Engineering Connection Assessment

P2464 Sunnynook Solar Connection

Sunnynook Solar Energy Inc.

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NOTE:

The conclusions and recommendations in this report are based on the results presented in *Attachment B: 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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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 B1 to Attachment B). 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

Sunnynook Solar Energy Inc. (Market Participant) has submitted a request for system access service to the AESO to connect its approved Sunnynook Solar project (Facility) to the AIES. The Facility includes an approved collector substation, designated as the Rose Lynn 1072S substation.

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 280 MW and a Rate DTS, *Demand Transmission Service*, contract capacity of 2 MW; and a request for transmission development (collectively, the Project).

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

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 Sheerness (Area 43) which is part of the AESO South planning region. Sheerness (Area 43) is surrounded by the planning areas of Hanna (Area 42), Strathmore/Blackie (Area 45), Brooks (Area 47), and Empress (Area 48).

From a transmission system perspective, Sheerness (Area 43) consists primarily of 240 kV and 144 kV transmission systems. Sheerness (Area 43) is connected to Hanna (Area 42) through the 240 kV transmission lines 9L59 and 9L24, and the 144 kV transmission lines 7L171 and 7L128; Sheerness (Area 43) is connected to Brooks (Area 48) through a 240 kV path consisting of 240 kV transmission lines 933L, 934L and 950L/9L950.

Although Sheerness (Area 43) is part of the South Planning Region, generation in Sheerness (Area 43) has a direct impact on existing constraints in Central East sub-region.[1] These constraints are managed in accordance with the procedures set out in Section 302.1 of the ISO rules, *Real Time Transmission Constraint Management* (TCM Rule).

[1] The Central East Sub-region comprises the following AESO planning areas: Lloydminster (Area 13), Wainwright (Area 32), Alliance/Battle River (Area 36), Provost (Area 37), Hanna (Area 42), and Vegreville (Area 56).

2.3 Study Area

The Study Area consists of the AESO planning areas of Sheerness (Area 43), Hanna (Area 42), Lloydminster (Area 13), Wainwright (Area 32), Vegreville (Area 56), Provost (Area 37), Battle River (Area 36), 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 B1).

3 Connection Alternatives

3.1 Overview

The AESO, in consultation with the TFO in the Study Area and the Market Participant, examined three transmission alternatives to meet the Market Participant'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 – Radial 240 kV connection to Oakland 946S substation

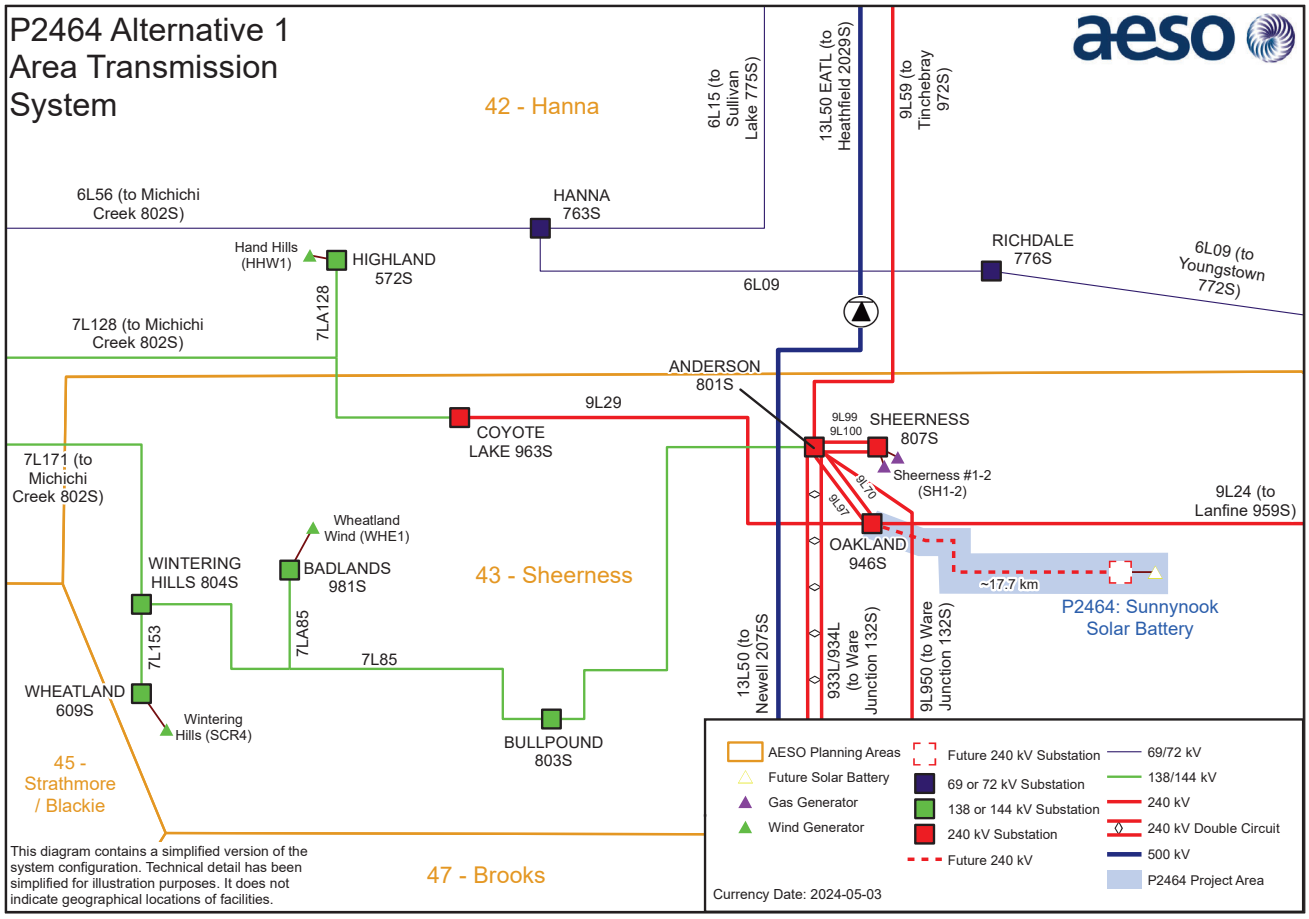
This alternative includes the following developments:

- Add one 240 kV circuit, approximately 17.7 km in length[2], to connect the Facility to the existing Oakland 946S substation using a radial configuration;
- Modify Oakland 946S substation, including adding one 240 kV circuit breaker; and
- Add or modify associated equipment as required for the above transmission developments.

The proposed connection configuration is shown in Figure 3-1.

[2] Exact line length to be determined by TFO

Figure 3-1: Connection Alternative 1



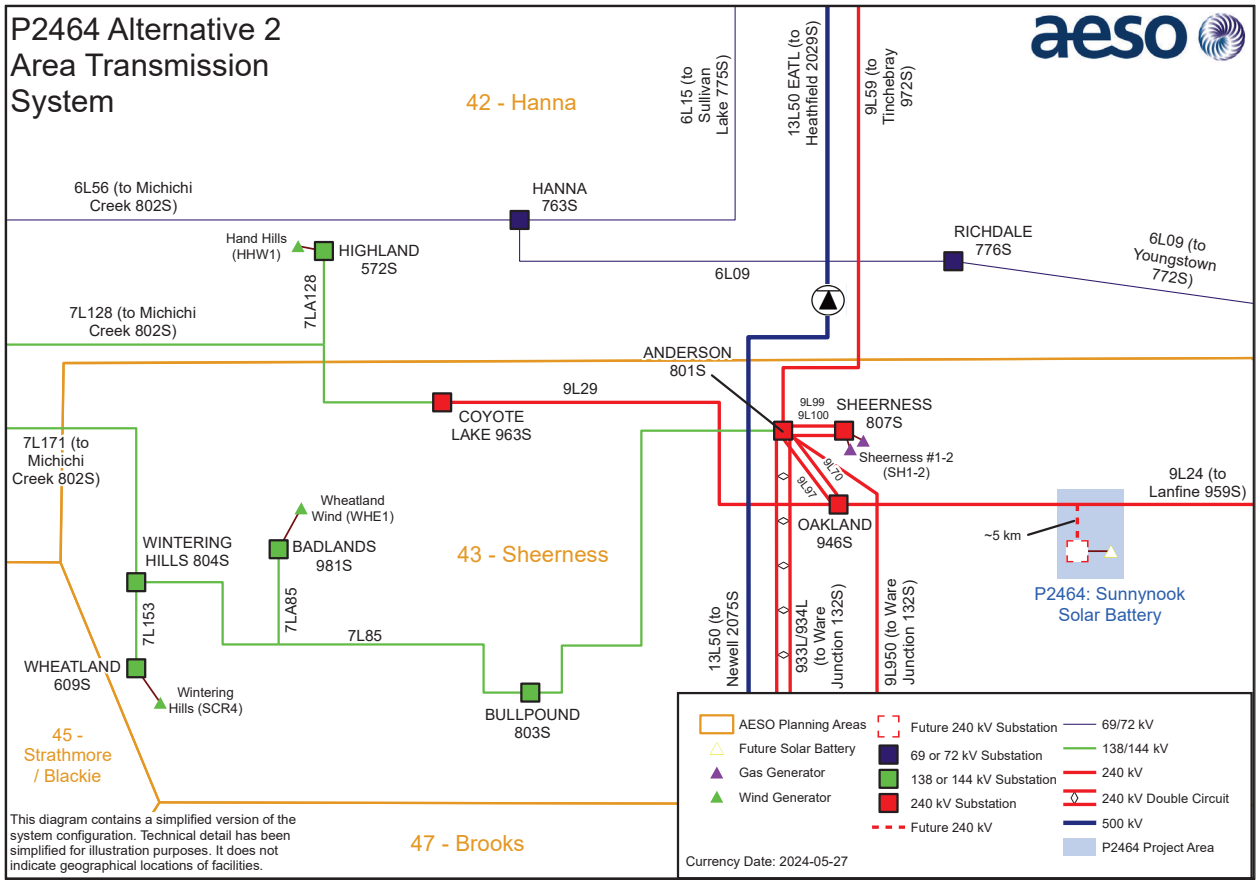
Alternative 2 – T-Tap Connection to the 240 kV Transmission Line 9L24

This alternative includes the following developments:

- Add one 240 kV circuit, approximately 3 km in length,[3] to connect the Facility to the existing 240 kV transmission line 9L24 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 Figure 3-2.

Figure 3-2: Connection Alternative 2



[3] Exact line length to be determined by the TFO

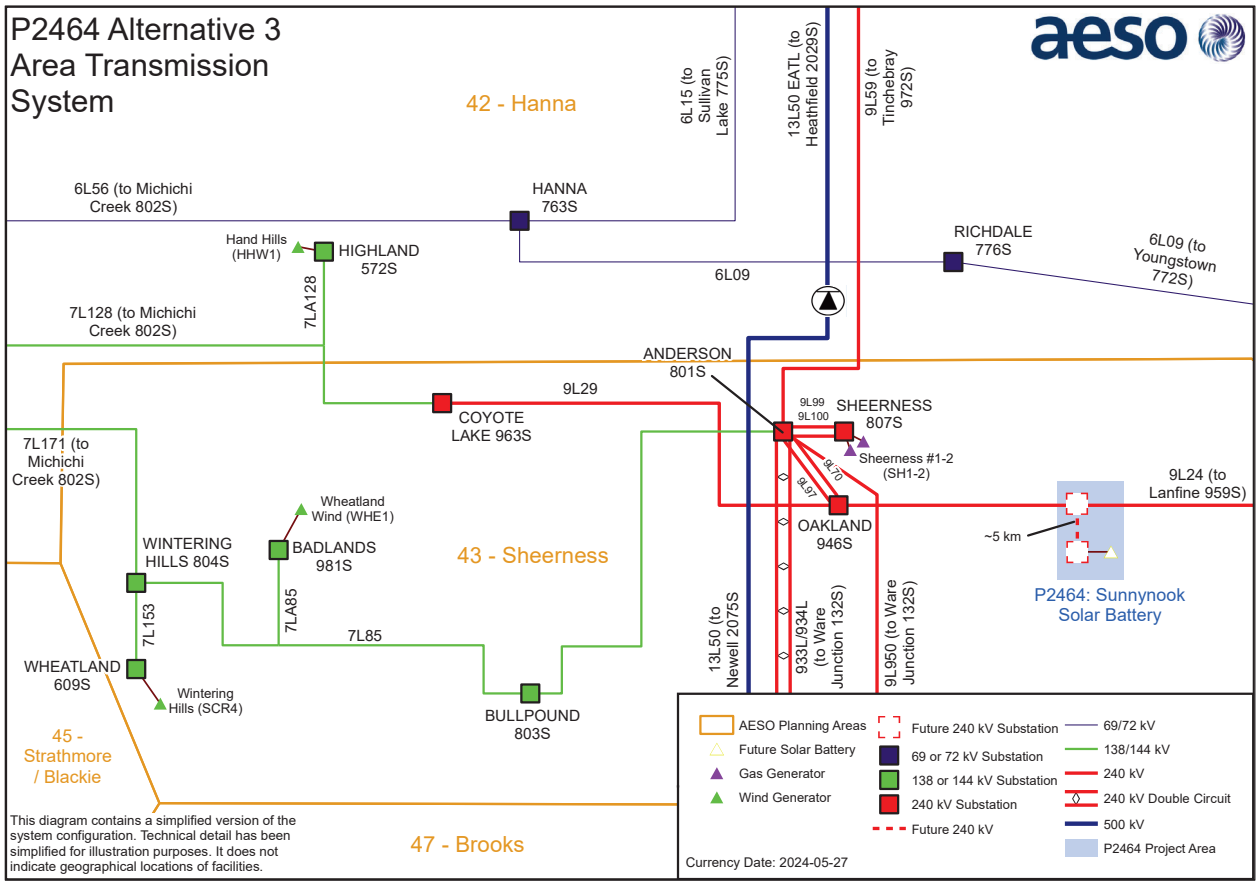
Alternative 3 – In-and-out Connection to the 240 kV Transmission Line 9L24

This alternative includes the following developments:

- Add a 240 kV switching substation, including three 240 kV circuit breakers to be connected to the existing 240 kV transmission line 9L24 (between Oakland 946S substation and Lanfine 959S substation) using an in-and-out configuration;
- Add one 240 kV circuit, approximately 3 km in length,[4] to connect the Facility to the proposed 240 kV 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



[4] Exact line length to be determined by the TFO

3.3 Connection Alternatives Selected for Further Study

Alternative 2 is considered technically feasible and was selected for further study.

3.4 Connection Alternatives Not Selected for Further Study

Alternatives 1 and 3 would have similar system impacts and technical performance as Alternative 2; however, Alternatives 1 and 3 would involve increased transmission development, and hence, increased cost compared to Alternative 2. Therefore, Alternatives 1 and 3 were not selected for further study.

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 B1).

4.2 Studies Performed

The scheduled ISD for the Project is May 1, 2027. Therefore, studies were performed using scenarios for 2028 Summer Light (SL), 2028 Summer Peak (SP) and 2028 Winter Peak (WP) high generation (HG).

Stage 1 of the approved Central East Transfer-out Transmission (CETO) system project[5] was included in all studied scenarios.

Short-circuit studies were performed using the 2028 WP HG pre-Project, 2028 WP HG post-project and 2033 WP post-Project scenarios.

Table 4-1 lists the study scenarios. Post-Project scenarios reflect the final requested Rate STS[6] contract capacity of 280 MW at the Rose Lynn 1072S substation.

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 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	280
5	2028 SP	HG	2028 SP HG Post-Project	0	280
6	2028 WP	HG	2028 WP HG Post-Project	0	280
7	2033 WP	All Generators in the Study Area in service	2033 WP Post-Project	0	280

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

[6] The requested DTS of 2MW has a minimal system impact and was not studied.

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

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.

In addition, power flow studies are also used to identify point of delivery (POD) low voltage bus voltage deviations beyond the limits listed in Table 3-1 of Attachment B1.[7]

Power flow studies were performed for all scenarios listed in Table 3-1, except Scenario 7.

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 WP post-Project scenario (Scenario 6).

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, 2028 WP post-project scenario and 2033 WP post-Project scenarios (Scenarios 3, 6 and 7).

4.3 Mitigation Measure Development and Evaluation

As explained in Section 6 of Attachment B1, 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 Effective Factor Studies

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

[7] The AESO’s desired post-contingency voltage deviations for low voltage busses represent guidelines rather than criteria. A POD bus voltage deviation that exceeds the desired limits shown in Table 3-1 of Attachment B1 does not represent a Reliability Criteria violation. Mitigation measures would not be developed to specifically address POD bus voltage deviations that exceed the desired values in Table 3-1 of Attachment B1.

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- All Scenarios

Scenario	Type of Reliability Criteria Violation Pre-Project	Type of Reliability Criteria Violation Post-Project	Details of Violation	Project Impact	Pre-Project Mitigation Measures	Post-Project Mitigation Measures
2028SL	Thermal-Below Emergency Rating	Thermal- Above Emergency Rating	7L760 (Oyen 767S - KSP Tap)	Materially Increased Violation	Real-time Operating Practice (RTOP)	RTOP
	None	Thermal-Below Emergency Rating	7L760 (Empress Liquid 164S Tap -Amoco Empress 163S)	New Violation*	None	RTOP
	Thermal-Below Emergency Rating	Thermal-Below Emergency Rating	7L760 (Empress Liquid 164S Tap - Bindloss 914S Tap)	Materially Increased Violation	RTOP	RTOP
	Thermal-Below Emergency Rating	Thermal- Above Emergency Rating	7L760 (KSP Tap - Bindloss 914S Tap)	Materially Increased Violation	RTOP	RTOP
	Thermal-Below Emergency Rating	Thermal-Below Emergency Rating	7L132 (Oyen 767S - Lanfine 959S)	Materially Increased Violation	RTOP	RTOP
2028SP	Thermal-Below Emergency Rating	Thermal-Below Emergency Rating	472L (Metiskow 648S - 472AL Tap)	Materially Increased Violation	RTOP	RTOP
	Thermal-Below Emergency Rating	Thermal- Above Emergency Rating	472L (Hughenden 213S - 472AL Tap)	Materially Increased Violation	RTOP	RTOP
	Thermal- Above Emergency Rating	Thermal- Above Emergency Rating	7L760 (Empress Liquid 164S Tap -Amoco Empress 163S)	Materially Increased Violation	RTOP	RTOP
	Thermal-Below Emergency Rating	Thermal-Below Emergency Rating	715L (Hansman Lake 650S - 715AL Tap)	Marginally Decreased Violation	RTOP	RTOP
	Thermal-Below Emergency Rating	Thermal-Below Emergency Rating	749L (Killarney 267S Tap - 749AL)	Marginally Decreased Violation	RTOP	RTOP
	Thermal- Above Emergency Rating	Thermal- Above Emergency Rating	715L (Rising Sun 1147S (P2540) Tap - 715AL Tap)	Marginally Decreased Violation	RTOP	RTOP
	Thermal- Above Emergency Rating	Thermal- Above Emergency Rating	7L760 (Empress Liquid 164S Tap - Binloss 914S Tap)	Materially Increased Violation	RTOP	RTOP
	None	Thermal-Below Emergency Rating	7L53 (Bonnyville 700S - Lindberg 969S Tap)	New Violation	RTOP	RTOP
	Thermal- Above Emergency Rating	Thermal- Above Emergency Rating	7L760 (KSP Tap - Bindloss 914S Tap)	Materially Increased Violation	RTOP	RTOP
	Thermal- Above Emergency Rating	Thermal- Above Emergency Rating	7L760 (Oyen 767S - KSP Tap)	Materially Increased Violation	RTOP	RTOP
	Thermal- Above Emergency Rating	Thermal- Above Emergency Rating	7L132 (Oyen 767S - Lanfine 959S)	Materially Increased Violation	RTOP	RTOP
2028WP	None	Thermal- Above Emergency Rating	1062L (Tinchebray 972S - Gaetz 87S) (CETO)	New Violation	RTOP	CETO Stage 2

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%)
- 240 kV transmission line 1062L is the first stage of the approved CETO project. The anticipated in-service date for CETO Stage 1 and 2 is Q2 2026.

*Although this violation is new in 2028SL, this violation is observed in 2028SP case for both pre and post project.

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 South 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 7L760, 7L132, 472L, 715L, and 749L. The study assumptions did account for the first stage of CETO Transmission Development.

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

5.2.2 Category B Conditions

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

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

5.3 Post-Project Study Results

5.3.1 Category A Conditions

Following the connection of the Project, power flow studies identified a number of thermal criteria violations under the Category A condition. Most of the Category A thermal criteria violations observed in the pre-Project scenarios were exacerbated (including violations on the 138/144 kV transmission lines 7L760, 7L132 and 472L) and new thermal criteria violations were observed on the 144 kV transmission line 7L53 and the planned 240 kV transmission line 1062L.

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 SL	7L760 (Oyen 767S - KSP Tap)	110.2	122.7	119.9	108.8	124.9	113.4	4.6
	7L760 (Empress Liquid 164S Tap -Amoco Empress 163S)	120	132	116.7	97.2	121.6	101.4	4.1
	7L760 (Empress Liquid 164S Tap - Bindloss 914S Tap)	110.2	122.7	117.3	106.4	122.3	111	4.5
	7L760 (KSP Tap - Bindloss 914S Tap)	110.2	122.7	119	107.9	124	112.5	4.6
	7L132 (Oyen 767S - Lanfine 959S)	112.1	138	121.5	108.4	127.7	113.9	5.5
2028 SP	472L (Metiskow 648S - 472AL Tap)	121	133	124.9	103.2	130.8	108.1	4.9
	472L (Hughenden - 472AL Tap)	84	92	89.6	106.6	95.2	113.3	6.7

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	
	7L760 (Empress Liquid 164S Tap -Amoco Empress 163S)	120	132	147.8	123.2	153.4	127.8	4.6
	715L (Hansman Lake 650S - 715AL Tap)	98	135	115.7	118.1	114	116.3	-1.8
	749L (Killarney 267S Tap - 749AL)	121	133	127.5	105.4	127.4	105.3	-0.1
	715L (Rising Sun 1147S (P2540) Tap - 715AL Tap)	98	108	115.8	118.1	114	116.4	-1.7
	7L760 (Empress Liquid 164S Tap - Binloss 914S Tap)	110.2	122.7	148.6	134.9	154.1	139.8	5
	7L53 (Bonnyville 700S - Lindberg 969S Tap)	124.6	139	123.4	99	137.4	110.3	11.3
	7L760 (KSP Tap - Binloss 914S Tap)	110.2	122.7	157	142.5	162.6	147.6	5.1
	7L760 (Oyen 767S - KSP Tap)	110.2	122.7	158	143.4	163.5	148.4	5
	7L132 (Oyen 767S - Lanfine 959S)	112.1	138	159	141.8	165.6	147.7	5.9
2028 WP	1062L (Tinchebray 972S - Gaetz 87S)	831.4	831.4	805.9	96.9	871.3	104.8	7.9

Table 5-2 indicates that most of the pre project violations are exacerbated and new violations are observed with the integration of this Project. The Project has material impacts on most of the Category A thermal criteria violations in the Study Area, following the inclusion of the Project and additional projects planning to connect in the south region.

Post-Project short-circuit fault levels were not significantly higher than pre-Project levels and were found to be within the typical capabilities of the nearby facilities.

5.3.2 Category B Conditions

Post-Project studies identified a number of thermal, voltage and transient stability criteria violations under Category B conditions; see Attachment A for details.

Following the connection of the Project, most thermal criteria violations observed in the pre-Project scenarios were exacerbated, the voltage criteria violations observed in the pre-Project scenarios were exacerbated and new thermal, voltage and transient stability criteria violations were observed. Additionally, pre-Project transient stability criteria violations persisted.

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

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

Prior to the connection of the Project, some of the observed Category B thermal criteria violations can be mitigated using RTOPs. The remaining thermal criteria violations can be mitigated by existing RASs 134, 200, 201, 211, and 215, planned RAS 204, RTOPs, alone or in combination, as appropriate. The total amount of generation tied to RAS 134 and RAS 201 exceeds the Most Severe Single Contingency (MSSC) limit of 466 MW. Pre-contingency generation curtailment under normal conditions may be required using real-time operational practices 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.

Prior to the connection of the Project, the voltage criteria violations observed under Category B conditions can be managed using RTOPs.

5.4.2 Post-Project

The thermal criteria violations observed under Category A conditions can be managed by applying the TCM Rule to curtail generation as required until such a time that system developments or other mitigations 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*.

The second stage of the approved CETO project,[8] which has a scheduled ISD of December 31, 2025 and is prior to the Project's scheduled ISD, will mitigate the thermal criteria violations observed on the 240 kV transmission line 1062L under the Category A condition.

After connection of the Project, some of the criteria violations observed under Category B conditions can be mitigated using RTOPs and existing RASs 200, 211, 215, planned RASs 204 and 213 alone or in combination, as appropriate. Some of the remaining thermal criteria violations can be mitigated by modifying RASs 134 and 201 by including the Project in the RAS logic.

Three new RASs are required to mitigate the remaining observed thermal and transient criteria violations under Category B conditions. The new RASs, hereafter referred to as 9L97 or 9L70 Overload Mitigation,934L/9L934 or 950L/9L950 Overload Mitigation, and 9L59 contingency transient are required to mitigate thermal and transient criteria violations on the 240 kV transmission lines 9L97, 9L70, 934L/9L934, 950L/9L950 and 9L59 with the Project included in the RAS logic.

The total amount of generation tied to modified RASs 134 and 201 exceeds the MSSC limit of 466 MW. Pre-contingency generation curtailment under normal conditions may be required using real-time operational practices 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 connection of the Project, voltage criteria violations were also observed under Category B conditions and can be managed using RTOPs.

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

5.4.3 Post-Project Mitigation Study Results

Under Category B conditions, most of the observed Reliability Criteria violations requiring RAS were mitigated. The remaining violations are mitigated by RTOP.

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 2 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 second stage of the approved CETO project will alleviate the thermal criteria violations observed on the planned 240 kV transmission line 1062L under Category A 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 thermal, voltage, and transient stability criteria violations observed under Category B conditions can be mitigated through the use of existing RASs 200, 201, 211, 215, planned RASs 204 & 213, new RASs 934L/9L934 or 950L/9L950 Overload Mitigation RAS, 9L97 or 9L70 Overload Mitigation RAS, 9L59 contingency transient RAS, and RTOP, alone or in combination, as appropriate.

The total amount of generation tied to modified RASs 134 and 201 exceed the Most Severe Single Contingency (MSSC) limit of 466 MW. Pre-contingency generation curtailment under normal conditions may be required using real-time operational practices 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.

The AESO recommends proceeding with the Project using Alternative 2 as the preferred alternative to respond to the Market Participant's request for system access service. Alternative 2 involves adding one 240 kV circuit to connect the Facility to the existing 240 kV transmission line 9L24 in a T-tap configuration.

The conductor used for the 240 kV circuit connecting the Facility to 9L24 should have a minimum capacity of 480 MVA to meet the Market Participant's requested STS contract capacity.

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

Scenario	Type of Reliability Criteria Violation Pre-Project	Type of Reliability Criteria Violation Post-Project	Contingency	Details of Violation	Project Impact	Pre-Project Mitigation Measures	Post-Project Mitigation Measures
SL	Thermal-Below Emergency Rating	Thermal-Below Emergency Rating	681L (Tucuman 478S - Hardisty 377S)	472L (Hughenden 213S - 472AL Tap)	Materially Increased Violation	Real-time Operating Practice (RTOP)	RTOP
	None	Thermal-Below Emergency Rating	6L09 (Hanna 763S - Oyen 767S)	7L760 (KSP Tap - Oyen 767S)	New Violation	None	RTOP
	None	Thermal-Below Emergency Rating	703L (Hughenden 213S - Hardisty 377S)	7L760 (KSP Tap - Bindloss 914S Tap)	New Violation	None	RTOP
	None	Thermal-Below Emergency Rating	703L (Hughenden 213S - Hardisty 377S)	7L760 (KSP Tap - Oyen 767S)	New Violation	None	RTOP
	None	Thermal-Below Emergency Rating	704L (Tucuman 478S - Wainwright 51S)	7L760 (KSP Tap - Oyen 767S)	New Violation	None	RTOP
	None	Thermal-Below Emergency Rating	749L (Edgerton 899S - Metiskow 648S)	704L (Tucuman 478S - Wainright 51S)	New Violation	None	RTOP
	Thermal-Below Emergency Rating	Thermal-Below Emergency Rating	749L (Edgerton 899S - Metiskow 648S)	715L (Hansman Lake 650S - 715AL Tap)	None	RTOP	RTOP
	Thermal-Below Emergency Rating	Thermal-Below Emergency Rating	749L (Edgerton 899S - Metiskow 648S)	715L (Rising Sun 1147S (P2540) Tap - 715AL Tap)	None	RTOP	RTOP
	None	Thermal-Below Emergency Rating	769L (Rosyth 296S - Hardisty 377S)	7L760 (KSP Tap - Oyen 767S)	New Violation	None	RTOP
	None	Thermal-Below Emergency Rating	7L116 (Excel 910S - Lanfine 959S)	7L760 (KSP Tap - Bindloss 914S Tap)	New Violation	None	RTOP
	None	Thermal-Below Emergency Rating	7L116 (Excel 910S - Lanfine 959S)	7L760 (KSP Tap - Oyen 767S)	New Violation	None	RTOP
	None	Thermal-Below Emergency Rating	7L127 Pemukan 932S - Monitor 774S)	7L760 (KSP Tap - Oyen 767S)	New Violation	None	RTOP
	None	Thermal-Below Emergency Rating	7L749 (Edgerton 899S - Lloyminster 716S)	472L (Hughenden 213S - 472AL Tap)	New Violation	None	RTOP
	None	Thermal-Below Emergency Rating	7L749 (Edgerton 899S - Lloyminster 716S)	704L (Tucuman 478S - Wainright 51S)	New Violation	None	RTOP
	None	Thermal-Below Emergency Rating	7L749 (Edgerton 899S - Lloyminster 716S)	7L760 (KSP Tap - Bindloss 914S Tap)	New Violation	None	RTOP
	None	Thermal-Below Emergency Rating	7L749 (Edgerton 899S - Lloyminster 716S)	7L760 (KSP Tap - Oyen 767S)	New Violation	None	RTOP
	None	Thermal-Below Emergency Rating	7L79 (Pemukan 932S - Ribstone Creek 892S)	7L760 (KSP Tap - Oyen 767S)	New Violation	None	RTOP
	None	Thermal-Below Emergency Rating	7L92 (Vegreville 709S - Whitby Lake 819S)	7L760 (KSP Tap - Oyen 767S)	New Violation	None	RTOP
	None	Thermal-Below Emergency Rating	9L20 (Nevis 766S - Cordel 755S)	7L760 (Empress Liquid 164S Tap - Bindloss 914S Tap)	New Violation	None	RTOP
	None	Thermal-Below Emergency Rating	9L20 (Nevis 766S - Cordel 755S)	7L760 (KSP Tap - Bindloss 914S Tap)	New Violation	None	RTOP
	None	Thermal-Below Emergency Rating	9L20 (Nevis 766S - Cordel 755S)	7L760 (KSP Tap - Oyen 767S)	New Violation	None	RTOP
	None	Thermal-Below Emergency Rating	9L20 (Nevis 766S - Cordel 755S)	7L132 (Oyen 767S - Lanfine 959S)	New Violation	None	RTOP
	Thermal- Above Emergency Rating	Thermal- Above Emergency Rating	9L24 (Lanfine 959S - Oakland 946S)	472L (Hughenden 213S - 472AL Tap)	Marginally Increased Violation	RTOP	RTOP
	Thermal- Above Emergency Rating	Thermal- Above Emergency Rating	9L24 (Lanfine 959S - Oakland 946S)	7L760 (Empress Liquid 164S Tap -Amoco Empress 163S)	Materially Decreased Violation	RTOP	RTOP
	Thermal- Above Emergency Rating	Thermal- Above Emergency Rating	9L24 (Lanfine 959S - Oakland 946S)	7L760 (Empress Liquid 164S Tap - Bindloss 914S Tap)	Materially Decreased Violation	RTOP	RTOP
	Thermal- Above Emergency Rating	Thermal- Above Emergency Rating	9L24 (Lanfine 959S - Oakland 946S)	7L760 (KSP Tap - Bindloss 914S Tap)	Materially Decreased Violation	RTOP	RTOP
	Thermal- Above Emergency Rating	Thermal- Above Emergency Rating	9L24 (Lanfine 959S - Oakland 946S)	7L760 (KSP Tap - Oyen 767S)	Materially Decreased Violation	RTOP	RTOP
	Thermal- Above Emergency Rating	Thermal- Above Emergency Rating	9L24 (Lanfine 959S - Oakland 946S)	7L132 (Oyen 767S - Lanfine 959S)	Materially Decreased Violation	RTOP	RTOP
	Thermal-Below Emergency Rating	Thermal- Above Emergency Rating	9L27 (Paintearth Creek - Cordel 755S)	472L (Hughenden 213S - 472AL Tap)	Materially Increased Violation	RTOP	RTOP
	None	Thermal-Below Emergency Rating	9L27 (Paintearth Creek - Cordel 755S)	7L760 (Empress Liquid 164S Tap - Bindloss 914S Tap)	New Violation	None	RTOP
	Thermal-Below Emergency Rating	Thermal-Below Emergency Rating	9L27 (Paintearth Creek - Cordel 755S)	7L760 (KSP Tap - Bindloss 914S Tap)	Materially Increased Violation	RTOP	RTOP
	Thermal-Below Emergency Rating	Thermal-Below Emergency Rating	9L27 (Paintearth Creek - Cordel 755S)	7L760 (KSP Tap - Oyen 767S)	Materially Increased Violation	RTOP	RTOP
	None	Thermal-Below Emergency Rating	9L27 (Paintearth Creek - Cordel 755S)	7L132 (Oyen 767S - Lanfine 959S)	New Violation	None	RTOP

