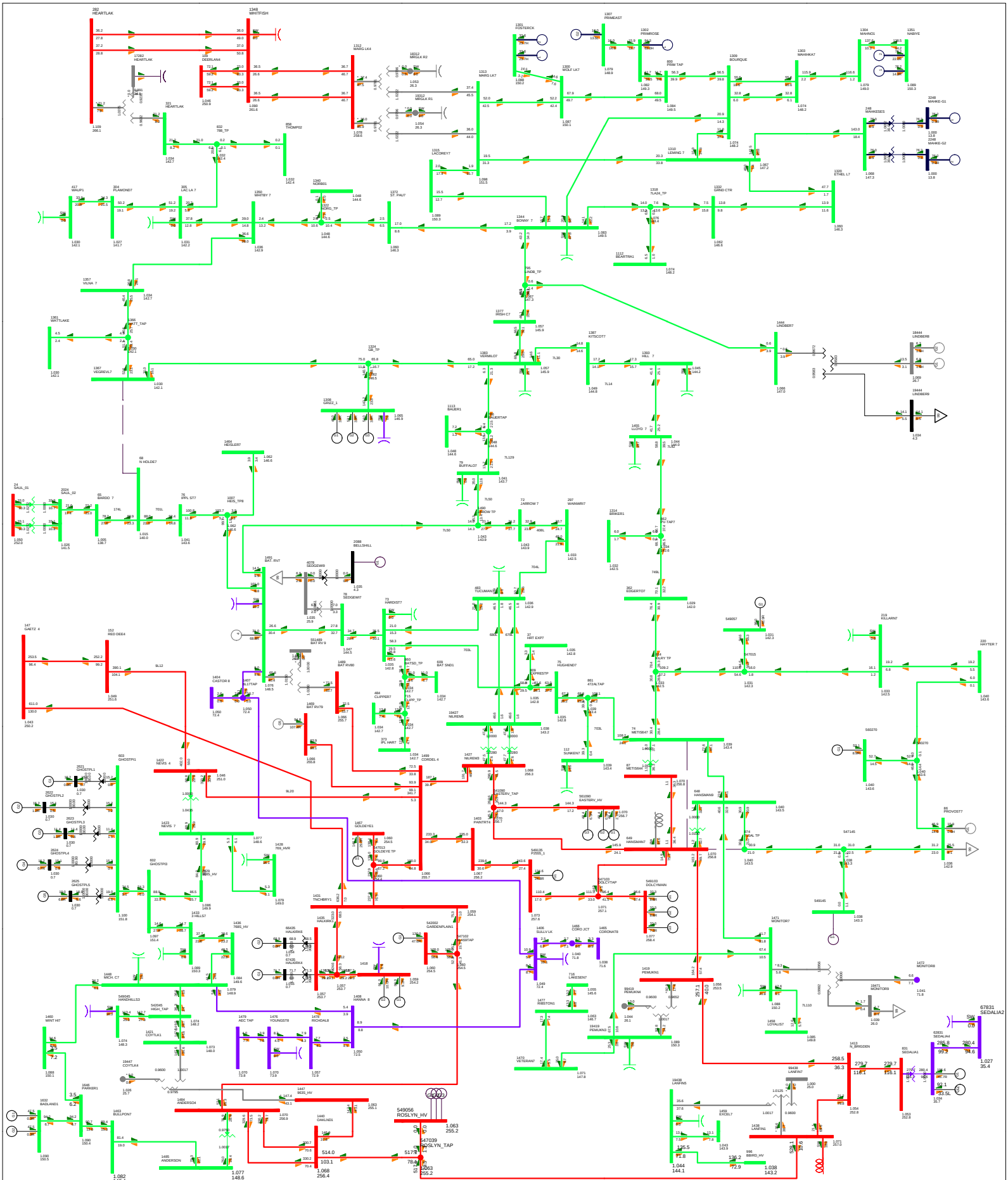
Attachment A2- 1	Contingency	Study Case Description	P2034 Cold Lake Area Cogen
	CONT 047: 794L & 7L94 (157S Lac La Biche - 819S Whitbylake)	2028SP PRE-PROJ Base Case	Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A2- 1	Contingency	Study Case Description	P2034 Cold Lake Area Cogen
	CONT 048: 7L92 (819S Whitbylake - 777S Vilna)	2028SP PRE-PROJ Base Case	Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A2- 1	Contingency	Study Case Description	P2034 Cold Lake Area Cogen
	CONT 049: 7L92 (777S Vilna - 709S Vegreville - 956S Watt Lake)	2028SP PRE-PROJ Base Case	Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A2- 1

Contingency

CONT 050: 7L77 (395S North Holden - 709S Vegreville)

Study Case Description

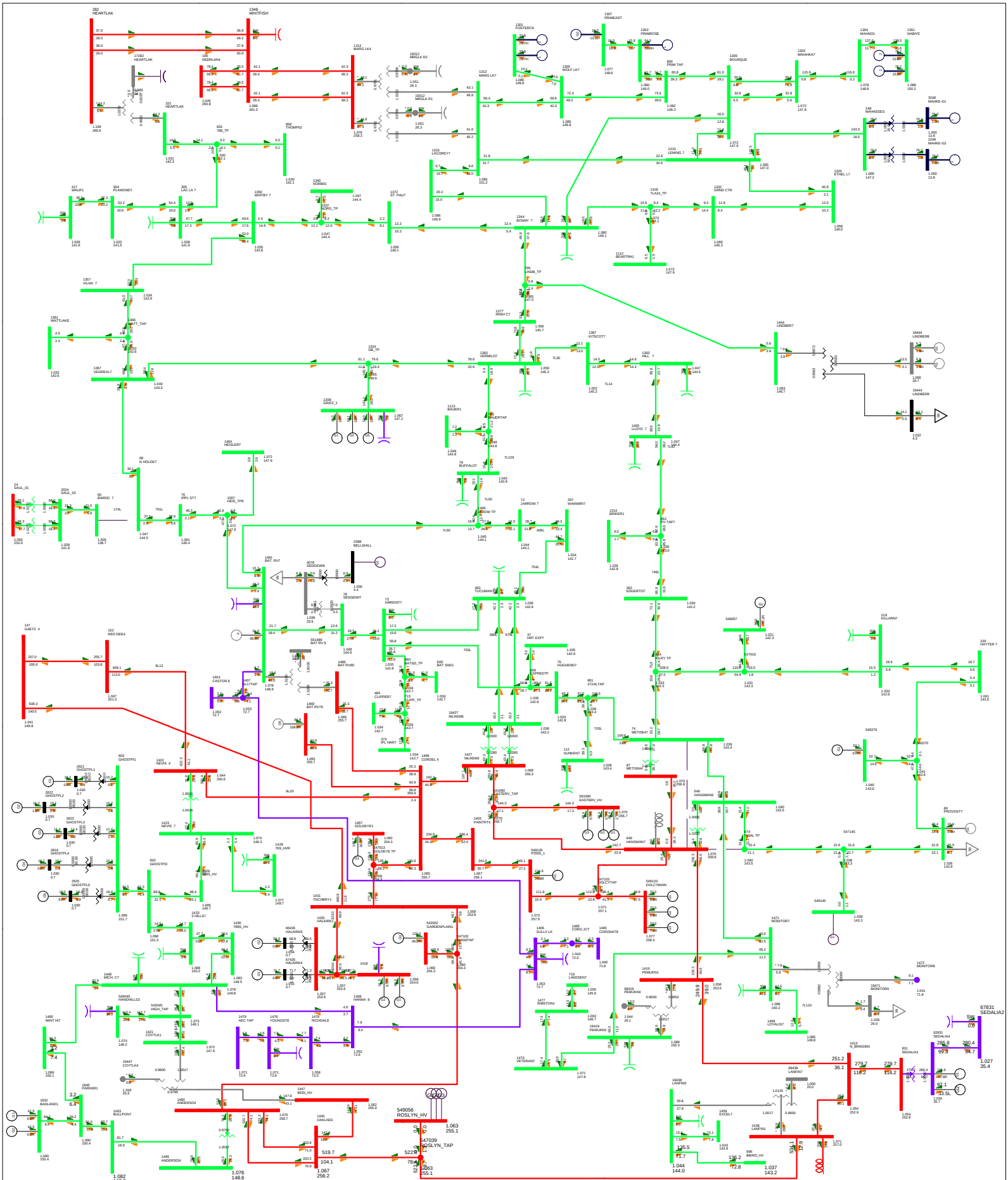
2028SP PRE-PROJ

Base Case

P2034 Cold Lake Area Cogen

Bus - VOLTAGE (kV/PU)
Branch - MW/Mvar
Equipment - MW/Mvar

100.0%RATEA
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A2- 1

Contingency

CONT 051: 174L (1978 Bardo - 3958 North Holden)

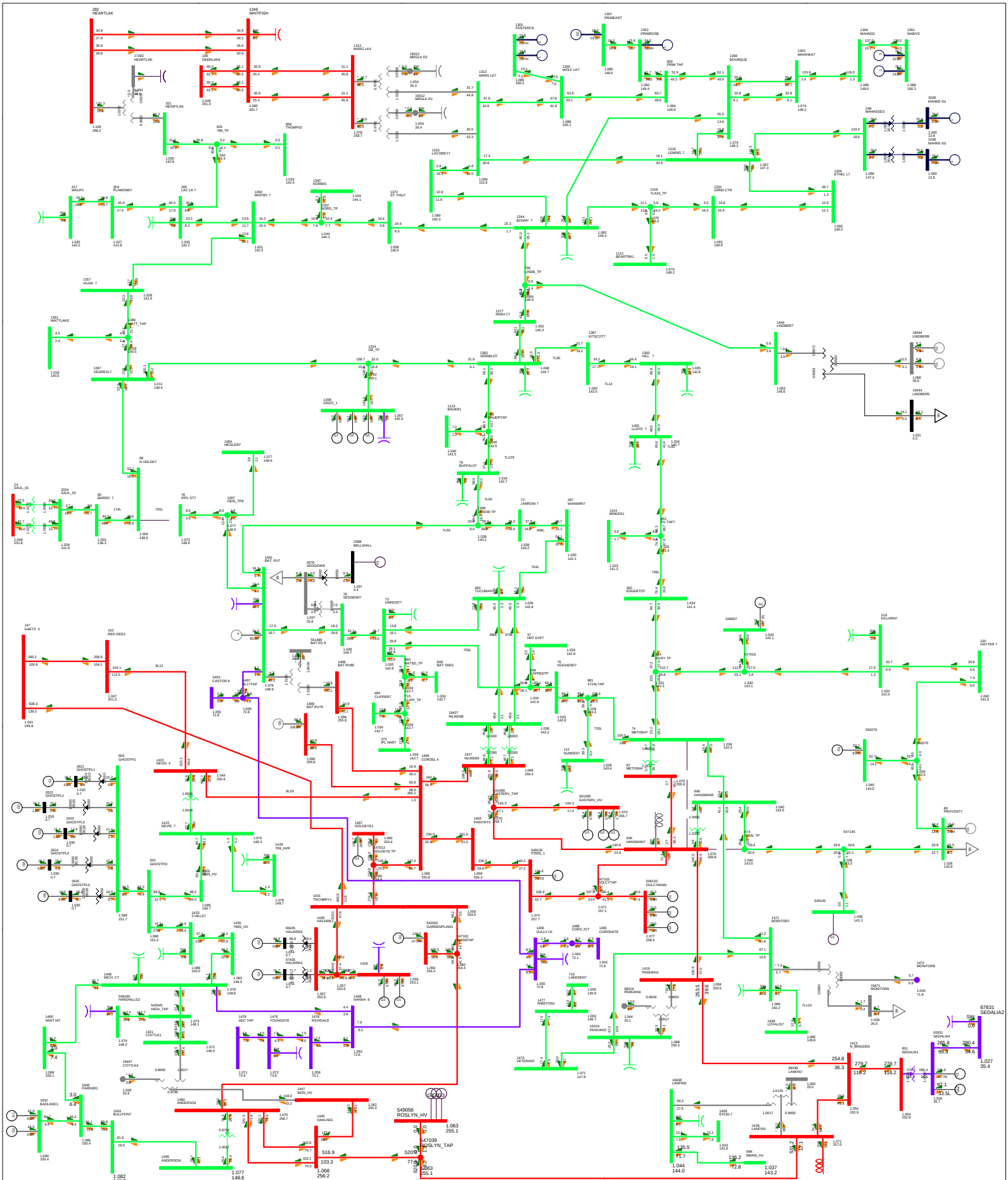
Study Case Description

2028SP PRE-PROJ

Base Case

P2034 Cold Lake Area Cogen

Bus - VOLTAGE (kV/PU)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%RATEA
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A2- 1

Contingency

CONT 052: 701L (395S North Holden - 223S Strome)

Study Case Description

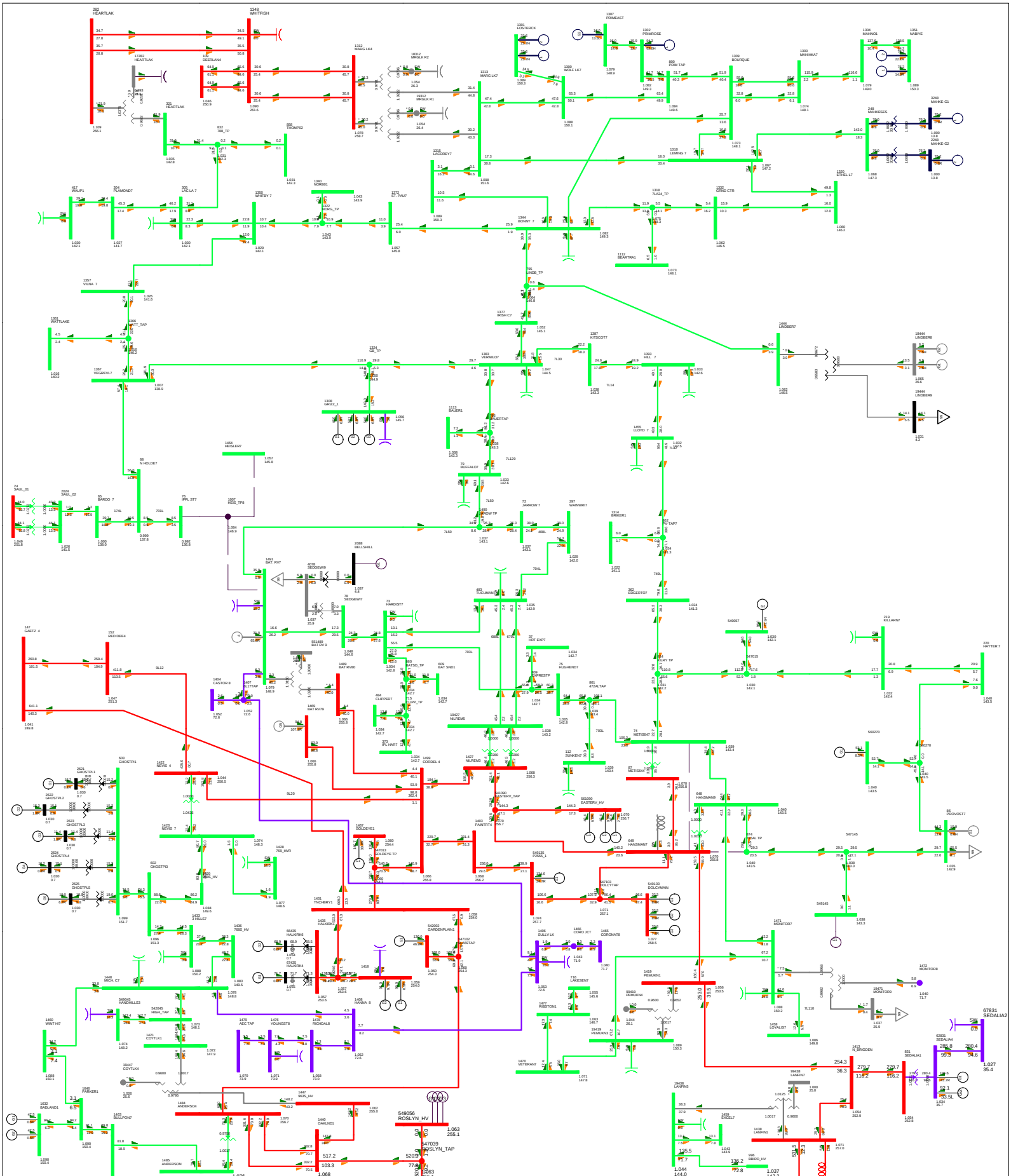
2028SP PRE-PROJ

Base Case

P2034 Cold Lake Area Cogen

Bus - VOLTAGE (kV/PU)
Branch - MW/Mvar
Equipment - MW/Mvar

100.0%RATEA
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A2- 1

Contingency

CONT 053: 701L (223S Strome - 757S Battle River - 764S Heisler)

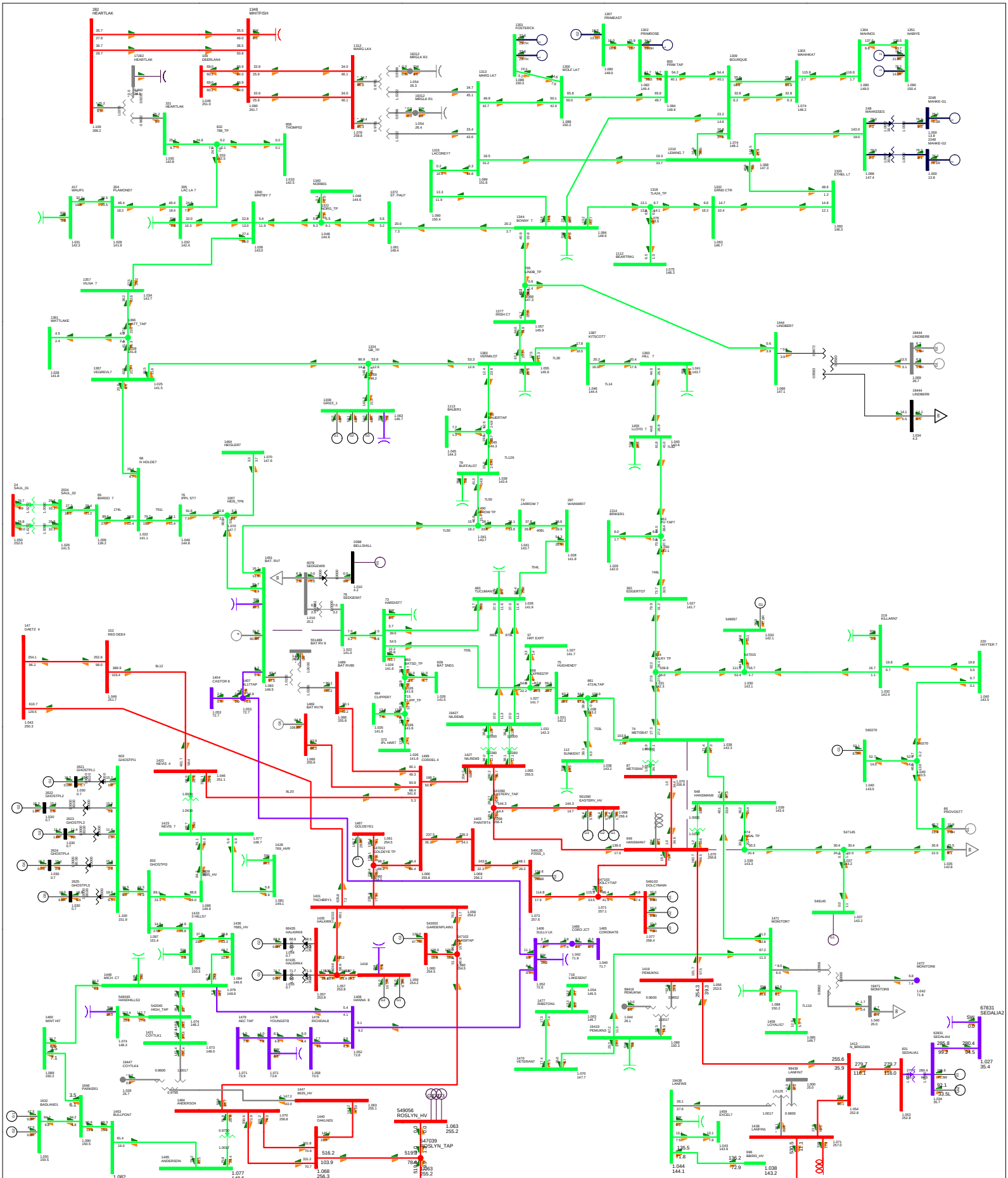
Study Case Description

2028SP PRE-PROJ

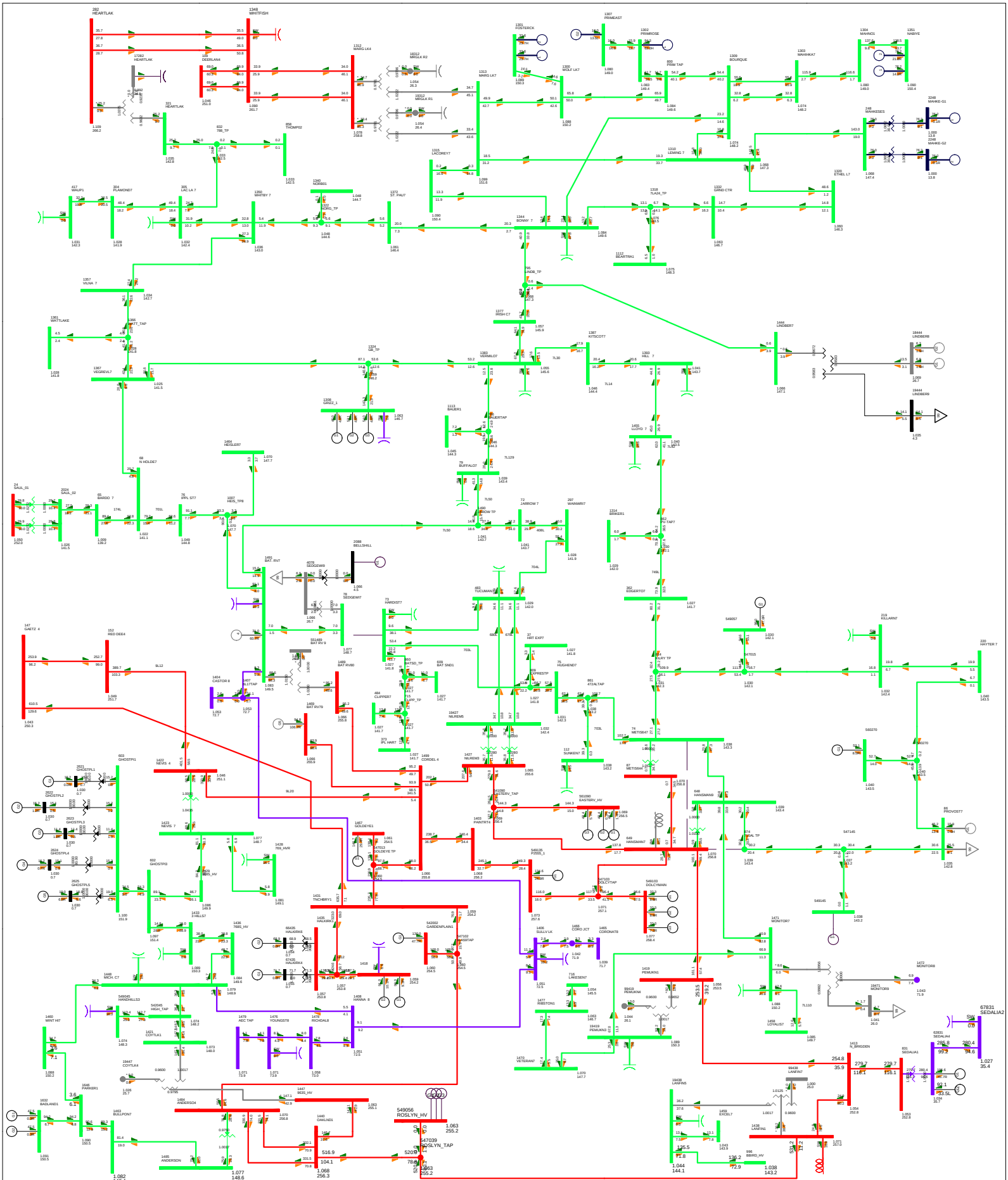
Base Case

P2034 Cold Lake Area Cogen

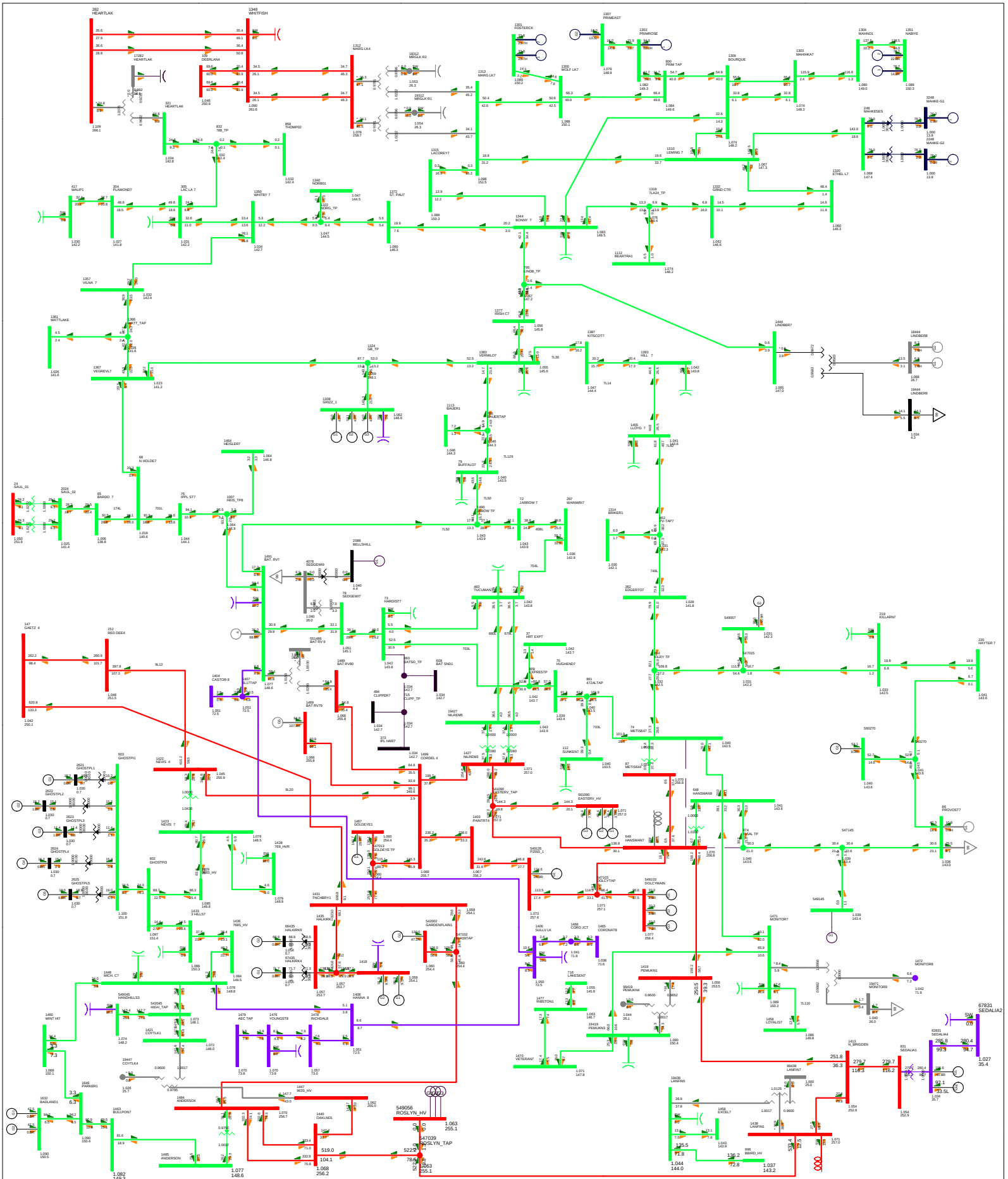
Bus - VOLTAGE (kV/PU)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%RATEA
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A2- 1	Contingency	Study Case Description	P2034 Cold Lake Area Cogen
	CONT 054: 7L702 (137S Sedgewick - 757S Battle River)	2028SP PRE-PROJ Base Case	Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A2- 1	Contingency	Study Case Description	P2034 Cold Lake Area Cogen
	CONT 055: 702L (377S Hardisty - 137S Sedgewick)	2028SP PRE-PROJ Base Case	Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A2- 1

Contingency

CONT 056: 769L (377S Hardisty - 594S Battle Sands - 296S Rosyth - 656S Clipper)

Study Case Description

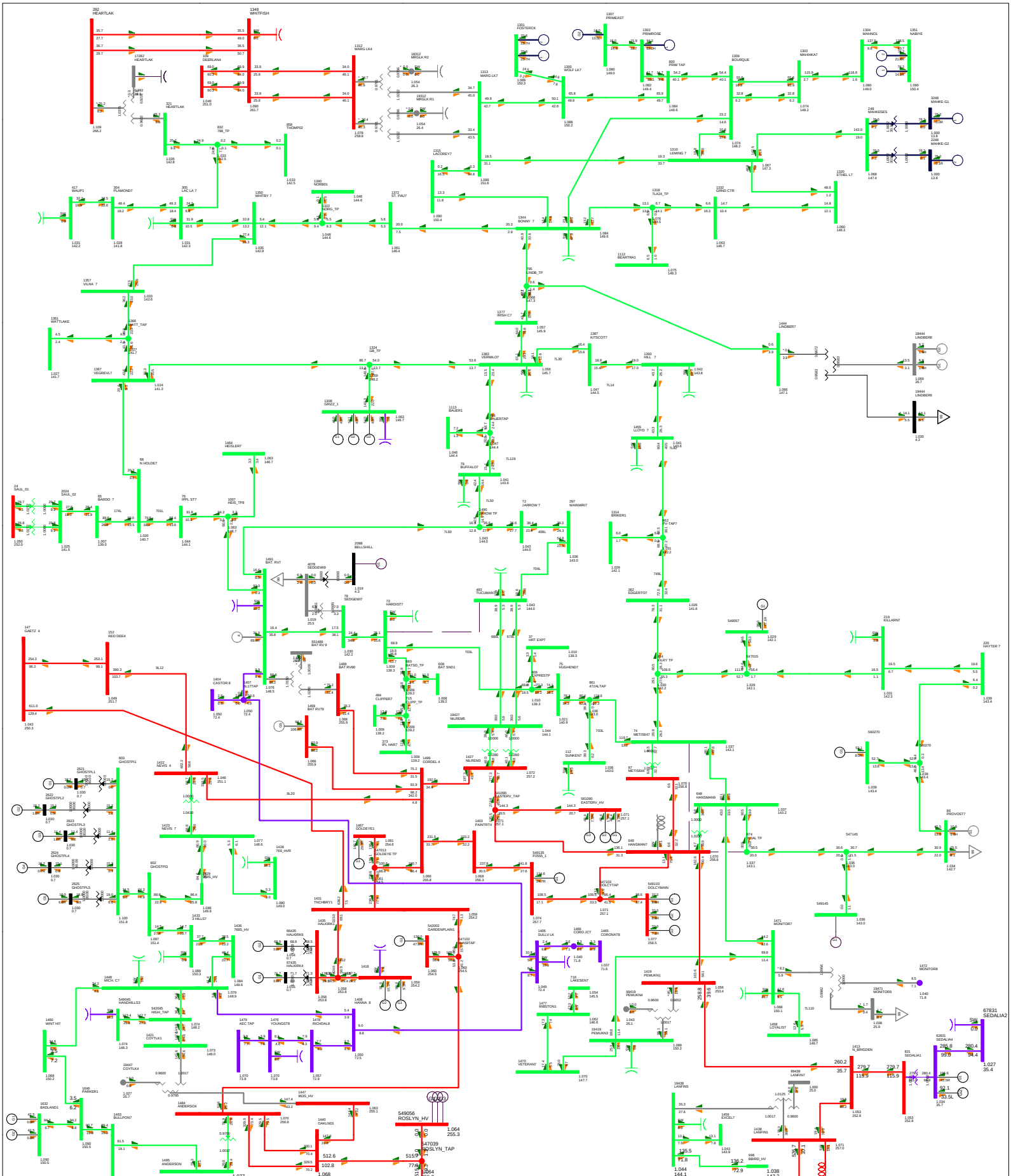
2028SP PRE-PROJ

Base Case

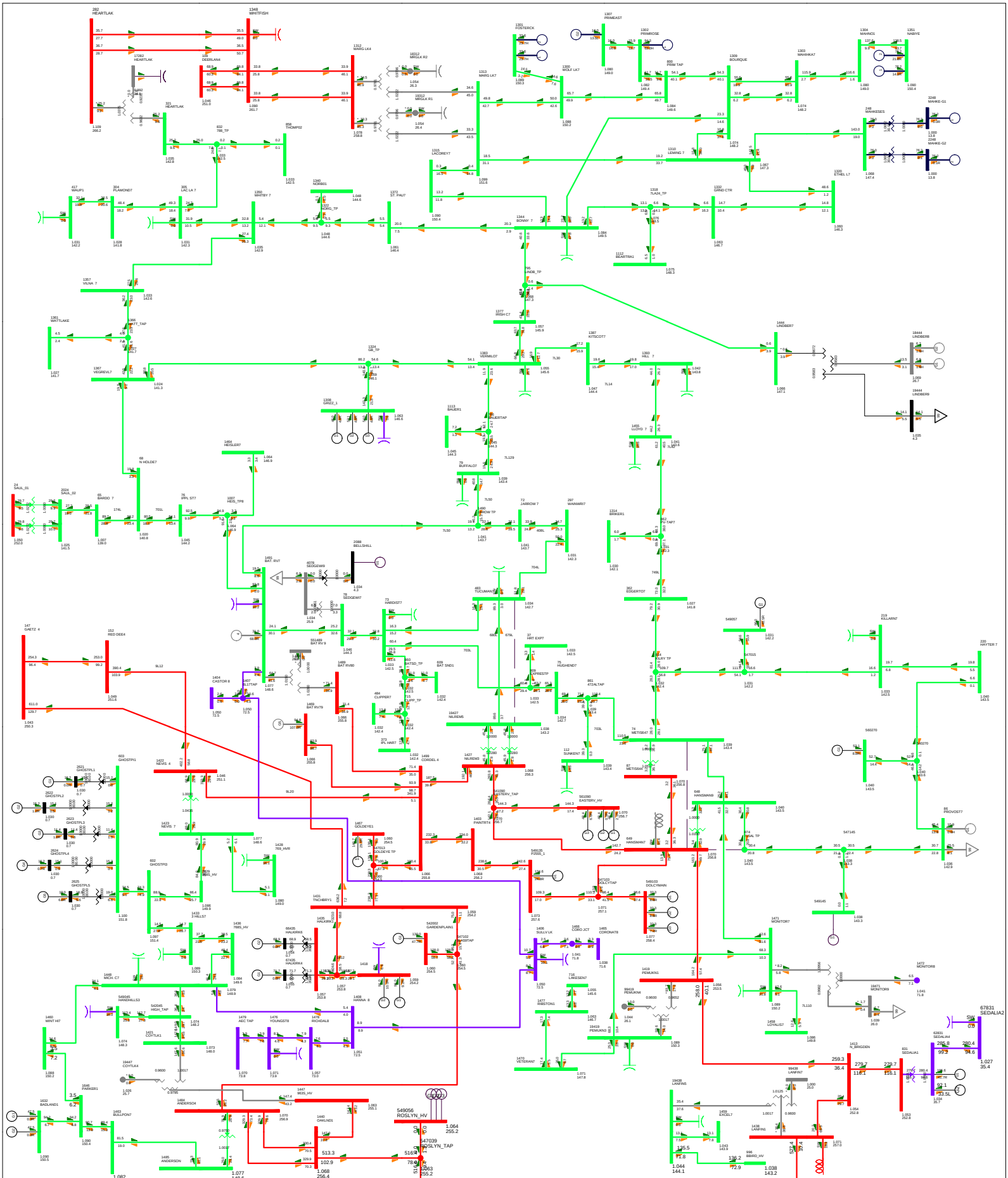
P2034 Cold Lake Area Cogen

Bus - VOLTAGE (kV/PU)
Branch - MW/Mvar
Equipment - MW/Mvar

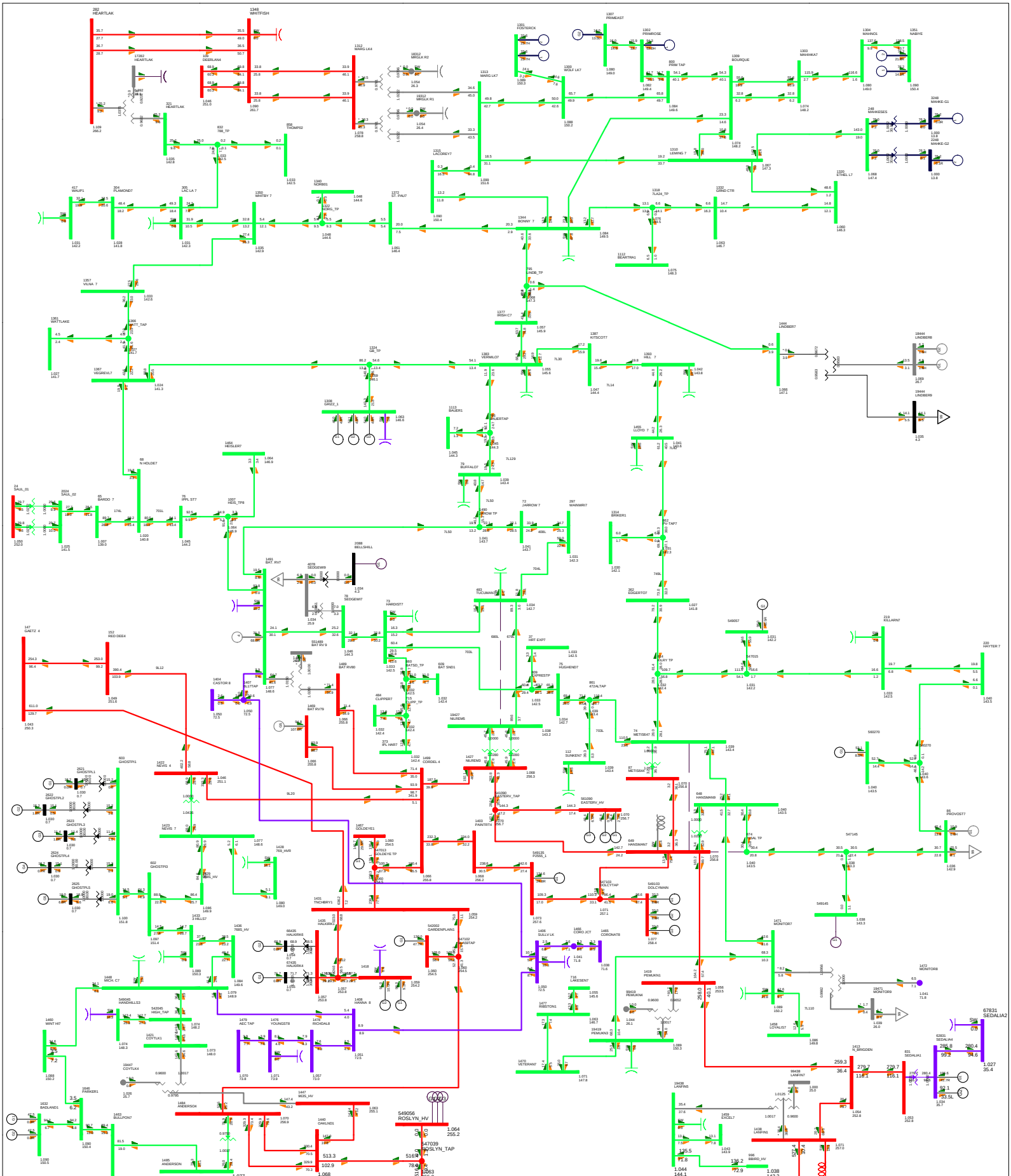
100.0%RATEA
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A2- 1	Contingency	Study Case Description	P2034 Cold Lake Area Cogen
	CONT 057: 681L (377S Hardisty - 478S Tucuman)	2028SP PRE-PROJ Base Case	Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A2- 1	**Contingency** CONT 058: 679L (478S Tucuman - 574S Nilrem)	**Study Case Description** 2028SP PRE-PROJ Base Case	**P2034 Cold Lake Area Cogen** Bus - VOLTAGE (kV/PU) Branch - MW/MVar Equipment - MW/Mvar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A2- 1

Contingency

CONT 059: 680L (478S Tucuman - 574S Nilrem)

Study Case Description

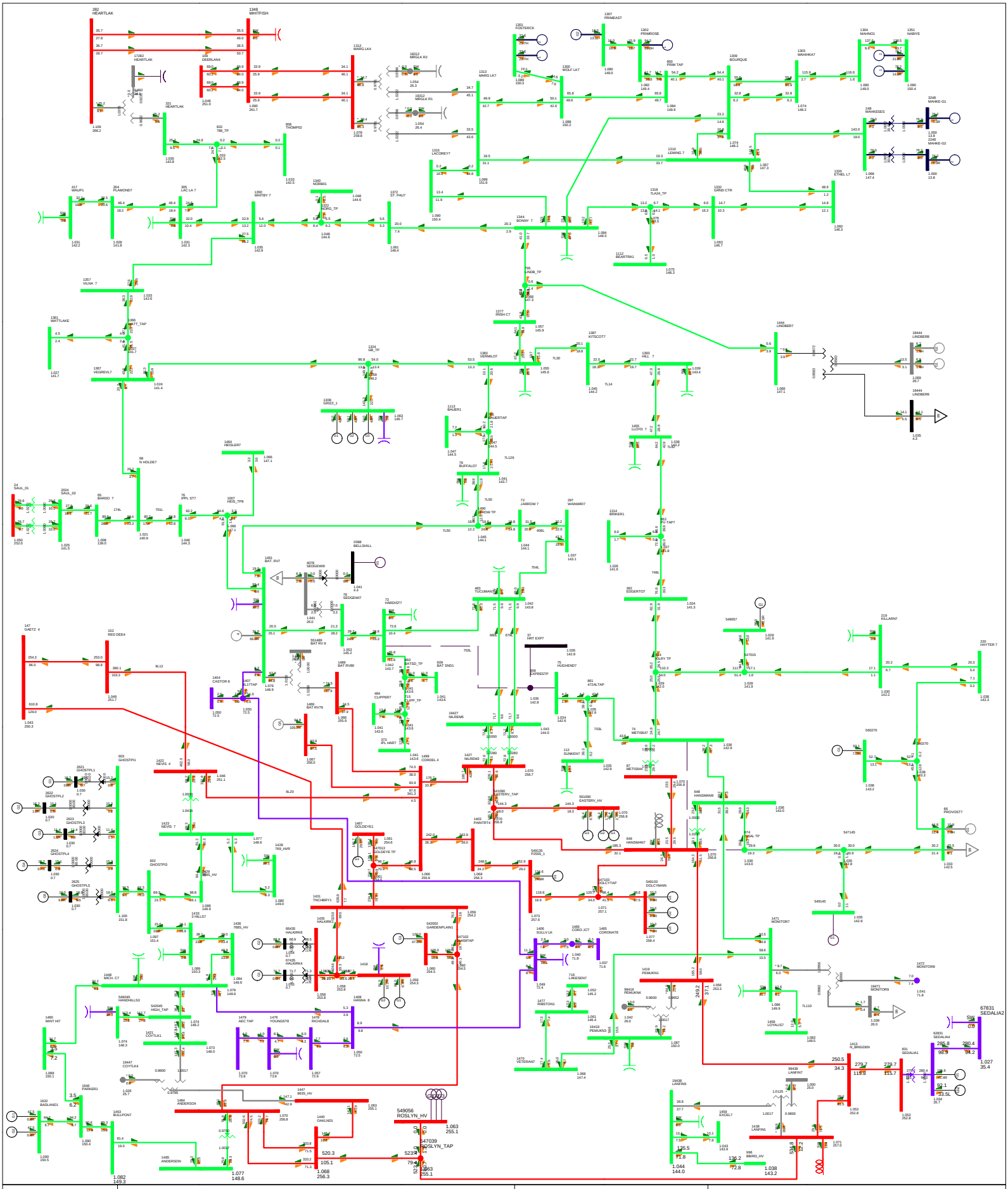
2028SP PRE-PROJ

Base Case

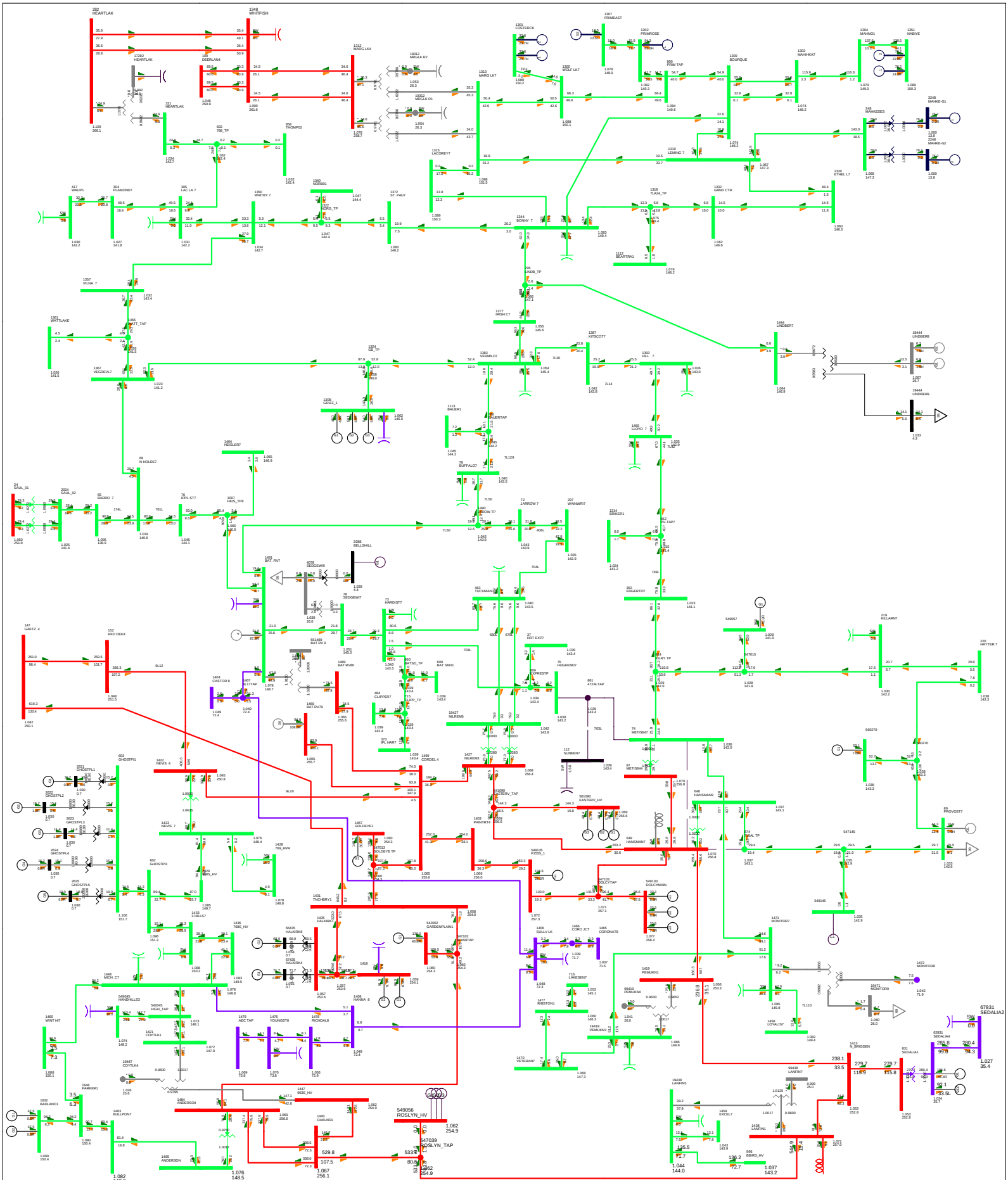
P2034 Cold Lake Area Cogen

Bus - VOLTAGE (kV/PU)
Branch - MW/MVar
Equipment - MW/Mvar

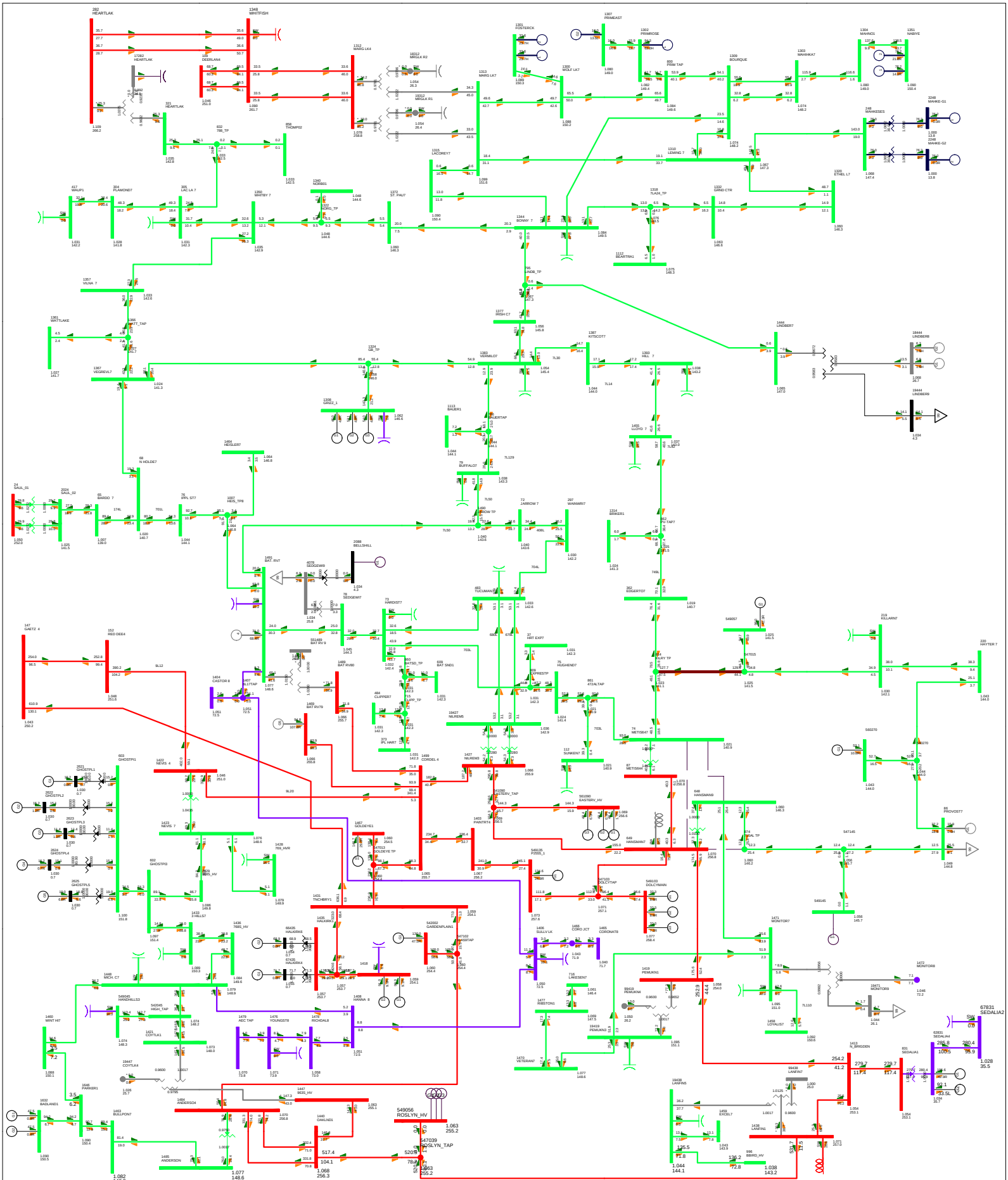
100.0%RATEA
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



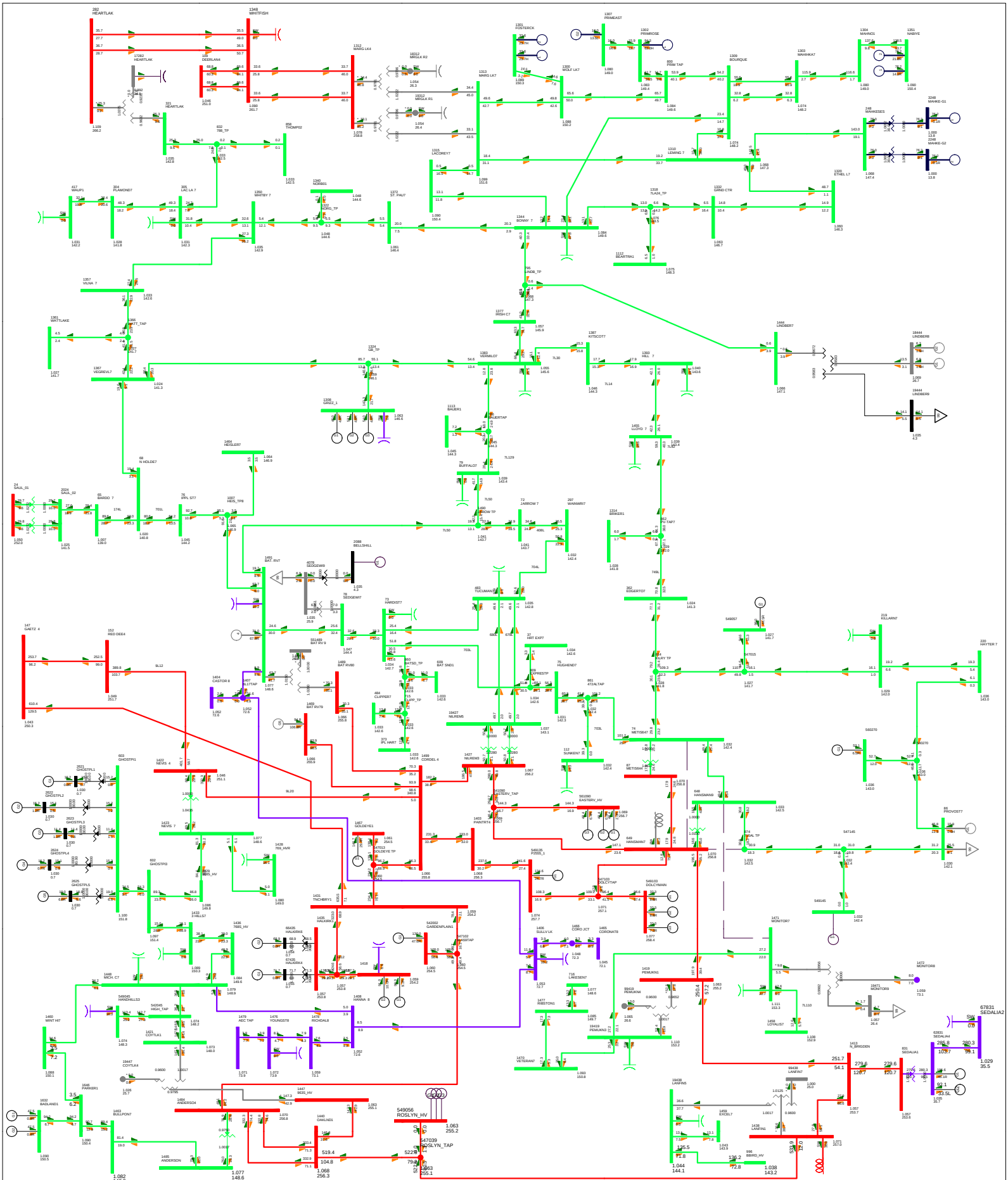
Attachment A2- 1	**Contingency** CONT 060: 703L (377S Hardisty - 213S Hughenden - 329S Hrt Express)	**Study Case Description** 2028SP PRE-PROJ Base Case	**P2034 Cold Lake Area Cogen** Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A2- 1	**Contingency** CONT 061: 472L (213S Hughenden - 648S Metiskow - 221S Sunken Lake)	**Study Case Description** 2028SP PRE-PROJ Base Case	**P2034 Cold Lake Area Cogen** Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A2- 1	Contingency	Study Case Description	P2034 Cold Lake Area Cogen
	CONT 062: 885L (648S Metiskow - 650S Hansman Lake)	2028SP PRE-PROJ Base Case	Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A2- 1

Contingency

CONT 063: 7L224 (650S Hansman Lake - 774S Monitor)

Study Case Description

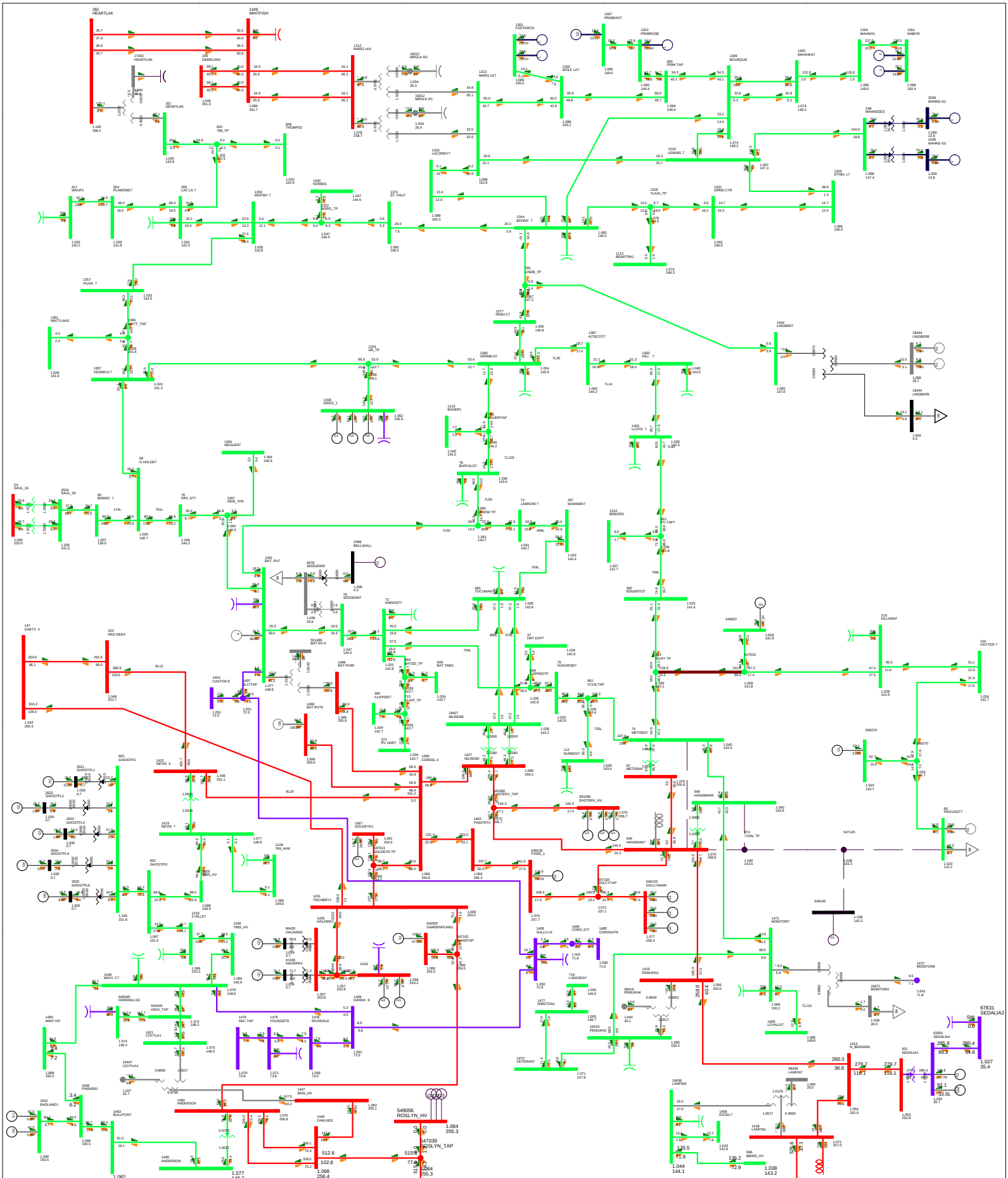
2028SP PRE-PROJ

Base Case

P2034 Cold Lake Area Cogen

Bus - VOLTAGE (kV/PU)
Branch - MW/Mvar
Equipment - MW/Mvar

100.0%RATEA
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A2- 1

Contingency

CONT 064: 715L (650S Hansman Lake - P2540 Cache Rising Sun - 545S Provost)

Study Case Description

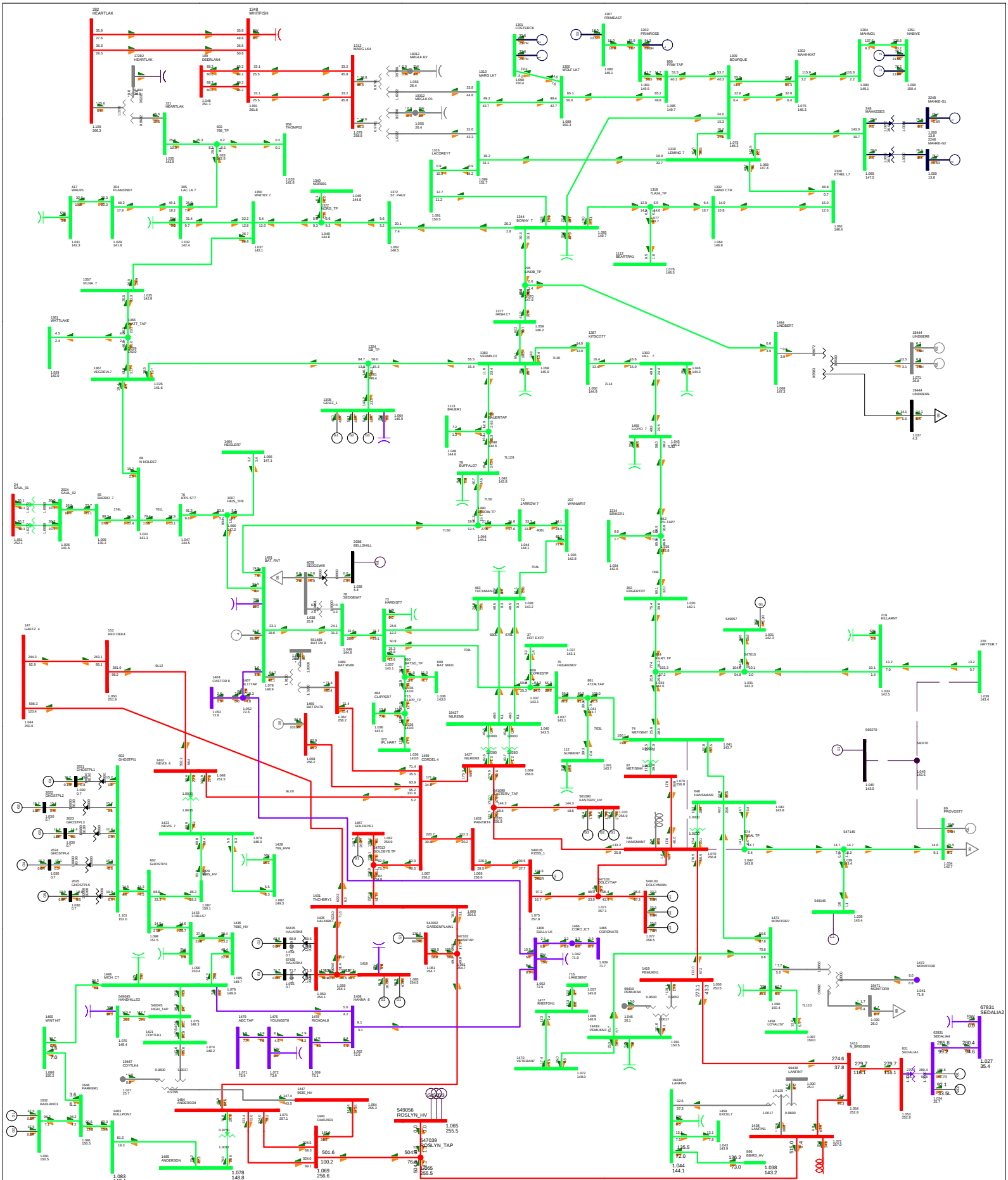
2028SP PRE-PROJ

Base Case

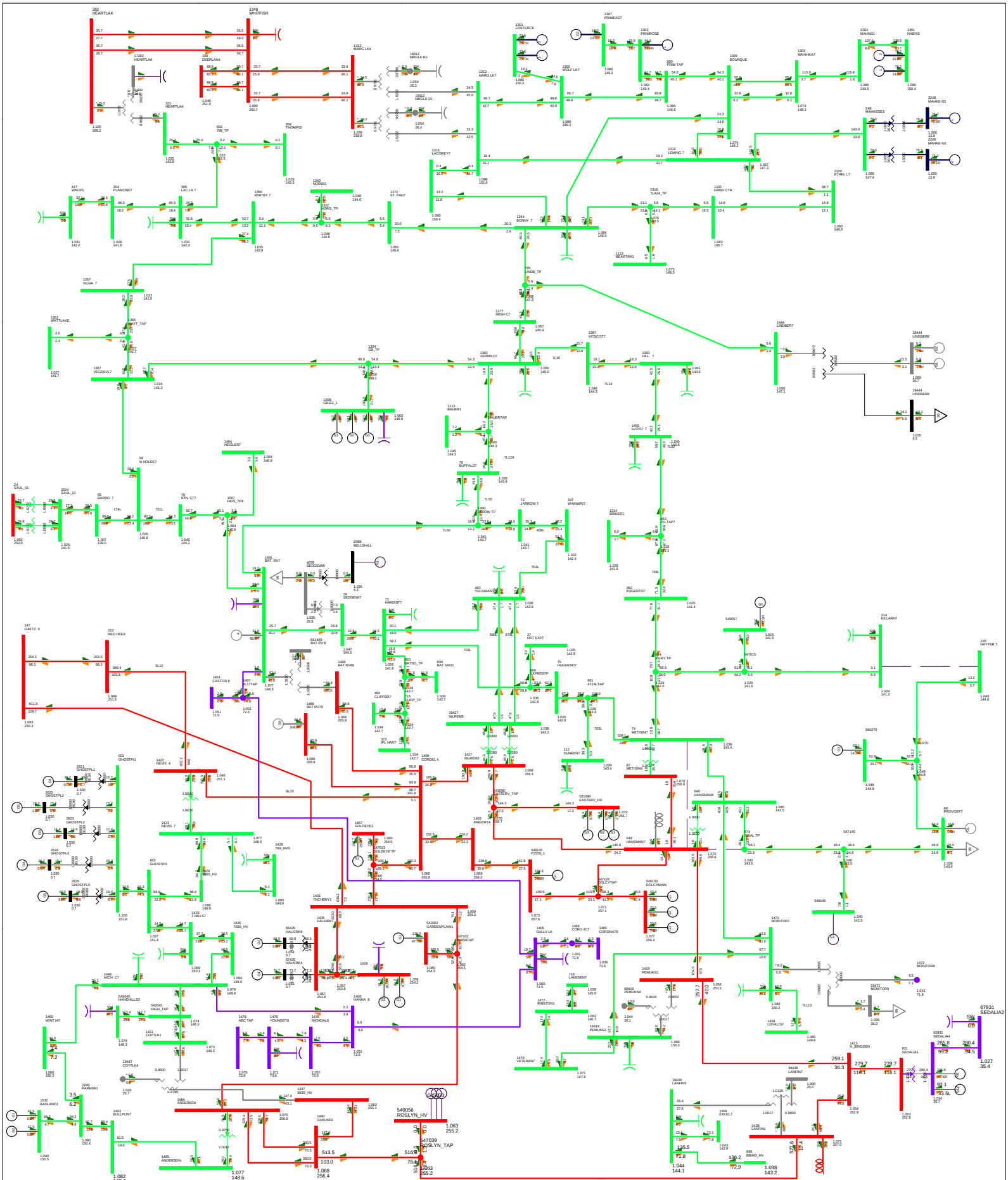
P2034 Cold Lake Area Cogen

Bus - VOLTAGE (kV/PU)
Branch - MW/Mvar
Equipment - MW/Mvar

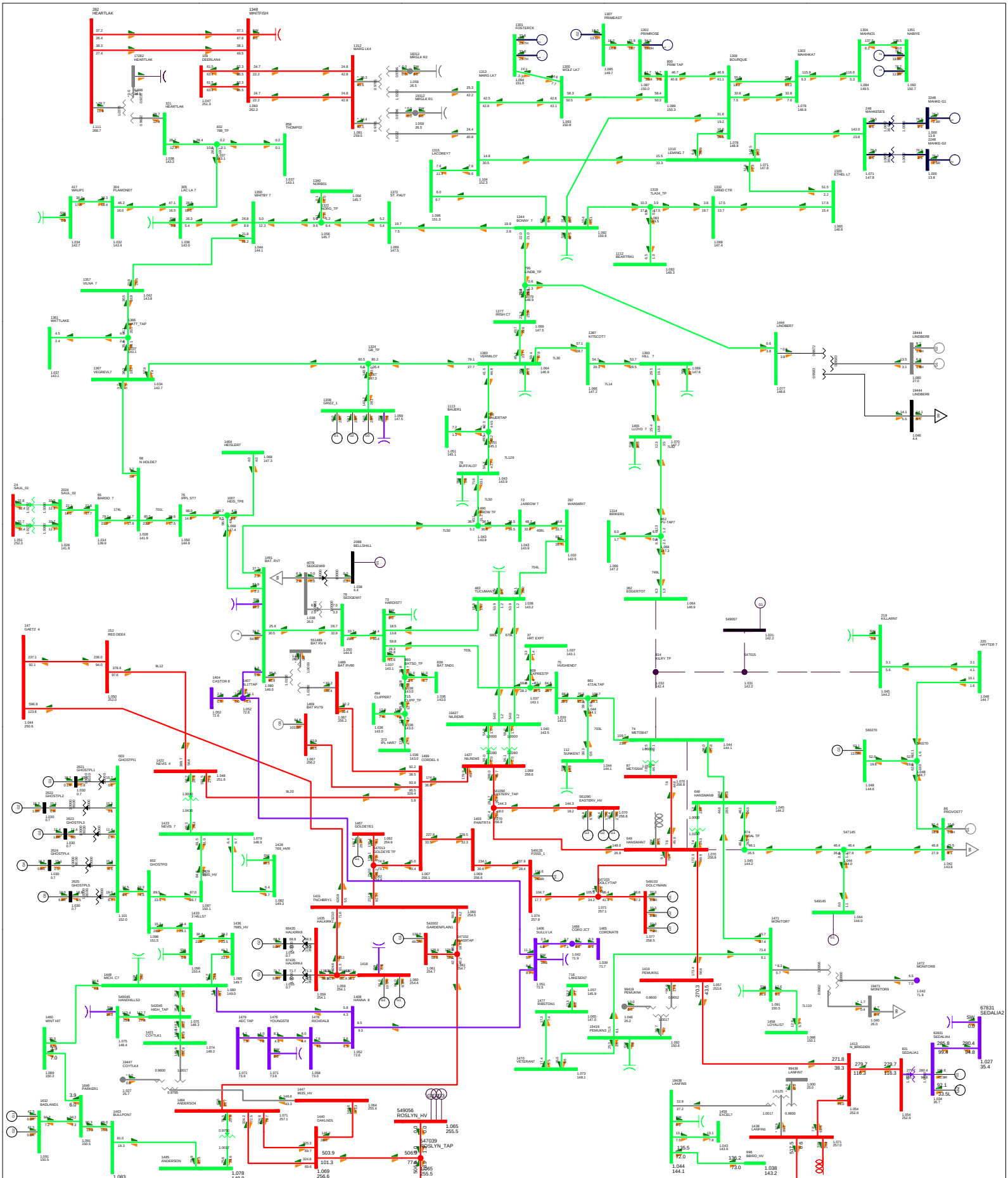
100.0%RATEA
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A2- 1	Contingency	Study Case Description	P2034 Cold Lake Area Cogen
	CONT 065: 398L (545S Provost - P2573 Prairie Yarrow - 277S Hayter)	2028SP PRE-PROJ Base Case	Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A2- 1	Contingency	Study Case Description	P2034 Cold Lake Area Cogen
	CONT 066: 748L (267S Killarney Lake - 277S Hayter)	2028SP PRE-PROJ Base Case	Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A2- 1

Contingency

CONT 067: 749L (648S Metiskow - 267S Killarney Lake - P2460 Fox Meadows Wind - 899S Edgerton)

Study Case Description

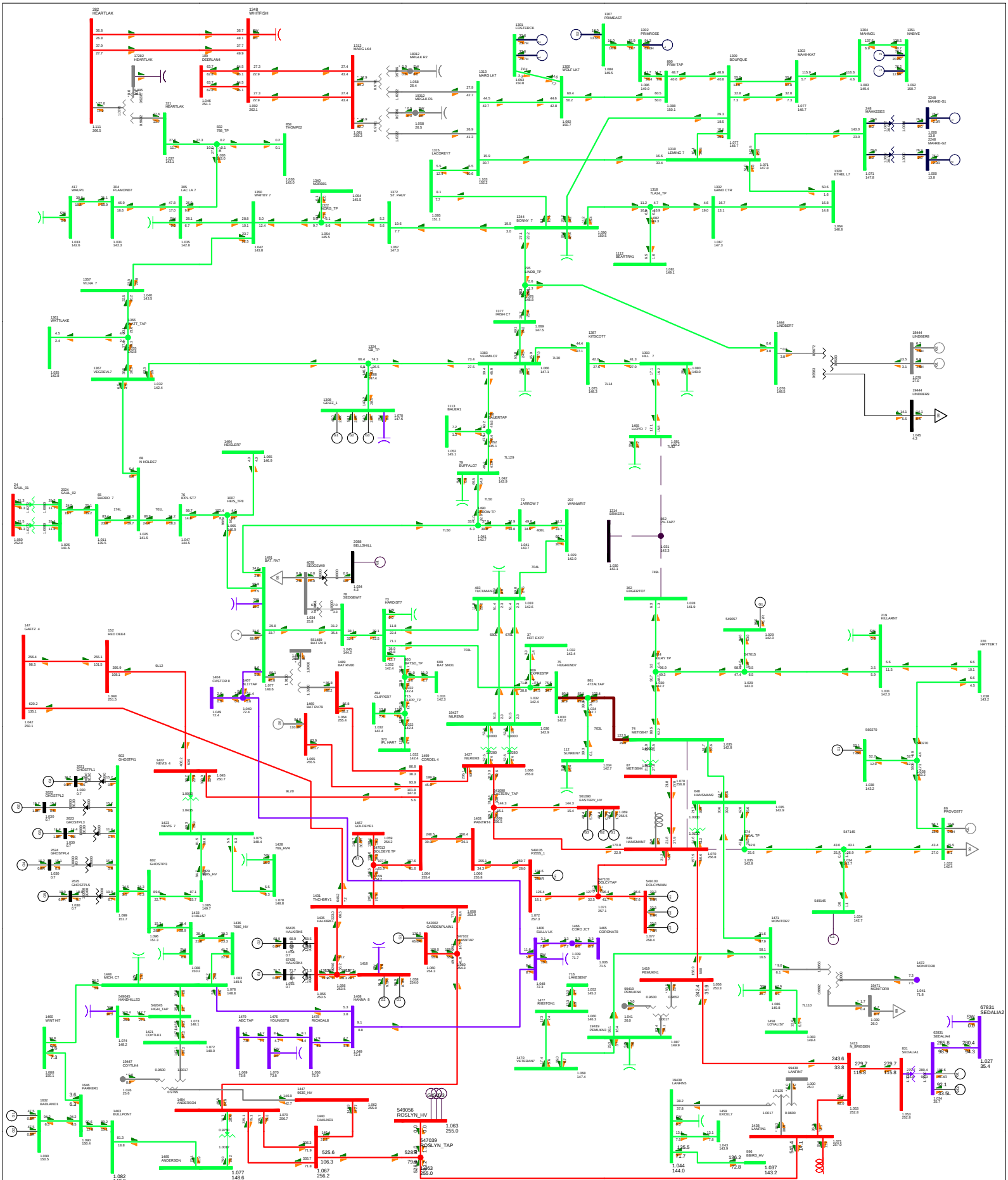
2034 PRE-PROJ

Base Case

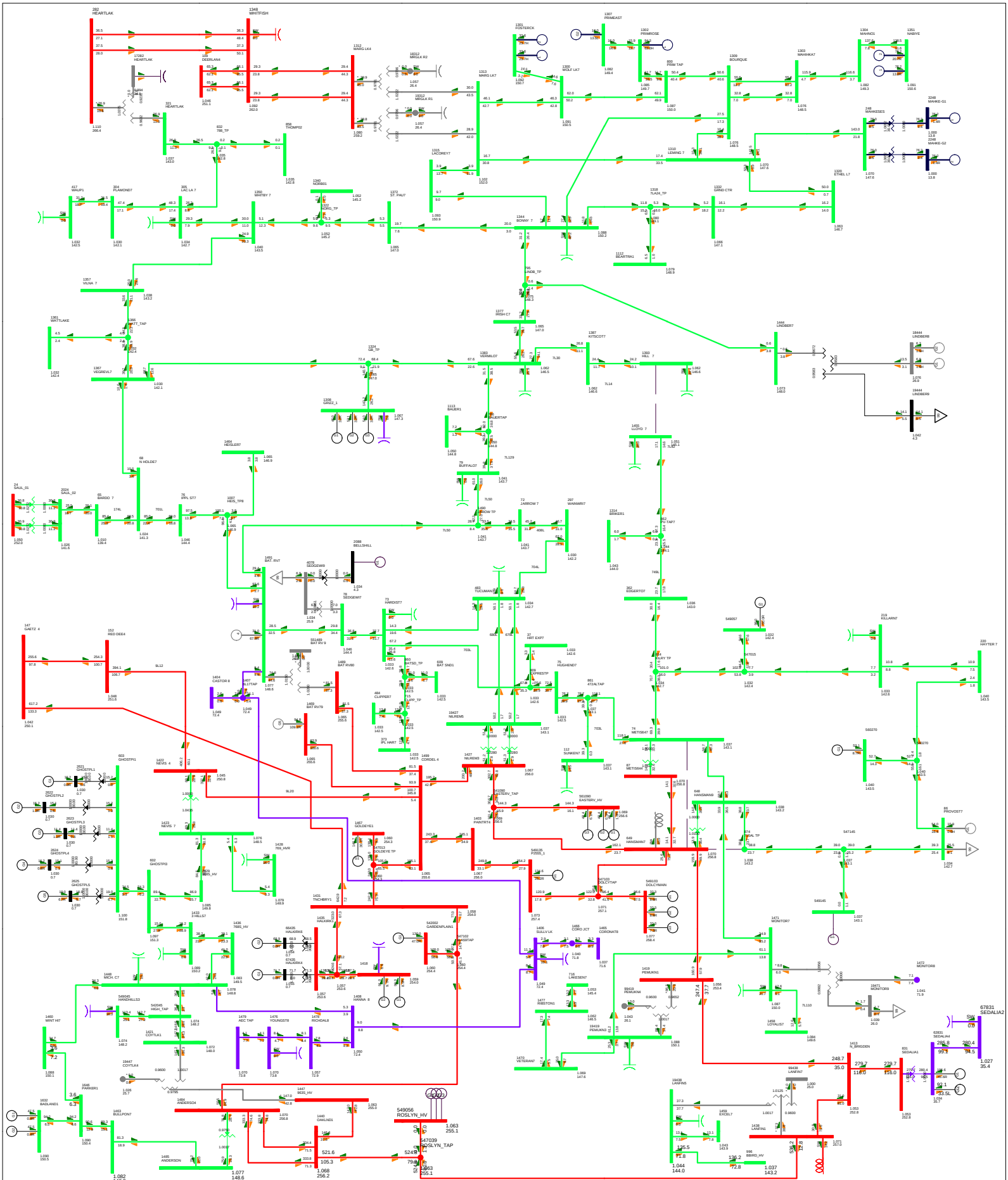
P2034 Cold Lake Area Cogen

Bus - VOLTAGE (kV/PU)
Branch - MW/MVar
Equipment - MW/Mvar

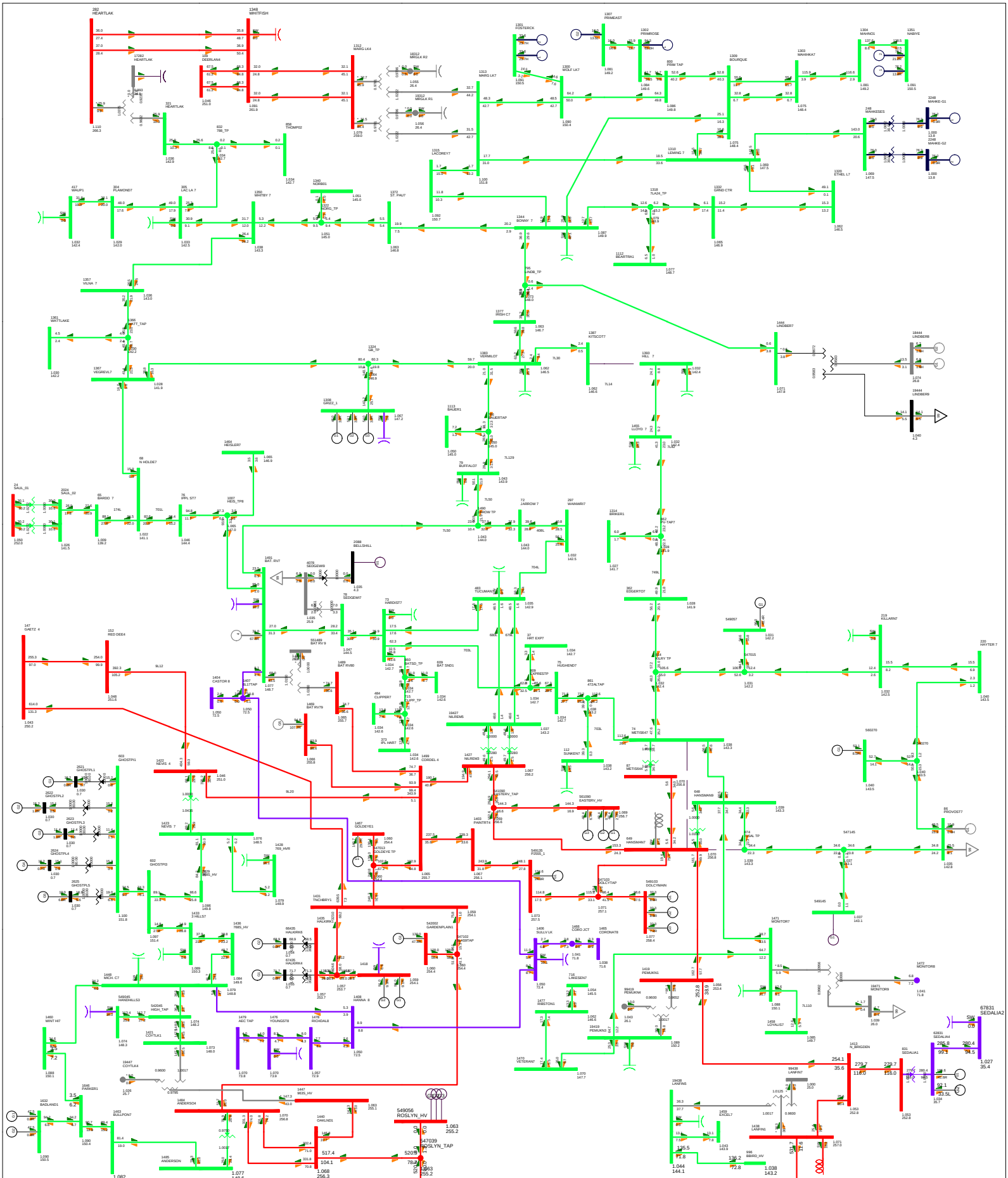
100.0%RATEA
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



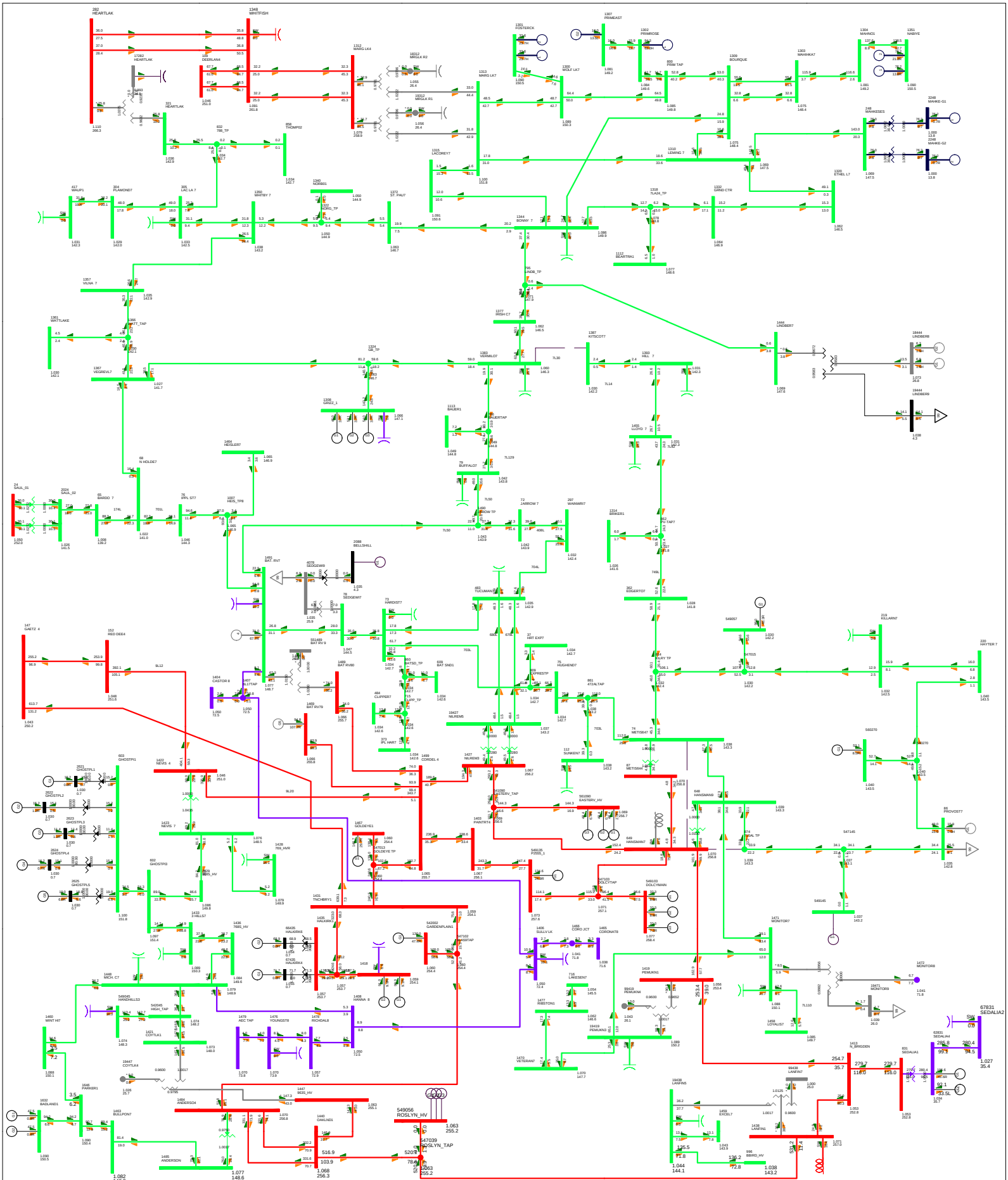
Attachment A2- 1	Contingency	Study Case Description	P2034 Cold Lake Area Cogen
	CONT 068: 7L749 (899S Edgerton - 716S Lloydminster - 880S Briker)	2028SP PRE-PROJ Base Case	Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



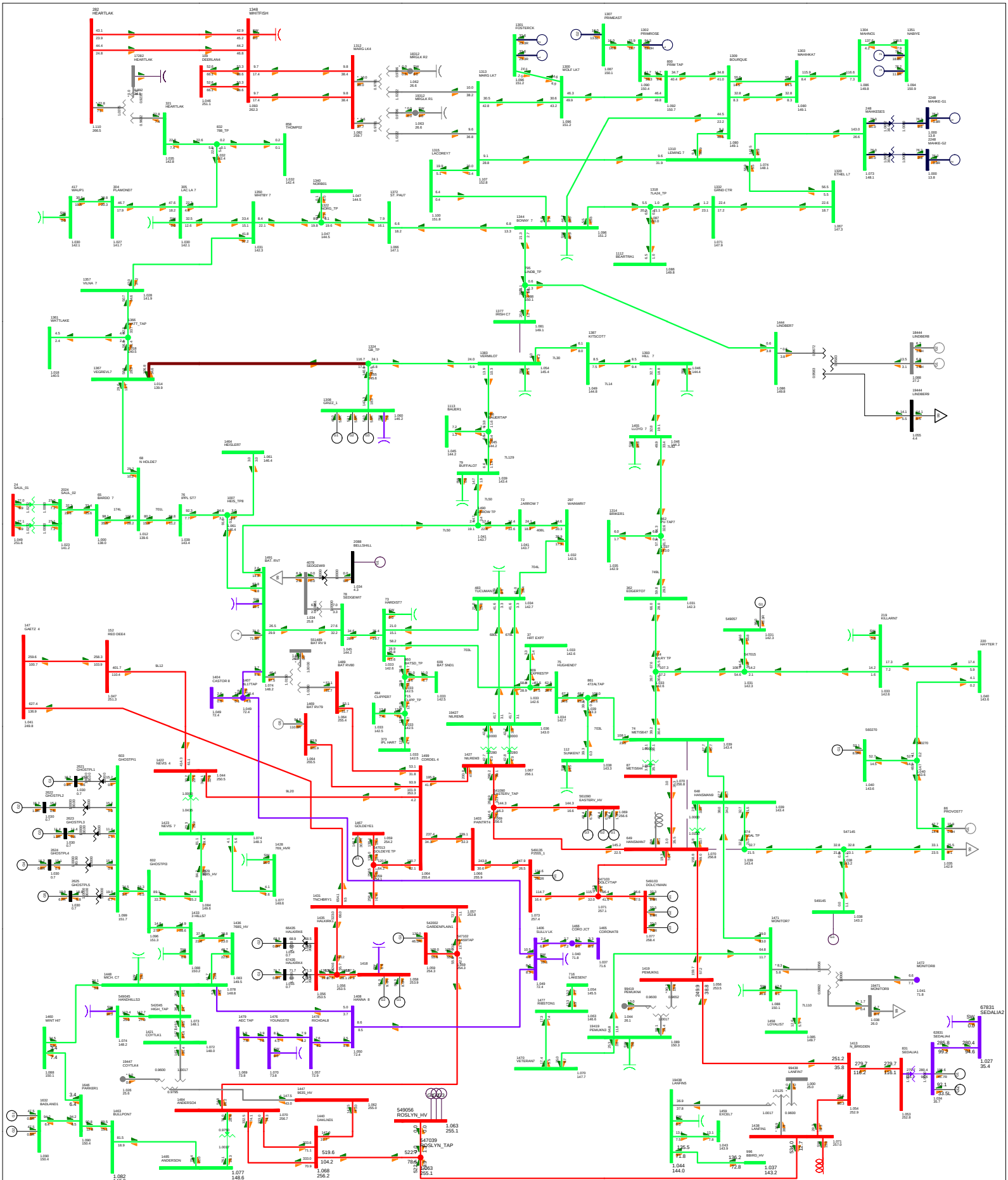
Attachment A2- 1	Contingency	Study Case Description	P2034 Cold Lake Area Cogen
	CONT 069: 7L42 (751S Hill - 716S Lloydminster)	2028SP PRE-PROJ Base Case	Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



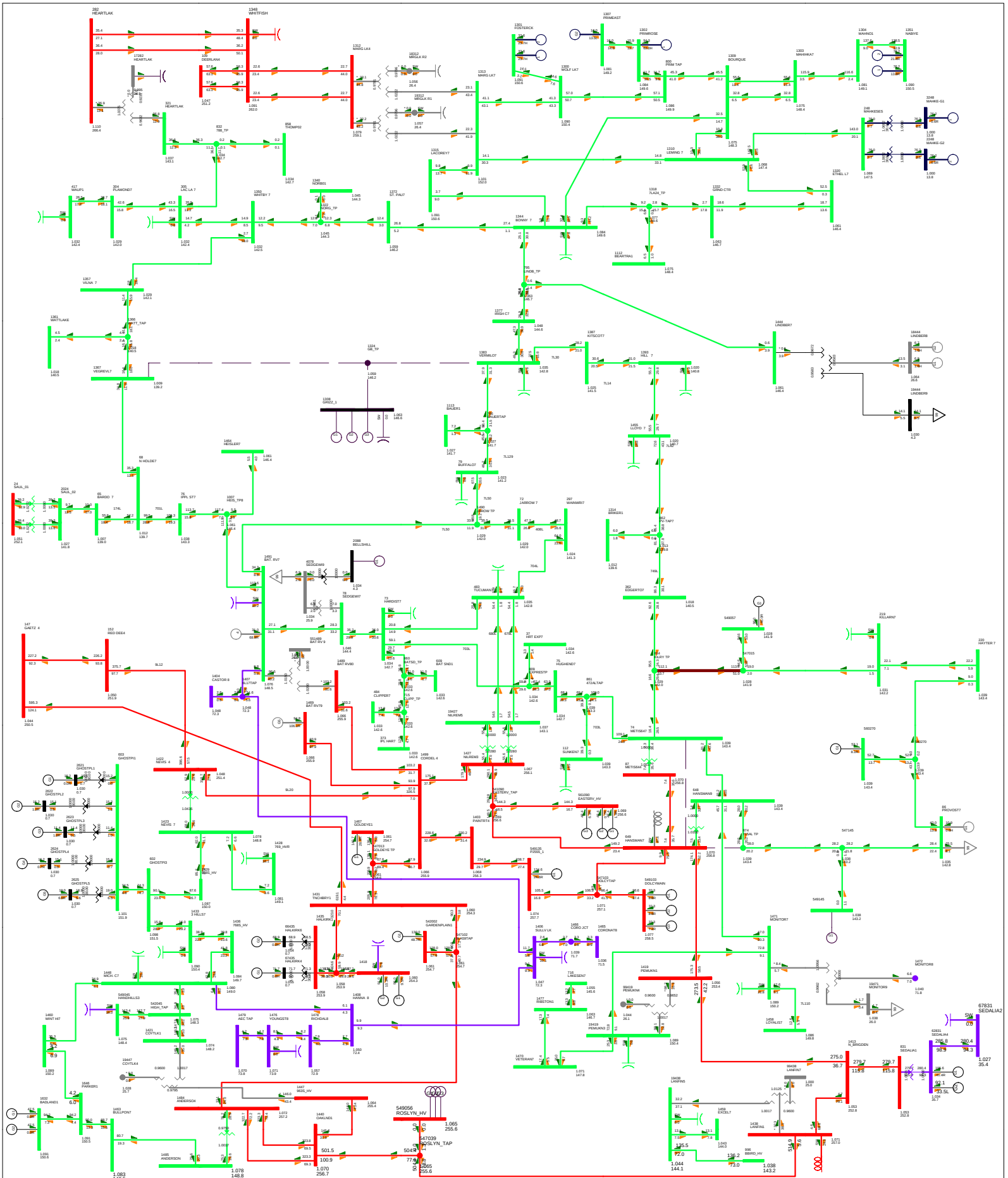
Attachment A2- 1	Contingency	Study Case Description	P2034 Cold Lake Area Cogen
	CONT 070: 7L14 (705S Kitscoty - 751S Hill)	2028SP PRE-PROJ Base Case	Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A2- 1	Contingency	Study Case Description	P2034 Cold Lake Area Cogen
	CONT 071: 7L130 (710S Vermilion - 705S Kitscoty)	2028SP PRE-PROJ Base Case	Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A2- 1	Contingency	Study Case Description	P2034 Cold Lake Area Cogen
	CONT 072: 7L117 (706S Irish Creek - 710S Vermilion)	2028SP PRE-PROJ Base Case	Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A2- 1

Contingency

CONT 073: 7L65 (709S Vegreville - 710S Vermilion - 708S Grizzly Bear)

Study Case Description

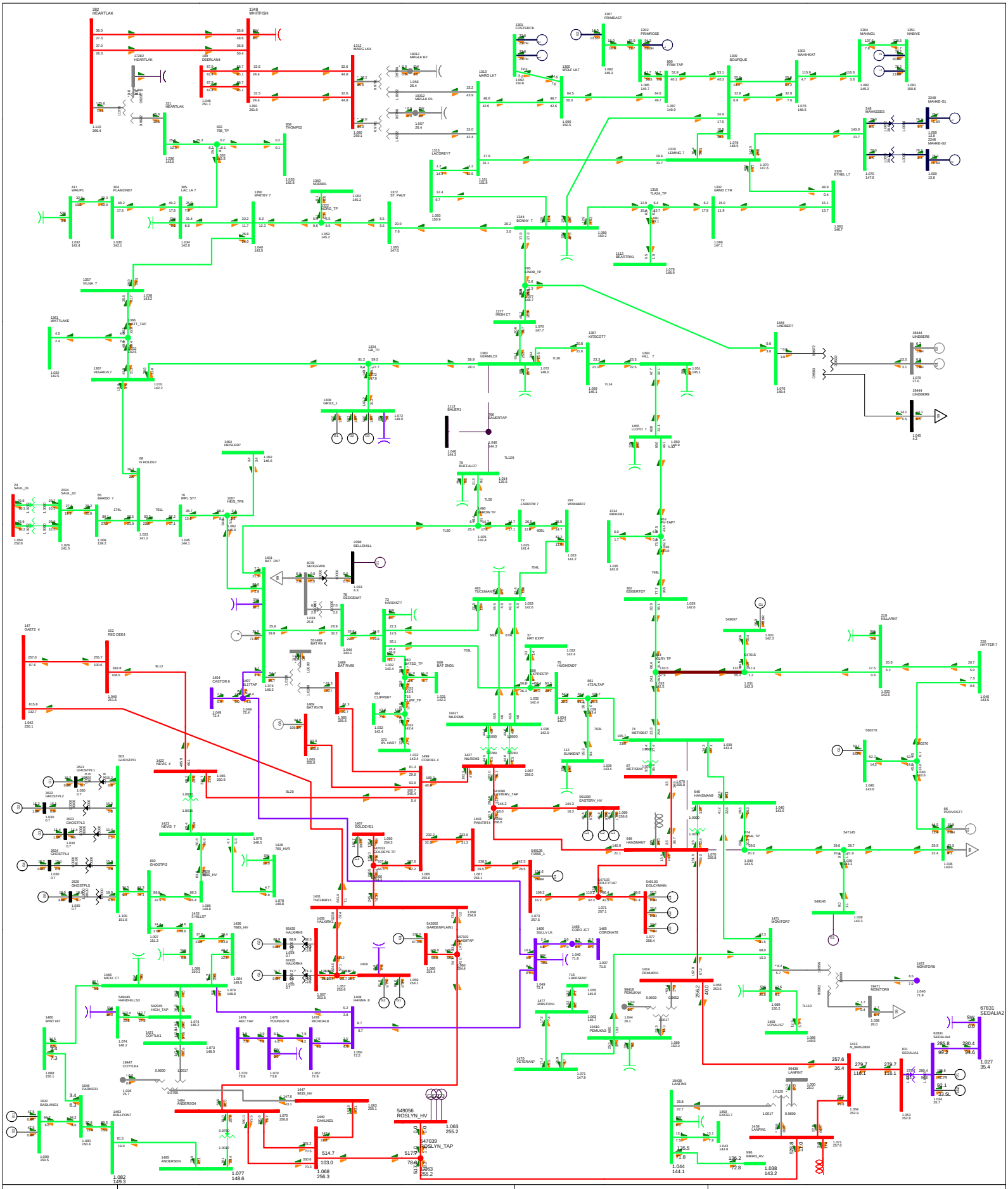
2028SP PRE-PROJ

Base Case

P2034 Cold Lake Area Cogen

Bus - VOLTAGE (kV/PU)
Branch - MW/Mvar
Equipment - MW/Mvar

100.0%RATEA
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A2- 1

Contingency

CONT 074: 7L129 (710S Vermilion - 918S Bauer - 526S Buffalo Creek)

Study Case Description

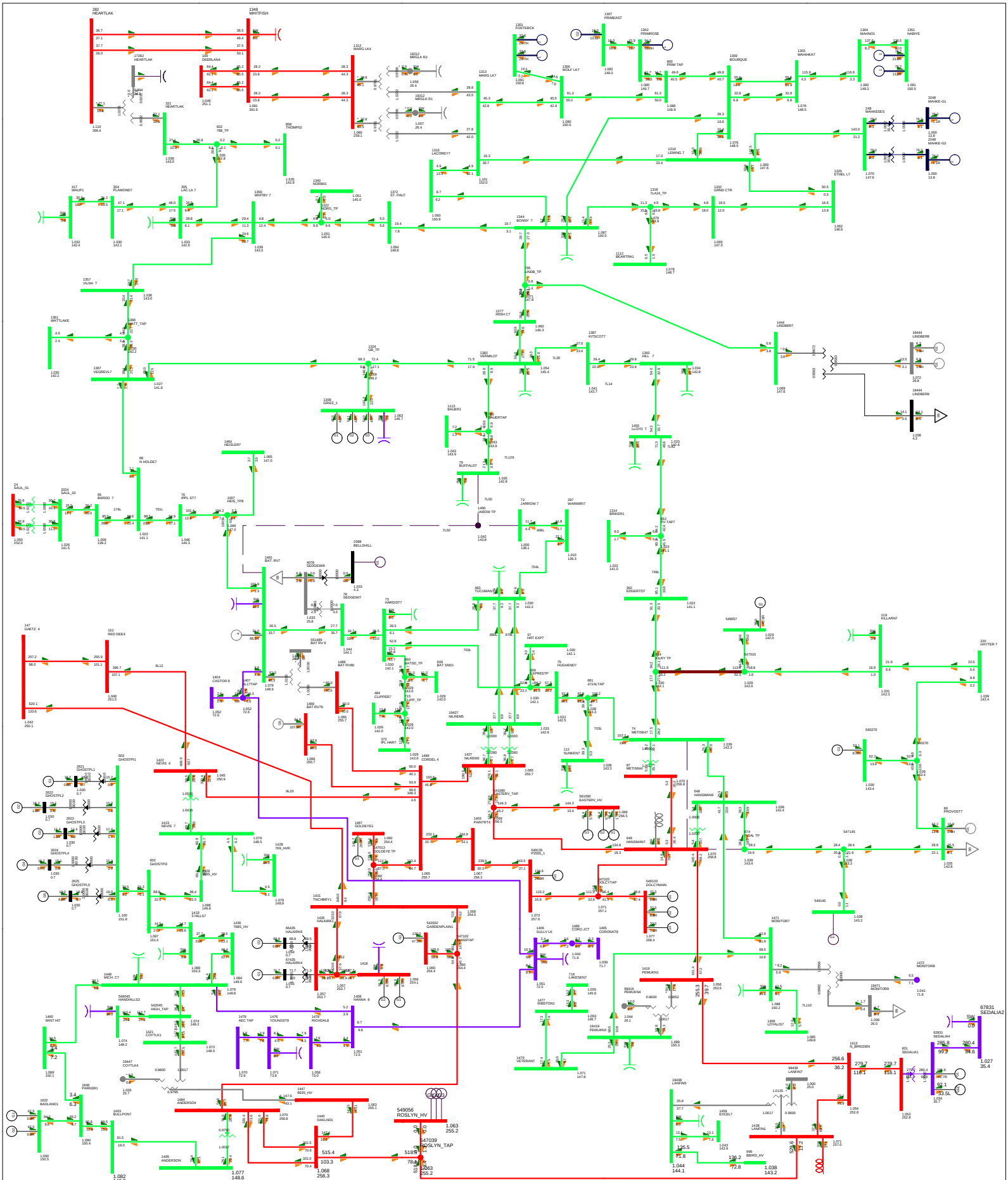
2028SP PRE-PROJ

Base Case

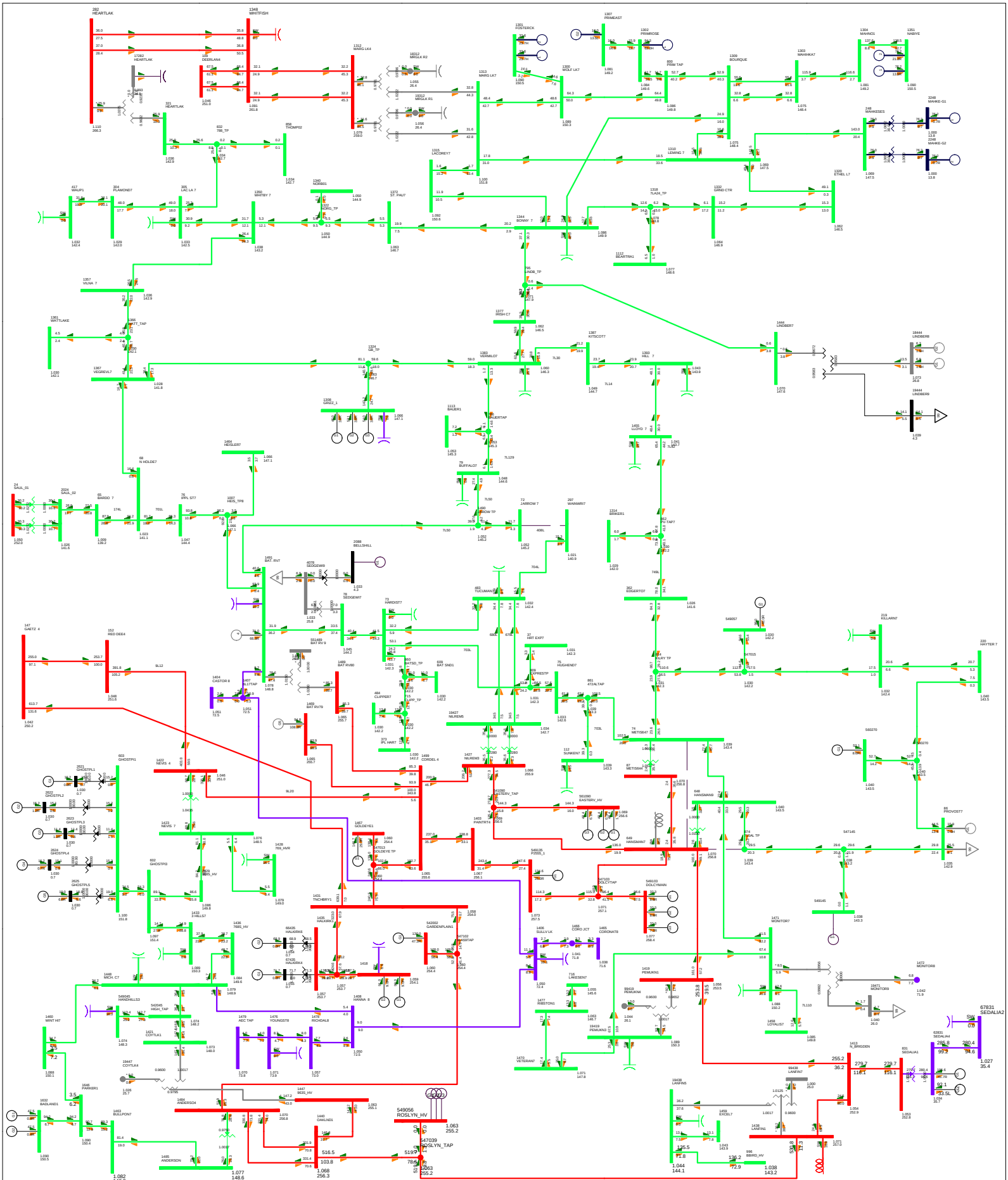
P2034 Cold Lake Area Cogen

Bus - VOLTAGE (kV/PU)
Branch - MW/Mvar
Equipment - MW/Mvar

100.0%RATEA
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A2- 1	Contingency	Study Case Description	P2034 Cold Lake Area Cogen
	CONT 075: 7L50 (526S Buffalo Creek - 757S Battle River - 252S Jarrow)	2028SP PRE-PROJ Base Case	Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A2- 1

Contingency

CONT 076: 408L (252S Jarrow - 51S Wainwright)

Study Case Description

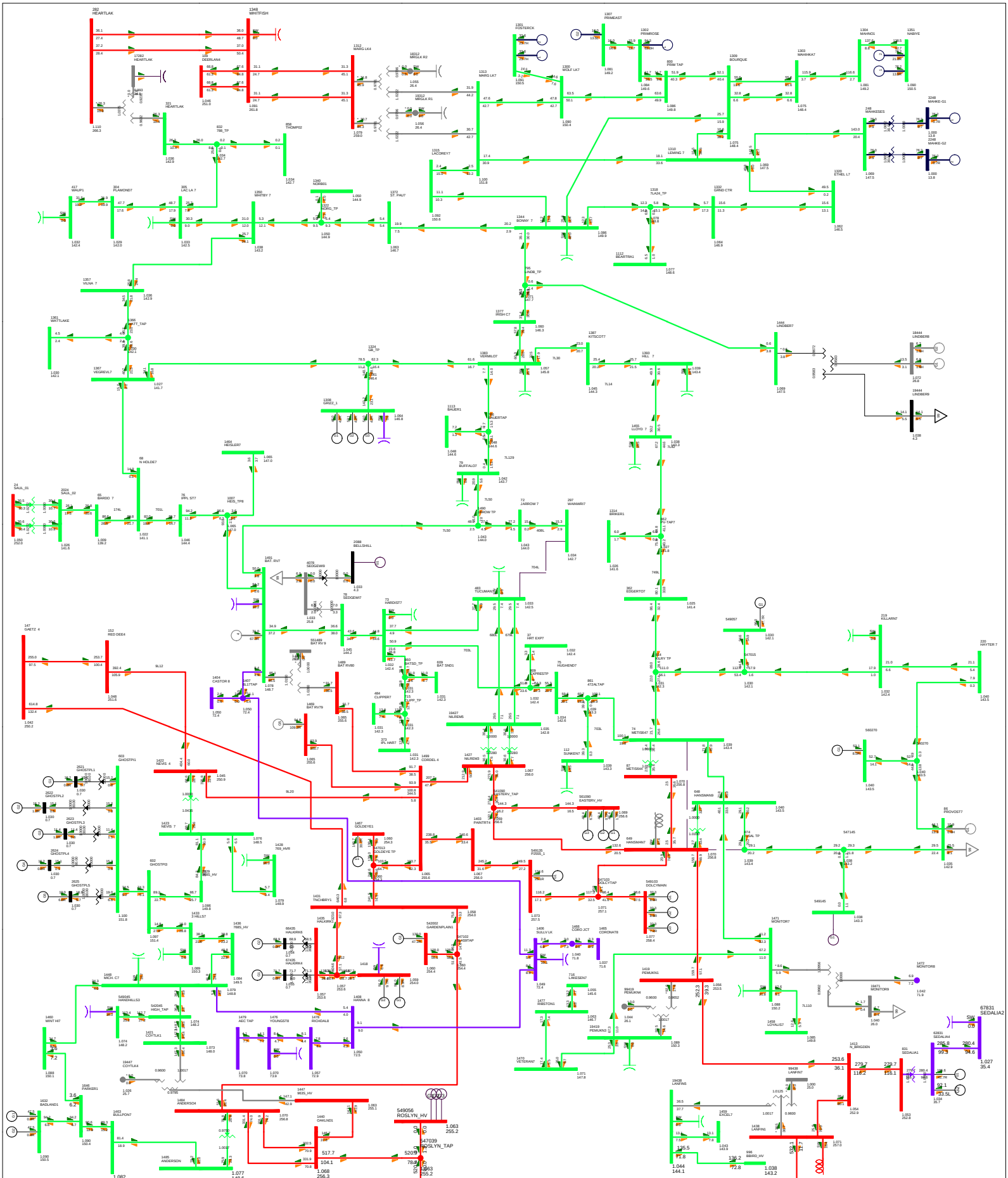
2028SP PRE-PROJ

Base Case

P2034 Cold Lake Area Cogen

Bus - VOLTAGE (kV/PU)
Branch - MW/Mvar
Equipment - MW/Mvar

100.0%RATEA
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A2- 1

Contingency

CONT 077: 704L (51S Wainwright - 478S Tucuman)

Study Case Description

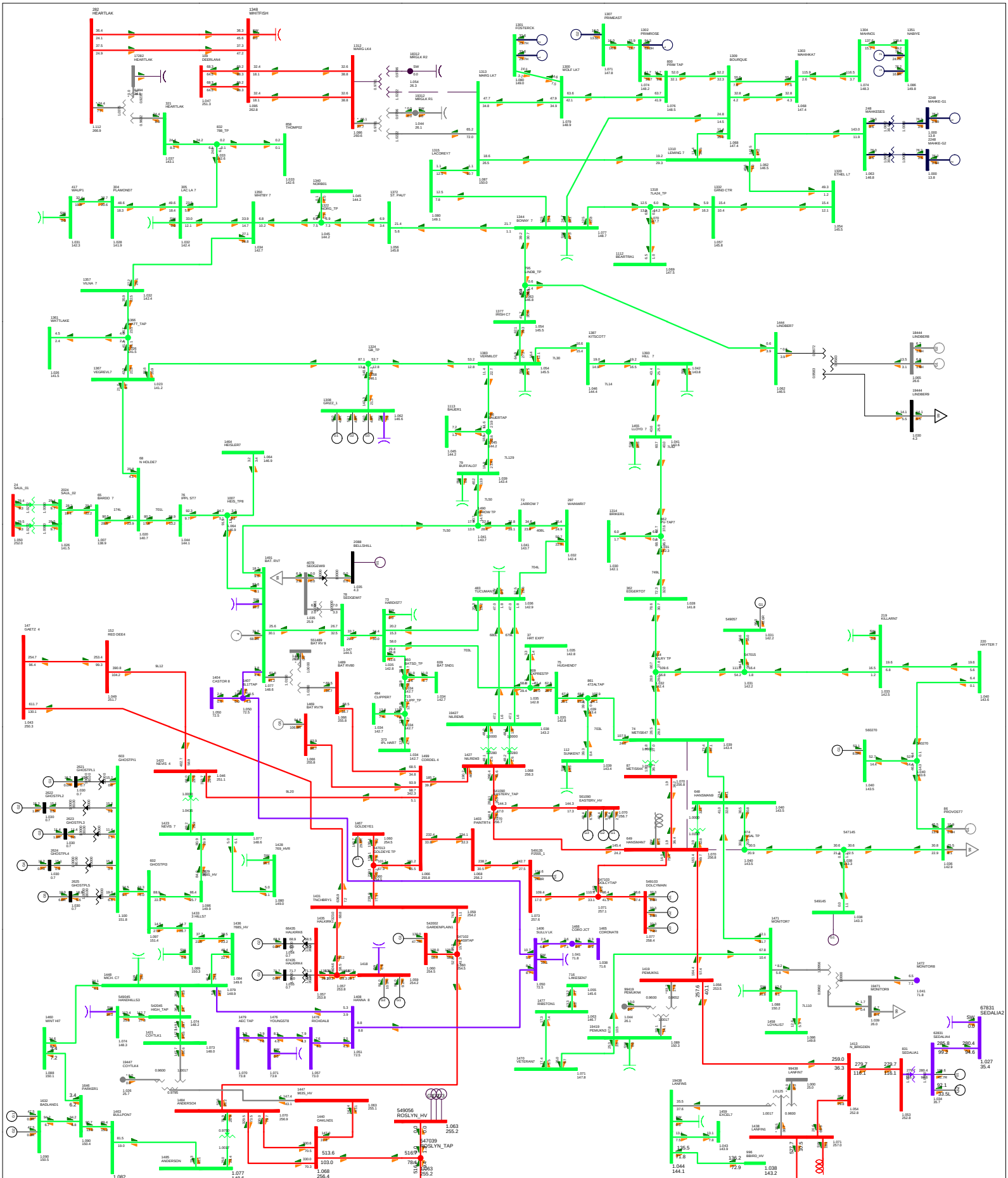
2028SP PRE-PROJ

Base Case

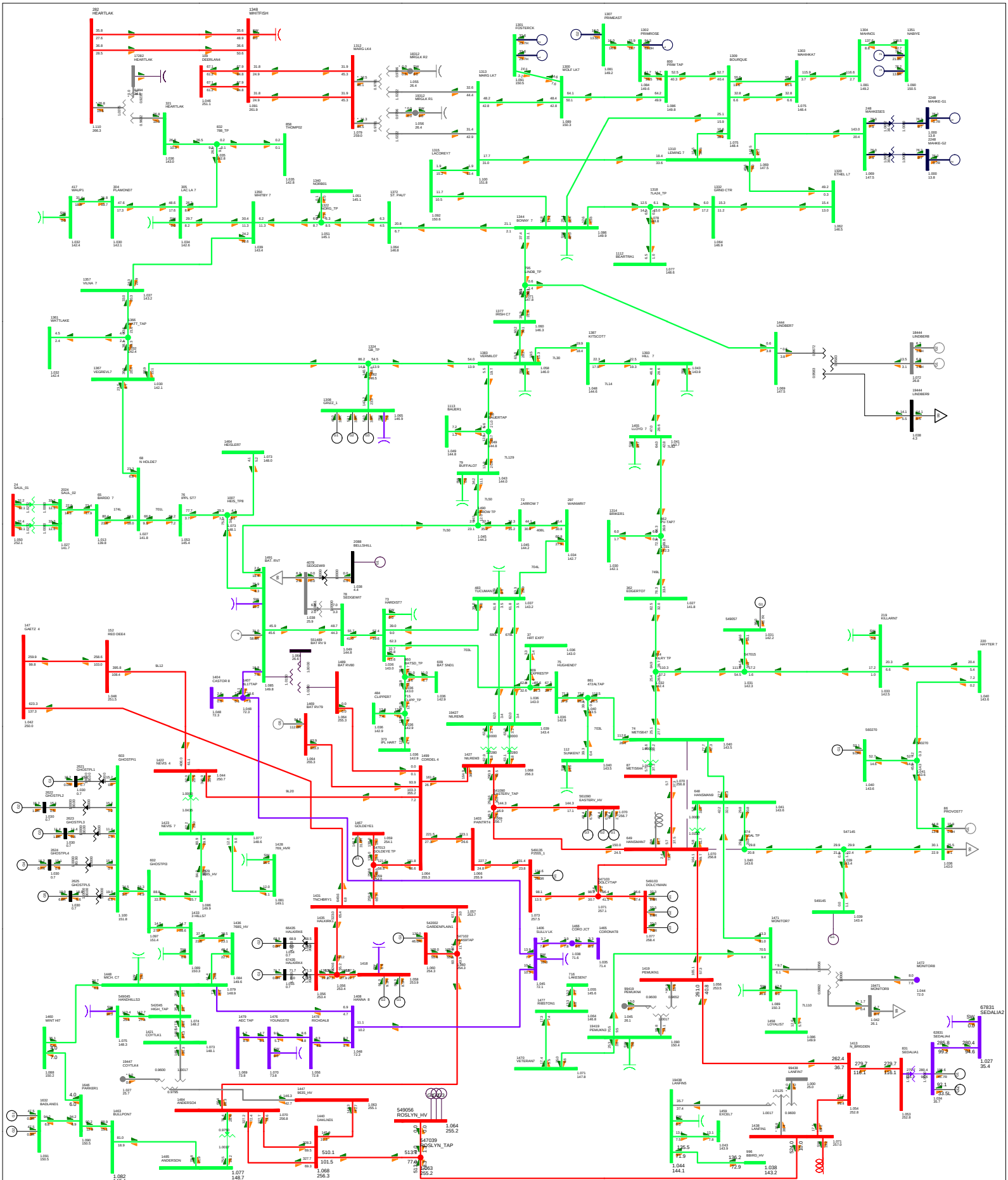
P2034 Cold Lake Area Cogen

Bus - VOLTAGE (kV/PU)
Branch - MW/Mvar
Equipment - MW/Mvar

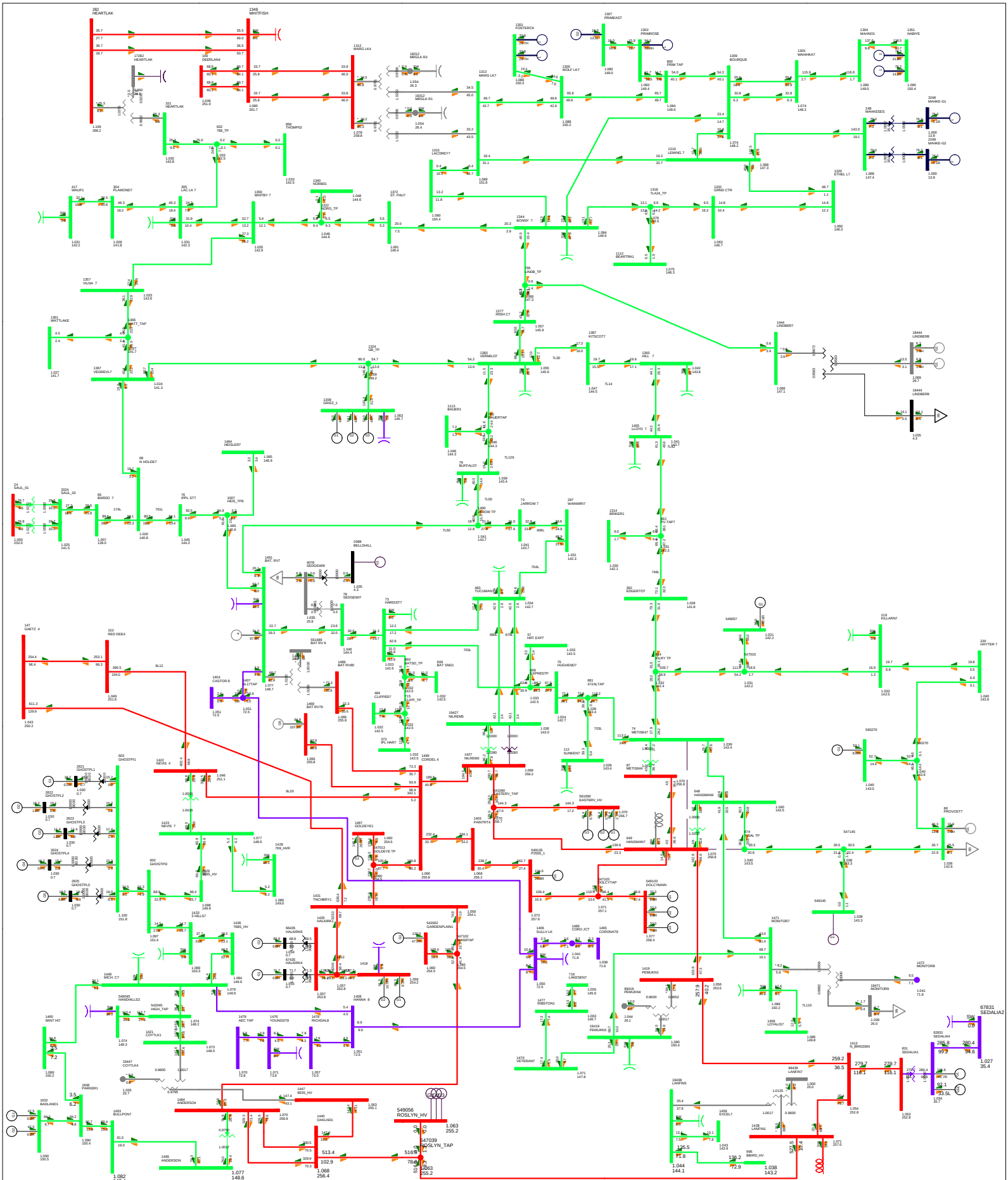
100.0%RATEA
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



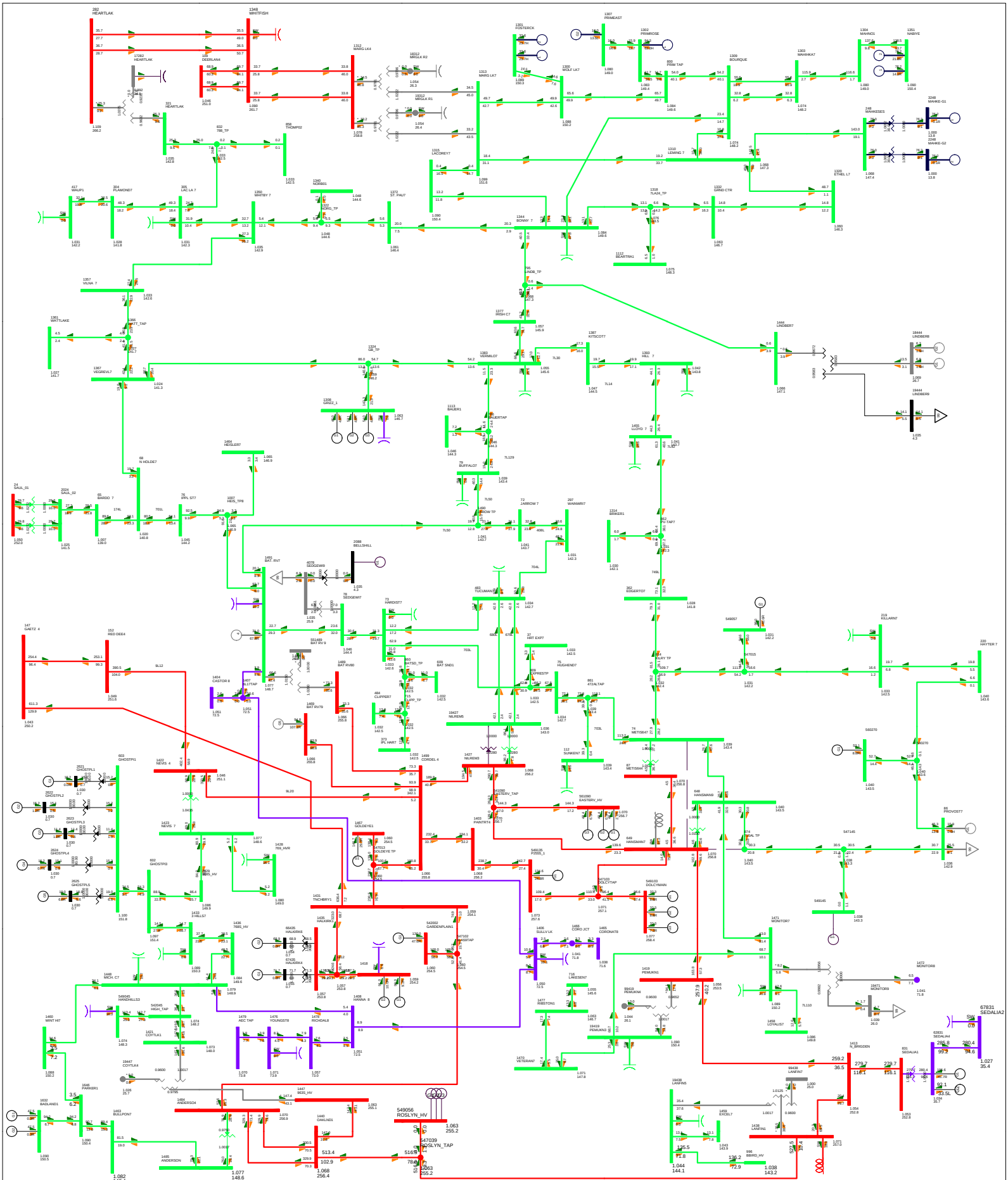
Attachment A2- 1	Contingency	Study Case Description	P2034 Cold Lake Area Cogen
	CONT 078: Marguerite Lake 2T	2028SP PRE-PROJ Base Case	Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



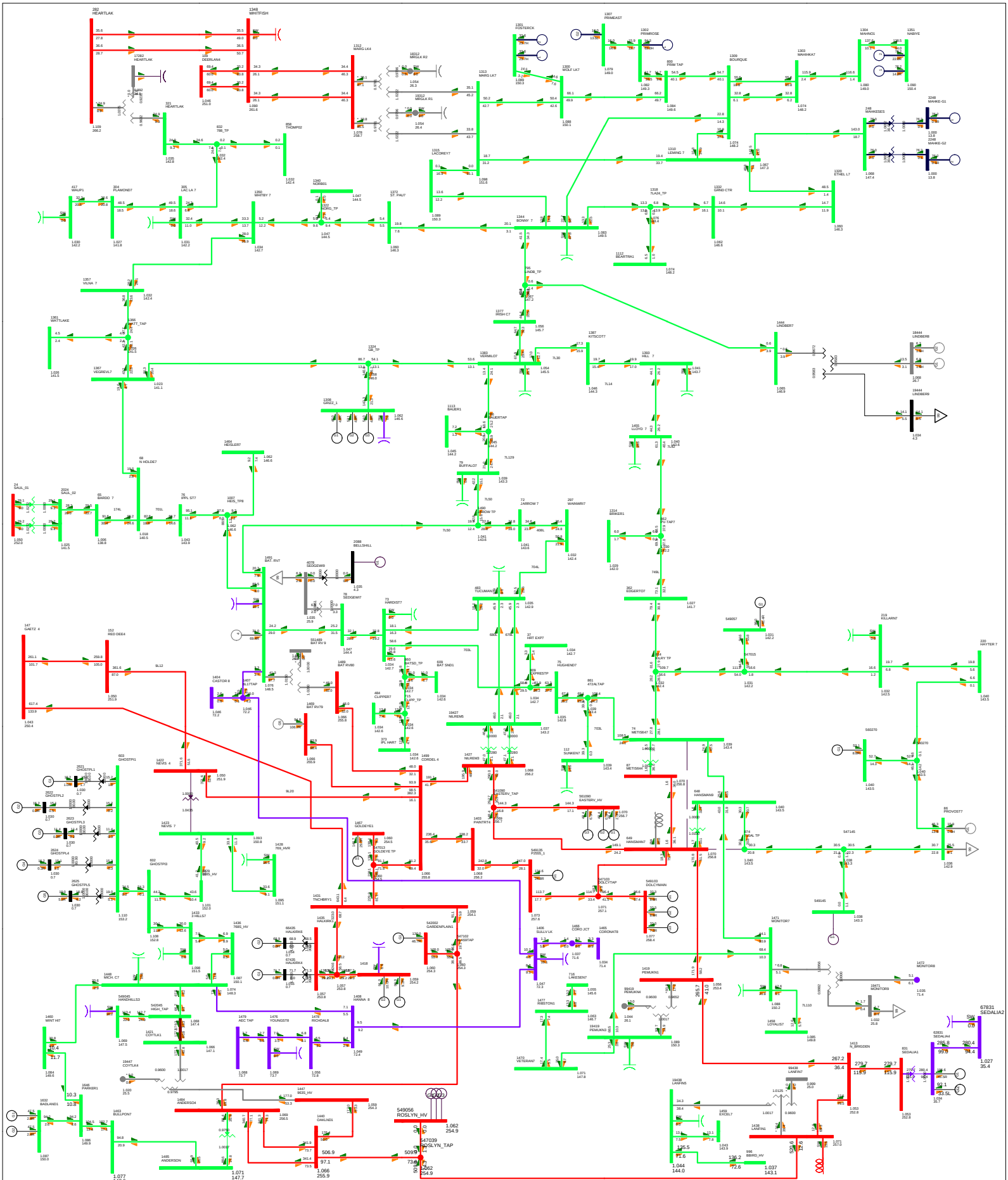
Attachment A2- 1	Contingency	Study Case Description	P2034 Cold Lake Area Cogen
	CONT 079: Battle River T2	2028SP PRE-PROJ Base Case	Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A2- 1	Contingency	Study Case Description	P2034 Cold Lake Area Cogen
	CONT 080: 574S Nilrem 162.2TR	2028SP PRE-PROJ Base Case	Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A2- 1	**Contingency** CONT 081: 574S Nilrem 87ST1	**Study Case Description** 2028SP PRE-PROJ Base Case	**P2034 Cold Lake Area Cogen** Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A2- 1

Contingency

CONT 082: 766S Nevis 162.1TR

Study Case Description

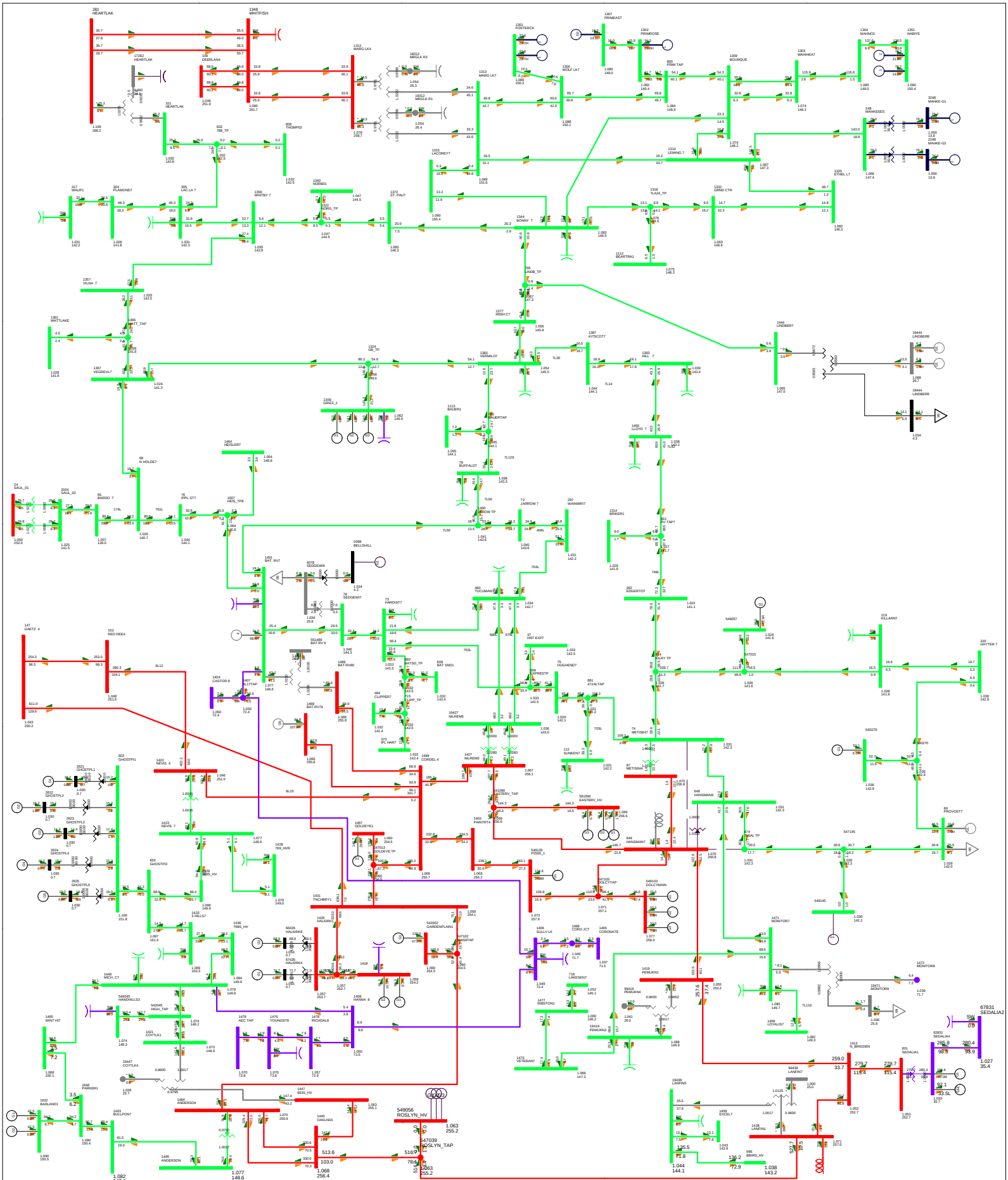
2028SP PRE-PROJ

Base Case

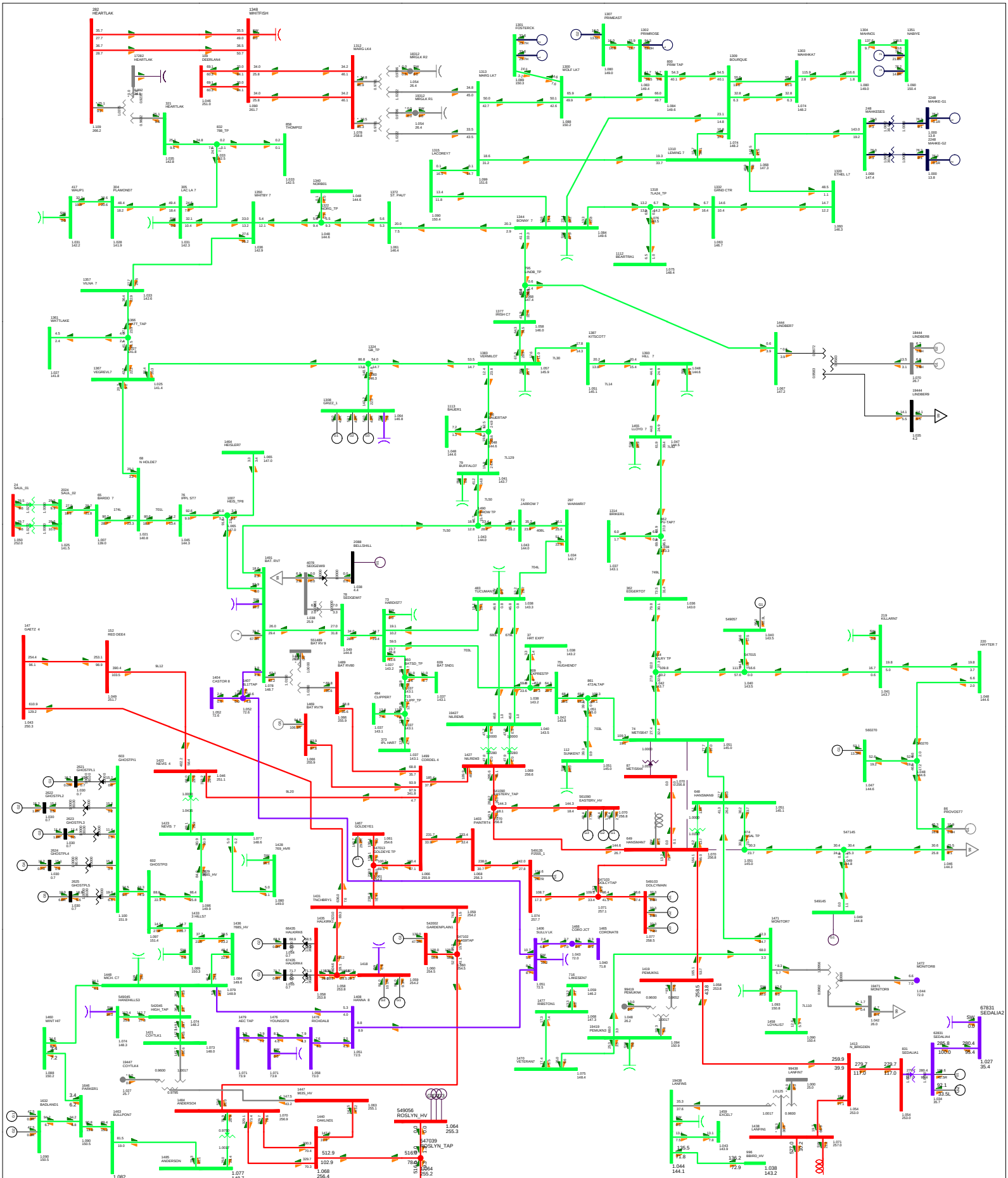
P2034 Cold Lake Area Cogen

Bus - VOLTAGE (kV/PU)
Branch - MW/Mvar
Equipment - MW/Mvar

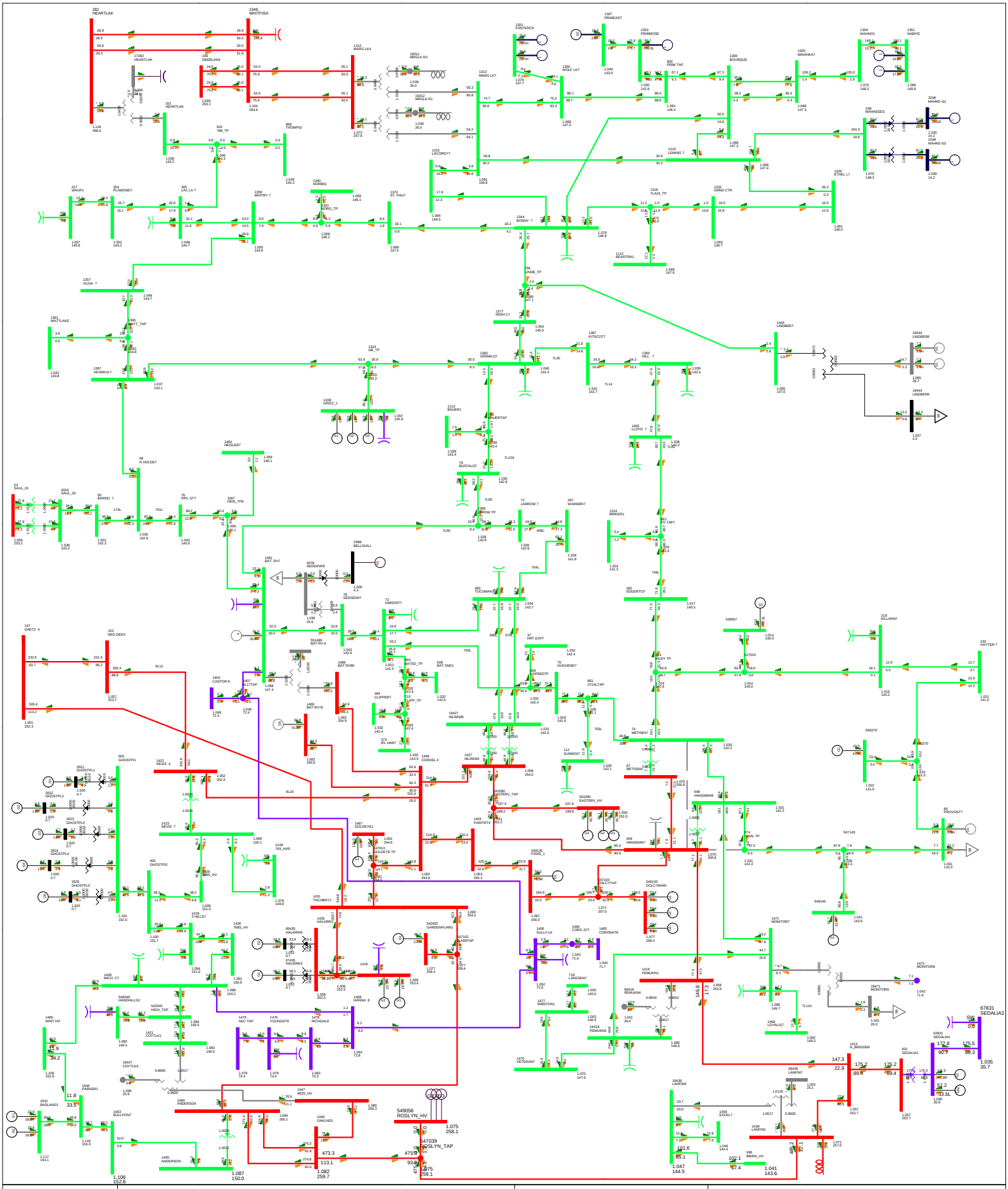
100.0%RATEA
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A2- 1	**Contingency** CONT 083: 650S Hansman Lake 63ST1	**Study Case Description** 2028SP PRE-PROJ Base Case	**P2034 Cold Lake Area Cogen** Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A2- 1	Contingency	Study Case Description	P2034 Cold Lake Area Cogen
	CONT 084: 648S Metiskow T3	2028SP PRE-PROJ Base Case	Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A2- 2

Contingency

CONT 000: All elements in service

Study Case Description

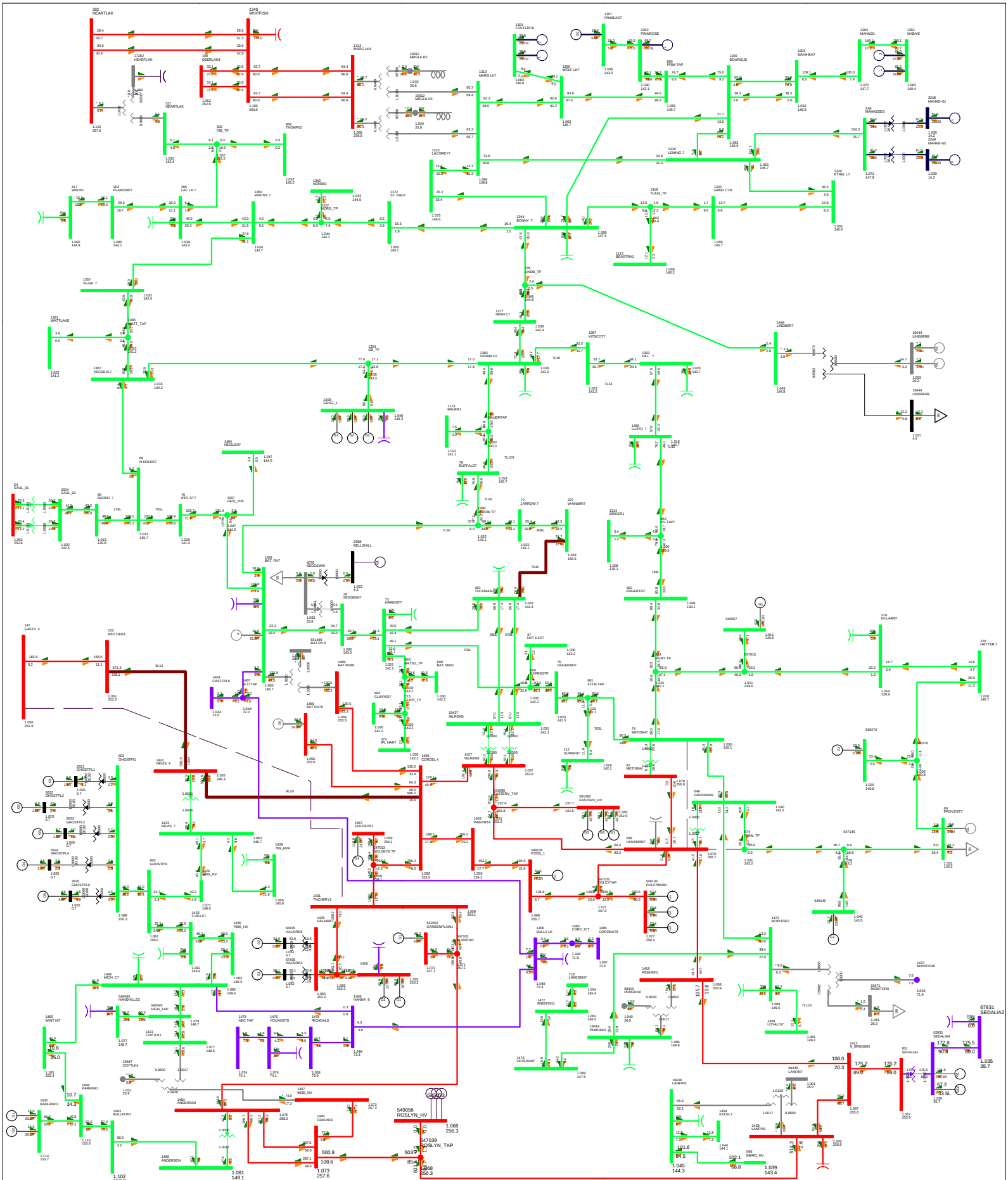
2028SL PRE-PROJ

Base Case

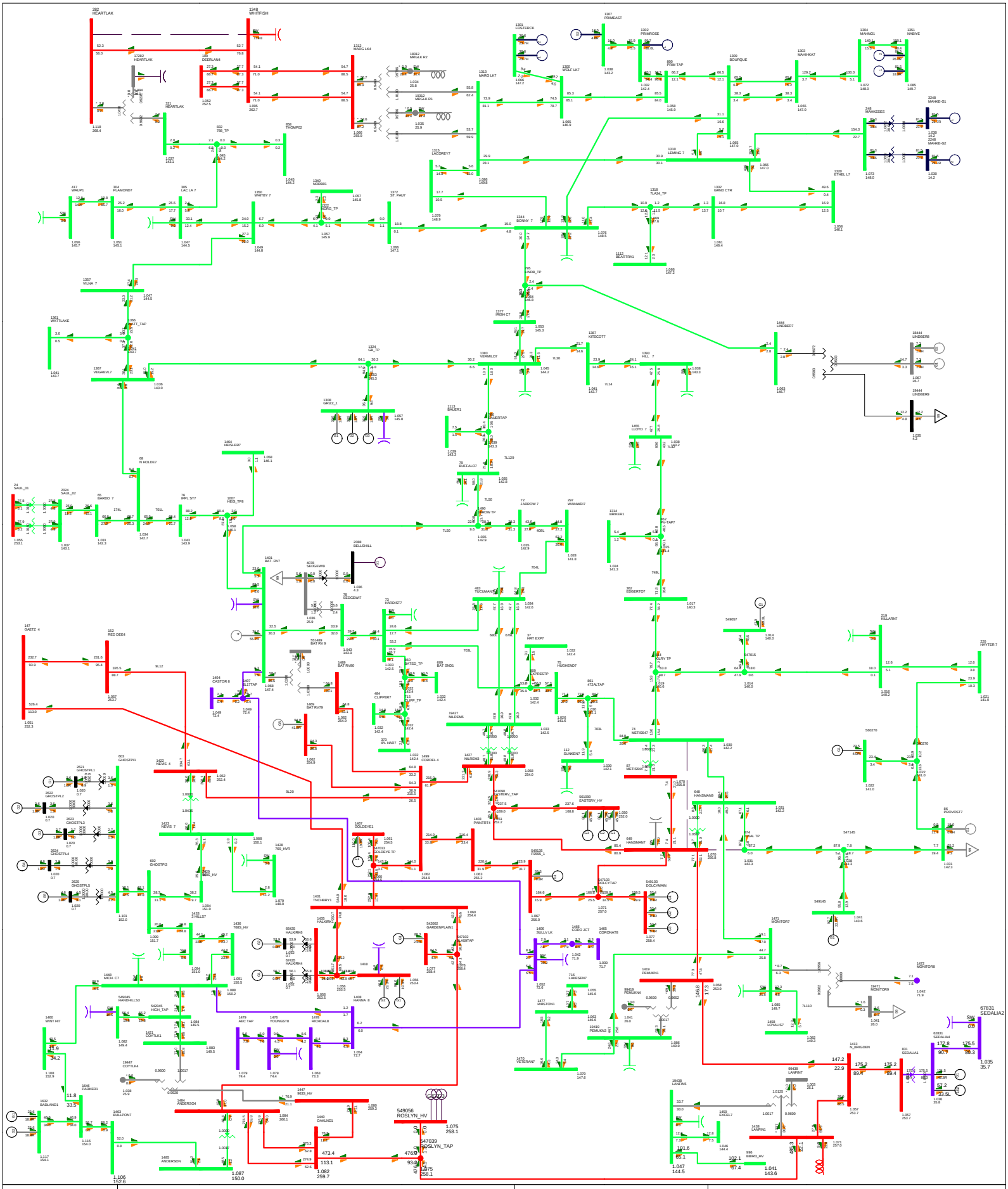
P2034 Cold Lake Area Cogen

Bus - VOLTAGE (kV/PU)
Branch - MW/MVar
Equipment - MW/Mvar

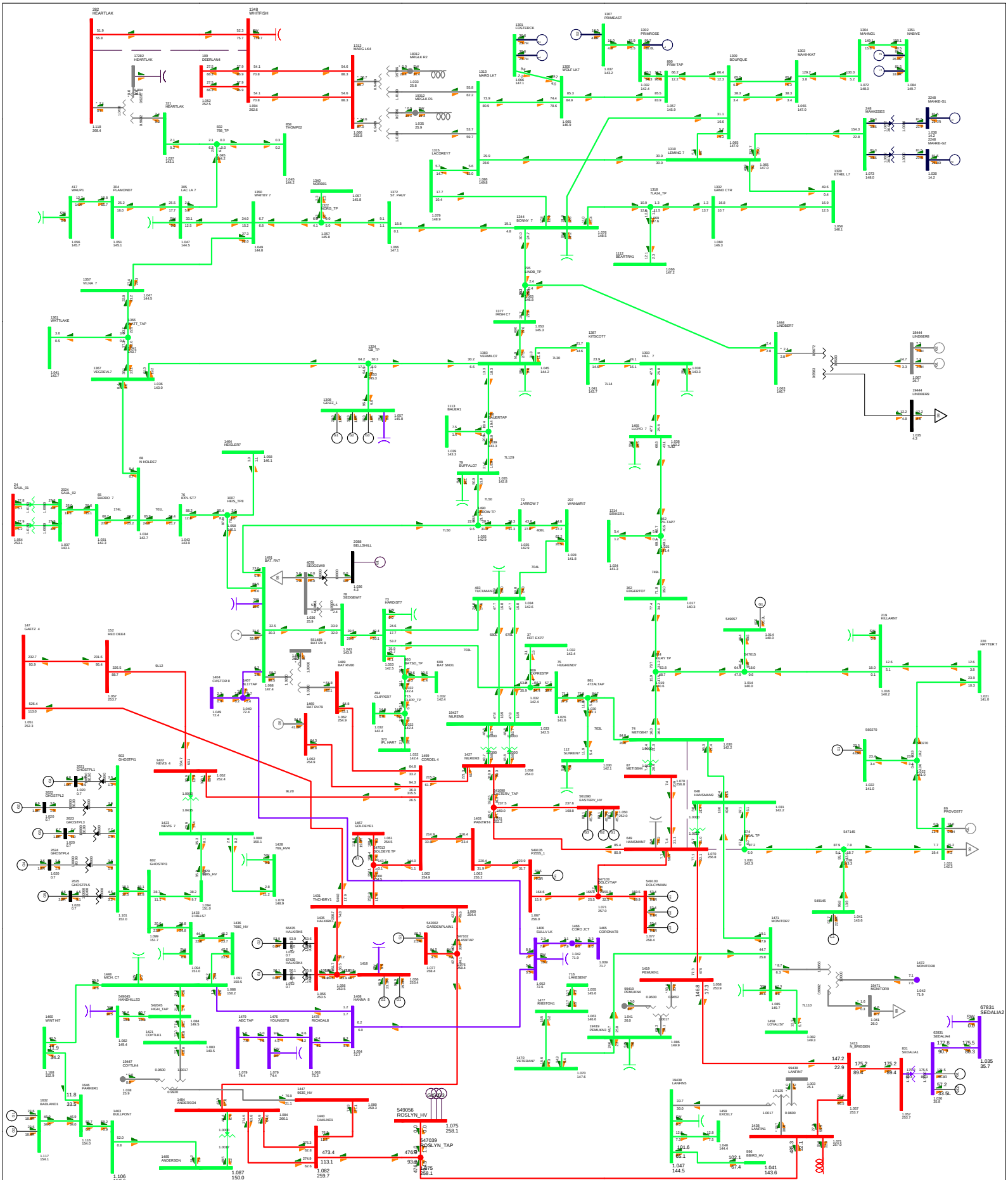
100.0%RATEA
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A2- 2	Contingency	Study Case Description	P2034 Cold Lake Area Cogen
	CONT 001: CETO (87S Gaetz - 972S Tinchebray)	2028SL PRE-PROJ Base Case	Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A2- 2	Contingency	Study Case Description	P2034 Cold Lake Area Cogen
	CONT 010: 9L22 (898S Heart Lake - 825S Whitefish Lake)	2028SL PRE-PROJ Base Case	Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A2- 2

Contingency

CONT 011: 9L81 (898S Heart Lake - 825S Whitefish Lake)

Study Case Description

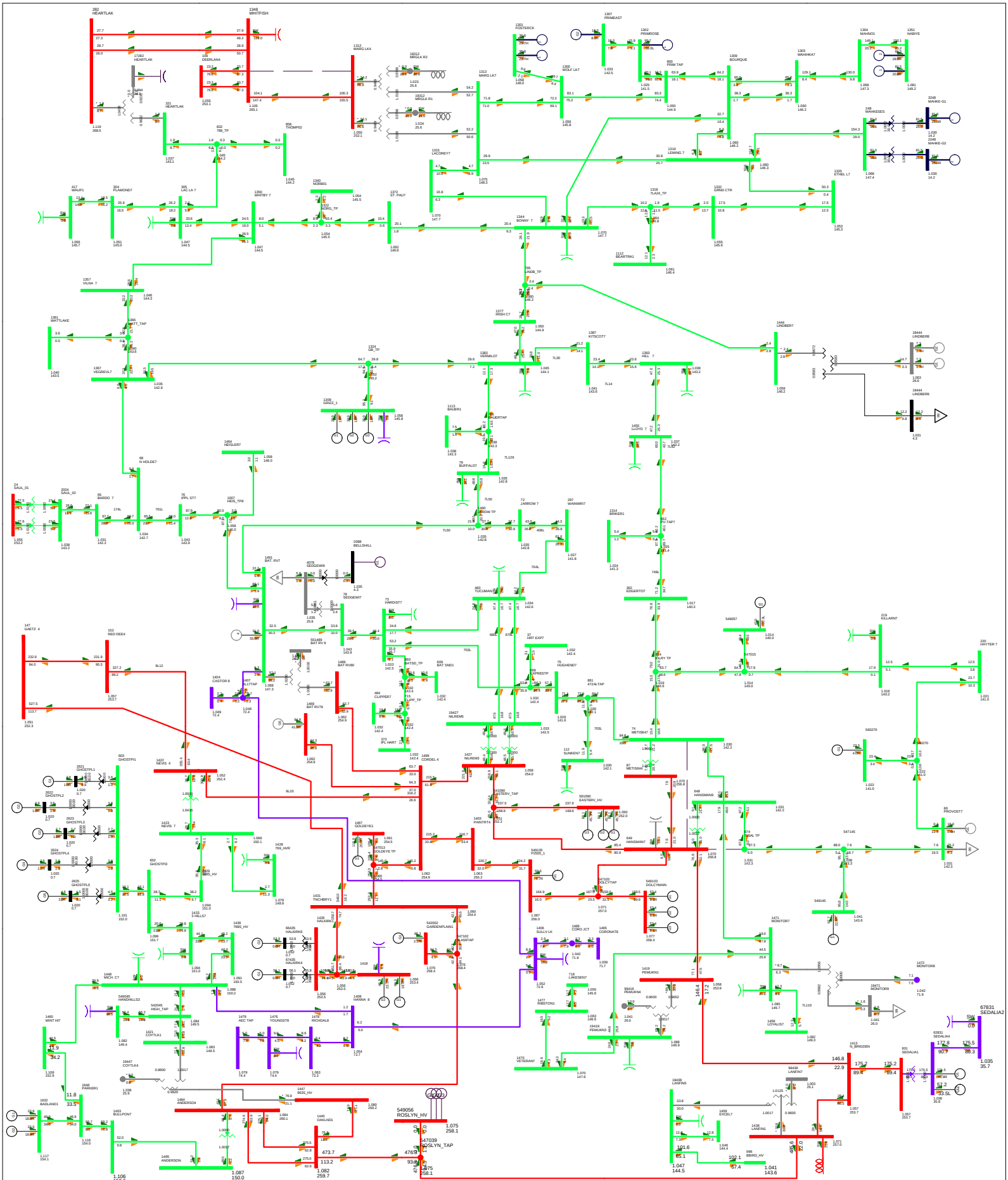
2028SL PRE-PROJ

Base Case

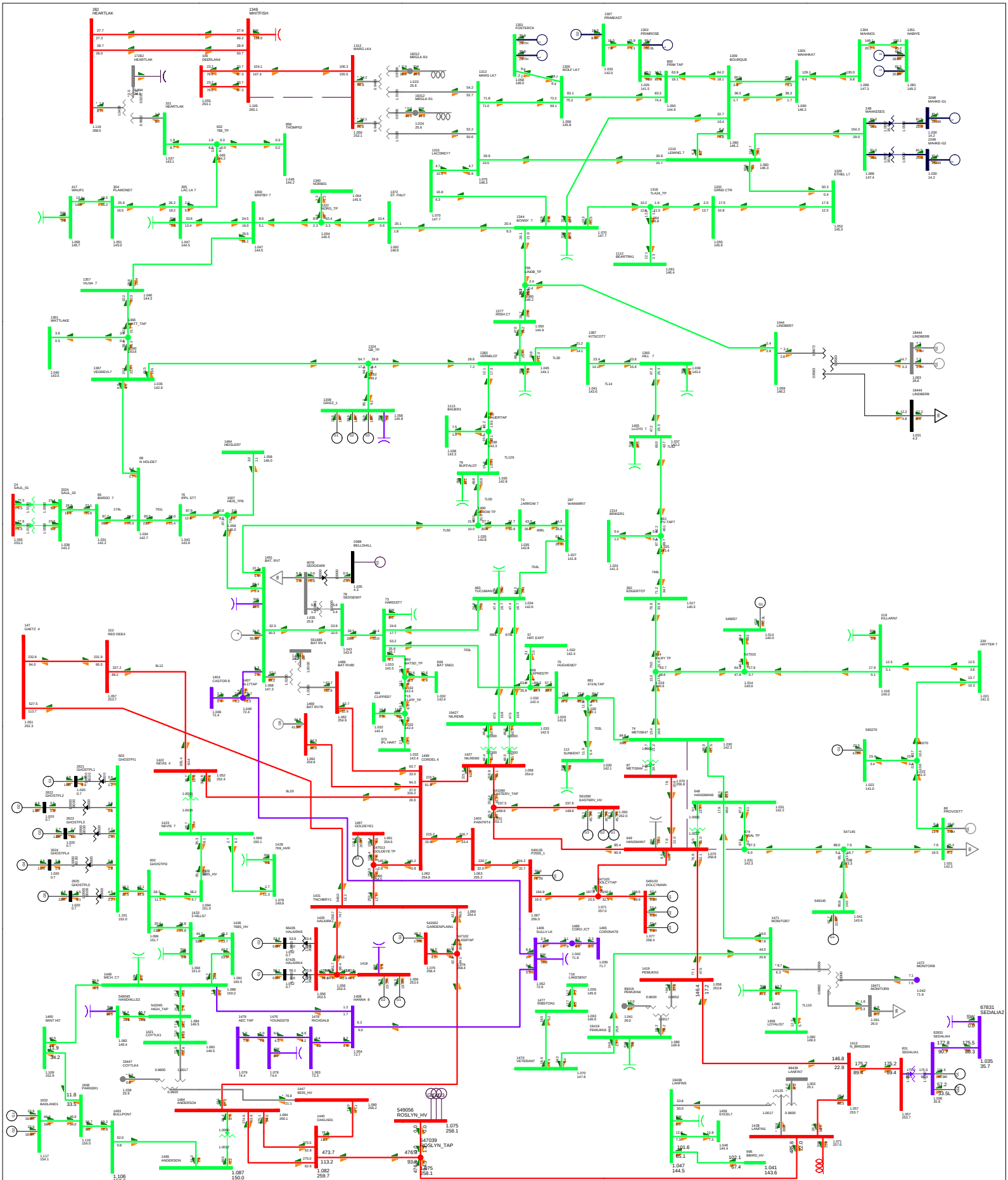
P2034 Cold Lake Area Cogen

Bus - VOLTAGE (kV/PU)
Branch - MW/Mvar
Equipment - MW/Mvar

100.0%RATEA
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A2- 2	Contingency	Study Case Description	P2034 Cold Lake Area Cogen
	CONT 012: 9L36 (826S Marguerite Lake - 825S Whitefish Lake)	2028SL PRE-PROJ Base Case	Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A2- 2

Contingency

CONT 013: 9L37 (826S Marguerite Lake - 825S Whitefish Lake)

Study Case Description

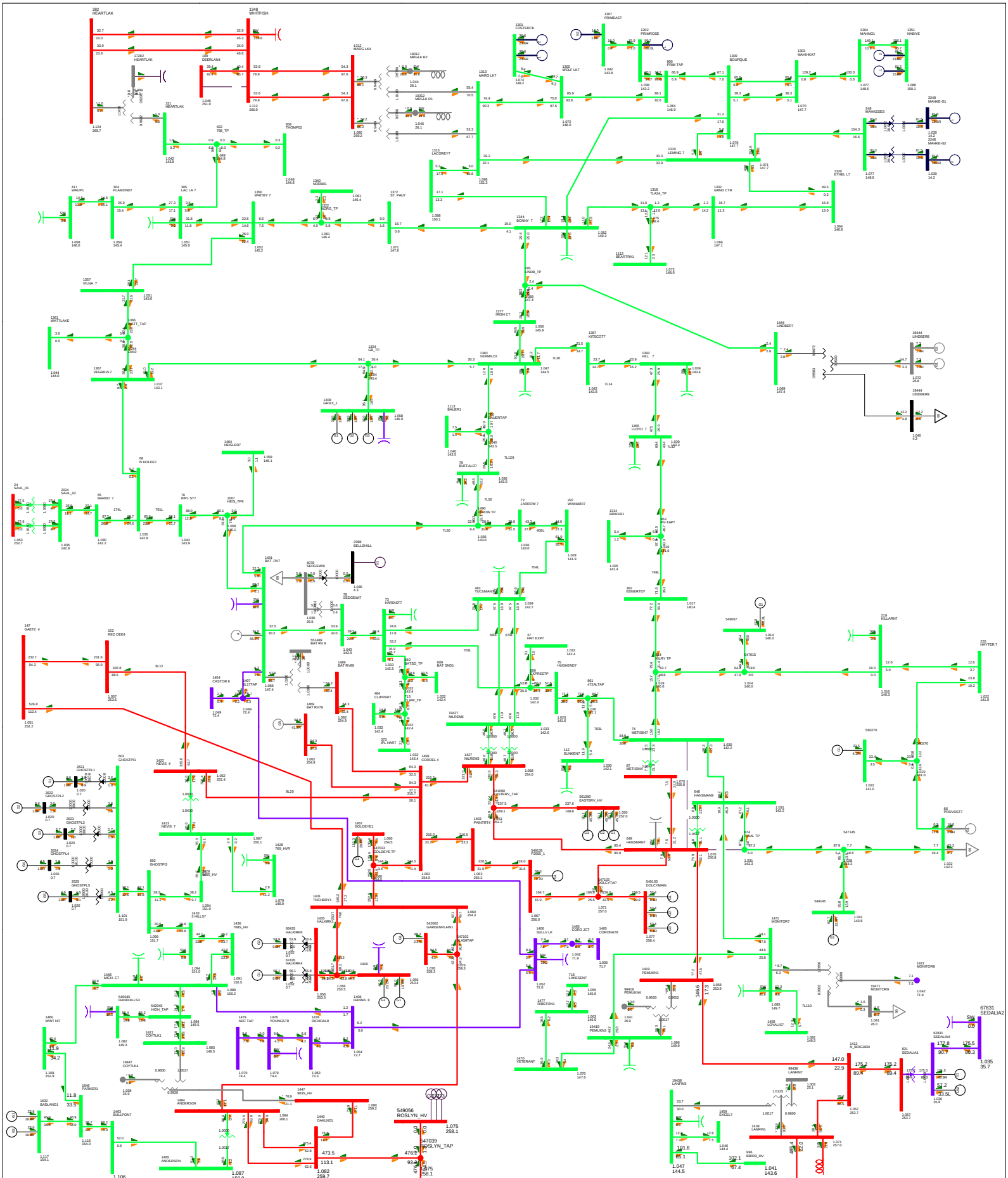
2028SL PRE-PROJ

Base Case

P2034 Cold Lake Area Cogen

Bus - VOLTAGE (kV/PU)
Branch - MW/Mvar
Equipment - MW/Mvar

100.0%RATEA
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A2- 2

Contingency

CONT 014: 9L960 (13S Deerland - 825S Whitefish Lake)

Study Case Description

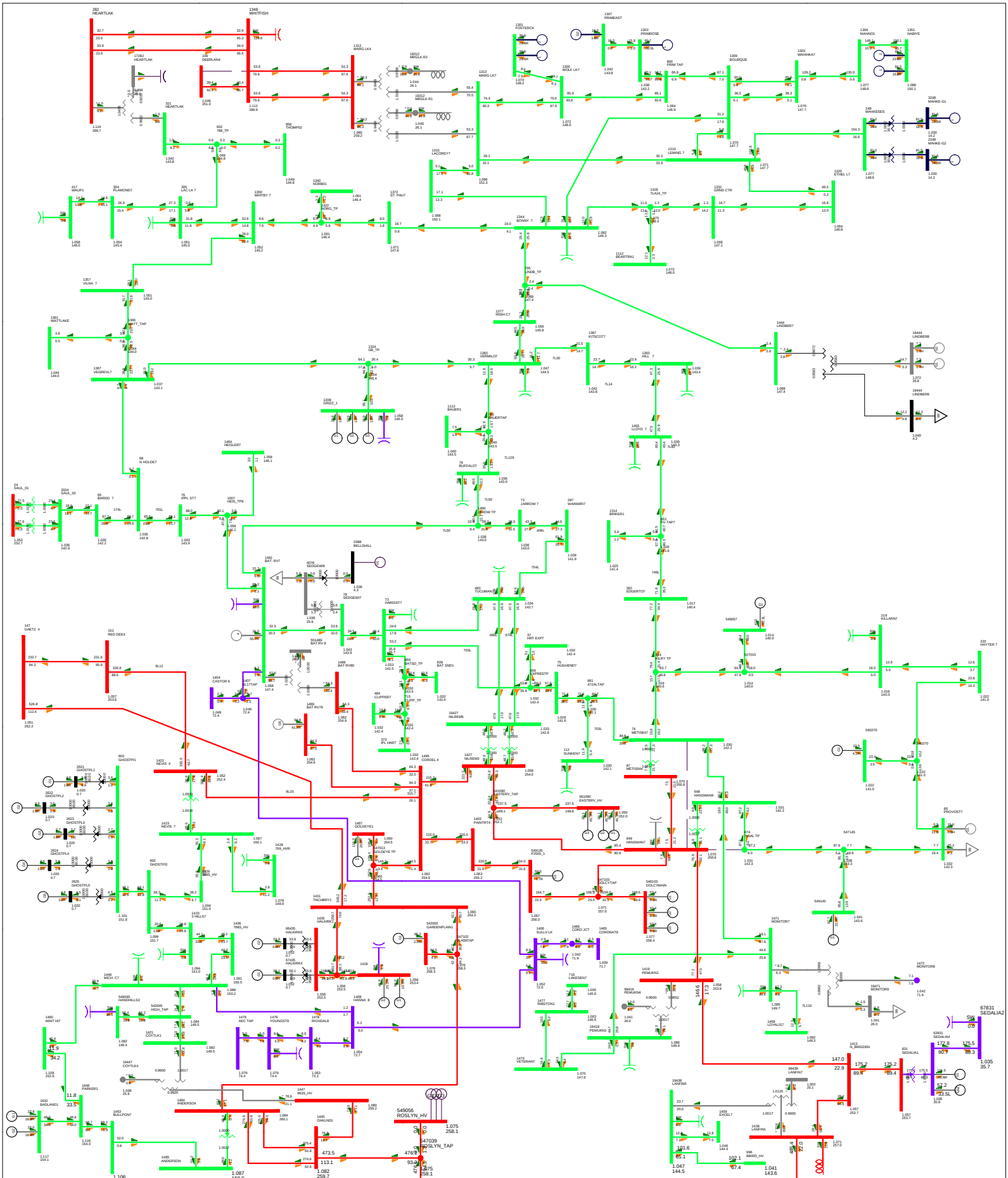
2028SL PRE-PROJ

Base Case

P2034 Cold Lake Area Cogen

Bus - VOLTAGE (kV/PU)
Branch - MW/Mvar
Equipment - MW/Mvar

100.0%RATEA
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A2- 2

Contingency

CONT 015: 9L961 (13S Deerland - 825S Whitefish Lake)

Study Case Description

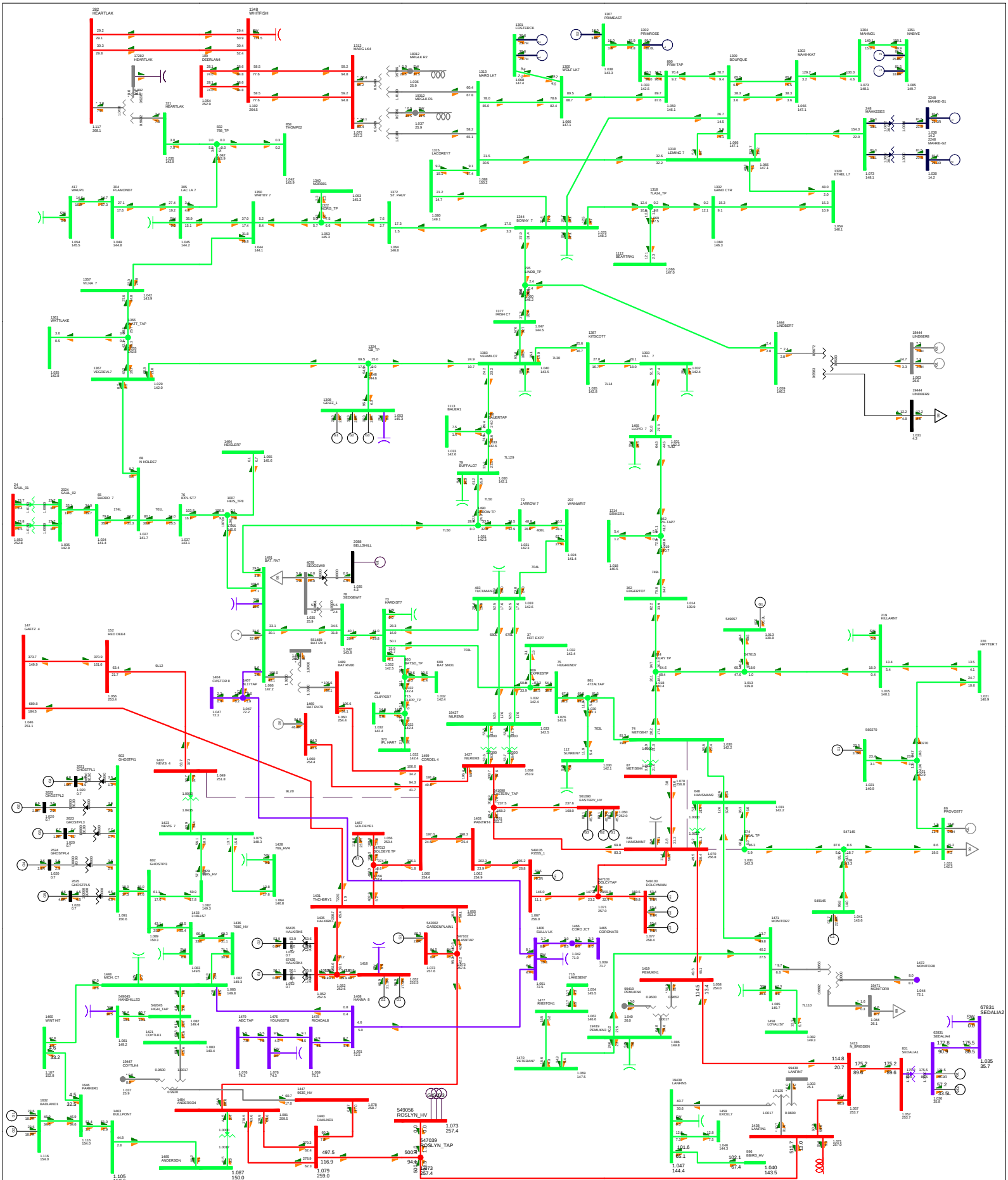
2028SL PRE-PROJ

Base Case

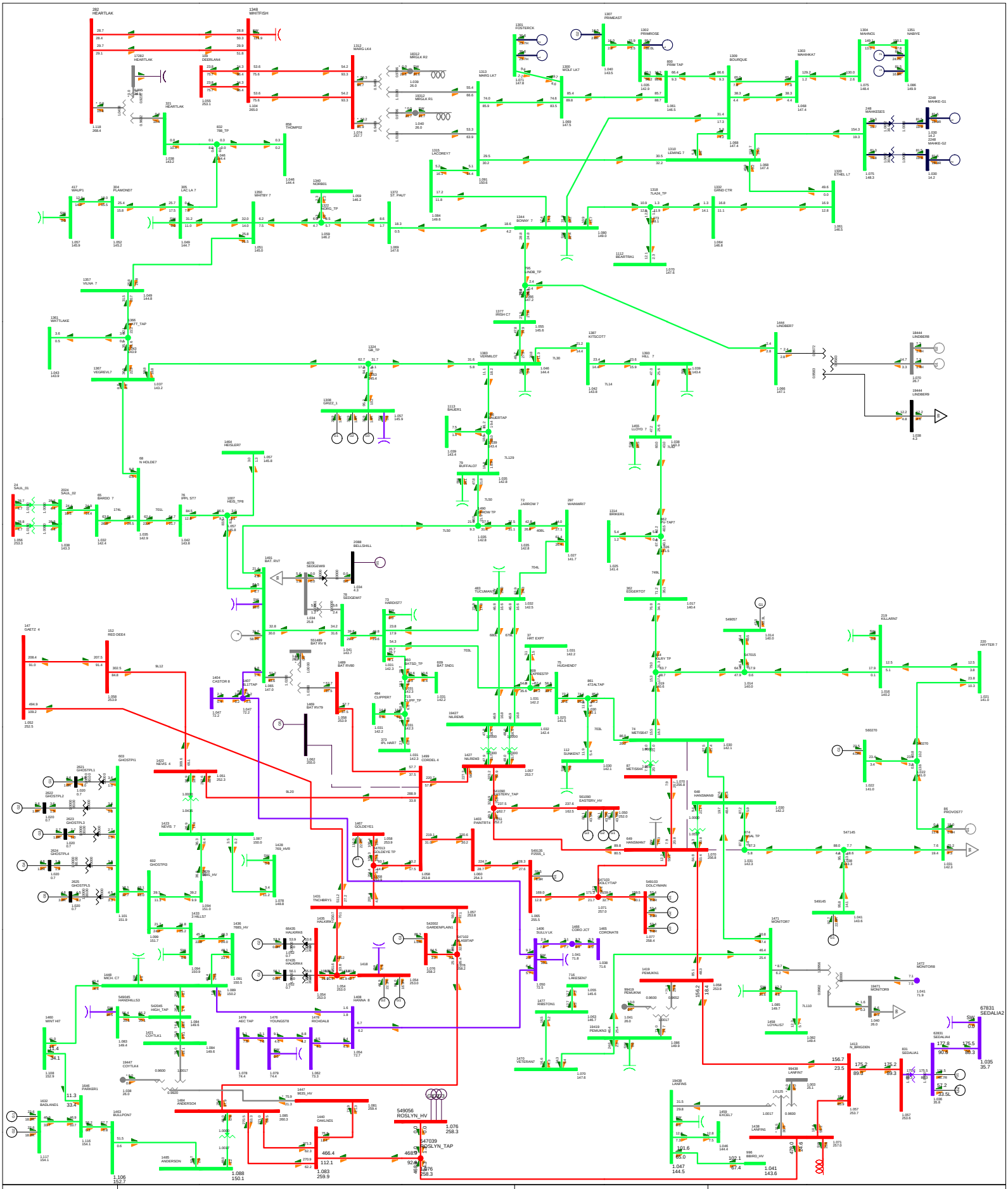
P2034 Cold Lake Area Cogen

Bus - VOLTAGE (kV/PU)
Branch - MW/Mvar
Equipment - MW/Mvar

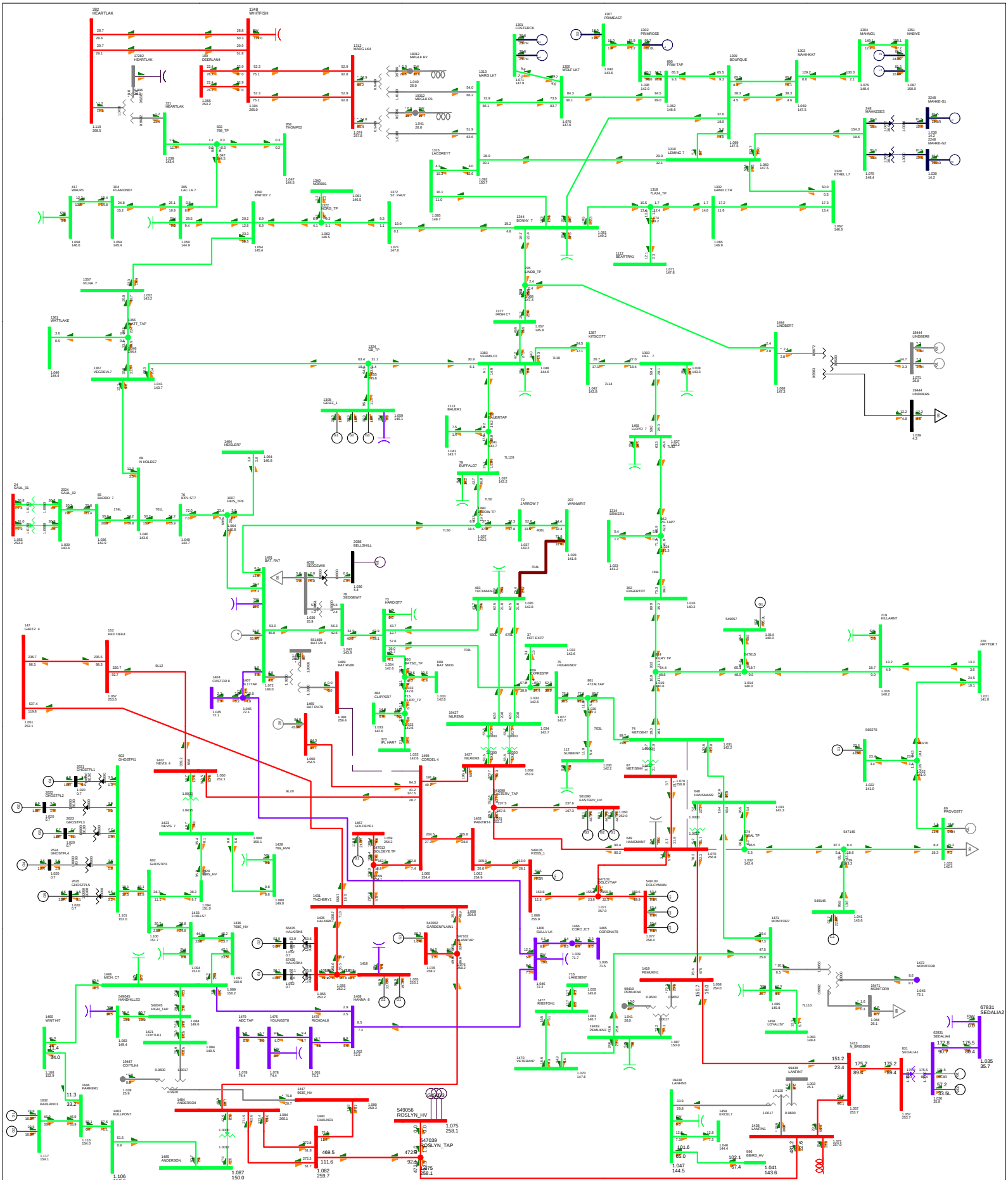
100.0%RATEA
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



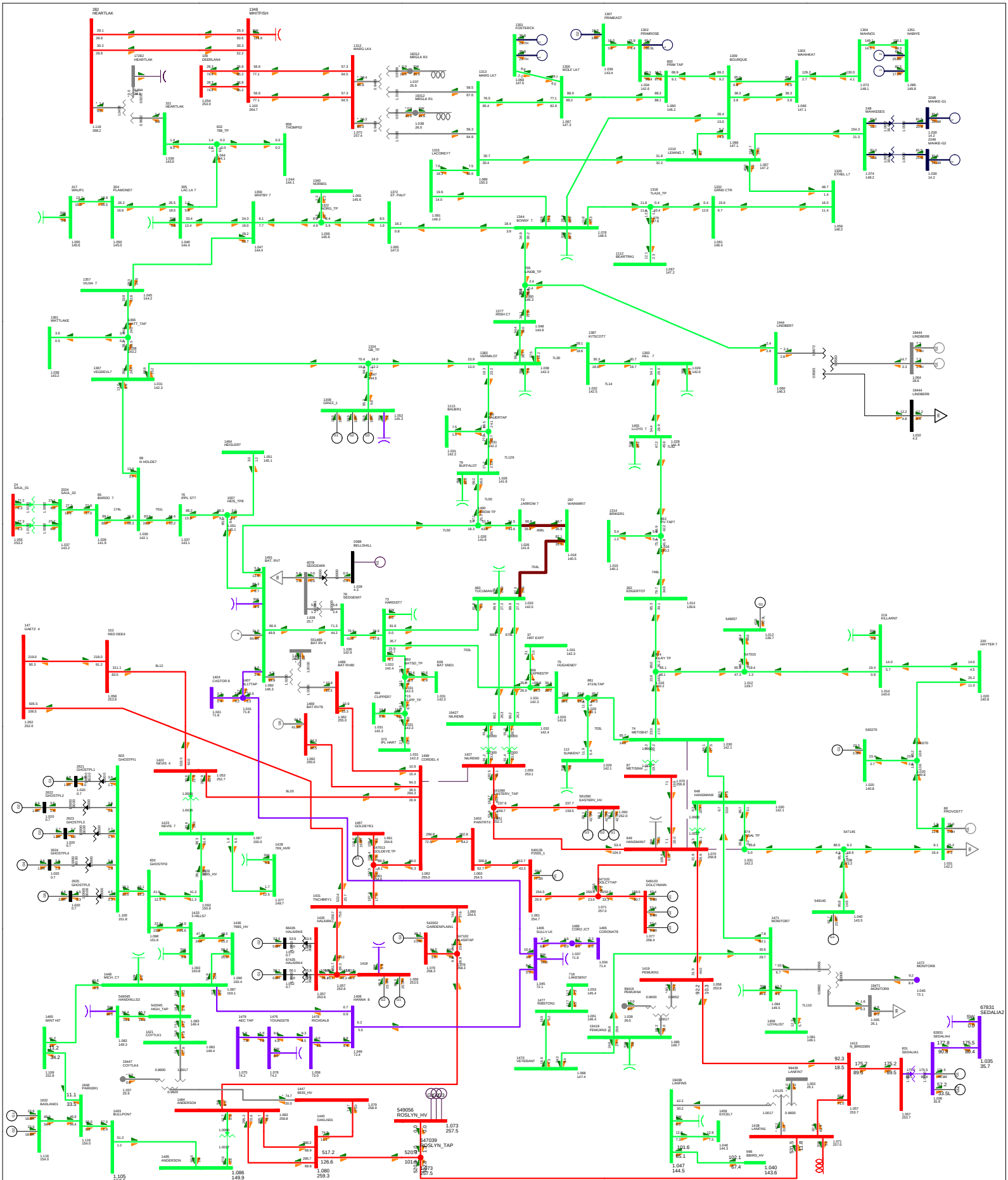
Attachment A2- 2	Contingency	Study Case Description	P2034 Cold Lake Area Cogen
	CONT 016: 9L20 (766S Nevis - 755S Cordel)	2028SL PRE-PROJ Base Case	Bus - VOLTAGE (kV/PU) Branch - MW/MVar Equipment - MW/Mvar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A2- 2	Contingency	Study Case Description	P2034 Cold Lake Area Cogen
	CONT 017: 9L79 (757S Battle River - 755S Cordel)	2028SL PRE-PROJ Base Case	Bus - VOLTAGE (kV/PU) Branch - MW/MVar Equipment - MW/Mvar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A2- 2	Contingency	Study Case Description	P2034 Cold Lake Area Cogen
	CONT 018: 9L80 (757S Battle River - 755S Cordel)	2028SL PRE-PROJ Base Case	Bus - VOLTAGE (kV/PU) Branch - MW/MVar Equipment - MW/Mvar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A2- 2

Contingency

CONT 019: 953L (574S Nilrem - 755S Cordel)

Study Case Description

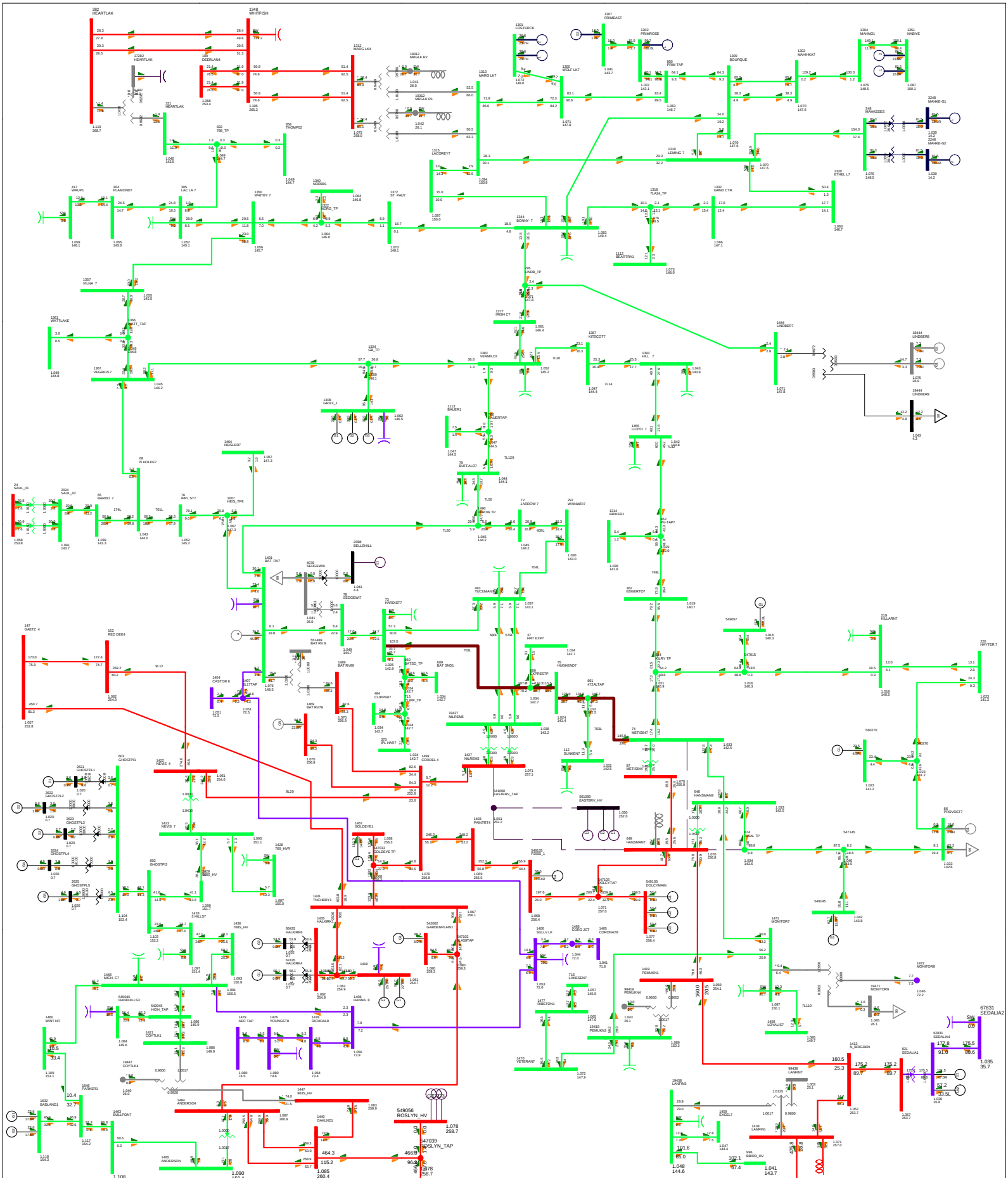
2028SL PRE-PROJ

Base Case

P2034 Cold Lake Area Cogen

Bus - VOLTAGE (kV/PU)
Branch - MW/Mvar
Equipment - MW/Mvar

100.0%RATEA
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A2- 2

Contingency

CONT 020: 1047L (574S Nilrem - P2566 Eastervale Solar - 650S Hansman Lake)

Study Case Description

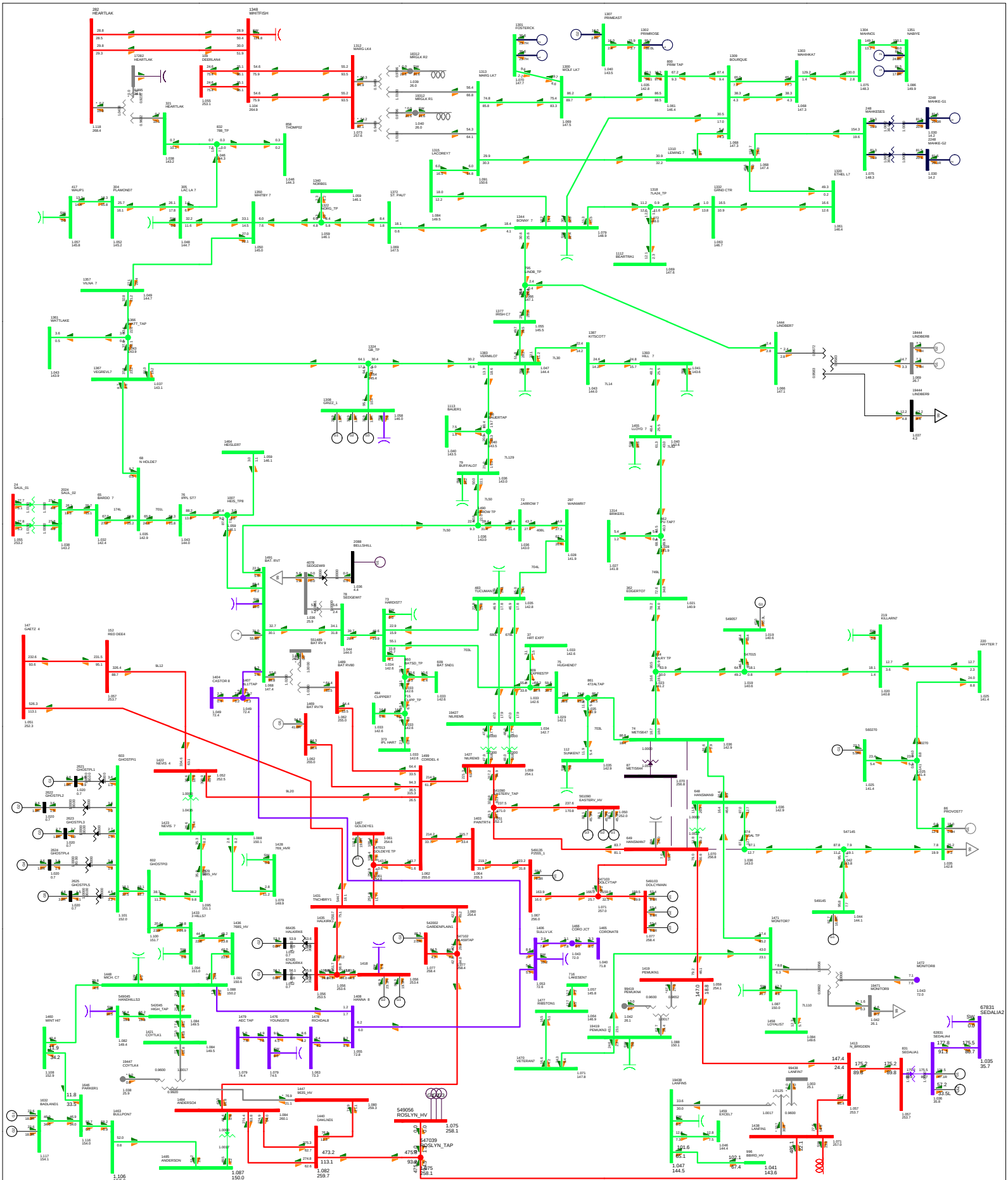
2028SL PRE-PROJ

Base Case

P2034 Cold Lake Area Cogen

Bus - VOLTAGE (kV/PU)
Branch - MW/Mvar
Equipment - MW/Mvar

100.0%RATEA
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A2- 2

Contingency

CONT 021: 954L (648S Metiskow - 650S Hansman Lake)

Study Case Description

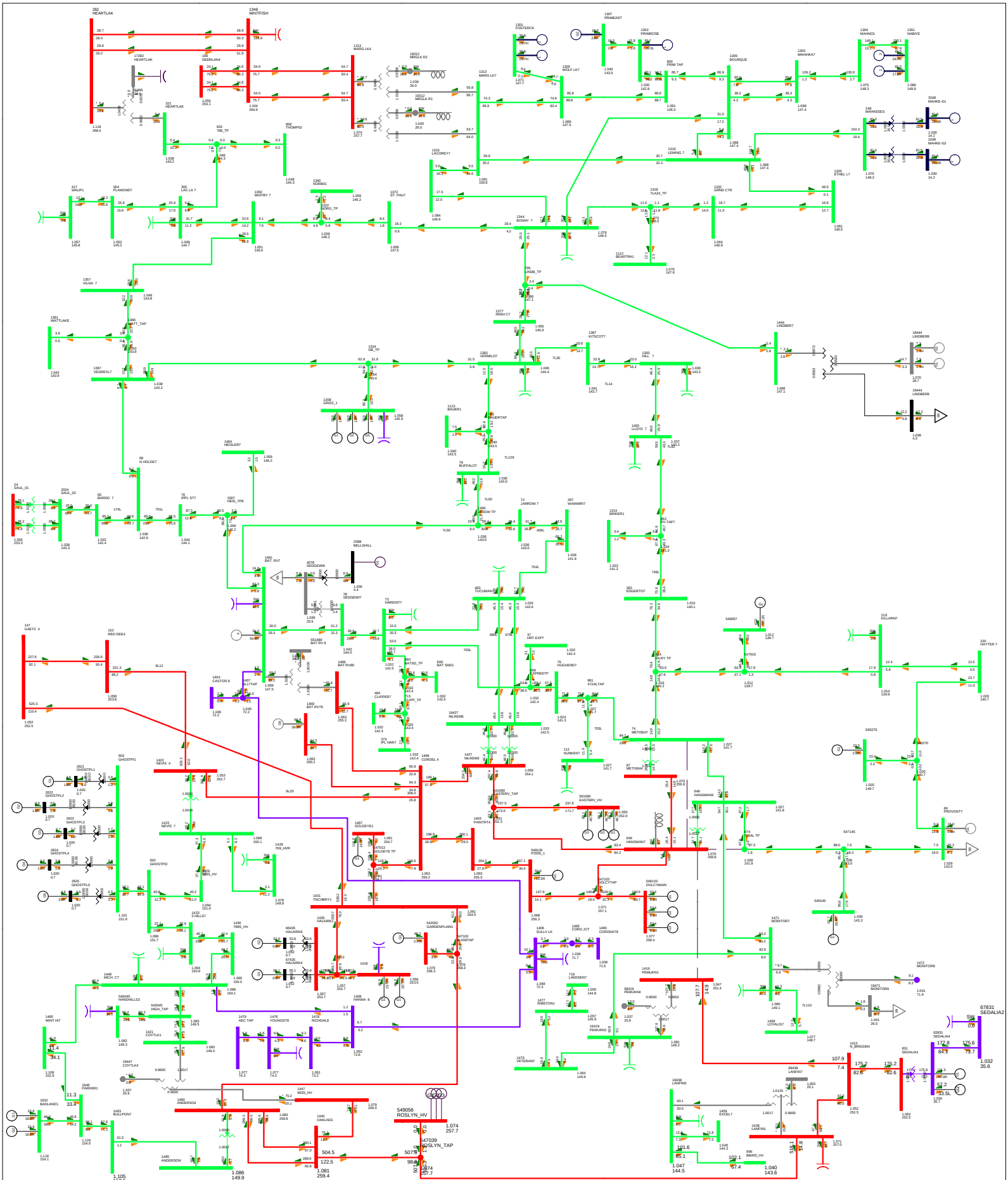
2028SL PRE-PROJ

Base Case

P2034 Cold Lake Area Cogen

Bus - VOLTAGE (kV/PU)
Branch - MW/Mvar
Equipment - MW/Mvar

100.0%RATEA
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A2- 2

Contingency

CONT 022: 9L966 (650S Hansman Lake - 932S Pemukan)

Study Case Description

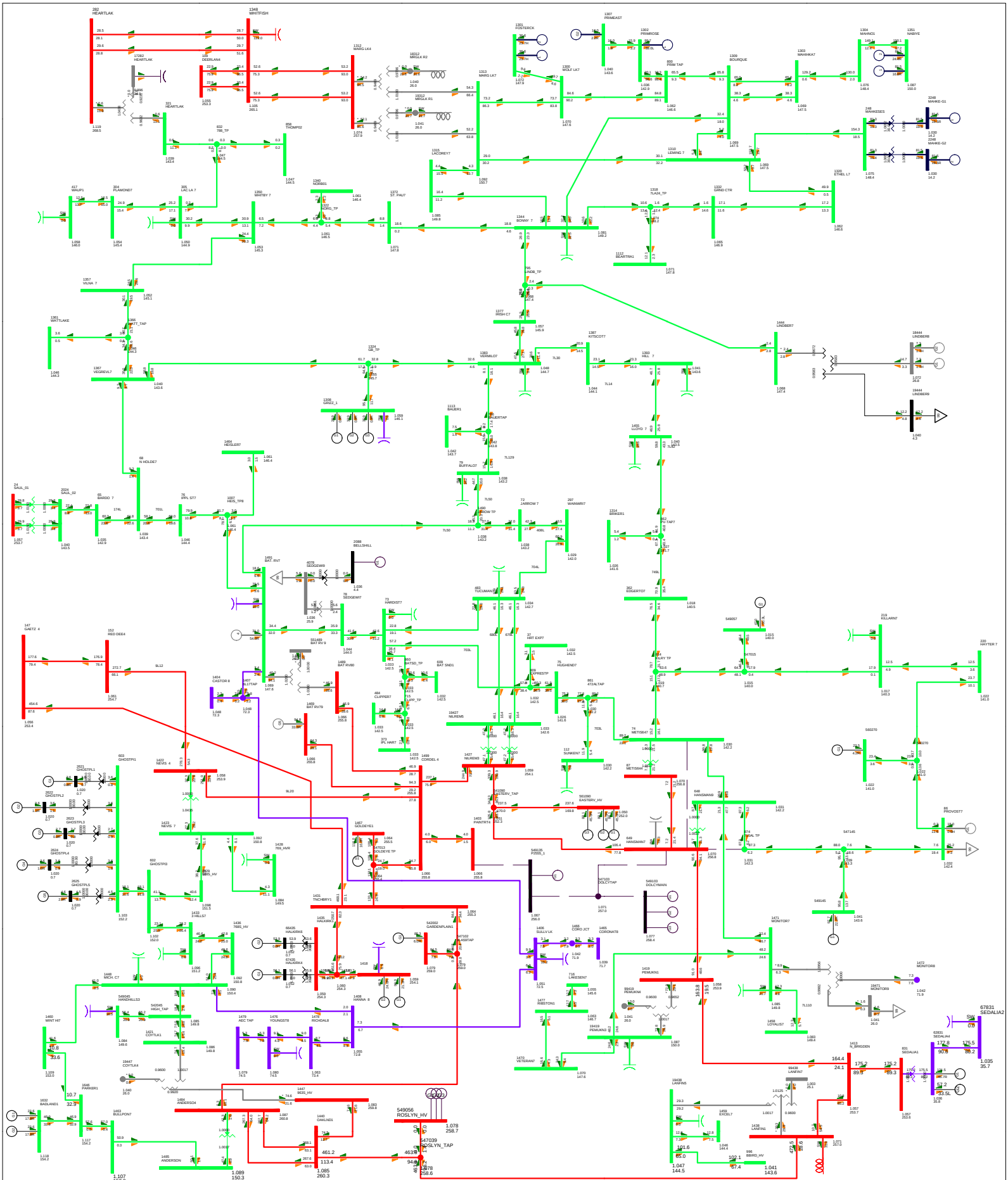
2028SL PRE-PROJ

Base Case

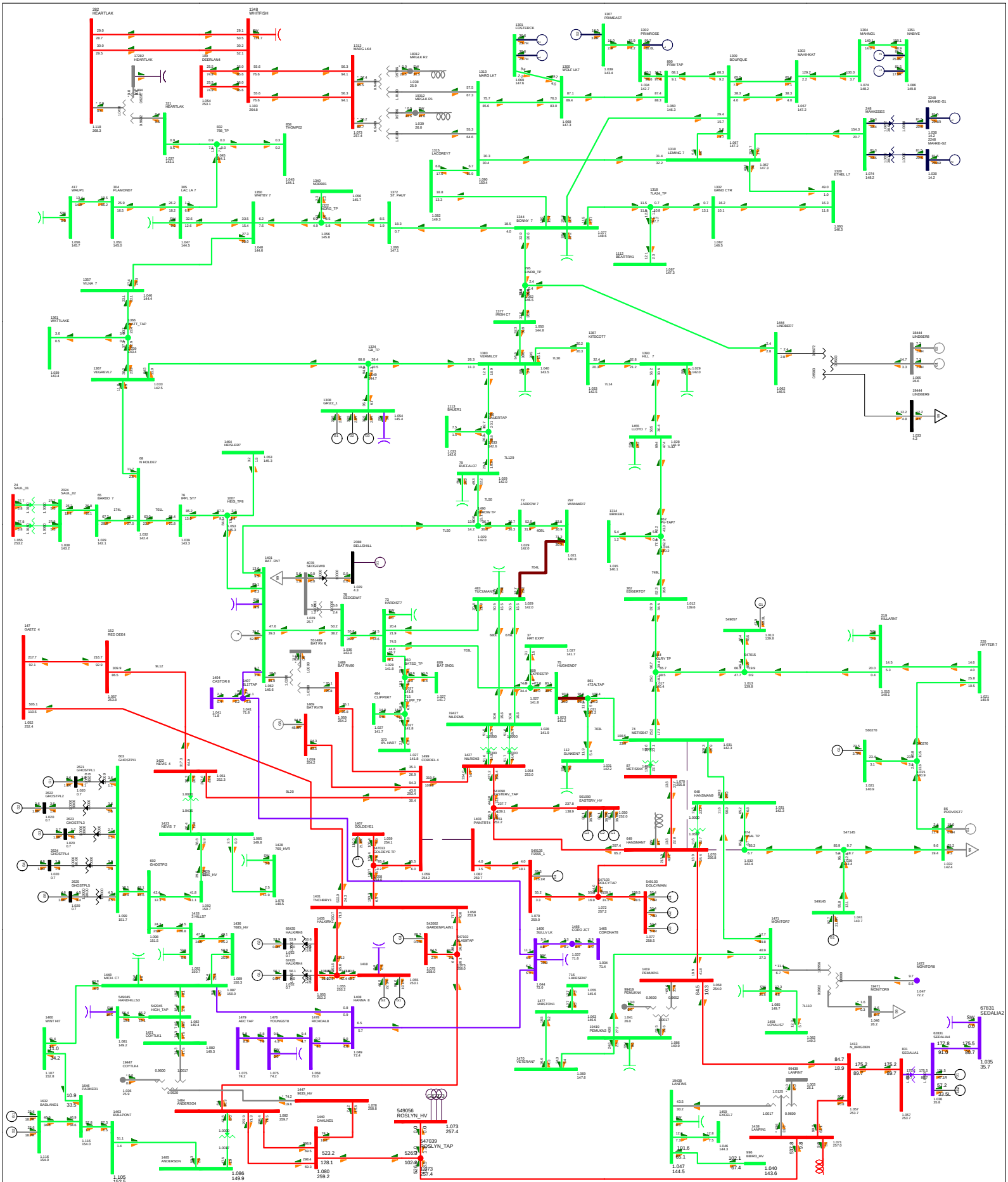
P2034 Cold Lake Area Cogen

Bus - VOLTAGE (kV/PU)
Branch - MW/Mvar
Equipment - MW/Mvar

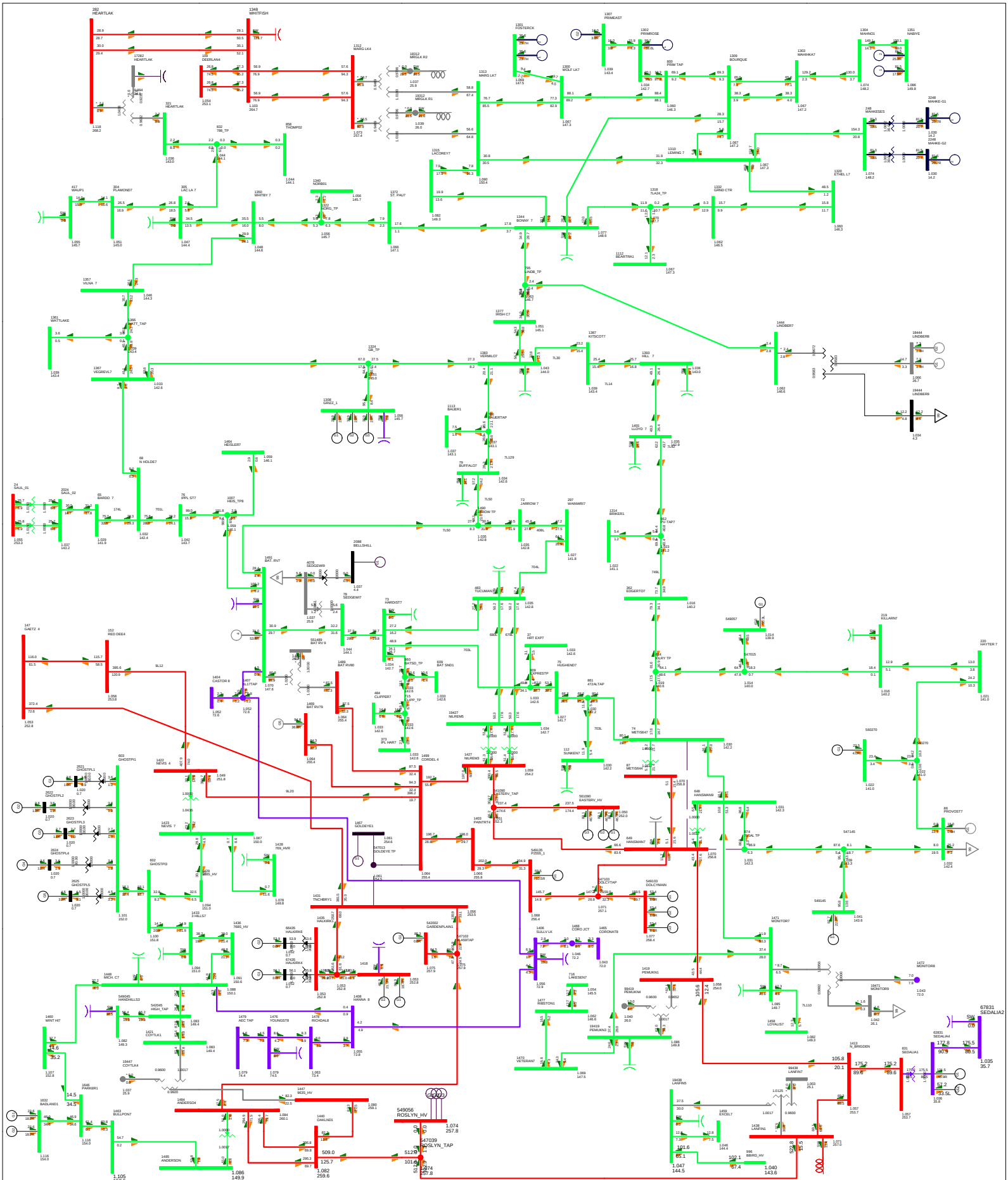
100.0%RATEA
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A2- 2	Contingency	Study Case Description	P2034 Cold Lake Area Cogen
	CONT 023: 948L (650S Hansman Lake - P2553 Dolcy Solar - P2555 Rolling Hills Wind - 8638 [illegible]	Base Case	Bus - VOLTAGE (kV/PU) Branch - MW/MVar Equipment - MW/Mvar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A2- 2	Contingency	Study Case Description	P2034 Cold Lake Area Cogen
	CONT 024: 9L27 (863S Paintearth - 755S Cordel)	2028SL PRE-PROJ Base Case	Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A2- 2

Contingency

CONT 025: 9L16 (755S Cordel - P2441 Halkirk 2 Wind - 972S Tinchebray)

Study Case Description

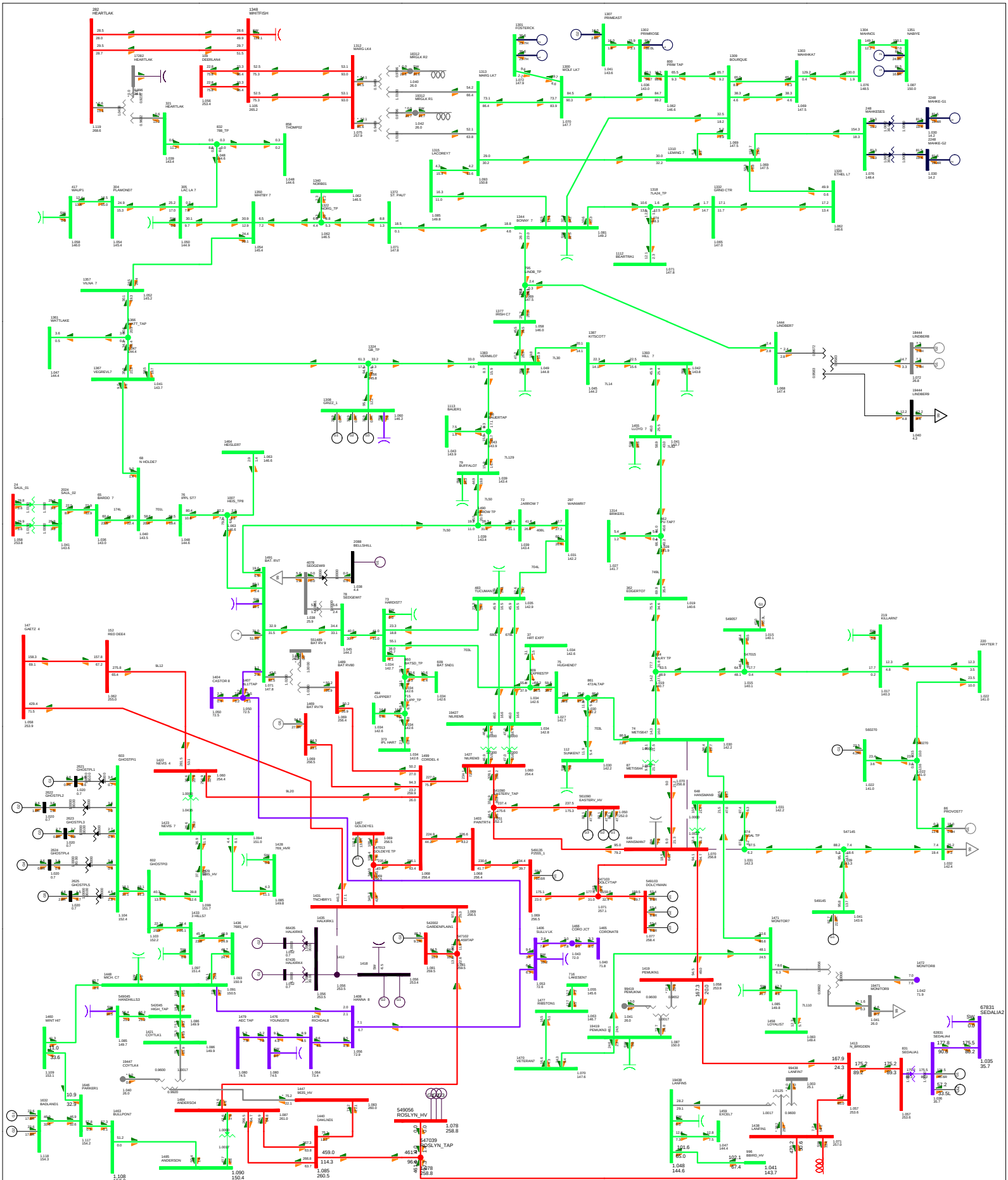
2028SL PRE-PROJ

Base Case

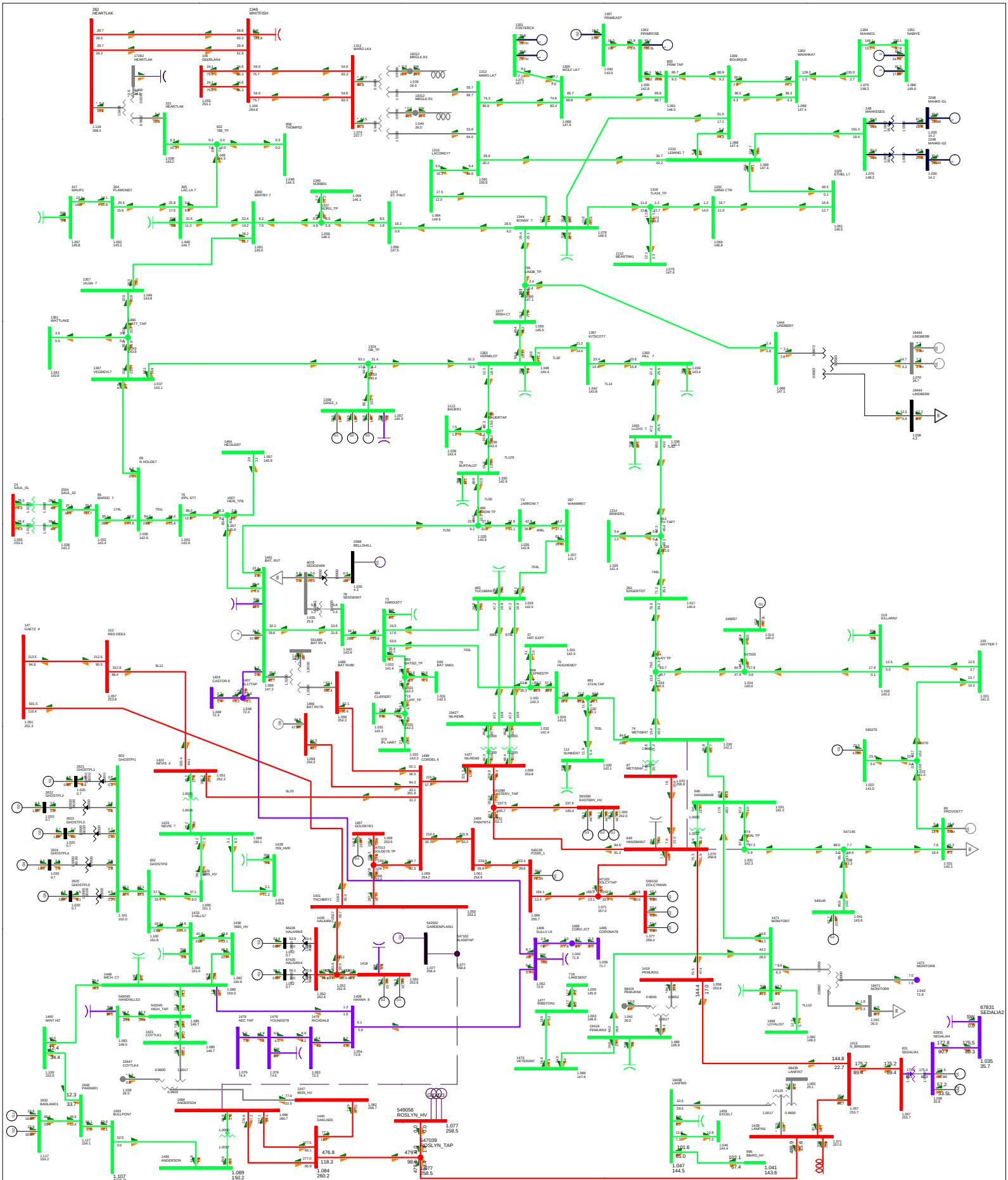
P2034 Cold Lake Area Cogen

Bus - VOLTAGE (kV/PU)
Branch - MW/Mvar
Equipment - MW/Mvar

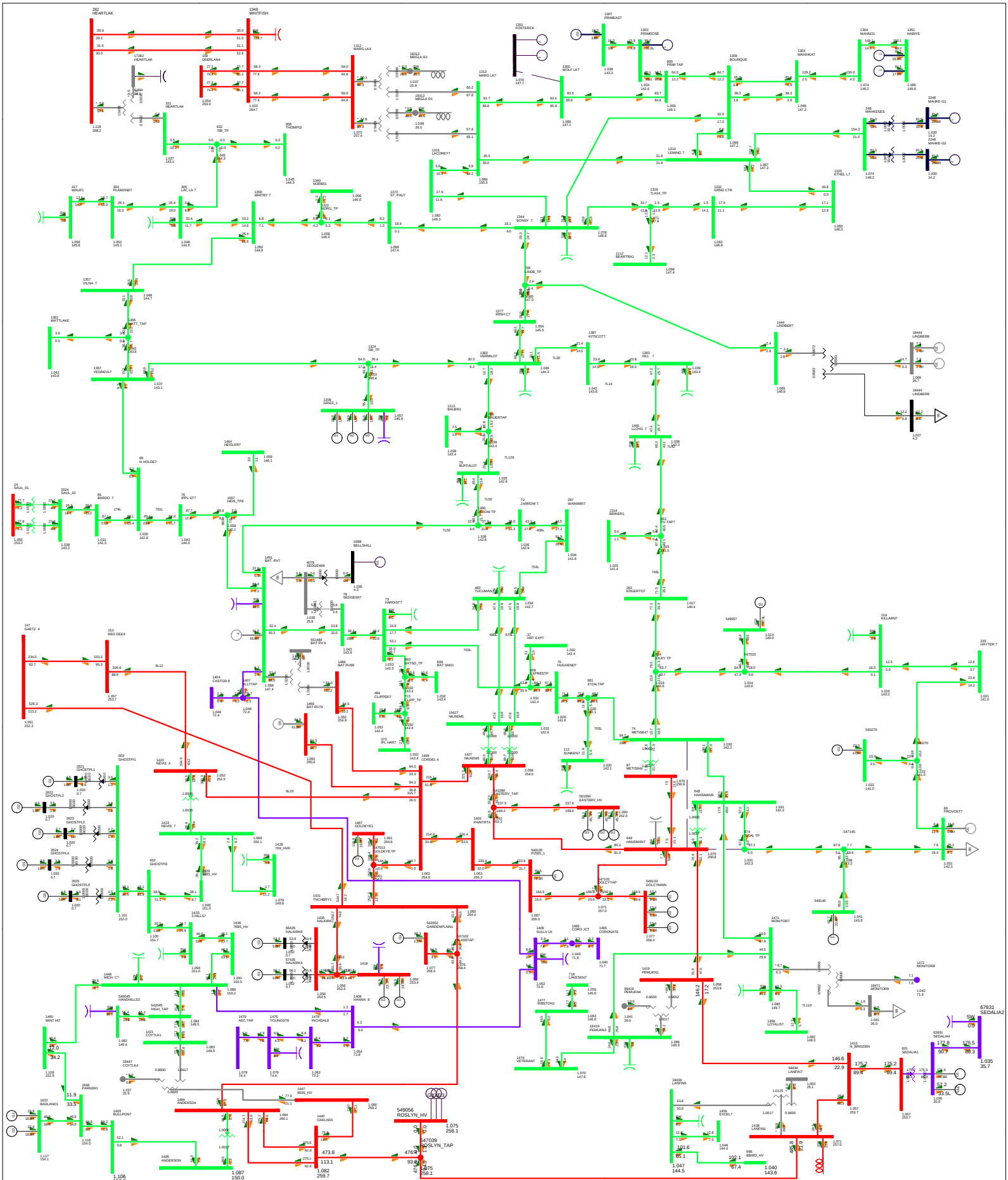
100.0%RATEA
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A2- 2	Contingency	Study Case Description	P2034 Cold Lake Area Cogen
	CONT 026: 9L93 (972S Tinchebray - 615S Halkirk - 973S Lanes Lake)	2028SL PRE-PROJ Base Case	Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A2- 2	Contingency	Study Case Description	P2034 Cold Lake Area Cogen
	CONT 027: 9L59 (972S Tinchebray - 1045S Garden Plain - 801S Anderson)	2028SL PRE-PROJ Base Case	Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A2- 2

Contingency

CONT 028: 7L86 (822S Wolf Lake - 877S Foster Creek)

Study Case Description

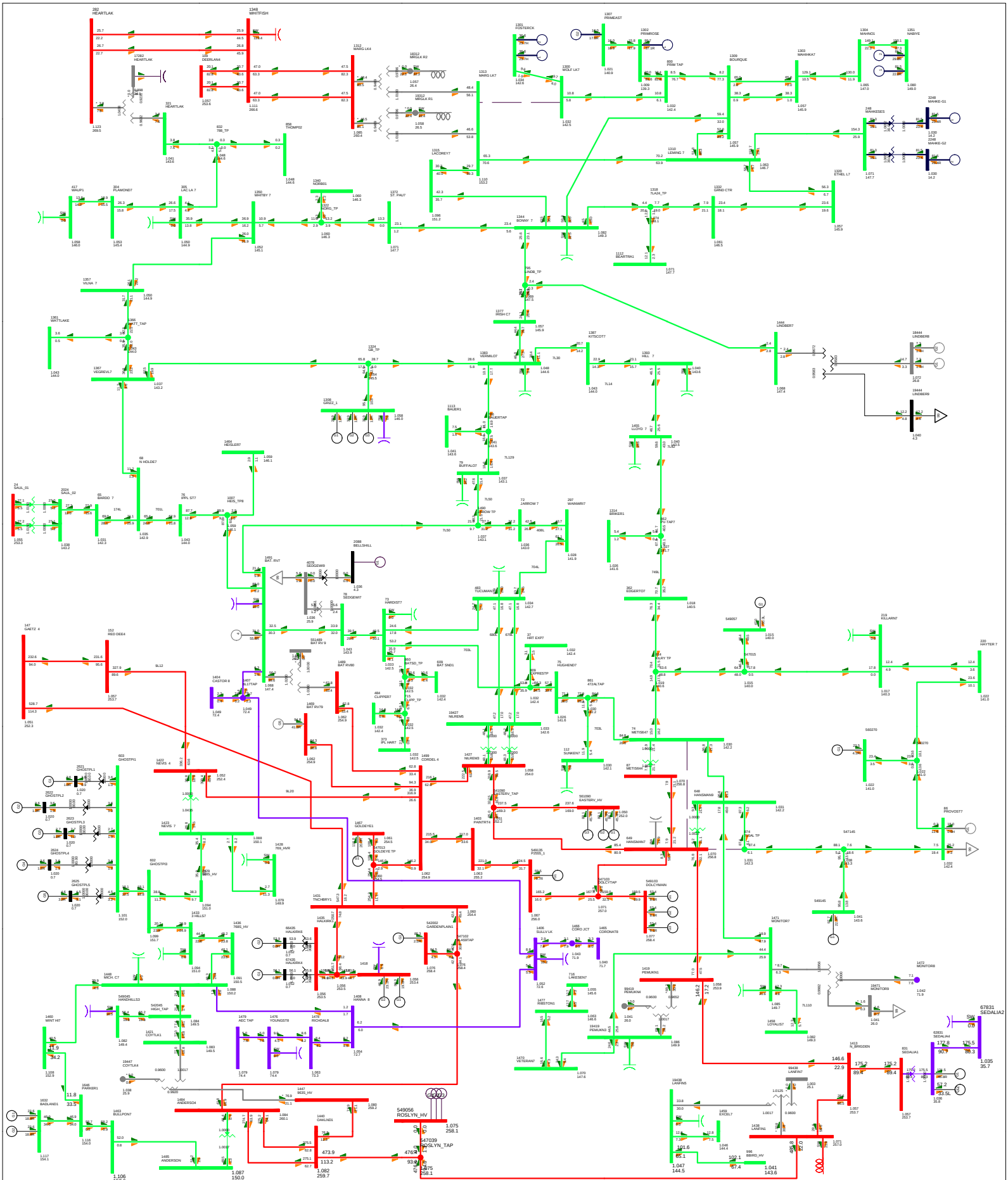
2028SL PRE-PROJ

Base Case

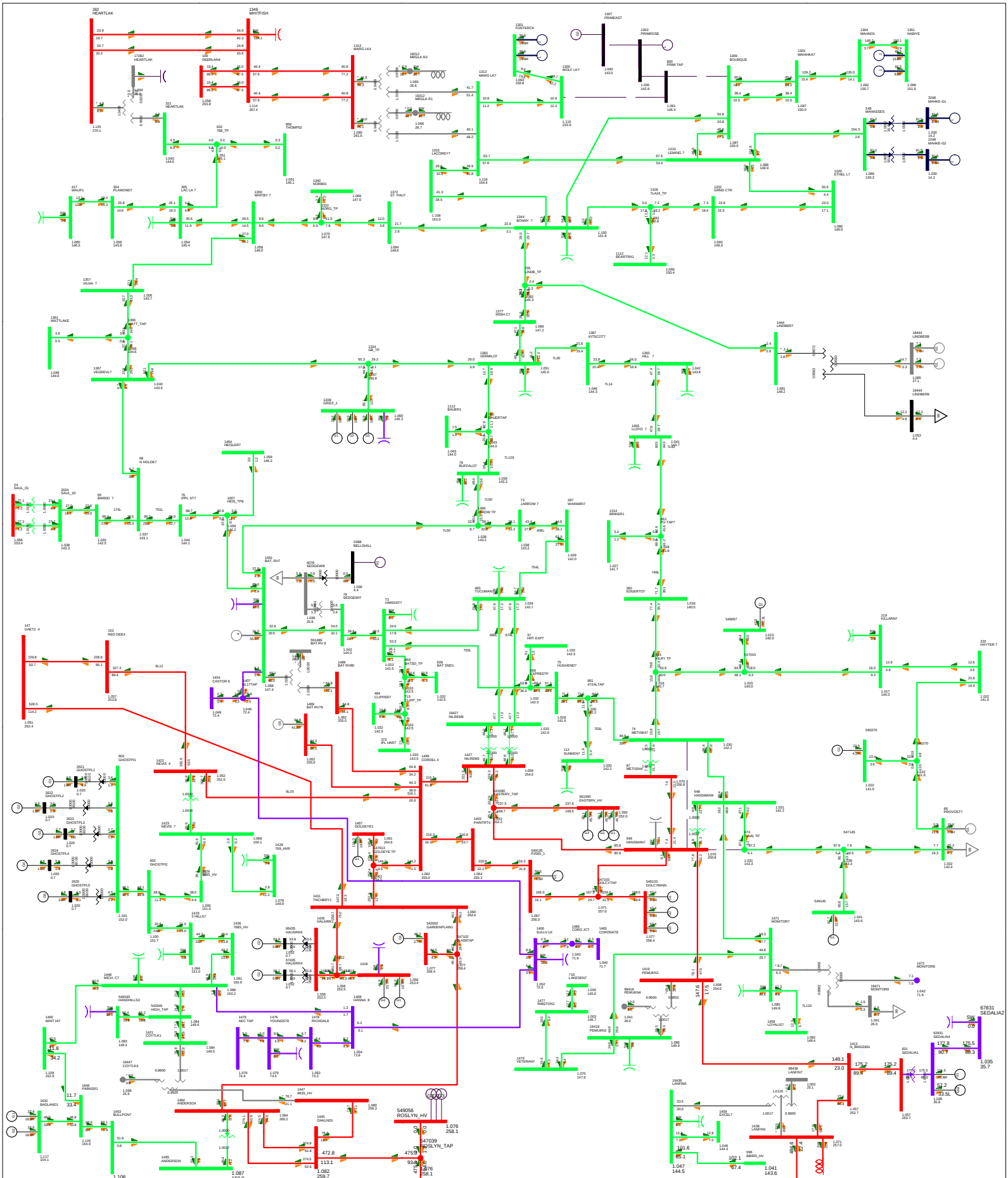
P2034 Cold Lake Area Cogen

Bus - VOLTAGE (kV/PU)
Branch - MW/Mvar
Equipment - MW/Mvar

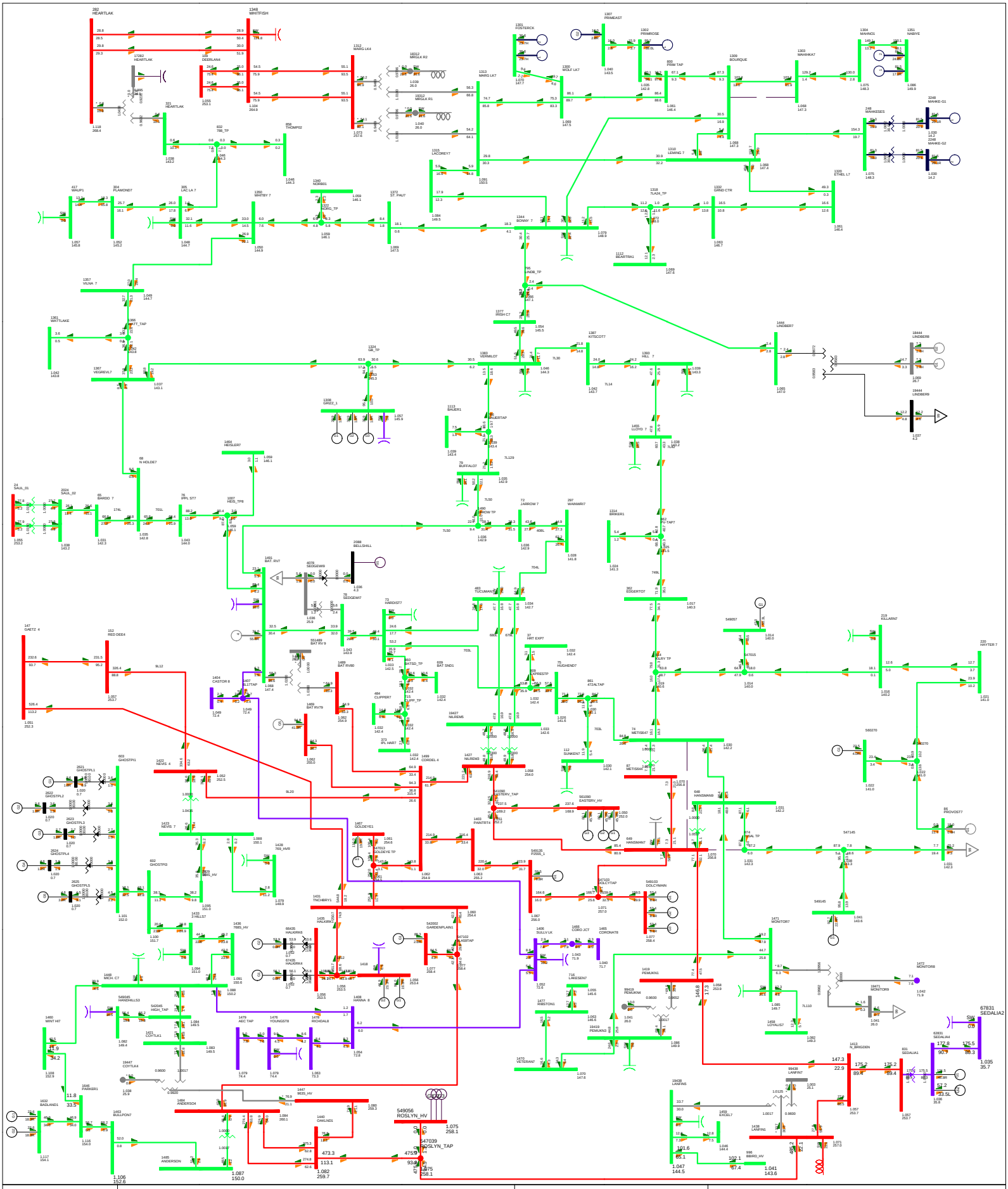
100.0%RATEA
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



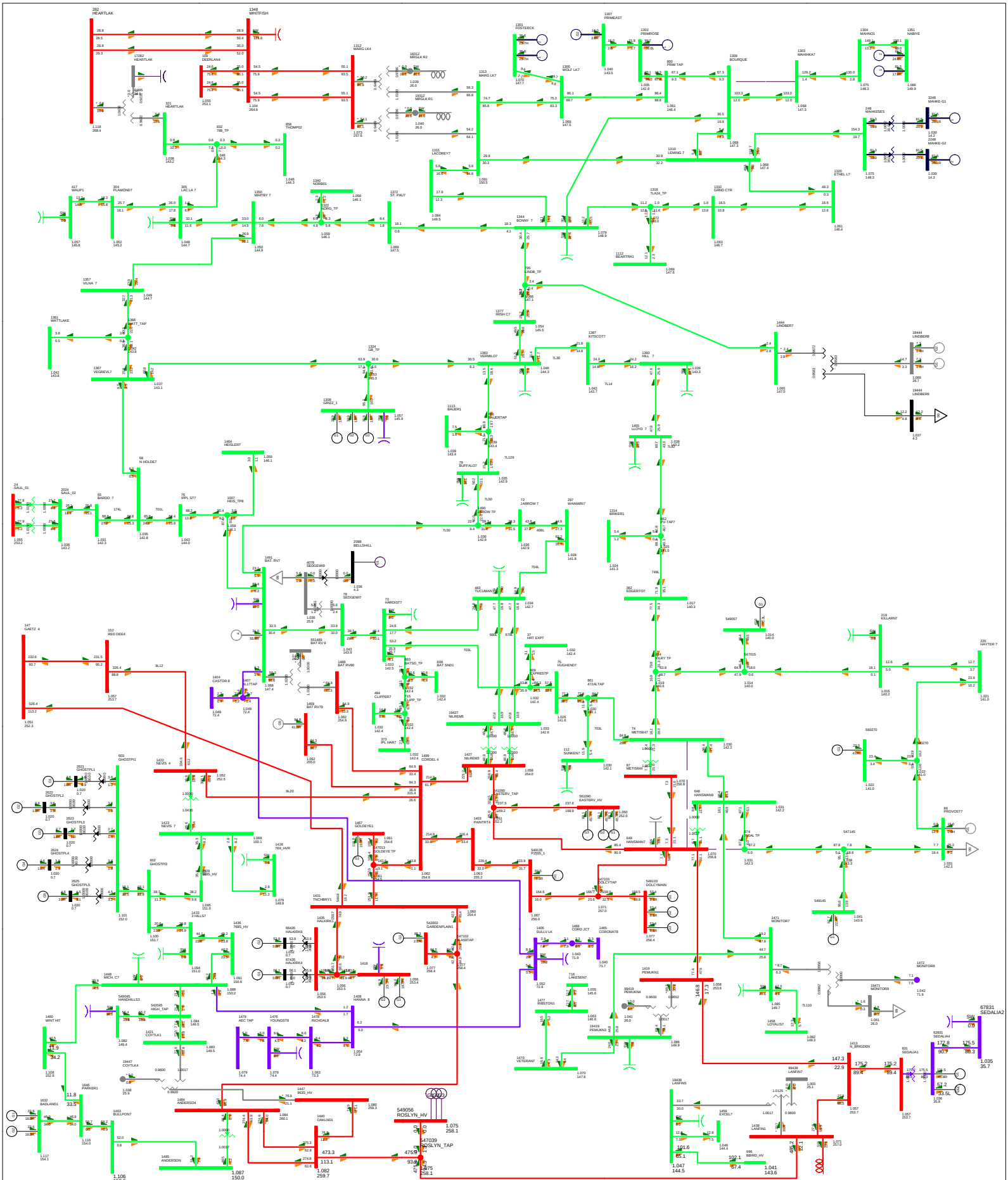
Attachment A2- 2	Contingency	Study Case Description	P2034 Cold Lake Area Cogen
	CONT 029: 7L587 (822S Wolf Lake - 826S Marguerite Lake)	2028SL PRE-PROJ Base Case	Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A2- 2	Contingency	Study Case Description	P2034 Cold Lake Area Cogen
	CONT 030: 7L574 (822S Wolf Lake - 859S Primrose - 970S Bourque)	2028SL PRE-PROJ Base Case	Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A2- 2	Contingency	Study Case Description	P2034 Cold Lake Area Cogen
	CONT 031: 7L157 (837S Mahihkan - 970S Bourque)	2028SL PRE-PROJ Base Case	Bus - VOLTAGE (kV/PU) Branch - MW/MVar Equipment - MW/Mvar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A2- 2

Contingency

CONT 032: 7L160 (837S Mahihkan - 970S Bourque)

Study Case Description

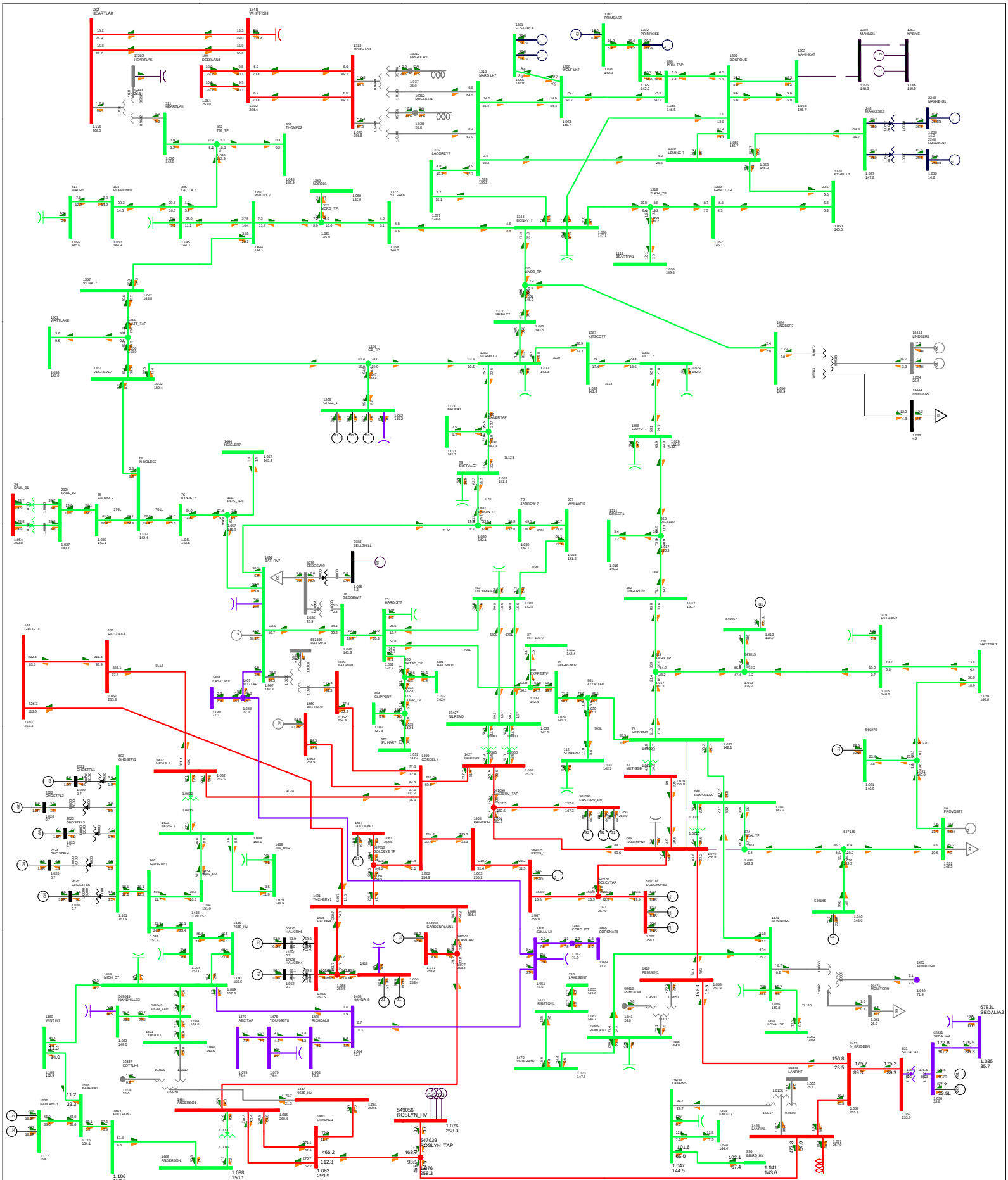
2028SL PRE-PROJ

Base Case

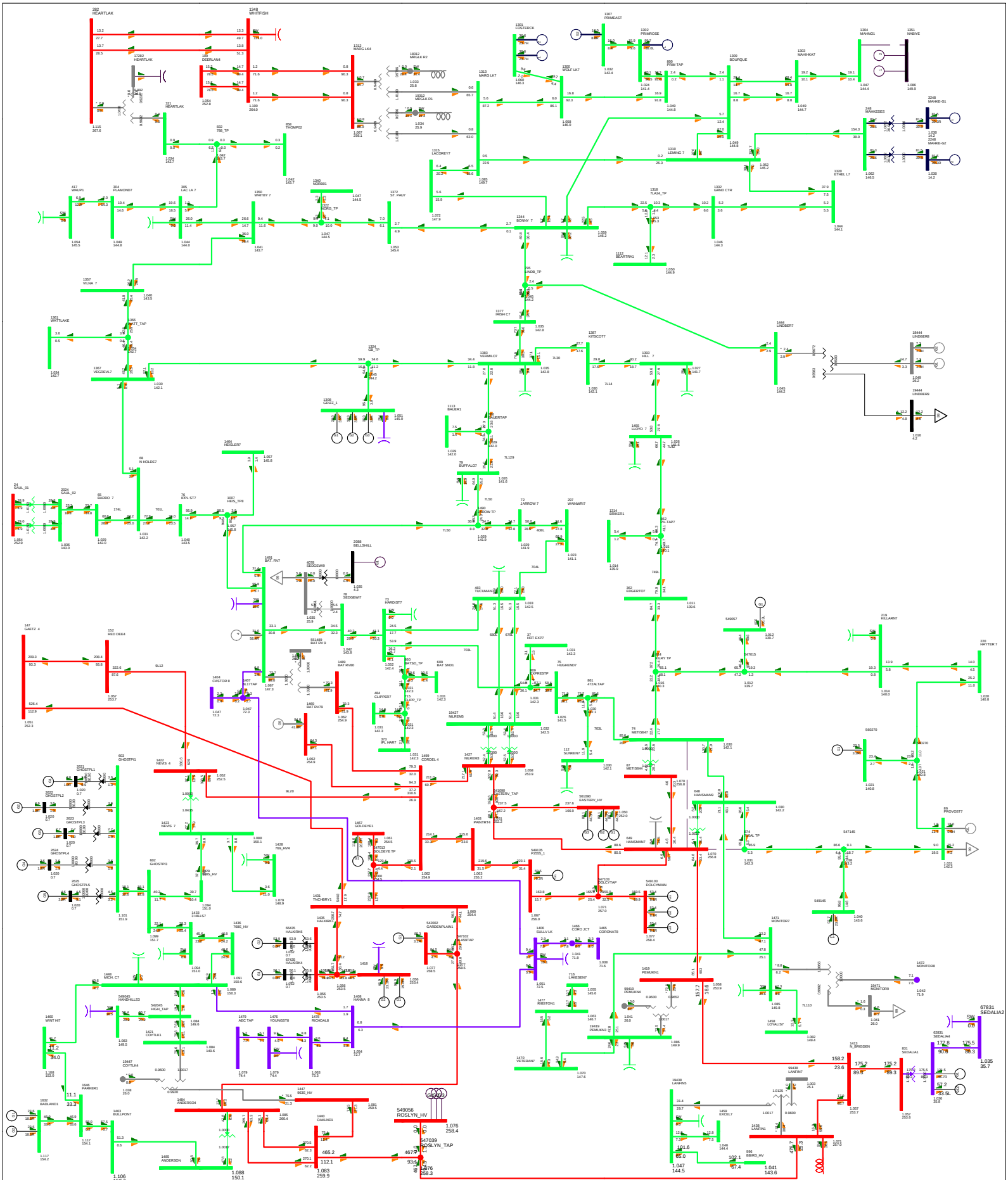
P2034 Cold Lake Area Cogen

Bus - VOLTAGE (kV/PU)
Branch - MW/MVar
Equipment - MW/Mvar

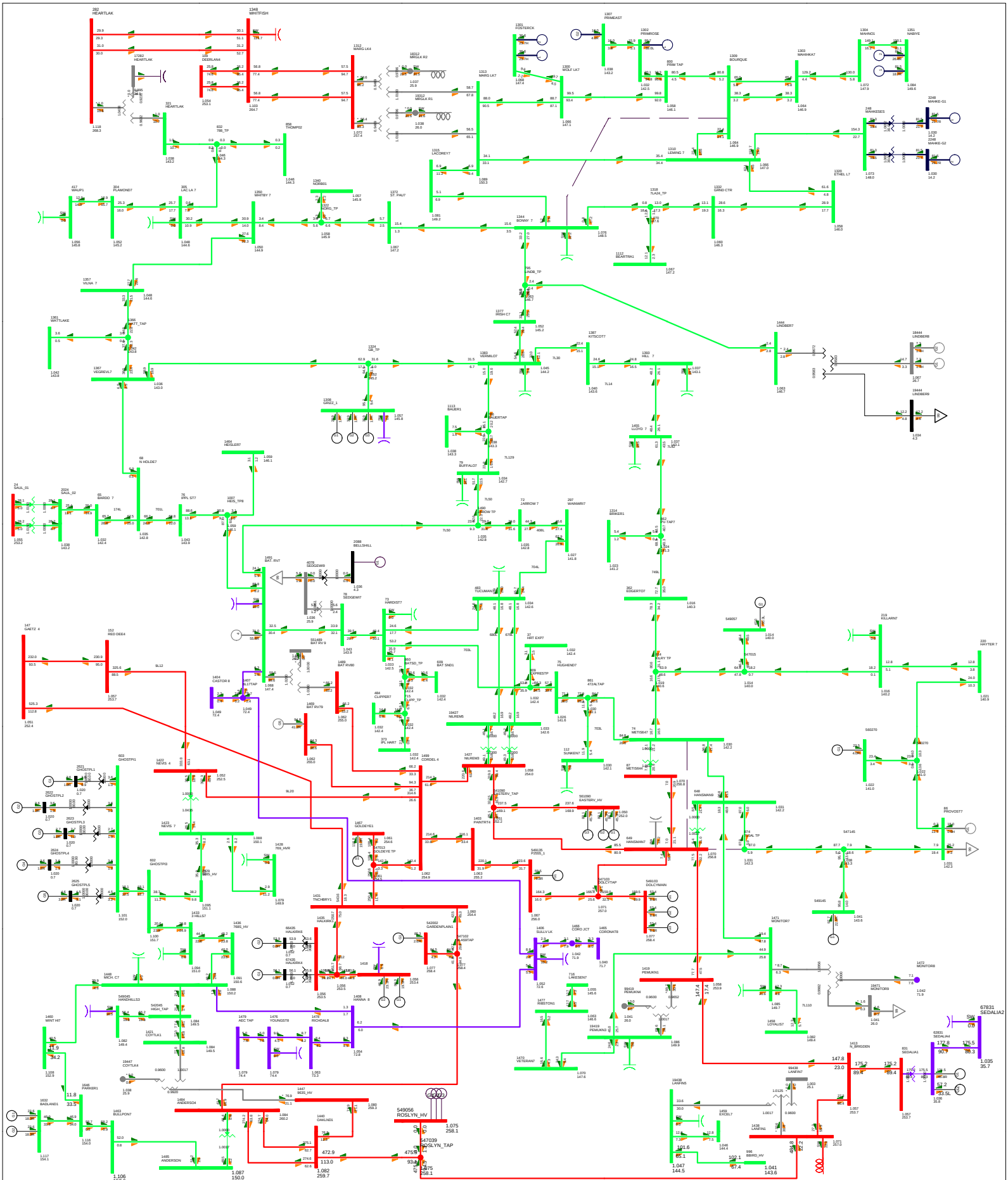
100.0%RATEA
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



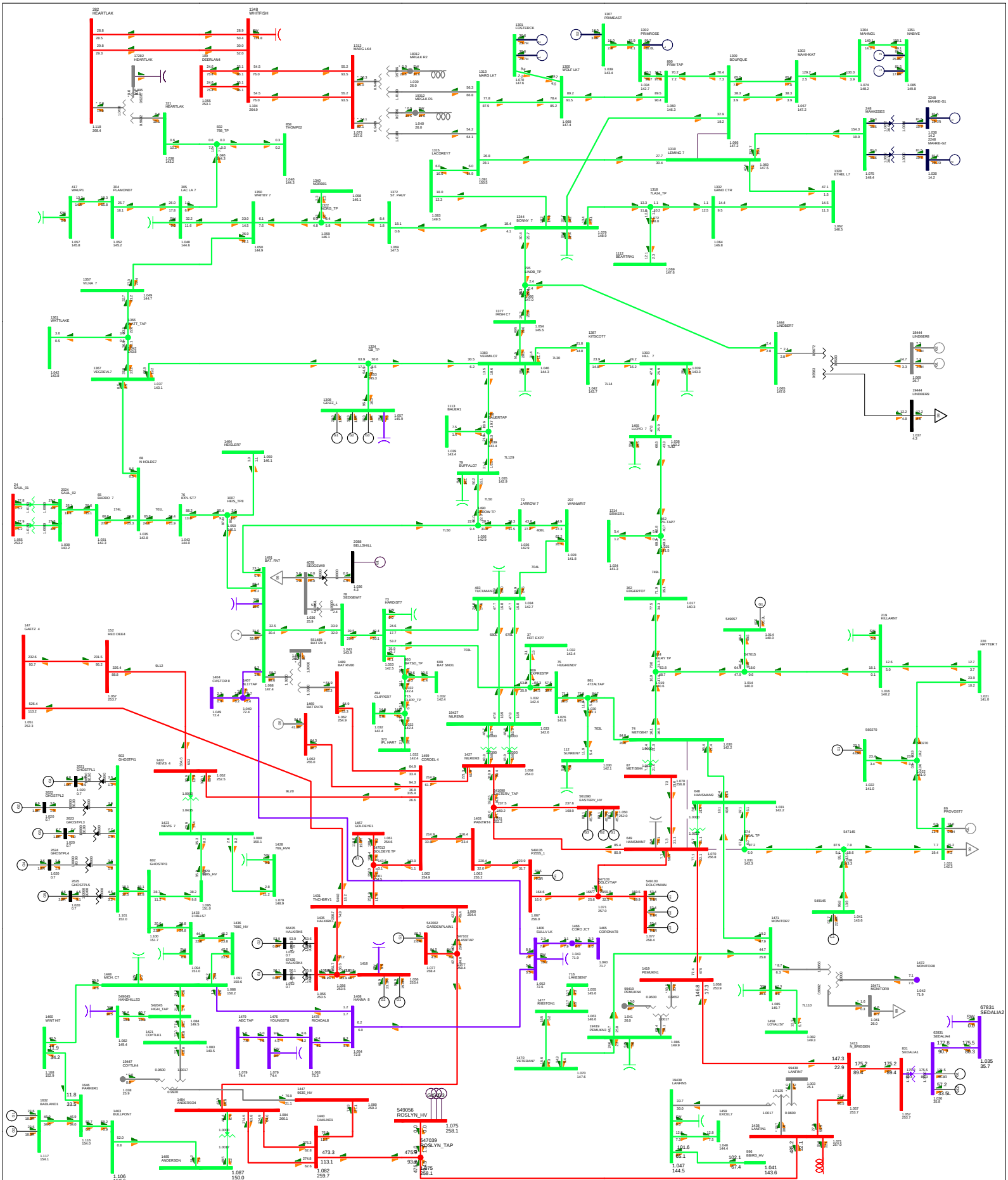
Attachment A2- 2	Contingency	Study Case Description	P2034 Cold Lake Area Cogen
	CONT 033: 7L105 (837S Mahihkan - 909S Mahno)	2028SL PRE-PROJ Base Case	Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A2- 2	Contingency	Study Case Description	P2034 Cold Lake Area Cogen
	CONT 034: 7L161 (909S Mahno - 942S Nabiye)	2028SL PRE-PROJ Base Case	Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A2- 2	Contingency	Study Case Description	P2034 Cold Lake Area Cogen
	CONT 035: 7L146 (970S Bourque - 700S Bonnyville)	2028SL PRE-PROJ Base Case	Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A2- 2

Contingency

CONT 036: 7L583 (970S Bourque - 715S Leming Lake)

Study Case Description

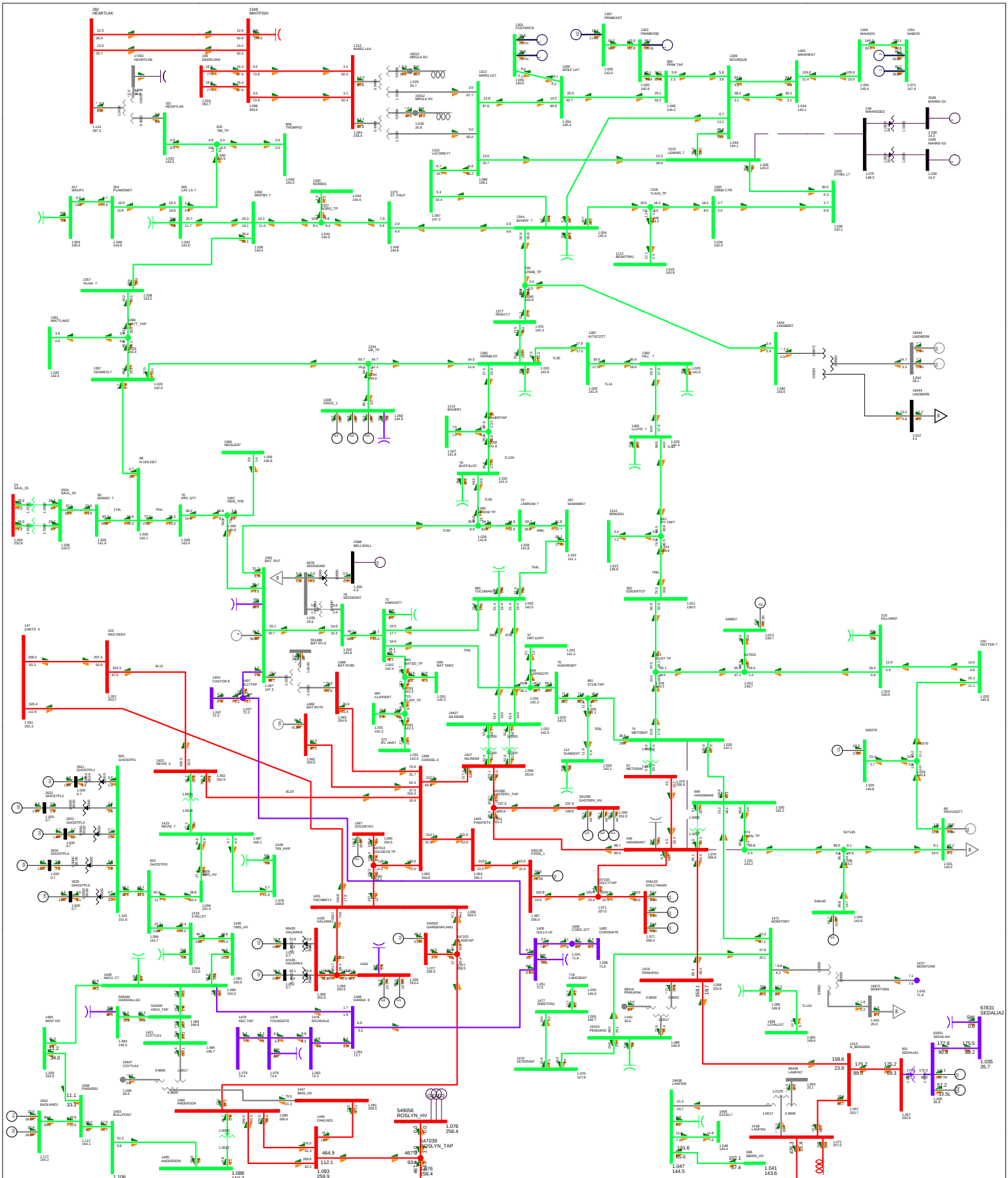
2028SL PRE-PROJ

Base Case

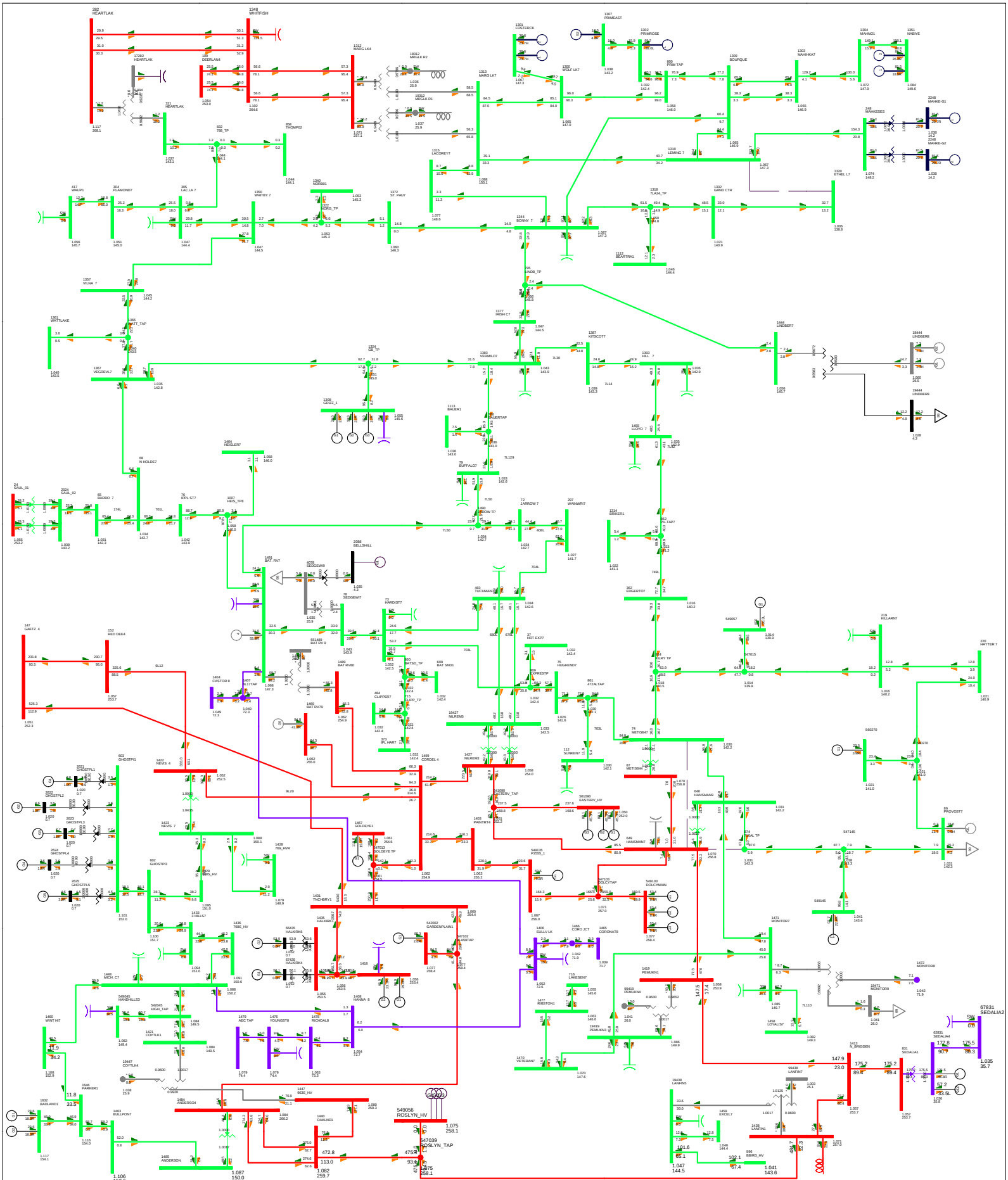
P2034 Cold Lake Area Cogen

Bus - VOLTAGE (kV/PU)
Branch - MW/MVar
Equipment - MW/Mvar

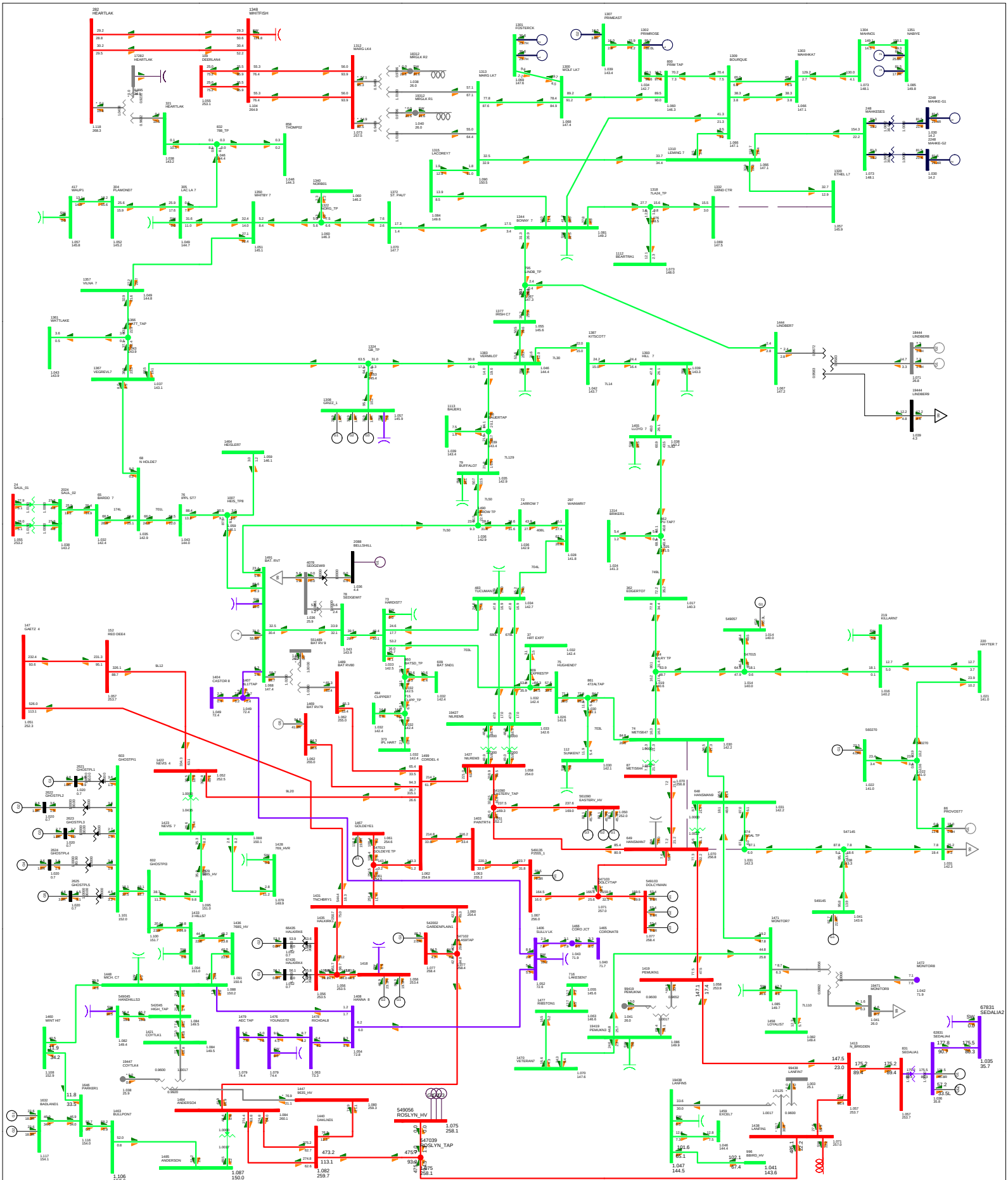
100.0%RATEA
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



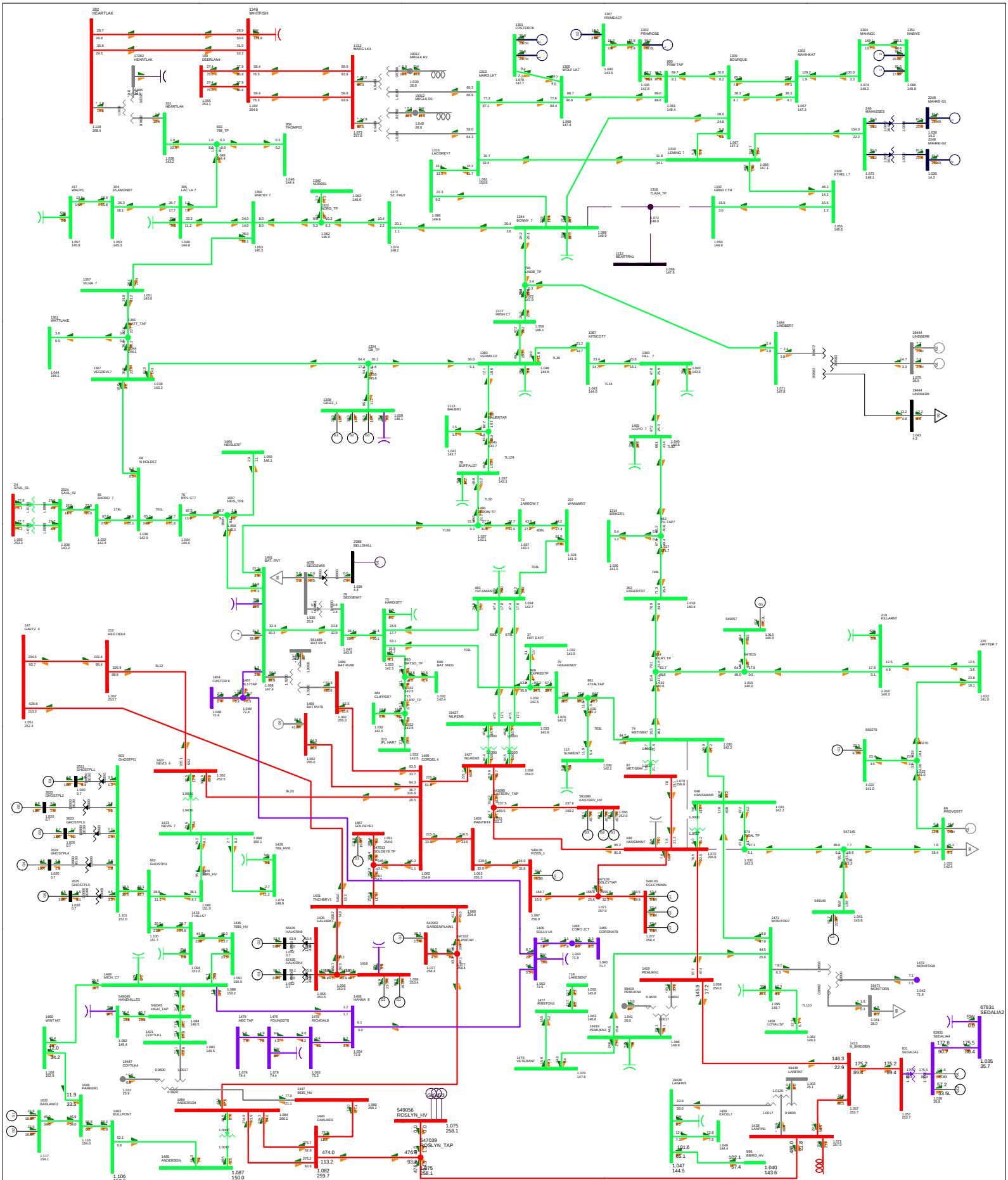
Attachment A2- 2	Contingency	Study Case Description	P2034 Cold Lake Area Cogen
	CONT 037: 7L95 (889S Mahkeses - 715S Leming Lake)	2028SL PRE-PROJ Base Case	Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A2- 2	Contingency	Study Case Description	P2034 Cold Lake Area Cogen
	CONT 038: 7L66 (715S Leming Lake - 717S Ethel Lake)	2028SL PRE-PROJ Base Case	Bus - VOLTAGE (kV/PU) Branch - MW/MVar Equipment - MW/Mvar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A2- 2	Contingency	Study Case Description	P2034 Cold Lake Area Cogen
	CONT 039: 7L28 (717S Ethel Lake - 846S Grand Centre)	2028SL PRE-PROJ Base Case	Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A2- 2

Contingency

CONT 040: 7L24 (846S Grand Centre - 700S Bonnyville - 940S Beartrap)

Study Case Description

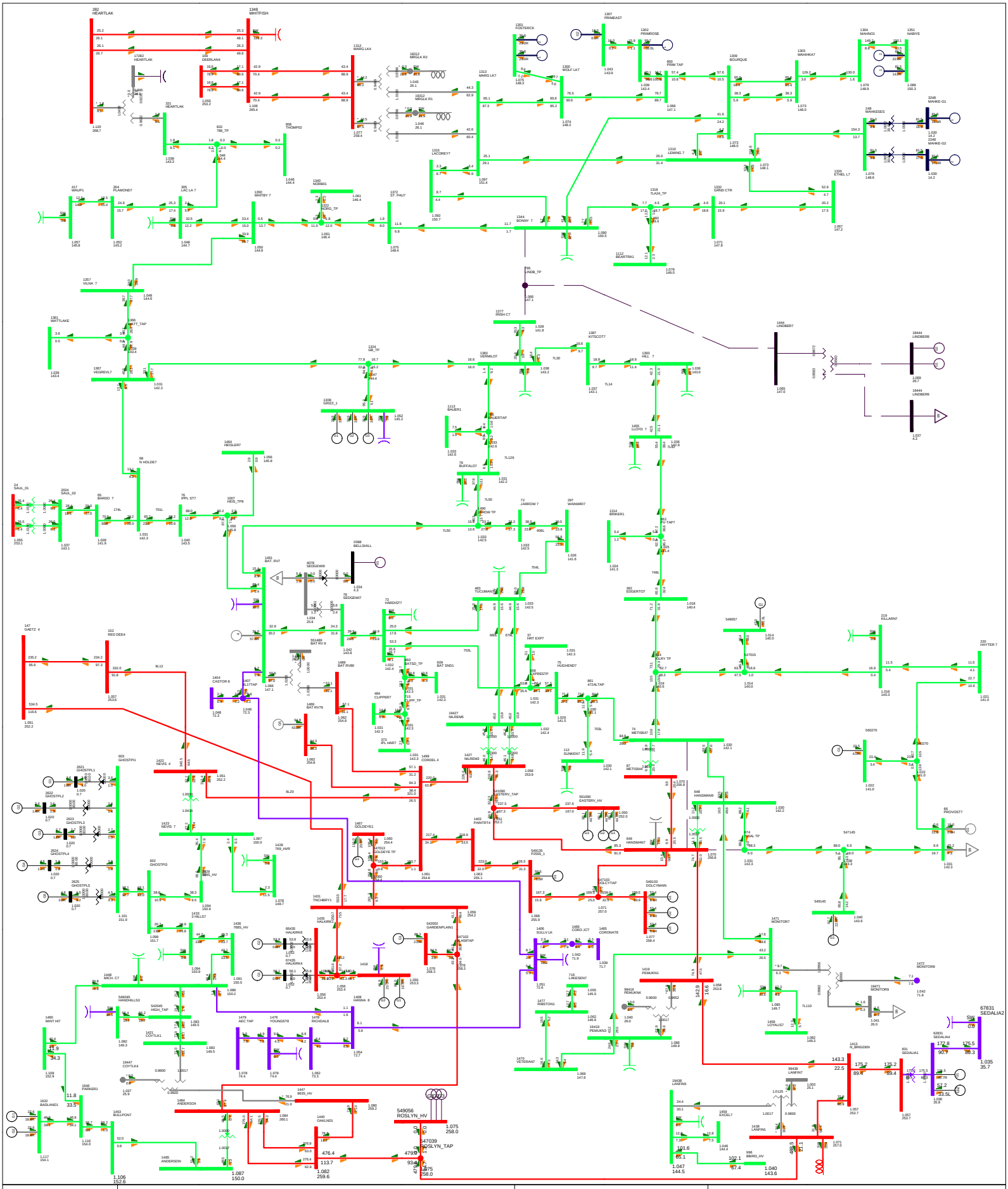
2028SL PRE-PROJ

Base Case

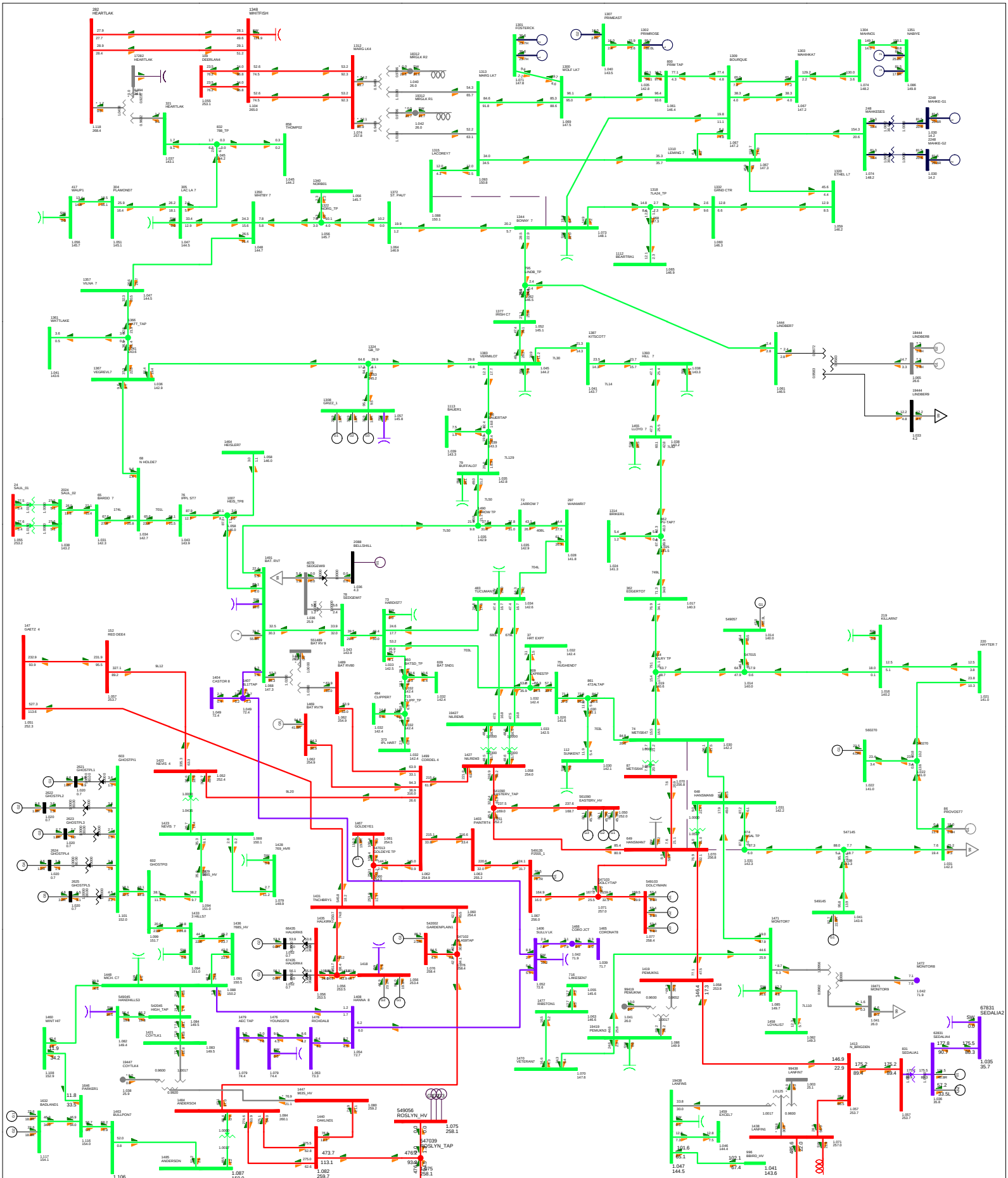
P2034 Cold Lake Area Cogen

Bus - VOLTAGE (kV/PU)
Branch - MW/Mvar
Equipment - MW/Mvar

100.0%RATEA
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A2- 2	Contingency	Study Case Description	P2034 Cold Lake Area Cogen
	CONT 041: 7L53 (700S Bonnyville - 706S Irish Creek - 969S Lindbergh)	2028SL PRE-PROJ Base Case	Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A2- 2

Contingency

CONT 042: 7L89 (721S Lacorey - 700S Bonnyville)

Study Case Description

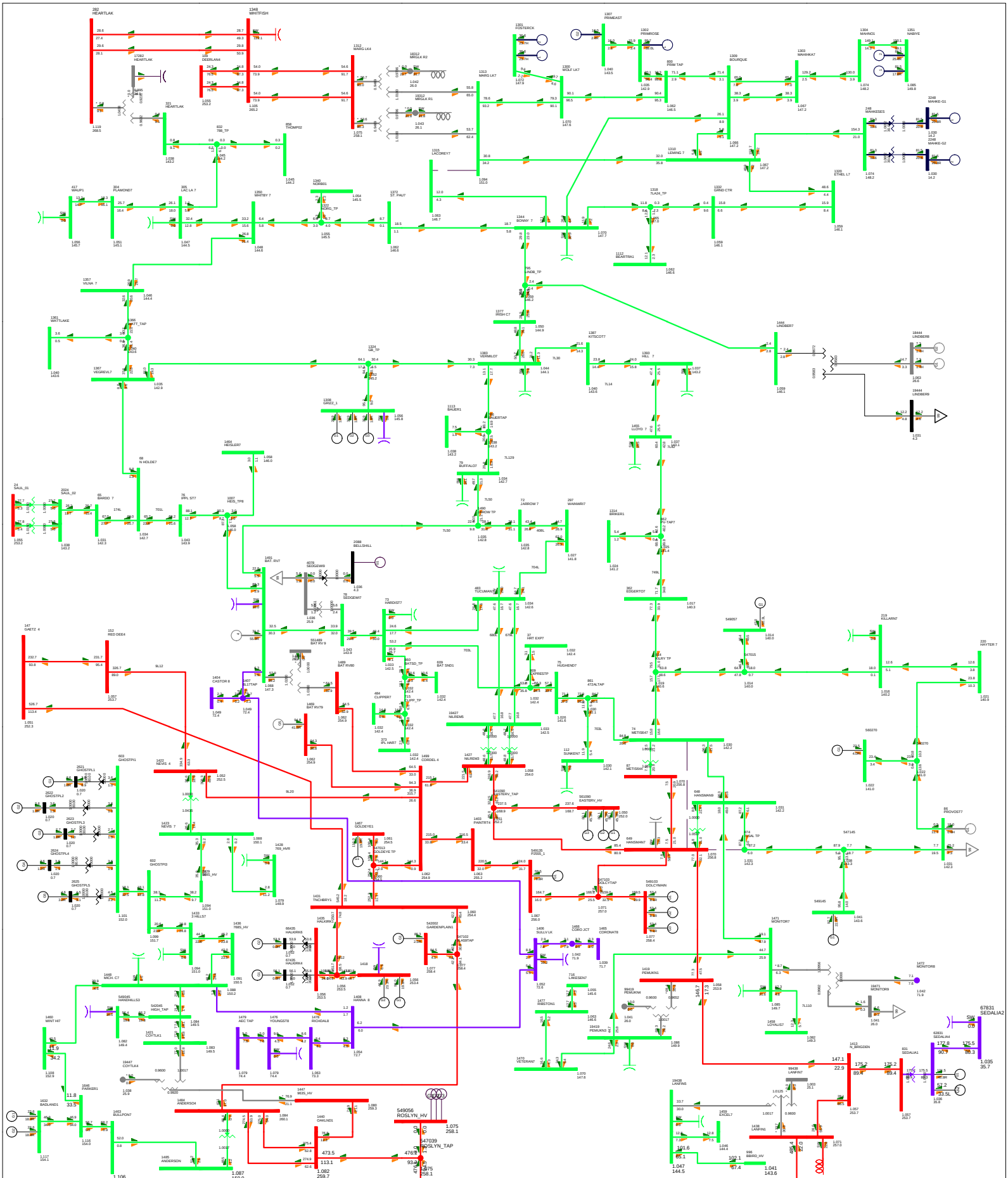
2028SL PRE-PROJ

Base Case

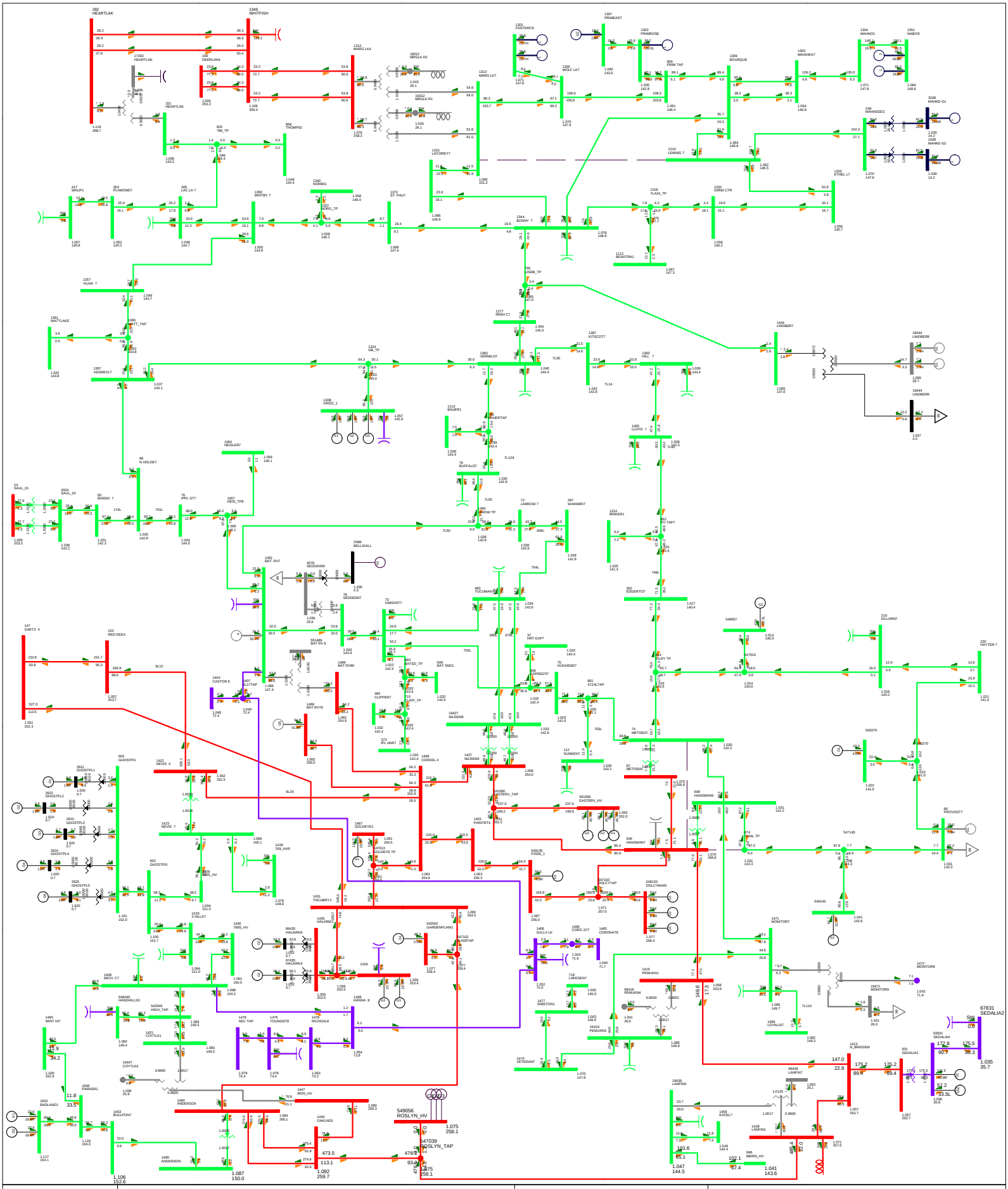
P2034 Cold Lake Area Cogen

Bus - VOLTAGE (kV/PU)
Branch - MW/MVar
Equipment - MW/Mvar

100.0%RATEA
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A2- 2	Contingency	Study Case Description	P2034 Cold Lake Area Cogen
	CONT 043: 7L89 (826S Marguerite Lake - 721S Lacorey)	2028SL PRE-PROJ Base Case	Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A2- 2

Contingency

CONT 044: 7L91 (715S Leming Lake - 826S Marguerite Lake)

Study Case Description

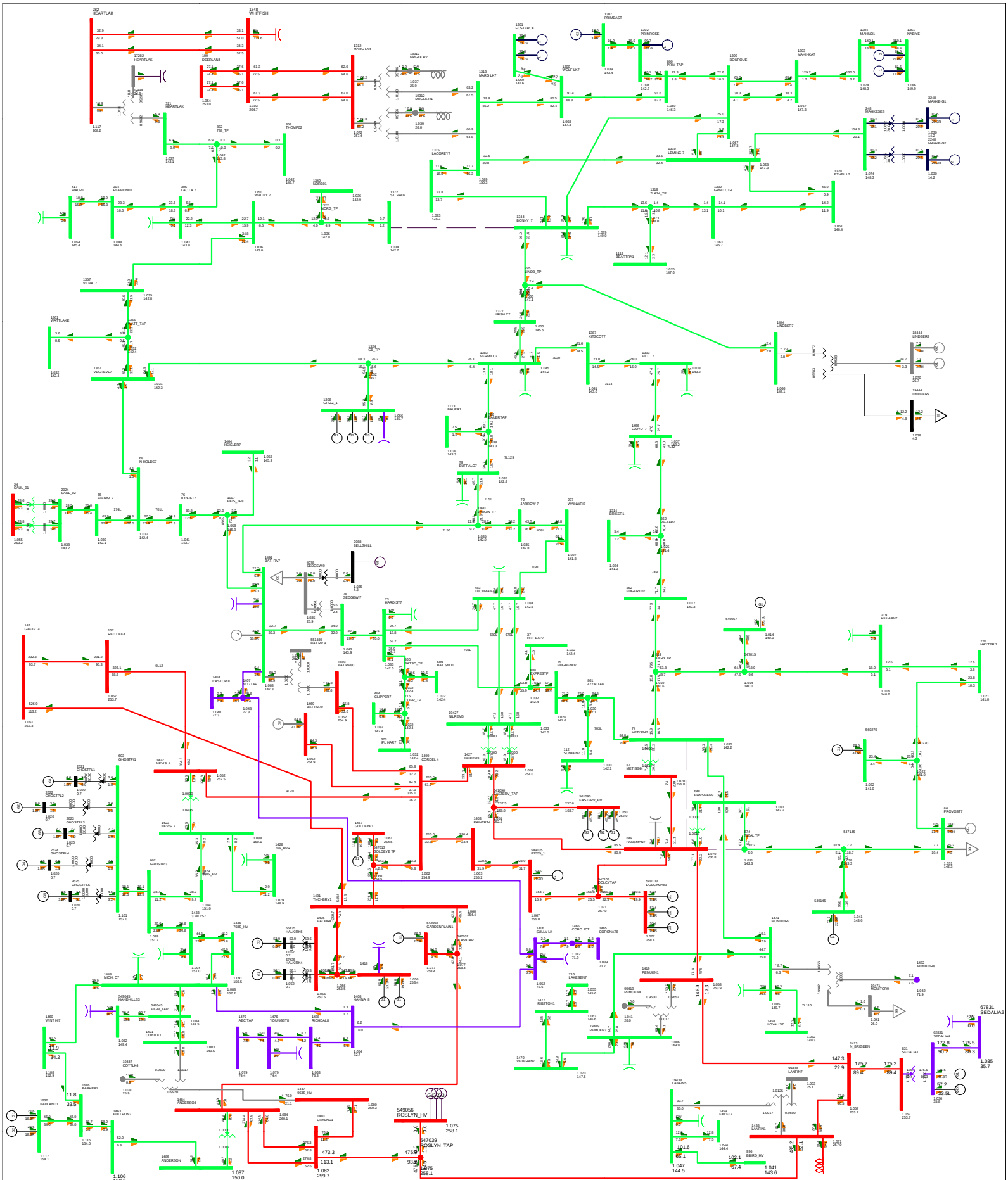
2028SL PRE-PROJ

Base Case

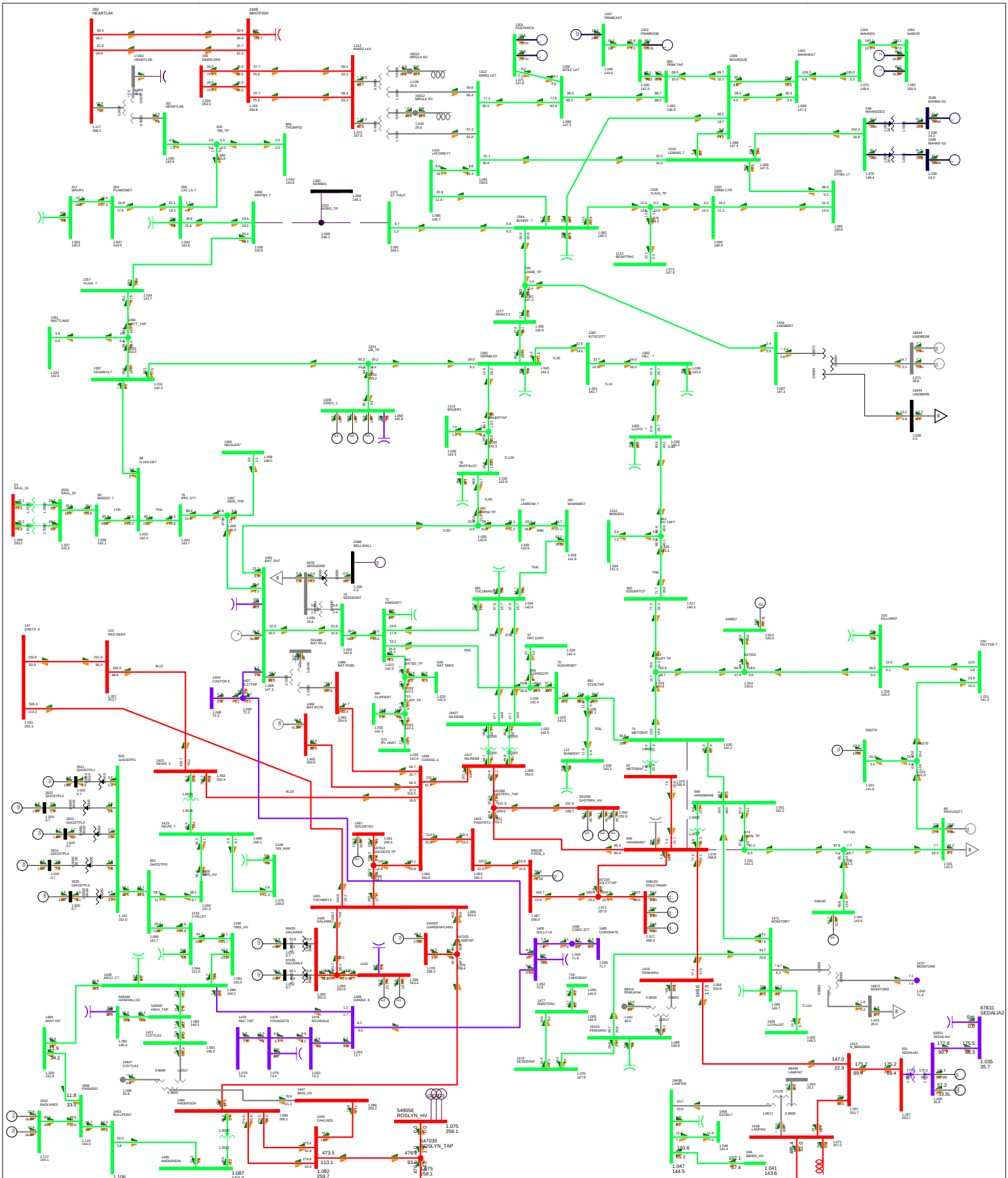
P2034 Cold Lake Area Cogen

Bus - VOLTAGE (kV/PU)
Branch - MW/MVar
Equipment - MW/Mvar

100.0%RATEA
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A2- 2	Contingency	Study Case Description	P2034 Cold Lake Area Cogen
	CONT 045: 7L70 (700S Bonnyville - 707S St.Paul)	2028SL PRE-PROJ Base Case	Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A2- 2

Contingency

CONT 046: 7L139 (819S Whitbylake - 707S St.Paul - 936S Norberg)

Study Case Description

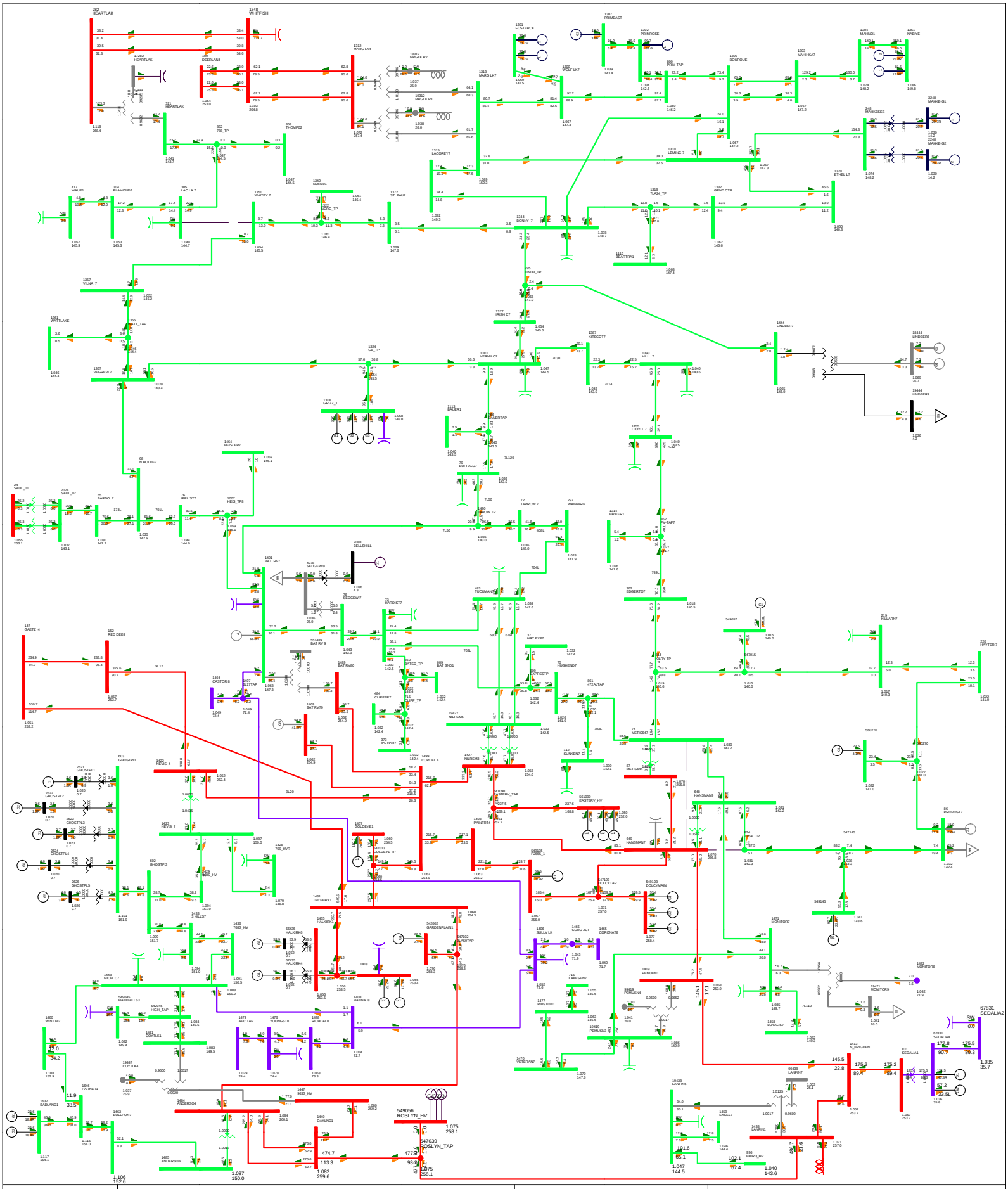
2028SL PRE-PROJ

Base Case

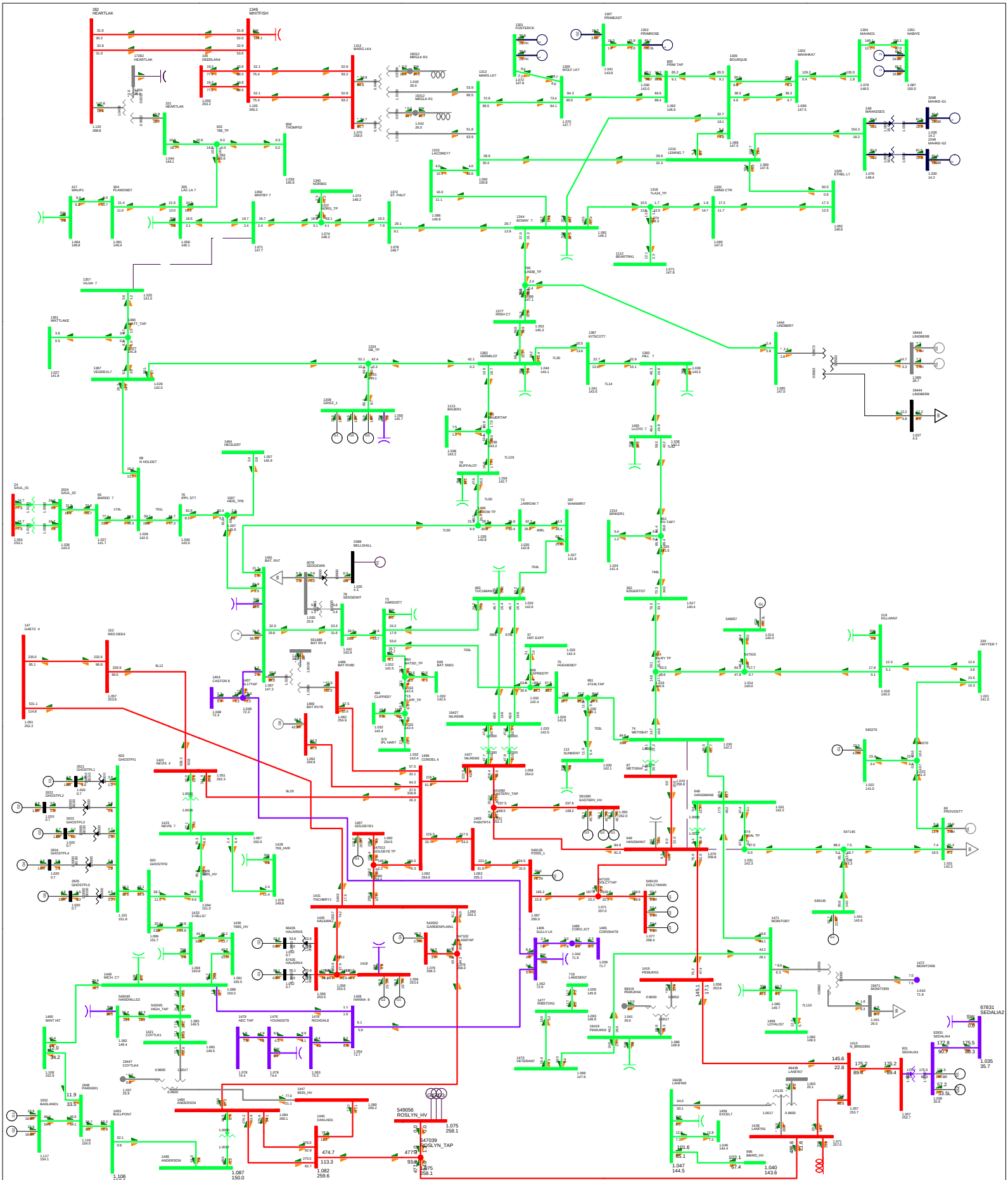
P2034 Cold Lake Area Cogen

Bus - VOLTAGE (kV/PU)
Branch - MW/MVar
Equipment - MW/Mvar

100.0%RATEA
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A2- 2	Contingency	Study Case Description	P2034 Cold Lake Area Cogen
	CONT 047: 794L & 7L94 (157S Lac La Biche - 819S Whitbylake)	2028SL PRE-PROJ Base Case	Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A2- 2

Contingency

CONT 048: 7L92 (819S Whitbylake - 777S Vilna)

Study Case Description

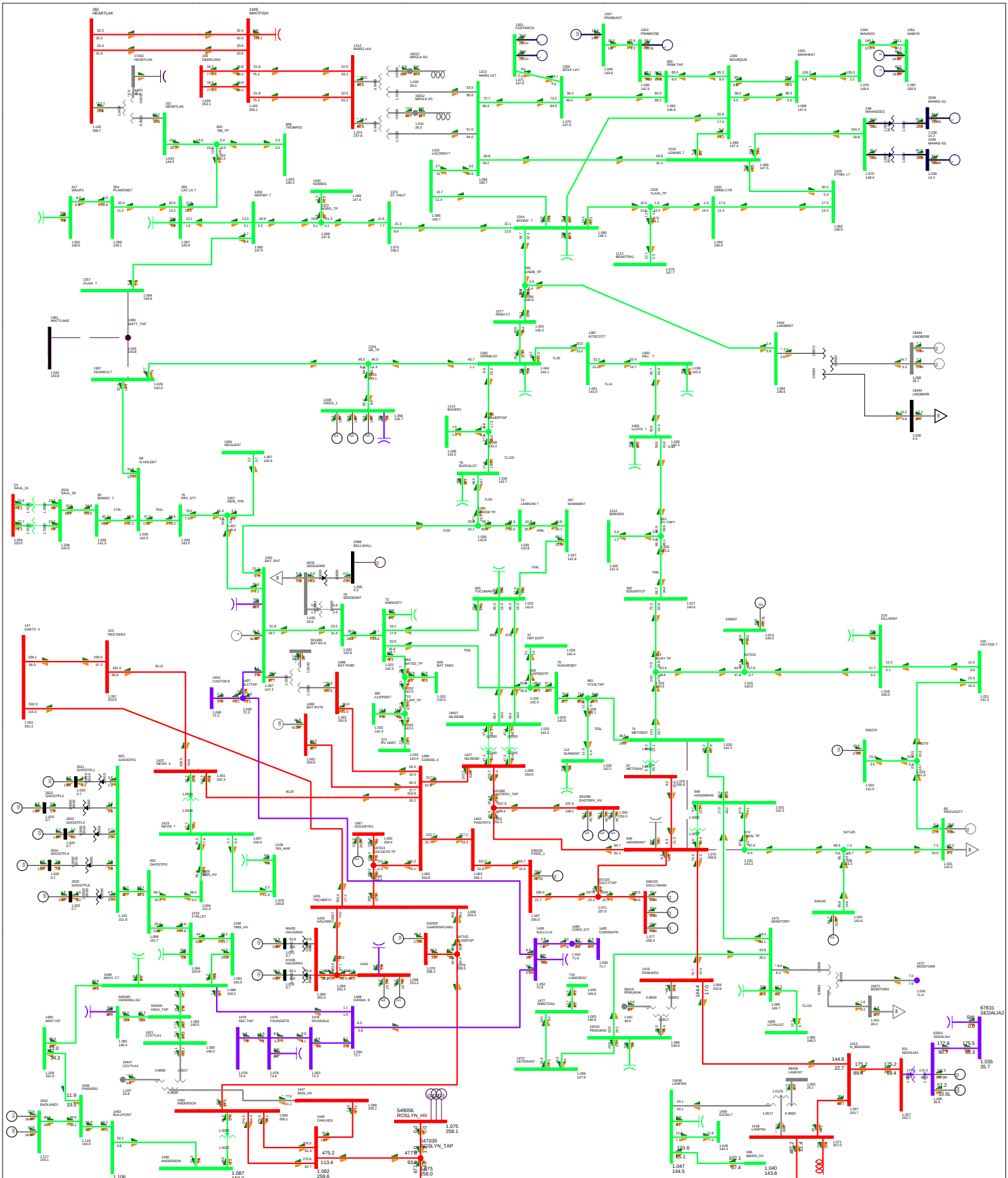
2028SL PRE-PROJ

Base Case

P2034 Cold Lake Area Cogen

Bus - VOLTAGE (kV/PU)
Branch - MW/MVar
Equipment - MW/Mvar

100.0%RATEA
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A2- 2

Contingency

CONT 049: 7L92 (777S Vilna - 709S Vegreville - 956S Watt Lake)

Study Case Description

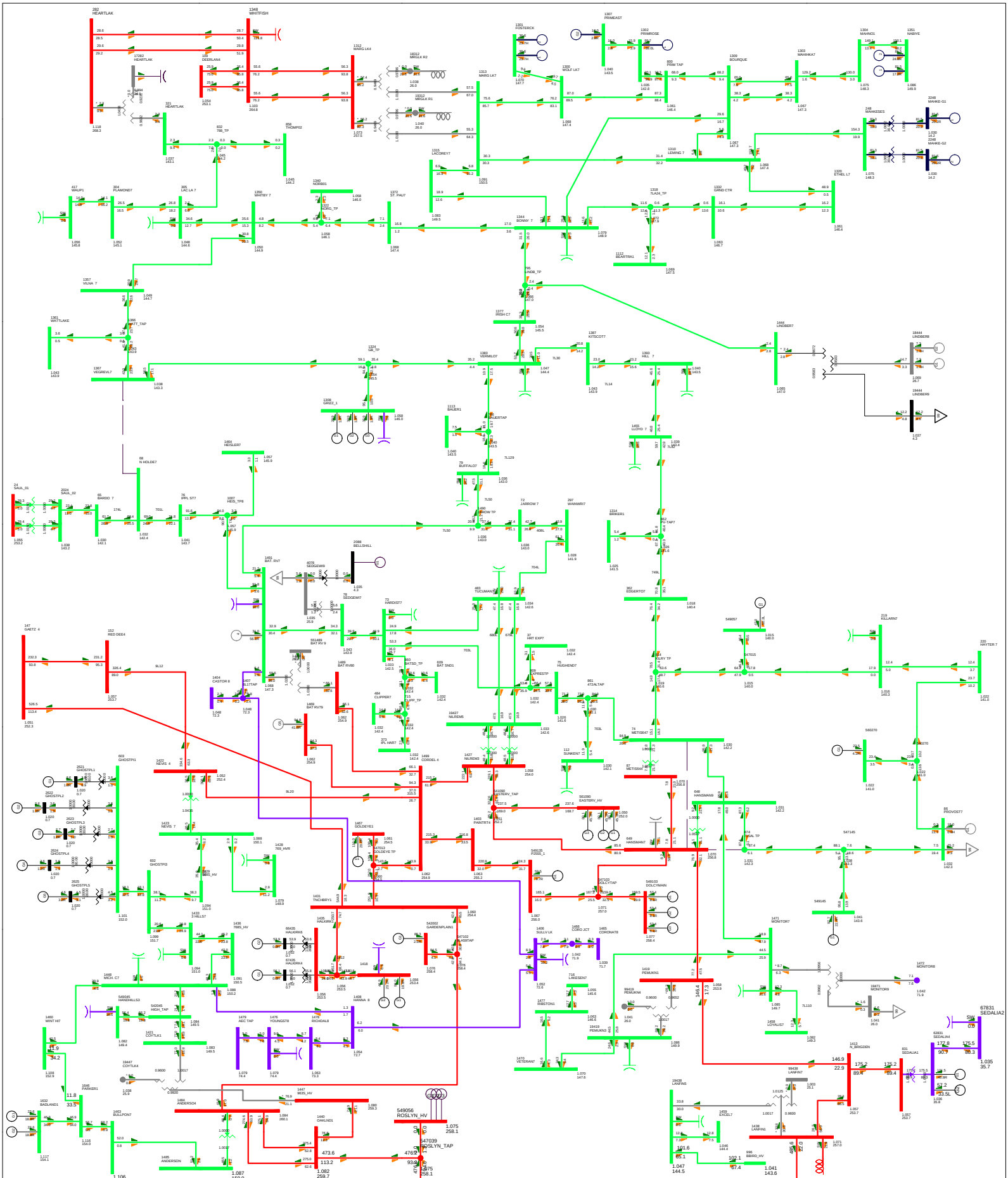
2028SL PRE-PROJ

Base Case

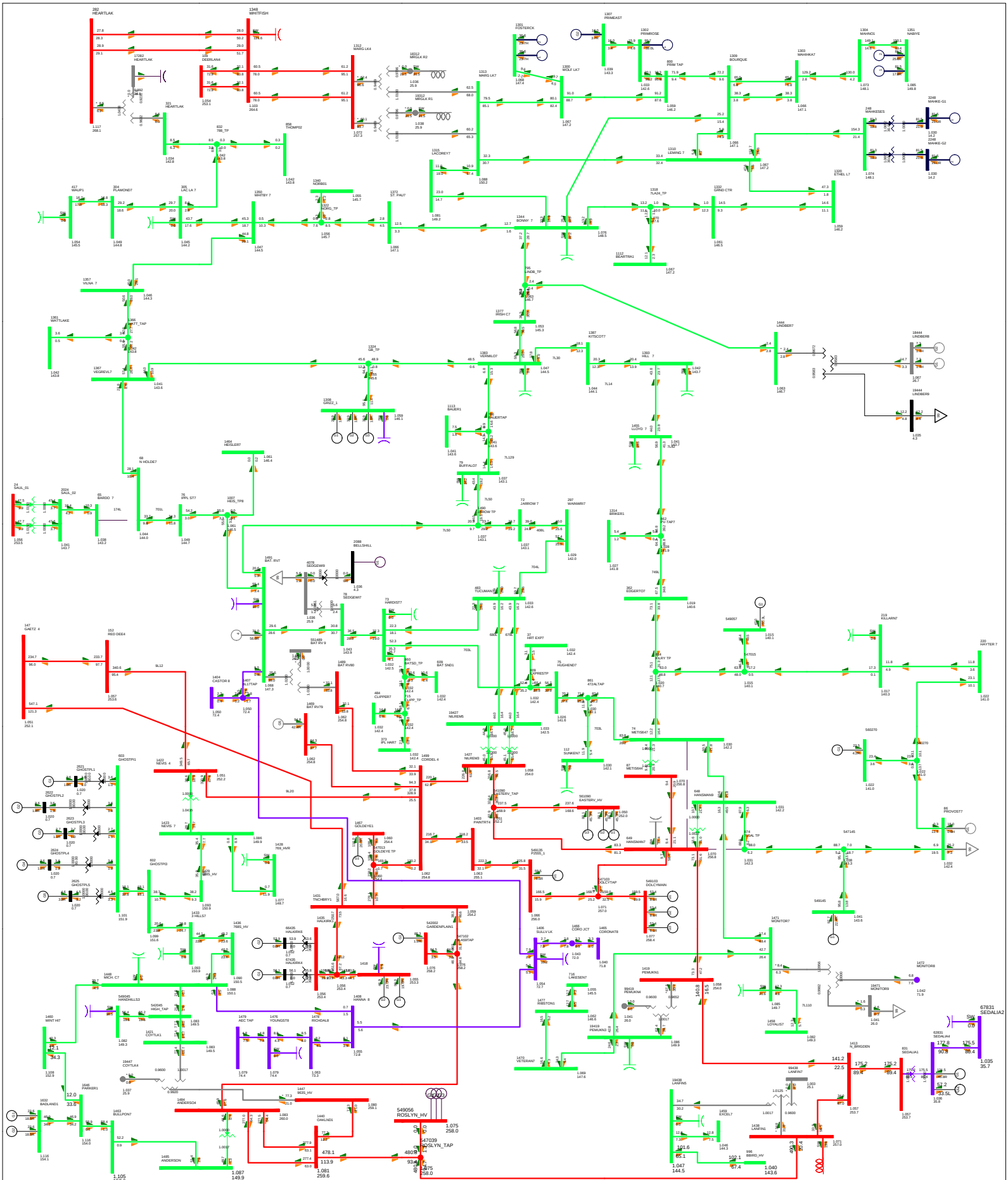
P2034 Cold Lake Area Cogen

Bus - VOLTAGE (kV/PU)
Branch - MW/MVar
Equipment - MW/Mvar

100.0%RATEA
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A2- 2	Contingency	Study Case Description	P2034 Cold Lake Area Cogen
	CONT 050: 7L77 (395S North Holden - 709S Vegreville)	2028SL PRE-PROJ Base Case	Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A2- 2

Contingency

CONT 051: 174L (197S Bardo - 395S North Holden)

Study Case Description

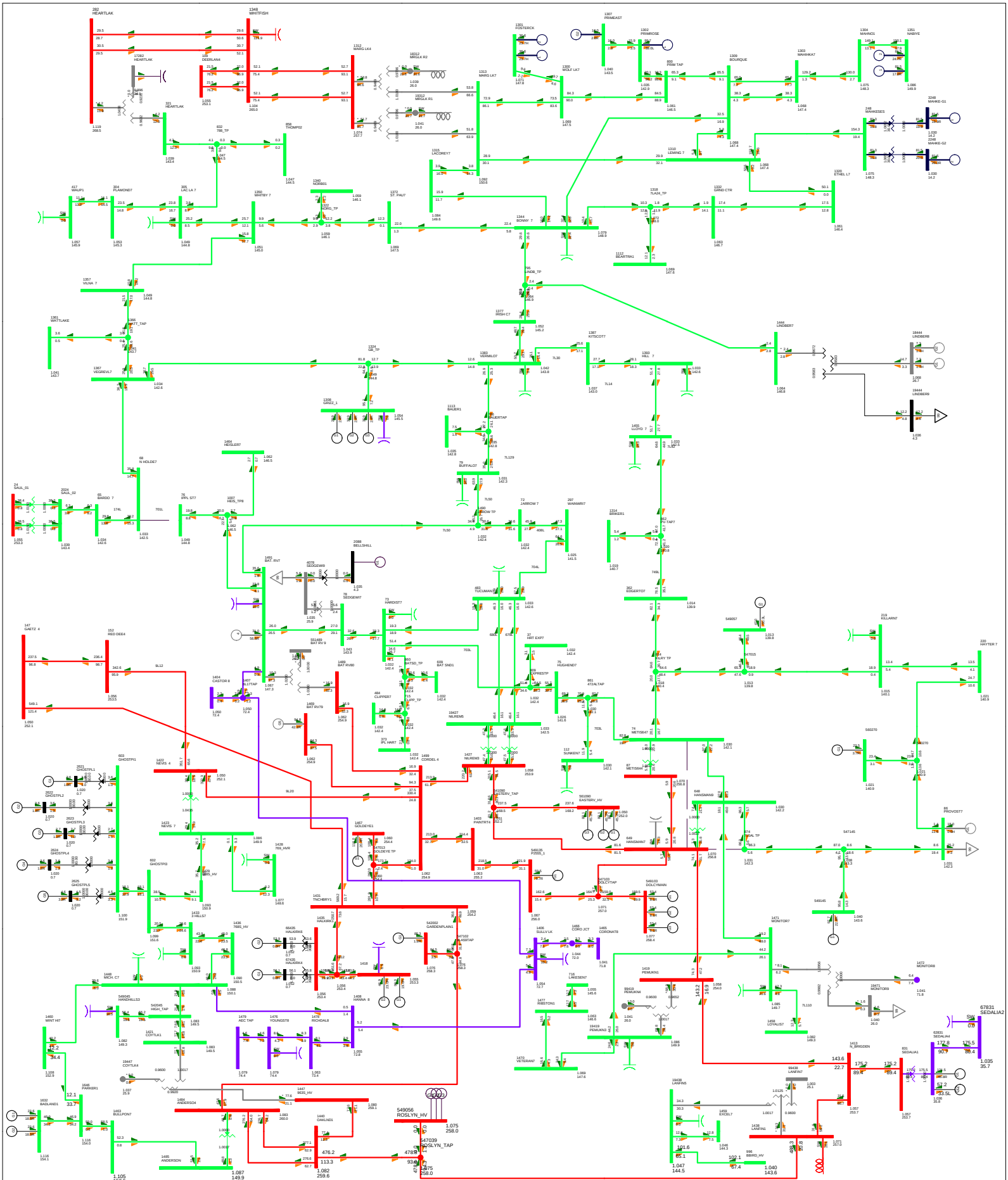
2028SL PRE-PROJ

Base Case

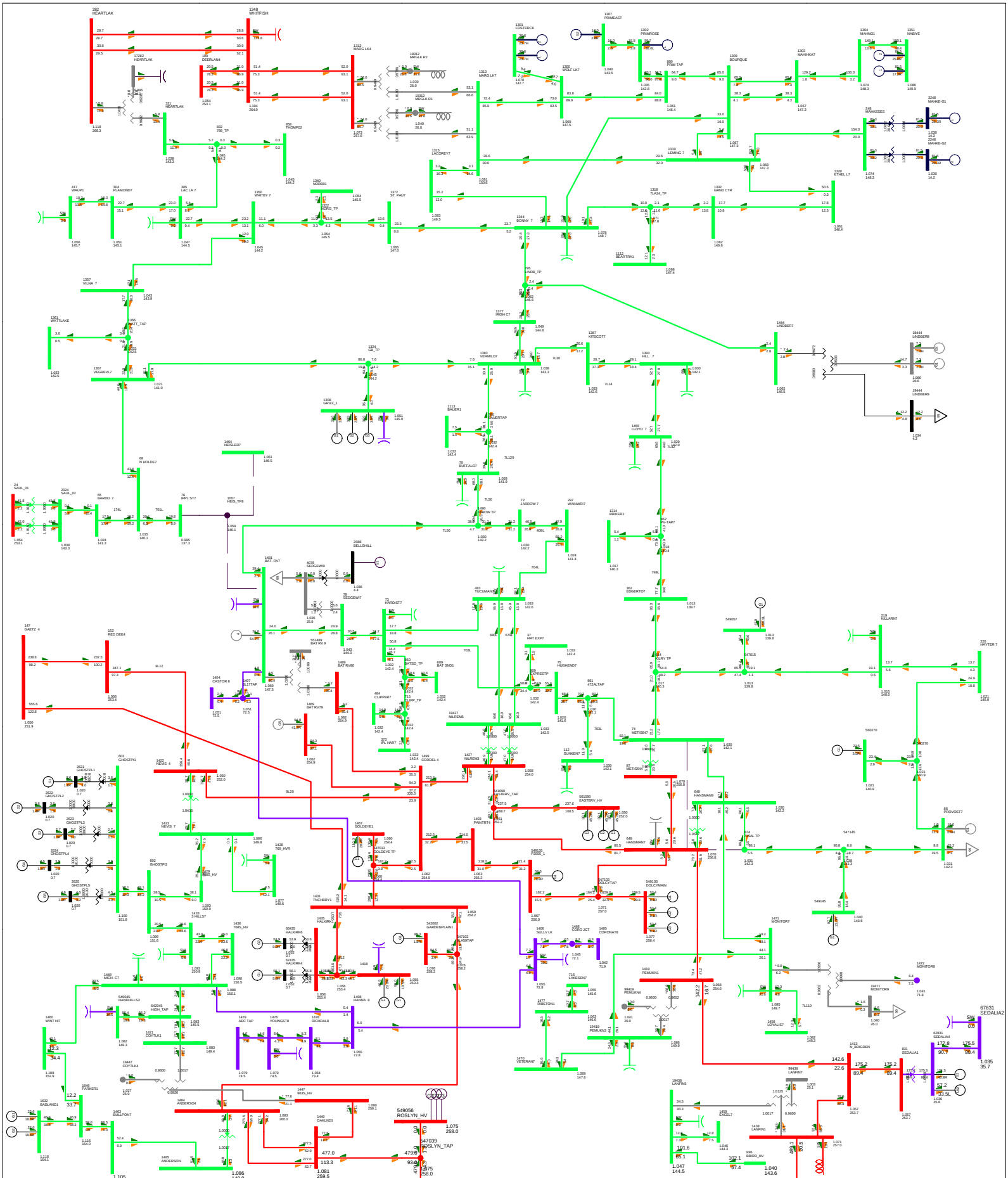
P2034 Cold Lake Area Cogen

Bus - VOLTAGE (kV/PU)
Branch - MW/Mvar
Equipment - MW/Mvar

100.0%RATEA
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A2- 2	Contingency	Study Case Description	P2034 Cold Lake Area Cogen
	CONT 052: 701L (395S North Holden - 223S Strome)	2028SL PRE-PROJ Base Case	Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A2- 2

Contingency

CONT 053: 701L (223S Strome - 757S Battle River - 764S Heisler)

Study Case Description

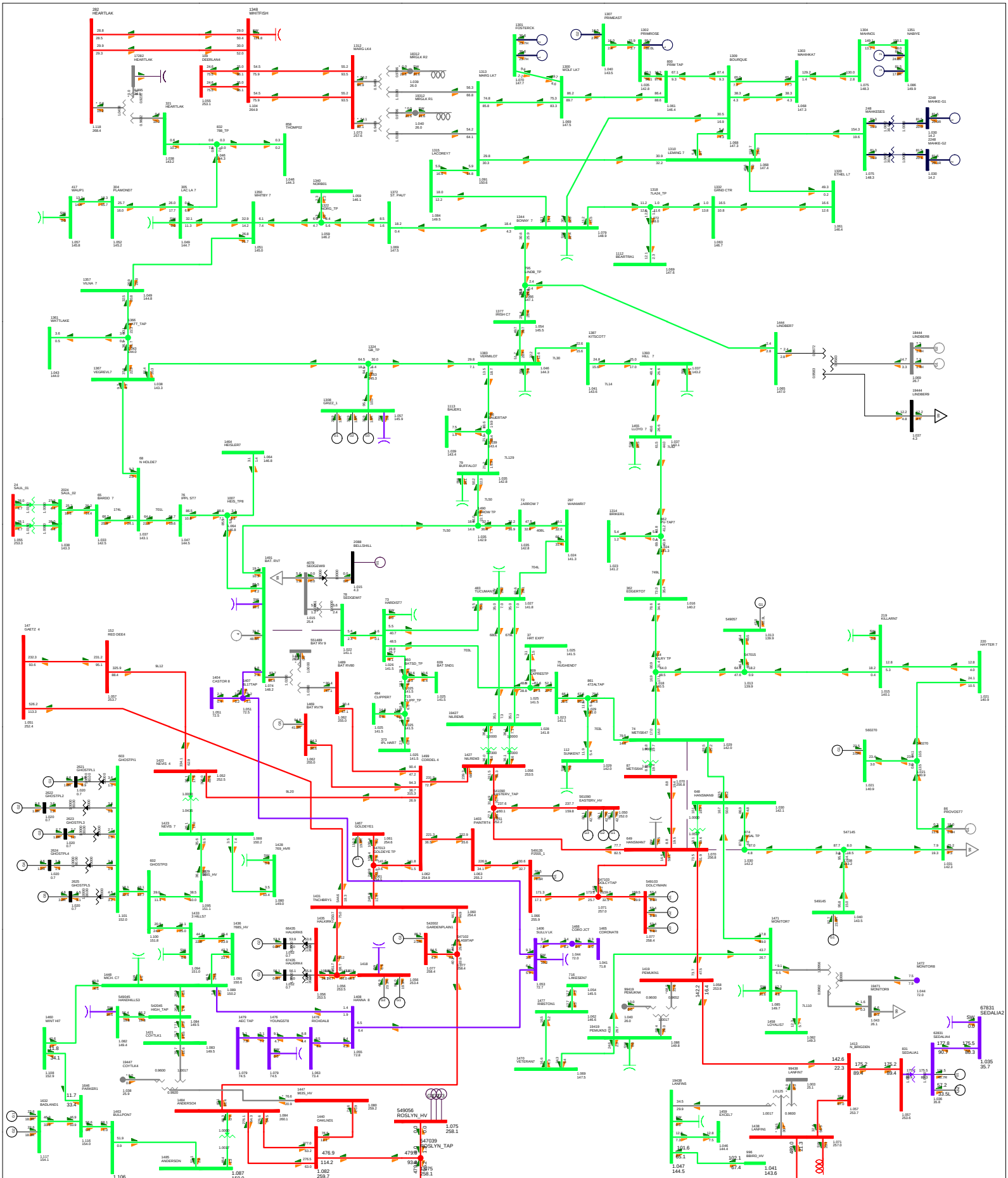
2028SL PRE-PROJ

Base Case

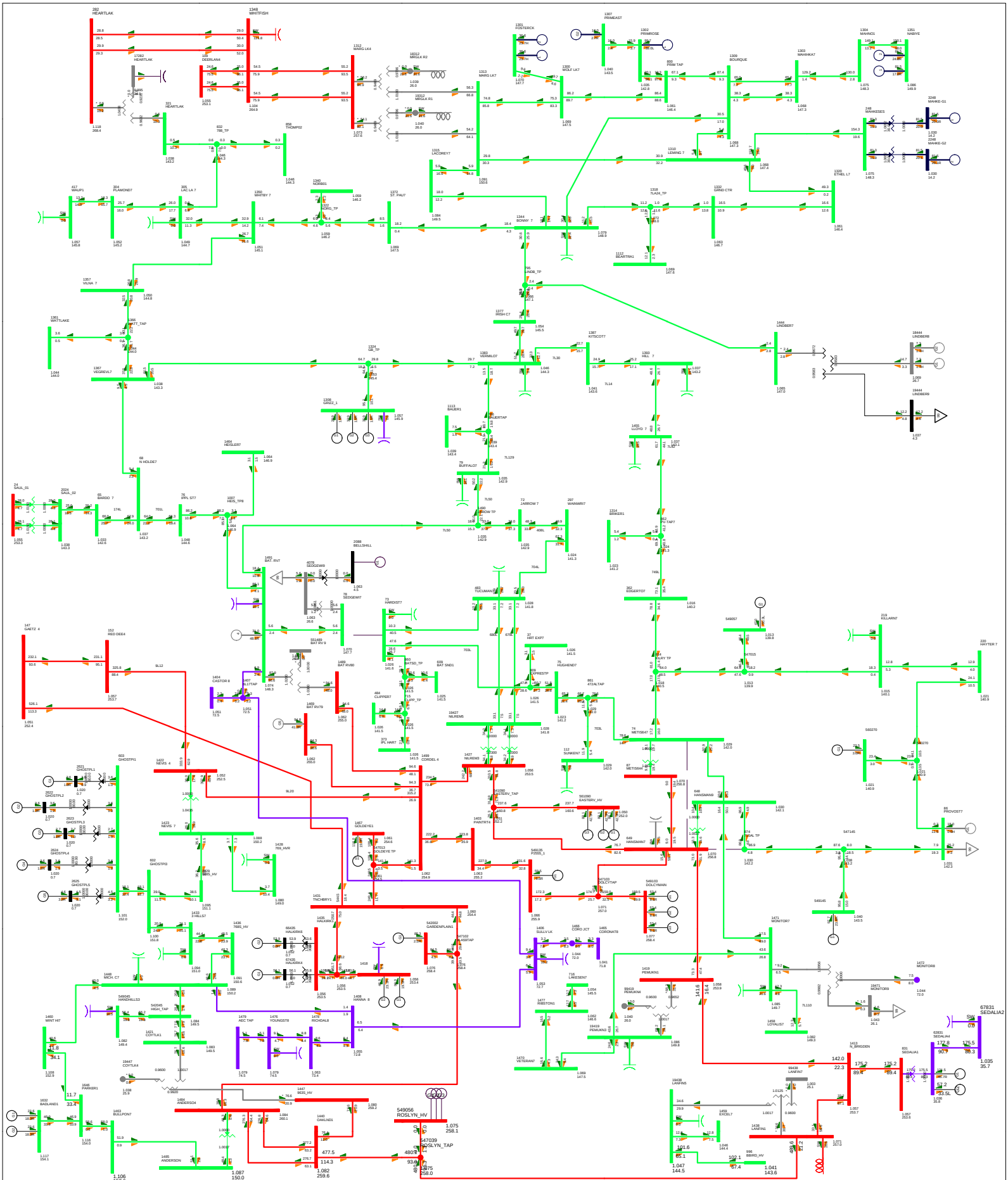
P2034 Cold Lake Area Cogen

Bus - VOLTAGE (kV/PU)
Branch - MW/Mvar
Equipment - MW/Mvar

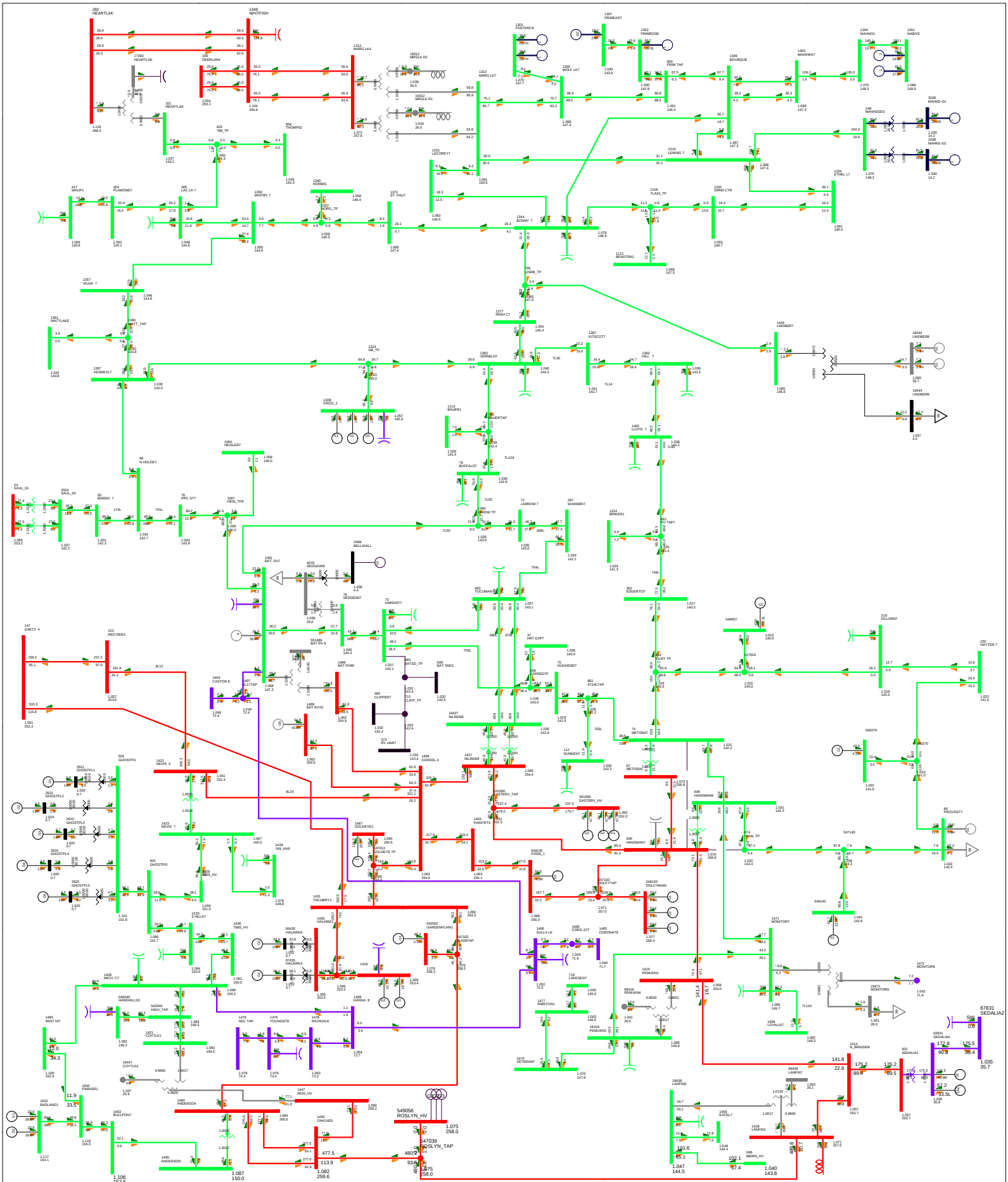
100.0%RATEA
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



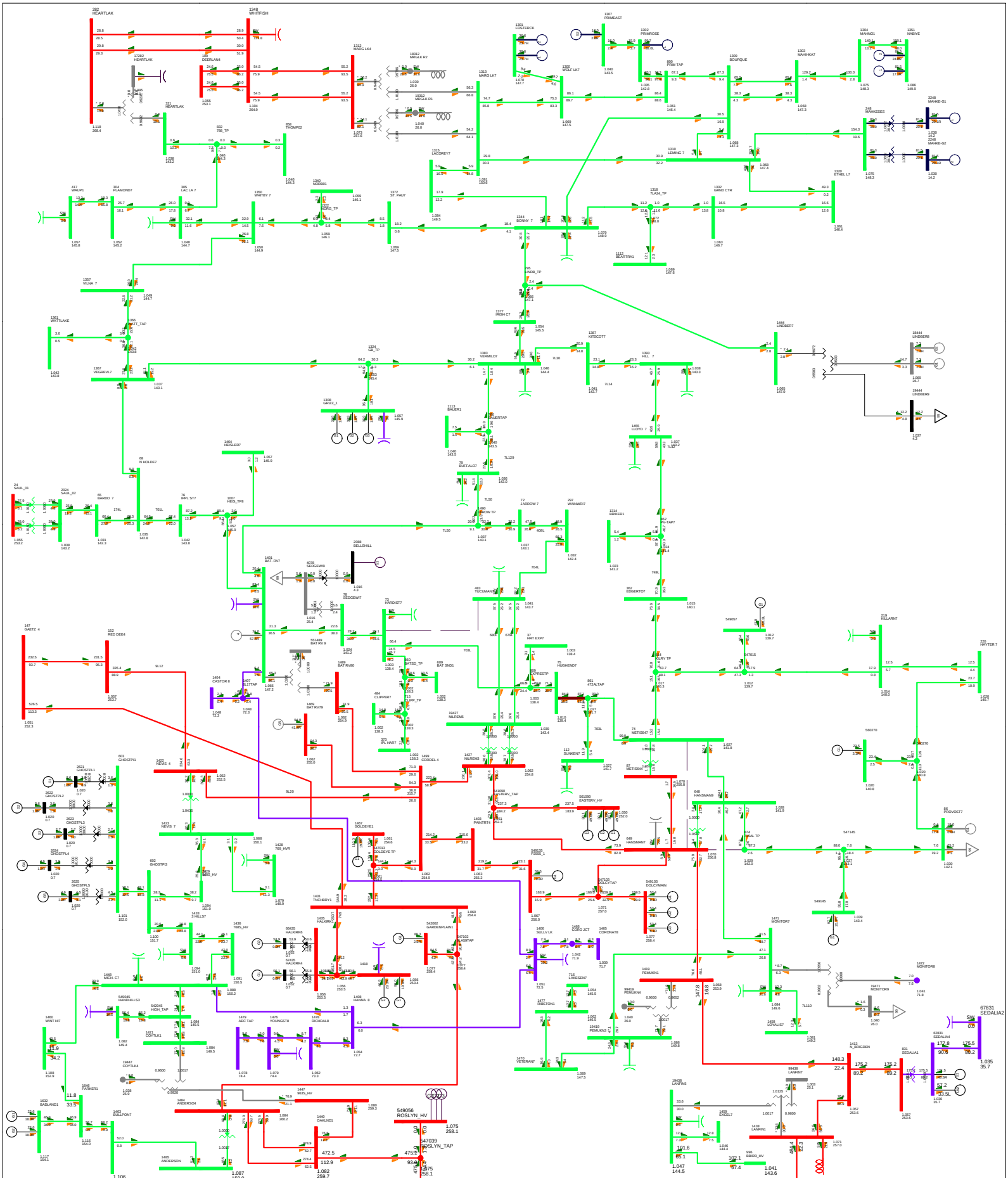
Attachment A2- 2	Contingency	Study Case Description	P2034 Cold Lake Area Cogen
	CONT 054: 7L702 (137S Sedgewick - 757S Battle River)	2028SL PRE-PROJ Base Case	Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A2- 2	Contingency	Study Case Description	P2034 Cold Lake Area Cogen
	CONT 055: 702L (377S Hardisty - 137S Sedgewick)	2028SL PRE-PROJ Base Case	Bus - VOLTAGE (kV/PU) Branch - MW/MVar Equipment - MW/Mvar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A2- 2	Contingency	Study Case Description	P2034 Cold Lake Area Cogen
	CONT 056: 769L (377S Hardisty - 594S Battle Sands - 296S Rosyth - 656S Clipper)	2028SL PRE-PROJ Base Case	Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A2- 2

Contingency

CONT 057: 681L (377S Hardisty - 478S Tucuman)

Study Case Description

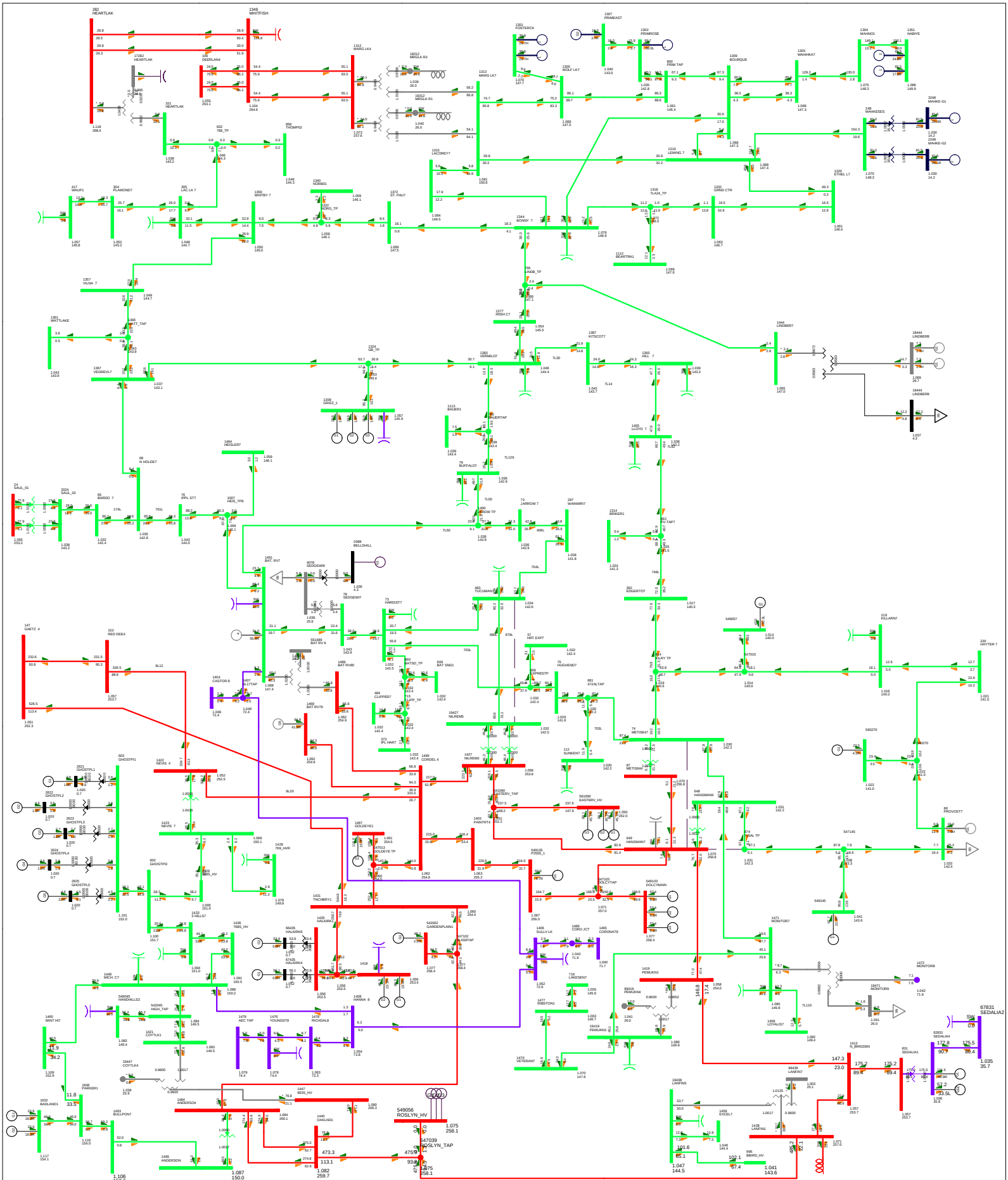
2028SL PRE-PROJ

Base Case

P2034 Cold Lake Area Cogen

Bus - VOLTAGE (kV/PU)
Branch - MW/MVar
Equipment - MW/Mvar

100.0%RATEA
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A2- 2

Contingency

CONT 058: 679L (478S Tucuman - 574S Nilrem)

Study Case Description

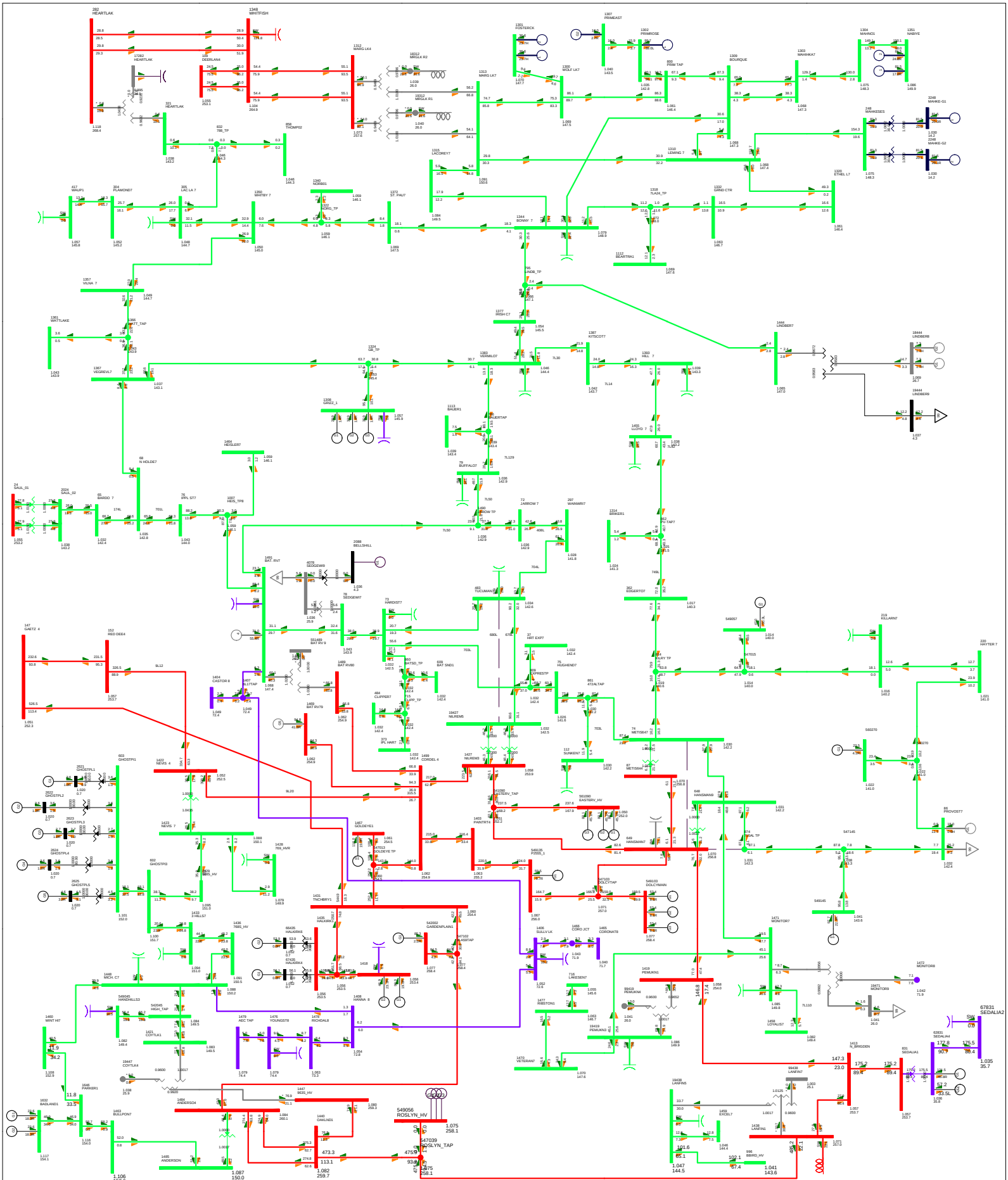
2028SL PRE-PROJ

Base Case

P2034 Cold Lake Area Cogen

Bus - VOLTAGE (kV/PU)
Branch - MW/Mvar
Equipment - MW/Mvar

100.0%RATEA
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A2- 2

Contingency

CONT 059: 680L (478S Tucuman - 574S Nilrem)

Study Case Description

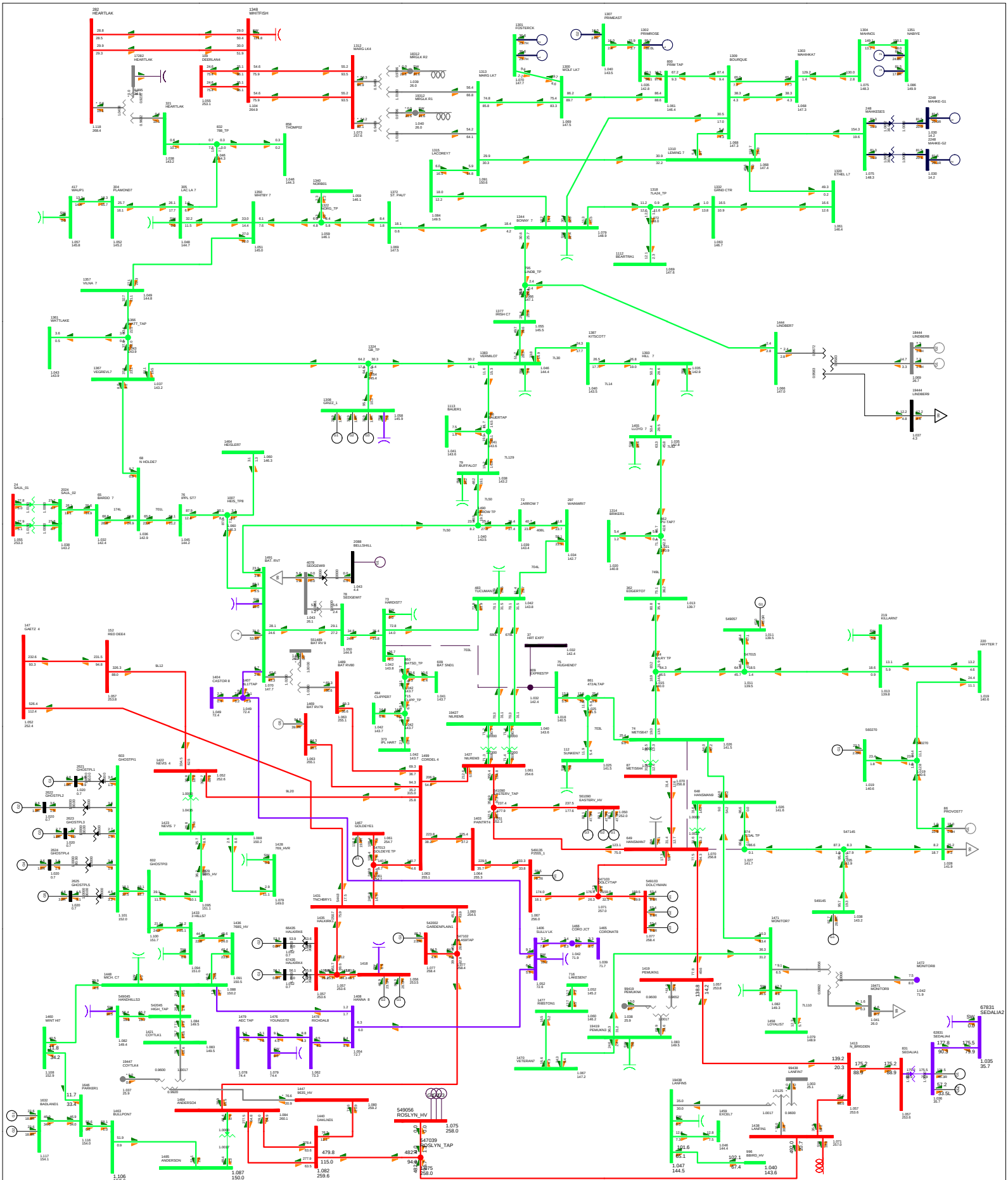
2028SL PRE-PROJ

Base Case

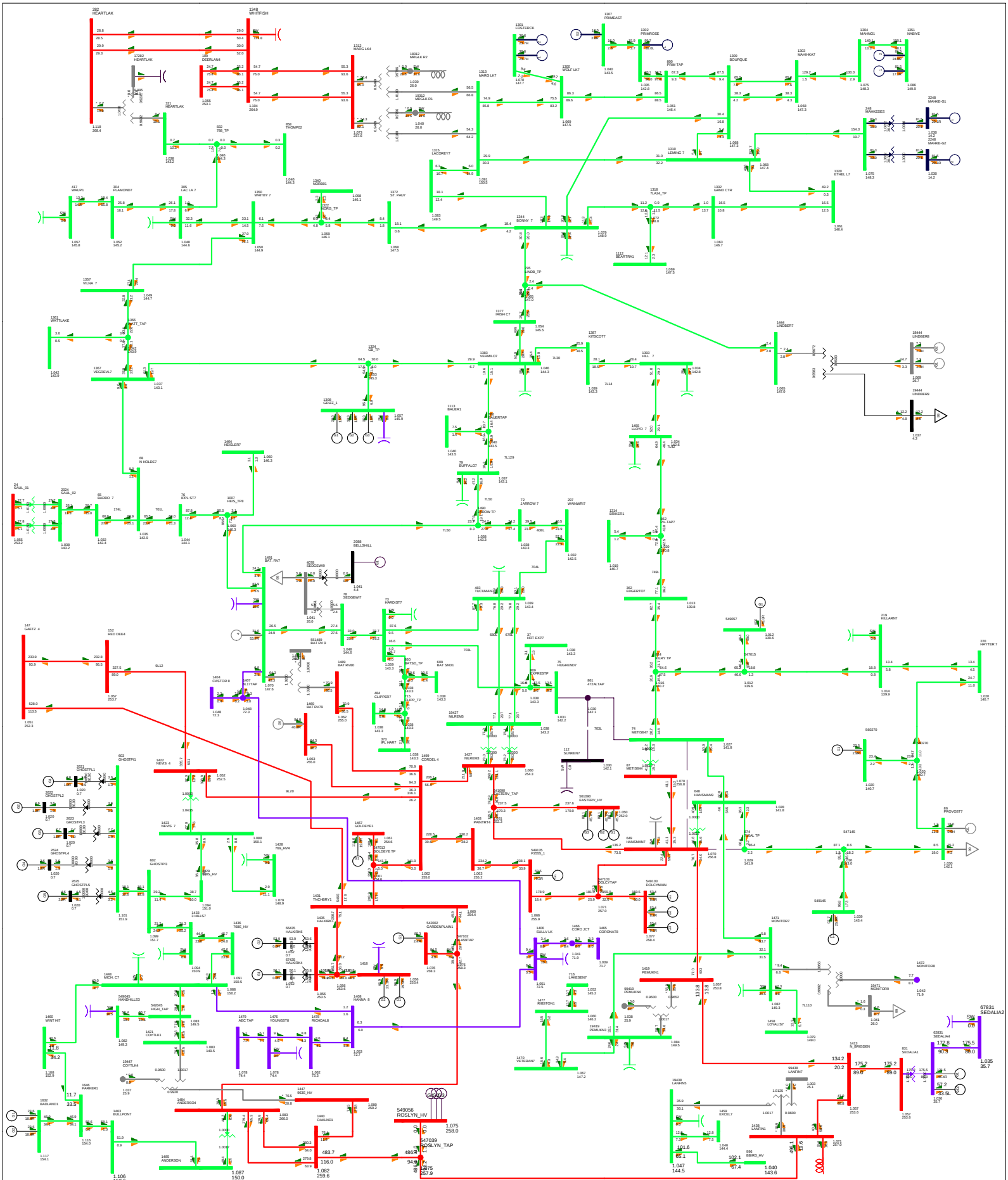
P2034 Cold Lake Area Cogen

Bus - VOLTAGE (kV/PU)
Branch - MW/Mvar
Equipment - MW/Mvar

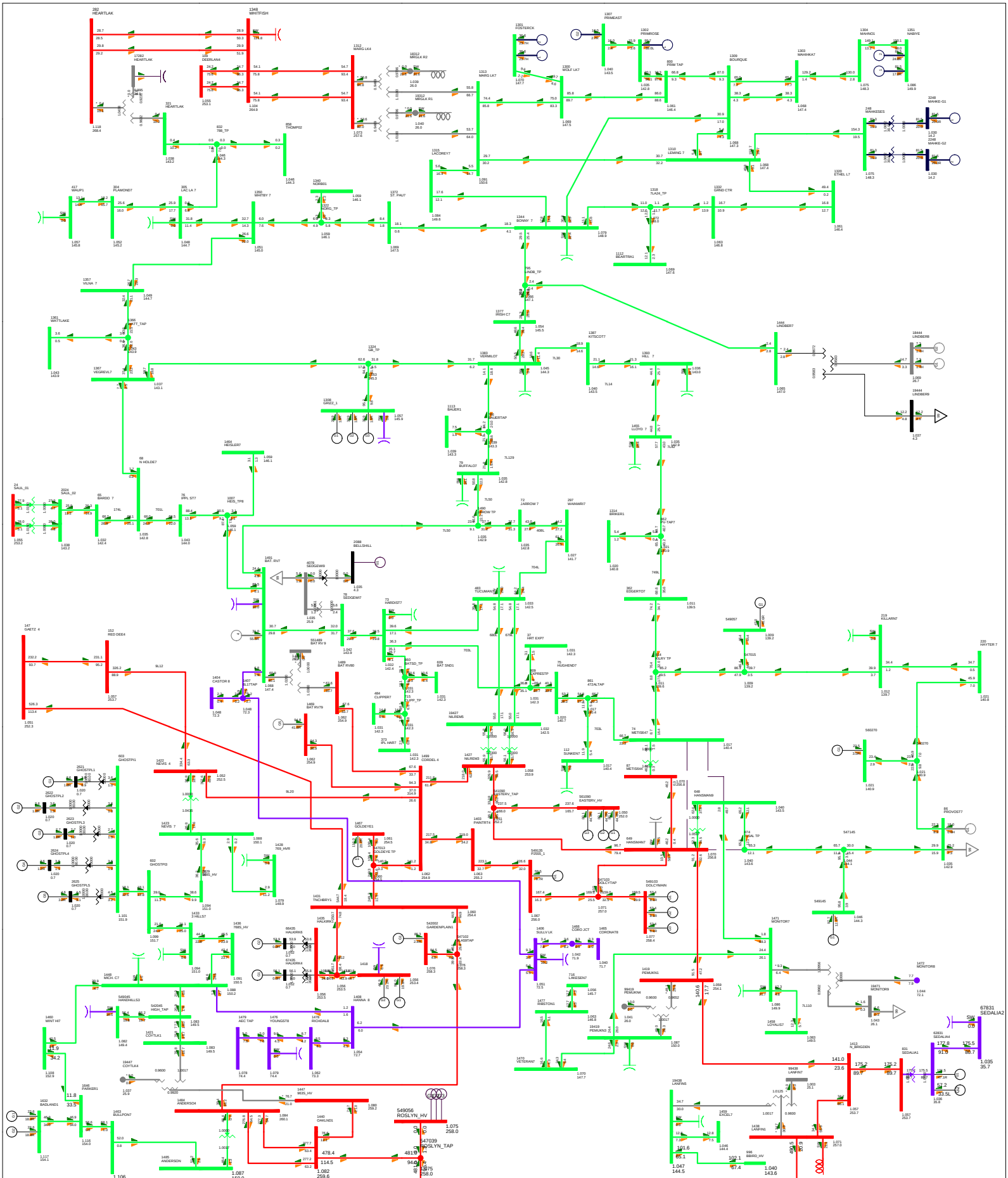
100.0%RATEA
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A2- 2	Contingency	Study Case Description	P2034 Cold Lake Area Cogen
	CONT 060: 703L (377S Hardisty - 213S Hughenden - 329S Hrt Express)	2028SL PRE-PROJ Base Case	Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A2- 2	**Contingency** CONT 061: 472L (213S Hughenden - 648S Metiskow - 221S Sunken Lake)	**Study Case Description** 2028SL PRE-PROJ Base Case	**P2034 Cold Lake Area Cogen** Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A2- 2

Contingency

CONT 062: 885L (648S Metiskow - 650S Hansman Lake)

Study Case Description

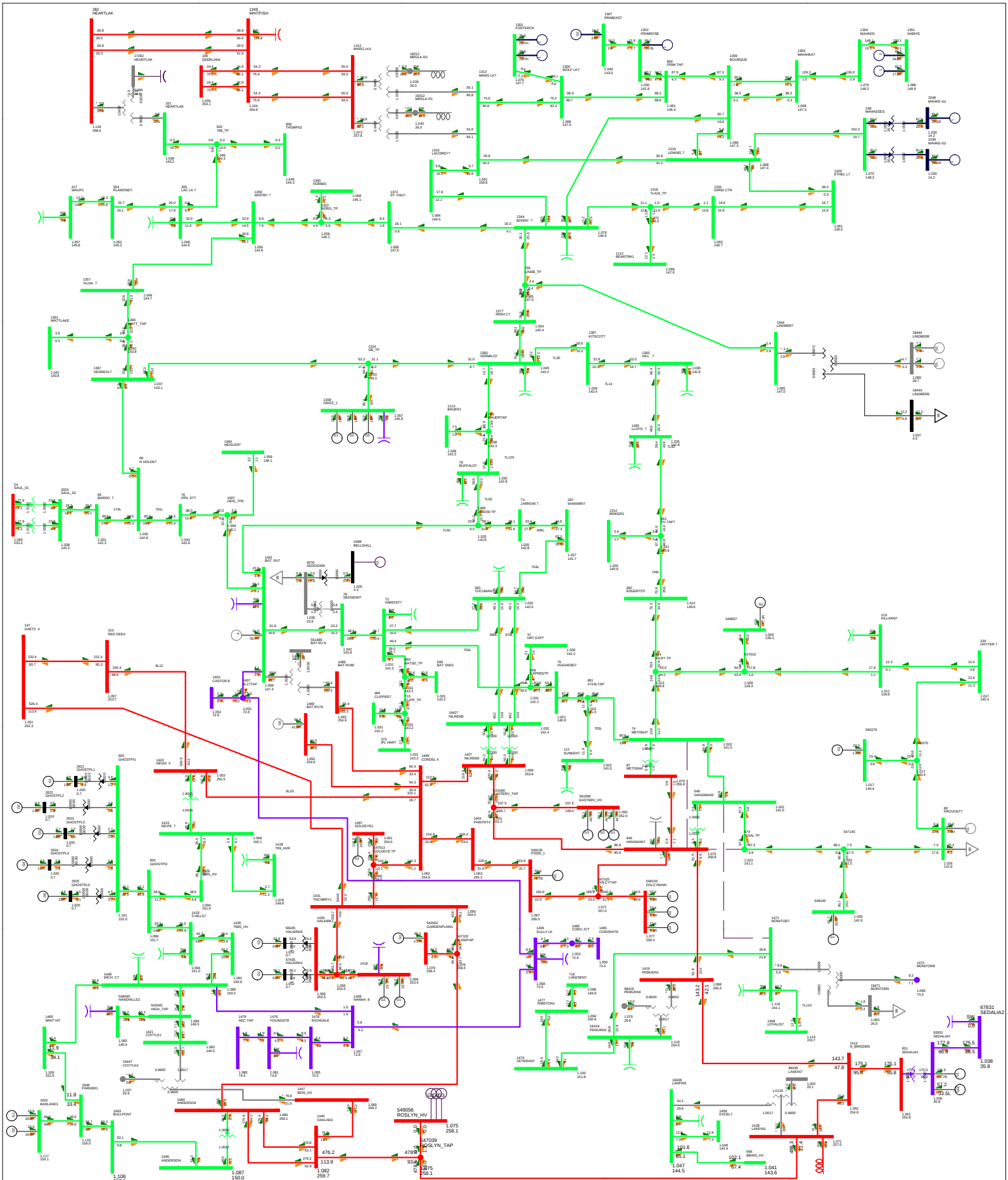
2028SL PRE-PROJ

Base Case

P2034 Cold Lake Area Cogen

Bus - VOLTAGE (kV/PU)
Branch - MW/MVar
Equipment - MW/Mvar

100.0%RATEA
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A2- 2

Contingency

CONT 063: 7L224 (650S Hansman Lake - 774S Monitor)

Study Case Description

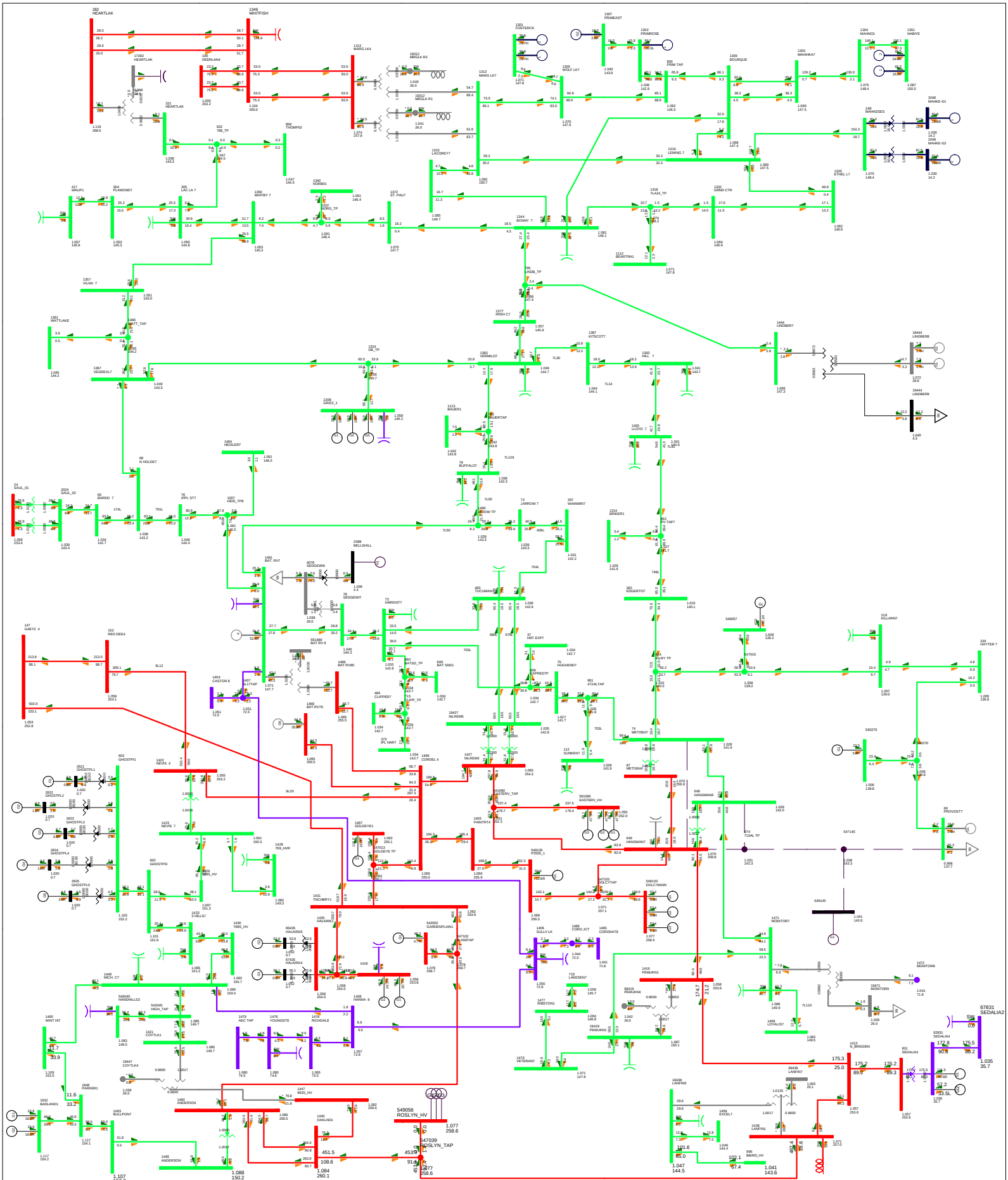
2028SL PRE-PROJ

Base Case

P2034 Cold Lake Area Cogen

Bus - VOLTAGE (kV/PU)
Branch - MW/Mvar
Equipment - MW/Mvar

100.0%RATEA
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A2- 2

Contingency

CONT 064: 715L (650S Hansman Lake - P2540 Cache Rising Sun - 545S Provost)

Study Case Description

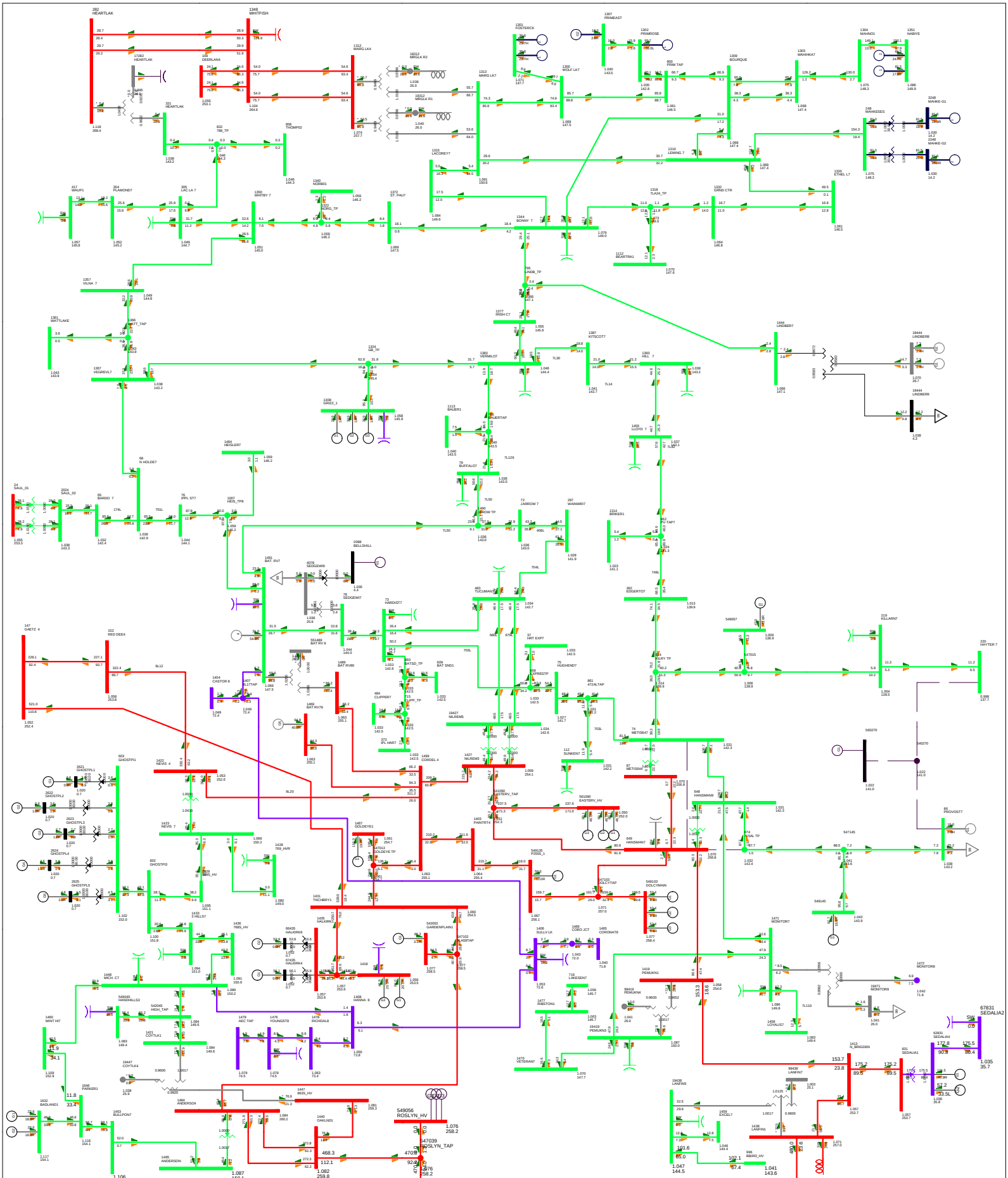
2028SL PRE-PROJ

Base Case

P2034 Cold Lake Area Cogen

Bus - VOLTAGE (kV/PU)
Branch - MW/Mvar
Equipment - MW/Mvar

100.0%RATEA
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A2- 2

Contingency

CONT 065: 398L (545S Provost - P2573 Prairie Yarrow - 277S Hayter)

Study Case Description

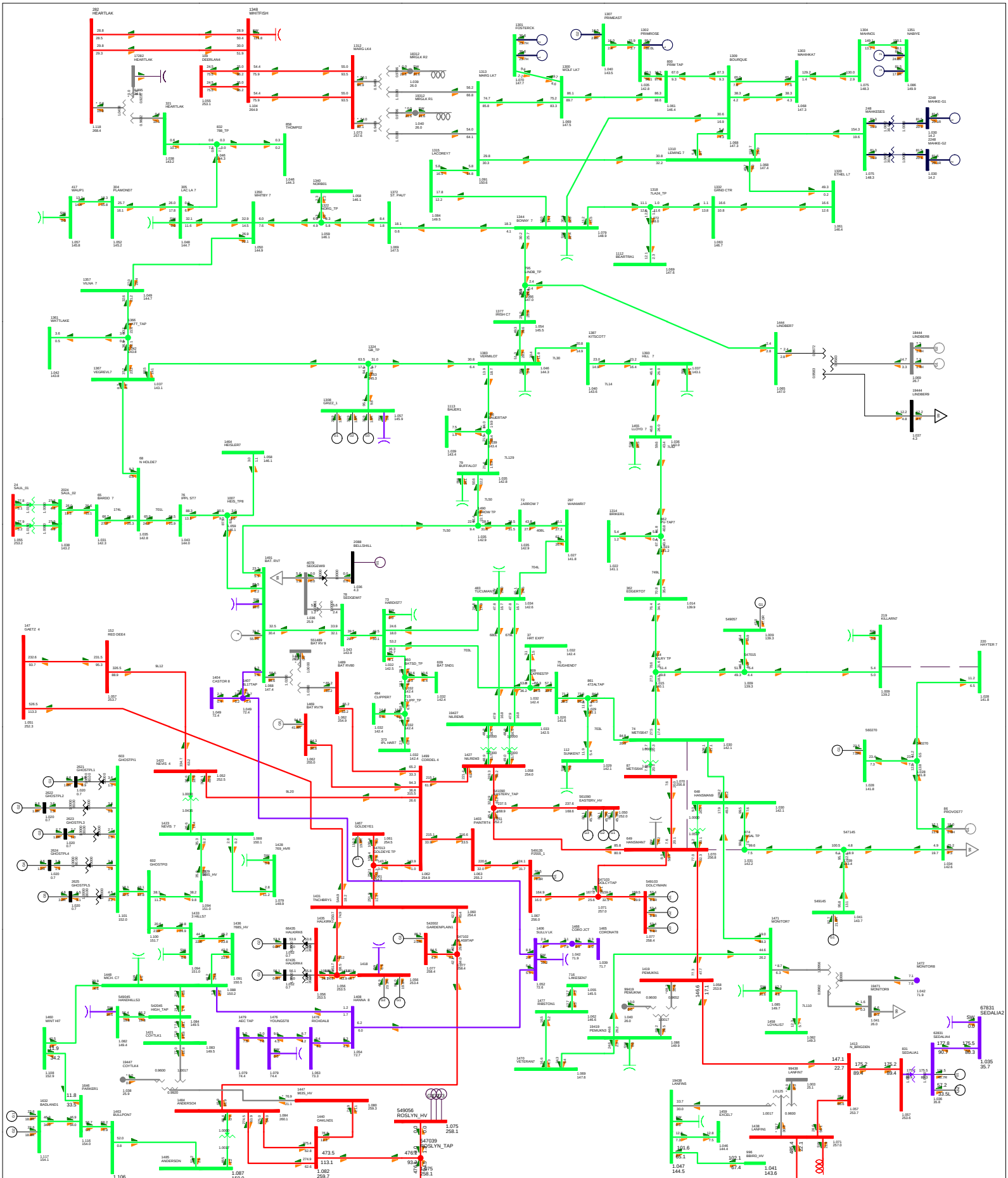
2028SL PRE-PROJ

Base Case

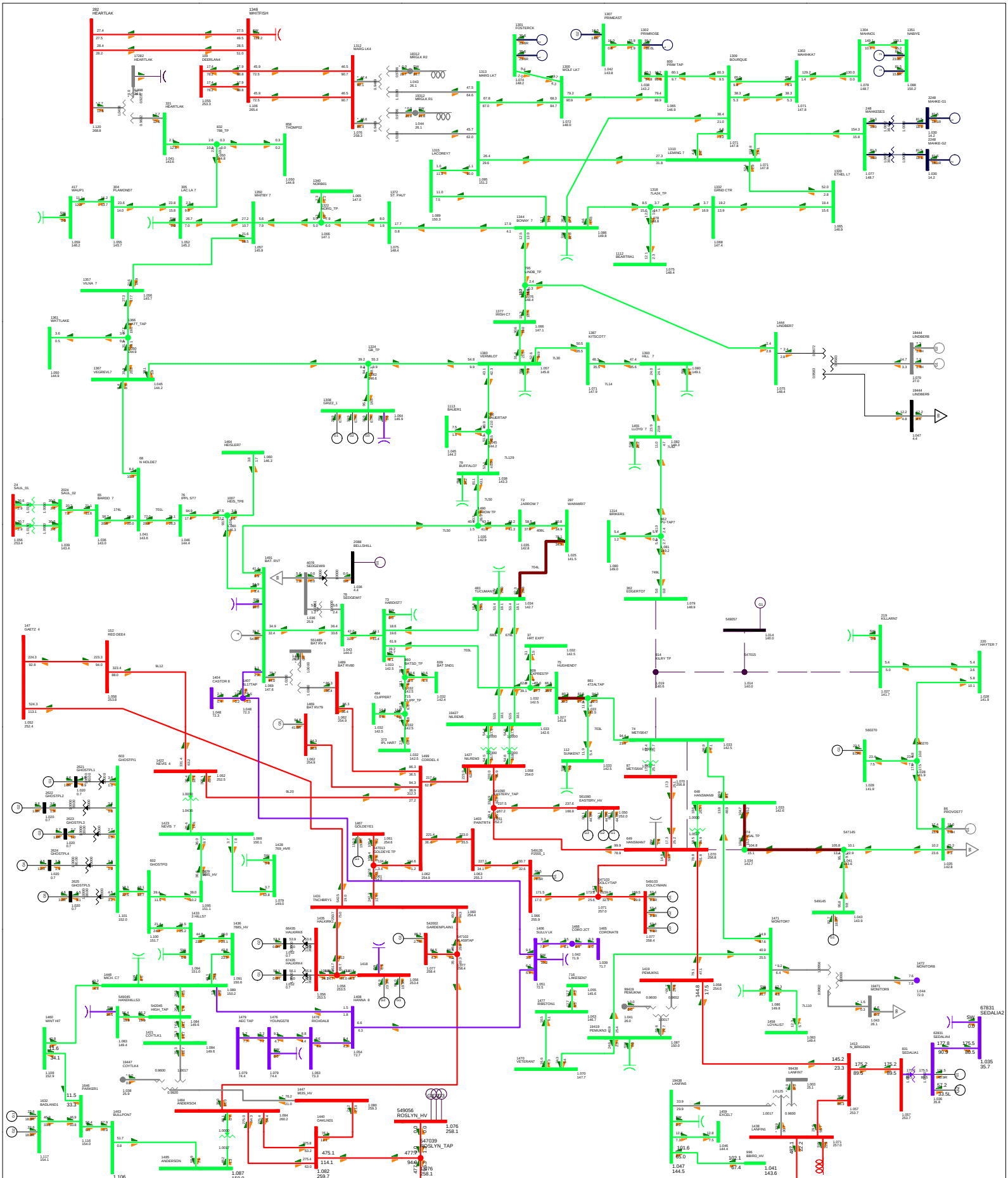
P2034 Cold Lake Area Cogen

Bus - VOLTAGE (kV/PU)
Branch - MW/Mvar
Equipment - MW/Mvar

100.0%RATEA
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A2- 2	Contingency	Study Case Description	P2034 Cold Lake Area Cogen
	CONT 066: 748L (267S Killarney Lake - 277S Hayter)	2028SL PRE-PROJ Base Case	Bus - VOLTAGE (kV/PU) Branch - MW/MVar Equipment - MW/Mvar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A2- 2

Contingency

CONT 067: 749L (648S Metiskow - 267S Killarney Lake - P2460 Fox Meadows Wind - 899S Edgerton)

Study Case Description

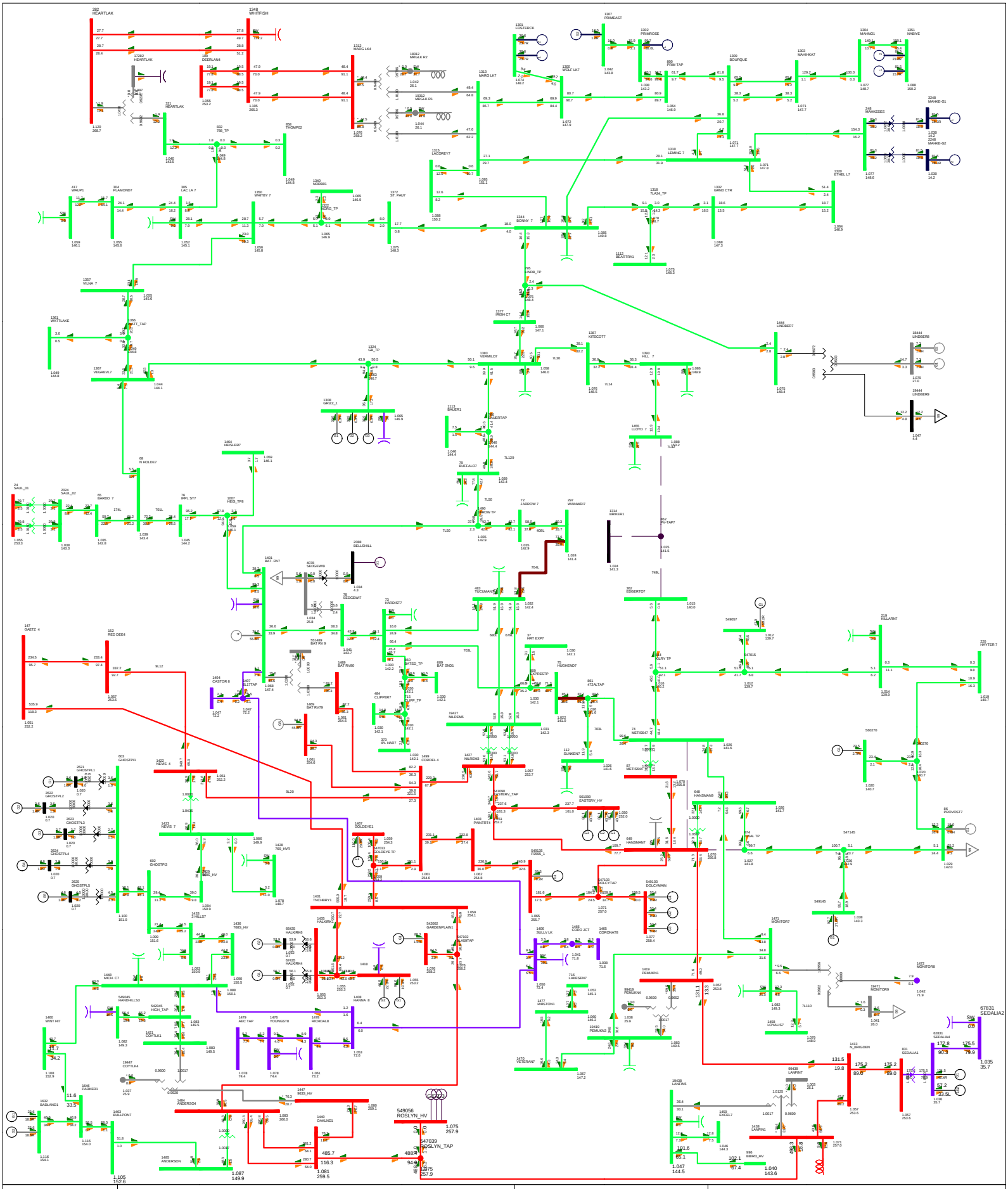
PRE-PROJ

Base Case

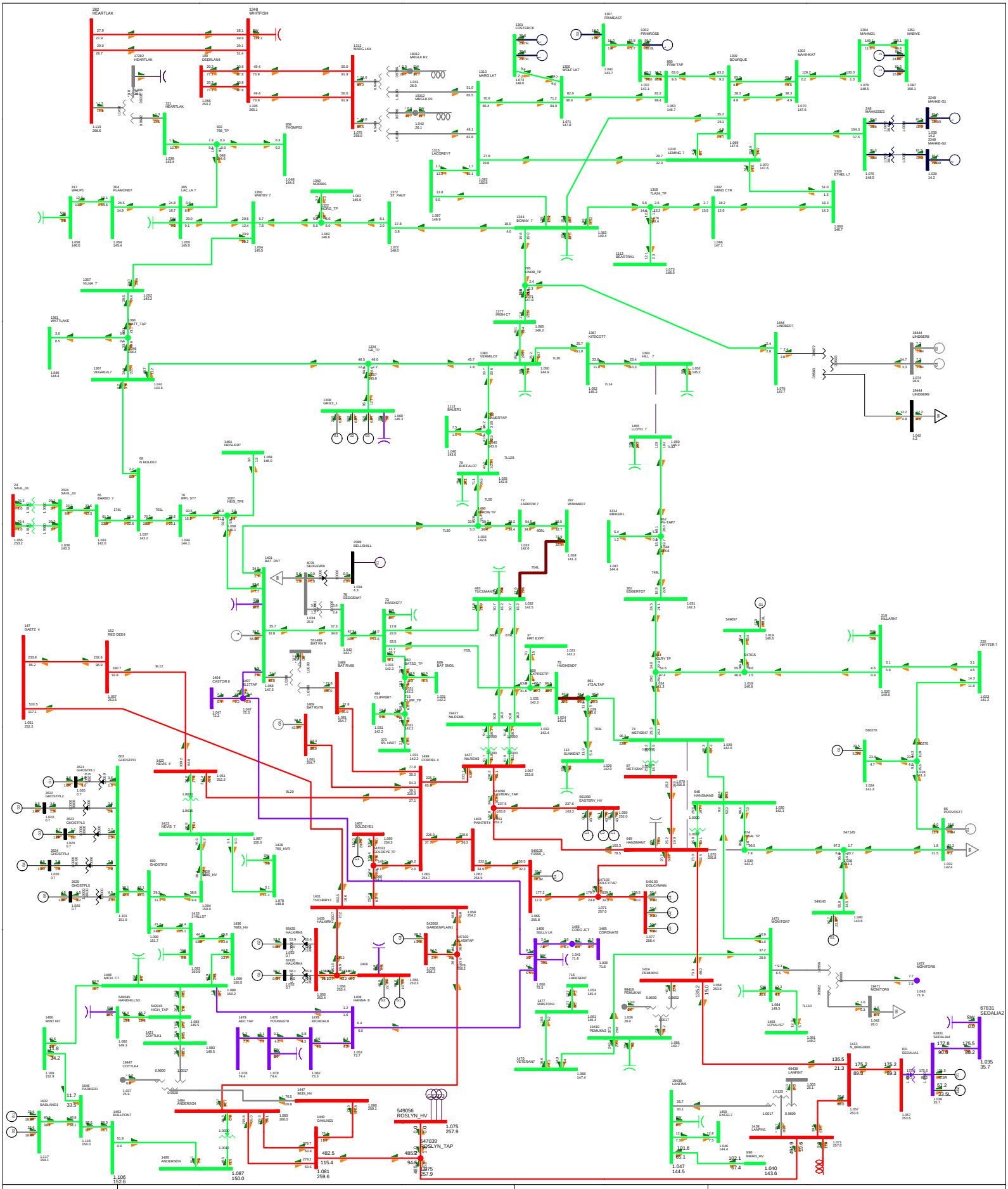
P2034 Cold Lake Area Cogen

Bus - VOLTAGE (kV/PU)
Branch - MW/Mvar
Equipment - MW/Mvar

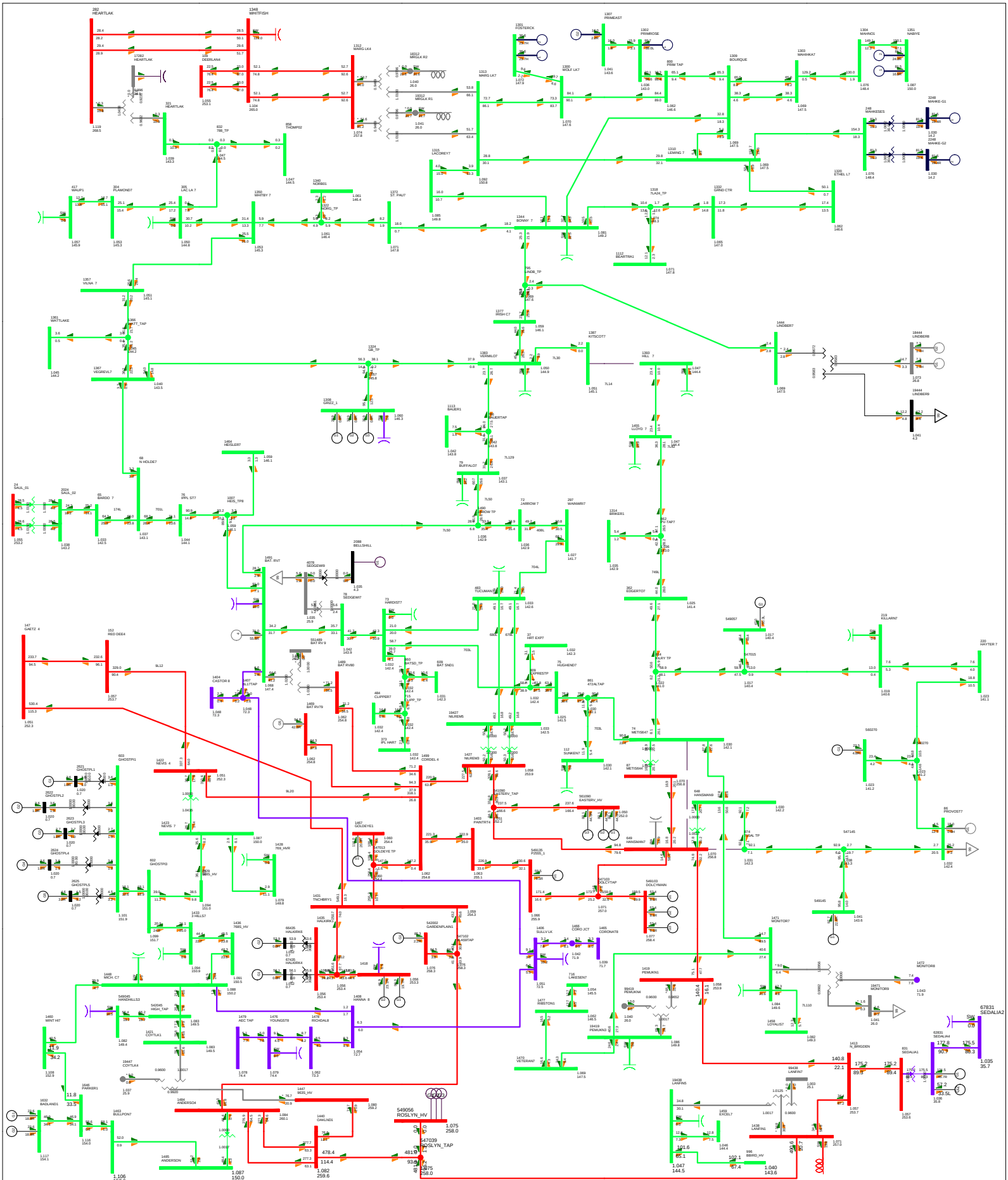
100.0%RATEA
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A2- 2	Contingency	Study Case Description	P2034 Cold Lake Area Cogen
	CONT 068: 7L749 (899S Edgerton - 716S Lloydminster - 880S Briker)	2028SL PRE-PROJ Base Case	Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A2- 2	**Contingency** CONT 069: 7L42 (751S Hill - 716S Lloydminster)	**Study Case Description** 2028SL PRE-PROJ Base Case	**P2034 Cold Lake Area Cogen** Bus - VOLTAGE (kV/PU) Branch - MW/MVar Equipment - MW/Mvar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A2- 2