Scenario	Type of Reliability Criteria Violation Pre-Project	Type of Reliability Criteria Violation Post-Project	Contingency	Details of Violation	Project Impact	Pre-Project Mitigation Measures	Post-Project Mitigation Measures
	None	Thermal-Below Emergency Rating	9L70 (Oakland 946S - Anderson 801S)	7L760 (KSP Tap - Bindloss 914S Tap)	New Violation	None	New RAS for 9L97 or 9L970
	None	Thermal-Below Emergency Rating	9L70 (Oakland 946S - Anderson 801S)	7L760 (KSP Tap - Oyen 767S)	New Violation	None	New RAS for 9L97 or 9L970
	None	Thermal- Above Emergency Rating	9L70 (Oakland 946S - Anderson 801S)	9L97 (Anderson 801S - Oakland 946S)	New Violation	None	New RAS for 9L97 or 9L970
	None	Thermal-Below Emergency Rating	9L70 (Oakland 946S - Anderson 801S)	7L132 (Oyen 767S - Lanfine 959S)	New Violation	None	New RAS for 9L97 or 9L970
	None	Thermal-Below Emergency Rating	9L912 (Nevis 766S – Red Deer 63S)	7L760 (Empress Liquid 164S Tap - Bindloss 914S Tap)	New Violation	None	RAS 215
	None	Thermal-Below Emergency Rating	9L912 (Nevis 766S – Red Deer 63S)	7L760 (KSP Tap - Bindloss 914S Tap)	New Violation	None	RAS 215, RTOP
	Thermal-Below Emergency Rating	Thermal-Below Emergency Rating	9L912 (Nevis 766S – Red Deer 63S)	7L760 (KSP Tap - Oyen 767S)	Materially Increased Violation	RTOP	RAS 215, RTOP
	None	Thermal- Above Emergency Rating	9L912 (Nevis 766S – Red Deer 63S)	9L16 (Goldeye Tap - Tinchebray 972S)	New Violation	None	RAS 215
	None	Thermal-Below Emergency Rating	9L912 (Nevis 766S – Red Deer 63S)	7L132 (Oyen 767S - Lanfine 959S)	New Violation	None	RAS 215
	Thermal-Below Emergency Rating	Thermal- Above Emergency Rating	9L953 (Cordel 755S - Nilrem 574S)	704L (Tucuman 478S - Wainright 51S)	Materially Increased Violation	RTOP	RAS 211
	None	Thermal-Below Emergency Rating	9L953 (Cordel 755S - Nilrem 574S)	7L760 (Empress Liquid 164S Tap - Bindloss 914S Tap)	New Violation	None	RAS 211
	None	Thermal-Below Emergency Rating	9L953 (Cordel 755S - Nilrem 574S)	7L760 (KSP Tap - Bindloss 914S Tap)	New Violation	None	RAS 211
	Thermal-Below Emergency Rating	Thermal-Below Emergency Rating	9L953 (Cordel 755S - Nilrem 574S)	7L760 (KSP Tap - Oyen 767S)	Materially Increased Violation	RTOP	RAS 211
	None	Thermal-Below Emergency Rating	9L953 (Cordel 755S - Nilrem 574S)	7L132 (Oyen 767S - Lanfine 959S)	New Violation	None	RAS 211
	None	Thermal-Below Emergency Rating	9L97 (Oakland 946S - Anderson 801S)	7L760 (KSP Tap - Bindloss 914S Tap)	New Violation	None	New RAS for 9L97 or 9L970
	None	Thermal-Below Emergency Rating	9L97 (Oakland 946S - Anderson 801S)	7L760 (KSP Tap - Oyen 767S)	New Violation	None	New RAS for 9L97 or 9L970
	None	Thermal- Above Emergency Rating	9L97 (Oakland 946S - Anderson 801S)	9L70 (Anderson 801S - Oakland 946S)	New Violation	None	New RAS for 9L97 or 9L970
	None	Thermal-Below Emergency Rating	9L97 (Oakland 946S - Anderson 801S)	7L132 (Oyen 767S - Lanfine 959S)	New Violation	None	New RAS for 9L97 or 9L970
	None	Thermal-Below Emergency Rating	Hardisty 377S Transformer T1	7L760 (KSP Tap - Bindloss 914S Tap)	New Violation	None	RTOP
	None	Thermal-Below Emergency Rating	Hardisty 377S Transformer T1	7L760 (KSP Tap - Oyen 767S)	New Violation	None	RTOP
	None	Thermal-Below Emergency Rating	Hardisty 377S Transformer T1	7L132 (Oyen 767S - Lanfine 959S)	New Violation	None	RTOP
	None	Thermal-Below Emergency Rating	Buffalo Creek 526S Transformers	7L760 (KSP Tap - Oyen 767S)	New Violation	None	RTOP
	None	Thermal-Below Emergency Rating	Edgerton 899S Transformer ST3	472L (Hughenden 213S - 472AL Tap)	New Violation	None	RTOP
	None	Thermal-Below Emergency Rating	Edgerton 899S Transformer ST3	704L (Tucuman 478S - Wainright 51S)	New Violation	None	RTOP
	Thermal-Below Emergency Rating	Thermal-Below Emergency Rating	Edgerton 899S Transformer ST3	715L (Hansman Lake 650S - 715AL Tap)	None	RTOP	RTOP
	Thermal-Below Emergency Rating	Thermal-Below Emergency Rating	Edgerton 899S Transformer ST3	715L (Rising Sun 1147S (P2540) Tap - 715AL Tap)	None	RTOP	RTOP
	None	Thermal-Below Emergency Rating	Edgerton 899S Transformer ST3	7L760 (KSP Tap - Bindloss 914S Tap)	New Violation	None	RTOP
	None	Thermal-Below Emergency Rating	Edgerton 899S Transformer ST3	7L760 (KSP Tap - Oyen 767S)	New Violation	None	RTOP
	None	Thermal-Below Emergency Rating	Empress 394S Transformer T1	7L760 (KSP Tap - Bindloss 914S Tap)	New Violation	None	RTOP
	None	Thermal-Below Emergency Rating	Empress 394S Transformer T1	7L760 (KSP Tap - Oyen 767S)	New Violation	None	RTOP
	None	Thermal-Below Emergency Rating	Empress 394S Transformer T1	7L132 (Oyen 767S - Lanfine 959S)	New Violation	None	RTOP
	None	Thermal-Below Emergency Rating	Excel 910S Transformer 701T	7L760 (KSP Tap - Bindloss 914S Tap)	New Violation	None	RTOP
	None	Thermal-Below Emergency Rating	Excel 910S Transformer 701T	7L760 (KSP Tap - Oyen 767S)	New Violation	None	RTOP

Scenario	Type of Reliability Criteria Violation Pre-Project	Type of Reliability Criteria Violation Post-Project	Contingency	Details of Violation	Project Impact	Pre-Project Mitigation Measures	Post-Project Mitigation Measures
	None	Thermal-Below Emergency Rating	Hill 751S Transformers 701T/702T	7L760 (KSP Tap - Bindloss 914S Tap)	New Violation	None	RTOP
	None	Thermal-Below Emergency Rating	Hill 751S Transformers 701T/702T	7L760 (KSP Tap - Oyen 767S)	New Violation	None	RTOP
	None	Thermal-Below Emergency Rating	Holden 395S Transformer T1	7L760 (KSP Tap - Oyen 767S)	New Violation	None	RTOP
	None	Thermal-Below Emergency Rating	Jarrow 252S Transformer T2	7L760 (KSP Tap - Oyen 767S)	New Violation	None	RTOP
	None	Thermal-Below Emergency Rating	Metiskow 648S Transformer T1	7L760 (KSP Tap - Oyen 767S)	New Violation	None	RTOP
	Thermal-Below Emergency Rating	Thermal- Above Emergency Rating	Paintearth Creek 863S Transformer 902T	472L (Hughenden 213S - 472AL Tap)	Materially Increased Violation	RTOP	RTOP
	None	Thermal-Below Emergency Rating	Paintearth Creek 863S Transformer 902T	7L760 (Empress Liquid 164S Tap - Bindloss 914S Tap)	New Violation	None	RTOP
	Thermal-Below Emergency Rating	Thermal-Below Emergency Rating	Paintearth Creek 863S Transformer 902T	7L760 (KSP Tap - Bindloss 914S Tap)	Materially Increased Violation	RTOP	RTOP
	Thermal-Below Emergency Rating	Thermal-Below Emergency Rating	Paintearth Creek 863S Transformer 902T	7L760 (KSP Tap - Oyen 767S)	Materially Increased Violation	RTOP	RTOP
	None	Thermal-Below Emergency Rating	Paintearth Creek 863S Transformer 902T	7L132 (Oyen 767S - Lanfine 959S)	New Violation	None	RTOP
	None	Thermal-Below Emergency Rating	Pemukan 932S Transformer 901T	7L760 (KSP Tap - Oyen 767S)	New Violation	None	RTOP
	None	Thermal-Below Emergency Rating	7L42 (Hill 751S - Lloydminster 716S)	7L760 (KSP Tap - Oyen 767S)	New Violation	None	RTOP
	Thermal-Below Emergency Rating	Thermal- Above Emergency Rating	9L960 (Paintearth 863S - Rolling Hills 1081S)	472L (Hughenden 213S - 472AL Tap)	Materially Increased Violation	RTOP	RTOP
	None	Thermal-Below Emergency Rating	9L960 (Paintearth 863S - Rolling Hills 1081S)	7L760 (Empress Liquid 164S Tap - Bindloss 914S Tap)	New Violation	None	RTOP
	Thermal-Below Emergency Rating	Thermal-Below Emergency Rating	9L960 (Paintearth 863S - Rolling Hills 1081S)	7L760 (KSP Tap - Bindloss 914S Tap)	Materially Increased Violation	RTOP	RTOP
	Thermal-Below Emergency Rating	Thermal-Below Emergency Rating	9L960 (Paintearth 863S - Rolling Hills 1081S)	7L760 (KSP Tap - Oyen 767S)	Materially Increased Violation	RTOP	RTOP
	None	Thermal-Below Emergency Rating	9L960 (Paintearth 863S - Rolling Hills 1081S)	7L132 (Oyen 767S - Lanfine 959S)	New Violation	None	RTOP
	None	Thermal-Below Emergency Rating	703L (Hughenden 213S - Hardisty 377S)	7L760 (KSP Tap - Oyen 767S)	New Violation	None	RTOP
	Thermal-Below Emergency Rating	Thermal-Below Emergency Rating	933L (Anderson 801S - Ware Junction 132S)	7L760 (KSP Tap - Bindloss 914S Tap)	Materially Increased Violation	RTOP	RTOP
	Thermal-Below Emergency Rating	Thermal-Below Emergency Rating	933L (Anderson 801S - Ware Junction 132S)	7L760 (KSP Tap - Oyen 767S)	Materially Increased Violation	RTOP	RTOP
	None	Thermal-Below Emergency Rating	933L (Anderson 801S - Ware Junction 132S)	7L132 (Oyen 767S - Lanfine 959S)	New Violation	None	RTOP
	Thermal-Below Emergency Rating	Thermal-Below Emergency Rating	934L (Anderson 801S - Ware Junction 132S)	7L760 (Empress Liquid 164S Tap - Bindloss 914S Tap)	Materially Increased Violation	RTOP	RTOP
	Thermal-Below Emergency Rating	Thermal-Below Emergency Rating	934L (Anderson 801S - Ware Junction 132S)	7L760 (KSP Tap - Bindloss 914S Tap)	Materially Increased Violation	RTOP	RTOP
	Thermal-Below Emergency Rating	Thermal-Below Emergency Rating	934L (Anderson 801S - Ware Junction 132S)	7L760 (KSP Tap - Oyen 767S)	Materially Increased Violation	RTOP	RTOP
	None	Thermal-Below Emergency Rating	934L (Anderson 801S - Ware Junction 132S)	7L132 (Oyen 767S - Lanfine 959S)	New Violation	None	RTOP
	Thermal-Below Emergency Rating	Thermal-Below Emergency Rating	950L (Anderson 801S - Ware Junction 132S)	7L760 (Empress Liquid 164S Tap - Bindloss 914S Tap)	Materially Increased Violation	RTOP	RTOP
	Thermal-Below Emergency Rating	Thermal-Below Emergency Rating	950L (Anderson 801S - Ware Junction 132S)	7L760 (KSP Tap - Bindloss 914S Tap)	Materially Increased Violation	RTOP	RTOP
	Thermal-Below Emergency Rating	Thermal-Below Emergency Rating	950L (Anderson 801S - Ware Junction 132S)	7L760 (KSP Tap - Oyen 767S)	Materially Increased Violation	RTOP	RTOP
	None	Thermal-Below Emergency Rating	950L (Anderson 801S - Ware Junction 132S)	7L132 (Oyen 767S - Lanfine 959S)	New Violation	None	RTOP
	None	Thermal-Below Emergency Rating	9L966 (Hansman Lake 650S - Pemukan 932S)	7L760 (Empress Liquid 164S Tap - Bindloss 914S Tap)	New Violation	None	RTOP
	None	Thermal-Below Emergency Rating	9L966 (Hansman Lake 650S - Pemukan 932S)	7L760 (KSP Tap - Bindloss 914S Tap)	New Violation	None	RTOP
	None	Thermal-Below Emergency Rating	9L966 (Hansman Lake 650S - Pemukan 932S)	7L760 (KSP Tap - Oyen 767S)	New Violation	None	RTOP
	None	Thermal-Below Emergency Rating	9L966 (Hansman Lake 650S - Pemukan 932S)	7L132 (Oyen 767S - Lanfine 959S)	New Violation	None	RTOP

Scenario	Type of Reliability Criteria Violation Pre-Project	Type of Reliability Criteria Violation Post-Project	Contingency	Details of Violation	Project Impact	Pre-Project Mitigation Measures	Post-Project Mitigation Measures
	None	Thermal-Below Emergency Rating	914L (Red Deer 63S - Gaetz 87S)	7L760 (KSP Tap - Oyen 767S)	New Violation	None	RTOP
	Thermal-Below Emergency Rating	Thermal- Above Emergency Rating	1062L (Tinchebray 972S - Gaetz 87S)	9L912 (Red Deer 63S - Nevis 766S)	Materially Increased Violation	RTOP	RTOP
	Thermal-Below Emergency Rating	Thermal-Below Emergency Rating	1062L (Tinchebray 972S - Gaetz 87S)	7L760 (Empress Liquid 164S Tap - Bindloss 914S Tap)	Materially Increased Violation	RTOP	RTOP
	None	Thermal-Below Emergency Rating	1062L (Tinchebray 972S - Gaetz 87S)	7L53 (Bonnyville 700S - Lindberg 969S Tap)	New Violation	None	RTOP
	Thermal-Below Emergency Rating	Thermal-Below Emergency Rating	1062L (Tinchebray 972S - Gaetz 87S)	7L760 (KSP Tap - Bindloss 914S Tap)	Materially Increased Violation	RTOP	RTOP
	Thermal-Below Emergency Rating	Thermal-Below Emergency Rating	1062L (Tinchebray 972S - Gaetz 87S)	7L760 (KSP Tap - Oyen 767S)	Materially Increased Violation	RTOP	RTOP
	Thermal-Below Emergency Rating	Thermal-Below Emergency Rating	1062L (Tinchebray 972S - Gaetz 87S)	9L20 (Nevis 766S – Cordel 755S)	Materially Increased Violation	RTOP	RTOP
	Thermal-Below Emergency Rating	Thermal-Below Emergency Rating	1062L (Tinchebray 972S - Gaetz 87S)	7L132 (Oyen 767S - Lanfine 959S)	Materially Increased Violation	RTOP	RTOP
	Thermal-Below Emergency Rating	Thermal- Above Emergency Rating	Tucuman 478S Transformers	472L (Hughenden 213S - 472AL Tap)	Materially Increased Violation	RTOP	RTOP
	None	Thermal-Below Emergency Rating	Tucuman 478S Transformers	7L760 (KSP Tap - Oyen 767S)	New Violation	None	RTOP
	None	Thermal-Below Emergency Rating	Wainwright 51S Transformer T3	7L760 (KSP Tap - Oyen 767S)	New Violation	None	RTOP
	Thermal-Below Emergency Rating	Thermal-Below Emergency Rating	EATL (Newell 2075S - Heathfield 2029S)	7L53 (Bonnyville 700S - Lindberg 969S Tap)	Materially Increased Violation	RTOP	RTOP
	None	Thermal-Below Emergency Rating	EATL (Newell 2075S - Heathfield 2029S)	704L (Tucuman 478S - Wainright 51S)	New Violation	None	RTOP
	None	Thermal-Below Emergency Rating	EATL (Newell 2075S - Heathfield 2029S)	472L (Hughenden 213S - 472AL Tap)	New Violation	None	RTOP
	None	Voltage	749L (Edgerton 899S - Metiskow 648S)	Edgerton 899S	New voltage criteria violation	None	RTOP
	Voltage	Voltage	7L77 (Holden 395S - Vegreville 709S)	Holden 395S	Marginally Increased Violation	RTOP	RTOP
SP	None	Thermal-Below Emergency Rating	681L (Tucuman 478S - Hardisty 377S)	472L (Hughenden 213S - 472AL Tap)	New Violation	None	RTOP
	None	Thermal-Below Emergency Rating	703L (Hughenden 213S - Hardisty 377S)	7L760 (KSP Tap - Bindloss 914S Tap)	New Violation	None	RTOP
	None	Thermal-Below Emergency Rating	703L (Hughenden 213S - Hardisty 377S)	7L760 (KSP Tap - Oyen 767S)	New Violation	None	RTOP
	Thermal-Below Emergency Rating	Thermal-Below Emergency Rating	749L (Edgerton 899S - Metiskow 648S)	715L (Hansman Lake 650S - 715AL Tap)	None	RTOP	RTOP
	Thermal- Above Emergency Rating	Thermal- Above Emergency Rating	749L (Edgerton 899S - Metiskow 648S)	715L (Rising Sun 1147S (P2540) Tap - 715AL Tap)	None	RTOP	RTOP
	None	Thermal-Below Emergency Rating	769L (Rosyth 296S - Hardisty 377S)	7L760 (KSP Tap - Oyen 767S)	New Violation	None	RTOP
	None	Thermal-Below Emergency Rating	7L116 (Excel 910S - Lanfine 959S)	7L760 (KSP Tap - Bindloss 914S Tap)	New Violation	None	RTOP
	None	Thermal-Below Emergency Rating	7L116 (Excel 910S - Lanfine 959S)	7L760 (KSP Tap - Oyen 767S)	New Violation	None	RTOP
	Thermal-Below Emergency Rating	Thermal-Below Emergency Rating	7L137 (Three Hills 770S - Rowley 768S)	7L128 (Coyote Lake 963S - High_Tap)	Marginally Decreased Violation	RTOP	RTOP
	Thermal- Above Emergency Rating	Thermal- Above Emergency Rating	7L16 (Nevis 766S - Heatburg 948S)	7L128 (Coyote Lake 963S - High_Tap)	Marginally Decreased Violation	RTOP	RTOP
	Thermal-Below Emergency Rating	Thermal-Below Emergency Rating	7L25 (Michichi Creek 802S - Rowley 768S)	7L128 (Coyote Lake 963S - High_Tap)	Marginally Decreased Violation	RTOP	RTOP
	Thermal-Below Emergency Rating	Thermal-Below Emergency Rating	7L749 (Edgerton 899S - Lloyminster 716S)	715L (Hansman Lake 650S - 715AL Tap)	None	RTOP	RTOP
	Thermal-Below Emergency Rating	Thermal-Below Emergency Rating	7L749 (Edgerton 899S - Lloyminster 716S)	715L (Rising Sun 1147S (P2540) Tap - 715AL Tap)	None	RTOP	RTOP
	None	Thermal-Below Emergency Rating	7L749 (Edgerton 899S - Lloyminster 716S)	7L760 (KSP Tap - Oyen 767S)	New Violation	None	RTOP
	None	Thermal-Below Emergency Rating	7L79 (Pemukan 932S - Ribstone Creek 892S)	7L760 (KSP Tap - Oyen 767S)	New Violation	None	RTOP
	None	Thermal-Below Emergency Rating	9L20 (Nevis 766S - Cordel 755S)	7L760 (KSP Tap - Bindloss 914S Tap)	New Violation	None	RTOP

Scenario	Type of Reliability Criteria Violation Pre-Project	Type of Reliability Criteria Violation Post-Project	Contingency	Details of Violation	Project Impact	Pre-Project Mitigation Measures	Post-Project Mitigation Measures
	None	Thermal-Below Emergency Rating	9L20 (Nevis 766S - Cordel 755S)	7L760 (KSP Tap - Oyen 767S)	New Violation	None	RTOP
	Thermal- Above Emergency Rating	Thermal- Above Emergency Rating	9L24 (Lanfine 959S - Oakland 946S)	7L760 (Empress Liquid 164S Tap -Amoco Empress 163S)	Materially Decreased Violation	RTOP	RTOP
	Thermal- Above Emergency Rating	Thermal- Above Emergency Rating	9L24 (Lanfine 959S - Oakland 946S)	7L760 (Empress Liquid 164S Tap - Bindloss 914S Tap)	Materially Decreased Violation	RTOP	RTOP
	Thermal- Above Emergency Rating	Thermal- Above Emergency Rating	9L24 (Lanfine 959S - Oakland 946S)	7L760 (KSP Tap - Bindloss 914S Tap)	Materially Decreased Violation	RTOP	RTOP
	Thermal- Above Emergency Rating	Thermal- Above Emergency Rating	9L24 (Lanfine 959S - Oakland 946S)	7L760 (KSP Tap - Oyen 767S)	Materially Decreased Violation	RTOP	RTOP
	Thermal-Below Emergency Rating	Thermal-Below Emergency Rating	9L24 (Lanfine 959S - Oakland 946S)	7L128 (Coyote Lake 963S - High_Tap)	Marginally Decreased Violation	RTOP	RTOP
	Thermal- Above Emergency Rating	Thermal- Above Emergency Rating	9L24 (Lanfine 959S - Oakland 946S)	7L132 (Oyen 767S - Lanfine 959S)	Materially Decreased Violation	RTOP	RTOP
	None	Thermal-Below Emergency Rating	9L27 (Paintearth Creek - Cordel 755S)	7L760 (KSP Tap - Bindloss 914S Tap)	New Violation	None	RTOP
	None	Thermal-Below Emergency Rating	9L27 (Paintearth Creek - Cordel 755S)	7L760 (KSP Tap - Oyen 767S)	New Violation	None	RTOP
	Thermal- Above Emergency Rating	Thermal- Above Emergency Rating	9L29 (Coyote Lake 963S - Oakland 946S)	7L159 (Heatburg 948S - Ghostpine 114S Tap)	Materially Increased Violation	RASs 134, RAS 200	Modified RAS 134, RAS 200
	None	Thermal-Below Emergency Rating	9L29 (Coyote Lake 963S - Oakland 946S)	7L760 (KSP Tap - Oyen 767S)	New Violation	None	Modified RAS 134, RAS 200
	Thermal-Below Emergency Rating	Thermal- Above Emergency Rating	9L29 (Coyote Lake 963S - Oakland 946S)	7L16 (Nevis 766S - Heatburg 948S)	Materially Increased Violation	RTOP	Modified RAS 134, RAS 200
	Thermal-Below Emergency Rating	Thermal-Below Emergency Rating	9L29 (Coyote Lake 963S - Oakland 946S)	7L85 (Bullpound 803S Tap - Anderson 801S)	Materially Decreased Violation	RTOP	Modified RAS 134, RAS 200
	Thermal- Above Emergency Rating	Thermal- Above Emergency Rating	9L29 (Coyote Lake 963S - Oakland 946S)	7L85 (Bullpound 803S Tap - Badlands 981S Tap)	Materially Decreased Violation	RAS 134, RAS 200	Modified RAS 134, RAS 200
	Thermal- Above Emergency Rating	Thermal- Above Emergency Rating	9L29 (Coyote Lake 963S - Oakland 946S)	Anderson 801S Transformer 901T	Materially Decreased Violation	RAS 134, RAS 200	Modified RAS 134, RAS 200
	None	Thermal-Below Emergency Rating	9L70 (Oakland 946S - Anderson 801S)	7L760 (KSP Tap - Bindloss 914S Tap)	New Violation	None	New RAS for 9L97 or 9L970
	None	Thermal-Below Emergency Rating	9L70 (Oakland 946S - Anderson 801S)	7L760 (KSP Tap - Oyen 767S)	New Violation	None	New RAS for 9L97 or 9L970
	None	Thermal- Above Emergency Rating	9L70 (Oakland 946S - Anderson 801S)	9L97 (Anderson 801S - Oakland 946S)	New Violation	None	New RAS for 9L97 or 9L970
	None	Thermal-Below Emergency Rating	9L912 (Nevis 766S – Red Deer 63S)	7L760 (KSP Tap - Bindloss 914S Tap)	New Violation	None	RTOP
	None	Thermal-Below Emergency Rating	9L912 (Nevis 766S – Red Deer 63S)	7L760 (KSP Tap - Oyen 767S)	New Violation	None	RTOP
	Thermal-Below Emergency Rating	Thermal-Below Emergency Rating	9L912 (Nevis 766S – Red Deer 63S)	7L128 (Coyote Lake 963S - High_Tap)	Materially Decreased Violation	RTOP	RTOP
	None	Thermal-Below Emergency Rating	9L953 (Cordel 755S - Nilrem 574S)	7L760 (KSP Tap - Bindloss 914S Tap)	New Violation	None	RTOP
	None	Thermal-Below Emergency Rating	9L953 (Cordel 755S - Nilrem 574S)	7L760 (KSP Tap - Oyen 767S)	New Violation	None	RTOP
	None	Thermal-Below Emergency Rating	9L97 (Oakland 946S - Anderson 801S)	7L760 (KSP Tap - Bindloss 914S Tap)	New Violation	None	New RAS for 9L97 or 9L970
	None	Thermal-Below Emergency Rating	9L97 (Oakland 946S - Anderson 801S)	7L760 (KSP Tap - Oyen 767S)	New Violation	None	New RAS for 9L97 or 9L970
	None	Thermal- Above Emergency Rating	9L97 (Oakland 946S - Anderson 801S)	9L70 (Anderson 801S - Oakland 946S)	New Violation	None	New RAS for 9L97 or 9L970
	None	Thermal-Below Emergency Rating	Hardisty 377S Transformer T1	7L760 (KSP Tap - Bindloss 914S Tap)	New Violation	None	RTOP
	None	Thermal-Below Emergency Rating	Hardisty 377S Transformer T1	7L760 (KSP Tap - Oyen 767S)	New Violation	None	RTOP
	Thermal- Above Emergency Rating	Thermal- Above Emergency Rating	Coyote Lake 963S Transformer 901T	7L159 (Heatburg 948S - Ghostpine 114S Tap)	Materially Increased Violation	RASs 134, RAS 200	Modified RAS 134, RAS 200
	None	Thermal-Below Emergency Rating	Coyote Lake 963S Transformer 901T	7L760 (KSP Tap - Oyen 767S)	New Violation	None	Modified RAS 134, RAS 200

Scenario	Type of Reliability Criteria Violation Pre-Project	Type of Reliability Criteria Violation Post-Project	Contingency	Details of Violation	Project Impact	Pre-Project Mitigation Measures	Post-Project Mitigation Measures
	Thermal-Below Emergency Rating	Thermal- Above Emergency Rating	Coyote Lake 963S Transformer 901T	7L16 (Nevis 766S - Heatburg 948S)	Materially Increased Violation	RTOP	Modified RAS 134, RAS 200
	Thermal-Below Emergency Rating	Thermal-Below Emergency Rating	Coyote Lake 963S Transformer 901T	7L85 (Bullpound 803S Tap - Anderson 801S)	Materially Decreased Violation	RTOP	Modified RAS 134, RAS 200
	Thermal- Above Emergency Rating	Thermal- Above Emergency Rating	Coyote Lake 963S Transformer 901T	7L85 (Bullpound 803S Tap - Badlands 981S Tap)	Materially Decreased Violation	RASs 134, RAS 200	Modified RAS 134, RAS 200
	Thermal- Above Emergency Rating	Thermal- Above Emergency Rating	Coyote Lake 963S Transformer 901T	Anderson 801S Transformer 901T	Materially Decreased Violation	RASs 134, RAS 200	Modified RAS 134, RAS 200
	Thermal-Below Emergency Rating	Thermal-Below Emergency Rating	Edgerton 899S Transformer ST3	715L (Hansman Lake 650S - 715AL Tap)	None	RTOP	RTOP
	Thermal-Below Emergency Rating	Thermal-Below Emergency Rating	Edgerton 899S Transformer ST3	715L (Rising Sun 1147S (P2540) Tap - 715AL Tap)	None	RTOP	RTOP
	None	Thermal-Below Emergency Rating	Edgerton 899S Transformer ST3	7L760 (KSP Tap - Oyen 767S)	New Violation	None	RTOP
	None	Thermal-Below Emergency Rating	Empress 394S Transformer T1	7L760 (KSP Tap - Bindloss 914S Tap)	New Violation	None	RTOP
	None	Thermal-Below Emergency Rating	Empress 394S Transformer T1	7L760 (KSP Tap - Oyen 767S)	New Violation	None	RTOP
	None	Thermal-Below Emergency Rating	Excel 910S Transformer 701T	7L760 (KSP Tap - Bindloss 914S Tap)	New Violation	None	RTOP
	None	Thermal-Below Emergency Rating	Excel 910S Transformer 701T	7L760 (KSP Tap - Oyen 767S)	New Violation	None	RTOP
	Thermal-Below Emergency Rating	Thermal-Below Emergency Rating	Metiskow 648S Transformer T1	715L (Hansman Lake 650S - 715AL Tap)	Materially Decreased Violation	RTOP	RTOP
	Thermal- Above Emergency Rating	Thermal- Above Emergency Rating	Metiskow 648S Transformer T1	715L (Rising Sun 1147S (P2540) Tap - 715AL Tap)	Materially Decreased Violation	RTOP	RTOP
	None	Thermal-Below Emergency Rating	Paintearth Creek 863S Transformer 902T	7L760 (KSP Tap - Bindloss 914S Tap)	New Violation	None	RTOP
	None	Thermal-Below Emergency Rating	Paintearth Creek 863S Transformer 902T	7L760 (KSP Tap - Oyen 767S)	New Violation	None	RTOP
	None	Thermal-Below Emergency Rating	9L960 (Paintearth 863S - Rolling Hills 1081S)	7L760 (KSP Tap - Bindloss 914S Tap)	New Violation	None	RTOP
	None	Thermal-Below Emergency Rating	9L960 (Paintearth 863S - Rolling Hills 1081S)	7L760 (KSP Tap - Oyen 767S)	New Violation	None	RTOP
	None	Thermal-Below Emergency Rating	885L (Metiskow 648S - Hansman Lake 650S)	749L (Killarney 267S Tap - 749AL)	New Violation	None	RTOP
	Thermal-Below Emergency Rating	Thermal-Below Emergency Rating	Nevis 766S Transformer 903T	7L128 (Coyote Lake 963S - High_Tap)	Marginally Decreased Violation	RTOP	RTOP
	Thermal- Above Emergency Rating	Thermal- Above Emergency Rating	Anderson 801S Transformer 901T	7L128 (Coyote Lake 963S - High_Tap)	Materially Decreased Violation	RTOP	RTOP
	Thermal-Below Emergency Rating	Thermal-Below Emergency Rating	Provost 545S Transformer 701T	715L (Hansman Lake 650S - 715AL Tap)	Marginally Decreased Violation	RTOP	RTOP
	Thermal-Below Emergency Rating	Thermal-Below Emergency Rating	Provost 545S Transformer 701T	715L (Rising Sun 1147S (P2540) Tap - 715AL Tap)	Marginally Decreased Violation	RTOP	RTOP
	Thermal-Below Emergency Rating	Thermal-Below Emergency Rating	748L (Killarney 267S - Hayter 277S)	715L (Hansman Lake 650S - 715AL Tap)	None	RTOP	RTOP
	Thermal- Above Emergency Rating	Thermal- Above Emergency Rating	748L (Killarney 267S - Hayter 277S)	715L (Rising Sun 1147S (P2540) Tap - 715AL Tap)	None	RTOP	RTOP
	None	Thermal- Above Emergency Rating	933L (Anderson 801S - Ware Junction 132S)	934L (Anderson 801S - Ware Junction 132S)	New Violation	None	New RAS for 934L/9L934 or 950/9L950
	None	Thermal- Above Emergency Rating	933L (Anderson 801S - Ware Junction 132S)	950L (Anderson 801S - Ware Junction 132S)	New Violation	None	New RAS for 934L/9L934 or 950/9L950
	None	Thermal-Below Emergency Rating	933L (Anderson 801S - Ware Junction 132S)	7L760 (Empress Liquid 164S Tap - Bindloss 914S Tap)	New Violation	None	New RAS for 934L/9L934 or 950/9L950
	Thermal-Below Emergency Rating	Thermal-Below Emergency Rating	933L (Anderson 801S - Ware Junction 132S)	7L760 (KSP Tap - Bindloss 914S Tap)	Materially Increased Violation	RTOP	New RAS for 934L/9L934 or 950/9L950

Scenario	Type of Reliability Criteria Violation Pre-Project	Type of Reliability Criteria Violation Post-Project	Contingency	Details of Violation	Project Impact	Pre-Project Mitigation Measures	Post-Project Mitigation Measures
	Thermal-Below Emergency Rating	Thermal-Below Emergency Rating	933L (Anderson 801S - Ware Junction 132S)	7L760 (KSP Tap - Oyen 767S)	Materially Increased Violation	RTOP	New RAS for 934L/9L934 or 950/9L950
	None	Thermal-Below Emergency Rating	933L (Anderson 801S - Ware Junction 132S)	7L132 (Oyen 767S - Lanfine 959S)	New Violation	None	New RAS for 934L/9L934 or 950/9L950
	None	Thermal- Above Emergency Rating	934L (Anderson 801S - Ware Junction 132S)	950L (Anderson 801S - Ware Junction 132S)	New Violation	None	New RAS for 934L/9L934 or 950/9L950
	None	Thermal-Below Emergency Rating	934L (Anderson 801S - Ware Junction 132S)	7L760 (Empress Liquid 164S Tap - Bindloss 914S Tap)	New Violation	None	New RAS for 934L/9L934 or 950/9L950
	Thermal-Below Emergency Rating	Thermal-Below Emergency Rating	934L (Anderson 801S - Ware Junction 132S)	7L760 (KSP Tap - Bindloss 914S Tap)	Materially Increased Violation	RTOP	New RAS for 934L/9L934 or 950/9L950
	Thermal-Below Emergency Rating	Thermal-Below Emergency Rating	934L (Anderson 801S - Ware Junction 132S)	7L760 (KSP Tap - Oyen 767S)	Materially Increased Violation	RTOP	New RAS for 934L/9L934 or 950/9L950
	None	Thermal-Below Emergency Rating	934L (Anderson 801S - Ware Junction 132S)	7L132 (Oyen 767S - Lanfine 959S)	New Violation	None	New RAS for 934L/9L934 or 950/9L950
	None	Thermal- Above Emergency Rating	950L (Anderson 801S - Ware Junction 132S)	934L (Anderson 801S - Ware Junction 132S)	New Violation	None	New RAS for 934L/9L934 or 950/9L950
	None	Thermal-Below Emergency Rating	950L (Anderson 801S - Ware Junction 132S)	7L760 (Empress Liquid 164S Tap - Bindloss 914S Tap)	New Violation	None	New RAS for 934L/9L934 or 950/9L950
	Thermal-Below Emergency Rating	Thermal-Below Emergency Rating	950L (Anderson 801S - Ware Junction 132S)	7L760 (KSP Tap - Bindloss 914S Tap)	Materially Increased Violation	RTOP	New RAS for 934L/9L934 or 950/9L950
	Thermal-Below Emergency Rating	Thermal-Below Emergency Rating	950L (Anderson 801S - Ware Junction 132S)	7L760 (KSP Tap - Oyen 767S)	Materially Increased Violation	RTOP	New RAS for 934L/9L934 or 950/9L950
	None	Thermal-Below Emergency Rating	950L (Anderson 801S - Ware Junction 132S)	7L132 (Oyen 767S - Lanfine 959S)	New Violation	None	New RAS for 934L/9L934 or 950/9L950
	None	Thermal-Below Emergency Rating	914L (Red Deer 63S - Gaetz 87S)	7L760 (KSP Tap - Bindloss 914S Tap)	New Violation	None	RTOP
	None	Thermal-Below Emergency Rating	914L (Red Deer 63S - Gaetz 87S)	7L760 (KSP Tap - Oyen 767S)	New Violation	None	RTOP
	None	Thermal-Below Emergency Rating	1082L (Red Deer 63S - Hazelwood 287S)	7L760 (KSP Tap - Oyen 767S)	New Violation	None	RTOP
	Thermal-Below Emergency Rating	Thermal-Below Emergency Rating	1062L (Tinchebray 972S - Gaetz 87S)	9L912 (Red Deer 63S - Nevis 766S)	Materially Increased Violation	RTOP	RTOP
	None	Thermal-Below Emergency Rating	1062L (Tinchebray 972S - Gaetz 87S)	7L760 (Empress Liquid 164S Tap - Bindloss 914S Tap)	New Violation	None	RTOP
	Thermal-Below Emergency Rating	Thermal-Below Emergency Rating	1062L (Tinchebray 972S - Gaetz 87S)	7L760 (KSP Tap - Bindloss 914S Tap)	Materially Increased Violation	RTOP	RTOP
	Thermal-Below Emergency Rating	Thermal-Below Emergency Rating	1062L (Tinchebray 972S - Gaetz 87S)	7L760 (KSP Tap - Oyen 767S)	Materially Increased Violation	RTOP	RTOP
	Thermal-Below Emergency Rating	Thermal-Below Emergency Rating	1062L (Tinchebray 972S - Gaetz 87S)	9L20 (Nevis 766S – Cordel 755S)	Materially Increased Violation	RTOP	RTOP
	None	Thermal-Below Emergency Rating	1062L (Tinchebray 972S - Gaetz 87S)	7L132 (Oyen 767S - Lanfine 959S)	New Violation	None	RTOP
	None	Thermal-Below Emergency Rating	Tucuman 478S Transformers	472L (Hughenden 213S - 472AL Tap)	New Violation	None	RTOP
WP	Thermal-Below Emergency Rating	Thermal-Below Emergency Rating	681L (Tucuman 478S - Hardisty 377S)	703L (Hardisty 377S - Express 329S Tap)	Materially Increased Violation	None	RTOP

Scenario	Type of Reliability Criteria Violation Pre-Project	Type of Reliability Criteria Violation Post-Project	Contingency	Details of Violation	Project Impact	Pre-Project Mitigation Measures	Post-Project Mitigation Measures
	None	Thermal-Below Emergency Rating	681L (Tucuman 478S - Hardisty 377S)	472L (Metiskow 648S - 472AL Tap)	Materially Increased Violation	None	RTOP
	None	Thermal- Above Emergency Rating	701L (Holden 395S – Strome 223S)	1062L (Tinchebray 972S - Gaetz 87S)	Materially Increased Violation	None	RTOP
	None	Thermal- Above Emergency Rating	749L (Edgerton 899S - Metiskow 648S)	704L (Tucuman 478S - Wainright 51S)	Materially Increased Violation	None	RAS 211
	None	Thermal-Below Emergency Rating	7L130 (Vermilion 710S - Kitscoty 705S)	703L (Hardisty 377S - Express 329S Tap)	Materially Increased Violation	None	RTOP
	None	Thermal-Below Emergency Rating	7L14 (Kitscoty 705S - Hill 751S)	703L (Hardisty 377S - Express 329S Tap)	New Violation	None	RTOP
	Thermal- Above Emergency Rating	Thermal- Above Emergency Rating	7L171 (Michichi Creek - Wintering Hills 804S)	Anderson 801S Transformer 901T	None	None	RAS 200
	None	Thermal- Above Emergency Rating	7L53 (Bonnyville 700S - Irish Creek 706S)	1062L (Tinchebray 972S - Gaetz 87S)	Materially Increased Violation	None	RTOP
	None	Thermal-Below Emergency Rating	7L65 (Vermilion 710S-- Vegreville 709S)	704L (Tucuman 478S - Wainright 51S)	Materially Increased Violation	None	RTOP
	None	Thermal- Above Emergency Rating	7L701 (Battle River 757S - Strome 223S)	1062L (Tinchebray 972S - Gaetz 87S)	New Violation	None	RTOP
	Thermal-Below Emergency Rating	Thermal-Below Emergency Rating	7L749 (Edgerton 899S - Lloyminster 716S)	703L (Hardisty 377S - Express 329S Tap)	Materially Increased Violation	RAS 211	RAS 211, RTOP
	Thermal-Below Emergency Rating	Thermal-Below Emergency Rating	7L749 (Edgerton 899S - Lloyminster 716S)	472L (Metiskow 648S - 472AL Tap)	Materially Increased Violation	RAS 211	RAS 211, RTOP
	Thermal-Below Emergency Rating	Thermal- Above Emergency Rating	7L749 (Edgerton 899S - Lloyminster 716S)	704L (Tucuman 478S - Wainright 51S)	Materially Increased Violation	None	RAS 211
	None	Thermal-Below Emergency Rating	7L760 (Oyen 767S - Amoco Express 163S)	703L (Hardisty 377S - Express 329S Tap)	Materially Increased Violation	None	RTOP
	None	Thermal-Below Emergency Rating	7L92 (Vegreville 709S - Whitby Lake 819S)	7L53 (Bonnyville 700S - Lindberg 969S Tap)	Materially Increased Violation	None	RTOP
	None	Thermal- Above Emergency Rating	7L92 (Vegreville 709S - Whitby Lake 819S)	1062L (Tinchebray 972S - Gaetz 87S)	Materially Increased Violation	None	RTOP
	None	Thermal-Below Emergency Rating	9L20 (Nevis 766S - Cordel 755S)	914L (Red Deer 63S - Gaetz 87S)	Materially Increased Violation	None	RAS 215
	None	Thermal-Below Emergency Rating	9L20 (Nevis 766S - Cordel 755S)	7L159 (Heatburg 948S - Ghostpine 114S Tap)	Materially Increased Violation	None	RAS 215, RTOP
	None	Thermal-Below Emergency Rating	9L20 (Nevis 766S - Cordel 755S)	7L53 (Bonnyville 700S - Lindberg 969S Tap)	Materially Increased Violation	None	RAS 215
	None	Thermal-Below Emergency Rating	9L20 (Nevis 766S - Cordel 755S)	7L16 (Nevis 766S - Heatburg 948S)	Materially Increased Violation	RAS 215	RAS 215
	Thermal- Above Emergency Rating	Thermal- Above Emergency Rating	9L20 (Nevis 766S - Cordel 755S)	1062L (Tinchebray 972S - Gaetz 87S)	Materially Increased Violation	RAS 215	RAS 215, RTOP
	Thermal- Above Emergency Rating	Thermal- Above Emergency Rating	9L20 (Nevis 766S - Cordel 755S)	9L16 (Goldeye Tap - Tinchebray 972S)	Marginally Increased Violation	Planned RAS 204	RAS 215
	Thermal-Below Emergency Rating	Thermal-Below Emergency Rating	9L24 (Lanfine 959S - Oakland 946S)	703L (Hardisty 377S - Express 329S Tap)	Marginally Increased Violation	Planned RAS 204	Planned RAS 204, RTOP
	Thermal-Below Emergency Rating	Thermal-Below Emergency Rating	9L24 (Lanfine 959S - Oakland 946S)	472L (Metiskow 648S - 472AL Tap)	Marginally Increased Violation	Planned RAS 204	Planned RAS 204, RTOP
	Thermal- Above Emergency Rating	Thermal- Above Emergency Rating	9L24 (Lanfine 959S - Oakland 946S)	7L760 (Empress Liquid 164S Tap -Amoco Empress 163S)	Materially Decreased Violation	Planned RAS 204	Planned RAS 204, RTOP
	Thermal- Above Emergency Rating	Thermal- Above Emergency Rating	9L24 (Lanfine 959S - Oakland 946S)	9L966 (Hansman Lake 650S - Pemukan 932S)	Marginally Increased Violation	Planned RAS 204	Planned RAS 204
	Thermal- Above Emergency Rating	Thermal- Above Emergency Rating	9L24 (Lanfine 959S - Oakland 946S)	7L760 (Empress Liquid 164S Tap - Bindloss 914S Tap)	Materially Decreased Violation	Planned RAS 204	Planned RAS 204, RTOP
	Thermal- Above Emergency Rating	Thermal- Above Emergency Rating	9L24 (Lanfine 959S - Oakland 946S)	7L760 (KSP Tap - Bindloss 914S Tap)	Materially Decreased Violation	Planned RAS 204	Planned RAS 204, RTOP
	Thermal- Above Emergency Rating	Thermal-Below Emergency Rating	9L24 (Lanfine 959S - Oakland 946S)	7L760 (KSP Tap - Oyen 767S)	Materially Decreased Violation	Planned RAS 204	Planned RAS 204, RTOP

Scenario	Type of Reliability Criteria Violation Pre-Project	Type of Reliability Criteria Violation Post-Project	Contingency	Details of Violation	Project Impact	Pre-Project Mitigation Measures	Post-Project Mitigation Measures
	Thermal- Above Emergency Rating	Thermal- Above Emergency Rating	9L24 (Lanfine 959S - Oakland 946S)	7L132 (Oyen 767S - Lanfine 959S)	Materially Decreased Violation	Planned RAS 204	Planned RAS 204, RTOP
	Thermal- Above Emergency Rating	Thermal- Above Emergency Rating	9L24 (Lanfine 959S - Oakland 946S)	6L09 (Oyen 767S - Hurd 2037S Tap)	Marginally Increased Violation	RTOP	Planned RAS 204, RTOP
	Thermal-Below Emergency Rating	Thermal-Below Emergency Rating	9L27 (Paintearth Creek - Cordel 755S)	703L (Hardisty 377S - Express 329S Tap)	Materially Increased Violation	RTOP	RTOP
	Thermal-Below Emergency Rating	Thermal- Above Emergency Rating	9L27 (Paintearth Creek - Cordel 755S)	472L (Metiskow 648S - 472AL Tap)	Materially Increased Violation	RTOP	RTOP
	Thermal-Below Emergency Rating	Thermal-Below Emergency Rating	9L27 (Paintearth Creek - Cordel 755S)	472L (Hughenden 213S - 472AL Tap)	Materially Increased Violation	None	RTOP
	None	Thermal-Below Emergency Rating	9L27 (Paintearth Creek - Cordel 755S)	704L (Tucuman 478S - Wainright 51S)	Materially Increased Violation	None	RTOP
	None	Thermal-Below Emergency Rating	9L27 (Paintearth Creek - Cordel 755S)	1047L (Nilrem 574S - Easterv Tap)	Materially Increased Violation	None	RTOP
	None	Thermal-Below Emergency Rating	9L29 (Coyote Lake 963S - Oakland 946S)	7L159 (Heatburg 948S - Ghostpine 114S Tap)	Materially Increased Violation	None	RTOP
	None	Thermal- Above Emergency Rating	9L70 (Oakland 946S - Anderson 801S)	9L97 (Anderson 801S - Oakland 946S)	Materially Increased Violation	None	New RAS for 9L97 or 9L970
	None	Thermal-Below Emergency Rating	9L80 (Battle River 757S - Cordel 755S)	703L (Hardisty 377S - Express 329S Tap)	Materially Increased Violation	None	RTOP
	None	Thermal-Below Emergency Rating	9L80 (Battle River 757S - Cordel 755S)	704L (Tucuman 478S - Wainright 51S)	New Violation	None	RTOP
	Thermal-Below Emergency Rating	Thermal-Below Emergency Rating	9L912 (Nevis 766S – Red Deer 63S)	914L (Red Deer 63S - Gaetz 87S)	Materially Increased Violation	None	RAS 215
	None	Thermal-Below Emergency Rating	9L912 (Nevis 766S – Red Deer 63S)	7L53 (Bonnyville 700S - Lindberg 969S Tap)	Materially Increased Violation	RAS 215	RAS 215
	Thermal- Above Emergency Rating	Thermal- Above Emergency Rating	9L912 (Nevis 766S – Red Deer 63S)	1062L (Tinchebray 972S - Gaetz 87S)	Materially Increased Violation	RAS 215	RAS 215, RTOP
	Thermal- Above Emergency Rating	Thermal- Above Emergency Rating	9L912 (Nevis 766S – Red Deer 63S)	9L16 (Goldeye Tap - Tinchebray 972S)	Materially Increased Violation	None	RAS 215, RTOP
	None	Thermal- Above Emergency Rating	9L912 (Nevis 766S – Red Deer 63S)	9L16 (Goldeye Tap - Cordel 755S)	Materially Increased Violation	None	RAS 215, RTOP
	None	Thermal-Below Emergency Rating	9L953 (Cordel 755S - Nilrem 574S)	702L (Hardisty 377S - Sedgewick 137S Tap)	Materially Increased Violation	RAS 211	RAS 211
	Thermal- Above Emergency Rating	Thermal- Above Emergency Rating	9L953 (Cordel 755S - Nilrem 574S)	704L (Tucuman 478S - Wainright 51S)	Materially Increased Violation	None	RAS 211
	None	Thermal- Above Emergency Rating	9L97 (Oakland 946S - Anderson 801S)	9L70 (Anderson 801S - Oakland 946S)	Materially Increased Violation	None	New RAS for 9L97 or 9L970
	None	Thermal-Below Emergency Rating	Amoco Empress 163S Transformer T5	703L (Hardisty 377S - Express 329S Tap)	Materially Increased Violation	None	RTOP
	None	Thermal- Above Emergency Rating	Buffalo Creek 526S Transformers	1062L (Tinchebray 972S - Gaetz 87S)	Materially Increased Violation	None	RTOP
	None	Thermal-Below Emergency Rating	Coyote Lake 963S Transformer 901T	7L159 (Heatburg 948S - Ghostpine 114S Tap)	New Violation	None	RTOP
	Thermal-Below Emergency Rating	Thermal-Below Emergency Rating	Edgerton 899S Transformer ST3	703L (Hardisty 377S - Express 329S Tap)	Materially Increased Violation	RAS 211	RAS 211, RTOP
	Thermal-Below Emergency Rating	Thermal-Below Emergency Rating	Edgerton 899S Transformer ST3	472L (Metiskow 648S - 472AL Tap)	Materially Increased Violation	RAS 211	RAS 211, RTOP
	Thermal-Below Emergency Rating	Thermal- Above Emergency Rating	Edgerton 899S Transformer ST3	704L (Tucuman 478S - Wainright 51S)	Materially Increased Violation	None	RAS 211
	None	Thermal- Above Emergency Rating	Grizzly Bear 708S Transformer T1	704L (Tucuman 478S - Wainright 51S)	Materially Increased Violation	RTOP	RAS 211
	Thermal-Below Emergency Rating	Thermal-Below Emergency Rating	Hill 751S Transformers 701T/702T	703L (Hardisty 377S - Express 329S Tap)	Materially Increased Violation	None	RTOP
	None	Thermal-Below Emergency Rating	Hill 751S Transformers 701T/702T	472L (Metiskow 648S - 472AL Tap)	Materially Increased Violation	None	RTOP

Scenario	Type of Reliability Criteria Violation Pre-Project	Type of Reliability Criteria Violation Post-Project	Contingency	Details of Violation	Project Impact	Pre-Project Mitigation Measures	Post-Project Mitigation Measures
	None	Thermal- Above Emergency Rating	Holden 395S Transformer T1	1062L (Tinchebray 972S - Gaetz 87S)	Materially Increased Violation	None	RTOP
	None	Thermal-Below Emergency Rating	HRT Express 329S 138-4.16 kV Transformer	703L (Hardisty 377S - Express 329S Tap)	Materially Increased Violation	RTOP	RTOP
	Thermal-Below Emergency Rating	Thermal-Below Emergency Rating	Lanfine 959S Transformer 901T	7L760 (Empress Liquid 164S Tap -Amoco Empress 163S)	Marginally Decreased Violation	RTOP	RTOP
	Thermal- Above Emergency Rating	Thermal- Above Emergency Rating	Lanfine 959S Transformer 901T	7L760 (Empress Liquid 164S Tap - Bindloss 914S Tap)	Marginally Decreased Violation	RTOP	RTOP
	Thermal- Above Emergency Rating	Thermal- Above Emergency Rating	Lanfine 959S Transformer 901T	7L760 (KSP Tap - Bindloss 914S Tap)	Marginally Decreased Violation	None	RTOP
	None	Thermal-Below Emergency Rating	Nilrem 574S Transformer T2	703L (Hardisty 377S - Express 329S Tap)	Materially Increased Violation	RTOP	RTOP
	Thermal-Below Emergency Rating	Thermal-Below Emergency Rating	Paintearth Creek 863S Transformer 902T	703L (Hardisty 377S - Express 329S Tap)	Materially Increased Violation	RTOP	RTOP
	Thermal-Below Emergency Rating	Thermal- Above Emergency Rating	Paintearth Creek 863S Transformer 902T	472L (Metiskow 648S - 472AL Tap)	Materially Increased Violation	RTOP	RTOP
	Thermal-Below Emergency Rating	Thermal-Below Emergency Rating	Paintearth Creek 863S Transformer 902T	472L (Hughenden 213S - 472AL Tap)	Materially Increased Violation	None	RTOP
	None	Thermal-Below Emergency Rating	Paintearth Creek 863S Transformer 902T	704L (Tucuman 478S - Wainright 51S)	Materially Increased Violation	None	RTOP
	None	Thermal-Below Emergency Rating	Paintearth Creek 863S Transformer 902T	1047L (Nilrem 574S - Easterv Tap)	Materially Increased Violation	None	RTOP
	None	Thermal- Above Emergency Rating	7L117 (Irish Creek 706S - Vermillion 710S)	1062L (Tinchebray 972S - Gaetz 87S)	Materially Increased Violation	RTOP	RTOP
	Thermal-Below Emergency Rating	Thermal-Below Emergency Rating	7L42 (Hill 751S - Lloydminster 716S)	703L (Hardisty 377S - Express 329S Tap)	Materially Increased Violation	None	RTOP
	None	Thermal-Below Emergency Rating	7L42 (Hill 751S - Lloydminster 716S)	472L (Metiskow 648S - 472AL Tap)	Materially Increased Violation	None	RTOP
	None	Thermal-Below Emergency Rating	7L42 (Hill 751S - Lloydminster 716S)	704L (Tucuman 478S - Wainright 51S)	Materially Increased Violation	RTOP	RTOP
	Thermal-Below Emergency Rating	Thermal-Below Emergency Rating	9L960 (Paintearth 863S - Rolling Hills 1081S)	703L (Hardisty 377S - Express 329S Tap)	Materially Increased Violation	RTOP	RTOP
	Thermal-Below Emergency Rating	Thermal- Above Emergency Rating	9L960 (Paintearth 863S - Rolling Hills 1081S)	472L (Metiskow 648S - 472AL Tap)	Materially Increased Violation	RTOP	RTOP
	Thermal-Below Emergency Rating	Thermal-Below Emergency Rating	9L960 (Paintearth 863S - Rolling Hills 1081S)	472L (Hughenden 213S - 472AL Tap)	Materially Increased Violation	None	RTOP
	None	Thermal-Below Emergency Rating	9L960 (Paintearth 863S - Rolling Hills 1081S)	704L (Tucuman 478S - Wainright 51S)	Materially Increased Violation	None	RTOP
	None	Thermal-Below Emergency Rating	9L960 (Paintearth 863S - Rolling Hills 1081S)	1047L (Nilrem 574S - Easterv Tap)	New Violation	None	RTOP
	Thermal- Above Emergency Rating	Thermal- Above Emergency Rating	885L (Metiskow 648S - Hansman Lake 650S)	749L (Killarney 267S Tap - 749AL)	Marginally Increased Violation	RTOP	Planned RAS 213
	Thermal-Below Emergency Rating	Thermal-Below Emergency Rating	Anderson 801S Transformer 901T	7L171 (Michichi Creek 802S - Wintering Hills 804S)	Marginally Increased Violation	None	RTOP
	None	Thermal- Above Emergency Rating	174L (Holden 395S - Bardo 197S)	1062L (Tinchebray 972S - Gaetz 87S)	New Violation	None	RTOP
	Thermal-Below Emergency Rating	Thermal- Above Emergency Rating	9L966 (Hansman Lake 650S - Pemukan 932S)	7L224 (Hansman Lake 650S - Monitor 774S)	Materially Increased Violation	RTOP	Modified RAS 201
	Thermal-Below Emergency Rating	Thermal-Below Emergency Rating	9L966 (Hansman Lake 650S - Pemukan 932S)	7L127 (Pemukan 932S - Monitor 774S)	Materially Increased Violation	RTOP	Modified RAS 201
	Thermal-Below Emergency Rating	Thermal- Above Emergency Rating	1062L (Tinchebray 972S - Gaetz 87S)	174L (Bardo 197S - Holden 395S)	Materially Increased Violation	None	RASs 134 & 211
	None	Thermal-Below Emergency Rating	1062L (Tinchebray 972S - Gaetz 87S)	730L (Bardo 197S - Kingman 299S Tap)	Materially Increased Violation	RASs 134 & 211	RASs 134 & 211, RTOP
	Thermal- Above Emergency Rating	Thermal- Above Emergency Rating	1062L (Tinchebray 972S - Gaetz 87S)	9L912 (Red Deer 63S - Nevis 766S)	Materially Increased Violation	None	RASs 134 & 211, RTOP

Scenario	Type of Reliability Criteria Violation Pre-Project	Type of Reliability Criteria Violation Post-Project	Contingency	Details of Violation	Project Impact	Pre-Project Mitigation Measures	Post-Project Mitigation Measures
	None	Thermal- Above Emergency Rating	1062L (Tinchebray 972S - Gaetz 87S)	704L (Tucuman 478S - Wainright 51S)	Materially Increased Violation	RASs 134 & 211	RASs 134 & 211
	Thermal-Below Emergency Rating	Thermal- Above Emergency Rating	1062L (Tinchebray 972S - Gaetz 87S)	7L53 (Bonnyville 700S - Lindberg 969S Tap)	Materially Increased Violation	RASs 134 & 211	RASs 134 & 211, RTOP
	Thermal- Above Emergency Rating	Thermal- Above Emergency Rating	1062L (Tinchebray 972S - Gaetz 87S)	9L20 (Nevis 766S – Cordel 755S)	Materially Increased Violation	None	RASs 134 & 211, RTOP
	None	Thermal- Above Emergency Rating	1062L (Tinchebray 972S - Gaetz 87S)	9L16 (Goldeye Tap - Cordel 755S)	Materially Increased Violation	RTOP	RASs 134 & 211
	Thermal-Below Emergency Rating	Thermal-Below Emergency Rating	Tucuman 478S Transformers	703L (Hardisty 377S - Express 329S Tap)	Materially Increased Violation	RTOP	RTOP
	Thermal-Below Emergency Rating	Thermal-Below Emergency Rating	Tucuman 478S Transformers	472L (Metiskow 648S - 472AL Tap)	Materially Increased Violation	None	RTOP
	None	Thermal-Below Emergency Rating	Tucuman 478S Transformers	472L (Hughenden 213S - 472AL Tap)	Materially Increased Violation	None	RTOP
	Thermal- Above Emergency Rating	Thermal- Above Emergency Rating	EATL (Newell 2075S - Heathfield 2029S)	1062L (Tinchebray 972S - Gaetz 87S)	Materially Increased Violation	RAS 211	RAS 211
	Thermal- Above Emergency Rating	Thermal- Above Emergency Rating	EATL (Newell 2075S - Heathfield 2029S)	9L59 (Tnchebray 972S - 9LA59Tap)	Materially Increased Violation	RAS 211	RAS 211, RTOP
	Thermal-Below Emergency Rating	Thermal- Above Emergency Rating	EATL (Newell 2075S - Heathfield 2029S)	704L (Tucuman 478S - Wainright 51S)	Materially Increased Violation	RAS 211	RAS 211
	Thermal-Below Emergency Rating	Thermal-Below Emergency Rating	EATL (Newell 2075S - Heathfield 2029S)	7L53 (Bonnyville 700S - Lindberg 969S Tap)	Materially Increased Violation	None	RAS 211, RTOP
	None	Thermal-Below Emergency Rating	EATL (Newell 2075S - Heathfield 2029S)	7L16 (Nevis 766S - Heatburg 948S)	Materially Increased Violation	RAS 211	RAS 211, RTOP
	Thermal-Below Emergency Rating	Thermal-Below Emergency Rating	EATL (Newell 2075S - Heathfield 2029S)	703L (Hardisty 377S - Express 329S Tap)	Materially Increased Violation	None	RAS 211, RTOP
	None	Thermal-Below Emergency Rating	EATL (Newell 2075S - Heathfield 2029S)	7L159 (Heatburg 948S - Ghostpine 114S Tap)	Materially Increased Violation	None	RAS 211, RTOP
	None	Thermal- Above Emergency Rating	EATL (Newell 2075S - Heathfield 2029S)	9L912 (Red Deer 63S - Nevis 766S)	New Violation	None	RAS 211
	Thermal- Above Emergency Rating	Thermal- Above Emergency Rating	7L77 (Holden 395S - Vegreville 709S)	Holden 395S	Marginally Increased Violation	RTOP	RTOP
	Thermal- Above Emergency Rating	Thermal- Above Emergency Rating	7L16 (Nevis 766S - Heatburg 948S)	Nevis 766S	New voltage criteria violation	None	RTOP
	Thermal- Above Emergency Rating	Thermal- Above Emergency Rating	7L159 (Three Hills 770S - Heatburg 948S)	Nevis 766S	New voltage criteria violation	None	RTOP
	Thermal- Above Emergency Rating	Thermal- Above Emergency Rating	7L159 (Three Hills 770S - Heatburg 948S)	Heatburg 948S	New voltage criteria violation	None	RTOP
	Transient Instability	Transient Instability	1062L (Tinchebray 972S – Gaetz 87S)	Transient Stability Issue	Pre-project transient stability issue	RTOP	RTOP
	Transient Instability	Transient Instability	912L/9L912 (Nevis 766S – Red Deer 63S)	Transient Stability Issue	Pre-project transient stability issue	RTOP	RTOP
	None	Transient Instability	9L59 (Anderson 801S – Tinchebray 972S)	Transient Stability Issue	New transient stability criteria violation	None	New 9L59 Contingency Transient RAS

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 211 is an existing RAS.
- RAS 200 is an existing RAS
- RAS 213 is proposed for the planned P2460- ABO Fox Meadows MPC Wind. This RAS is referred to herein as “Planned RAS 213”.
- New RAS for 934L/9L934 or 950/9L950 is to mitigate overload on 934L/9L934 or 950L/9L950 by tripping P2464 (the project) and Garden Plain (GDP1).
- RAS 215 is an existing RAS.
- RAS 204 is proposed for the approved P2421-Big Sky Solar Project Connection. This RAS is referred to herein as “Planned RAS 204”
- RAS 134 is an existing RAS.

- New RAS for 9L97 or 9L70 Overload Mitigation is to mitigate overload on 9L97 or 9L70 by tripping P2464 (the project).
- RAS 201 is to mitigate overload on 7L224 by tripping P2464 (the project), SHH1 (P1567), LAN1 (P1898), P2421.
- New 9L59 Contingency Transient RAS is to mitigate transient instability resulting from 9L59 by tripping P2464 (the project) within six (6) cycles.
- For some of the thermal criteria violations above the emergency rating and transient stability criteria violations which are impacted by CETO phase 1, RTOP is used. Nevertheless, pursuant to forthcoming AESO operation planning studies with consideration of CETO, new RAS(s) might be proposed. The Market Participant shall receive notification in the event that Project P2464 necessitates inclusion in any additional RAS(s).
- In this table, “Modify” refers to adding the Project to the logic of the respective RAS.

Attachment B:
Engineering Connection Assessment Results

Engineering Connection Assessment: Study Results

P2464 Sunnynook Solar Battery Project

Sunnynook Solar Energy Inc.

Date: May 21, 2024

Version: V1Final

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Prepared	Vijitha Wijetilleke, P.Eng.	May 30,2024	
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PERMIT TO PRACTICE
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RM APEGA ID #: 67537
DATE: May. 30, 2024
PERMIT NUMBER: P000850
The Association of Professional Engineers and Geoscientists of Alberta (APEGA)

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Attachments

Attachment A1: Engineering Connection Assessment – Study Scope

Attachment A2: Pre-Project Power Flow Diagrams (Scenario 1, 2, 3)

Attachment A3: Post-Project Power Flow Diagrams (Scenario 4, 5, 6)

Attachment A4: Pre-Project and Post-Project Transient Stability Diagrams (Scenario 3, 6)

Attachment A5: Dynamic Data Assumptions

Attachment A6: Post-Mitigation Power Flow Diagrams (Scenario 4, 5, 6)

Attachment A7: Post-Mitigation Transient Stability Diagrams (Scenario 6)

Attachment A8: Constraint Summary Table (Scenario 4, 5, 6) – Loading and Voltage Performance

Attachment A9: Constraint Effectiveness Factors (Scenario 4, 5, 6)

1 Introduction

This report presents the results of the engineering studies that were completed by ATCO Infrastructure Services (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, which was prepared by the AESO.

The power system network analysis tool that was used for the studies in this connection assessment was PSS/E version 34.

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 Light High Wind Pre-Project

Category A Conditions

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

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

Contingency (No System Element Lost)	Violation Location Details	Thermal Ratings[a] (MVA)		Pre-Project Results	
		Normal Rating	Emergency Rating	Power Flow[b] (MVA)	% Loading[c]
Category A	7L760 (Oyen 767S - KSP Tap)	110.2	122.7	119.9	108.8
	7L760 (Empress Liquid 164S Tap - Bindloss 914S Tap)	110.2	122.7	117.3	106.4
	7L760 (KSP Tap - Bindloss 914S Tap)	110.2	122.7	119	107.9
	7L132 (Oyen 767S - Lanfine 959S)	112.1	138	121.5	108.4

Notes:

[a] The facility ratings 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).

To mitigate the observed thermal criteria violations, units in the following Table 2-1-2 were dispatched down from the dispatches provided in the AESO's Study Scope for SL study scenarios. The pre-project generation dispatches were set to be identical to post-project generation dispatches to create same study environment while CAT A thermal violations in both pre- and post- project scenarios are mitigated. Details of the generator, its capacity and current dispatch levels are as per the following Table 2-1-2.

Table 2-2-2: Scaled Down Generator Dispatch Table

Generator	Generator Busses	Generator Capacity (MW)	Scenario 1 2028 SL HW Pre-Project		Scenario 4 2028 SL HW Post-Project	
			Dispatch at CSS (MW)	Current Dispatch (MW)	Dispatch at CSS (MW)	Current Dispatch (MW)
Lanfine Wind (LAN1)	60996	151	103	50	103	50
UK Solar East (P2611)	561042,562042	401	314	250	314	250
RESC Oyen Wind (P2356)	560032	250	192	150	192	150
EDPR Sharp Hills Wind Farm (P1567)	60831,60832	289	179	150	179	150
Total Curtailment			188 MW			

Post curtailment loading under Category A condition are shown in Table 2-1-3.

Table 2-1-3: Post Curtailment Loading under Category A Conditions for Scenario 1

Contingency (No System Element Lost)	Violation Location Details	Thermal Ratings[a] (MVA)		Pre-Project Results	
		Normal Rating	Emergency Rating	Power Flow[b] (MVA)	% Loading[c]
Category A	7L760 (Oyen 767S - KSP Tap)	110.2	122.7	103.8	94.2
	7L760 (Empress Liquid 164S Tap - Amoco Empress 163S)	120	132	100.6	83.8
	7L760 (Empress Liquid 164S Tap - Bindloss 914S Tap)	110.2	122.7	101.2	91.8
	7L760 (KSP Tap - Bindloss 914S Tap)	110.2	122.7	102.0	92.6
	7L132 (Oyen 767S - Lanfine 959S)	112.1	138	102.3	91.3

Notes:

[a] The facility ratings 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).

Category B Conditions

Thermal Criteria Violations

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

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

Contingency (System Element Lost)	Violation Location Details	Thermal Ratings[a] (MVA)		Pre-Project	
		Nominal Rating (MVA)	Emergency Rating (MVA)	Power Flow[b] (MVA)	%Loading[c]
749L (Edgerton 899S - Metiskow 648S)	715L (Hansman Lake 650S - 715AL Tap)	98	135	102.5	104.6
	715L (Rising Sun 1147S (P2540) Tap - 715AL Tap)	98	108	102.6	104.7
9L24 (Lanfine 959S - Oakland 946S)	472L (Hughenden 213S - 472AL Tap)	84	92	97	115.5
	7L760 (Empress Liquid 164S Tap -Amoco Empress 163S)	120	132	207	172.5
	7L760 (Empress Liquid 164S Tap - Bindloss 914S Tap)	110.2	122.7	207.7	188.4
	7L760 (KSP Tap - Bindloss 914S Tap)	110.2	122.7	209.4	190
	7L760 (KSP Tap - Oyen 767S)	110.2	122.7	210.1	190.7
	7L132 (Oyen 767S - Lanfine 959S)	112.1	138	217.4	193.9
9L27 (Paintearth Creek - Cordel 755S)	472L (Hughenden 213S - 472AL Tap)	84	92	88.2	105
	7L760 (KSP Tap - Bindloss 914S Tap)	110.2	122.7	110.3	100.1
	7L760 (KSP Tap - Oyen 767S)	110.2	122.7	111.3	101
9L912 (Nevis 766S – Red Deer 63S)	7L760 (KSP Tap - Oyen 767S)7L760	110.2	122.7	110.8	100.5
9L953 (Cordel 755S - Nilrem 574S)	704L (Tucuman 478S - Wainright 51S)	75	83	76.2	101.5
	7L760 (KSP Tap - Oyen 767S)	110.2	122.7	110.5	100.3

Edgerton_899ST3	715L (Hansman Lake 650S - 715AL Tap)	98	135	98.6	100.7
	715L (Rising Sun 1147S (P2540) Tap - 715AL Tap)	98	108	98.6	100.7
Paintearth Creek 863S 902T	472L (Hughenden 213S - 472AL Tap)	84	92	88.6	105.4
	7L760 (KSP Tap - Bindloss 914S Tap)	110.2	122.7	110.5	100.3
	7L760 (KSP Tap - Oyen 767S)	110.2	122.7	111.5	101.2
9L960 (Paintearth 863S - Rolling Hills 1081S)	472L (Hughenden 213S - 472AL Tap)	84	92	88.7	105.6
	7L760 (KSP Tap - Bindloss 914S Tap)	110.2	122.7	110.4	100.2
	7L760 (KSP Tap - Oyen 767S)	110.2	122.7	111.4	101.1
933L (Anderson 801S - Ware Junction 132S)	7L760 (Empress Liquid 164S Tap - Bindloss 914S Tap)	110.2	122.7	111.3	101
	7L760 (KSP Tap - Bindloss 914S Tap)	110.2	122.7	112.9	102.5
	7L760 (KSP Tap - Oyen 767S)	110.2	122.7	113.9	103.4
934L (Anderson 801S - Ware Junction 132S)	7L760 (Empress Liquid 164S Tap - Bindloss 914S Tap)	110.2	122.7	111.3	101
	7L760 (KSP Tap - Bindloss 914S Tap)	110.2	122.7	113	102.5
	7L760 (KSP Tap - Oyen 767S)	110.2	122.7	113.9	103.4
950L (Anderson 801S - Ware Junction 132S)	7L760 (Empress Liquid 164S Tap - Bindloss 914S Tap)	110.2	122.7	111.2	100.9
	7L760 (KSP Tap - Bindloss 914S Tap)	110.2	122.7	112.9	102.4
	7L760 (KSP Tap - Oyen 767S)	110.2	122.7	113.8	103.3
9L62 (Tinchebray 972S - Gaetz 87S)	9L912 (Red Deer 63S - Nevis 766S)	507	608	570.7	112.6
	7L760 (Empress Liquid 164S Tap - Bindloss 914S Tap)	110.2	122.7	112.5	102.1
	7L760 (KSP Tap - Bindloss 914S Tap)	110.2	122.7	114.1	103.5
	7L760 (KSP Tap - Oyen 767S)	110.2	122.7	115	104.3
	9L20 (Nevis 766S – Cordel 755S)	429	624	535.2	124.8
	7L132 (Oyen 767S - Lanfine 959S)	112.1	138	112.9	100.7
Tucuman 478S Transformers	472L (Hughenden 213S - 472AL Tap)	84	92	87.7	104.4

EATL (Newell 2075S - Heathfield 2029S)	7L53 (Bonnyville 700S - Lindberg 969S Tap)	155.2	177.3	155.2	100.0

Notes:

[a] The facility ratings 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).

Voltage Criteria Violations

The following voltage criteria violations were observed under Category B conditions.