Contingency

CONT 070: 7L14 (705S Kitscoty - 751S Hill)

Study Case Description

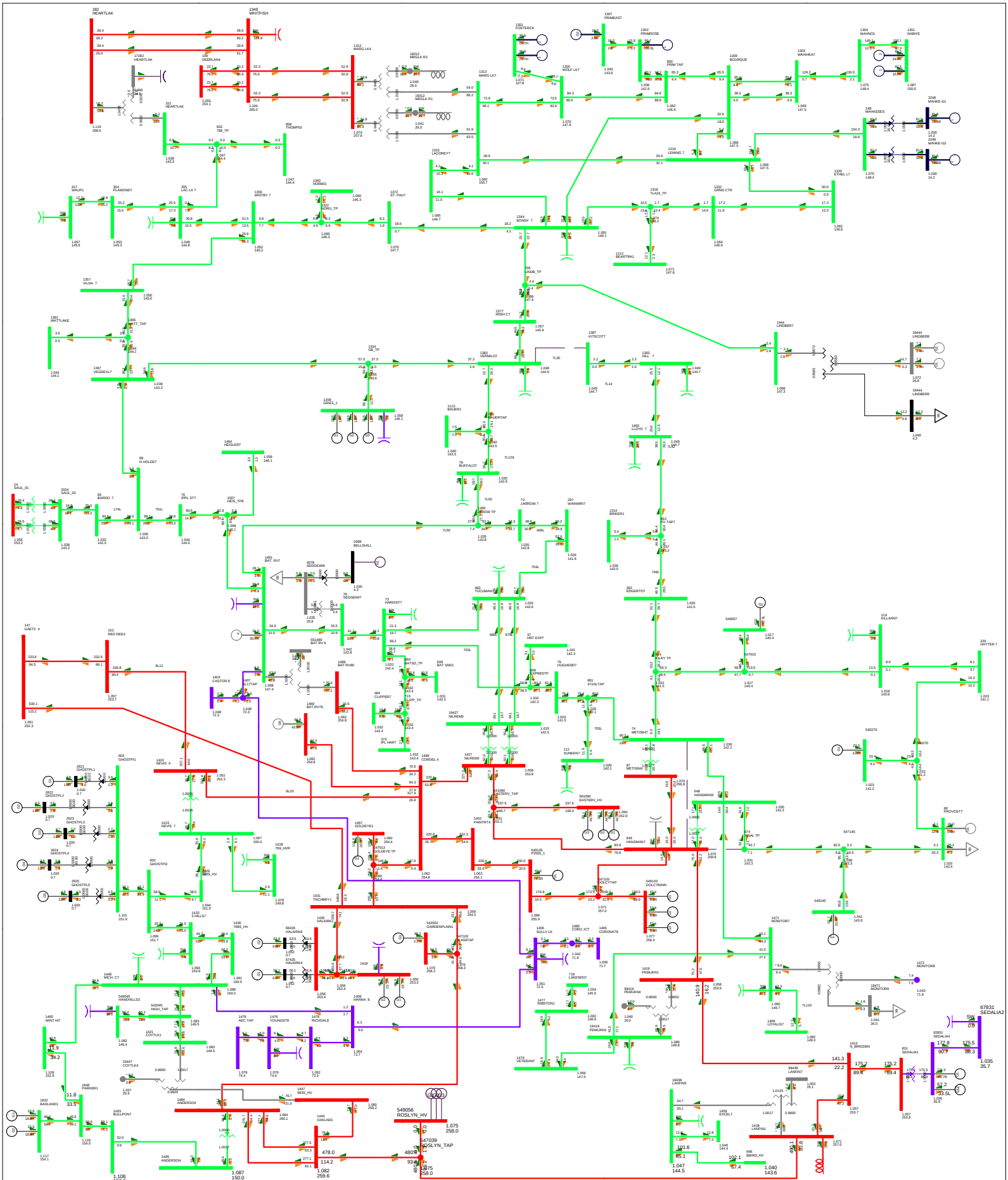
2028SL PRE-PROJ

Base Case

P2034 Cold Lake Area Cogen

Bus - VOLTAGE (kV/PU)
Branch - MW/Mvar
Equipment - MW/Mvar

100.0%RATEA
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A2- 2

Contingency

CONT 071: 7L130 (710S Vermilion - 705S Kitscoty)

Study Case Description

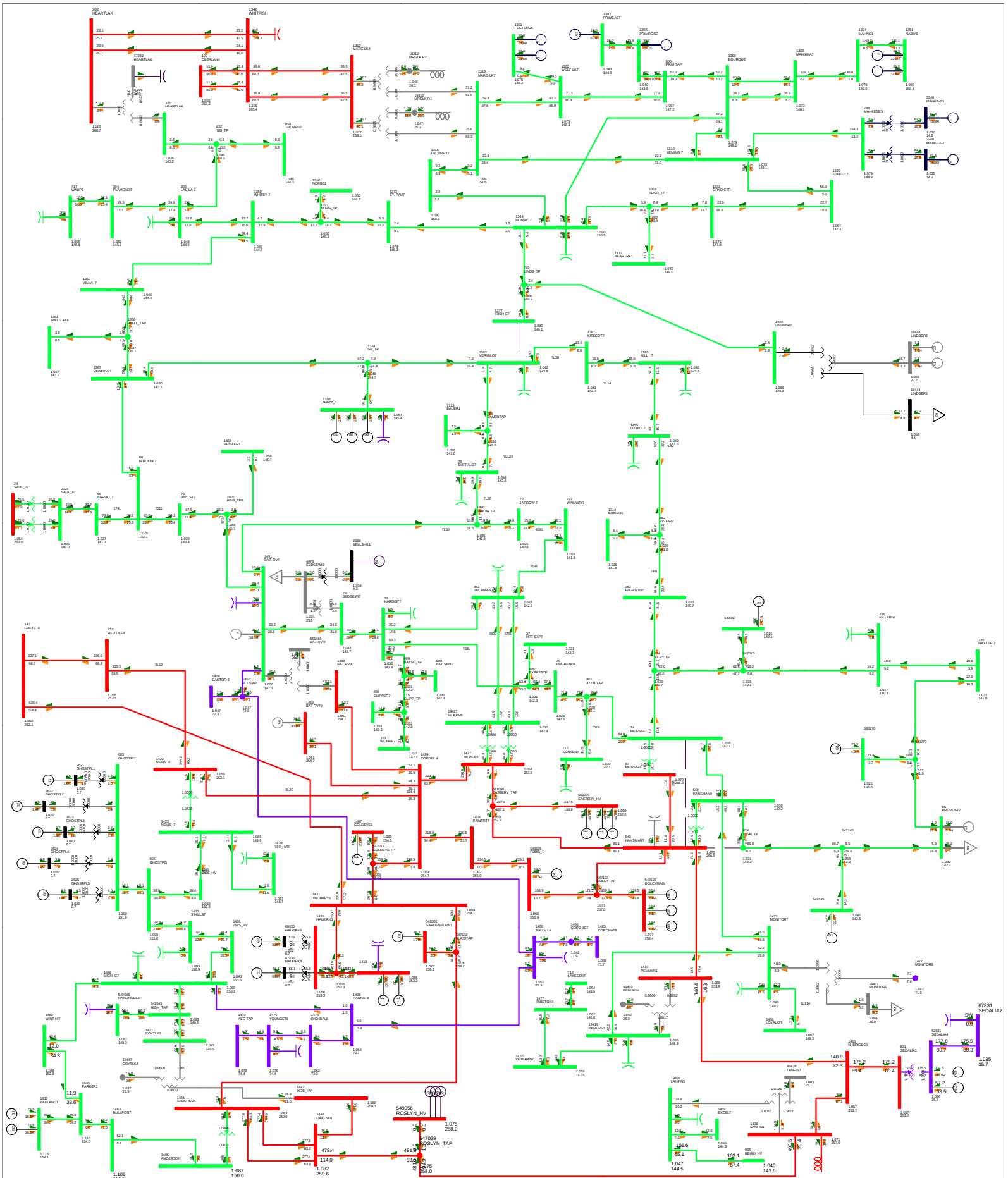
2028SL PRE-PROJ

Base Case

P2034 Cold Lake Area Cogen

Bus - VOLTAGE (kV/PU)
Branch - MW/Mvar
Equipment - MW/Mvar

100.0%RATEA
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A2- 2

Contingency

CONT 072: 7L117 (706S Irish Creek - 710S Vermilion)

Study Case Description

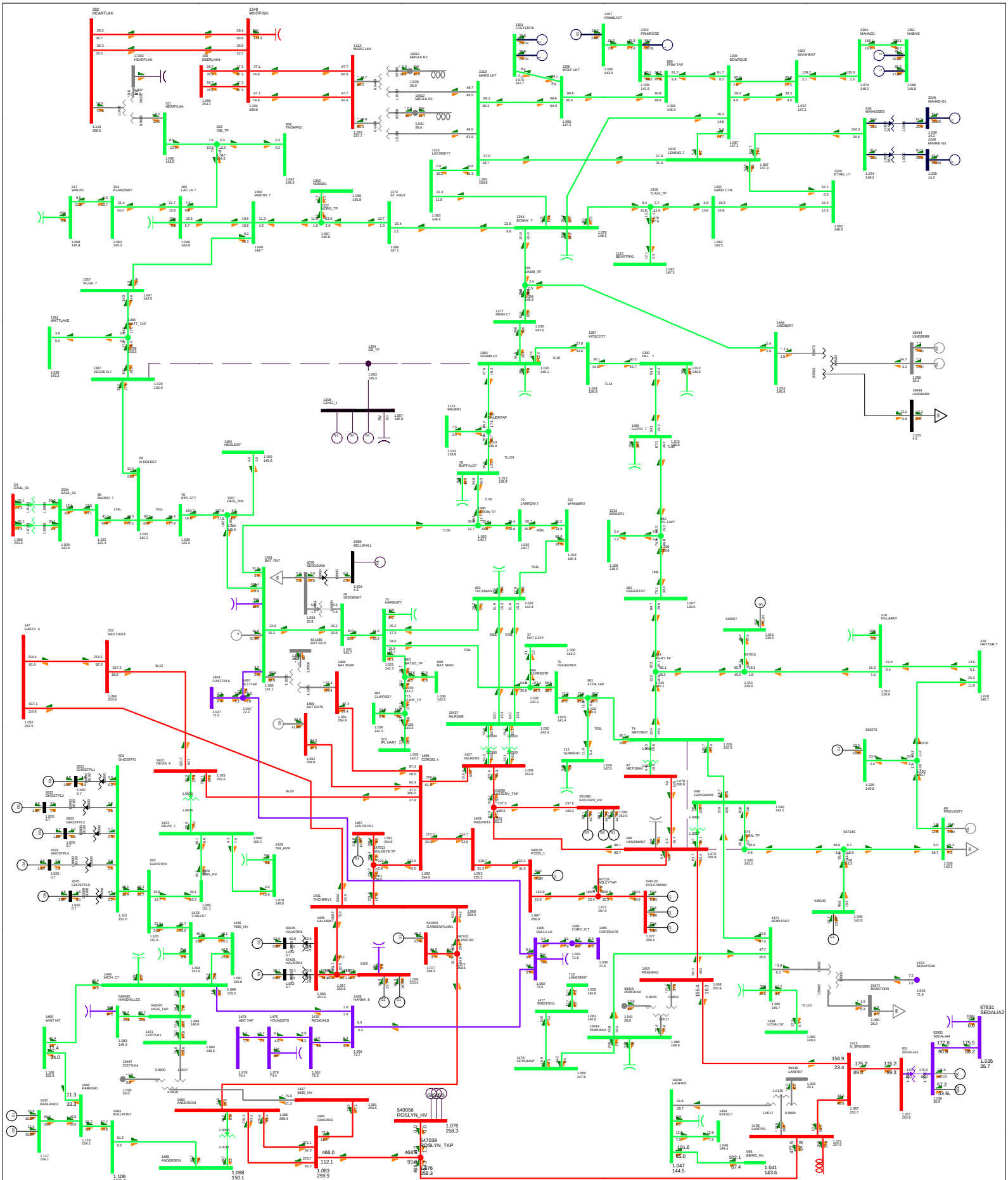
2028SL PRE-PROJ

Base Case

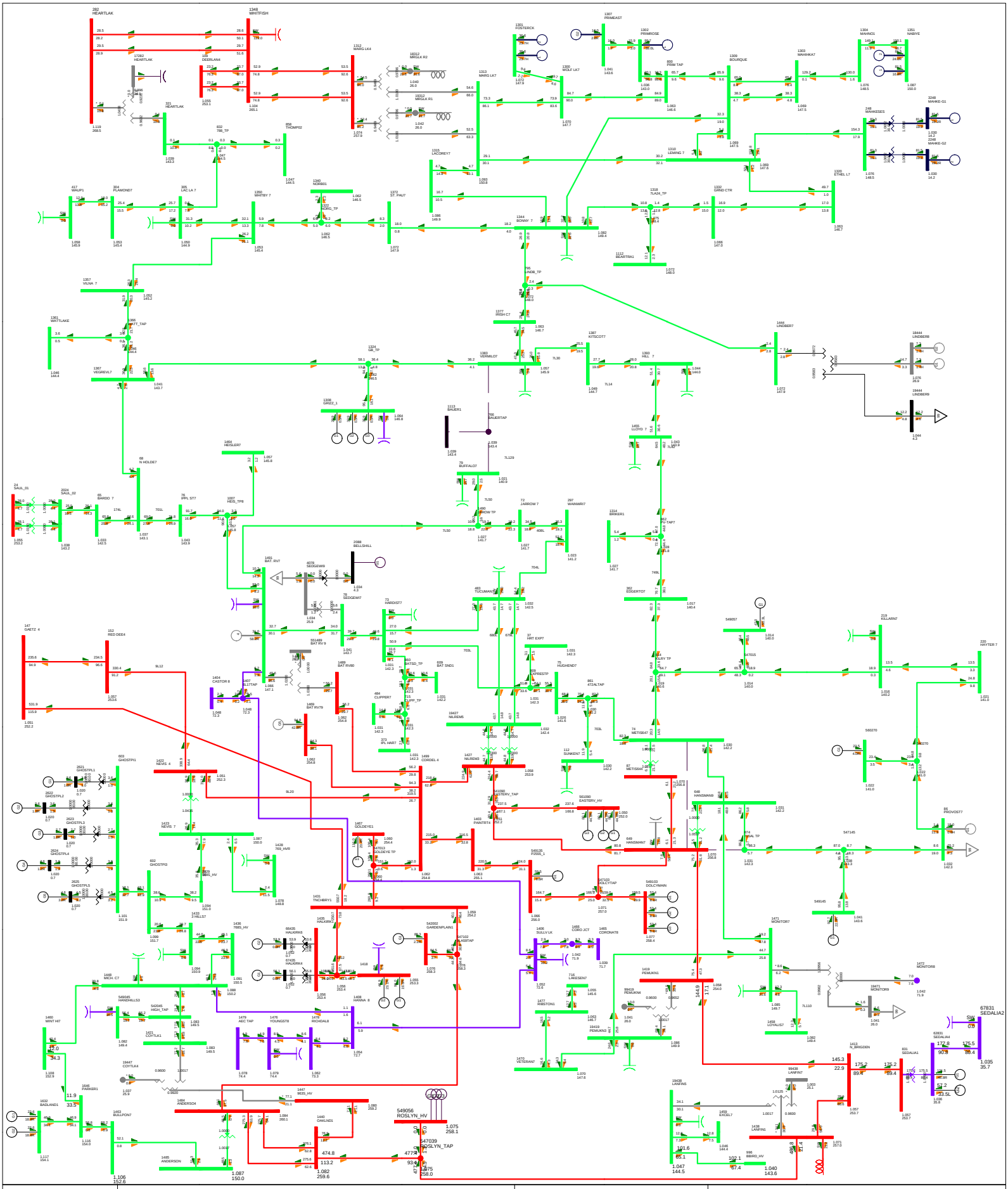
P2034 Cold Lake Area Cogen

Bus - VOLTAGE (kV/PU)
Branch - MW/Mvar
Equipment - MW/Mvar

100.0%RATEA
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A2- 2	Contingency	Study Case Description	P2034 Cold Lake Area Cogen
	CONT 073: 7L65 (709S Vegreville - 710S Vermilion - 708S Grizzly Bear)	2028SL PRE-PROJ Base Case	Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A2- 2

Contingency

CONT 074: 7L129 (710S Vermilion - 918S Bauer - 526S Buffalo Creek)

Study Case Description

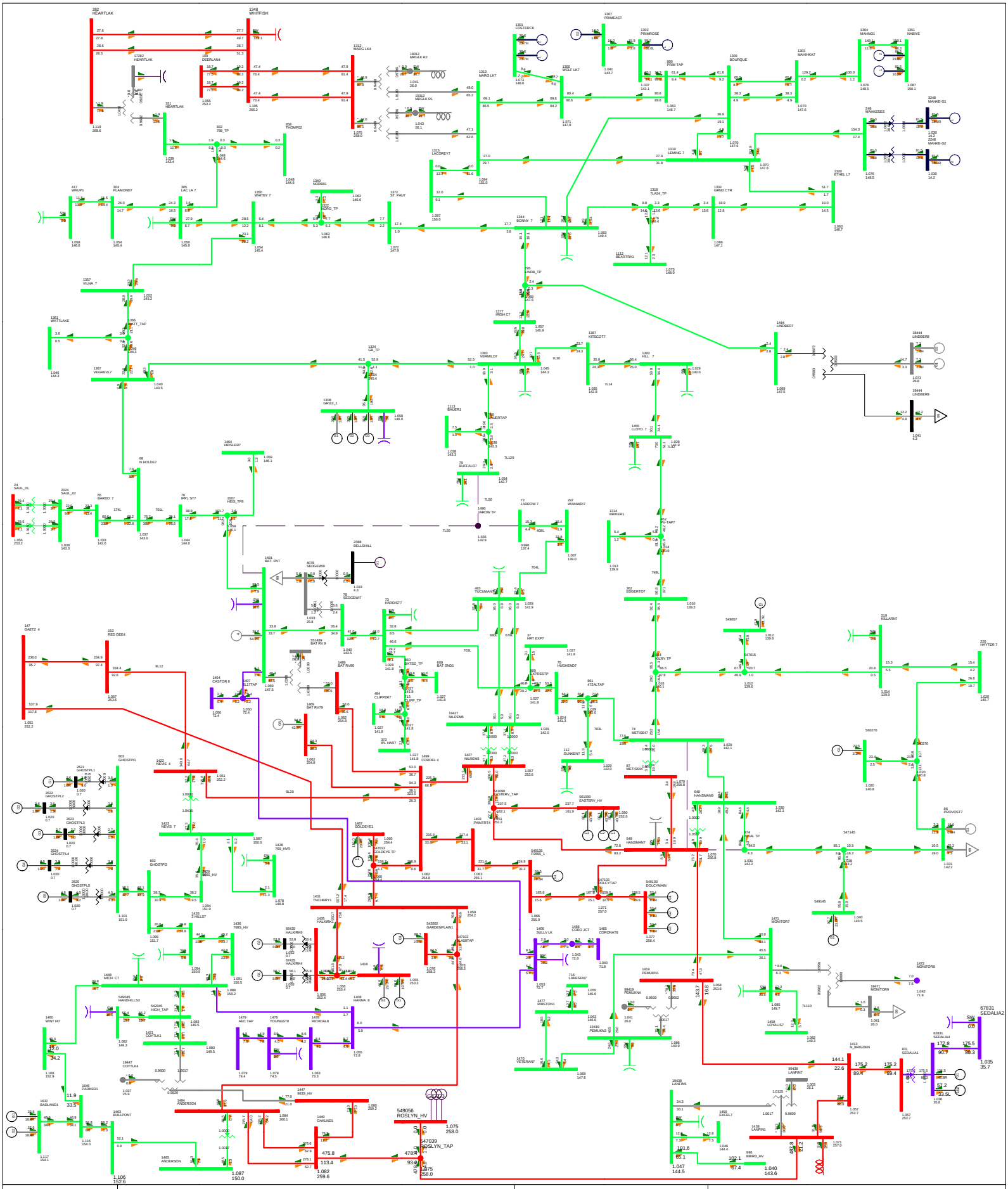
2028SL PRE-PROJ

Base Case

P2034 Cold Lake Area Cogen

Bus - VOLTAGE (kV/PU)
Branch - MW/Mvar
Equipment - MW/Mvar

100.0%RATEA
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A2- 2

Contingency

CONT 075: 7L50 (526S Buffalo Creek - 757S Battle River - 252S Jarrow)

Study Case Description

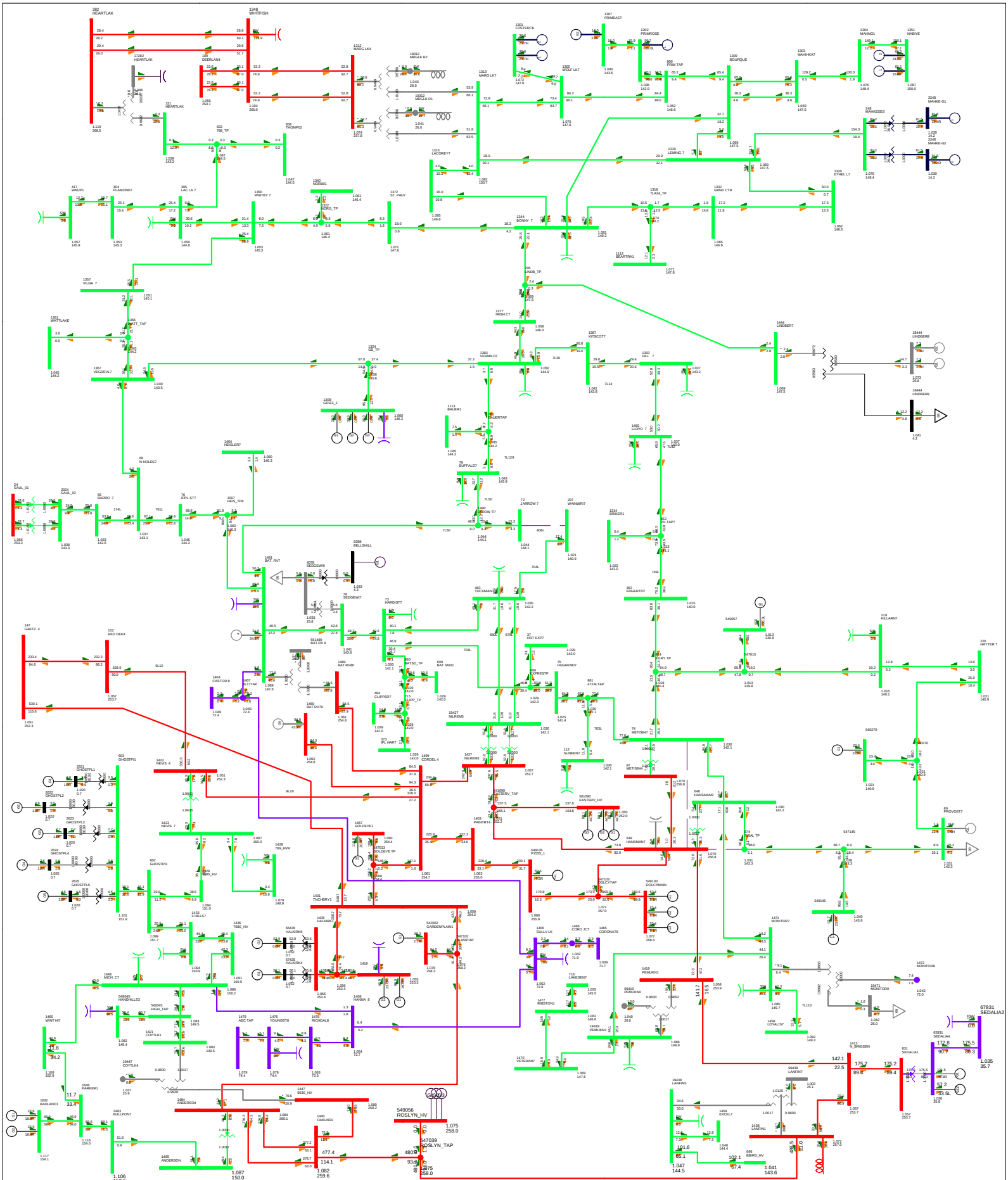
2028SL PRE-PROJ

Base Case

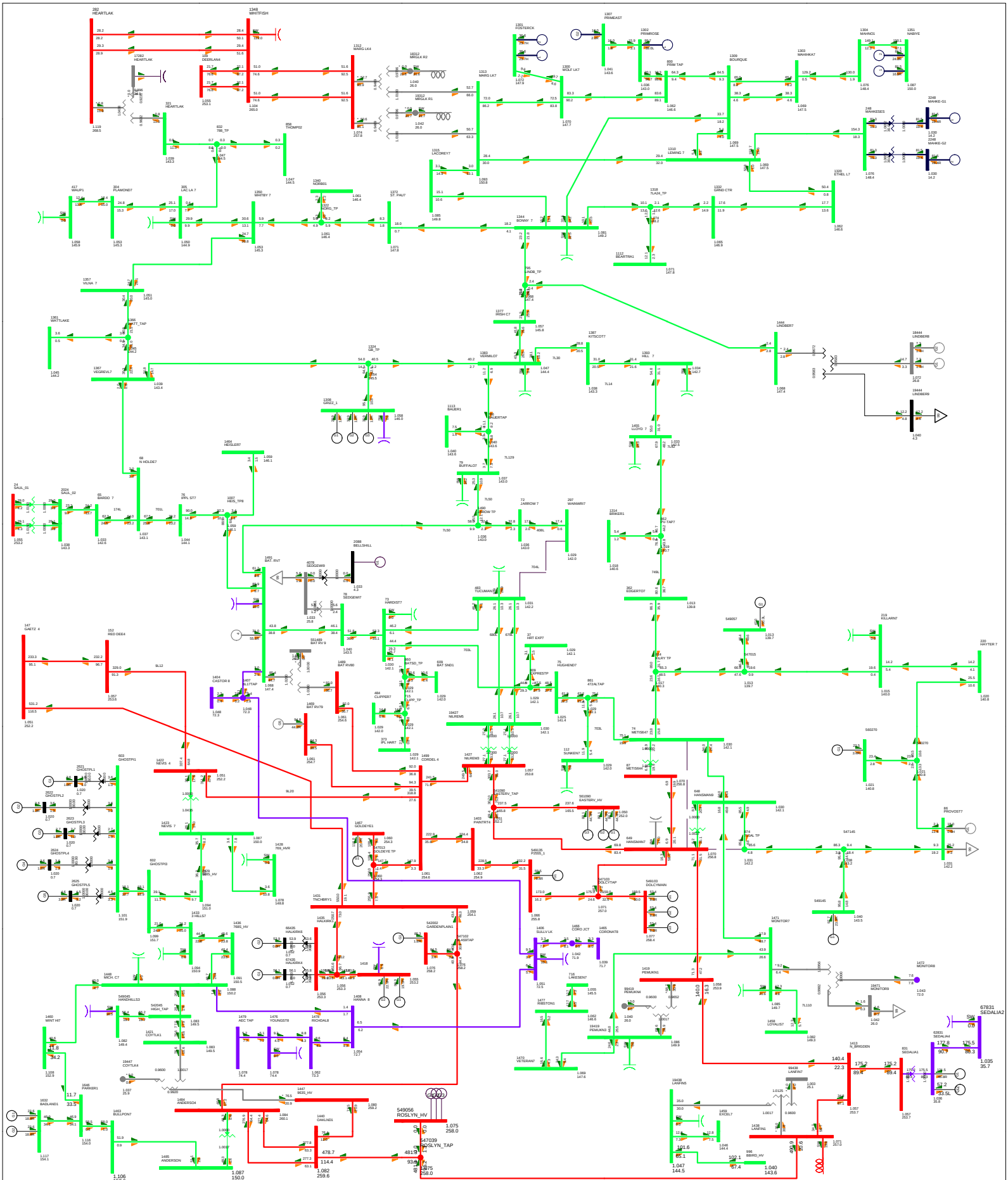
P2034 Cold Lake Area Cogen

Bus - VOLTAGE (kV/PU)
Branch - MW/Mvar
Equipment - MW/Mvar

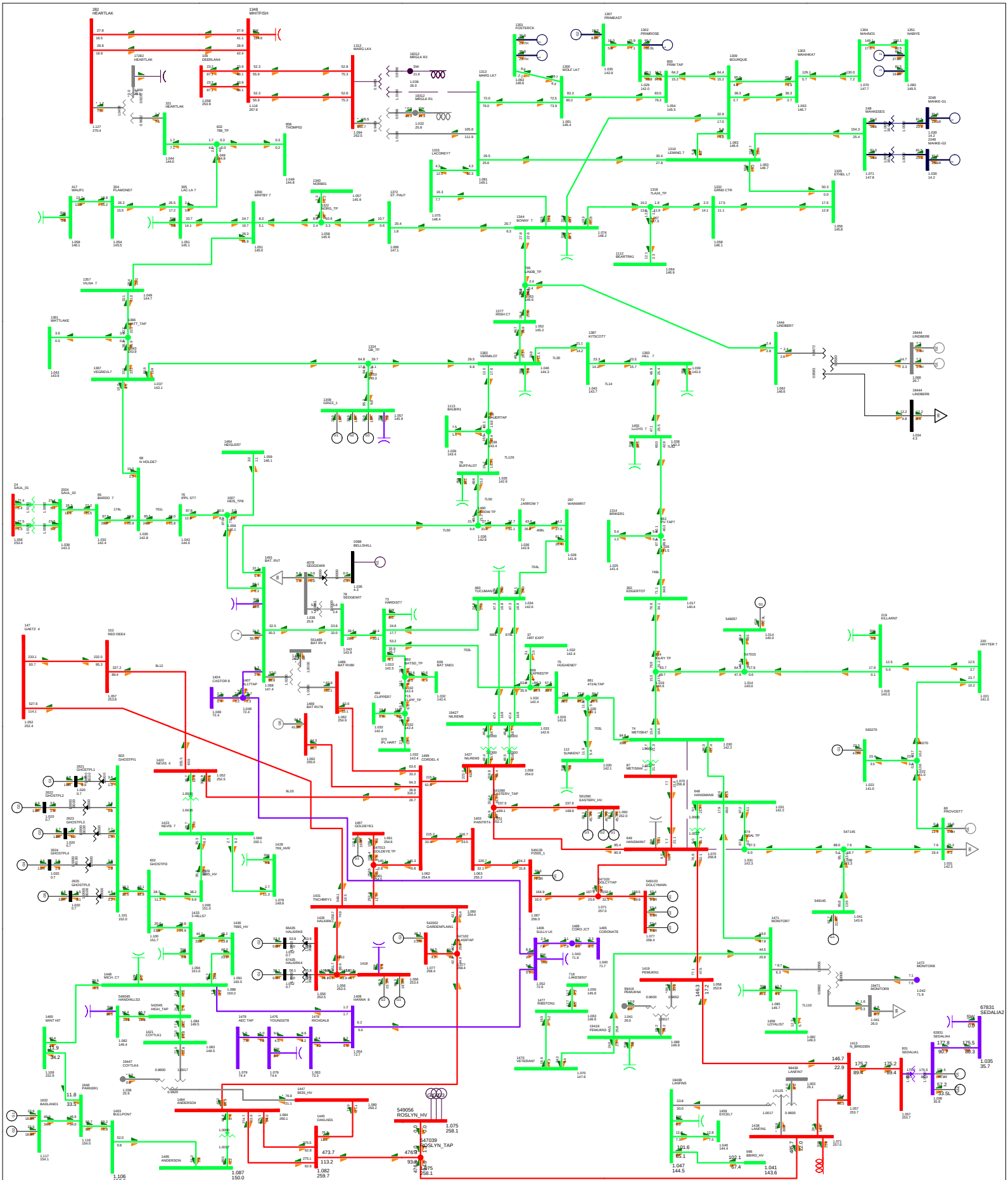
100.0%RATEA
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



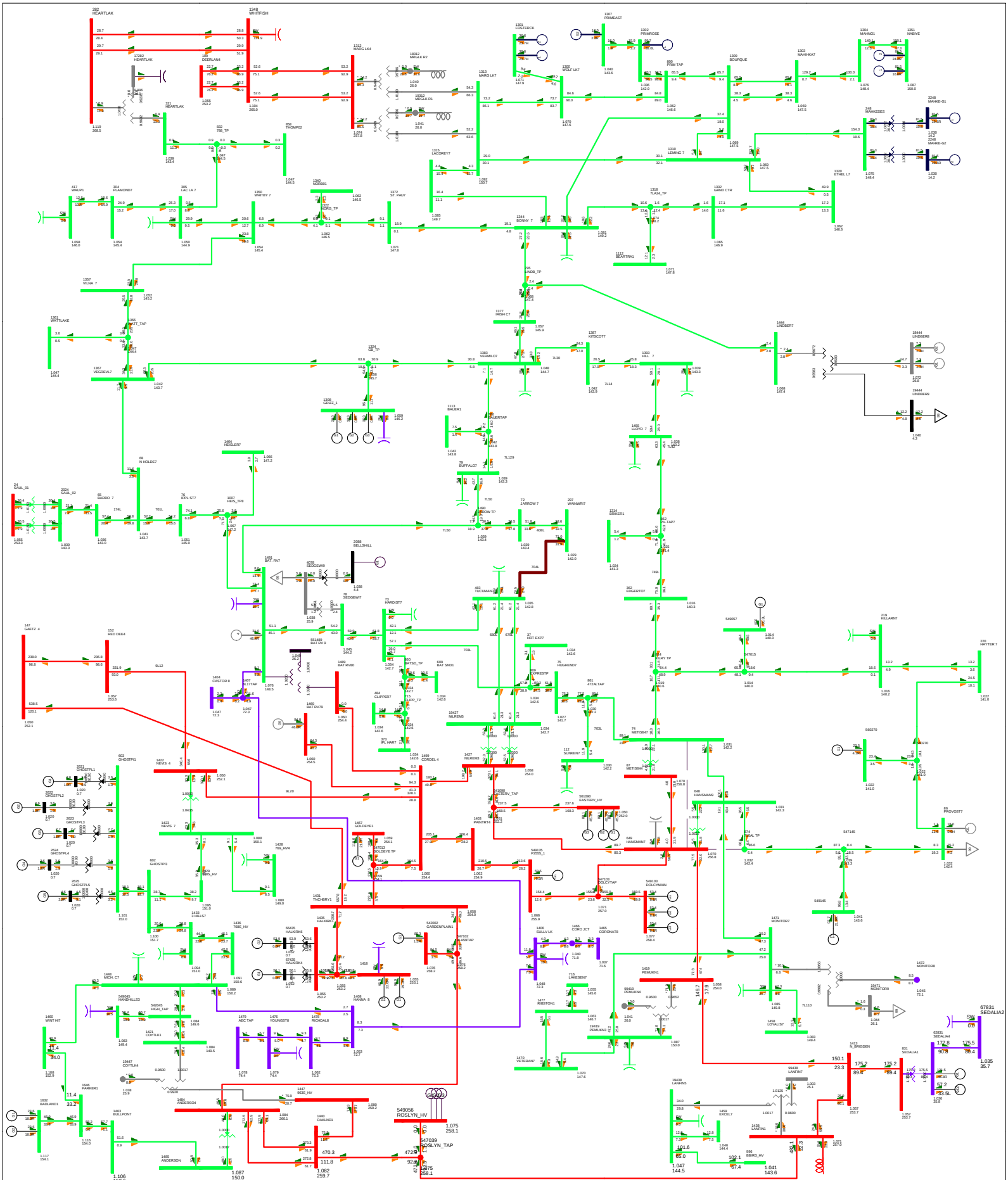
Attachment A2- 2	Contingency	Study Case Description	P2034 Cold Lake Area Cogen
	CONT 076: 408L (252S Jarrow - 51S Wainwright)	2028SL PRE-PROJ Base Case	Bus - VOLTAGE (kV/PU) Branch - MW/MVar Equipment - MW/Mvar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



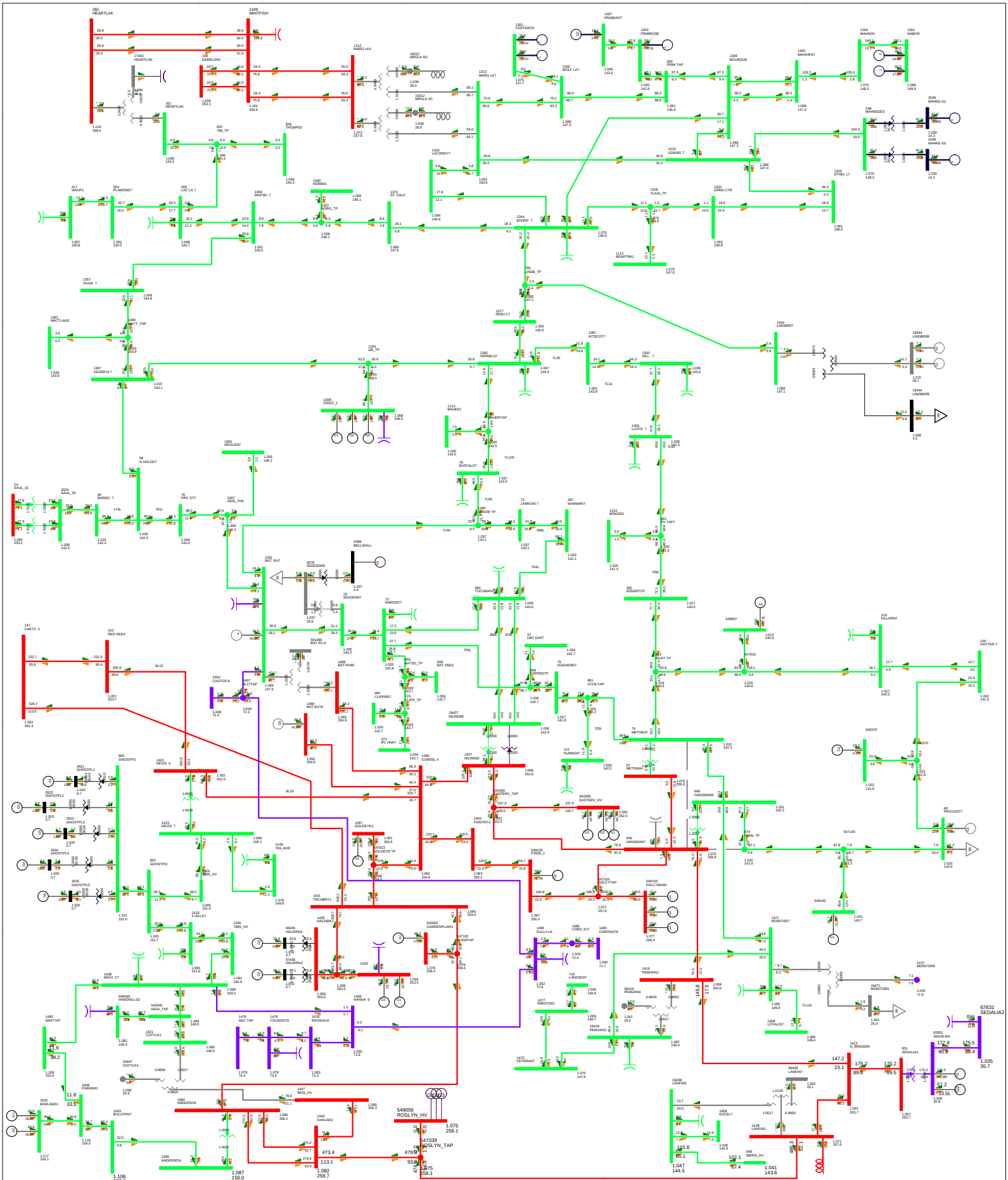
Attachment A2- 2	Contingency	Study Case Description	P2034 Cold Lake Area Cogen
	CONT 077: 704L (51S Wainwright - 478S Tucuman)	2028SL PRE-PROJ Base Case	Bus - VOLTAGE (kV/PU) Branch - MW/MVar Equipment - MW/Mvar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A2- 2	**Contingency** CONT 078: Marguerite Lake 2T	**Study Case Description** 2028SL PRE-PROJ Base Case	**P2034 Cold Lake Area Cogen** Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A2- 2	**Contingency** CONT 079: Battle River T2	**Study Case Description** 2028SL PRE-PROJ Base Case	**P2034 Cold Lake Area Cogen** Bus - VOLTAGE (kv/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A2- 2

Contingency

CONT 080: 574S Nilrem 162.2TR

Study Case Description

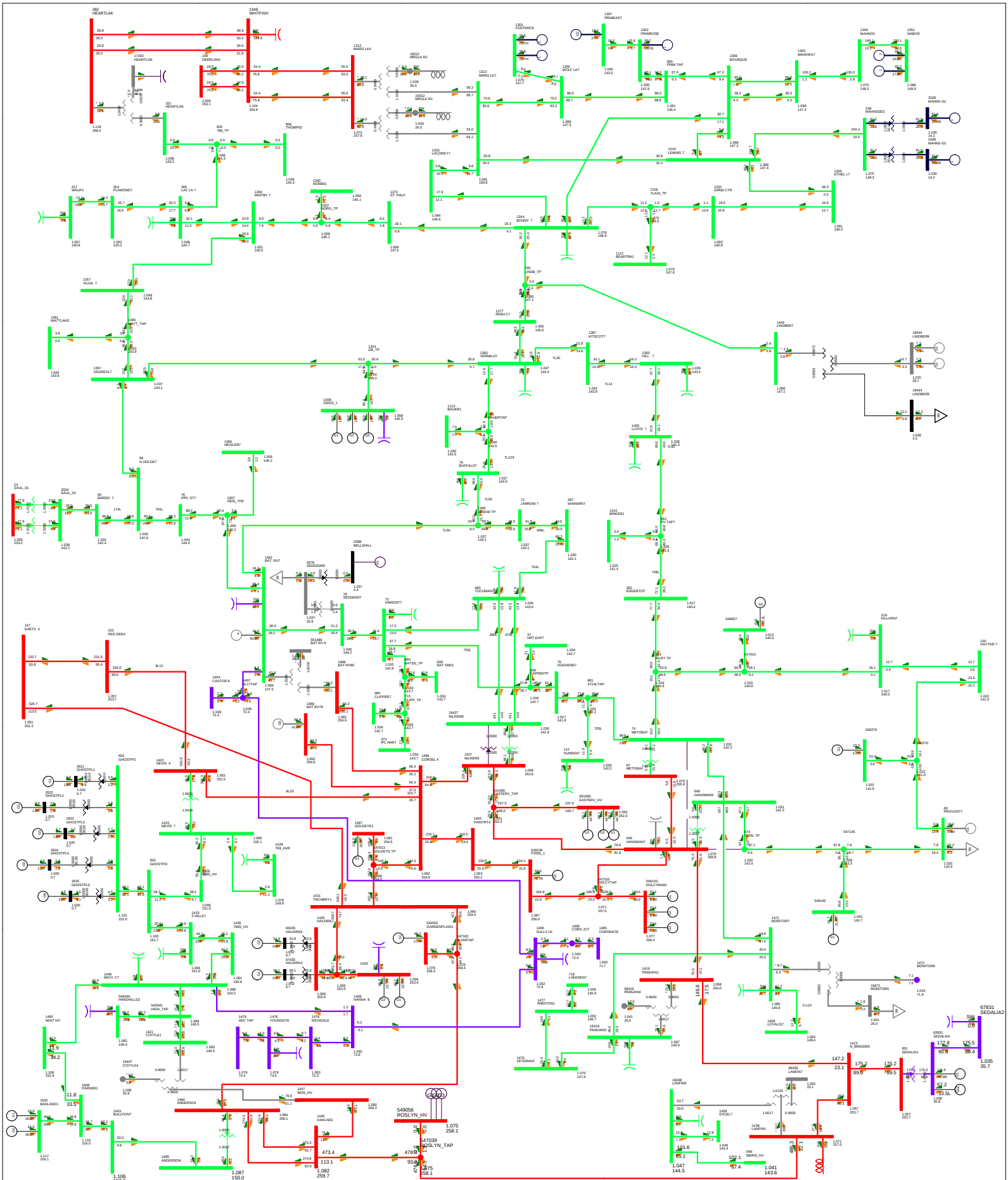
2028SL PRE-PROJ

Base Case

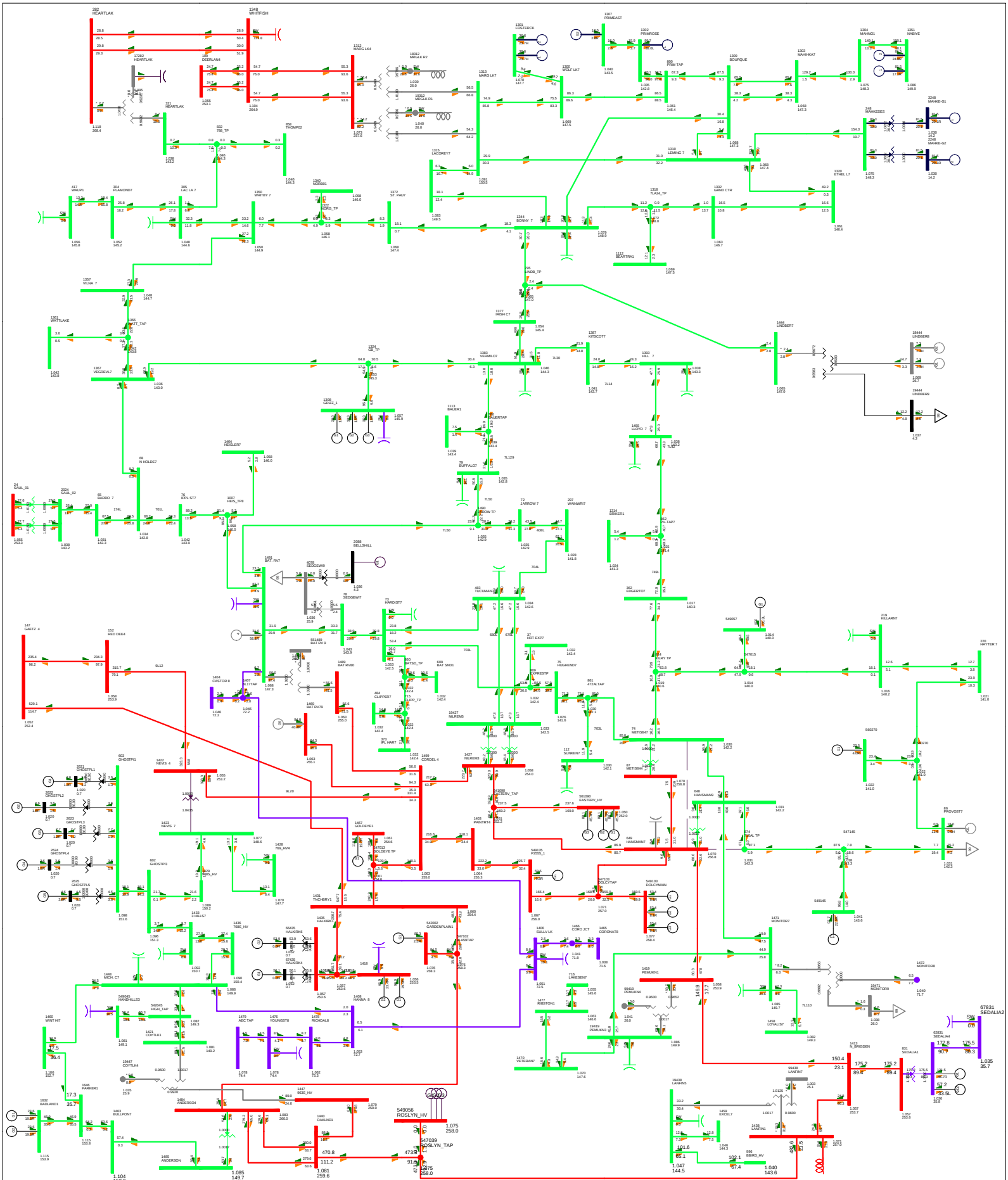
P2034 Cold Lake Area Cogen

Bus - VOLTAGE (kV/PU)
Branch - MW/MVar
Equipment - MW/Mvar

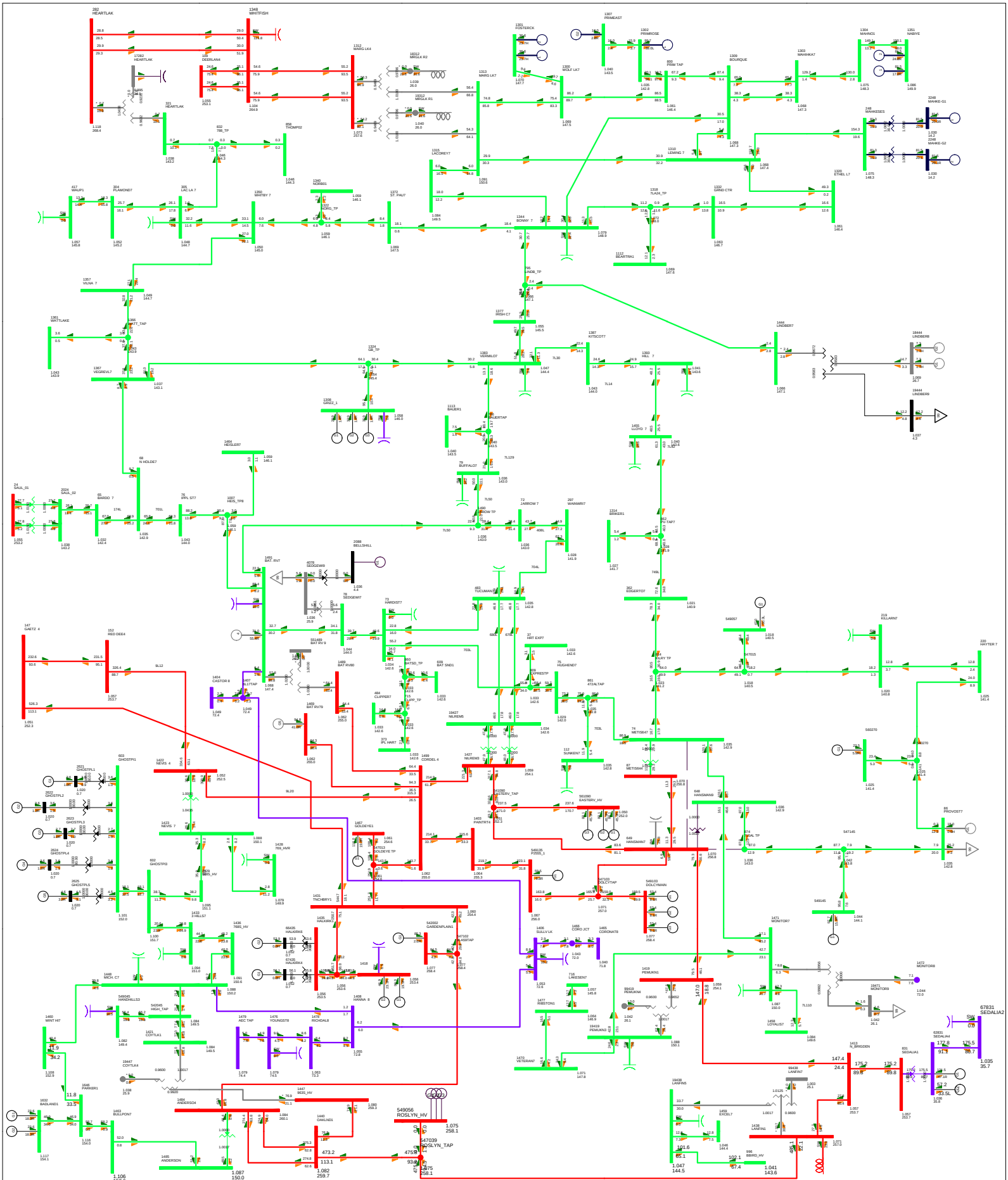
100.0%RATEA
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



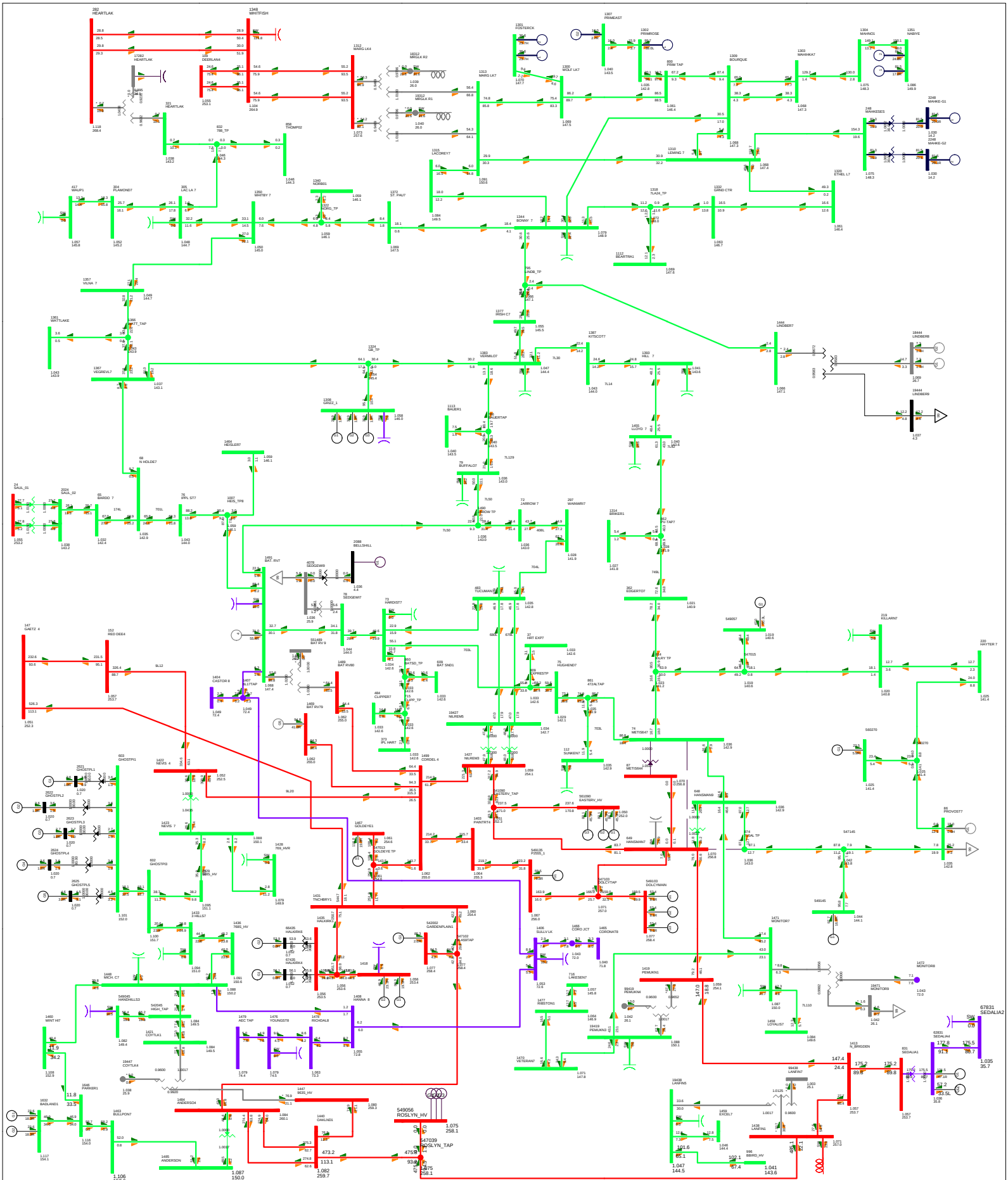
Attachment A2- 2	Contingency	Study Case Description	P2034 Cold Lake Area Cogen
	CONT 081: 574S Nilrem 87ST1	2028SL PRE-PROJ Base Case	Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



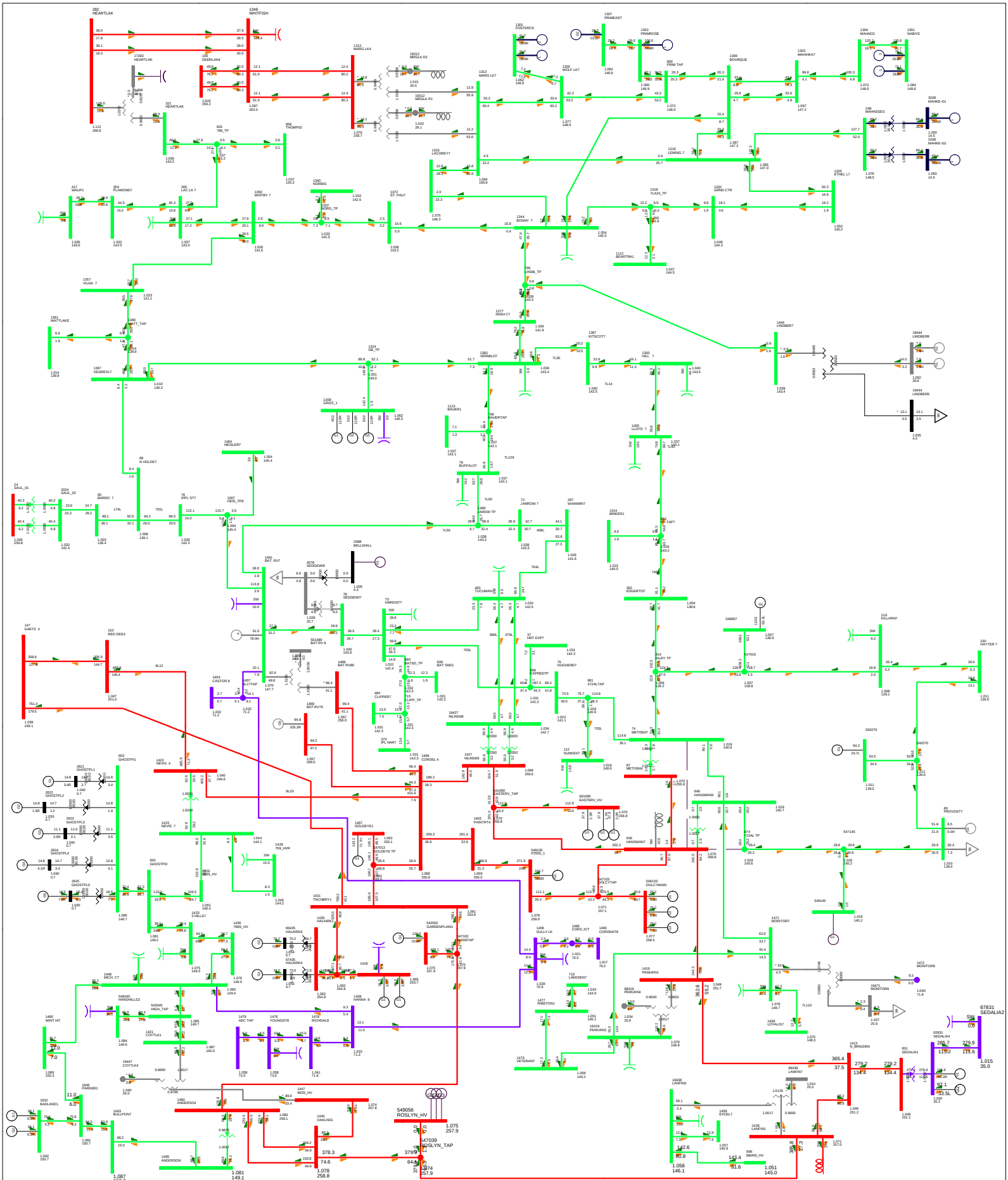
Attachment A2- 2	**Contingency** CONT 082: 766S Nevis 162.1TR	**Study Case Description** 2028SL PRE-PROJ Base Case	**P2034 Cold Lake Area Cogen** Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



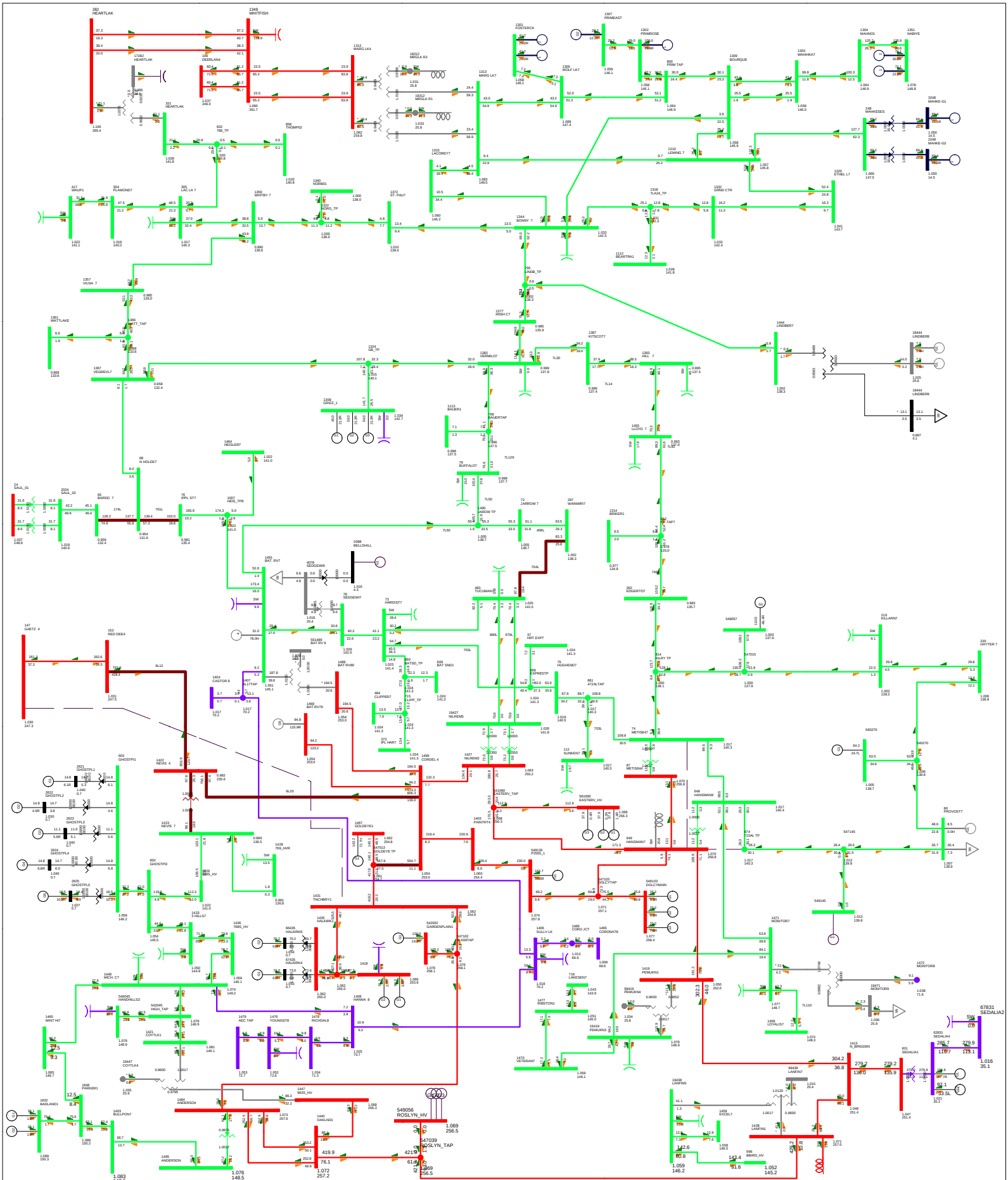
Attachment A2- 2	Contingency	Study Case Description	P2034 Cold Lake Area Cogen
	CONT 083: 650S Hansman Lake 63ST1	2028SL PRE-PROJ Base Case	Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



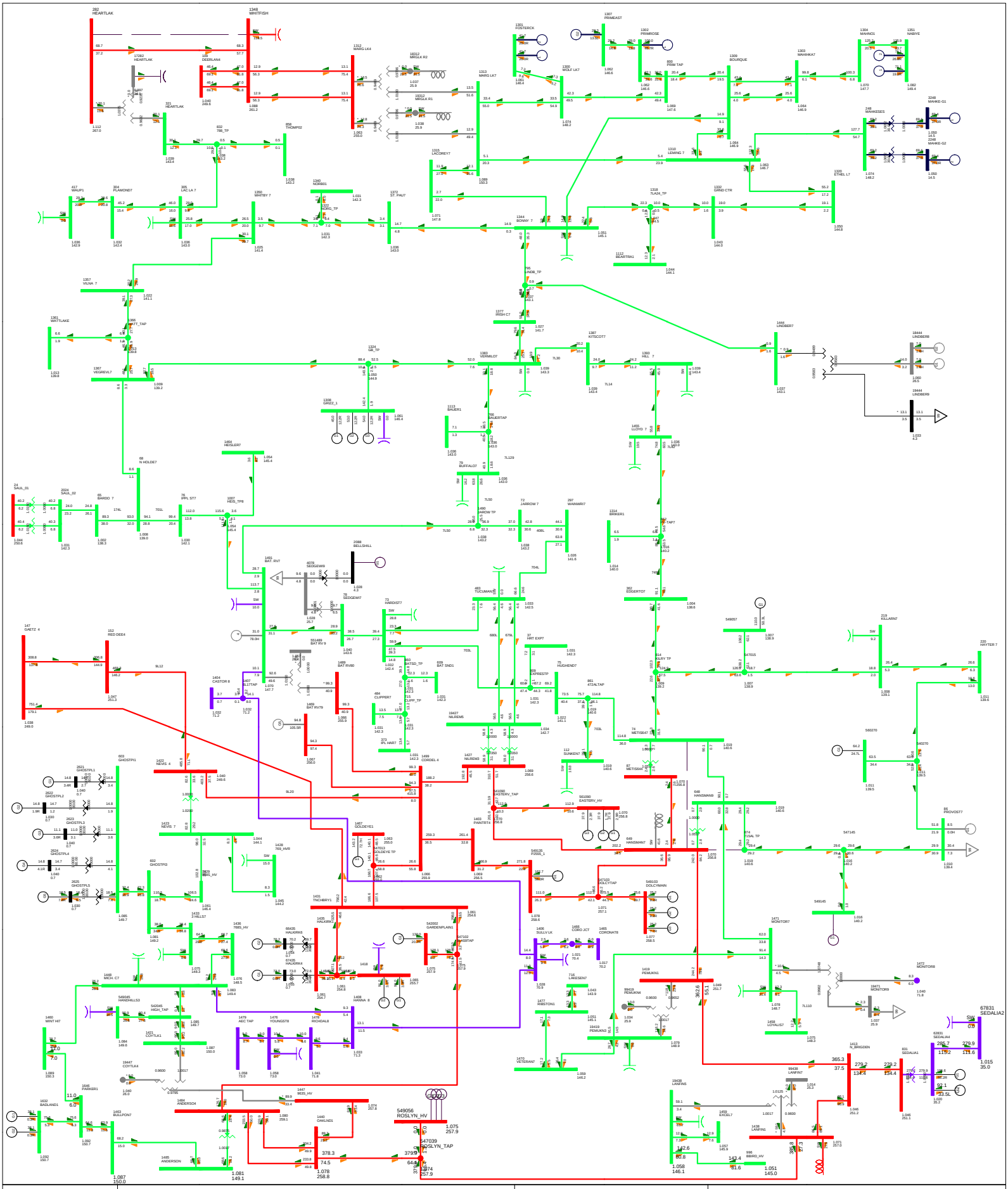
Attachment A2- 2	Contingency	Study Case Description	P2034 Cold Lake Area Cogen
	CONT 084: 648S Metiskow T3	2028SL PRE-PROJ Base Case	Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



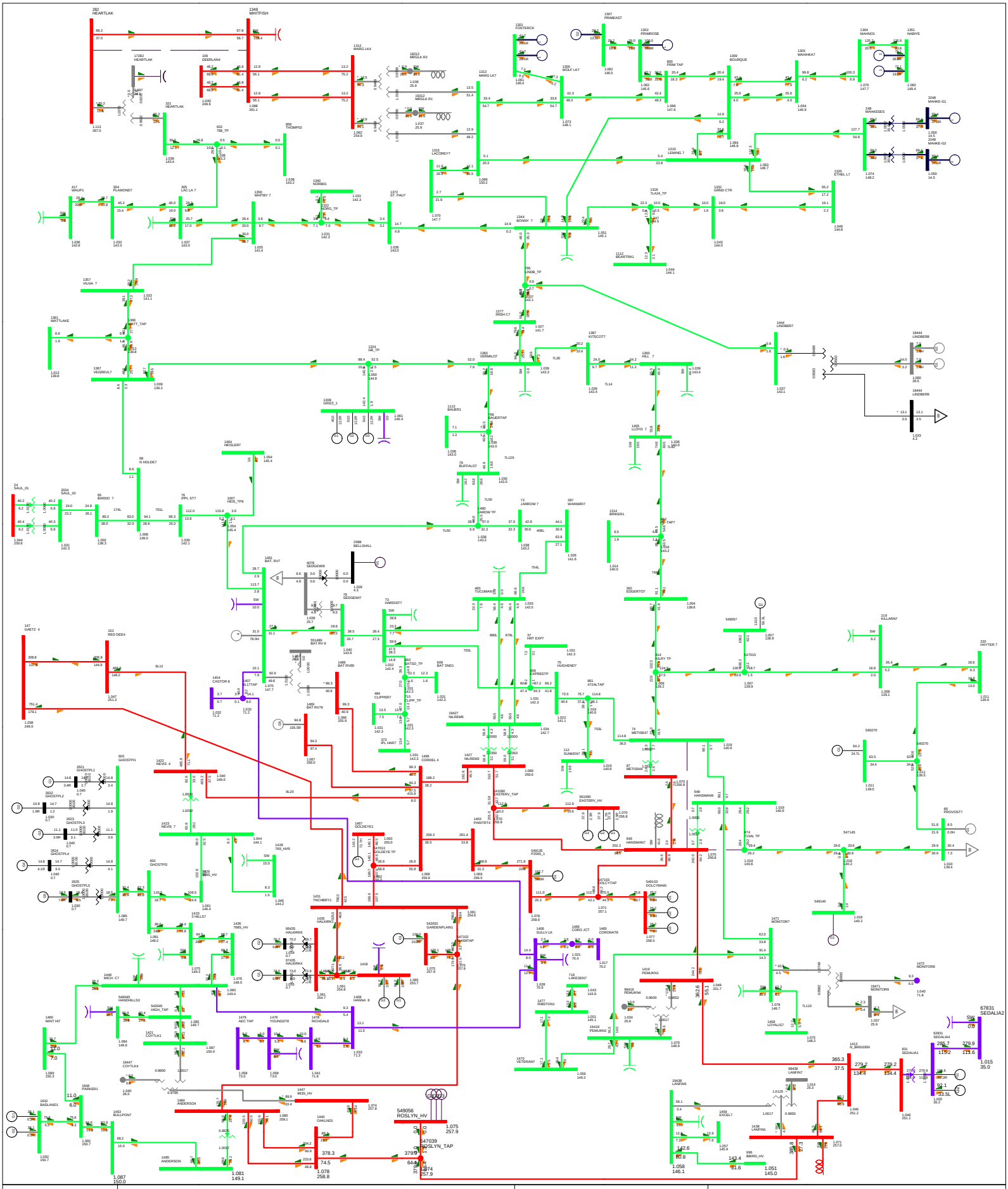
Attachment A2- 3	Contingency	Study Case Description	P2034 Cold Lake Area Cogen
	CONT 000: All elements in service	2028WP PRE-PROJ Base Case	Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEB kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



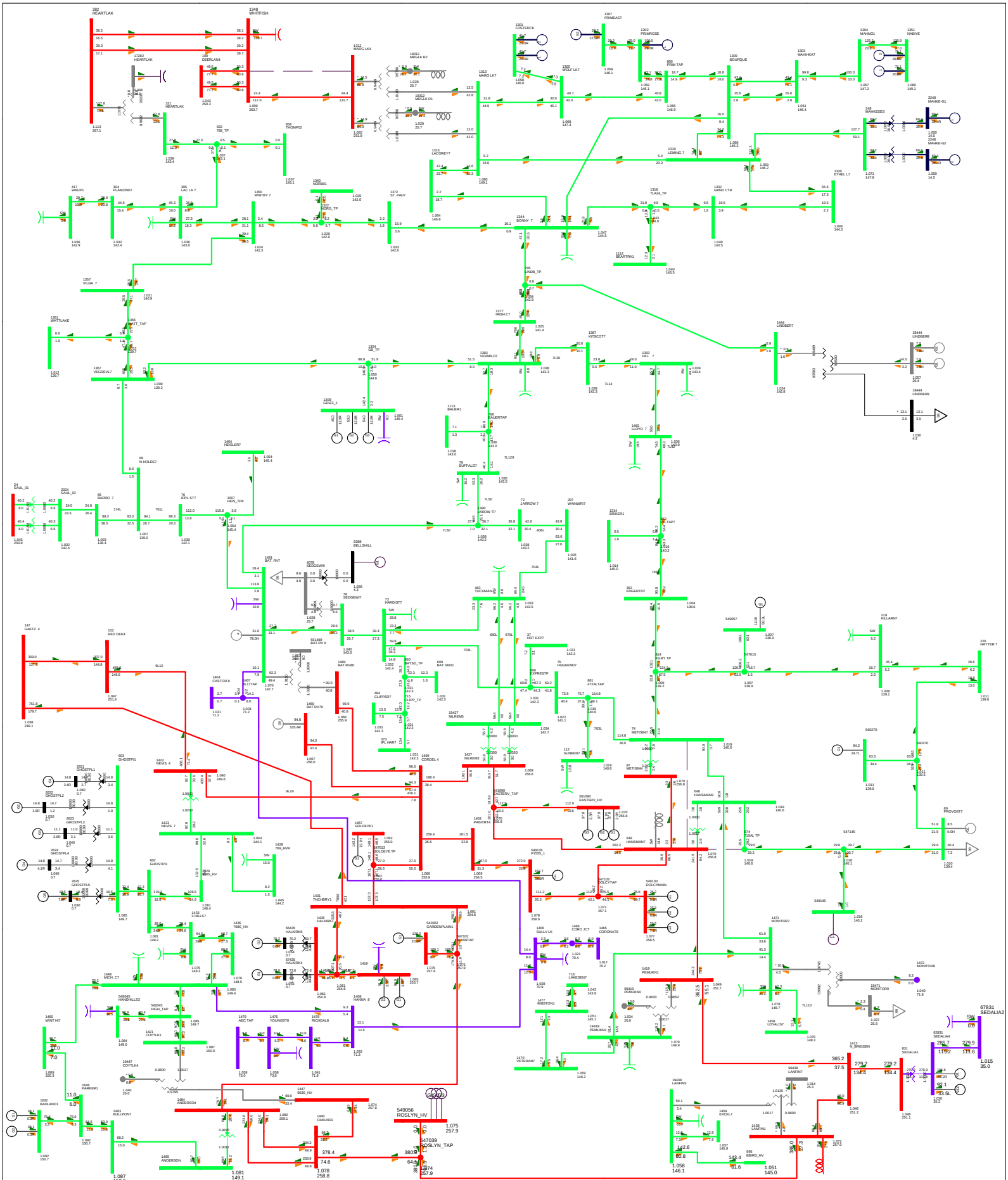
Attachment A2- 3	**Contingency** CONT 001: CETO (87S Gaetz - 972S Tinchebray)	**Study Case Description** 2028WP PRE-PROJ Base Case	**P2034 Cold Lake Area Cogen** Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEB kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



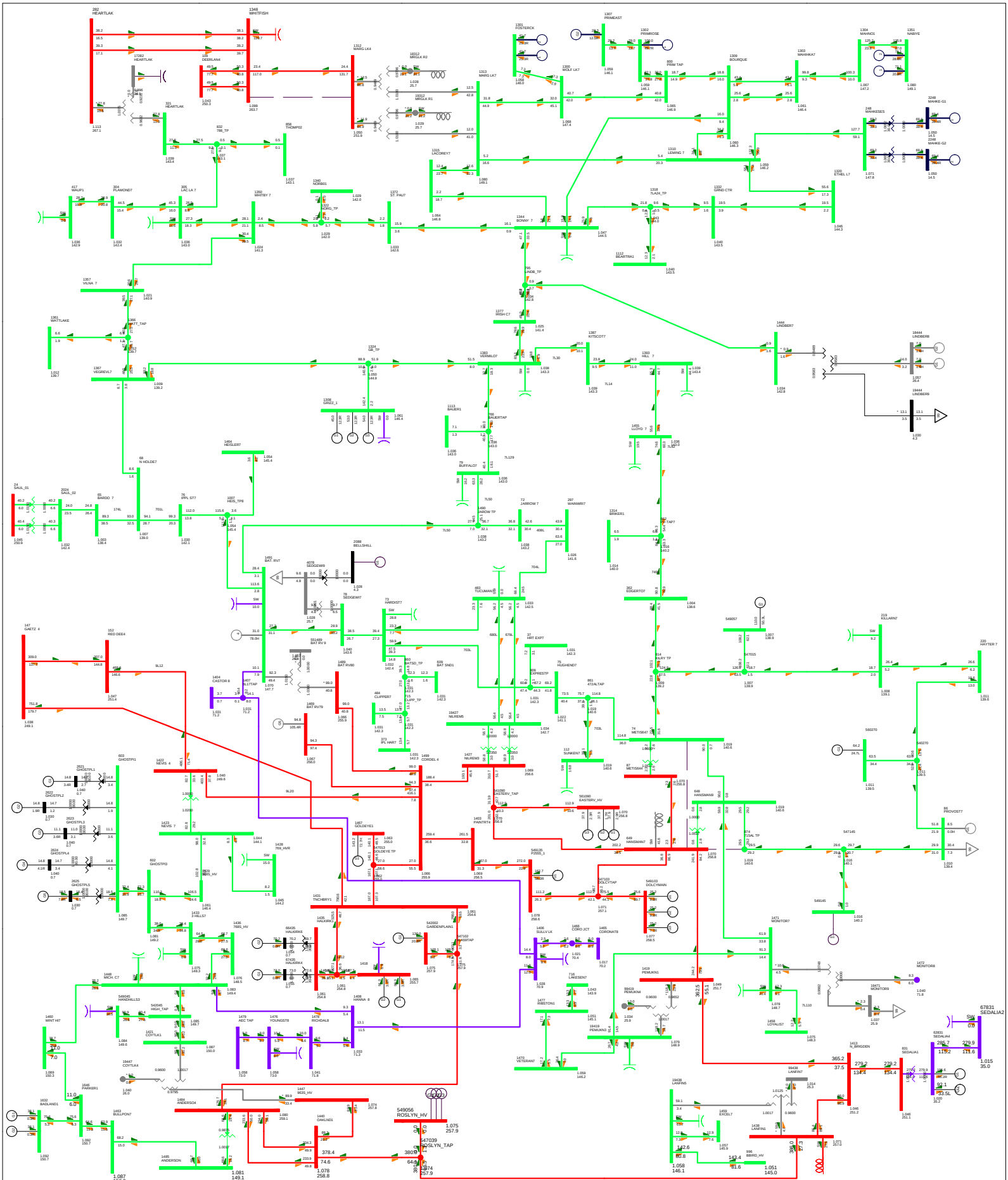
Attachment A2- 3	Contingency	Study Case Description	P2034 Cold Lake Area Cogen
	CONT 010: 9L22 (898S Heart Lake - 825S Whitefish Lake)	2028WP PRE-PROJ Base Case	Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEB kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



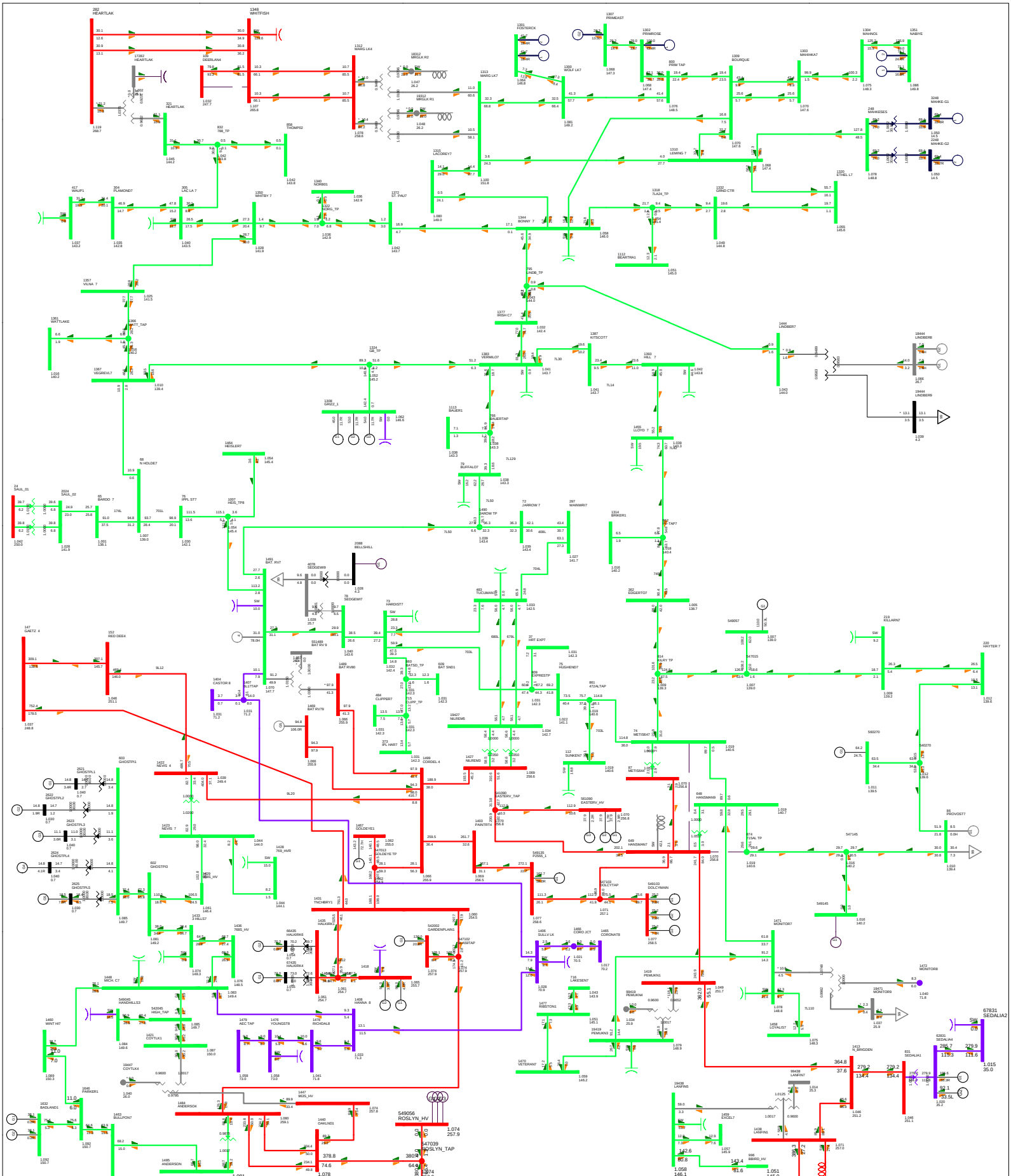
Attachment A2- 3	Contingency	Study Case Description	P2034 Cold Lake Area Cogen
	CONT 011: 9L81 (898S Heart Lake - 825S Whitefish Lake)	2028WP PRE-PROJ Base Case	Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEB kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A2- 3	Contingency	Study Case Description	P2034 Cold Lake Area Cogen
	CONT 012: 9L36 (826S Marguerite Lake - 825S Whitefish Lake)	2028WP PRE-PROJ Base Case	Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEB kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A2- 3	Contingency	Study Case Description	P2034 Cold Lake Area Cogen
	CONT 013: 9L37 (826S Marguerite Lake - 825S Whitefish Lake)	2028WP PRE-PROJ Base Case	Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEB kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A2- 3

Contingency

CONT 014: 9L960 (13S Deerland - 825S Whitefish Lake)

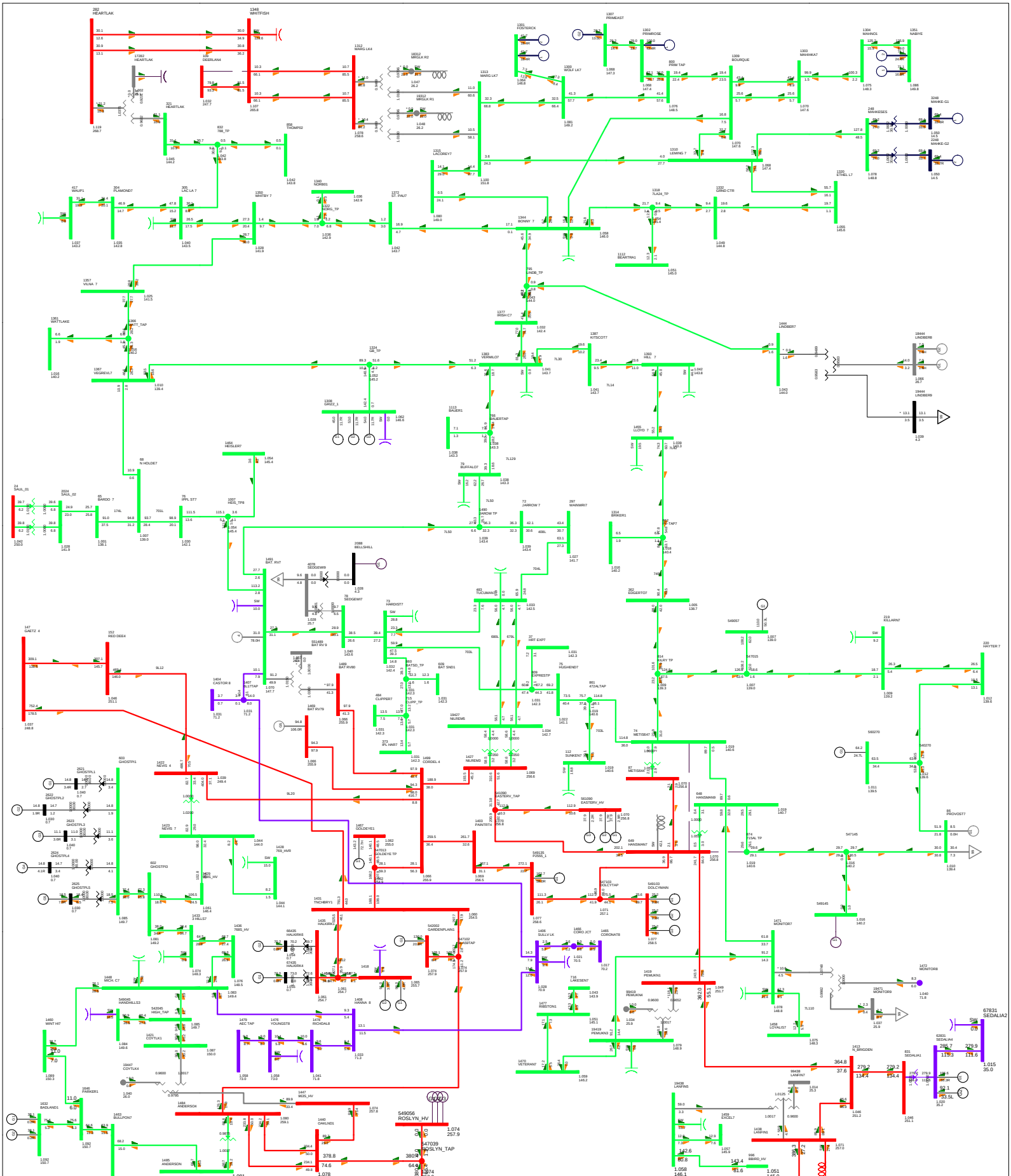
Study Case Description

2028WP PRE-PROJ

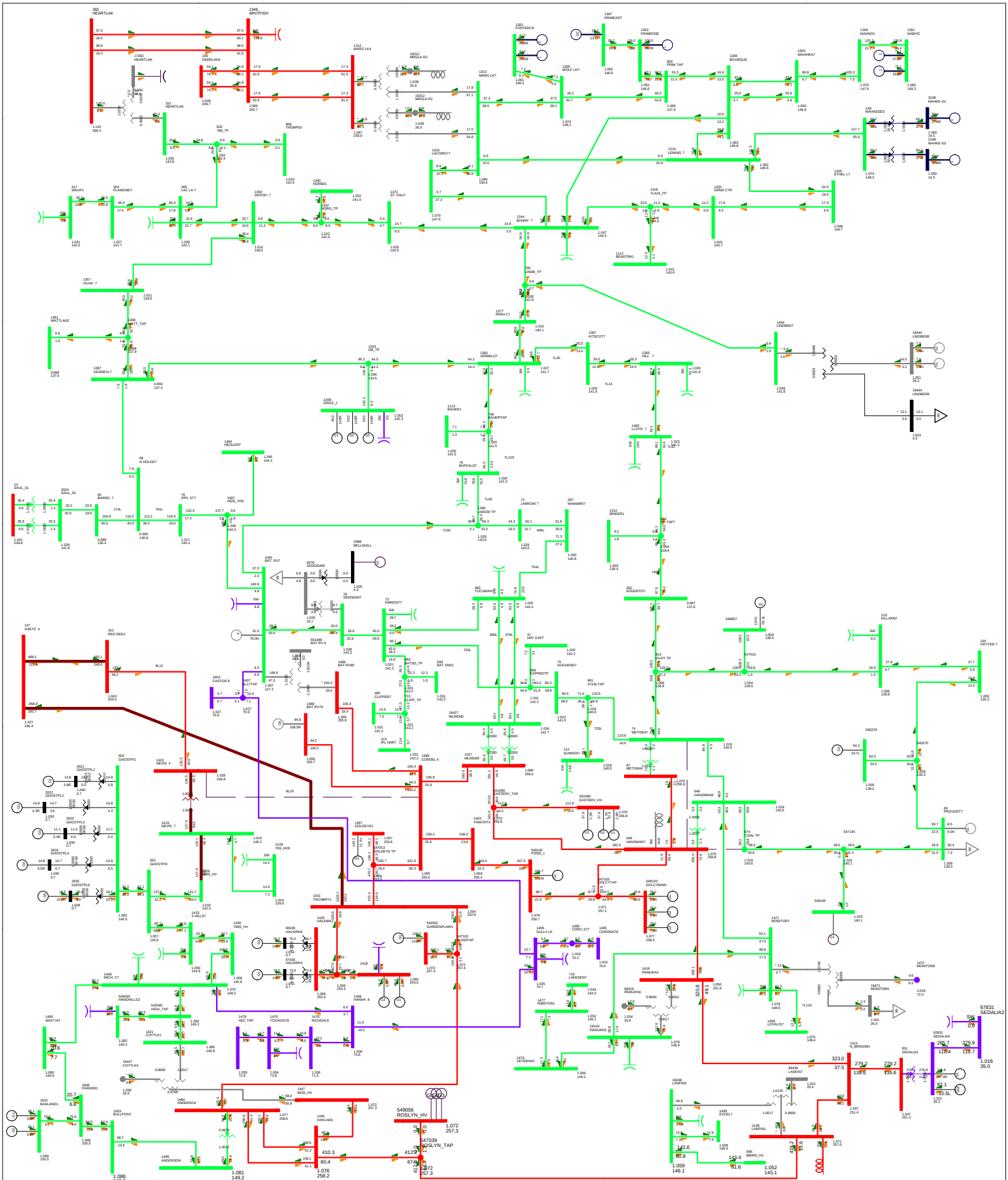
Base Case

P2034 Cold Lake Area Cogen

Bus - VOLTAGE (kV/PU)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%RATEB
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A2- 3	Contingency	Study Case Description	P2034 Cold Lake Area Cogen
	CONT 015: 9L961 (13S Deerland - 825S Whitefish Lake)	2028WP PRE-PROJ Base Case	Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEB kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A2- 3

Contingency

CONT 016: 9L20 (766S Nevis - 755S Cordel)

Study Case Description

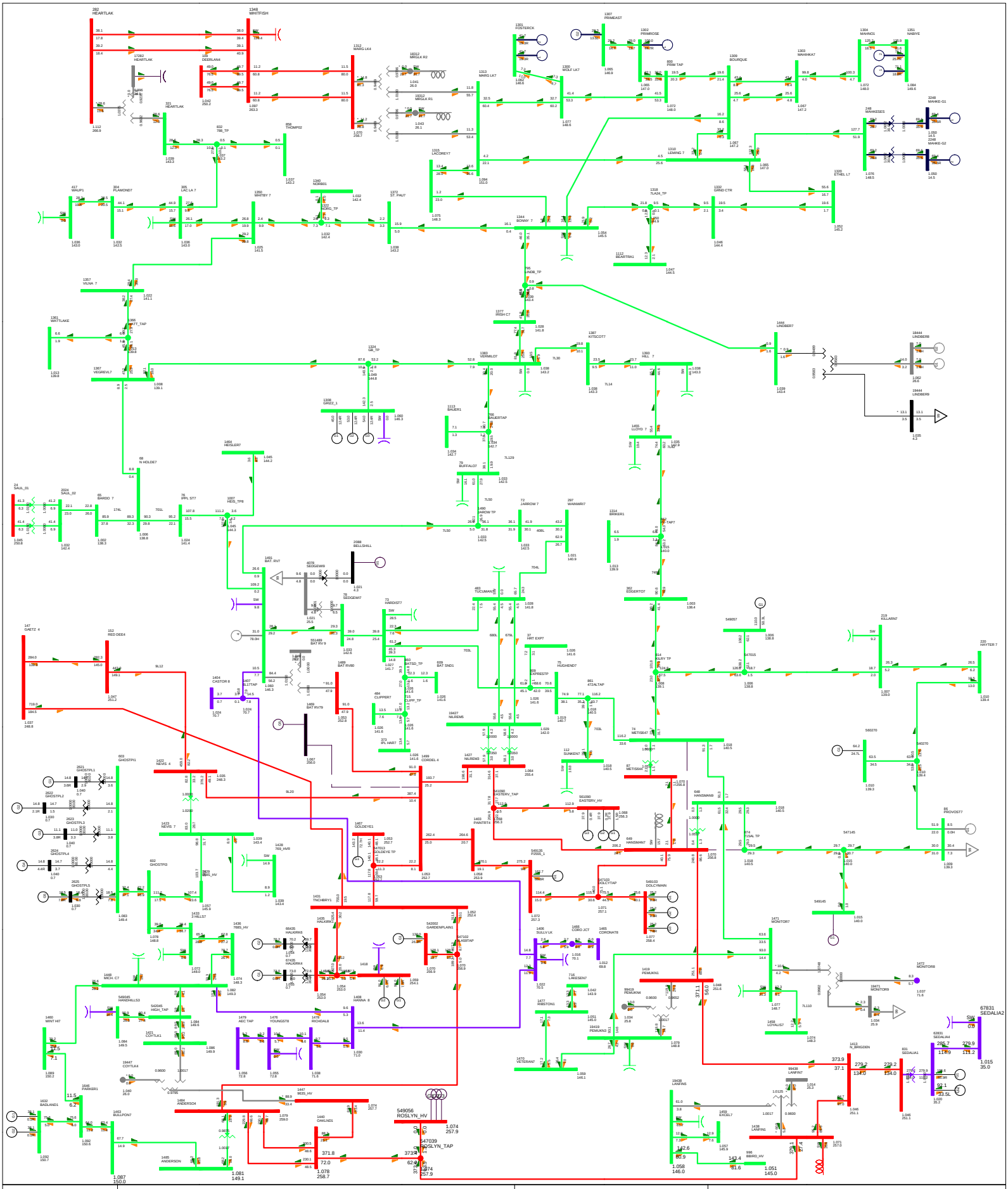
2028WP PRE-PROJ

Base Case

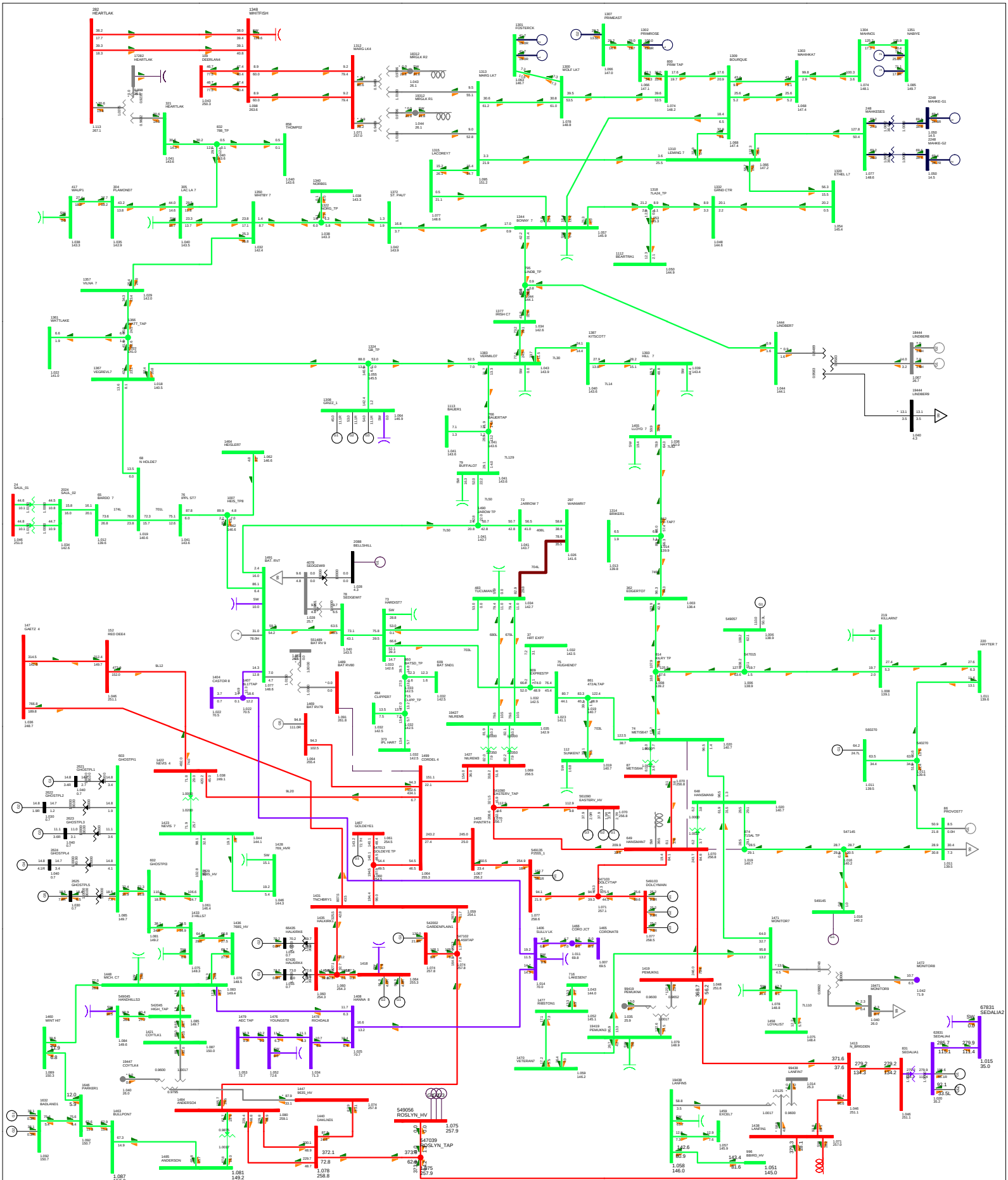
P2034 Cold Lake Area Cogen

Bus - VOLTAGE (kV/PU)
Branch - MW/Mvar
Equipment - MW/Mvar

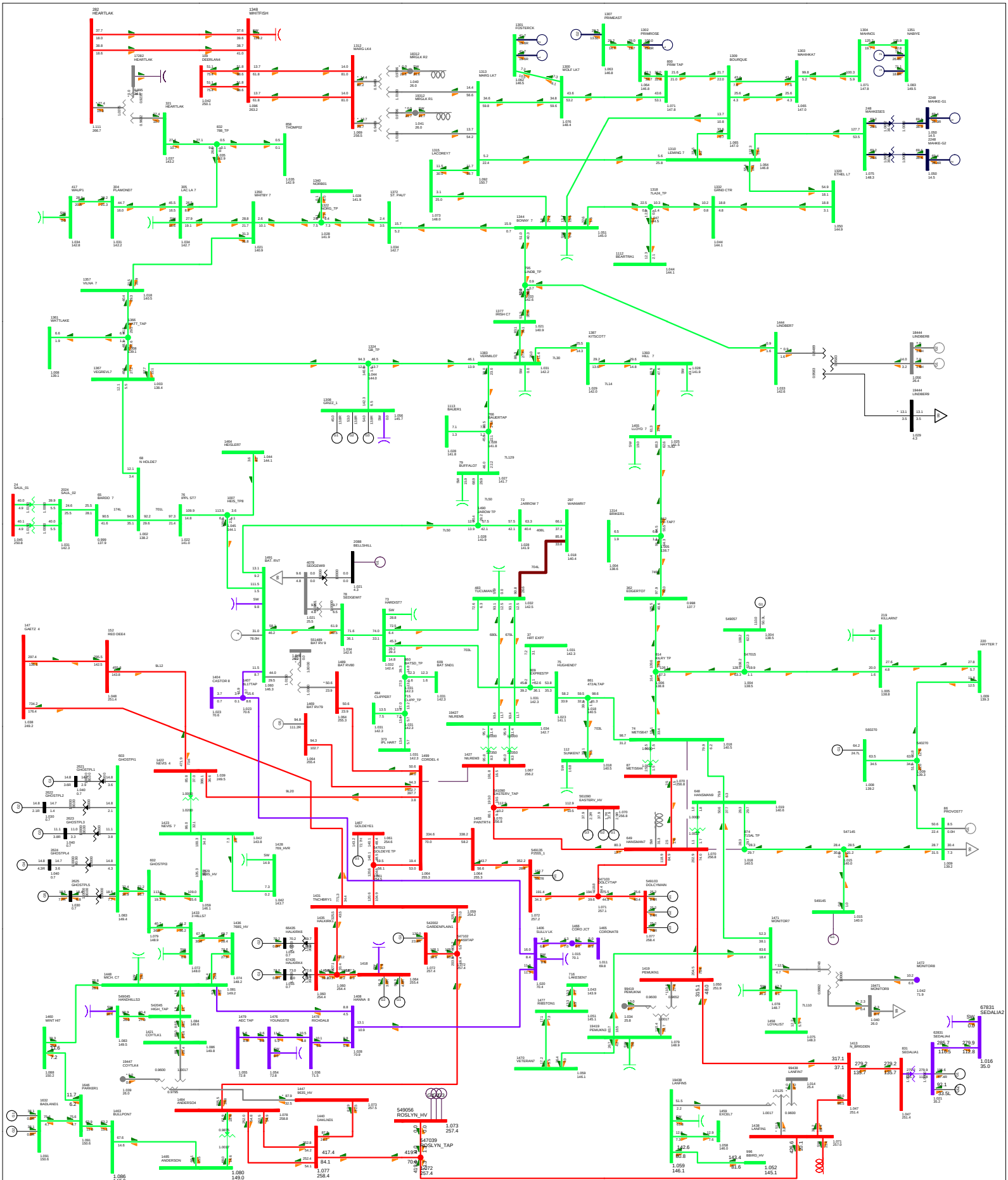
100.0%RATEB
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A2- 3	Contingency	Study Case Description	P2034 Cold Lake Area Cogen
	CONT 017: 9L79 (757S Battle River - 755S Cordel)	2028WP PRE-PROJ Base Case	Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEB kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A2- 3	Contingency	Study Case Description	P2034 Cold Lake Area Cogen
	CONT 018: 9L80 (757S Battle River - 755S Cordel)	2028WP PRE-PROJ Base Case	Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEB kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A2- 3

Contingency

CONT 019: 953L (574S Nilrem - 755S Cordel)

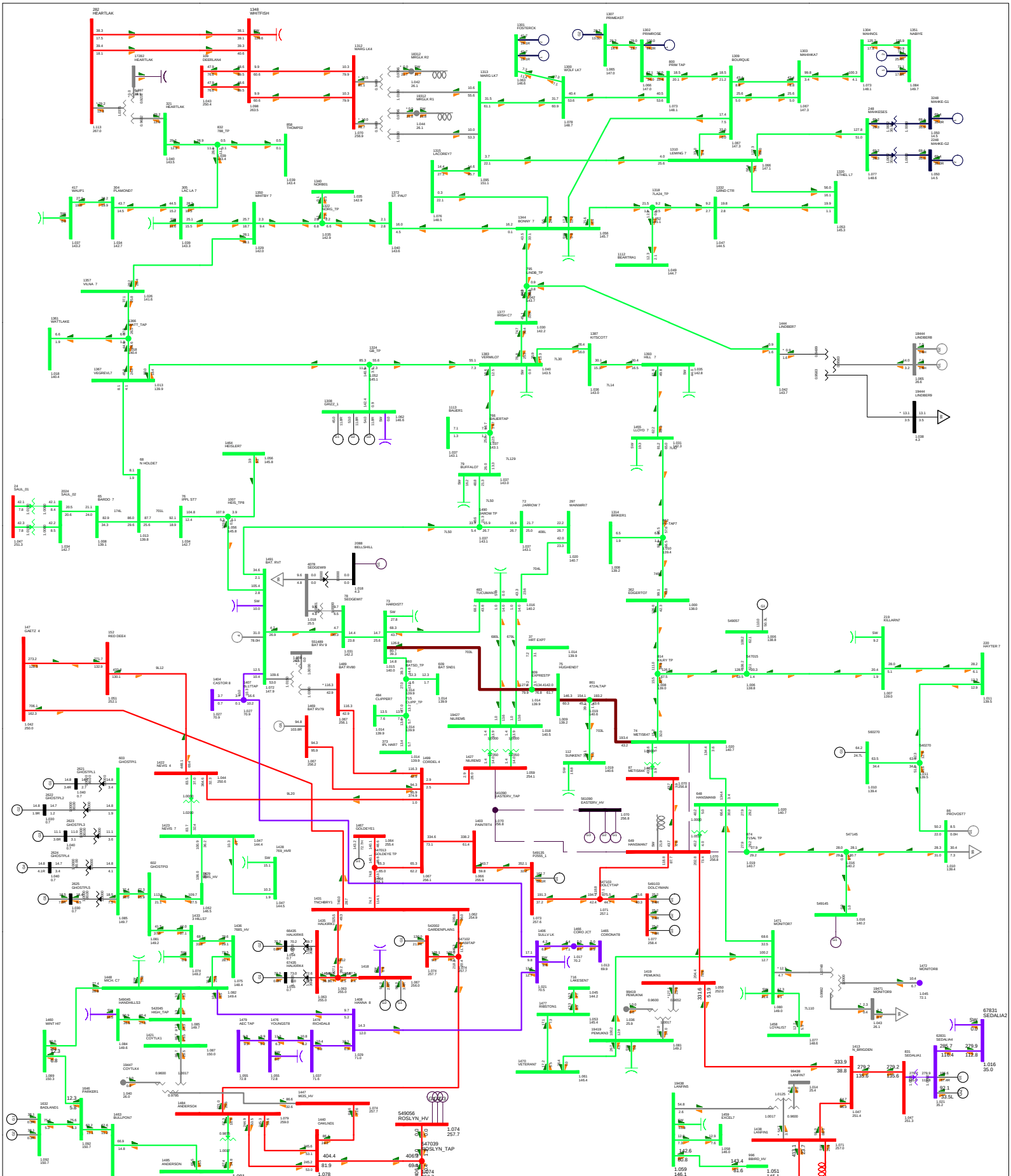
Study Case Description

2028WP PRE-PROJ

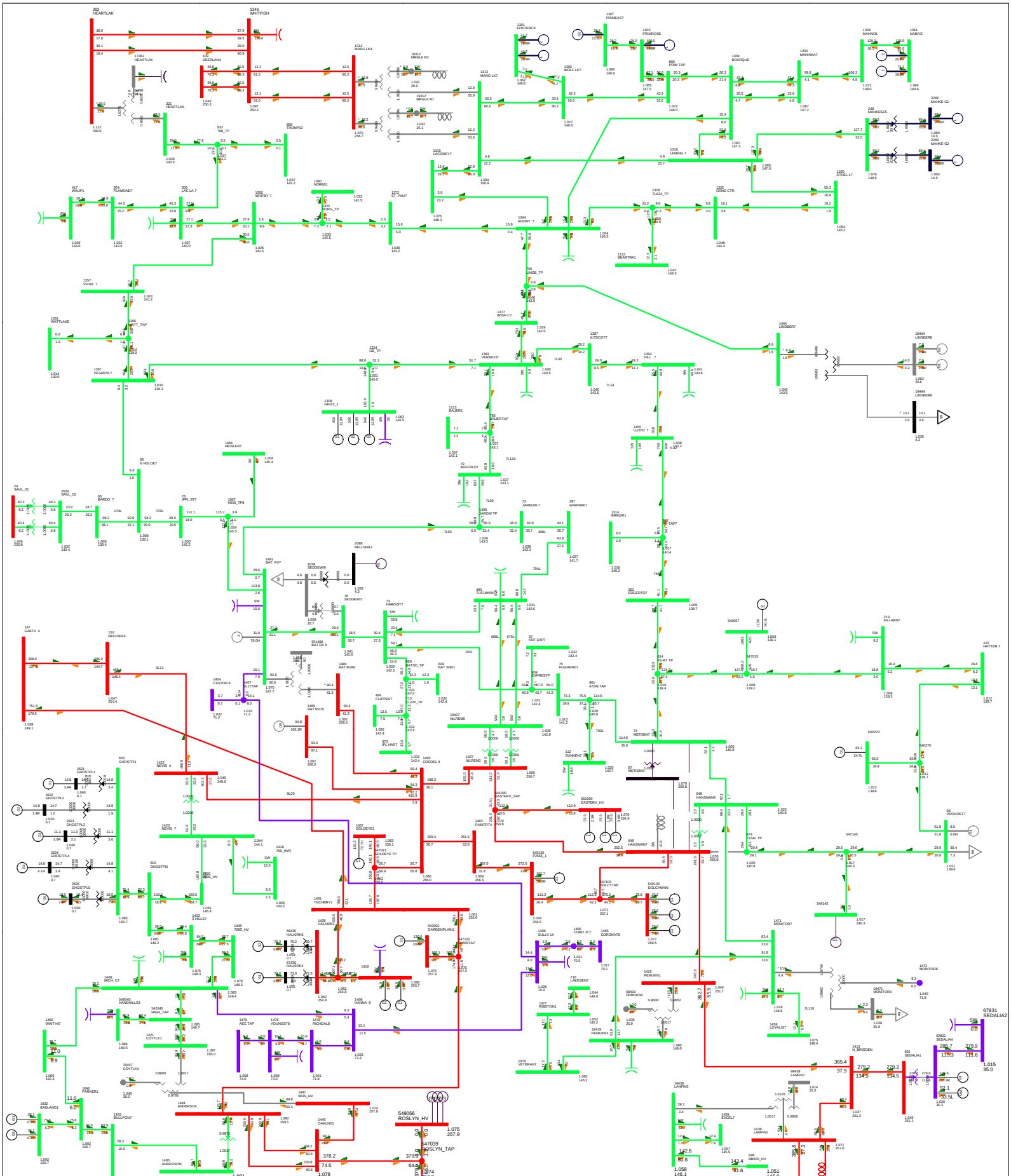
Base Case

P2034 Cold Lake Area Cogen

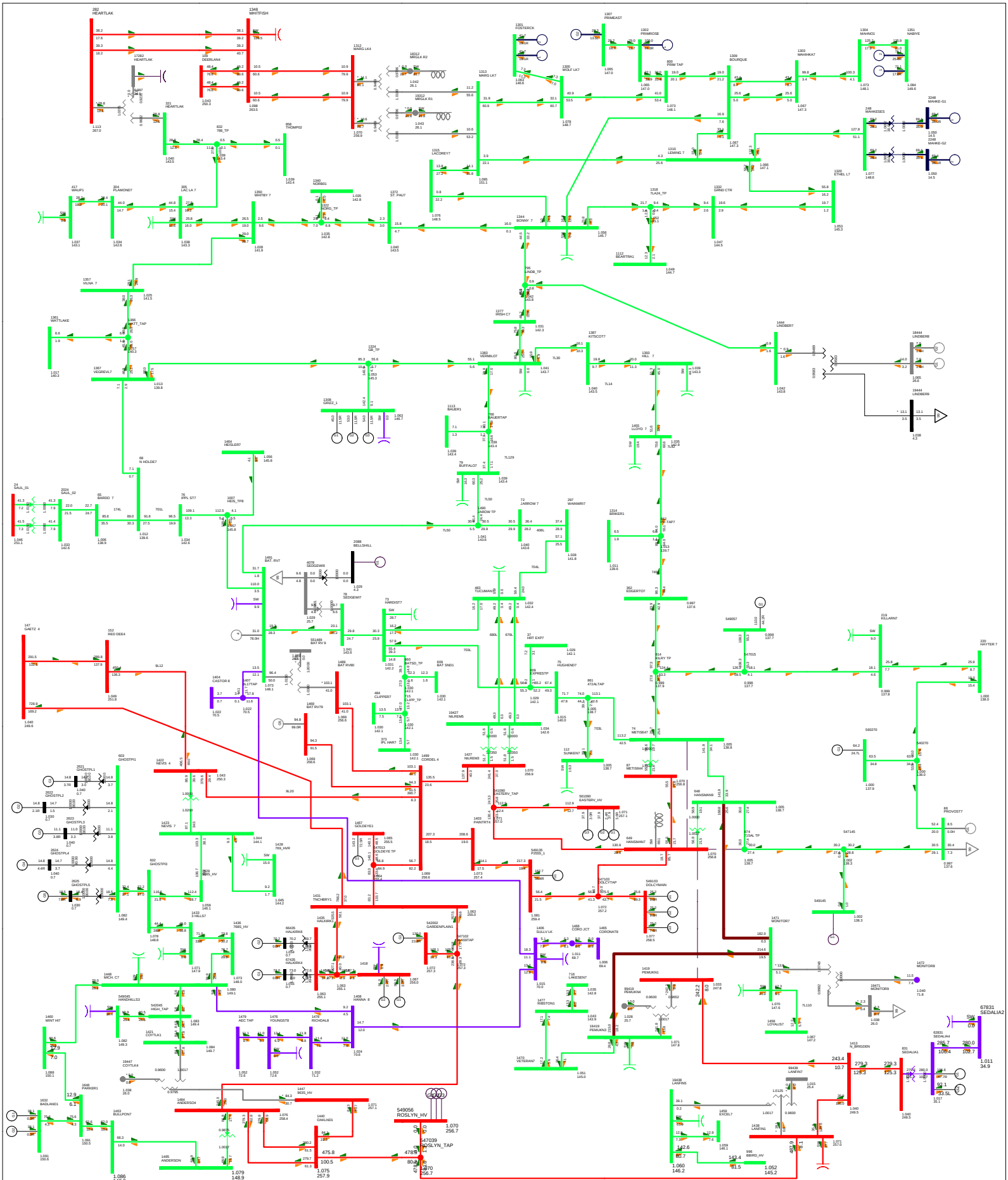
Bus - VOLTAGE (kV/PU)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%RATEB
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



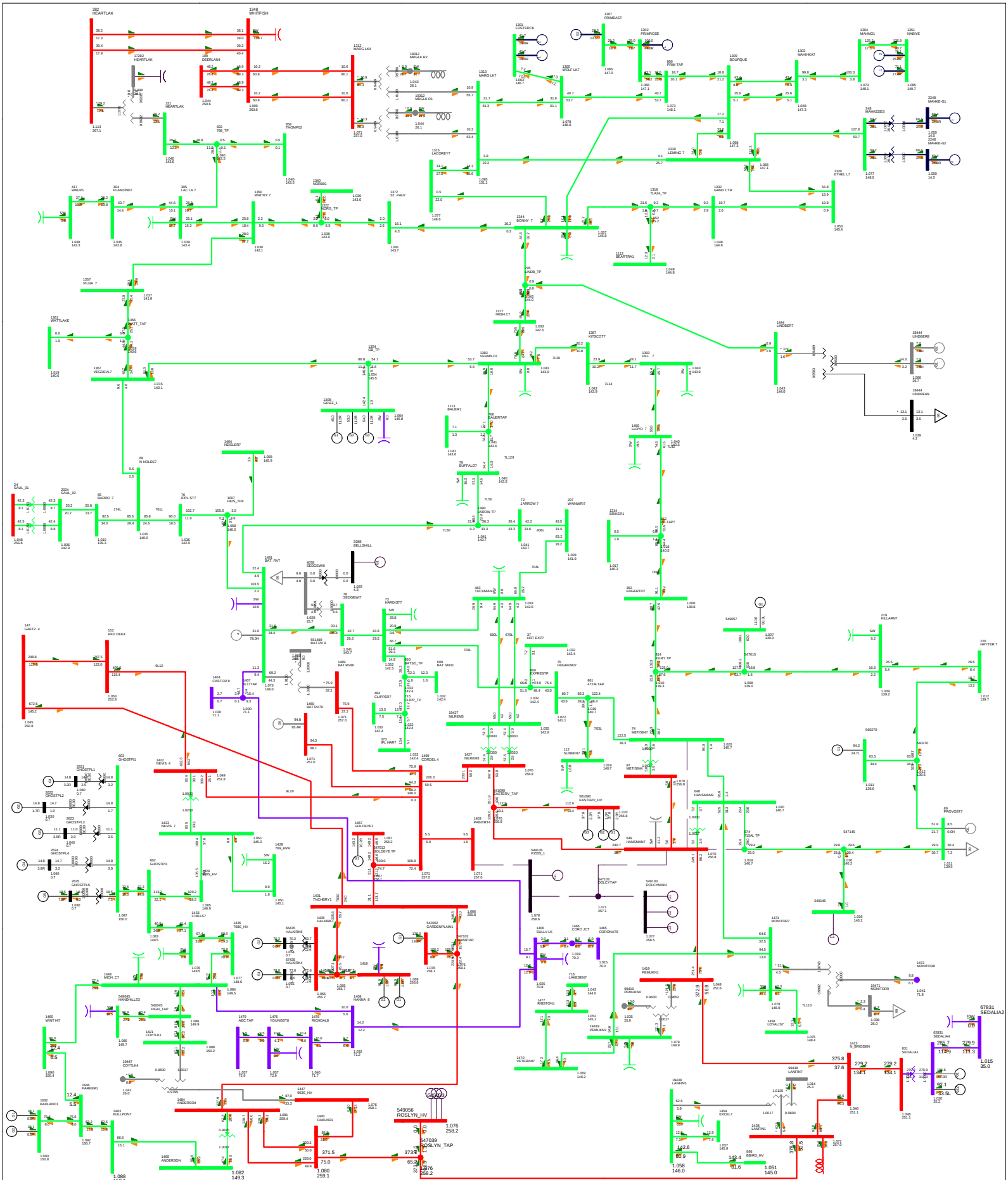
Attachment A2- 3	Contingency	Study Case Description	P2034 Cold Lake Area Cogen
	CONT 020: 1047L (574S Nilrem - P2566 Eastervale Solar - 650S Hansman Lake)	2028WP PRE-PROJ Base Case	Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEB kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



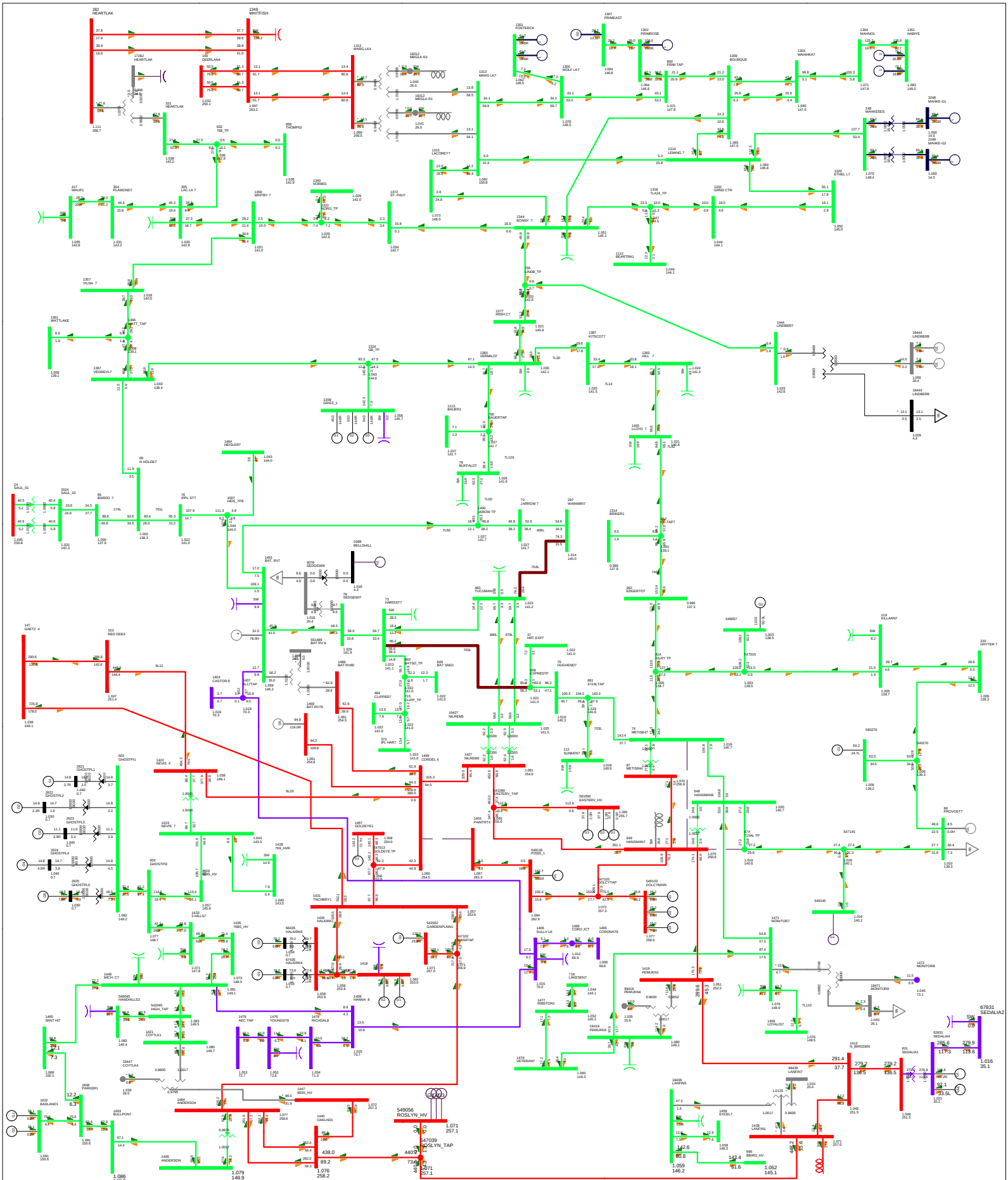
Attachment A2- 3	Contingency	Study Case Description	P2034 Cold Lake Area Cogen
	CONT 021: 954L (648S Metiskow - 650S Hansman Lake)	2028WP PRE-PROJ Base Case	Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEB kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



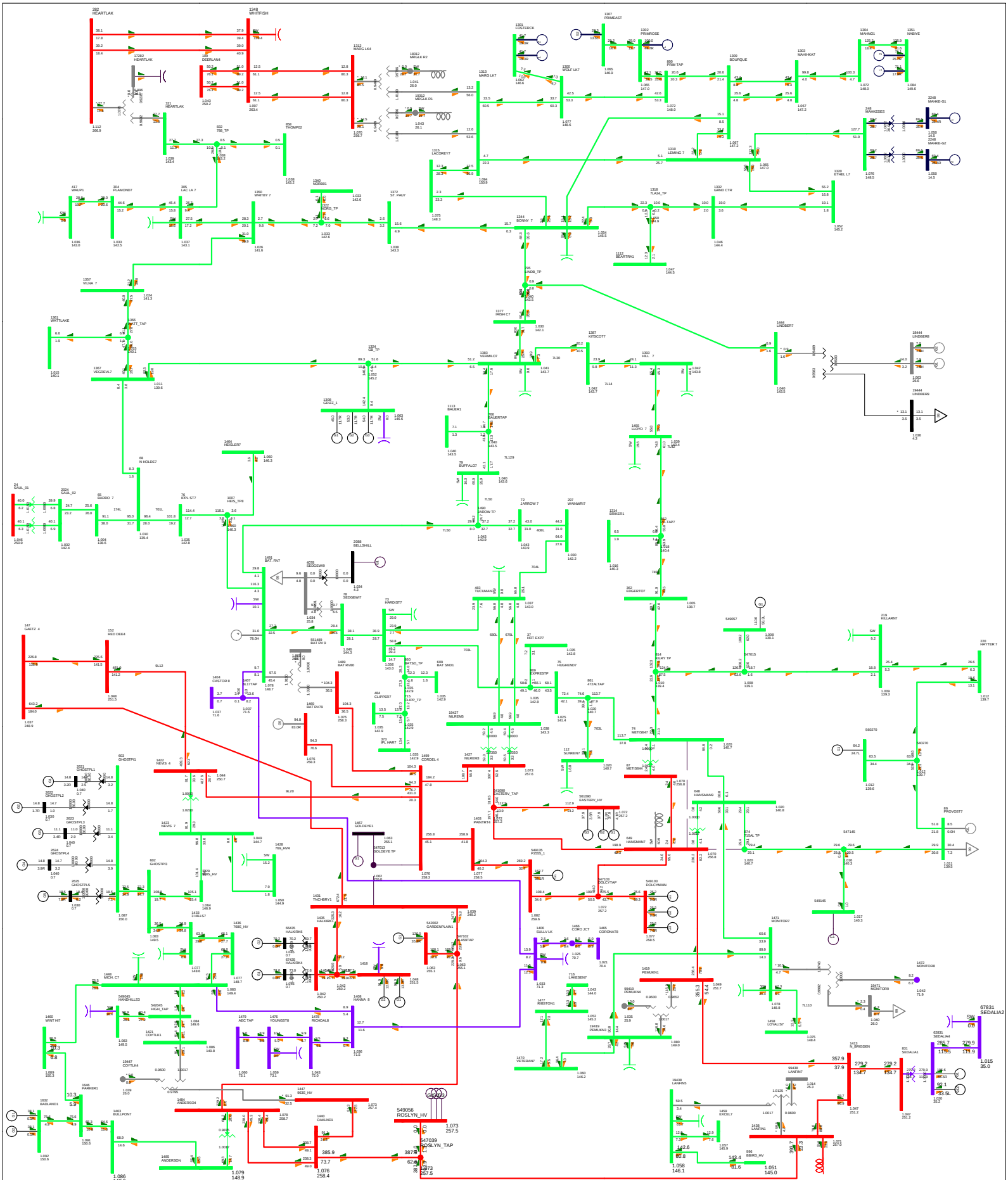
Attachment A2- 3	Contingency	Study Case Description	P2034 Cold Lake Area Cogen
	CONT 022: 9L966 (650S Hansman Lake - 932S Pemukan)	2028WP PRE-PROJ Base Case	Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEB kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A2- 3	Contingency	Study Case Description	P2034 Cold Lake Area Cogen
	CONT 023: 948L (650S Hansman Lake - P2553 Dolcy Solar - P2555 Rolling Hills Wind - 8638 [illegible]	Base Case	Bus - VOLTAGE (kV/PU) Branch - MW/MVar Equipment - MW/Mvar 100.0%RATEB kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A2- 3	Contingency	Study Case Description	P2034 Cold Lake Area Cogen
	CONT 024: 9L27 (863S Paintearth - 755S Cordel)	2028WP PRE-PROJ Base Case	Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEB kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A2- 3

Contingency

CONT 025: 9L16 (755S Cordel - P2441 Halkirk 2 Wind - 972S Tinchebray)

Study Case Description

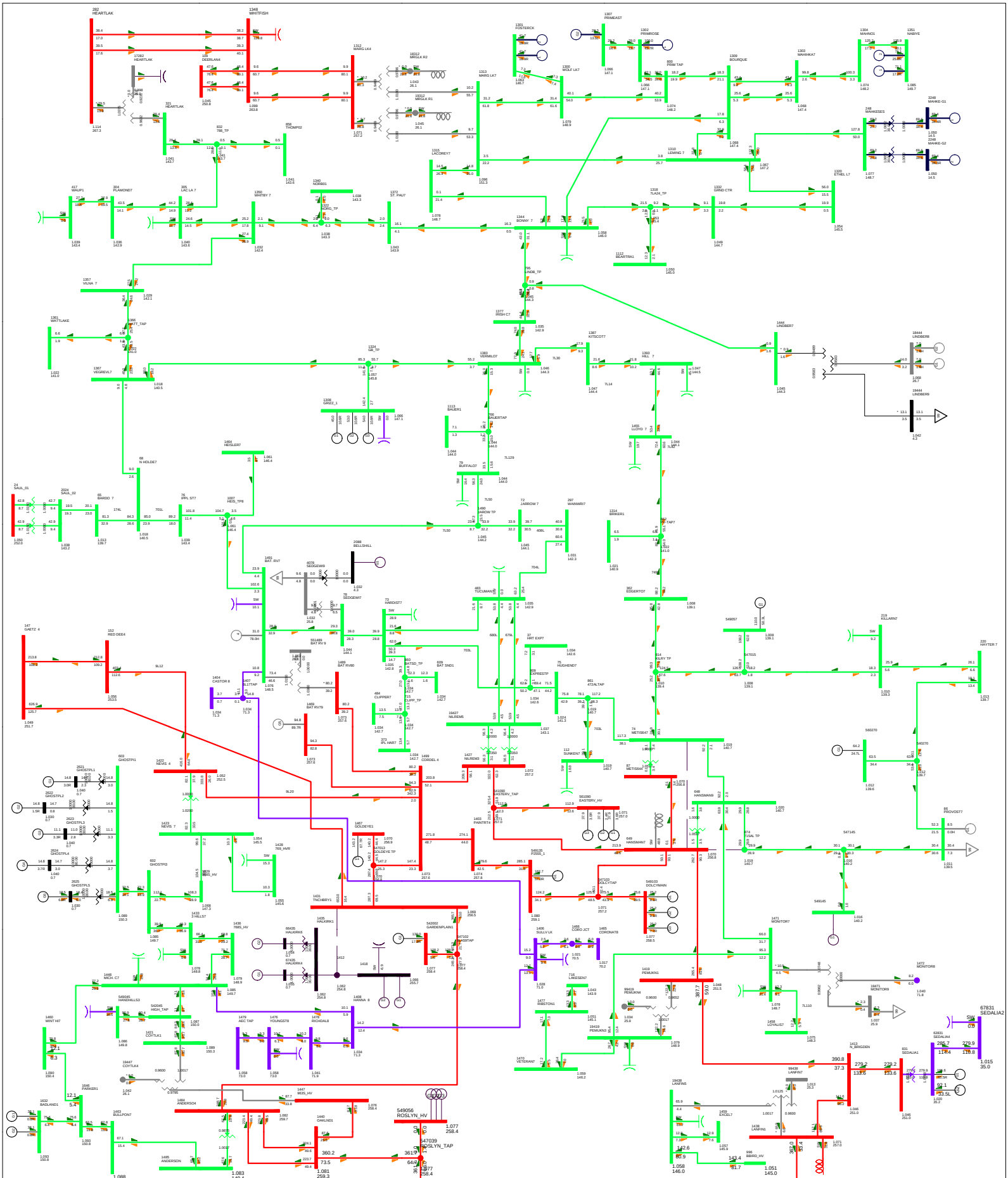
2028WP PRE-PROJ

Base Case

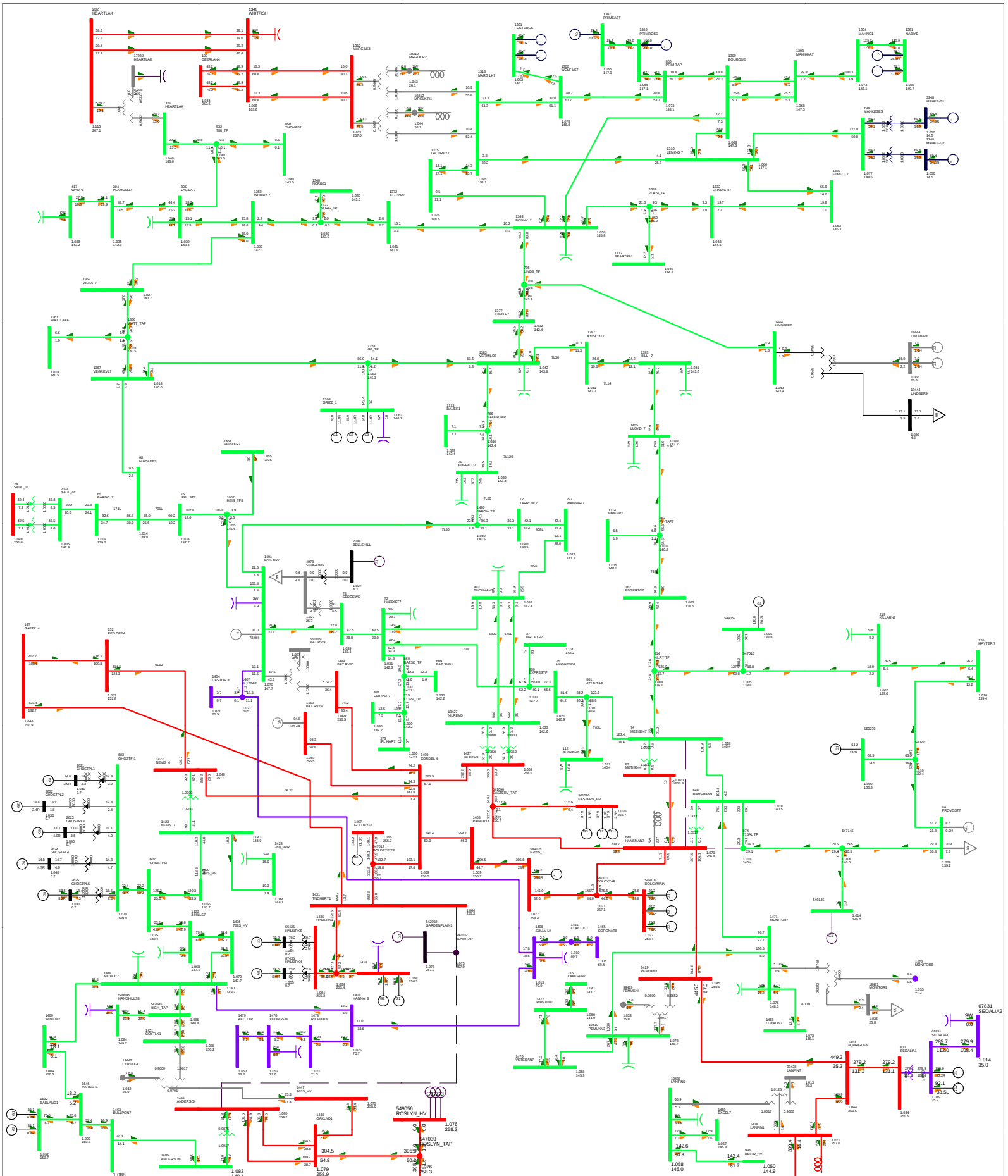
P2034 Cold Lake Area Cogen

Bus - VOLTAGE (kV/PU)
Branch - MW/Mvar
Equipment - MW/Mvar

100.0%RATEB
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A2- 3	Contingency	Study Case Description	P2034 Cold Lake Area Cogen
	CONT 026: 9L93 (972S Tinchebray - 615S Halkirk - 973S Lanes Lake)	2028WP PRE-PROJ Base Case	Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEB kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A2- 3

Contingency

CONT 027: 9L59 (972S Tinchebray - 1045S Garden Plain - 801S Anderson)

Study Case Description

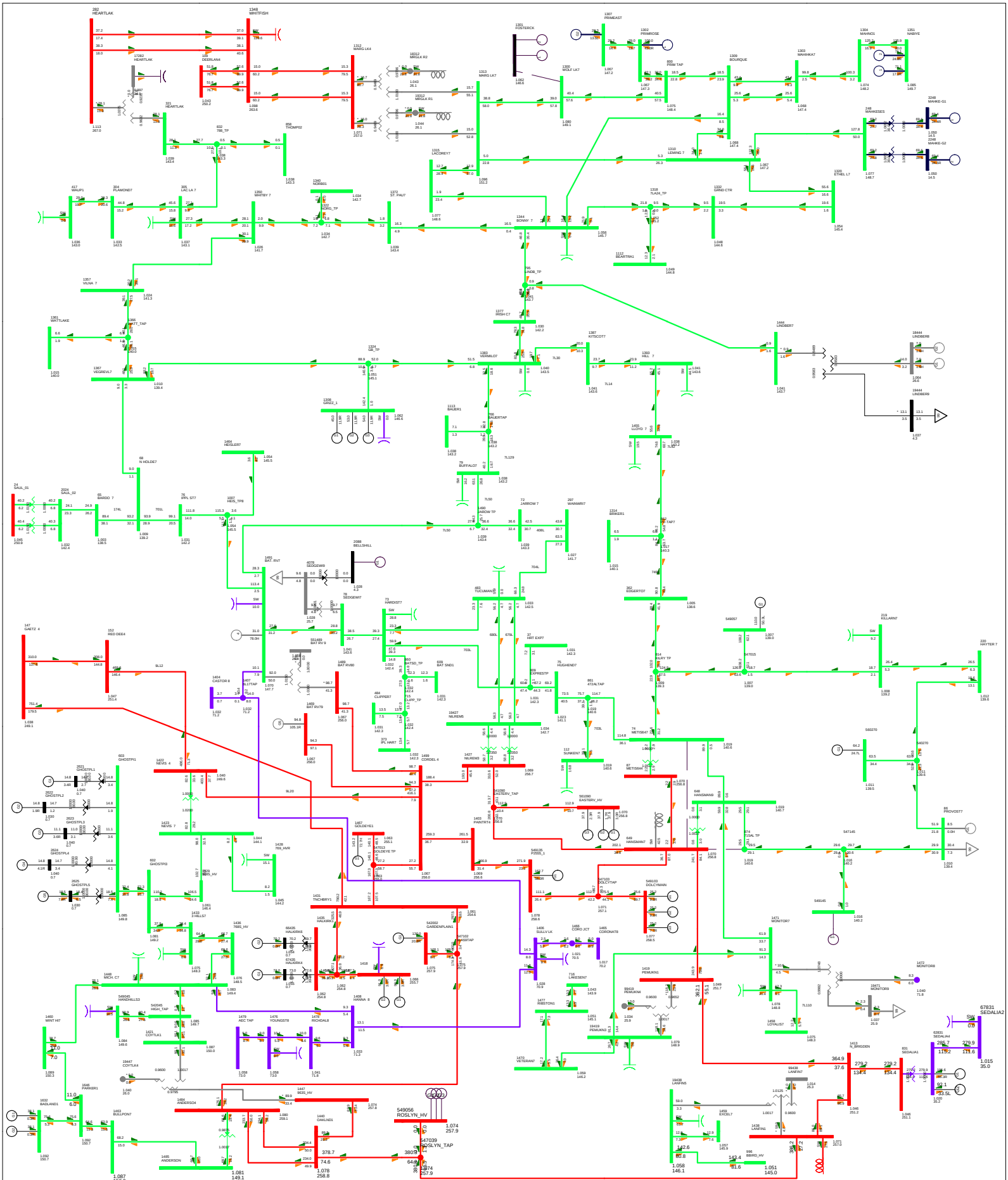
2028WP PRE-PROJ

Base Case

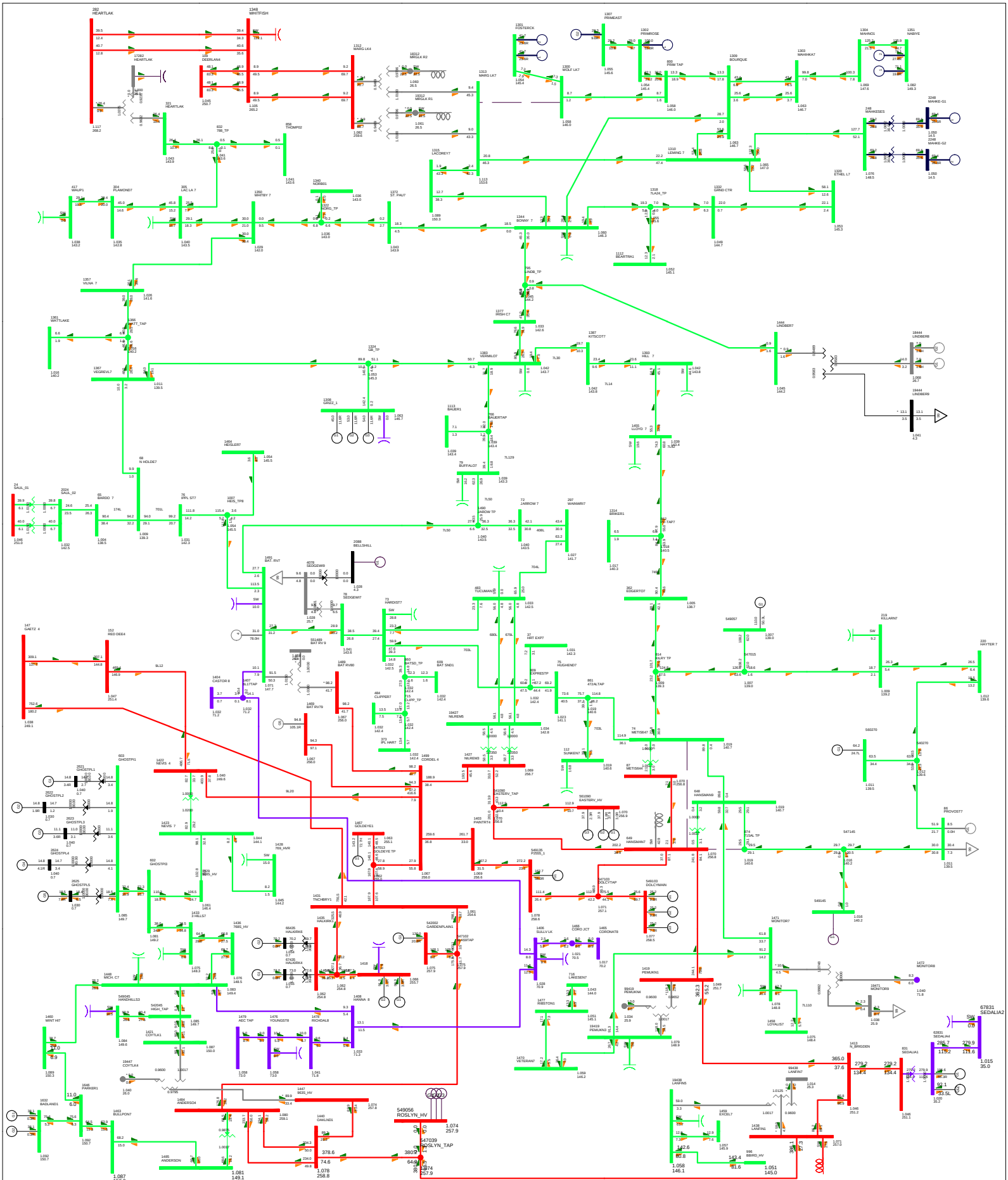
P2034 Cold Lake Area Cogen

Bus - VOLTAGE (kV/PU)
Branch - MW/Mvar
Equipment - MW/Mvar

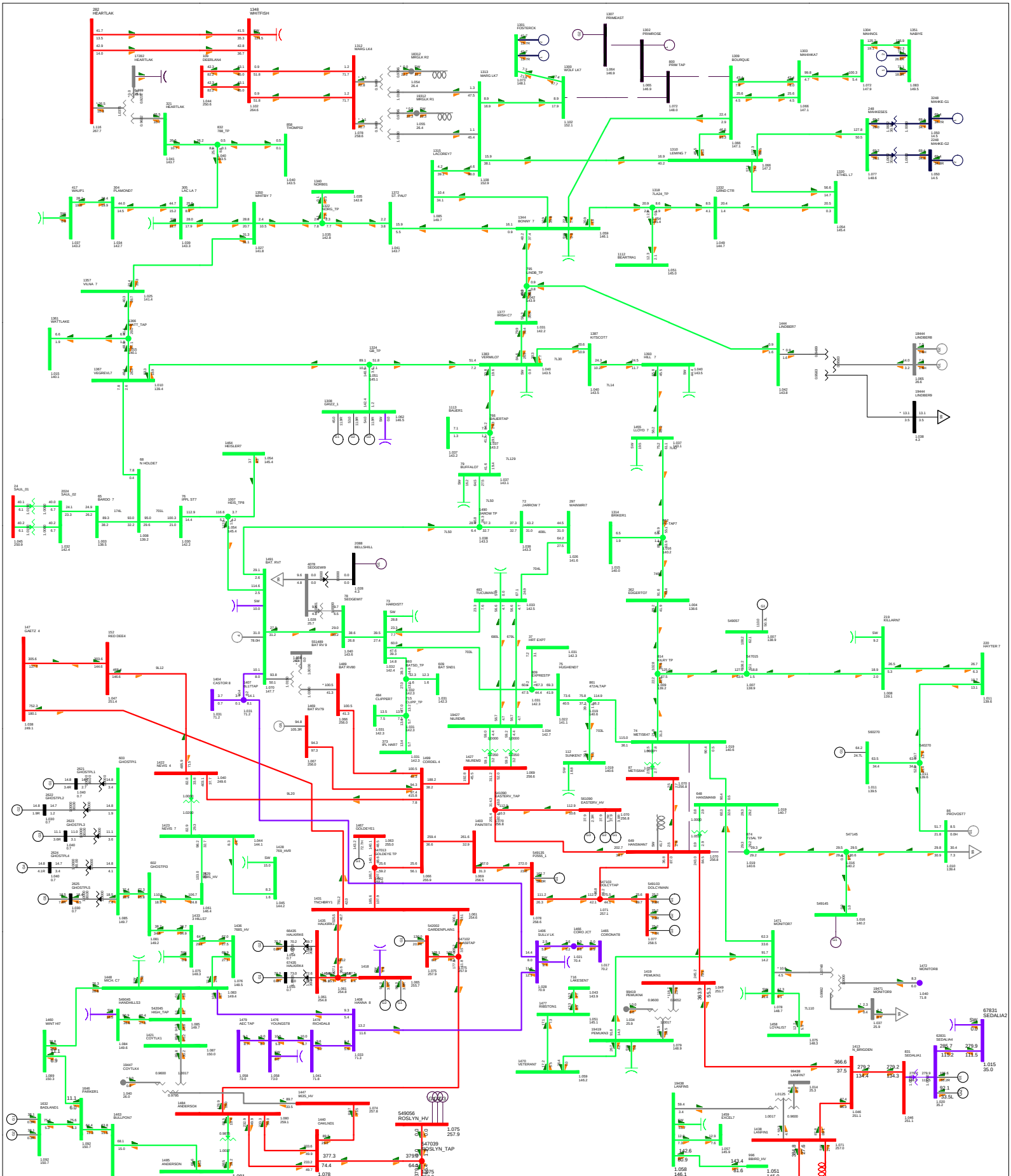
100.0%RATEB
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



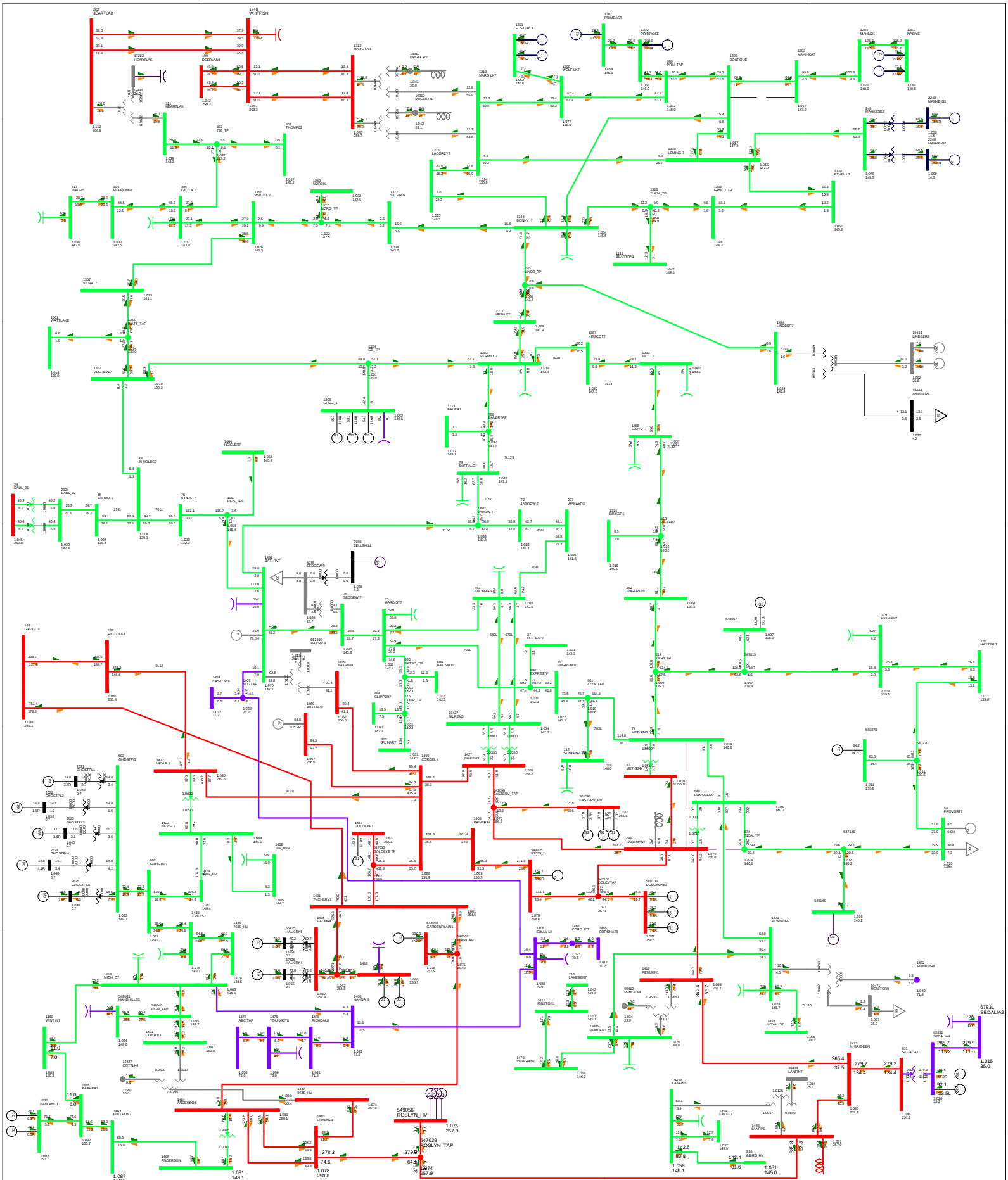
Attachment A2- 3	Contingency	Study Case Description	P2034 Cold Lake Area Cogen
	CONT 028: 7L86 (822S Wolf Lake - 877S Foster Creek)	2028WP PRE-PROJ Base Case	Bus - VOLTAGE (kV/PU) Branch - MW/MVar Equipment - MW/Mvar 100.0%RATEB kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A2- 3	Contingency	Study Case Description	P2034 Cold Lake Area Cogen
	CONT 029: 7L587 (822S Wolf Lake - 826S Marguerite Lake)	2028WP PRE-PROJ Base Case	Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEB kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A2- 3	**Contingency** CONT 030: 7L574 (822S Wolf Lake - 859S Primrose - 970S Bourque)	**Study Case Description** 2028WP PRE-PROJ Base Case	**P2034 Cold Lake Area Cogen** Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEB kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A2- 3

Contingency

CONT 031: 7L157 (837S Mahihkan - 970S Bourque)

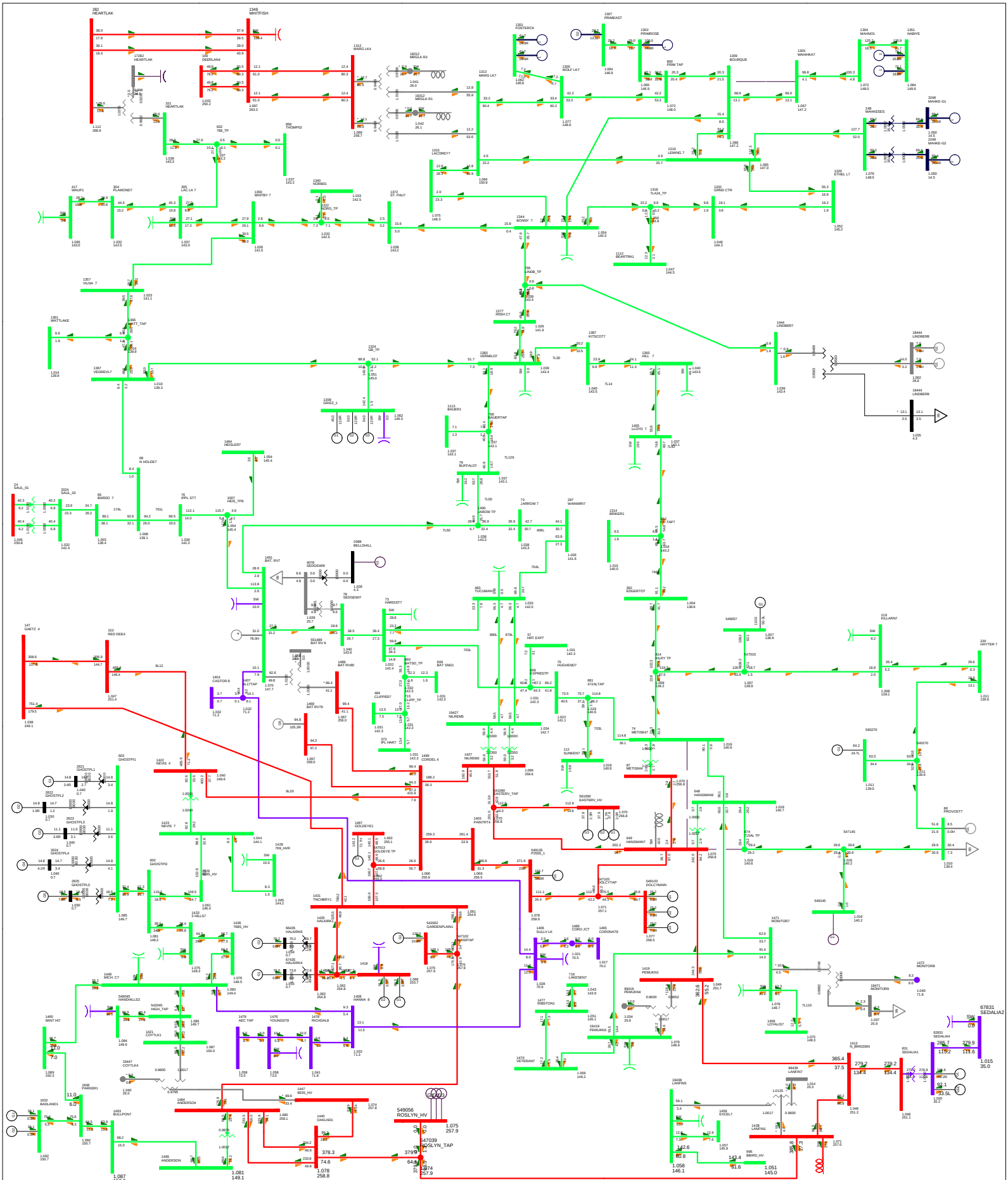
Study Case Description

2028WP PRE-PROJ

Base Case

P2034 Cold Lake Area Cogen

Bus - VOLTAGE (kV/PU)
Branch - MW/MVar
Equipment - MW/Mvar
100.0%RATEB
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A2- 3

Contingency

CONT 032: 7L160 (837S Mahihkan - 970S Bourque)

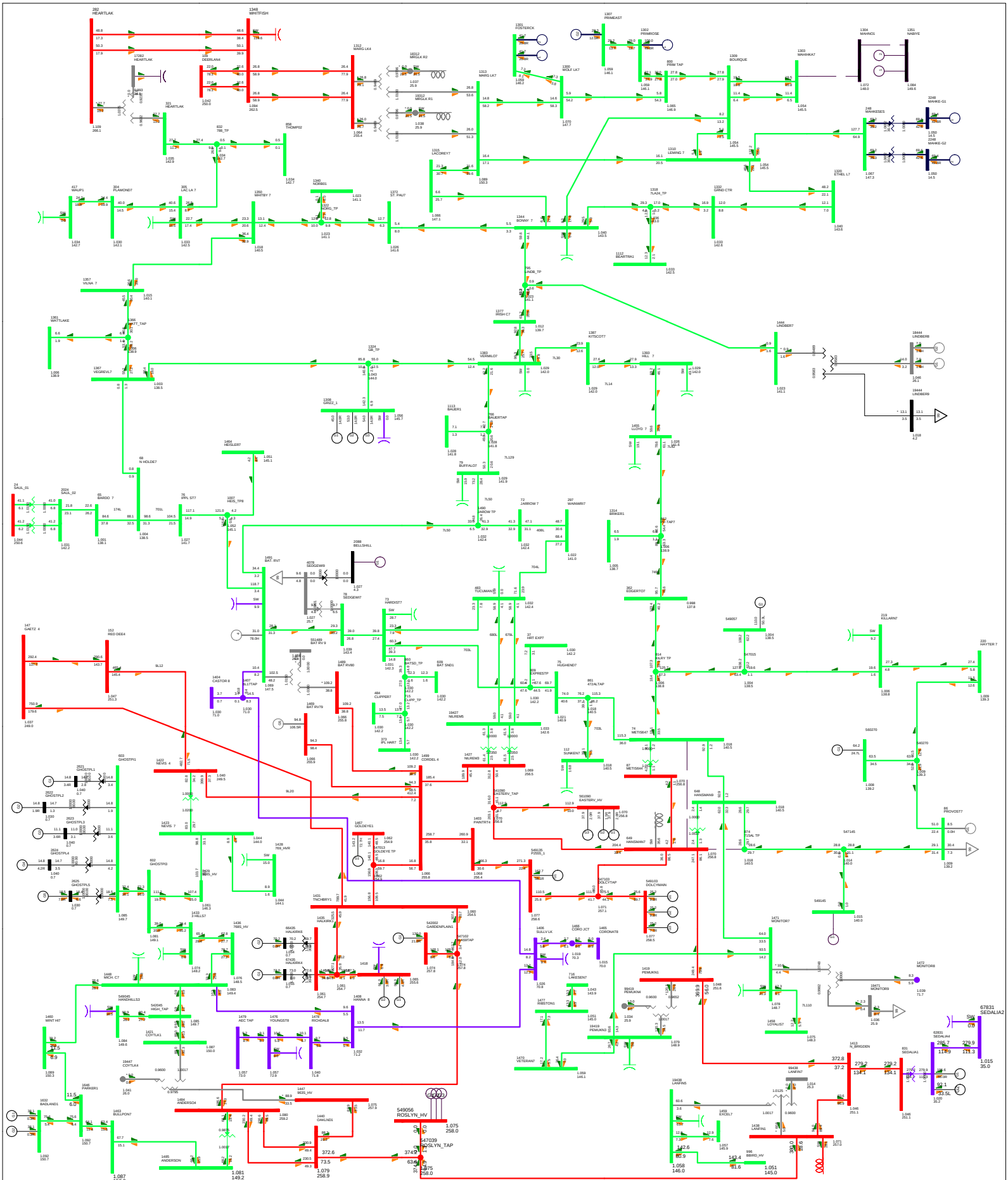
Study Case Description

2028WP PRE-PROJ

Base Case

P2034 Cold Lake Area Cogen

Bus - VOLTAGE (kV/PU)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%RATEB
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A2- 3

Contingency

CONT 033: 7L105 (837S Mahihkan - 909S Mahno)

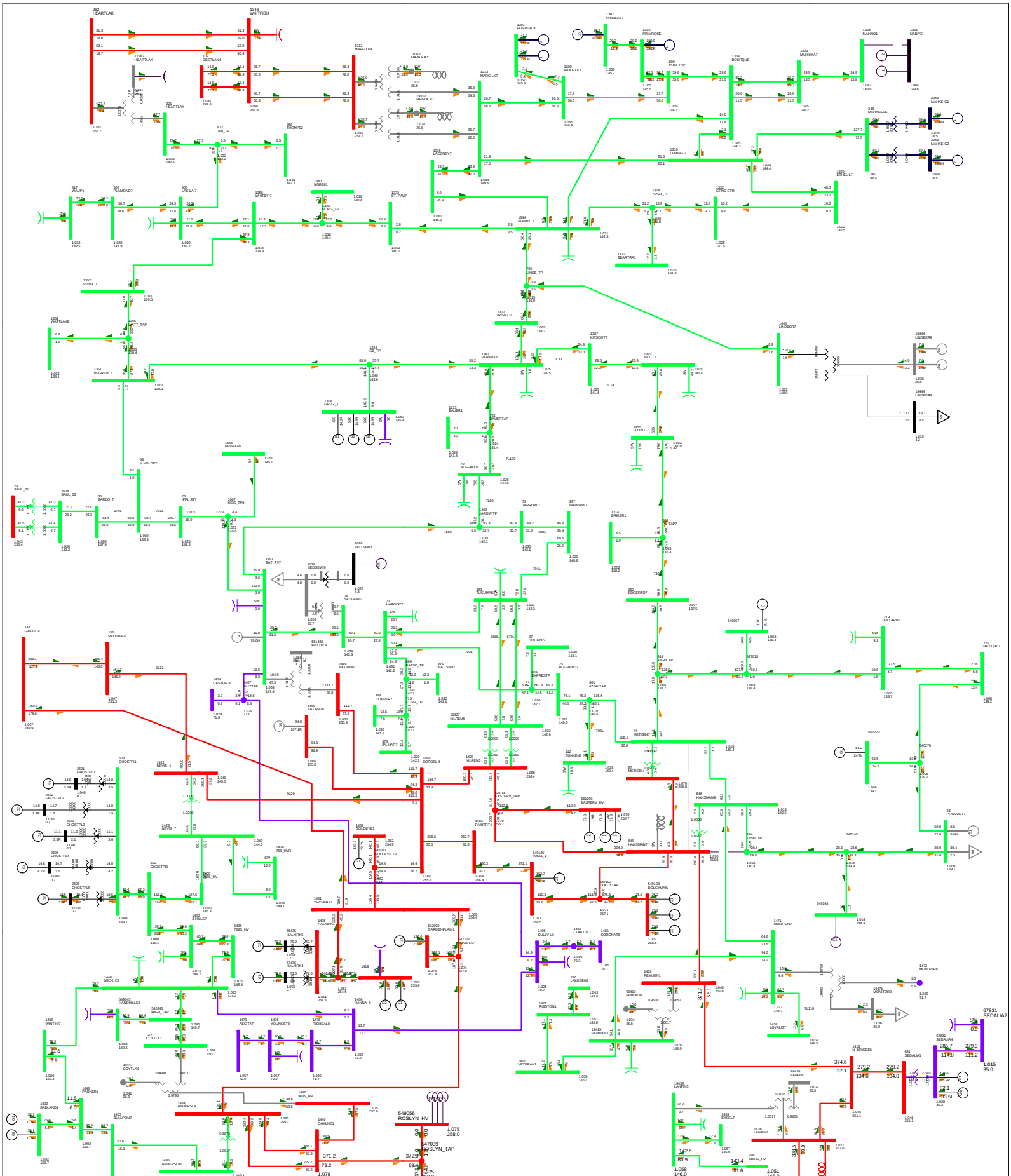
Study Case Description

2028WP PRE-PROJ

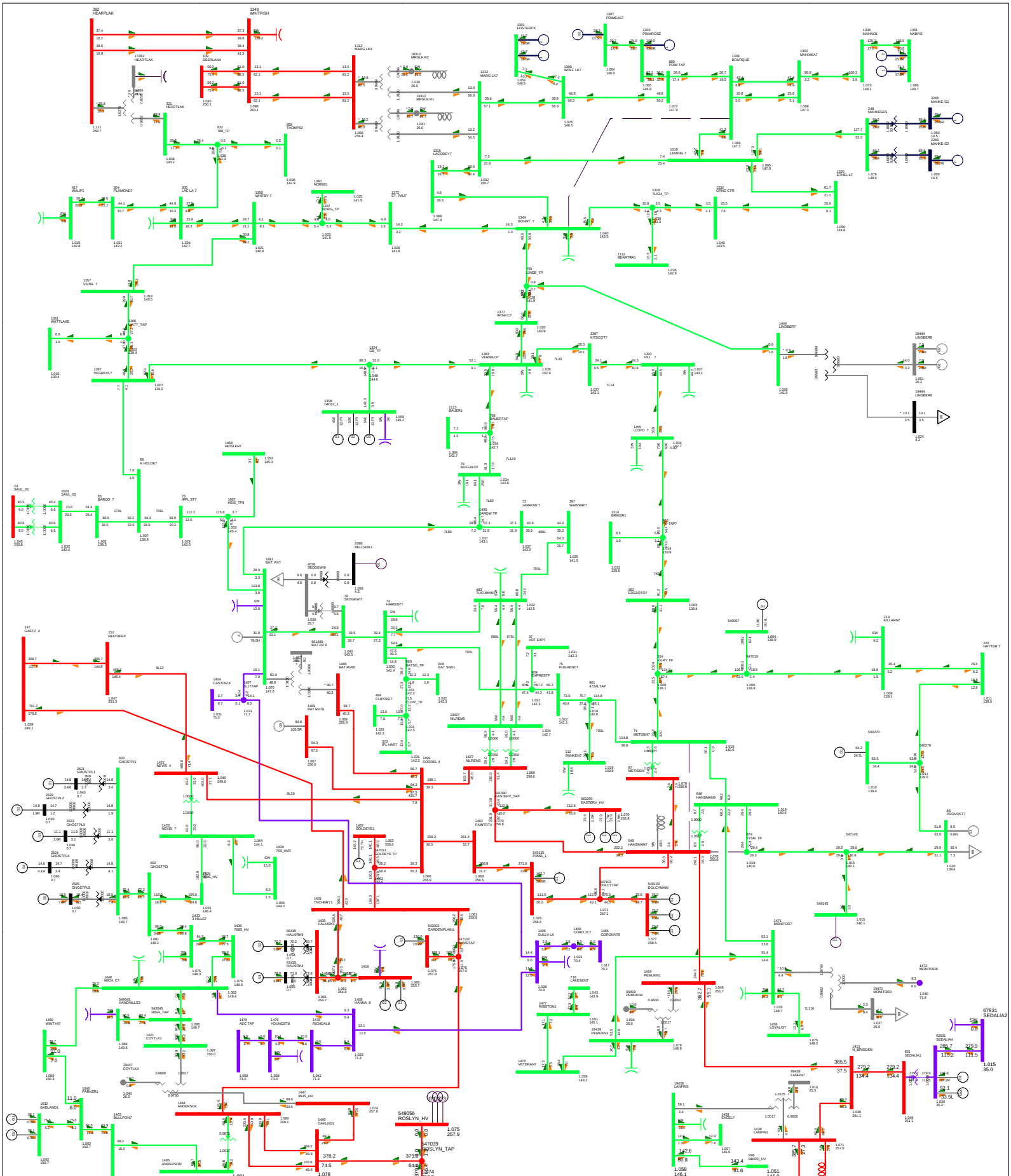
Base Case

P2034 Cold Lake Area Cogen

Bus - VOLTAGE (kV/PU)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%RATEB
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A2- 3	**Contingency** CONT 034: 7L161 (909S Mahno - 942S Nabiye)	**Study Case Description** 2028WP PRE-PROJ Base Case	**P2034 Cold Lake Area Cogen** Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEB kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A2- 3

Contingency

CONT 035: 7L146 (970S Bourque - 700S Bonnyville)

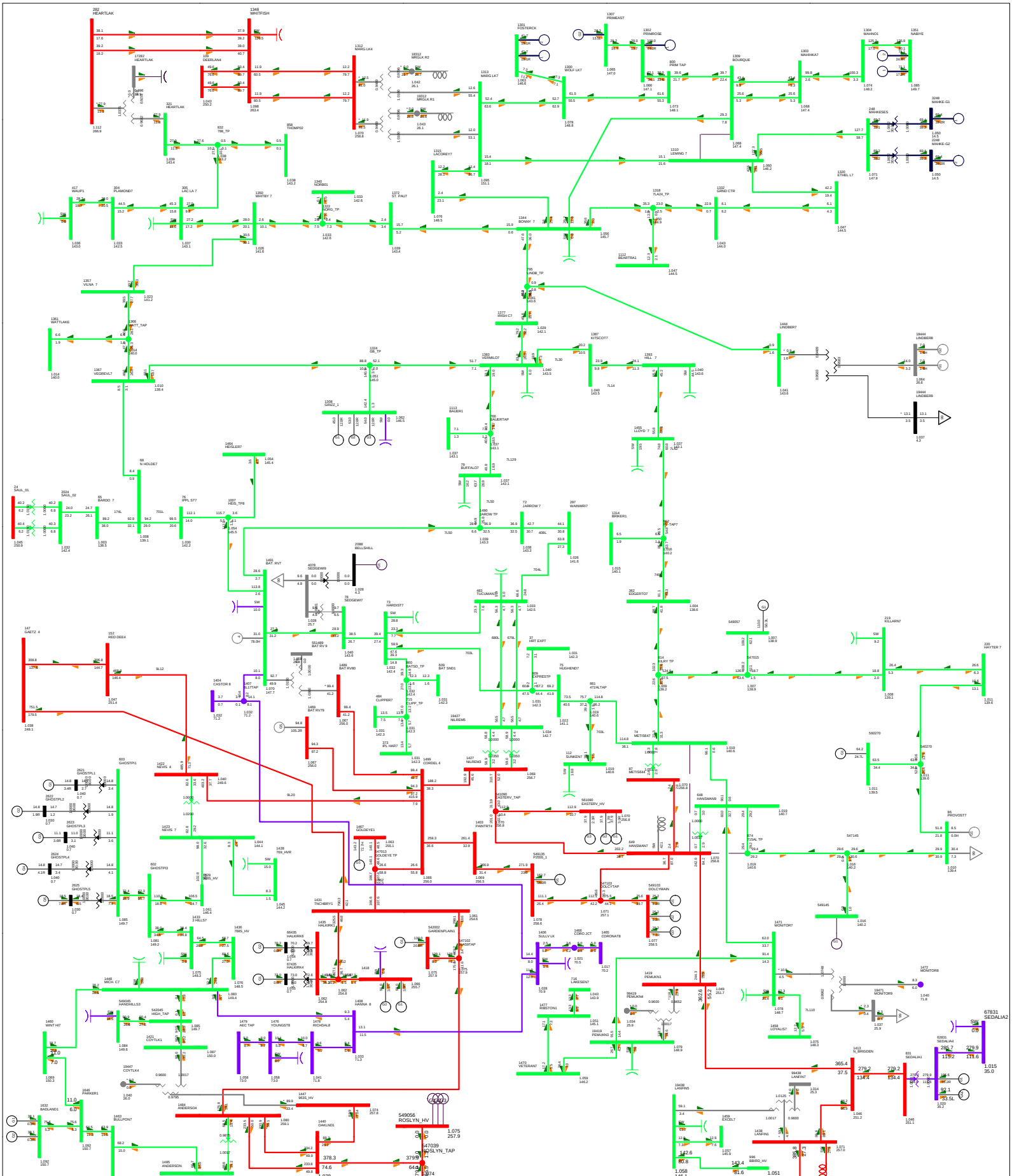
Study Case Description

2028WP PRE-PROJ

Base Case

P2034 Cold Lake Area Cogen

Bus - VOLTAGE (kV/PU)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%RATEB
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A2- 3

Contingency

CONT 036: 7L583 (970S Bourque - 715S Leming Lake)

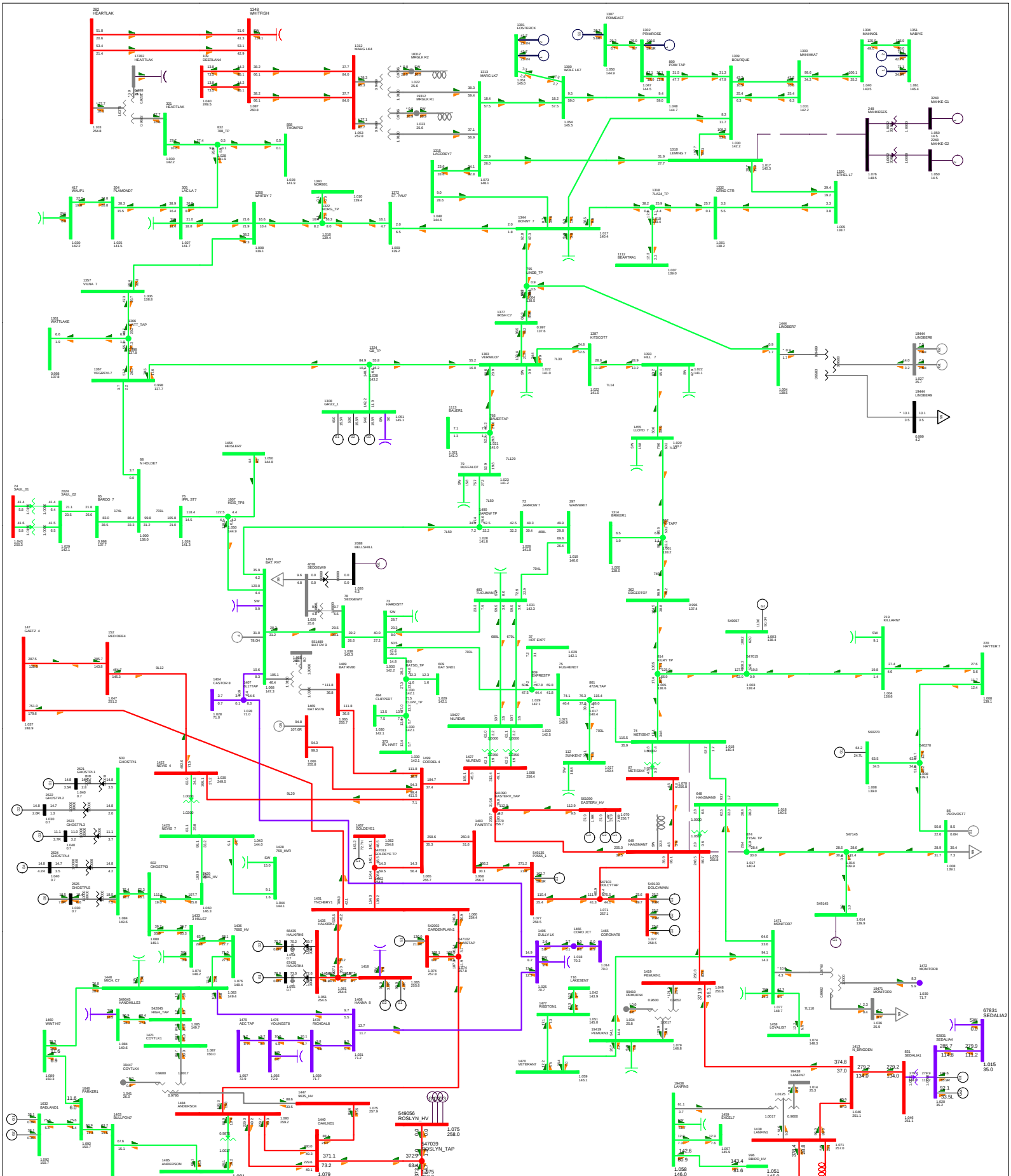
Study Case Description

2028WP PRE-PROJ

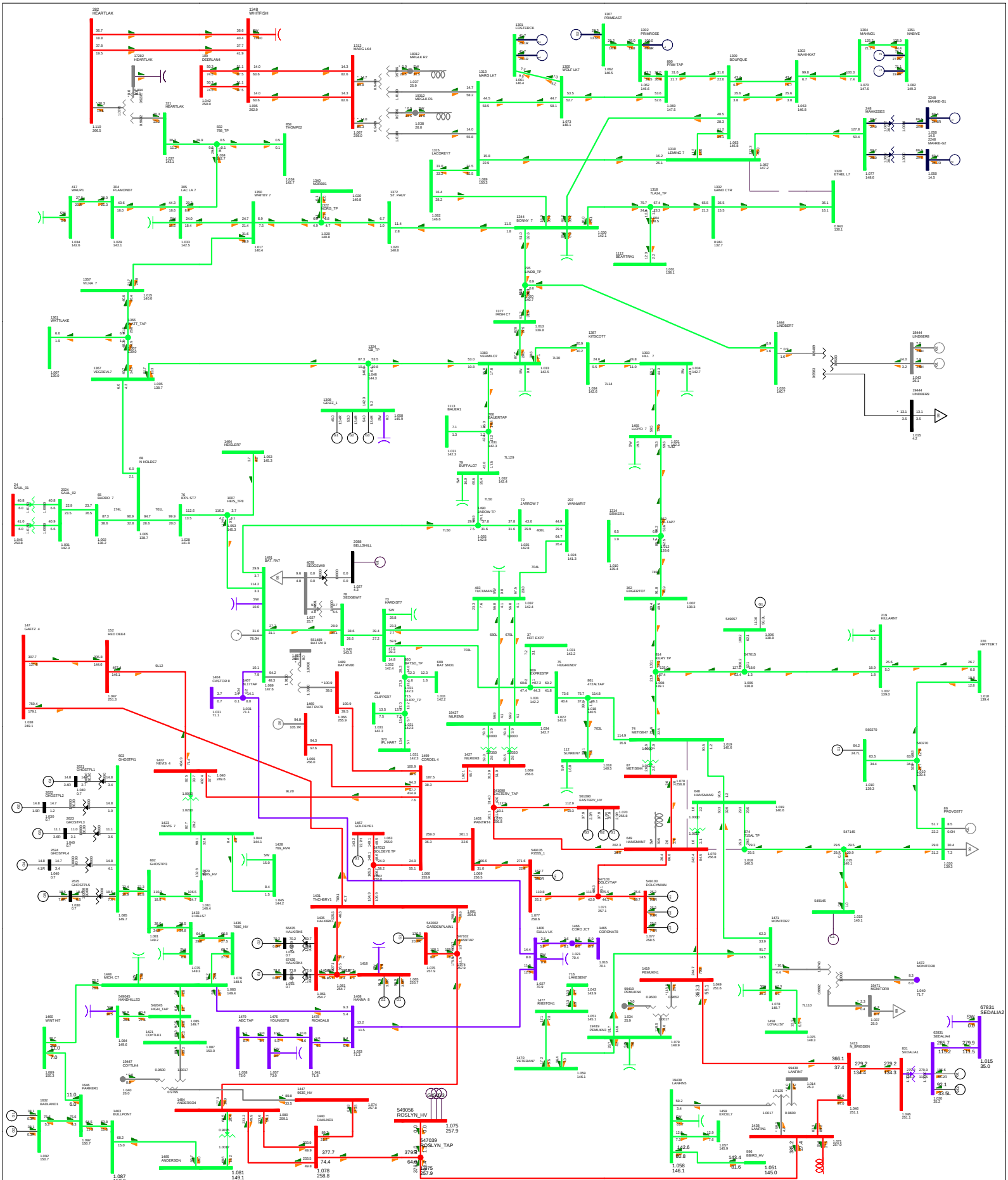
Base Case

P2034 Cold Lake Area Cogen

Bus - VOLTAGE (kV/PU)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%RATEB
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A2- 3	Contingency	Study Case Description	P2034 Cold Lake Area Cogen
	CONT 037: 7L95 (889S Mahkeses - 715S Leming Lake)	2028WP PRE-PROJ Base Case	Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEB kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A2- 3

Contingency

CONT 038: 7L66 (715S Leming Lake - 717S Ethel Lake)

Study Case Description

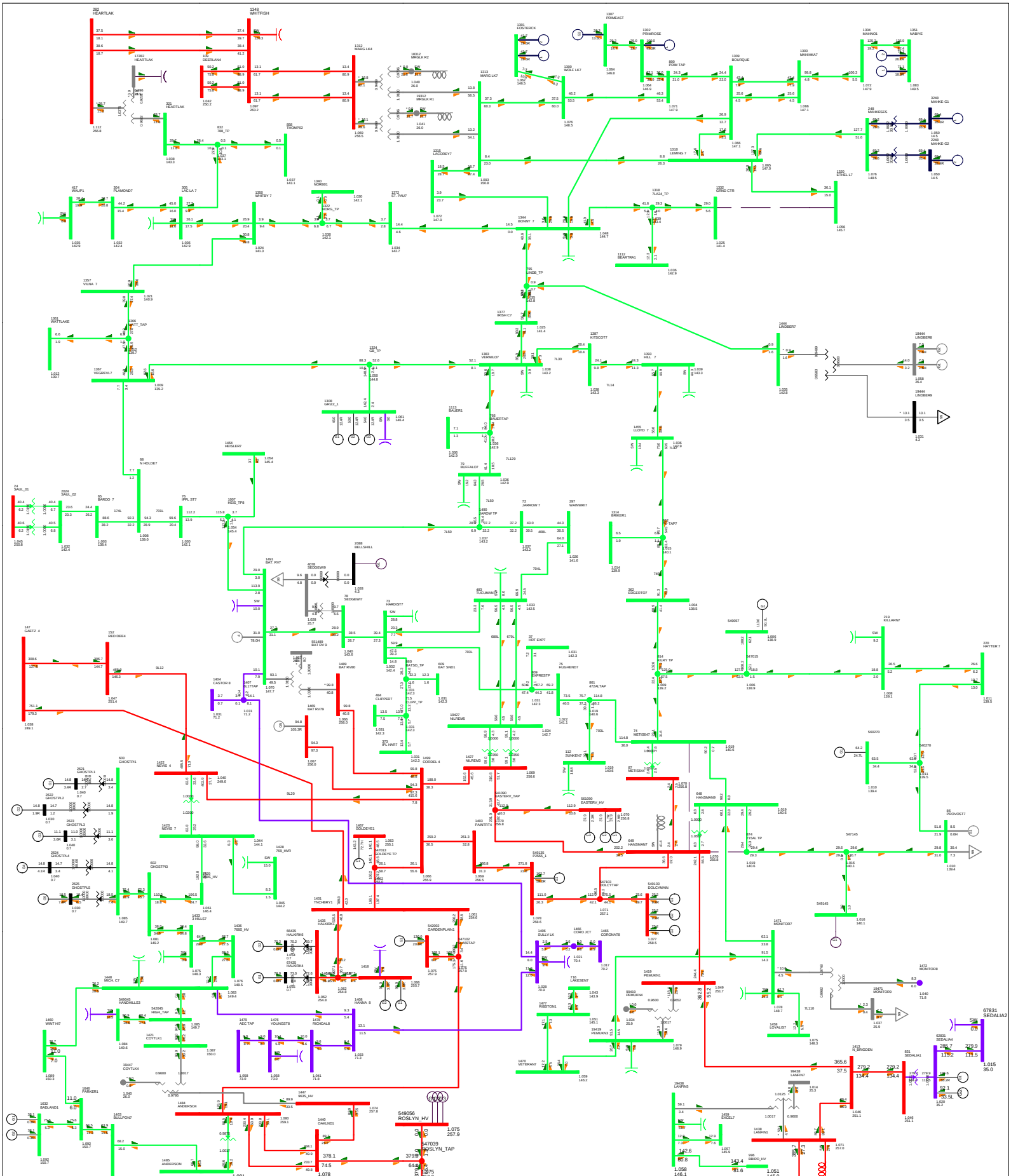
2028WP PRE-PROJ

Base Case

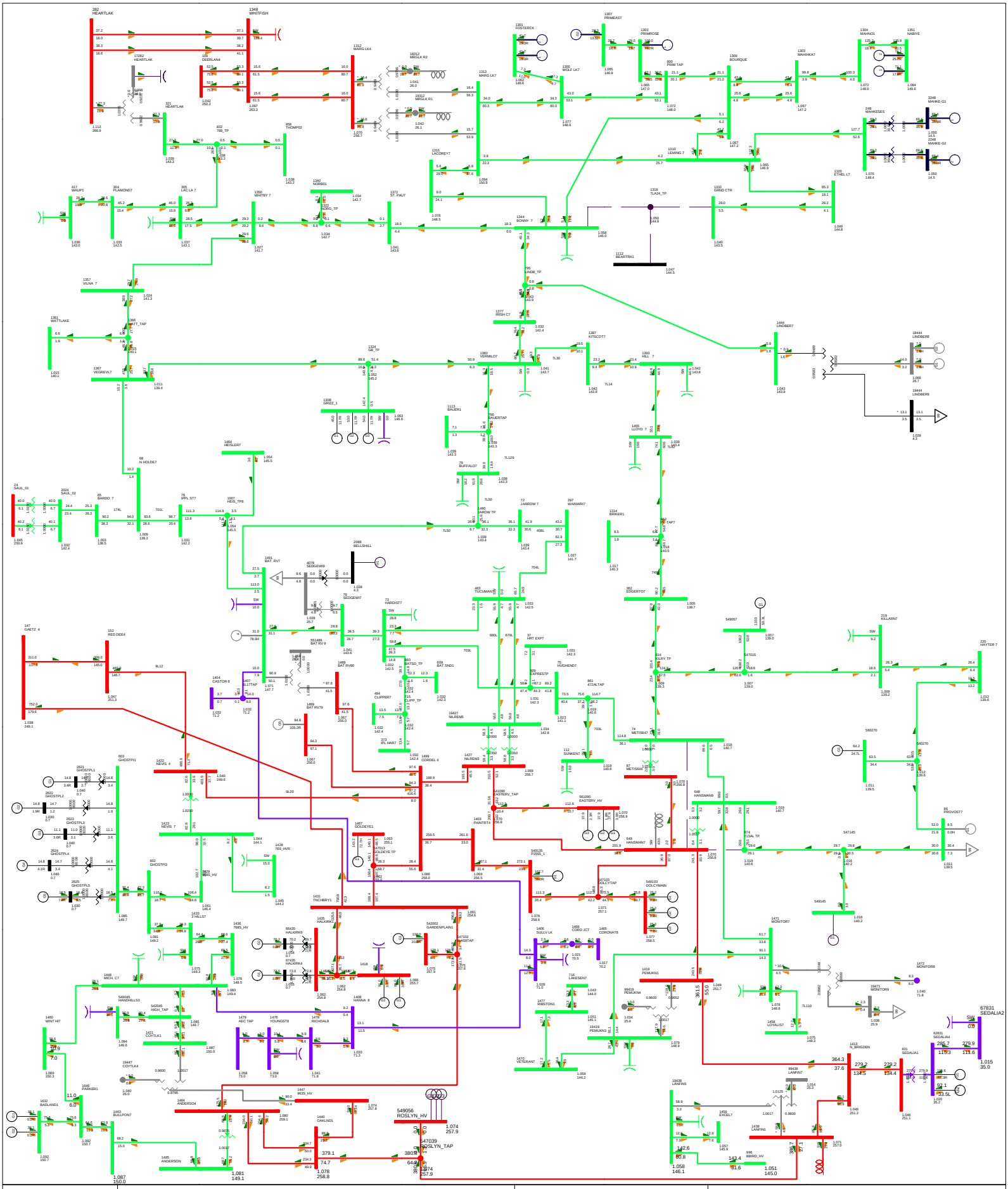
P2034 Cold Lake Area Cogen

Bus - VOLTAGE (kV/PU)
Branch - MW/Mvar
Equipment - MW/Mvar

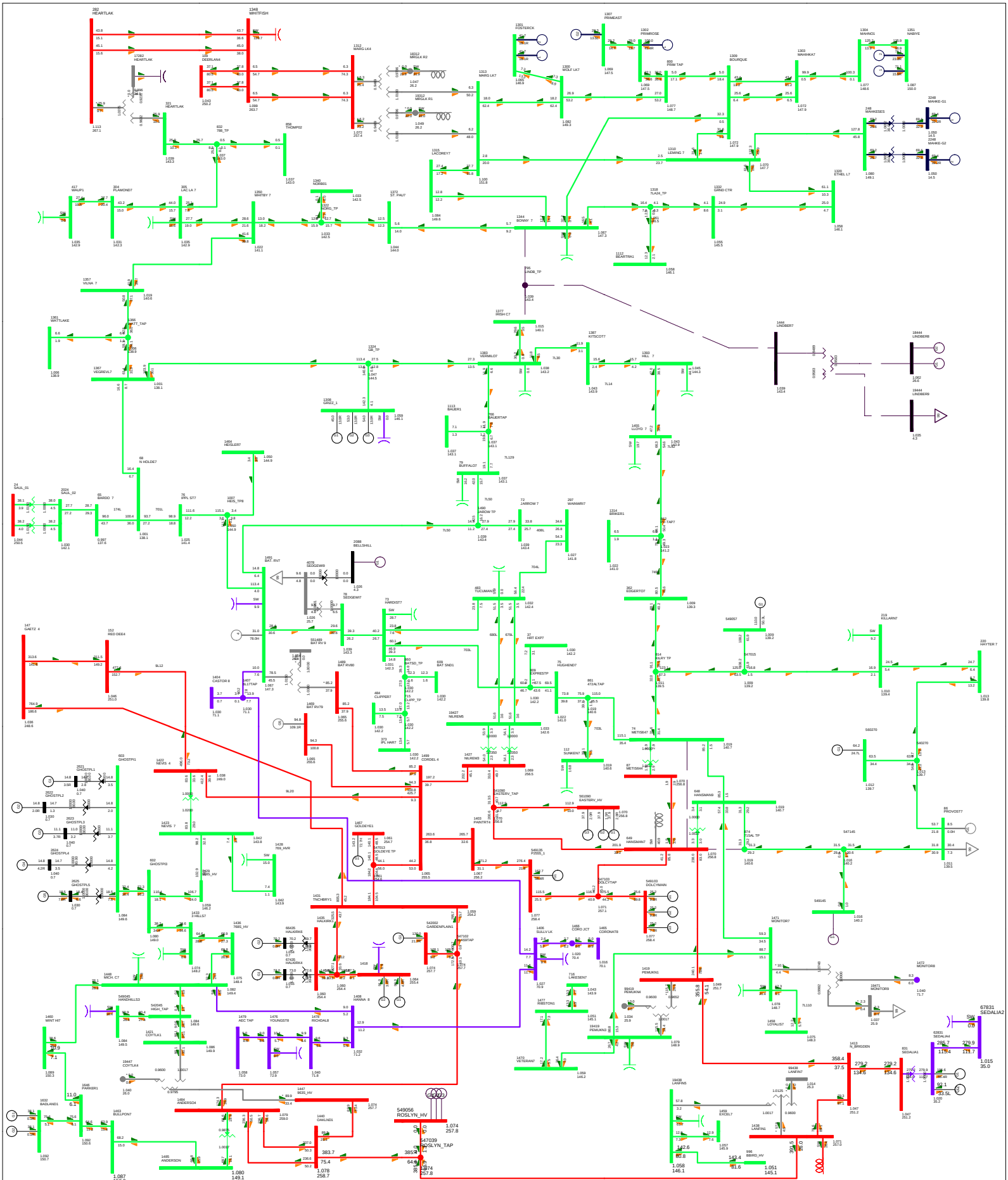
100.0%RATEB
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A2- 3	**Contingency** CONT 039: 7L28 (717S Ethel Lake - 846S Grand Centre)	**Study Case Description** 2028WP PRE-PROJ Base Case	**P2034 Cold Lake Area Cogen** Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEB kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A2- 3	Contingency	Study Case Description	P2034 Cold Lake Area Cogen
	CONT 040: 7L24 (846S Grand Centre - 700S Bonnyville - 940S Beartrap)	2028WP PRE-PROJ Base Case	Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEB kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A2- 3

Contingency

CONT 041: 7L53 (700S Bonnyville - 706S Irish Creek - 969S Lindbergh)

Study Case Description

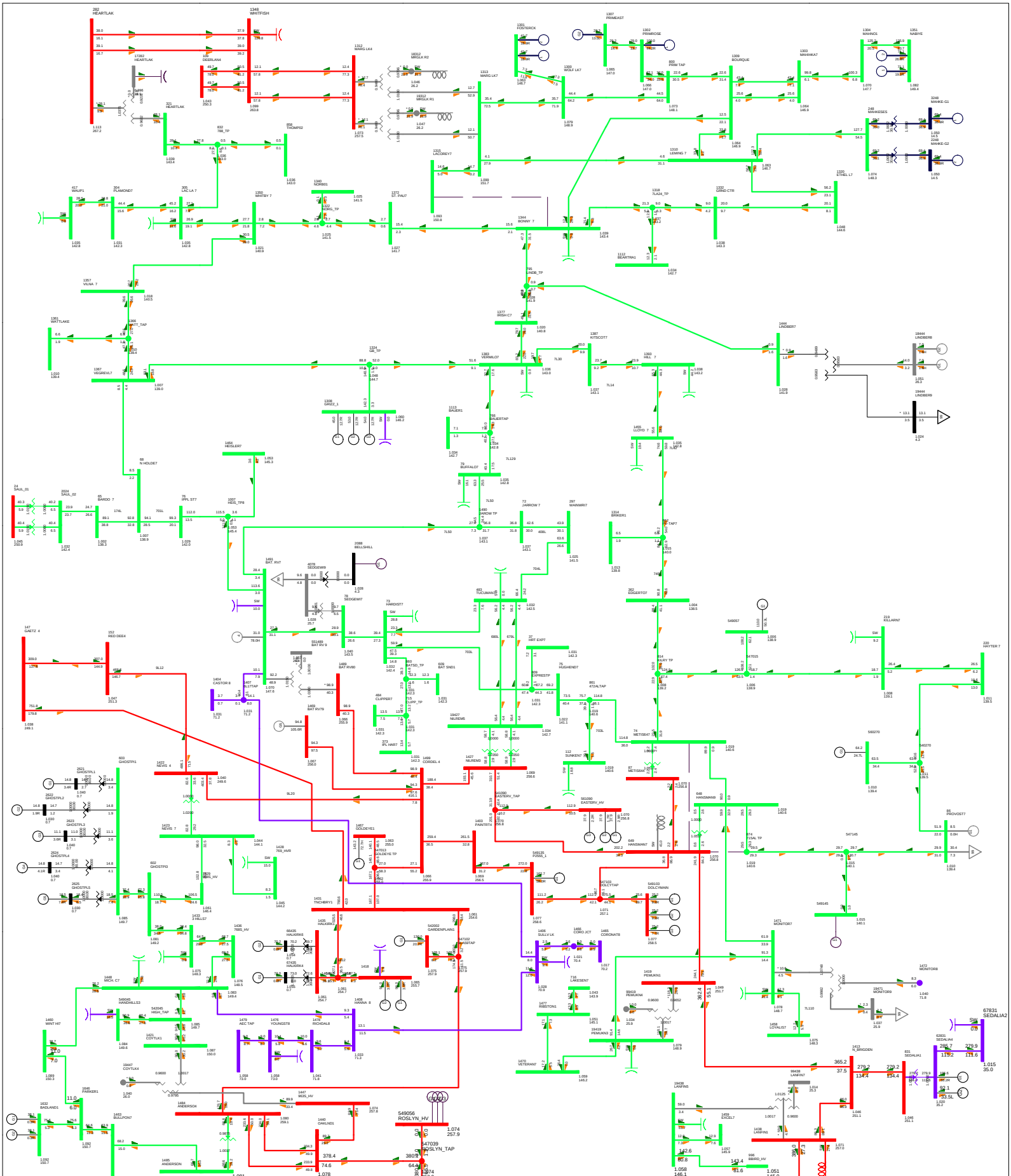
2028WP PRE-PROJ

Base Case

P2034 Cold Lake Area Cogen

Bus - VOLTAGE (kV/PU)
Branch - MW/Mvar
Equipment - MW/Mvar

100.0%RATEB
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A2- 3

Contingency

CONT 042: 7L89 (721S Lacorey - 700S Bonnyville)

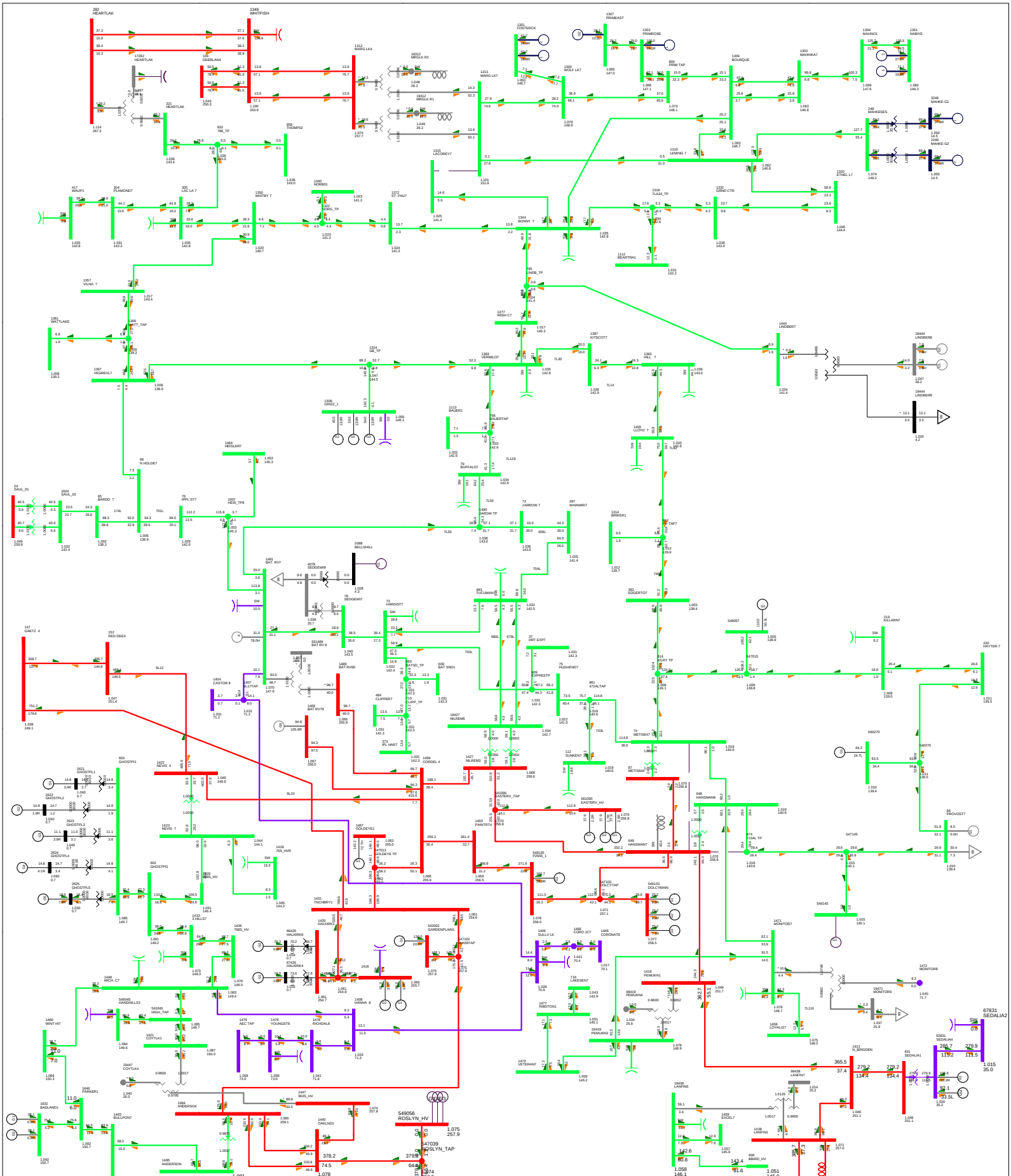
Study Case Description

2028WP PRE-PROJ

Base Case

P2034 Cold Lake Area Cogen

Bus - VOLTAGE (kV/PU)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%RATEB
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A2- 3

Contingency

CONT 043: 7L89 (826S Marguerite Lake - 721S Lacorey)

Study Case Description

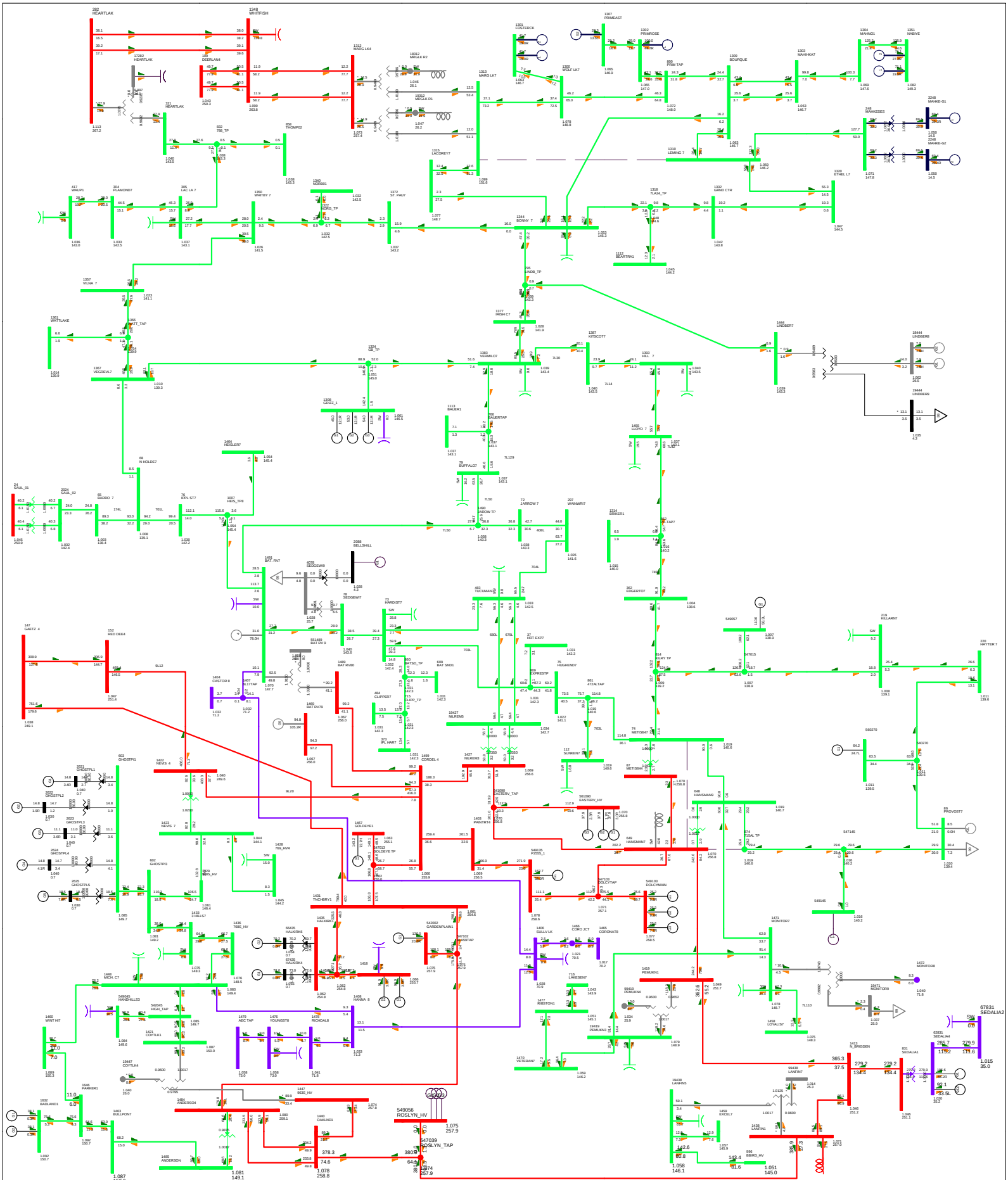
2028WP PRE-PROJ

Base Case

P2034 Cold Lake Area Cogen

Bus - VOLTAGE (kV/PU)
Branch - MW/Mvar
Equipment - MW/Mvar

100.0%RATEB
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A2- 3

Contingency

CONT 044: 7L91 (715S Leming Lake - 826S Marguerite Lake)

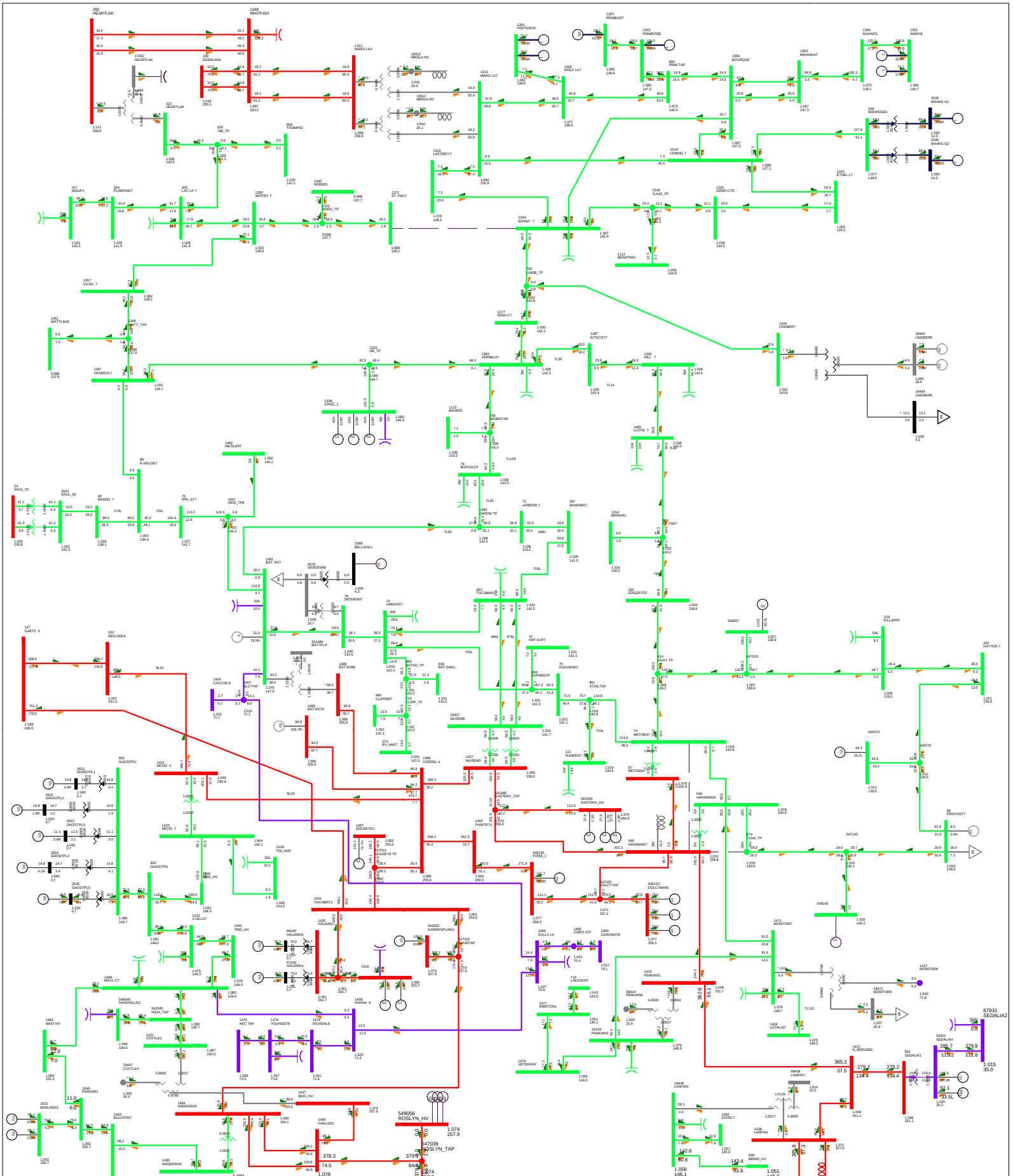
Study Case Description

2028WP PRE-PROJ

Base Case

P2034 Cold Lake Area Cogen

Bus - VOLTAGE (kV/PU)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%RATEB
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A2- 3

Contingency

CONT 045: 7L70 (700S Bonnyville - 707S St.Paul)

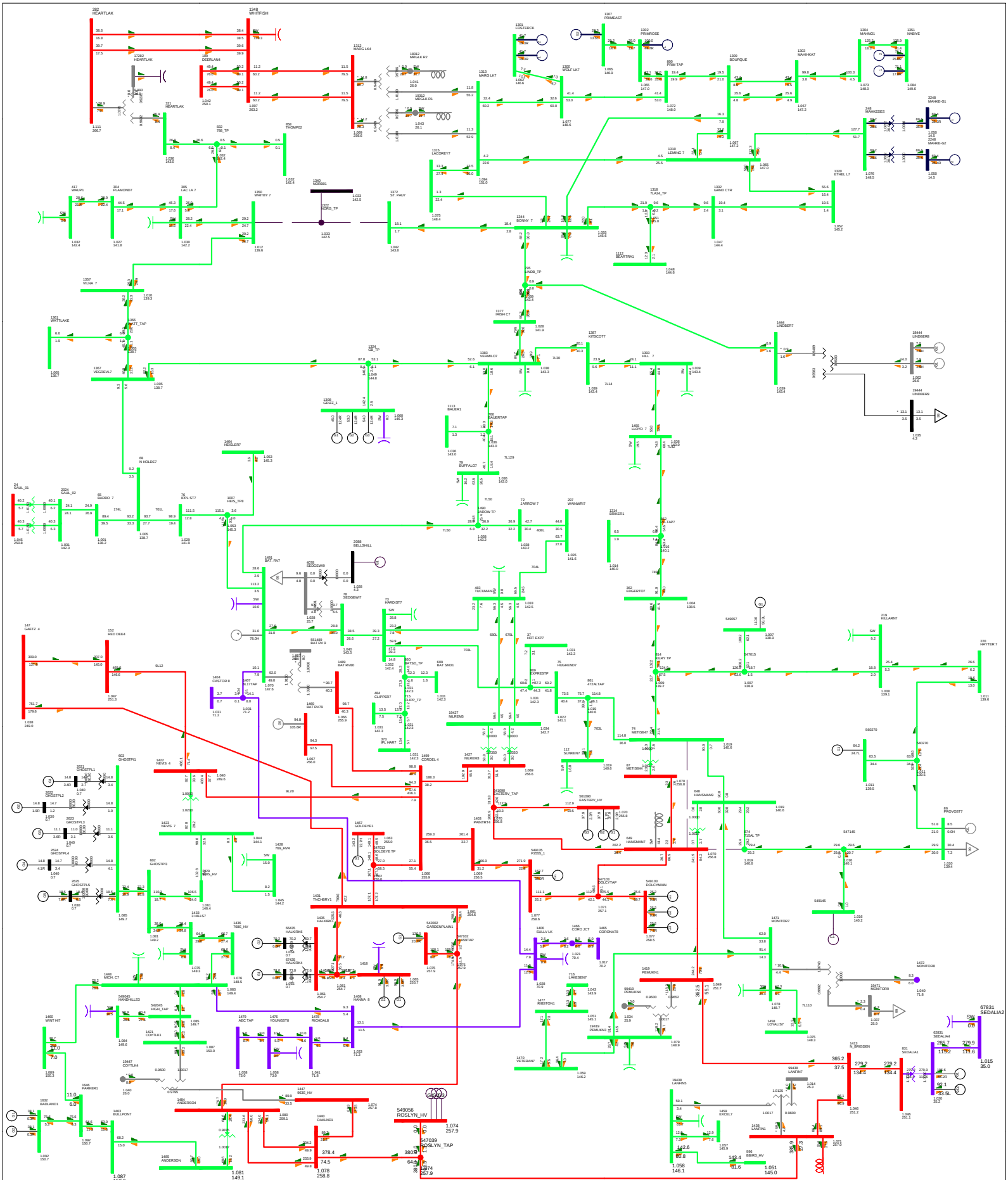
Study Case Description

2028WP PRE-PROJ

Base Case

P2034 Cold Lake Area Cogen

Bus - VOLTAGE (kV/PU)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%RATEB
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A2- 3

Contingency

CONT 046: 7L139 (819S Whitbylake - 707S St.Paul - 936S Norberg)

Study Case Description

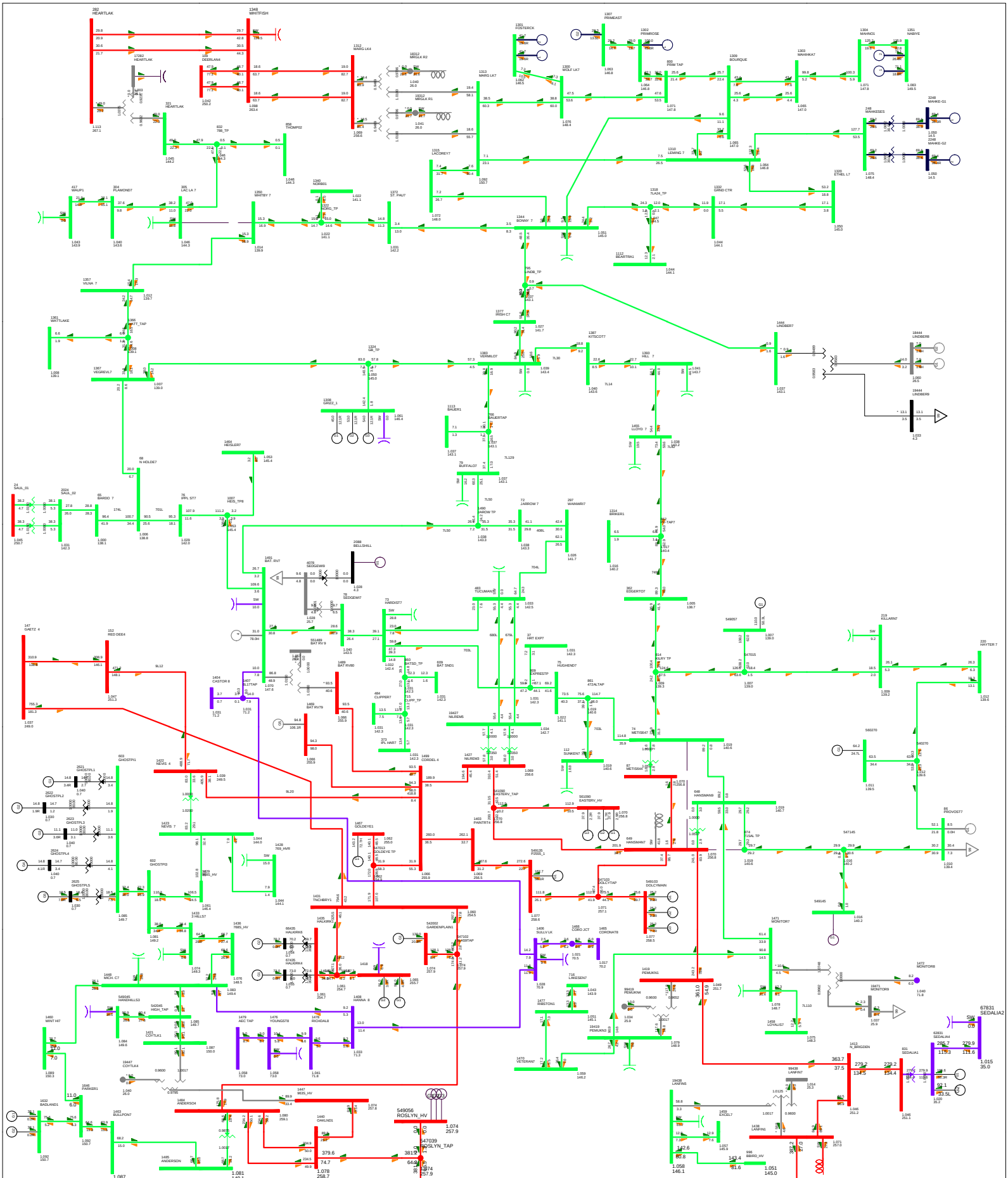
2028WP PRE-PROJ

Base Case

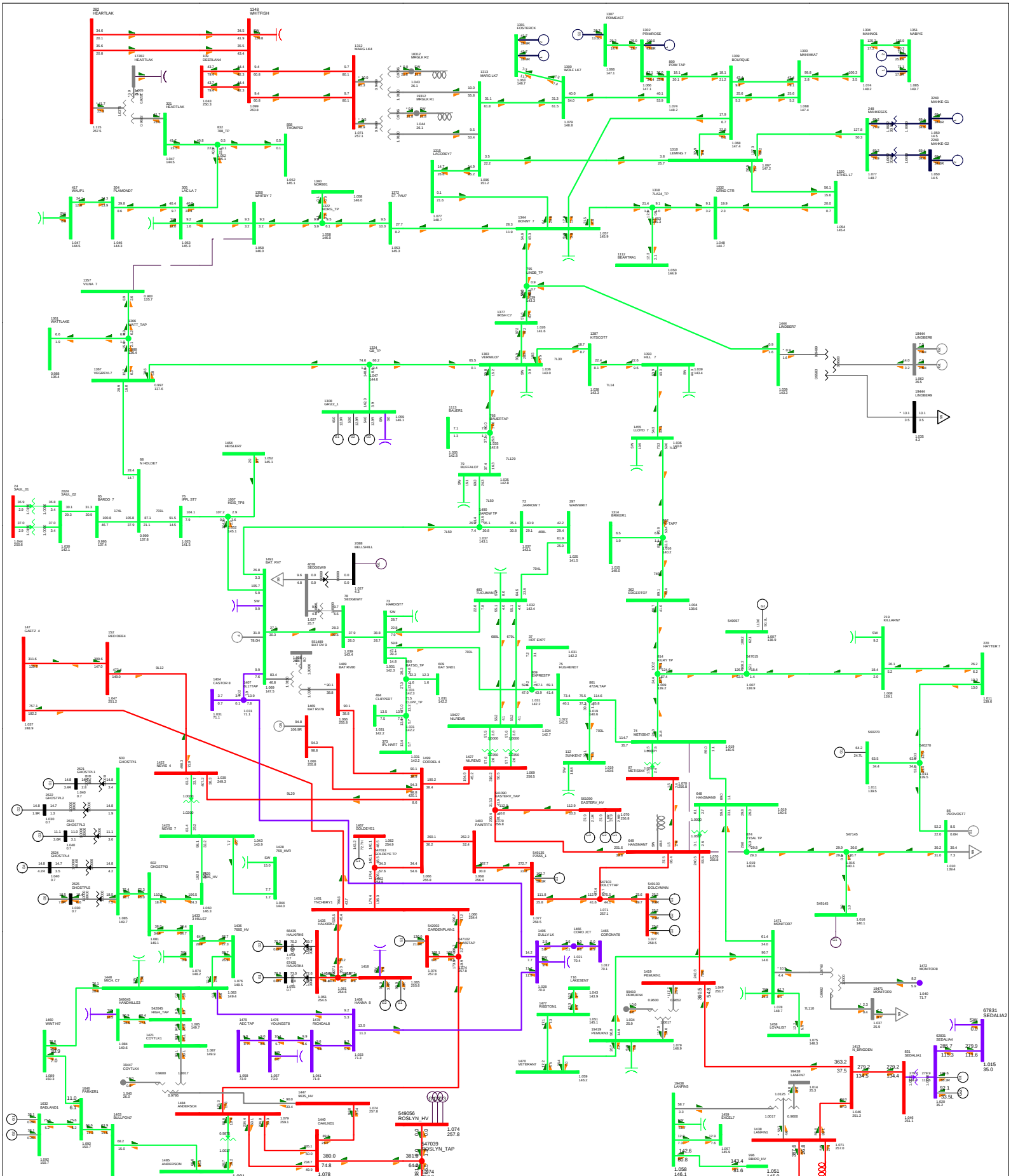
P2034 Cold Lake Area Cogen

Bus - VOLTAGE (kV/PU)
Branch - MW/Mvar
Equipment - MW/Mvar

100.0%RATEB
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A2- 3	Contingency	Study Case Description	P2034 Cold Lake Area Cogen
	CONT 047: 794L & 7L94 (157S Lac La Biche - 819S Whitbylake)	2028WP PRE-PROJ Base Case	Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEB kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A2- 3

Contingency

CONT 048: 7L92 (819S Whitbylake - 777S Vilna)

Study Case Description

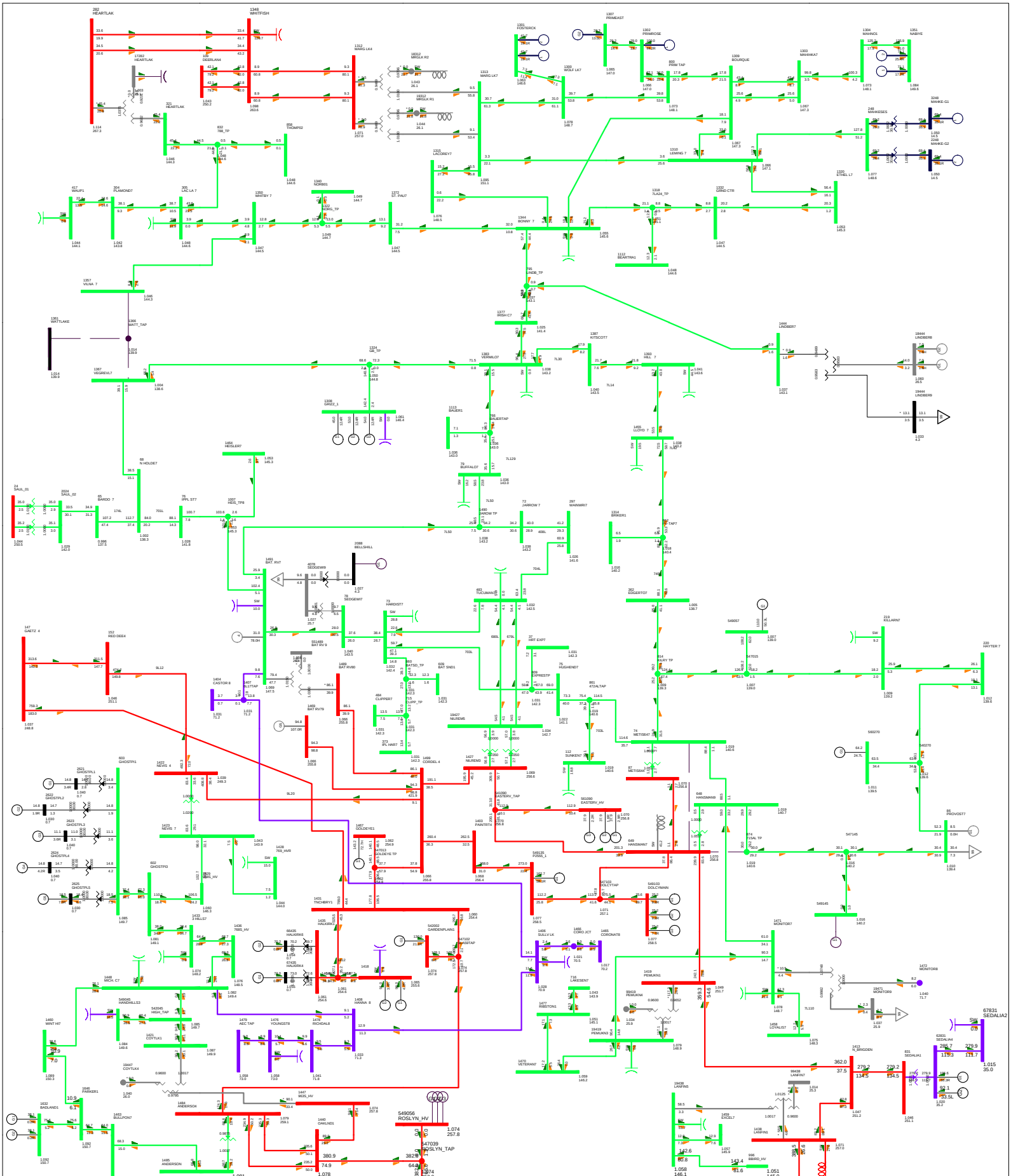
2028WP PRE-PROJ

Base Case

P2034 Cold Lake Area Cogen

Bus - VOLTAGE (kV/PU)
Branch - MW/Mvar
Equipment - MW/Mvar

100.0%RATEB
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A2- 3

Contingency

CONT 049: 7L92 (777S Vilna - 709S Vegreville - 956S Watt Lake)

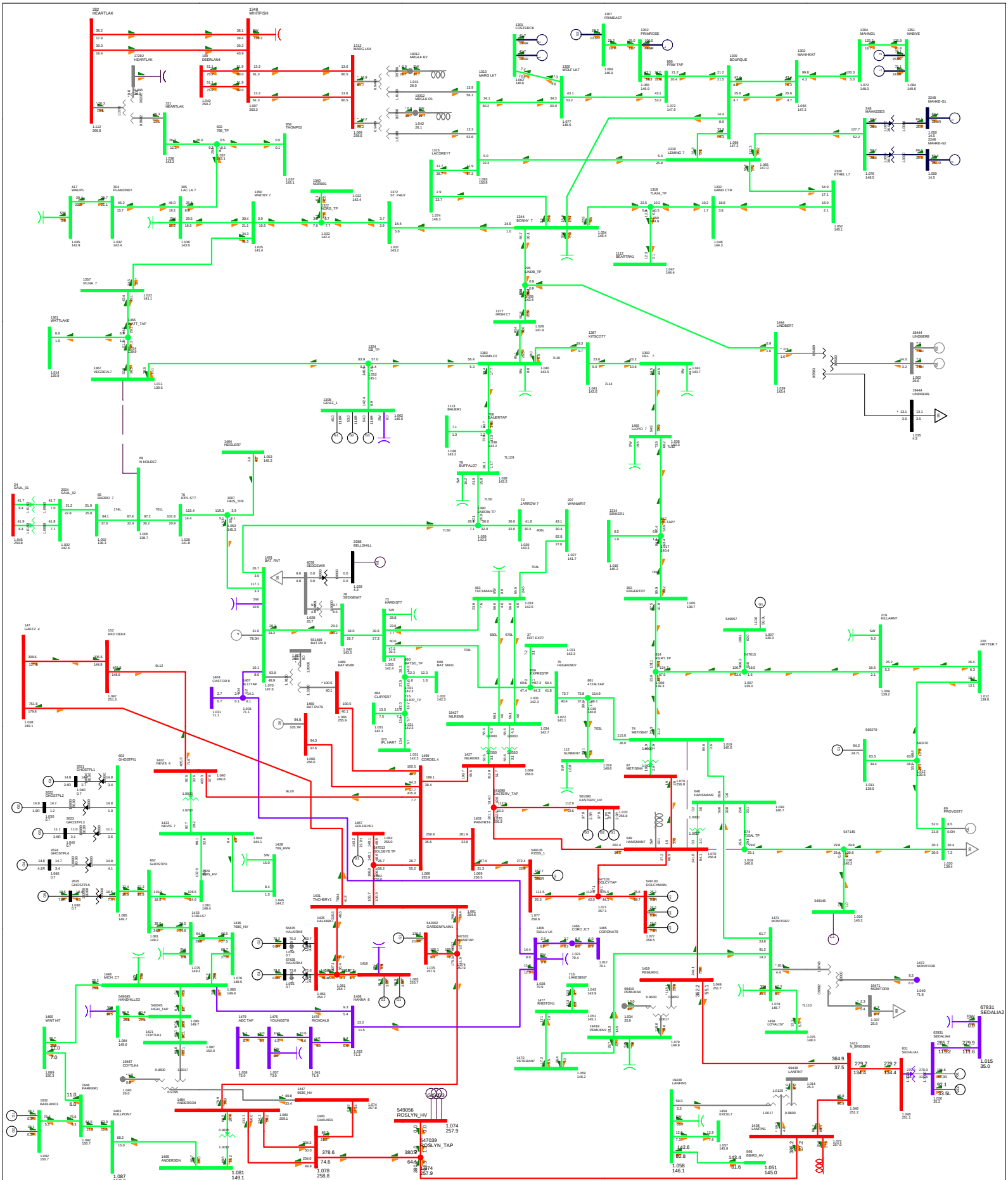
Study Case Description

2028WP PRE-PROJ

Base Case

P2034 Cold Lake Area Cogen

Bus - VOLTAGE (kV/PU)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%RATEB
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A2- 3

Contingency

CONT 050: 7L77 (395S North Holden - 709S Vegreville)

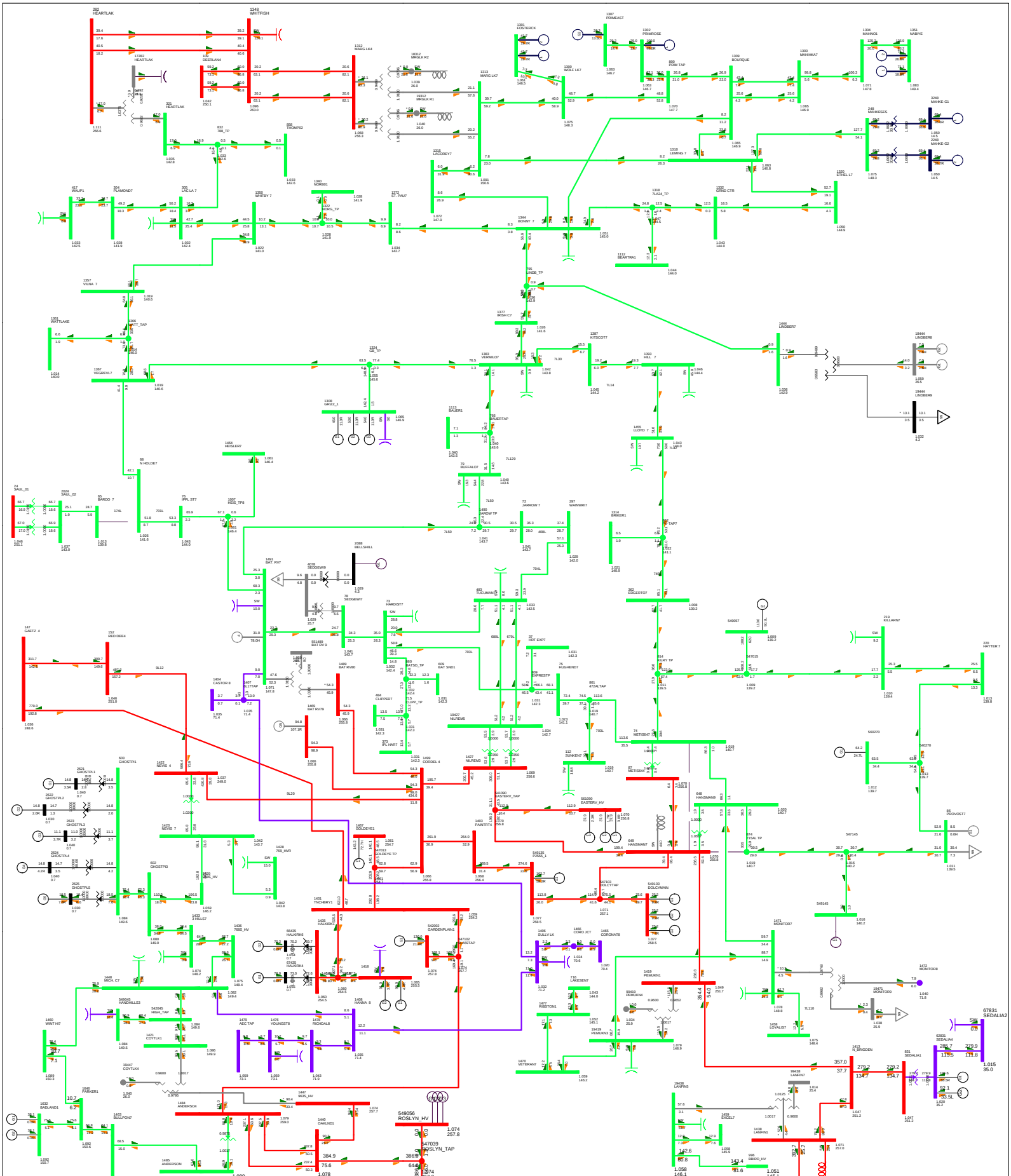
Study Case Description

2028WP PRE-PROJ

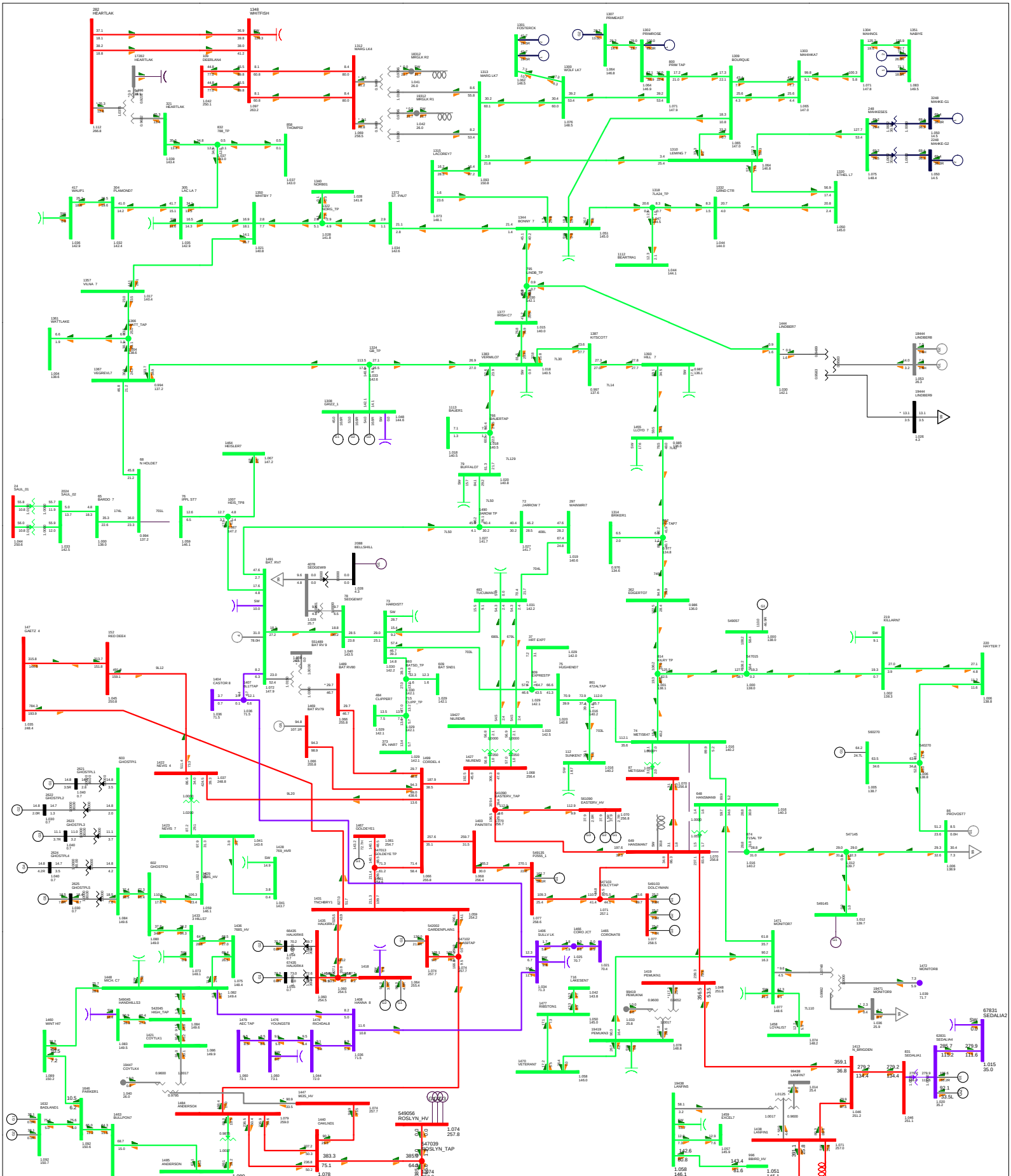
Base Case

P2034 Cold Lake Area Cogen

Bus - VOLTAGE (kV/PU)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%RATEB
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A2- 3	Contingency	Study Case Description	P2034 Cold Lake Area Cogen
	CONT 051: 174L (197S Bardo - 395S North Holden)	2028WP PRE-PROJ Base Case	Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEB kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A2- 3

Contingency

CONT 052: 701L (395S North Holden - 223S Strome)

Study Case Description

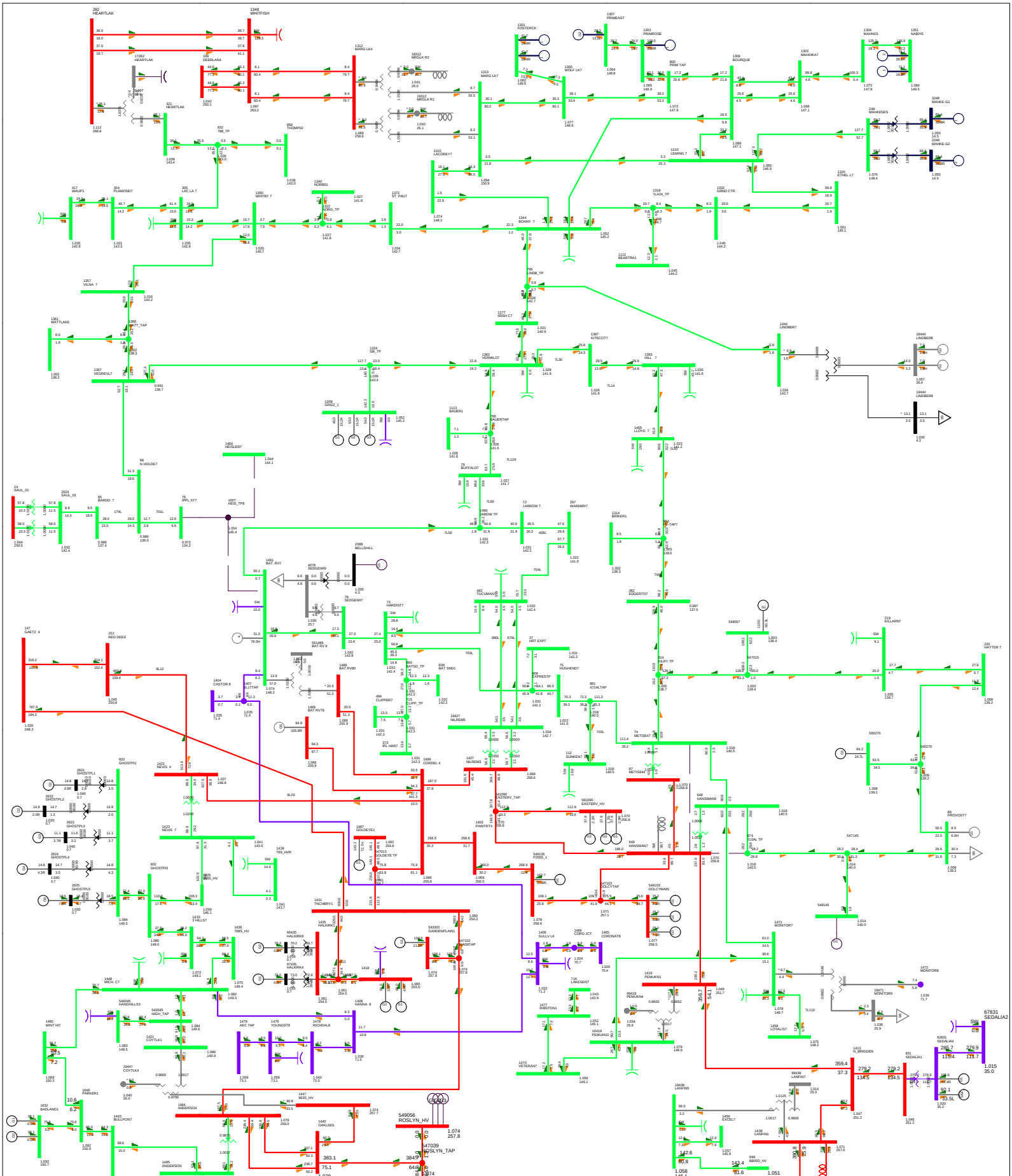
2028WP PRE-PROJ

Base Case

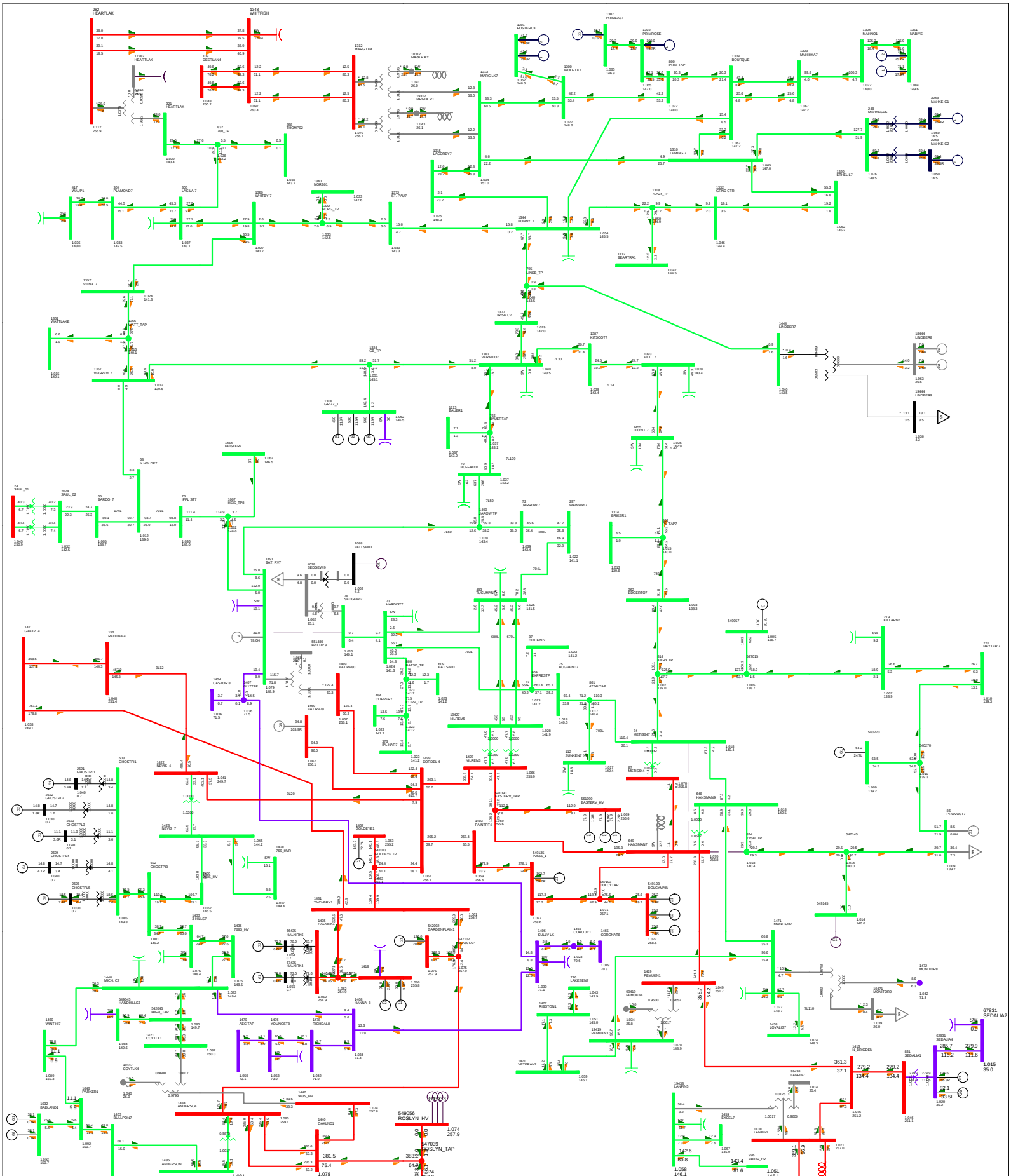
P2034 Cold Lake Area Cogen

Bus - VOLTAGE (kV/PU)
Branch - MW/Mvar
Equipment - MW/Mvar

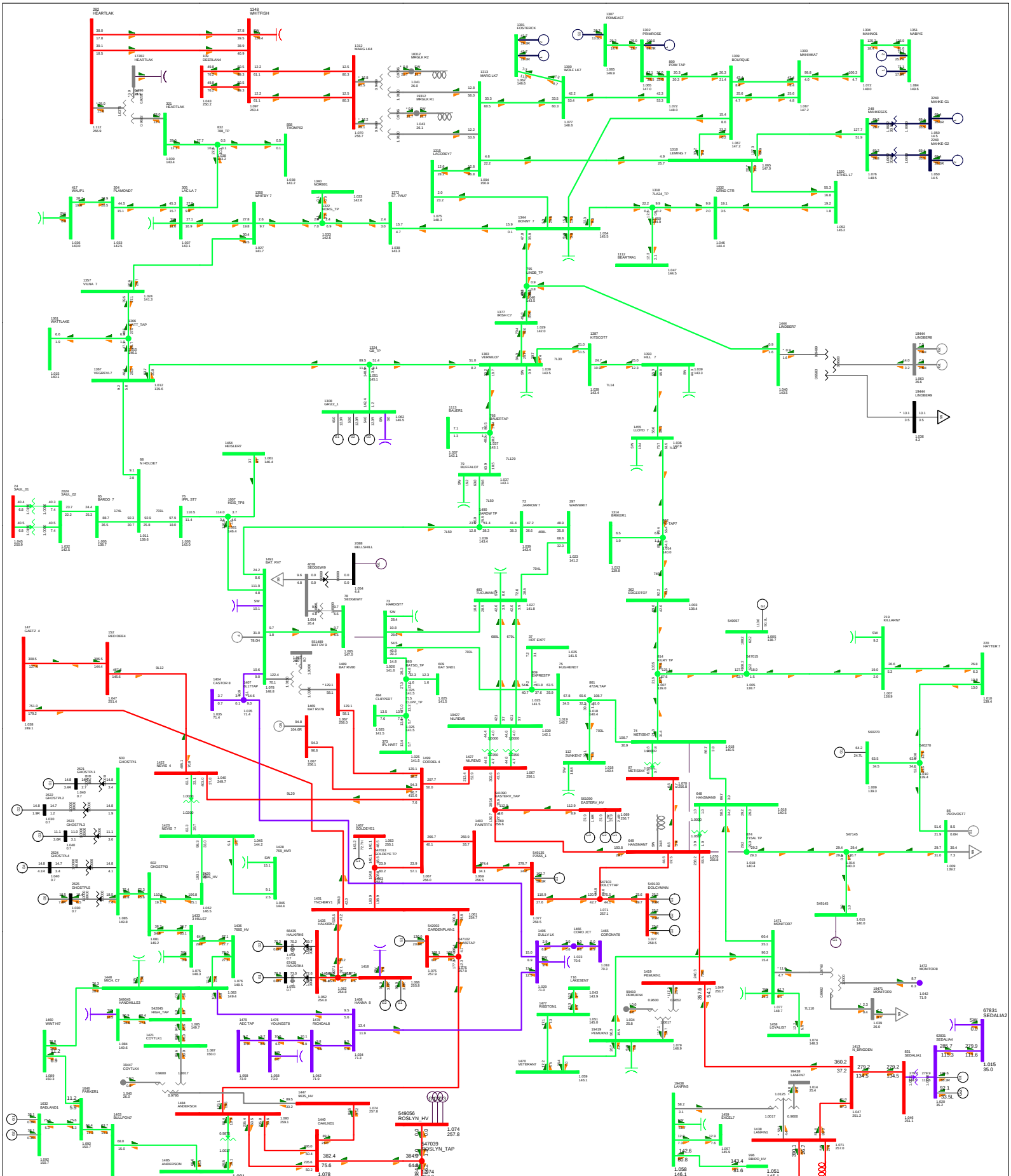
100.0%RATEB
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



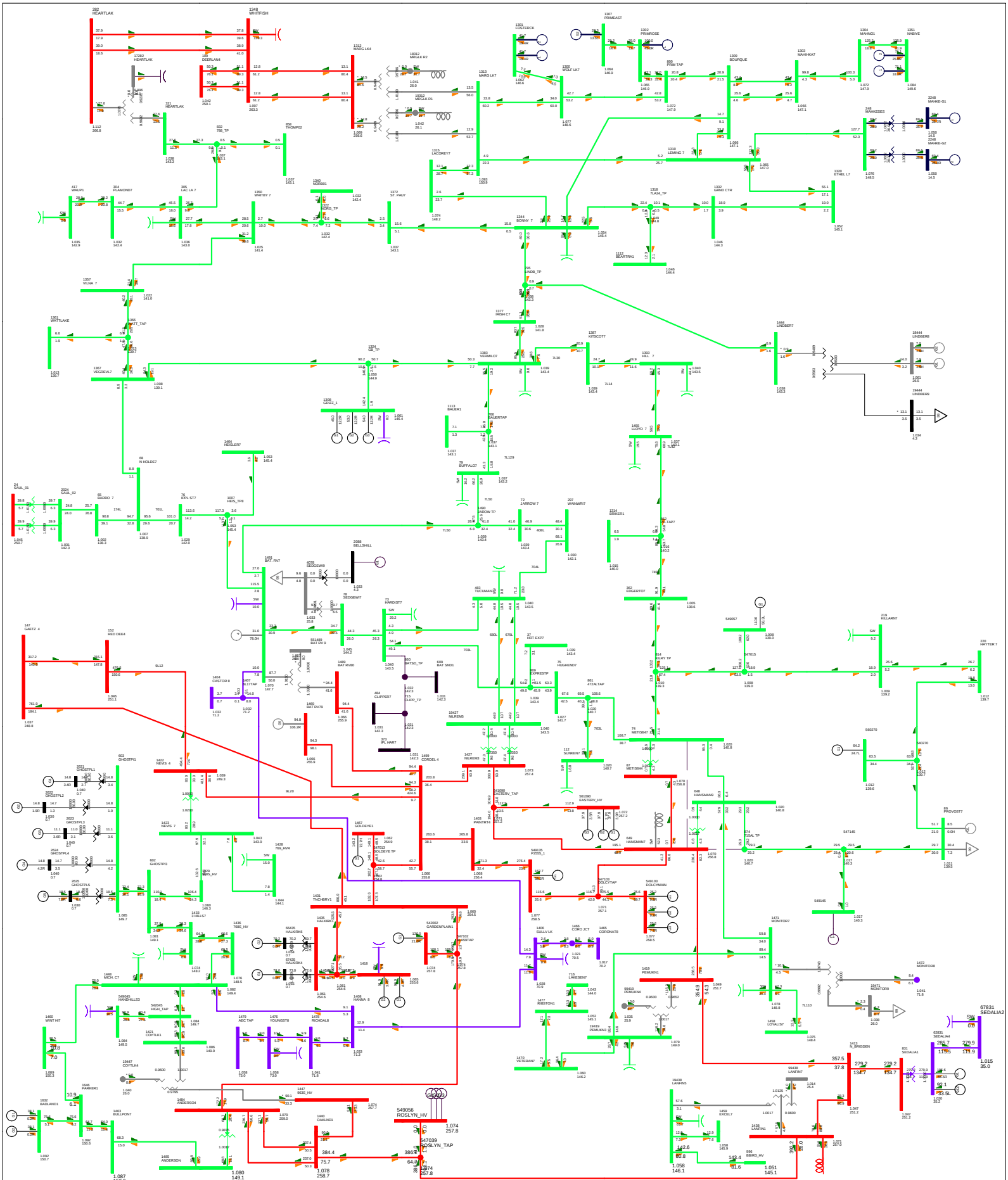
Attachment A2- 3	Contingency	Study Case Description	P2034 Cold Lake Area Cogen
	CONT 053: 701L (223S Strome - 757S Battle River - 764S Heisler)	2028WP PRE-PROJ Base Case	Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEB kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A2- 3	Contingency	Study Case Description	P2034 Cold Lake Area Cogen
	CONT 054: 7L702 (137S Sedgewick - 757S Battle River)	2028WP PRE-PROJ Base Case	Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEB kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A2- 3	Contingency	Study Case Description	P2034 Cold Lake Area Cogen
	CONT 055: 702L (377S Hardisty - 137S Sedgewick)	2028WP PRE-PROJ Base Case	Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEB kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A2- 3

Contingency

CONT 056: 769L (377S Hardisty - 594S Battle Sands - 296S Rosyth - 656S Clipper)

Study Case Description

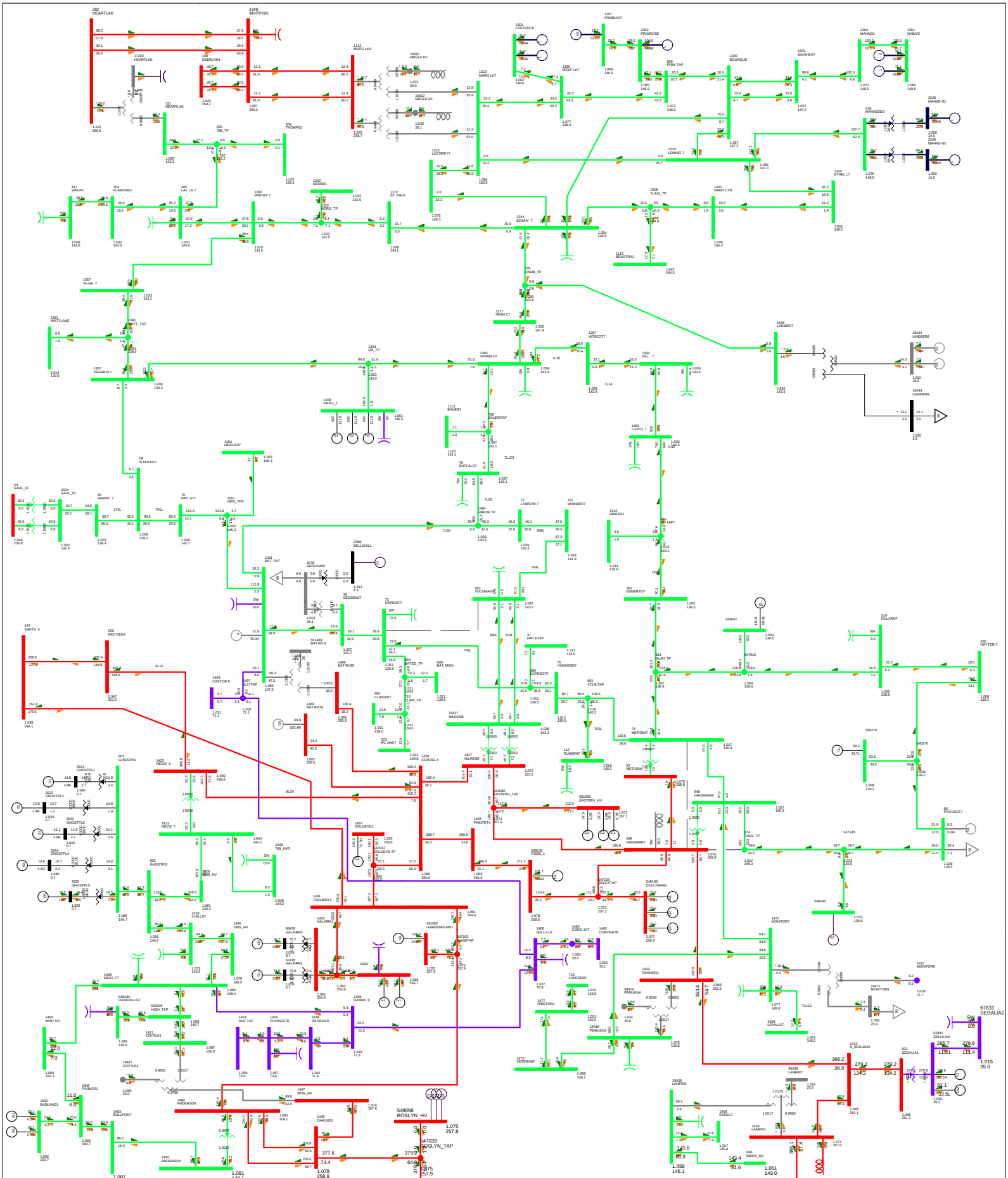
2028WP PRE-PROJ

Base Case

P2034 Cold Lake Area Cogen

Bus - VOLTAGE (kV/PU)
Branch - MW/Mvar
Equipment - MW/Mvar

100.0%RATEB
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A2- 3

Contingency

CONT 057: 681L (377S Hardisty - 478S Tucuman)

Study Case Description

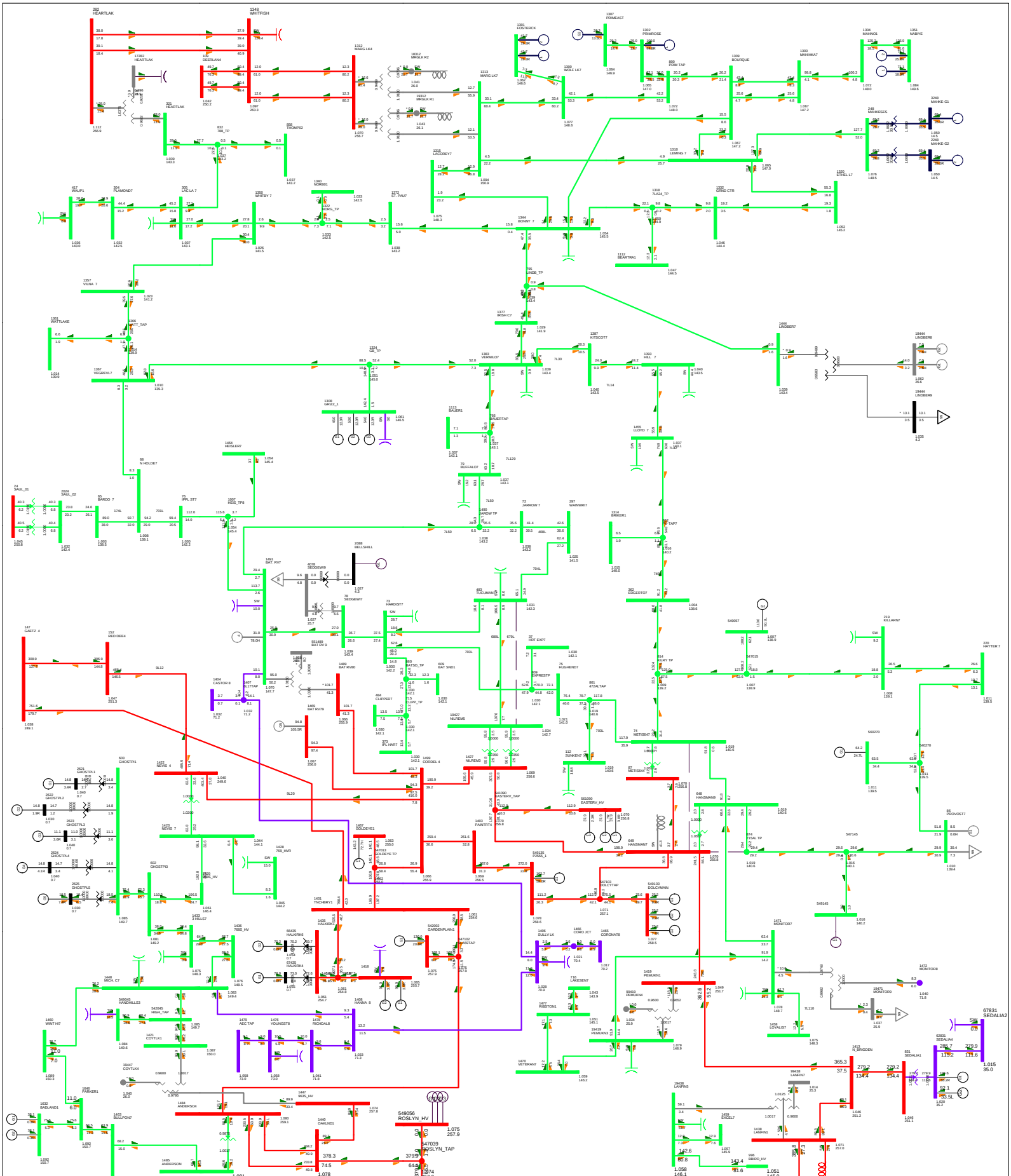
2028WP PRE-PROJ

Base Case

P2034 Cold Lake Area Cogen

Bus - VOLTAGE (kV/PU)
Branch - MW/Mvar
Equipment - MW/Mvar

100.0%RATEB
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A2- 3

Contingency

CONT 058: 679L (478S Tucuman - 574S Nilrem)

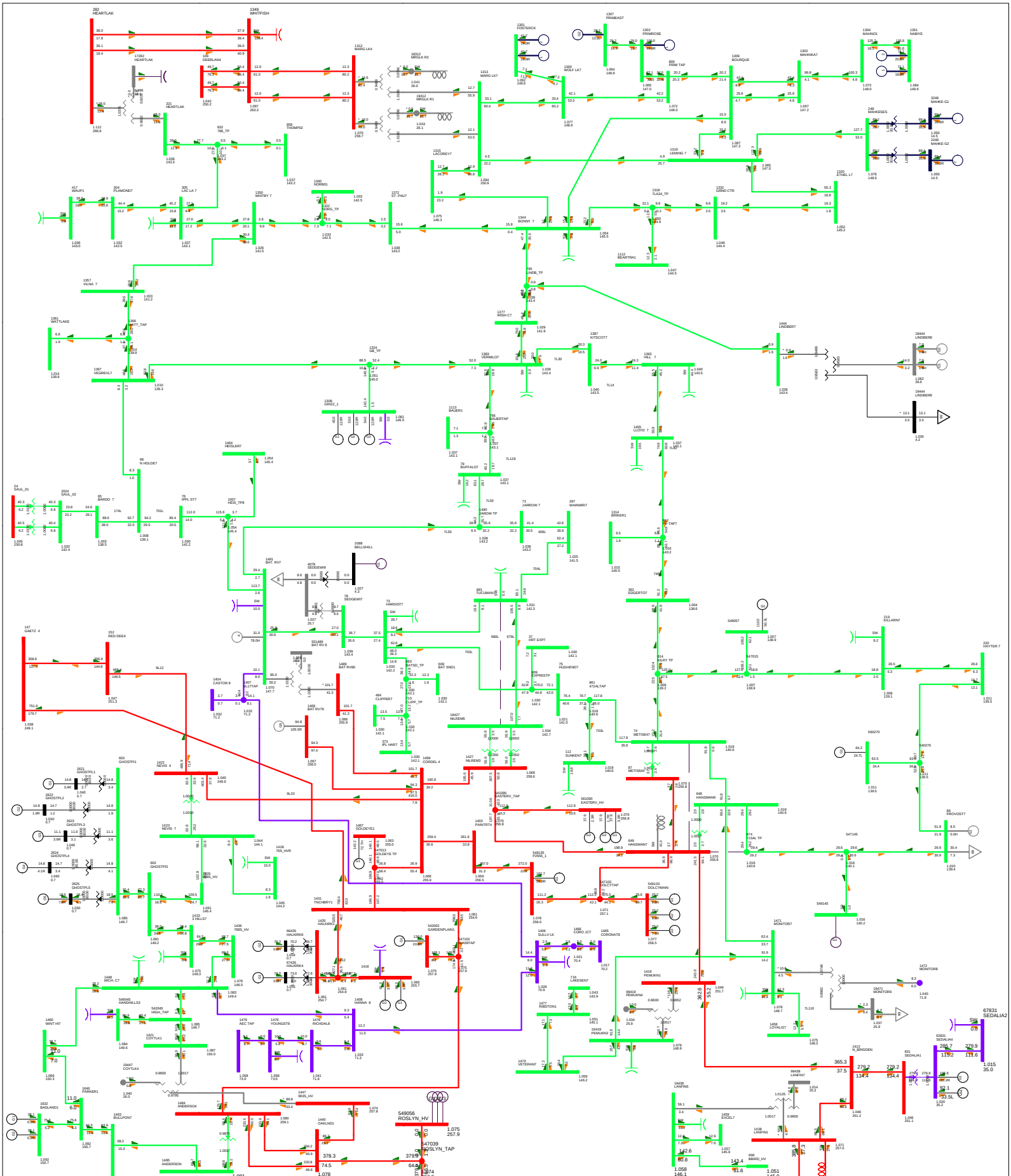
Study Case Description

2028WP PRE-PROJ

Base Case

P2034 Cold Lake Area Cogen

Bus - VOLTAGE (kV/PU)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%RATEB
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A2- 3

Contingency

CONT 059: 680L (478S Tucuman - 574S Nilrem)

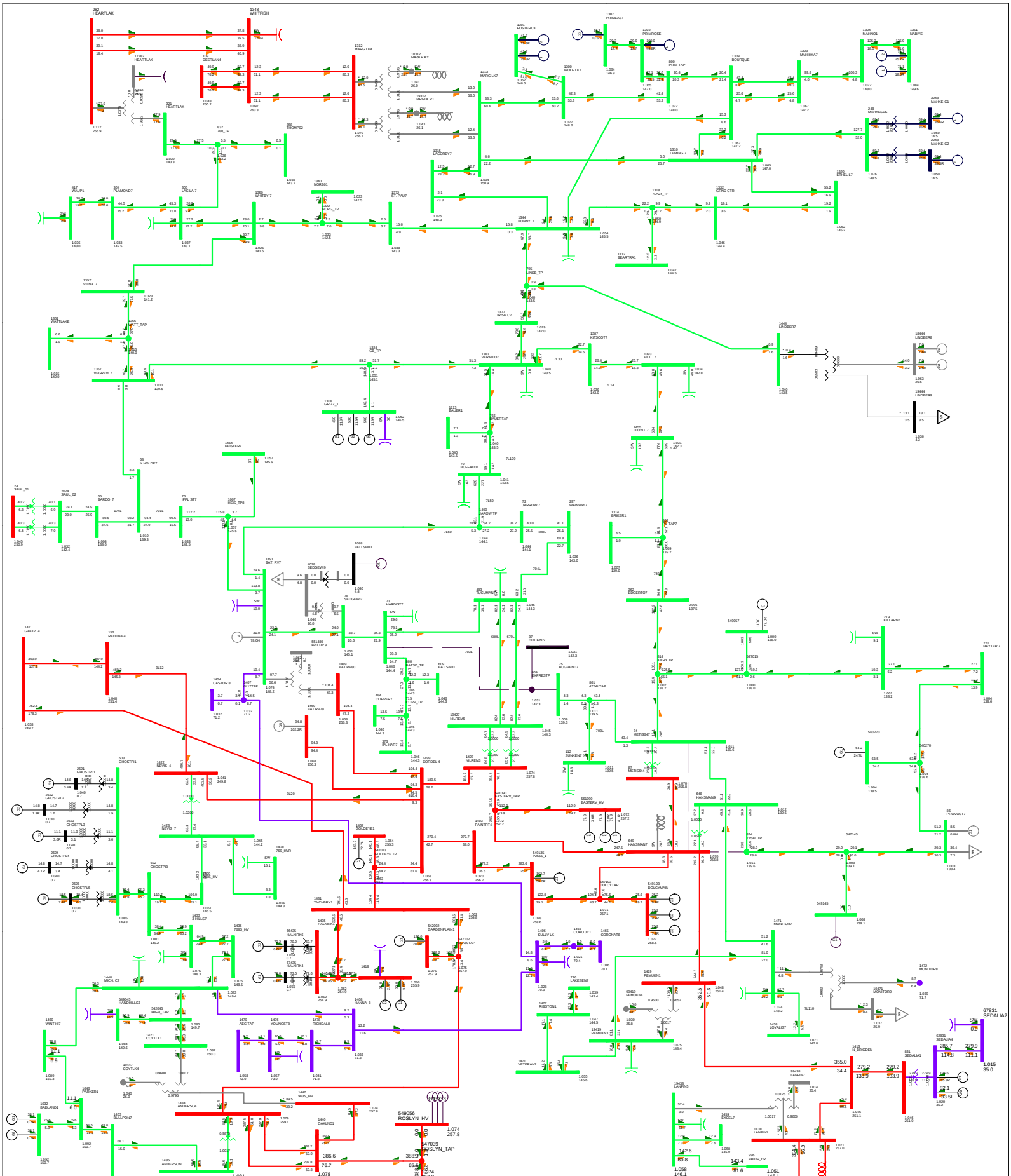
Study Case Description

2028WP PRE-PROJ

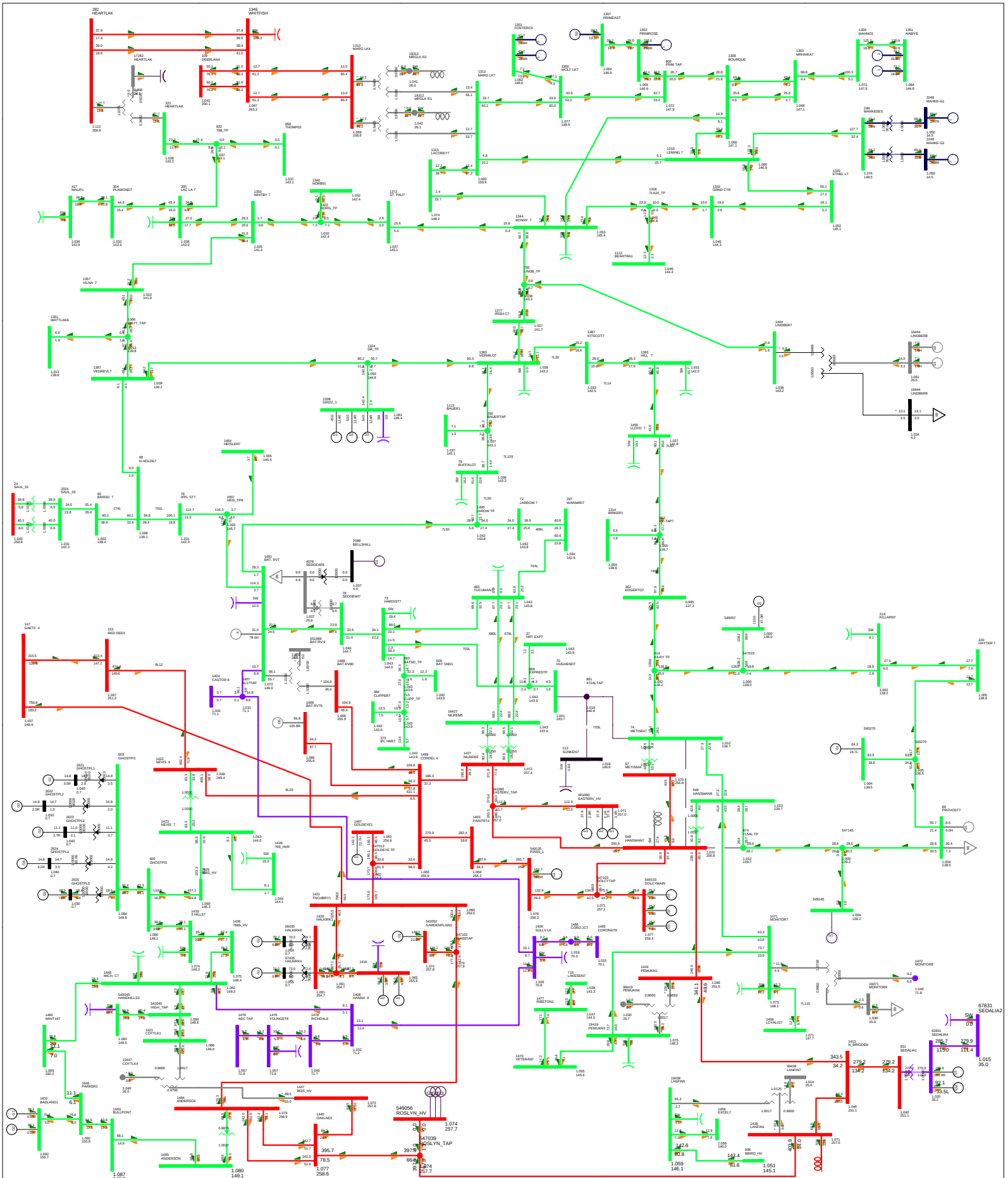
Base Case

P2034 Cold Lake Area Cogen

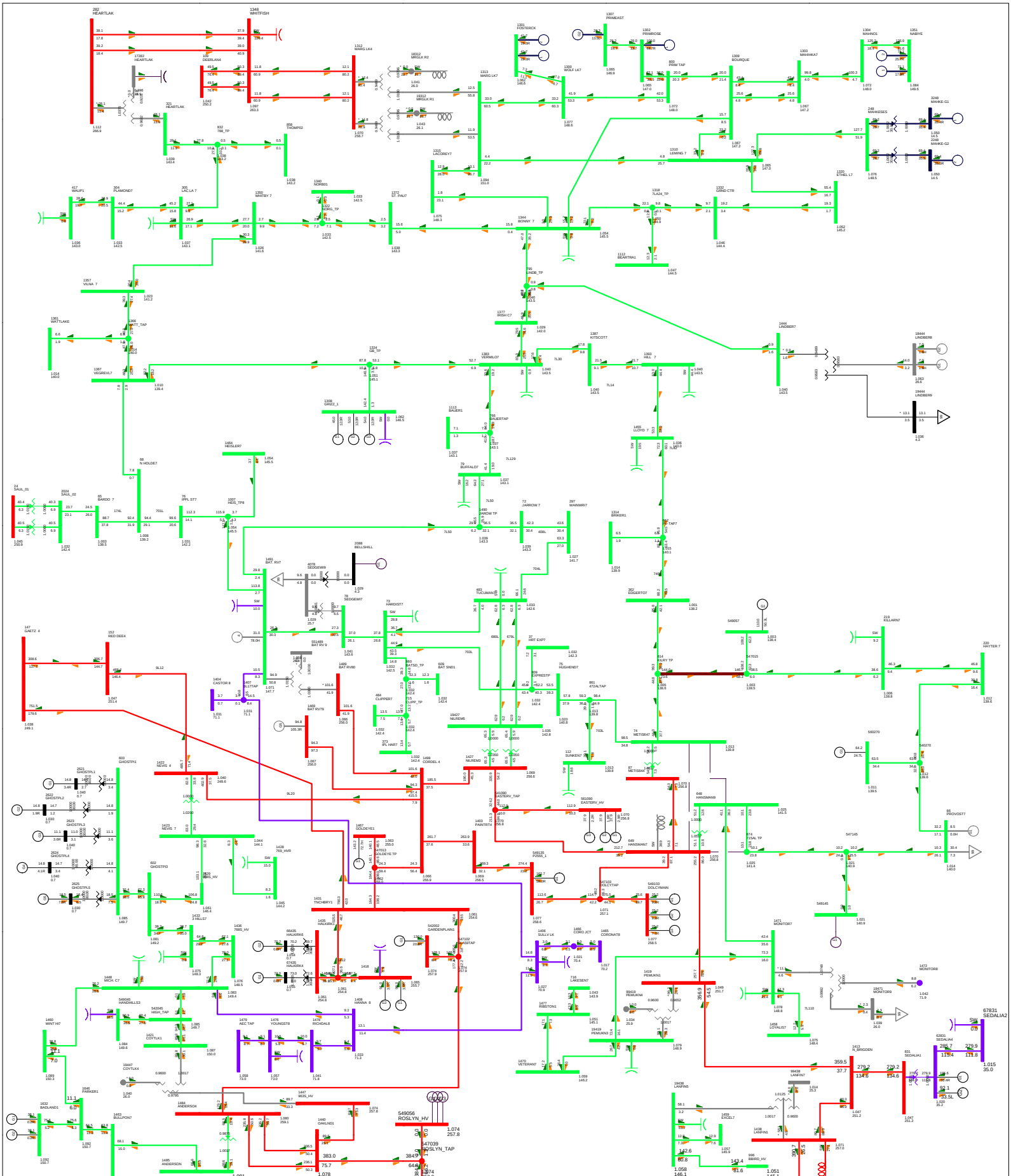
Bus - VOLTAGE (kV/PU)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%RATEB
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



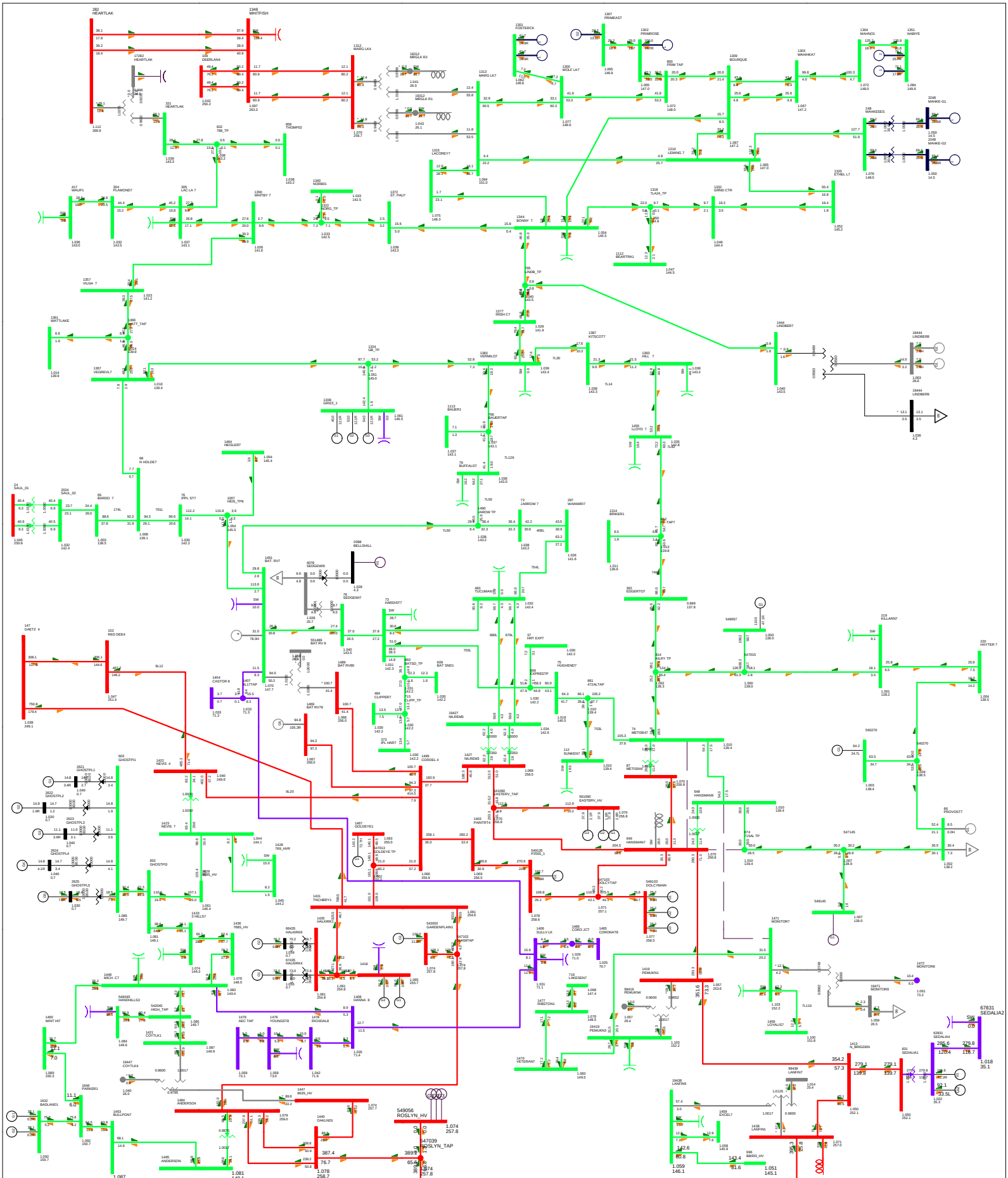
Attachment A2- 3	**Contingency** CONT 060: 703L (377S Hardisty - 213S Hughenden - 329S Hrt Express)	**Study Case Description** 2028WP PRE-PROJ Base Case	**P2034 Cold Lake Area Cogen** Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEB kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



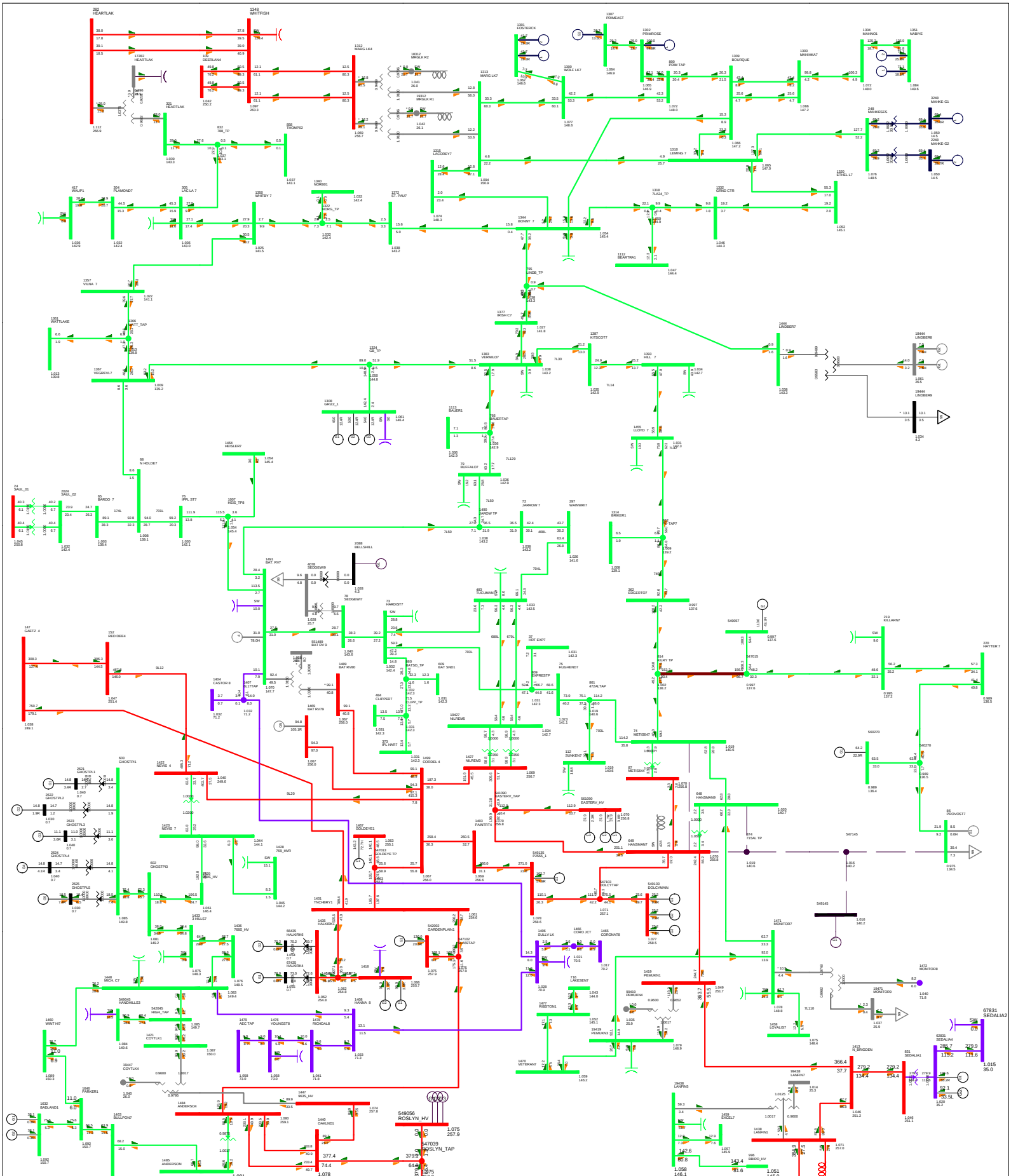
Attachment A2- 3	Contingency	Study Case Description	P2034 Cold Lake Area Cogen
	CONT 061: 472L (213S Hughenden - 648S Metiskow - 221S Sunken Lake)	2028WP PRE-PROJ Base Case	Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEB kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A2- 3	Contingency	Study Case Description	P2034 Cold Lake Area Cogen
	CONT 062: 885L (648S Metiskow - 650S Hansman Lake)	2028WP PRE-PROJ Base Case	Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEB kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A2- 3	Contingency	Study Case Description	P2034 Cold Lake Area Cogen
	CONT 063: 7L224 (650S Hansman Lake - 774S Monitor)	2028WP PRE-PROJ Base Case	Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEB kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A2- 3

Contingency

CONT 064: 715L (650S Hansman Lake - P2540 Cache Rising Sun - 545S Provost)

Study Case Description

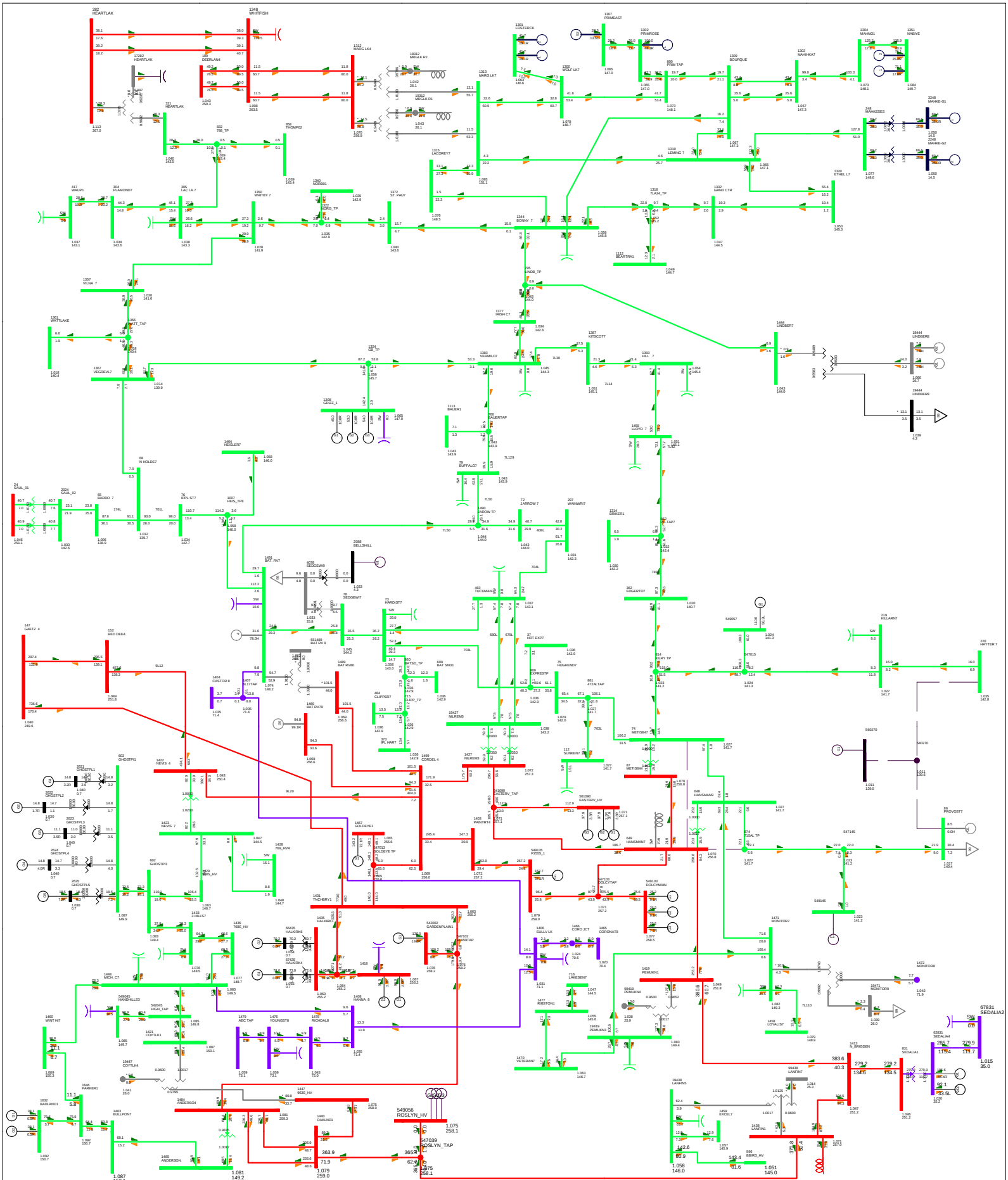
2028WP PRE-PROJ

Base Case

P2034 Cold Lake Area Cogen

Bus - VOLTAGE (kV/PU)
Branch - MW/Mvar
Equipment - MW/Mvar

100.0%RATEB
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A2- 3

Contingency

CONT 065: 398L (545S Provost - P2573 Prairie Yarrow - 277S Hayter)

Study Case Description

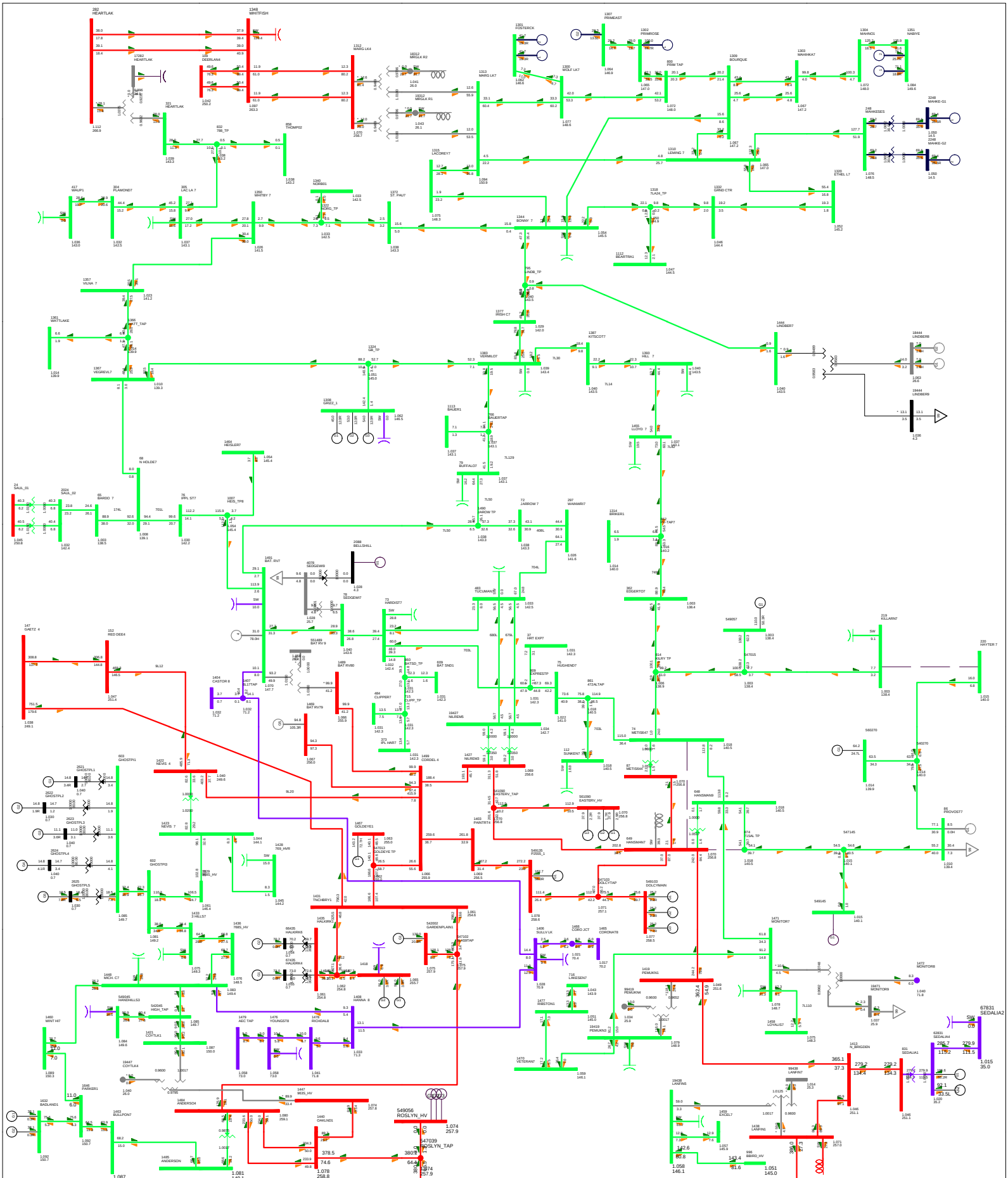
2028WP PRE-PROJ

Base Case

P2034 Cold Lake Area Cogen

Bus - VOLTAGE (kV/PU)
Branch - MW/Mvar
Equipment - MW/Mvar

100.0%RATEB
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A2- 3

Contingency

CONT 066: 748L (267S Killarney Lake - 277S Hayter)

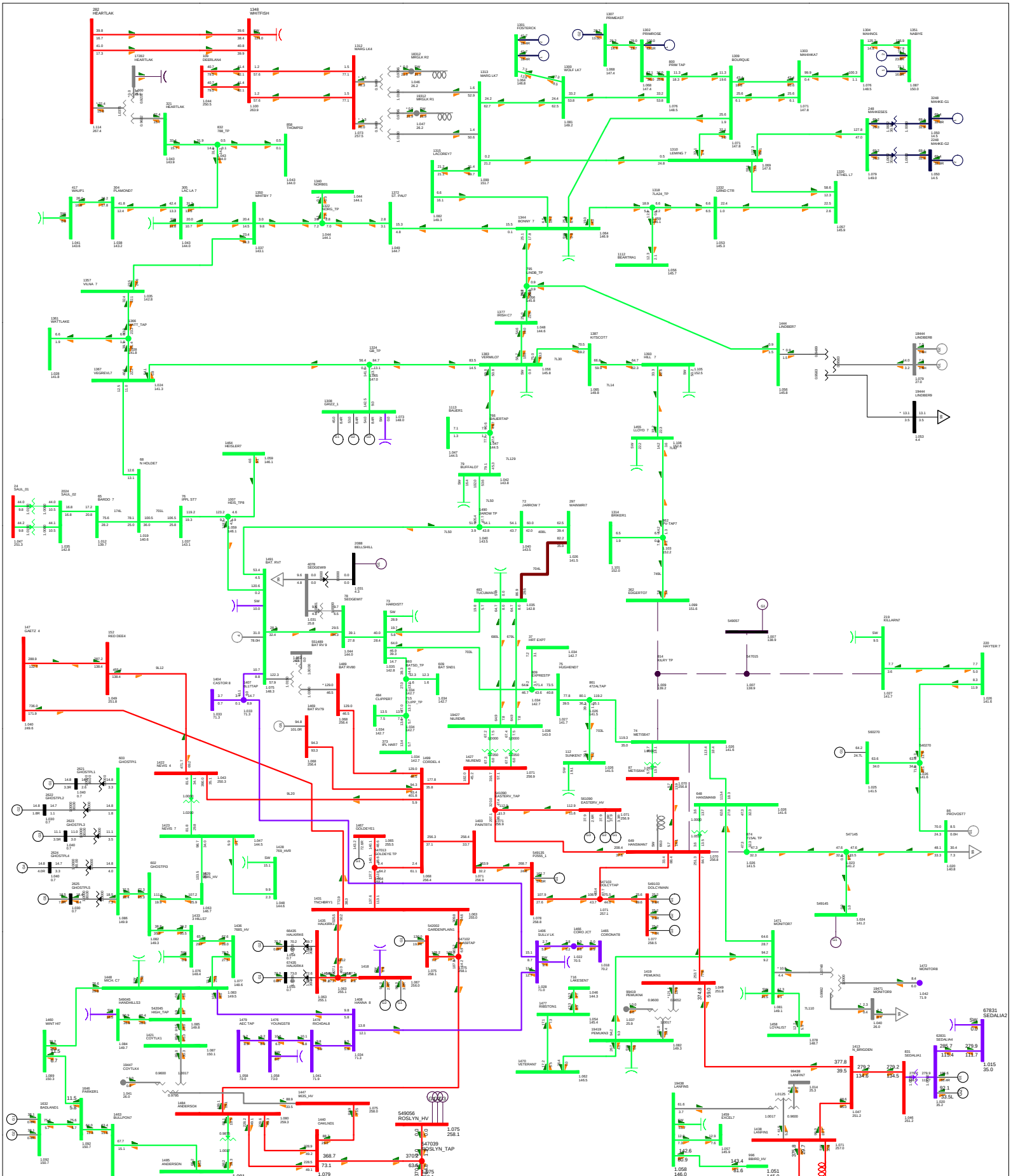
Study Case Description

2028WP PRE-PROJ

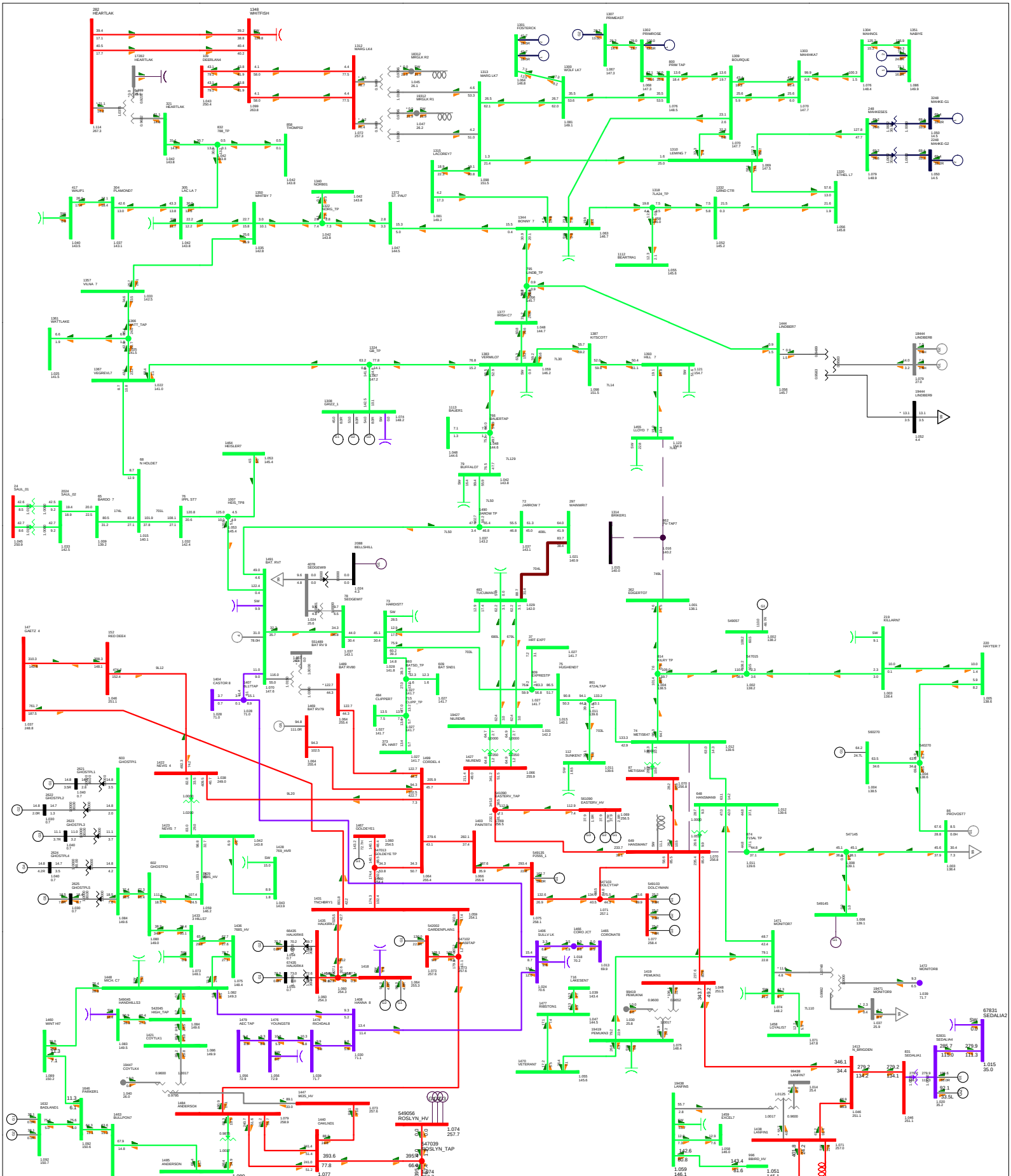
Base Case

P2034 Cold Lake Area Cogen

Bus - VOLTAGE (kV/PU)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%RATEB
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A2- 3	Contingency	Study Case Description	P2034 Cold Lake Area Cogen
	CONT 067: 749L (648S Metiskow - 267S Killarney Lake - P2460 Fox Meadows Wind - 899S Edgerton)	PRE-PROJ Base Case	Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEB kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A2- 3

Contingency

CONT 068: 7L749 (899S Edgerton - 716S Lloydminster - 880S Briker)

Study Case Description

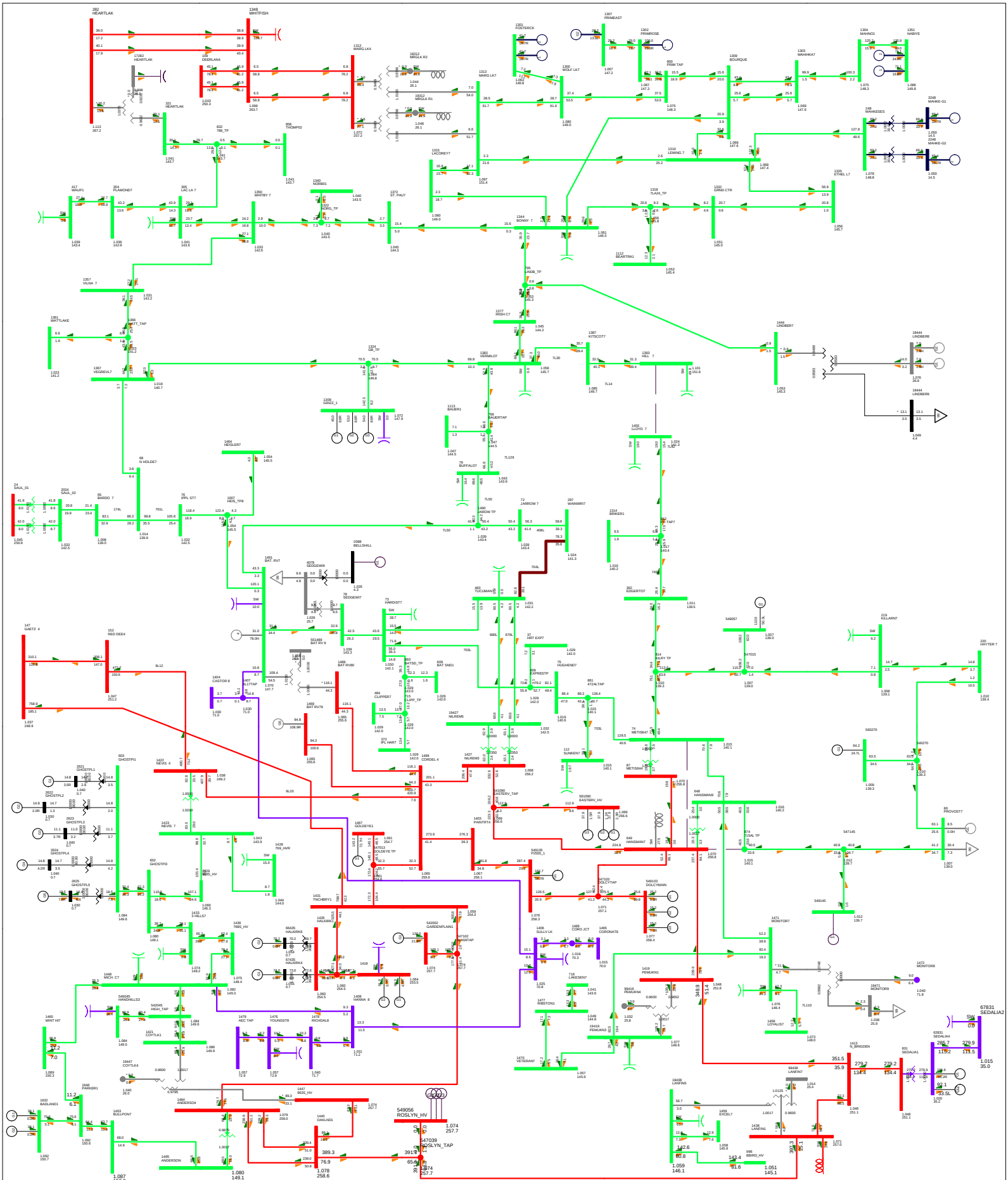
2028WP PRE-PROJ

Base Case

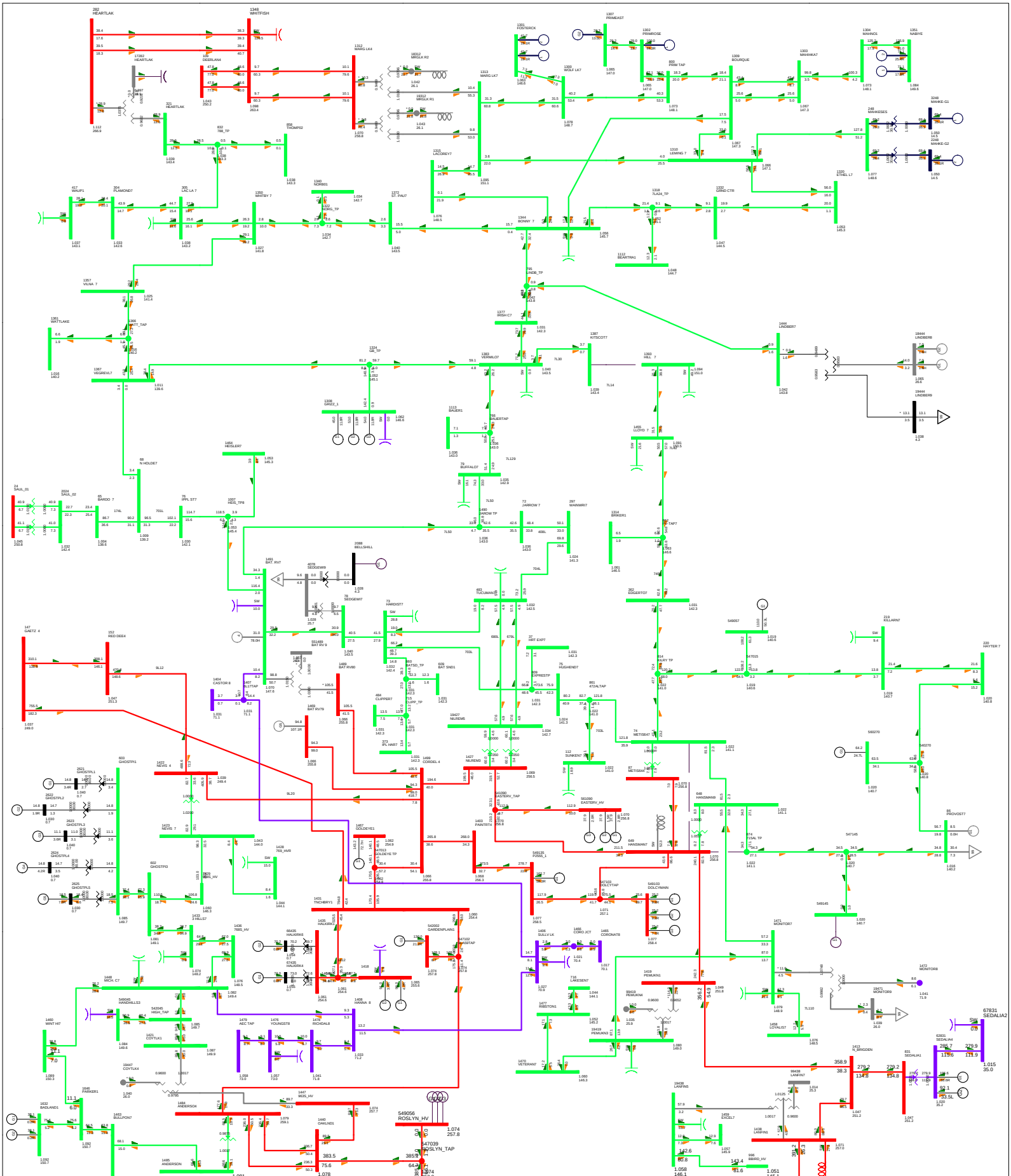
P2034 Cold Lake Area Cogen

Bus - VOLTAGE (kV/PU)
Branch - MW/Mvar
Equipment - MW/Mvar

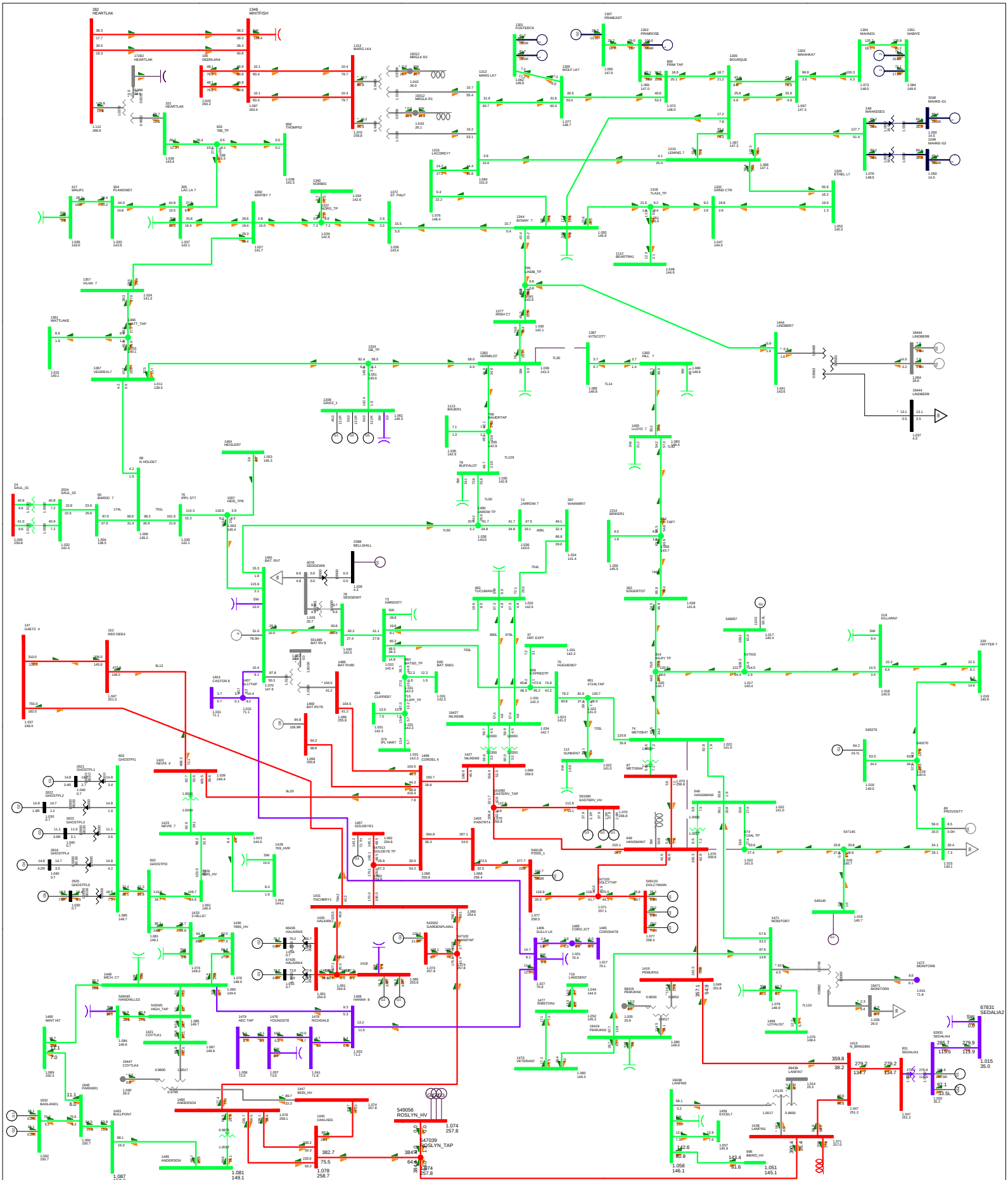
100.0%RATEB
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



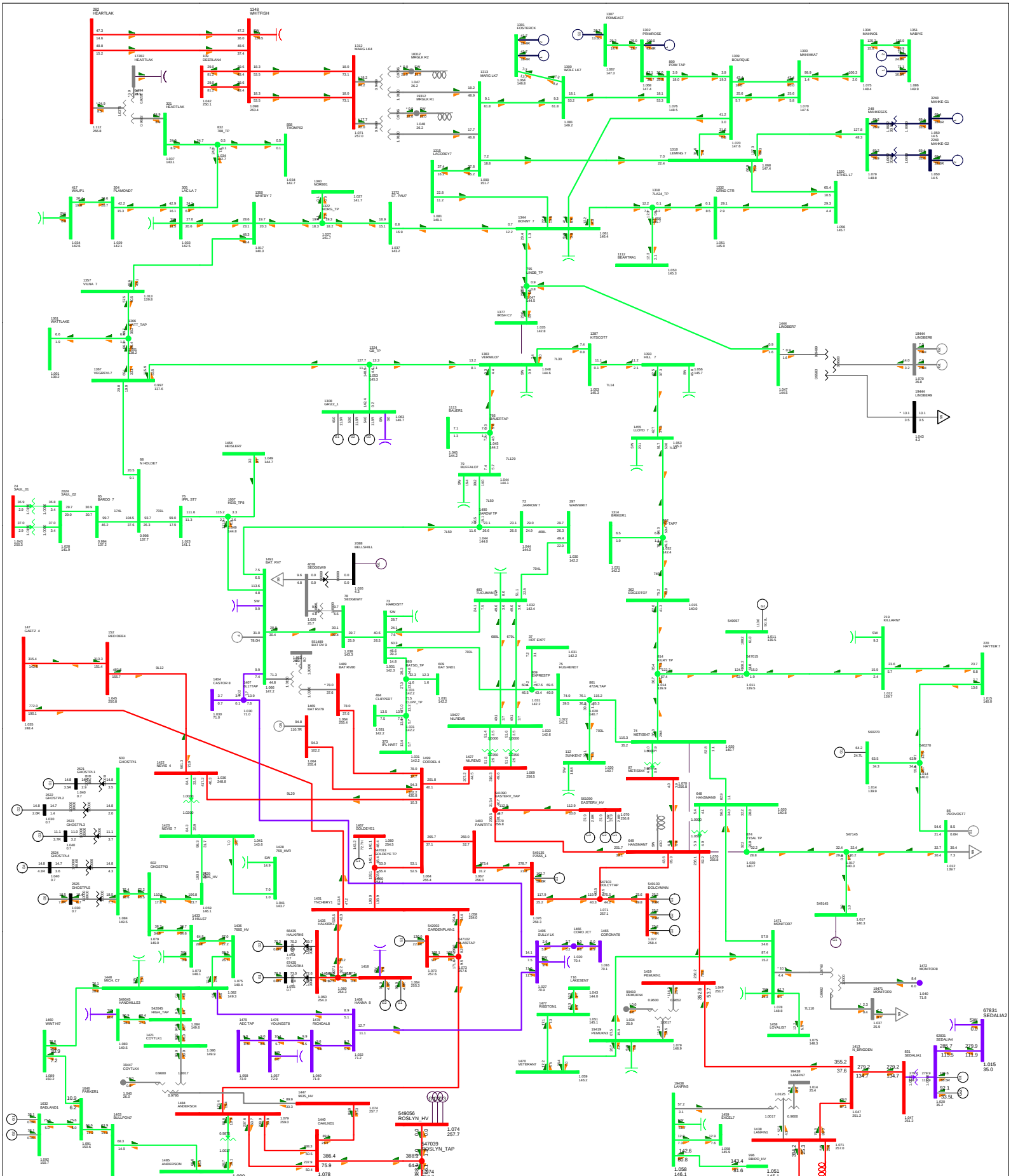
Attachment A2- 3	Contingency	Study Case Description	P2034 Cold Lake Area Cogen
	CONT 069: 7L42 (751S Hill - 716S Lloydminster)	2028WP PRE-PROJ Base Case	Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEB kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



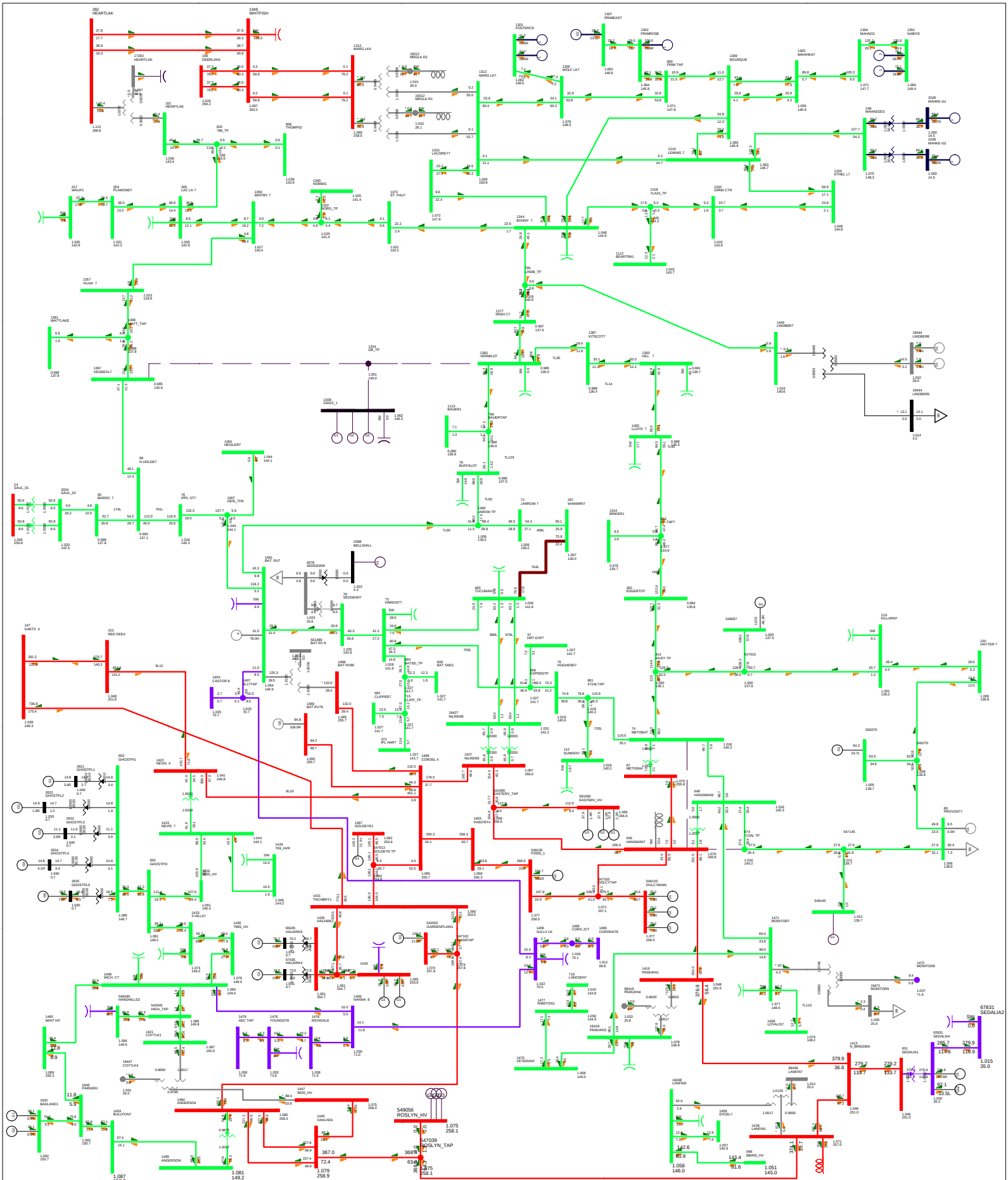
Attachment A2- 3	Contingency	Study Case Description	P2034 Cold Lake Area Cogen
	CONT 070: 7L14 (705S Kitscoty - 751S Hill)	2028WP PRE-PROJ Base Case	Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEB kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A2- 3	Contingency	Study Case Description	P2034 Cold Lake Area Cogen
	CONT 071: 7L130 (710S Vermilion - 705S Kitscoty)	2028WP PRE-PROJ Base Case	Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEB kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A2- 3	Contingency	Study Case Description	P2034 Cold Lake Area Cogen
	CONT 072: 7L117 (706S Irish Creek - 710S Vermilion)	2028WP PRE-PROJ Base Case	Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEB kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A2- 3

Contingency

CONT 073: 7L65 (709S Vegreville - 710S Vermilion - 708S Grizzly Bear)

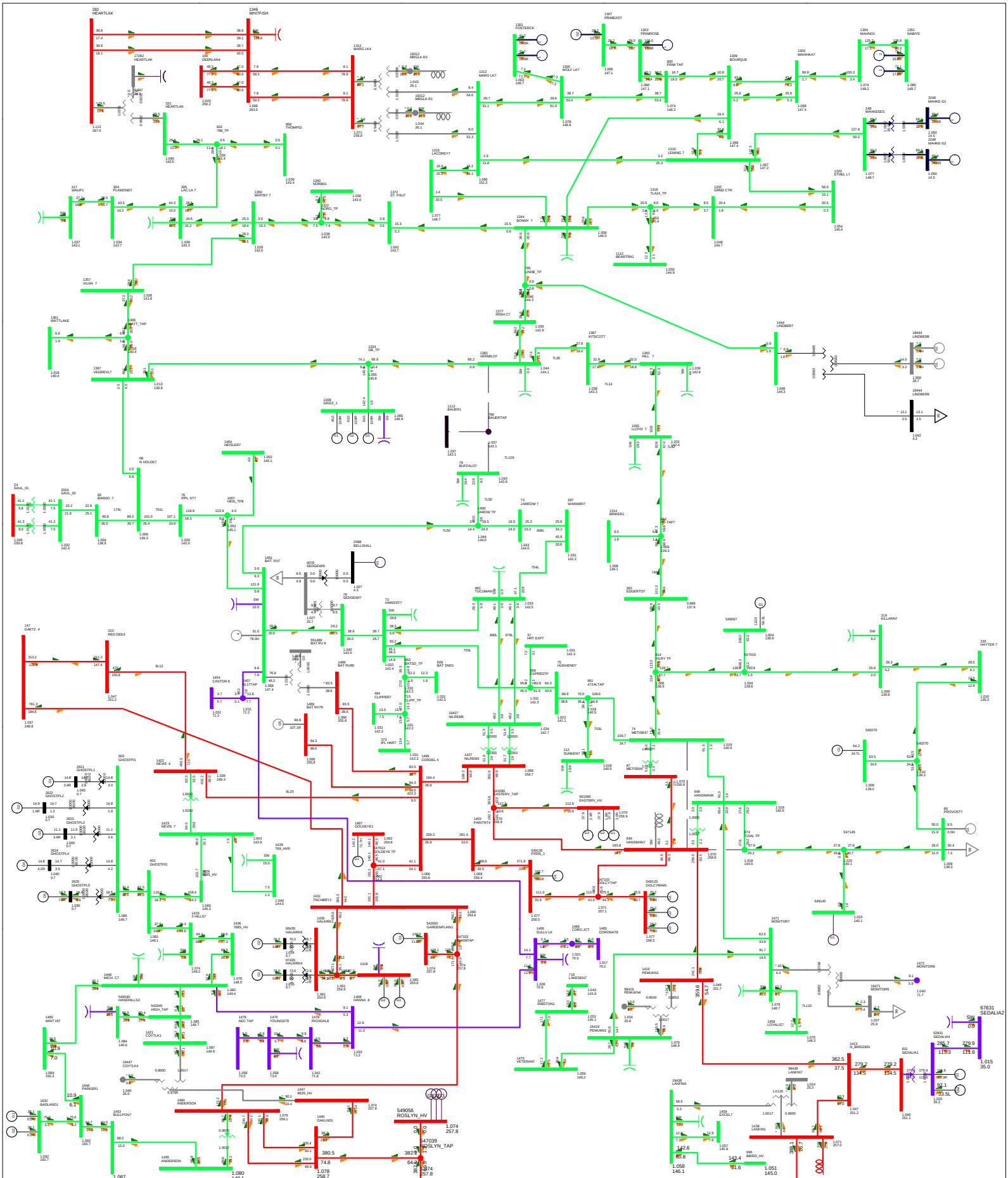
Study Case Description

2028WP PRE-PROJ

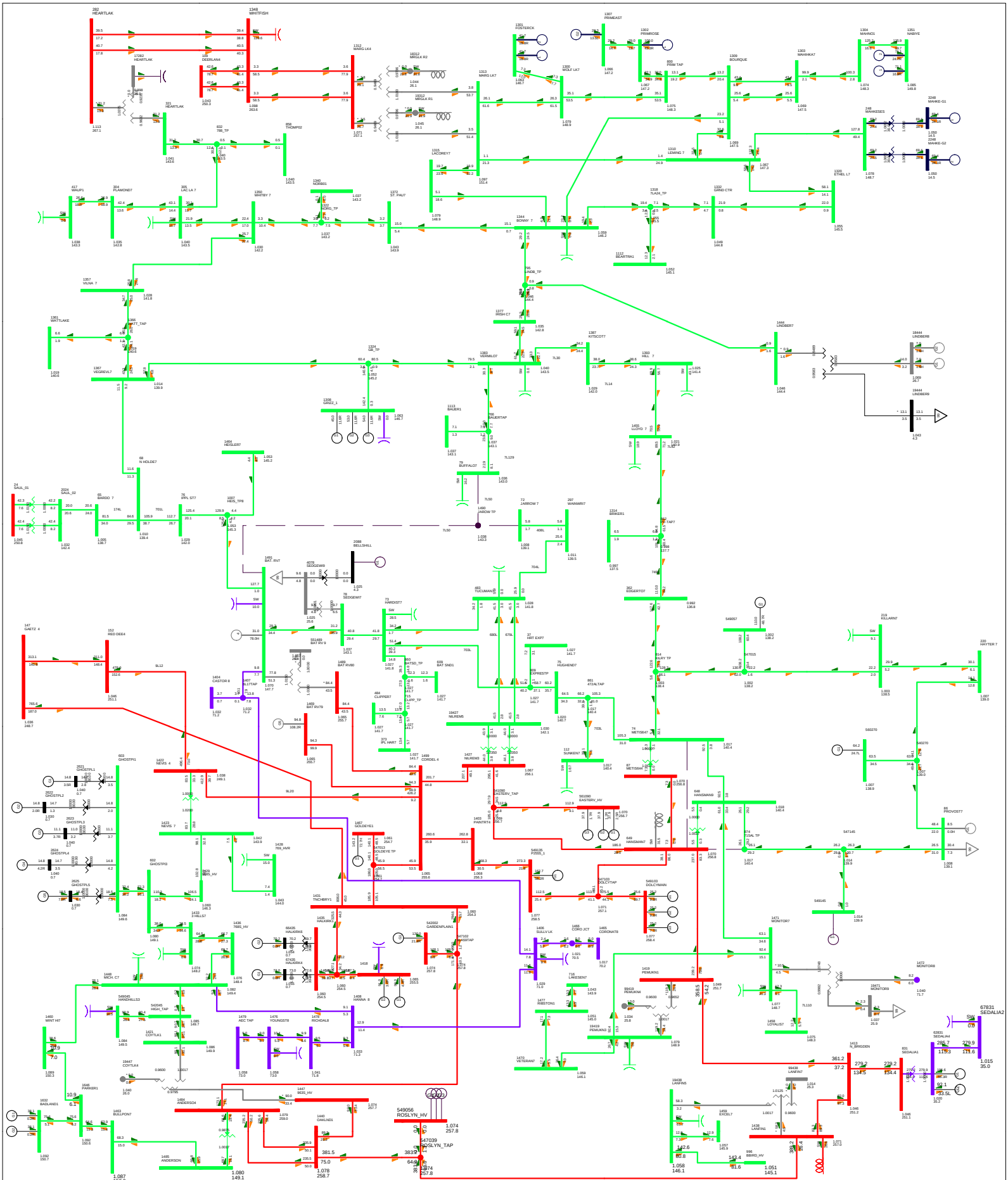
Base Case

P2034 Cold Lake Area Cogen

Bus - VOLTAGE (kV/PU)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%RATEB
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A2- 3	**Contingency** CONT 074: 7L129 (710S Vermilion - 918S Bauer - 526S Buffalo Creek)	**Study Case Description** 2028WP PRE-PROJ Base Case	**P2034 Cold Lake Area Cogen** Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEB kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A2- 3

Contingency

CONT 075: 7L50 (526S Buffalo Creek - 757S Battle River - 252S Jarrow)

Study Case Description

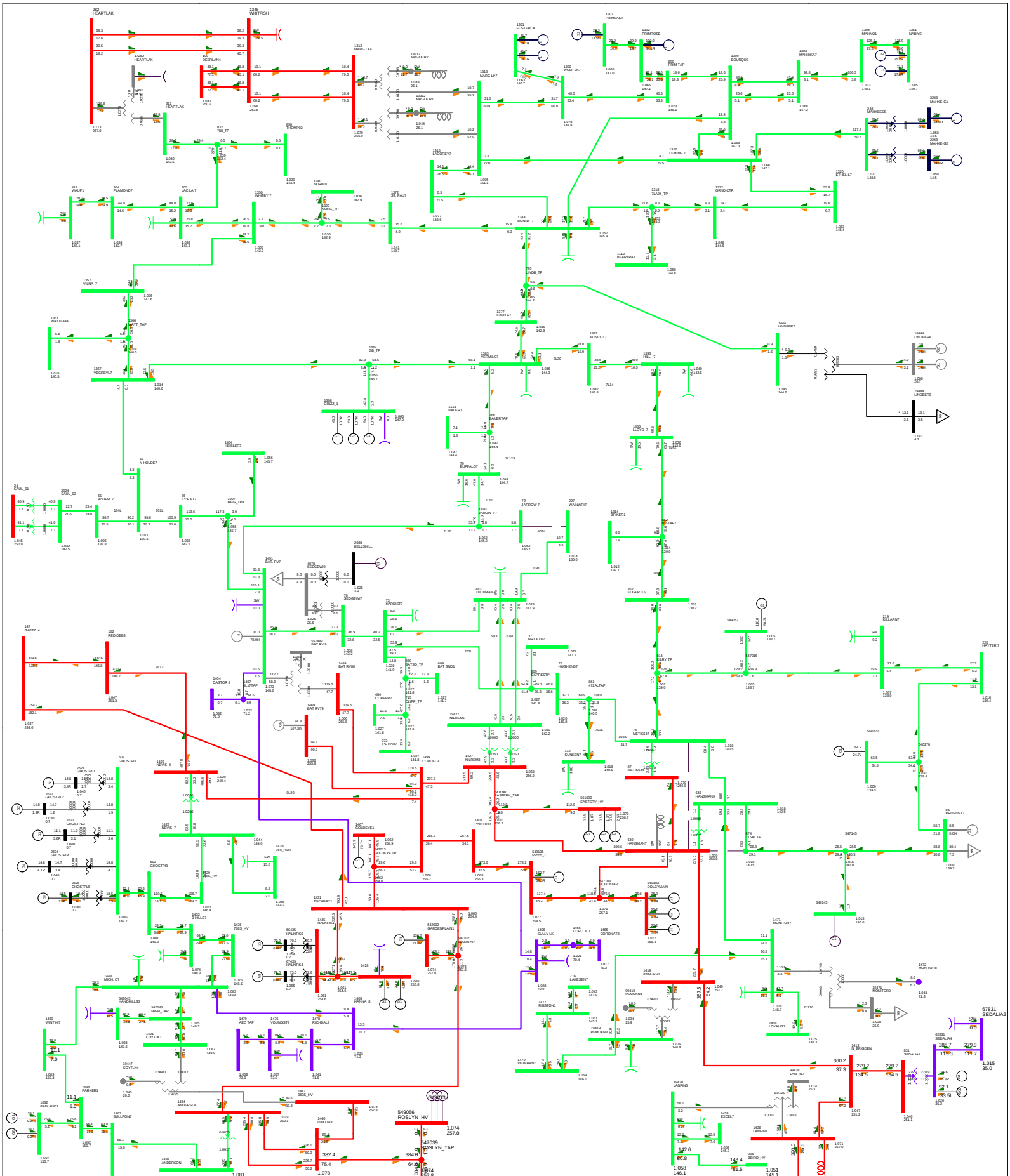
2028WP PRE-PROJ

Base Case

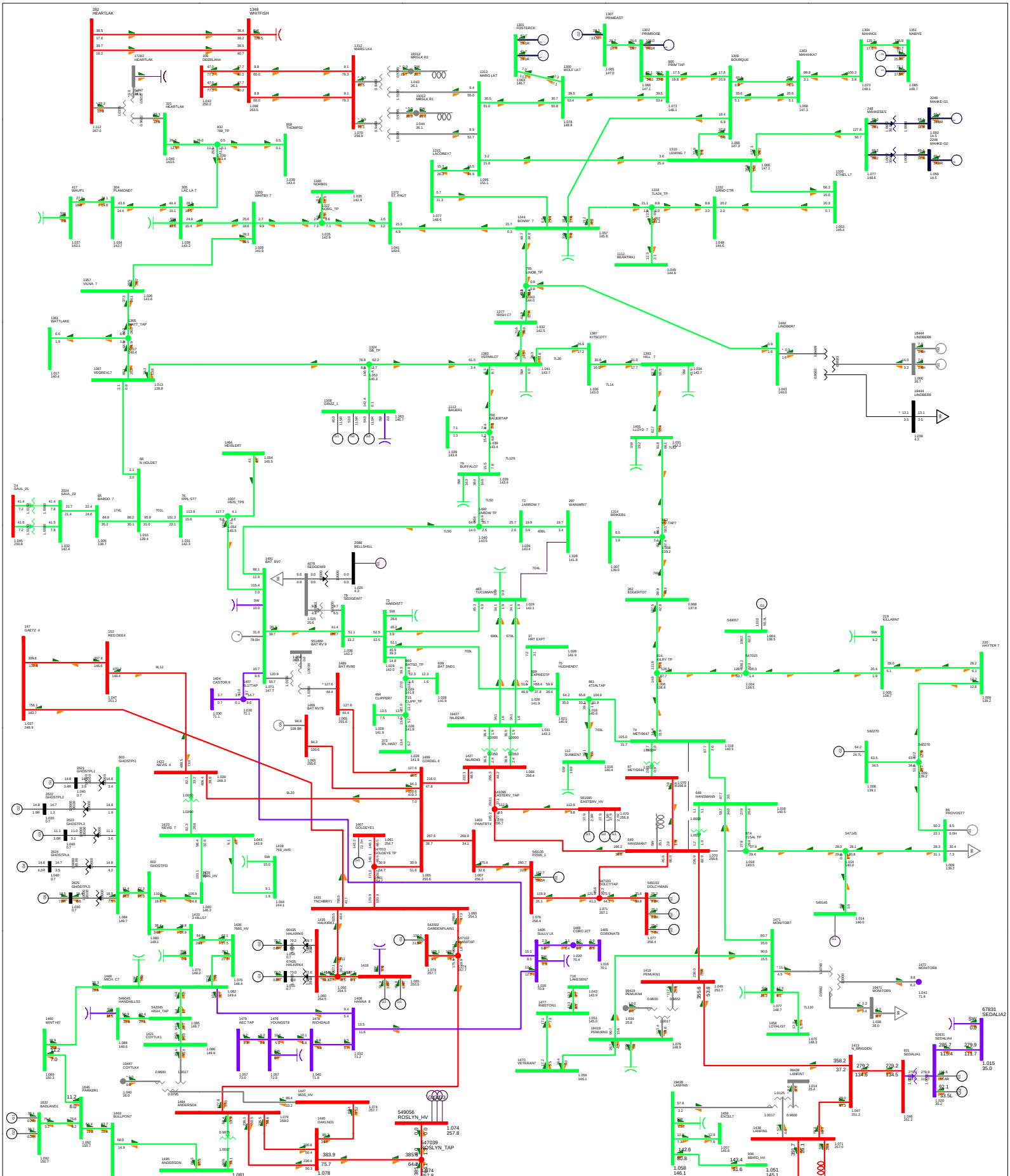
P2034 Cold Lake Area Cogen

Bus - VOLTAGE (kV/PU)
Branch - MW/Mvar
Equipment - MW/Mvar

100.0%RATEB
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A2- 3	Contingency	Study Case Description	P2034 Cold Lake Area Cogen
	CONT 076: 408L (252S Jarrow - 51S Wainwright)	2028WP PRE-PROJ Base Case	Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEB kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A2- 3

Contingency

CONT 077: 704L (51S Wainwright - 478S Tucuman)

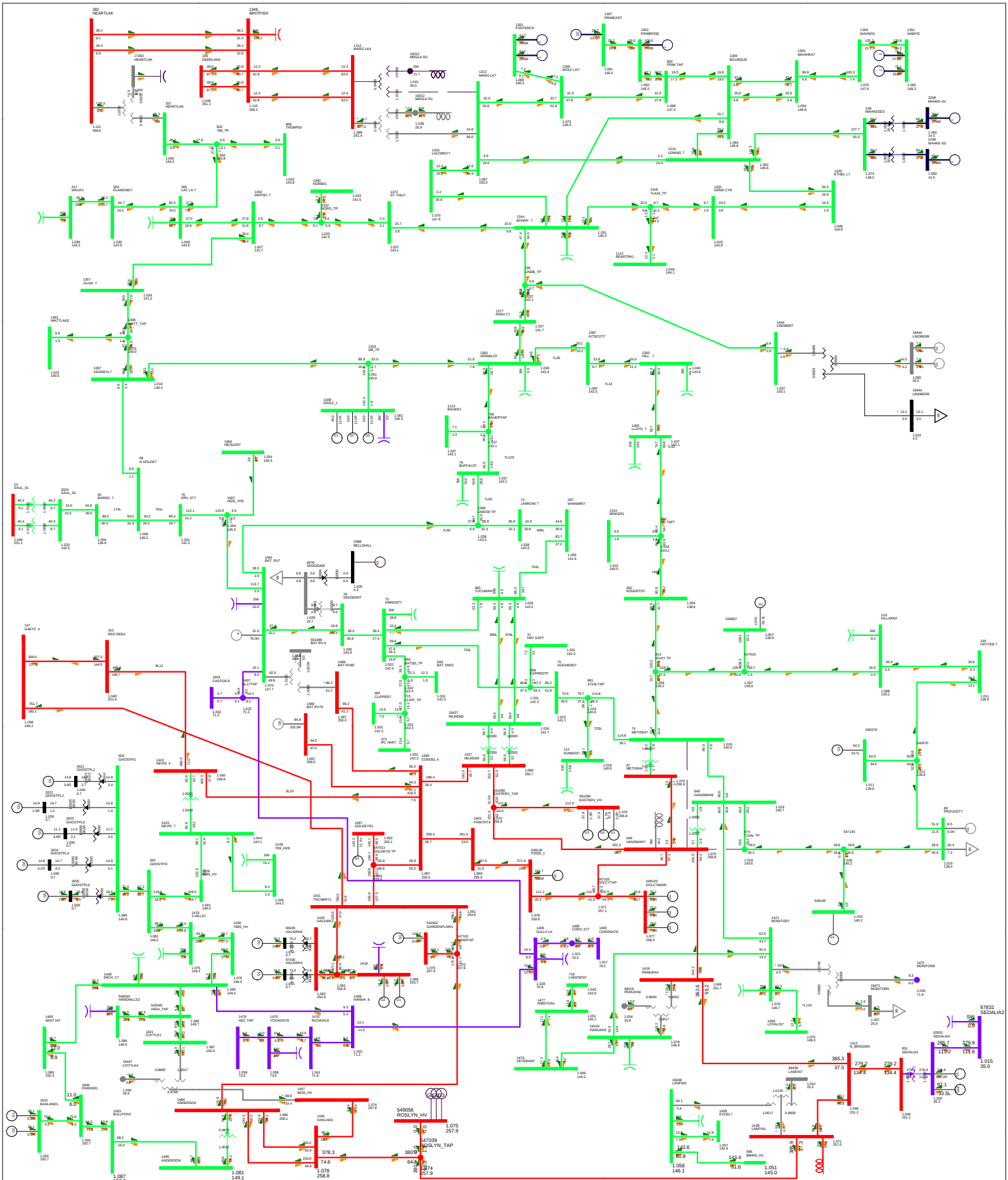
Study Case Description

2028WP PRE-PROJ

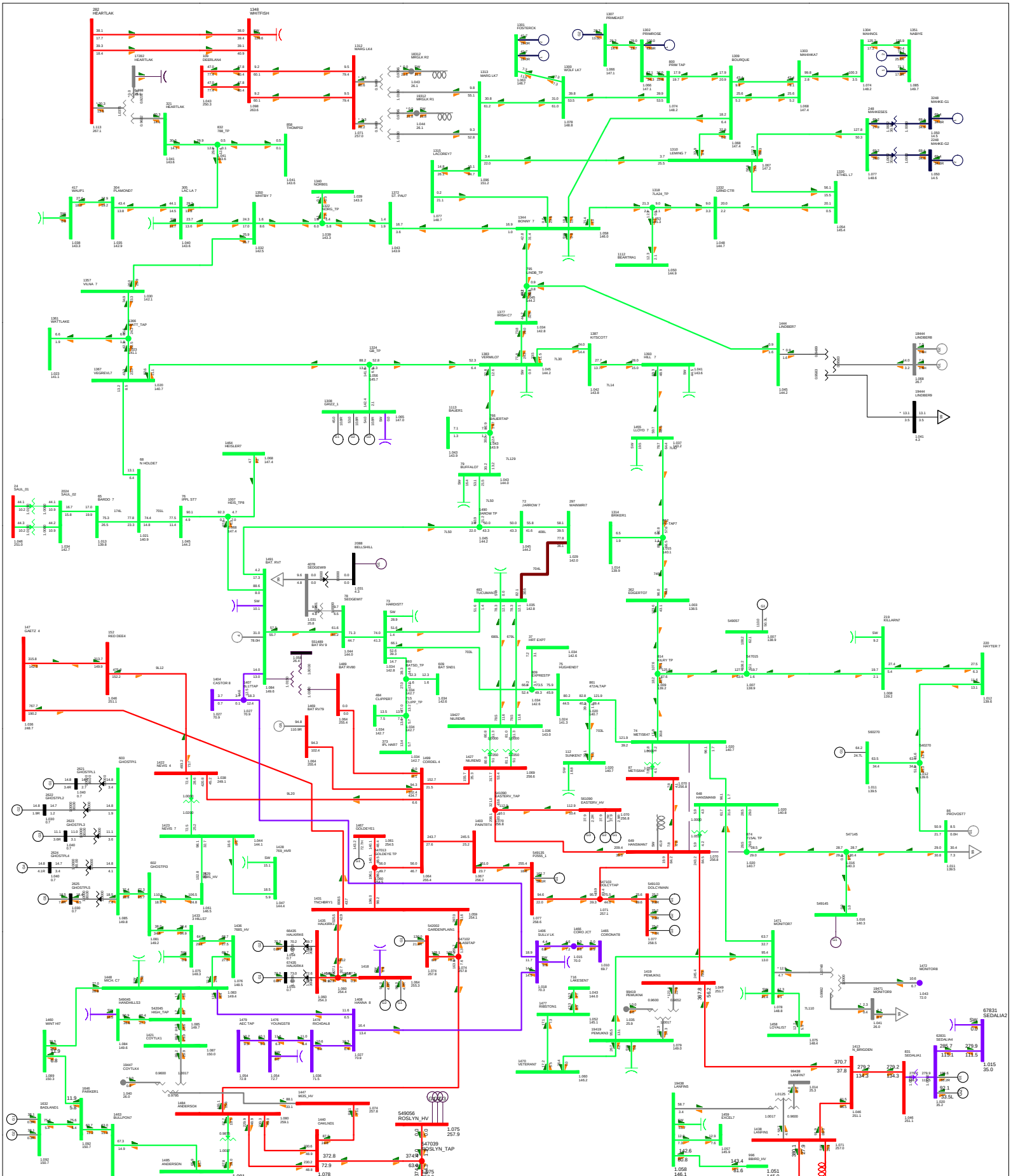
Base Case

P2034 Cold Lake Area Cogen

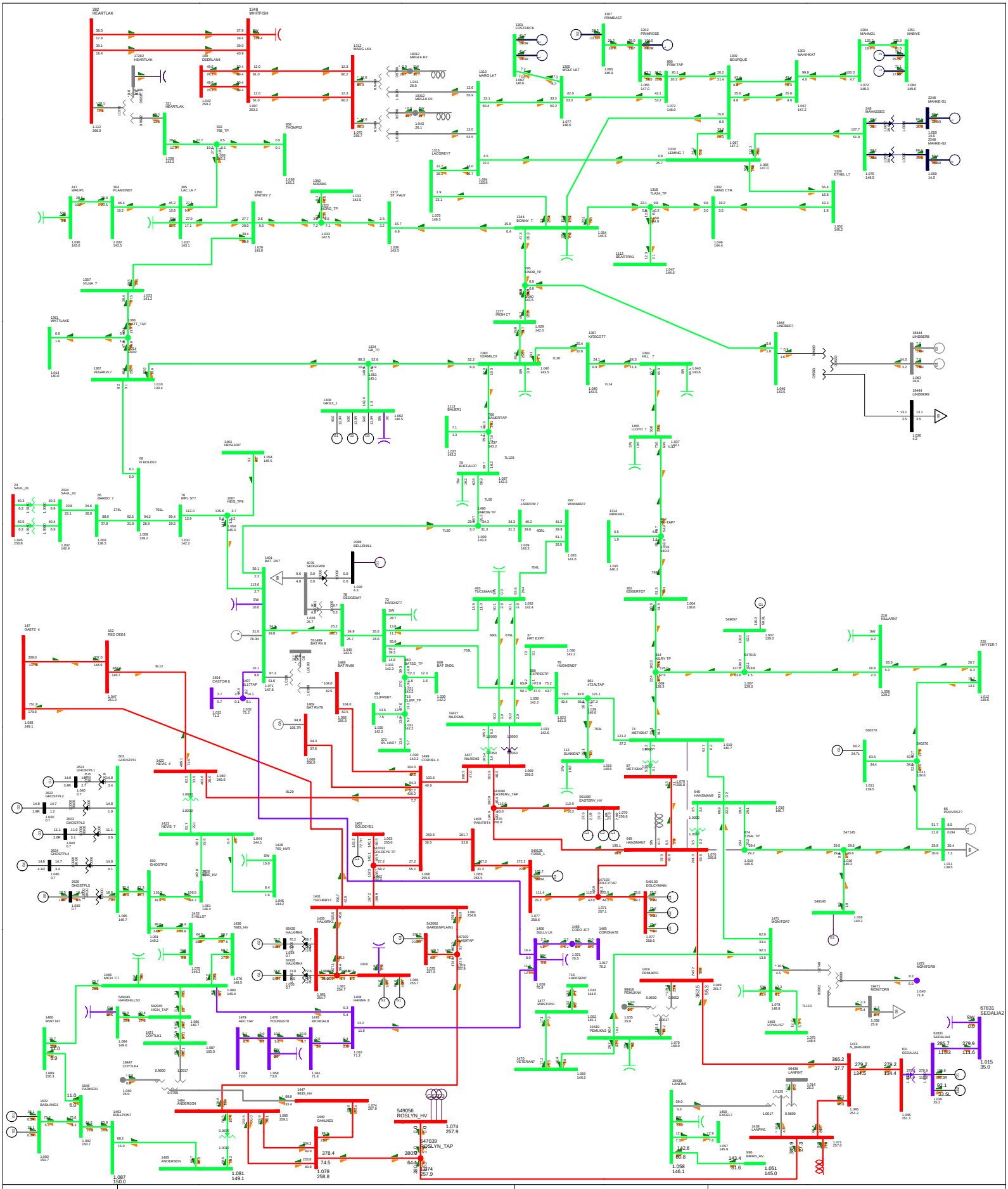
Bus - VOLTAGE (kV/PU)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%RATEB
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



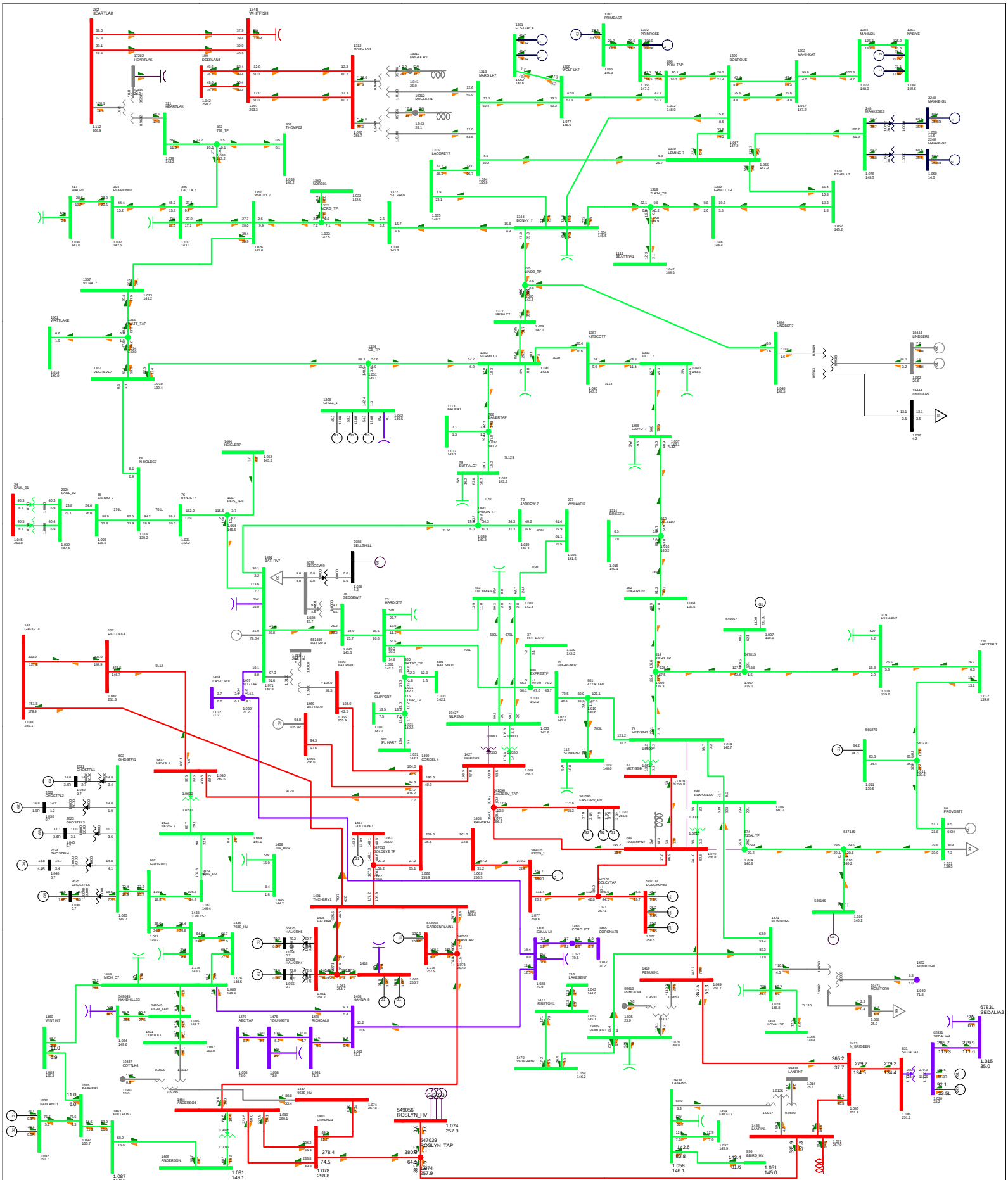
Attachment A2- 3	**Contingency** CONT 078: Marguerite Lake 2T	**Study Case Description** 2028WP PRE-PROJ Base Case	**P2034 Cold Lake Area Cogen** Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEB kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A2- 3	Contingency	Study Case Description	P2034 Cold Lake Area Cogen
	CONT 079: Battle River T2	2028WP PRE-PROJ Base Case	Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEB kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A2- 3	Contingency	Study Case Description	P2034 Cold Lake Area Cogen
	CONT 080: 574S Nilrem 162.2TR	2028WP PRE-PROJ Base Case	Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEB kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A2- 3

Contingency

CONT 081: 574S Nilrem 87ST1

Study Case Description

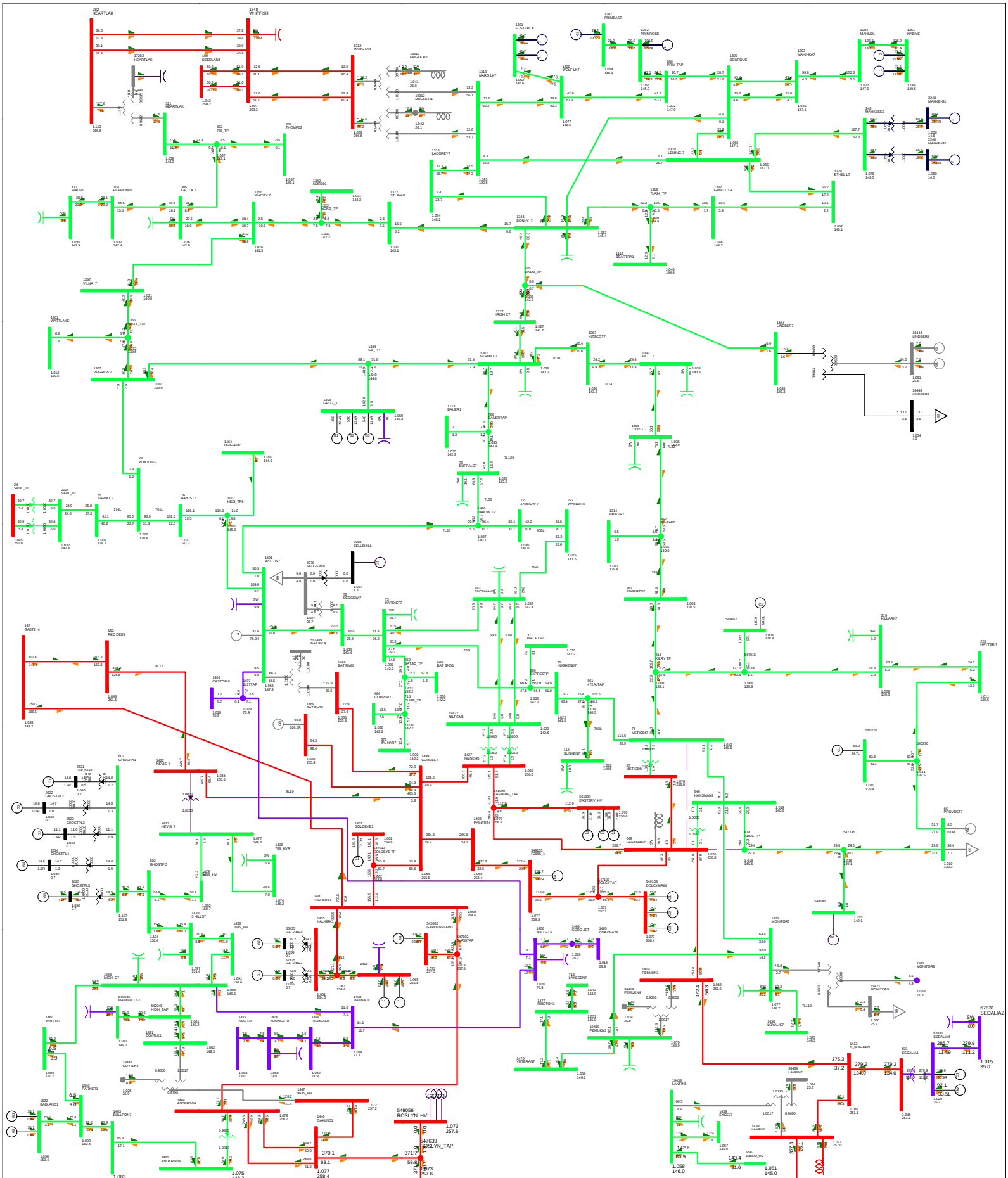
2028WP PRE-PROJ

Base Case

P2034 Cold Lake Area Cogen

Bus - VOLTAGE (kV/PU)
Branch - MW/Mvar
Equipment - MW/Mvar

100.0%RATEB
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A2- 3

Contingency

CONT 082: 766S Nevis 162.1TR

Study Case Description

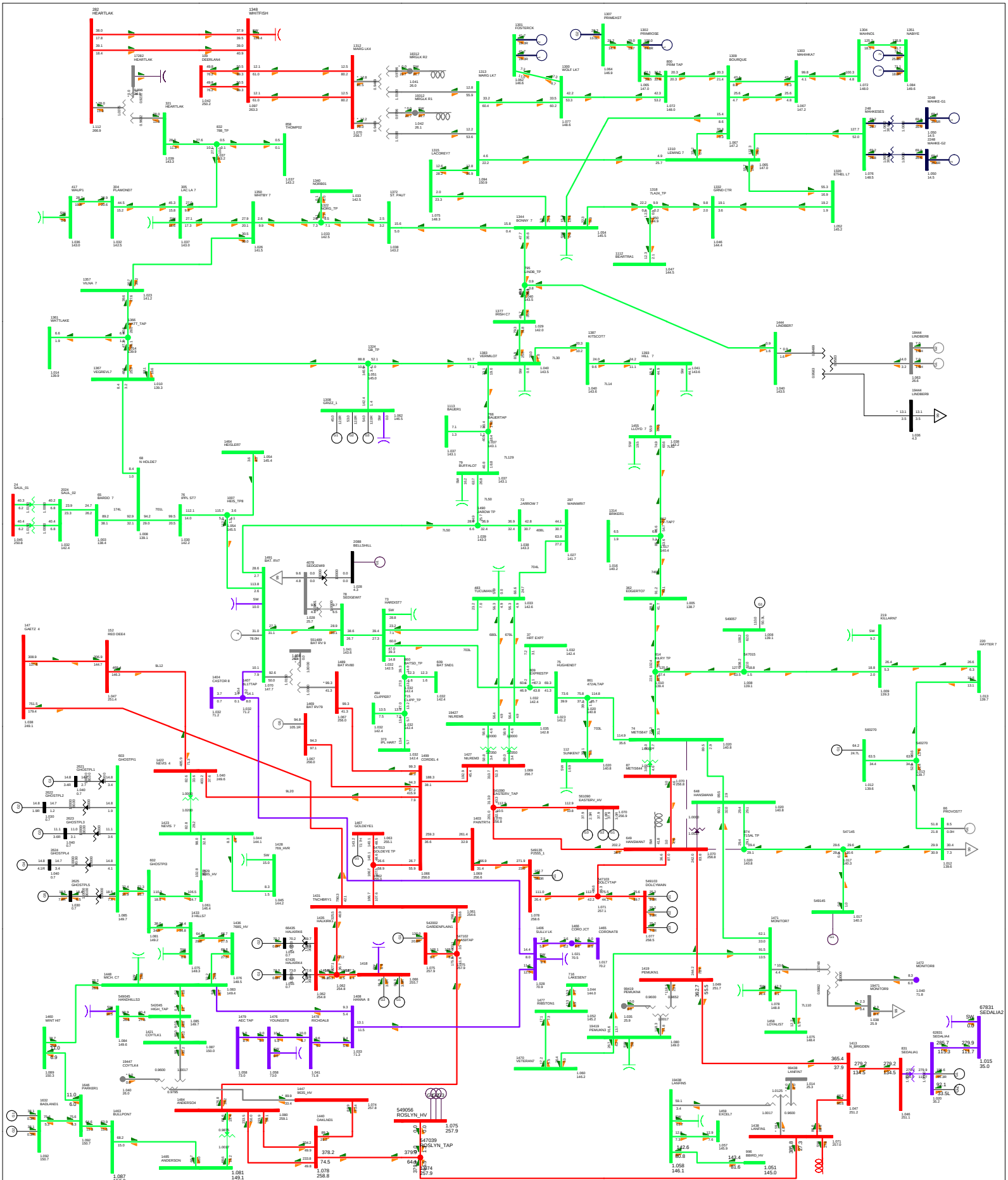
2028WP PRE-PROJ

Base Case

P2034 Cold Lake Area Cogen

Bus - VOLTAGE (kV/PU)
Branch - MW/Mvar
Equipment - MW/Mvar

100.0%RATEB
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A2- 3

Contingency

CONT 083: 650S Hansman Lake 63ST1

Study Case Description

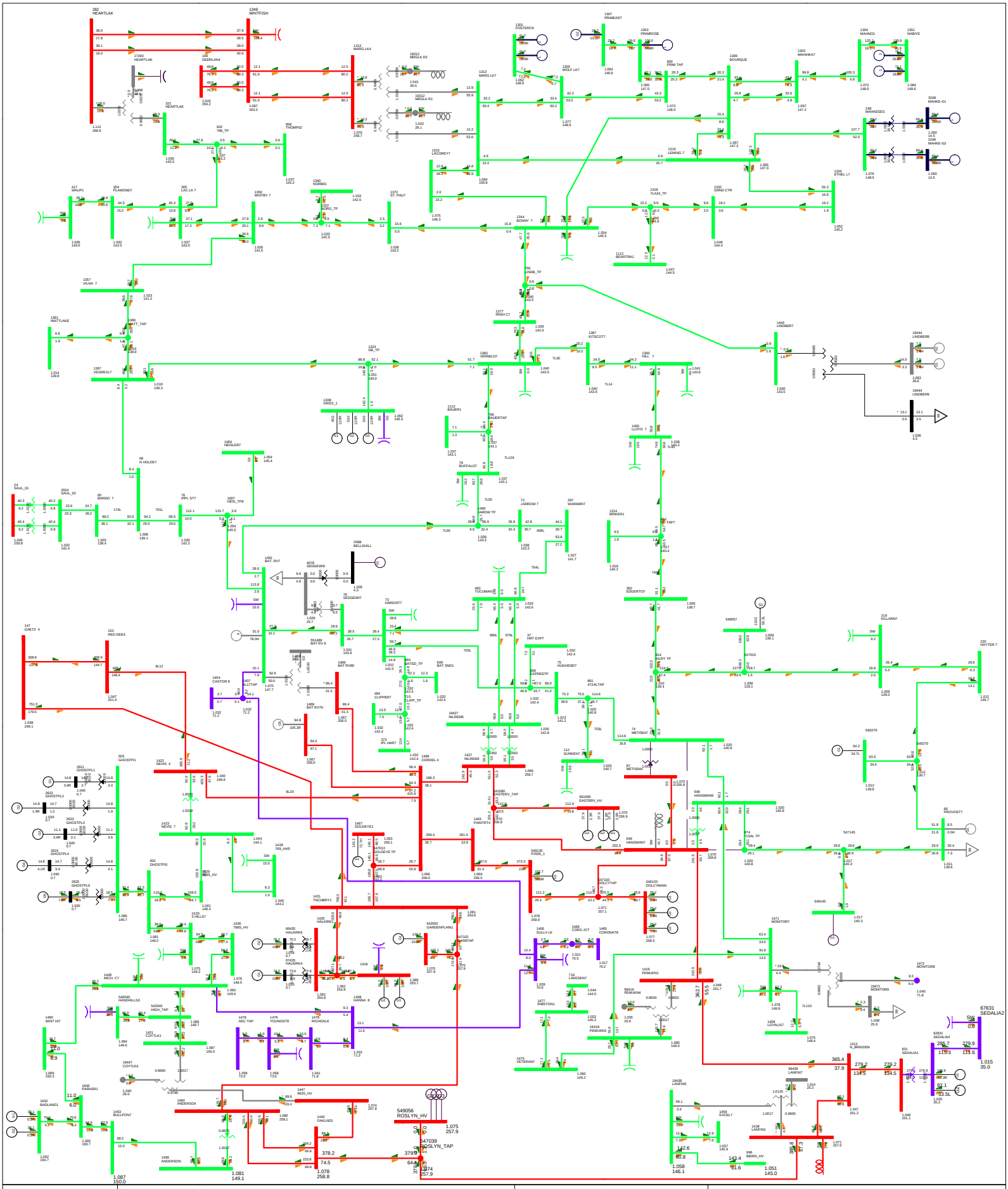
2028WP PRE-PROJ

Base Case

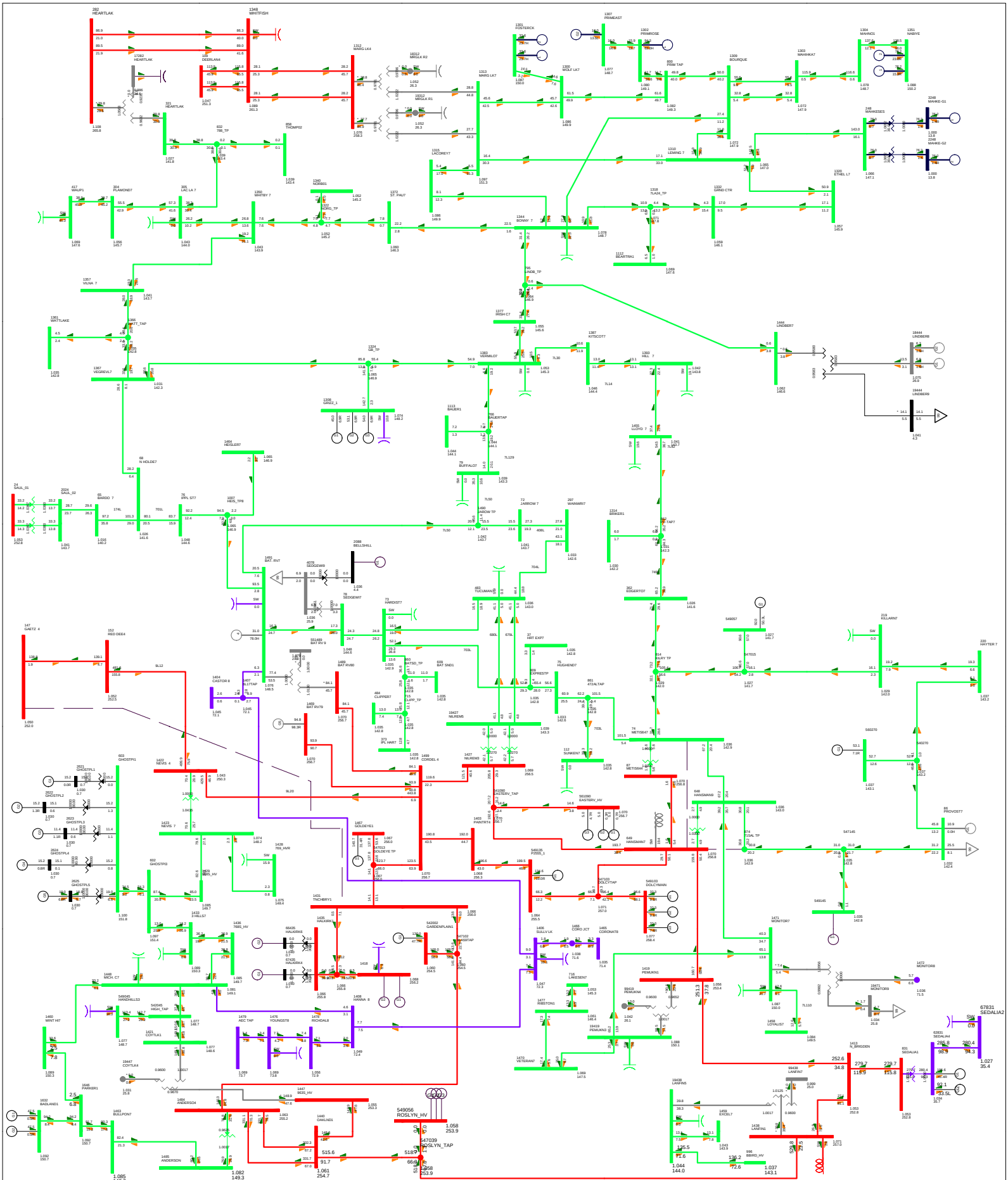
P2034 Cold Lake Area Cogen

Bus - VOLTAGE (kV/PU)
Branch - MW/Mvar
Equipment - MW/Mvar

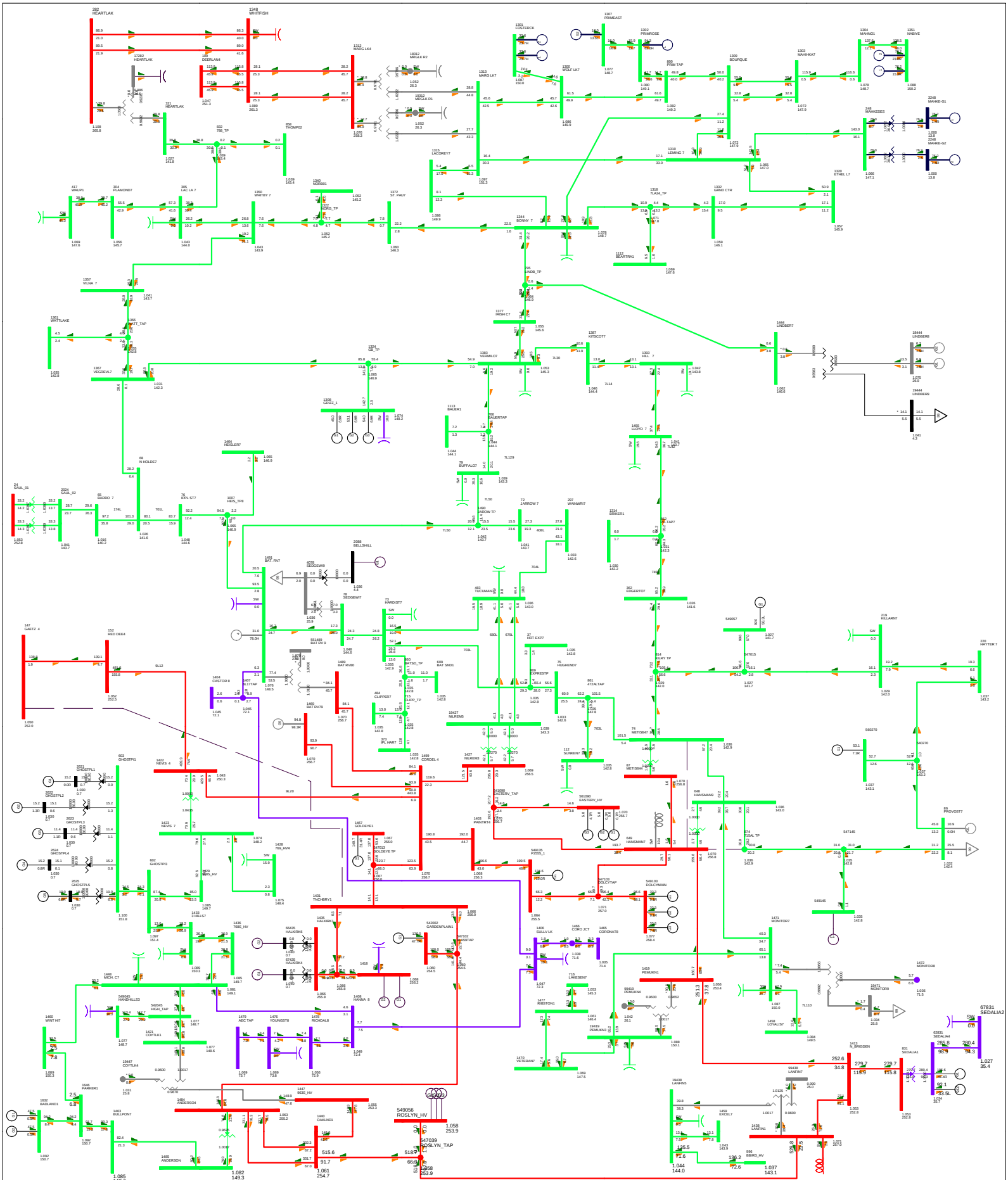
100.0%RATEB
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



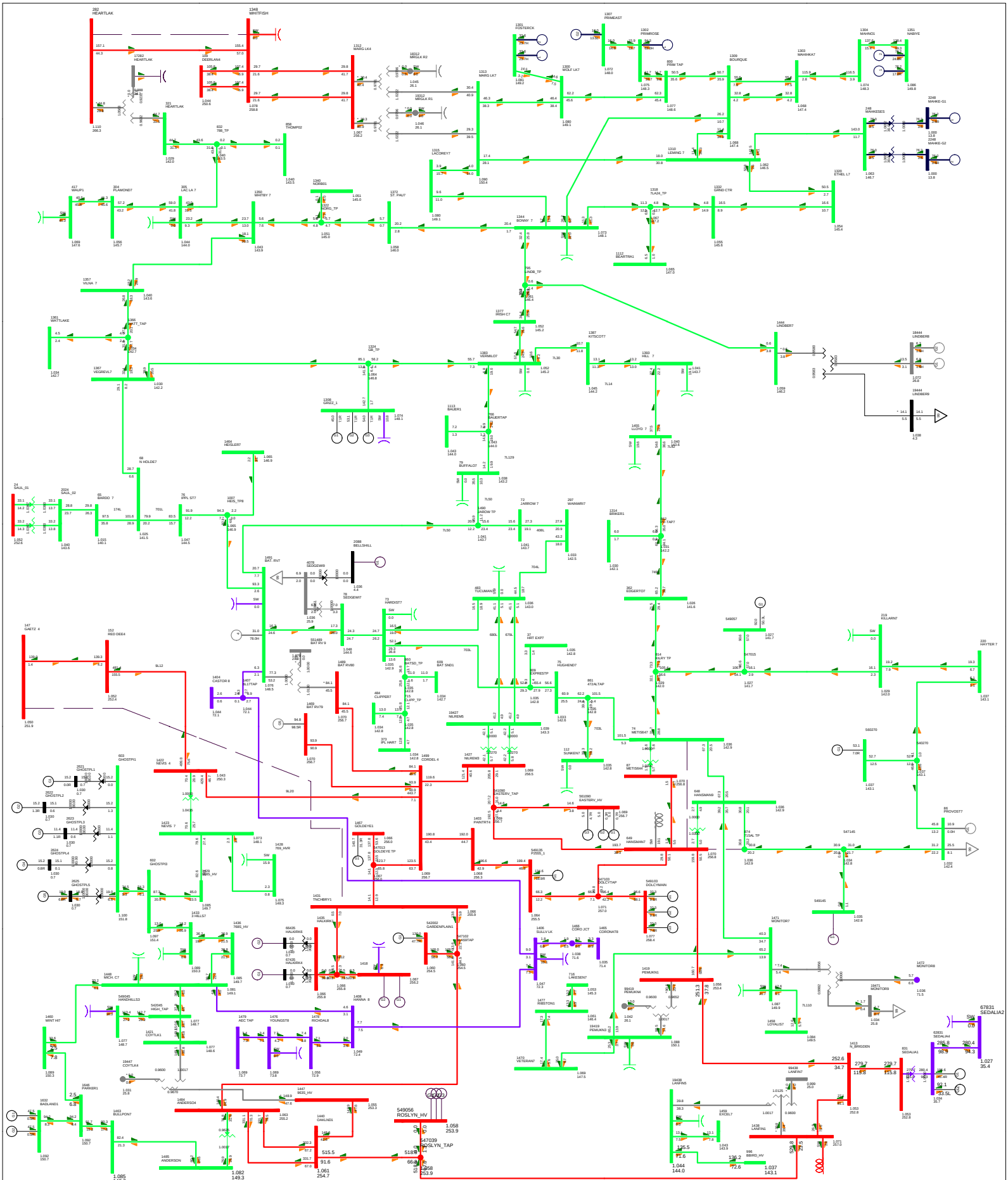
Attachment A2- 3	Contingency	Study Case Description	P2034 Cold Lake Area Cogen
	CONT 084: 648S Metiskow T3	2028WP PRE-PROJ Base Case	Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEB kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



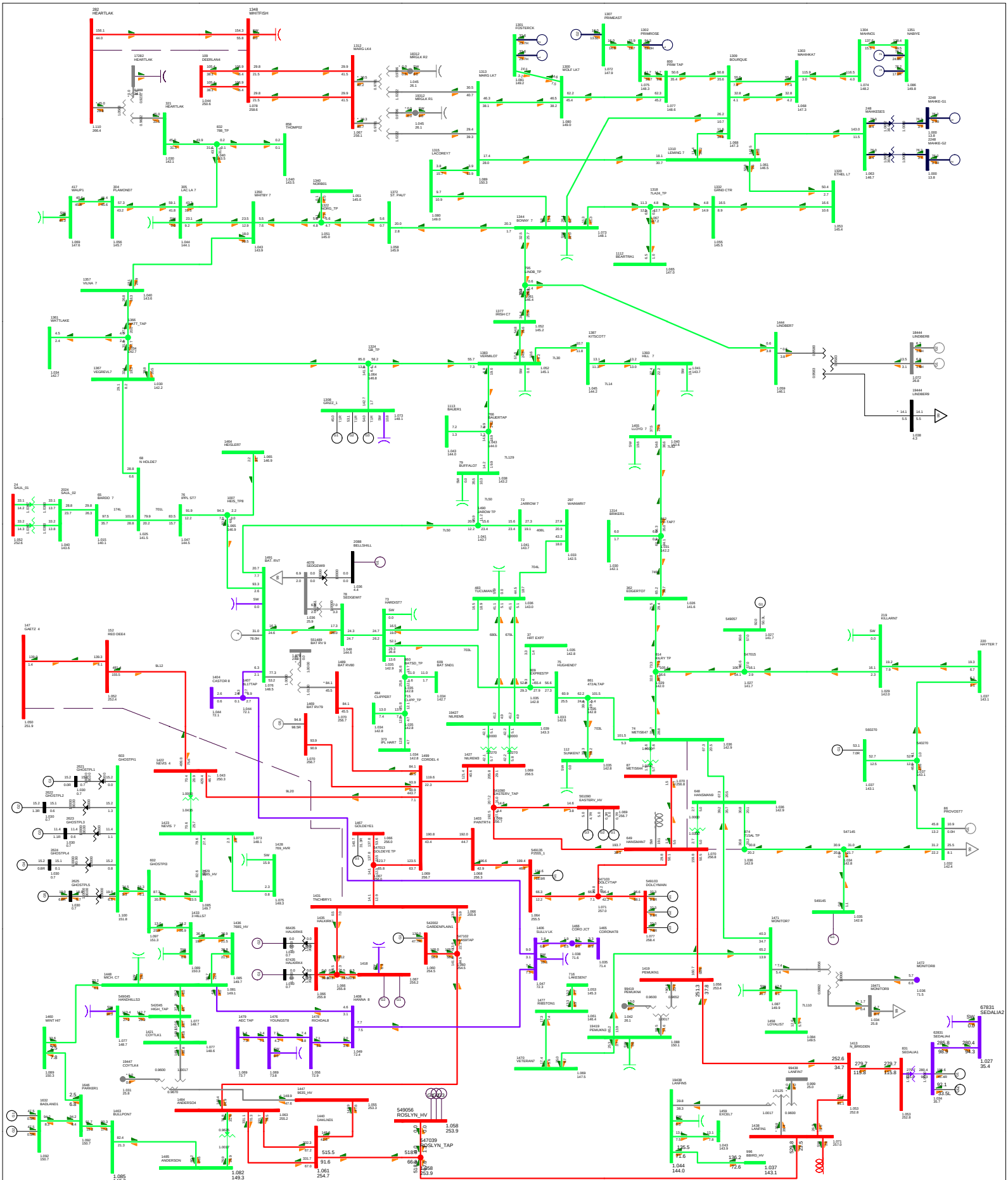
Attachment A2- 4	Contingency	Study Case Description	P2034 Cold Lake Area Cogen
	CONT 000: All elements in service	2028SP-woCETO PRE-PROJ Base Case	Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A2- 4	Contingency	Study Case Description	P2034 Cold Lake Area Cogen
	CONT 001: CETO (87S Gaetz - 972S Tinchebray)	2028SP-woCETO PRE-PROJ Base Case	Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A2- 4	Contingency	Study Case Description	P2034 Cold Lake Area Cogen
	CONT 010: 9L22 (898S Heart Lake - 825S Whitefish Lake)	2028SP-woCETO PRE-PROJ Base Case	Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A2- 4

Contingency

CONT 011: 9L81 (898S Heart Lake - 825S Whitefish Lake)

Study Case Description

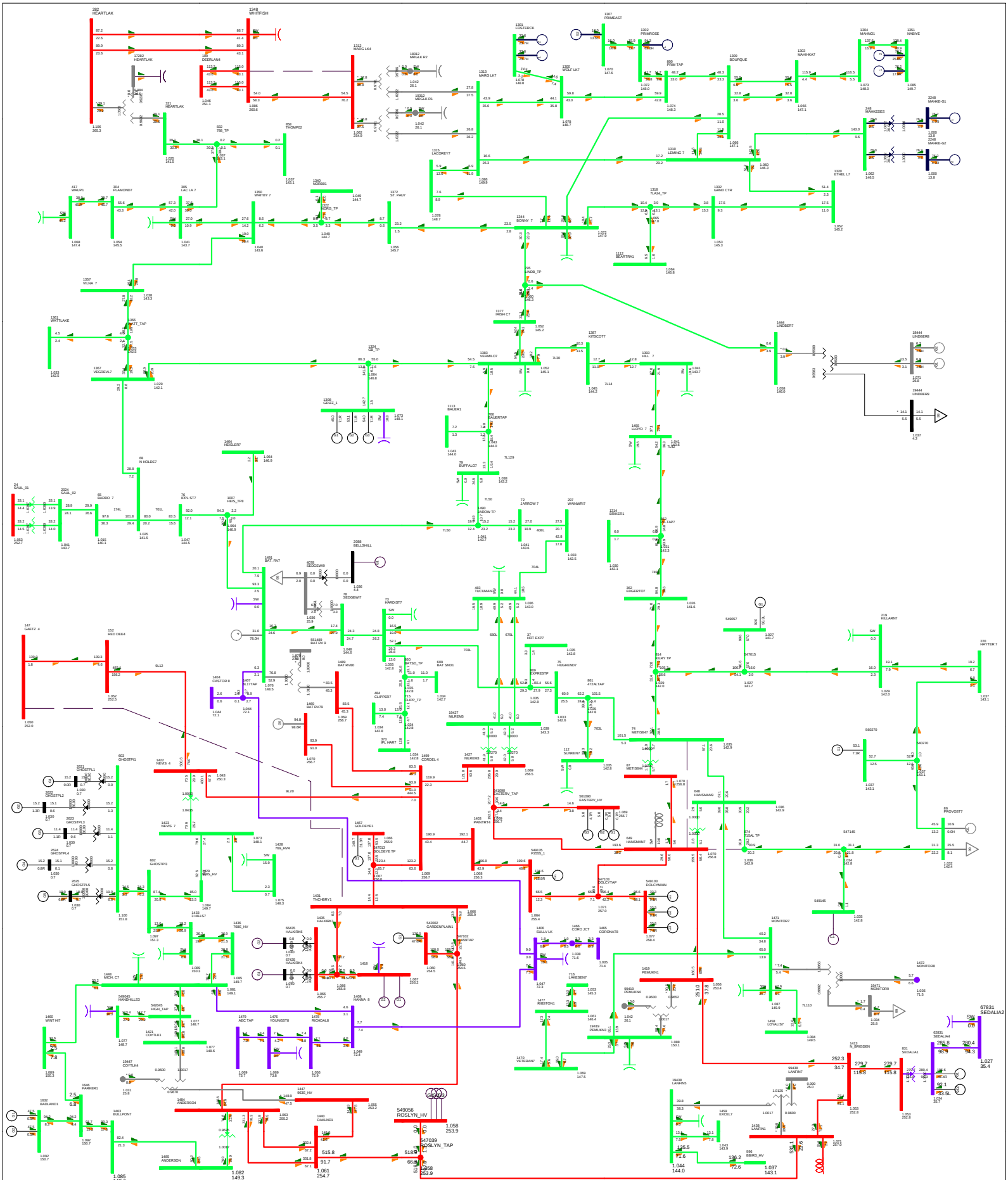
2028SP-woCETO PRE-PROJ

Base Case

P2034 Cold Lake Area Cogen

Bus - VOLTAGE (kV/PU)
Branch - MW/Mvar
Equipment - MW/Mvar

100.0%RATEA
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A2- 4

Contingency

CONT 012: 9L36 (826S Marguerite Lake - 825S Whitefish Lake)

Study Case Description

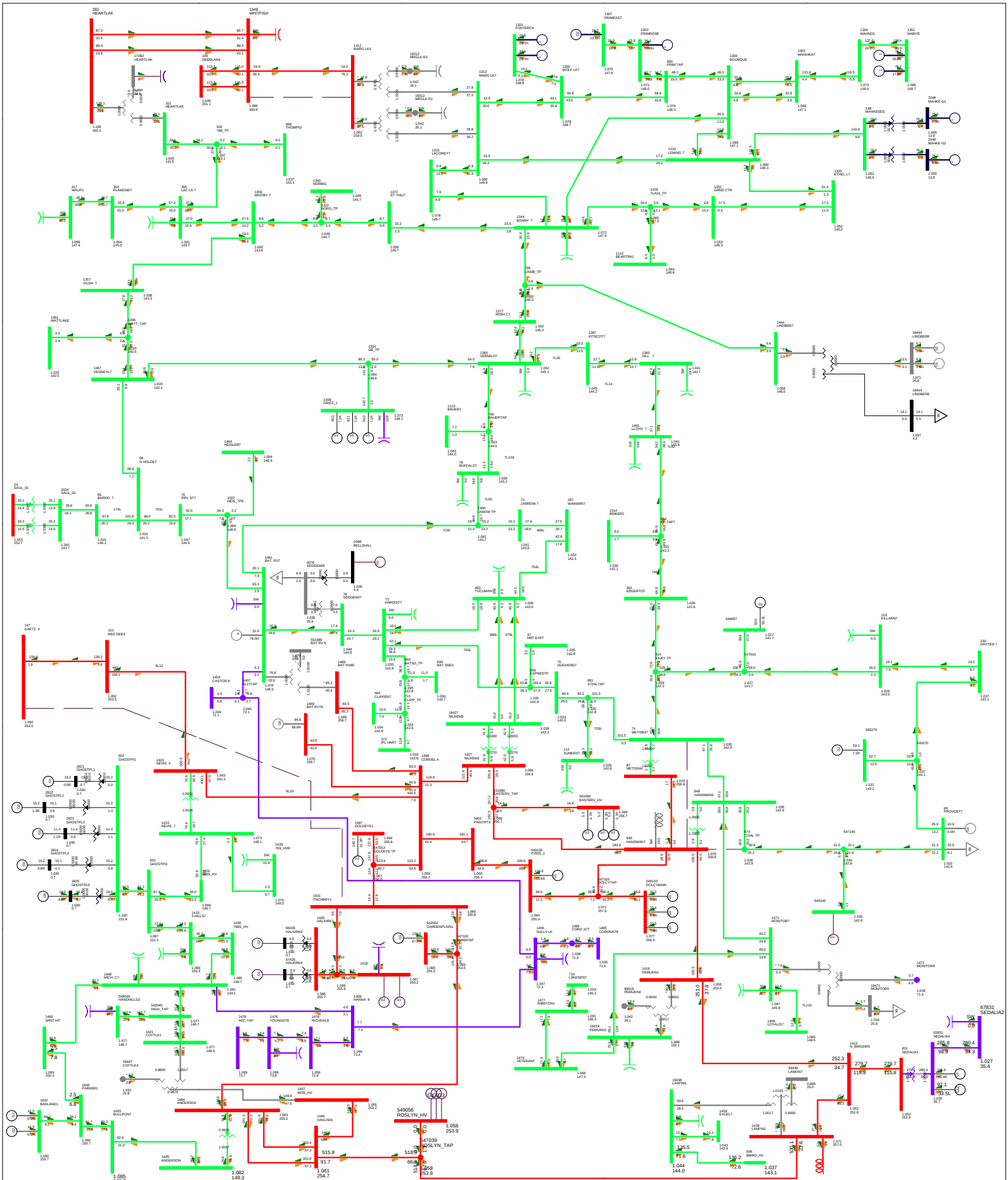
2028SP-woCETO PRE-PROJ

Base Case

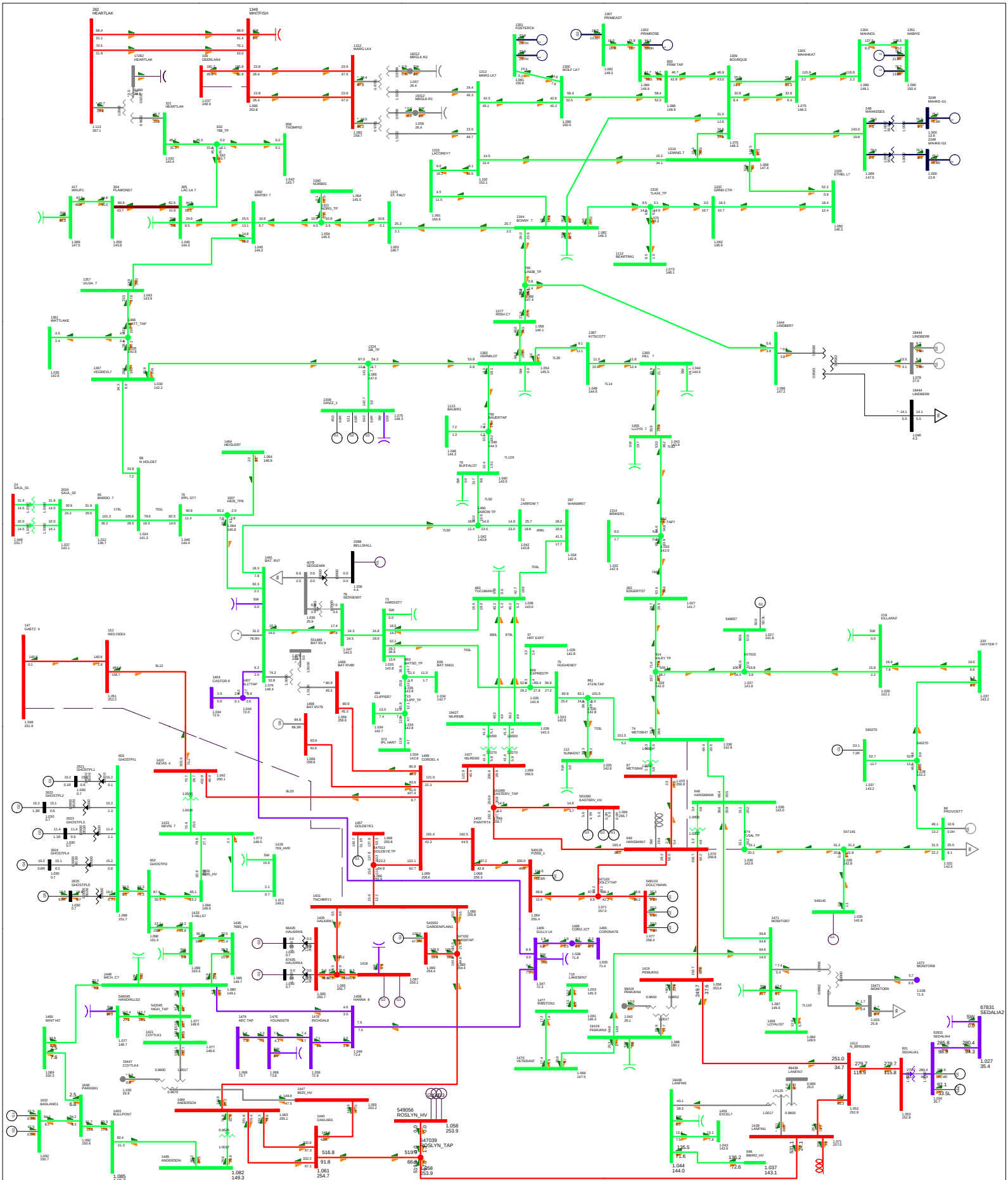
P2034 Cold Lake Area Cogen

Bus - VOLTAGE (kV/PU)
Branch - MW/Mvar
Equipment - MW/Mvar

100.0%RATEA
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A2- 4	Contingency	Study Case Description	P2034 Cold Lake Area Cogen
	CONT 013: 9L37 (826S Marguerite Lake - 825S Whitefish Lake)	2028SP-woCETO PRE-PROJ Base Case	Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A2- 4

Contingency

CONT 014: 9L960 (13S Deerland - 825S Whitefish Lake)