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

Contingency	Substation Name and Number	Bus No.	Nominal kV	Emergency Minimum Voltage (kV)	Emergency Maximum Voltage (kV)	PRE (Initial Voltage (kV))	PRE (Steady State (kV))
7L77 (Holden 395S - Vegreville 709S)	Holden 395S	68	138	124	152	148.5	152.2

POD Bus Voltage Deviations

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

2.1.2 Scenario 2: 2028 Summer Peak High Wind Pre-Project

Category A Conditions

Thermal Criteria violations were observed under Category A conditions as shown in Table 2-4-1. The generation effective factors result under the Category A conditions are provided in Table A9-3-1 of Attachment A9.

Table 2-4-1: Thermal Criteria Violations under Category A Conditions for Scenario 2

Contingency (No System Element Lost)	Violation Location Details	Thermal Ratings[a] (MVA)		Pre-Project Results	
		Normal Rating	Emergency Rating	Power Flow[b] (MVA)	% Loading[c]
Category A	472L (Metiskow 648S - 472AL Tap)	121	133	124.9	103.2
	472L (Hughenden - 472AL Tap)	84	92	89.6	106.6
	7L760 (Empress Liquid 164S Tap - Amoco Empress 163S)	120	132	147.8	123.2
	715L (Hansman Lake 650S - 715AL Tap)	98	135	115.7	118.1

	749L (Killarney 267S Tap - 749AL Tap)	121	133	127.5	105.4
	715L (Rising Sun 1147S (P2540) Tap - 715AL Tap)	98	108	115.8	118.1
	7L760 (Empress Liquid 164S Tap - Binloss 914S Tap)	110.2	122.7	148.6	134.9
	7L760 (KSP Tap - Binloss 914S Tap)	110.2	122.7	157	142.5
	7L760 (Oyen 767S - KSP Tap)	110.2	122.7	158	143.4
	7L132 (Oyen 767S - Lanfine 959S)	112.1	138	159	141.8

Notes:

[a] The facility ratings 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).

To mitigate the observed thermal criteria violations, units in the following Table 2-4-2 were dispatched down from the dispatches provided in the AESO's Study Scope for SP study scenarios. The pre-project generation dispatches were set to be identical to post-project generation dispatches to create same study environment while CAT A thermal violations in both pre- and post- project scenarios are mitigated. Details of the generator, its capacity and current dispatch levels are as per the following Table 2-4-2.

Table 2-4-2: Scaled Down Generator Dispatch Table

Generator	Generator Busses	Generator Capacity (MW)	Scenario 2 2028 SP HW Pre-Project		Scenario 5 2028 SP HW Post-Project	
			Dispatch at CSS (MW)	Current Dispatch (MW)	Dispatch at CSS (MW)	Current Dispatch (MW)
Lanfine Wind (LAN1)	60996	151	138	40	138	40
UK Solar East (P2611)	561042,562042	401	313	100	313	100
RESC Oyen Wind (P2356)	560032	250	250	70	250	70
Rising Sun Solar (P2540)	562046	125	97	70	97	70
EDPR Sharp Hills Wind Farm (P1567)	60831,60832	289	288	100	288	100
ABO Fox Meadows Wind (P2460)	560039	150	106	90	106	90

Total Curtailment	722 MW

Post curtailment loading under Category A condition are shown in Table 2-4-3.

Table 2-4-3: Post Curtailment Loading under Category A Conditions for Scenario 2

Contingency (No System Element Lost)	Violation Location Details	Thermal Ratings[a] (MVA)		Pre-Project Results	
		Normal Rating	Emergency Rating	Power Flow[b] (MVA)	% Loading[c]
Category A	472L (Metiskow 648S - 472AL Tap)	121	133	84.7	70
	472L (Hughenden - 472AL Tap)	84	92	49.1	58.5
	7L760 (Empress Liquid 164S Tap - Amoco Empress 163S)	120	132	93.2	77.7
	715L (Hansman Lake 650S - 715AL Tap)	98	135	95.5	97.4
	749L (Killarney 267S Tap - 749AL Tap)	121	133	109.1	90.2
	715L (Rising Sun 1147S (P2540) Tap - 715AL Tap)	98	108	95.5	97.4
	7L760 (Empress Liquid 164S Tap - Binloss 914S Tap)	110.2	122.7	93.9	85.2
	7L53 (Bonnyville 700S - Lindberg 969S Tap)	124.6	139	74.4	59.7
	7L760 (KSP Tap - Binloss 914S Tap)	110.2	122.7	101.8	92.4
	7L760 (Oyen 767S - KSP Tap)	110.2	122.7	103.6	94
	7L132 (Oyen 767S - Lanfine 959S)	112.1	138	96.2	85.8

Notes:

[a] The facility ratings 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).

Category B Conditions

Thermal Criteria Violations

Thermal criteria violations were observed under certain Category B conditions as shown in Table 2-5.

Table 2-5: Thermal Criteria Violations under Category B Conditions for Scenario 2

Contingency (System Element Lost)	Violation Location Details	Thermal Ratings[a] (MVA)		Pre-Project	
		Nominal Rating (MVA)	Emergency Rating (MVA)	Power Flow[b] (MVA)	%Loading[c]
749L (Edgerton 899S - Metiskow 648S)	715L (Hansman Lake 650S - 715AL Tap)	98	135	111.6	113.9
	715L (Rising Sun 1147S (P2540) Tap - 715AL Tap)	98	108	111.6	113.9
7L137 (Three Hills 770S - Rowley 768S)	7L128 (Coyote Lake 963S - High_Tap)	162.9	186.9	167	102.6
7L16 (Nevis 766S - Heatburg 948S)	7L128 (Coyote Lake 963S - High_Tap)	162.9	186.9	195.9	120.3
7L25 (Michichi Creek 802S - Rowley 768S)	7L128 (Coyote Lake 963S - High_Tap)	162.9	186.9	168.4	103.4
7L749 (Edgerton 899S - Lloyminster 716S)	715L (Hansman Lake 650S - 715AL Tap)	98	135	101.6	103.7
	715L (Rising Sun 1147S (P2540) Tap - 715AL Tap)	98	108	101.6	103.7
9L24 (Lanfine 959S - Oakland 946S)	7L760 (Empress Liquid 164S Tap - Amoco Empress 163S)	120	132	163.8	136.5
	7L760 (Empress Liquid 164S Tap - Bindloss 914S Tap)	110.2	122.7	164.6	149.3
	7L760 (KSP Tap - Bindloss 914S Tap)	110.2	122.7	173.2	157.1
	7L760 (KSP Tap - Oyen 767S)	110.2	122.7	174	157.9
	7L128 (Coyote Lake 963S - High_Tap)	162.9	186.9	173.2	106.3
	7L132 (Oyen 767S - Lanfine 959S)	112.1	138	172.3	153.7
9L29 (Coyote Lake 963S - Oakland 946S)	7L159 (Heatburg 948S - Ghostpine 114S Tap)	107.3	118.8	119.2	111.1
	7L16 (Nevis 766S - Heatburg 948S)	107.3	119.8	116.6	108.6
	7L85 (Bullpound 803S Tap - Anderson 801S)	139	165.8	161.9	116.5
	7L85 (Bullpound 803S Tap - Badlands 981S Tap)	138	157.2	169	122.5
	Anderson 801S 901T	125	125	163.5	130.8
9L912 (Nevis 766S – Red Deer 63S)	7L128 (Coyote Lake 963S - High_Tap)7L760	162.9	186.9	175	107.4
Coyote Lake 963S 901T	7L159 (Heatburg 948S - Ghostpine 114S Tap)	107.3	118.8	119.2	111.1
	7L16 (Nevis 766S - Heatburg 948S)	107.3	119.8	116.6	108.7
	7L85 (Bullpound 803S Tap - Anderson 801S)	139	165.8	161.9	116.5

	7L85 (Bullpound 803S Tap - Badlands 981S Tap)	138	157.2	169.1	122.5
	Anderson 801S 901T	125	125	163.5	130.8
Edgerton_899ST3	715L (Hansman Lake 650S - 715AL Tap)	98	135	102.6	104.7
	715L (Rising Sun 1147S (P2540) Tap - 715AL Tap)	98	108	102.6	104.7
Metiskow_648ST 1	715L (Hansman Lake 650S - 715AL Tap)	98	135	133.2	135.9
	715L (Rising Sun 1147S (P2540) Tap - 715AL Tap)	98	108	133.3	136
Nevis 766S_903T	7L128 (Coyote Lake 963S - High_Tap)	162.9	186.9	179	109.9
Anderson 801S_901T	7L128 (Coyote Lake 963S - High_Tap)	162.9	186.9	215.7	132.4
Provost 545S 701T	715L (Hansman Lake 650S - 715AL Tap)	98	135	106.2	108.4
	715L (Rising Sun 1147S (P2540) Tap - 715AL Tap)	98	108	106.2	108.4
748L (Killarney 267S - Hayter 277S)	715L (Hansman Lake 650S - 715AL Tap)	98	135	114	116.4
	715L (Rising Sun 1147S (P2540) Tap - 715AL Tap)	98	108	114.1	116.4
933L (Anderson 801S - Ware Junction 132S)	7L760 (KSP Tap - Bindloss 914S Tap)	110.2	122.7	114.4	103.8
	7L760 (KSP Tap - Oyen 767S)	110.2	122.7	115.3	104.7
934L (Anderson 801S - Ware Junction 132S)	7L760 (KSP Tap - Bindloss 914S Tap)	110.2	122.7	114.4	103.8
	7L760 (KSP Tap - Oyen 767S)7L760	110.2	122.7	115.3	104.7
950L (Anderson 801S - Ware Junction 132S)	7L760 (KSP Tap - Bindloss 914S Tap)	110.2	122.7	114.3	103.7
	7L760 (KSP Tap - Oyen 767S)7L760	110.2	122.7	115.3	104.6
9L62 (Tinchebray 972S - Gaetz 87S)	9L912 (Red Deer 63S - Nevis 766S)	507	608	522.1	103
	7L760 (KSP Tap - Bindloss 914S Tap)	110.2	122.7	112.7	102.3
	7L760 (KSP Tap - Oyen 767S)	110.2	122.7	113.7	103.2
	9L20 (Nevis 766S – Cordel 755S)	429	624	462.3	107.8

Notes:

[a] The facility ratings 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) .

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 certain Category B conditions.

2.1.3 Scenario 3: 2028 Winter Peak High Wind Pre-Project

Category A Conditions

There are no thermal Criteria violations observed under Category A conditions.

As it will be discussed in Section 3.1.3, thermal Criteria violations were observed under Category A conditions; to mitigate the observed thermal criteria violations, units in the following Table 2-6 were dispatched down from the dispatches provided in the AESO's Study Scope for WP study scenarios. The pre-project generation dispatches were set to be identical to post-project generation dispatches to create same study environment while CAT A thermal violations in both pre- and post- project scenarios are mitigated. Details of the generator, its capacity and current dispatch levels are as per the following Table 2-6. The generation effective factors result under the Category A conditions are provided in Table A9-4-1 of Attachment A9.

Table 2-6-1: Scaled Down Generator Dispatch Table

Generator	Generator Busses	Generator Capacity (MW)	Scenario 3 2028 WP HW Pre-Project		Scenario 6 2028 WP HW Post-Project	
			Dispatch at CSS (MW)	Current Dispatch (MW)	Dispatch at CSS (MW)	Current Dispatch (MW)
Halkirk Wind Power Facility (HAL1)	66435,67435	150	143	100	143	100
Paintearth Wind Power (P1704)	61418	99	95	62.5	95	62.5
Paintearth Wind Phase 2 (P2562)	62418	99	95	57.5	95	57.5
Total Curtailment			113 MW			

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	
		Nominal Rating (MVA)	Emergency Rating (MVA)	Power Flow[b] (MVA)	%Loading[c]
681L (Tucuman 478S - Hardisty 377S)	703L (Hardisty 377S - Express 329S Tap)	96	143	108	112.5
7L171 (Michichi Creek - Wintering Hills 804S)	Anderson 801S 901T	125	125	142	113.6
7L749 (Edgerton 899S - Lloyminster 716S)	703L (Hardisty 377S - Express 329S Tap)	96	143	106	110.4
	472L (Metiskow 648S - 472AL Tap)	150	165	150.1	100.1
	704L (Tucuman 478S - Wainright 51S)	79	87	80.3	101.7
9L20 (Nevis 766S - Cordel 755S)	9L62 (Tinchebray 972S - Gaetz 87S)	831.4	831.4	989.5	119
	9L16 (Goldeye Tap - Tinchebray 972S)	499	499	546.1	109.4
9L24 (Lanfine 959S - Oakland 946S)	703L (Hardisty 377S - Express 329S Tap)	96	143	114.3	119.1
	472L (Metiskow 648S - 472AL Tap)	150	165	159	106
	7L760 (Empress Liquid 164S Tap -Amoco Empress 163S)	148	163	211.4	142.8
	9L966 (Hansman Lake 650S - Pemukan 932S)	442	442	447	101.1
	7L760 (Empress Liquid 164S Tap - Bindloss 914S Tap)	142	156	212.1	149.4
	7L760 (KSP Tap - Bindloss 914S Tap)	146.6	167.7	222.8	152
	7L760 (KSP Tap - Oyen 767S)	146.6	167.7	169.6	115.7
	7L132 (Oyen 767S - Lanfine 959S)	140.9	171.5	191.2	135.7
	6L09 (Oyen 767S - Hurd 2037S Tap)	23	23	24.5	106.7
9L27 (Paintearth Creek - Cordel 755S)	703L (Hardisty 377S - Express 329S Tap)	96	143	116.6	121.5
	472L (Metiskow 648S - 472AL Tap)	150	165	161.6	107.7
	472L (Hughenden 213S - 472AL Tap)	125	138	125.8	100.6
9L912 (Nevis 766S – Red Deer 63S)	914L (Red Deer 63S - Gaetz 87S)	499	748	566.2	113.5

	9L62 (Tinchebray 972S - Gaetz 87S)	831.4	831.4	1068.5	128.5
	9L16 (Goldeye Tap - Tinchebray 972S)	499	499	612.3	122.7
9L953 (Cordel 755S - Nilrem 574S)	704L (Tucuman 478S - Wainright 51S)	79	87	87.2	110.4
Edgerton_899ST3	703L (Hardisty 377S - Express 329S Tap)	96	143	107.5	112
	472L (Metiskow 648S - 472AL Tap)	150	165	151.7	101.1
	704L (Tucuman 478S - Wainright 51S)	79	87	81.9	103.7
Hill 751S_TIEXMER	703L (Hardisty 377S - Express 329S Tap)	96	143	98.9	103
Lanfine 959S 901T	7L760 (Empress Liquid 164S Tap -Amoco Empress 163S)	148	163	160.5	108.4
	7L760 (Empress Liquid 164S Tap - Bindloss 914S Tap)	142	156	161.2	113.5
	7L760 (KSP Tap - Bindloss 914S Tap)	146.6	167.7	171.8	117.2
Paintearth Creek 863S 902T	703L (Hardisty 377S - Express 329S Tap)	96	143	117.1	121.9
	472L (Metiskow 648S - 472AL Tap)	150	165	162.1	108
	472L (Hughenden 213S - 472AL Tap)	125	138	126.2	101
7L42 (Hill 751S - Lloydminster 716S)	703L (Hardisty 377S - Express 329S Tap)	96	143	100.3	104.5
9L960 (Paintearth 863S - Rolling Hills 1081S)	703L (Hardisty 377S - Express 329S Tap)	96	143	117.2	122.1
	472L (Metiskow 648S - 472AL Tap)	150	165	162.2	108.1
	472L (Hughenden 213S - 472AL Tap)	125	138	126.4	101.1
885L (Metiskow 648S - Hansman Lake 650S)	749L (Killarney 267S Tap - 749AL Tap)	148	163	163.4	110.4
Anderson 801S_901T	7L171 (Michichi Creek 802S - Wintering Hills 804S)	140.9	143.8	142.2	100.9
9L966 (Hansman Lake 650S - Pemukan 932S)	7L224 (Hansman Lake 650S - Monitor 774S)	143.8	163.9	156.2	108.6
	7L127 (Pemukan 932S - Monitor 774S)	182.1	243.4	189.6	104.2
9L62 (Tinchebray 972S - Gaetz 87S)	174L (Bardo 197S - Holden 395S)	90.1	99	97.3	108
	9L912 (Red Deer 63S - Nevis 766S)	624	624	908.1	145.5
	7L53 (Bonnyville 700S - Lindberg 969S Tap)	155.2	177.3	164.7	106.1

	9L20 (Nevis 766S – Cordel 755S)	540	624	794.1	147.1
Tucuman 478S Transformers	703L (Hardisty 377S - Express 329S Tap)	96	143	112.4	117
	472L (Metiskow 648S - 472AL Tap)	150	165	153.5	102.3
EATL (Newell 2075S - Heathfield 2029S)	9L62 (Tinchebray 972S - Gaetz 87S)	831.4	831.4	944.5	114
	9L59 (Tnchebray 972S - 9LA59Tap)	499	499	533.9	106.8
	704L (Tucuman 478S - Wainright 51S)	79	87	80.1	101.6
	7L53 (Bonnyville 700S - Lindberg 969S Tap)	155.3	177.3	162.9	105.2
	703L (Hardisty 377S - Express 329S Tap)	96	143	98.5	102.6

Notes:

[a] The facility ratings 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).

Voltage Criteria Violations

Voltage criteria violations were observed under Category B conditions as shown in Table 2-8.

Table 2-8: Voltage criteria violations under Category B Conditions for Scenario 3

Contingency	Substation Name and Number	Bus No.	Nominal kV	Emergency Minimum Voltage (kV)	Emergency Maximum Voltage (kV)	PRE (Initial Voltage (kV))	PRE (Steady State (kV))
7L77 (Holden 395S - Vegreville 709S)	Holden 395S	68	138	124	152	147.1	153.2

POD Bus Voltage Deviations

NO POD voltage deviations were observed under certain Category B conditions.

3 Post-Project Study Results

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

As described in Section 2 of Attachment A1, the post-Project studies were performed using Alternative 2.

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.

3.1.1 Scenario 4: 2028 Summer Light High Wind Post-Project Alternative 2

Category A Conditions

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

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

Contingency (No System Element Lost)	Violation Location Details	Thermal Ratings[a] (MVA)		Pre-Project Results		Post-Project Results		(Post-Pre)%
		Normal Rating	Emergency Rating	Power Flow[b] (MVA)	% Loading[c]	Power Flow[b] (MVA)	% Loading[c]	
Category A	7L760 (Oyen 767S - KSP Tap)	110.2	122.7	119.9	108.8	124.9	113.4	4.6
	7L760 (Empress Liquid 164S Tap -Amoco Empress 163S)	120	132	116.7	97.2	121.6	101.4	4.1
	7L760 (Empress Liquid 164S Tap - Bindloss 914S Tap)	110.2	122.7	117.3	106.4	122.3	111	4.5
	7L760 (KSP Tap - Bindloss 914S Tap)	110.2	122.7	119	107.9	124	112.5	4.6
	7L132 (Oyen 767S - Lanfine 959S)	112.1	138	121.5	108.4	127.7	113.9	5.5

Notes:

[a] The facility ratings 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).

To mitigate the observed thermal criteria violations, units in the following Table 3-1-2 were dispatched down from the dispatches provided in the AESO's Study Scope for SL study scenarios. The pre-project generation dispatches were set to be identical to post-project generation dispatches to create same study environment while CAT A thermal violations in both pre- and post- project scenarios are mitigated. Details of the generator, its capacity and current dispatch levels are as per the following Table 3-1-2.

Table 3-1-2: Scaled Down Generator Dispatch Table

Generator	Generator Busses	Generator Capacity (MW)	Scenario 1 2028 SL HW Pre-Project		Scenario 4 2028 SL HW Post-Project	
			Dispatch at CSS (MW)	Current Dispatch (MW)	Dispatch at CSS (MW)	Current Dispatch (MW)
Lanfine Wind (LAN1)	60996	151	103	50	103	50
UK Solar East (P2611)	561042,562042	401	314	250	314	250
RESC Oyen Wind (P2356)	560032	250	192	150	192	150
EDPR Sharp Hills Wind Farm (P1567)	60831,60832	289	179	150	179	150
Total Curtailment			188 MW			

Post curtailment loading under Category A condition are shown in Table 2-1-3.

Table 3-1-3: Post Curtailment Loading under Category A Conditions for Scenario 4

Contingency (No System Element Lost)	Violation Location Details	Thermal Ratings[a] (MVA)		Pre-Project Results		Post-Project Results		(Post-Pre)%
		Normal Rating	Emergency Rating	Power Flow[b] (MVA)	% Loading[c]	Power Flow[b] (MVA)	% Loading[c]	
Category A	7L760 (Oyen 767S - KSP Tap)	110.2	122.7	103.8	94.2	109.3	99.2	5.0
	7L760 (Empress Liquid 164S Tap -Amoco Empress 163S)	120	132	100.6	83.8	106.0	88.3	4.5
	7L760 (Empress Liquid 164S Tap	110.2	122.7	101.2	91.8	106.6	96.7	4.9

	- Bindloss 914S Tap)							
	7L760 (KSP Tap - Bindloss 914S Tap)	110.2	122.7	102.0	92.6	107.4	97.5	4.9
	7L132 (Oyen 767S - Lanfine 959S)	112.1	138	102.3	91.3	109.2	97.4	6.1

Notes:

[a] The facility ratings 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) .

Category B Conditions

Thermal Criteria Violations

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

Table 3-2: Thermal Criteria Violations under Category B Conditions for Scenario 4

Contingency (System Element Lost)	Violation Location Details	Thermal Ratings[a] (MVA)		Pre-Project		Post-Project		Post - Pre (%)
		Nominal Rating (MVA)	Emergency Rating (MVA)	Power Flow[b] (MVA)	%Loading[c]	Power Flow[b] (MVA)	%Loading[c]	
681L (Tucuman 478S - Hardisty 377S)	472L (Hughenden 213S - 472AL Tap)	84	92	84	100	88.9	105.8	5.9
6L09 (Hanna 763S - Oyen 767S)	7L760 (KSP Tap - Oyen 767S)	110.2	122.7	105.3	95.5	111.1	100.8	5.2
703L (Hughenden 213S - Hardisty 377S)	7L760 (KSP Tap - Bindloss 914S Tap)	110.2	122.7	105	95.2	110.5	100.3	5.1
	7L760 (KSP Tap - Oyen 767S)	110.2	122.7	105.9	96.1	111.6	101.2	5.1
749L (Edgerton 899S - Metiskow 648S)	704L (Tucuman 478S - Wainright 51S)	75	83	65.7	87.6	75.9	101.2	13.6

	715L (Hansman Lake 650S - 715AL Tap)	98	135	102.5	104.6	102.5	104.6	0
	715L (Rising Sun 1147S (P2540) Tap - 715AL Tap)	98	108	102.6	104.7	102.6	104.7	0
769L (Rosyth 296S - Hardisty 377S)	7L760 (KSP Tap - Oyen 767S)	110.2	122.7	104.8	95.1	110.3	100.1	5
7L116 (Excel 910S - Lanfine 959S)	7L760 (KSP Tap - Bindloss 914S Tap)	110.2	122.7	105.2	95.5	110.7	100.4	5
	7L760 (KSP Tap - Oyen 767S)	110.2	122.7	106.2	96.4	111.7	101.4	5
7L127 Pemukan 932S - Monitor 774S)	7L760 (KSP Tap - Oyen 767S)	110.2	122.7	104.4	94.8	110.2	100	5.3
7L749 (Edgerton 899S - Lloyminster 716S)	472L (Hughenden 213S - 472AL Tap)	84	92	80	95.2	88	104.8	9.6
	704L (Tucuman 478S - Wainright 51S)	75	83	65.6	87.5	75.8	101.1	13.6
	7L760 (KSP Tap - Bindloss 914S Tap)	110.2	122.7	104.5	94.8	110.3	100	5.2
	7L760 (KSP Tap - Oyen 767S)	110.2	122.7	105.5	95.7	111.3	101	5.3
7L79 (Pemukan 932S - Ribstone Creek 892S)	7L760 (KSP Tap - Oyen 767S)	110.2	122.7	105.4	95.6	110.9	100.6	5
7L92 (Vegreville 709S - Whitby Lake 819S)	7L760 (KSP Tap - Oyen 767S)	110.2	122.7	104.6	94.9	110.3	100.1	5.2
9L20 (Nevis 766S - Cordel 755S)	7L760 (Empress Liquid 164S Tap - Bindloss 914S Tap)	110.2	122.7	107	97.1	112.9	102.4	5.4
	7L760 (KSP Tap - Bindloss 914S Tap)	110.2	122.7	108.6	98.6	114.6	104	5.4
	7L760 (KSP Tap - Oyen 767S)	110.2	122.7	109.6	99.4	115.6	104.9	5.5

	7L132 (Oyen 767S - Lanfine 959S)	112.1	138	108.6	96.8	115.9	103.4	6.6
9L24 (Lanfine 959S - Oakland 946S)	472L (Hughenden 213S - 472AL Tap)	84	92	97	115.5	97.5	116.1	0.5
	7L760 (Empress Liquid 164S Tap -Amoco Empress 163S)	120	132	207	172.5	202	168.4	-4.1
	7L760 (Empress Liquid 164S Tap - Bindloss 914S Tap)	110.2	122.7	207.7	188.4	202.8	184	-4.4
	7L760 (KSP Tap - Bindloss 914S Tap)	110.2	122.7	209.4	190	204.6	185.6	-4.4
	7L760 (KSP Tap - Oyen 767S)	110.2	122.7	210.1	190.7	205.4	186.4	-4.3
	7L132 (Oyen 767S - Lanfine 959S)	112.1	138	217.4	193.9	213	190	-3.9
9L27 (Paintearth Creek - Cordel 755S)	472L (Hughenden 213S - 472AL Tap)	84	92	88.2	105	96.2	114.5	9.5
	7L760 (Empress Liquid 164S Tap - Bindloss 914S Tap)	110.2	122.7	108.6	98.6	114.6	104	5.5
	7L760 (KSP Tap - Bindloss 914S Tap)	110.2	122.7	110.3	100.1	116.4	105.6	5.5
	7L760 (KSP Tap - Oyen 767S)	110.2	122.7	111.3	101	117.4	106.5	5.6
	7L132 (Oyen 767S - Lanfine 959S)	112.1	138	110.6	98.7	118.1	105.3	6.7
9L70 (Oakland 946S - Anderson 801S)	7L760 (KSP Tap - Bindloss 914S Tap)	110.2	122.7	104.9	95.2	111.2	101	5.8
	7L760 (KSP Tap - Oyen 767S)	110.2	122.7	105.9	96.1	112.3	101.9	5.8

	9L97 (Anderson 801S - Oakland 946S)	499	499	442.8	88.7	629.9	126.2	37.5
	7L132 (Oyen 767S - Lanfine 959S)	112.1	138	104.5	93.2	112.2	100	6.8
9L912 (Nevis 766S – Red Deer 63S)	7L760 (Empress Liquid 164S Tap - Bindloss 914S Tap)	110.2	122.7	108.2	98.2	114.4	103.8	5.6
	7L760 (KSP Tap - Bindloss 914S Tap)	110.2	122.7	109.8	99.6	116.1	105.4	5.7
	7L760 (KSP Tap - Oyen 767S)	110.2	122.7	110.8	100.5	117.1	106.2	5.7
	9L16 (Goldeye Tap - Tinchebray 972S)	499	499	479.3	96	500.7	100.3	4.3
	7L132 (Oyen 767S - Lanfine 959S)	112.1	138	108	96.3	115.4	102.9	6.6
9L953 (Cordel 755S - Nilrem 574S)	704L (Tucuman 478S - Wainright 51S)	75	83	76.2	101.5	86.2	115	13.5
	7L760 (Empress Liquid 164S Tap - Bindloss 914S Tap)	110.2	122.7	107.9	97.9	113.8	103.2	5.4
	7L760 (KSP Tap - Bindloss 914S Tap)	110.2	122.7	109.5	99.4	115.5	104.8	5.4
	7L760 (KSP Tap - Oyen 767S)	110.2	122.7	110.5	100.3	116.5	105.7	5.5
	7L132 (Oyen 767S - Lanfine 959S)	112.1	138	109.6	97.8	117	104.3	6.5
9L97 (Oakland 946S - Anderson 801S)	7L760 (KSP Tap - Bindloss 914S Tap)	110.2	122.7	104.9	95.2	111.2	101	5.8

	7L760 (KSP Tap - Oyen 767S)	110.2	122.7	105.9	96.1	112.3	101.9	5.8
	9L70 (Anderson 801S - Oakland 946S)	499	499	442.8	88.7	630	126.2	37.5
	7L132 (Oyen 767S - Lanfine 959S)	112.1	138	104.5	93.2	112.2	100	6.8
Hardisty 377S T1 Transformer	7L760 (KSP Tap - Bindloss 914S Tap)	110.2	122.7	105.4	95.7	111.1	100.8	5.1
	7L760 (KSP Tap - Oyen 767S)	110.2	122.7	106.4	96.6	112.1	101.7	5.1
	7L132 (Oyen 767S - Lanfine 959S)	112.1	138	105.2	93.8	112.2	100.1	6.2
Buffalo Creek 526S_Xmers	7L760 (KSP Tap - Oyen 767S)	110.2	122.7	104.8	95	110.4	100.2	5.1
Edgerton_899ST3	472L (Hughenden 213S - 472AL Tap)	84	92	81.2	96.6	89.2	106.2	9.6
	704L (Tucuman 478S - Wainright 51S)	75	83	66.9	89.2	77.1	102.8	13.6
	715L (Hansman Lake 650S - 715AL Tap)	98	135	98.6	100.7	98.6	100.6	0
	715L (Rising Sun 1147S (P2540) Tap - 715AL Tap)	98	108	98.6	100.7	98.6	100.6	0
	7L760 (KSP Tap - Bindloss 914S Tap)	110.2	122.7	104.7	95	110.4	100.2	5.2
	7L760 (KSP Tap - Oyen 767S)	110.2	122.7	105.6	95.9	111.4	101.1	5.2
Empress_394S_T1	7L760 (KSP Tap - Bindloss 914S Tap)	110.2	122.7	106	96.2	111.6	101.3	5.1
	7L760 (KSP Tap - Oyen 767S)	110.2	122.7	106.9	97	112.6	102.2	5.2

	7L132 (Oyen 767S - Lanfine 959S)	112.1	138	105.2	93.9	112.3	100.2	6.3
Excel 910S Transformer 701T	7L760 (KSP Tap - Bindloss 914S Tap)	110.2	122.7	105.2	95.5	110.7	100.4	5
	7L760 (KSP Tap - Oyen 767S)	110.2	122.7	106.2	96.4	111.7	101.4	5
Hill 751S_TieXmer	7L760 (KSP Tap - Bindloss 914S Tap)	110.2	122.7	104.5	94.8	110.2	100	5.2
	7L760 (KSP Tap - Oyen 767S)	110.2	122.7	105.5	95.7	111.3	101	5.3
Holden 395S Transformer T1	7L760 (KSP Tap - Oyen 767S)	110.2	122.7	104.7	95	110.4	100.1	5.2
Jarrow 252S Transformer T2	7L760 (KSP Tap - Oyen 767S)	110.2	122.7	104.7	95	110.3	100.1	5.1
Metiskow_648ST1	7L760 (KSP Tap - Oyen 767S)	110.2	122.7	104.7	95	110.4	100.2	5.2
Paintearth Creek 863S 902T	472L (Hughenden 213S - 472AL Tap)	84	92	88.6	105.4	96.6	115	9.5
	7L760 (Empress Liquid 164S Tap - Bindloss 914S Tap)	110.2	122.7	108.9	98.8	114.9	104.2	5.5
	7L760 (KSP Tap - Bindloss 914S Tap)	110.2	122.7	110.5	100.3	116.6	105.8	5.5
	7L760 (KSP Tap - Oyen 767S)	110.2	122.7	111.5	101.2	117.6	106.8	5.6
	7L132 (Oyen 767S - Lanfine 959S)	112.1	138	110.9	98.9	118.3	105.5	6.7
Pemukan 932S 901T	7L760 (KSP Tap - Oyen 767S)	110.2	122.7	105	95.3	110.8	100.6	5.3
7L42 (Hill 751S - Lloydminster 716S)	7L760 (KSP Tap - Oyen 767S)	110.2	122.7	104.9	95.2	110.7	100.5	5.3
9L960 (Paintearth 863S - Rolling Hills 1081S)	472L (Hughenden 213S - 472AL Tap)	84	92	88.7	105.6	96.6	115.1	9.5

	7L760 (Empress Liquid 164S Tap - Bindloss 914S Tap)	110.2	122.7	108.8	98.7	114.8	104.2	5.5
	7L760 (KSP Tap - Bindloss 914S Tap)	110.2	122.7	110.4	100.2	116.5	105.7	5.5
	7L760 (KSP Tap - Oyen 767S)	110.2	122.7	111.4	101.1	117.5	106.6	5.6
	7L132 (Oyen 767S - Lanfine 959S)	112.1	138	110.8	98.8	118.2	105.4	6.7
933L (Anderson 801S - Ware Junction 132S)	7L760 (Empress Liquid 164S Tap - Bindloss 914S Tap)	110.2	122.7	111.3	101	118	107.1	6.1
	7L760 (KSP Tap - Bindloss 914S Tap)	110.2	122.7	112.9	102.5	119.7	108.7	6.2
	7L760 (KSP Tap - Oyen 767S)	110.2	122.7	113.9	103.4	120.7	109.6	6.2
	7L132 (Oyen 767S - Lanfine 959S)	112.1	138	112	99.9	120	107.1	7.1
934L (Anderson 801S - Ware Junction 132S)	7L760 (Empress Liquid 164S Tap - Bindloss 914S Tap)	110.2	122.7	111.3	101	118	107.1	6.1
	7L760 (KSP Tap - Bindloss 914S Tap)	110.2	122.7	113	102.5	119.7	108.7	6.2
	7L760 (KSP Tap - Oyen 767S)	110.2	122.7	113.9	103.4	120.7	109.6	6.2
	7L132 (Oyen 767S - Lanfine 959S)	112.1	138	112	99.9	120	107.1	7.1
950L (Anderson 801S - Ware Junction 132S)	7L760 (Empress Liquid 164S Tap - Bindloss 914S Tap)	110.2	122.7	111.2	100.9	118	107	6.1
	7L760 (KSP Tap -	110.2	122.7	112.9	102.4	119.7	108.6	6.2

	Bindloss 914S Tap)							
	7L760 (KSP Tap - Oyen 767S)	110.2	122.7	113.8	103.3	120.7	109.5	6.2
	7L132 (Oyen 767S - Lanfine 959S)	112.1	138	112	99.9	120	107	7.1
9L966 (Hansman Lake 650S - Pemukan 932S)	7L760 (Empress Liquid 164S Tap - Bindloss 914S Tap)	110.2	122.7	102.7	93.2	111.1	100.8	7.6
	7L760 (KSP Tap - Bindloss 914S Tap)	110.2	122.7	104.3	94.7	112.8	102.4	7.7
	7L760 (KSP Tap - Oyen 767S)	110.2	122.7	105.3	95.6	113.8	103.3	7.7
	7L132 (Oyen 767S - Lanfine 959S)	112.1	138	104.1	92.9	114.3	101.9	9.1
914L (Red Deer 63S - Gaetz 87S)	7L760 (KSP Tap - Oyen 767S)	110.2	122.7	105.6	95.8	111.2	100.9	5.1
9L62 (Tinchebray 972S - Gaetz 87S)	9L912 (Red Deer 63S - Nevis 766S)	507	608	570.7	112.6	644.1	127	14.5
	7L760 (Empress Liquid 164S Tap - Bindloss 914S Tap)	110.2	122.7	112.5	102.1	119.2	108.2	6.1
	7L53 (Bonnyville 700S - Lindberg 969S Tap)	124.6	139	114.8	92.2	132.3	106.2	14
	7L760 (KSP Tap - Bindloss 914S Tap)	110.2	122.7	114.1	103.5	120.9	109.7	6.2
	7L760 (KSP Tap - Oyen 767S)	110.2	122.7	115	104.3	121.8	110.6	6.2
	9L20 (Nevis 766S – Cordel 755S)	429	624	535.2	124.8	595.9	138.9	14.1
	7L132 (Oyen 767S - Lanfine 959S)	112.1	138	112.9	100.7	120.9	107.9	7.2

Tucuman 478S Transformers	472L (Hughenden 213S - 472AL Tap)	84	92	87.7	104.4	93.1	110.8	6.5
	7L760 (KSP Tap - Oyen 767S)	110.2	122.7	104.6	95	110.3	100.1	5.1
Wainwright 51S Transformer T3	7L760 (KSP Tap - Oyen 767S)	110.2	122.7	105	95.2	110.6	100.4	5.1
EATL (Newell 2075S - Heathfield 2029S)	7L53 (Bonnyville 700S - Lindberg 969S Tap)	155.2	177.3	155.2	100.0	173.5	111.8	11.8
	704L (Tucuman 478S - Wainright 51S)	79	87	73.2	92.7	82.2	104.1	11.4
	472L (Hughenden 213S - 472AL Tap)	84	92	79.1	94.2	85.1	101.3	7.1

Notes:

[a] The facility ratings 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).