Study Case Description

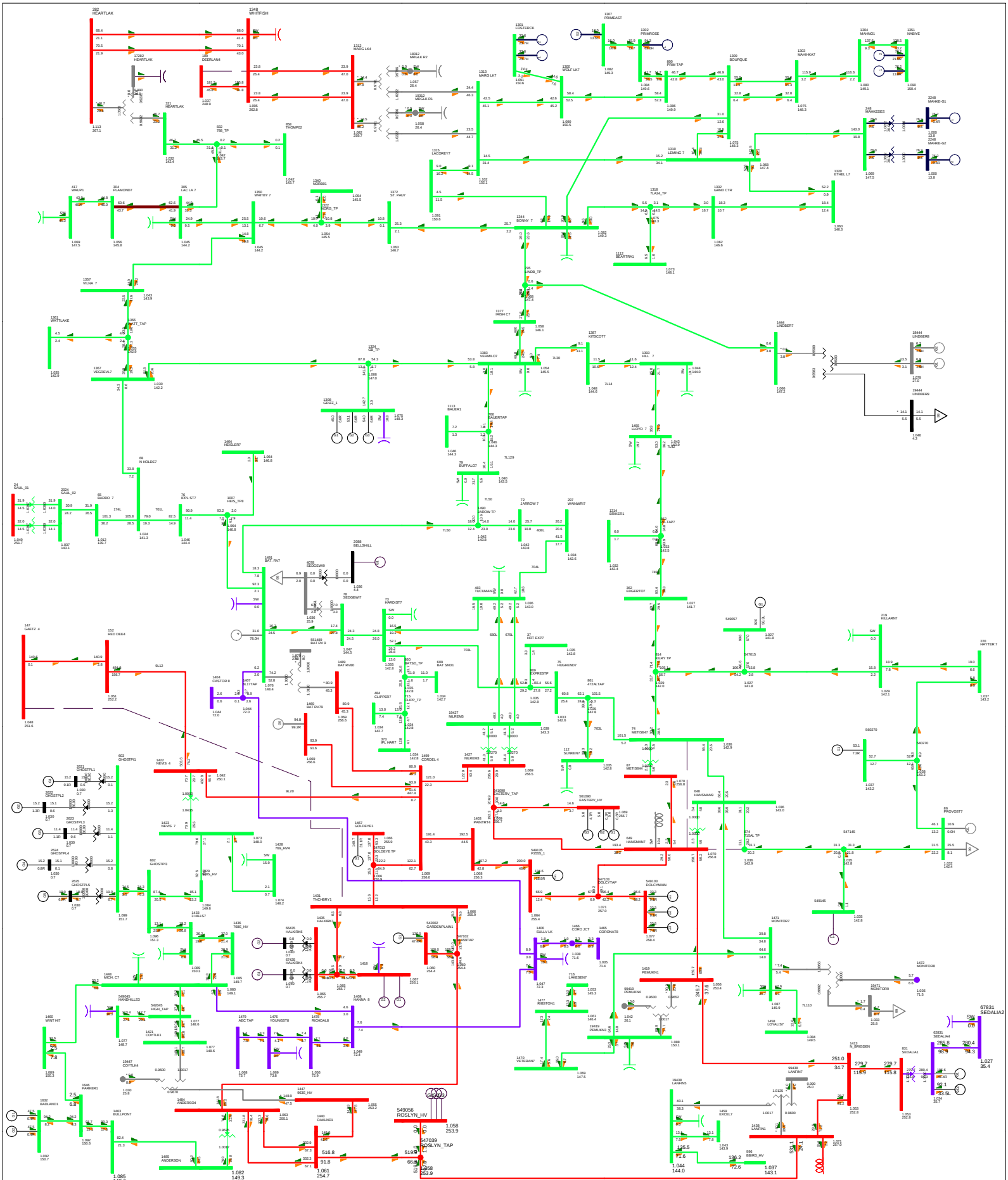
2028SP-woCETO PRE-PROJ

Base Case

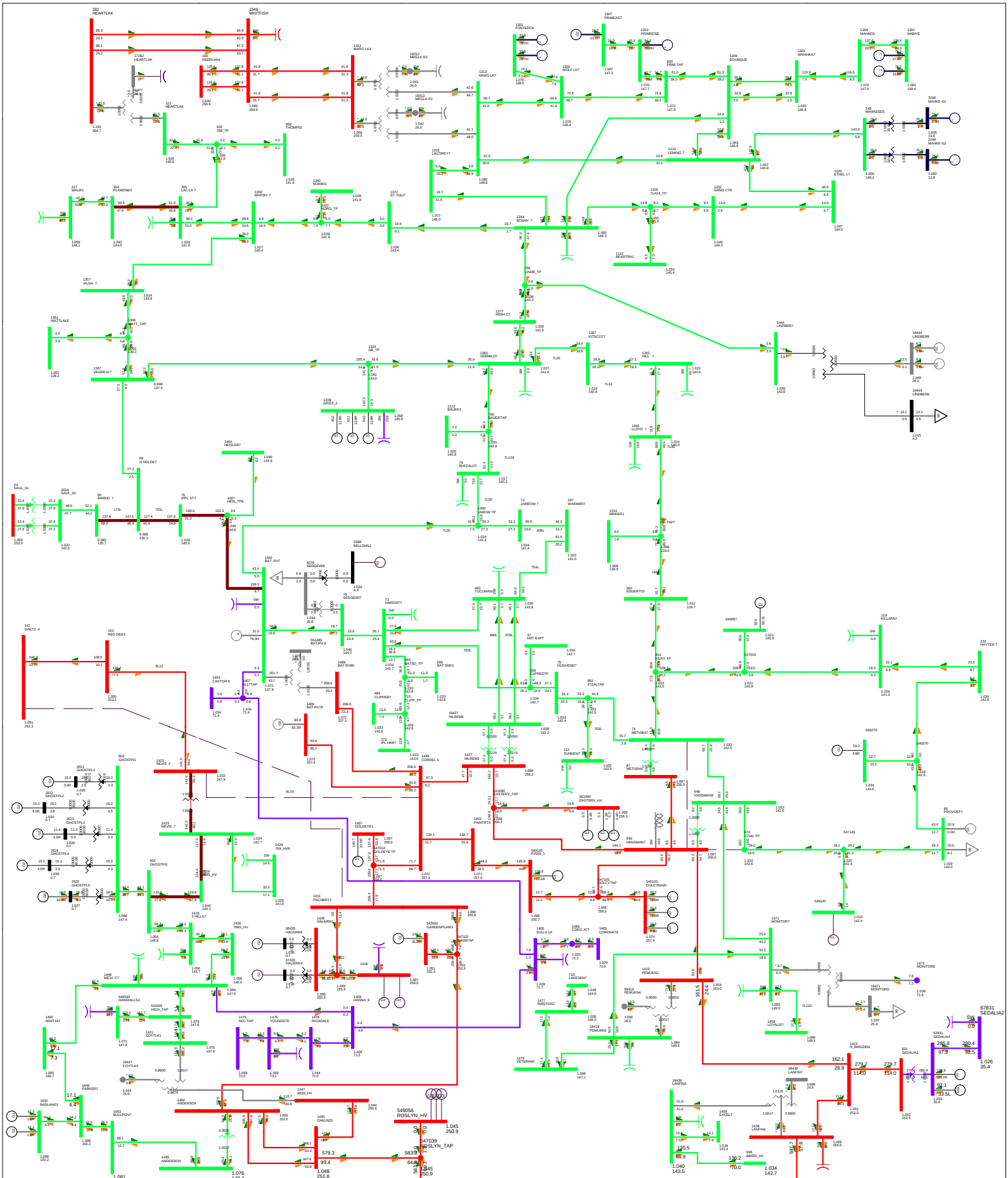
P2034 Cold Lake Area Cogen

Bus - VOLTAGE (kV/PU)
Branch - MW/Mvar
Equipment - MW/Mvar

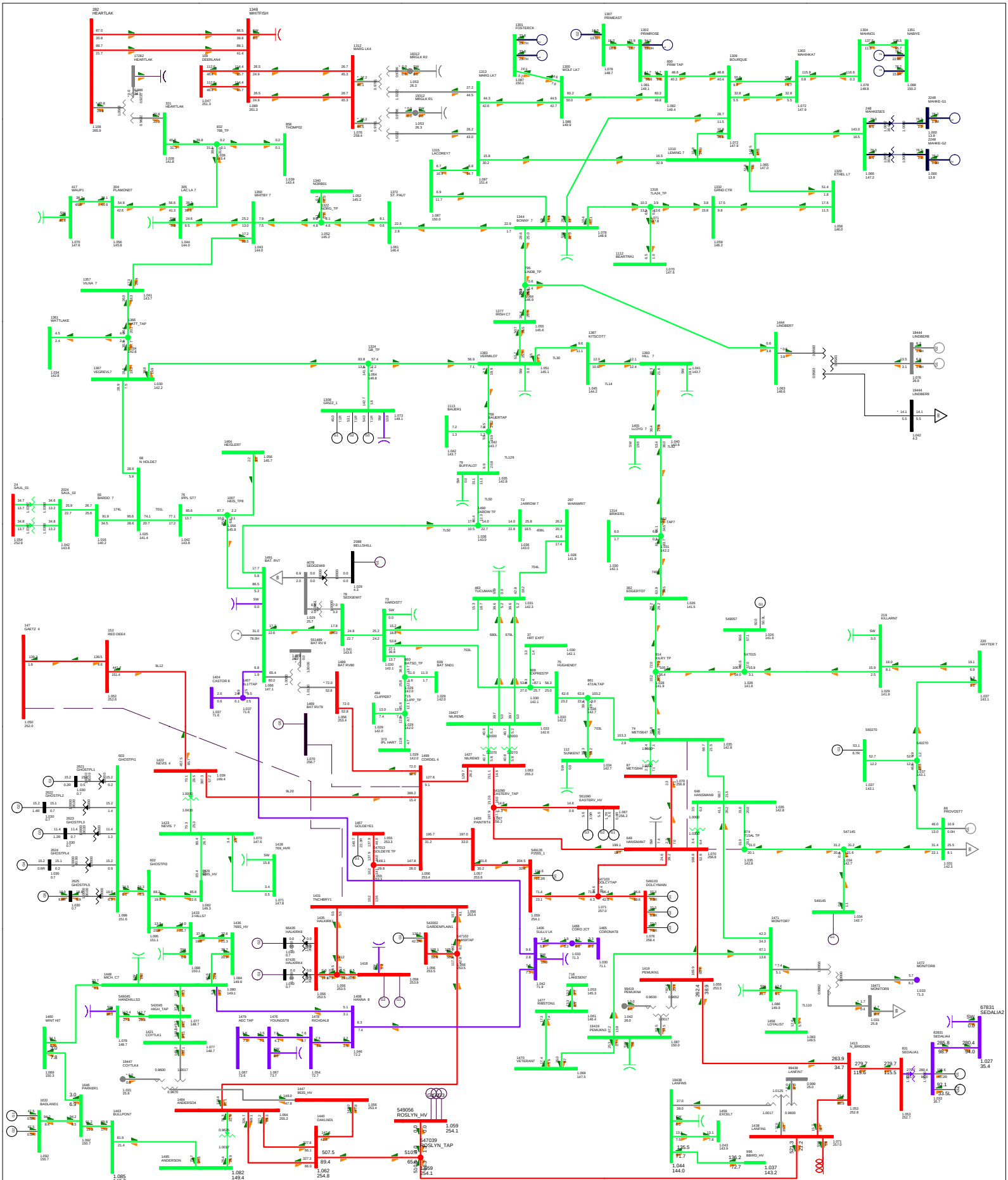
100.0%RATEA
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



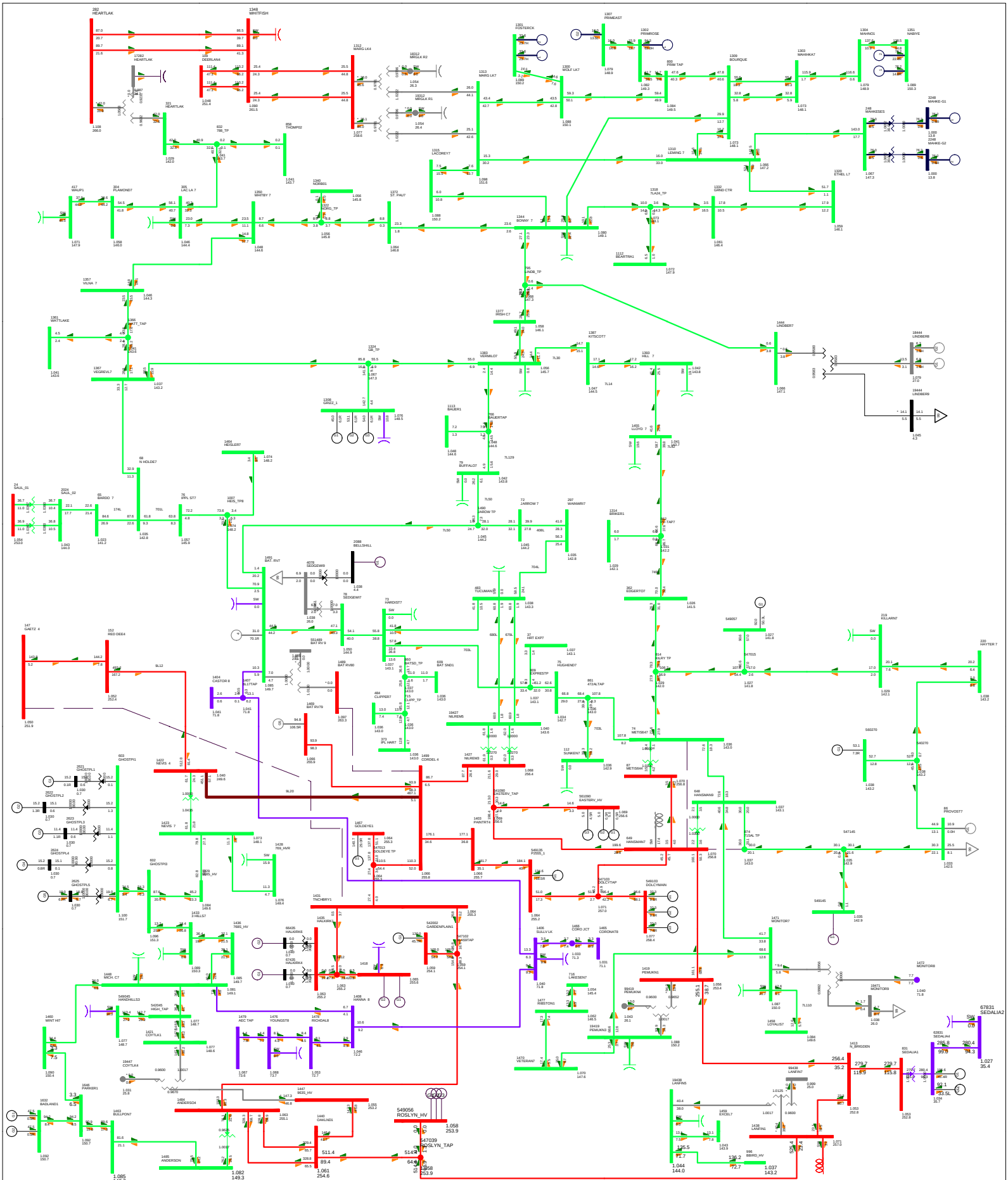
Attachment A2- 4	Contingency	Study Case Description	P2034 Cold Lake Area Cogen
	CONT 015: 9L961 (13S Deerland - 825S Whitefish Lake)	2028SP-woCETO PRE-PROJ Base Case	Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



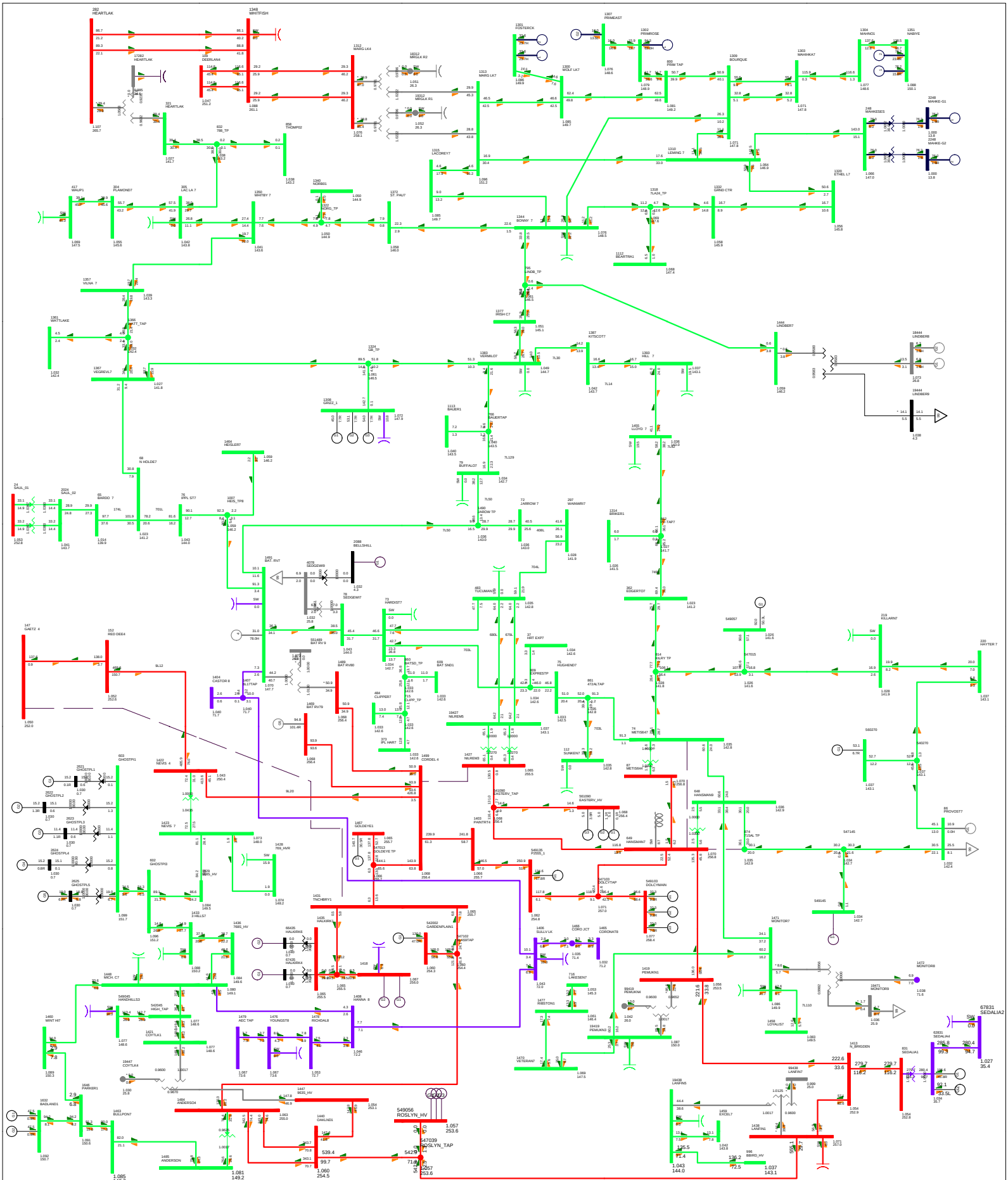
Attachment A2- 4	Contingency	Study Case Description	P2034 Cold Lake Area Cogen
	CONT 016: 9L20 (766S Nevis - 755S Cordel)	2028SP-woCETO PRE-PROJ Base Case	Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



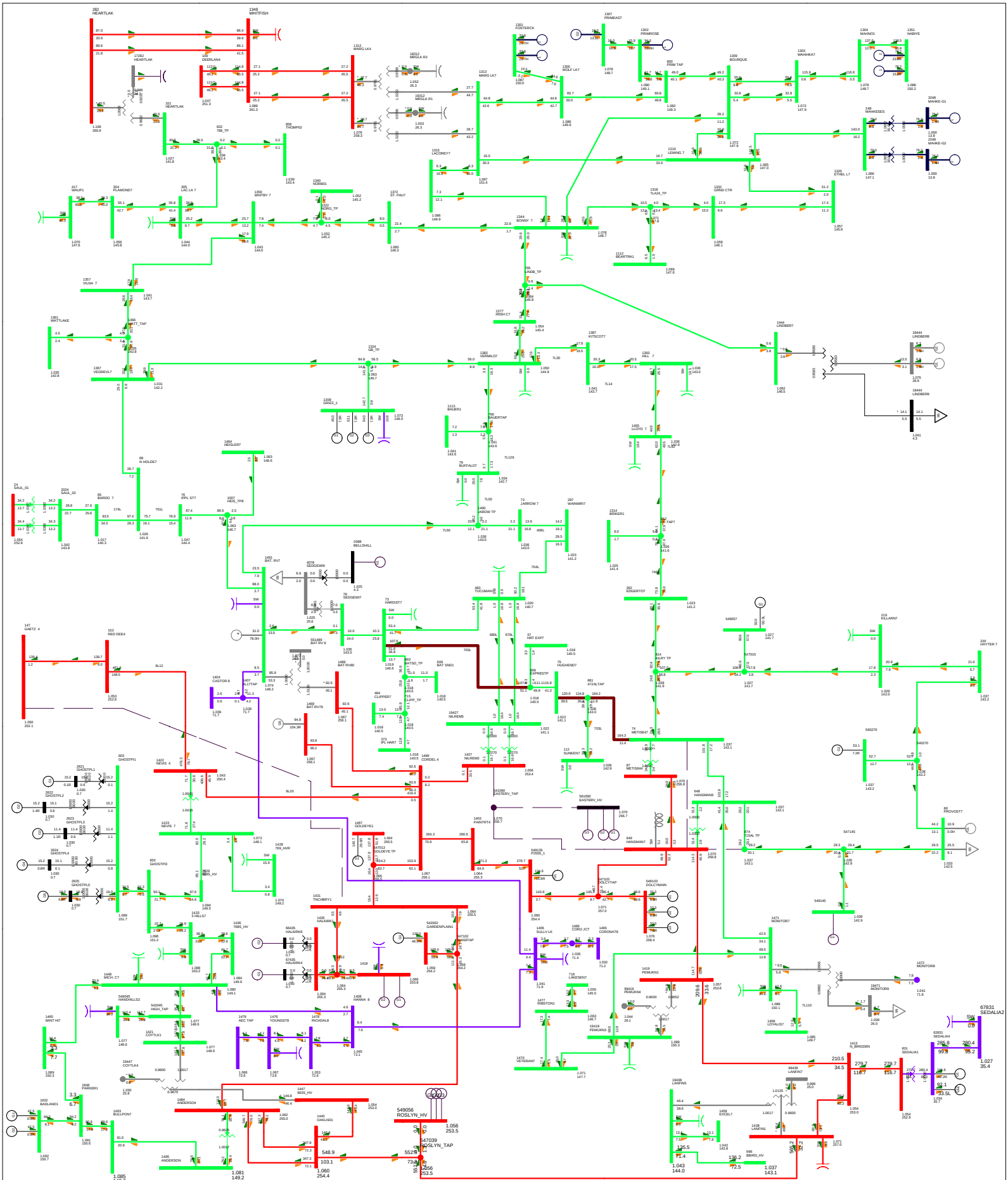
Attachment A2- 4	Contingency	Study Case Description	P2034 Cold Lake Area Cogen
	CONT 017: 9L79 (757S Battle River - 755S Cordel)	2028SP-woCETO PRE-PROJ Base Case	Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A2- 4	Contingency	Study Case Description	P2034 Cold Lake Area Cogen
	CONT 018: 9L80 (757S Battle River - 755S Cordel)	2028SP-woCETO PRE-PROJ Base Case	Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A2- 4	Contingency	Study Case Description	P2034 Cold Lake Area Cogen
	CONT 019: 953L (574S Nilrem - 755S Cordel)	2028SP-woCETO PRE-PROJ Base Case	Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A2- 4

Contingency

CONT 020: 1047L (574S Nilrem - P2566 Eastervale Solar - 650S Hansman Lake)

Study Case Description

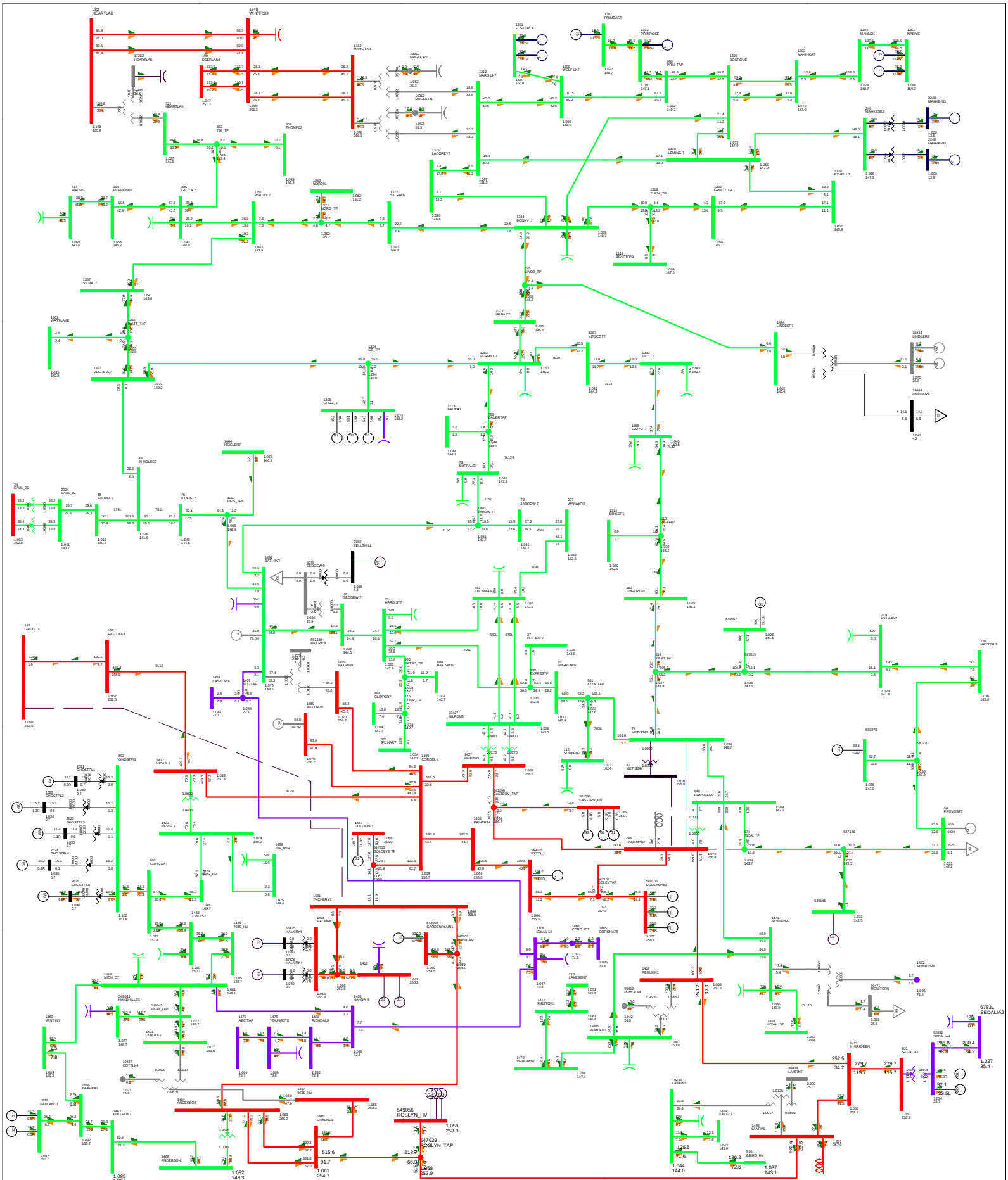
2028SP-woCETO PRE-PROJ

Base Case

P2034 Cold Lake Area Cogen

Bus - VOLTAGE (kV/PU)
Branch - MW/Mvar
Equipment - MW/Mvar

100.0%RATEA
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A2- 4

Contingency

CONT 021: 954L (648S Metiskow - 650S Hansman Lake)

Study Case Description

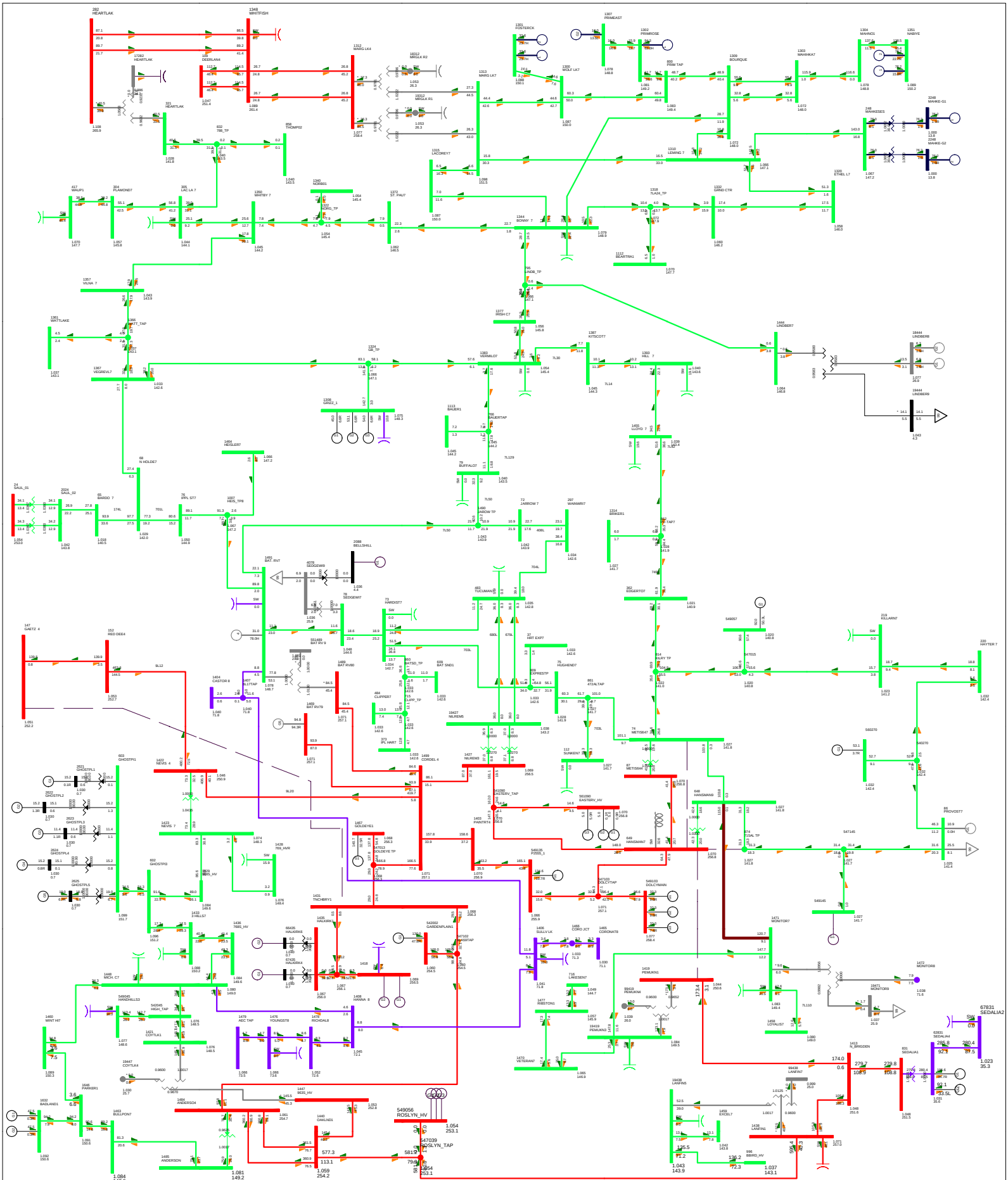
2028SP-woCETO PRE-PROJ

Base Case

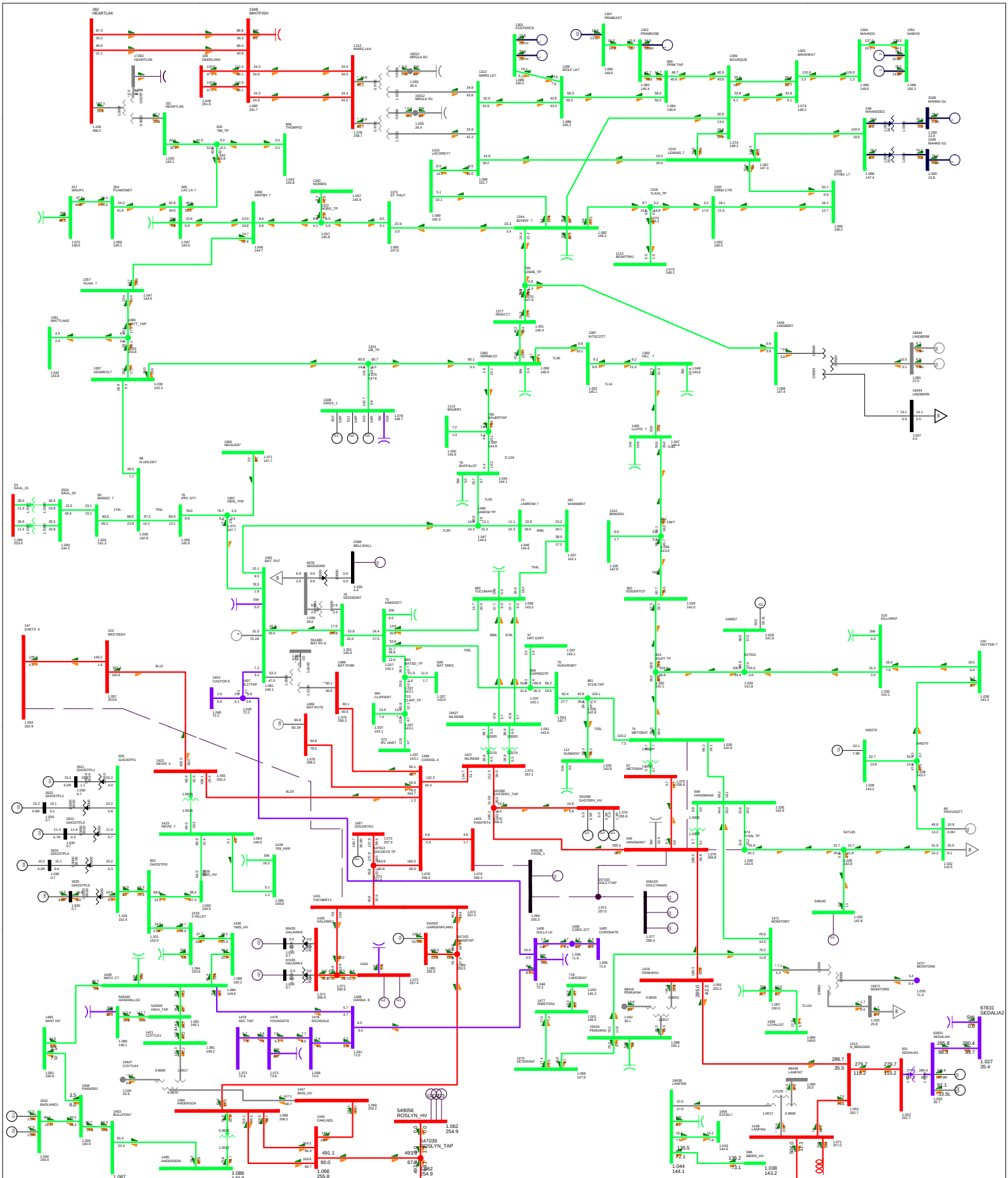
P2034 Cold Lake Area Cogen

Bus - VOLTAGE (kV/PU)
Branch - MW/Mvar
Equipment - MW/Mvar

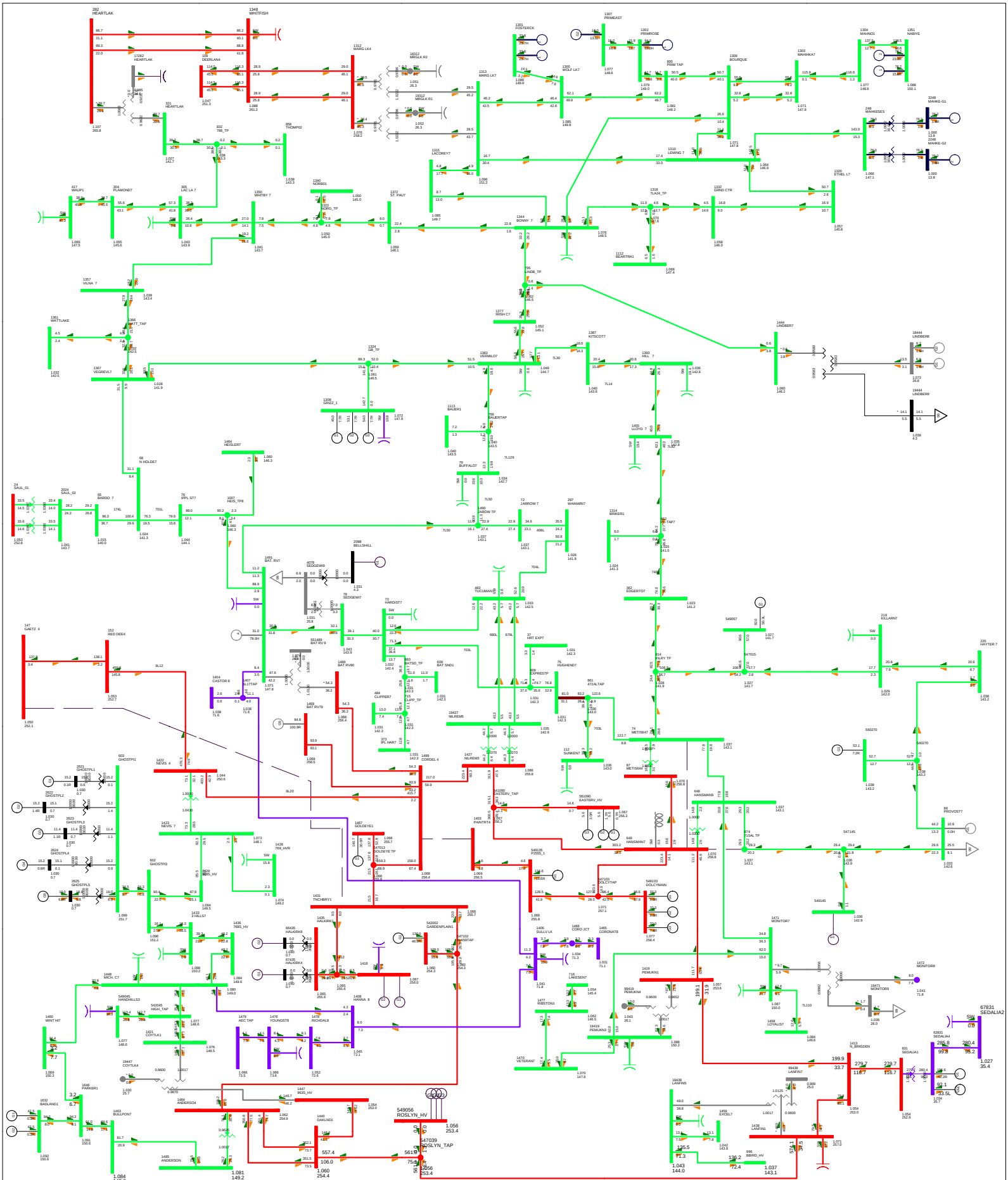
100.0%RATEA
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



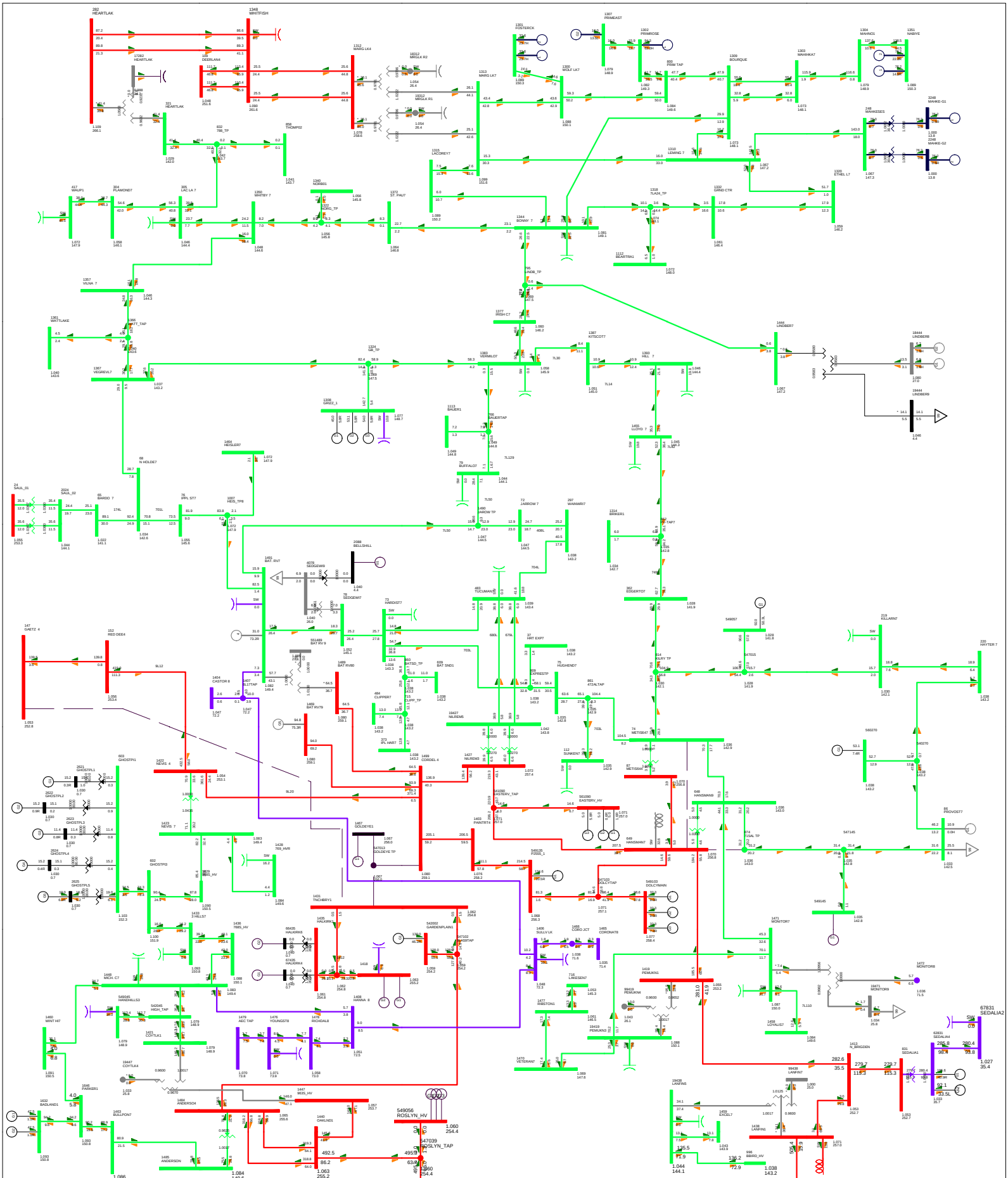
Attachment A2- 4	Contingency	Study Case Description	P2034 Cold Lake Area Cogen
	CONT 022: 9L966 (650S Hansman Lake - 932S Pemukan)	2028SP-woCETO PRE-PROJ Base Case	Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A2- 4	Contingency	Study Case Description	P2034 Cold Lake Area Cogen
	CONT 023: 948L (650S Hansman Lake - P2553 Dolcy Solar - P2555 Rolling Hills Wind - 863S [illegible])	PRE-PROJ Base Case	Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A2- 4	Contingency	Study Case Description	P2034 Cold Lake Area Cogen
	CONT 024: 9L27 (863S Paintearth - 755S Cordel)	2028SP-woCETO PRE-PROJ Base Case	Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A2- 4

Contingency

CONT 025: 9L16 (755S Cordel - P2441 Halkirk 2 Wind - 972S Tinchebray)

Study Case Description

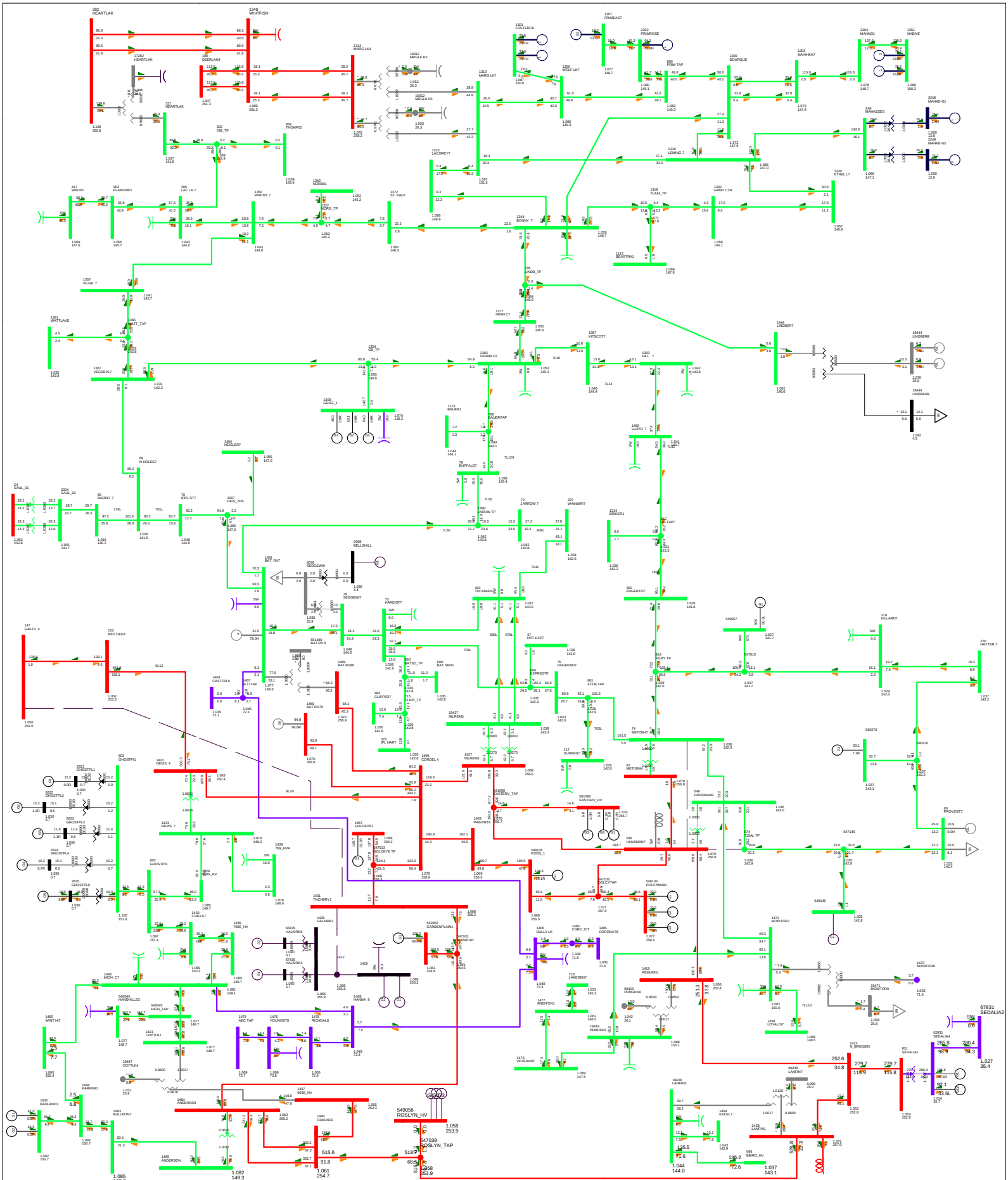
2028SP-woCETO PRE-PROJ

Base Case

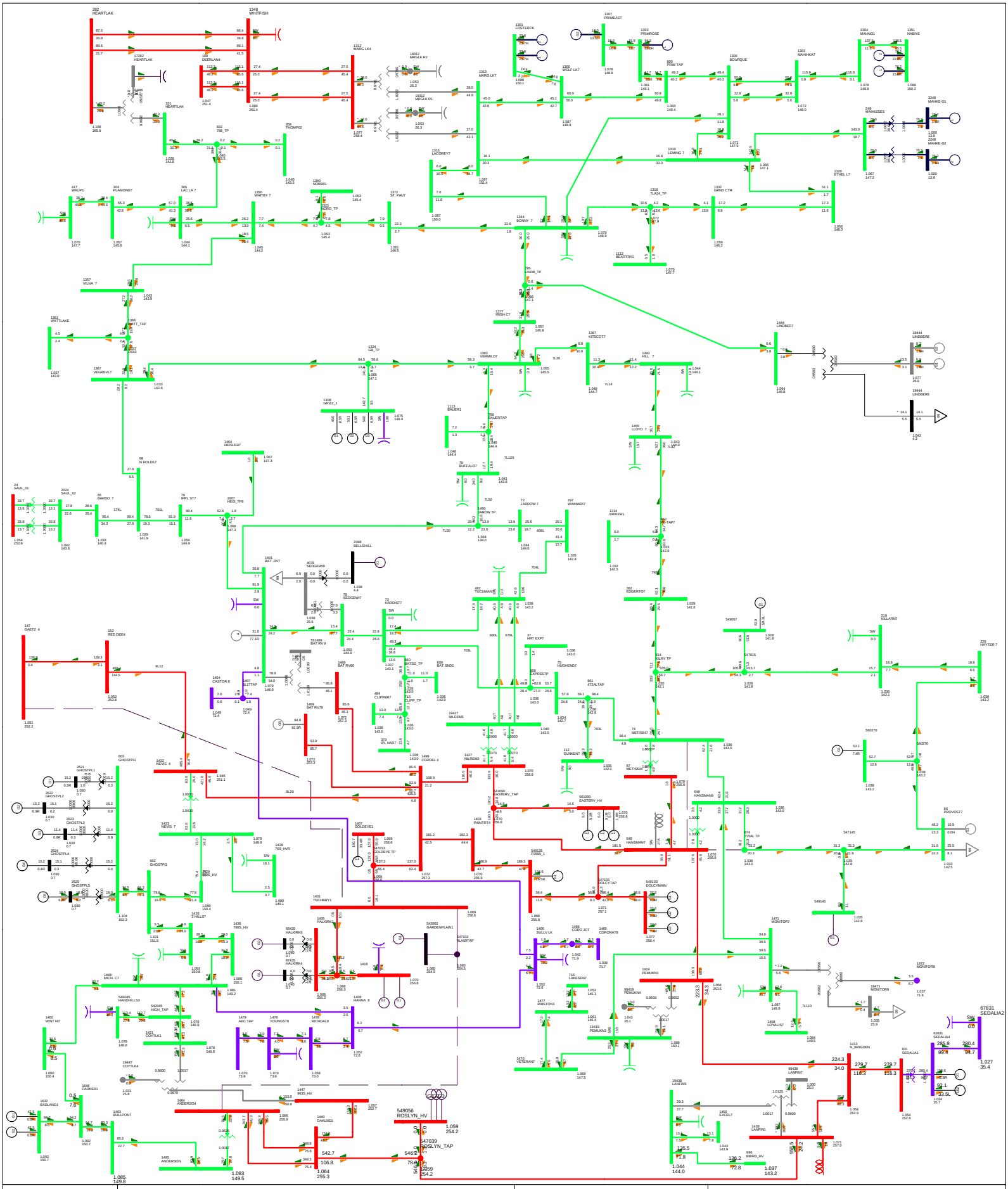
P2034 Cold Lake Area Cogen

Bus - VOLTAGE (kV/PU)
Branch - MW/Mvar
Equipment - MW/Mvar

100.0%RATEA
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A2- 4	Contingency	Study Case Description	P2034 Cold Lake Area Cogen
	CONT 026: 9L93 (972S Tinchebray - 615S Halkirk - 973S Lanes Lake)	2028SP-woCETO PRE-PROJ Base Case	Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A2- 4

Contingency

CONT 027: 9L59 (972S Tinchebray - 1045S Garden Plain - 801S Anderson)

Study Case Description

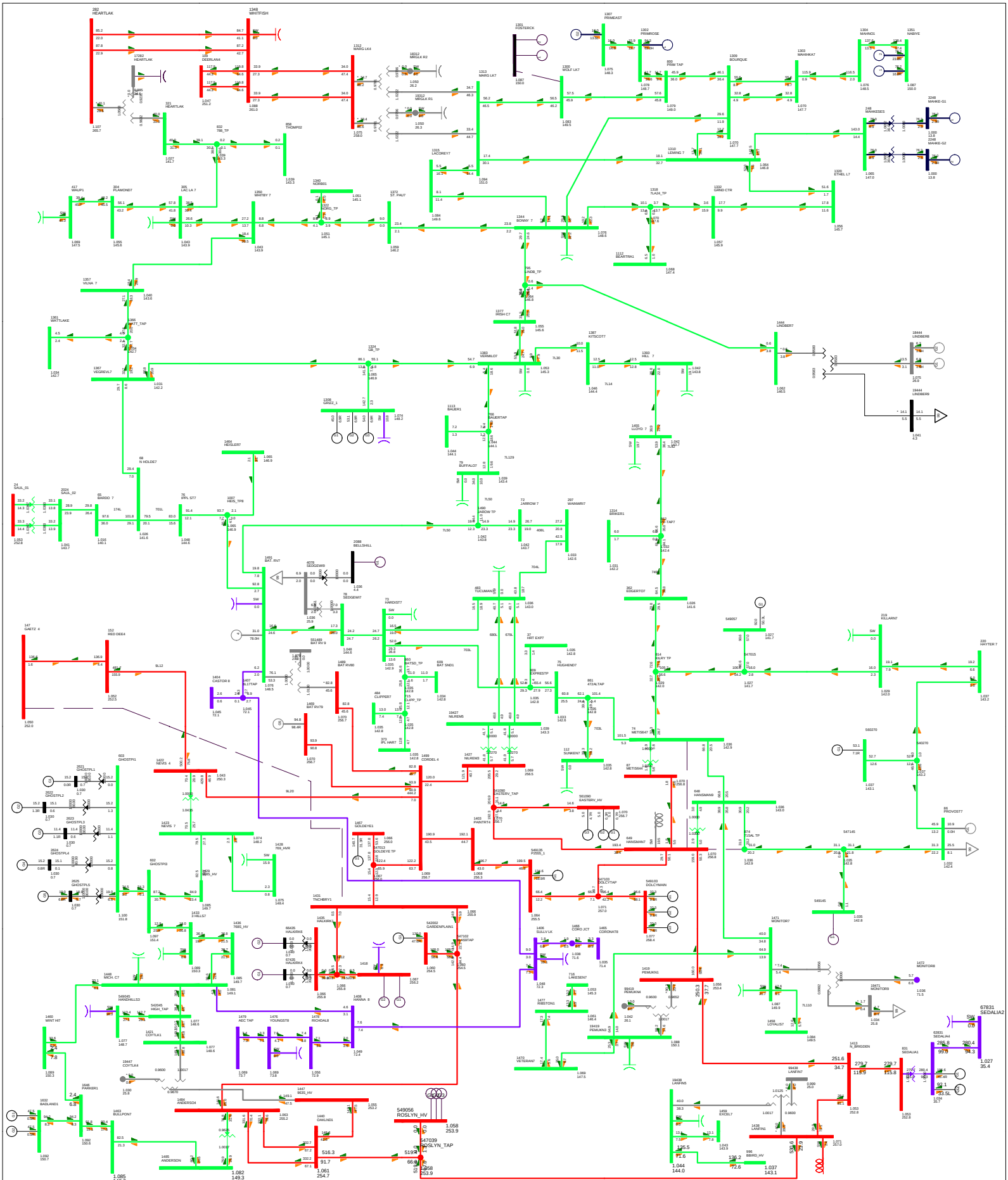
2028SP-woCETO PRE-PROJ

Base Case

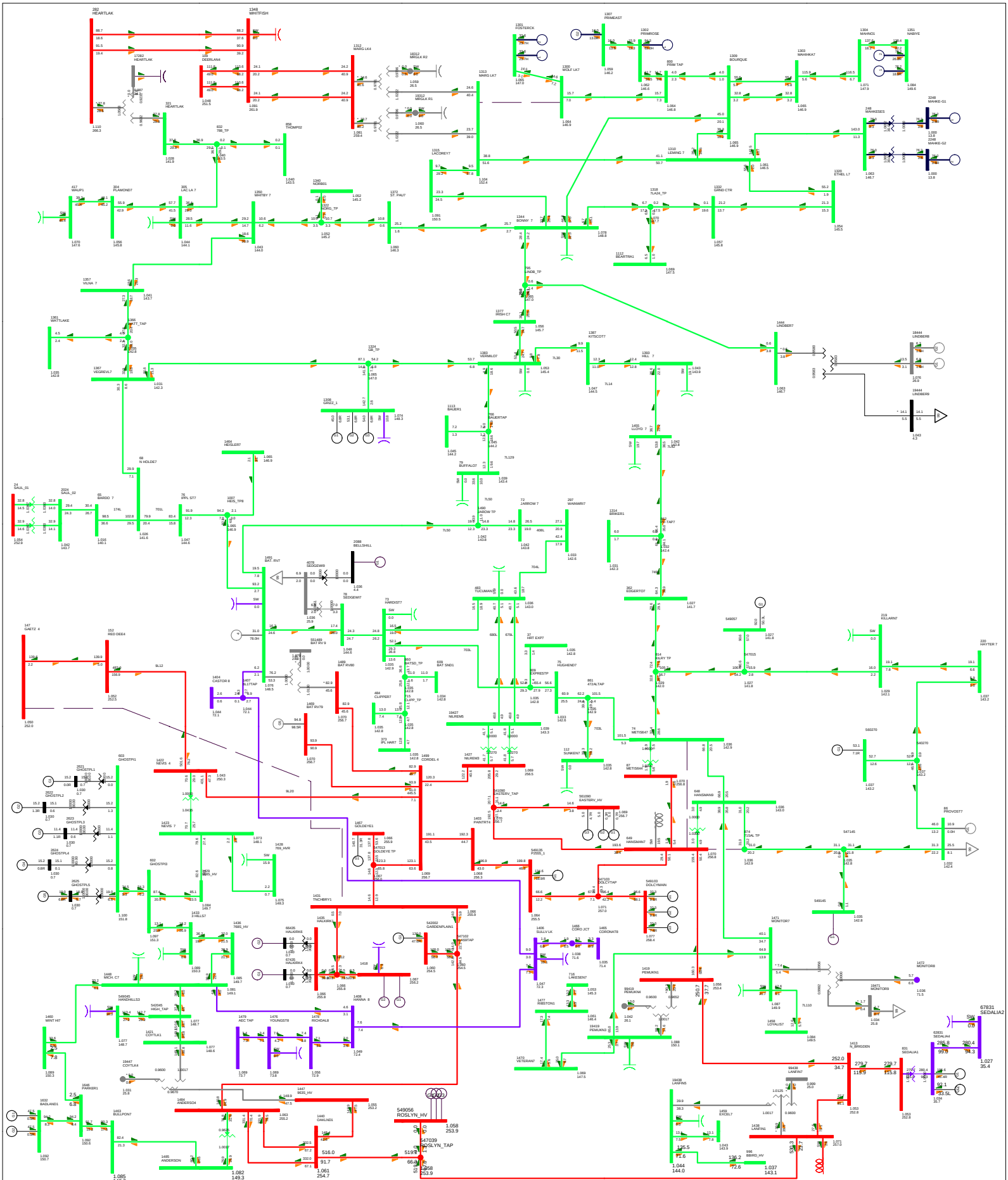
P2034 Cold Lake Area Cogen

Bus - VOLTAGE (kV/PU)
Branch - MW/Mvar
Equipment - MW/Mvar

100.0%RATEA
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A2- 4	Contingency	Study Case Description	P2034 Cold Lake Area Cogen
	CONT 028: 7L86 (822S Wolf Lake - 877S Foster Creek)	2028SP-woCETO PRE-PROJ Base Case	Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A2- 4

Contingency

CONT 029: 7L587 (822S Wolf Lake - 826S Marguerite Lake)

Study Case Description

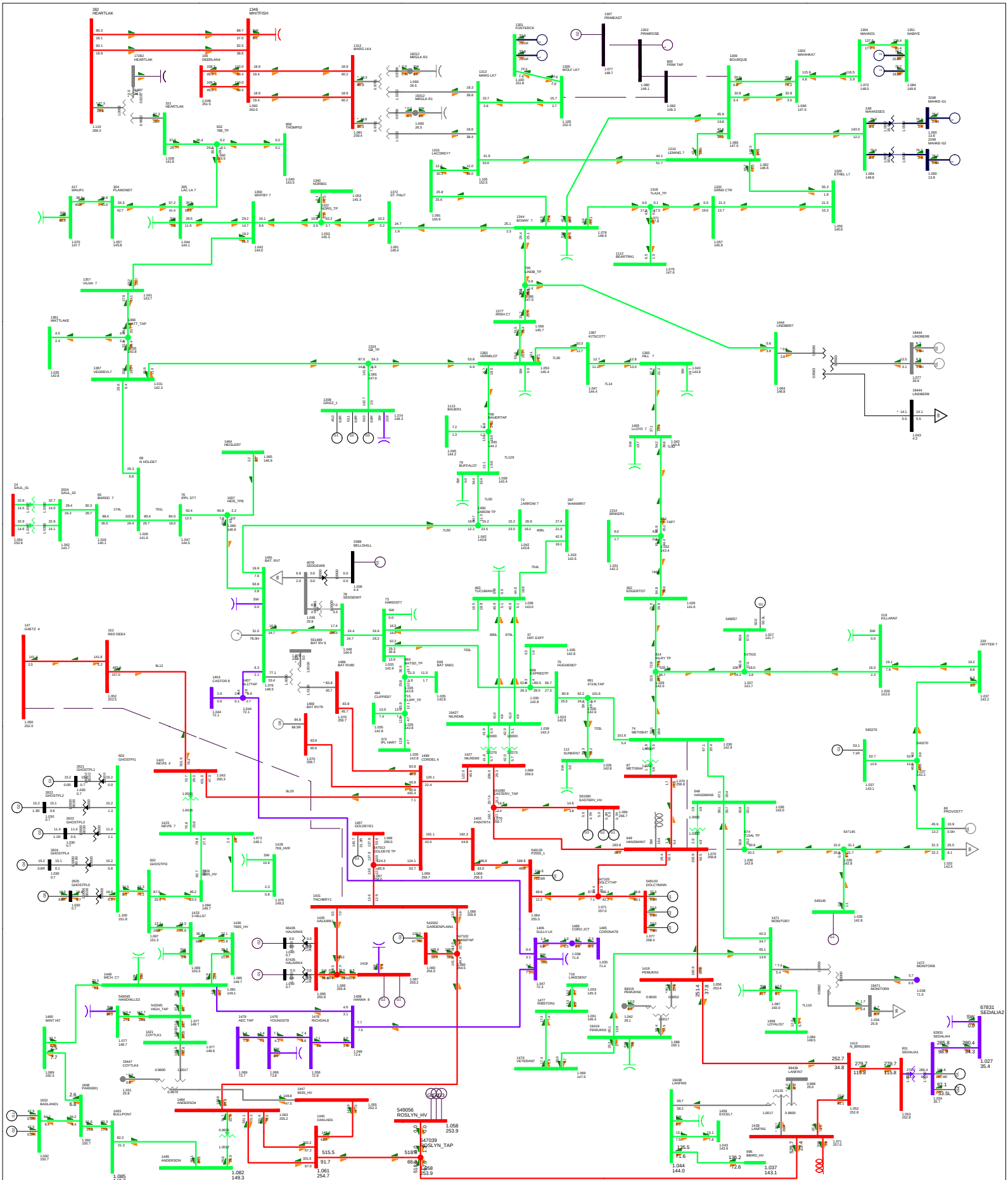
2028SP-woCETO PRE-PROJ

Base Case

P2034 Cold Lake Area Cogen

Bus - VOLTAGE (kV/PU)
Branch - MW/Mvar
Equipment - MW/Mvar

100.0%RATEA
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A2- 4

Contingency

CONT 030: 7L574 (822S Wolf Lake - 859S Primrose - 970S Bourque)

Study Case Description

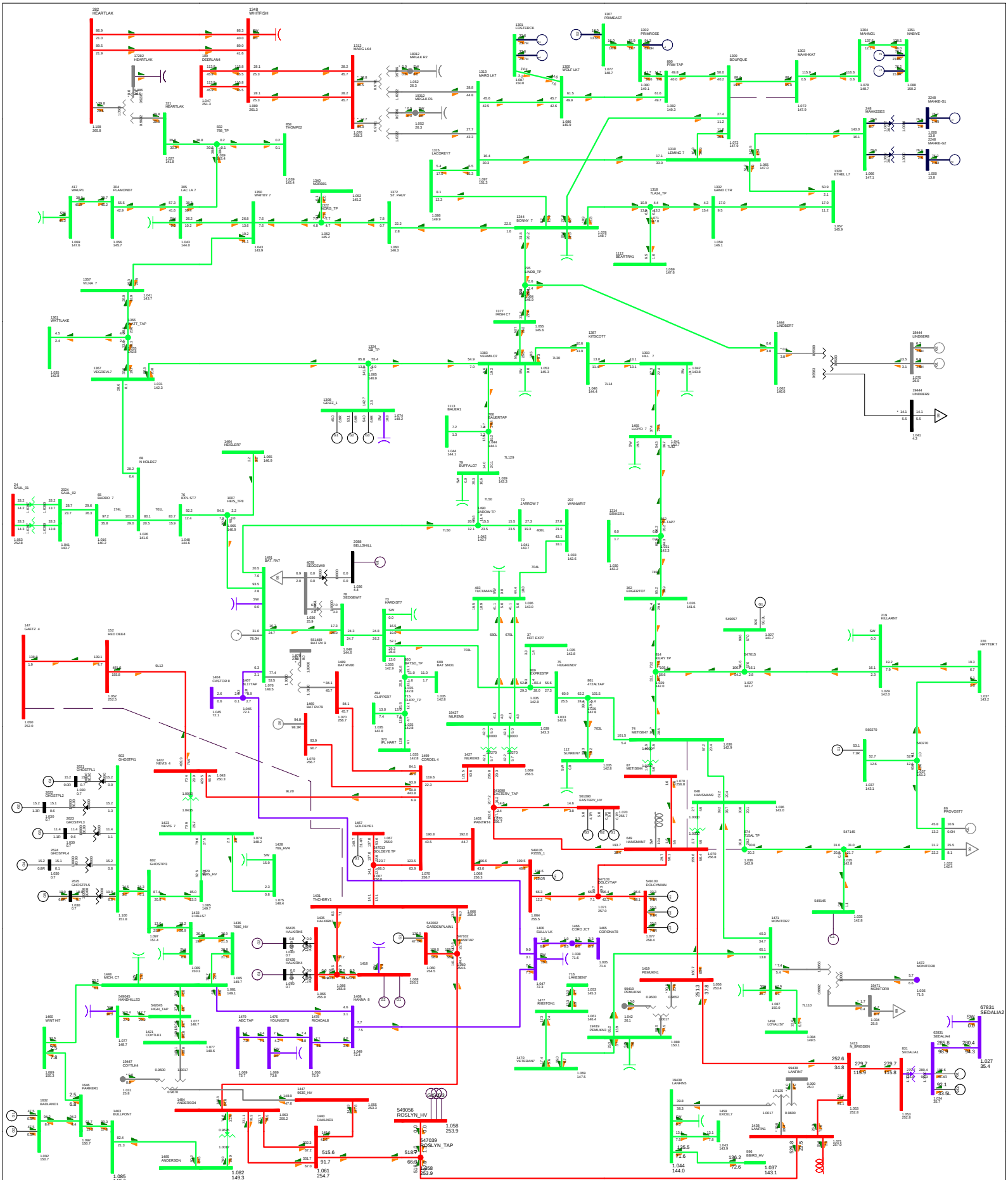
2028SP-woCETO PRE-PROJ

Base Case

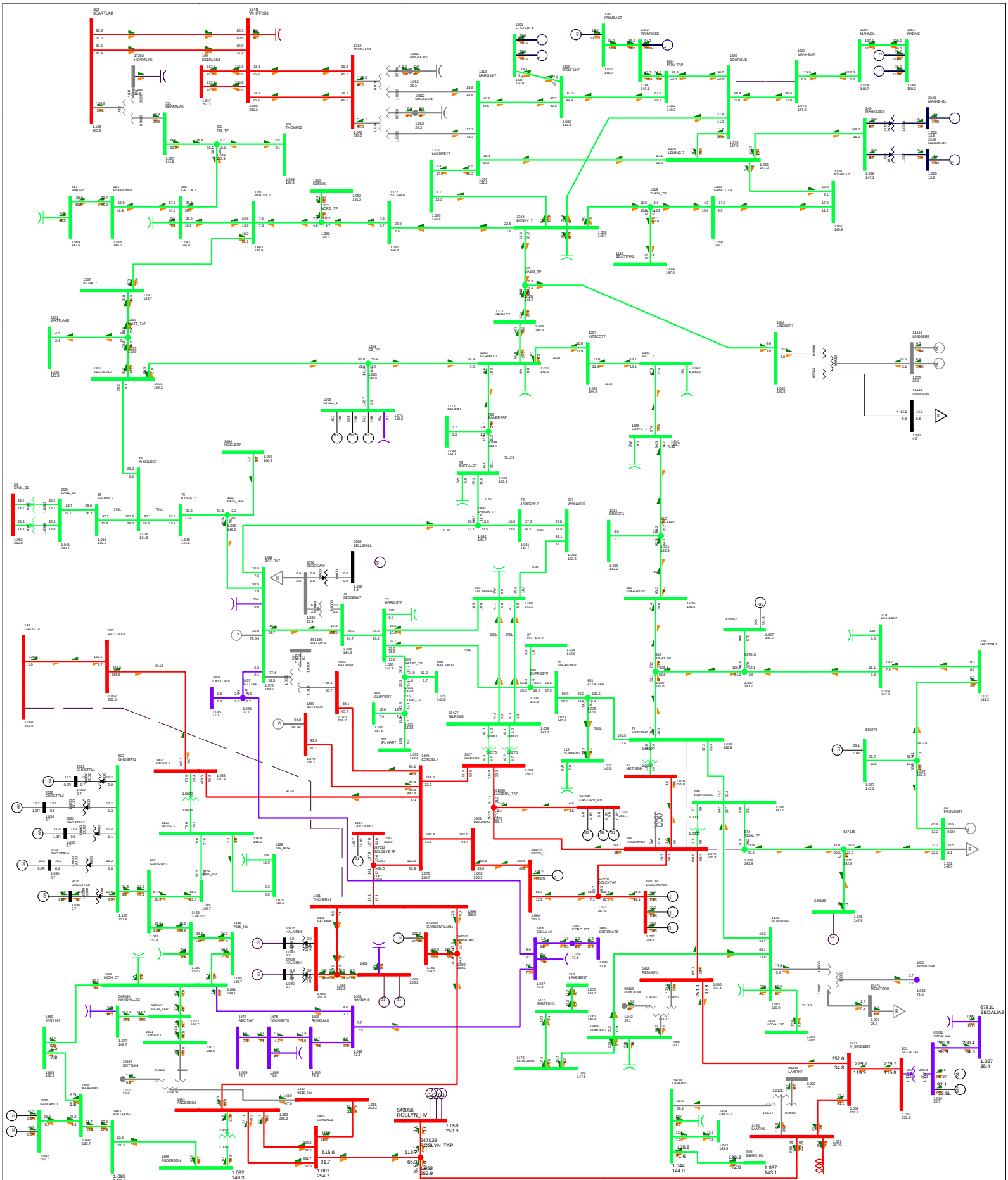
P2034 Cold Lake Area Cogen

Bus - VOLTAGE (kV/PU)
Branch - MW/Mvar
Equipment - MW/Mvar

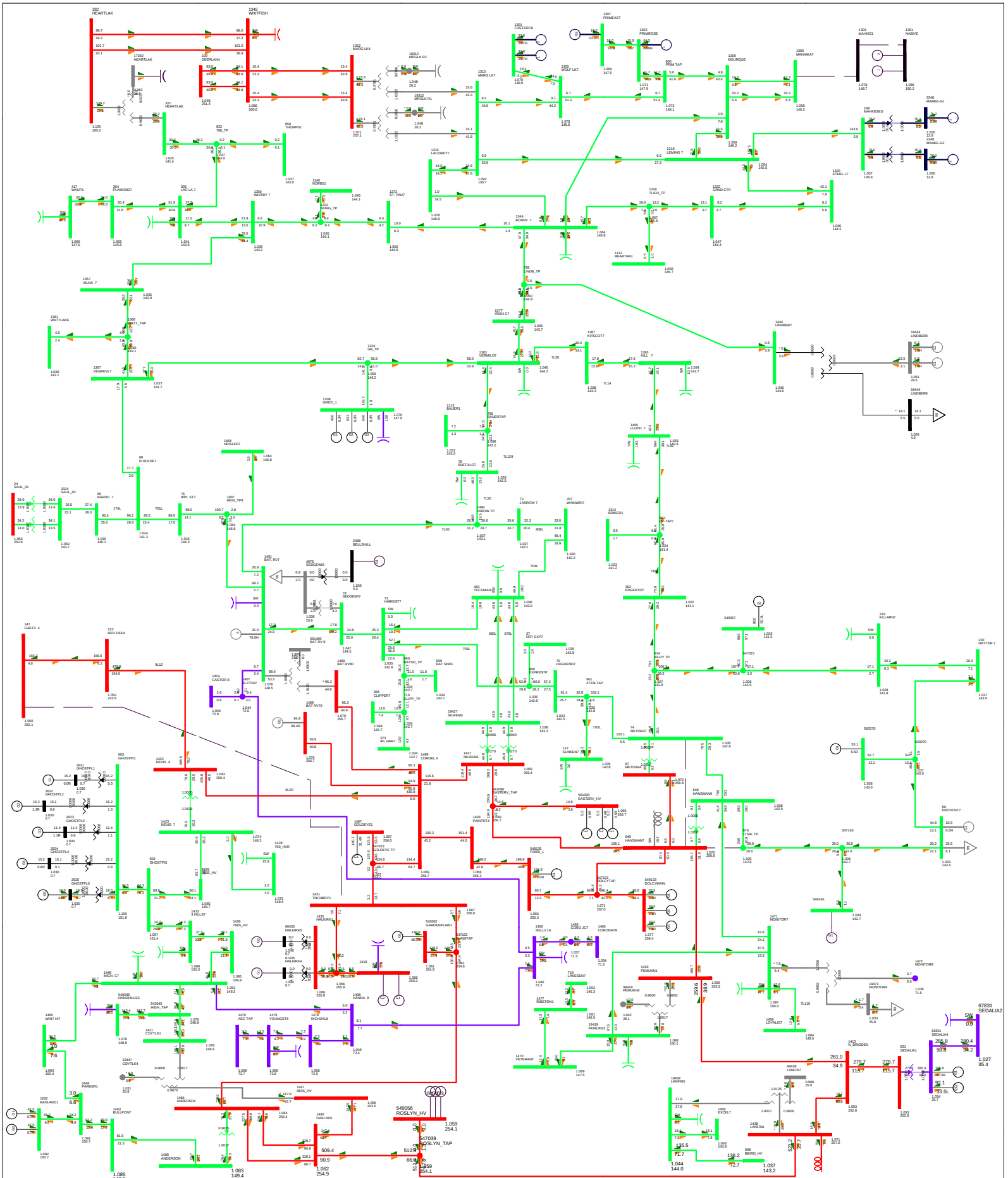
100.0%RATEA
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A2- 4	**Contingency** CONT 031: 7L157 (837S Mahihkan - 970S Bourque)	**Study Case Description** 2028SP-woCETO PRE-PROJ Base Case	**P2034 Cold Lake Area Cogen** Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A2- 4	Contingency	Study Case Description	P2034 Cold Lake Area Cogen
	CONT 032: 7L160 (837S Mahihkan - 970S Bourque)	2028SP-woCETO PRE-PROJ Base Case	Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A2- 4

Contingency

CONT 033: 7L105 (837S Mahihkan - 909S Mahno)

Study Case Description

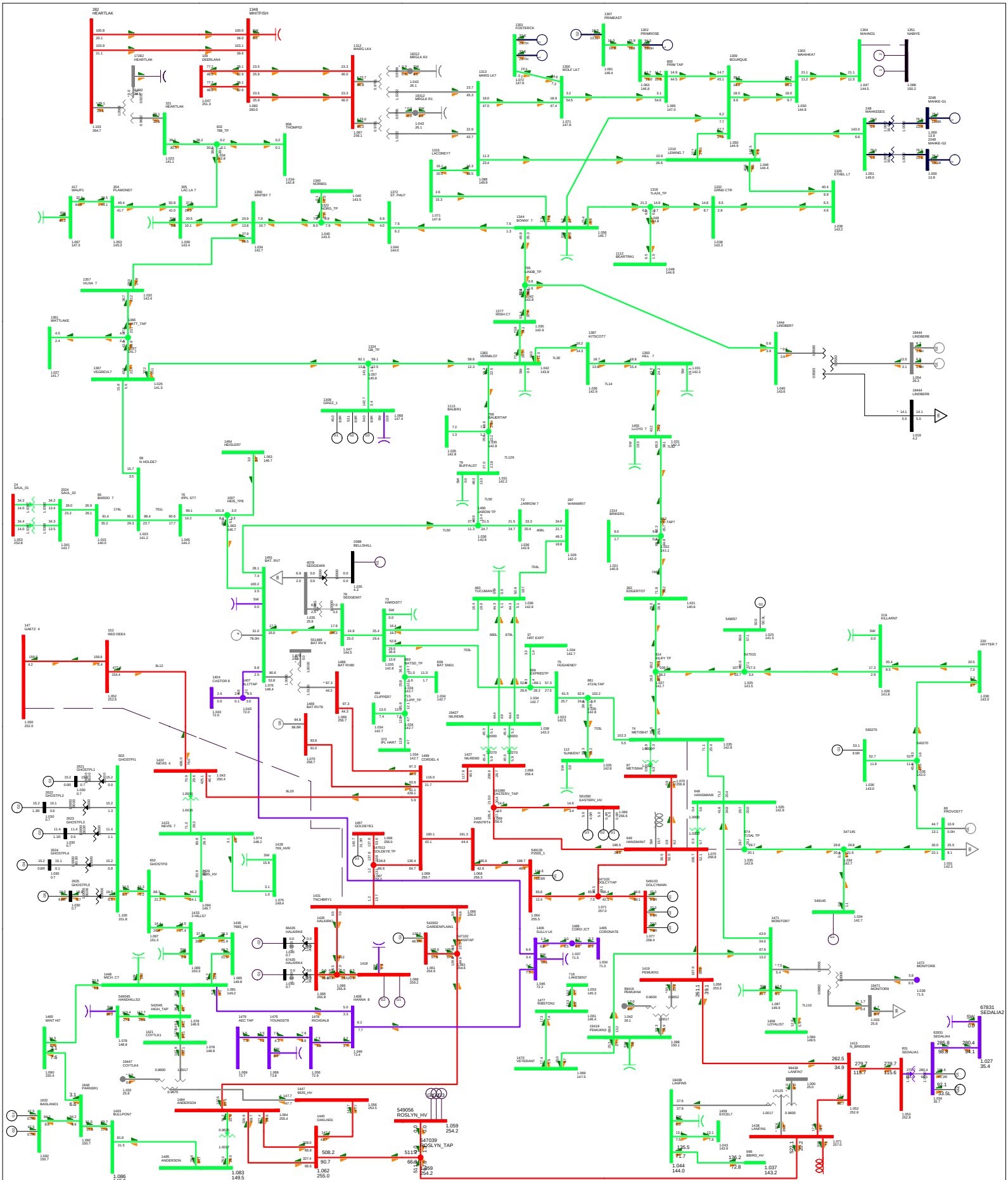
2028SP-woCETO PRE-PROJ

Base Case

P2034 Cold Lake Area Cogen

Bus - VOLTAGE (kV/PU)
Branch - MW/Mvar
Equipment - MW/Mvar

100.0%RATEA
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A2- 4

Contingency

CONT 034: 7L161 (909S Mahno - 942S Nabiye)

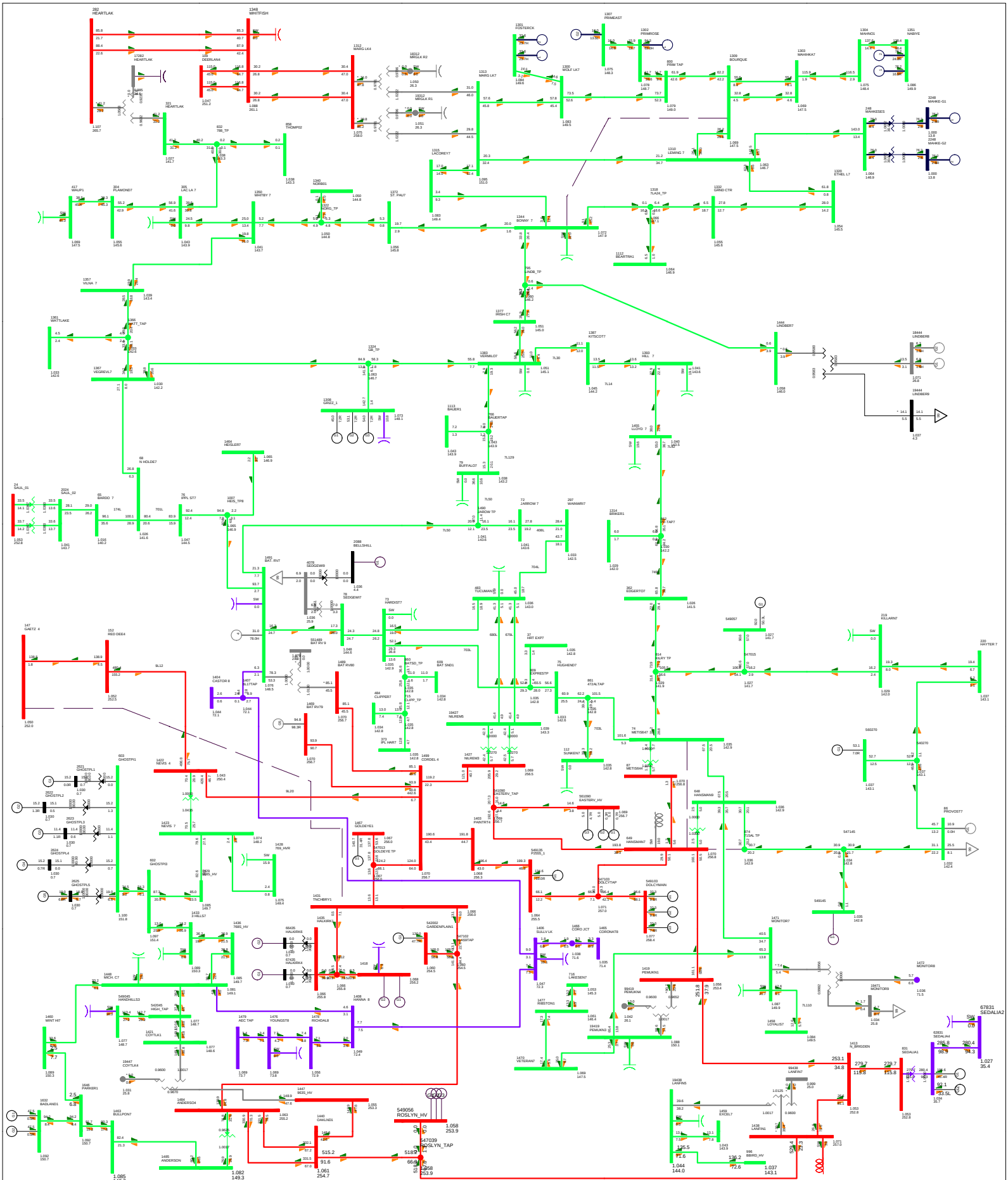
Study Case Description

2028SP-woCETO PRE-PROJ

Base Case

P2034 Cold Lake Area Cogen

Bus - VOLTAGE (kV/PU)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%RATEA
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A2- 4

Contingency

CONT 035: 7L146 (970S Bourque - 700S Bonnyville)

Study Case Description

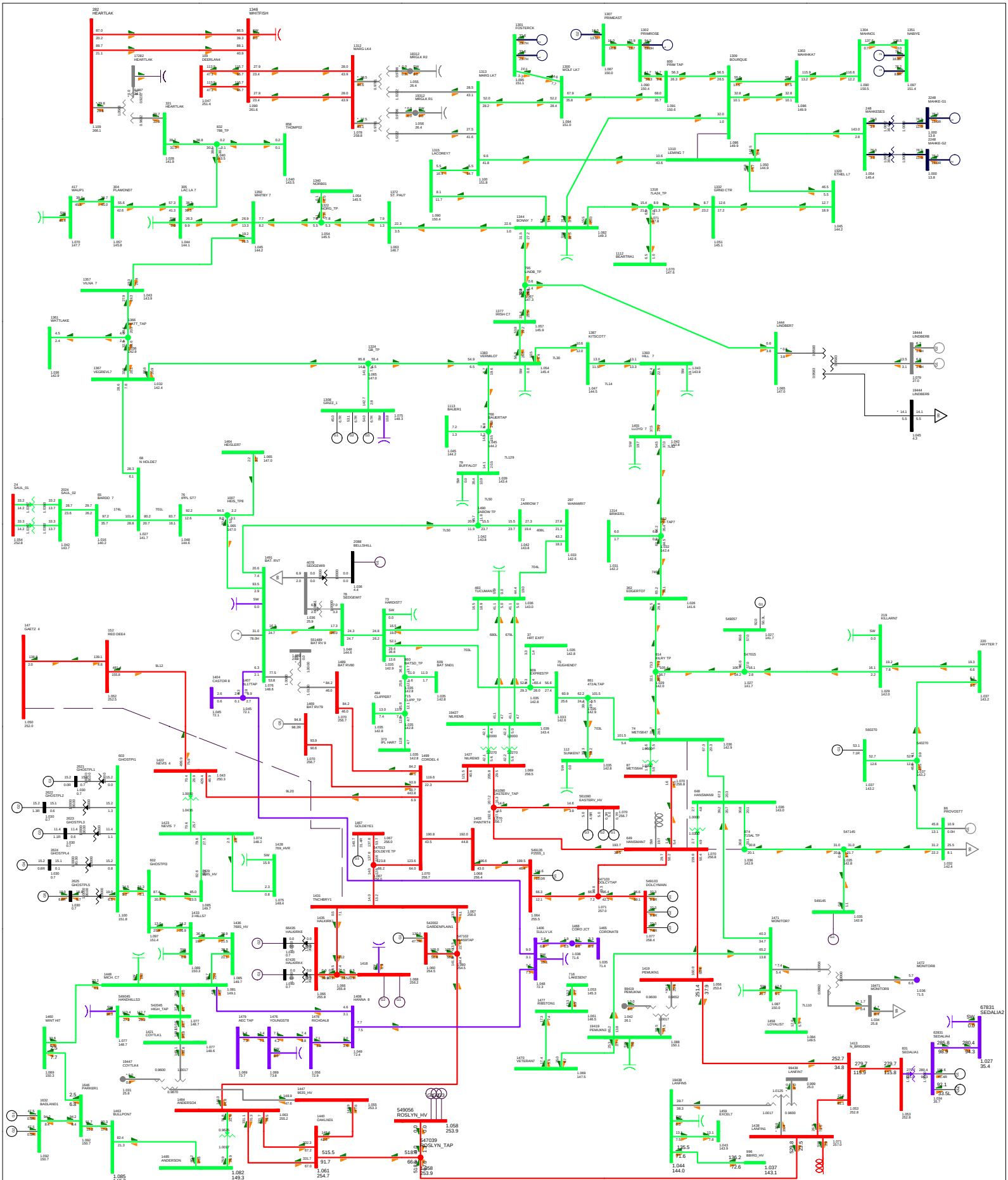
2028SP-woCETO PRE-PROJ

Base Case

P2034 Cold Lake Area Cogen

Bus - VOLTAGE (kV/PU)
Branch - MW/Mvar
Equipment - MW/Mvar

100.0%RATEA
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A2- 4

Contingency

CONT 036: 7L583 (970S Bourque - 715S Leming Lake)

Study Case Description

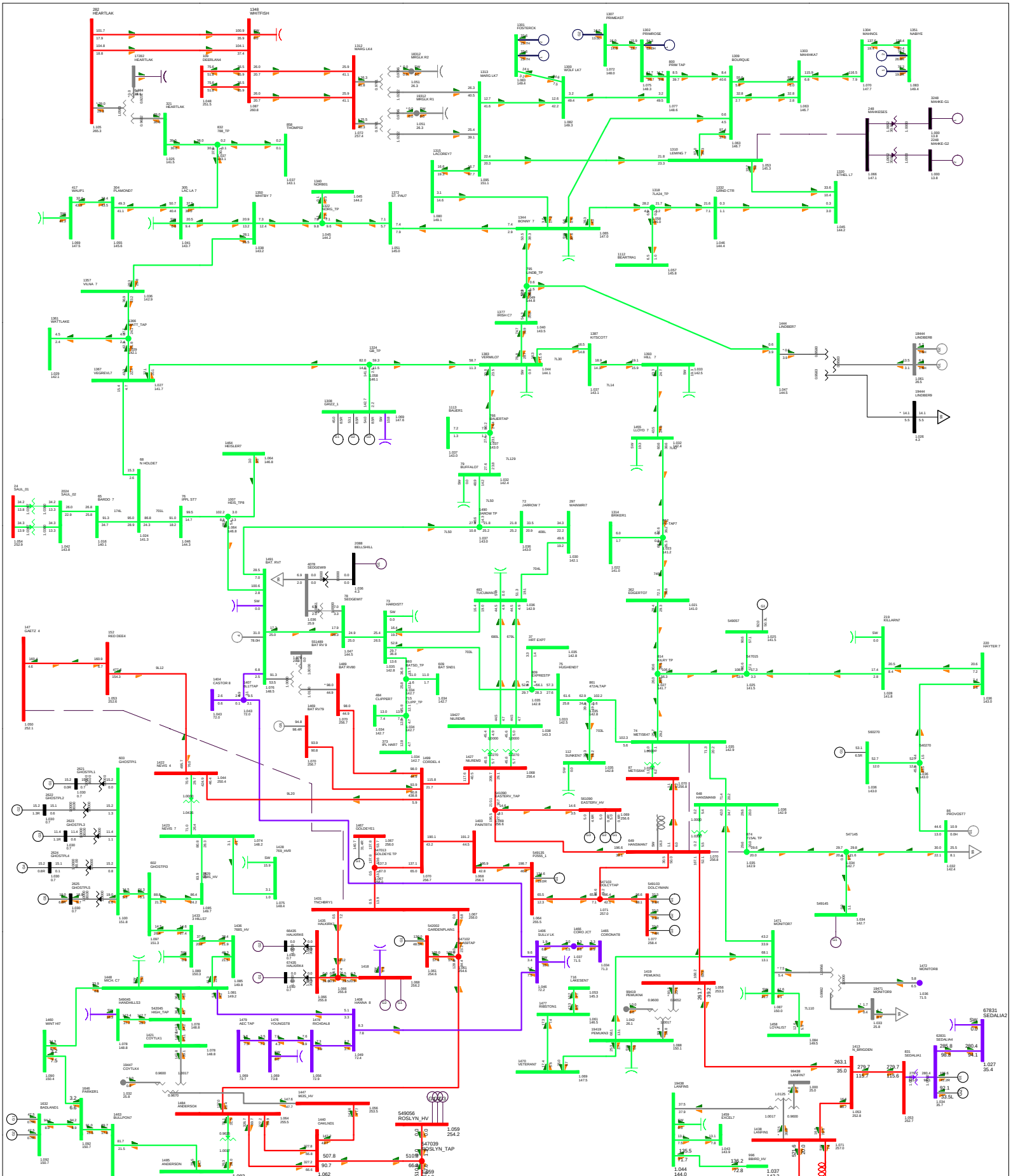
2028SP-woCETO PRE-PROJ

Base Case

P2034 Cold Lake Area Cogen

Bus - VOLTAGE (kV/PU)
Branch - MW/Mvar
Equipment - MW/Mvar

100.0%RATEA
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A2- 4

Contingency

CONT 037: 7L95 (889S Mahkeses - 715S Leming Lake)

Study Case Description

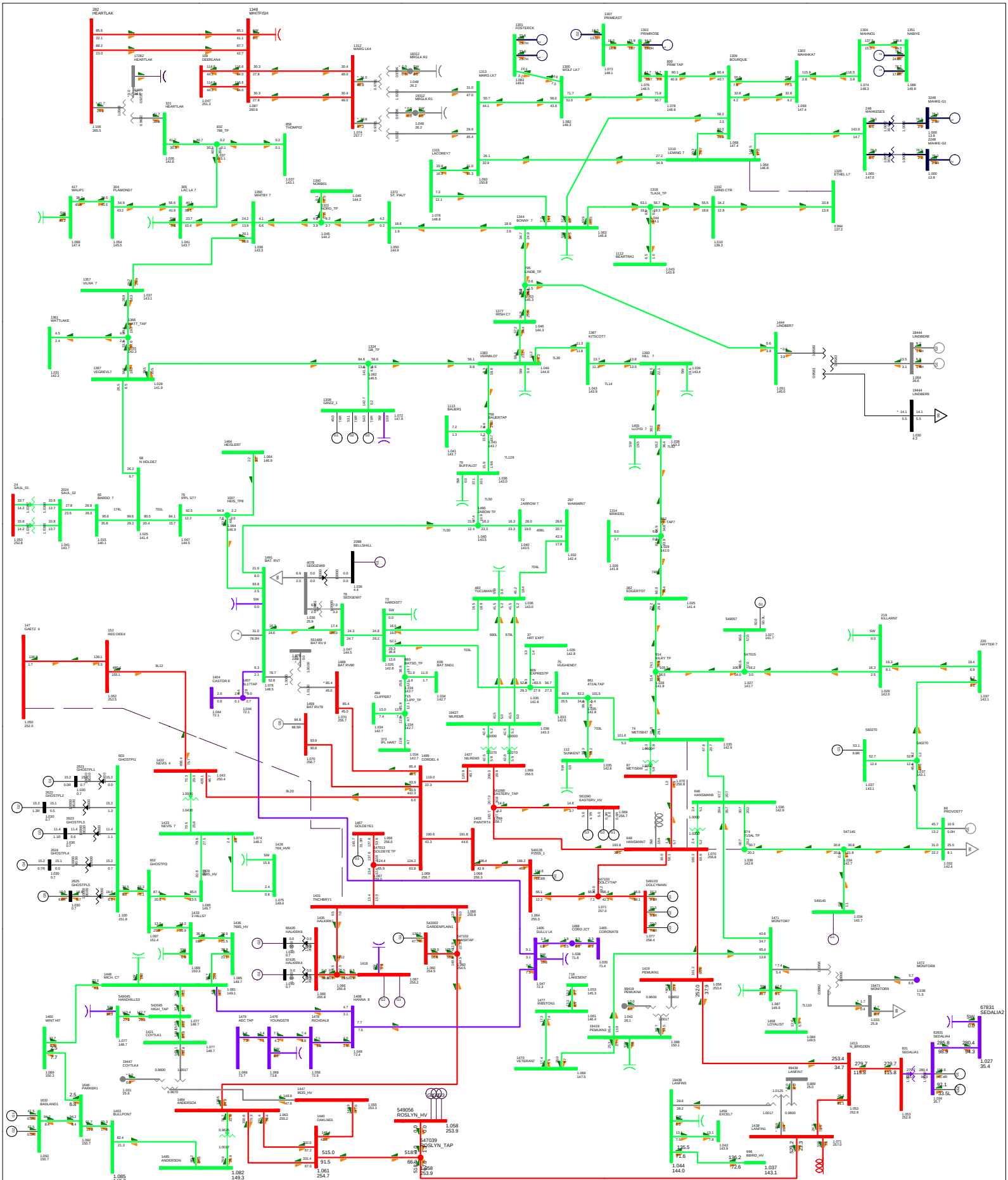
2028SP-woCETO PRE-PROJ

Base Case

P2034 Cold Lake Area Cogen

Bus - VOLTAGE (kV/PU)
Branch - MW/Mvar
Equipment - MW/Mvar

100.0%RATEA
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A2- 4

Contingency

CONT 038: 7L66 (715S Leming Lake - 717S Ethel Lake)

Study Case Description

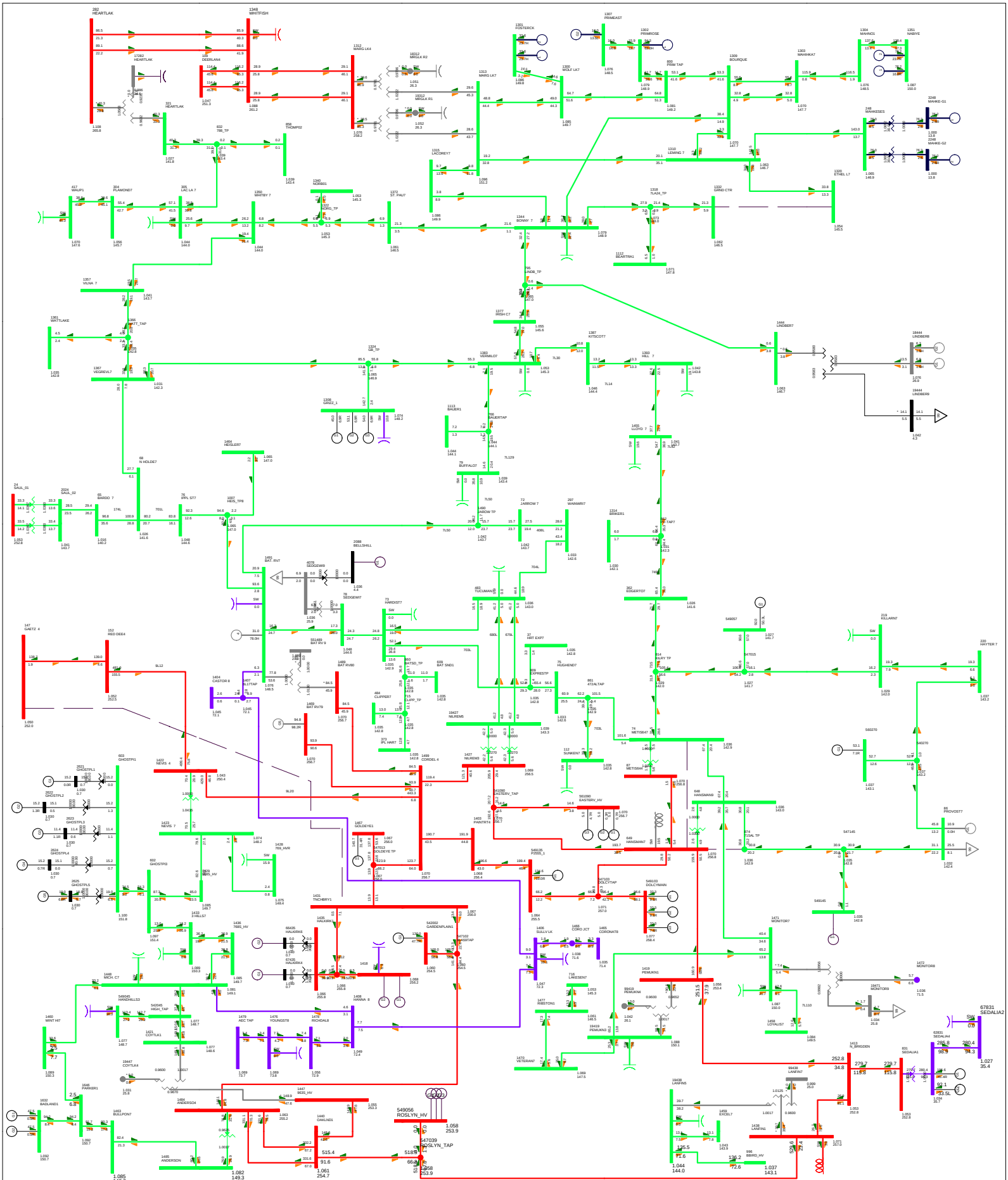
2028SP-woCETO PRE-PROJ

Base Case

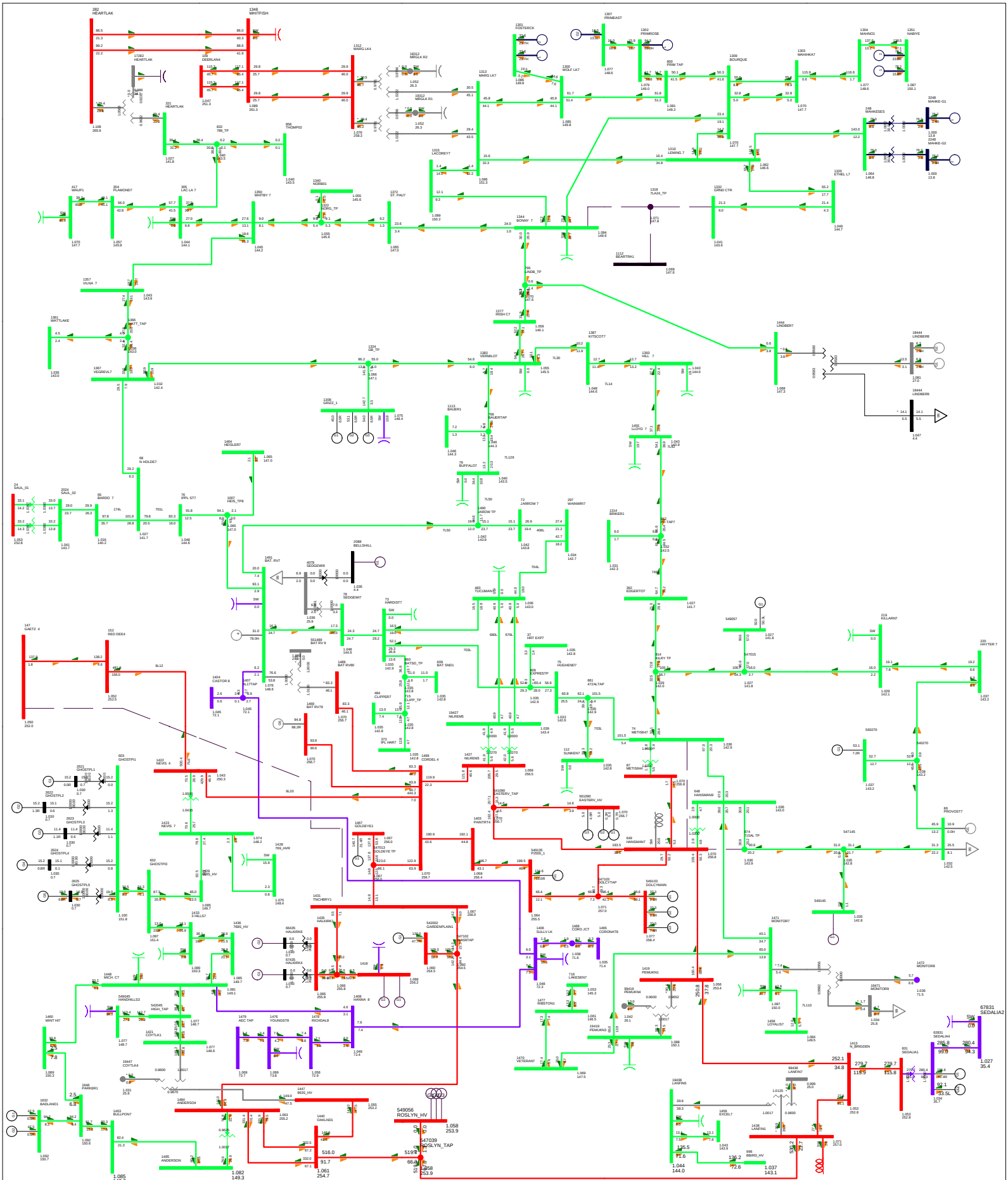
P2034 Cold Lake Area Cogen

Bus - VOLTAGE (kV/PU)
Branch - MW/Mvar
Equipment - MW/Mvar

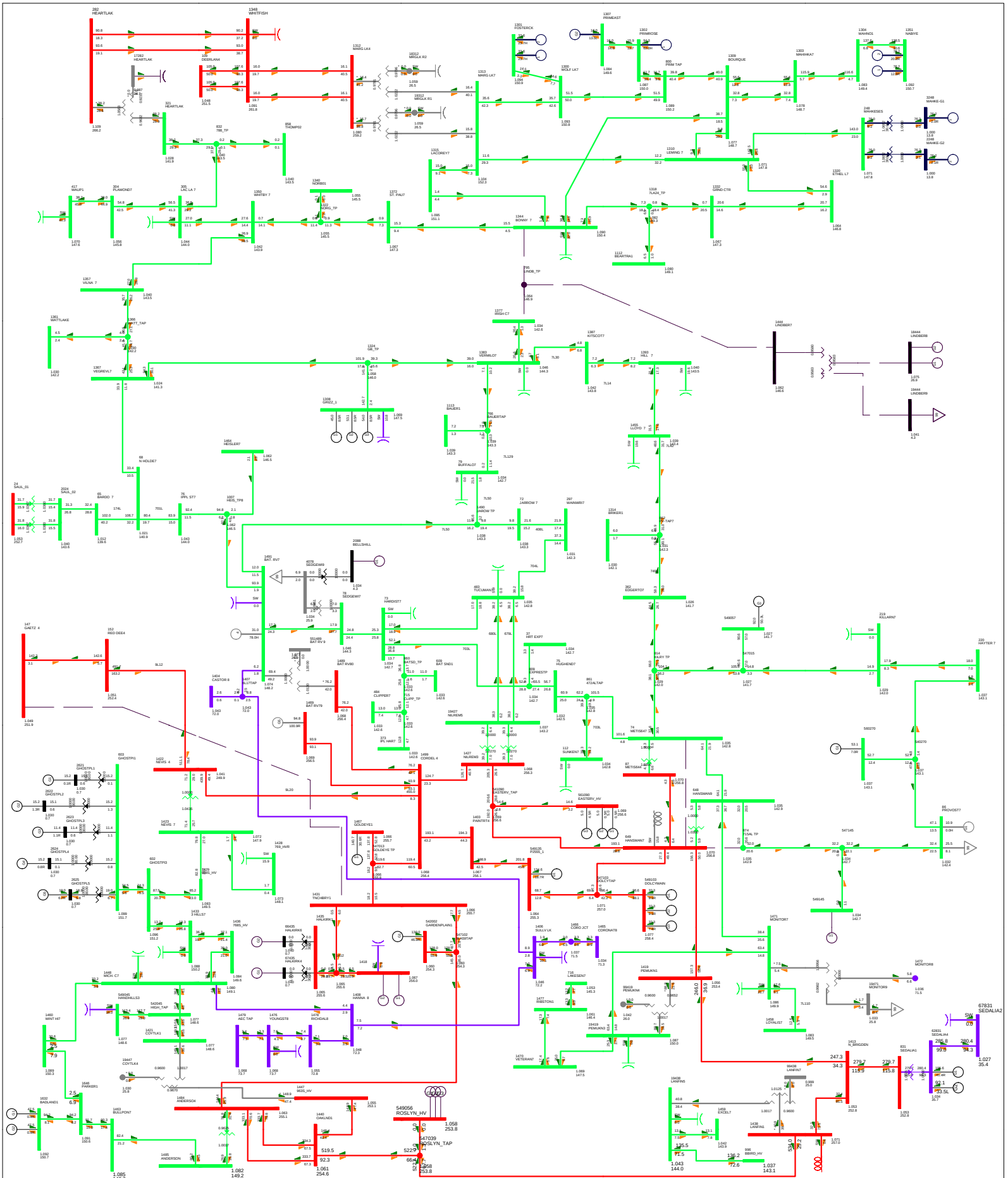
100.0%RATEA
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A2- 4	**Contingency** CONT 039: 7L28 (717S Ethel Lake - 846S Grand Centre)	**Study Case Description** 2028SP-woCETO PRE-PROJ Base Case	**P2034 Cold Lake Area Cogen** Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A2- 4	Contingency	Study Case Description	P2034 Cold Lake Area Cogen
	CONT 040: 7L24 (846S Grand Centre - 700S Bonnyville - 940S Beartrap)	2028SP-woCETO PRE-PROJ Base Case	Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A2- 4

Contingency

CONT 041: 7L53 (700S Bonnyville - 706S Irish Creek - 969S Lindbergh)

Study Case Description

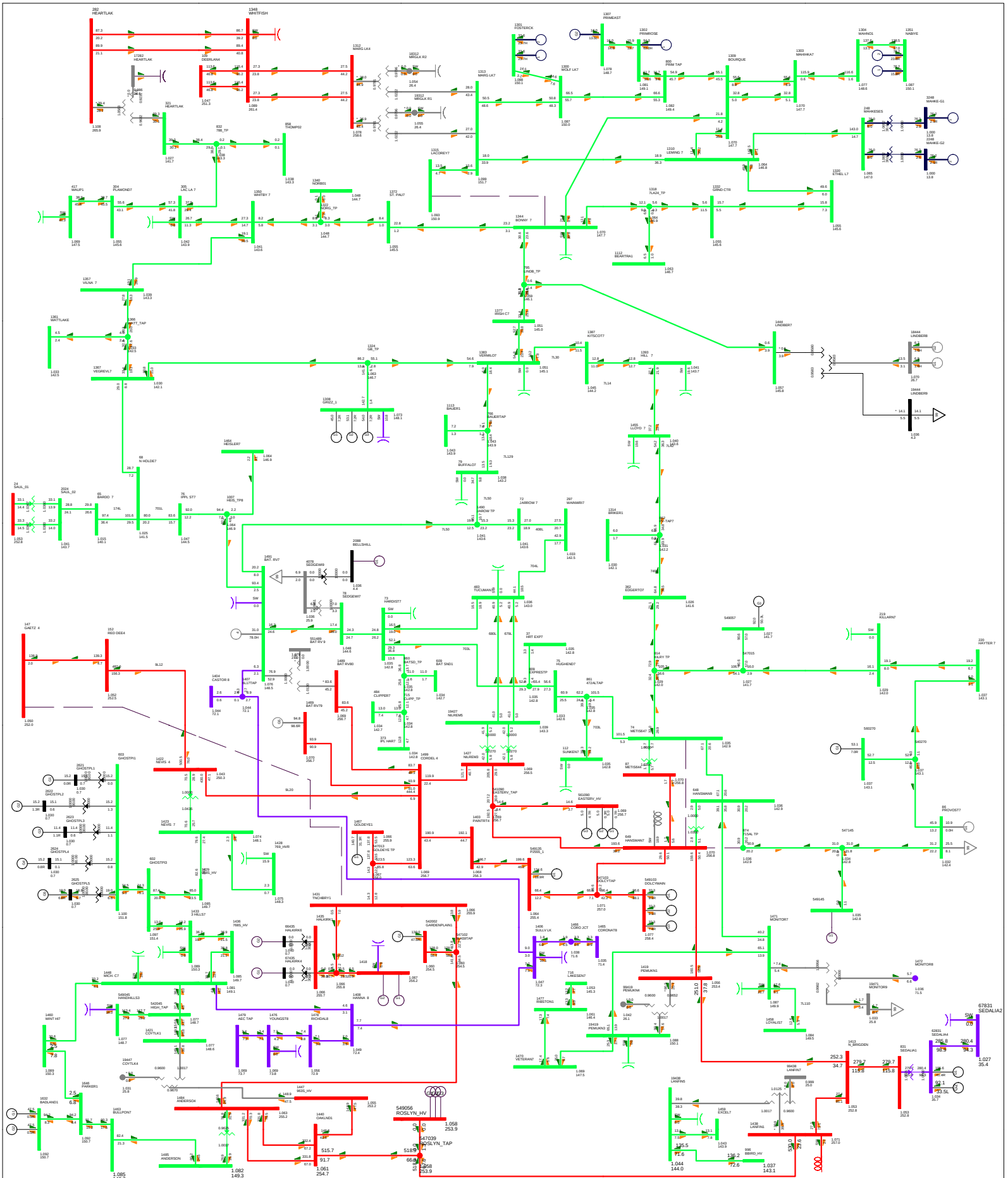
2028SP-woCETO PRE-PROJ

Base Case

P2034 Cold Lake Area Cogen

Bus - VOLTAGE (kV/PU)
Branch - MW/Mvar
Equipment - MW/Mvar

100.0%RATEA
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A2- 4

Contingency

CONT 042: 7L89 (721S Lacorey - 700S Bonnyville)

Study Case Description

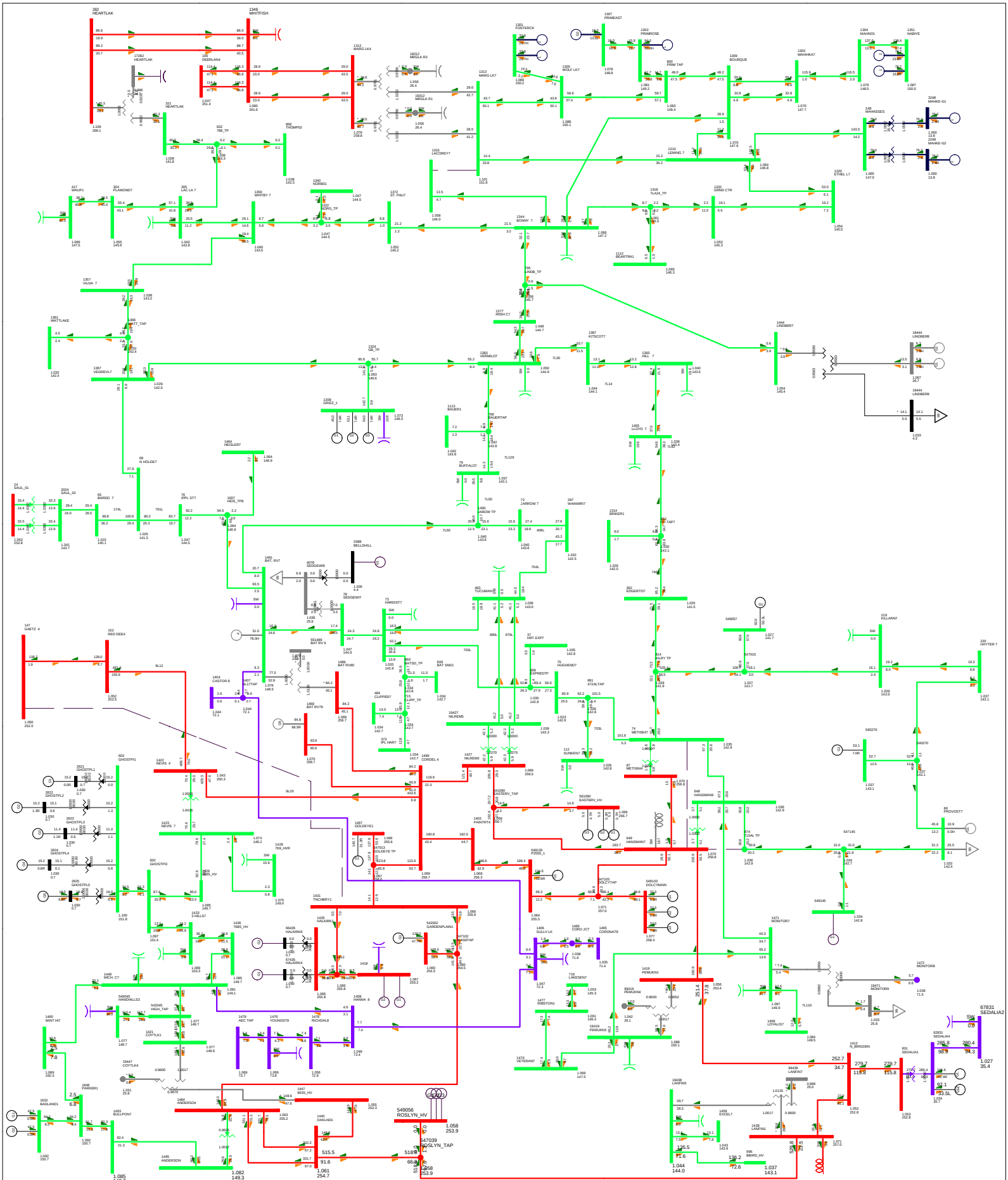
2028SP-woCETO PRE-PROJ

Base Case

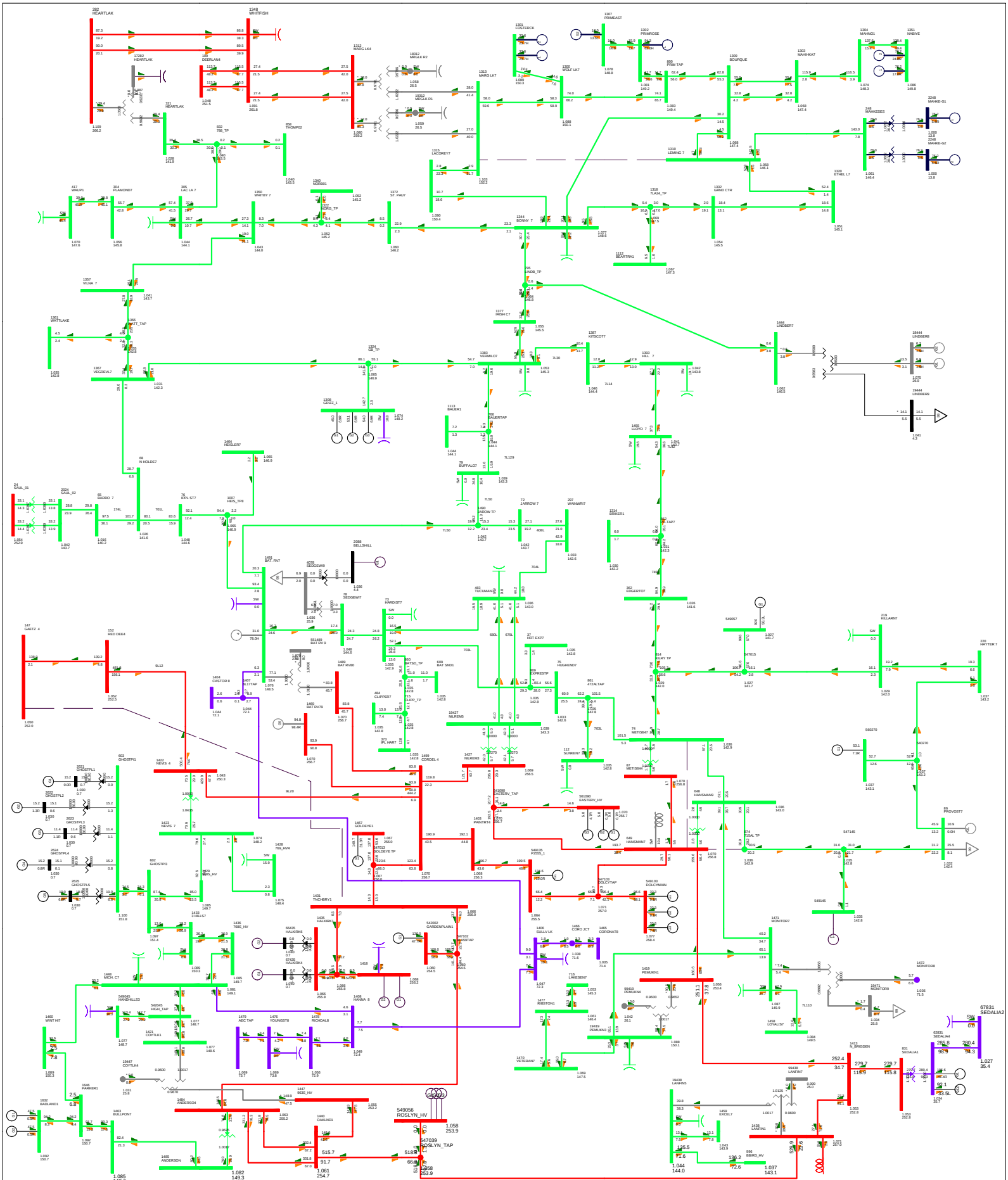
P2034 Cold Lake Area Cogen

Bus - VOLTAGE (kV/PU)
Branch - MW/Mvar
Equipment - MW/Mvar

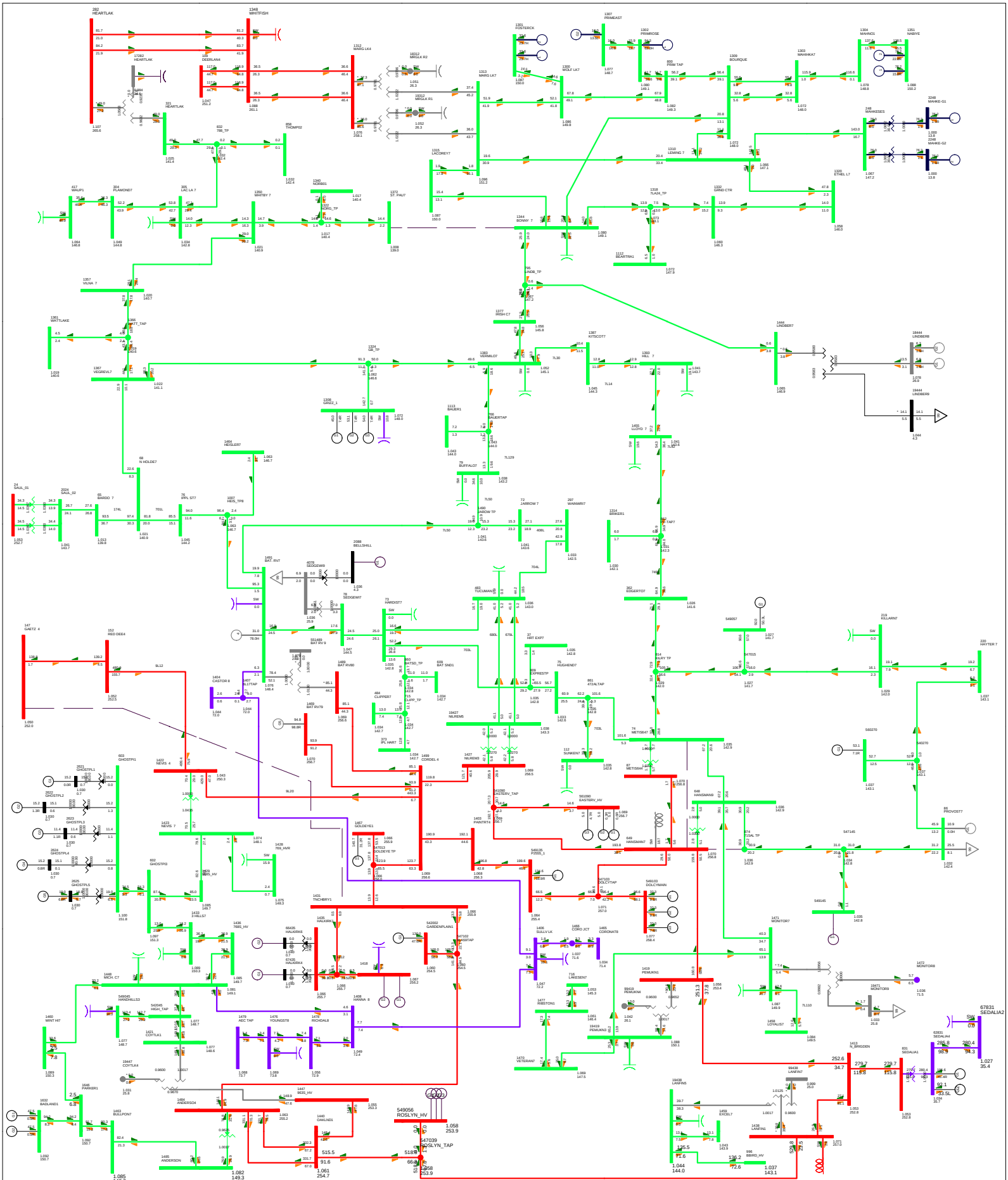
100.0%RATEA
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A2- 4	Contingency	Study Case Description	P2034 Cold Lake Area Cogen
	CONT 043: 7L89 (826S Marguerite Lake - 721S Lacorey)	2028SP-woCETO PRE-PROJ Base Case	Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A2- 4	Contingency	Study Case Description	P2034 Cold Lake Area Cogen
	CONT 044: 7L91 (715S Leming Lake - 826S Marguerite Lake)	2028SP-woCETO PRE-PROJ Base Case	Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A2- 4

Contingency

CONT 045: 7L70 (700S Bonnyville - 707S St.Paul)

Study Case Description

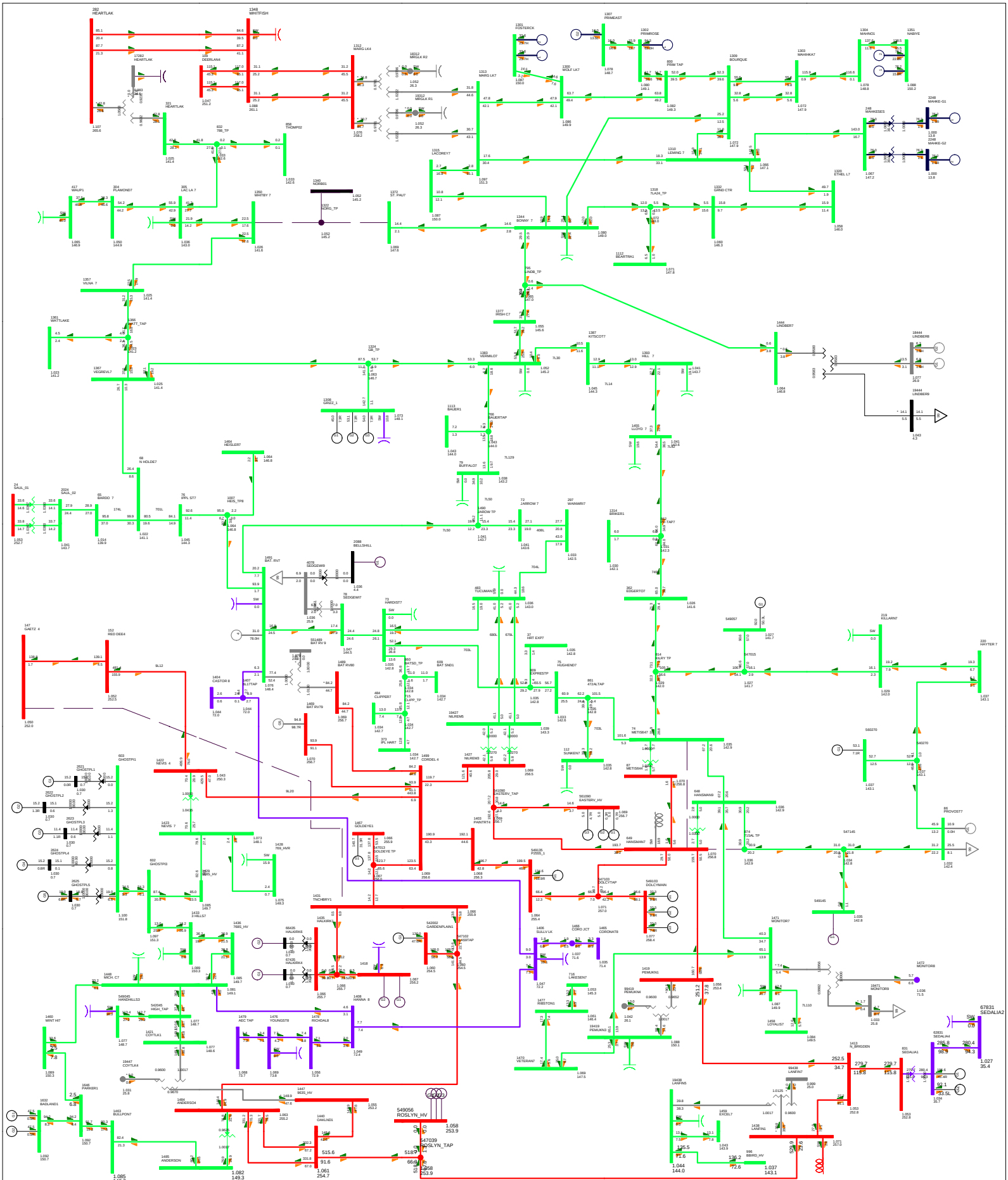
2028SP-woCETO PRE-PROJ

Base Case

P2034 Cold Lake Area Cogen

Bus - VOLTAGE (kV/PU)
Branch - MW/Mvar
Equipment - MW/Mvar

100.0%RATEA
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A2- 4

Contingency

CONT 046: 7L139 (819S Whitbylake - 707S St.Paul - 936S Norberg)

Study Case Description

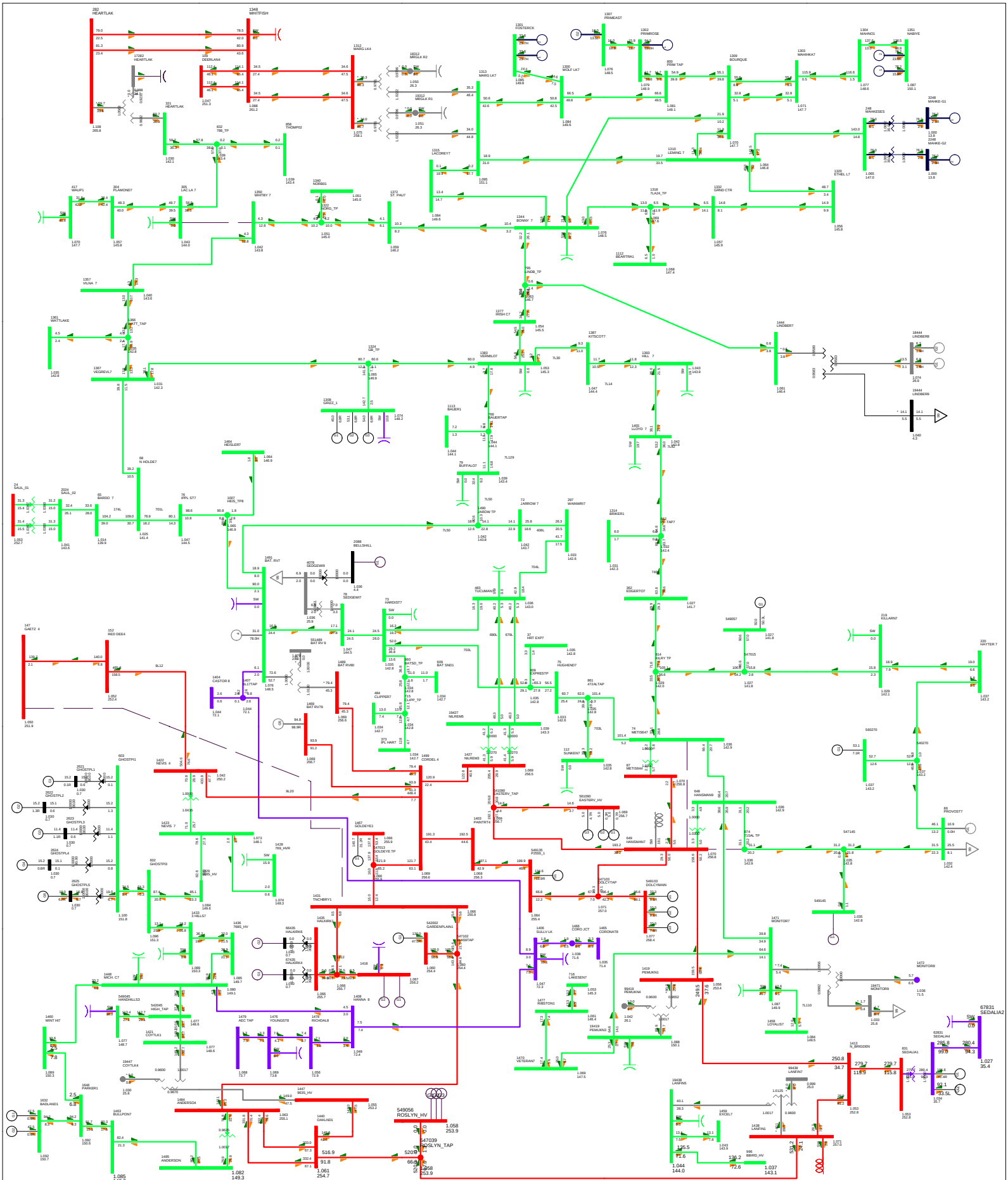
2028SP-woCETO PRE-PROJ

Base Case

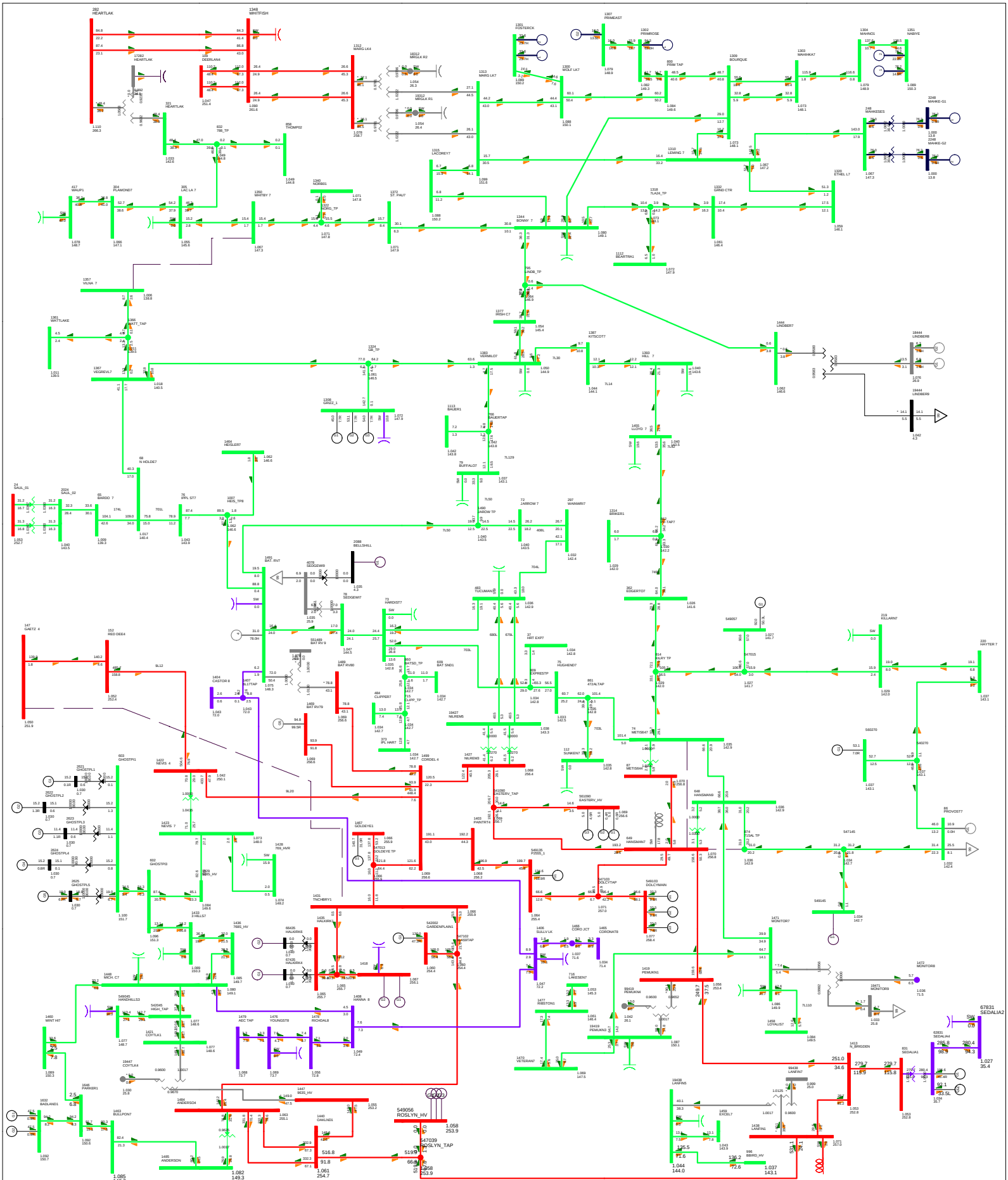
P2034 Cold Lake Area Cogen

Bus - VOLTAGE (kV/PU)
Branch - MW/Mvar
Equipment - MW/Mvar

100.0%RATEA
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A2- 4	Contingency	Study Case Description	P2034 Cold Lake Area Cogen
	CONT 047: 794L & 7L94 (157S Lac La Biche - 819S Whitbylake)	2028SP-woCETO PRE-PROJ Base Case	Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A2- 4

Contingency

CONT 048: 7L92 (819S Whitbylake - 777S Vilna)

Study Case Description

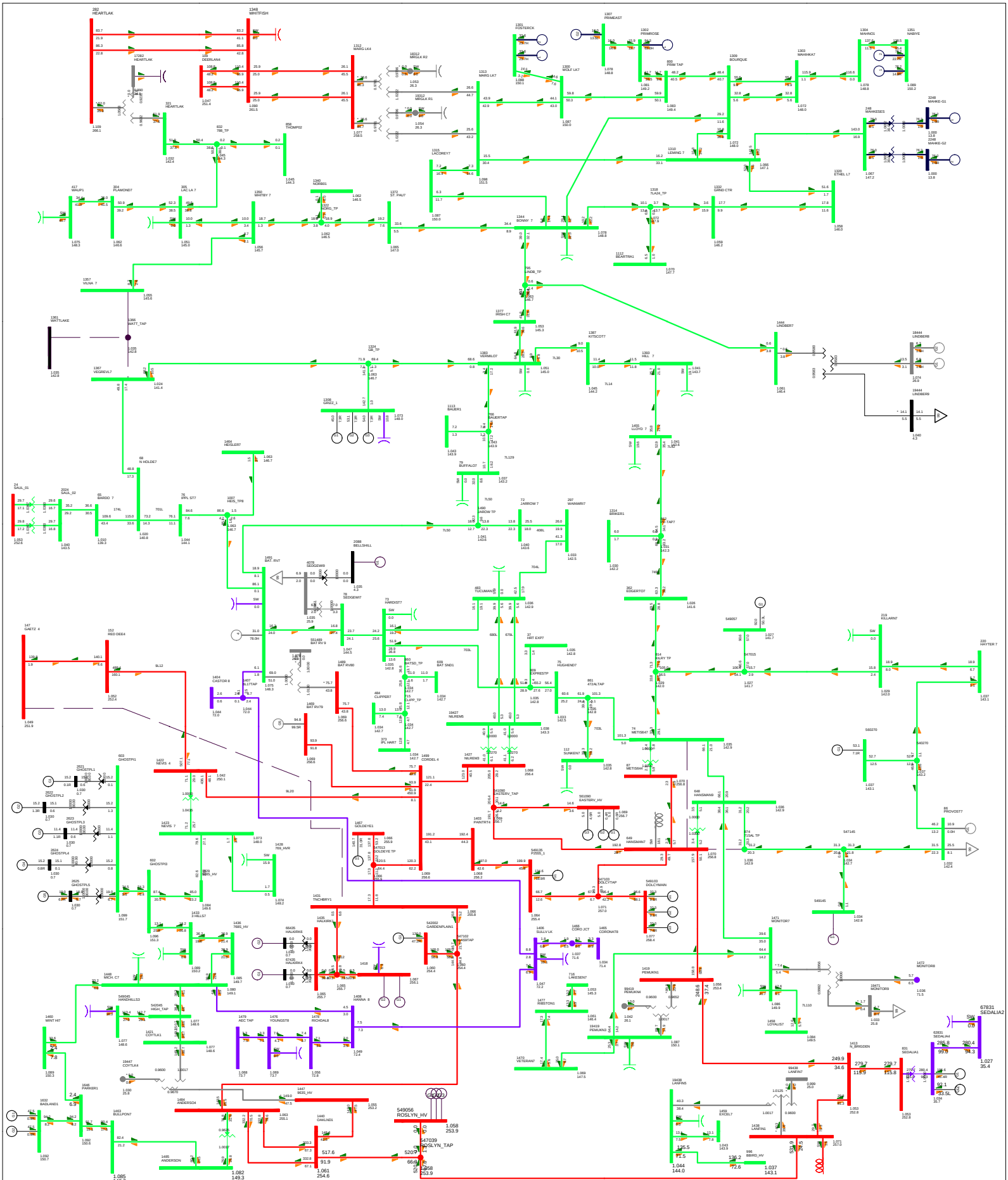
2028SP-woCETO PRE-PROJ

Base Case

P2034 Cold Lake Area Cogen

Bus - VOLTAGE (kV/PU)
Branch - MW/Mvar
Equipment - MW/Mvar

100.0%RATEA
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A2- 4

Contingency

CONT 049: 7L92 (777S Vilna - 709S Vegreville - 956S Watt Lake)

Study Case Description

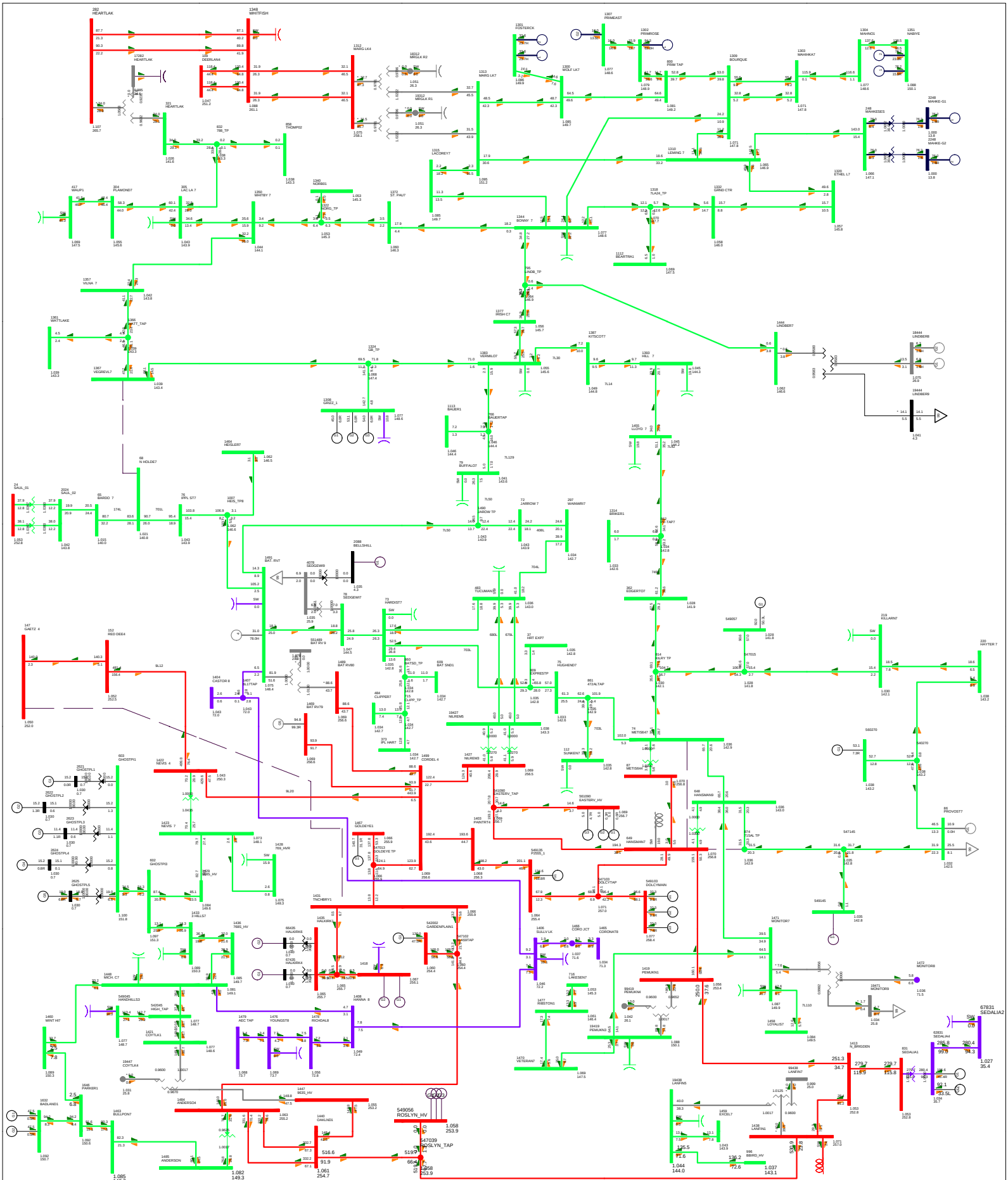
2028SP-woCETO PRE-PROJ

Base Case

P2034 Cold Lake Area Cogen

Bus - VOLTAGE (kV/PU)
Branch - MW/Mvar
Equipment - MW/Mvar

100.0%RATEA
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A2- 4

Contingency

CONT 050: 7L77 (395S North Holden - 709S Vegreville)

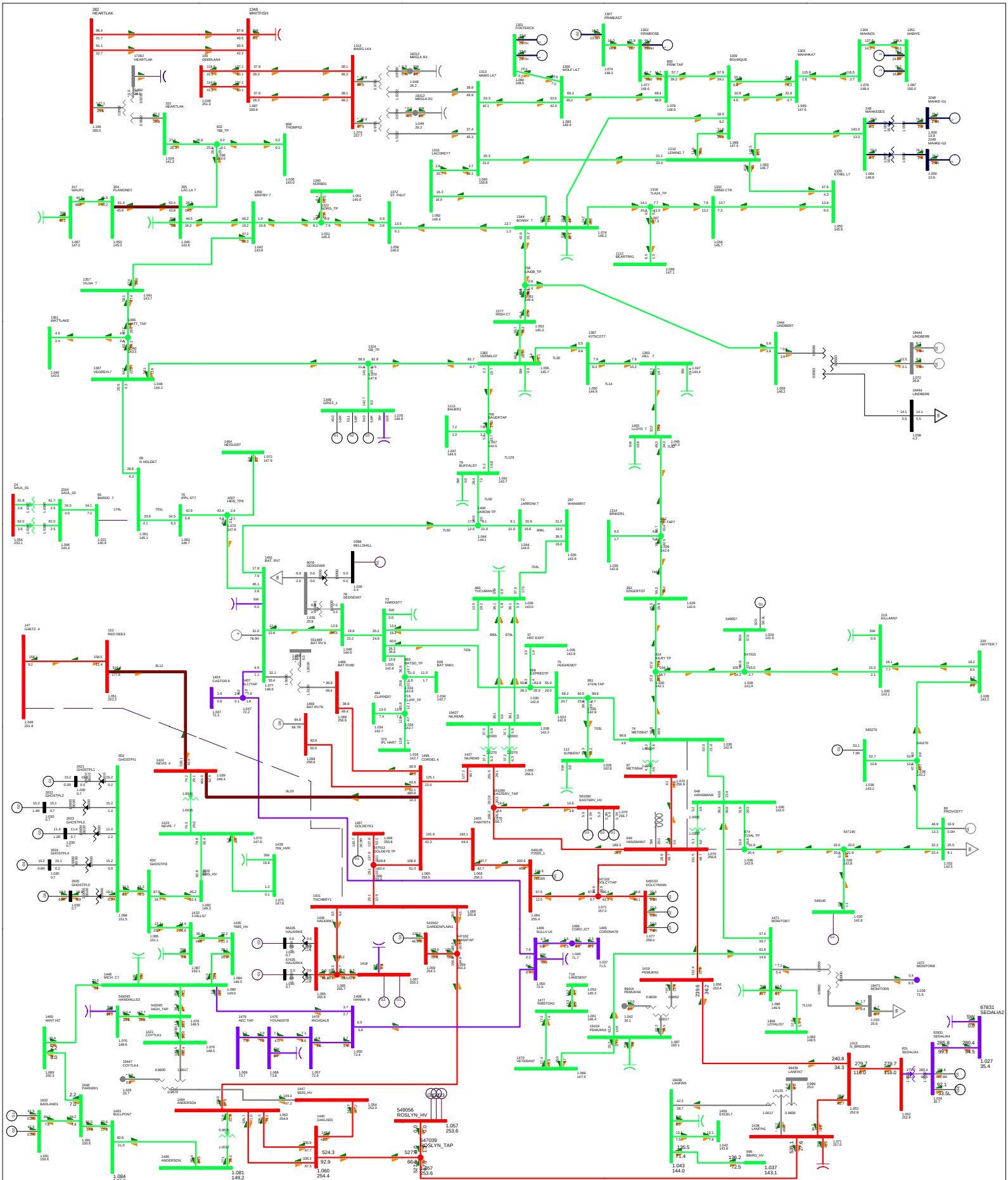
Study Case Description

2028SP-woCETO PRE-PROJ

Base Case

P2034 Cold Lake Area Cogen

Bus - VOLTAGE (kV/PU)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%RATEA
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A2- 4

Contingency

CONT 051: 174L (197S Bardo - 395S North Holden)

Study Case Description

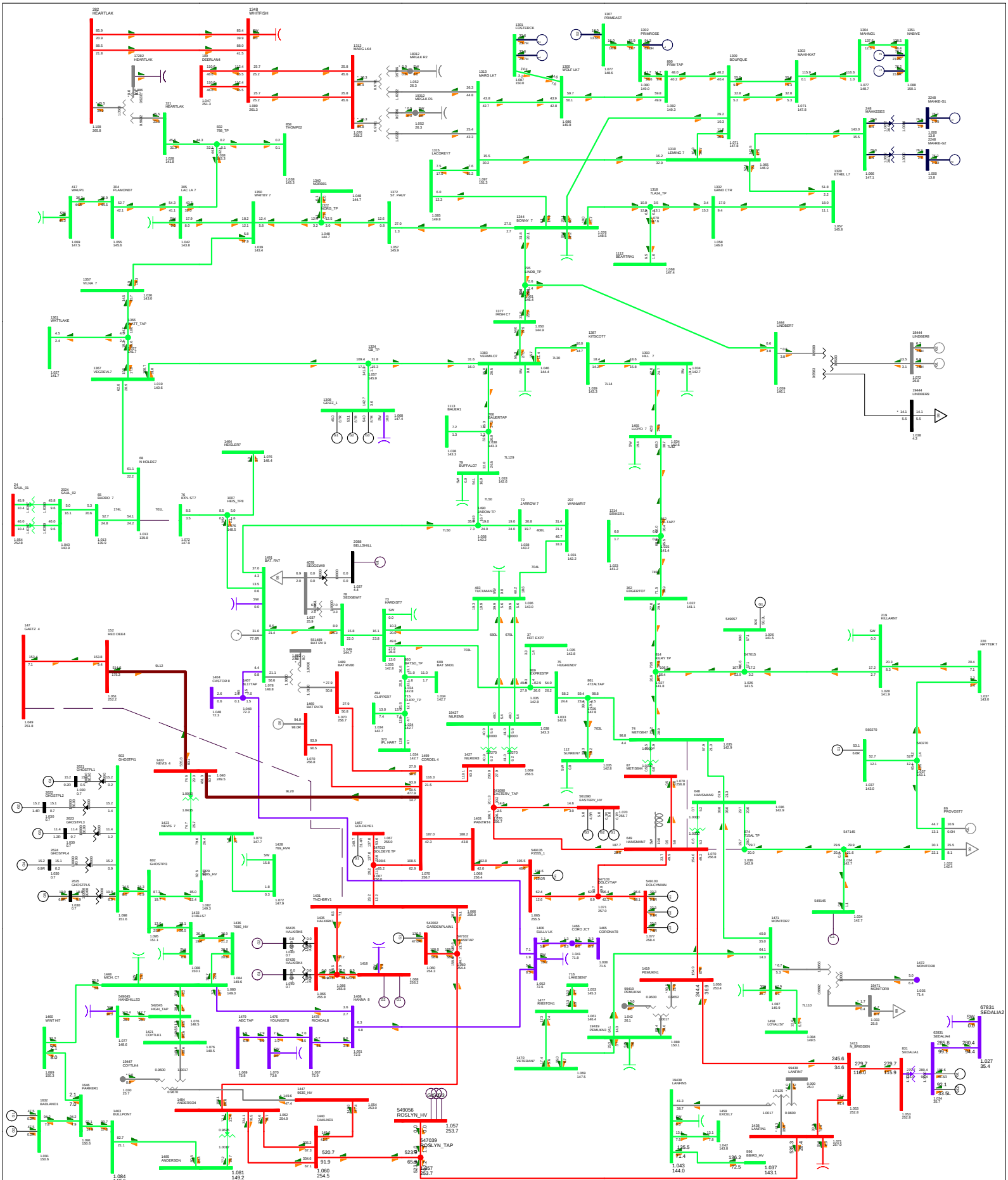
2028SP-woCETO PRE-PROJ

Base Case

P2034 Cold Lake Area Cogen

Bus - VOLTAGE (kV/PU)
Branch - MW/Mvar
Equipment - MW/Mvar

100.0%RATEA
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A2- 4

Contingency

CONT 052: 701L (395S North Holden - 223S Strome)

Study Case Description

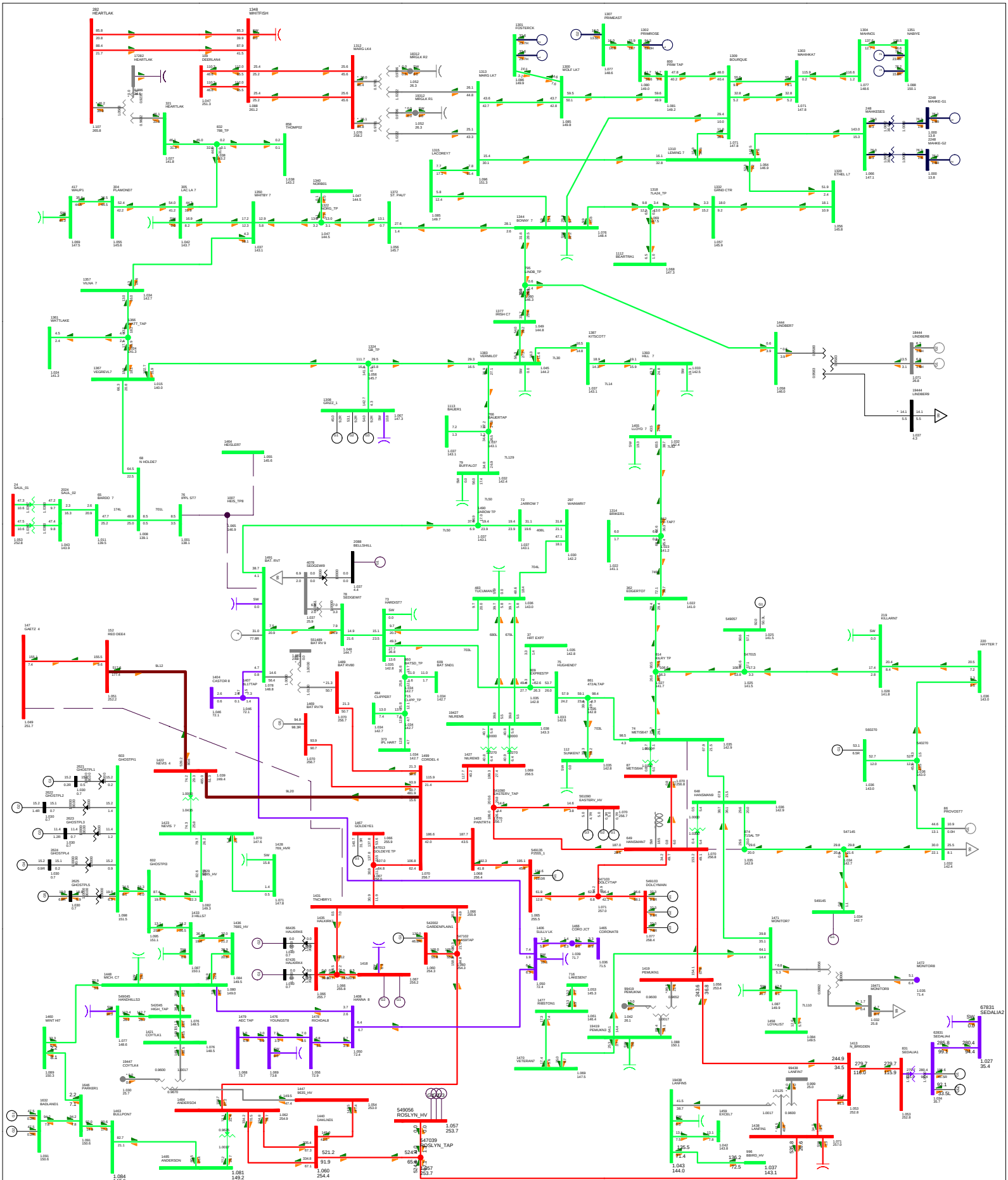
2028SP-woCETO PRE-PROJ

Base Case

P2034 Cold Lake Area Cogen

Bus - VOLTAGE (kV/PU)
Branch - MW/Mvar
Equipment - MW/Mvar

100.0%RATEA
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A2- 4

Contingency

CONT 053: 701L (223S Strome - 757S Battle River - 764S Heisler)

Study Case Description

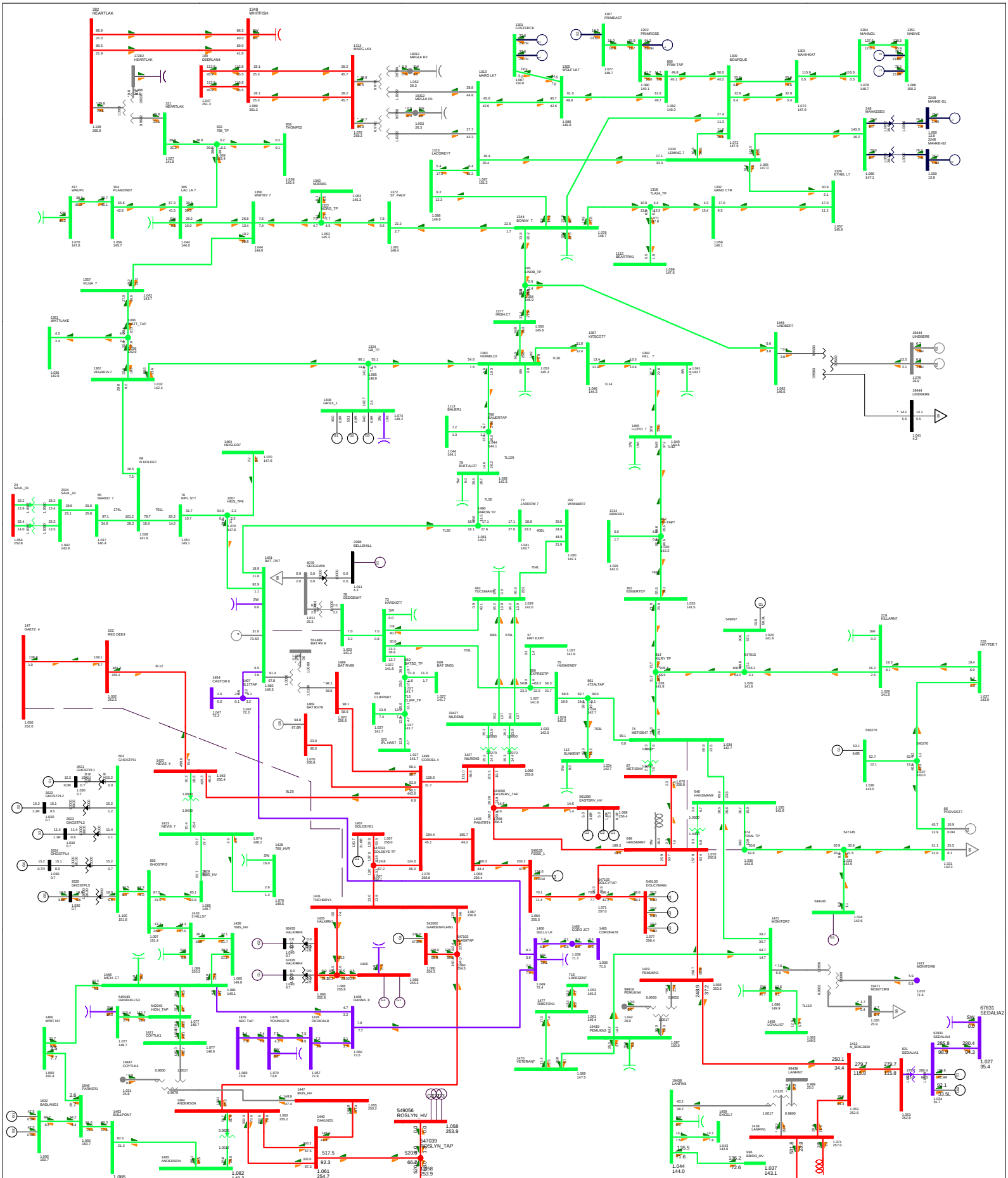
2028SP-woCETO PRE-PROJ

Base Case

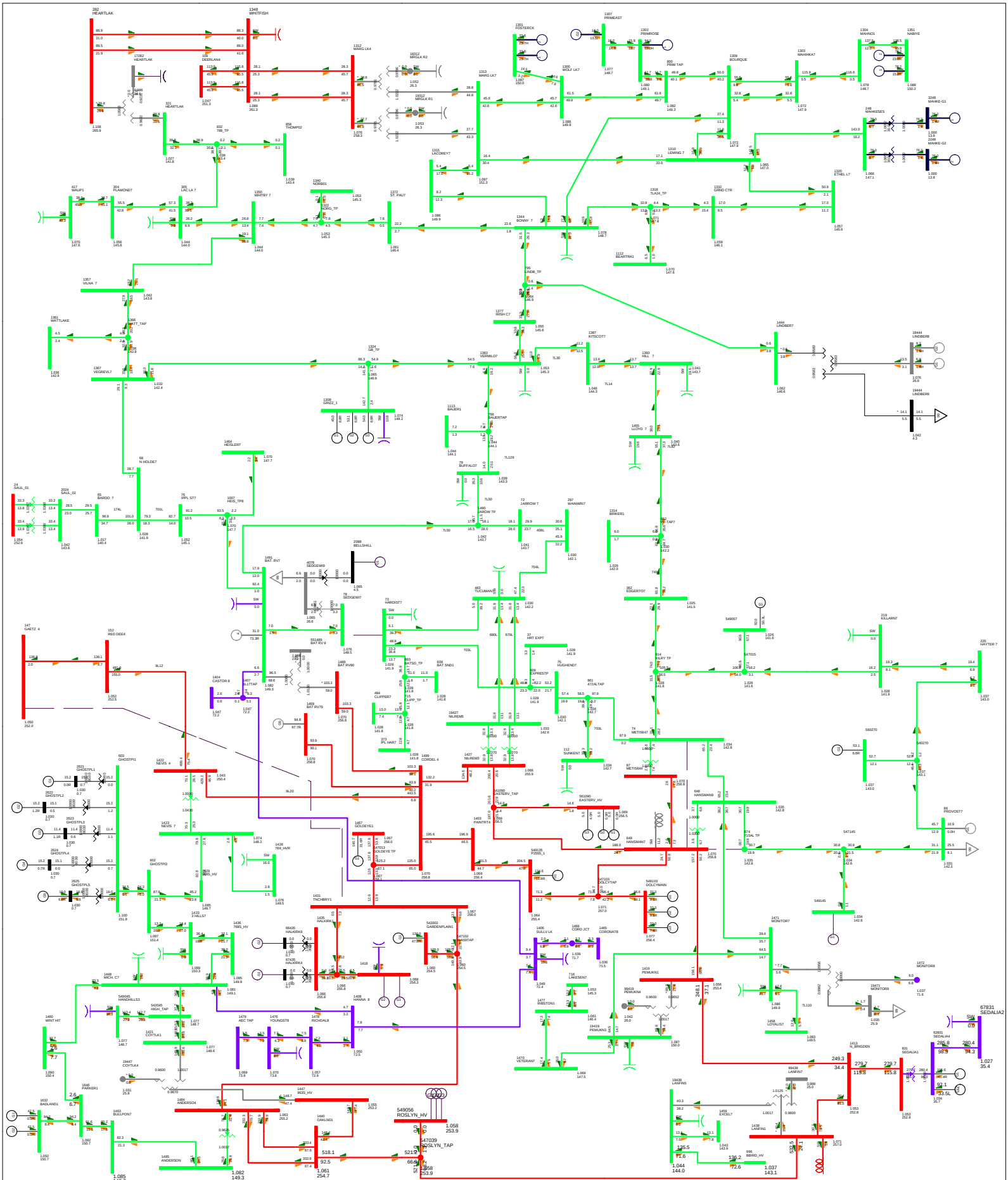
P2034 Cold Lake Area Cogen

Bus - VOLTAGE (kV/PU)
Branch - MW/Mvar
Equipment - MW/Mvar

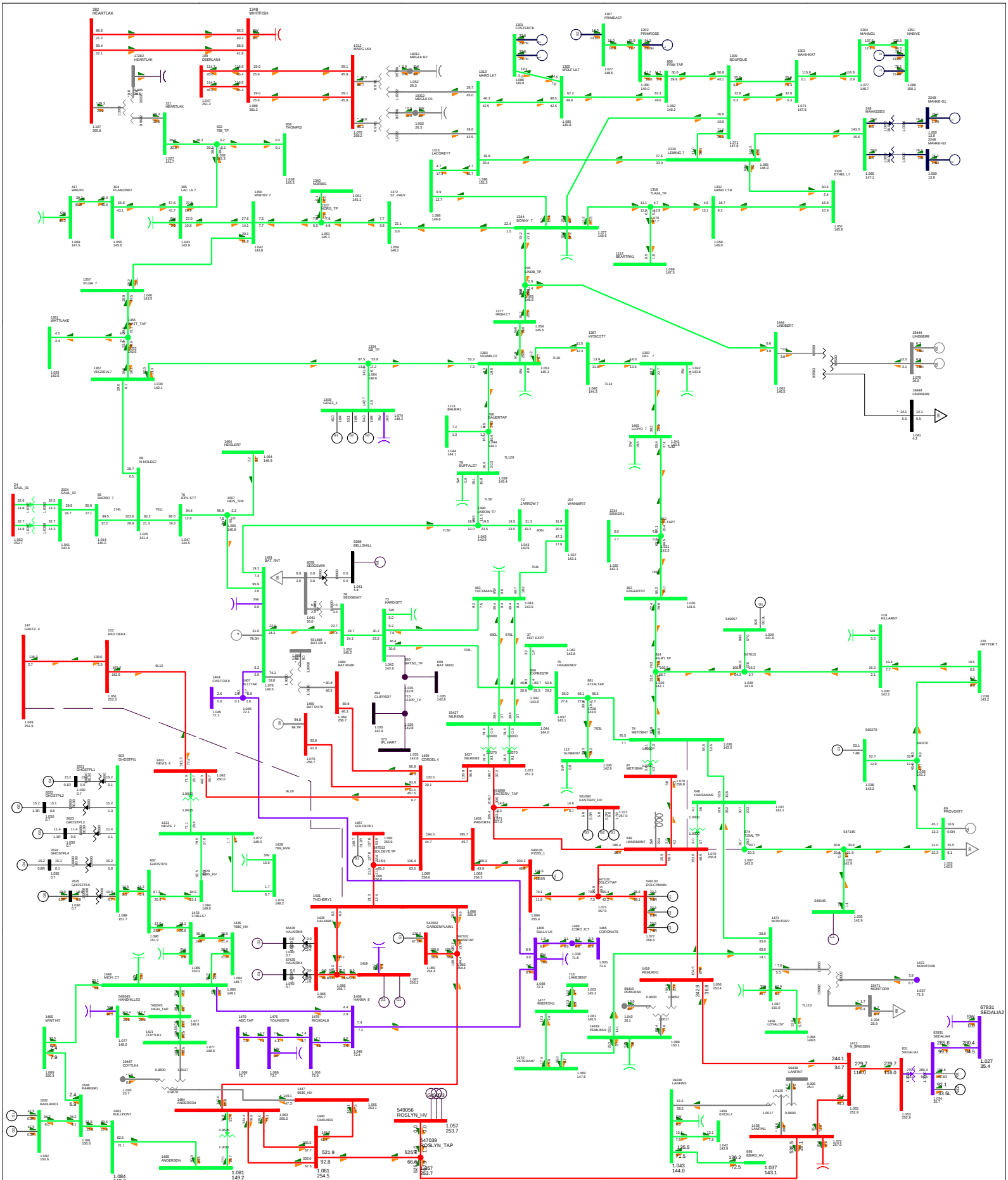
100.0%RATEA
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A2- 4	Contingency	Study Case Description	P2034 Cold Lake Area Cogen
	CONT 054: 7L702 (137S Sedgewick - 757S Battle River)	2028SP-woCETO PRE-PROJ Base Case	Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A2- 4	**Contingency** CONT 055: 702L (377S Hardisty - 137S Sedgewick)	**Study Case Description** 2028SP-woCETO PRE-PROJ Base Case	**P2034 Cold Lake Area Cogen** Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A2- 4

Contingency

CONT 056: 769L (377S Hardisty - 594S Battle Sands - 296S Rosyth - 656S Clipper)

Study Case Description

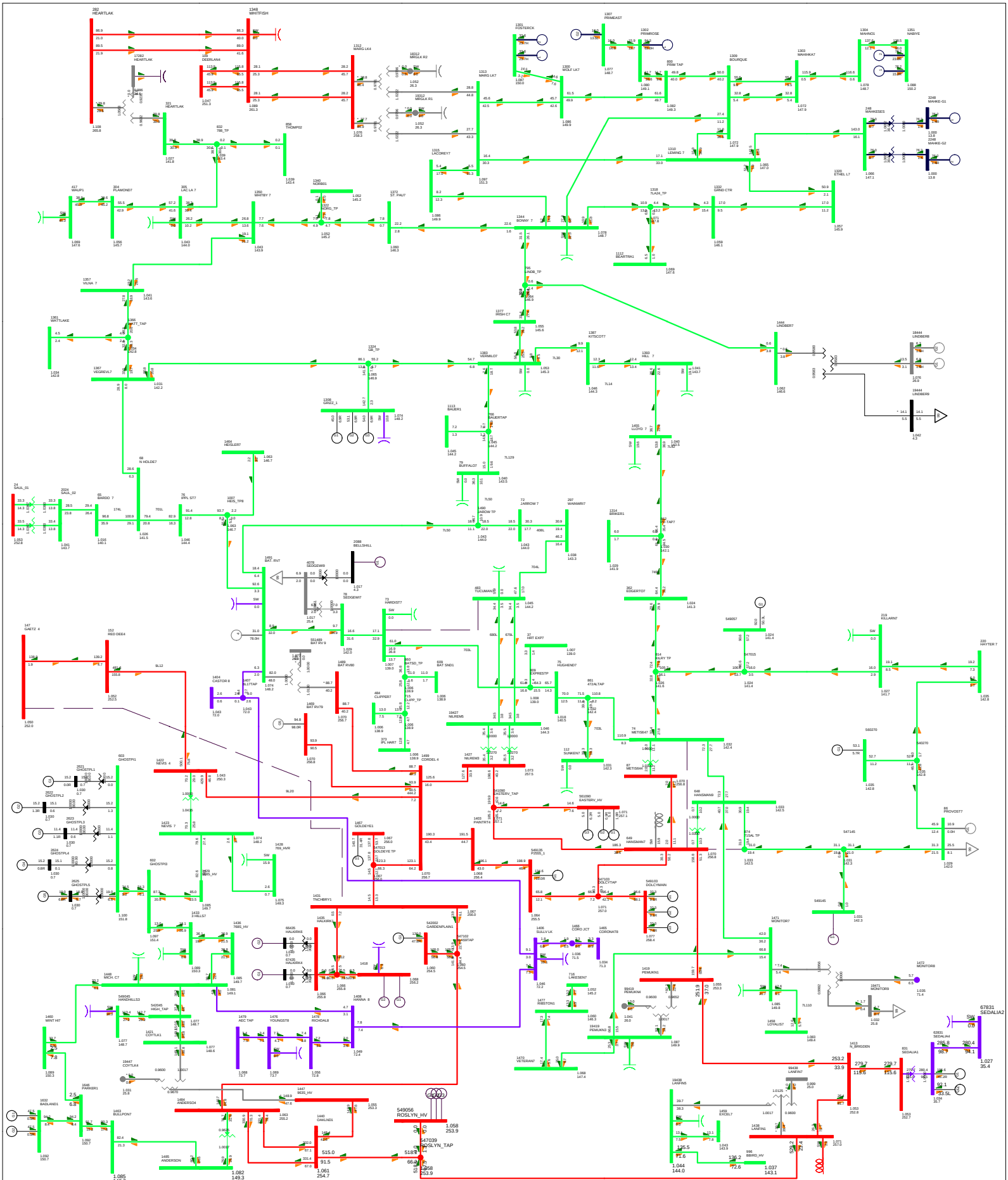
2028SP-woCETO PRE-PROJ

Base Case

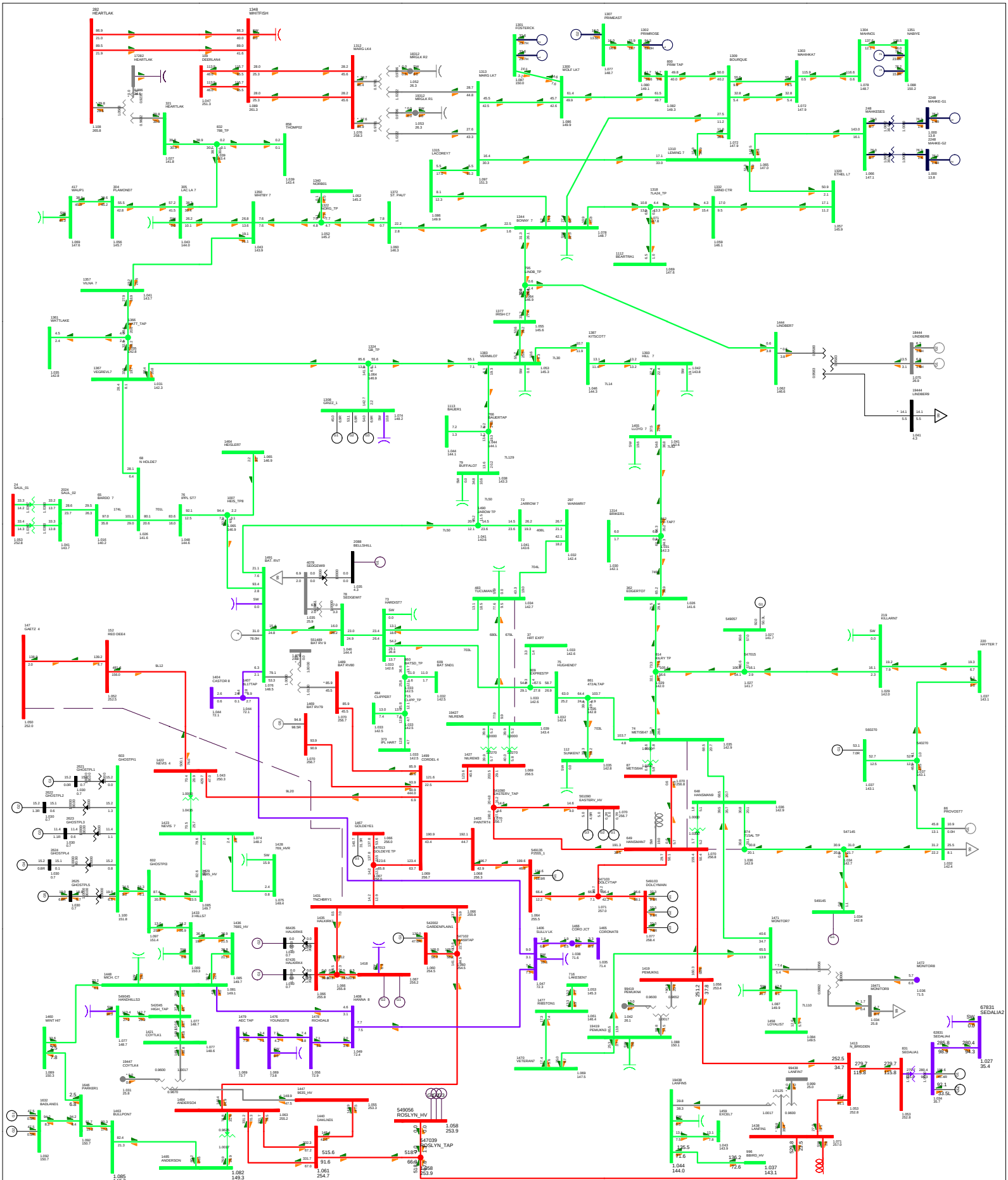
P2034 Cold Lake Area Cogen

Bus - VOLTAGE (kV/PU)
Branch - MW/Mvar
Equipment - MW/Mvar

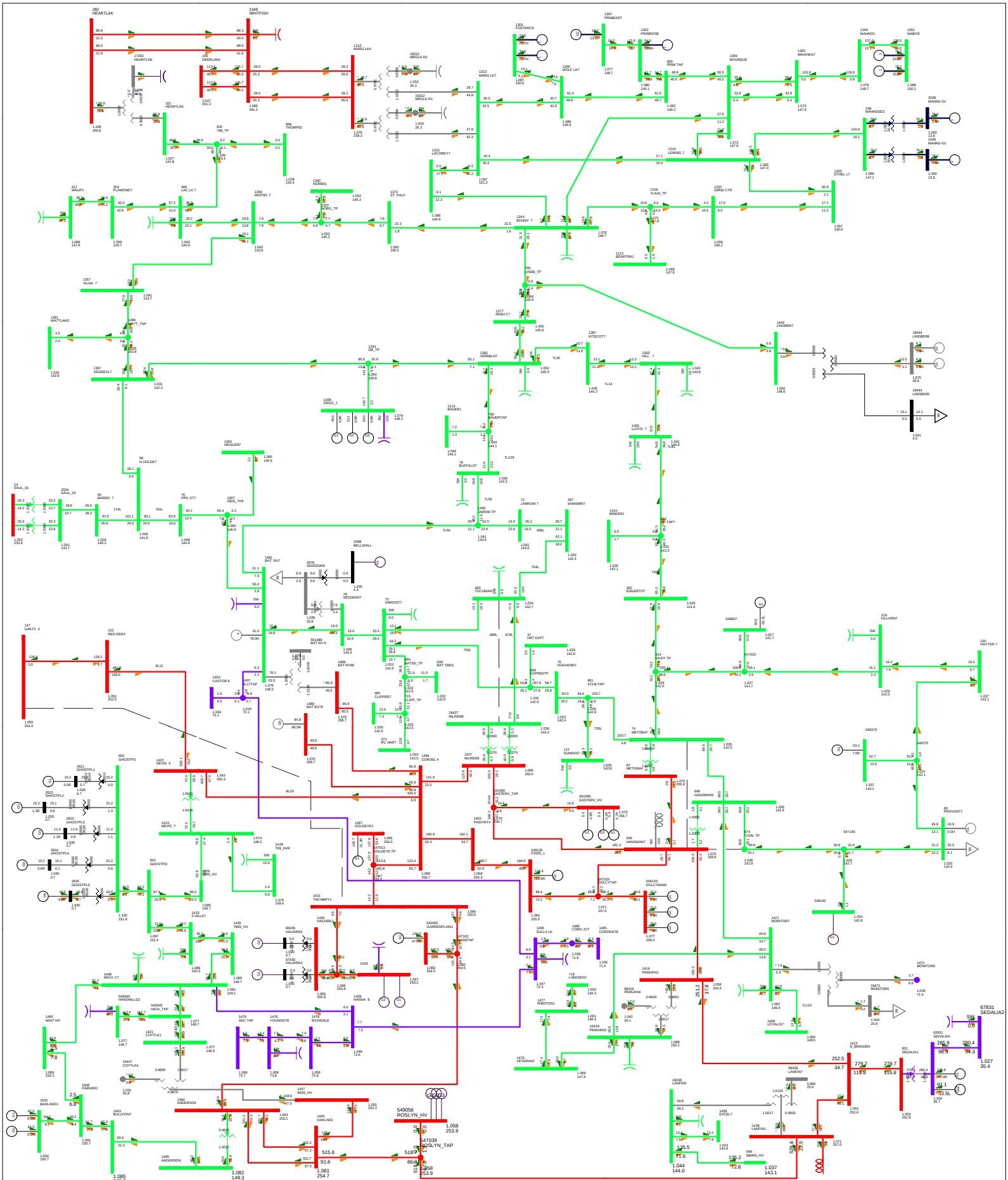
100.0%RATEA
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A2- 4	Contingency	Study Case Description	P2034 Cold Lake Area Cogen
	CONT 057: 681L (377S Hardisty - 478S Tucuman)	2028SP-woCETO PRE-PROJ Base Case	Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A2- 4	Contingency	Study Case Description	P2034 Cold Lake Area Cogen
	CONT 058: 679L (478S Tucuman - 574S Nilrem)	2028SP-woCETO PRE-PROJ Base Case	Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A2- 4

Contingency

CONT 059: 680L (478S Tucuman - 574S Nilrem)

Study Case Description

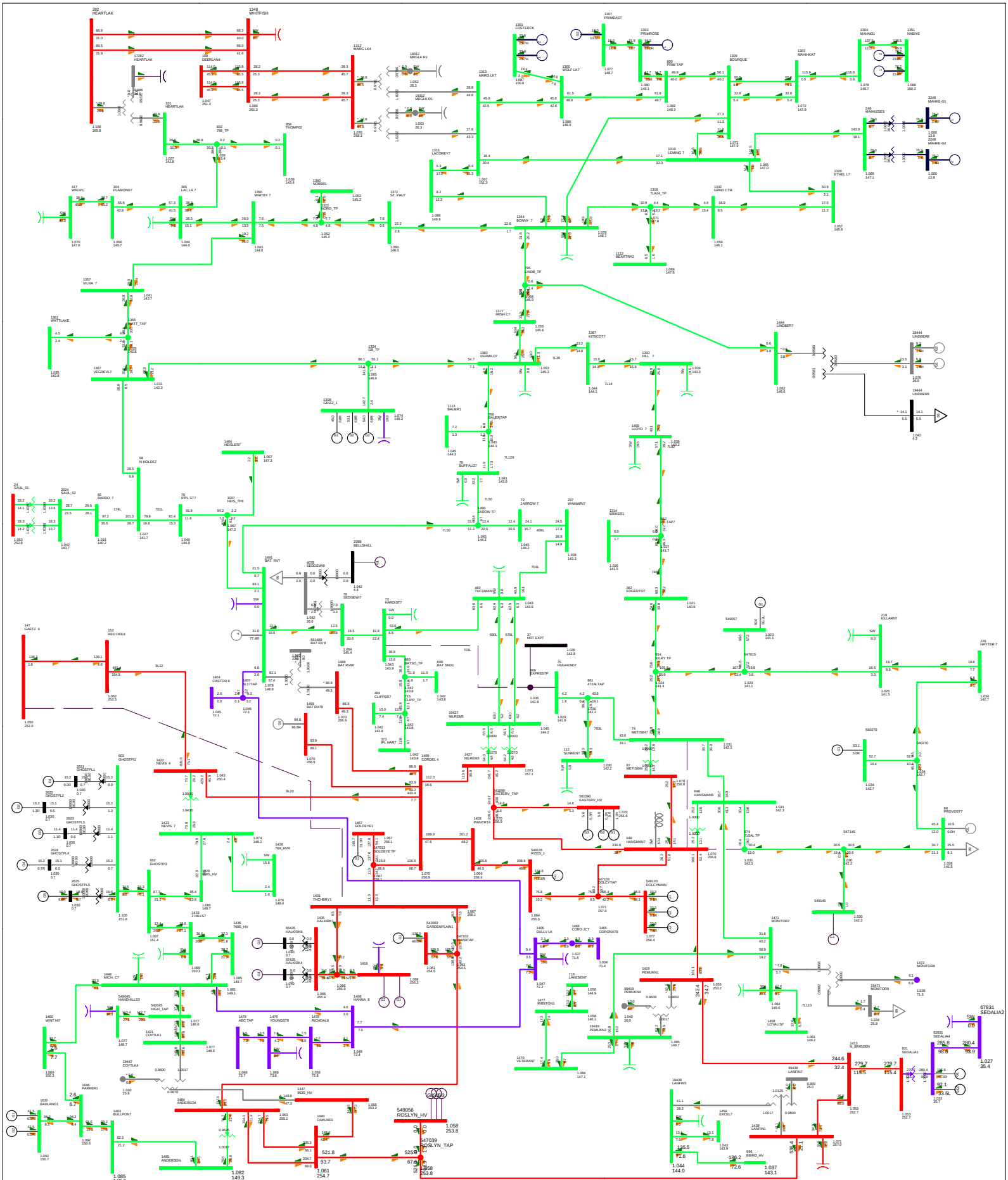
2028SP-woCETO PRE-PROJ

Base Case

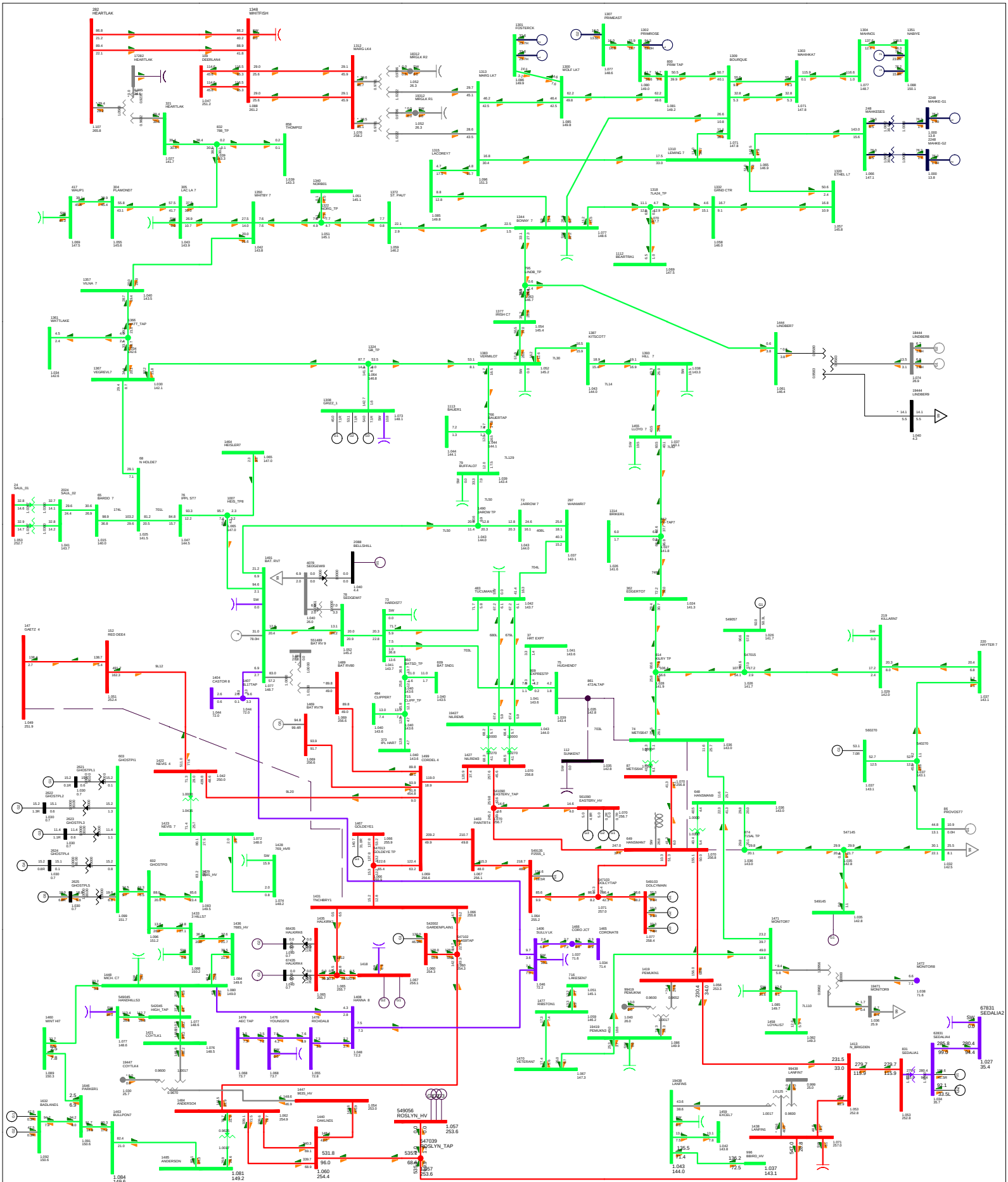
P2034 Cold Lake Area Cogen

Bus - VOLTAGE (kV/PU)
Branch - MW/Mvar
Equipment - MW/Mvar

100.0%RATEA
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A2- 4	Contingency	Study Case Description	P2034 Cold Lake Area Cogen
	CONT 060: 703L (377S Hardisty - 213S Hughenden - 329S Hrt Express)	2028SP-woCETO PRE-PROJ Base Case	Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A2- 4

Contingency

CONT 061: 472L (213S Hughenden - 648S Metiskow - 221S Sunken Lake)

Study Case Description

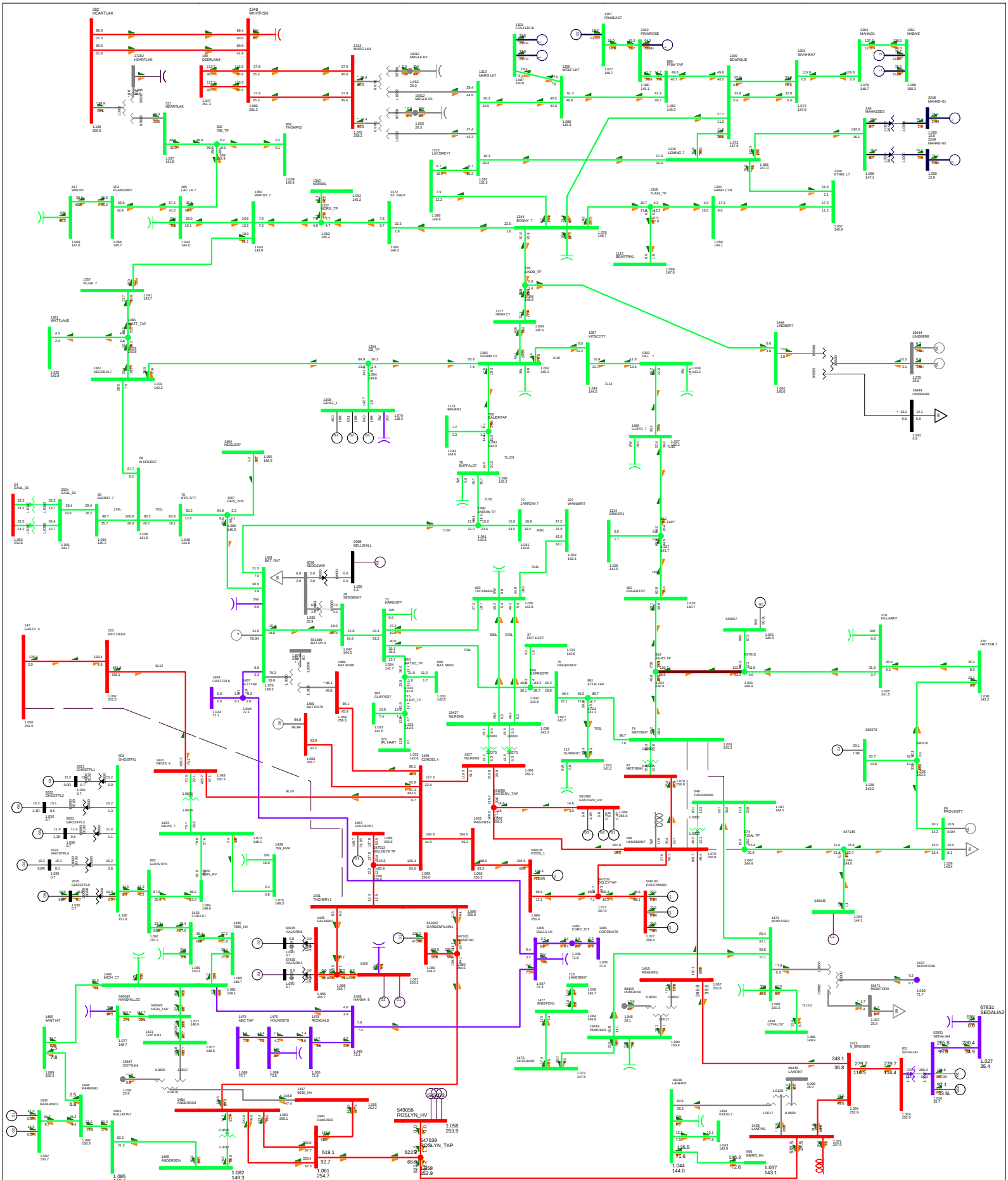
2028SP-woCETO PRE-PROJ

Base Case

P2034 Cold Lake Area Cogen

Bus - VOLTAGE (kV/PU)
Branch - MW/Mvar
Equipment - MW/Mvar

100.0%RATEA
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A2- 4

Contingency

CONT 062: 885L (648S Metiskow - 650S Hansman Lake)

Study Case Description

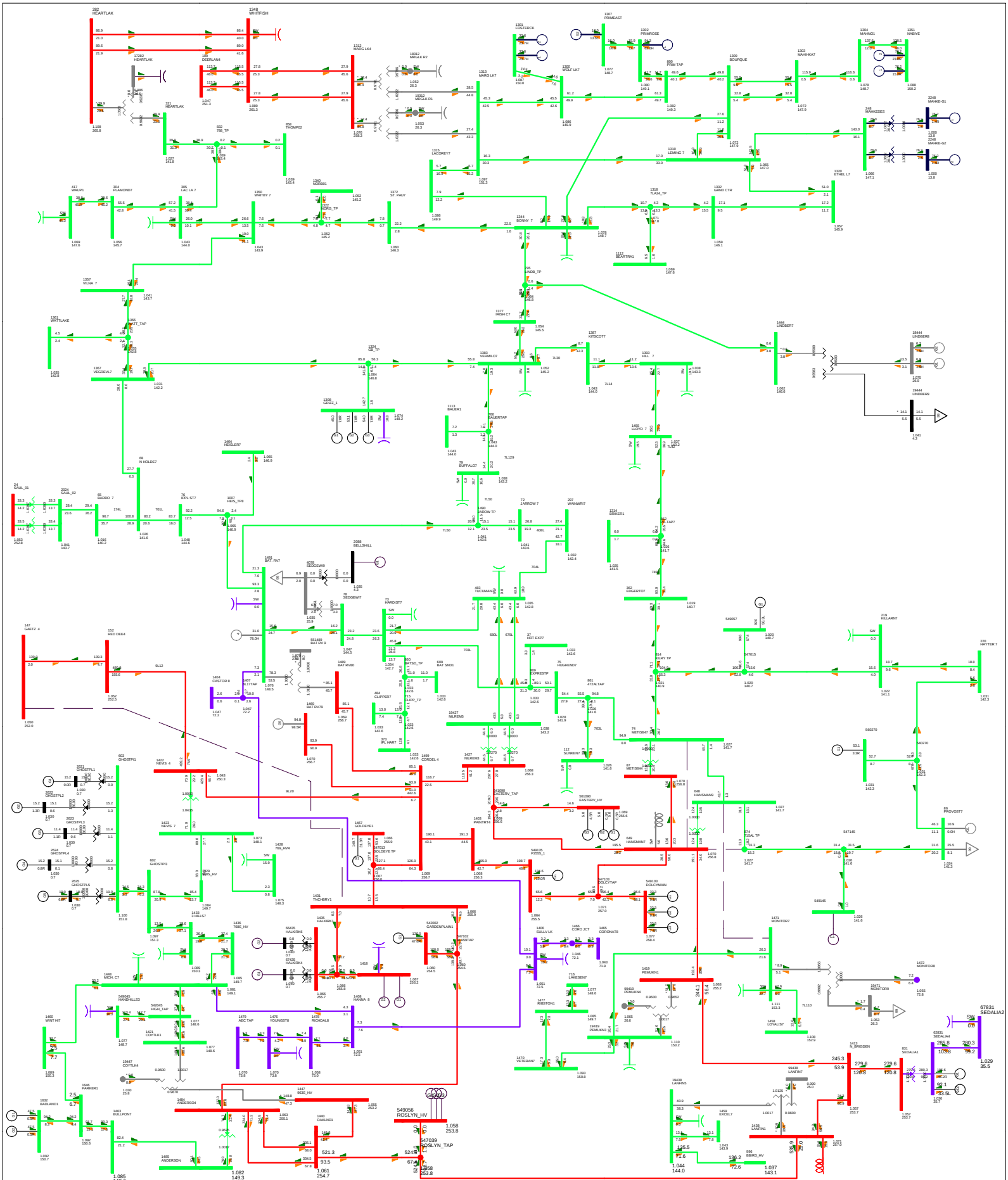
2028SP-woCETO PRE-PROJ

Base Case

P2034 Cold Lake Area Cogen

Bus - VOLTAGE (kV/PU)
Branch - MW/Mvar
Equipment - MW/Mvar

100.0%RATEA
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A2- 4

Contingency

CONT 063: 7L224 (650S Hansman Lake - 774S Monitor)

Study Case Description

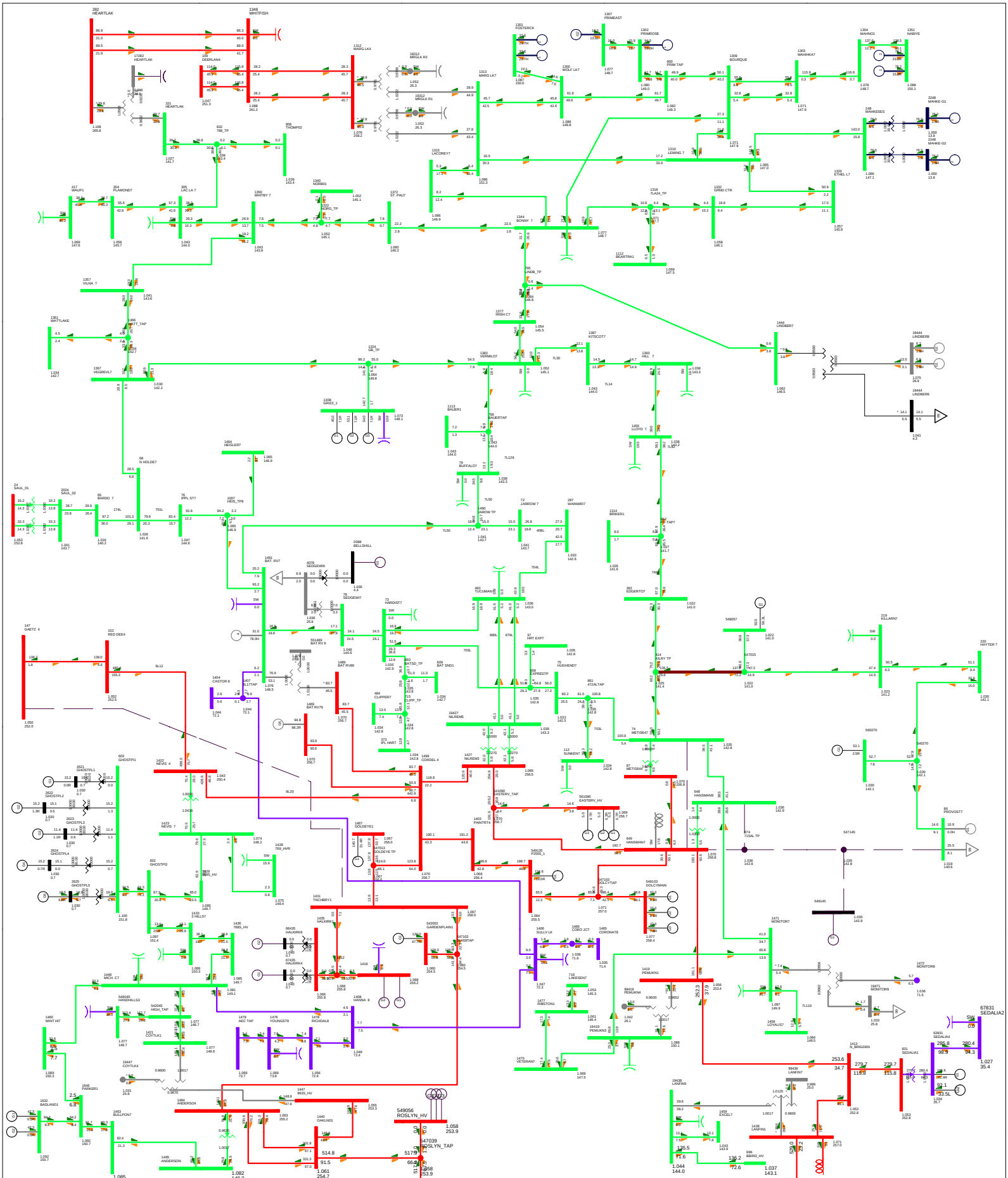
2028SP-woCETO PRE-PROJ

Base Case

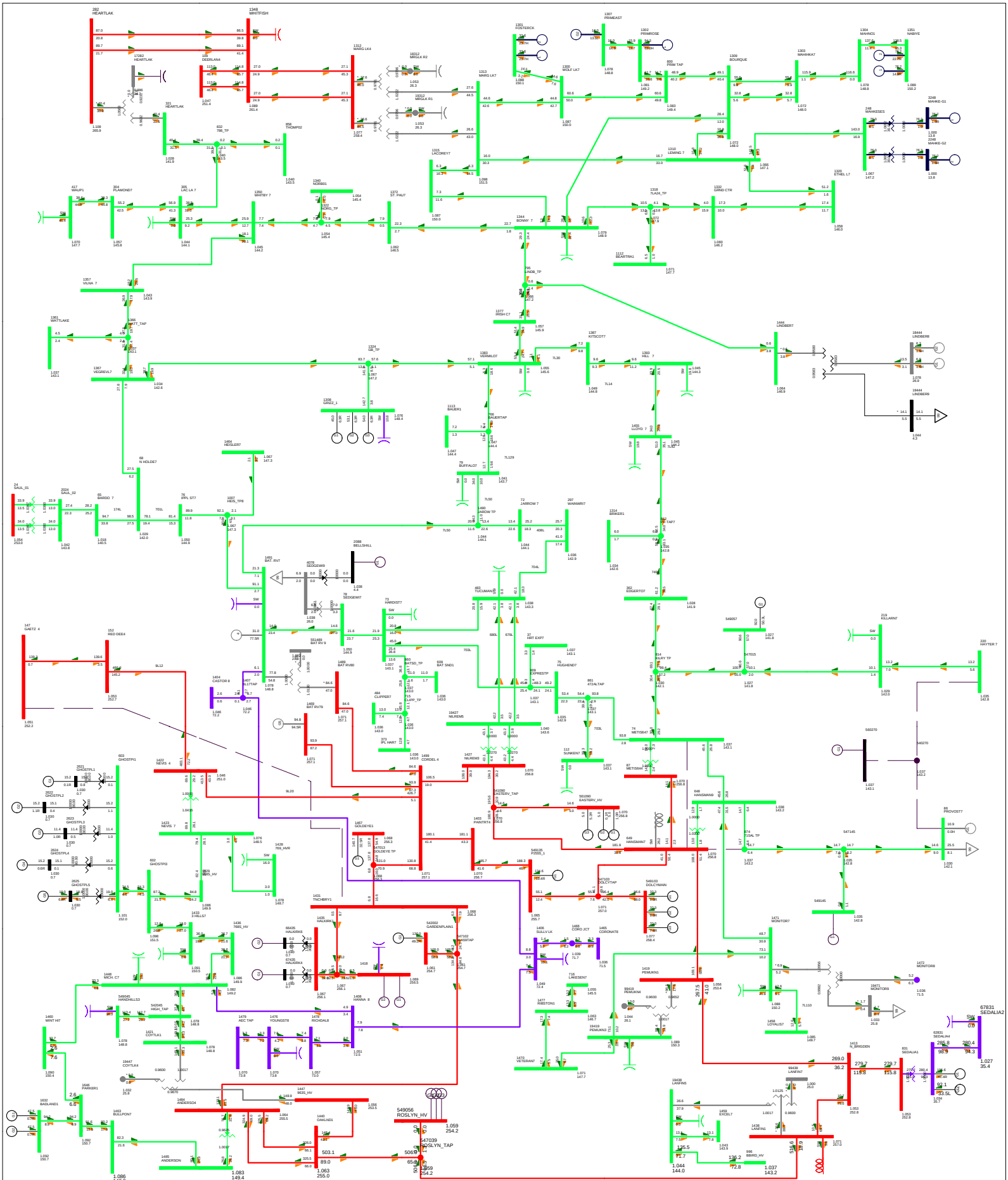
P2034 Cold Lake Area Cogen

Bus - VOLTAGE (kV/PU)
Branch - MW/Mvar
Equipment - MW/Mvar

100.0%RATEA
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A2- 4	**Contingency** CONT 064: 715L (650S Hansman Lake - P2540 Cache Rising Sun - 545S Provost)	**Study Case Description** 2028SP-woCETO PRE-PROJ Base Case	**P2034 Cold Lake Area Cogen** Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A2- 4

Contingency

CONT 065: 398L (545S Provost - P2573 Prairie Yarrow - 277S Hayter)

Study Case Description

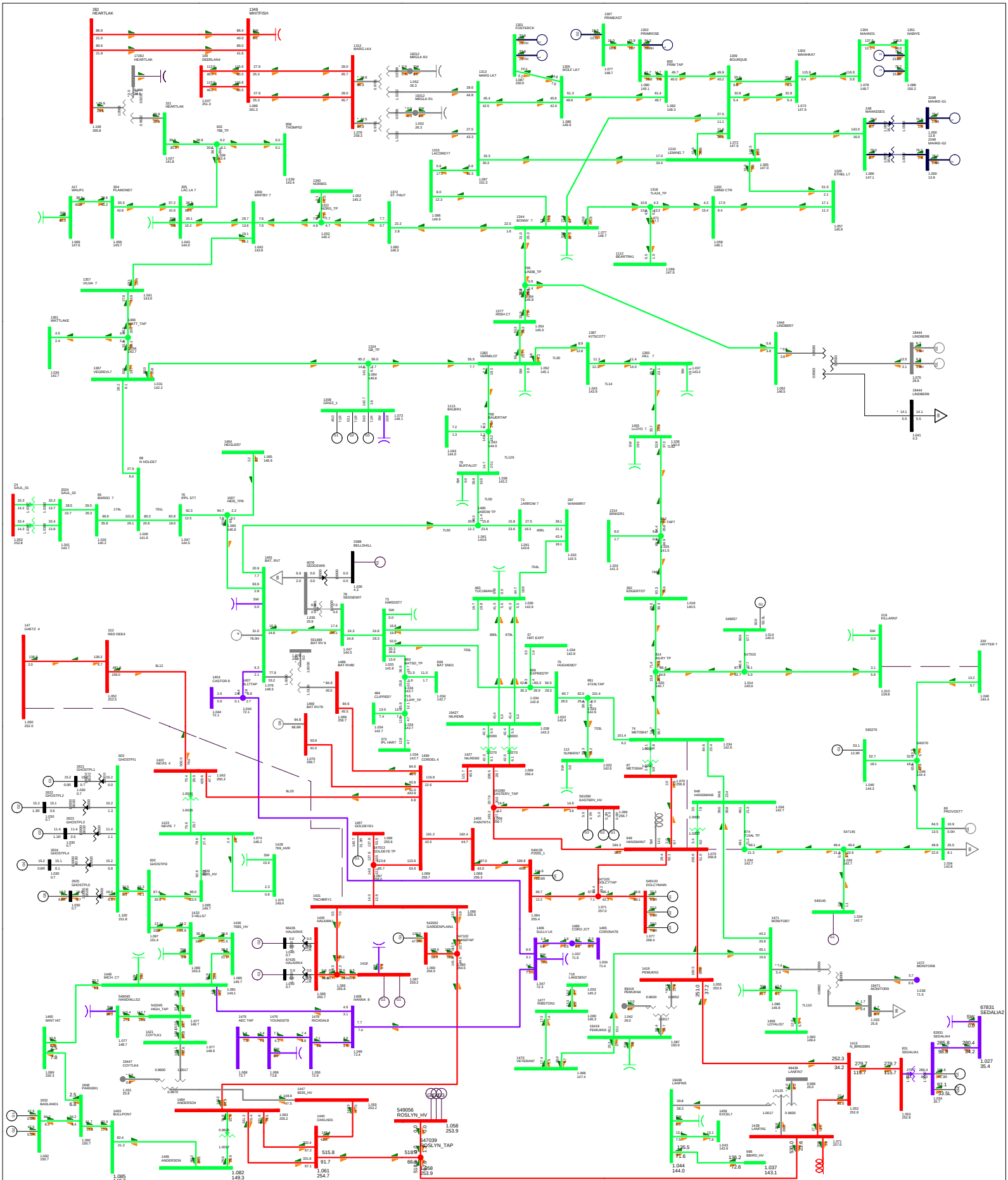
2028SP-woCETO PRE-PROJ

Base Case

P2034 Cold Lake Area Cogen

Bus - VOLTAGE (kV/PU)
Branch - MW/Mvar
Equipment - MW/Mvar

100.0%RATEA
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A2- 4

Contingency

CONT 066: 748L (267S Killarney Lake - 277S Hayter)

Study Case Description

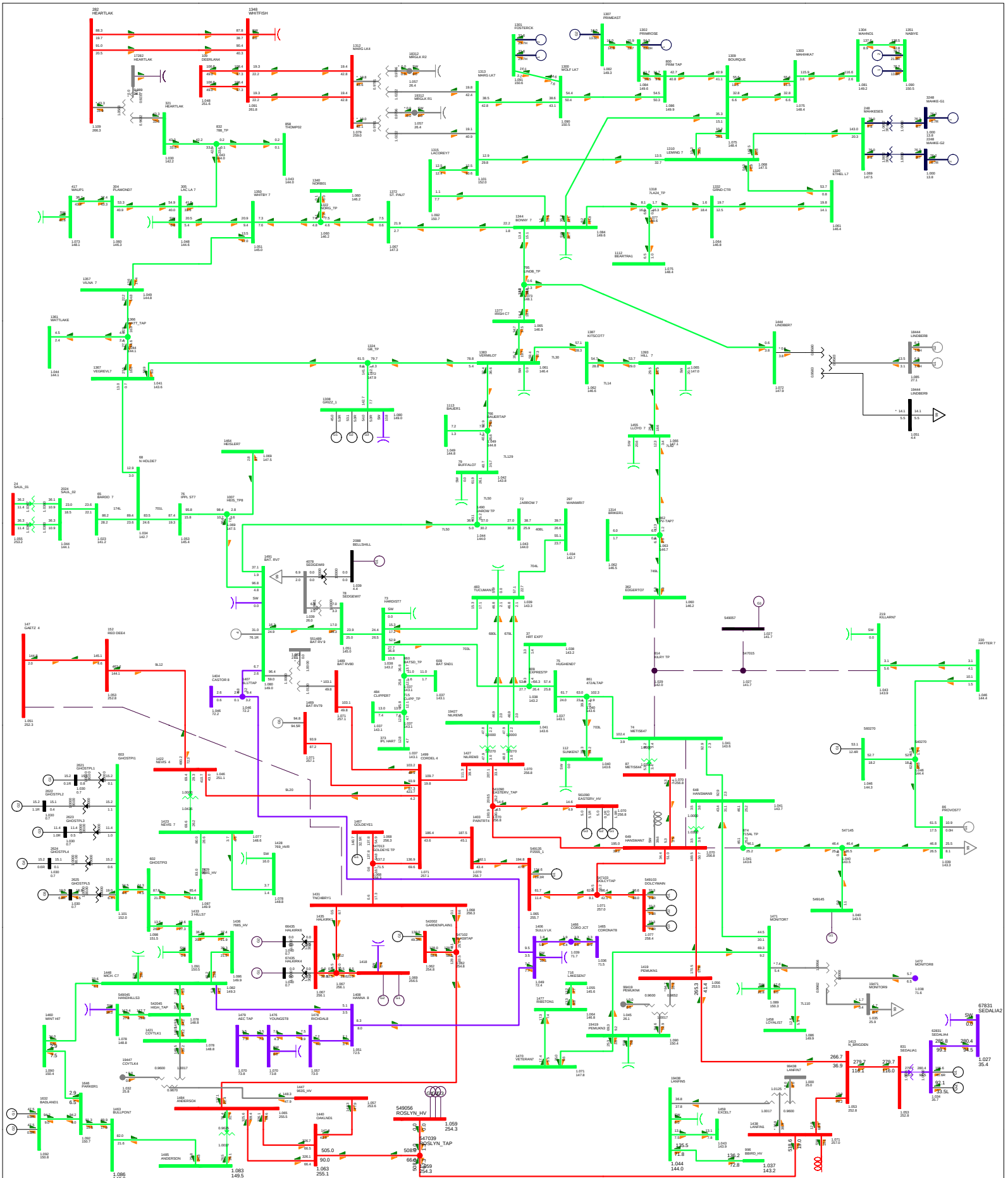
2028SP-woCETO PRE-PROJ

Base Case

P2034 Cold Lake Area Cogen

Bus - VOLTAGE (kV/PU)
Branch - MW/Mvar
Equipment - MW/Mvar

100.0%RATEA
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A2- 4

Contingency

CONT 067: 749L (648S Metiskow - 267S Killarney Lake - P2460 Fox Meadows Wind - 899S Edgerton)

Study Case Description

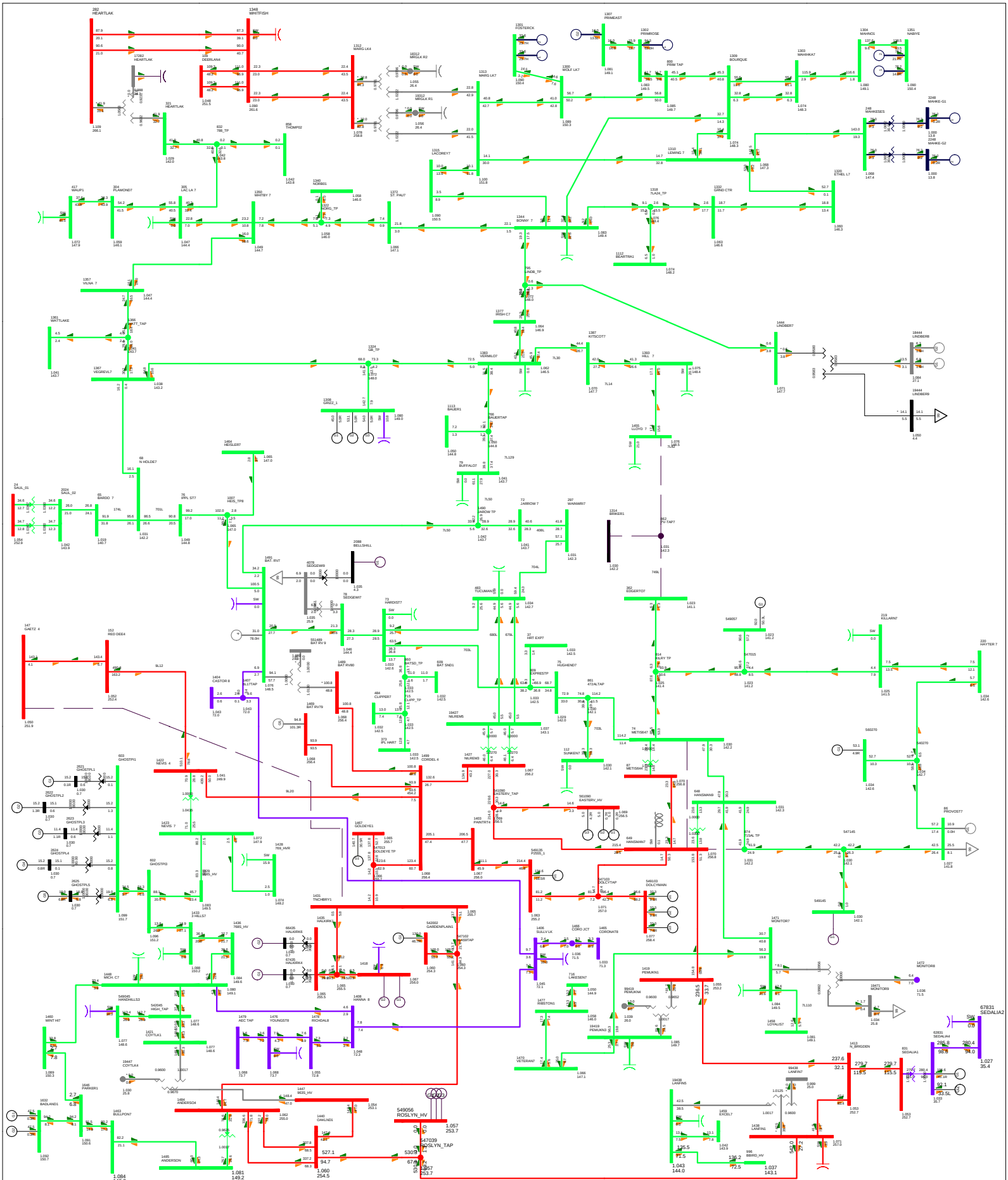
Edgerton CETO PRE-PROJ

Base Case

P2034 Cold Lake Area Cogen

Bus - VOLTAGE (kV/PU)
Branch - MW/Mvar
Equipment - MW/Mvar

100.0%RATEA
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A2- 4

Contingency

CONT 068: 7L749 (899S Edgerton - 716S Lloydminster - 880S Briker)

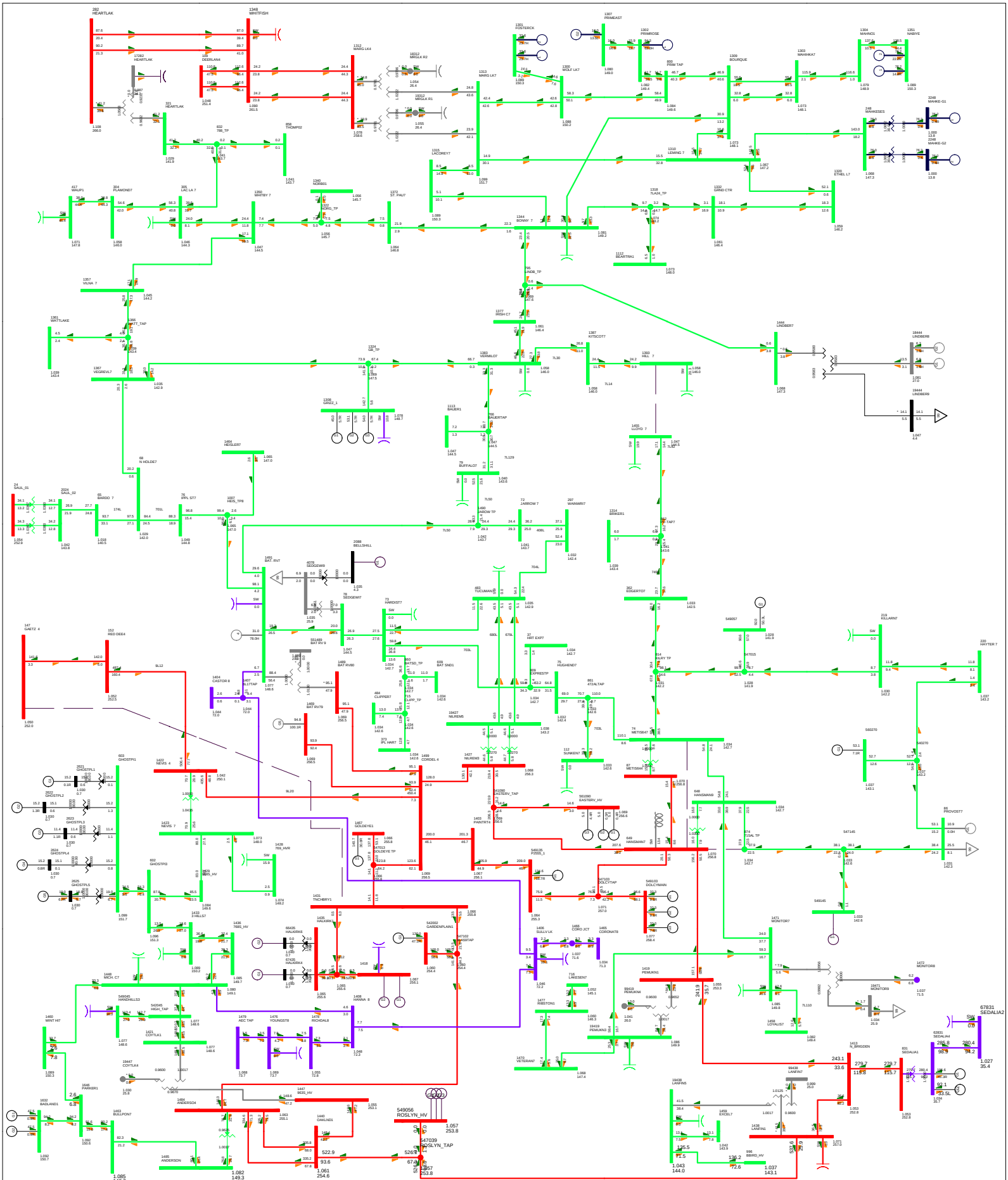
Study Case Description

2028SP-woCETO PRE-PROJ

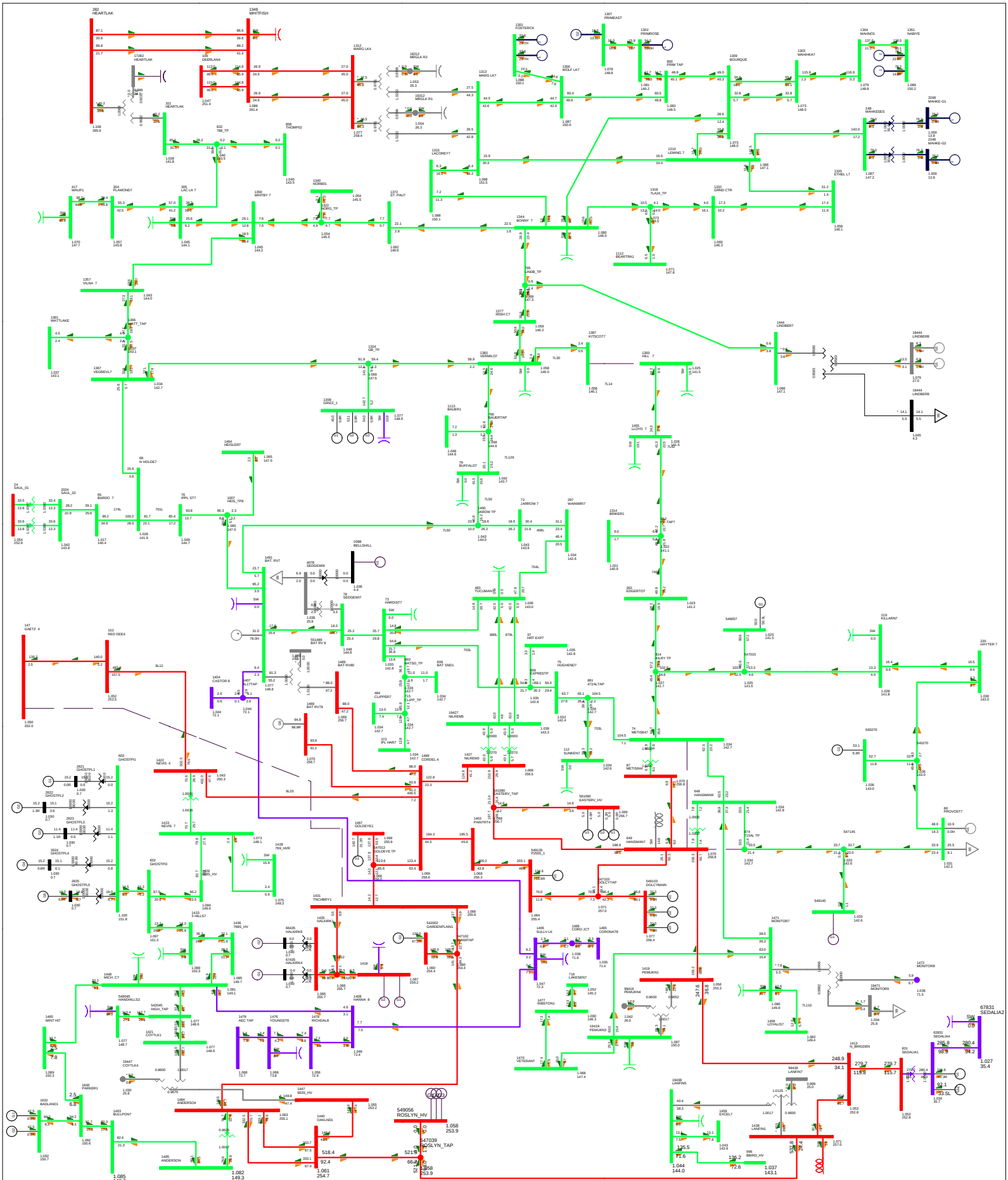
Base Case

P2034 Cold Lake Area Cogen

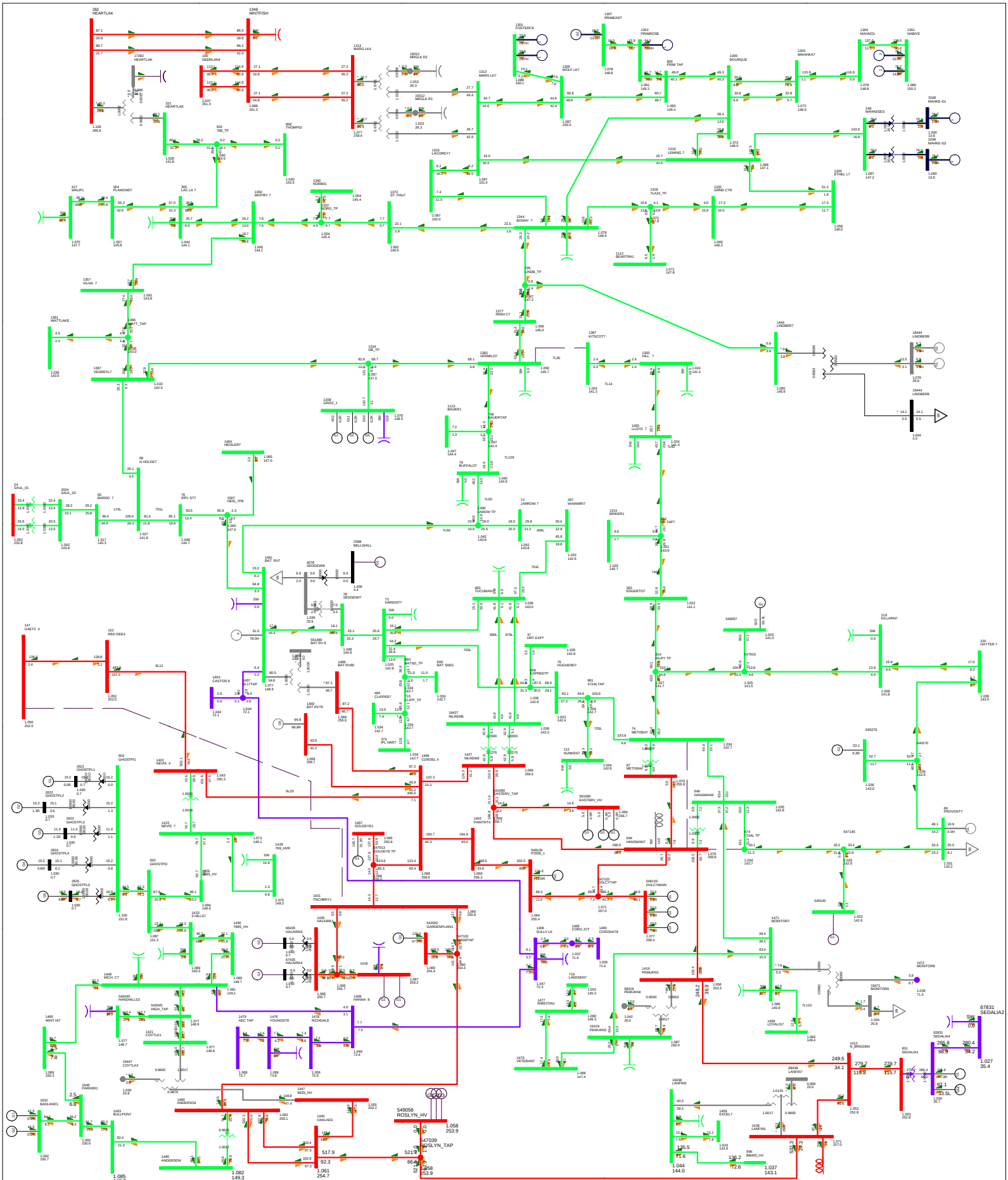
Bus - VOLTAGE (kV/PU)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%RATEA
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



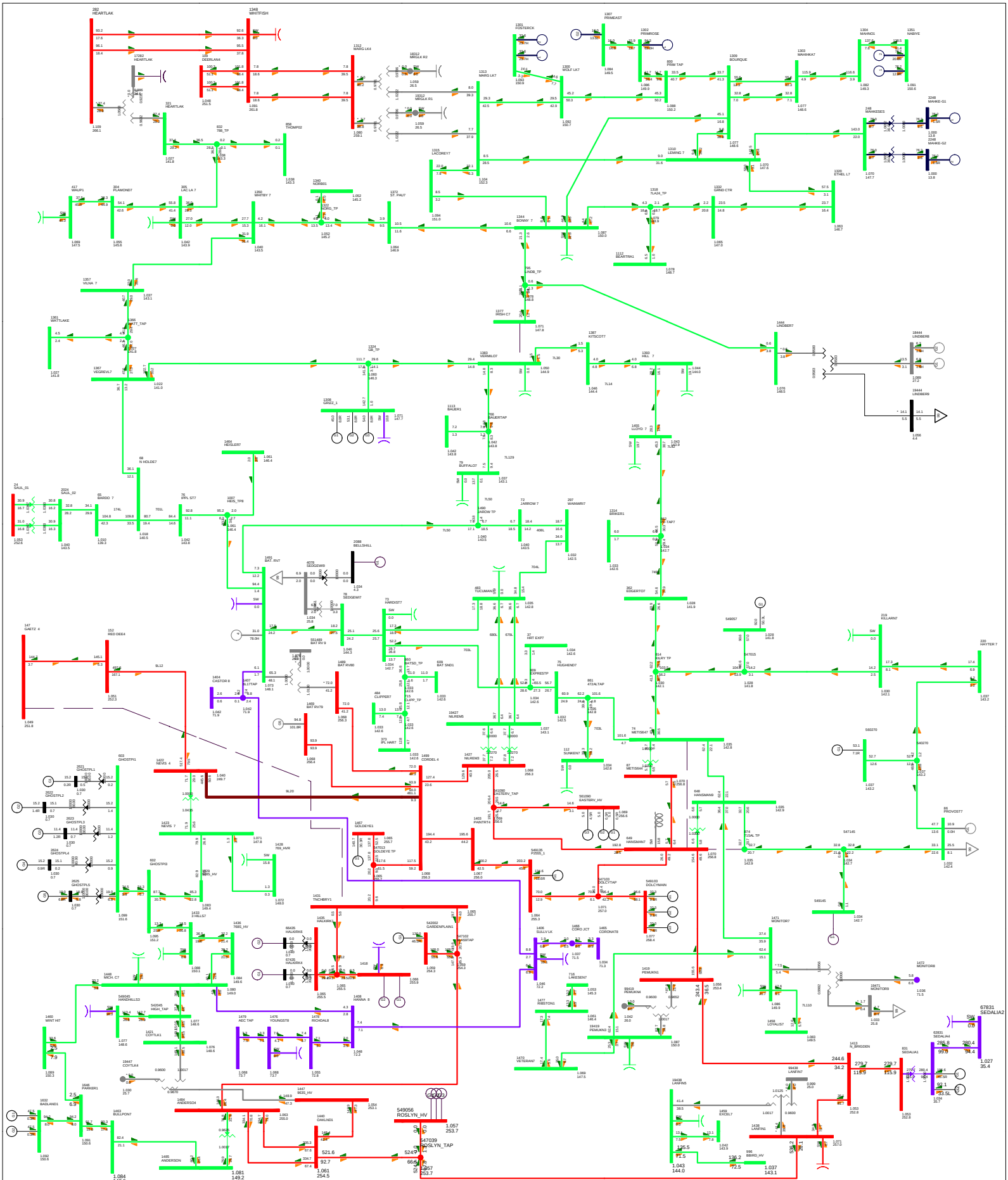
Attachment A2- 4	Contingency	Study Case Description	P2034 Cold Lake Area Cogen
	CONT 069: 7L42 (751S Hill - 716S Lloydminster)	2028SP-woCETO PRE-PROJ Base Case	Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A2- 4	**Contingency** CONT 070: 7L14 (705S Kitscoty - 751S Hill)	**Study Case Description** 2028SP-woCETO PRE-PROJ Base Case	**P2034 Cold Lake Area Cogen** Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A2- 4	Contingency	Study Case Description	P2034 Cold Lake Area Cogen
	CONT 071: 7L130 (710S Vermilion - 705S Kitscoty)	2028SP-woCETO PRE-PROJ Base Case	Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A2- 4

Contingency

CONT 072: 7L117 (706S Irish Creek - 710S Vermilion)

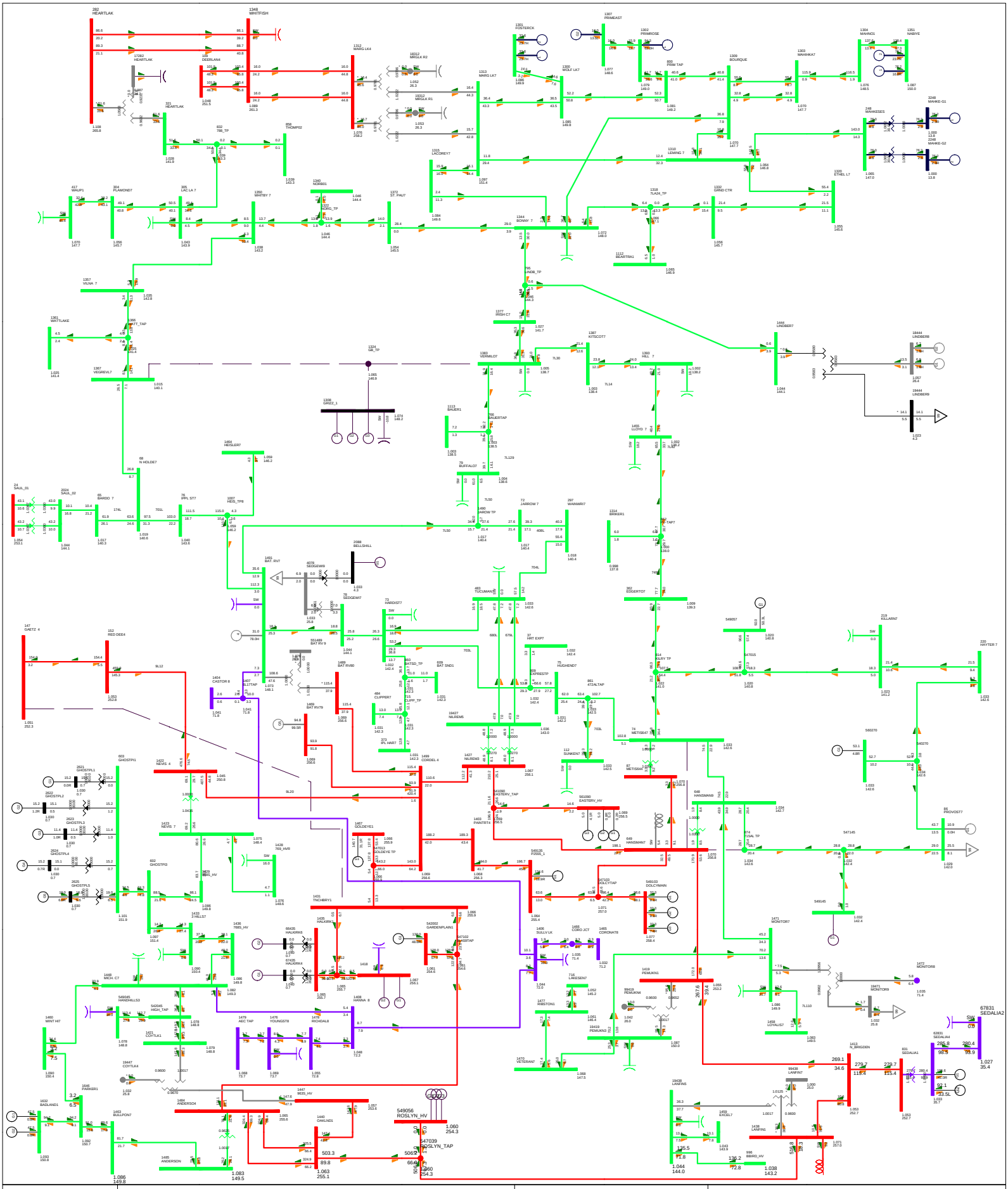
Study Case Description

2028SP-woCETO PRE-PROJ

Base Case

P2034 Cold Lake Area Cogen

Bus - VOLTAGE (kV/PU)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%RATEA
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A2- 4

Contingency

CONT 073: 7L65 (709S Vegreville - 710S Vermilion - 708S Grizzly Bear)

Study Case Description

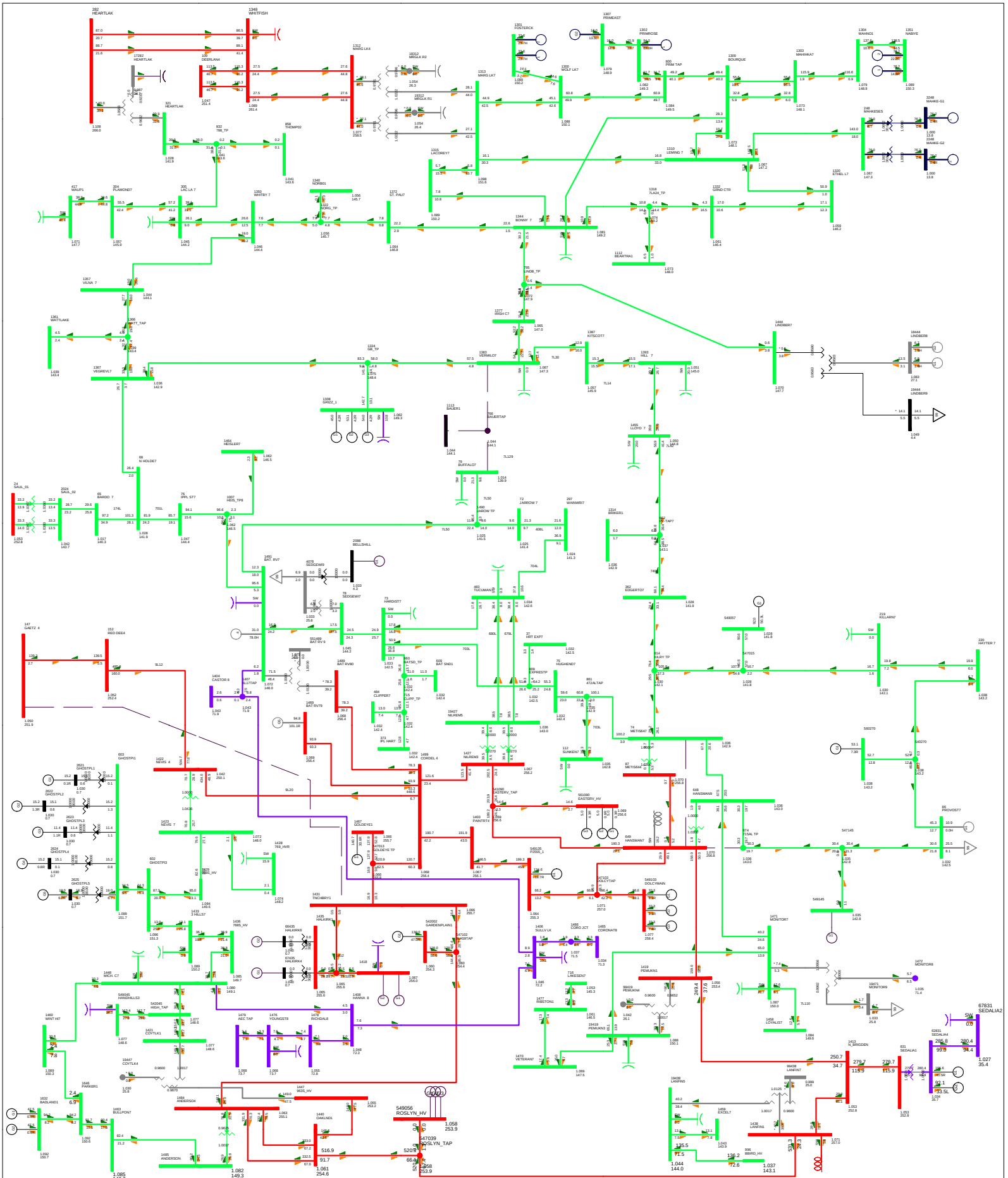
2028SP-woCETO PRE-PROJ

Base Case

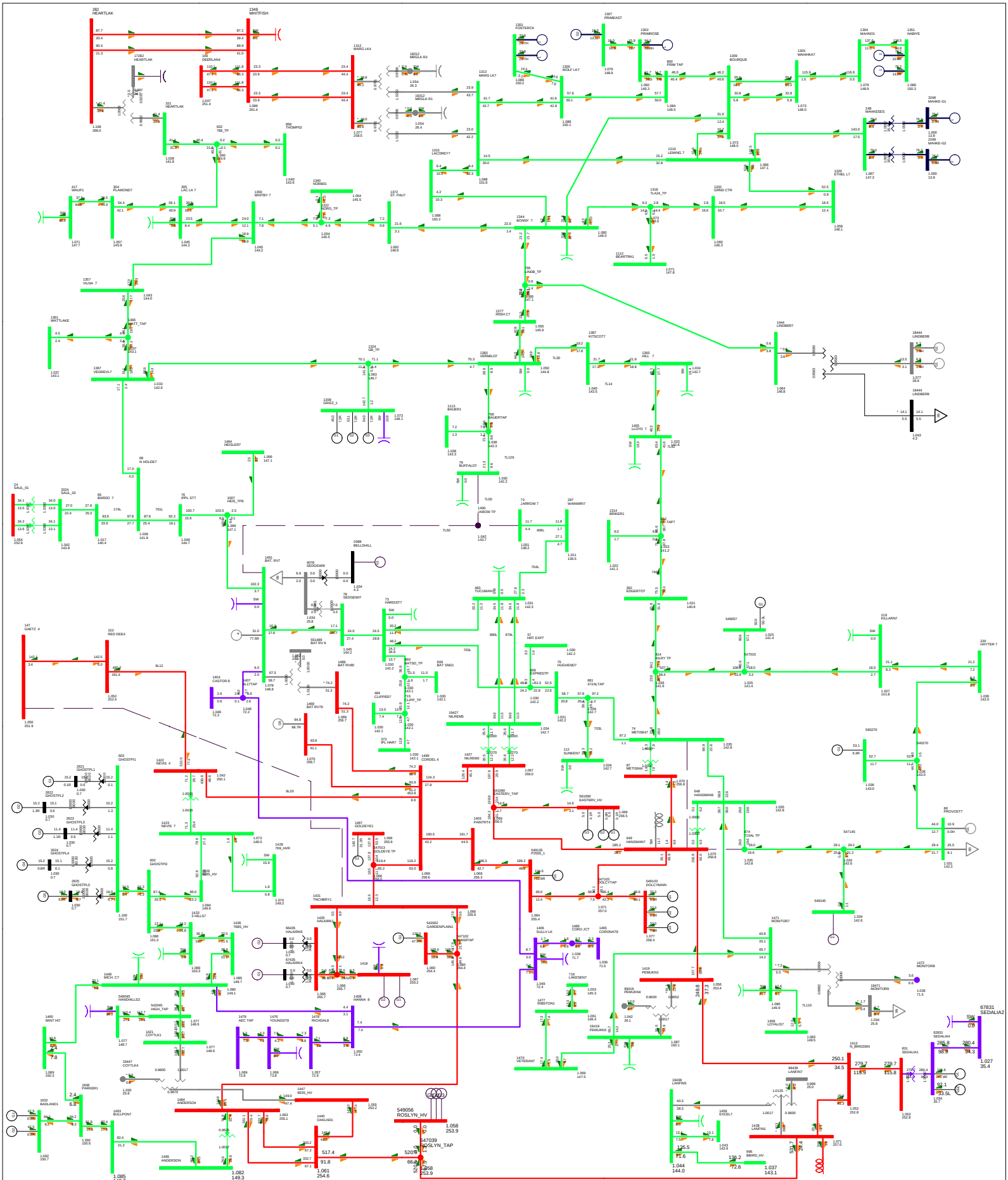
P2034 Cold Lake Area Cogen

Bus - VOLTAGE (kV/PU)
Branch - MW/Mvar
Equipment - MW/Mvar

100.0%RATEA
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A2- 4	Contingency	Study Case Description	P2034 Cold Lake Area Cogen
	CONT 074: 7L129 (710S Vermilion - 918S Bauer - 526S Buffalo Creek)	2028SP-woCETO PRE-PROJ Base Case	Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A2- 4

Contingency

CONT 075: 7L50 (526S Buffalo Creek - 757S Battle River - 252S Jarrow)

Study Case Description

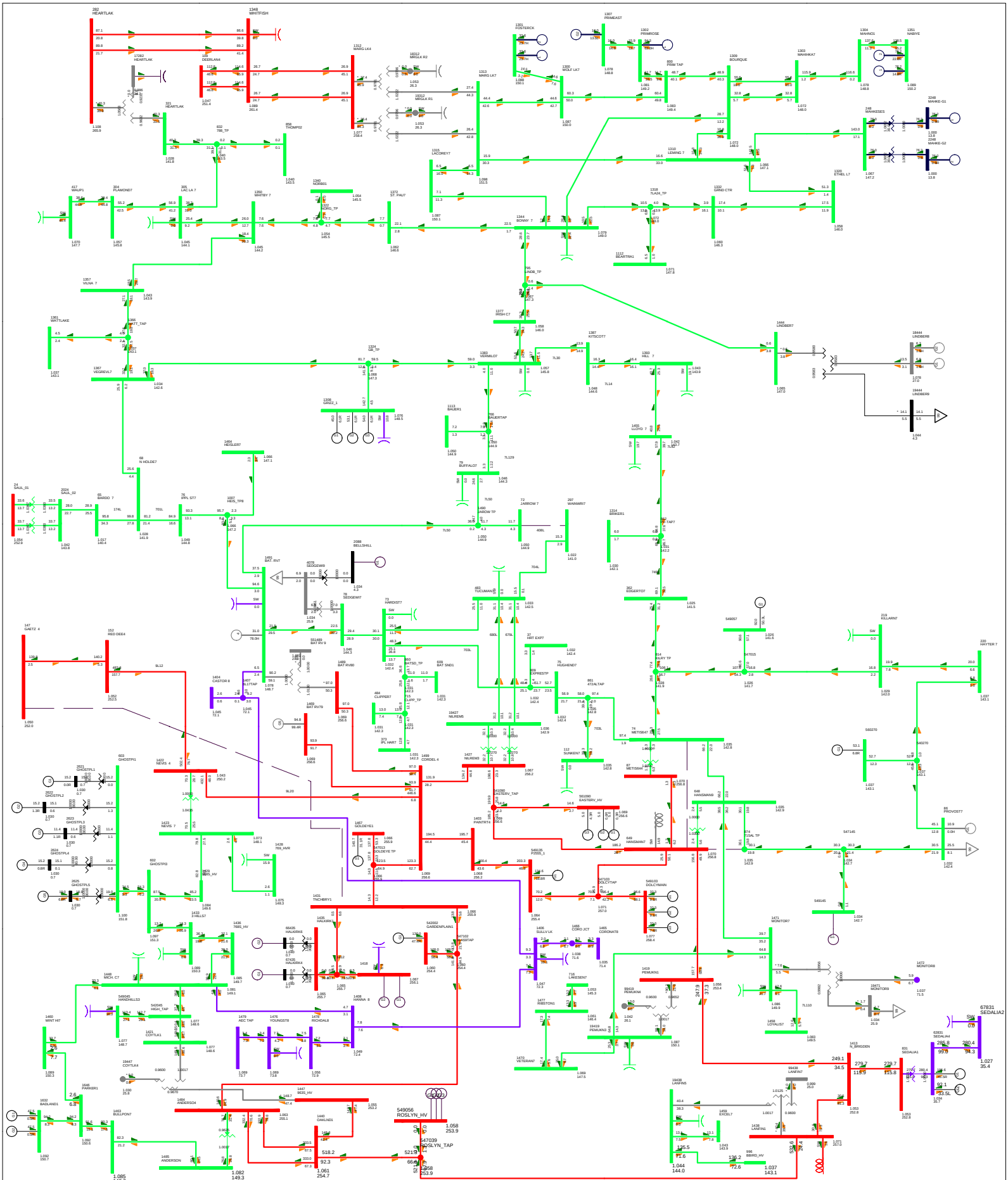
2028SP-woCETO PRE-PROJ

Base Case

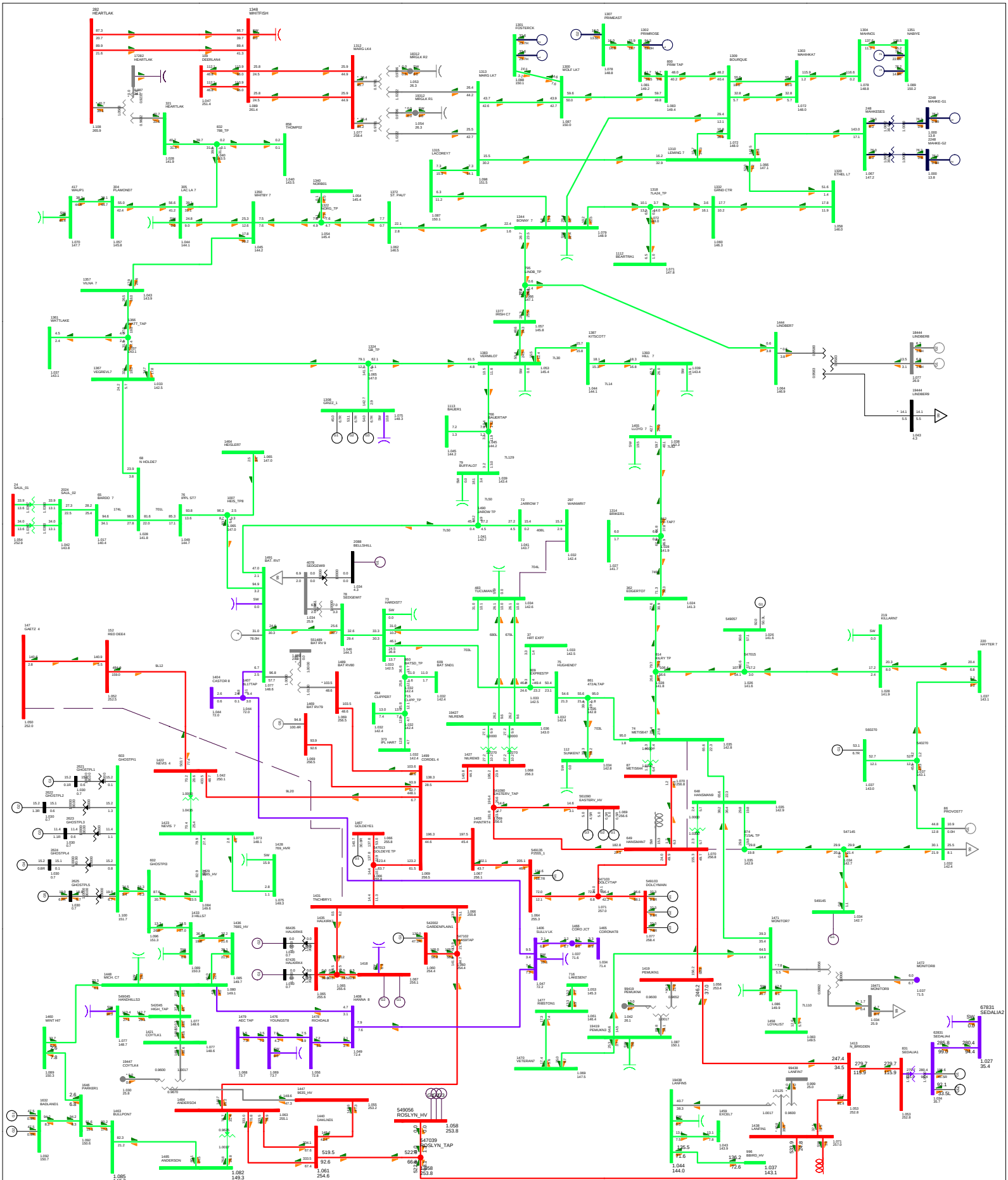
P2034 Cold Lake Area Cogen

Bus - VOLTAGE (kV/PU)
Branch - MW/Mvar
Equipment - MW/Mvar

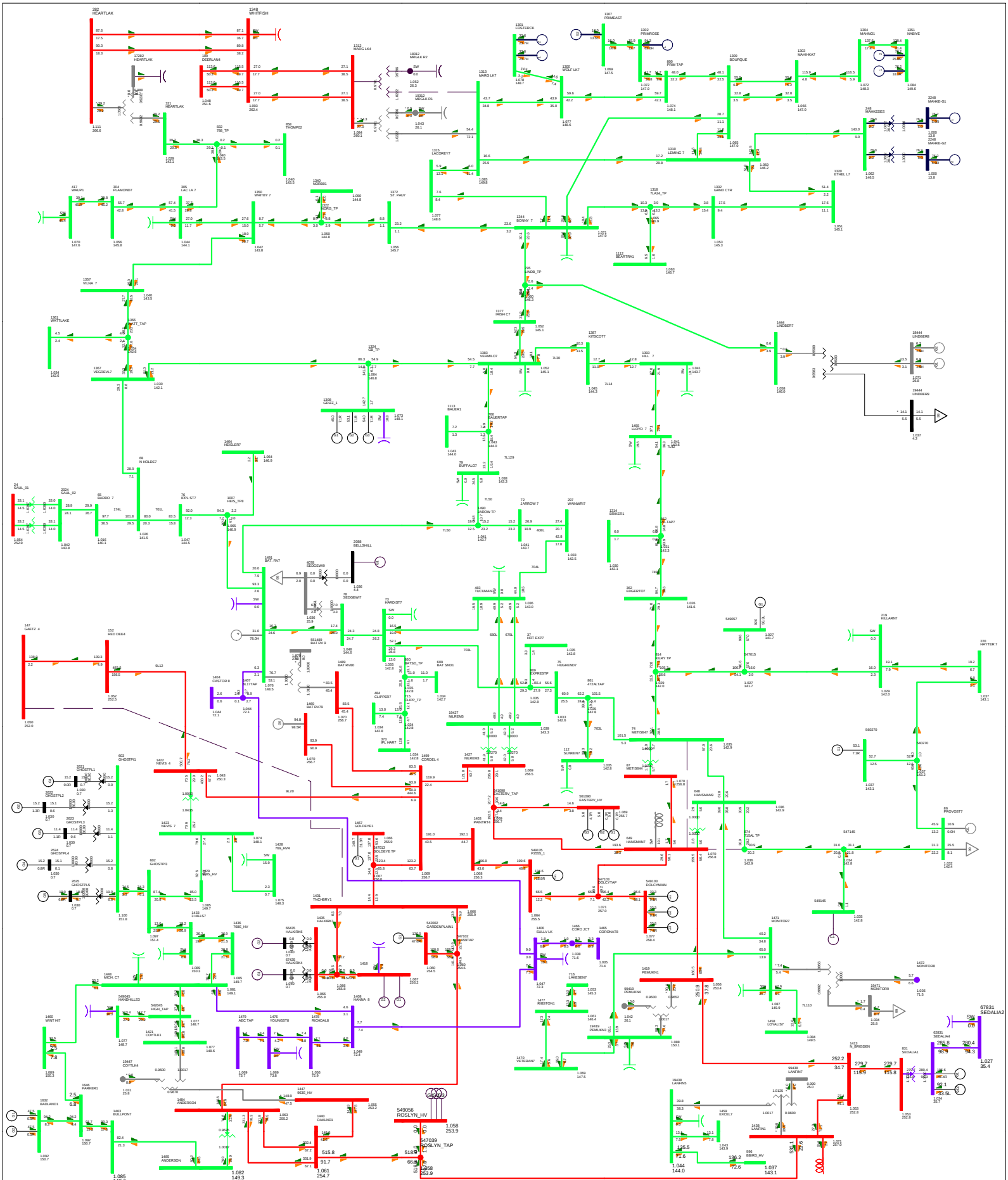
100.0%RATEA
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A2- 4	Contingency	Study Case Description	P2034 Cold Lake Area Cogen
	CONT 076: 408L (252S Jarrow - 51S Wainwright)	2028SP-woCETO PRE-PROJ Base Case	Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A2- 4	Contingency	Study Case Description	P2034 Cold Lake Area Cogen
	CONT 077: 704L (51S Wainwright - 478S Tucuman)	2028SP-woCETO PRE-PROJ Base Case	Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A2- 4

Contingency

CONT 078: Marguerite Lake 2T

Study Case Description

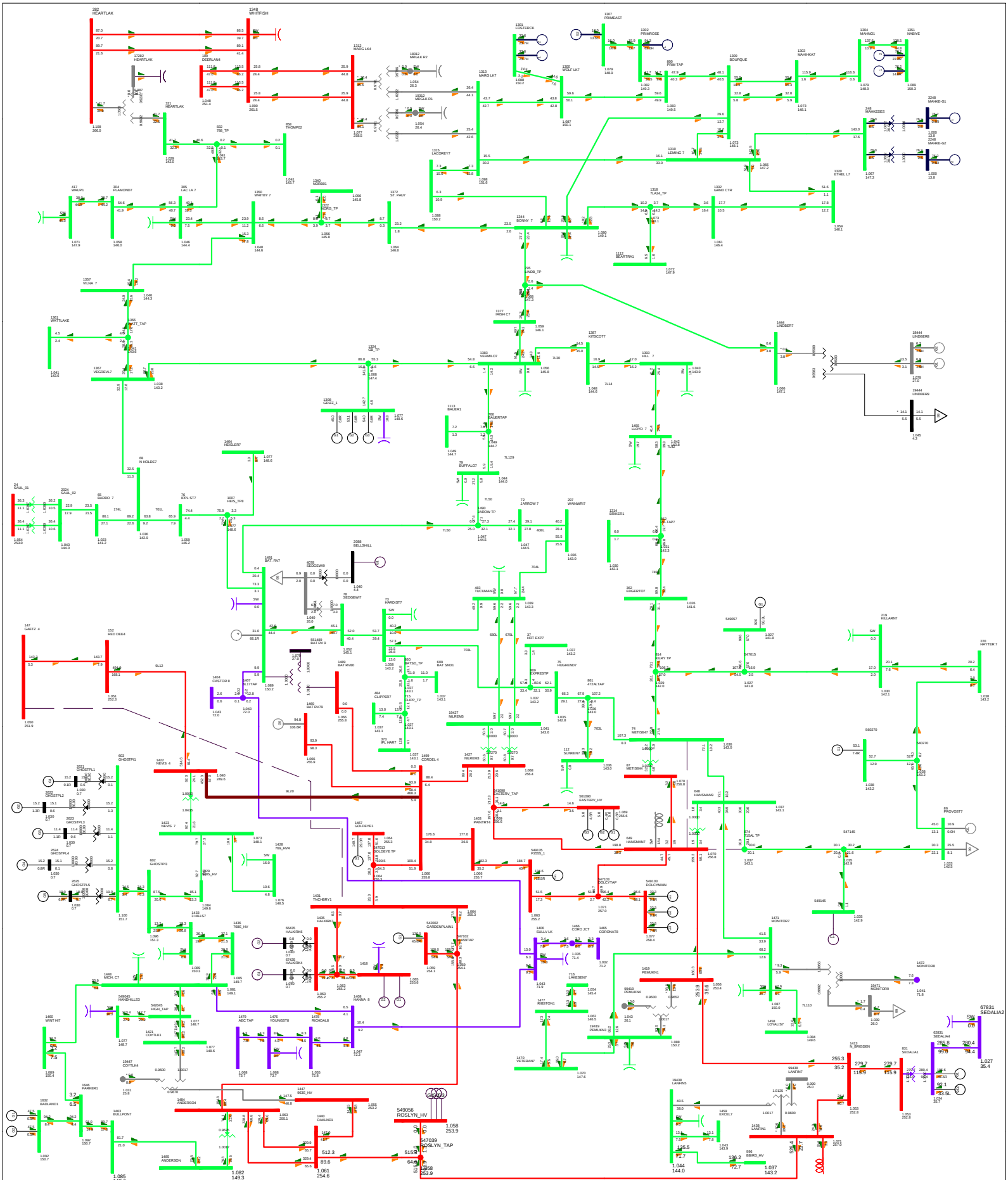
2028SP-woCETO PRE-PROJ

Base Case

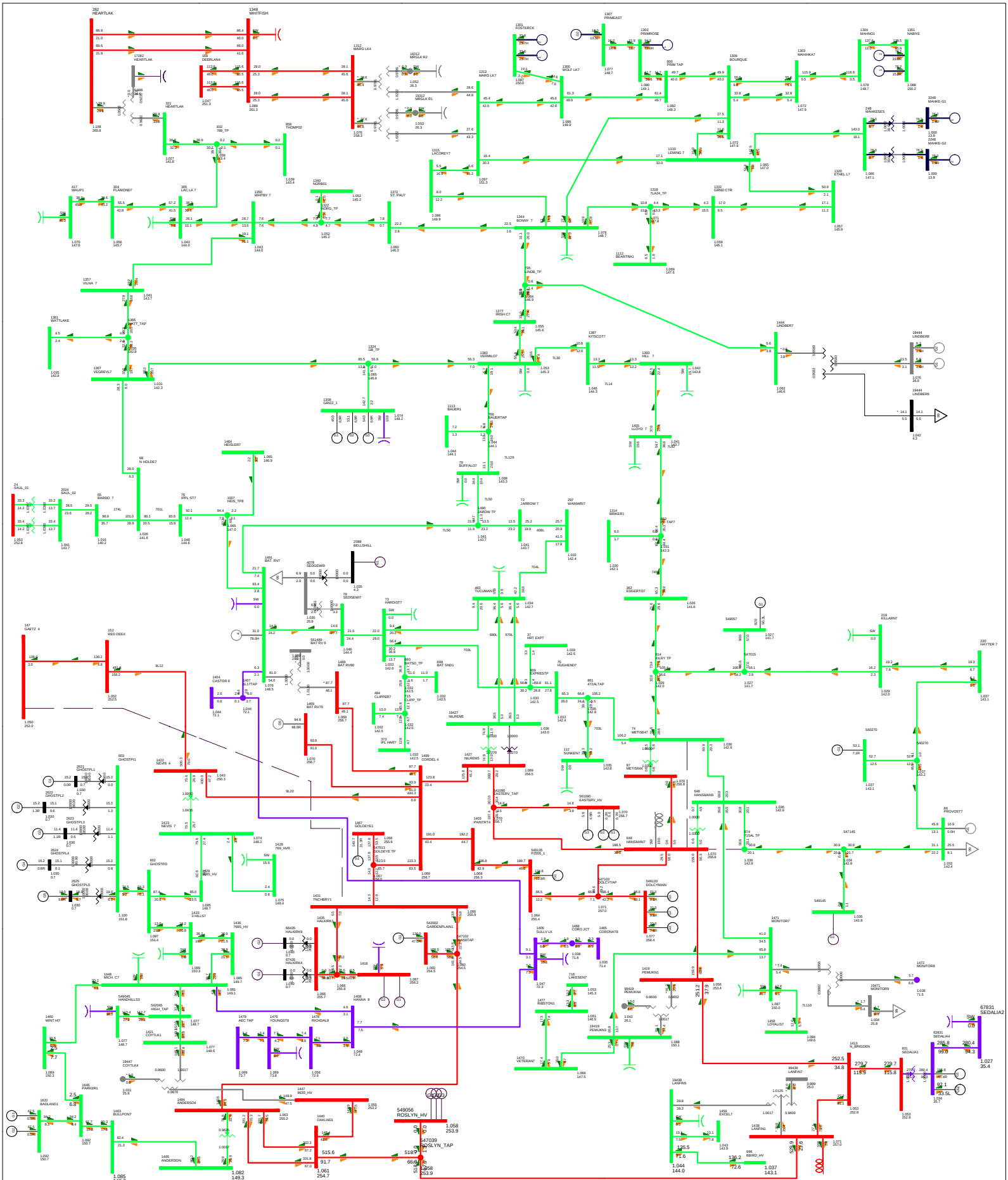
P2034 Cold Lake Area Cogen

Bus - VOLTAGE (kV/PU)
Branch - MW/Mvar
Equipment - MW/Mvar

100.0%RATEA
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A2- 4	Contingency	Study Case Description	P2034 Cold Lake Area Cogen
	CONT 079: Battle River T2	2028SP-woCETO PRE-PROJ Base Case	Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A2- 4

Contingency

CONT 080: 574S Nilrem 162.2TR

Study Case Description

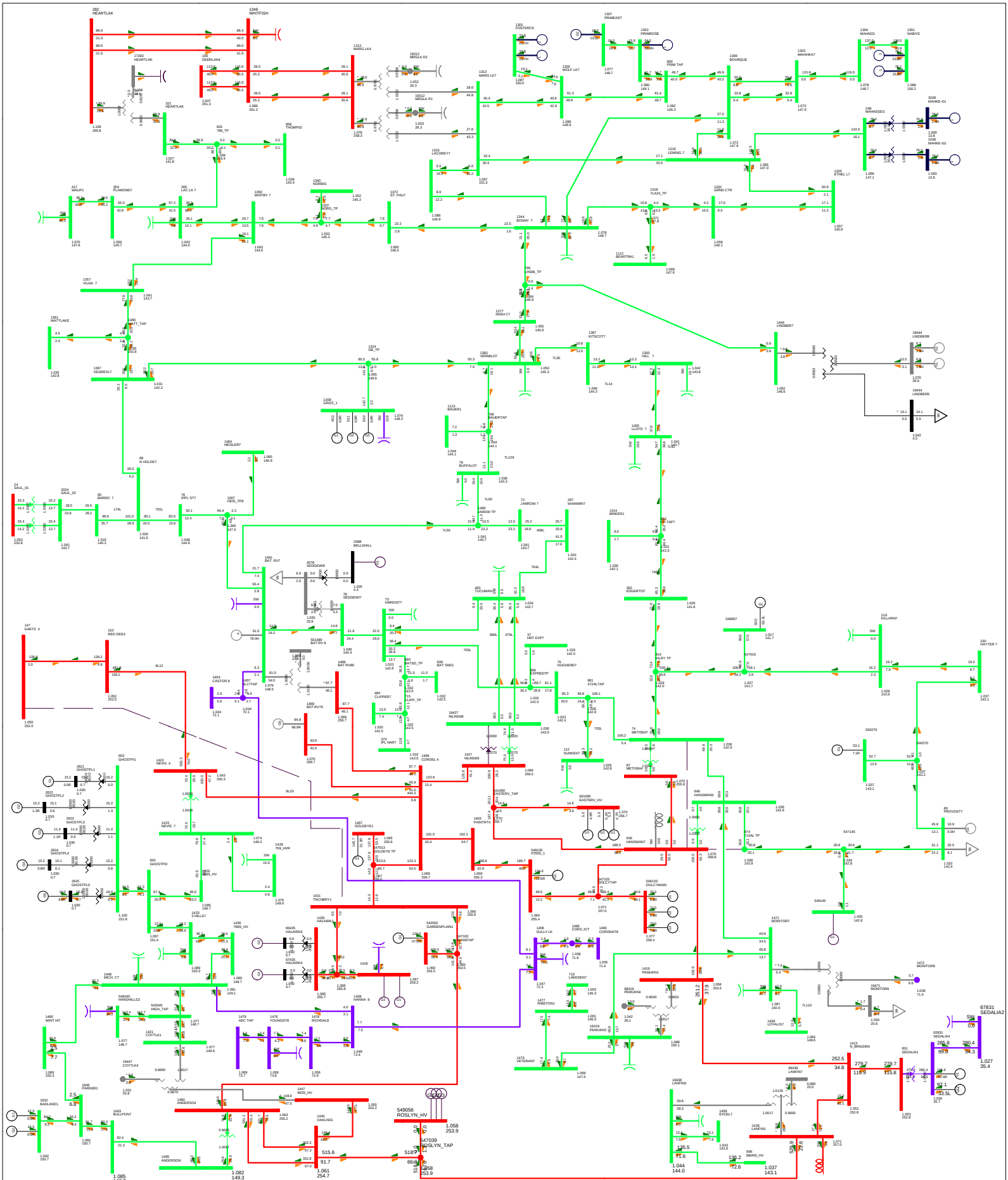
2028SP-woCETO PRE-PROJ

Base Case

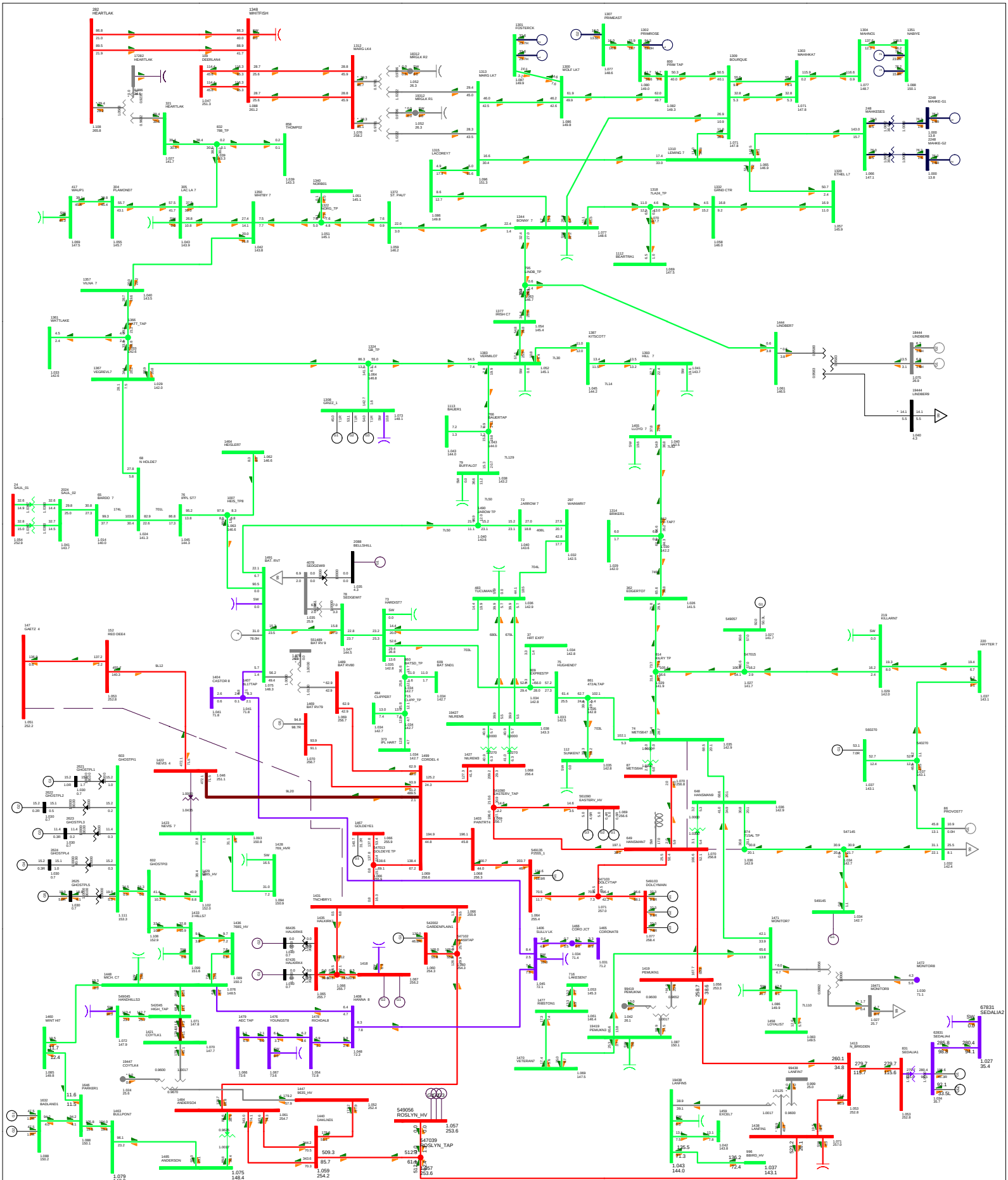
P2034 Cold Lake Area Cogen

Bus - VOLTAGE (kV/PU)
Branch - MW/Mvar
Equipment - MW/Mvar

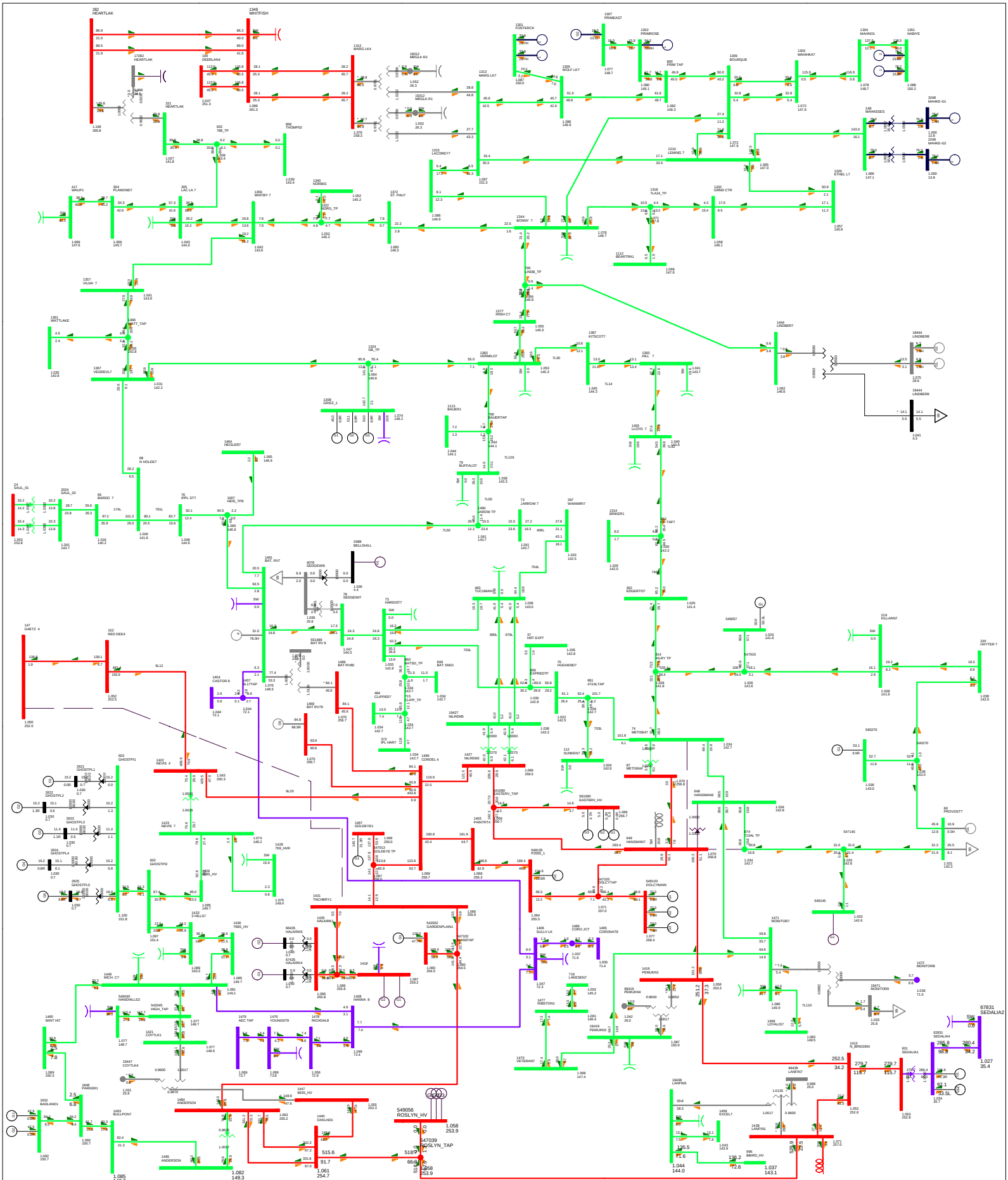
100.0%RATEA
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



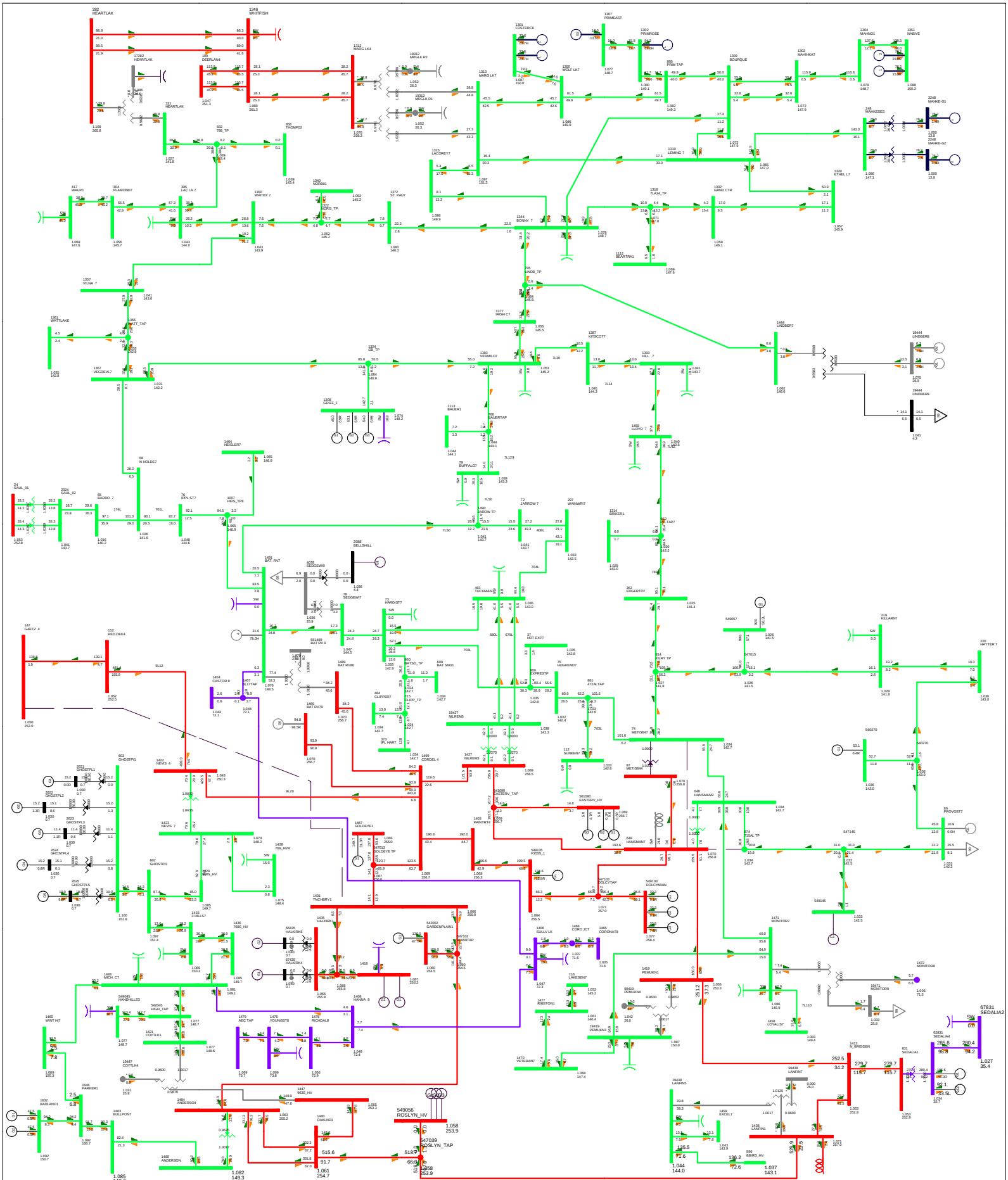
Attachment A2- 4	Contingency	Study Case Description	P2034 Cold Lake Area Cogen
	CONT 081: 574S Nilrem 87ST1	2028SP-woCETO PRE-PROJ Base Case	Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A2- 4	Contingency	Study Case Description	P2034 Cold Lake Area Cogen
	CONT 082: 766S Nevis 162.1TR	2028SP-woCETO PRE-PROJ Base Case	Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000

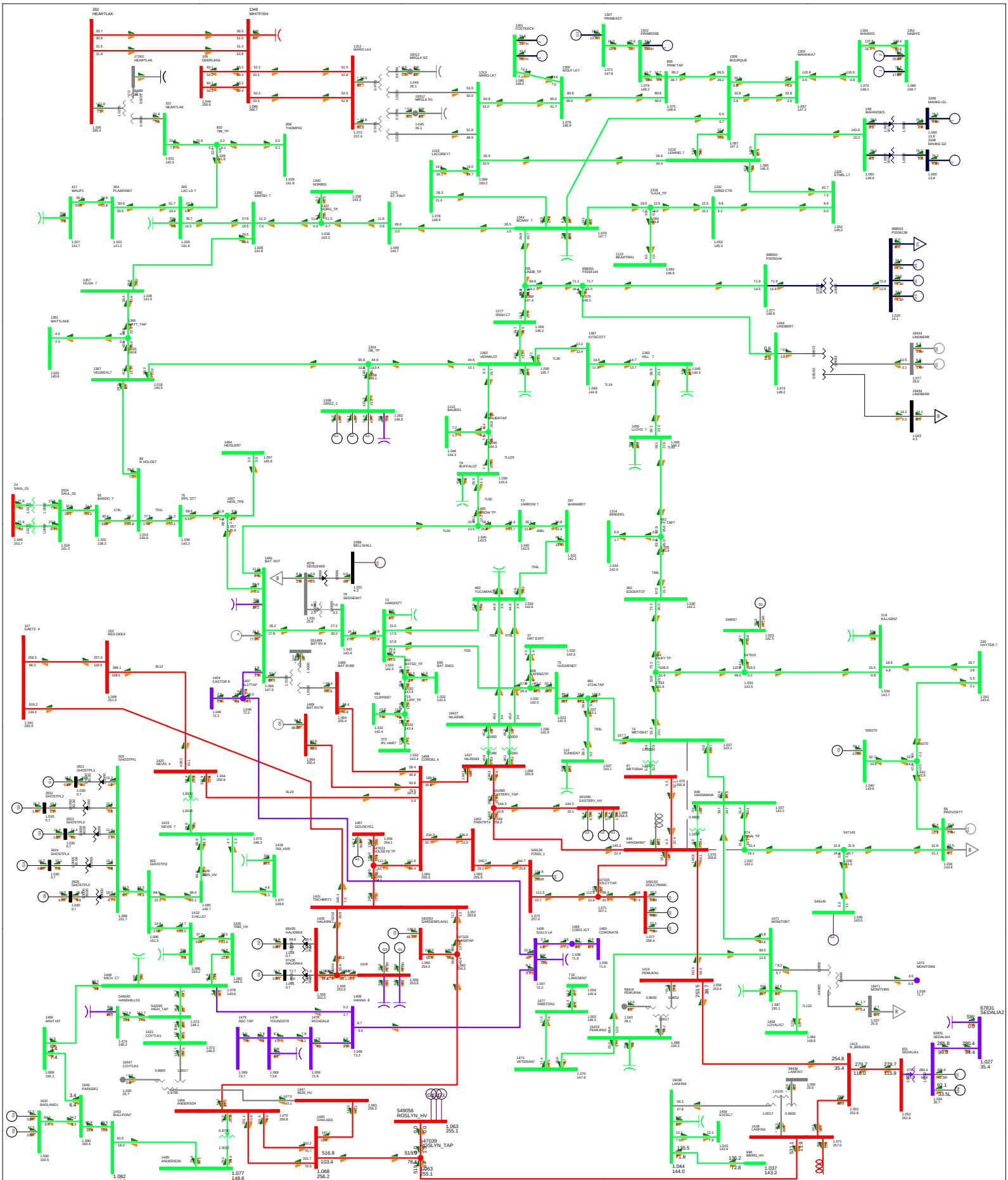


Attachment A2- 4	**Contingency** CONT 083: 650S Hansman Lake 63ST1	**Study Case Description** 2028SP-woCETO PRE-PROJ Base Case	**P2034 Cold Lake Area Cogen** Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000

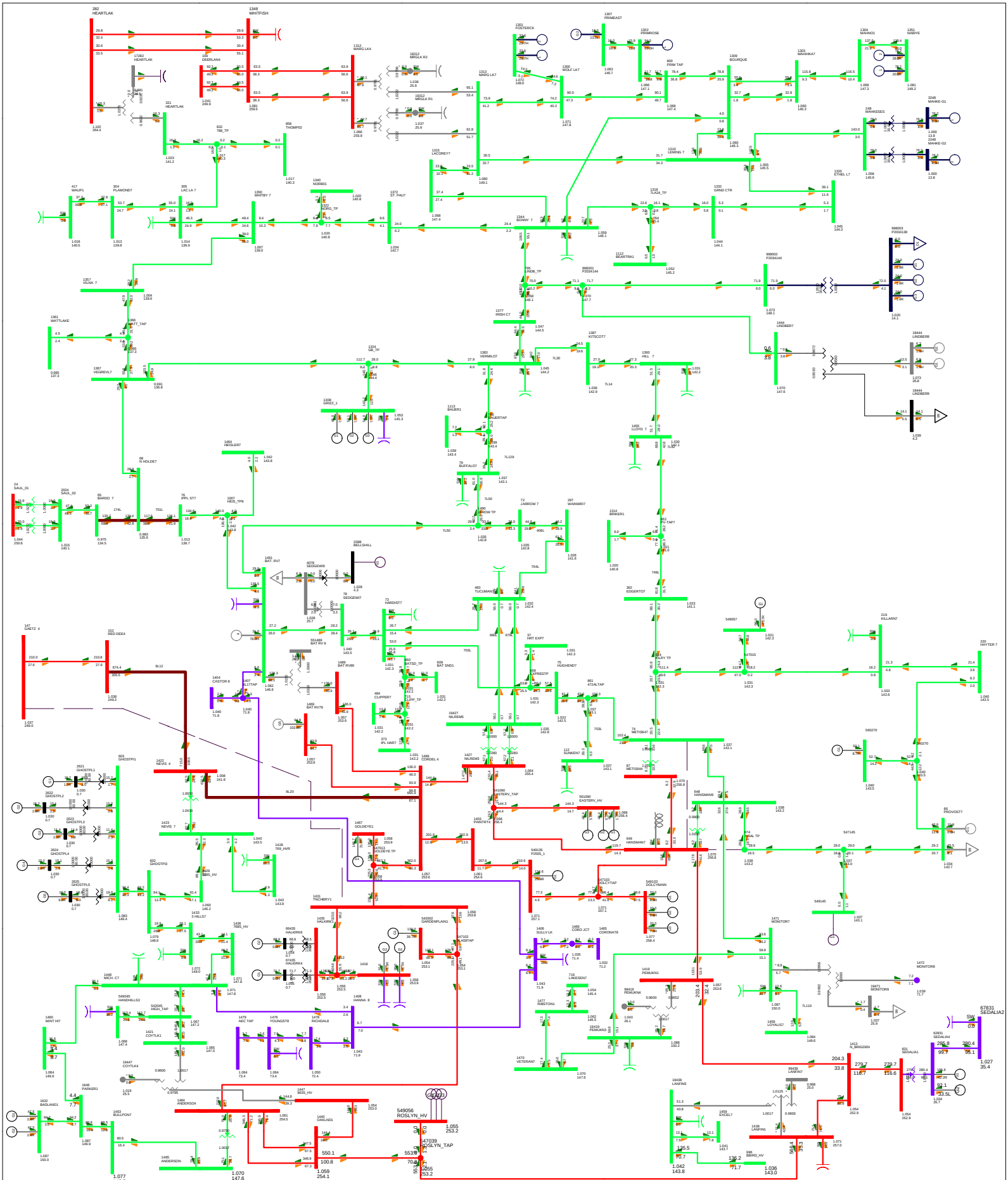


Attachment A2- 4	Contingency	Study Case Description	P2034 Cold Lake Area Cogen
	CONT 084: 648S Metiskow T3	2028SP-woCETO PRE-PROJ Base Case	Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000

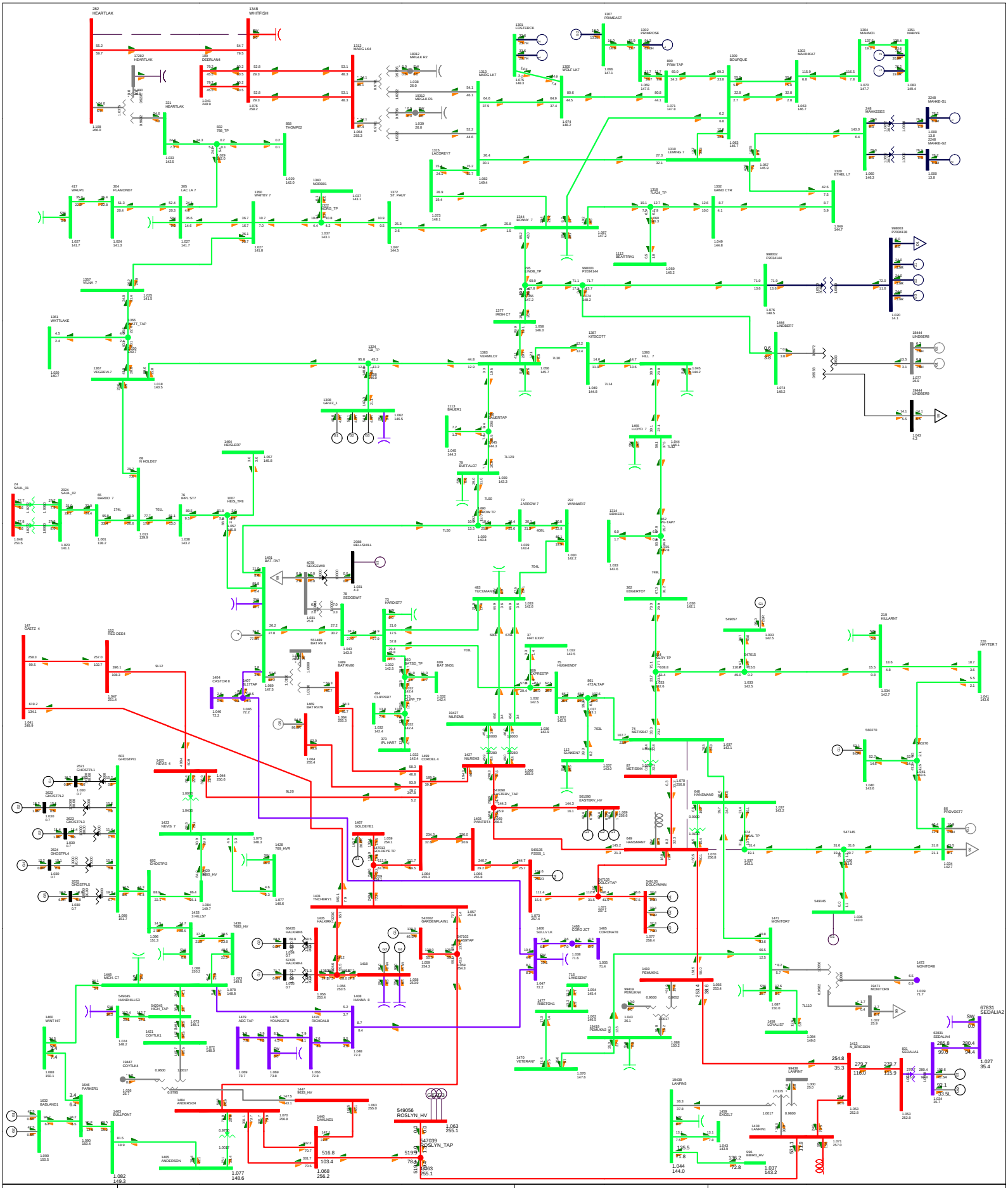
Attachment A3
Post-Project Power Flow Diagrams



Attachment A3- 1	Contingency	Study Case Description	P2034 Cold Lake Area Cogen
	CONT 000: All elements in service	2028SP POST-PROJ Base Case	Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A3- 1	Contingency	Study Case Description	P2034 Cold Lake Area Cogen
	CONT 001: CETO (87S Gaetz - 972S Tinchebray)	2028SP POST-PROJ Base Case	Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A3- 1

Contingency

CONT 010: 9L22 (898S Heart Lake - 825S Whitefish Lake)

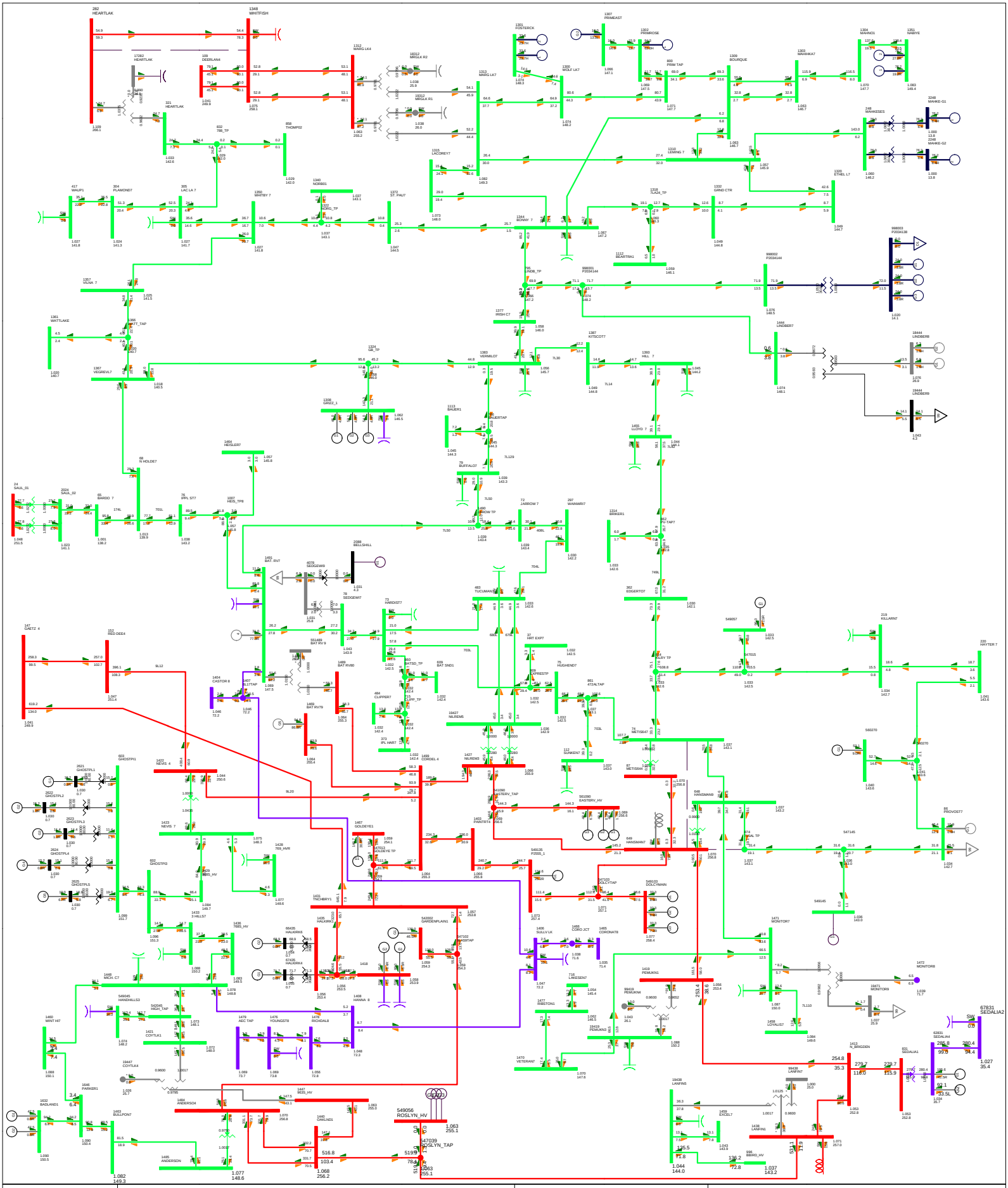
Study Case Description

2028SP POST-PROJ

Base Case

P2034 Cold Lake Area Cogen

Bus - VOLTAGE (kV/PU)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%RATEA
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A3- 1

Contingency

CONT 011: 9L81 (898S Heart Lake - 825S Whitefish Lake)

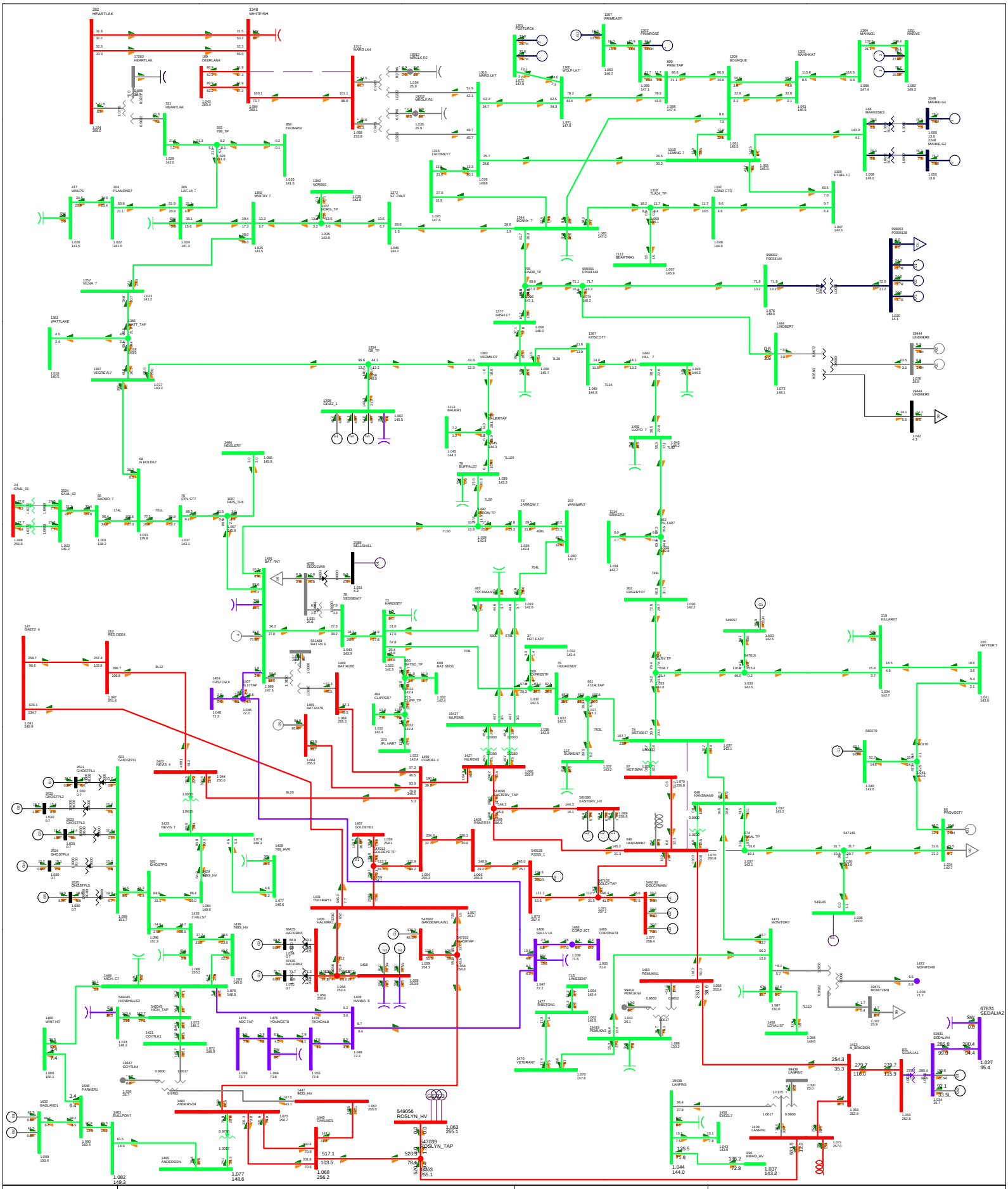
Study Case Description

2028SP POST-PROJ

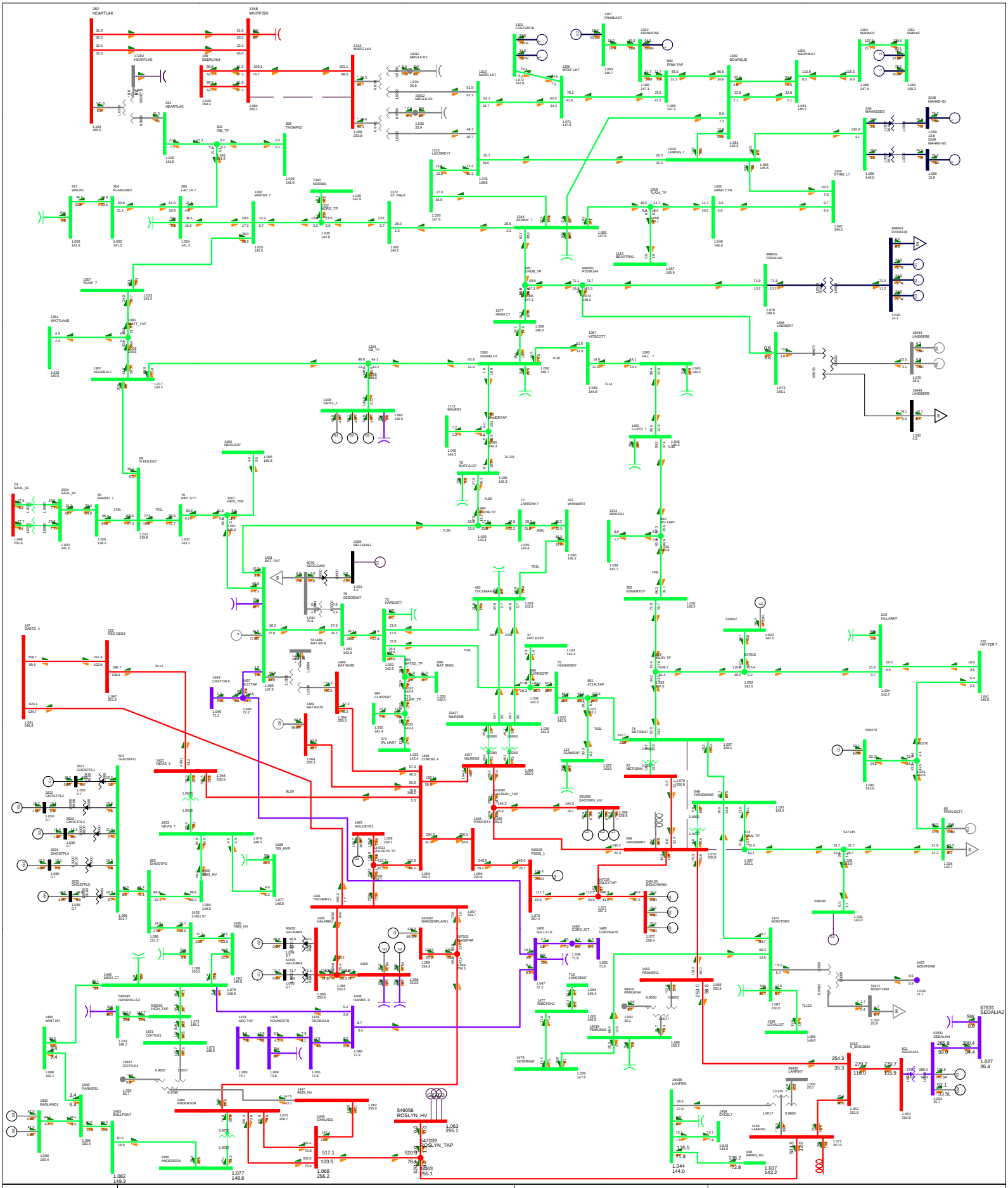
Base Case

P2034 Cold Lake Area Cogen

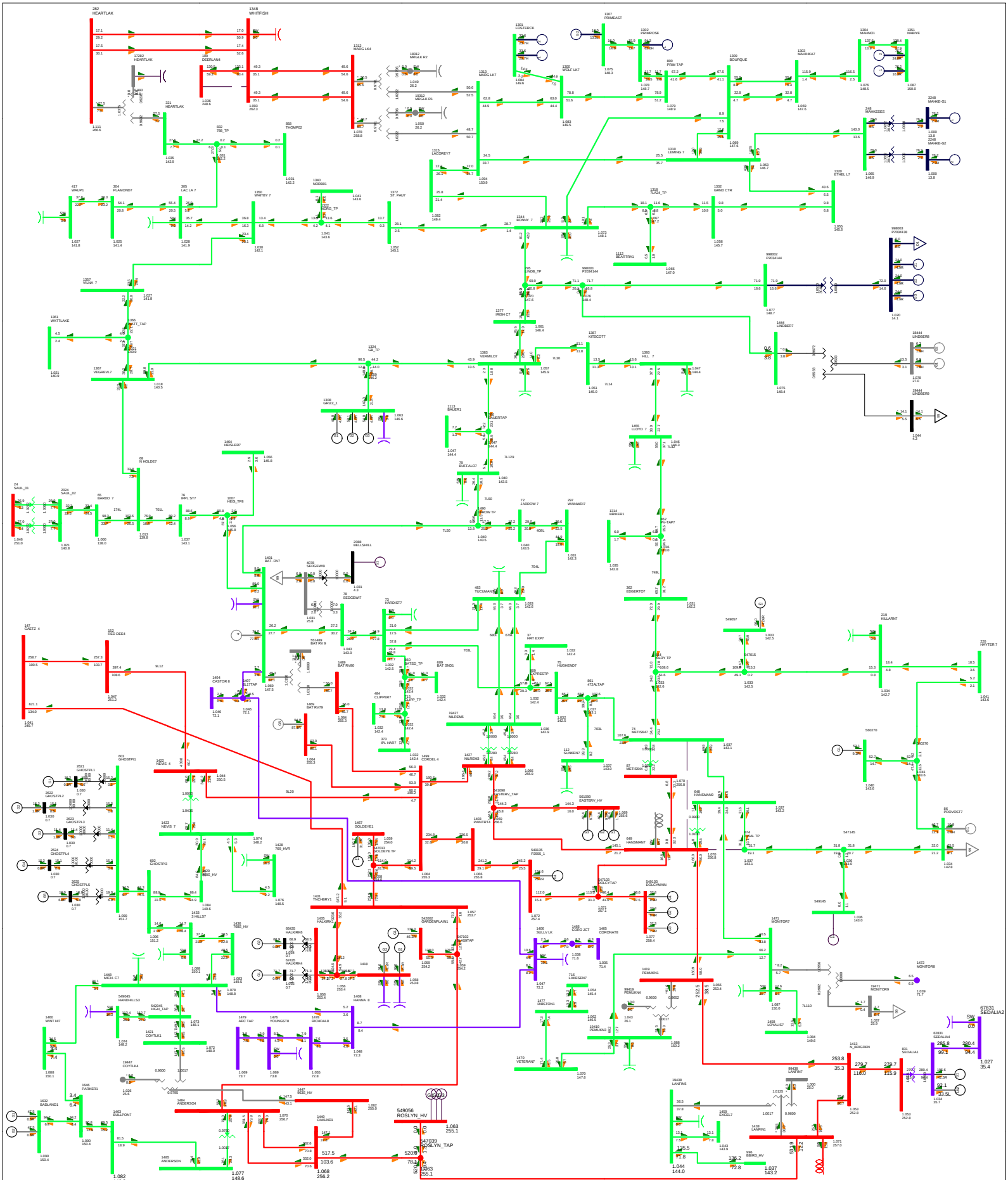
Bus - VOLTAGE (kV/PU)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%RATEA
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



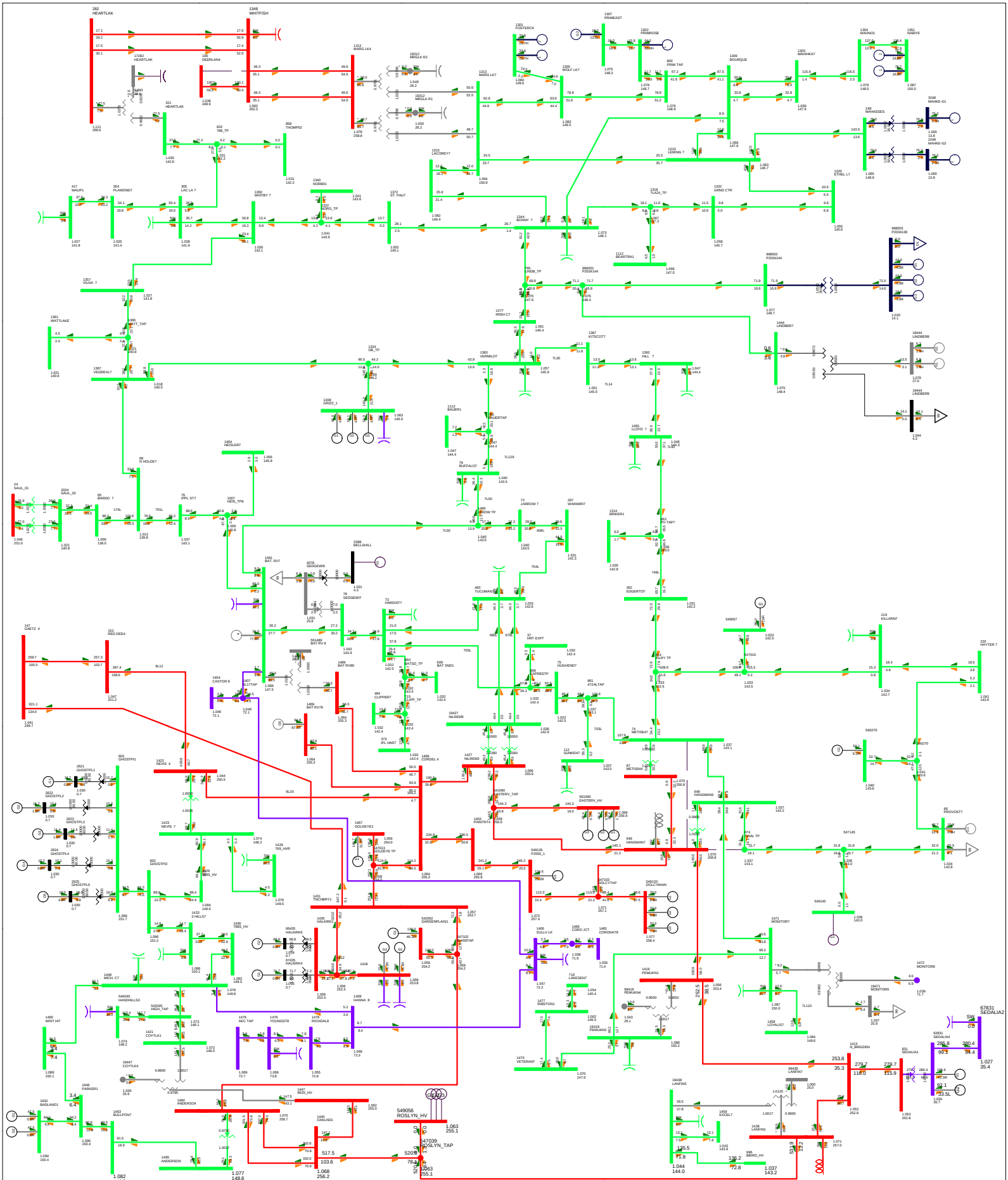
Attachment A3- 1	Contingency	Study Case Description	P2034 Cold Lake Area Cogen
	CONT 012: 9L36 (826S Marguerite Lake - 825S Whitefish Lake)	2028SP POST-PROJ Base Case	Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



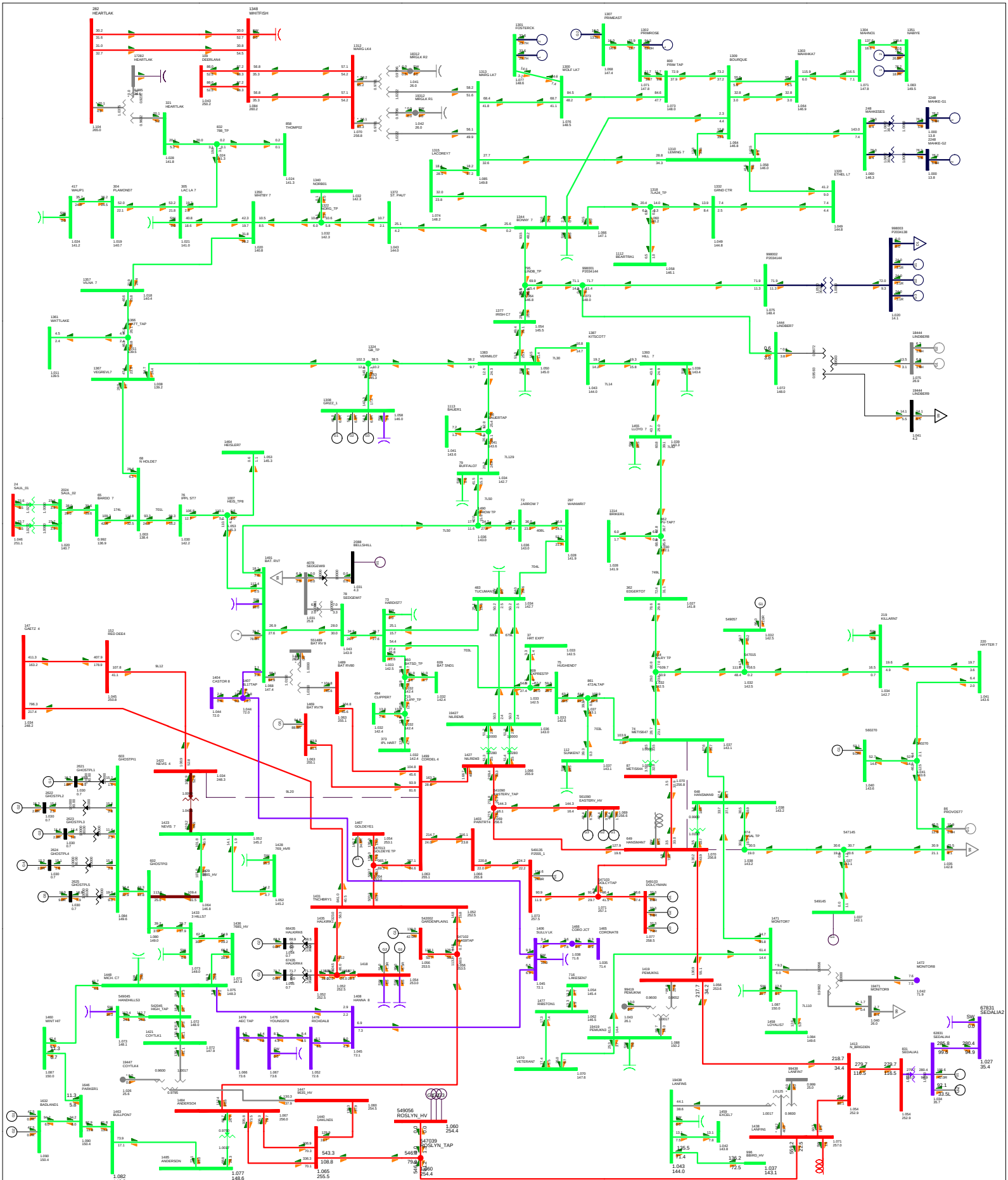
Attachment A3- 1	**Contingency** CONT 013: 9L37 (826S Marguerite Lake - 825S Whitefish Lake)	**Study Case Description** 2028SP POST-PROJ Base Case	**P2034 Cold Lake Area Cogen** Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A3- 1	Contingency	Study Case Description	P2034 Cold Lake Area Cogen
	CONT 014: 9L960 (13S Deerland - 825S Whitefish Lake)	2028SP POST-PROJ Base Case	Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A3- 1	**Contingency** CONT 015: 9L961 (13S Deerland - 825S Whitefish Lake)	**Study Case Description** 2028SP POST-PROJ Base Case	**P2034 Cold Lake Area Cogen** Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A3- 1

Contingency

CONT 016: 9L20 (766S Nevis - 755S Cordel)

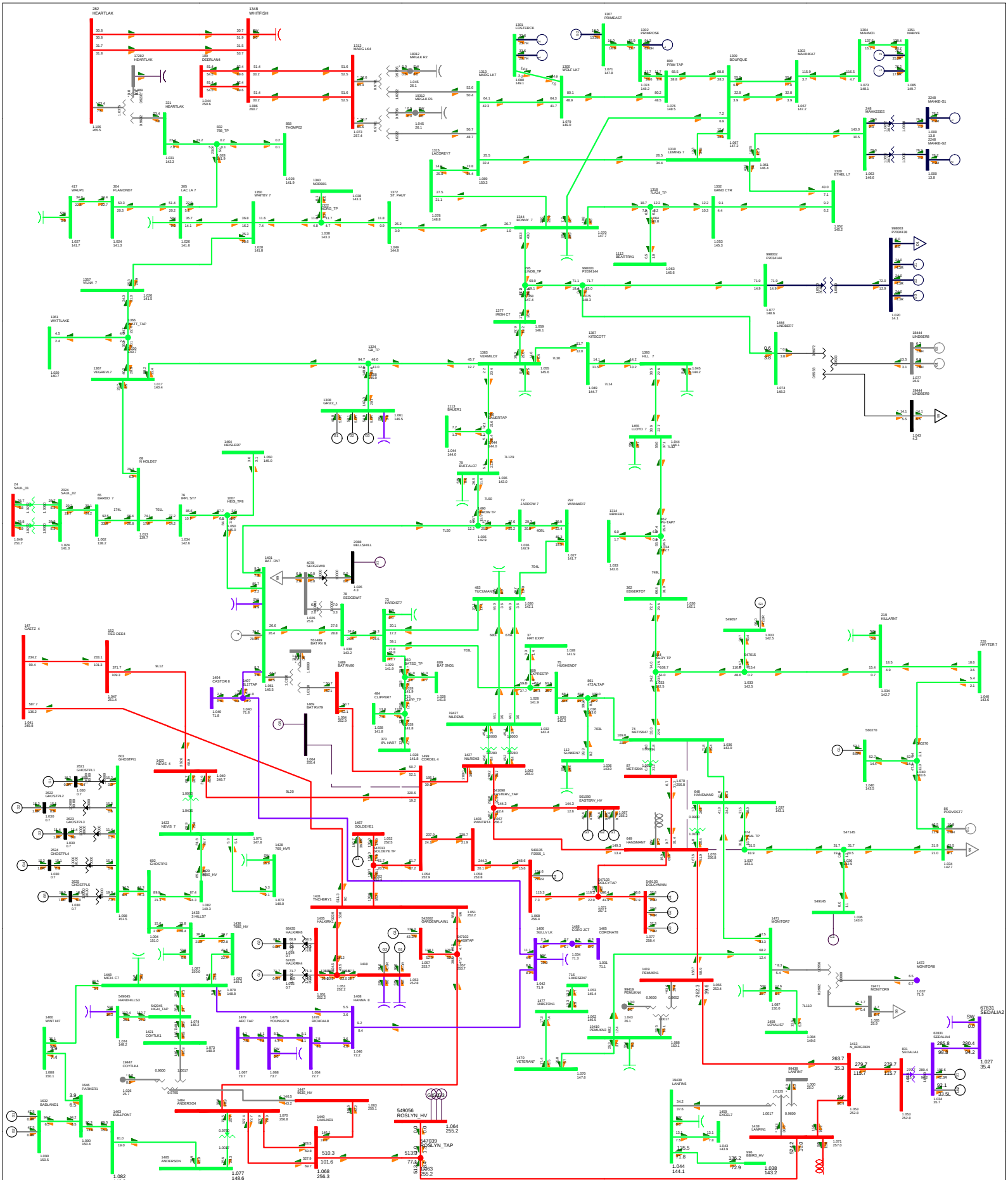
Study Case Description

2028SP POST-PROJ

Base Case

P2034 Cold Lake Area Cogen

Bus - VOLTAGE (kV/PU)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%RATEA
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A3- 1

Contingency

CONT 017: 9L79 (757S Battle River - 755S Cordel)

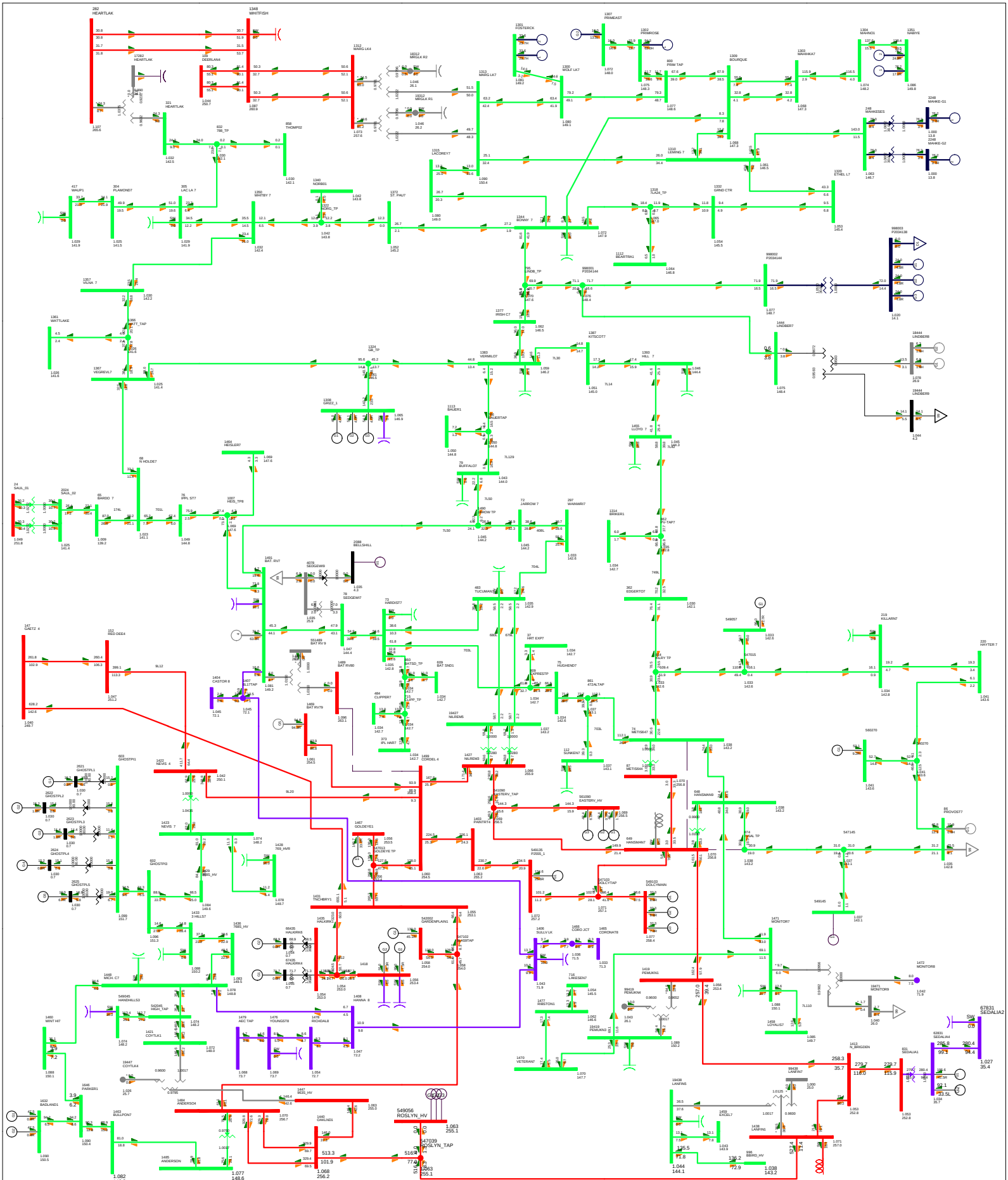
Study Case Description

2028SP POST-PROJ

Base Case

P2034 Cold Lake Area Cogen

Bus - VOLTAGE (kV/PU)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%RATEA
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A3- 1

Contingency

CONT 018: 9L80 (757S Battle River - 755S Cordel)

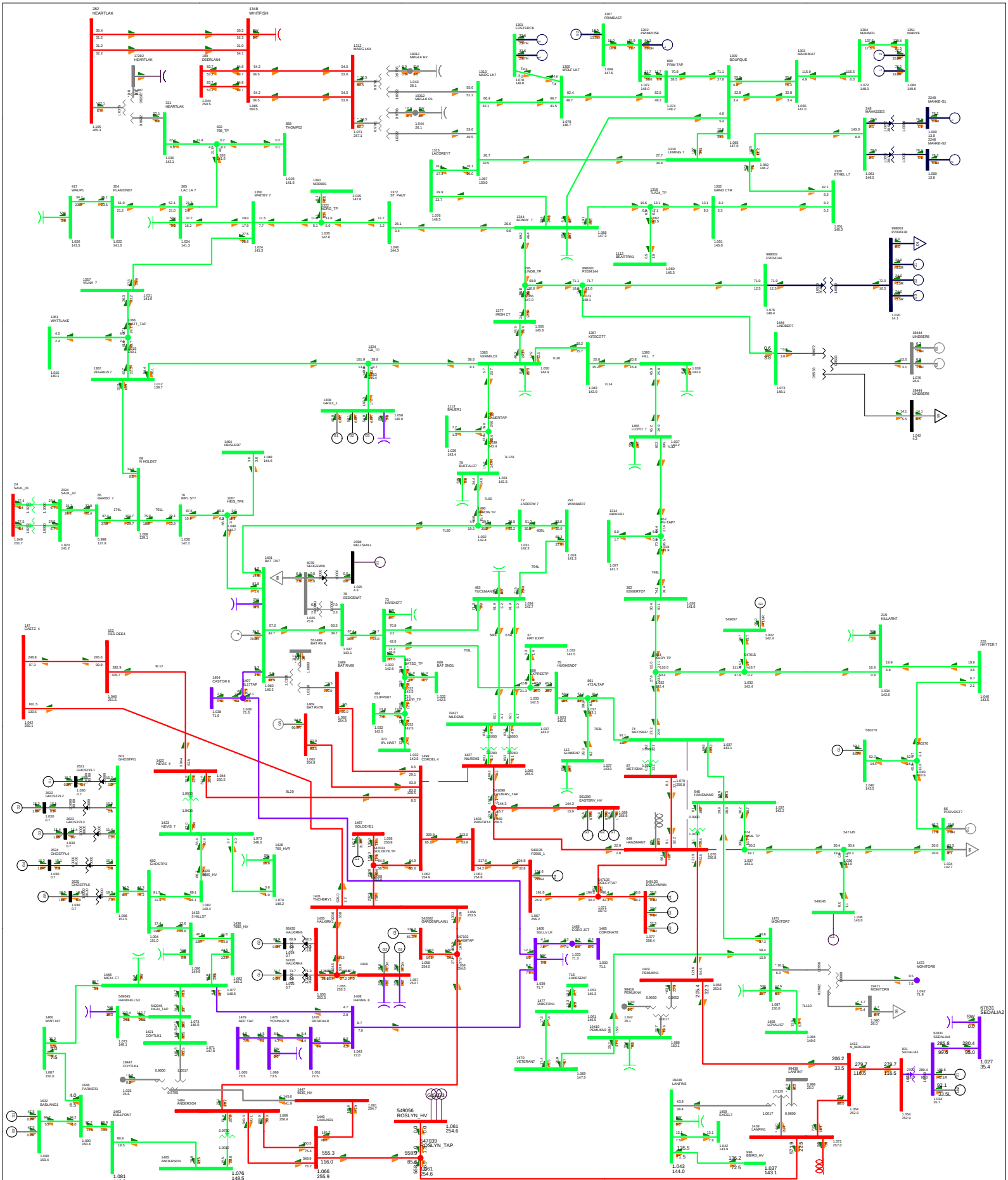
Study Case Description

2028SP POST-PROJ

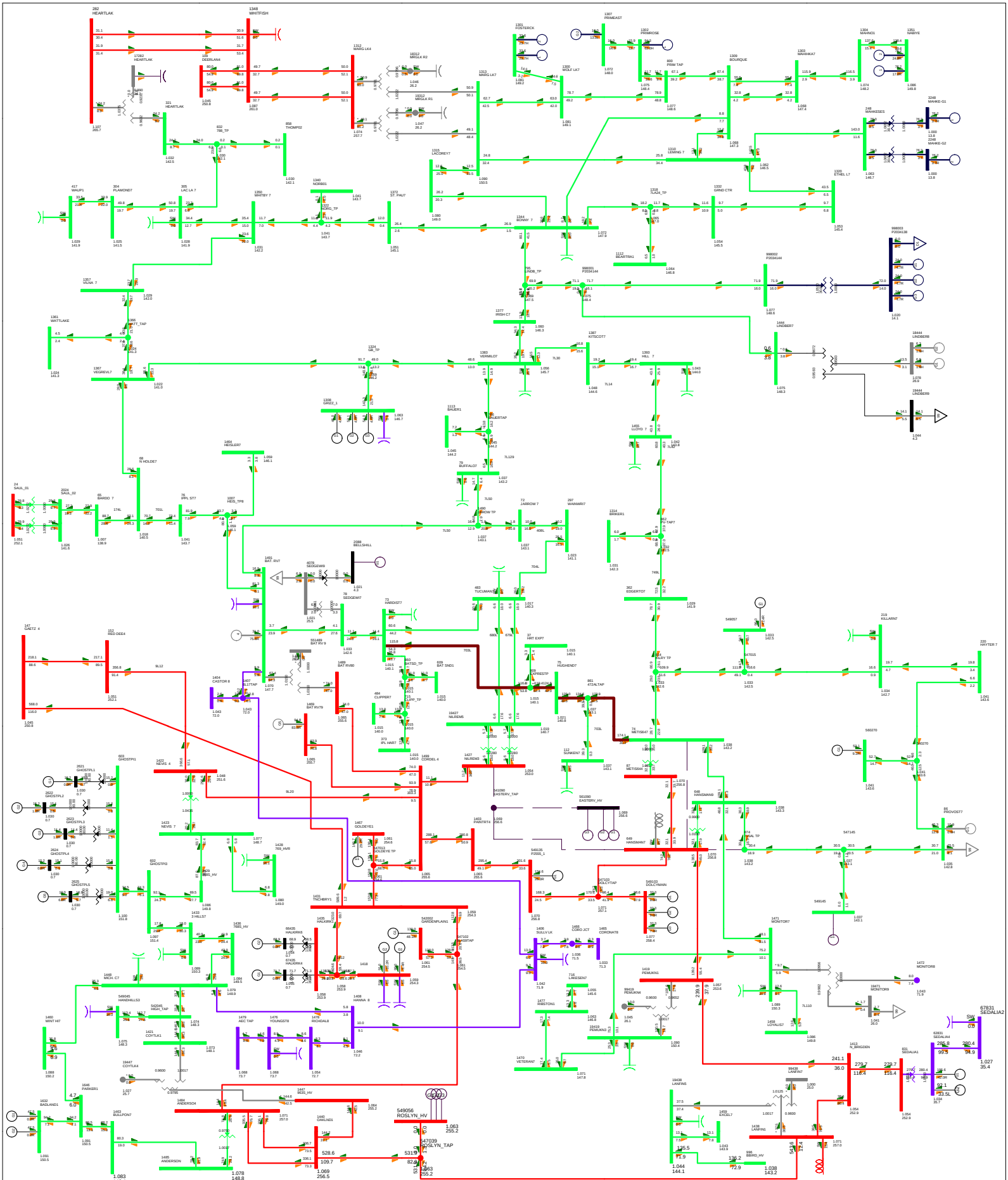
Base Case

P2034 Cold Lake Area Cogen

Bus - VOLTAGE (kV/PU)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%RATEA
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A3- 1	Contingency	Study Case Description	P2034 Cold Lake Area Cogen
	CONT 019: 953L (574S Nilrem - 755S Cordel)	2028SP POST-PROJ Base Case	Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A3- 1

Contingency

CONT 020: 1047L (574S Nilrem - P2566 Eastervale Solar - 650S Hansman Lake)

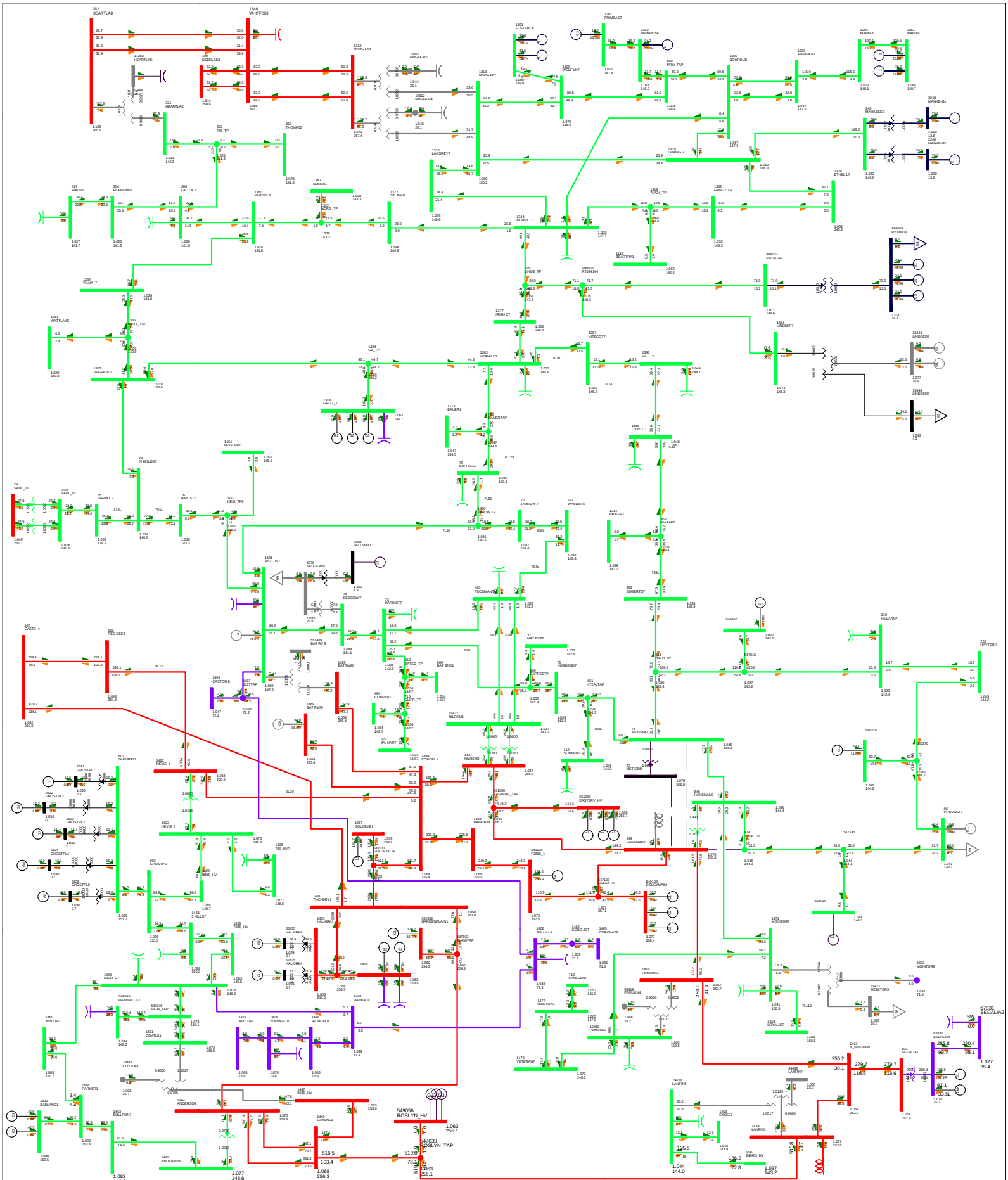
Study Case Description

2028SP POST-PROJ

Base Case

P2034 Cold Lake Area Cogen

Bus - VOLTAGE (kV/PU)
Branch - MW/MVar
Equipment - MW/MVar
100.0%RATEA
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A3- 1

Contingency

CONT 021: 954L (648S Metiskow - 650S Hansman Lake)

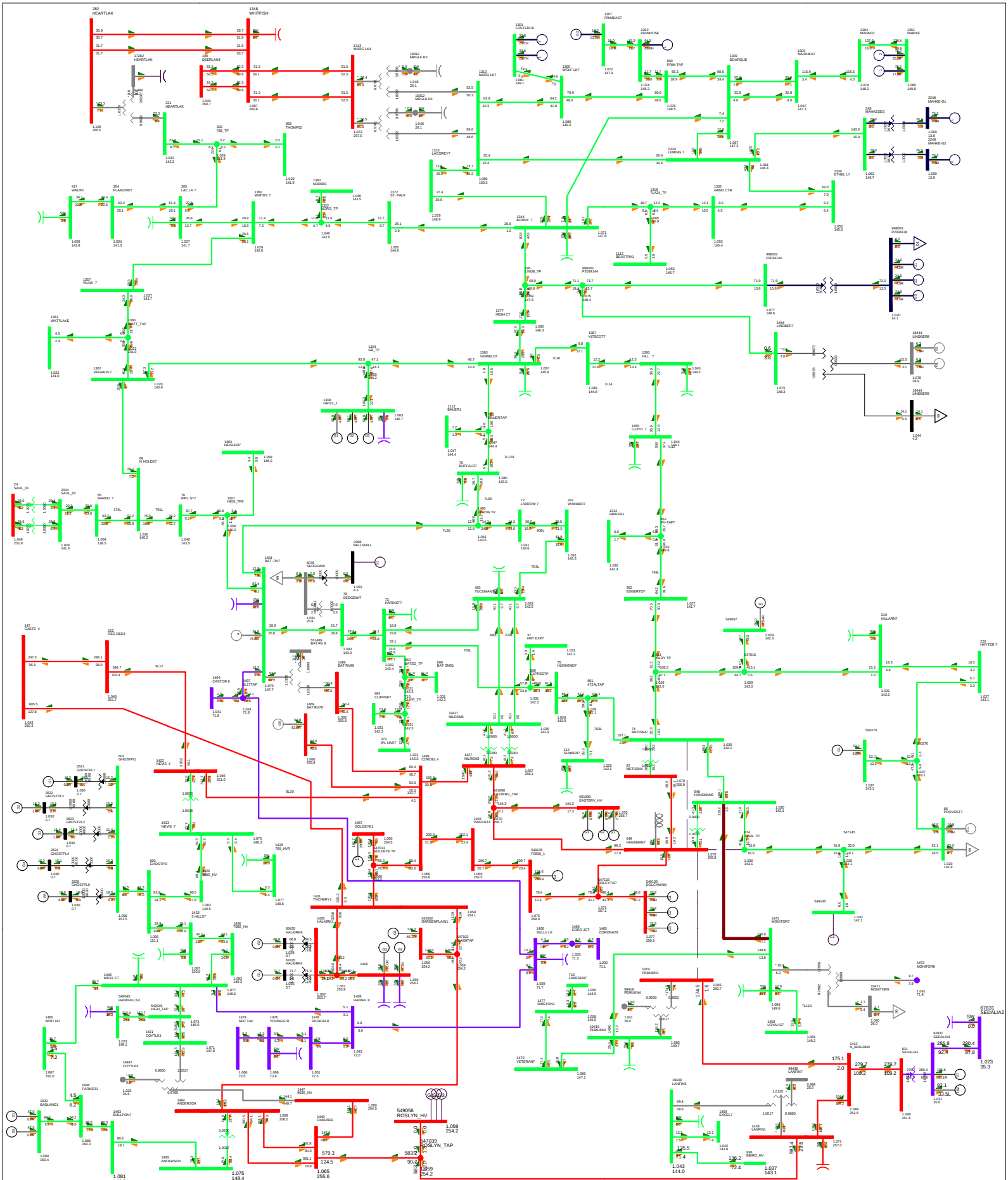
Study Case Description

2028SP POST-PROJ

Base Case

P2034 Cold Lake Area Cogen

Bus - VOLTAGE (kV/PU)
Branch - MW/MVar
Equipment - MW/MVar
100.0%RATEA
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A3- 1

Contingency

CONT 022: 9L966 (650S Hansman Lake - 932S Pemukan)

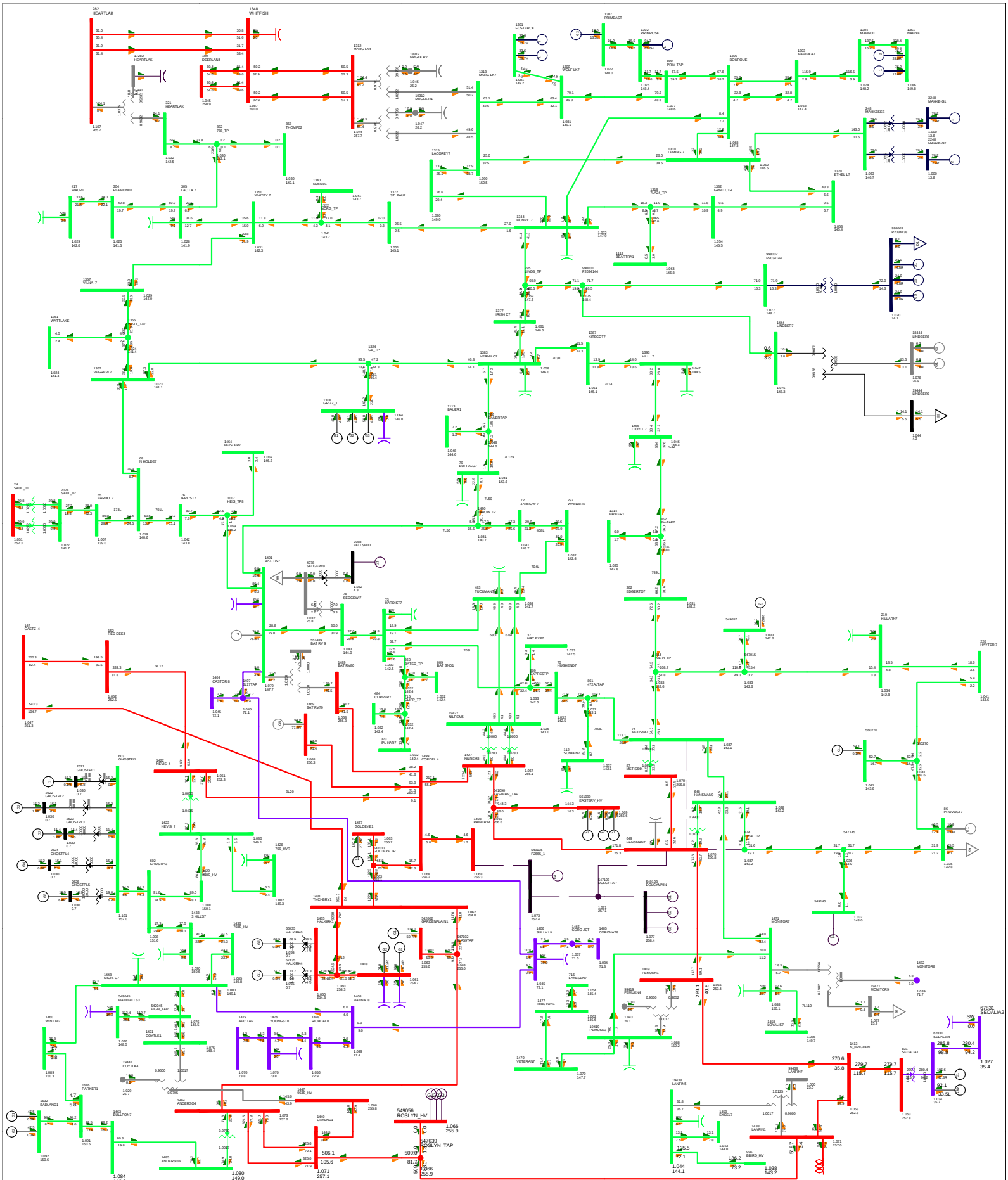
Study Case Description

2028SP POST-PROJ

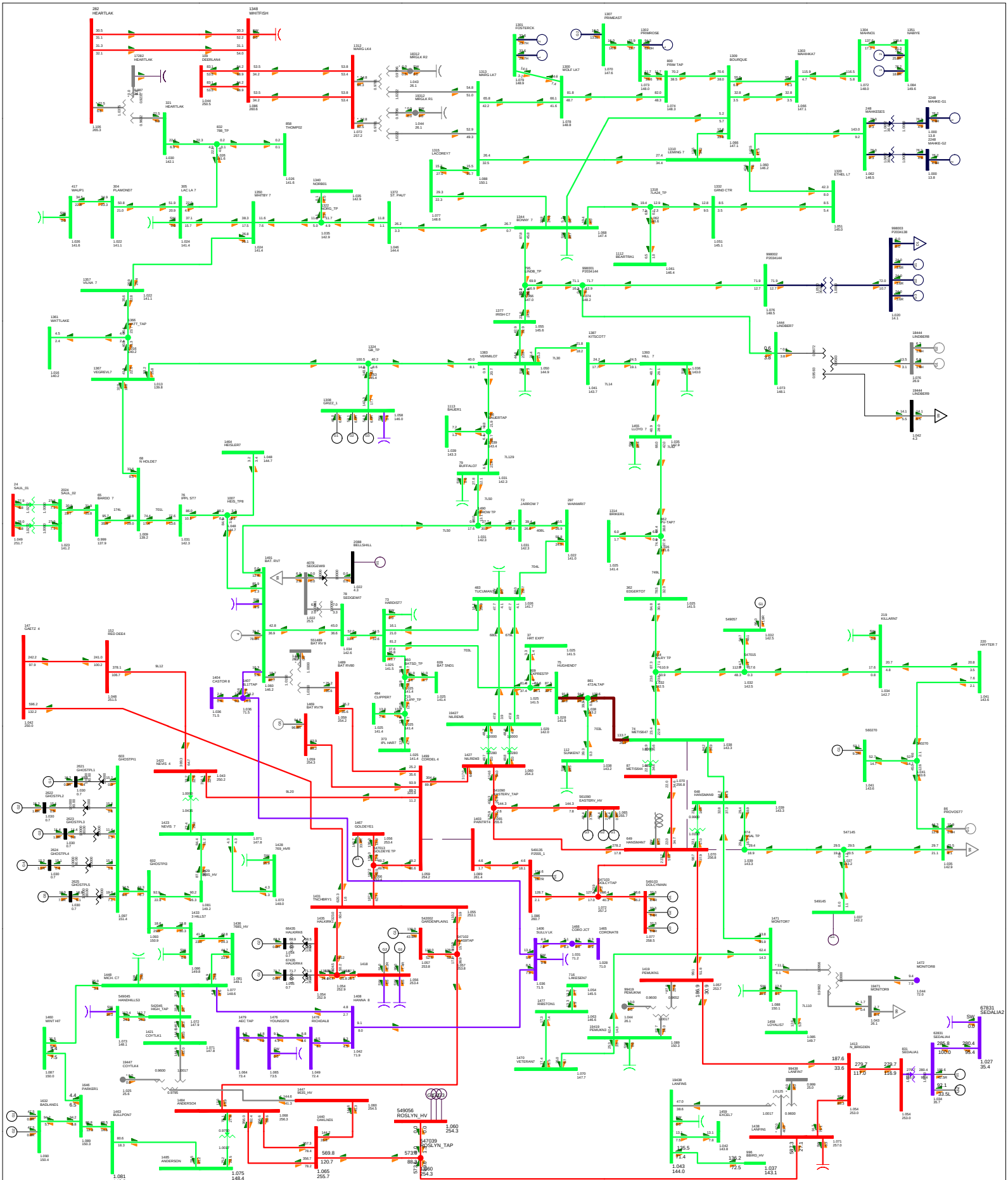
Base Case

P2034 Cold Lake Area Cogen

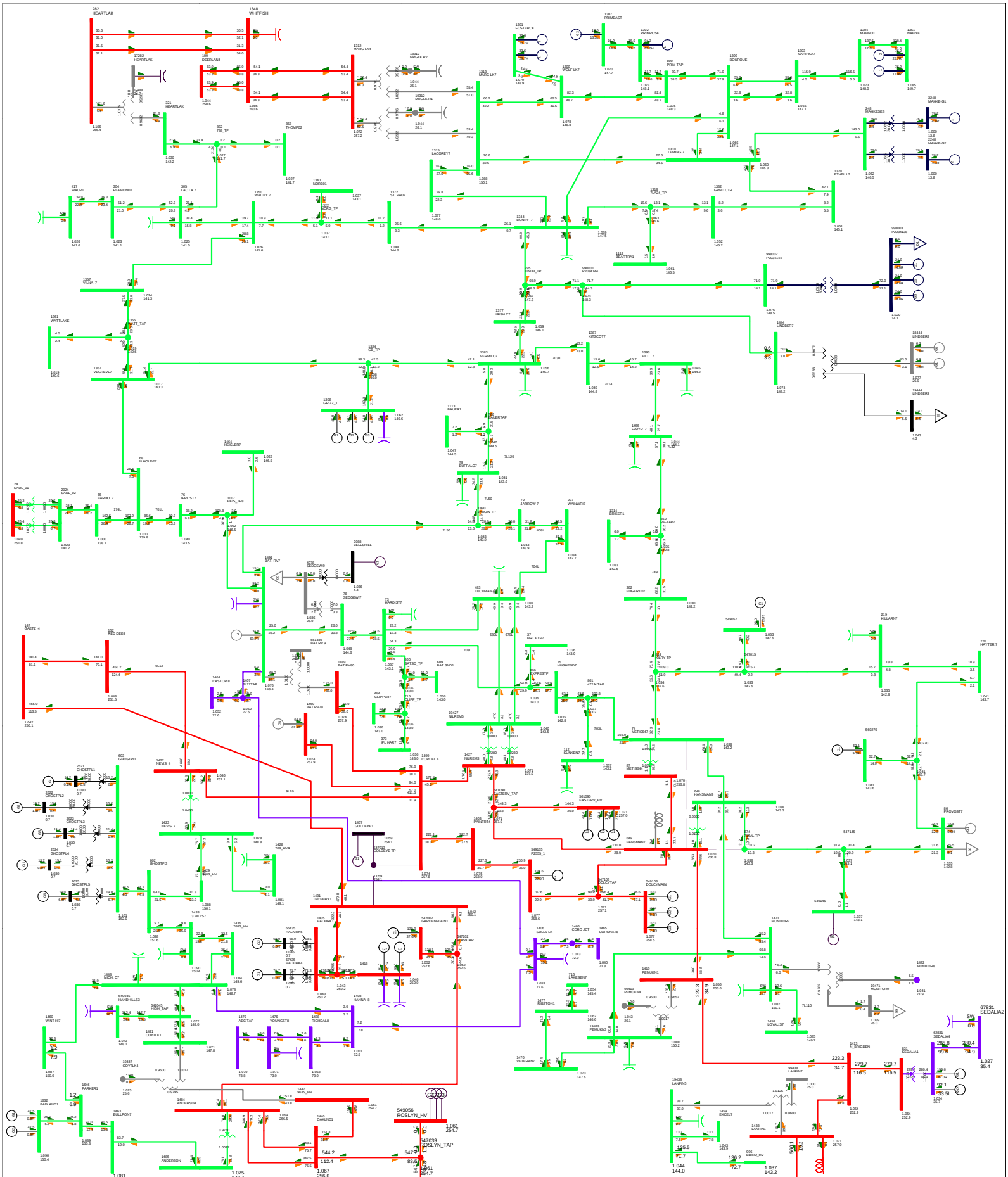
Bus - VOLTAGE (kV/PU)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%RATEA
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



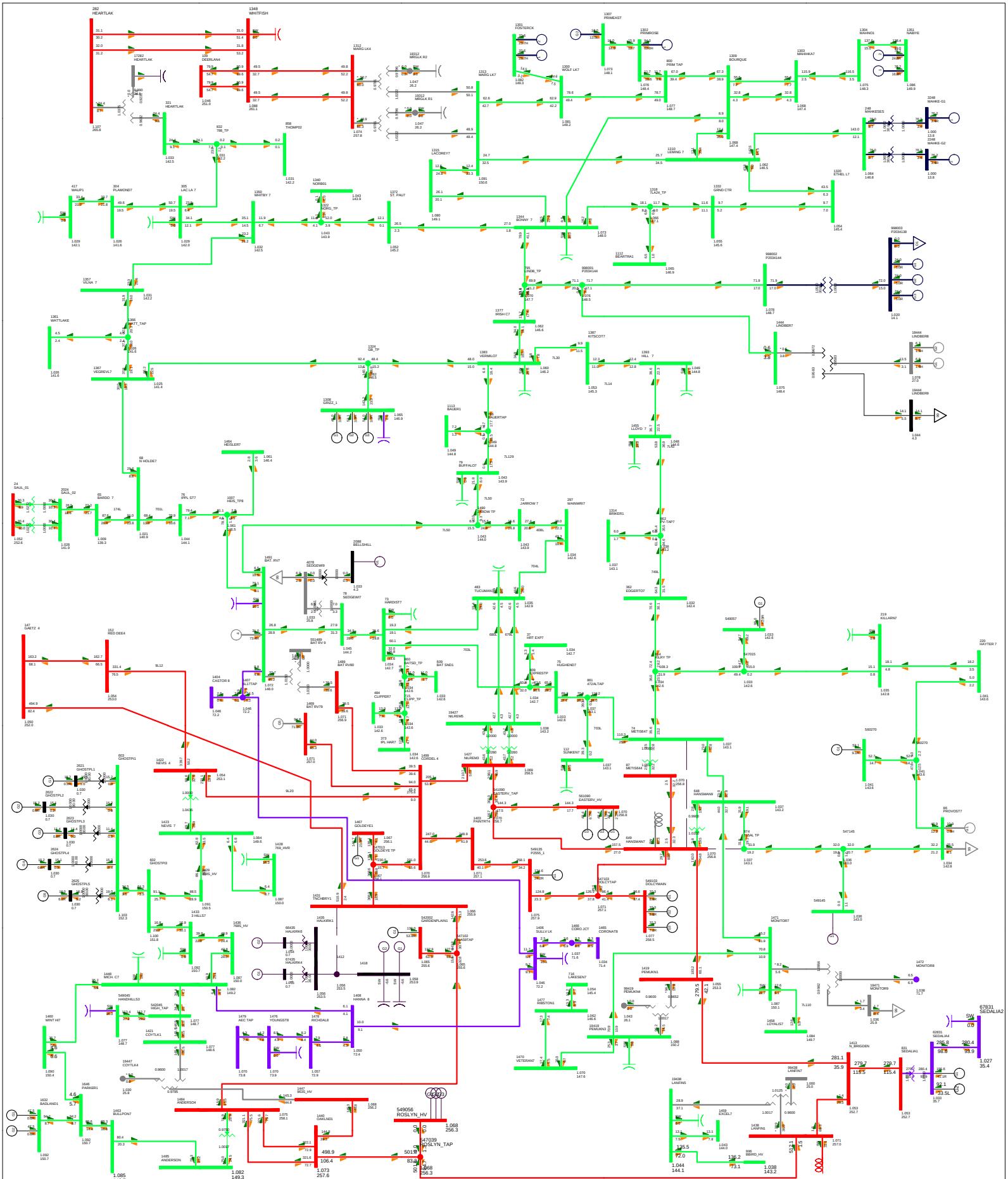
Attachment A3- 1	Contingency	Study Case Description	P2034 Cold Lake Area Cogen
	CONT 023: 948L (650S Hansman Lake - P2553 Dolcy Solar - P2555 Rolling Hills Wind - 863S [illegible]	Base Case	Bus - VOLTAGE (kV/PU) Branch - MW/MVar Equipment - MW/Mvar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



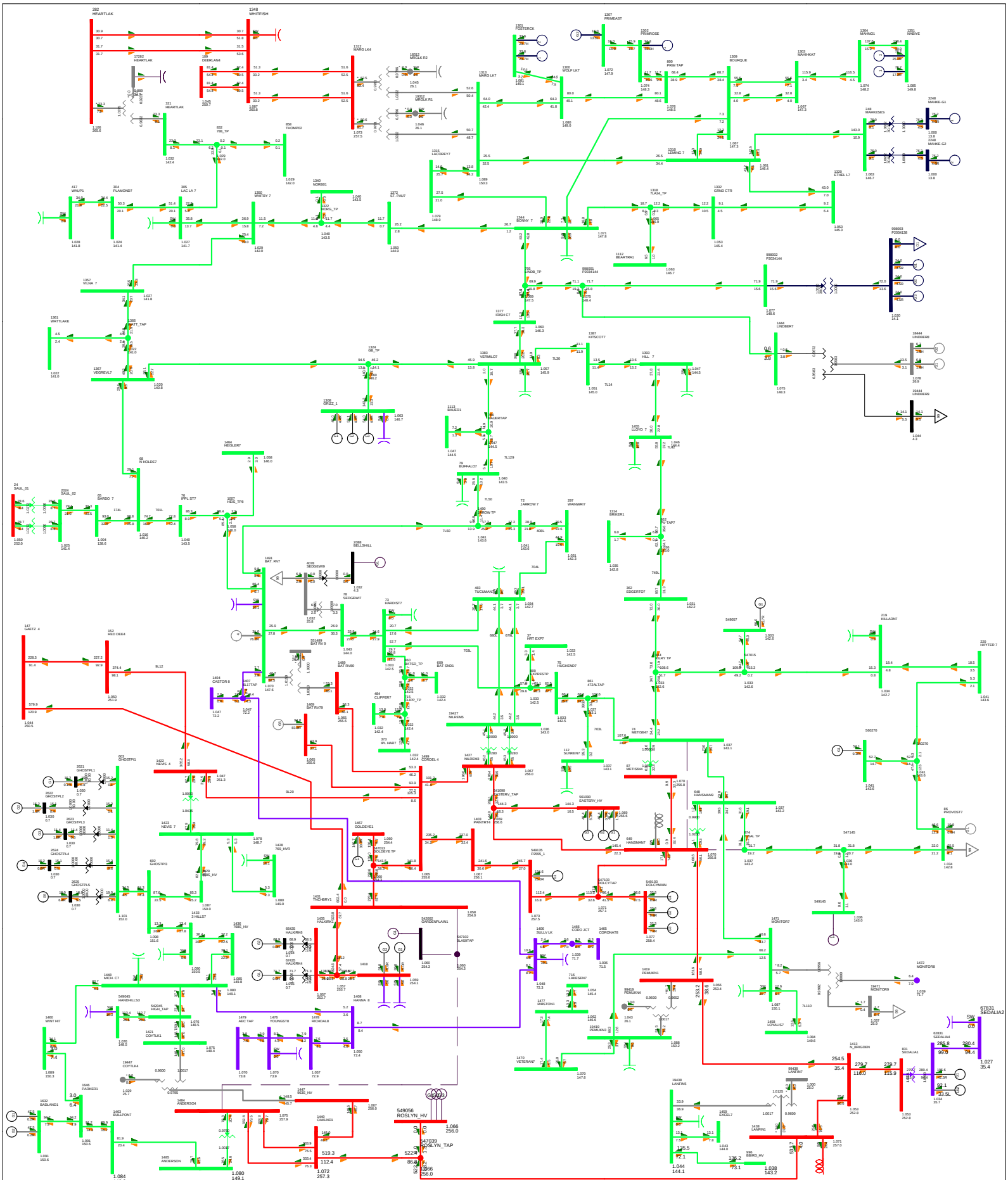
Attachment A3- 1	**Contingency** CONT 024: 9L27 (863S Paintearth - 755S Cordel)	**Study Case Description** 2028SP POST-PROJ Base Case	**P2034 Cold Lake Area Cogen** Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A3- 1	Contingency	Study Case Description	P2034 Cold Lake Area Cogen
	CONT 025: 9L16 (755S Cordel - P2441 Halkirk 2 Wind - 972S Tinchebray)	2028SP POST-PROJ Base Case	Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A3- 1	Contingency	Study Case Description	P2034 Cold Lake Area Cogen
	CONT 026: 9L93 (972S Tinchebray - 615S Halkirk - 973S Lanes Lake)	2028SP POST-PROJ Base Case	Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A3- 1

Contingency

CONT 027: 9L59 (972S Tinchebray - 1045S Garden Plain - 801S Anderson)

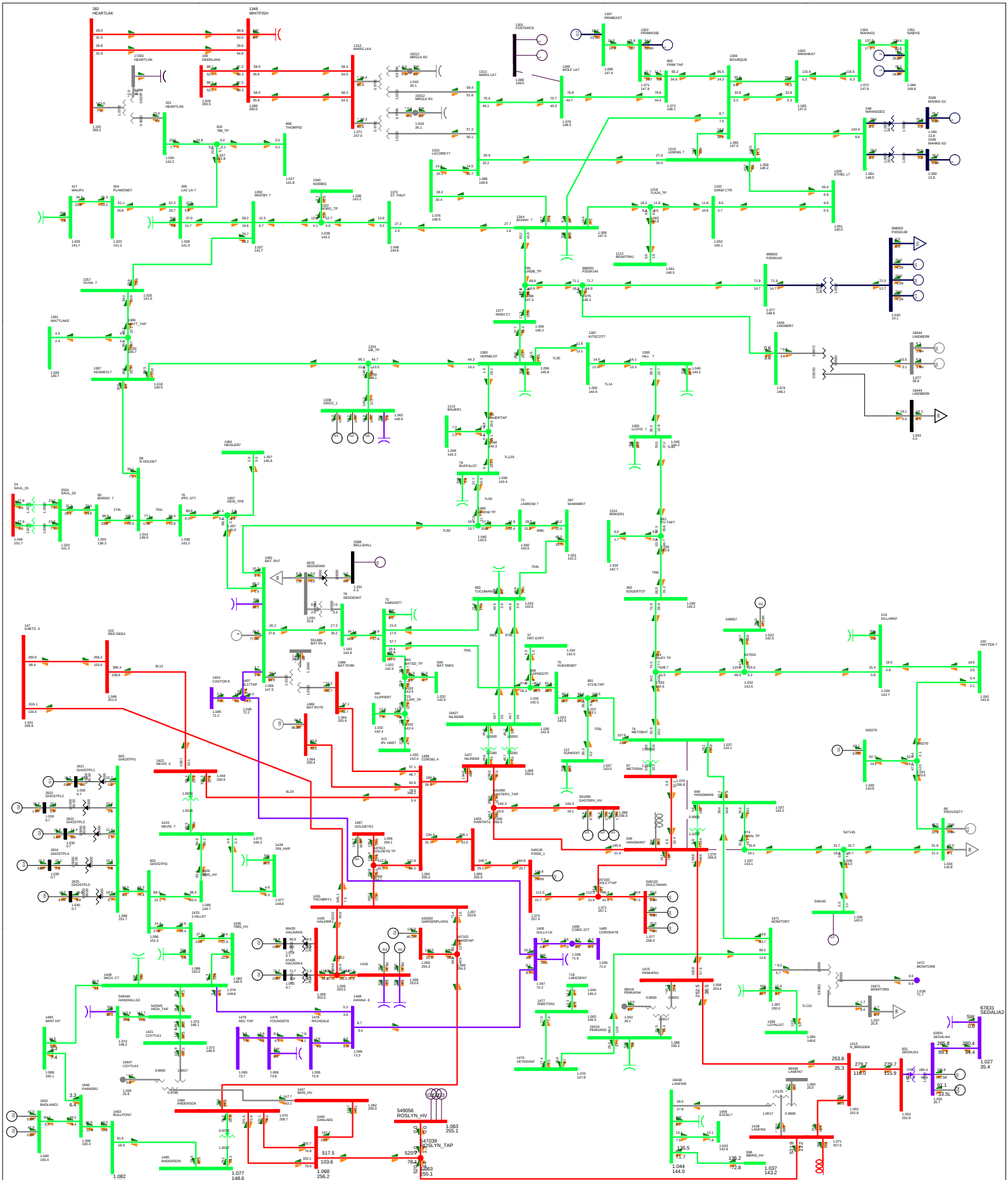
Study Case Description

2028SP POST-PROJ

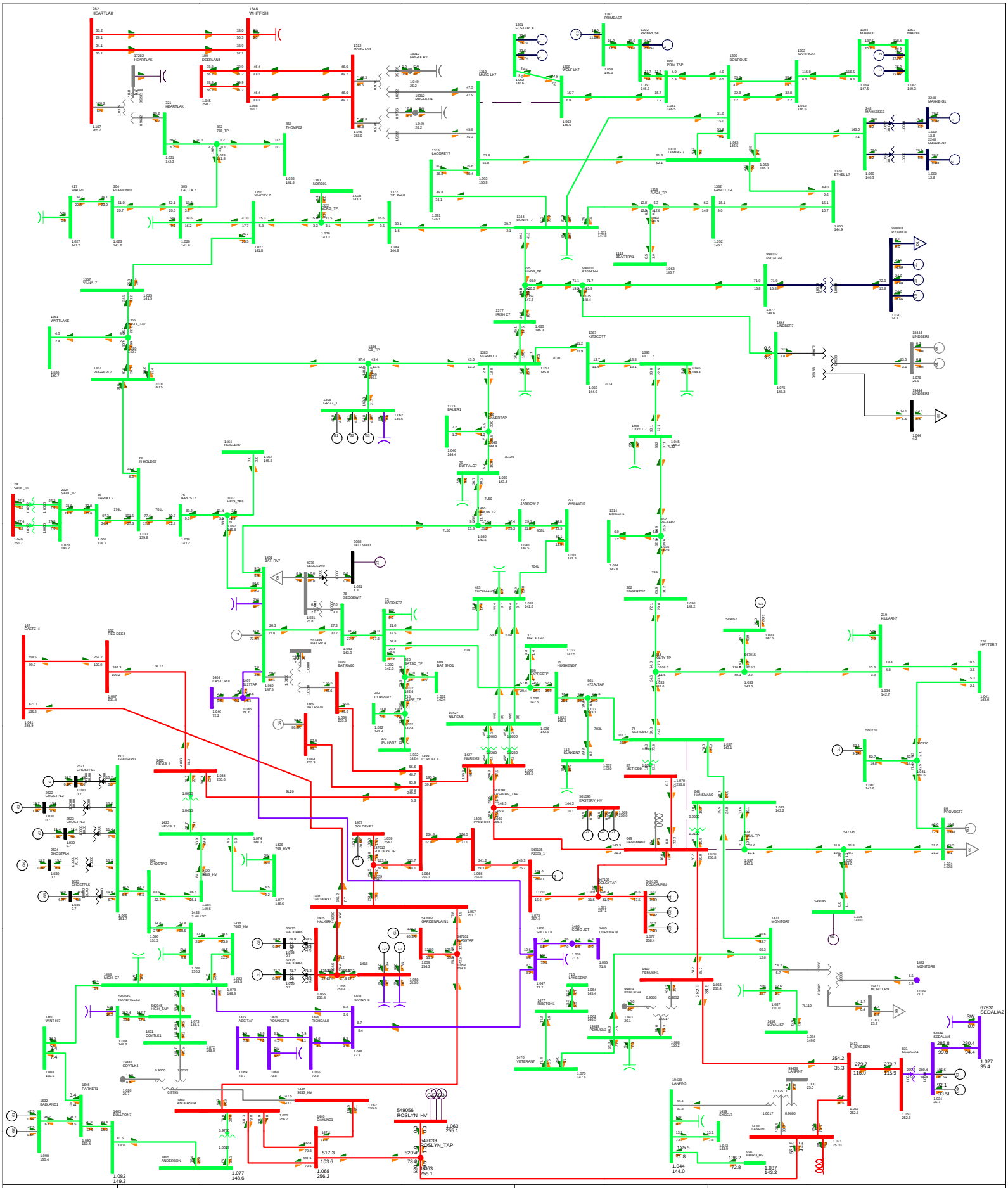
Base Case

P2034 Cold Lake Area Cogen

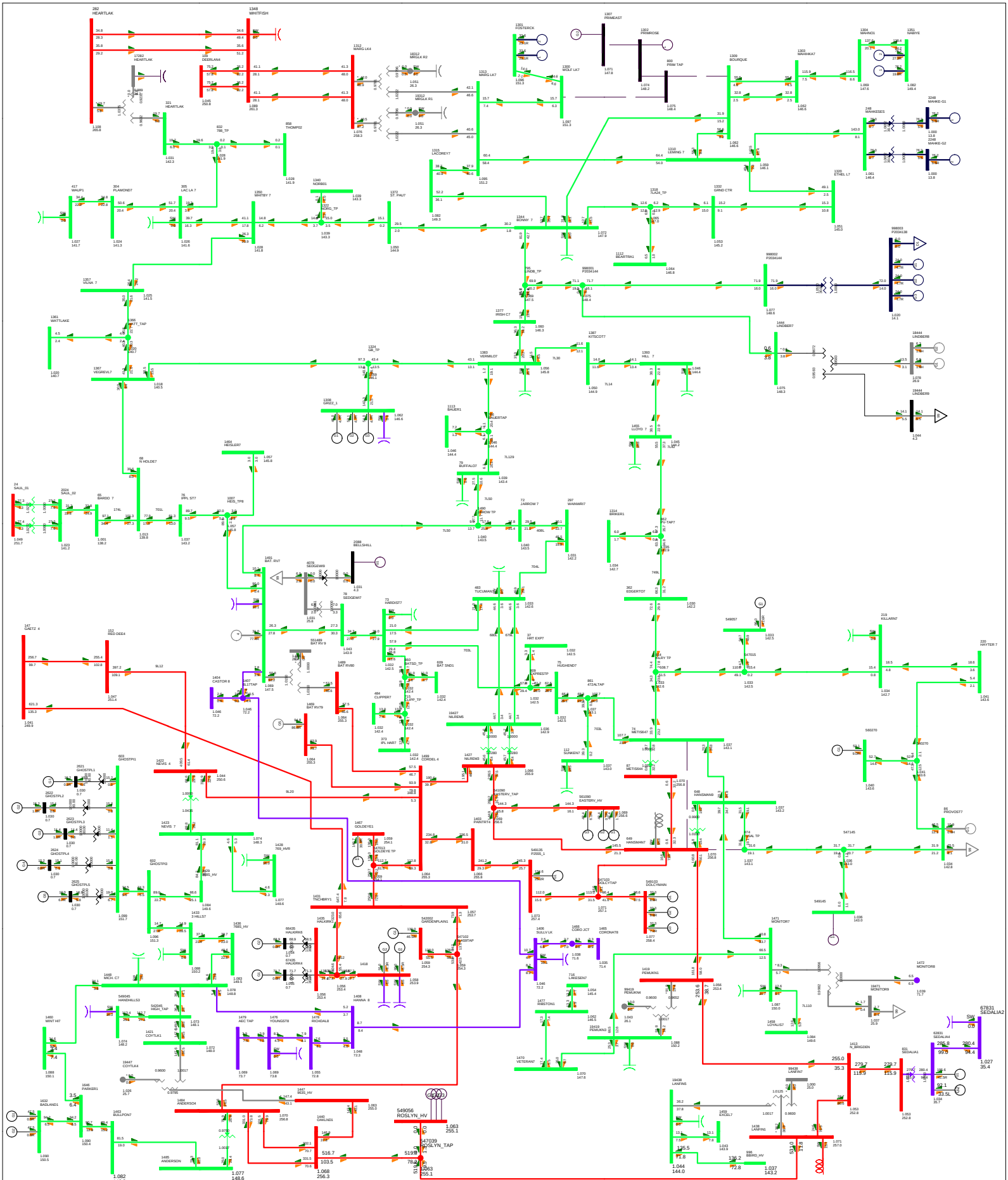
Bus - VOLTAGE (kv/PU)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%RATEA
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



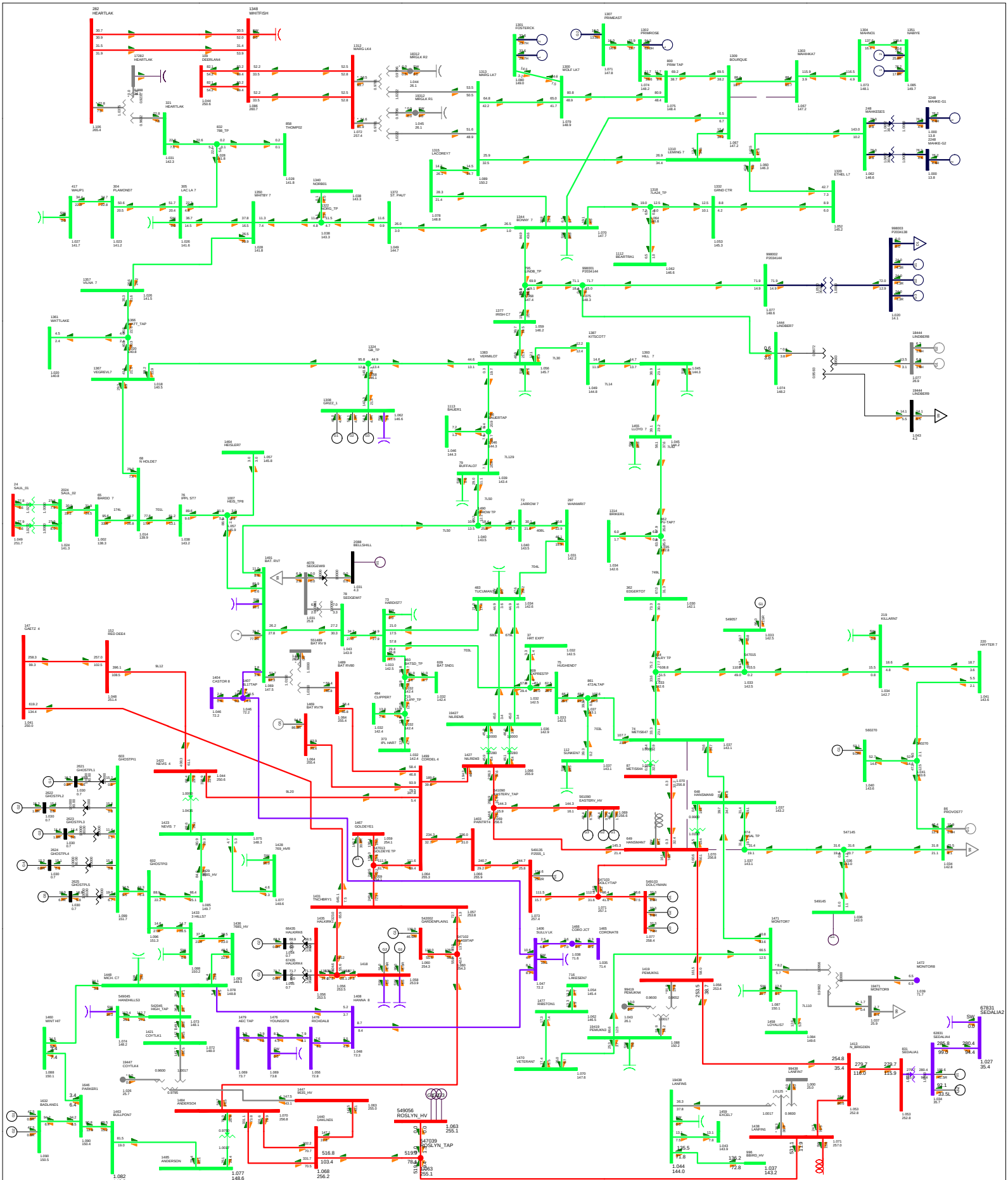
Attachment A3- 1	Contingency	Study Case Description	P2034 Cold Lake Area Cogen
	CONT 028: 7L86 (822S Wolf Lake - 877S Foster Creek)	2028SP POST-PROJ Base Case	Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



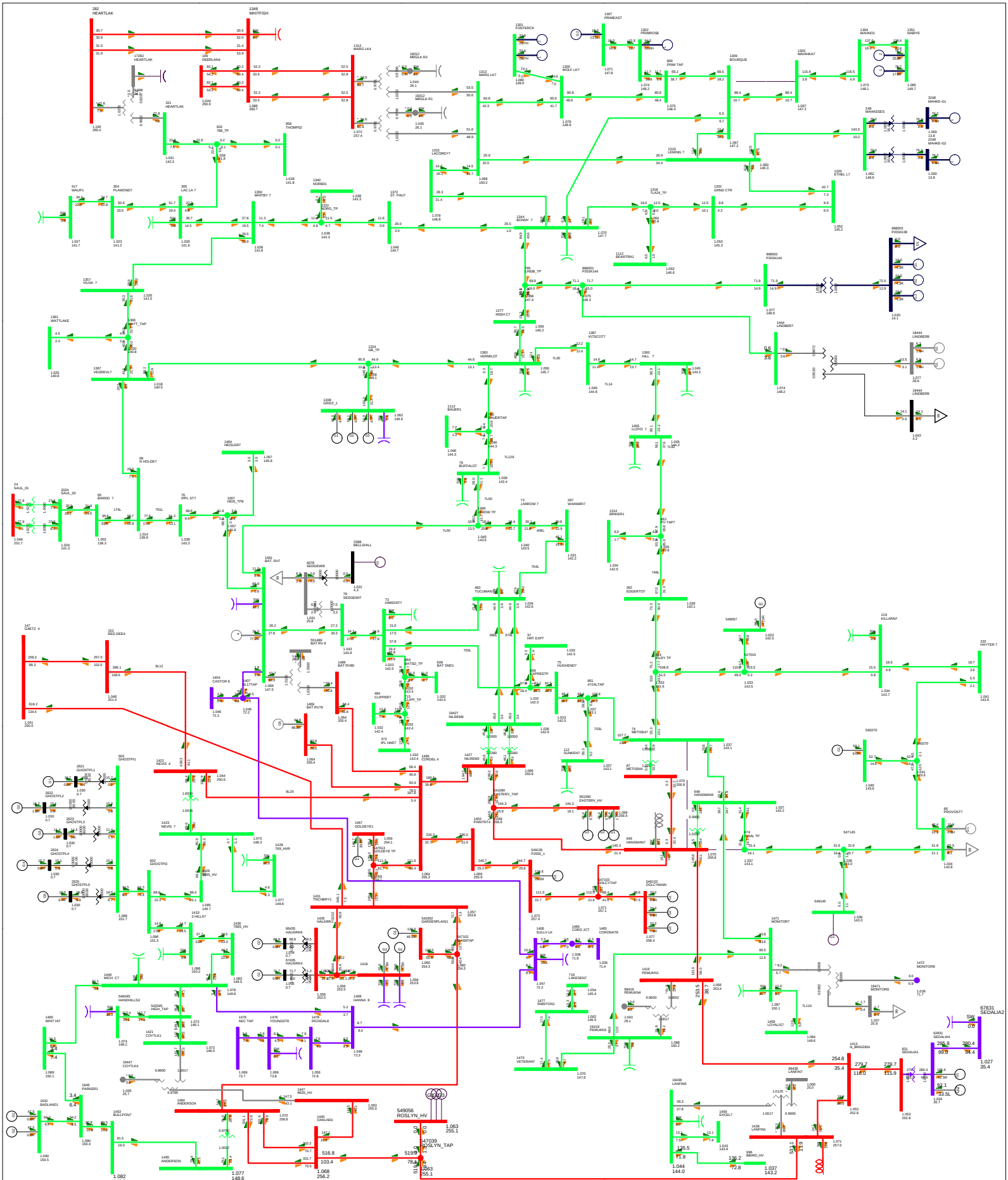
Attachment A3- 1	**Contingency** CONT 029: 7L587 (822S Wolf Lake - 826S Marguerite Lake)	**Study Case Description** 2028SP POST-PROJ Base Case	**P2034 Cold Lake Area Cogen** Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



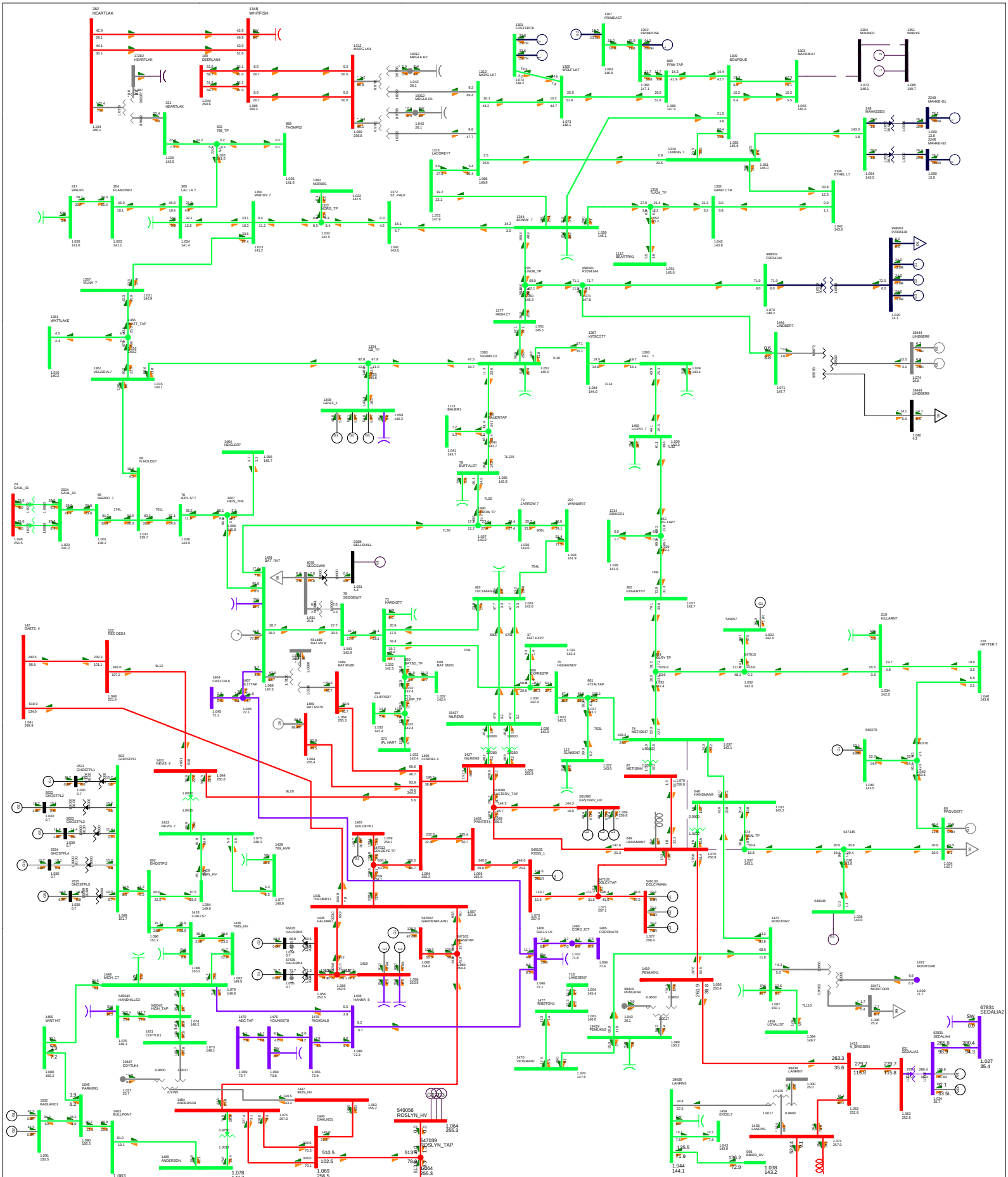
Attachment A3- 1	Contingency	Study Case Description	P2034 Cold Lake Area Cogen
	CONT 030: 7L574 (822S Wolf Lake - 859S Primrose - 970S Bourque)	2028SP POST-PROJ Base Case	Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



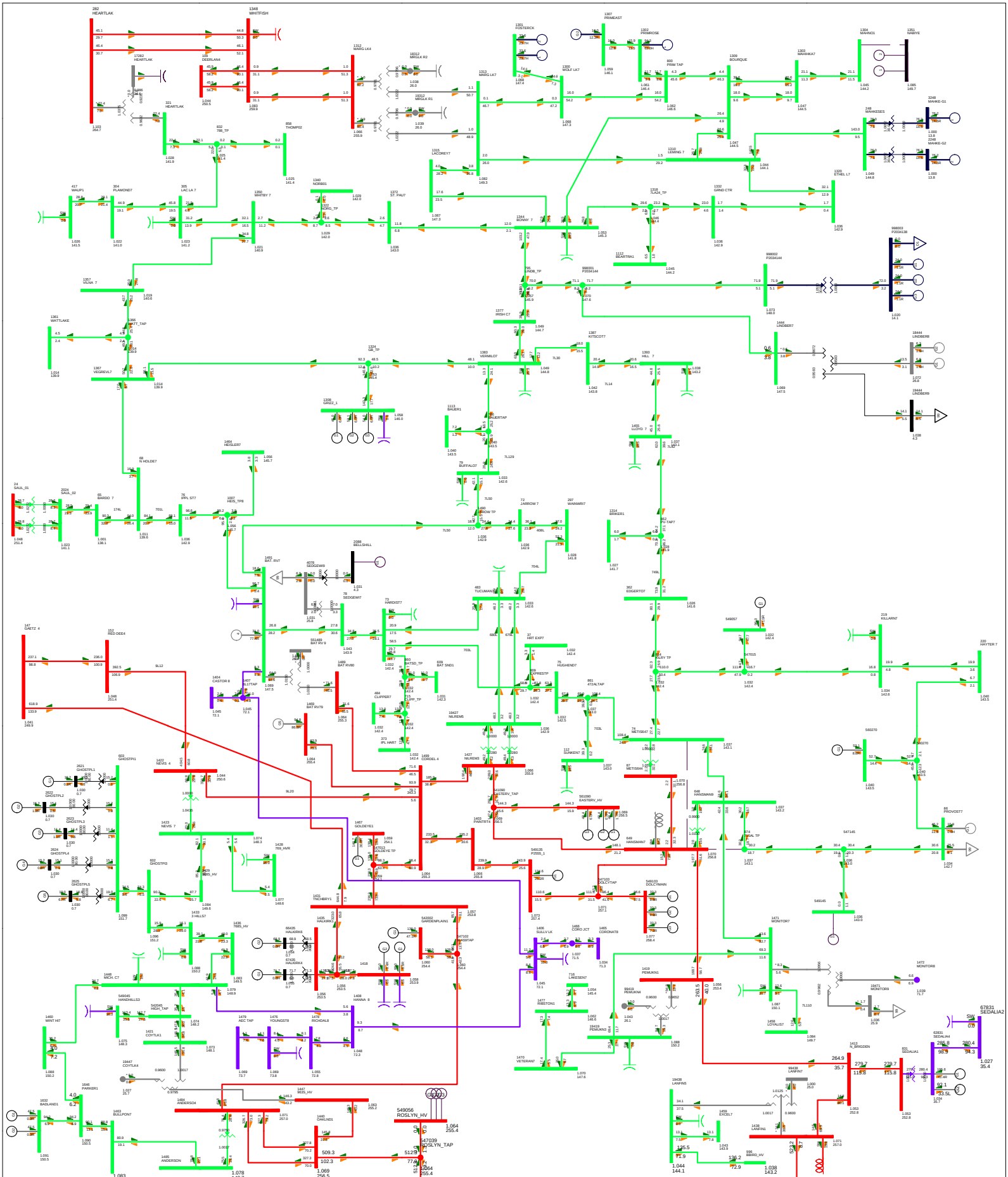
Attachment A3- 1	Contingency	Study Case Description	P2034 Cold Lake Area Cogen
	CONT 031: 7L157 (837S Mahihkan - 970S Bourque)	2028SP POST-PROJ Base Case	Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



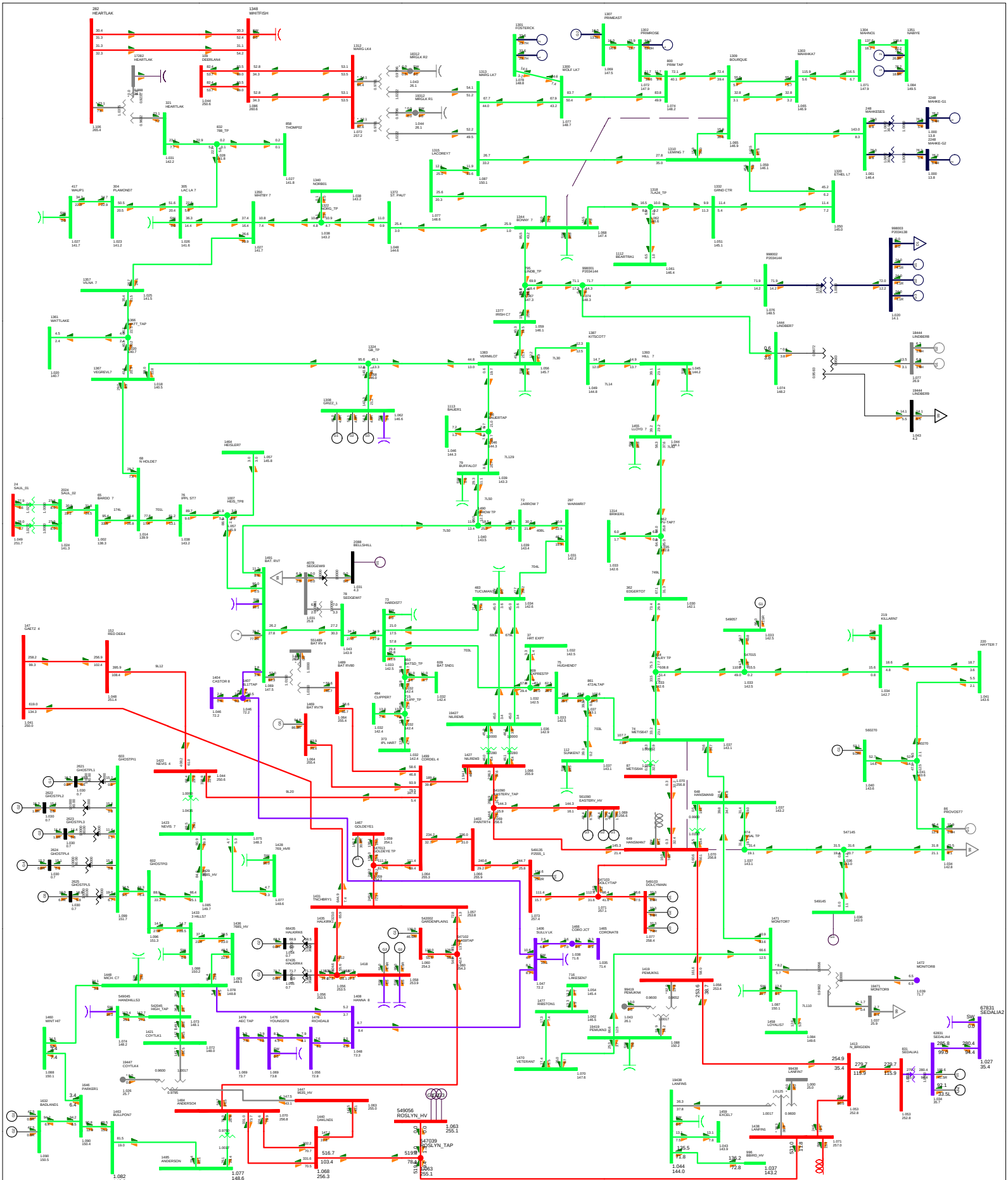
Attachment A3- 1	**Contingency** CONT 032: 7L160 (837S Mahihkan - 970S Bourque)	**Study Case Description** 2028SP POST-PROJ Base Case	**P2034 Cold Lake Area Cogen** Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A3- 1	**Contingency** CONT 033: 7L105 (837S Mahihkan - 909S Mahno)	**Study Case Description** 2028SP POST-PROJ Base Case	**P2034 Cold Lake Area Cogen** Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A3- 1	Contingency	Study Case Description	P2034 Cold Lake Area Cogen
	CONT 034: 7L161 (909S Mahno - 942S Nabiye)	2028SP POST-PROJ Base Case	Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A3- 1

Contingency

CONT 035: 7L146 (970S Bourque - 700S Bonnyville)

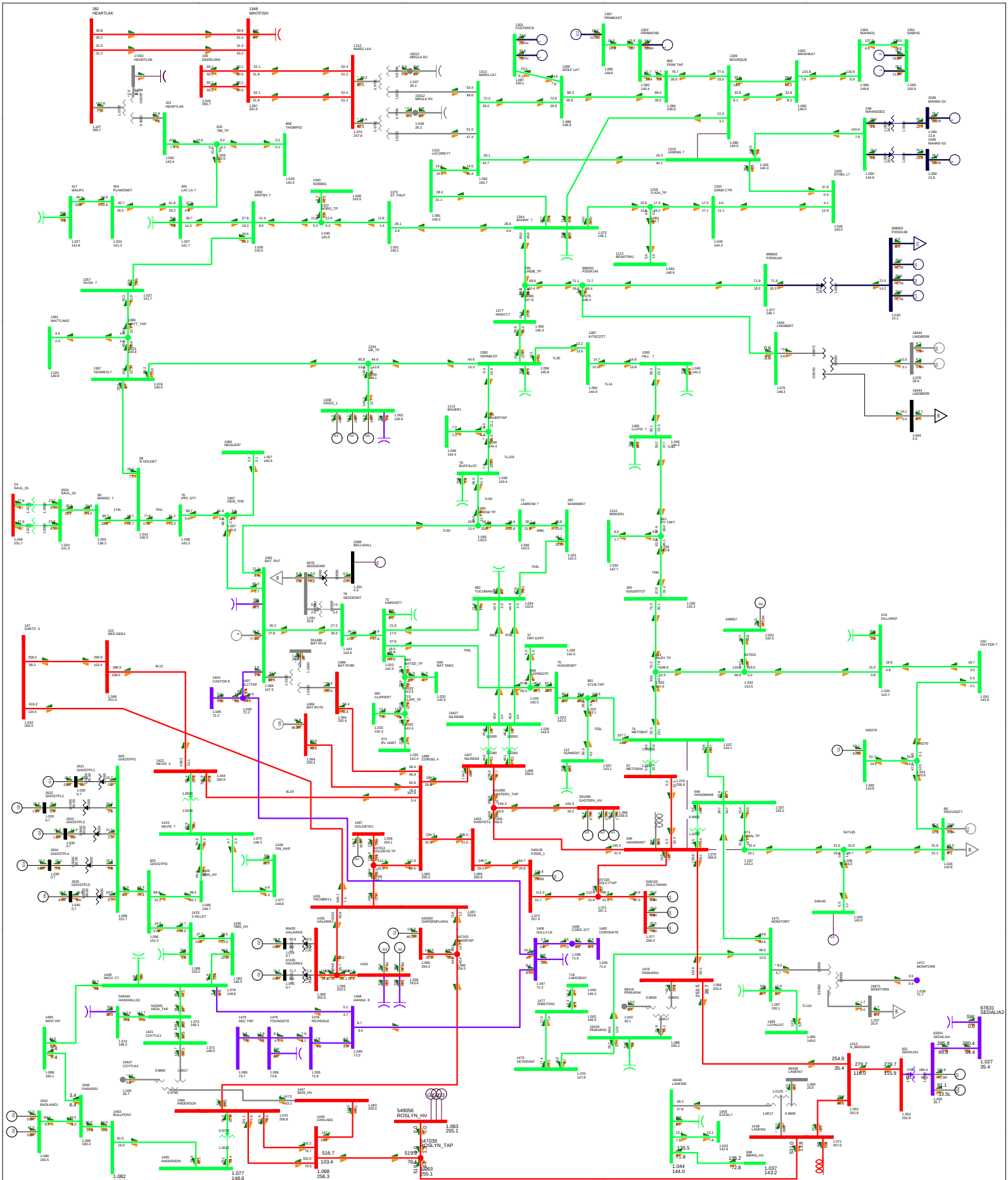
Study Case Description

2028SP POST-PROJ

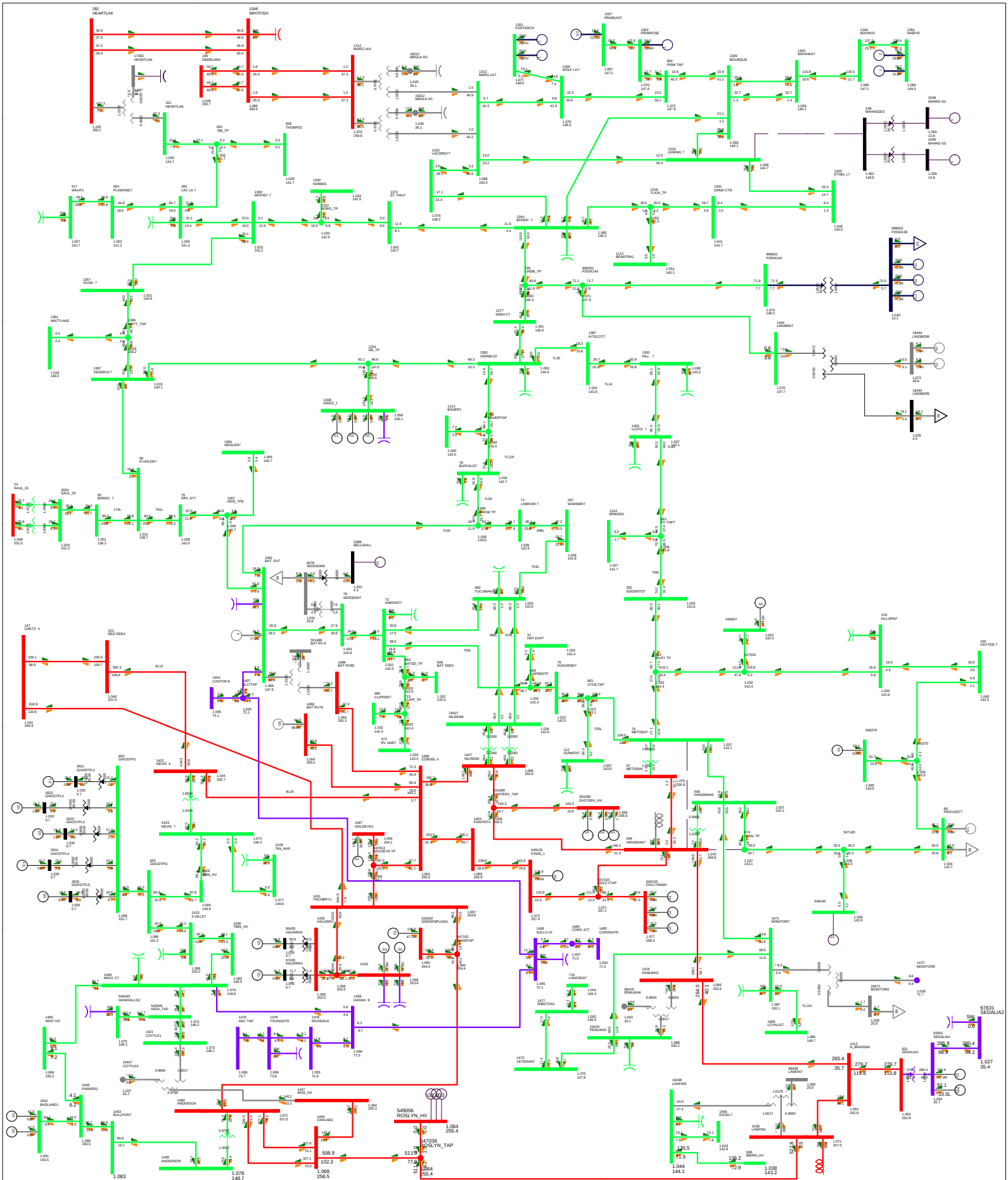
Base Case

P2034 Cold Lake Area Cogen

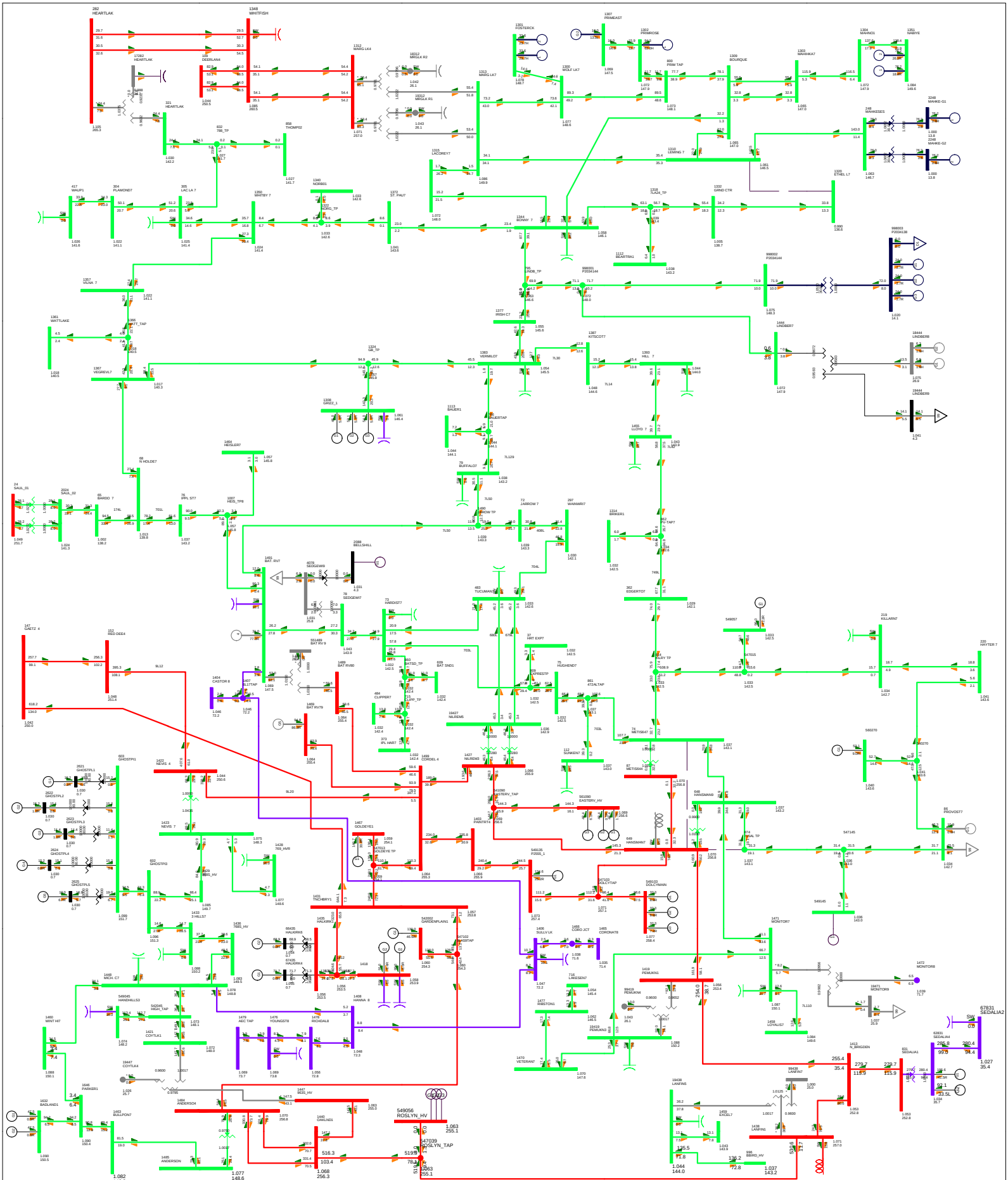
Bus - VOLTAGE (kV/PU)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%RATEA
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



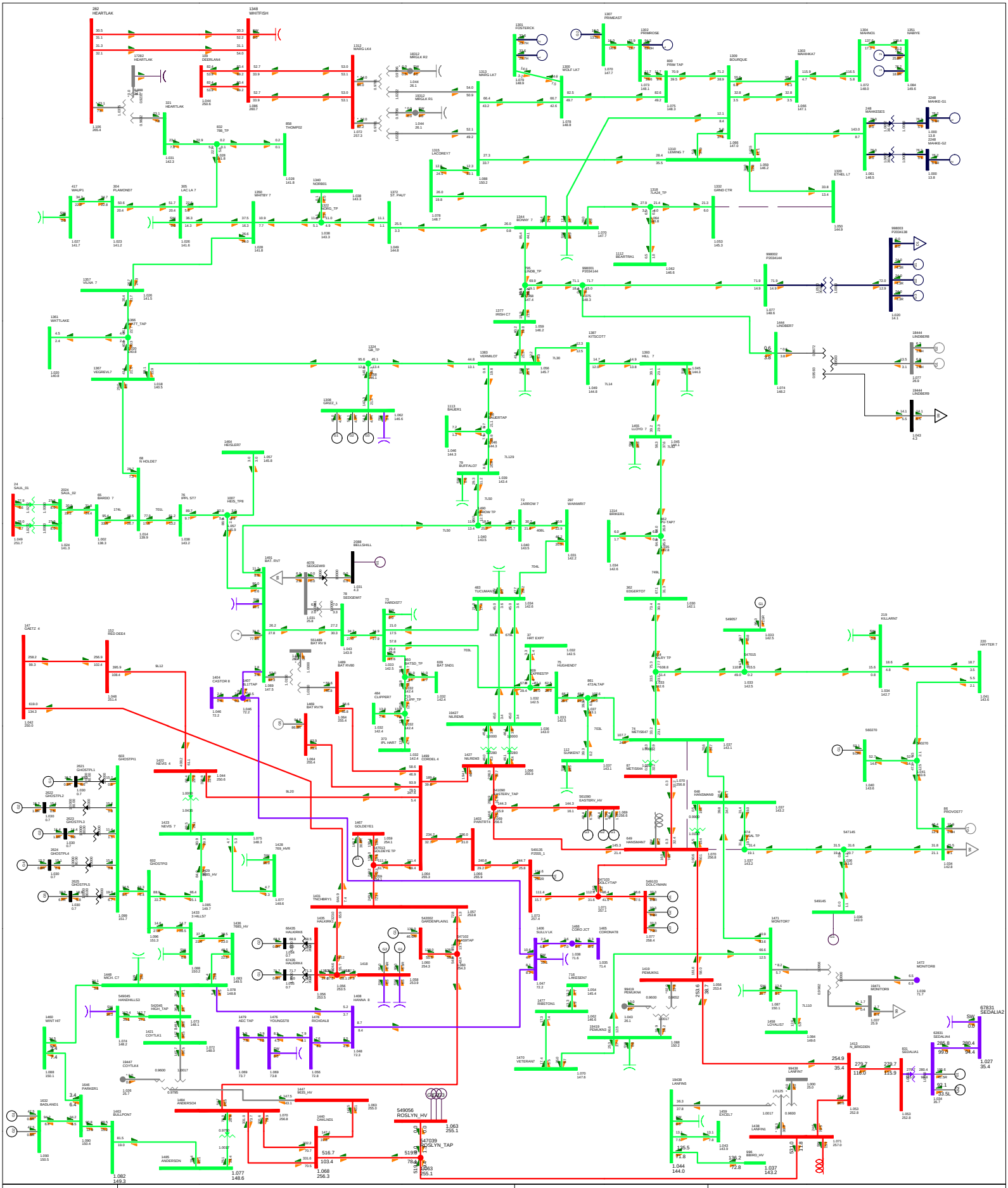
Attachment A3- 1	Contingency	Study Case Description	P2034 Cold Lake Area Cogen
	CONT 036: 7L583 (970S Bourque - 715S Leming Lake)	2028SP POST-PROJ Base Case	Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



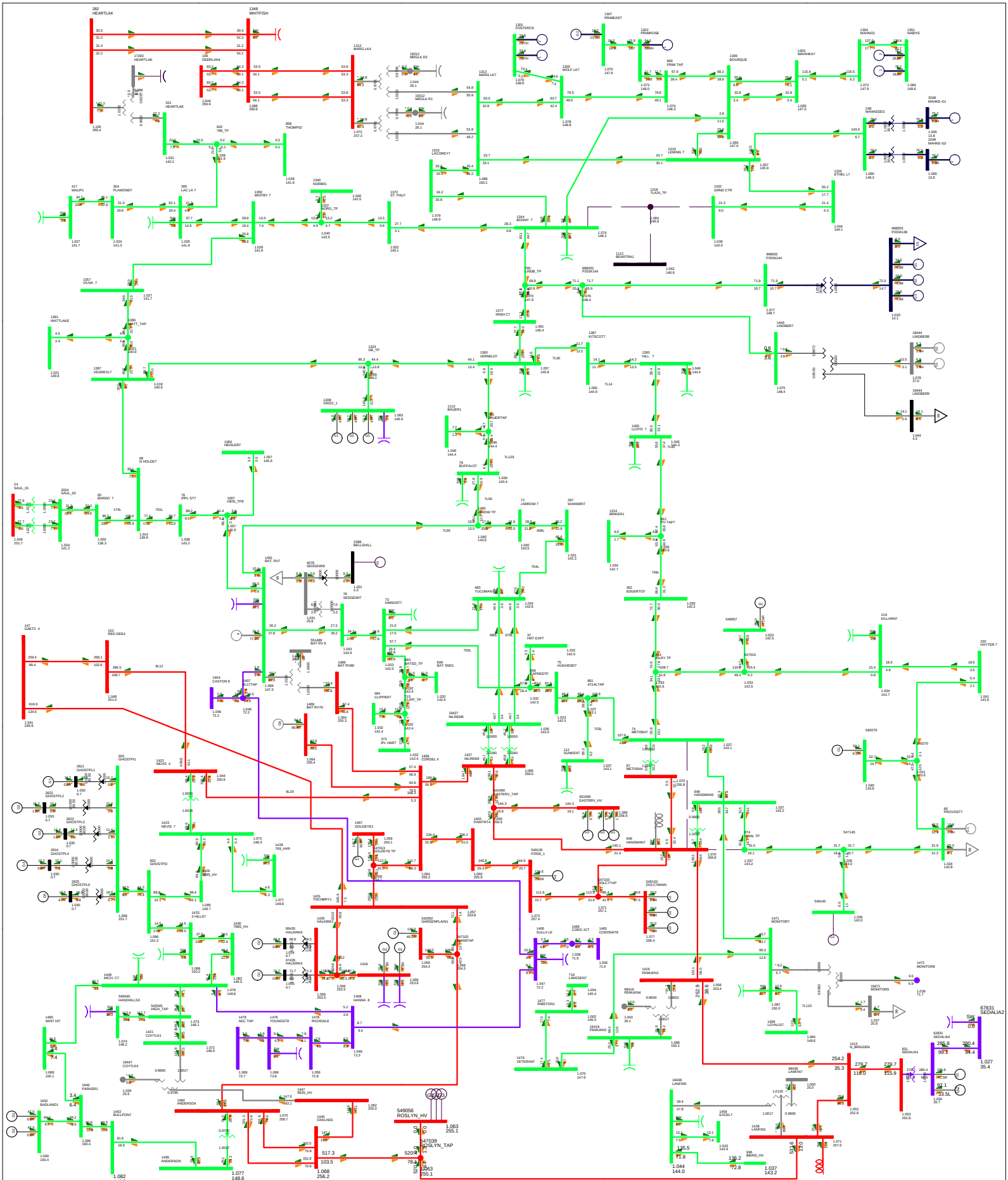
Attachment A3- 1	**Contingency** CONT 037: 7L95 (889S Mahkeses - 715S Leming Lake)	**Study Case Description** 2028SP POST-PROJ Base Case	**P2034 Cold Lake Area Cogen** Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



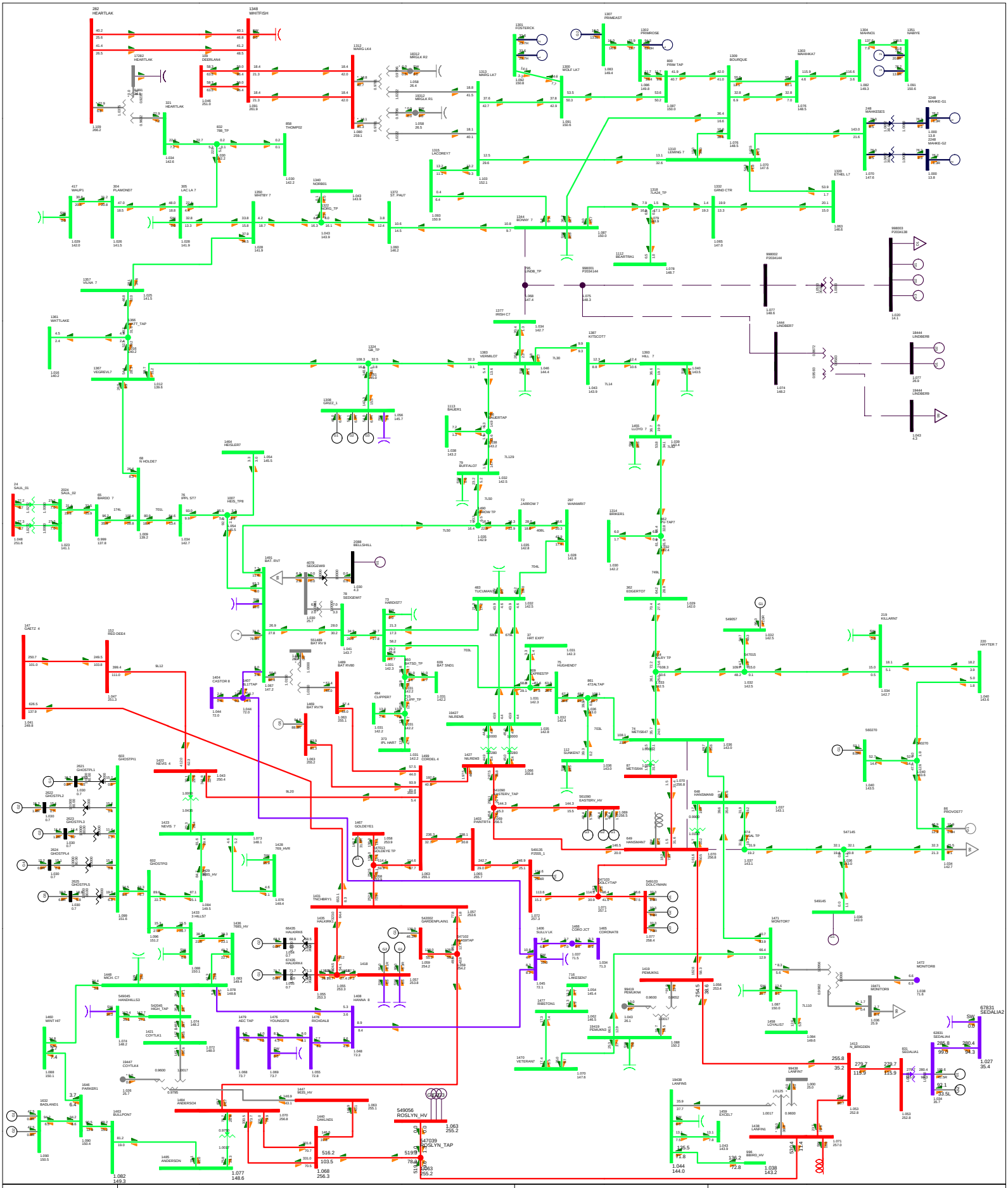
Attachment A3- 1	Contingency	Study Case Description	P2034 Cold Lake Area Cogen
	CONT 038: 7L66 (715S Leming Lake - 717S Ethel Lake)	2028SP POST-PROJ Base Case	Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



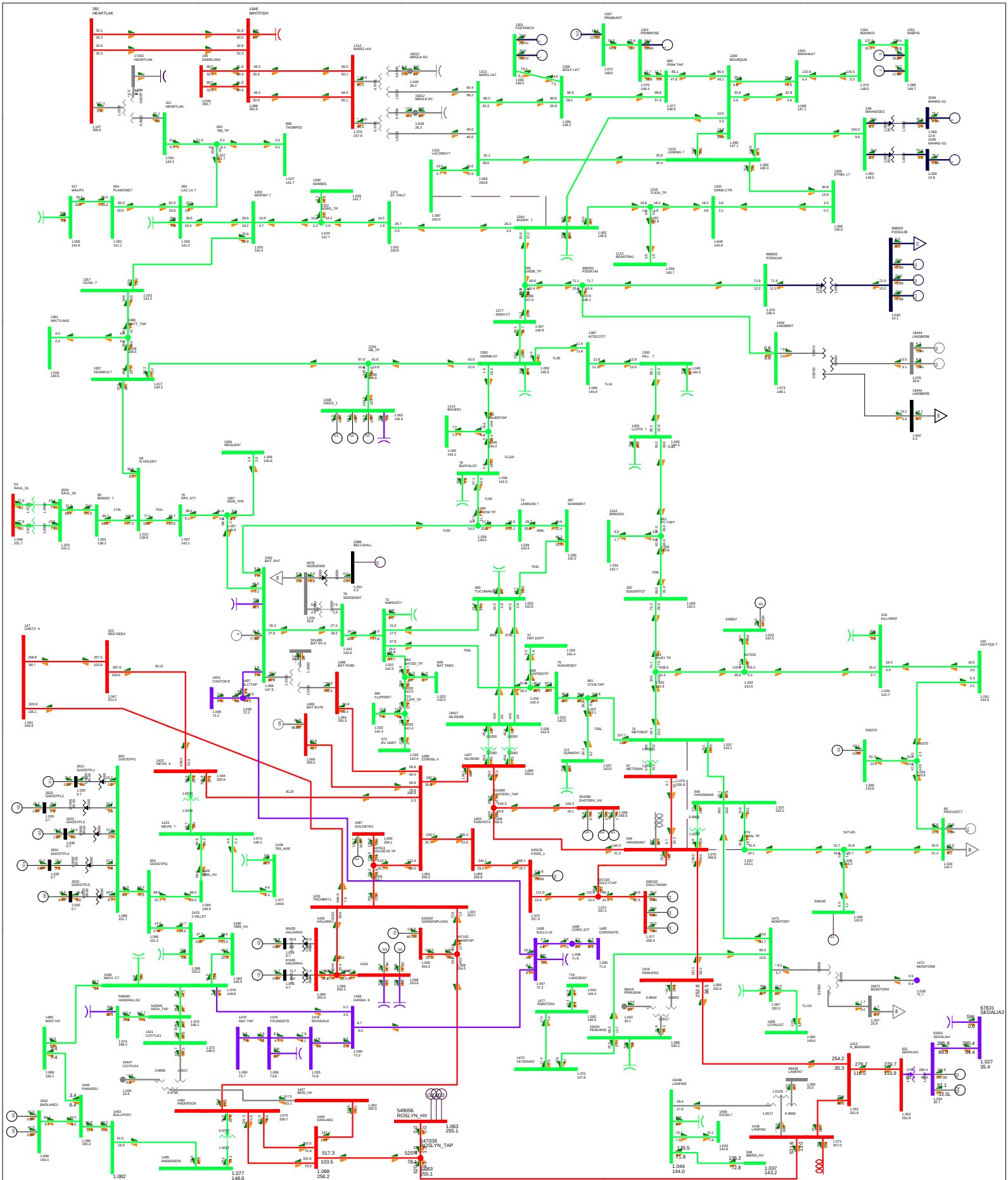
Attachment A3- 1	Contingency	Study Case Description	P2034 Cold Lake Area Cogen
	CONT 039: 7L28 (717S Ethel Lake - 846S Grand Centre)	2028SP POST-PROJ Base Case	Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A3- 1	Contingency	Study Case Description	P2034 Cold Lake Area Cogen
	CONT 040: 7L24 (846S Grand Centre - 700S Bonnyville - 940S Beartrap)	2028SP POST-PROJ Base Case	Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A3- 1	**Contingency** CONT 041: 7L53 (700S Bonnyville - 706S Irish Creek - 969S Lindbergh)	**Study Case Description** 2028SP POST-PROJ Base Case	**P2034 Cold Lake Area Cogen** Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A3- 1

Contingency

CONT 042: 7L89 (721S Lacorey - 700S Bonnyville)

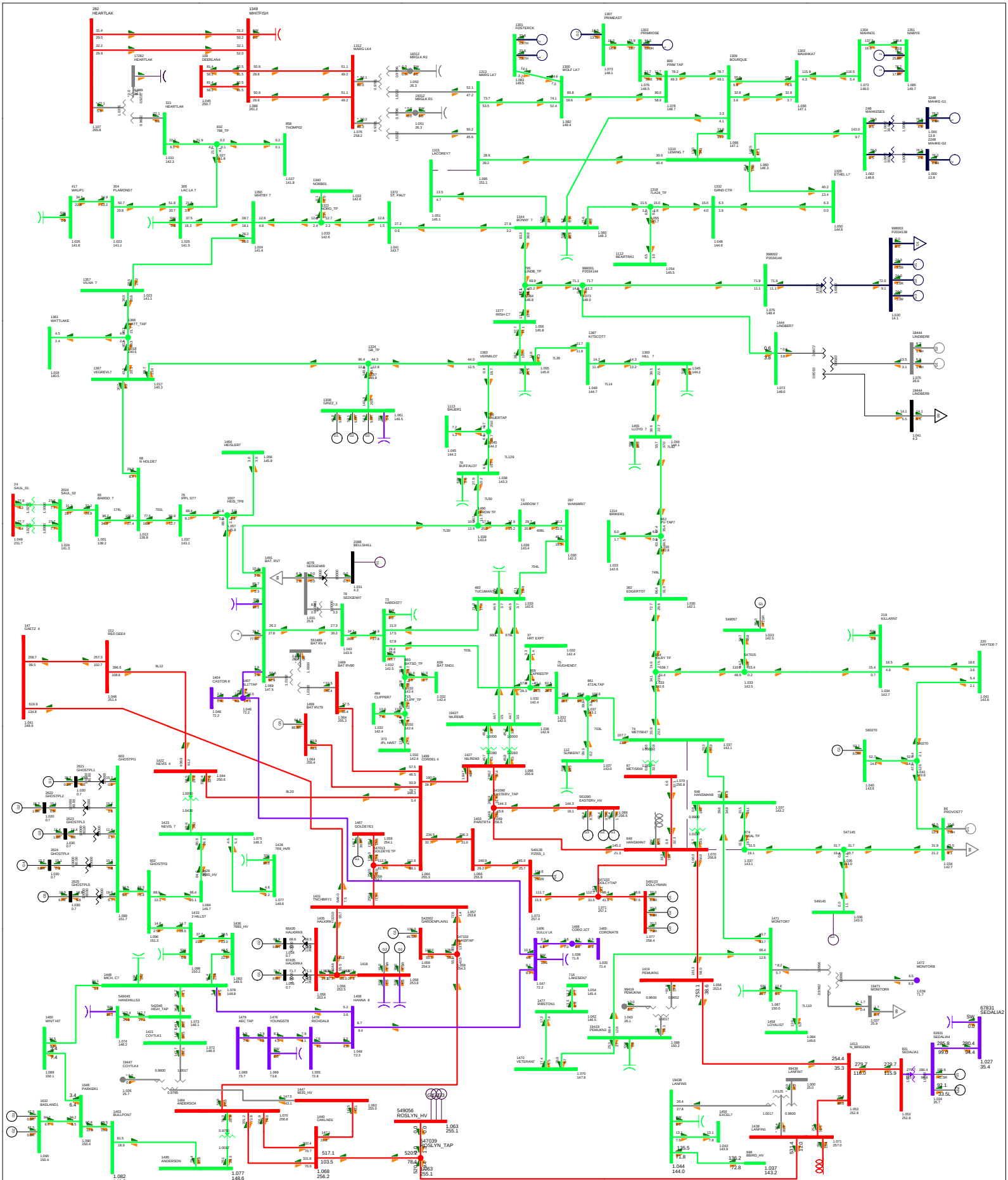
Study Case Description

2028SP POST-PROJ

Base Case

P2034 Cold Lake Area Cogen

Bus - VOLTAGE (kV/PU)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%RATEA
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A3- 1

Contingency

CONT 043: 7L89 (826S Marguerite Lake - 721S Lacorey)

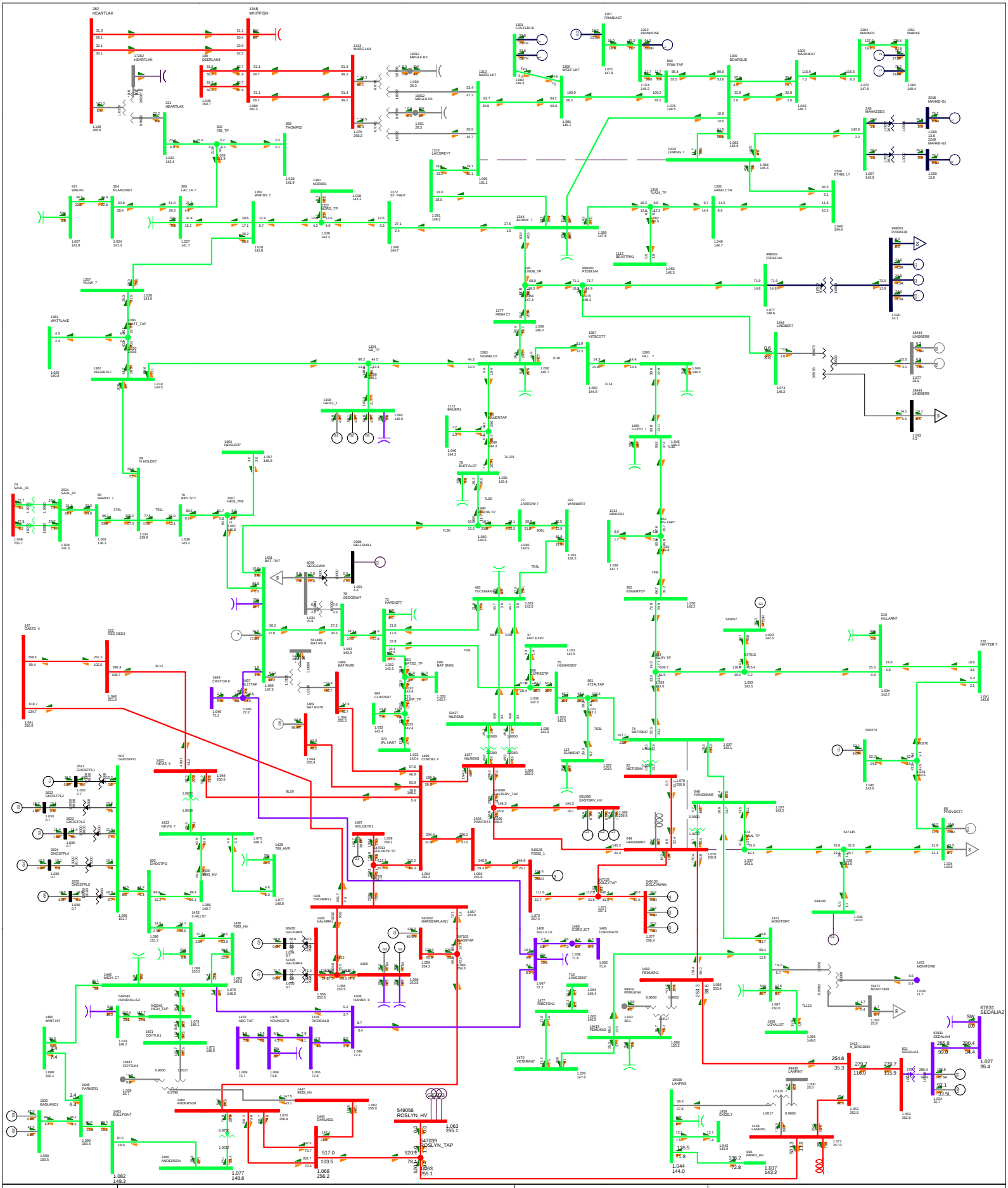
Study Case Description

2028SP POST-PROJ

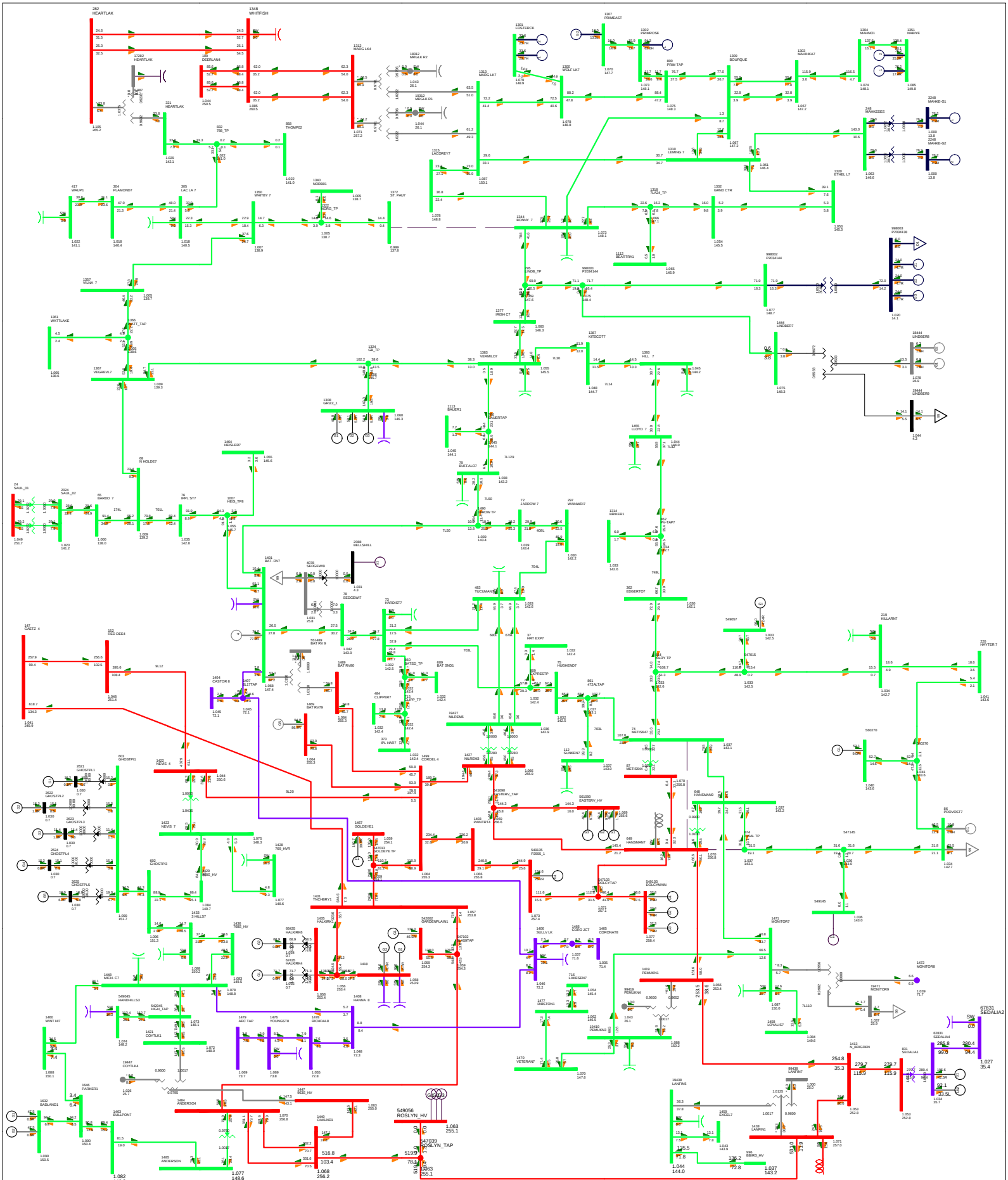
Base Case

P2034 Cold Lake Area Cogen

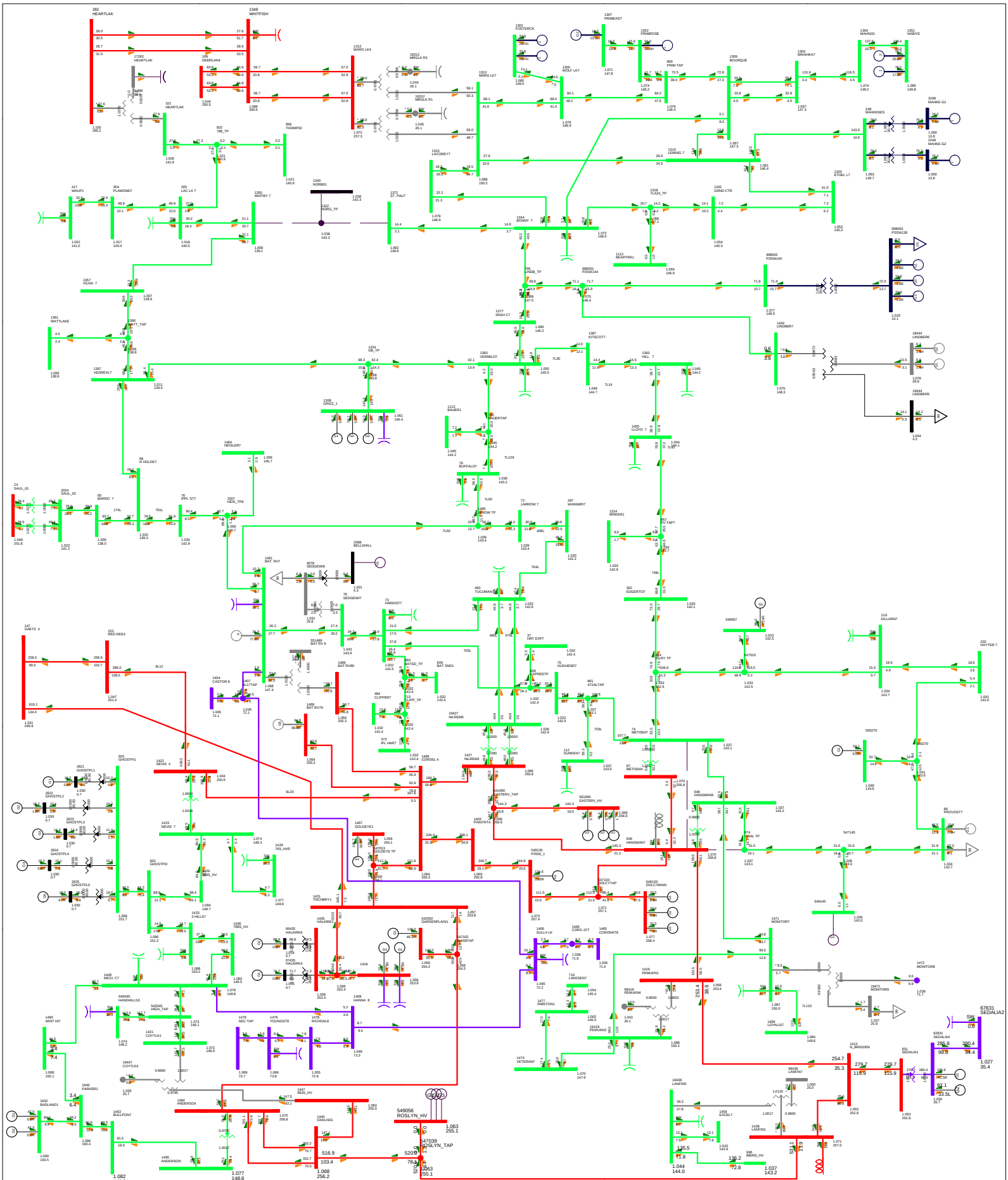
Bus - VOLTAGE (kV/PU)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%RATEA
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



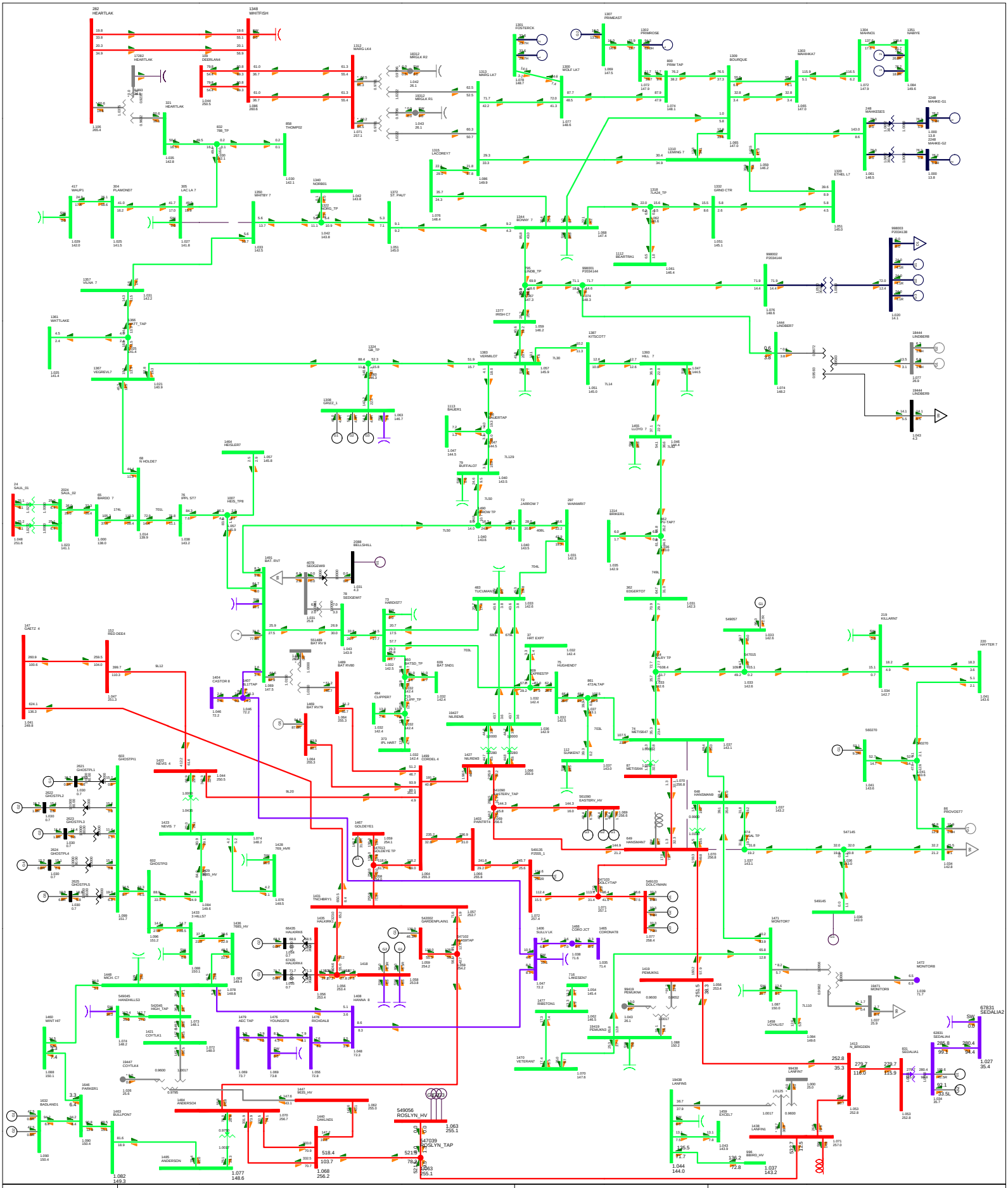
Attachment A3- 1	**Contingency** CONT 044: 7L91 (715S Leming Lake - 826S Marguerite Lake)	**Study Case Description** 2028SP POST-PROJ Base Case	**P2034 Cold Lake Area Cogen** Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



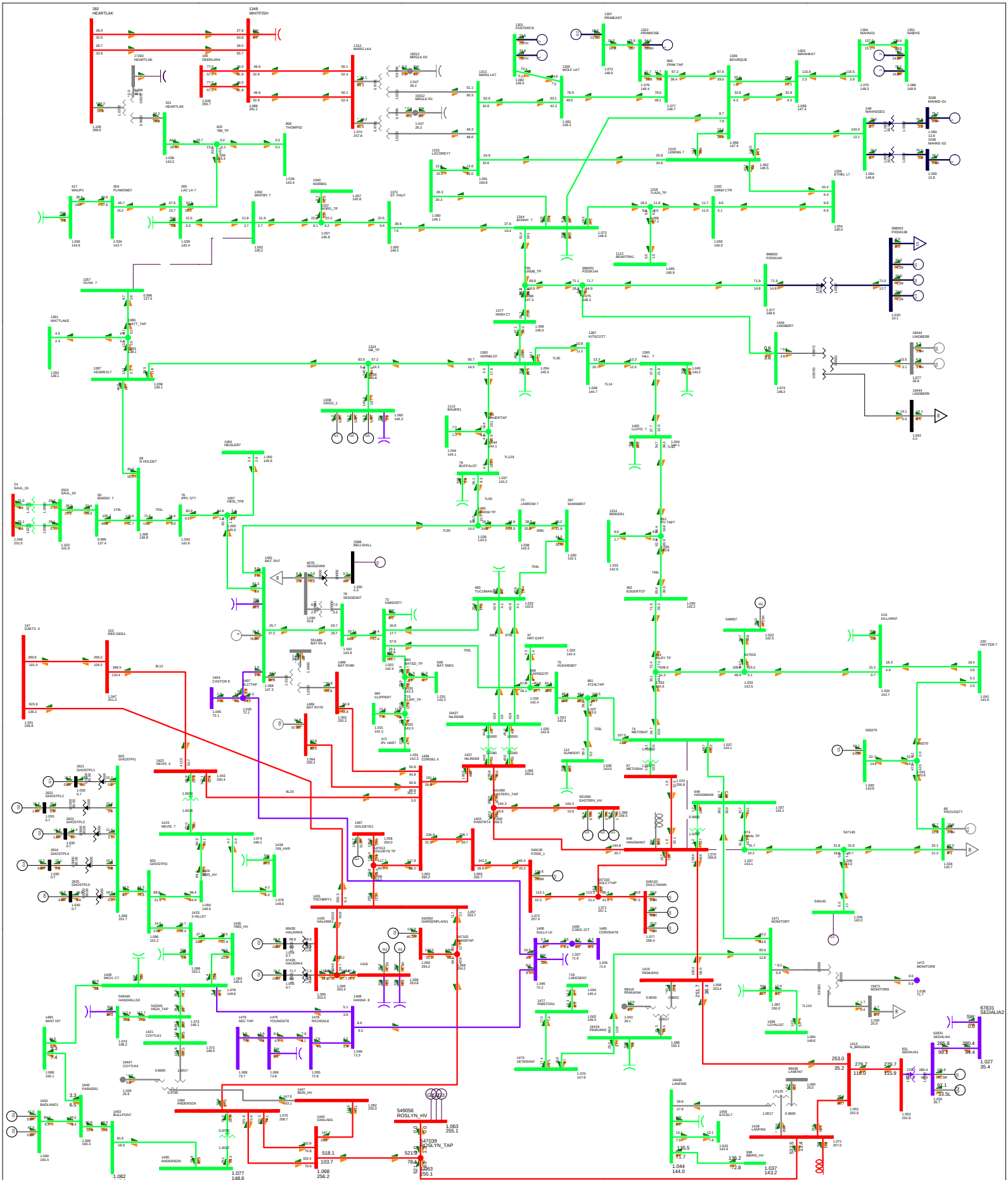
Attachment A3- 1	**Contingency** CONT 045: 7L70 (700S Bonnyville - 707S St.Paul)	**Study Case Description** 2028SP POST-PROJ Base Case	**P2034 Cold Lake Area Cogen** Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



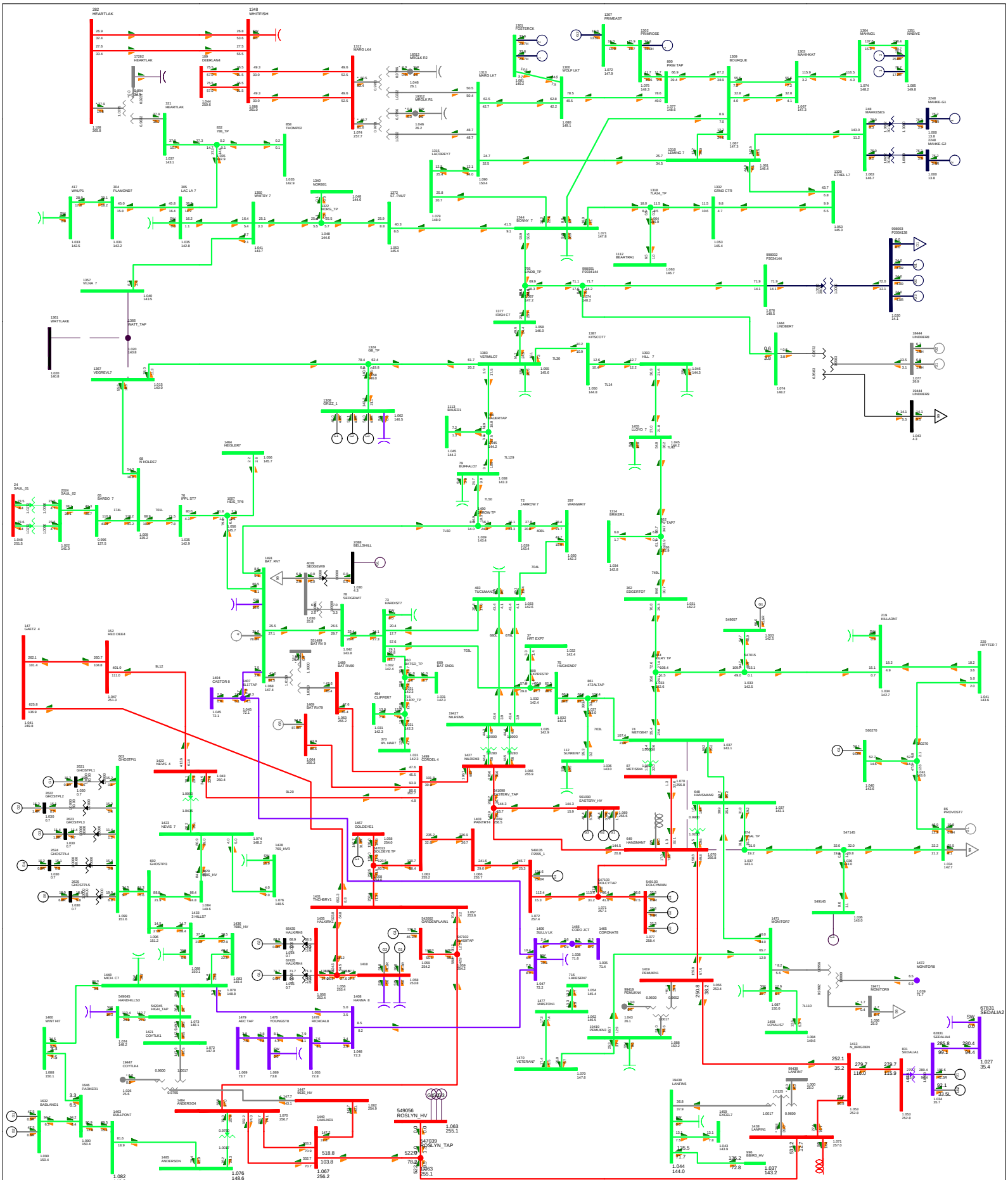
Attachment A3- 1	**Contingency** CONT 046: 7L139 (819S Whitbylake - 707S St.Paul - 936S Norberg)	**Study Case Description** 2028SP POST-PROJ Base Case	**P2034 Cold Lake Area Cogen** Bus - VOLTAGE (kv/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



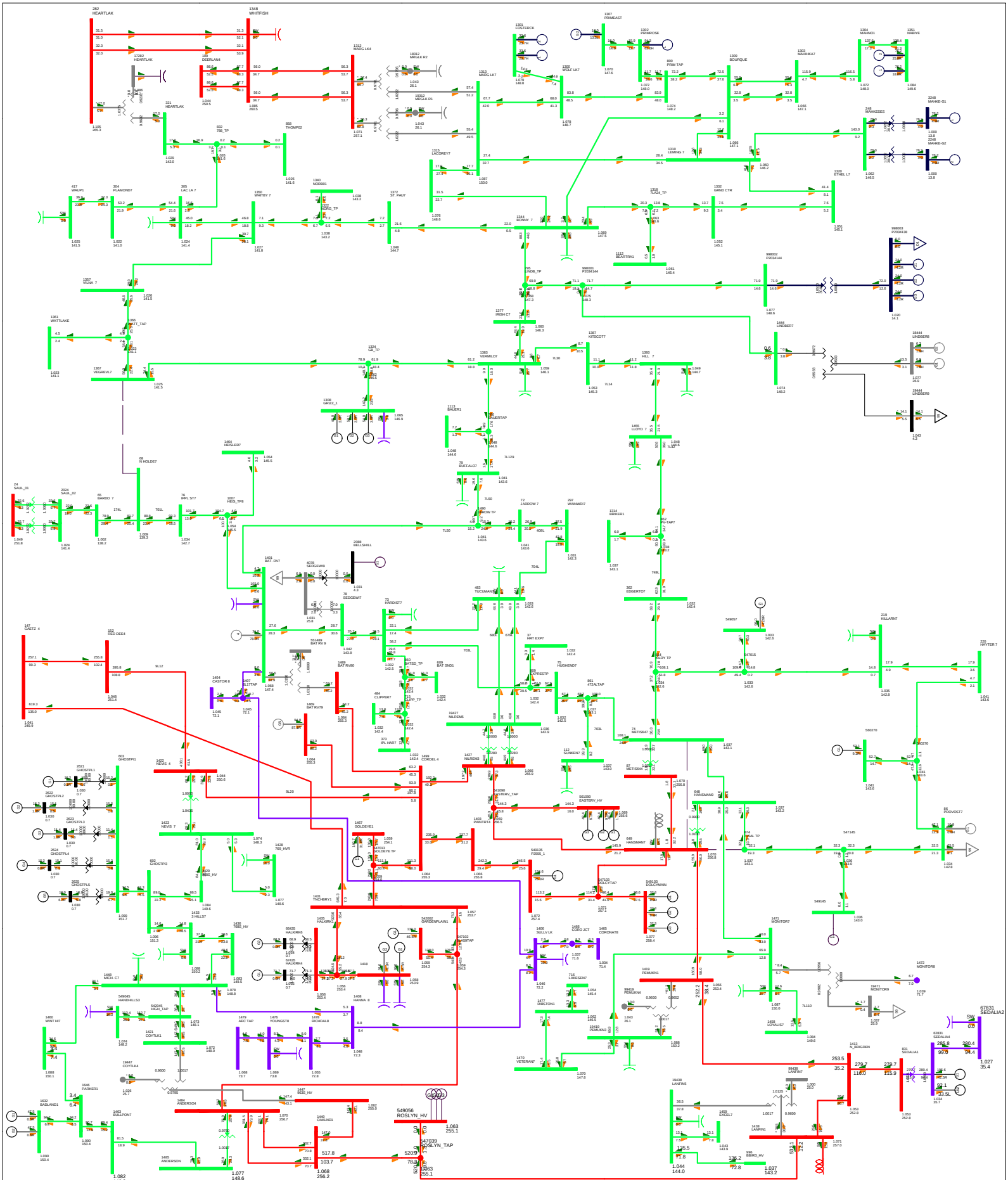
Attachment A3- 1	**Contingency** CONT 047: 794L & 7L94 (157S Lac La Biche - 819S Whitbylake)	**Study Case Description** 2028SP POST-PROJ Base Case	**P2034 Cold Lake Area Cogen** Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



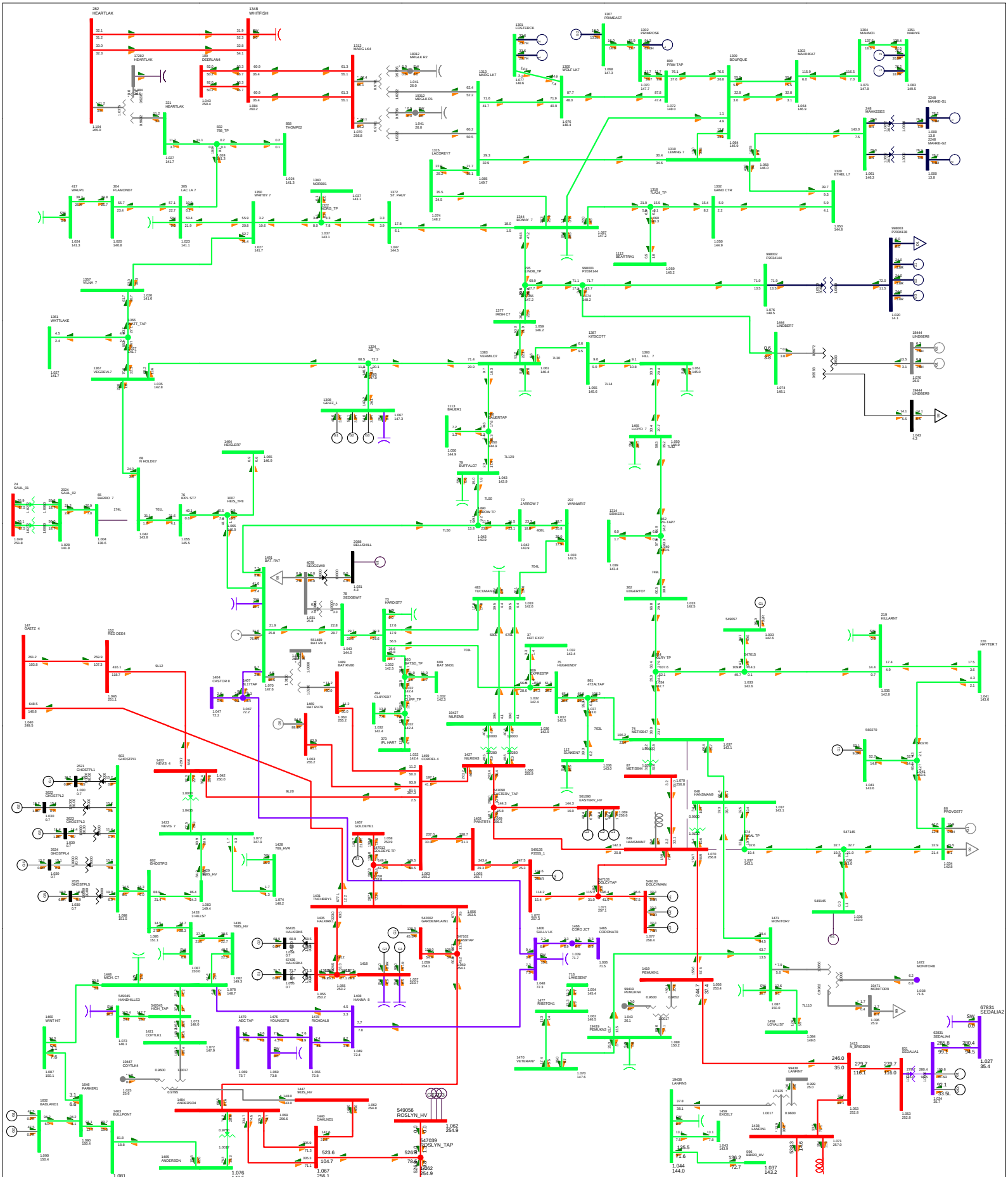
Attachment A3- 1	Contingency	Study Case Description	P2034 Cold Lake Area Cogen
	CONT 048: 7L92 (819S Whitbylake - 777S Vilna)	2028SP POST-PROJ Base Case	Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



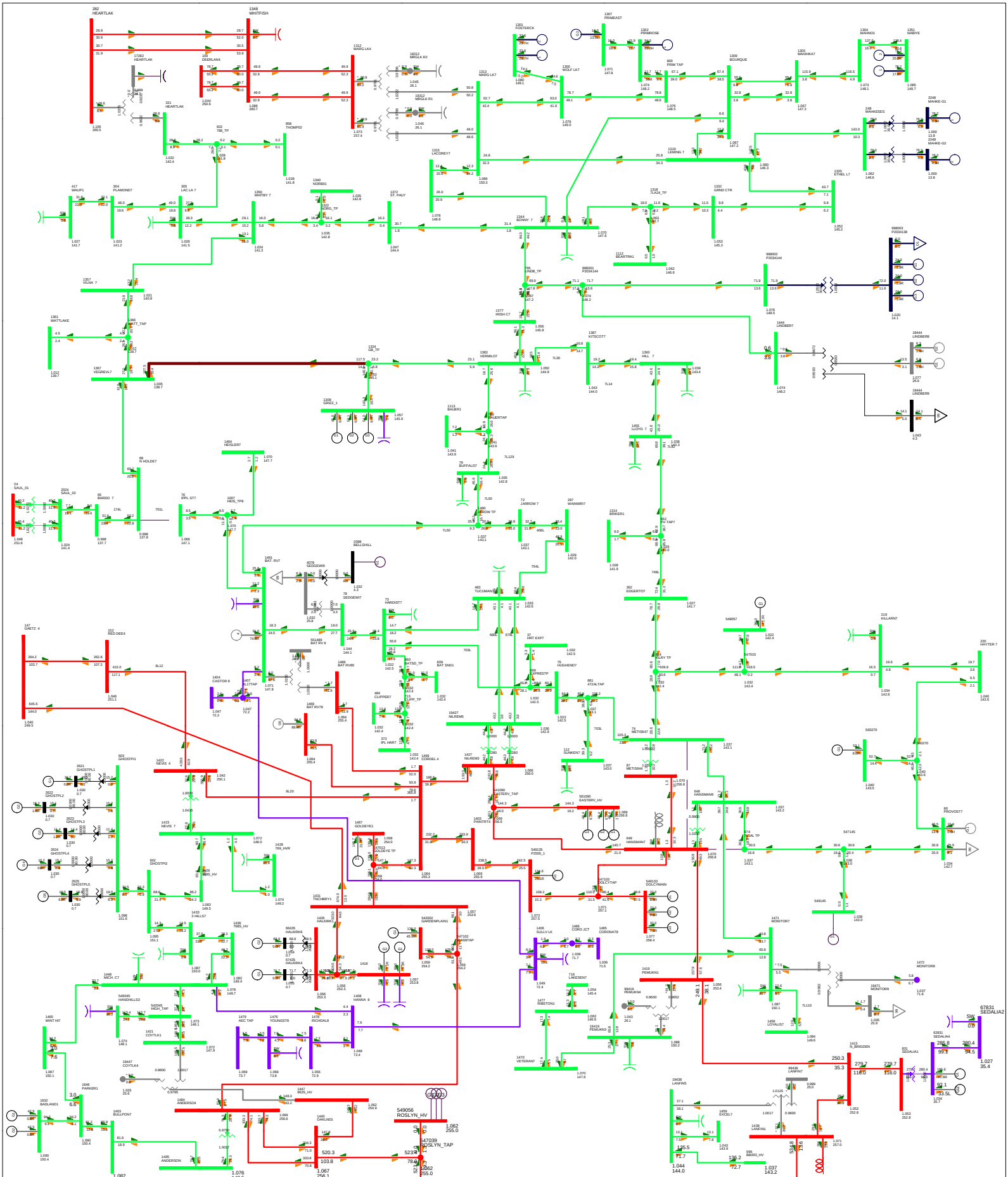
Attachment A3- 1	**Contingency** CONT 049: 7L92 (777S Vilna - 709S Vegreville - 956S Watt Lake)	**Study Case Description** 2028SP POST-PROJ Base Case	**P2034 Cold Lake Area Cogen** Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



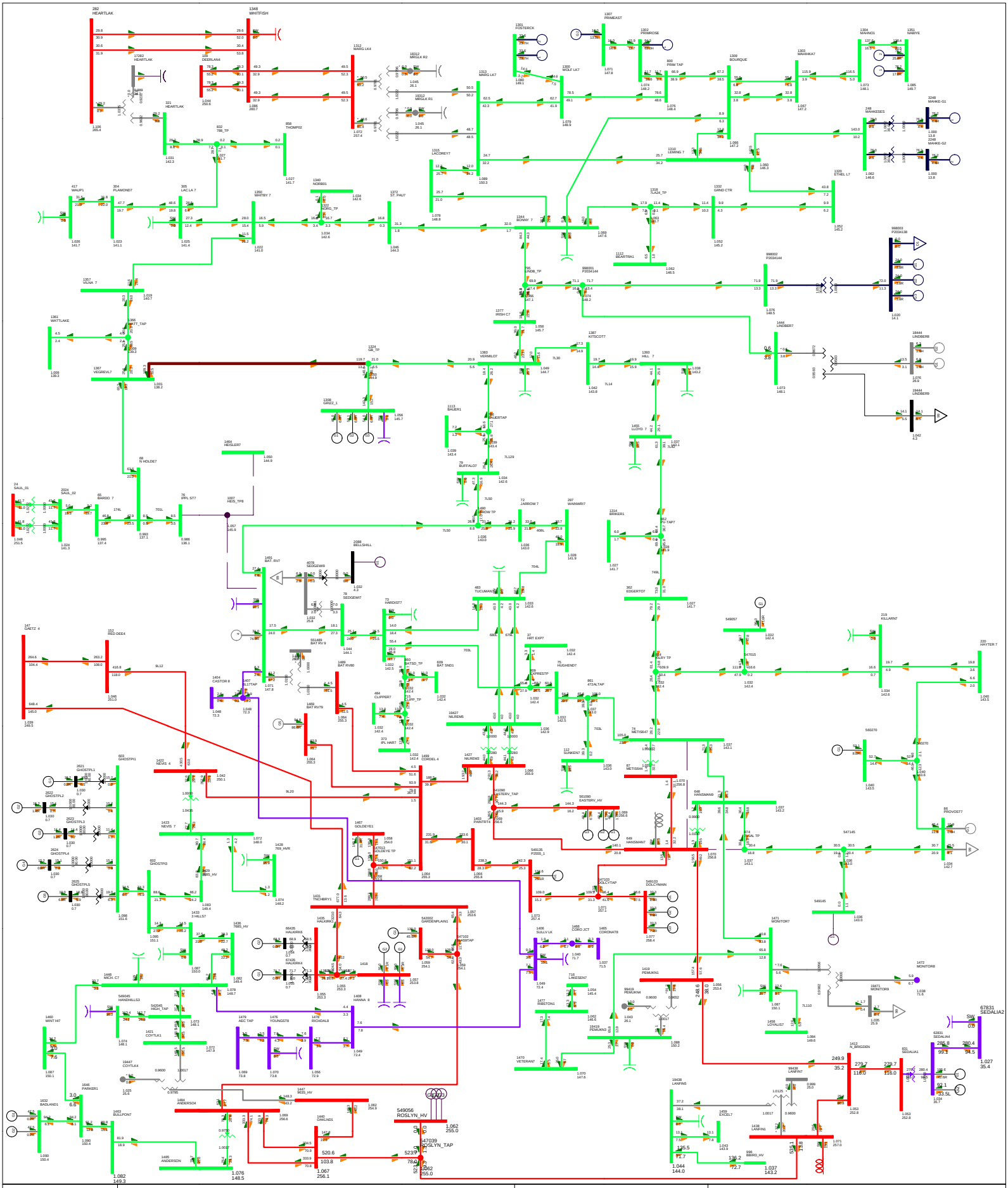
Attachment A3- 1	**Contingency** CONT 050: 7L77 (395S North Holden - 709S Vegreville)	**Study Case Description** 2028SP POST-PROJ Base Case	**P2034 Cold Lake Area Cogen** Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



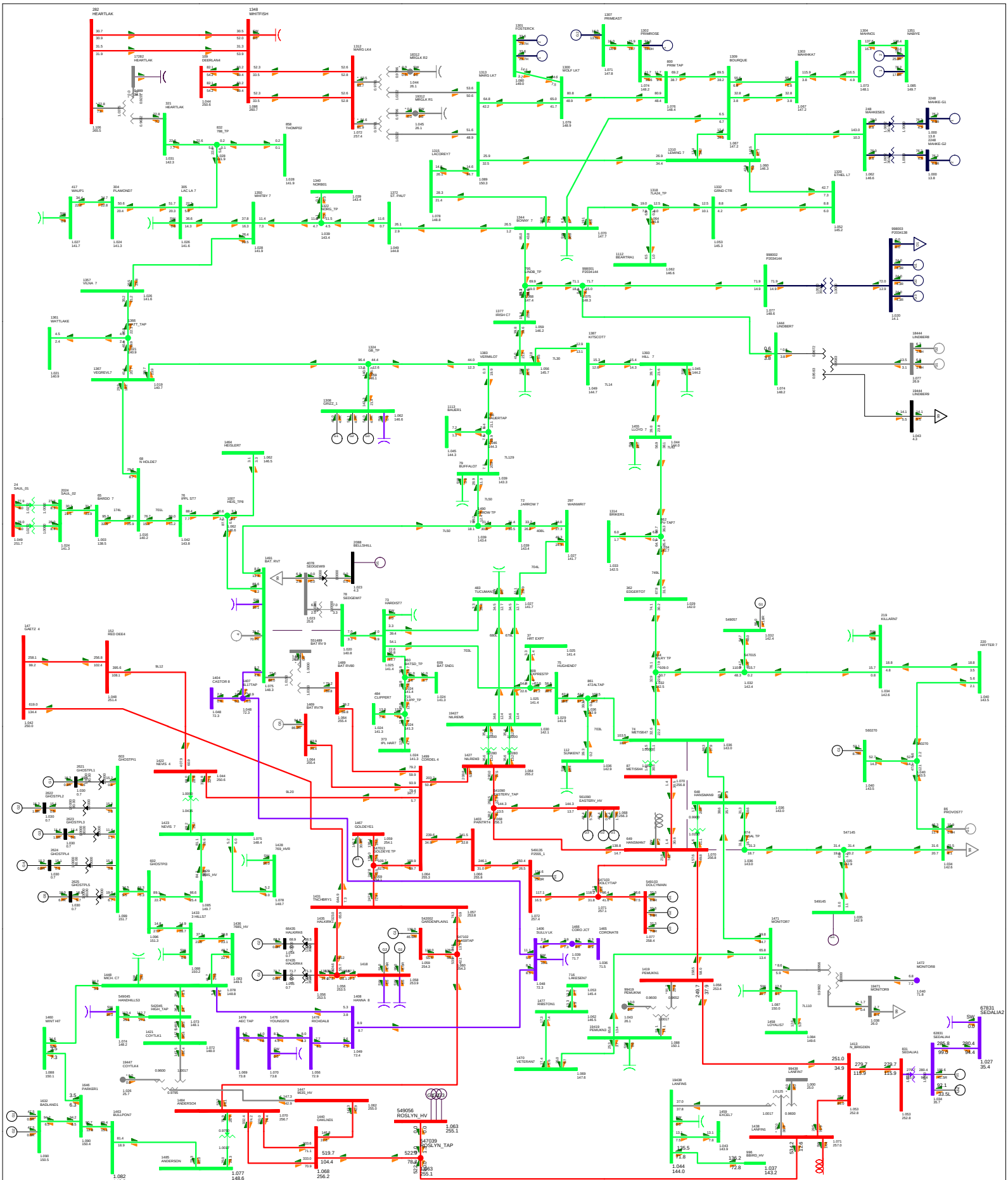
Attachment A3- 1	**Contingency** CONT 051: 174L (197S Bardo - 395S North Holden)	**Study Case Description** 2028SP POST-PROJ Base Case	**P2034 Cold Lake Area Cogen** Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



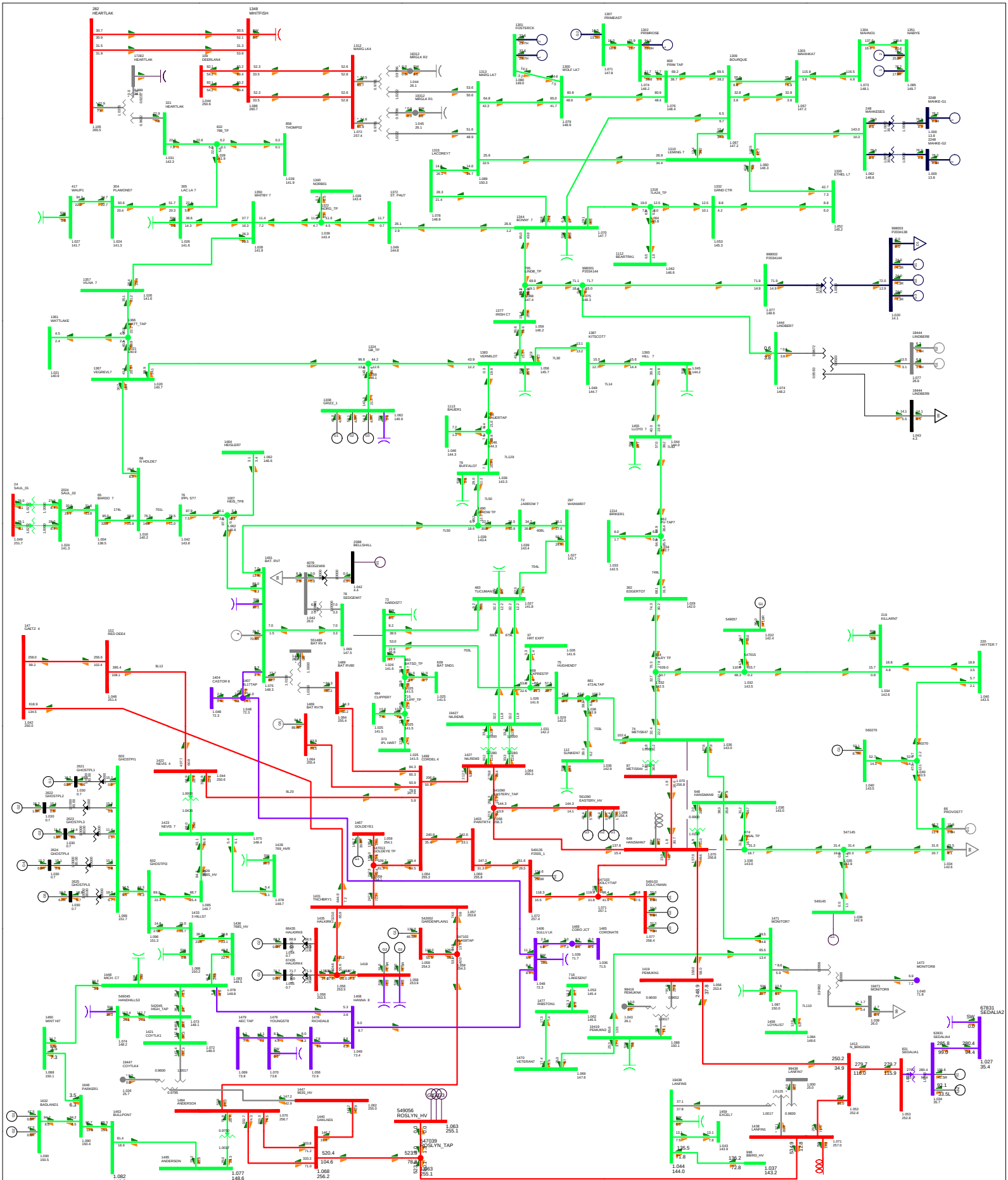
Attachment A3- 1	Contingency	Study Case Description	P2034 Cold Lake Area Cogen
	CONT 052: 701L (395S North Holden - 223S Strome)	2028SP POST-PROJ Base Case	Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



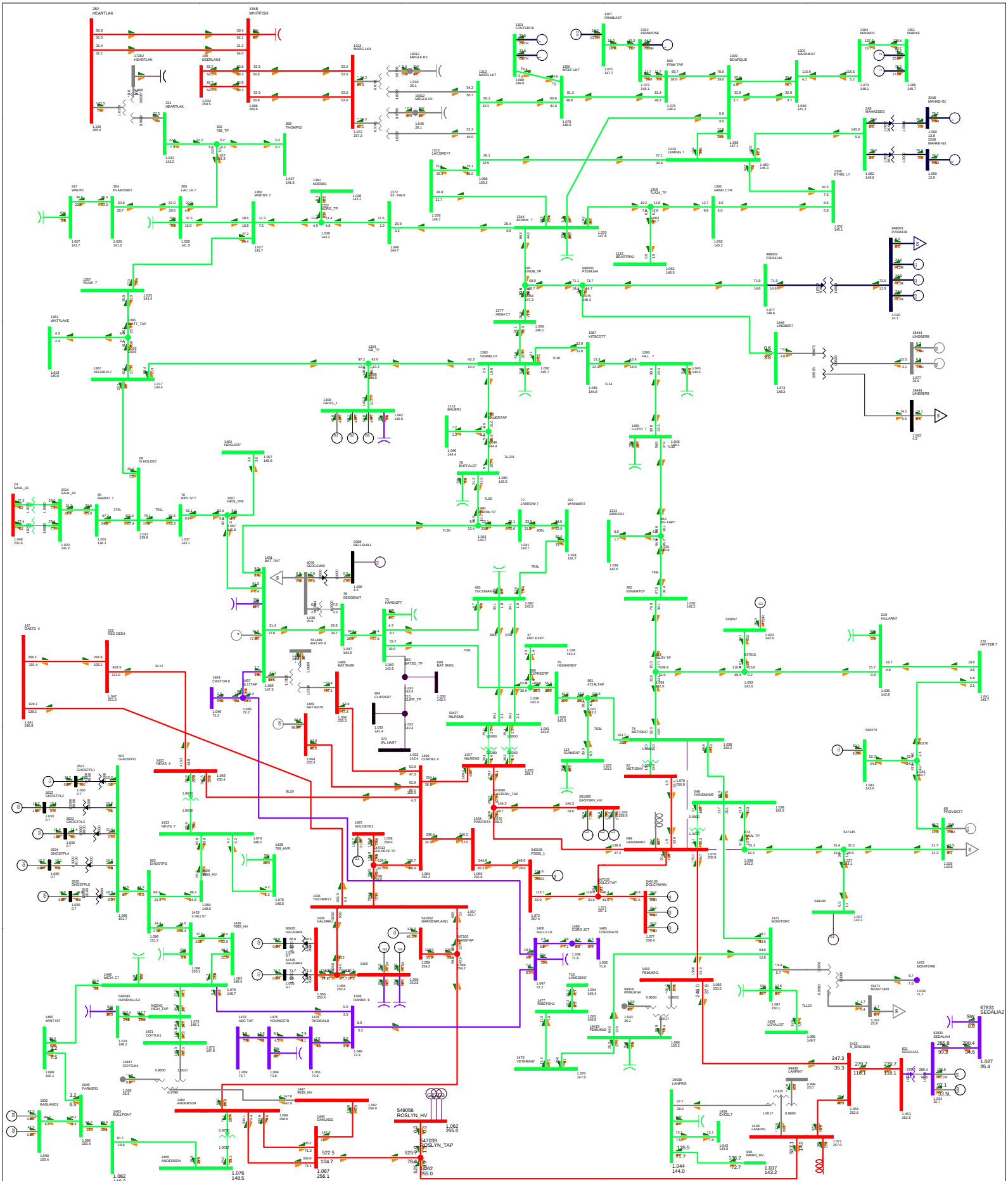
Attachment A3- 1	**Contingency** CONT 053: 701L (223S Strome - 757S Battle River - 764S Heisler)	**Study Case Description** 2028SP POST-PROJ Base Case	**P2034 Cold Lake Area Cogen** Bus - VOLTAGE (kv/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A3- 1	**Contingency** CONT 054: 7L702 (137S Sedgewick - 757S Battle River)	**Study Case Description** 2028SP POST-PROJ Base Case	**P2034 Cold Lake Area Cogen** Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A3- 1	Contingency	Study Case Description	P2034 Cold Lake Area Cogen
	CONT 055: 702L (377S Hardisty - 137S Sedgewick)	2028SP POST-PROJ Base Case	Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A3- 1

Contingency

CONT 056: 769L (377S Hardisty - 594S Battle Sands - 296S Rosyth - 656S Clipper)

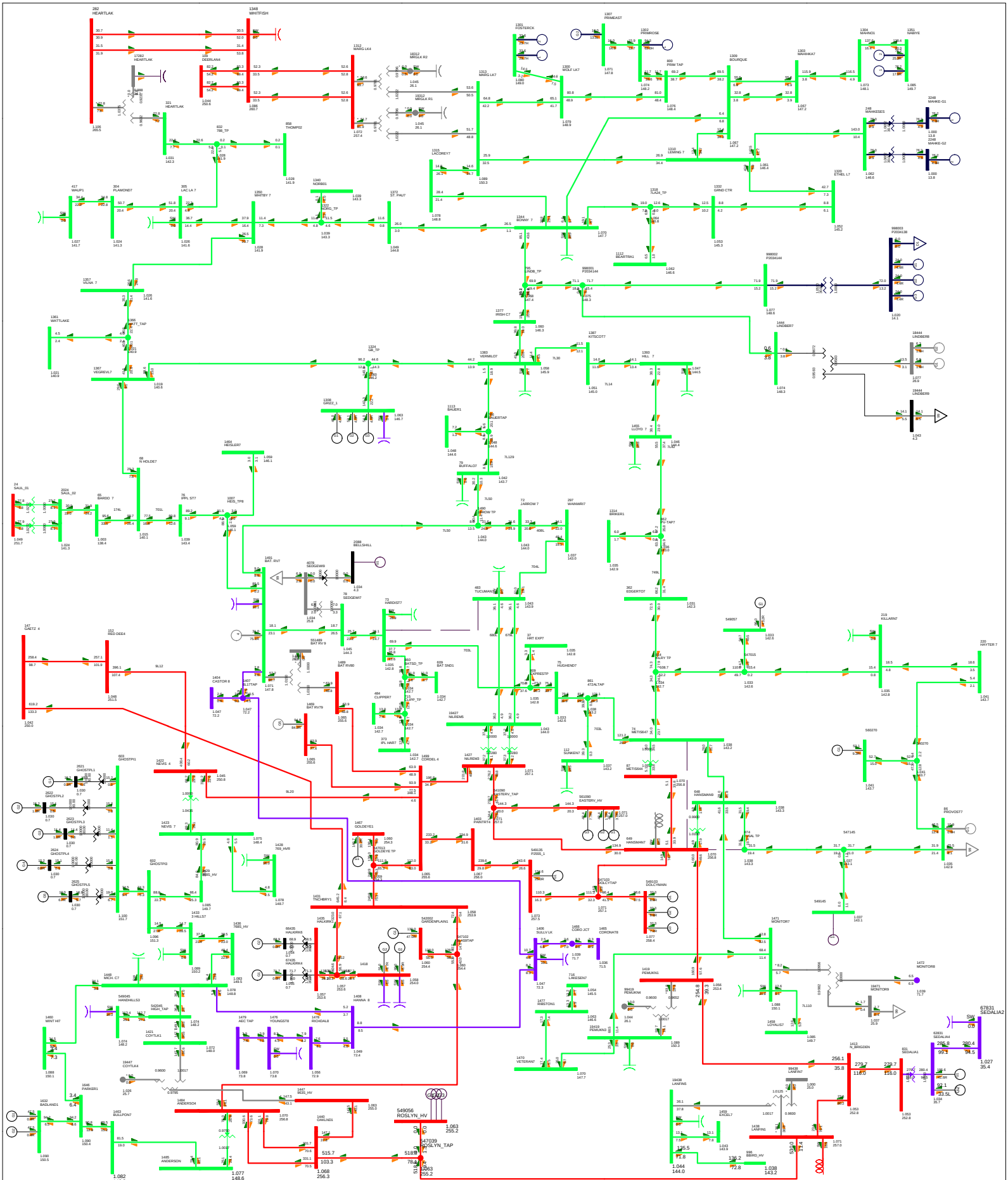
Study Case Description

2028SP POST-PROJ

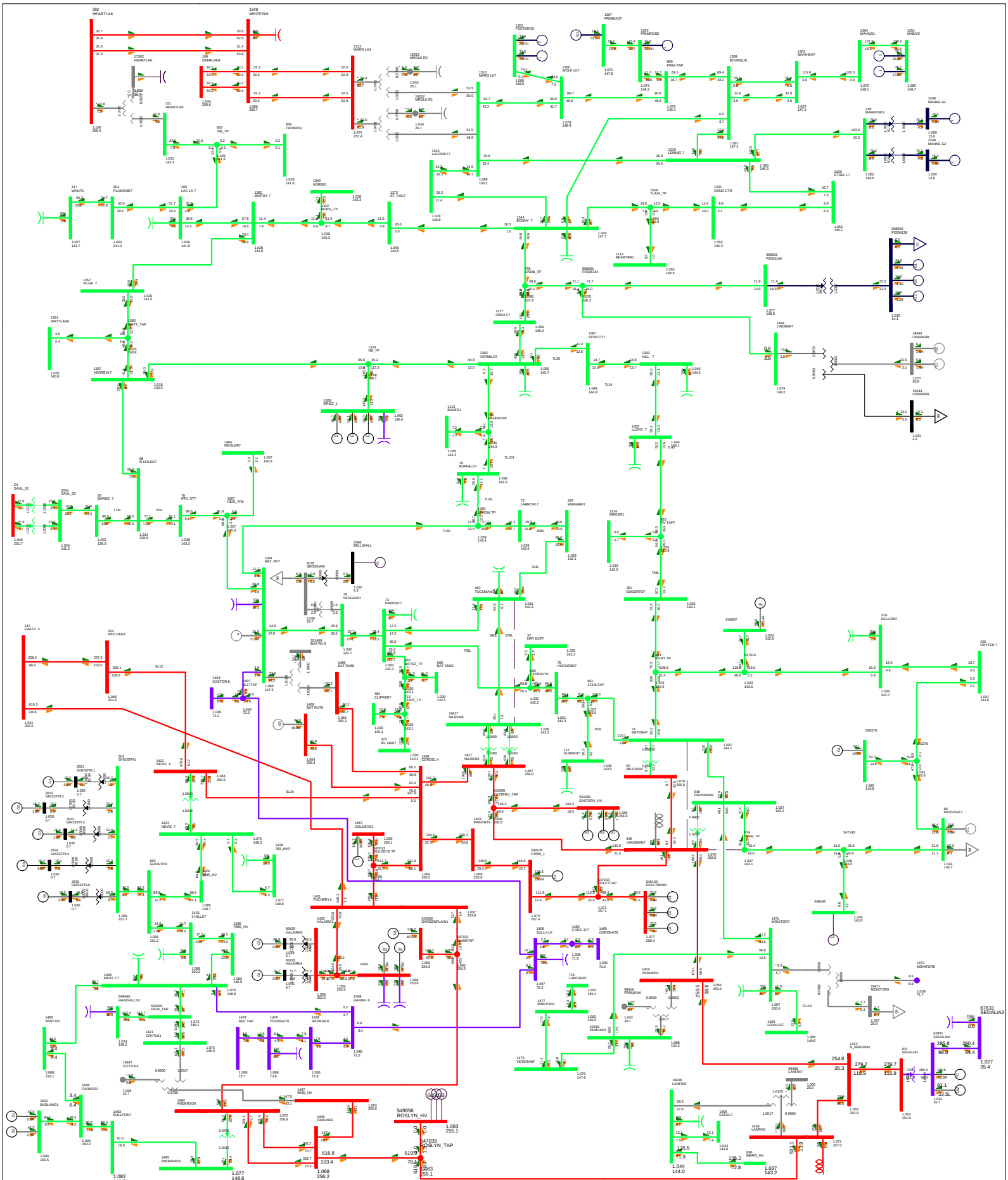
Base Case

P2034 Cold Lake Area Cogen

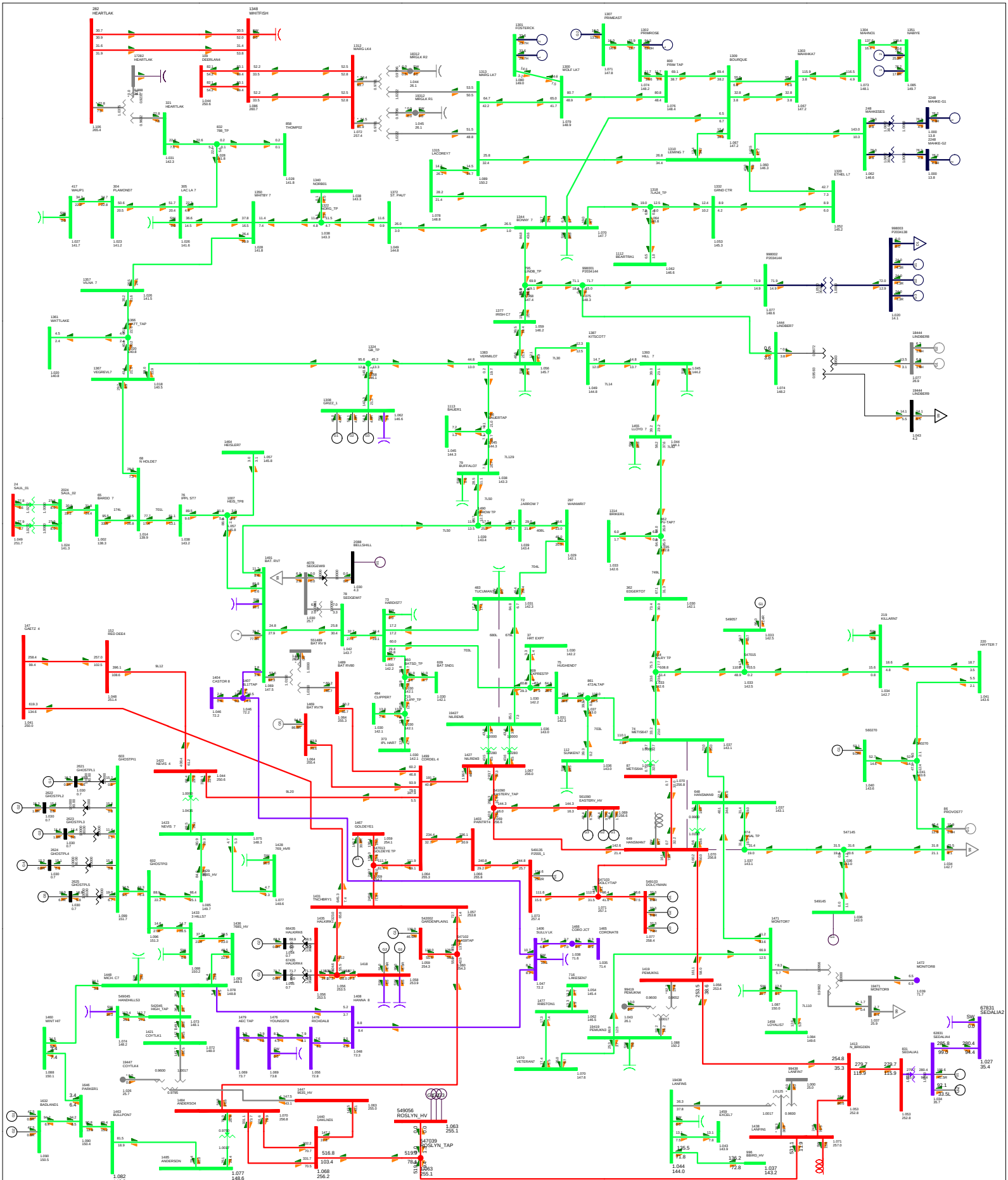
Bus - VOLTAGE (kV/PU)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%RATEA
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



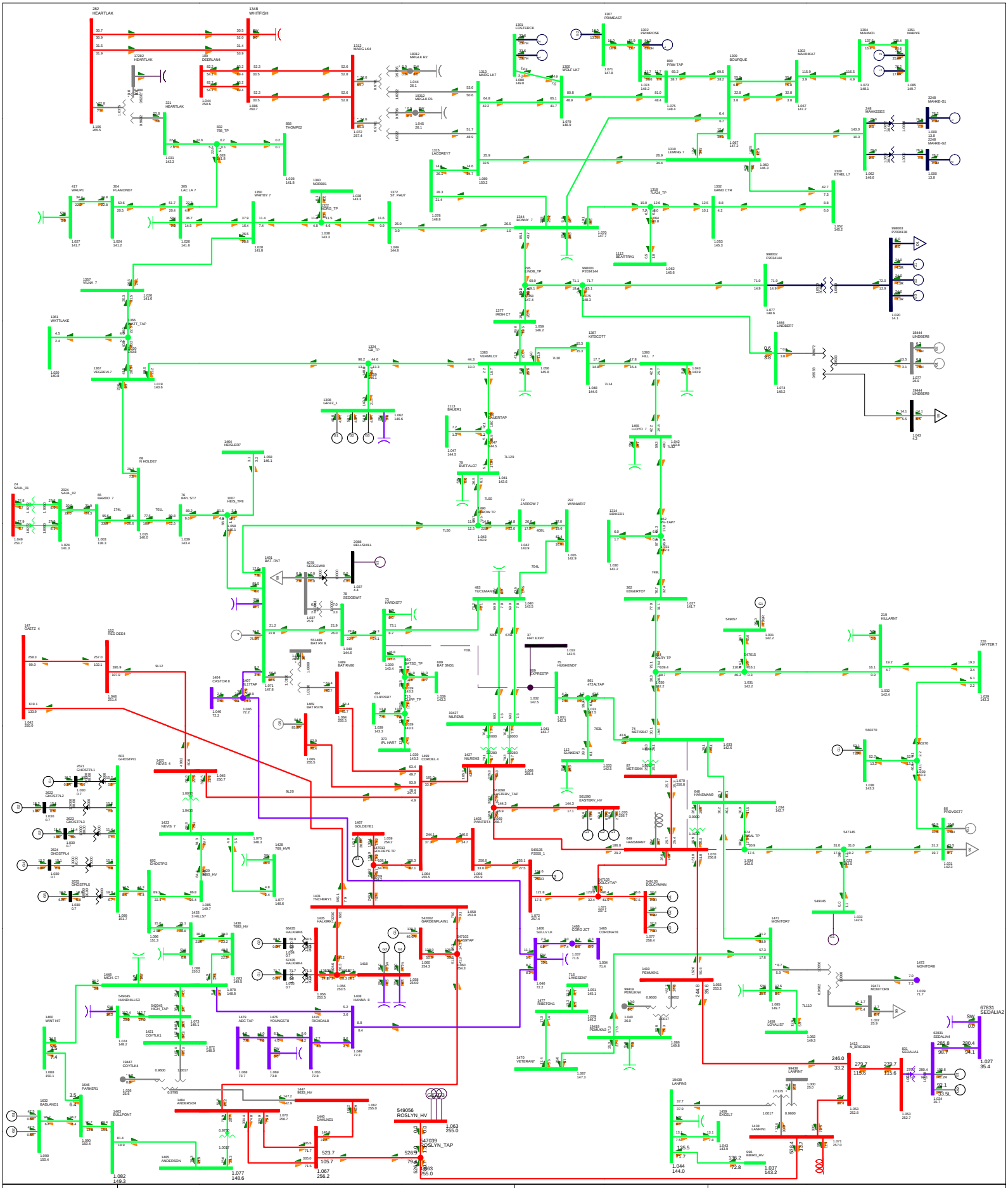
Attachment A3- 1	**Contingency** CONT 057: 681L (377S Hardisty - 478S Tucuman)	**Study Case Description** 2028SP POST-PROJ Base Case	**P2034 Cold Lake Area Cogen** Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



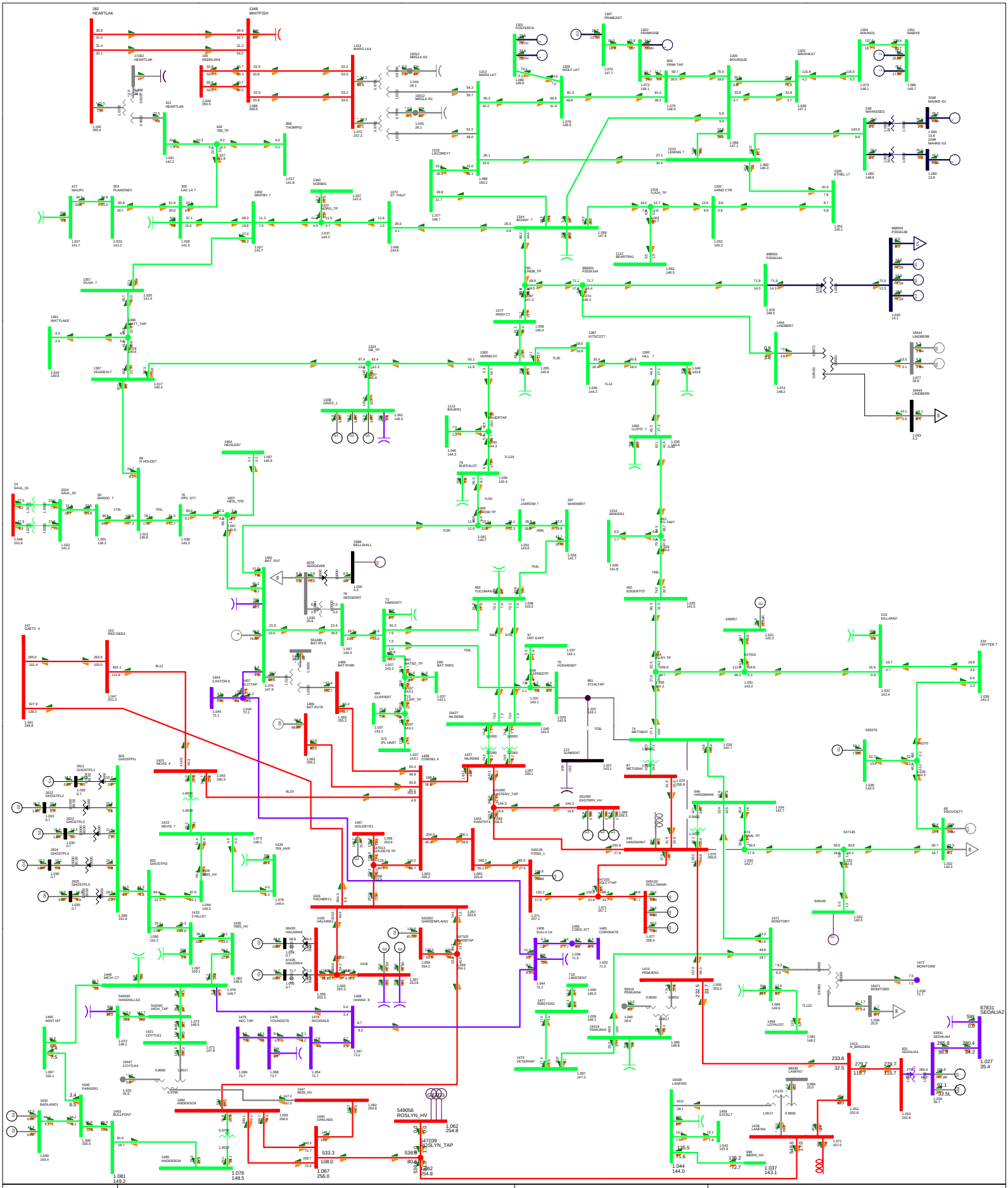
Attachment A3- 1	**Contingency** CONT 058: 679L (478S Tucuman - 574S Nilrem)	**Study Case Description** 2028SP POST-PROJ Base Case	**P2034 Cold Lake Area Cogen** Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A3- 1	Contingency	Study Case Description	P2034 Cold Lake Area Cogen
	CONT 059: 680L (478S Tucuman - 574S Nilrem)	2028SP POST-PROJ Base Case	Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A3- 1	**Contingency** CONT 060: 703L (377S Hardisty - 213S Hughenden - 329S Hrt Express)	**Study Case Description** 2028SP POST-PROJ Base Case	**P2034 Cold Lake Area Cogen** Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A3- 1

Contingency

CONT 061: 472L (213S Hughenden - 648S Metiskow - 221S Sunken Lake)

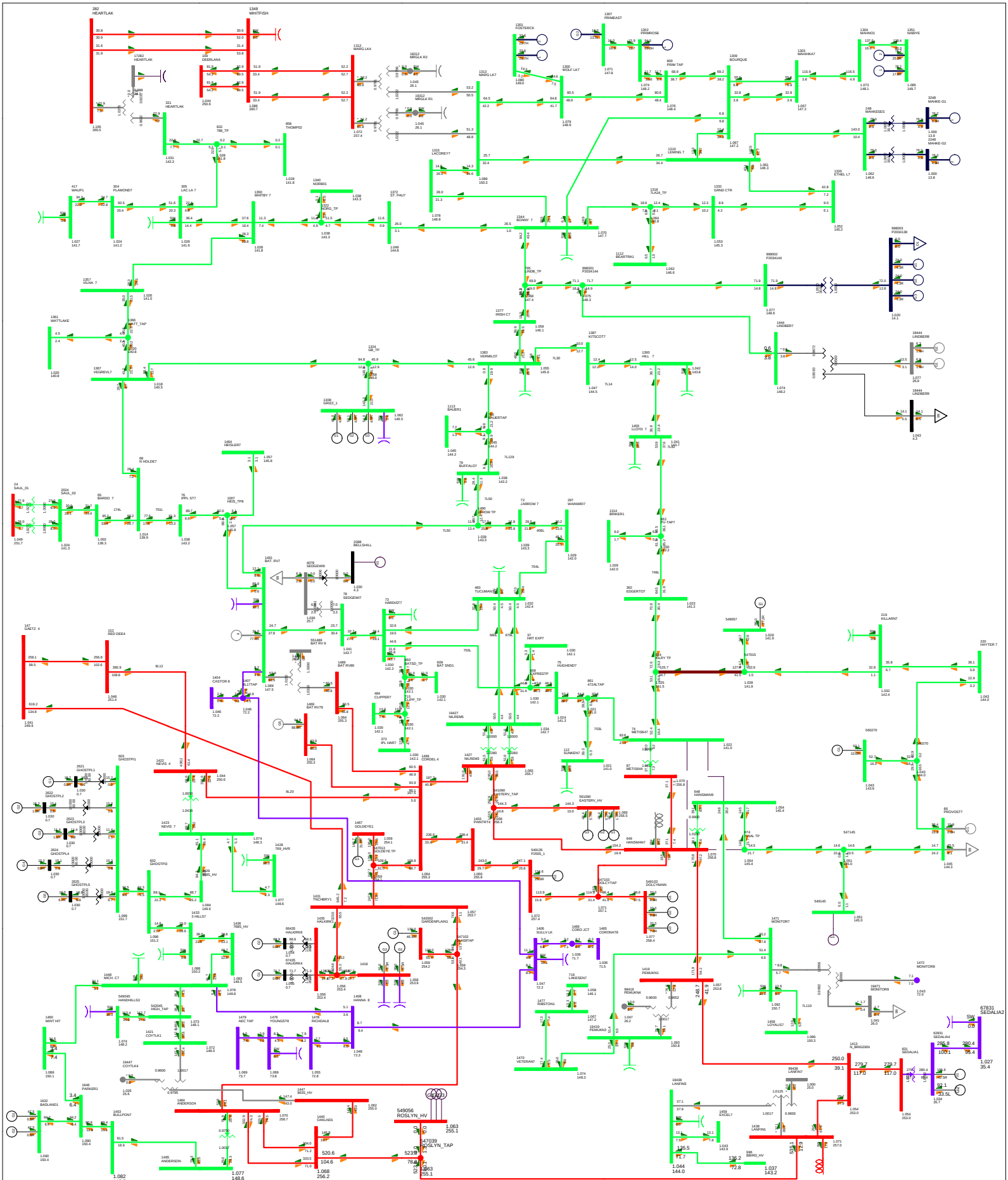
Study Case Description

2028SP POST-PROJ

Base Case

P2034 Cold Lake Area Cogen

Bus - VOLTAGE (kV/PU)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%RATEA
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A3- 1

Contingency

CONT 062: 885L (648S Metiskow - 650S Hansman Lake)

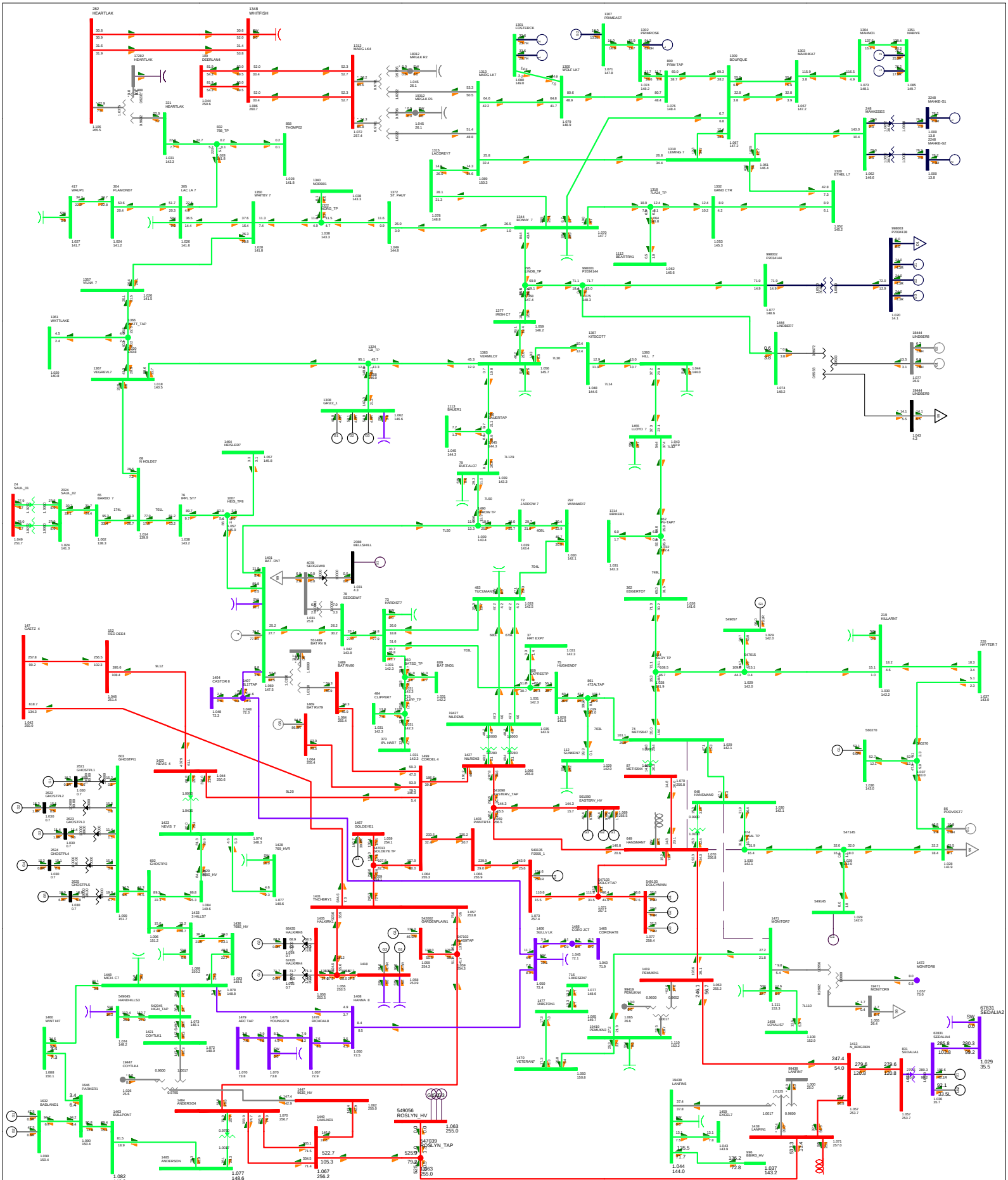
Study Case Description

2028SP POST-PROJ

Base Case

P2034 Cold Lake Area Cogen

Bus - VOLTAGE (kV/PU)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%RATEA
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A3- 1

Contingency

CONT 063: 7L224 (650S Hansman Lake - 774S Monitor)

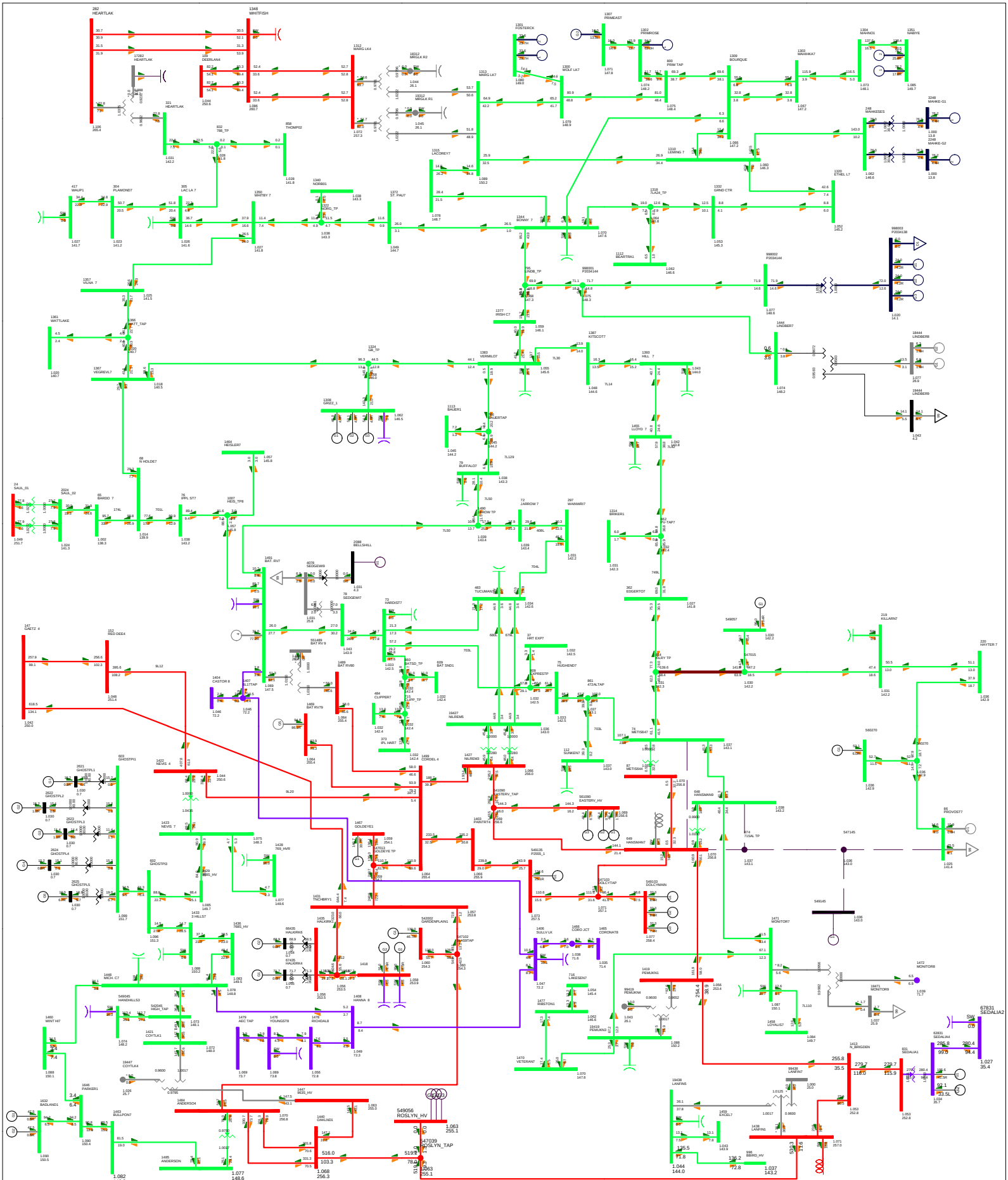
Study Case Description

2028SP POST-PROJ

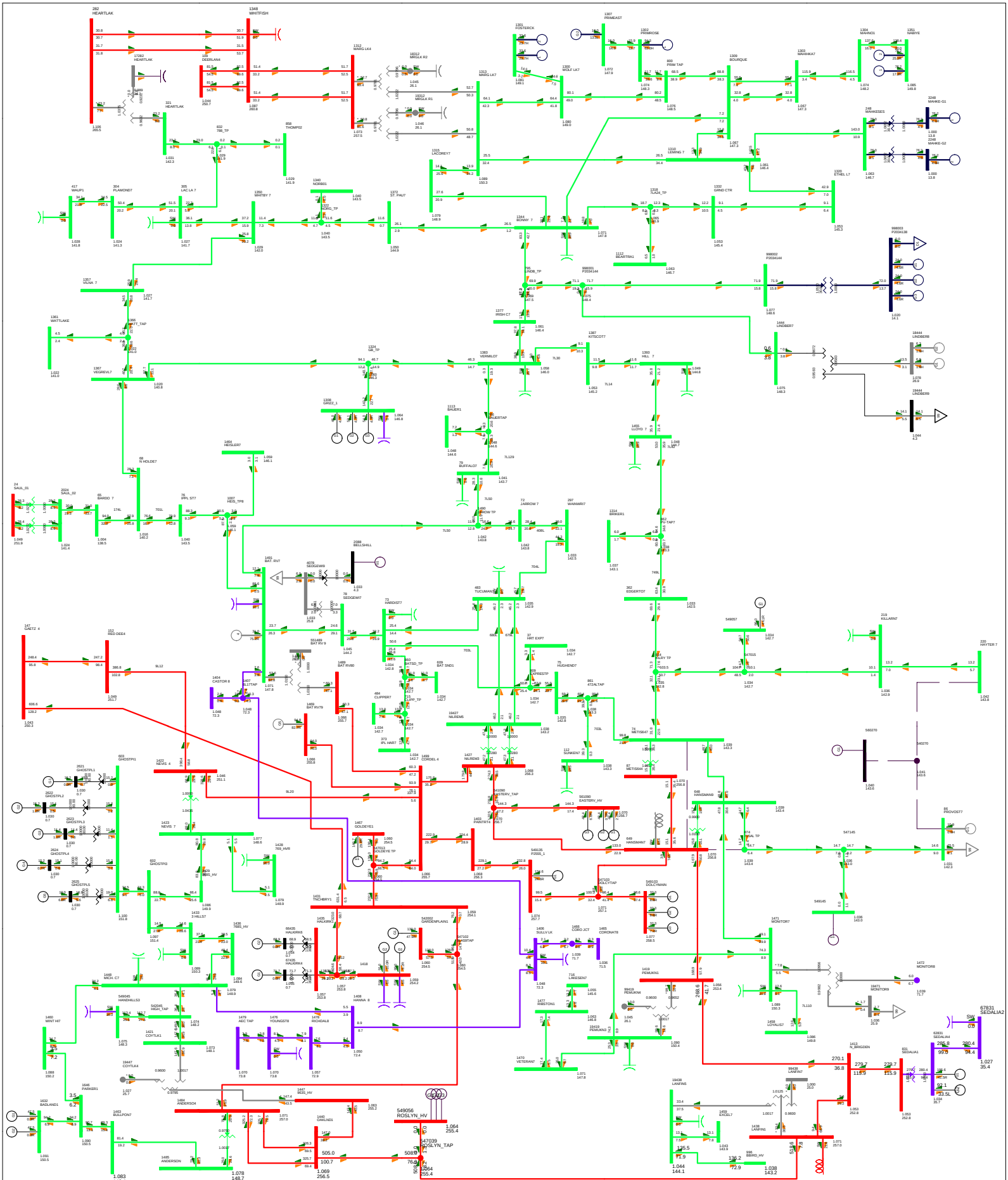
Base Case

P2034 Cold Lake Area Cogen

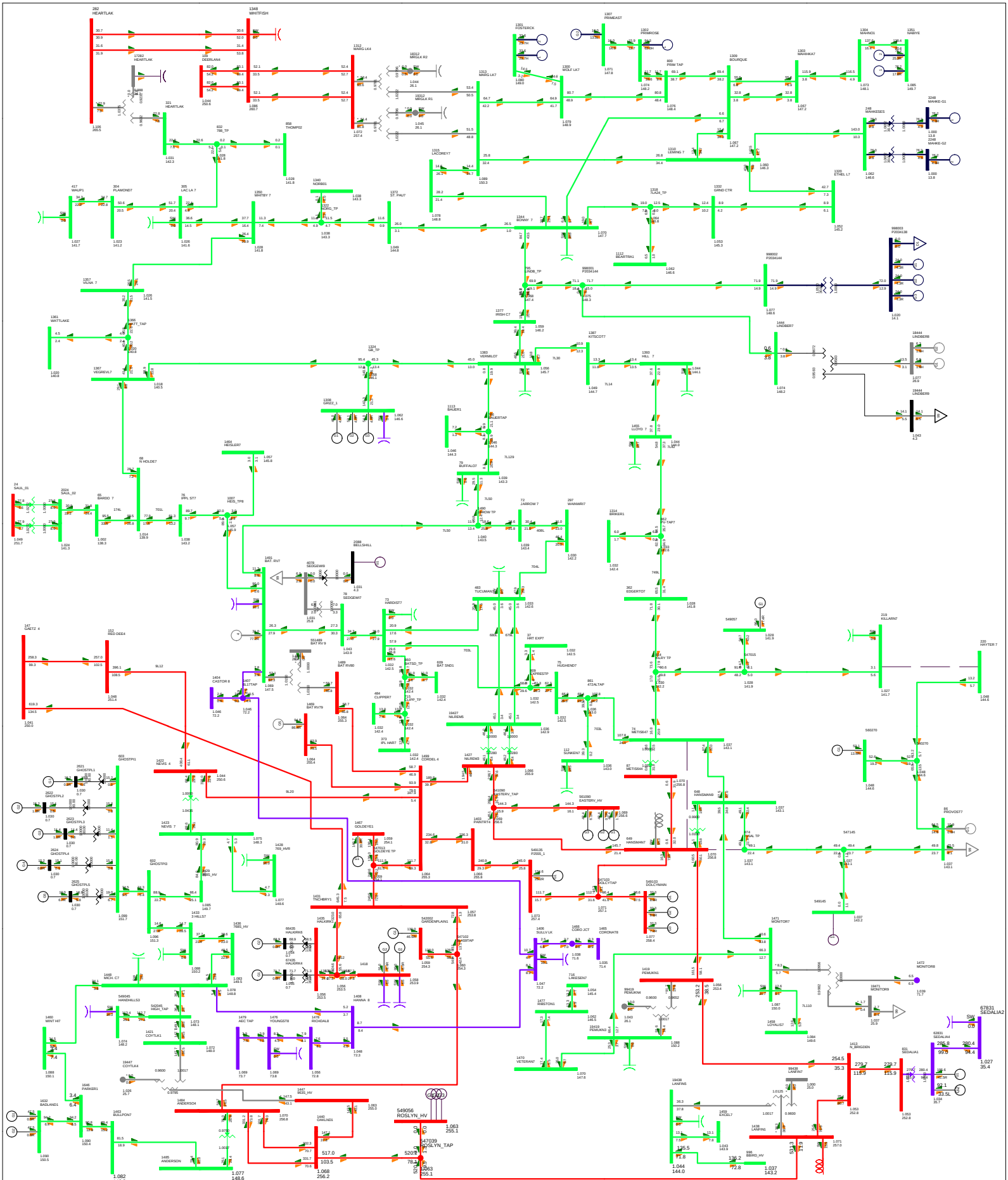
Bus - VOLTAGE (kV/PU)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%RATEA
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



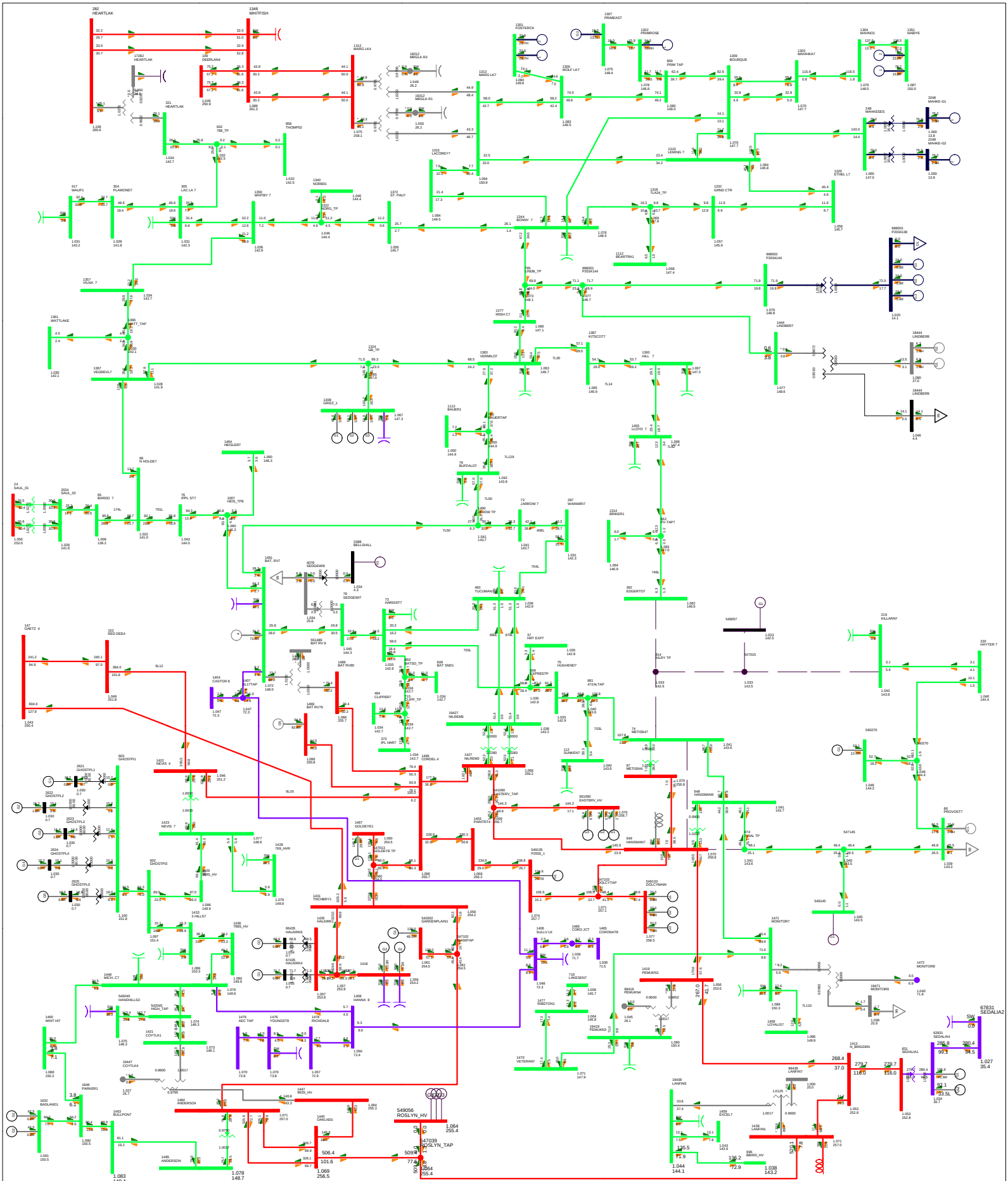
Attachment A3- 1	**Contingency** CONT 064: 715L (650S Hansman Lake - P2540 Cache Rising Sun - 545S Provost)	**Study Case Description** 2028SP POST-PROJ Base Case	**P2034 Cold Lake Area Cogen** Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



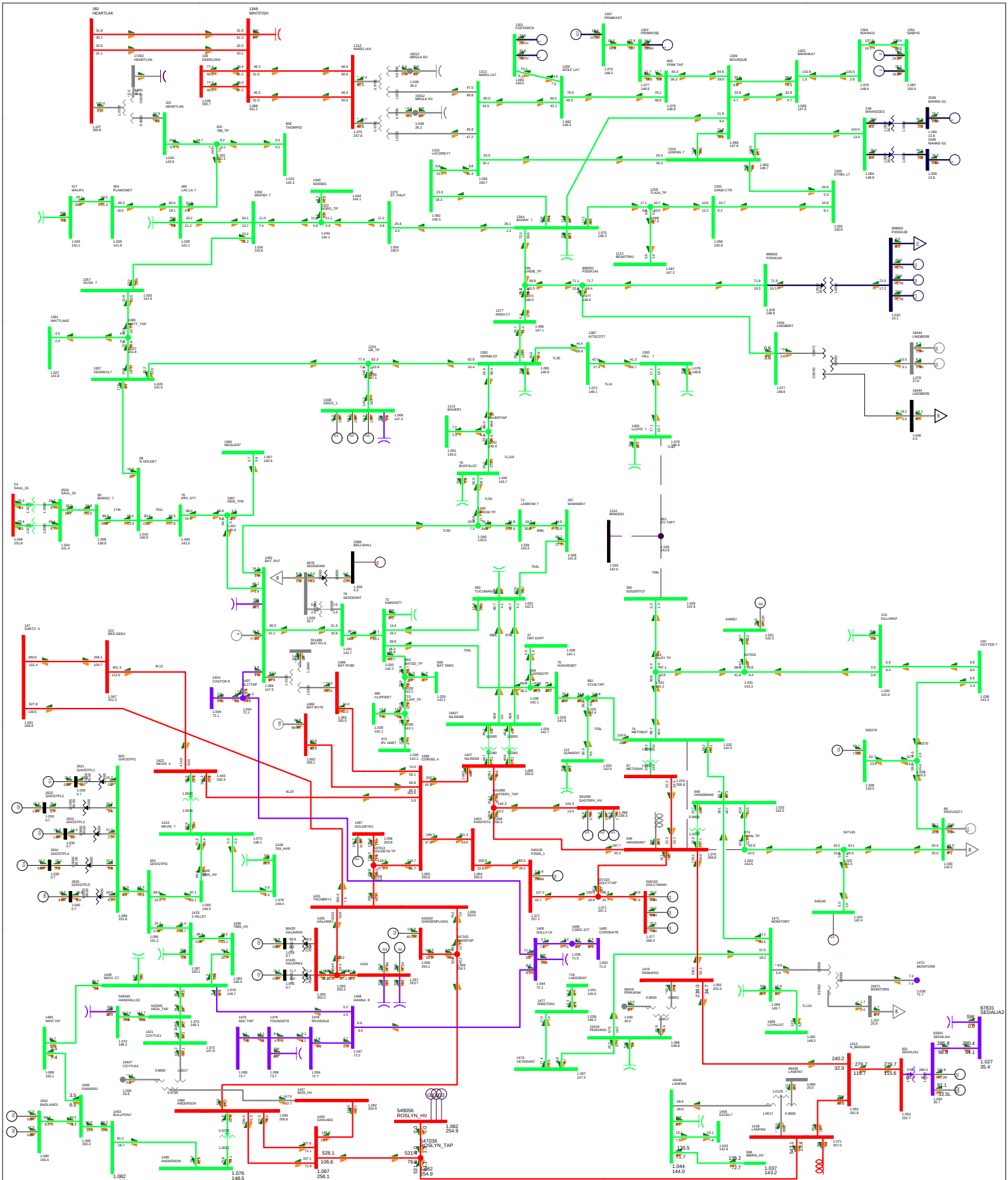
Attachment A3- 1	Contingency	Study Case Description	P2034 Cold Lake Area Cogen
	CONT 065: 398L (545S Provost - P2573 Prairie Yarrow - 277S Hayter)	2028SP POST-PROJ Base Case	Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



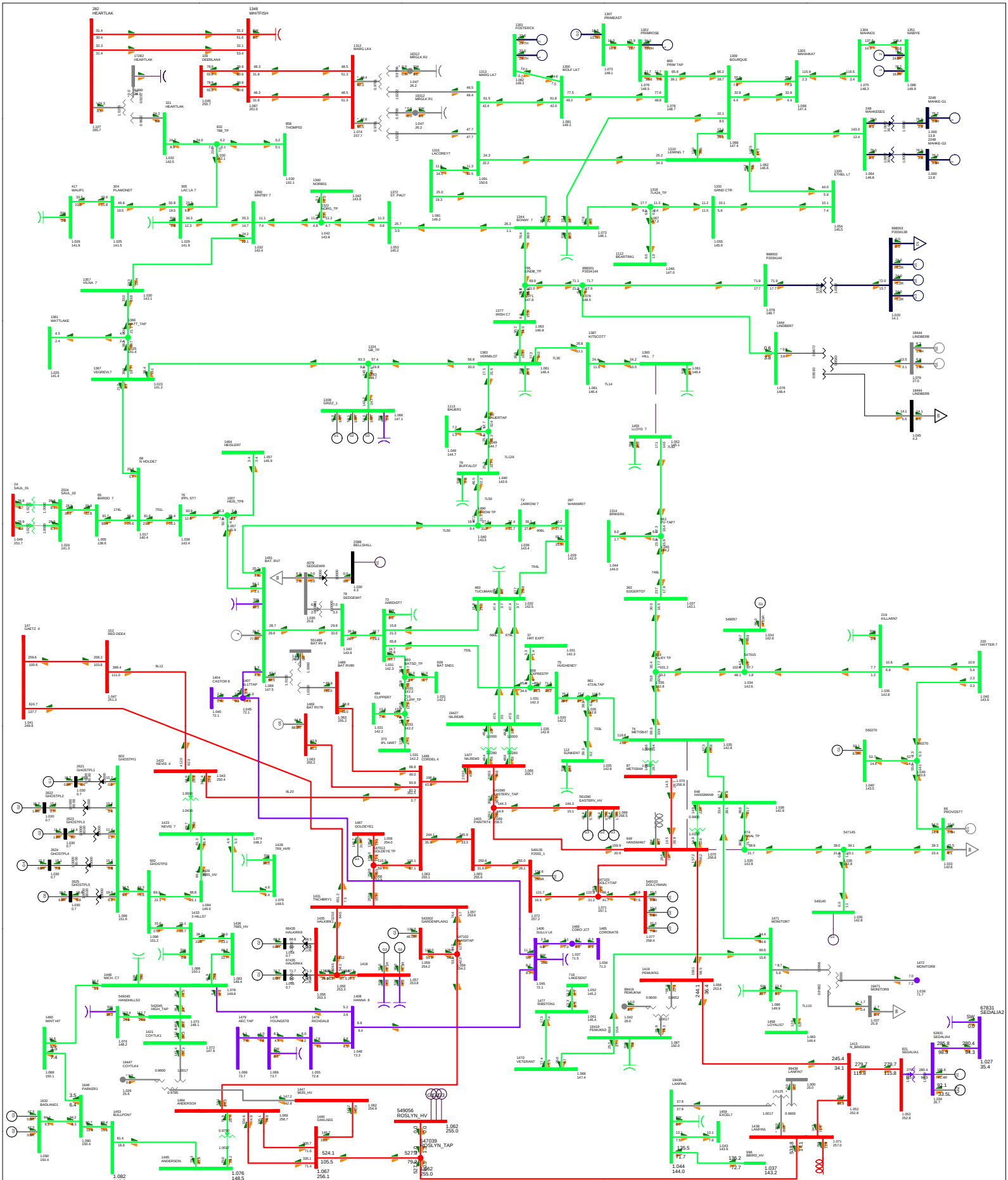
Attachment A3- 1	Contingency	Study Case Description	P2034 Cold Lake Area Cogen
	CONT 066: 748L (267S Killarney Lake - 277S Hayter)	2028SP POST-PROJ Base Case	Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



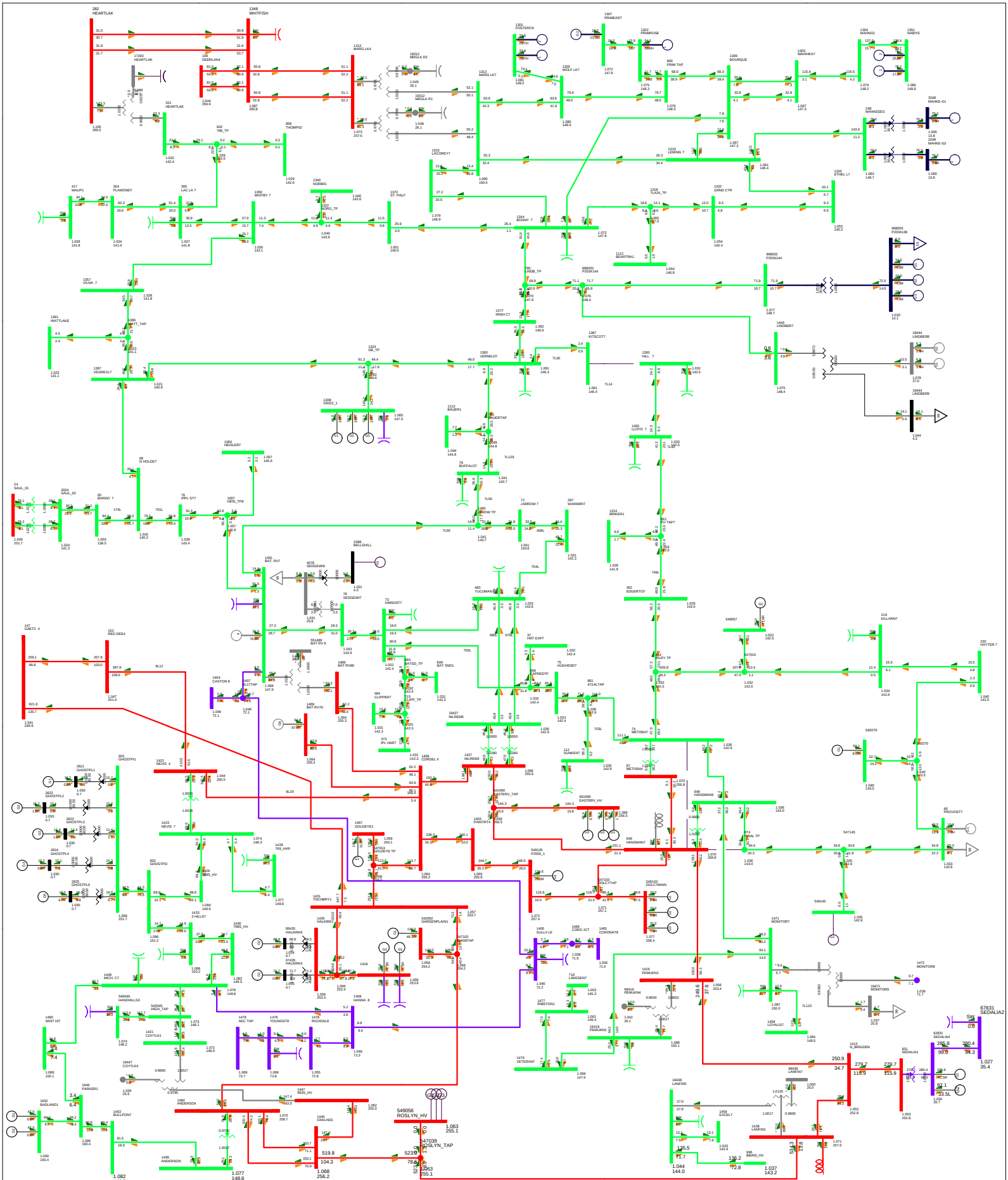
Attachment A3- 1	**Contingency** CONT 067: 749L (648S Metiskow - 267S Killarney Lake - P2460 Fox Meadows Wind - 899S Edgerton	**Study Case Description** POST-PROJ Base Case	**P2034 Cold Lake Area Cogen** Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



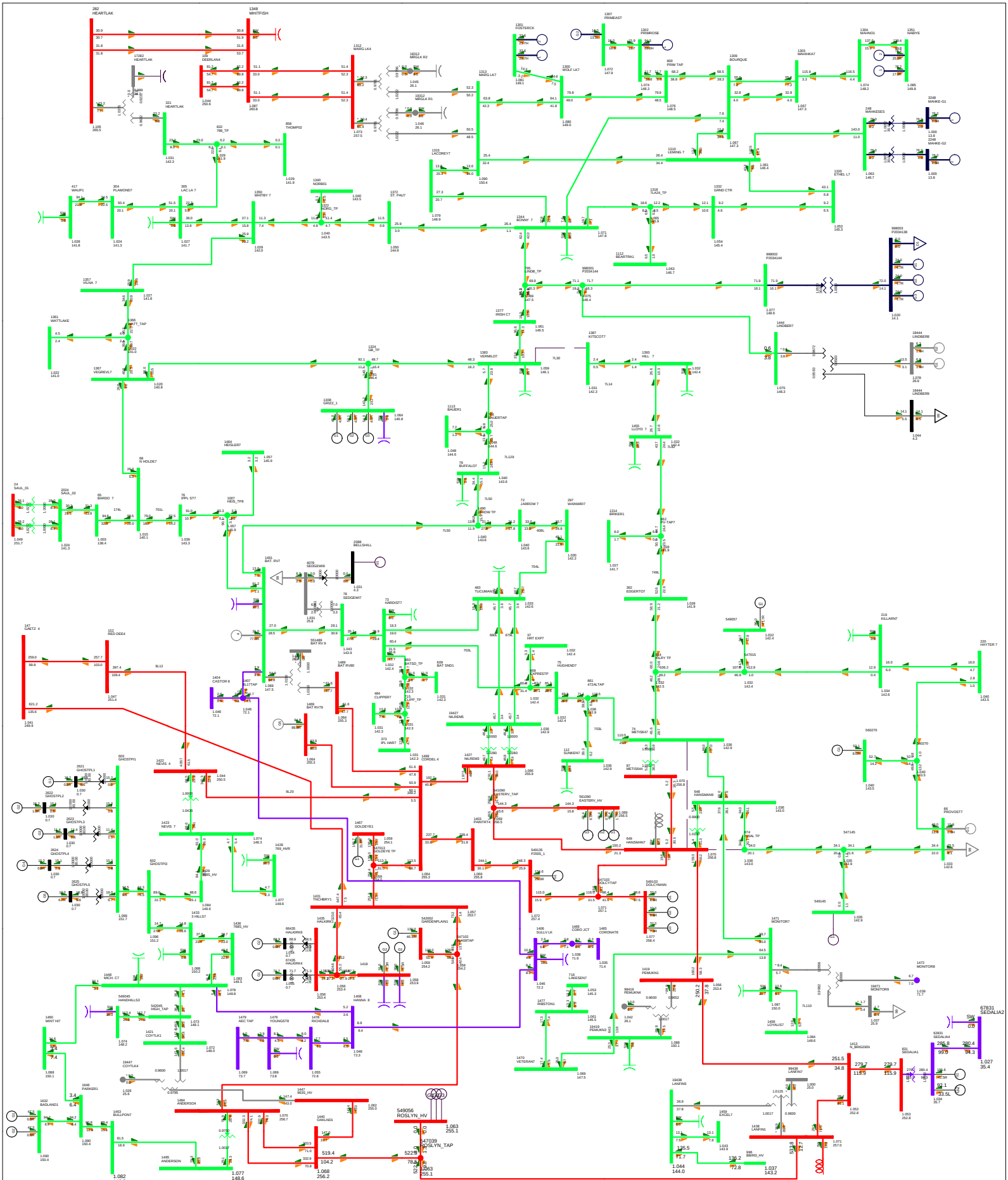
Attachment A3- 1	**Contingency** CONT 068: 7L749 (899S Edgerton - 716S Lloydminster - 880S Briker)	**Study Case Description** 2028SP POST-PROJ Base Case	**P2034 Cold Lake Area Cogen** Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



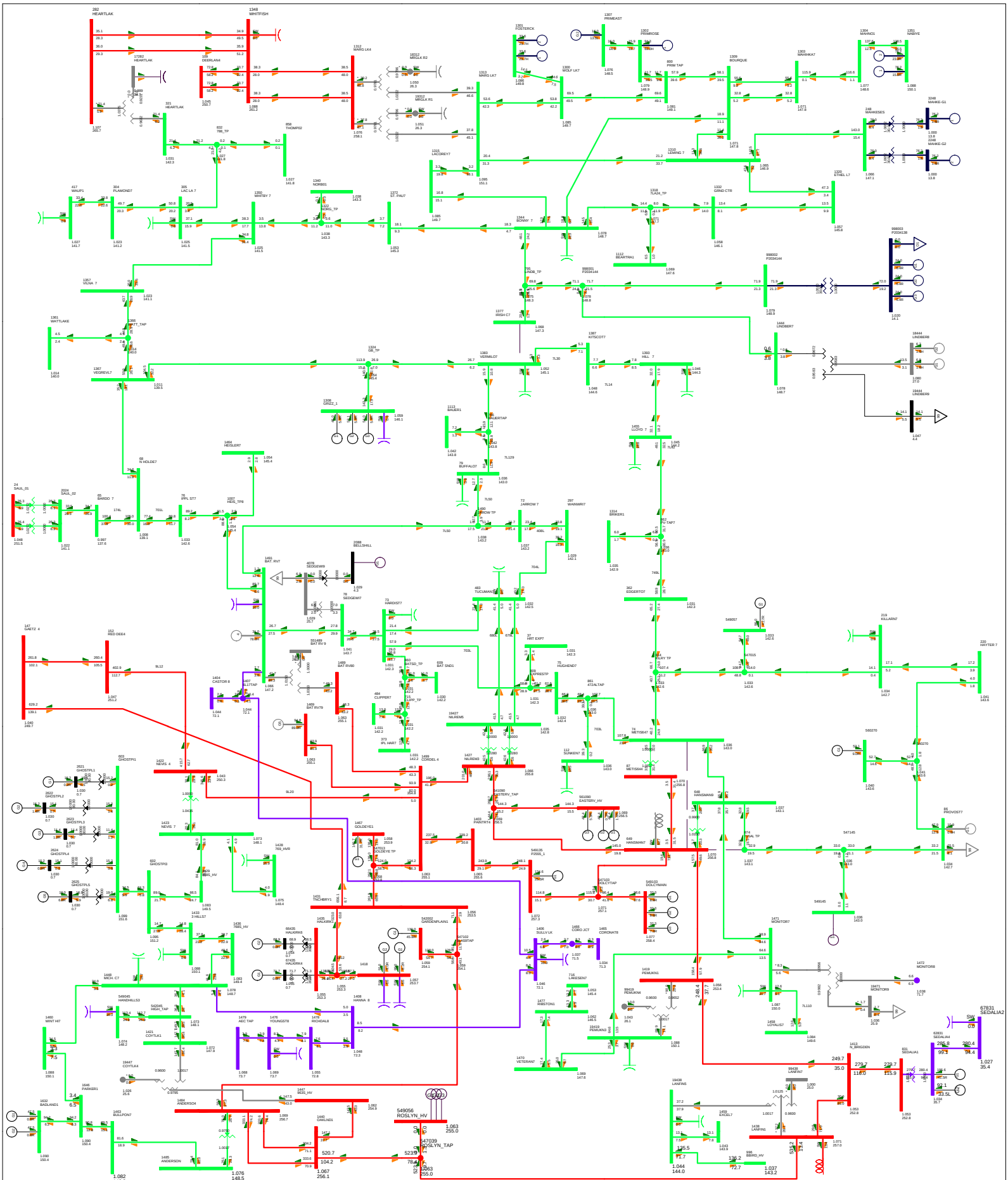
Attachment A3- 1	Contingency	Study Case Description	P2034 Cold Lake Area Cogen
	CONT 069: 7L42 (751S Hill - 716S Lloydminster)	2028SP POST-PROJ Base Case	Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



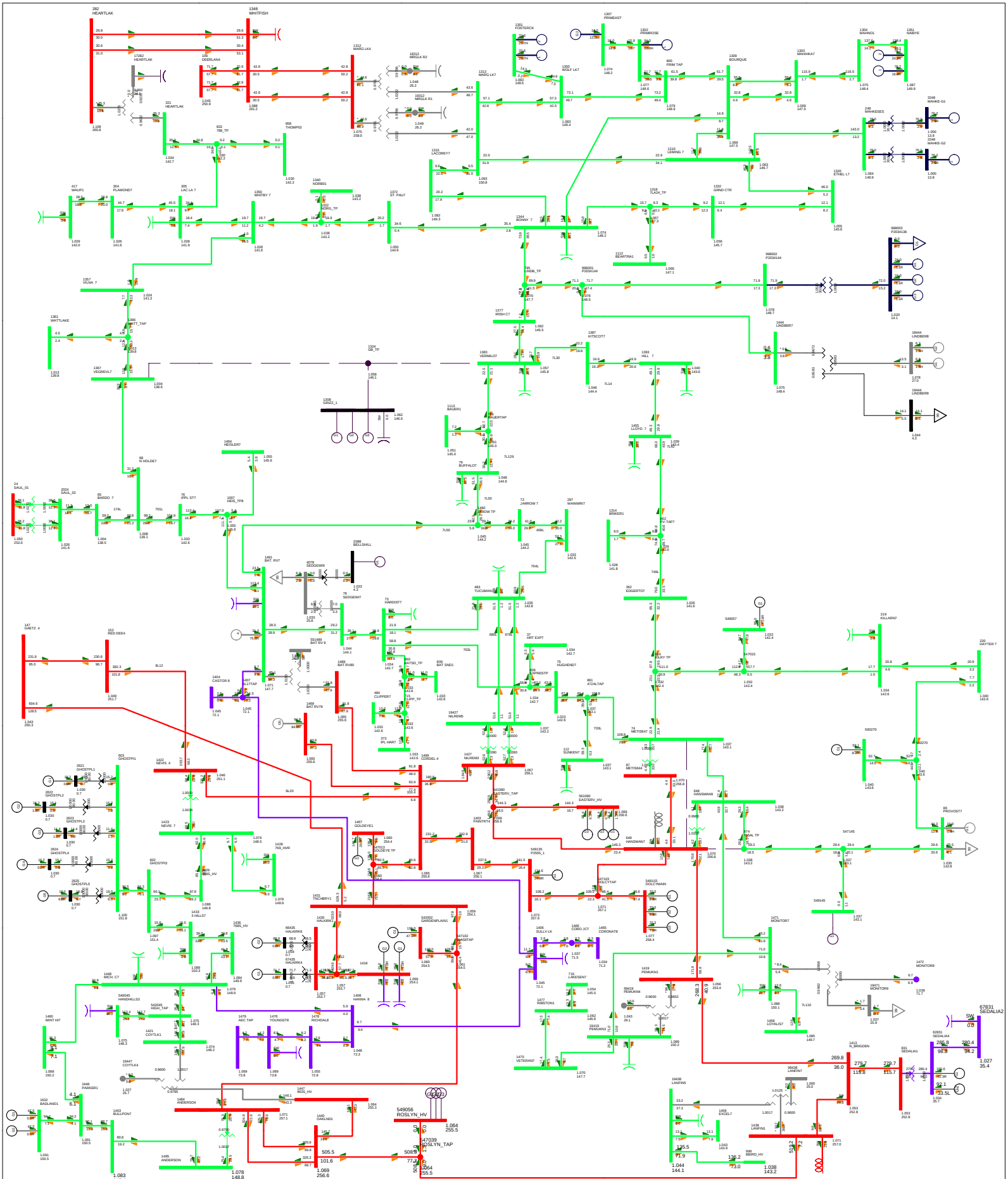
Attachment A3- 1	Contingency	Study Case Description	P2034 Cold Lake Area Cogen
	CONT 070: 7L14 (705S Kitscoty - 751S Hill)	2028SP POST-PROJ Base Case	Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



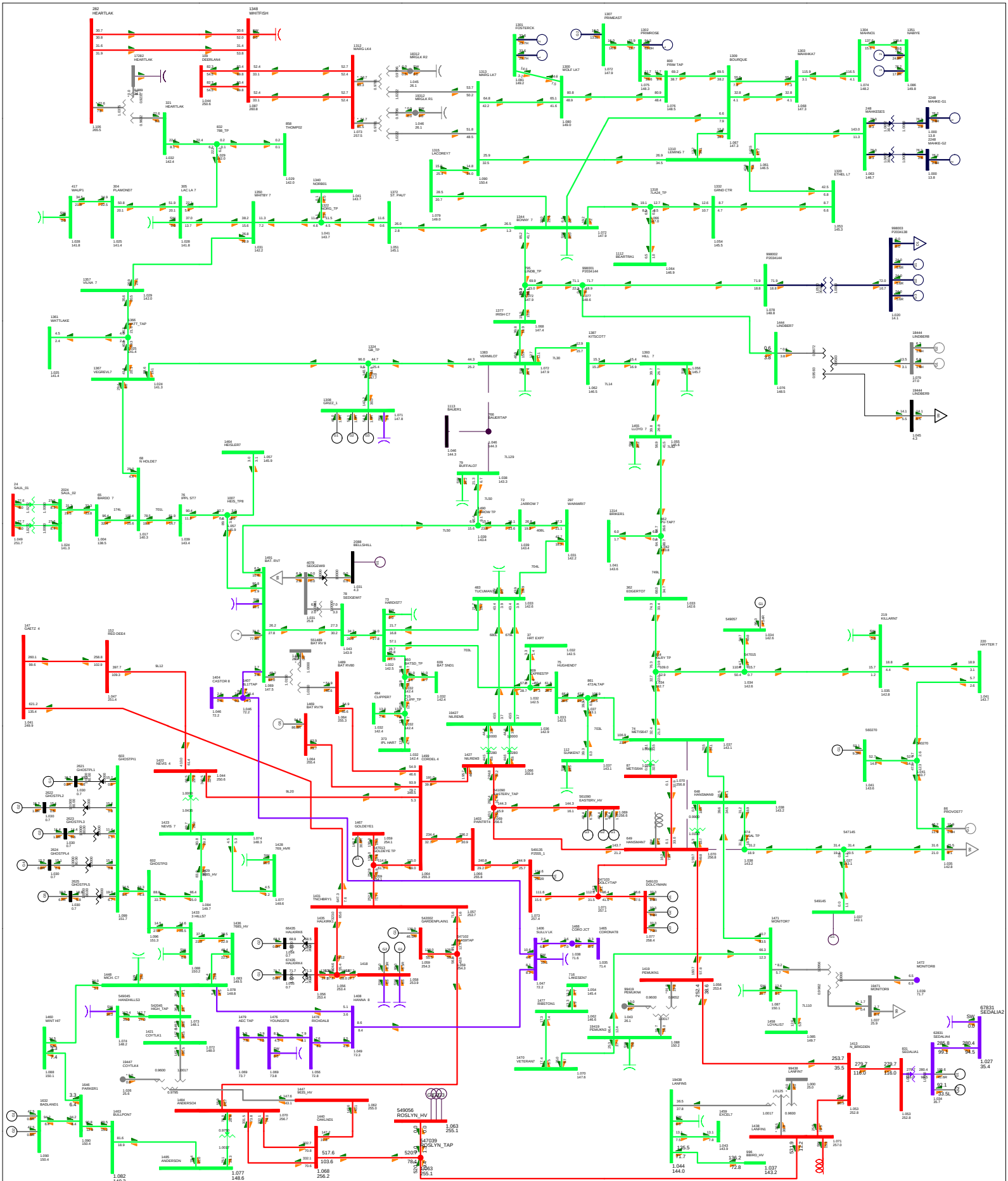
Attachment A3- 1	**Contingency** CONT 071: 7L130 (710S Vermilion - 705S Kitscoty)	**Study Case Description** 2028SP POST-PROJ Base Case	**P2034 Cold Lake Area Cogen** Bus - VOLTAGE (kv/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



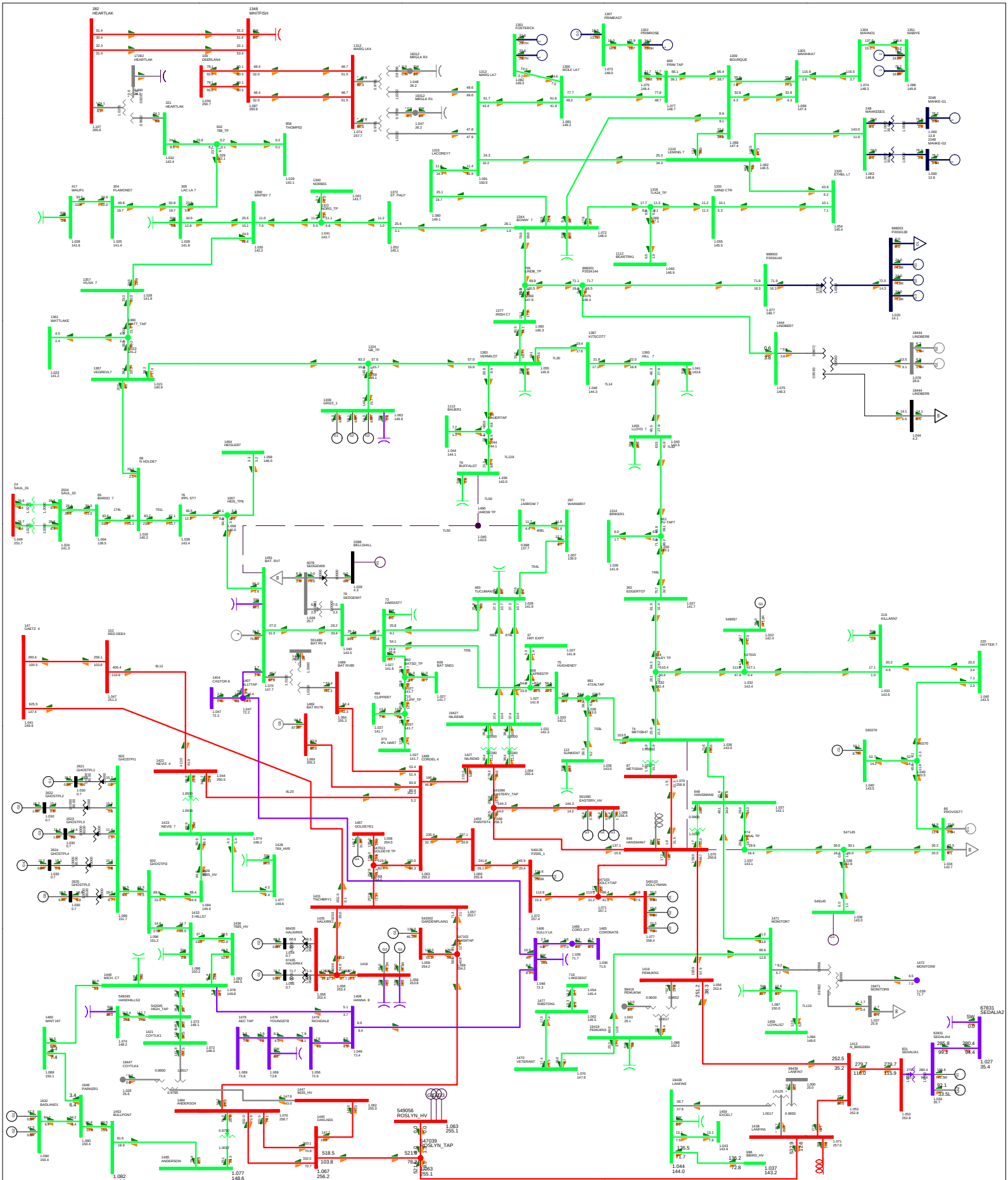
Attachment A3- 1	**Contingency** CONT 072: 7L117 (706S Irish Creek - 710S Vermilion)	**Study Case Description** 2028SP POST-PROJ Base Case	**P2034 Cold Lake Area Cogen** Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A3- 1	**Contingency** CONT 073: 7L65 (709S Vegreville - 710S Vermilion - 708S Grizzly Bear)	**Study Case Description** 2028SP POST-PROJ Base Case	**P2034 Cold Lake Area Cogen** Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A3- 1	**Contingency** CONT 074: 7L129 (710S Vermilion - 918S Bauer - 526S Buffalo Creek)	**Study Case Description** 2028SP POST-PROJ Base Case	**P2034 Cold Lake Area Cogen** Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A3- 1

Contingency

CONT 075: 7L50 (526S Buffalo Creek - 757S Battle River - 252S Jarrow)

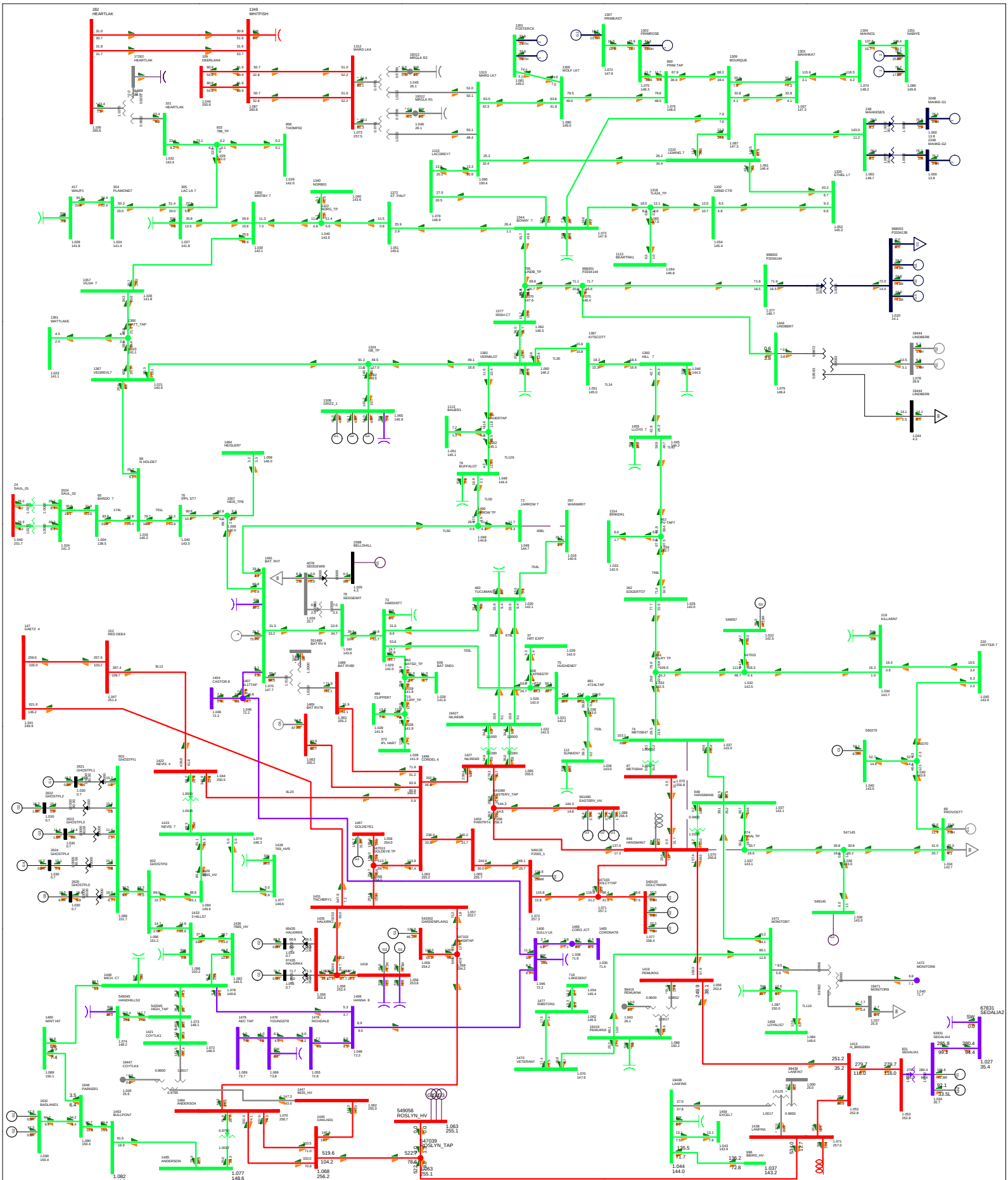
Study Case Description

2028SP POST-PROJ

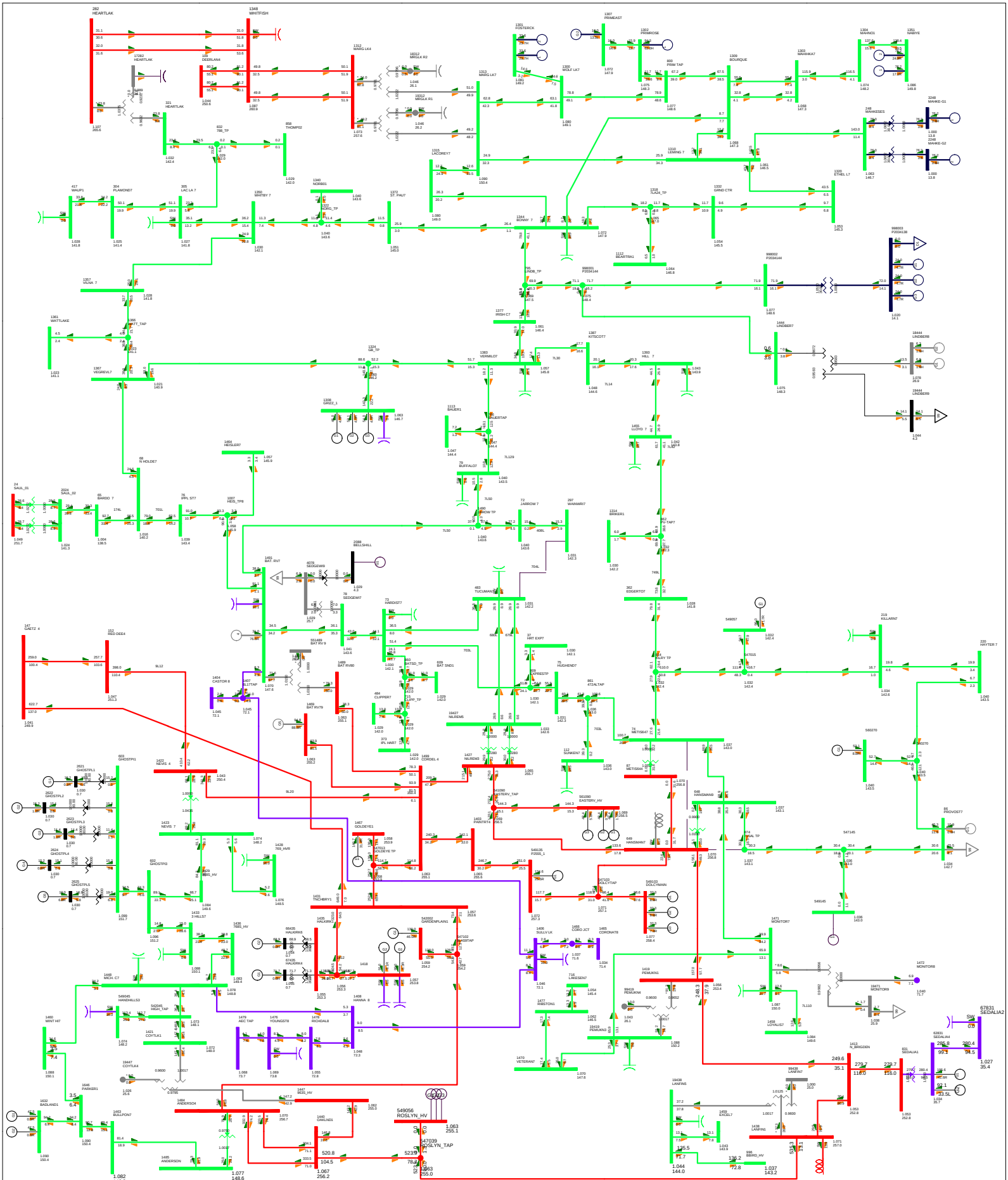
Base Case

P2034 Cold Lake Area Cogen

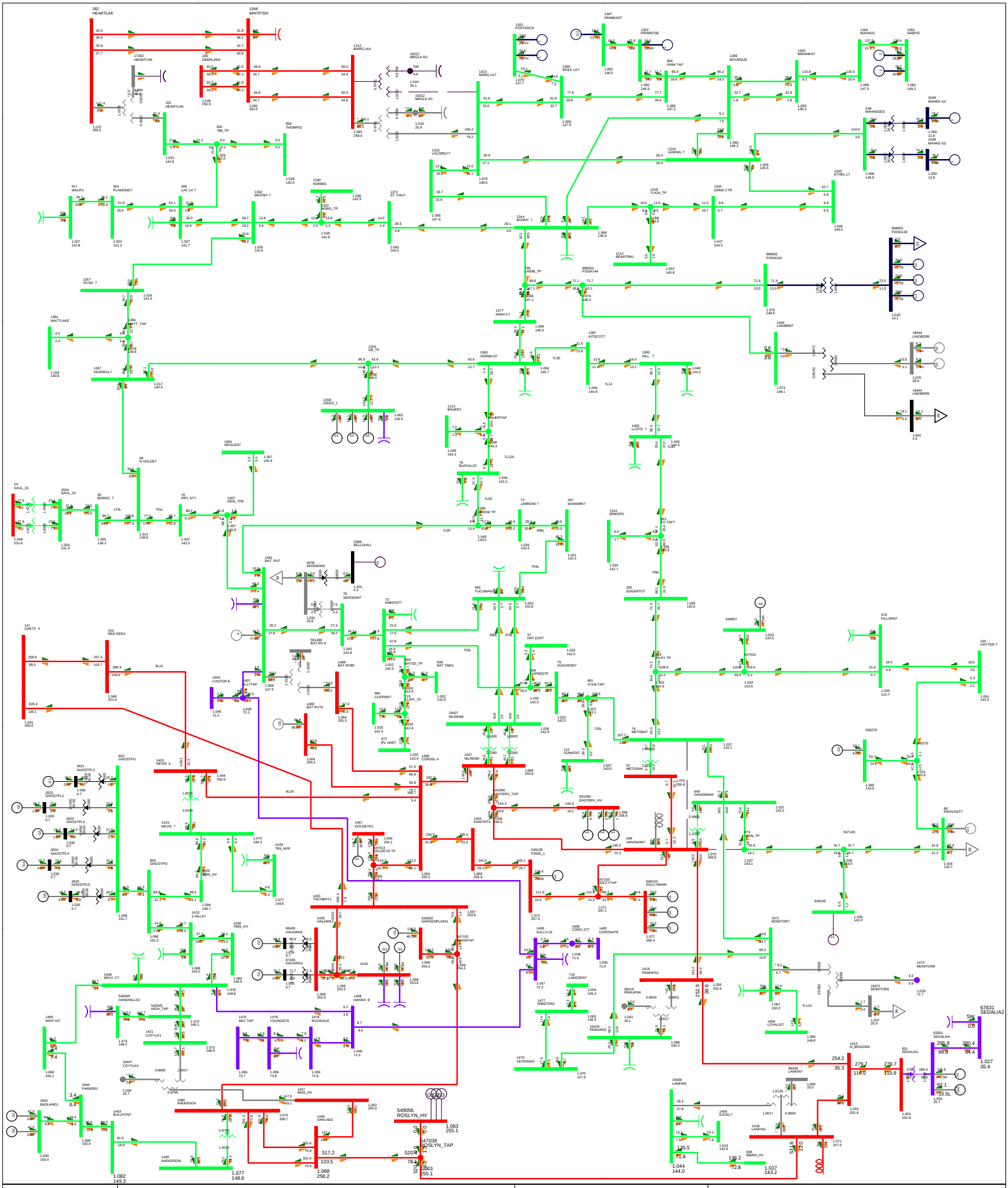
Bus - VOLTAGE (kV/PU)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%RATEA
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



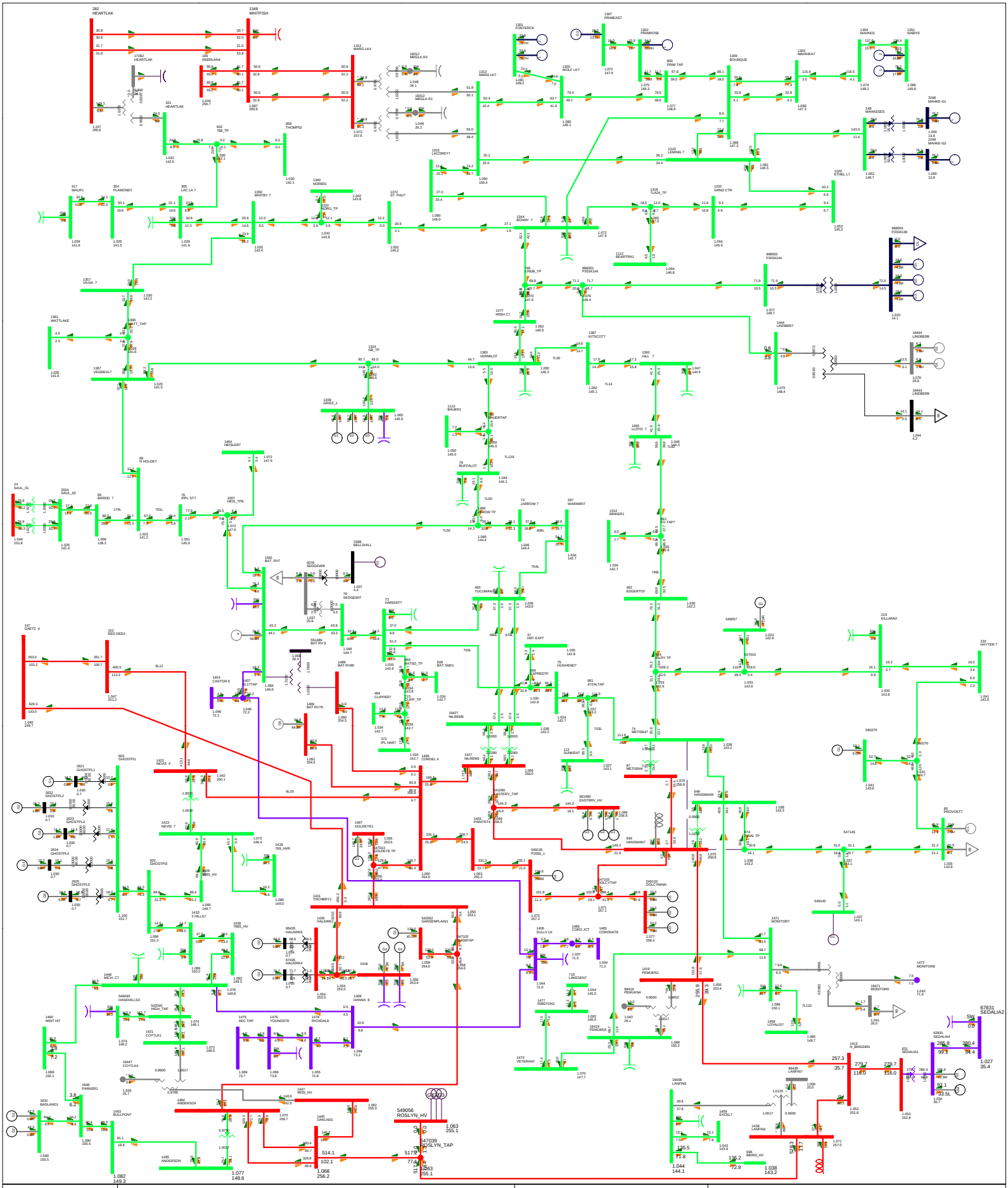
Attachment A3- 1	**Contingency** CONT 076: 408L (252S Jarrow - 51S Wainwright)	**Study Case Description** 2028SP POST-PROJ Base Case	**P2034 Cold Lake Area Cogen** Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



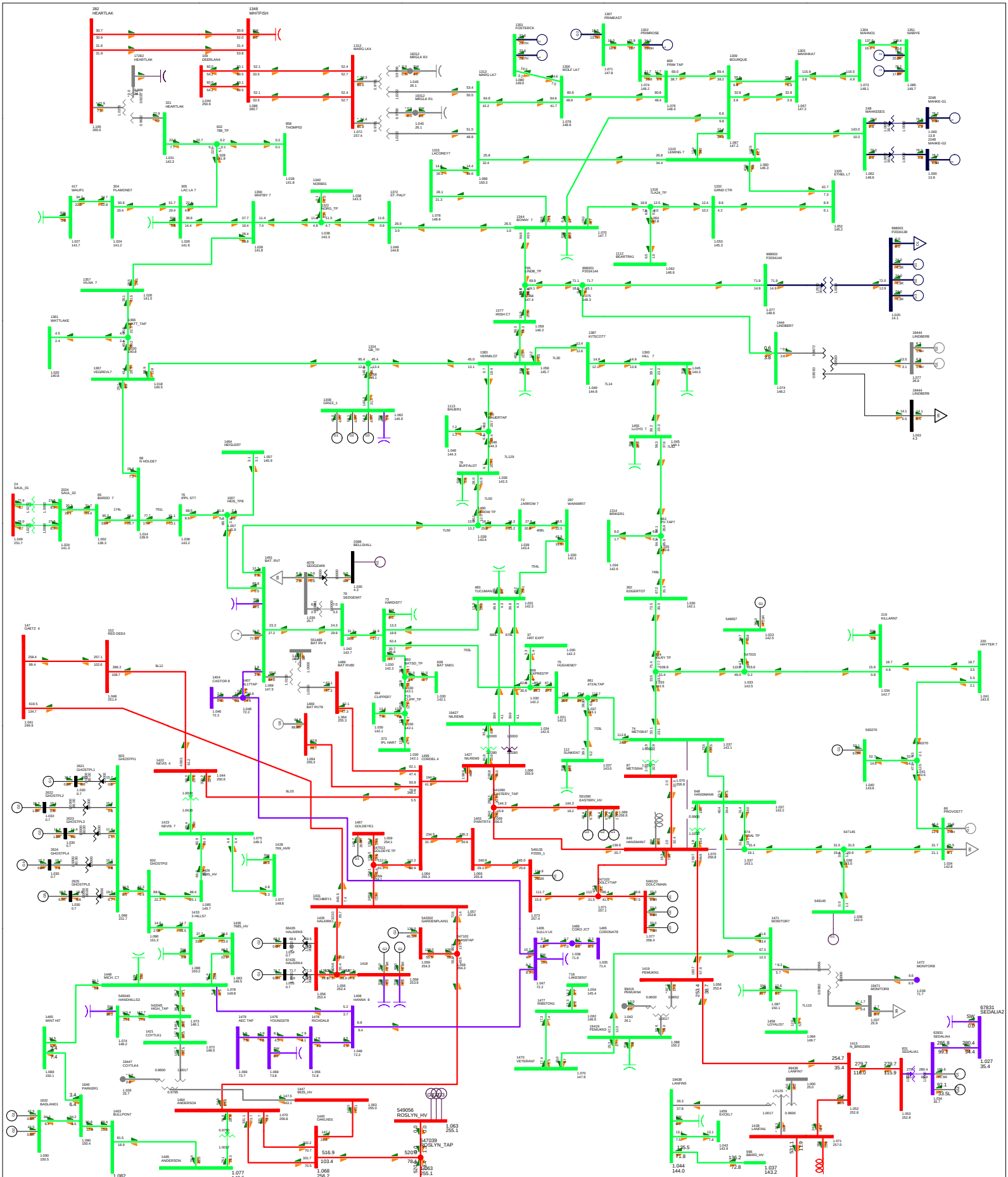
Attachment A3- 1	Contingency	Study Case Description	P2034 Cold Lake Area Cogen
	CONT 077: 704L (51S Wainwright - 478S Tucuman)	2028SP POST-PROJ Base Case	Bus - VOLTAGE (kV/PU) Branch - MW/MVar Equipment - MW/MVar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



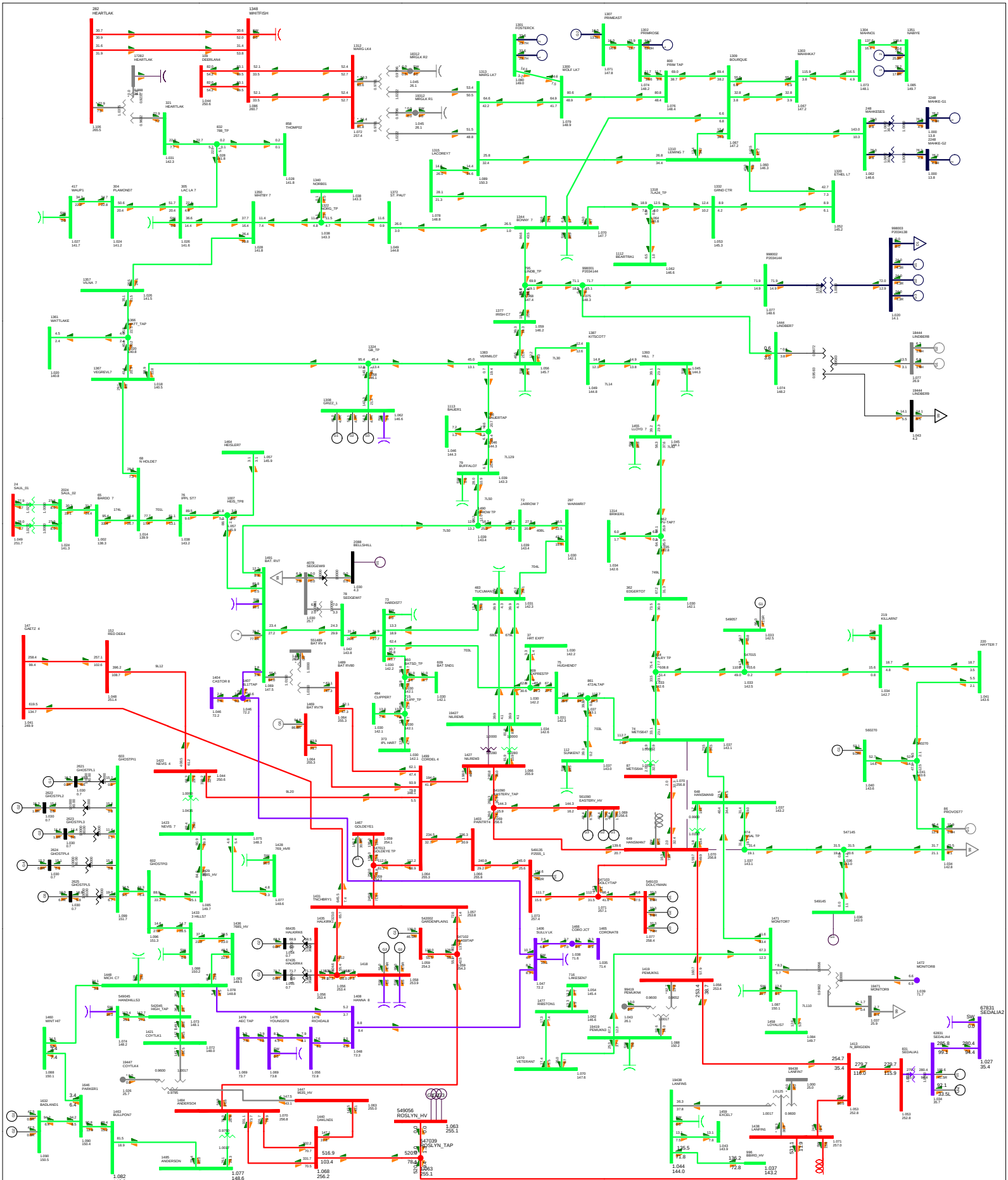
Attachment A3- 1	Contingency	Study Case Description	P2034 Cold Lake Area Cogen
	CONT 078: Marguerite Lake 2T	2028SP POST-PROJ Base Case	Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



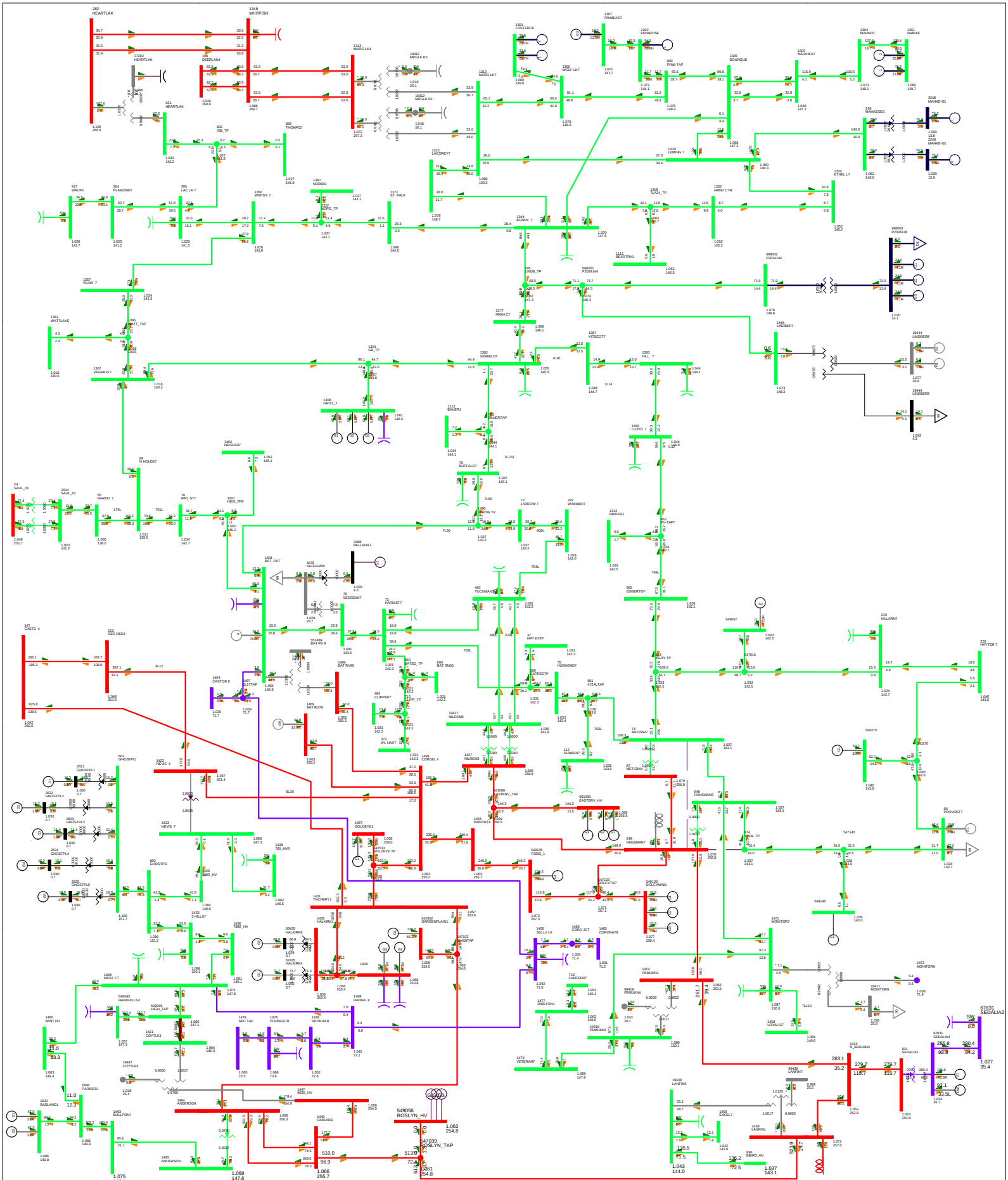
Attachment A3- 1	Contingency	Study Case Description	P2034 Cold Lake Area Cogen
	CONT 079: Battle River T2	2028SP POST-PROJ Base Case	Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



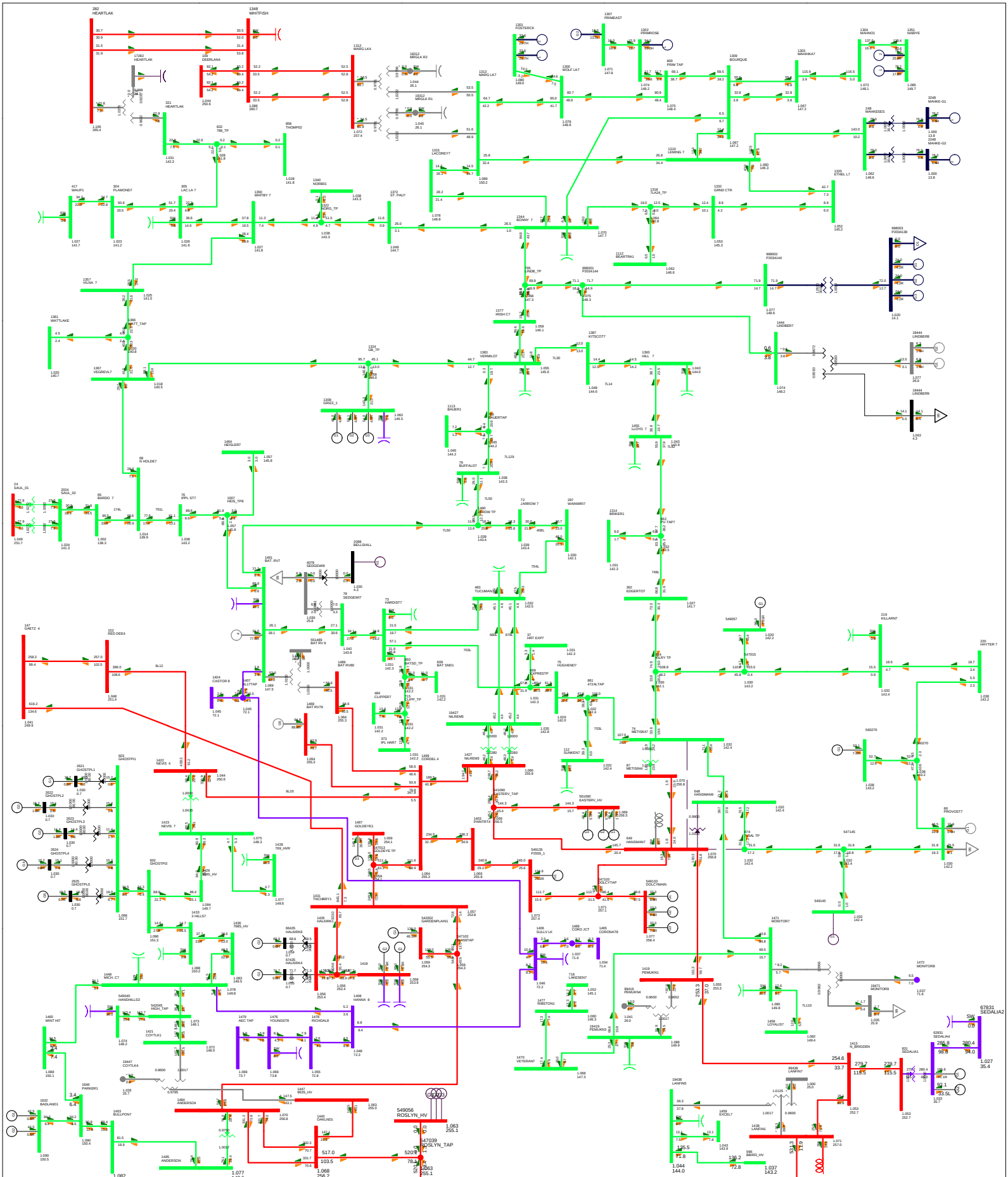
Attachment A3- 1	Contingency	Study Case Description	P2034 Cold Lake Area Cogen
	CONT 080: 574S Nilrem 162.2TR	2028SP POST-PROJ Base Case	Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



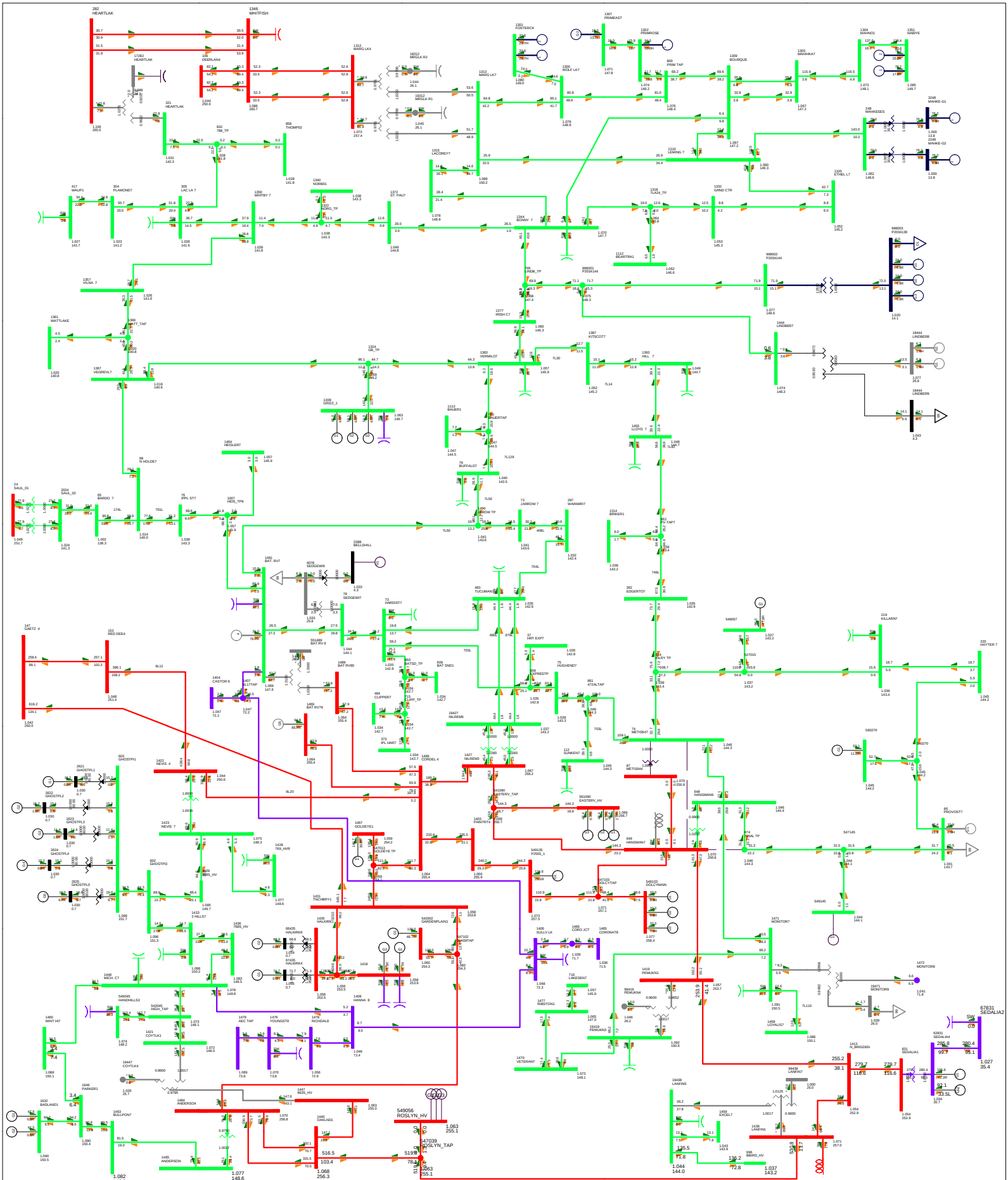
Attachment A3- 1	Contingency	Study Case Description	P2034 Cold Lake Area Cogen
	CONT 081: 574S Nilrem 87ST1	2028SP POST-PROJ Base Case	Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A3- 1	**Contingency** CONT 082: 766S Nevis 162.1TR	**Study Case Description** 2028SP POST-PROJ Base Case	**P2034 Cold Lake Area Cogen** Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A3- 1	**Contingency** CONT 083: 650S Hansman Lake 63ST1	**Study Case Description** 2028SP POST-PROJ Base Case	**P2034 Cold Lake Area Cogen** Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A3- 1

Contingency

CONT 084: 648S Metiskow T3

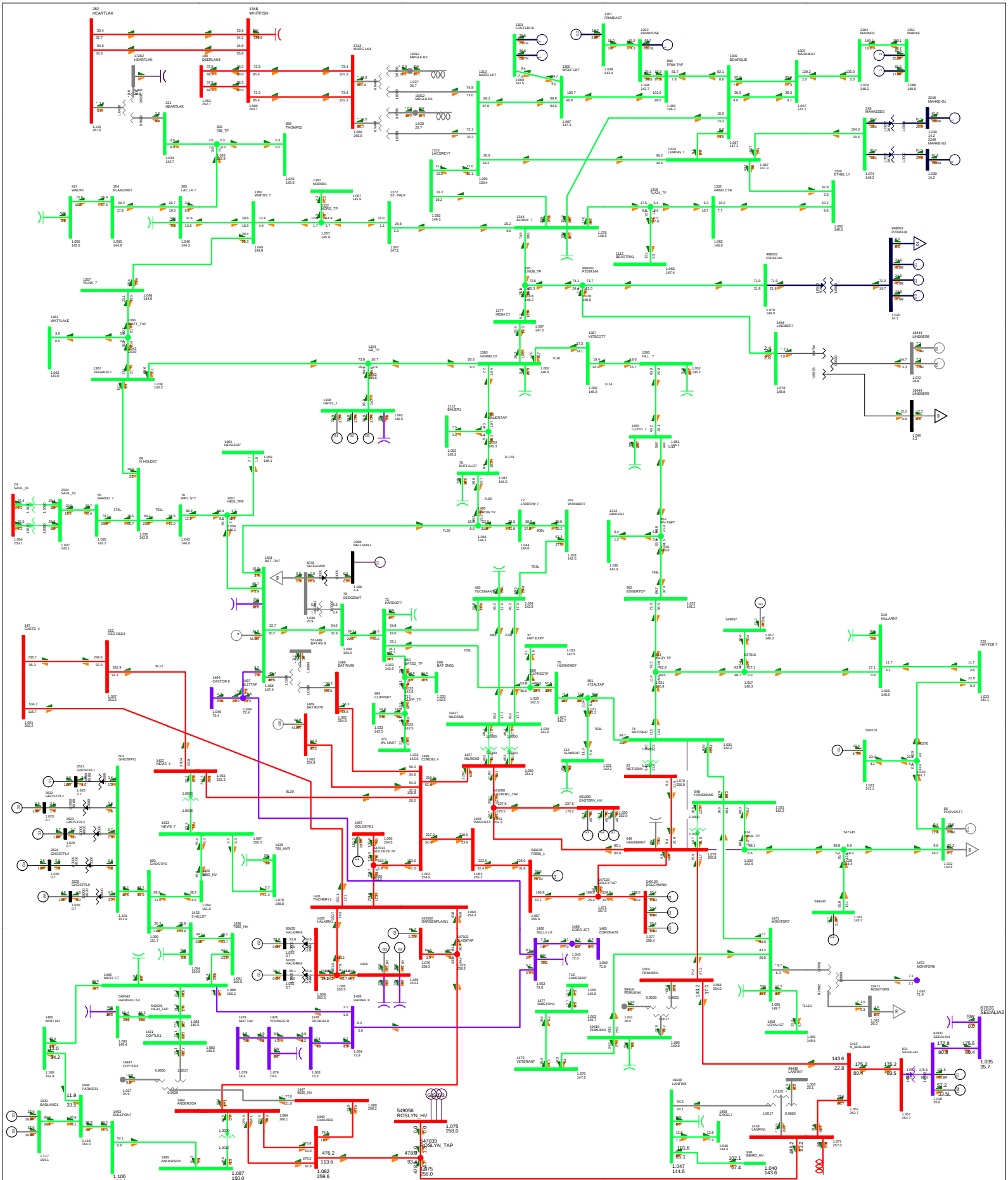
Study Case Description

2028SP POST-PROJ

Base Case

P2034 Cold Lake Area Cogen

Bus - VOLTAGE (kV/PU)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%RATEA
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A3- 2

Contingency

CONT 000: All elements in service

Study Case Description

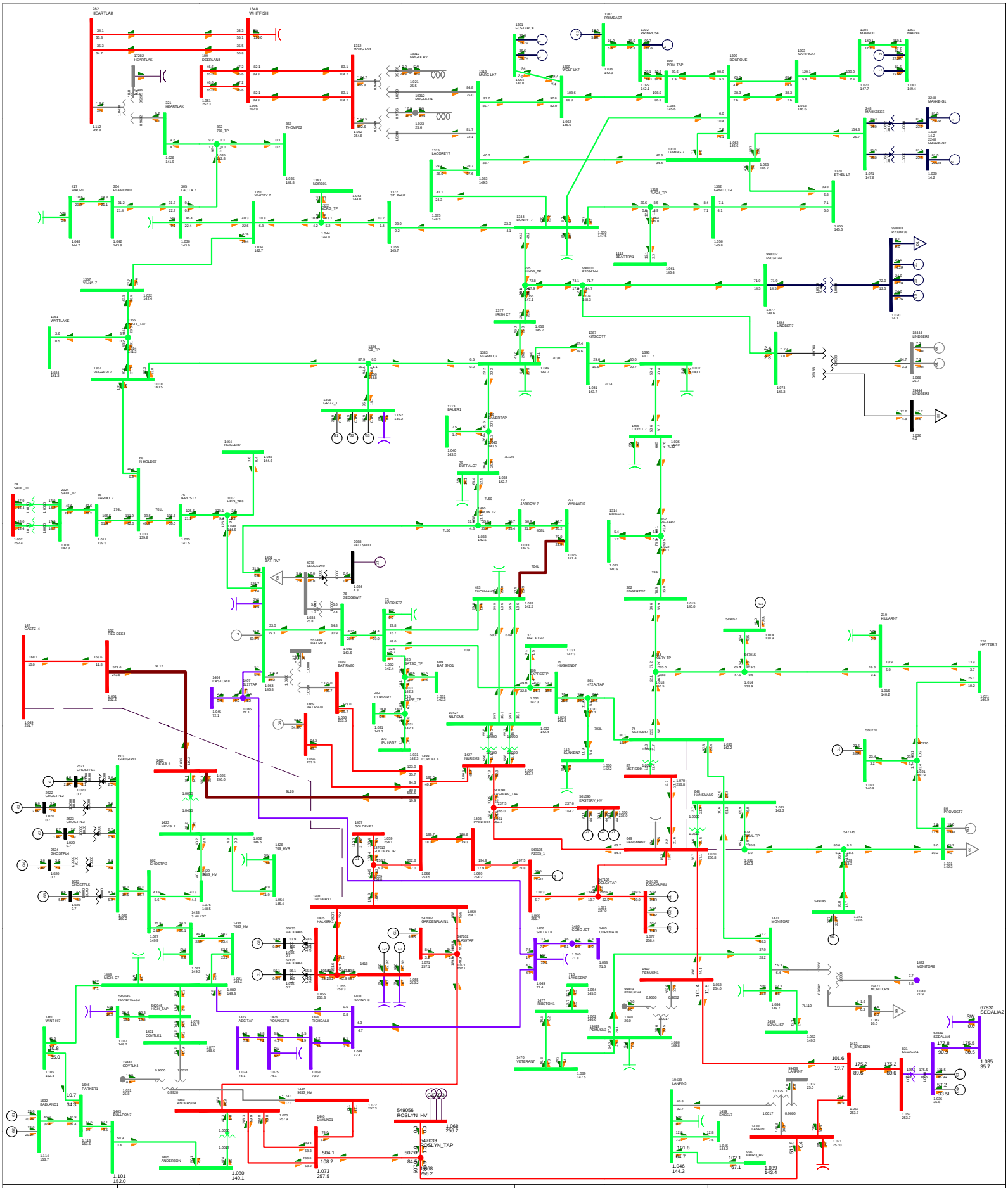
2028SL POST-PROJ

Base Case

P2034 Cold Lake Area Cogen

Bus - VOLTAGE (kV/PU)
Branch - MW/MVar
Equipment - MW/MVar

100.0%RATEA
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A3- 2

Contingency

CONT 001: CETO (87S Gaetz - 972S Tinchebray)

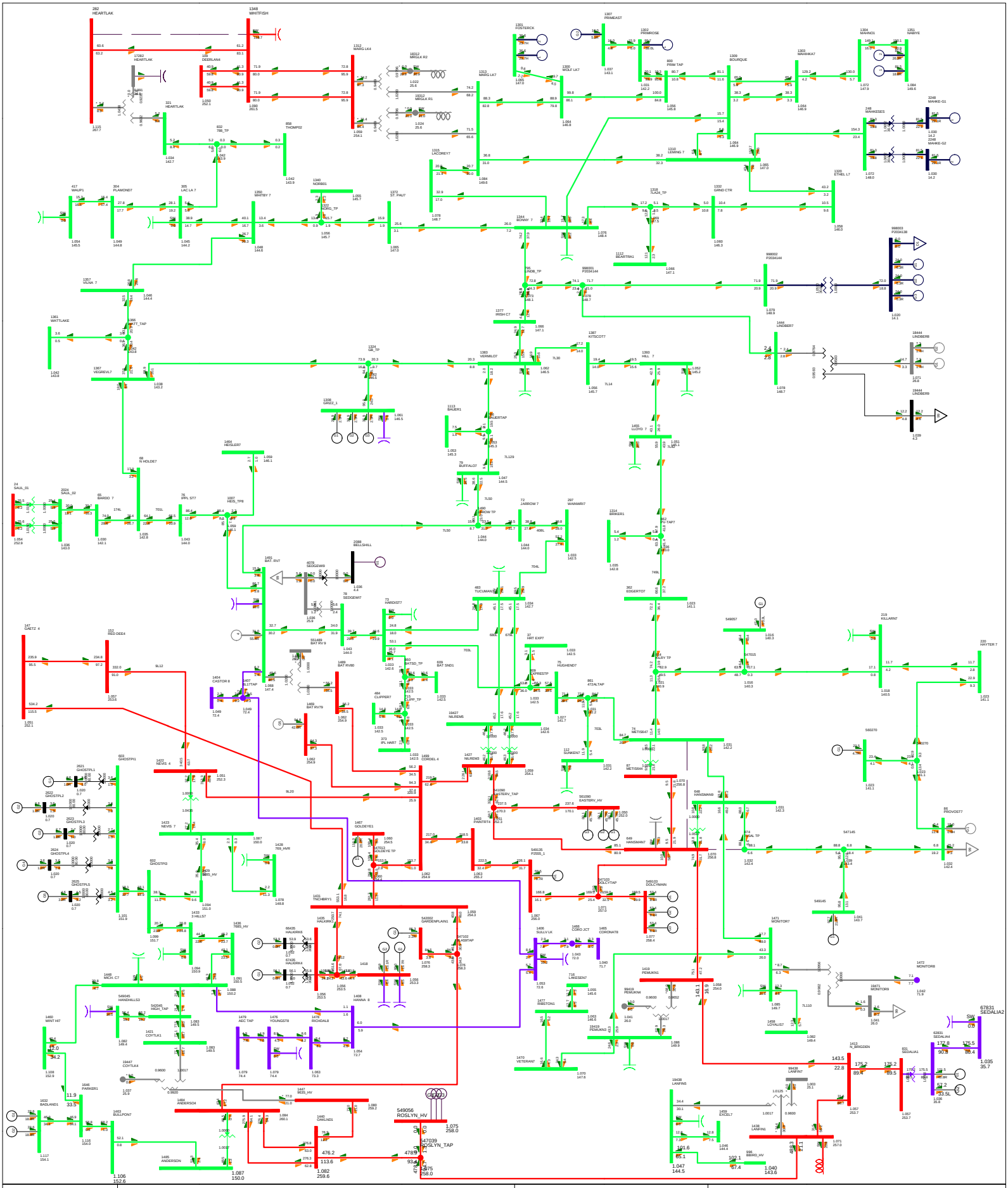
Study Case Description

2028SL POST-PROJ

Base Case

P2034 Cold Lake Area Cogen

Bus - VOLTAGE (kV/PU)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%RATEA
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A3- 2

Contingency

CONT 010: 9L22 (898S Heart Lake - 825S Whitefish Lake)

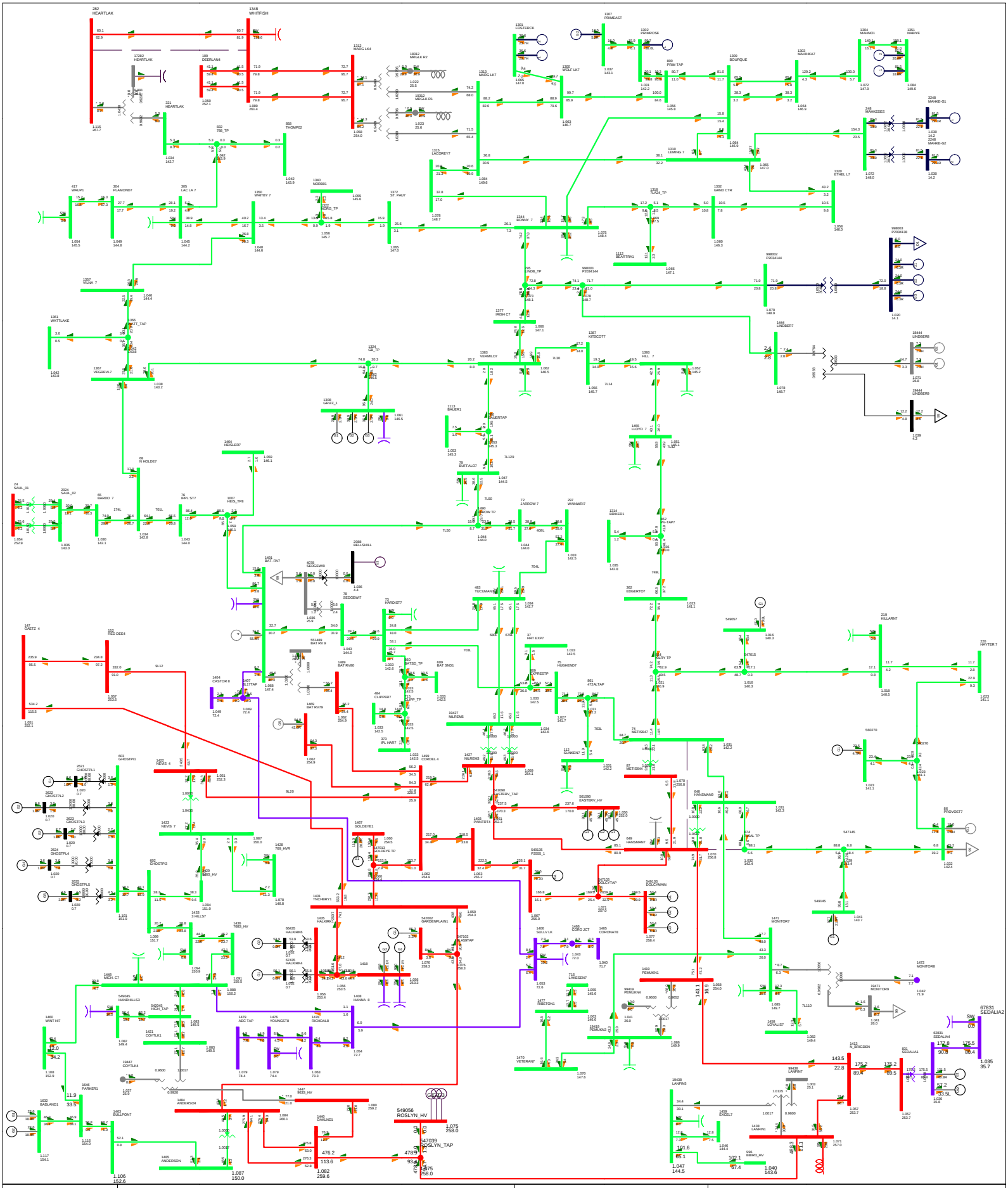
Study Case Description

2028SL POST-PROJ

Base Case

P2034 Cold Lake Area Cogen

Bus - VOLTAGE (kV/PU)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%RATEA
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A3- 2

Contingency

CONT 011: 9L81 (898S Heart Lake - 825S Whitefish Lake)

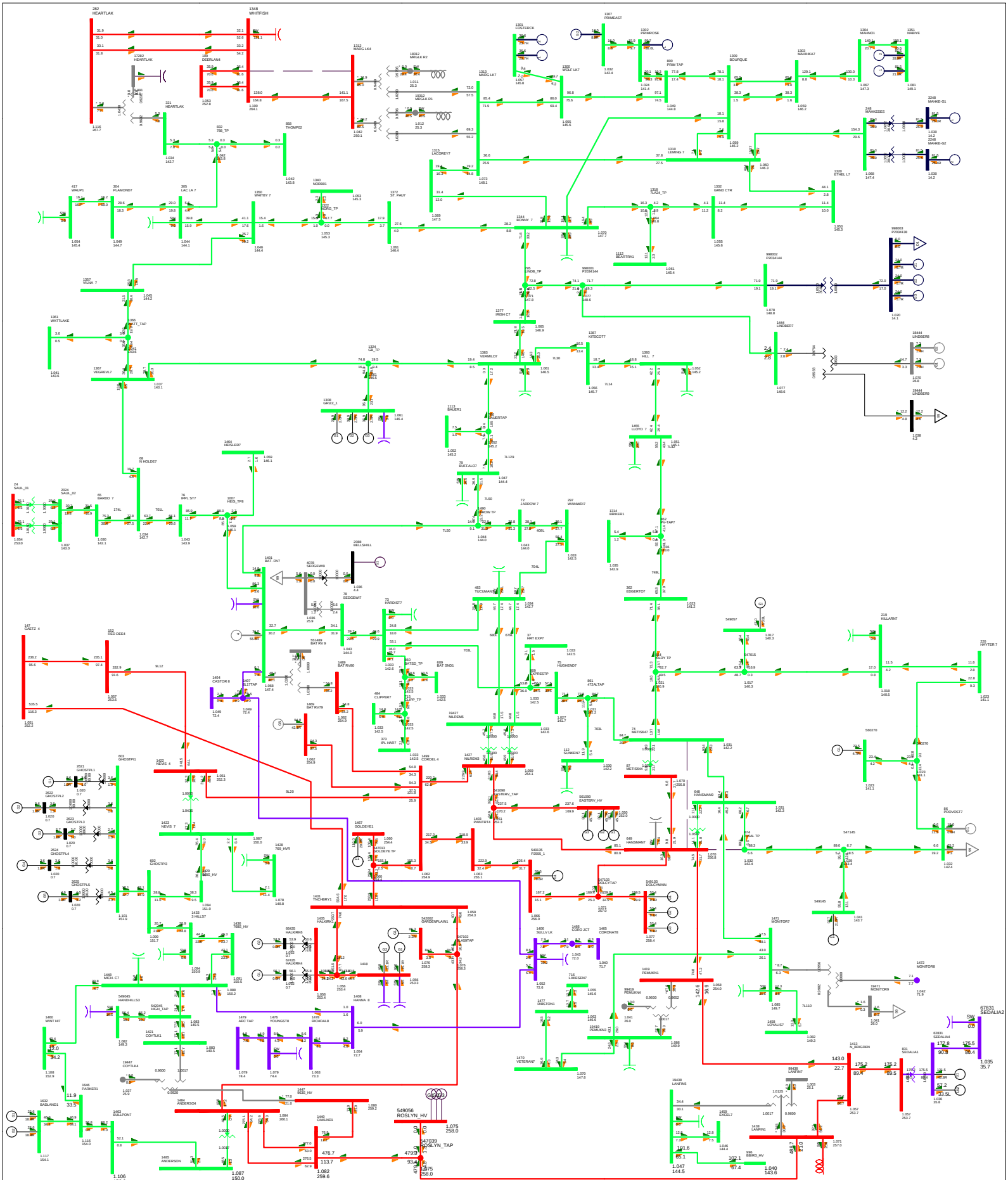
Study Case Description

2028SL POST-PROJ

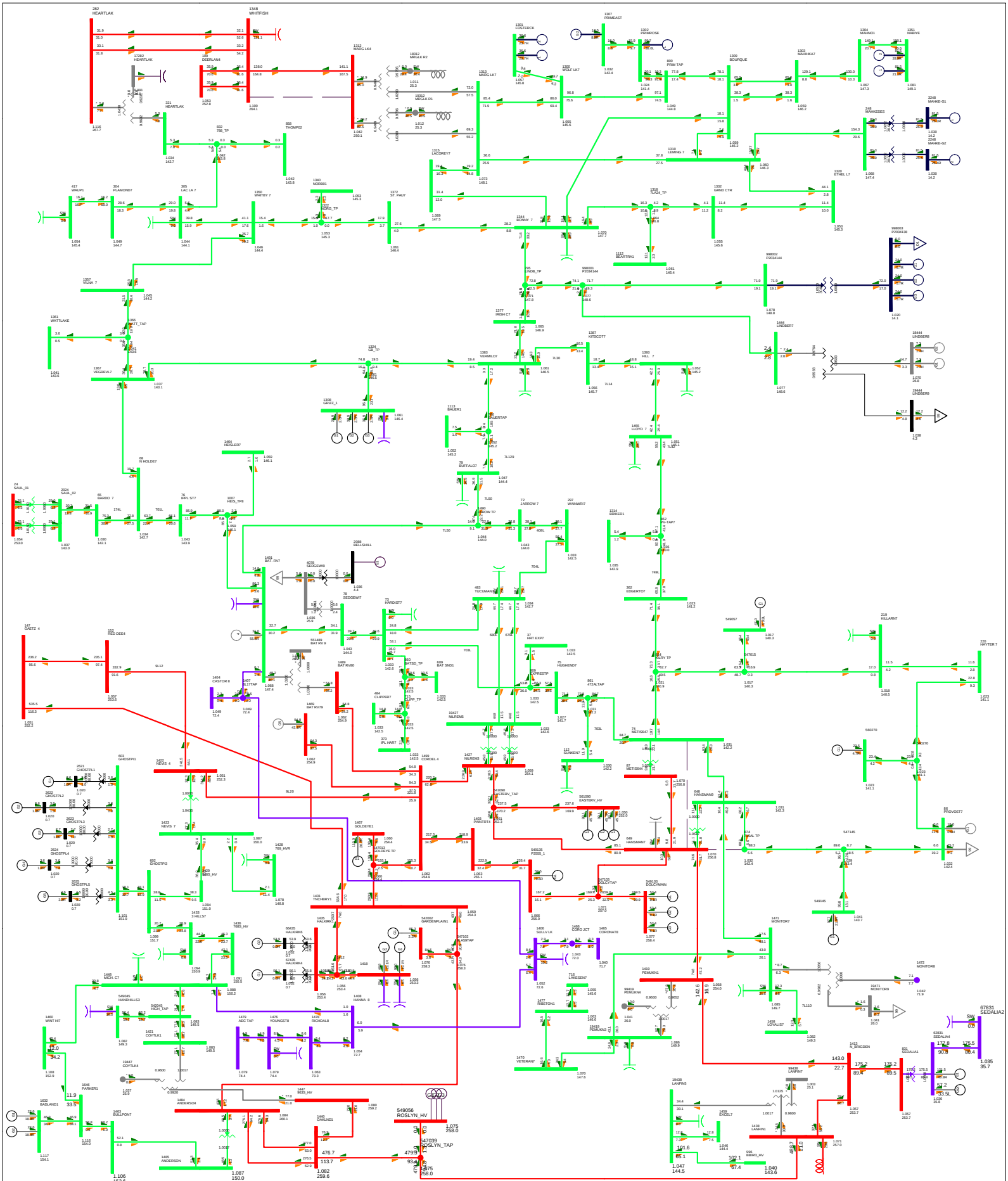
Base Case

P2034 Cold Lake Area Cogen

Bus - VOLTAGE (kV/PU)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%RATEA
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A3- 2	Contingency	Study Case Description	P2034 Cold Lake Area Cogen
	CONT 012: 9L36 (826S Marguerite Lake - 825S Whitefish Lake)	2028SL POST-PROJ Base Case	Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A3- 2

Contingency

CONT 013: 9L37 (826S Marguerite Lake - 825S Whitefish Lake)

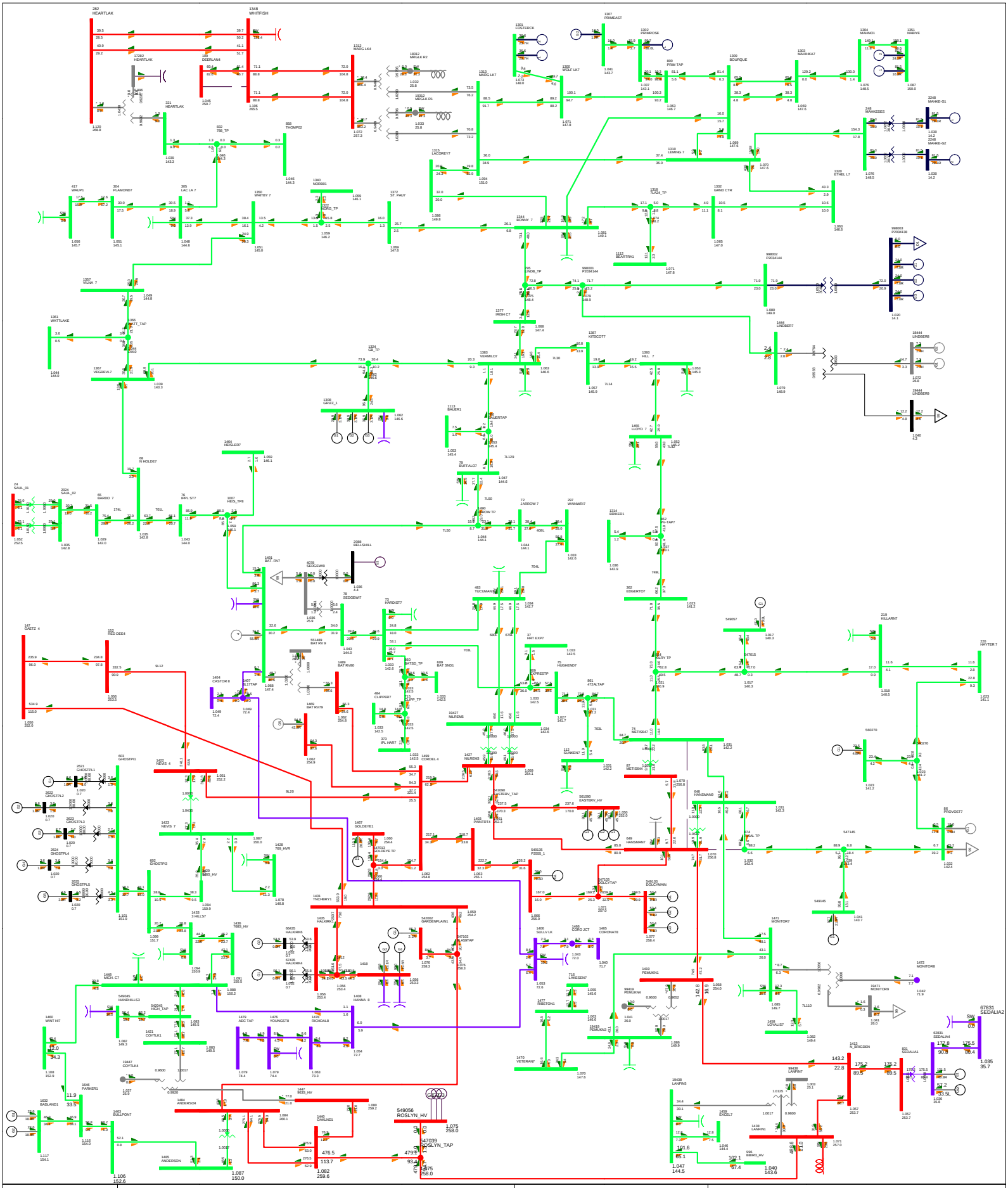
Study Case Description

2028SL POST-PROJ

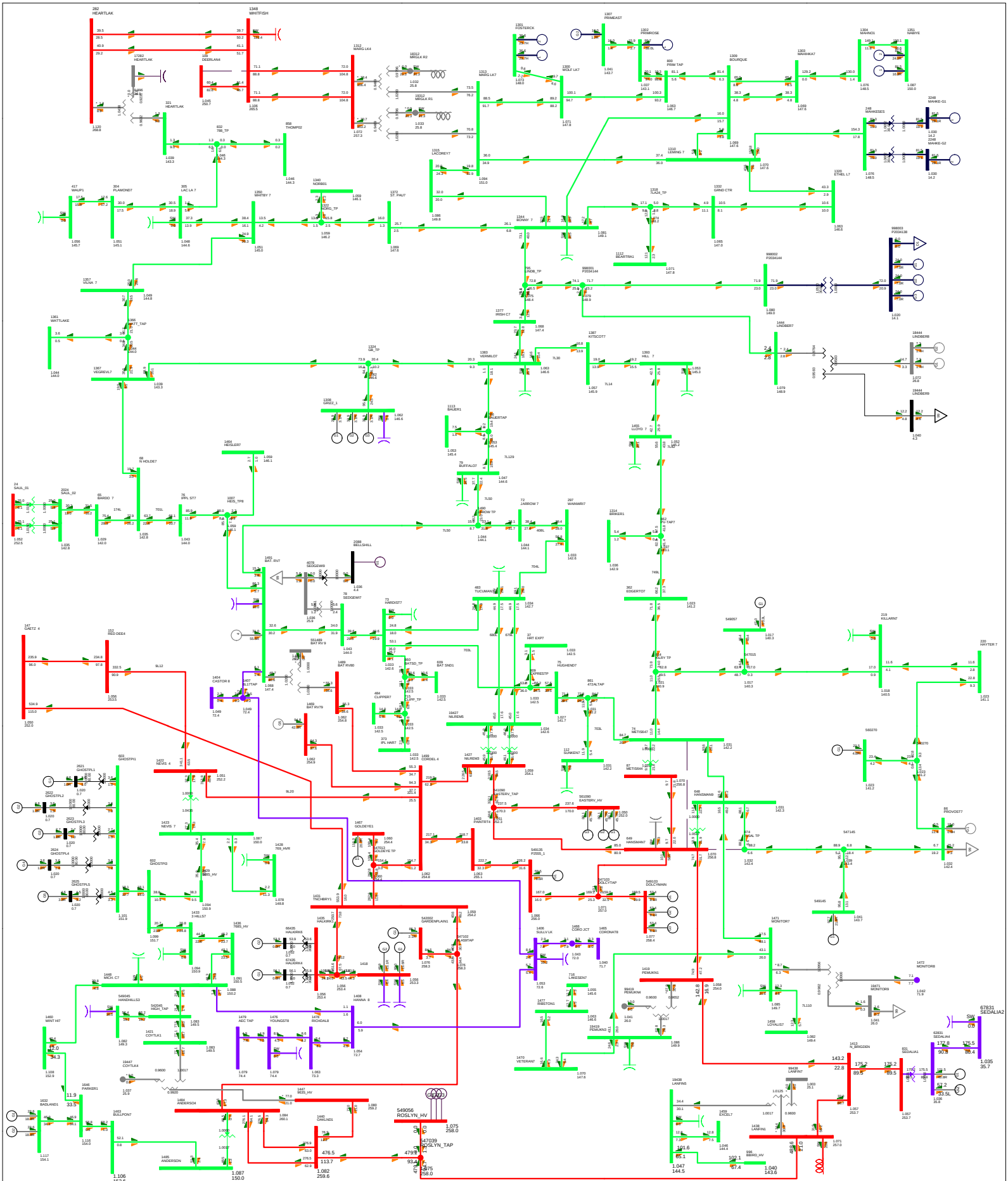
Base Case

P2034 Cold Lake Area Cogen

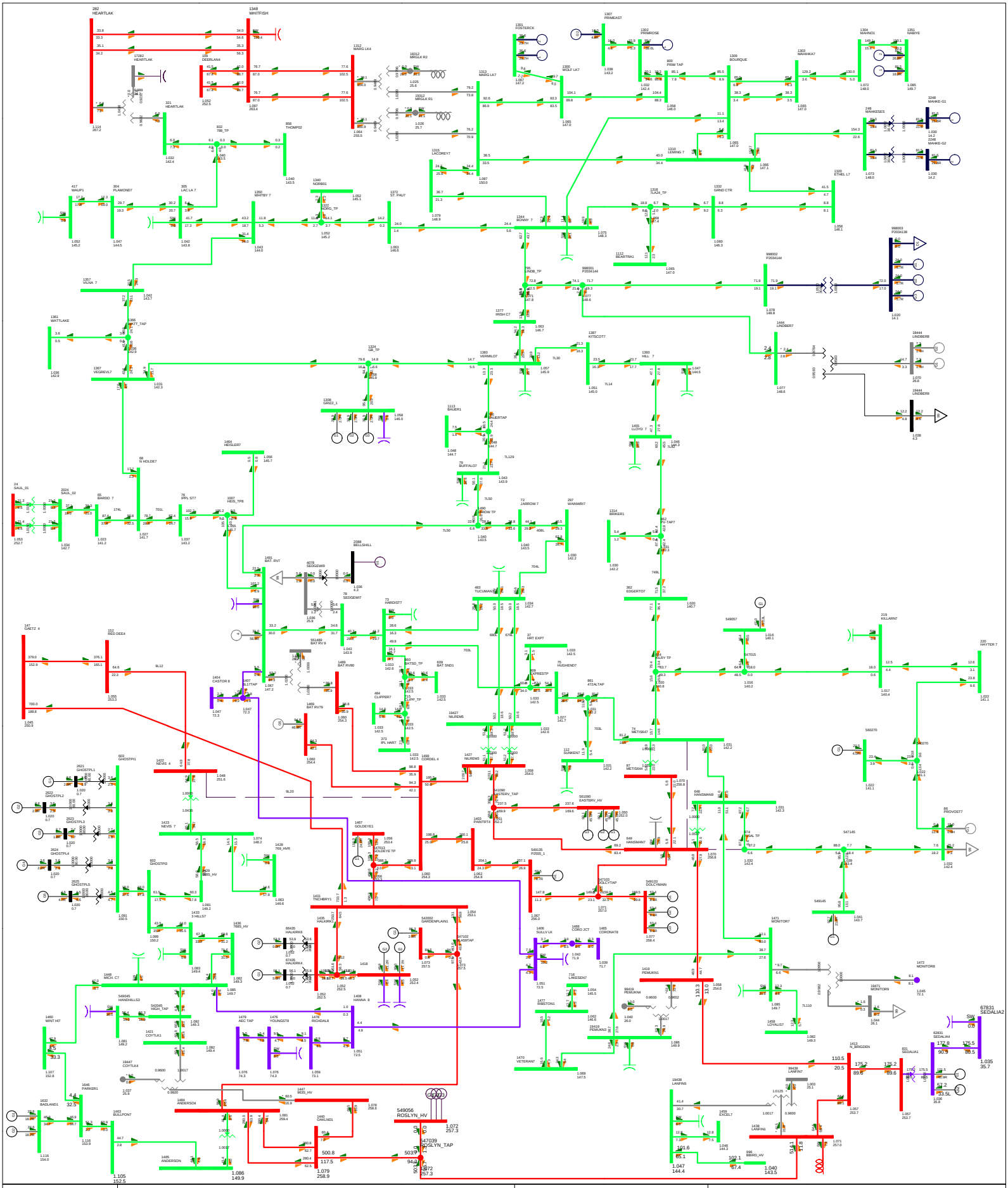
Bus - VOLTAGE (kV/PU)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%RATEA
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A3- 2	Contingency	Study Case Description	P2034 Cold Lake Area Cogen
	CONT 014: 9L960 (13S Deerland - 825S Whitefish Lake)	2028SL POST-PROJ Base Case	Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A3- 2	Contingency	Study Case Description	P2034 Cold Lake Area Cogen
	CONT 015: 9L961 (13S Deerland - 825S Whitefish Lake)	2028SL POST-PROJ Base Case	Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A3- 2

Contingency

CONT 016: 9L20 (766S Nevis - 755S Cordel)

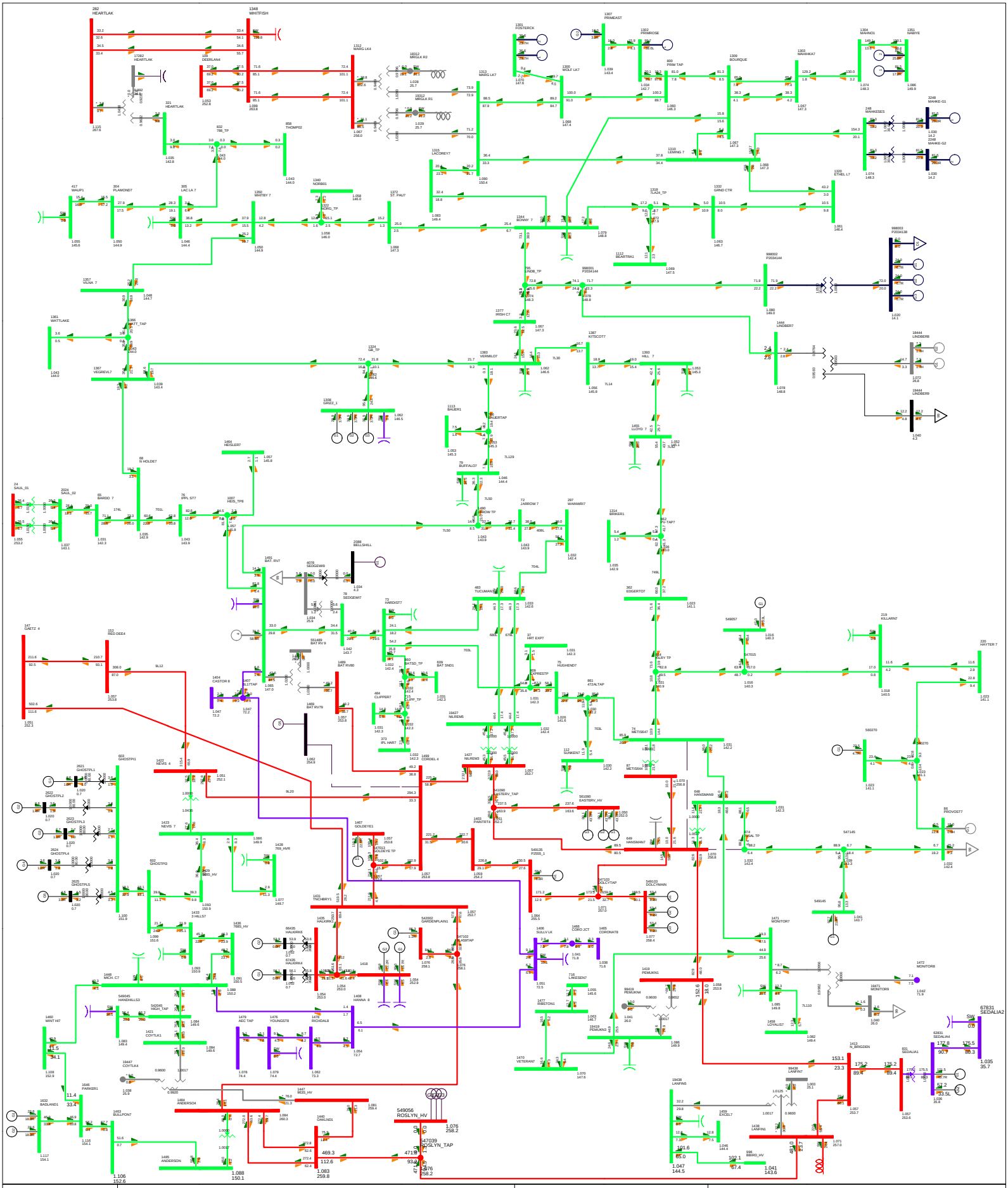
Study Case Description

2028SL POST-PROJ

Base Case

P2034 Cold Lake Area Cogen

Bus - VOLTAGE (kV/PU)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%RATEA
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A3- 2

Contingency

CONT 017: 9L79 (757S Battle River - 755S Cordel)

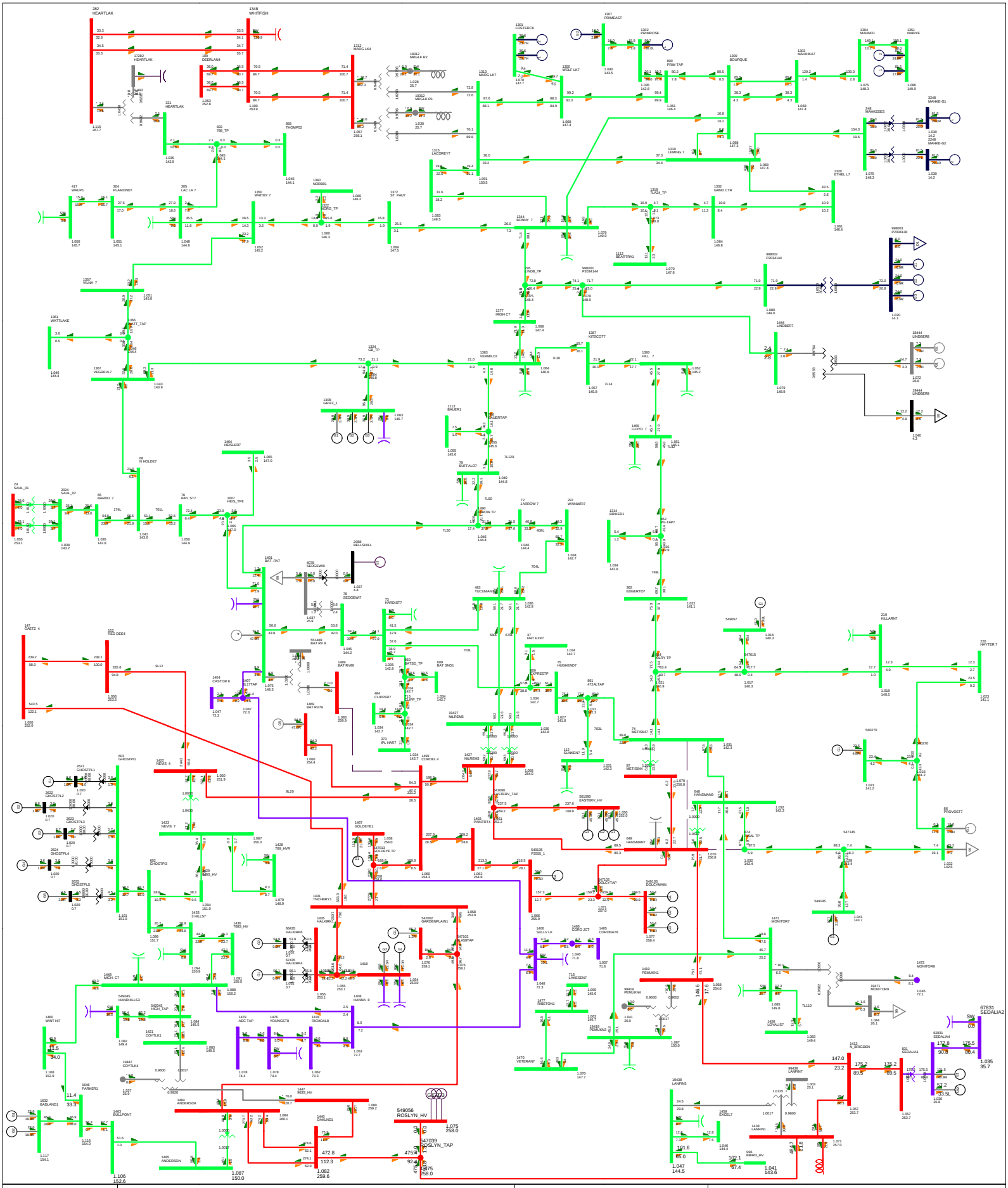
Study Case Description

2028SL POST-PROJ

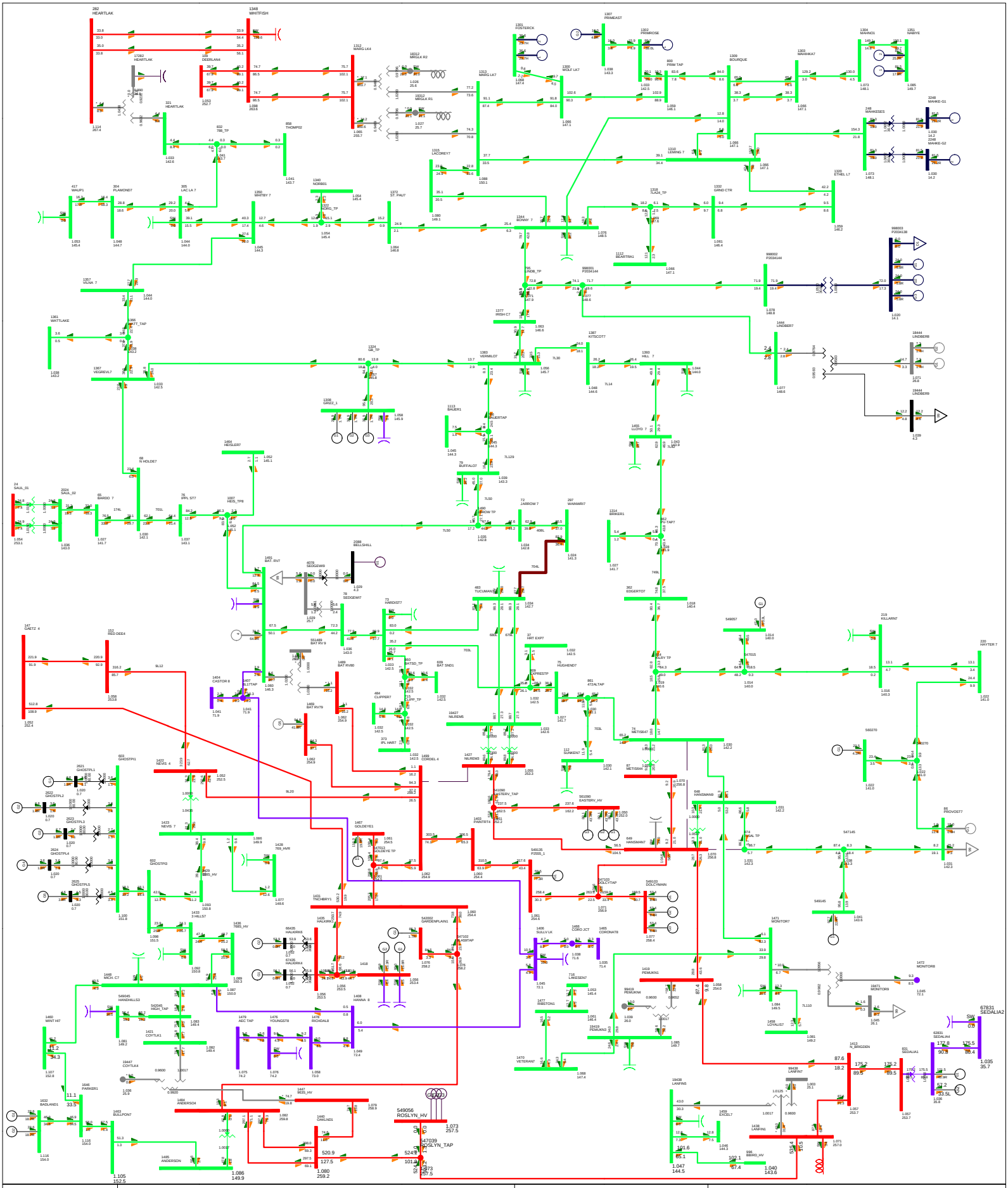
Base Case

P2034 Cold Lake Area Cogen

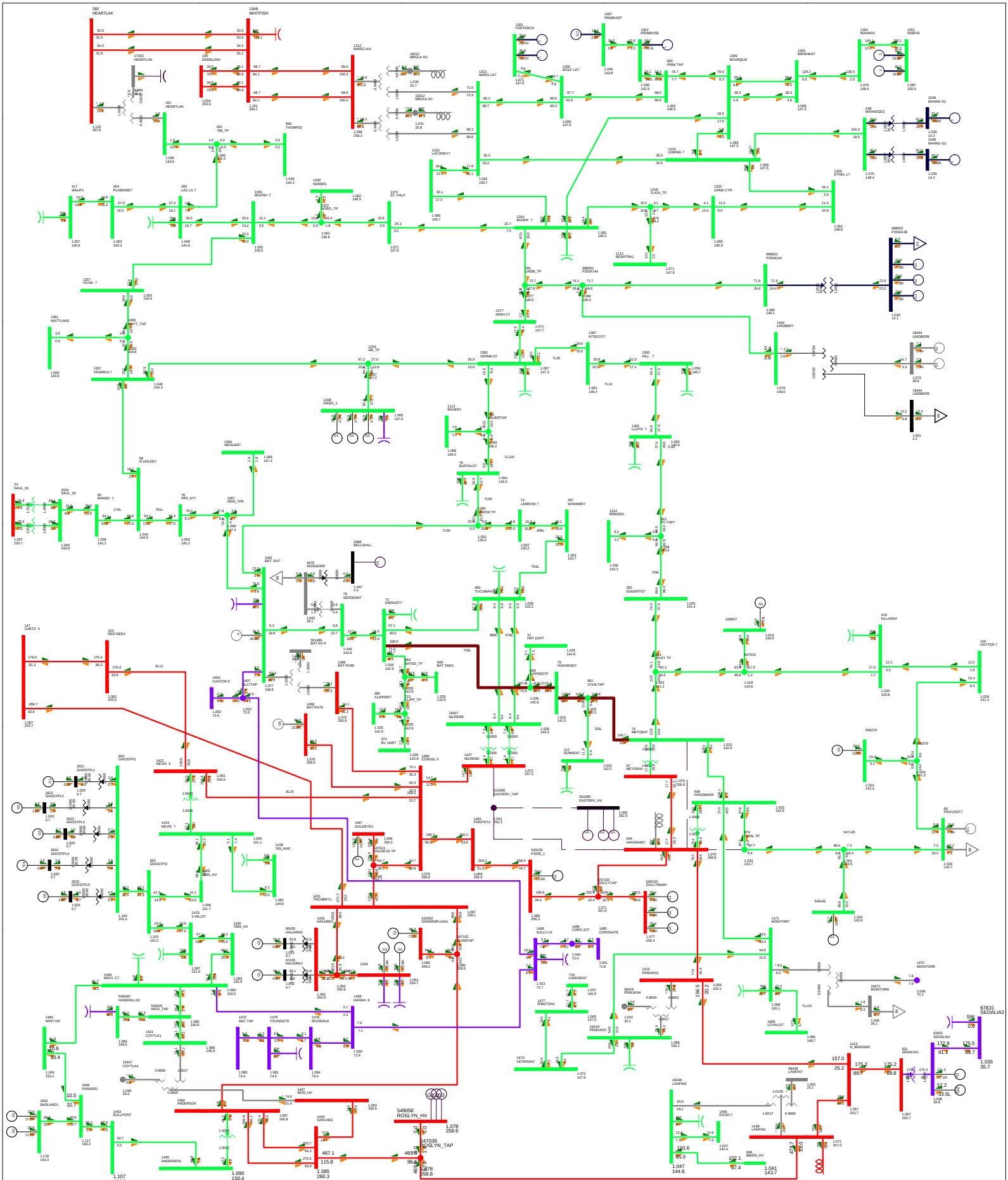
Bus - VOLTAGE (kV/PU)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%RATEA
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A3- 2	**Contingency** CONT 018: 9L80 (757S Battle River - 755S Cordel)	**Study Case Description** 2028SL POST-PROJ Base Case	**P2034 Cold Lake Area Cogen** Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A3- 2	Contingency	Study Case Description	P2034 Cold Lake Area Cogen
	CONT 019: 953L (574S Nilrem - 755S Cordel)	2028SL POST-PROJ Base Case	Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A3- 2

Contingency

CONT 020: 1047L (574S Nilrem - P2566 Eastervale Solar - 650S Hansman Lake)

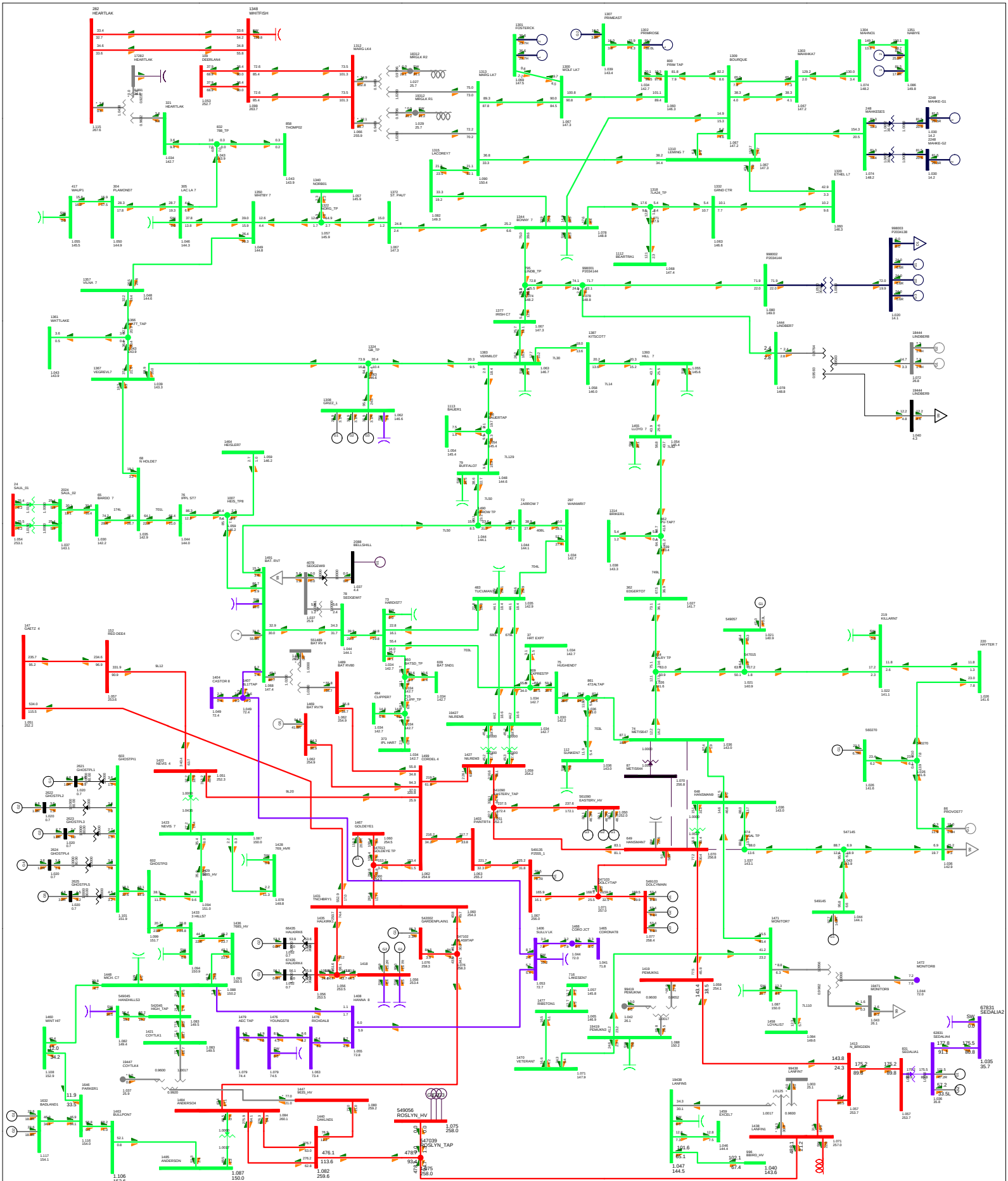
Study Case Description

2028SL POST-PROJ

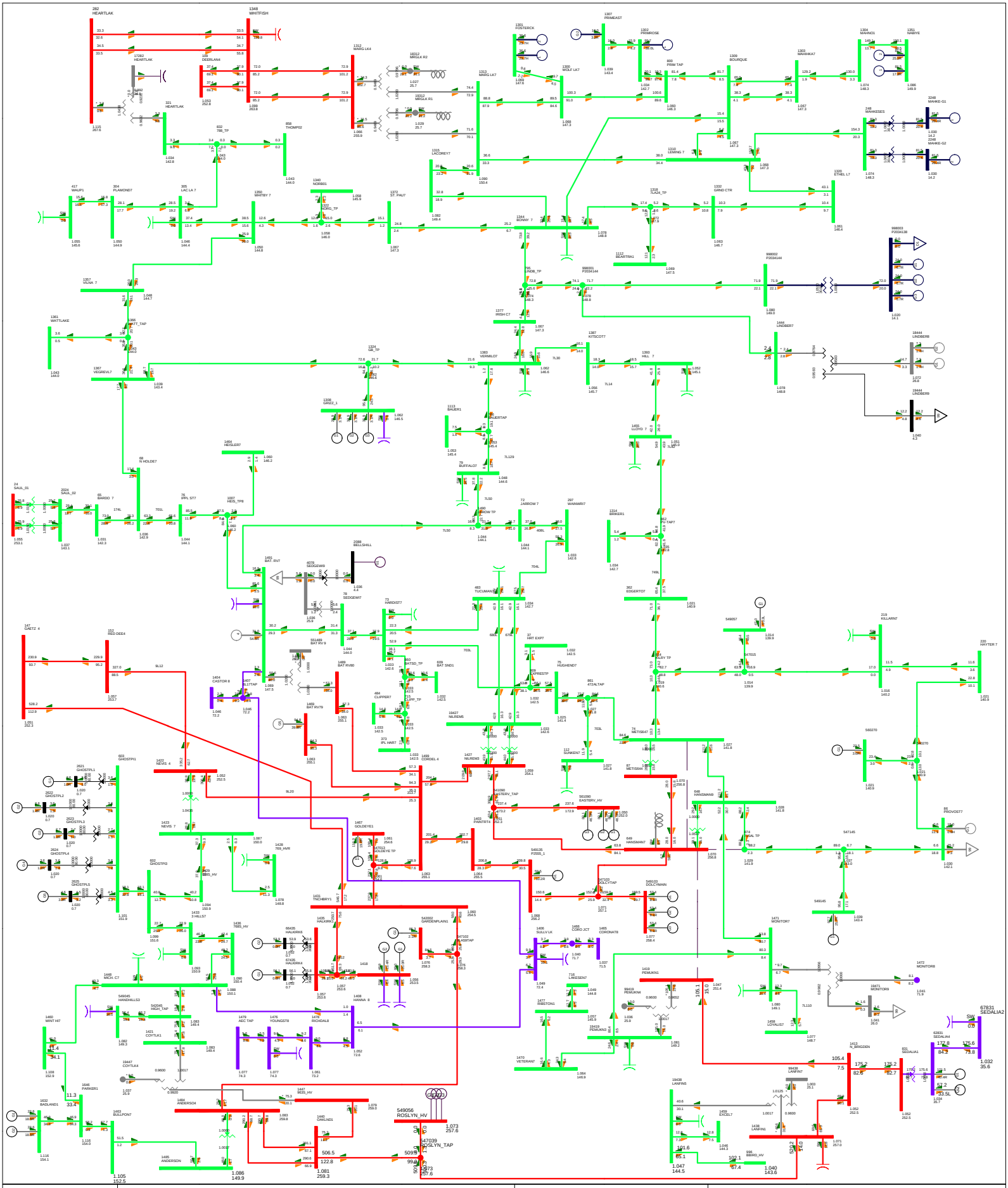
Base Case

P2034 Cold Lake Area Cogen

Bus - VOLTAGE (kV/PU)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%RATEA
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A3- 2	Contingency	Study Case Description	P2034 Cold Lake Area Cogen
	CONT 021: 954L (648S Metiskow - 650S Hansman Lake)	2028SL POST-PROJ Base Case	Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A3- 2

Contingency

CONT 022: 9L966 (650S Hansman Lake - 932S Pemukan)

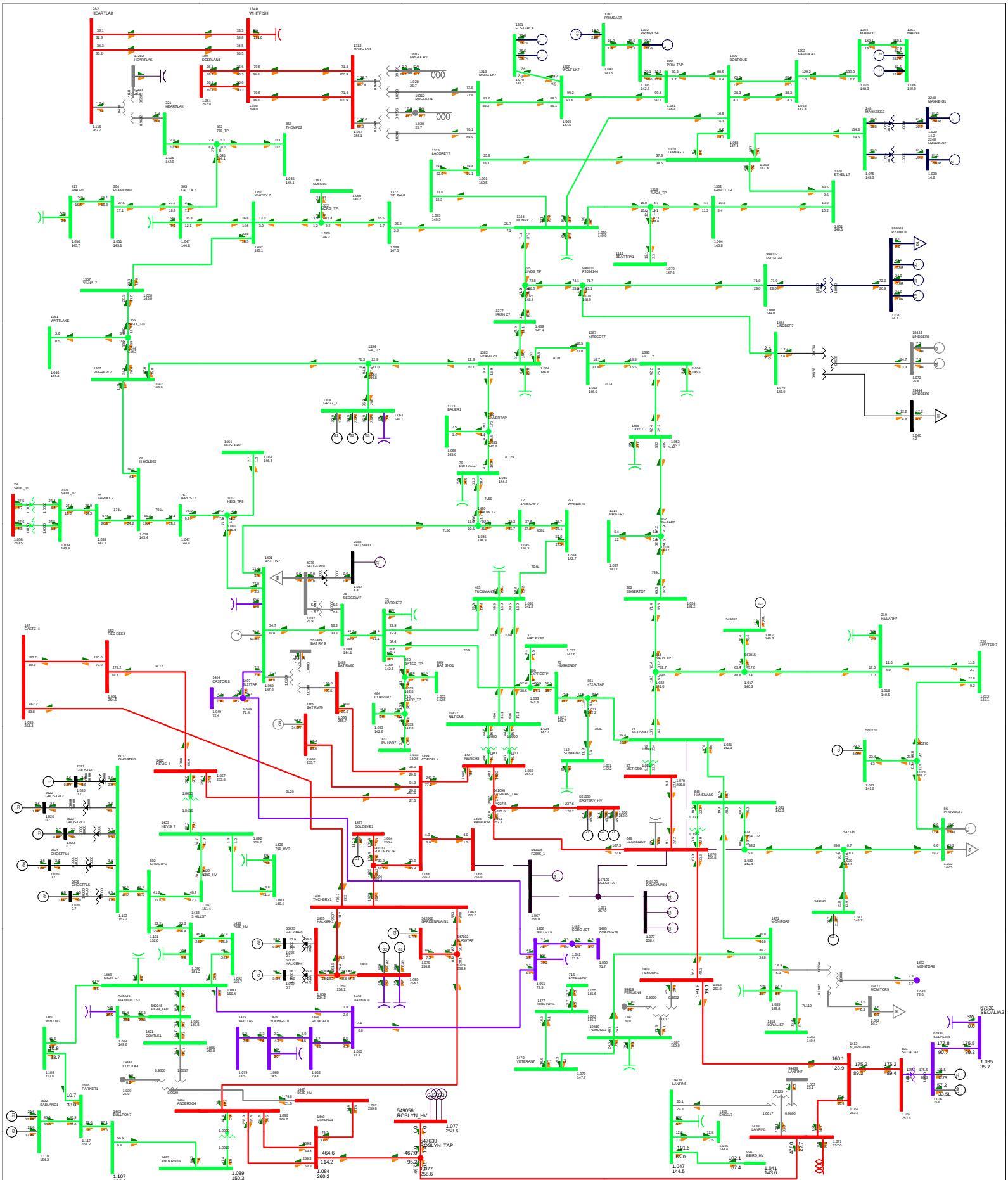
Study Case Description

2028SL POST-PROJ

Base Case

P2034 Cold Lake Area Cogen

Bus - VOLTAGE (kV/PU)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%RATEA
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A3- 2

Contingency

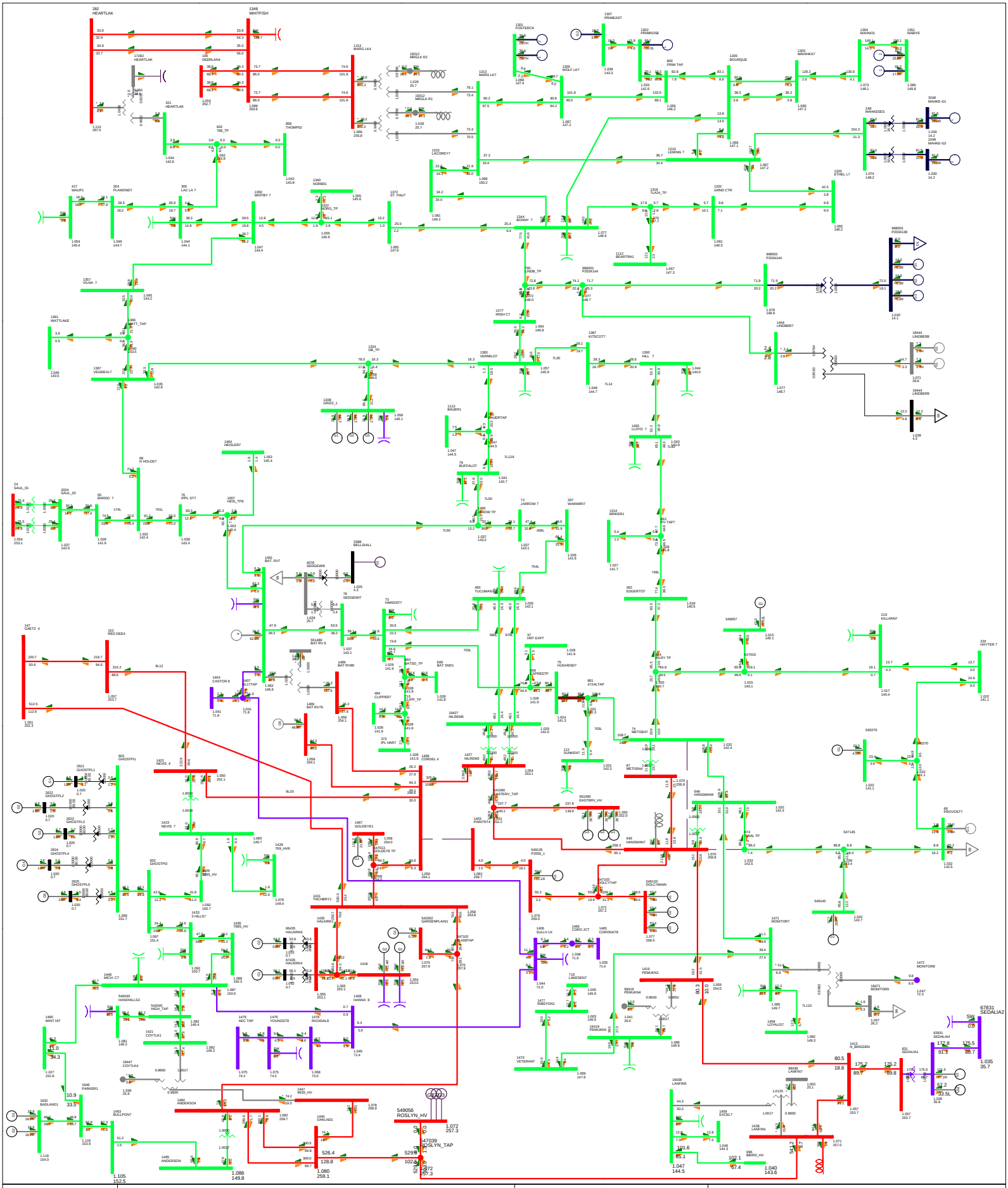
CONT 023: 948L (650S Hansman Lake - P2553 Dolcy Solar - P2555 Rolling Hills Wind - 863S Plain Creek

Study Case Description

Base Case

P2034 Cold Lake Area Cogen

Bus - VOLTAGE (kV/PU)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%RATEA
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A3- 2

Contingency

CONT 024: 9L27 (863S Paintearth - 755S Cordel)

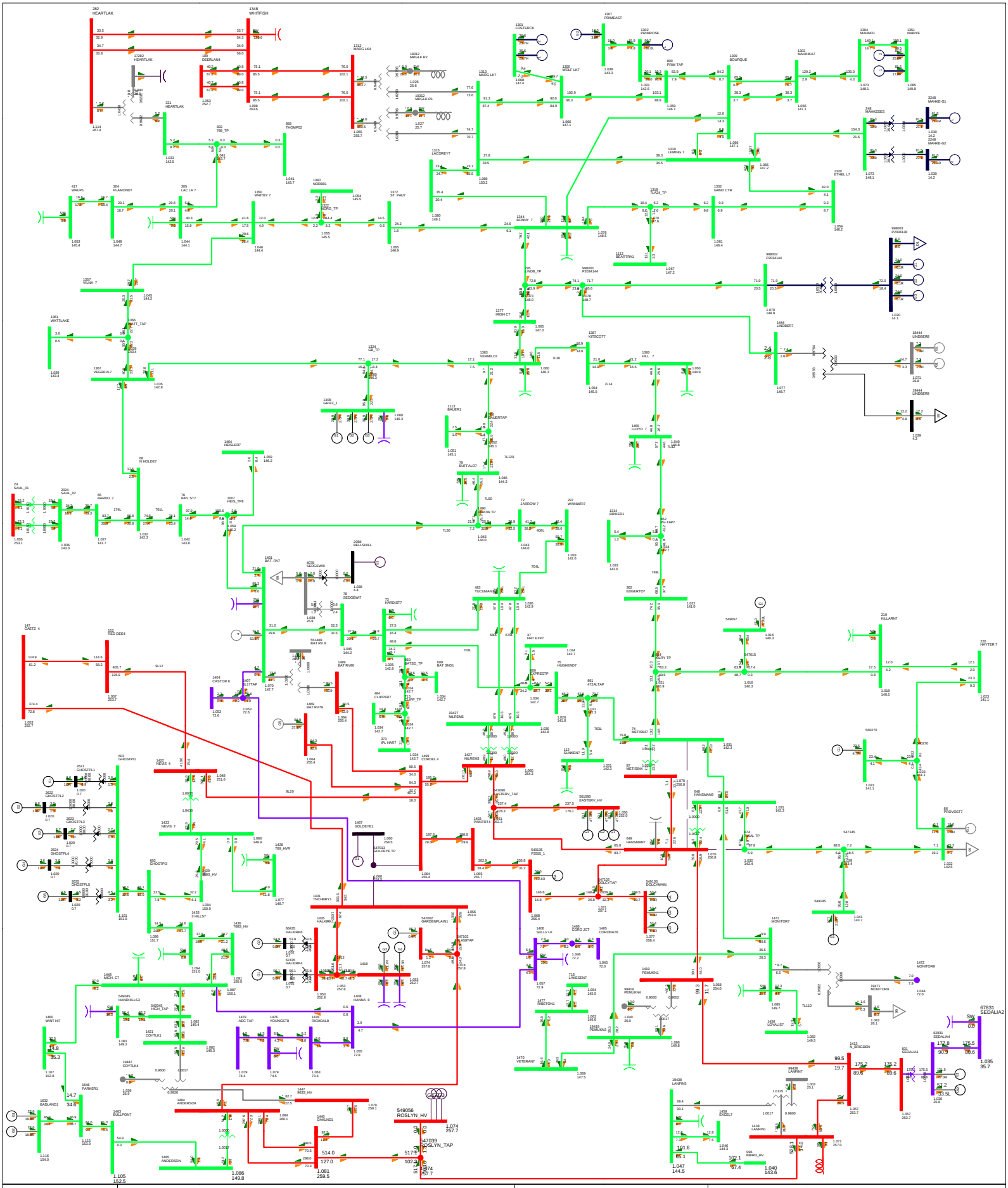
Study Case Description

2028SL POST-PROJ

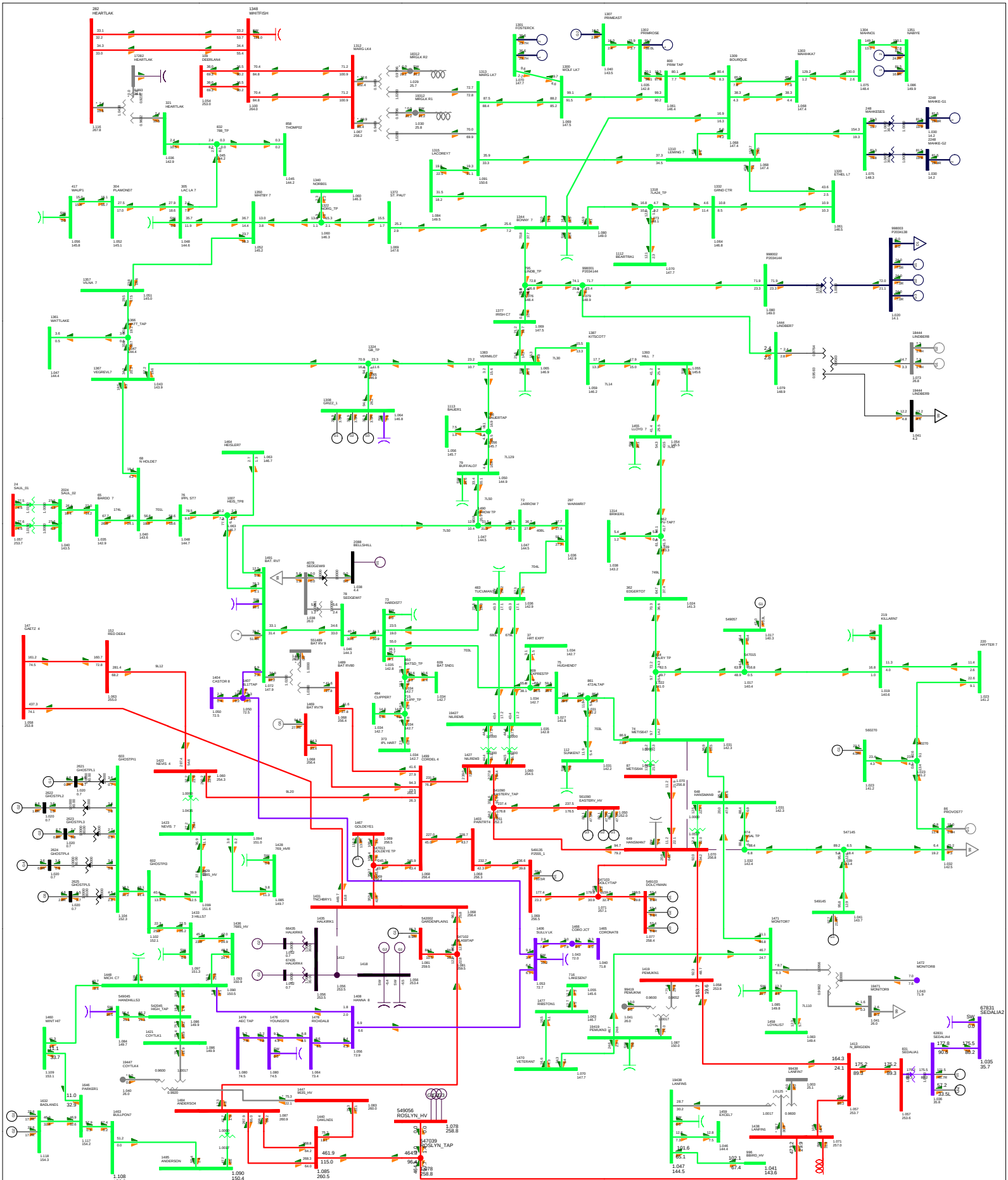
Base Case

P2034 Cold Lake Area Cogen

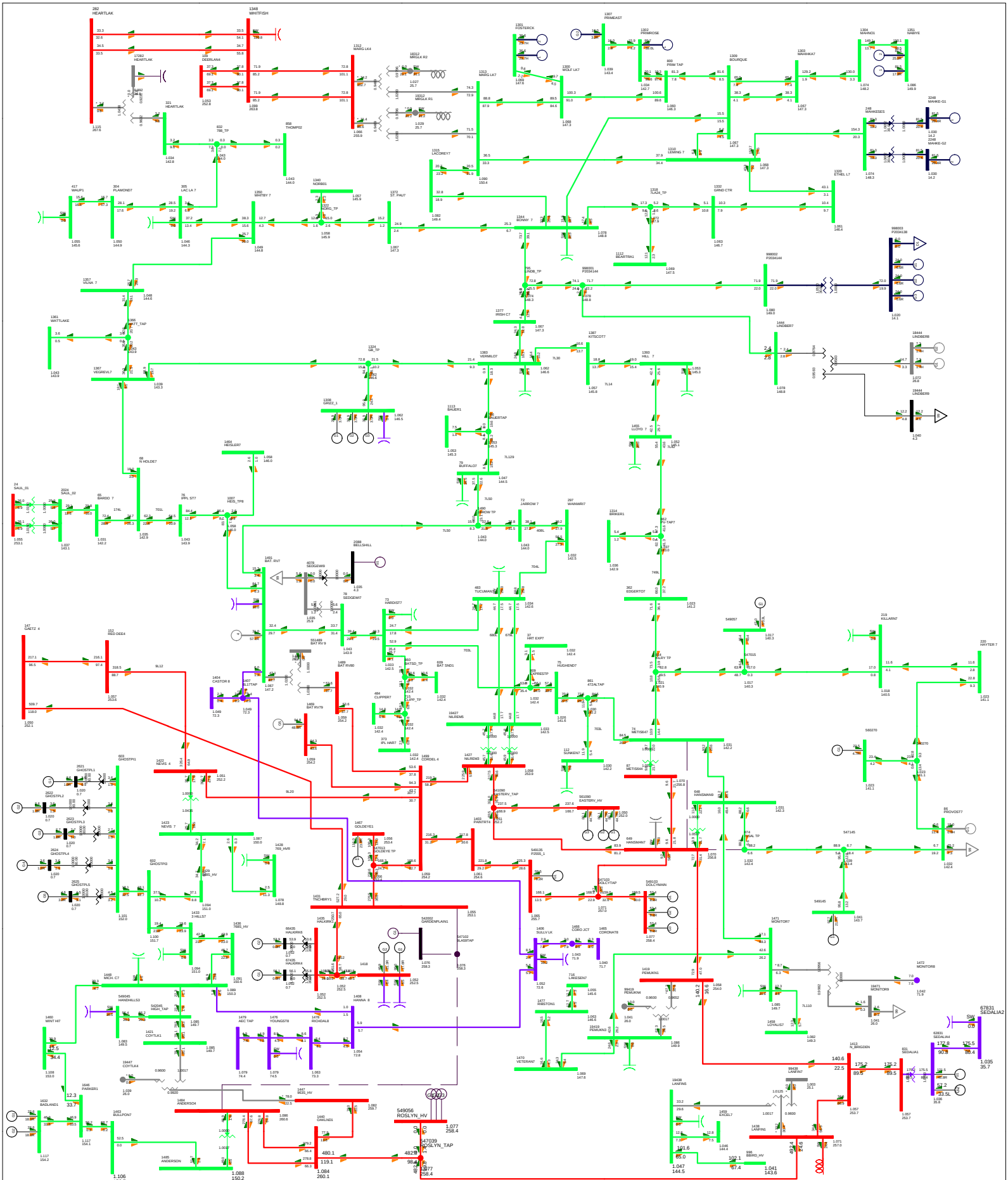
Bus - VOLTAGE (kV/PU)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%RATEA
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A3- 2	Contingency	Study Case Description	P2034 Cold Lake Area Cogen
	CONT 025: 9L16 (755S Cordel - P2441 Halkirk 2 Wind - 972S Tinchebray)	2028SL POST-PROJ Base Case	Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A3- 2	Contingency	Study Case Description	P2034 Cold Lake Area Cogen
	CONT 026: 9L93 (972S Tinchebray - 615S Halkirk - 973S Lanes Lake)	2028SL POST-PROJ Base Case	Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A3- 2

Contingency

CONT 027: 9L59 (972S Tinchebray - 1045S Garden Plain - 801S Anderson)

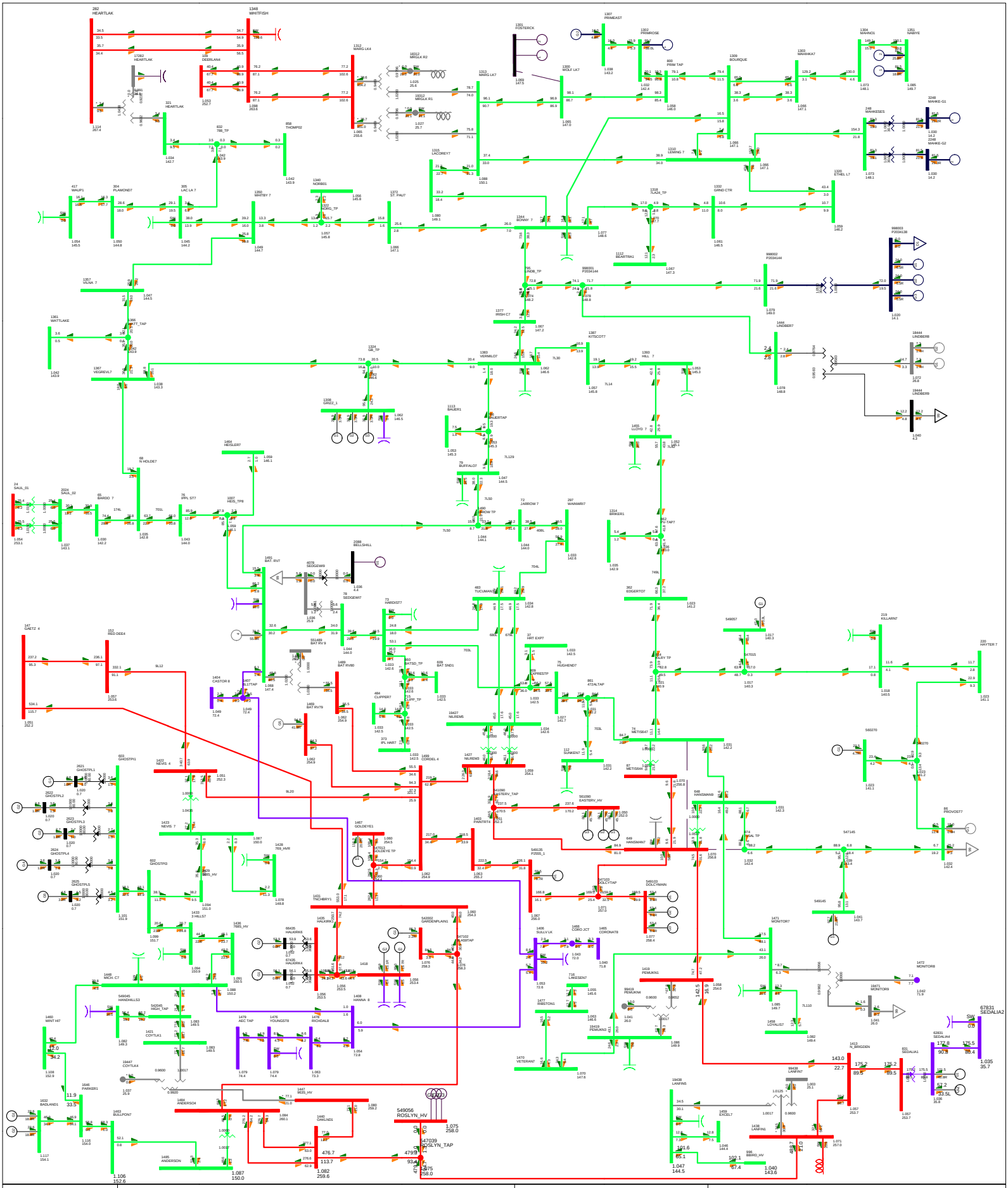
Study Case Description

2028SL POST-PROJ

Base Case

P2034 Cold Lake Area Cogen

Bus - VOLTAGE (kV/PU)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%RATEA
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A3- 2

Contingency

CONT 028: 7L86 (822S Wolf Lake - 877S Foster Creek)

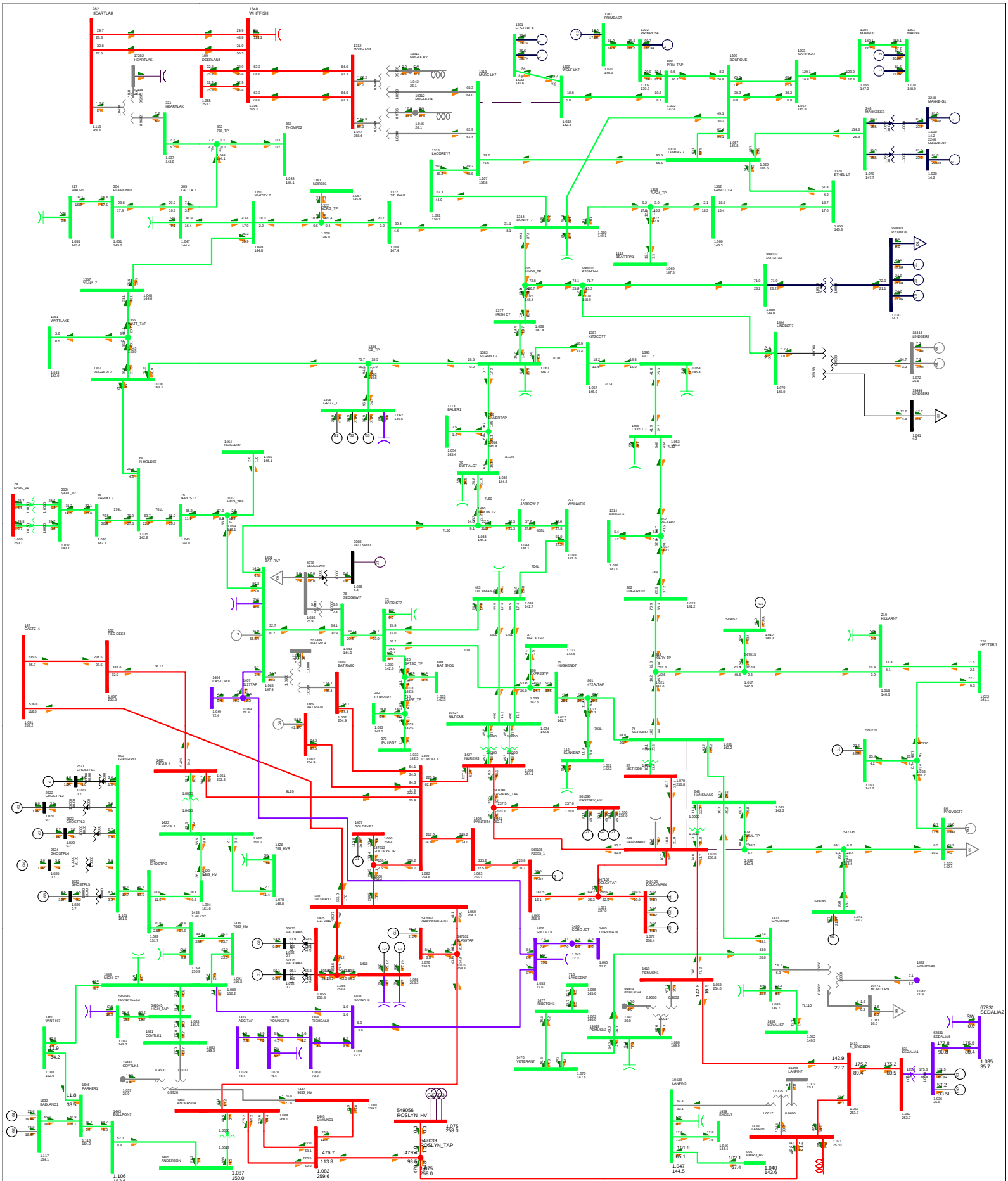
Study Case Description

2028SL POST-PROJ

Base Case

P2034 Cold Lake Area Cogen

Bus - VOLTAGE (kV/PU)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%RATEA
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A3- 2

Contingency

CONT 029: 7L587 (822S Wolf Lake - 826S Marguerite Lake)

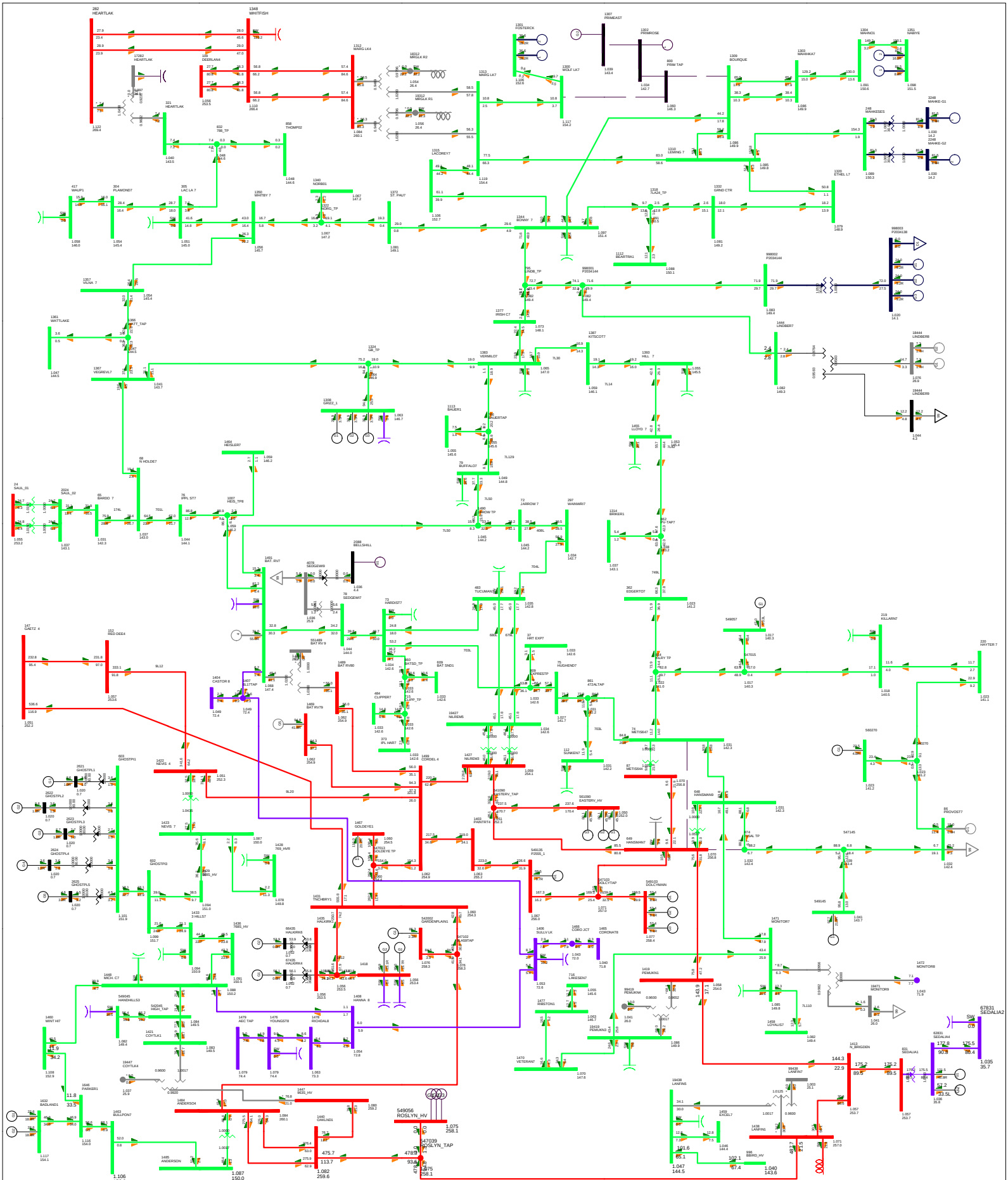
Study Case Description

2028SL POST-PROJ

Base Case

P2034 Cold Lake Area Cogen

Bus - VOLTAGE (kV/PU)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%RATEA
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A3- 2

Contingency

CONT 030: 7L574 (822S Wolf Lake - 859S Primrose - 970S Bourque)

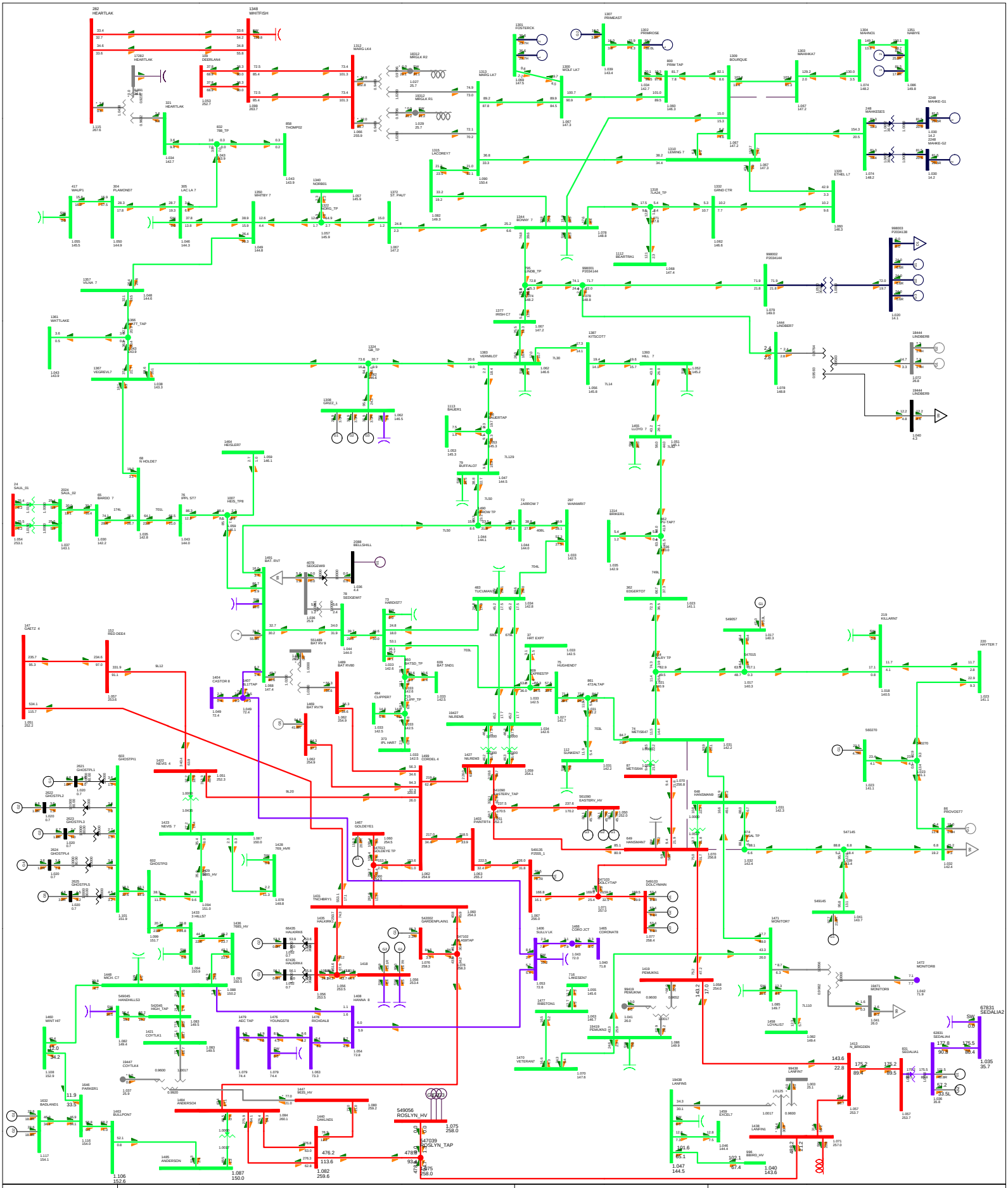
Study Case Description

2028SL POST-PROJ

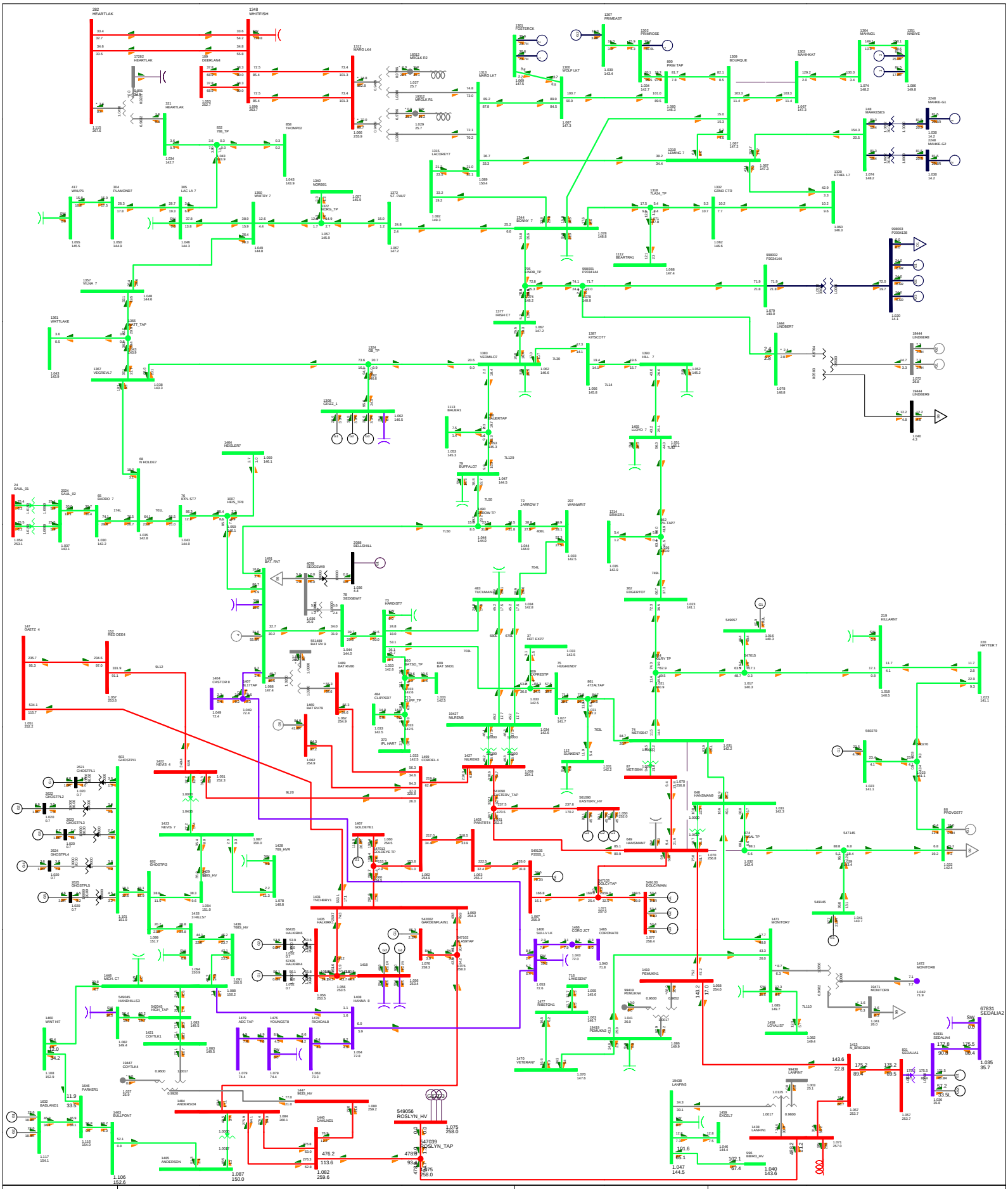
Base Case

P2034 Cold Lake Area Cogen

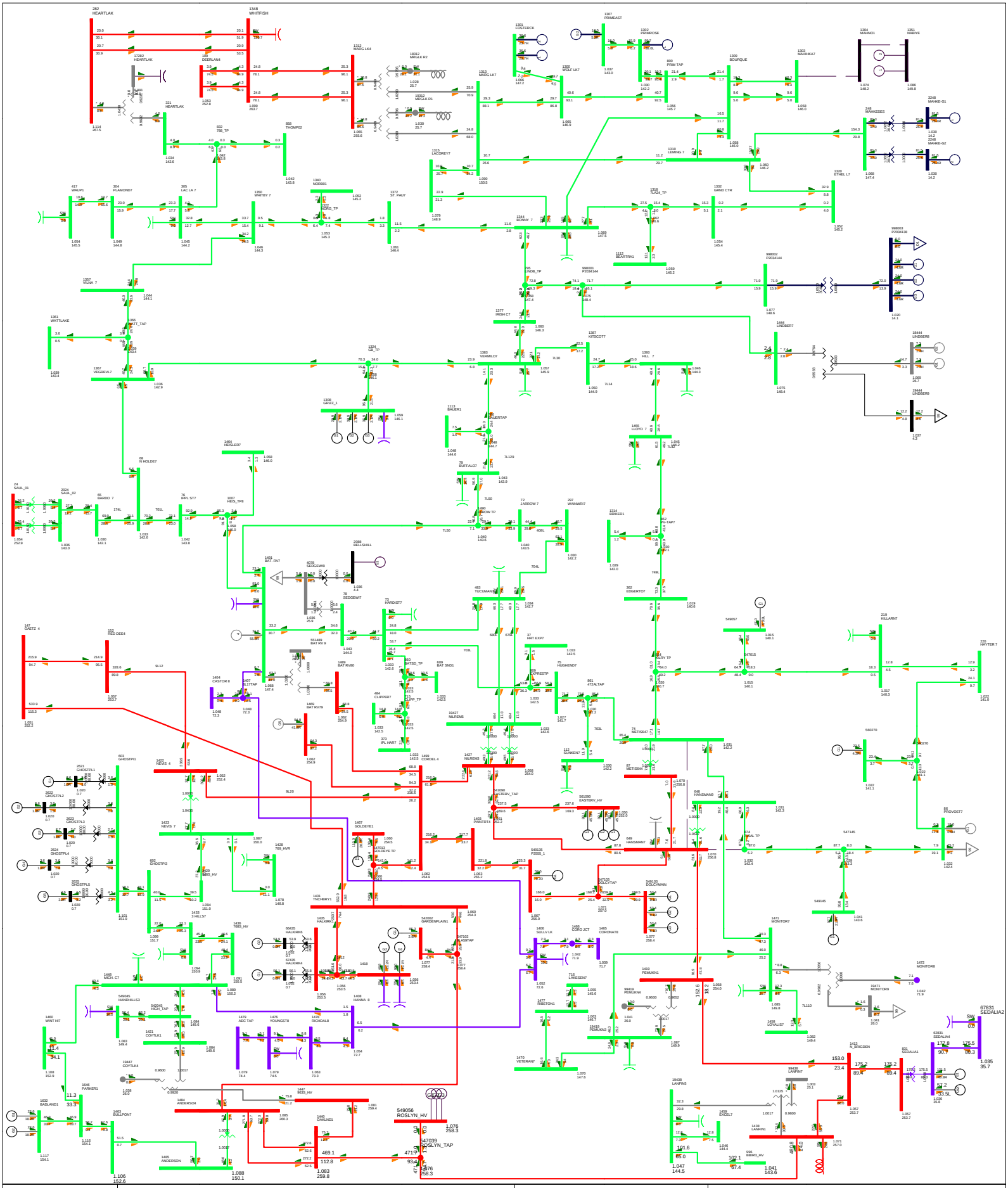
Bus - VOLTAGE (kV/PU)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%RATEA
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



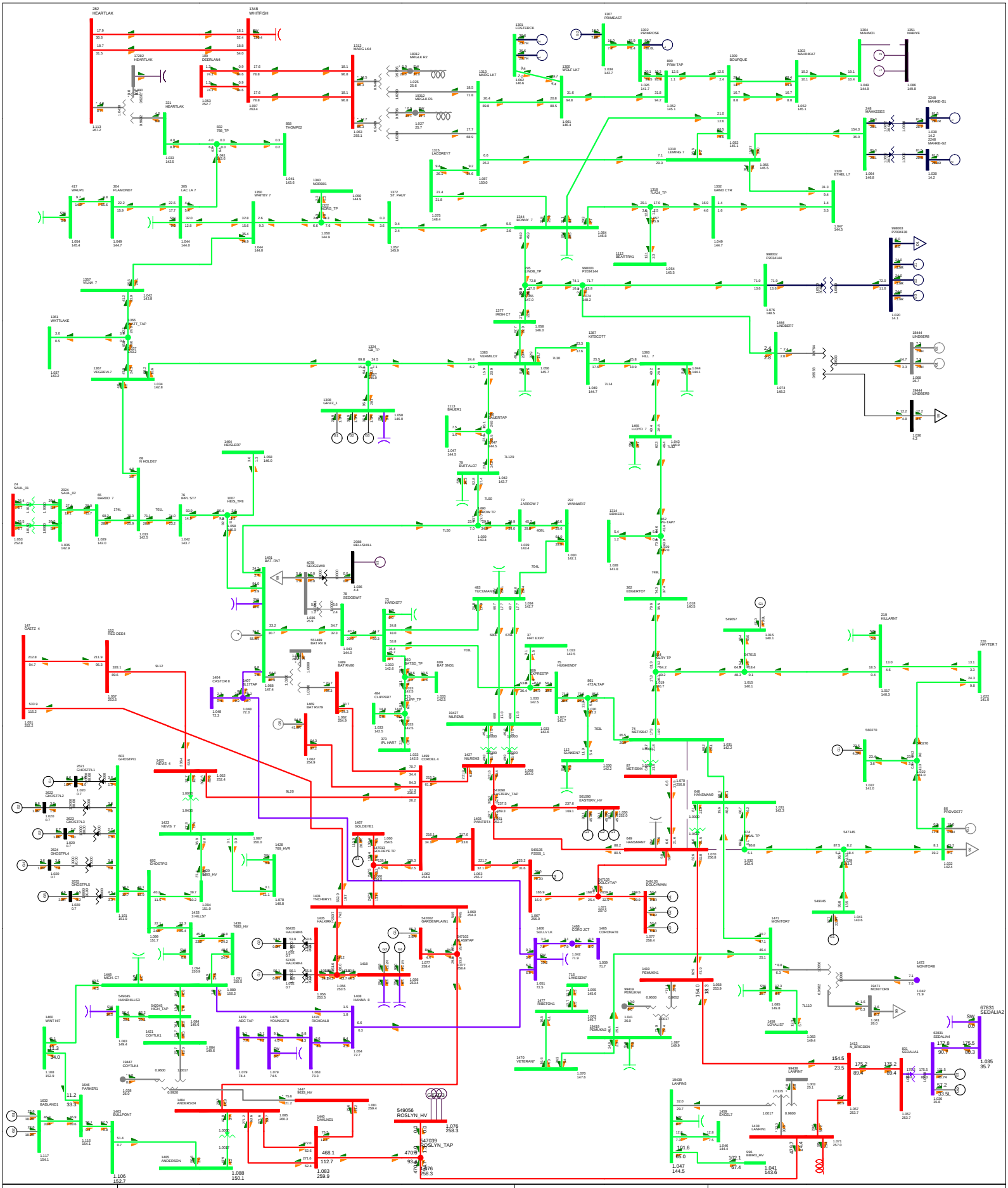
Attachment A3- 2	Contingency	Study Case Description	P2034 Cold Lake Area Cogen
	CONT 031: 7L157 (837S Mahihkan - 970S Bourque)	2028SL POST-PROJ Base Case	Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



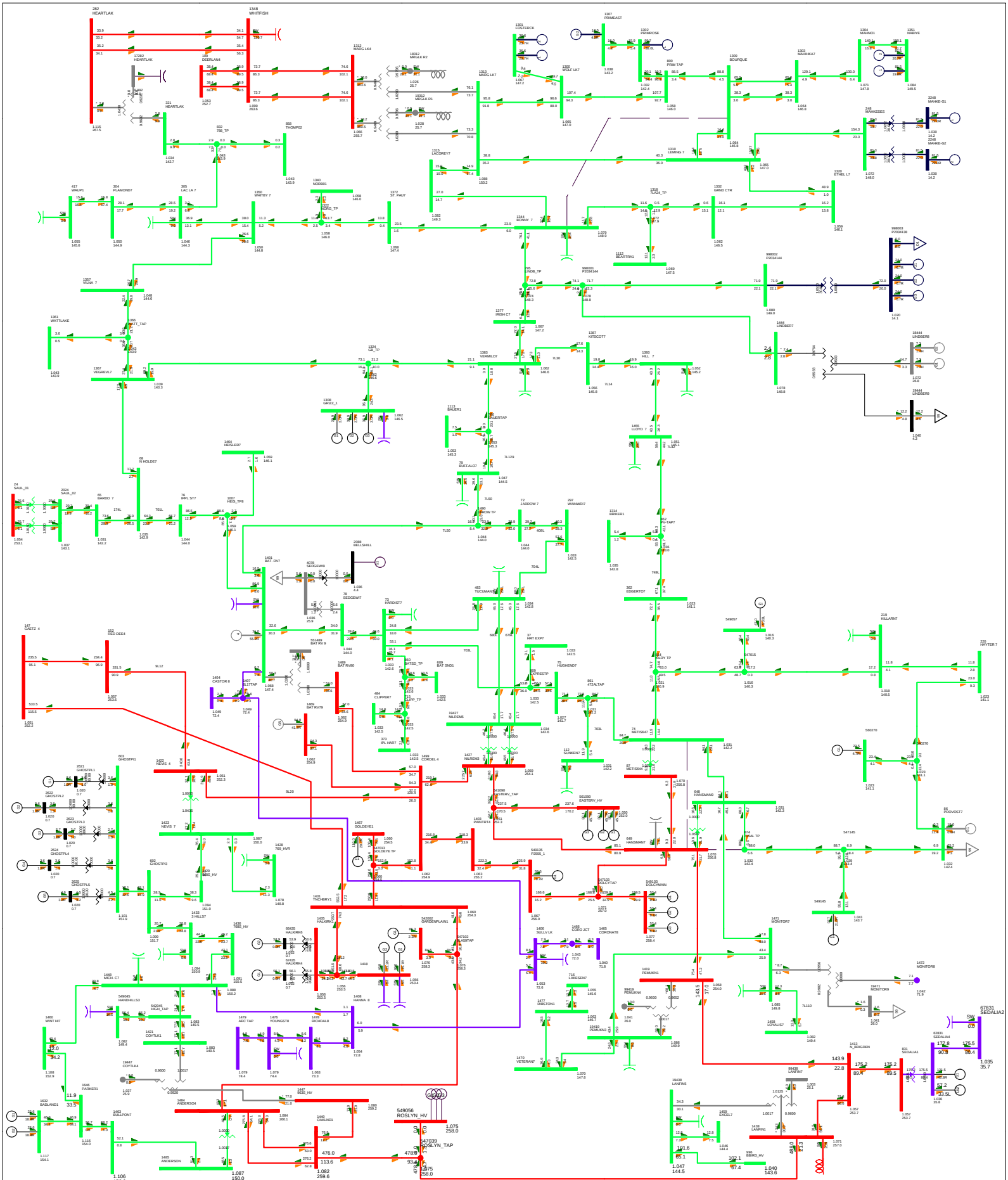
Attachment A3- 2	Contingency	Study Case Description	P2034 Cold Lake Area Cogen
	CONT 032: 7L160 (837S Mahihkan - 970S Bourque)	2028SL POST-PROJ Base Case	Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A3- 2	Contingency	Study Case Description	P2034 Cold Lake Area Cogen
	CONT 033: 7L105 (837S Mahihkan - 909S Mahno)	2028SL POST-PROJ Base Case	Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A3- 2	Contingency	Study Case Description	P2034 Cold Lake Area Cogen
	CONT 034: 7L161 (909S Mahno - 942S Nabiye)	2028SL POST-PROJ Base Case	Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A3- 2

Contingency

CONT 035: 7L146 (970S Bourque - 700S Bonnyville)

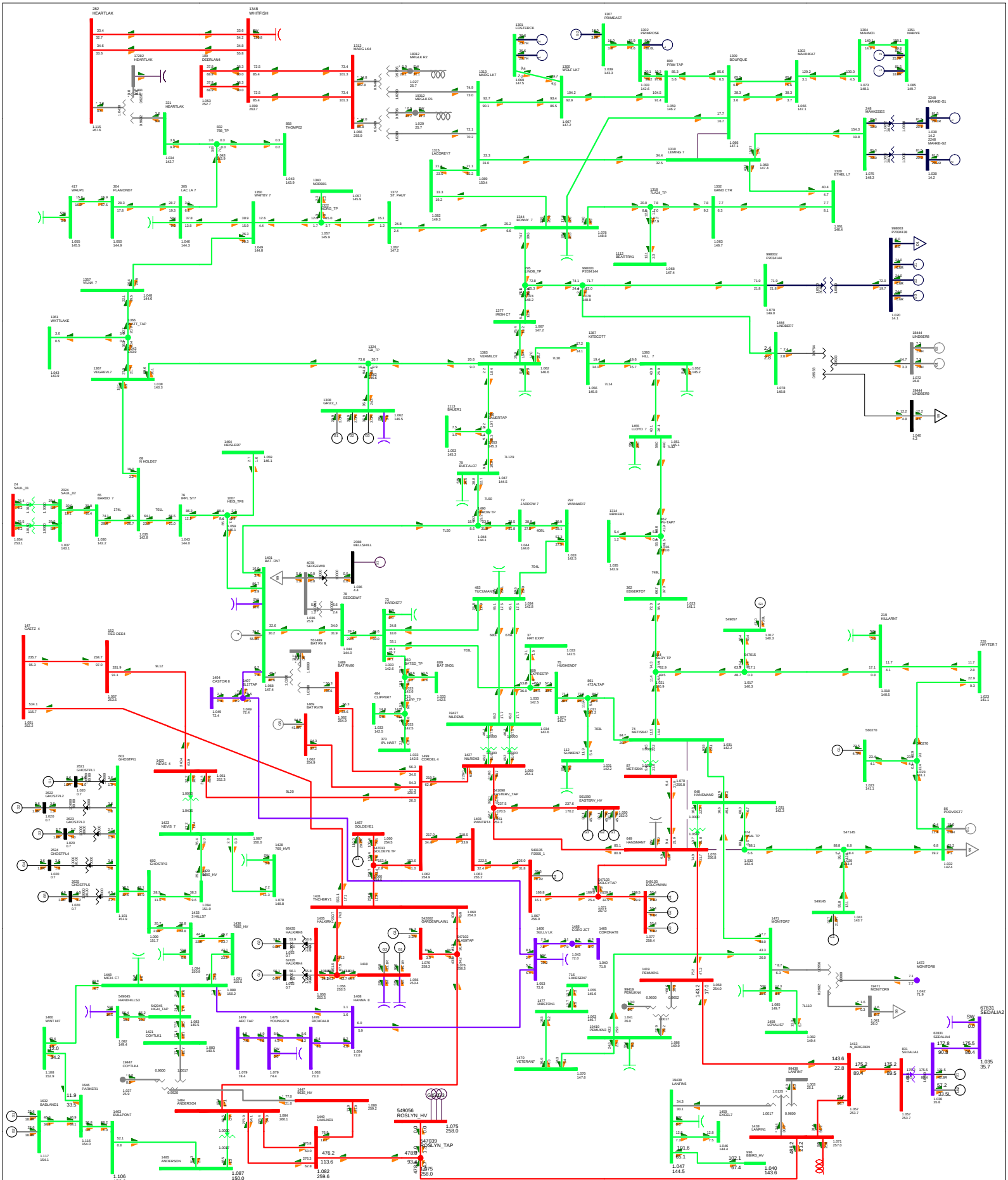
Study Case Description

2028SL POST-PROJ

Base Case

P2034 Cold Lake Area Cogen

Bus - VOLTAGE (kV/PU)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%RATEA
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A3- 2

Contingency

CONT 036: 7L583 (970S Bourque - 715S Leming Lake)

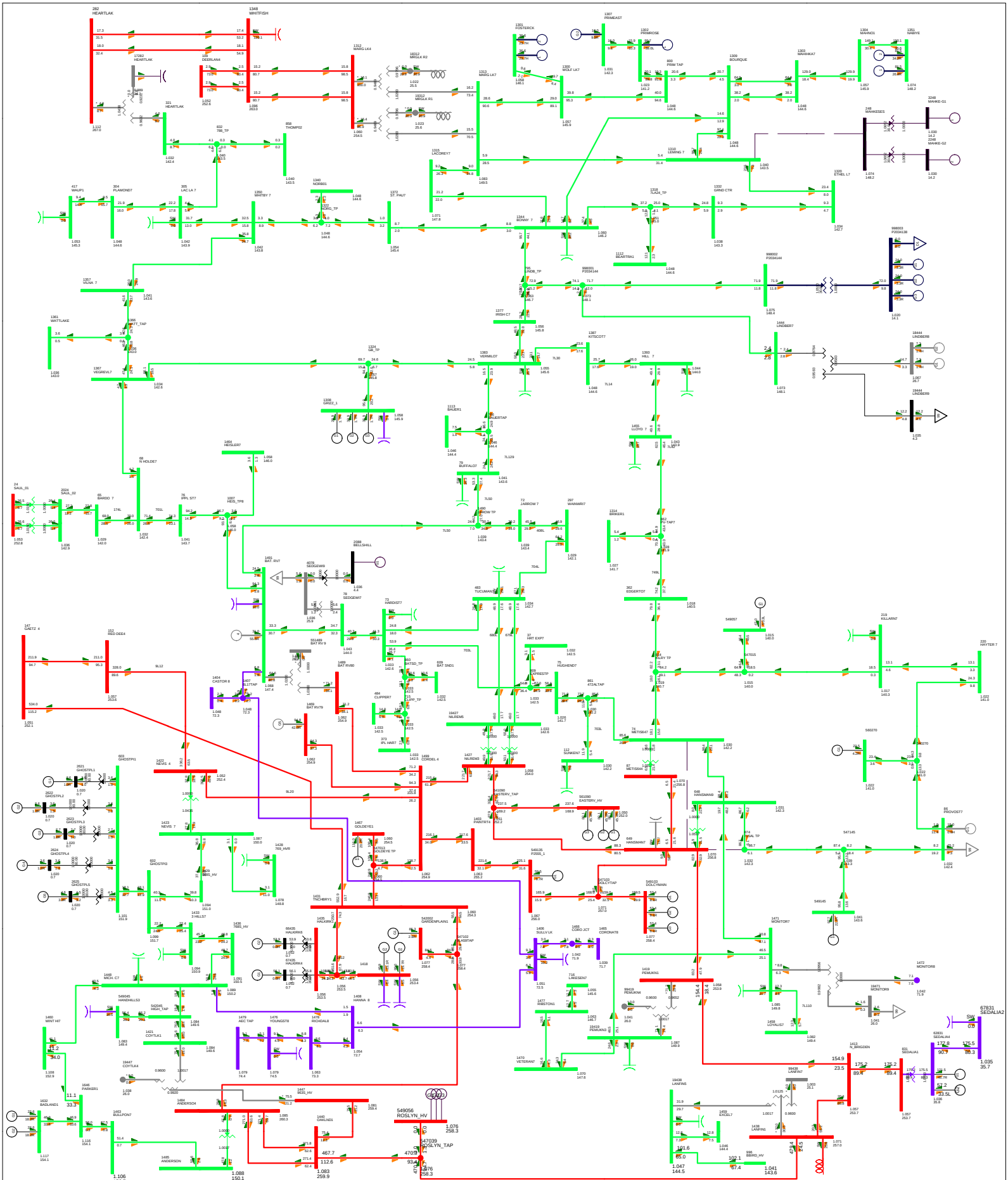
Study Case Description

2028SL POST-PROJ

Base Case

P2034 Cold Lake Area Cogen

Bus - VOLTAGE (kV/PU)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%RATEA
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A3- 2

Contingency

CONT 037: 7L95 (889S Mahkeses - 715S Leming Lake)

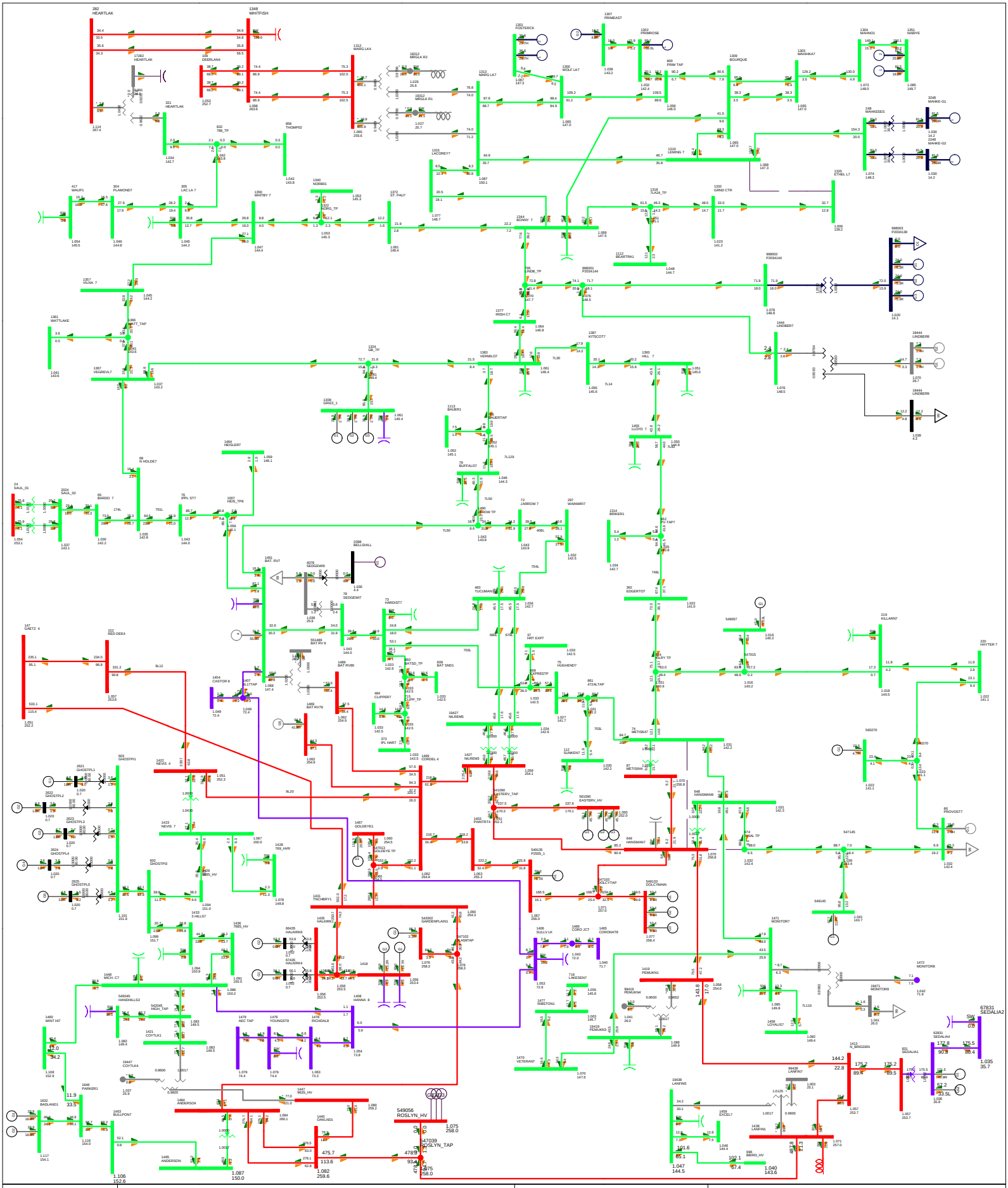
Study Case Description

2028SL POST-PROJ

Base Case

P2034 Cold Lake Area Cogen

Bus - VOLTAGE (kV/PU)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%RATEA
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A3- 2

Contingency

CONT 038: 7L66 (715S Leming Lake - 717S Ethel Lake)

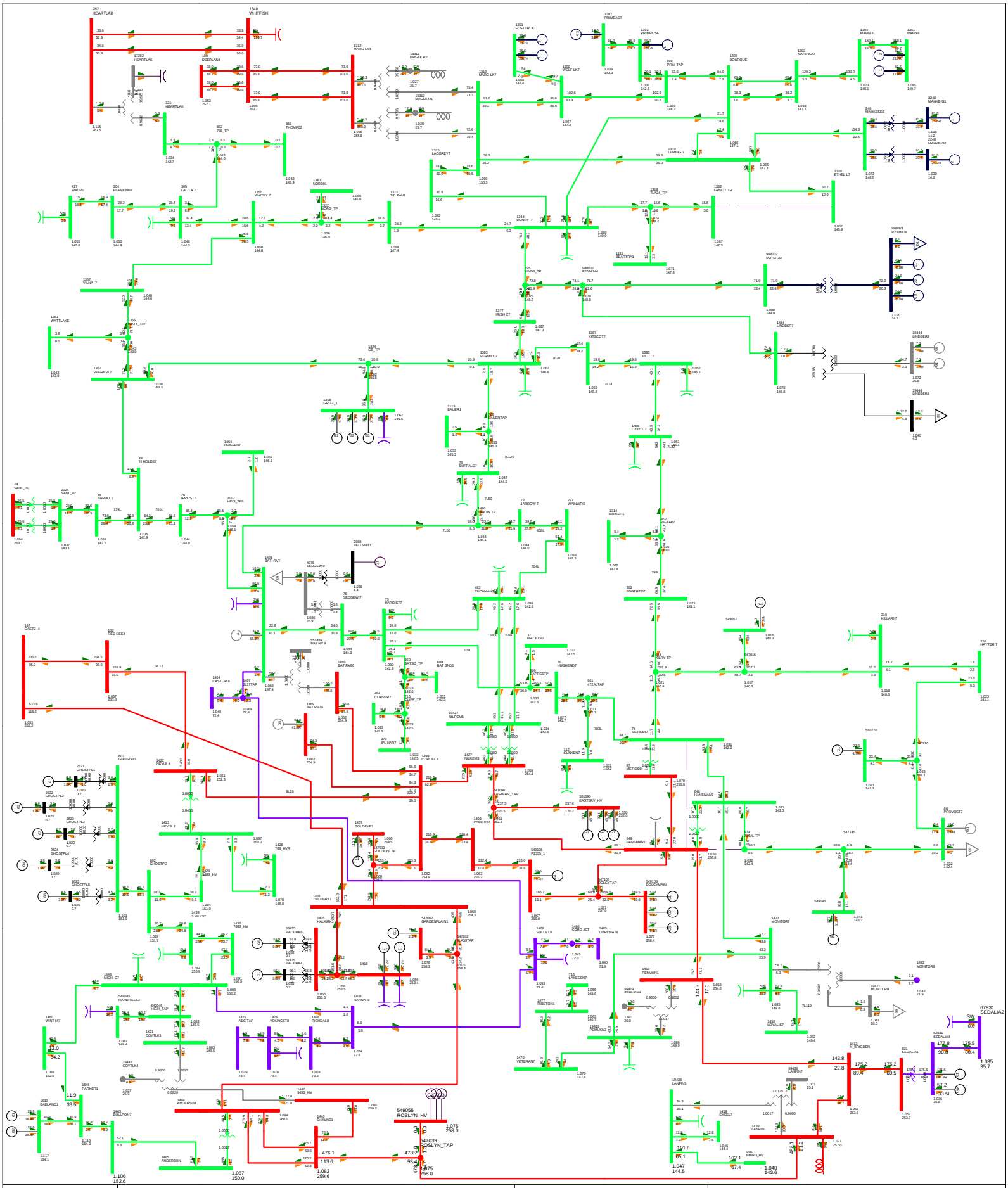
Study Case Description

2028SL POST-PROJ

Base Case

P2034 Cold Lake Area Cogen

Bus - VOLTAGE (kV/PU)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%RATEA
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A3- 2

Contingency

CONT 039: 7L28 (717S Ethel Lake - 846S Grand Centre)

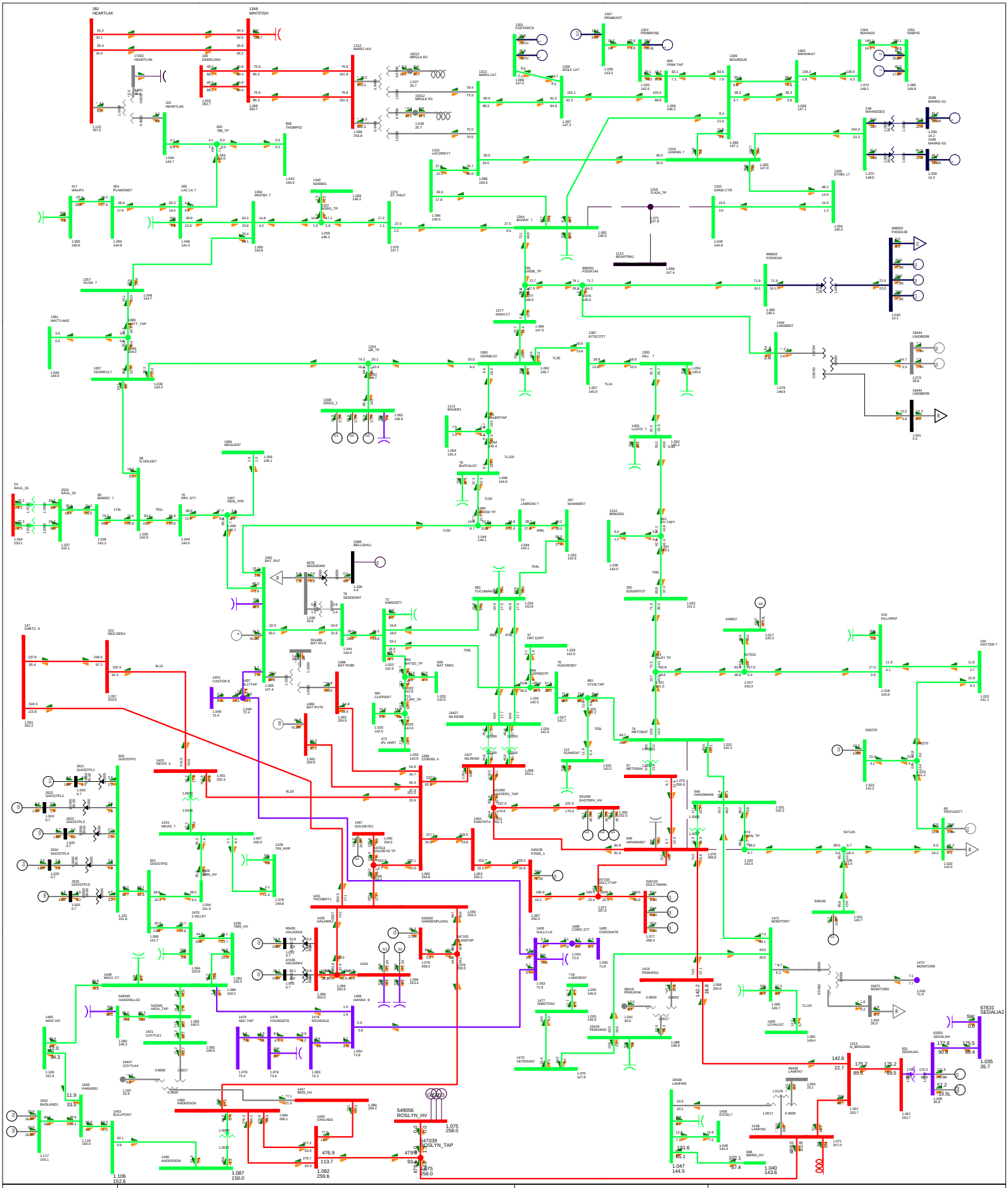
Study Case Description

2028SL POST-PROJ

Base Case

P2034 Cold Lake Area Cogen

Bus - VOLTAGE (kV/PU)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%RATEA
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A3- 2

Contingency

CONT 040: 7L24 (846S Grand Centre - 700S Bonnyville - 940S Beartrap)

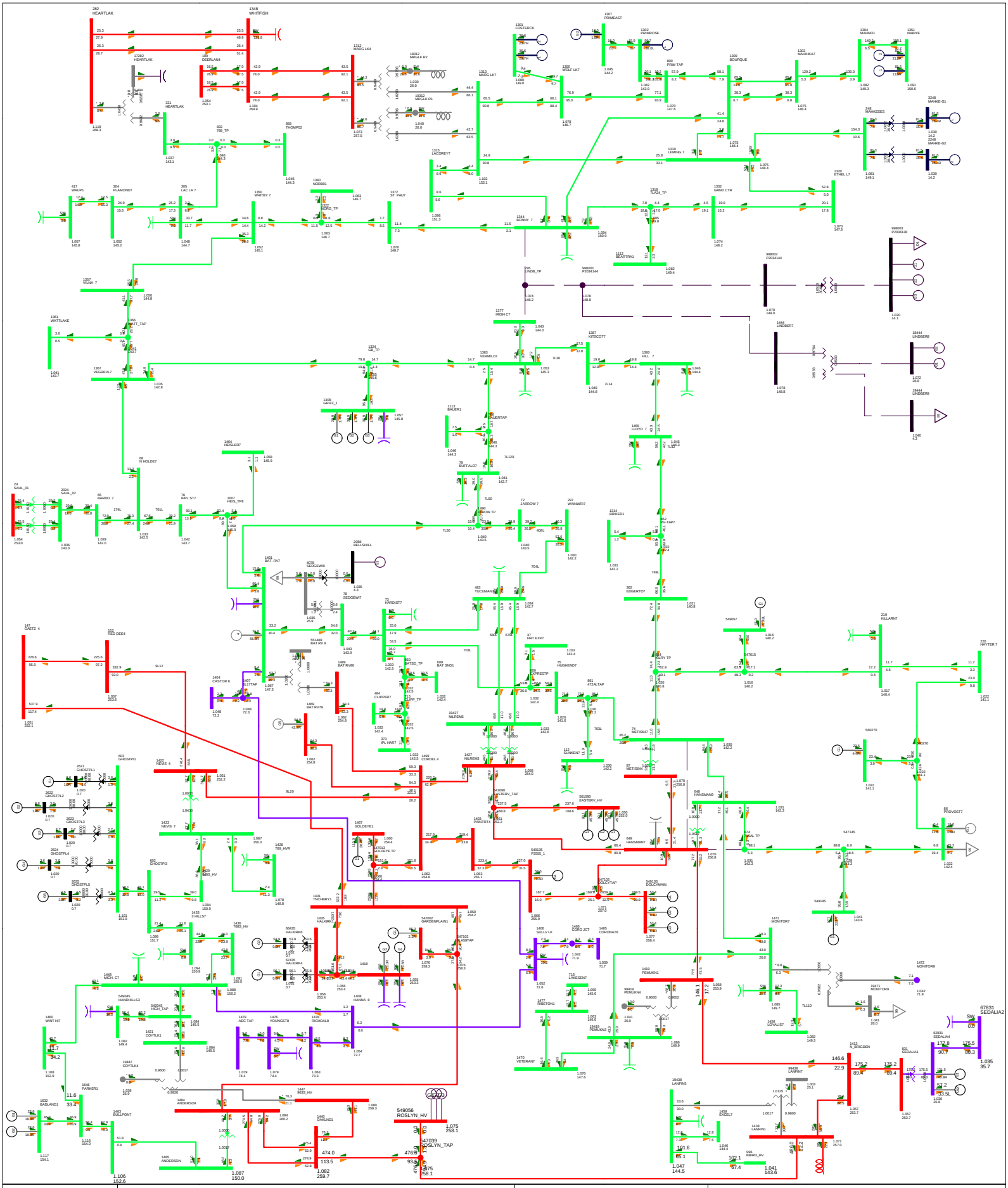
Study Case Description

2028SL POST-PROJ

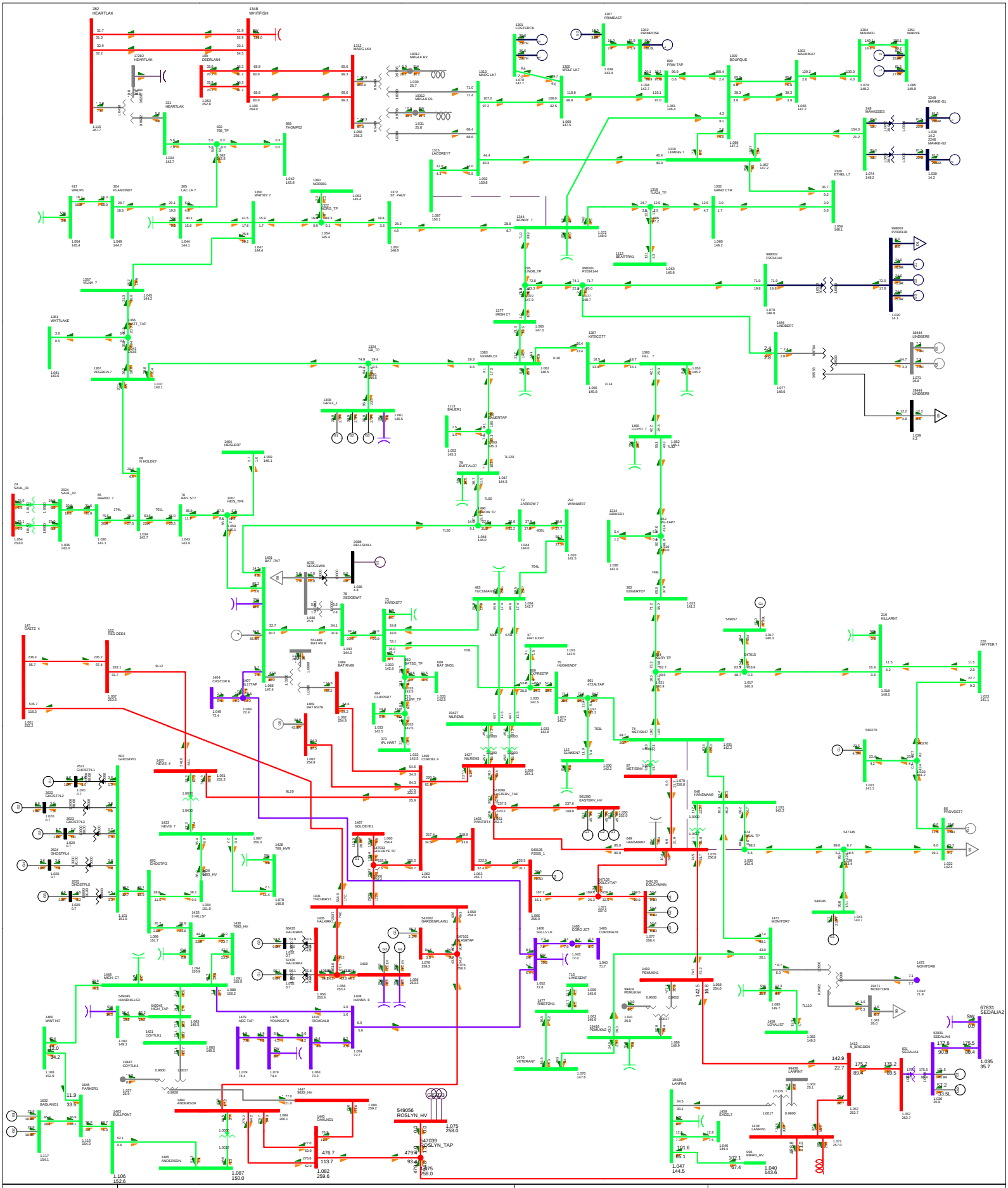
Base Case

P2034 Cold Lake Area Cogen

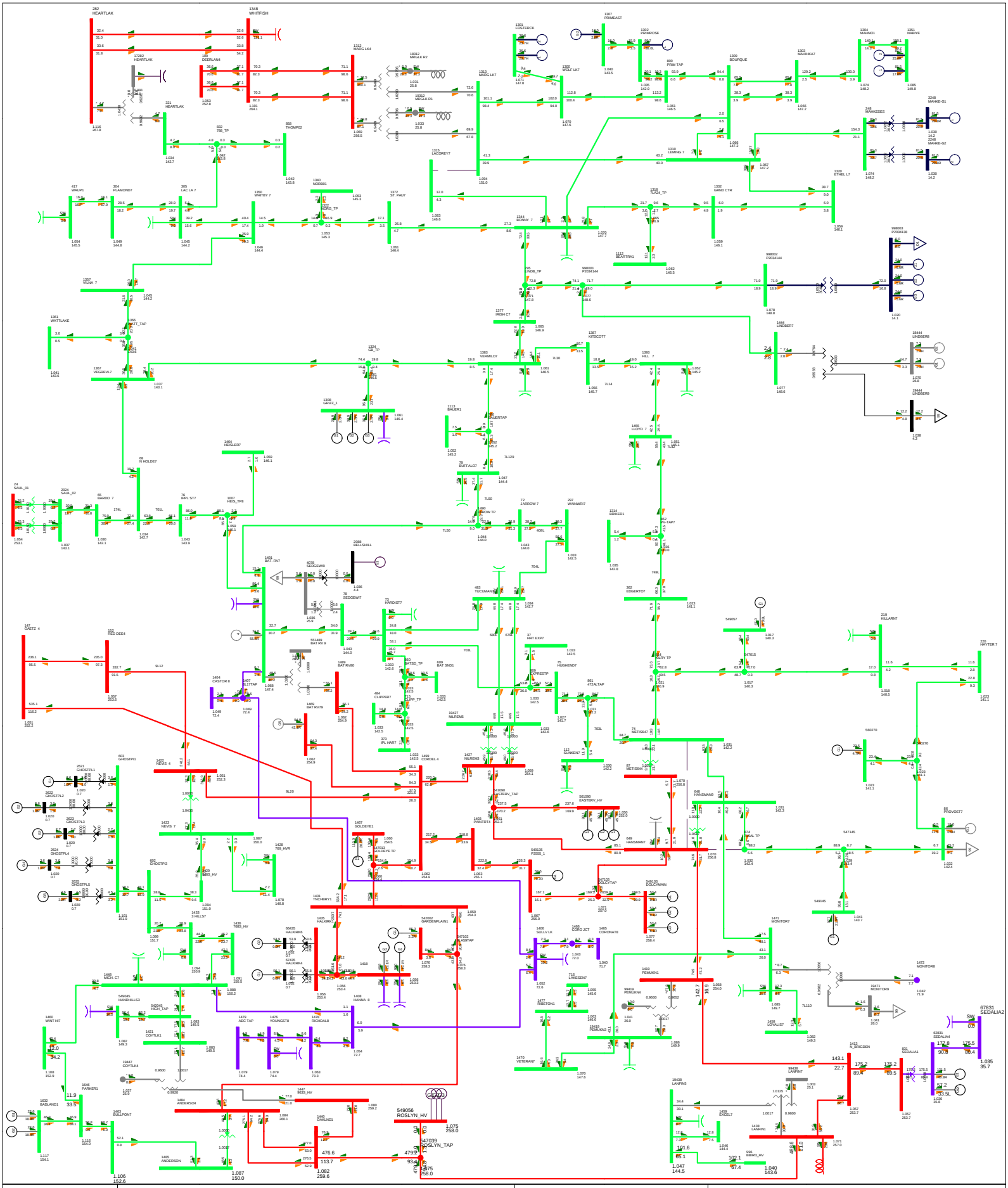
Bus - VOLTAGE (kV/PU)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%RATEA
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



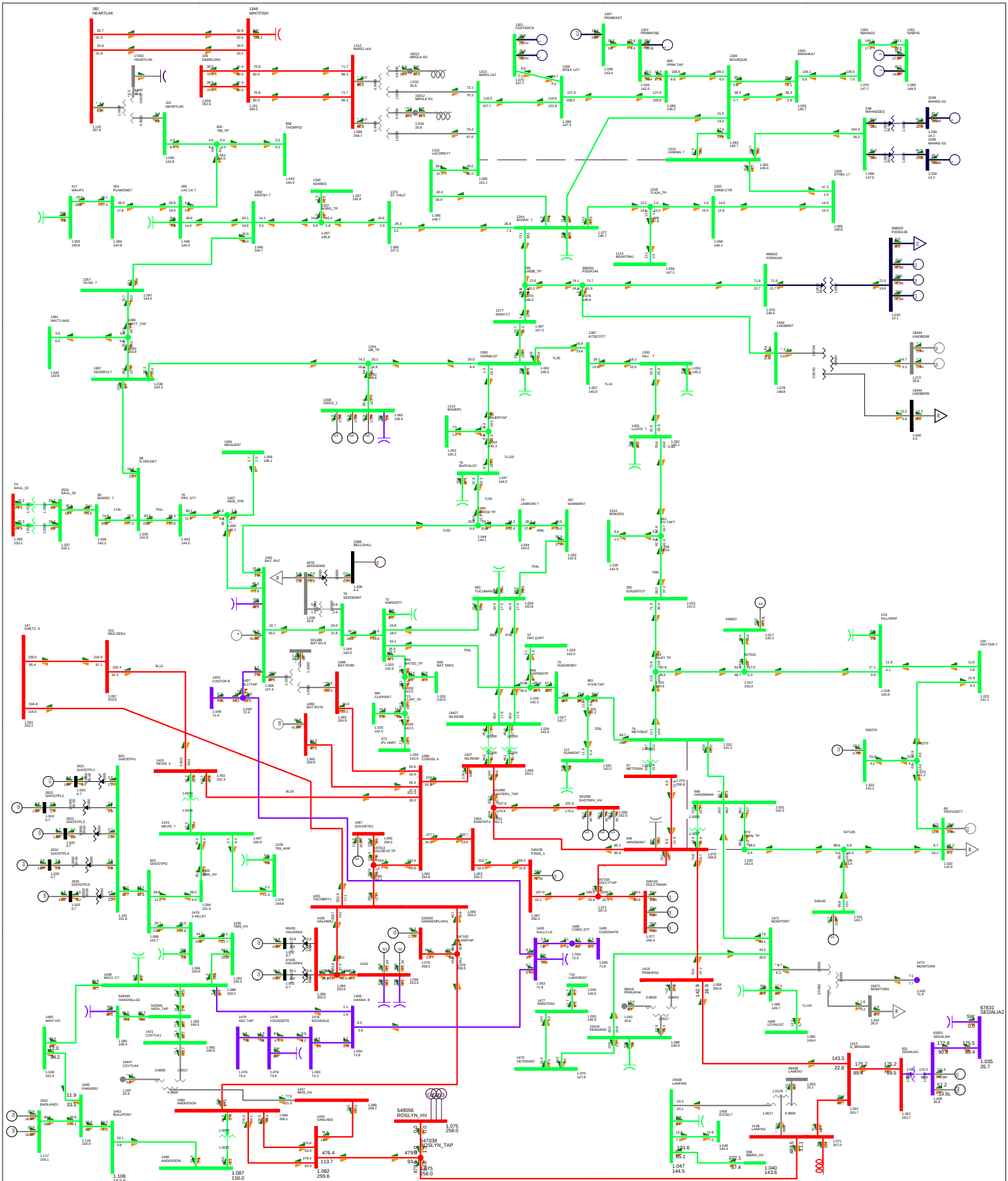
Attachment A3- 2	Contingency	Study Case Description	P2034 Cold Lake Area Cogen
	CONT 041: 7L53 (700S Bonnyville - 706S Irish Creek - 969S Lindbergh)	2028SL POST-PROJ Base Case	Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



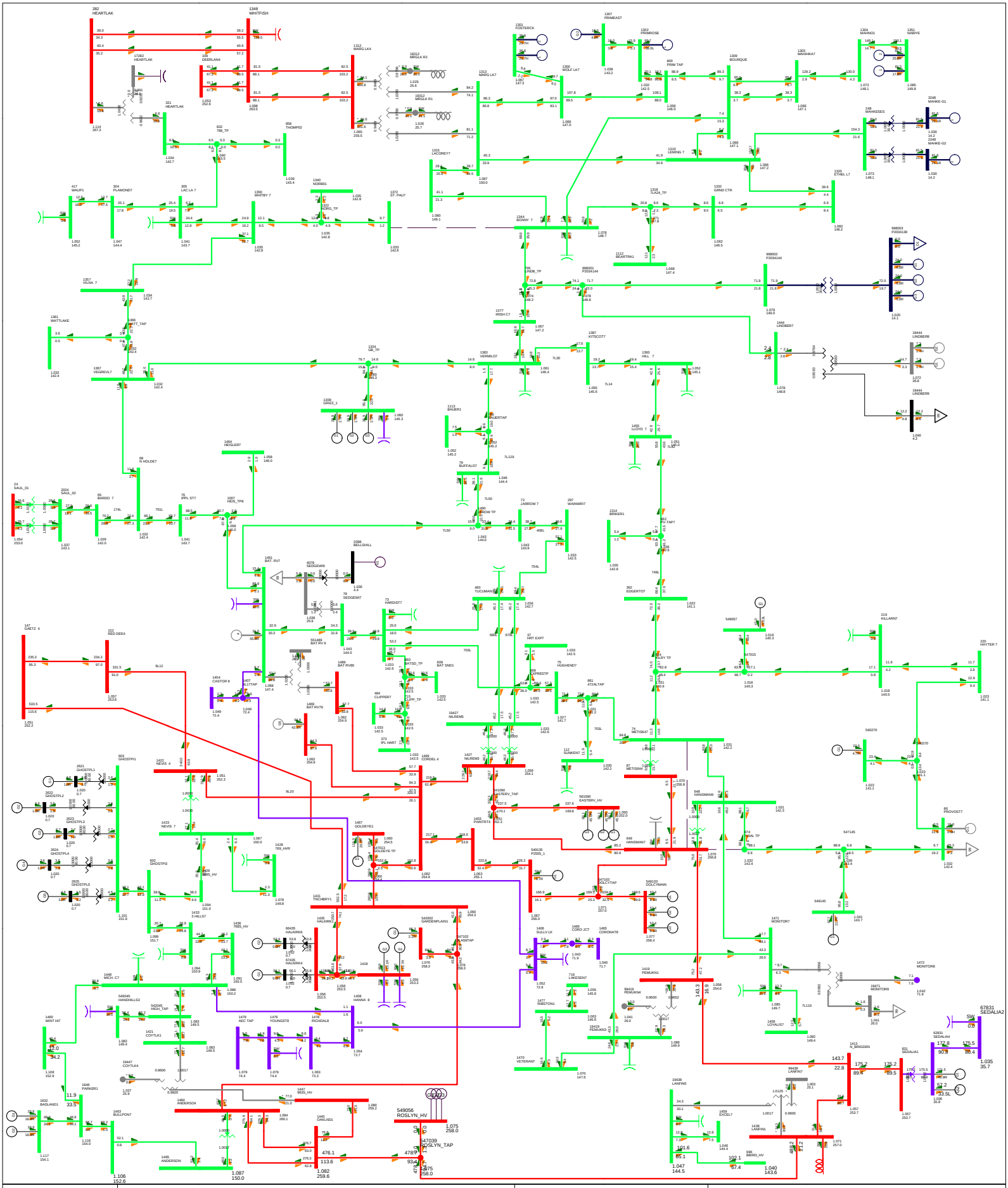
Attachment A3- 2	Contingency	Study Case Description	P2034 Cold Lake Area Cogen
	CONT 042: 7L89 (721S Lacorey - 700S Bonnyville)	2028SL POST-PROJ Base Case	Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A3- 2	Contingency	Study Case Description	P2034 Cold Lake Area Cogen
	CONT 043: 7L89 (826S Marguerite Lake - 721S Lacorey)	2028SL POST-PROJ Base Case	Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A3- 2	Contingency	Study Case Description	P2034 Cold Lake Area Cogen
	CONT 044: 7L91 (715S Leming Lake - 826S Marguerite Lake)	2028SL POST-PROJ Base Case	Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A3- 2

Contingency

CONT 045: 7L70 (700S Bonnyville - 707S St.Paul)

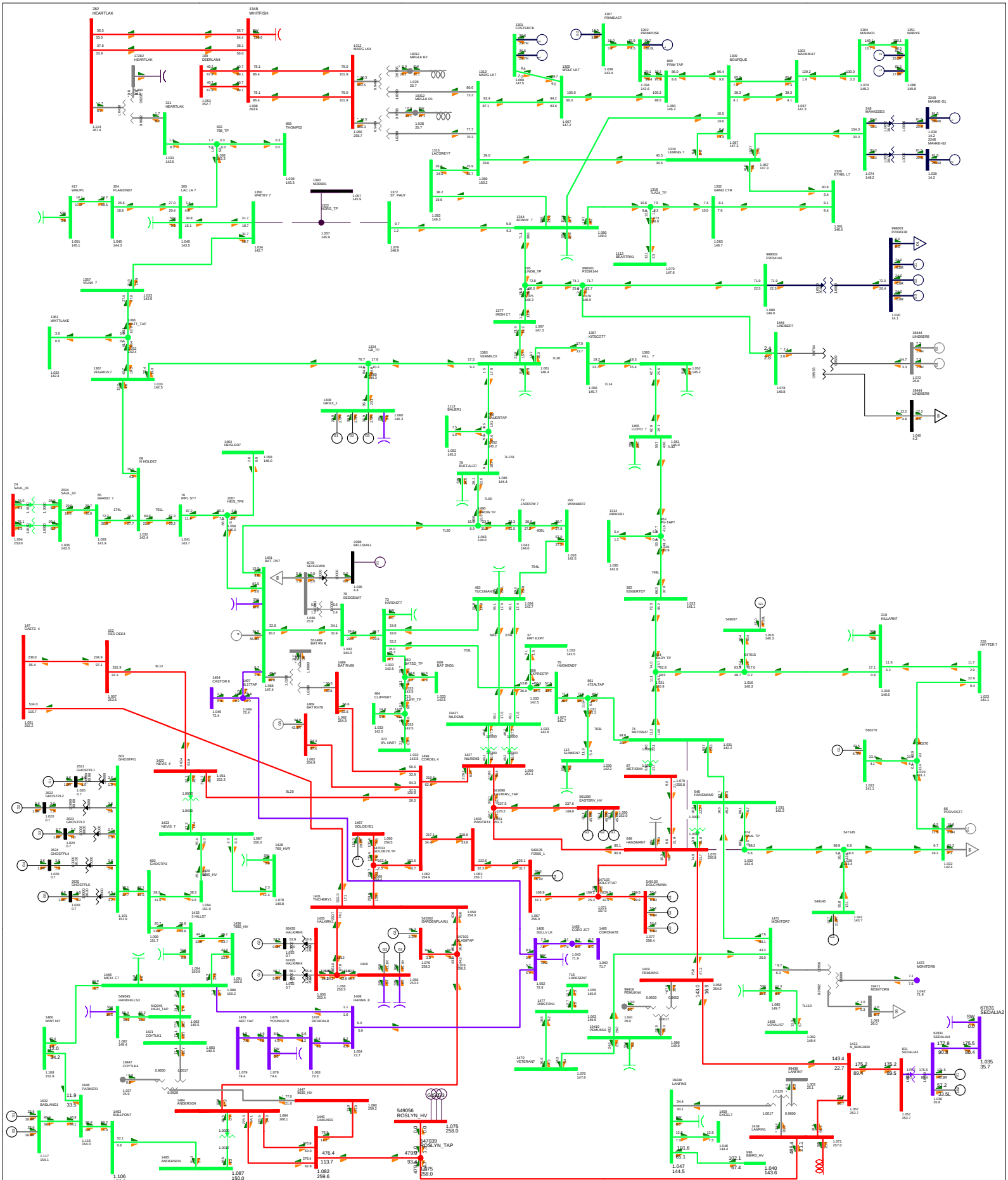
Study Case Description

2028SL POST-PROJ

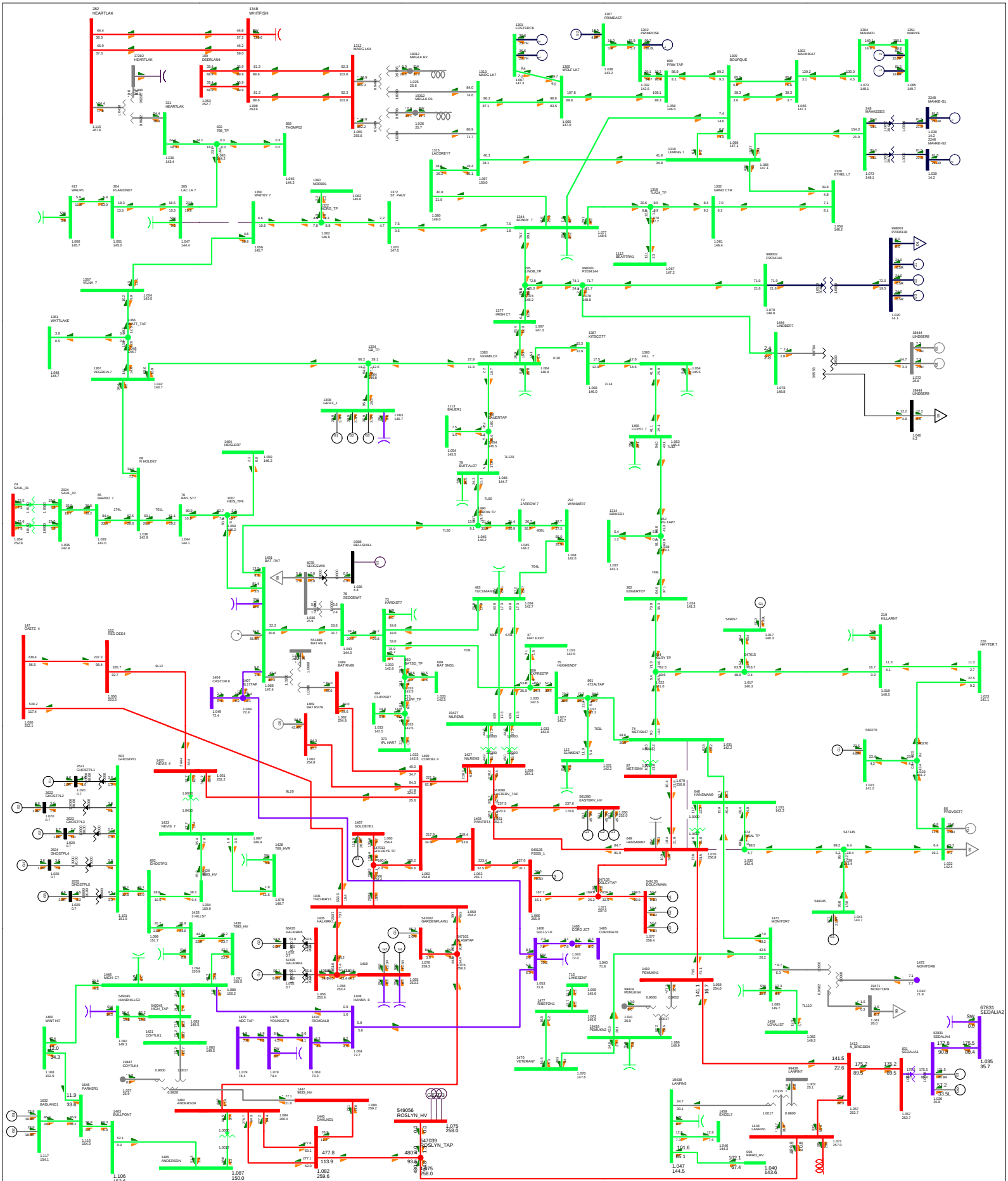
Base Case

P2034 Cold Lake Area Cogen

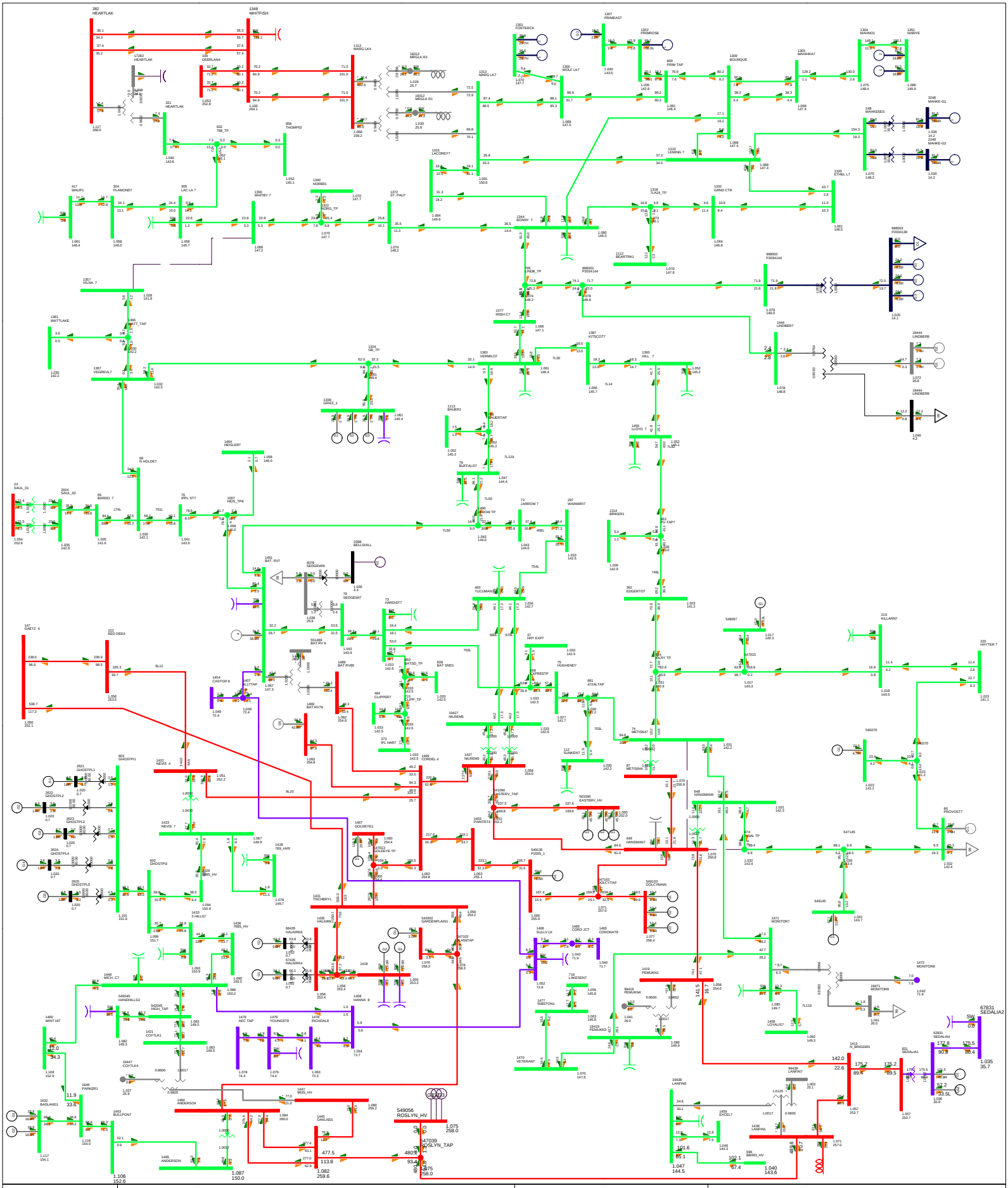
Bus - VOLTAGE (kV/PU)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%RATEA
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A3- 2	Contingency	Study Case Description	P2034 Cold Lake Area Cogen
	CONT 046: 7L139 (819S Whitbylake - 707S St.Paul - 936S Norberg)	2028SL POST-PROJ Base Case	Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A3- 2	Contingency	Study Case Description	P2034 Cold Lake Area Cogen
	CONT 047: 794L & 7L94 (157S Lac La Biche - 819S Whitbylake)	2028SL POST-PROJ Base Case	Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A3- 2

Contingency

CONT 048: 7L92 (819S Whitbylake - 777S Vilna)

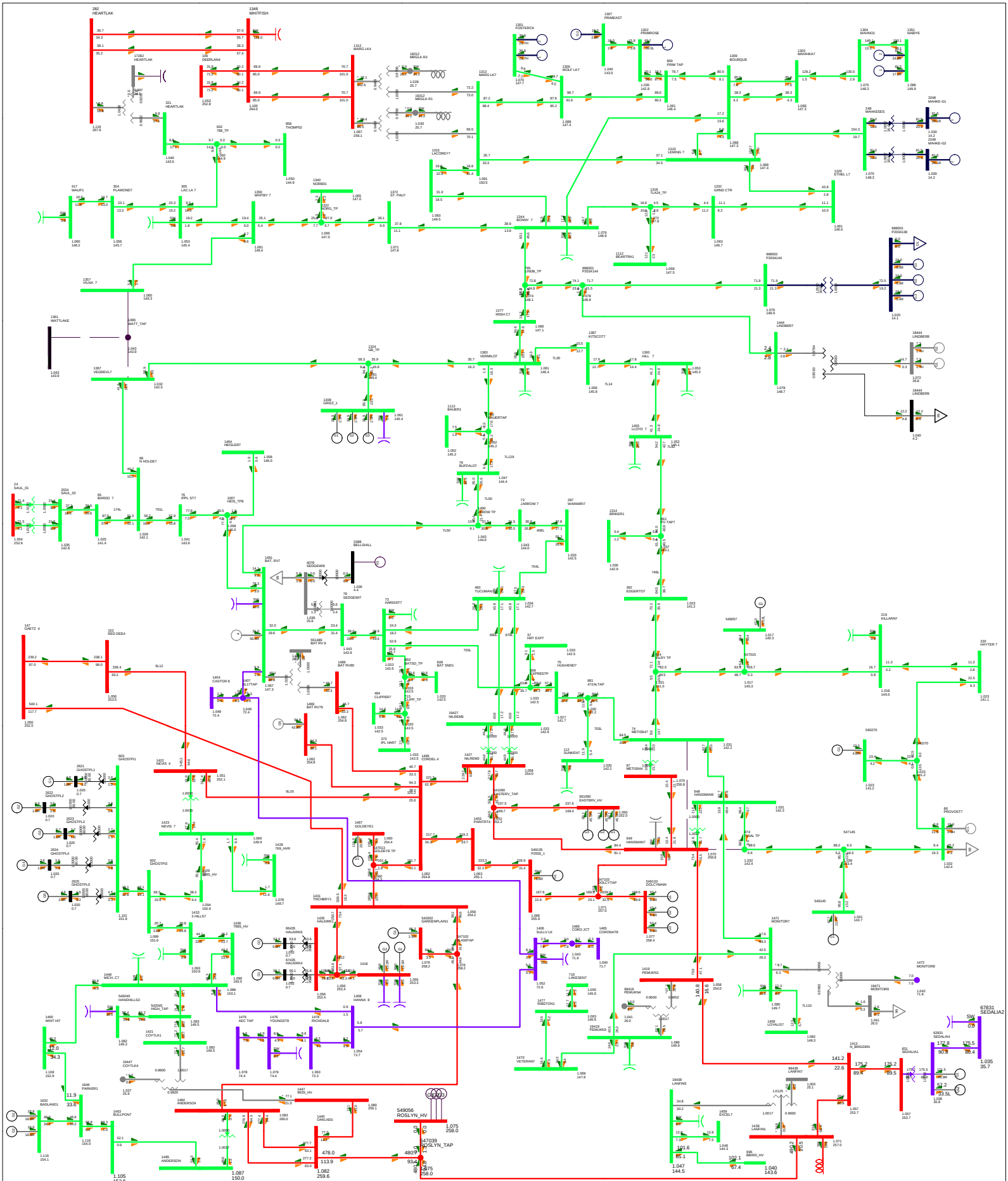
Study Case Description

2028SL POST-PROJ

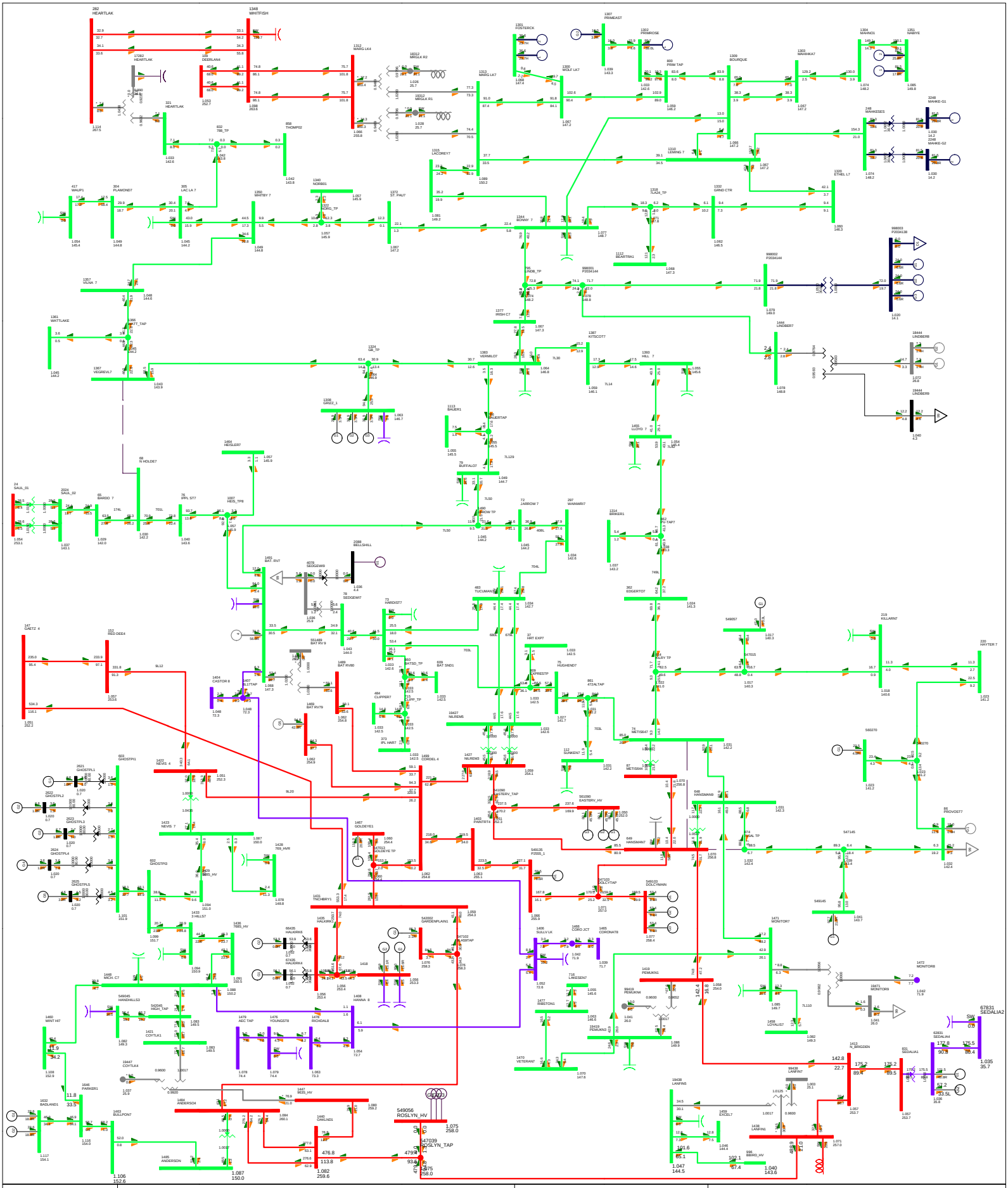
Base Case

P2034 Cold Lake Area Cogen

Bus - VOLTAGE (kV/PU)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%RATEA
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A3- 2	**Contingency** CONT 049: 7L92 (777S Vilna - 709S Vegreville - 956S Watt Lake)	**Study Case Description** 2028SL POST-PROJ Base Case	**P2034 Cold Lake Area Cogen** Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A3- 2

Contingency

CONT 050: 7L77 (395S North Holden - 709S Vegreville)

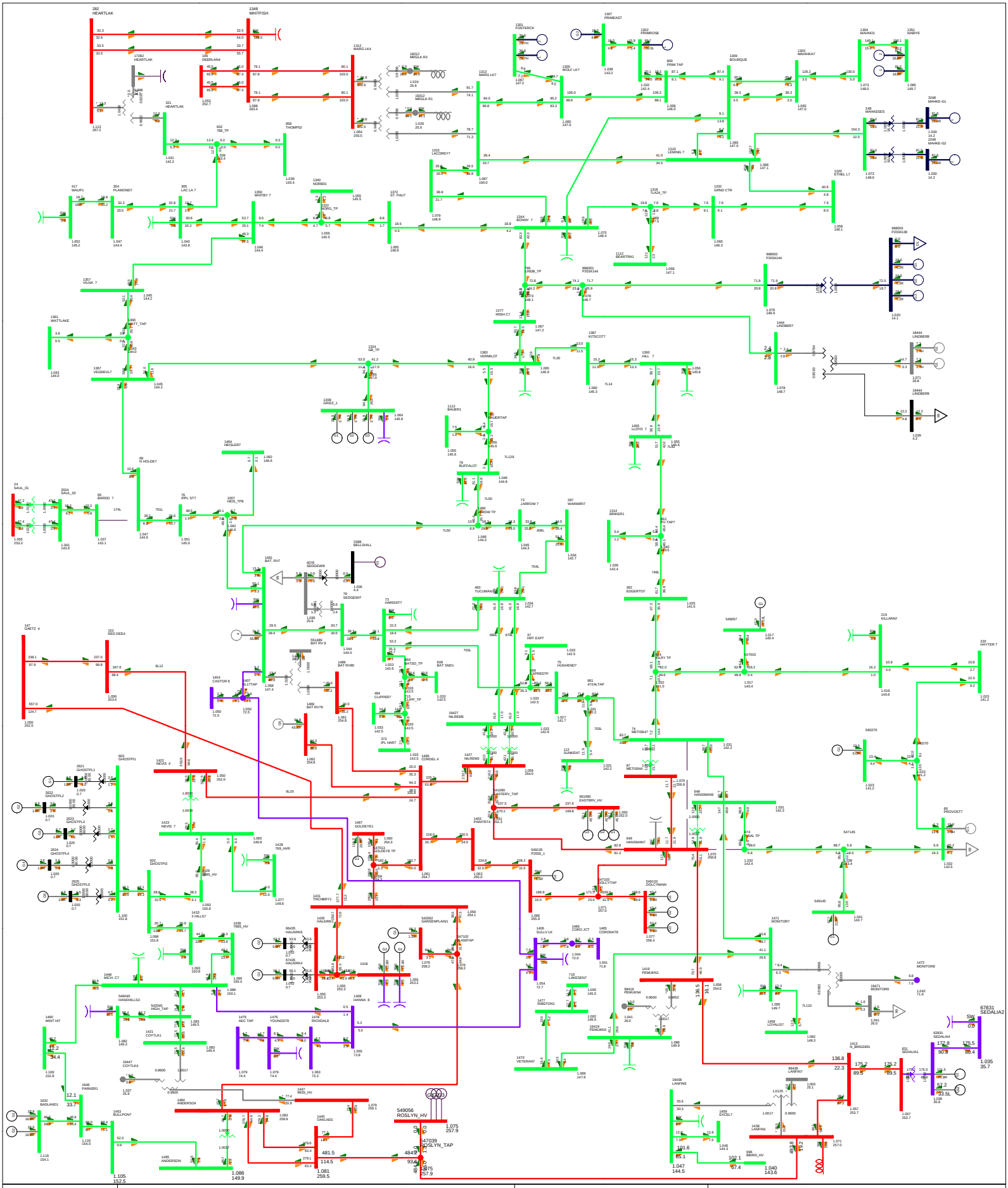
Study Case Description

2028SL POST-PROJ

Base Case

P2034 Cold Lake Area Cogen

Bus - VOLTAGE (kV/PU)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%RATEA
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A3- 2

Contingency

CONT 051: 174L (197S Bardo - 395S North Holden)

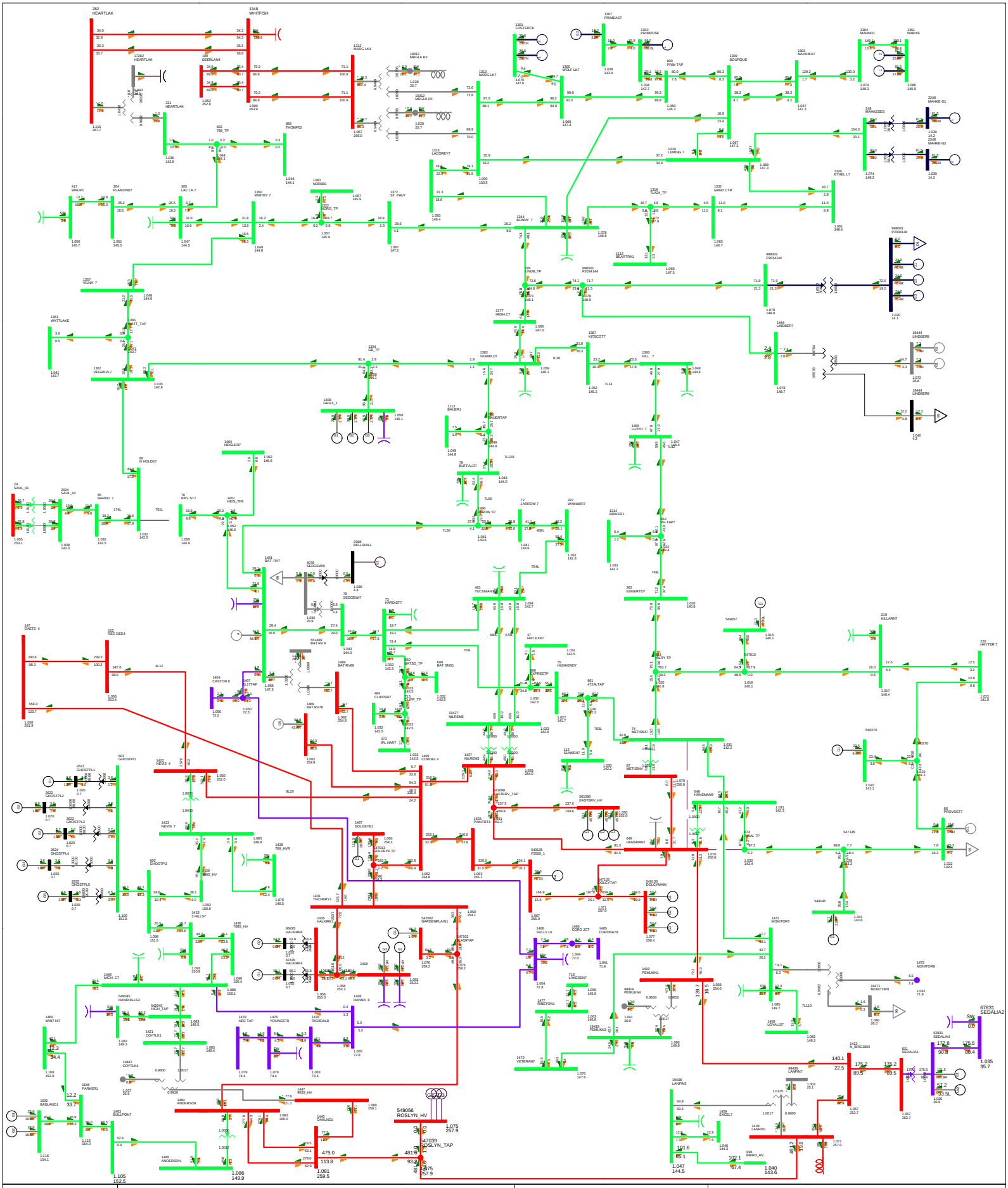
Study Case Description

2028SL POST-PROJ

Base Case

P2034 Cold Lake Area Cogen

Bus - VOLTAGE (kV/PU)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%RATEA
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A3- 2

Contingency

CONT 052: 701L (395S North Holden - 223S Strome)

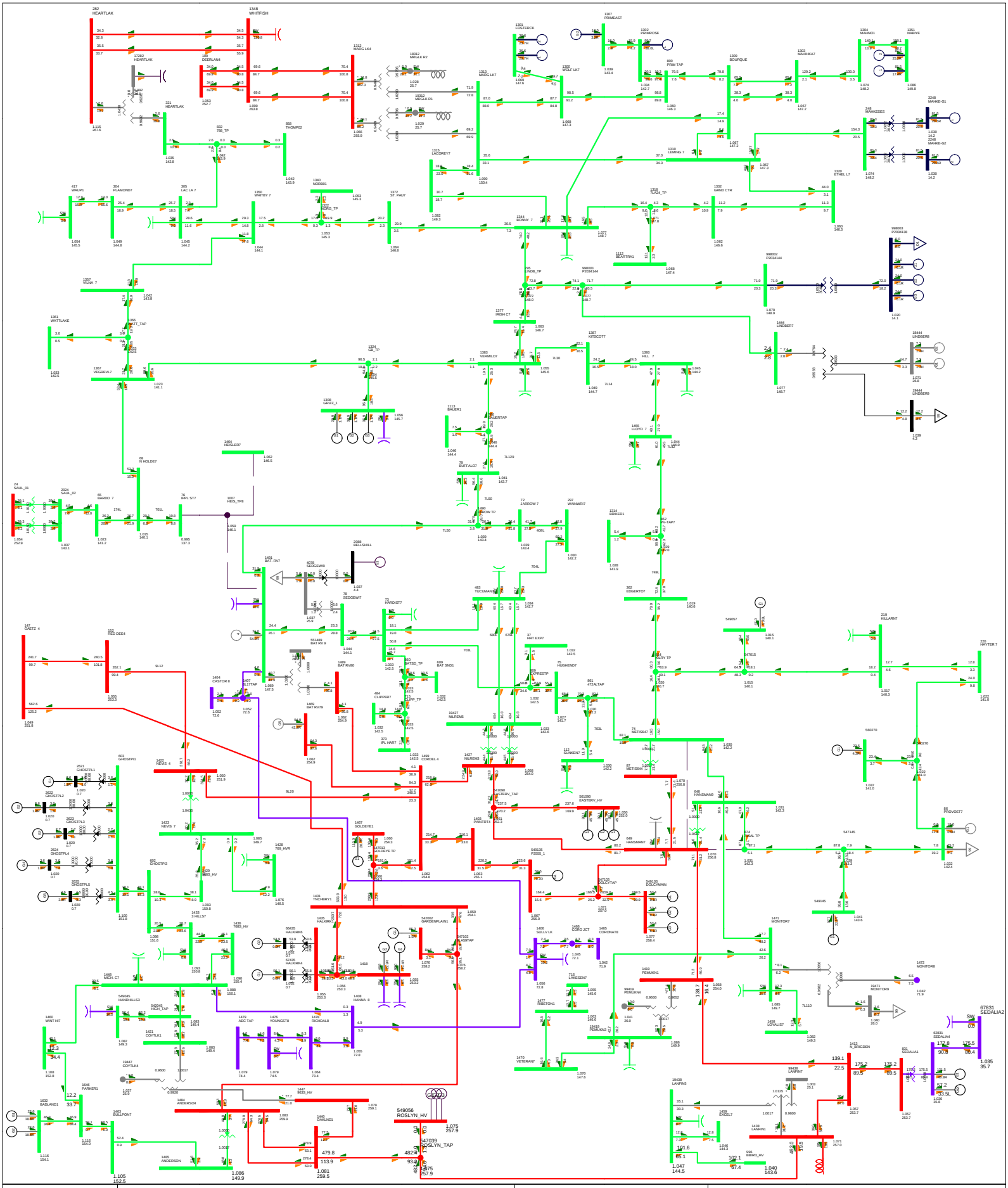
Study Case Description

2028SL POST-PROJ

Base Case

P2034 Cold Lake Area Cogen

Bus - VOLTAGE (kV/PU)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%RATEA
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A3- 2

Contingency

CONT 053: 701L (223S Strome - 757S Battle River - 764S Heisler)

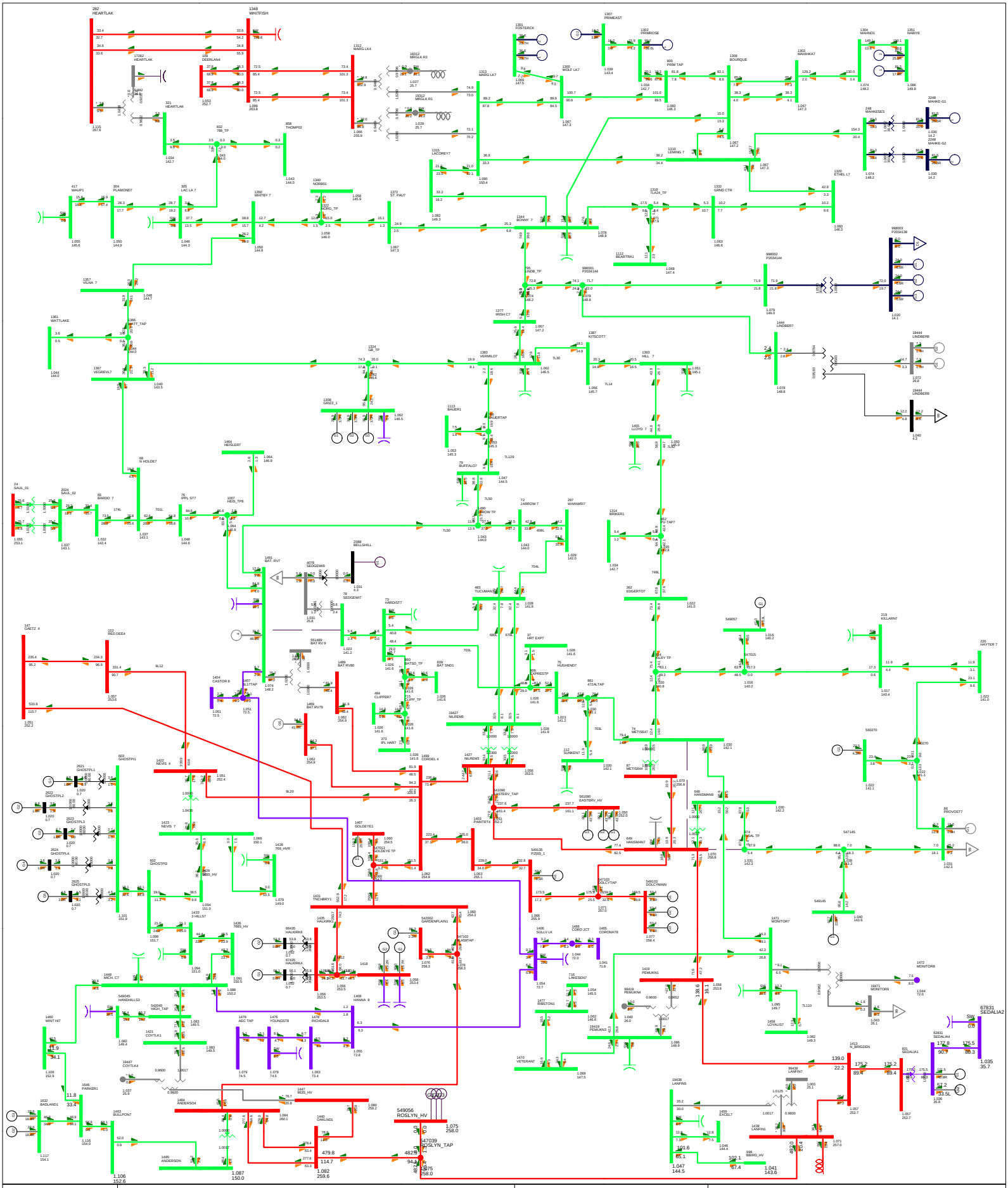
Study Case Description

2028SL POST-PROJ

Base Case

P2034 Cold Lake Area Cogen

Bus - VOLTAGE (kV/PU)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%RATEA
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A3- 2

Contingency

CONT 054: 7L702 (137S Sedgewick - 757S Battle River)

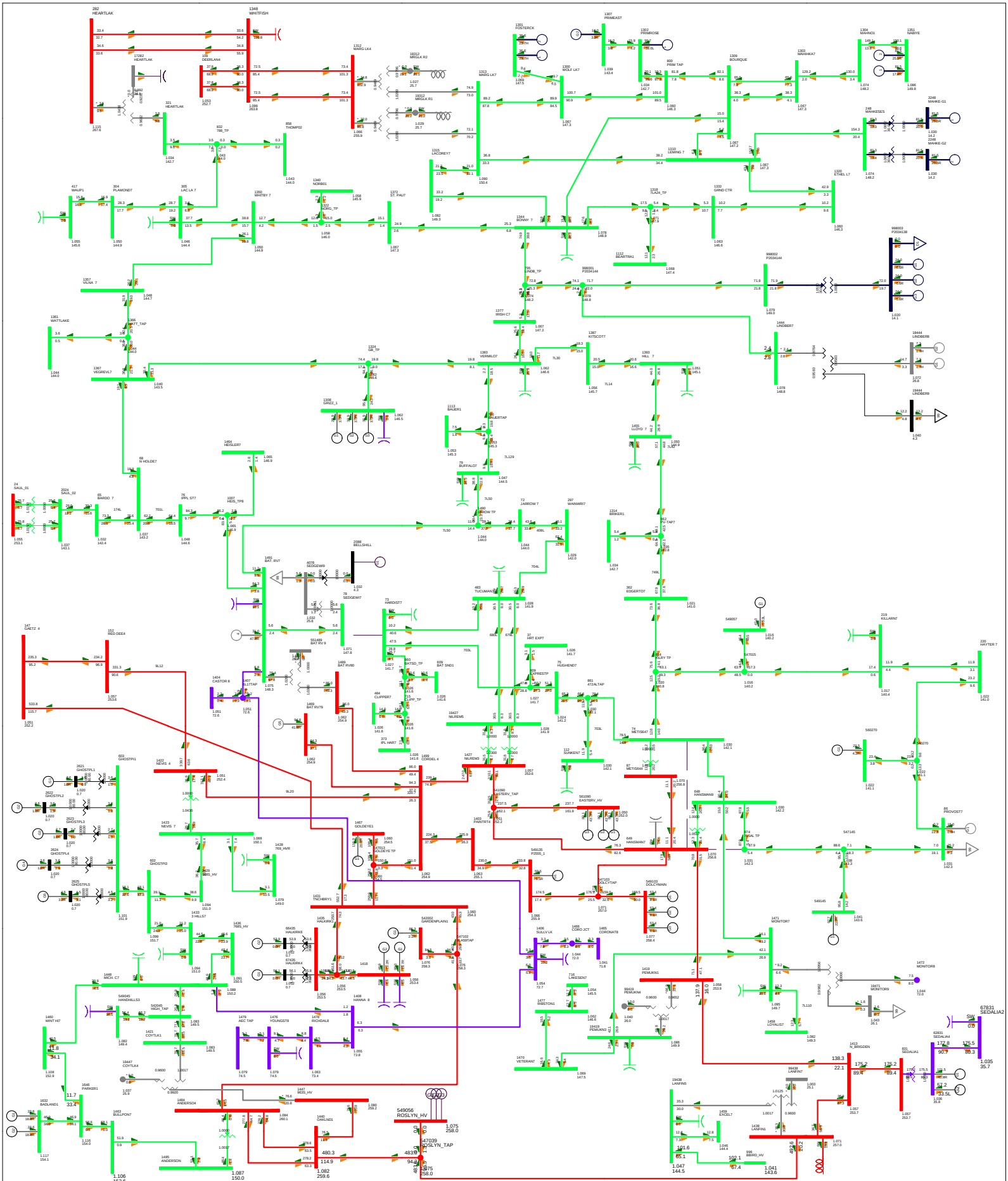
Study Case Description

2028SL POST-PROJ

Base Case

P2034 Cold Lake Area Cogen

Bus - VOLTAGE (kV/PU)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%RATEA
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A3- 2

Contingency

CONT 055: 702L (377S Hardisty - 137S Sedgewick)

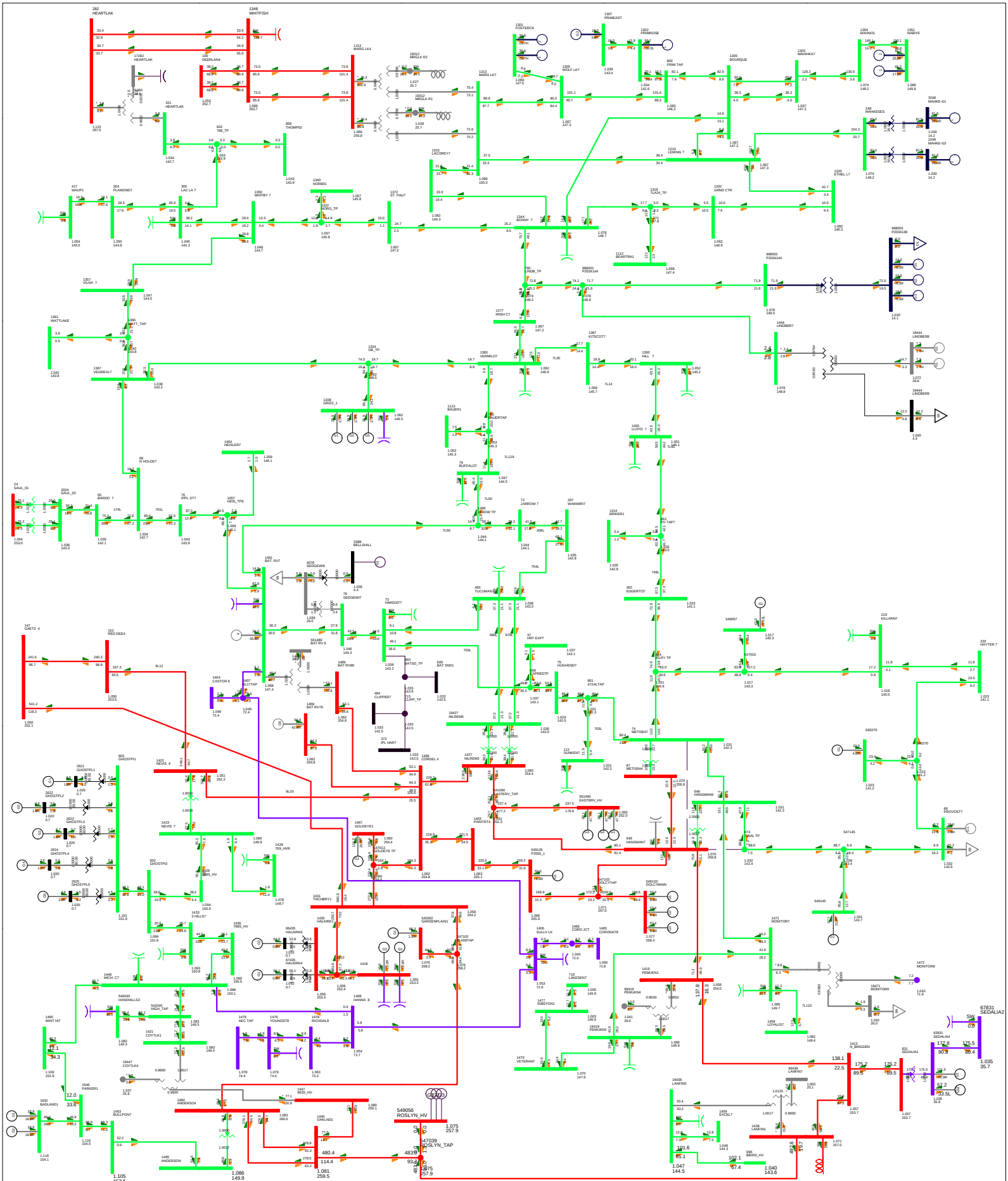
Study Case Description

2028SL POST-PROJ

Base Case

P2034 Cold Lake Area Cogen

Bus - VOLTAGE (kV/PU)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%RATEA
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A3- 2

Contingency

CONT 056: 769L (377S Hardisty - 594S Battle Sands - 296S Rosyth - 656S Clipper)

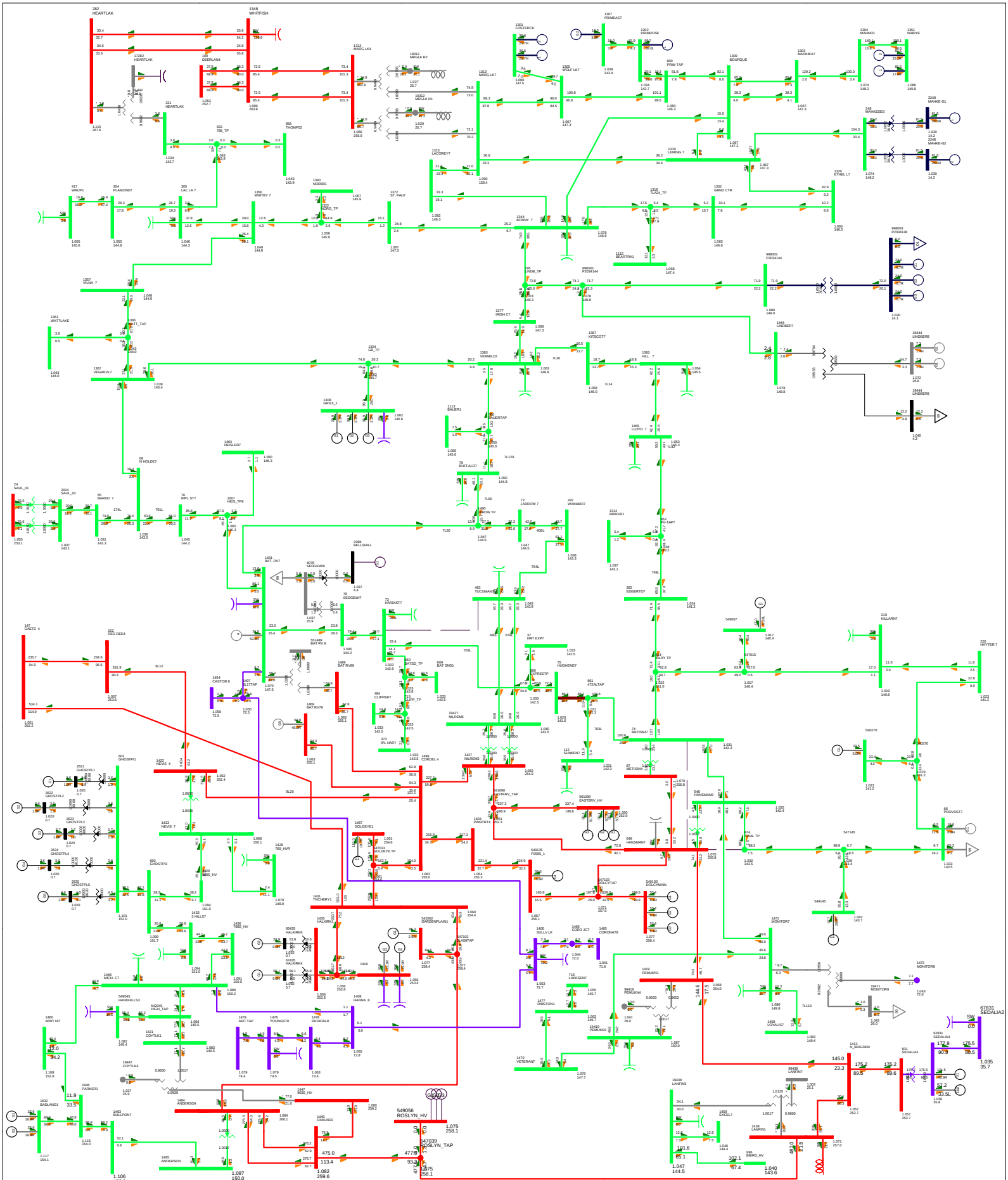
Study Case Description

2028SL POST-PROJ

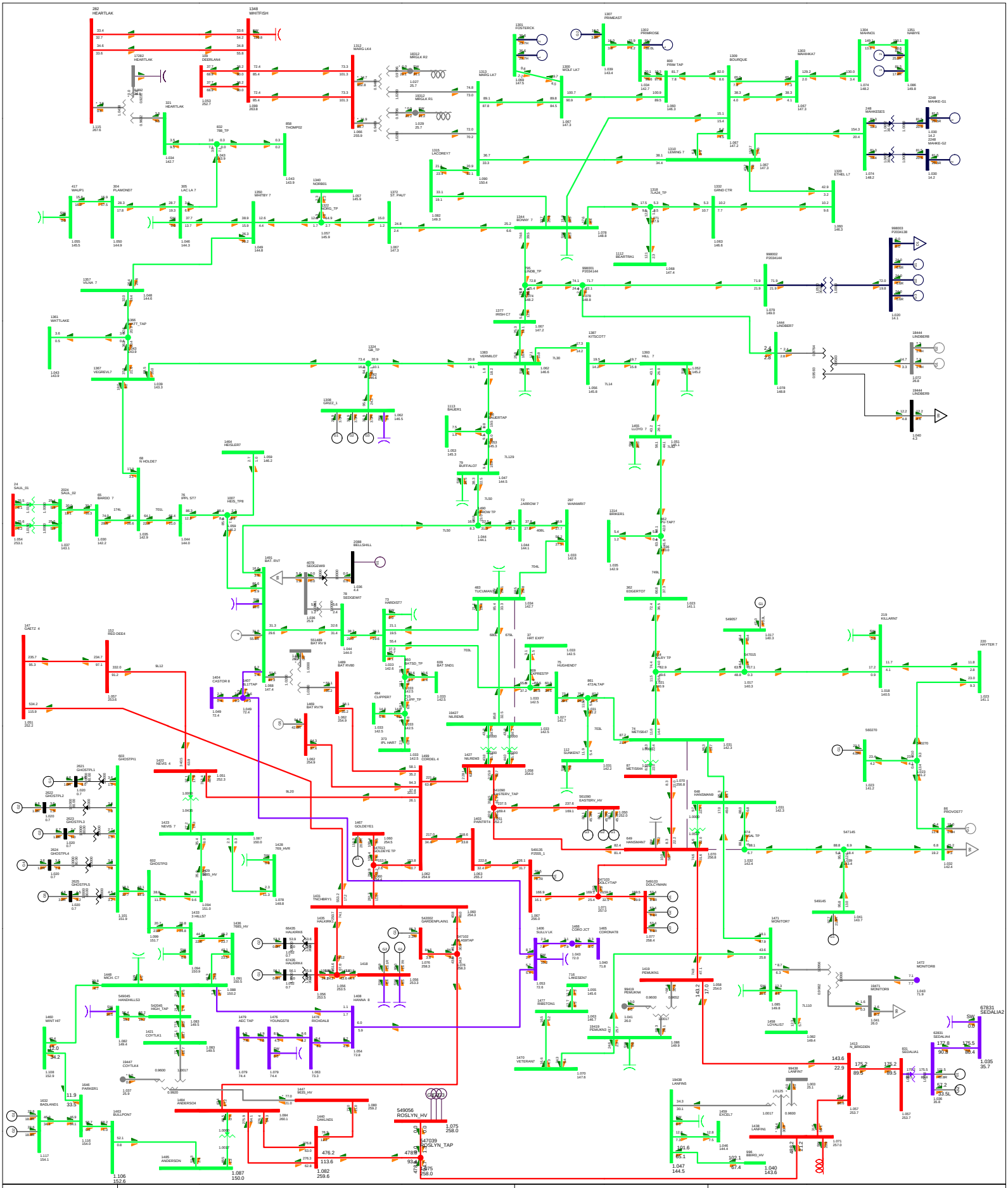
Base Case

P2034 Cold Lake Area Cogen

Bus - VOLTAGE (kV/PU)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%RATEA
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A3- 2	**Contingency** CONT 057: 681L (377S Hardisty - 478S Tucuman)	**Study Case Description** 2028SL POST-PROJ Base Case	**P2034 Cold Lake Area Cogen** Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A3- 2