Voltage Criteria Violations

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

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

Contingency	Substation Name and Number	Bus No.	Nominal kV	Emergency Minimum Voltage (kV)	Emergency Maximum Voltage (kV)	PRE (Initial Voltage (kV))	PRE (Steady State (kV))	POST (Initial Voltage (kV))	POST (Steady State (kV))	% Voltage Diff. (post-pre)
749L (Edgerton 899S - Metiskow 648S)	Edgerton 899S	362	138	124	152	142.1	151.9	141.9	153.1	0.8%
7L77 (Holden 395S - Vegreville 709S)	Holden 395S	68	138	124	152	148.5	152.2	148.7	152.7	0.3%

POD Bus Voltage Deviations

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

3.1.2 Scenario 5: 2028 Summer Peak High Wind Post-Project Alternative 2

Category A Conditions

Thermal Criteria violations were observed under Category A conditions as shown in Table 2-4-1. The generation effective factors result under the Category A conditions are provided in Table A9-3-1 of Attachment A9.

Table 3-4-1: Thermal Criteria Violations under Category A Conditions for Scenario 5

Contingency (No System Element Lost)	Violation Location Details	Thermal Ratings[a] (MVA)		Pre-Project Results		Post-Project Results		(Post-Pre)%
		Normal Rating	Emergency Rating	Power Flow[b] (MVA)	% Loading[c]	Power Flow[b] (MVA)	% Loading[c]	
Category A	472L (Metiskow 648S - 472AL Tap)	121	133	124.9	103.2	130.8	108.1	4.9
	472L (Hughenden - 472AL Tap)	84	92	89.6	106.6	95.2	113.3	6.7
	7L760 (Empress Liquid 164S Tap -Amoco Empress 163S)	120	132	147.8	123.2	153.4	127.8	4.6
	715L (Hansman Lake 650S - 715AL Tap)	98	135	115.7	118.1	114	116.3	-1.8
	749L (Killarney 267S Tap - 749AL Tap)	121	133	127.5	105.4	127.4	105.3	-0.1
	715L (Rising Sun 1147S (P2540) Tap - 715AL Tap)	98	108	115.8	118.1	114	116.4	-1.7
	7L760 (Empress Liquid 164S Tap - Binloss 914S Tap)	110.2	122.7	148.6	134.9	154.1	139.8	5
	7L53 (Bonnyville 700S - Lindberg 969S Tap)	124.6	139	123.4	99	137.4	110.3	11.3
	7L760 (KSP Tap - Binloss 914S Tap)	110.2	122.7	157	142.5	162.6	147.6	5.1

Contingency (No System Element Lost)	Violation Location Details	Thermal Ratings[a] (MVA)		Pre-Project Results		Post-Project Results		(Post-Pre)%
		Normal Rating	Emergency Rating	Power Flow[b] (MVA)	% Loading[c]	Power Flow[b] (MVA)	% Loading[c]	
	7L760 (Oyen 767S - KSP Tap)	110.2	122.7	158	143.4	163.5	148.4	5
	7L132 (Oyen 767S - Lanfine 959S)	112.1	138	159	141.8	165.6	147.7	5.9

Notes:

[a] The facility ratings 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).

To mitigate the observed thermal criteria violations, units in the following Table 3-4-2 were dispatched down from the dispatches provided in the AESO's Study Scope for SL study scenarios. The pre-project generation dispatches were set to be identical to post-project generation dispatches to create same study environment while CAT A thermal violations in both pre- and post- project scenarios are mitigated. Details of the generator, its capacity and current dispatch levels are as per the following Table 3-4-2.

Table 3-4-2: Scaled Down Generator Dispatch Table

Generator	Generator Busses	Generator Capacity (MW)	Scenario 2 2028 SP HW Pre-Project		Scenario 5 2028 SP HW Post-Project	
			Dispatch at CSS (MW)	Current Dispatch (MW)	Dispatch at CSS (MW)	Current Dispatch (MW)
Lanfine Wind (LAN1)	60996	151	138	40	138	40
UK Solar East (P2611)	561042,562042	401	313	100	313	100
RESC Oyen Wind (P2356)	560032	250	250	70	250	70
Rising Sun Solar (P2540)	562046	125	97	70	97	70
EDPR Sharp Hills Wind Farm (P1567)	60831,60832	289	288	100	288	100
ABO Fox Meadows	560039	150	106	90	106	90

Wind (P2460)						
Total Curtailment			722 MW			

Post curtailment loading under Category A condition are shown in Table 2-4-3.

Table 3-4-3: Post Curtailment Loading under Category A Conditions for Scenario 5

Contingency (No System Element Lost)	Violation Location Details	Thermal Ratings[a] (MVA)		Pre-Project Results		Post-Project Results		(Post-Pre)%
		Normal Rating	Emergency Rating	Power Flow[b] (MVA)	% Loading[c]	Power Flow[b] (MVA)	% Loading[c]	
Category A	472L (Metiskow 648S - 472AL Tap)	121	133	84.7	70	91.1	75.3	5.3
	472L (Hughenden - 472AL Tap)	84	92	49.1	58.5	55.4	65.9	7.4
	7L760 (Empress Liquid 164S Tap -Amoco Empress 163S)	120	132	93.2	77.7	98.6	82.2	4.5
	715L (Hansman Lake 650S - 715AL Tap)	98	135	95.5	97.4	94.0	95.9	-1.5
	749L (Killarney 267S Tap - 749AL Tap)	121	133	109.1	90.2	110.7	91.5	1.3
	715L (Rising Sun 1147S (P2540) Tap - 715AL Tap)	98	108	95.5	97.4	94.0	95.9	-1.5
	7L760 (Empress Liquid 164S Tap - Binloss 914S Tap)	110.2	122.7	93.9	85.2	99.3	90.1	4.9
	7L53 (Bonnyville 700S - Lindberg 969S Tap)	124.6	139	74.4	59.7	89.5	71.8	12.1
	7L760 (KSP Tap - Binloss 914S Tap)	110.2	122.7	101.8	92.4	107.4	97.5	5.1
	7L760 (Oyen 767S - KSP Tap)	110.2	122.7	103.6	94	109.0	98.9	4.9

Contingency (No System Element Lost)	Violation Location Details	Thermal Ratings[a] (MVA)		Pre-Project Results		Post-Project Results		(Post-Pre)%
		Normal Rating	Emergency Rating	Power Flow[b] (MVA)	% Loading[c]	Power Flow[b] (MVA)	% Loading[c]	
	7L132 (Oyen 767S - Lanfine 959S)	112.1	138	96.2	85.8	102.8	91.7	5.9

Notes:

[a] The facility ratings 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).

Category B Conditions

Thermal Criteria Violations

Thermal criteria violations were observed under certain Category B conditions as shown in Table 2-5.

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

Contingency (System Element Lost)	Violation Location Details	Thermal Ratings[a] (MVA)		Pre-Project		Post-Project		Post-Pre (%)
		Nominal Rating (MVA)	Emergency Rating (MVA)	Power Flow[b] (MVA)	%Loading[c]	Power Flow[b] (MVA)	%Loading[c]	
681L (Tucuman 478S - Hardisty 377S)	472L (Hughenden 213S - 472AL Tap)	84	92	81.2	96.7	86.6	103	6.3
703L (Hughenden 213S - Hardisty 377S)	7L760 (KSP Tap - Bindloss 914S Tap)	110.2	122.7	105.5	95.7	111.2	100.9	5.1
	7L760 (KSP Tap - Oyen 767S)	110.2	122.7	106.5	96.6	112	101.7	5
749L (Edgerton 899S - Metiskow 648S)	715L (Hansman Lake 650S - 715AL Tap)	98	135	111.6	113.9	111.6	113.9	0
	715L (Rising Sun 1147S (P2540) Tap - 715AL Tap)	98	108	111.6	113.9	111.6	113.9	0

Contingency (System Element Lost)	Violation Location Details	Thermal Ratings[a] (MVA)		Pre-Project		Post-Project		Post - Pre (%)
		Nominal Rating (MVA)	Emergency Rating (MVA)	Power Flow[b] (MVA)	%Loading[c]	Power Flow[b] (MVA)	%Loading[c]	
769L (Rosyth 296S - Hardisty 377S)	7L760 (KSP Tap - Oyen 767S)	110.2	122.7	105	95.2	110.4	100.2	4.9
7L116 (Excel 910S - Lanfine 959S)	7L760 (KSP Tap - Bindloss 914S Tap)	110.2	122.7	105.1	95.3	110.6	100.4	5
	7L760 (KSP Tap - Oyen 767S)	110.2	122.7	106	96.2	111.4	101.1	4.9
7L137 (Three Hills 770S - Rowley 768S)	7L128 (Coyote Lake 963S - High_Tap)	162.9	186.9	167	102.6	165.5	101.6	-1
7L16 (Nevis 766S - Heatburg 948S)	7L128 (Coyote Lake 963S - High_Tap)	162.9	186.9	195.9	120.3	194.4	119.4	-0.9
7L25 (Michichi Creek 802S - Rowley 768S)	7L128 (Coyote Lake 963S - High_Tap)	162.9	186.9	168.4	103.4	166.9	102.4	-1
7L749 (Edgerton 899S - Lloyminster 716S)	715L (Hansman Lake 650S - 715AL Tap)	98	135	101.6	103.7	101.6	103.6	0
	715L (Rising Sun 1147S (P2540) Tap - 715AL Tap)	98	108	101.6	103.7	101.6	103.7	0
	7L760 (KSP Tap - Oyen 767S)	110.2	122.7	104.7	95	110.4	100.2	5.2
7L79 (Pemukan 932S - Ribstone Creek 892S)	7L760 (KSP Tap - Oyen 767S)	110.2	122.7	105.2	95.5	110.6	100.4	4.9
9L20 (Nevis 766S - Cordel 755S)	7L760 (KSP Tap - Bindloss 914S Tap)	110.2	122.7	107.6	97.6	113.8	103.2	5.6
	7L760 (KSP Tap - Oyen 767S)	110.2	122.7	108.6	98.5	114.6	104	5.5

Contingency (System Element Lost)	Violation Location Details	Thermal Ratings[a] (MVA)		Pre-Project		Post-Project		Post - Pre (%)
		Nominal Rating (MVA)	Emergency Rating (MVA)	Power Flow[b] (MVA)	%Loading[c]	Power Flow[b] (MVA)	%Loading[c]	
9L24 (Lanfine 959S - Oakland 946S)	7L760 (Empress Liquid 164S Tap - Amoco Empress 163S)	120	132	163.8	136.5	157.8	131.5	-5
	7L760 (Empress Liquid 164S Tap - Bindloss 914S Tap)	110.2	122.7	164.6	149.3	158.5	143.9	-5.5
	7L760 (KSP Tap - Bindloss 914S Tap)	110.2	122.7	173.2	157.1	167.2	151.7	-5.4
	7L760 (KSP Tap - Oyen 767S)	110.2	122.7	174	157.9	168	152.4	-5.4
	7L128 (Coyote Lake 963S - High_Tap)	162.9	186.9	173.2	106.3	170.9	104.9	-1.4
	7L132 (Oyen 767S - Lanfine 959S)	112.1	138	172.3	153.7	166.5	148.5	-5.2
9L27 (Paintearth Creek - Cordel 755S)	7L760 (KSP Tap - Bindloss 914S Tap)	110.2	122.7	108.4	98.3	114.6	104	5.7
	7L760 (KSP Tap - Oyen 767S)	110.2	122.7	109.4	99.2	115.5	104.8	5.6
9L29 (Coyote Lake 963S - Oakland 946S)	7L159 (Heatburg 948S - Ghostpine 114S Tap)	107.3	118.8	119.2	111.1	126.7	118	7
	7L760 (KSP Tap - Oyen 767S)	110.2	122.7	105	95.3	110.3	100.1	4.8
	7L16 (Nevis 766S - Heatburg 948S)	107.3	119.8	116.6	108.6	124	115.6	6.9
	7L85 (Bullpound	139	165.8	161.9	116.5	156.4	112.5	-3.9

Contingency (System Element Lost)	Violation Location Details	Thermal Ratings[a] (MVA)		Pre-Project		Post-Project		Post - Pre (%)
		Nominal Rating (MVA)	Emergency Rating (MVA)	Power Flow[b] (MVA)	%Loading[c]	Power Flow[b] (MVA)	%Loading[c]	
	803S Tap - Anderson 801S)							
	7L85 (Bullpound 803S Tap - Badlands 981S Tap)	138	157.2	169	122.5	163.5	118.5	-4
	Anderson 801S 901T	125	125	163.5	130.8	157.8	126.2	-4.6
9L70 (Oakland 946S - Anderson 801S)	7L760 (KSP Tap - Bindloss 914S Tap)	110.2	122.7	104.4	94.8	110.9	100.6	5.8
	7L760 (KSP Tap - Oyen 767S)	110.2	122.7	105.4	95.7	111.8	101.4	5.7
	9L97 (Anderson 801S - Oakland 946S)	499	499	392.8	78.7	579.7	116.2	37.5
9L912 (Nevis 766S – Red Deer 63S)	7L760 (KSP Tap - Bindloss 914S Tap)	110.2	122.7	109.2	99.1	115.7	105	6
	7L760 (KSP Tap - Oyen 767S)	110.2	122.7	110.1	99.9	116.6	105.8	5.9
	7L128 (Coyote Lake 963S - High_Tap)	162.9	186.9	175	107.4	168.2	103.3	-4.2
9L953 (Cordel 755S - Nilrem 574S)	7L760 (KSP Tap - Bindloss 914S Tap)	110.2	122.7	106.2	96.4	112.4	102	5.6
	7L760 (KSP Tap - Oyen 767S)	110.2	122.7	107.2	97.3	113.3	102.8	5.5
9L97 (Oakland 946S - Anderson 801S)	7L760 (KSP Tap - Bindloss 914S Tap)	110.2	122.7	104.4	94.8	110.9	100.6	5.8
	7L760 (KSP Tap - Oyen 767S)	110.2	122.7	105.4	95.7	111.7	101.4	5.7
	9L70 (Anderson	499	499	392.8	78.7	579.8	116.2	37.5

Contingency (System Element Lost)	Violation Location Details	Thermal Ratings[a] (MVA)		Pre-Project		Post-Project		Post - Pre (%)
		Nominal Rating (MVA)	Emergency Rating (MVA)	Power Flow[b] (MVA)	%Loading[c]	Power Flow[b] (MVA)	%Loading[c]	
	801S - Oakland 946S)							
Hardisty 377S T1 Transformer	7L760 (KSP Tap - Bindloss 914S Tap)	110.2	122.7	105.1	95.4	110.8	100.6	5.2
	7L760 (KSP Tap - Oyen 767S)	110.2	122.7	106.1	96.3	111.7	101.4	5.1
Coyote Lake 963S 901T	7L159 (Heatburg 948S - Ghostpine 114S Tap)	107.3	118.8	119.2	111.1	126.7	118	6.9
	7L760 (KSP Tap - Oyen 767S)	110.2	122.7	105	95.3	110.3	100.1	4.8
	7L16 (Nevis 766S - Heatburg 948S)	107.3	119.8	116.6	108.7	124.1	115.6	7
	7L85 (Bullpound 803S Tap - Anderson 801S)	139	165.8	161.9	116.5	156.5	112.6	-3.9
	7L85 (Bullpound 803S Tap - Badlands 981S Tap)	138	157.2	169.1	122.5	163.5	118.5	-4
	Anderson 801S 901T	125	125	163.5	130.8	157.8	126.3	-4.6
Edgerton_899ST3	715L (Hansman Lake 650S - 715AL Tap)	98	135	102.6	104.7	102.6	104.7	0
	715L (Rising Sun 1147S (P2540) Tap - 715AL Tap)	98	108	102.6	104.7	102.6	104.7	0
	7L760 (KSP Tap - Oyen 767S)	110.2	122.7	104.9	95.2	110.5	100.3	5.1

Contingency (System Element Lost)	Violation Location Details	Thermal Ratings[a] (MVA)		Pre-Project		Post-Project		Post - Pre (%)
		Nominal Rating (MVA)	Emergency Rating (MVA)	Power Flow[b] (MVA)	%Loading[c]	Power Flow[b] (MVA)	%Loading[c]	
Empress_394S_T1	7L760 (KSP Tap - Bindloss 914S Tap)	110.2	122.7	105.4	95.7	110.9	100.6	5
	7L760 (KSP Tap - Oyen 767S)	110.2	122.7	106.4	96.6	111.8	101.5	4.9
Excel 910S Transformer 701T	7L760 (KSP Tap - Bindloss 914S Tap)	110.2	122.7	105.1	95.3	110.6	100.4	5
	7L760 (KSP Tap - Oyen 767S)	110.2	122.7	106	96.2	111.4	101.1	4.9
Metiskow_648ST1	715L (Hansman Lake 650S - 715AL Tap)	98	135	133.2	135.9	126.1	128.7	-7.2
	715L (Rising Sun 1147S (P2540) Tap - 715AL Tap)	98	108	133.3	136	126.2	128.8	-7.2
Paintearth Creek 863S 902T	7L760 (KSP Tap - Bindloss 914S Tap)	110.2	122.7	108.6	98.6	114.9	104.2	5.7
	7L760 (KSP Tap - Oyen 767S)	110.2	122.7	109.6	99.5	115.8	105	5.6
9L960 (Paintearth 863S - Rolling Hills 1081S)	7L760 (KSP Tap - Bindloss 914S Tap)	110.2	122.7	108.5	98.5	114.8	104.1	5.7
	7L760 (KSP Tap - Oyen 767S)	110.2	122.7	109.5	99.4	115.6	104.9	5.6
885L (Metiskow 648S - Hansman Lake 650S)	749L (Killarney 267S Tap - 749AL Tap)	121	133	117.8	97.4	122	100.9	3.6
Nevis 766S_903T	7L128 (Coyote Lake 963S - High_Tap)	162.9	186.9	179	109.9	175	107.4	-2.4
Anderson 801S_901T	7L128 (Coyote	162.9	186.9	215.7	132.4	204.6	125.6	-6.8

Contingency (System Element Lost)	Violation Location Details	Thermal Ratings[a] (MVA)		Pre-Project		Post-Project		Post - Pre (%)
		Nominal Rating (MVA)	Emergency Rating (MVA)	Power Flow[b] (MVA)	%Loading[c]	Power Flow[b] (MVA)	%Loading[c]	
	Lake 963S - High_Tap)							
Provost 545S 701T	715L (Hansman Lake 650S - 715AL Tap)	98	135	106.2	108.4	104.7	106.8	-1.5
	715L (Rising Sun 1147S (P2540) Tap - 715AL Tap)	98	108	106.2	108.4	104.7	106.8	-1.5
748L (Killarney 267S - Hayter 277S)	715L (Hansman Lake 650S - 715AL Tap)	98	135	114	116.4	114	116.4	0
	715L (Rising Sun 1147S (P2540) Tap - 715AL Tap)	98	108	114.1	116.4	114.1	116.4	0
933L (Anderson 801S - Ware Junction 132S)	934L (Anderson 801S - Ware Junction 132S)	499	499	453.4	90.9	505.9	101.4	10.5
	950L (Anderson 801S - Ware Junction 132S)	499	499	451.5	90.5	503.8	101	10.5
	7L760 (Empress Liquid 164S Tap - Bindloss 914S Tap)	110.2	122.7	105.7	95.9	112.5	102.1	6.2
	7L760 (KSP Tap - Bindloss 914S Tap)	110.2	122.7	114.4	103.8	121.4	110.2	6.4
	7L760 (KSP Tap - Oyen 767S)	110.2	122.7	115.3	104.7	122.2	110.9	6.2

Contingency (System Element Lost)	Violation Location Details	Thermal Ratings[a] (MVA)		Pre-Project		Post-Project		Post - Pre (%)
		Nominal Rating (MVA)	Emergency Rating (MVA)	Power Flow[b] (MVA)	%Loading[c]	Power Flow[b] (MVA)	%Loading[c]	
	7L132 (Oyen 767S - Lanfine 959S)	112.1	138	107.6	95.9	115.5	103	7.1
934L (Anderson 801S - Ware Junction 132S)	950L (Anderson 801S - Ware Junction 132S)	499	499	451.6	90.5	503.8	101	10.5
	7L760 (Empress Liquid 164S Tap - Bindloss 914S Tap)	110.2	122.7	105.7	95.9	112.5	102.1	6.2
	7L760 (KSP Tap - Bindloss 914S Tap)	110.2	122.7	114.4	103.8	121.4	110.2	6.4
	7L760 (KSP Tap - Oyen 767S)	110.2	122.7	115.3	104.7	122.2	110.9	6.2
	7L132 (Oyen 767S - Lanfine 959S)	112.1	138	107.6	95.9	115.5	103	7.1
950L (Anderson 801S - Ware Junction 132S)	934L (Anderson 801S - Ware Junction 132S)	499	499	452.6	90.7	505	101.2	10.5
	7L760 (Empress Liquid 164S Tap - Bindloss 914S Tap)	110.2	122.7	105.6	95.8	112.4	102	6.2
	7L760 (KSP Tap - Bindloss 914S Tap)	110.2	122.7	114.3	103.7	121.3	110.1	6.3
	7L760 (KSP Tap - Oyen 767S)	110.2	122.7	115.3	104.6	122.1	110.8	6.2
	7L132 (Oyen 767S	112.1	138	107.5	95.9	115.5	103	7.1

Contingency (System Element Lost)	Violation Location Details	Thermal Ratings[a] (MVA)		Pre-Project		Post-Project		Post - Pre (%)
		Nominal Rating (MVA)	Emergency Rating (MVA)	Power Flow[b] (MVA)	%Loading[c]	Power Flow[b] (MVA)	%Loading[c]	
	- Lanfine 959S)							
914L (Red Deer 63S - Gaetz 87S)	7L760 (KSP Tap - Bindloss 914S Tap)	110.2	122.7	104.7	95	110.3	100.1	5.1
	7L760 (KSP Tap - Oyen 767S)	110.2	122.7	105.7	95.9	111.2	100.9	5
1082L (Red Deer 63S - Hazelwood 287S)	7L760 (KSP Tap - Oyen 767S)	110.2	122.7	105.3	95.5	110.5	100.3	4.8
9L62 (Tinchebray 972S - Gaetz 87S)	9L912 (Red Deer 63S - Nevis 766S)	507	608	522.1	103	601.3	118.6	15.6
	7L760 (Empress Liquid 164S Tap - Bindloss 914S Tap)	110.2	122.7	104	94.4	111.2	100.9	6.5
	7L760 (KSP Tap - Bindloss 914S Tap)	110.2	122.7	112.7	102.3	120	108.9	6.6
	7L760 (KSP Tap - Oyen 767S)	110.2	122.7	113.7	103.2	120.8	109.7	6.5
	9L20 (Nevis 766S – Cordel 755S)	429	624	462.3	107.8	527.9	123	15.3
	7L132 (Oyen 767S - Lanfine 959S)	112.1	138	105.9	94.4	114.1	101.8	7.4
Tucuman 478S Transformers	472L (Hughenden 213S - 472AL Tap)	84	92	83.1	98.9	88.8	105.8	6.9

Notes:

[a] The facility ratings 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 = √3 x V_{base} x I_{actual})

[c] Reported as a percentage of the power flow (in MVA, i.e., S = √3 x V_{base} x I_{actual}) relative to the transmission line's Normal Rating (also in MVA).

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 High Wind Post-Project Alternative 2

Category A Conditions

Thermal Criteria violations were observed under Category A conditions as shown in Table 2-6-1. The generation effective factors result under the Category A conditions are provided in Table A9-4-1 of Attachment A9.

Table 3-6-1: Thermal Criteria Violations under Category A Conditions for Scenario 6

Contingency (No System Element Lost)	Violation Location Details	Thermal Ratings[a] (MVA)		Pre-Project Results		Post-Project Results		(Post-Pre)%
		Normal Rating	Emergency Rating	Power Flow[b] (MVA)	% Loading[c]	Power Flow[b] (MVA)	% Loading[c]	
Category A	1062L (Tinchebray 972S - Gaetz 87S)	831.4	831.4	805.9	96.9	871.3	104.8	7.9

Notes:

[a] The facility ratings 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 = √3 x V_{base} x I_{actual})

[c] Reported as a percentage of the power flow (in MVA, i.e., S = √3 x V_{base} x I_{actual}) relative to the transmission line's Normal Rating (also in MVA) .

To mitigate the observed thermal criteria violations, units in the following Table 3-6-2 were dispatched down from the dispatches provided in the AESO's Study Scope for SL study scenarios. The pre-project generation dispatches were set to be identical to post-project generation dispatches to create same study environment while CAT A thermal violations in both pre- and post- project scenarios are mitigated. Details of the generator, its capacity and current dispatch levels are as per the following Table 3-6-2.

Table 3-6-2: Scaled Down Generator Dispatch Table

Generator	Generator Busses	Generator Capacity (MW)	Scenario 3 2028 WP HW Pre-Project		Scenario 6 2028 WP HW Post-Project	
			Dispatch at CSS (MW)	Current Dispatch (MW)	Dispatch at CSS (MW)	Current Dispatch (MW)
Halkirk Wind Power Facility (HAL1)	66435,67435	150	143	100	143	100
Paintearth Wind Power (P1704)	61418	99	95	62.5	95	62.5
Paintearth Wind Phase 2 (P2562)	62418	99	95	57.5	95	57.5
Total Curtailment			113 MW			

Post curtailment loading under Category A condition are shown in Table 2-6-3.

Table 3-6-3: Post Curtailment Loading under Category A Conditions for Scenario 6

Contingency (No System Element Lost)	Violation Location Details	Thermal Ratings[a] (MVA)		Pre-Project Results		Post-Project Results		(Post-Pre)%
		Normal Rating	Emergency Rating	Power Flow[b] (MVA)	% Loading[c]	Power Flow[b] (MVA)	% Loading[c]	
Category A	1062L (Tinchebray 972S - Gaetz 87S)	831.4	831.4	756.6	91	818.9	98.5	7.5

Notes:

[a] The facility ratings 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) .

Category B Conditions

Thermal Criteria Violations

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

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

Contingency (System Element Lost)	Violation Location Details	Thermal Ratings[a] (MVA)		Pre-Project		Post-Project		Post - Pre (%)
		Nominal Rating (MVA)	Emergency Rating (MVA)	Power Flow[b] (MVA)	%Loading[c]	Power Flow[b] (MVA)	%Loading[c]	
681L (Tucuman 478S - Hardisty 377S)	703L (Hardisty 377S - Express 329S Tap)	96	143	108	112.5	112.7	117.4	4.9
	472L (Metiskow 648S - 472AL Tap)	150	165	148.8	99.2	153.8	102.5	3.3
701L (Holden 395S – Strome 223S)	9L62 (Tinchebray 972S - Gaetz 87S)	831.4	831.4	775.2	93.2	841.7	101.2	8.0
749L (Edgerton 899S - Metiskow 648S)	704L (Tucuman 478S - Wainright 51S)	79	87	76.9	97.3	87.5	110.8	13.5
7L130 (Vermilion 710S - Kitscoty 705S)	703L (Hardisty 377S - Express 329S Tap)	96	143	92	95.8	99.6	103.7	7.9
7L14 (Kitscoty 705S - Hill 751S)	703L (Hardisty 377S - Express 329S Tap)	96	143	92.9	96.8	100.5	104.7	7.9
7L171 (Michichi Creek - Wintering Hills 804S)	Anderson 801S 901T	125	125	142	113.6	141.9	113.6	0.0
7L53 (Bonnyville 700S - Irish Creek 706S)	9L62 (Tinchebray 972S - Gaetz 87S)	831.4	831.4	766	92.1	833.5	100.3	8.2
7L65 (Vermilion 710S-- Vegreville 709S)	704L (Tucuman 478S - Wainright 51S)	79	87	71.7	90.8	79.8	101.1	10.3
7L701 (Battle River 757S - Strome 223S)	9L62 (Tinchebray 972S - Gaetz 87S)	831.4	831.4	779.4	93.8	846	101.8	8.0
7L749 (Edgerton 899S - Lloyminster 716S)	703L (Hardisty 377S -	96	143	106	110.4	113.6	118.3	7.9

Contingency (System Element Lost)	Violation Location Details	Thermal Ratings[a] (MVA)		Pre-Project		Post-Project		Post - Pre (%)
		Nominal Rating (MVA)	Emergency Rating (MVA)	Power Flow[b] (MVA)	%Loading[c]	Power Flow[b] (MVA)	%Loading[c]	
	Express 329S Tap)							
	472L (Metiskow 648S - 472AL Tap)	150	165	150.1	100.1	157.9	105.3	5.2
	704L (Tucuman 478S - Wainright 51S)	79	87	80.3	101.7	91.2	115.4	13.7
7L92 (Vegreville 709S - Whitby Lake 819S)	7L53 (Bonnyville 700S - Lindberg 969S Tap)	155.2	177.3	148.1	95.4	163.7	105.4	10.0
	9L62 (Tinchebray 972S - Gaetz 87S)	831.4	831.4	770.4	92.7	836	100.6	7.9
9L20 (Nevis 766S - Cordel 755S)	914L (Red Deer 63S - Gaetz 87S)	499	748	495.2	99.2	519.8	104.2	5.0
	7L159 (Heatburg 948S - Ghostpine 114S Tap)	142.8	160	136.5	95.6	149.3	104.5	8.9
	7L53 (Bonnyville 700S - Lindberg 969S Tap)	155.2	177.3	143.1	92.2	156.7	100.9	8.7
	7L16 (Nevis 766S - Heatburg 948S)	127.5	127.5	132.7	104.1	145.5	114.1	10.0
	9L62 (Tinchebray 972S - Gaetz 87S)	831.4	831.4	989.5	119	1070.8	128.8	9.8
	9L16 (Goldeye Tap - Tinchebray 972S)	499	499	546.1	109.4	560.9	112.4	3.0
	703L (Hardisty 377S -	96	143	114.3	119.1	114.8	119.6	0.5

Contingency (System Element Lost)	Violation Location Details	Thermal Ratings[a] (MVA)		Pre-Project		Post-Project		Post - Pre (%)
		Nominal Rating (MVA)	Emergency Rating (MVA)	Power Flow[b] (MVA)	%Loading[c]	Power Flow[b] (MVA)	%Loading[c]	
9L24 (Lanfine 959S - Oakland 946S)	Express 329S Tap)							
	472L (Metiskow 648S - 472AL Tap)	150	165	159	106	159.3	106.2	0.2
	7L760 (Empress Liquid 164S Tap -Amoco Empress 163S)	148	163	211.4	142.8	206.6	139.6	-3.2
	9L966 (Hansman Lake 650S - Pemukan 932S)	442	442	447	101.1	450.2	101.9	0.8
	7L760 (Empress Liquid 164S Tap - Bindloss 914S Tap)	142	156	212.1	149.4	207.3	146	-3.4
	7L760 (KSP Tap - Bindloss 914S Tap)	146.6	167.7	222.8	152	217.9	148.6	-3.4
	7L760 (KSP Tap - Oyen 767S)	146.6	167.7	169.6	115.7	164.3	112.1	-3.6
	7L132 (Oyen 767S - Lanfine 959S)	140.9	171.5	191.2	135.7	186.1	132.1	-3.6
	6L09 (Oyen 767S - Hurd 2037S Tap)	23	23	24.5	106.7	24.6	107.2	0.5
9L27 (Paintearth Creek - Cordel 755S)	703L (Hardisty 377S - Express 329S Tap)	96	143	116.6	121.5	124.4	129.5	8.0
	472L (Metiskow 648S - 472AL Tap)	150	165	161.6	107.7	169.6	113.1	5.4
	472L (Hughenden	125	138	125.8	100.6	133.6	106.9	6.3

Contingency (System Element Lost)	Violation Location Details	Thermal Ratings[a] (MVA)		Pre-Project		Post-Project		Post - Pre (%)
		Nominal Rating (MVA)	Emergency Rating (MVA)	Power Flow[b] (MVA)	%Loading[c]	Power Flow[b] (MVA)	%Loading[c]	
	213S - 472AL Tap)							
	704L (Tucuman 478S - Wainright 51S)	79	87	72.9	92.2	82.6	104.6	12.4
	1047L (Nilrem 574S - Easterv Tap)	499	748	476.3	95.4	506.5	101.5	6.1
9L29 (Coyote Lake 963S - Oakland 946S)	7L159 (Heatburg 948S - Ghostpine 114S Tap)	142.8	160	135.9	95.2	143.1	100.2	5.0
	7L16 (Nevis 766S - Heatburg 948S)	127.5	127.5	132.1	103.7	139.4	109.3	5.6
9L70 (Oakland 946S - Anderson 801S)	9L97 (Anderson 801S - Oakland 946S)	499	499	444.2	89	626.4	125.5	36.5
9L80 (Battle River 757S - Cordel 755S)	703L (Hardisty 377S - Express 329S Tap)	96	143	91.3	95.1	98	102.1	7.0
	704L (Tucuman 478S - Wainright 51S)	79	87	68.9	87.2	79.7	100.9	13.7
9L912 (Nevis 766S – Red Deer 63S)	914L (Red Deer 63S - Gaetz 87S)	499	748	566.2	113.5	601.2	120.5	7.0
	7L53 (Bonnyville 700S - Lindberg 969S Tap)	155.2	177.3	148.5	95.6	162.8	104.9	9.3
	9L62 (Tinchebray 972S - Gaetz 87S)	831.4	831.4	1068.5	128.5	1162.1	139.8	11.3

Contingency (System Element Lost)	Violation Location Details	Thermal Ratings[a] (MVA)		Pre-Project		Post-Project		Post - Pre (%)
		Nominal Rating (MVA)	Emergency Rating (MVA)	Power Flow[b] (MVA)	%Loading[c]	Power Flow[b] (MVA)	%Loading[c]	
	9L16 (Goldeye Tap - Tinchebray 972S)	499	499	612.3	122.7	636.8	127.6	4.9
9L953 (Cordel 755S - Nilrem 574S)	702L (Hardisty 377S - Sedgewick 137S Tap)	91	100	88.1	96.8	95.1	104.6	7.8
	704L (Tucuman 478S - Wainright 51S)	79	87	87.2	110.4	97.9	124	13.6
9L97 (Oakland 946S - Anderson 801S)	9L70 (Anderson 801S - Oakland 946S)	499	499	444.2	89	626.4	125.5	36.5
Amoco Empress_163S_T5	703L (Hardisty 377S - Express 329S Tap)	96	143	90.4	94.1	96.2	100.2	6.1
Buffalo Creek 526S_Xmers	9L62 (Tinchebray 972S - Gaetz 87S)	831.4	831.4	765.5	92.1	831.8	100	7.9
Coyote Lake 963S 901T	7L159 (Heatburg 948S - Ghostpine 114S Tap)	142.8	160	135.9	95.2	143.1	100.2	5.0
	7L16 (Nevis 766S - Heatburg 948S)	127.5	127.5	132.2	103.7	139.4	109.4	5.7
Edgerton_899ST3	703L (Hardisty 377S - Express 329S Tap)	96	143	107.5	112	115.1	119.9	7.9
	472L (Metiskow 648S - 472AL Tap)	150	165	151.7	101.1	159.5	106.3	5.2