Contingency

CONT 058: 679L (478S Tucuman - 574S Nilrem)

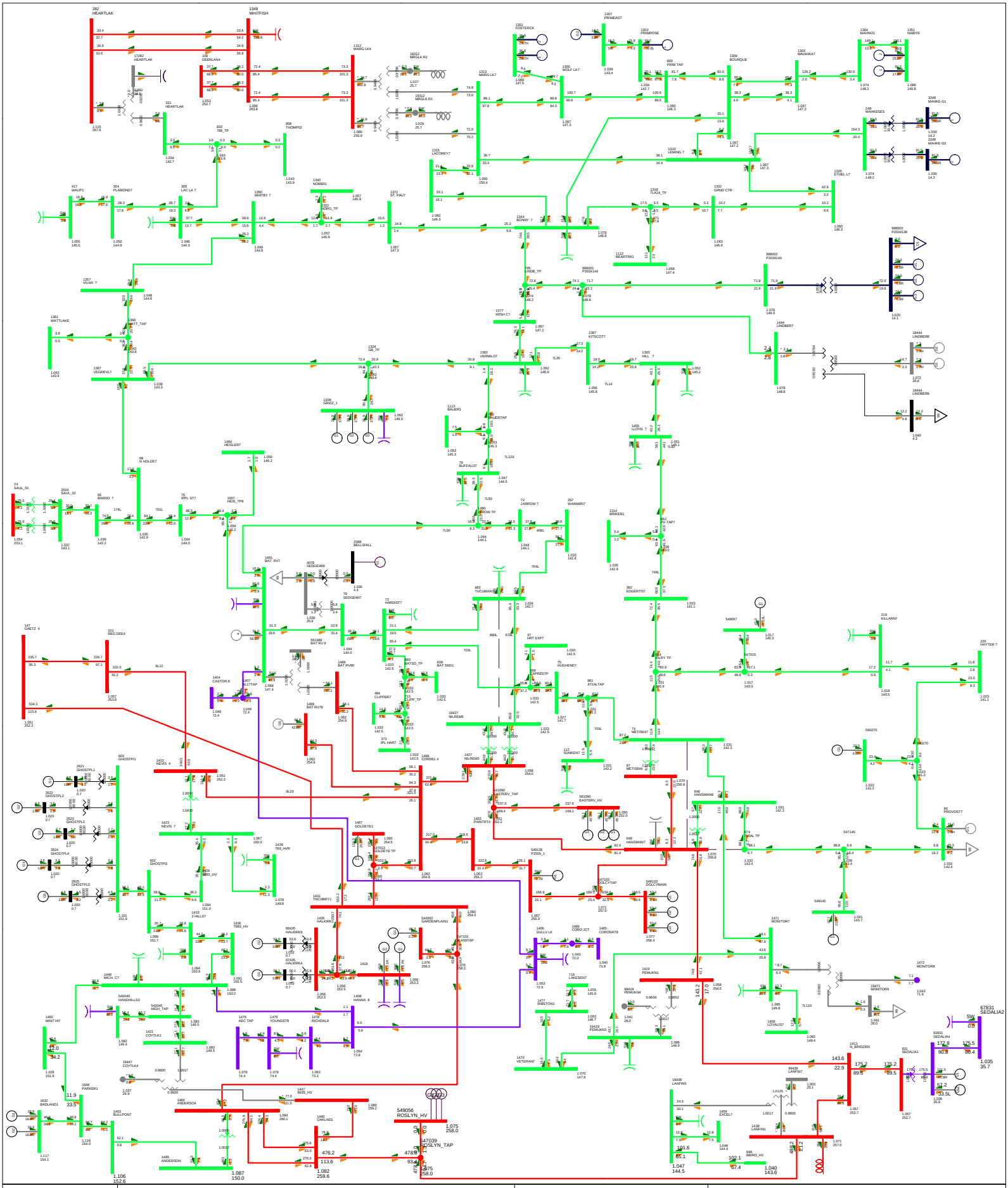
Study Case Description

2028SL POST-PROJ

Base Case

P2034 Cold Lake Area Cogen

Bus - VOLTAGE (kV/PU)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%RATEA
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A3- 2

Contingency

CONT 059: 680L (478S Tucuman - 574S Nilrem)

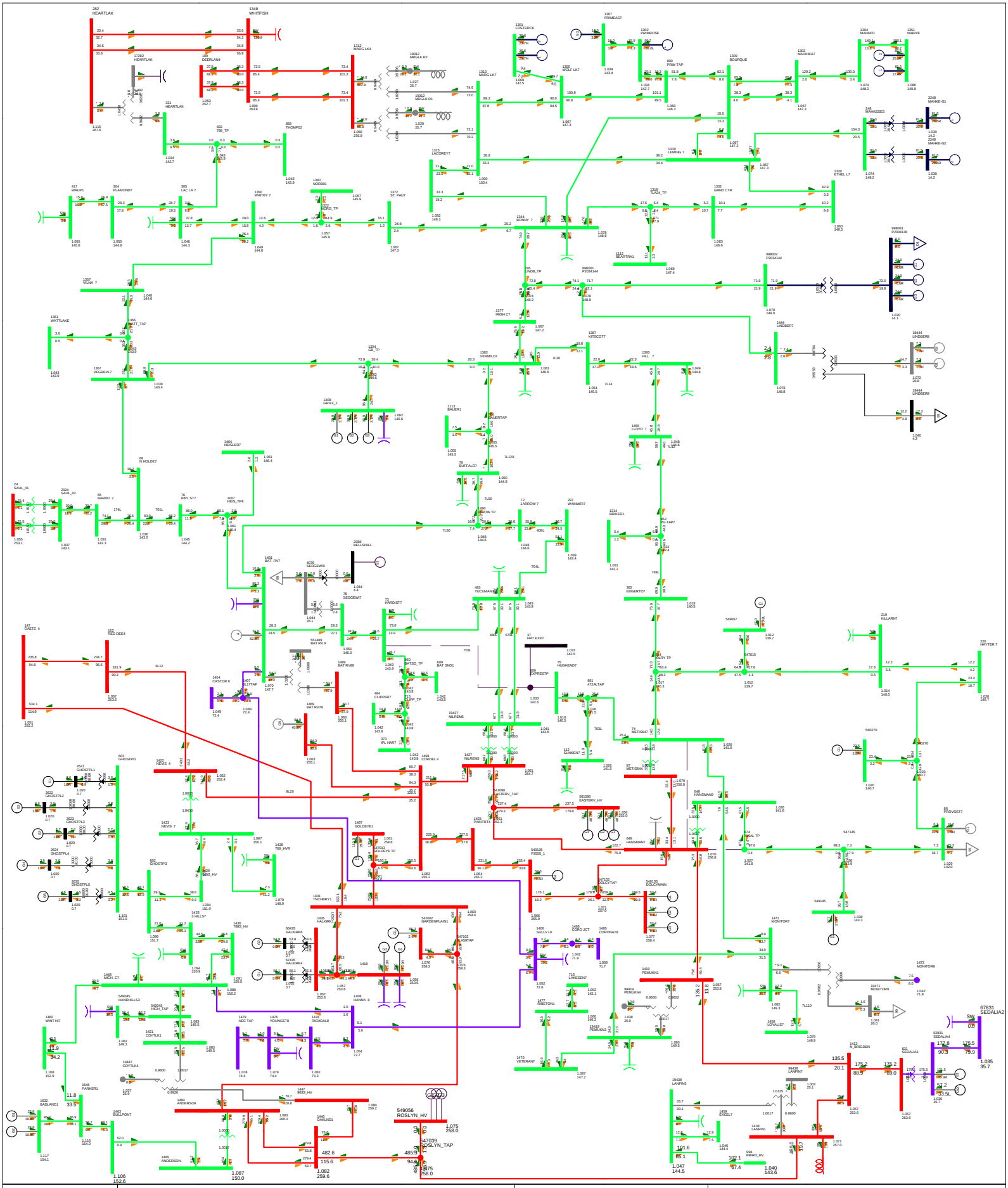
Study Case Description

2028SL POST-PROJ

Base Case

P2034 Cold Lake Area Cogen

Bus - VOLTAGE (kV/PU)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%RATEA
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A3- 2

Contingency

CONT 060: 703L (377S Hardisty - 213S Hughenden - 329S Hrt Express)

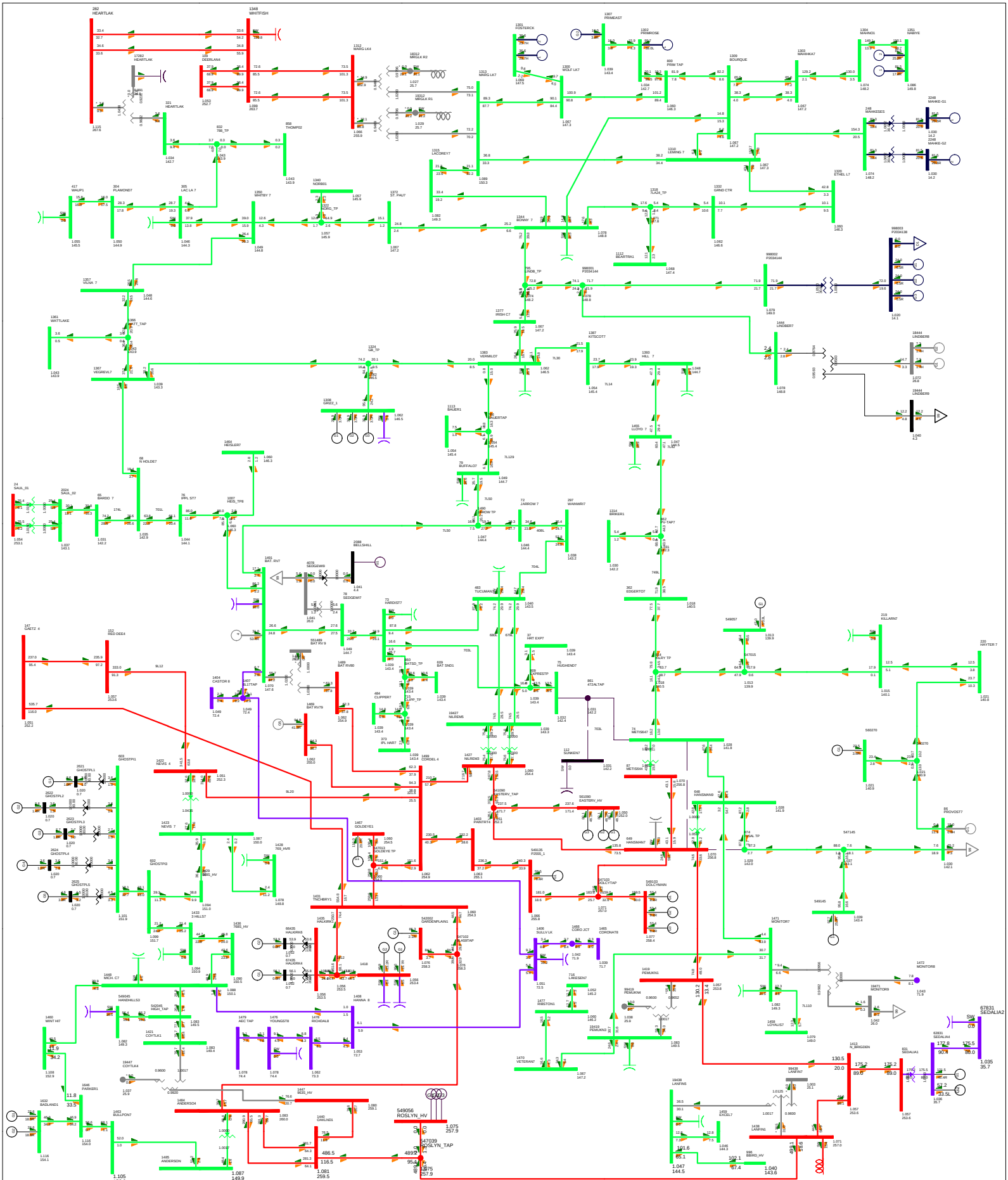
Study Case Description

2028SL POST-PROJ

Base Case

P2034 Cold Lake Area Cogen

Bus - VOLTAGE (kV/PU)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%RATEA
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A3- 2

Contingency

CONT 061: 472L (213S Hughenden - 648S Metiskow - 221S Sunken Lake)

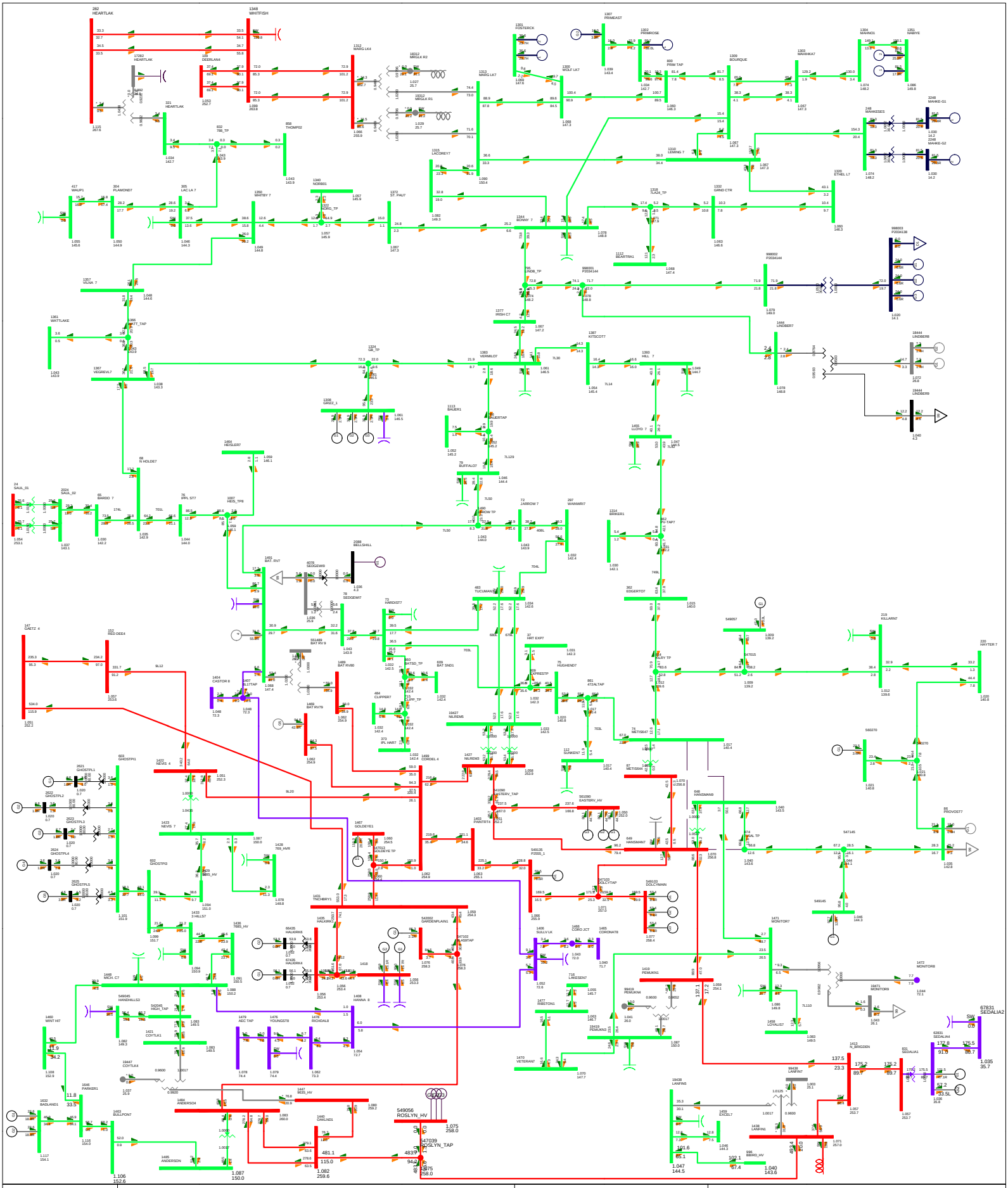
Study Case Description

2028SL POST-PROJ

Base Case

P2034 Cold Lake Area Cogen

Bus - VOLTAGE (kV/PU)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%RATEA
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A3- 2

Contingency

CONT 062: 885L (648S Metiskow - 650S Hansman Lake)

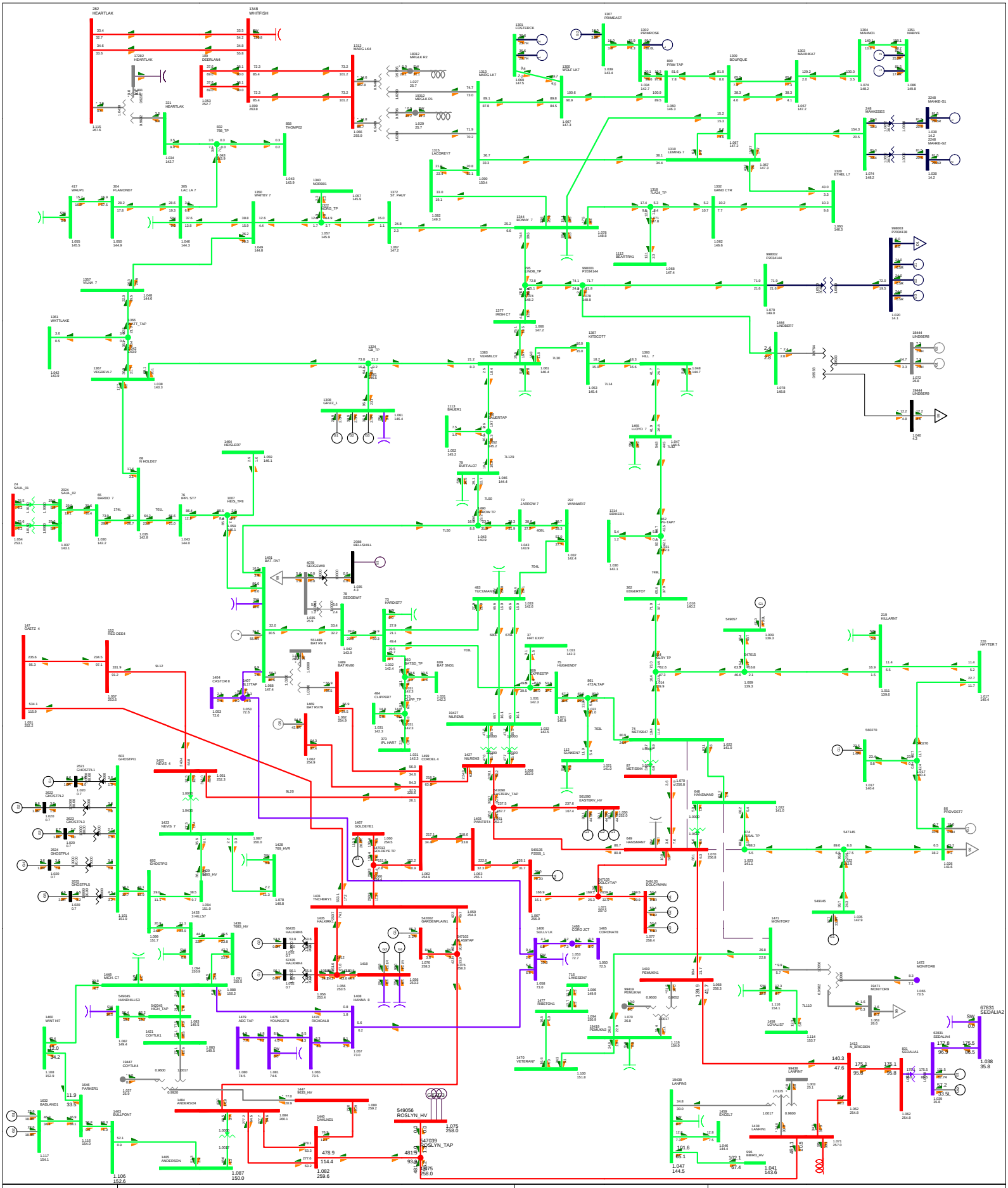
Study Case Description

2028SL POST-PROJ

Base Case

P2034 Cold Lake Area Cogen

Bus - VOLTAGE (kV/PU)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%RATEA
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A3- 2

Contingency

CONT 063: 7L224 (650S Hansman Lake - 774S Monitor)

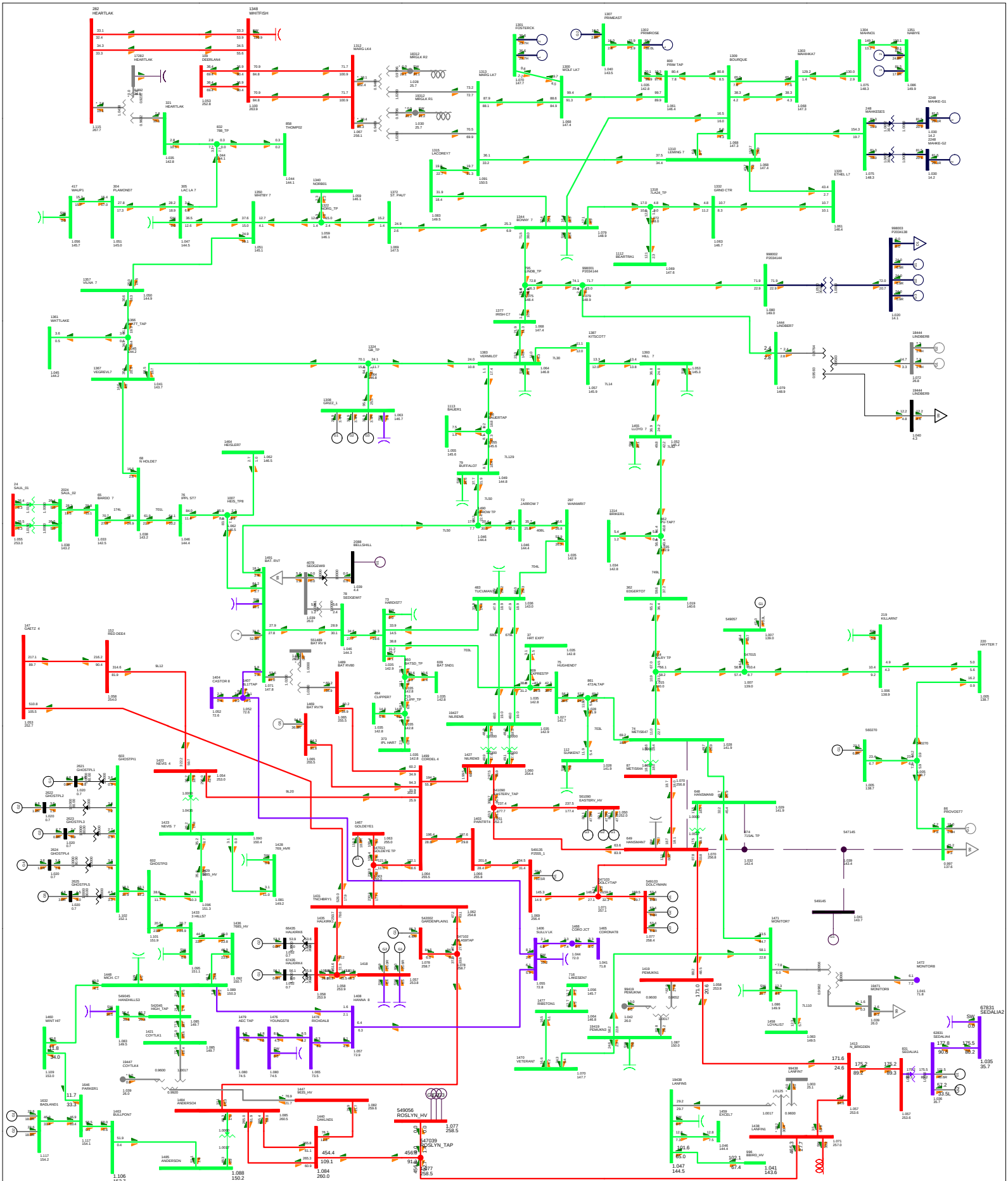
Study Case Description

2028SL POST-PROJ

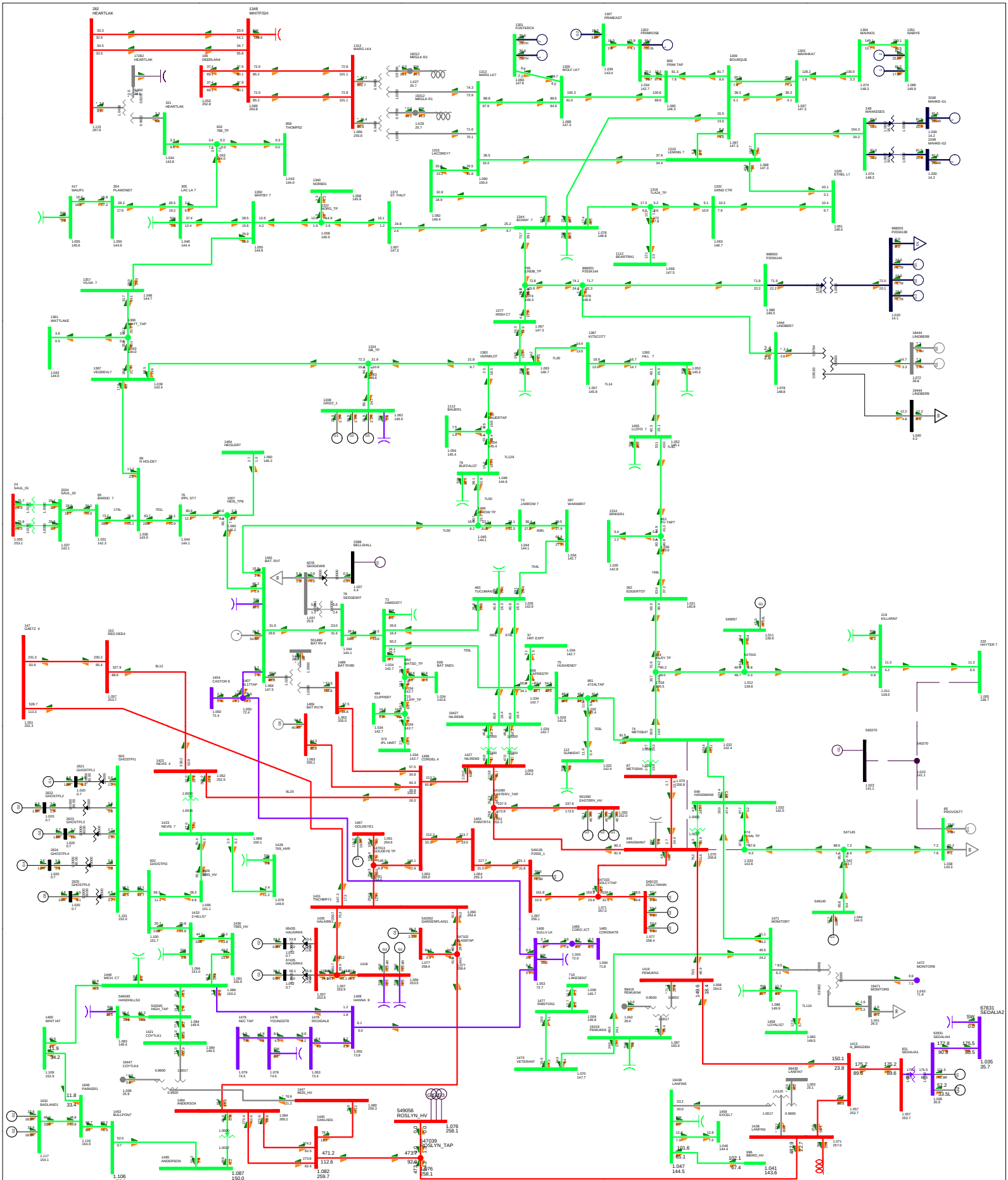
Base Case

P2034 Cold Lake Area Cogen

Bus - VOLTAGE (kV/PU)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%RATEA
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A3- 2	Contingency	Study Case Description	P2034 Cold Lake Area Cogen
	CONT 064: 715L (650S Hansman Lake - P2540 Cache Rising Sun - 545S Provost)	2028SL POST-PROJ Base Case	Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A3- 2

Contingency

CONT 065: 398L (545S Provost - P2573 Prairie Yarrow - 277S Hayter)

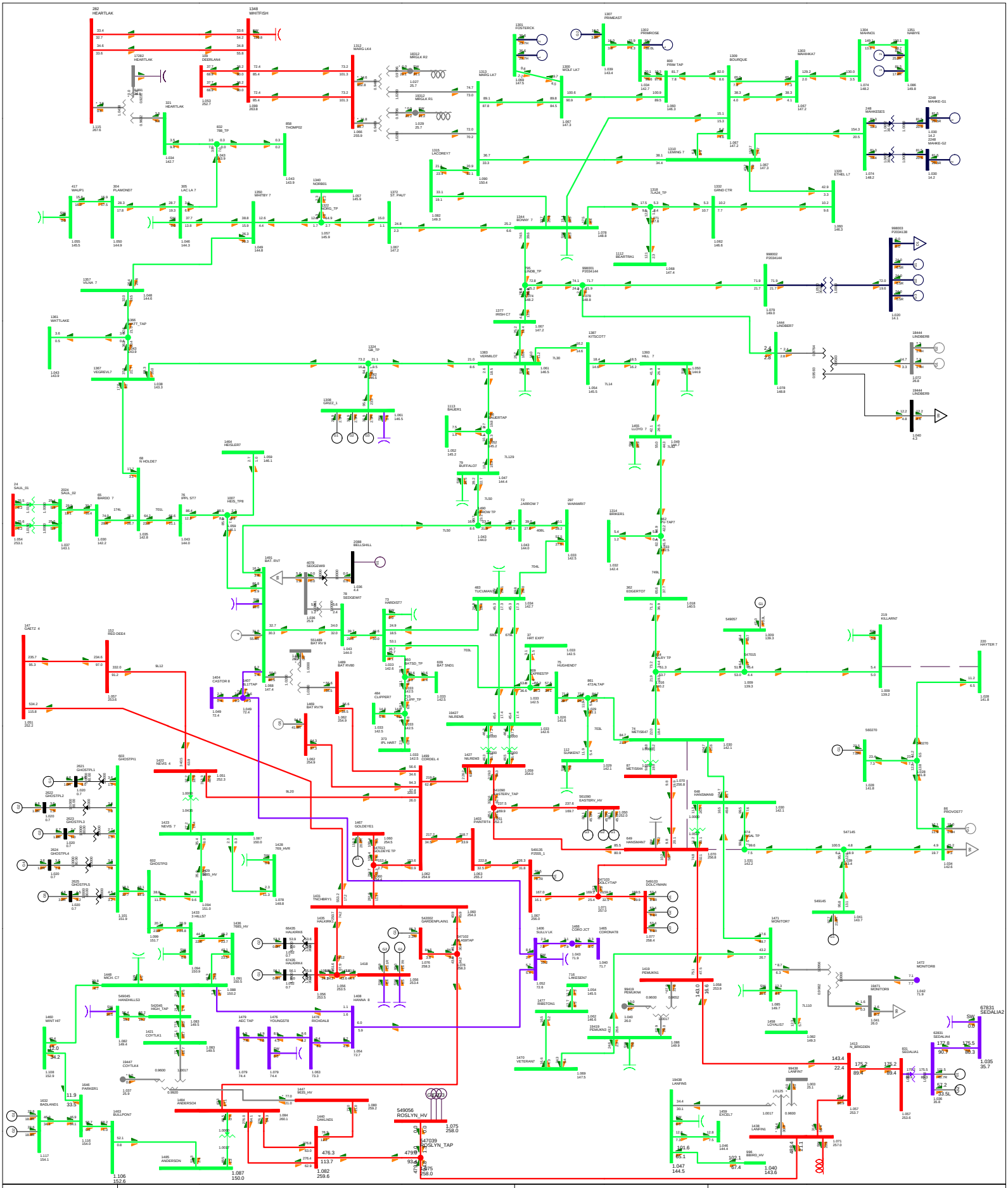
Study Case Description

2028SL POST-PROJ

Base Case

P2034 Cold Lake Area Cogen

Bus - VOLTAGE (kV/PU)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%RATEA
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A3- 2

Contingency

CONT 066: 748L (267S Killarney Lake - 277S Hayter)

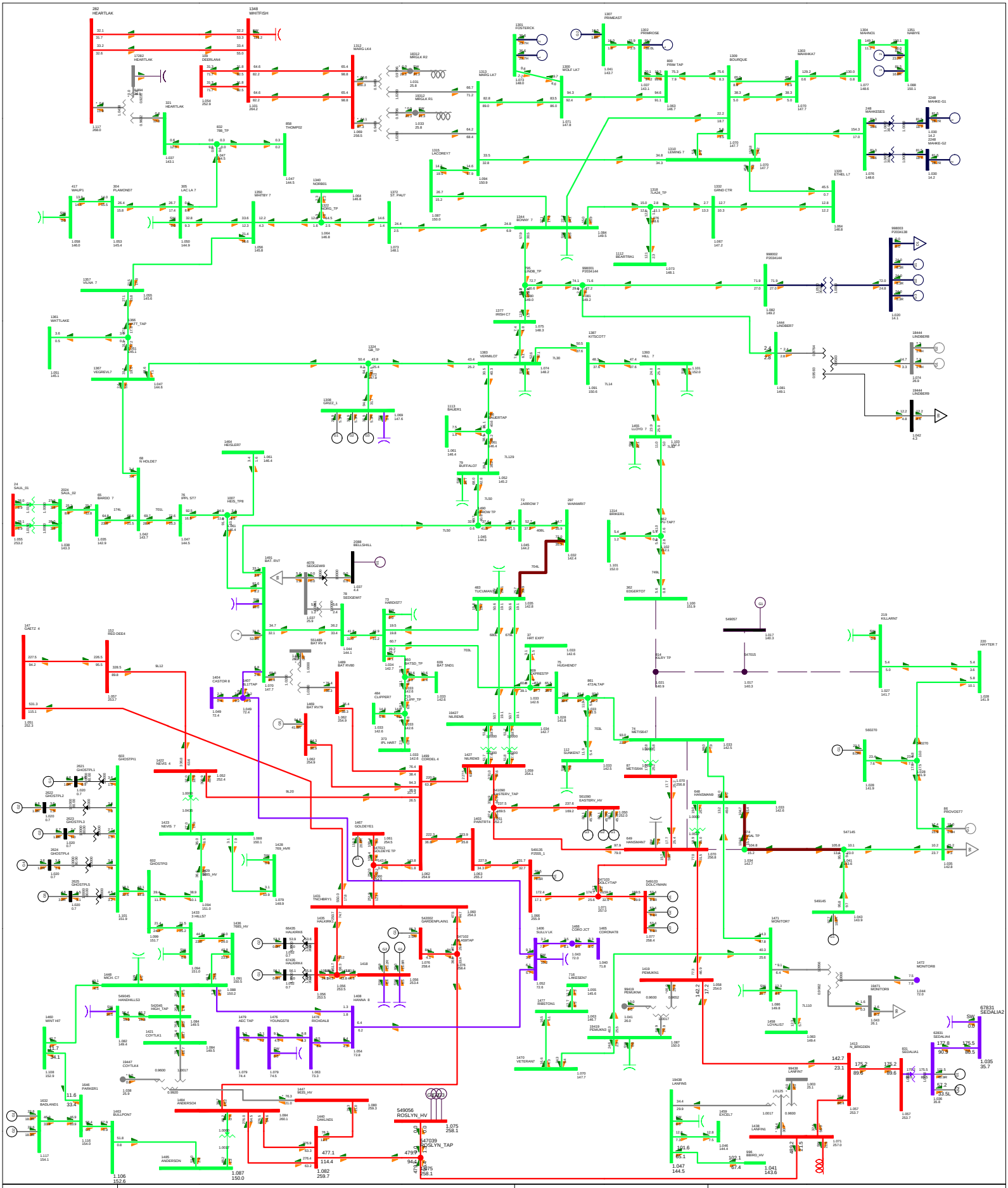
Study Case Description

2028SL POST-PROJ

Base Case

P2034 Cold Lake Area Cogen

Bus - VOLTAGE (kV/PU)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%RATEA
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A3- 2

Contingency

CONT 067: 749L (648S Metiskow - 267S Killarney Lake - P2460 Fox Meadows Wind - 899S Edgerton

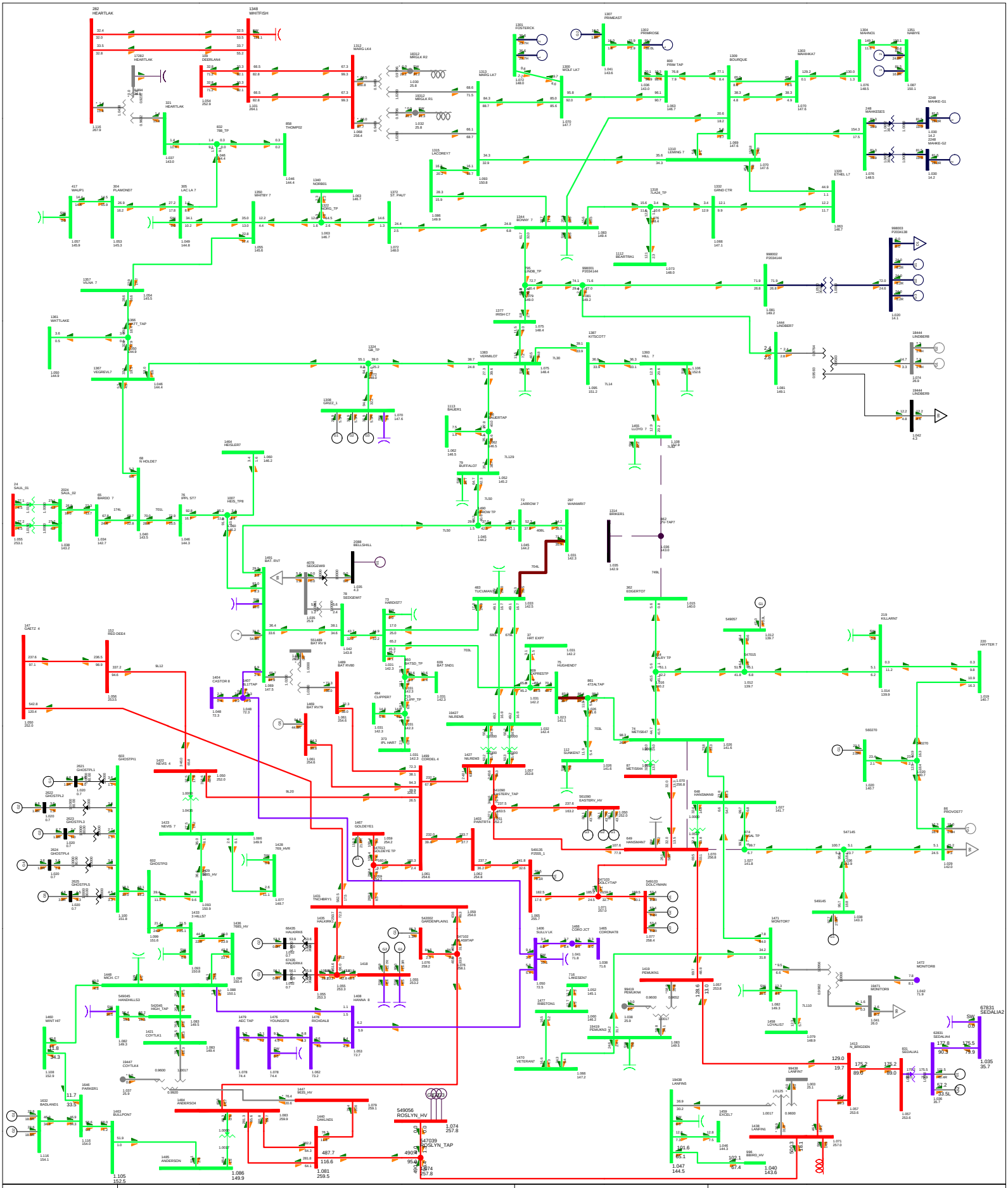
Study Case Description

POST-PROJ

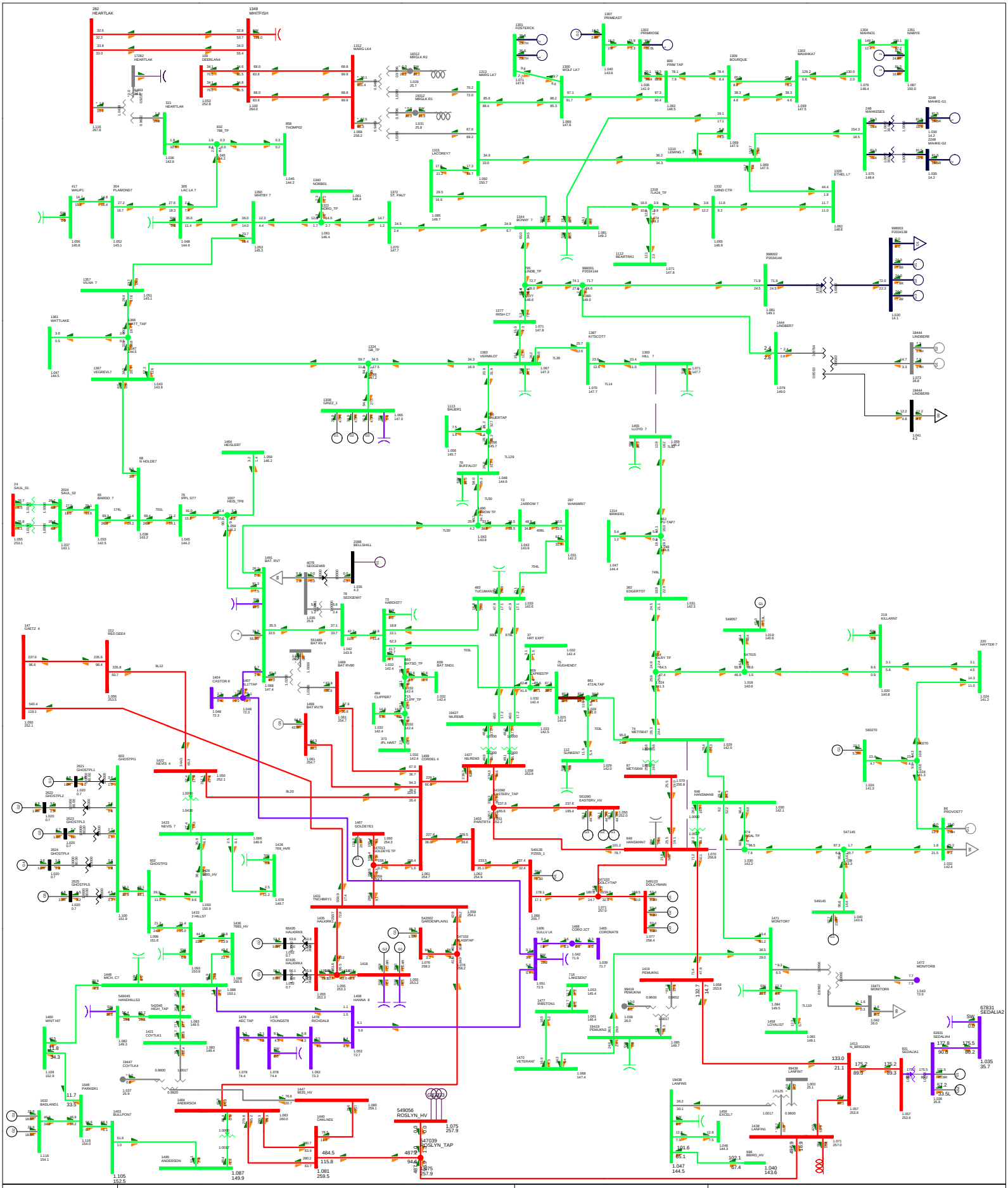
Base Case

P2034 Cold Lake Area Cogen

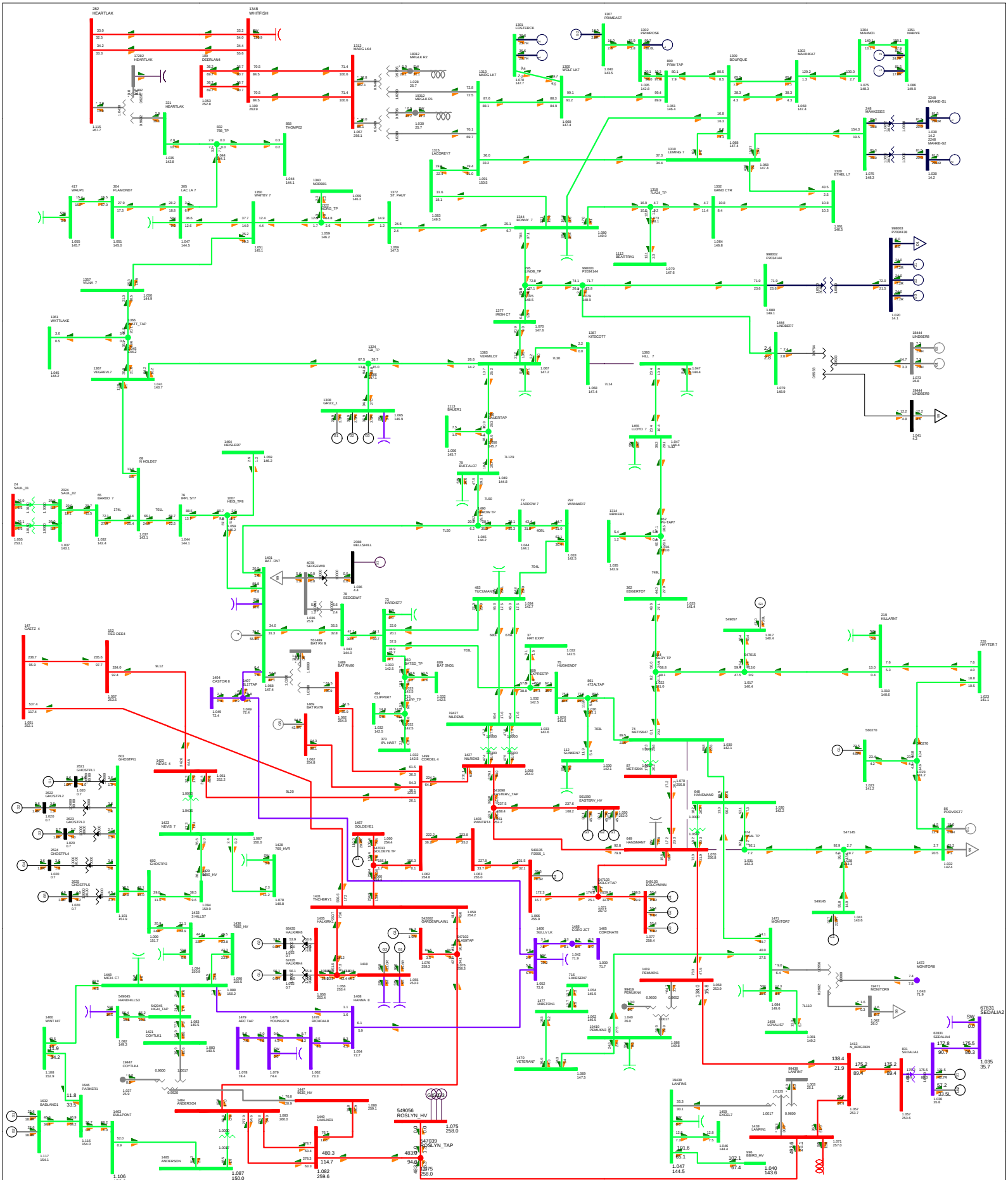
Bus - VOLTAGE (kV/PU)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%RATEA
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



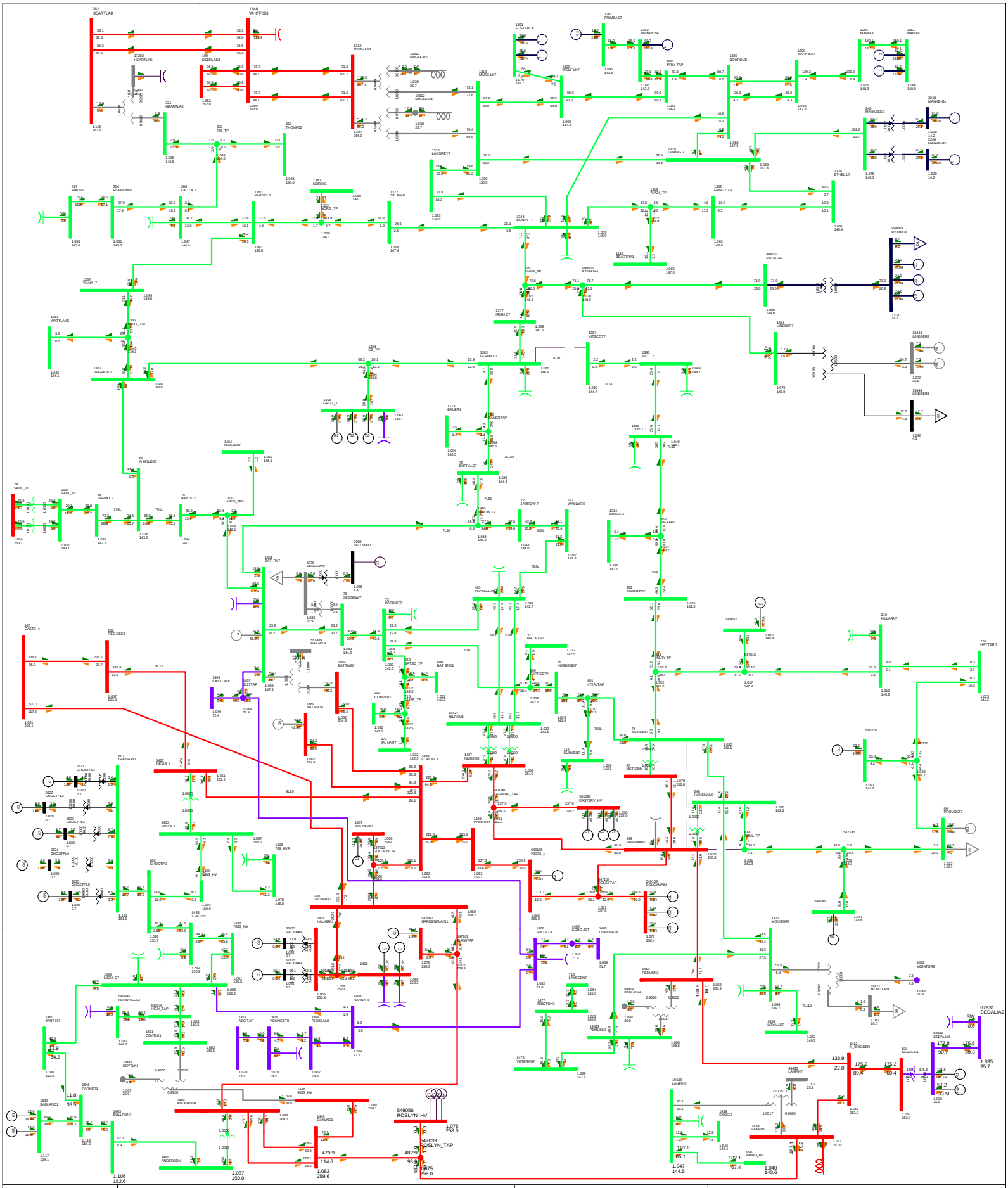
Attachment A3- 2	**Contingency** CONT 068: 7L749 (899S Edgerton - 716S Lloydminster - 880S Briker)	**Study Case Description** 2028SL POST-PROJ Base Case	**P2034 Cold Lake Area Cogen** Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A3- 2	Contingency	Study Case Description	P2034 Cold Lake Area Cogen
	CONT 069: 7L42 (751S Hill - 716S Lloydminster)	2028SL POST-PROJ Base Case	Bus - VOLTAGE (kV/PU) Branch - MW/MVar Equipment - MW/Mvar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A3- 2	Contingency	Study Case Description	P2034 Cold Lake Area Cogen
	CONT 070: 7L14 (705S Kitscoty - 751S Hill)	2028SL POST-PROJ Base Case	Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A3- 2

Contingency

CONT 071: 7L130 (710S Vermilion - 705S Kitscoty)

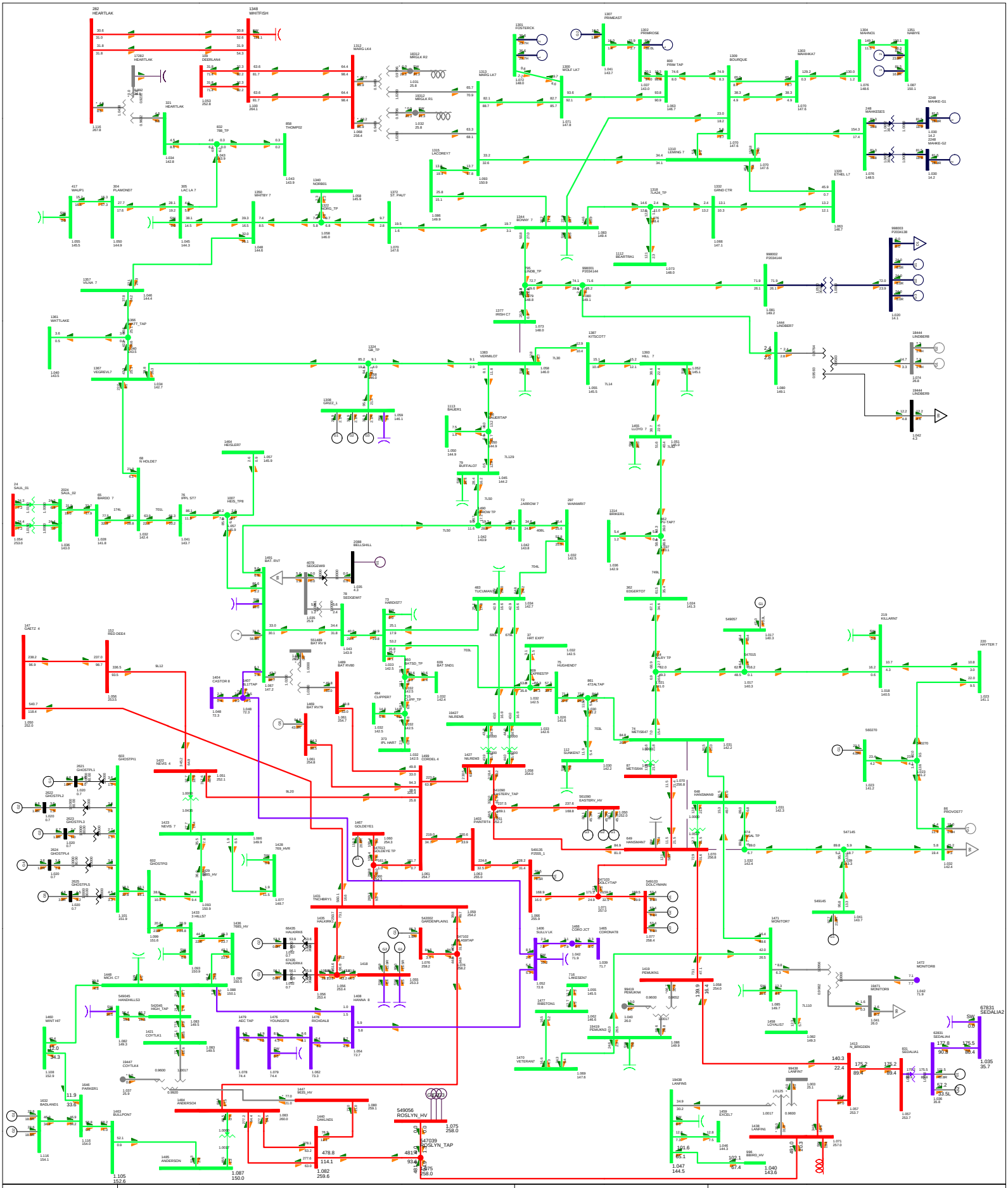
Study Case Description

2028SL POST-PROJ

Base Case

P2034 Cold Lake Area Cogen

Bus - VOLTAGE (kV/PU)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%RATEA
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A3- 2

Contingency

CONT 072: 7L117 (706S Irish Creek - 710S Vermilion)

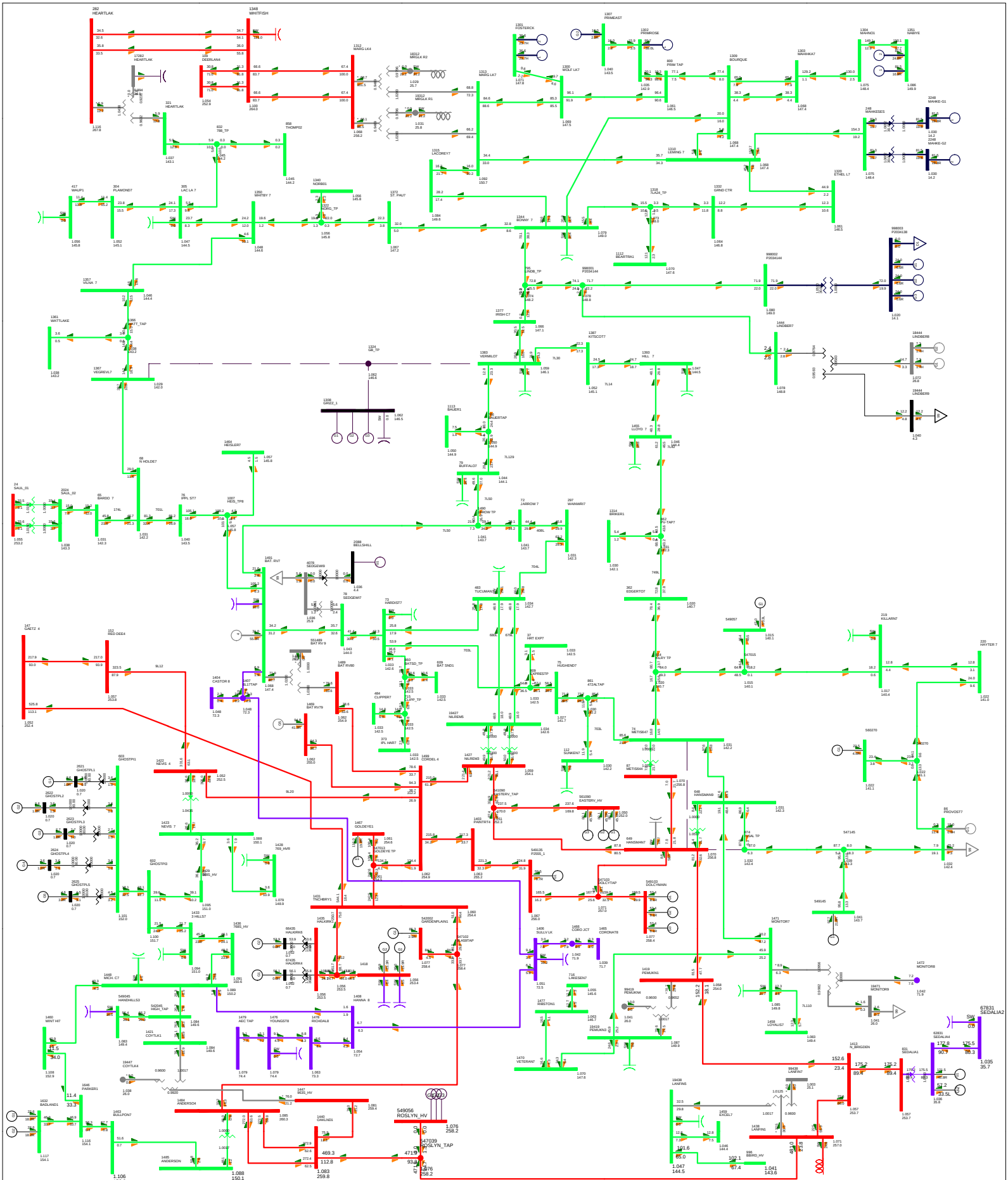
Study Case Description

2028SL POST-PROJ

Base Case

P2034 Cold Lake Area Cogen

Bus - VOLTAGE (kV/PU)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%RATEA
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A3- 2

Contingency

CONT 073: 7L65 (709S Vegreville - 710S Vermilion - 708S Grizzly Bear)

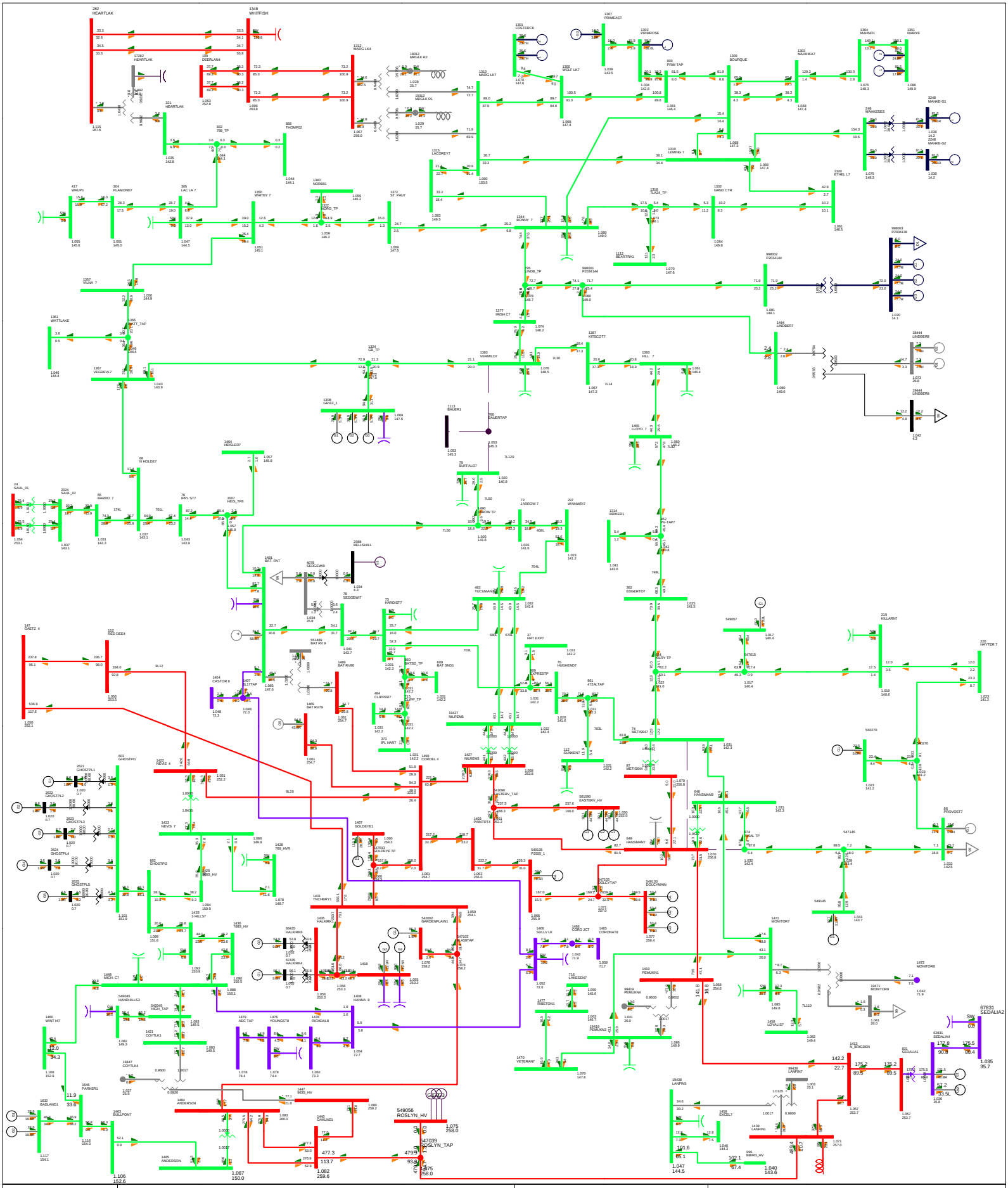
Study Case Description

2028SL POST-PROJ

Base Case

P2034 Cold Lake Area Cogen

Bus - VOLTAGE (kV/PU)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%RATEA
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A3- 2

Contingency

CONT 074: 7L129 (710S Vermilion - 918S Bauer - 526S Buffalo Creek)

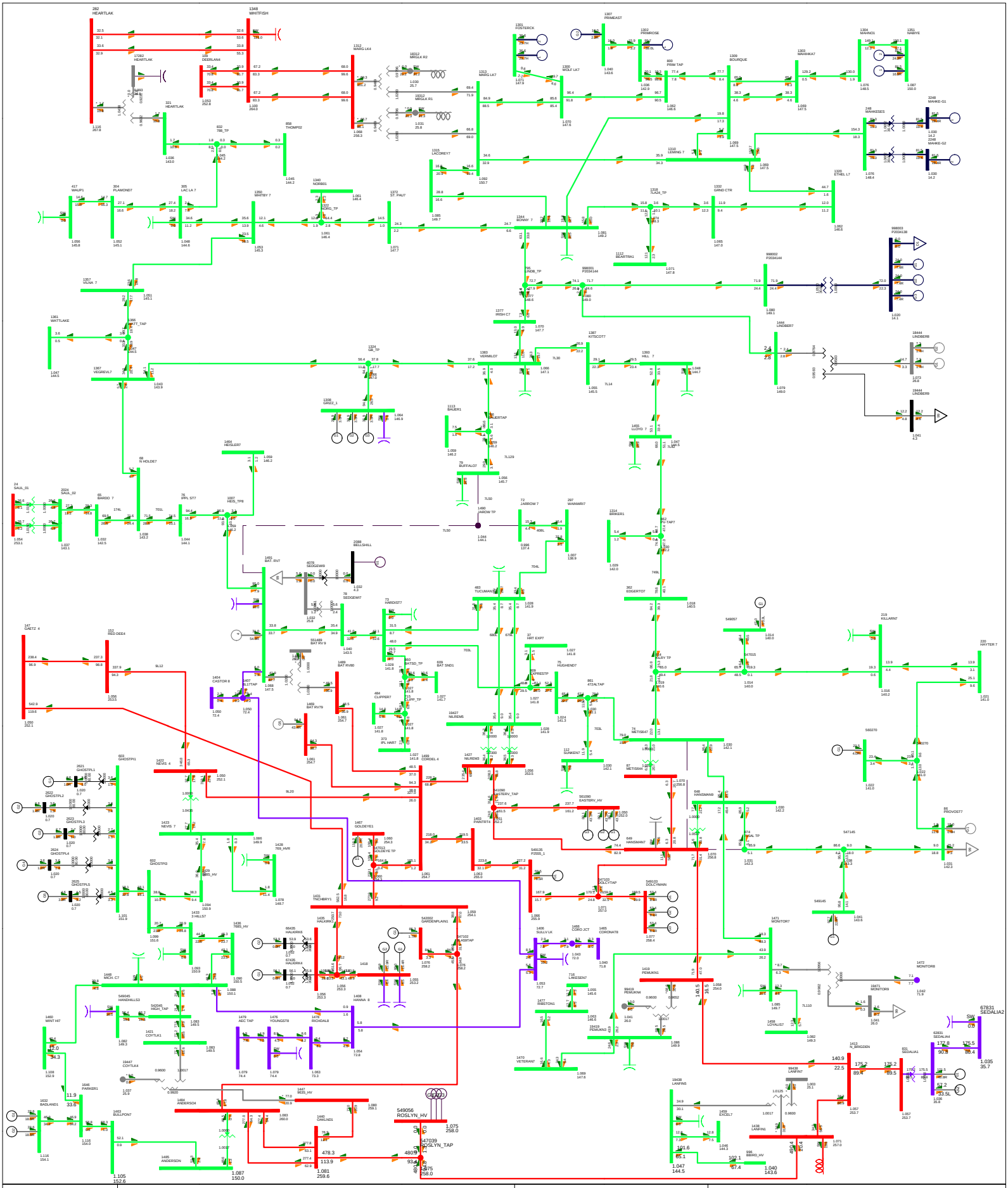
Study Case Description

2028SL POST-PROJ

Base Case

P2034 Cold Lake Area Cogen

Bus - VOLTAGE (kV/PU)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%RATEA
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A3- 2

Contingency

CONT 075: 7L50 (526S Buffalo Creek - 757S Battle River - 252S Jarrow)

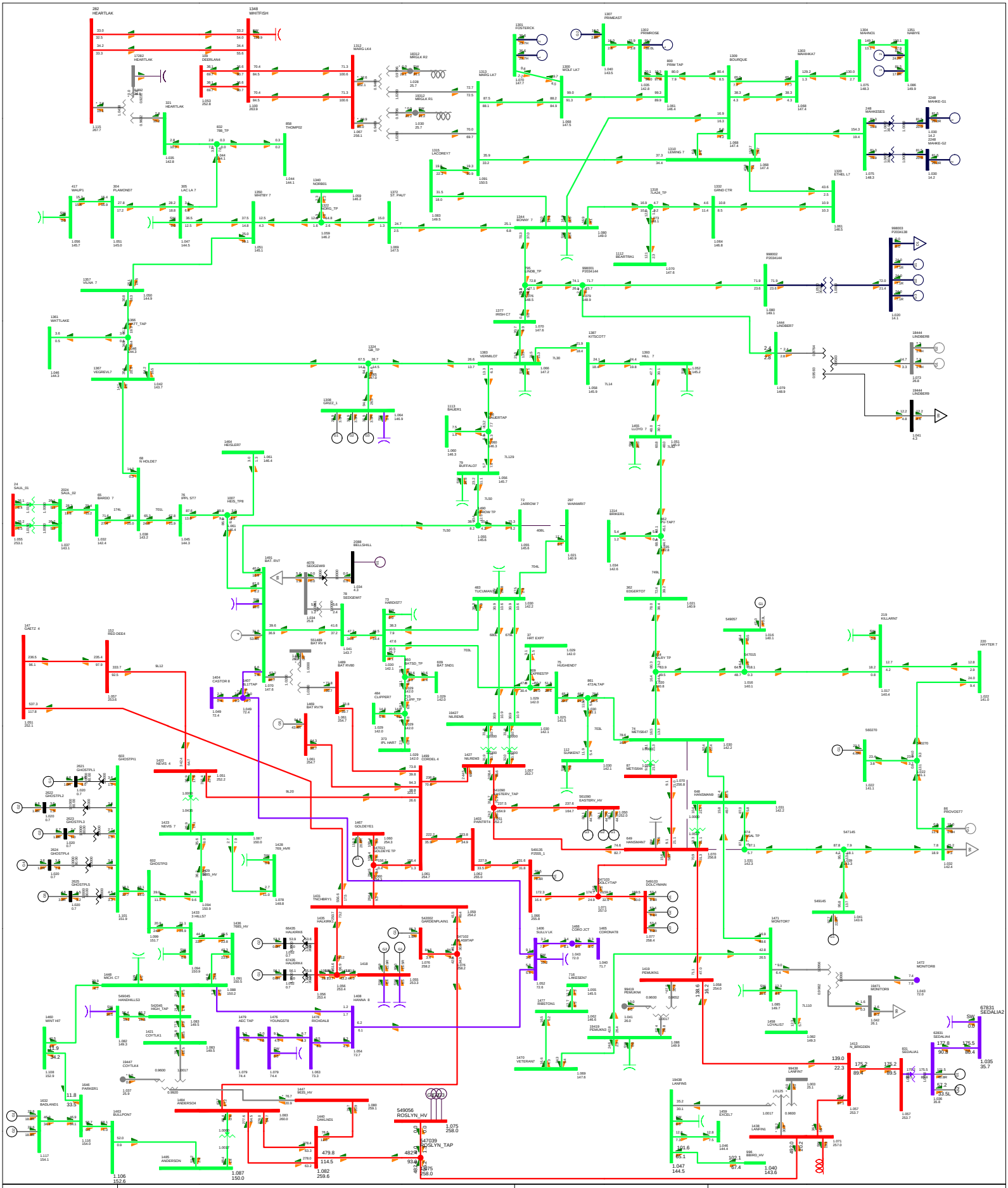
Study Case Description

2028SL POST-PROJ

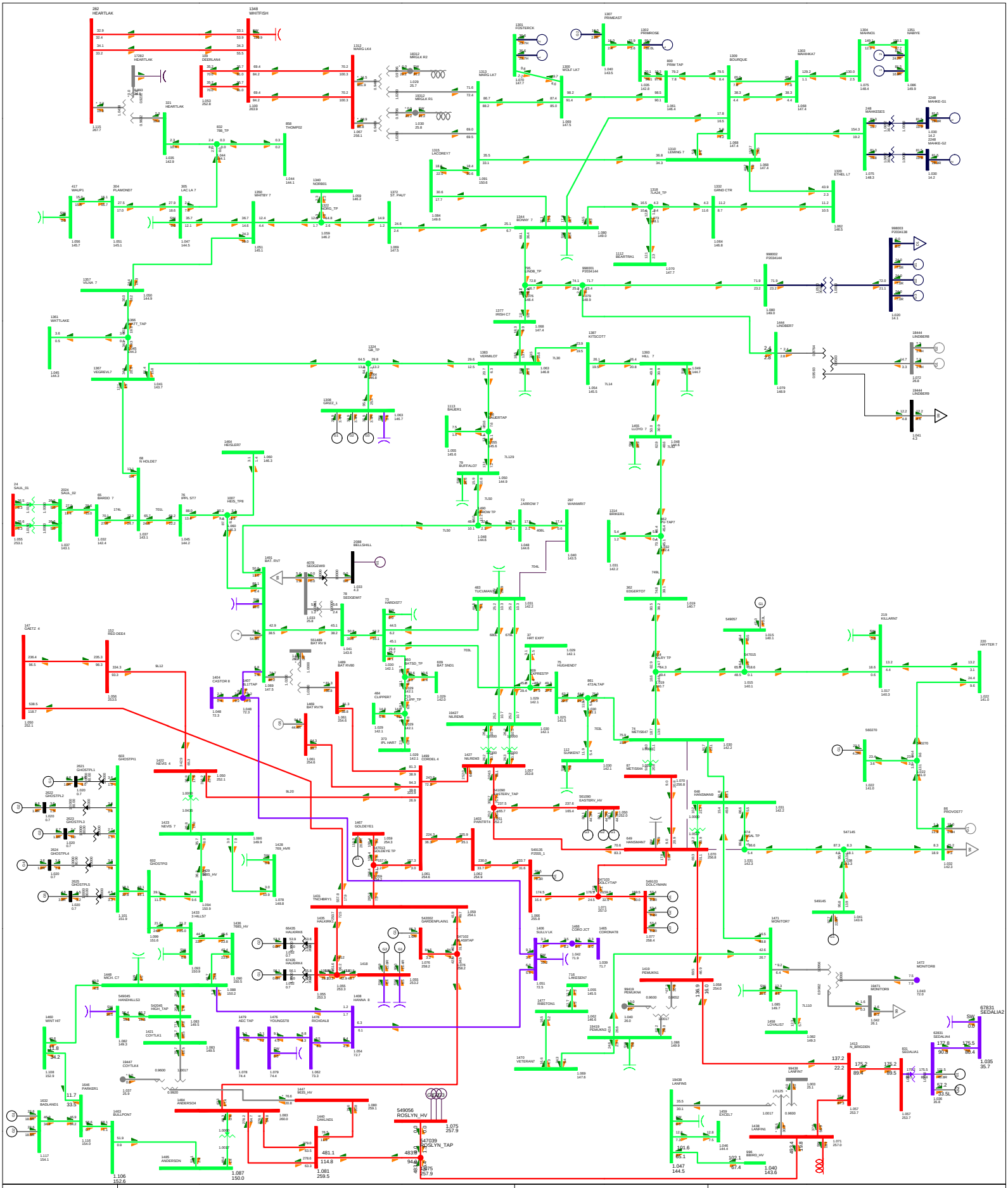
Base Case

P2034 Cold Lake Area Cogen

Bus - VOLTAGE (kV/PU)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%RATEA
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A3- 2	Contingency	Study Case Description	P2034 Cold Lake Area Cogen
	CONT 076: 408L (252S Jarrow - 51S Wainwright)	2028SL POST-PROJ Base Case	Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A3- 2

Contingency

CONT 077: 704L (51S Wainwright - 478S Tucuman)

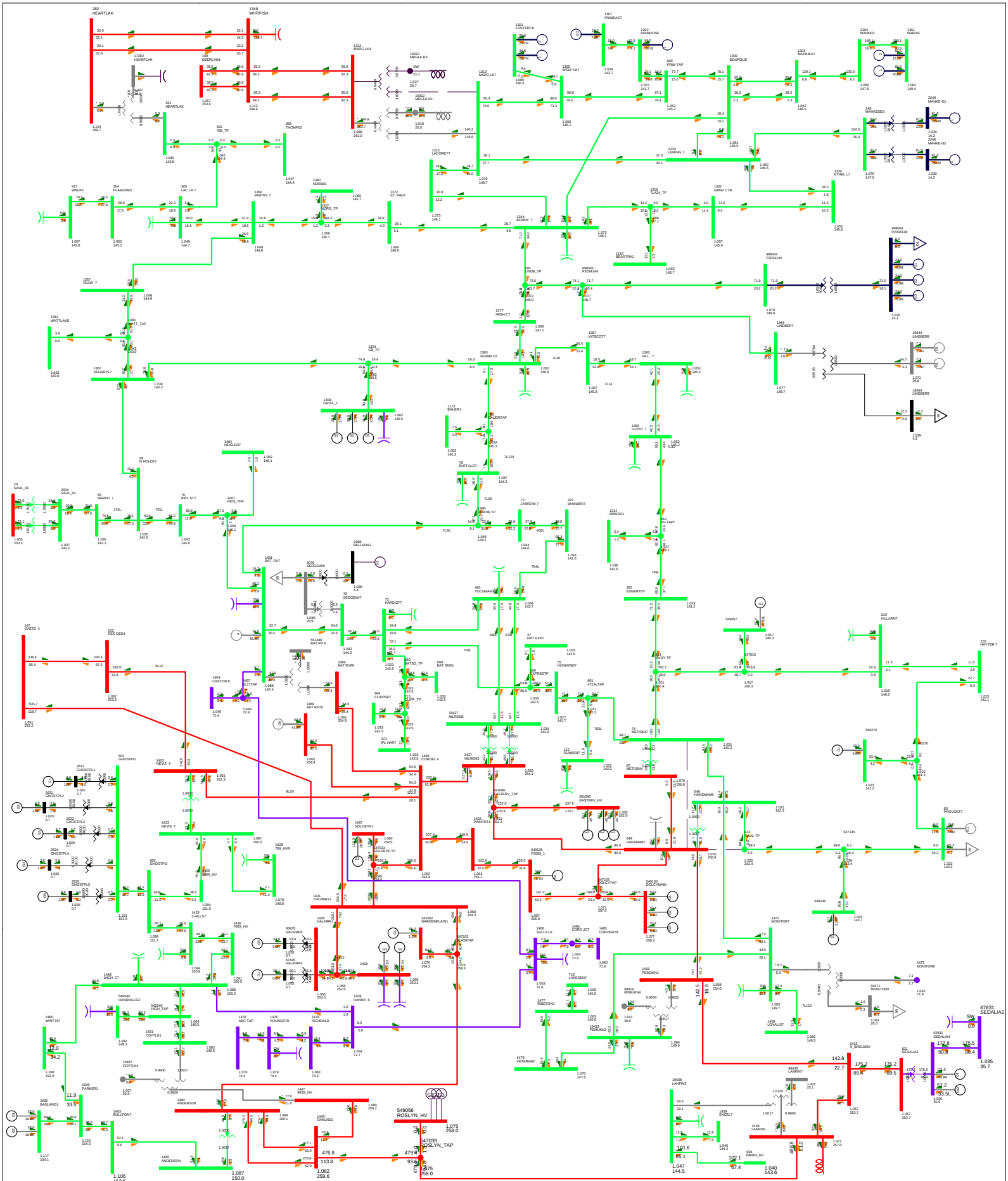
Study Case Description

2028SL POST-PROJ

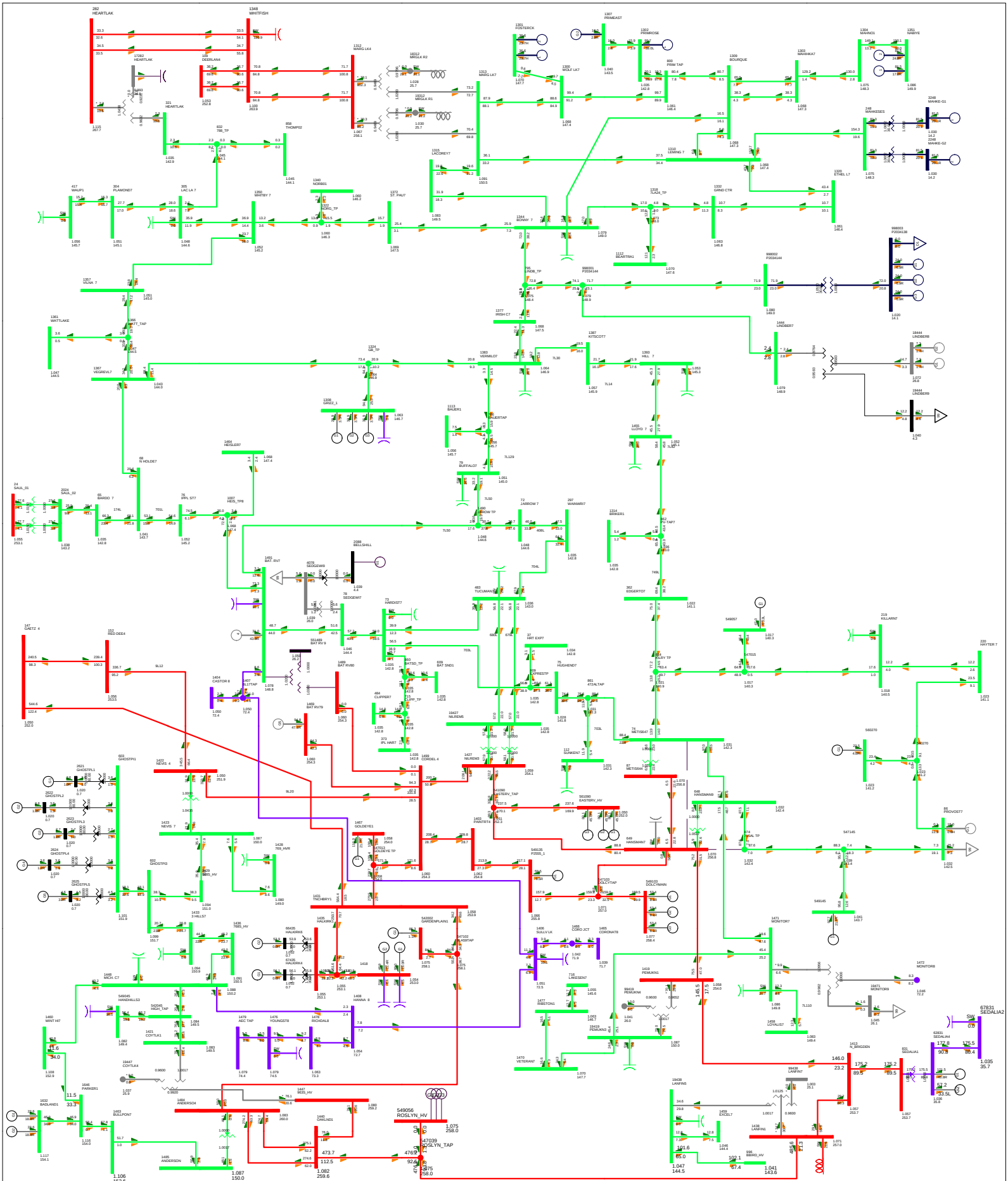
Base Case

P2034 Cold Lake Area Cogen

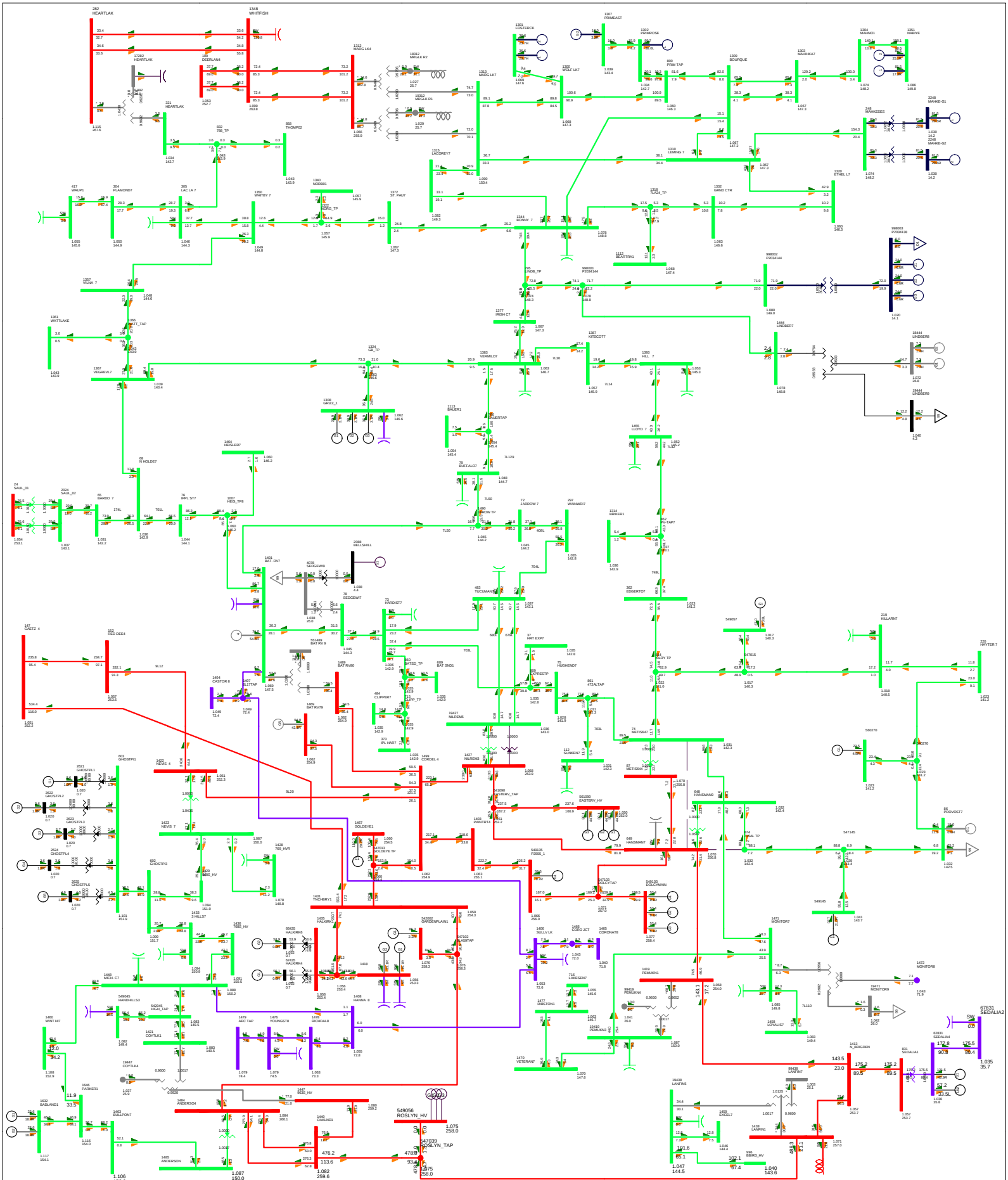
Bus - VOLTAGE (kV/PU)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%RATEA
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A3- 2	Contingency	Study Case Description	P2034 Cold Lake Area Cogen
	CONT 078: Marguerite Lake 2T	2028SL POST-PROJ Base Case	Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A3- 2	Contingency	Study Case Description	P2034 Cold Lake Area Cogen
	CONT 079: Battle River T2	2028SL POST-PROJ Base Case	Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A3- 2

Contingency

CONT 080: 574S Nilrem 162.2TR

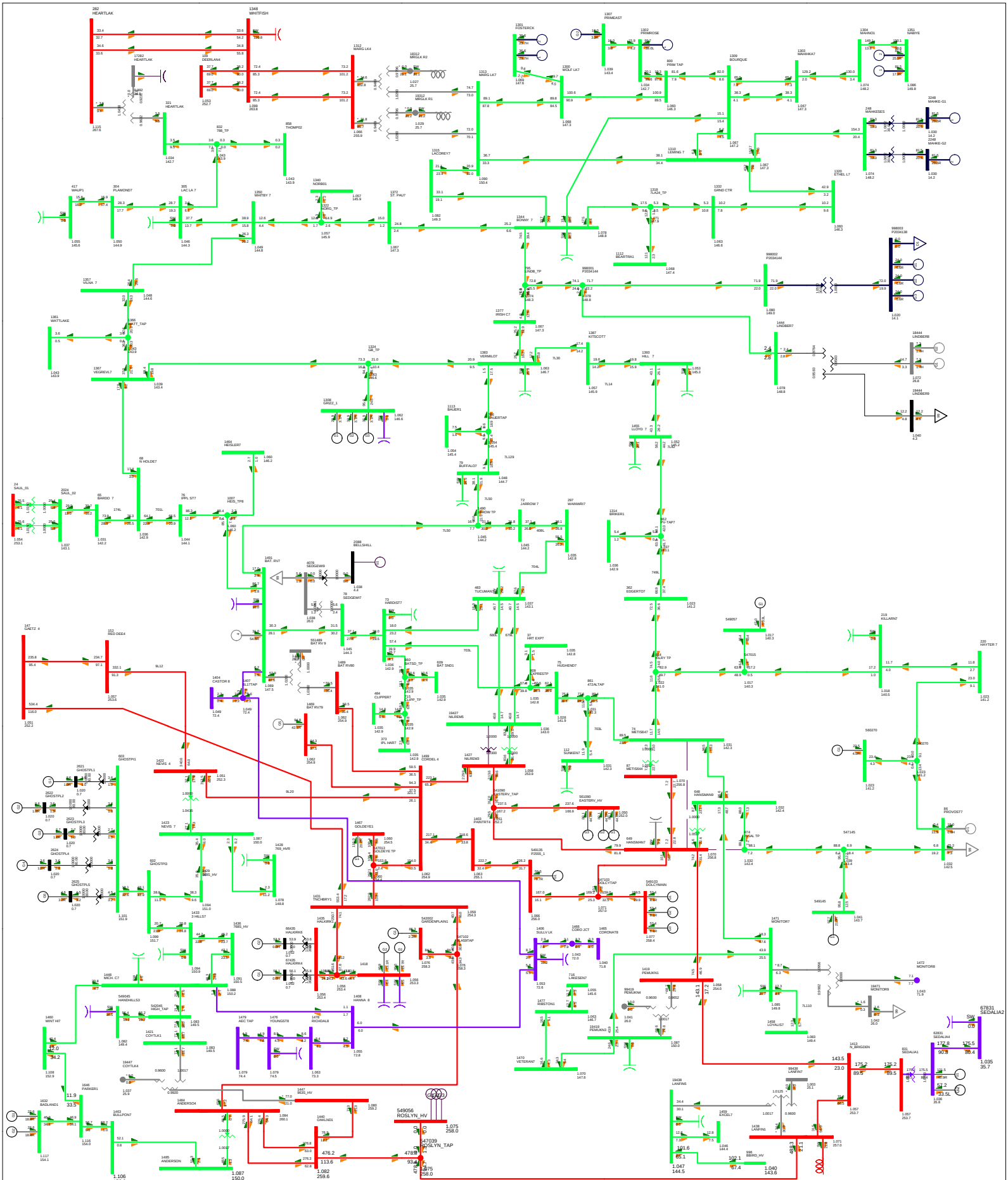
Study Case Description

2028SL POST-PROJ

Base Case

P2034 Cold Lake Area Cogen

Bus - VOLTAGE (kV/PU)
Branch - MW/MVar
Equipment - MW/Mvar
100.0%RATEA
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A3- 2

Contingency

CONT 081: 574S Nilrem 87ST1

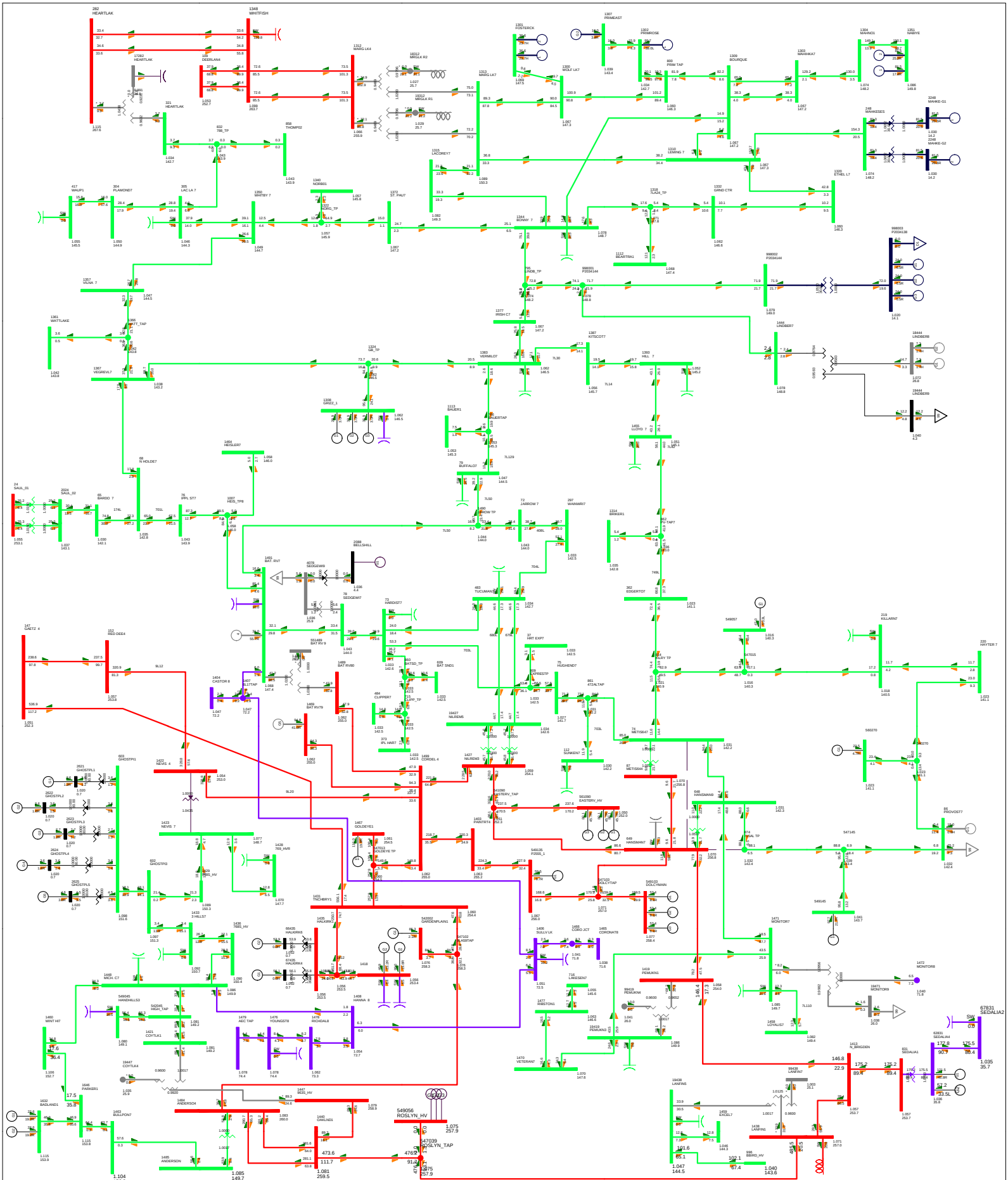
Study Case Description

2028SL POST-PROJ

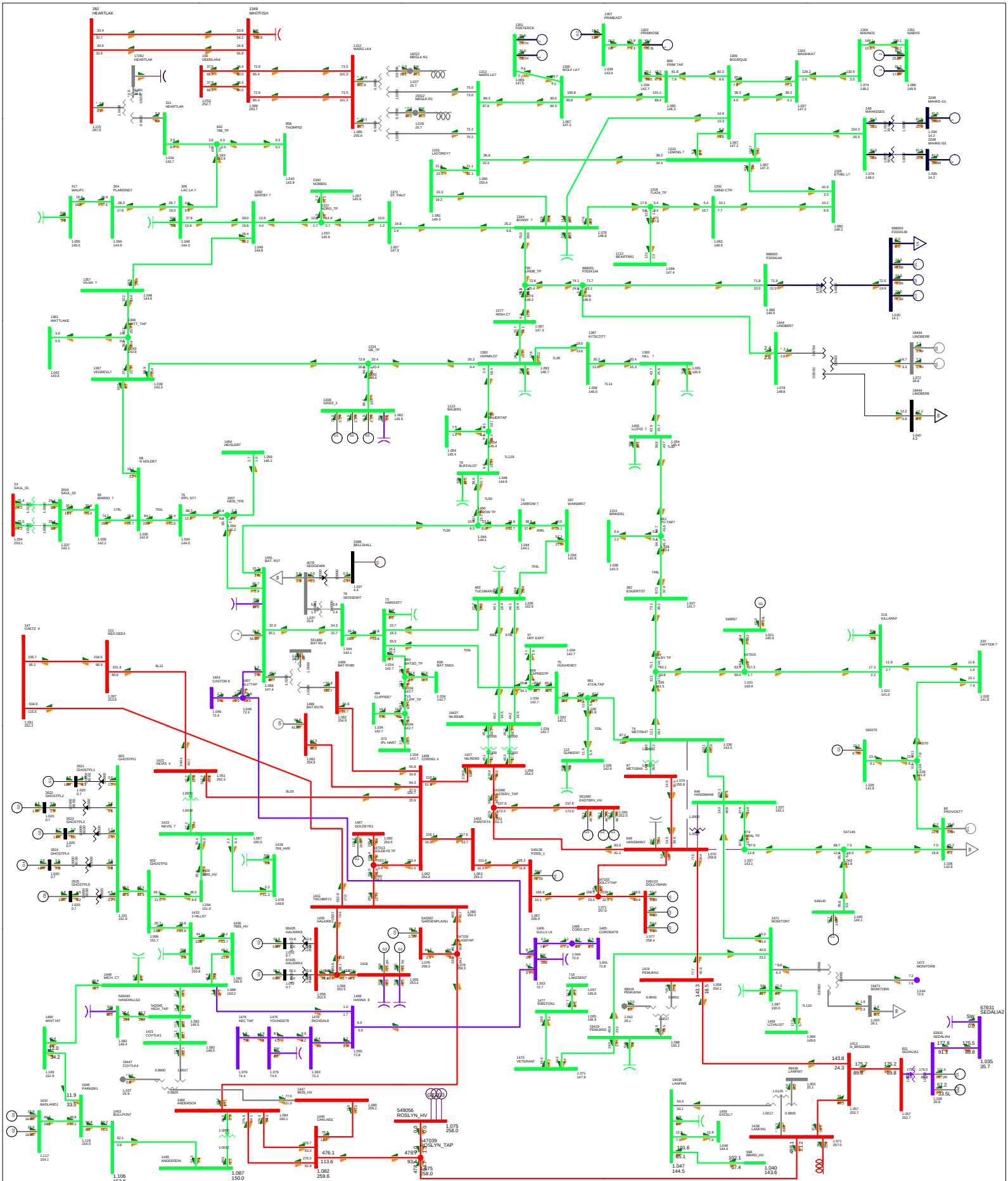
Base Case

P2034 Cold Lake Area Cogen

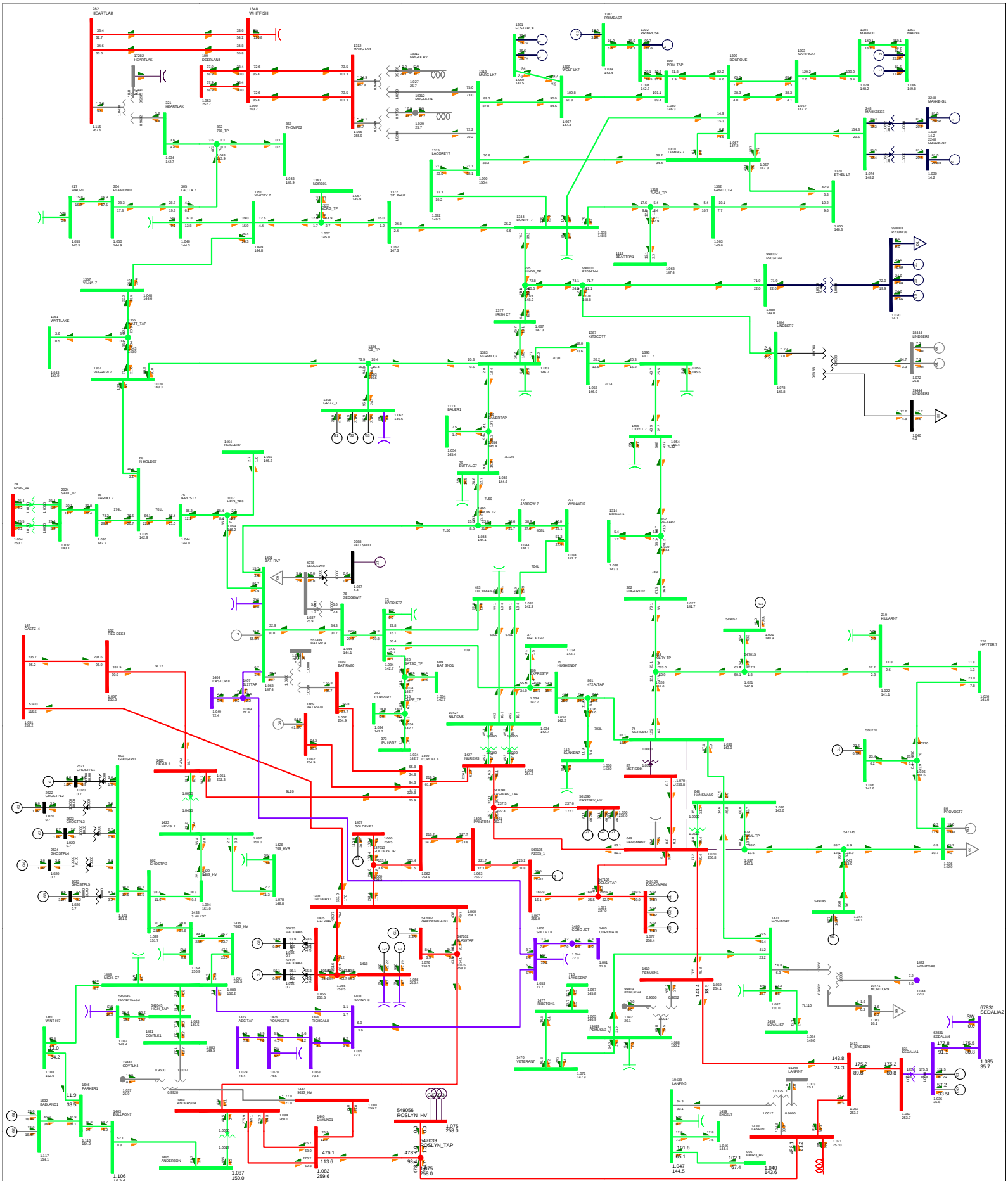
Bus - VOLTAGE (kV/PU)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%RATEA
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



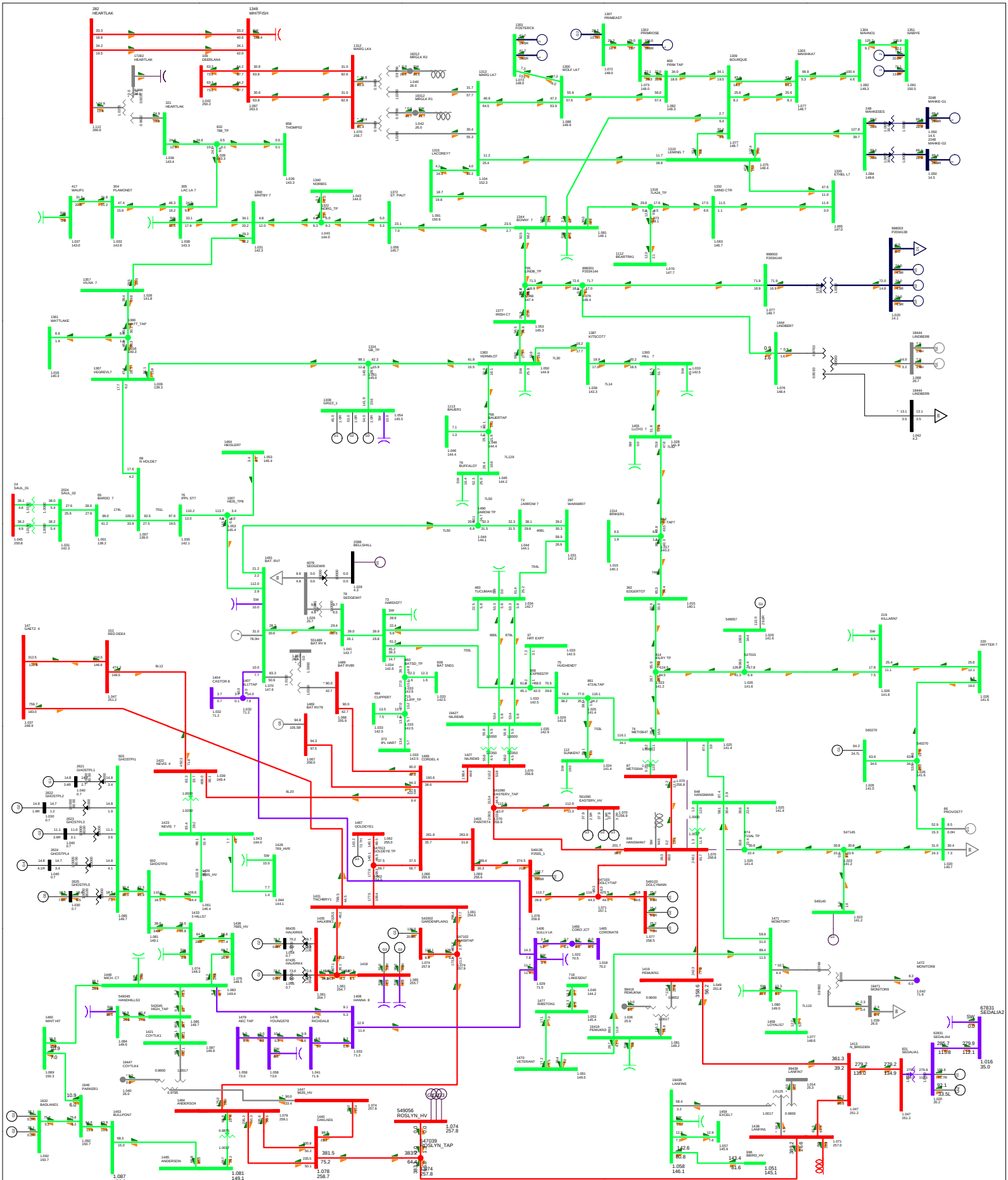
Attachment A3- 2	Contingency	Study Case Description	P2034 Cold Lake Area Cogen
	CONT 082: 766S Nevis 162.1TR	2028SL POST-PROJ Base Case	Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



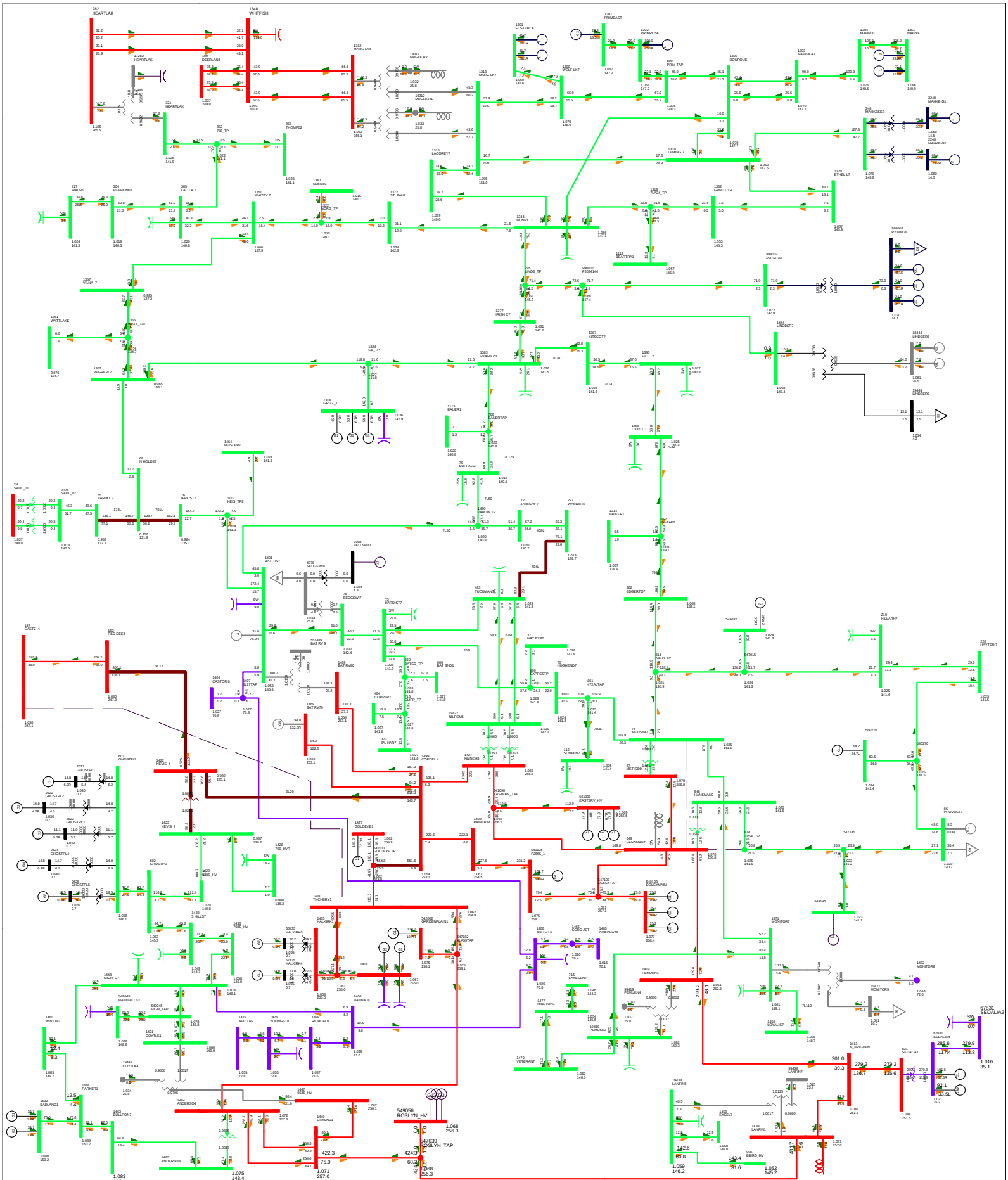
Attachment A3- 2	**Contingency** CONT 083: 650S Hansman Lake 63ST1	**Study Case Description** 2028SL POST-PROJ Base Case	**P2034 Cold Lake Area Cogen** Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



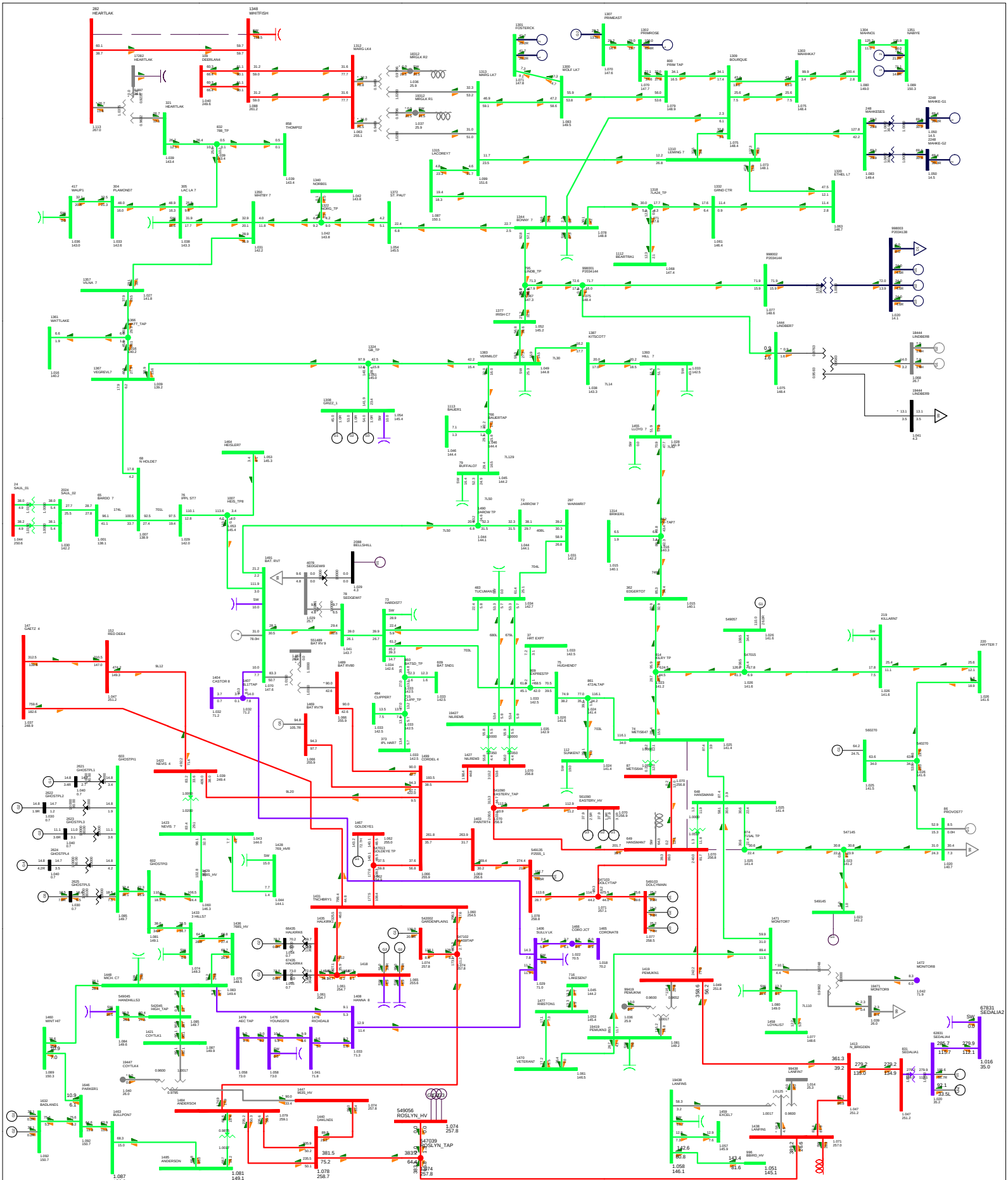
Attachment A3- 2	Contingency	Study Case Description	P2034 Cold Lake Area Cogen
	CONT 084: 648S Metiskow T3	2028SL POST-PROJ Base Case	Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



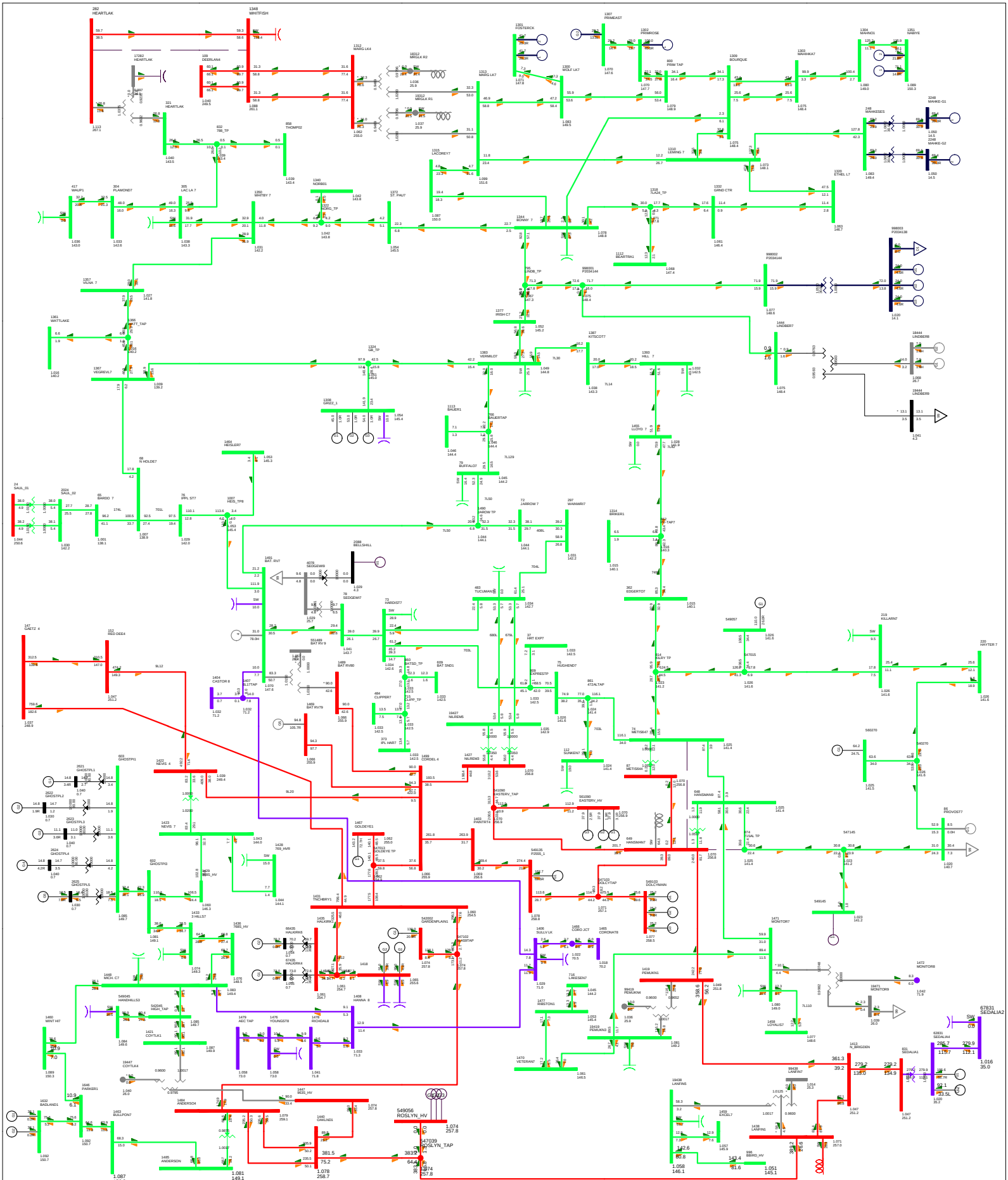
Attachment A3- 3	**Contingency** CONT 000: All elements in service	**Study Case Description** 2028WP POST-PROJ Base Case	**P2034 Cold Lake Area Cogen** Bus - VOLTAGE (kV/PU) Branch - MW/MVar Equipment - MW/MVar 100.0%RATEB kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



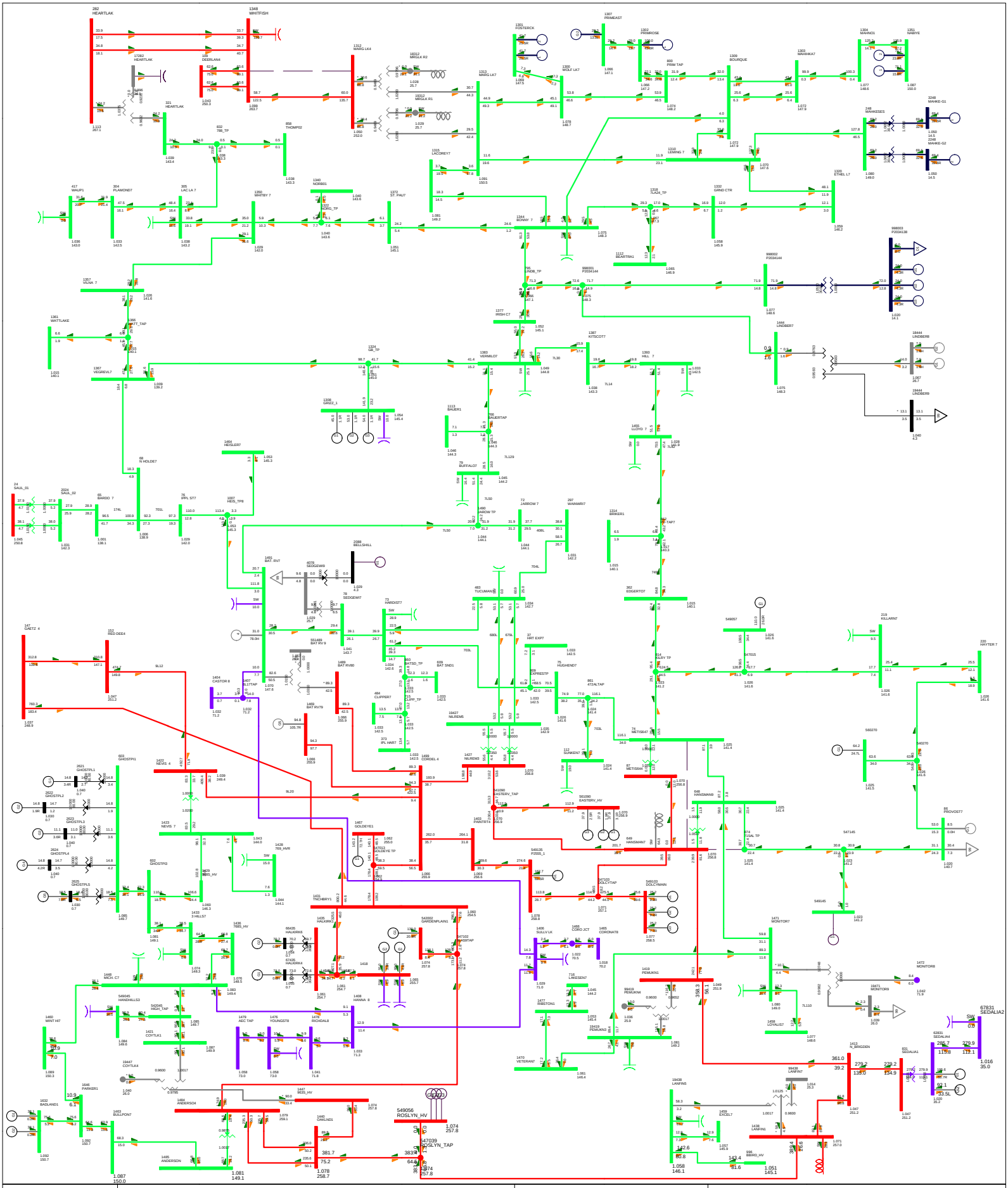
Attachment A3- 3	**Contingency** CONT 001: CETO (87S Gaetz - 972S Tinchebray)	**Study Case Description** 2028WP POST-PROJ Base Case	**P2034 Cold Lake Area Cogen** Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEB kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



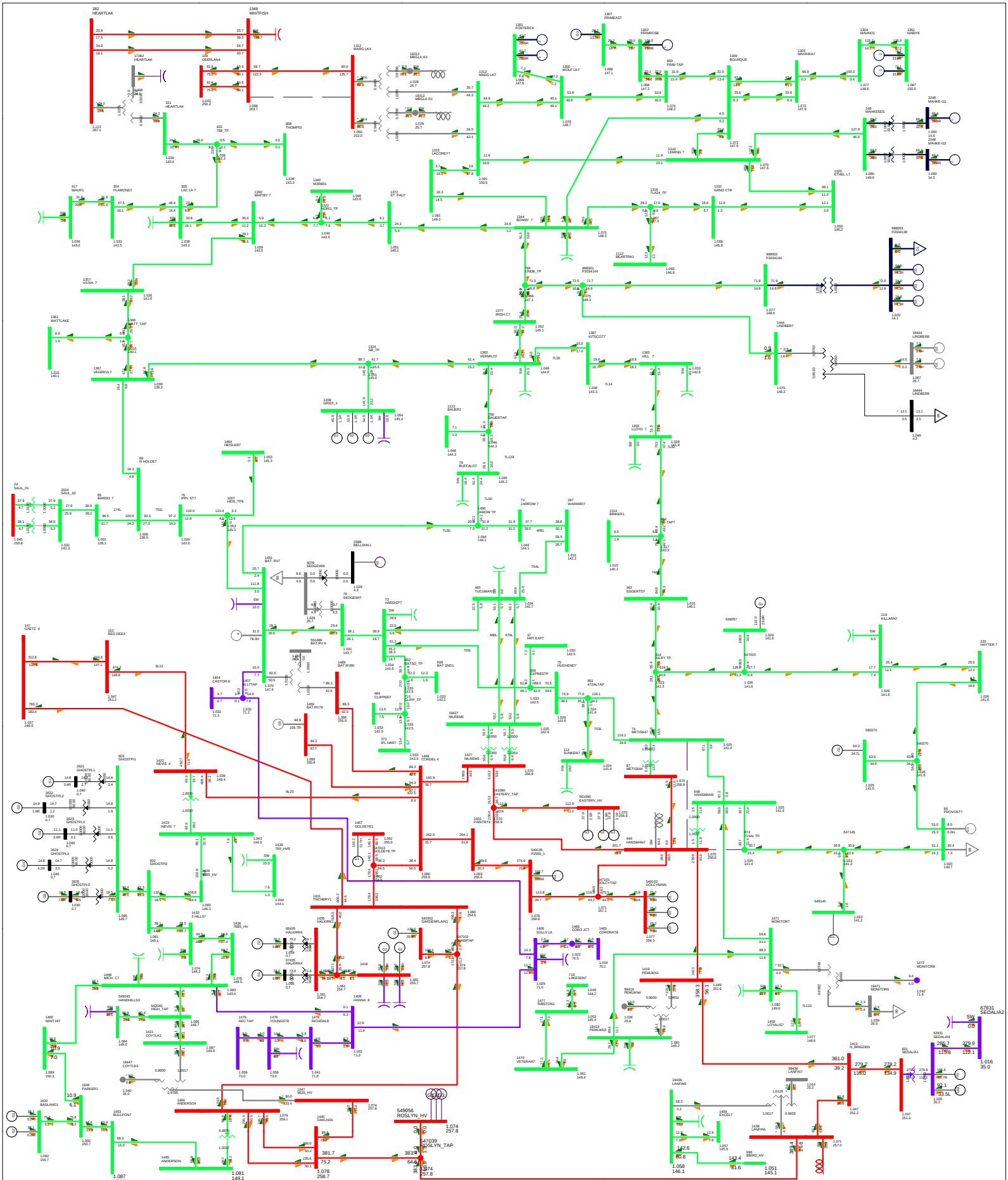
Attachment A3- 3	Contingency	Study Case Description	P2034 Cold Lake Area Cogen
	CONT 010: 9L22 (898S Heart Lake - 825S Whitefish Lake)	2028WP POST-PROJ Base Case	Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEB kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



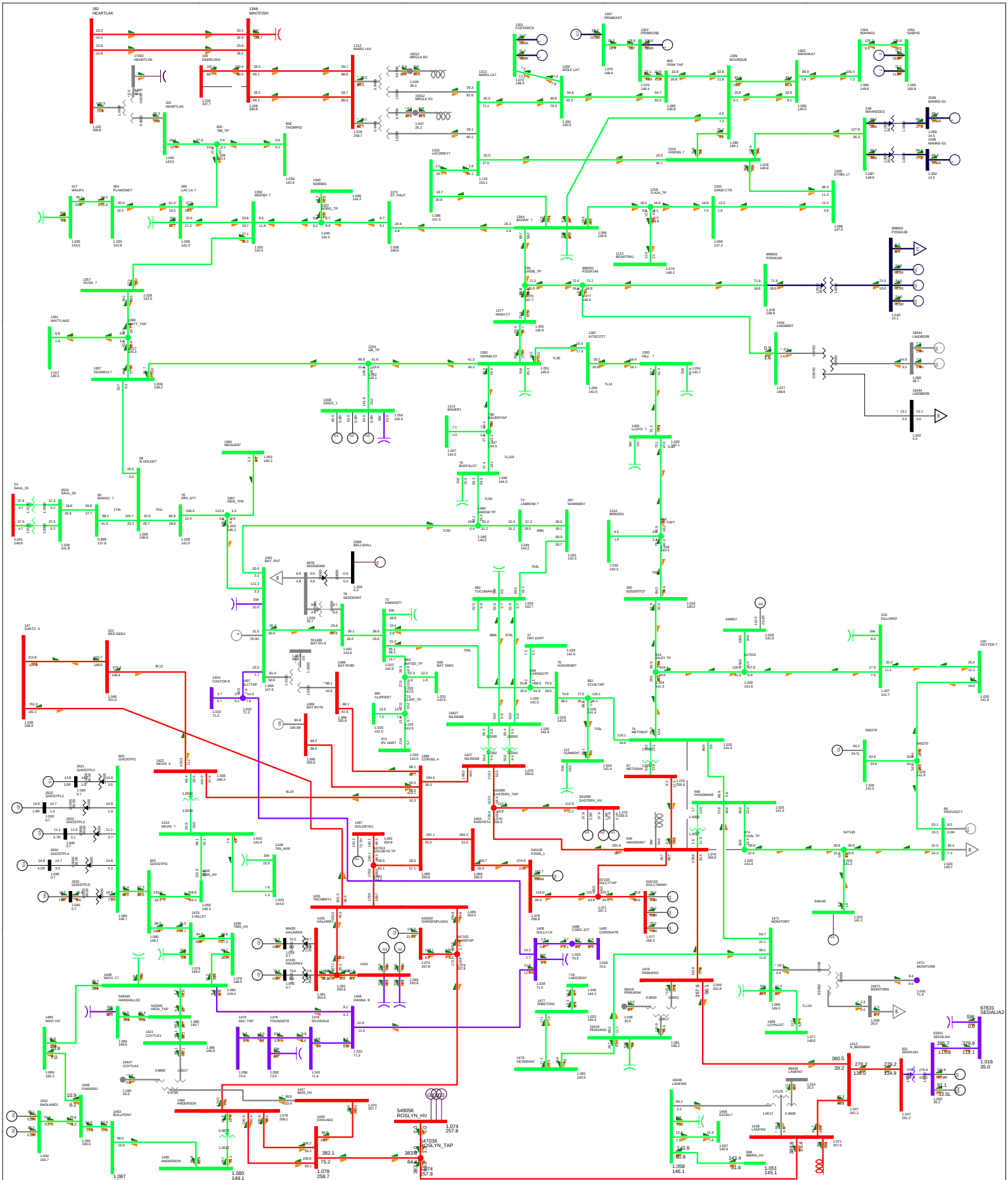
Attachment A3- 3	**Contingency** CONT 011: 9L81 (898S Heart Lake - 825S Whitefish Lake)	**Study Case Description** 2028WP POST-PROJ Base Case	**P2034 Cold Lake Area Cogen** Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEB kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



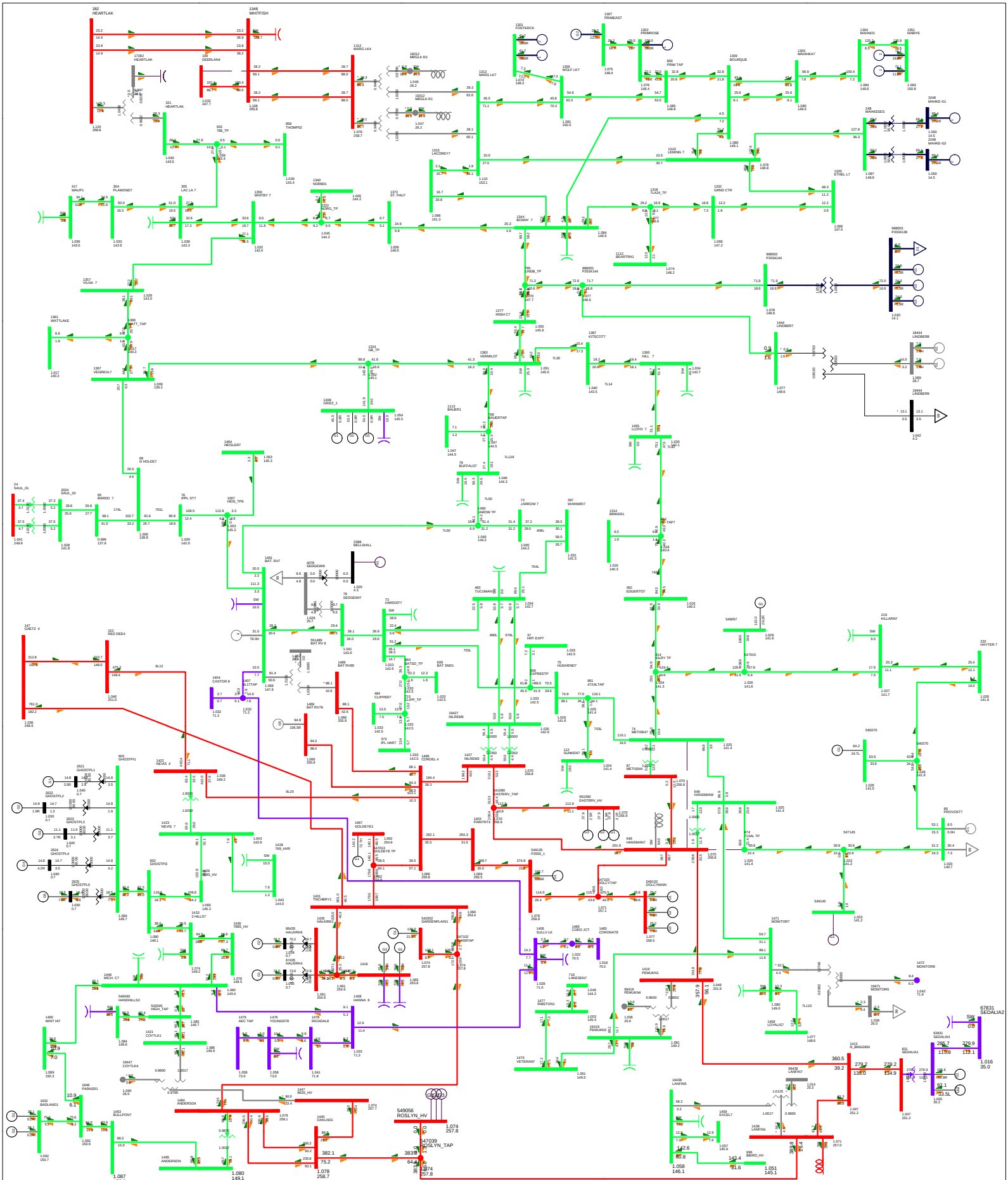
Attachment A3- 3	Contingency	Study Case Description	P2034 Cold Lake Area Cogen
	CONT 012: 9L36 (826S Marguerite Lake - 825S Whitefish Lake)	2028WP POST-PROJ Base Case	Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEB kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



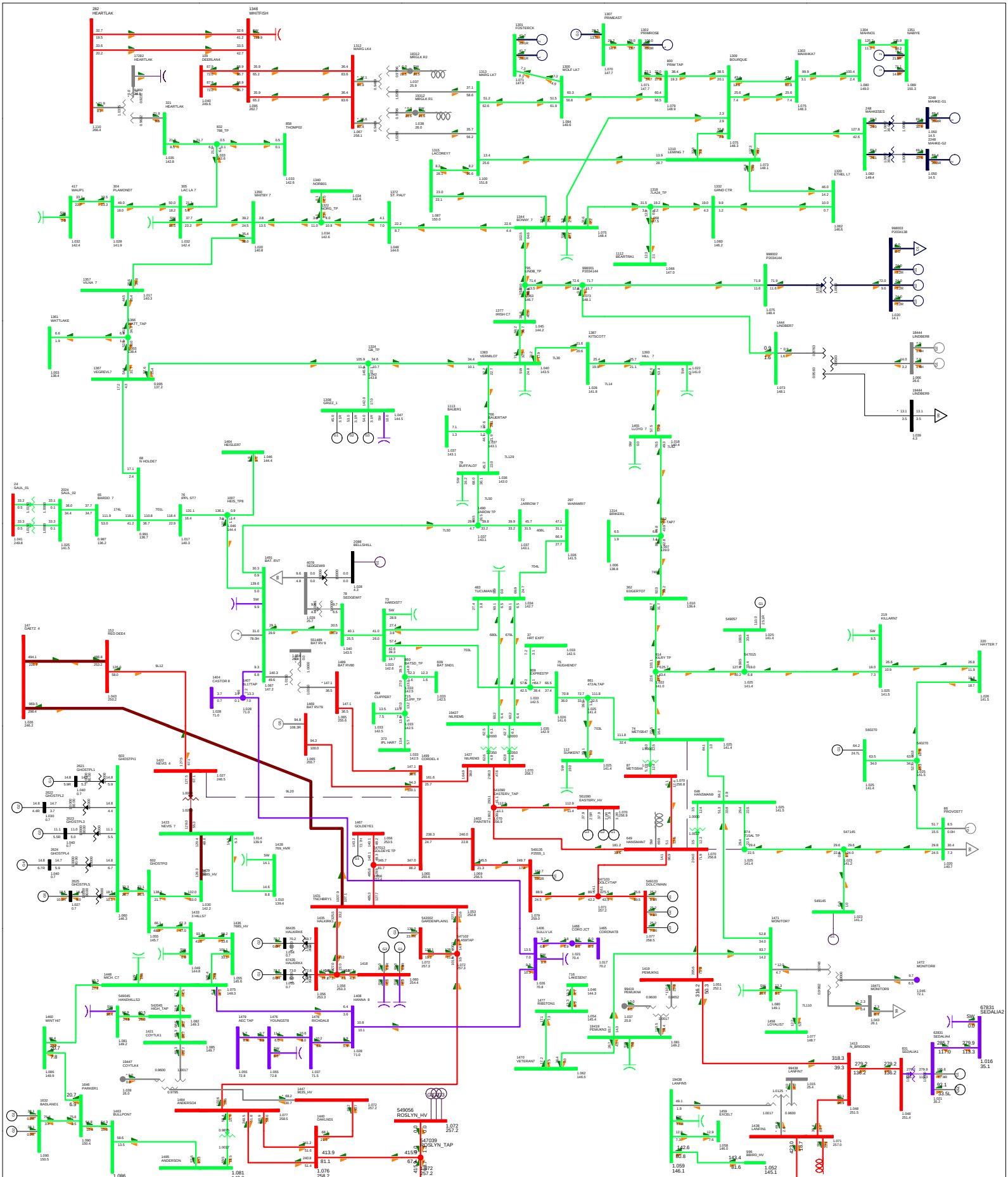
Attachment A3- 3	Contingency	Study Case Description	P2034 Cold Lake Area Cogen
	CONT 013: 9L37 (826S Marguerite Lake - 825S Whitefish Lake)	2028WP POST-PROJ Base Case	Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEB kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A3- 3	Contingency	Study Case Description	P2034 Cold Lake Area Cogen
	CONT 014: 9L960 (13S Deerland - 825S Whitefish Lake)	2028WP POST-PROJ Base Case	Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEB kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A3- 3	Contingency	Study Case Description	P2034 Cold Lake Area Cogen
	CONT 015: 9L961 (13S Deerland - 825S Whitefish Lake)	2028WP POST-PROJ Base Case	Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEB kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A3- 3

Contingency

CONT 016: 9L20 (766S Nevis - 755S Cordel)

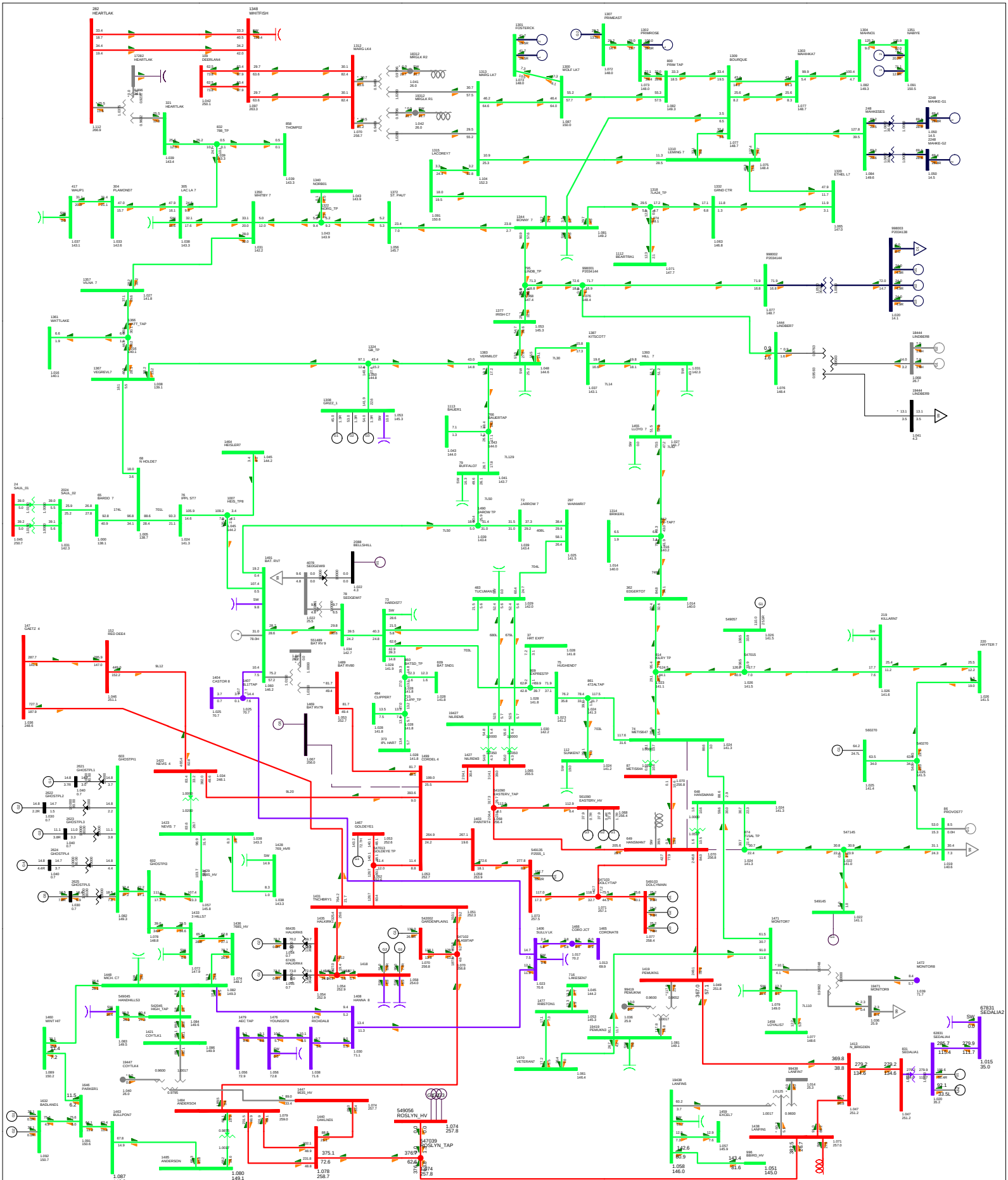
Study Case Description

2028WP POST-PROJ

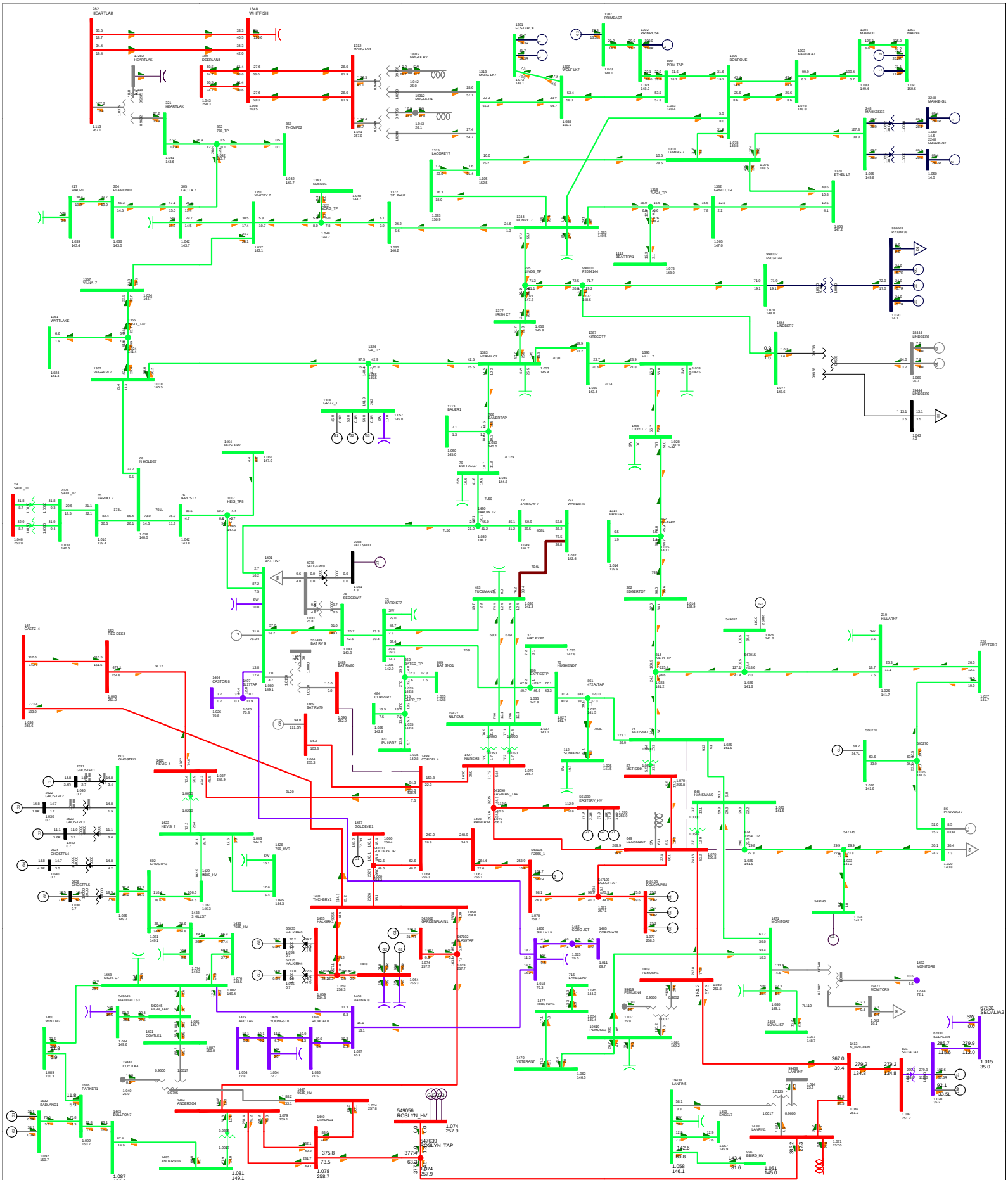
Base Case

P2034 Cold Lake Area Cogen

Bus - VOLTAGE (kV/PU)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%RATEB
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A3- 3	**Contingency** CONT 017: 9L79 (757S Battle River - 755S Cordel)	**Study Case Description** 2028WP POST-PROJ Base Case	**P2034 Cold Lake Area Cogen** Bus - VOLTAGE (kV/PU) Branch - MW/MVar Equipment - MW/Mvar 100.0%RATEB kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A3- 3

Contingency

CONT 018: 9L80 (757S Battle River - 755S Cordel)

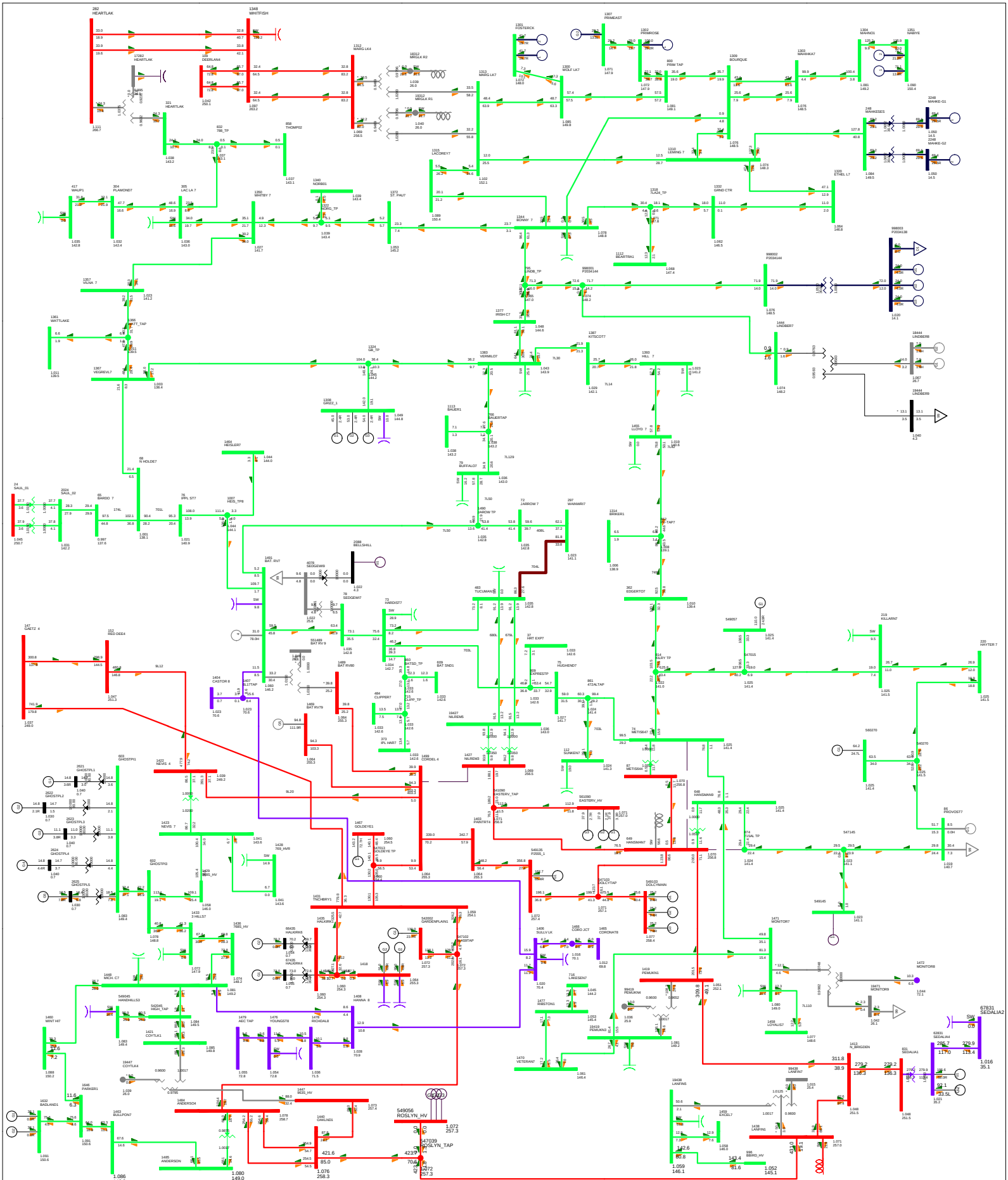
Study Case Description

2028WP POST-PROJ

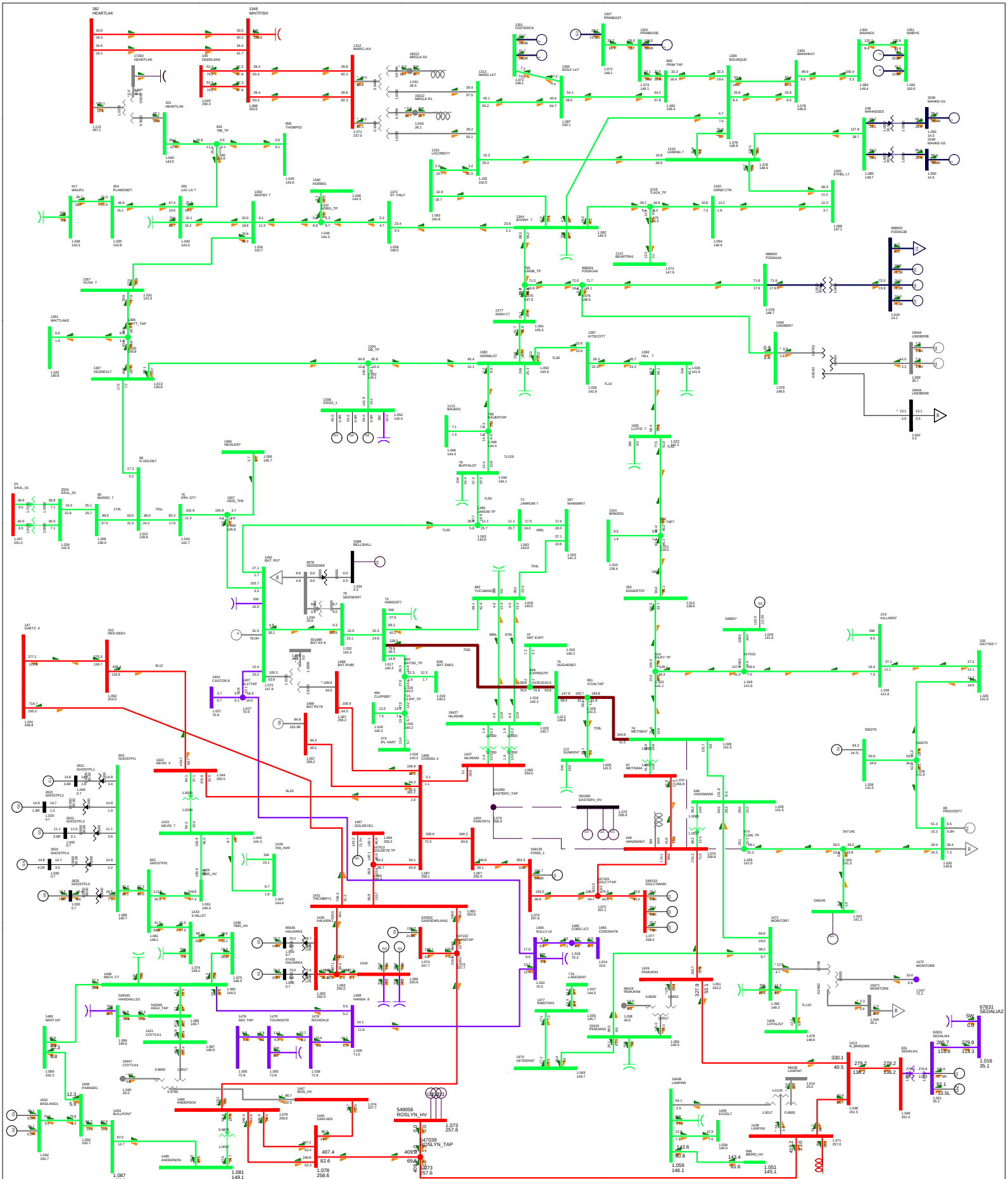
Base Case

P2034 Cold Lake Area Cogen

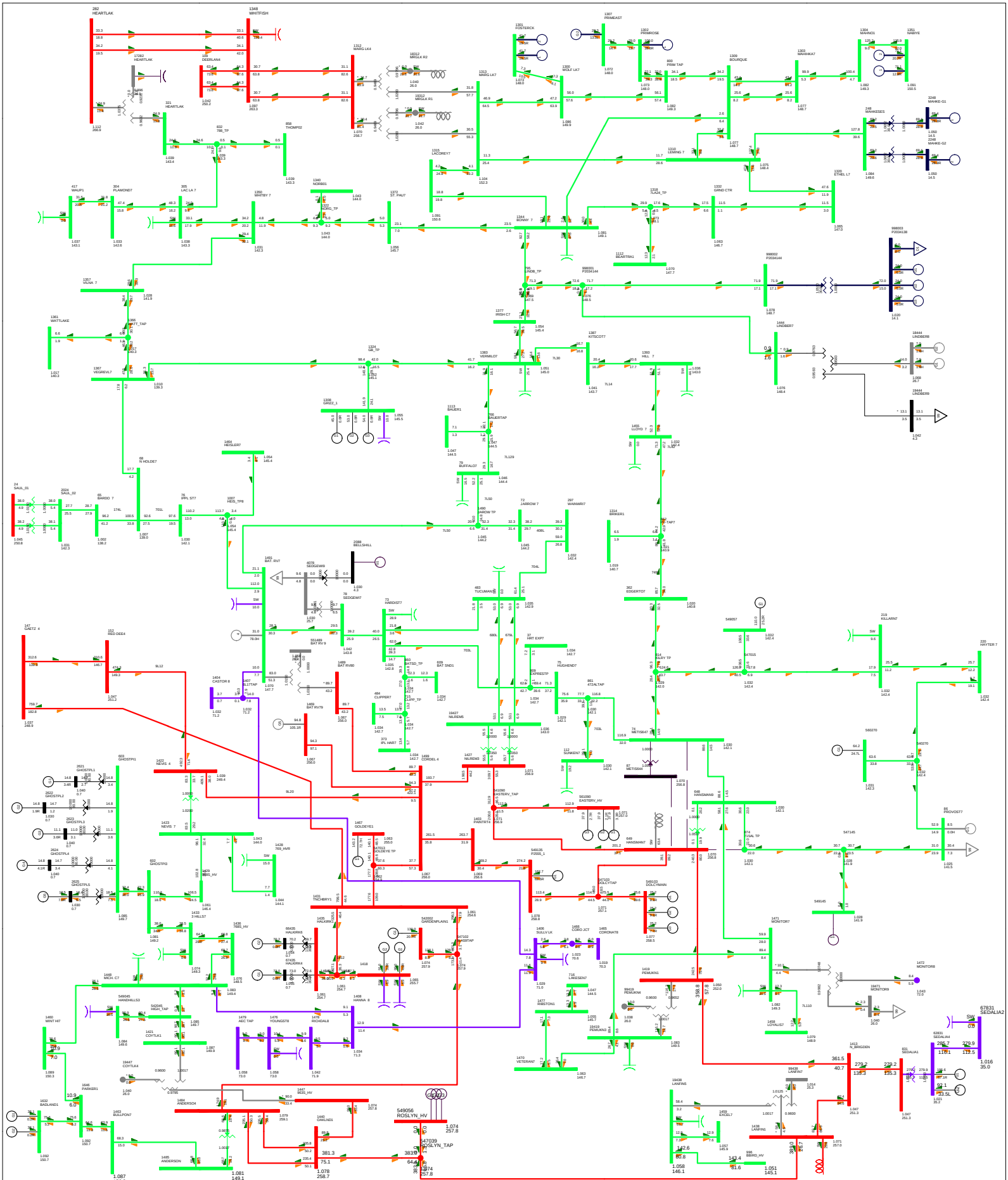
Bus - VOLTAGE (kV/PU)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%RATEB
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A3- 3	**Contingency** CONT 019: 953L (574S Nilrem - 755S Cordel)	**Study Case Description** 2028WP POST-PROJ Base Case	**P2034 Cold Lake Area Cogen** Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEB kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A3- 3	**Contingency** CONT 020: 1047L (574S Nilrem - P2566 Eastervale Solar - 650S Hansman Lake)	**Study Case Description** 2028WP POST-PROJ Base Case	**P2034 Cold Lake Area Cogen** Bus - VOLTAGE (kV/PU) Branch - MW/MVar Equipment - MW/Mvar 100.0%RATEB kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A3- 3

Contingency

CONT 021: 954L (648S Metiskow - 650S Hansman Lake)

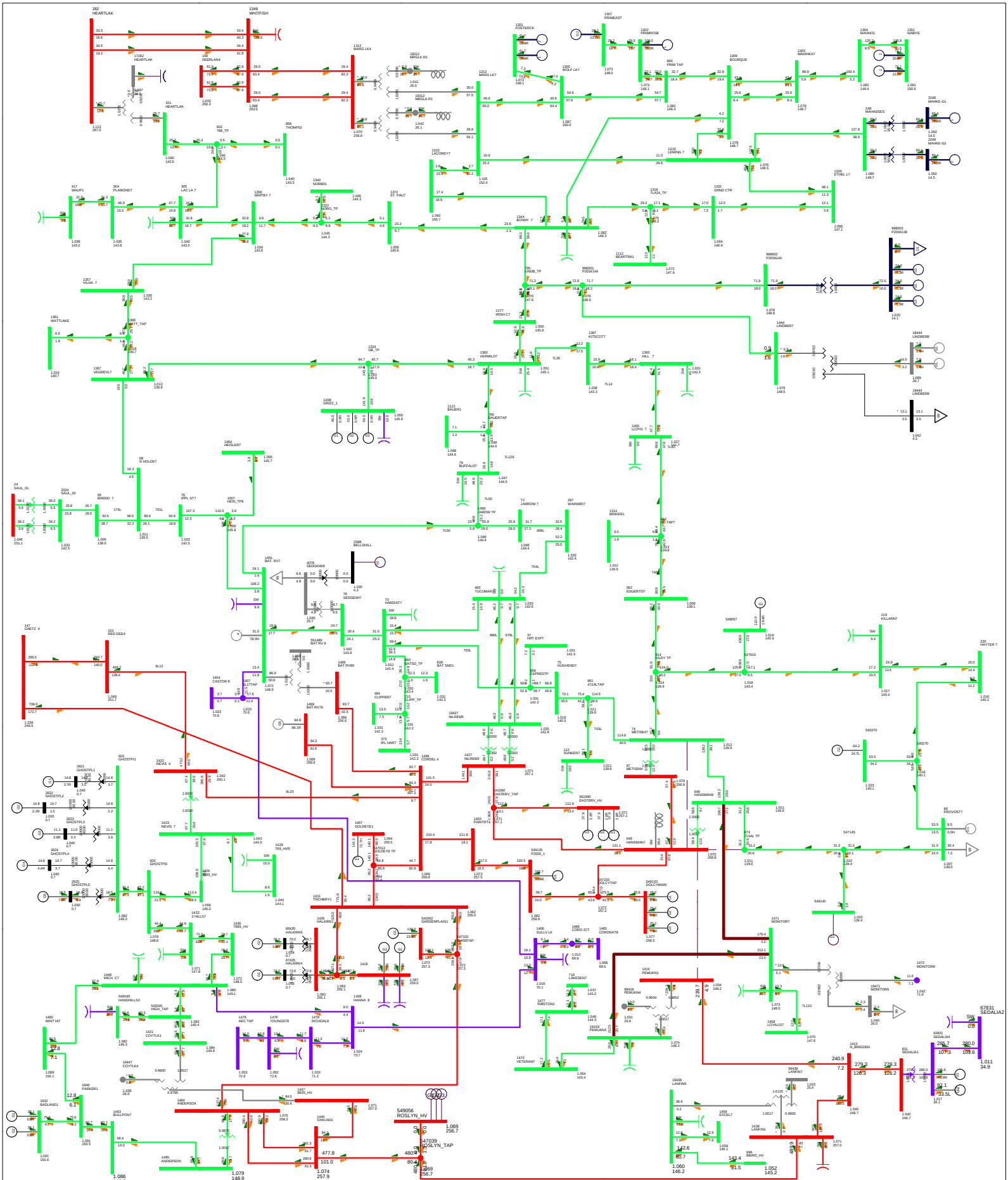
Study Case Description

2028WP POST-PROJ

Base Case

P2034 Cold Lake Area Cogen

Bus - VOLTAGE (kV/PU)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%RATEB
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A3- 3

Contingency

CONT 022: 9L966 (650S Hansman Lake - 932S Pemukan)

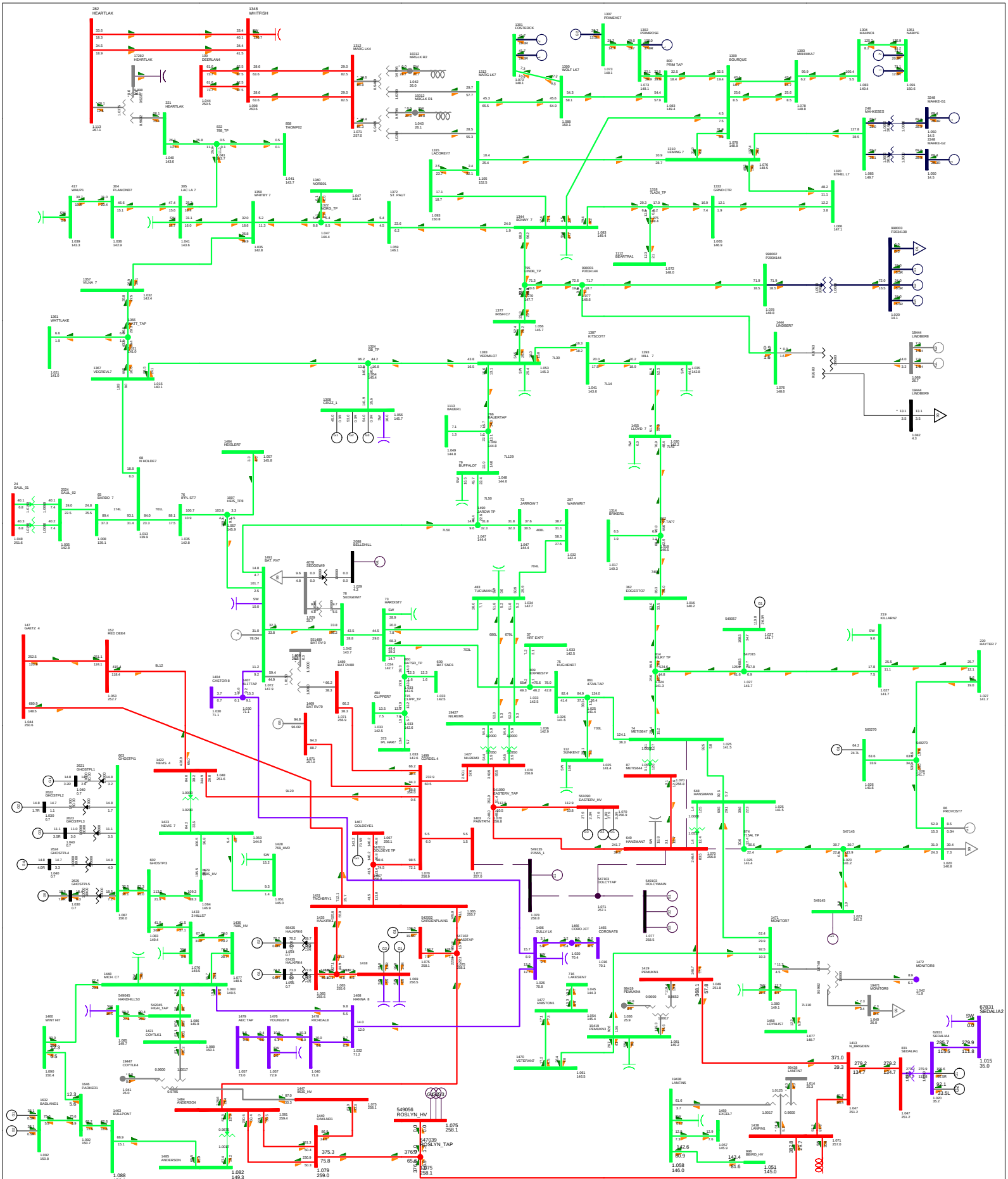
Study Case Description

2028WP POST-PROJ

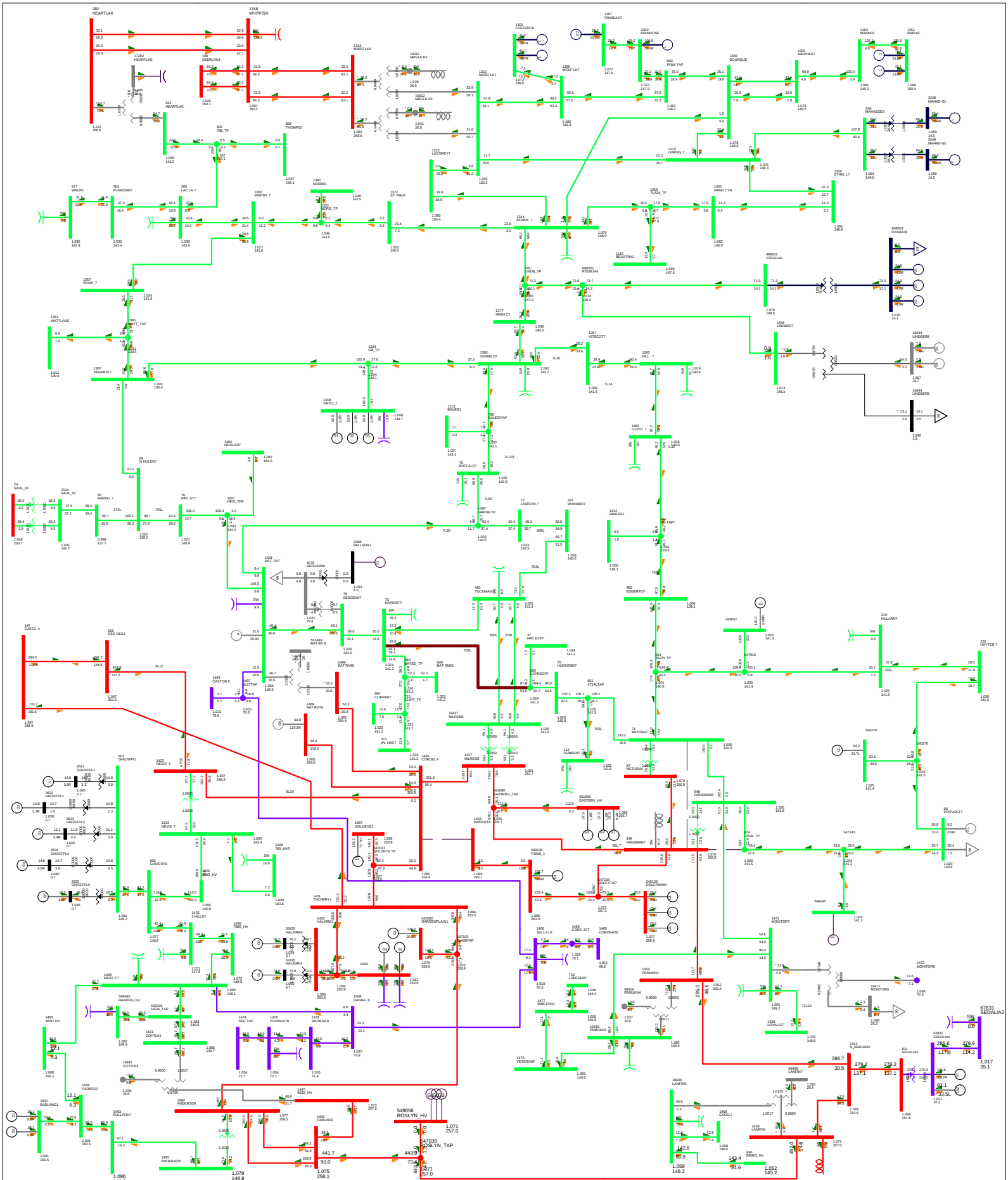
Base Case

P2034 Cold Lake Area Cogen

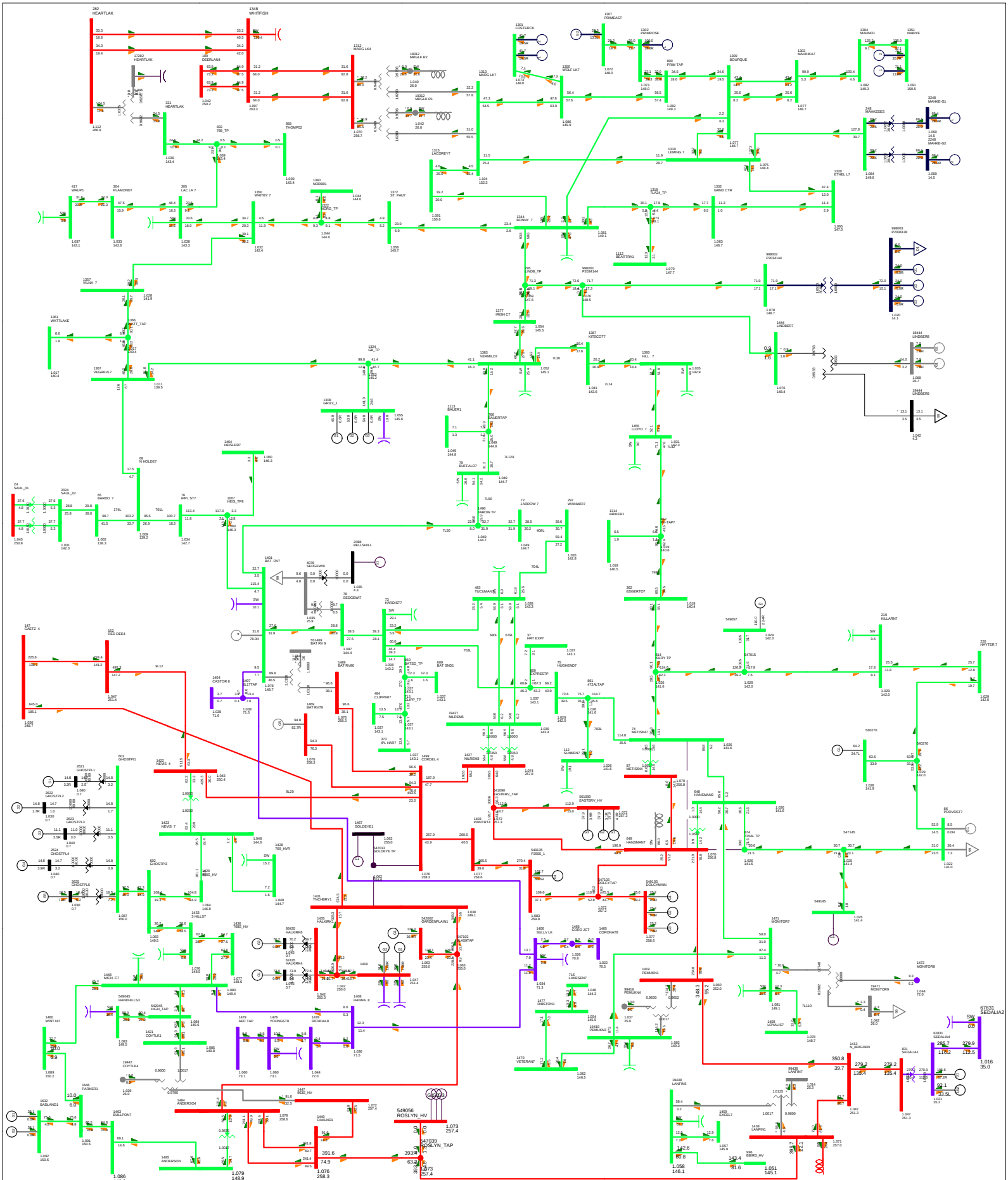
Bus - VOLTAGE (kV/PU)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%RATEB
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A3- 3	Contingency	Study Case Description	P2034 Cold Lake Area Cogen
	CONT 023: 948L (650S Hansman Lake - P2553 Dolcy Solar - P2555 Rolling Hills Wind - 863S [illegible]	Base Case	Bus - VOLTAGE (kV/PU) Branch - MW/MVar Equipment - MW/MVar 100.0%RATEB kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A3- 3	**Contingency** CONT 024: 9L27 (863S Paintearth - 755S Cordel)	**Study Case Description** 2028WP POST-PROJ Base Case	**P2034 Cold Lake Area Cogen** Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEB kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A3- 3

Contingency

CONT 025: 9L16 (755S Cordel - P2441 Halkirk 2 Wind - 972S Tinchebray)

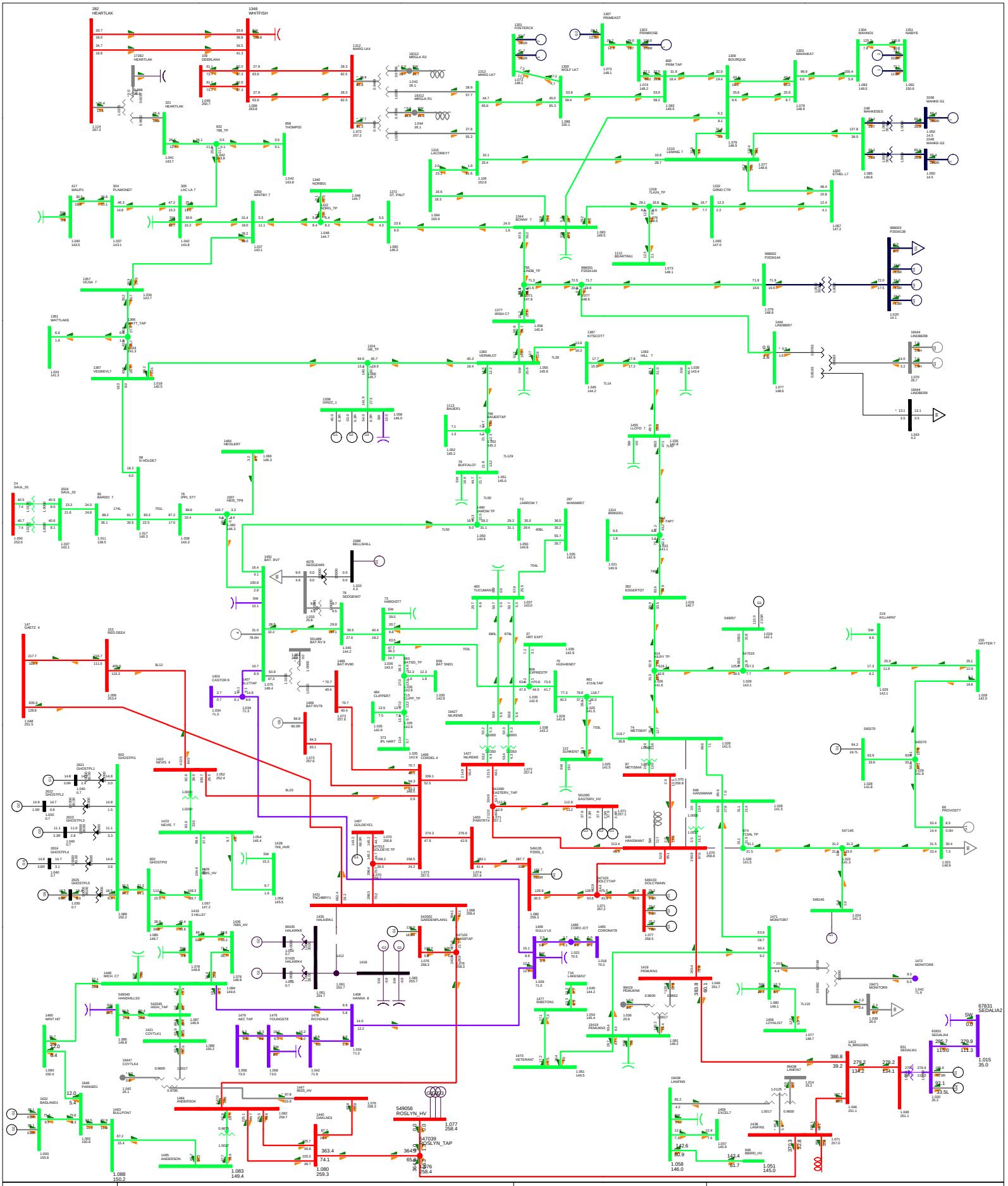
Study Case Description

2028WP POST-PROJ

Base Case

P2034 Cold Lake Area Cogen

Bus - VOLTAGE (kv/PU)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%RATEB
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A3- 3

Contingency

CONT 026: 9L93 (972S Tinchebray - 615S Halkirk - 973S Lanes Lake)

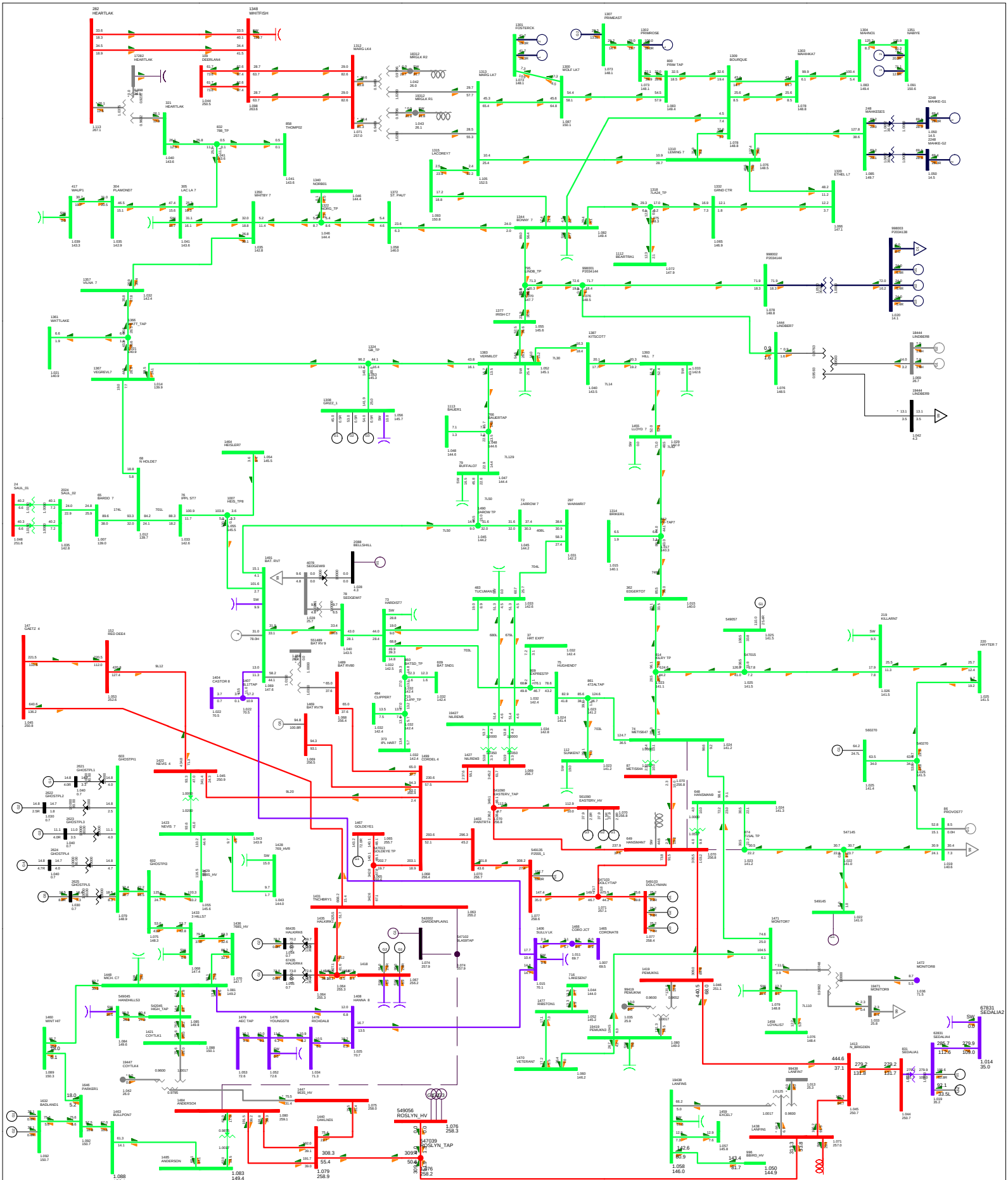
Study Case Description

2028WP POST-PROJ

Base Case

P2034 Cold Lake Area Cogen

Bus - VOLTAGE (kV/PU)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%RATEB
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A3- 3

Contingency

CONT 027: 9L59 (9728 Tinchebray - 1045S Garden Plain - 801S Anderson)

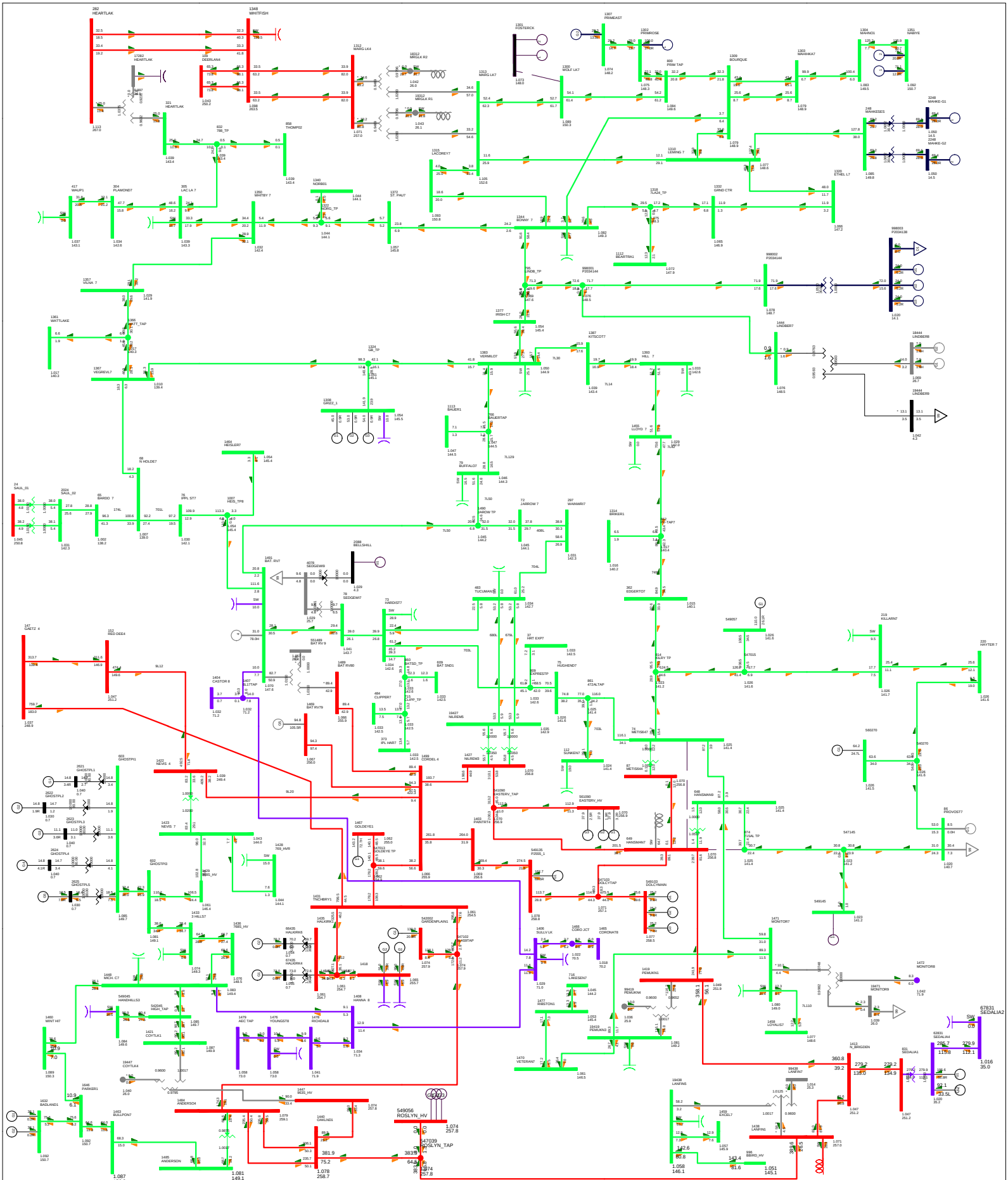
Study Case Description

2028WP POST-PROJ

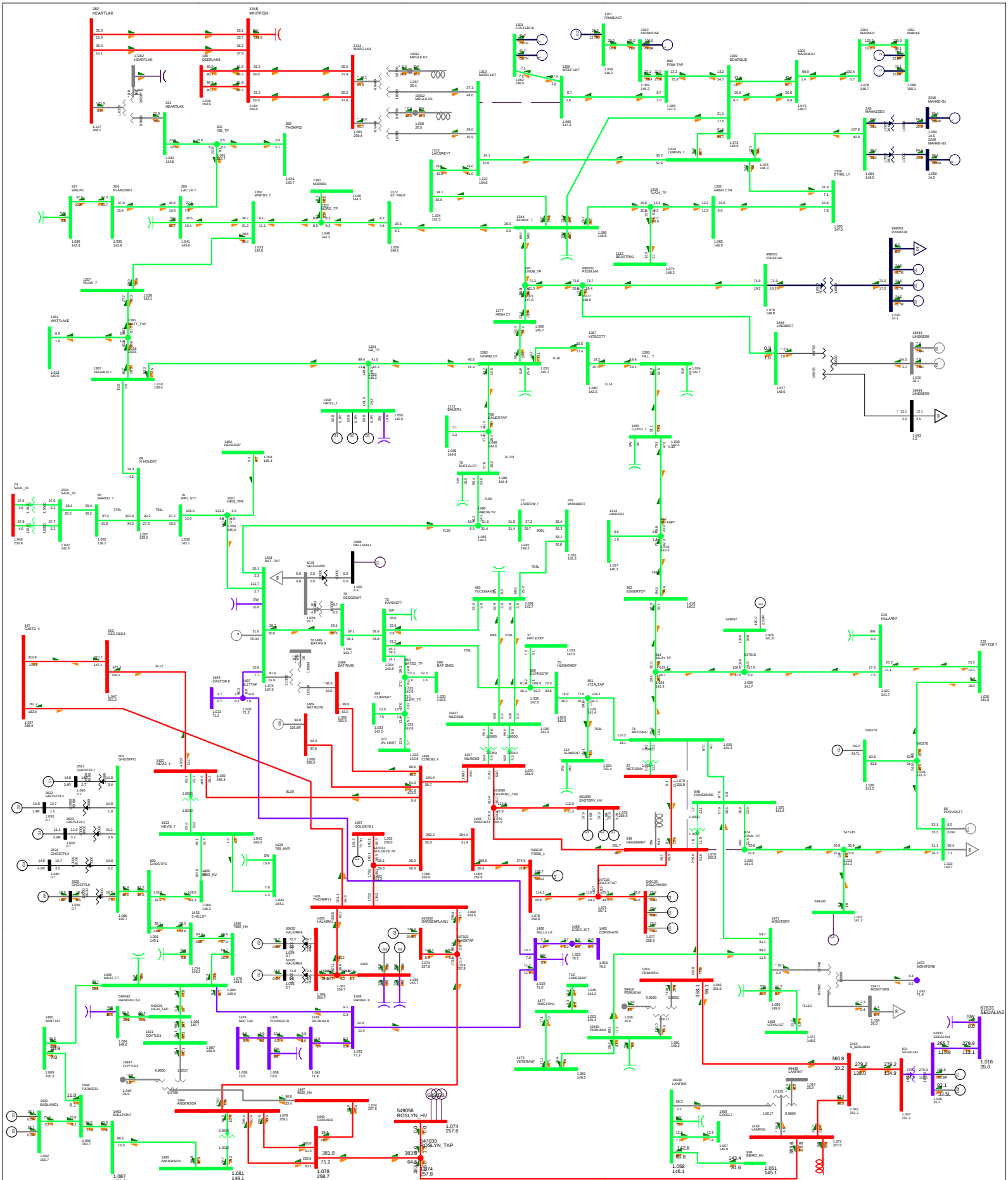
Base Case

P2034 Cold Lake Area Cogen

Bus - VOLTAGE (kV/PU)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%RATEB
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A3- 3	**Contingency** CONT 028: 7L86 (822S Wolf Lake - 877S Foster Creek)	**Study Case Description** 2028WP POST-PROJ Base Case	**P2034 Cold Lake Area Cogen** Bus - VOLTAGE (kv/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEB kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A3- 3

Contingency

CONT 029: 7L587 (822S Wolf Lake - 826S Marguerite Lake)

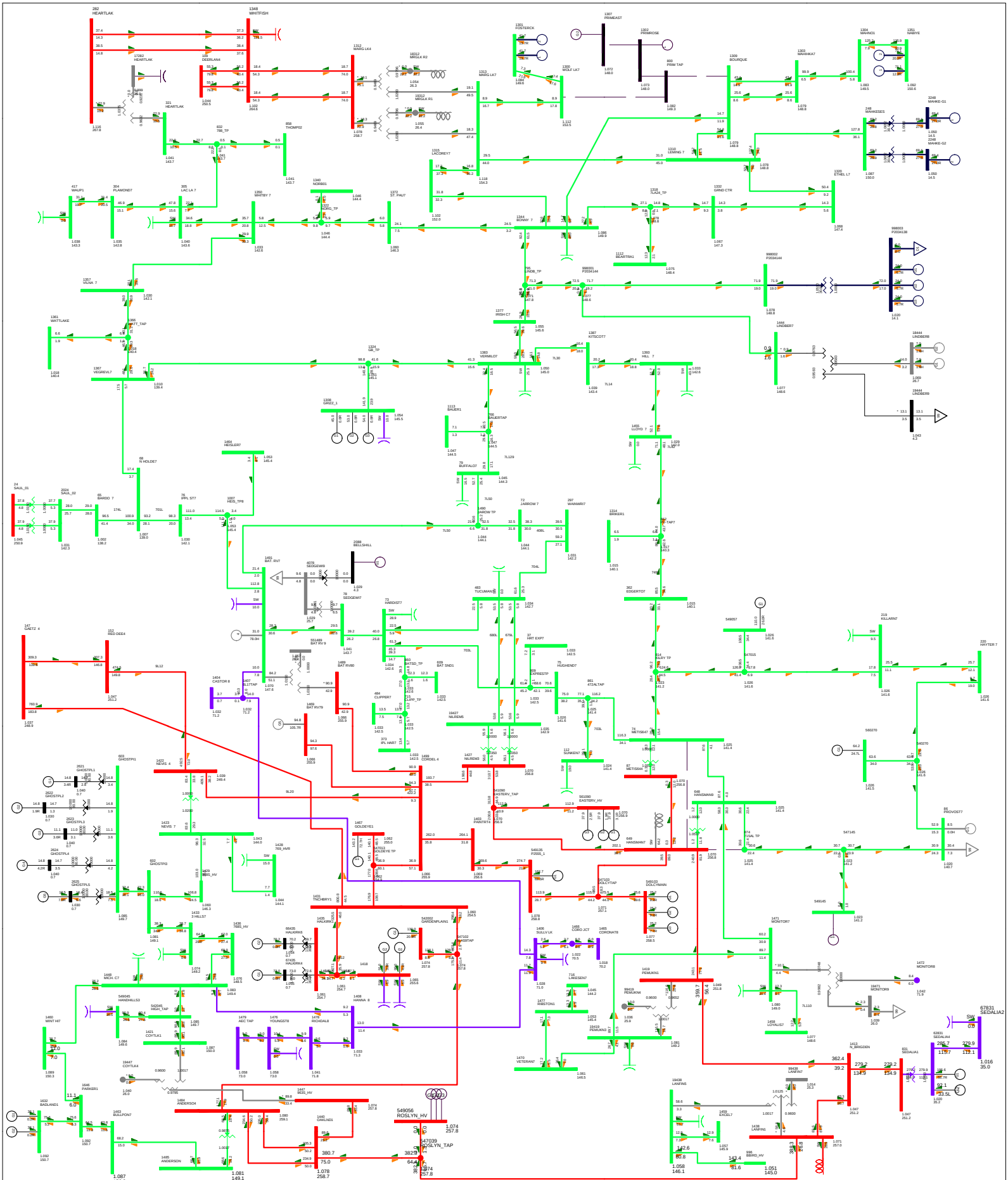
Study Case Description

2028WP POST-PROJ

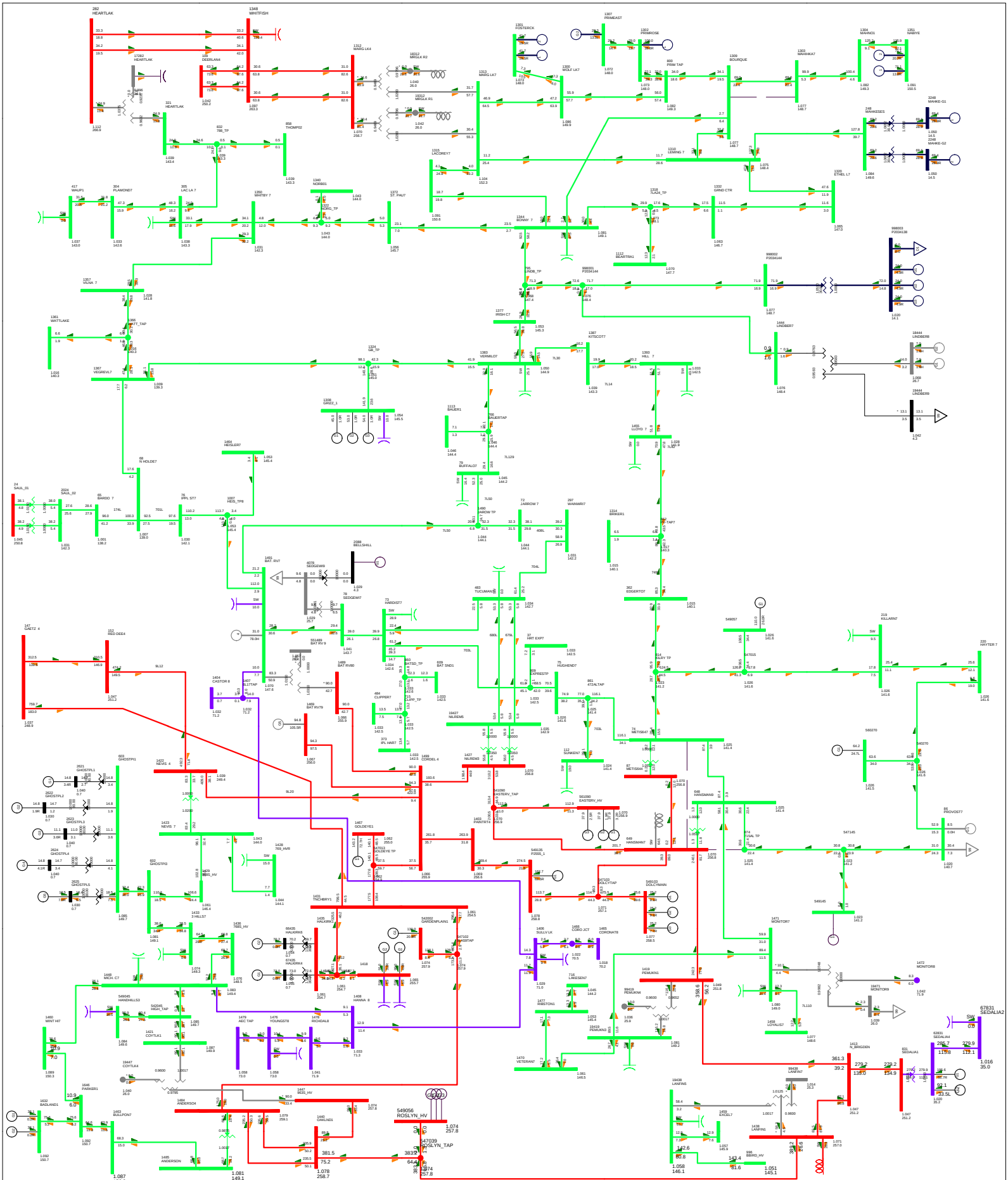
Base Case

P2034 Cold Lake Area Cogen

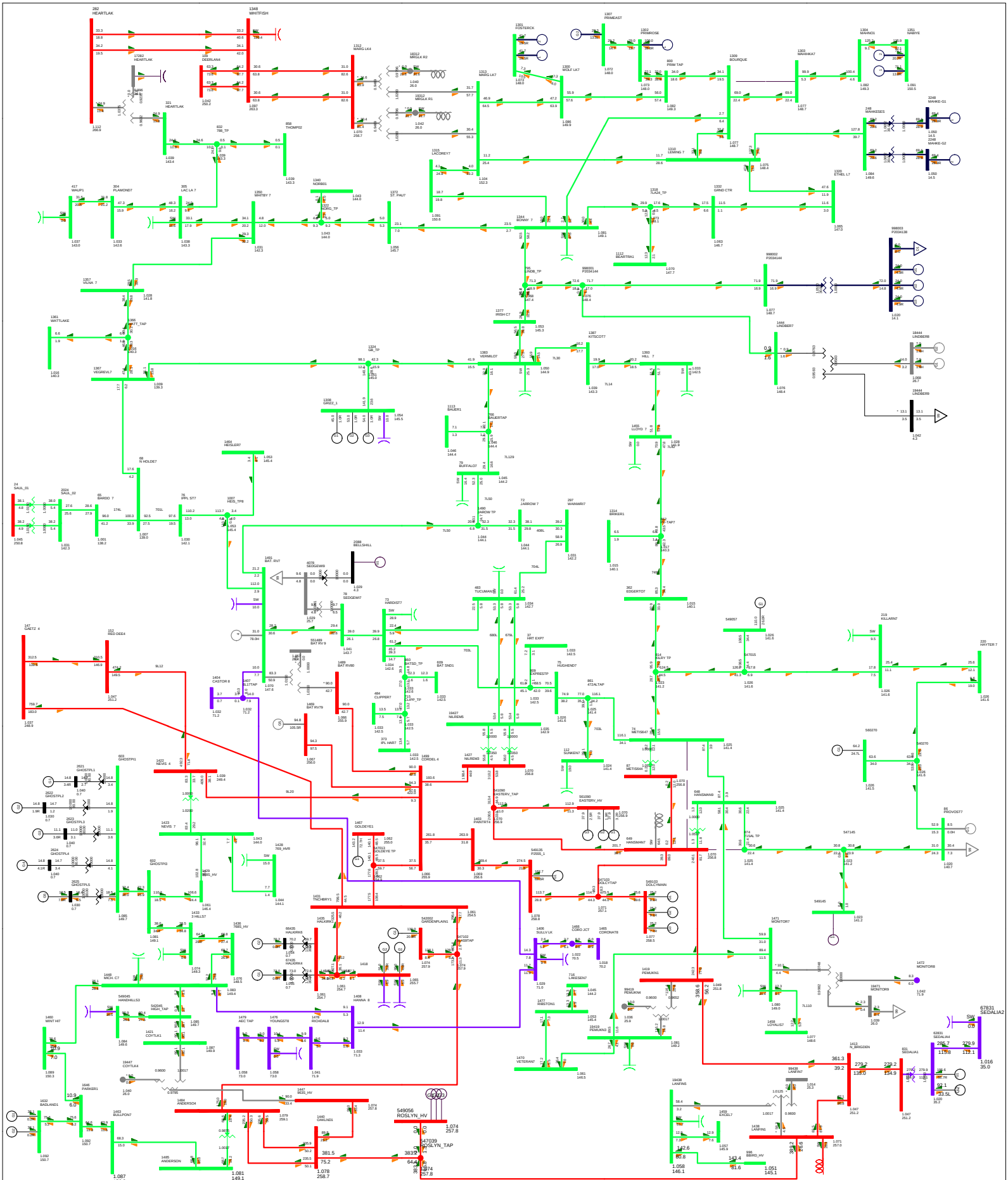
Bus - VOLTAGE (kV/PU)
Branch - MW/MVar
Equipment - MW/Mvar
100.0%RATEB
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



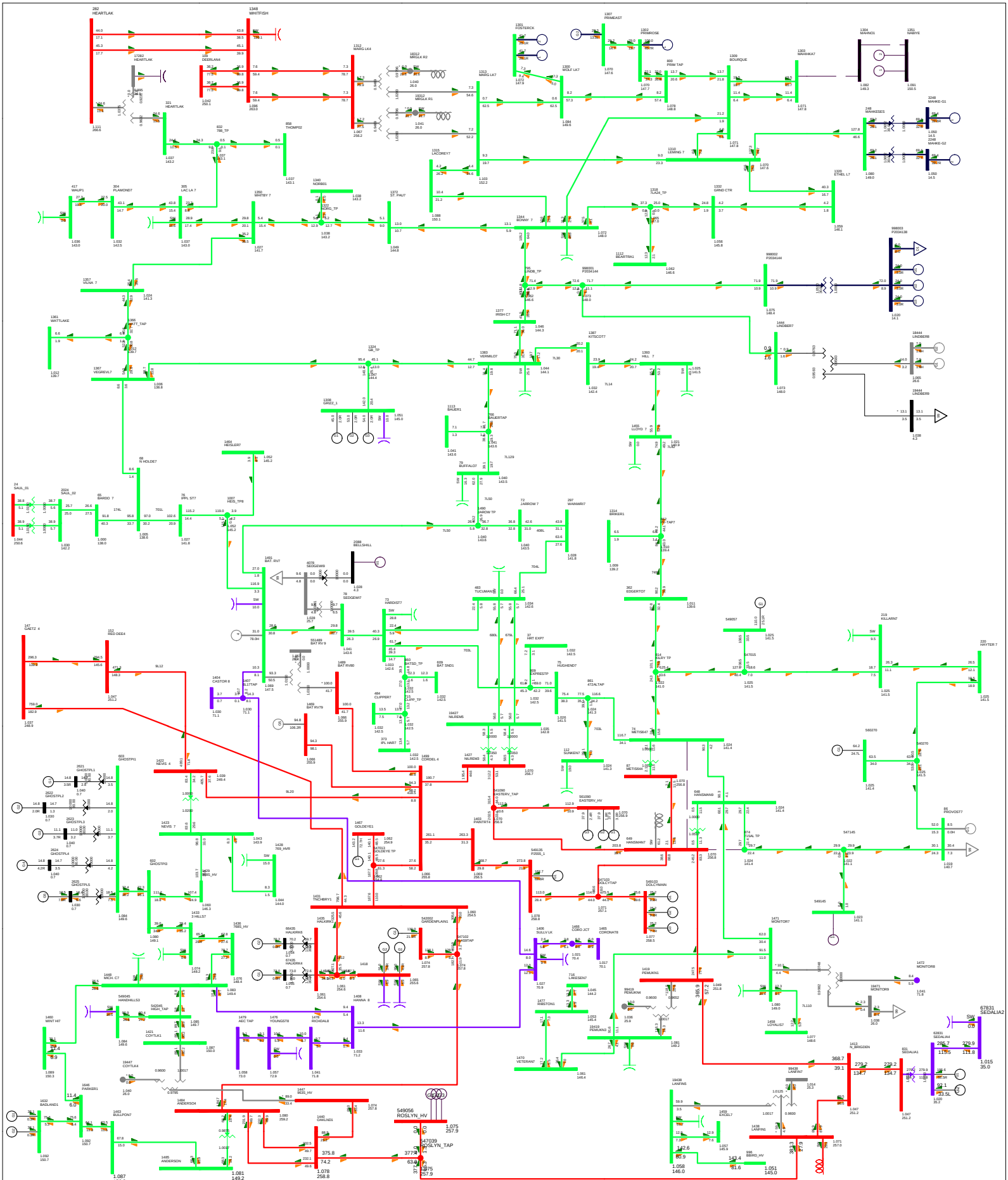
Attachment A3- 3	**Contingency** CONT 030: 7L574 (822S Wolf Lake - 859S Primrose - 970S Bourque)	**Study Case Description** 2028WP POST-PROJ Base Case	**P2034 Cold Lake Area Cogen** Bus - VOLTAGE (kv/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEB kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



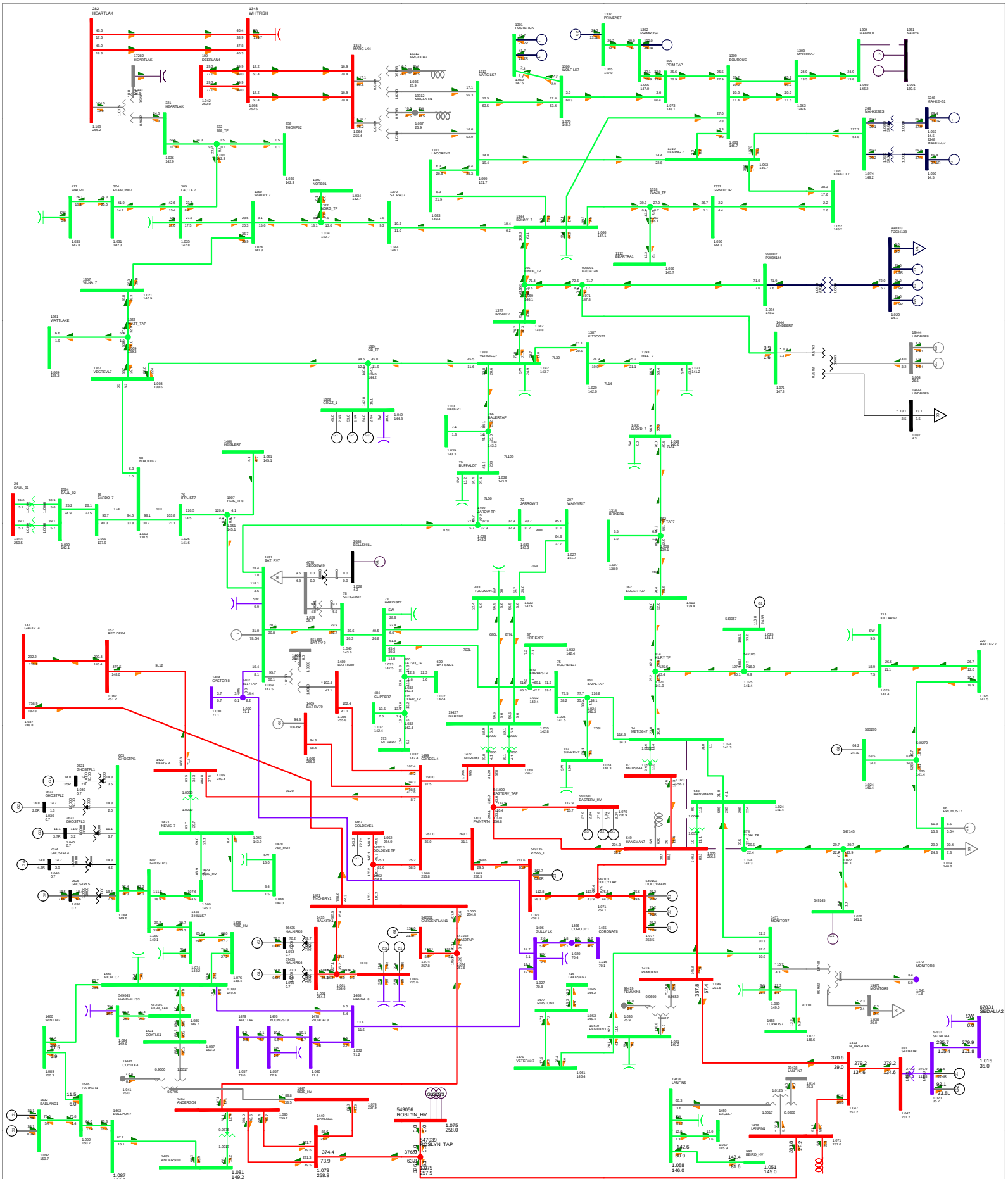
Attachment A3- 3	**Contingency** CONT 031: 7L157 (837S Mahihkan - 970S Bourque)	**Study Case Description** 2028WP POST-PROJ Base Case	**P2034 Cold Lake Area Cogen** Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEB kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



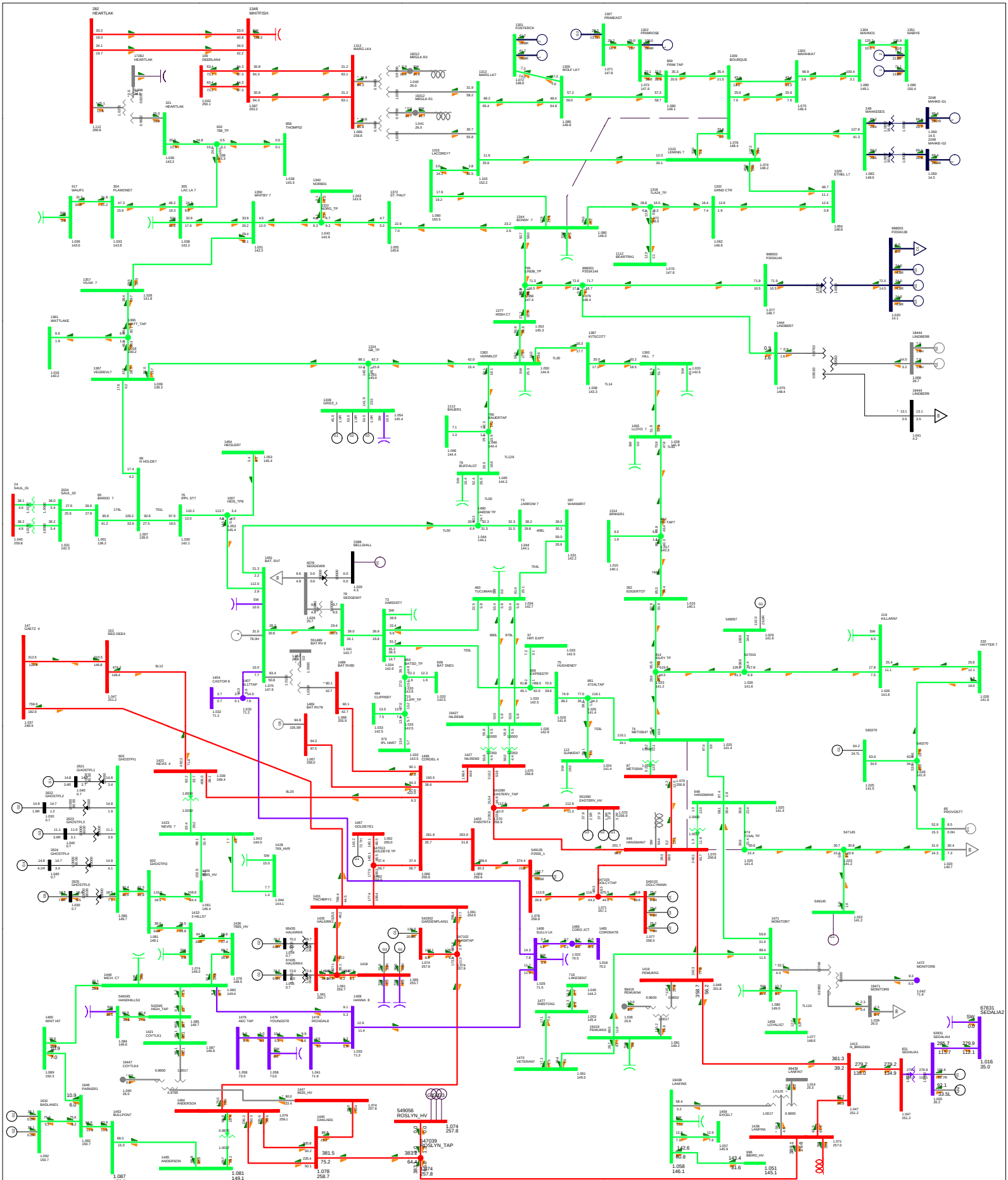
Attachment A3- 3	**Contingency** CONT 032: 7L160 (837S Mahihkan - 970S Bourque)	**Study Case Description** 2028WP POST-PROJ Base Case	**P2034 Cold Lake Area Cogen** Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEB kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



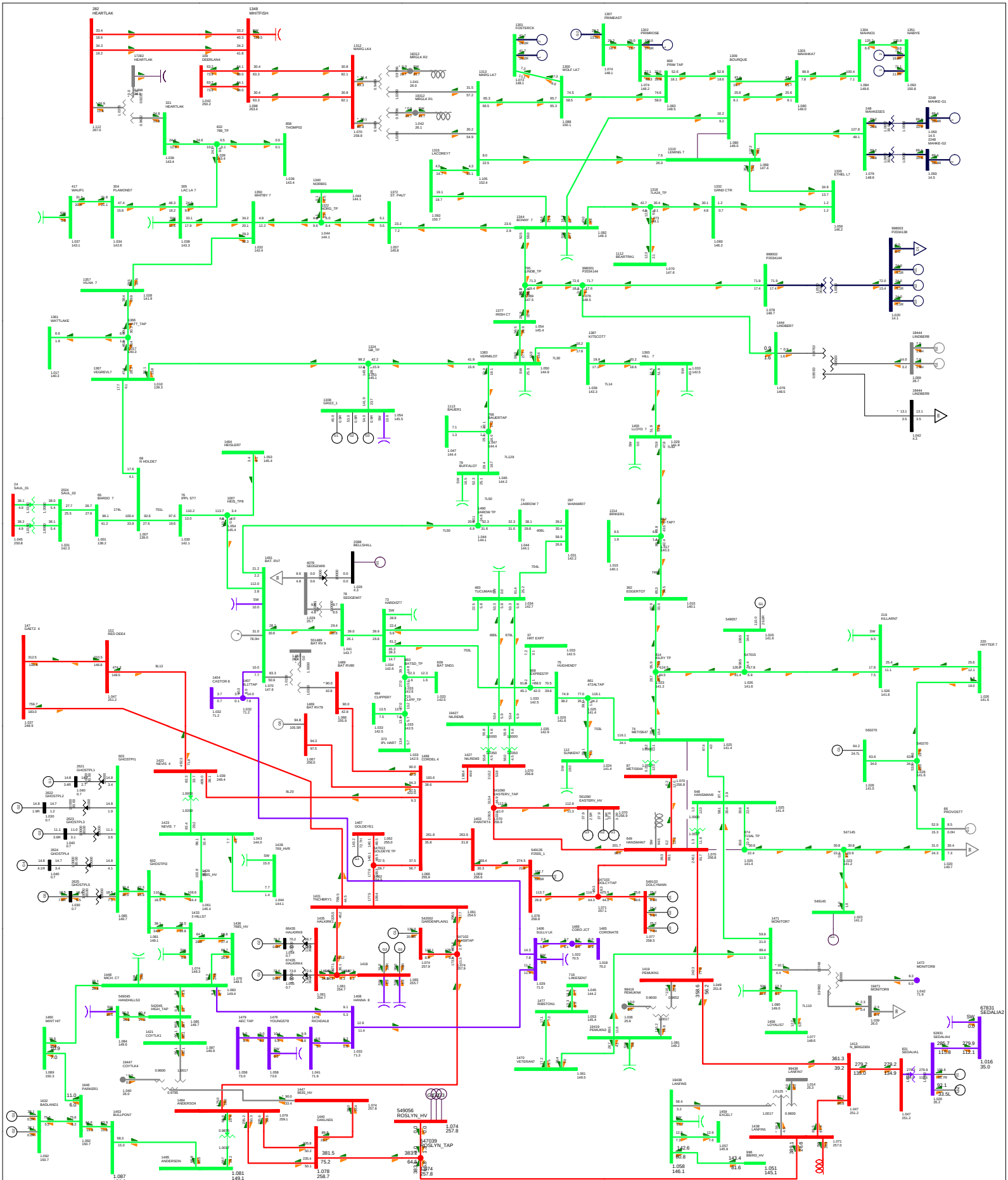
Attachment A3- 3	Contingency	Study Case Description	P2034 Cold Lake Area Cogen
	CONT 033: 7L105 (837S Mahihkan - 909S Mahno)	2028WP POST-PROJ Base Case	Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEB kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



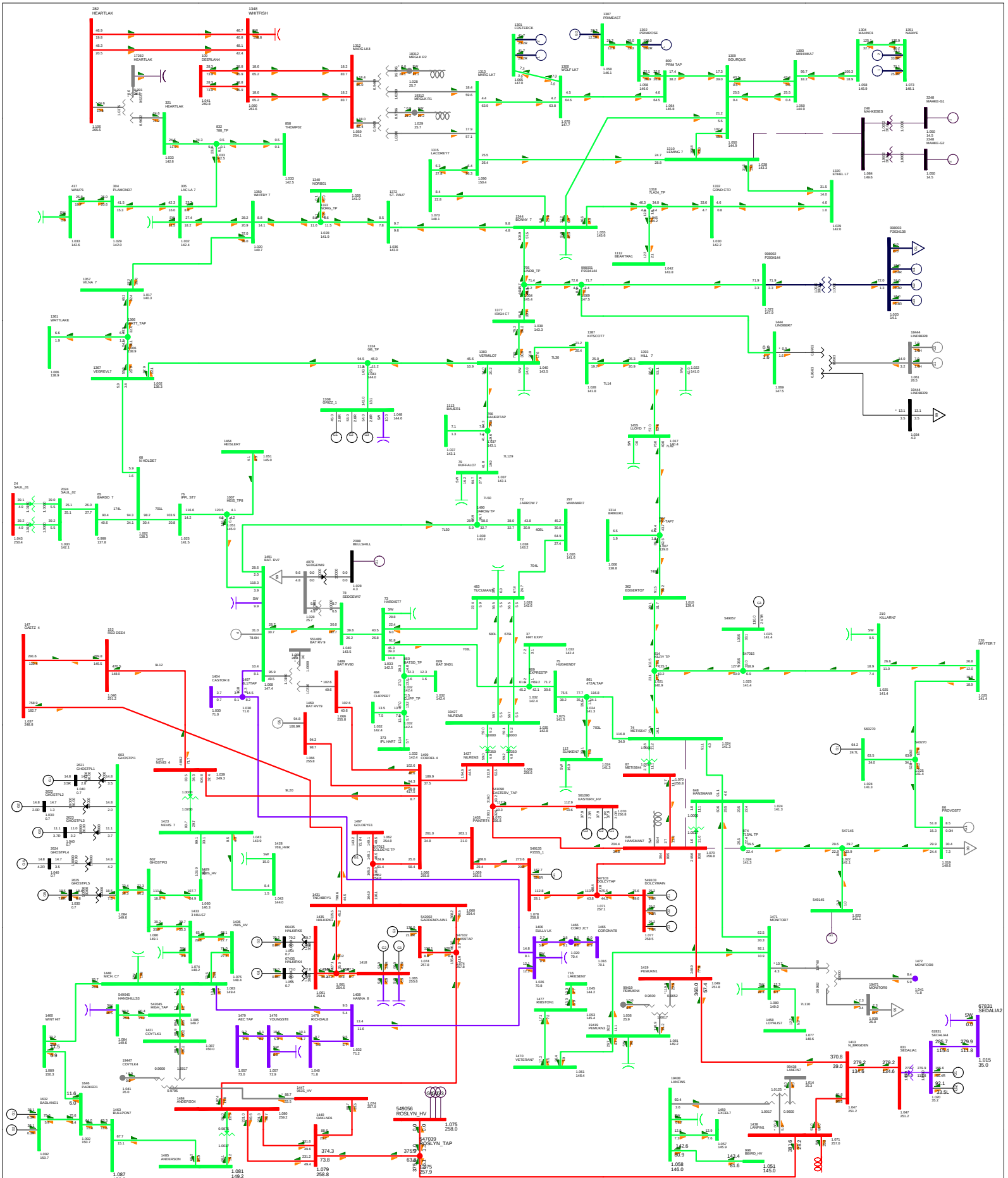
Attachment A3- 3	**Contingency** CONT 034: 7L161 (909S Mahno - 942S Nabiye)	**Study Case Description** 2028WP POST-PROJ Base Case	**P2034 Cold Lake Area Cogen** Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEB kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A3- 3	**Contingency** CONT 035: 7L146 (970S Bourque - 700S Bonnyville)	**Study Case Description** 2028WP POST-PROJ Base Case	**P2034 Cold Lake Area Cogen** Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEB kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A3- 3	Contingency	Study Case Description	P2034 Cold Lake Area Cogen
	CONT 036: 7L583 (970S Bourque - 715S Leming Lake)	2028WP POST-PROJ Base Case	Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEB kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A3- 3

Contingency

CONT 037: 7L95 (889S Mahkeses - 715S Leming Lake)

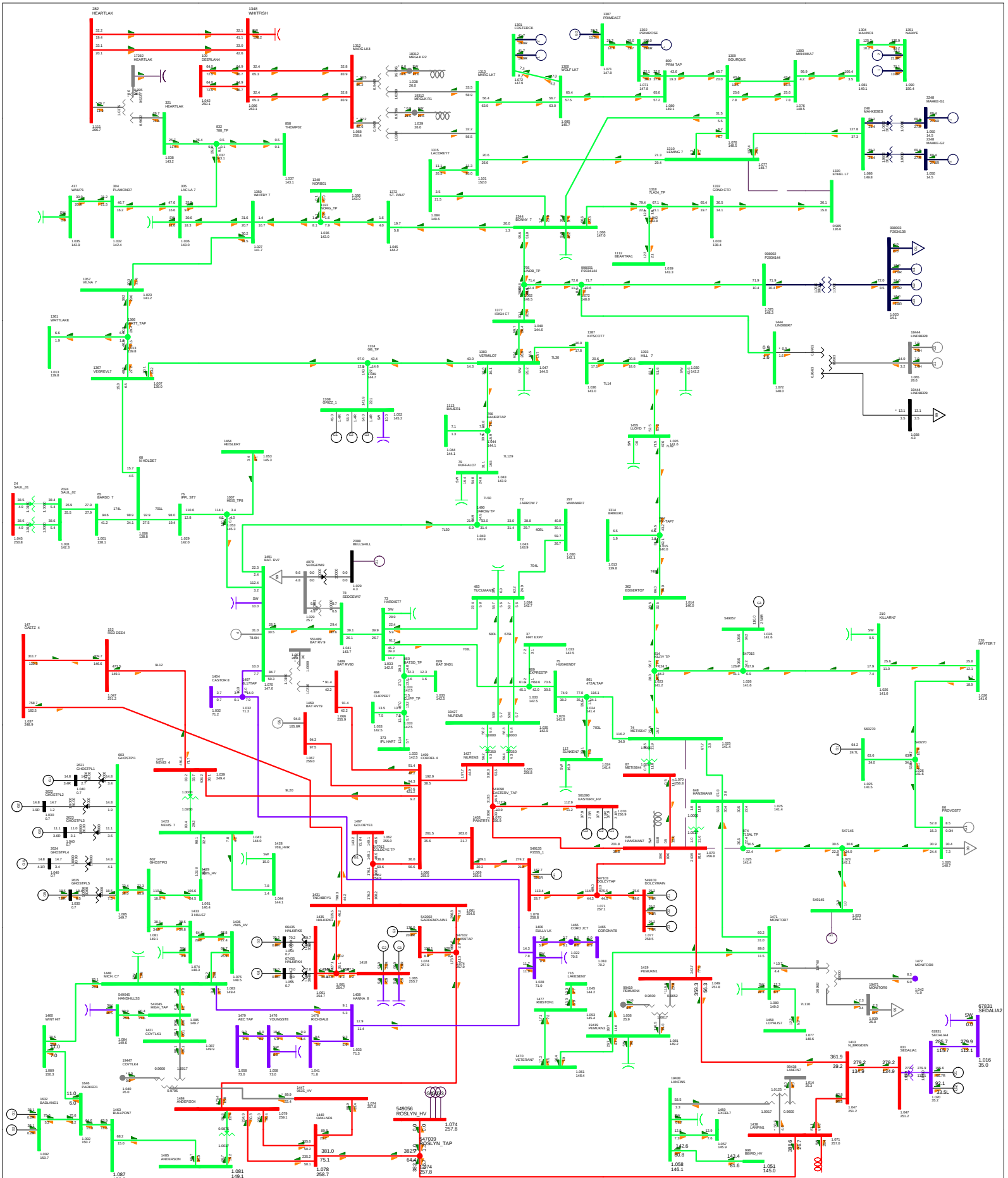
Study Case Description

2028WP POST-PROJ

Base Case

P2034 Cold Lake Area Cogen

Bus - VOLTAGE (kv/PU)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%RATEB
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A3- 3

Contingency

CONT 038: 7L66 (715S Leming Lake - 717S Ethel Lake)

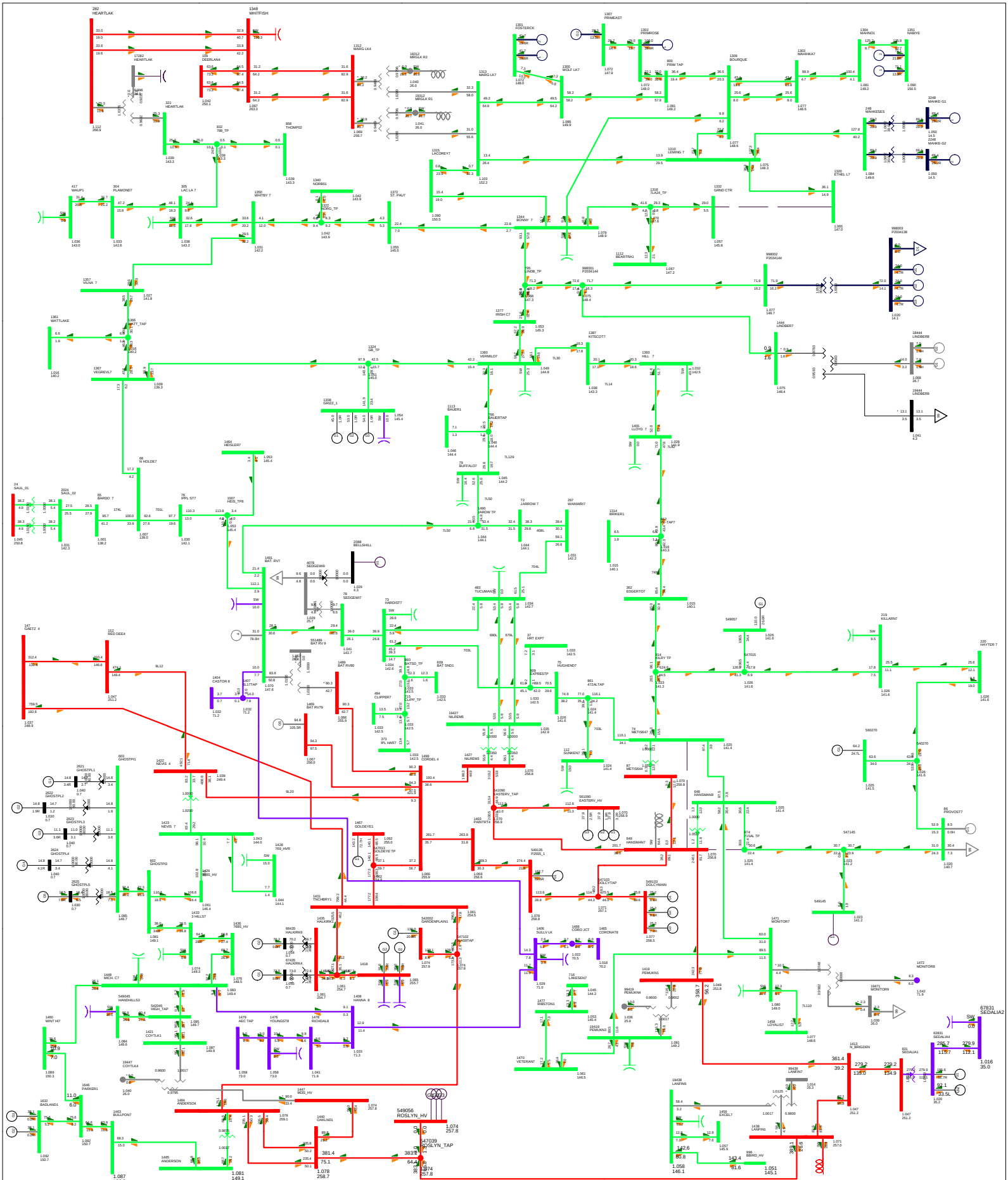
Study Case Description

2028WP POST-PROJ

Base Case

P2034 Cold Lake Area Cogen

Bus - VOLTAGE (kV/PU)
Branch - MW/MVar
Equipment - MW/Mvar
100.0%RATEB
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A3- 3

Contingency

CONT 039: 7L28 (717S Ethel Lake - 846S Grand Centre)

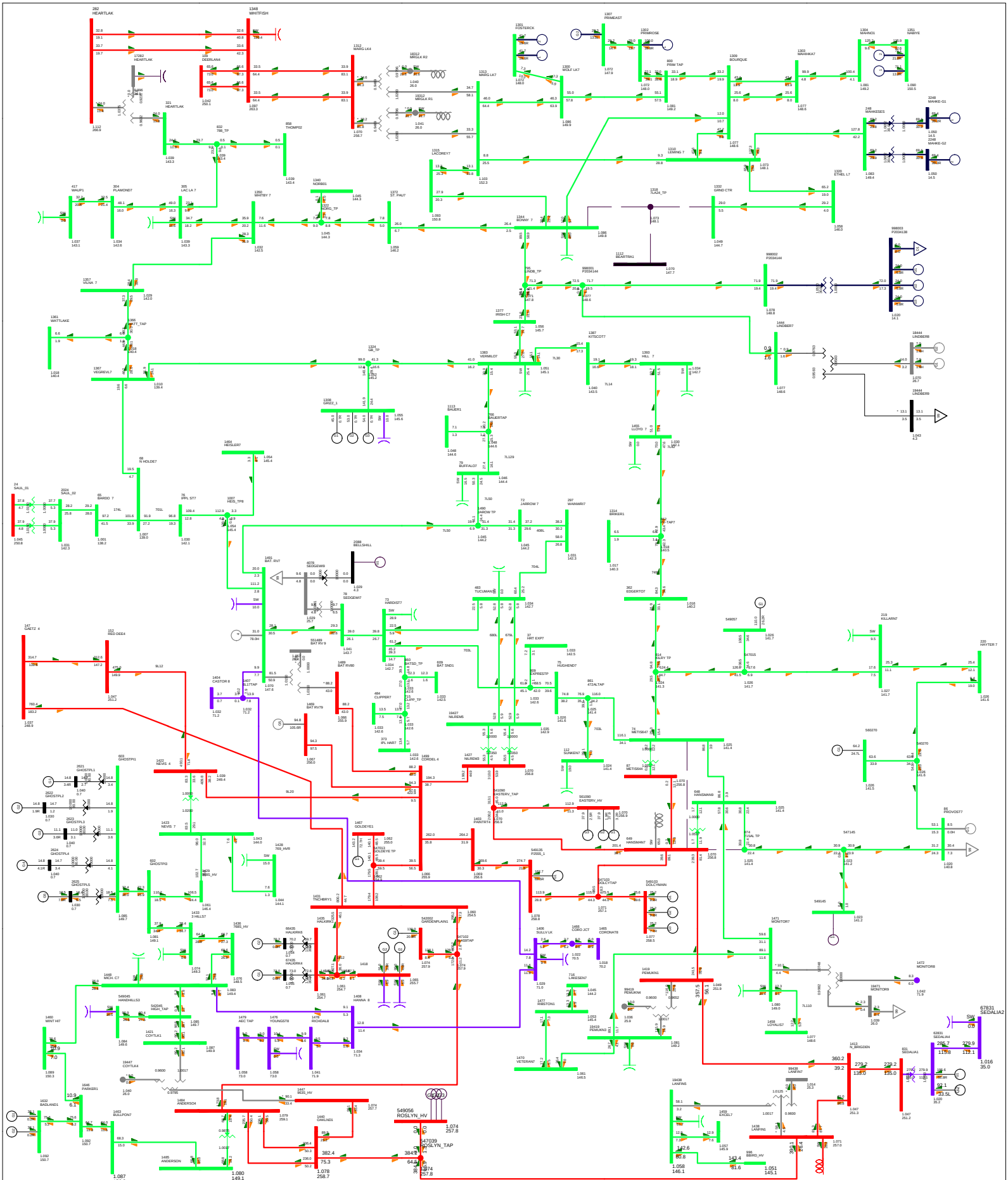
Study Case Description

2028WP POST-PROJ

Base Case

P2034 Cold Lake Area Cogen

Bus - VOLTAGE (kV/PU)
Branch - MW/MVar
Equipment - MW/MVar
100.0%RATEB
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A3- 3

Contingency

CONT 040: 7L24 (846S Grand Centre - 700S Bonnyville - 940S Beartrap)

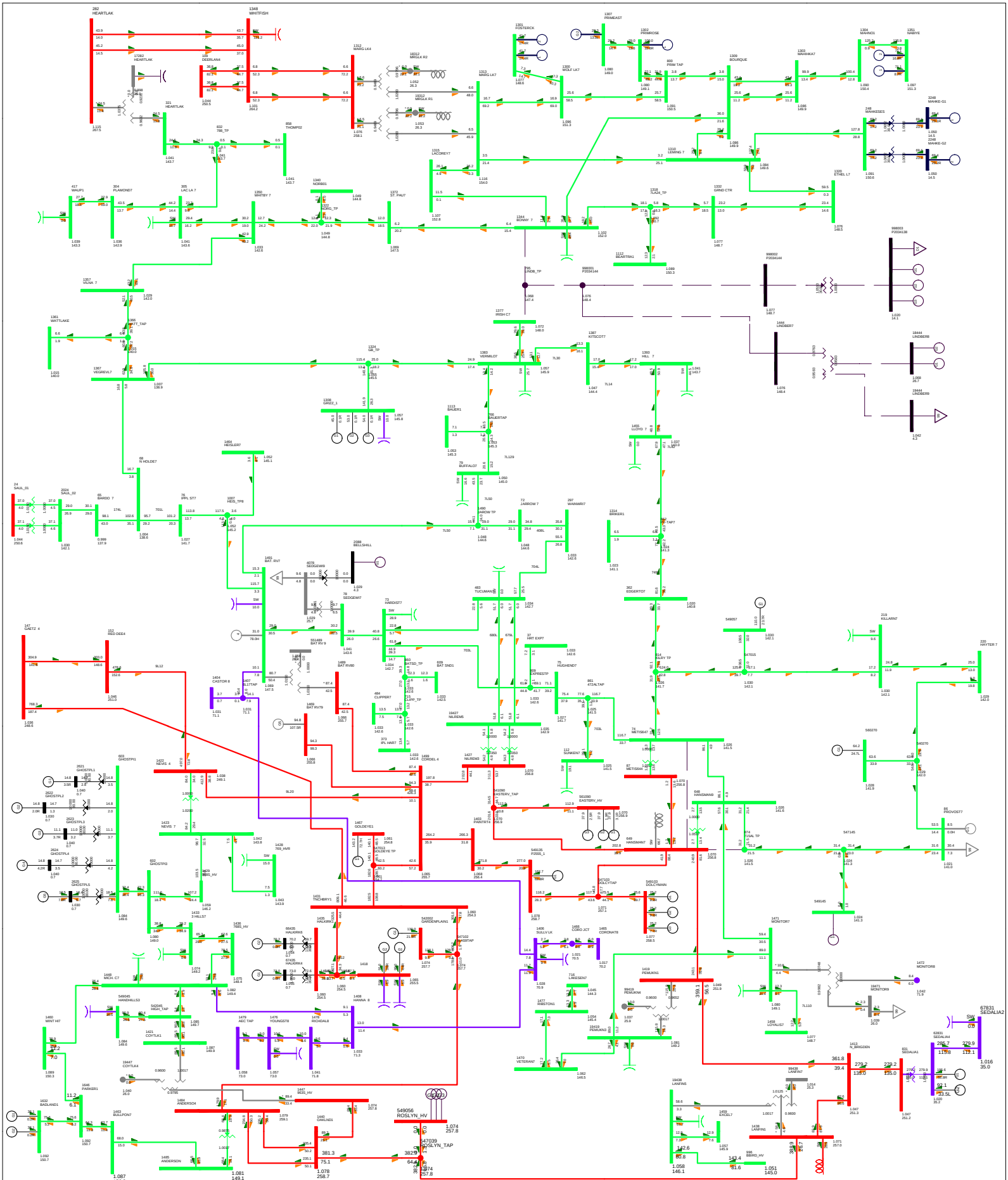
Study Case Description

2028WP POST-PROJ

Base Case

P2034 Cold Lake Area Cogen

Bus - VOLTAGE (kV/PU)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%RATEB
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A3- 3

Contingency

CONT 041: 7L53 (700S Bonnyville - 706S Irish Creek - 969S Lindbergh)

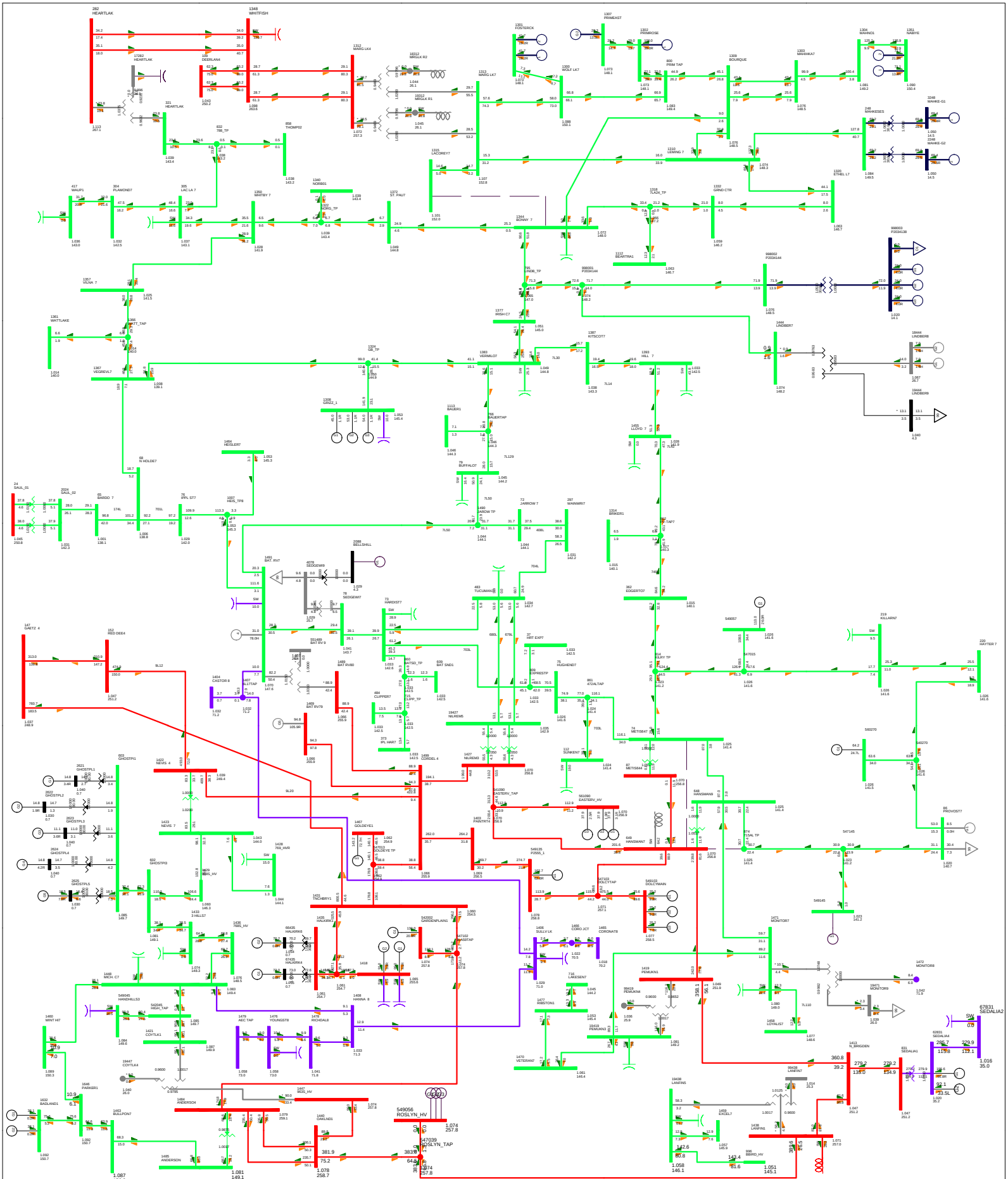
Study Case Description

2028WP POST-PROJ

Base Case

P2034 Cold Lake Area Cogen

Bus - VOLTAGE (kV/PU)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%RATEB
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A3- 3

Contingency

CONT 042: 7L89 (721S Lacorey - 700S Bonnyville)

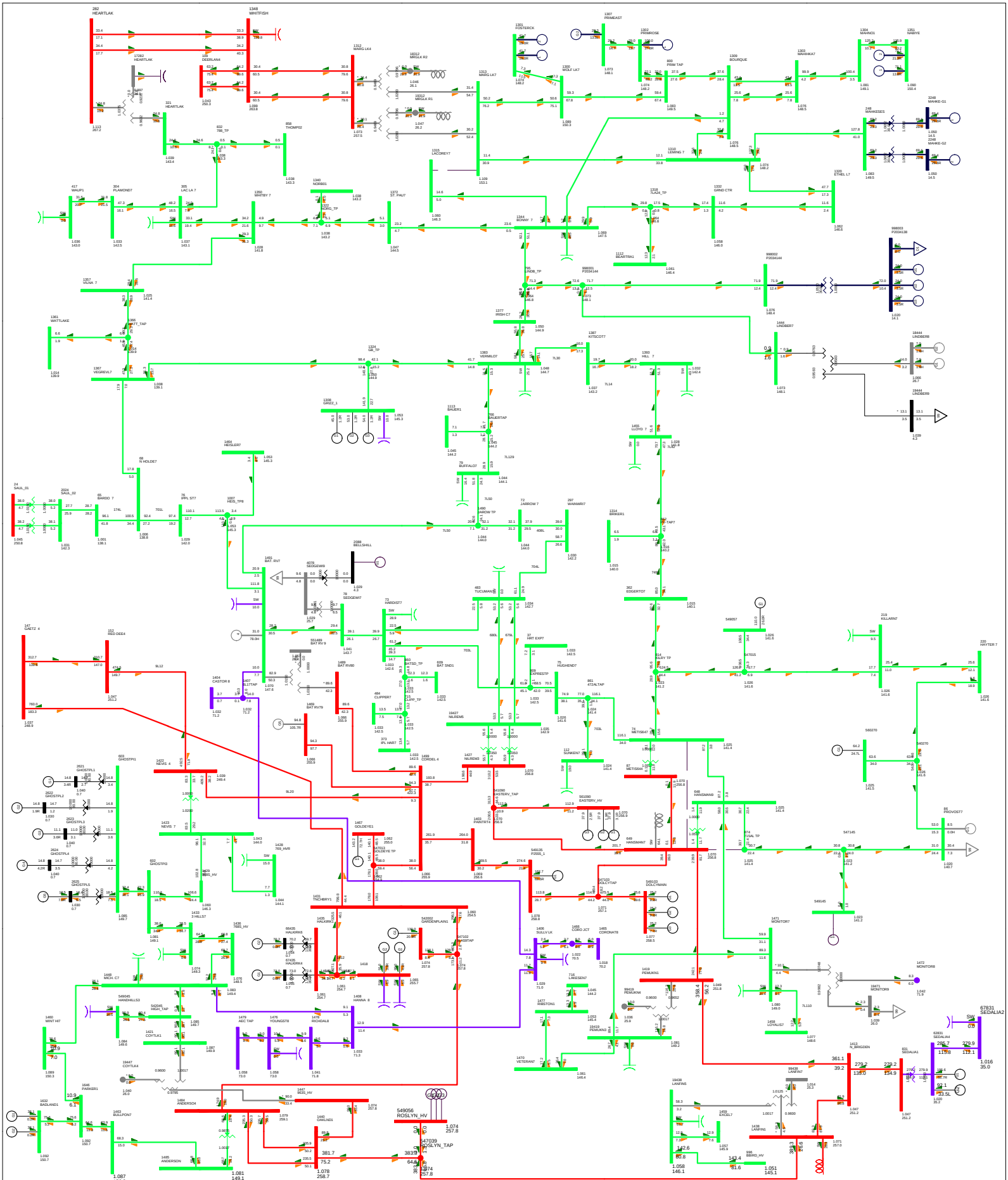
Study Case Description

2028WP POST-PROJ

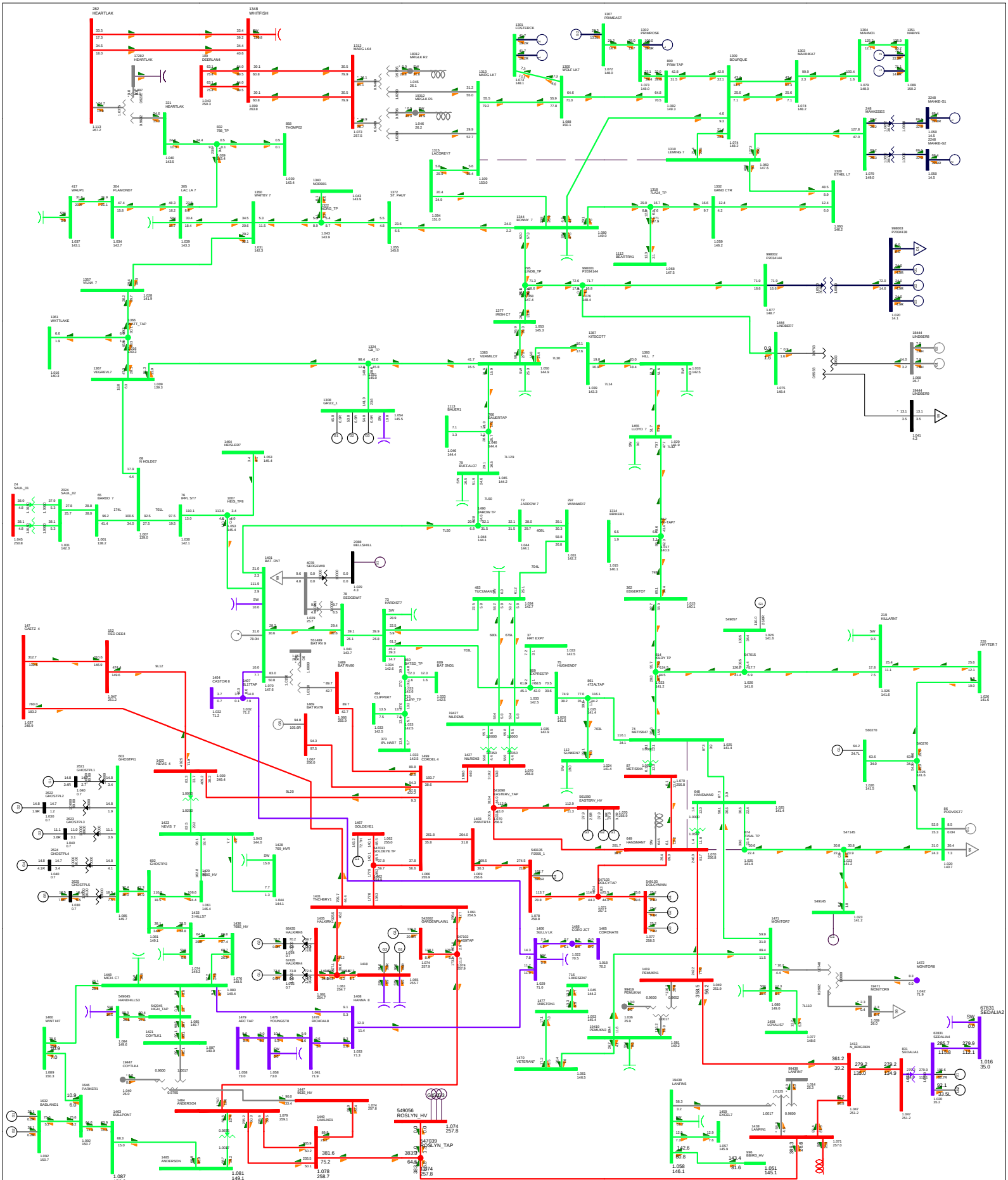
Base Case

P2034 Cold Lake Area Cogen

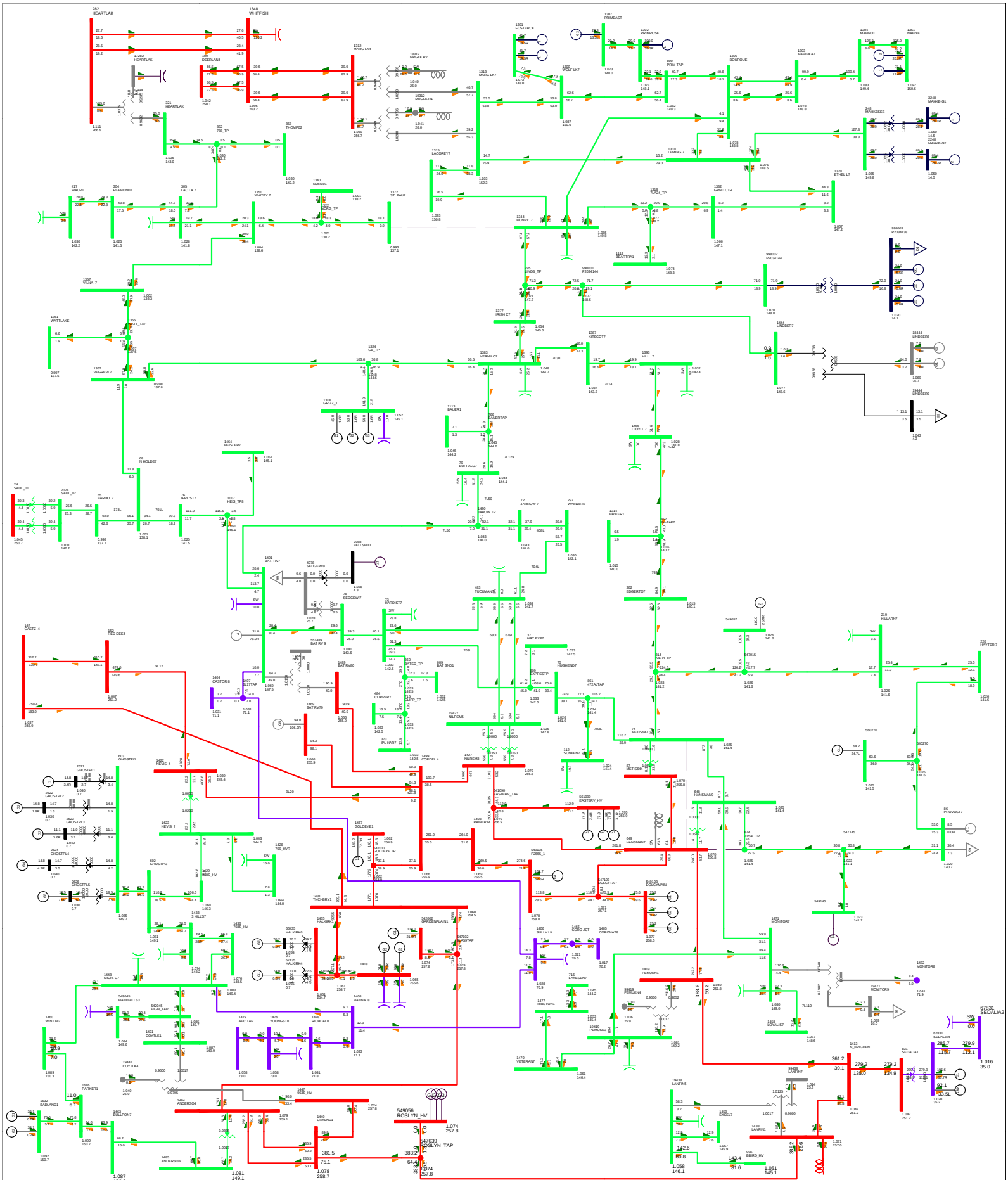
Bus - VOLTAGE (kV/PU)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%RATEB
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



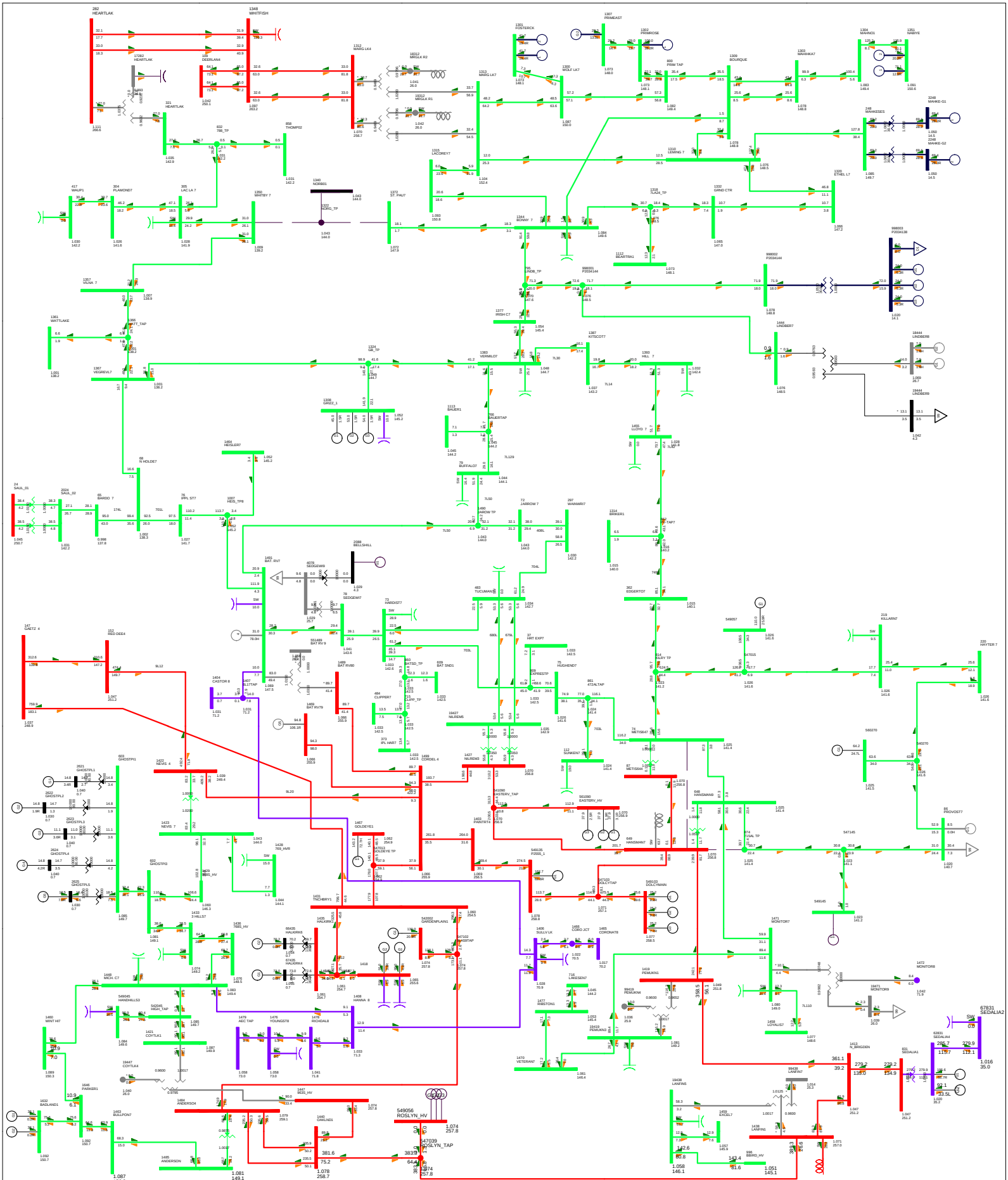
Attachment A3- 3	**Contingency** CONT 043: 7L89 (826S Marguerite Lake - 721S Lacorey)	**Study Case Description** 2028WP POST-PROJ Base Case	**P2034 Cold Lake Area Cogen** Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEB kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A3- 3	**Contingency** CONT 044: 7L91 (715S Leming Lake - 826S Marguerite Lake)	**Study Case Description** 2028WP POST-PROJ Base Case	**P2034 Cold Lake Area Cogen** Bus - VOLTAGE (kV/PU) Branch - MW/MVar Equipment - MW/MVar 100.0%RATEB kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A3- 3	**Contingency** CONT 045: 7L70 (700S Bonnyville - 707S St.Paul)	**Study Case Description** 2028WP POST-PROJ Base Case	**P2034 Cold Lake Area Cogen** Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEB kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A3- 3

Contingency

CONT 046: 7L139 (819S Whitbylake - 707S St.Paul - 936S Norberg)

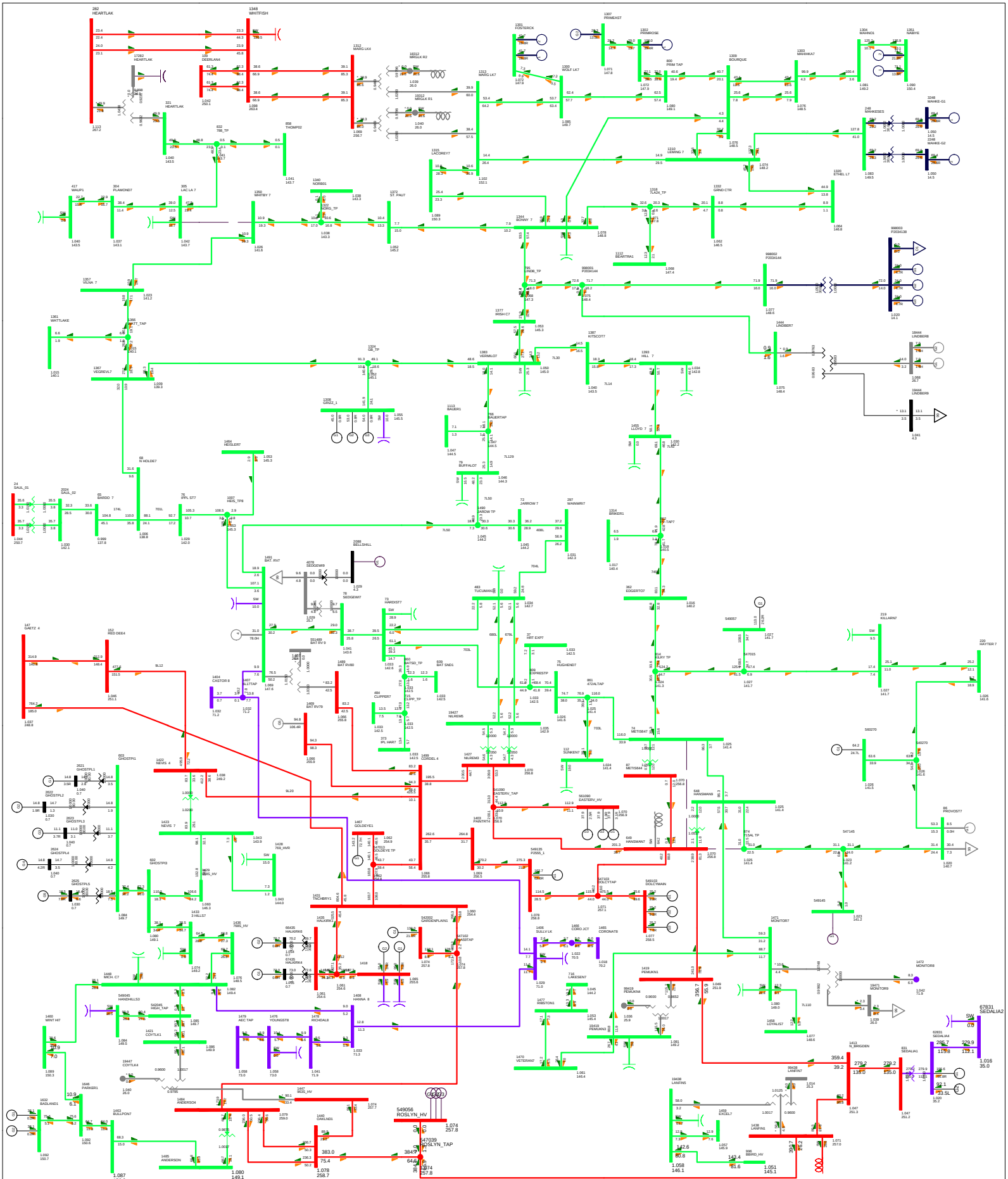
Study Case Description

2028WP POST-PROJ

Base Case

P2034 Cold Lake Area Cogen

Bus - VOLTAGE (kV/PU)
Branch - MW/MVar
Equipment - MW/Mvar
100.0%RATEB
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A3- 3

Contingency

CONT 047: 794L & 7L94 (157S Lac La Biche - 819S Whitbylake)

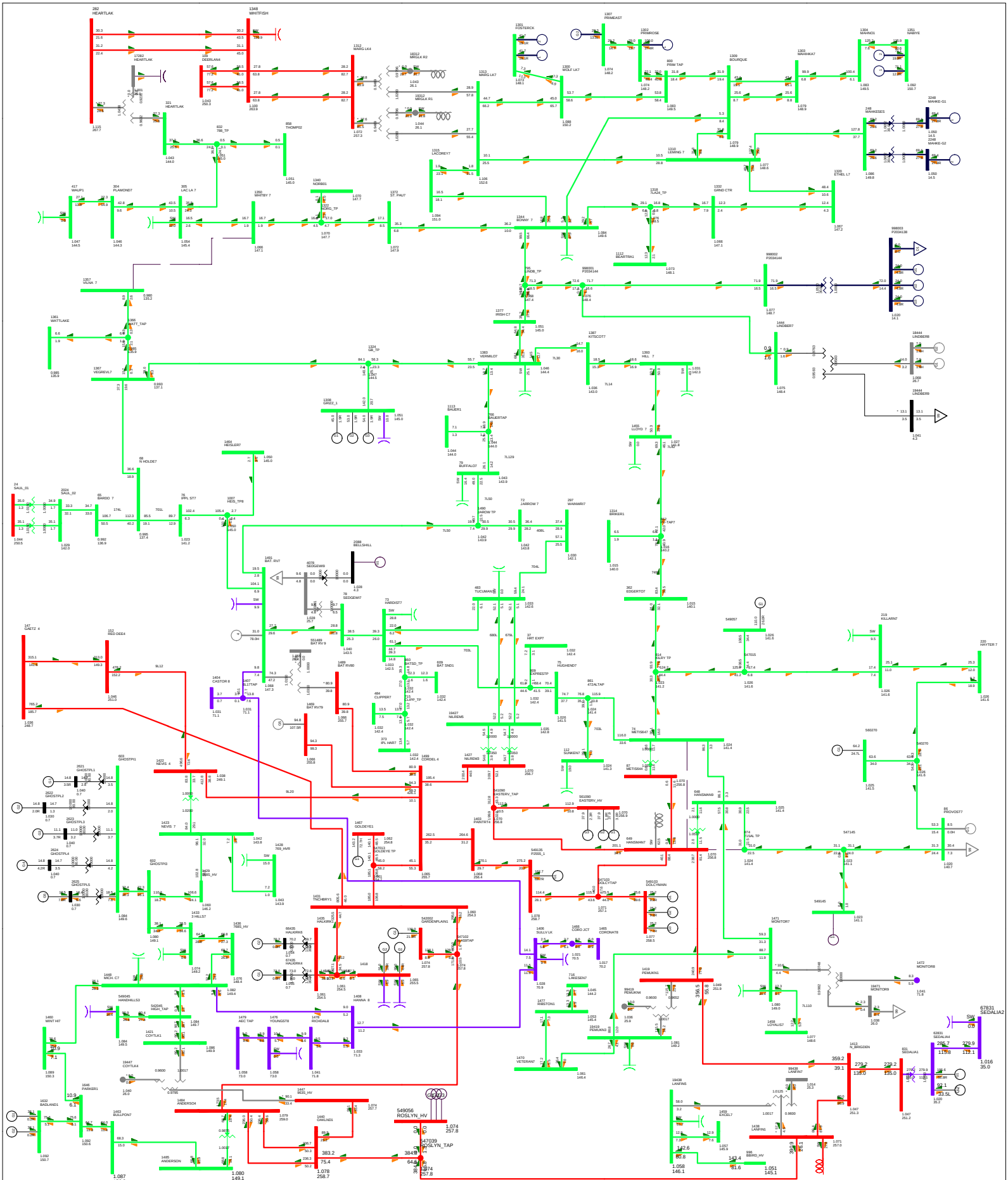
Study Case Description

2028WP POST-PROJ

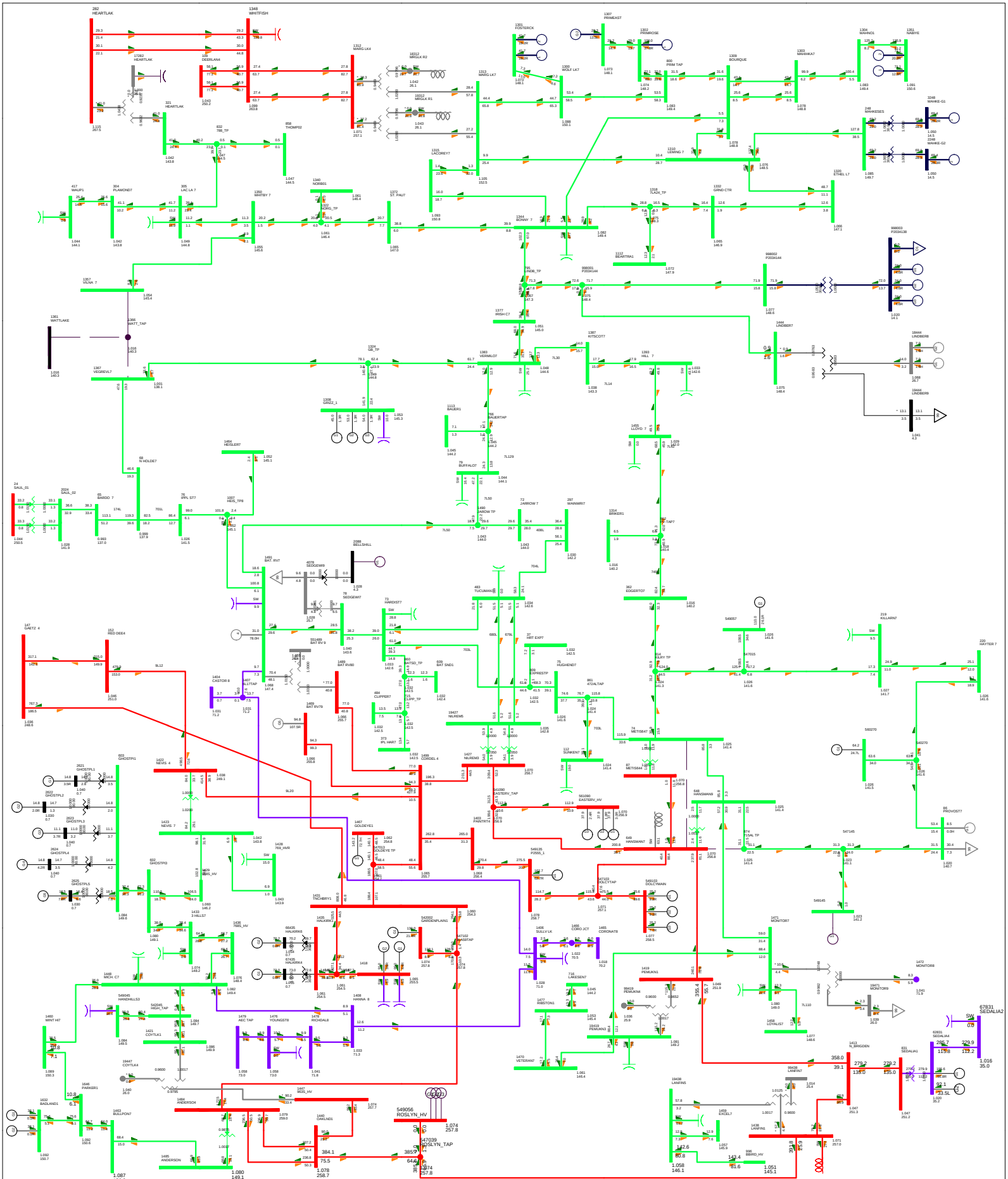
Base Case

P2034 Cold Lake Area Cogen

Bus - VOLTAGE (kV/PU)
Branch - MW/MVar
Equipment - MW/Mvar
100.0%RATEB
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A3- 3	**Contingency** CONT 048: 7L92 (819S Whitbylake - 777S Vilna)	**Study Case Description** 2028WP POST-PROJ Base Case	**P2034 Cold Lake Area Cogen** Bus - VOLTAGE (kV/PU) Branch - MW/MVar Equipment - MW/Mvar 100.0%RATEB kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A3- 3

Contingency

CONT 049: 7L92 (777S Vilna - 709S Vegreville - 956S Watt Lake)

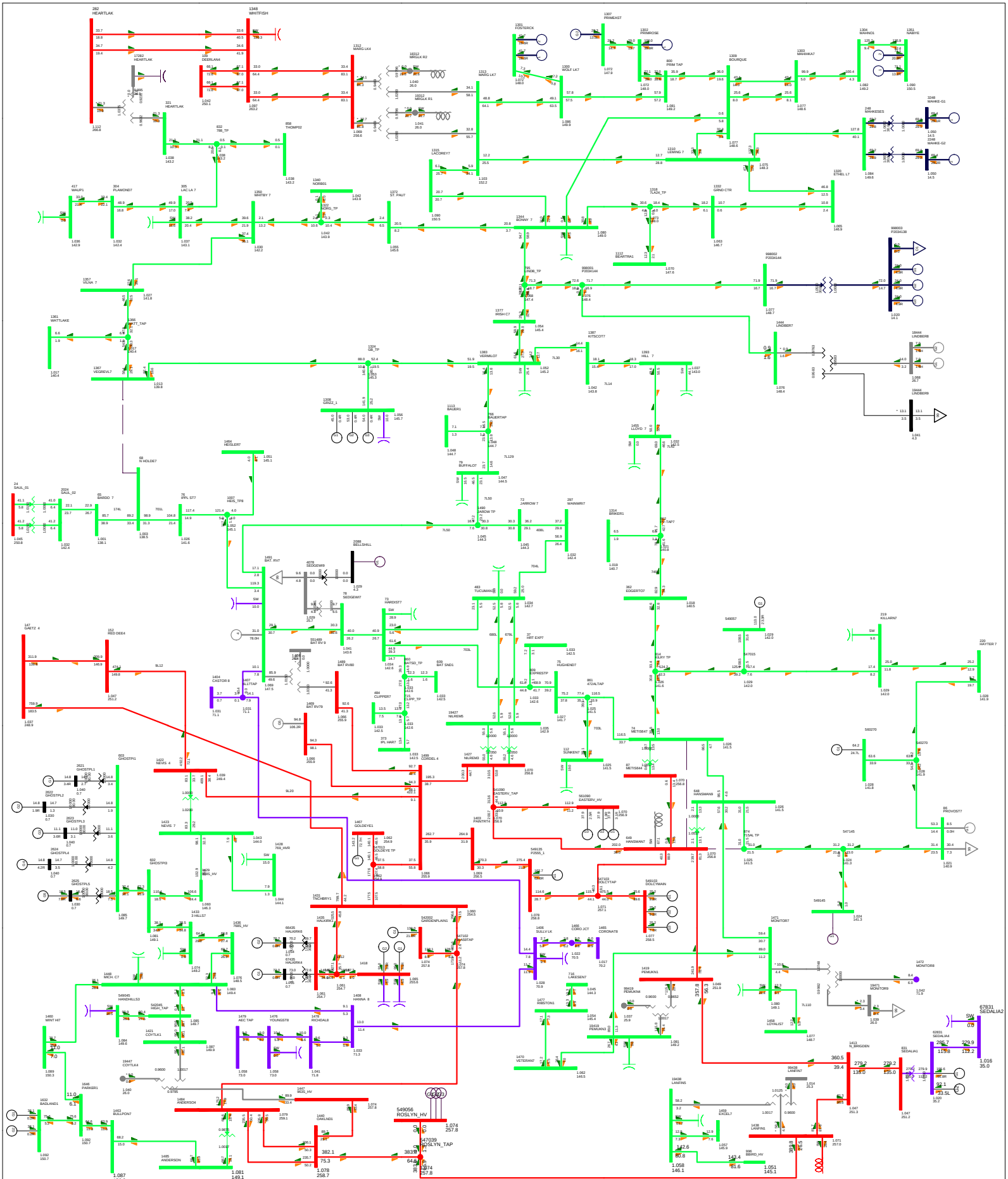
Study Case Description

2028WP POST-PROJ

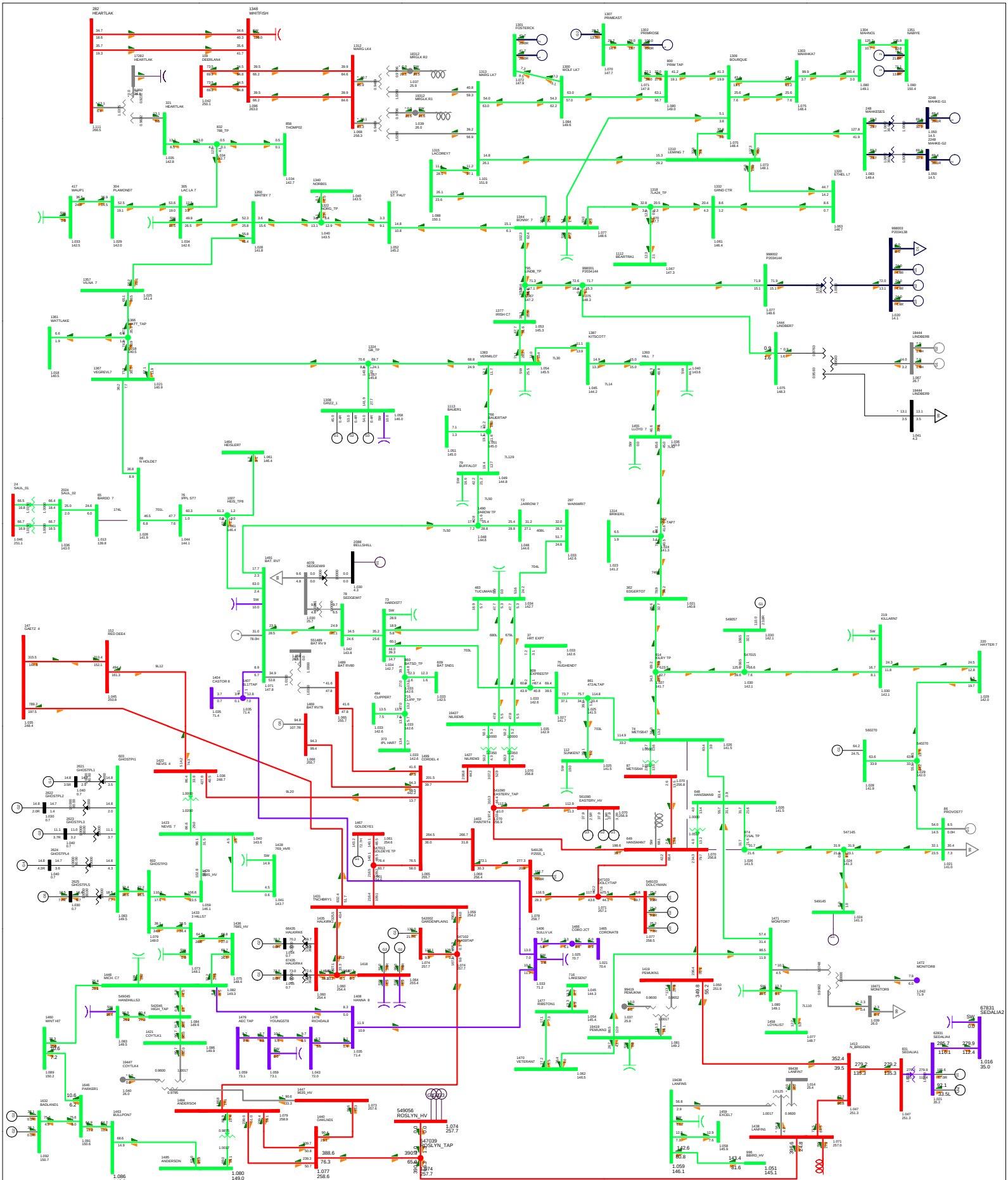
Base Case

P2034 Cold Lake Area Cogen

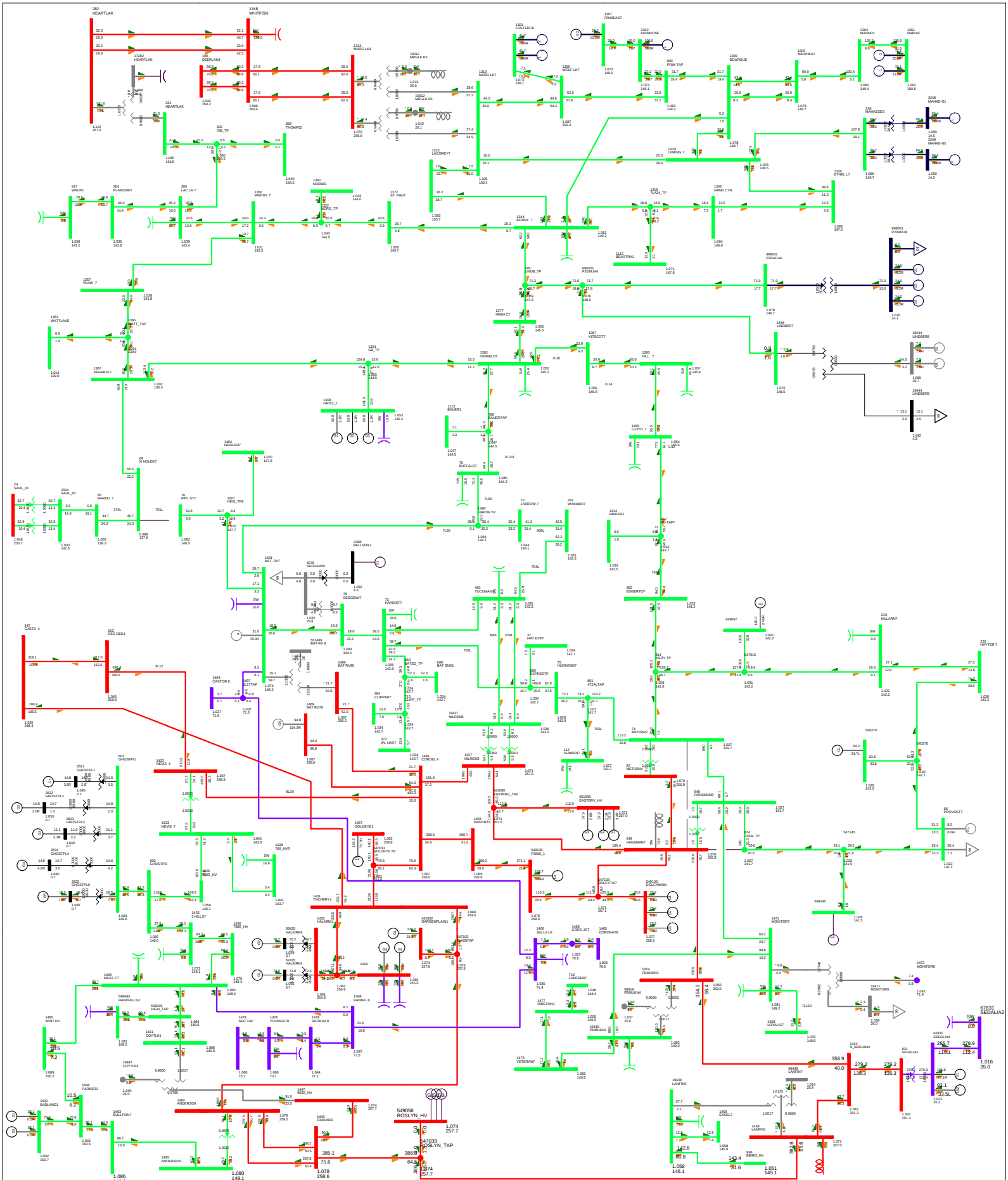
Bus - VOLTAGE (kV/PU)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%RATEB
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



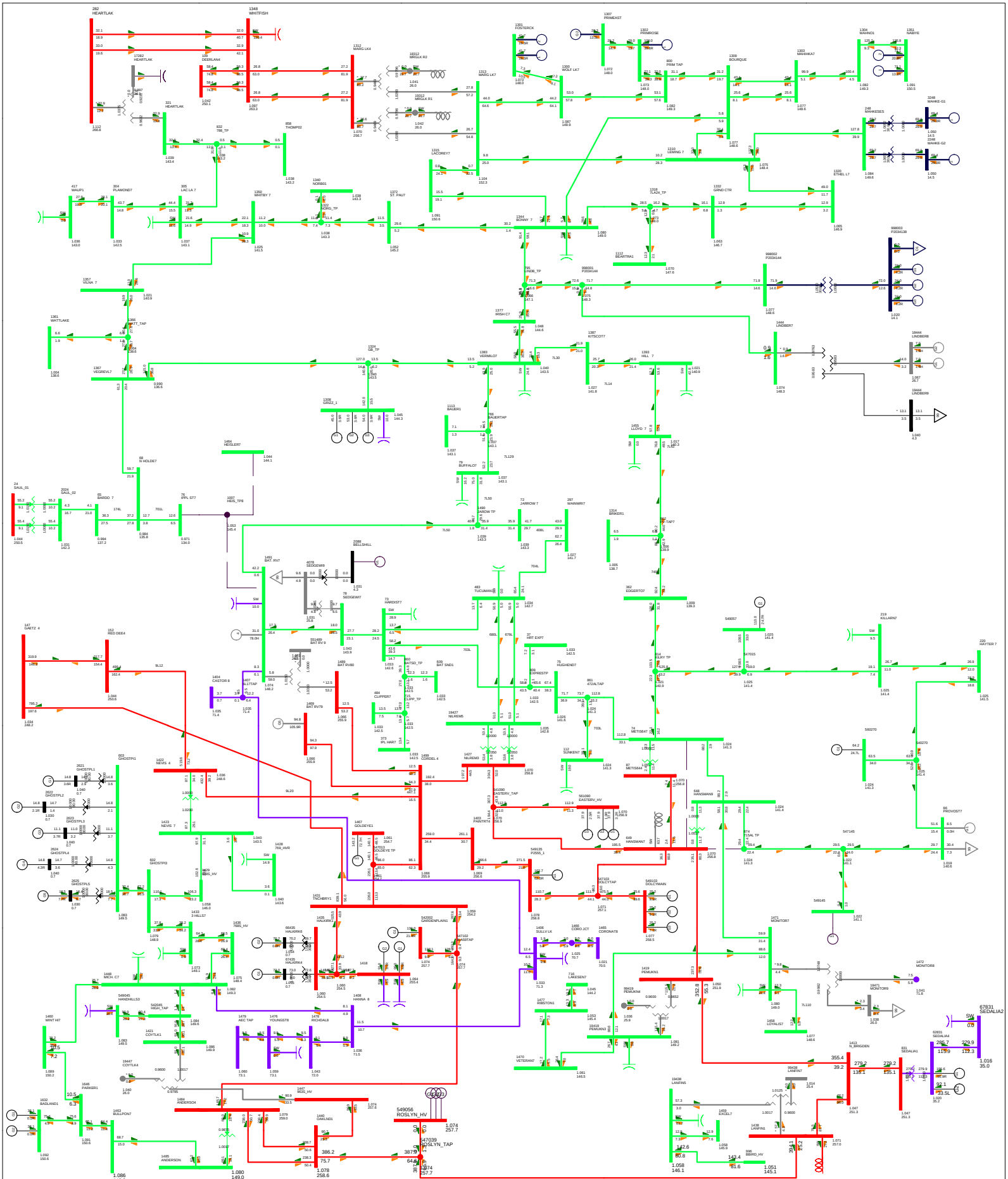
Attachment A3- 3	Contingency	Study Case Description	P2034 Cold Lake Area Cogen
	CONT 050: 7L77 (395S North Holden - 709S Vegreville)	2028WP POST-PROJ Base Case	Bus - VOLTAGE (kv/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEB kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



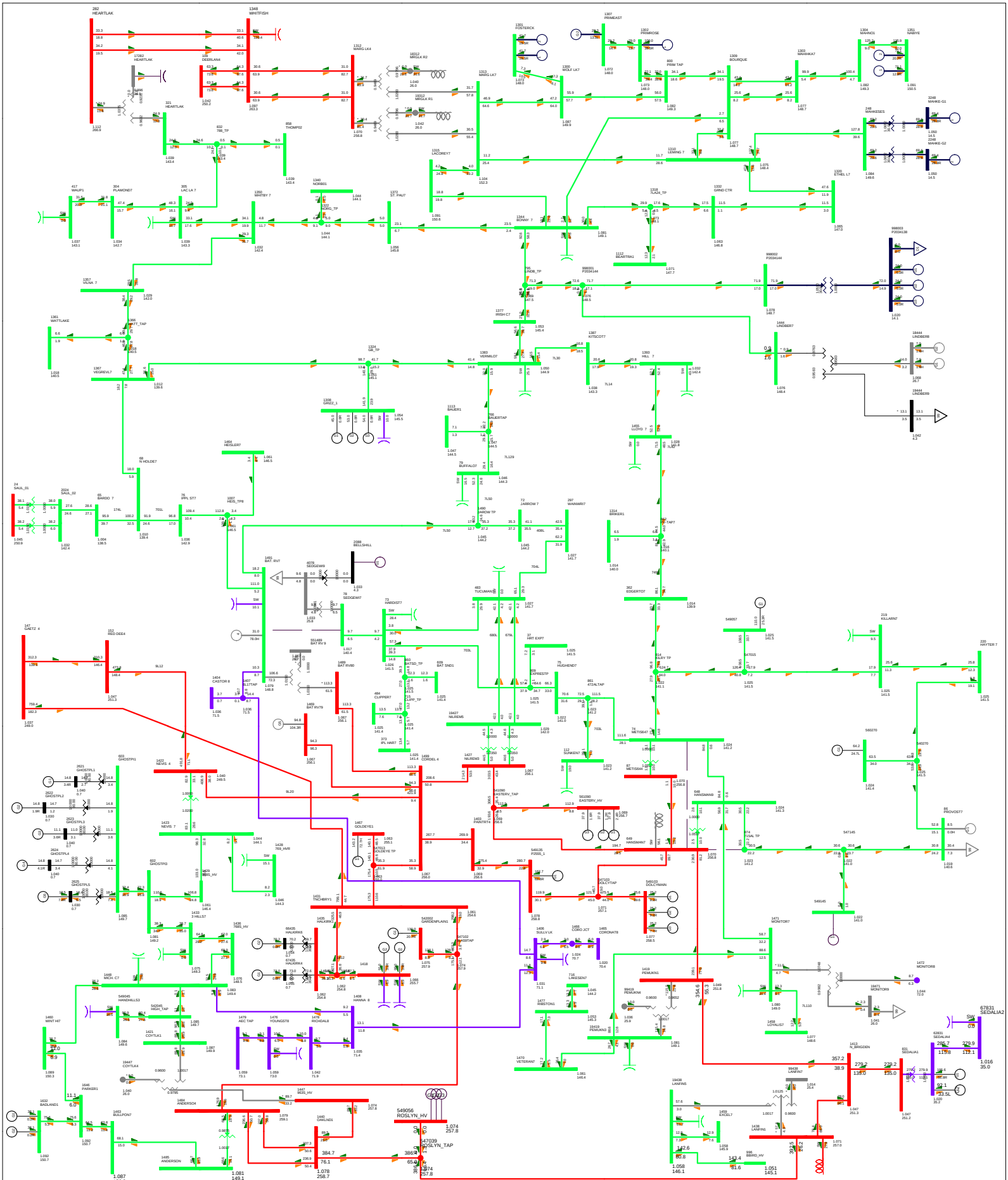
Attachment A3- 3	**Contingency** CONT 051: 174L (197S Bardo - 395S North Holden)	**Study Case Description** 2028WP POST-PROJ Base Case	**P2034 Cold Lake Area Cogen** Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEB kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A3- 3	Contingency	Study Case Description	P2034 Cold Lake Area Cogen
	CONT 052: 701L (395S North Holden - 223S Strome)	2028WP POST-PROJ Base Case	Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEB kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A3- 3	**Contingency** CONT 053: 701L (223S Strome - 757S Battle River - 764S Heisler)	**Study Case Description** 2028WP POST-PROJ Base Case	**P2034 Cold Lake Area Cogen** Bus - VOLTAGE (kV/PU) Branch - MW/MVar Equipment - MW/Mvar 100.0%RATEB kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A3- 3

Contingency

CONT 054: 7L702 (137S Sedgewick - 757S Battle River)

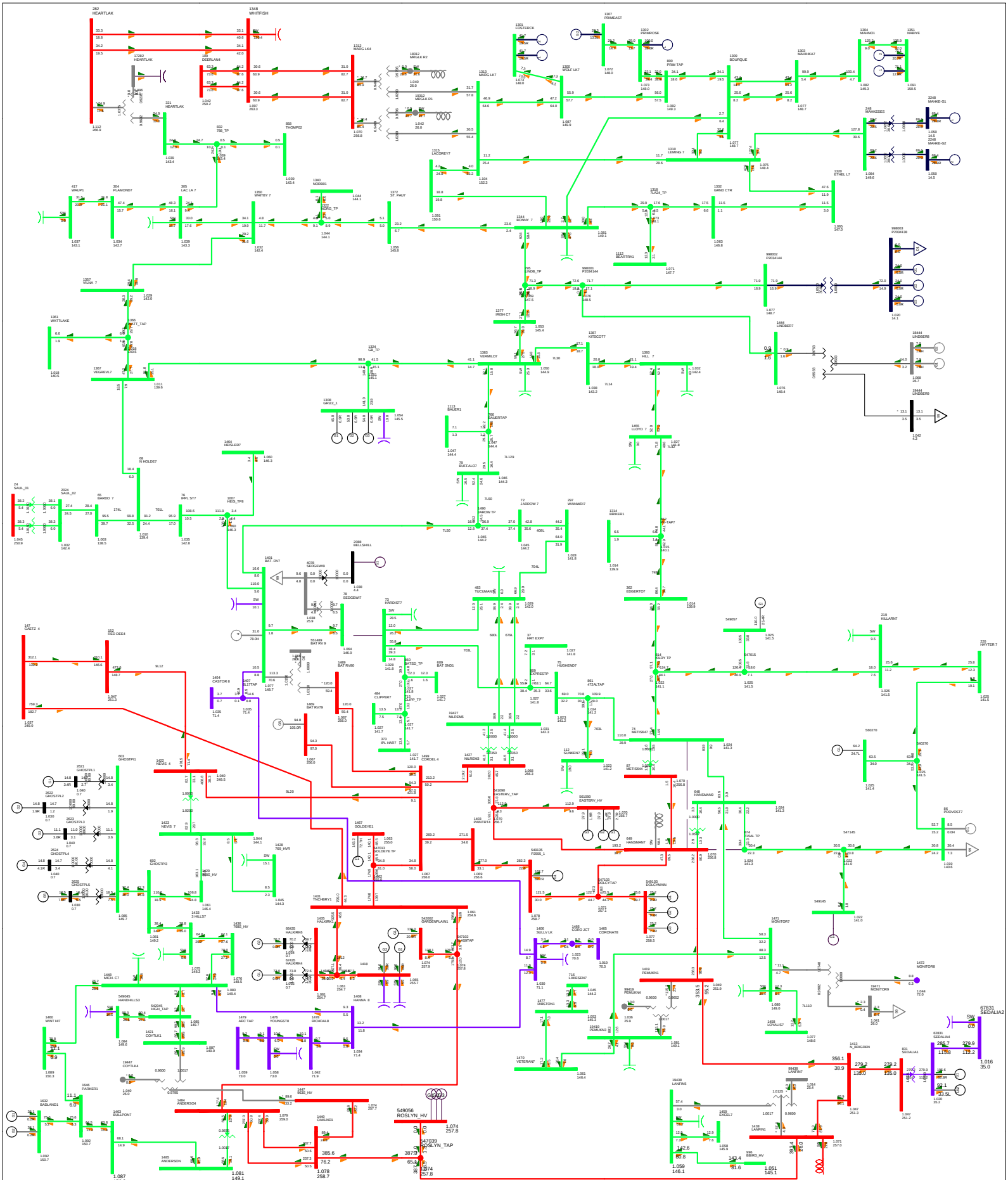
Study Case Description

2028WP POST-PROJ

Base Case

P2034 Cold Lake Area Cogen

Bus - VOLTAGE (kV/PU)
Branch - MW/MVar
Equipment - MW/Mvar
100.0%RATEB
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A3- 3

Contingency

CONT 055: 702L (377S Hardisty - 137S Sedgewick)

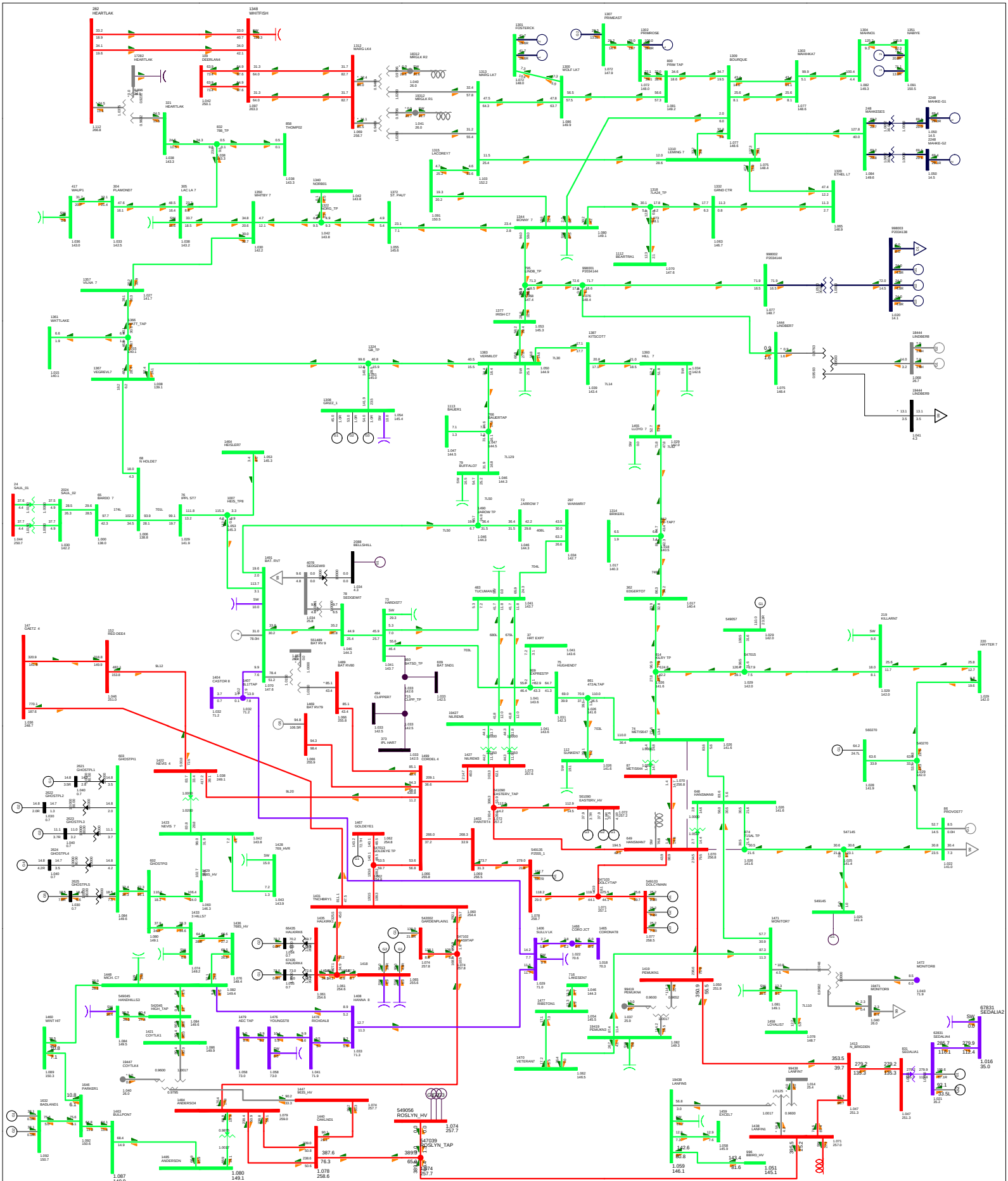
Study Case Description

2028WP POST-PROJ

Base Case

P2034 Cold Lake Area Cogen

Bus - VOLTAGE (kV/PU)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%RATEB
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A3- 3

Contingency

CONT 056: 769L (377S Hardisty - 594S Battle Sands - 296S Rosyth - 656S Clipper)

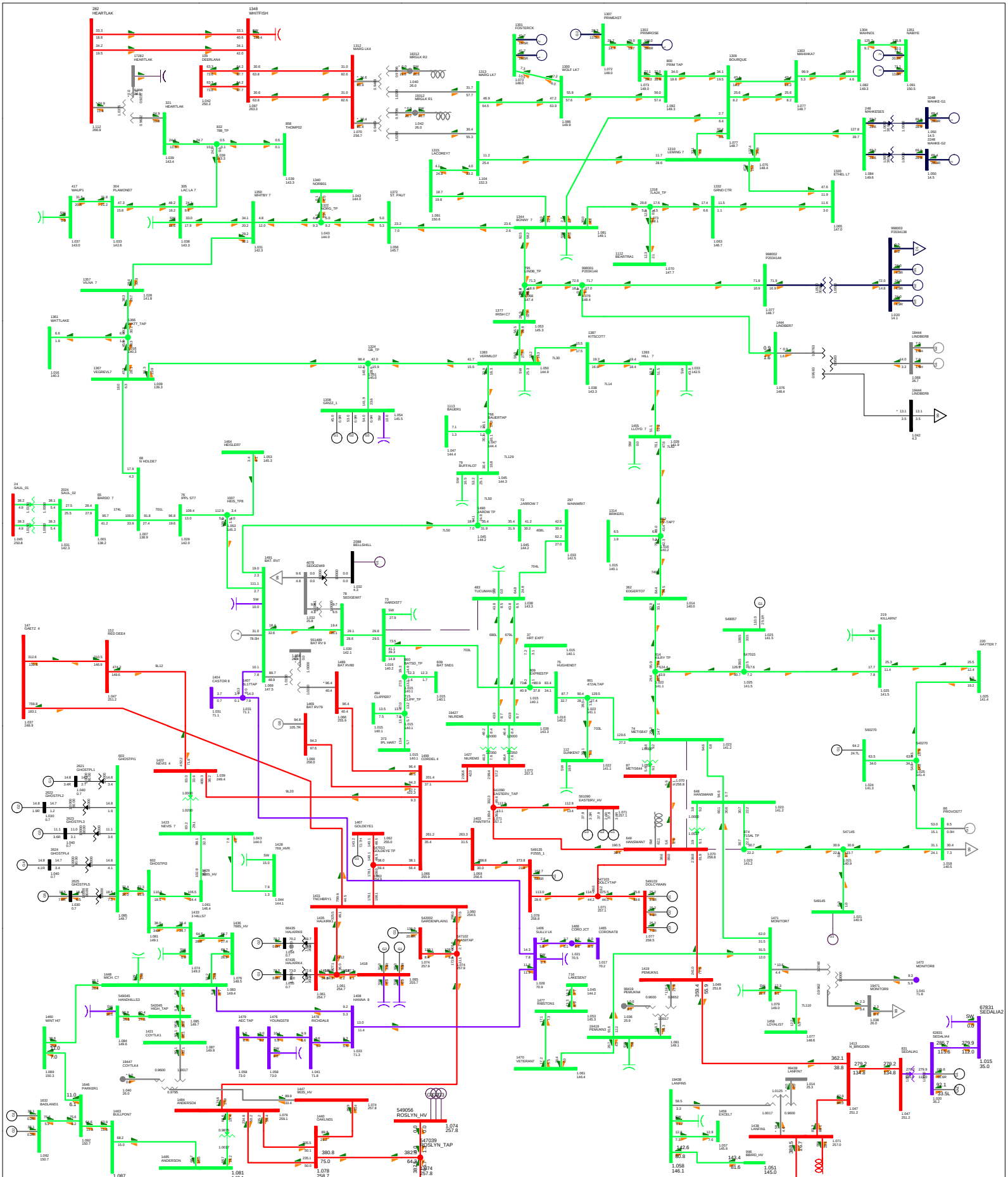
Study Case Description

2028WP POST-PROJ

Base Case

P2034 Cold Lake Area Cogen

Bus - VOLTAGE (kV/PU)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%RATEB
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A3- 3

Contingency

CONT 057: 681L (377S Hardisty - 478S Tucuman)

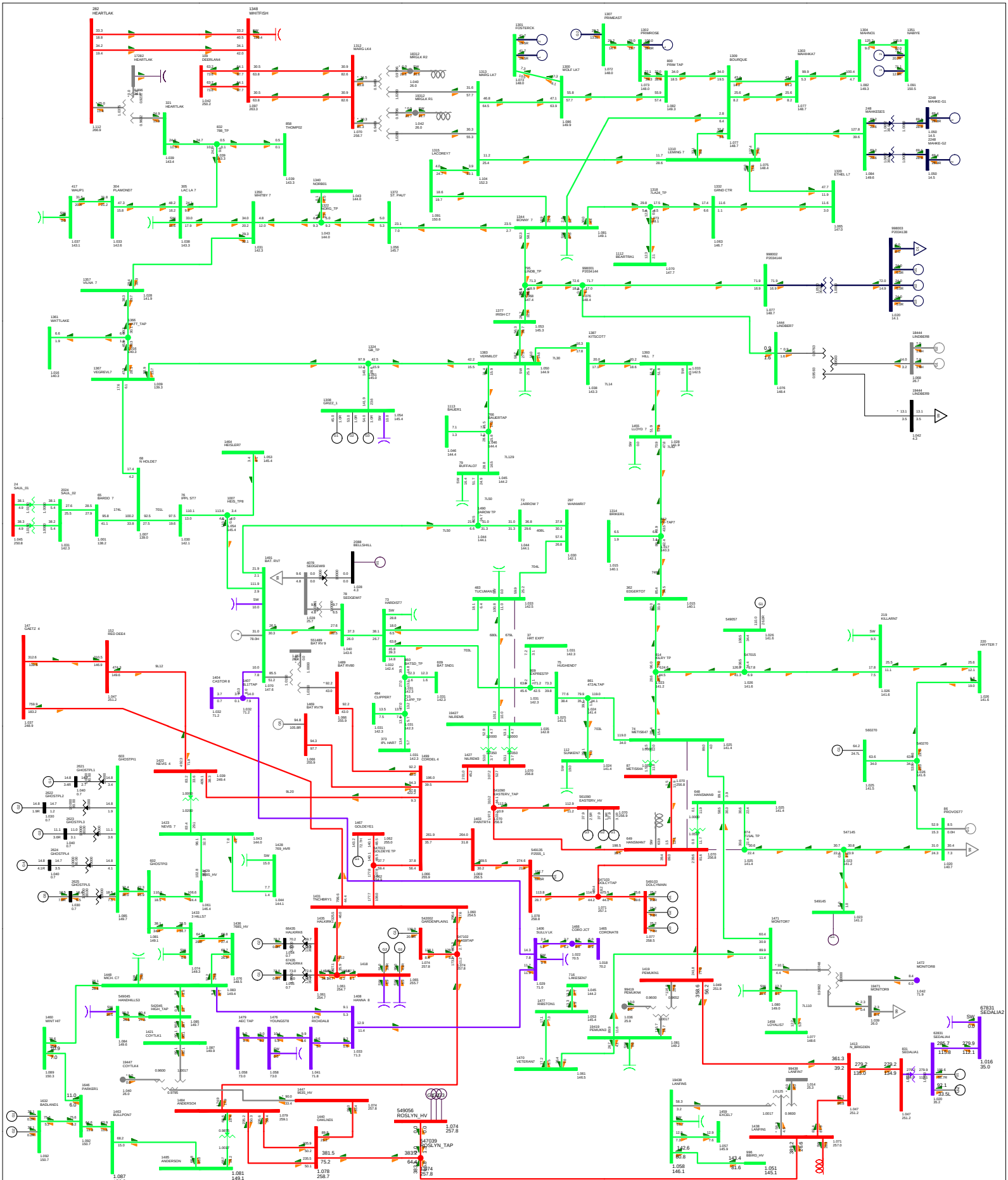
Study Case Description

2028WP POST-PROJ

Base Case

P2034 Cold Lake Area Cogen

Bus - VOLTAGE (kV/PU)
Branch - MW/MVar
Equipment - MW/MVar
100.0%RATEB
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A3- 3

Contingency

CONT 058: 679L (478S Tucuman - 574S Nilrem)

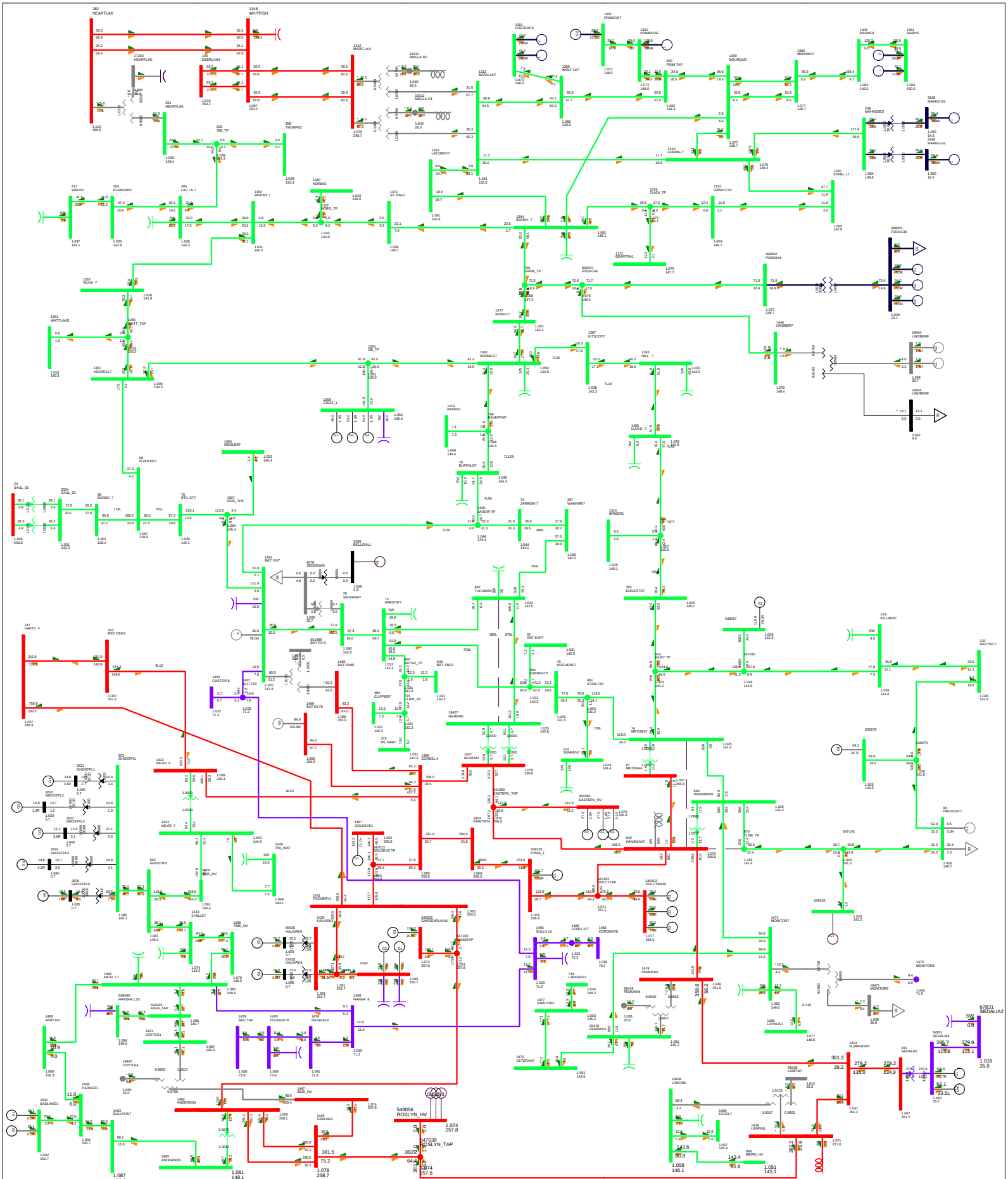
Study Case Description

2028WP POST-PROJ

Base Case

P2034 Cold Lake Area Cogen

Bus - VOLTAGE (kV/PU)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%RATEB
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A3- 3

Contingency

CONT 059: 680L (478S Tucuman - 574S Nilrem)

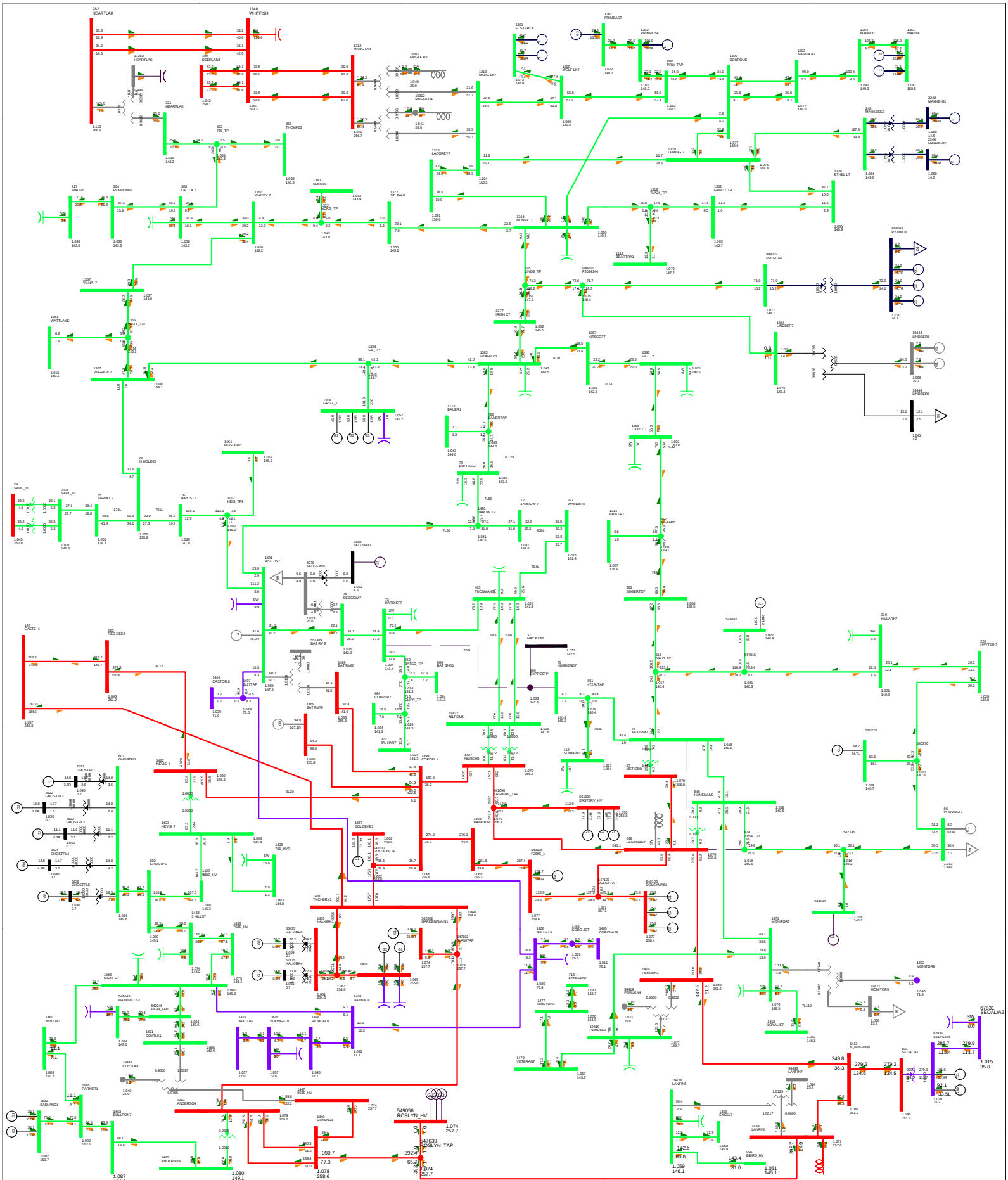
Study Case Description

2028WP POST-PROJ

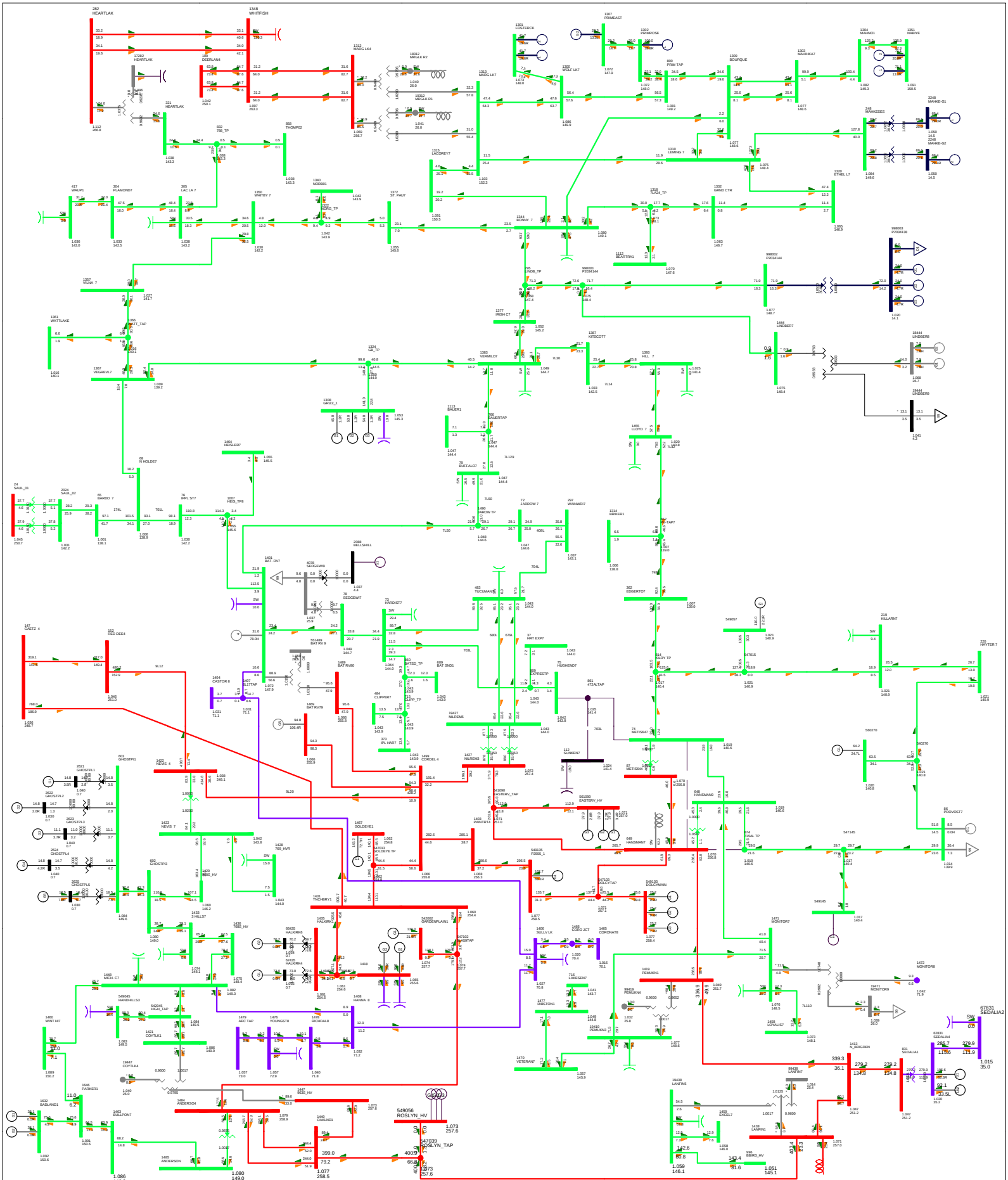
Base Case

P2034 Cold Lake Area Cogen

Bus - VOLTAGE (kv/PU)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%RATEB
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A3- 3	Contingency	Study Case Description	P2034 Cold Lake Area Cogen
	CONT 060: 703L (377S Hardisty - 213S Hughenden - 329S Hrt Express)	2028WP POST-PROJ Base Case	Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEB kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A3- 3

Contingency

CONT 061: 472L (213S Hughenden - 648S Metiskow - 221S Sunken Lake)

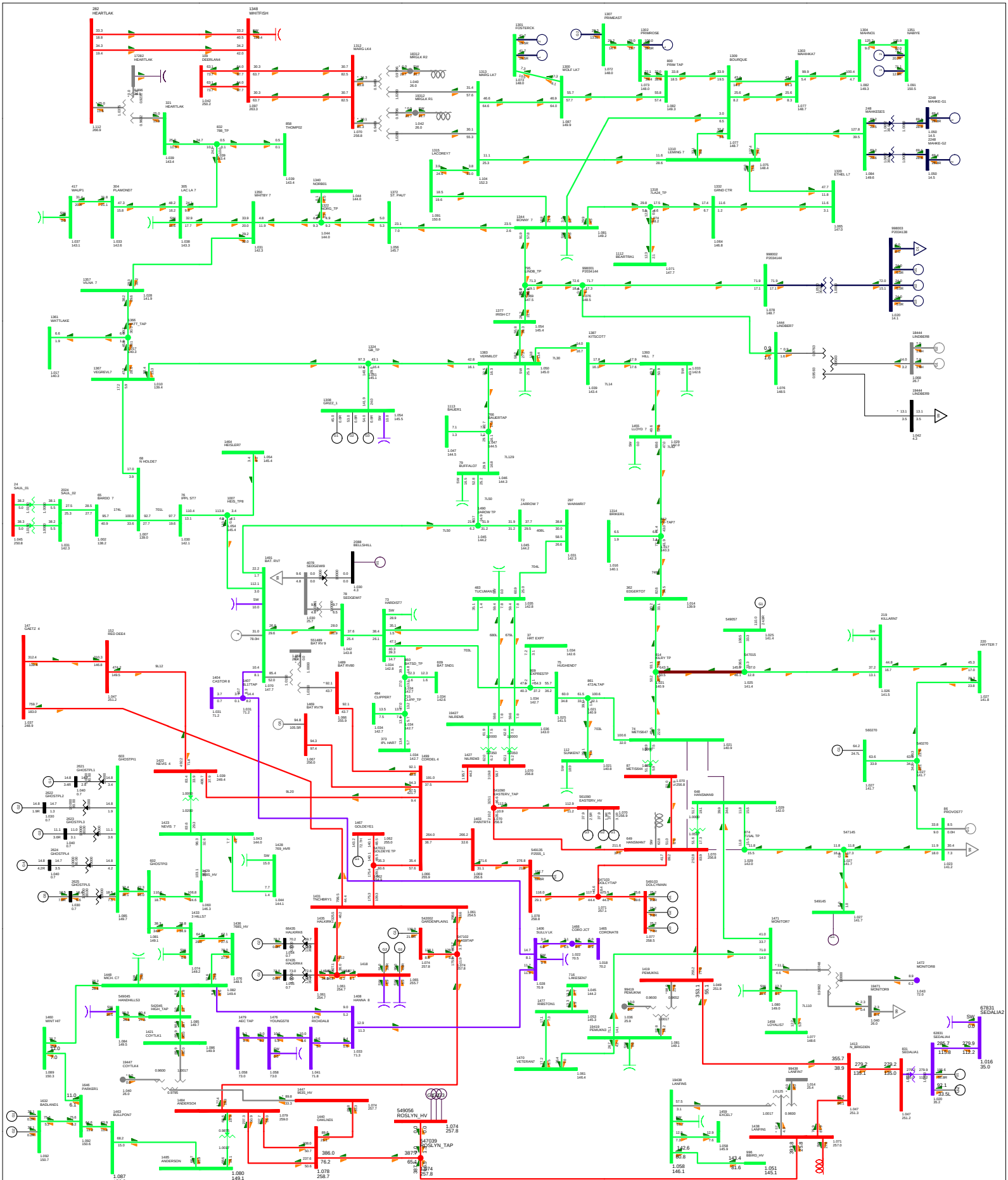
Study Case Description

2028WP POST-PROJ

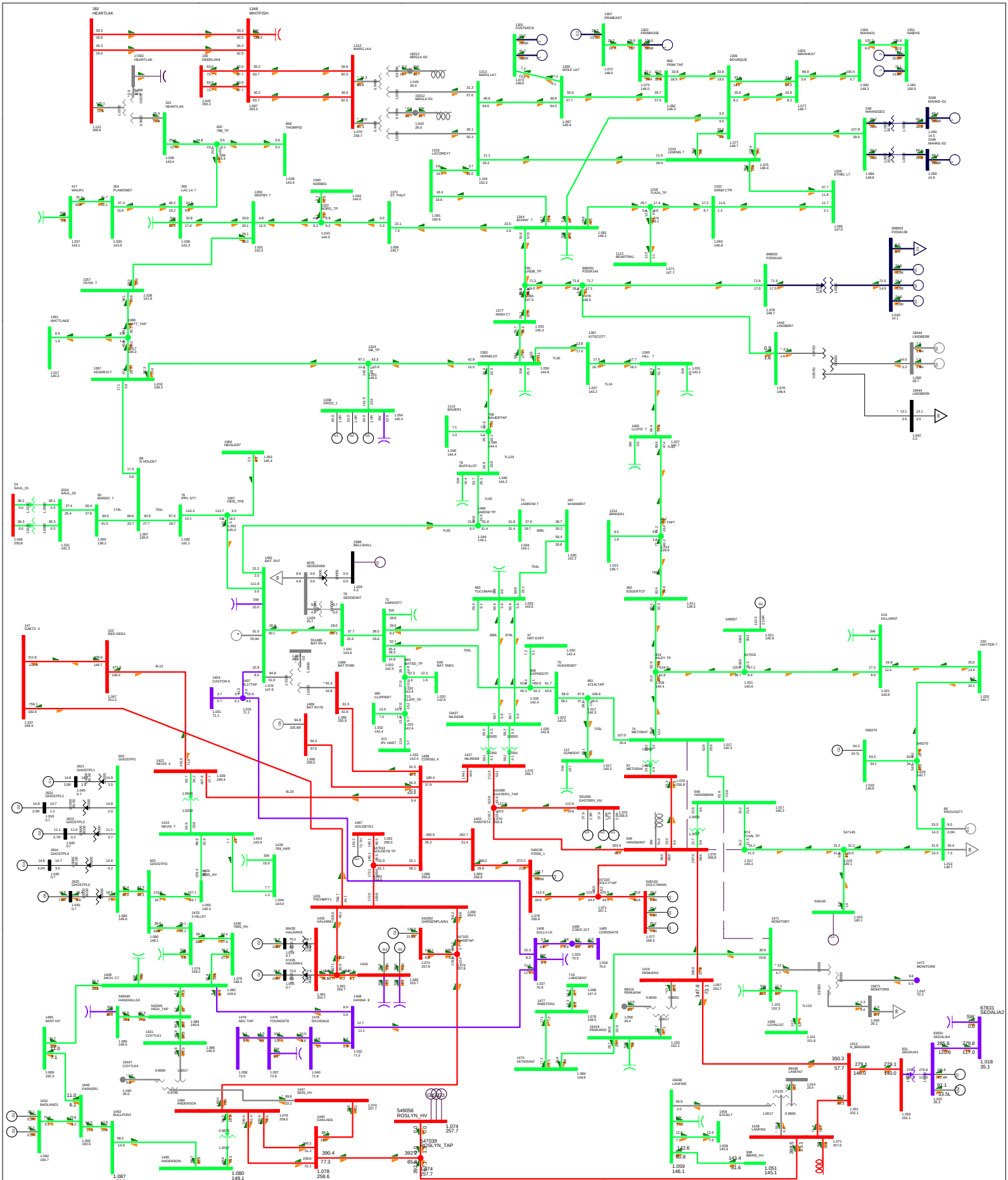
Base Case

P2034 Cold Lake Area Cogen

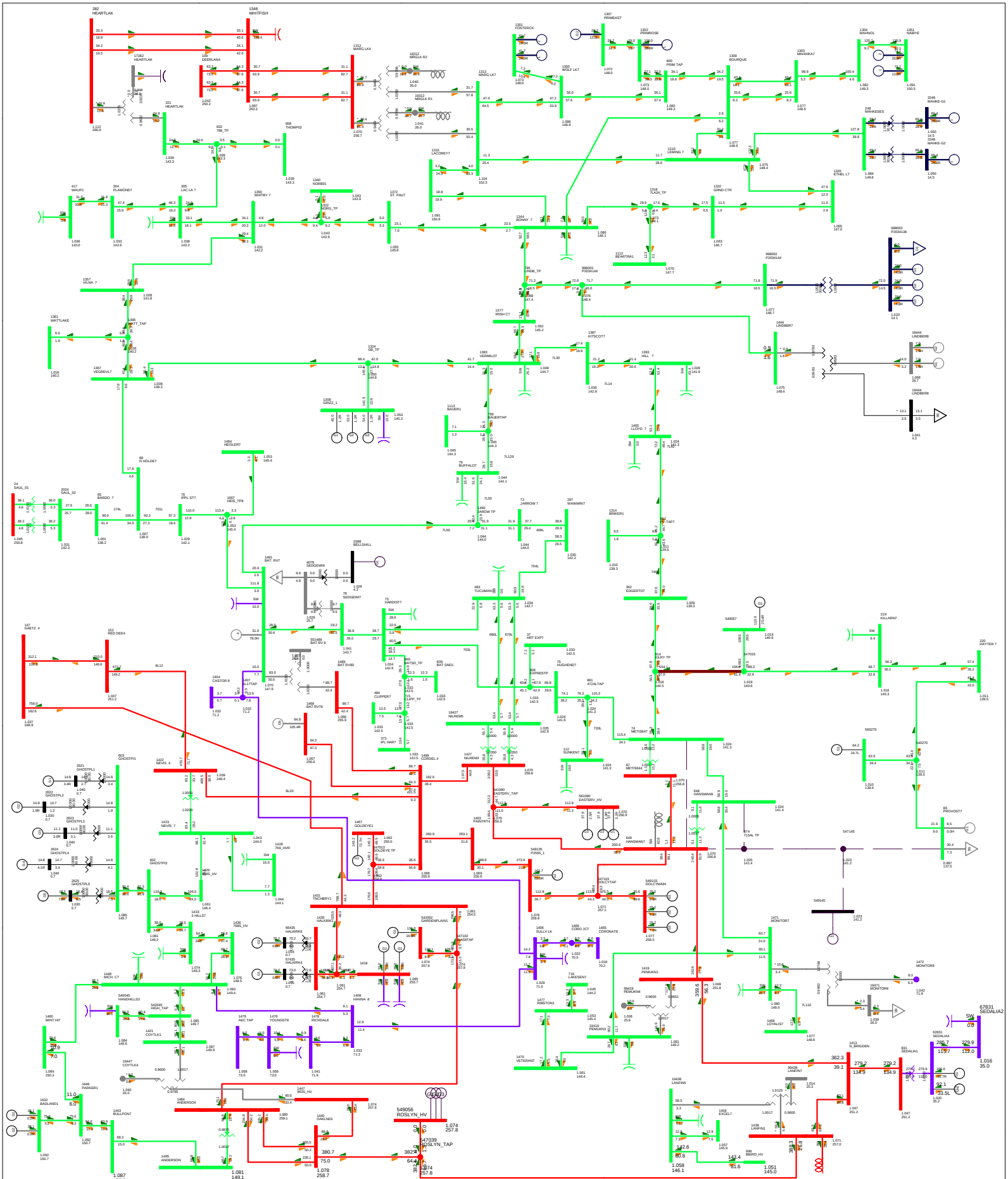
Bus - VOLTAGE (kV/PU)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%RATEB
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A3- 3	**Contingency** CONT 062: 885L (648S Metiskow - 650S Hansman Lake)	**Study Case Description** 2028WP POST-PROJ Base Case	**P2034 Cold Lake Area Cogen** Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEB kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A3- 3	**Contingency** CONT 063: 7L224 (650S Hansman Lake - 774S Monitor)	**Study Case Description** 2028WP POST-PROJ Base Case	**P2034 Cold Lake Area Cogen** Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEB kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A3- 3

Contingency

CONT 064: 715L (650S Hansman Lake - P2540 Cache Rising Sun - 545S Provost)

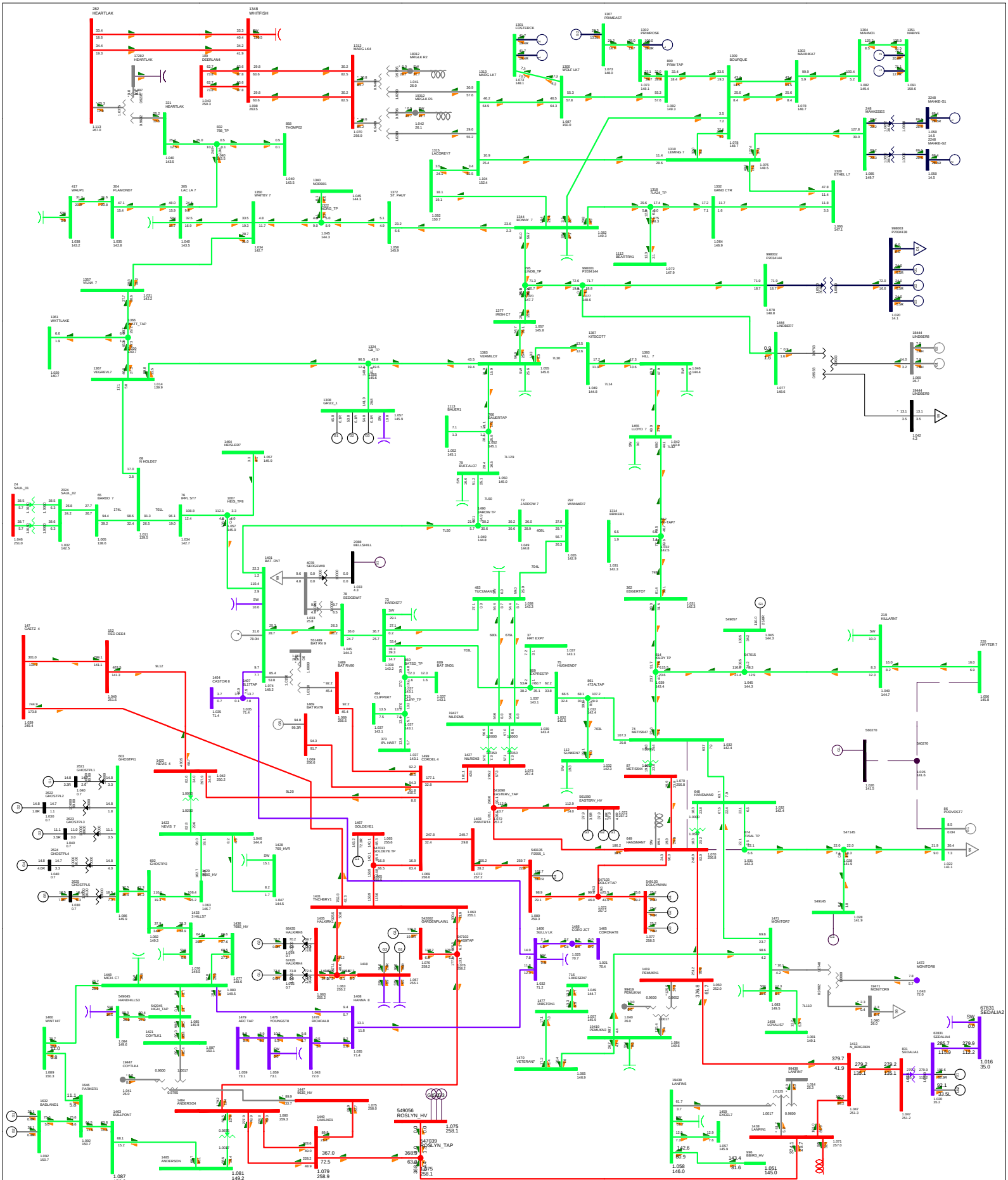
Study Case Description

2028WP POST-PROJ

Base Case

P2034 Cold Lake Area Cogen

Bus - VOLTAGE (kV/PU)
Branch - MW/MVar
Equipment - MW/MVar
100.0%RATEB
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A3- 3

Contingency

CONT 065: 398L (545S Provost - P2573 Prairie Yarrow - 277S Hayter)

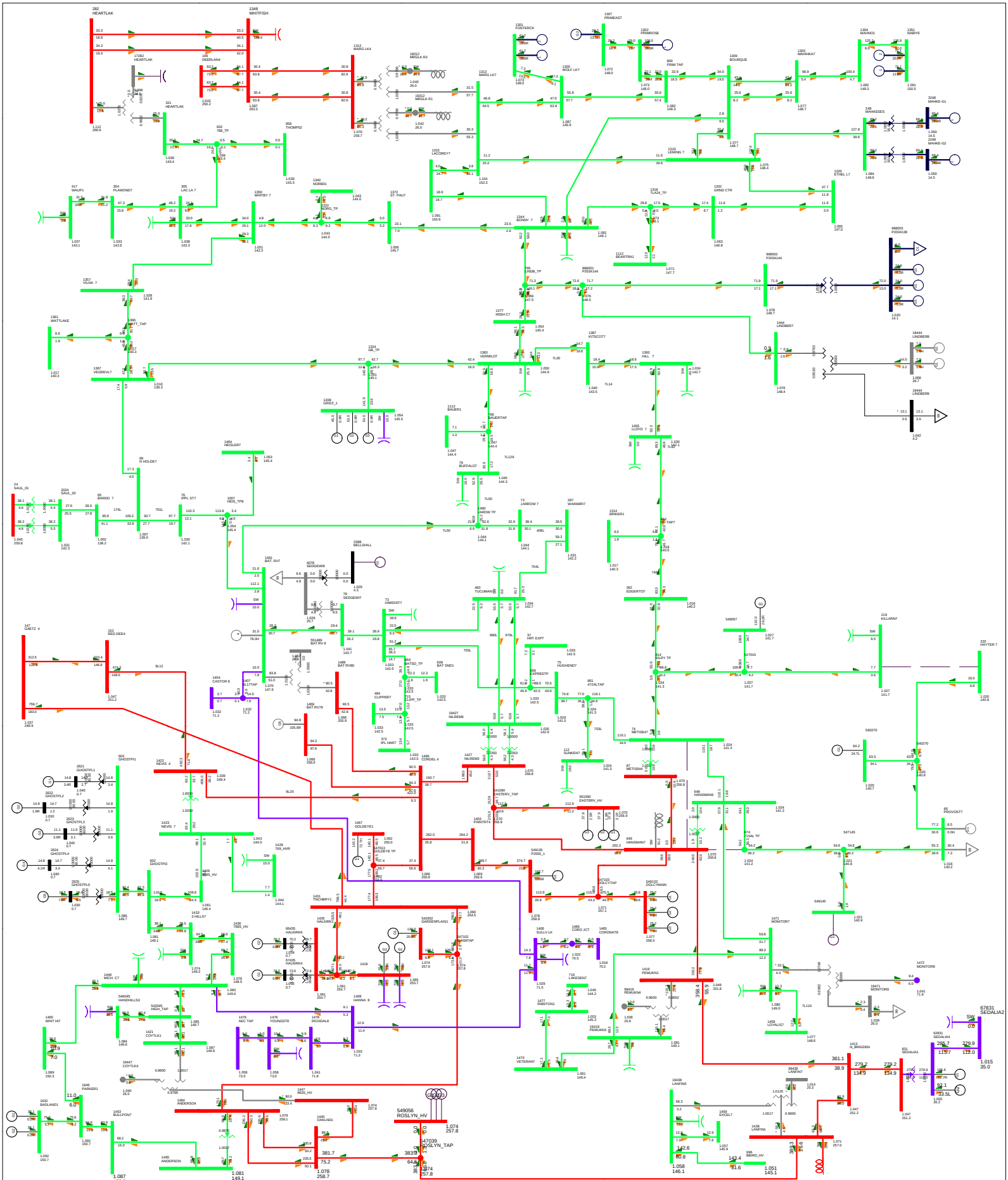
Study Case Description

2028WP POST-PROJ

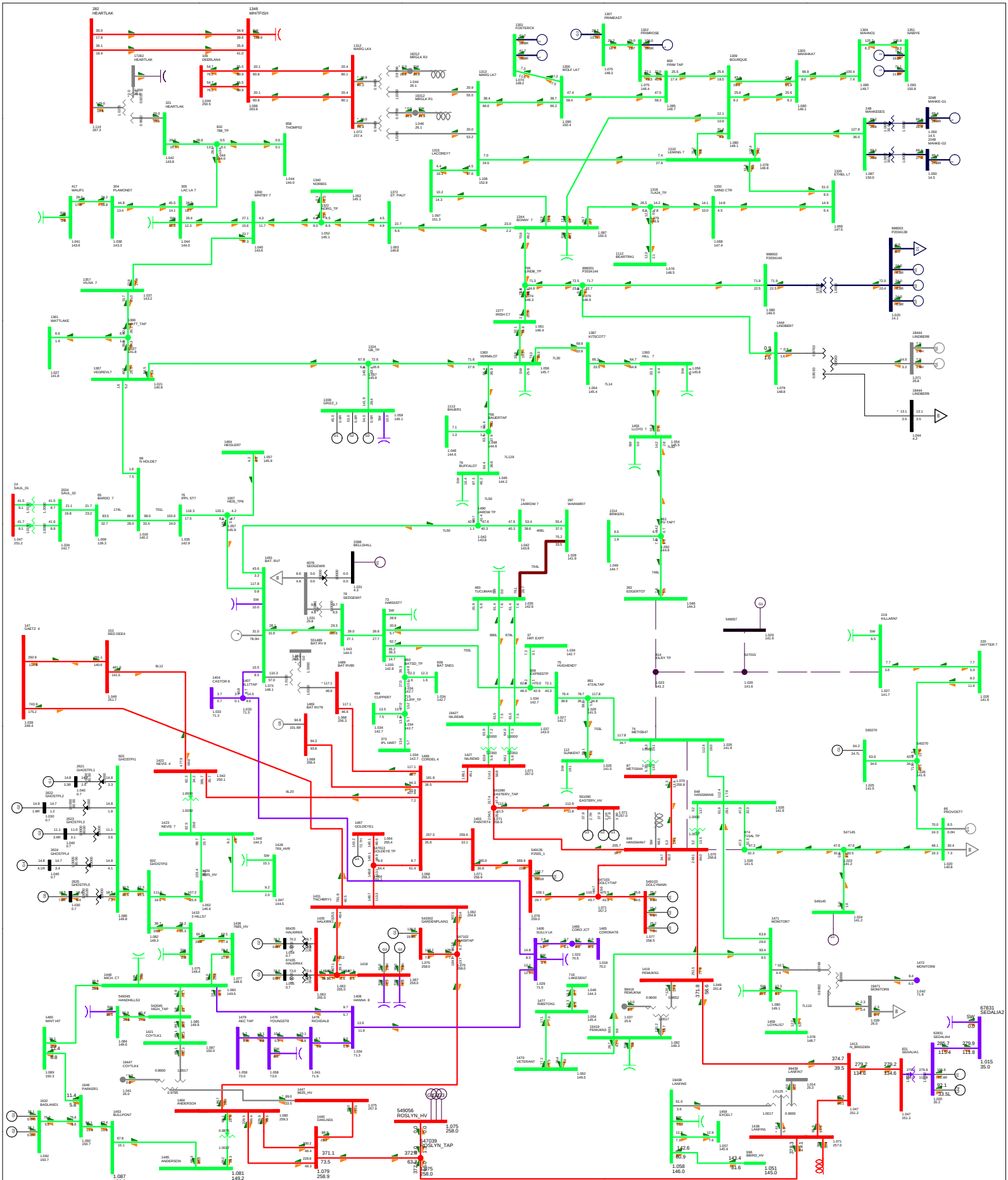
Base Case

P2034 Cold Lake Area Cogen

Bus - VOLTAGE (kV/PU)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%RATEB
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A3- 3	Contingency	Study Case Description	P2034 Cold Lake Area Cogen
	CONT 066: 748L (267S Killarney Lake - 277S Hayter)	2028WP POST-PROJ Base Case	Bus - VOLTAGE (kv/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEB kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A3- 3

Contingency

CONT 067: 749L (648S Metiskow - 267S Killarney Lake - P2460 Fox Meadows Wind - 899S Edgerton

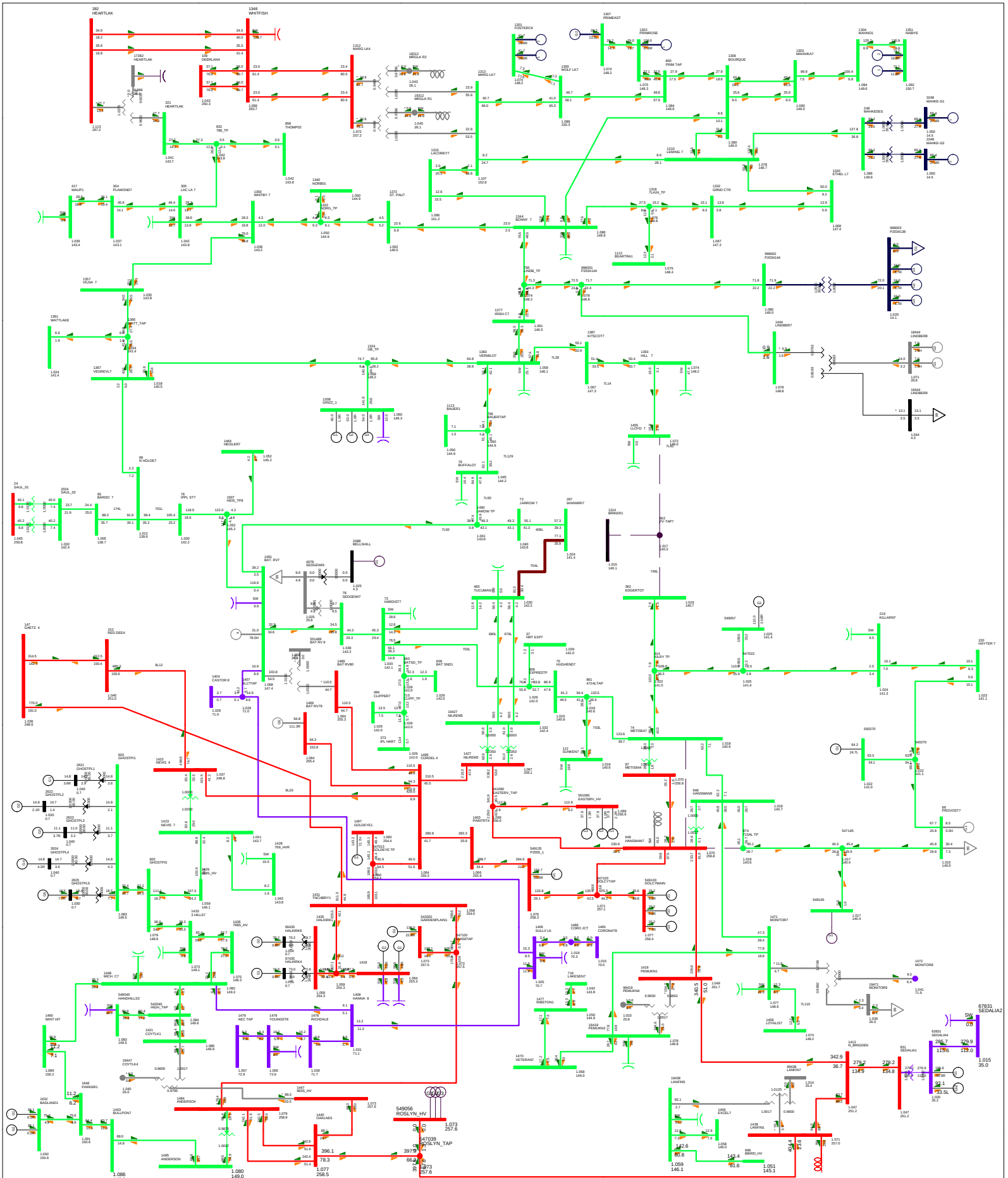
Study Case Description

POST-PROJ

Base Case

P2034 Cold Lake Area Cogen

Bus - VOLTAGE (kV/PU)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%RATEB
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A3- 3

Contingency

CONT 068: 7L749 (899S Edgerton - 716S Lloydminster - 880S Briker)

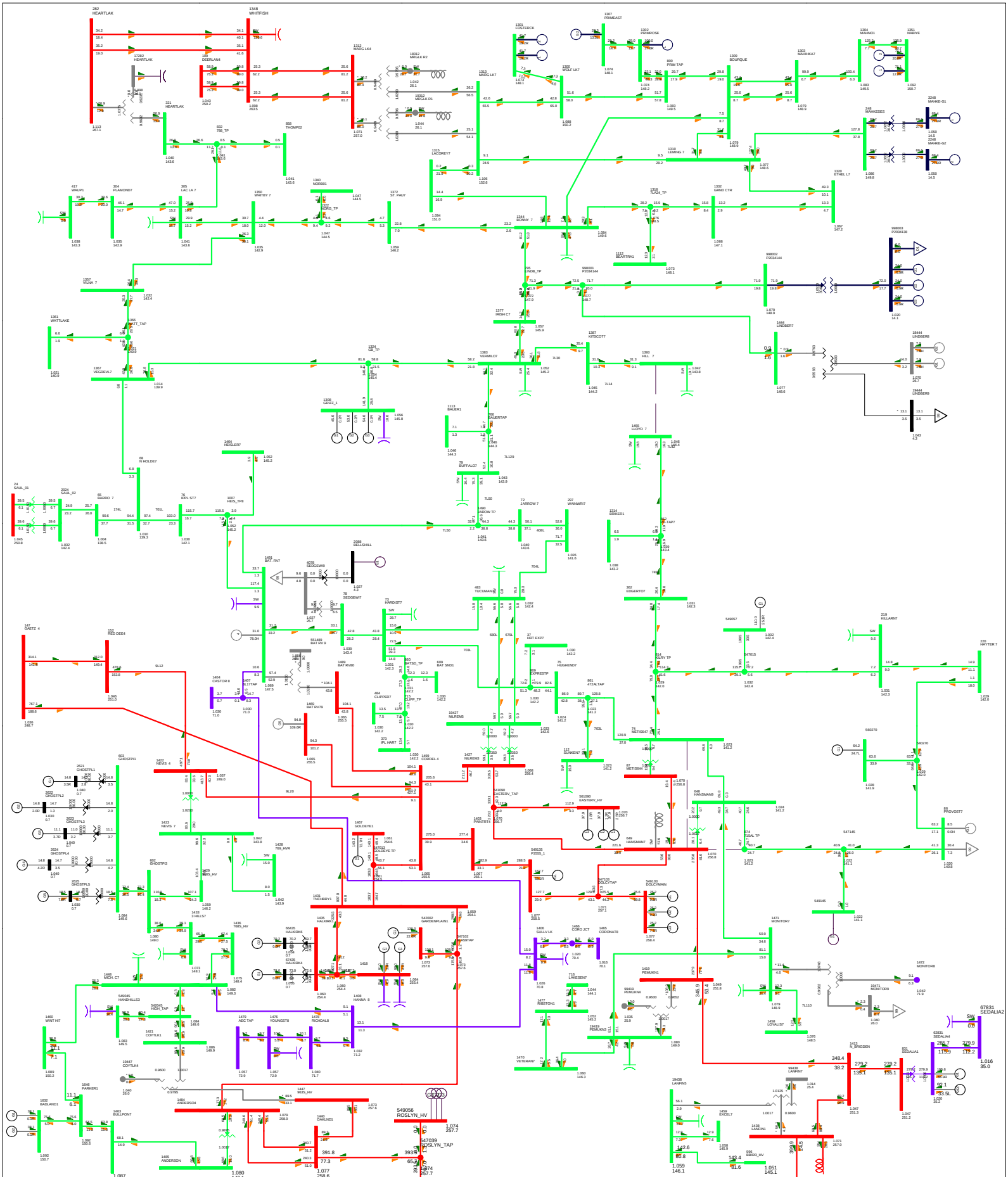
Study Case Description

2028WP POST-PROJ

Base Case

P2034 Cold Lake Area Cogen

Bus - VOLTAGE (kV/PU)
Branch - MW/MVar
Equipment - MW/Mvar
100.0%RATEB
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A3- 3

Contingency

CONT 069: 7L42 (751S Hill - 716S Lloydminster)

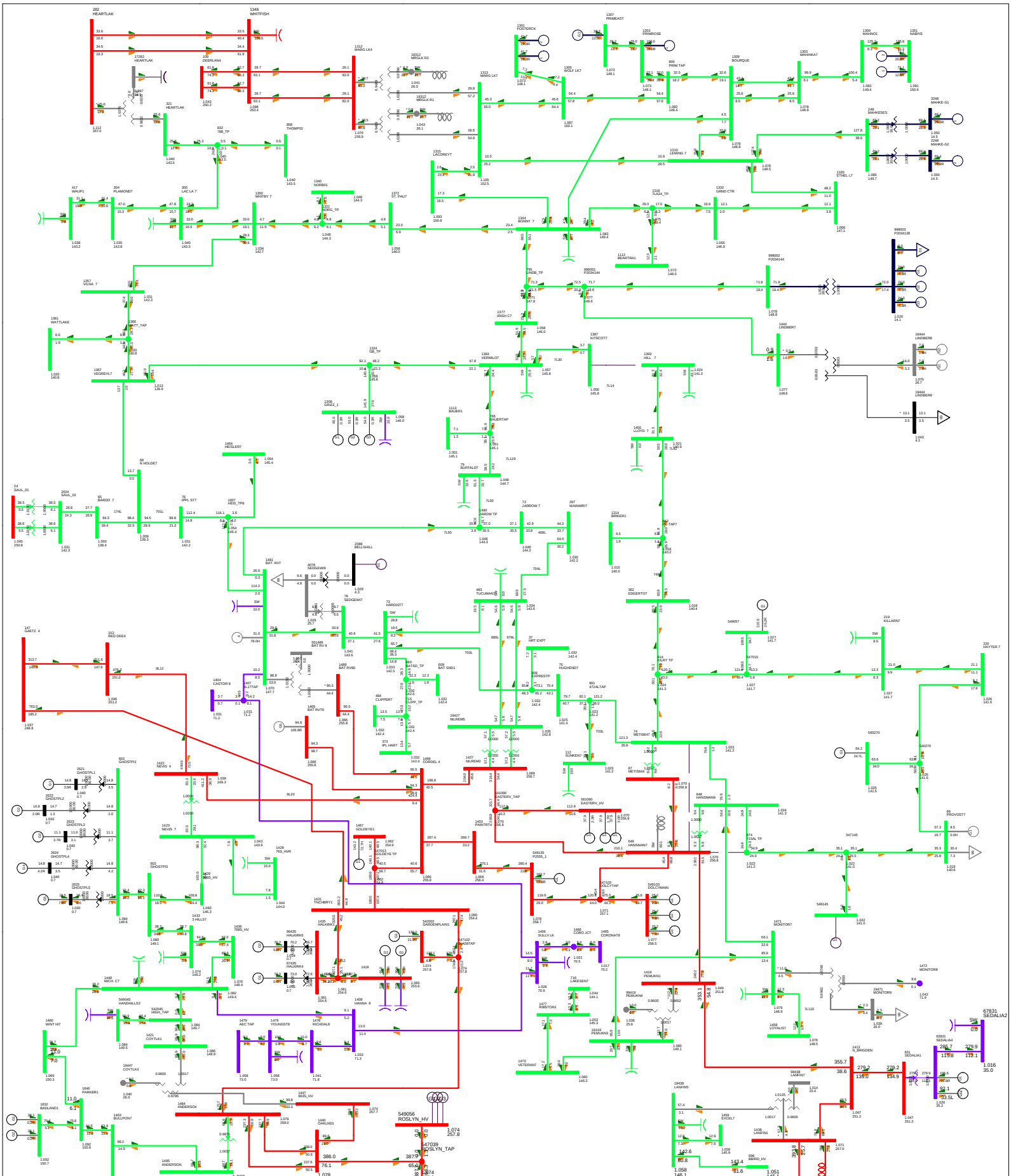
Study Case Description

2028WP POST-PROJ

Base Case

P2034 Cold Lake Area Cogen

Bus - VOLTAGE (kV/PU)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%RATEB
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A3- 3

Contingency

CONT 070: 7L14 (705S Kitscoty - 751S Hill)

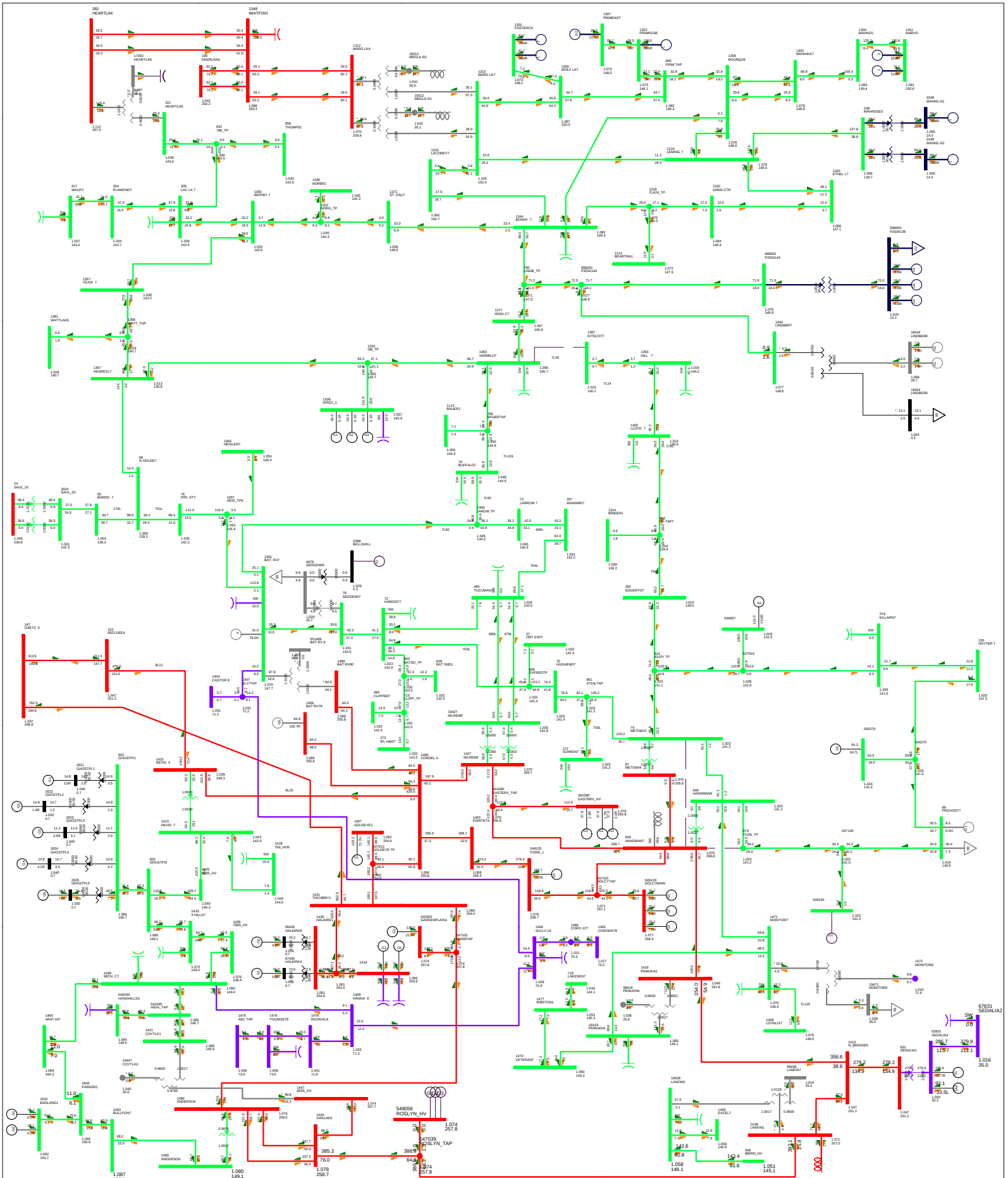
Study Case Description

2028WP POST-PROJ

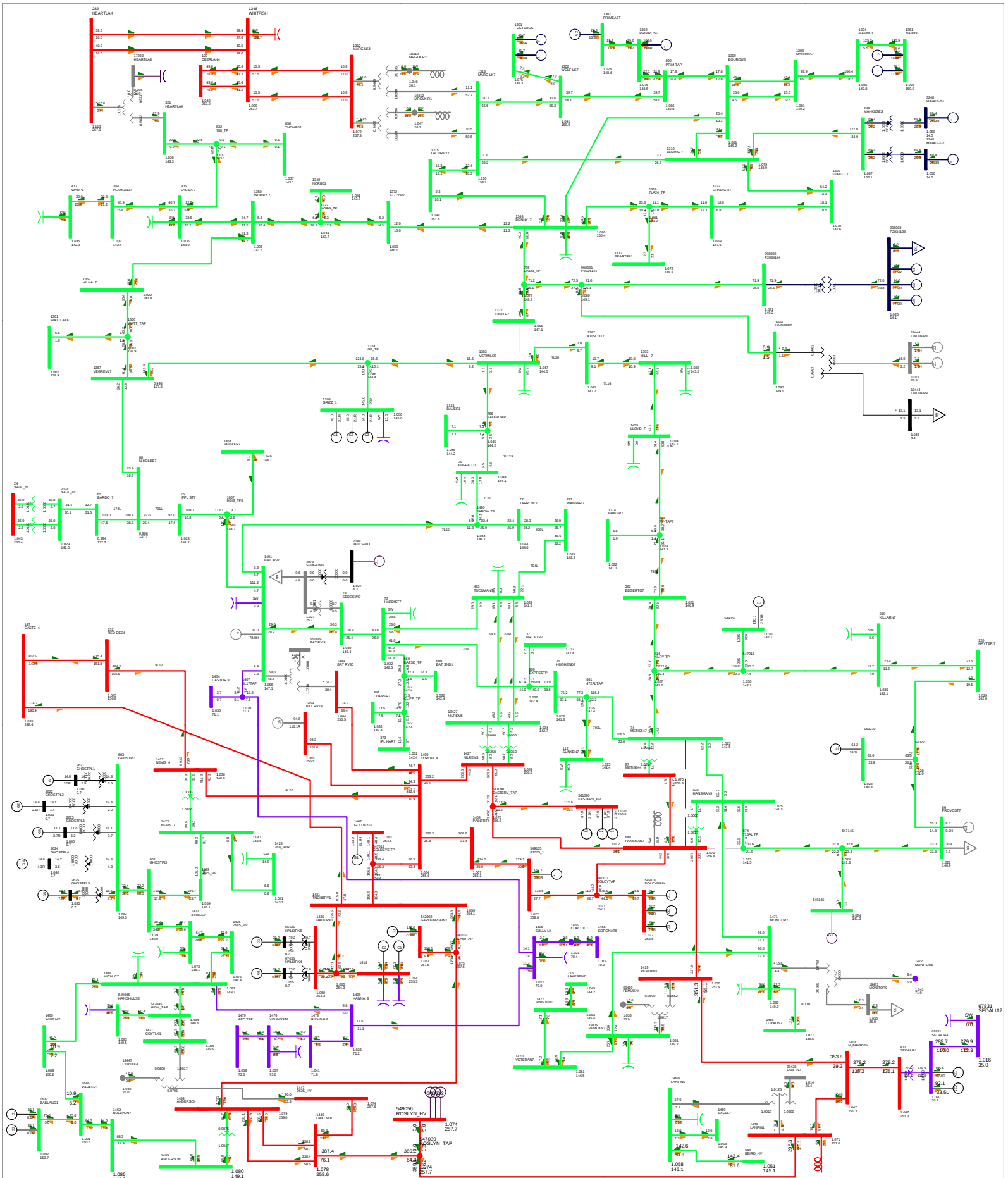
Base Case

P2034 Cold Lake Area Cogen

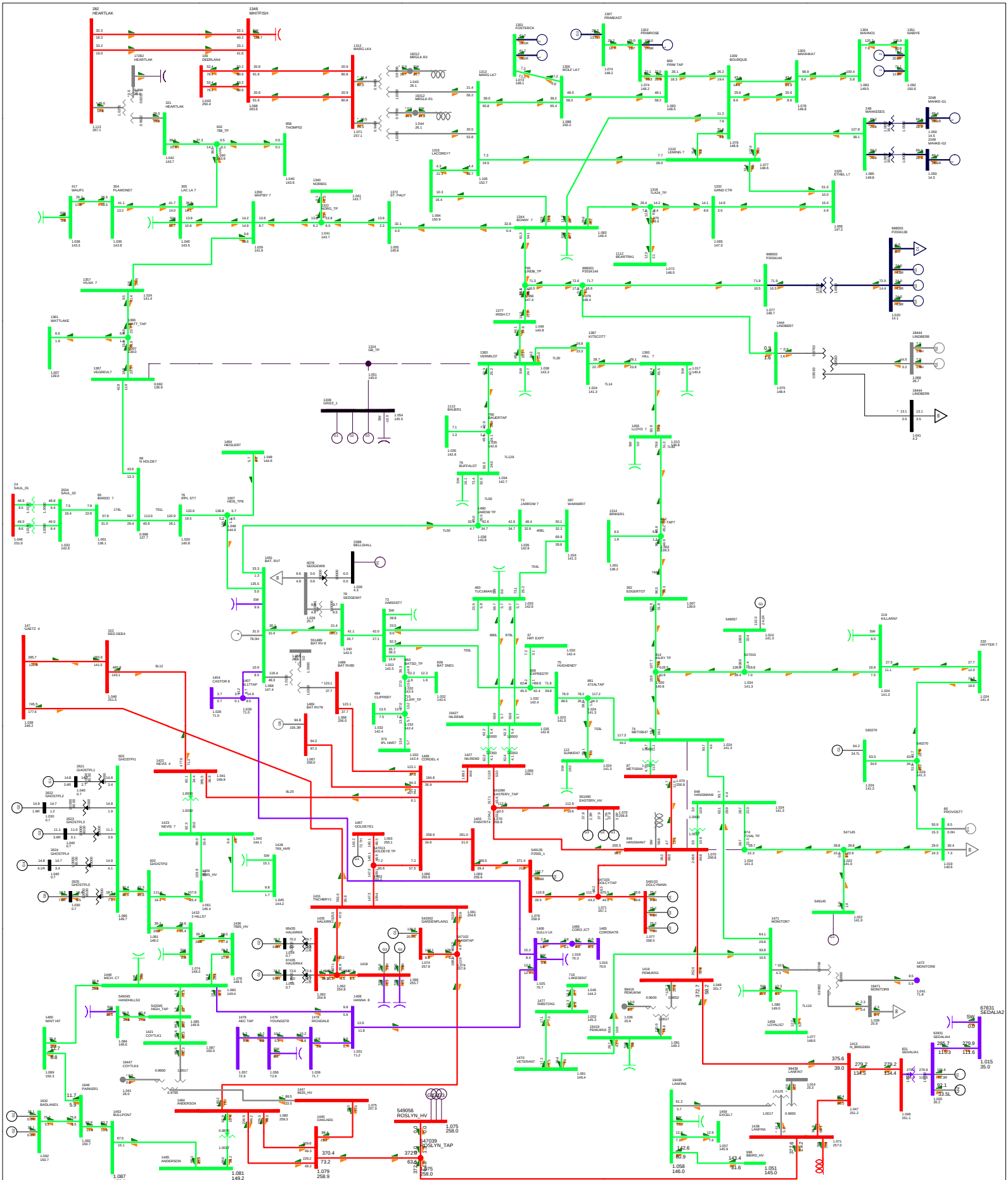
Bus - VOLTAGE (kV/PU)
Branch - MW/MVar
Equipment - MW/MVar
100.0%RATEB
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A3- 3	Contingency	Study Case Description	P2034 Cold Lake Area Cogen
	CONT 071: 7L130 (710S Vermilion - 705S Kitscoty)	2028WP POST-PROJ Base Case	Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEB kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A3- 3	**Contingency** CONT 072: 7L117 (706S Irish Creek - 710S Vermilion)	**Study Case Description** 2028WP POST-PROJ Base Case	**P2034 Cold Lake Area Cogen** Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEB kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A3- 3

Contingency

CONT 073: 7L65 (709S Vegreville - 710S Vermilion - 708S Grizzly Bear)

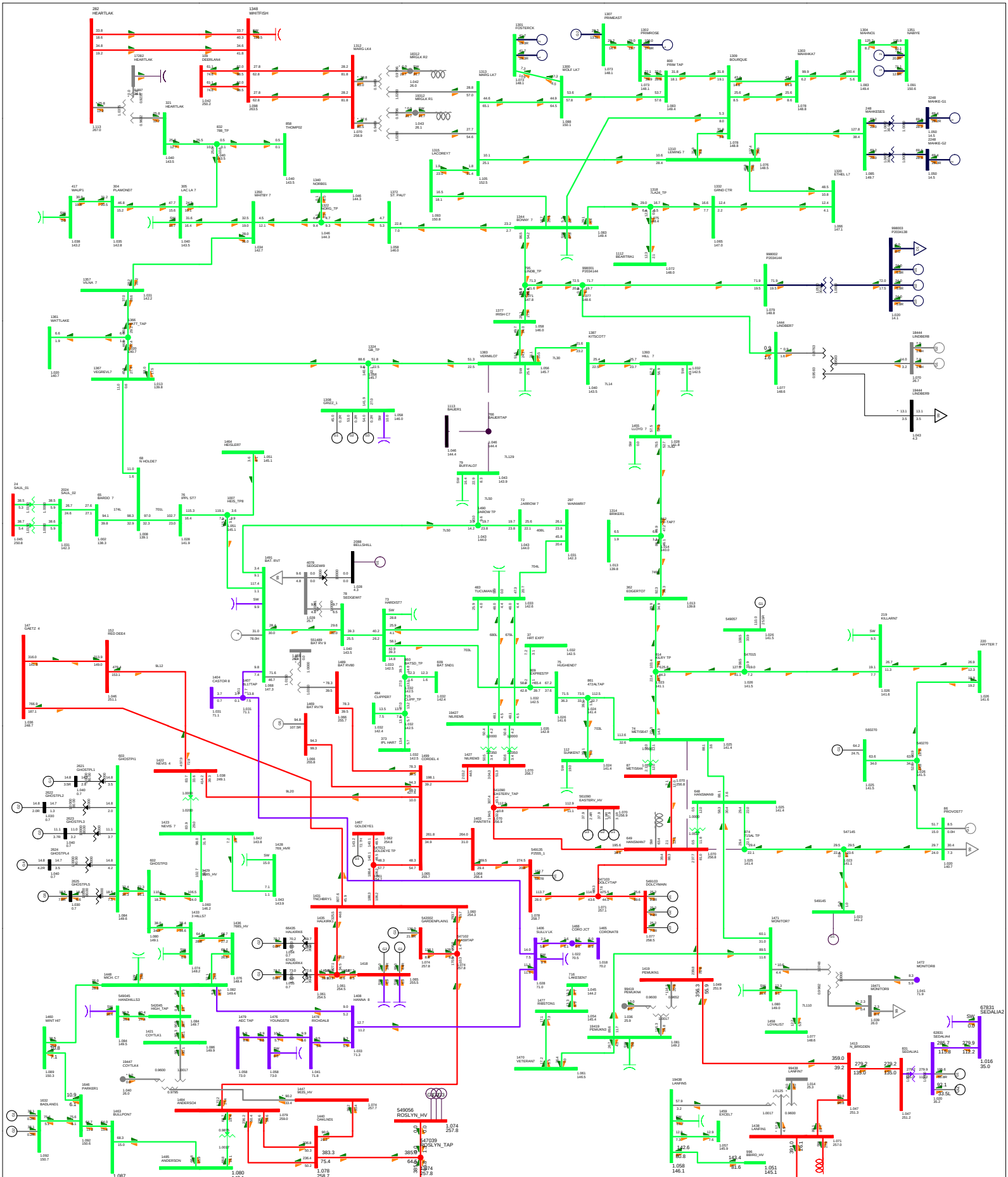
Study Case Description

2028WP POST-PROJ

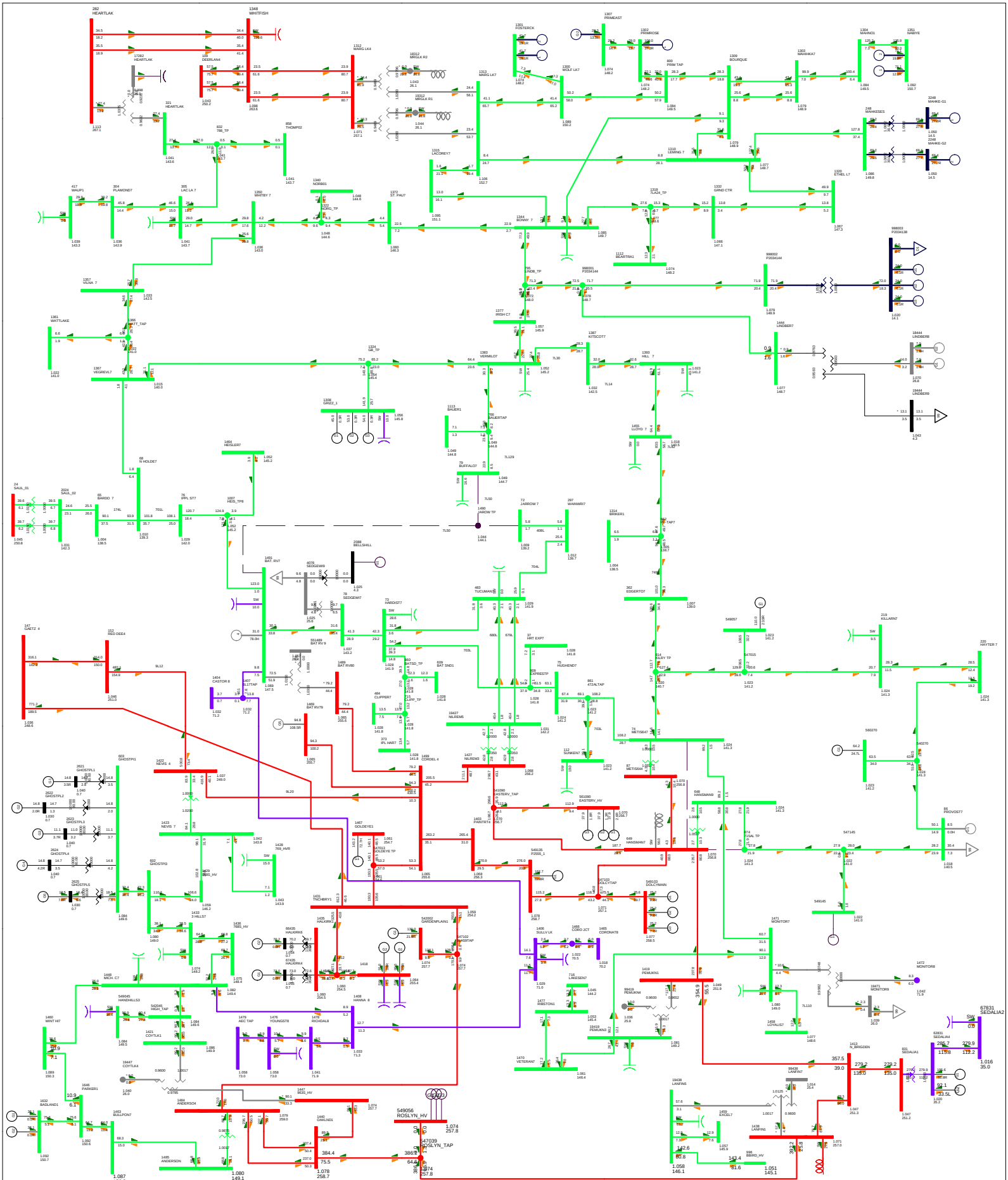
Base Case

P2034 Cold Lake Area Cogen

Bus - VOLTAGE (kV/PU)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%RATEB
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A3- 3	Contingency	Study Case Description	P2034 Cold Lake Area Cogen
	CONT 074: 7L129 (710S Vermilion - 918S Bauer - 526S Buffalo Creek)	2028WP POST-PROJ Base Case	Bus - VOLTAGE (kv/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEB kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A3- 3

Contingency

CONT 075: 7L50 (526S Buffalo Creek - 757S Battle River - 252S Jarrow)

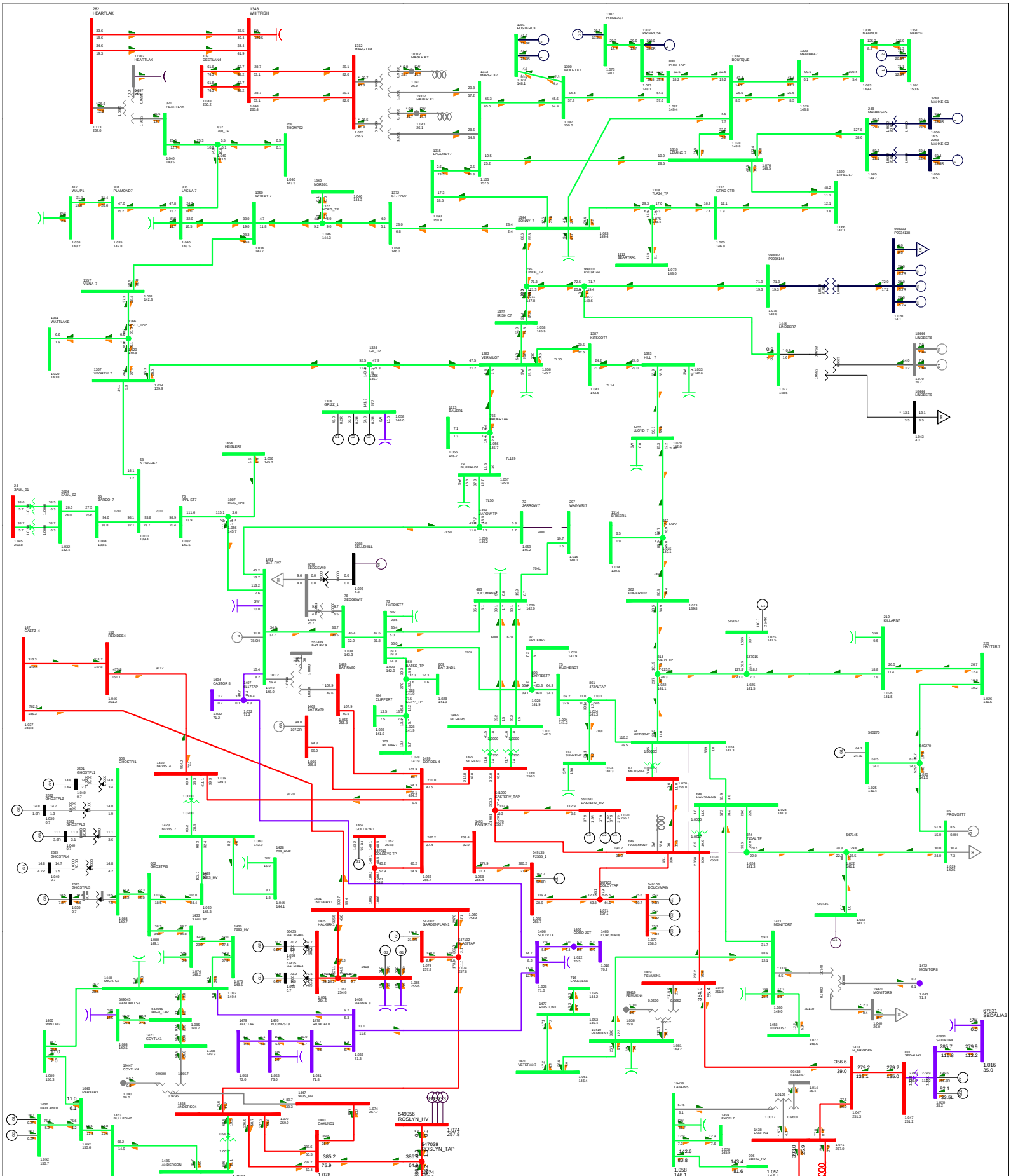
Study Case Description

2028WP POST-PROJ

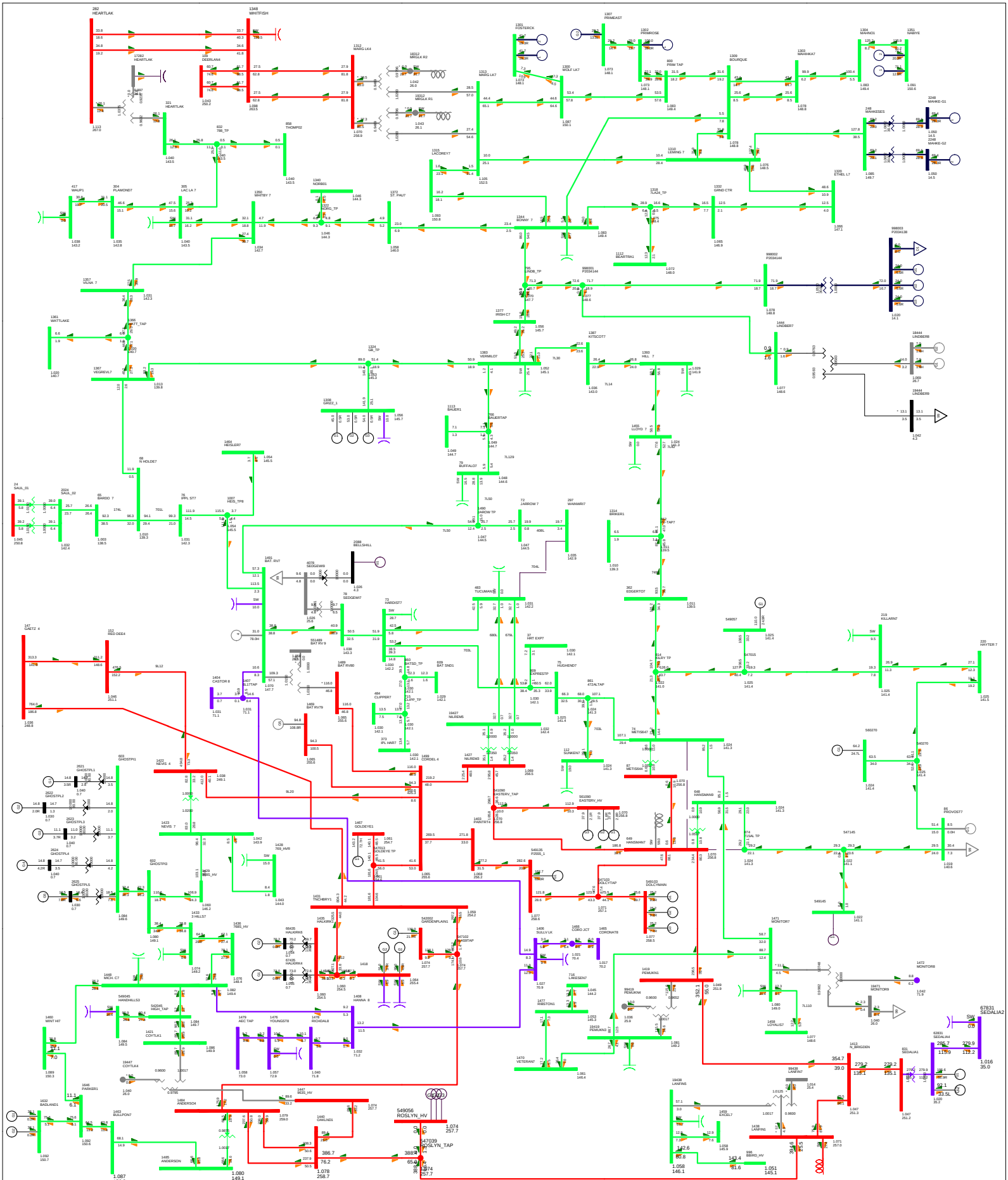
Base Case

P2034 Cold Lake Area Cogen

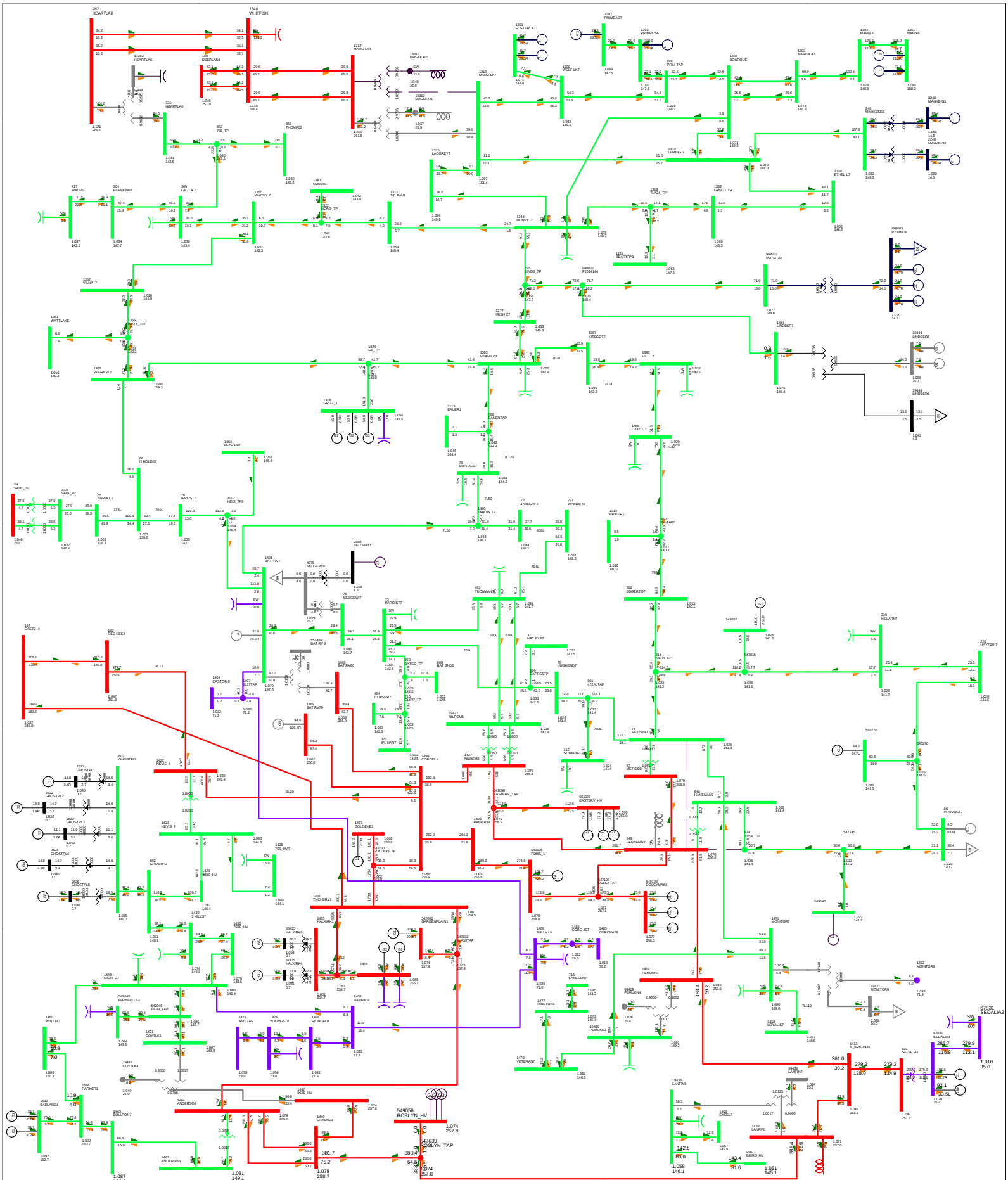
Bus - VOLTAGE (kV/PU)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%RATEB
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



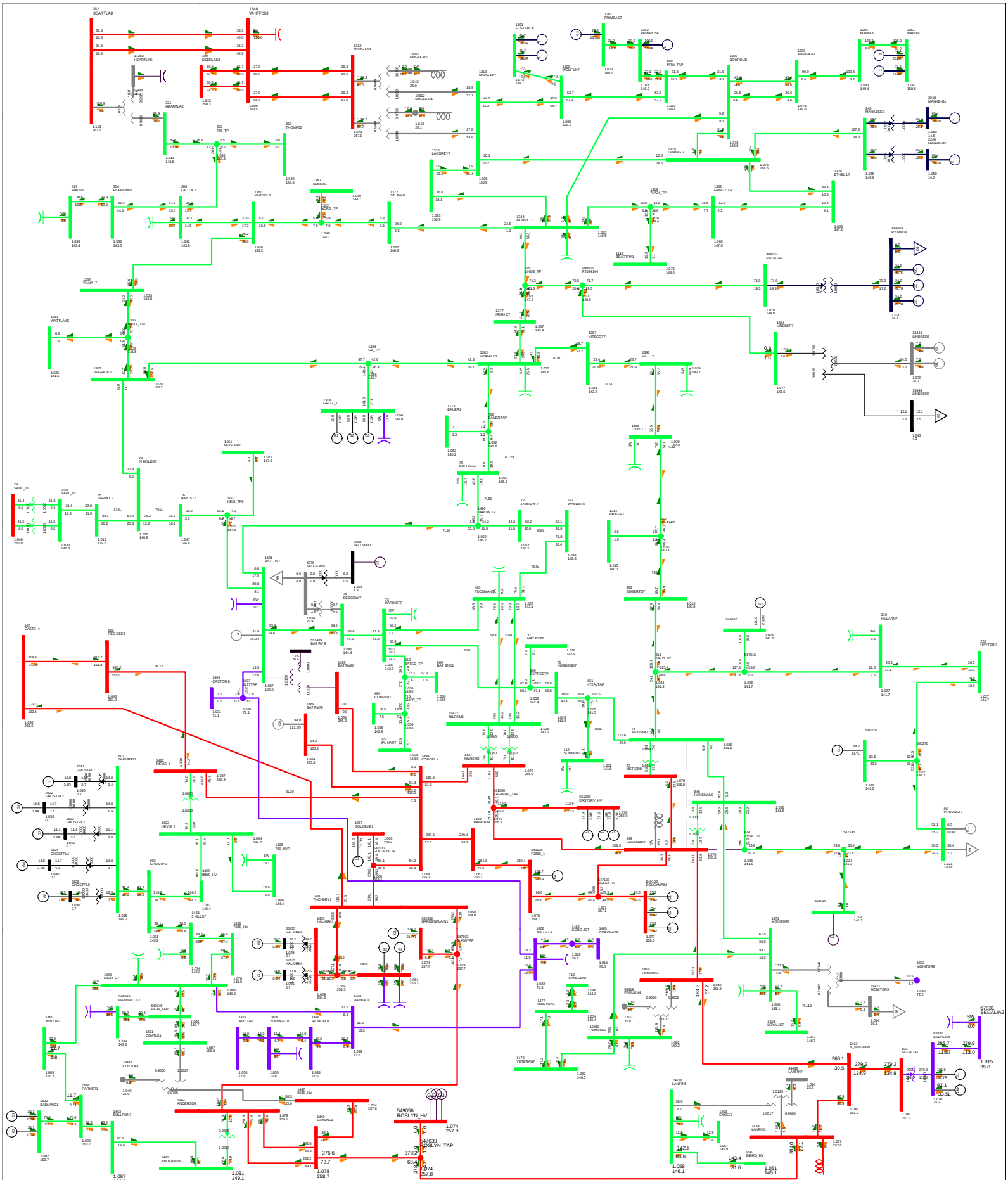
Attachment A3- 3	**Contingency** CONT 076: 408L (252S Jarrow - 51S Wainwright)	**Study Case Description** 2028WP POST-PROJ Base Case	**P2034 Cold Lake Area Cogen** Bus - VOLTAGE (kv/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEB kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