Contingency (System Element Lost)	Violation Location Details	Thermal Ratings[a] (MVA)		Pre-Project		Post-Project		Post - Pre (%)
		Nominal Rating (MVA)	Emergency Rating (MVA)	Power Flow[b] (MVA)	%Loading[c]	Power Flow[b] (MVA)	%Loading[c]	
	704L (Tucuman 478S - Wainright 51S)	79	87	81.9	103.7	92.7	117.4	13.7
Grizzly Bear 708S T1	704L (Tucuman 478S - Wainright 51S)	79	87	78.7	99.7	87.3	110.5	10.8
Hill 751S_TieXmer	703L (Hardisty 377S - Express 329S Tap)	96	143	98.9	103	106.5	110.9	7.9
	472L (Metiskow 648S - 472AL Tap)	150	165	143	95.3	150.8	100.5	5.2
Holden 395S T1	9L62 (Tinchebray 972S - Gaetz 87S)	831.4	831.4	782	94.1	848.7	102.1	8.0
HRT Express 329S T1	703L (Hardisty 377S - Express 329S Tap)	96	143	90.2	93.9	96	100	6.1
Lanfine 959S 901T	7L760 (Empress Liquid 164S Tap -Amoco Empress 163S)	148	163	160.5	108.4	159.9	108	-0.4
	7L760 (Empress Liquid 164S Tap - Bindloss 914S Tap)	142	156	161.2	113.5	160.6	113.1	-0.4
	7L760 (KSP Tap - Bindloss 914S Tap)	146.6	167.7	171.8	117.2	171.2	116.8	-0.4
Nilrem 574S T2	703L (Hardisty 377S - Express 329S Tap)	96	143	92.5	96.4	98.7	102.8	6.4

Contingency (System Element Lost)	Violation Location Details	Thermal Ratings[a] (MVA)		Pre-Project		Post-Project		Post - Pre (%)
		Nominal Rating (MVA)	Emergency Rating (MVA)	Power Flow[b] (MVA)	%Loading[c]	Power Flow[b] (MVA)	%Loading[c]	
Paintearth Creek 863S 902T	703L (Hardisty 377S - Express 329S Tap)	96	143	117.1	121.9	124.8	130	8.1
	472L (Metiskow 648S - 472AL Tap)	150	165	162.1	108	170	113.4	5.4
	472L (Hughenden 213S - 472AL Tap)	125	138	126.2	101	134.1	107.2	6.2
	704L (Tucuman 478S - Wainright 51S)	79	87	73.2	92.6	82.9	105	12.4
	1047L (Nilrem 574S - Easterv Tap)	499	748	478.6	95.9	508.8	102	6.1
7L117 (Irish Creek 706S - Vermillion 710S)	9L62 (Tinchebray 972S - Gaetz 87S)	831.4	831.4	772.1	92.9	839.8	101	8.1
7L42 (Hill 751S - Lloydminster 716S)	703L (Hardisty 377S - Express 329S Tap)	96	143	100.3	104.5	107.9	112.4	7.9
	472L (Metiskow 648S - 472AL Tap)	150	165	144.4	96.3	152.2	101.5	5.2
	704L (Tucuman 478S - Wainright 51S)	79	87	74.4	94.2	85.2	107.9	13.7
9L960 (Paintearth 863S - Rolling Hills 1081S)	703L (Hardisty 377S - Express 329S Tap)	96	143	117.2	122.1	125	130.2	8.1
	472L (Metiskow	150	165	162.2	108.1	170.2	113.4	5.3

Contingency (System Element Lost)	Violation Location Details	Thermal Ratings[a] (MVA)		Pre-Project		Post-Project		Post - Pre (%)
		Nominal Rating (MVA)	Emergency Rating (MVA)	Power Flow[b] (MVA)	%Loading[c]	Power Flow[b] (MVA)	%Loading[c]	
	648S - 472AL Tap)							
	472L (Hughenden 213S - 472AL Tap)	125	138	126.4	101.1	134.2	107.4	6.3
	704L (Tucuman 478S - Wainright 51S)	79	87	73.1	92.5	82.8	104.9	12.4
	1047L (Nilrem 574S - Easterv Tap)	499	748	479.1	96	509.4	102.1	6.1
885L (Metiskow 648S - Hansman Lake 650S)	749L (Killarney 267S Tap - 749AL Tap)	148	163	163.4	110.4	167.4	113.1	2.7
Anderson 801S_901T	7L171 (Michichi Creek 802S - Wintering Hills 804S)	140.9	143.8	142.2	100.9	142.6	101.2	0.3
174L (Holden 395S - Bardo 197S)	9L62 (Tinchebray 972S - Gaetz 87S)	831.4	831.4	769.5	92.6	833.8	100.3	7.7
9L966 (Hansman Lake 650S - Pemukan 932S)	7L224 (Hansman Lake 650S - Monitor 774S)	143.8	163.9	156.2	108.6	190	132.1	23.5
	7L127 (Pemukan 932S - Monitor 774S)	182.1	243.4	189.6	104.2	225	123.6	19.4
9L62 (Tinchebray 972S - Gaetz 87S)	174L (Bardo 197S - Holden 395S)	90.1	99	97.3	108	103.9	115.4	7.4
	730L (Bardo 197S - Kingman 299S Tap)	91.1	99.9	88.1	96.8	93	102.1	5.3

Contingency (System Element Lost)	Violation Location Details	Thermal Ratings[a] (MVA)		Pre-Project		Post-Project		Post - Pre (%)
		Nominal Rating (MVA)	Emergency Rating (MVA)	Power Flow[b] (MVA)	%Loading[c]	Power Flow[b] (MVA)	%Loading[c]	
	9L912 (Red Deer 63S - Nevis 766S)	624	624	908.1	145.5	988.1	158.4	12.9
	704L (Tucuman 478S - Wainright 51S)	79	87	77.6	98.2	88.3	111.8	13.6
	7L53 (Bonnyville 700S - Lindberg 969S Tap)	155.2	177.3	164.7	106.1	180.4	116.2	10.1
	9L20 (Nevis 766S – Cordel 755S)	540	624	794.1	147.1	860.7	159.4	12.3
	9L16 (Goldeye Tap - Cordel 755S)	499	499	443.5	88.9	502.9	100.8	11.9
Three Hills 770S 703T	7L16 (Nevis 766S - Heatburg 948S)	127.5	127.5	116.4	91.3	127.6	100.1	8.8
Tucuman 478S Transformers	703L (Hardisty 377S - Express 329S Tap)	96	143	112.4	117	117.6	122.5	5.5
	472L (Metiskow 648S - 472AL Tap)	150	165	153.5	102.3	159	106	3.7
	472L (Hughenden 213S - 472AL Tap)	125	138	120.2	96.2	125.5	100.4	4.2
EATL (Newell 2075S - Heathfield 2029S)	9L62 (Tinchebray 972S - Gaetz 87S)	831.4	831.4	944.5	114	1016.0	122.7	8.7
	9L59 (Tnchebray 972S - 9LA59Tap)	499	499	533.9	106.8	607.3	121.5	14.7
	704L (Tucuman	79	87	80.1	101.6	90.1	114.4	12.8

Contingency (System Element Lost)	Violation Location Details	Thermal Ratings[a] (MVA)		Pre-Project		Post-Project		Post - Pre (%)
		Nominal Rating (MVA)	Emergency Rating (MVA)	Power Flow[b] (MVA)	%Loading[c]	Power Flow[b] (MVA)	%Loading[c]	
	478S - Wainright 51S)							
	7L53 (Bonnyville 700S - Lindberg 969S Tap)	155.3	177.3	162.9	105.2	176.4	113.8	8.6
	7L16 (Nevis 766S - Heatburg 948S)	142.8	160	149.1	104.4	161.6	113.2	8.8
	703L (Hardisty 377S - Express 329S Tap)	96	143	98.5	102.6	104.1	108.3	5.7
	7L159 (Heatburg 948S - Ghostpine 114S Tap)	142.8	160	136.8	95.8	148.1	103.7	7.9
	9L912 (Red Deer 63S - Nevis 766S)	624	624	590.3	94.9	634.6	102.0	7.1

Notes:

[a] The facility ratings shown 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).

Voltage Criteria Violations

Voltage criteria violations were observed under Category B conditions as shown in Table 3-8.

Table 3-8: Voltage Criteria Violations under Category B Conditions for Scenario 6

Contingency	Substation Name and Number	Bus No.	Nominal kV	Emergency Minimum Voltage (kV)	Emergency Maximum Voltage (kV)	PRE (Initial Voltage (kV))	PRE (Steady State (kV))	POST (Initial Voltage (kV))	POST (Steady State (kV))	% Voltage Diff. (post-pre)

7L77 (Holden 395S - Vegreville 709S)	Holden 395S	68	138	124	152	147.1	153.2	146.9	153.8	0.4%
7L16 (Nevis 766S - Heatburg 948S)	Nevis 766S	1423	144	130	155	149.2	154	149.5	155.4	0.9%
7L159 (Three Hills 770S - Heatburg 948S)	Nevis 766S	1423	144	130	155	149.2	154.6	149.5	156.1	1.0%
	Heatburg 948S	1429	144	130	155	149.1	154.5	148.9	156	1.0%

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 under selected Category B contingencies for 2028 WP Post-Project scenario Transient stability studies were also completed under selected Category B contingencies for 2028 WP Pre-Project scenario when the post-Project plots were unstable. The following section gives a summary of the results for the studied scenario. Transient stability plots are provided in Attachment A4. The dynamic data and assumptions of all equipment proposed for the Facility are provided in Attachment A5. Post-RAS transient stability plots are provided in Attachment A7.

3.2.1 Scenario 6: 2028 WP Post-Project

Scenario 6 2024 WP Post-Project resulted in transient stability issues for several Category B contingencies as shown in Table 3-9-1. All other studied Category B events were stable.

Table 3-9-1: Transient Stability Study Results under Category B Conditions for Scenario 6 2028 WP Post-Project

Studied Contingency	Fault Description and Location	Results
System normal (Category A)		Stable
9L20 (Cordel 755S – Nevis 766S)	3-phase fault at Cordel 755S	Stable
	3-phase fault at Nevis 766S	Stable
9L24 (Lanfine 959S – Oakland 946S)	3-phase fault at Lanfine 959S	Stable
	3-phase fault at Oakland 946S	Stable
9L59 (Anderson 801S – Tinchebray 972S)	3-phase fault at Anderson 801S	Stable
	3-phase fault at Tinchebray 972S	Unstable
9L62 (Tinchebray 972S – Gaetz 87S)	3-phase fault at Tinchebray 972S	Unstable

	3-phase fault at Gaetz 87S	Unstable
9L97 (Anderson 801S – Oakland 946S)	3-phase fault at Anderson 801S	Stable
	3-phase fault at Oakland 946S	Stable
912L/9L912 (Nevis 766S – Red Deer 63S)	3-phase fault at Nevis 766S	Stable
	3-phase fault at Red Deer 63S	Unstable

3.2.2 Scenario 3: 2028 WP Pre-Project

Scenario 3 2024 WP Pre-Project transient stability studies were done of the contingencies that resulted in unstable transient plots for post-Project scenario and the results are shown in Table 3-9-2.

Table 3-9-2: Transient Stability Study Results under Category B Conditions for Scenario 3 2028 WP Pre-Project

Studied Contingency	Fault Description and Location	Results
9L59 (Anderson 801S – Tinchebray 972S)	3-phase fault at Tinchebray 972S	Stable
9L62 (Tinchebray 972S – Gaetz 87S)	3-phase fault at Tinchebray 972S	Unstable
	3-phase fault at Gaetz 87S	Unstable
912L/9L912 (Nevis 766S – Red Deer 63S)	3-phase fault at Red Deer 63S	Unstable

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

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)
Lanfine 959S	240	257.76	6.19	0.006557+j0.040278	6.78	0.006176+j0.026095
Oakland 946S	240	258.79	12.77	0.002685+j0.019598	11.68	0.004569+j0.023945
Wintering Hills 804S	138	150.08	3.45	0.034801+j0.12233	3.26	0.042444+j0.14262
Bullpound 803S	138	149.73	3.25	0.0319+j0.131503	2.90	0.036852+j0.178825
Sheerness 807S	240	259.32	13.55	0.002547+j0.018473	13.53	0.002118+j0.017661
Anderson 801S	240	259.09	14.12	0.002464+j0.017715	14.29	0.001978+j0.016187
Anderson 801S	138	148.71	4.59	0.009726+j0.09519	4.50	0.006373+j0.100339
Sheerness 807S	240	259.34	13.53	0.002557+j0.018487	13.52	0.002208+j0.017647

4.2 Post-Project Results

4.2.1 Scenario 6: 2028 WP HW Post-Project

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

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

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)
Lanfine 959S	240	258.00	6.39	0.00619+j0.039043	6.85	0.006188+j0.026119
Oakland 946S	240	258.48	13.65	0.002379+j0.018352	11.90	0.004568+j0.023946
Wintering Hills 804S	138	150.35	3.46	0.034788+j0.12213	3.26	0.042429+j0.14261
Bullpound 803S	138	149.91	3.26	0.031763+j0.131039	2.90	0.036851+j0.178824
Sheerness 807S	240	258.97	14.29	0.002308+j0.017524	13.76	0.002118+j0.017661

[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.

Anderson 801S	240	258.73	14.95	0.002219+j0.016752	14.55	0.001978+j0.016187
Anderson 801S	240	148.78	4.63	0.009473+j0.094425	4.51	0.006373+j0.100338
Sheerness 807S	240	258.98	14.28	0.002318+j0.017537	13.75	0.002208+j0.017647
Sunnynook bus 549056	240	258.32	9.24	0.003165+j0.027153	6.49	0.012865+j0.055579

4.2.2 Scenario 7: 2033 WP HW Post-Project

Post-Project short-circuit current levels for Scenario 7 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)
Lanfine 959S	240	259.11	6.71	0.005468+j0.037239	7.18	0.0059+j0.025529
Oakland 946S	240	259.50	14.04	0.002073+j0.01787	12.30	0.004452+j0.023286
Wintering Hills 804S	138	150.71	3.49	0.033842+j0.121238	3.40	0.034473+j0.129467
Bullpound 803S	138	150.13	3.28	0.031005+j0.130082	3.17	0.026181+j0.145092
Sheerness 807S	240	259.42	14.73	0.002004+j0.017029	14.38	0.001914+j0.016685
Anderson 801S	240	259.44	15.42	0.001914+j0.016268	15.24	0.001767+j0.015233
Anderson 801S	240	148.65	4.69	0.008906+j0.09329	4.95	0.004373+j0.077241
Sheerness 807S	240	259.37	14.72	0.002013+j0.017043	14.37	0.002004+j0.016672
Sunnynook bus 549056	240	259.20	9.45	0.002857+j0.026587	6.62	0.012764+j0.055092

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

[As part of this Project, mitigation measures will not be specifically developed for the POD bus voltage deviations observed under certain Category B conditions during pre-Project and post-Project scenarios.[2]]

5.1 Pre-Project

5.1.1 Pre-Project

Pre-Project mitigation measures are summarized in Table 5-1.

Table 5-1: Pre-Project Mitigation Measures

Mitigation Measure	Location of Observed Violation	Contingency
Realtime Operating Practice (RTOP)	472L (Hughenden 213S - 472AL Tap)	9L960 (Paintearth 863S - Rolling Hills 1081S)
	7L760 (KSP Tap - Bindloss 914S Tap)	
	7L760 (KSP Tap - Oyen 767S)	
	703L (Hardisty 377S - Express 329S Tap)	
	472L (Metiskow 648S - 472AL Tap)	
	472L (Hughenden 213S - 472AL Tap)	
RTOP	7L128 (Coyote Lake 963S - High_Tap)	Nevis 766S_903T
RTOP	472L (Hughenden 213S - 472AL Tap)	681L (Tucuman 478S - Hardisty 377S)
	703L (Hardisty 377S - Express 329S Tap)	
RTOP	715L (Hansman Lake 650S - 715AL Tap)	748L (Killarney 267S - Hayter 277S)

[2] The AESO's desired post-contingency voltage deviations for low voltage busses represent guidelines rather than criteria. A POD bus voltage deviation that exceeds the desired limits shown in Table 3-1 of Attachment A1 does not represent a Reliability Criteria violation.

	715L (Rising Sun 1147S (P2540) Tap - 715AL Tap)	
RTOP	715L (Hansman Lake 650S - 715AL Tap)	749L (Edgerton 899S - Metiskow 648S)
	715L (Rising Sun 1147S (P2540) Tap - 715AL Tap)	
RTOP	7L128 (Coyote Lake 963S - High_Tap)	7L137 (Three Hills 770S - Rowley 768S)
RTOP	7L128 (Coyote Lake 963S - High_Tap)	7L16 (Nevis 766S - Heatburg 948S)
RAS 200[3]	Anderson 801S 901T	7L171 (Michichi Creek - Wintering Hills 804S)
RTOP	7L128 (Coyote Lake 963S - High_Tap)	7L25 (Michichi Creek 802S - Rowley 768S)
RTOP	703L (Hardisty 377S - Express 329S Tap)	7L42 (Hill 751S - Lloydminster 716S)
RTOP	715L (Hansman Lake 650S - 715AL Tap)	7L749 (Edgerton 899S - Lloyminster 716S)
	715L (Rising Sun 1147S (P2540) Tap - 715AL Tap)	
RAS 211[1]	703L (Hardisty 377S - Express 329S Tap)	7L749 (Edgerton 899S - Lloyminster 716S)
	472L (Metiskow 648S - 472AL Tap)	
	704L (Tucuman 478S - Wainright 51S)	
Planned RAS 213[4]	749L (Killarney 267S Tap - 749AL Tap)	885L (Metiskow 648S - Hansman Lake 650S)
RTOP	7L760 (Empress Liquid 164S Tap - Bindloss 914S Tap)	933L (Anderson 801S - Ware Junction 132S)
	7L760 (KSP Tap - Bindloss 914S Tap)	
	7L760 (KSP Tap - Oyen 767S)	
RTOP	7L760 (Empress Liquid 164S Tap - Bindloss 914S Tap)	934L (Anderson 801S - Ware Junction 132S)
	7L760 (KSP Tap - Bindloss 914S Tap)	
	7L760 (KSP Tap - Oyen 767S)	
RTOP	7L760 (Empress Liquid 164S Tap - Bindloss 914S Tap)	950L (Anderson 801S - Ware Junction 132S)
	7L760 (KSP Tap - Bindloss 914S Tap)	
	7L760 (KSP Tap - Oyen 767S)	

RAS 215[5]	7L16 (Nevis 766S - Heatburg 948S)	9L20 (Nevis 766S - Cordel 755S)
	9L62 (Tinchebray 972S - Gaetz 87S)	
	9L16 (Goldeye Tap - Tinchebray 972S)	
Planned RAS 204 Logic #2[6]/RTOP[2]	472L (Hughenden 213S - 472AL Tap)	9L24 (Lanfine 959S - Oakland 946S)
	7L760 (Empress Liquid 164S Tap -Amoco Empress 163S)	
	7L760 (Empress Liquid 164S Tap - Bindloss 914S Tap)	
	7L760 (KSP Tap - Bindloss 914S Tap)	
	7L760 (KSP Tap - Oyen 767S)	
	7L132 (Oyen 767S - Lanfine 959S)	
	7L128 (Coyote Lake 963S - High_Tap)	
	703L (Hardisty 377S - Express 329S Tap)	
	472L (Metiskow 648S - 472AL Tap)	
	9L966 (Hansman Lake 650S - Pemukan 932S)	
	6L09 (Oyen 767S - Hurd 2037S Tap)	
RTOP	472L (Hughenden 213S - 472AL Tap)	9L27 (Paintearth Creek - Cordel 755S)
	7L760 (KSP Tap - Bindloss 914S Tap)	
	7L760 (KSP Tap - Oyen 767S)	
	703L (Hardisty 377S - Express 329S Tap)	
	472L (Metiskow 648S - 472AL Tap)	
RAS 134 Logic #3[8], RAS 200[3]	7L159 (Heatburg 948S - Ghostpine 114S Tap)	9L29 (Coyote Lake 963S - Oakland 946S)
	7L16 (Nevis 766S - Heatburg 948S)	
	7L85 (Bullpound 803S Tap - Anderson 801S)	
	7L85 (Bullpound 803S Tap - Badlands 981S Tap)	
	Anderson 801S 901T	
RAS 134 Logic#1[7], RAS 211[1], RAS 215[5]/RTOP[2]	9L912 (Red Deer 63S - Nevis 766S)	9L62 (Tinchebray 972S - Gaetz 87S)
	7L760 (Empress Liquid 164S Tap - Bindloss 914S Tap)	

	7L760 (KSP Tap - Bindloss 914S Tap)	
	7L760 (KSP Tap - Oyen 767S)	
	9L20 (Nevis 766S – Cordel 755S)	
	7L132 (Oyen 767S - Lanfine 959S)	
	174L (Bardo 197S - Holden 395S)	
	704L (Tucuman 478S - Wainright 51S)	
	7L53 (Bonnyville 700S - Lindberg 969S Tap)	
RAS 215[5]/RTOP[2]	7L760 (KSP Tap - Oyen 767S)	9L912 (Nevis 766S – Red Deer 63S)
	7L128 (Coyote Lake 963S - High_Tap)	
	914L (Red Deer 63S - Gaetz 87S)	
	9L62 (Tinchebray 972S - Gaetz 87S)	
	9L16 (Goldeye Tap - Tinchebray 972S)	
RTOP[9]	Transient Instability	
RTOP[9]	Transient Instability	9L62 (Tinchebray 972S - Gaetz 87S)
RAS 211[1]	704L (Tucuman 478S - Wainright 51S)	9L953 (Cordel 755S - Nilrem 574S)
	7L760 (KSP Tap - Oyen 767S)	
RAS 201	7L224 (Hansman Lake 650S - Monitor 774S)	9L966 (Hansman Lake 650S - Pemukan 932S)
	7L127 (Pemukan 932S - Monitor 774S)	
RTOP	7L128 (Coyote Lake 963S - High_Tap)	Anderson 801S_901T
	7L171 (Michichi Creek 802S - Wintering Hills 804S)	
RAS 134 Logic #3[8], RAS 200[3]	7L159 (Heatburg 948S - Ghostpine 114S Tap)	Coyote Lake 963S 901T
	7L16 (Nevis 766S - Heatburg 948S)	
	7L85 (Bullpound 803S Tap - Anderson 801S)	
	7L85 (Bullpound 803S Tap - Badlands 981S Tap)	
	Anderson 801S 901T	
RAS 211[1]/RTOP[2]	7L53 (Bonnyville 700S - Lindberg 969S Tap)	EATL (Newell 2075S - Heathfield 2029S)
	9L62 (Tinchebray 972S - Gaetz 87S)	

	9L59 (Tnchebray 972S - 9LA59Tap)	
	704L (Tucuman 478S - Wainright 51S)	
	7L53 (Bonnyville 700S - Lindberg 969S Tap)	
	7L16 (Nevis 766S - Heatburg 948S)	
	703L (Hardisty 377S - Express 329S Tap)	
RAS 211[1]/RTOP[2]	715L (Hansman Lake 650S - 715AL Tap)	Edgerton_899ST3
	715L (Rising Sun 1147S (P2540) Tap - 715AL Tap)	
	715L (Hansman Lake 650S - 715AL Tap)	
	715L (Rising Sun 1147S (P2540) Tap - 715AL Tap)	
	703L (Hardisty 377S - Express 329S Tap)	
	472L (Metiskow 648S - 472AL Tap)	
	704L (Tucuman 478S - Wainright 51S)	
RTOP	703L (Hardisty 377S - Express 329S Tap)	Hill 751S_TIEXMER
RTOP	7L760 (Empress Liquid 164S Tap -Amoco Empress 163S)	Lanfine 959S 901T
	7L760 (Empress Liquid 164S Tap - Bindloss 914S Tap)	
	7L760 (KSP Tap - Bindloss 914S Tap)	
RTOP	715L (Hansman Lake 650S - 715AL Tap)	Metiskow_648ST1
	715L (Rising Sun 1147S (P2540) Tap - 715AL Tap)	
RTOP	472L (Hughenden 213S - 472AL Tap)	Paintearth Creek 863S 902T
	7L760 (KSP Tap - Bindloss 914S Tap)	
	7L760 (KSP Tap - Oyen 767S)	
	703L (Hardisty 377S - Express 329S Tap)	
	472L (Metiskow 648S - 472AL Tap)	
RTOP	715L (Hansman Lake 650S - 715AL Tap)	Provost 545S 701T
	715L (Rising Sun 1147S (P2540) Tap - 715AL Tap)	
RTOP	472L (Hughenden 213S - 472AL Tap)	Tucuman 478S Transformers

	703L (Hardisty 377S - Express 329S Tap)	
	472L (Metiskow 648S - 472AL Tap)	

Notes:

[1] Existing RAS 211 is a RAS to mitigate overload on 704L by sequentially tripping PAW1 (P2562, P1704), HAL1, P2441, P2555, P2566.

[2] If the overload is below the emergency rating RTOP will be used.

[3] Existing RAS 200 is a RAS to mitigate Anderson 801S 901T transformer overload by sequentially tripping WHE1, MIC1 (P2061), MCH1 (P2248), FCS1 (P1978), TRH1 (P2059), HHW1 (P2263).

[4] Planned RAS 213 is a RAS to mitigate overload on 749AL Tap Tap to 749AAL Tap O/L by tripping P2460.

[5] Existing RAS 215 is to mitigate overload on 9L16 by tripping Trip PAW1 (P2562, P1704), P2441, HAL1.

[6] Planned RAS 204 logic # 2 is to mitigate overload in Oyen Area and specifically 7L132 overload by tripping P2421.

[7] Existing RAS 134 logic # 1 is a Central East Transfer Out overload mitigation scheme which mitigate overloads by tripping P1704, P2034, P2356, P2369, P2441, P2421.

[8] Existing RAS 134 Logic #3 is to mitigate overload on 7L159 by sequentially tripping HAL1, P1704, NEP1, MIC1 (P2061), GDP1 (P1909), TRH1 (P2059), FCS1 (P1978), MCH1 (P2248), WHE1, P2464 (the project).

[9] RTOP is used for this contingency/violation. AESO will evaluate the RAS related to CETO in the next round of operation planning study in detail.

5.2 Post-Project

5.2.1 Post-Project

Post-Project mitigation measures are summarized in Table 5-14.

Table 5-4: Post-Project Mitigation Measures

Mitigation Measure	Location of Observed Violation	Contingency
Realtime Operating Practice (RTOP)	472L (Hughenden 213S - 472AL Tap)	9L960 (Paintearth 863S - Rolling Hills 1081S)
	7L760 (Empress Liquid 164S Tap - Bindloss 914S Tap)	
	7L760 (KSP Tap - Bindloss 914S Tap)	
	7L760 (KSP Tap - Oyen 767S)	
	7L132 (Oyen 767S - Lanfine 959S)	
	703L (Hardisty 377S - Express 329S Tap)	

	472L (Metiskow 648S - 472AL Tap)	
	704L (Tucuman 478S - Wainright 51S)	
	1047L (Nilrem 574S - Easterv Tap)	
RTOP	7L128 (Coyote Lake 963S - High_Tap)	Nevis 766S_903T
RTOP	7L760 (KSP Tap - Oyen 767S)	1082L (Red Deer 63S - Hazelwood 287S)
RTOP	9L62 (Tinchebray 972S - Gaetz 87S)	174L (Holden 395S - Bardo 197S)
RTOP	472L (Hughenden 213S - 472AL Tap)	681L (Tucuman 478S - Hardisty 377S)
	703L (Hardisty 377S - Express 329S Tap)	
	472L (Metiskow 648S - 472AL Tap)	
RTOP	7L760 (KSP Tap - Oyen 767S)	6L09 (Hanna 763S - Oyen 767S)
RTOP	9L62 (Tinchebray 972S - Gaetz 87S)	701L (Holden 395S – Strome 223S)
RTOP	7L760 (KSP Tap - Bindloss 914S Tap)	703L (Hughenden 213S - Hardisty 377S)
	7L760 (KSP Tap - Oyen 767S)	
RTOP	715L (Hansman Lake 650S - 715AL Tap)	748L (Killarney 267S - Hayter 277S)
RTOP	715L (Rising Sun 1147S (P2540) Tap - 715AL Tap)	
RAS 211[1]/RTOP[2]	704L (Tucuman 478S - Wainright 51S)	749L (Edgerton 899S - Metiskow 648S)
	715L (Hansman Lake 650S - 715AL Tap)	
	715L (Rising Sun 1147S (P2540) Tap - 715AL Tap)	
RTOP	7L760 (KSP Tap - Oyen 767S)	769L (Rosyth 296S - Hardisty 377S)

RTOP	7L760 (KSP Tap - Bindloss 914S Tap)	7L116 (Excel 910S - Lanfine 959S)
	7L760 (KSP Tap - Oyen 767S)	
RTOP	9L62 (Tinchebray 972S - Gaetz 87S)[14]	7L117 (Irish Creek 706S - Vermillion 710S)
RTOP	7L760 (KSP Tap - Oyen 767S)	7L127 Pemukan 932S - Monitor 774S)
RTOP	703L (Hardisty 377S - Express 329S Tap)	7L130 (Vermilion 710S - Kitscoty 705S)
RTOP	7L128 (Coyote Lake 963S - High_Tap)	7L137 (Three Hills 770S - Rowley 768S)
RTOP	703L (Hardisty 377S - Express 329S Tap)	7L14 (Kitscoty 705S - Hill 751S)
RTOP	7L128 (Coyote Lake 963S - High_Tap)	7L16 (Nevis 766S - Heatburg 948S)
RAS 200[3]	Anderson 801S 901T	7L171 (Michichi Creek - Wintering Hills 804S)
RTOP	7L128 (Coyote Lake 963S - Highland_572S Tap)	7L25 (Michichi Creek 802S - Rowley 768S)
RTOP	7L760 (KSP Tap - Oyen 767S)	7L42 (Hill 751S - Lloydminster 716S)
	703L (Hardisty 377S - Express 329S Tap)	
	472L (Metiskow 648S - 472AL Tap)	
	704L (Tucuman 478S - Wainright 51S)	
RTOP	9L62 (Tinchebray 972S - Gaetz 87S)	7L53 (Bonnyville 700S - Irish Creek 706S)
RTOP	704L (Tucuman 478S - Wainright 51S)	7L65 (Vermilion 710S-- Vegreville 709S)
RTOP	9L62 (Tinchebray 972S - Gaetz 87S)[14]	7L701 (Battle River 757S - Strome 223S)
RAS 211/RTOP	472L (Hughenden 213S - 472AL Tap)	7L749 (Edgerton 899S - Lloyminster 716S)
	704L (Tucuman 478S - Wainright 51S)	
	7L760 (KSP Tap - Bindloss 914S Tap)	
	7L760 (KSP Tap - Oyen 767S)	

	715L (Hansman Lake 650S - 715AL Tap)	
	715L (Rising Sun 1147S (P2540) Tap - 715AL Tap)	
	7L760 (KSP Tap - Oyen 767S)	
	703L (Hardisty 377S - Express 329S Tap)	
	472L (Metiskow 648S - 472AL Tap)	
RTOP	7L760 (KSP Tap - Oyen 767S)	7L79 (Pemukan 932S - Ribstone Creek 892S)
RTOP	7L760 (KSP Tap - Oyen 767S)	7L92 (Vegreville 709S - Whitby Lake 819S)
RTOP	7L53 (Bonnyville 700S - Lindberg 969S Tap)	
RTOP	9L62 (Tinchebray 972S - Gaetz 87S)[14]	
Planned RAS 213[4]/ RTOP[2]	749L (Killarney 267S Tap - 749AL Tap)	885L (Metiskow 648S - Hansman Lake 650S)
RTOP	7L760 (KSP Tap - Oyen 767S)	914L (Red Deer 63S - Gaetz 87S)
RTOP	7L760 (KSP Tap - Bindloss 914S Tap)	
New RAS for 934L/9L934 or 950L/9L950 Overload Mitigation[5]/RTOP[2]	7L760 (Empress Liquid 164S Tap - Bindloss 914S Tap)	933L (Anderson 801S - Ware Junction 132S)
	7L760 (KSP Tap - Bindloss 914S Tap)	
	7L760 (KSP Tap - Oyen 767S)	
	7L132 (Oyen 767S - Lanfine 959S)	
	934L (Anderson 801S - Ware Junction 132S)	
	950L (Anderson 801S - Ware Junction 132S)	
New RAS for 934L/9L934 or 950L/9L950 Overload Mitigation[5]/RTOP[2]	7L760 (Empress Liquid 164S Tap - Bindloss 914S Tap)	934L (Anderson 801S - Ware Junction 132S)
	7L760 (KSP Tap - Bindloss 914S Tap)	
	7L760 (KSP Tap - Oyen 767S)	
	7L132 (Oyen 767S - Lanfine 959S)	

	950L (Anderson 801S - Ware Junction 132S)	
New RAS for 934L/9L934 or 950L/9L950 Overload Mitigation[5]/RTOP[2]	7L760 (Empress Liquid 164S Tap - Bindloss 914S Tap)	950L (Anderson 801S - Ware Junction 132S)
	7L760 (KSP Tap - Bindloss 914S Tap)	
	7L760 (KSP Tap - Oyen 767S)	
	7L132 (Oyen 767S - Lanfine 959S)	
	934L (Anderson 801S - Ware Junction 132S)	
RAS 215[6]/RTOP[2]	7L760 (Empress Liquid 164S Tap - Bindloss 914S Tap)	9L20 (Nevis 766S - Cordel 755S)
	7L760 (KSP Tap - Bindloss 914S Tap)	
	7L760 (KSP Tap - Oyen 767S)	
	7L132 (Oyen 767S - Lanfine 959S)	
	914L (Red Deer 63S - Gaetz 87S)	
	7L159 (Heatburg 948S - Ghostpine 114S Tap)	
	7L53 (Bonnyville 700S - Lindberg 969S Tap)	
	7L16 (Nevis 766S - Heatburg 948S)	
	9L62 (Tinchebray 972S - Gaetz 87S)[14]	
	9L16 (Goldeye Tap - Tinchebray 972S)	
Planned RAS 204 Logic #2[7]/RTOP[2]	472L (Hughenden 213S - 472AL Tap)	9L24 (Lanfine 959S - Oakland 946S)
	7L760 (Empress Liquid 164S Tap -Amoco Empress 163S)	
	7L760 (Empress Liquid 164S Tap - Bindloss 914S Tap)	
	7L760 (KSP Tap - Bindloss 914S Tap)	
	7L760 (KSP Tap - Oyen 767S)	
	7L132 (Oyen 767S - Lanfine 959S)	
	7L128 (Coyote Lake 963S - High_Tap)	
	703L (Hardisty 377S - Express 329S Tap)	

	472L (Metiskow 648S - 472AL Tap)	
	9L966 (Hansman Lake 650S - Pemukan 932S)	
	6L09 (Oyen 767S - Hurd 2037S Tap)	
RTOP	472L (Hughenden 213S - 472AL Tap)	9L27 (Paintearth Creek - Cordel 755S)
	7L760 (Empress Liquid 164S Tap - Bindloss 914S Tap)	
	7L760 (KSP Tap - Bindloss 914S Tap)	
	7L760 (KSP Tap - Oyen 767S)	
	7L132 (Oyen 767S - Lanfine 959S)	
	7L760 (KSP Tap - Bindloss 914S Tap)	
	7L760 (KSP Tap - Oyen 767S)	
	703L (Hardisty 377S - Express 329S Tap)	
	472L (Metiskow 648S - 472AL Tap)	
	472L (Hughenden 213S - 472AL Tap)	
	704L (Tucuman 478S - Wainright 51S)	
	1047L (Nilrem 574S - Easterv Tap)	
Modified[14] RAS 134 Logic #3[9], RAS 200[3]/RTOP[2]	7L159 (Heatburg 948S - Ghostpine 114S Tap)	9L29 (Coyote Lake 963S - Oakland 946S)
	7L760 (KSP Tap - Oyen 767S)	
	7L16 (Nevis 766S - Heatburg 948S)	
	7L85 (Bullpound 803S Tap - Anderson 801S)	
	7L85 (Bullpound 803S Tap - Badlands 981S Tap)	
	Anderson 801S 901T	
	7L159 (Heatburg 948S - Ghostpine 114S Tap)	
RAS 134 Logic#1[8], RAS 211[1], RAS 215[10]/RTOP[2]	9L912 (Red Deer 63S - Nevis 766S)	9L62 (Tinchebray 972S - Gaetz 87S)[13]
	7L760 (Empress Liquid 164S Tap - Bindloss 914S Tap)	
	7L53 (Bonnyville 700S - Lindberg 969S Tap)	
	7L760 (KSP Tap - Bindloss 914S Tap)	
	7L760 (KSP Tap - Oyen 767S)	

	9L20 (Nevis 766S – Cordel 755S)	
	7L132 (Oyen 767S - Lanfine 959S)	
	174L (Bardo 197S - Holden 395S)	
	730L (Bardo 197S - Kingman 299S Tap)	
	704L (Tucuman 478S - Wainright 51S)	
	9L16 (Goldeye Tap - Cordel 755S)	
RTOP[13]	Transient Instability	
New RAS for 9L97 or 9L70 Overload Mitigation[9]	7L760 (KSP Tap - Bindloss 914S Tap)	9L70 (Oakland 946S - Anderson 801S)
	7L760 (KSP Tap - Oyen 767S)	
	9L97 (Anderson 801S - Oakland 946S)	
	7L132 (Oyen 767S - Lanfine 959S)	
	9L97 (Anderson 801S - Oakland 946S)	
RAS 215[6]/RTOP[2]	7L760 (Empress Liquid 164S Tap - Bindloss 914S Tap)	9L912 (Nevis 766S – Red Deer 63S)
	7L760 (KSP Tap - Bindloss 914S Tap)	
	7L760 (KSP Tap - Oyen 767S)	
	9L16 (Goldeye Tap - Tinchebray 972S)	
	7L132 (Oyen 767S - Lanfine 959S)	
	7L128 (Coyote Lake 963S - High_Tap)	
	914L (Red Deer 63S - Gaetz 87S)	
	7L53 (Bonnyville 700S - Lindberg 969S Tap)	
	9L62 (Tinchebray 972S - Gaetz 87S) [14]	
	9L16 (Goldeye Tap - Cordel 755S)	
RTOP[12]	Transient Instability	
RAS 211[1]/RTOP[2]	704L (Tucuman 478S - Wainright 51S)	9L953 (Cordel 755S - Nilrem 574S)
	7L760 (Empress Liquid 164S Tap - Bindloss 914S Tap)	
	7L760 (KSP Tap - Bindloss 914S Tap)	
	7L760 (KSP Tap - Oyen 767S)	

	7L132 (Oyen 767S - Lanfine 959S)	
	702L (Hardisty 377S - Sedgewick 137S Tap)	
Modified RAS 201[10]/RTOP[2]	7L760 (Empress Liquid 164S Tap - Bindloss 914S Tap)	9L966 (Hansman Lake 650S - Pemukan 932S)
	7L760 (KSP Tap - Bindloss 914S Tap)	
	7L760 (KSP Tap - Oyen 767S)	
	7L132 (Oyen 767S - Lanfine 959S)	
	7L224 (Hansman Lake 650S - Monitor 774S)	
	7L127 (Pemukan 932S - Monitor 774S)	
New RAS for 9L97 or 9L70 Overload Mitigation[9]	7L760 (KSP Tap - Bindloss 914S Tap)	9L97 (Oakland 946S - Anderson 801S)
	7L760 (KSP Tap - Oyen 767S)	
	9L70 (Anderson 801S - Oakland 946S)	
	7L132 (Oyen 767S - Lanfine 959S)	
RTOP	703L (Hardisty 377S - Express 329S Tap)	Amoco Empress_163S_T5
RTOP	7L128 (Coyote Lake 963S - High_Tap)	Anderson 801S_901T
	7L171 (Michichi Creek 802S - Wintering Hills 804S)	
RTOP	7L760 (KSP Tap - Oyen 767S)	Buffalo Creek 526S_Xmers
	9L62 (Tinchebray 972S - Gaetz 87S)	
Modified RAS 134 Logic #3[8], RAS 200[3]/RTOP[2]	7L159 (Heatburg 948S - Ghostpine 114S Tap)	Coyote Lake 963S 901T
	7L760 (KSP Tap - Oyen 767S)	
	7L16 (Nevis 766S - Heatburg 948S)	
	7L85 (Bullpound 803S Tap - Anderson 801S)	
	7L85 (Bullpound 803S Tap - Badlands 981S Tap)	
	Anderson 801S 901T	
	7L159 (Heatburg 948S - Ghostpine 114S Tap)	
RAS 211[1]/RTOP[2]	7L53 (Bonnyville 700S - Lindberg 969S Tap)	EATL (Newell 2075S - Heathfield 2029S)
	704L (Tucuman 478S - Wainright 51S)	
	472L (Hughenden 213S - 472AL Tap)	

	9L62 (Tinchebray 972S - Gaetz 87S) [14]	
	9L59 (Tnchebray 972S - 9LA59Tap)	
	7L53 (Bonnyville 700S - Lindberg 969S Tap)	
	7L16 (Nevis 766S - Heatburg 948S)	
	703L (Hardisty 377S - Express 329S Tap)	
	7L159 (Heatburg 948S - Ghostpine 114S Tap)	
	9L912 (Red Deer 63S - Nevis 766S)	
RAS 211[1]/RTOP[2]	472L (Hughenden 213S - 472AL Tap)	Edgerton_899ST3
	704L (Tucuman 478S - Wainright 51S)	
	715L (Hansman Lake 650S - 715AL Tap)	
	715L (Rising Sun 1147S (P2540) Tap - 715AL Tap)	
	7L760 (KSP Tap - Bindloss 914S Tap)	
	7L760 (KSP Tap - Oyen 767S)	
	703L (Hardisty 377S - Express 329S Tap)	
	472L (Metiskow 648S - 472AL Tap)	
RTOP	7L760 (KSP Tap - Bindloss 914S Tap)	Empress_394S_T1
	7L760 (KSP Tap - Oyen 767S)	
	7L132 (Oyen 767S - Lanfine 959S)	
RTOP	7L760 (KSP Tap - Bindloss 914S Tap)	Excel 910S Transformer 701T
	7L760 (KSP Tap - Oyen 767S)	
RAS 211[1]	704L (Tucuman 478S - Wainright 51S)	Grizzly Bear 708S T1
RTOP	7L760 (KSP Tap - Bindloss 914S Tap)	Hardisty 377S T1 Transformer
	7L760 (KSP Tap - Oyen 767S)	
	7L132 (Oyen 767S - Lanfine 959S)	
RTOP	7L760 (KSP Tap - Bindloss 914S Tap)	Hill 751S_TIEXMER
	7L760 (KSP Tap - Oyen 767S)	
	703L (Hardisty 377S - Express 329S Tap)	
	472L (Metiskow 648S - 472AL Tap)	

RTOP	9L62 (Tinchebray 972S - Gaetz 87S) [14]	Holden 395S T1
RTOP	7L760 (KSP Tap - Oyen 767S)	Holden 395S Transformer T1
RTOP	703L (Hardisty 377S - Express 329S Tap)	HRT Express 329S T1
RTOP	7L760 (KSP Tap - Oyen 767S)	Jarrow 252S Transformer T2
RTOP	7L760 (Empress Liquid 164S Tap -Amoco Empress 163S)	Lanfine 959S 901T
	7L760 (Empress Liquid 164S Tap - Bindloss 914S Tap)	
	7L760 (KSP Tap - Bindloss 914S Tap)	
RTOP	7L760 (KSP Tap - Oyen 767S)	Metiskow_648ST1
	715L (Hansman Lake 650S - 715AL Tap)	
	715L (Rising Sun 1147S (P2540) Tap - 715AL Tap)	
RTOP	703L (Hardisty 377S - Express 329S Tap)	Nilrem 574S T2
RTOP	472L (Hughenden 213S - 472AL Tap)	Paintearth Creek 863S 902T
	7L760 (Empress Liquid 164S Tap - Bindloss 914S Tap)	
	7L760 (KSP Tap - Bindloss 914S Tap)	
	7L760 (KSP Tap - Oyen 767S)	
	7L132 (Oyen 767S - Lanfine 959S)	
	703L (Hardisty 377S - Express 329S Tap)	
	472L (Metiskow 648S - 472AL Tap)	
	704L (Tucuman 478S - Wainright 51S)	
	1047L (Nilrem 574S - Easterv Tap)	
RTOP	7L760 (KSP Tap - Oyen 767S)	Pemukan 932S 901T
RTOP	715L (Hansman Lake 650S - 715AL Tap)	Provost 545S 701T
	(Rising Sun 1147S (P2540) Tap – 715AL Tap)	
RTOP	472L (Hughenden 213S - 472AL Tap)	Tucuman 478S Transformers
	7L760 (KSP Tap - Oyen 767S)	
	703L (Hardisty 377S - Express 329S Tap)	
	472L (Metiskow 648S - 472AL Tap)	
RTOP	7L760 (KSP Tap - Oyen 767S)	Wainwright 51S Transformer T3

New 9L59 Contingency Transient RAS[11]	Transient Instability	9L59 (Anderson 801S – Tinchebray 972S)
RTOP	Voltage Violation at Edgerton 899S	749L (Edgerton 899S - Metiskow 648S)
RTOP	Voltage Violation at Holden 395S	7L77 (Holden 395S - Vegreville 709S)
RTOP	Voltage Violation at Nevis 766S	7L16 (Nevis 766S - Heatburg 948S)
RTOP	Voltage Violation at Nevis 766S	7L159 (Three Hills 770S - Heatburg 948S)
RTOP	Voltage Violation at Heatburg 948S	

Notes:

[1] Existing RAS 211 is a RAS to mitigate overload on 704L by sequentially tripping PAW1 (P2562, P1704), HAL1, P2441, P2555, P2566.

[2] If the overload is below the emergency rating RTOP will be used.

[3] Existing RAS 200 is a RAS to mitigate Anderson 801S 901T transformer overload by sequentially tripping WHE1, MIC1 (P2061), MCH1 (P2248), FCS1 (P1978), TRH1 (P2059), HHW1 (P2263).

[4] Planned RAS 213 is a RAS to mitigate overload on 749AL Tap Tap to 749AAL Tap O/L by tripping P2460.

[5] New 934L/9L934 or 950L/9L950 Overload Mitigation RAS is to mitigate overload on 934L/9L934 or 950L/9L950 by tripping P2464 (the project) and GDP1.

[6] Existing RAS 215 is to mitigate overload on 9L16 by tripping Trip PAW1 (P2562, P1704), P2441, HAL1.

[7] Planned RAS 204 logic # 2 is to mitigate overload in Oyen Area and specifically 7L132 overload by tripping P2421.

[8] Existing RAS 134 logic # 1 is a Central East Transfer Out overload mitigation scheme which mitigate overloads by tripping P1704, P2034, P2356, P2369, P2441, P2421. Modified RAS 134 Logic #3 is to mitigate overload on 7L159 by sequentially tripping HAL1, P1704, NEP1, MIC1 (P2061), GDP1 (P1909), TRH1 (P2059), FCS1 (P1978), MCH1 (P2248), WHE1, P2464 (the project).

[9] New RAS for 9L97 or 9L70 Overload Mitigation is to mitigate overload on 9L97 or 9L70 by tripping P2464 (the project).

[10] Modified RAS 201 is to mitigate overload on 7L224 by tripping P2464 (the project), SHH1 (P1567), LAN1 (P1898), P2421.

[11] New 9L59 Contingency Transient RAS is to mitigate transient instability resulting from 9L59 by tripping P2464 (the project) within six (6) cycles.

[12] RTOP is used for this contingency/violation. AESO will evaluate the RAS related to CETO in the next round of operation planning study in detail. This project (P2464) might be included in other RASs where required.

[13] “Modify” refers to adding the Project to the logic of the planned RAS.

5.3 Evaluation of Mitigation Measures

This section describes the results of the power flow and transient 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 Scenario 4, Scenario 5, and Scenario 6, using Alternative 2 and the RASs described in the previous section.

The post-mitigation power flow diagrams for selected Category B conditions for Scenario 4, Scenario 5, and Scenario 6 are provided in Attachment A6. Post-mitigation power flow diagrams present only those post-Project contingencies that result in thermal criteria violations that RASs are used to mitigate the violation. Post-Project contingencies that result in thermal criteria violations that can be mitigated by real-time operational practice (RTOP) or TFO capital maintenance projects were not studied. The post-mitigation transient study plots for Scenario 6 are provided in Attachment A7.

5.3.1 Scenario 4: 2028 SL Post-Project Alternative 2

Category B Conditions

Thermal criteria violations observed under certain Category B conditions in the post-Project studies were mitigated by RASs as shown in Table 5-7. Voltage criteria violations observed under certain Category B conditions in the post-Project studies will be mitigated by real time operation practice.

After RAS actions were complete, RTOP are required to fully alleviate certain thermal criteria violations observed on some transmission lines.

Table 5-7: Post-RAS Power Flow Study Results for Scenario 4 2028 SL Post-Project Alternative 2

Contingency	Details of Violation	Seasonal Continuous Rating (MVA)	Short-term (Emergency) Rating (MVA)	Post-Project		Post-RAS Action Results	
				Power Flow (MVA)	% (Loading)	Power Flow (MVA)	% (Loading)
9L70 (Oakland 946S - Anderson 801S)	7L760 (KSP Tap - Bindloss 914S Tap)	110.2	122.7	111.2	101	101.3	91.9%
	7L760 (KSP Tap - Oyen 767S)	110.2	122.7	112.3	101.9	103.3	93.7%
	9L97 (Anderson 801S - Oakland 946S)	499	499	629.9	126.2	433.1	86.8%
	7L132 (Oyen 767S - Lanfine 959S)	112.1	138	112.2	100	102.5	91.4%
9L912 (Nevis 766S – Red Deer 63S)	7L760 (Empress Liquid 164S Tap - Bindloss 914S Tap)	110.2	122.7	114.4	103.8	109.1	99.0%

	7L760 (KSP Tap - Bindloss 914S Tap)	110.2	122.7	116.1	105.4	110.9	100.6[1]%
	7L760 (KSP Tap - Oyen 767S)	110.2	122.7	117.1	106.2	111.9	101.5[1]%
	9L16 (Goldeye Tap - Tinchebray 972S)	499	499	500.7	100.3	434.1	87.0%
	7L132 (Oyen 767S - Lanfine 959S)	112.1	138	115.4	102.9	110.6	98.7%
9L953 (Cordel 755S - Nilrem 574S)	704L (Tucuman 478S - Wainright 51S)	75	83	86.2	115	68.1	90.8%
	7L760 (Empress Liquid 164S Tap - Bindloss 914S Tap)	110.2	122.7	113.8	103.2	95.4	86.6%
	7L760 (KSP Tap - Bindloss 914S Tap)	110.2	122.7	115.5	104.8	96.3	87.4%
	7L760 (KSP Tap - Oyen 767S)	110.2	122.7	116.5	105.7	98.3	89.2%
	7L132 (Oyen 767S - Lanfine 959S)	112.1	138	117	104.3	99.5	88.8%
9L97 (Oakland 946S - Anderson 801S)	7L760 (KSP Tap - Bindloss 914S Tap)	110.2	122.7	111.2	101	101.3	91.9%
	7L760 (KSP Tap - Oyen 767S)	110.2	122.7	112.3	101.9	103.3	93.7%
	9L70 (Anderson 801S - Oakland 946S)	499	499	630	126.2	433.1	86.8%
	7L132 (Oyen 767S - Lanfine 959S)	112.1	138	112.2	100	102.5	91.4%

[1] Real-time operational practices will mitigate the remaining overloads.

5.3.2 Scenario 5: 2028 SP Post-Project Alternative 2

Category B Conditions

Thermal criteria violations observed under Category B conditions in the post-Project studies were mitigated by RASs as shown in Table 5-8. There were no voltage criteria violations observed after RAS actions were complete.

After RAS actions were complete, real-time operational practices are required to fully alleviate certain thermal criteria violations observed on some of the transmission lines.

Table 5-8: Post-RAS Power Flow Study Results for Scenario 5 2028 SP Post-Project Alternative 2

Contingency	Details of Violation	Seasonal Continuous Rating (MVA)	Short-term (Emergency) Rating (MVA)	Post-Project		Post-RAS Action Results	
				Power Flow (MVA)	% (Loading)	Power Flow (MVA)	% (Loading)
9L29 (Coyote Lake 963S - Oakland 946S)	7L159 (Heatburg 948S - Ghostpine 114S Tap)	107.3	118.8	126.7	118	104.3	97.2%
	7L760 (KSP Tap - Oyen 767S)	110.2	122.7	110.3	100.1	108.9	98.8%
	7L16 (Nevis 766S - Heatburg 948S)	107.3	119.8	124	115.6	101.7	94.8%
	7L85 (Bullpound 803S Tap - Anderson 801S)	139	165.8	156.4	112.5	101.1	72.7%
	7L85 (Bullpound 803S Tap - Badlands 981S Tap)	138	157.2	163.5	118.5	107.8	78.1%
	Anderson 801S 901T	125	125	157.8	126.2	100.6	80.5%
9L70 (Oakland 946S - Anderson 801S)	7L760 (KSP Tap - Bindloss 914S Tap)	110.2	122.7	110.9	100.6	103.9	94.3%
	7L760 (KSP Tap - Oyen 767S)	110.2	122.7	111.8	101.4	105.5	95.7%
	9L97 (Anderson 801S - Oakland 946S)	499	499	579.7	116.2	451.6	90.5%
9L97 (Oakland 946S - Anderson 801S)	7L760 (KSP Tap - Bindloss 914S Tap)	110.2	122.7	110.9	100.6	103.9	94.3%
	7L760 (KSP Tap - Oyen 767S)	110.2	122.7	111.7	101.4	105.5	95.7%
	9L70 (Anderson 801S - Oakland 946S)	499	499	579.8	116.2	451.6	90.5%
Coyote Lake 963S 901T	7L159 (Heatburg 948S - Ghostpine 114S Tap)	107.3	118.8	126.7	118	104.3	97.2%
	7L760 (KSP Tap - Oyen 767S)	110.2	122.7	110.3	100.1	108.9	98.8%
	7L16 (Nevis 766S - Heatburg 948S)	107.3	119.8	124.1	115.6	101.7	94.8%
	7L85 (Bullpound 803S Tap - Anderson 801S)	139	165.8	156.5	112.6	101.2	72.8%

	7L85 (Bullpound 803S Tap - Badlands 981S Tap)	138	157.2	163.5	118.5	107.8	78.1%
	Anderson 801S 901T	125	125	157.8	126.3	100.8	80.6%
933L (Anderson 801S - Ware Junction 132S)	934L (Anderson 801S - Ware Junction 132S)	499	499	505.9	101.4	406.2	81.4%
	950L (Anderson 801S - Ware Junction 132S)	499	499	503.8	101	404.7	81.1%
	7L760 (Empress Liquid 164S Tap - Bindloss 914S Tap)	110.2	122.7	112.5	102.1	99.2	90.0%
	7L760 (KSP Tap - Bindloss 914S Tap)	110.2	122.7	121.4	110.2	107.3	97.4%
	7L760 (KSP Tap - Oyen 767S)	110.2	122.7	122.2	110.9	108.9	98.8%
	7L132 (Oyen 767S - Lanfine 959S)	112.1	138	115.5	103	101.6	90.6%
934L (Anderson 801S - Ware Junction 132S)	950L (Anderson 801S - Ware Junction 132S)	499	499	503.8	101	406.2	81.4%
	7L760 (Empress Liquid 164S Tap - Bindloss 914S Tap)	110.2	122.7	112.5	102.1	99.2	90.0%
	7L760 (KSP Tap - Bindloss 914S Tap)	110.2	122.7	121.4	110.2	107.3	97.4%
	7L760 (KSP Tap - Oyen 767S)	110.2	122.7	122.2	110.9	108.9	98.8%
	7L132 (Oyen 767S - Lanfine 959S)	112.1	138	115.5	103	101.6	90.6%
950L (Anderson 801S - Ware Junction 132S)	934L (Anderson 801S - Ware Junction 132S)	499	499	505	101.2	406.7	81.5%
	7L760 (Empress Liquid 164S Tap - Bindloss 914S Tap)	110.2	122.7	112.4	102	98.8	89.7%
	7L760 (KSP Tap - Bindloss 914S Tap)	110.2	122.7	121.3	110.1	107.7	97.7%
	7L760 (KSP Tap - Oyen 767S)	110.2	122.7	122.1	110.8	108.5	98.5%
	7L132 (Oyen 767S - Lanfine 959S)	112.1	138	115.5	103	101.2	90.3%

[1] Real-time operational practices will mitigate the remaining overloads.

5.3.3 Scenario 6: 2028 WP Post-Project Alternative 2

Category B Conditions

Thermal criteria violations observed under Category B conditions in the post-Project studies were mitigated by RASs as shown in Table 5-9. Voltage criteria violations observed under certain Category B conditions in the post-Project studies will be mitigated by real time operation practice.

After RAS actions were complete, real-time operational practices are required to fully alleviate certain thermal criteria violations observed on some of the transmission lines.

Table 5-9: Post-RAS Power Flow Study Results for Scenario 6 2028 WP Post-Project Alternative 2

Contingency	Details of Violation	Seasonal Continuous Rating (MVA)	Short-term (Emergency) Rating (MVA)	Post-Project		Post-RAS Action Results	
				Power Flow (MVA)	% (Loading)	Power Flow (MVA)	% (Loading)
749L (Edgerton 899S - Metiskow 648S)	704L (Tucuman 478S - Wainright 51S)	79	87	87.5	110.8	78.8	99.8%
7L171 (Michichi Creek - Wintering Hills 804S)	Anderson 801S 901T	125	125	141.9	113.6	107.5	86.0%
7L749 (Edgerton 899S - Lloyminster 716S)	703L (Hardisty 377S - Express 329S Tap)	96	143	113.6	118.3	109.2	113.8[1]%
	472L (Metiskow 648S - 472AL Tap)	150	165	157.9	105.3	153.2	102.1[1]%
	704L (Tucuman 478S - Wainright 51S)	79	87	91.2	115.4	76.1	96.3%
9L20 (Nevis 766S - Cordel 755S)	914L (Red Deer 63S - Gaetz 87S)	499	748	519.8	104.2	461.6	92.5%
	7L159 (Heatburg 948S - Ghostpine 114S Tap)	142.8	160	149.3	104.5	147.7	103.4[1]%
	7L53 (Bonnyville 700S - Lindberg 969S Tap)	155.2	177.3	156.7	100.9	150.4	96.9%
	7L16 (Nevis 766S - Heatburg 948S)	127.5	127.5	145.5	114.1	128.4	100.7[1]%
	9L62 (Tinchebray 972S - Gaetz 87S)	831.4	831.4	1070.8	128.8	968.6	116.5[1]%
	9L16 (Goldeye Tap - Tinchebray 972S)	499	499	560.9	112.4	466.6	93.5%
9L24 (Lanfine 959S - Oakland 946S)	703L (Hardisty 377S - Express 329S Tap)	96	143	114.8	119.6	112.5	117.2[1]%
	472L (Metiskow 648S - 472AL Tap)	150	165	159.3	106.2	156.9	104.6[1]%
	7L760 (Empress Liquid 164S Tap - Amoco Empress 163S)	148	163	206.6	139.6	177.0	119.6[1]%

	9L966 (Hansman Lake 650S - Pemukan 932S)	442	442	450.2	101.9	431.4	97.6%
	7L760 (Empress Liquid 164S Tap - Bindloss 914S Tap)	142	156	207.3	146	177.8	125.2[1]%
	7L760 (KSP Tap - Bindloss 914S Tap)	146.6	167.7	217.9	148.6	187.9	128.2[1]%
	7L760 (KSP Tap - Oyen 767S)	146.6	167.7	164.3	112.1	188.8	128.8[1]%
	7L132 (Oyen 767S - Lanfine 959S)	140.9	171.5	186.1	132.1	208.5	148.0[1]%
	6L09 (Oyen 767S - Hurd 2037S Tap)	23	23	24.6	107.2	23.1	100.6[1]%
9L70 (Oakland 946S - Anderson 801S)	9L97 (Anderson 801S - Oakland 946S)	499	499	626.4	125.5	433.6	86.9%
9L912 (Nevis 766S – Red Deer 63S)	914L (Red Deer 63S - Gaetz 87S)	499	748	601.2	120.5	478.0	95.8%
	7L53 (Bonnyville 700S - Lindberg 969S Tap)	155.2	177.3	162.8	104.9	152.1	98.0%
	9L62 (Tinchebray 972S - Gaetz 87S)	831.4	831.4	1162.1	139.8	968.6	116.5[1]%
	9L16 (Goldeye Tap - Tinchebray 972S)	499	499	636.8	127.6	570.9	114.4[1]%
	9L16 (Goldeye Tap - Cordel 755S)	499	499	499.2	100	570.9	114.4[1]%
9L953 (Cordel 755S - Nilrem 574S)	702L (Hardisty 377S - Sedgewick 137S Tap)	91	100	95.1	104.6	75.5	83.0%
	704L (Tucuman 478S - Wainright 51S)	79	87	97.9	124	78.6	99.5%
9L97 (Oakland 946S - Anderson 801S)	9L70 (Anderson 801S - Oakland 946S)	499	499	626.4	125.5	434.1	87.0%
Edgerton_899ST3	703L (Hardisty 377S - Express 329S Tap)	96	143	115.1	119.9	110.7	115.3[1]%
	472L (Metiskow 648S - 472AL Tap)	150	165	159.5	106.3	154.7	103.1[1]%
	704L (Tucuman 478S - Wainright 51S)	79	87	92.7	117.4	77.6	98.2%
Grizzly Bear 708S T1	704L (Tucuman 478S - Wainright 51S)	79	87	87.3	110.5	74.9	94.8%
885L (Metiskow 648S - Hansman Lake 650S)	749L (Killarney 267S Tap - 749AL Tap)	148	163	167.4	113.1	82.1	55.5%
9L966 (Hansman Lake 650S - Pemukan 932S)	7L224 (Hansman Lake 650S - Monitor 774S)	143.8	163.9	190	132.1	141.9	98.7%
	7L127 (Pemukan 932S - Monitor 774S)	182.1	243.4	225	123.6	172.8	94.9%
9L62 (Tinchebray 972S - Gaetz 87S)	174L (Bardo 197S - Holden 395S)	90.1	99	103.9	115.4	88.3	98.0%
	730L (Bardo 197S - Kingman 299S Tap)	91.1	99.9	93	102.1	93.8	103.0[1]%

	9L912 (Red Deer 63S - Nevis 766S)	624	624	988.1	158.4	785.0	125.8[1]%
	704L (Tucuman 478S - Wainright 51S)	79	87	88.3	111.8	77.1	97.6%
	7L53 (Bonnyville 700S - Lindberg 969S Tap)	155.2	177.3	180.4	116.2	161.3	103.9[1]%
	9L20 (Nevis 766S – Cordel 755S)	540	624	860.7	159.4	665.3	123.2[1]%
	9L16 (Goldeye Tap - Cordel 755S)	499	499	502.9	100.8	336.8	67.5%
EATL (Newell 2075S - Heathfield 2029S)	9L62 (Tinchebray 972S - Gaetz 87S)	831.4	831.4	1016.0	122.7	775.7	93.3%
	9L59 (Tnchebray 972S - 9LA59Tap)	499	499	607.3	121.5	703.6	141.0[1]%
	704L (Tucuman 478S - Wainright 51S)	79	87	90.1	114.4	76.4	96.7%
	7L53 (Bonnyville 700S - Lindberg 969S Tap)	155.3	177.3	176.4	113.8	160.0	103.0[1]%
	7L16 (Nevis 766S - Heatburg 948S)	142.8	160	161.6	113.2	147.5	103.3[1]%
	703L (Hardisty 377S - Express 329S Tap)	96	143	104.1	108.3	102.0	106.3[1]%
	7L159 (Heatburg 948S - Ghostpine 114S Tap)	142.8	160	148.1	103.7	151.2	105.9[1]%
	9L912 (Red Deer 63S - Nevis 766S)	624	624	634.6	102.0	411.8	66.0%

[1] Real-time operational practices will mitigate the remaining overloads.

Table 5-10: Post-RAS Transient Stability Study Results for Scenario 6 2028 WP Post-Project Alternative 2

Studied Contingency	Fault Description and Location	Results
9L59 (Anderson 801S – Tinchebray 972S)	3-phase fault at Tinchebray 972S	Stable

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% (for all of the contingencies that resulted in thermal criteria violations). The results of the constraint effective factor studies are provided in Attachment A9.

Attachment A1

Engineering Connection Assessment Study Scope

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Engineering Connection Assessment: Study Scope

P2464 Sunnynook Solar Battery

Sunnynook Solar Energy Inc.

Date: Mar. 01, 2024

Version: V3

Classification: Public

Company Name	Name and Credentials	Date	Signature
ATCO Infrastructure Services (Study Consultant)	Vijitha Wijetilleke, P. Eng.	May 21,2024	
AESO	Nima Safari, P. Eng.	5/22/2024	DocuSigned by: Nima Safari FDA585810A024D2...
ATCO Electric (Transmission Facility Owner)	Julian Tong, P. Eng.	May 27, 2024	DocuSigned by: C78E3372049248B...
Sunnynook Solar Energy Inc. (Market Participant)	Margaret McKenna	May 22, 2024	DocuSigned by: Margaret Mckenna 4A50D8B40E3D4BC...

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1 Introduction

This Study Scope provides an overview of the engineering studies to be completed by ATCO Infrastructure Services (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 1-2.

Table 1-1: Project Overview

Market Participant	Type of Project	In-service Date (ISD)
Sunnynook Solar Energy Inc.	Connection	May 1, 2027

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	2 MW
	Type	station service load
	Motors (number and size)	Not applicable
	Power factor	Not applicable
	Future load expansion plans	No
Generation	Generation type	Solar and Battery
	Existing Rate STS, *Supply Transmission Service,* contract capacity	No existing contract
	Requested Rate STS	280 MW
	Number and size of generating units	To be decided
	Maximum authorized real power (MARP)	280 MW
	Maximum authorized discharging power rating	100 MW
	Maximum capability (MC)	280 MW (Solar) 100 MW (Battery)

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Project Component		Description
	Reactive power capability	0.95 pf absorbing
		0.9 pf producing
	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 Sheerness (Area 43).

The Study Area consists of the AESO planning areas of Sheerness (Area 43), Hanna (Area 42), Lloydminster (Area 13), Wainwright (Area 32), Vegreville (Area 56), Provost (Area 37), Battle River (Area 36), 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).

The following existing RASs are used to manage constraints in the the area:

- RAS 134: Central East Transfer Out Overload Mitigation Scheme
- RAS 151: Central East Transfer Out Overload Mitigation Scheme
- RAS 20: Anderson 801S 240 kV Line 9L933, 9L934 and 9L950 Thermal Protection Scheme to Sheerness Plant
- RAS 159: 936S Norberg Under Voltage Mitigation

  RAS 200: 901T-801S Anderson Overload Mitigation

  RAS 201: 7L224-774S Overload Mitigation Scheme

  RAS 202: 7L171-804S Overload Mitigation

  RAS 203: 7L128-963S Overload Mitigation

  RAS 211: 704L-478S Overload Mitigation Scheme (P1704/2562)

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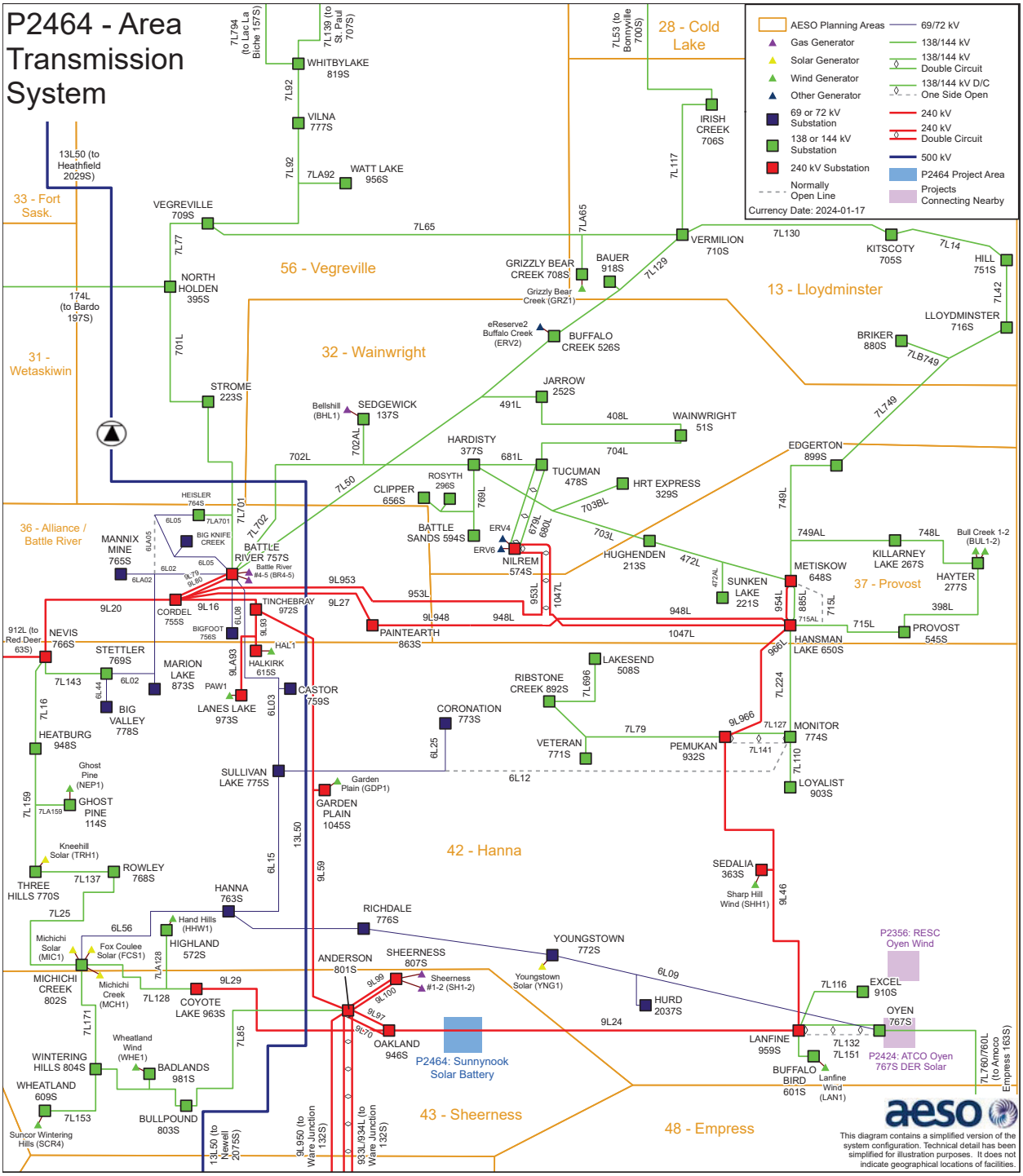
Figure 1-1: Transmission System in the Study Area



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2 Connection Alternative to be Studied

The following alternative will be studied:

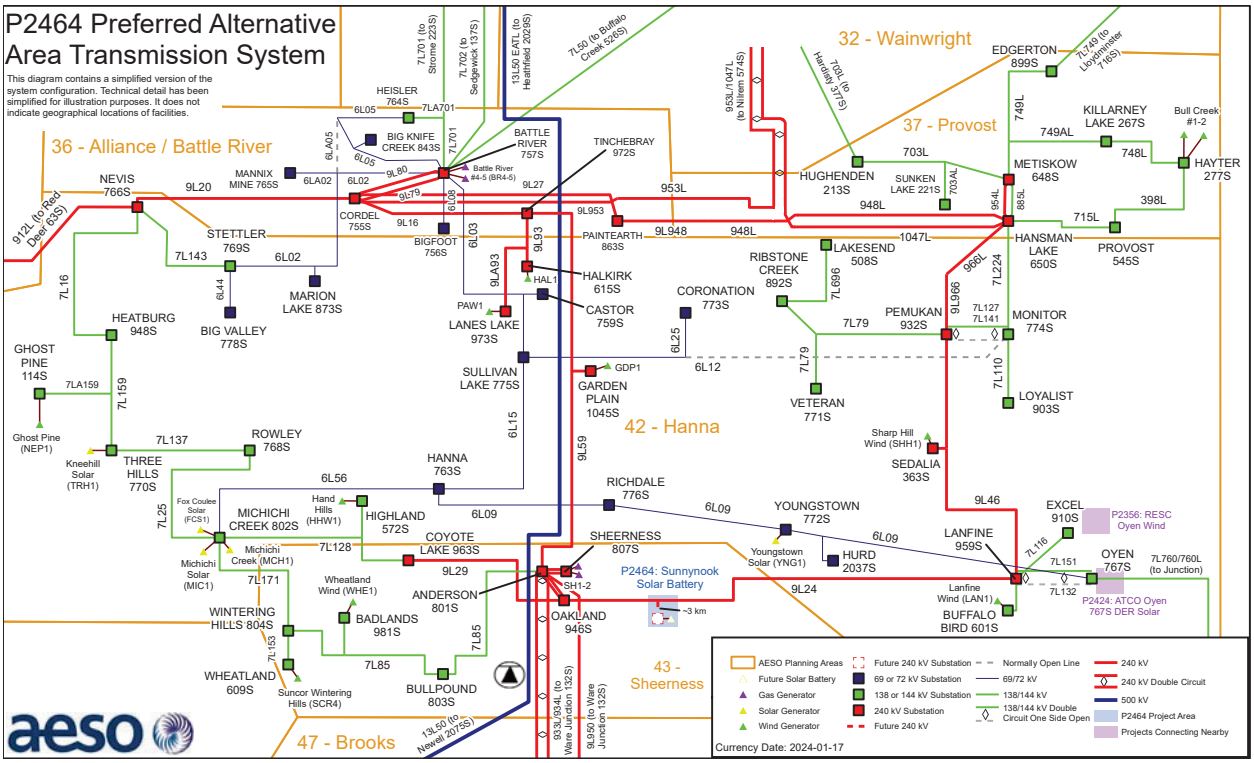
2.1 Alternative 2 – T-tap 240 kV connection to the Existing Transmission Line 9L24

This alternative includes the following developments:

- Add one new 240 kV circuit, approximately 3 km in length, to connect the Facility to the North circuit of the double-circuit transmission line 9L24, between Oakland 946S substation and Lanfine 959S substation, 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 Figure 2-1.