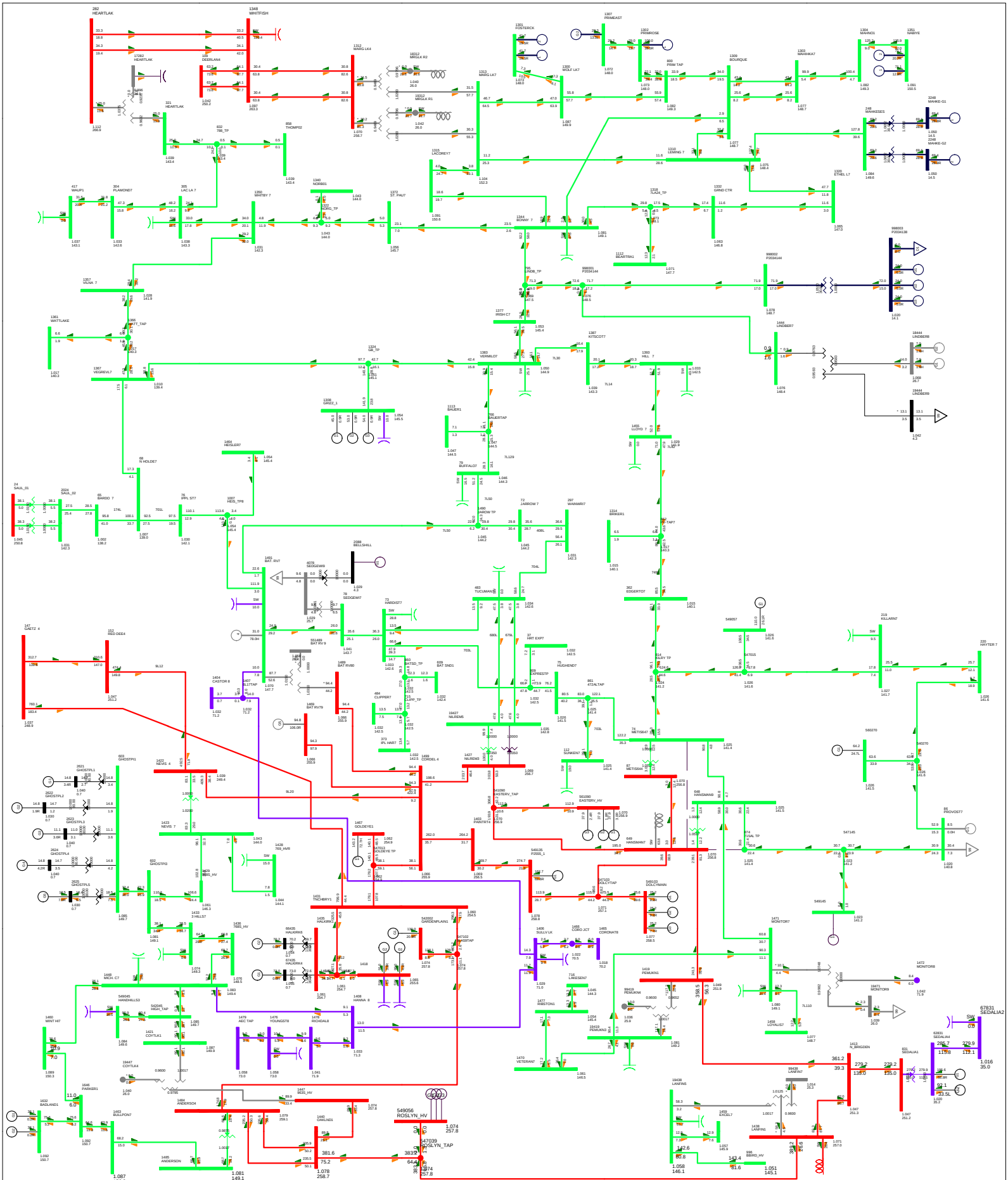
Attachment A3- 3	**Contingency** CONT 077: 704L (51S Wainwright - 478S Tucuman)	**Study Case Description** 2028WP POST-PROJ Base Case	**P2034 Cold Lake Area Cogen** Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEB kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A3- 3	Contingency	Study Case Description	P2034 Cold Lake Area Cogen
	CONT 078: Marguerite Lake 2T	2028WP POST-PROJ Base Case	Bus - VOLTAGE (kV/PU) Branch - MW/MVar Equipment - MW/MVar 100.0%RATEB kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A3- 3	Contingency	Study Case Description	P2034 Cold Lake Area Cogen
	CONT 079: Battle River T2	2028WP POST-PROJ Base Case	Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEB kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A3- 3

Contingency

CONT 080: 574S Nilrem 162.2TR

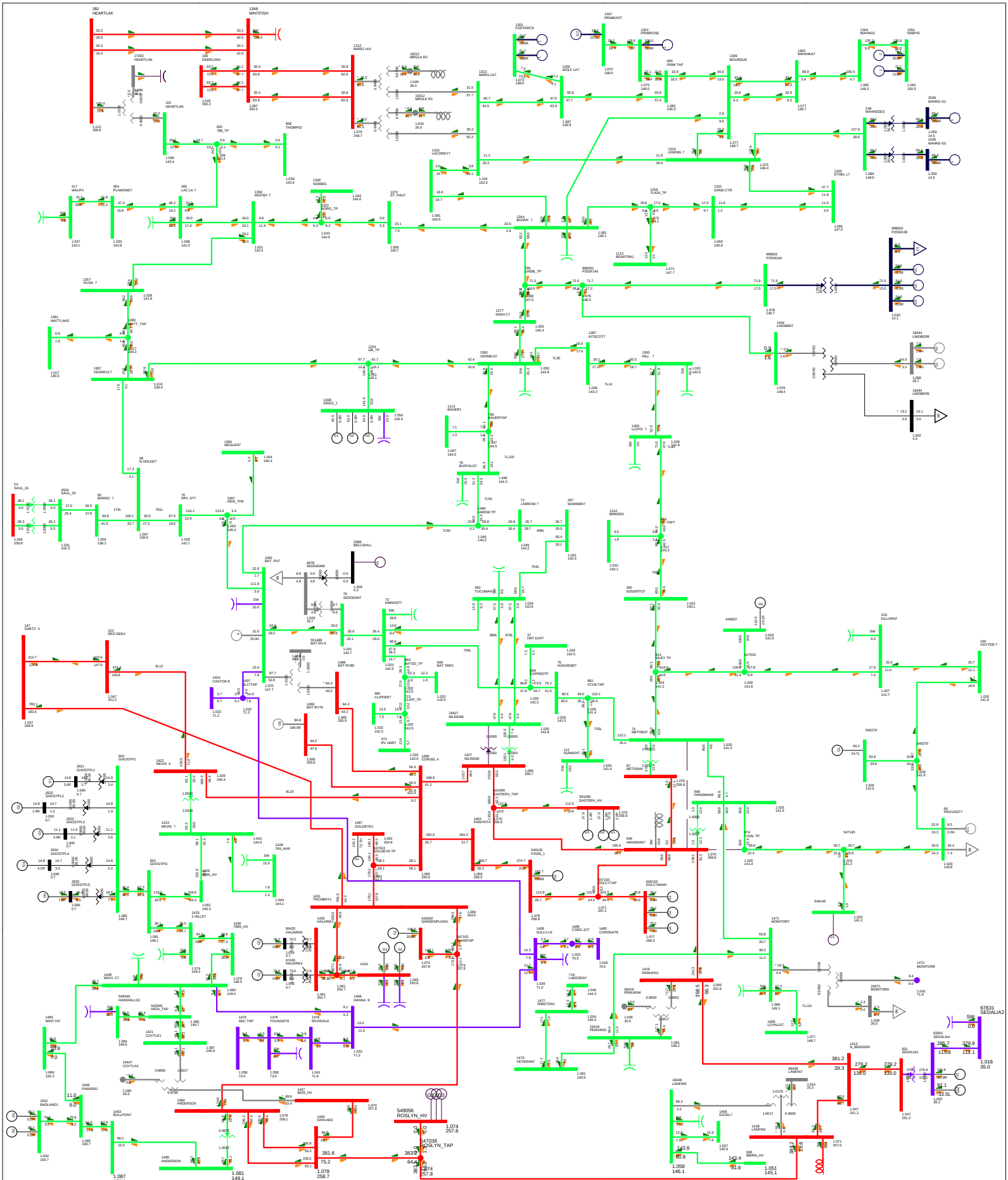
Study Case Description

2028WP POST-PROJ

Base Case

P2034 Cold Lake Area Cogen

Bus - VOLTAGE (kV/PU)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%RATEB
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A3- 3

Contingency

CONT 081: 574S Nilrem 87ST1

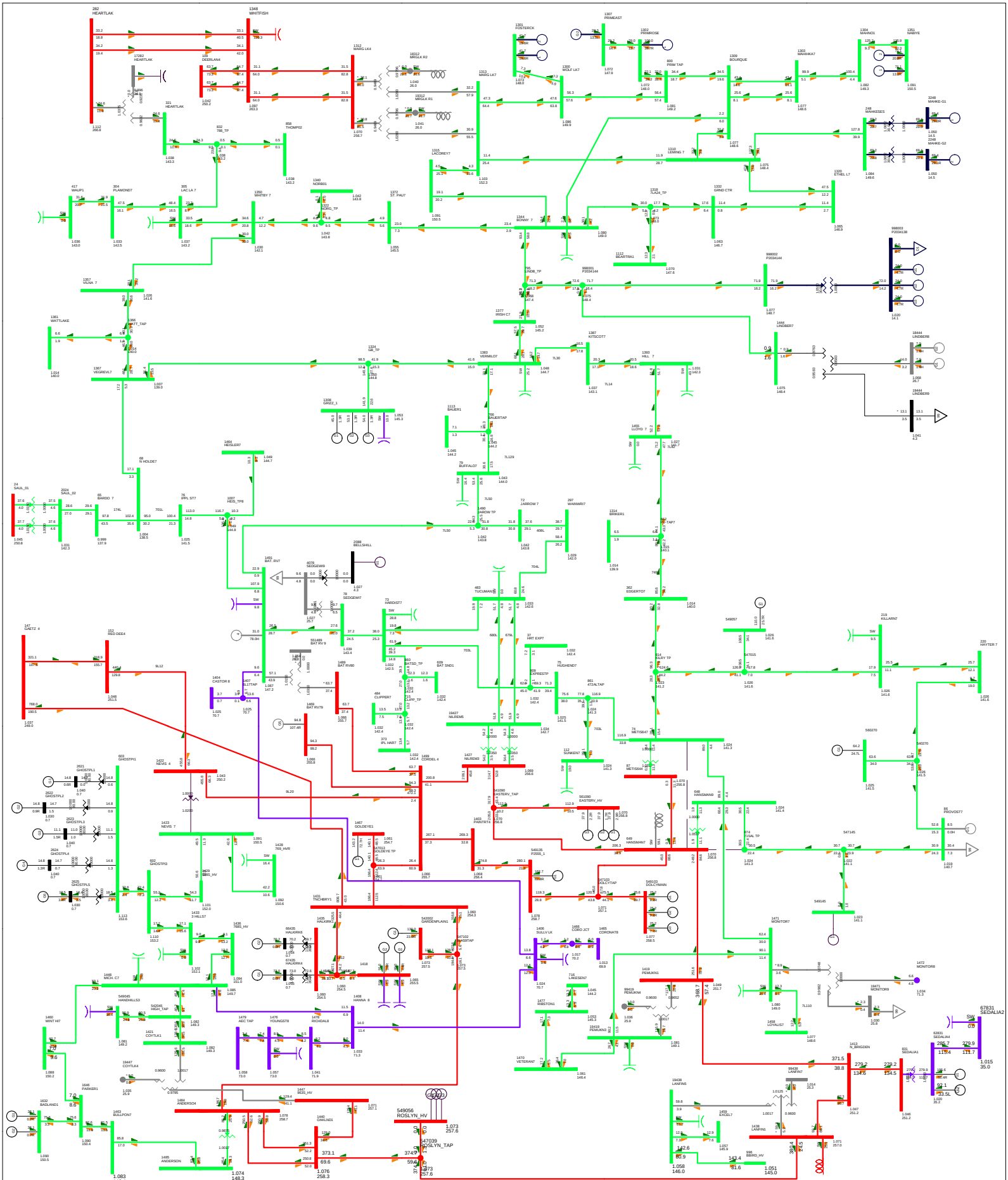
Study Case Description

2028WP POST-PROJ

Base Case

P2034 Cold Lake Area Cogen

Bus - VOLTAGE (kV/PU)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%RATEB
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A3- 3

Contingency

CONT 082: 766S Nevis 162.1TR

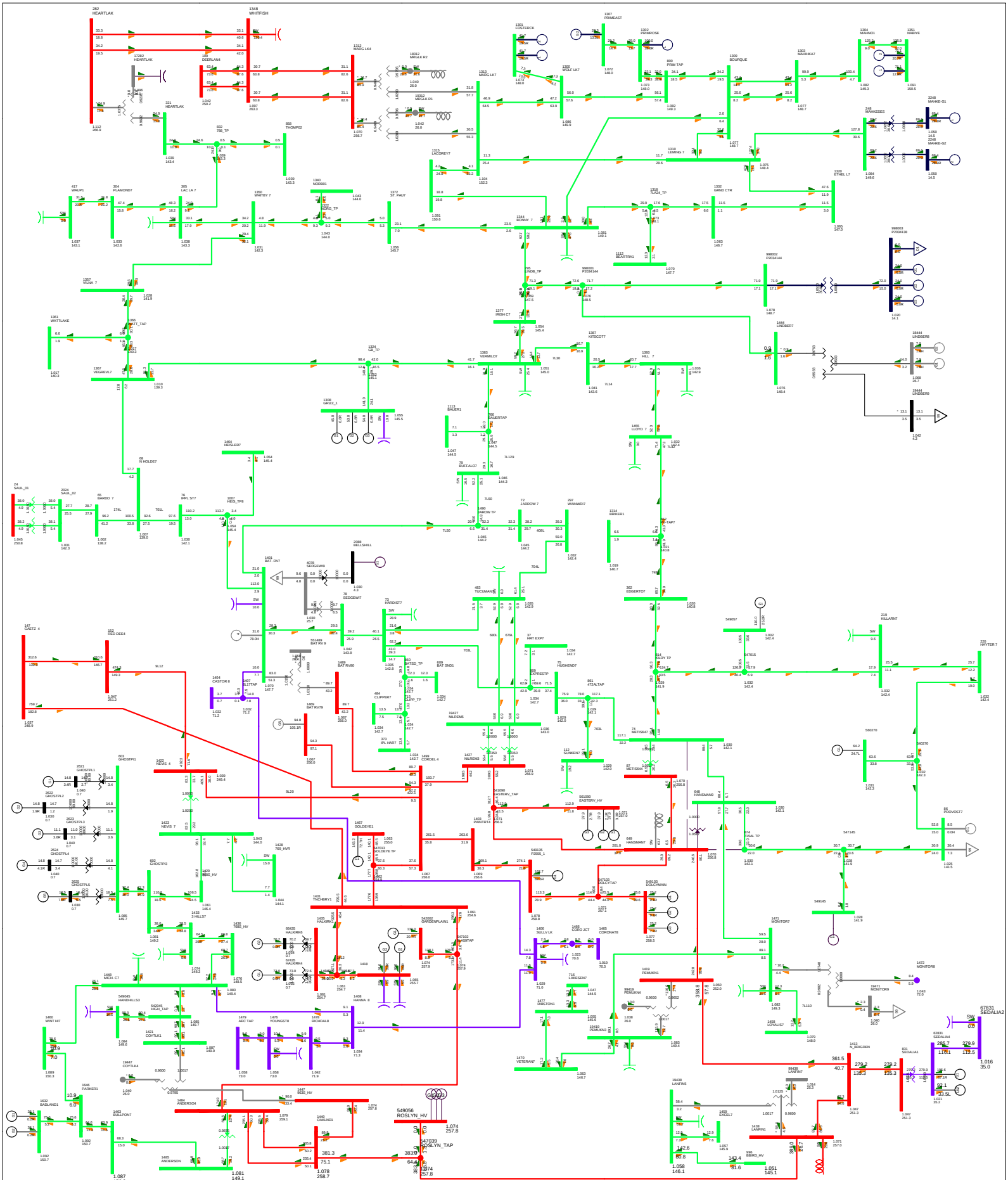
Study Case Description

2028WP POST-PROJ

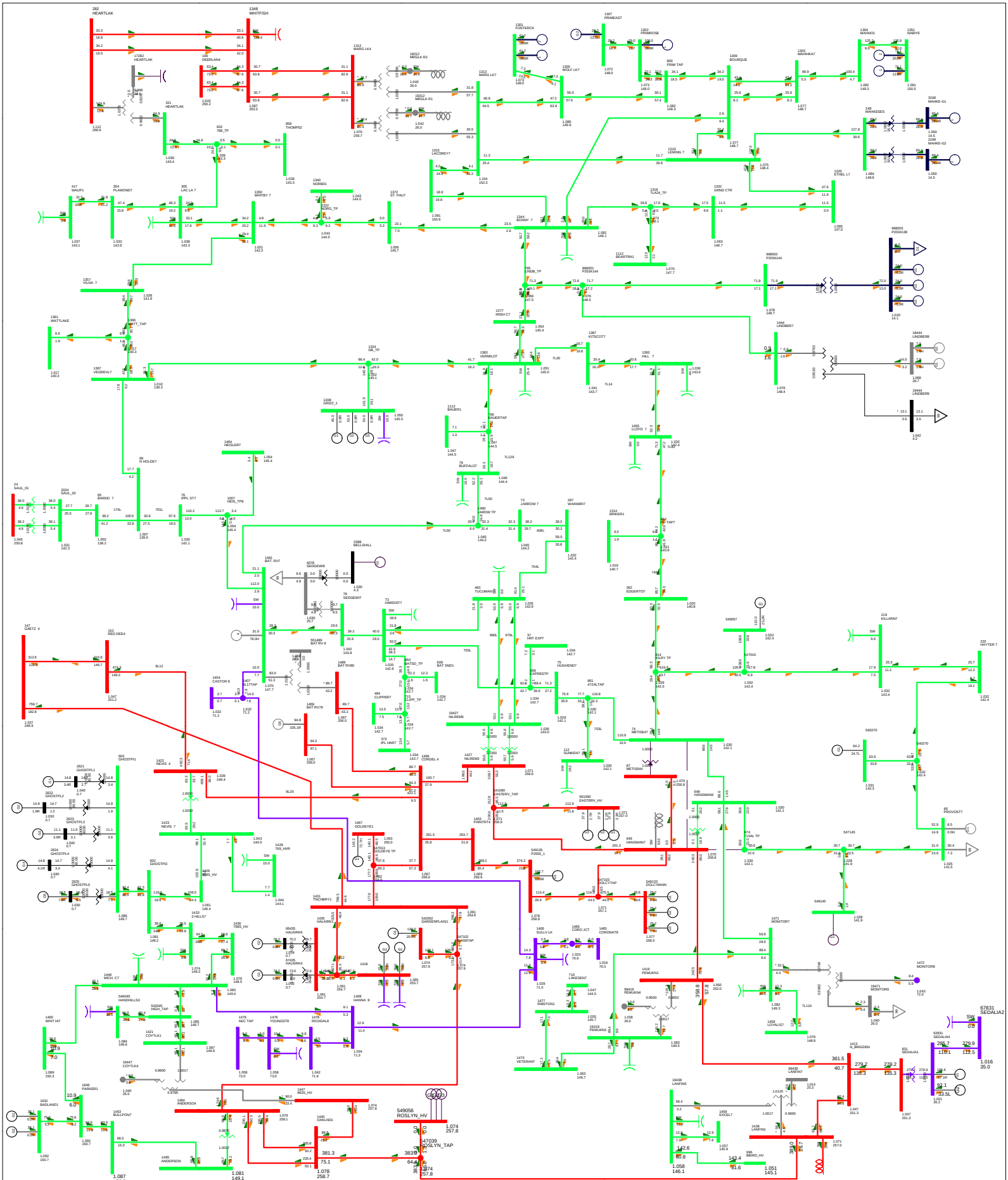
Base Case

P2034 Cold Lake Area Cogen

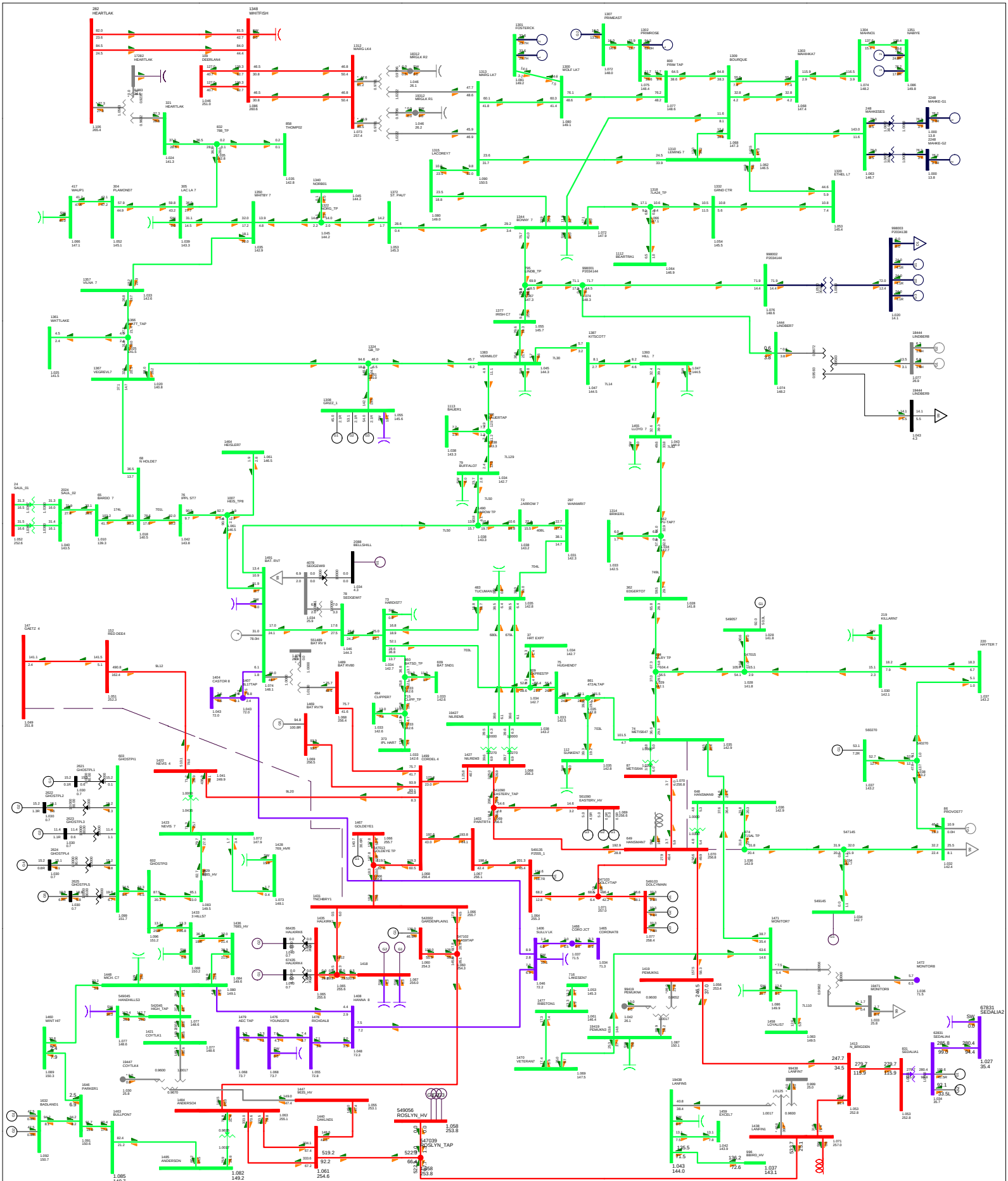
Bus - VOLTAGE (kV/PU)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%RATEB
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



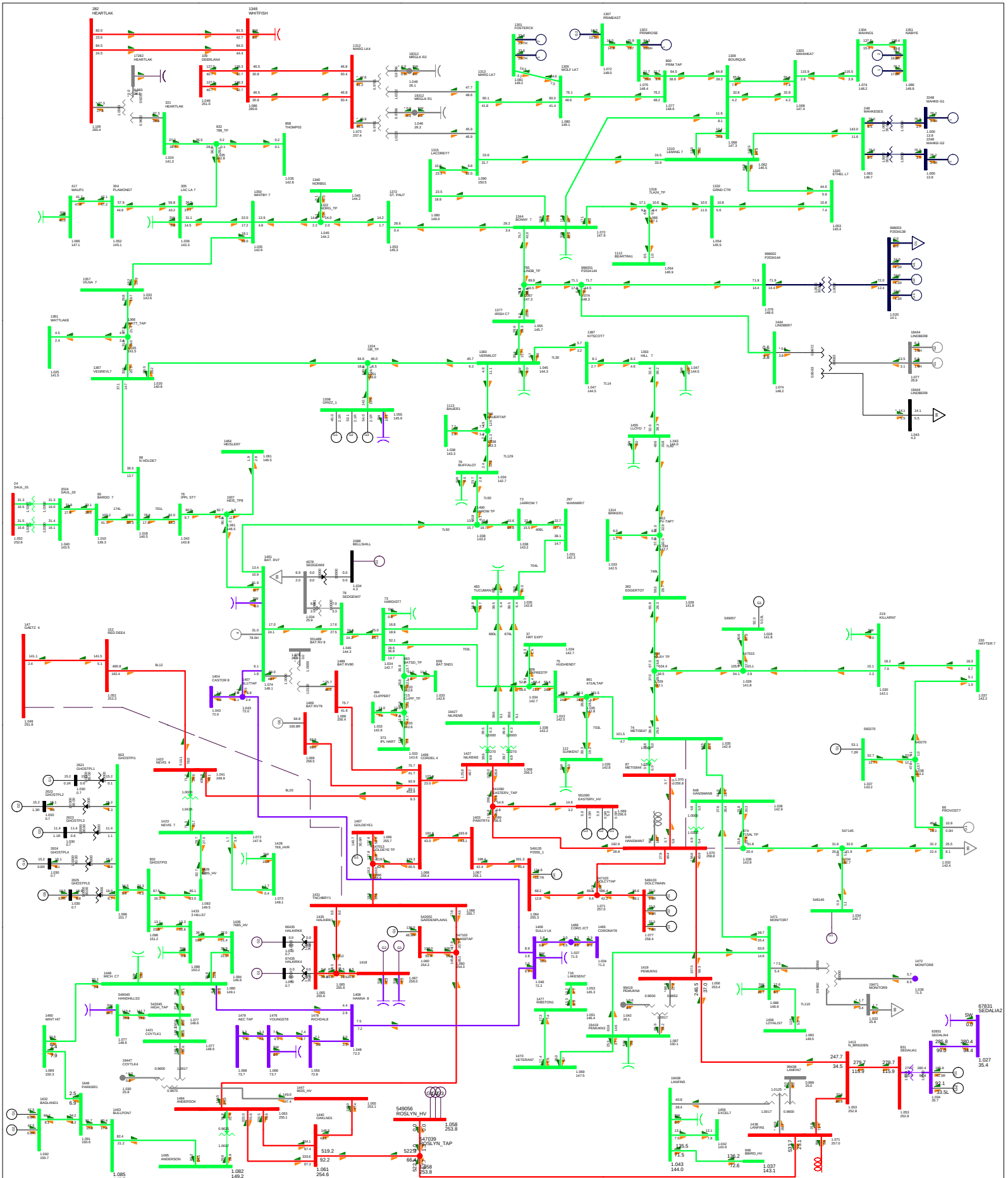
Attachment A3- 3	**Contingency** CONT 083: 650S Hansman Lake 63ST1	**Study Case Description** 2028WP POST-PROJ Base Case	**P2034 Cold Lake Area Cogen** Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEB kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A3- 3	Contingency	Study Case Description	P2034 Cold Lake Area Cogen
	CONT 084: 648S Metiskow T3	2028WP POST-PROJ Base Case	Bus - VOLTAGE (kV/PU) Branch - MW/MVar Equipment - MW/MVar 100.0%RATEB kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A3- 4	Contingency	Study Case Description	P2034 Cold Lake Area Cogen
	CONT 000: All elements in service	2028SP-woCETO POST-PROJ Base Case	Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A3- 4

Contingency

CONT 001: CETO (87S Gaetz - 972S Tinchebray)

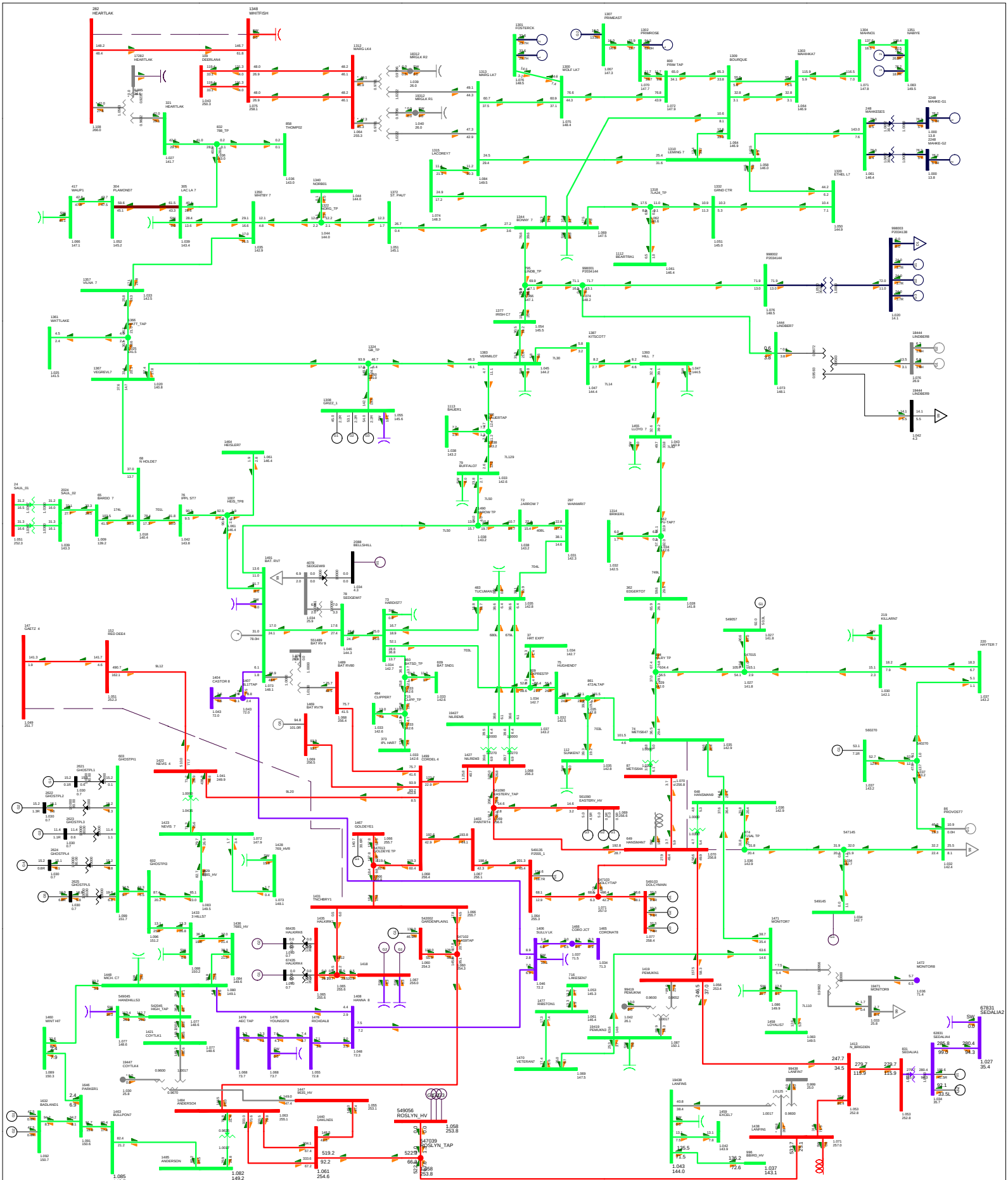
Study Case Description

2028SP-woCETO POST-PROJ

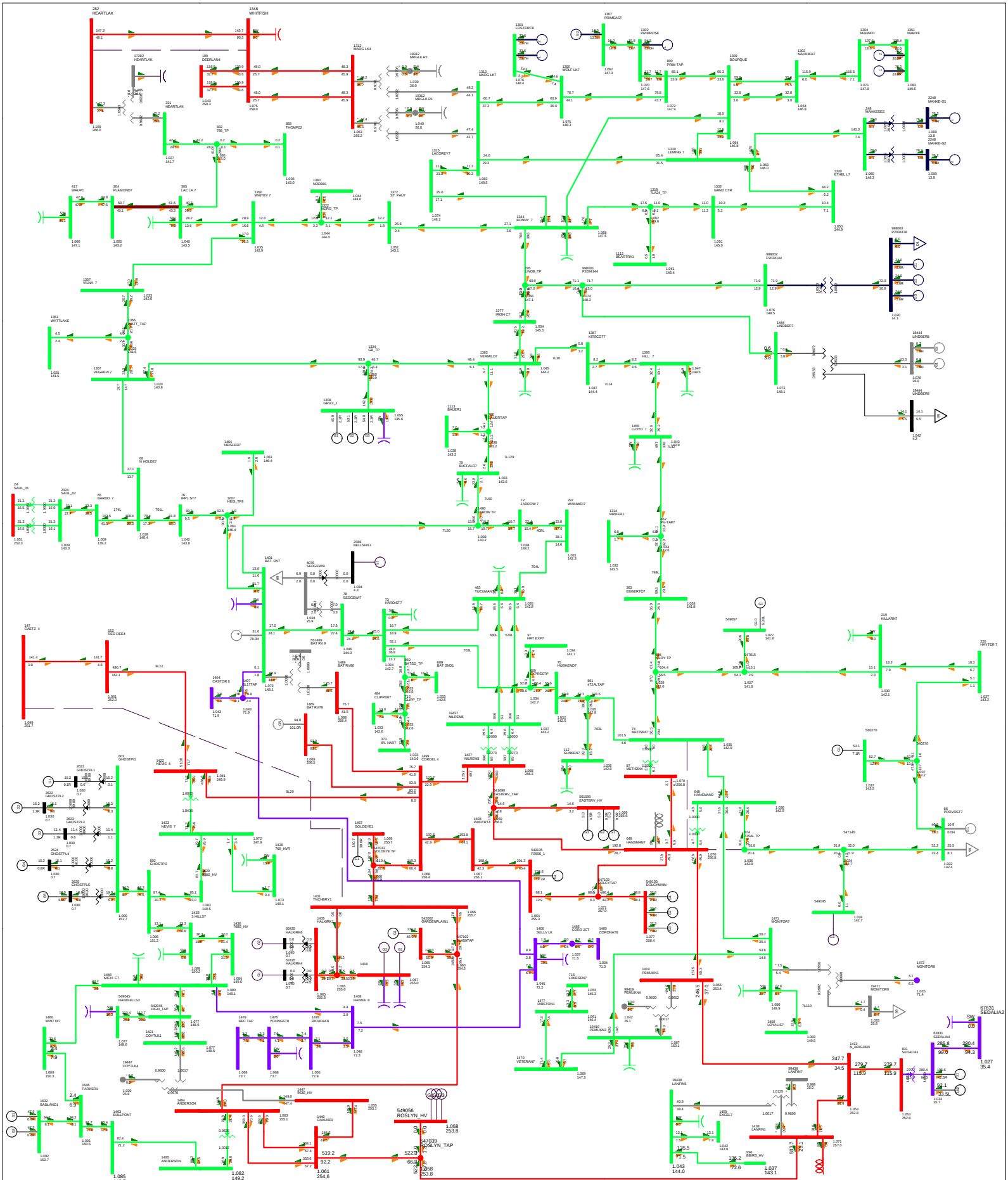
Base Case

P2034 Cold Lake Area Cogen

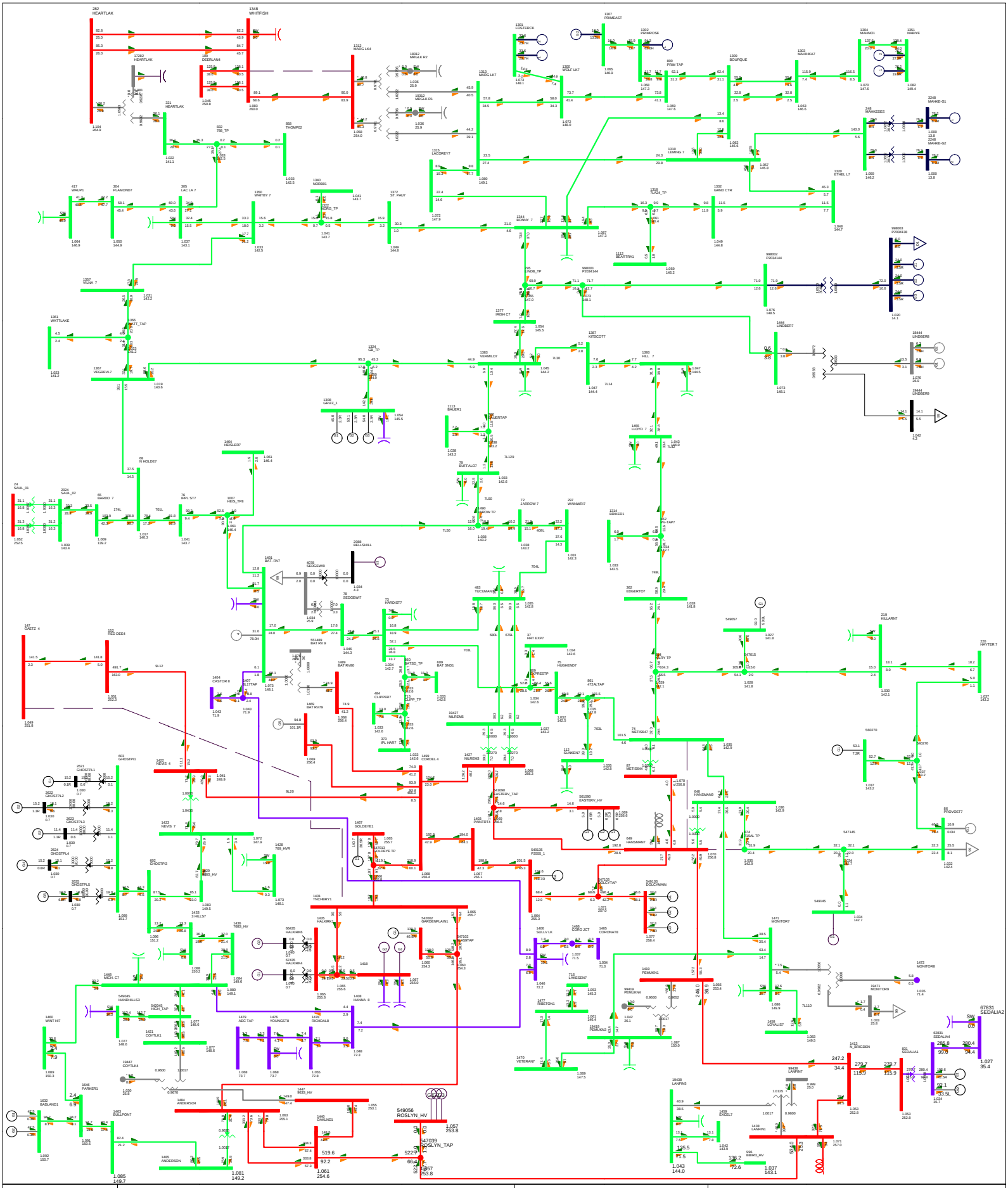
Bus - VOLTAGE (kV/PU)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%RATEA
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



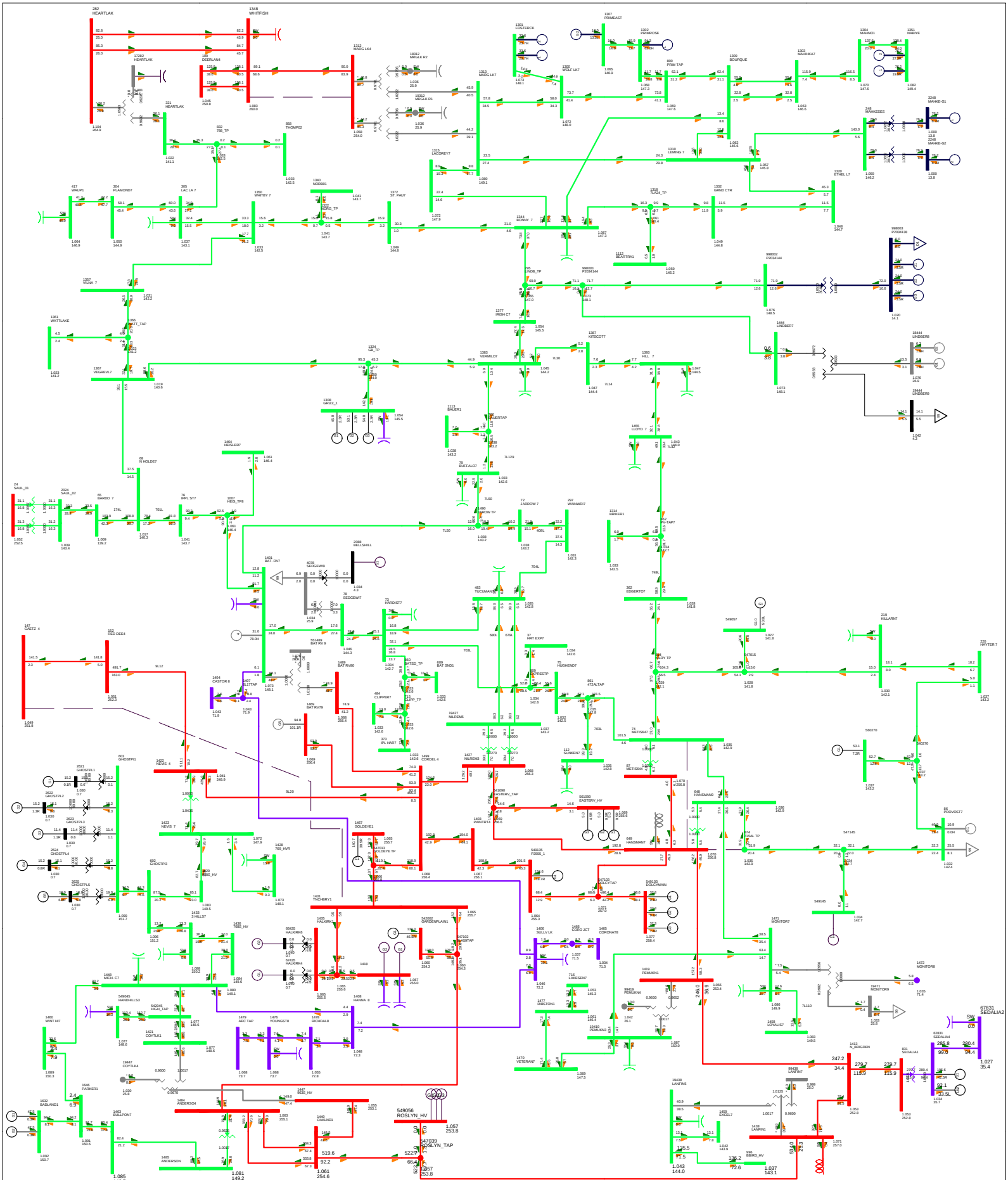
Attachment A3- 4	**Contingency** CONT 010: 9L22 (898S Heart Lake - 825S Whitefish Lake)	**Study Case Description** 2028SP-woCETO POST-PROJ Base Case	**P2034 Cold Lake Area Cogen** Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



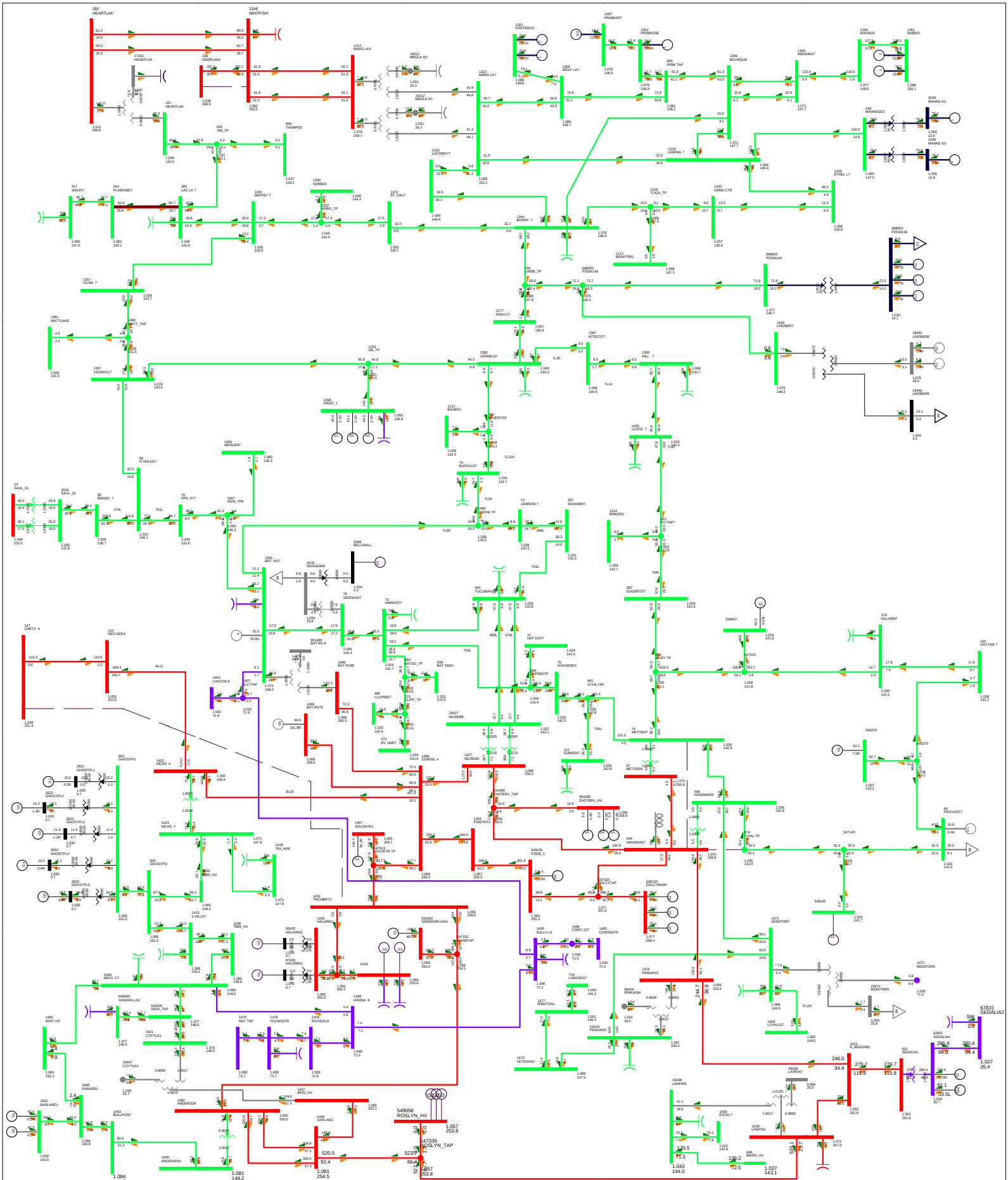
Attachment A3- 4	**Contingency** CONT 011: 9L81 (898S Heart Lake - 825S Whitefish Lake)	**Study Case Description** 2028SP-woCETO POST-PROJ Base Case	**P2034 Cold Lake Area Cogen** Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



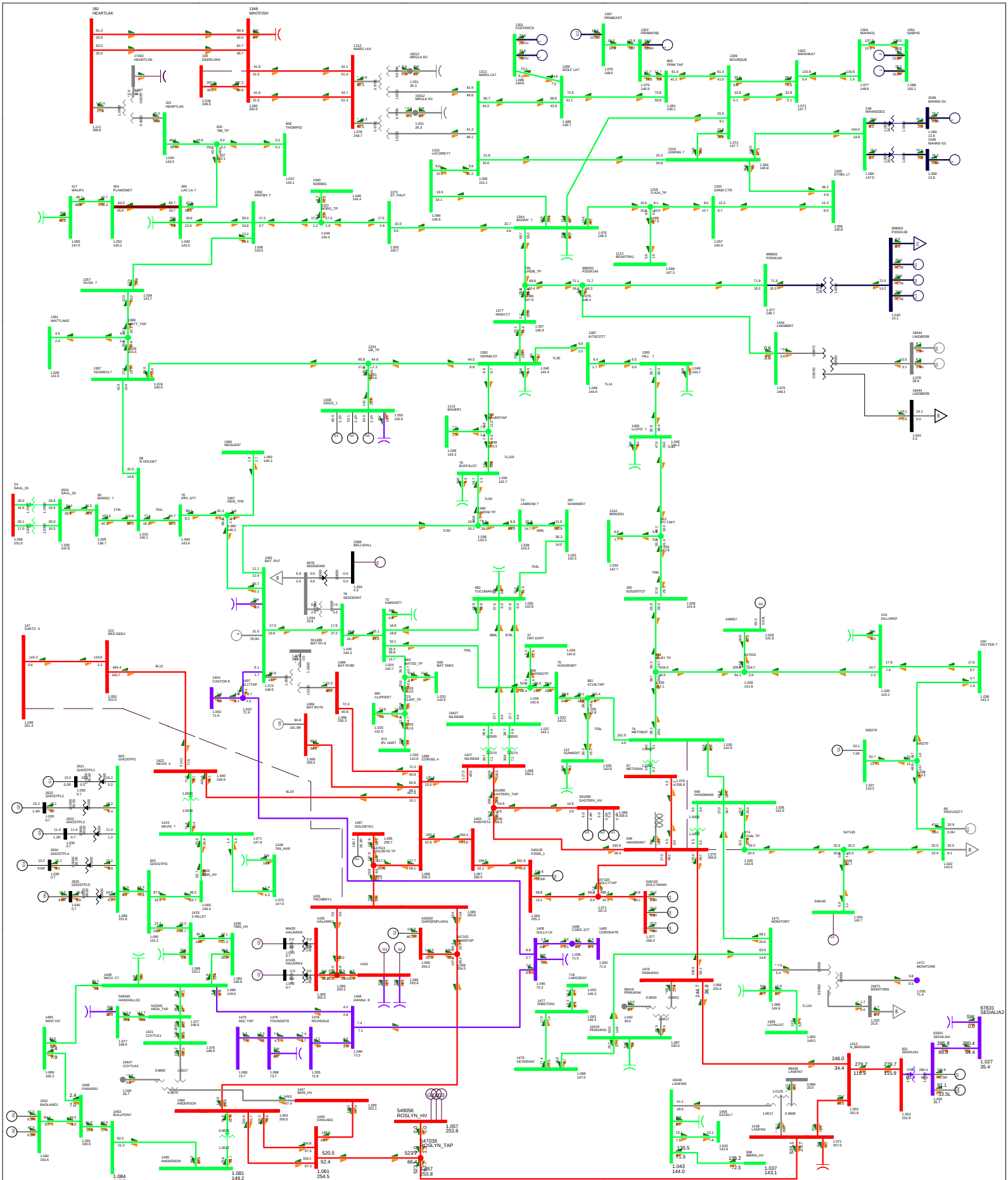
Attachment A3- 4	**Contingency** CONT 012: 9L36 (826S Marguerite Lake - 825S Whitefish Lake)	**Study Case Description** 2028SP-woCETO POST-PROJ Base Case	**P2034 Cold Lake Area Cogen** Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



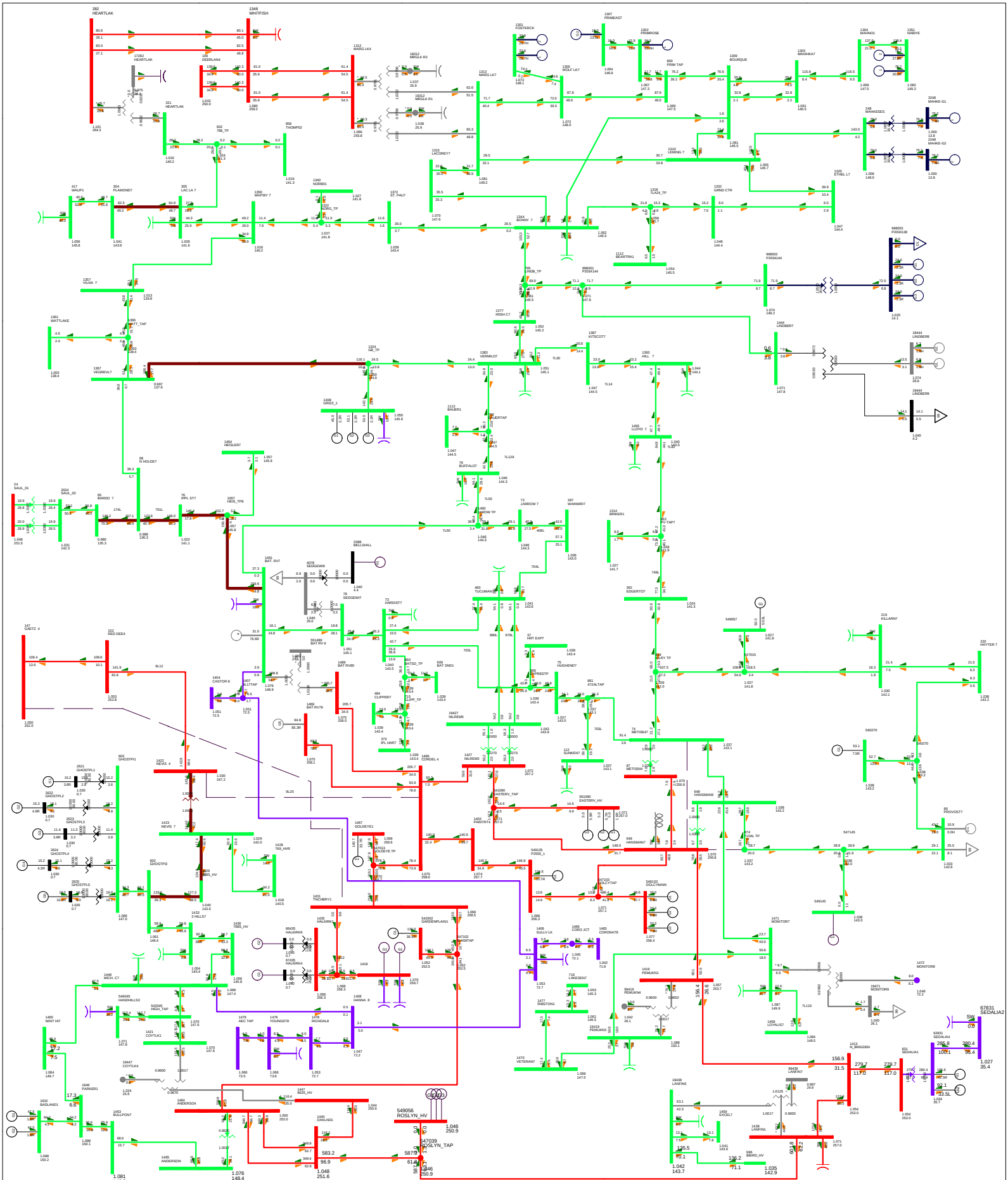
Attachment A3- 4	Contingency	Study Case Description	P2034 Cold Lake Area Cogen
	CONT 013: 9L37 (826S Marguerite Lake - 825S Whitefish Lake)	2028SP-woCETO POST-PROJ Base Case	Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A3- 4	Contingency	Study Case Description	P2034 Cold Lake Area Cogen
	CONT 014: 9L960 (13S Deerland - 825S Whitefish Lake)	2028SP-woCETO POST-PROJ Base Case	Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A3- 4	Contingency	Study Case Description	P2034 Cold Lake Area Cogen
	CONT 015: 9L961 (13S Deerland - 825S Whitefish Lake)	2028SP-woCETO POST-PROJ Base Case	Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A3- 4

Contingency

CONT 016: 9L20 (766S Nevis - 755S Cordel)

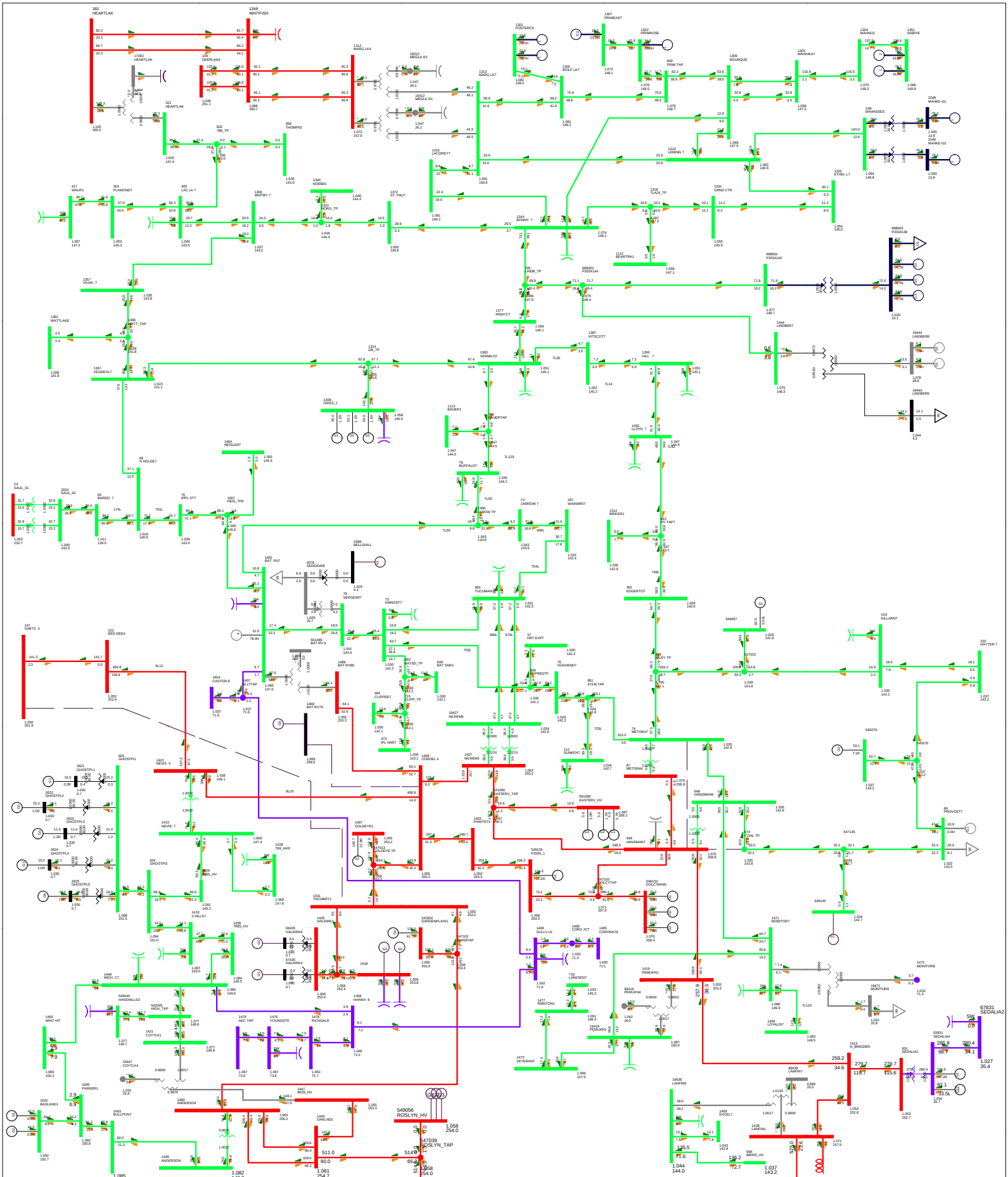
Study Case Description

2028SP-woCETO POST-PROJ

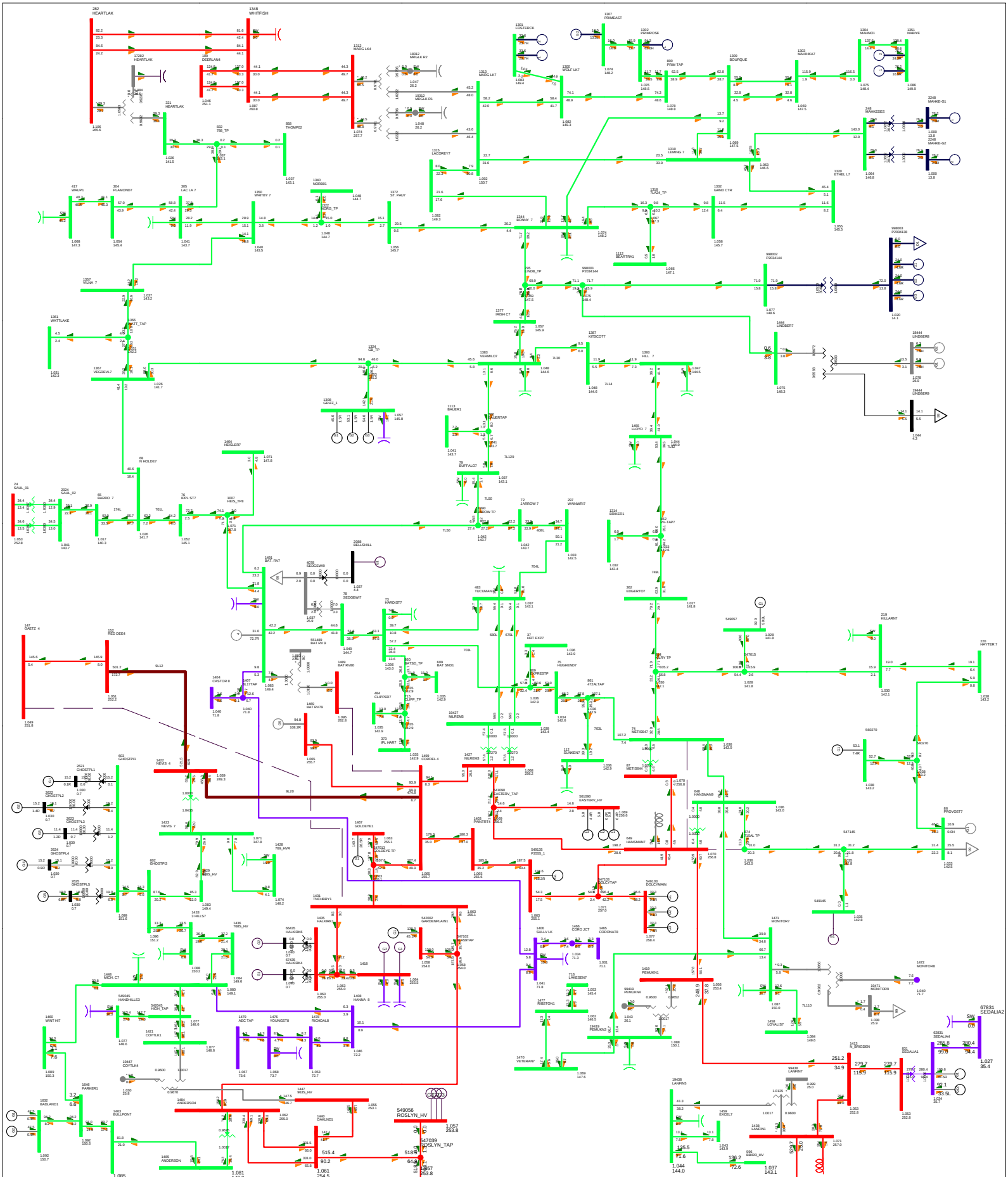
Base Case

P2034 Cold Lake Area Cogen

Bus - VOLTAGE (kV/PU)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%RATEA
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A3- 4	**Contingency** CONT 017: 9L79 (757S Battle River - 755S Cordel)	**Study Case Description** 2028SP-woCETO POST-PROJ Base Case	**P2034 Cold Lake Area Cogen** Bus - VOLTAGE (kv/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A3- 4

Contingency

CONT 018: 9L80 (757S Battle River - 755S Cordel)

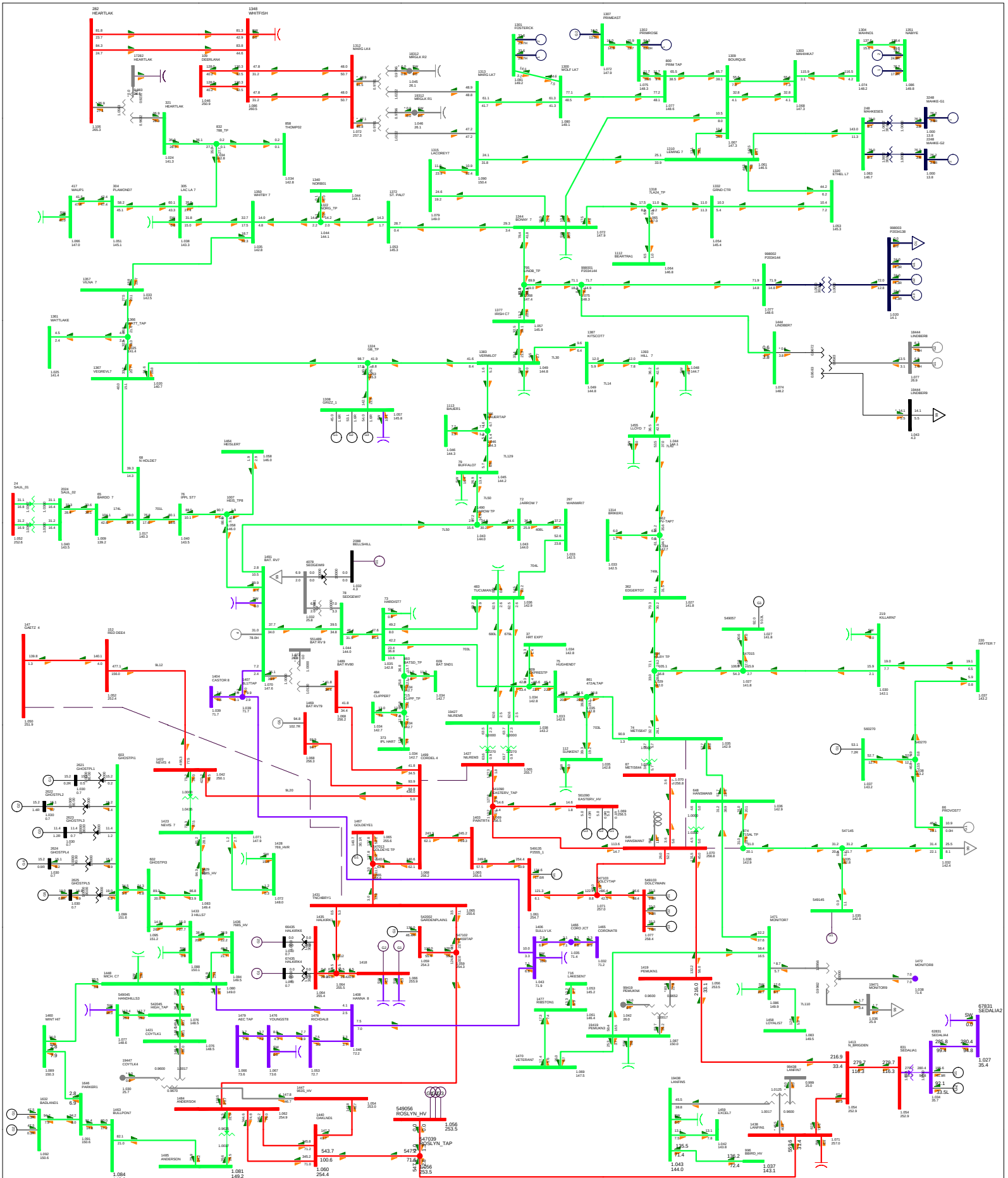
Study Case Description

2028SP-woCETO POST-PROJ

Base Case

P2034 Cold Lake Area Cogen

Bus - VOLTAGE (kV/PU)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%RATEA
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A3- 4

Contingency

CONT 019: 953L (574S Nilrem - 755S Cordel)

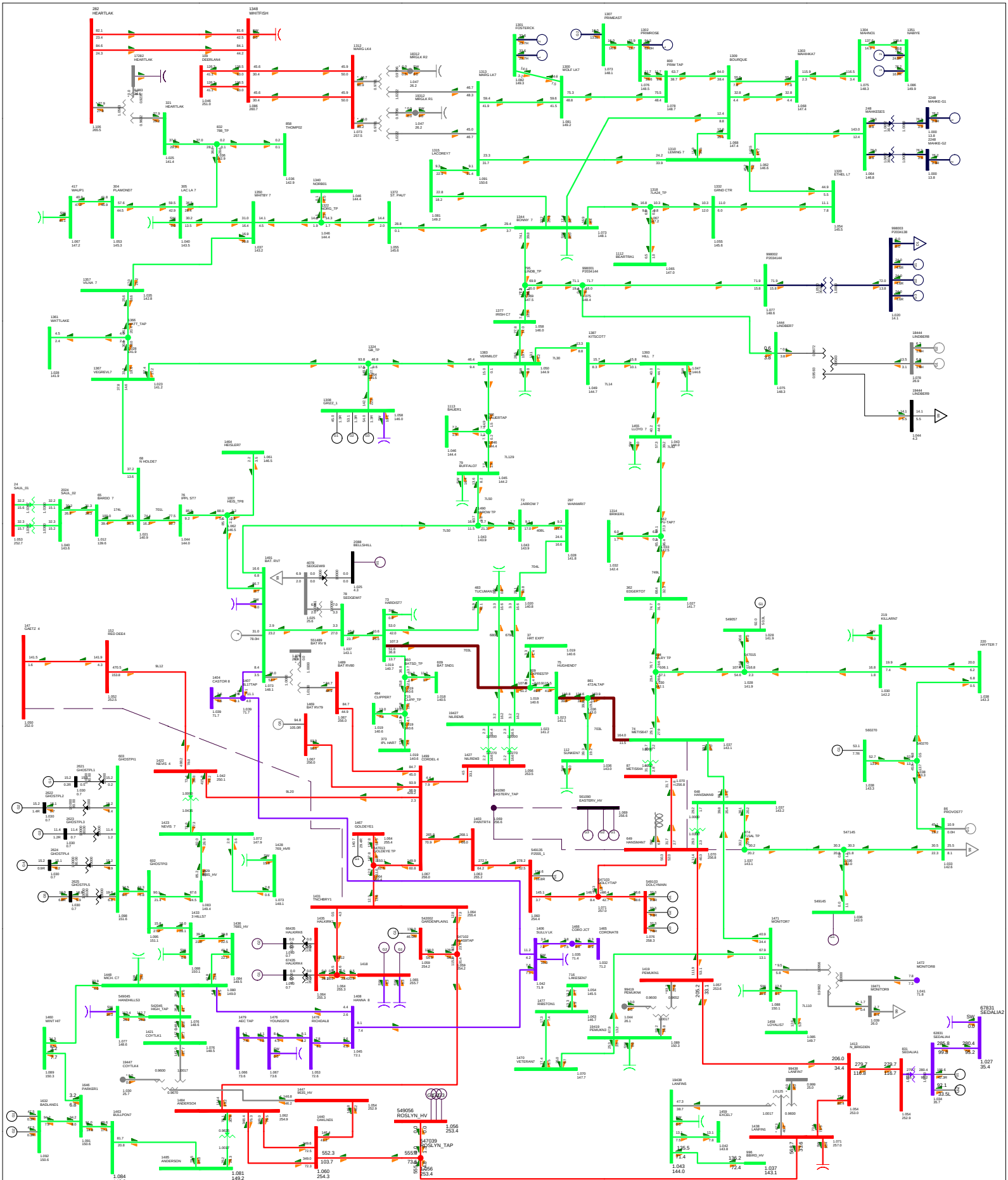
Study Case Description

2028SP-woCETO POST-PROJ

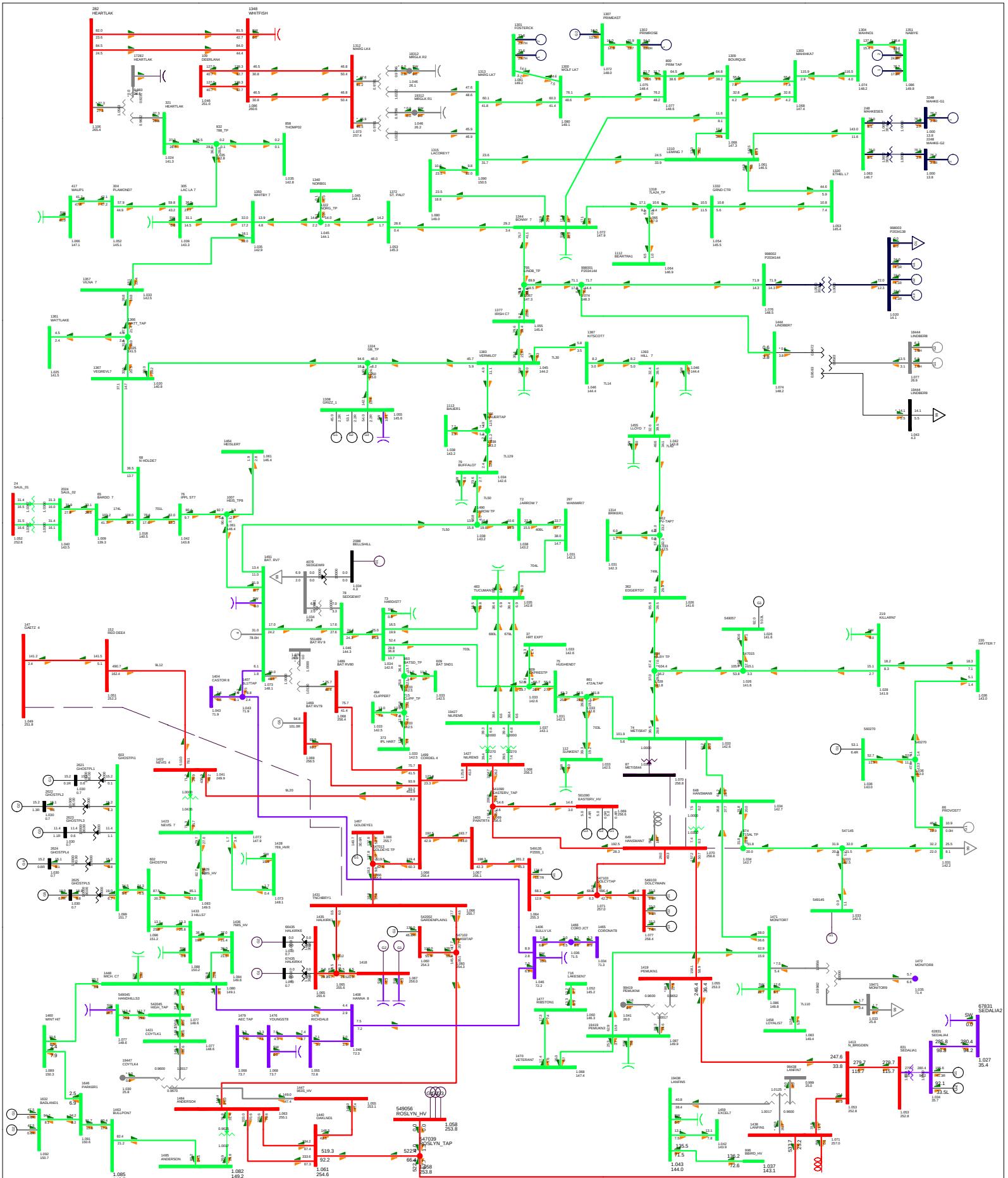
Base Case

P2034 Cold Lake Area Cogen

Bus - VOLTAGE (kV/PU)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%RATEA
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A3- 4	Contingency	Study Case Description	P2034 Cold Lake Area Cogen
	CONT 020: 1047L (574S Nilrem - P2566 Eastervale Solar - 650S Hansman Lake)	2028SP-woCETO POST-PROJ Base Case	Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A3- 4

Contingency

CONT 021: 954L (648S Metiskow - 650S Hansman Lake)

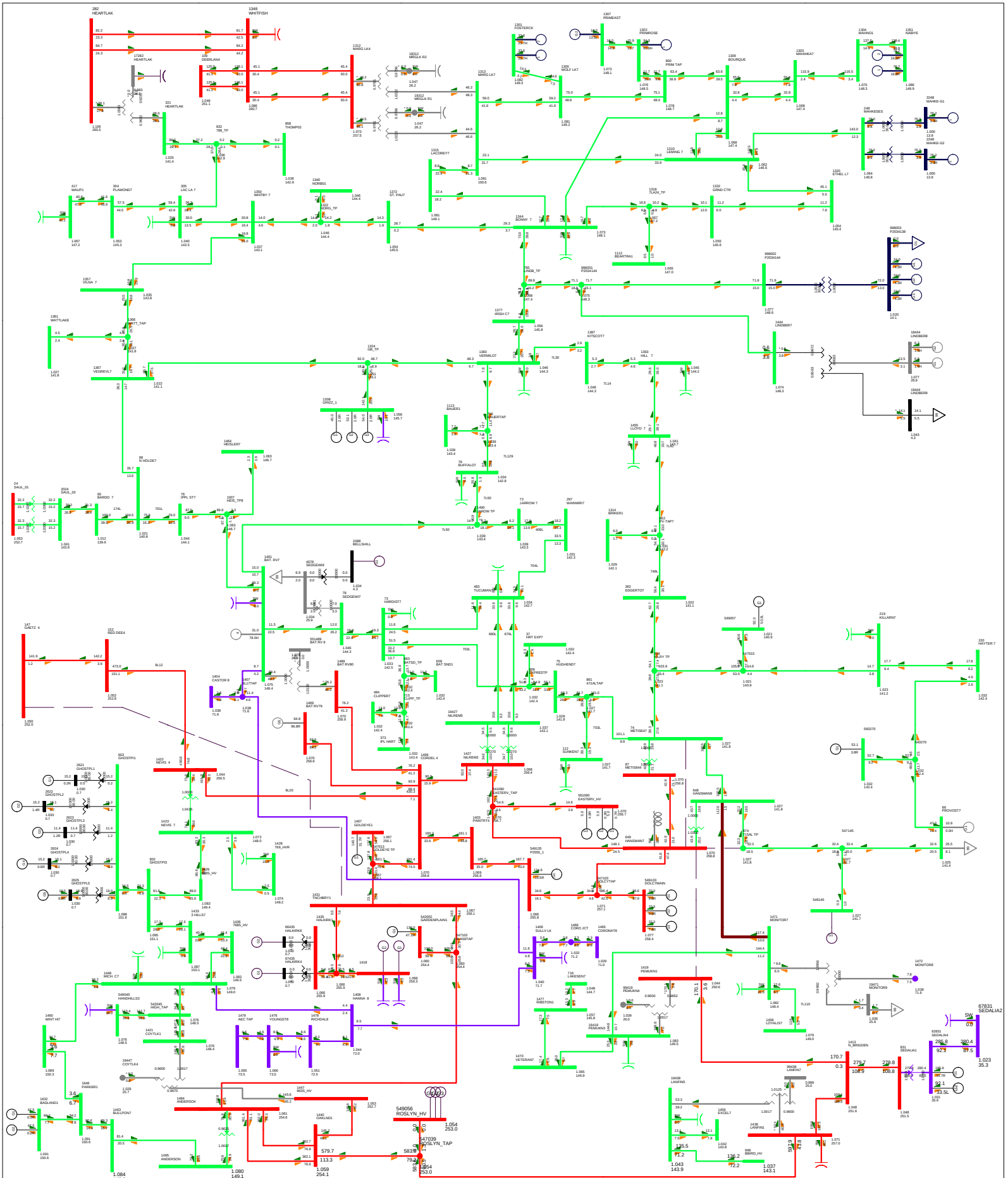
Study Case Description

2028SP-woCETO POST-PROJ

Base Case

P2034 Cold Lake Area Cogen

Bus - VOLTAGE (kV/PU)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%RATEA
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A3- 4

Contingency

CONT 022: 9L966 (650S Hansman Lake - 932S Pemukan)

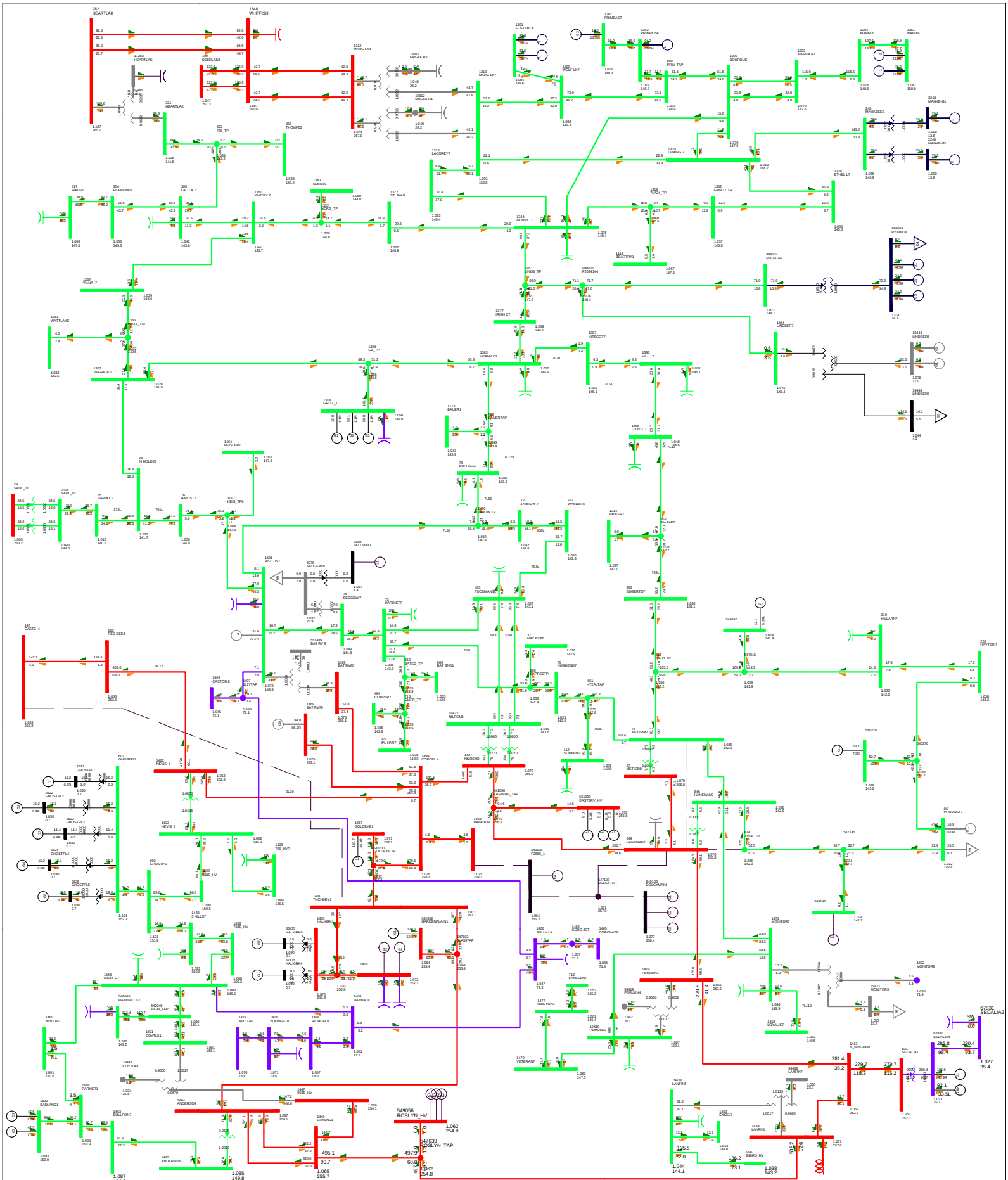
Study Case Description

2028SP-woCETO POST-PROJ

Base Case

P2034 Cold Lake Area Cogen

Bus - VOLTAGE (kV/PU)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%RATEA
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A3- 4

Contingency

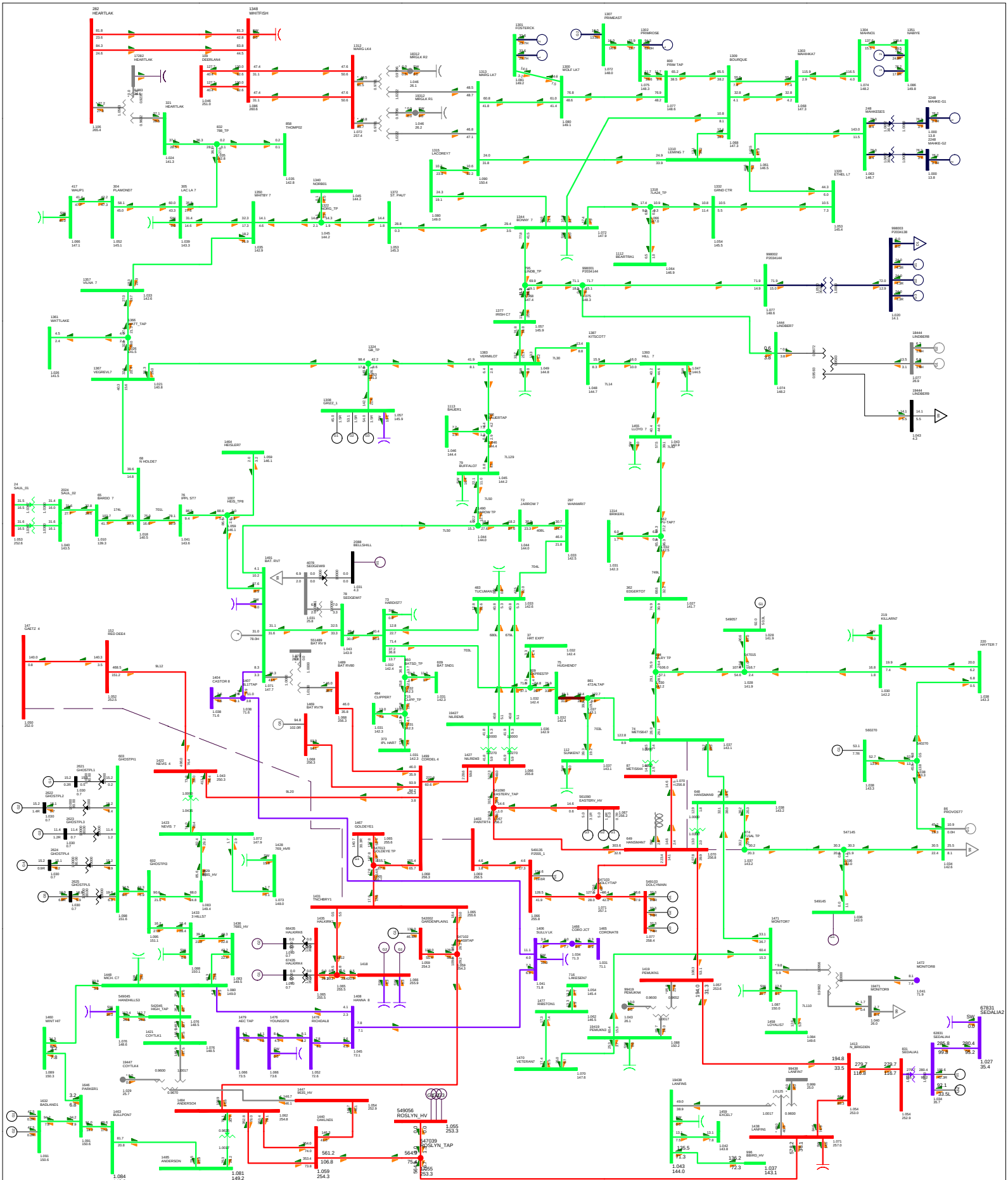
CONT 023: 948L (650S Hansman Lake - P2553 Dolcy Solar - P2555 Rolling Hills Wind - 863S Paintearth) POST-PROJ

Study Case Description

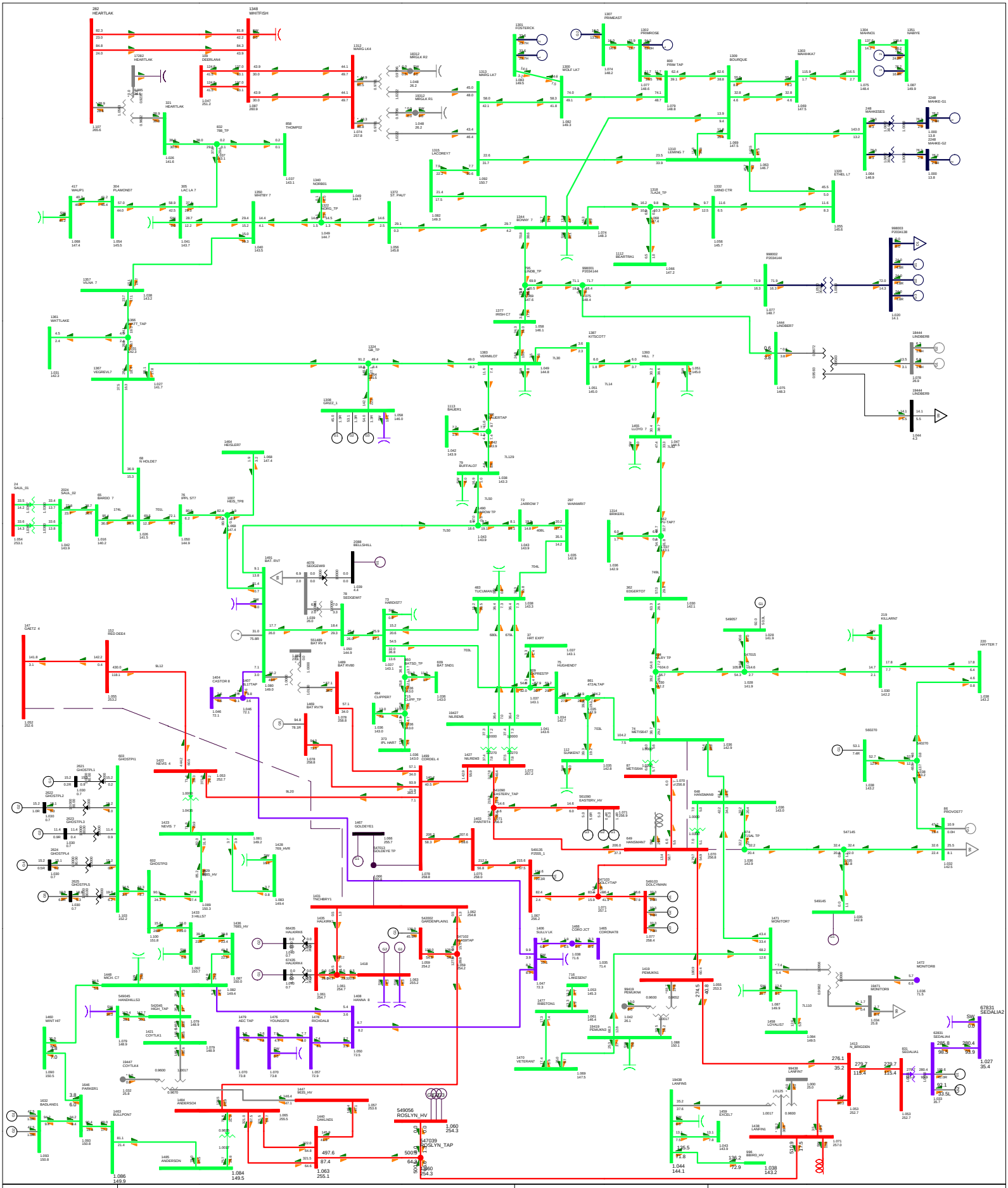
Base Case

P2034 Cold Lake Area Cogen

Bus - VOLTAGE (kV/PU)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%RATEA
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A3- 4	**Contingency** CONT 024: 9L27 (863S Paintearth - 755S Cordel)	**Study Case Description** 2028SP-woCETO POST-PROJ Base Case	**P2034 Cold Lake Area Cogen** Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A3- 4

Contingency

CONT 025: 9L16 (755S Cordel - P2441 Halkirk 2 Wind - 972S Tinchebray)

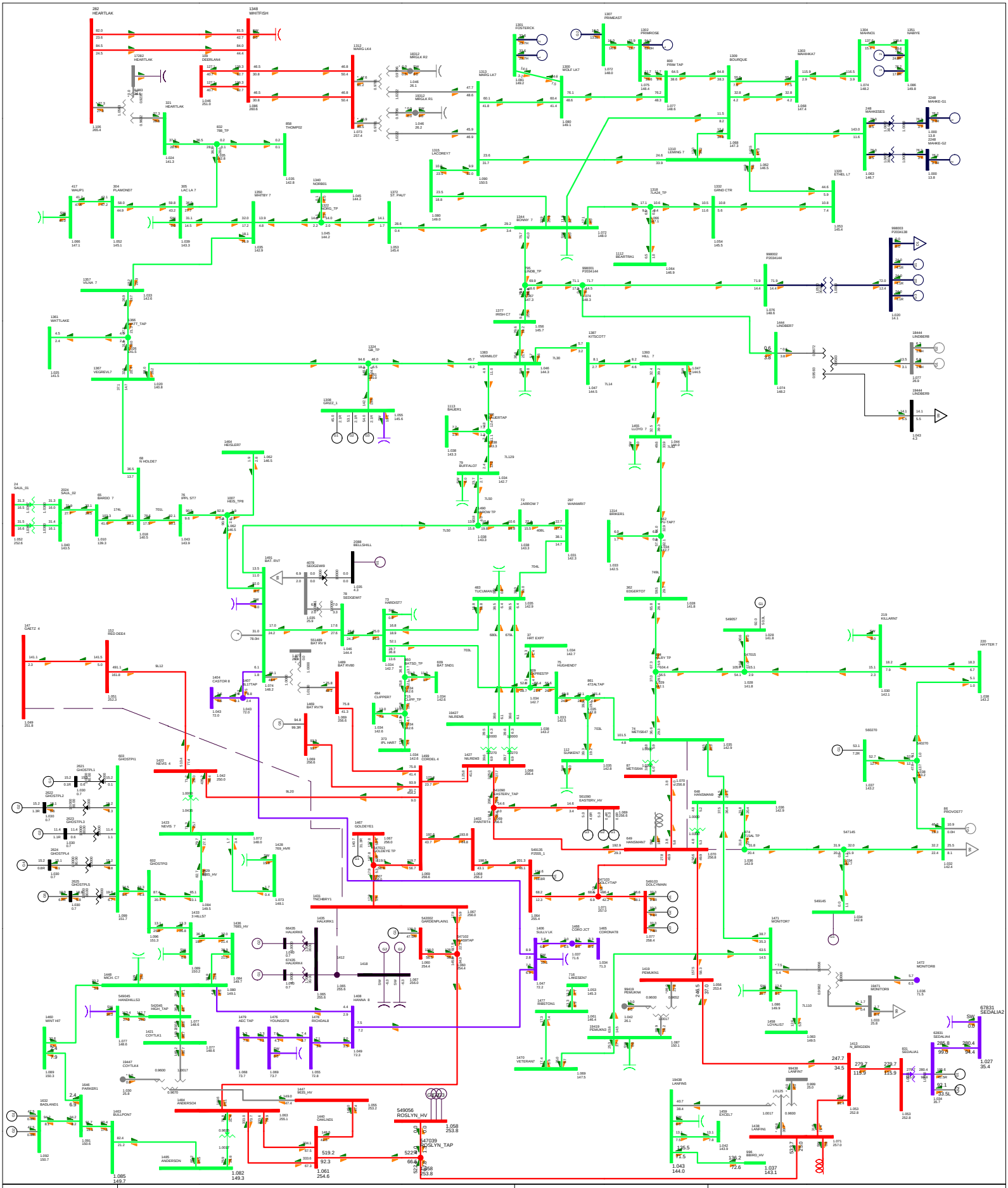
Study Case Description

2028SP-woCETO POST-PROJ

Base Case

P2034 Cold Lake Area Cogen

Bus - VOLTAGE (kV/PU)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%RATEA
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A3- 4

Contingency

CONT 026: 9L93 (972S Tinchebray - 615S Halkirk - 973S Lanes Lake)

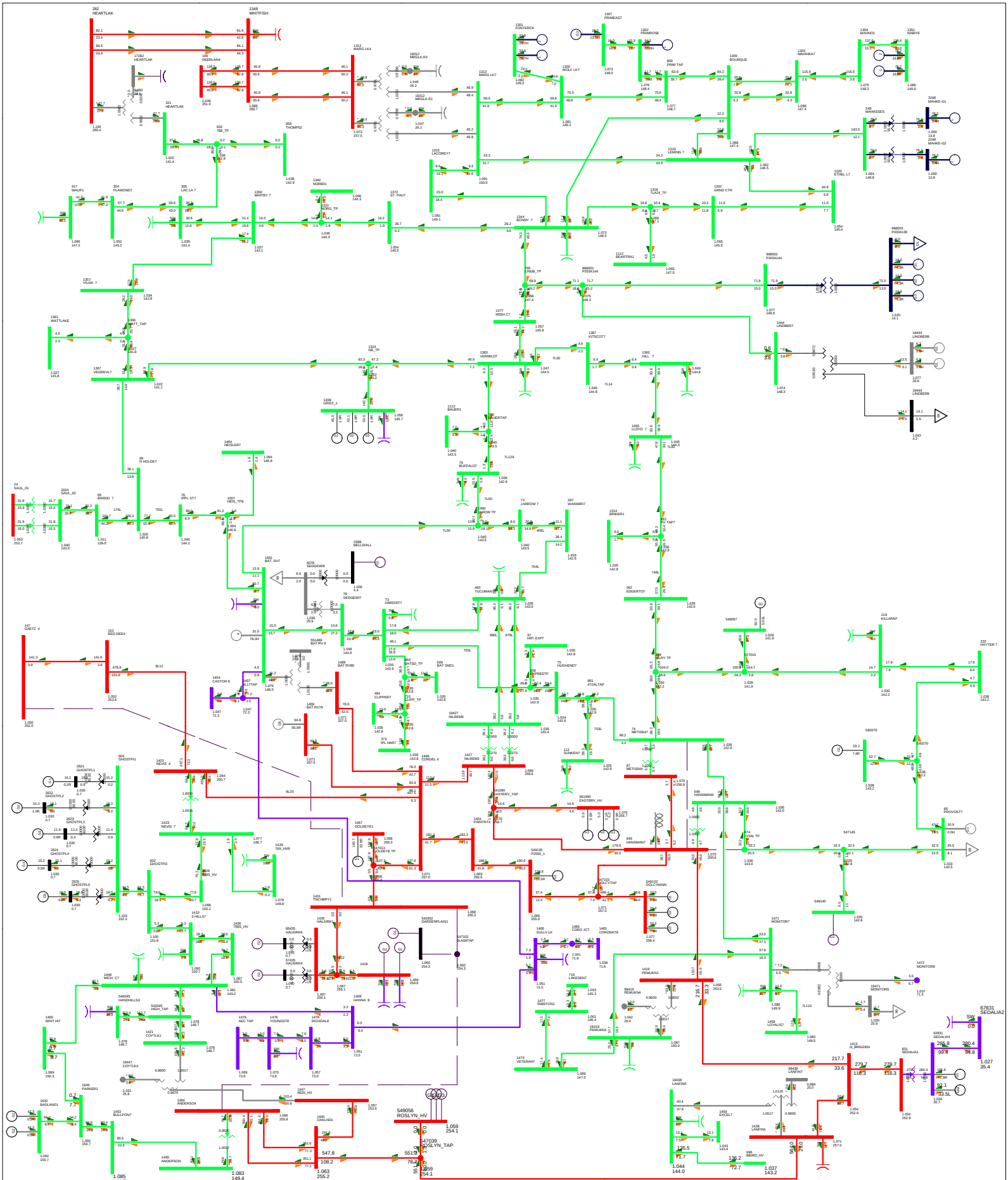
Study Case Description

2028SP-woCETO POST-PROJ

Base Case

P2034 Cold Lake Area Cogen

Bus - VOLTAGE (kV/PU)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%RATEA
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A3- 4

Contingency

CONT 027: 9L59 (972S Tinchebray - 1045S Garden Plain - 801S Anderson)

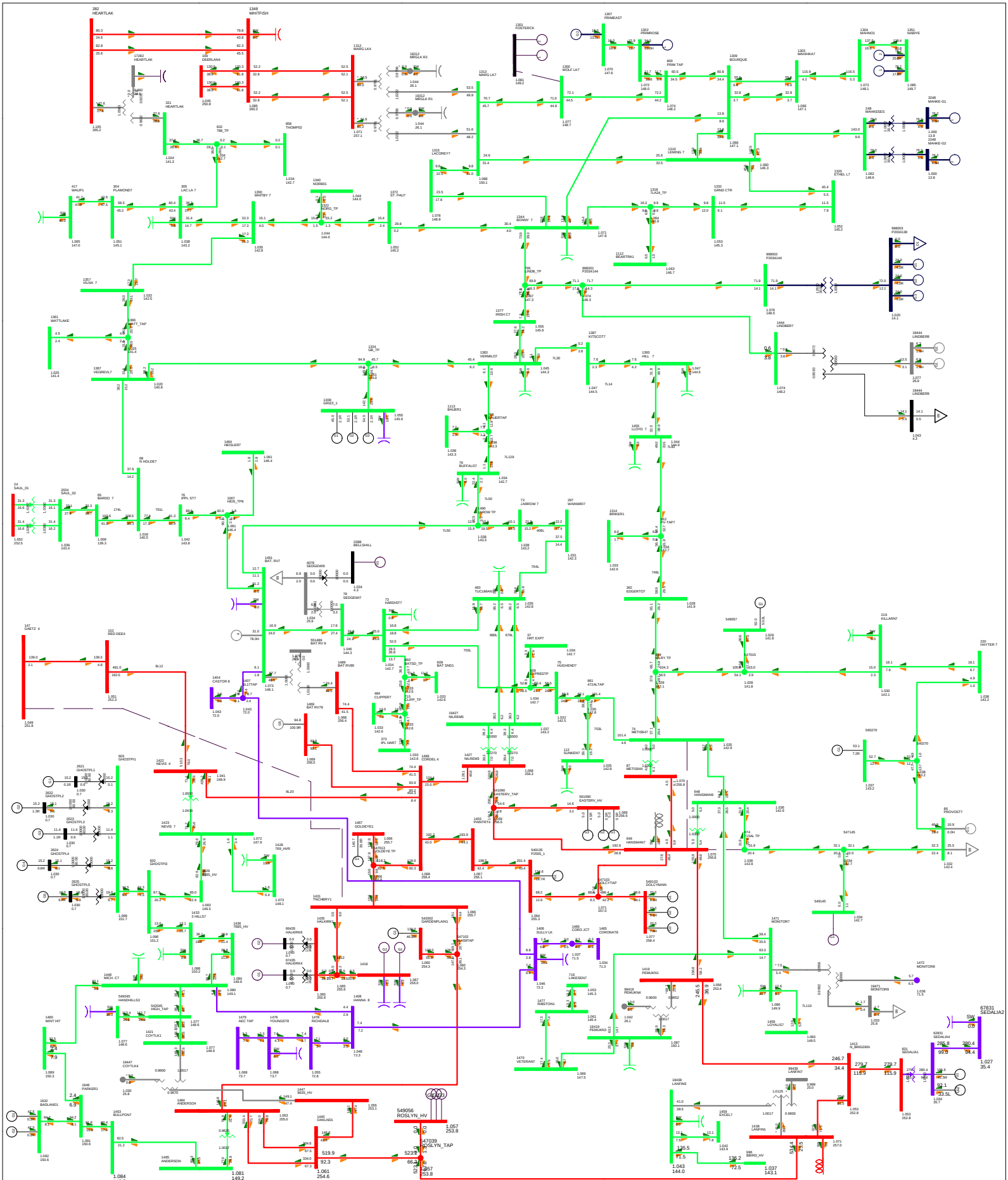
Study Case Description

2028SP-woCETO POST-PROJ

Base Case

P2034 Cold Lake Area Cogen

Bus - VOLTAGE (kV/PU)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%RATEA
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A3- 4

Contingency

CONT 028: 7L86 (822S Wolf Lake - 877S Foster Creek)

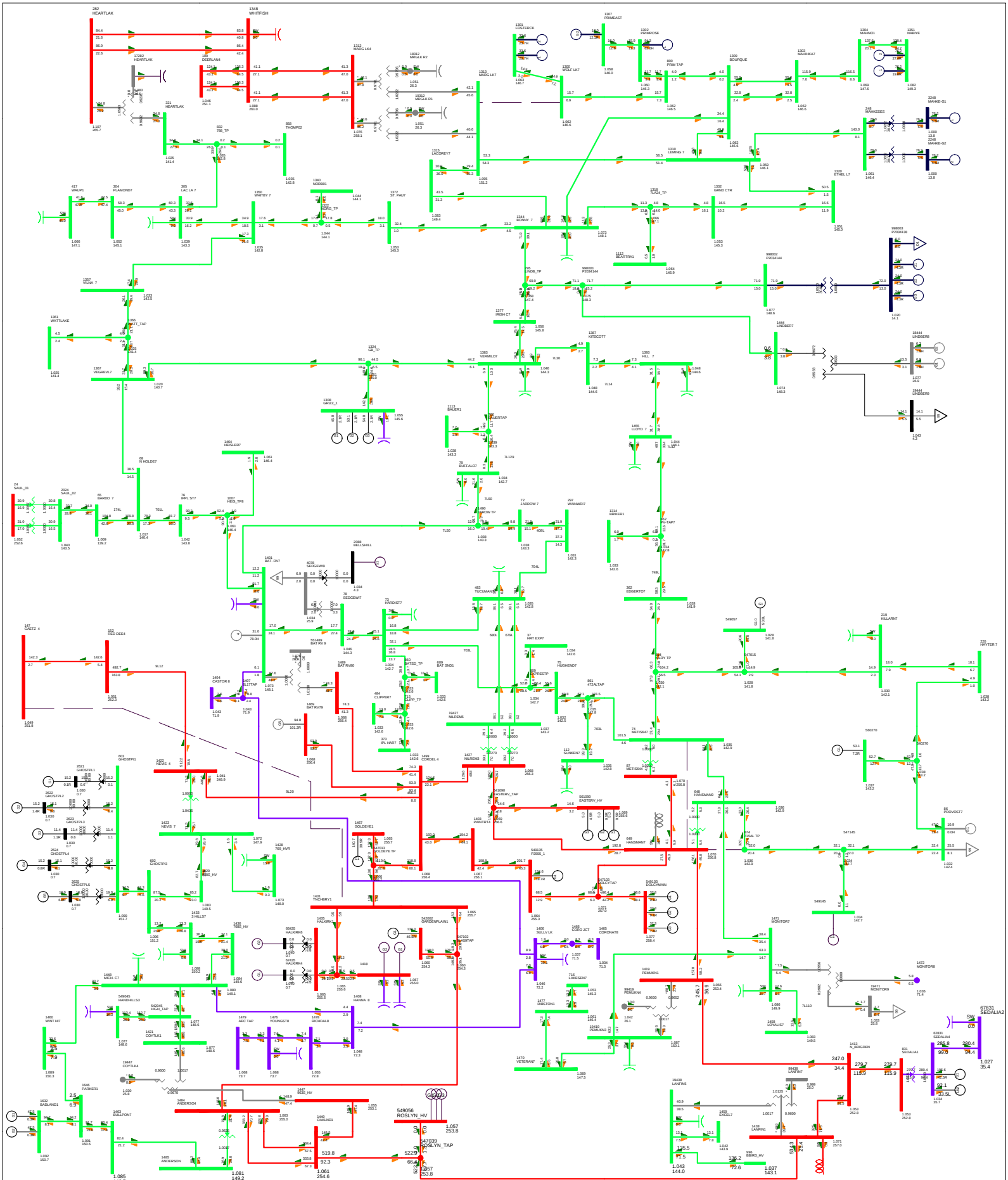
Study Case Description

2028SP-woCETO POST-PROJ

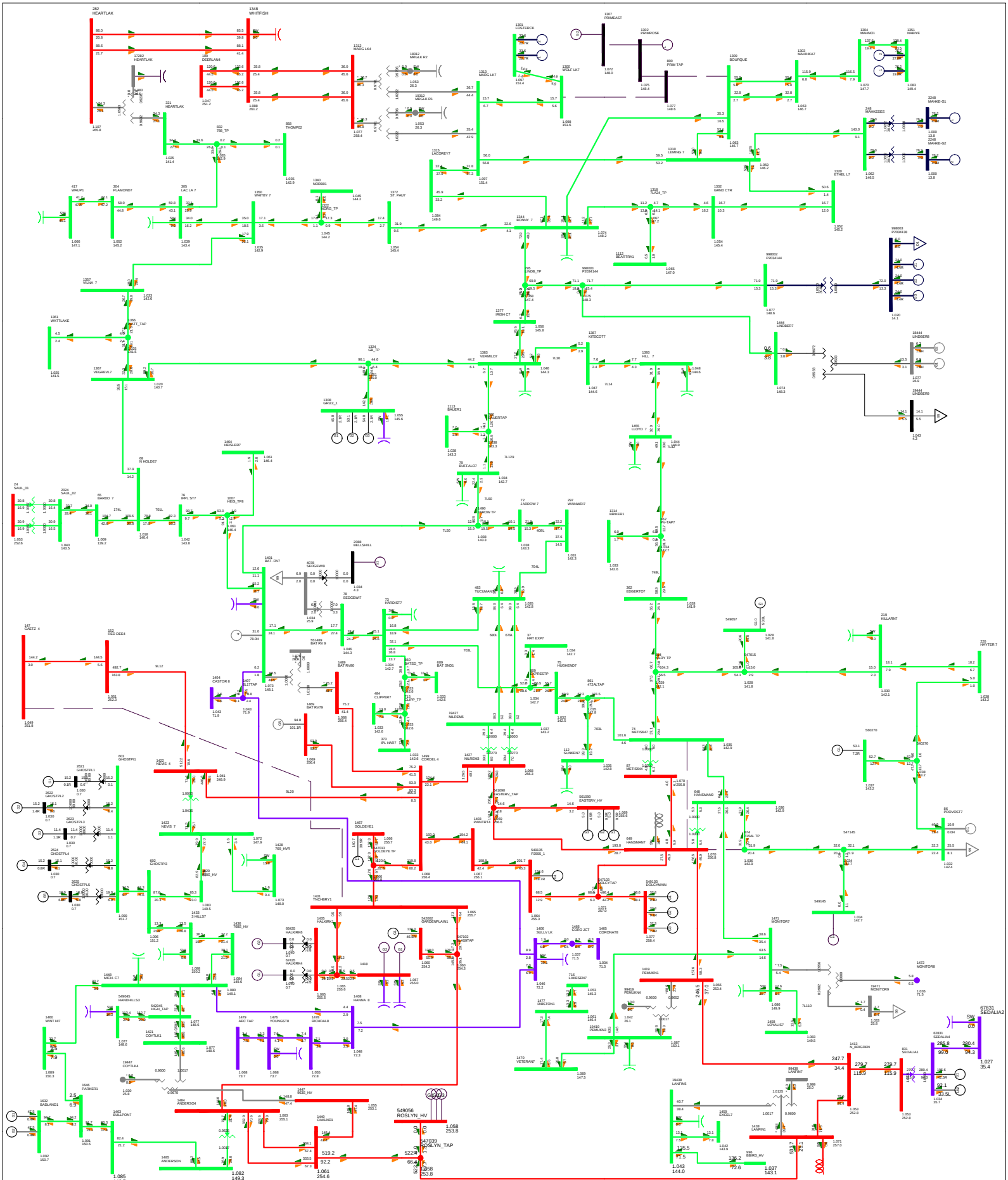
Base Case

P2034 Cold Lake Area Cogen

Bus - VOLTAGE (kV/PU)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%RATEA
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A3- 4	**Contingency** CONT 029: 7L587 (822S Wolf Lake - 826S Marguerite Lake)	**Study Case Description** 2028SP-woCETO POST-PROJ Base Case	**P2034 Cold Lake Area Cogen** Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A3- 4

Contingency

CONT 030: 7L574 (822S Wolf Lake - 859S Primrose - 970S Bourque)

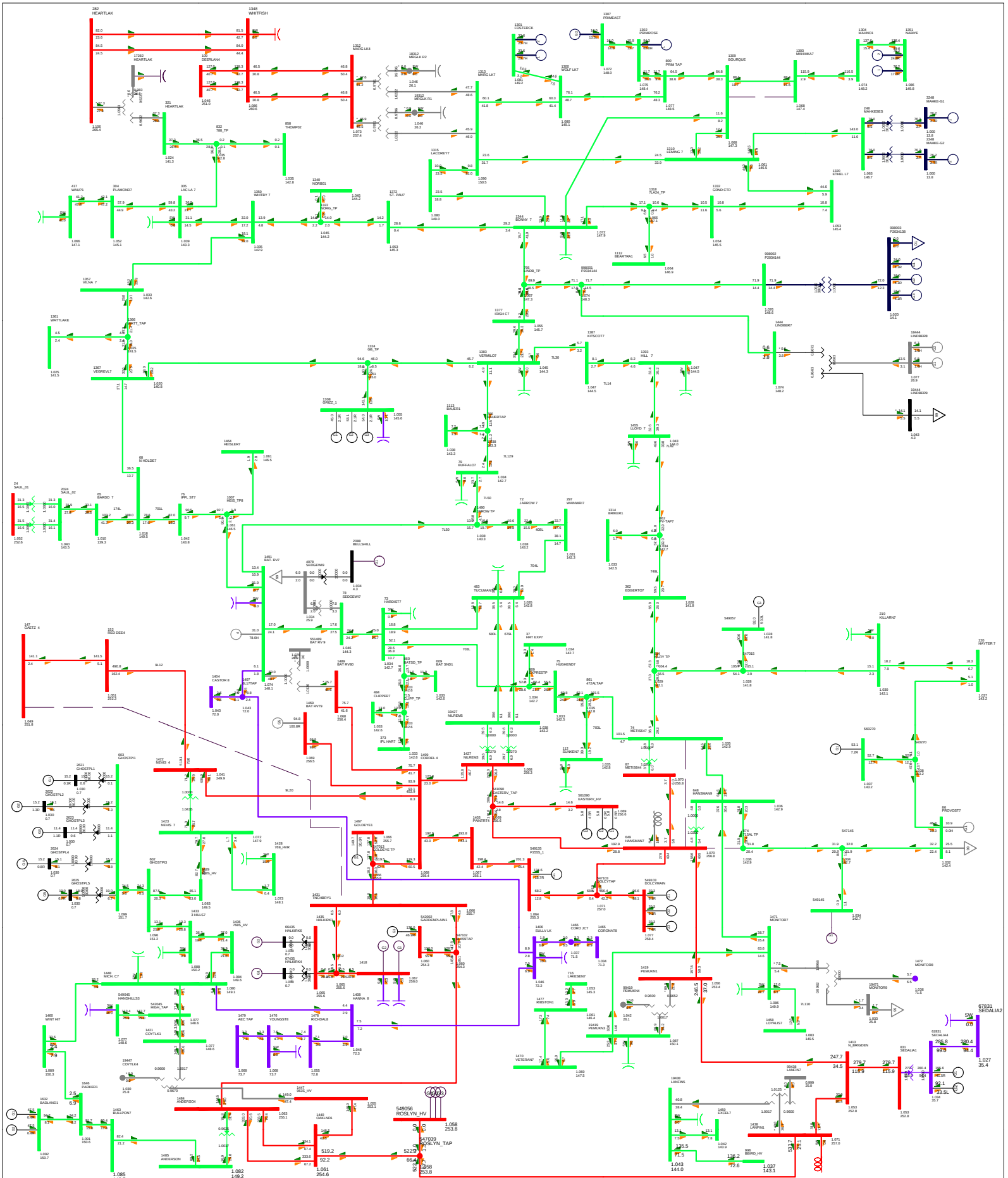
Study Case Description

2028SP-woCETO POST-PROJ

Base Case

P2034 Cold Lake Area Cogen

Bus - VOLTAGE (kV/PU)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%RATEA
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A3- 4

Contingency

CONT 031: 7L157 (837S Mahihkan - 970S Bourque)

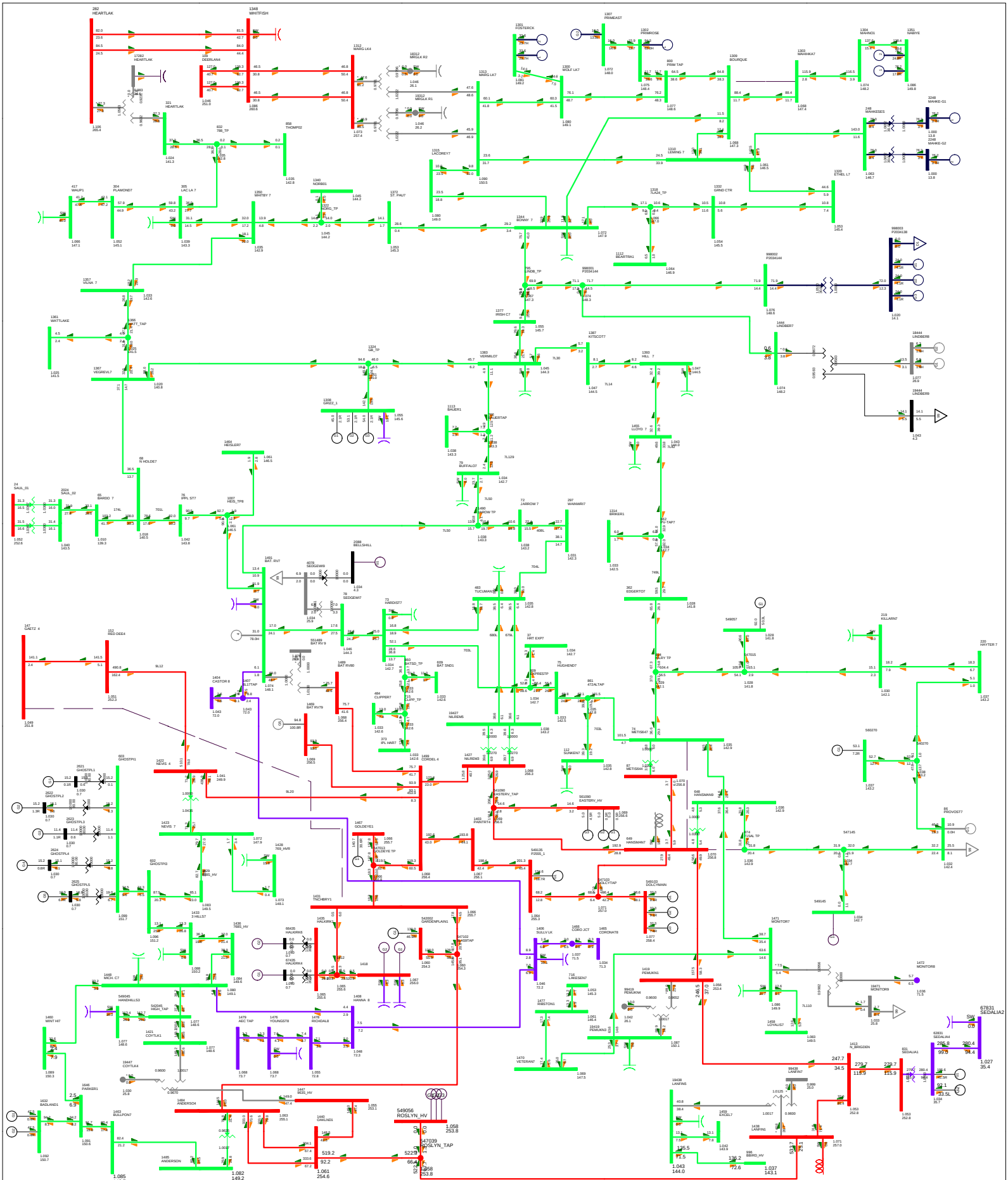
Study Case Description

2028SP-woCETO POST-PROJ

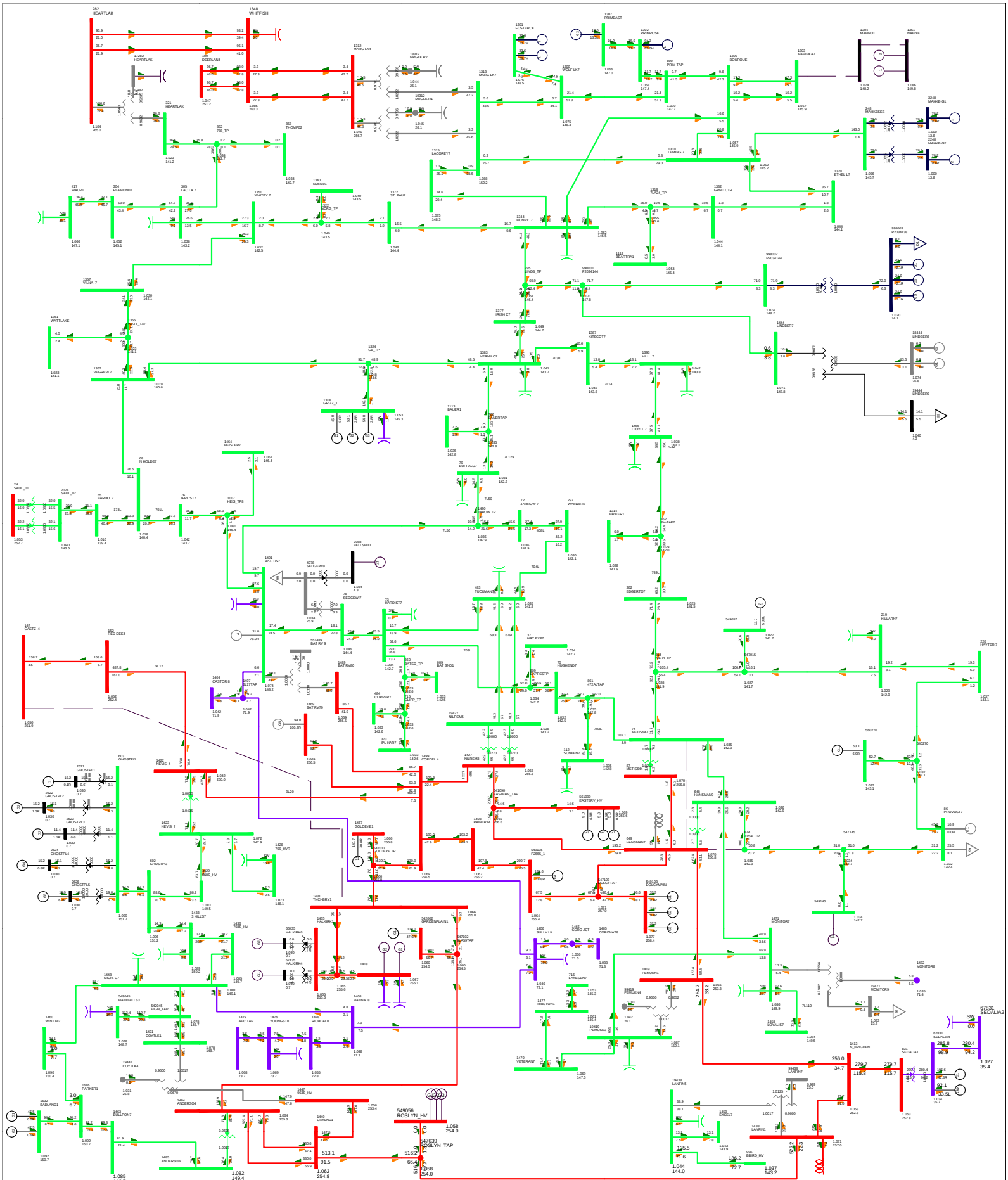
Base Case

P2034 Cold Lake Area Cogen

Bus - VOLTAGE (kV/PU)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%RATEA
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A3- 4	**Contingency** CONT 032: 7L160 (837S Mahihkan - 970S Bourque)	**Study Case Description** 2028SP-woCETO POST-PROJ Base Case	**P2034 Cold Lake Area Cogen** Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A3- 4

Contingency

CONT 033: 7L105 (837S Mahihkan - 909S Mahno)

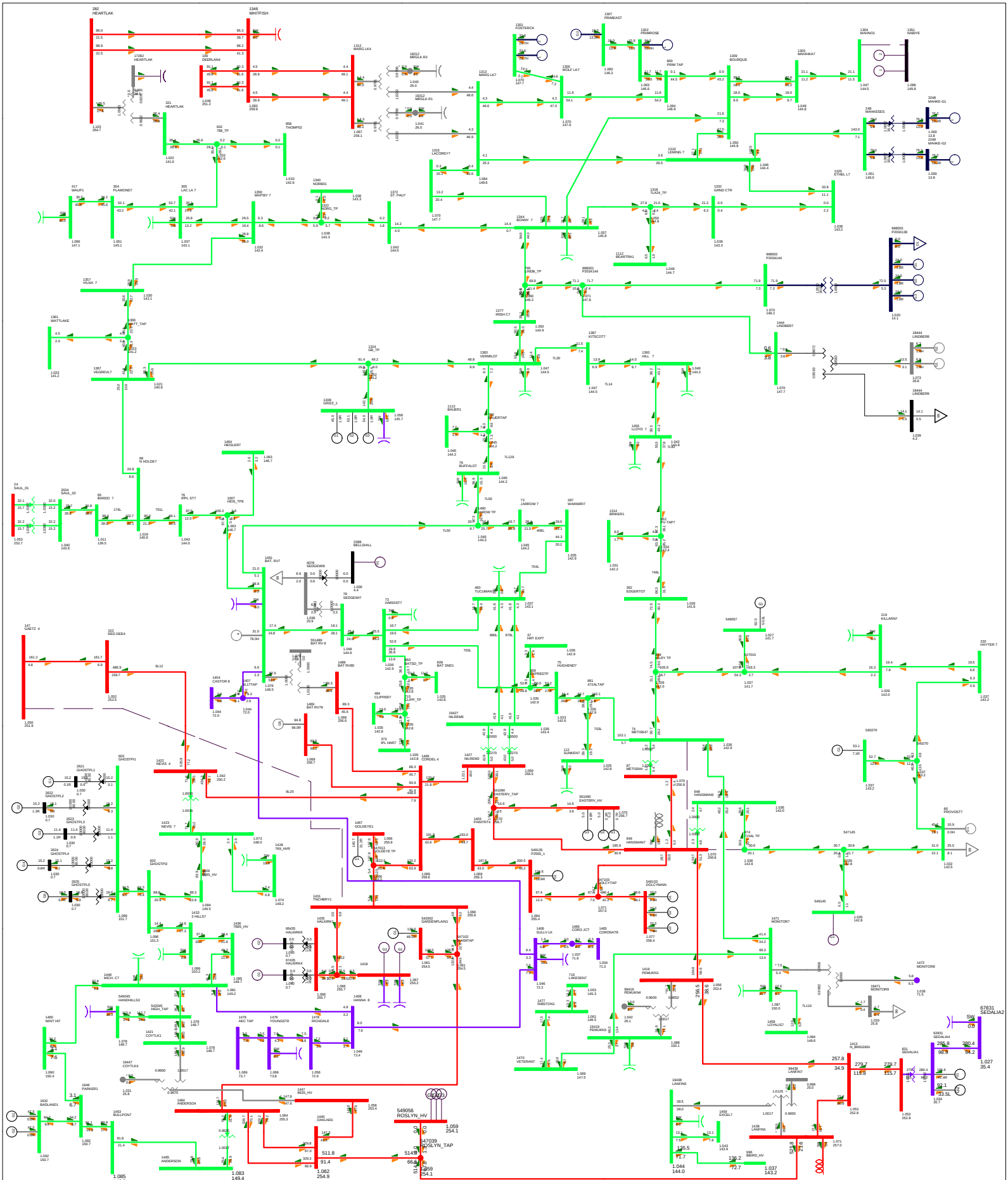
Study Case Description

2028SP-woCETO POST-PROJ

Base Case

P2034 Cold Lake Area Cogen

Bus - VOLTAGE (kV/PU)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%RATEA
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A3- 4

Contingency

CONT 034: 7L161 (909S Mahno - 942S Nabiye)

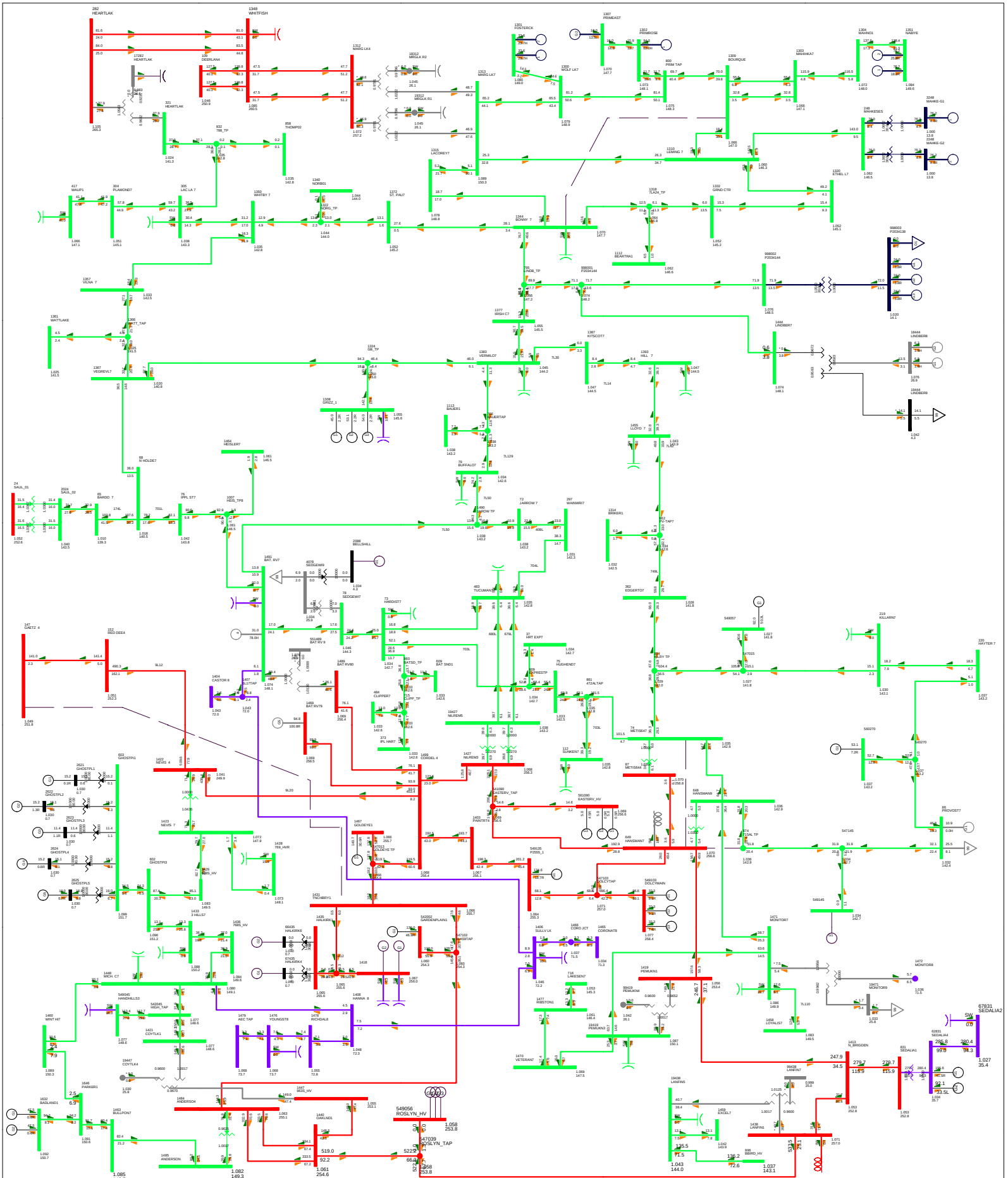
Study Case Description

2028SP-woCETO POST-PROJ

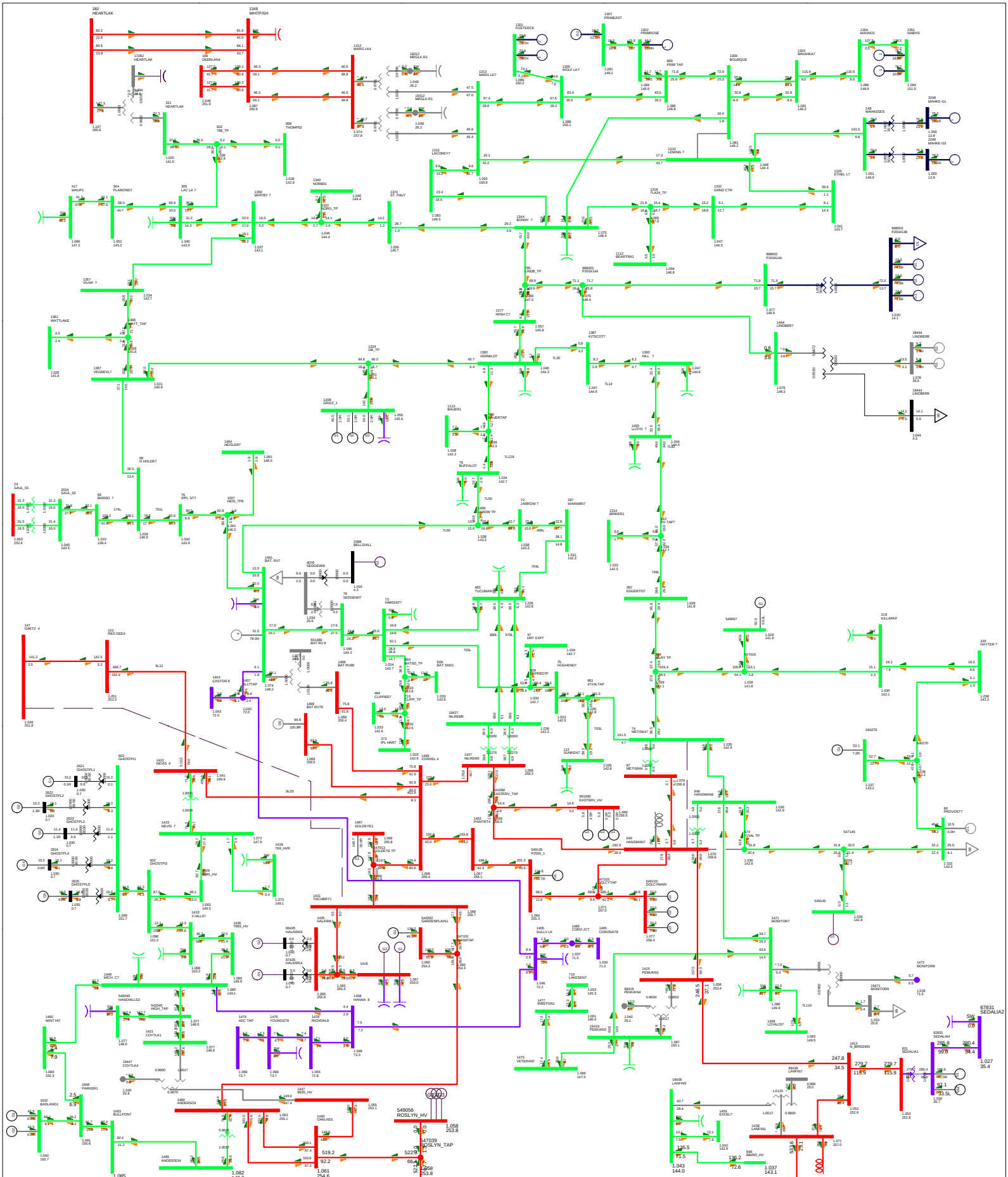
Base Case

P2034 Cold Lake Area Cogen

Bus - VOLTAGE (kV/PU)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%RATEA
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A3- 4	Contingency	Study Case Description	P2034 Cold Lake Area Cogen
	CONT 035: 7L146 (970S Bourque - 700S Bonnyville)	2028SP-woCETO POST-PROJ Base Case	Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A3- 4

Contingency

CONT 036: 7L583 (970S Bourque - 715S Leming Lake)

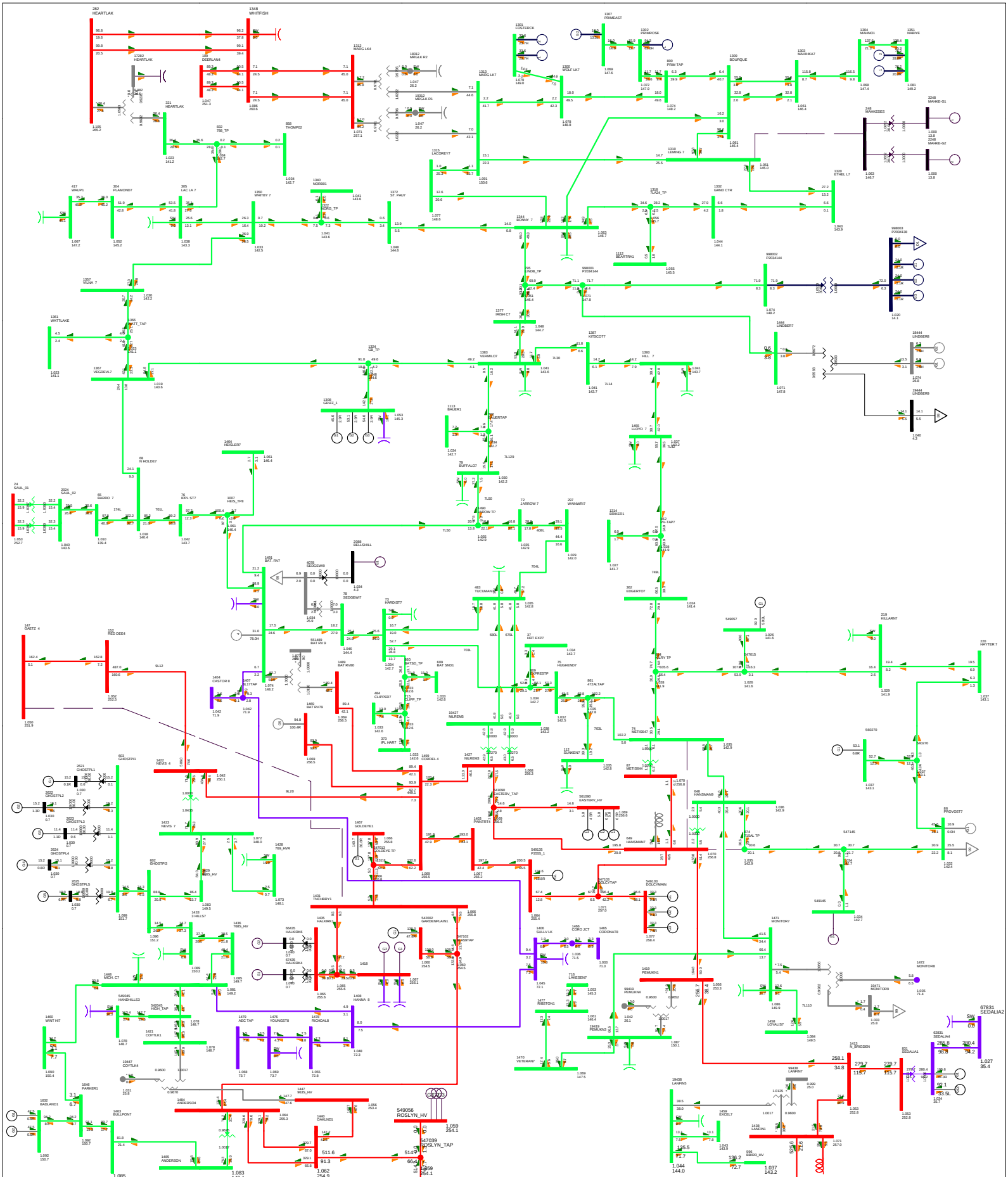
Study Case Description

2028SP-woCETO POST-PROJ

Base Case

P2034 Cold Lake Area Cogen

Bus - VOLTAGE (kV/PU)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%RATEA
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A3- 4

Contingency

CONT 037: 7L95 (889S Mahkeses - 715S Leming Lake)

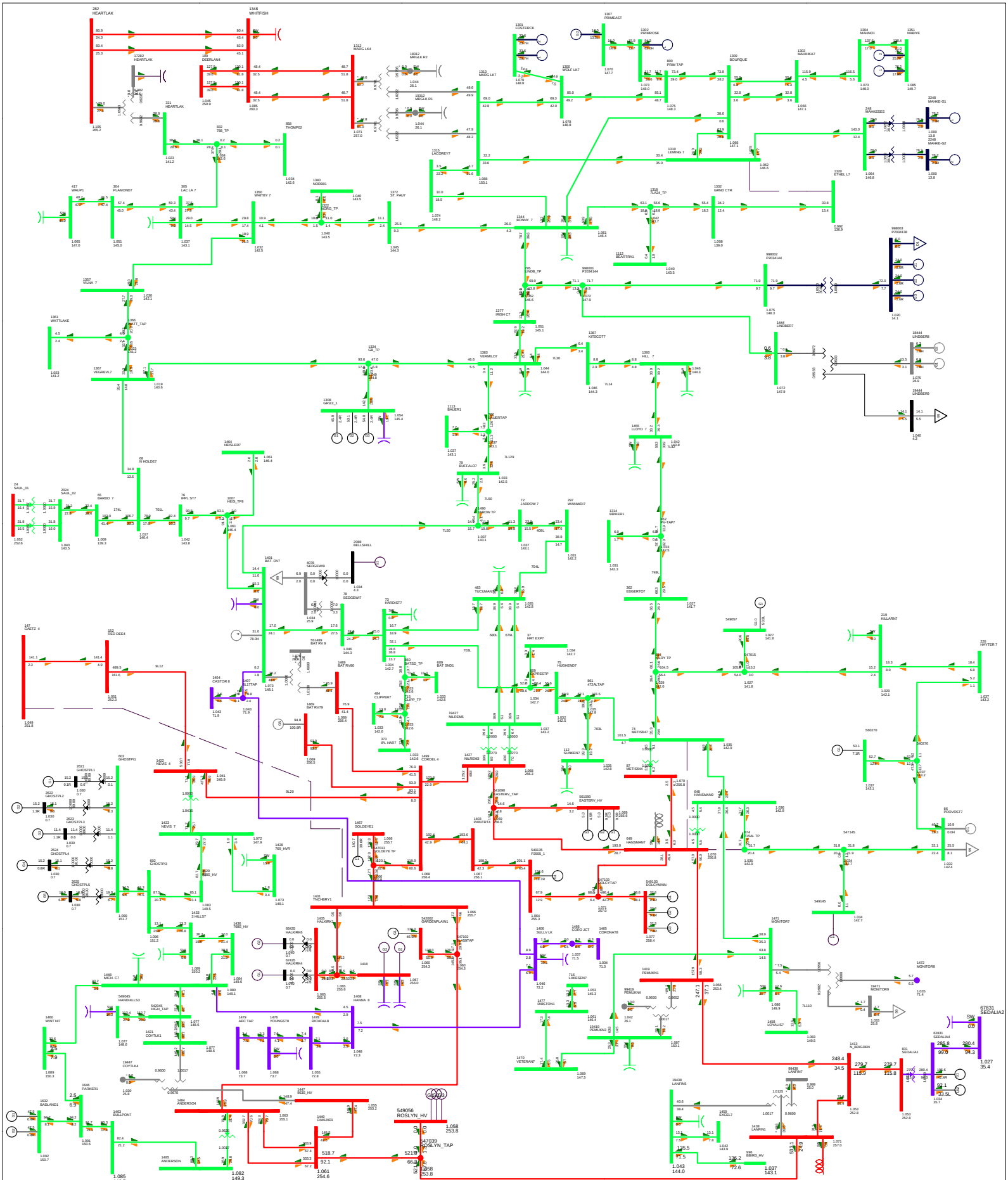
Study Case Description

2028SP-woCETO POST-PROJ

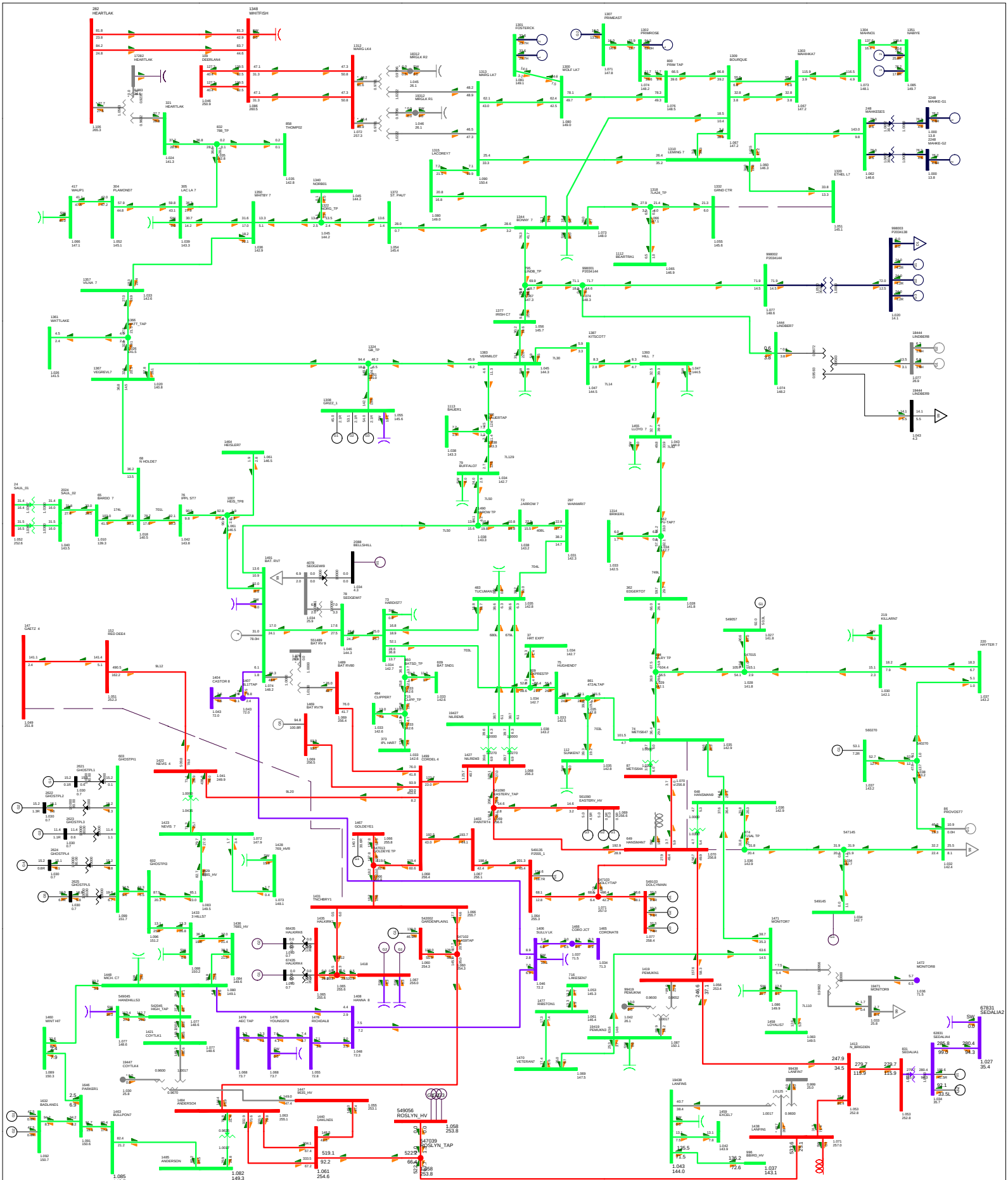
Base Case

P2034 Cold Lake Area Cogen

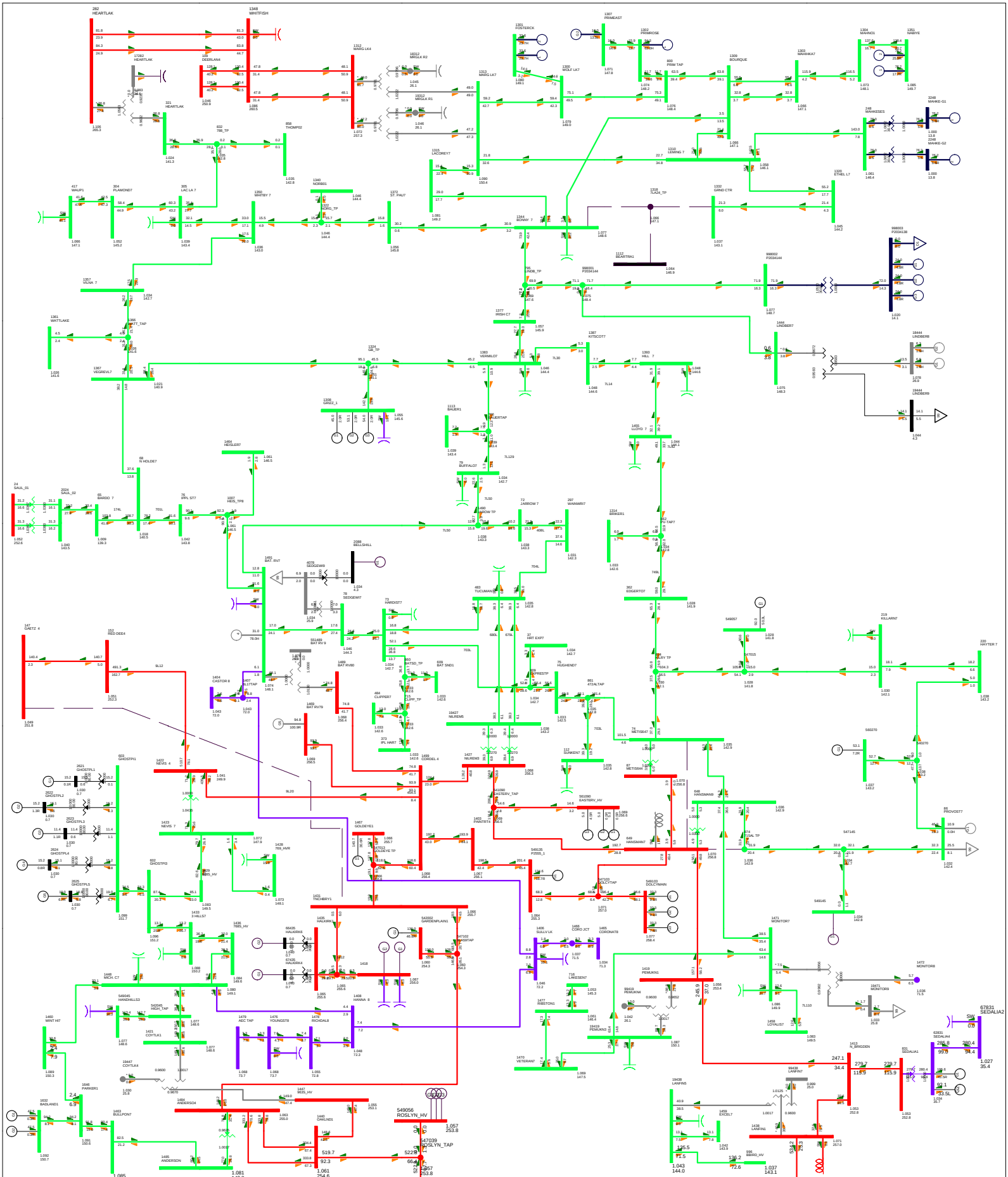
Bus - VOLTAGE (kV/PU)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%RATEA
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



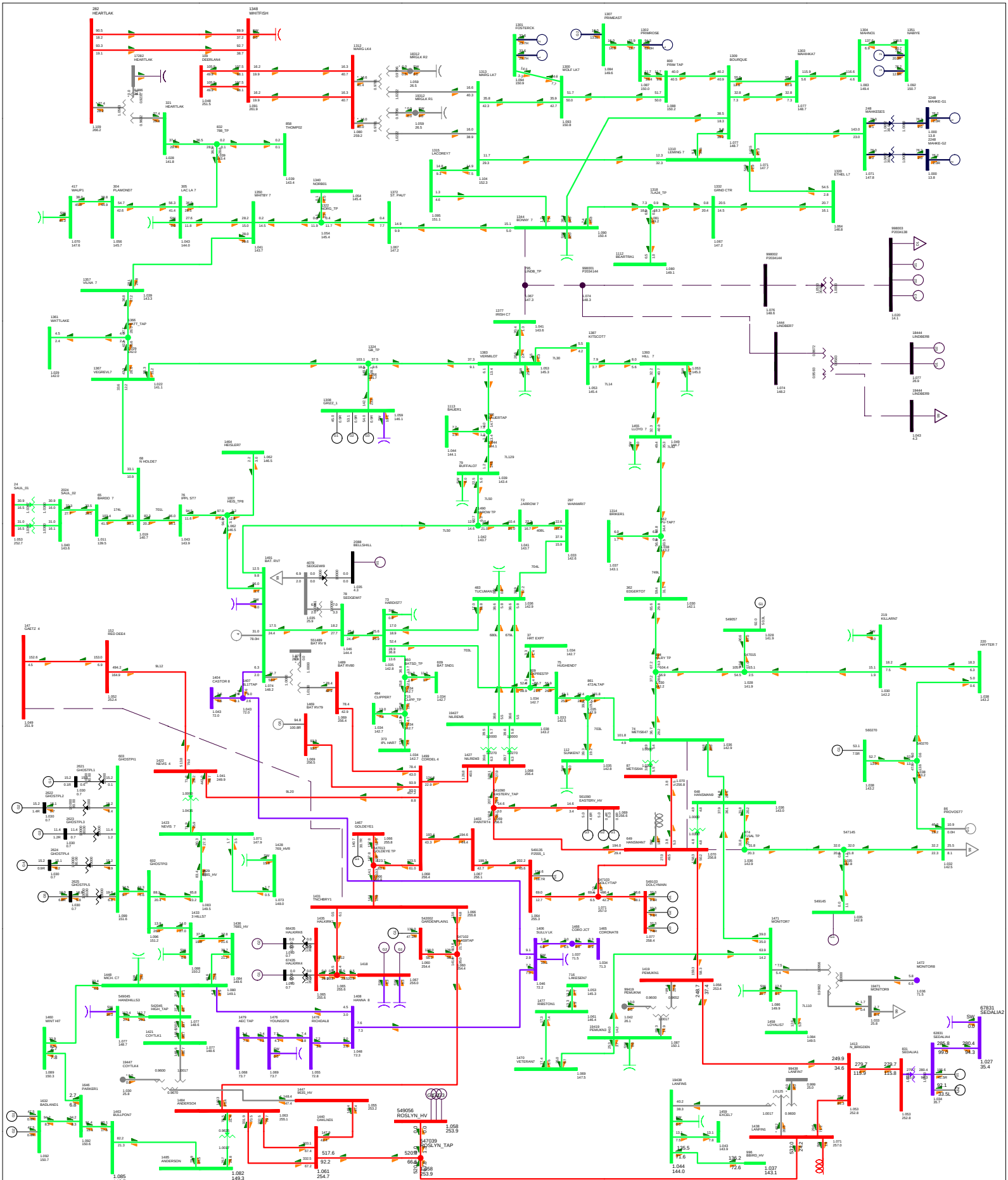
Attachment A3- 4	Contingency	Study Case Description	P2034 Cold Lake Area Cogen
	CONT 038: 7L66 (715S Leming Lake - 717S Ethel Lake)	2028SP-woCETO POST-PROJ Base Case	Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A3- 4	Contingency	Study Case Description	P2034 Cold Lake Area Cogen
	CONT 039: 7L28 (717S Ethel Lake - 846S Grand Centre)	2028SP-woCETO POST-PROJ Base Case	Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A3- 4	Contingency	Study Case Description	P2034 Cold Lake Area Cogen
	CONT 040: 7L24 (846S Grand Centre - 700S Bonnyville - 940S Beartrap)	2028SP-woCETO POST-PROJ Base Case	Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A3- 4

Contingency

CONT 041: 7L53 (700S Bonnyville - 706S Irish Creek - 969S Lindbergh)

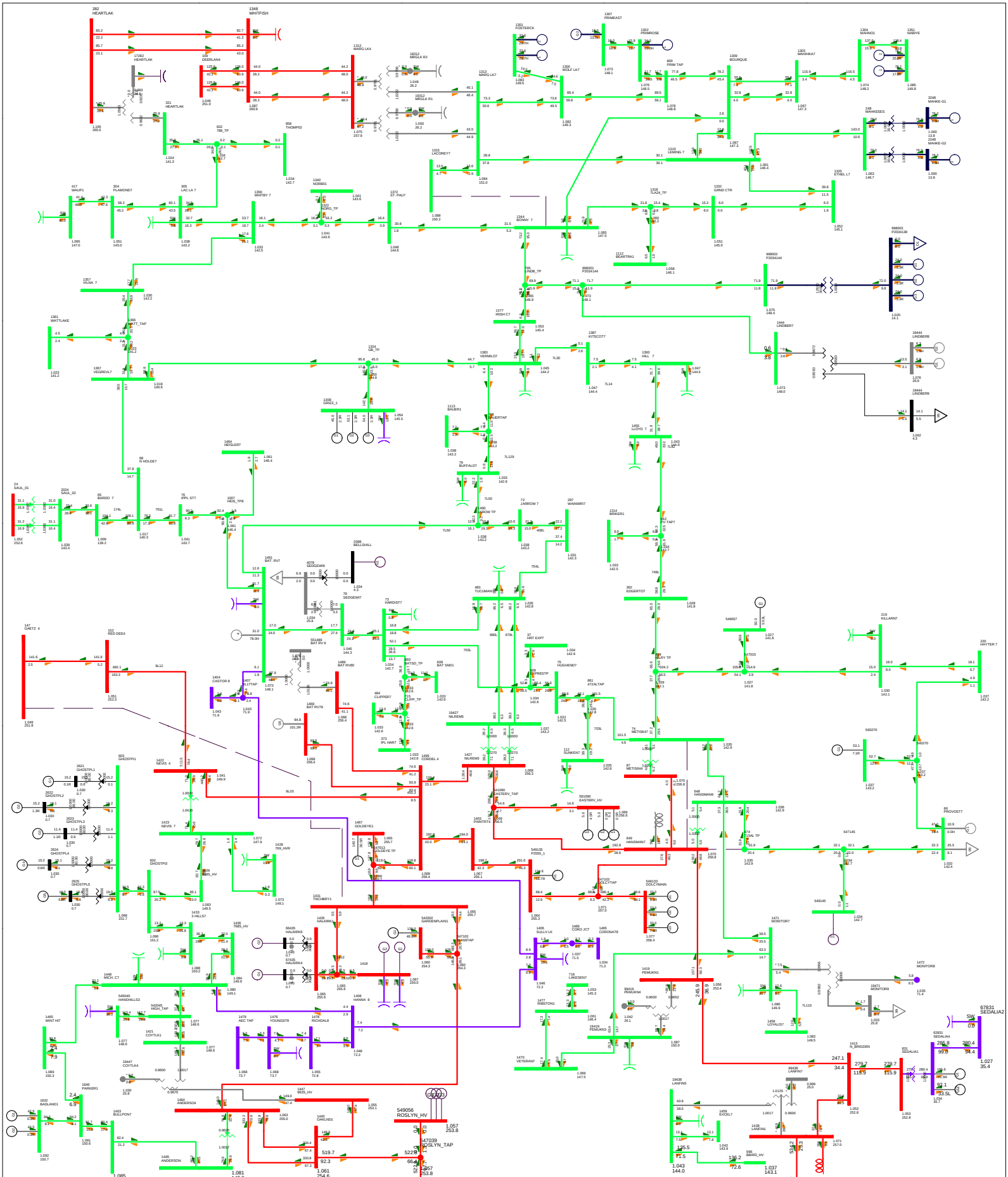
Study Case Description

2028SP-woCETO POST-PROJ

Base Case

P2034 Cold Lake Area Cogen

Bus - VOLTAGE (kV/PU)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%RATEA
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A3- 4

Contingency

CONT 042: 7L89 (721S Lacorey - 700S Bonnyville)

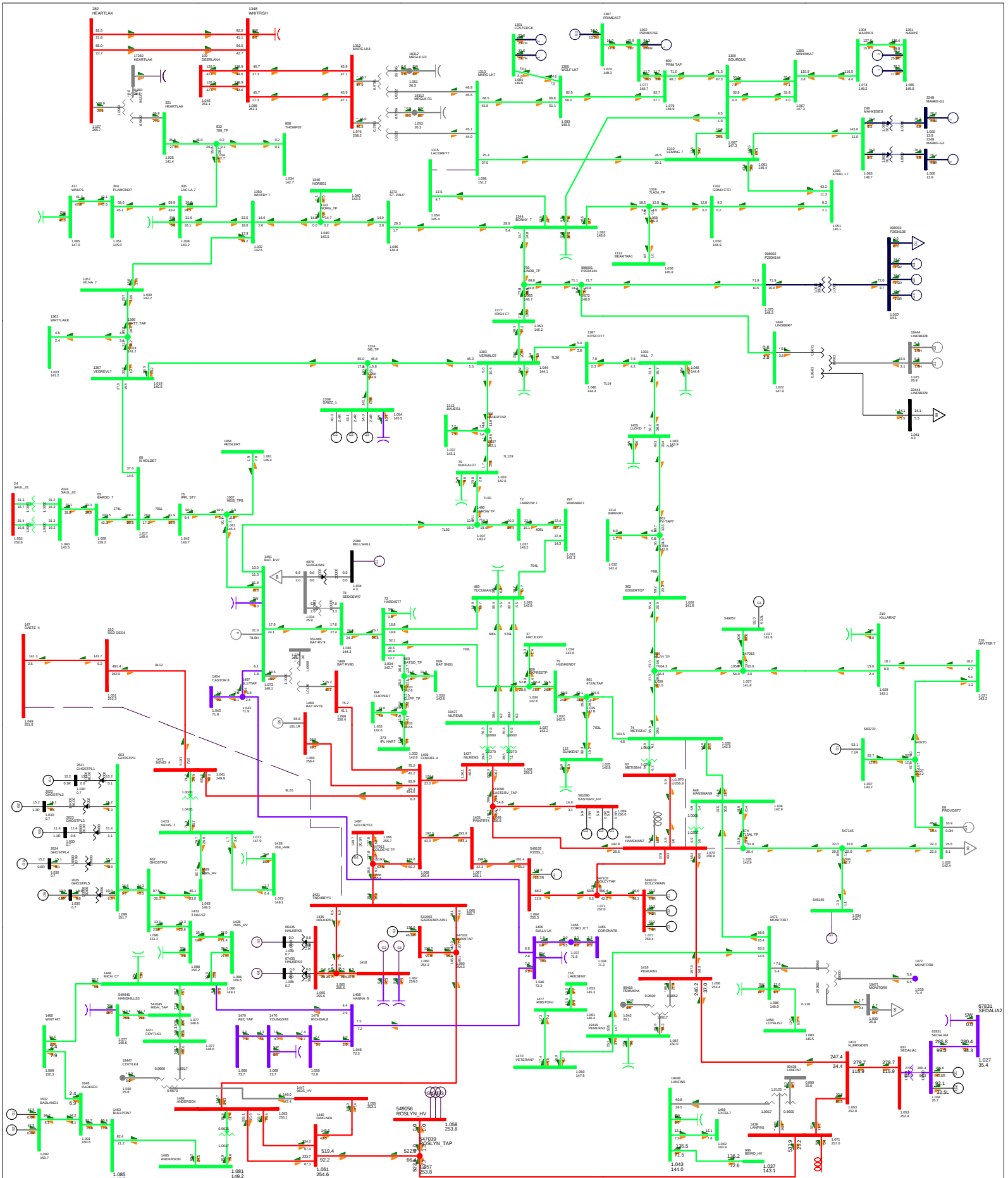
Study Case Description

2028SP-woCETO POST-PROJ

Base Case

P2034 Cold Lake Area Cogen

Bus - VOLTAGE (kV/PU)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%RATEA
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A3- 4

Contingency

CONT 043: 7L89 (826S Marguerite Lake - 721S Lacorey)

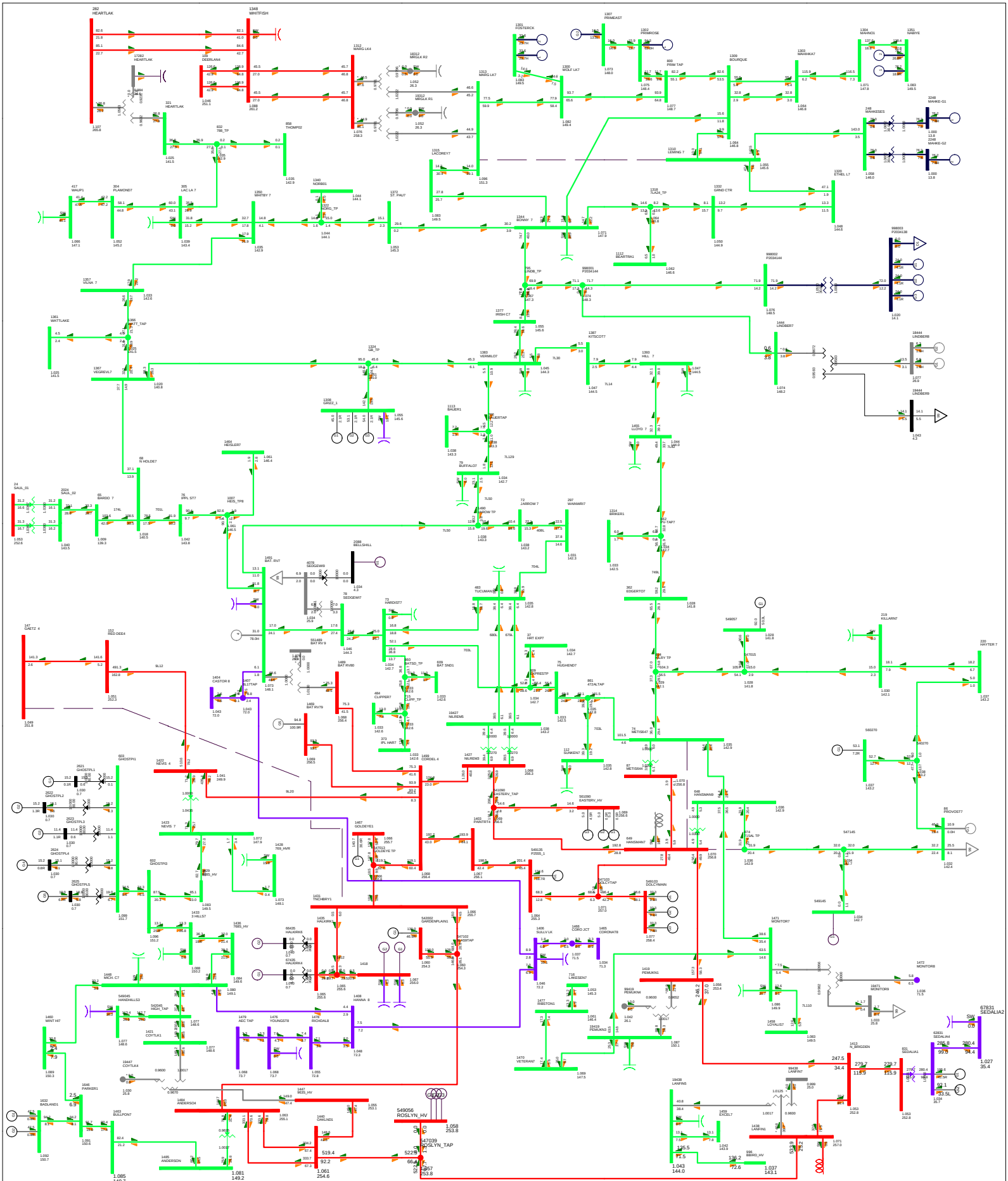
Study Case Description

2028SP-woCETO POST-PROJ

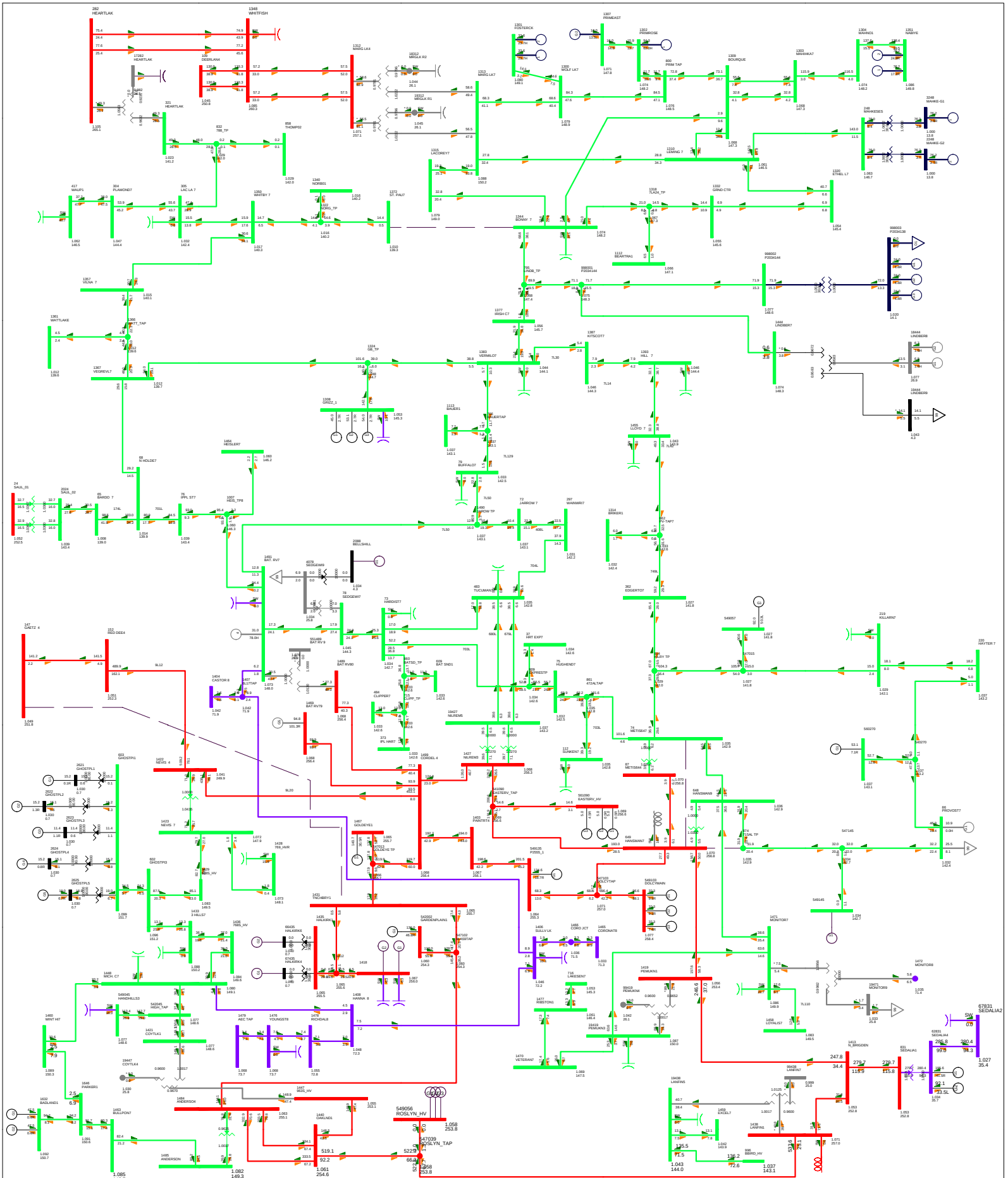
Base Case

P2034 Cold Lake Area Cogen

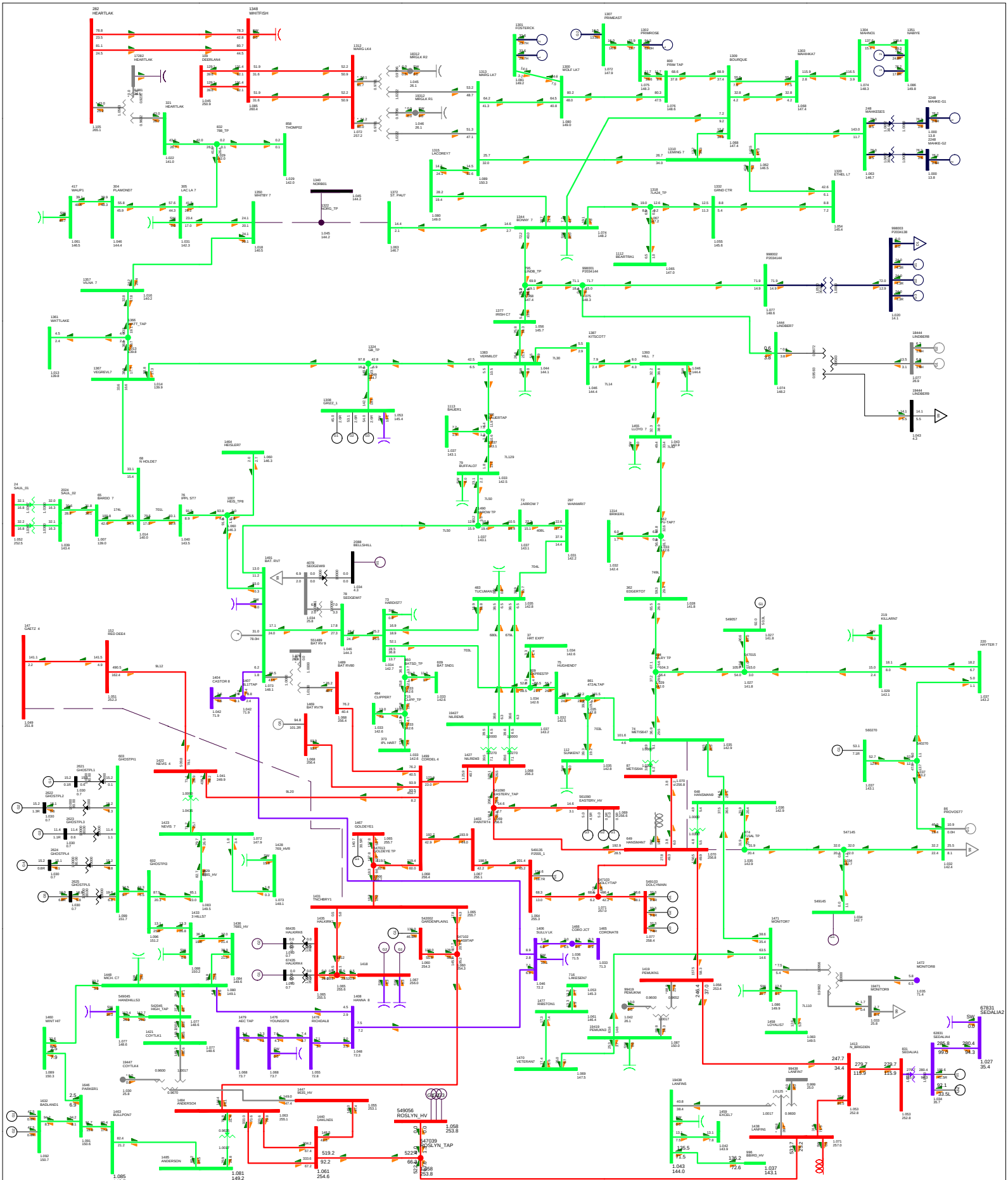
Bus - VOLTAGE (kV/PU)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%RATEA
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A3- 4	**Contingency** CONT 044: 7L91 (715S Leming Lake - 826S Marguerite Lake)	**Study Case Description** 2028SP-woCETO POST-PROJ Base Case	**P2034 Cold Lake Area Cogen** Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A3- 4	Contingency	Study Case Description	P2034 Cold Lake Area Cogen
	CONT 045: 7L70 (700S Bonnyville - 707S St.Paul)	2028SP-woCETO POST-PROJ Base Case	Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A3- 4

Contingency

CONT 046: 7L139 (819S Whitbylake - 707S St.Paul - 936S Norberg)

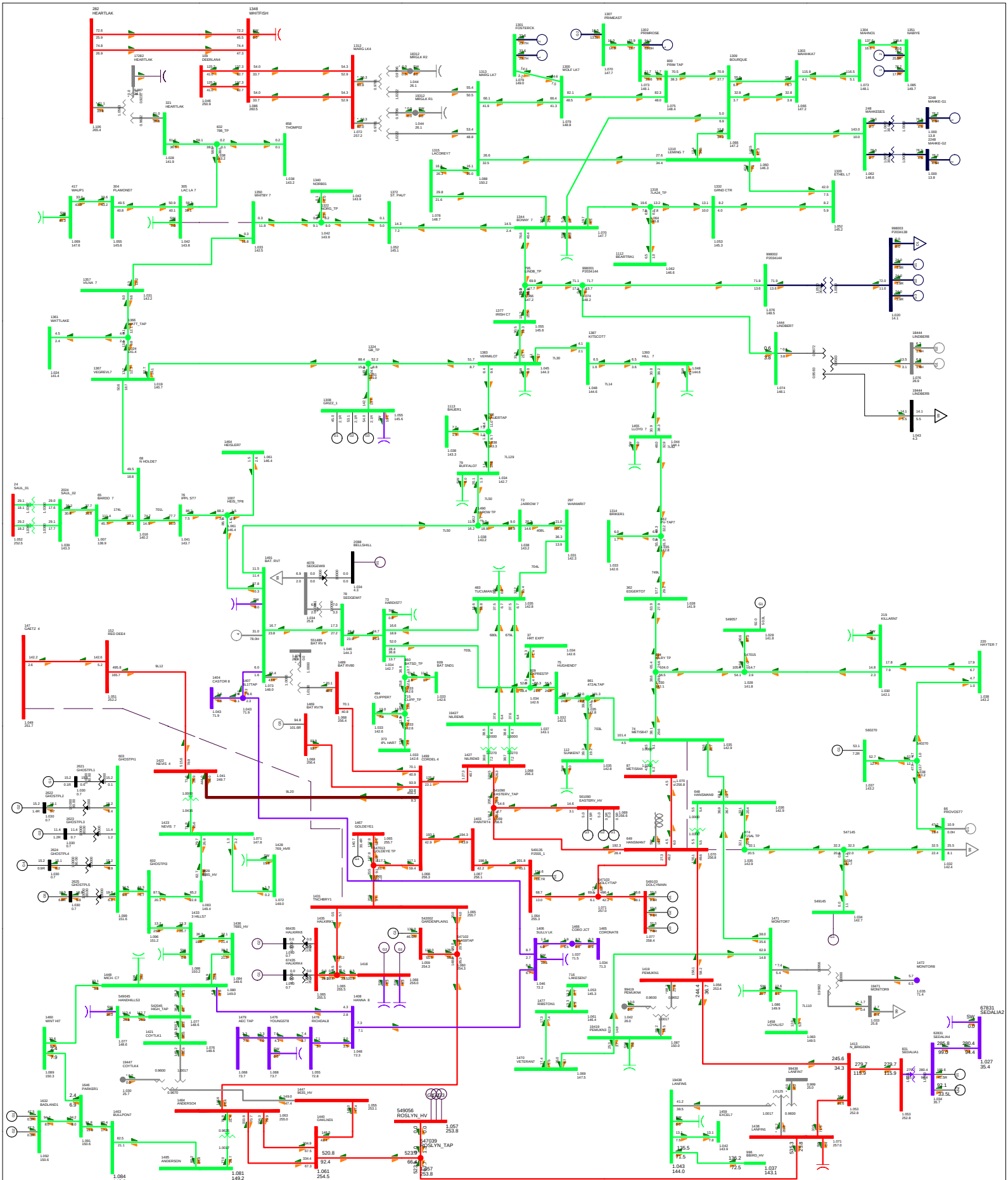
Study Case Description

2028SP-woCETO POST-PROJ

Base Case

P2034 Cold Lake Area Cogen

Bus - VOLTAGE (kV/PU)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%RATEA
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A3- 4

Contingency

CONT 047: 794L & 7L94 (157S Lac La Biche - 819S Whitbylake)

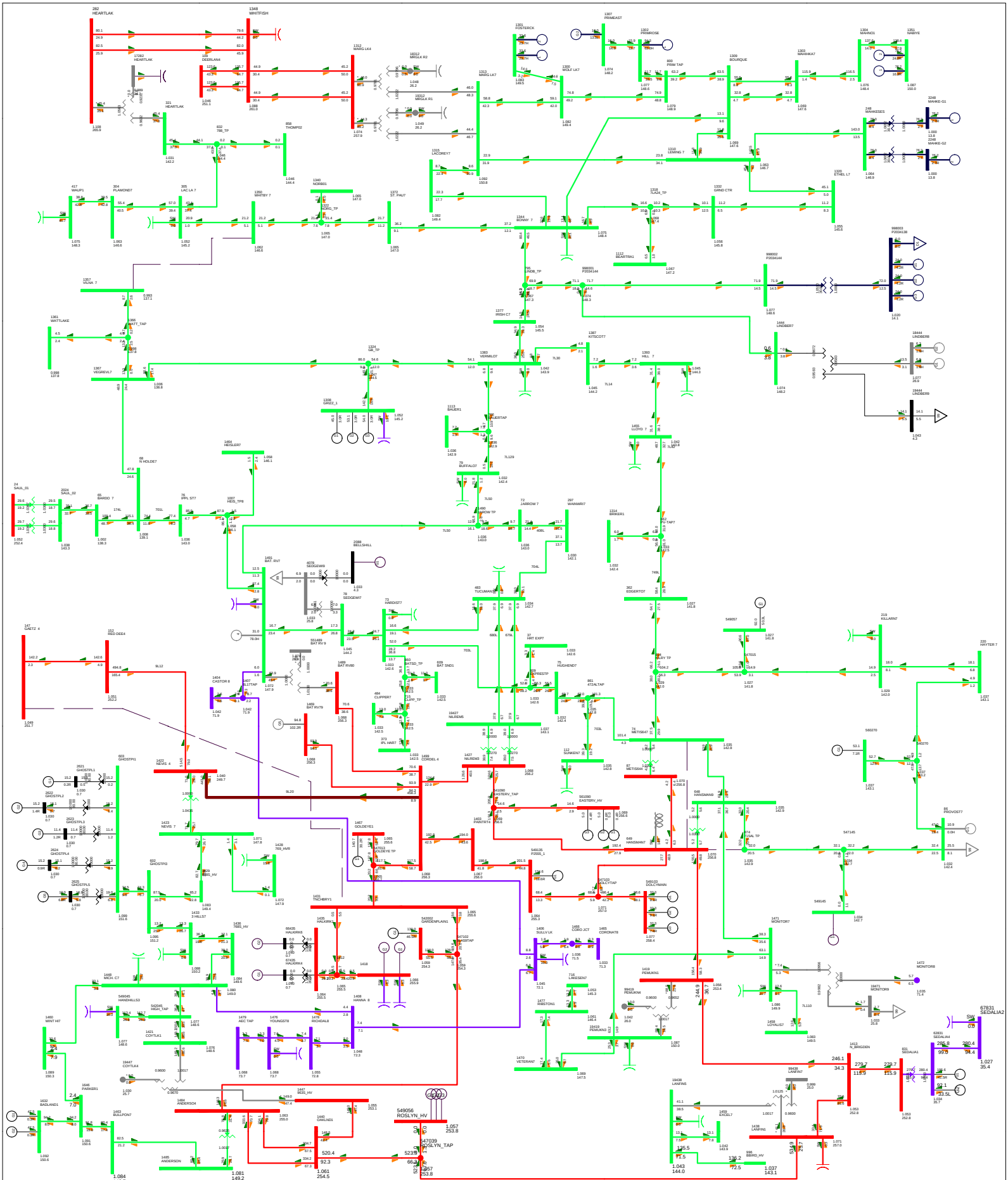
Study Case Description

2028SP-woCETO POST-PROJ

Base Case

P2034 Cold Lake Area Cogen

Bus - VOLTAGE (kV/PU)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%RATEA
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A3- 4

Contingency

CONT 048: 7L92 (819S Whitbylake - 777S Vilna)

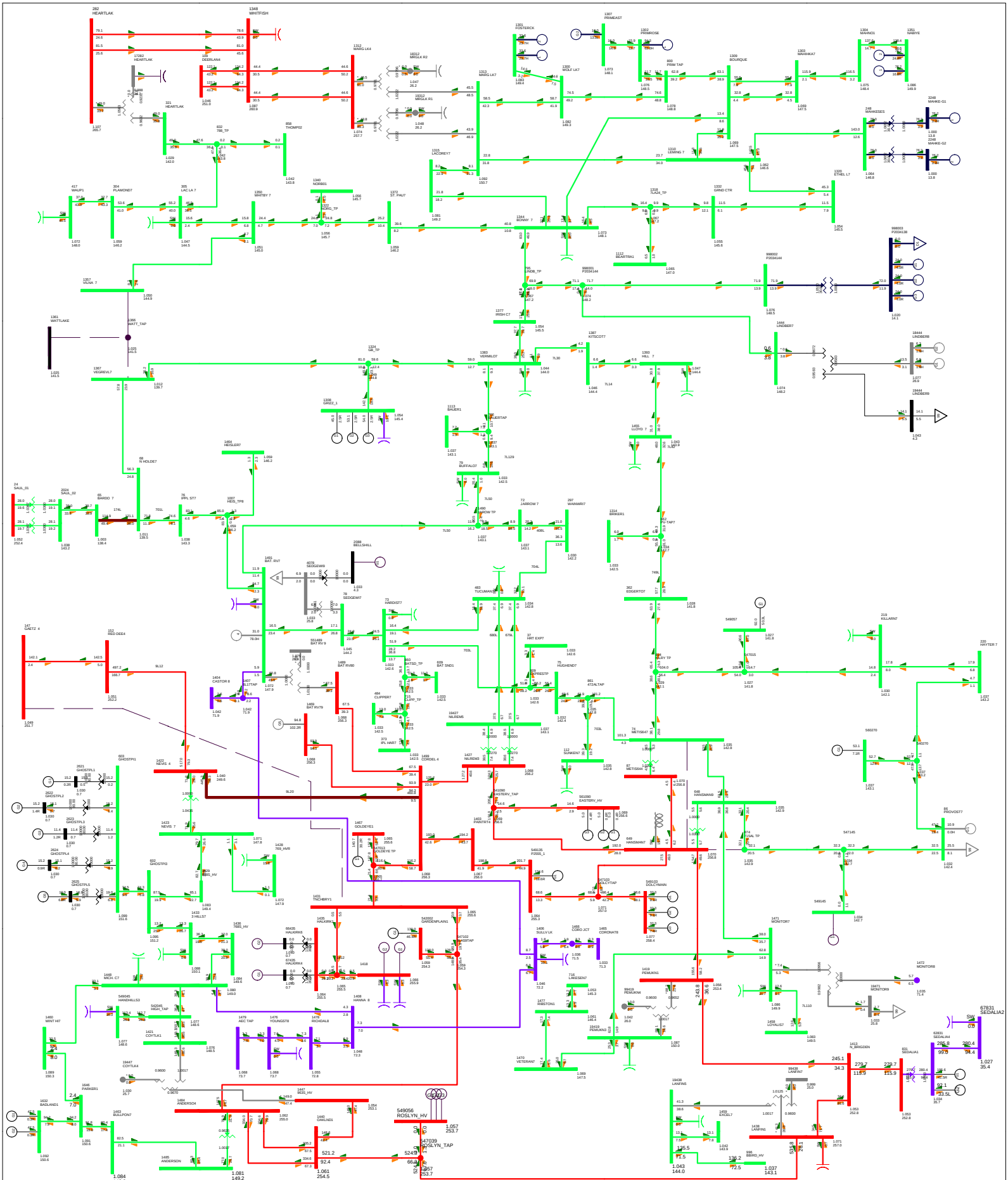
Study Case Description

2028SP-woCETO POST-PROJ

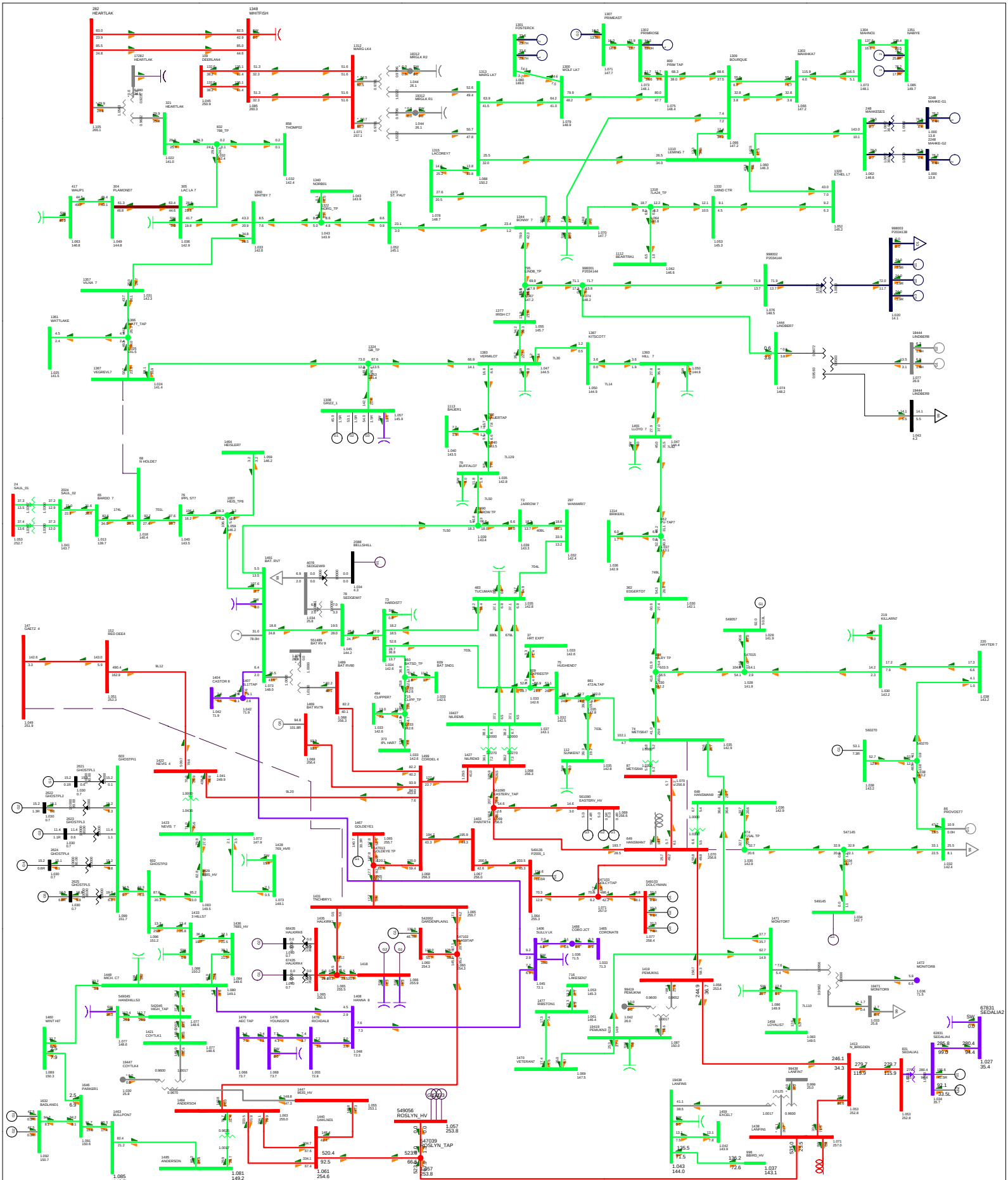
Base Case

P2034 Cold Lake Area Cogen

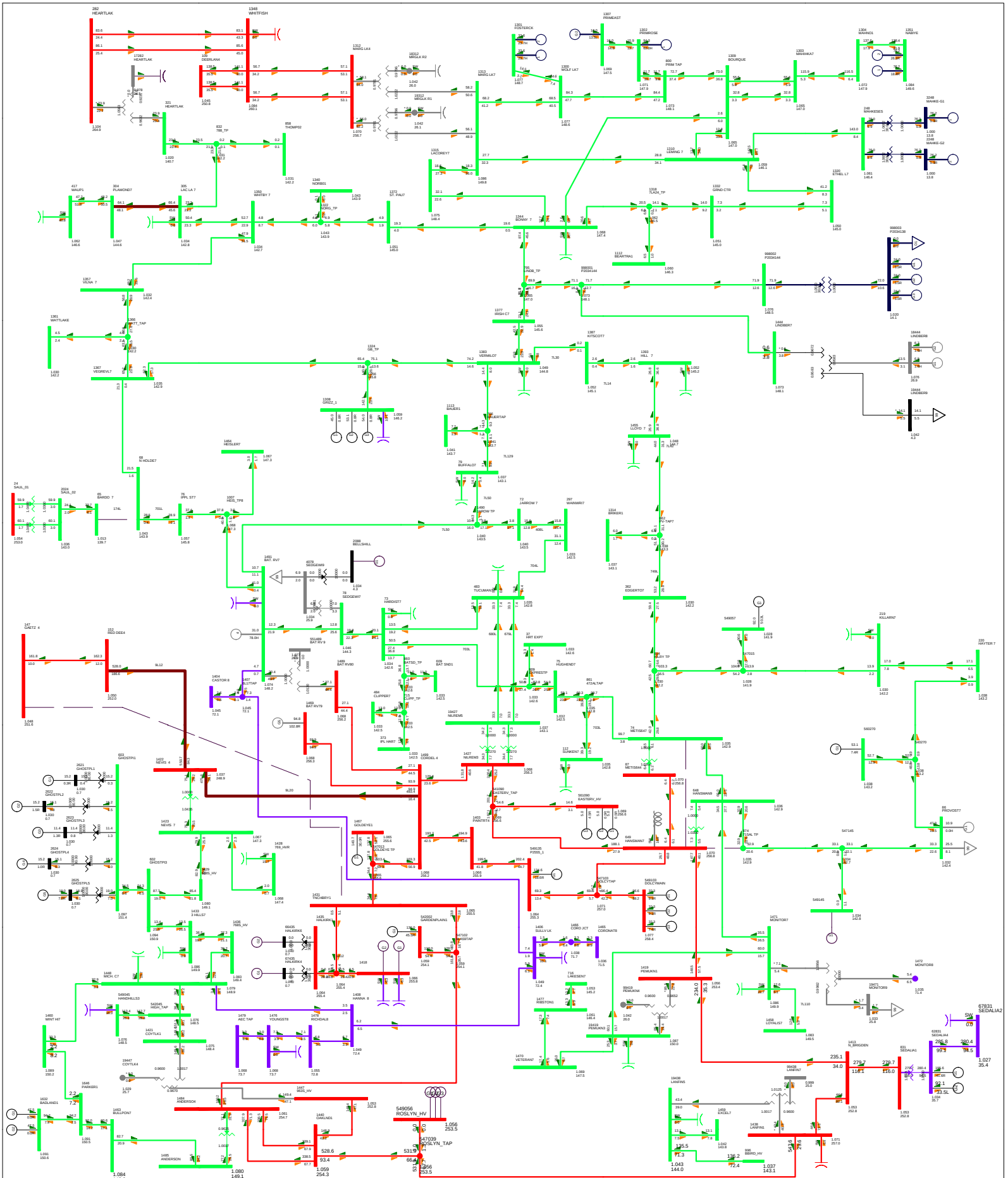
Bus - VOLTAGE (kV/PU)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%RATEA
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A3- 4	**Contingency** CONT 049: 7L92 (777S Vilna - 709S Vegreville - 956S Watt Lake)	**Study Case Description** 2028SP-woCETO POST-PROJ Base Case	**P2034 Cold Lake Area Cogen** Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A3- 4	**Contingency** CONT 050: 7L77 (395S North Holden - 709S Vegreville)	**Study Case Description** 2028SP-woCETO POST-PROJ Base Case	**P2034 Cold Lake Area Cogen** Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A3- 4

Contingency

CONT 051: 174L (197S Bardo - 395S North Holden)

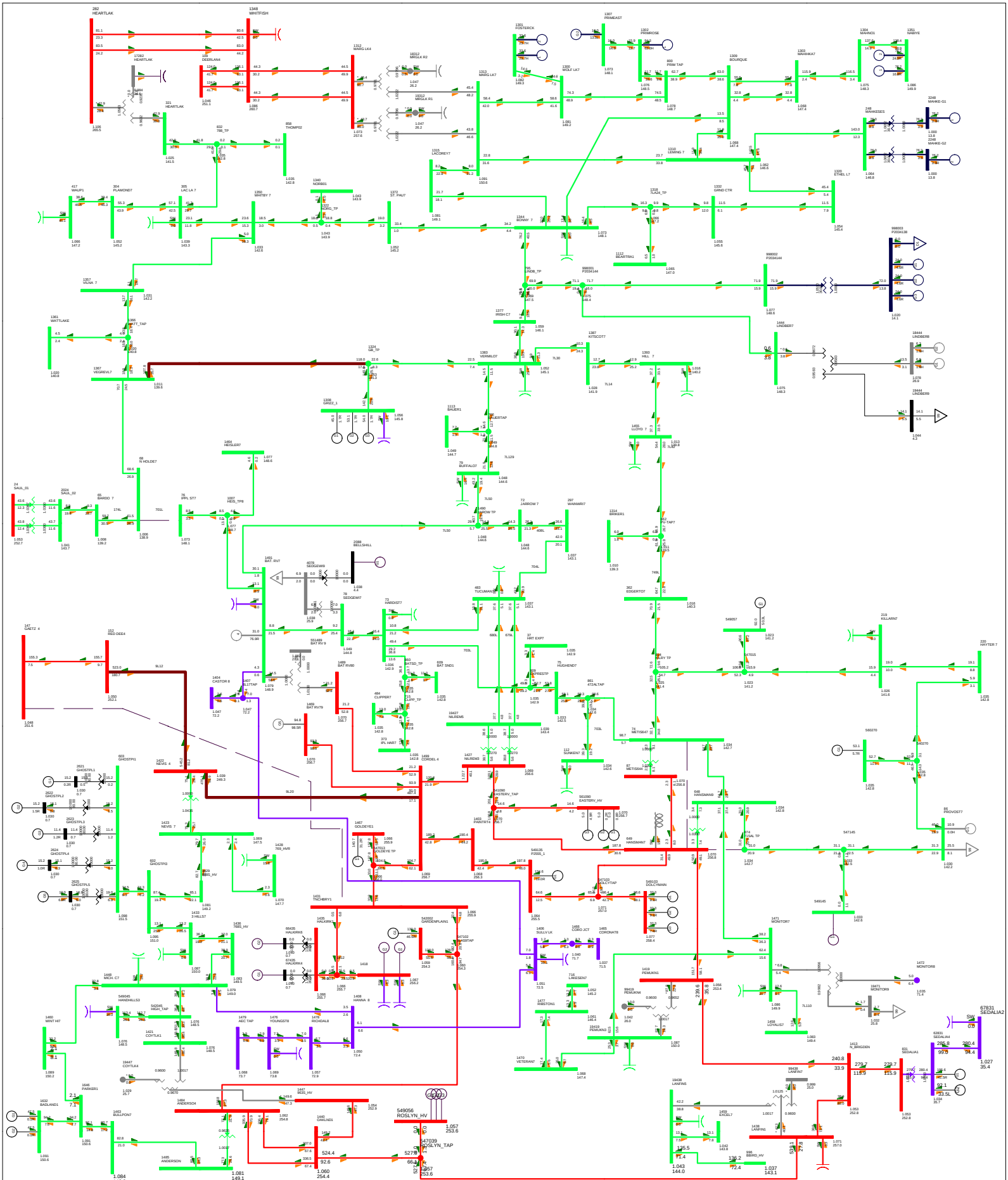
Study Case Description

2028SP-woCETO POST-PROJ

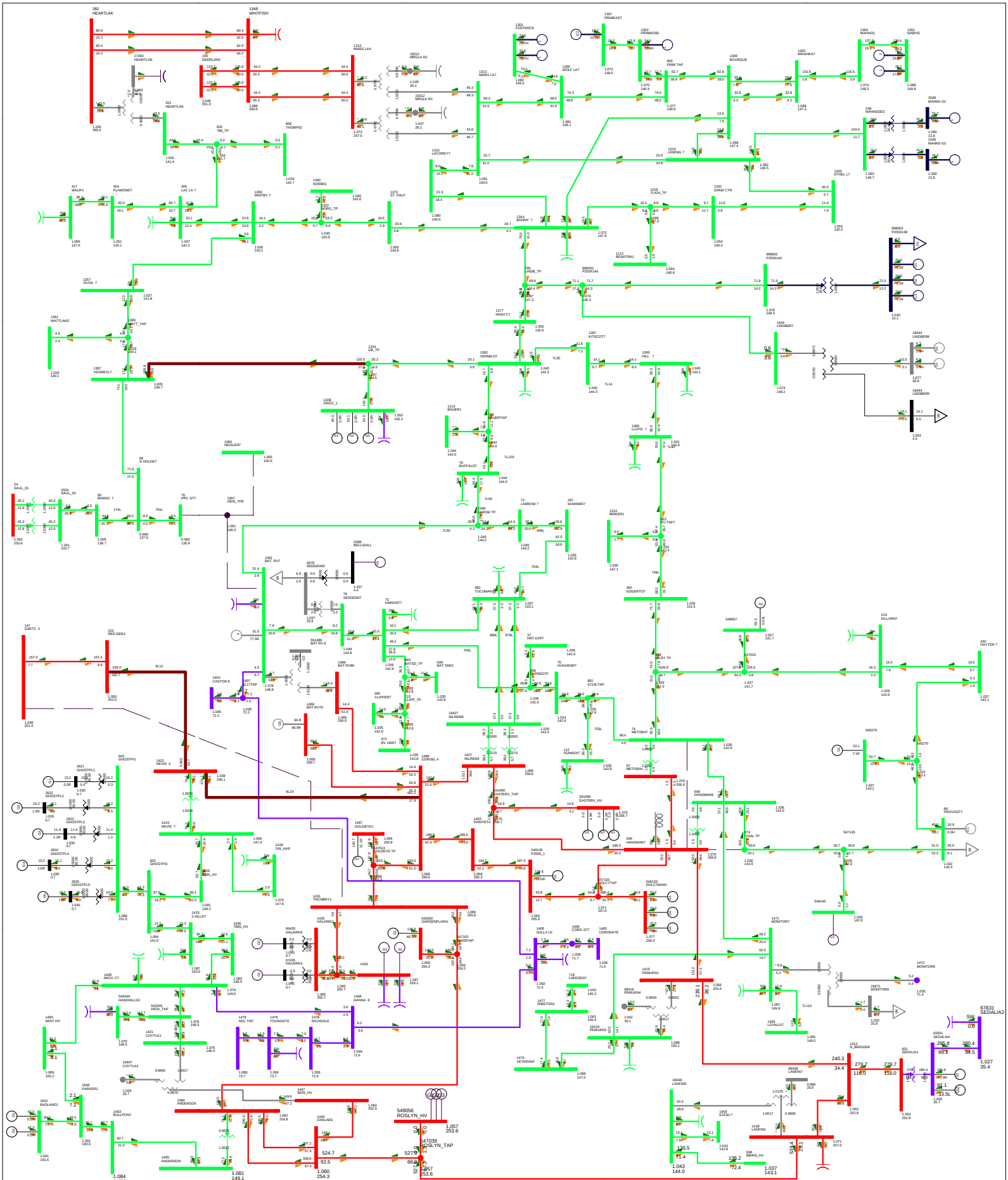
Base Case

P2034 Cold Lake Area Cogen

Bus - VOLTAGE (kV/PU)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%RATEA
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A3- 4	Contingency	Study Case Description	P2034 Cold Lake Area Cogen
	CONT 052: 701L (395S North Holden - 223S Strome)	2028SP-woCETO POST-PROJ Base Case	Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A3- 4

Contingency

CONT 053: 701L (223S Strome - 757S Battle River - 764S Heisler)

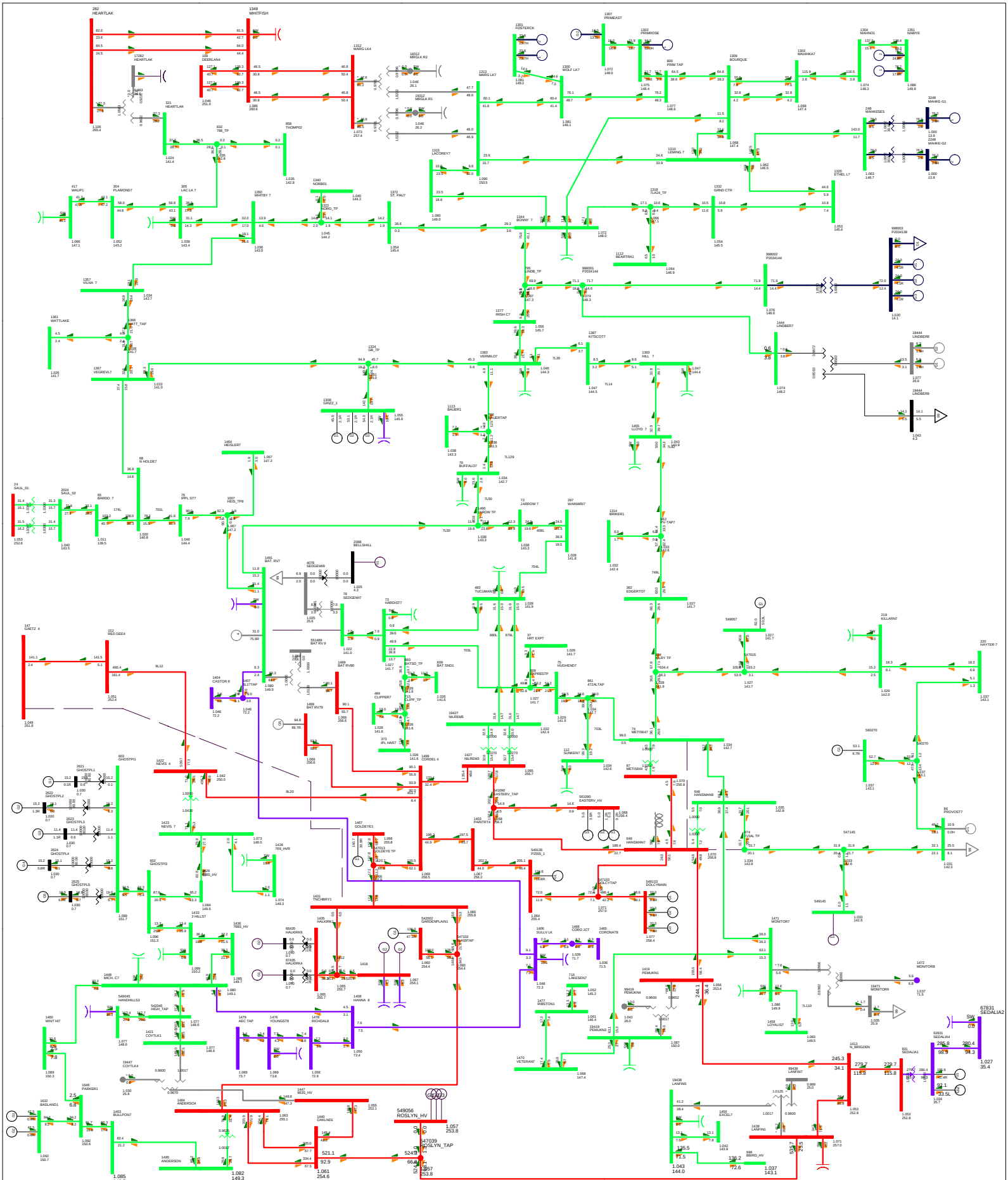
Study Case Description

2028SP-woCETO POST-PROJ

Base Case

P2034 Cold Lake Area Cogen

Bus - VOLTAGE (kV/PU)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%RATEA
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A3- 4

Contingency

CONT 054: 7L702 (137S Sedgewick - 757S Battle River)

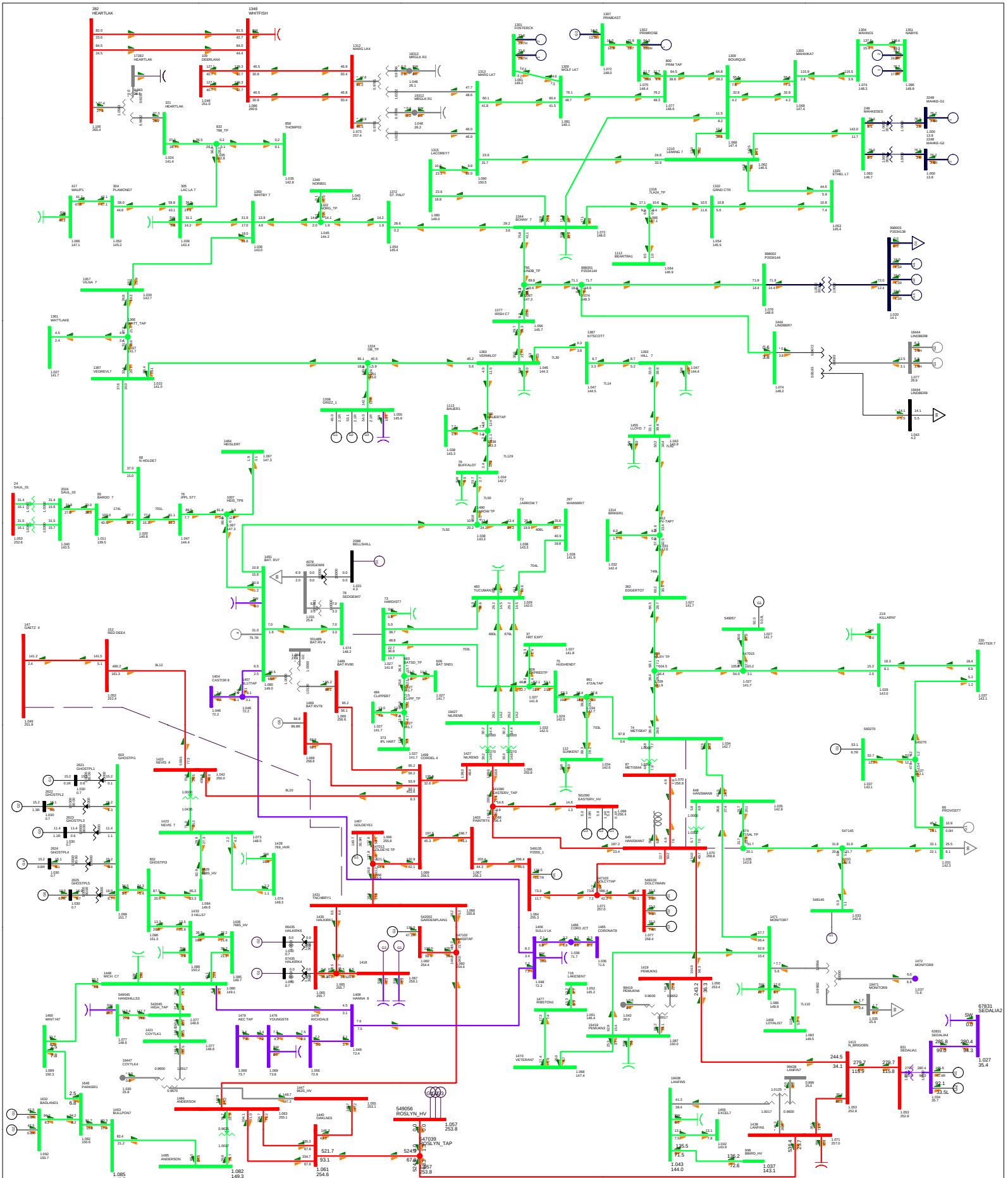
Study Case Description

2028SP-woCETO POST-PROJ

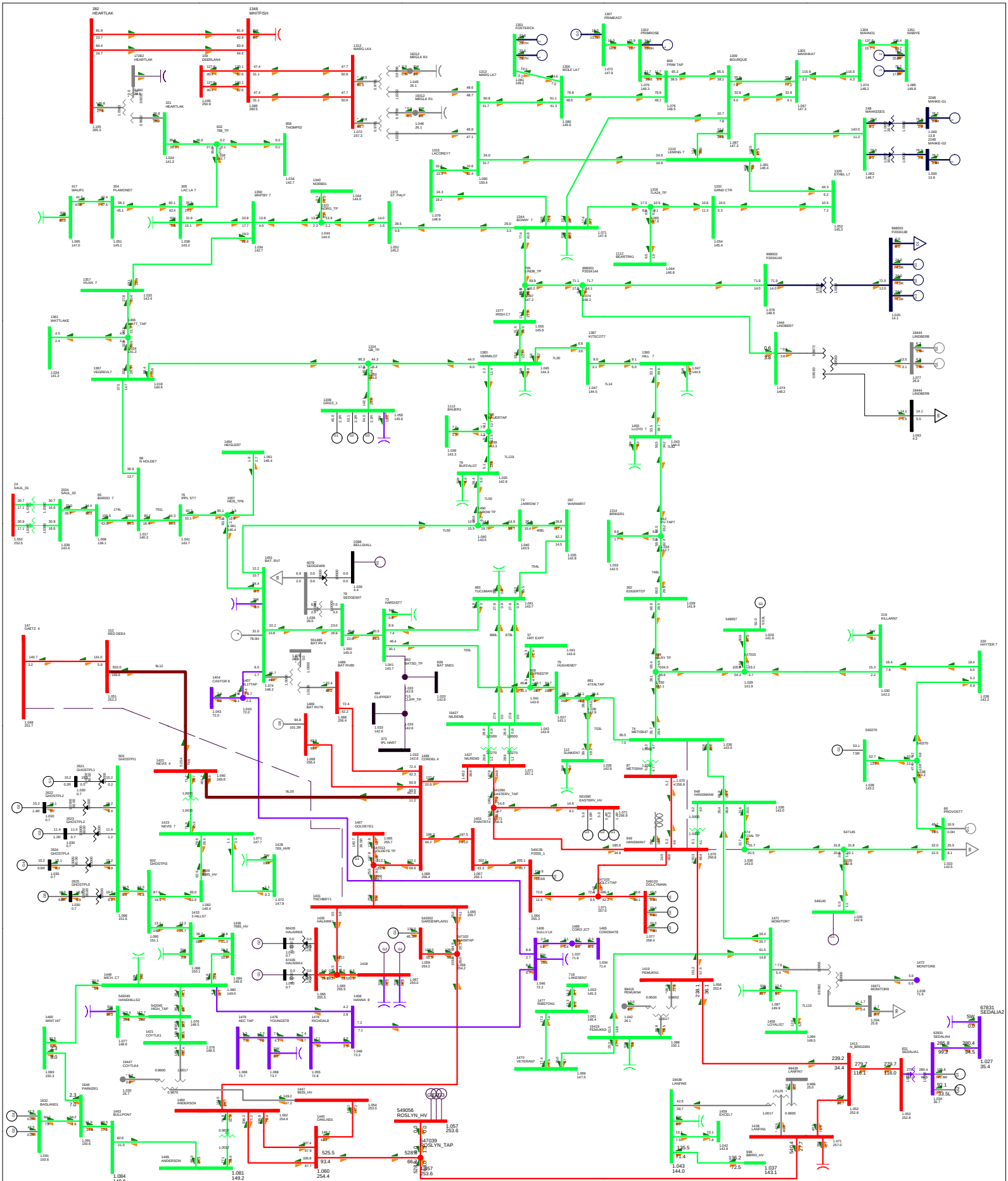
Base Case

P2034 Cold Lake Area Cogen

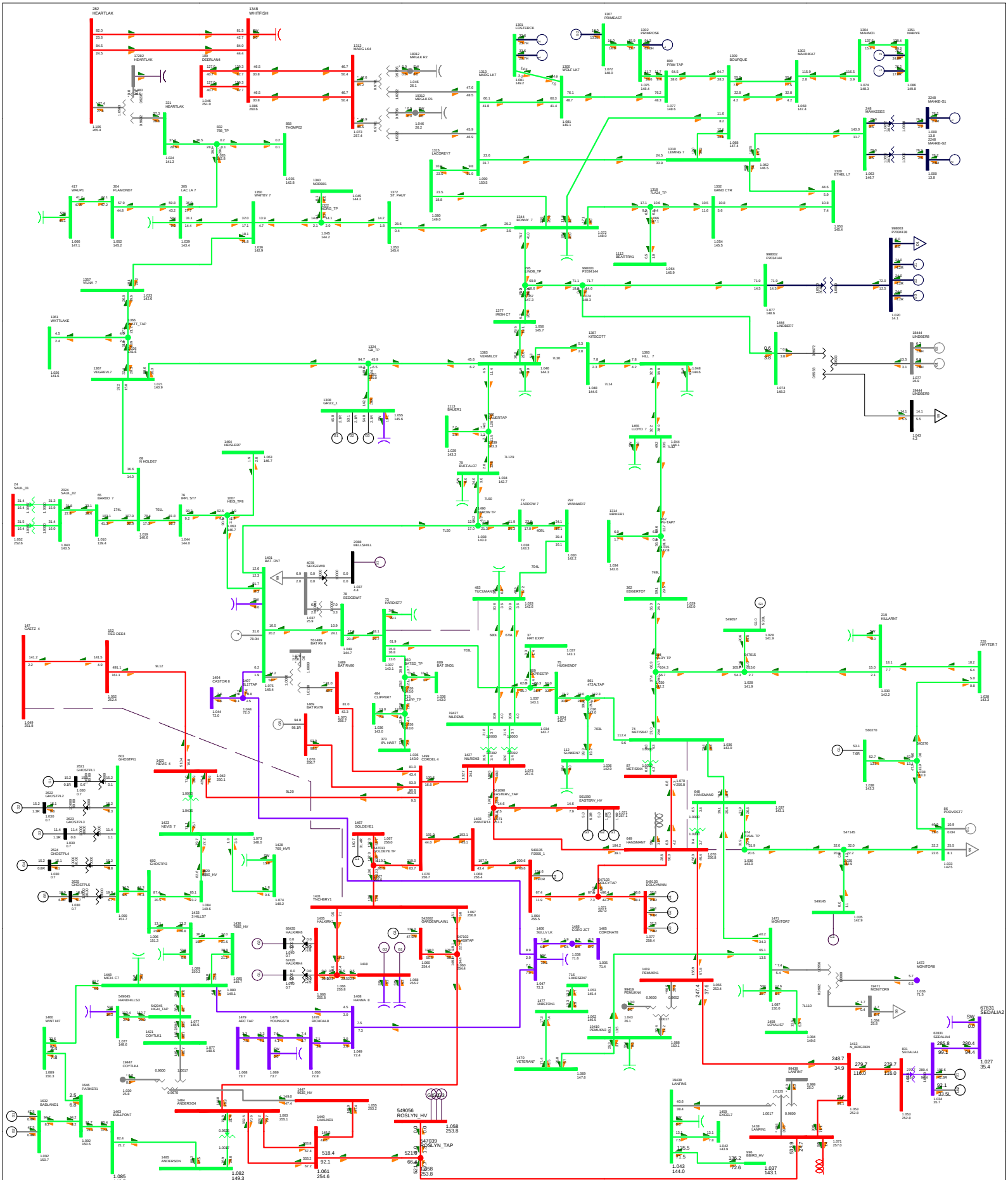
Bus - VOLTAGE (kV/PU)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%RATEA
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



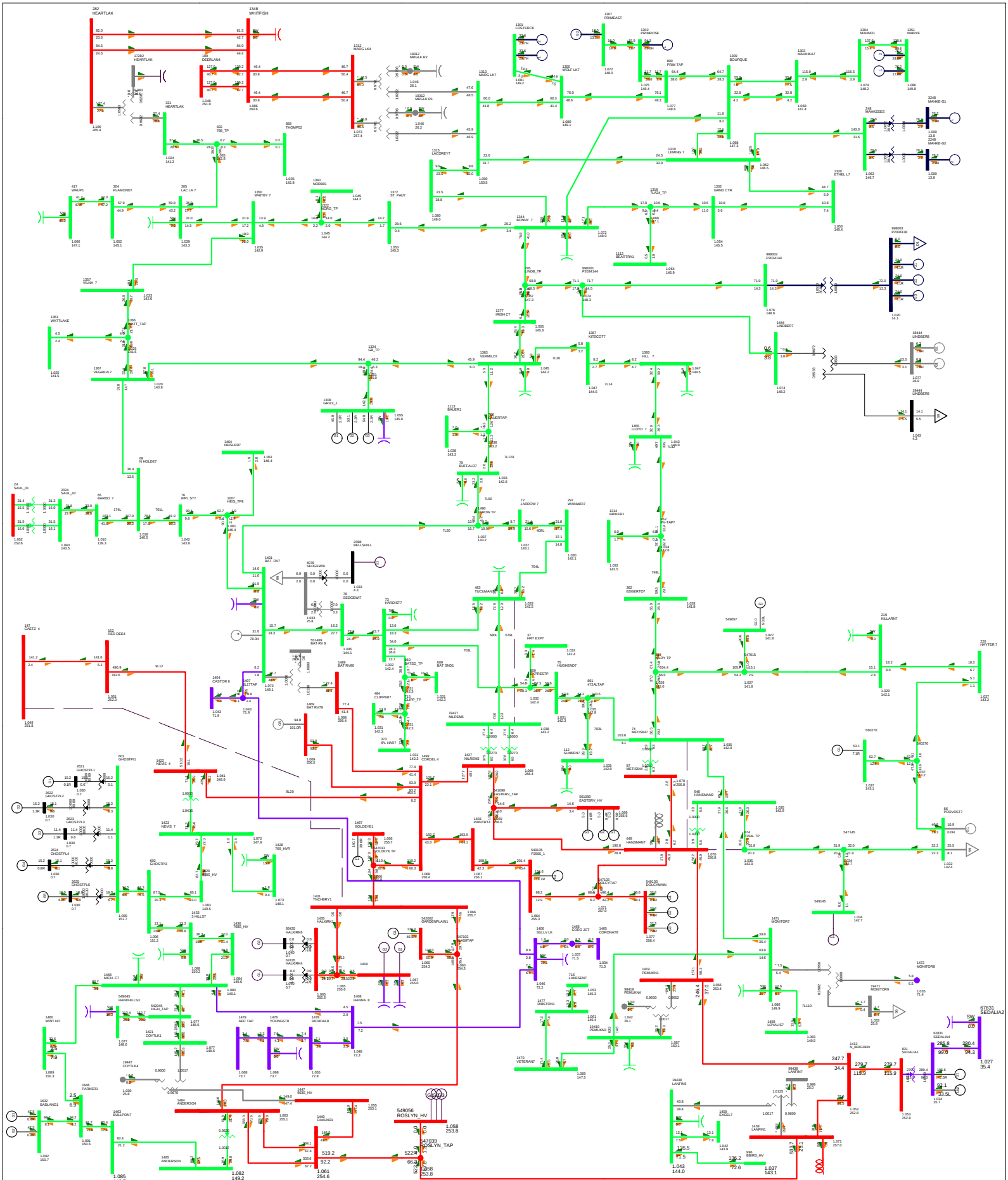
Attachment A3- 4	**Contingency** CONT 055: 702L (377S Hardisty - 137S Sedgewick)	**Study Case Description** 2028SP-woCETO POST-PROJ Base Case	**P2034 Cold Lake Area Cogen** Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A3- 4	Contingency	Study Case Description	P2034 Cold Lake Area Cogen
	CONT 056: 769L (377S Hardisty - 594S Battle Sands - 296S Rosyth - 656S Clipper)	2028SP-woCETO POST-PROJ Base Case	Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A3- 4	Contingency	Study Case Description	P2034 Cold Lake Area Cogen
	CONT 057: 681L (377S Hardisty - 478S Tucuman)	2028SP-woCETO POST-PROJ Base Case	Bus - VOLTAGE (kV/PU) Branch - MW/MVar Equipment - MW/Mvar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A3- 4

Contingency

CONT 058: 679L (478S Tucuman - 574S Nilrem)

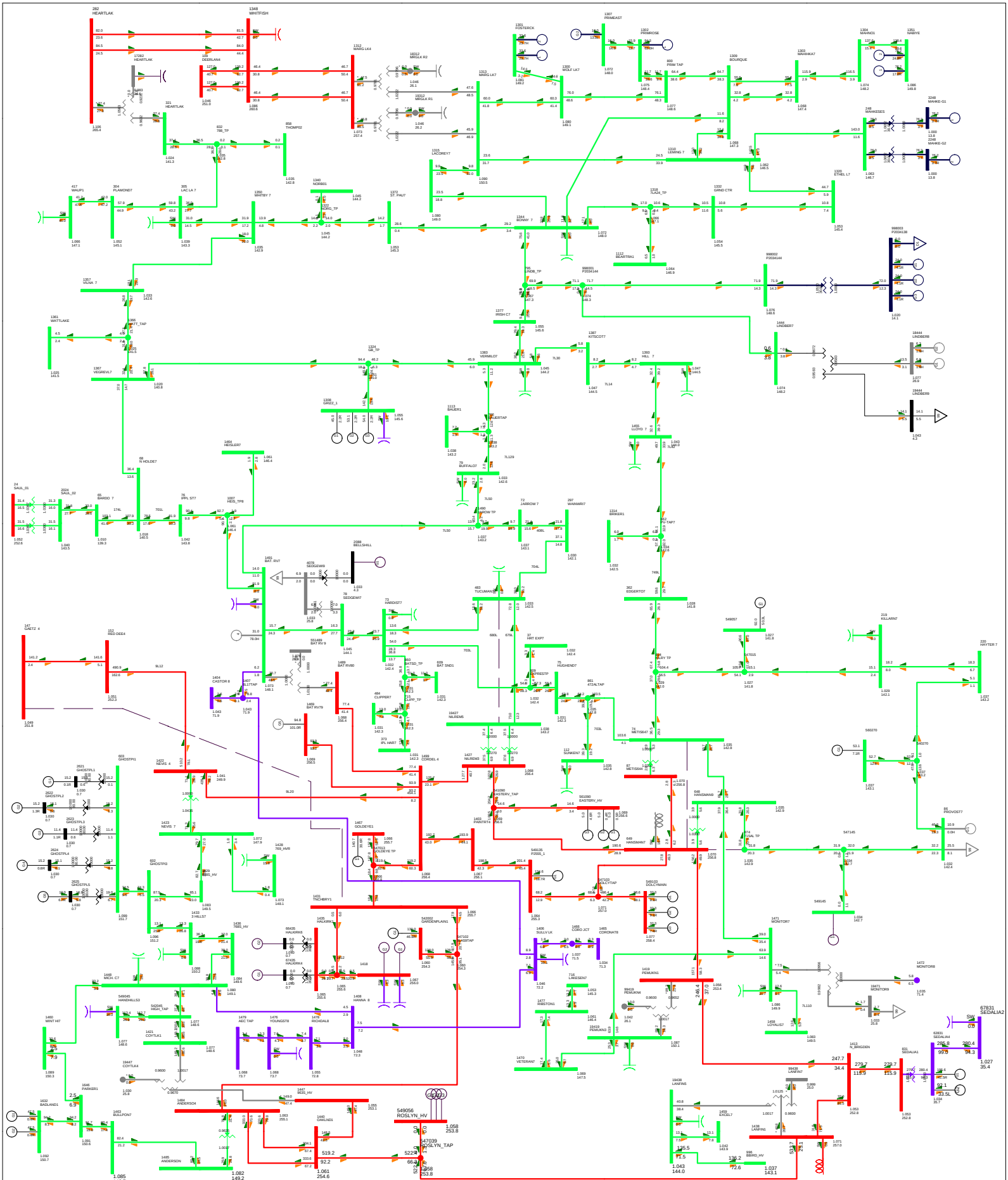
Study Case Description

2028SP-woCETO POST-PROJ

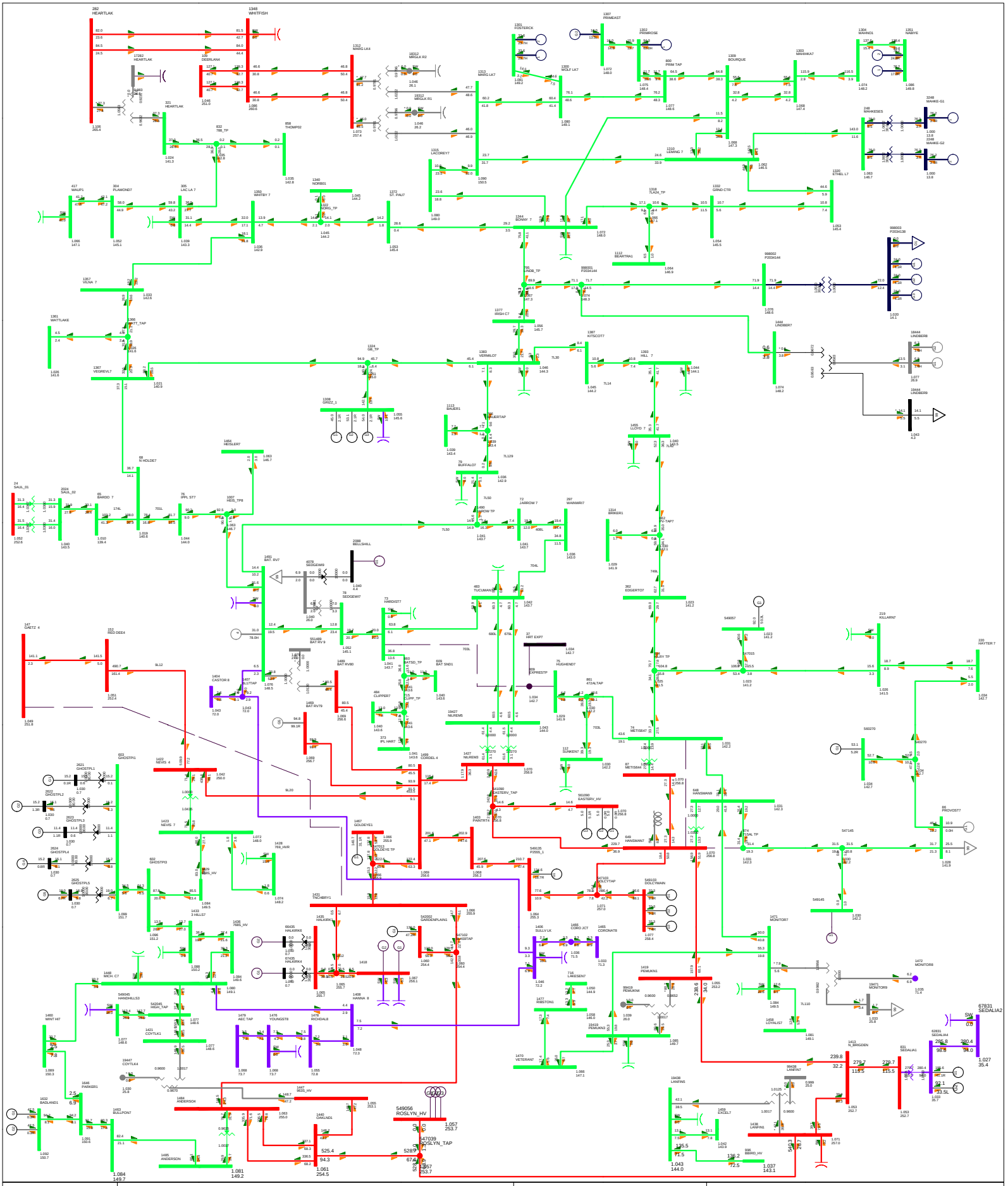
Base Case

P2034 Cold Lake Area Cogen

Bus - VOLTAGE (kV/PU)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%RATEA
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A3- 4	**Contingency** CONT 059: 680L (478S Tucuman - 574S Nilrem)	**Study Case Description** 2028SP-woCETO POST-PROJ Base Case	**P2034 Cold Lake Area Cogen** Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A3- 4

Contingency

CONT 060: 703L (377S Hardisty - 213S Hughenden - 329S Hrt Express)

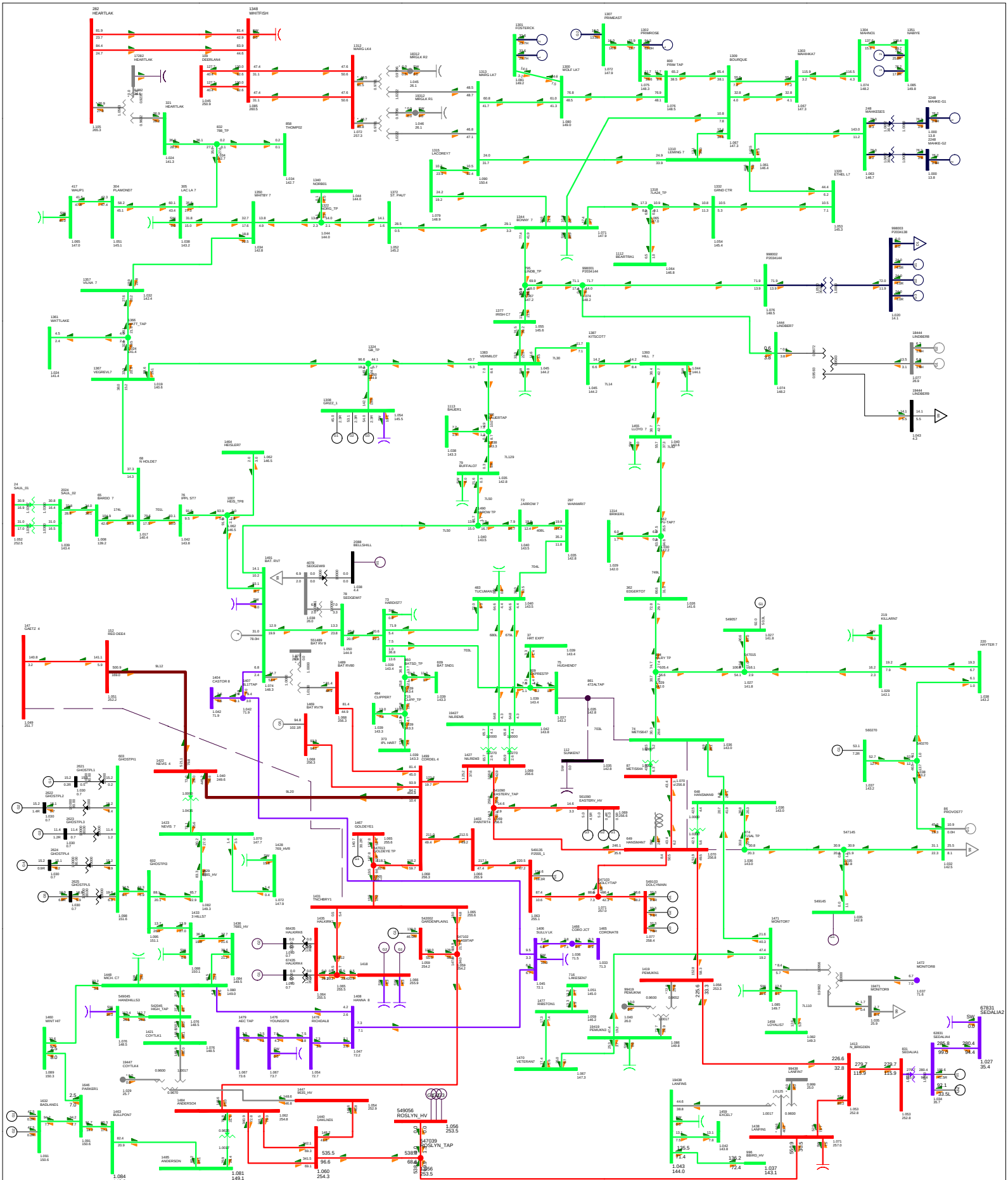
Study Case Description

2028SP-woCETO POST-PROJ

Base Case

P2034 Cold Lake Area Cogen

Bus - VOLTAGE (kV/PU)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%RATEA
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A3- 4

Contingency

CONT 061: 472L (213S Hughenden - 648S Metiskow - 221S Sunken Lake)

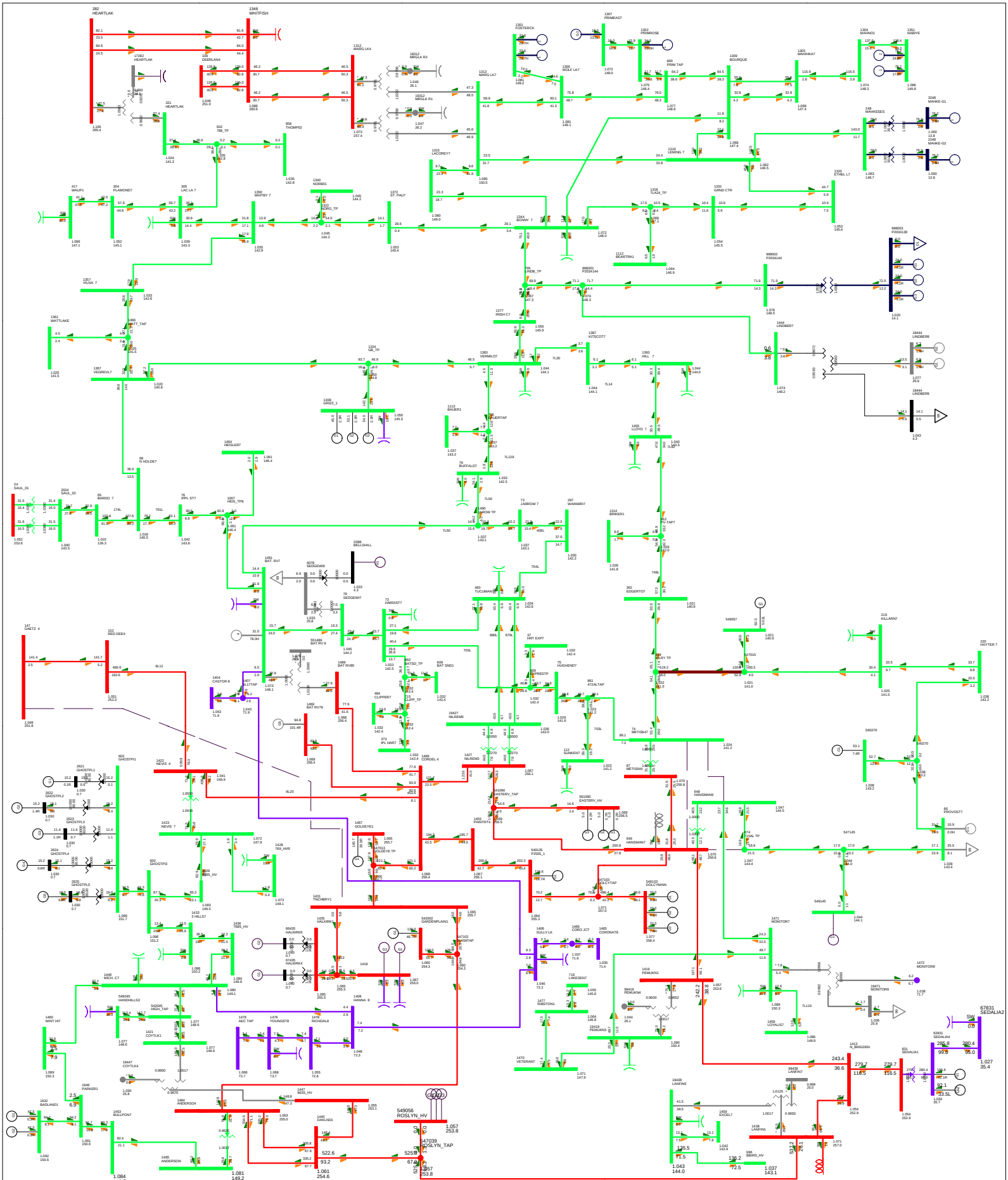
Study Case Description

2028SP-woCETO POST-PROJ

Base Case

P2034 Cold Lake Area Cogen

Bus - VOLTAGE (kV/PU)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%RATEA
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A3- 4

Contingency

CONT 062: 885L (648S Metiskow - 650S Hansman Lake)

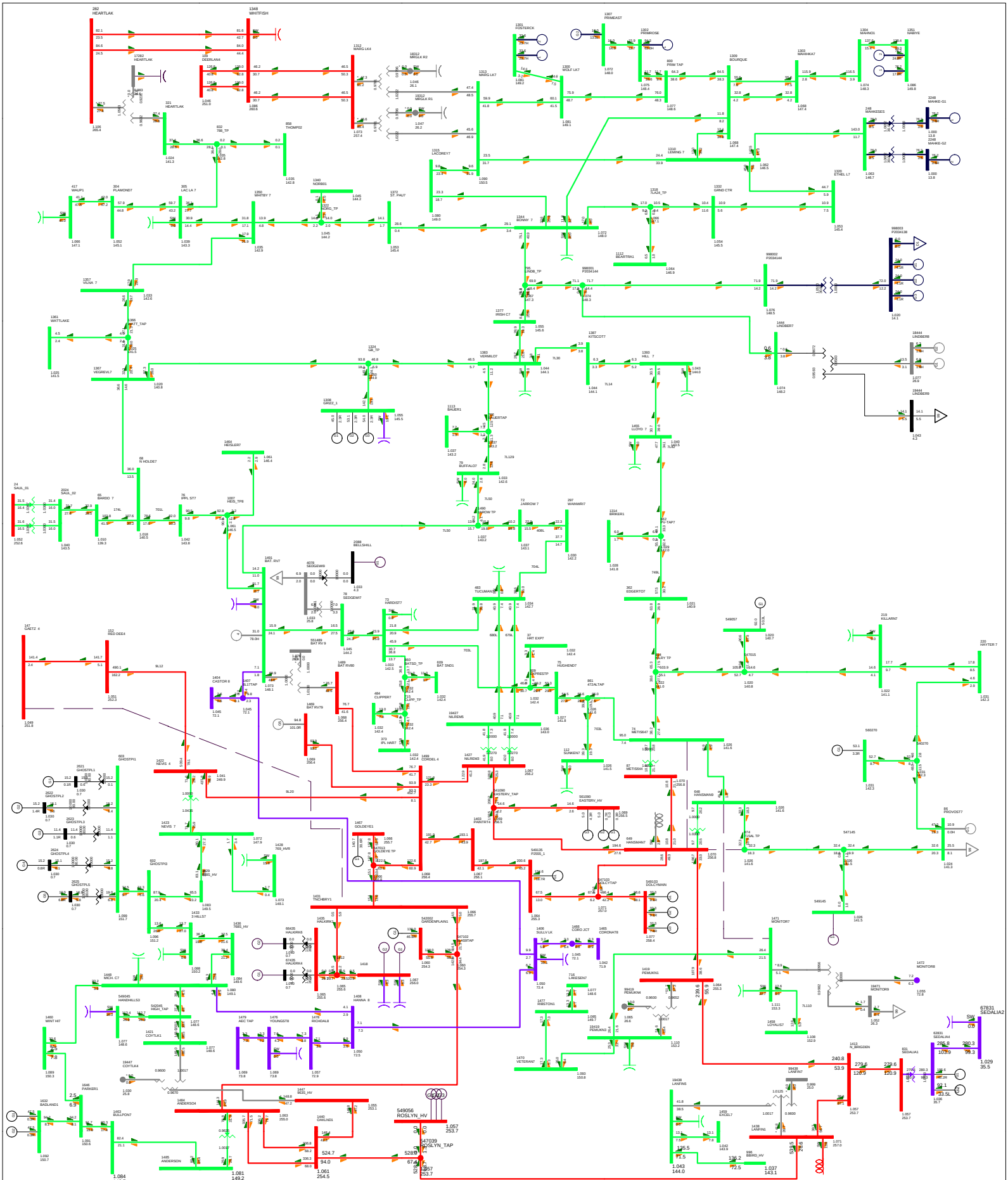
Study Case Description

2028SP-woCETO POST-PROJ

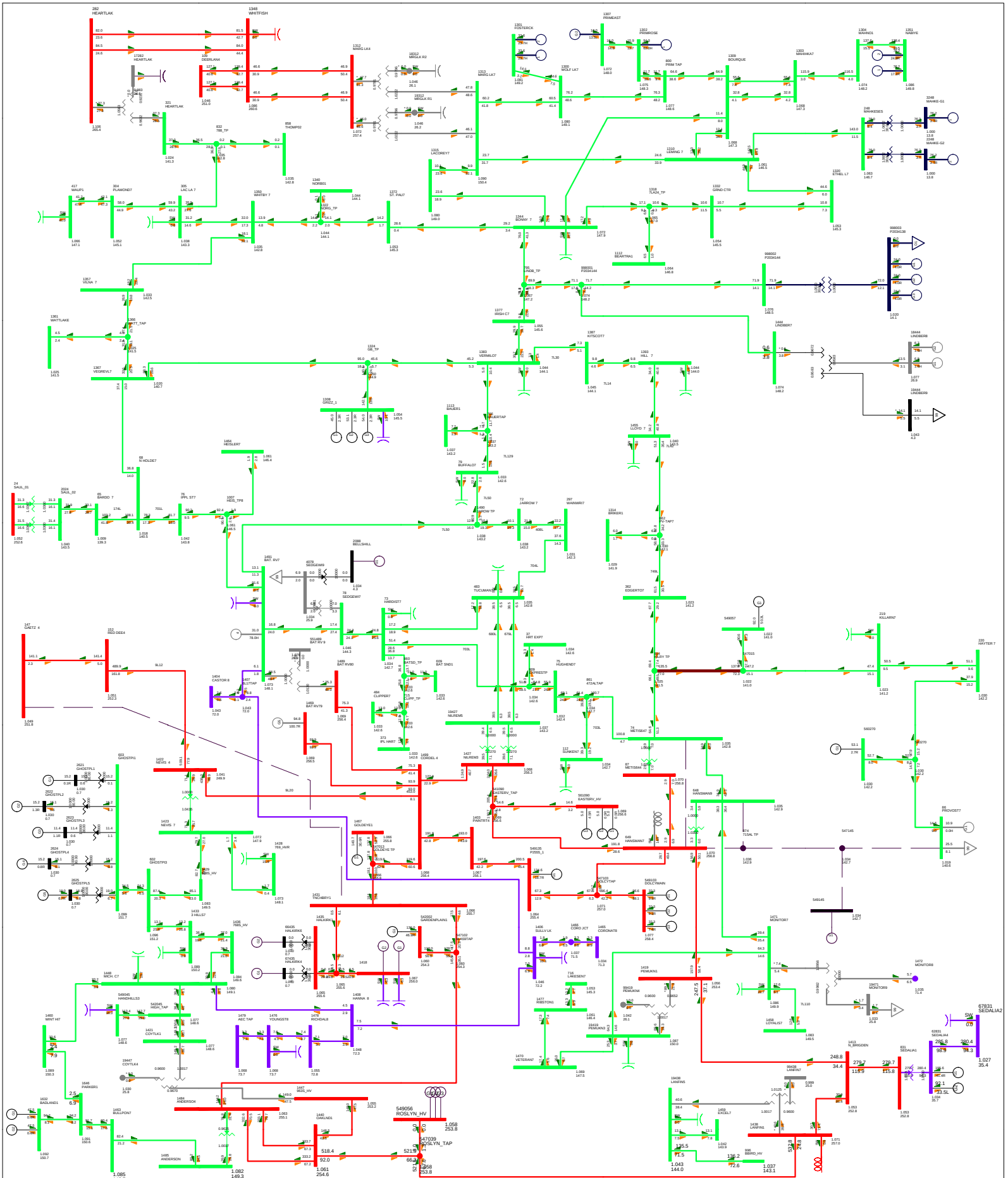
Base Case

P2034 Cold Lake Area Cogen

Bus - VOLTAGE (kV/PU)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%RATEA
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A3- 4	Contingency	Study Case Description	P2034 Cold Lake Area Cogen
	CONT 063: 7L224 (650S Hansman Lake - 774S Monitor)	2028SP-woCETO POST-PROJ Base Case	Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A3- 4

Contingency

CONT 064: 715L (650S Hansman Lake - P2540 Cache Rising Sun - 545S Provost)

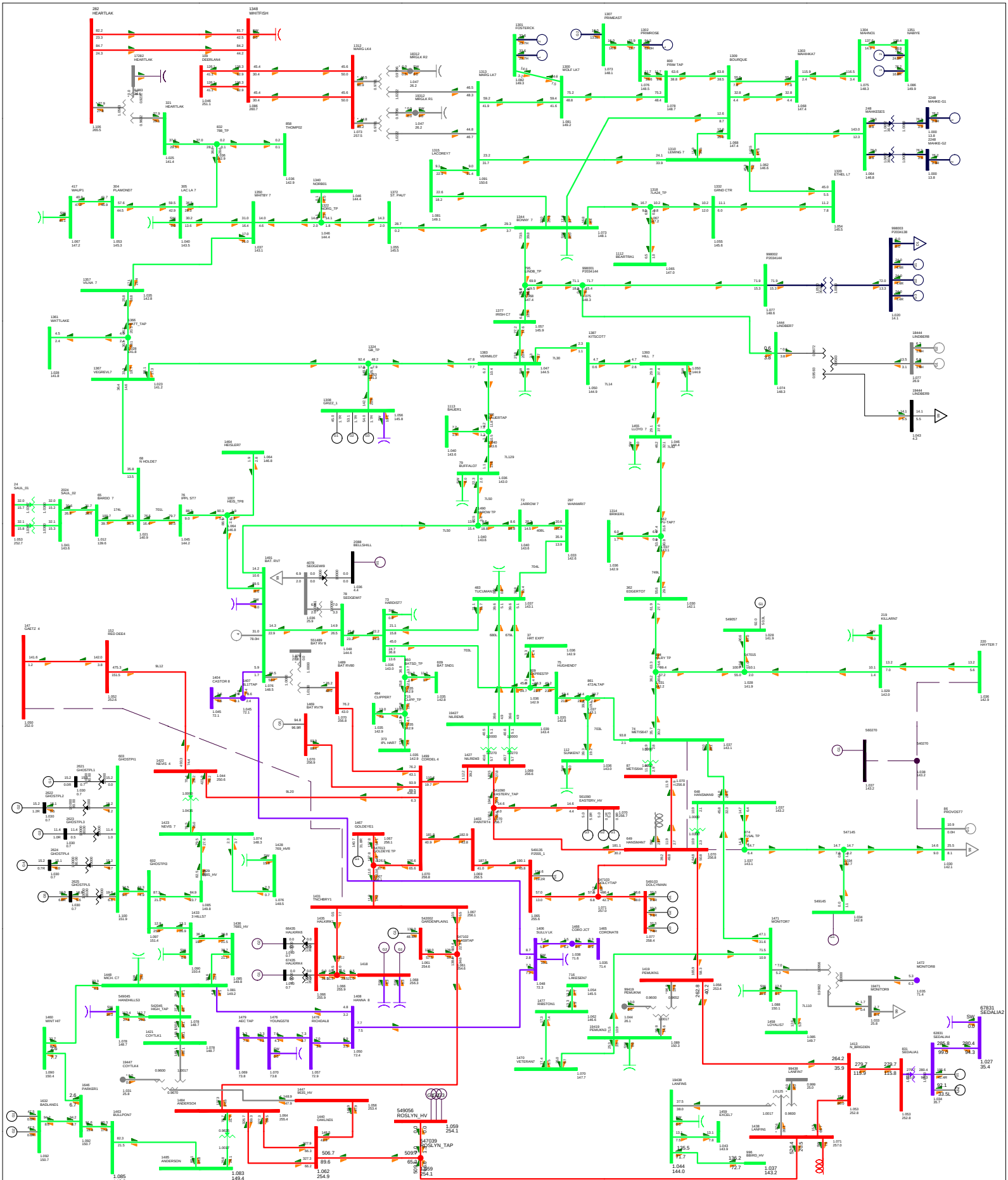
Study Case Description

2028SP-woCETO POST-PROJ

Base Case

P2034 Cold Lake Area Cogen

Bus - VOLTAGE (kV/PU)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%RATEA
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A3- 4

Contingency

CONT 065: 398L (545S Provost - P2573 Prairie Yarrow - 277S Hayter)

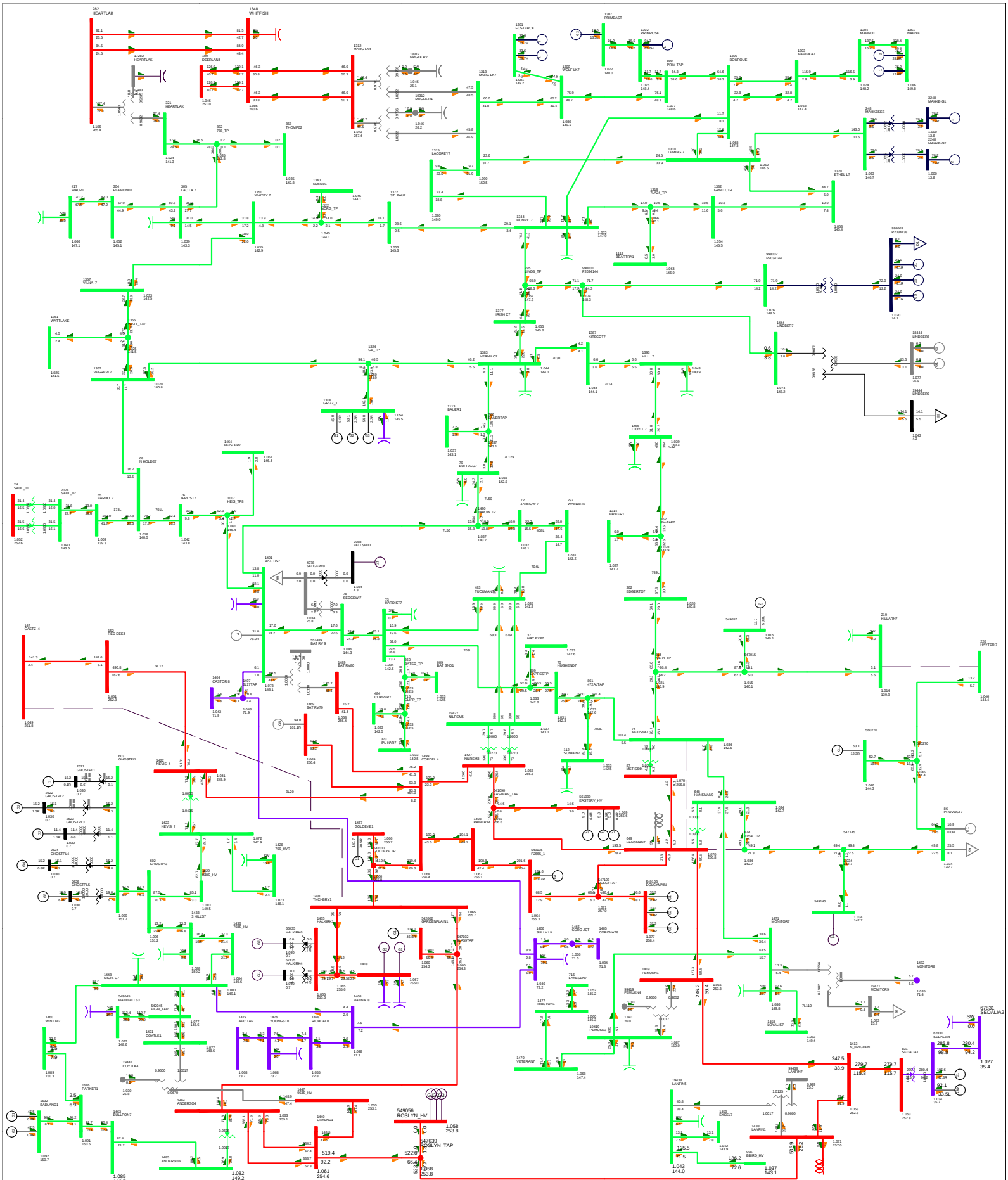
Study Case Description

2028SP-woCETO POST-PROJ

Base Case

P2034 Cold Lake Area Cogen

Bus - VOLTAGE (kV/PU)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%RATEA
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A3- 4

Contingency

CONT 066: 748L (267S Killarney Lake - 277S Hayter)

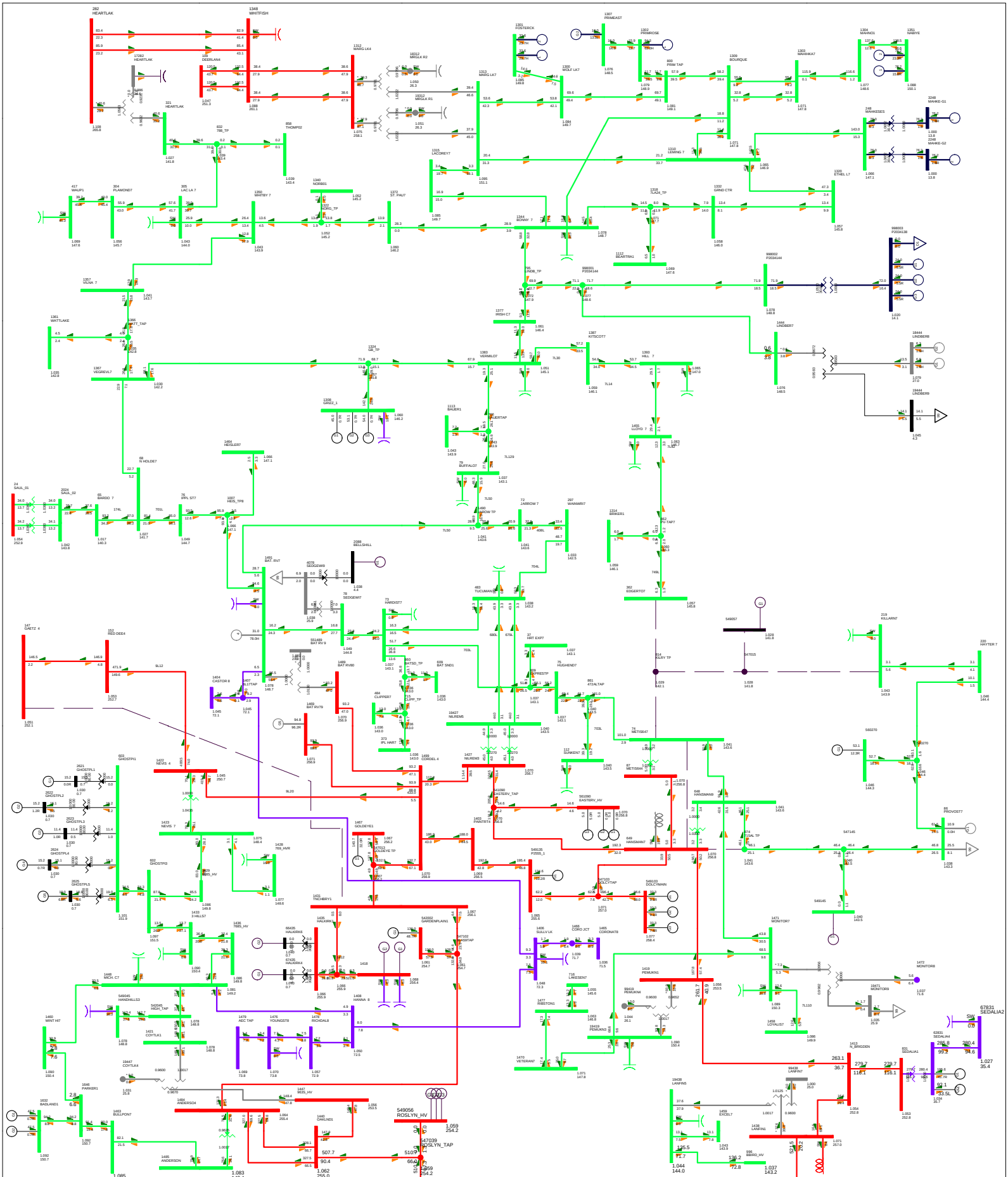
Study Case Description

2028SP-woCETO POST-PROJ

Base Case

P2034 Cold Lake Area Cogen

Bus - VOLTAGE (kV/PU)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%RATEA
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A3- 4

Contingency

CONT 067: 749L (648S Metiskow - 267S Killarney Lake - P2460 Fox Meadows Wind - 899S Edgerton

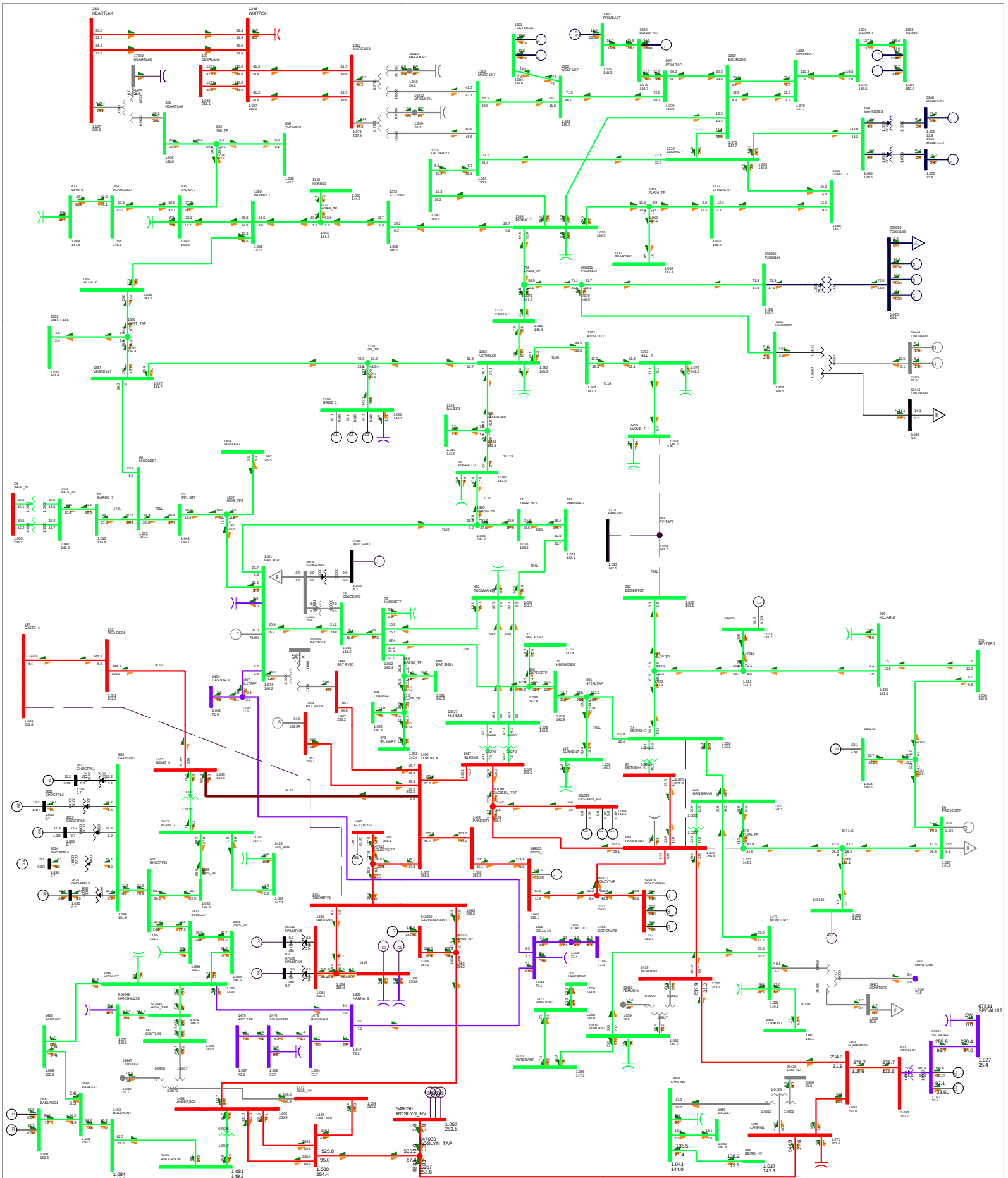
Study Case Description

EXISTING CETO POST-PROJ

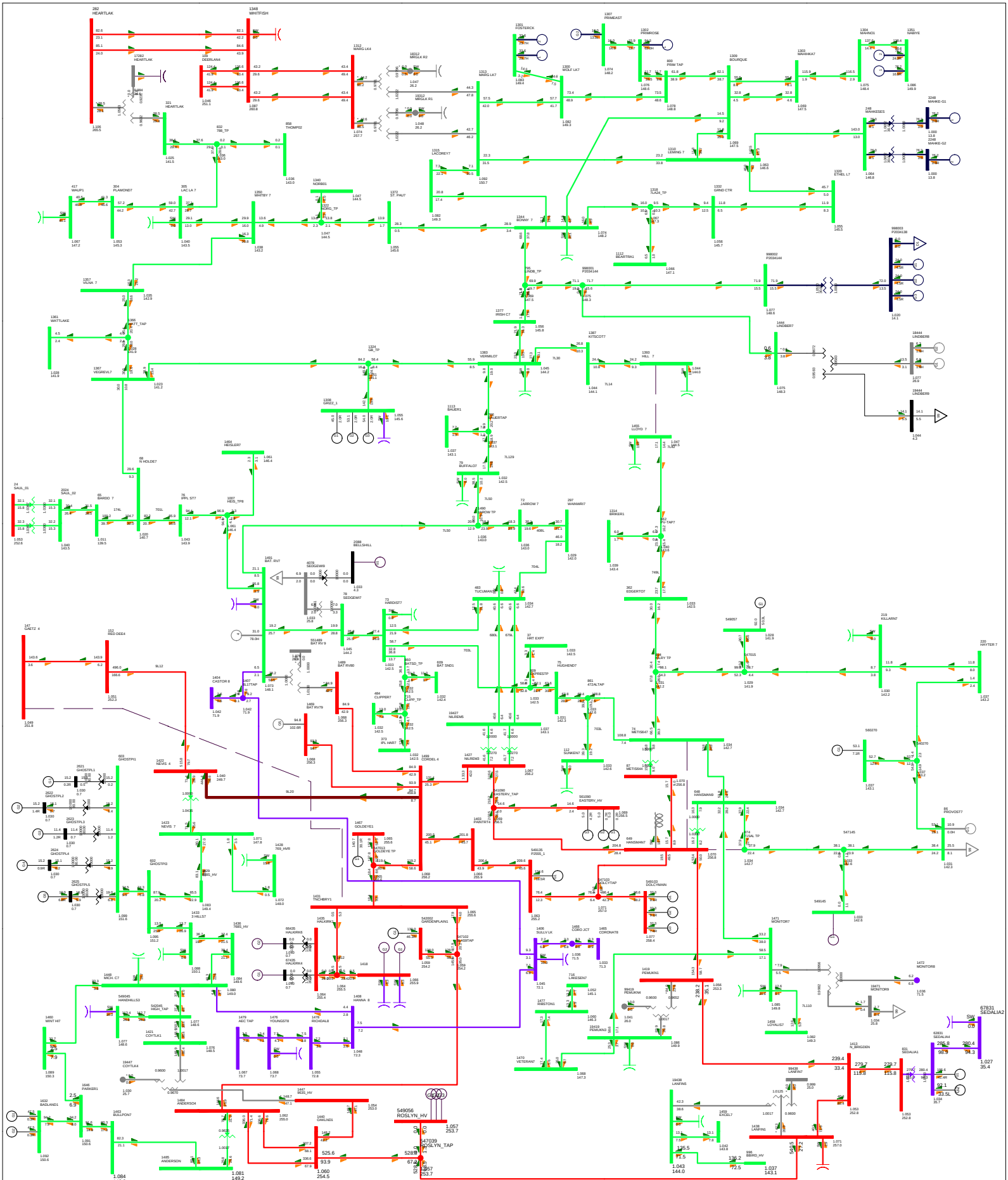
Base Case

P2034 Cold Lake Area Cogen

Bus - VOLTAGE (kV/PU)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%RATEA
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A3- 4	**Contingency** CONT 068: 7L749 (899S Edgerton - 716S Lloydminster - 880S Briker)	**Study Case Description** 2028SP-woCETO POST-PROJ Base Case	**P2034 Cold Lake Area Cogen** Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A3- 4

Contingency

CONT 069: 7L42 (751S Hill - 716S Lloydminster)

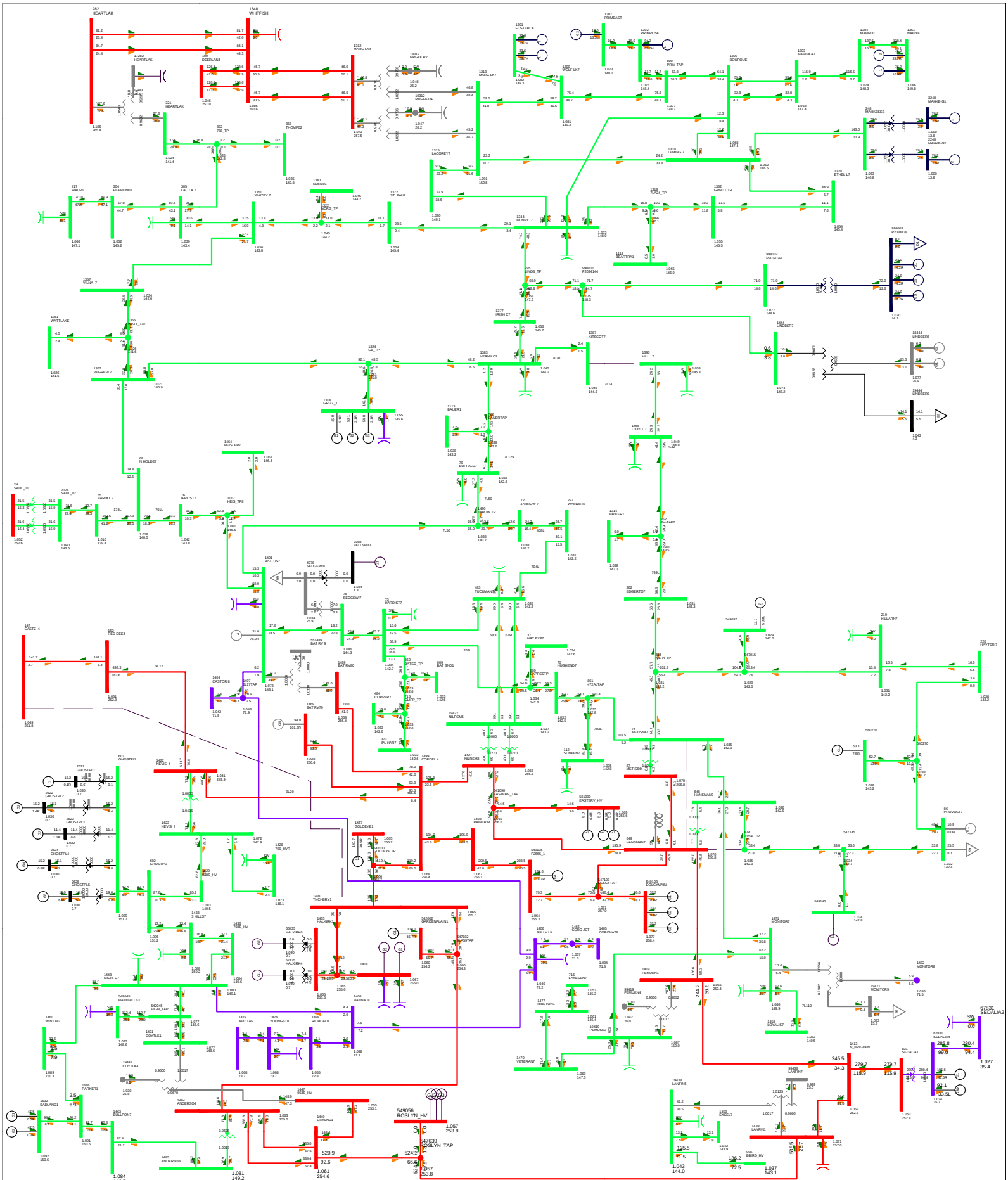
Study Case Description

2028SP-woCETO POST-PROJ

Base Case

P2034 Cold Lake Area Cogen

Bus - VOLTAGE (kV/PU)
Branch - MW/MVar
Equipment - MW/MVar
100.0%RATEA
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A3- 4

Contingency

CONT 070: 7L14 (705S Kitscoty - 751S Hill)

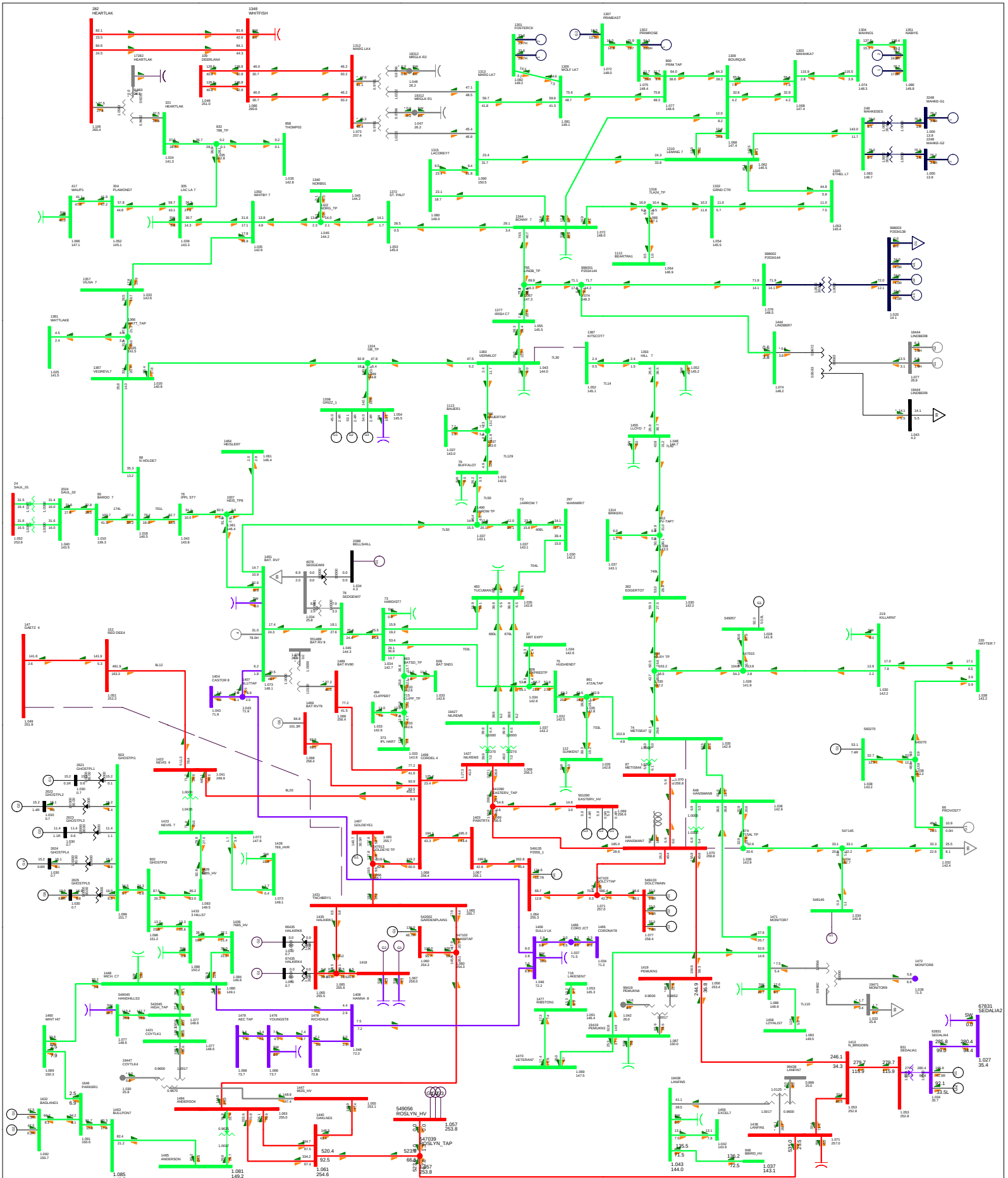
Study Case Description

2028SP-woCETO POST-PROJ

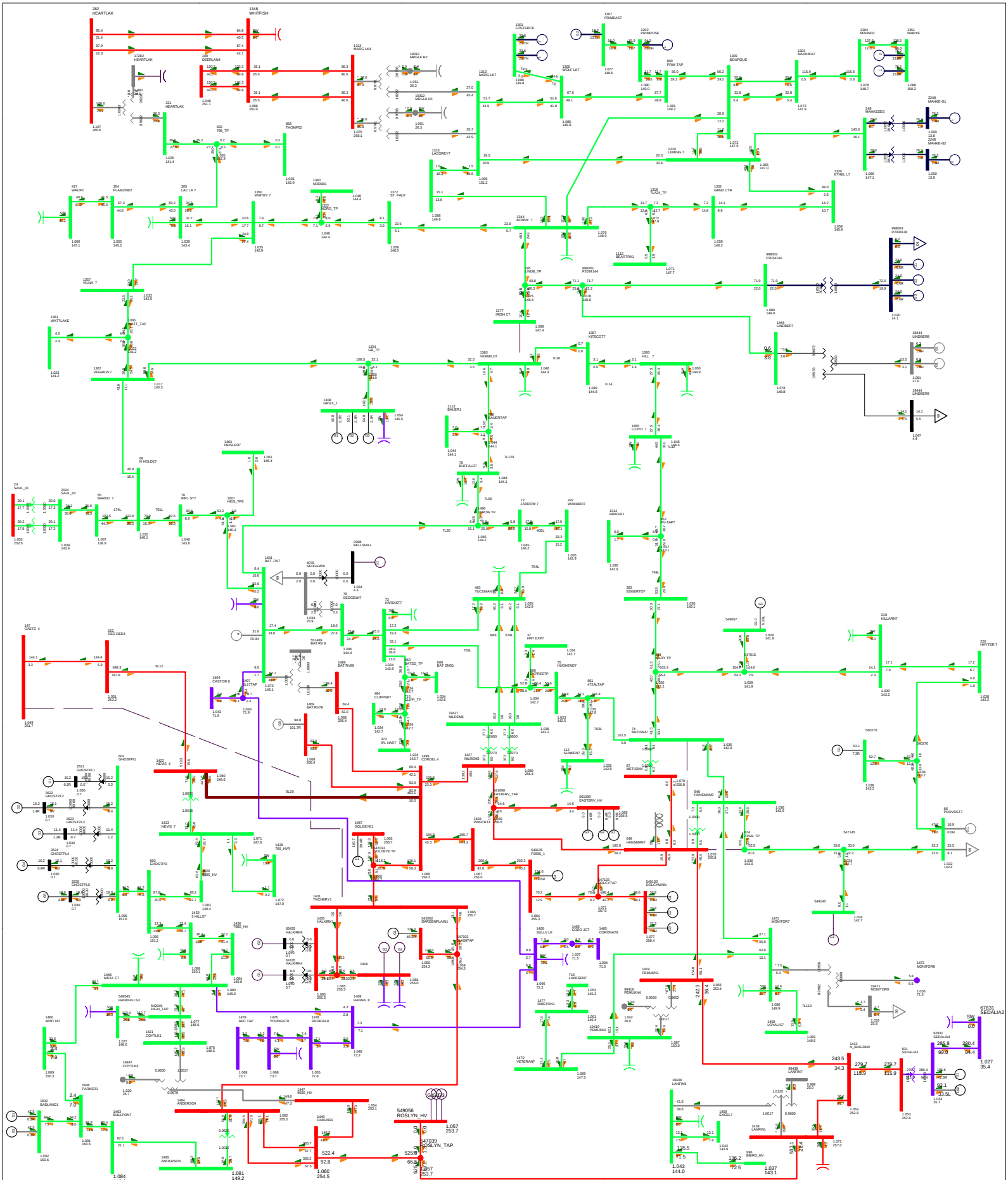
Base Case

P2034 Cold Lake Area Cogen

Bus - VOLTAGE (kV/PU)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%RATEA
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A3- 4	Contingency	Study Case Description	P2034 Cold Lake Area Cogen
	CONT 071: 7L130 (710S Vermilion - 705S Kitscoty)	2028SP-woCETO POST-PROJ Base Case	Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A3- 4

Contingency

CONT 072: 7L117 (706S Irish Creek - 710S Vermilion)

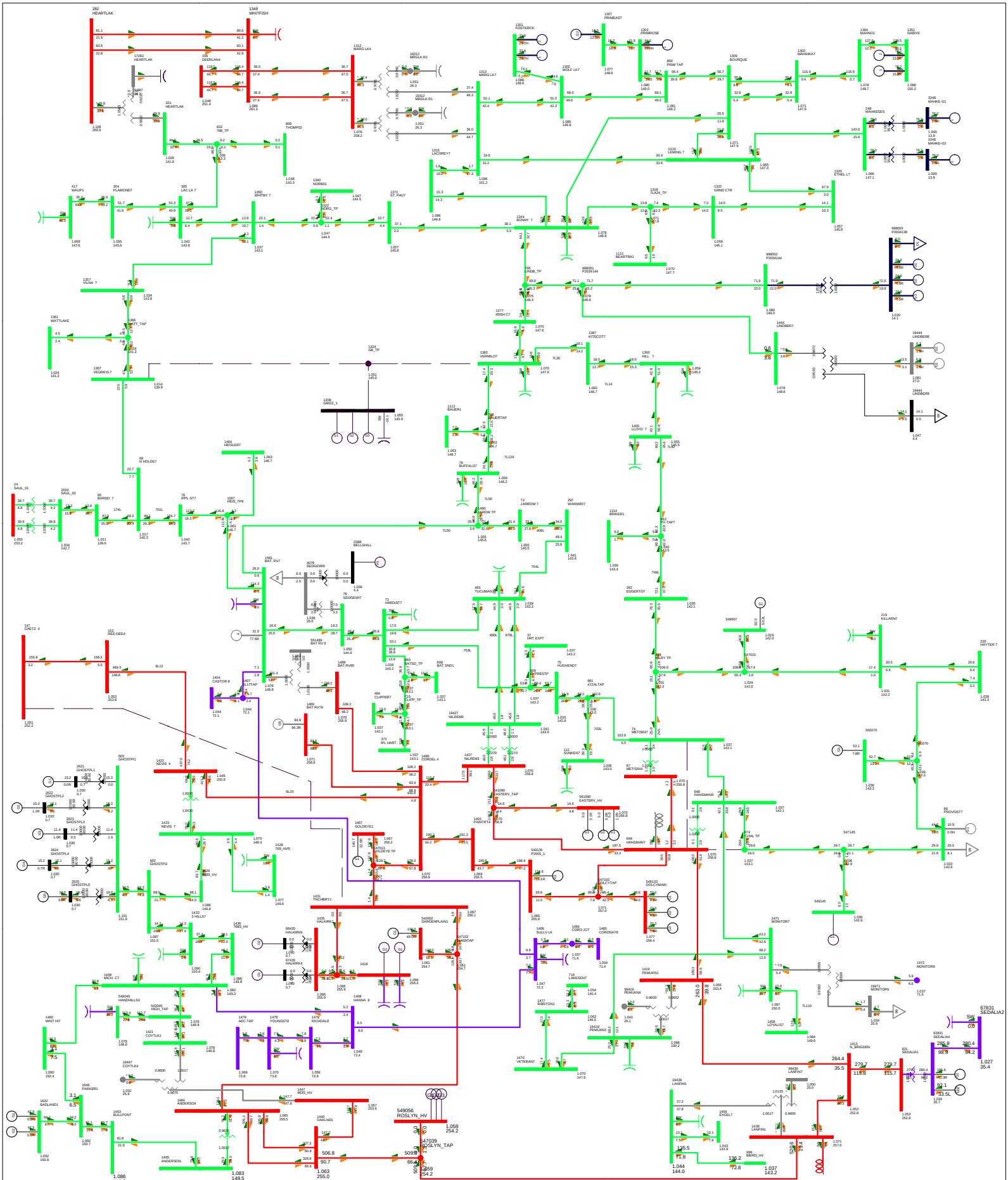
Study Case Description

2028SP-woCETO POST-PROJ

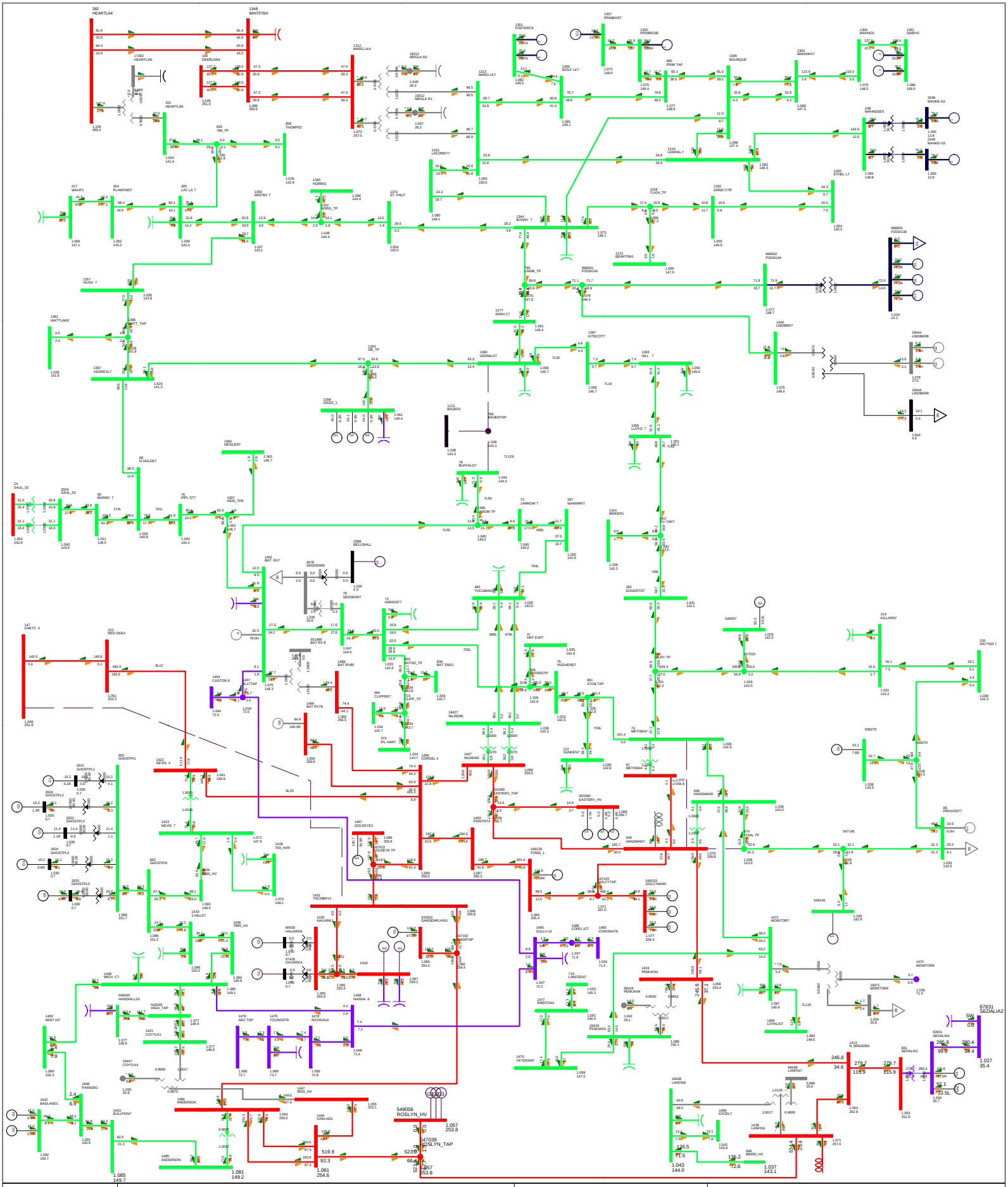
Base Case

P2034 Cold Lake Area Cogen

Bus - VOLTAGE (kV/PU)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%RATEA
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A3- 4	Contingency	Study Case Description	P2034 Cold Lake Area Cogen
	CONT 073: 7L65 (709S Vegreville - 710S Vermilion - 708S Grizzly Bear)	2028SP-woCETO POST-PROJ Base Case	Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A3- 4

Contingency

CONT 074: 7L129 (710S Vermilion - 918S Bauer - 526S Buffalo Creek)

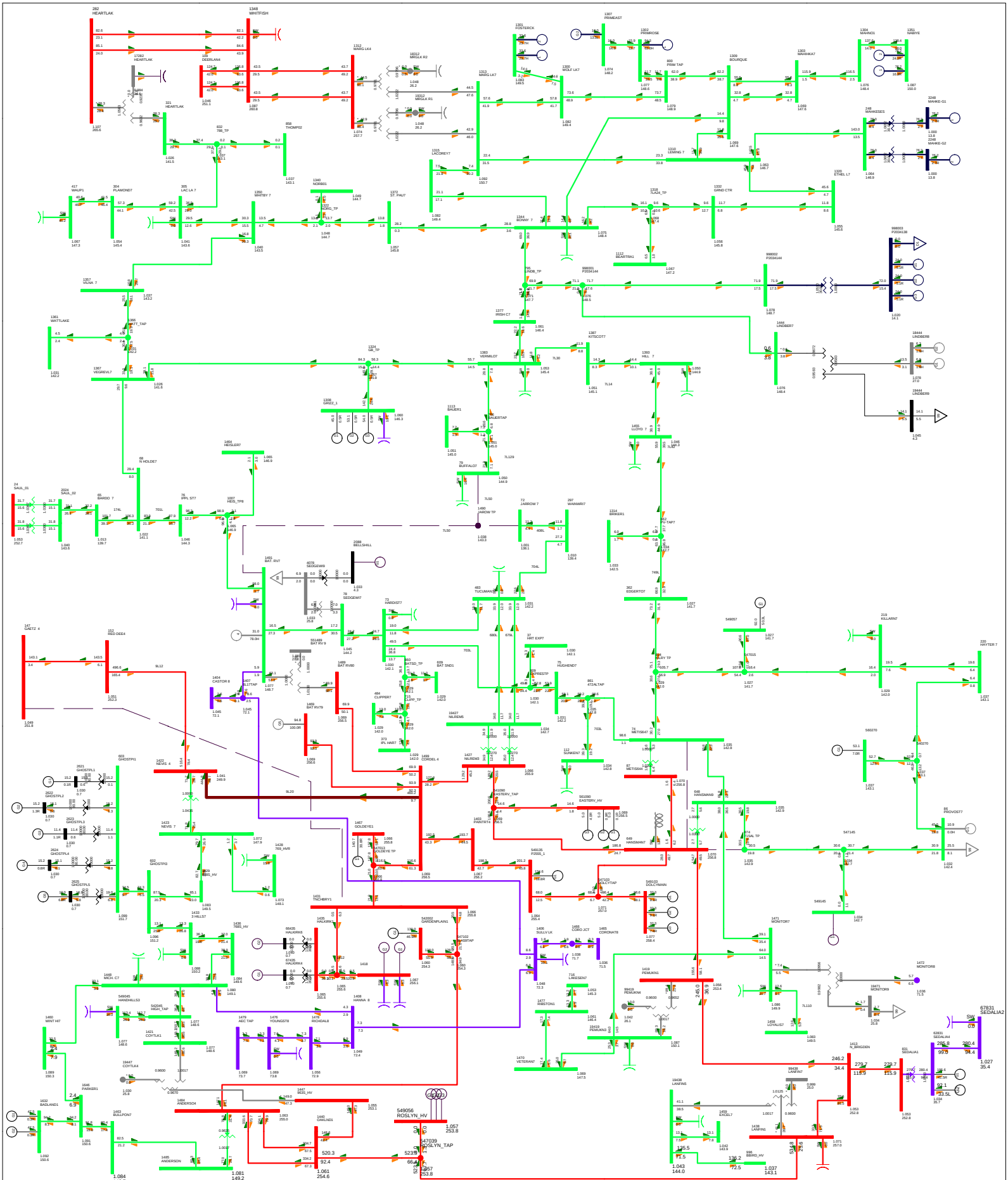
Study Case Description

2028SP-woCETO POST-PROJ

Base Case

P2034 Cold Lake Area Cogen

Bus - VOLTAGE (kV/PU)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%RATEA
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A3- 4

Contingency

CONT 075: 7L50 (526S Buffalo Creek - 757S Battle River - 252S Jarrow)

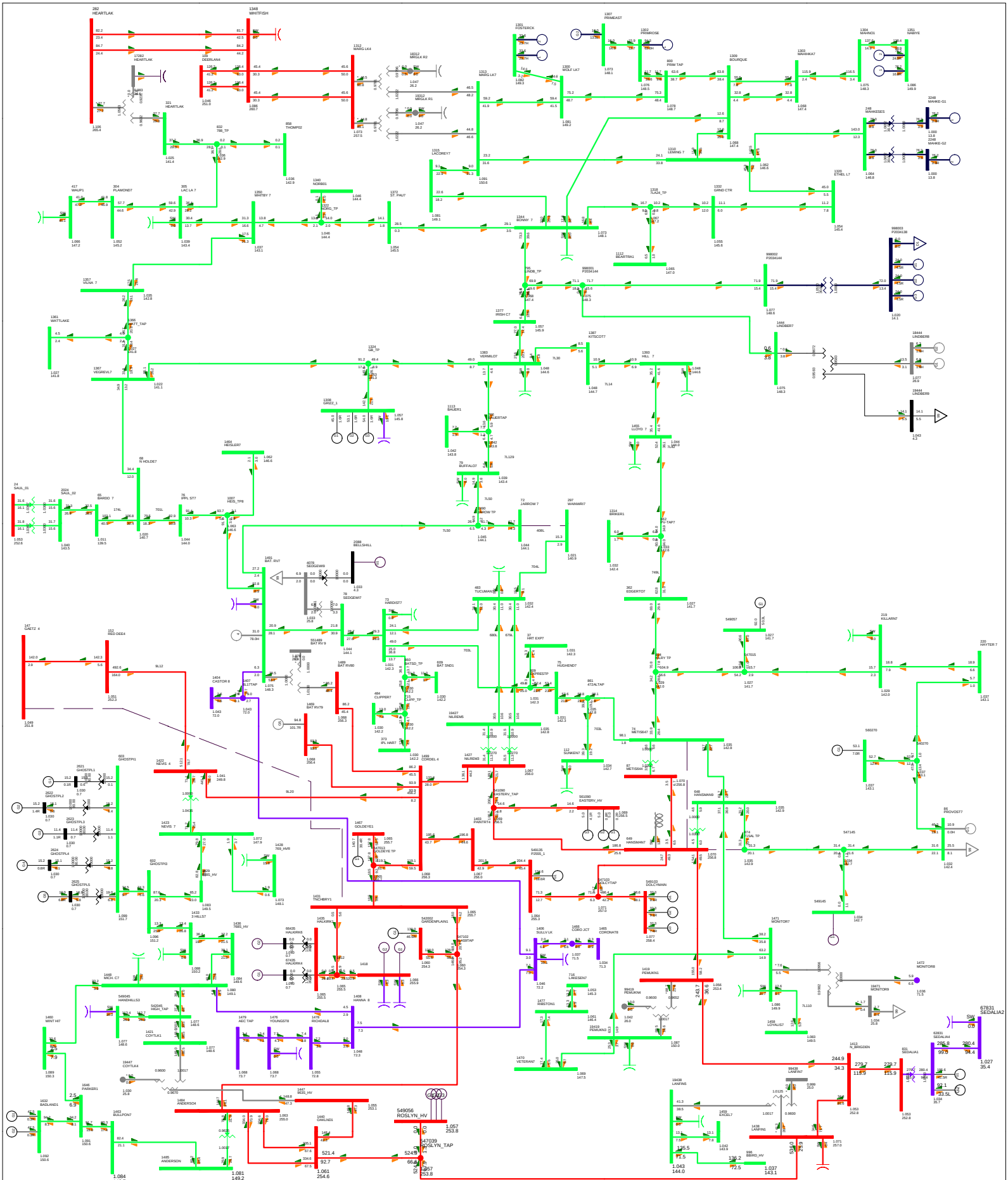
Study Case Description

2028SP-woCETO POST-PROJ

Base Case

P2034 Cold Lake Area Cogen

Bus - VOLTAGE (kV/PU)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%RATEA
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A3- 4

Contingency

CONT 076: 408L (252S Jarrow - 51S Wainwright)

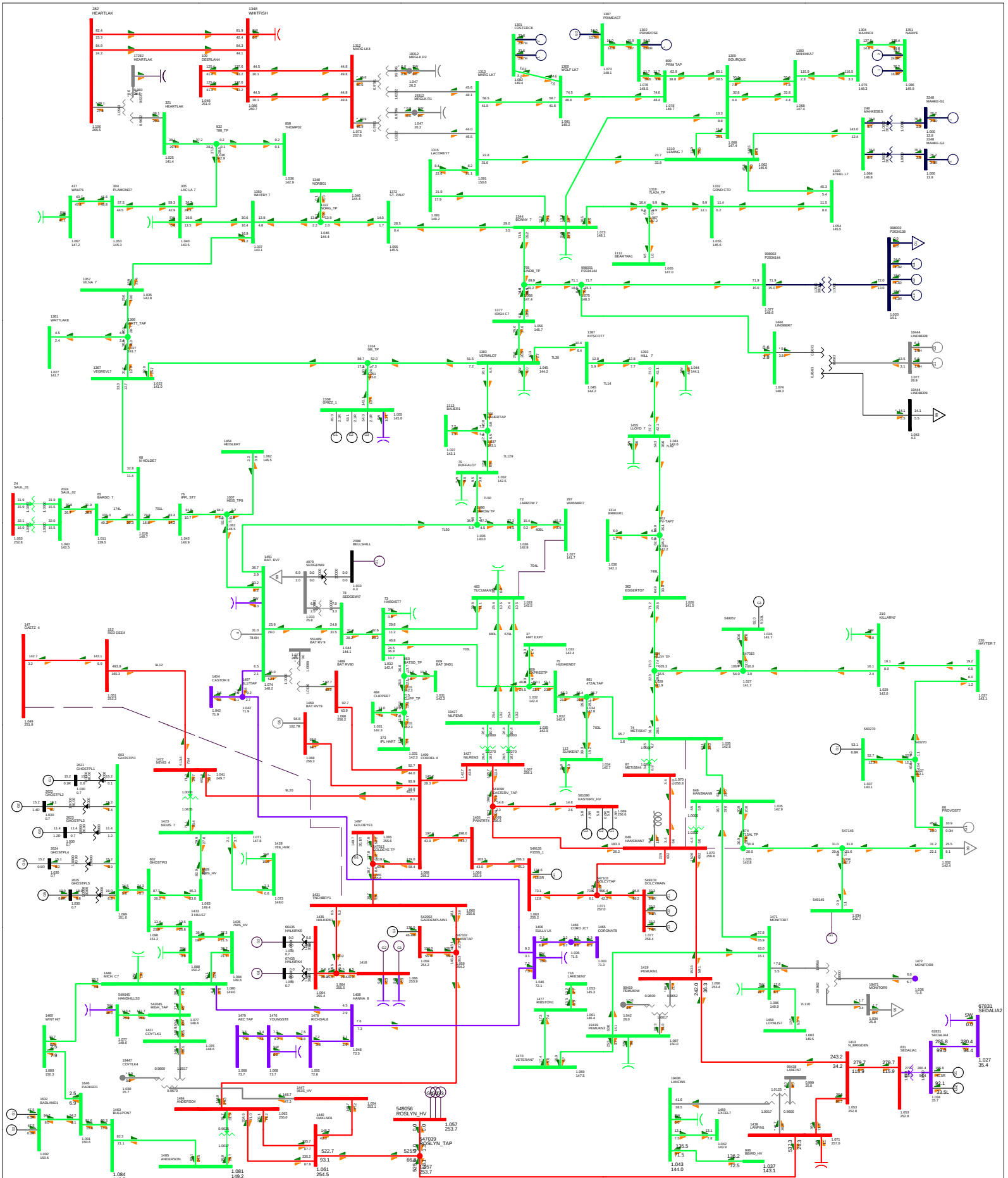
Study Case Description

2028SP-woCETO POST-PROJ

Base Case

P2034 Cold Lake Area Cogen

Bus - VOLTAGE (kV/PU)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%RATEA
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A3- 4

Contingency

CONT 077: 704L (51S Wainwright - 478S Tucuman)

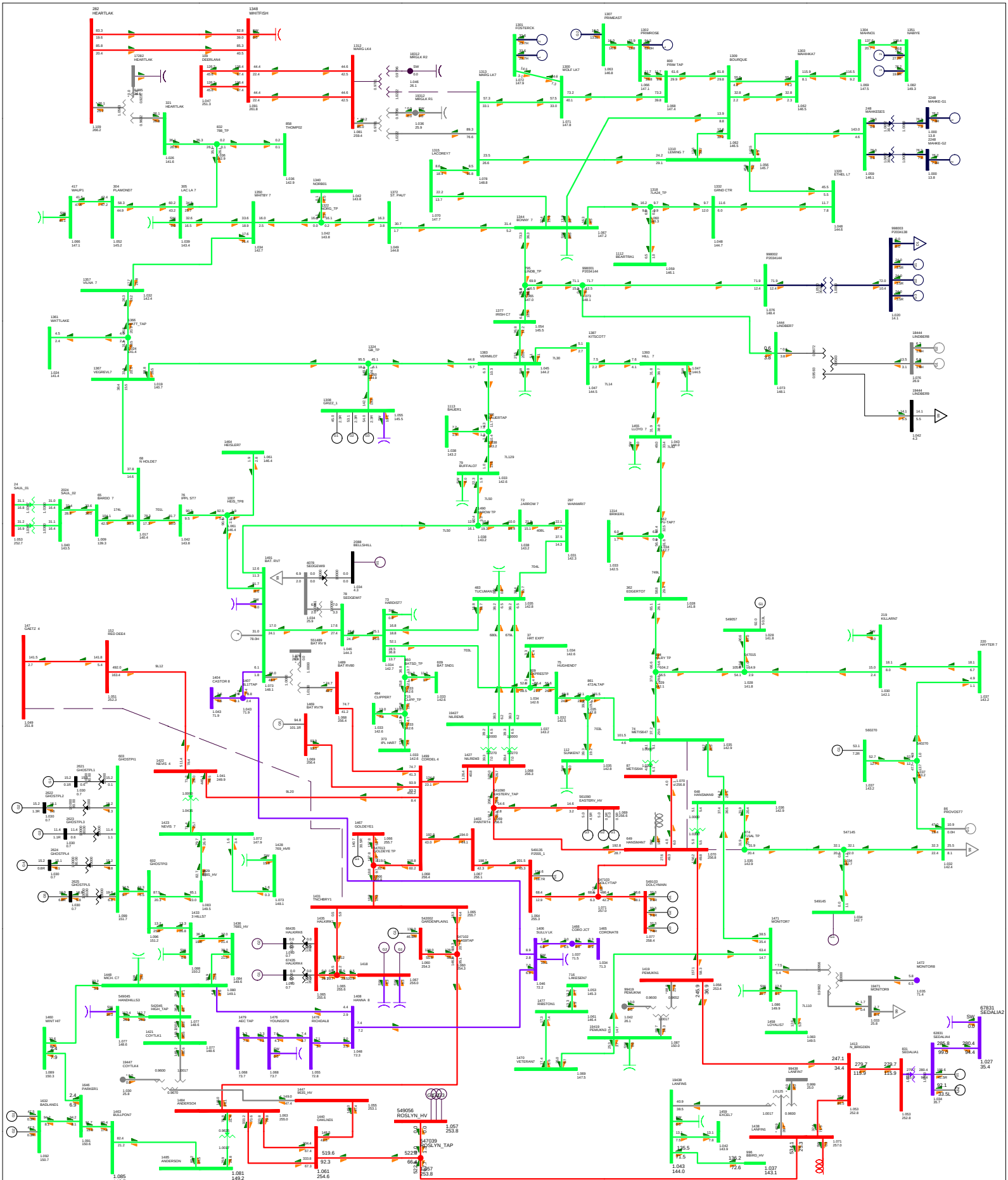
Study Case Description

2028SP-woCETO POST-PROJ

Base Case

P2034 Cold Lake Area Cogen

Bus - VOLTAGE (kV/PU)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%RATEA
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A3- 4

Contingency

CONT 078: Marguerite Lake 2T

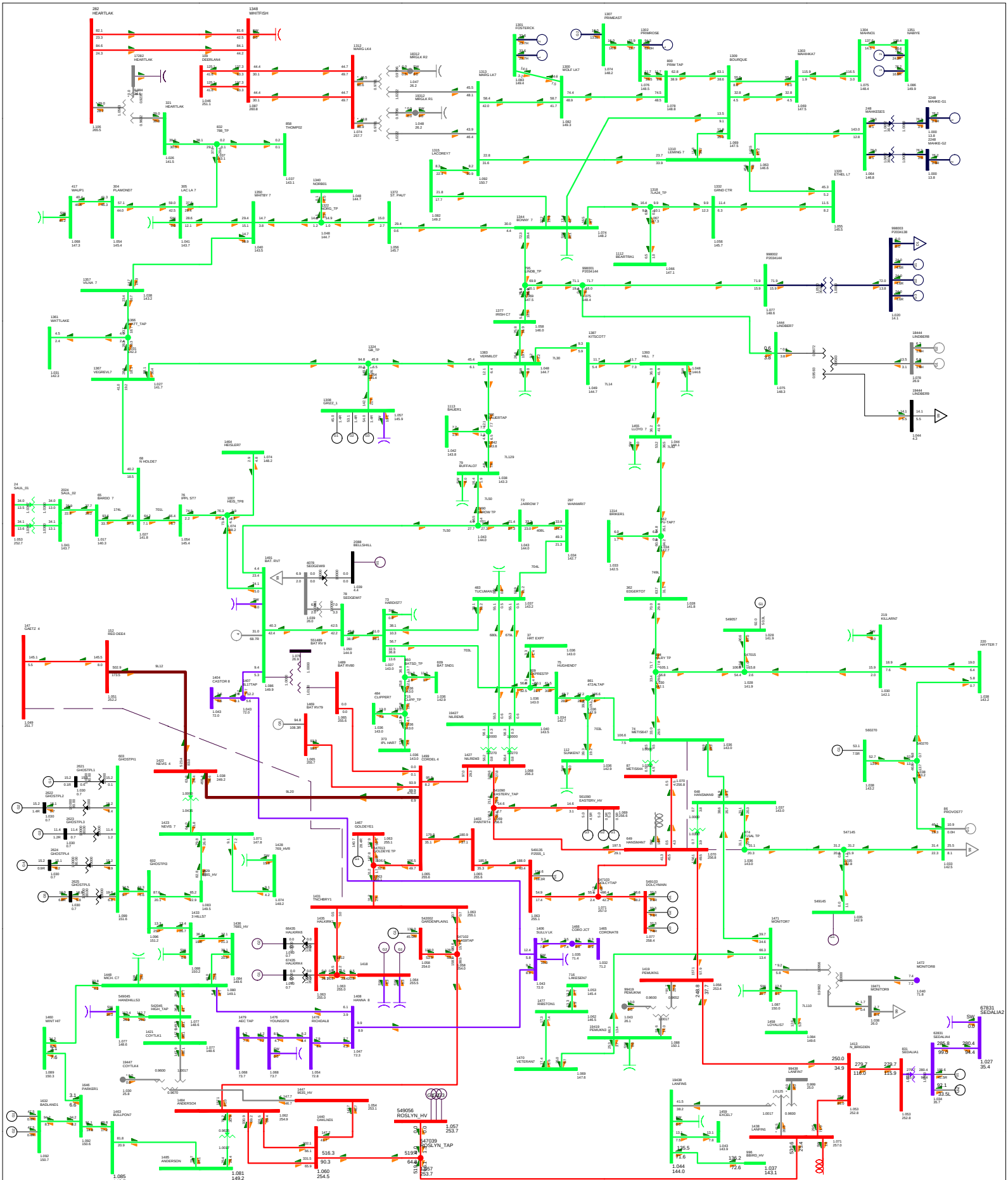
Study Case Description

2028SP-woCETO POST-PROJ

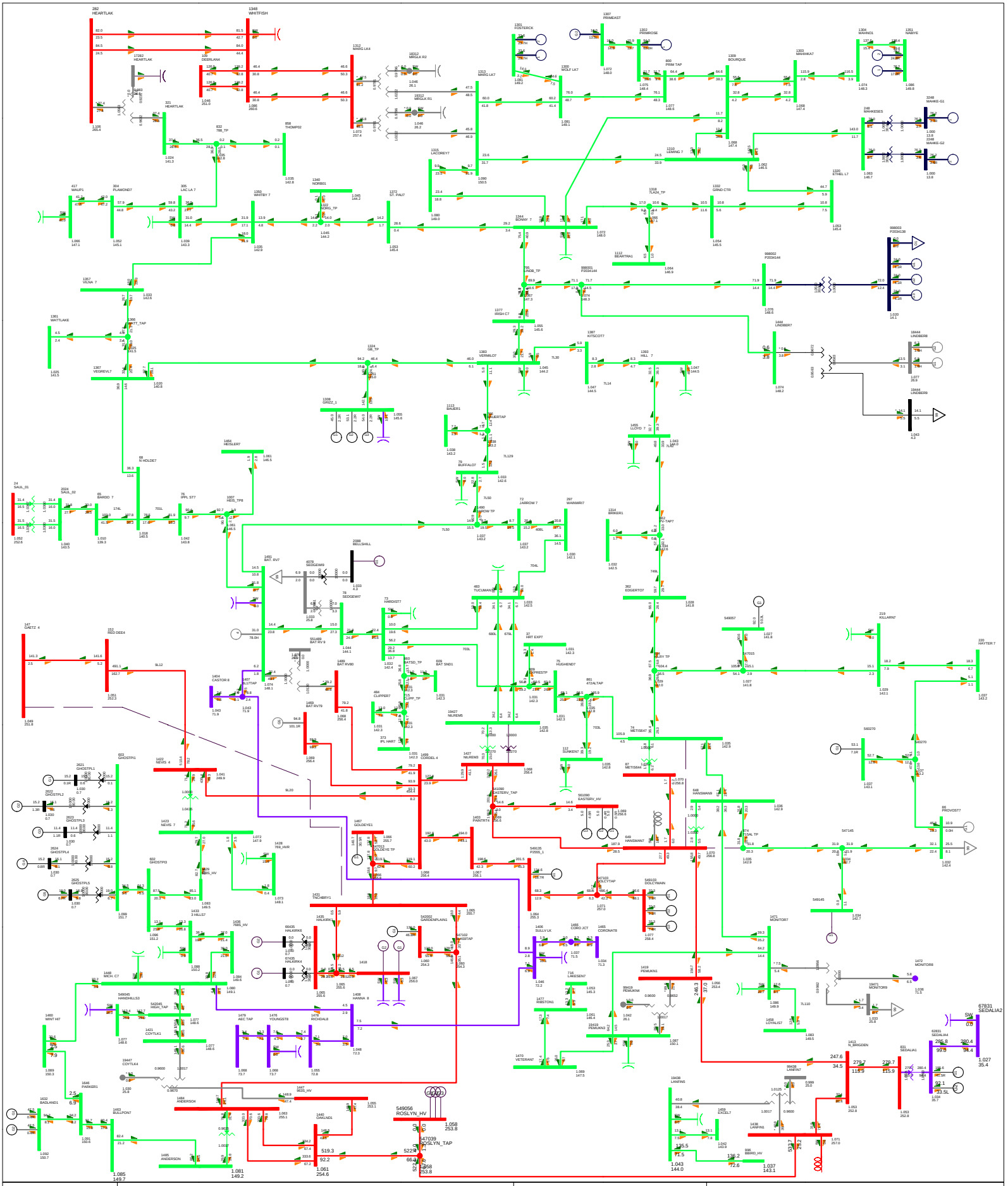
Base Case

P2034 Cold Lake Area Cogen

Bus - VOLTAGE (kV/PU)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%RATEA
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A3- 4	**Contingency** CONT 079: Battle River T2	**Study Case Description** 2028SP-woCETO POST-PROJ Base Case	**P2034 Cold Lake Area Cogen** Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A3- 4

Contingency

CONT 080: 574S Nilrem 162.2TR

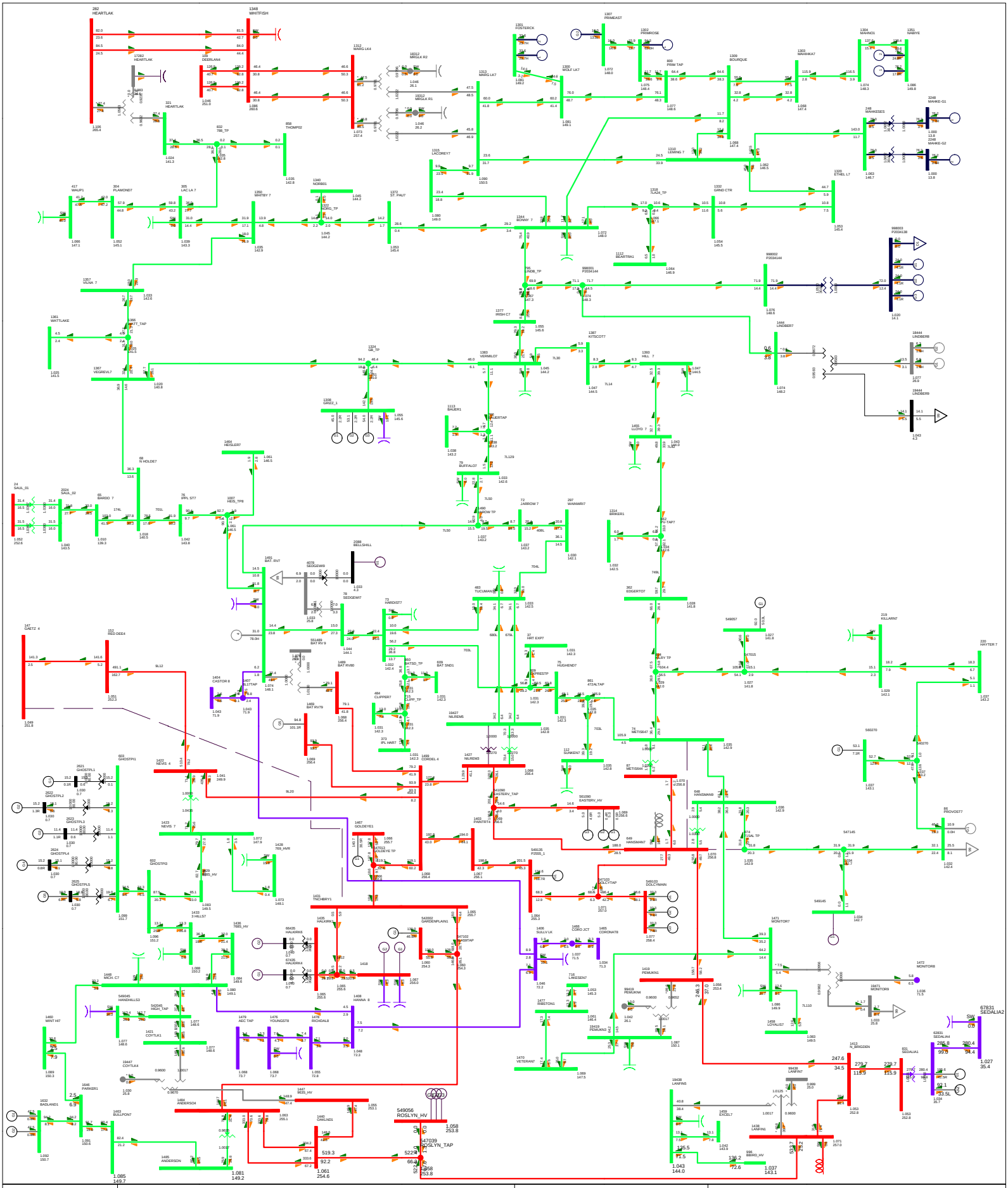
Study Case Description

2028SP-woCETO POST-PROJ

Base Case

P2034 Cold Lake Area Cogen

Bus - VOLTAGE (kV/PU)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%RATEA
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A3- 4

Contingency

CONT 081: 574S Nilrem 87ST1

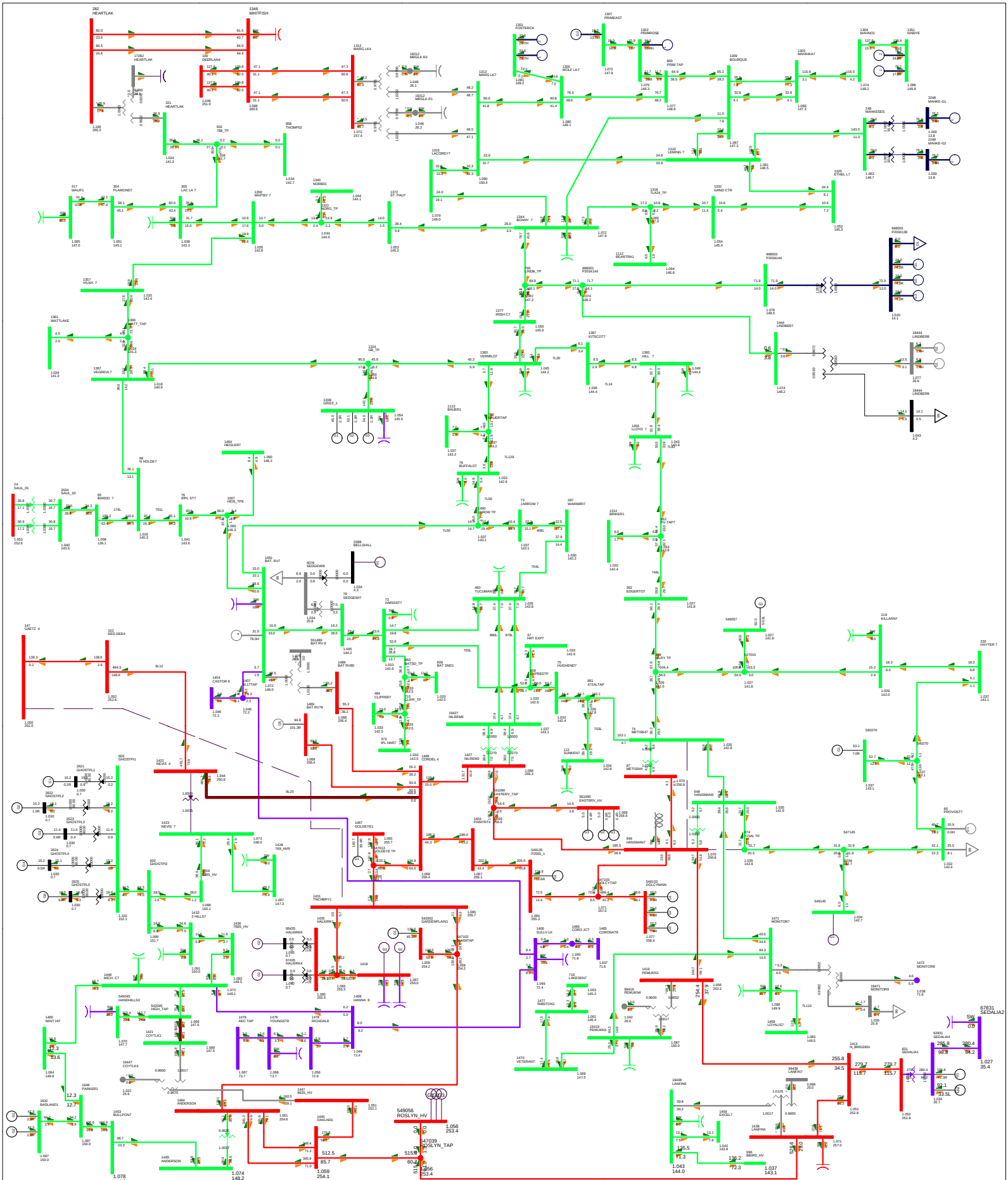
Study Case Description

2028SP-woCETO POST-PROJ

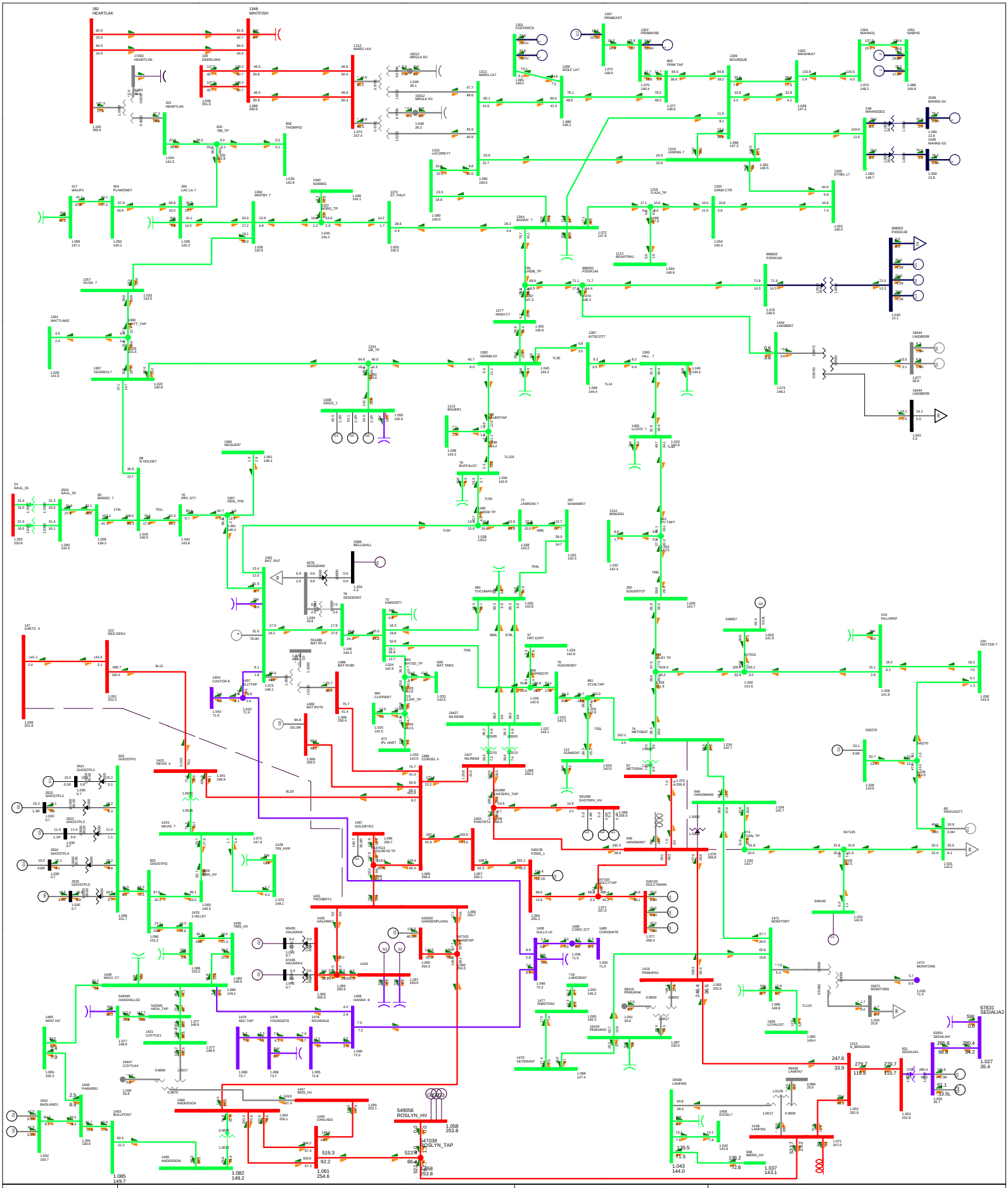
Base Case

P2034 Cold Lake Area Cogen

Bus - VOLTAGE (kV/PU)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%RATEA
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A3- 4	**Contingency** CONT 082: 766S Nevis 162.1TR	**Study Case Description** 2028SP-woCETO POST-PROJ Base Case	**P2034 Cold Lake Area Cogen** Bus - VOLTAGE (kV/PU) Branch - MW/MVar Equipment - MW/MVar 100.0%RATEA kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A3- 4

Contingency

CONT 083: 650S Hansman Lake 63ST1

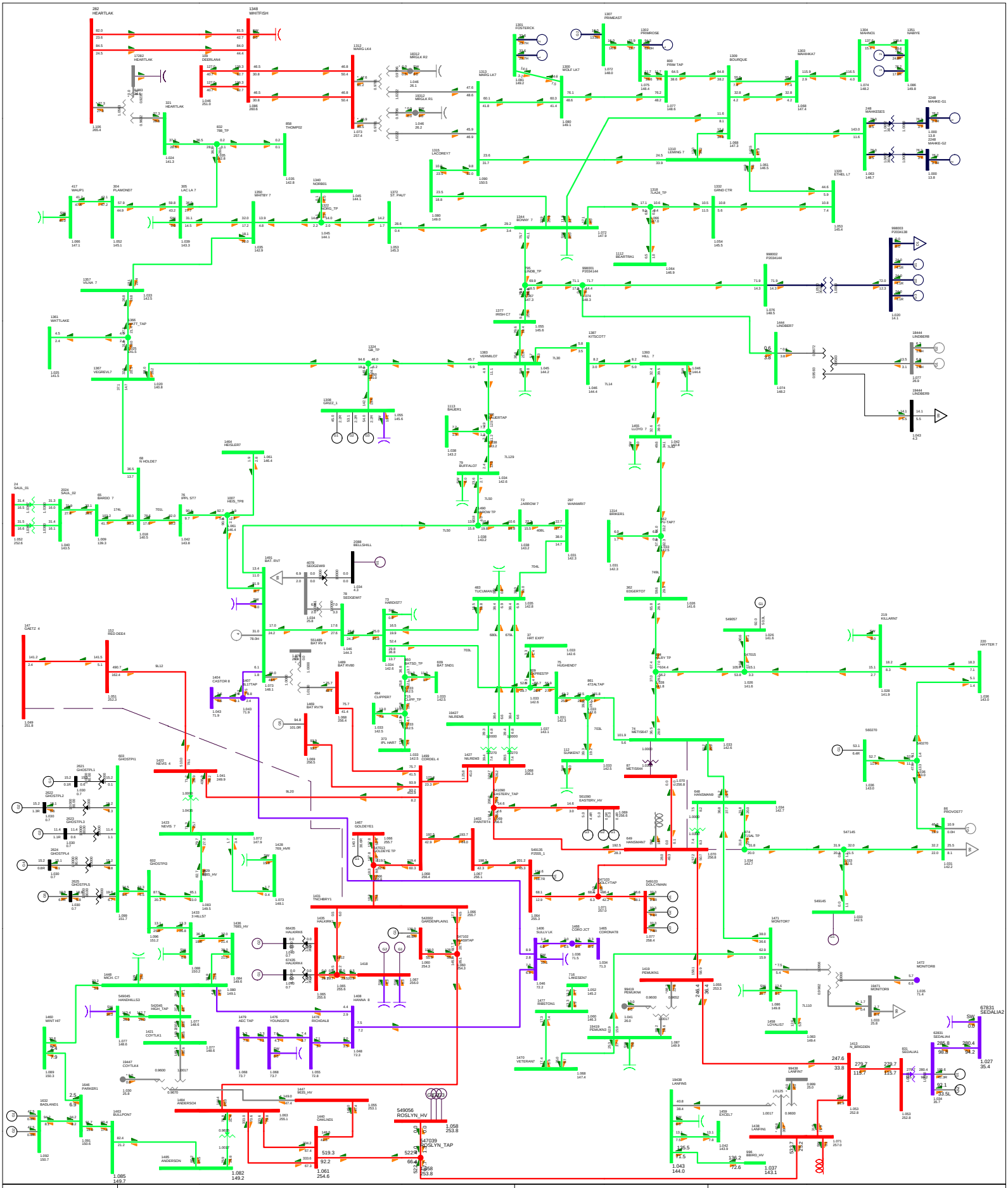
Study Case Description

2028SP-woCETO POST-PROJ

Base Case

P2034 Cold Lake Area Cogen

Bus - VOLTAGE (kV/PU)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%RATEA
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment A3- 4

Contingency

CONT 084: 648S Metiskow T3

Study Case Description

2028SP-woCETO POST-PROJ

Base Case

P2034 Cold Lake Area Cogen

Bus - VOLTAGE (kV/PU)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%RATEA
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000

Attachment A4
Post-Project Voltage Stability Diagrams

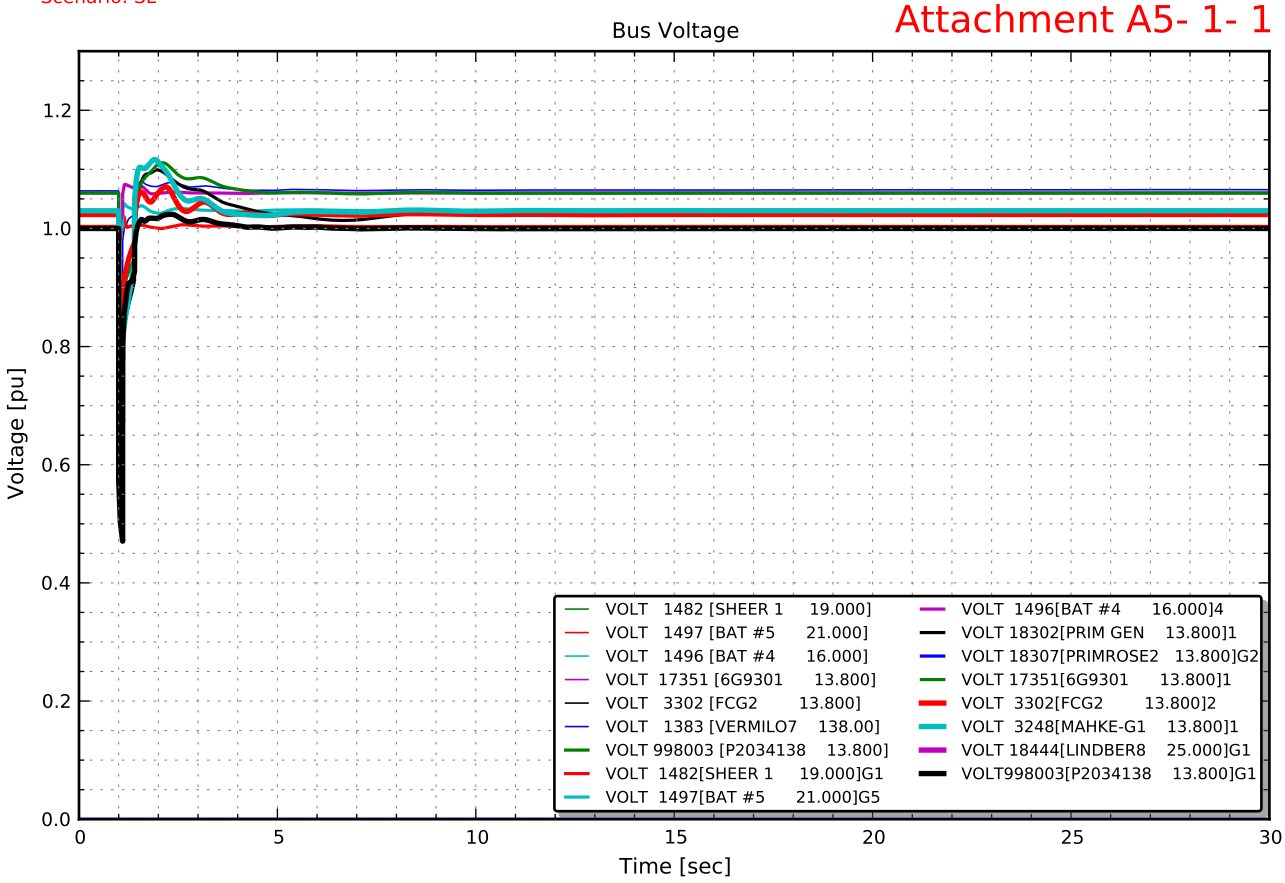
Voltage Stability Analysis was not required.

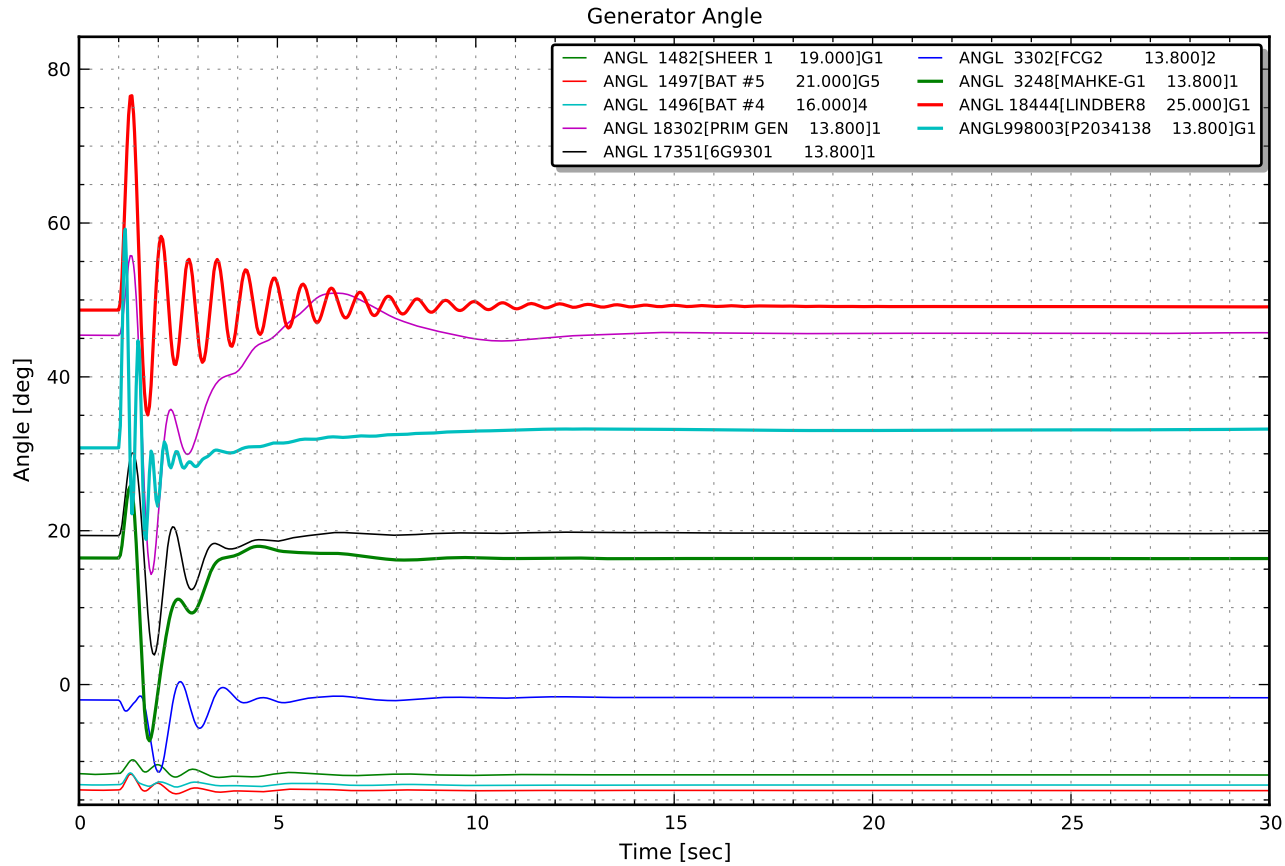
Attachment A5
Post-Project Transient Stability Diagrams

Dynamic Stability Analysis

Contingency: 01A - 7L24 Bonnyville 700S to Grande Centre 846S
Alternnative: Post-Project Basecase
Scenario: SL

Attachment A5- 1- 1



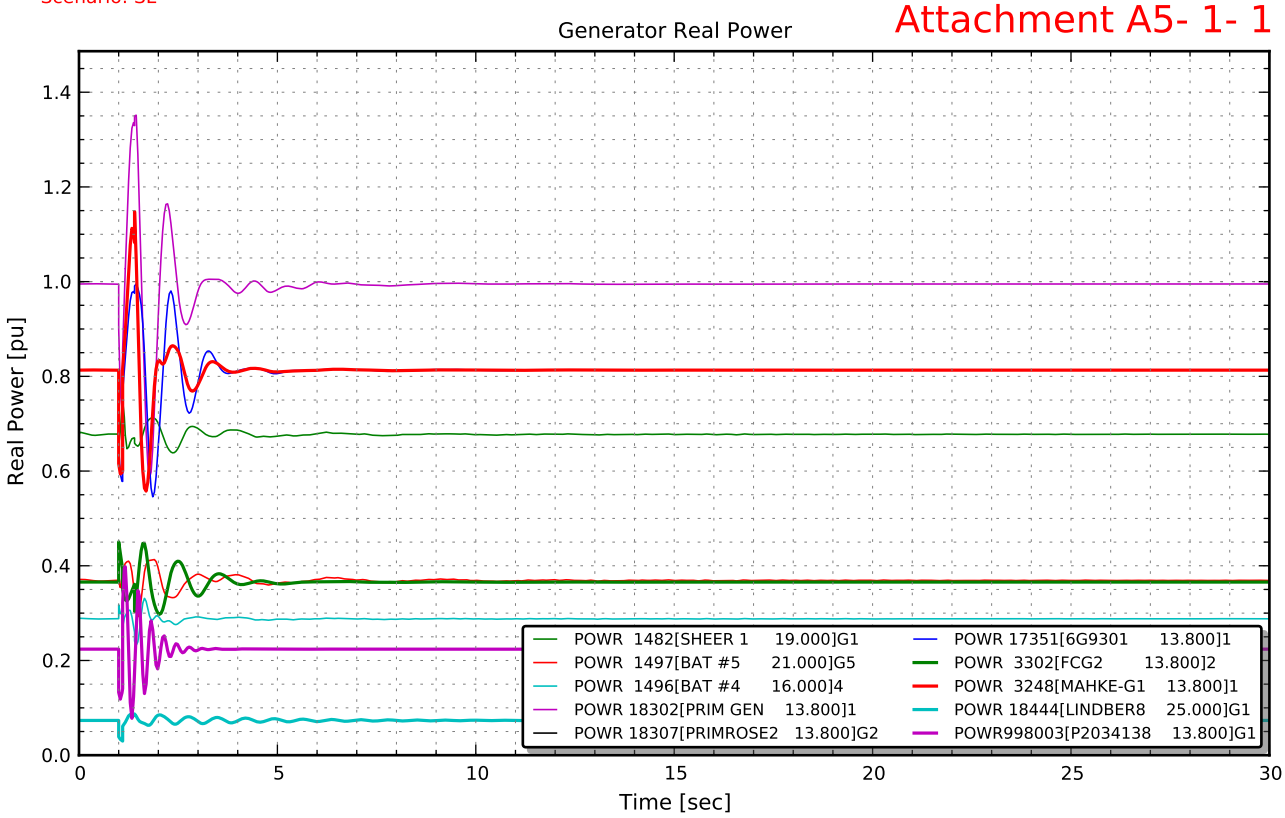


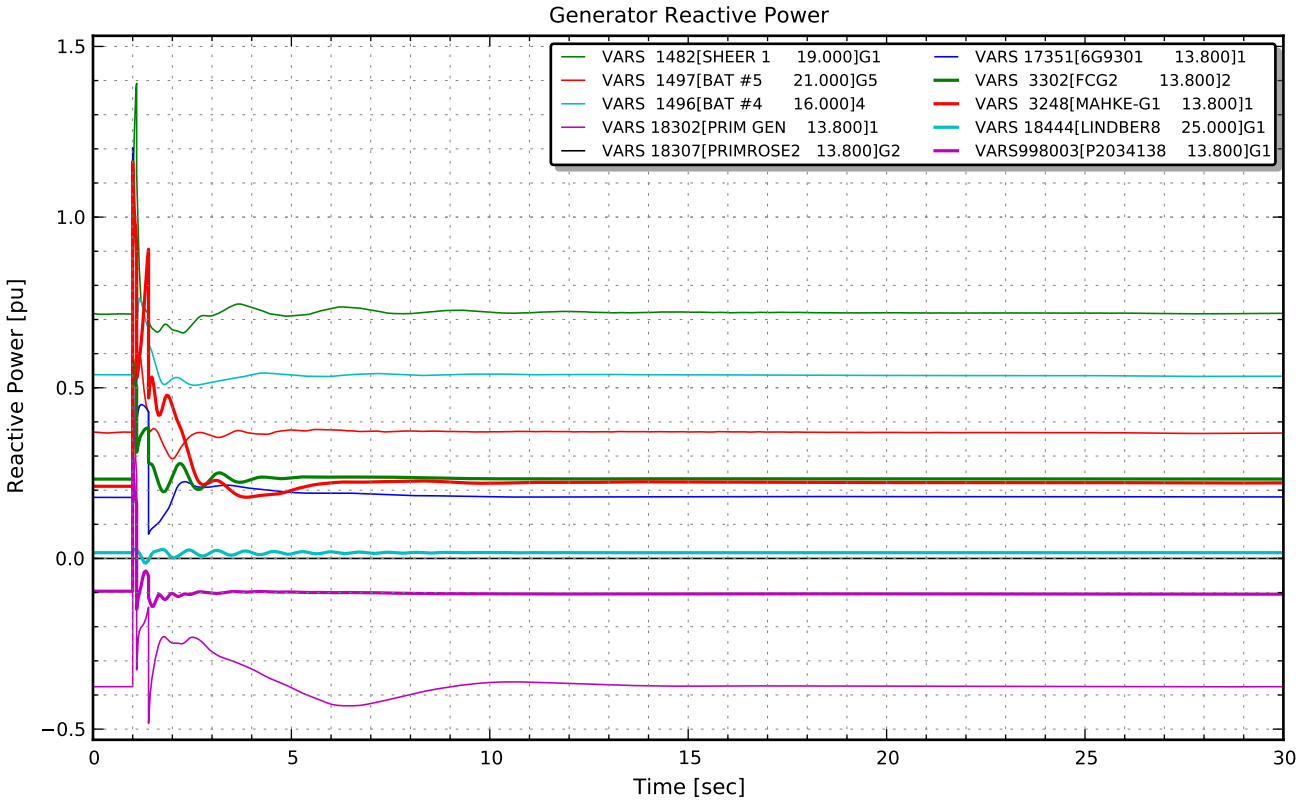
Notes: P2034 Coldlake Area Cogen

Dynamic Stability Analysis

Contingency: 01A - 7L24 Bonnyville 700S to Grande Centre 846S
Alternnative: Post-Project Basecase
Scenario: SL

Attachment A5- 1- 1



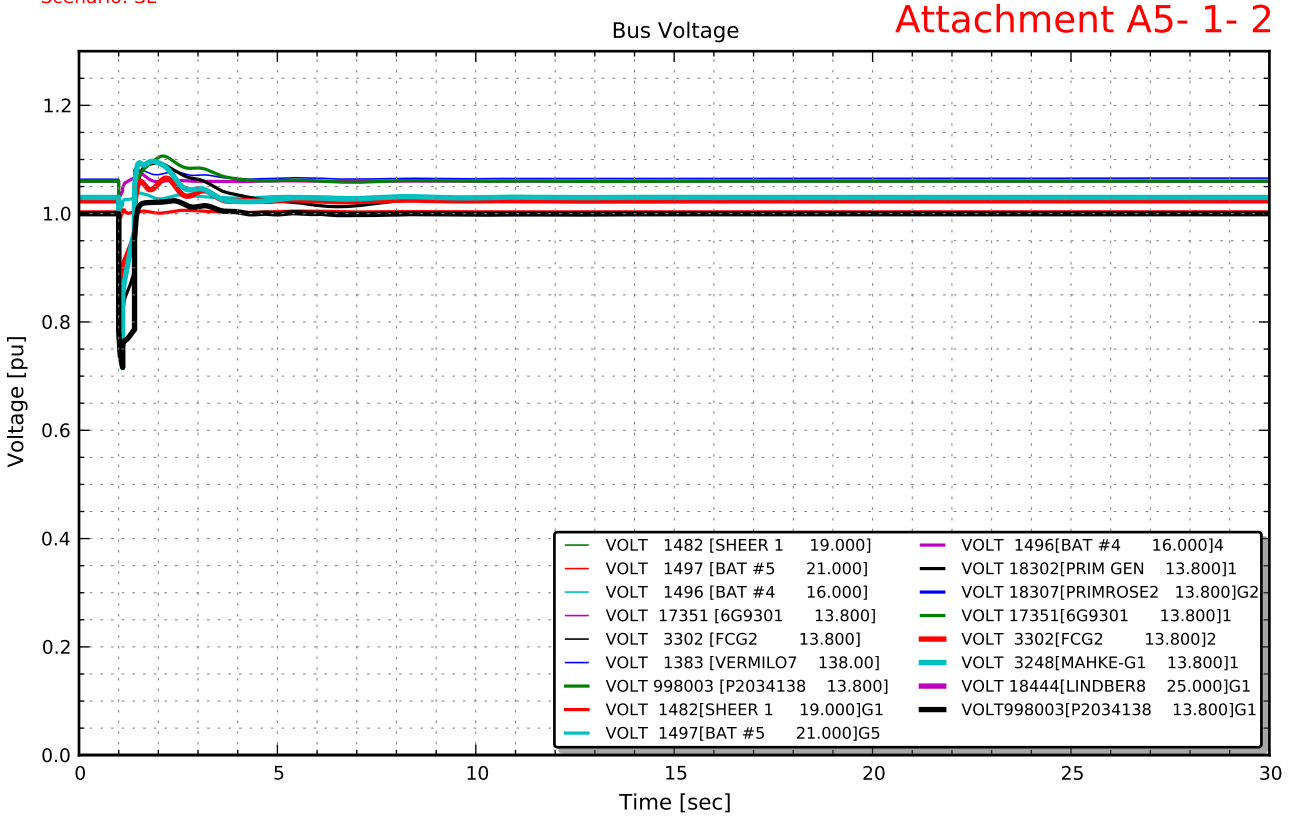


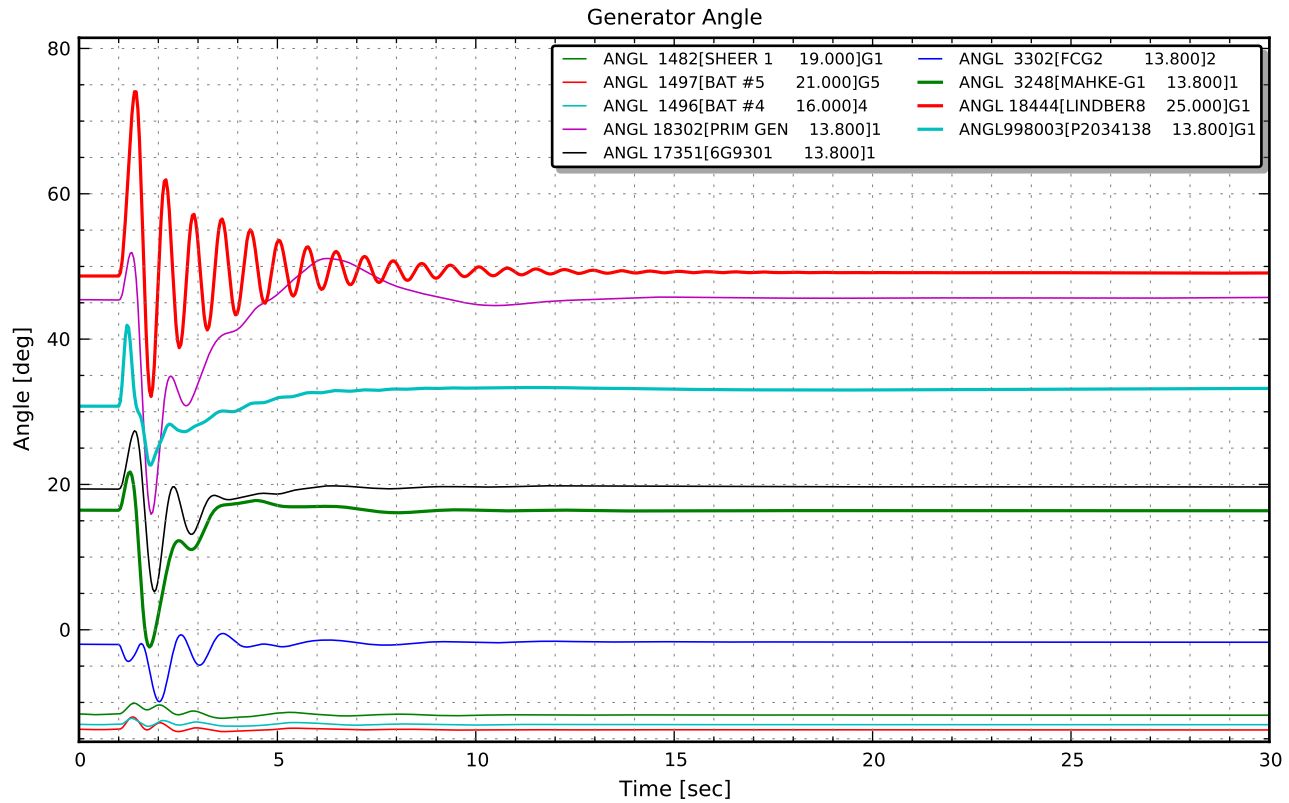
Notes: P2034 Coldlake Area Cogen

Dynamic Stability Analysis

Contingency: 01B - 7L24 Grande Centre 846S to Bonnyville 700S
Alternnative: Post-Project Basecase
Scenario: SL

Attachment A5- 1- 2



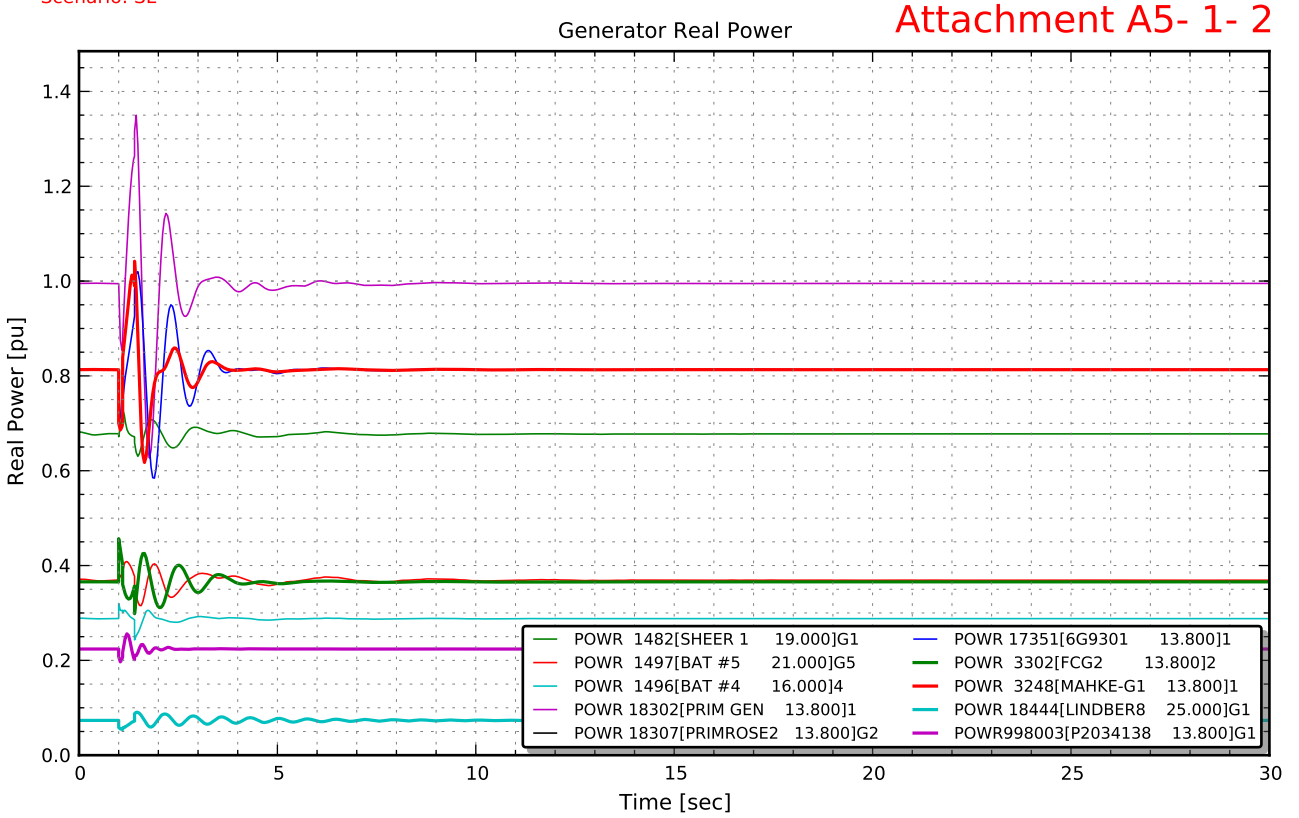


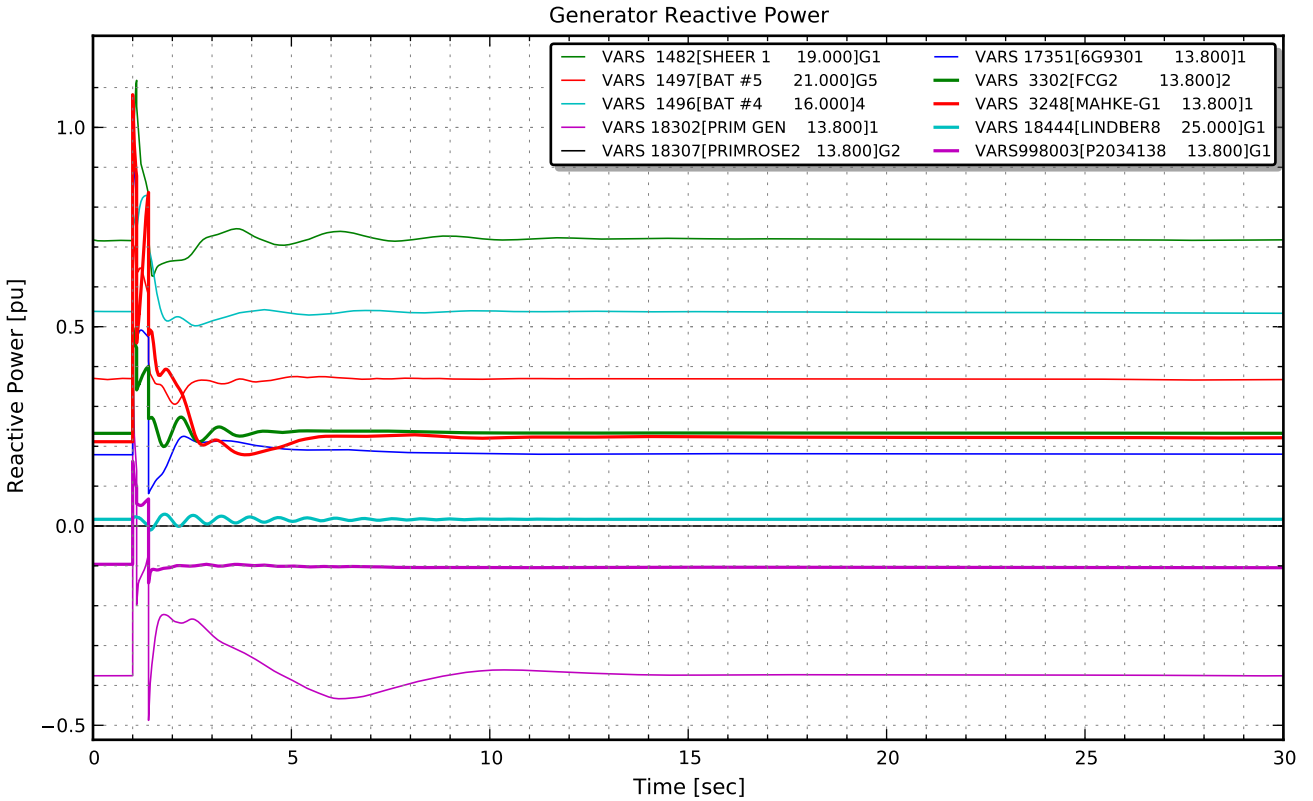
Notes: P2034 Coldlake Area Cogen

Dynamic Stability Analysis

Contingency: 01B - 7L24 Grande Centre 846S to Bonnyville 700S
Alternnative: Post-Project Basecase
Scenario: SL

Attachment A5- 1- 2



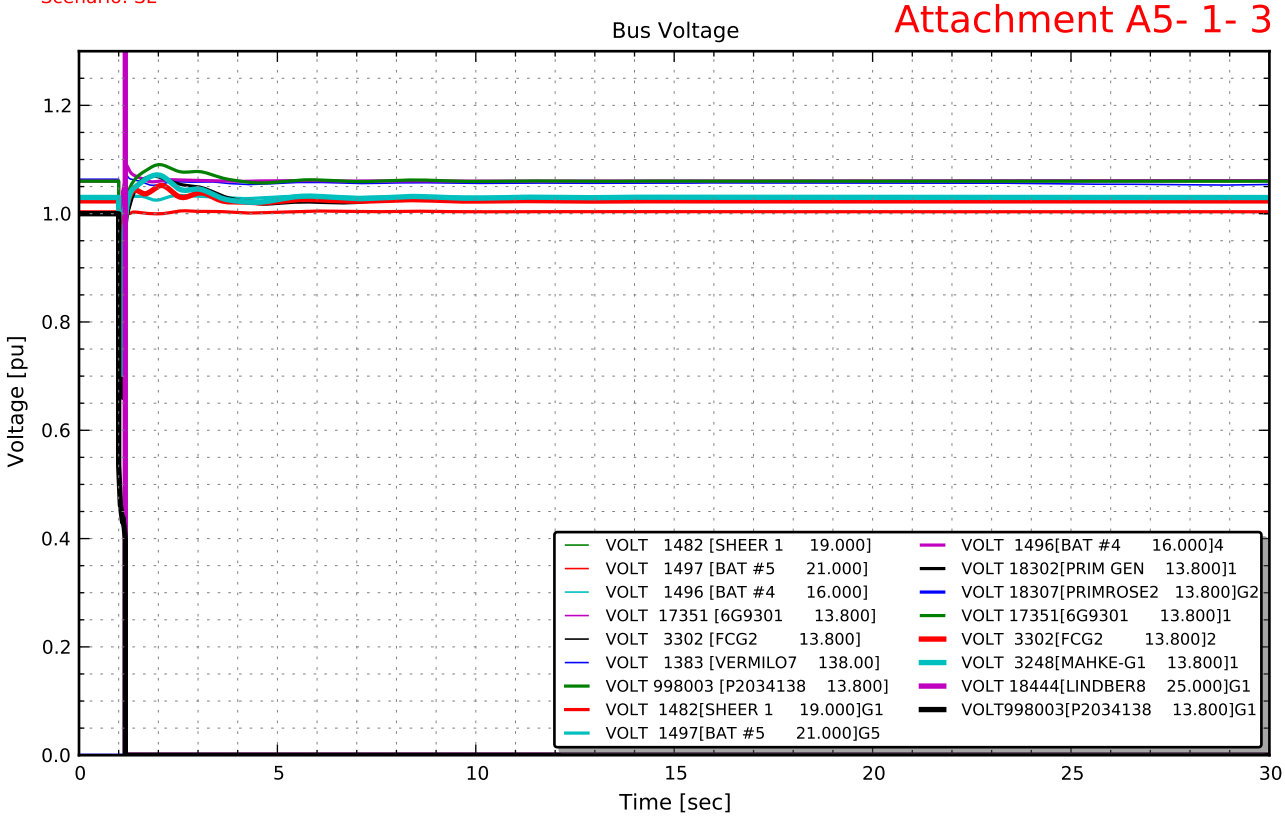


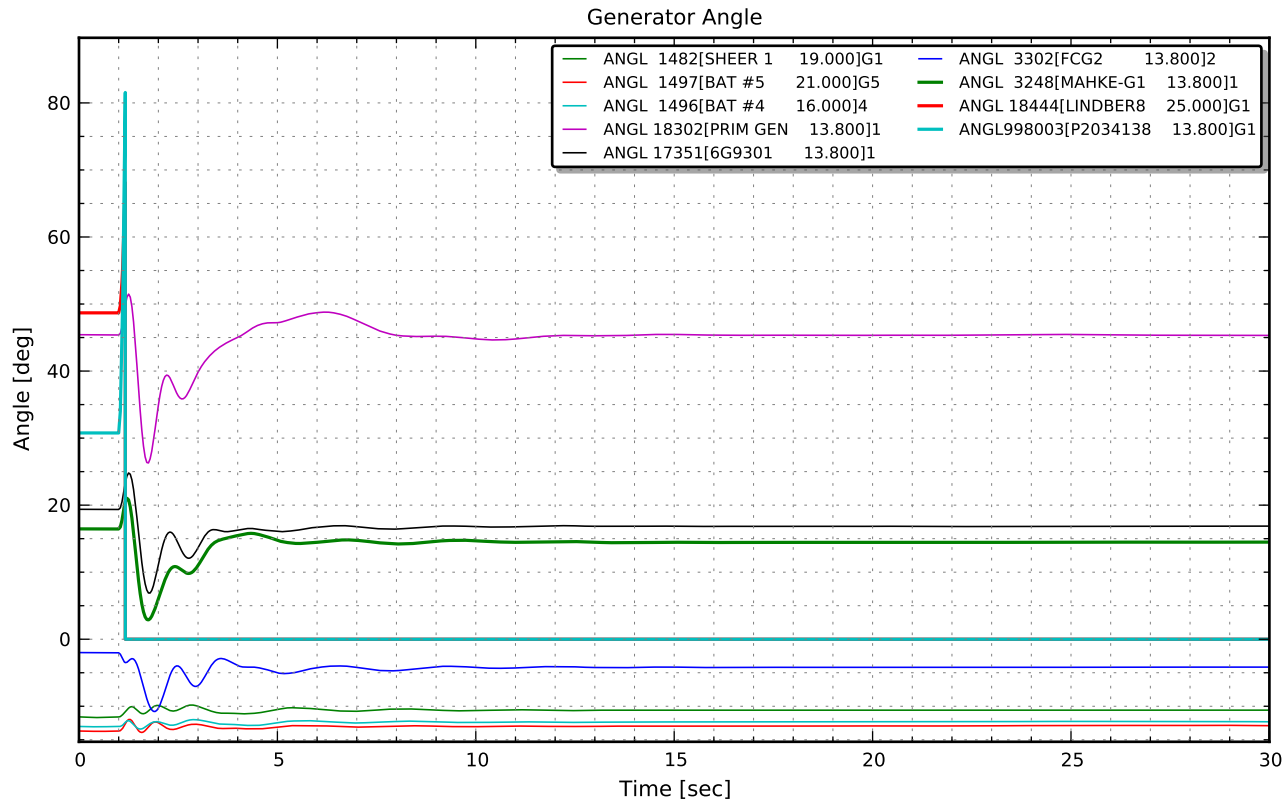
Notes: P2034 Coldlake Area Cogen

Dynamic Stability Analysis

Contingency: 02APost - 7L53 Bonnyville 700S to Irish Creek 706S
Alternnative: Post-Project Basecase
Scenario: SL

Attachment A5- 1- 3



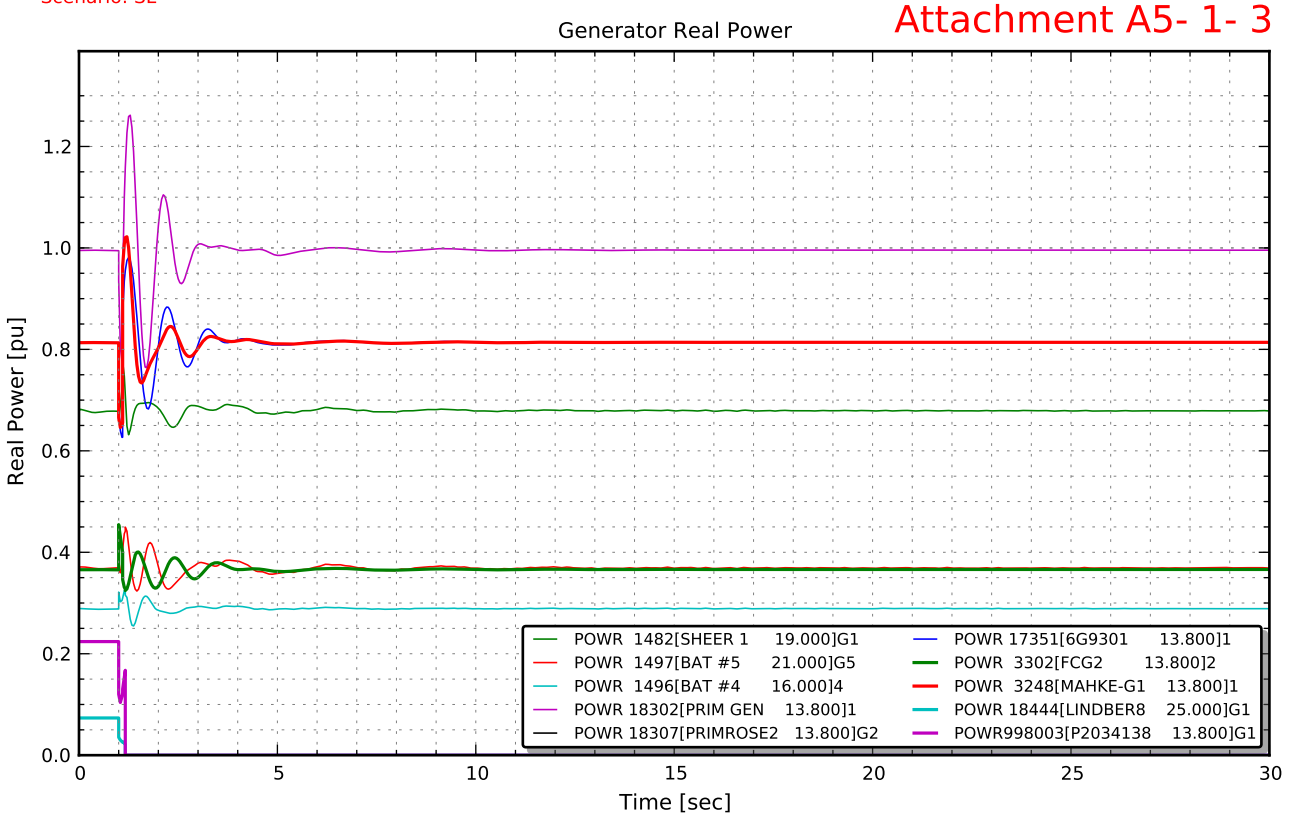


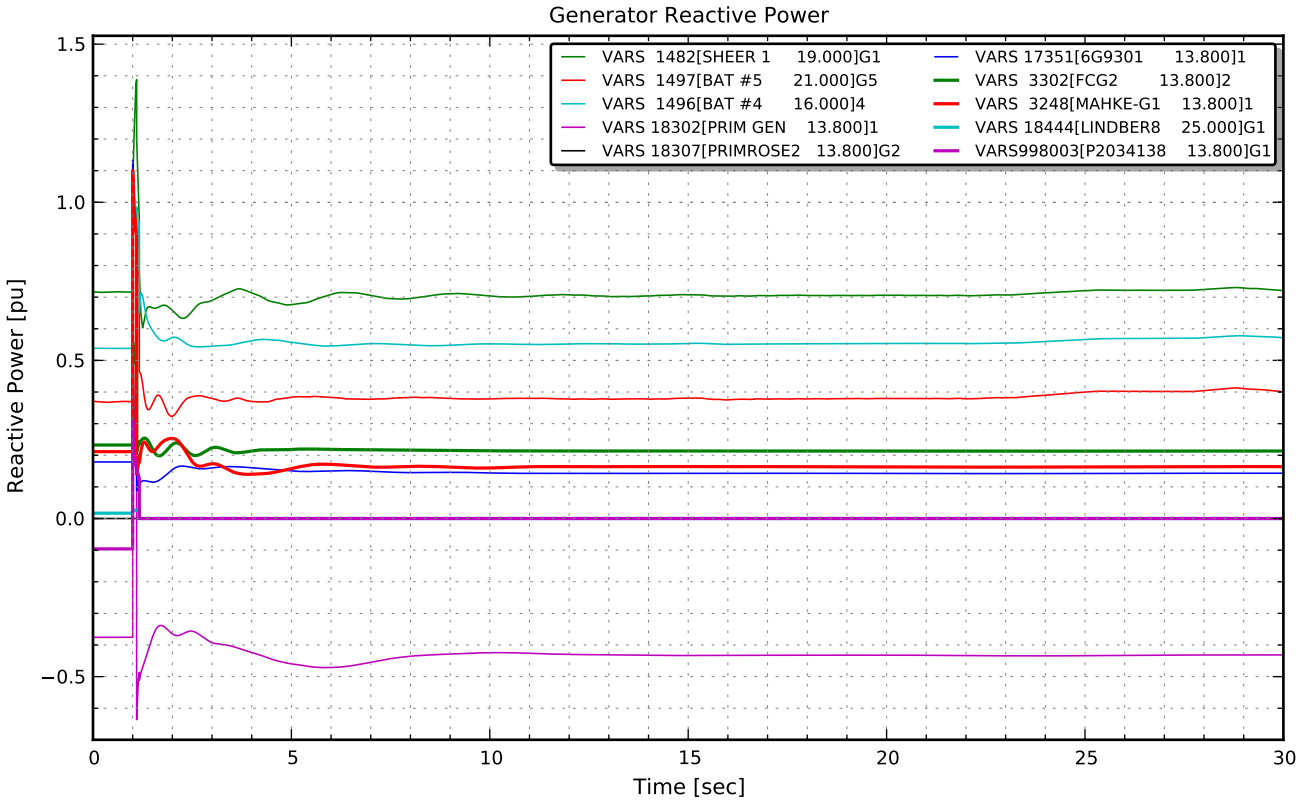
Notes: P2034 Coldlake Area Cogen

Dynamic Stability Analysis

Contingency: 02APost - 7L53 Bonnyville 700S to Irish Creek 706S
Alternnative: Post-Project Basecase
Scenario: SL

Attachment A5- 1- 3



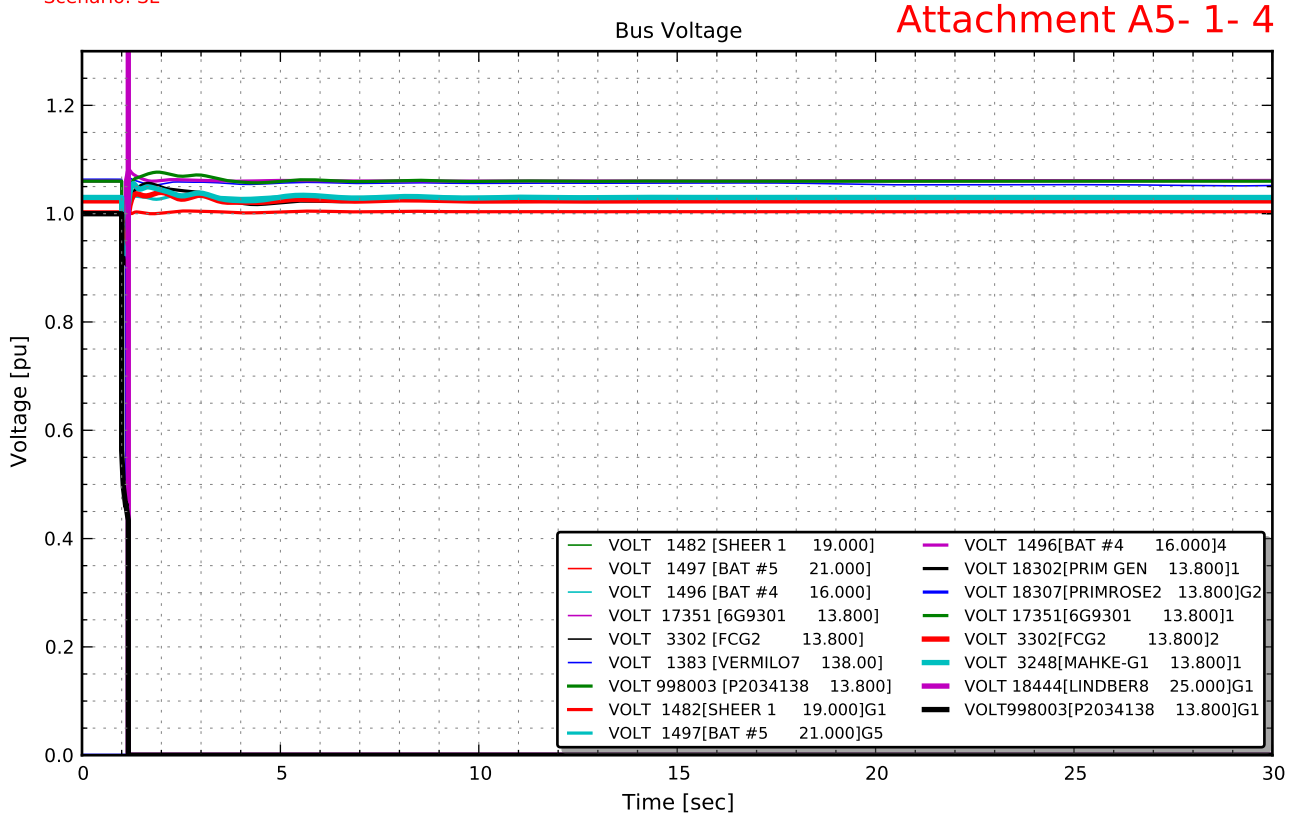


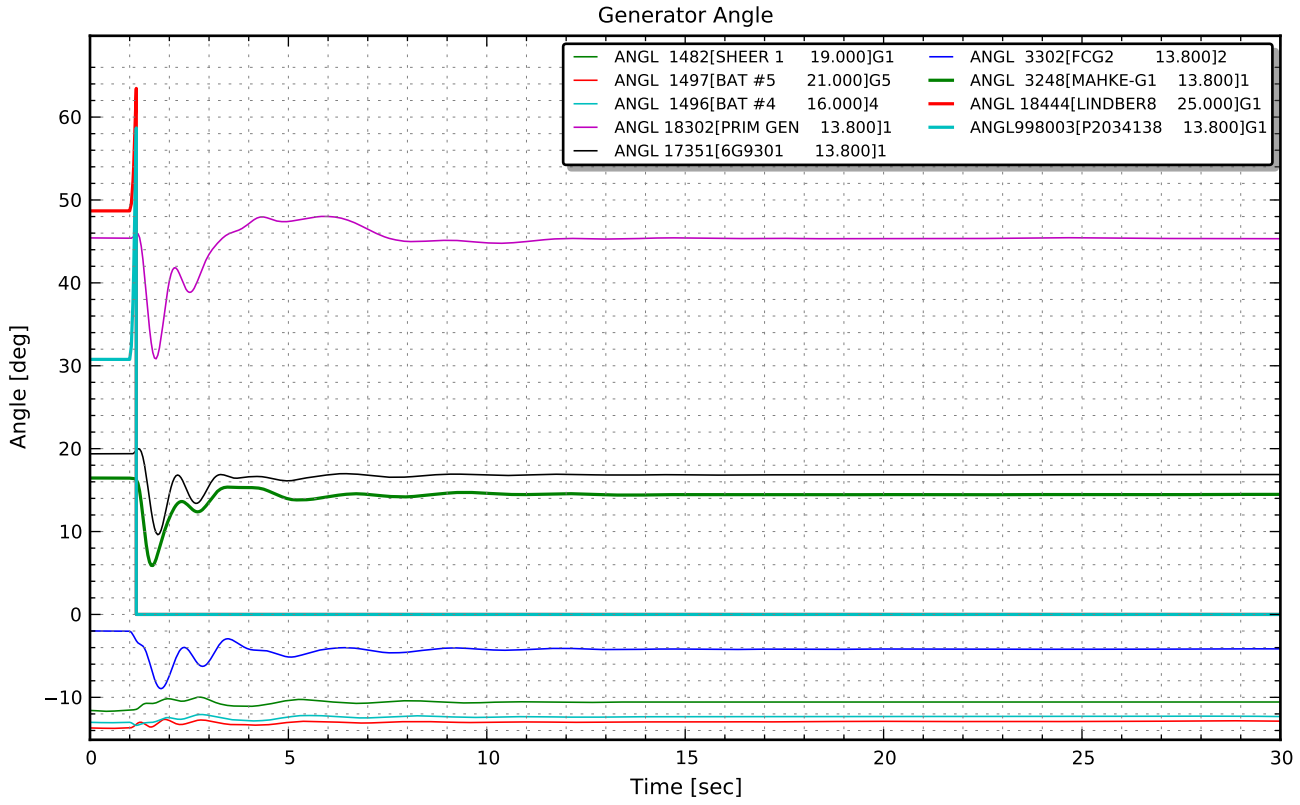
Notes: P2034 Coldlake Area Cogen

Dynamic Stability Analysis

Contingency: 02BPost - 7L53 Irish Creek 706S to Bonnyville 700S
Alternnative: Post-Project Basecase
Scenario: SL

Attachment A5- 1- 4



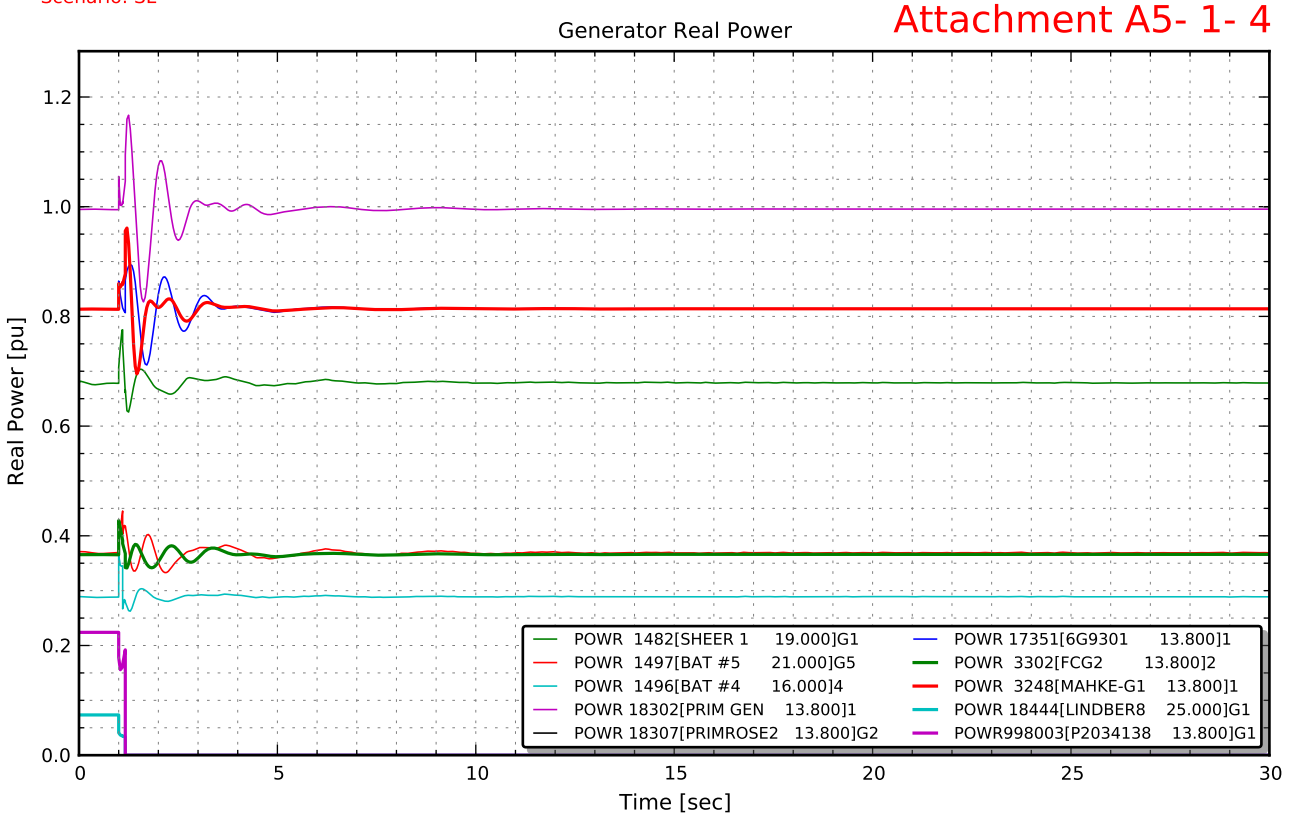


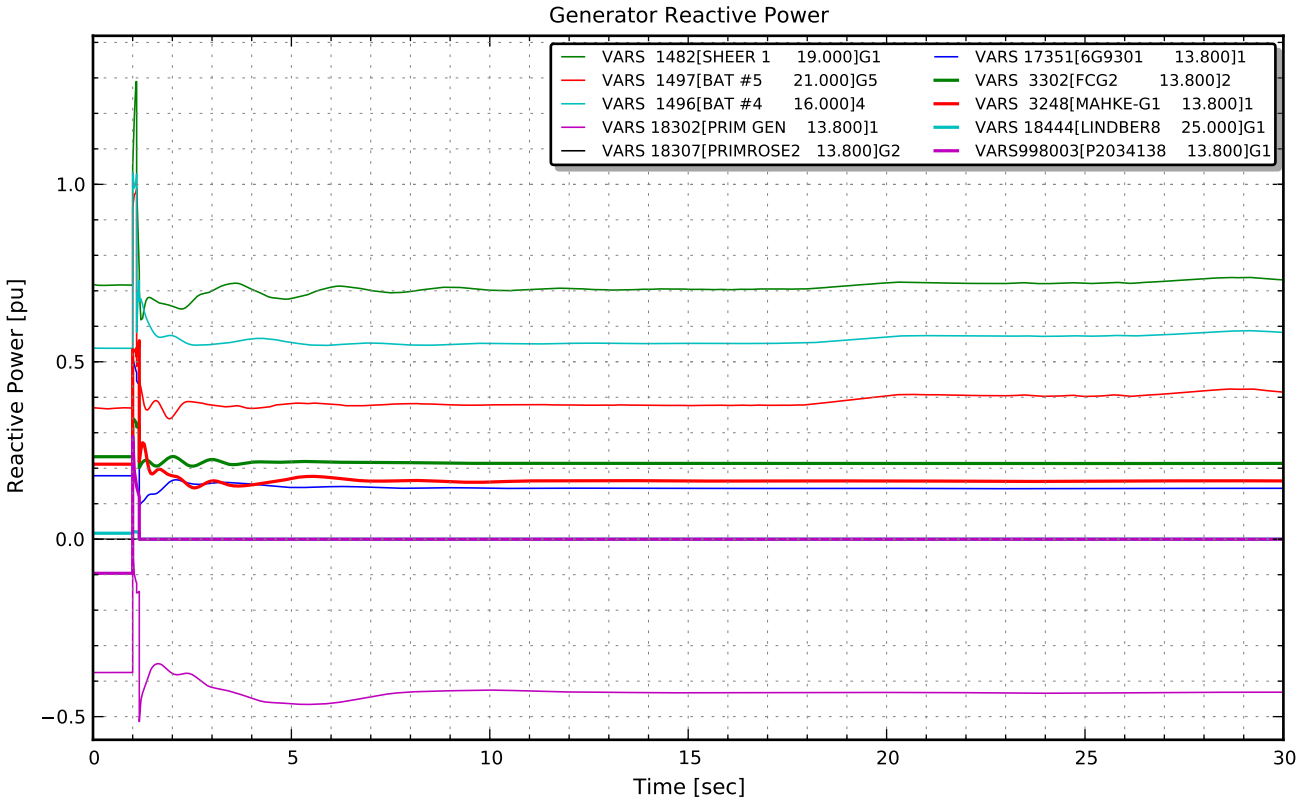
Notes: P2034 Coldlake Area Cogen

Dynamic Stability Analysis

Contingency: 02BPost - 7L53 Irish Creek 706S to Bonnyville 700S
Alternnative: Post-Project Basecase
Scenario: SL

Attachment A5- 1- 4



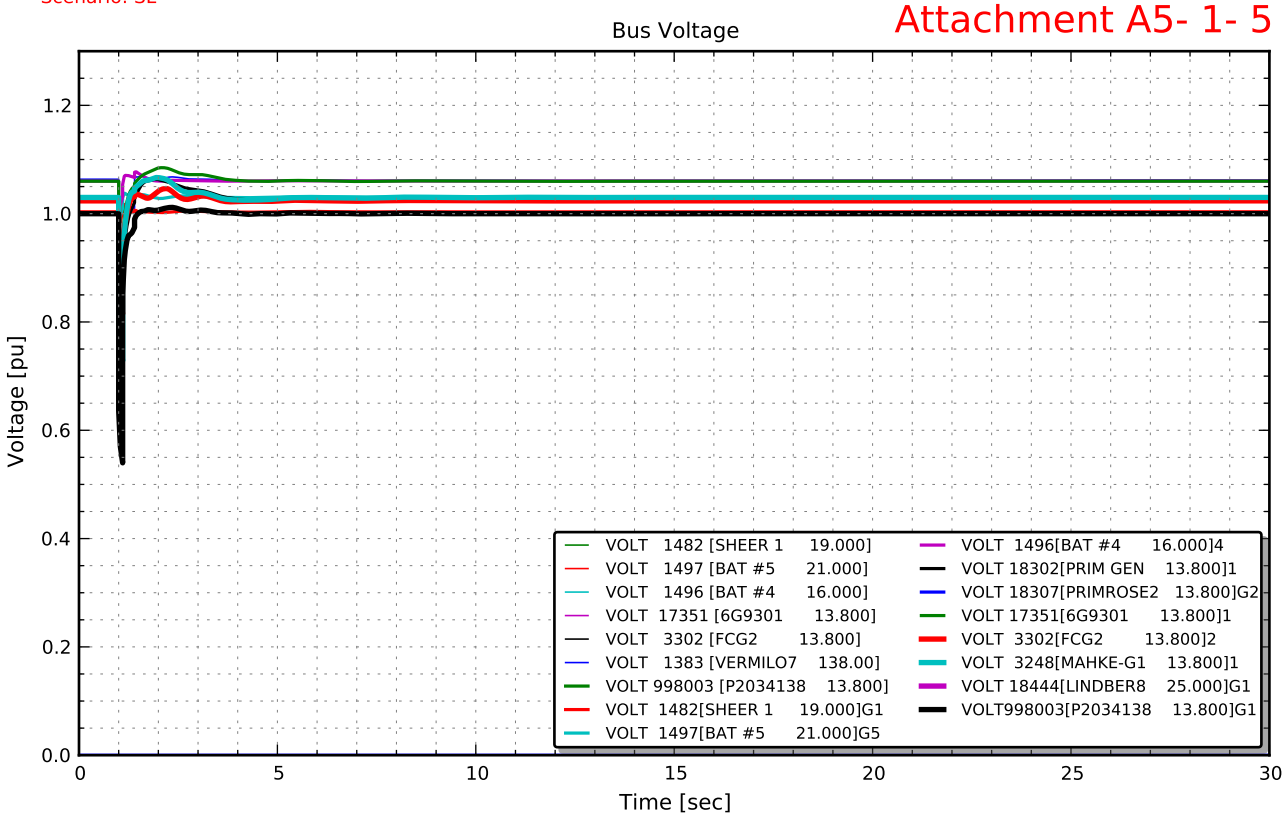


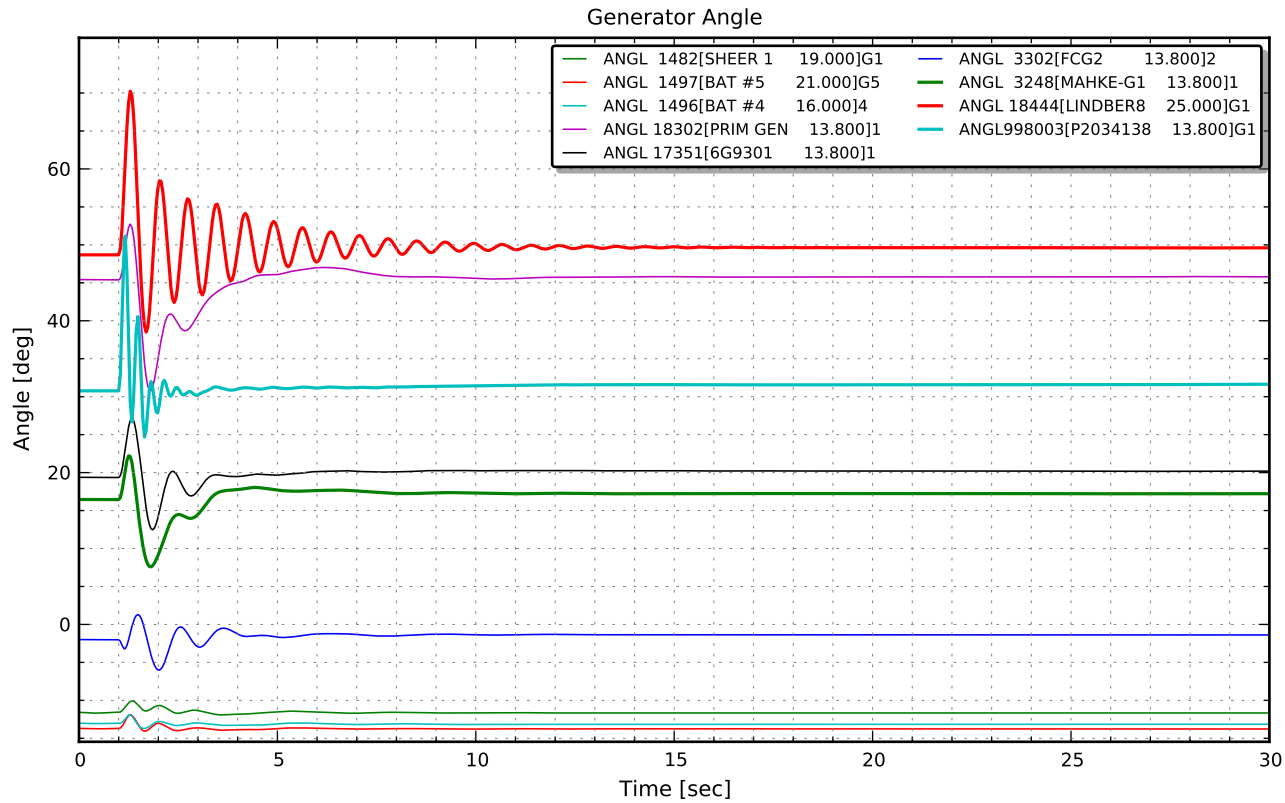
Notes: P2034 Coldlake Area Cogen

Dynamic Stability Analysis

Contingency: 03A - 7L70 Bonnyville 700S to St. Paul 707S
Alternnative: Post-Project Basecase
Scenario: SL

Attachment A5- 1- 5



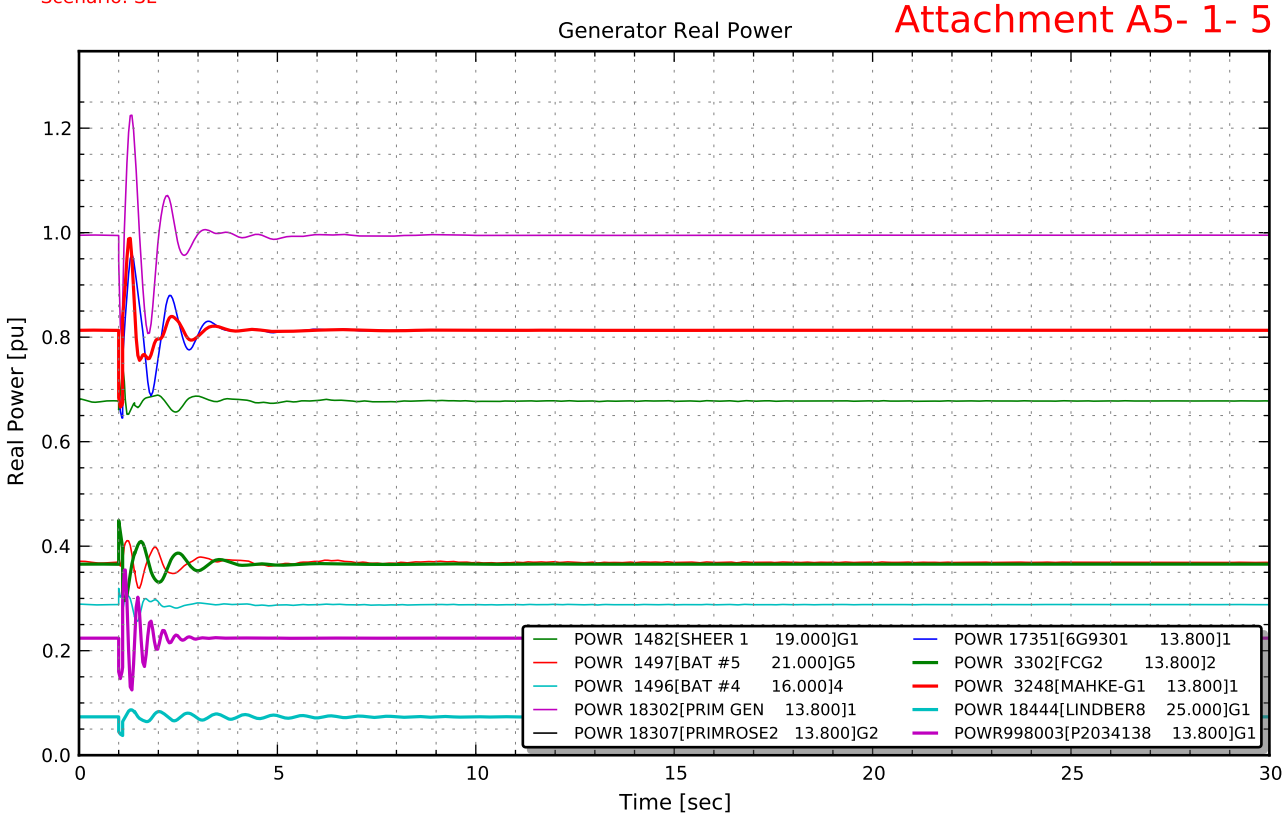


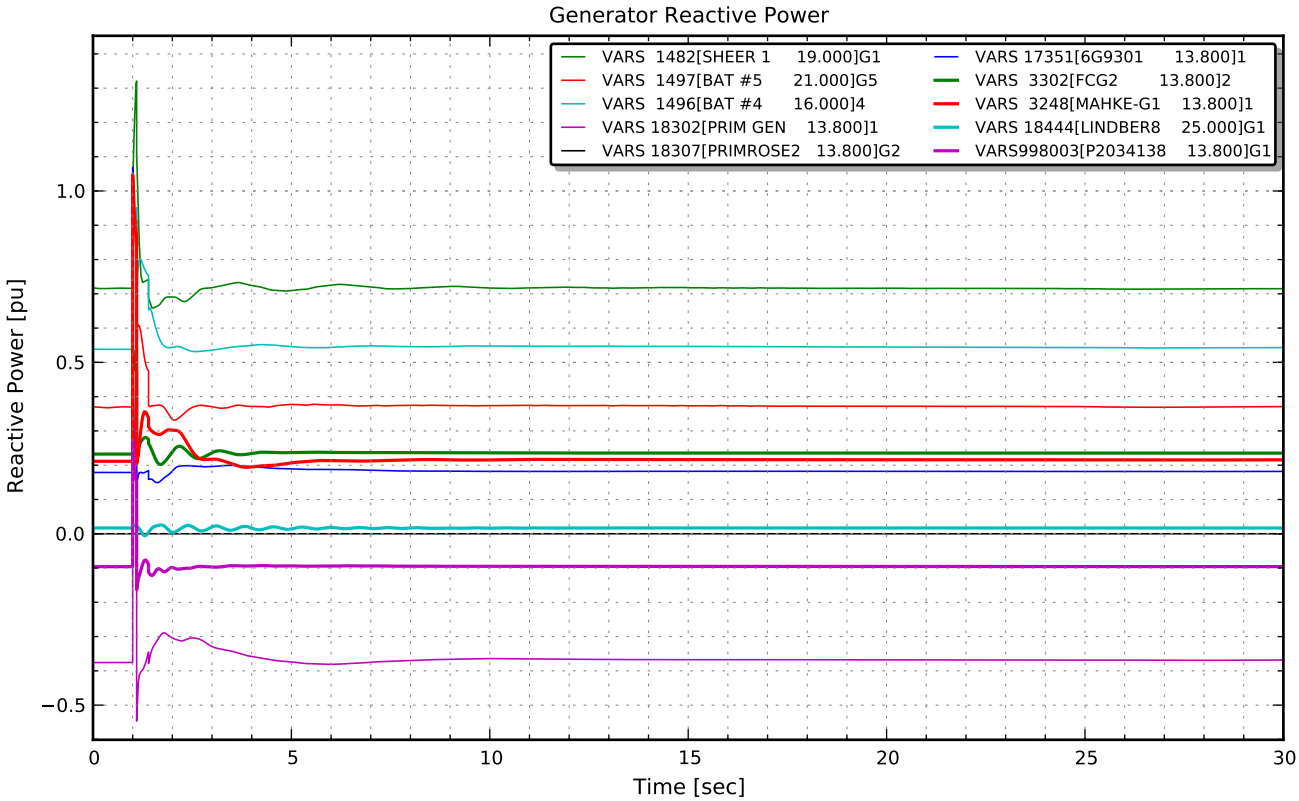
Notes: P2034 Coldlake Area Cogen

Dynamic Stability Analysis

Contingency: 03A - 7L70 Bonnyville 700S to St. Paul 707S
Alternnative: Post-Project Basecase
Scenario: SL

Attachment A5- 1- 5



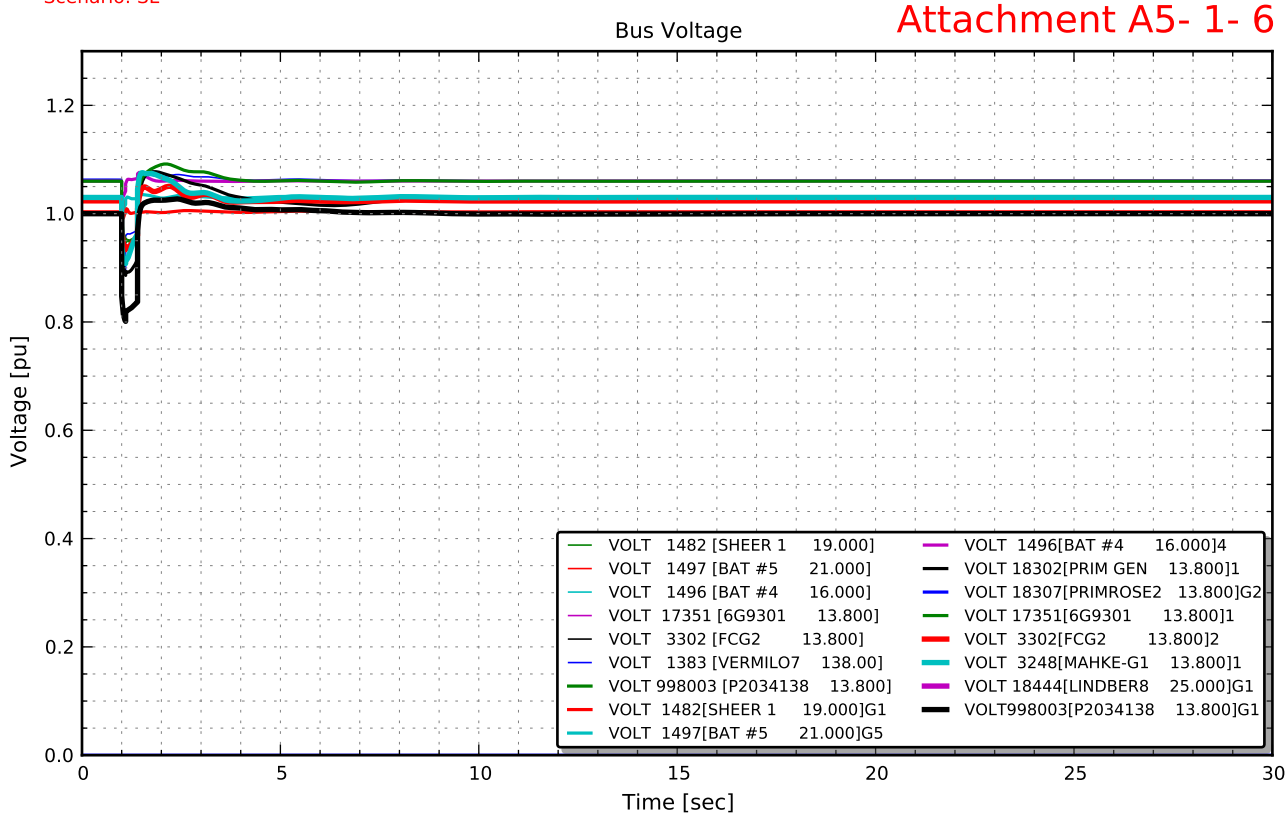


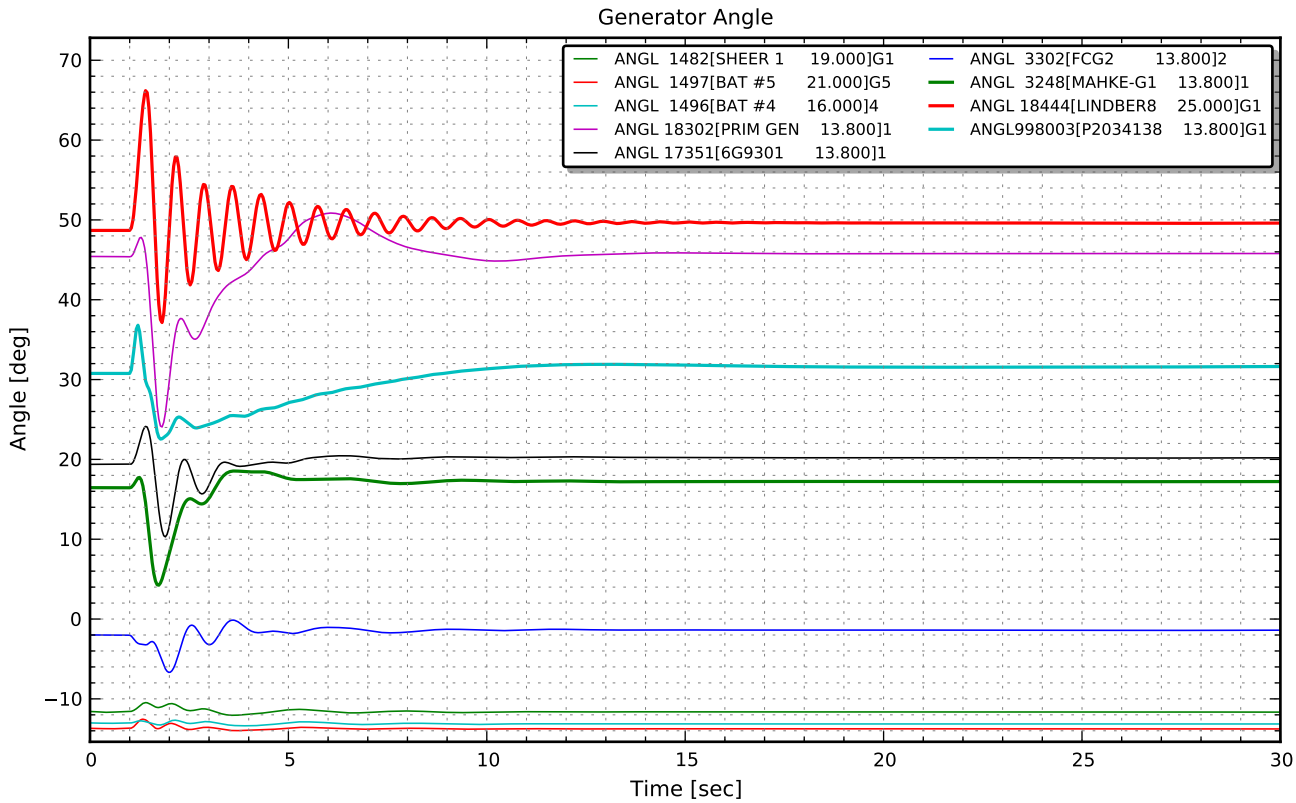
Notes: P2034 Coldlake Area Cogen

Dynamic Stability Analysis

Contingency: 03B - 7L70 St. Paul 707S to Bonnyville 700S
Alternnative: Post-Project Basecase
Scenario: SL

Attachment A5- 1- 6



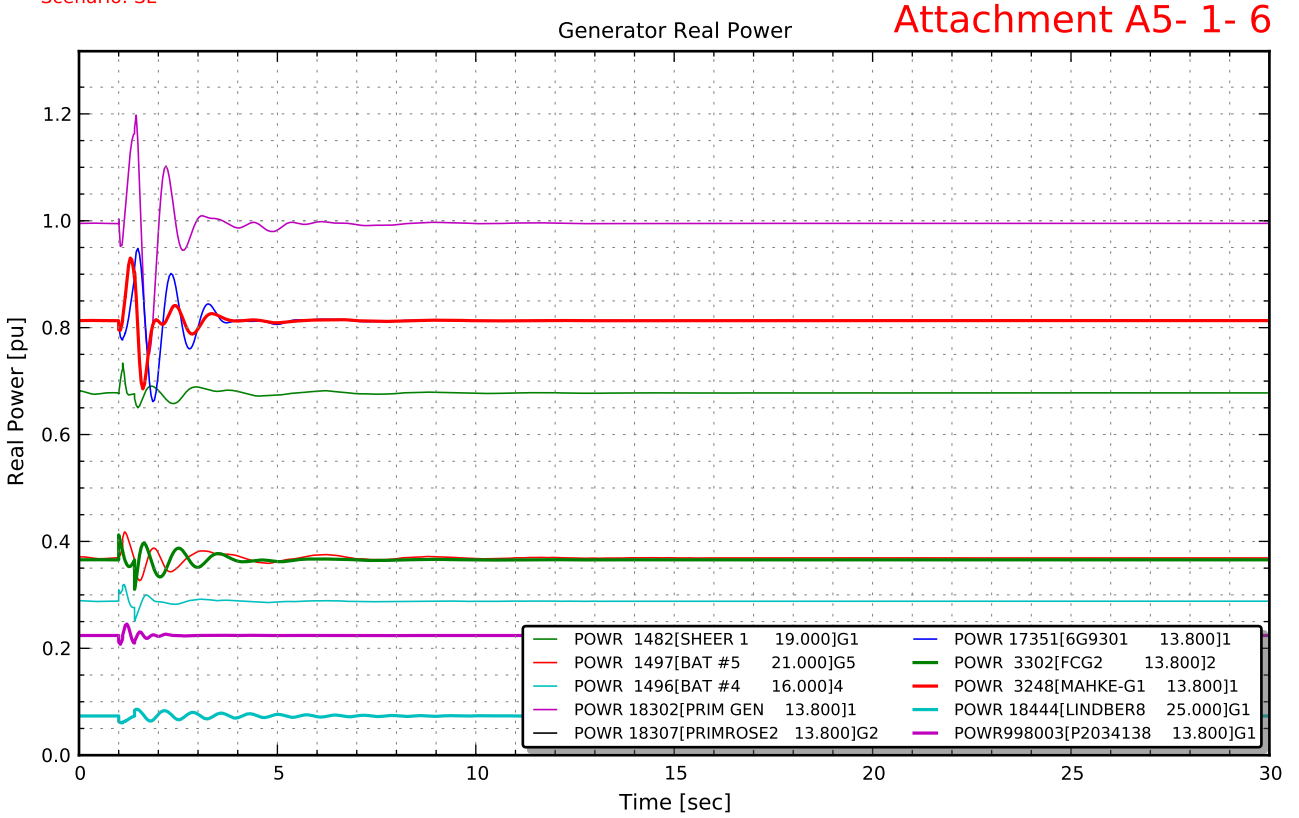


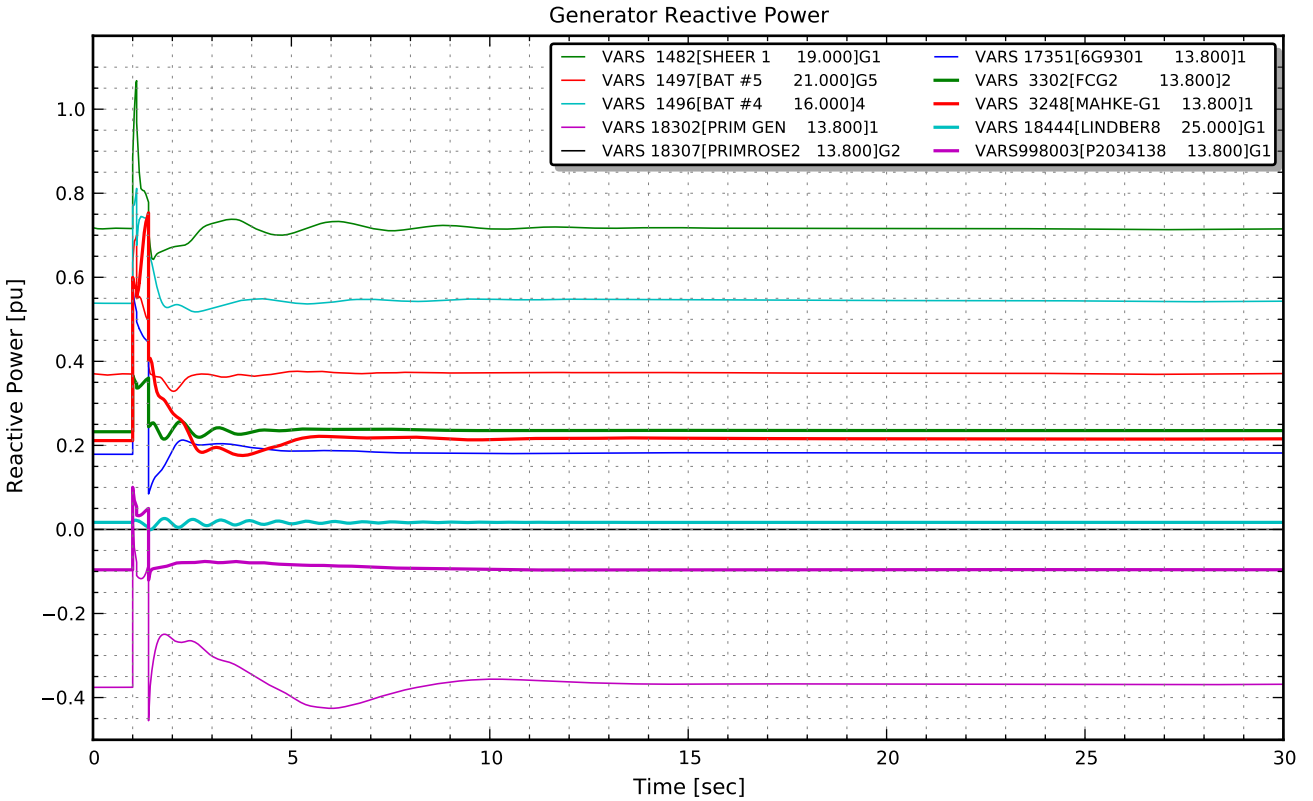
Notes: P2034 Coldlake Area Cogen

Dynamic Stability Analysis

Contingency: 03B - 7L70 St. Paul 707S to Bonnyville 700S
Alternnative: Post-Project Basecase
Scenario: SL

Attachment A5- 1- 6



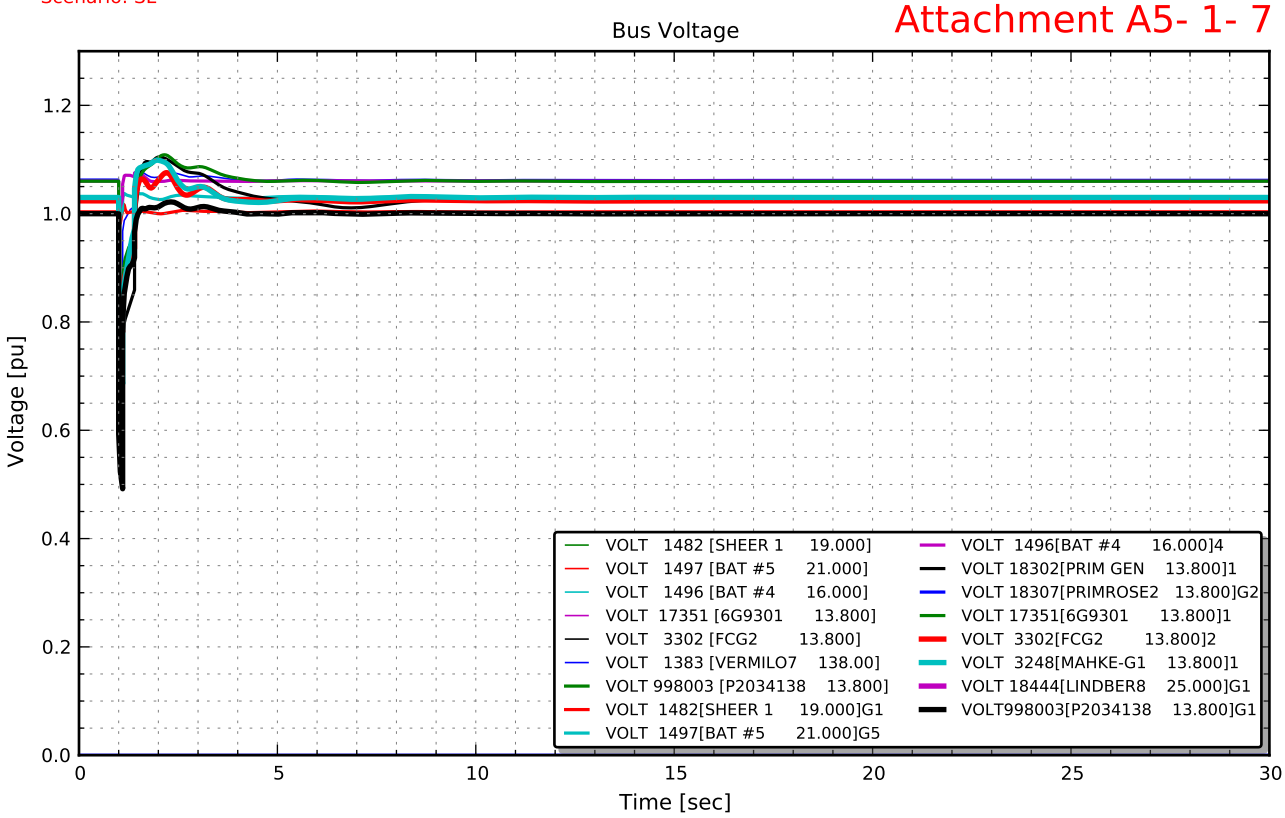


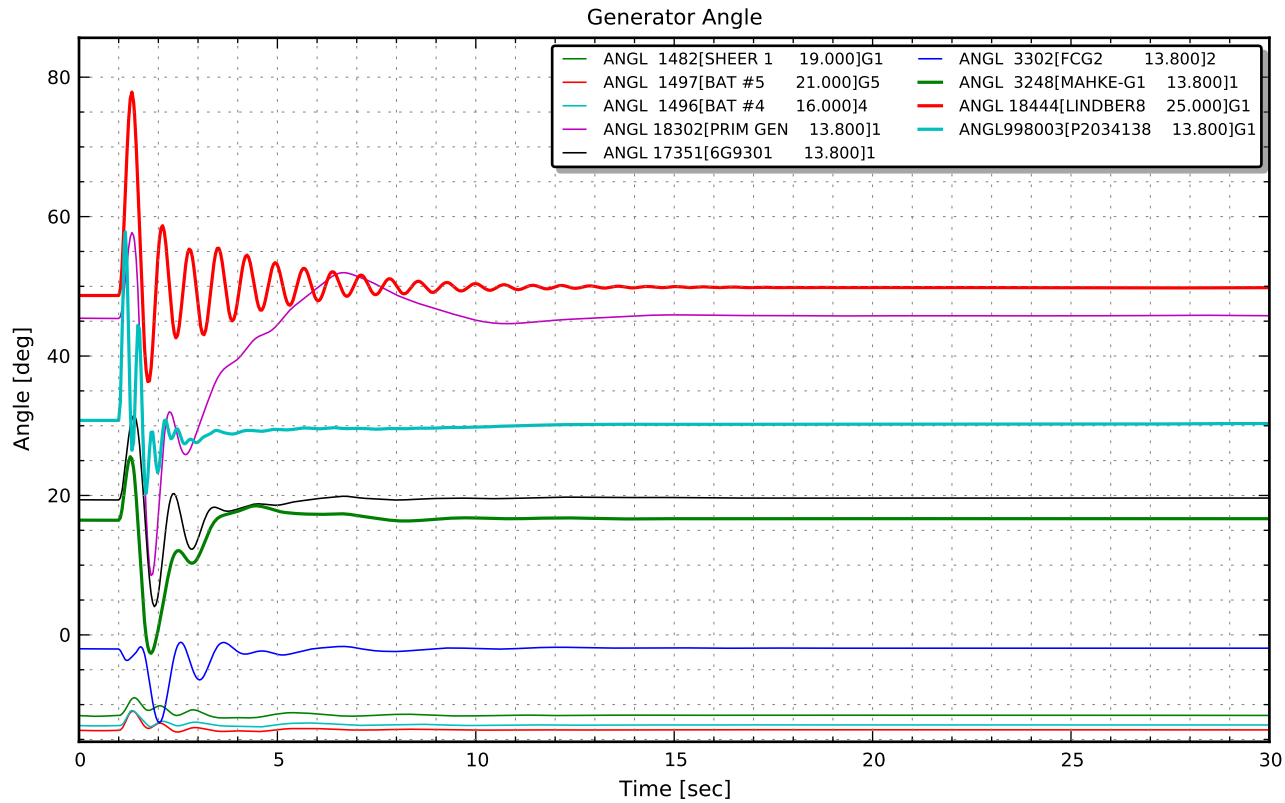
Notes: P2034 Coldlake Area Cogen

Dynamic Stability Analysis

Contingency: 04A - 7L89 Bonnyville 700S to Marguerite Lake 826S
Alternnative: Post-Project Basecase
Scenario: SL

Attachment A5- 1- 7



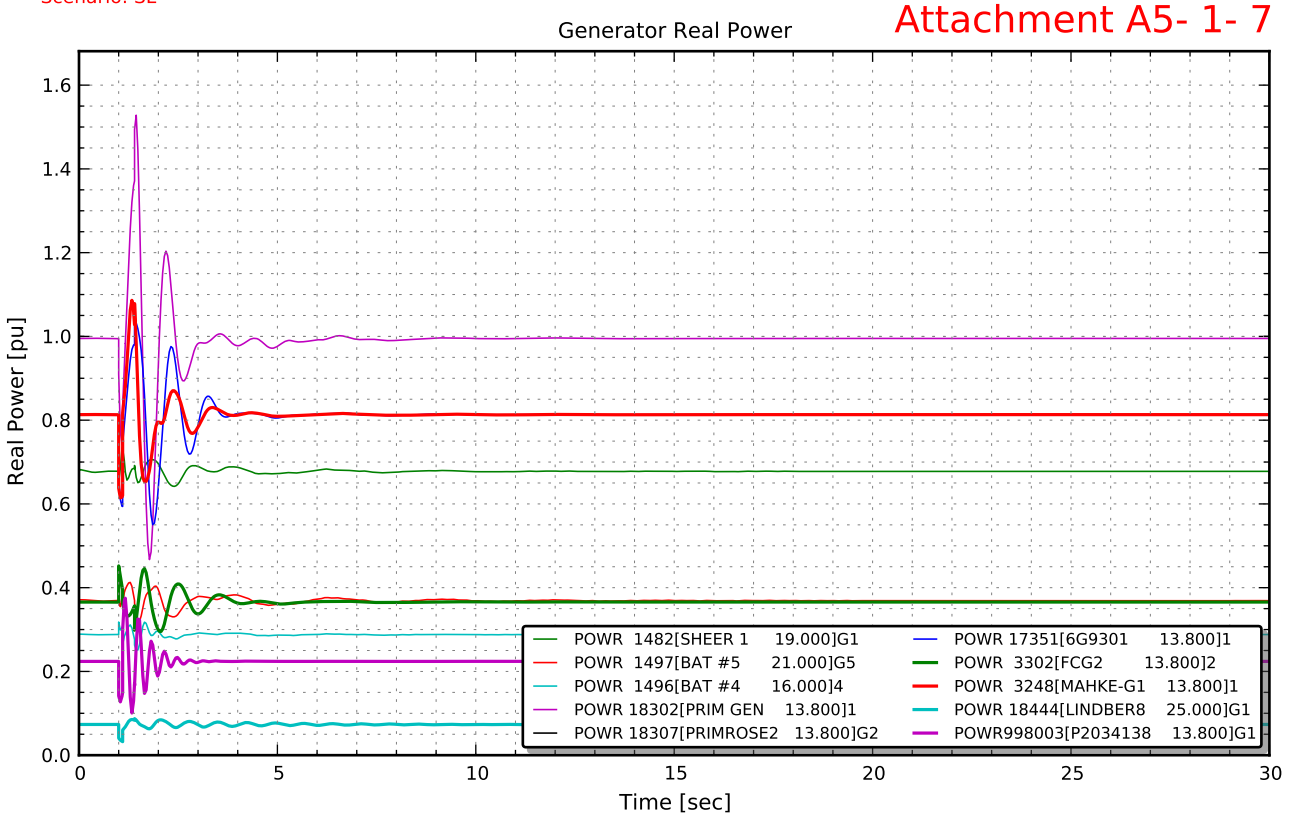


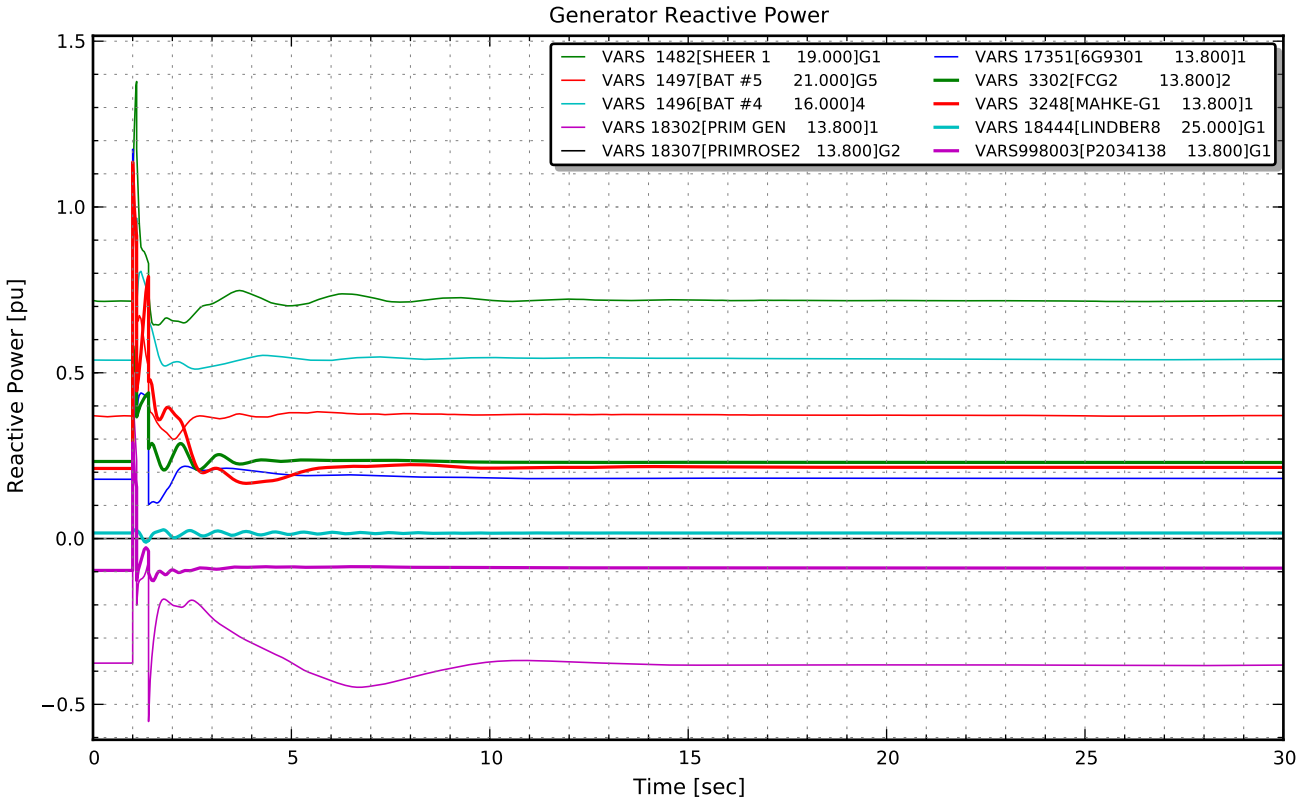
Notes: P2034 Coldlake Area Cogen

Dynamic Stability Analysis

Contingency: 04A - 7L89 Bonnyville 700S to Marguerite Lake 826S
Alternnative: Post-Project Basecase
Scenario: SL

Attachment A5- 1- 7



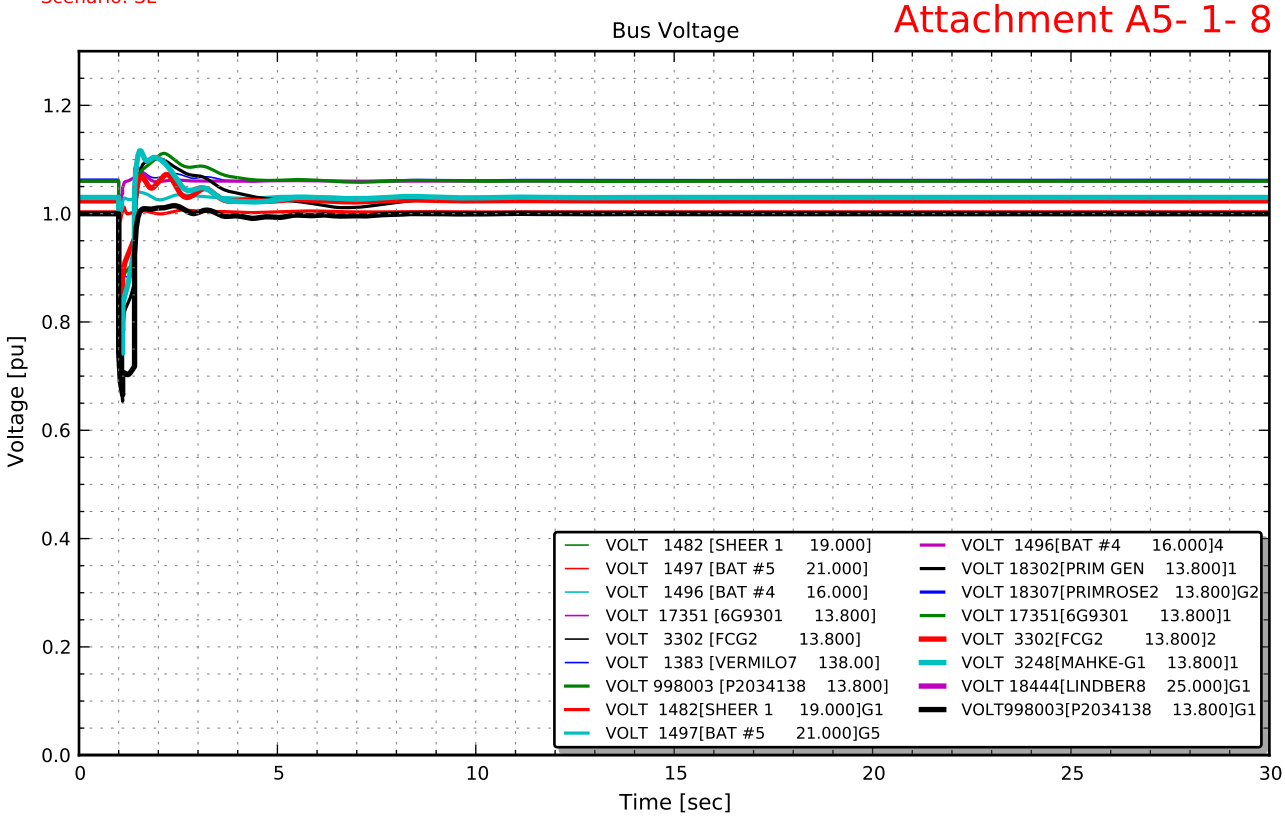


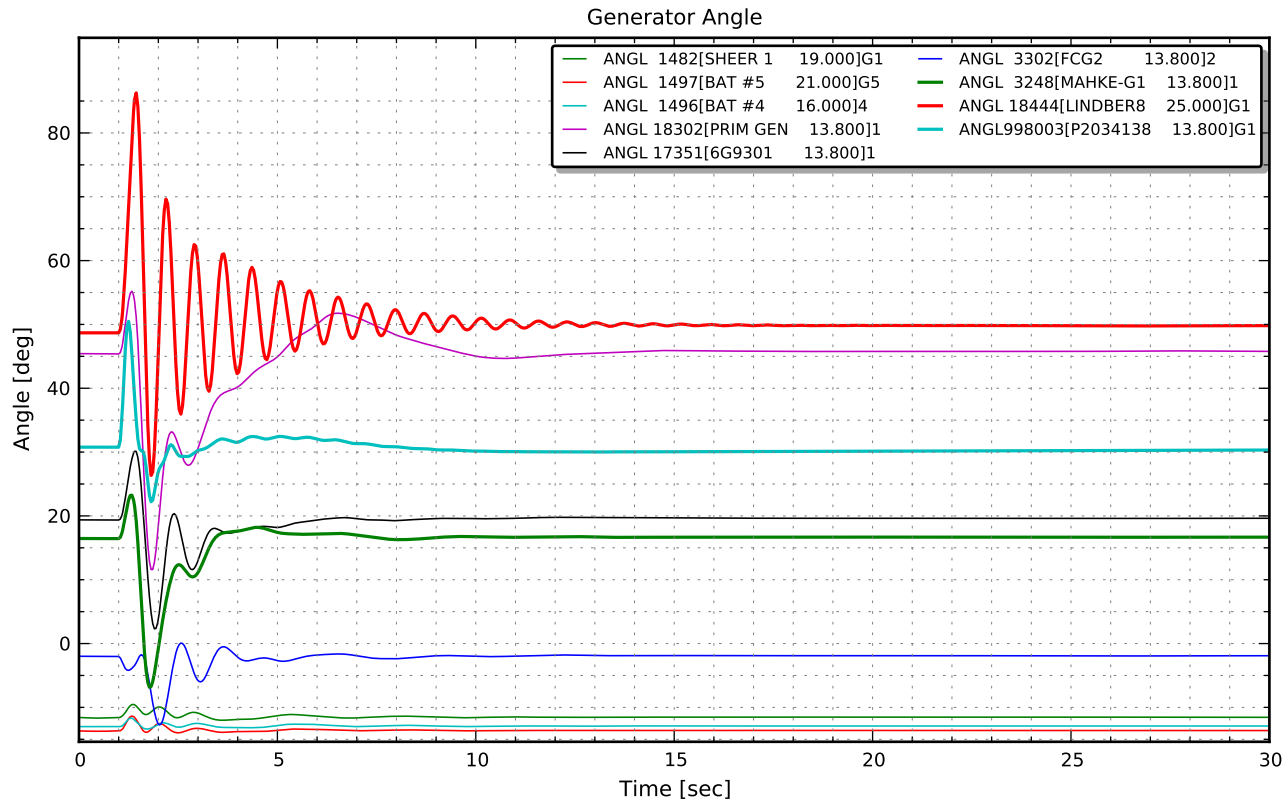
Notes: P2034 Coldlake Area Cogen

Dynamic Stability Analysis

Contingency: 04B - 7L89 Marguerite Lake 826S to Bonnyville 700S
Alternnative: Post-Project Basecase
Scenario: SL

Attachment A5- 1- 8



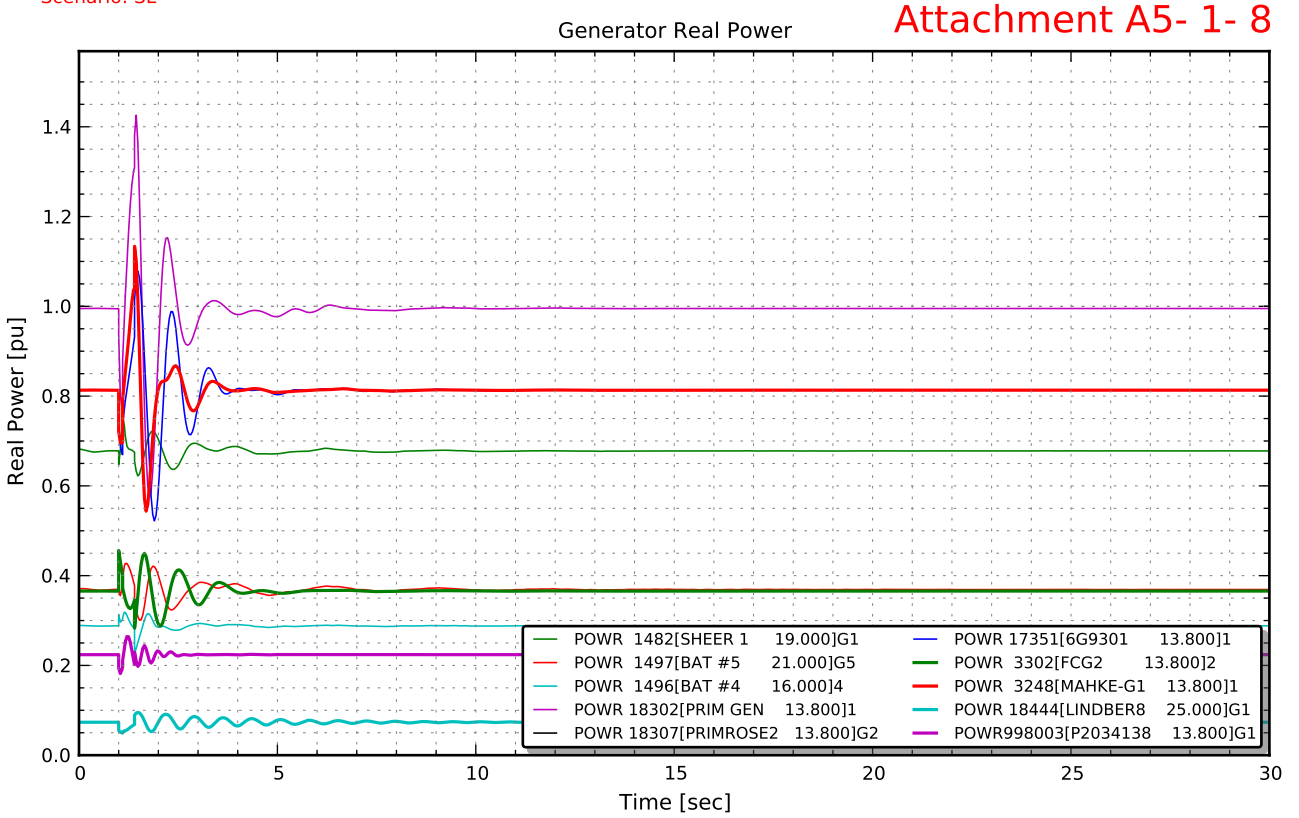


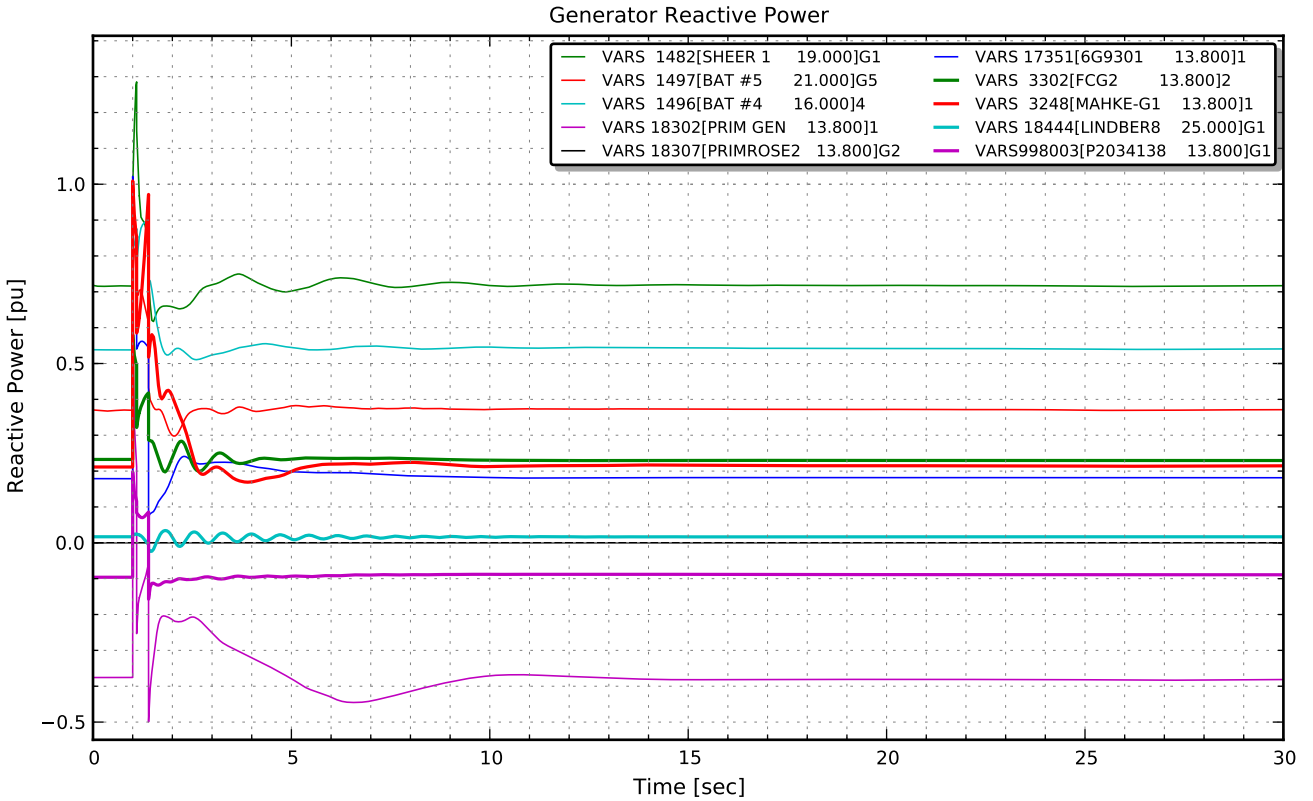
Notes: P2034 Coldlake Area Cogen

Dynamic Stability Analysis

Contingency: 04B - 7L89 Marguerite Lake 826S to Bonnyville 700S
Alternnative: Post-Project Basecase
Scenario: SL

Attachment A5- 1- 8



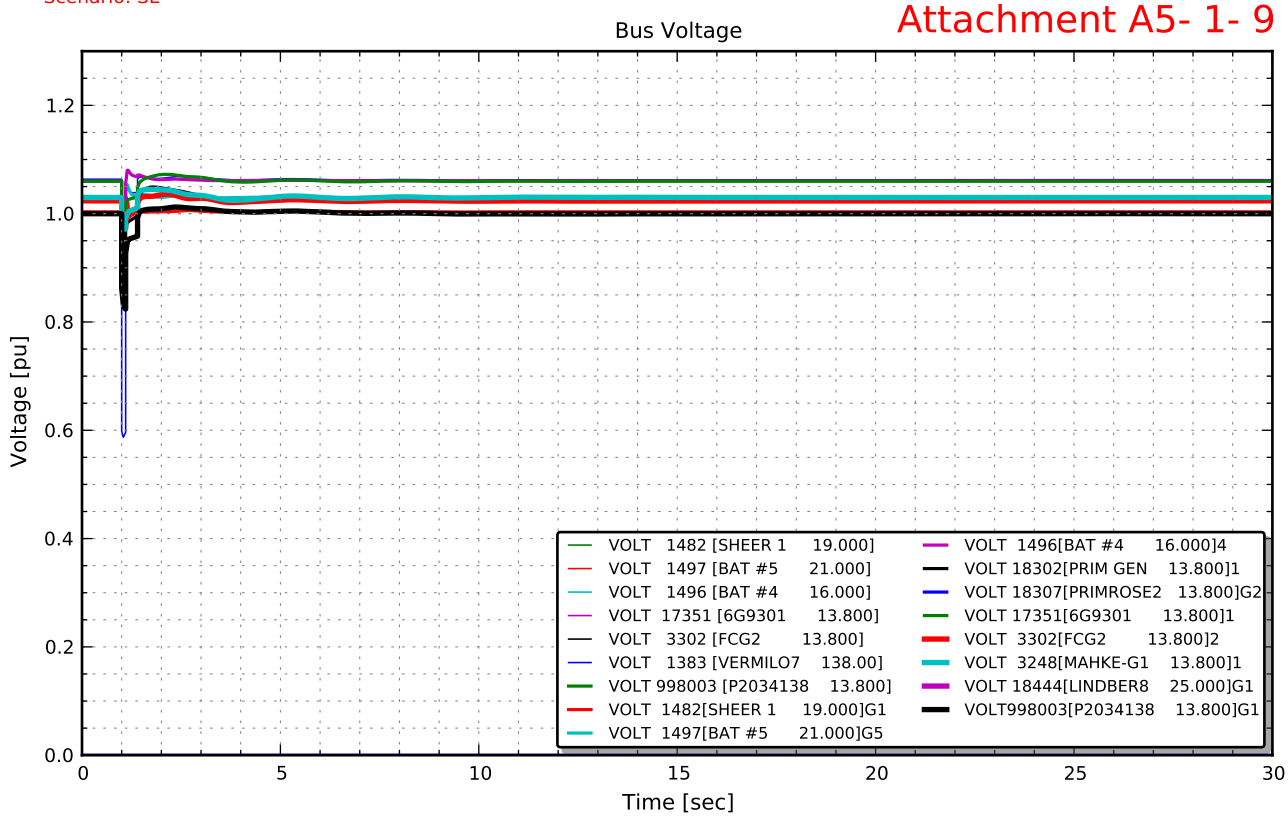


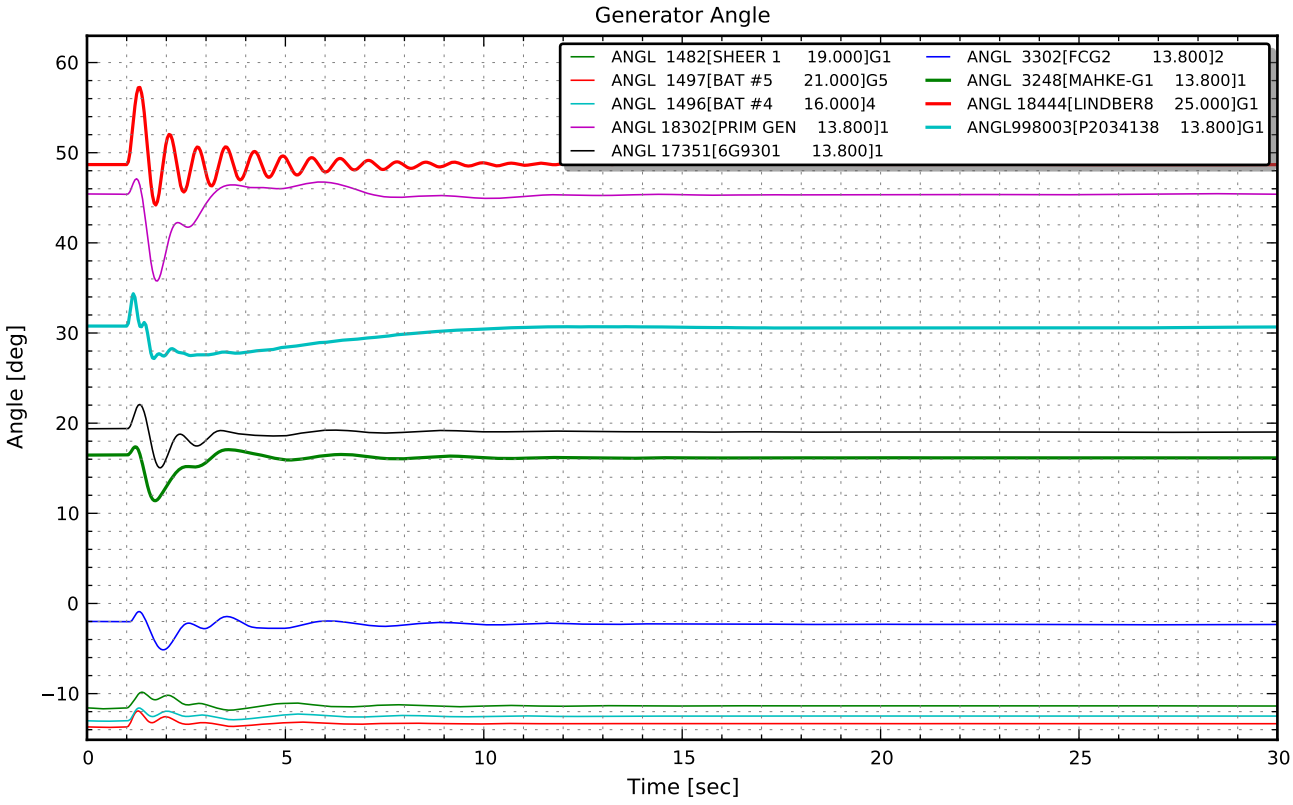
Notes: P2034 Coldlake Area Cogen

Dynamic Stability Analysis

Contingency: 05A - 7L92 Vegreville 709S to Whitby Lake 819S
Alternnative: Post-Project Basecase
Scenario: SL

Attachment A5- 1- 9



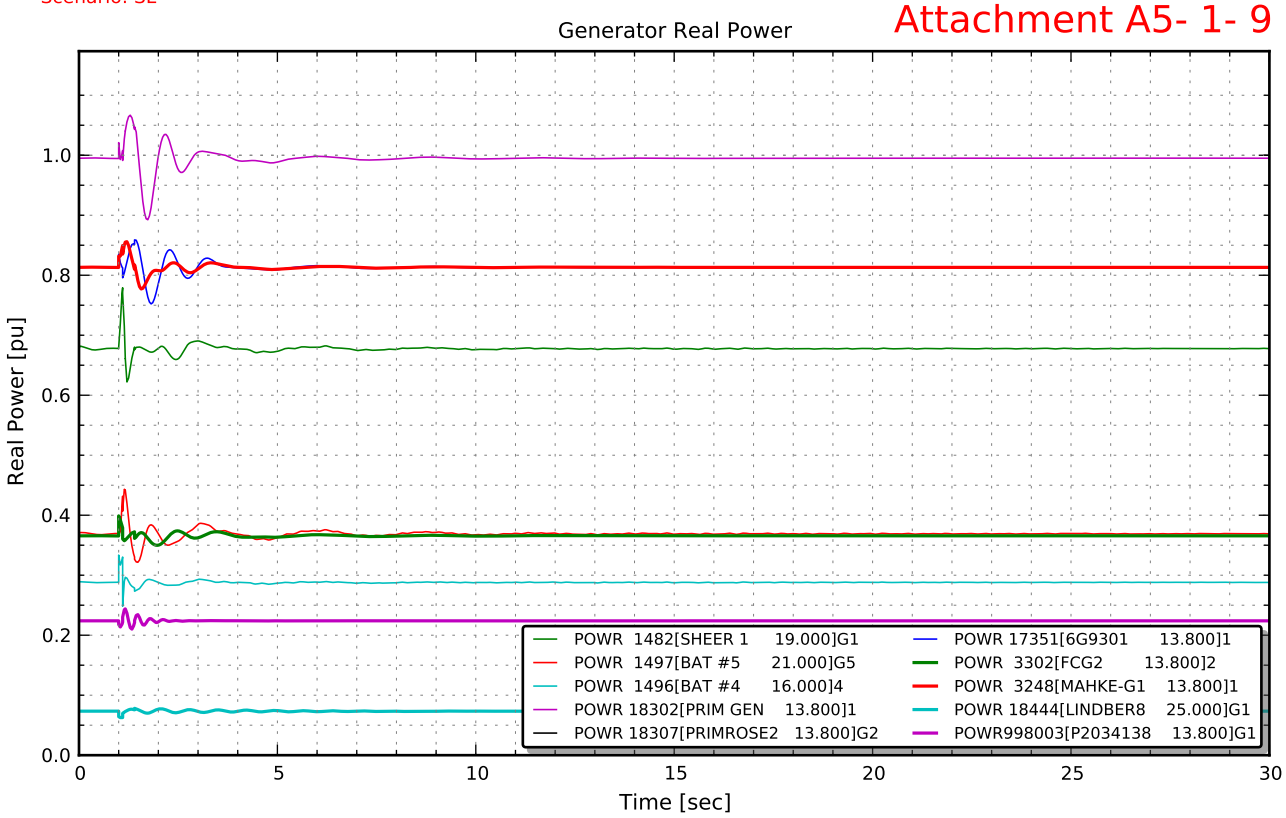


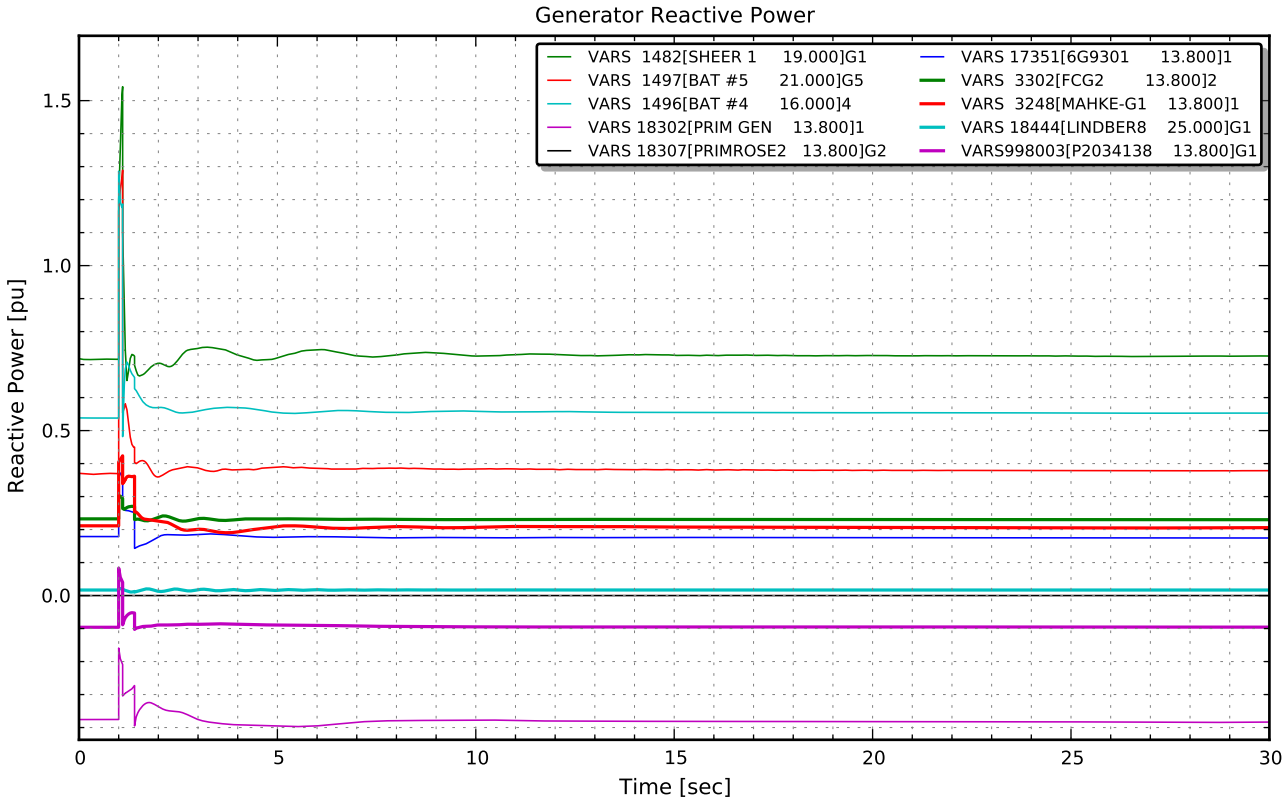
Notes: P2034 Coldlake Area Cogen

Dynamic Stability Analysis

Contingency: 05A - 7L92 Vegreville 709S to Whitby Lake 819S
Alternnative: Post-Project Basecase
Scenario: SL

Attachment A5- 1- 9



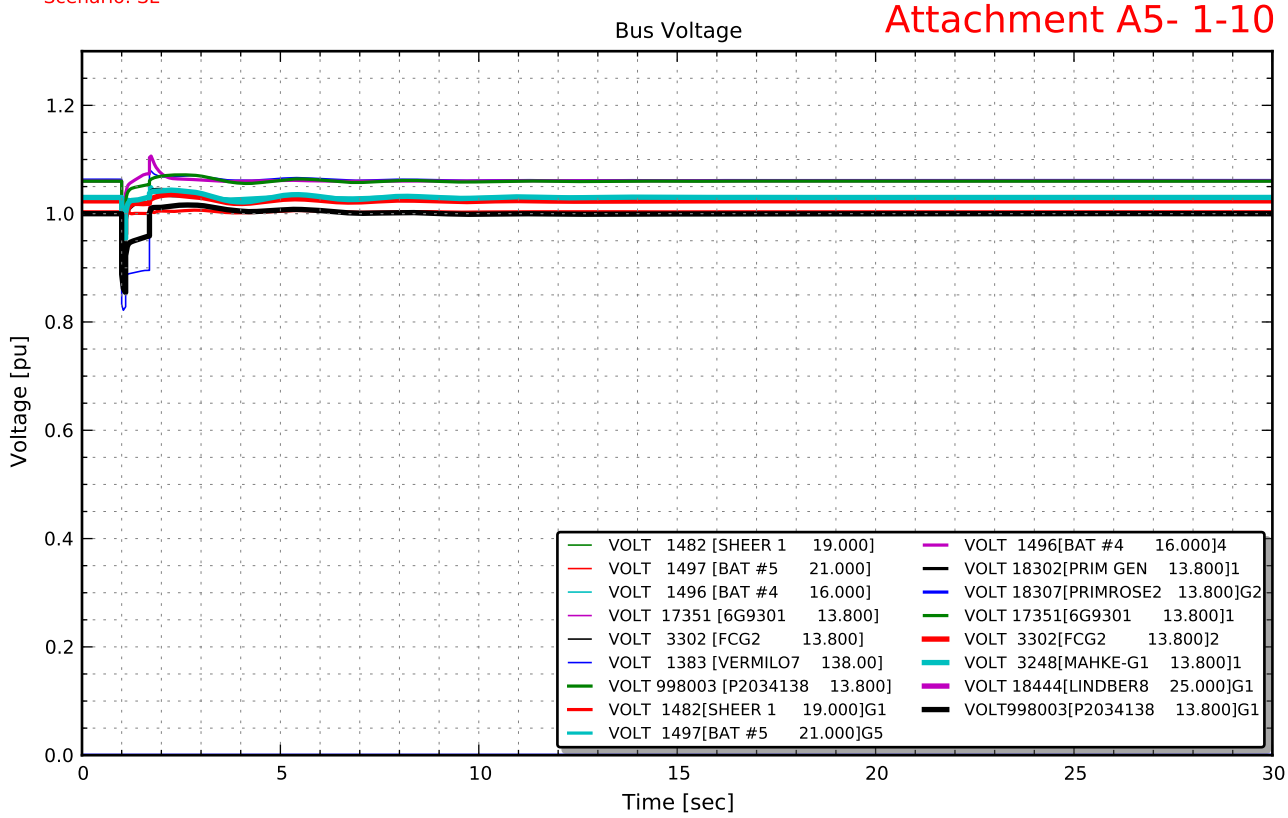


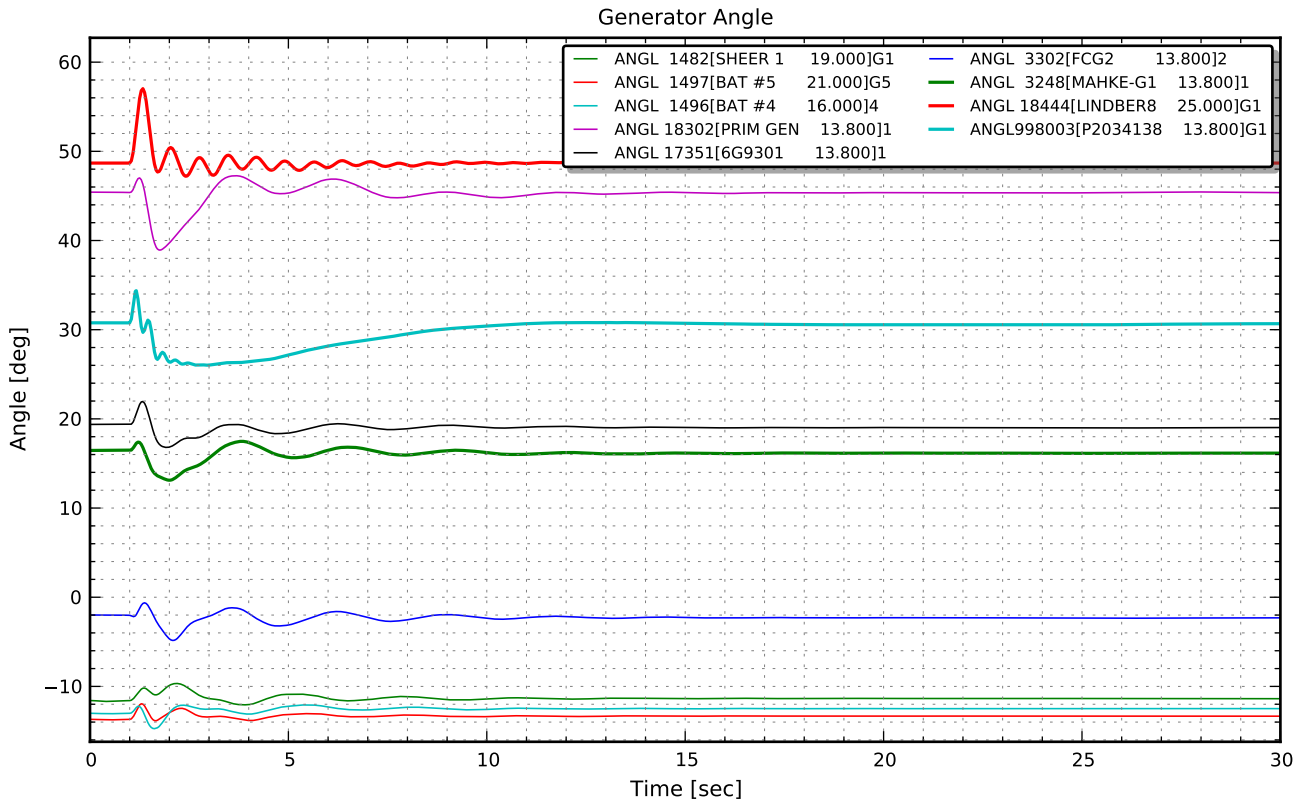
Notes: P2034 Coldlake Area Cogen

Dynamic Stability Analysis

Contingency: 05B - 7L92 Whitby Lake 819S to Vegreville 709S
Alternnative: Post-Project Basecase
Scenario: SL

Attachment A5- 1-10



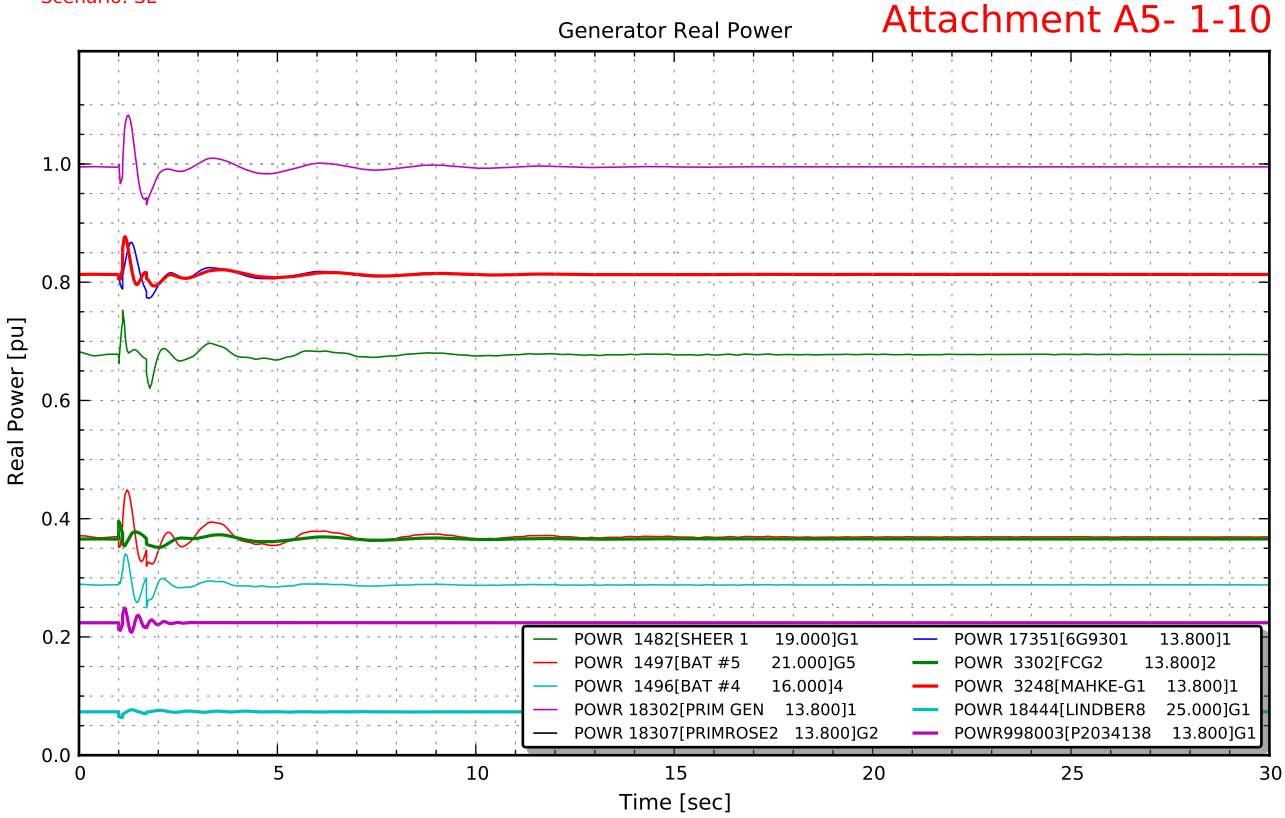


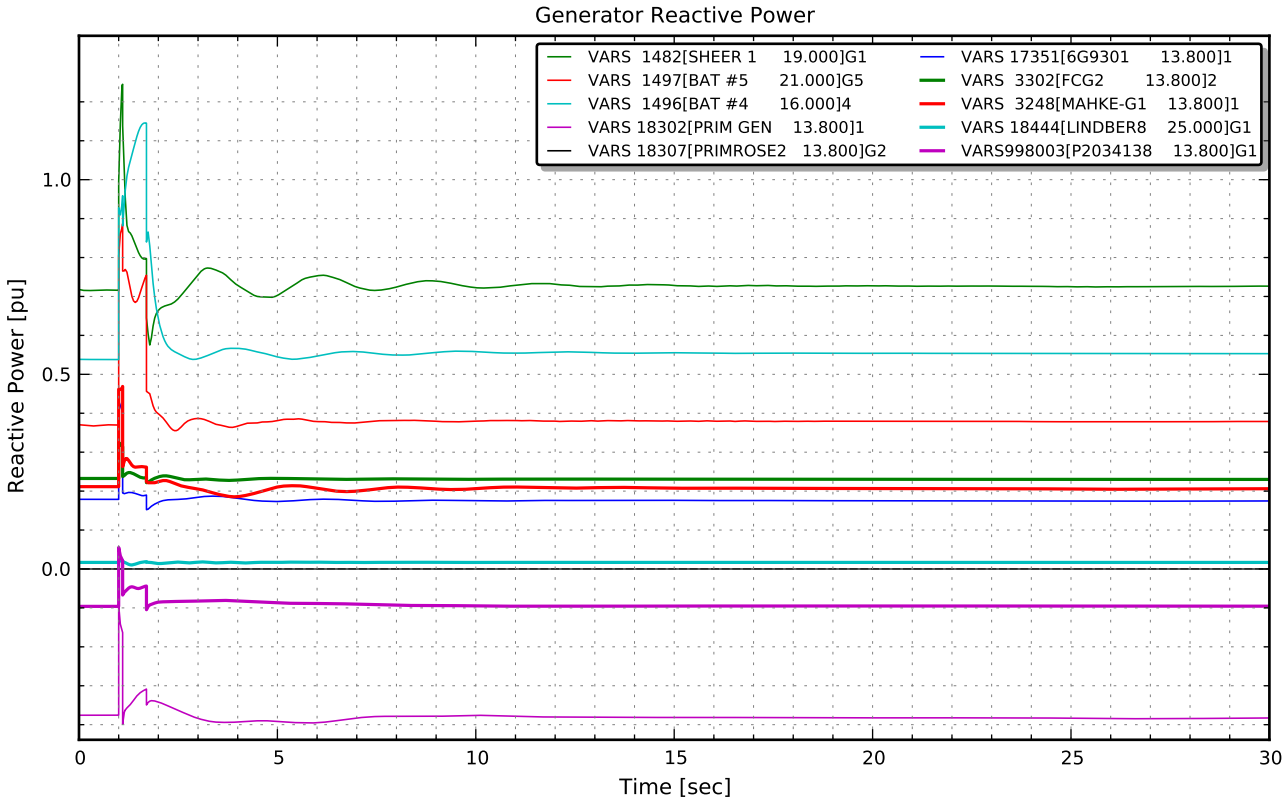
Notes: P2034 Coldlake Area Cogen

Dynamic Stability Analysis

Contingency: 05B - 7L92 Whitby Lake 819S to Vegreville 709S
Alternnative: Post-Project Basecase
Scenario: SL

Attachment A5- 1-10



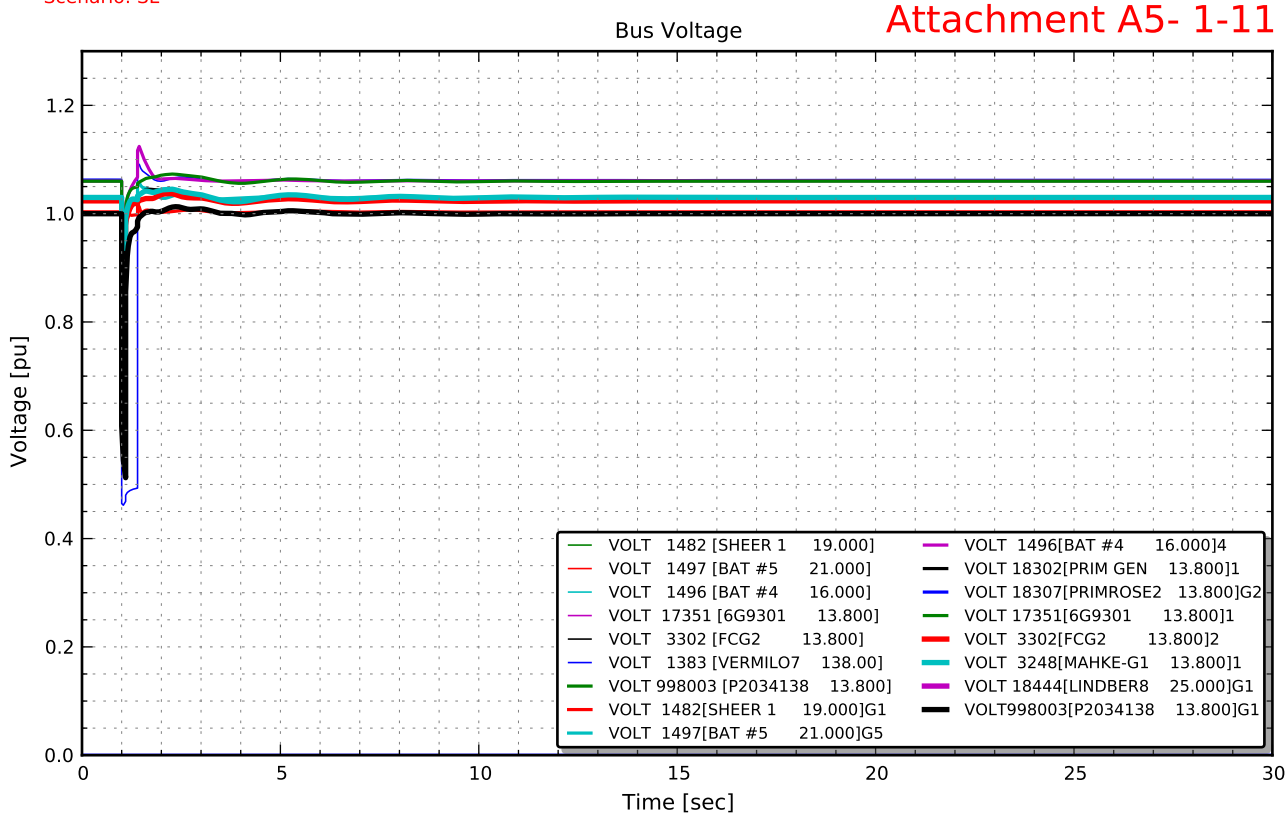


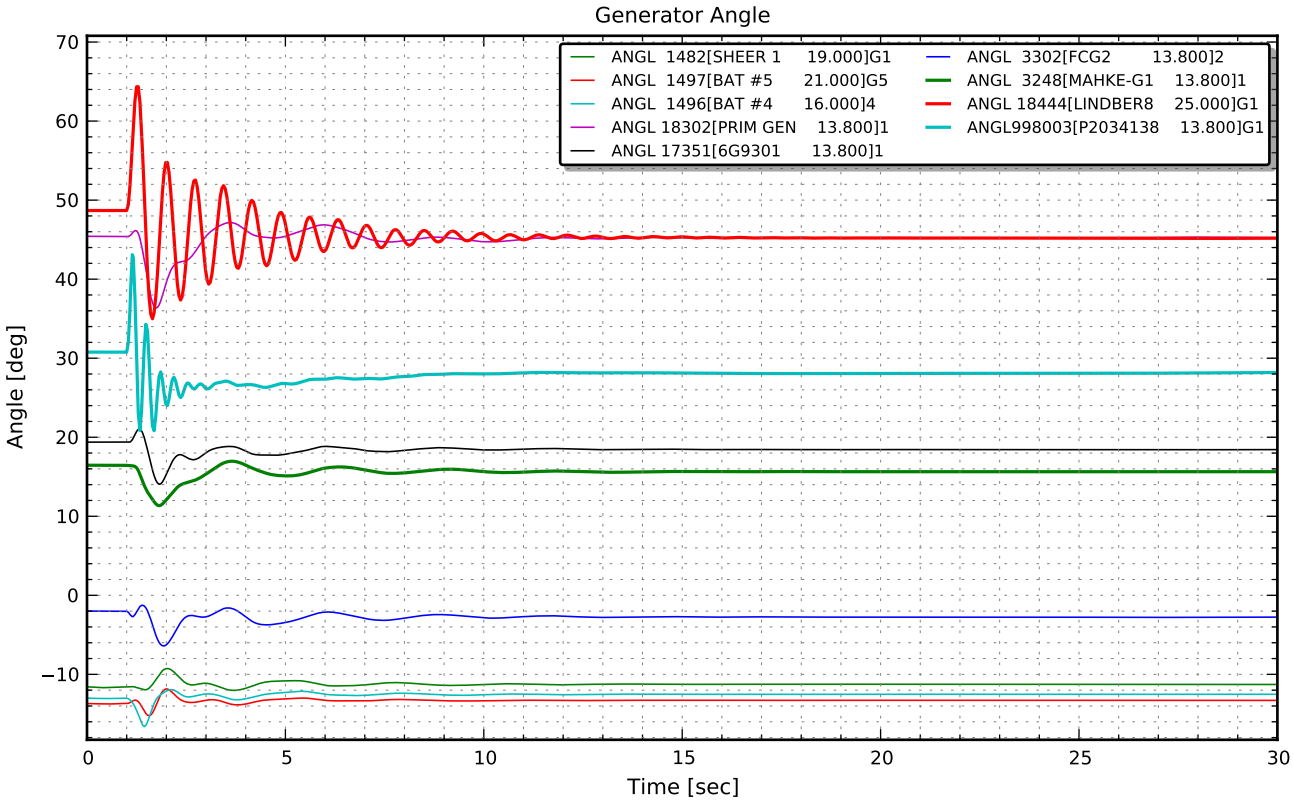
Notes: P2034 Coldlake Area Cogen

Dynamic Stability Analysis

Contingency: 06A - 7L117 Irish Creek 706S to Vermilion 710S
Alternnative: Post-Project Basecase
Scenario: SL

Attachment A5- 1-11



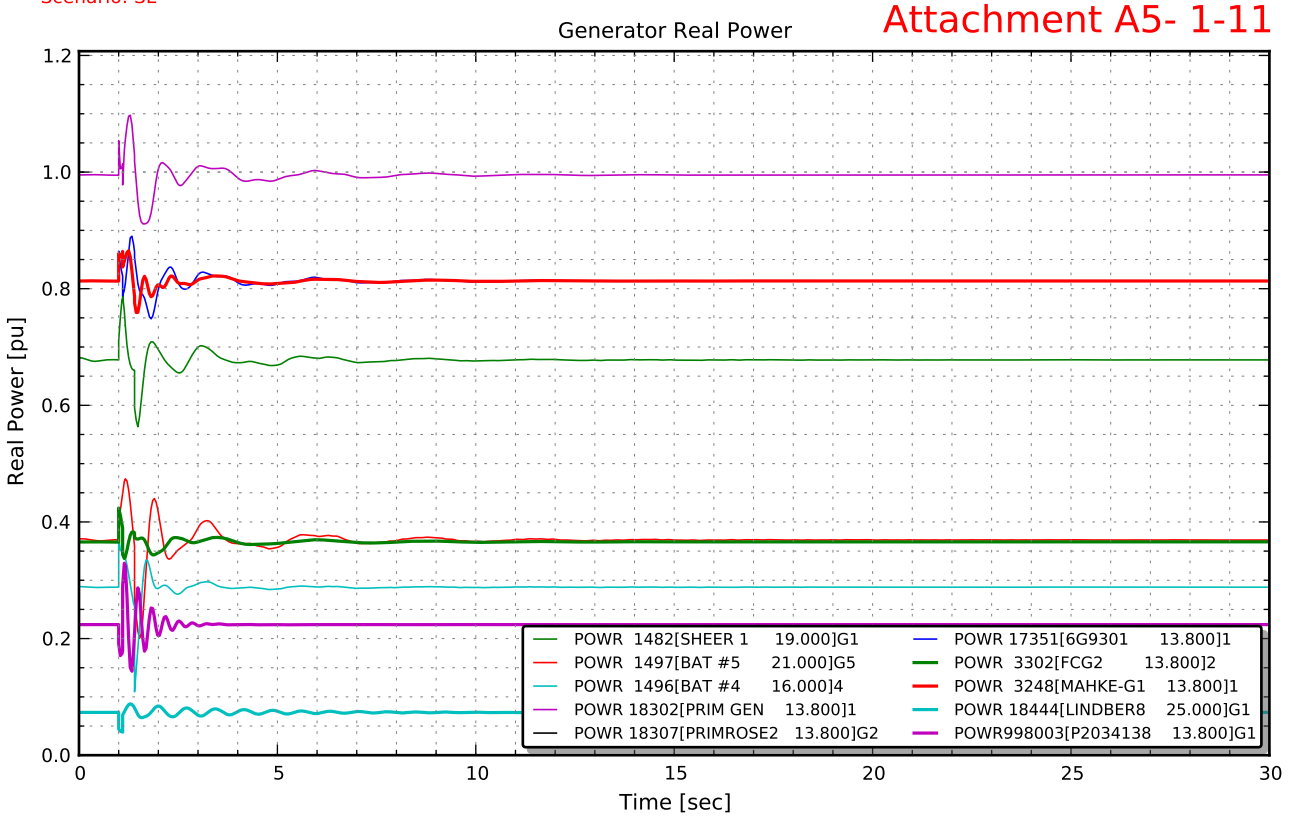


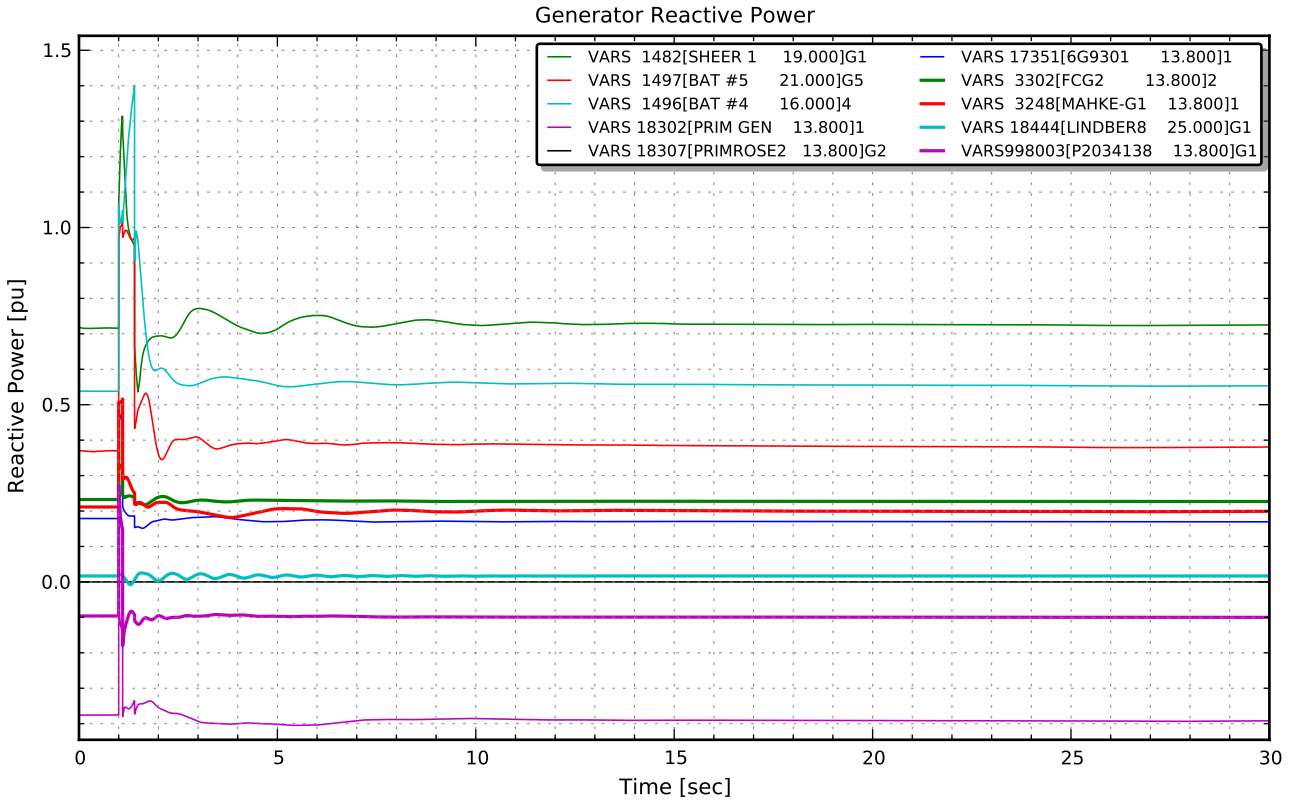
Notes: P2034 Coldlake Area Cogen

Dynamic Stability Analysis

Contingency: 06A - 7L117 Irish Creek 706S to Vermilion 710S
Alternnative: Post-Project Basecase
Scenario: SL

Attachment A5- 1-11



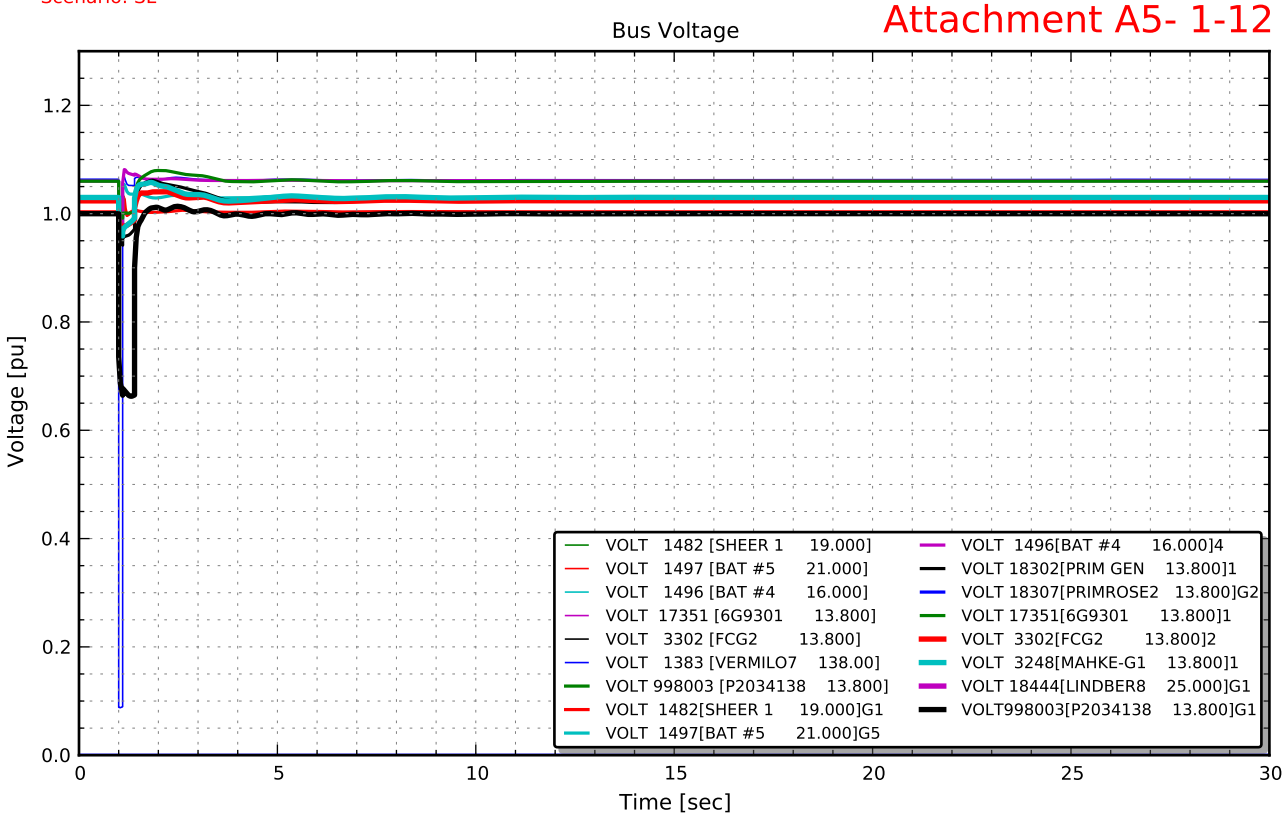


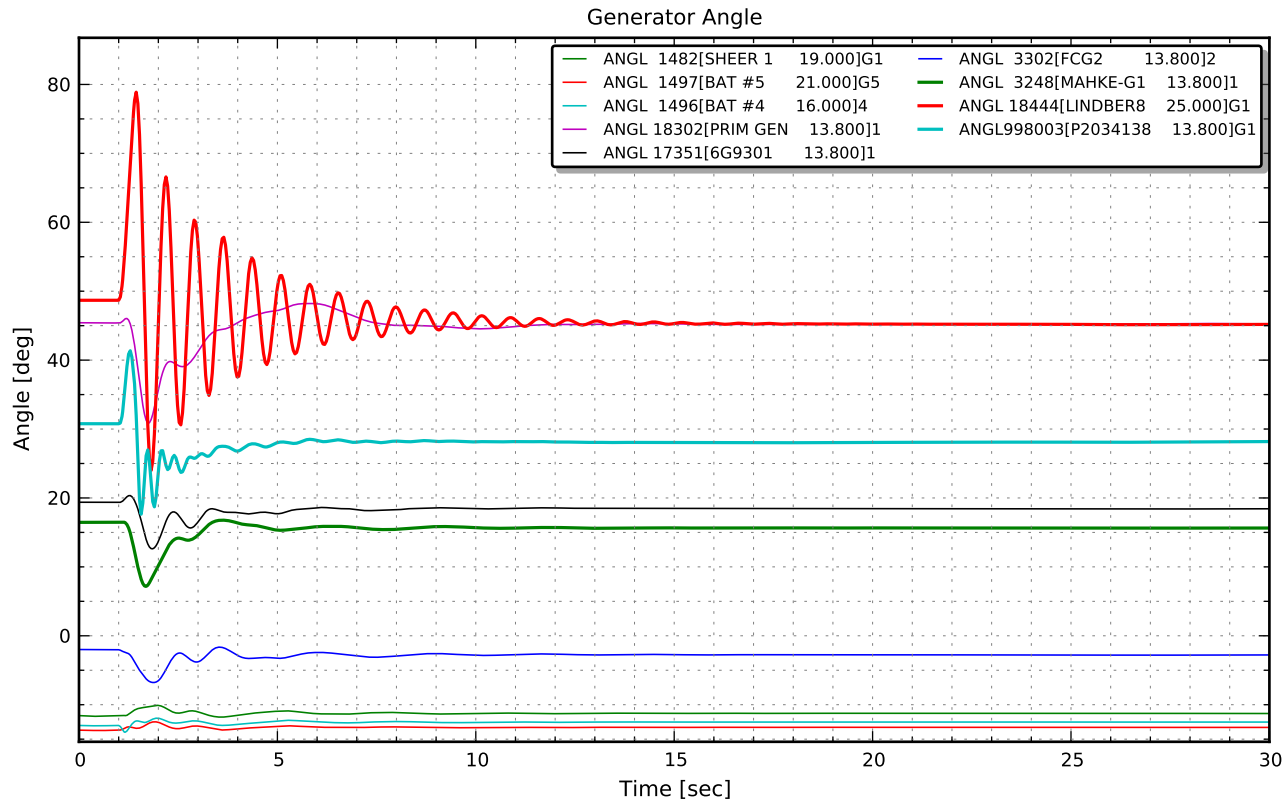
Notes: P2034 Coldlake Area Cogen

Dynamic Stability Analysis

Contingency: 06B - 7L117 Vermilion 710S to Irish Creek 706S
Alternnative: Post-Project Basecase
Scenario: SL

Attachment A5- 1-12



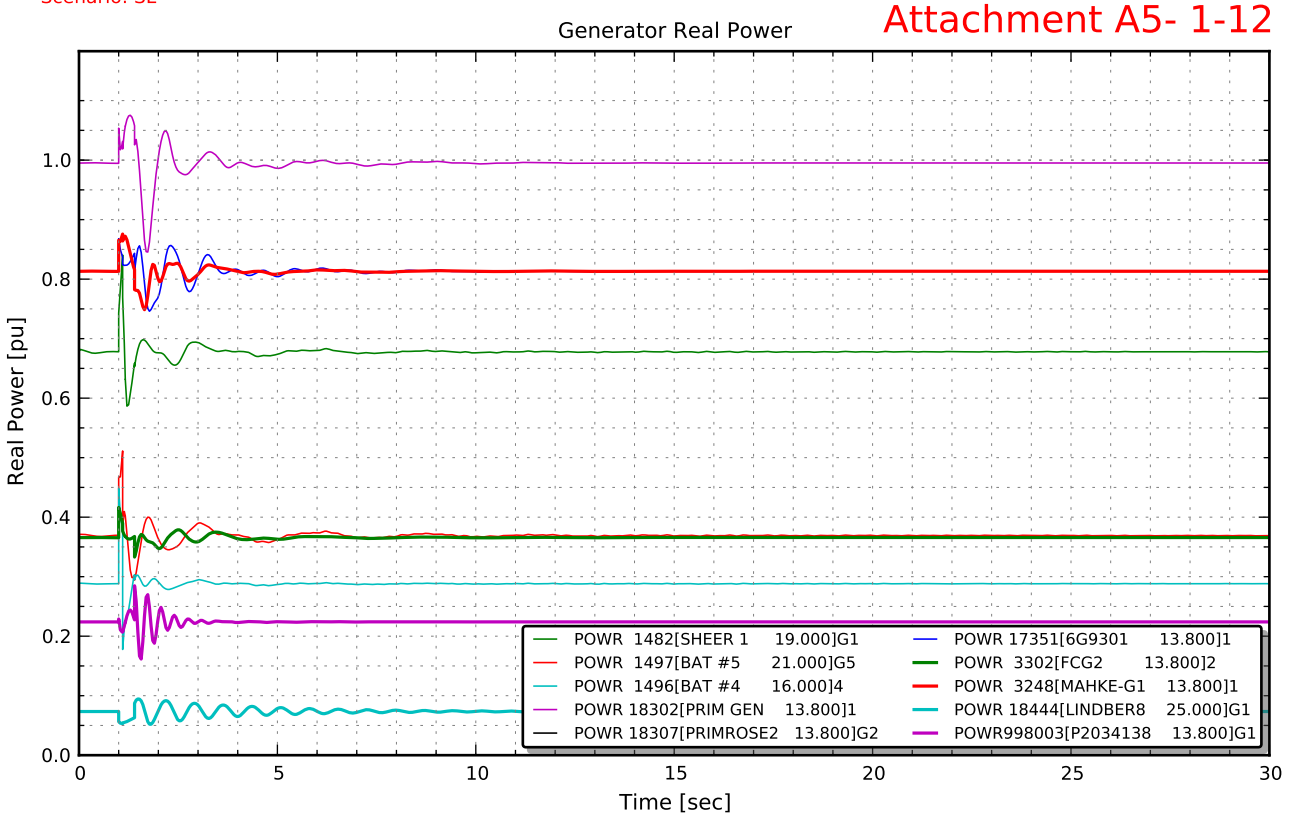


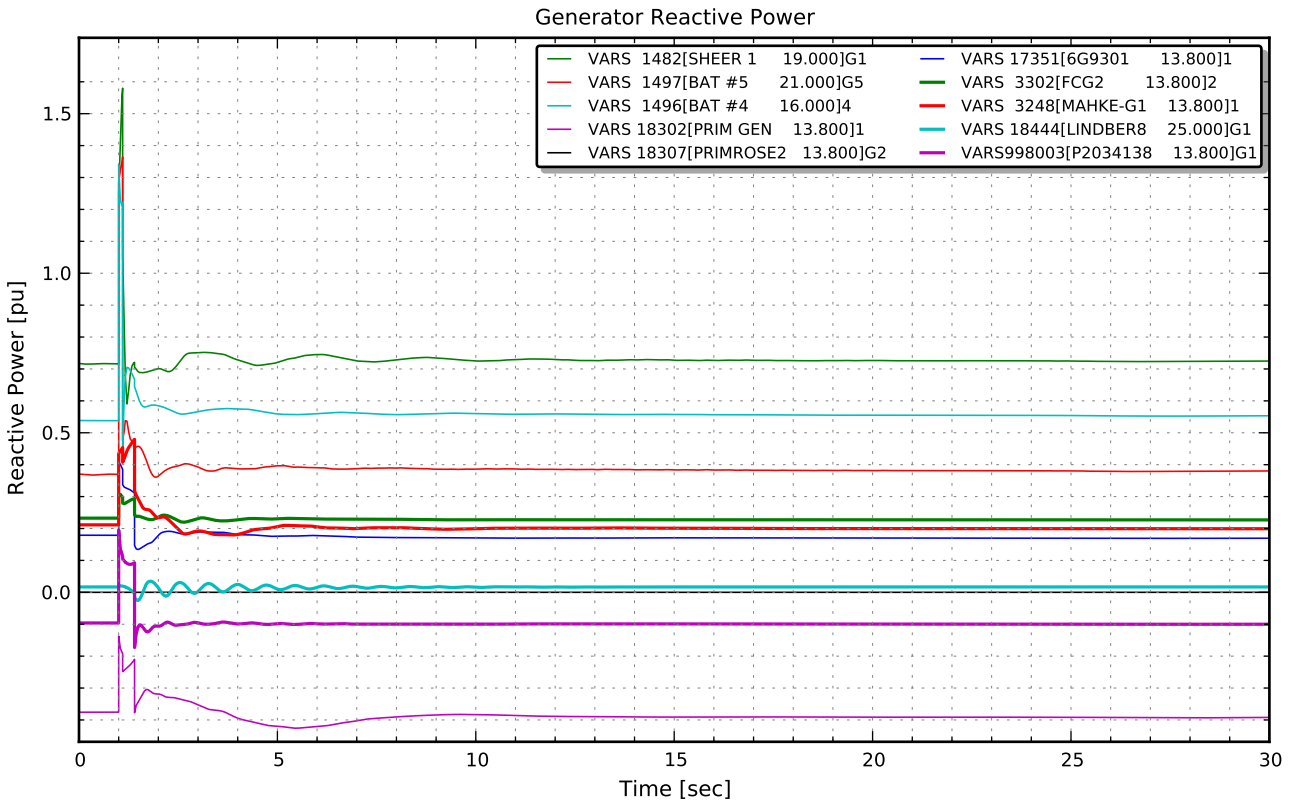
Notes: P2034 Coldlake Area Cogen

Dynamic Stability Analysis

Contingency: 06B - 7L117 Vermilion 710S to Irish Creek 706S
Alternnative: Post-Project Basecase
Scenario: SL

Attachment A5- 1-12



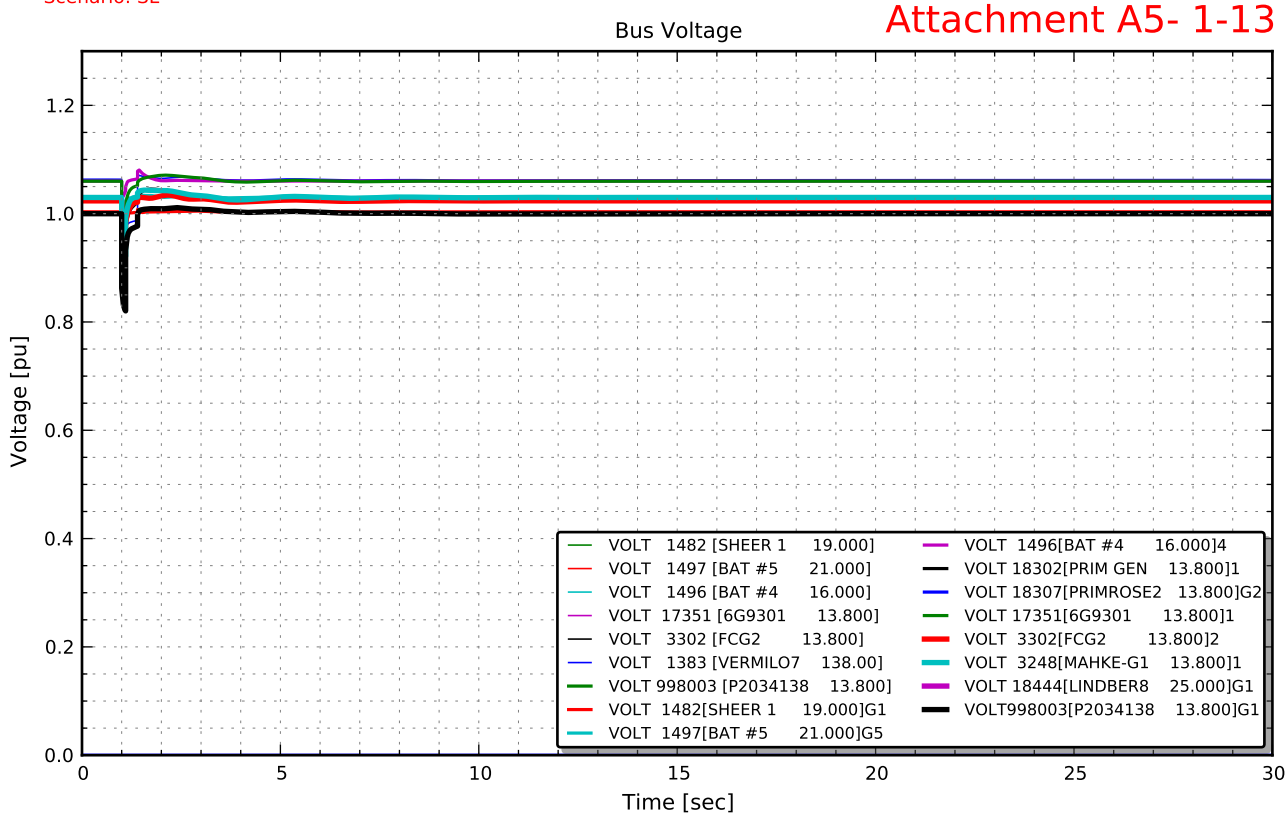


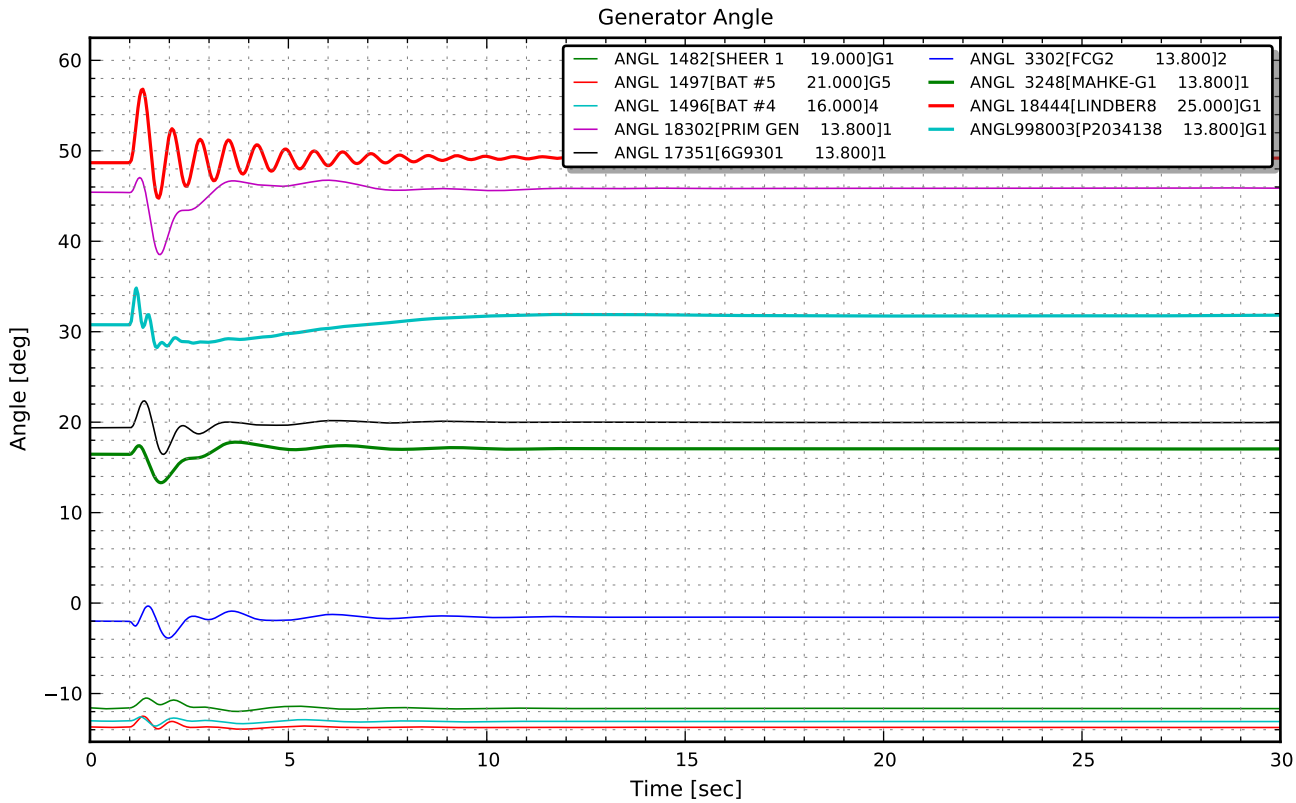
Notes: P2034 Coldlake Area Cogen

Dynamic Stability Analysis

Contingency: 07A - 7L139 St. Paul 707S to Whitby Lake 819S
Alternnative: Post-Project Basecase
Scenario: SL

Attachment A5- 1-13



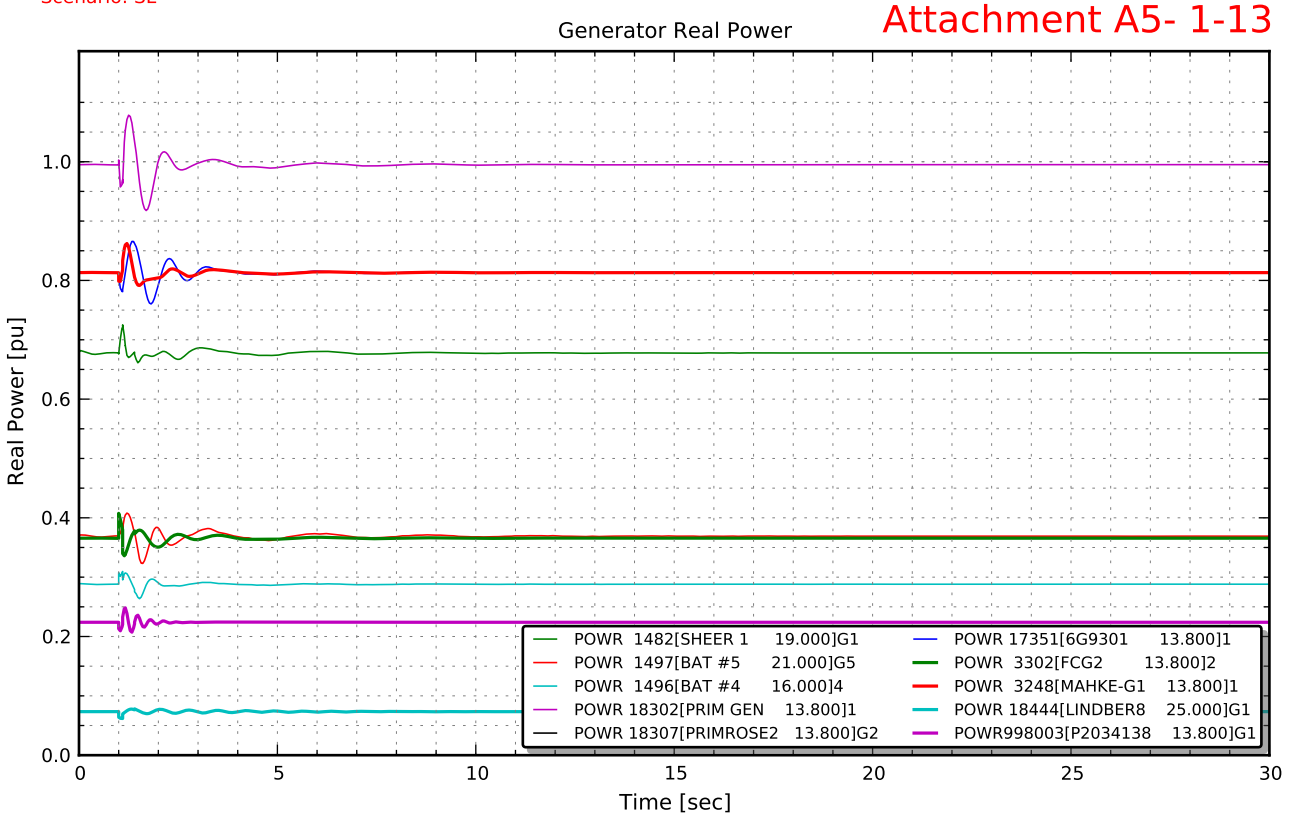


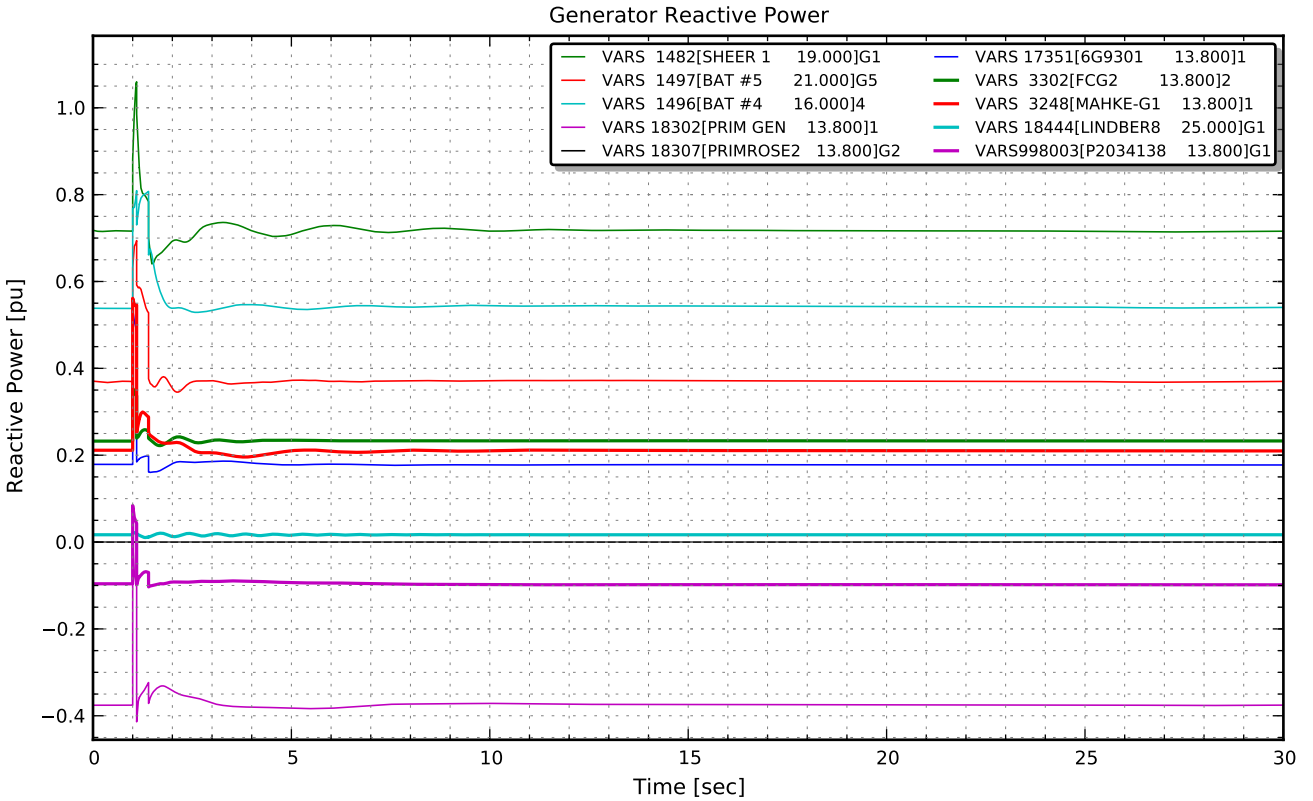
Notes: P2034 Coldlake Area Cogen

Dynamic Stability Analysis

Contingency: 07A - 7L139 St. Paul 707S to Whitby Lake 819S
Alternnative: Post-Project Basecase
Scenario: SL

Attachment A5- 1-13



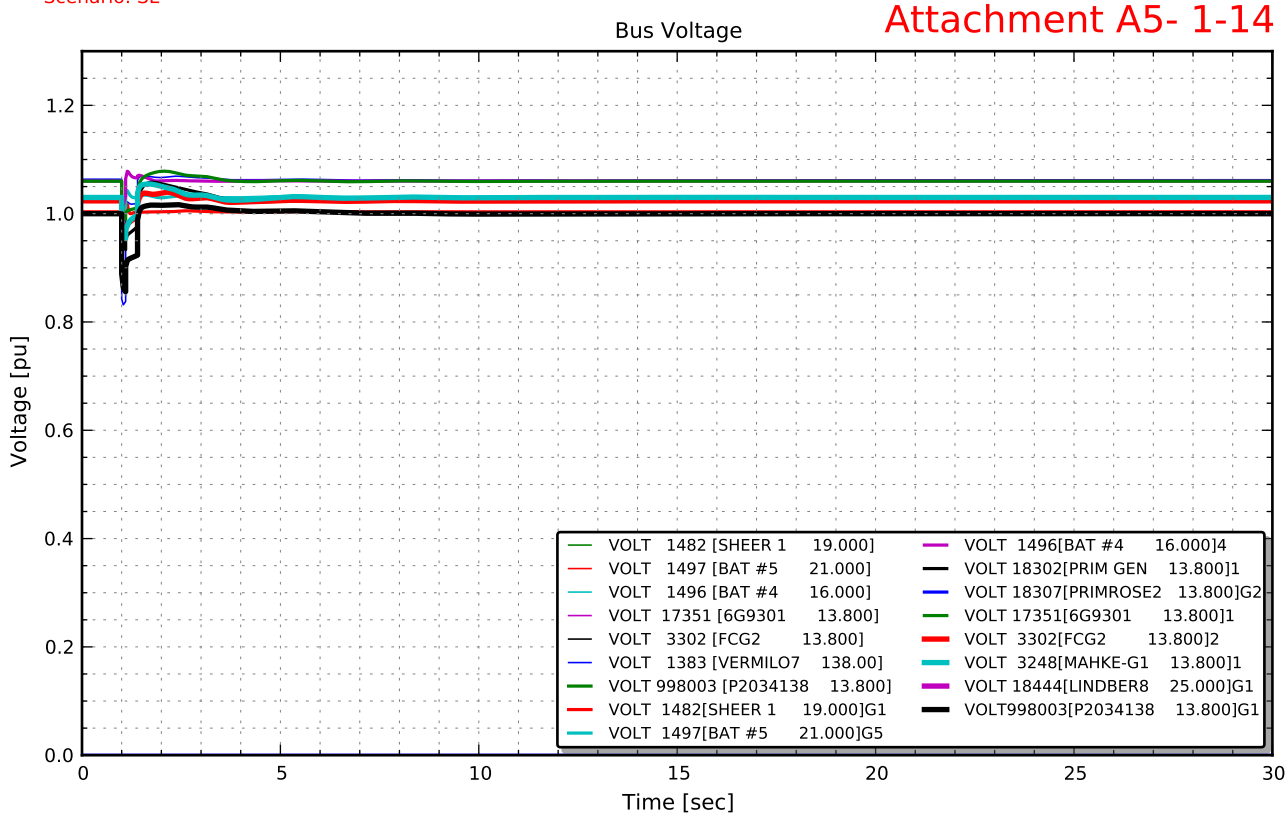


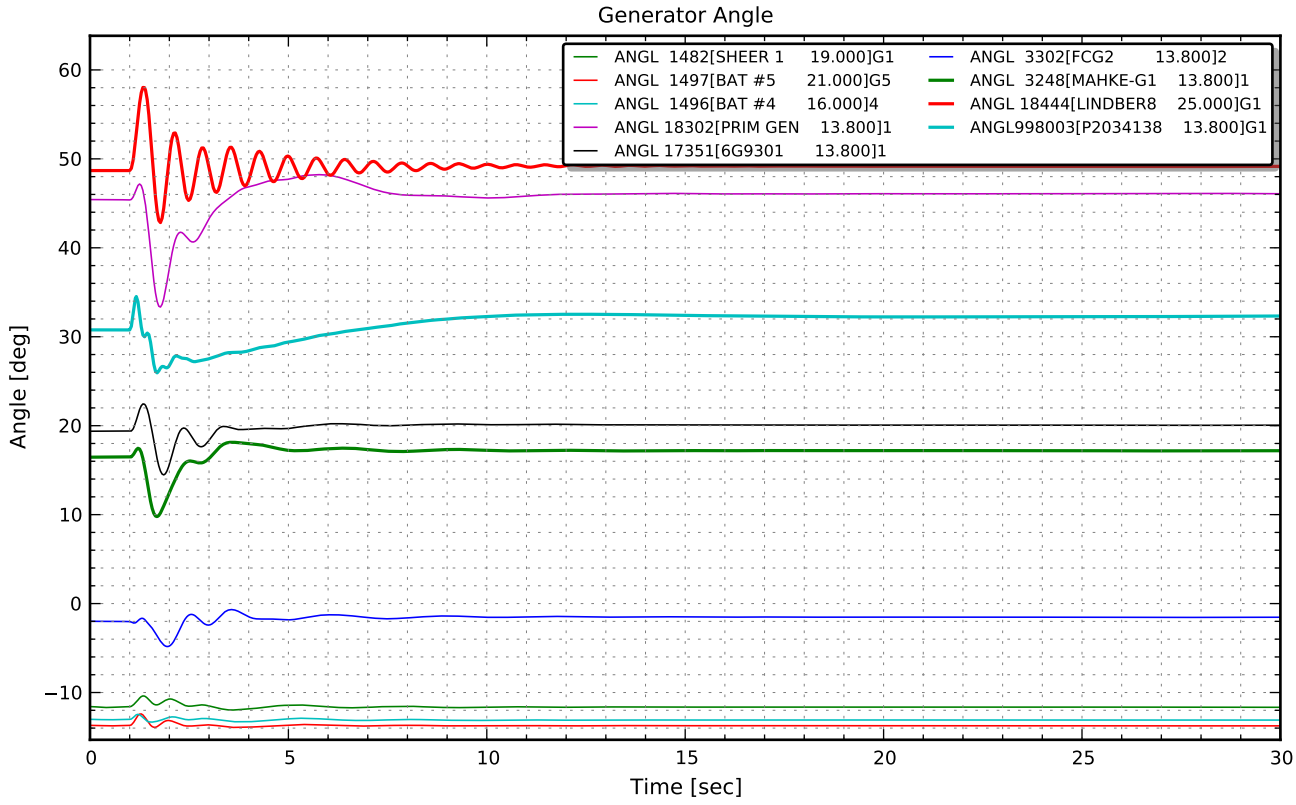
Notes: P2034 Coldlake Area Cogen

Dynamic Stability Analysis

Contingency: 07B - 7L139 Whitby Lake 819S to St. Paul 707S
Alternnative: Post-Project Basecase
Scenario: SL

Attachment A5- 1-14



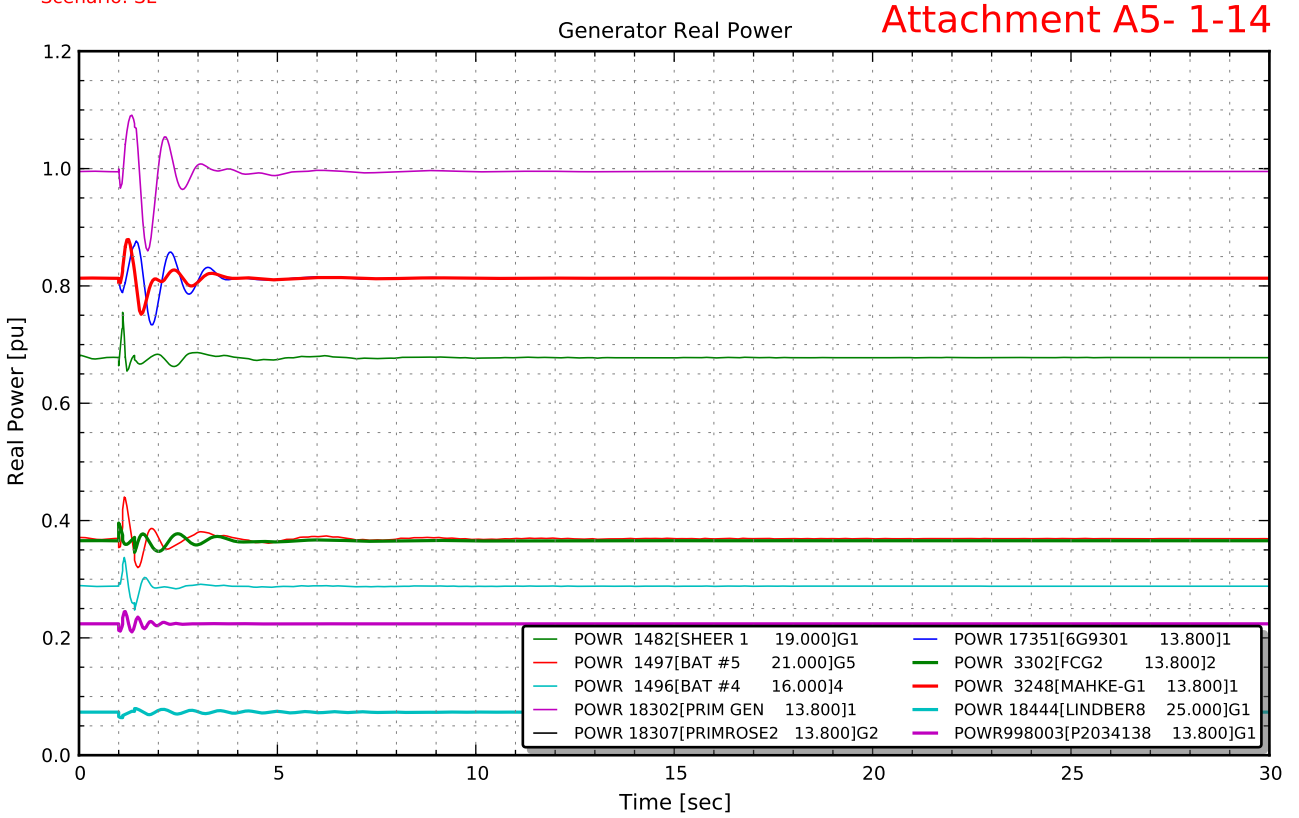


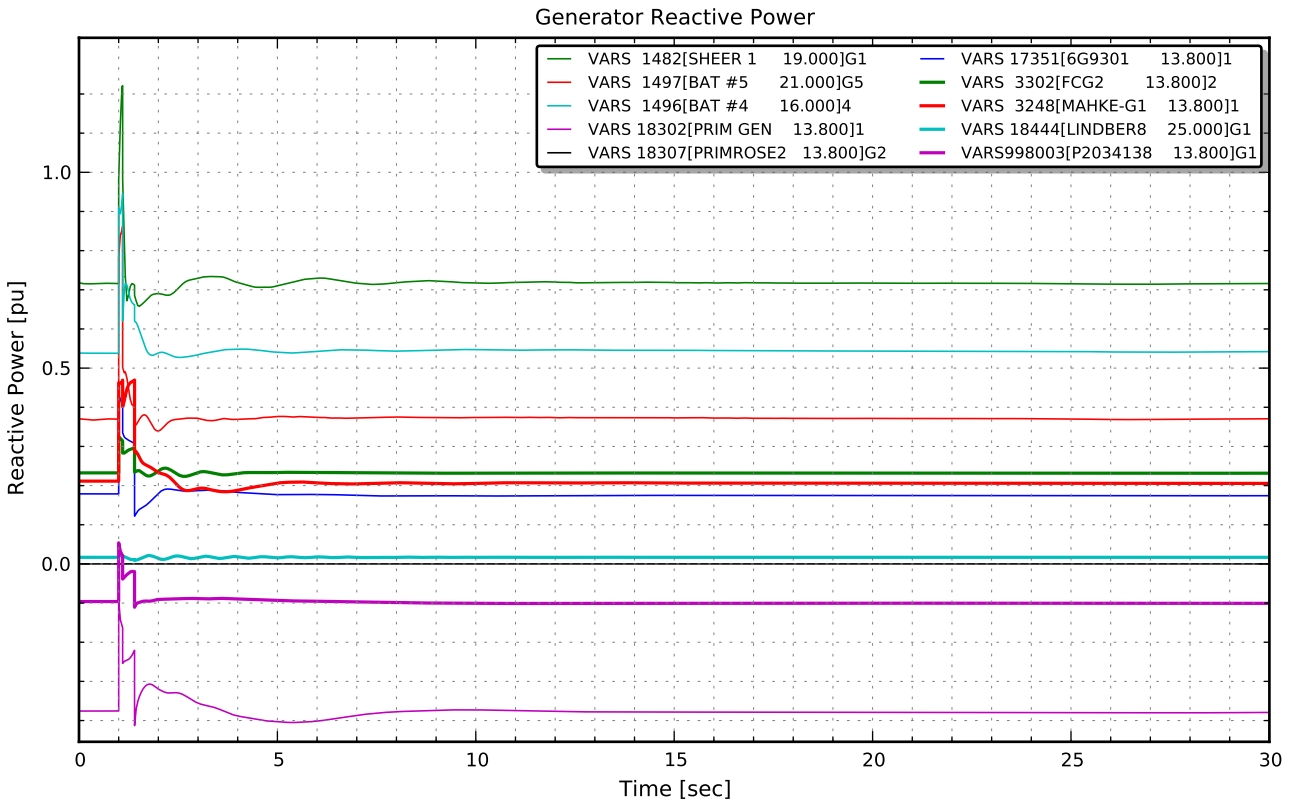
Notes: P2034 Coldlake Area Cogen

Dynamic Stability Analysis

Contingency: 07B - 7L139 Whitby Lake 819S to St. Paul 707S
Alternnative: Post-Project Basecase
Scenario: SL

Attachment A5- 1-14



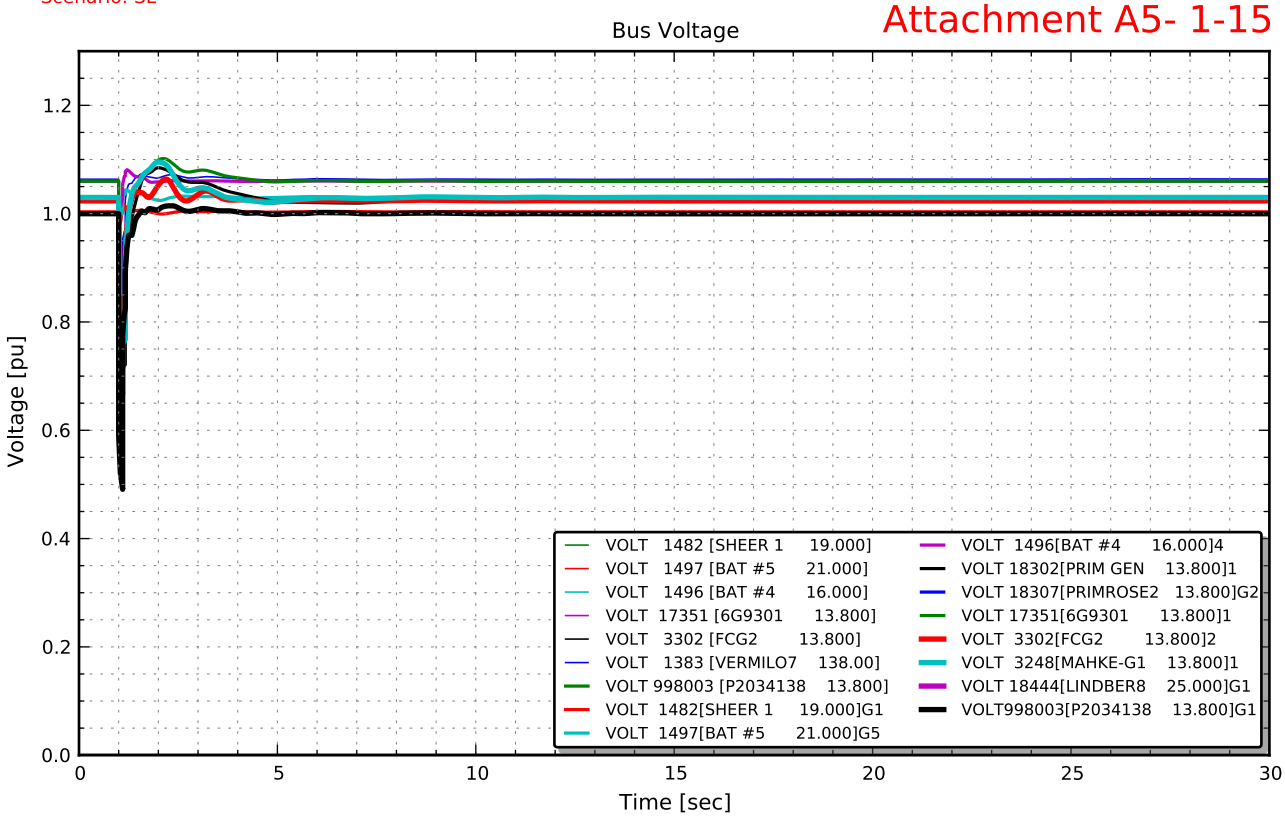


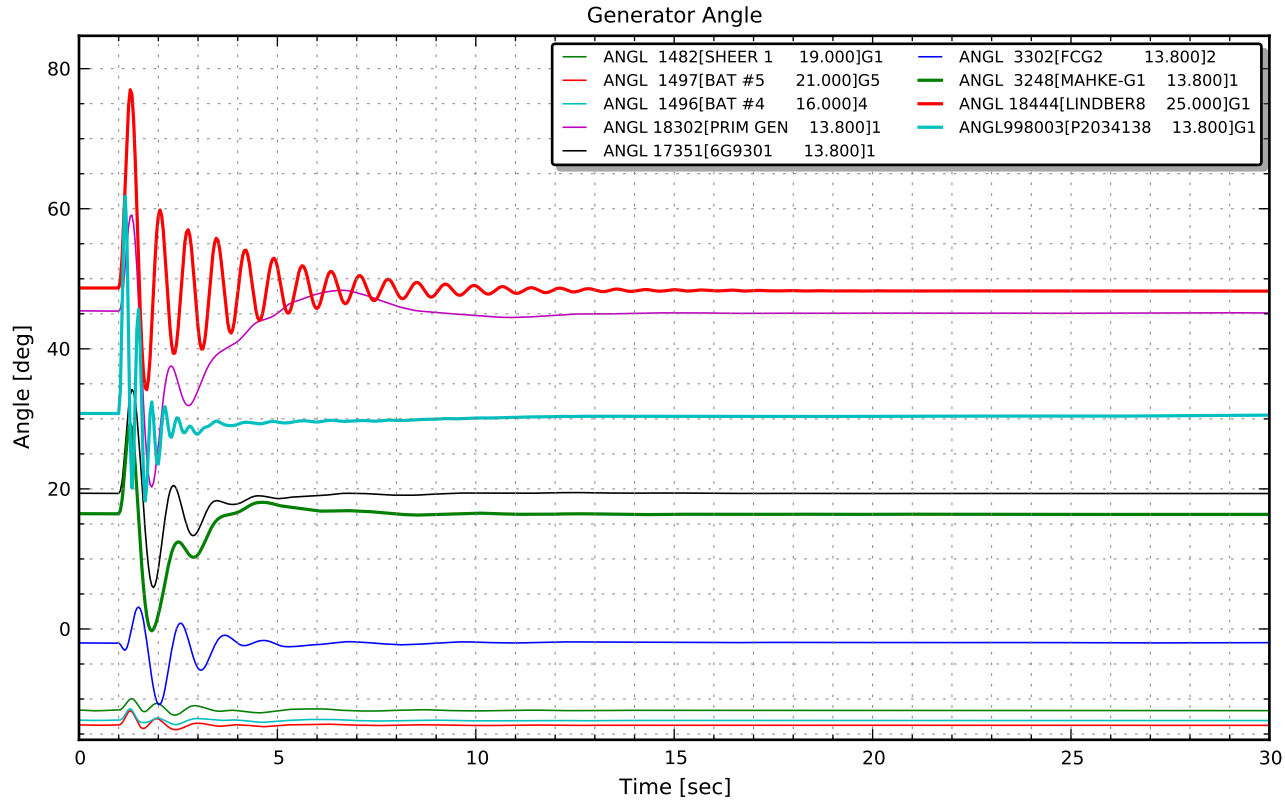
Notes: P2034 Coldlake Area Cogen

Dynamic Stability Analysis

Contingency: 08A - 7L146 Bonnyville 700S to Bourque 970S
Alternnative: Post-Project Basecase
Scenario: SL

Attachment A5- 1-15



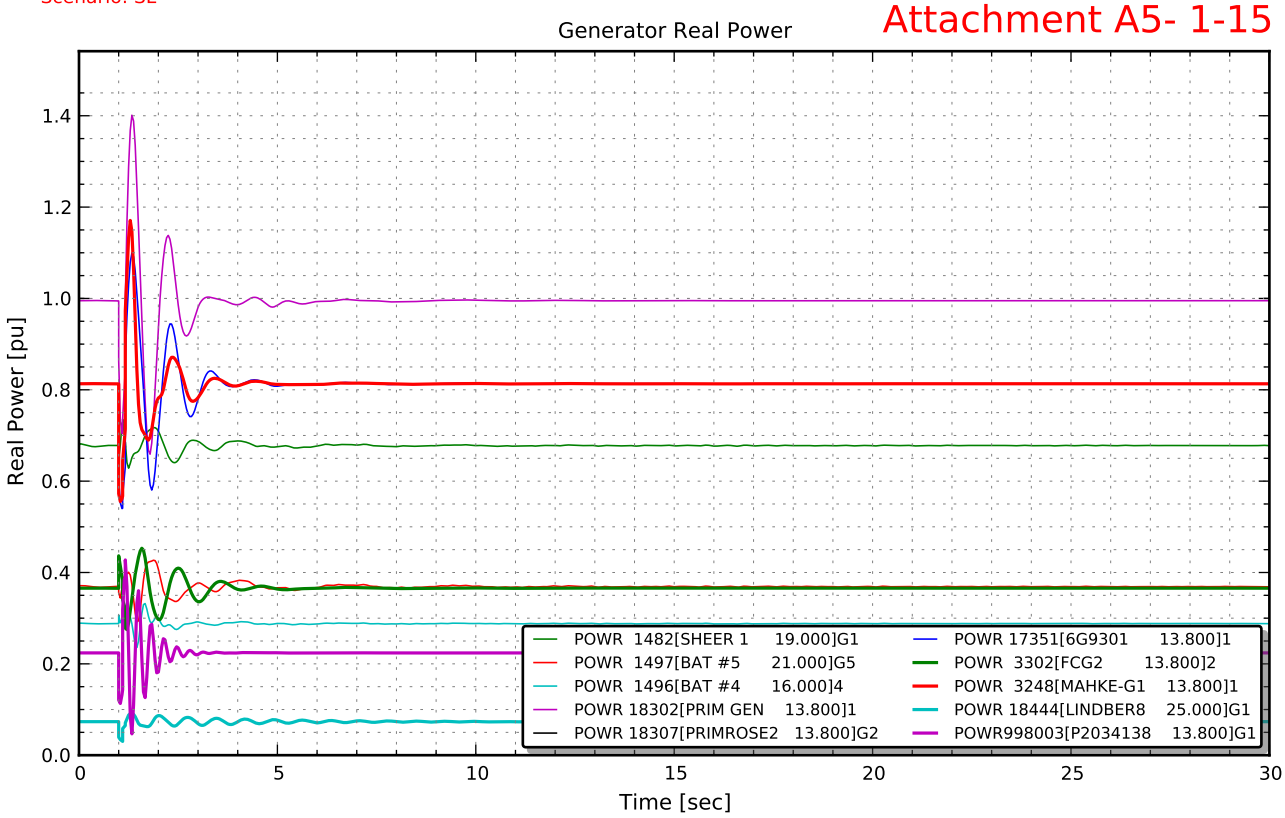


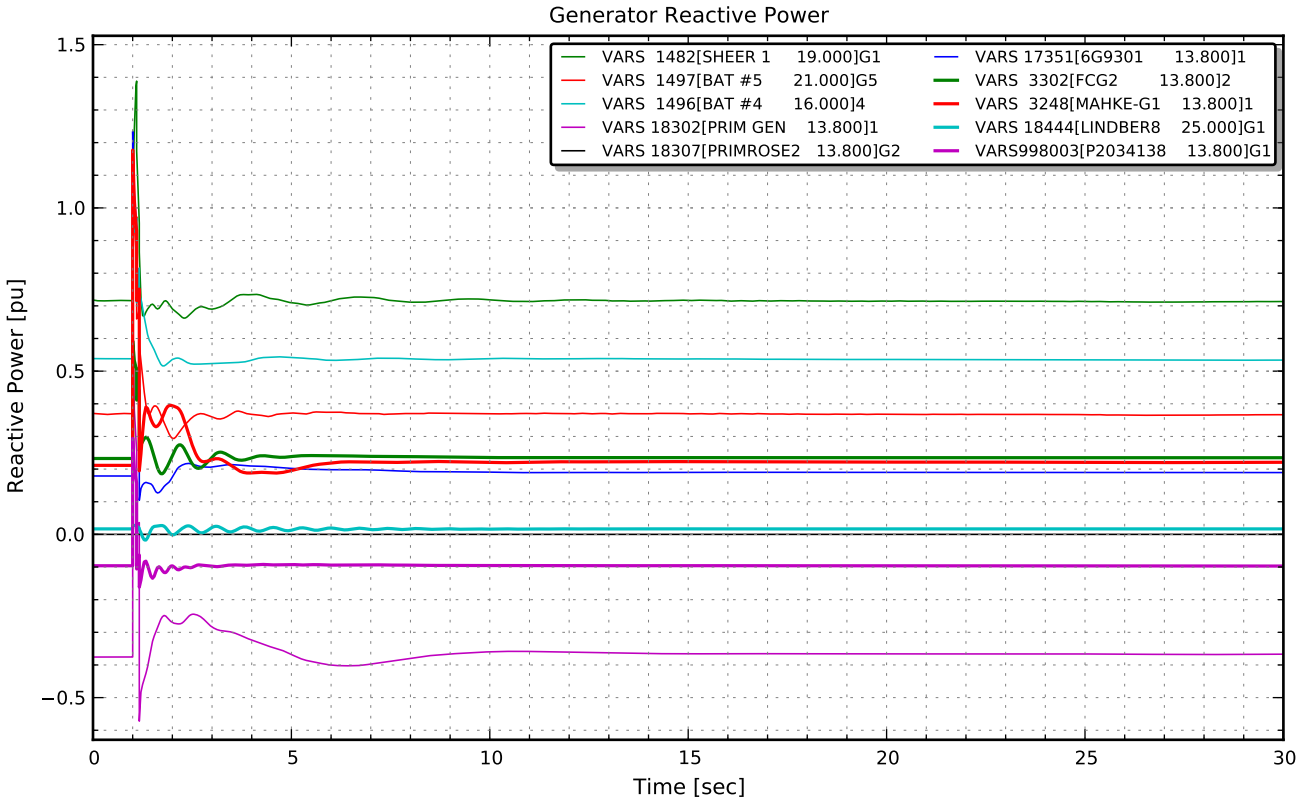
Notes: P2034 Coldlake Area Cogen

Dynamic Stability Analysis

Contingency: 08A - 7L146 Bonnyville 700S to Bourque 970S
Alternnative: Post-Project Basecase
Scenario: SL

Attachment A5- 1-15



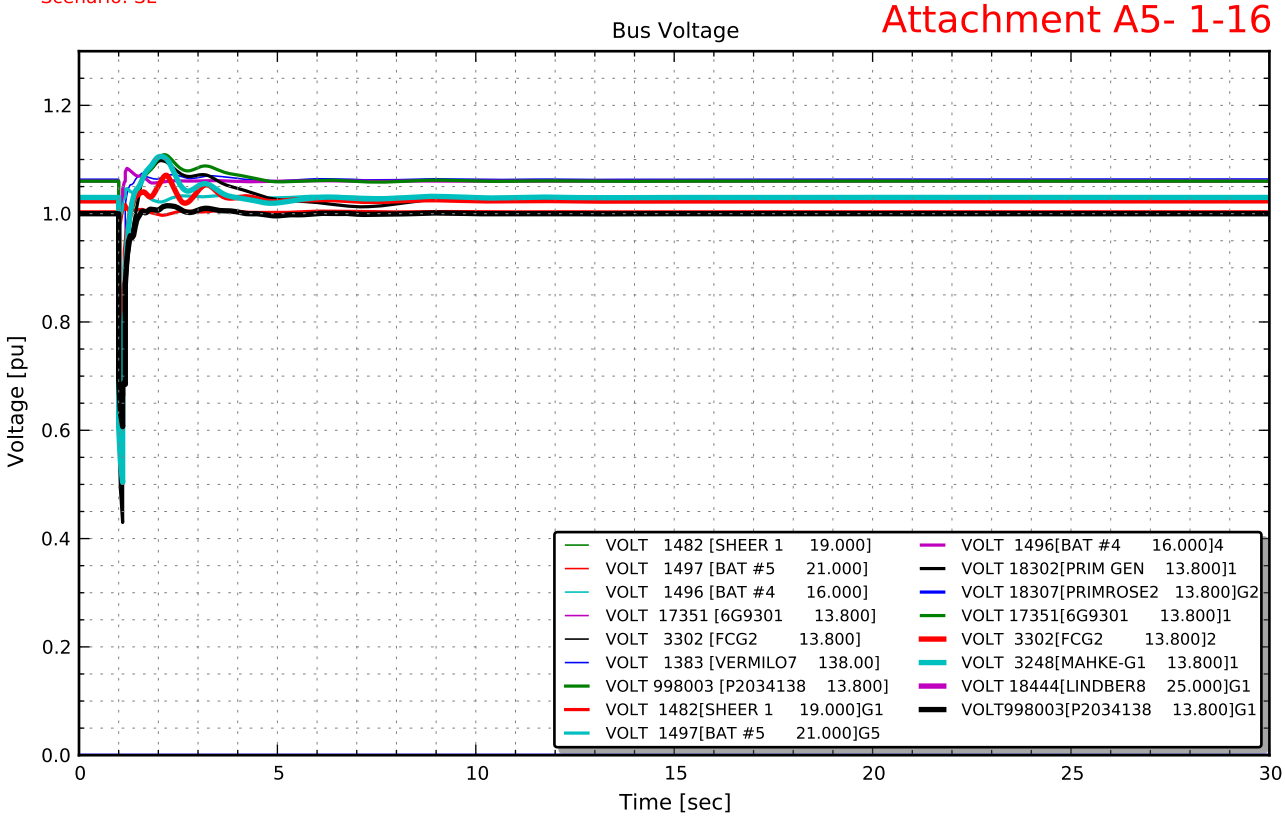


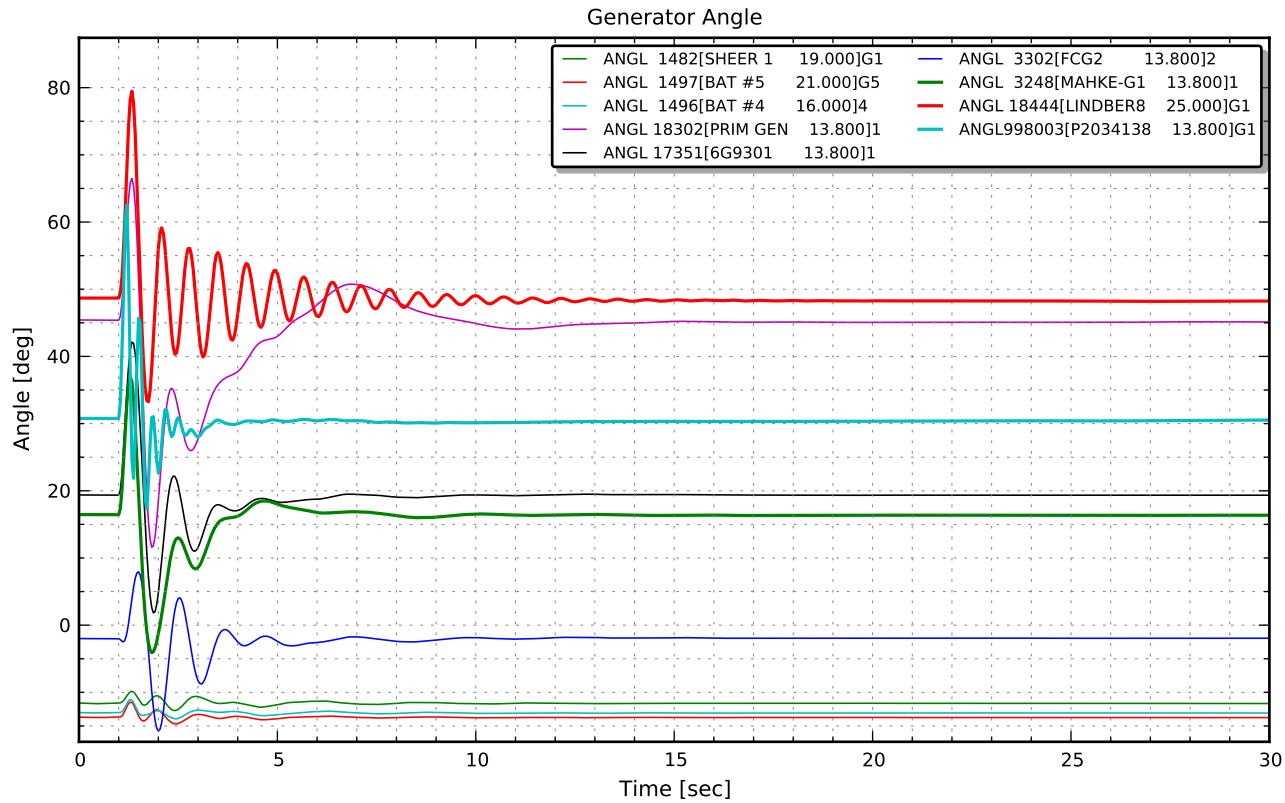
Notes: P2034 Coldlake Area Cogen

Dynamic Stability Analysis

Contingency: 08B - 7L146 Bourque 970S to Bonnyville 700S
Alternnative: Post-Project Basecase
Scenario: SL

Attachment A5- 1-16



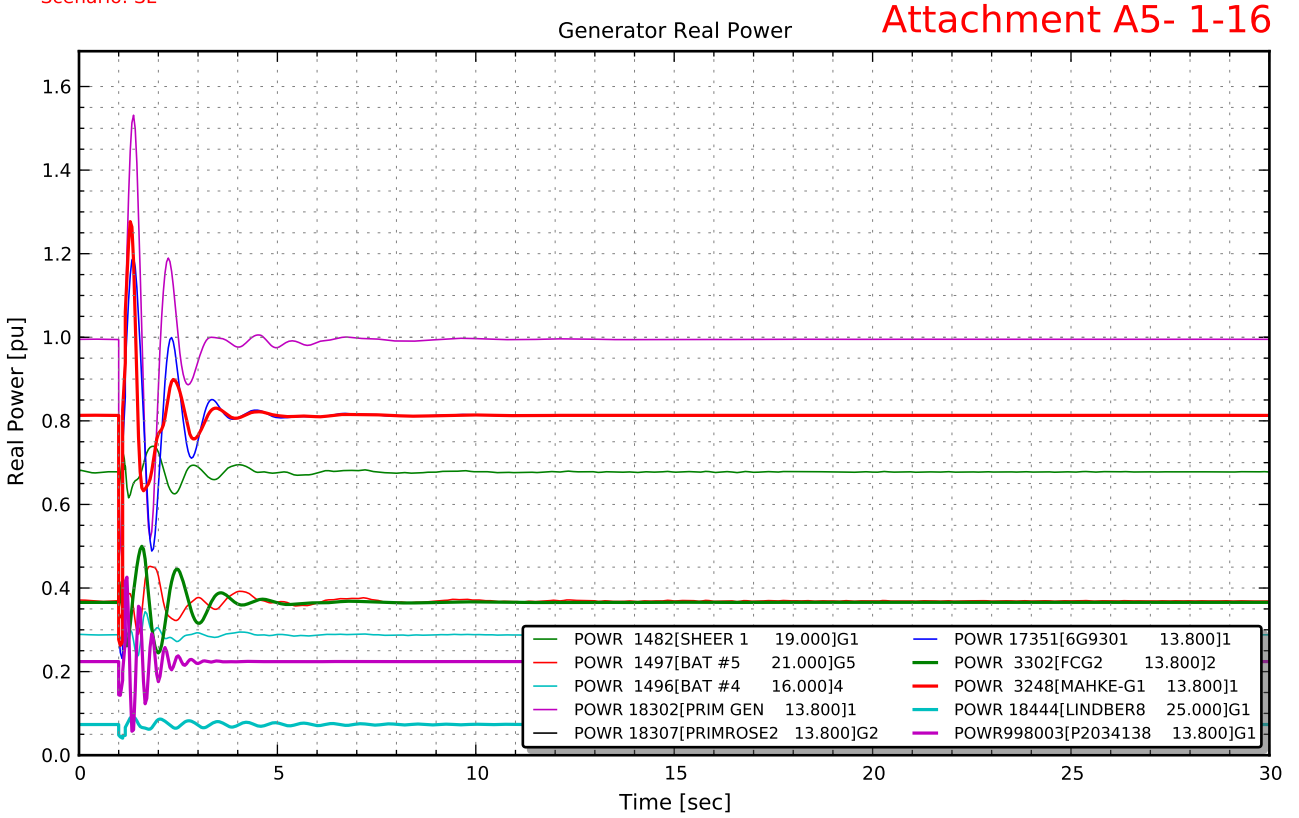


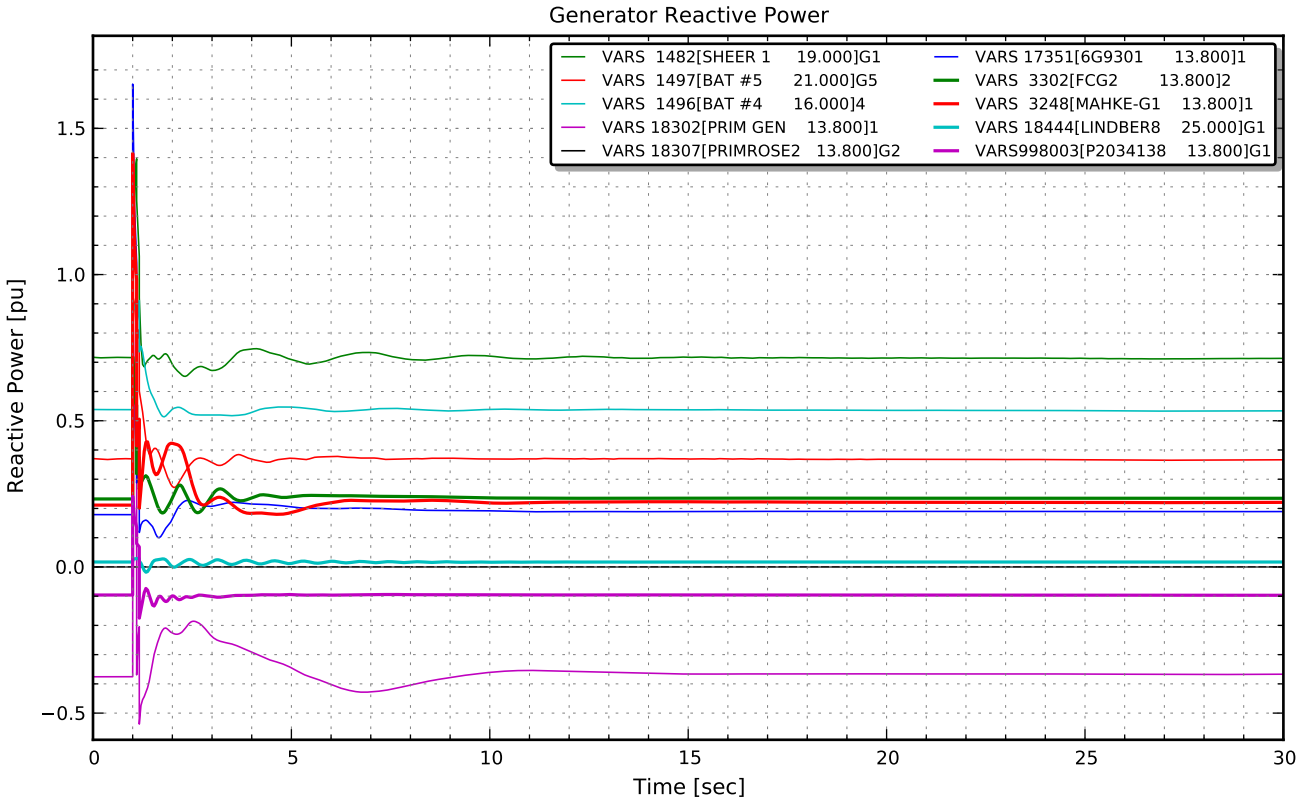
Notes: P2034 Coldlake Area Cogen

Dynamic Stability Analysis

Contingency: 08B - 7L146 Bourque 970S to Bonnyville 700S
Alternnative: Post-Project Basecase
Scenario: SL

Attachment A5- 1-16



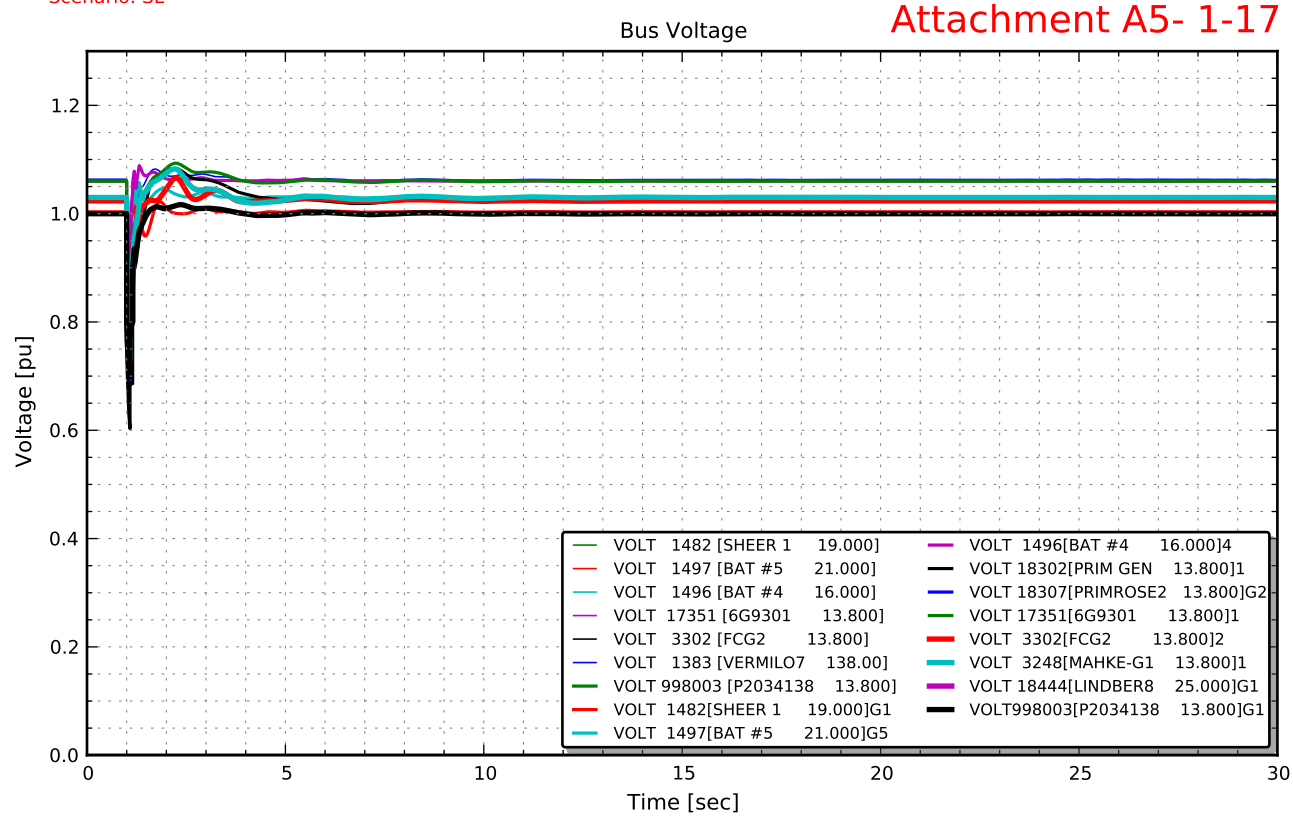


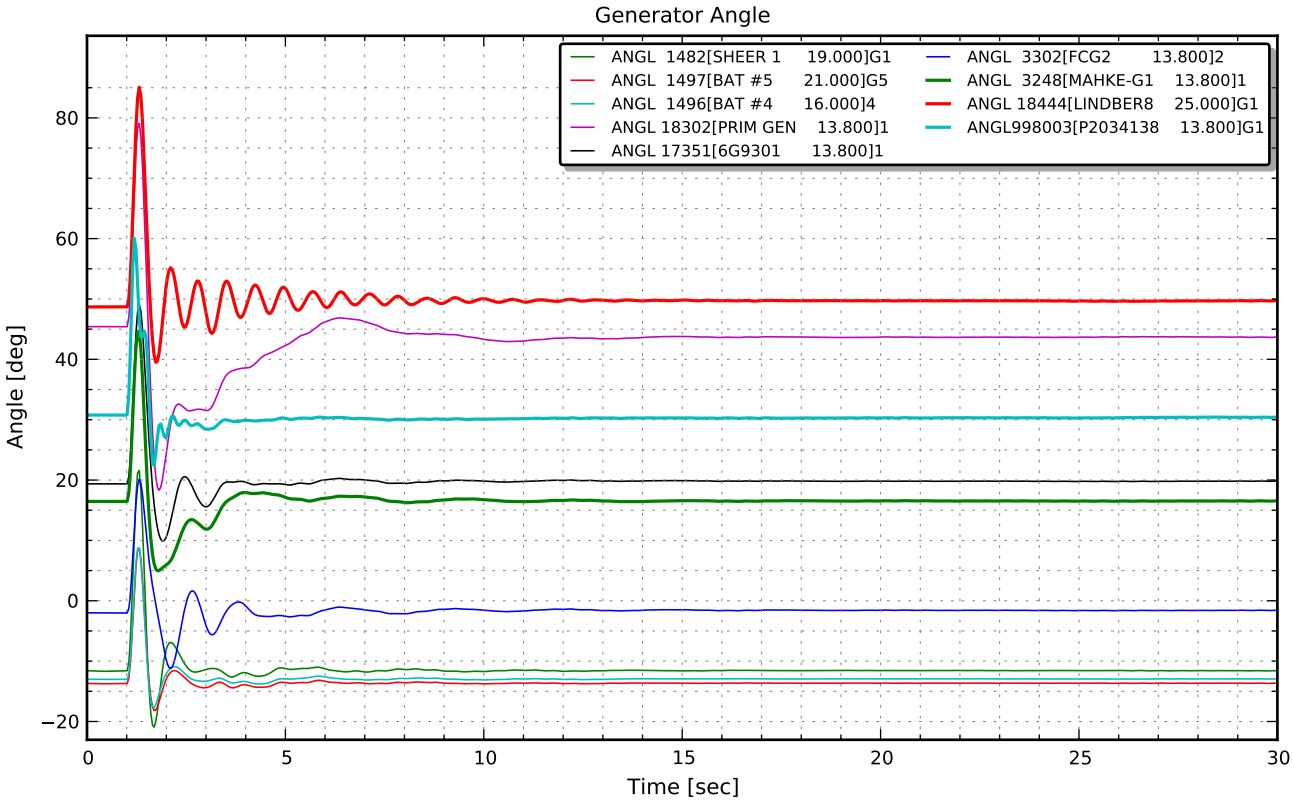
Notes: P2034 Coldlake Area Cogen

Dynamic Stability Analysis

Contingency: 09A - 9L36 Whitefish Lake 825S to Marguerite Lake 826S
Alternnative: Post-Project Basecase
Scenario: SL

Attachment A5- 1-17



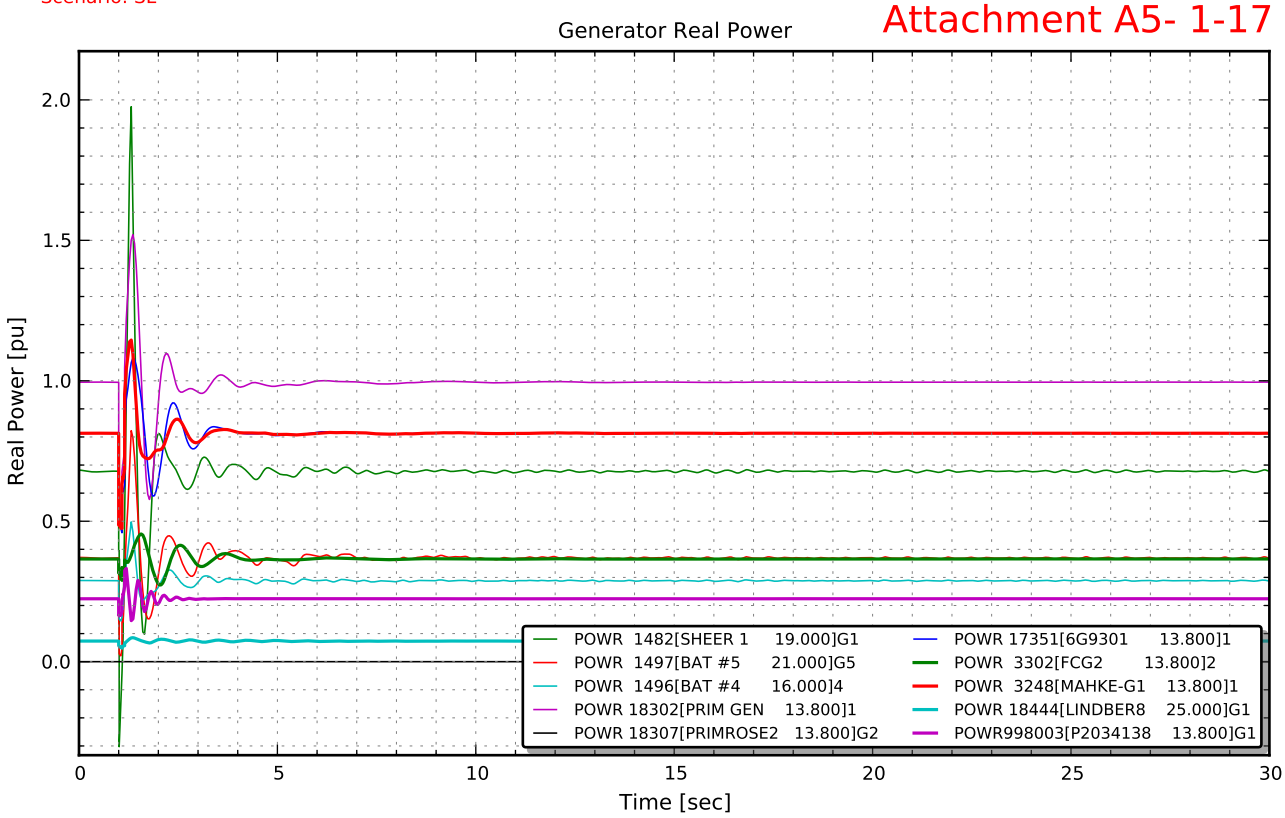


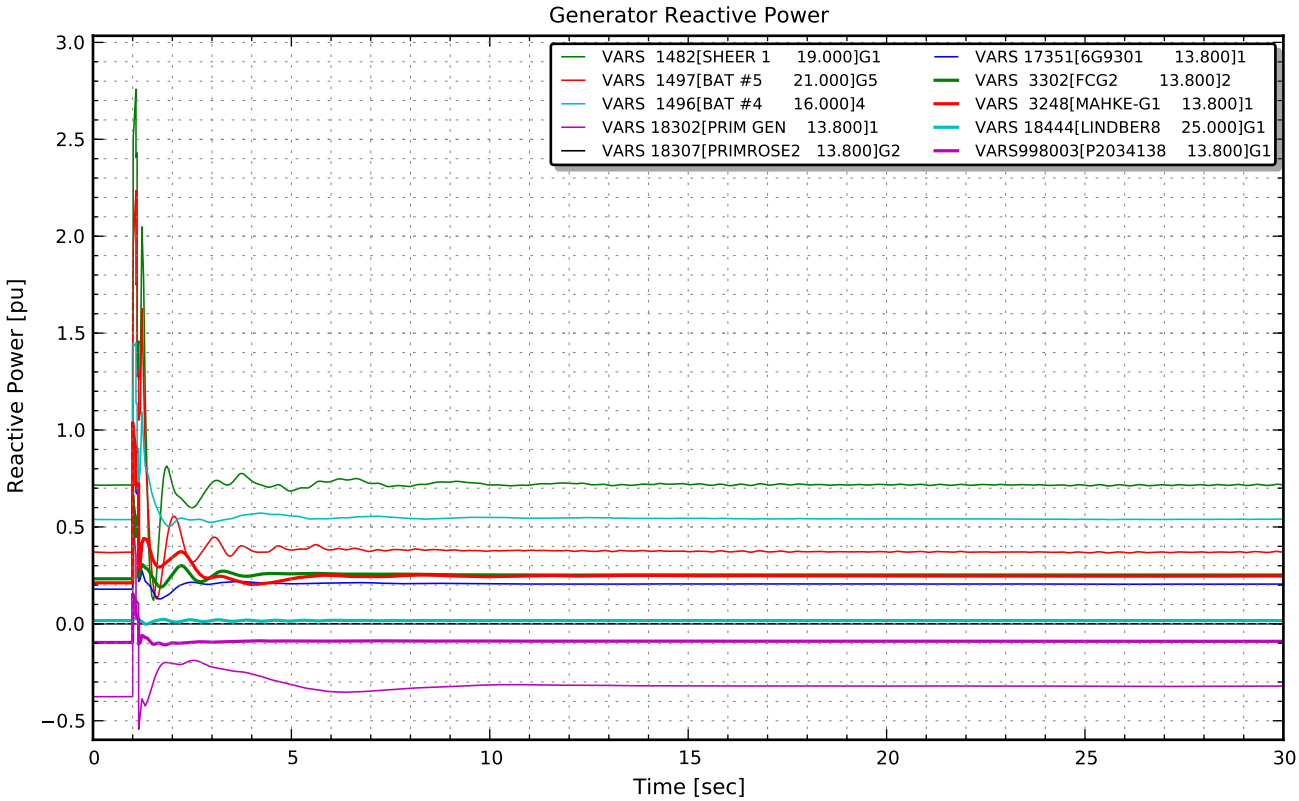
Notes: P2034 Coldlake Area Cogen

Dynamic Stability Analysis

Contingency: 09A - 9L36 Whitefish Lake 825S to Marguerite Lake 826S
Alternnative: Post-Project Basecase
Scenario: SL

Attachment A5- 1-17



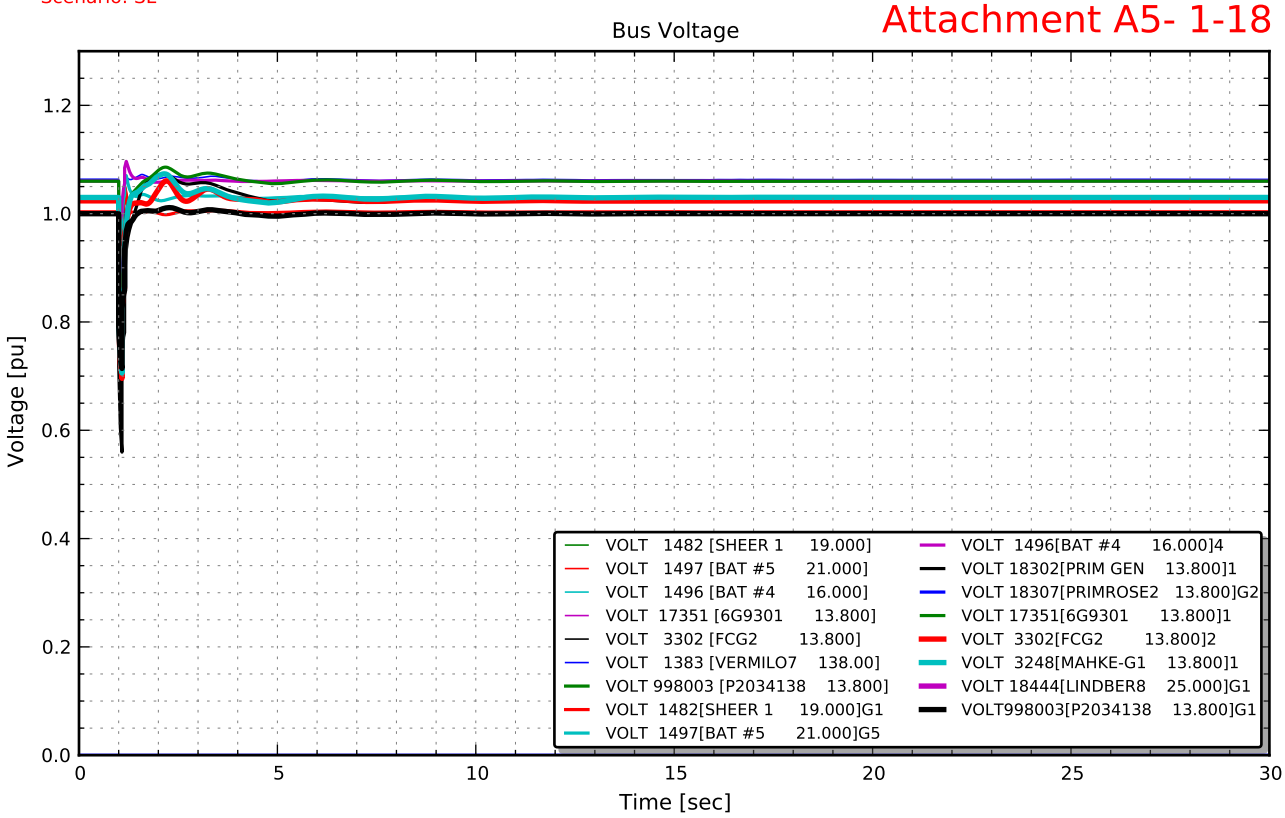


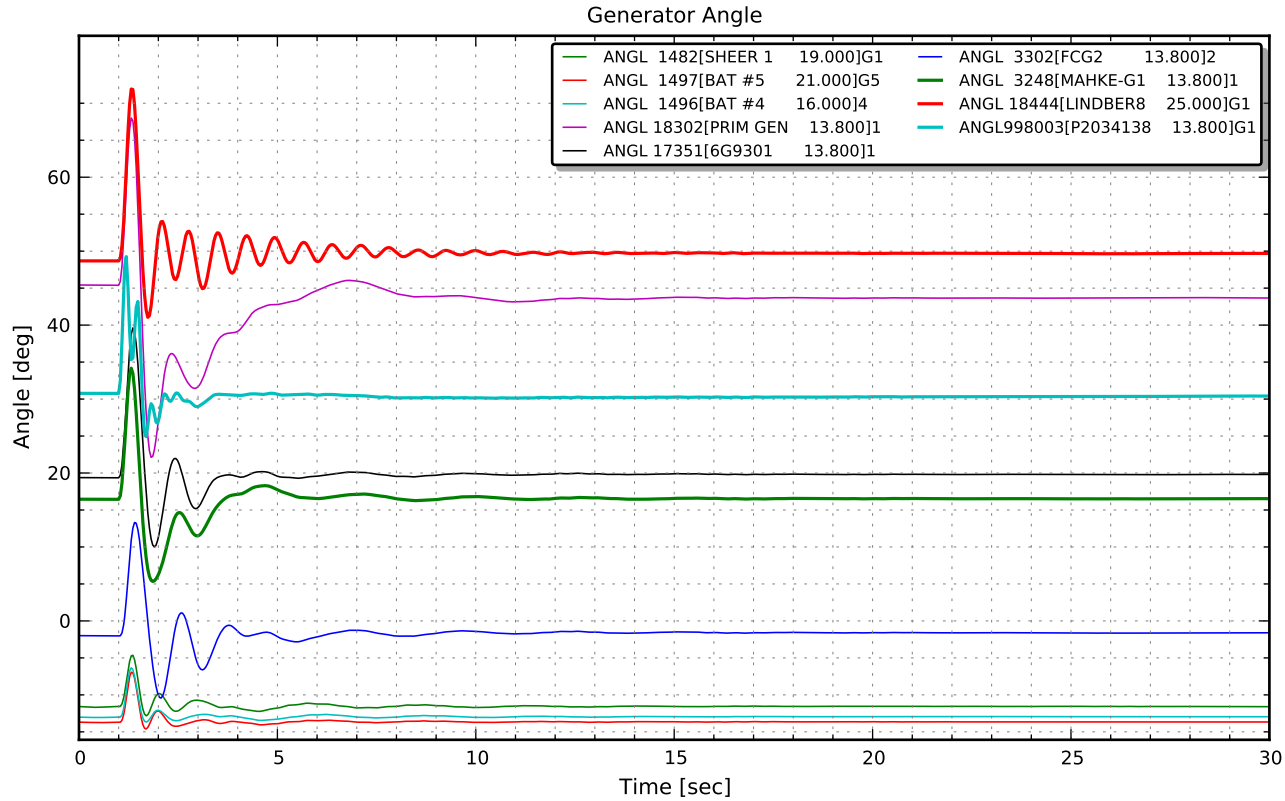
Notes: P2034 Coldlake Area Cogen

Dynamic Stability Analysis

Contingency: 09B - 9L36 Marguerite Lake 826S to Whitefish Lake 825S
Alternnative: Post-Project Basecase
Scenario: SL

Attachment A5- 1-18



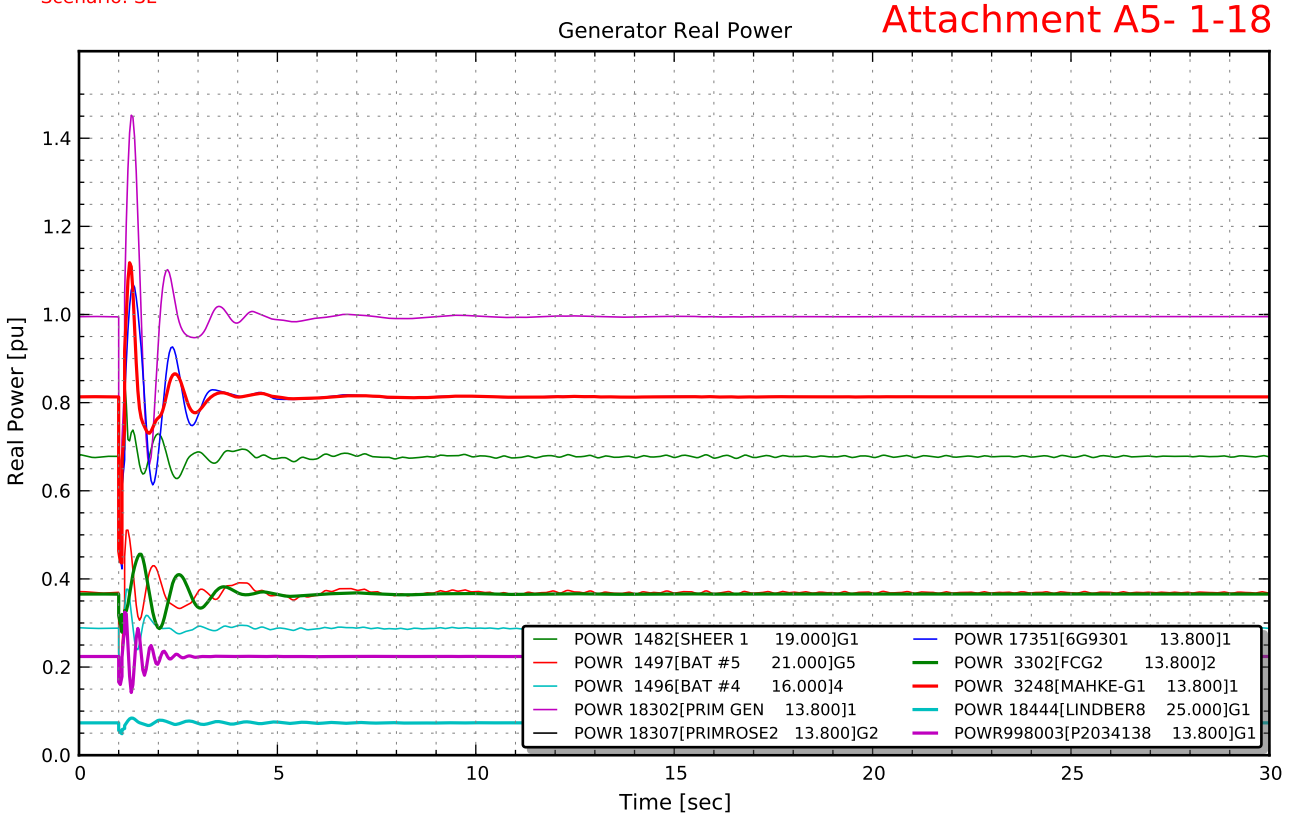


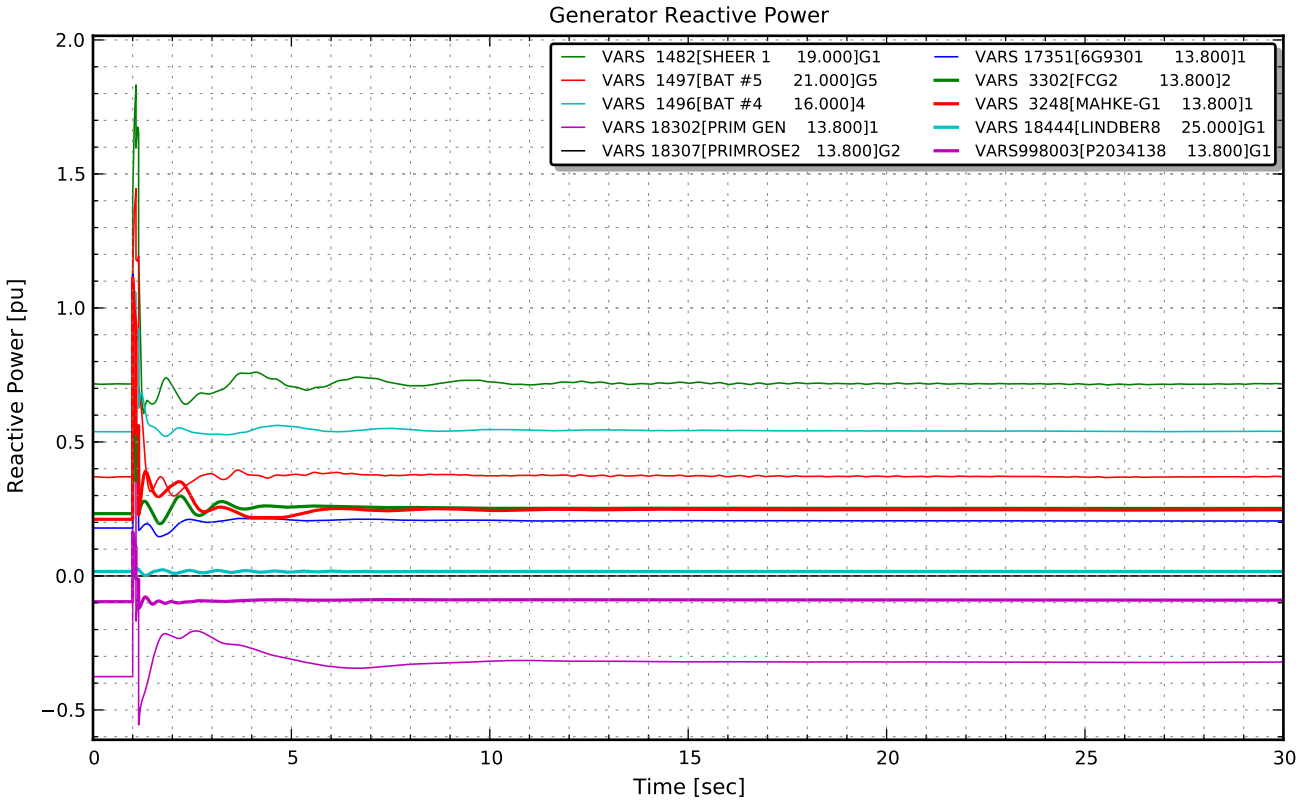
Notes: P2034 Coldlake Area Cogen

Dynamic Stability Analysis

Contingency: 09B - 9L36 Marguerite Lake 826S to Whitefish Lake 825S
Alternnative: Post-Project Basecase
Scenario: SL

Attachment A5- 1-18



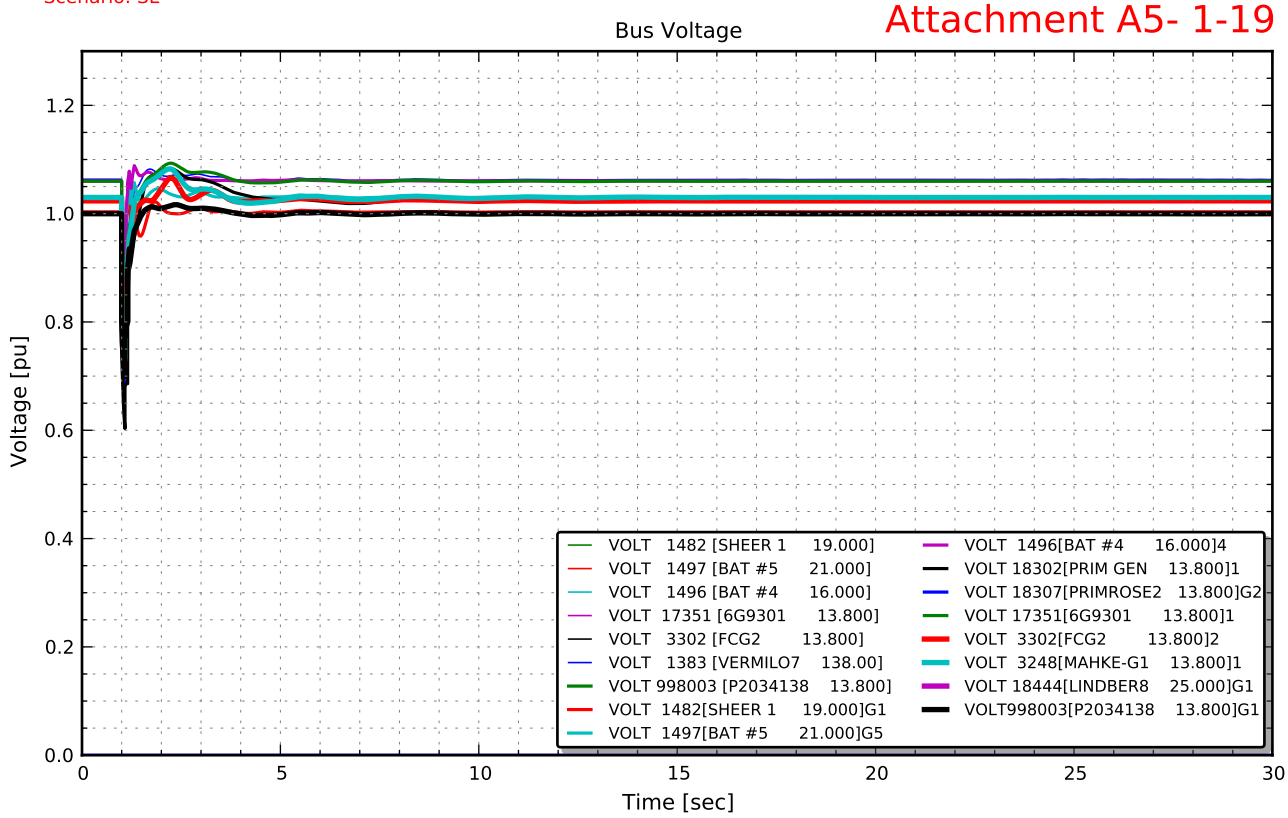


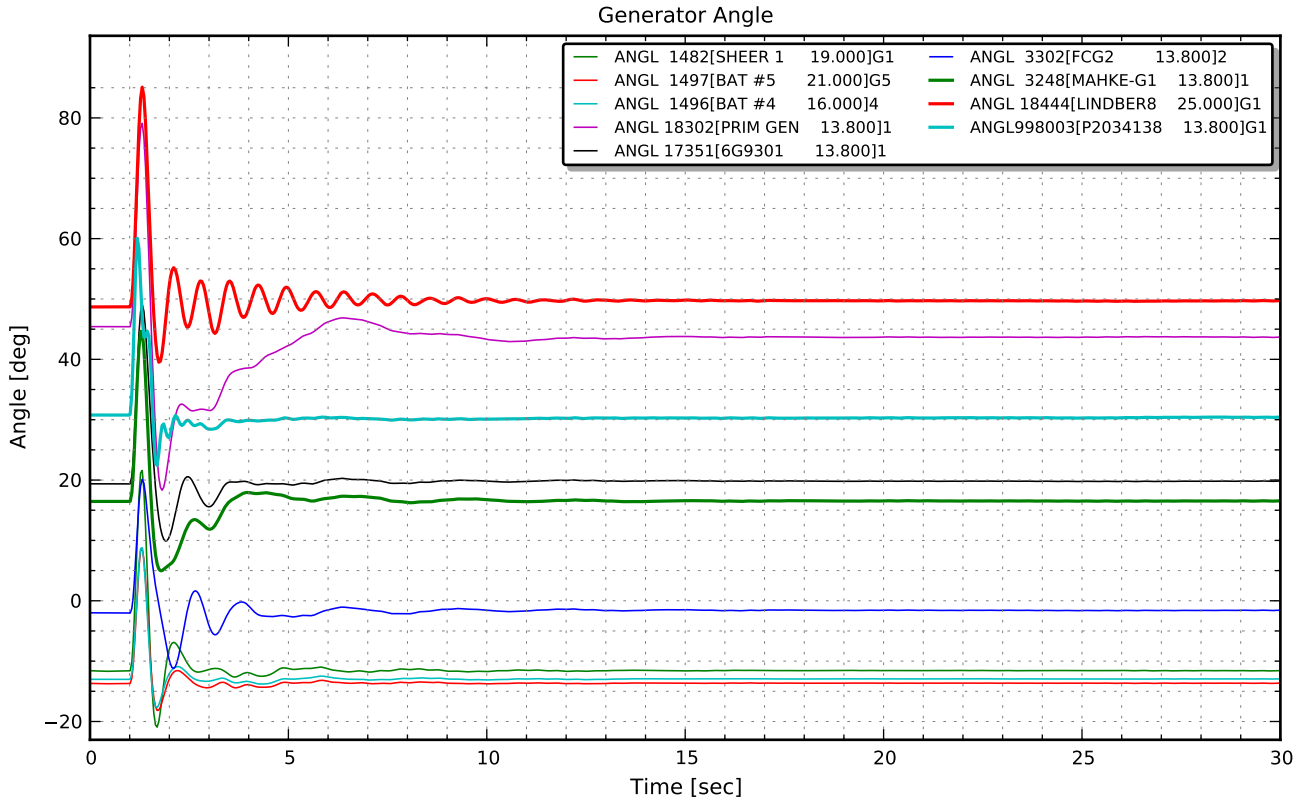
Notes: P2034 Coldlake Area Cogen

Dynamic Stability Analysis

Contingency: 10A - 9L37 Whitefish Lake 825S to Marguerite Lake 826S
Alternnative: Post-Project Basecase
Scenario: SL

Attachment A5- 1-19



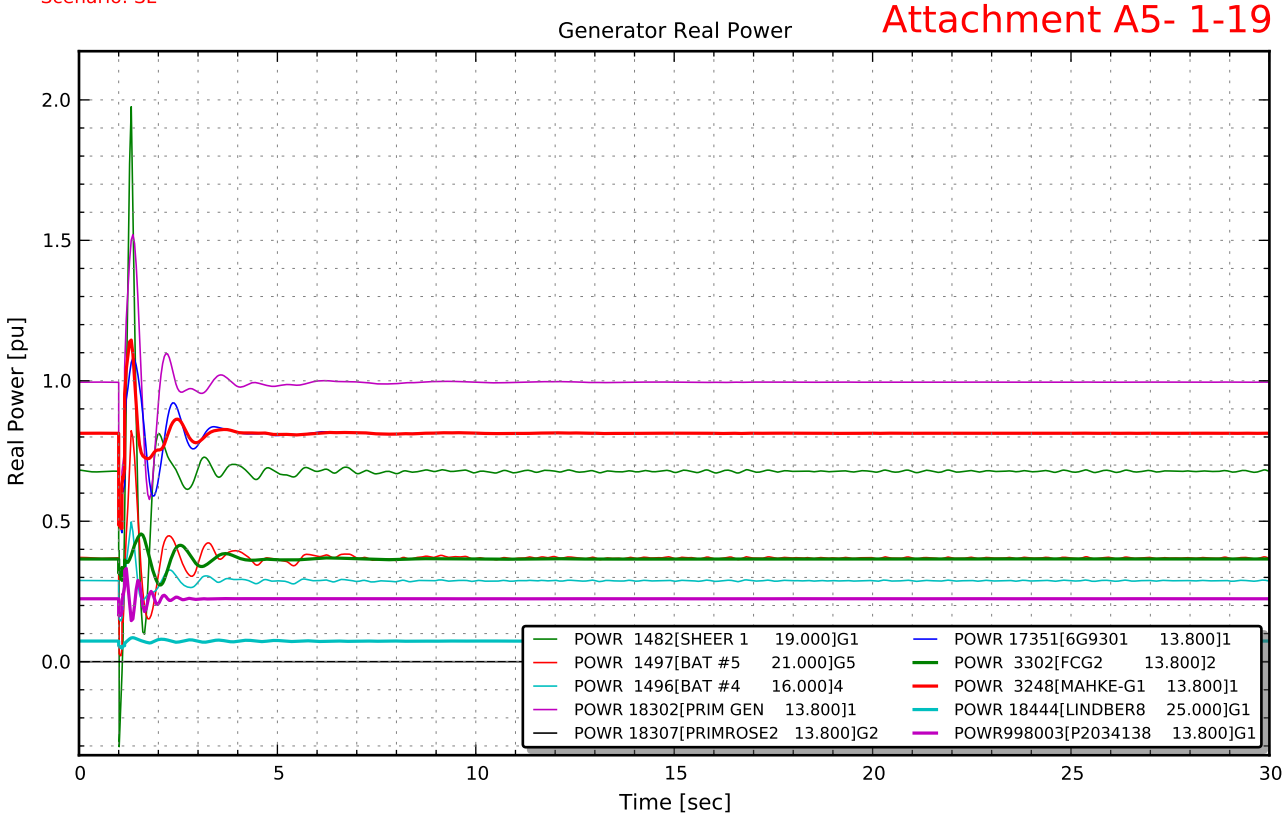


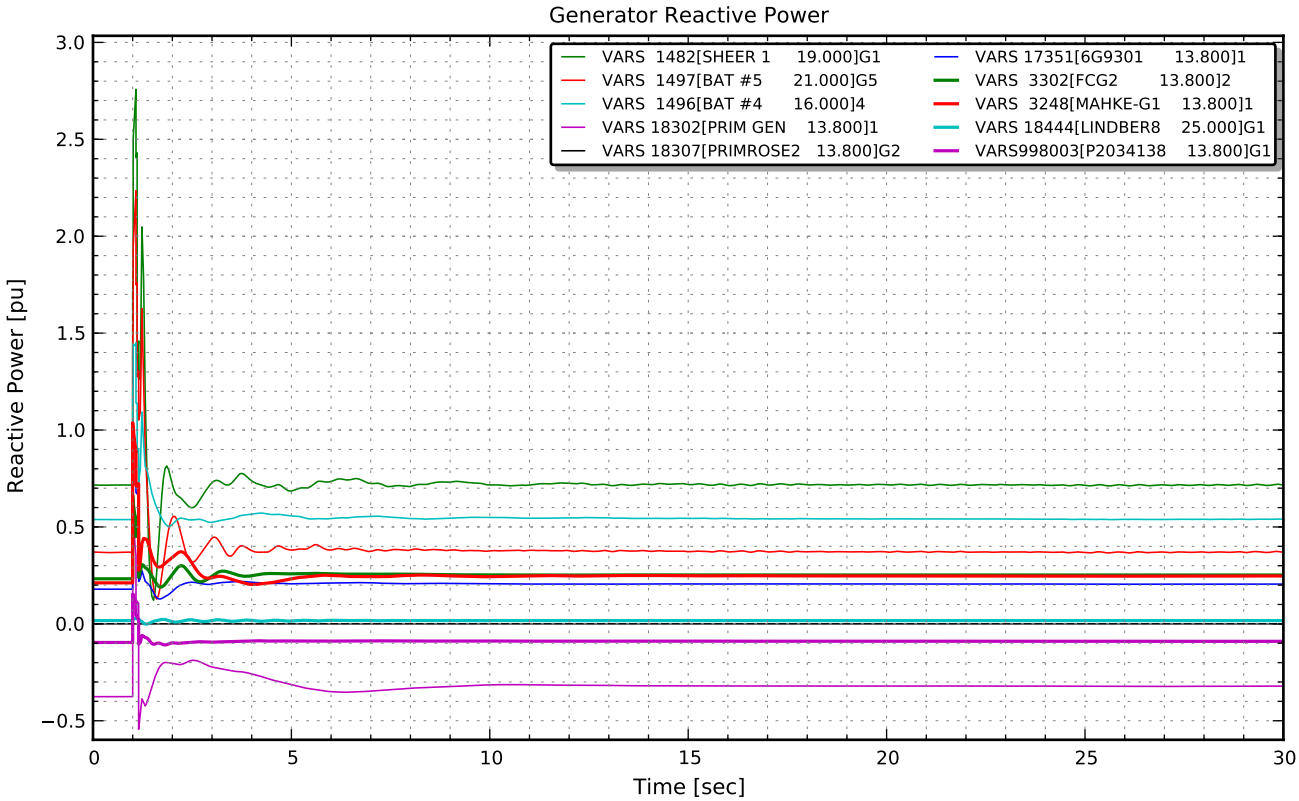
Notes: P2034 Coldlake Area Cogen

Dynamic Stability Analysis

Contingency: 10A - 9L37 Whitefish Lake 825S to Marguerite Lake 826S
Alternnative: Post-Project Basecase
Scenario: SL

Attachment A5- 1-19



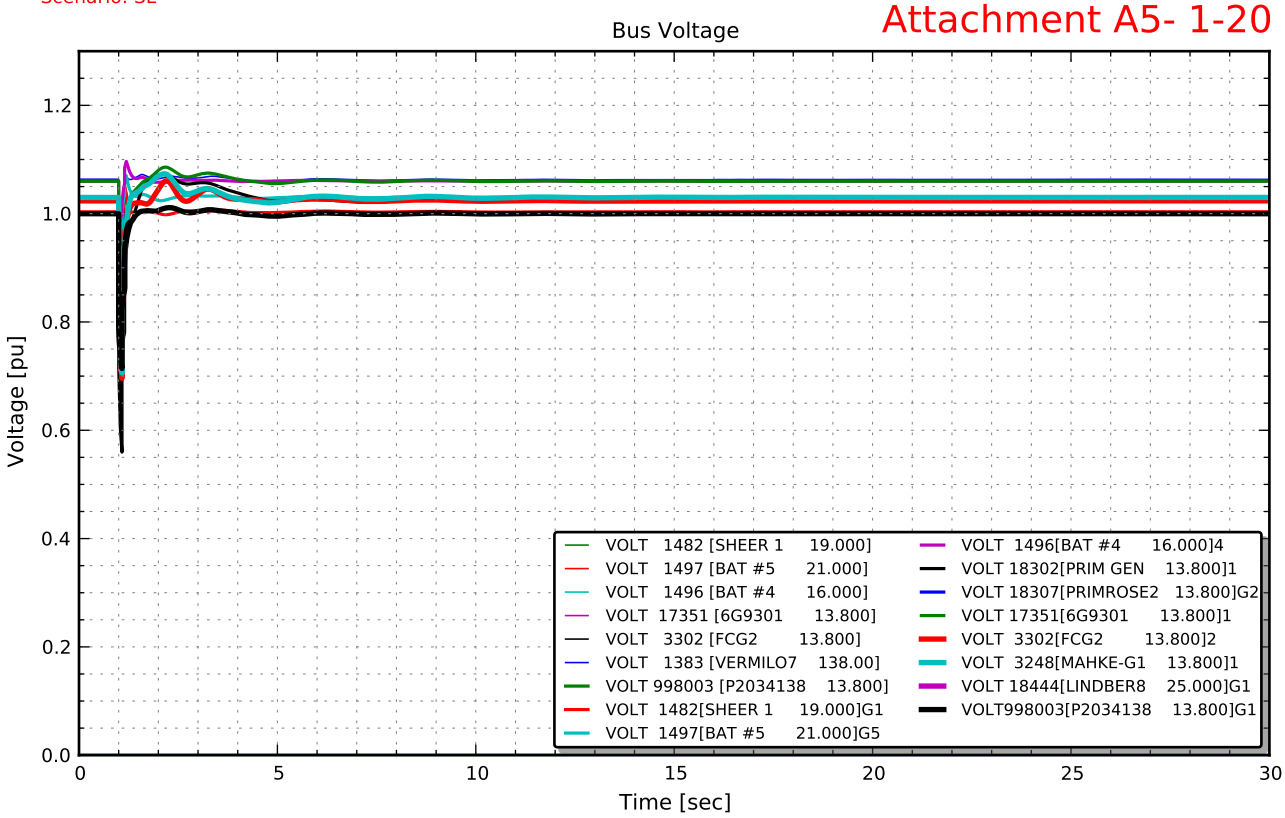


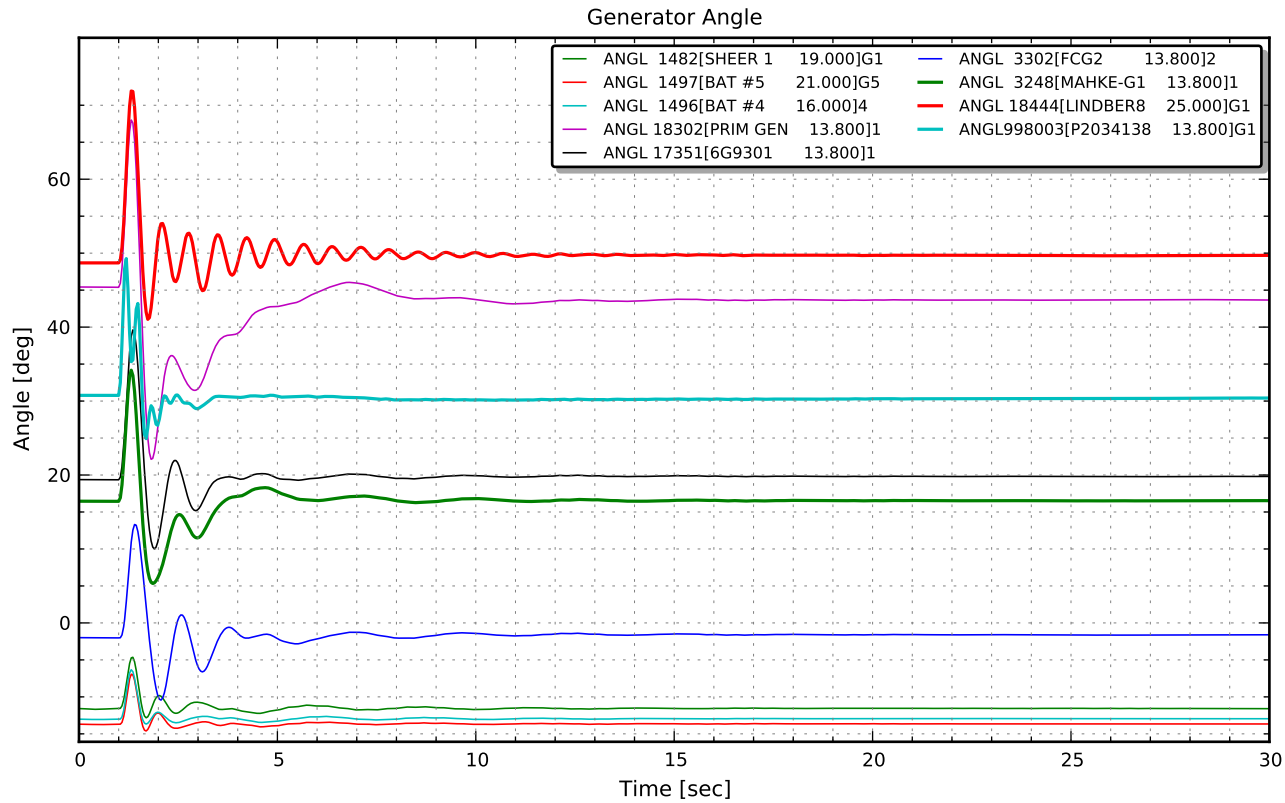
Notes: P2034 Coldlake Area Cogen

Dynamic Stability Analysis

Contingency: 10B - 9L37 Marguerite Lake 826S to Whitefish Lake 825S
Alternnative: Post-Project Basecase
Scenario: SL

Attachment A5- 1-20



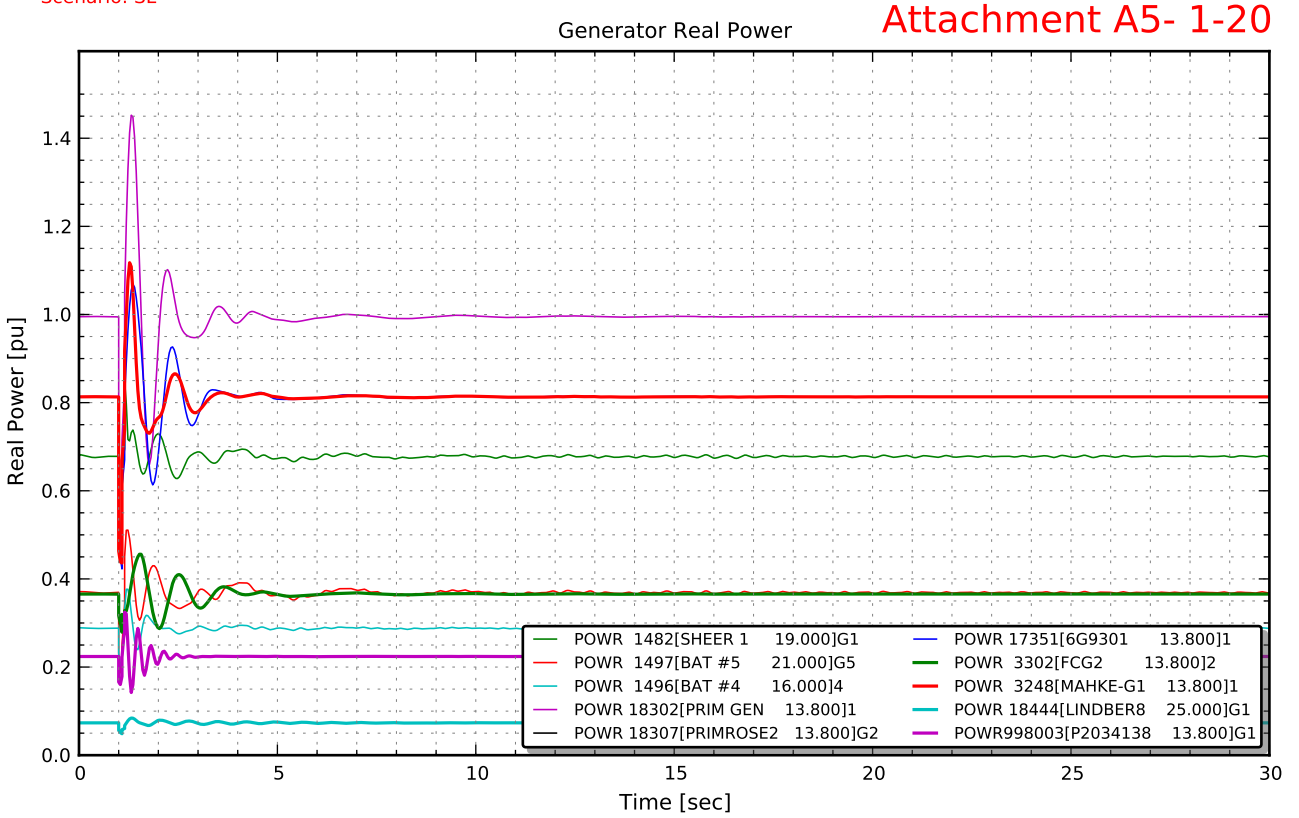


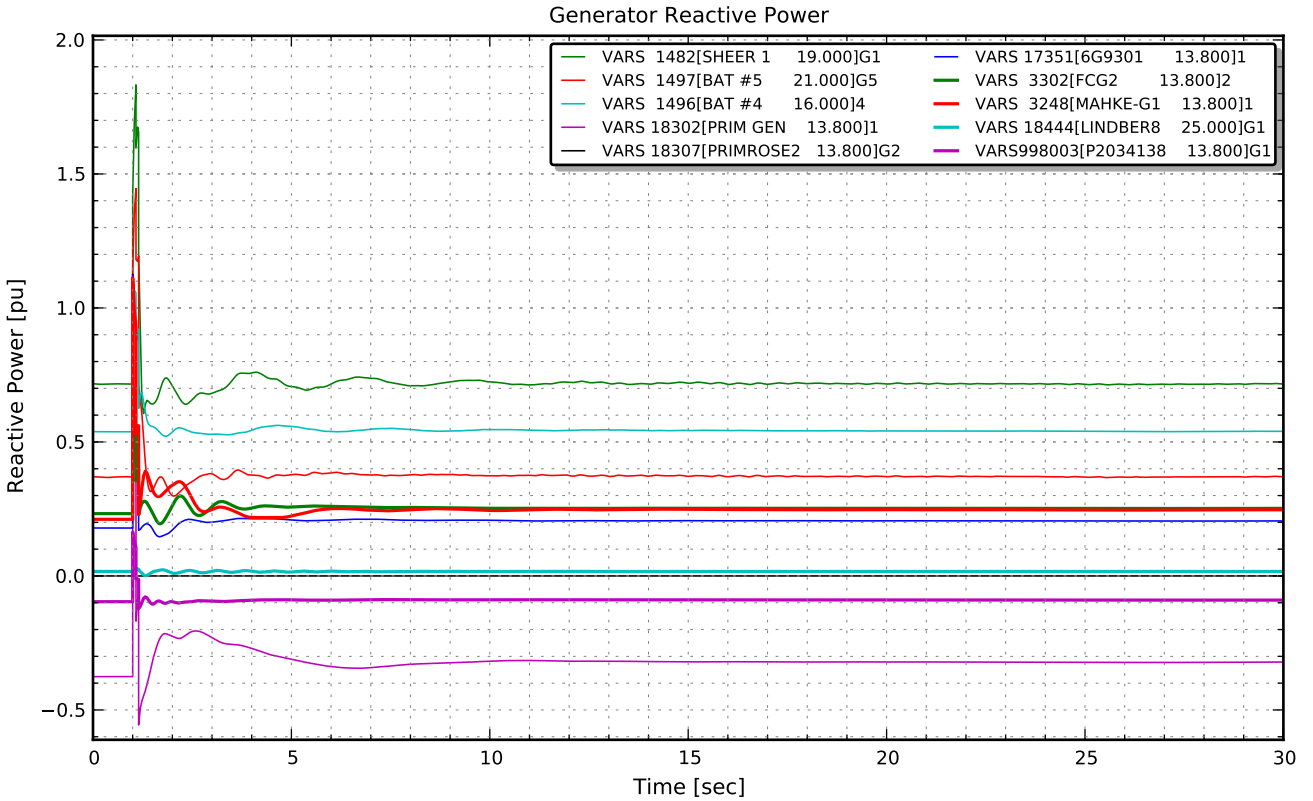
Notes: P2034 Coldlake Area Cogen

Dynamic Stability Analysis

Contingency: 10B - 9L37 Marguerite Lake 826S to Whitefish Lake 825S
Alternnative: Post-Project Basecase
Scenario: SL

Attachment A5- 1-20



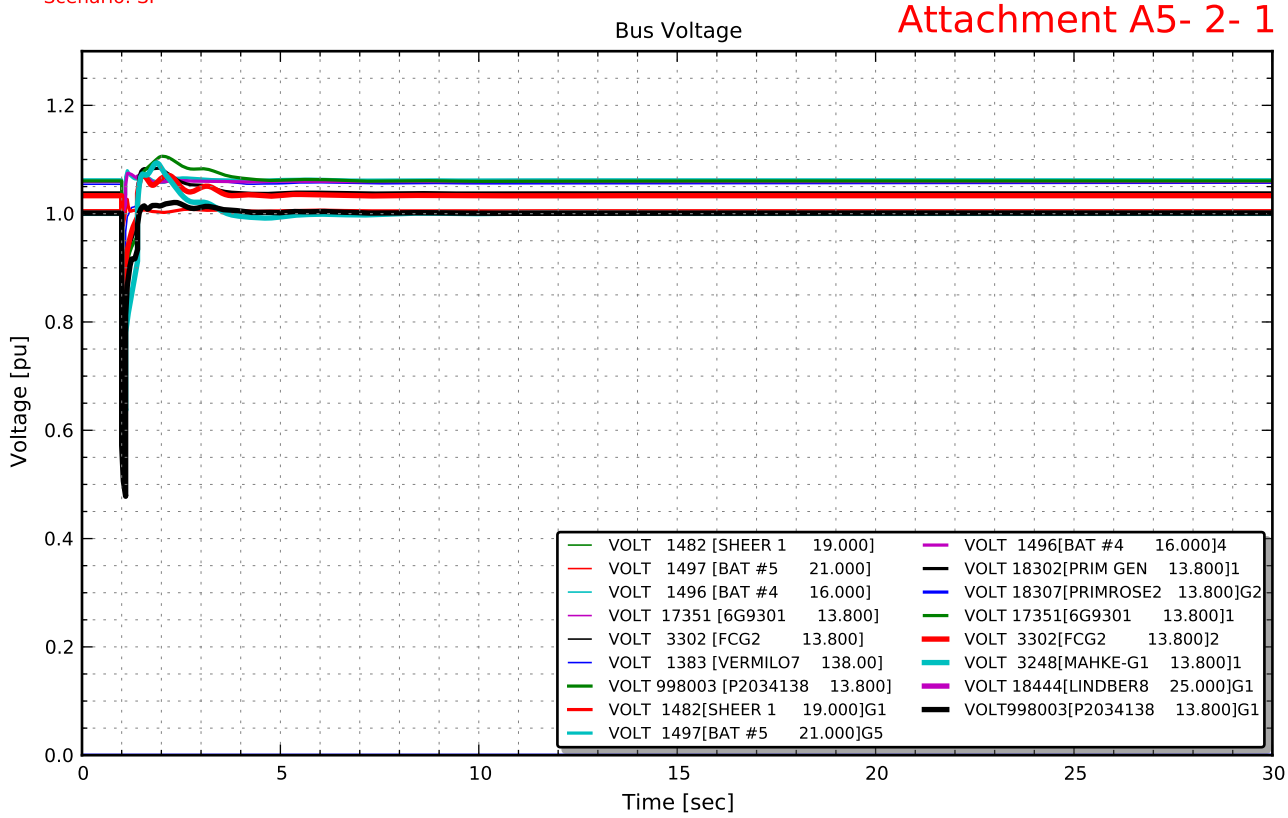


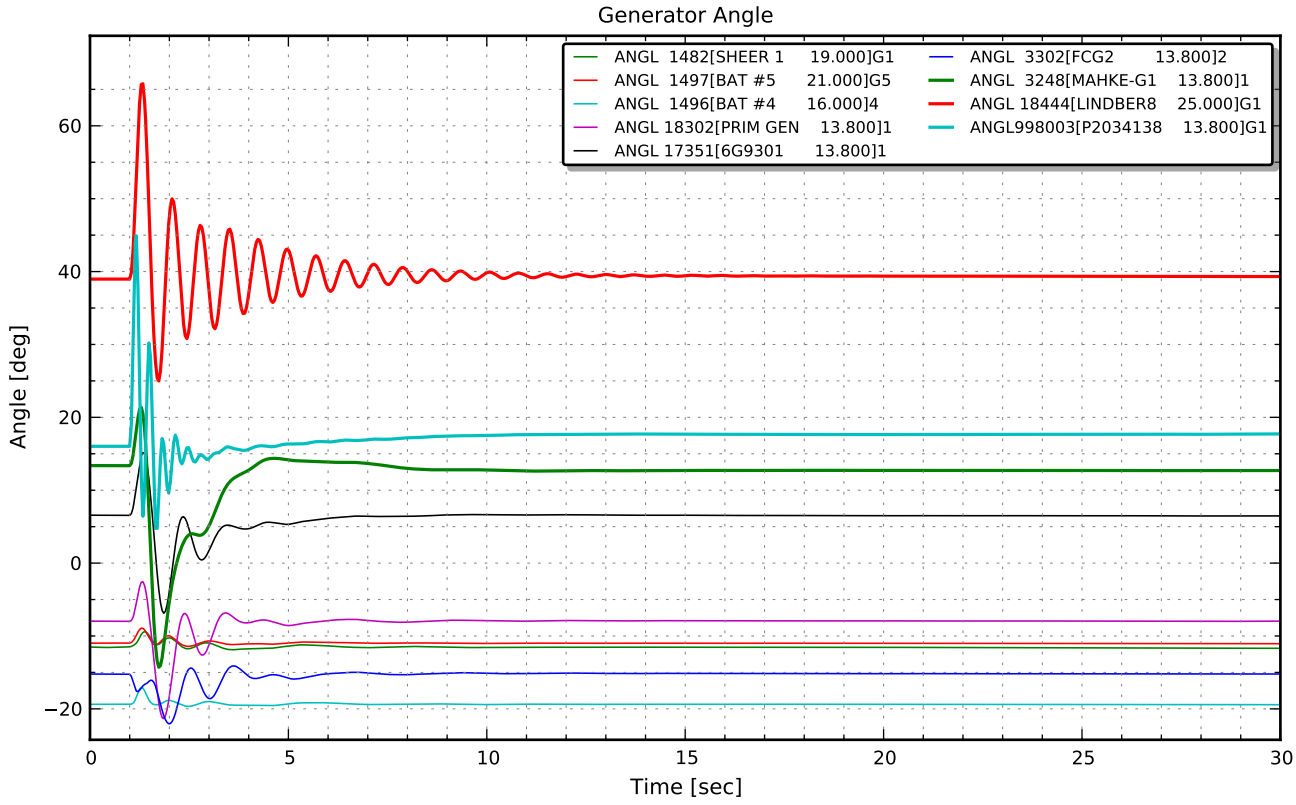
Notes: P2034 Coldlake Area Cogen

Dynamic Stability Analysis

Contingency: 01A - 7L24 Bonnyville 700S to Grande Centre 846S
Alternnative: Post-Project Basecase
Scenario: SP

Attachment A5- 2- 1



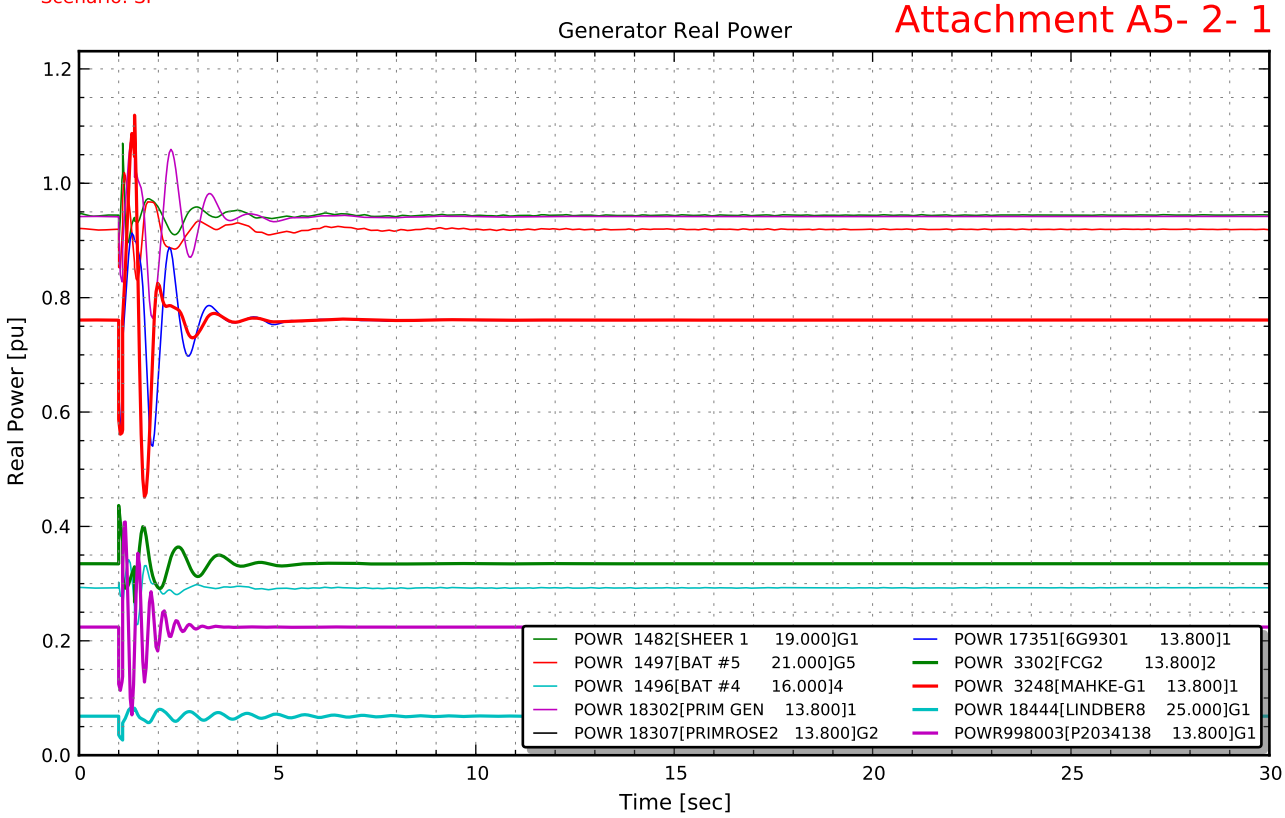


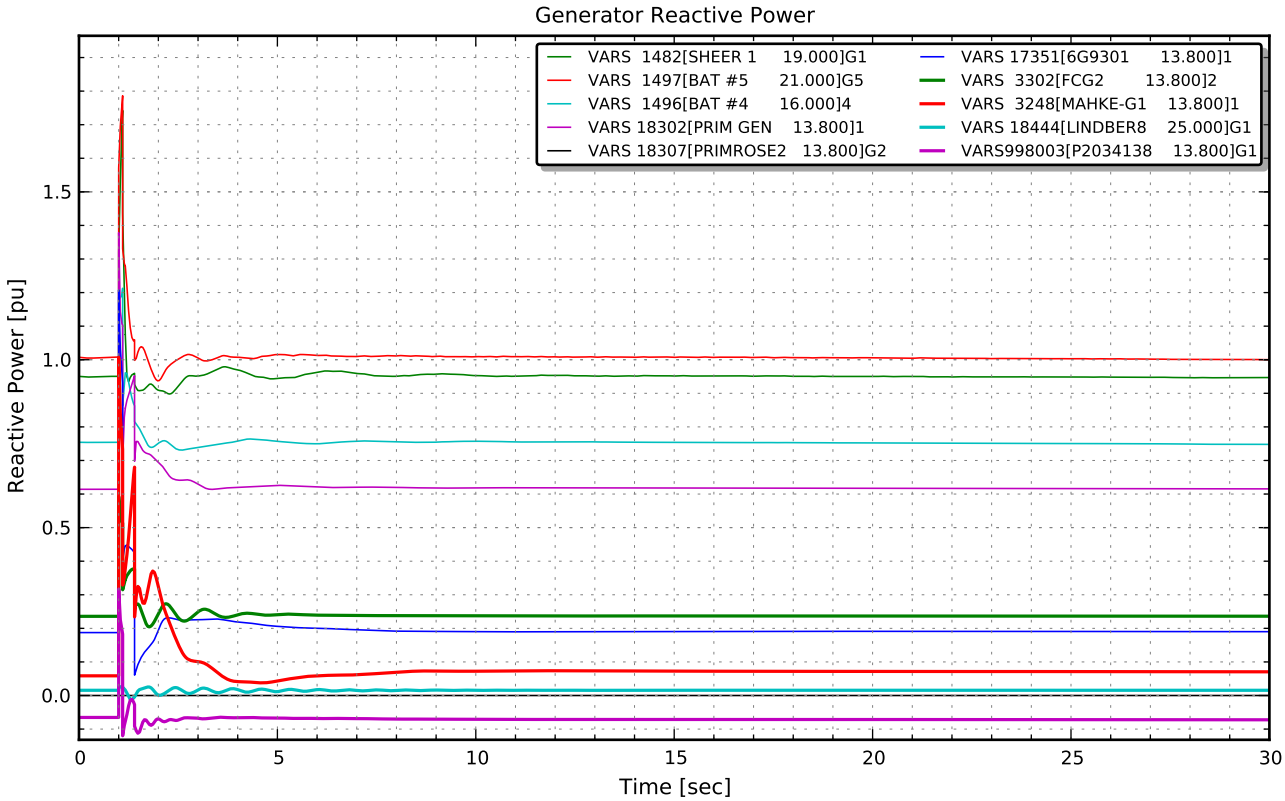
Notes: P2034 Coldlake Area Cogen

Dynamic Stability Analysis

Contingency: 01A - 7L24 Bonnyville 700S to Grande Centre 846S
Alternnative: Post-Project Basecase
Scenario: SP

Attachment A5- 2- 1



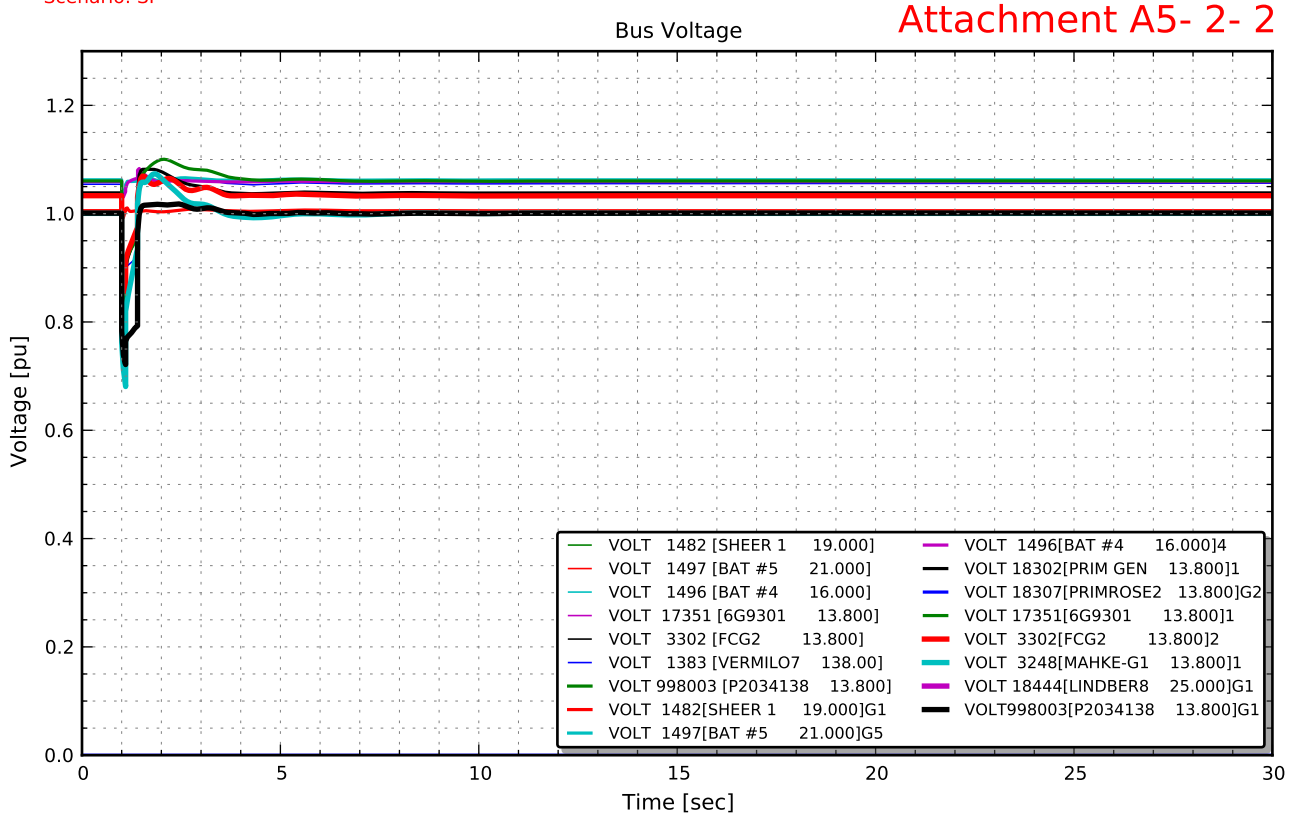


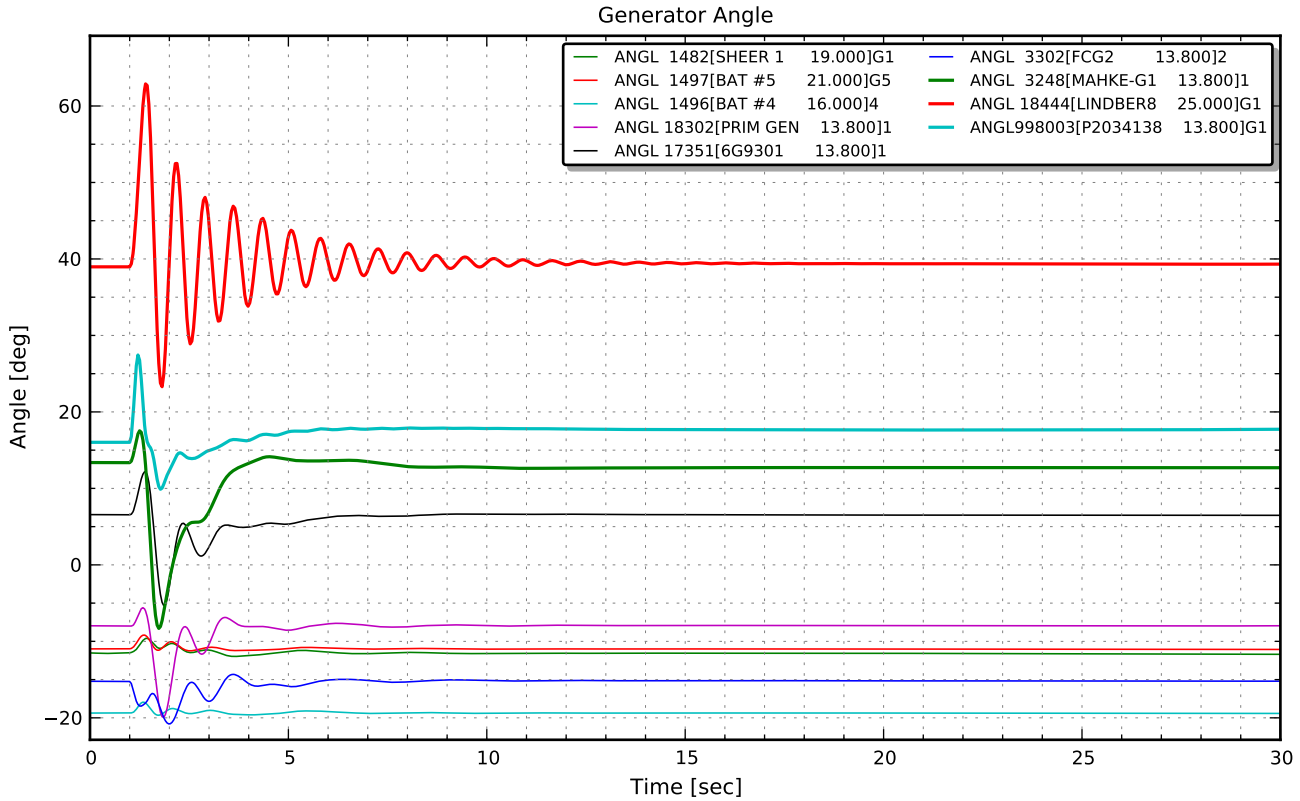
Notes: P2034 Coldlake Area Cogen

Dynamic Stability Analysis

Contingency: 01B - 7L24 Grande Centre 846S to Bonnyville 700S
Alternnative: Post-Project Basecase
Scenario: SP

Attachment A5- 2- 2



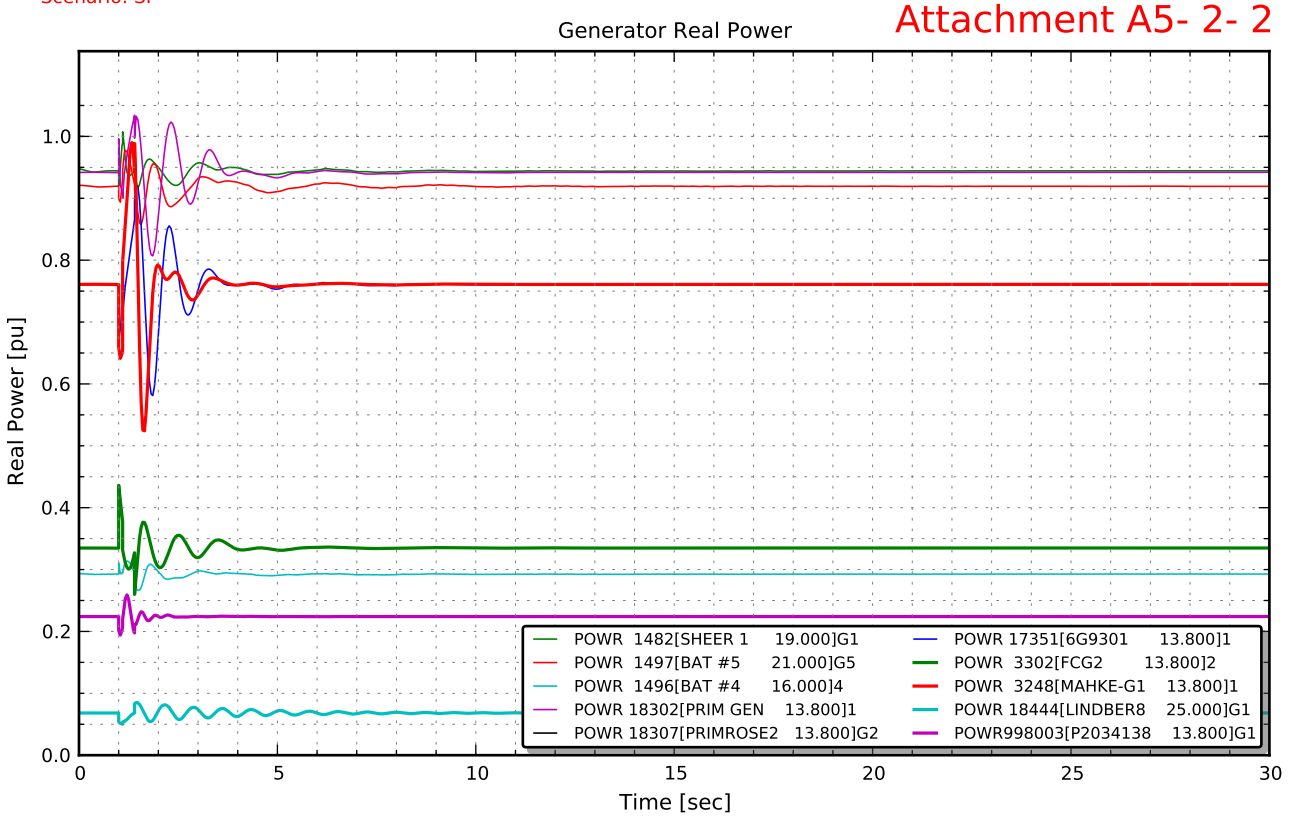


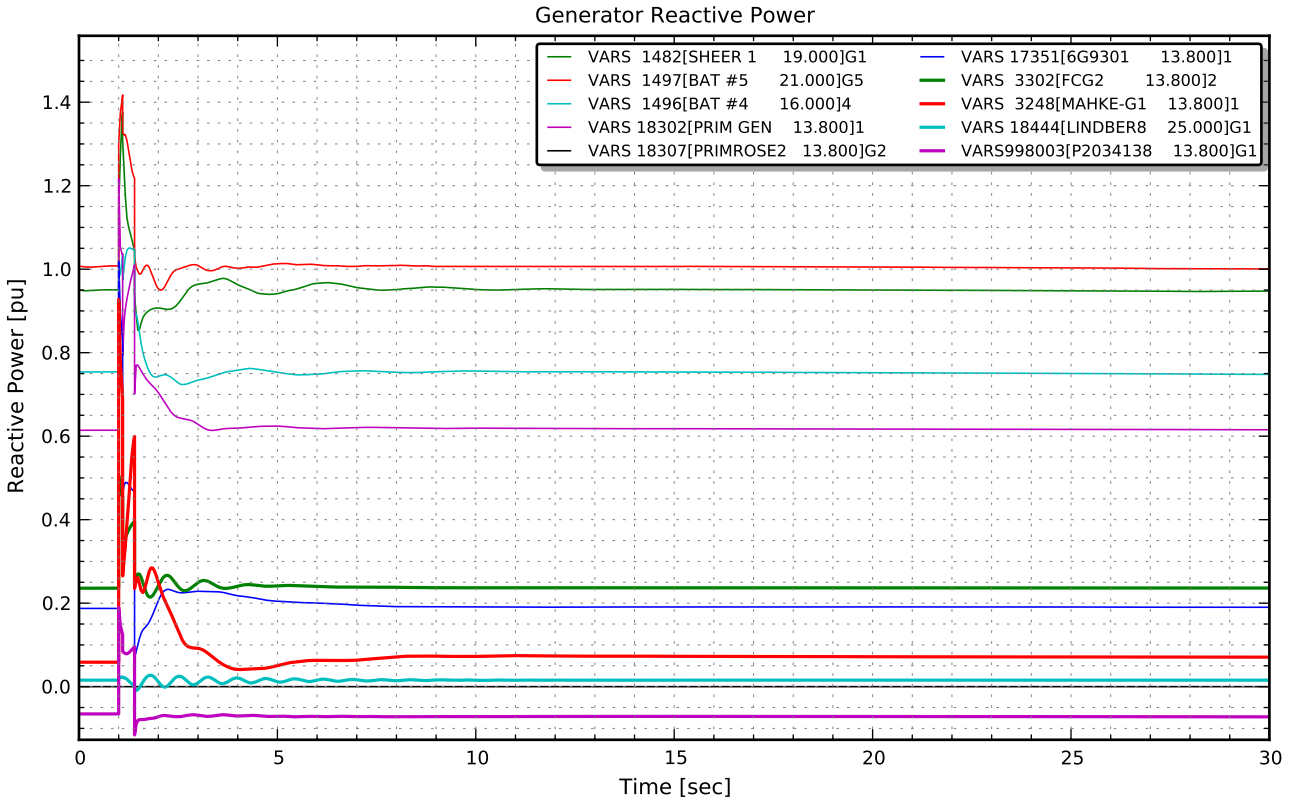
Notes: P2034 Coldlake Area Cogen

Dynamic Stability Analysis

Contingency: 01B - 7L24 Grande Centre 846S to Bonnyville 700S
Alternnative: Post-Project Basecase
Scenario: SP

Attachment A5- 2- 2



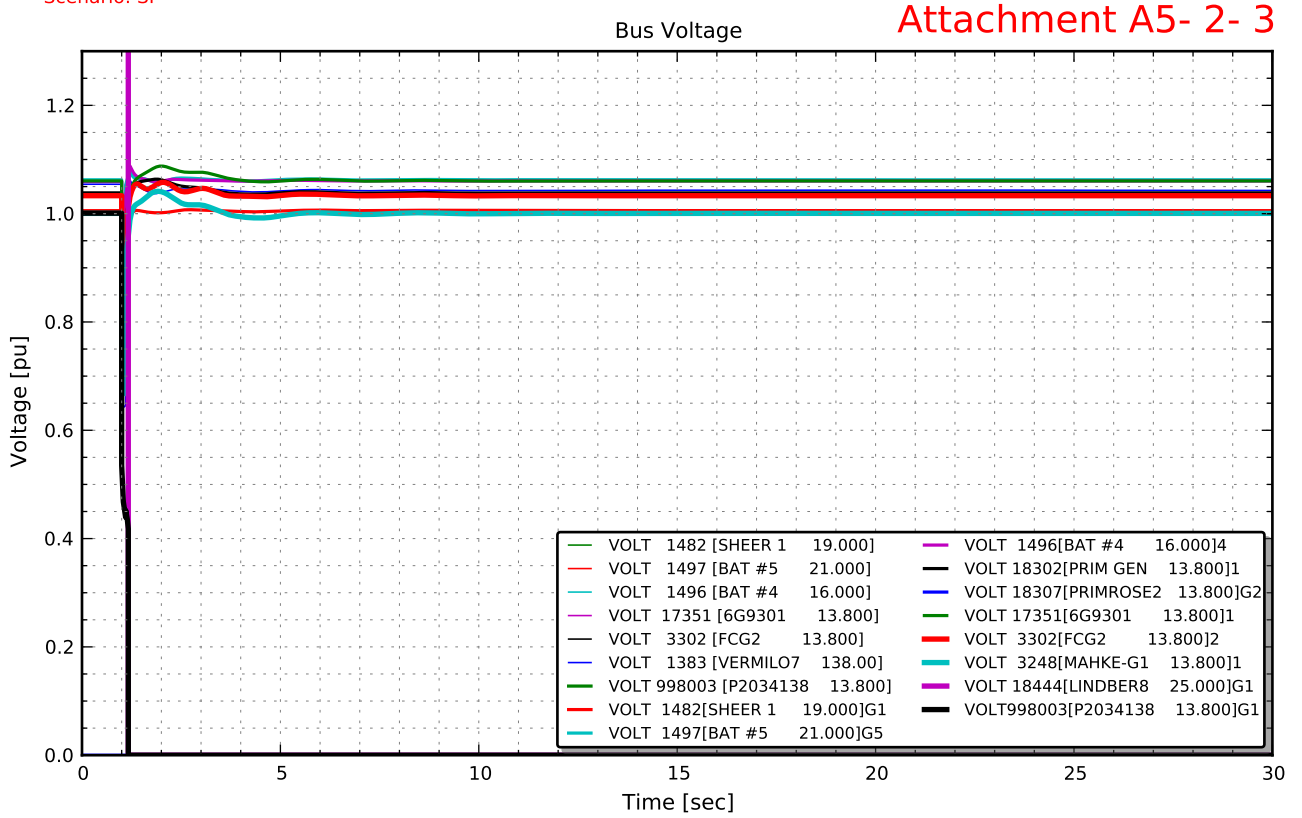


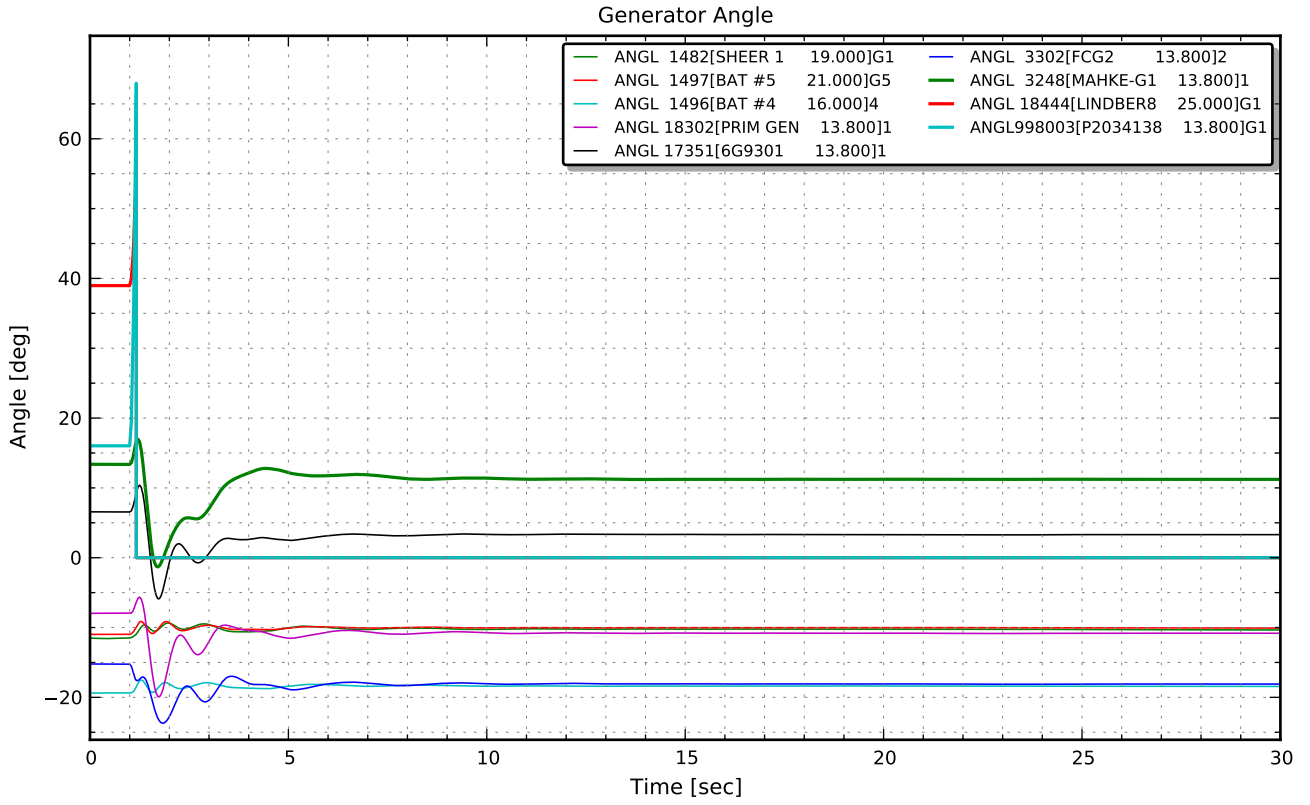
Notes: P2034 Coldlake Area Cogen

Dynamic Stability Analysis

Contingency: 02APost - 7L53 Bonnyville 700S to Irish Creek 706S
Alternnative: Post-Project Basecase
Scenario: SP

Attachment A5- 2- 3



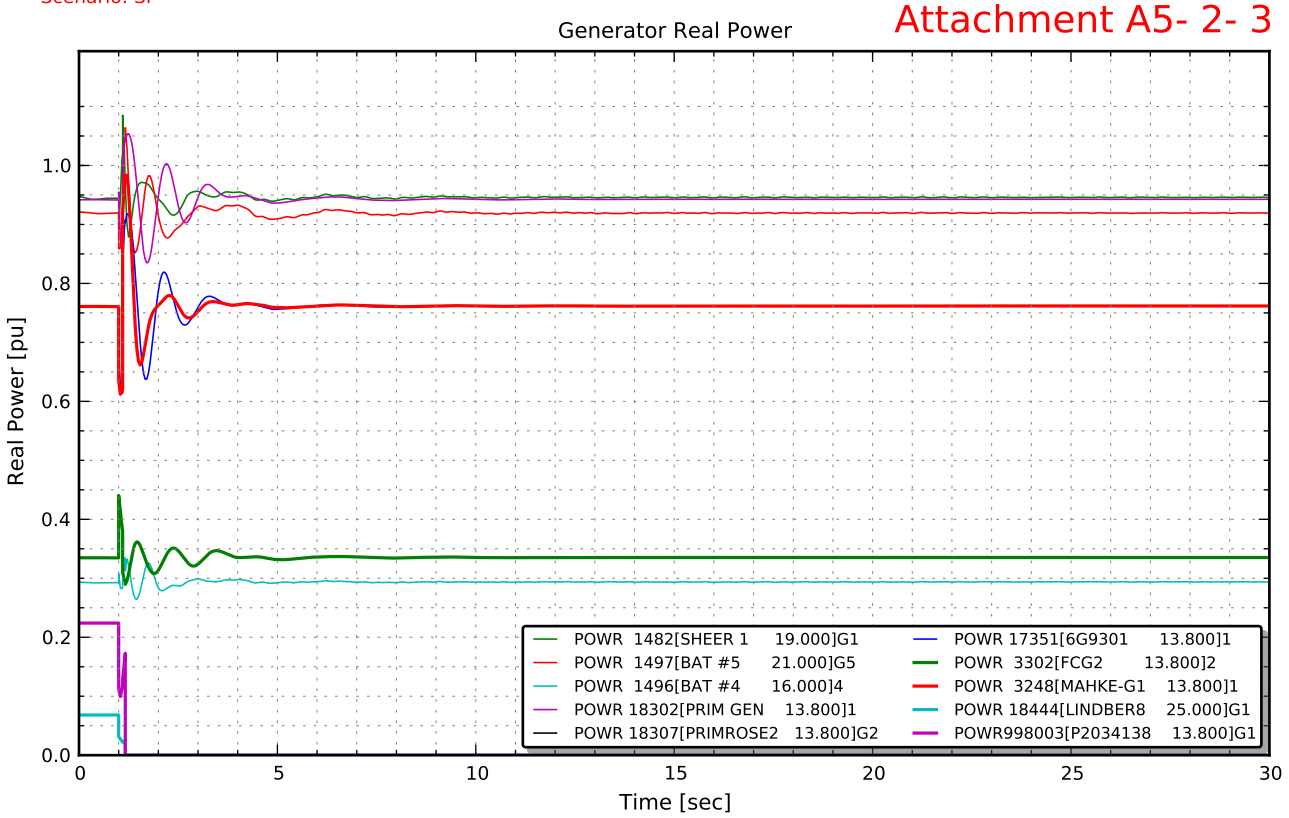


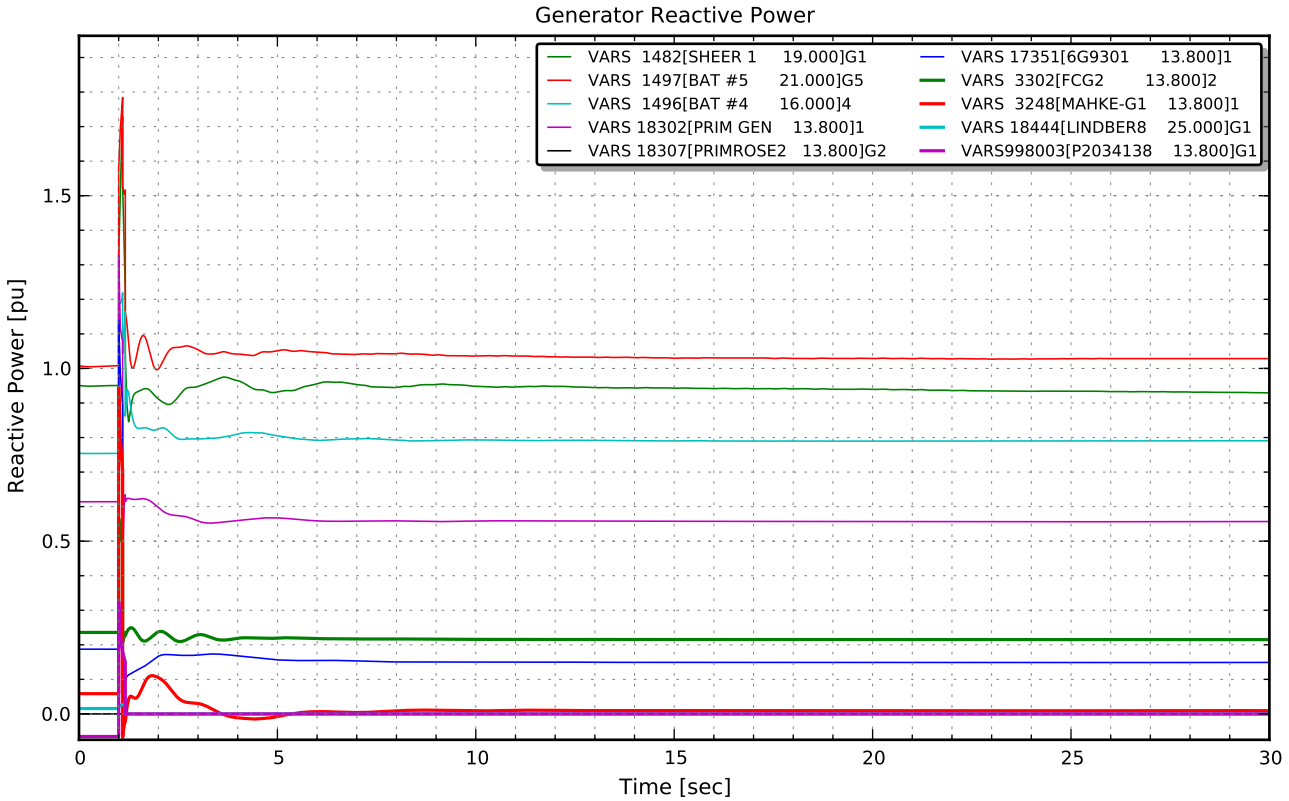
Notes: P2034 Coldlake Area Cogen

Dynamic Stability Analysis

Contingency: 02APost - 7L53 Bonnyville 700S to Irish Creek 706S
Alternnative: Post-Project Basecase
Scenario: SP

Attachment A5- 2- 3



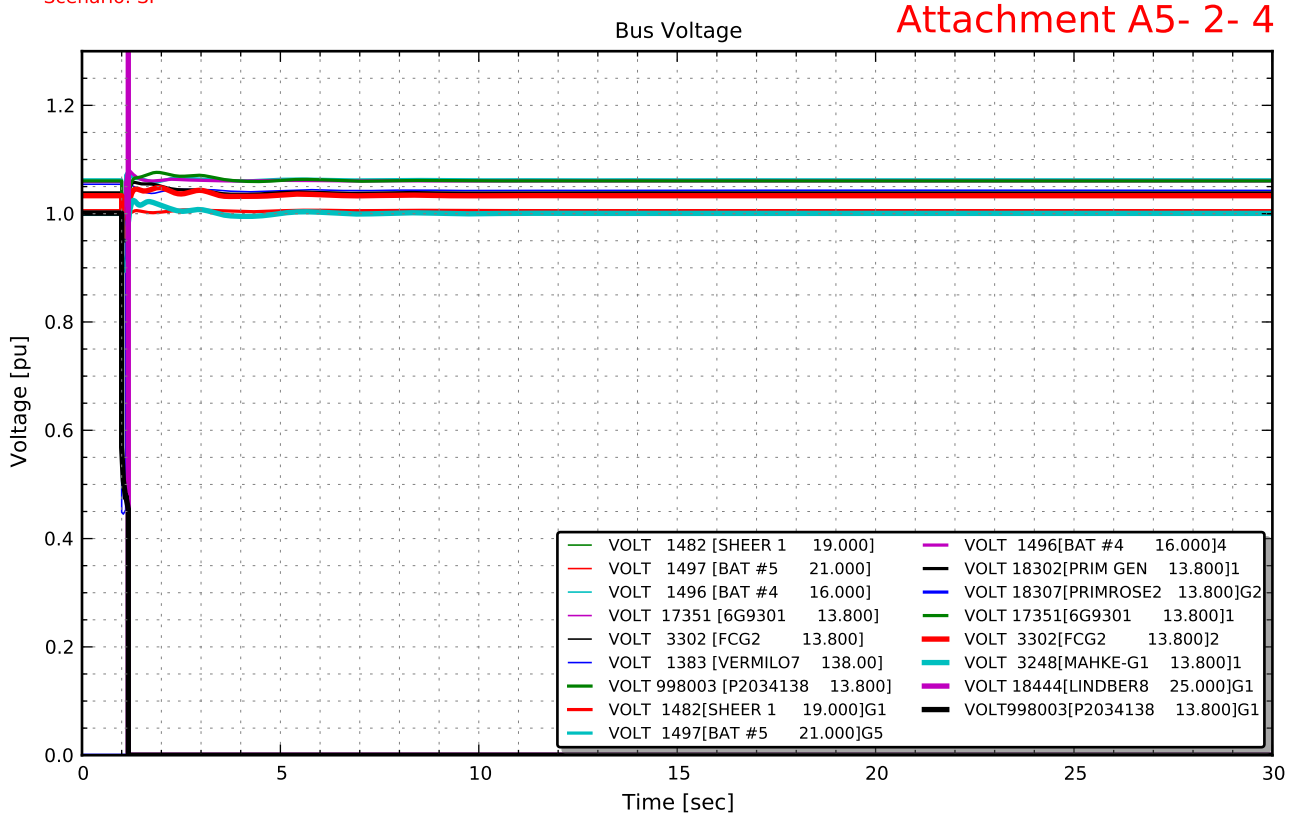


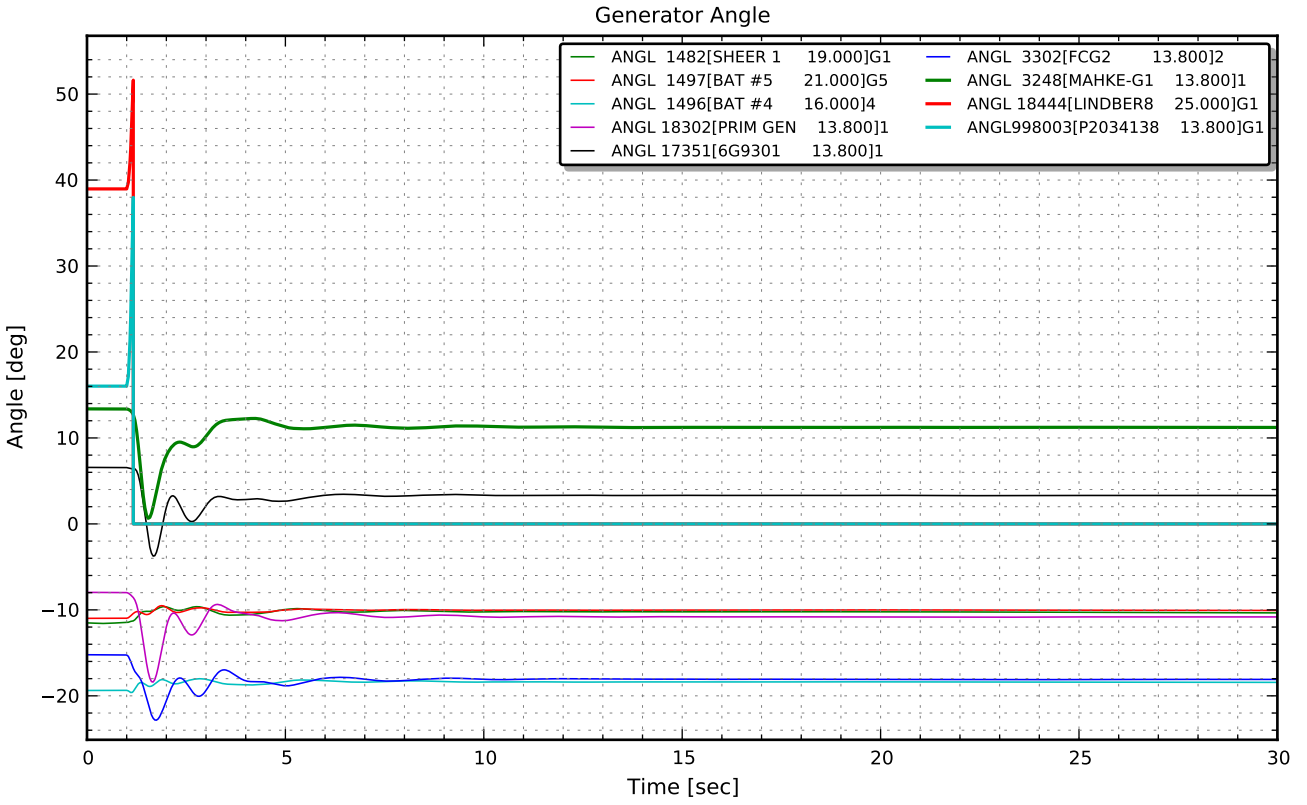
Notes: P2034 Coldlake Area Cogen

Dynamic Stability Analysis

Contingency: 02BPost - 7L53 Irish Creek 706S to Bonnyville 700S
Alternnative: Post-Project Basecase
Scenario: SP

Attachment A5- 2- 4



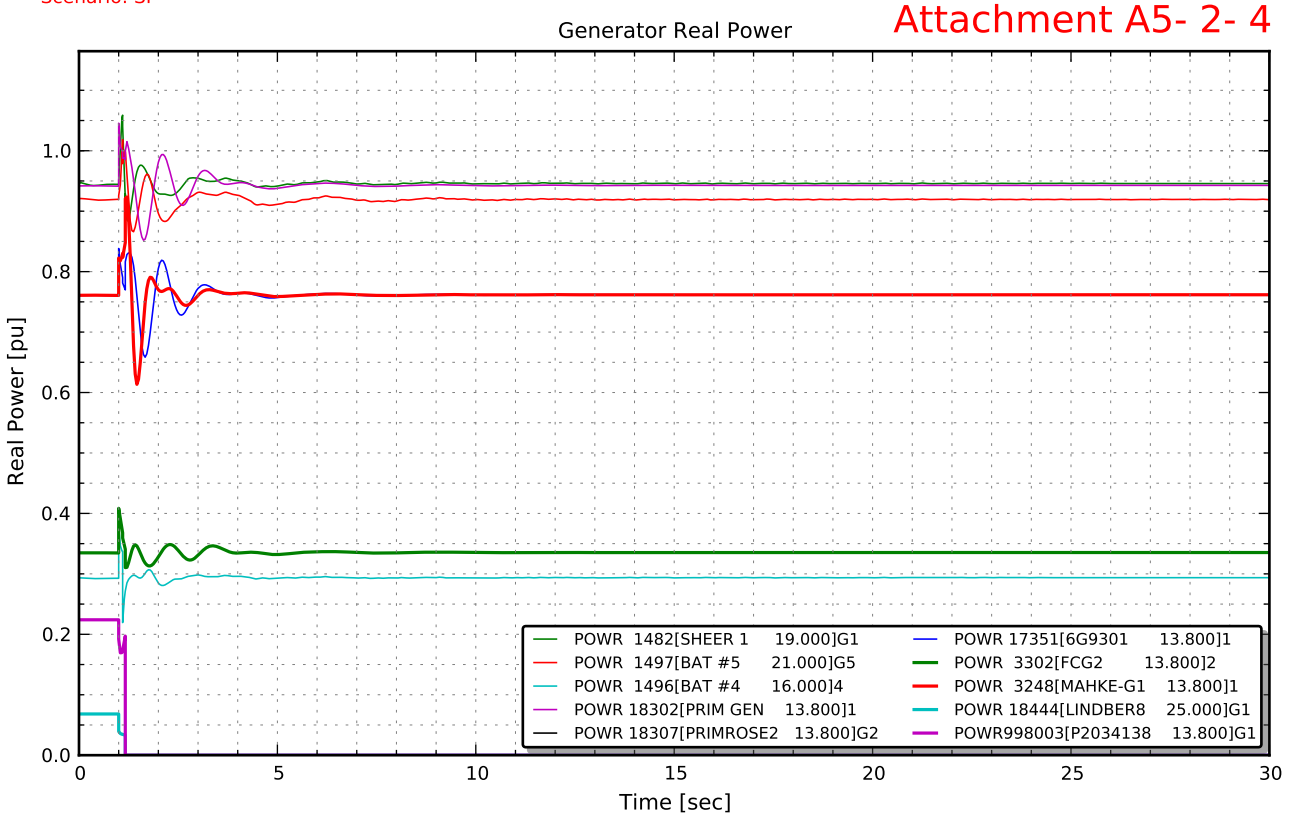


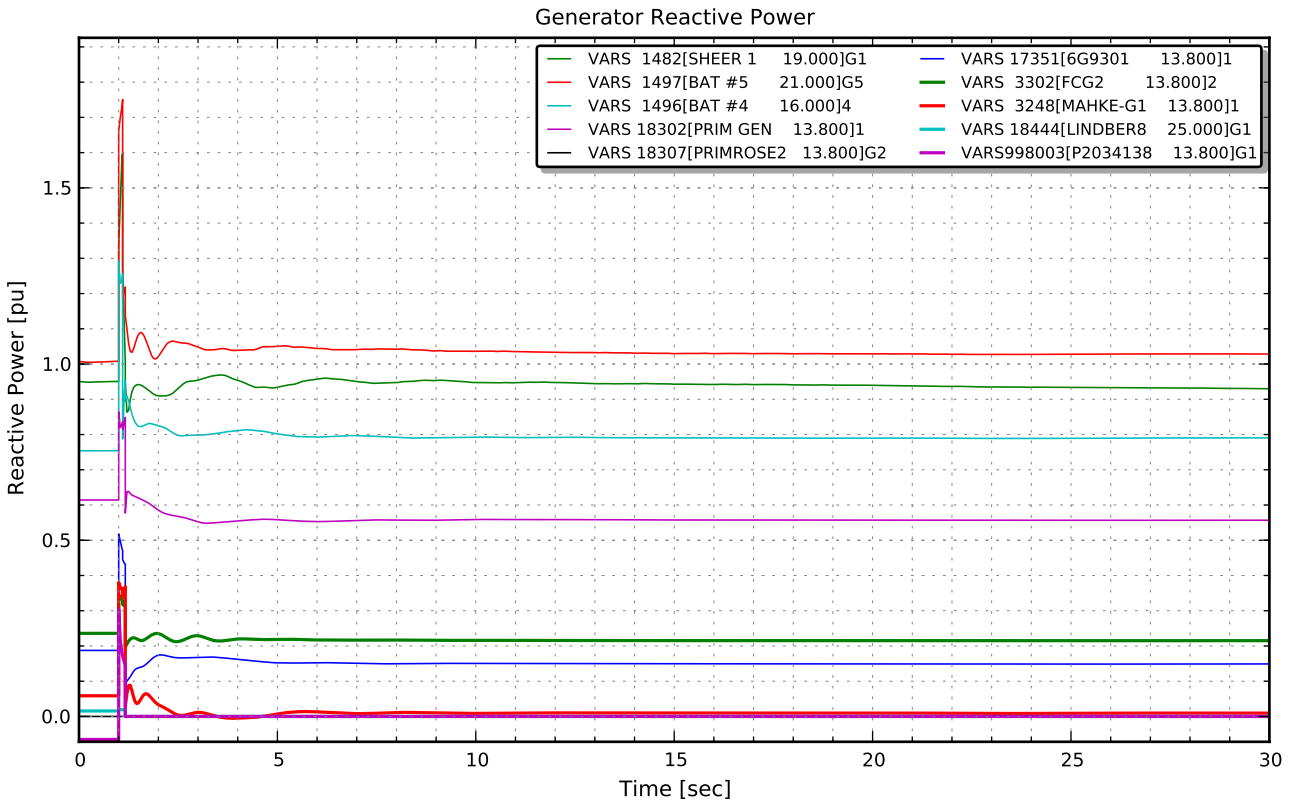
Notes: P2034 Coldlake Area Cogen

Dynamic Stability Analysis

Contingency: 02BPost - 7L53 Irish Creek 706S to Bonnyville 700S
Alternnative: Post-Project Basecase
Scenario: SP

Attachment A5- 2- 4



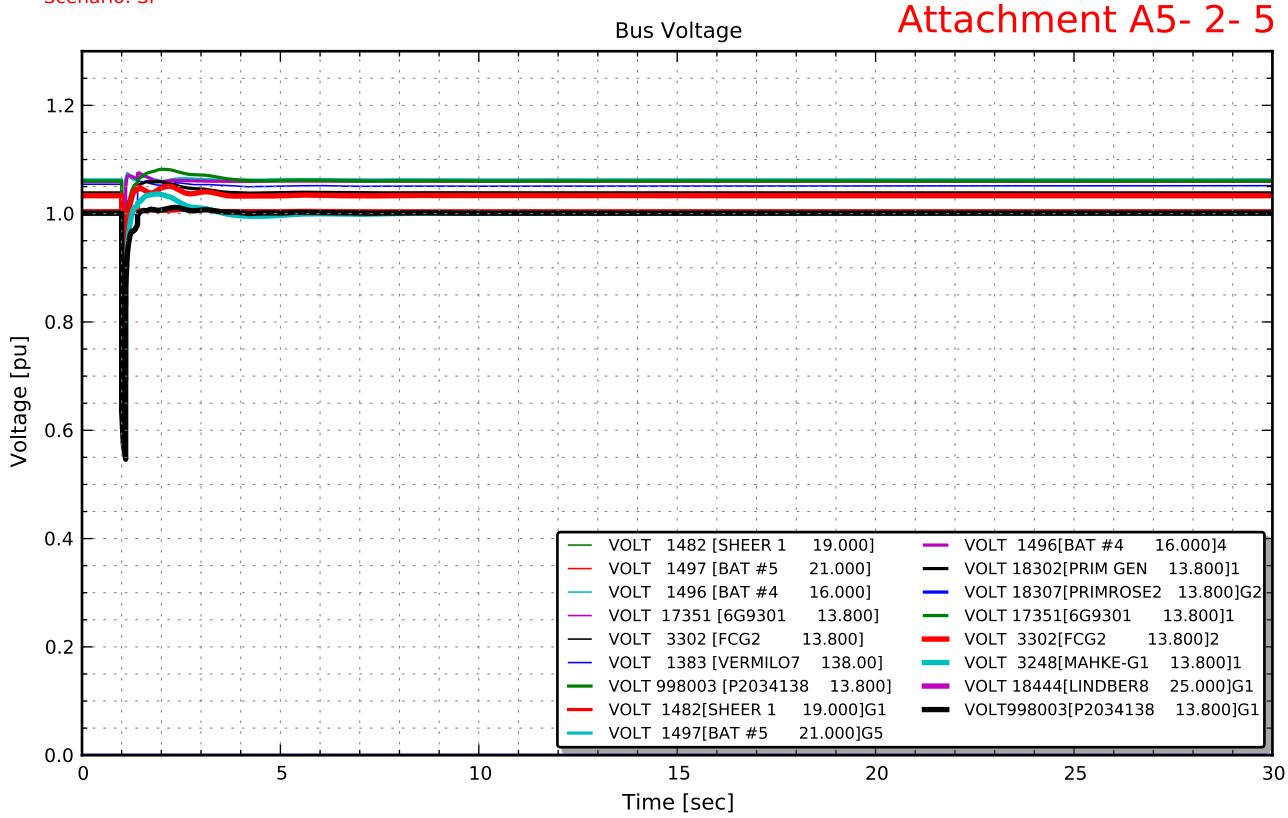


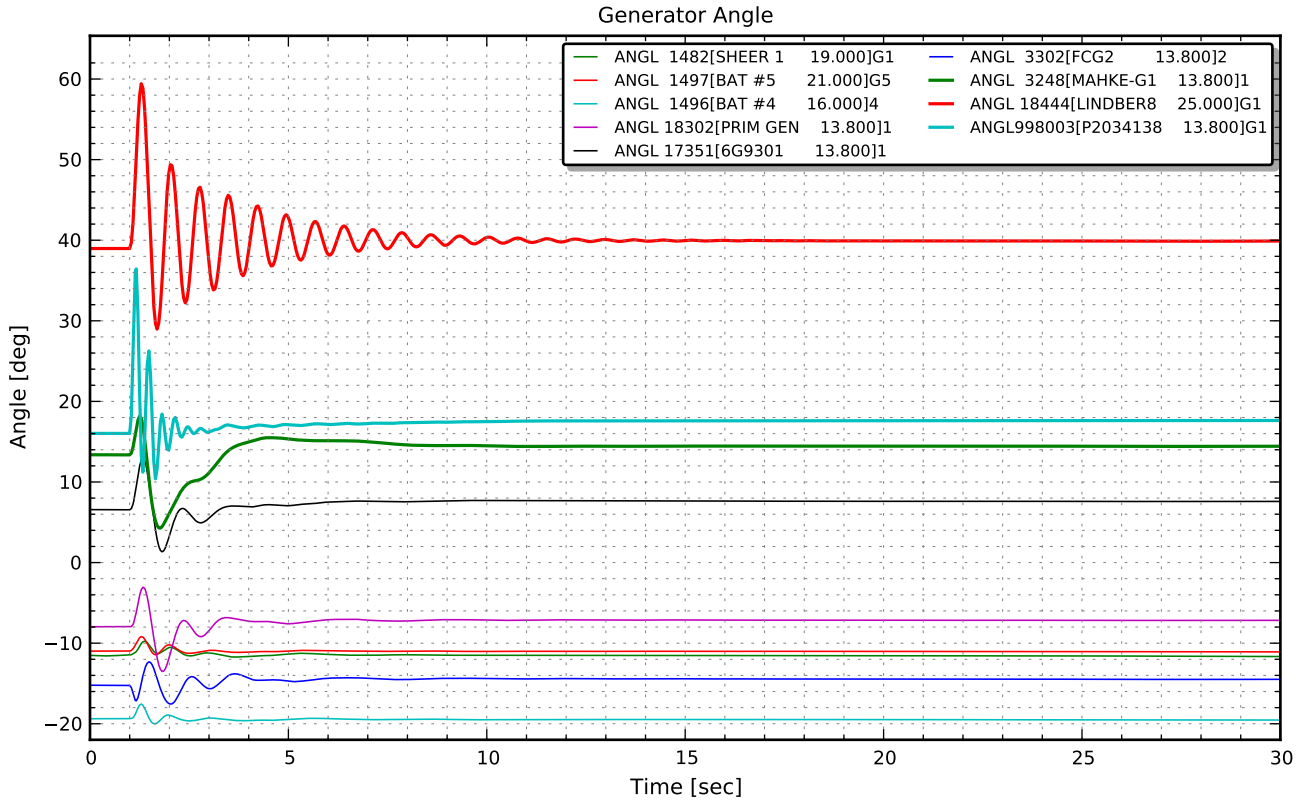
Notes: P2034 Coldlake Area Cogen

Dynamic Stability Analysis

Contingency: 03A - 7L70 Bonnyville 700S to St. Paul 707S
Alternnative: Post-Project Basecase
Scenario: SP

Attachment A5- 2- 5



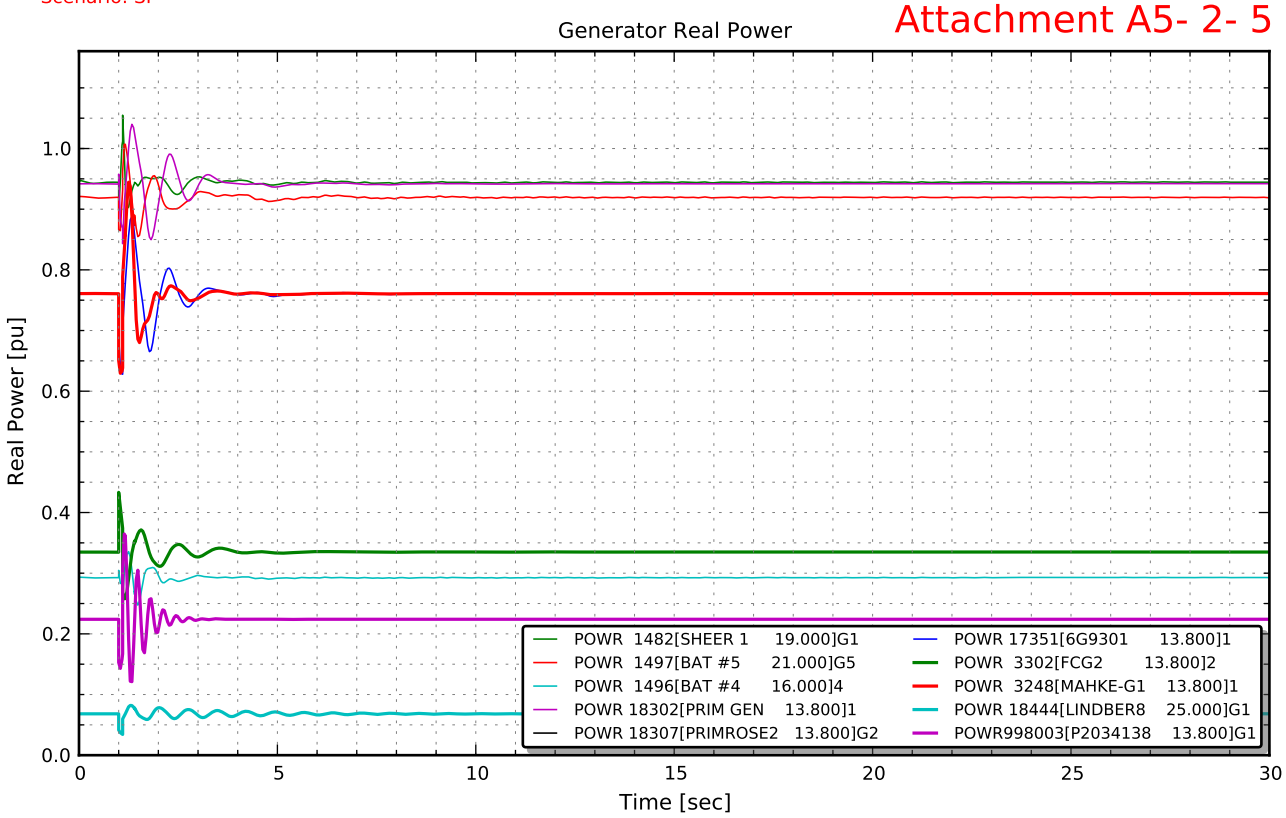


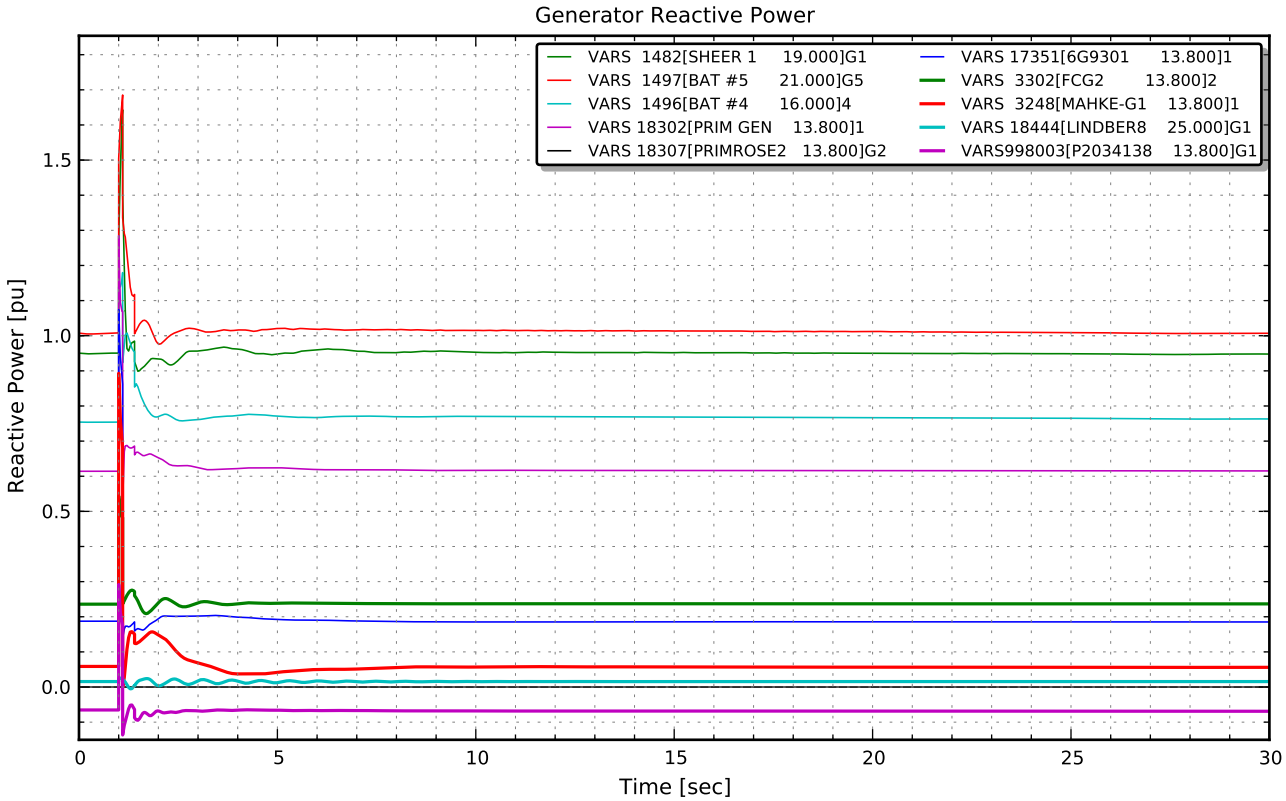
Notes: P2034 Coldlake Area Cogen

Dynamic Stability Analysis

Contingency: 03A - 7L70 Bonnyville 700S to St. Paul 707S
Alternnative: Post-Project Basecase
Scenario: SP

Attachment A5- 2- 5



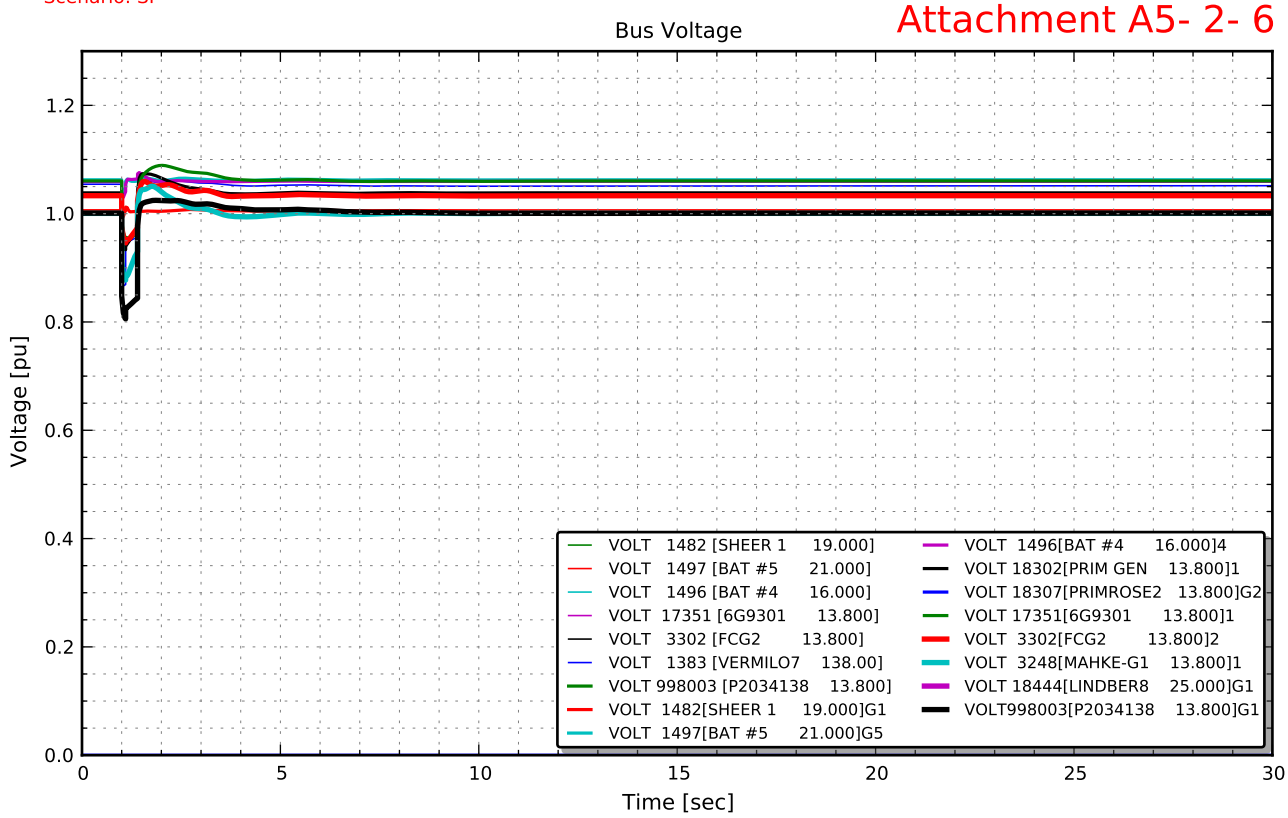


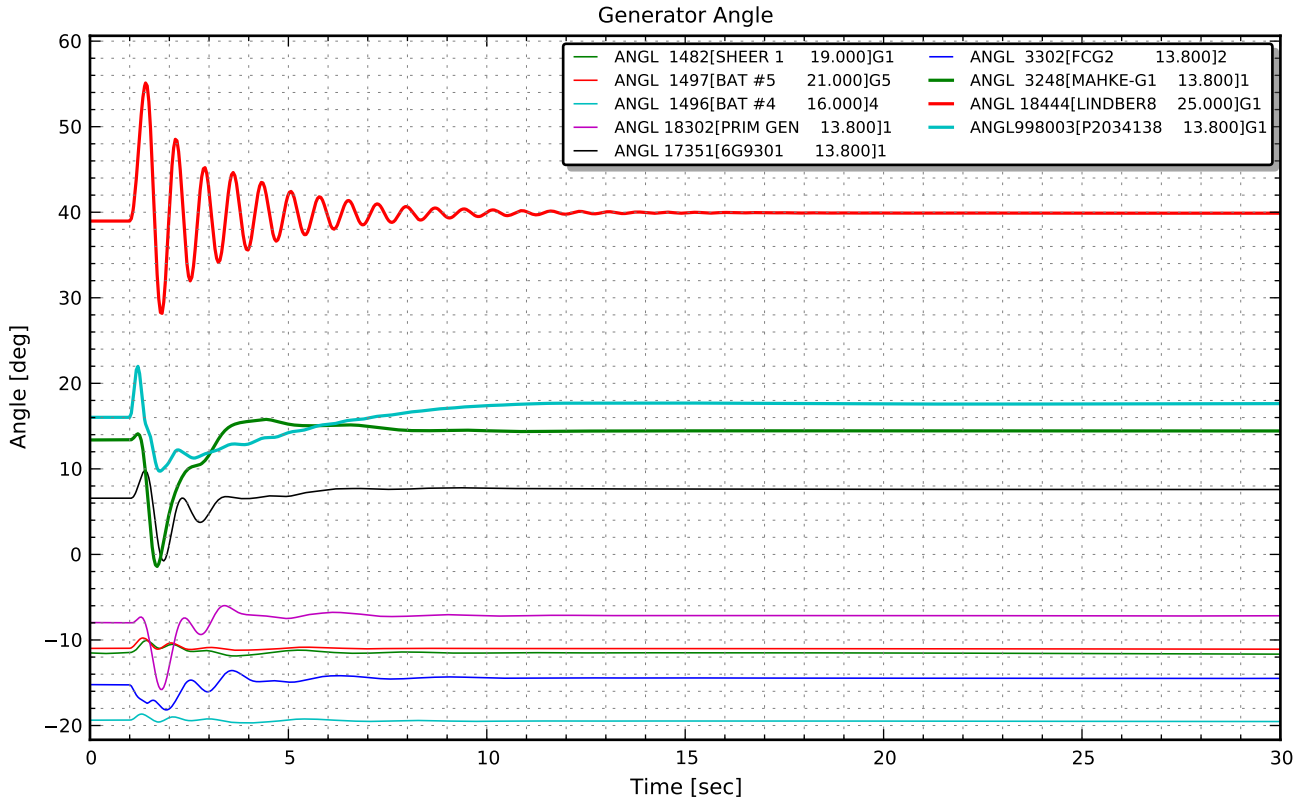
Notes: P2034 Coldlake Area Cogen

Dynamic Stability Analysis

Contingency: 03B - 7L70 St. Paul 707S to Bonnyville 700S
Alternnative: Post-Project Basecase
Scenario: SP

Attachment A5- 2- 6



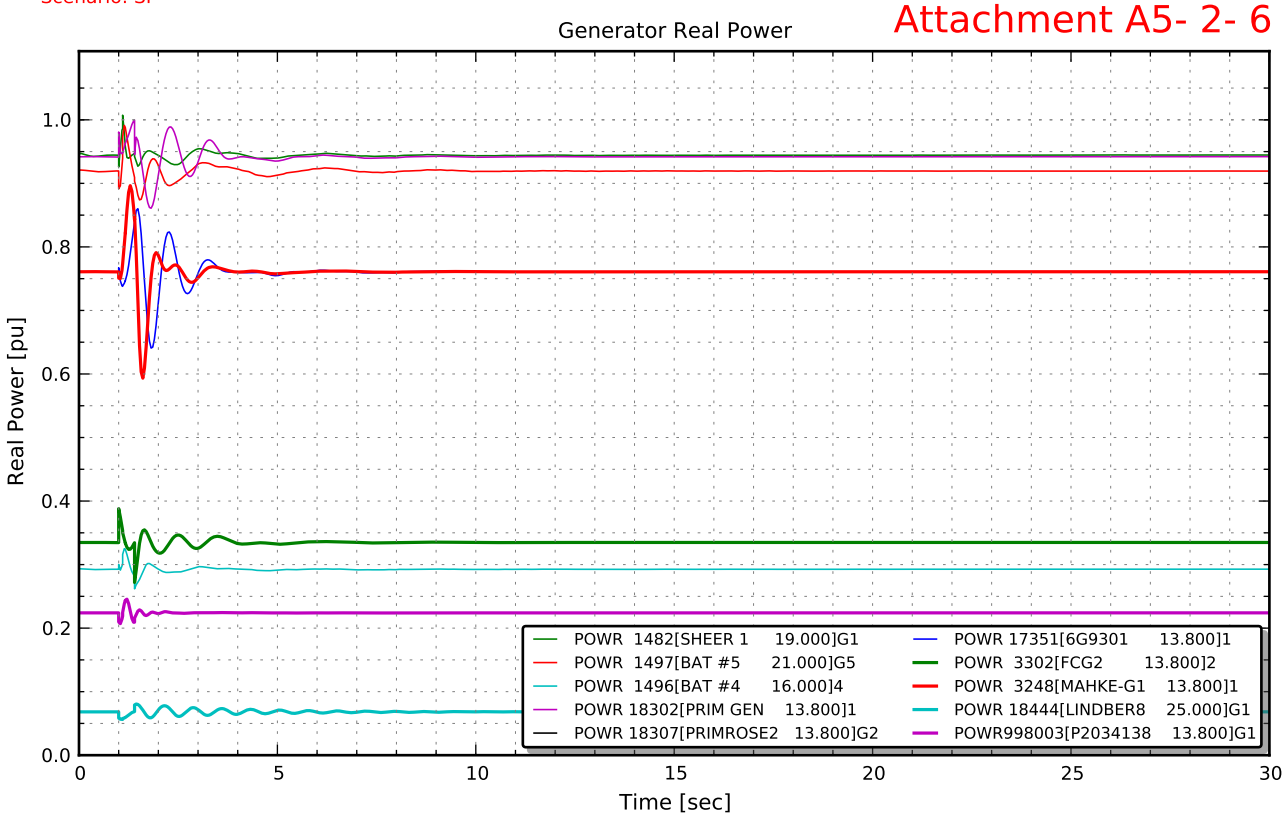


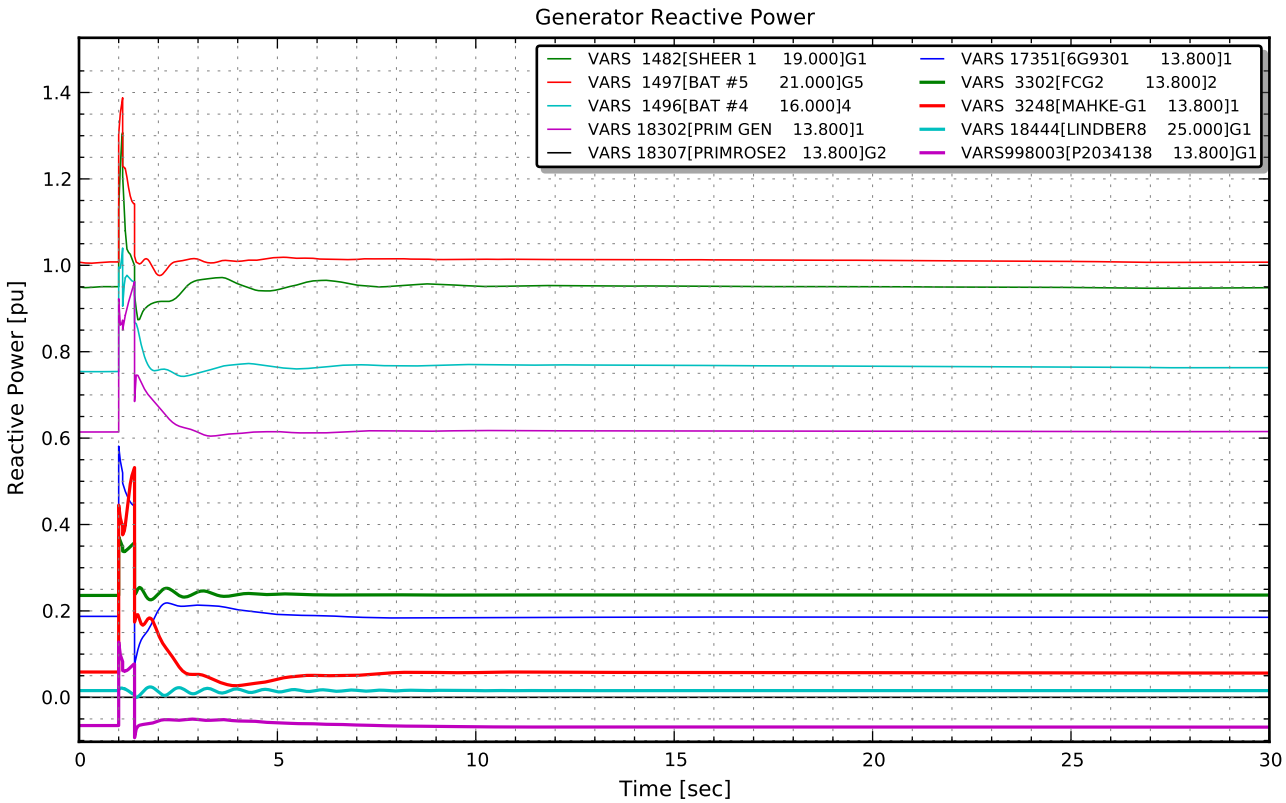
Notes: P2034 Coldlake Area Cogen

Dynamic Stability Analysis

Contingency: 03B - 7L70 St. Paul 707S to Bonnyville 700S
Alternnative: Post-Project Basecase
Scenario: SP

Attachment A5- 2- 6



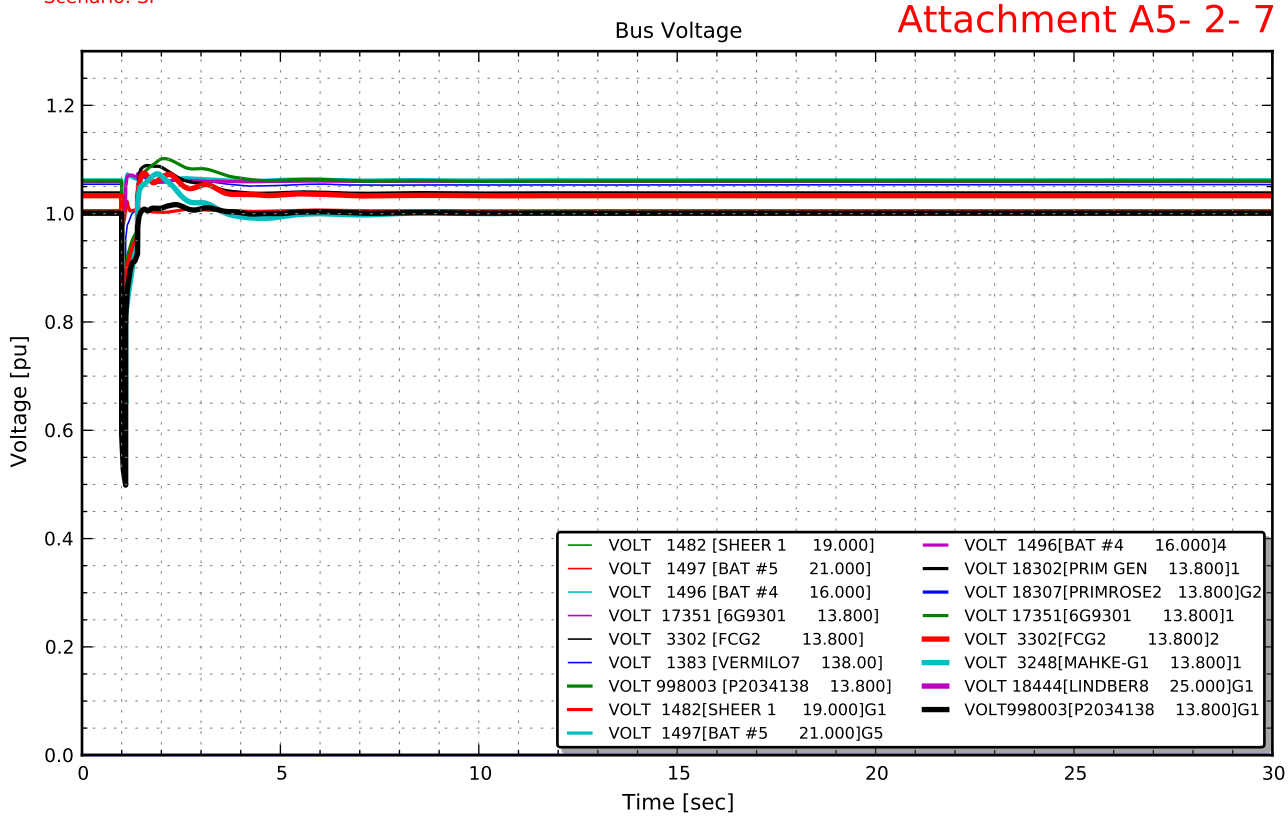


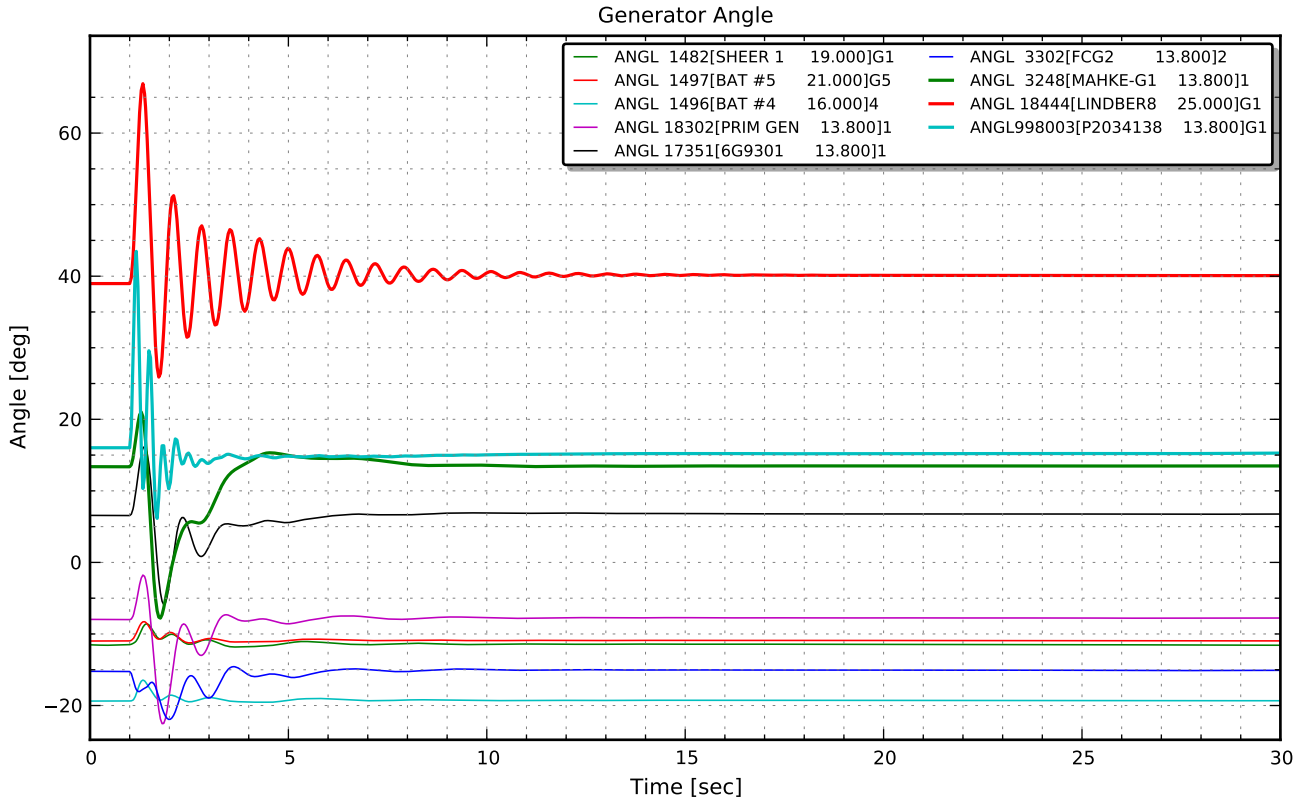
Notes: P2034 Coldlake Area Cogen

Dynamic Stability Analysis

Contingency: 04A - 7L89 Bonnyville 700S to Marguerite Lake 826S
Alternnative: Post-Project Basecase
Scenario: SP

Attachment A5- 2- 7



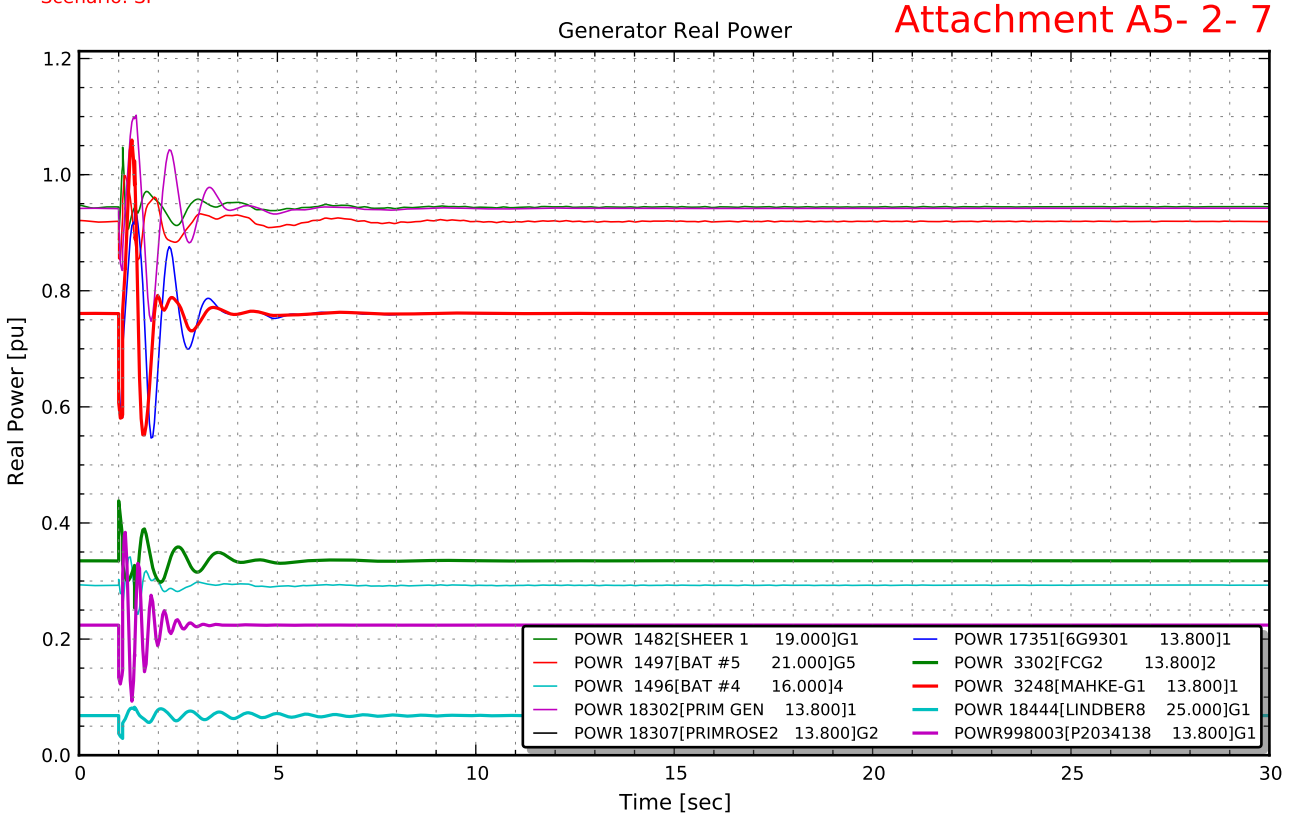


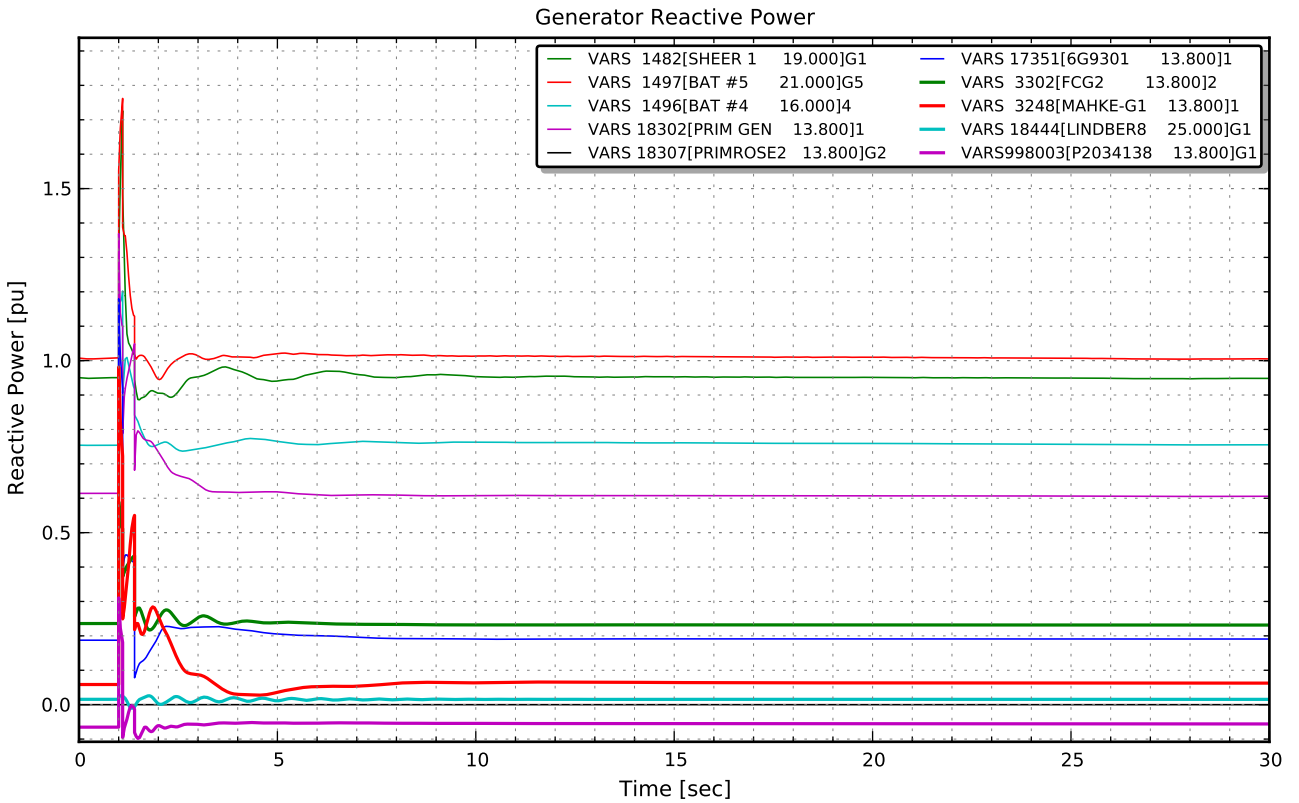
Notes: P2034 Coldlake Area Cogen

Dynamic Stability Analysis

Contingency: 04A - 7L89 Bonnyville 700S to Marguerite Lake 826S
Alternnative: Post-Project Basecase
Scenario: SP

Attachment A5- 2- 7



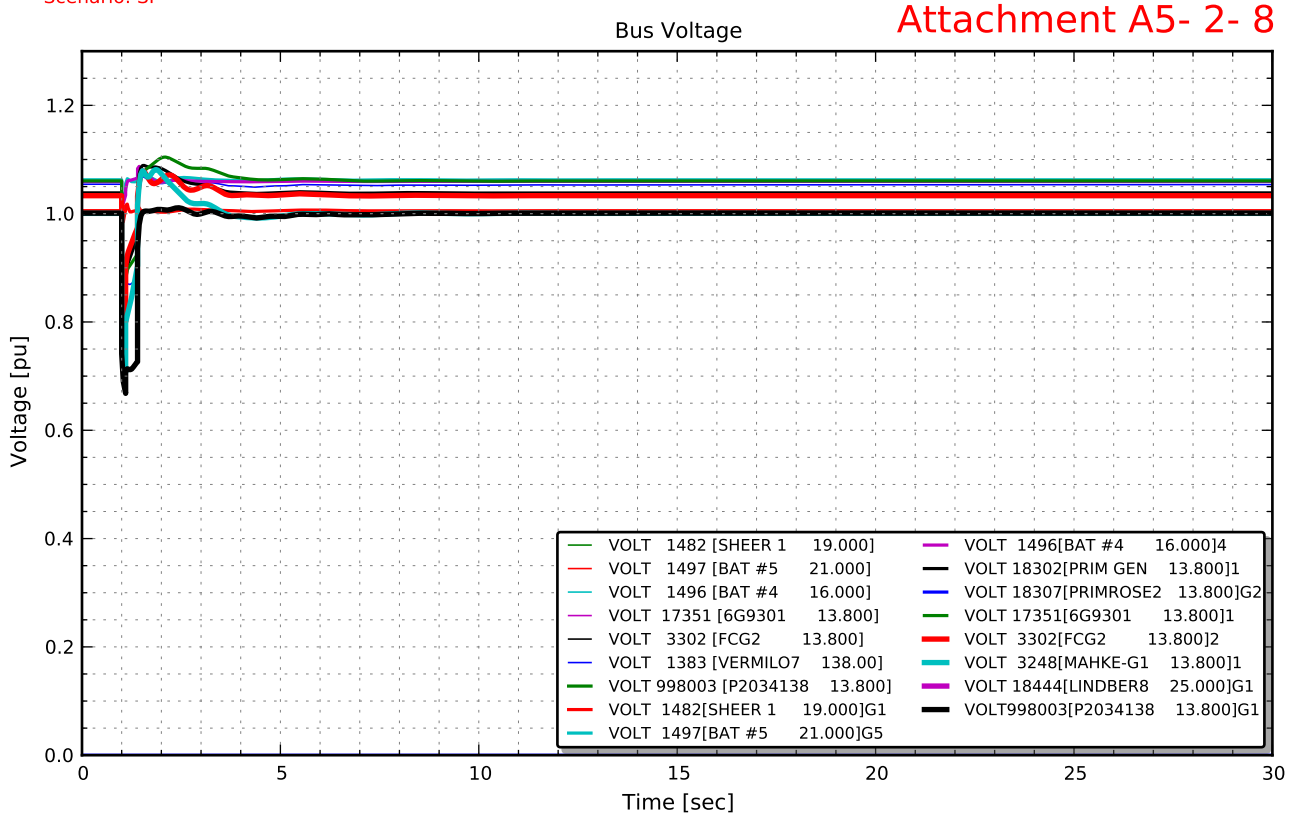


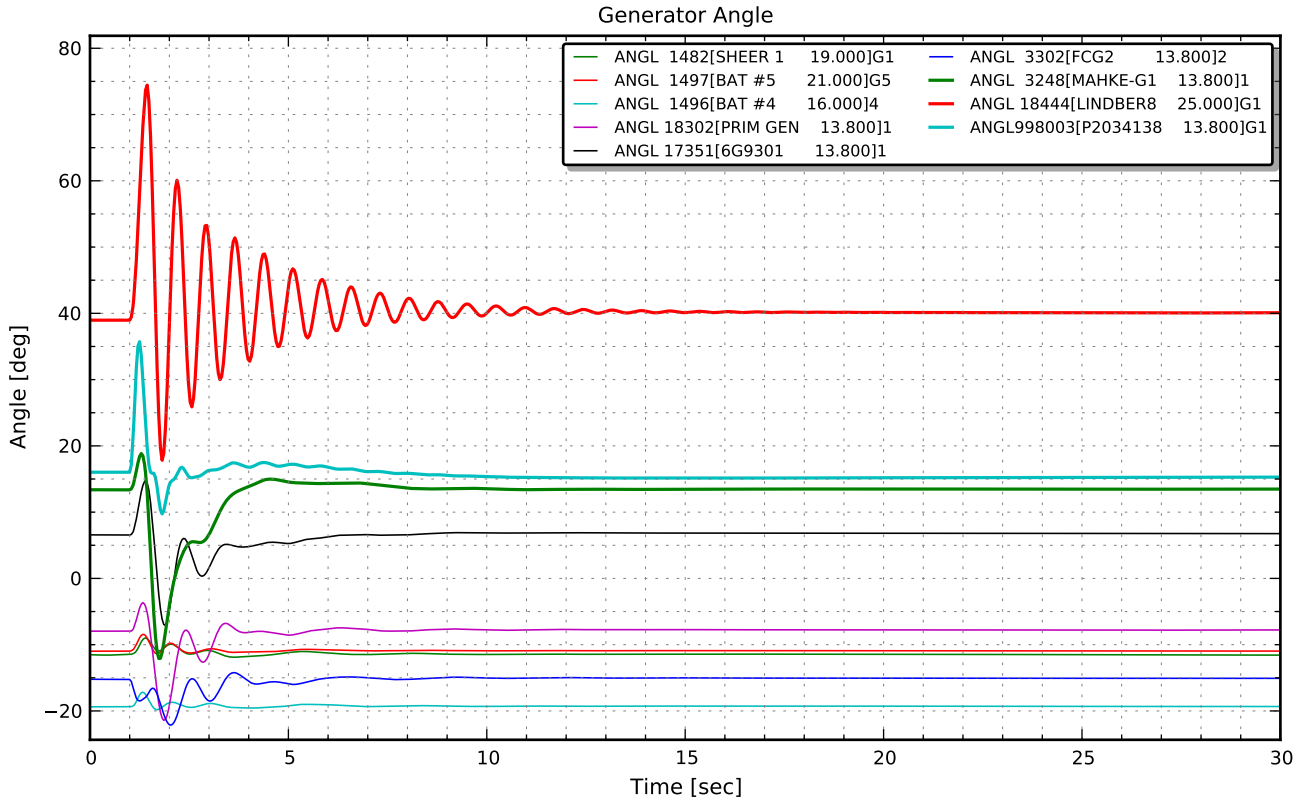
Notes: P2034 Coldlake Area Cogen

Dynamic Stability Analysis

Contingency: 04B - 7L89 Marguerite Lake 826S to Bonnyville 700S
Alternnative: Post-Project Basecase
Scenario: SP

Attachment A5- 2- 8



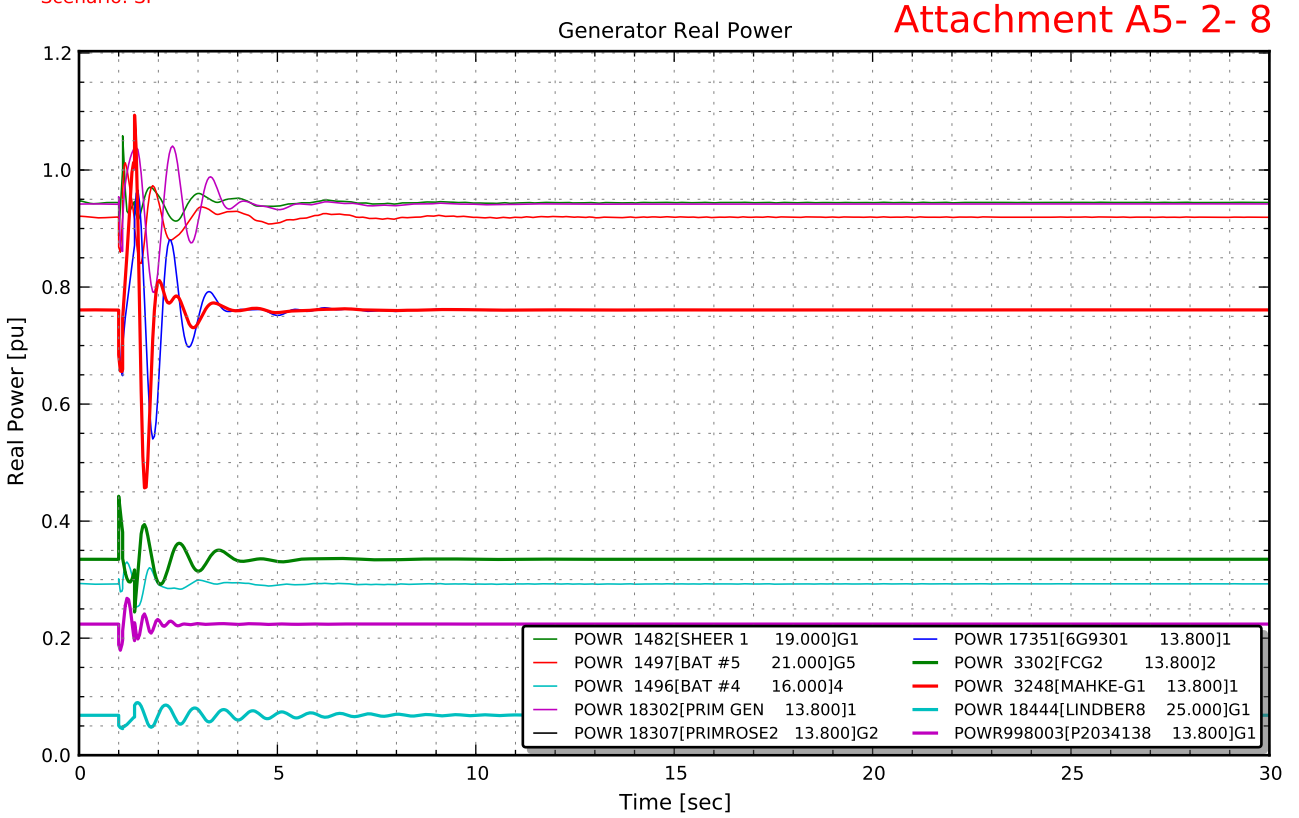


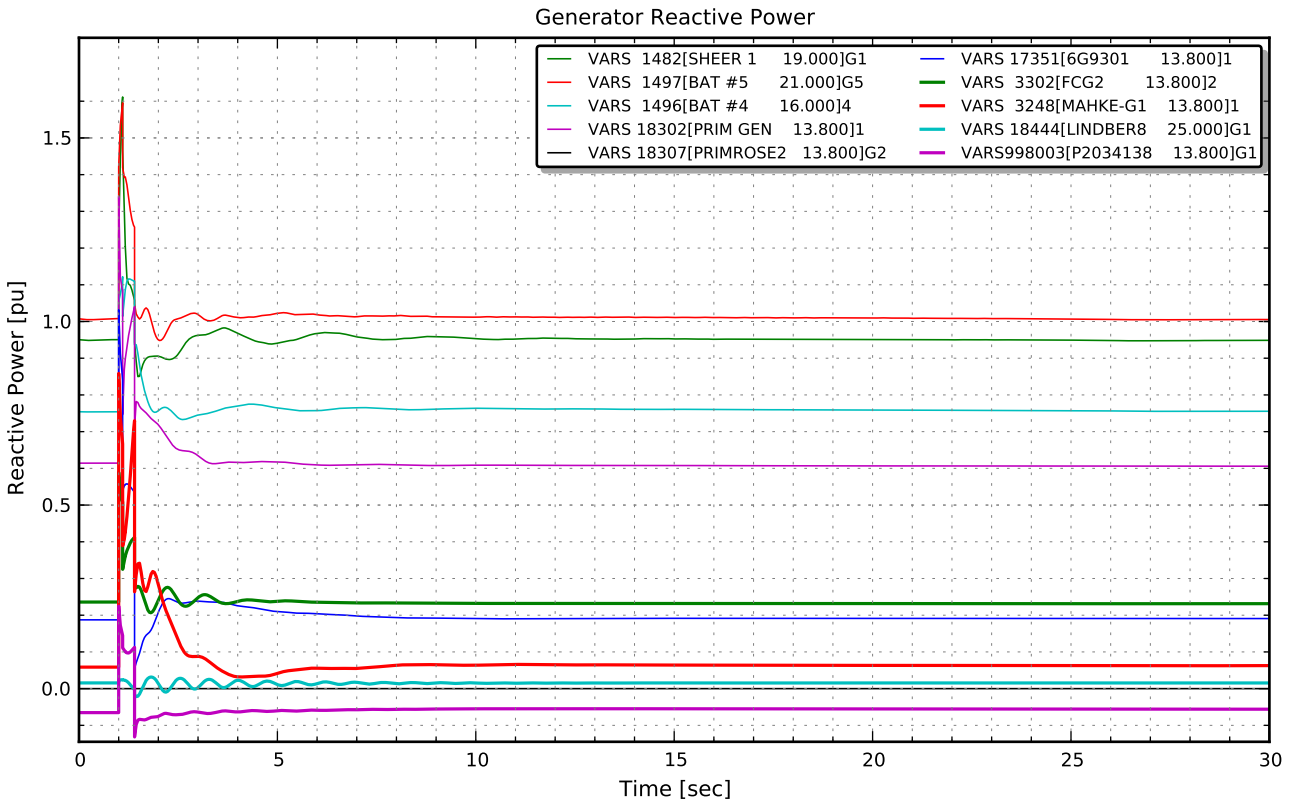
Notes: P2034 Coldlake Area Cogen

Dynamic Stability Analysis

Contingency: 04B - 7L89 Marguerite Lake 826S to Bonnyville 700S
Alternnative: Post-Project Basecase
Scenario: SP

Attachment A5- 2- 8



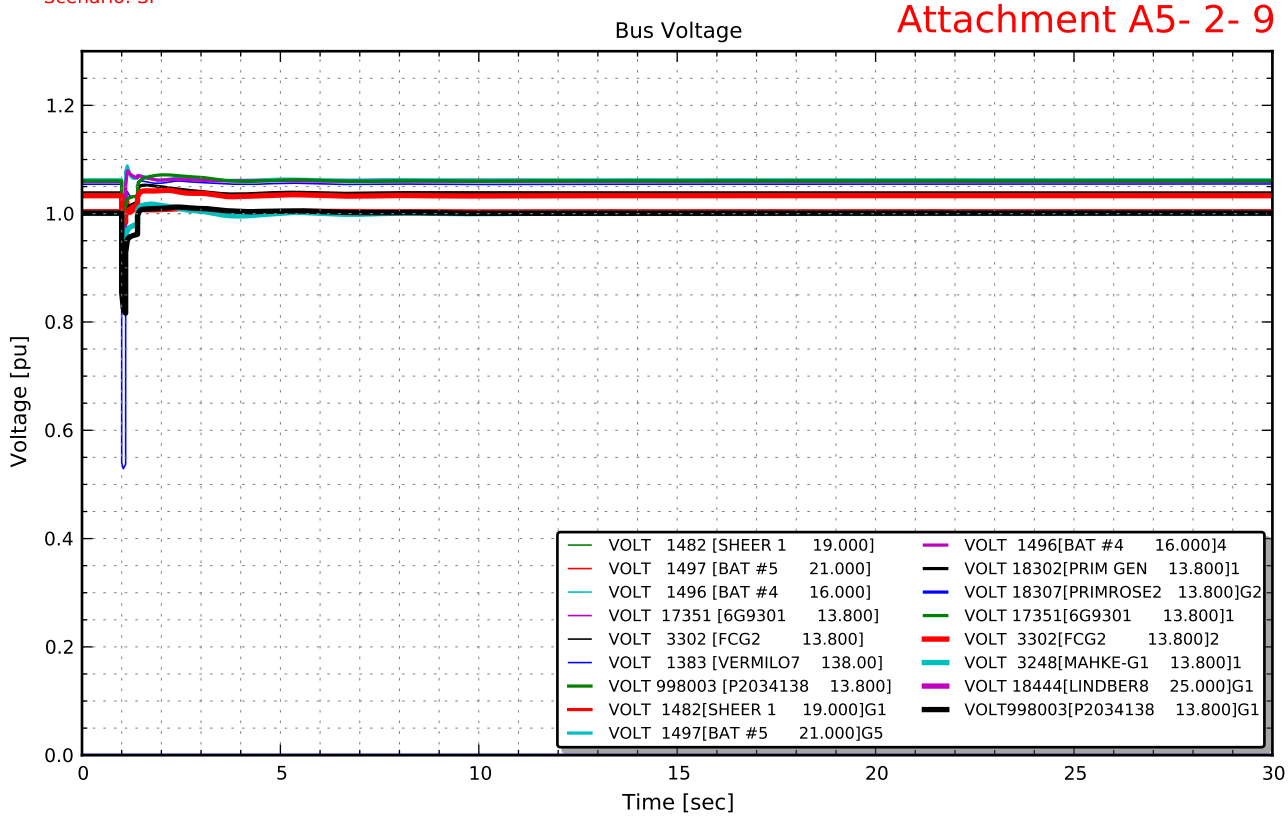


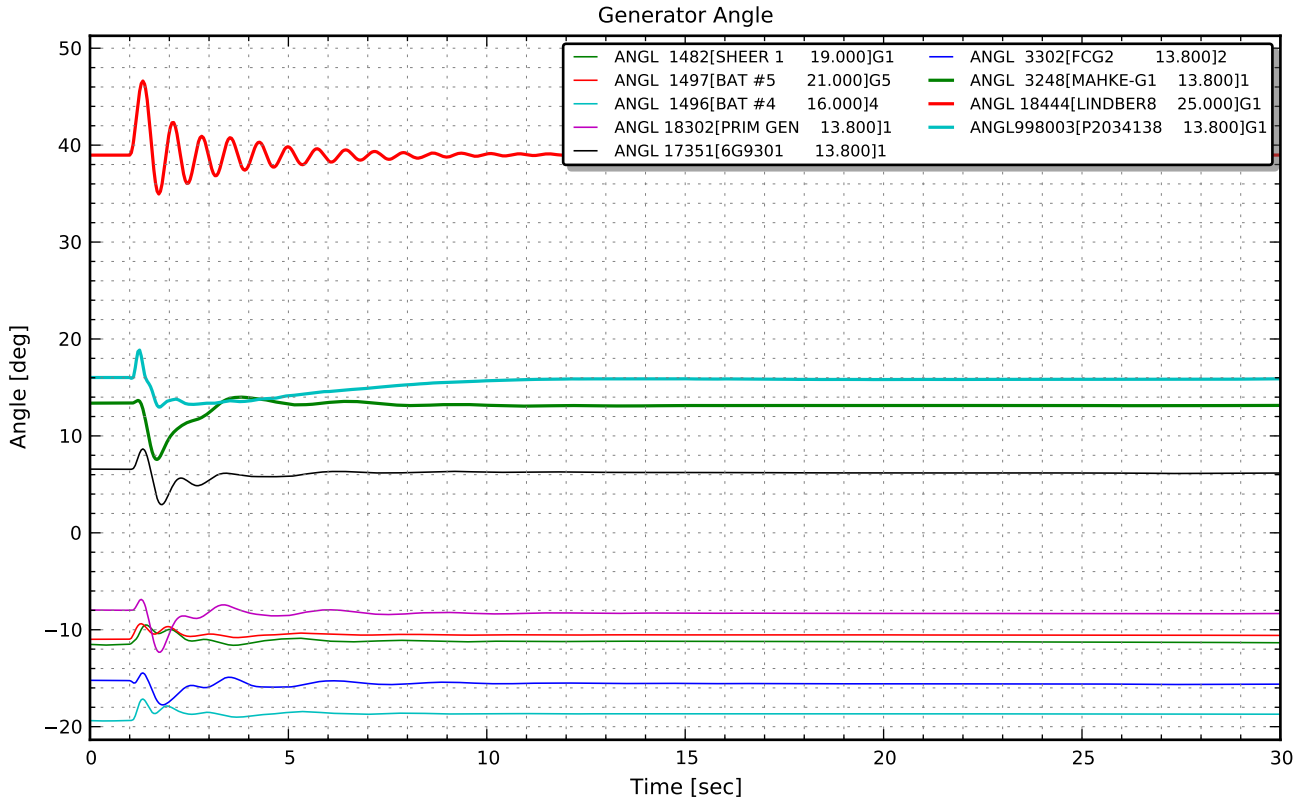
Notes: P2034 Coldlake Area Cogen

Dynamic Stability Analysis

Contingency: 05A - 7L92 Vegreville 709S to Whitby Lake 819S
Alternnative: Post-Project Basecase
Scenario: SP

Attachment A5- 2- 9



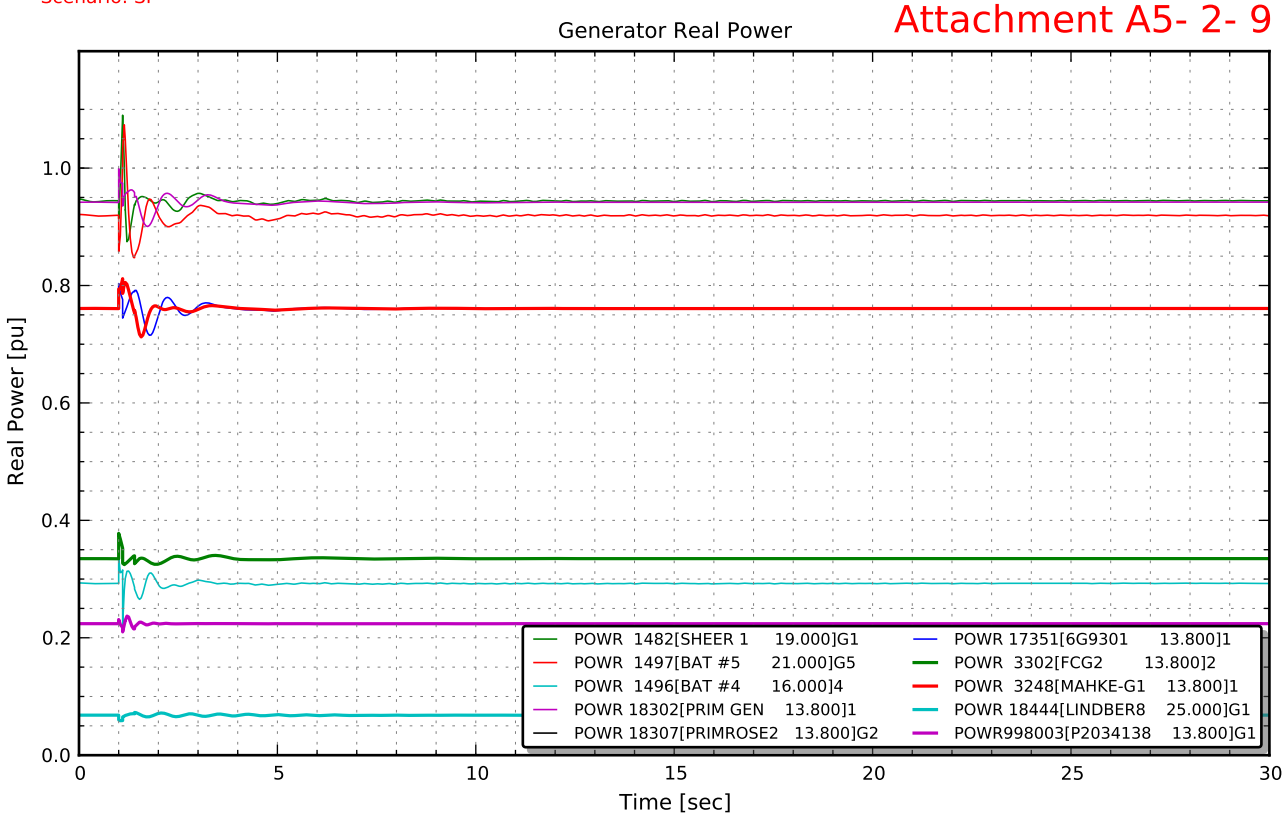


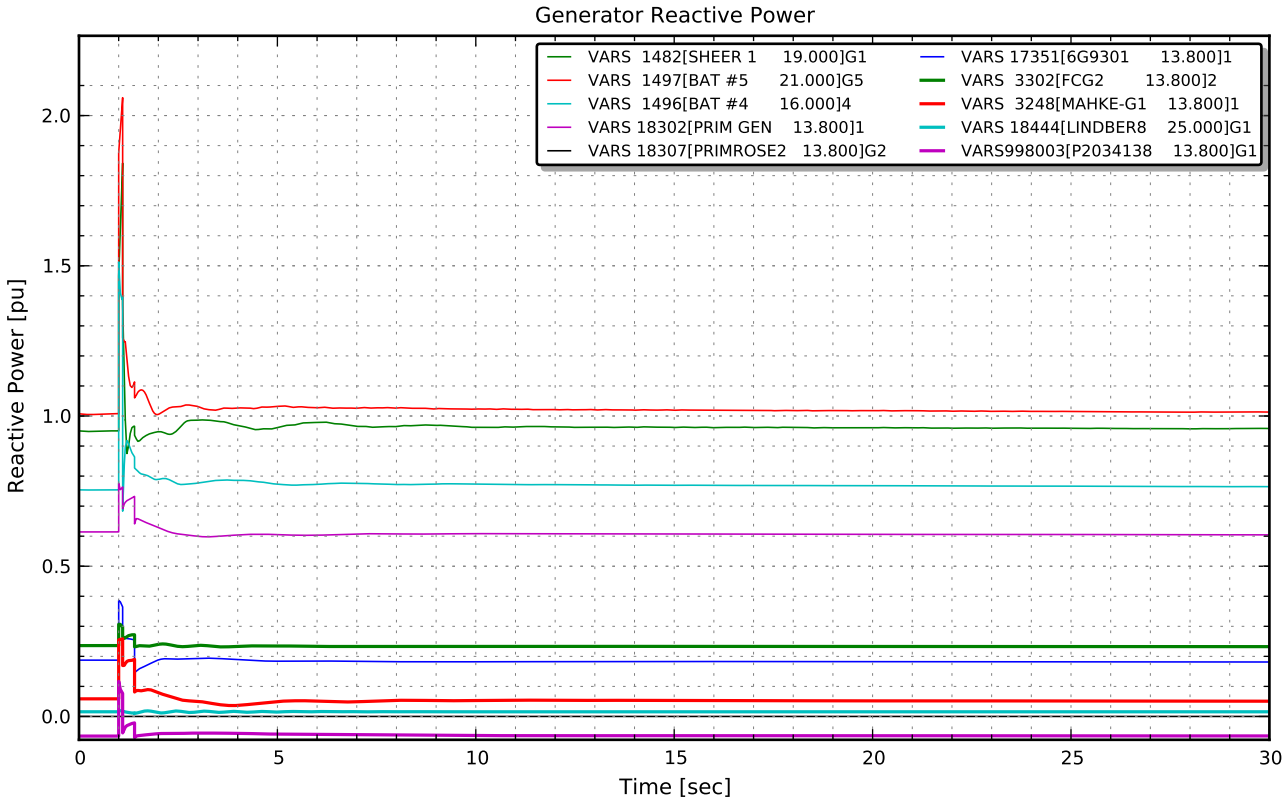
Notes: P2034 Coldlake Area Cogen

Dynamic Stability Analysis

Contingency: 05A - 7L92 Vegreville 709S to Whitby Lake 819S
Alternnative: Post-Project Basecase
Scenario: SP

Attachment A5- 2- 9



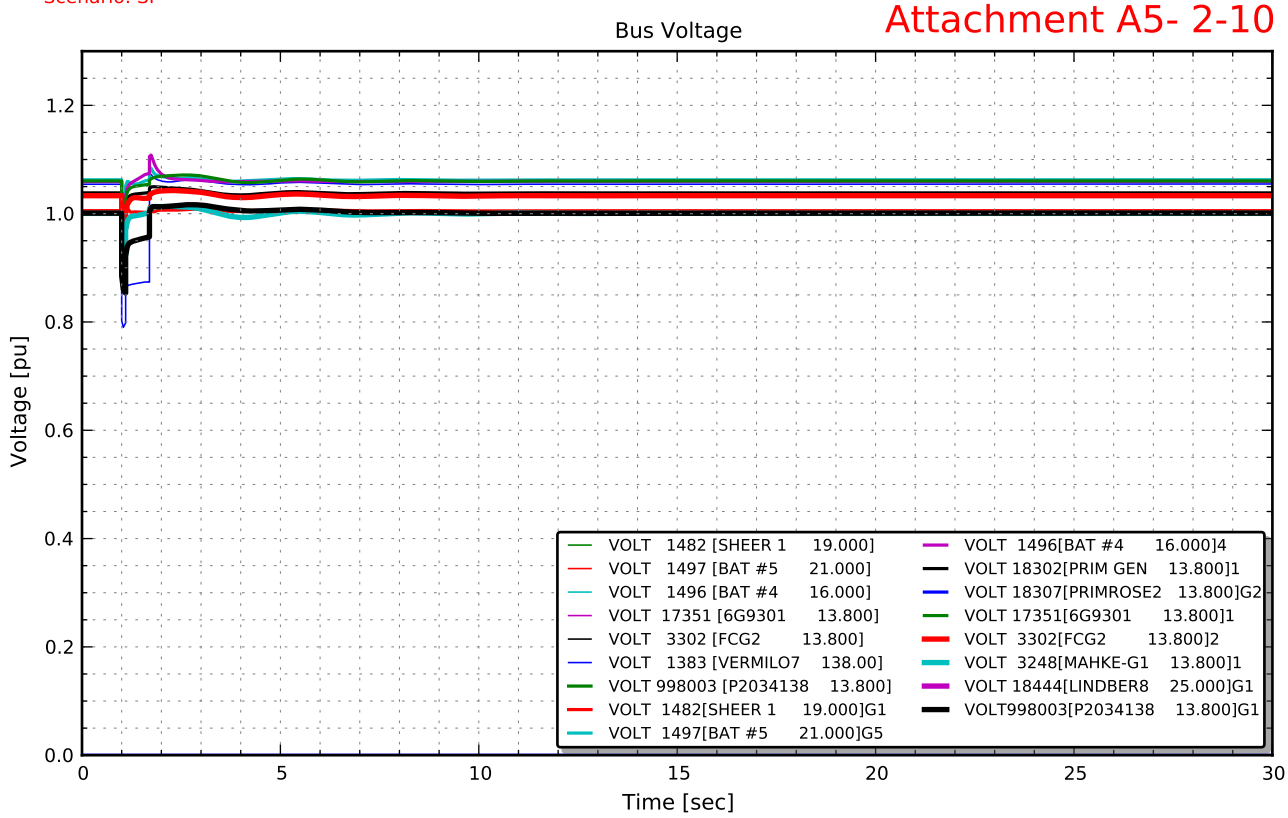


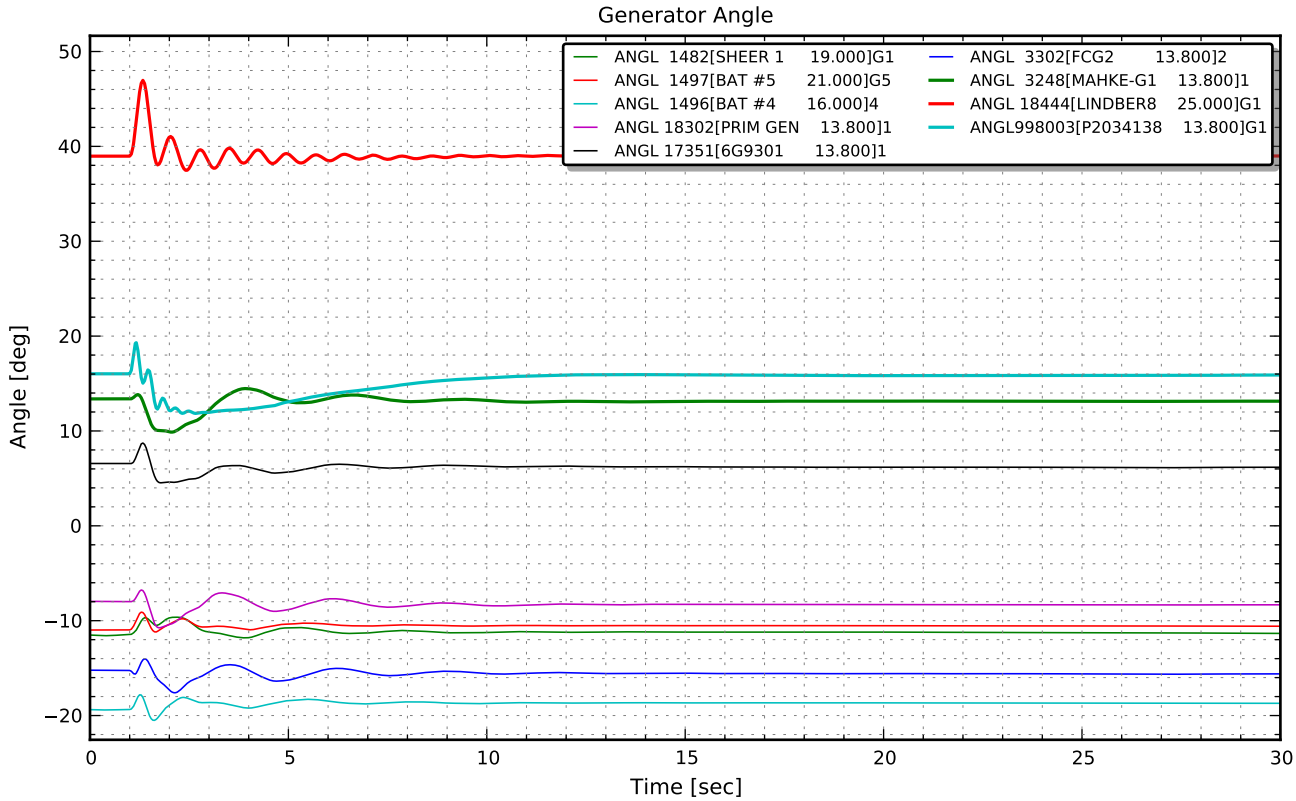
Notes: P2034 Coldlake Area Cogen

Dynamic Stability Analysis

Contingency: 05B - 7L92 Whitby Lake 819S to Vegreville 709S
Alternnative: Post-Project Basecase
Scenario: SP

Attachment A5- 2-10



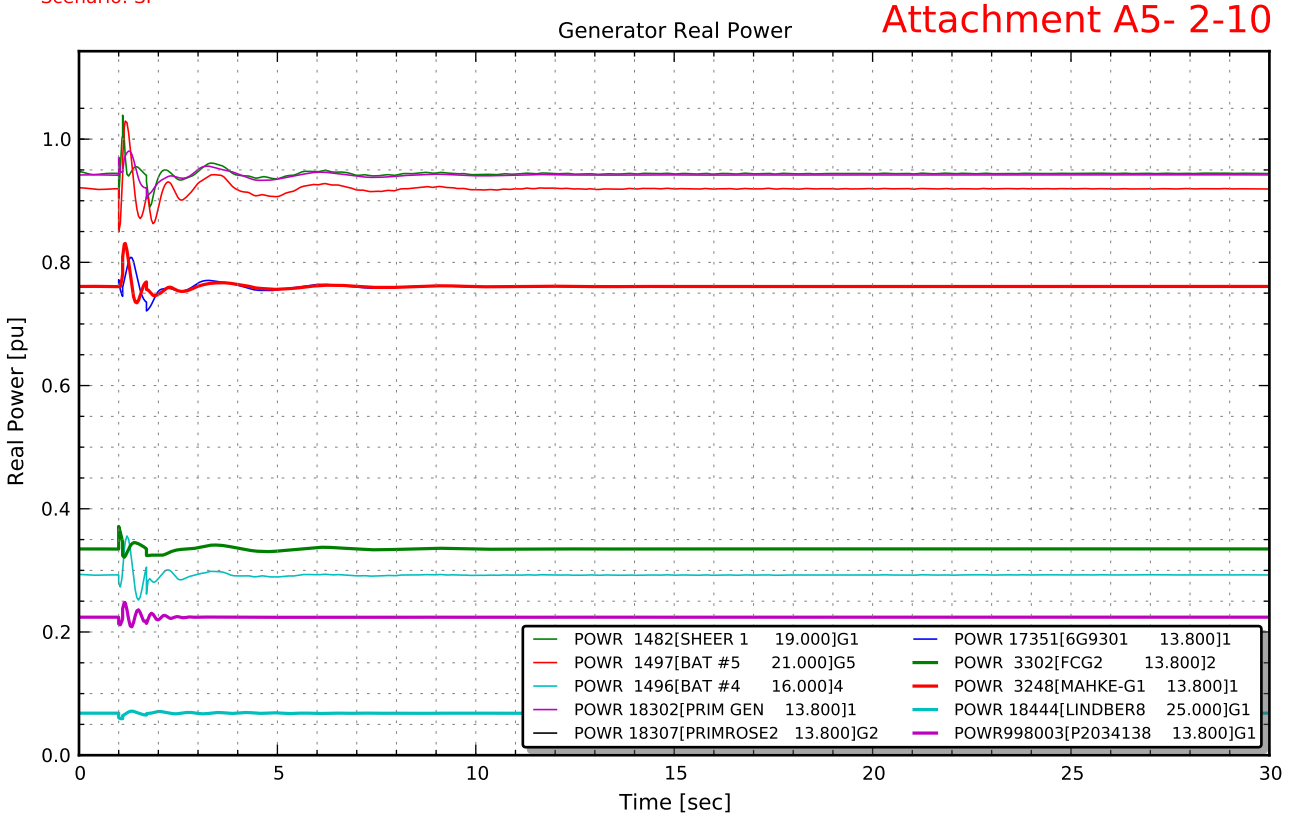


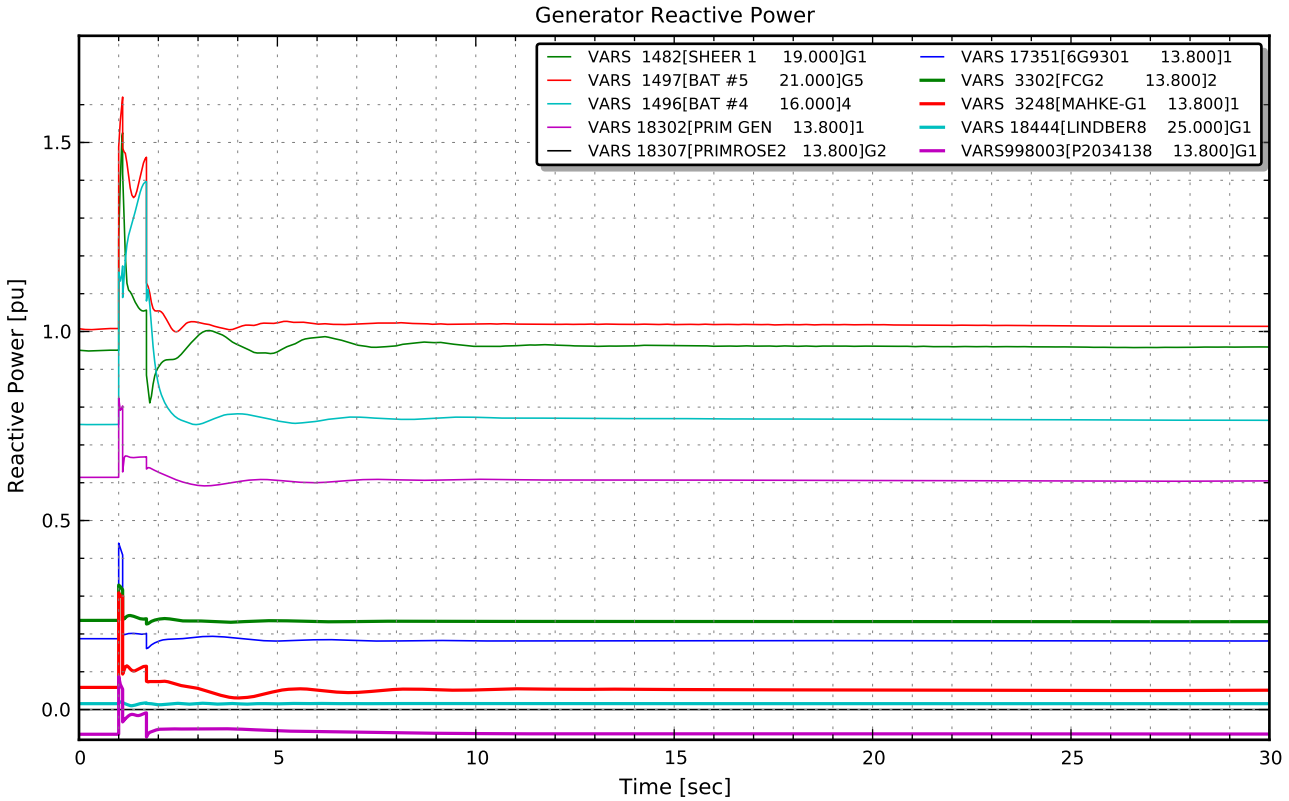
Notes: P2034 Coldlake Area Cogen

Dynamic Stability Analysis

Contingency: 05B - 7L92 Whitby Lake 819S to Vegreville 709S
Alternnative: Post-Project Basecase
Scenario: SP

Attachment A5- 2-10



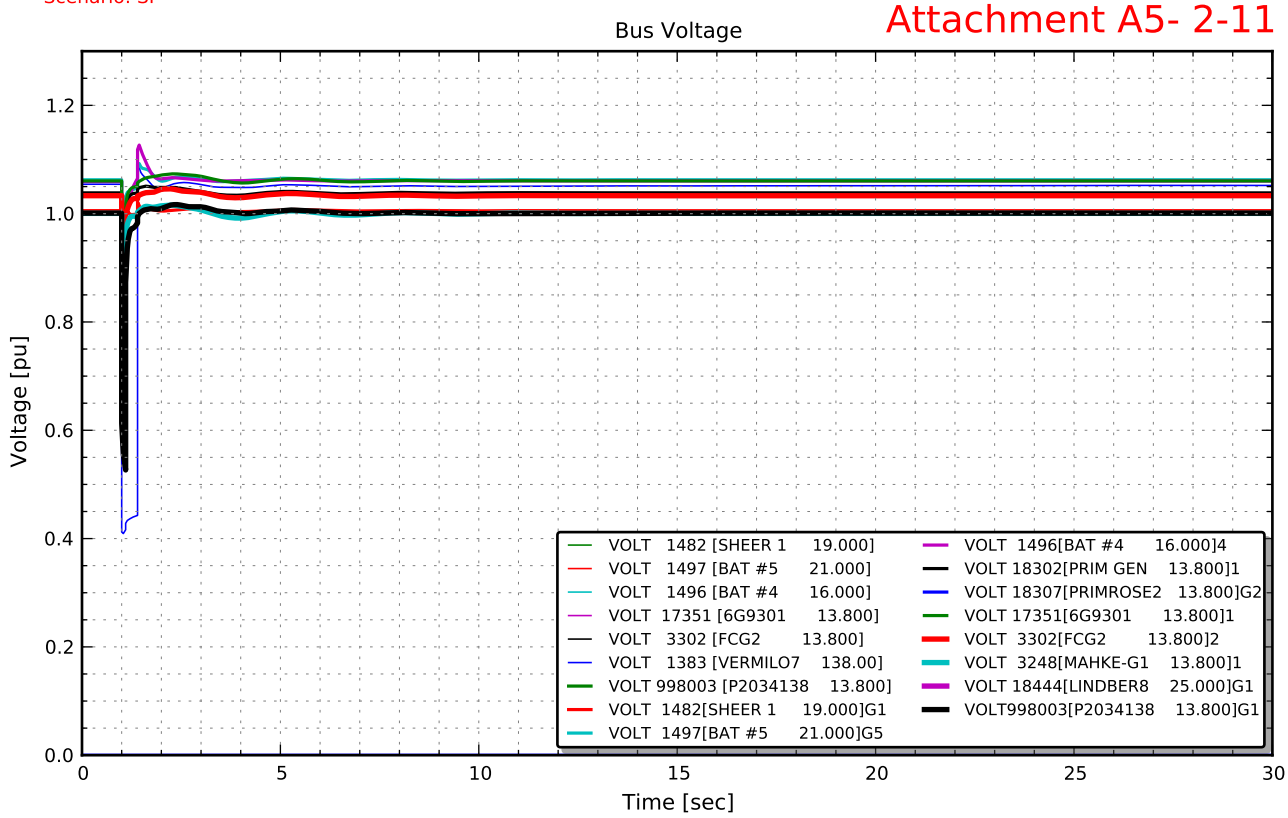


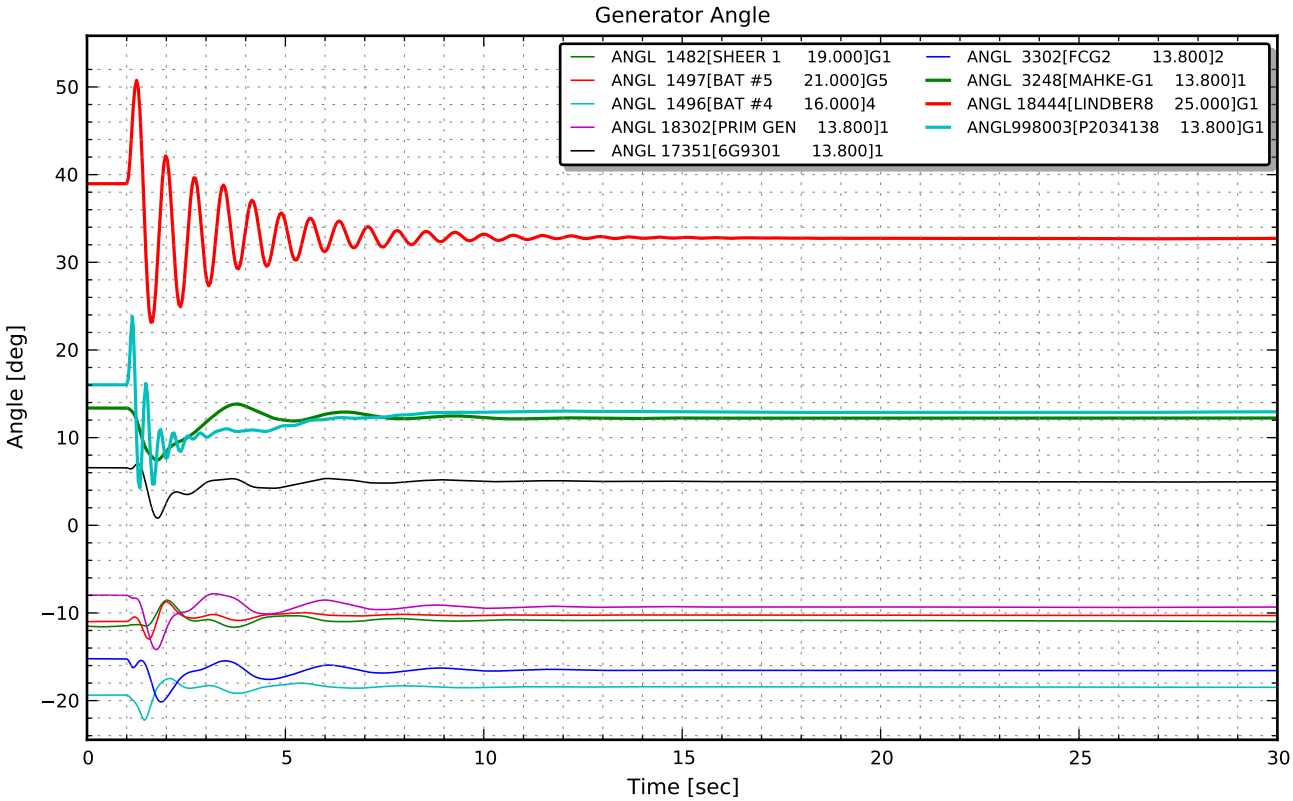
Notes: P2034 Coldlake Area Cogen

Dynamic Stability Analysis

Contingency: 06A - 7L117 Irish Creek 706S to Vermilion 710S
Alternnative: Post-Project Basecase
Scenario: SP

Attachment A5- 2-11



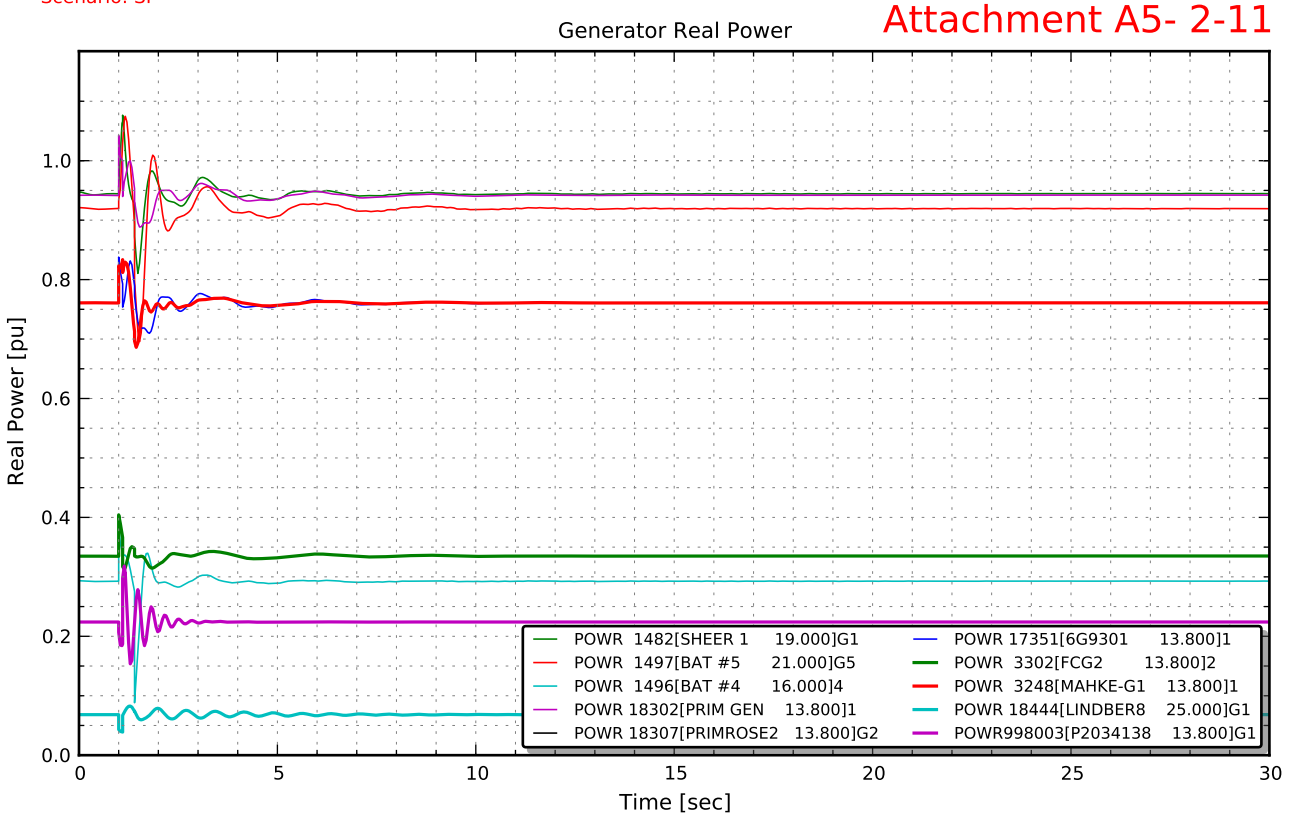


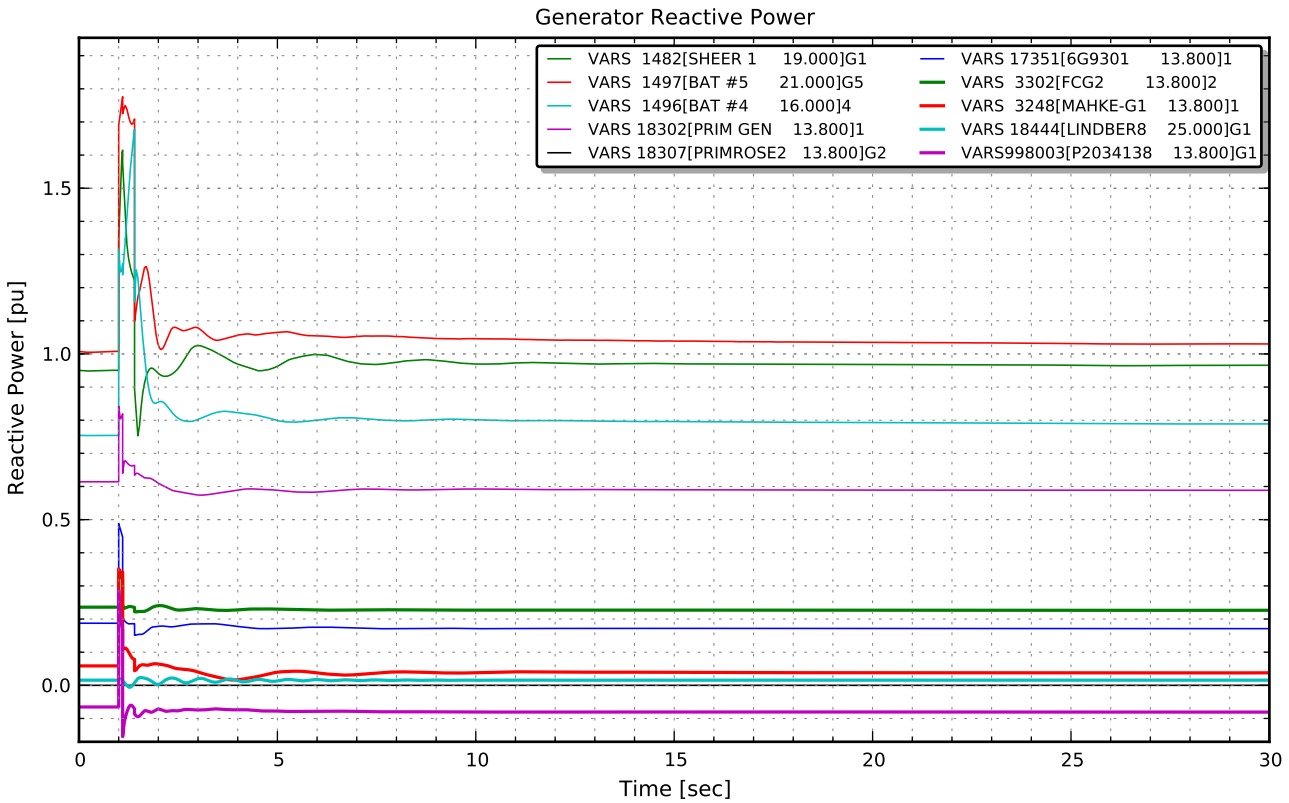
Notes: P2034 Coldlake Area Cogen

Dynamic Stability Analysis

Contingency: 06A - 7L117 Irish Creek 706S to Vermilion 710S
Alternnative: Post-Project Basecase
Scenario: SP

Attachment A5- 2-11



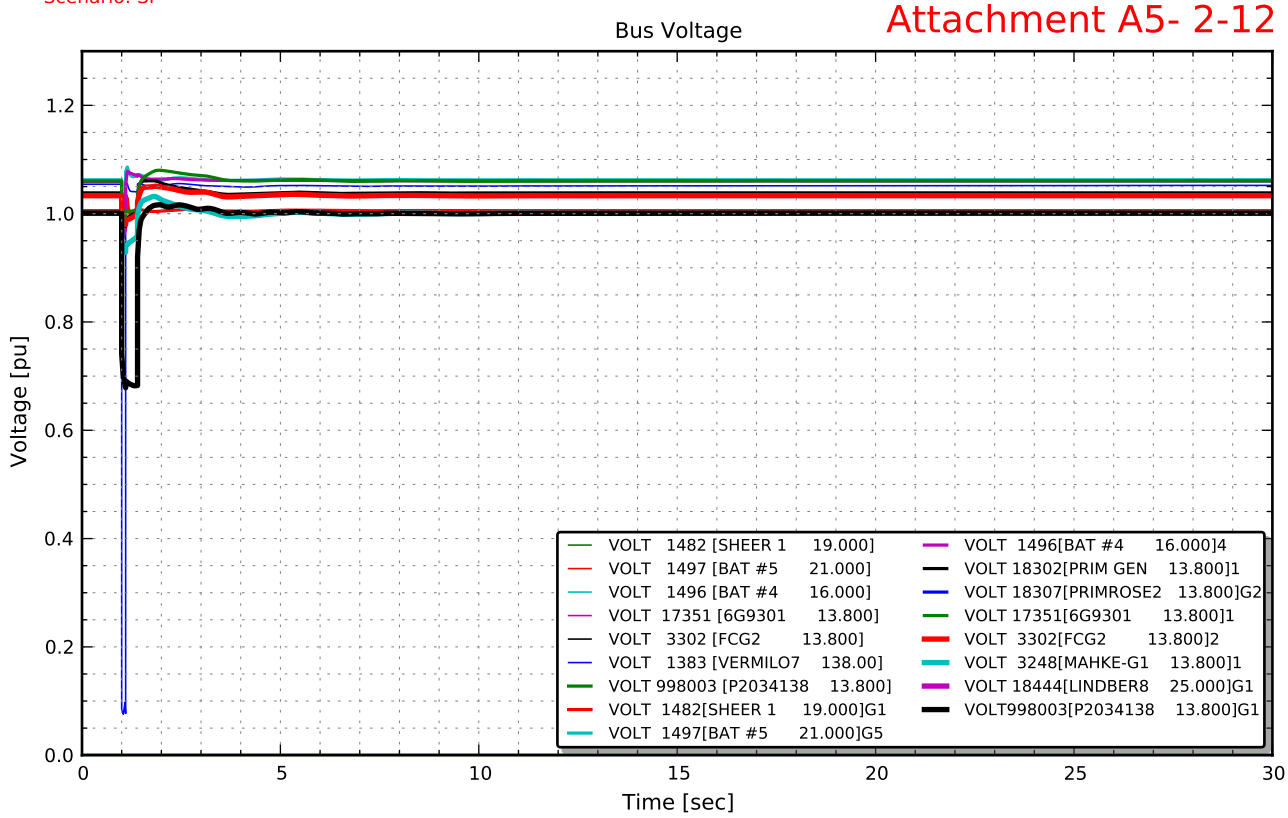


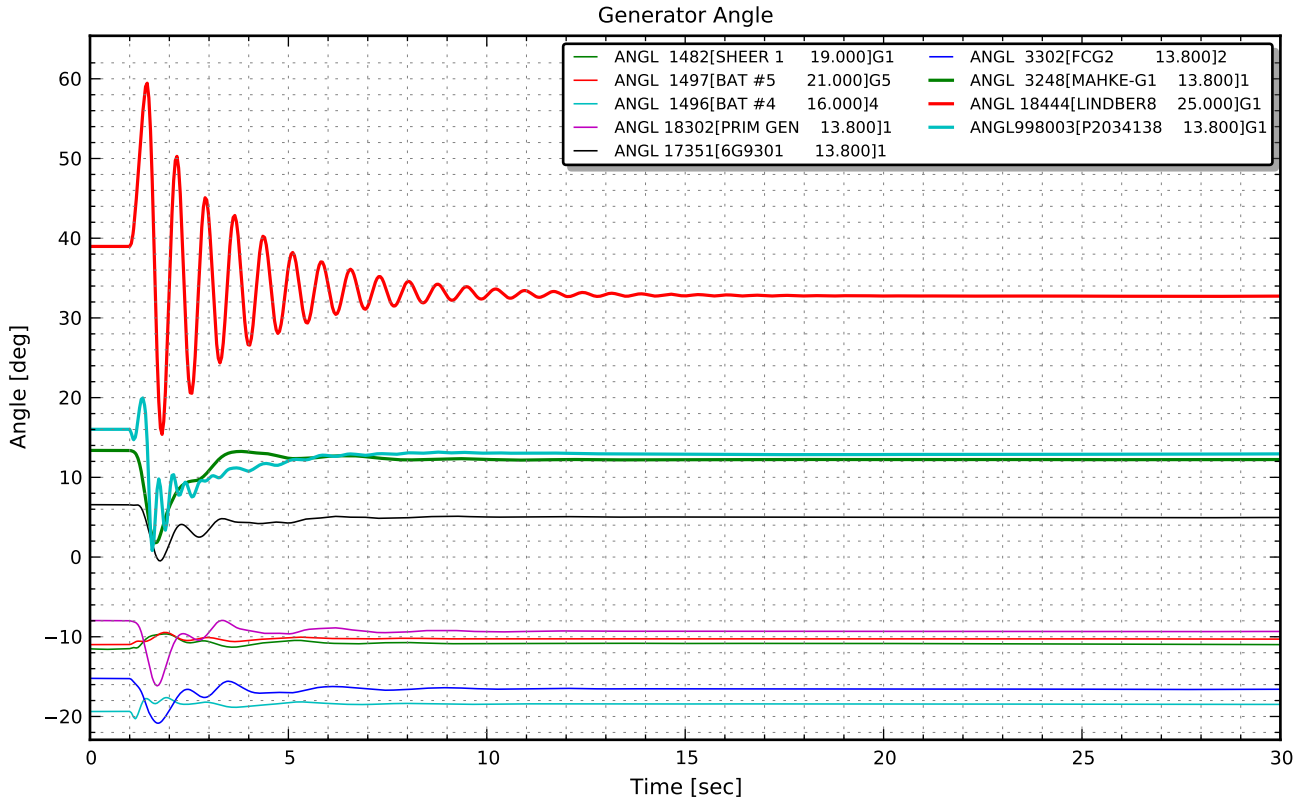
Notes: P2034 Coldlake Area Cogen

Dynamic Stability Analysis

Contingency: 06B - 7L117 Vermilion 710S to Irish Creek 706S
Alternnative: Post-Project Basecase
Scenario: SP

Attachment A5- 2-12



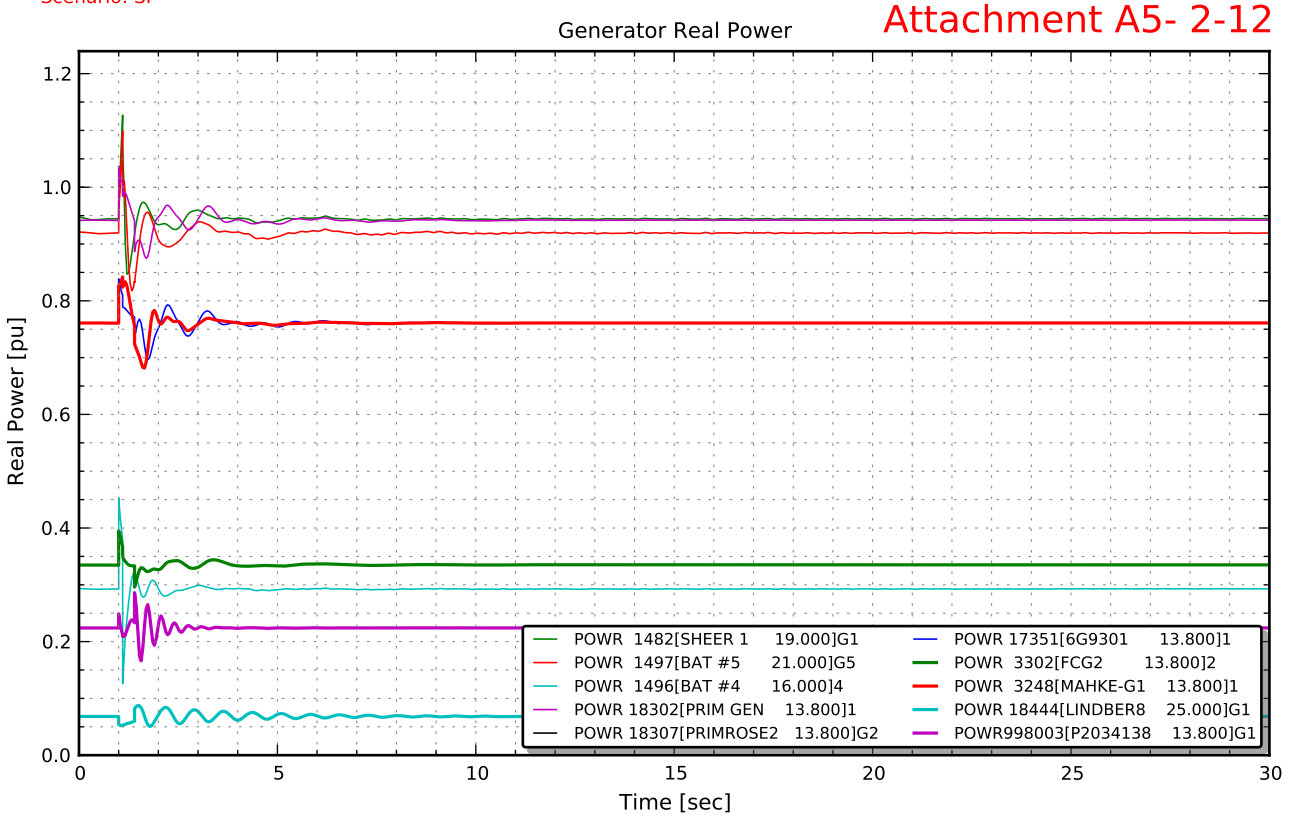


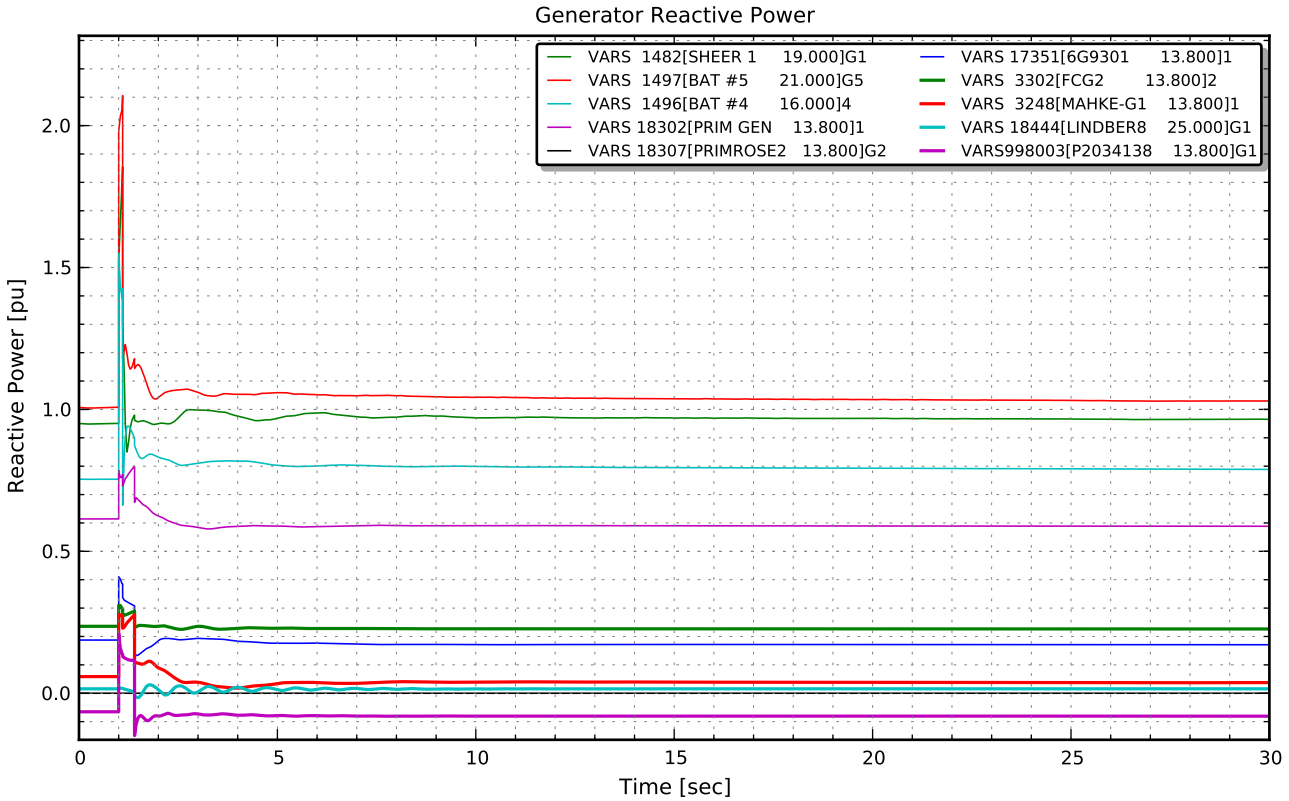
Notes: P2034 Coldlake Area Cogen

Dynamic Stability Analysis

Contingency: 06B - 7L117 Vermilion 710S to Irish Creek 706S
Alternnative: Post-Project Basecase
Scenario: SP

Attachment A5- 2-12



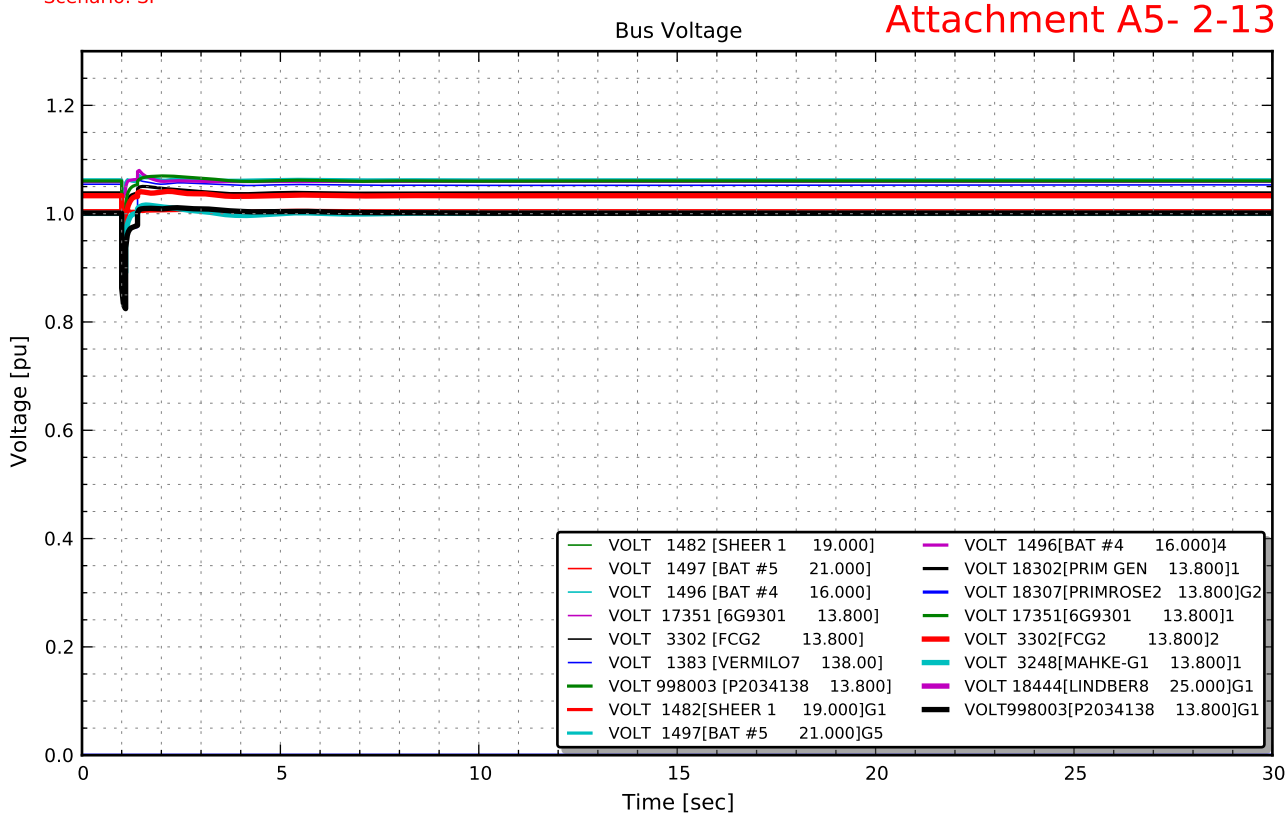


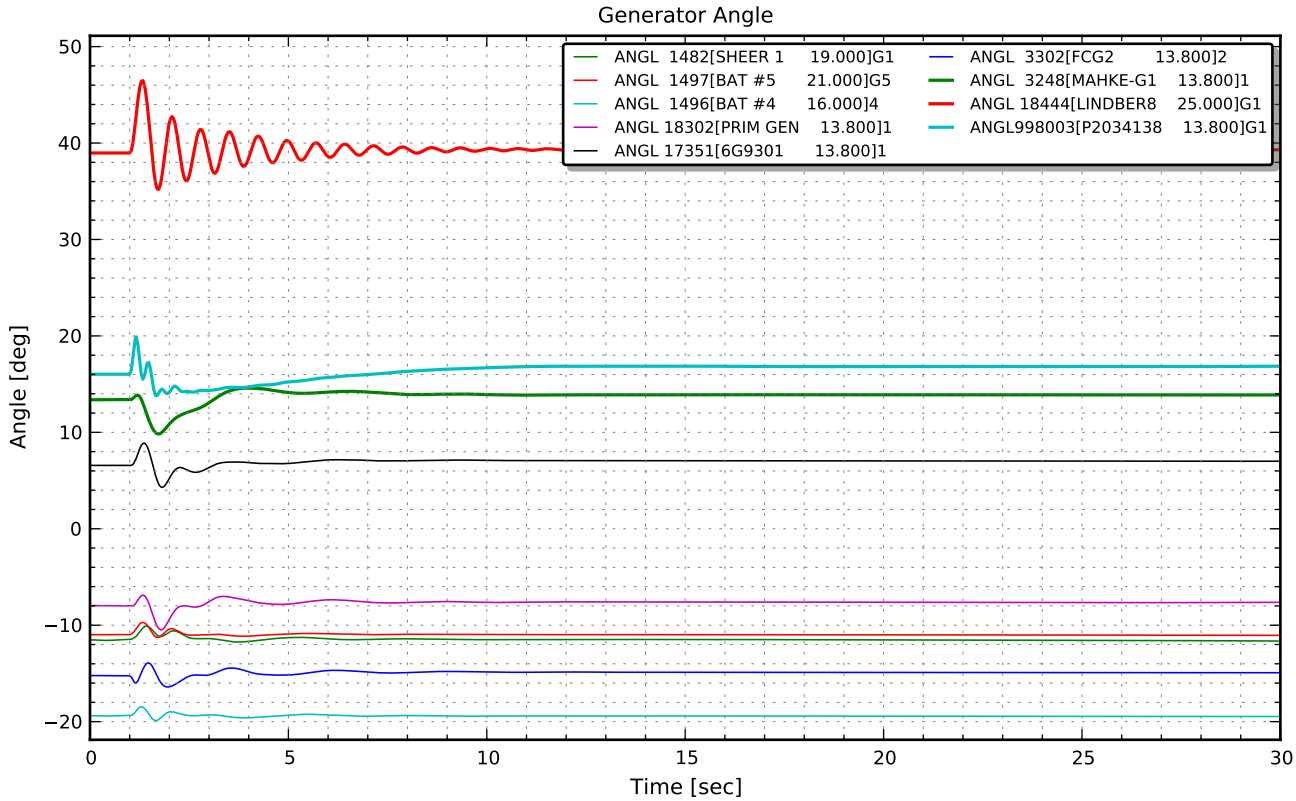
Notes: P2034 Coldlake Area Cogen

Dynamic Stability Analysis

Contingency: 07A - 7L139 St. Paul 707S to Whitby Lake 819S
Alternnative: Post-Project Basecase
Scenario: SP

Attachment A5- 2-13



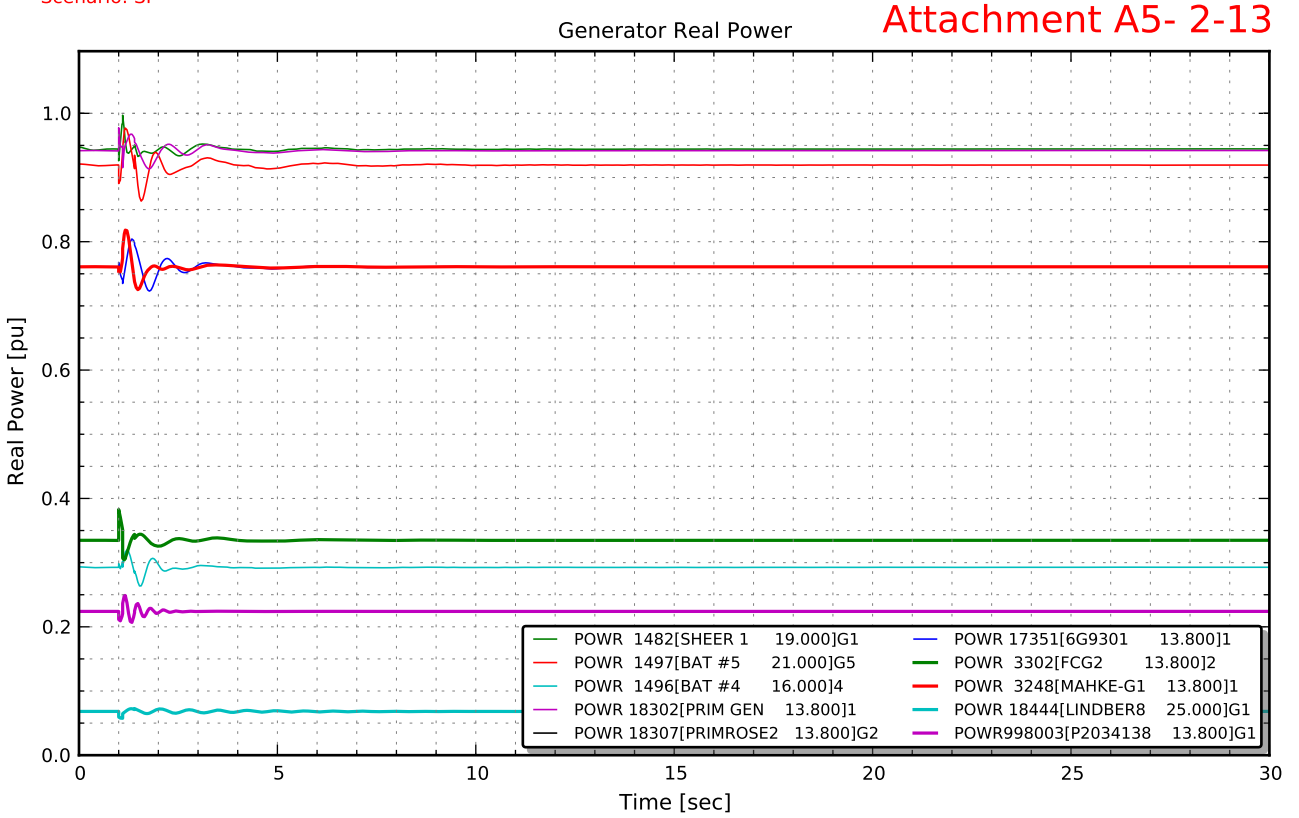


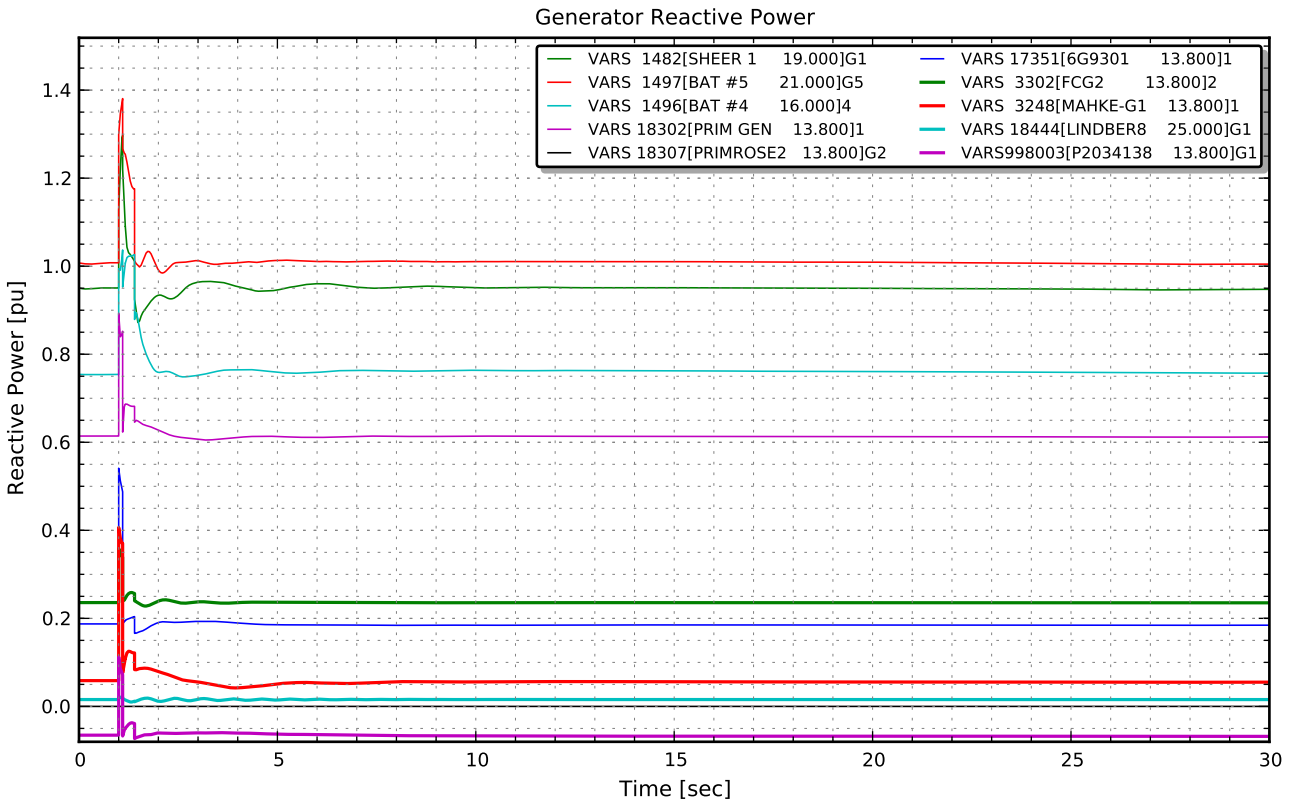
Notes: P2034 Coldlake Area Cogen

Dynamic Stability Analysis

Contingency: 07A - 7L139 St. Paul 707S to Whitby Lake 819S
Alternnative: Post-Project Basecase
Scenario: SP

Attachment A5- 2-13



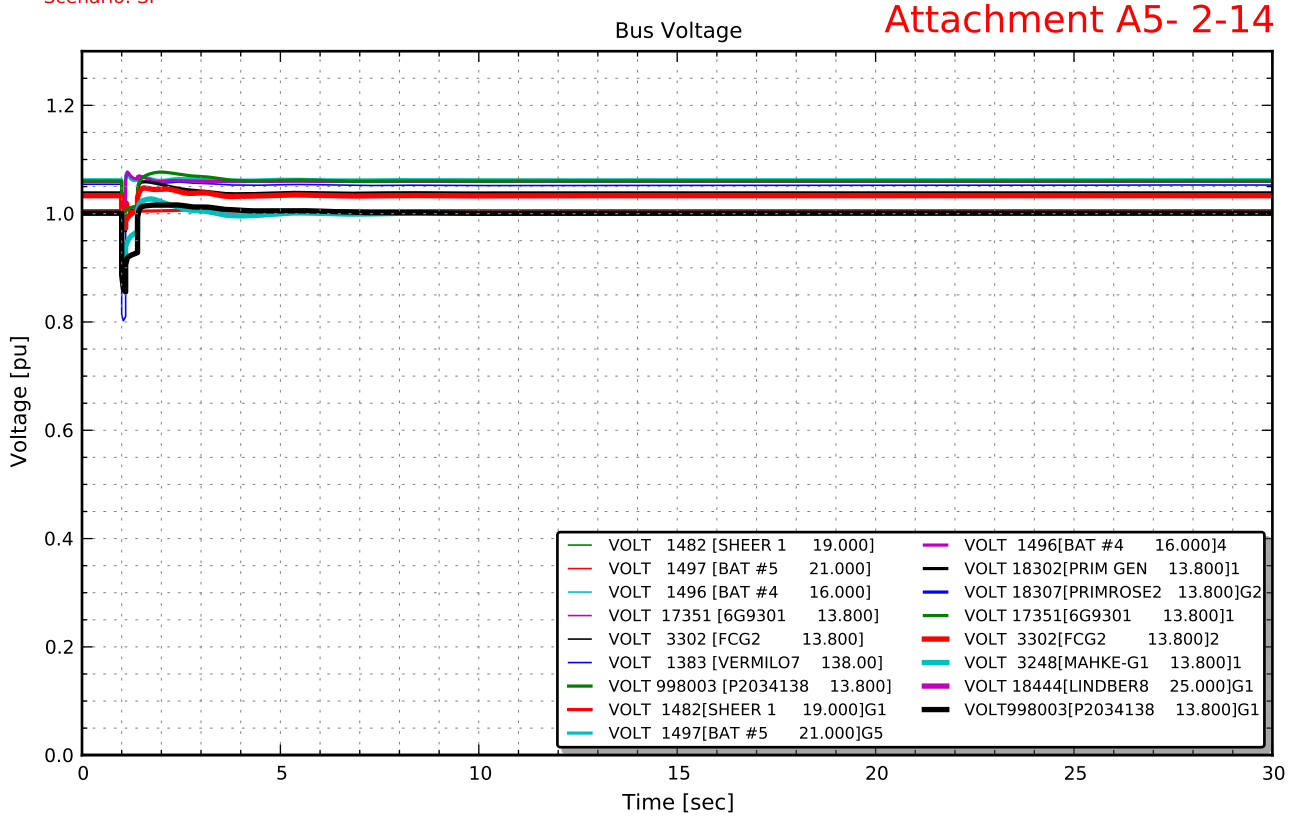


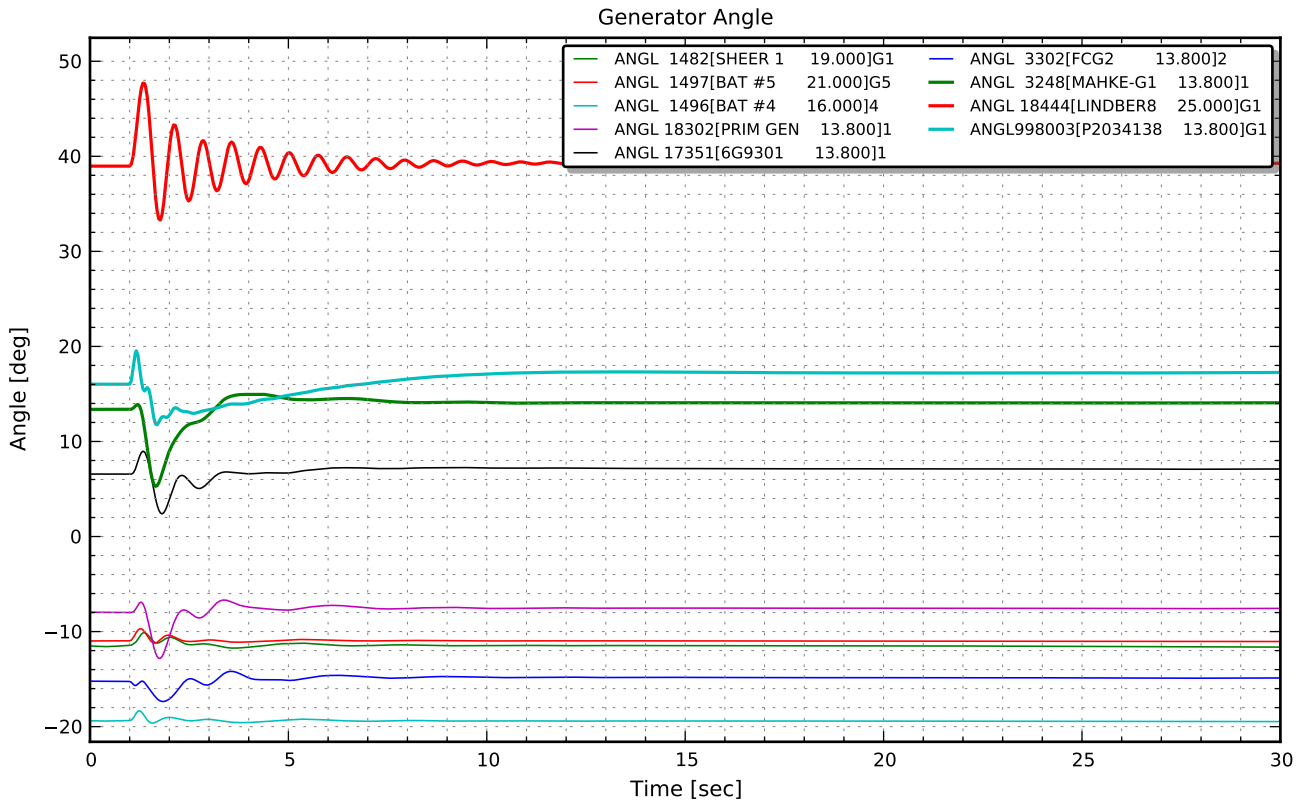
Notes: P2034 Coldlake Area Cogen

Dynamic Stability Analysis

Contingency: 07B - 7L139 Whitby Lake 819S to St. Paul 707S
Alternnative: Post-Project Basecase
Scenario: SP

Attachment A5- 2-14



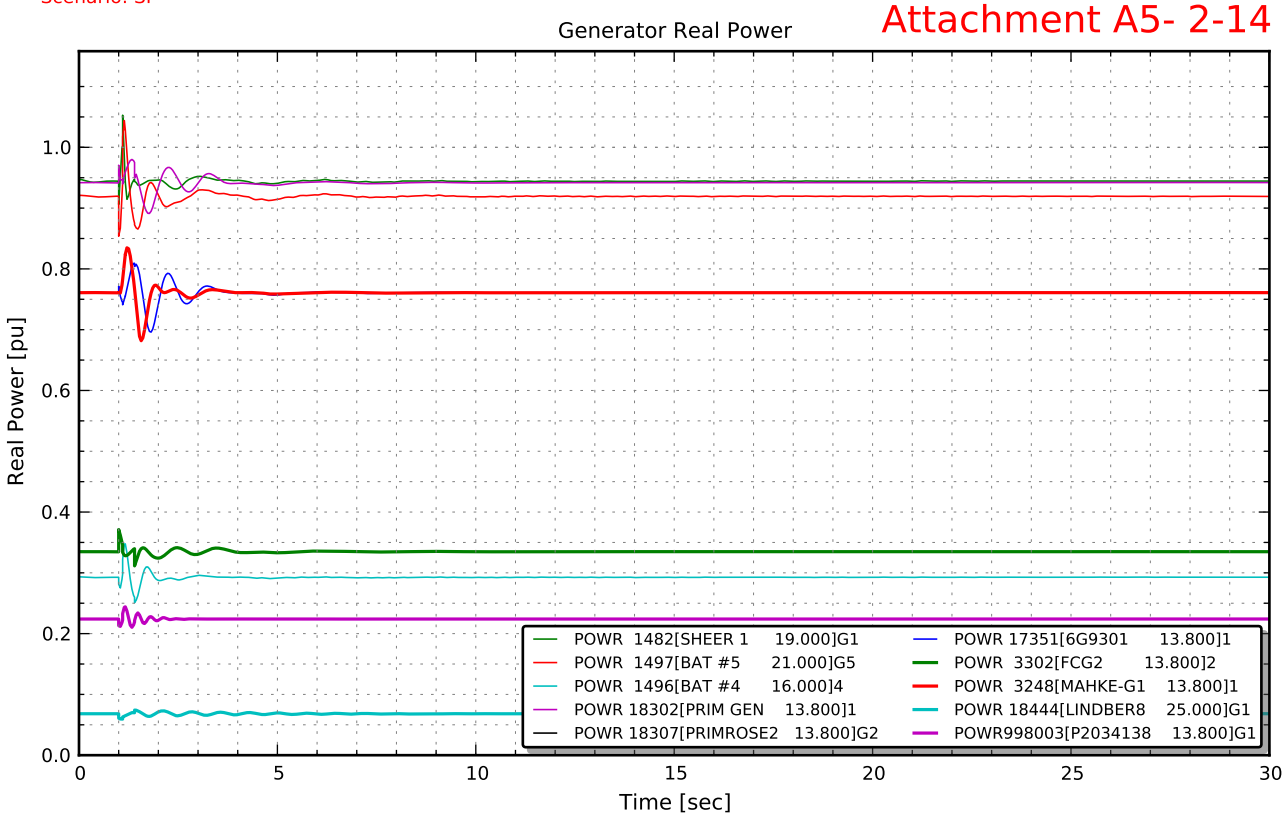


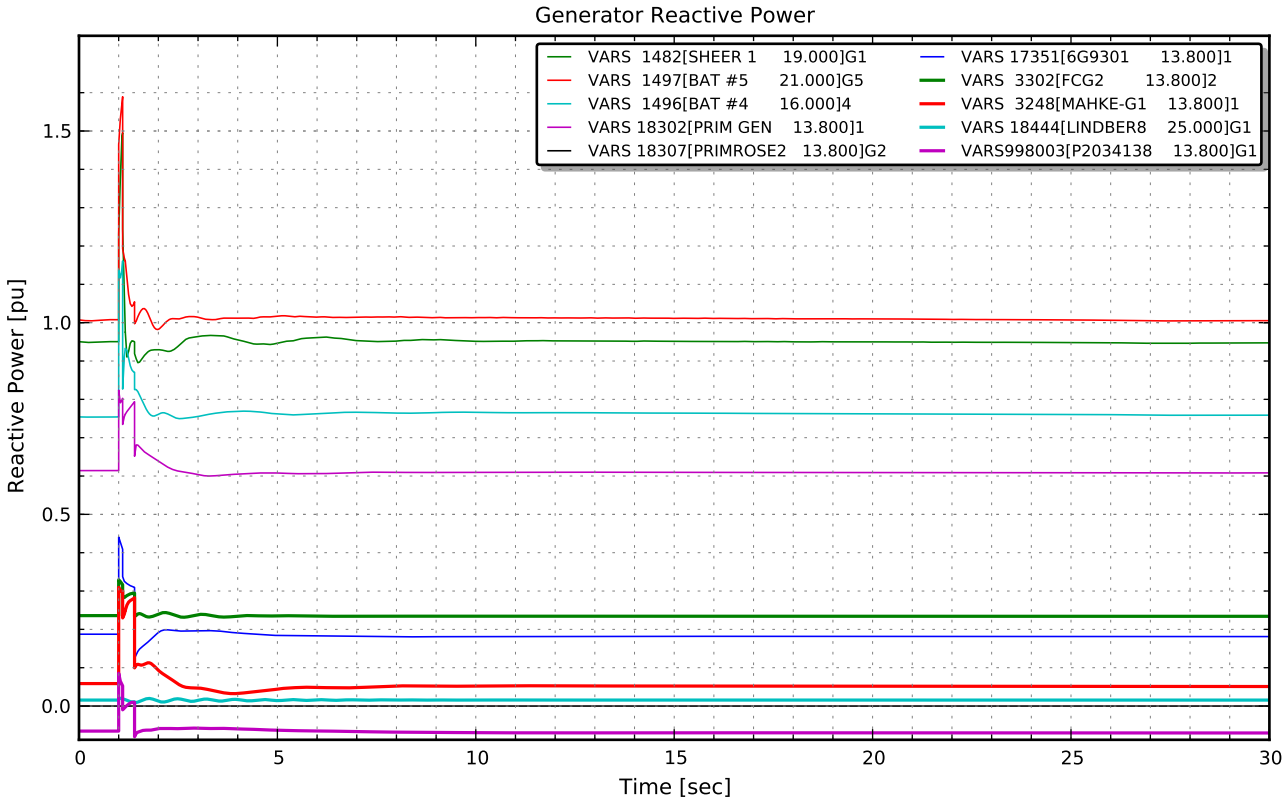
Notes: P2034 Coldlake Area Cogen

Dynamic Stability Analysis

Contingency: 07B - 7L139 Whitby Lake 819S to St. Paul 707S
Alternnative: Post-Project Basecase
Scenario: SP

Attachment A5- 2-14



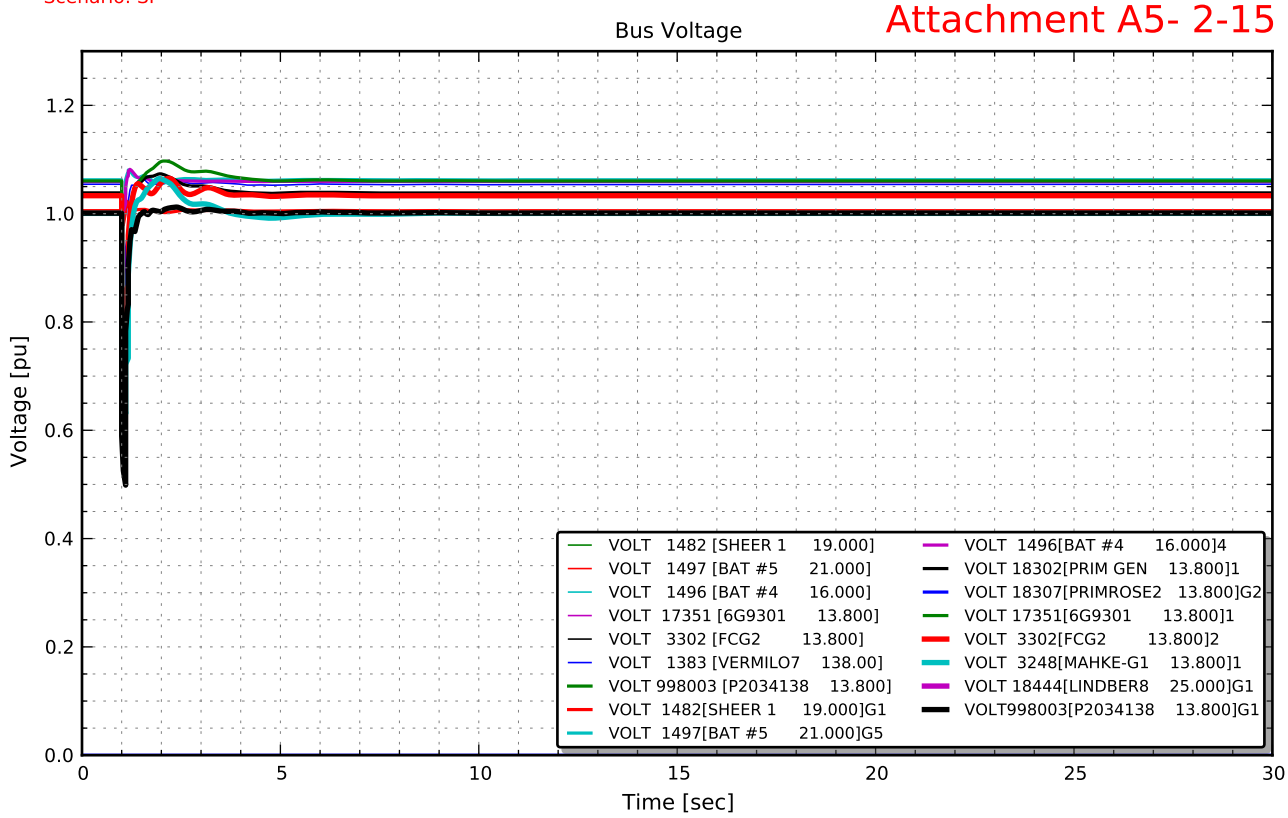


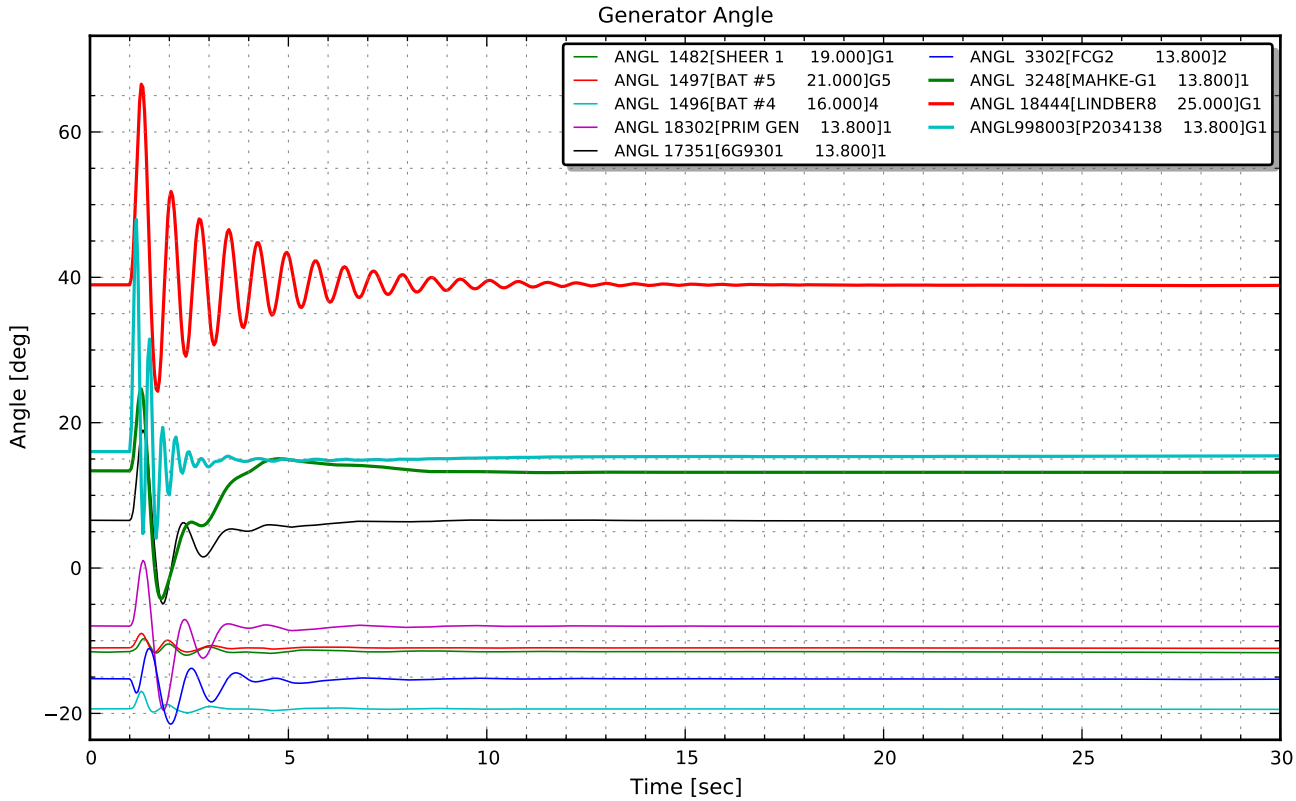
Notes: P2034 Coldlake Area Cogen

Dynamic Stability Analysis

Contingency: 08A - 7L146 Bonnyville 700S to Bourque 970S
Alternnative: Post-Project Basecase
Scenario: SP

Attachment A5- 2-15



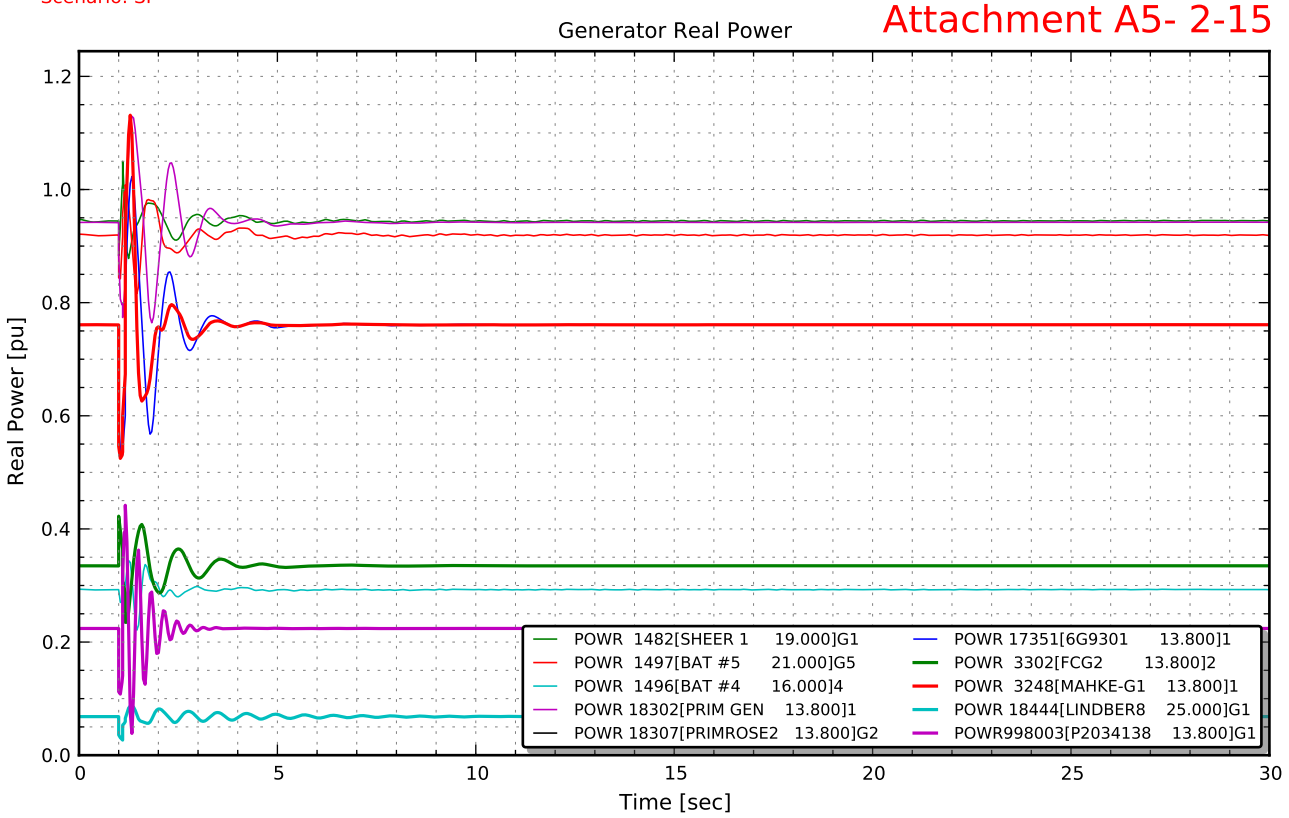


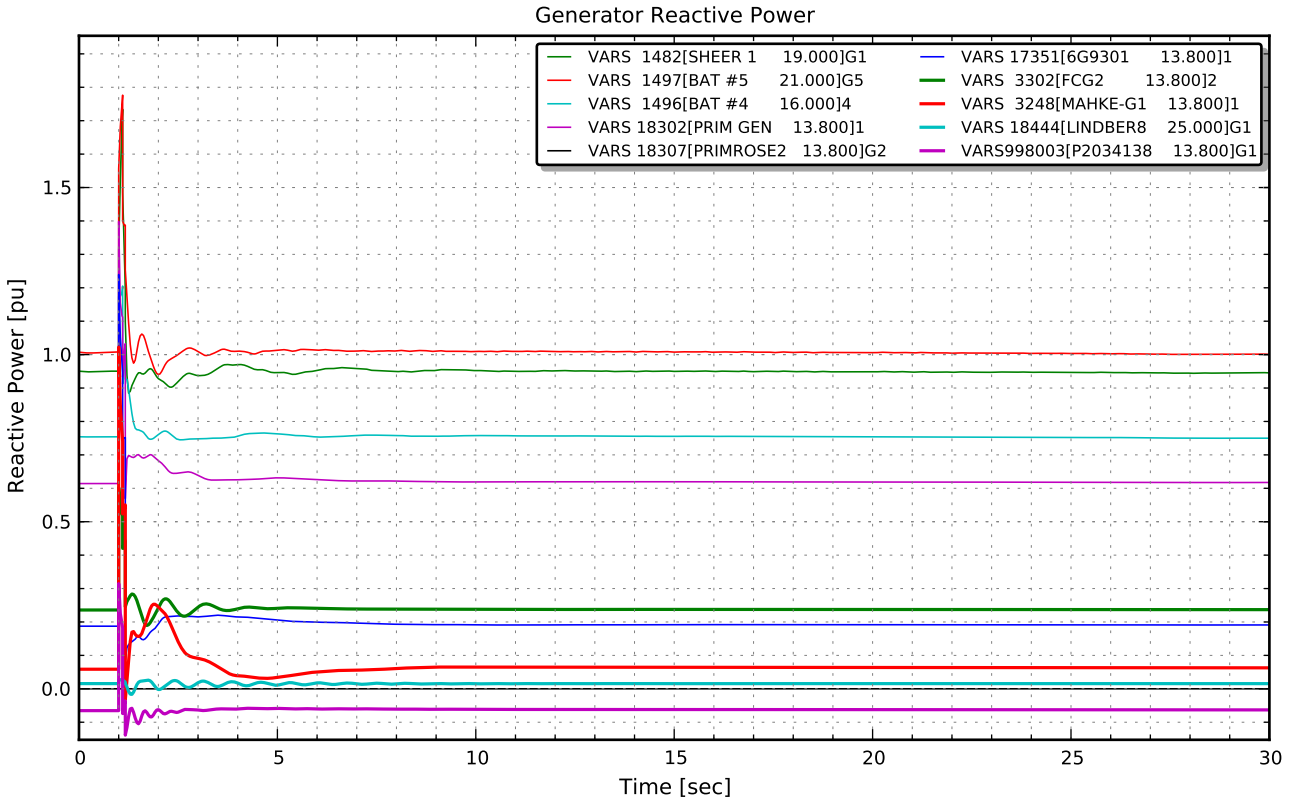
Notes: P2034 Coldlake Area Cogen

Dynamic Stability Analysis

Contingency: 08A - 7L146 Bonnyville 700S to Bourque 970S
Alternnative: Post-Project Basecase
Scenario: SP

Attachment A5- 2-15



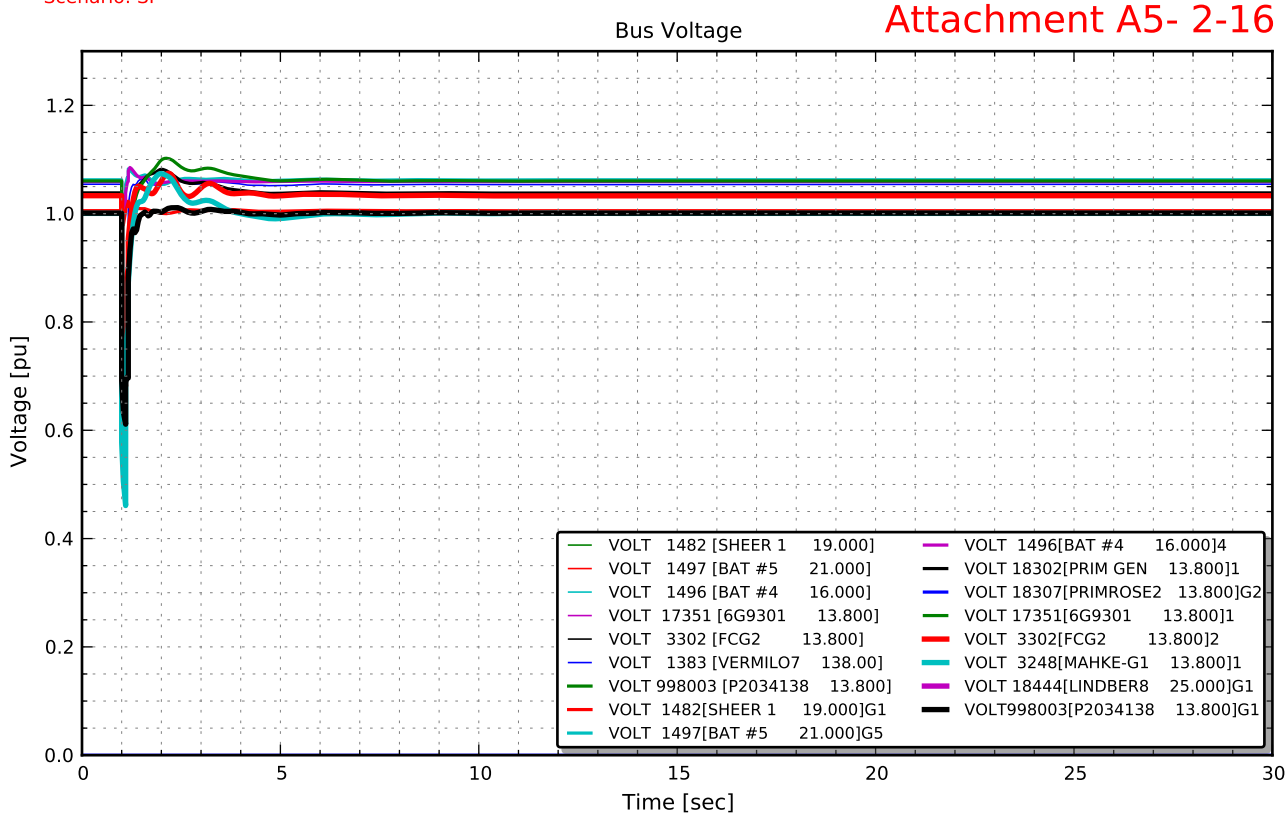


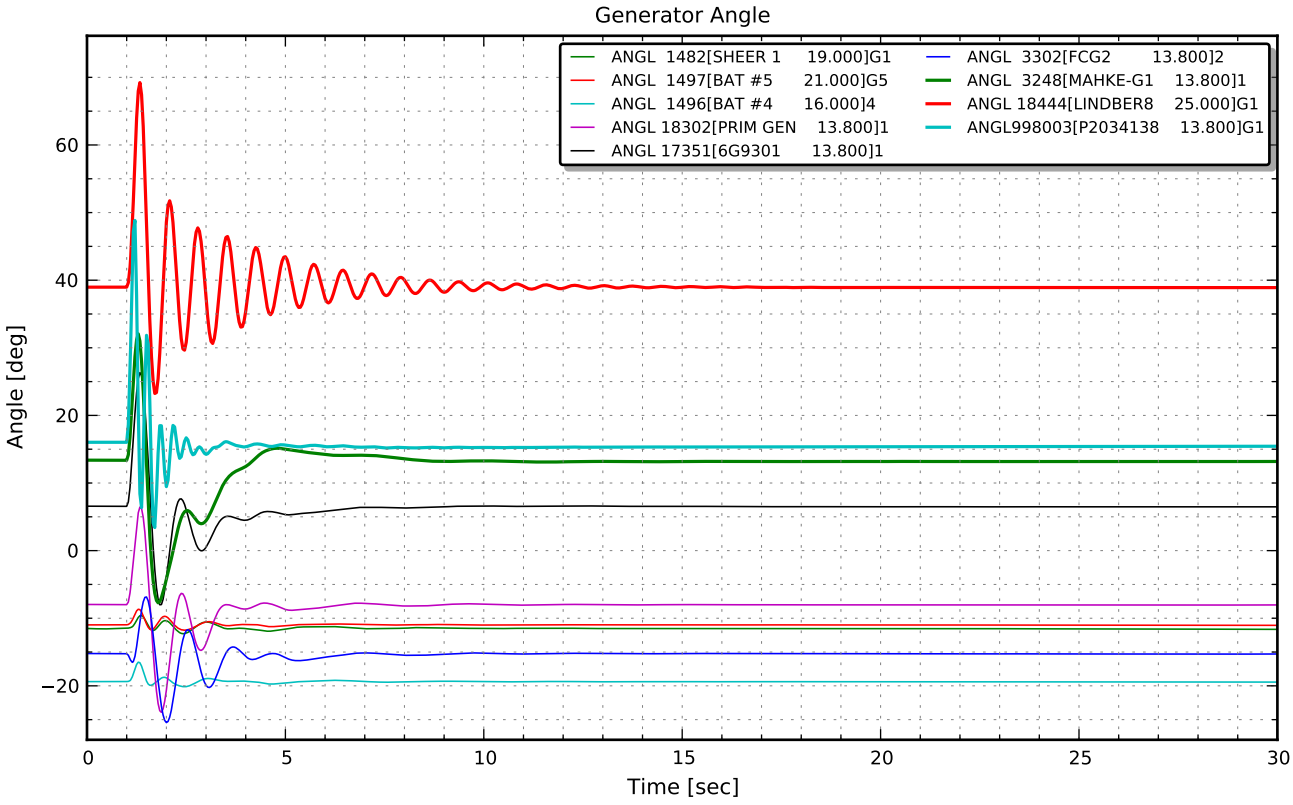
Notes: P2034 Coldlake Area Cogen

Dynamic Stability Analysis

Contingency: 08B - 7L146 Bourque 970S to Bonnyville 700S
Alternnative: Post-Project Basecase
Scenario: SP

Attachment A5- 2-16



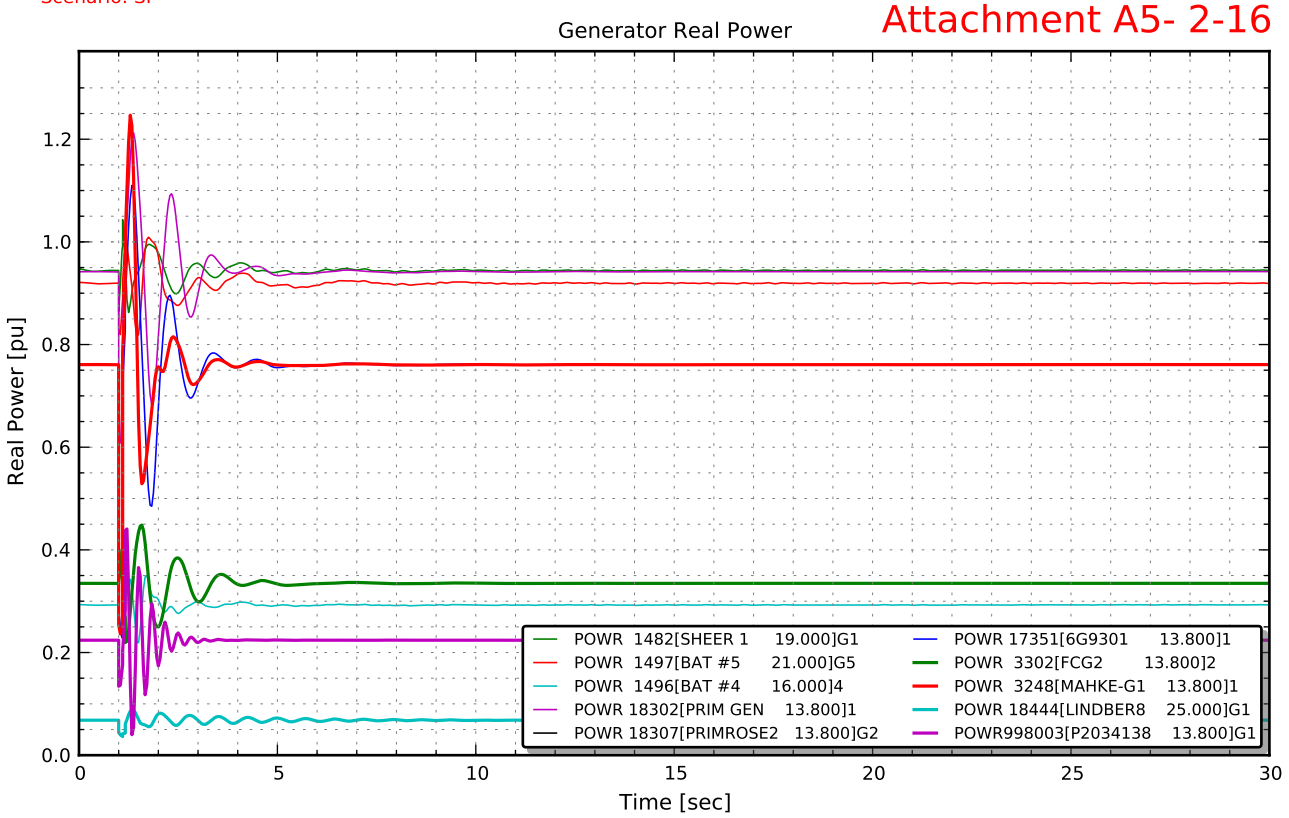


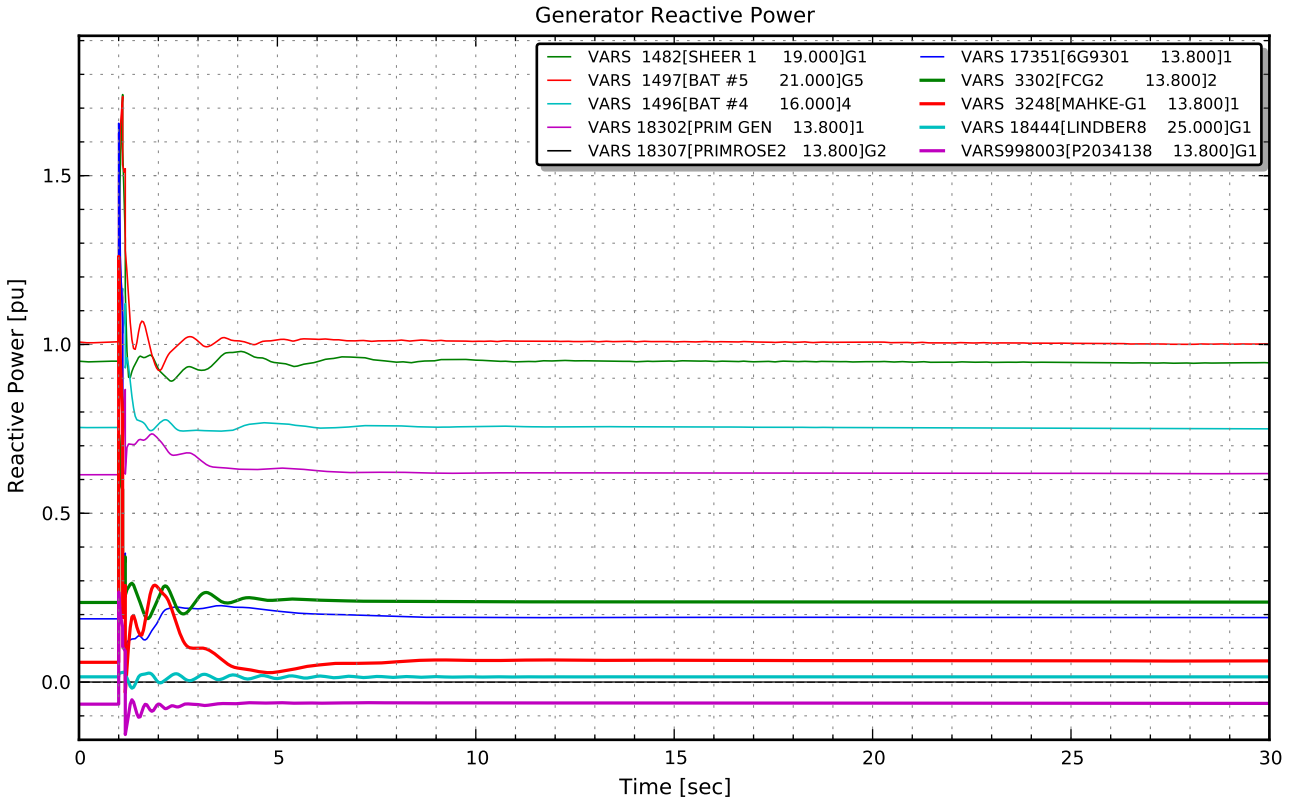
Notes: P2034 Coldlake Area Cogen

Dynamic Stability Analysis

Contingency: 08B - 7L146 Bourque 970S to Bonnyville 700S
Alternnative: Post-Project Basecase
Scenario: SP

Attachment A5- 2-16



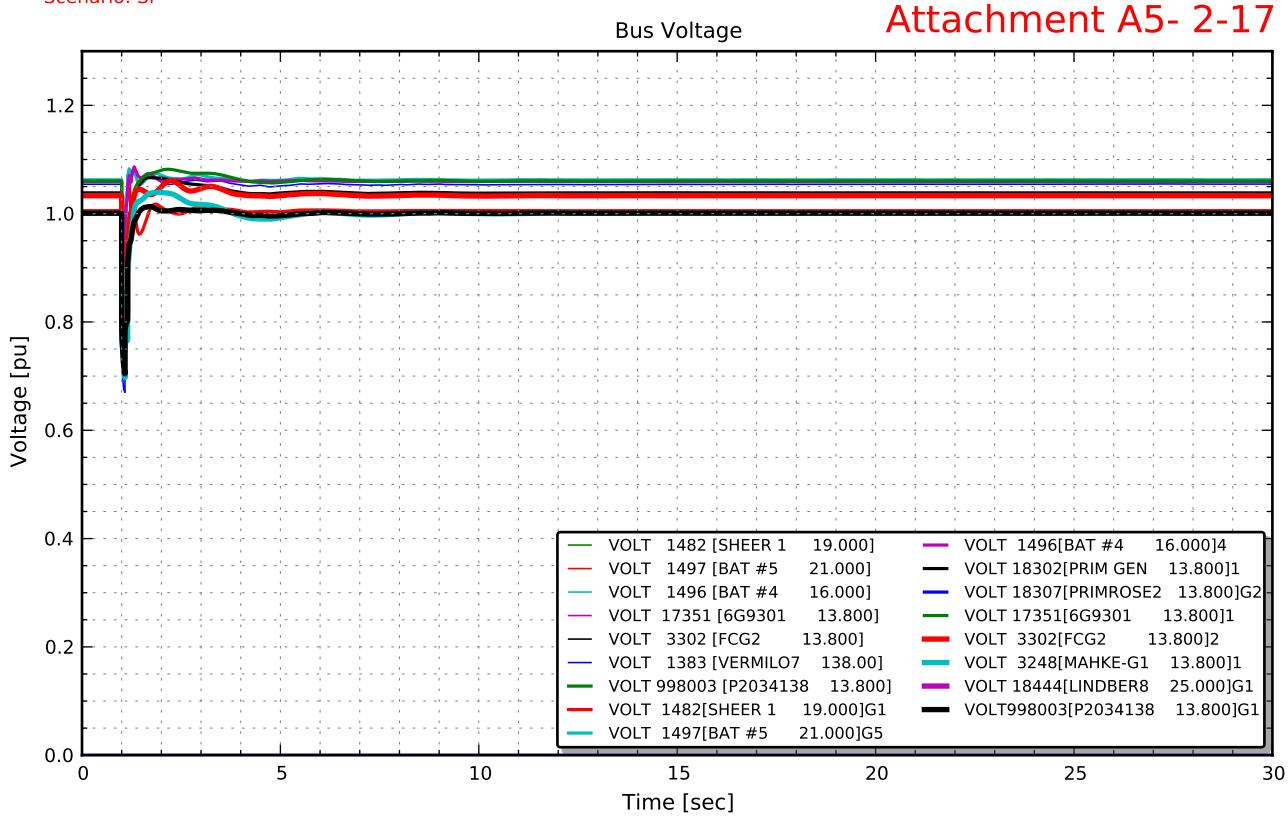


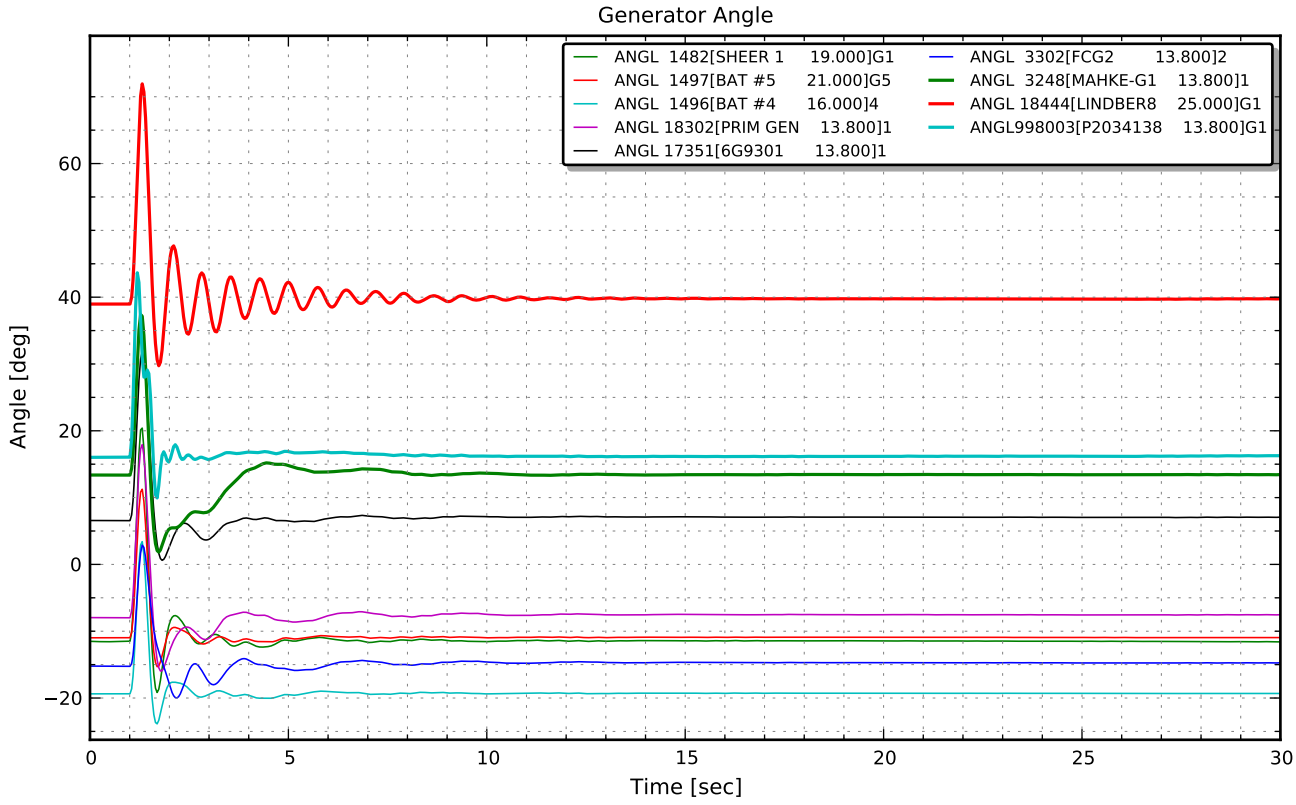
Notes: P2034 Coldlake Area Cogen

Dynamic Stability Analysis

Contingency: 09A - 9L36 Whitefish Lake 825S to Marguerite Lake 826S
Alternnative: Post-Project Basecase
Scenario: SP

Attachment A5- 2-17



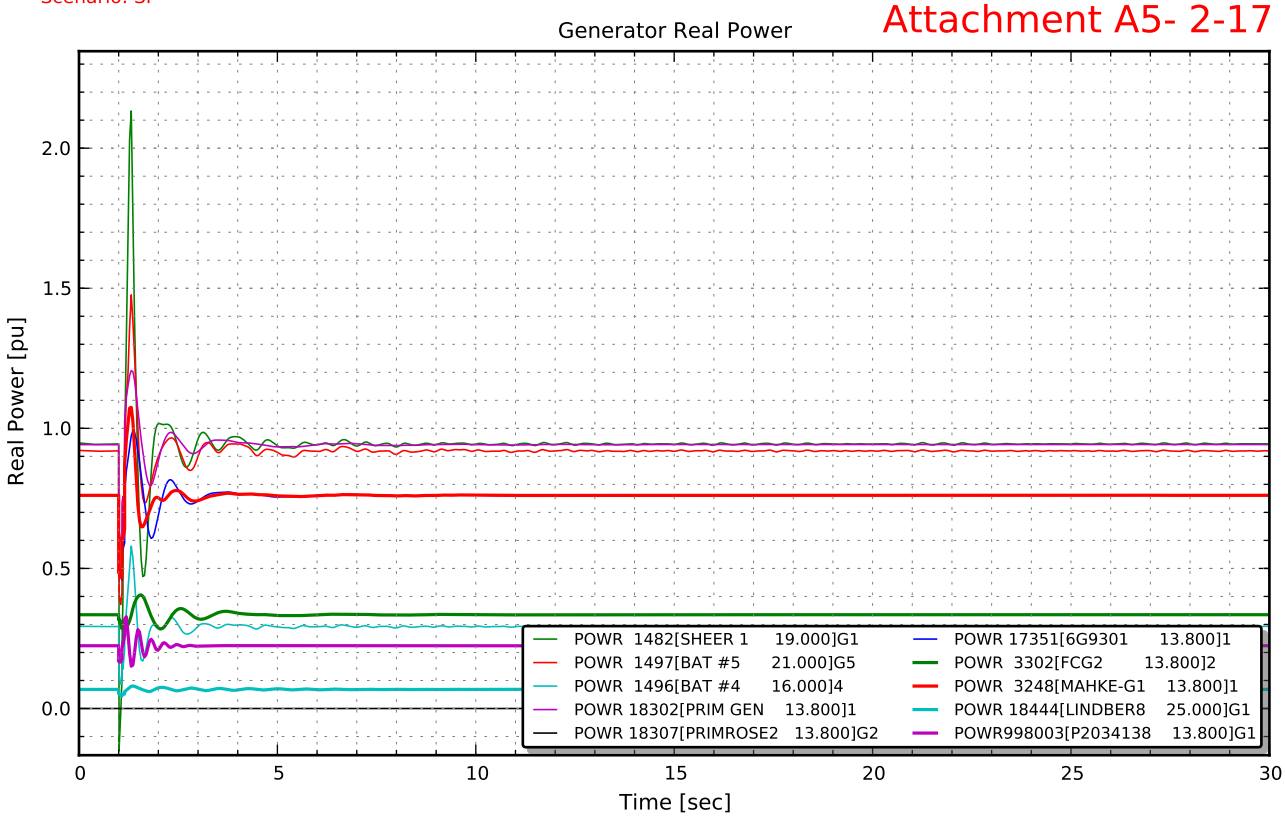


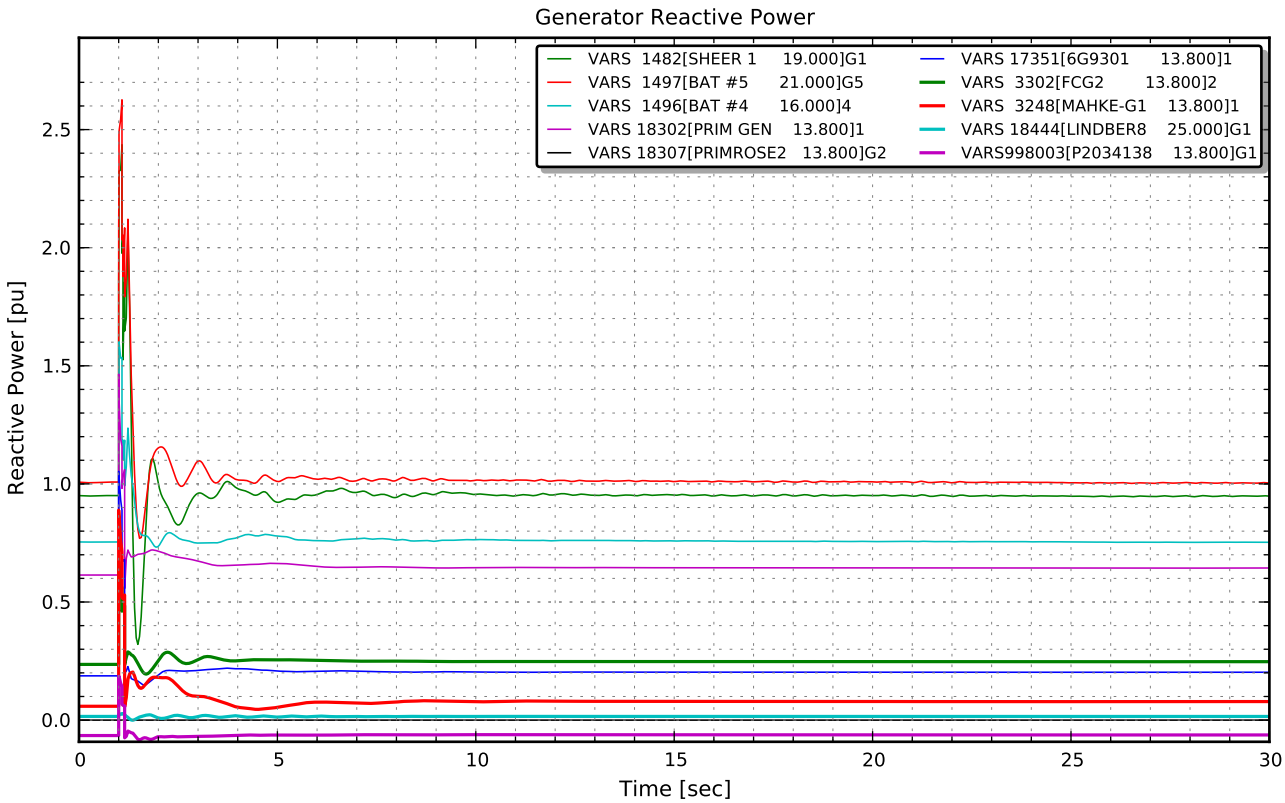
Notes: P2034 Coldlake Area Cogen

Dynamic Stability Analysis

Contingency: 09A - 9L36 Whitefish Lake 825S to Marguerite Lake 826S
Alternnative: Post-Project Basecase
Scenario: SP

Attachment A5- 2-17



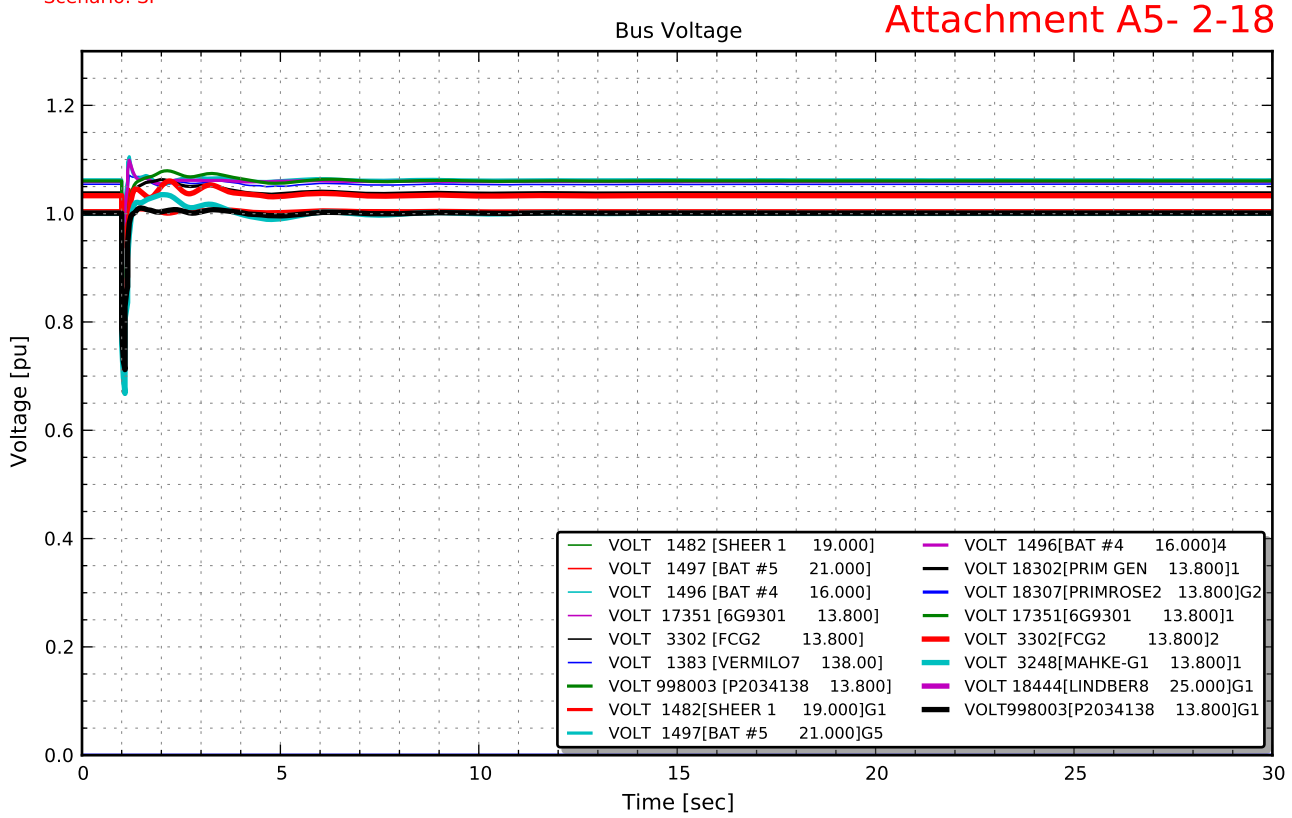


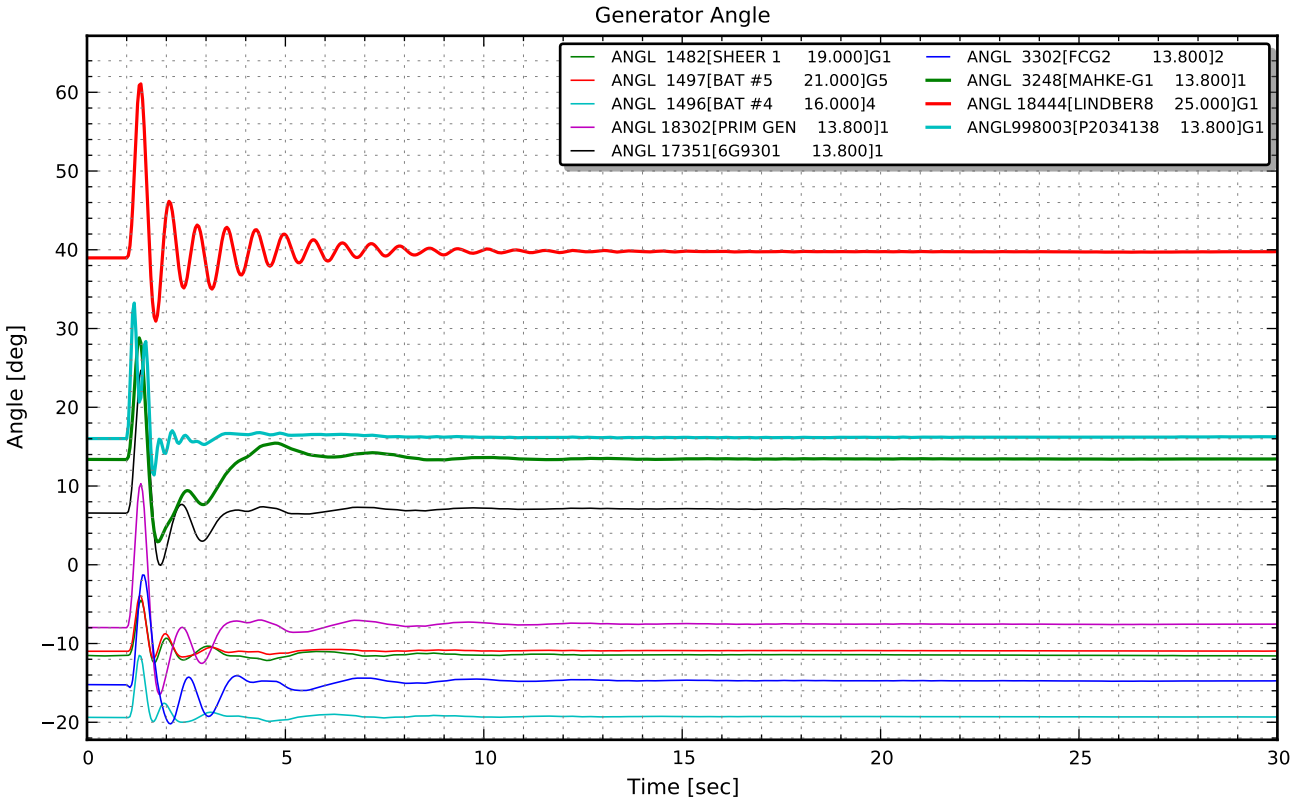
Notes: P2034 Coldlake Area Cogen

Dynamic Stability Analysis

Contingency: 09B - 9L36 Marguerite Lake 826S to Whitefish Lake 825S
Alternnative: Post-Project Basecase
Scenario: SP

Attachment A5- 2-18



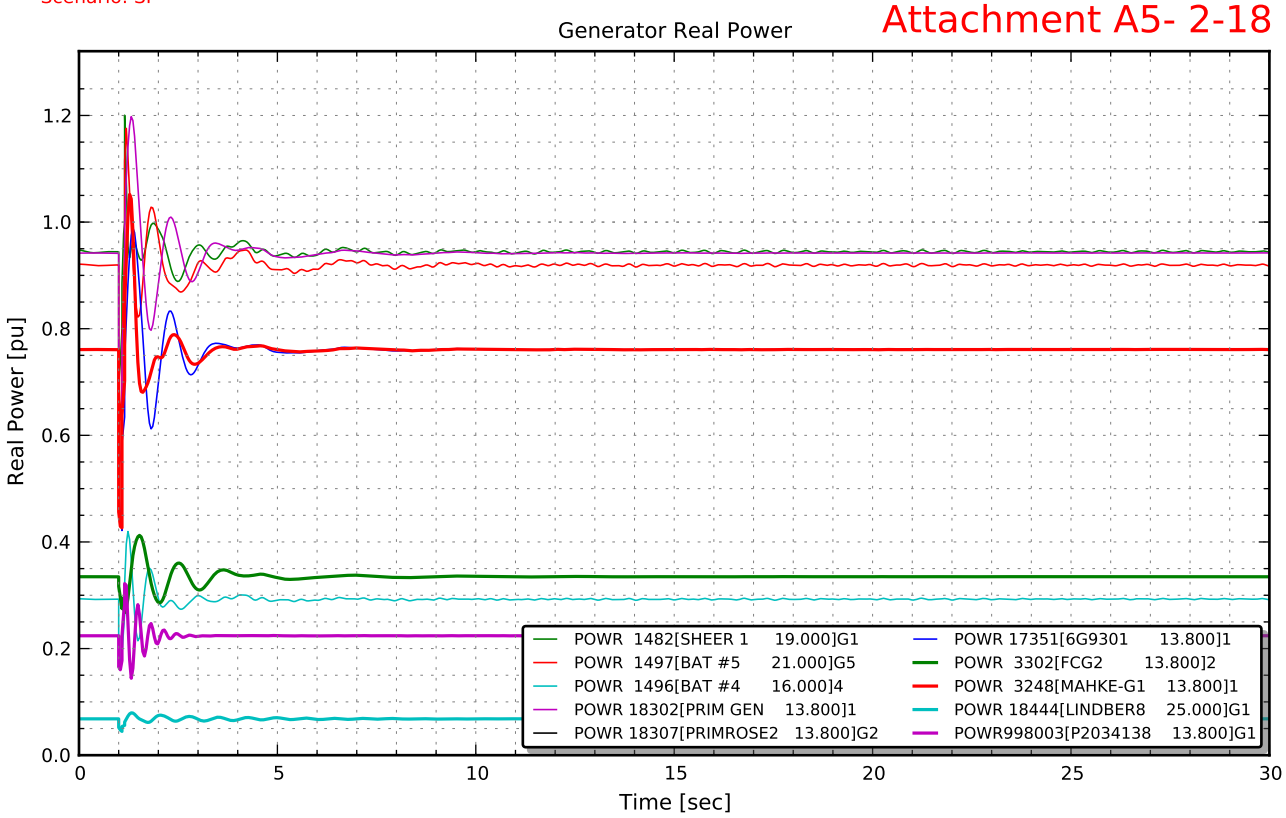


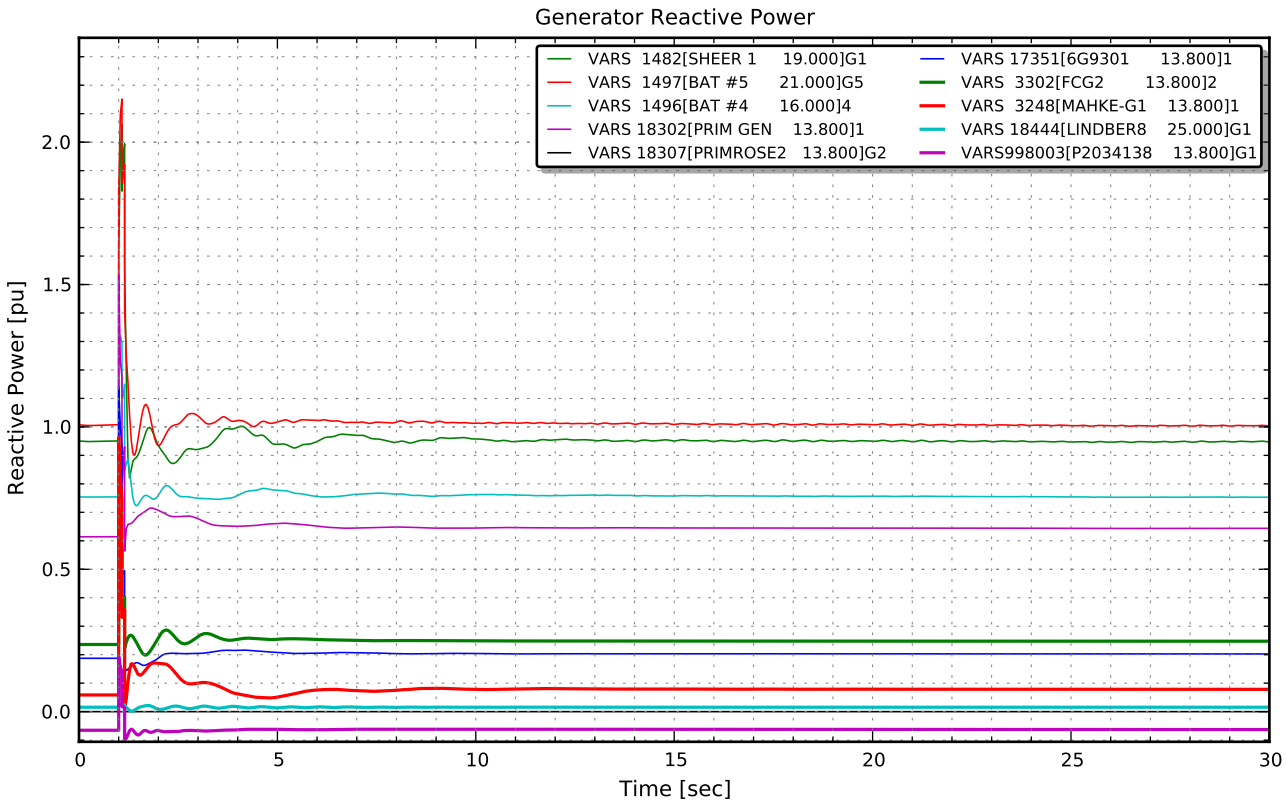
Notes: P2034 Coldlake Area Cogen

Dynamic Stability Analysis

Contingency: 09B - 9L36 Marguerite Lake 826S to Whitefish Lake 825S
Alternnative: Post-Project Basecase
Scenario: SP

Attachment A5- 2-18



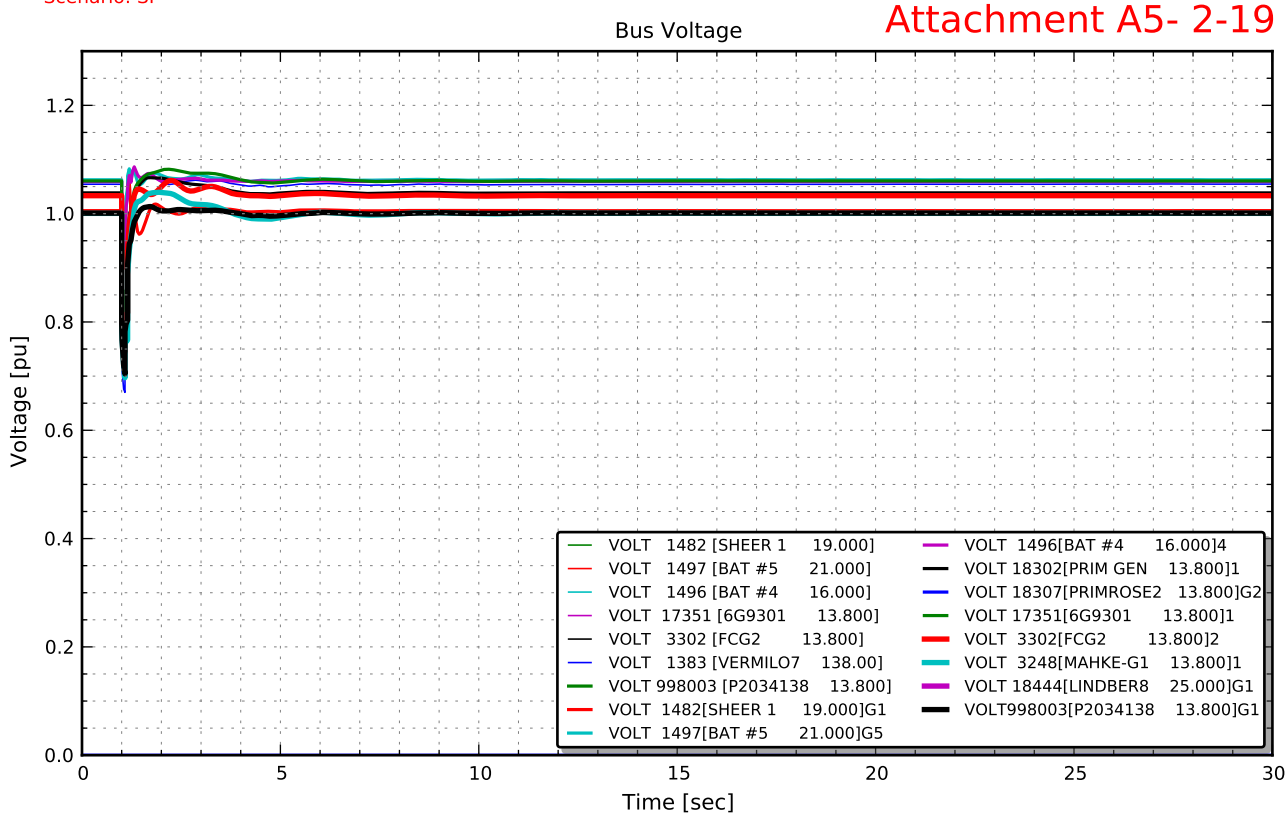


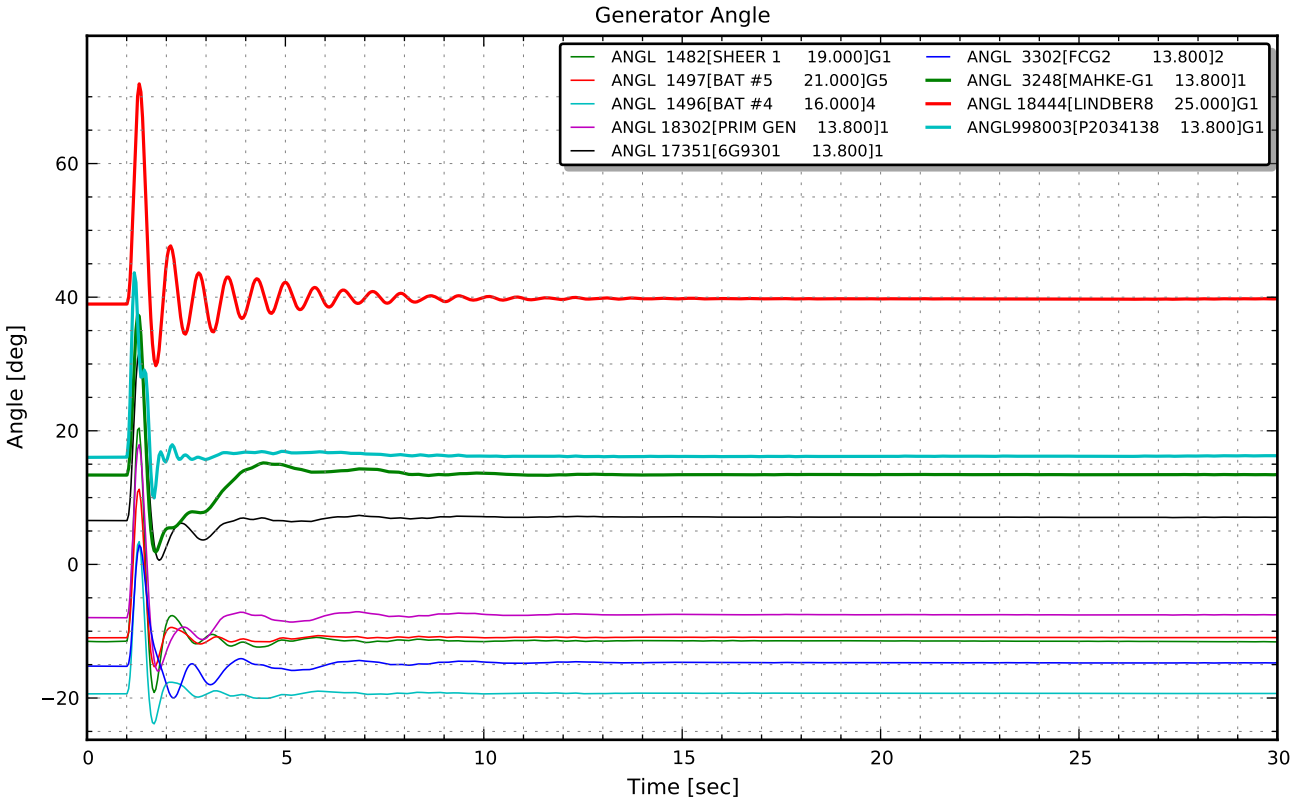
Notes: P2034 Coldlake Area Cogen

Dynamic Stability Analysis

Contingency: 10A - 9L37 Whitefish Lake 825S to Marguerite Lake 826S
Alternnative: Post-Project Basecase
Scenario: SP

Attachment A5- 2-19



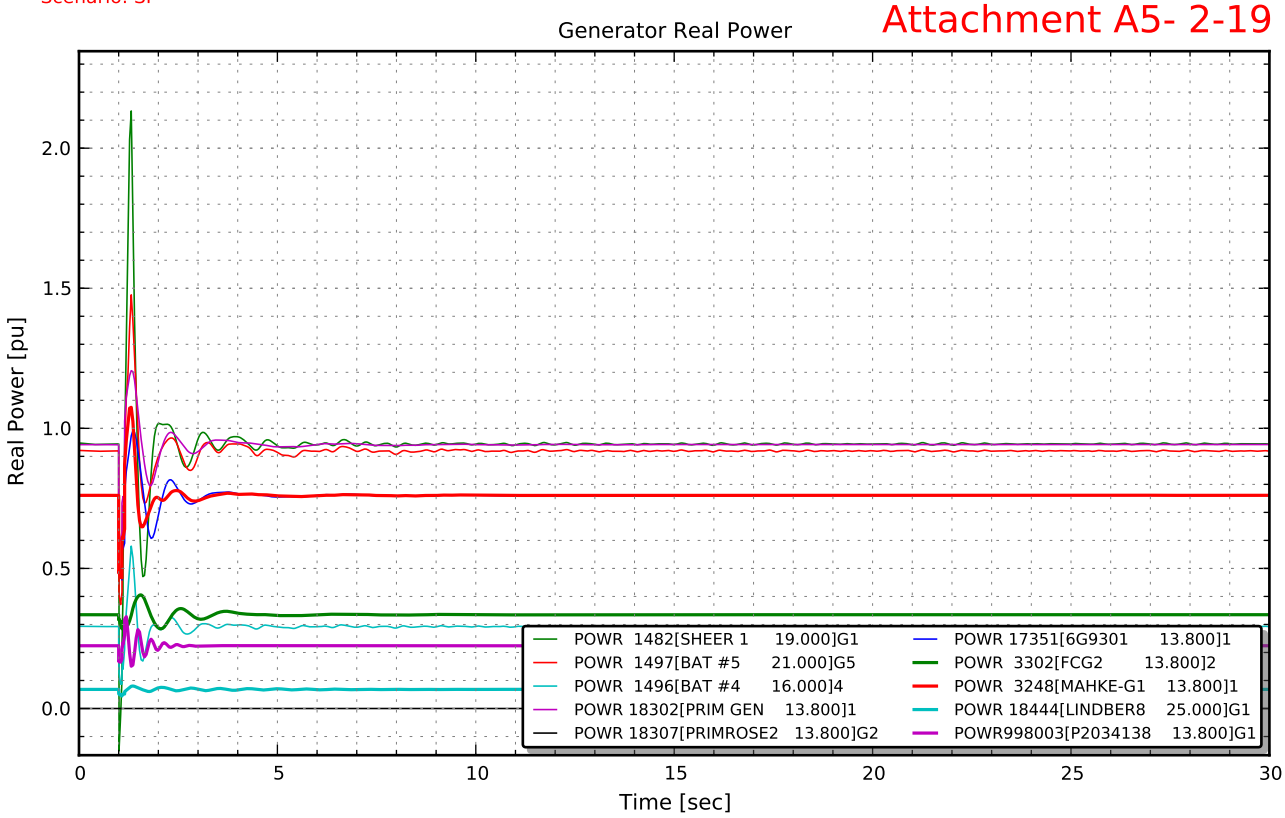


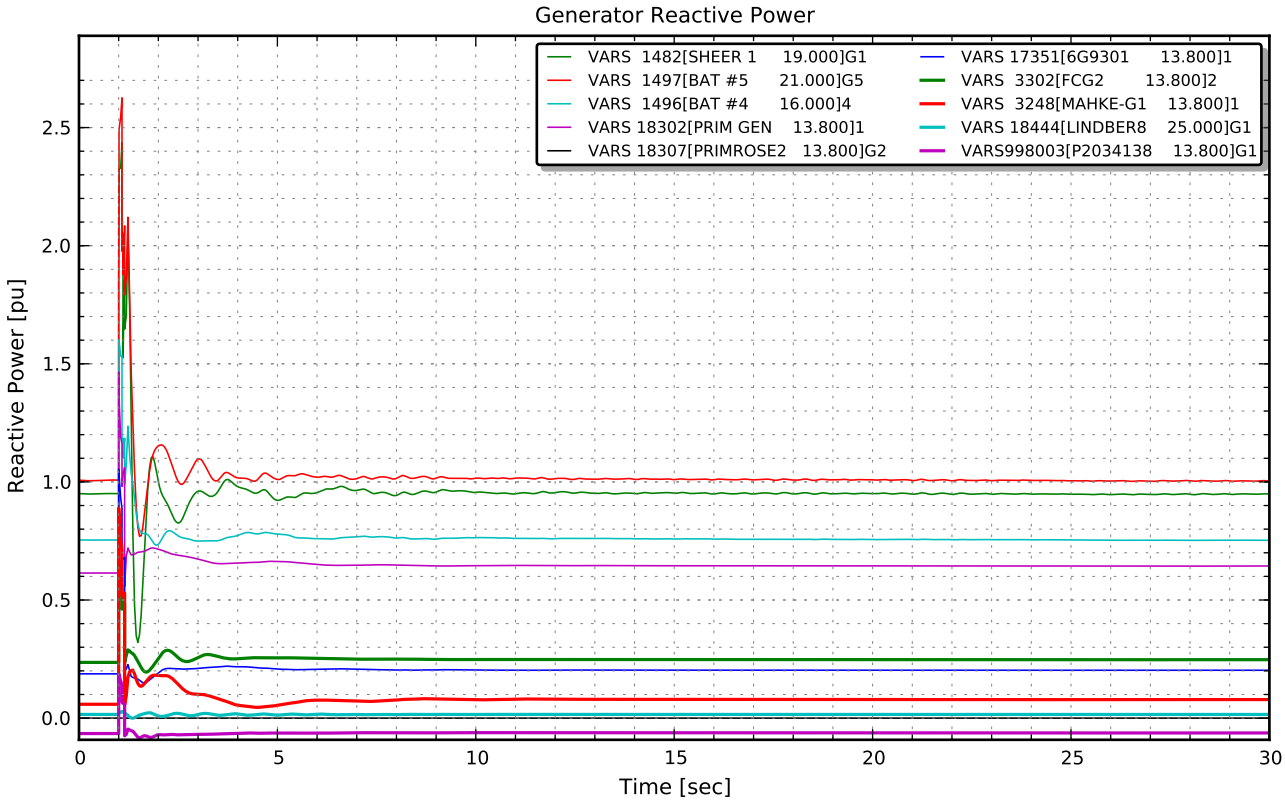
Notes: P2034 Coldlake Area Cogen

Dynamic Stability Analysis

Contingency: 10A - 9L37 Whitefish Lake 825S to Marguerite Lake 826S
Alternnative: Post-Project Basecase
Scenario: SP

Attachment A5- 2-19



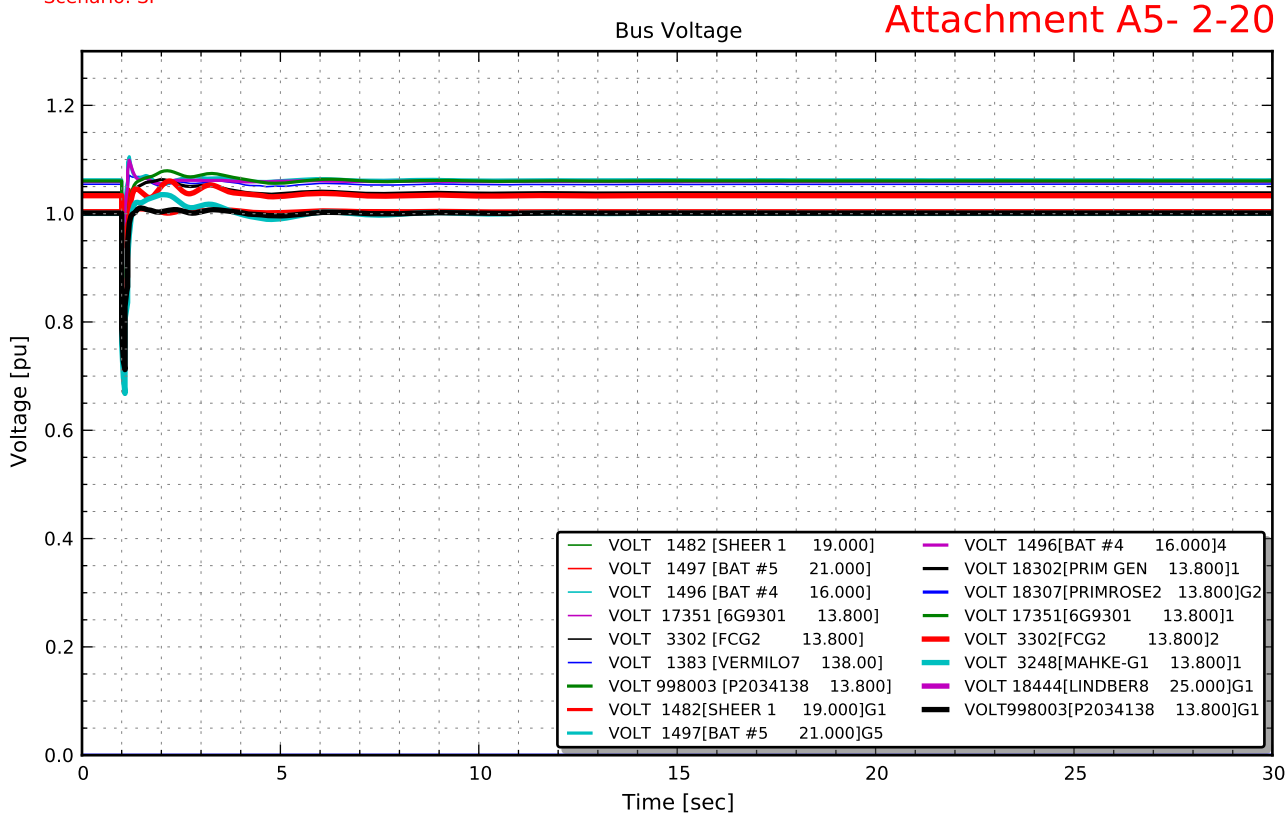


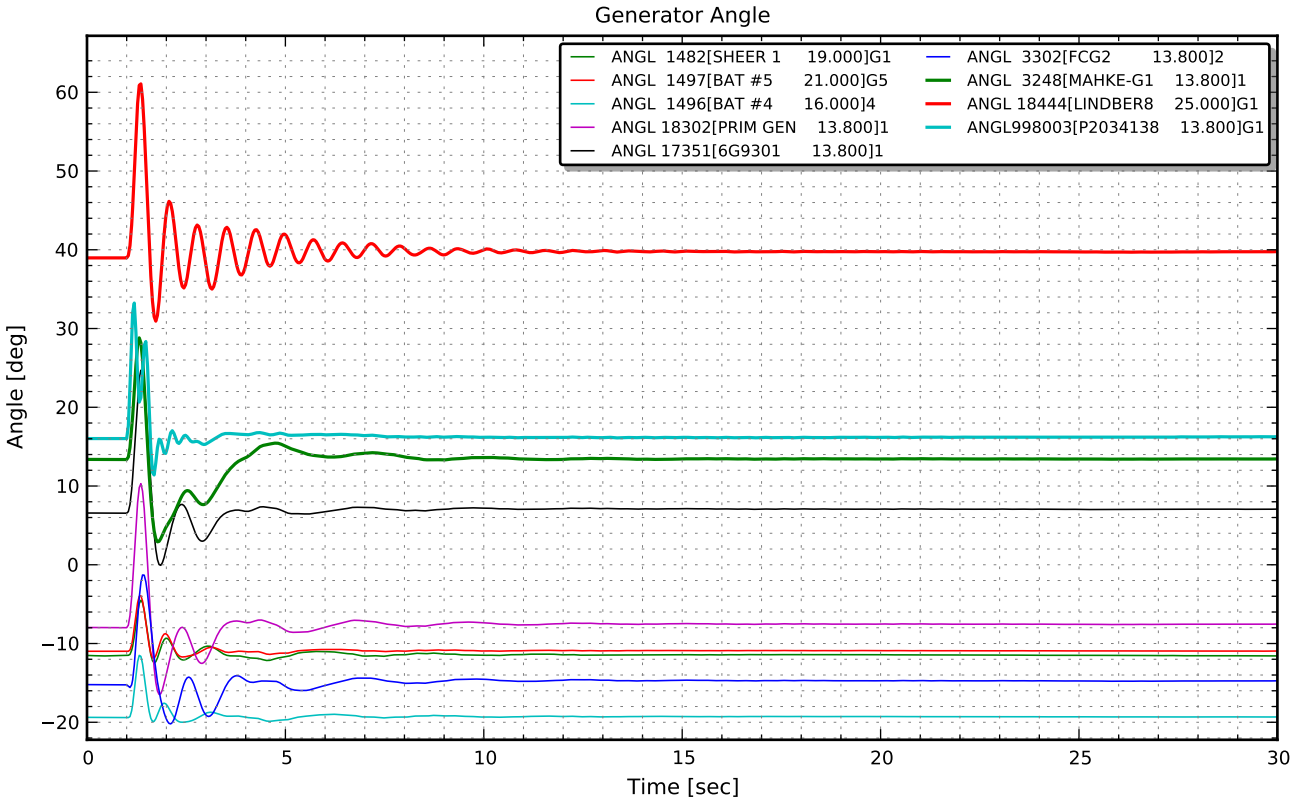
Notes: P2034 Coldlake Area Cogen

Dynamic Stability Analysis

Contingency: 10B - 9L37 Marguerite Lake 826S to Whitefish Lake 825S
Alternnative: Post-Project Basecase
Scenario: SP

Attachment A5- 2-20



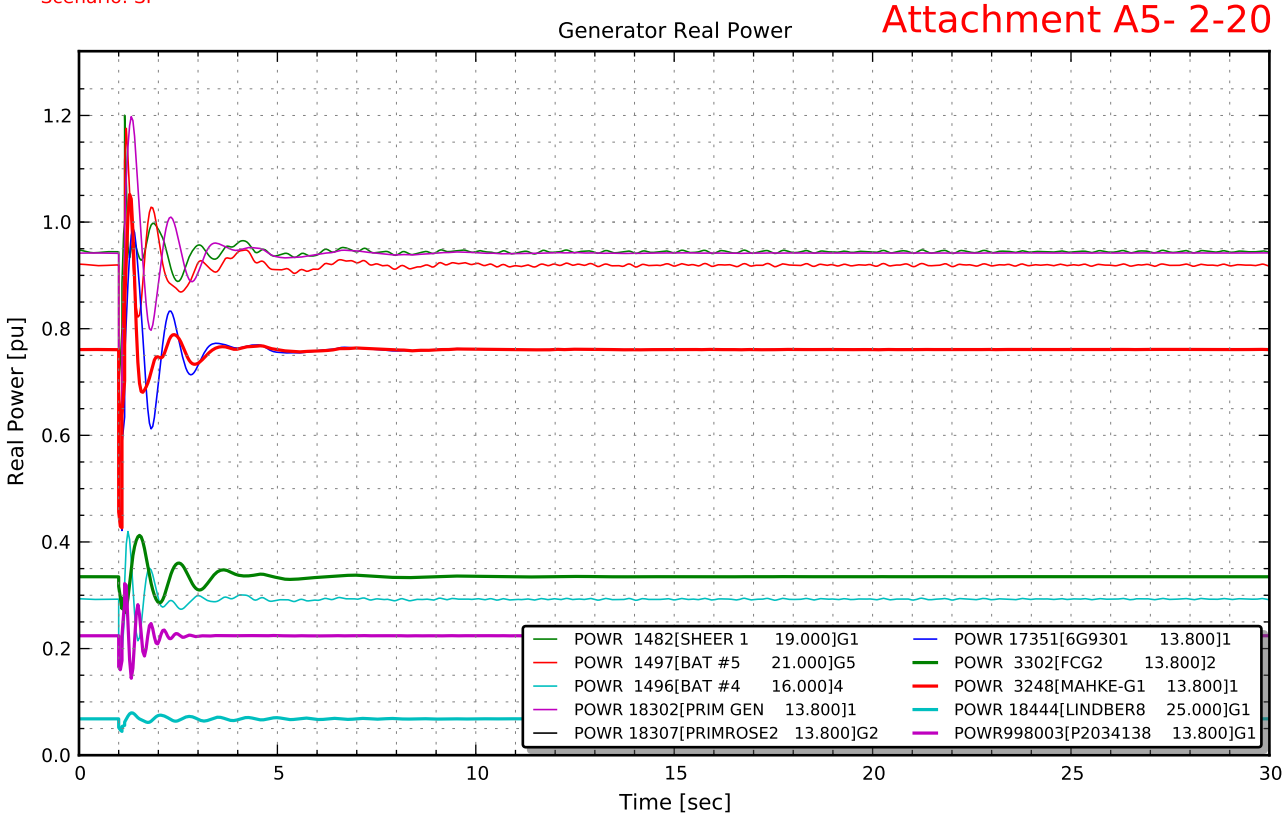


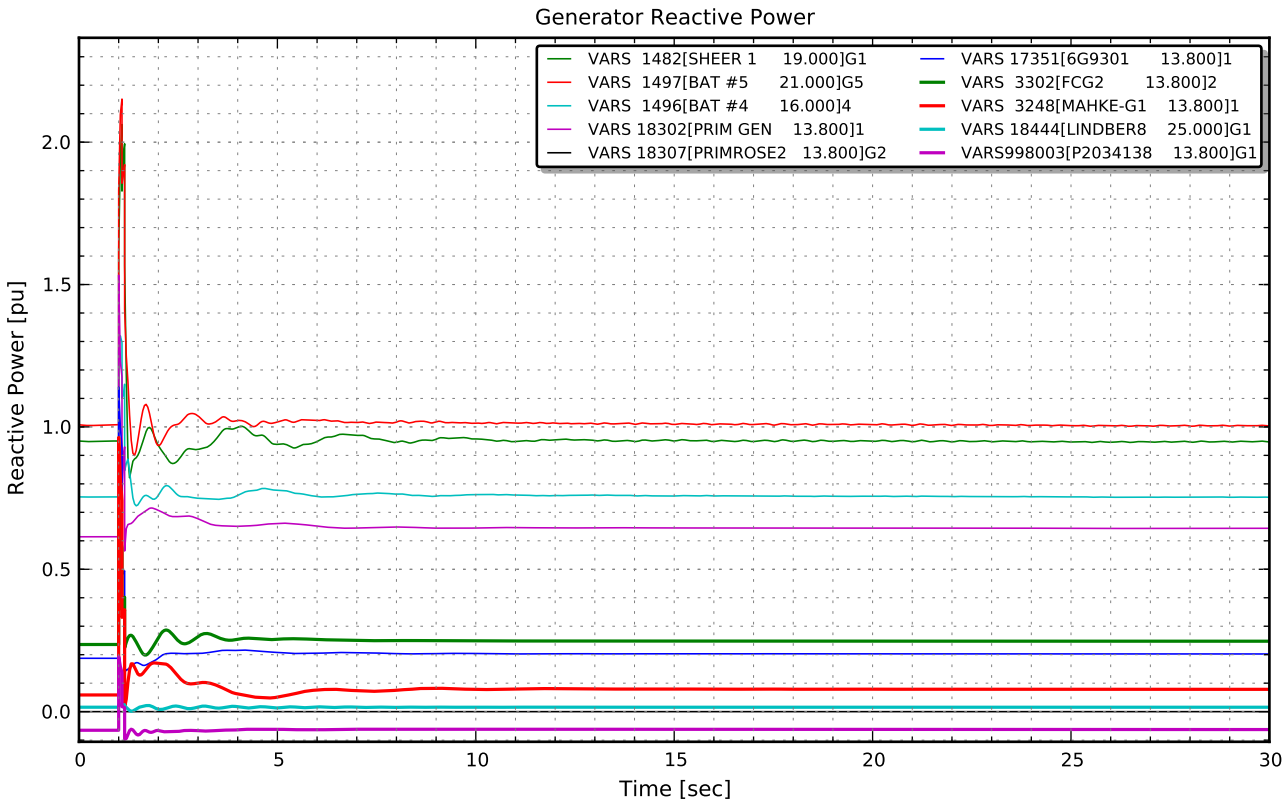
Notes: P2034 Coldlake Area Cogen

Dynamic Stability Analysis

Contingency: 10B - 9L37 Marguerite Lake 826S to Whitefish Lake 825S
Alternnative: Post-Project Basecase
Scenario: SP

Attachment A5- 2-20



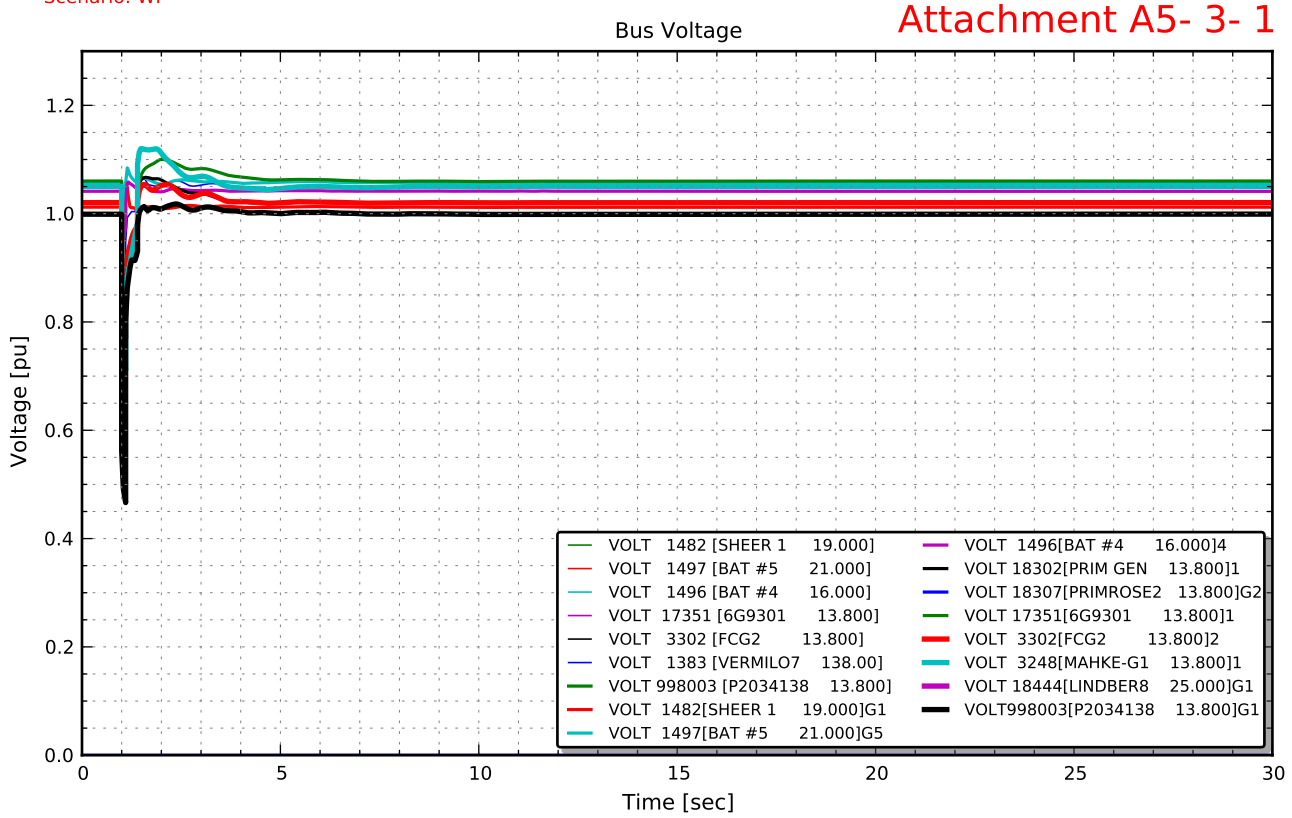


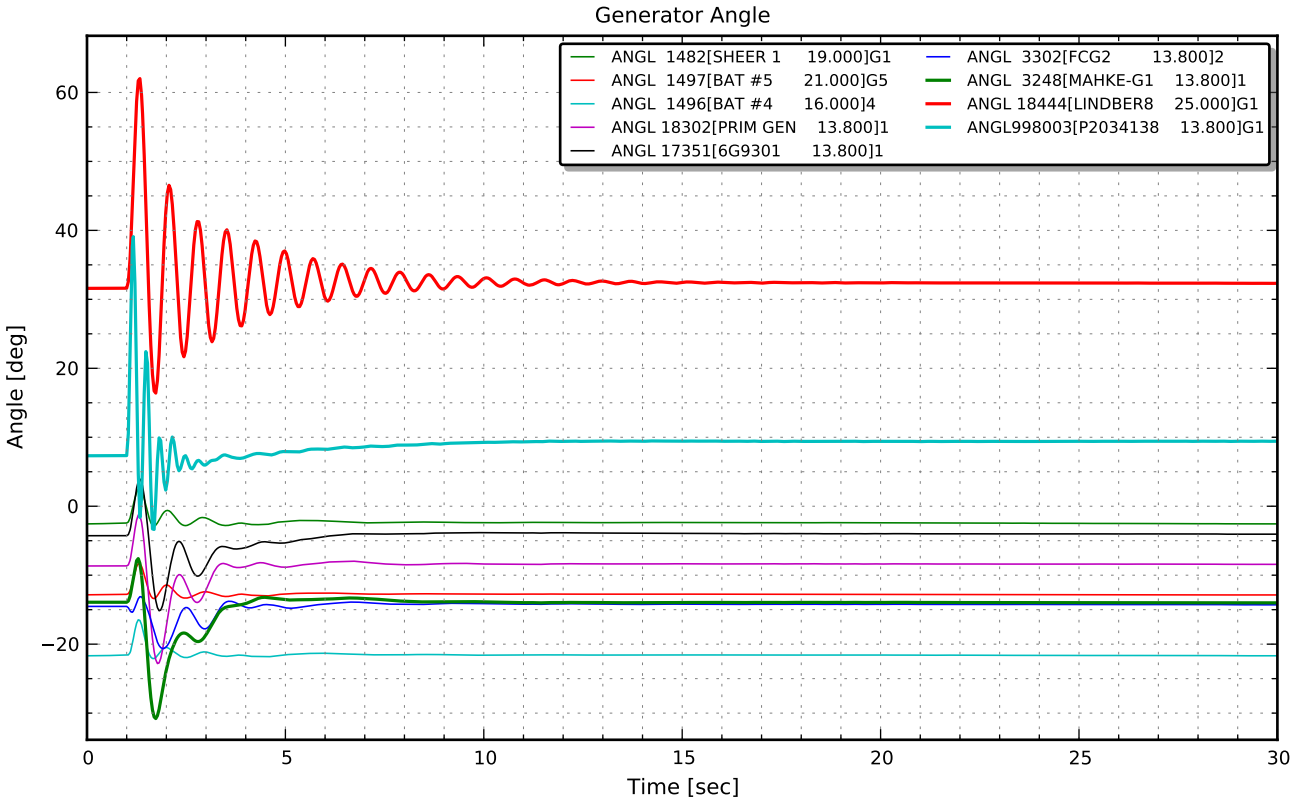
Notes: P2034 Coldlake Area Cogen

Dynamic Stability Analysis

Contingency: 01A - 7L24 Bonnyville 700S to Grande Centre 846S
Alternnative: Post-Project Basecase
Scenario: WP

Attachment A5- 3- 1



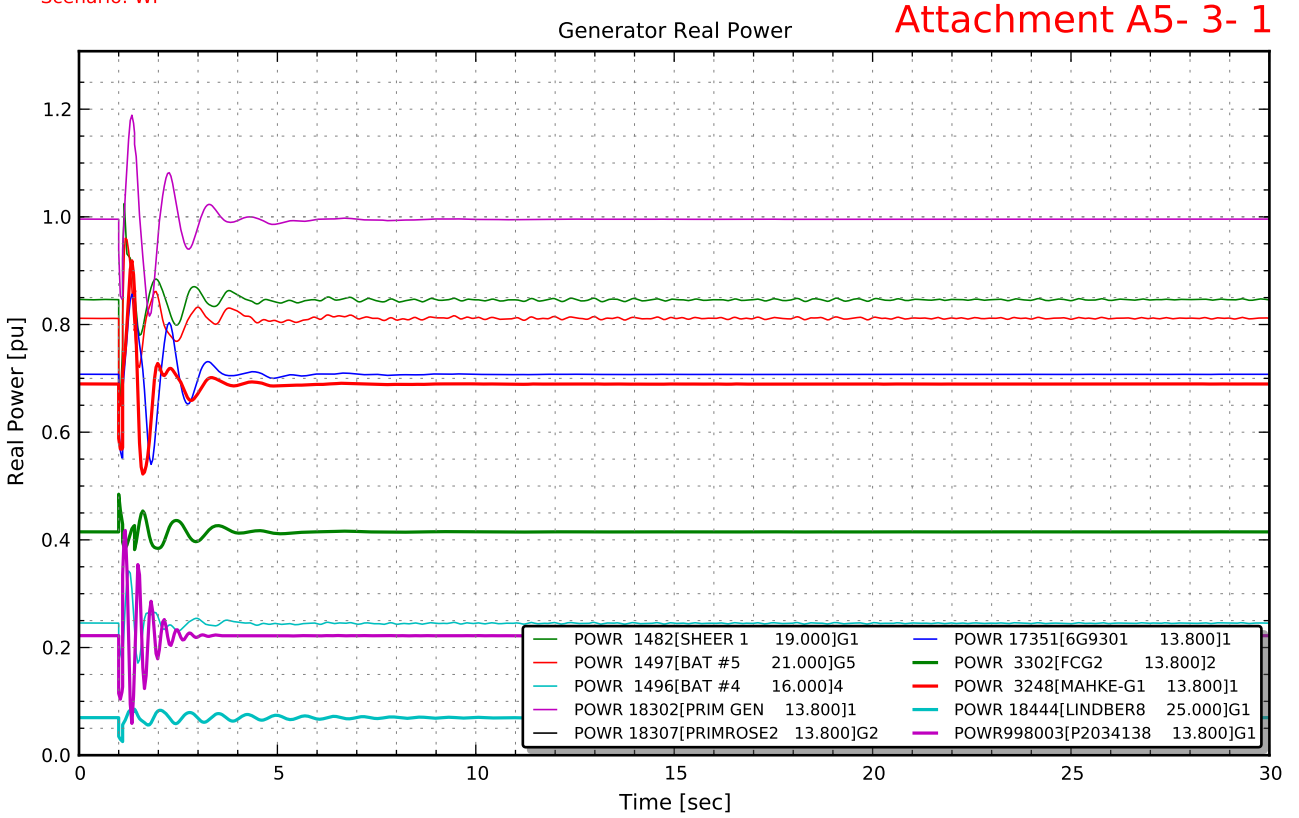


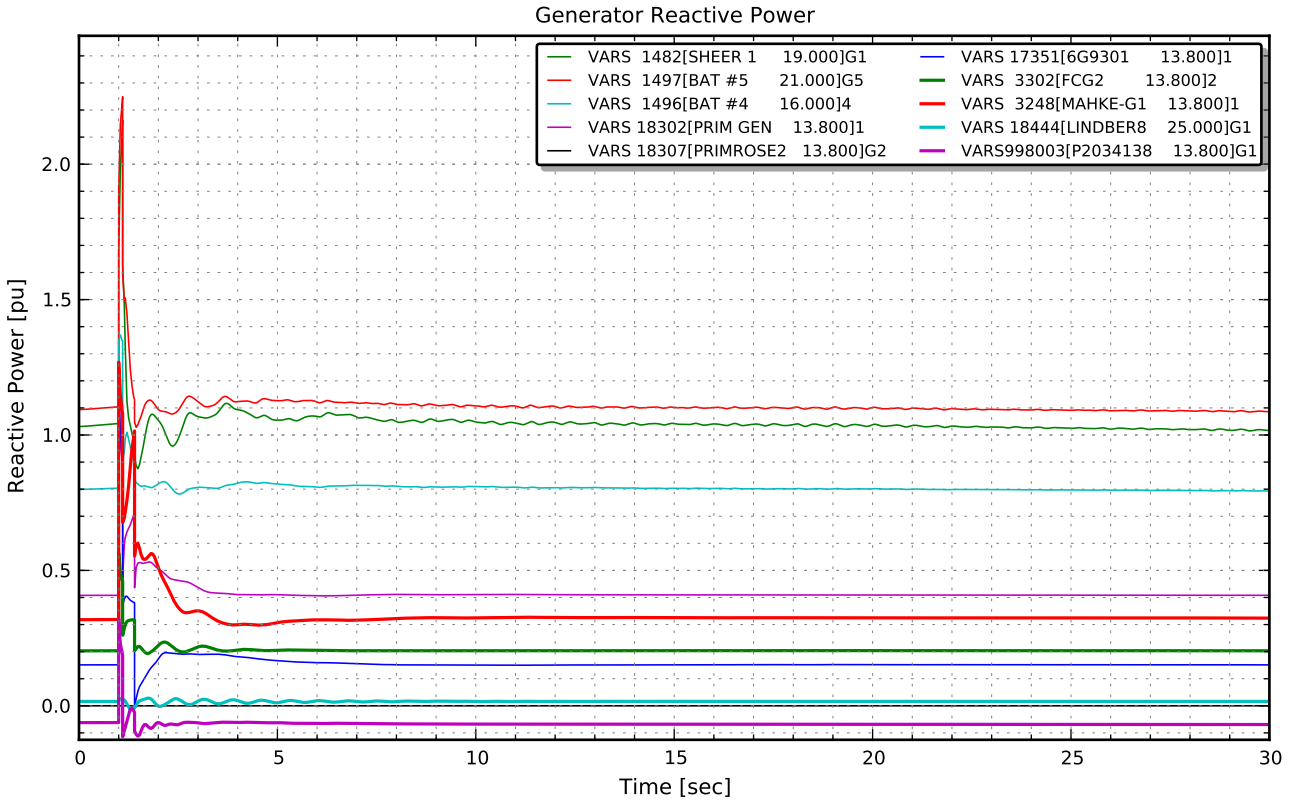
Notes: P2034 Coldlake Area Cogen

Dynamic Stability Analysis

Contingency: 01A - 7L24 Bonnyville 700S to Grande Centre 846S
Alternnative: Post-Project Basecase
Scenario: WP

Attachment A5- 3- 1



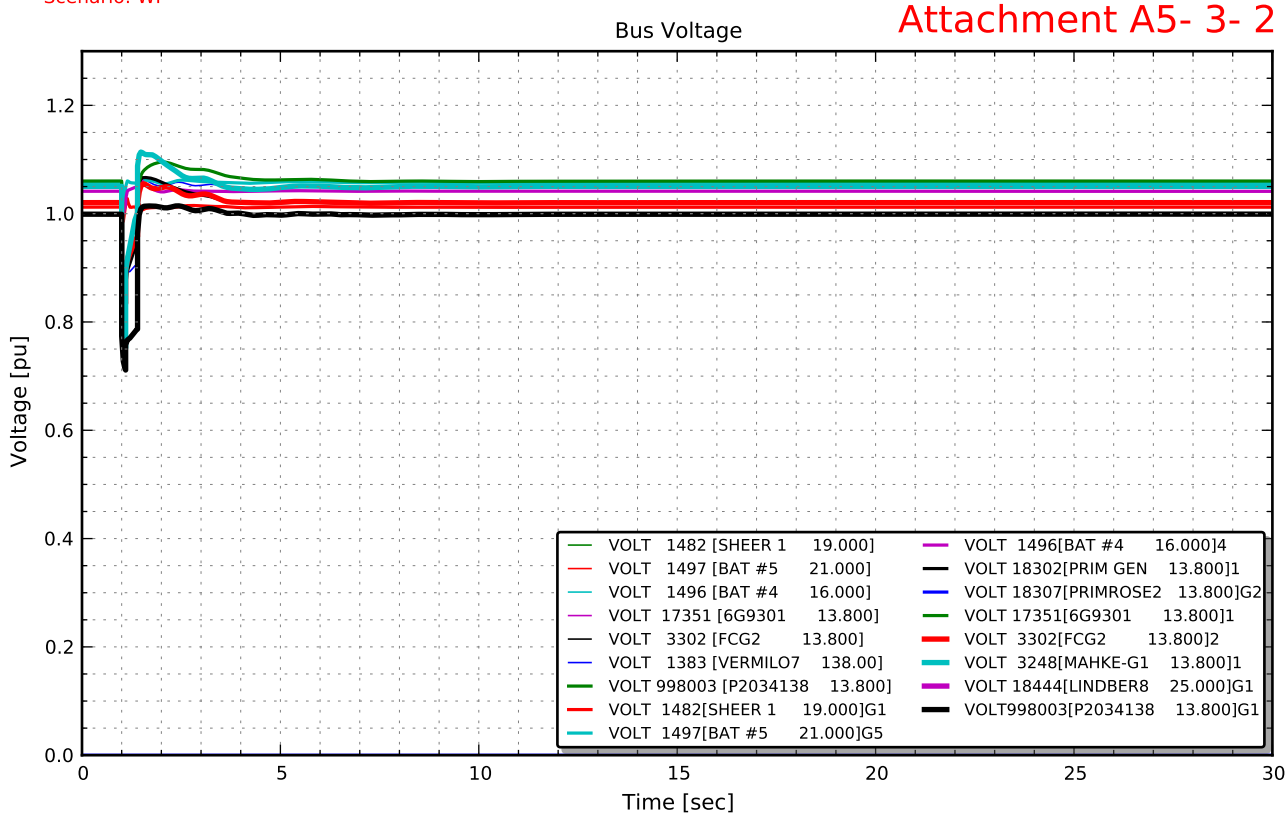


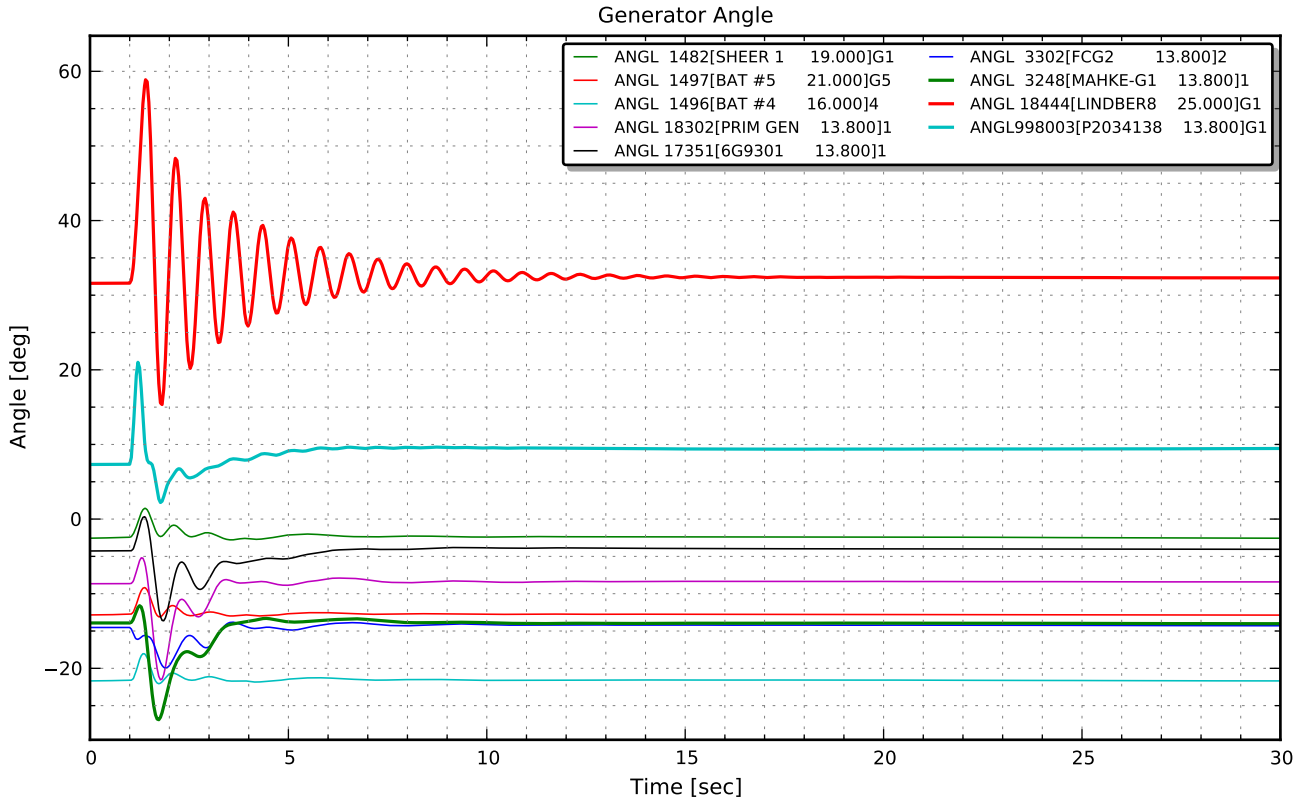
Notes: P2034 Coldlake Area Cogen

Dynamic Stability Analysis

Contingency: 01B - 7L24 Grande Centre 846S to Bonnyville 700S
Alternnative: Post-Project Basecase
Scenario: WP

Attachment A5- 3- 2



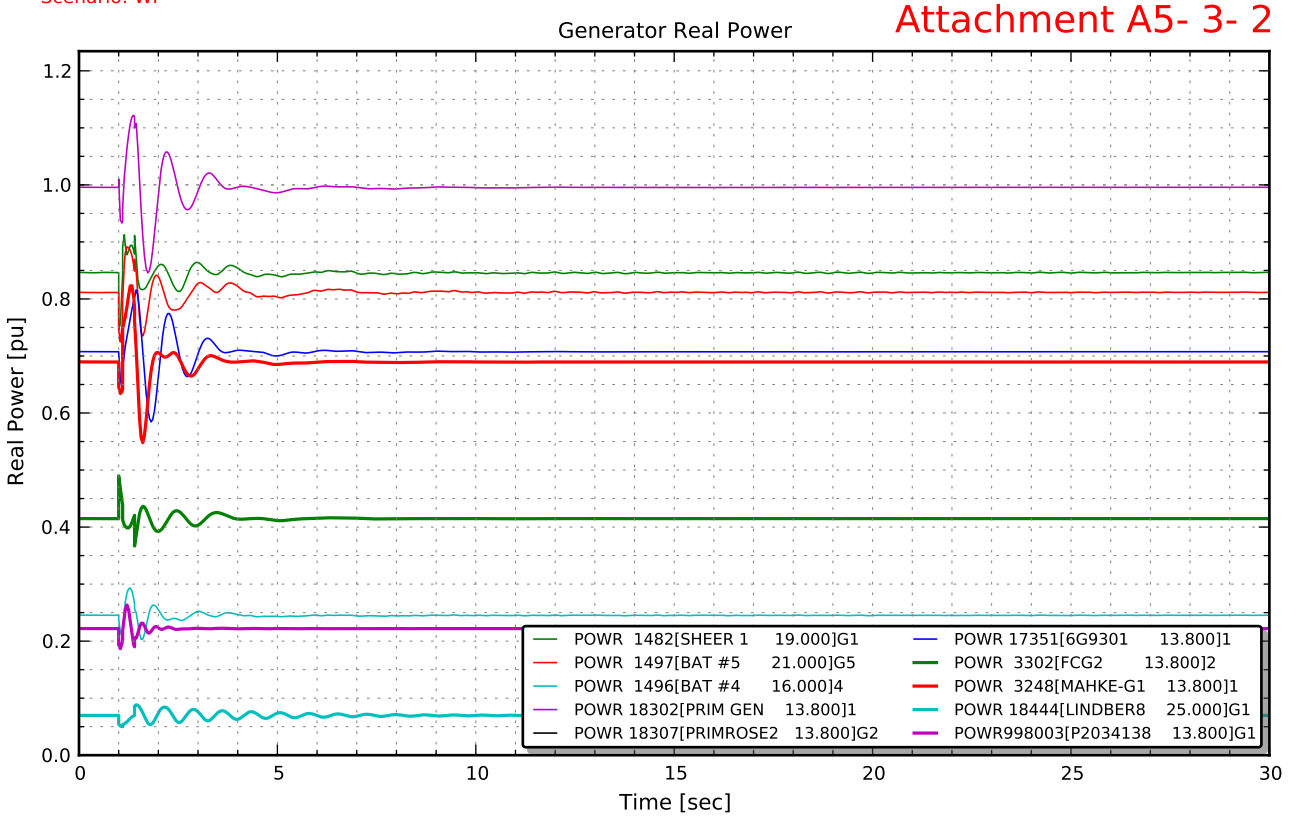


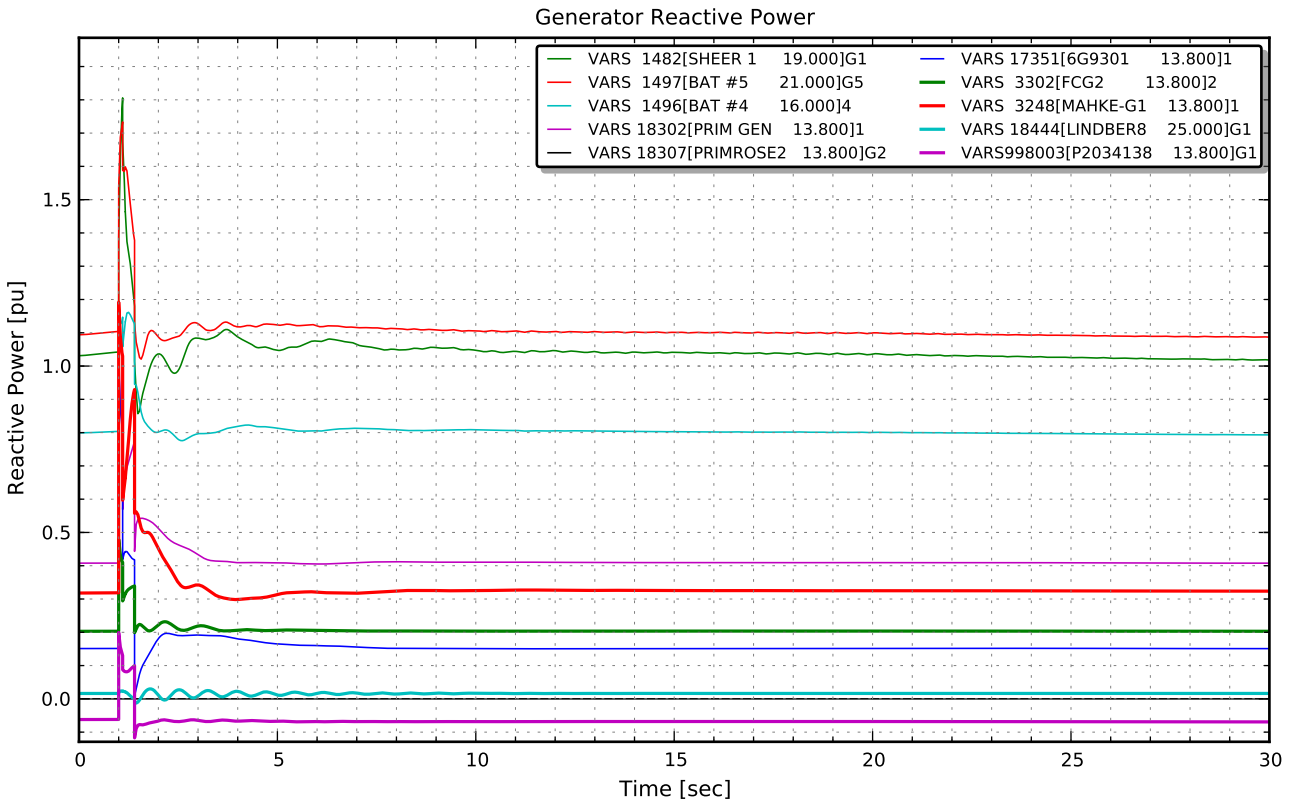
Notes: P2034 Coldlake Area Cogen

Dynamic Stability Analysis

Contingency: 01B - 7L24 Grande Centre 846S to Bonnyville 700S
Alternnative: Post-Project Basecase
Scenario: WP

Attachment A5- 3- 2



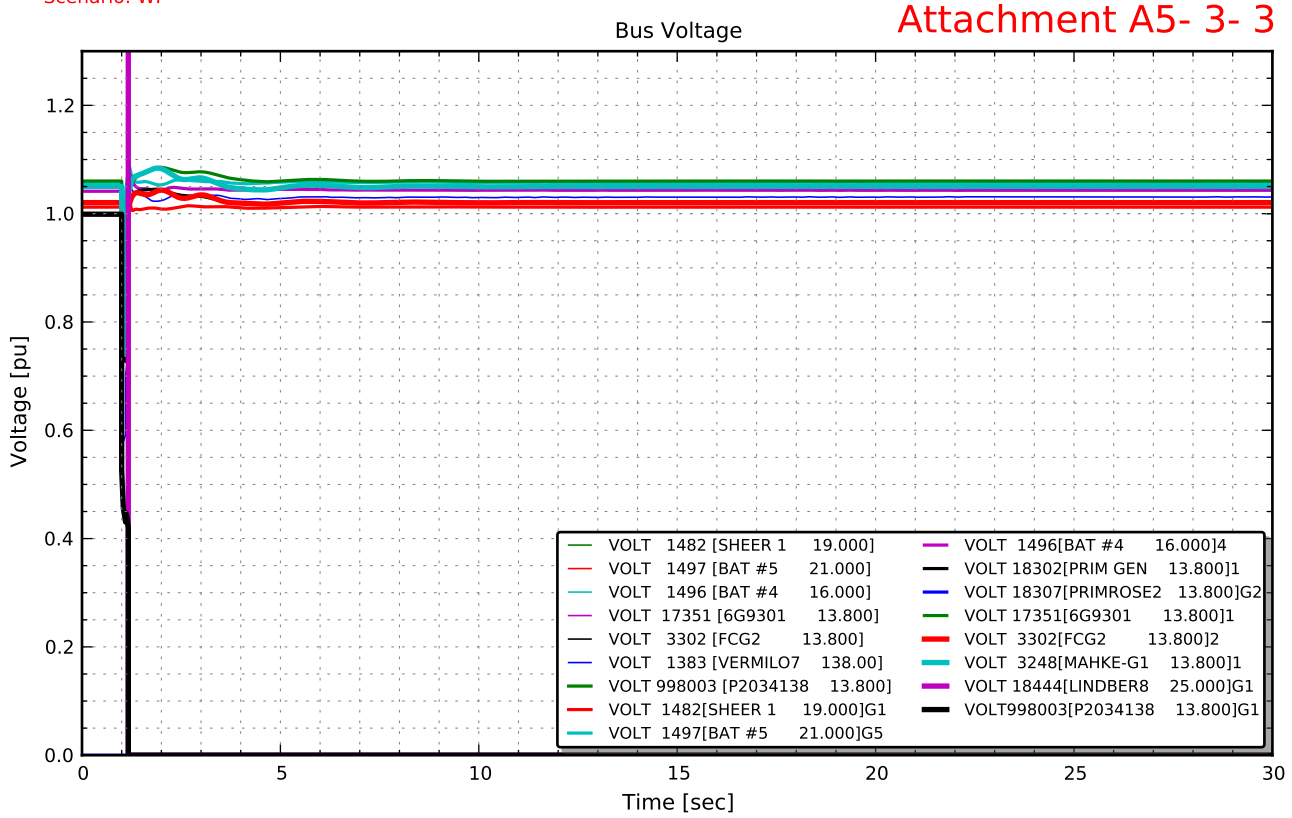


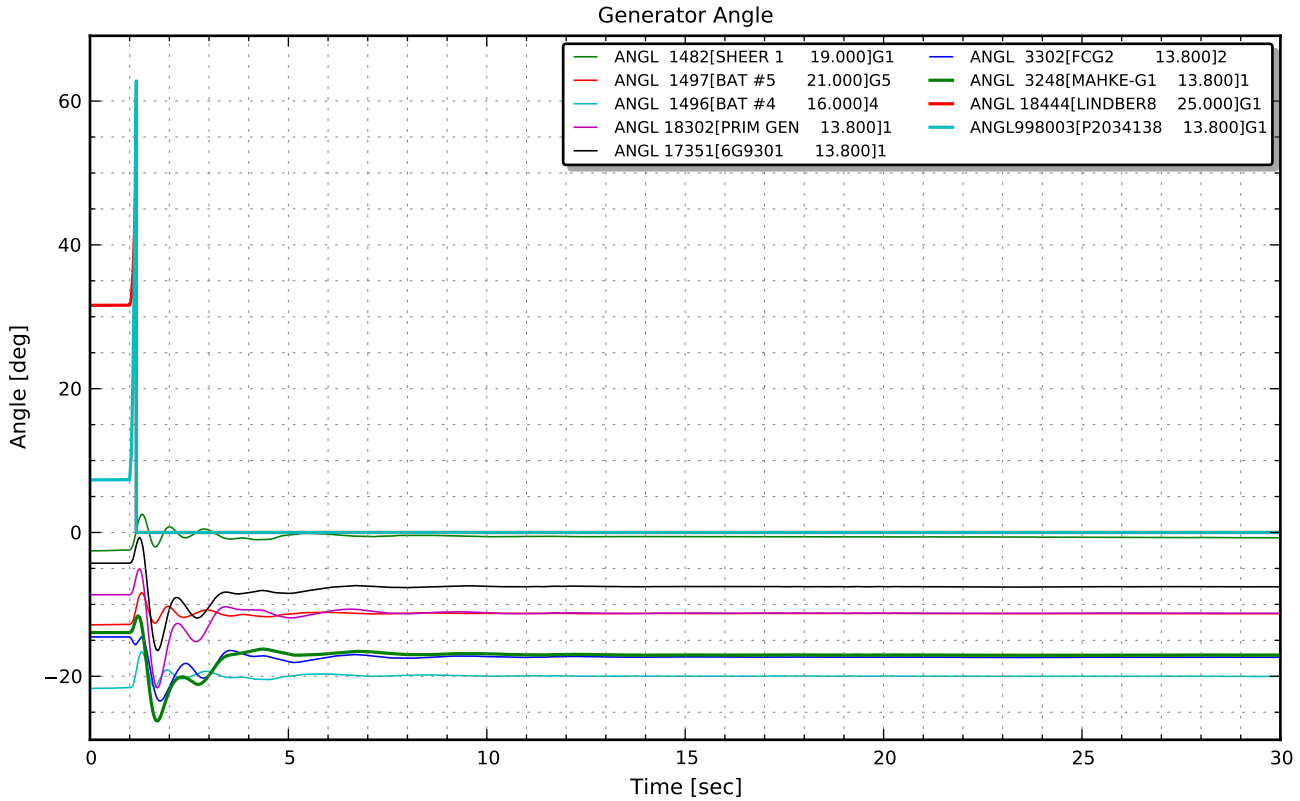
Notes: P2034 Coldlake Area Cogen

Dynamic Stability Analysis

Contingency: 02APost - 7L53 Bonnyville 700S to Irish Creek 706S
Alternnative: Post-Project Basecase
Scenario: WP

Attachment A5- 3- 3



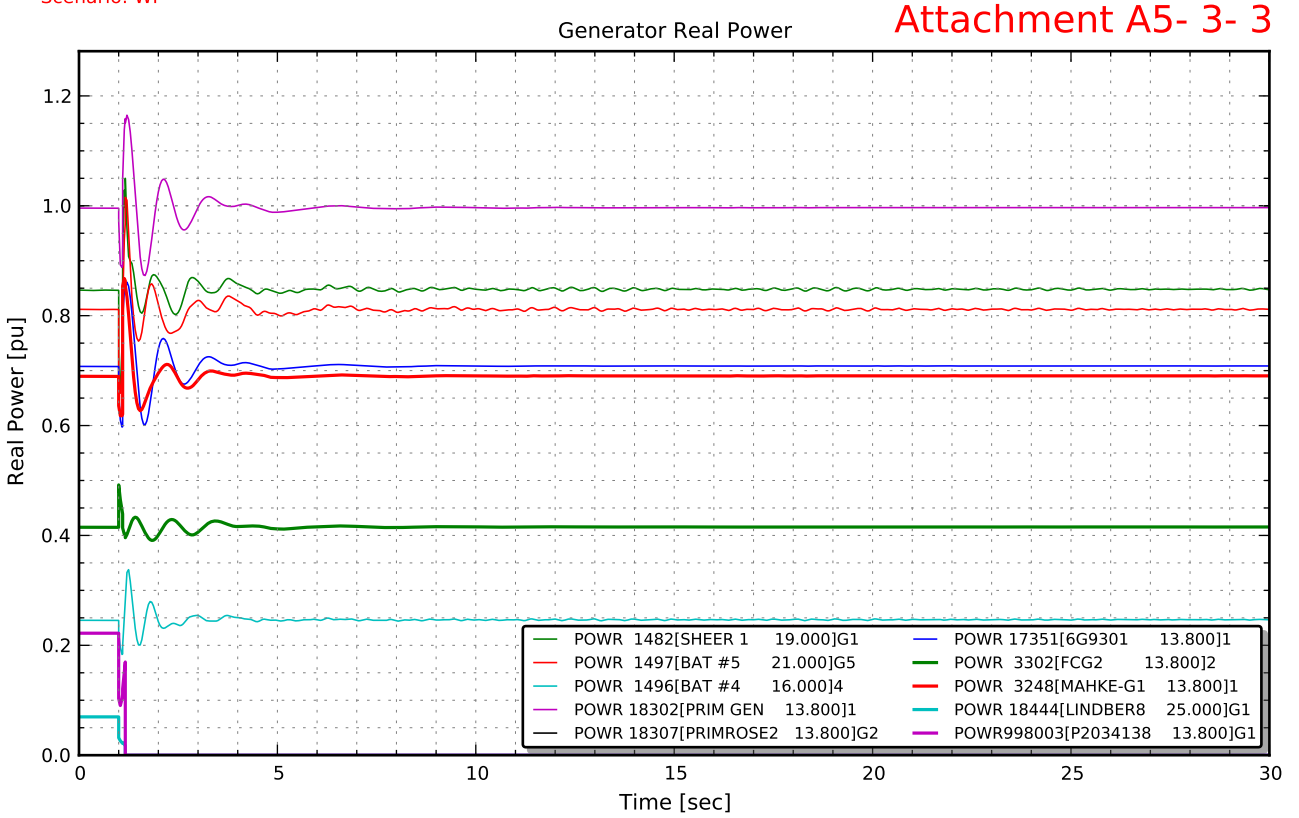


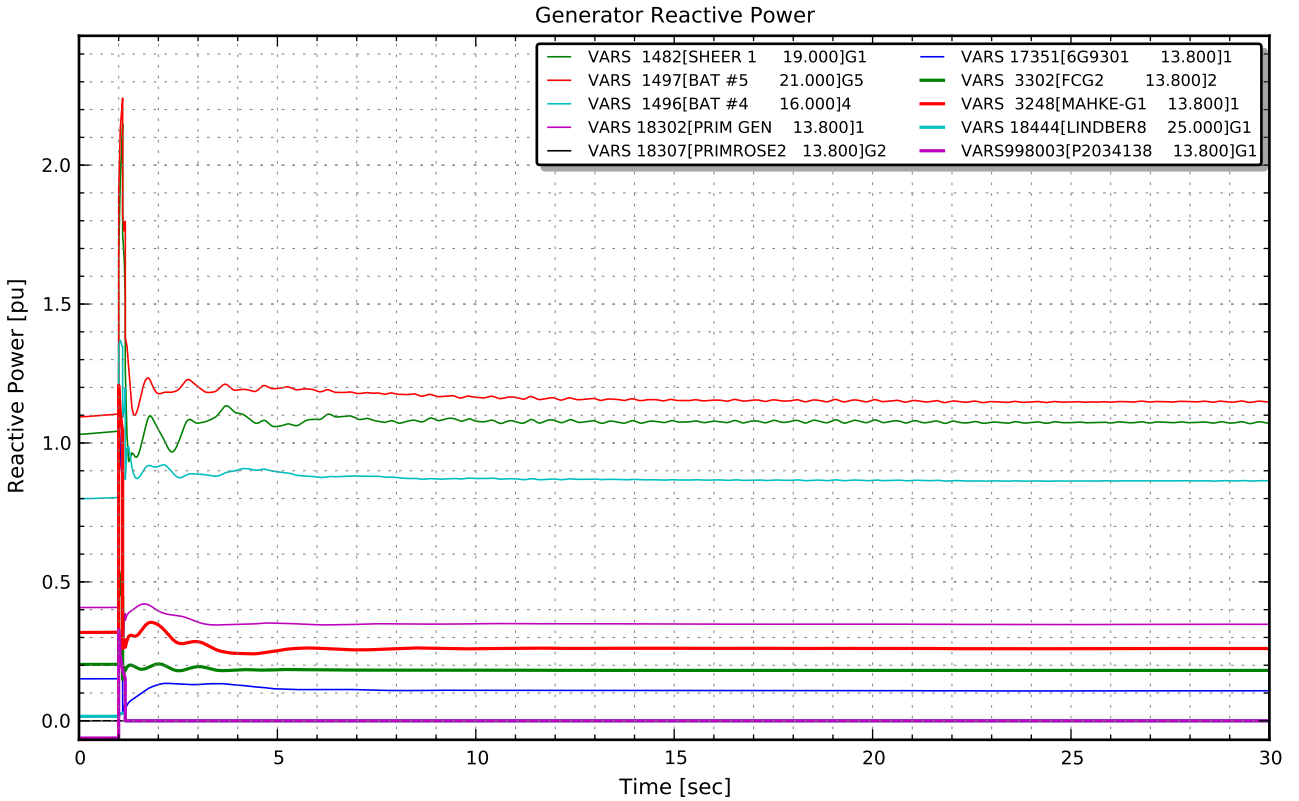
Notes: P2034 Coldlake Area Cogen

Dynamic Stability Analysis

Contingency: 02APost - 7L53 Bonnyville 700S to Irish Creek 706S
Alternnative: Post-Project Basecase
Scenario: WP

Attachment A5- 3- 3



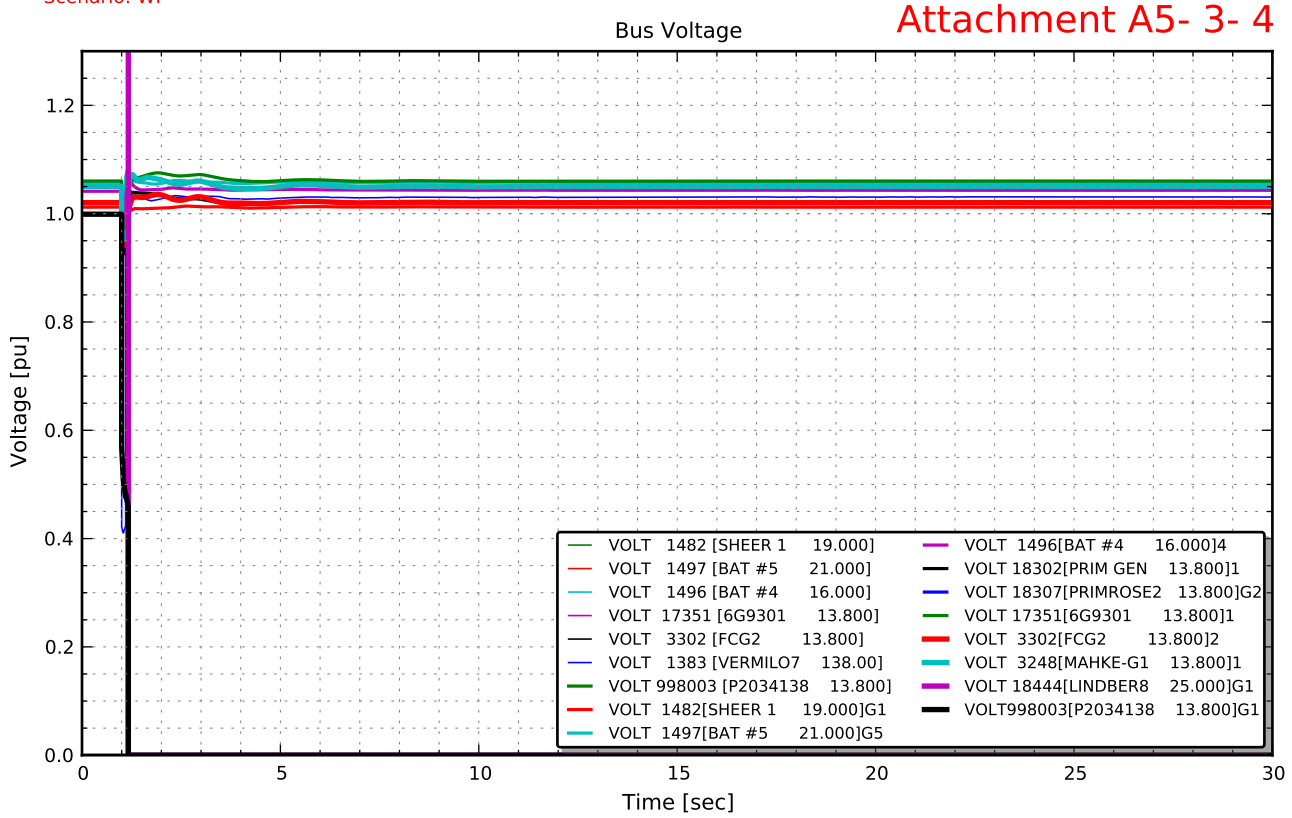


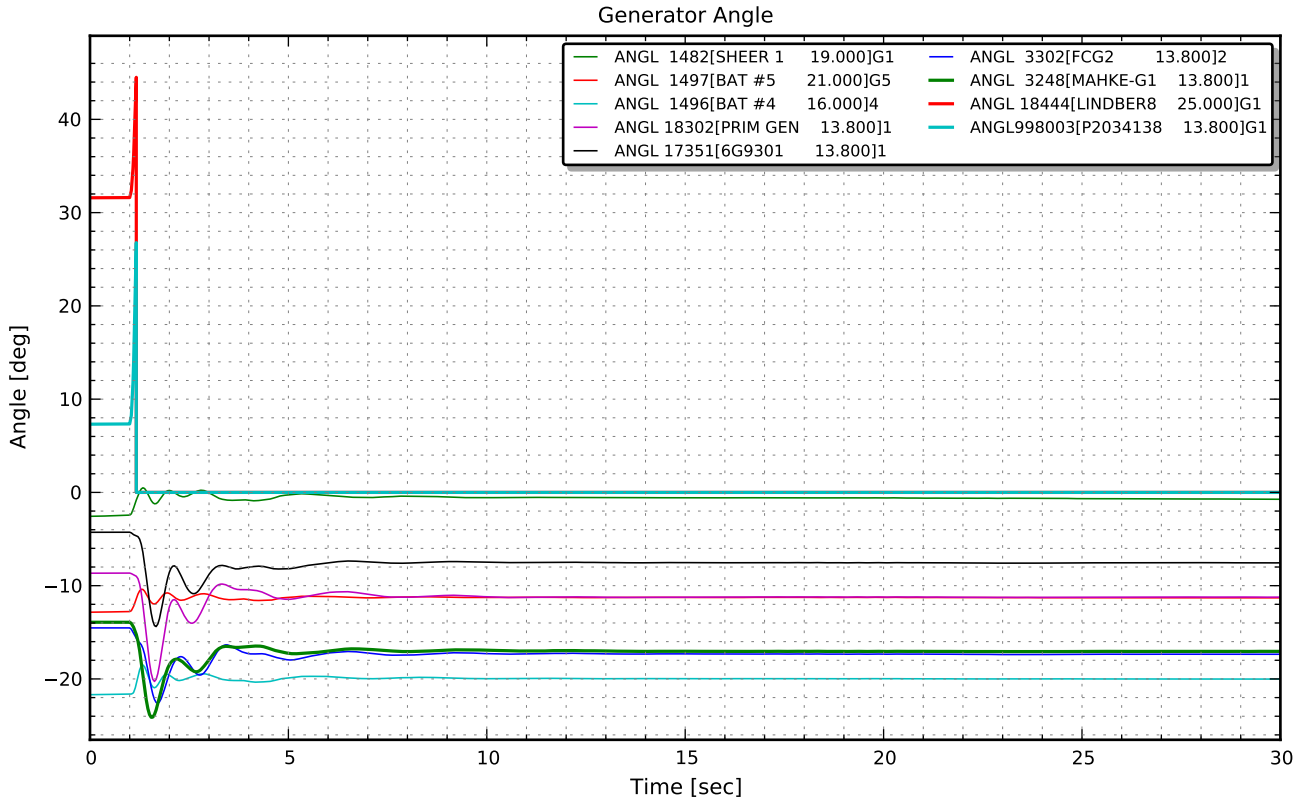
Notes: P2034 Coldlake Area Cogen

Dynamic Stability Analysis

Contingency: 02BPost - 7L53 Irish Creek 706S to Bonnyville 700S
Alternnative: Post-Project Basecase
Scenario: WP

Attachment A5- 3- 4



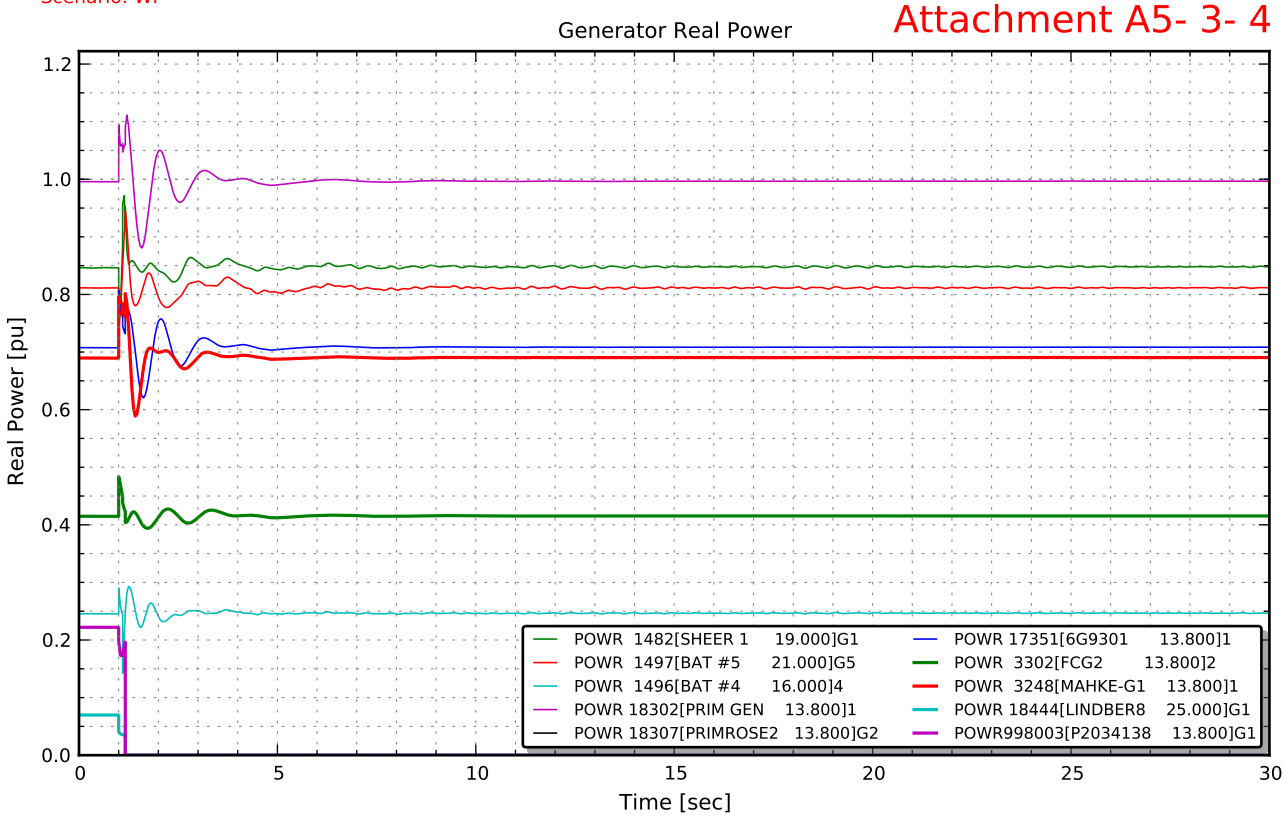


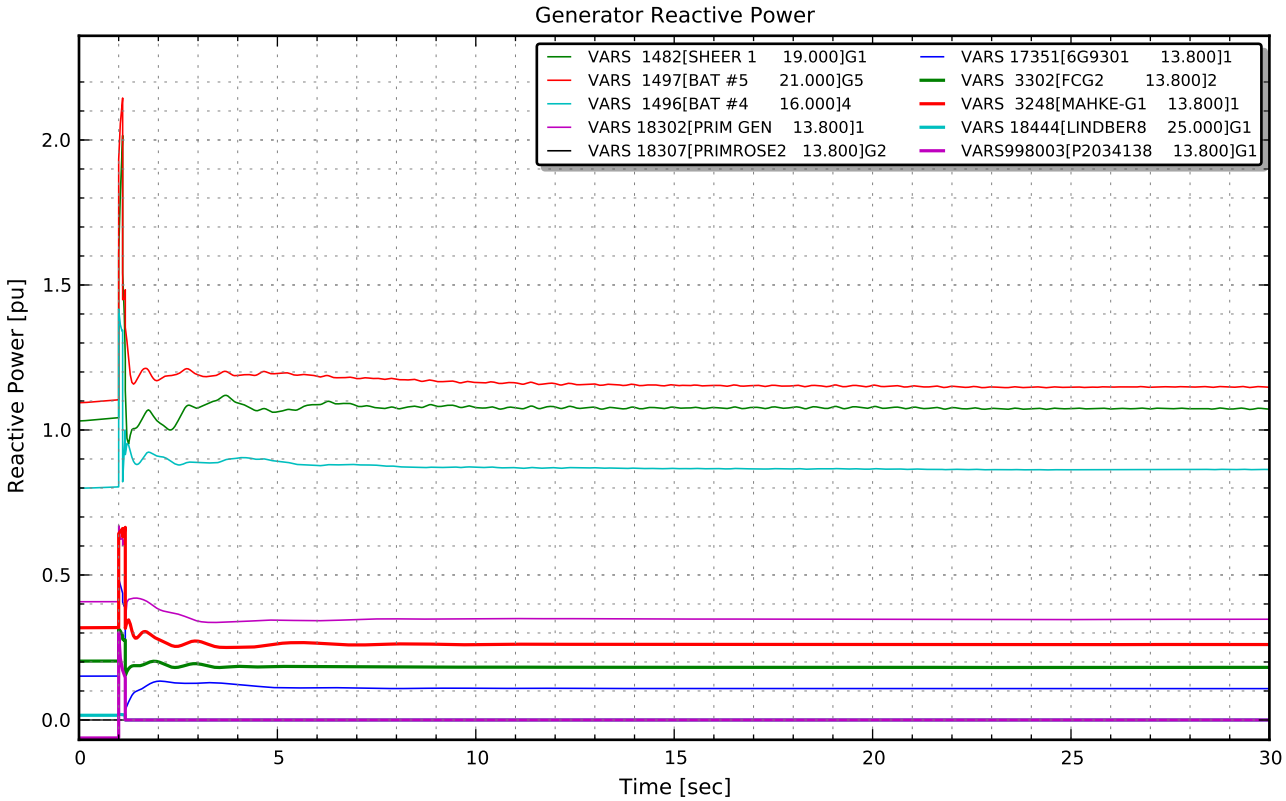
Notes: P2034 Coldlake Area Cogen

Dynamic Stability Analysis

Contingency: 02BPost - 7L53 Irish Creek 706S to Bonnyville 700S
Alternnative: Post-Project Basecase
Scenario: WP

Attachment A5- 3- 4



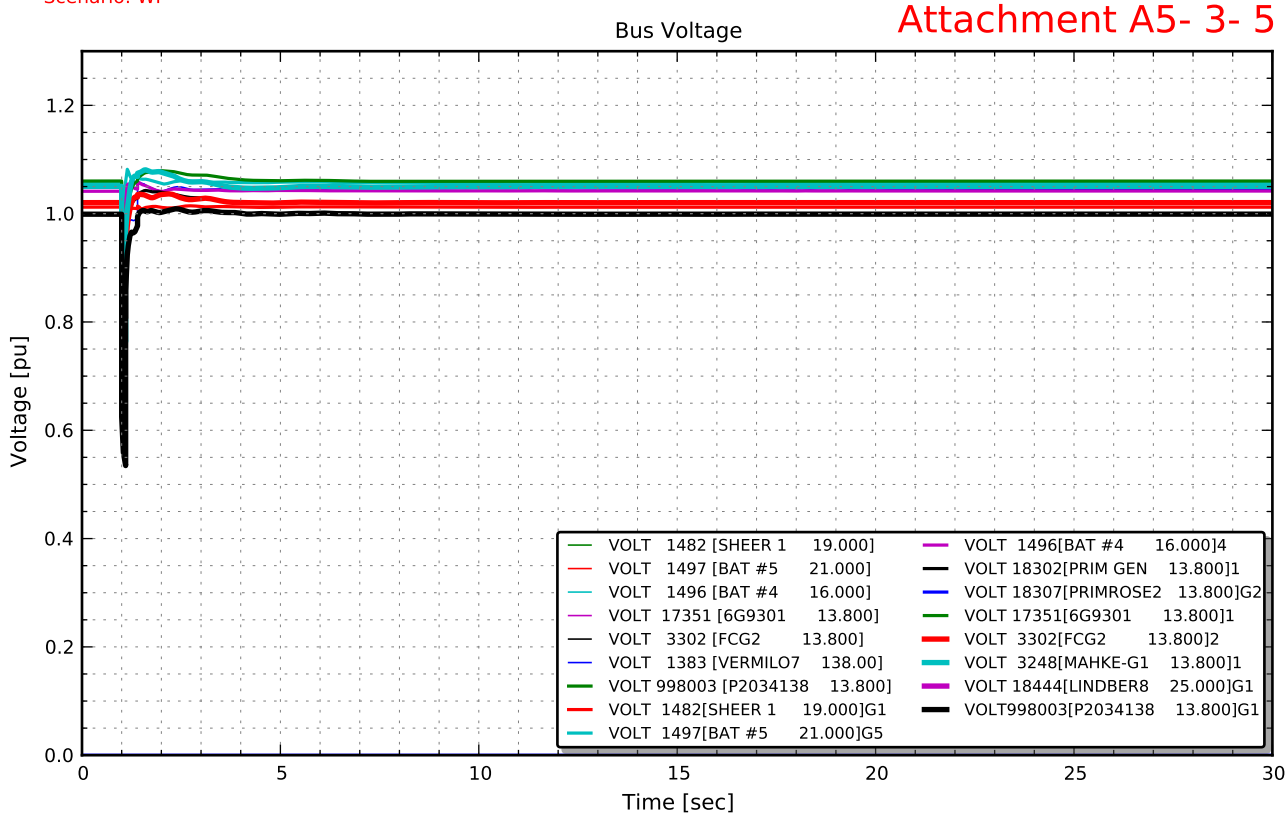


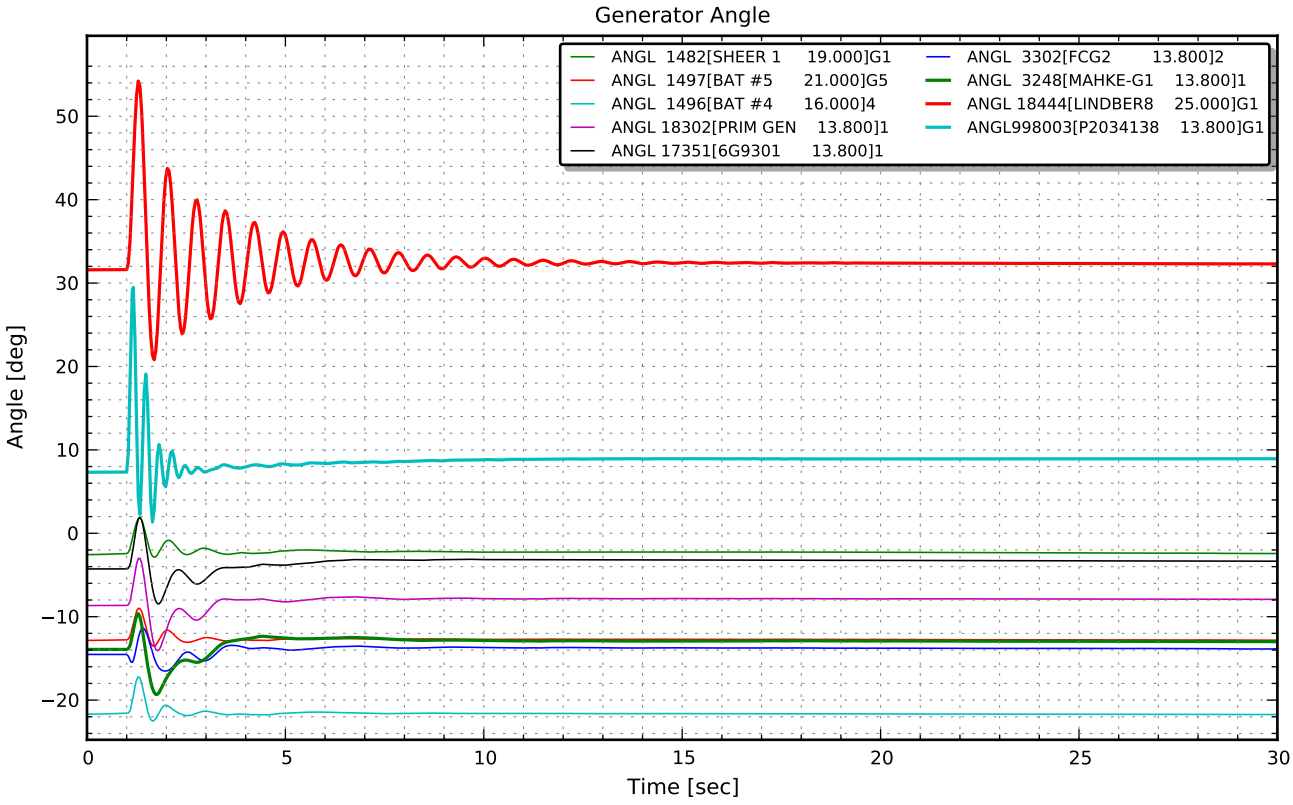
Notes: P2034 Coldlake Area Cogen

Dynamic Stability Analysis

Contingency: 03A - 7L70 Bonnyville 700S to St. Paul 707S
Alternnative: Post-Project Basecase
Scenario: WP

Attachment A5- 3- 5



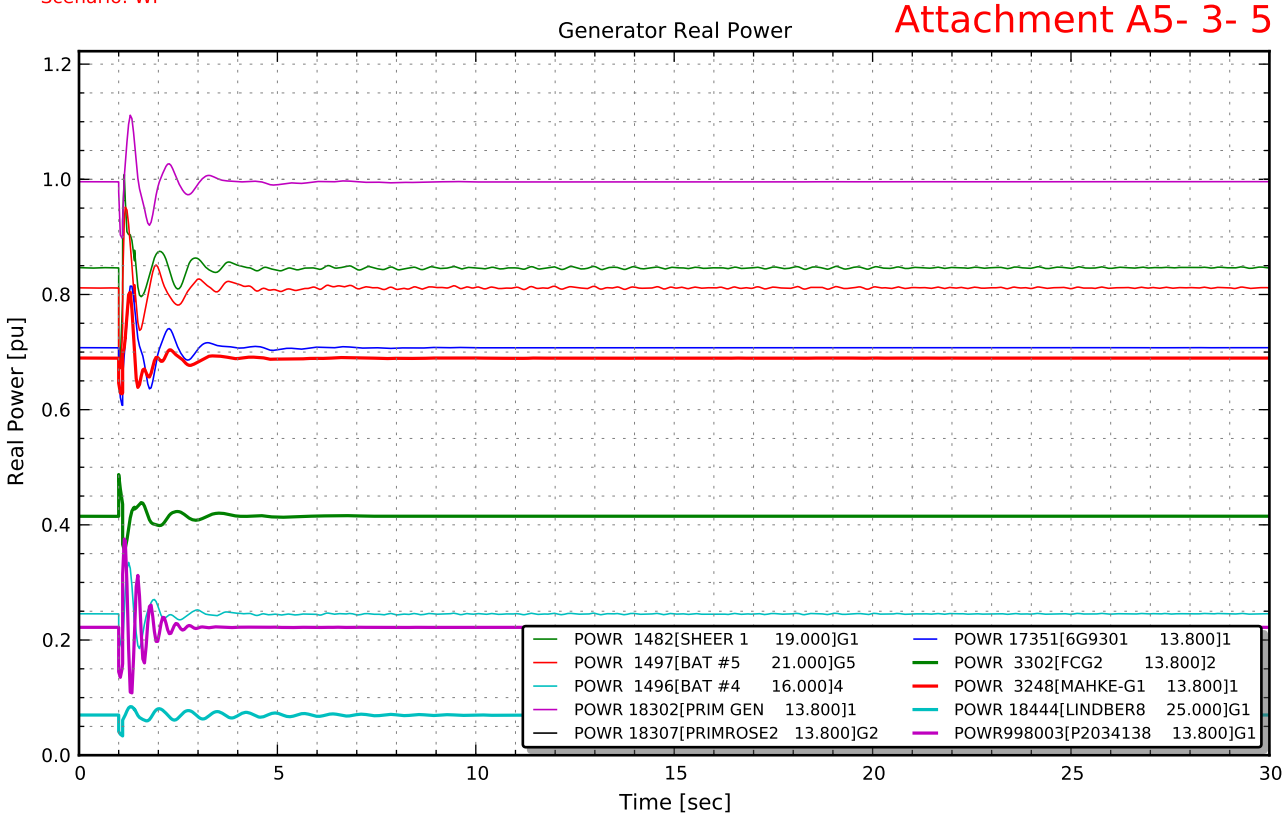


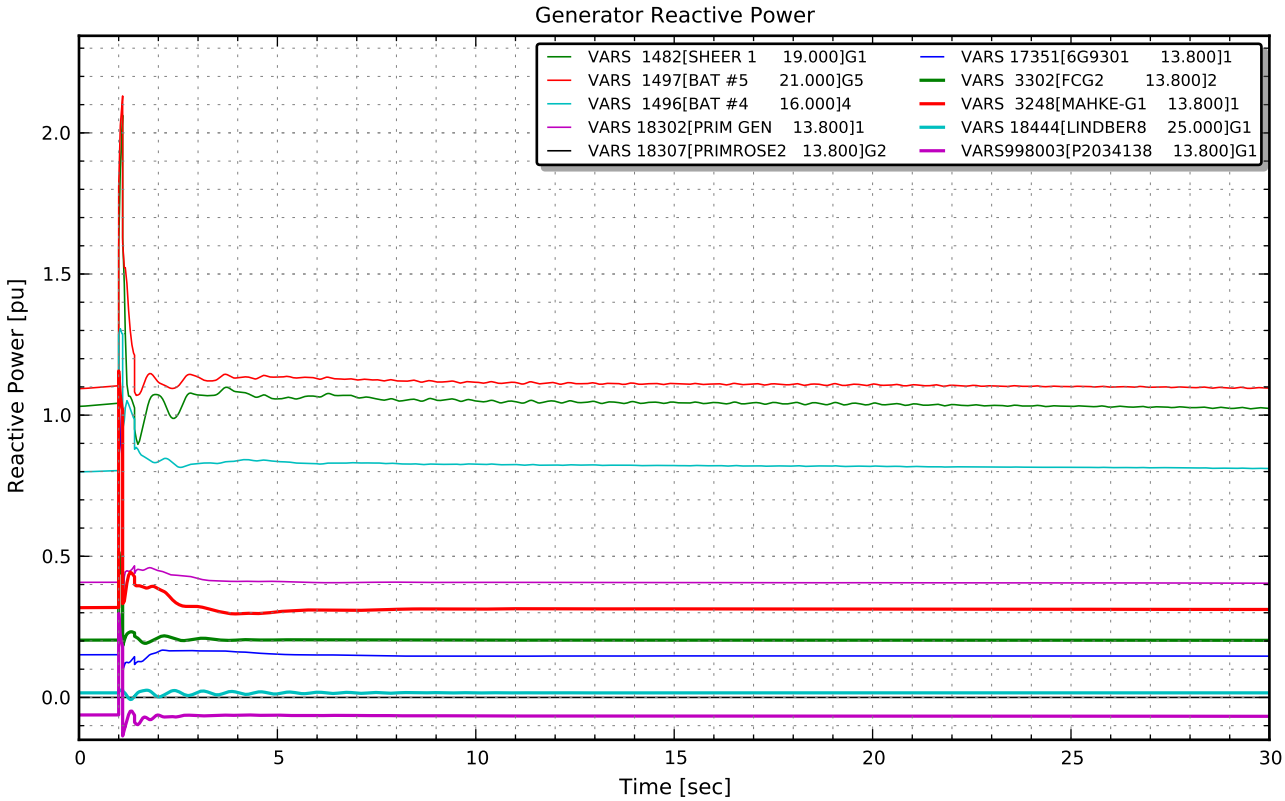
Notes: P2034 Coldlake Area Cogen

Dynamic Stability Analysis

Contingency: 03A - 7L70 Bonnyville 700S to St. Paul 707S
Alternnative: Post-Project Basecase
Scenario: WP

Attachment A5- 3- 5



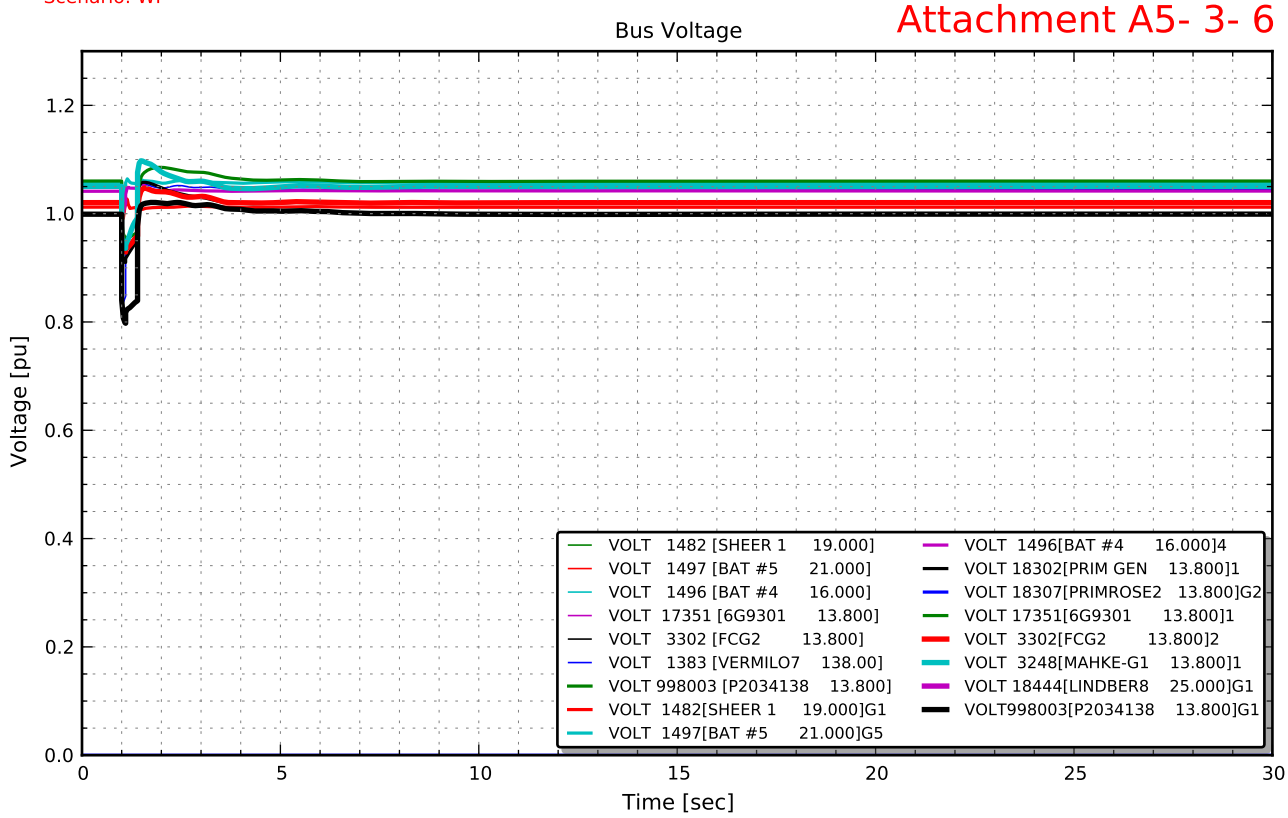


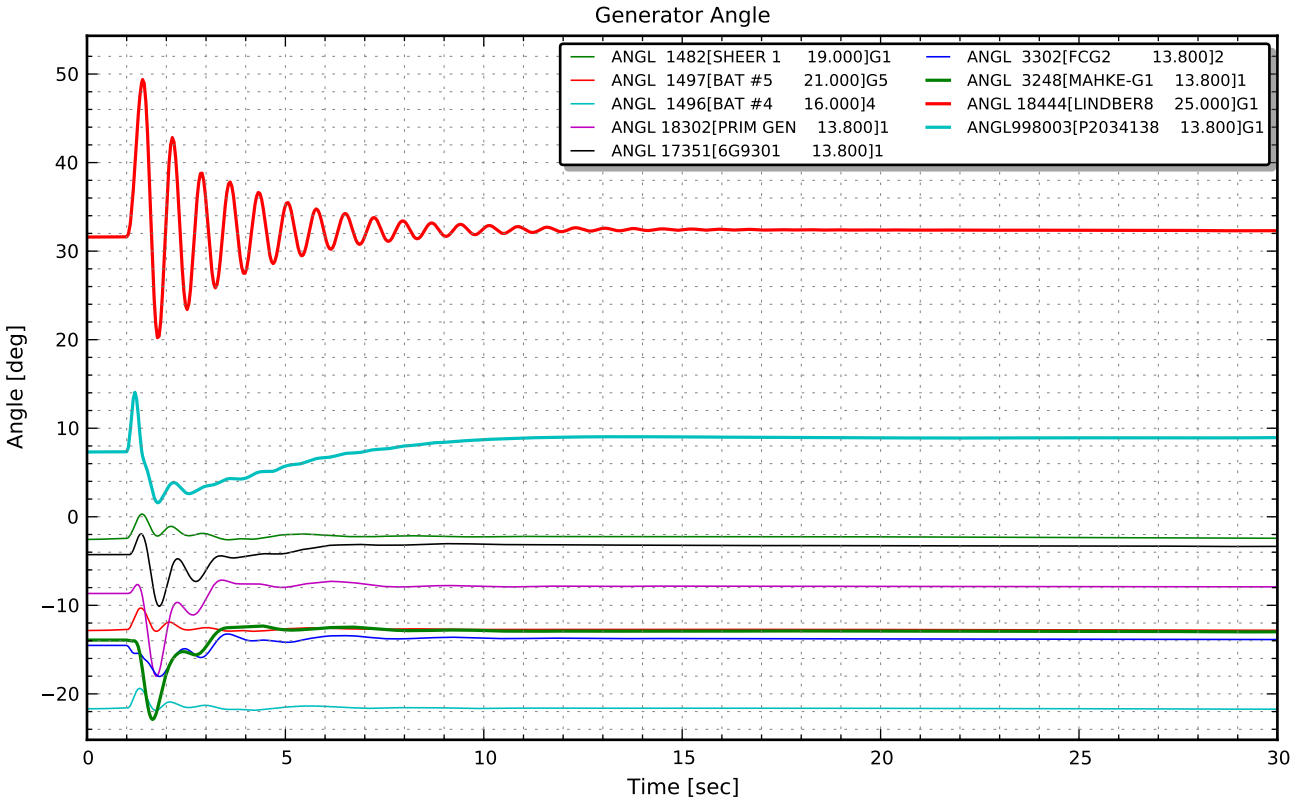
Notes: P2034 Coldlake Area Cogen

Dynamic Stability Analysis

Contingency: 03B - 7L70 St. Paul 707S to Bonnyville 700S
Alternnative: Post-Project Basecase
Scenario: WP

Attachment A5- 3- 6



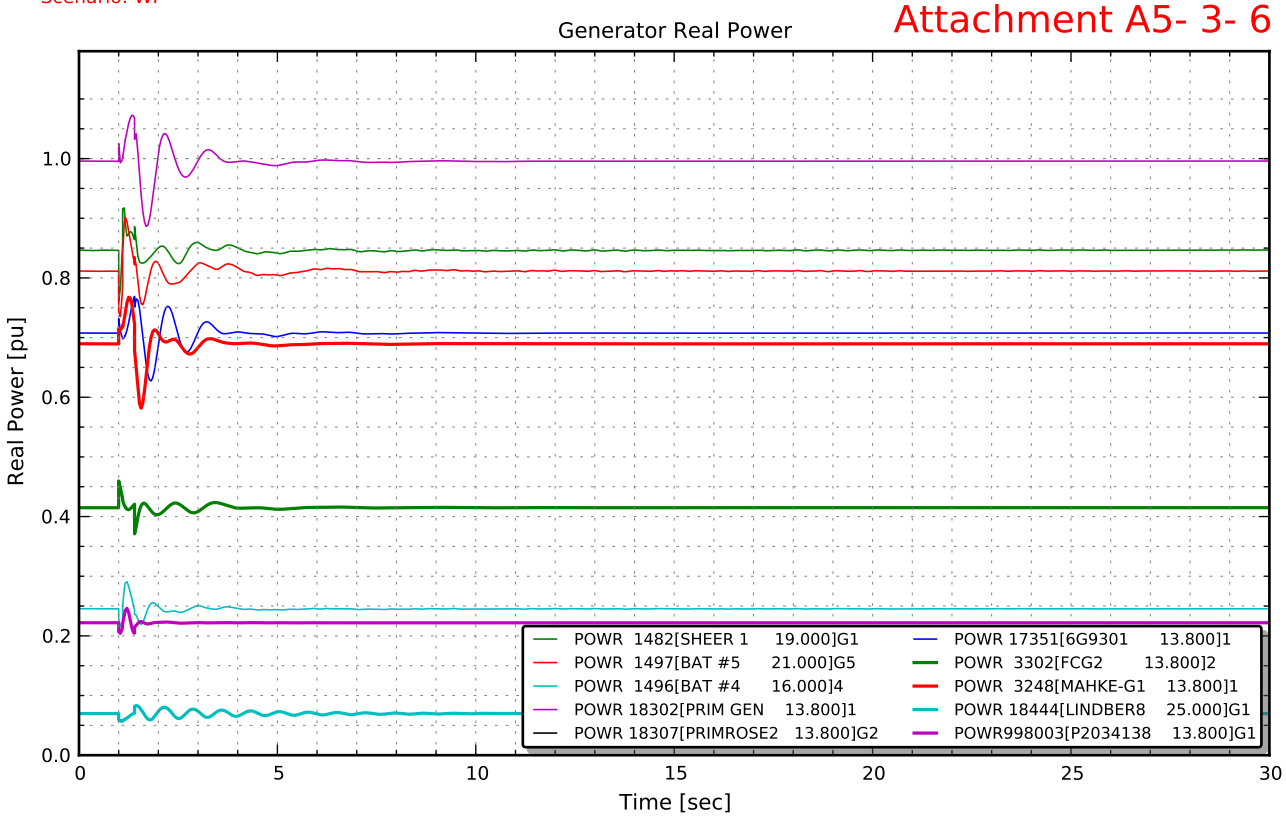


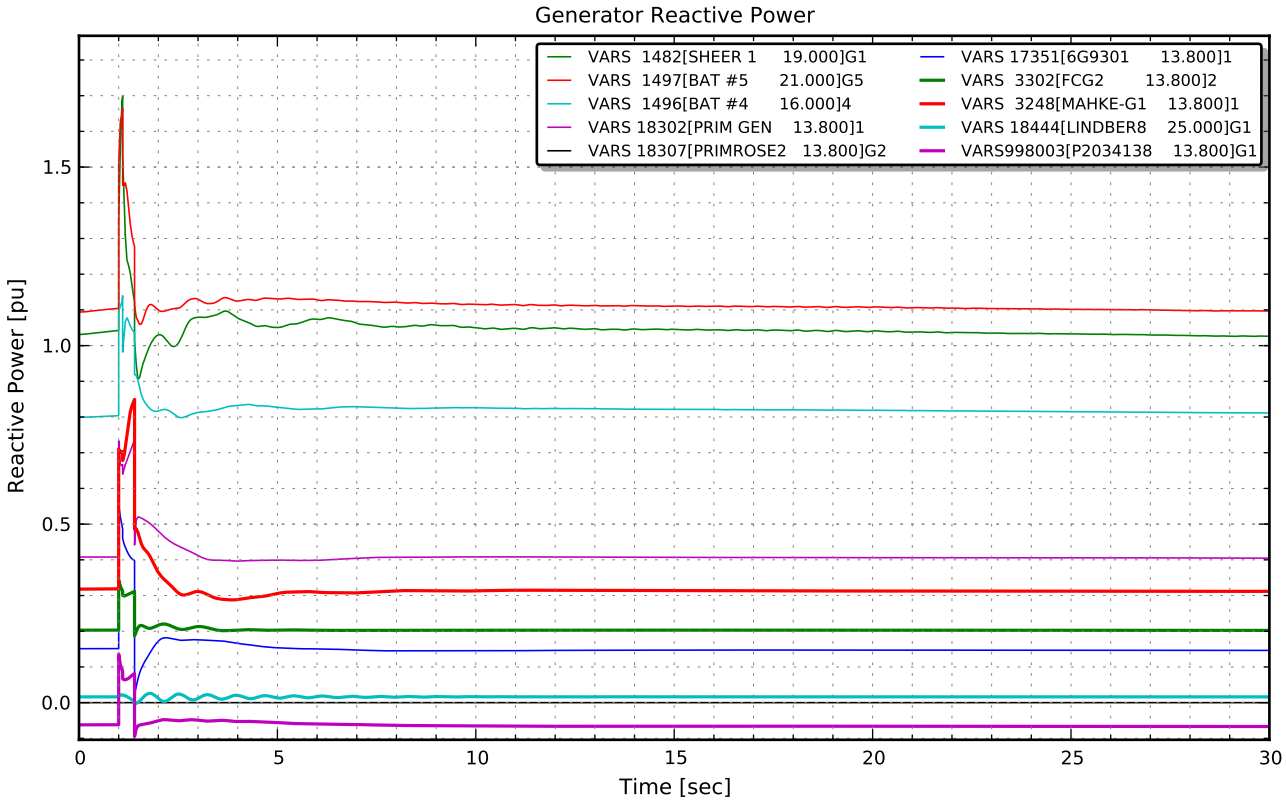
Notes: P2034 Coldlake Area Cogen

Dynamic Stability Analysis

Contingency: 03B - 7L70 St. Paul 707S to Bonnyville 700S
Alternnative: Post-Project Basecase
Scenario: WP

Attachment A5- 3- 6



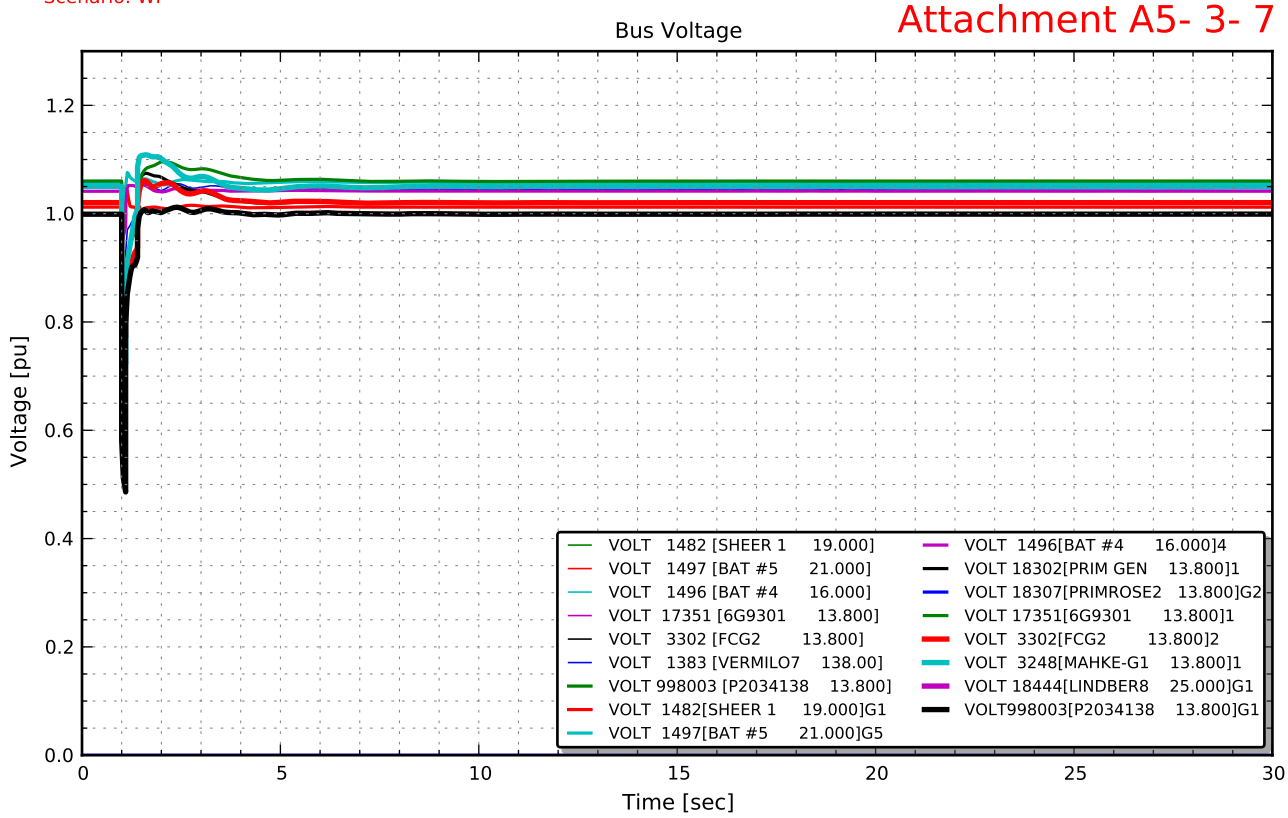


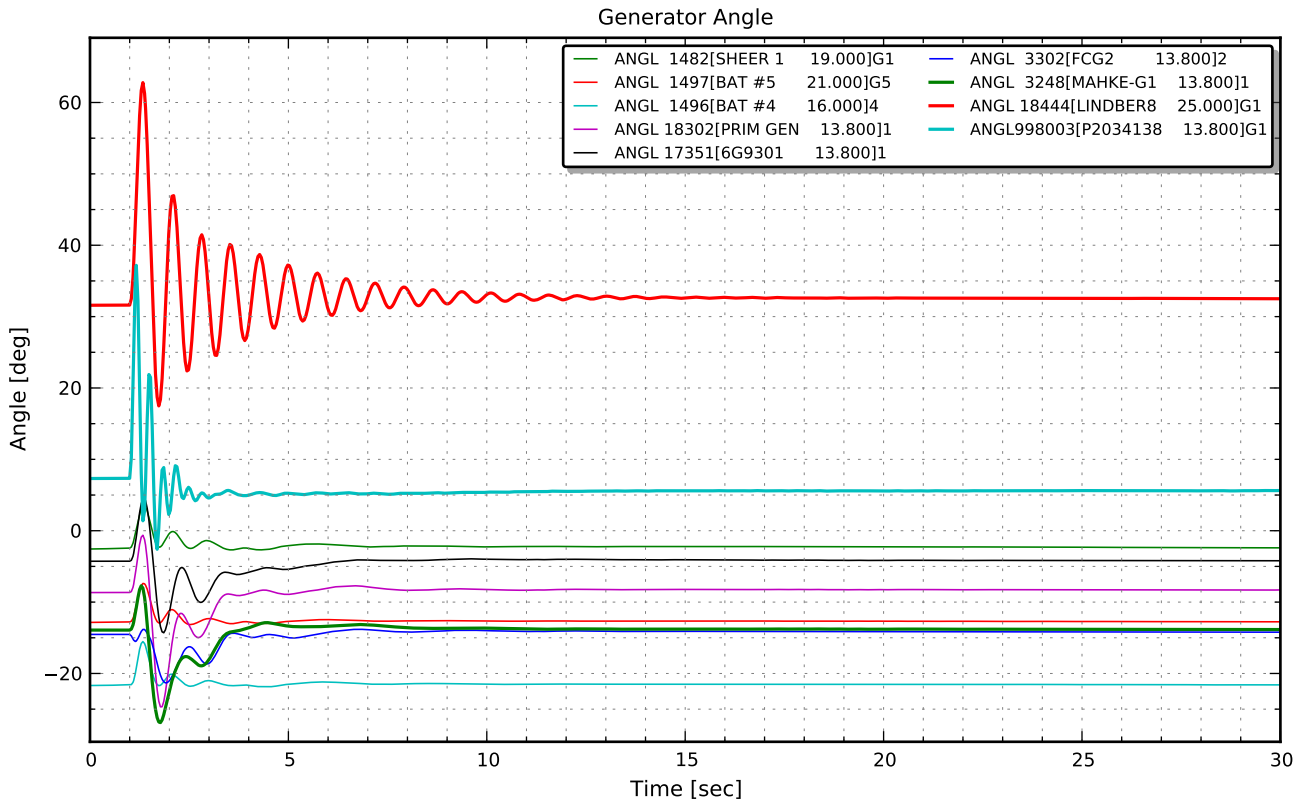
Notes: P2034 Coldlake Area Cogen

Dynamic Stability Analysis

Contingency: 04A - 7L89 Bonnyville 700S to Marguerite Lake 826S
Alternnative: Post-Project Basecase
Scenario: WP

Attachment A5- 3- 7



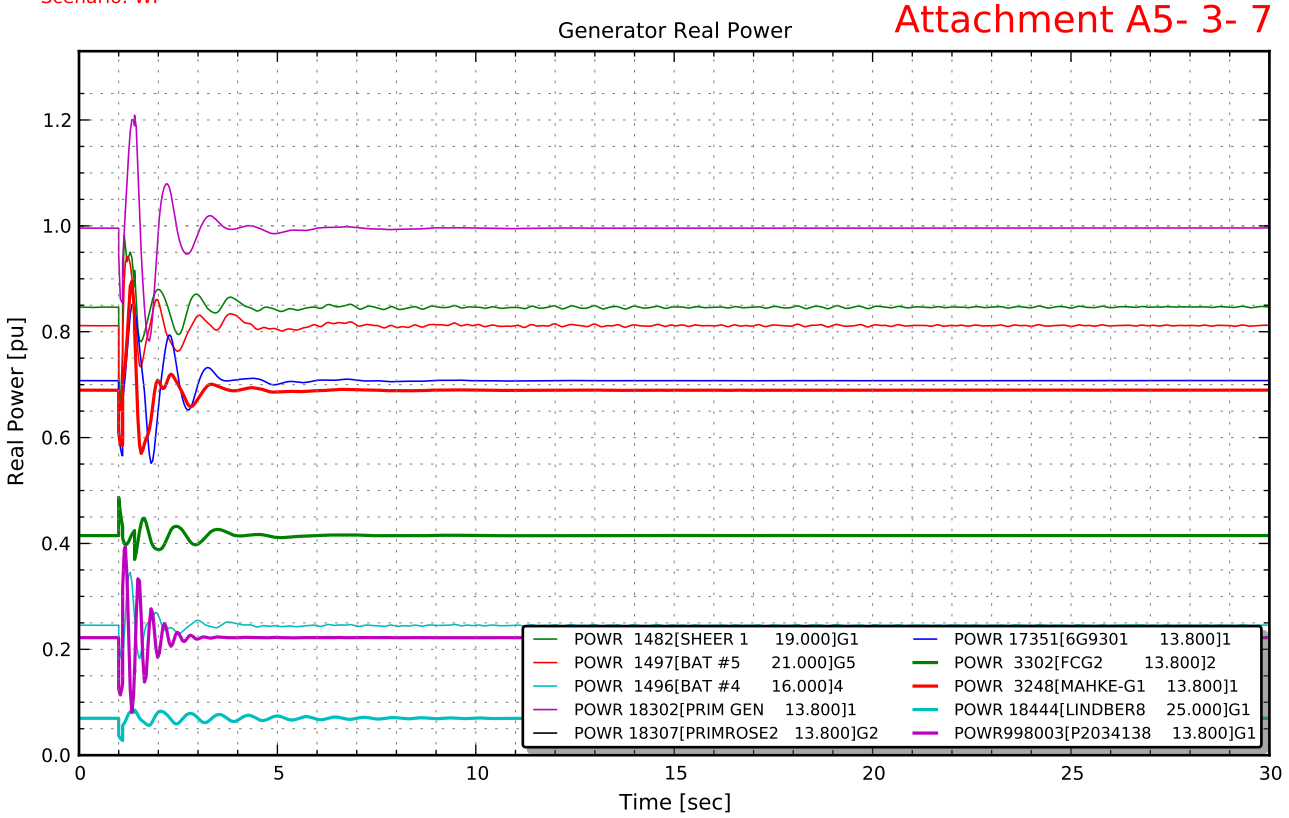


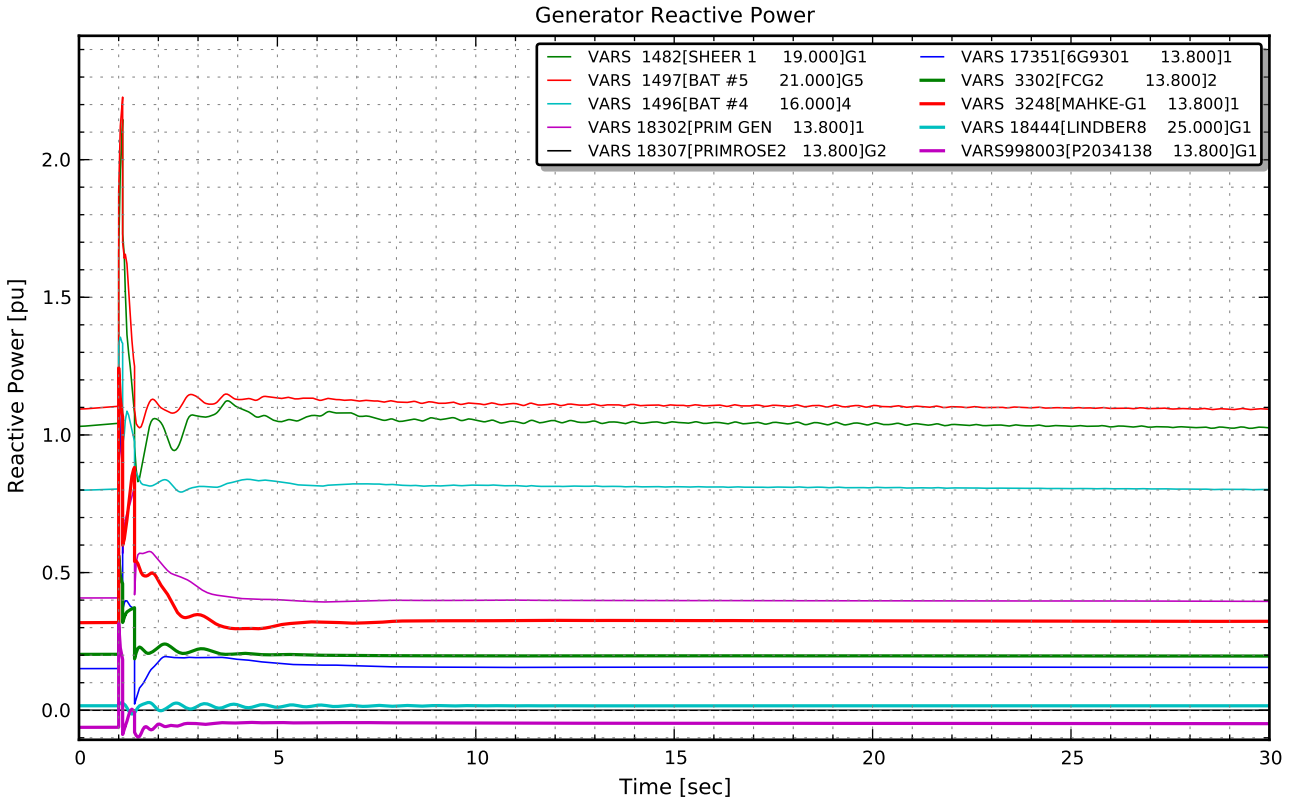
Notes: P2034 Coldlake Area Cogen

Dynamic Stability Analysis

Contingency: 04A - 7L89 Bonnyville 700S to Marguerite Lake 826S
Alternnative: Post-Project Basecase
Scenario: WP

Attachment A5- 3- 7



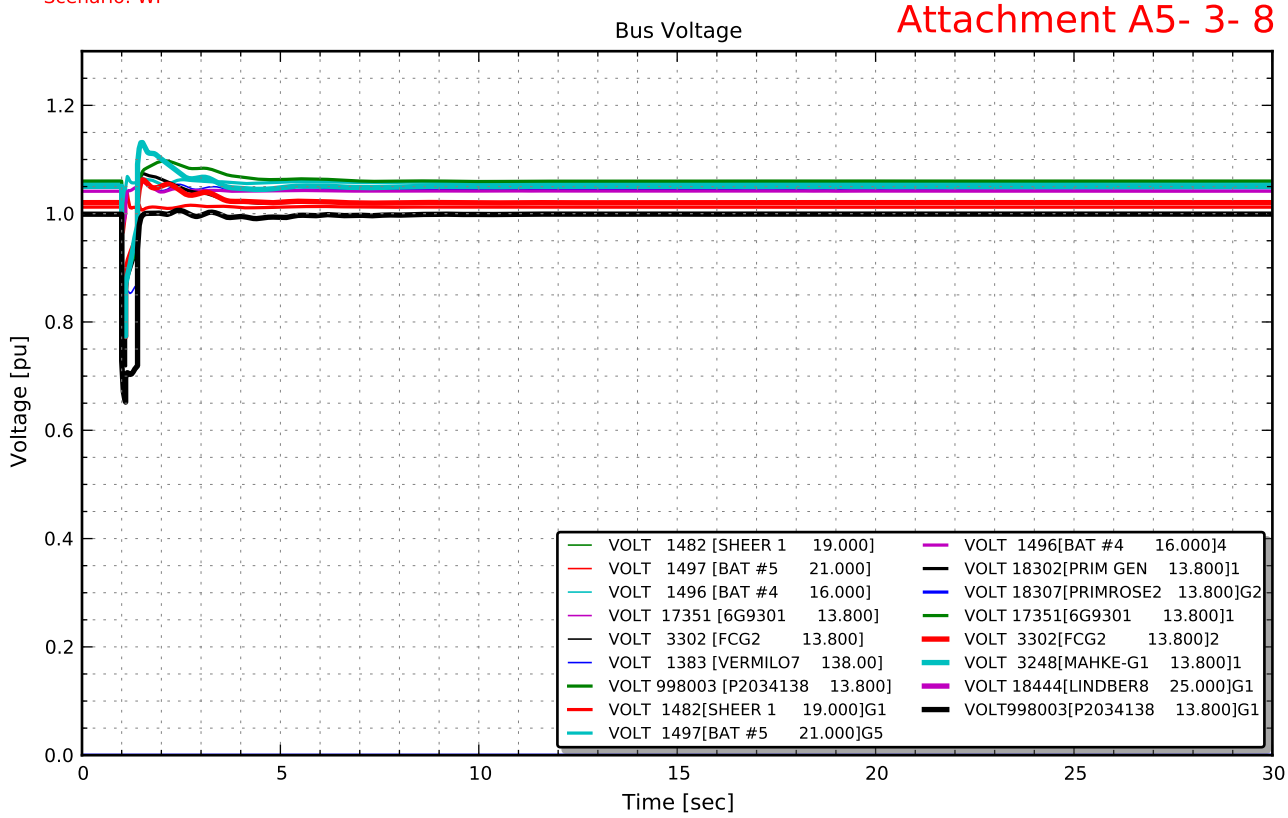


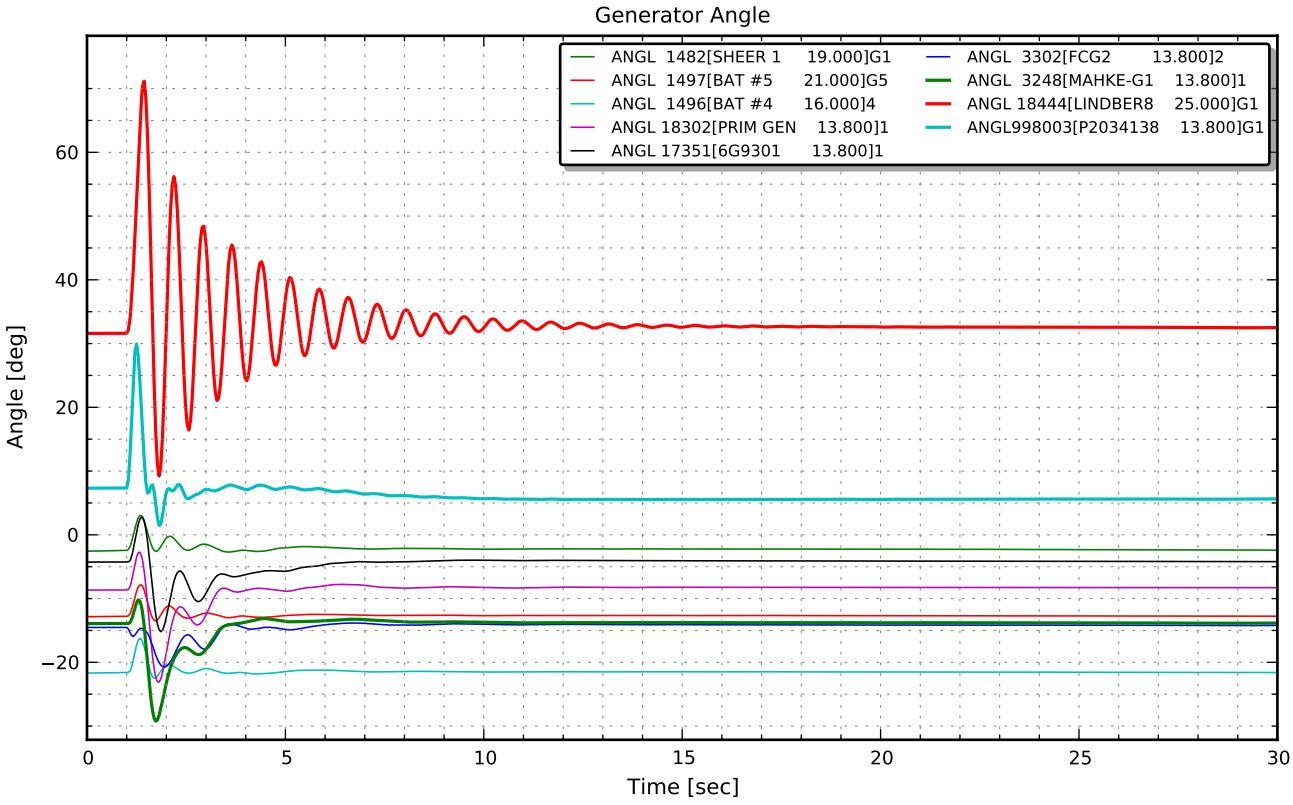
Notes: P2034 Coldlake Area Cogen

Dynamic Stability Analysis

Contingency: 04B - 7L89 Marguerite Lake 826S to Bonnyville 700S
Alternnative: Post-Project Basecase
Scenario: WP

Attachment A5- 3- 8



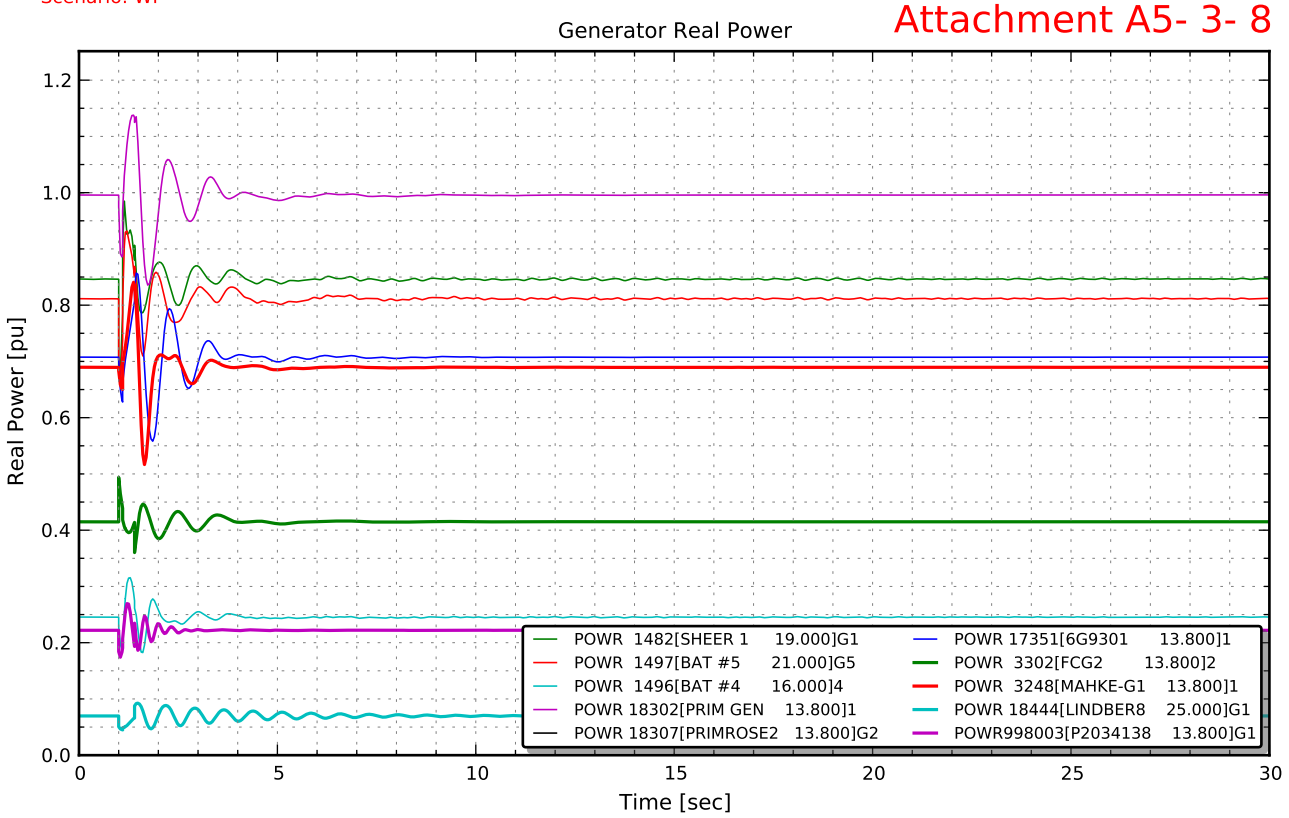


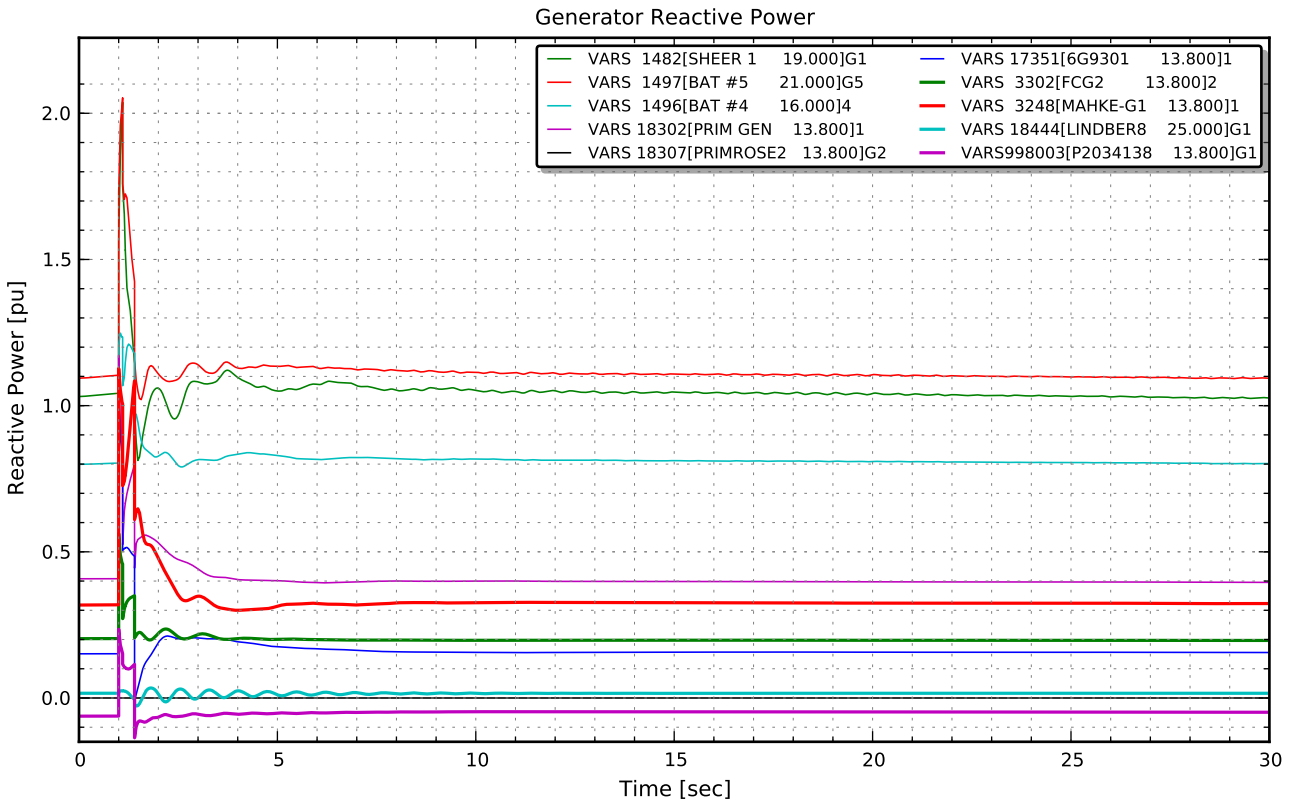
Notes: P2034 Coldlake Area Cogen

Dynamic Stability Analysis

Contingency: 04B - 7L89 Marguerite Lake 826S to Bonnyville 700S
Alternnative: Post-Project Basecase
Scenario: WP

Attachment A5- 3- 8



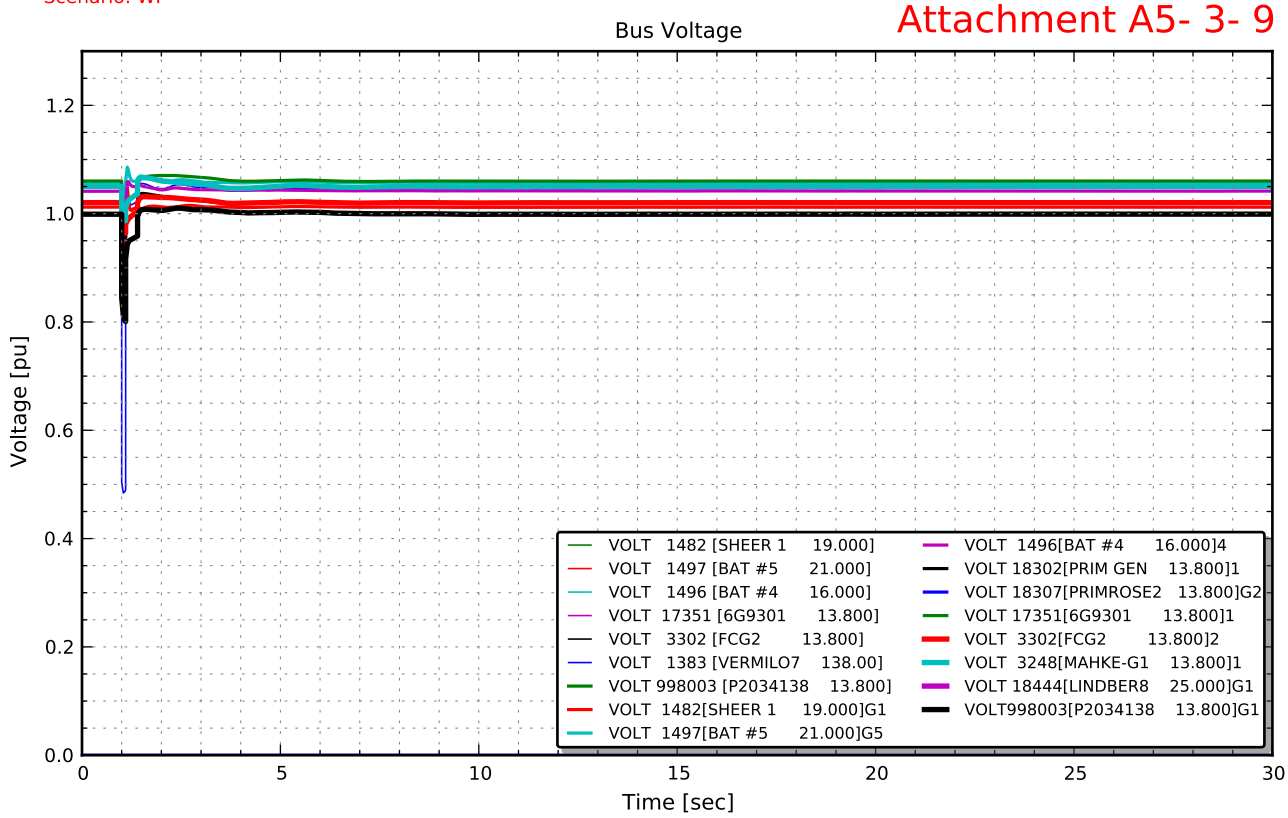


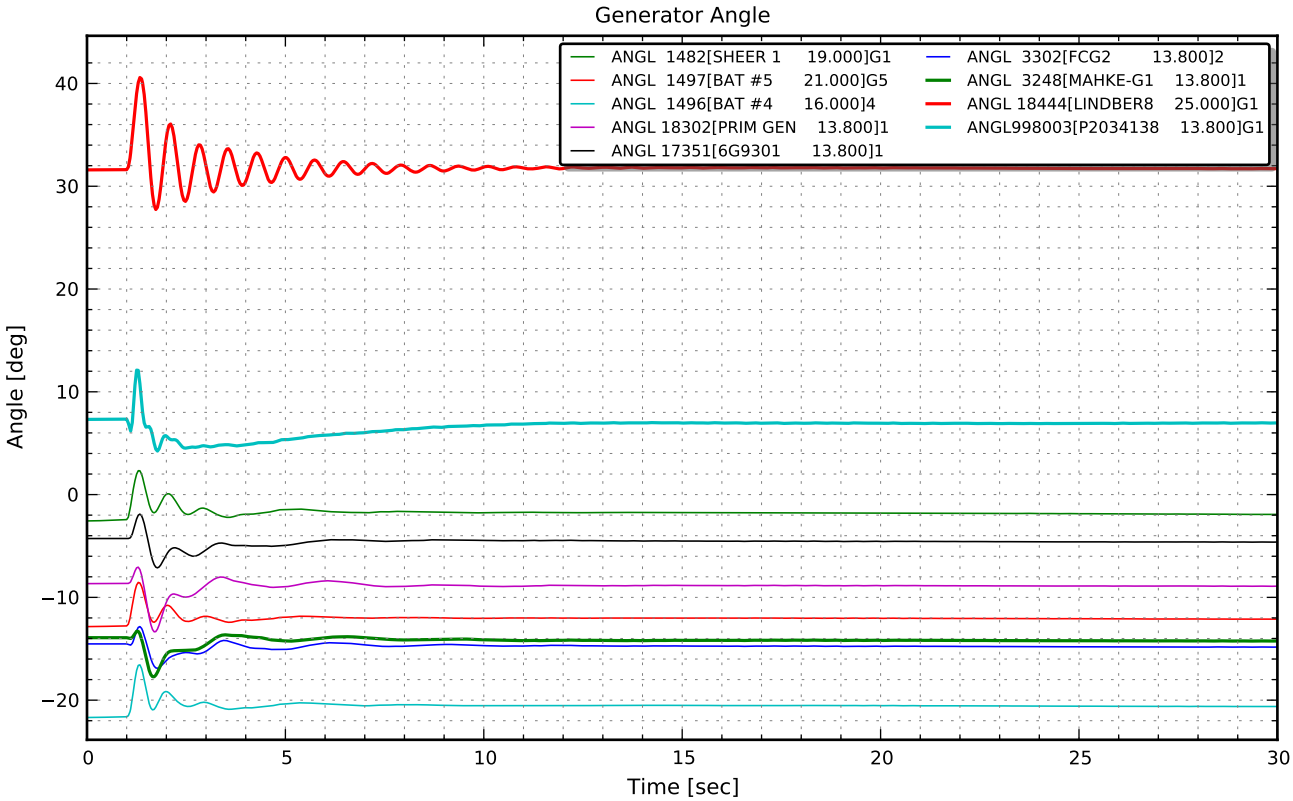
Notes: P2034 Coldlake Area Cogen

Dynamic Stability Analysis

Contingency: 05A - 7L92 Vegreville 709S to Whitby Lake 819S
Alternnative: Post-Project Basecase
Scenario: WP

Attachment A5- 3- 9



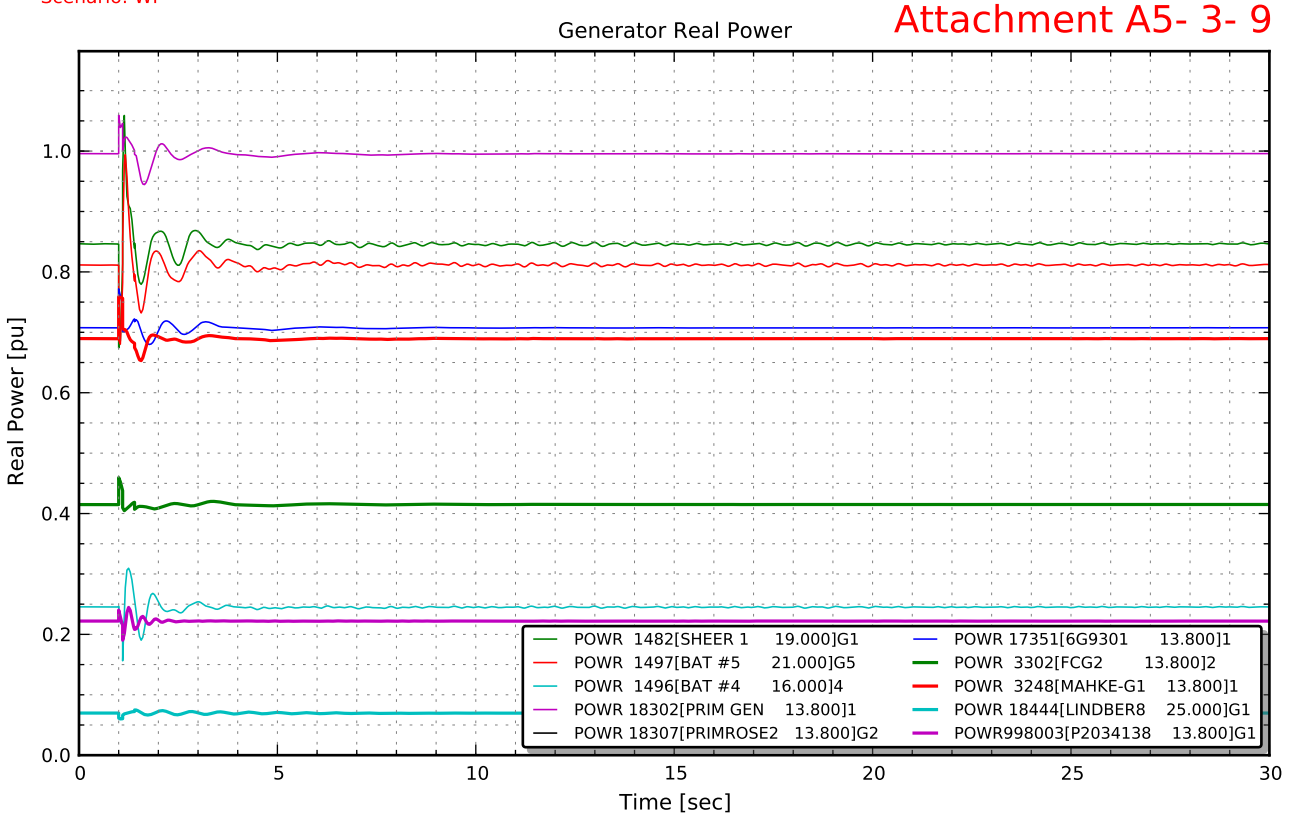


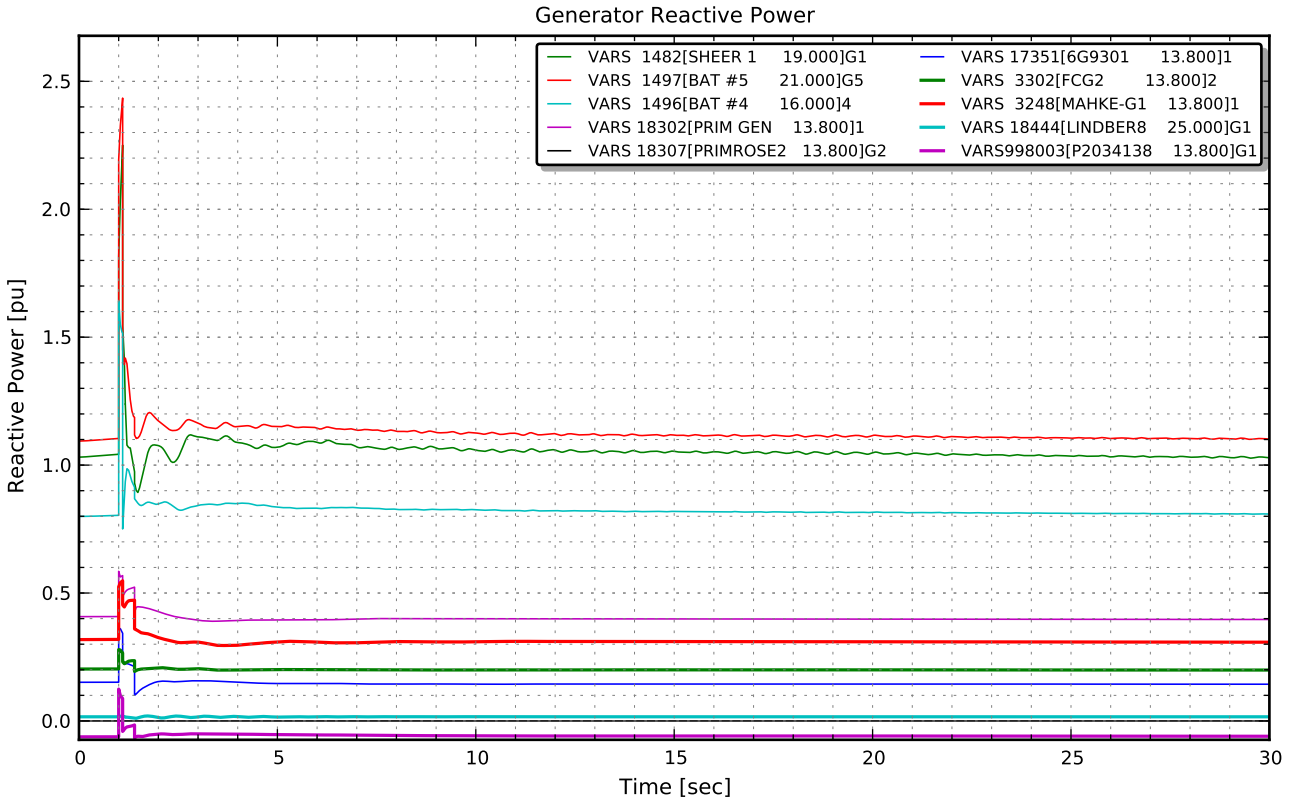
Notes: P2034 Coldlake Area Cogen

Dynamic Stability Analysis

Contingency: 05A - 7L92 Vegreville 709S to Whitby Lake 819S
Alternnative: Post-Project Basecase
Scenario: WP

Attachment A5- 3- 9



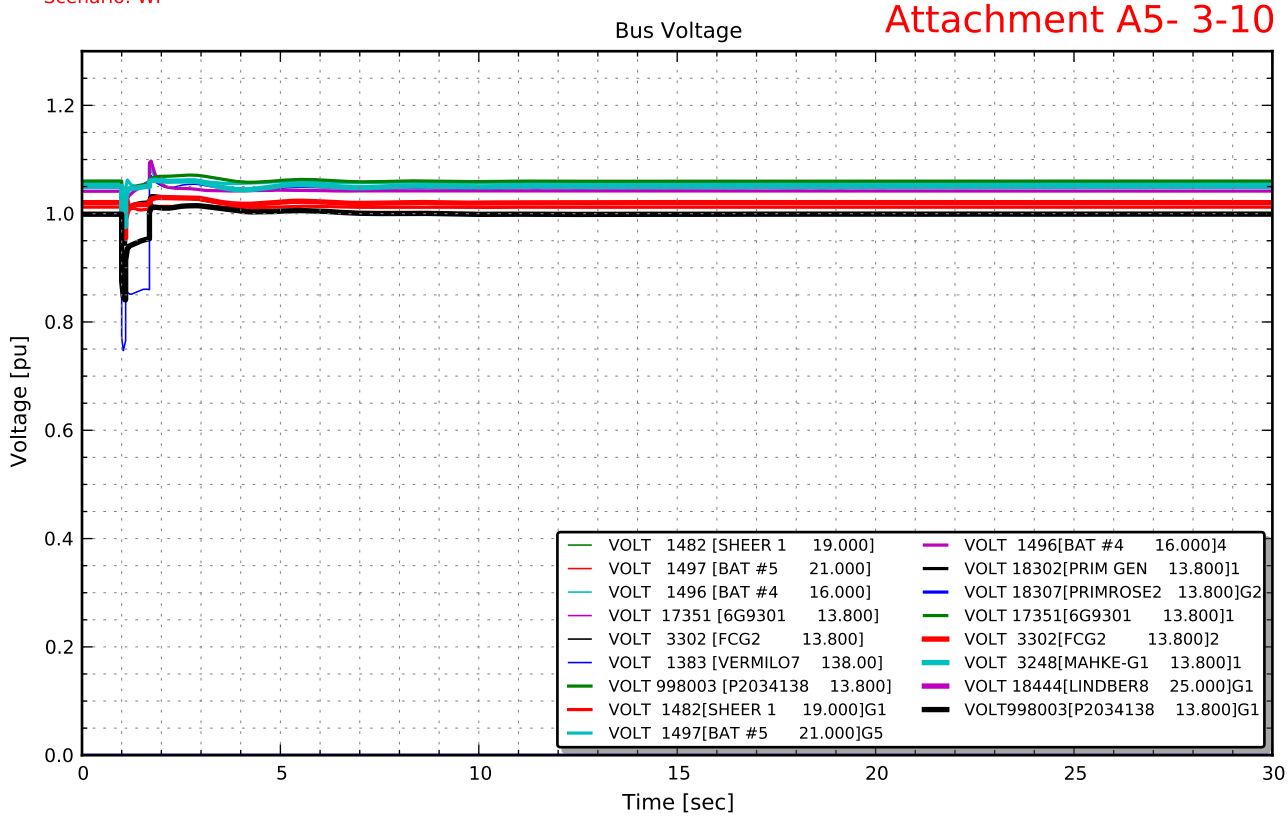


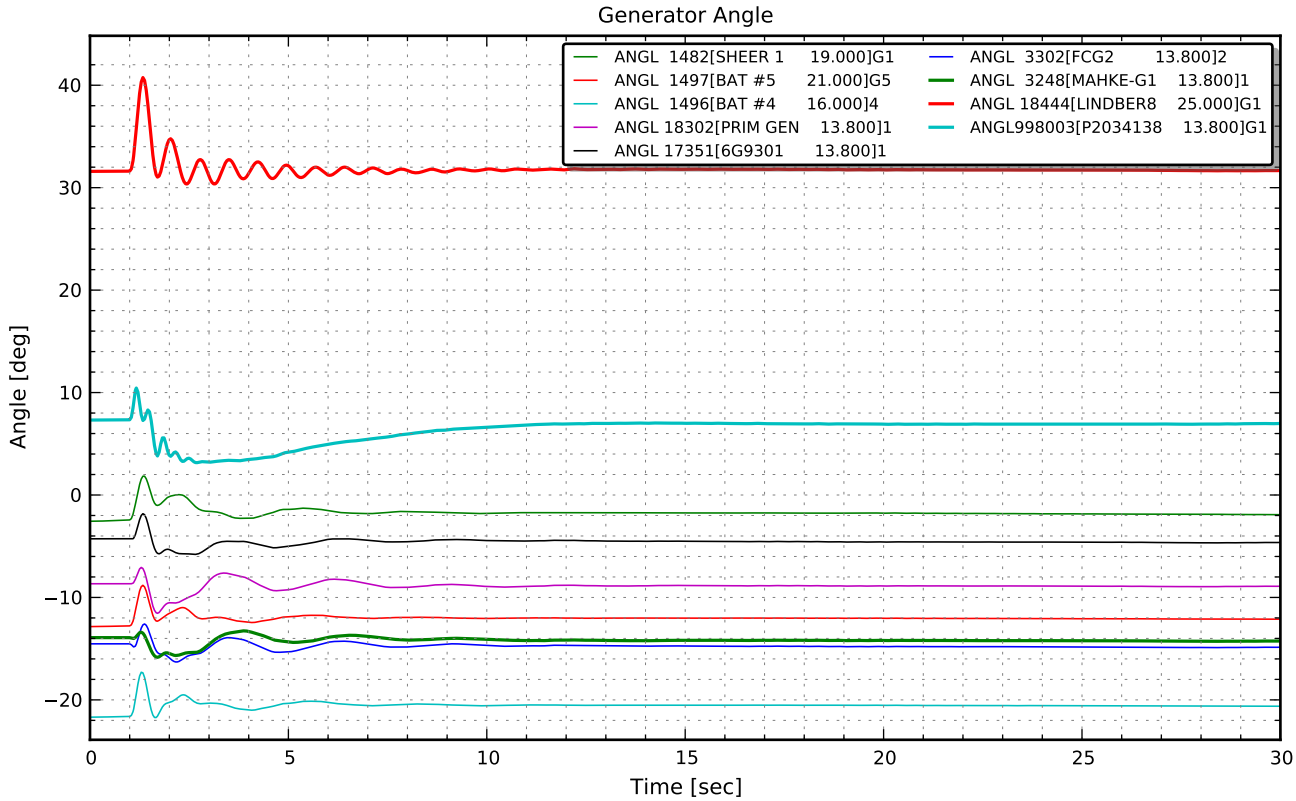
Notes: P2034 Coldlake Area Cogen

Dynamic Stability Analysis

Contingency: 05B - 7L92 Whitby Lake 819S to Vegreville 709S
Alternnative: Post-Project Basecase
Scenario: WP

Attachment A5- 3-10



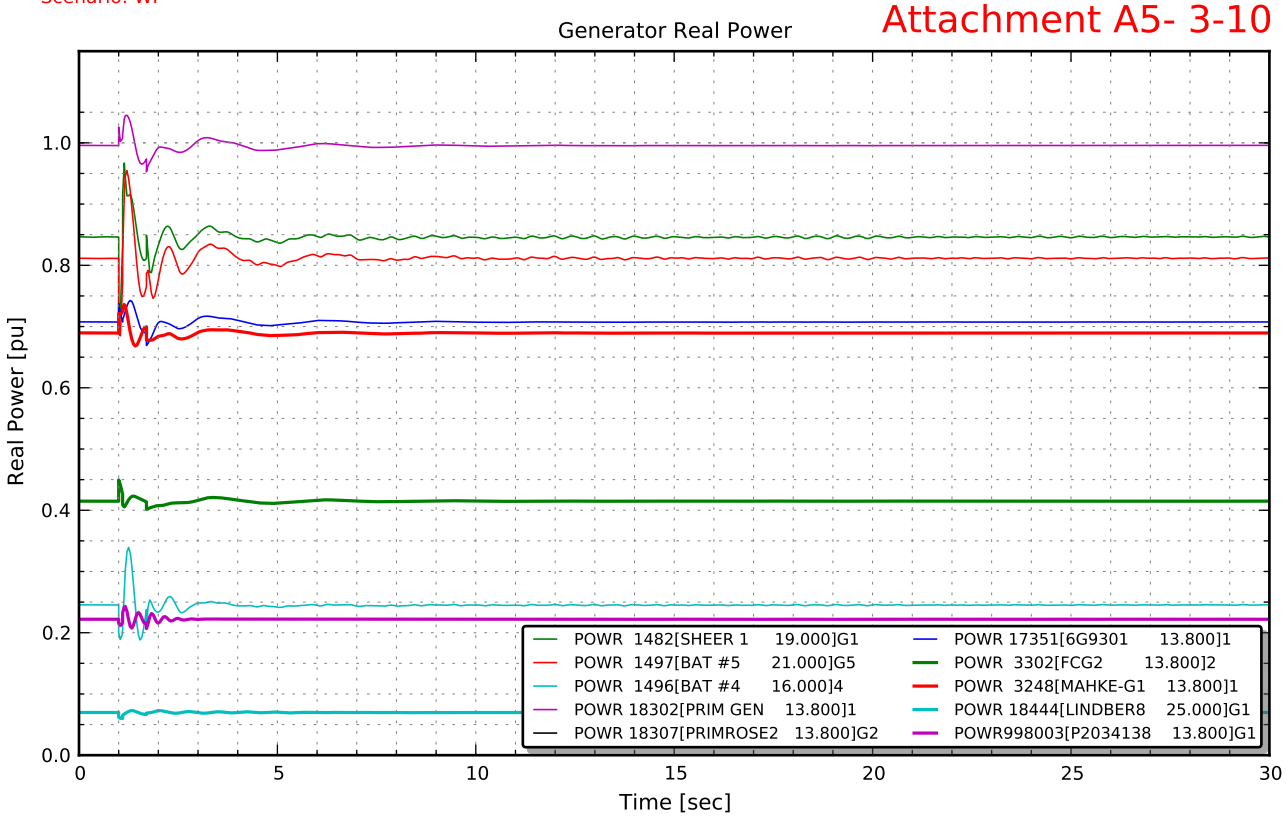


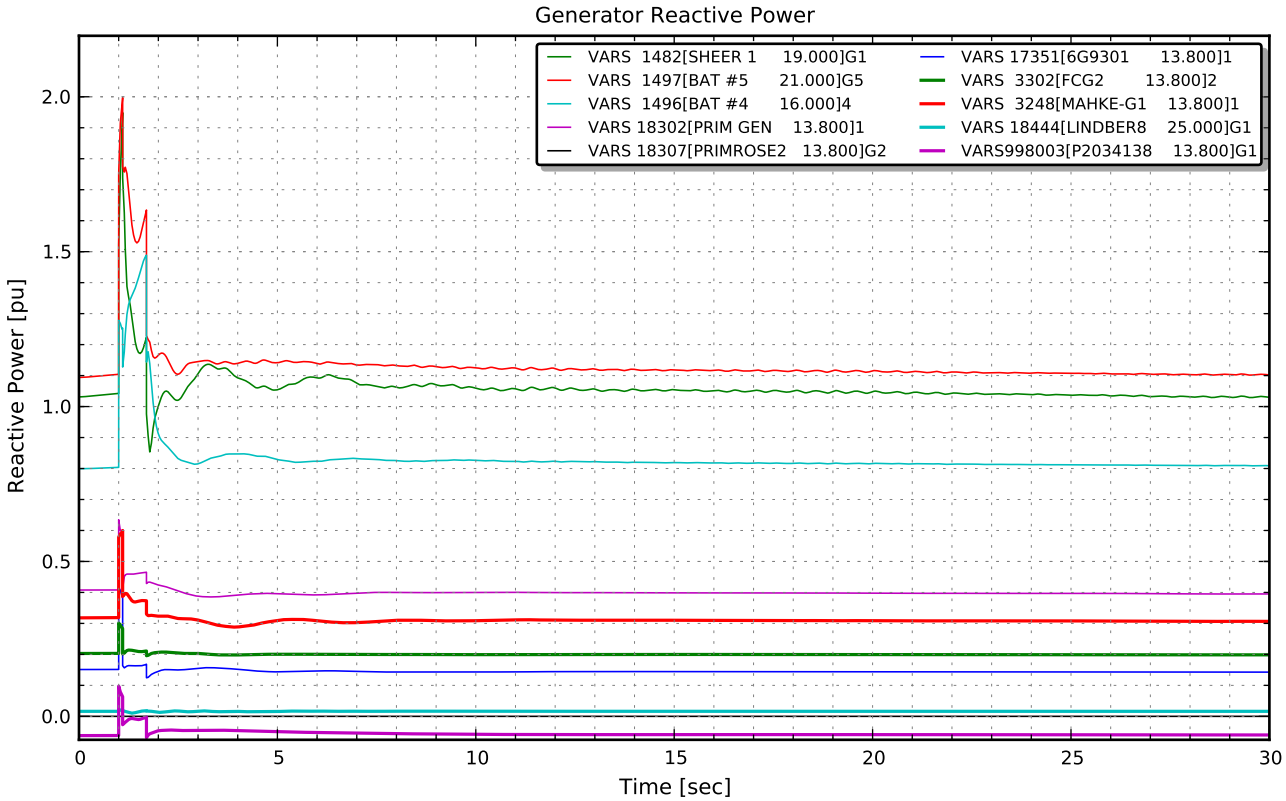
Notes: P2034 Coldlake Area Cogen

Dynamic Stability Analysis

Contingency: 05B - 7L92 Whitby Lake 819S to Vegreville 709S
Alternnative: Post-Project Basecase
Scenario: WP

Attachment A5- 3-10



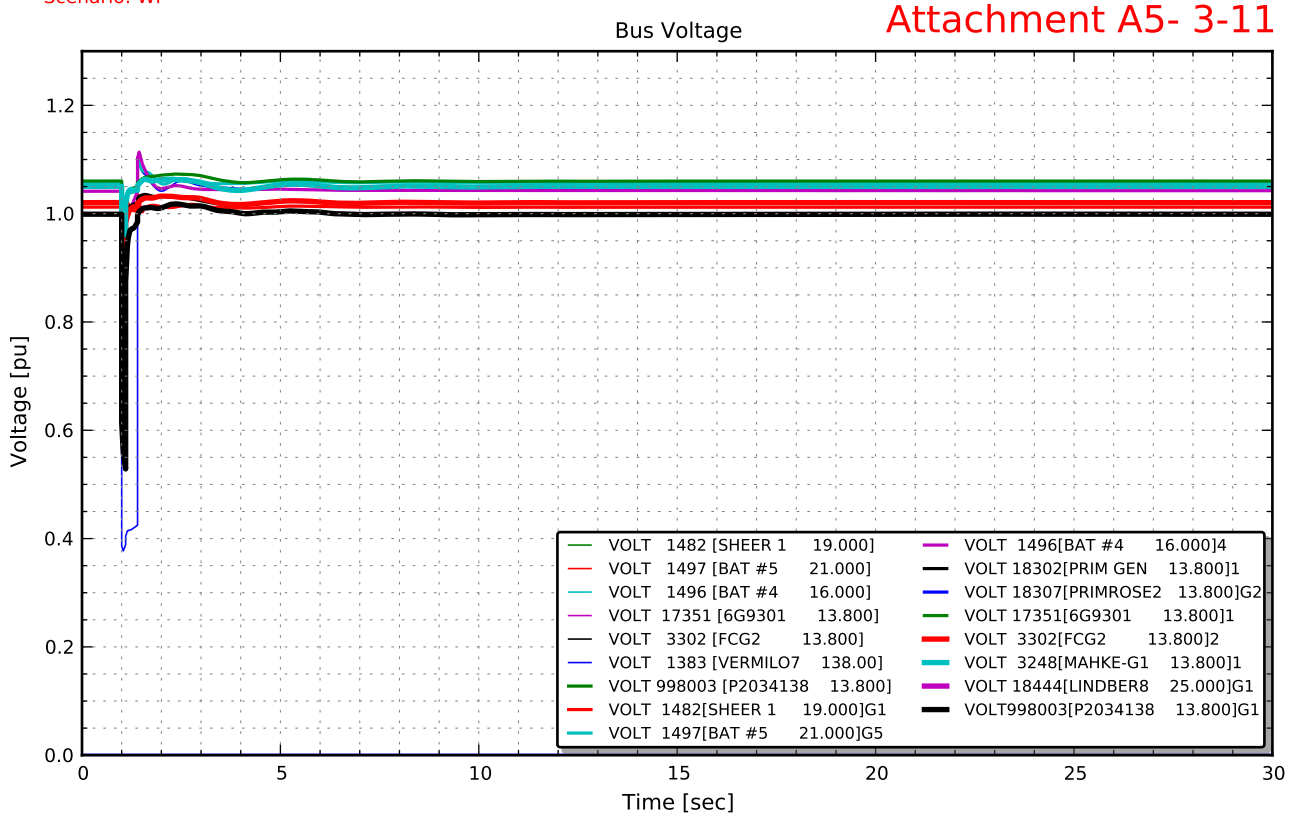


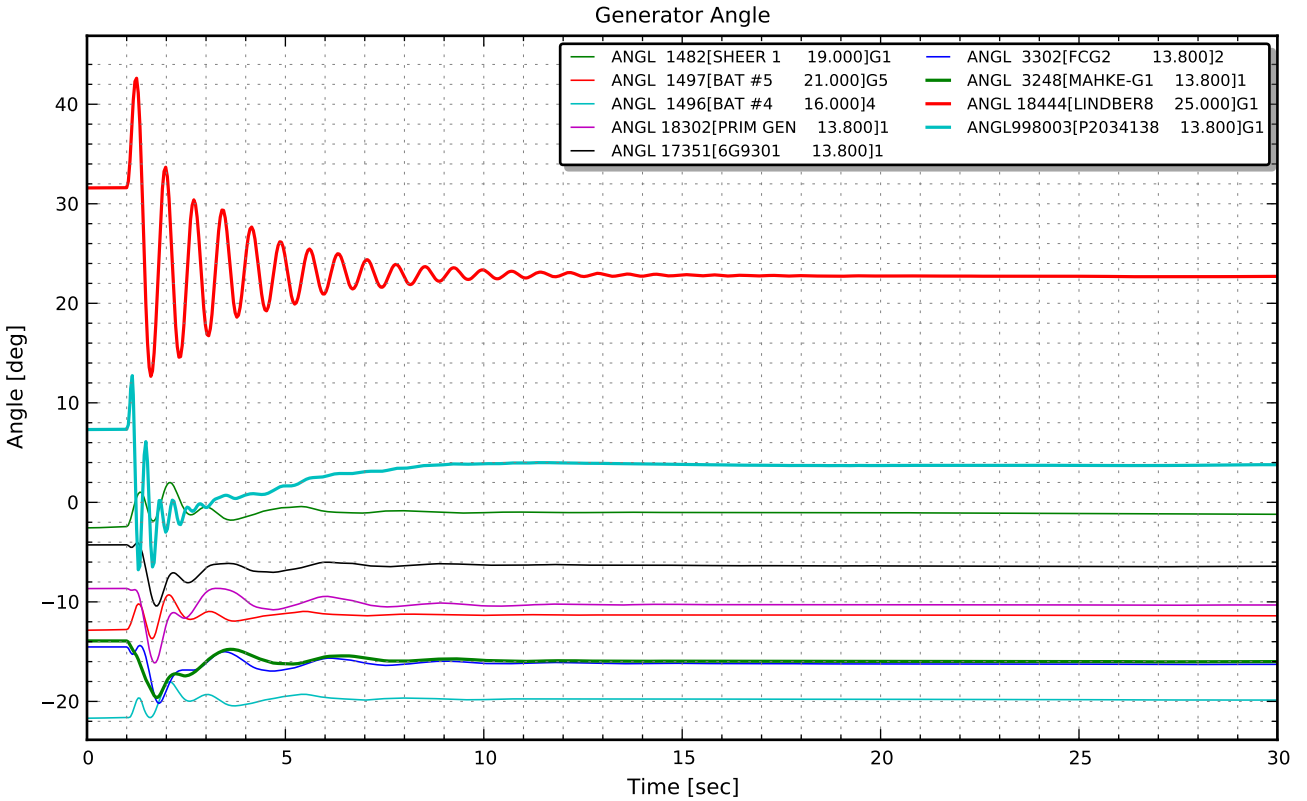
Notes: P2034 Coldlake Area Cogen

Dynamic Stability Analysis

Contingency: 06A - 7L117 Irish Creek 706S to Vermilion 710S
Alternnative: Post-Project Basecase
Scenario: WP

Attachment A5- 3-11



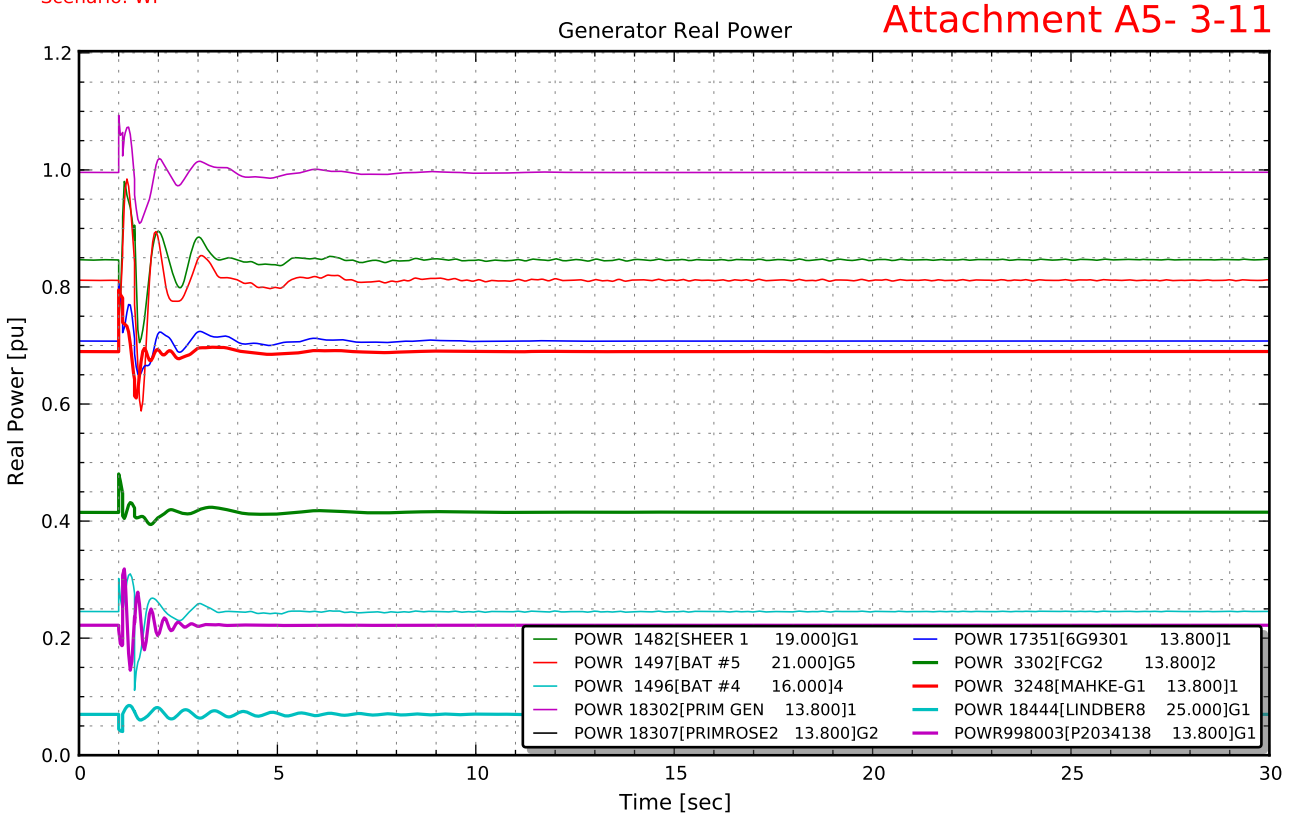


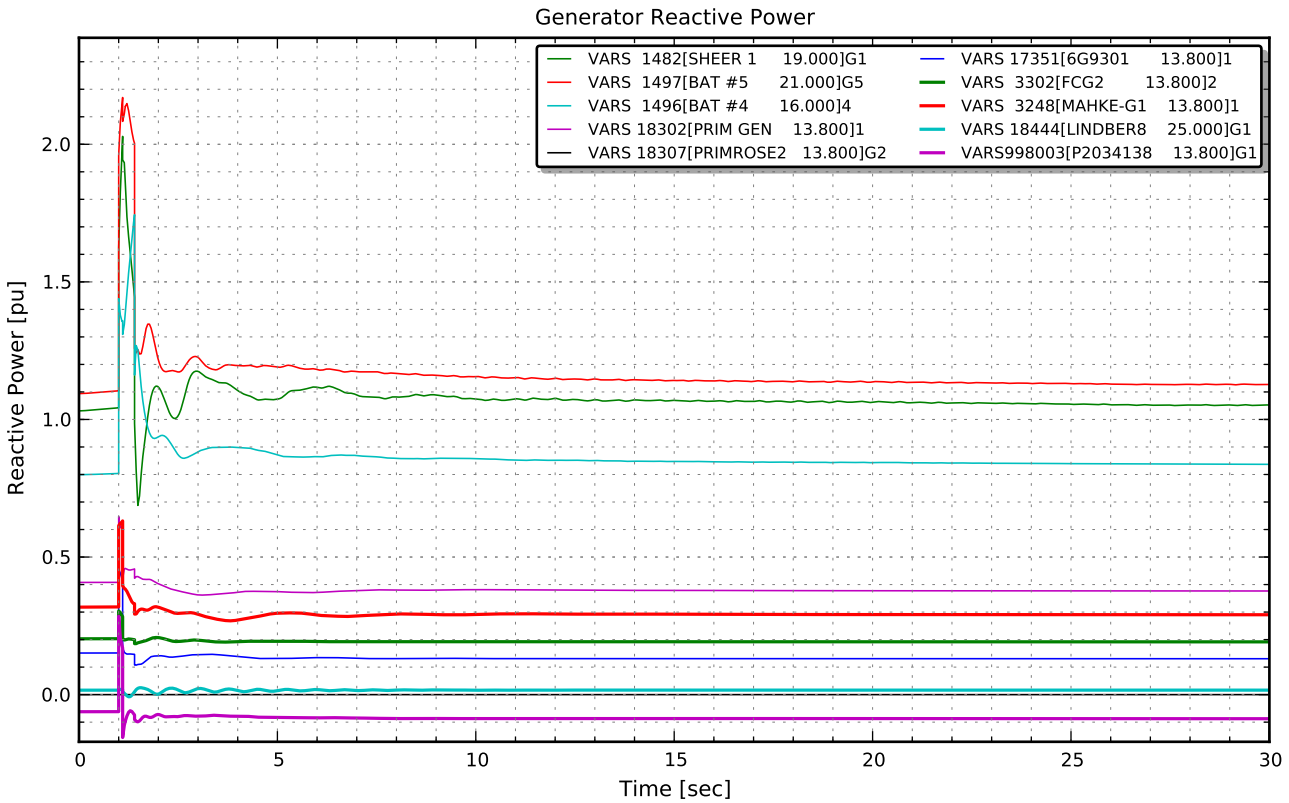
Notes: P2034 Coldlake Area Cogen

Dynamic Stability Analysis

Contingency: 06A - 7L117 Irish Creek 706S to Vermilion 710S
Alternnative: Post-Project Basecase
Scenario: WP

Attachment A5- 3-11



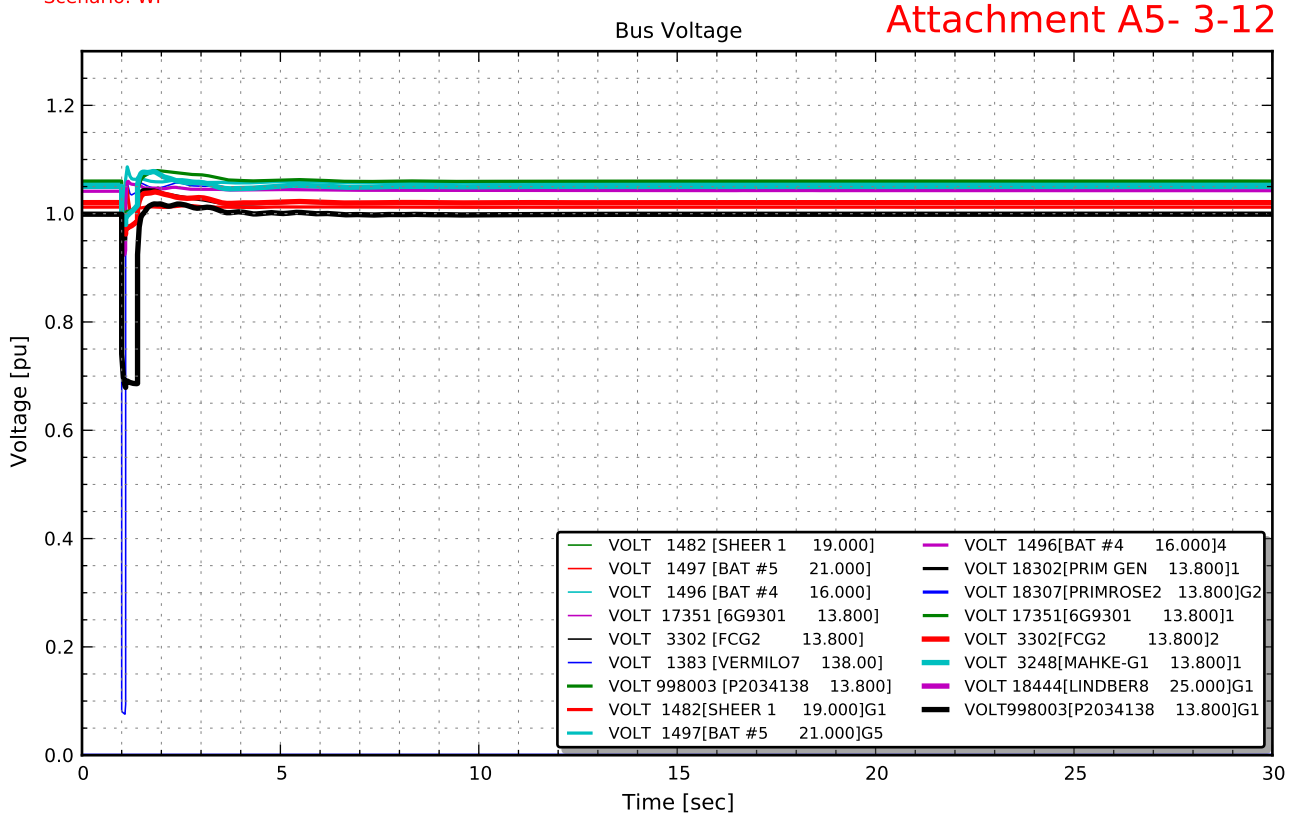


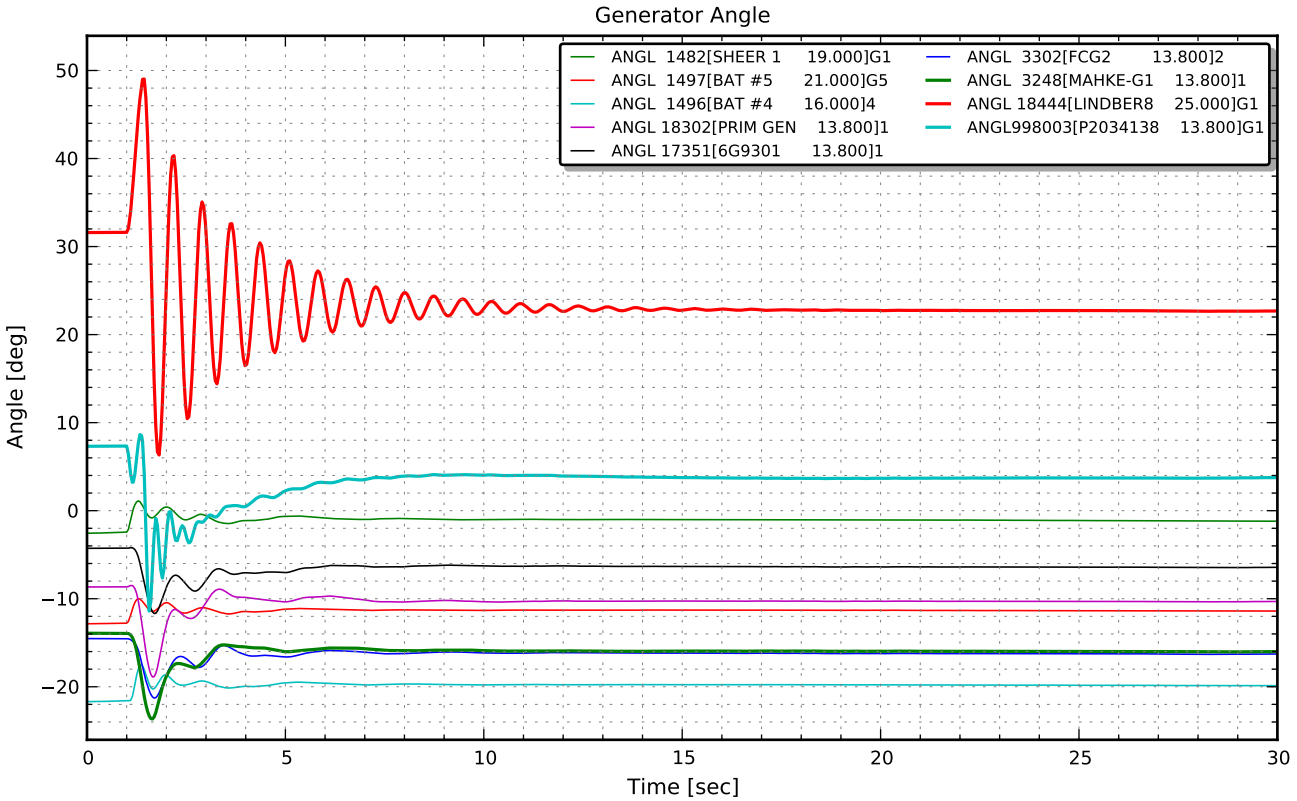
Notes: P2034 Coldlake Area Cogen

Dynamic Stability Analysis

Contingency: 06B - 7L117 Vermilion 710S to Irish Creek 706S
Alternnative: Post-Project Basecase
Scenario: WP

Attachment A5- 3-12



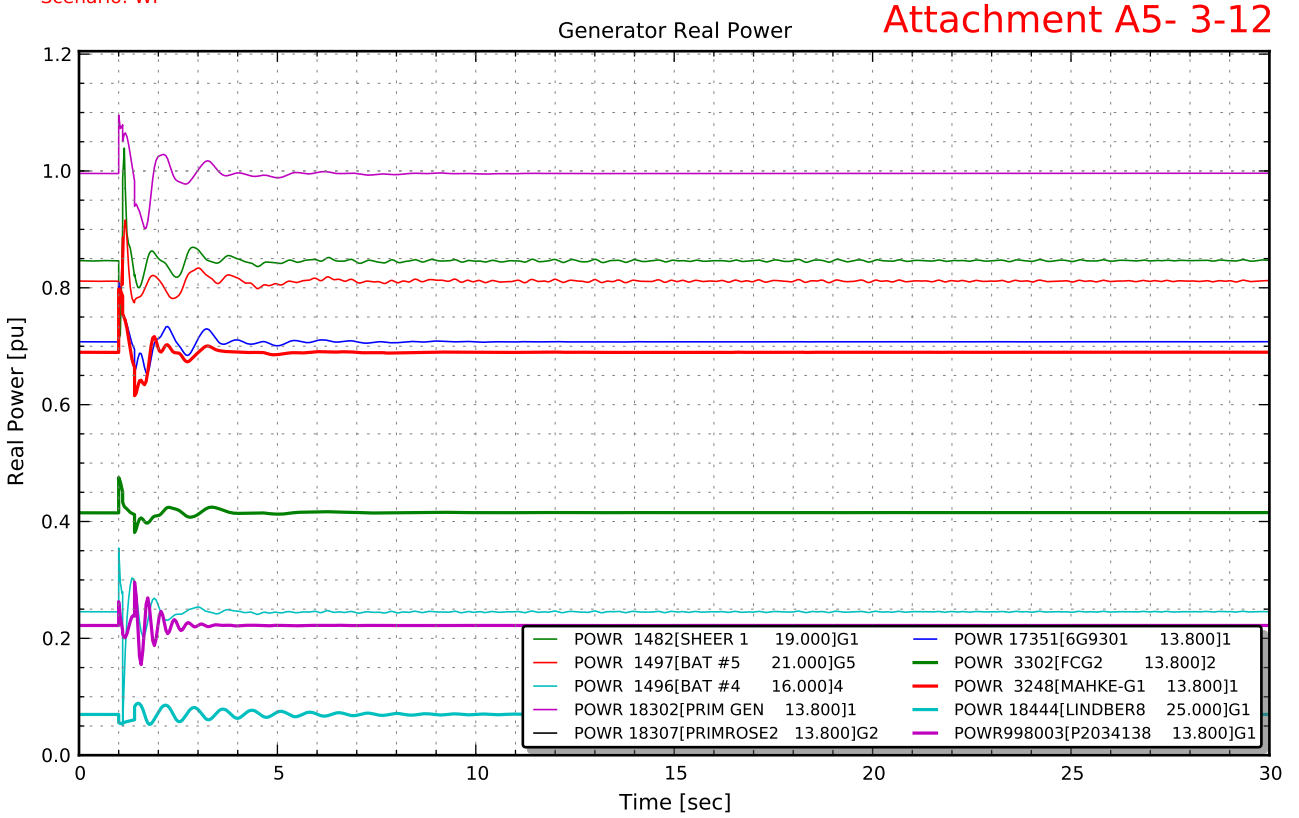


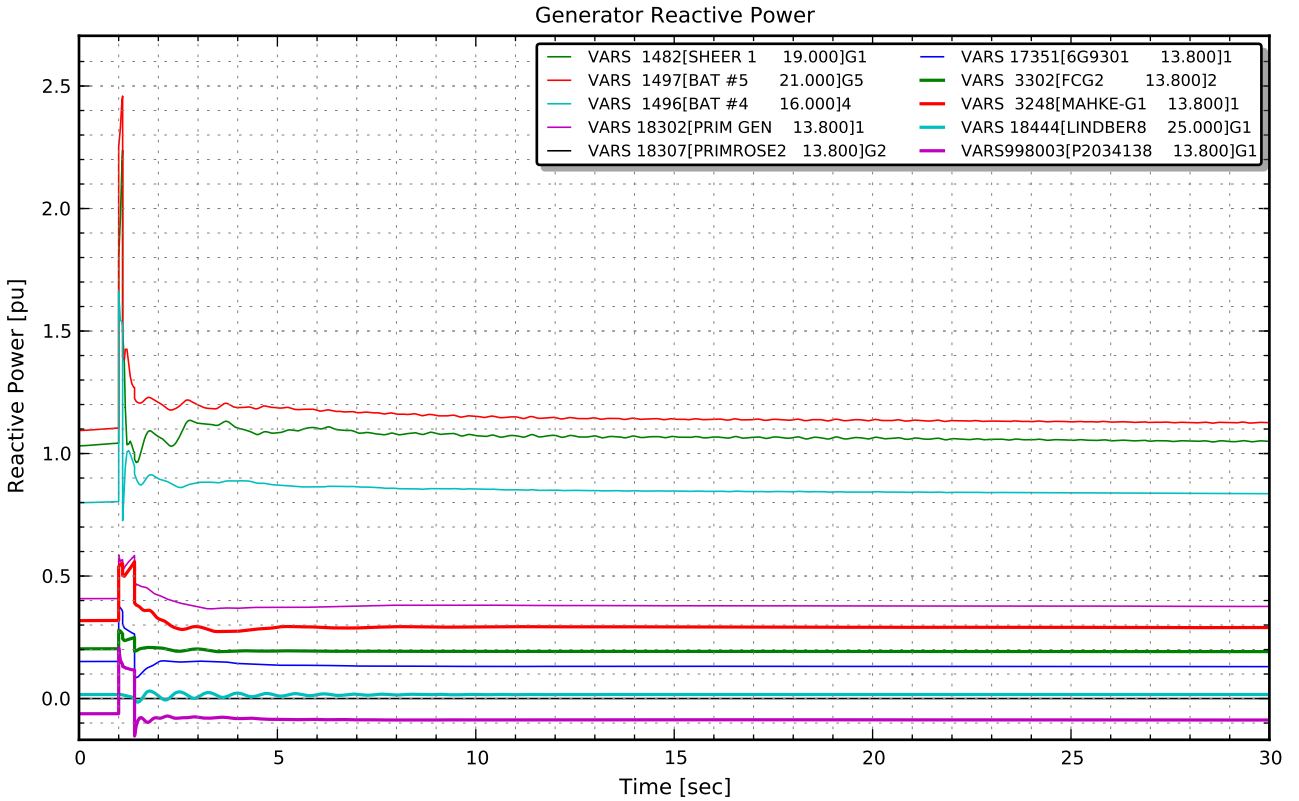
Notes: P2034 Coldlake Area Cogen

Dynamic Stability Analysis

Contingency: 06B - 7L117 Vermilion 710S to Irish Creek 706S
Alternnative: Post-Project Basecase
Scenario: WP

Attachment A5- 3-12



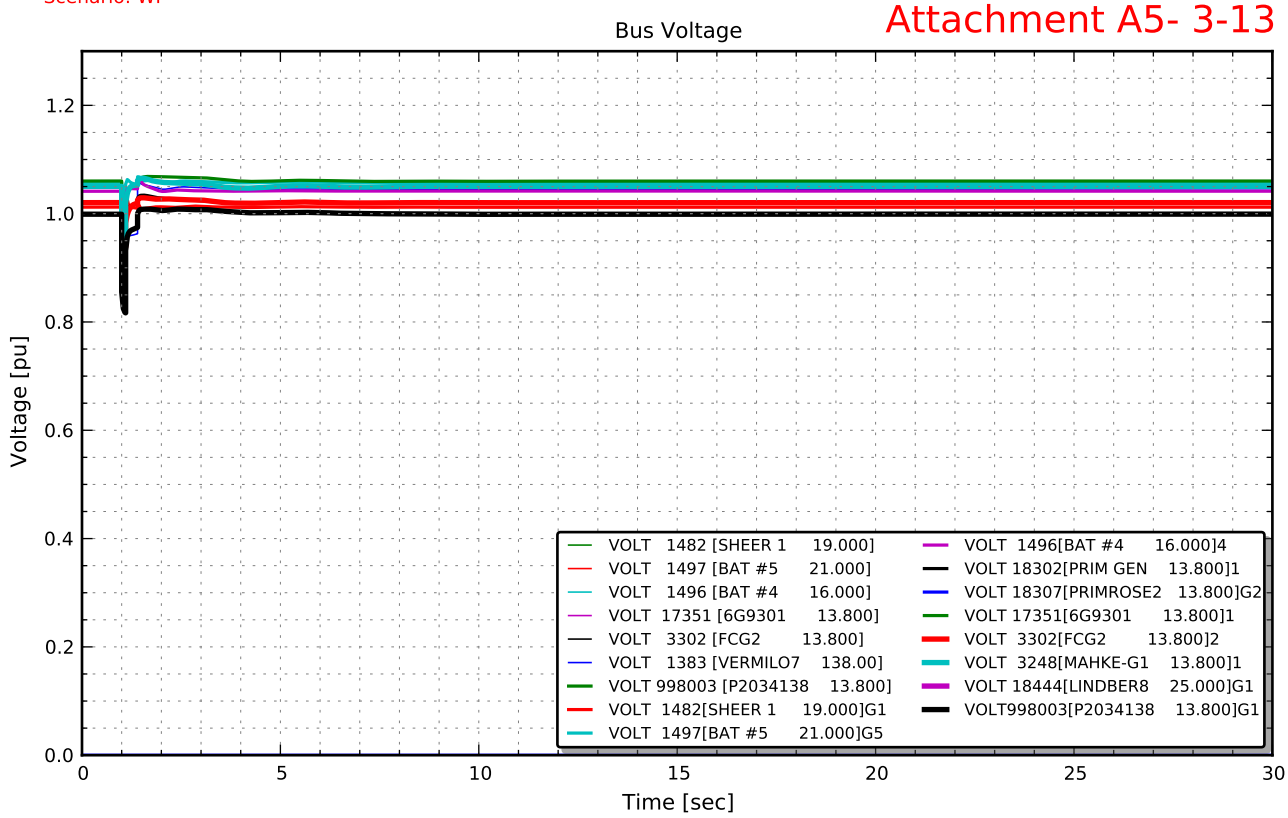


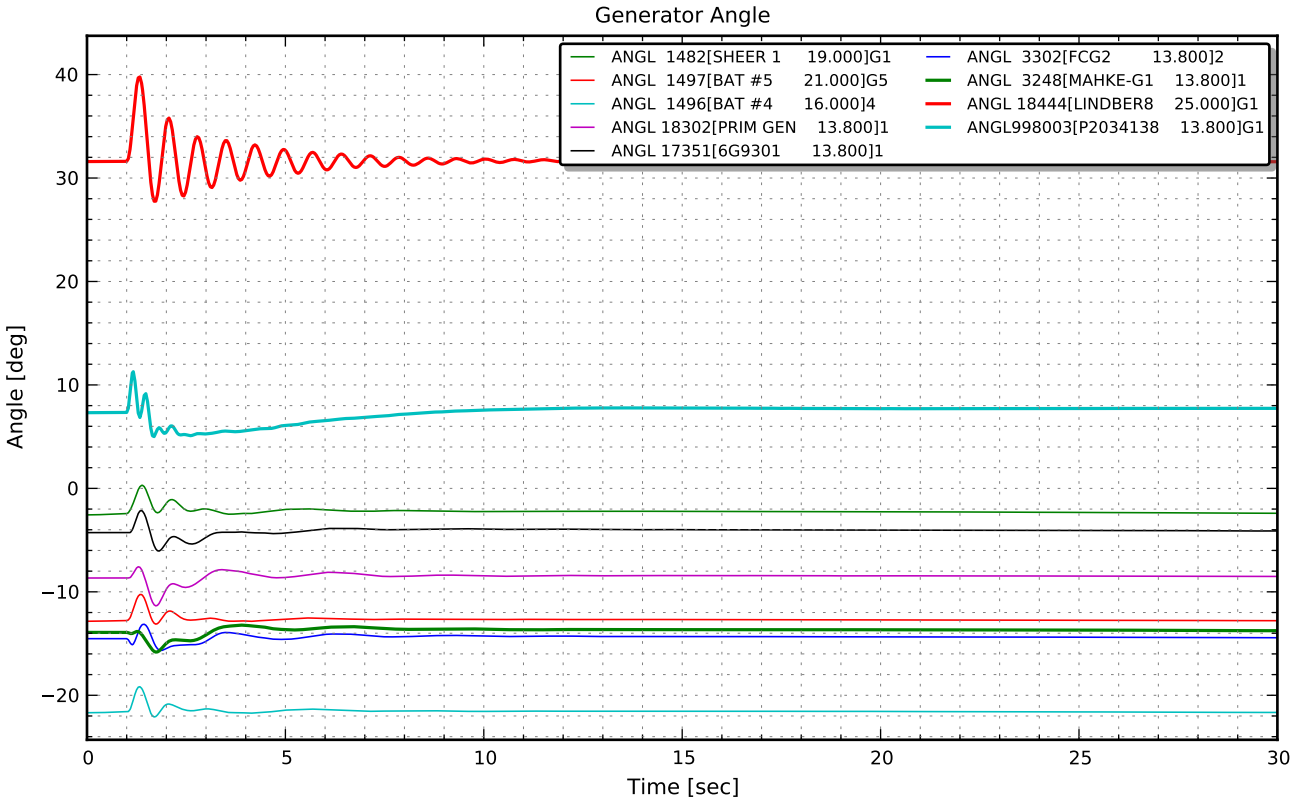
Notes: P2034 Coldlake Area Cogen

Dynamic Stability Analysis

Contingency: 07A - 7L139 St. Paul 707S to Whitby Lake 819S
Alternnative: Post-Project Basecase
Scenario: WP

Attachment A5- 3-13



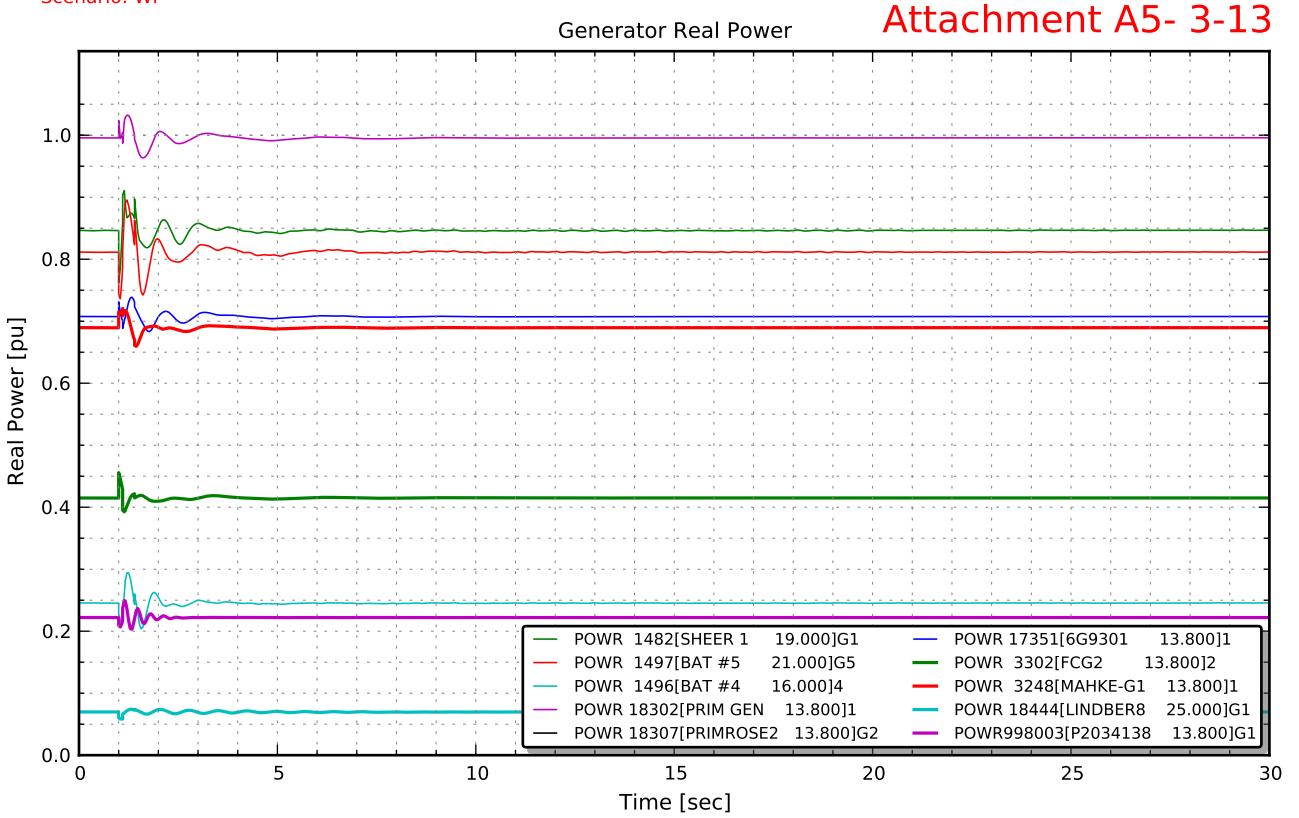


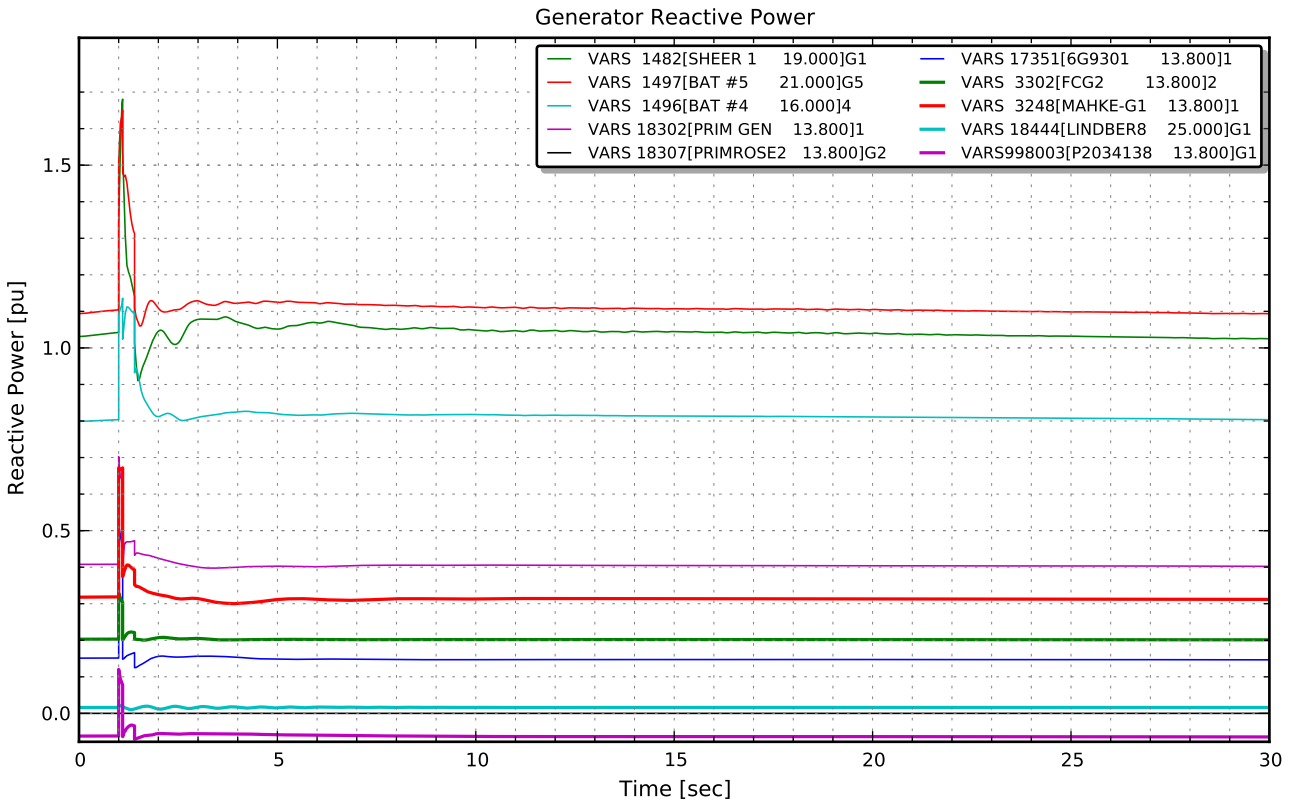
Notes: P2034 Coldlake Area Cogen

Dynamic Stability Analysis

Contingency: 07A - 7L139 St. Paul 707S to Whitby Lake 819S
Alternnative: Post-Project Basecase
Scenario: WP

Attachment A5- 3-13



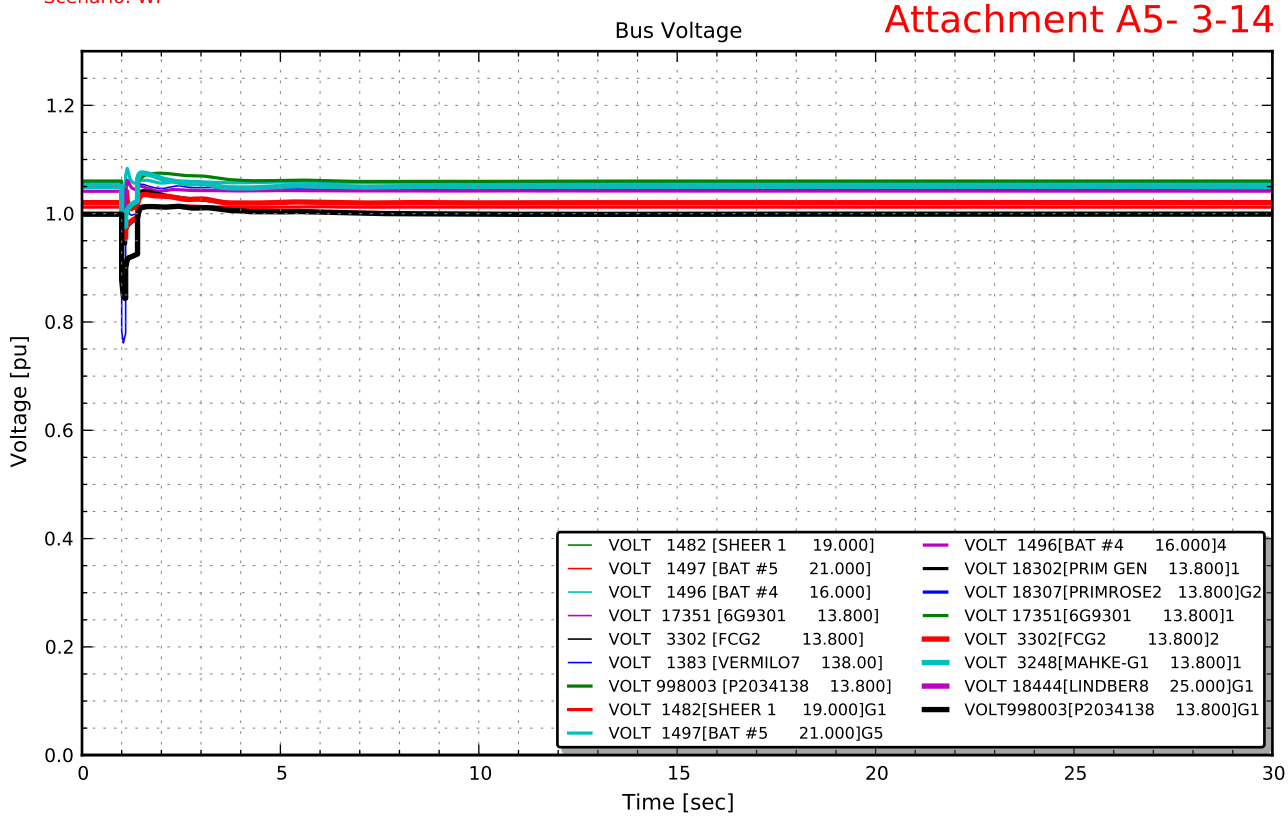


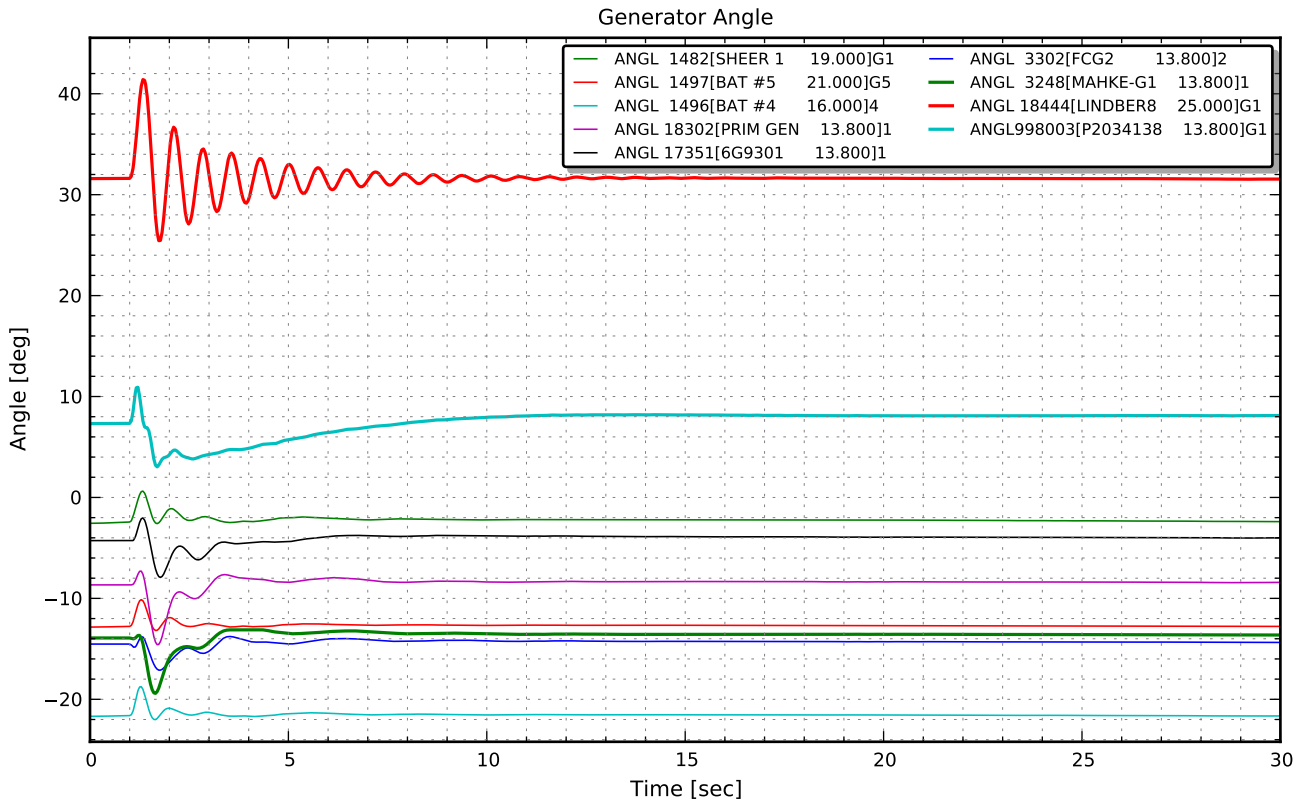
Notes: P2034 Coldlake Area Cogen

Dynamic Stability Analysis

Contingency: 07B - 7L139 Whitby Lake 819S to St. Paul 707S
Alternnative: Post-Project Basecase
Scenario: WP

Attachment A5- 3-14



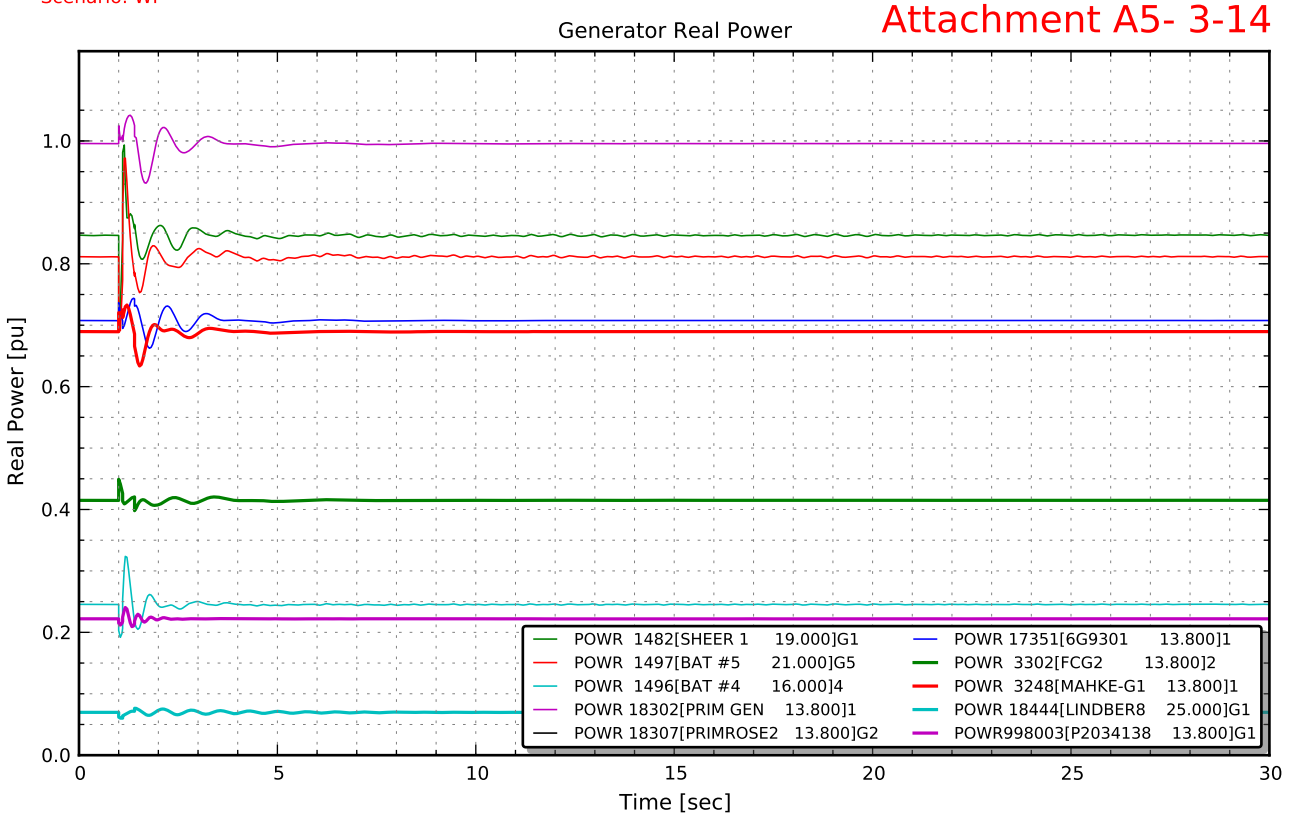


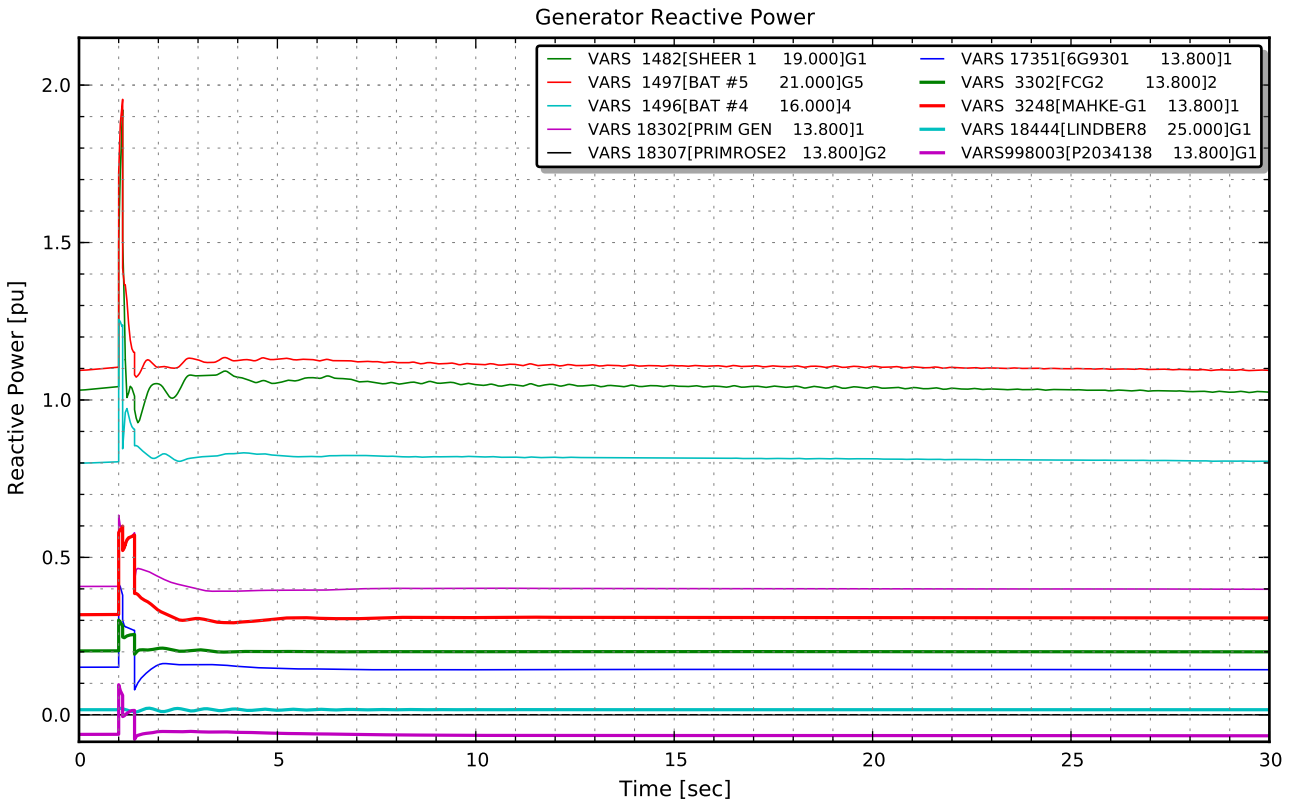
Notes: P2034 Coldlake Area Cogen

Dynamic Stability Analysis

Contingency: 07B - 7L139 Whitby Lake 819S to St. Paul 707S
Alternnative: Post-Project Basecase
Scenario: WP

Attachment A5- 3-14



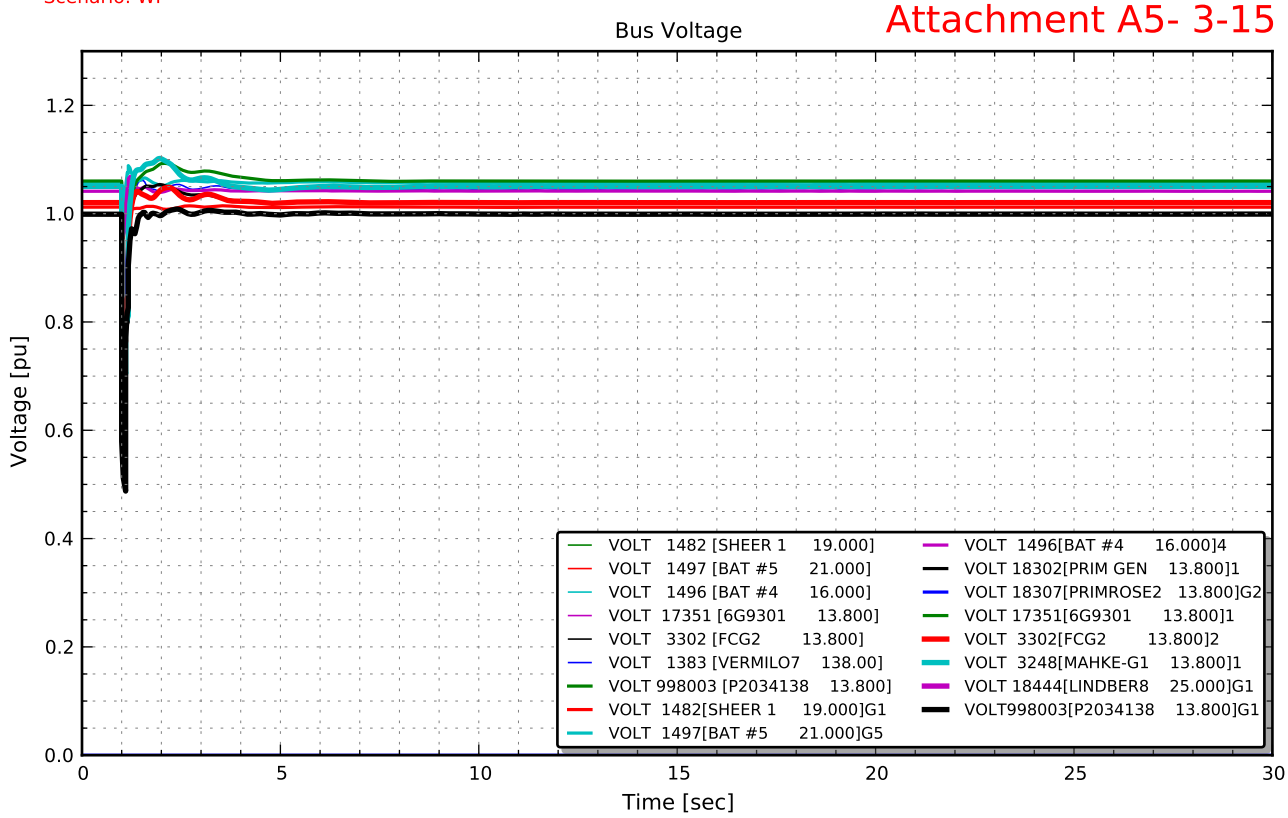


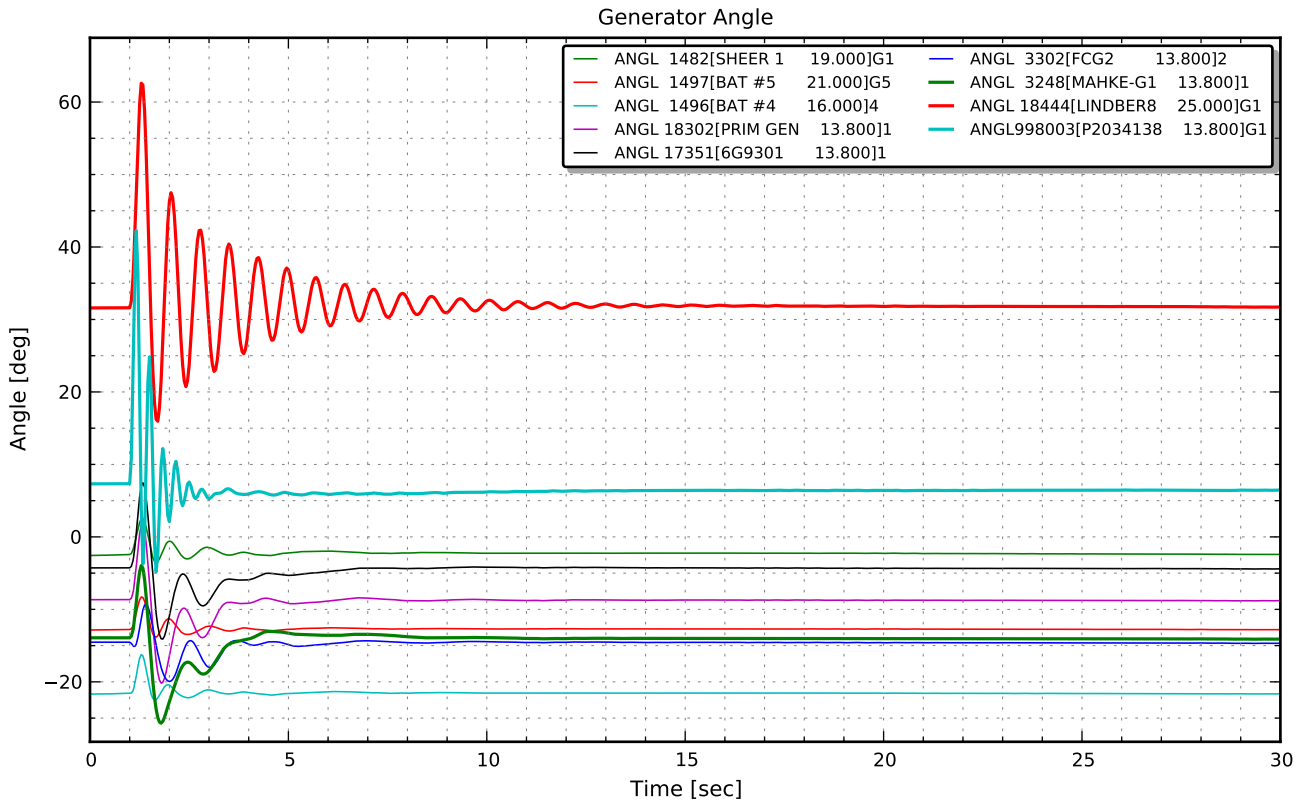
Notes: P2034 Coldlake Area Cogen

Dynamic Stability Analysis

Contingency: 08A - 7L146 Bonnyville 700S to Bourque 970S
Alternnative: Post-Project Basecase
Scenario: WP

Attachment A5- 3-15



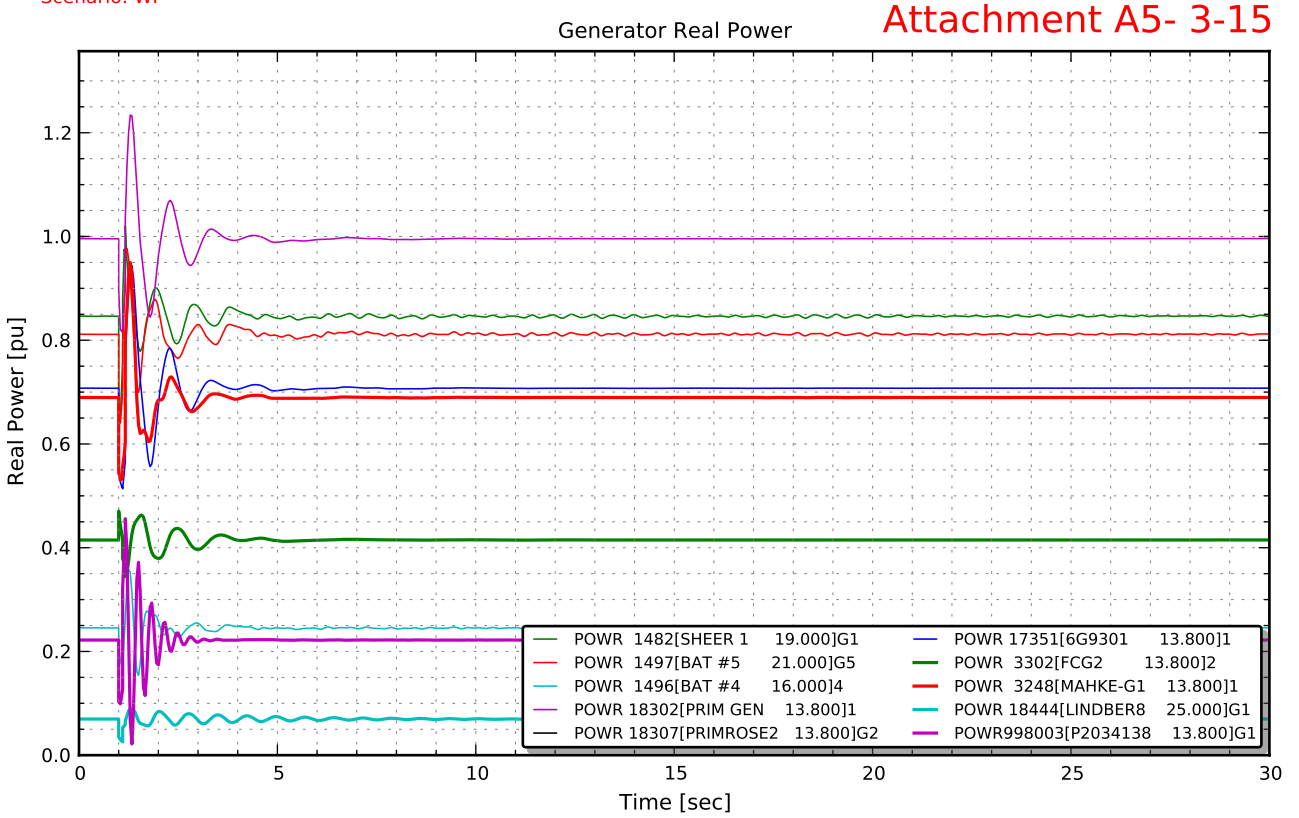


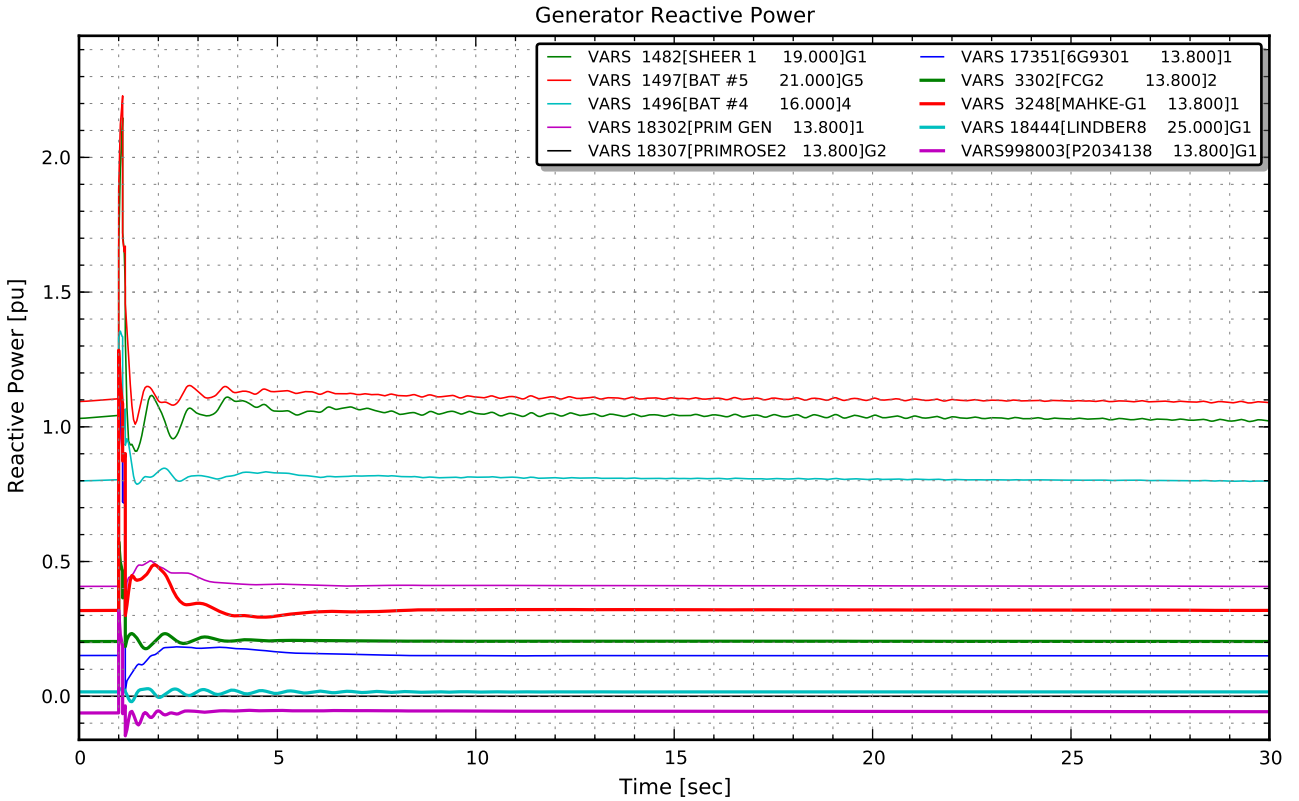
Notes: P2034 Coldlake Area Cogen

Dynamic Stability Analysis

Contingency: 08A - 7L146 Bonnyville 700S to Bourque 970S
Alternnative: Post-Project Basecase
Scenario: WP

Attachment A5- 3-15



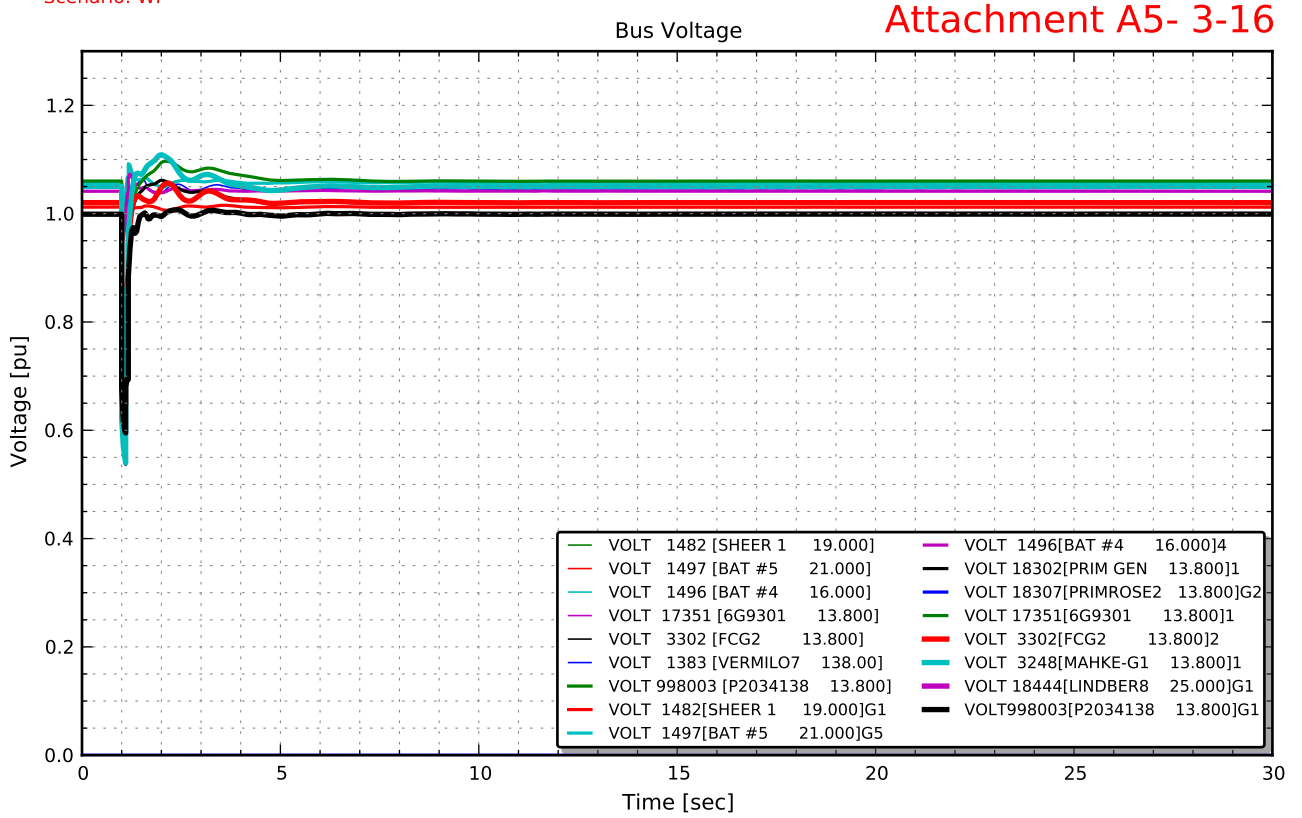


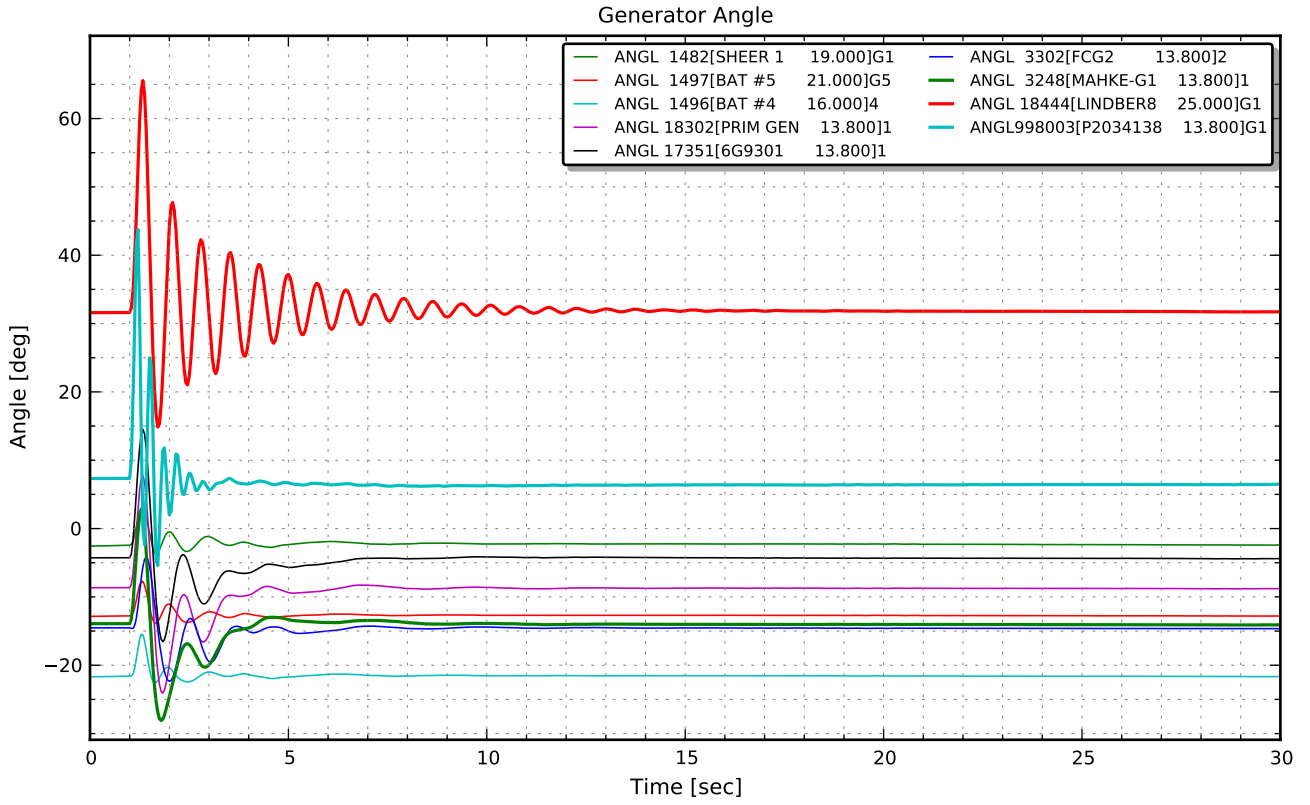
Notes: P2034 Coldlake Area Cogen

Dynamic Stability Analysis

Contingency: 08B - 7L146 Bourque 970S to Bonnyville 700S
Alternnative: Post-Project Basecase
Scenario: WP

Attachment A5- 3-16



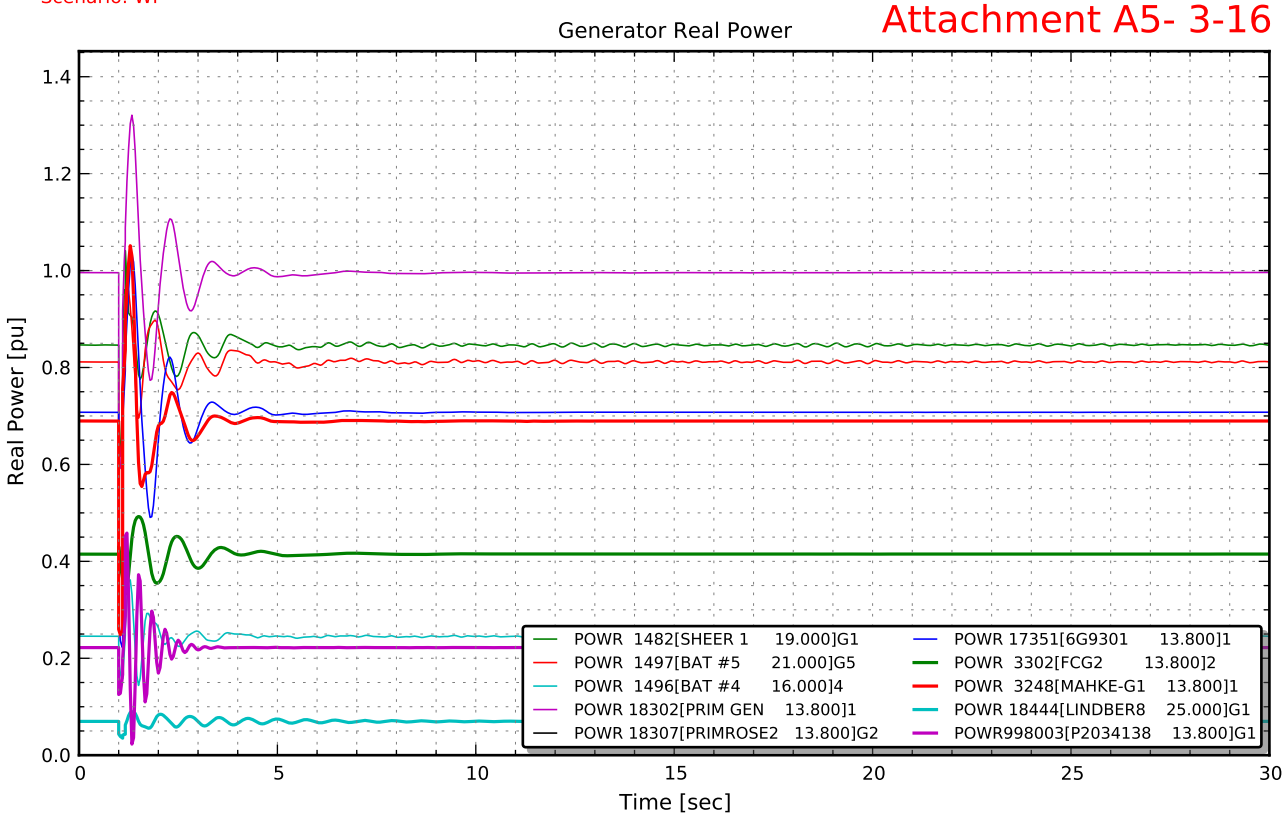


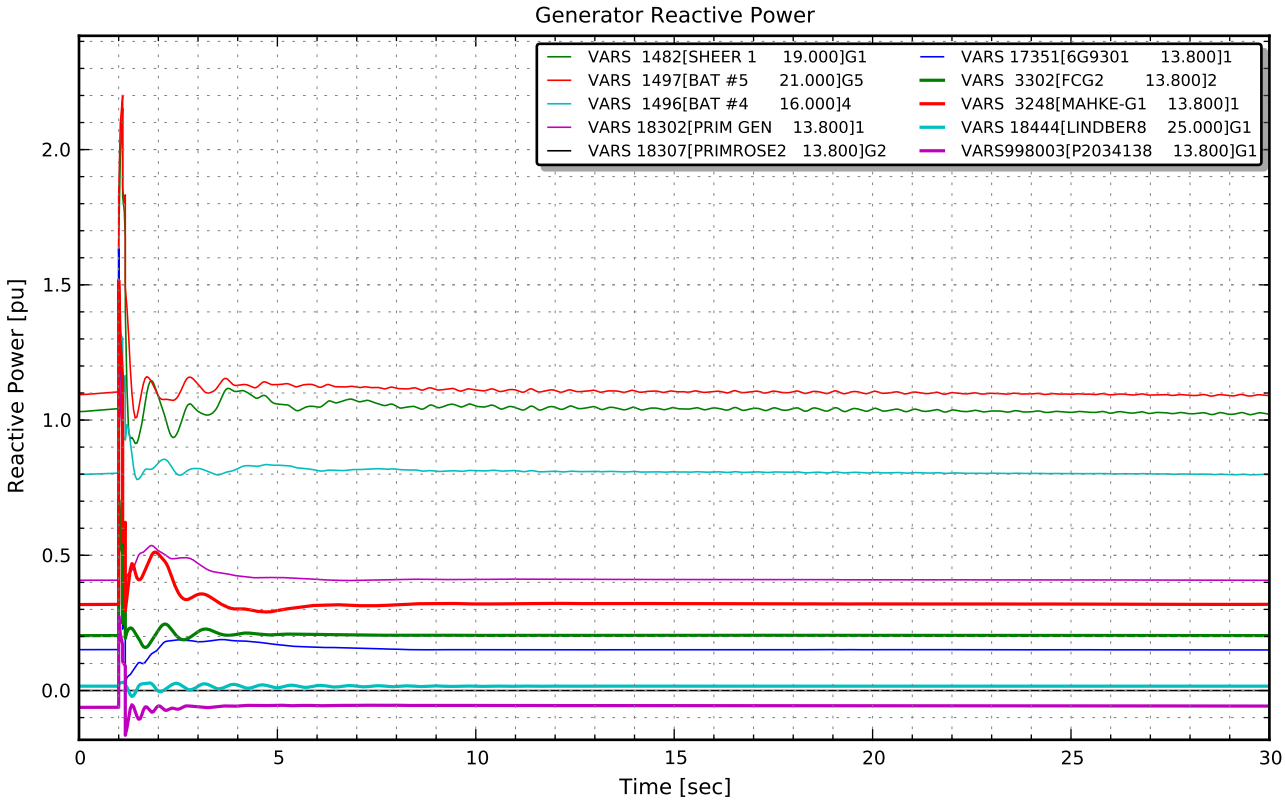
Notes: P2034 Coldlake Area Cogen

Dynamic Stability Analysis

Contingency: 08B - 7L146 Bourque 970S to Bonnyville 700S
Alternnative: Post-Project Basecase
Scenario: WP

Attachment A5- 3-16



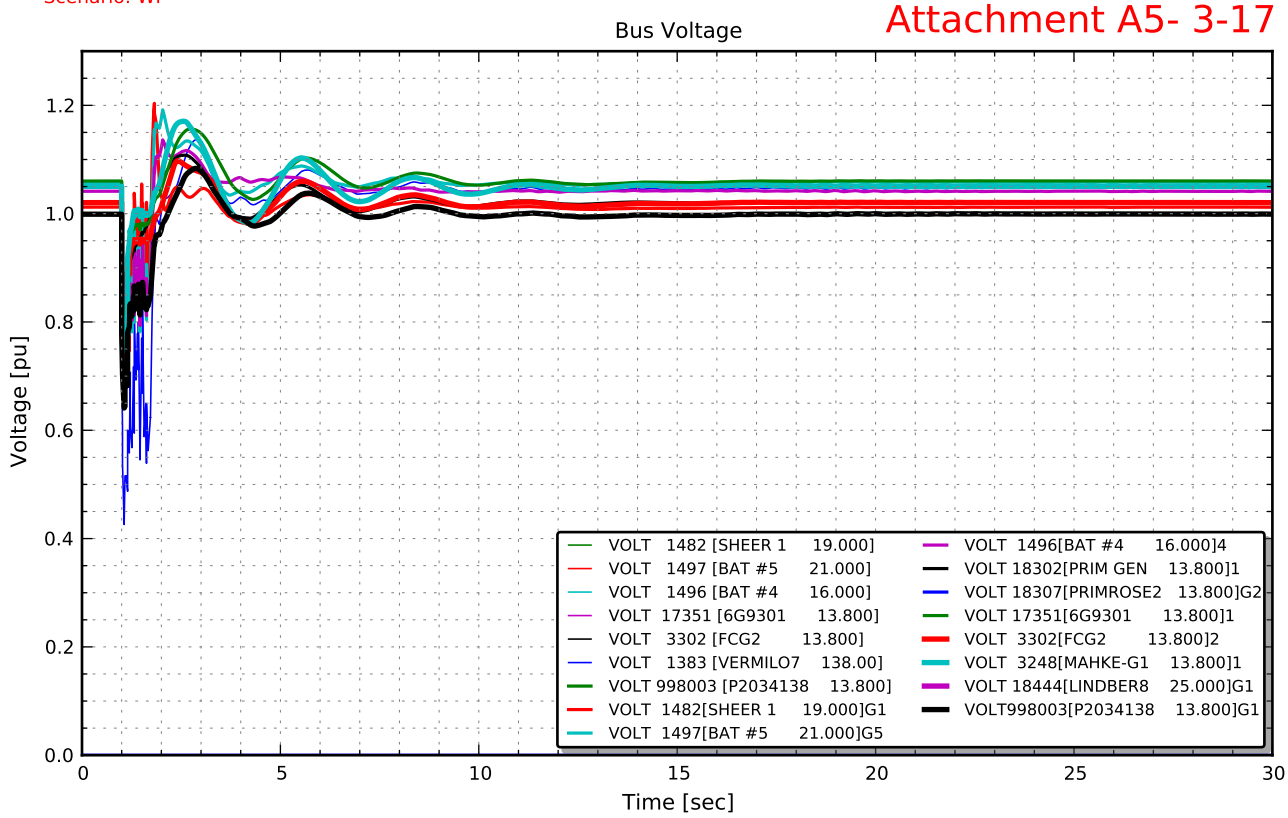


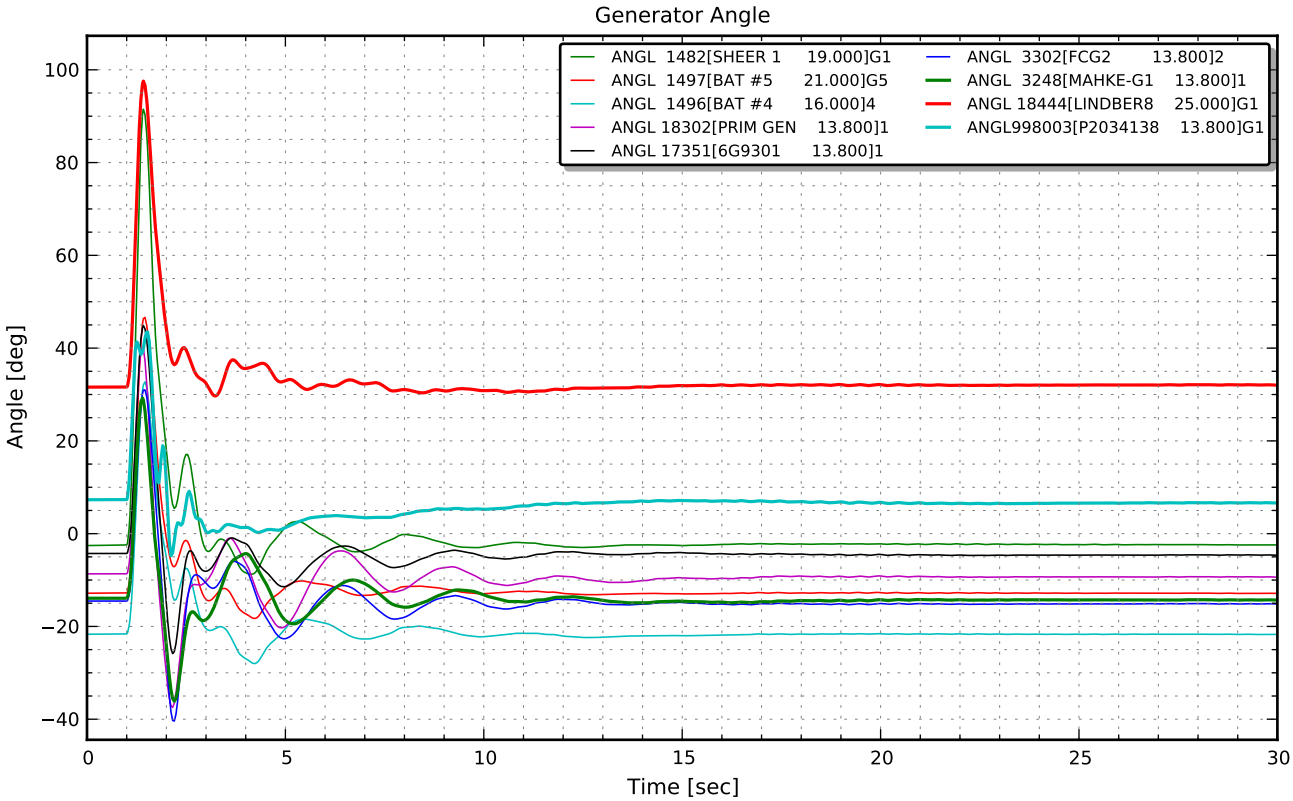
Notes: P2034 Coldlake Area Cogen

Dynamic Stability Analysis

Contingency: 09A - 9L36 Whitefish Lake 825S to Marguerite Lake 826S
Alternnative: Post-Project Basecase
Scenario: WP

Attachment A5- 3-17



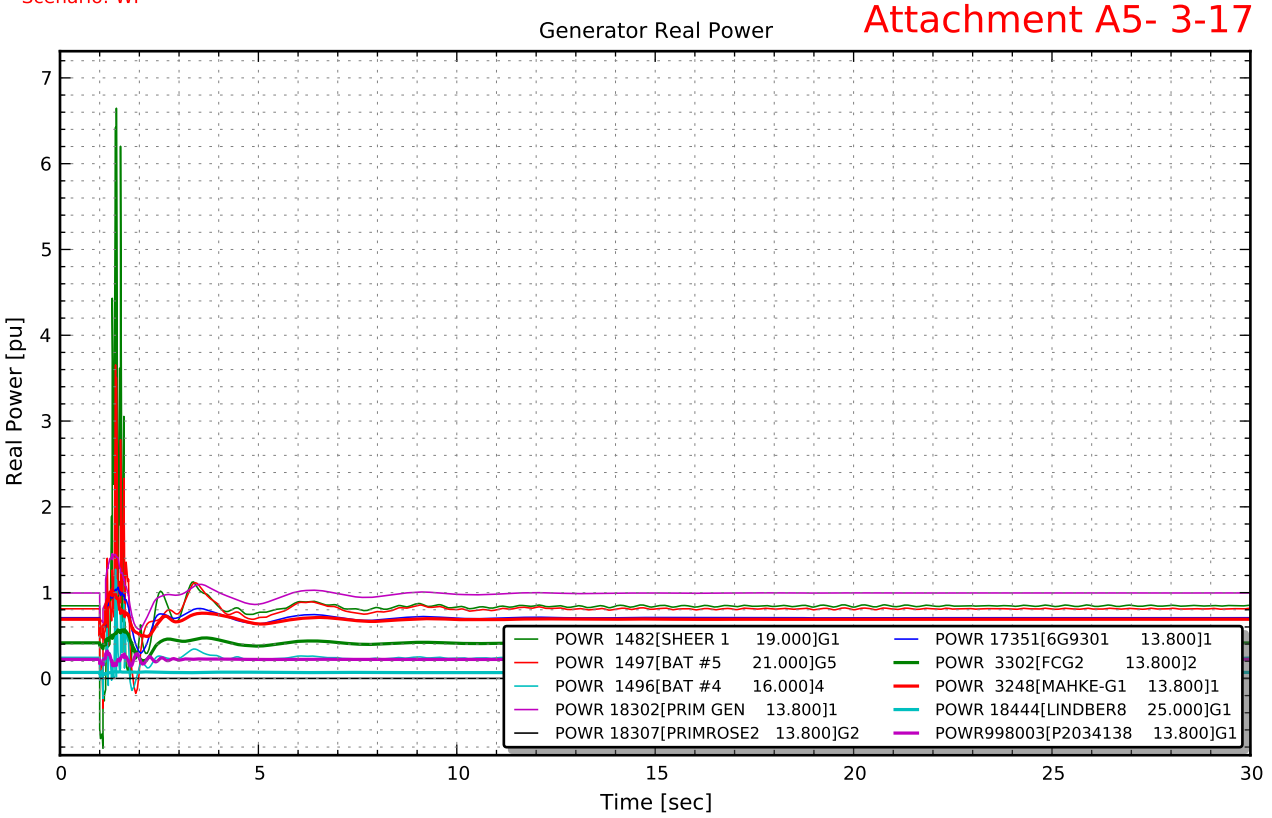


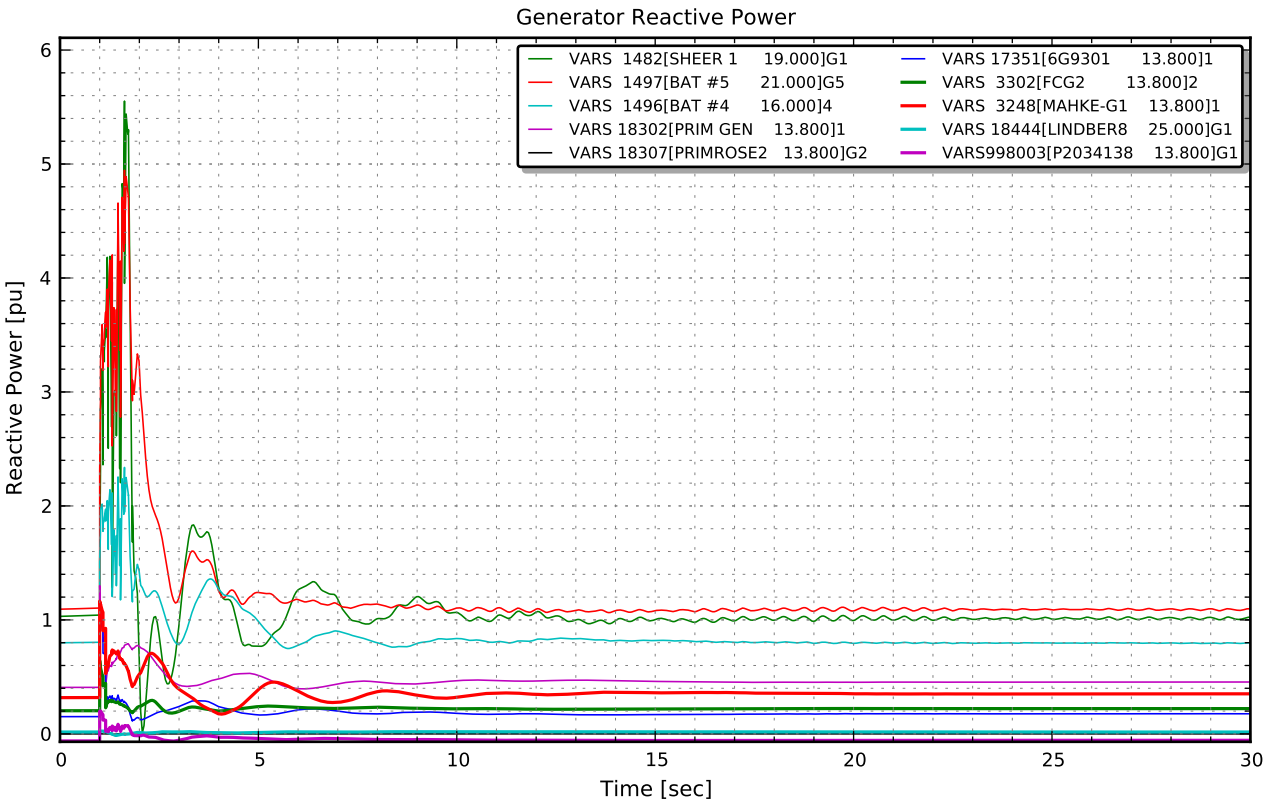
Notes: P2034 Coldlake Area Cogen

Dynamic Stability Analysis

Contingency: 09A - 9L36 Whitefish Lake 825S to Marguerite Lake 826S
Alternnative: Post-Project Basecase
Scenario: WP

Attachment A5- 3-17



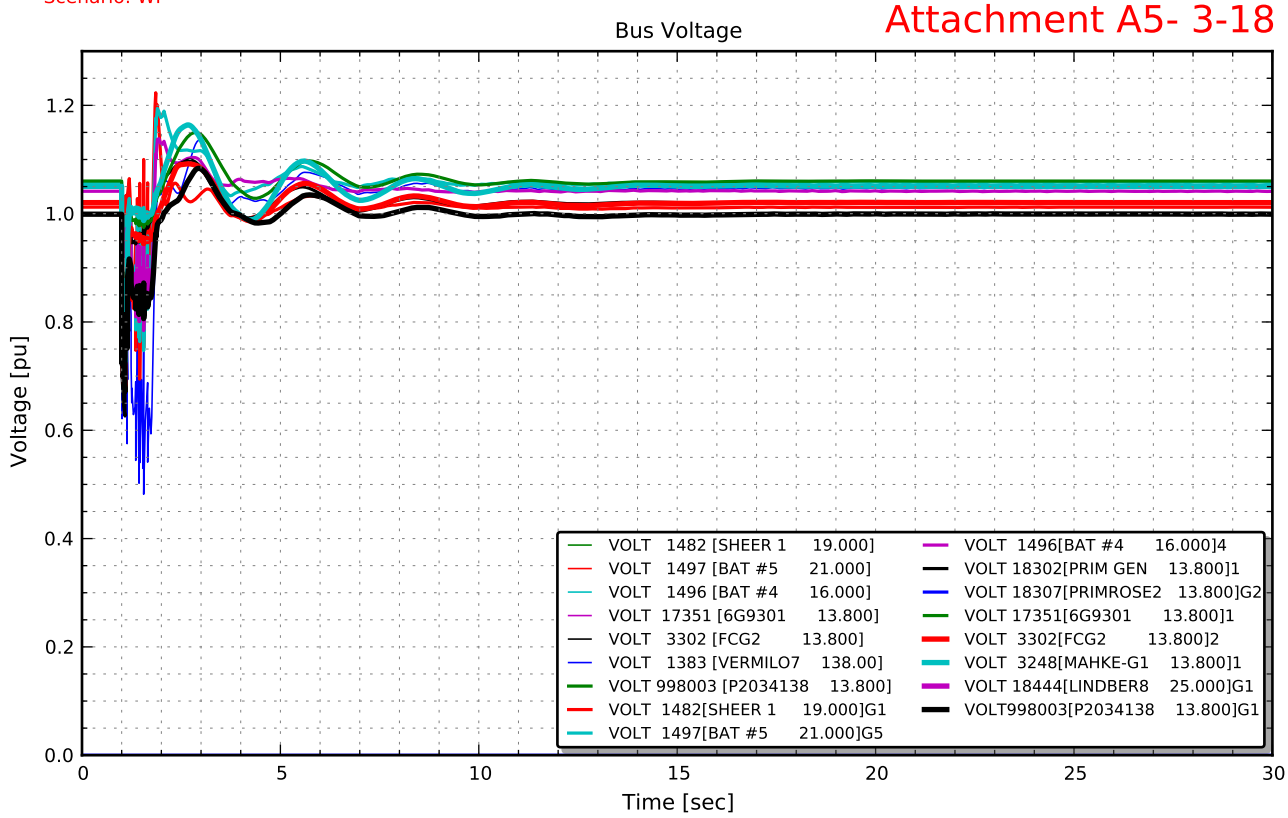


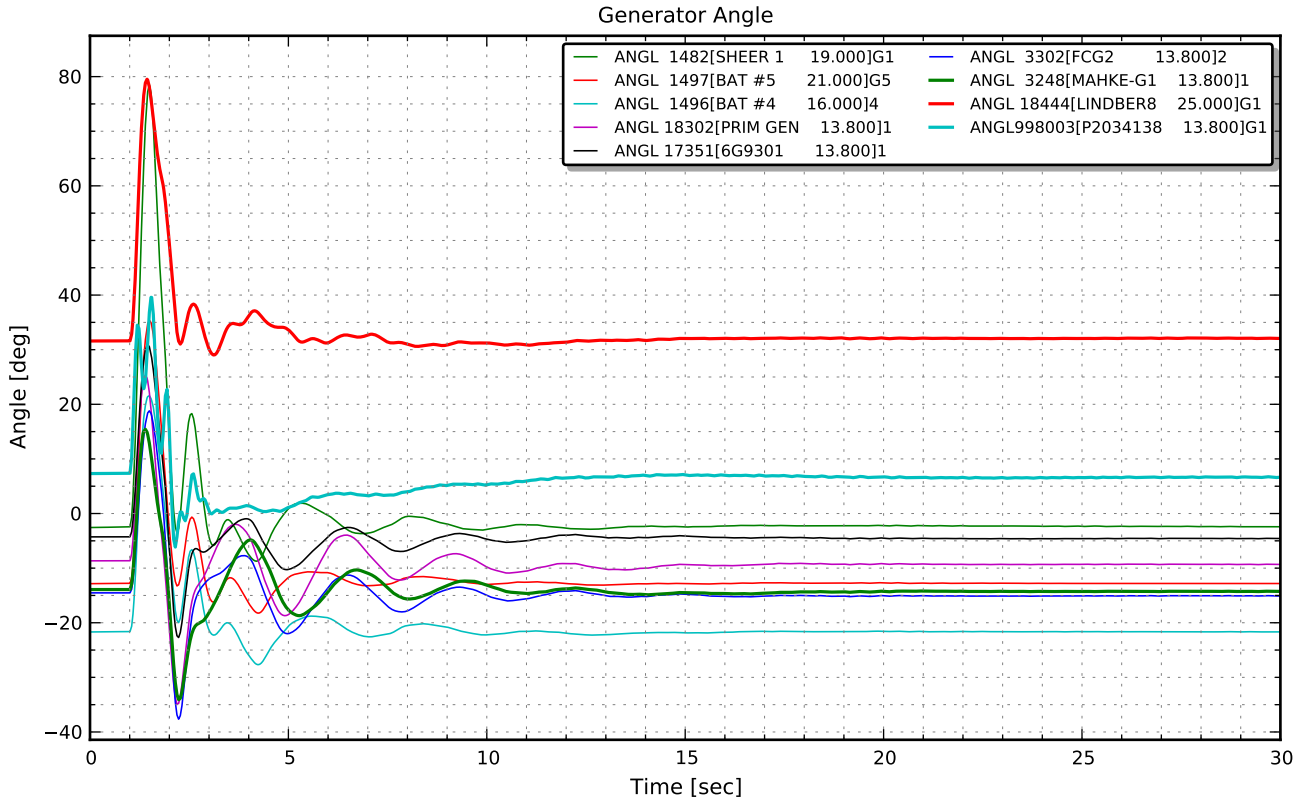
Notes: P2034 Coldlake Area Cogen

Dynamic Stability Analysis

Contingency: 09B - 9L36 Marguerite Lake 826S to Whitefish Lake 825S
Alternnative: Post-Project Basecase
Scenario: WP

Attachment A5- 3-18



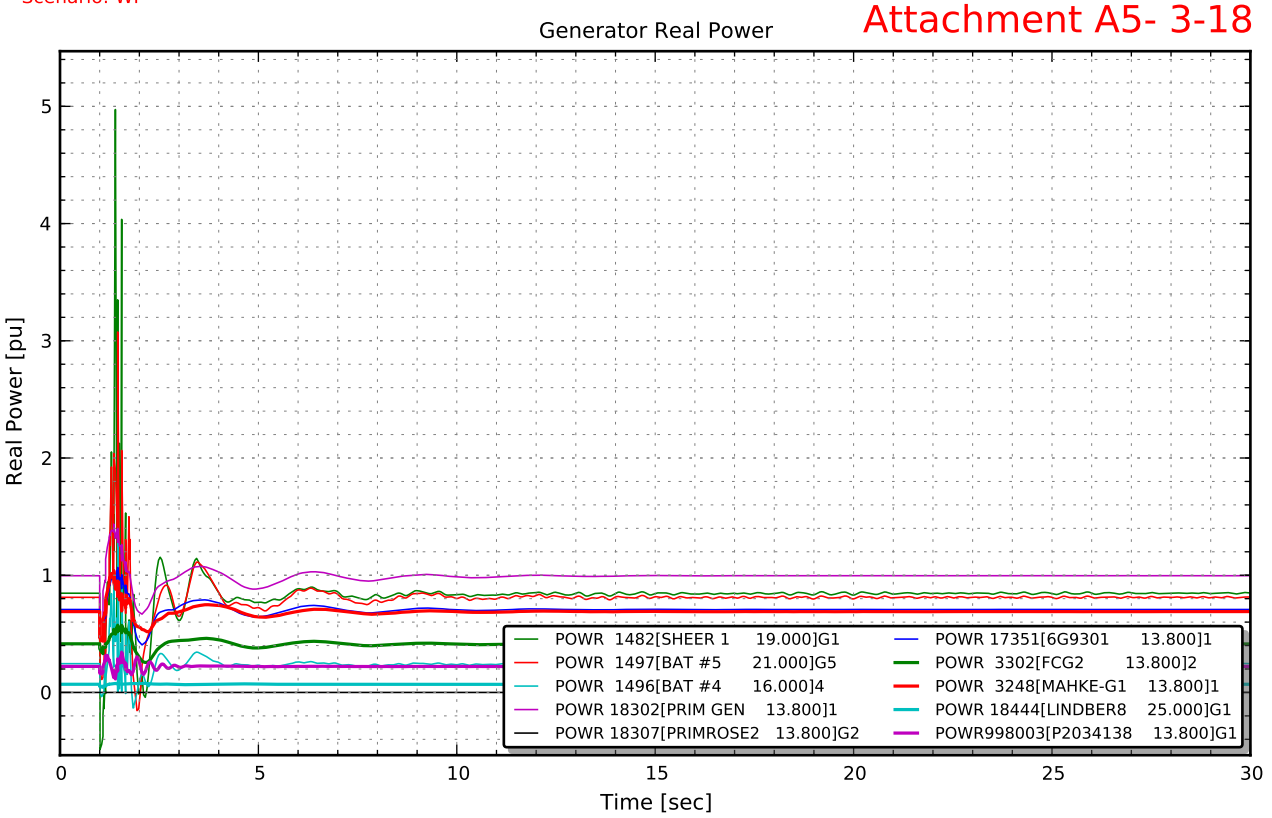


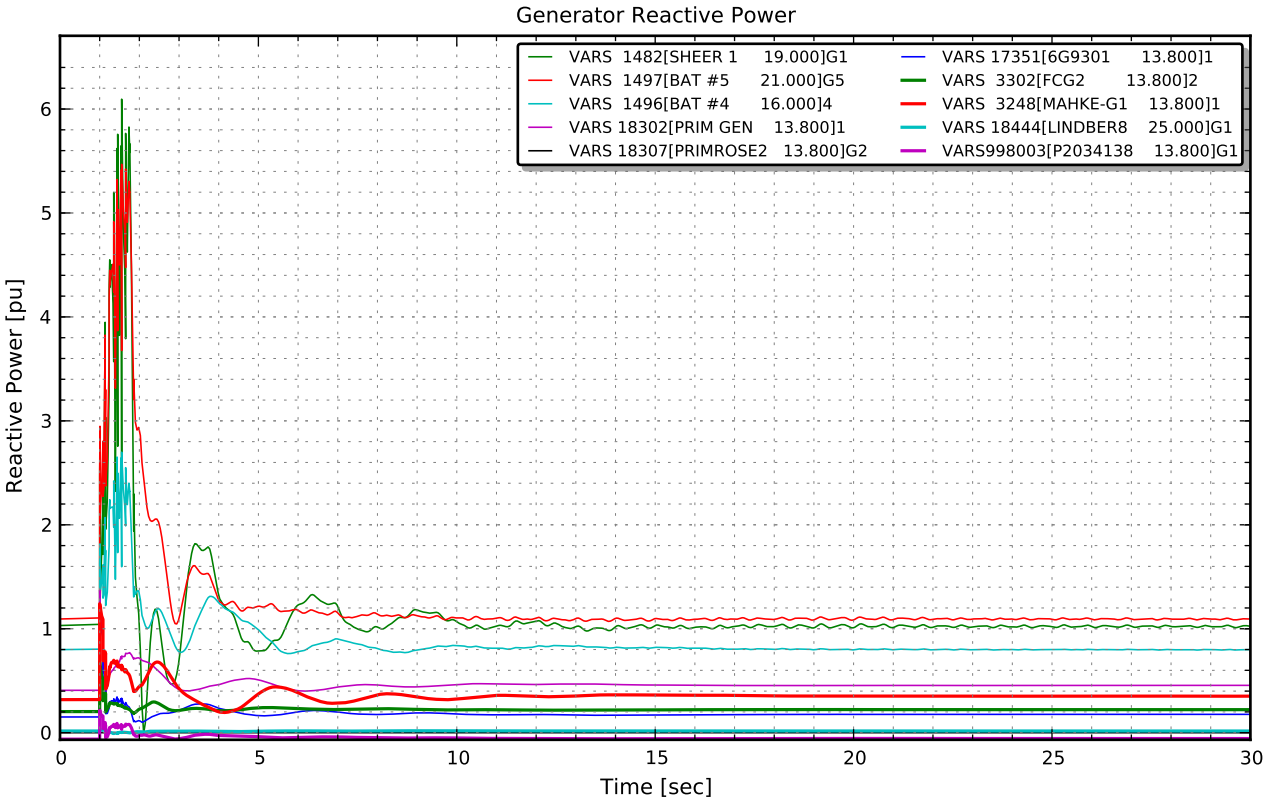
Notes: P2034 Coldlake Area Cogen

Dynamic Stability Analysis

Contingency: 09B - 9L36 Marguerite Lake 826S to Whitefish Lake 825S
Alternnative: Post-Project Basecase
Scenario: WP

Attachment A5- 3-18



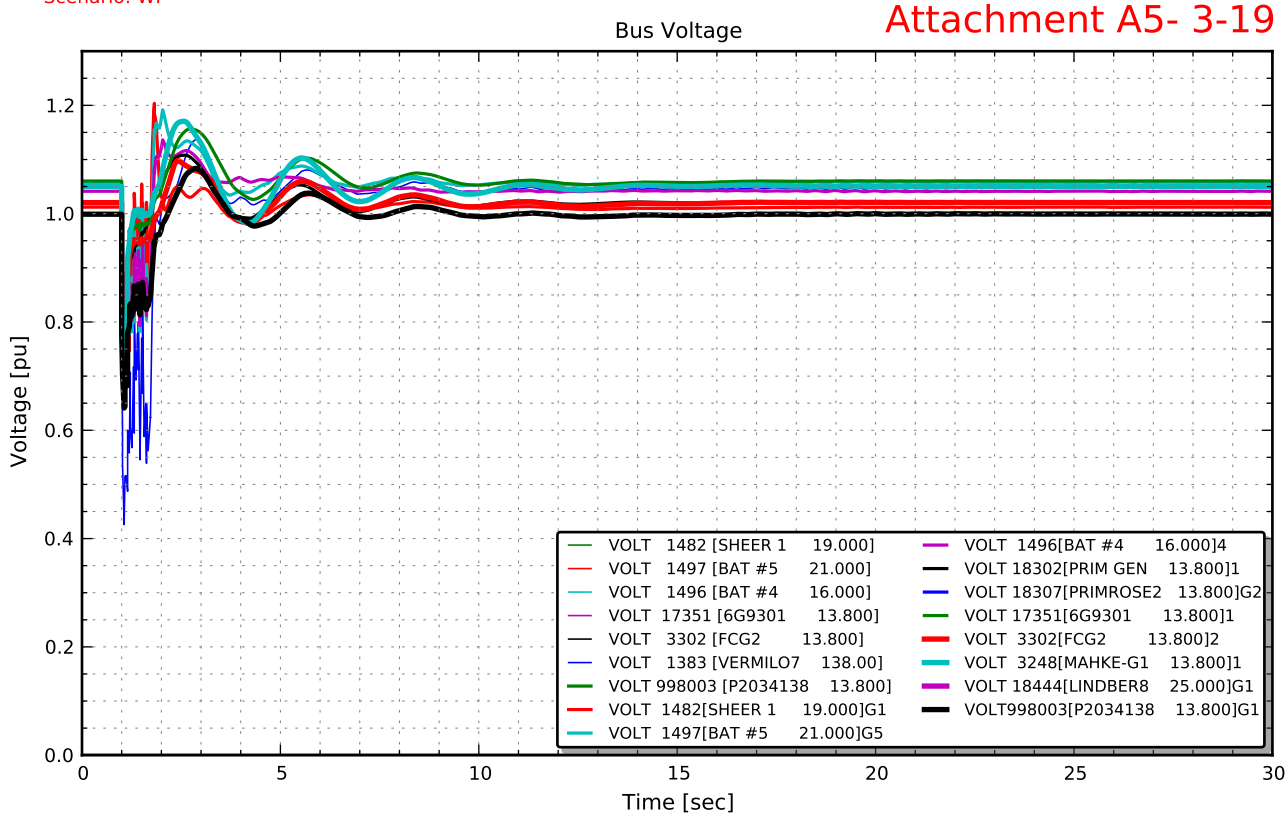


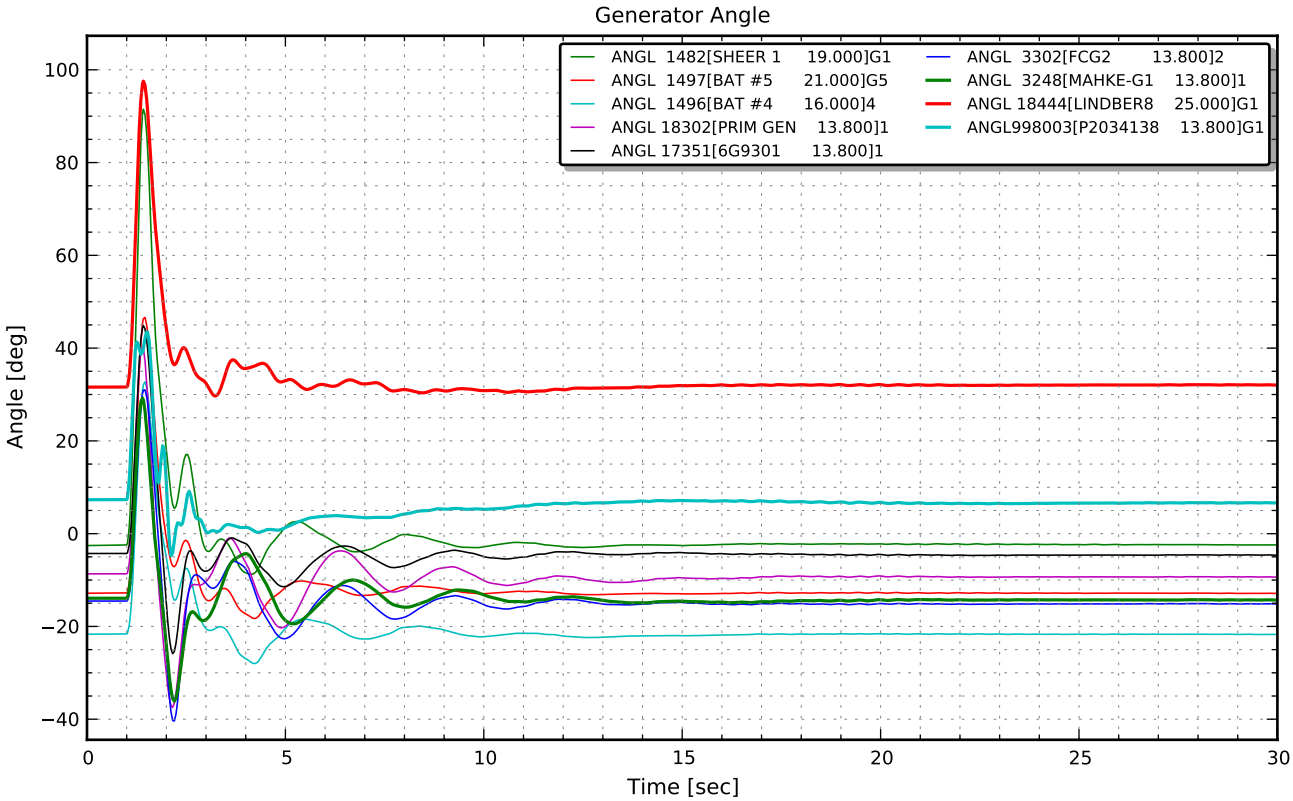
Notes: P2034 Coldlake Area Cogen

Dynamic Stability Analysis

Contingency: 10A - 9L37 Whitefish Lake 825S to Marguerite Lake 826S
Alternnative: Post-Project Basecase
Scenario: WP

Attachment A5- 3-19



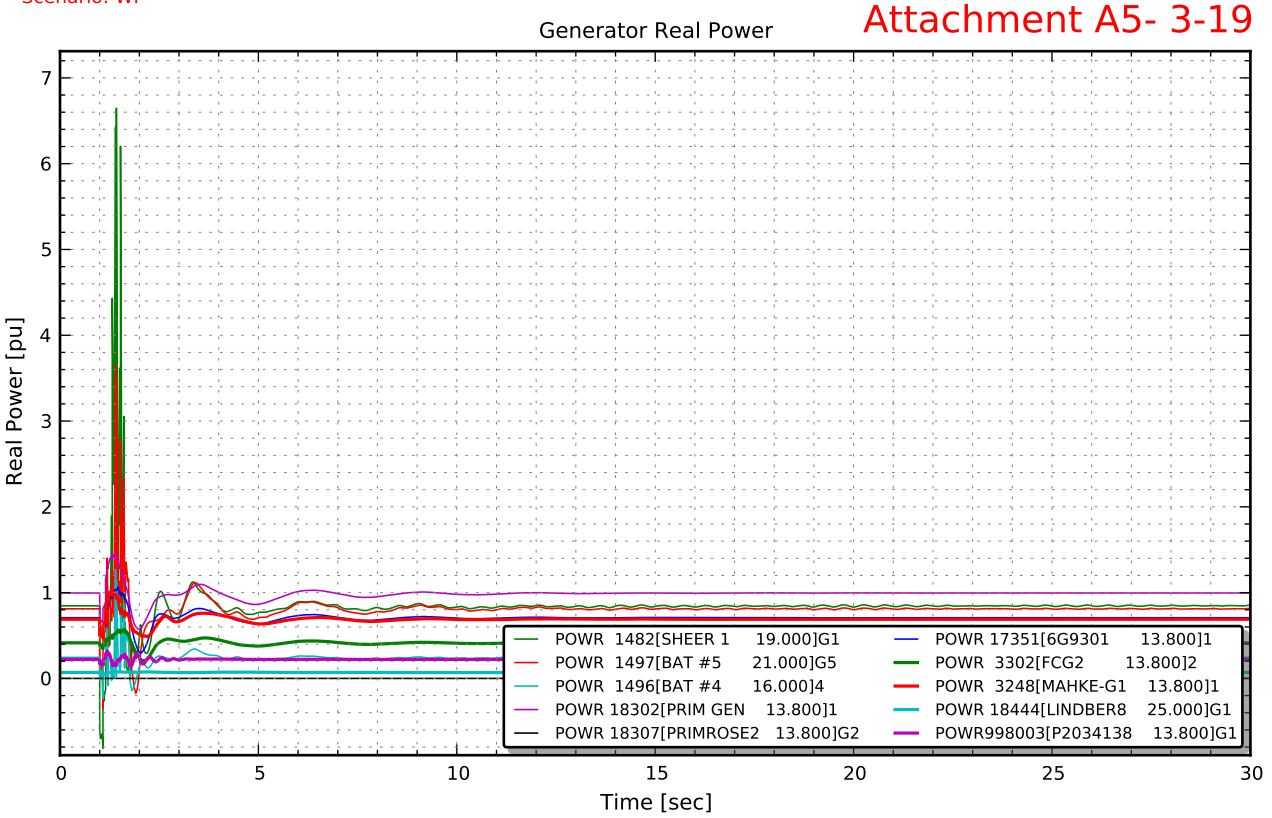


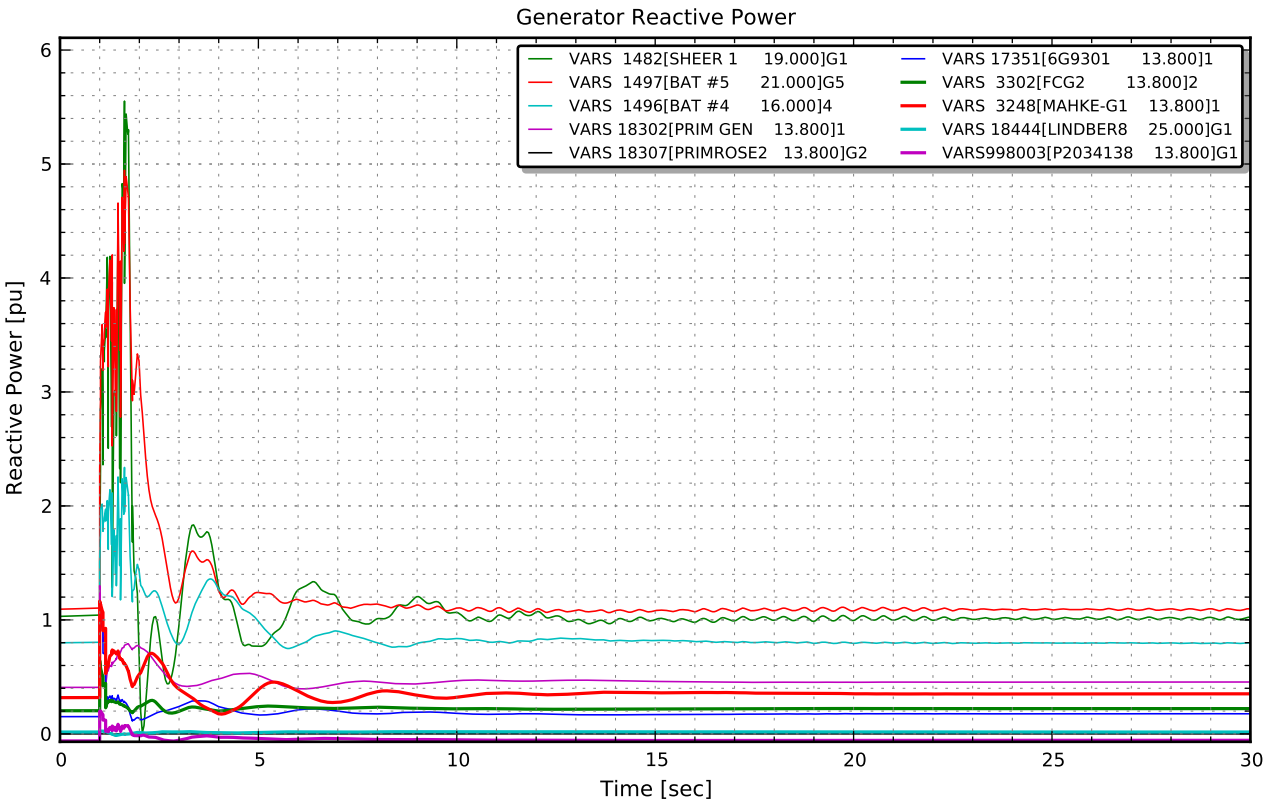
Notes: P2034 Coldlake Area Cogen

Dynamic Stability Analysis

Contingency: 10A - 9L37 Whitefish Lake 825S to Marguerite Lake 826S
Alternnative: Post-Project Basecase
Scenario: WP

Attachment A5- 3-19



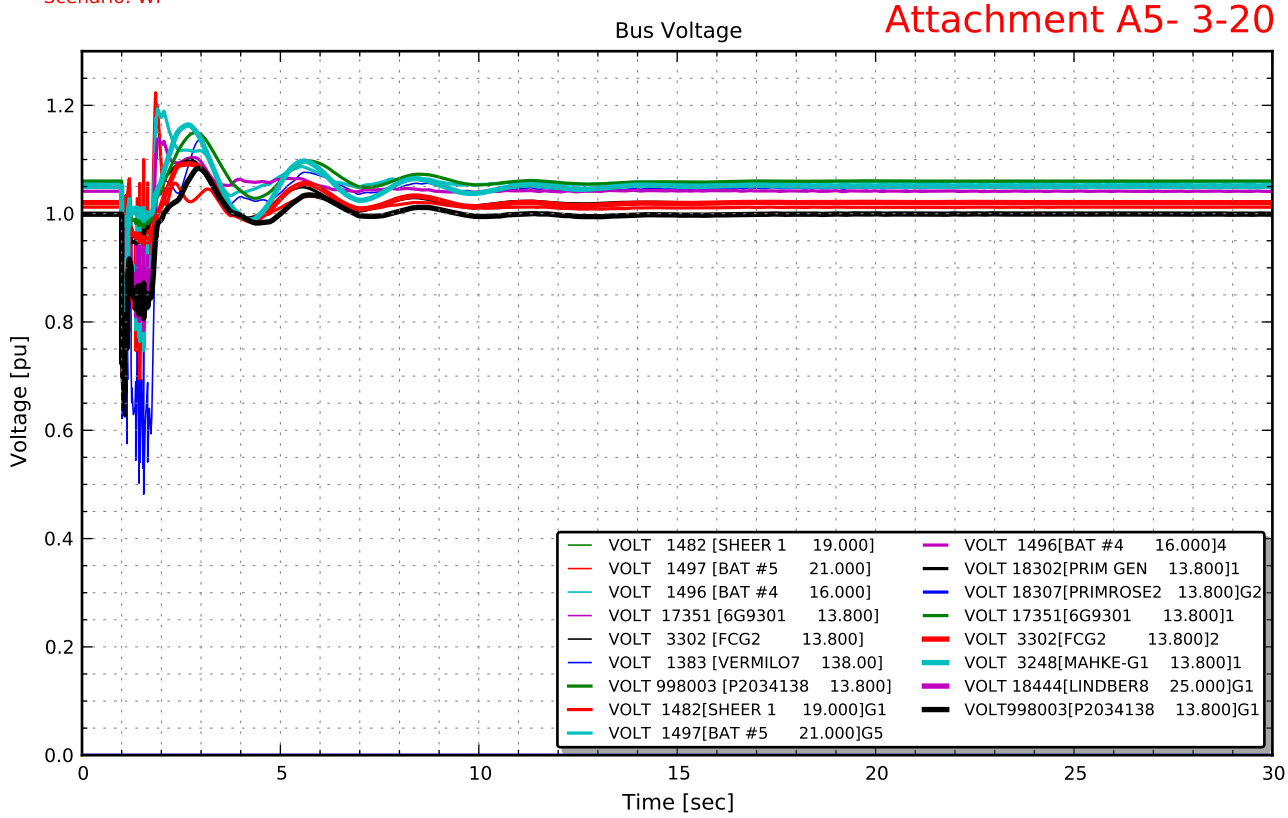


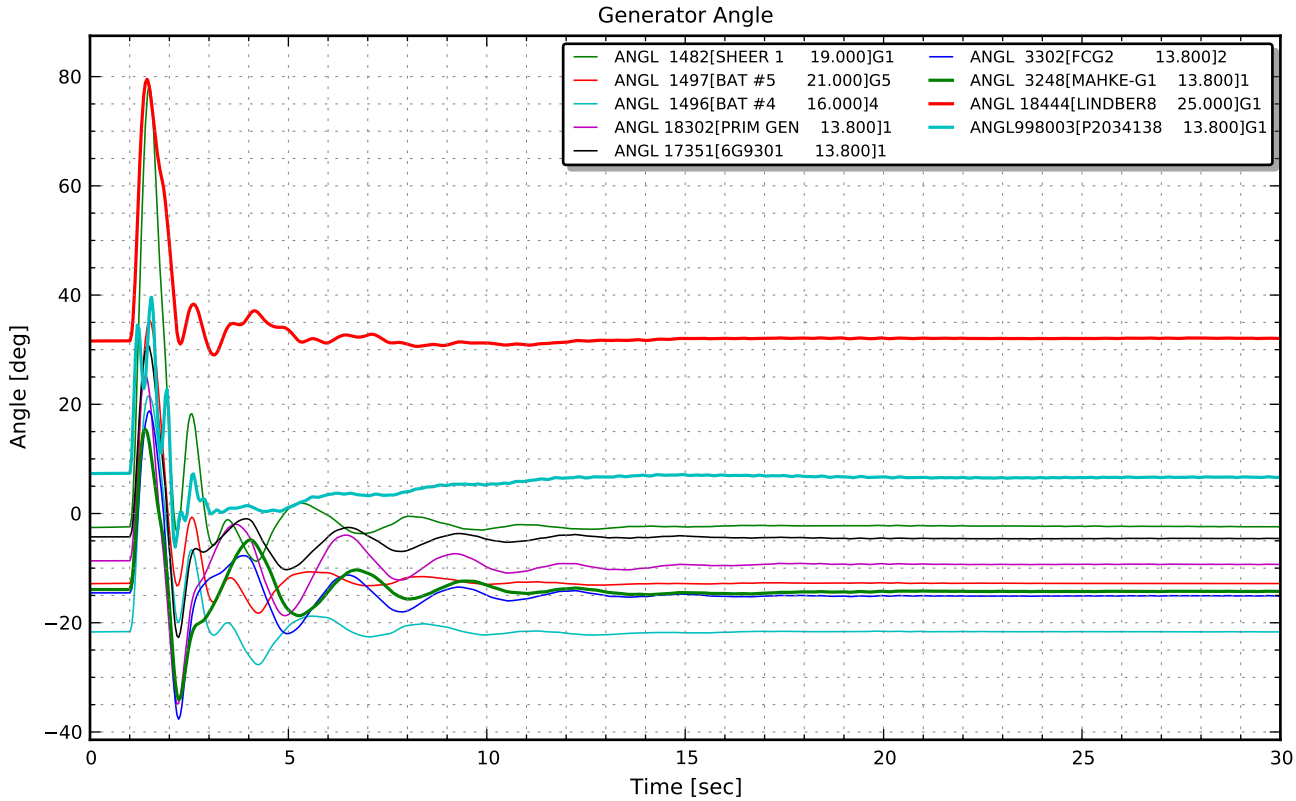
Notes: P2034 Coldlake Area Cogen

Dynamic Stability Analysis

Contingency: 10B - 9L37 Marguerite Lake 826S to Whitefish Lake 825S
Alternnative: Post-Project Basecase
Scenario: WP

Attachment A5- 3-20



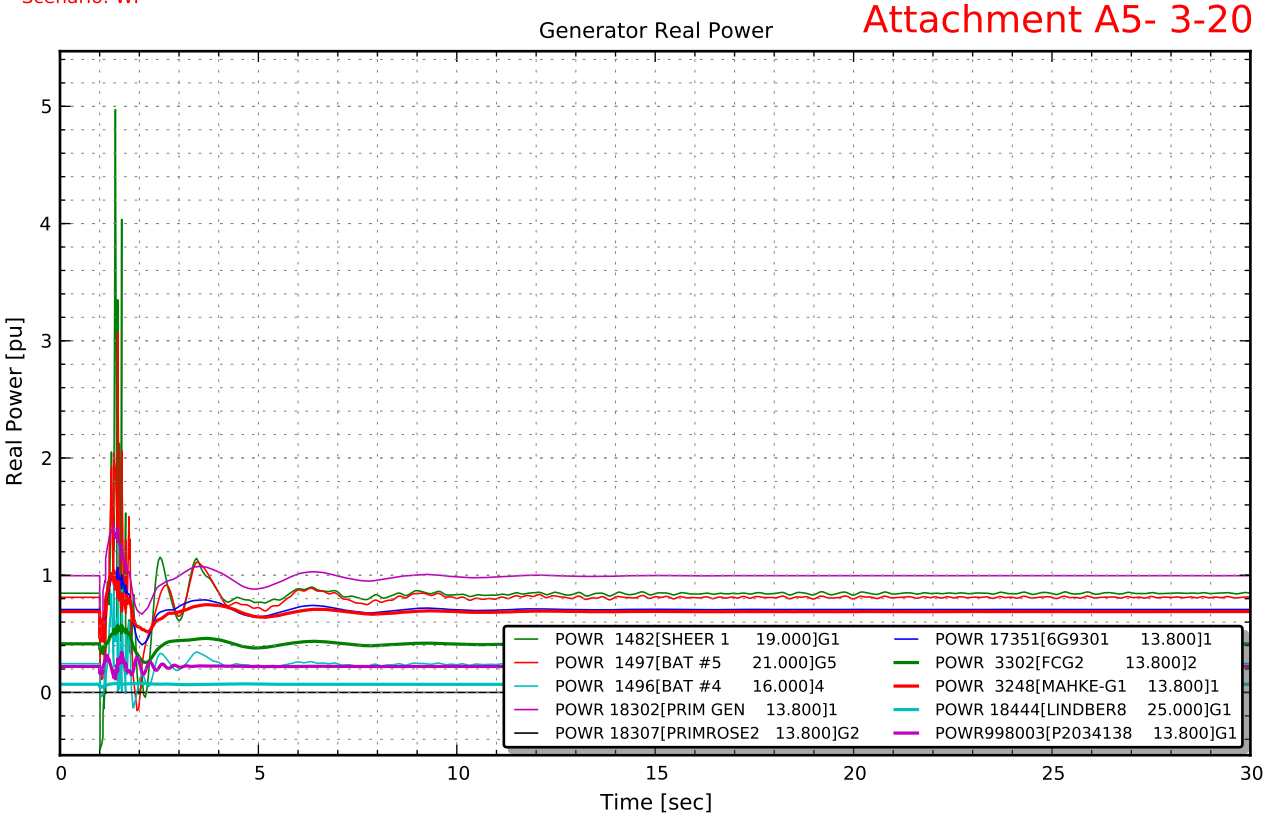


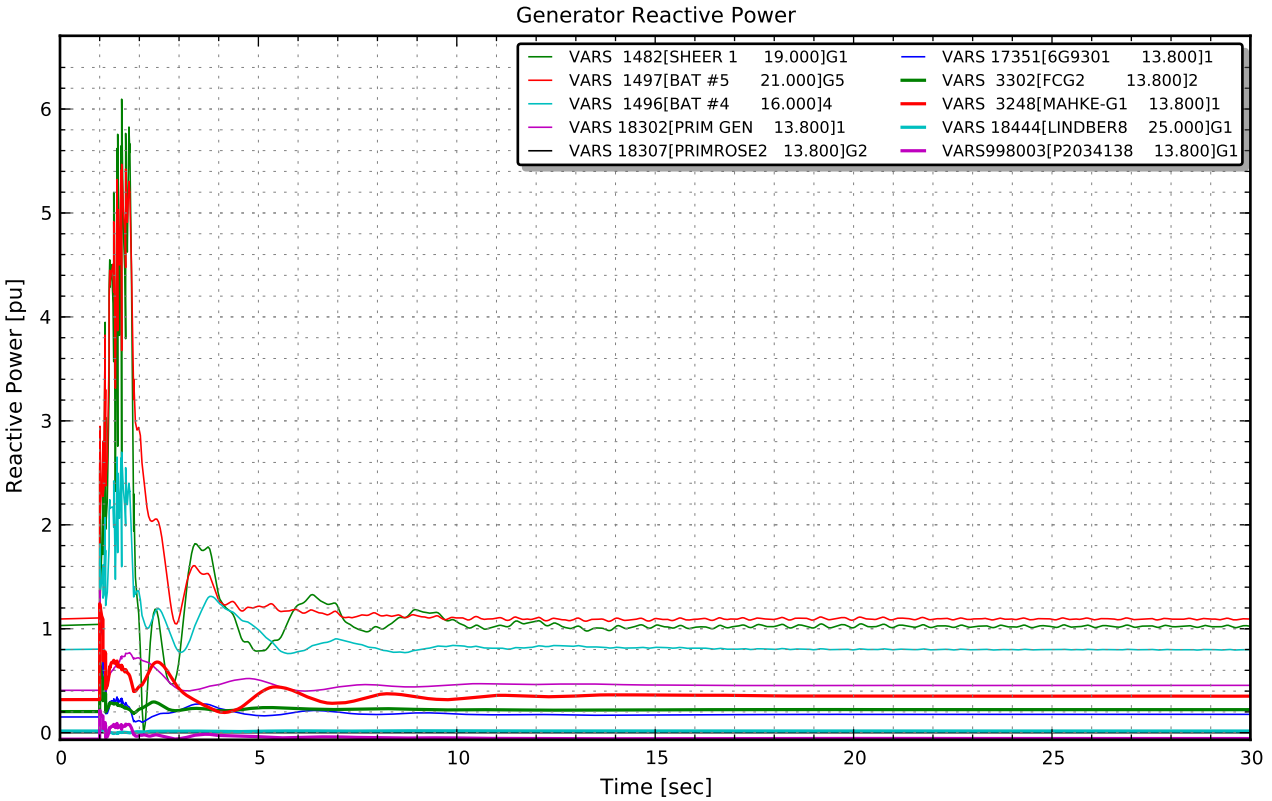
Notes: P2034 Coldlake Area Cogen

Dynamic Stability Analysis

Contingency: 10B - 9L37 Marguerite Lake 826S to Whitefish Lake 825S
Alternnative: Post-Project Basecase
Scenario: WP

Attachment A5- 3-20





Notes: P2034 Coldlake Area Cogen

Attachment A6
Motor Start Curves and Voltage Diagrams

Motor Start analysis was not performed.

Attachment A7
Dynamic Data and Assumptions of All Equipment Proposed for the Connection

Study Area load representation assumed for the transient studies is shown in Table A-1

Table A-1: Transient Stability Analysis Load Representation

Planning Areas	% of load specified as Large Motors	% of load specified as Small Motors	The Remainder of the Load (excluding Motor loads)	
			Active Power	Reactive Power
			Constant Current	Constant Impedance
Areas in NW and NE regions	*40%*	*30%*	*100%*	*100%*
Areas in other regions	*10%*	*10%*	*100%*	*100%*

Table A-2: G1/G2/G3 Generator Dynamic Data

Generator Dynamic Data (GENROU model)											
T'do	T"do	T'qo	T"qo	H	D	Xd	Xq	X'd	X'q	X"d	Xl
9.37	0.053	2.95	0.05	1.193	0	2.35	2.15	0.245	0.35	0.181	0.088
S(1.0)	S(1.2)										
1.55	2.5										

Table A-2: G1/G2/G3 Governor Dynamic Data

Governor Dynamic Data (GGOV1 model)											
R	Tpelec	Maxerr	Minerr	Kpgov	Kigov	Kdgov	Tdgov	Vmax	Vmin	Tact	Kturb
1	0	0.05	1	0.023	-0.023	3	1.2	0	1	1.2	0.17
Wfnl	Tb	Tc	Teng	Tfload	Kpload	kiload	Ldref	Dm	Ropen	Rclose	Kimw
0.3	1.3	0.22	0.1	0	0	0.3	1	3.3	0.918	0	99
Aact	Ka	Ta	Trate	db	Tsa	Tsb	Rup	Rdown	Rselect	Flag	
-99	0	99	10	0.1	0	0	1	1	99	-99	

Table A-3: G1/G2/G3 Exciter Dynamic Data

Exciter Dynamic Data (AC7B model)											
TR	KPR	KIR	KDR	TDR	VRmax	VRmin	KPA	KIA	VAmax	VAmin	KP
0	20	20	0	0	10.74	0	1.69	2.79	1	-1	22.52

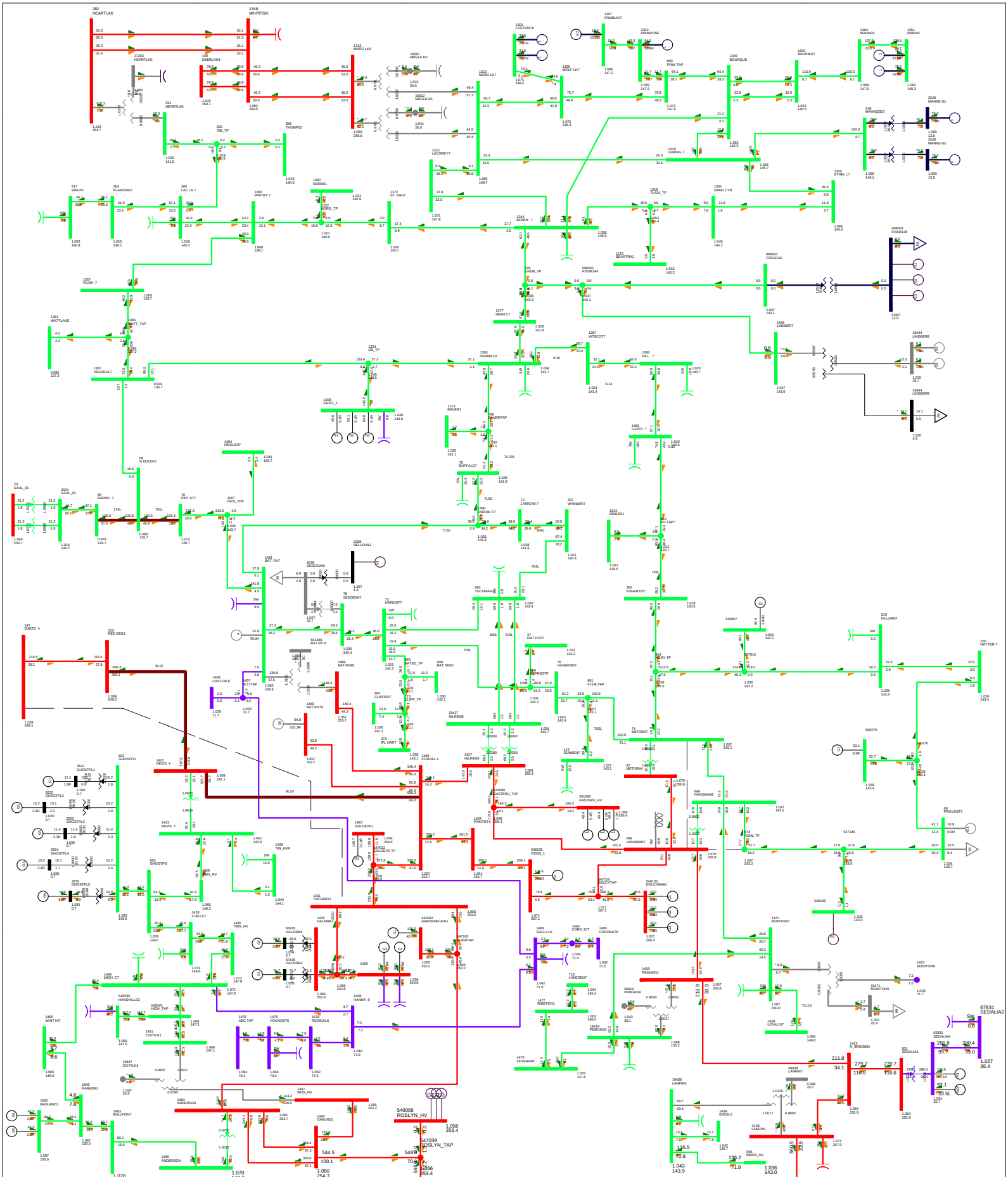
Exciter Dynamic Data (AC7B model)											
KL	**KF1**	**KF2**	**KF3**	**TF3**	**KC**	**KD**	**KE**	**TE**	**VFEmax**	**VFEmin**	**E1**
10	0	1	0	1	0.194	1.11	1	0.61	10.74	0	6.39
S(E1)	**E2**	**S(E2)**									
0.065	8.52	0.65									

Table A-4: G1/G2/G3 Stabilizer Dynamic Data

Stabilizer Dynamic Data (PSS2B model)											
Tw1	**Tw2**	**T6**	**Tw3**	**Tw4**	**T7**	**KS2**	**KS3**	**T8**	**T9**	**KS1**	**T1**
1	0	3	0	5	1	4	4	0	4	0	4
T2	**T3**	**T4**	**T10**	**T11**	**VSI1MAX**	**VSI2MIN**	**VSI1MAX**	**VSI2MIN**	**VSTMAX**	**VSTMIN**	**ICS1**
0.308	1	0.5	0.1	12	0.15	0.02	0.1	0.02	0	0	99
REMBUS1	**ICS2**	**REMBUS2**	**M**	**N**							
-99	99	-99	0.05	-0.05							

All other dynamic modelling data was provided by AESO with 2019 PBCS R1.

Attachment A8
Post-Mitigation Power Flow Diagram



Attachment G1- 1

Contingency

CONT 001: CETO (87S Gaetz - 972S Tinchebray) after RAS

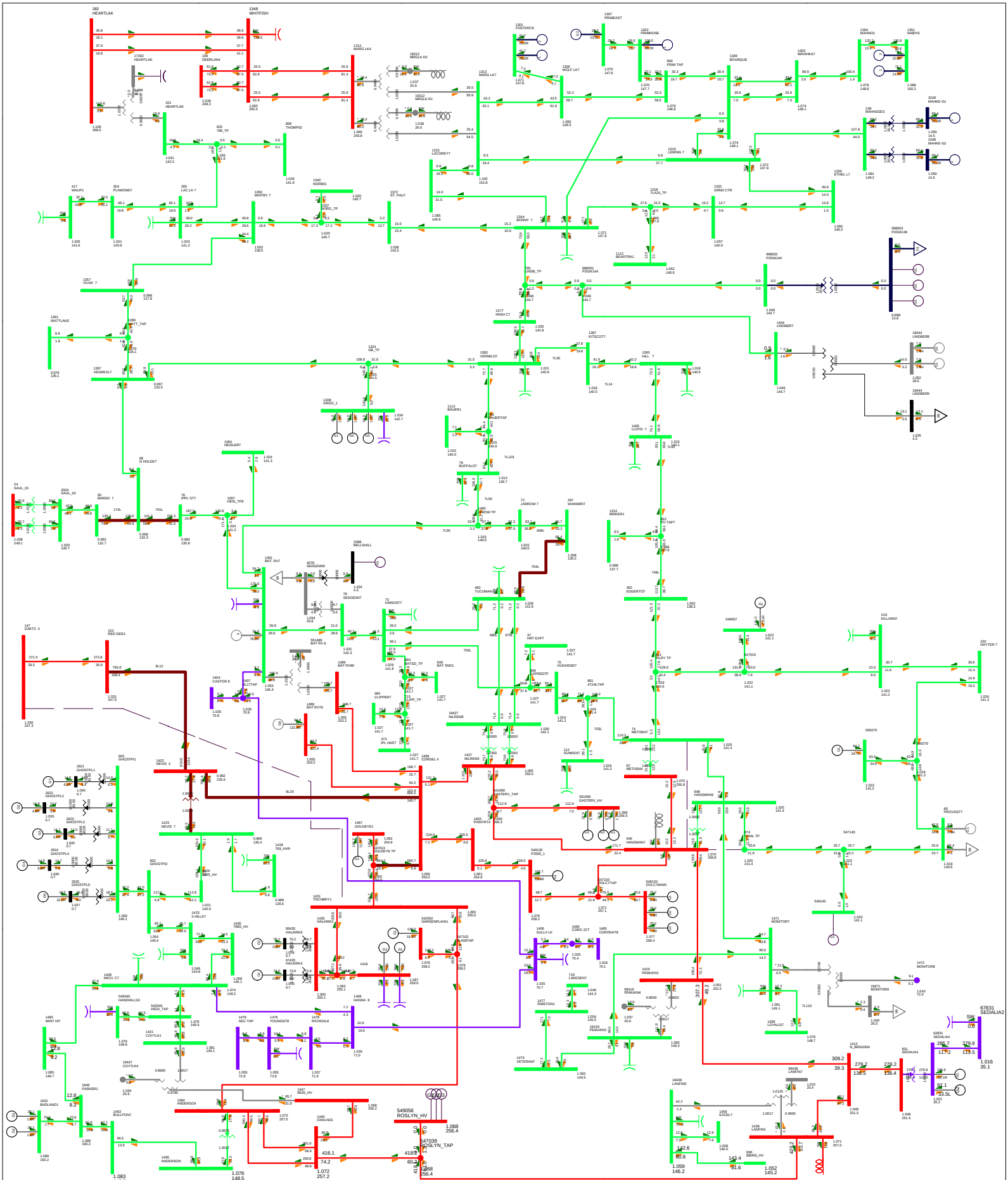
Study Case Description

2028SP POST-PROJ

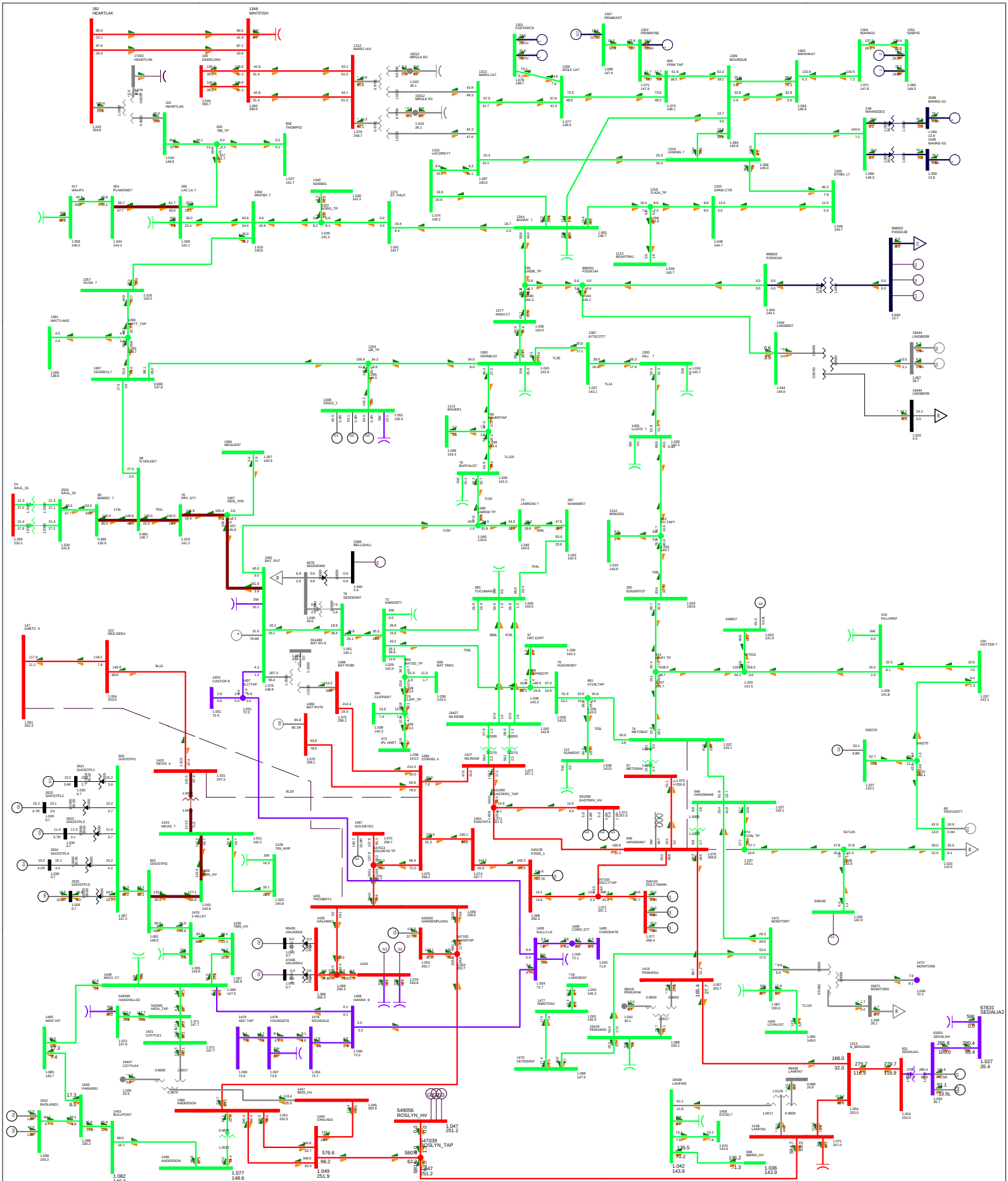
Base Case

P2034 Cold Lake Area Cogen

Bus - VOLTAGE (kV/PU)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%RATEA
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment G1- 3	**Contingency** CONT 001: CETO (87S Gaetz - 972S Tinchebray) after RAS	**Study Case Description** 2028WP POST-PROJ Base Case	**P2034 Cold Lake Area Cogen** Bus - VOLTAGE (kV/PU) Branch - MW/Mvar Equipment - MW/Mvar 100.0%RATEB kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000



Attachment G1- 4

Contingency

CONT 016: 9L20 (766S Nevis - 755S Cordel) after RAS

Study Case Description

2028SP-woCETO POST-PROJ

Base Case

P2034 Cold Lake Area Cogen

Bus - VOLTAGE (kV/PU)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%RATEA
kV: <=5.000 <=10.000 <=15.000 <=25.000 <=100.000 <=150.000 <=250.000>250.000

Attachment A9
Generator Effectiveness Table

The effectiveness was calculated by varying each generator output by small amount and using the resulting reduction or increase in loading of the overloaded component in calculating the marginal overload change per MW of generation change. Negative values indicate reduction in component overload as a result of reduction in generation; positive value indicate increase in overload as a result of reduction in generation.

Table A9-0: Generator Types

Plant	Battle River G5	Mahkeses	Foster Creek	Nabiye	Primrose	Grizzly Lake	Bull Creek	Lindberg	Hallkirk	Paintearth Wind	Garden Plain	Provost P2574
Type	*Gas Fired*	*Co-Gen*	*Co-Gen*	*Co-Gen*	*Co-Gen*	*Wind*	*Wind*	*Co-Gen*	*Wind*	*Wind*	*Wind*	*Solar*

Plant	Killarney Lake P2292	Metiskow Solar P2259	Fox Meadows P2460	Rolling Hills Wind P2555	Prairie Yarrow P2573	Cache Rising Sun P2540	Eastervale Solar P2566	Mannix Solar P2669	P2697 Springbrook Solar	Halkirk Wind P2441	Dolcy Solar P2553
Type	*Solar*	*Solar*	*Wind*	*Wind*	*Wind*	*Solar*	*Solar*	*Solar*	*Solar*	*Wind*	*Solar*

Plant	Project P2034
Type	*Co-Gen*

Table A9-1: Generator Effectiveness Factors (Pre-Project)

This table shows the Category A contingency generator effectiveness results in the pre-Project scenarios.

Scenario	Contingency	Limiting Element	Battle River 5	Battle River 6	Bells Hill	Mahkeses 2	Hughen	Foster Creek 1	Vilna 1	Irish Creek 1	Vermillion 1	Provost P2574	Killarney Lake P2292	Nabiye 1	Prim 1	Lindberg 1	Nilrem 1	Halkirk	Grizzly Lake	Bull Creek 1	Metiskow Solar P2259	P2352 Ethel Lake	Fox Meadows P2460	P2555 Rolling Hills Wind	Prairie Yarrow P2573	Cache Rising Sun P2540	Eastervale Solar	Mannix Solar	Dolcy Solar P2553
2028SP	All elements in	138kV Line 472	Battle River 5	-1.1%	0.0%	-0.5%	0.0%	-0.5%	0.0%	0.0%	0.0%	15.0%	14.4%	-0.5%	-0.5%	-0.6%	0.0%	-0.9%	-0.4%	13.7%	15.8%	0.0%	14.1%	3.0%	14.4%	14.9%	0.8%	0.0%	5.9%
2028SP	All elements in	138kV Line 472	Battle River 5	-1.1%	0.0%	-0.5%	0.0%	-0.5%	0.0%	0.0%	0.0%	15.0%	14.3%	-0.5%	-0.5%	-0.5%	0.0%	-0.9%	-0.5%	13.6%	15.6%	0.0%	14.0%	2.8%	14.3%	14.8%	0.7%	0.0%	5.7%
2028SP	All elements in	138kV Line 719	Battle River 5	-0.2%	0.0%	0.8%	0.0%	0.8%	0.0%	0.0%	0.0%	73.8%	29.1%	0.8%	0.8%	1.5%	0.0%	-0.3%	2.3%	43.8%	-1.1%	0.0%	20.9%	-0.8%	47.2%	83.2%	-0.7%	0.0%	-0.9%
2028SP	All elements in	138kV Line 749	Battle River 5	0.1%	0.0%	-0.6%	0.0%	-0.5%	0.0%	0.0%	0.0%	19.0%	62.5%	-0.6%	-0.5%	-0.6%	0.0%	0.0%	-2.0%	41.2%	0.6%	0.0%	70.6%	0.1%	45.5%	8.1%	0.3%	0.0%	0.4%
2028SP	All elements in	138kV Line 719	Battle River 5	-0.2%	0.0%	0.8%	0.0%	0.8%	0.0%	0.0%	0.0%	73.7%	29.0%	0.8%	0.8%	1.5%	0.0%	-0.3%	2.3%	43.7%	-1.1%	0.0%	20.9%	-0.8%	47.1%	83.2%	-0.7%	0.0%	-0.9%
2028WP	All elements in	138kV Line 749	Battle River 5	0.3%	0.0%	-1.0%	0.0%	-0.9%	0.0%	0.0%	0.0%	16.4%	55.4%	-1.0%	-0.9%	-1.8%	0.0%	0.3%	-2.7%	32.3%	1.1%	0.0%	78.1%	0.9%	50.1%	9.4%	0.8%	0.0%	1.0%
2028SP_woCE	All elements in	138kV Line 174	Battle River 5	6.6%	0.0%	4.5%	0.0%	3.7%	0.0%	0.0%	0.0%	6.4%	6.7%	4.4%	3.8%	9.1%	0.0%	6.2%	17.7%	6.2%	6.4%	0.0%	6.4%	6.3%	6.3%	6.1%	6.5%	0.0%	6.3%
2028SP_woCE	All elements in	138kV Line 701	Battle River 5	7.1%	0.0%	4.8%	0.0%	4.8%	0.0%	0.0%	0.0%	5.1%	4.6%	4.8%	4.8%	4.9%	0.0%	6.7%	6.0%	4.4%	5.3%	0.0%	4.5%	6.2%	4.7%	5.0%	6.0%	0.0%	5.7%
2028SP_woCE	All elements in	138kV Line 719	Battle River 5	-0.4%	0.0%	0.8%	0.0%	0.8%	0.0%	0.0%	0.0%	74.1%	29.0%	0.8%	0.8%	1.5%	0.0%	-0.5%	2.3%	43.9%	-1.3%	0.0%	21.0%	-0.9%	47.3%	83.4%	-0.9%	0.0%	-1.0%
2028SP_woCE	All elements in	138kV Line 749	Battle River 5	0.3%	0.0%	-0.7%	0.0%	-0.7%	0.0%	0.0%	0.0%	18.3%	57.8%	-0.7%	-0.7%	-1.1%	0.0%	0.3%	-2.2%	37.1%	1.0%	0.0%	73.7%	0.6%	45.7%	8.9%	0.6%	0.0%	0.8%
2028SP_woCE	All elements in	138kV Line 719	Battle River 5	-0.4%	0.0%	0.8%	0.0%	0.8%	0.0%	0.0%	0.0%	74.0%	29.0%	0.8%	0.8%	1.5%	0.0%	-0.5%	2.3%	43.8%	-1.3%	0.0%	21.0%	-1.0%	47.3%	83.4%	-0.9%	0.0%	-1.0%
2028SP_woCE	All elements in	240kV Line 9L2	Battle River 5	44.1%	0.0%	4.0%	0.0%	3.1%	0.0%	0.0%	0.0%	32.2%	31.1%	4.0%	3.3%	10.1%	0.0%	41.2%	20.6%	29.5%	32.7%	0.0%	30.4%	38.0%	30.5%	31.2%	35.6%	0.0%	34.4%
2028SP_woCE	All elements in	240kV Line 912	Battle River 5	45.2%	0.0%	3.8%	0.0%	2.8%	0.0%	0.0%	0.0%	34.2%	33.1%	3.8%	3.1%	10.5%	0.0%	42.6%	22.1%	31.4%	34.8%	0.0%	32.3%	39.7%	32.5%	33.3%	37.6%	0.0%	36.5%