Figure 2-1: Connection Alternative 2



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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.

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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 502.7 of the ISO rules, *Load Facility Technical 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*;
- Section 502.13 of the ISO rules, *Battery Energy Storage Facility Technical Requirements*; and
- Section 502.14 of the ISO rules, *Battery Energy Storage Facility Operating Requirements*.

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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

Scenario No.	Year/Season	System Generation Dispatch Conditions	Scenario Name	Project Load (MW)	Project Generation (MW)
Pre-Project					
1	2028 Summer Light (SL)	High Wind (HW)	2028 SL HW Pre-Project	0	0
2	2028 Summer Peak (SP)	HW	2028 SP HW Pre-Project		
3	2028 Winter Peak (WP)	HW	2028 WP HW Pre-Project	0	0
Post-Project					
4	2028 SL	HW	2028 SL HW Post-Project	0	280
5	2028 SP	HW	2028 SP HW Post-Project	0	280
6	2028 WP	HW	2028 WP HW Post-Project	0	280
7	2033 WP	All Generators in the Study Area in service	2033 HW Post-Project	0	280

4.2 Assumptions

4.2.1 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 (phase1)[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.

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4.2.2 Load Assumptions

The load forecast to be used for the studies is shown Table 4-3 and is a forecast for the AESO Central Cluster[1] based on the AESO's Preliminary 2023 Long-term Outlook (2023 LTO)].

Table 4-3: Forecast Load in Central Cluster

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

Note:
[1] 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).

4.2.3 Generation Assumptions

The generation forecast to be used for the studies is based on the 2023 LTO with modifications to incorporate the latest forecast intelligence. The generation assumptions for the studies will assume high generation dispatch conditions for the Central Cluster. Additional studies may be required in the event of changes to the AESO's corporate forecast.

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 Study Areas

Facility Name	Bus No.	MC (MW)	AESO Planning Area No.	Unit Net Generation[a] (MW) by Scenario		
				2028 SL[b]	2028 SP[c]	2028 WP[d]
Bellshill (BHL1)	2088	5	32	0	0	0
Battle River #4 (BR4)	1496	155	36	31	31	31
Battle River #5 (BR5)	1497	395	36	95	95	95

[1] 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)

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Facility Name	Bus No.	MC (MW)	AESO Planning Area No.	Unit Net Generation[a] (MW) by Scenario		
				2028 SL[b]	2028 SP[c]	2028 WP[d]
eReserve2 Buffalo Creek (ERV2)	558079	20	32	0	0	0
eReserve4 (ERV4)	19428	20	32	0	0	0
eReserve5 Hughenden (ERV5)	3075	20	37	0	0	0
eReserve6 (ERV6)	19428	20	32	0	0	0
Sheerness #1 (SH1)	1482	400	43	140	140	140
Sheerness #2 (SH2)	1487	400	43	140	140	140

Notes:
[a] "Unit Net Generation" refers to gross generating unit output (MW) less unit service load.
[b] "SL" refers to Summer Peak High Generation Scenario.
[c] "SP" refers to Summer Peak High Generation Scenario.
[d] "WP" refers to Summer Peak High Generation Scenario.

Using this value, the wind and solar generation facilities will be dispatched to yield the credible worst-case generation dispatches for the Central Cluster. 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 Study Areas

Facility Name	Bus No.	MC (MW)	AESO Planning Area No.	Unit Net Generation[a] (MW) by Scenario		
				2028 SL[b]	2028 SP[c]	2028 WP[d]
BUL1 Bull Creek (BUL1)	550003	13	37	3	10	10
BUL2 Bull Creek (BUL2)	550004	16	37	5	11	14
Garden Plain (GDP1)	565002	130	42	85	130	130
Grizzly Bear (GRZ1)	63308,65308,67308	152	13	100	152	153

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

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Facility Name	Bus No.	MC (MW)	AESO Planning Area No.	Unit Net Generation[a] (MW) by Scenario		
				2028 SL[b]	2028 SP[c]	2028 WP[d]
Halkirk Wind Power Facility (HAL1)	66435,67435	150	42	110	141	143
Hand Hills (HHW1)	560045	145	42	57	115	92
Lanfine Wind (LAN1)	60996	151	42	103	138	151
Ghost Pine (NEP1)	2621,2622,2623,2624,2625	82	42	18	76	75
EDPR Sharp Hills Wind Farm (P1567)	60831,60832	289	42	179	288	288
Paintearth Wind Power (P1704)	61418	150	42	115	150	150
Lone Pine MPC Wind (P1824)	561103,561104	466	42	318	425	466
RESC Oyen Wind (P2356)	560032	250	42	192	250	250
Capital Power Halkirk 2 Wind (P2441)	60467	150	42	110	141	143
ABO Fox Meadows Wind (P2460)	560039	150	37	47	106	128
CP Rolling Hills Wind (P2555)	560235	190	37	60	135	163
Paintearth Wind Phase 2 (P2562)	62418	40	42	31	40	40
BluEarth Prairie Yarrow MPC Wind (P2573)	560273	75	37	24	53	64
Wintering Hills (SCR4)	60789,60791,60793,60846,60848,60850	88	43	60	38	77
Wheatland Wind (WHE1)	60632,61632	120	43	47	95	76

Notes:
[a] "Unit Net Generation" refers to gross generating unit output (MW) less unit service load.
[b] "SL" refers to Summer Peak High Generation Scenario.
[c] "SP" refers to Summer Peak High Generation Scenario.
[d] "WP" refers to Summer Peak High Generation Scenario.

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

Facility Name	Unit No.	MC (MW)	AESO Planning Area No.	Unit Net Generation[a] (MW) by Scenario		
				2028 SL	2028 SP	2028 WP
Michichi Creek (MCH1)	557448	14	42	0	11	4
Michichi Solar (MIC1)	554448	25	42	20	21	11
ATCO Michichi DER Solar (P1978)	552448,553448	75	42	60	62	32
FortisAlberta Metiskow 648S DER Solar (P2259)	557074	23	37	18	11	9
FortisAlberta Killarney Lake 267S DER Solar/Battery Storage (P2292)	4219	23	37	18	11	9
ATCO Anderson 801S DER Solar (P2369)	19485	13	43	0	0	6
ATCO Oyen 767S DER Solar (P2424)	19474	15	42	12	12	7
Rising Sun Solar (P2540)	562046	125	37	98	97	54
Kneehill Solar (P2552)	560103,560106	450	42	352	351	194
Dolcy Solar Battery (P2553)	567156,567157,567158	200	37	160	97	75
ATCO Bullpound 803S DER Solar (P2564)	19463	15	43	0	0	6
Eastervale Solar Battery (P2566)	562092,563092,564092	300	37	240	145	114
Fortis Aura Provost DER Solar (P2574)	4086	23	37	18	11	9
UK Solar East (P2611)	561042,562042	401	42	314	313	172
Youngstown Solar (YNG1)	19476	6	42	5	5	2

Notes:
[a] "Unit Net Generation" refers to gross generating unit output (MW) less unit service load.
[b] "SL" refers to Summer Peak High Generation Scenario.
[c] "SP" refers to Summer Peak High Generation Scenario.
[d] "WP" refers to Summer Peak High Generation Scenario.

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4.2.4 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

4.2.5 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.

The reactive power limits of the MVAr exchanges between the HVDC terminals (WATL and EATL) and the connected alternating current (AC) transmission systems are shown in Table 4-8. These limits must be maintained when performing the studies.

Table 4-8: HVDC to Adjacent AC System MVAr Exchange Limits

HVDC Facility	North Terminal Reactive Power Limit (MVAr)	South Terminal Reactive Power Limit (MVAr)
EATL	-85 to 75	-35 to 35
WATL	-75 to 75	-35 to 35

4.2.6 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 and as shown in Table 4-9. Only those contingencies shown in Table 4-9 will be studied for transient stability studies. If the TFO 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*.

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Table 4-9: Protection Fault Clearing Times

Contingency (System Element Lost)	Fault Location	Clearing Times (Cycles)	
		Near End	Far End
9L20 (Cordel 755S – Nevis 766S)	Cordel 755S	5	6
	Nevis 766S	5	6
912L/9L912 (Nevis 766S – Red Deer 63S)	Nevis 766S	5	6
	Red Deer 63S	5	6
9L97 (Oakland 946S – Anderson 801S)	Oakland 946S	5	6
	Anderson 801S	5	6
9L24 (Oakland 946S – Lanfine 959S)	Oakland 946S	5	6
	Lanfine 959S	5	6
9L59 (Anderson 801S – Tinchebray 972S)	Anderson 801S	5	6
	Tinchebray 972S	5	6
9L62 (Tinchebray 972S – Gaetz 87S)	Gaetz 87S	5	6
	Tinchebray 972S	5	6

4.2.7 Project Dynamic Data

Dynamic data for the Project can be found in Attachment A5.

4.2.8 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.

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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 HW Pre-Project	X	X							
2	2028 SP HW Pre-Project	X	X							
3	2028 WP HW Pre-Project	X	X			X[a]	X[a]			X
Post-Project										
4	2028 SL HW Post -Project	X	X							
5	2028 SP HW Post -Project	X	X							
6	2028 WP HW Post -Project	X	X			X	X			X
7	2033 WP HW Post-Project									X

Notes:
a: Only required if post-Project studies show potential transient stability issues

For the engineering studies, all transmission facilities 69 kV and above, within the Study Area and the transmission lines connecting these planning areas to neighbouring 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

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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 and EATL outage conditions in the Study Area.

5.3 Transient Stability Studies

The Genesis Unit #1 in AESO planning area 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 generating units in the study area. 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

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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 4-9

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:

- Bullpound 803S 144 kV bus
- Wintering Hills 804S 144 kV bus
- Anderson 801S 144 kV bus
- Anderson 801S 240kV bus
- Oakland 946S 240kV bus
- Sheerness 807S 240kV bus
- Lanfine 959S 240kV bus
- P2464 Facility (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.

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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.

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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 (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.

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Attachment A: Transmission Planning Criteria – Basis and Assumptions

Attachment A2
Pre- Project Power Flow Diagrams
(Scenarios 1, 2, 3)

Pre-Project Power Flow Results

Power Flow Diagrams

The pre-Project power flow diagrams for Scenario 1 2028 SL, Scenario 2 2028 SP, and Scenario 3 2028 WP under Category A condition and Category B contingencies are provided in this attachment as identified in the following tables.

Table A2-1: List of pre-Project Scenario 1 2028 SL Power Flow Diagrams

Scenario	Load flow diagram	Page number
2028 SL Scenario 1	CATEGORY A, N-0 (System Normal Condition)	A2-5
	CATEGORY B, Loss of 9L24 (Lanfine 959S - Oakland 946S)	A2-6
	CATEGORY B, Loss of 9L27 (Paintearth Creek - Cordel 755S)	A2-7
	CATEGORY B, Loss of 9L912 (Nevis 766S – Red Deer 63S)	A2-8
	CATEGORY B, Loss of 9L953 (Cordel 755S - Nilrem 574S)	A2-9
	CATEGORY B, Loss of Edgerton_899ST3	A2-10
	CATEGORY B, Loss of Paintearth Creek 863S 902T	A2-11
	CATEGORY B, Loss of 9L960 (Paintearth 863S - P2555_Bus 549135)	A2-12
	CATEGORY B, Loss of 933L (Anderson 801S - Ware Junction 132S)	A2-13
	CATEGORY B, Loss of 934L (Anderson 801S - Ware Junction 132S)	A2-14
	CATEGORY B, Loss of 950L (Anderson 801S - Ware Junction 132S)	A2-15
	CATEGORY B, Loss of 9L62 (Tinchebray 972S - Gaetz 87S)	A2-16
	CATEGORY B, Loss of Tucuman 478S Transformers	A2-17
	CATEGORY B, Loss of 749L (Edgerton 899S - Metiskow 648S)	A2-18
	CATEGORY B, Loss of 7L77 (Holden 395S - Vegreville 709S)	A2-19
	CATEGORY B, Loss of EATL (Newell 2075S - Heathfield 2029S)	A2-20

Table A2-2: List of pre-Project Scenario 2 2028 SP Power Flow Diagrams

Scenario	Load flow diagram	Page number
2028 SP Scenario 2	CATEGORY A, N-0 (System Normal Condition)	A2-21
	CATEGORY B, Loss of 749L (Edgerton 899S - Metiskow 648S)	A2-22
	CATEGORY B, Loss of 7L137 (Three Hills 770S - Rowley 768S)	A2-23
	CATEGORY B, Loss of 7L16 (Nevis 766S - Heatburg 948S)	A2-24
	CATEGORY B, Loss of 7L25 (Michichi Creek 802S - Rowley 768S)	A2-25
	CATEGORY B, Loss of 7L749 (Edgerton 899S - Lloyminster 716S)	A2-26
	CATEGORY B, Loss of 9L24 (Lanfine 959S - Oakland 946S)	A2-27

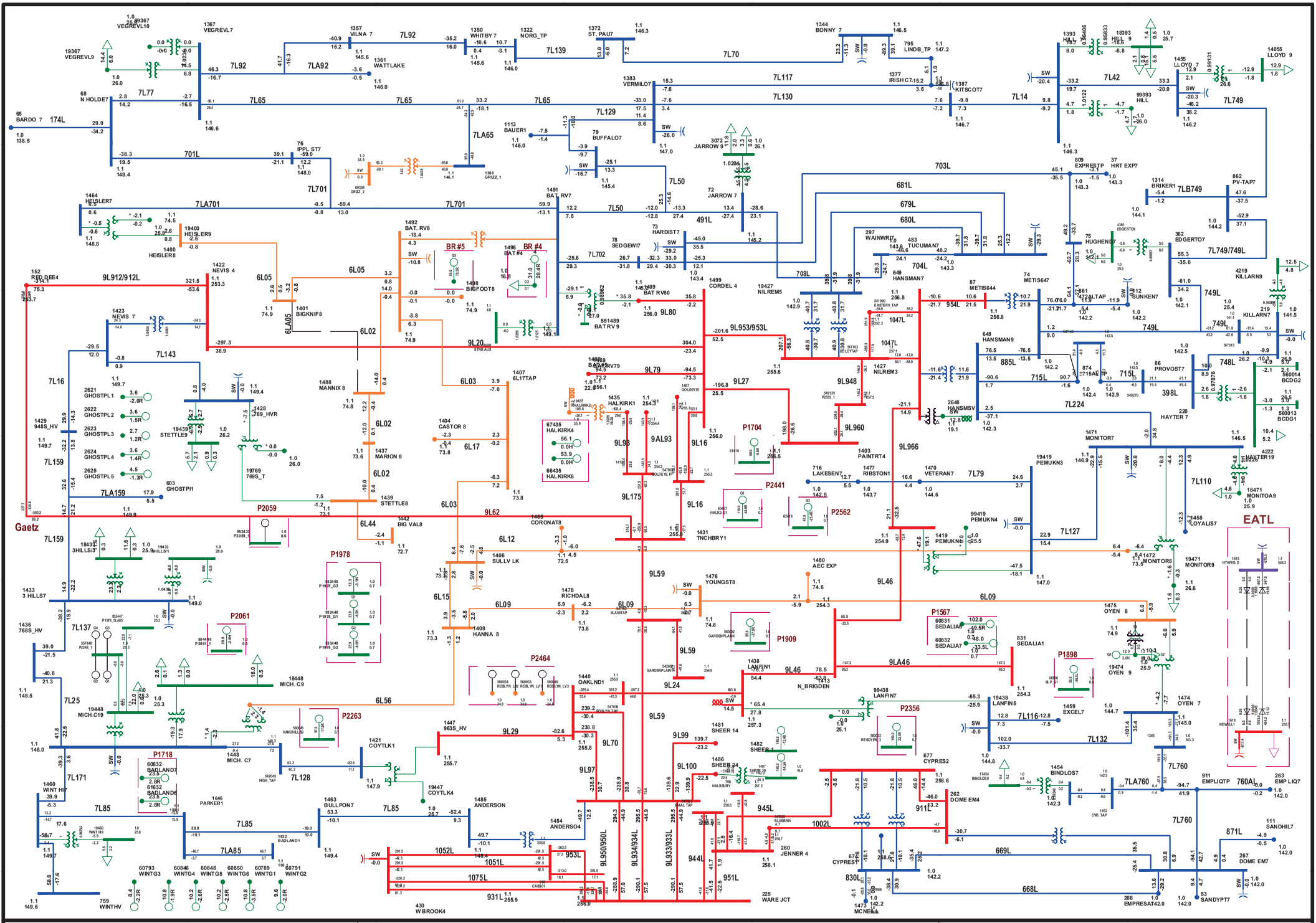
Scenario	Load flow diagram	Page number
	CATEGORY B, Loss of 9L29 (Coyote Lake 963S - Oakland 946S)	A2-28
	CATEGORY B, Loss of 9L912 (Nevis 766S – Red Deer 63S)	A2-29
	CATEGORY B, Loss of Edgerton_899ST3	A2-30
	CATEGORY B, Loss of Metiskow_648ST1	A2-31
	CATEGORY B, Loss of Nevis 766S_903T	A2-32
	CATEGORY B, Loss of Anderson 801S_901T	A2-33
	CATEGORY B, Loss of Provost 545S 701T	A2-34
	CATEGORY B, Loss of 748L (Killarney 267S - Hayter 277S)	A2-35
	CATEGORY B, Loss of 933L (Anderson 801S - Ware Junction 132S)	A2-36
	CATEGORY B, Loss of 934L (Anderson 801S - Ware Junction 132S)	A2-37
	CATEGORY B, Loss of 950L (Anderson 801S - Ware Junction 132S)	A2-38
	CATEGORY B, Loss of 9L62 (Tinchebray 972S - Gaetz 87S)	A2-39
	CATEGORY B, Loss of Coyote Lake 963S 901T	A2-40

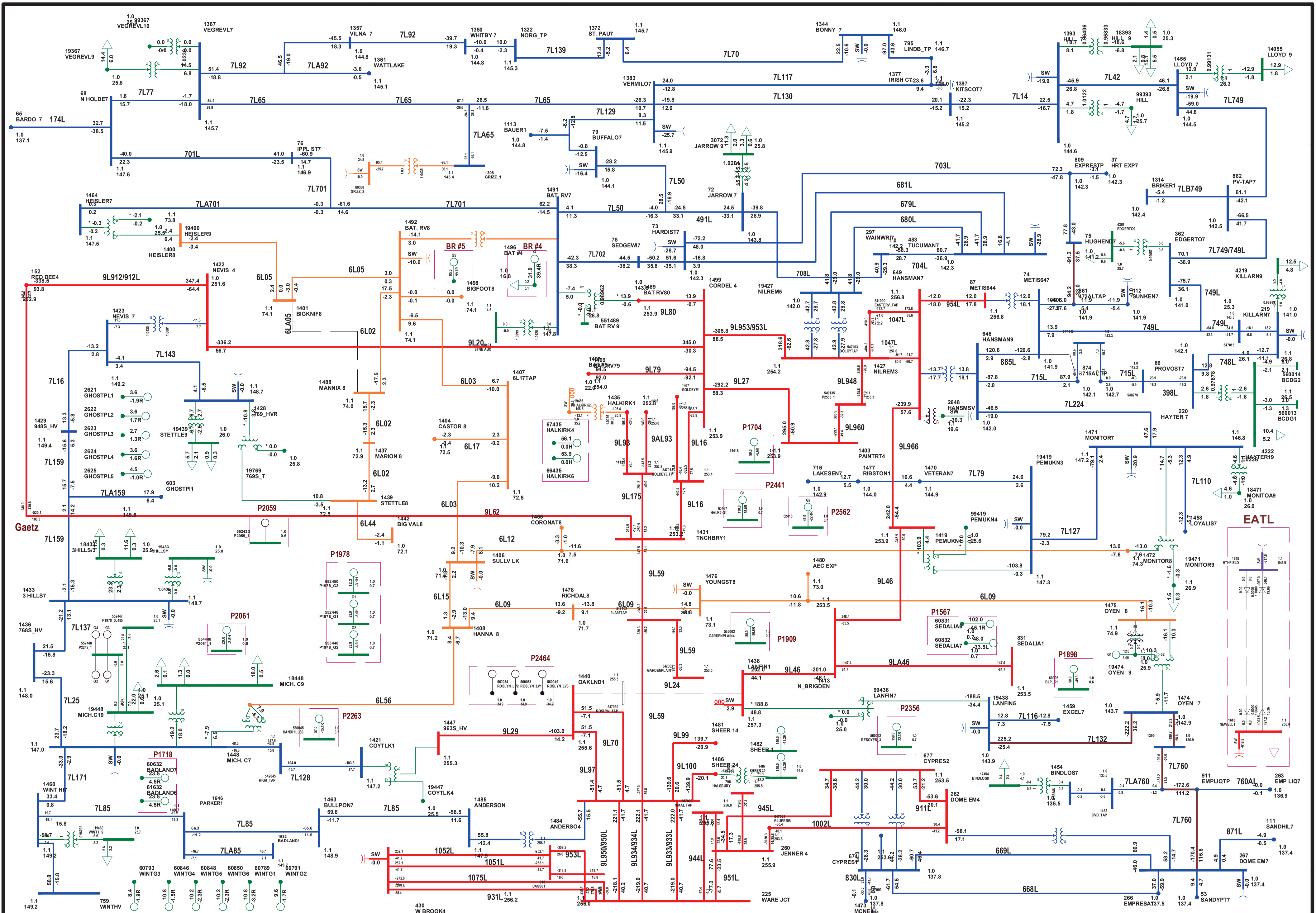
Table A2-3: List of pre-Project Scenario 3 2028 WP Power Flow Diagrams

Scenario	Load flow diagram	Page number
2028 WP Scenario 3	CATEGORY A, N-0 (System Normal Condition)	A2-41
	CATEGORY B, Loss of 681L (Tucuman 478S - Hardisty 377S)	A2-42
	CATEGORY B, Loss of 7L171 (Michichi Creek - Wintering Hills 804S)	A2-43
	CATEGORY B, Loss of 7L749 (Edgerton 899S - Lloyminster 716S)	A2-44
	CATEGORY B, Loss of 9L20 (Nevis 766S - Cordel 755S)	A2-45
	CATEGORY B, Loss of 9L24 (Lanfine 959S - Oakland 946S)	A2-46
	CATEGORY B, Loss of 9L27 (Paintearth Creek - Cordel 755S)	A2-47
	CATEGORY B, Loss of 9L912 (Nevis 766S – Red Deer 63S)	A2-48
	CATEGORY B, Loss of 9L953 (Cordel 755S - Nilrem 574S)	A2-49
	CATEGORY B, Loss of Edgerton_899ST3	A2-50
	CATEGORY B, Loss of Hill 751S_TIEXMER	A2-51
	CATEGORY B, Loss of Lanfine 959S 901T	A2-52
	CATEGORY B, Loss of Paintearth Creek 863S 902T	A2-53
	CATEGORY B, Loss of 7L42 (Hill 751S - Lloydminster 716S)	A2-54
	CATEGORY B, Loss of 9L960 (Paintearth 863S - P2555_Bus 549135)	A2-55
	CATEGORY B, Loss of 885L (Metiskow 648S - Hansman Lake 650S)	A2-56
	CATEGORY B, Loss of Anderson 801S_901T	A2-57
	CATEGORY B, Loss of 9L966 (Hansman Lake 650S - Pemukan 932S)	A2-58
	CATEGORY B, Loss of 9L62 (Tinchebray 972S - Gaetz 87S)	A2-59
	CATEGORY B, Loss of Tucuman 478S Transformers	A2-60

Scenario	Load flow diagram	Page number
	CATEGORY B, Loss of 7L77 (Holden 395S - Vegreville 709S)	A2-61
	CATEGORY B, Loss of EATL (Newell 2075S - Heathfield 2029S)	A2-62

Scenario 1
2028 SL Pre-Project


Gaetz
EATL
P2464 - Sunnynook Solar Battery Project
CATEGORY A, N-0
SCENARIO 1_2028SL_PRE-PROJECT
THU, APR 11 2024 12:47
A2 - 5
Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A
kV: >0.000 <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 <=500.000 >500.000



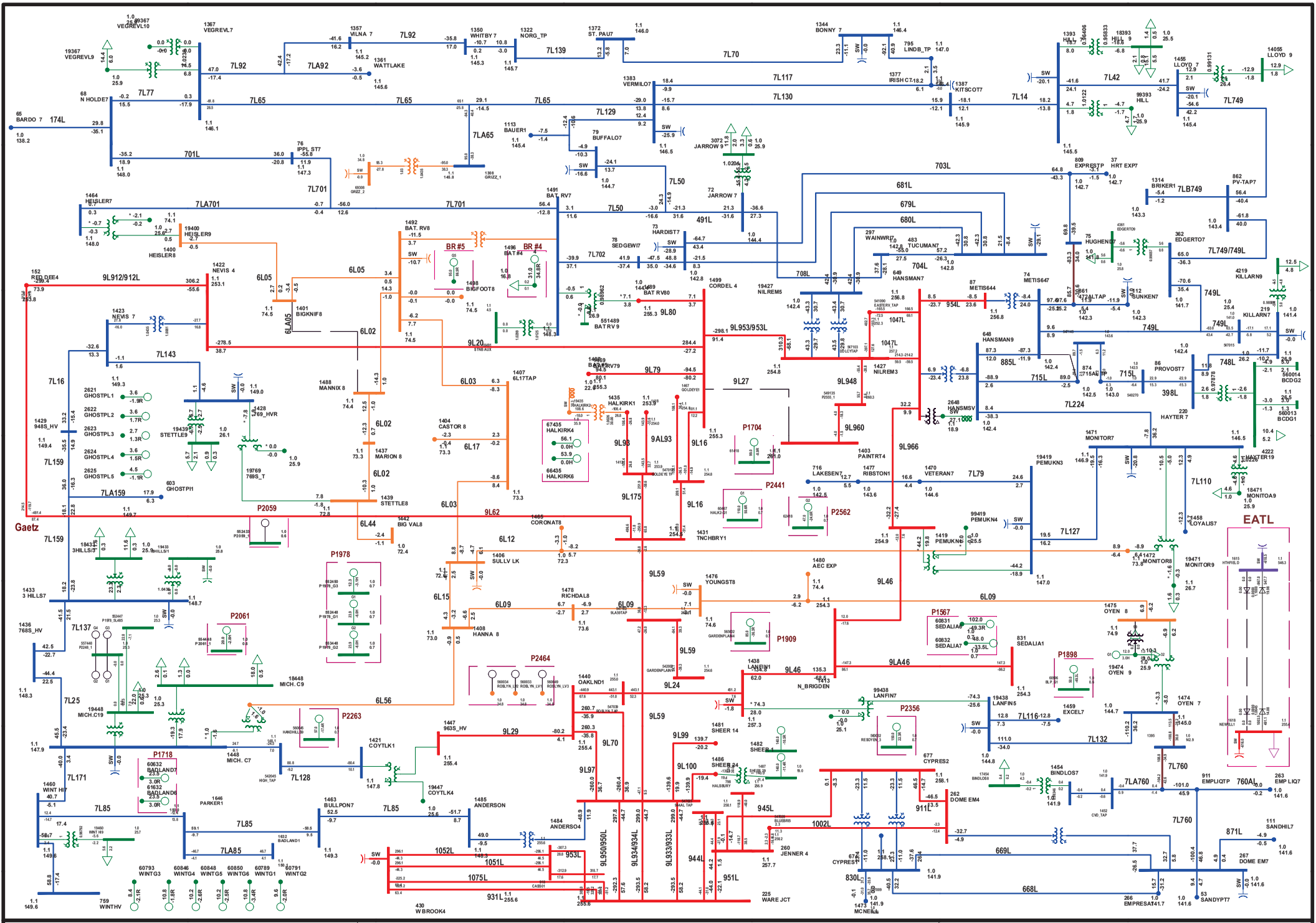
P2464 - Sunnynook Solar Battery Project

CATEGORY B, LOSS OF 9L24 (LANFINE 959S - OAKLAND 946S)
SCENARIO 1_2028SL_PRE-PROJECT
THU, APR 11 2024 12:48

A2 - 6

Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A

kV: >0.000 <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 <=500.000 >500.000



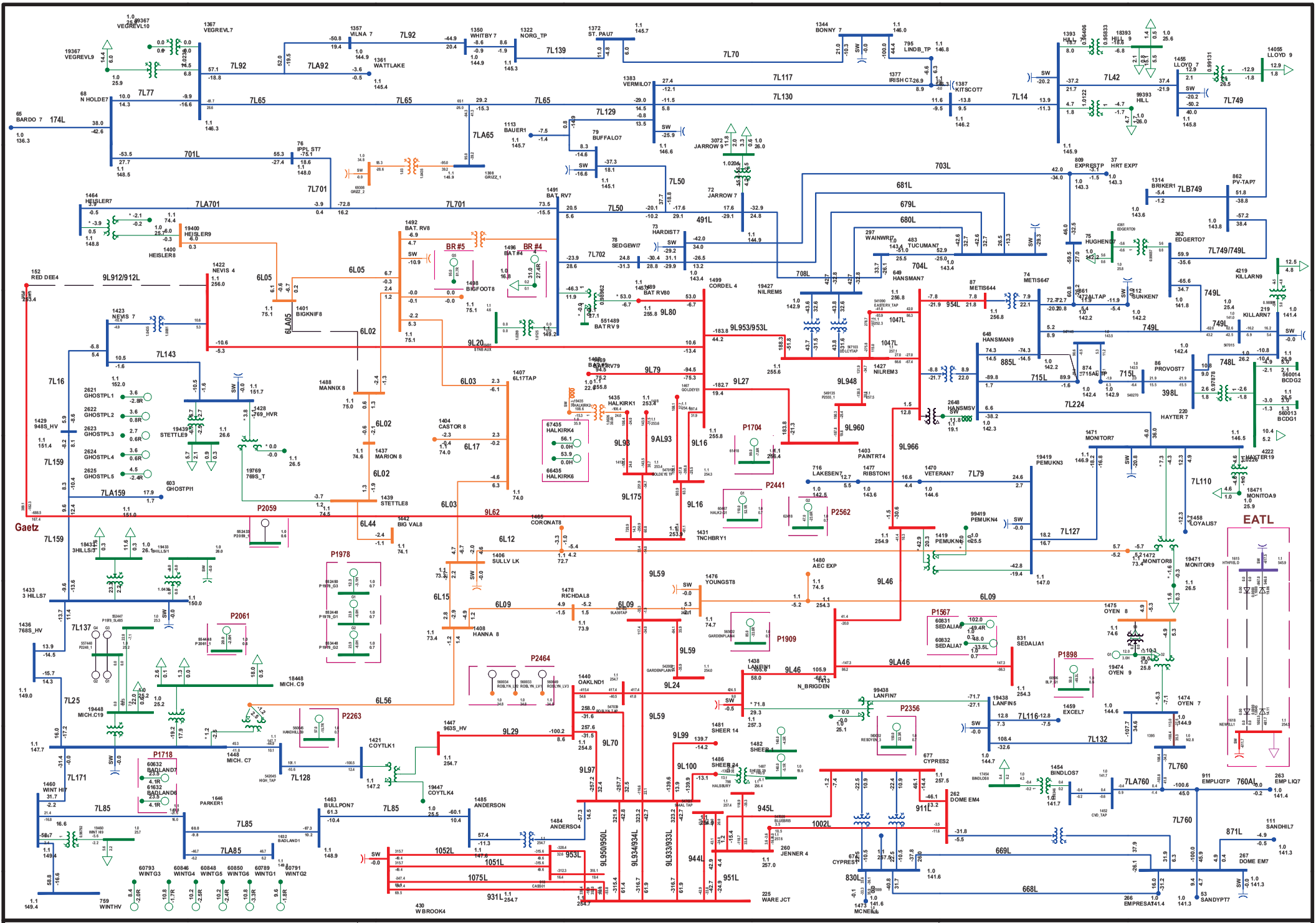
P2464 - Sunnynook Solar Battery Project

CATEGORY B, LOSS OF 9L27 (PAINTEARTH CREEK - CORDEL 755S)
SCENARIO 1_2028SL_PRE-PROJECT
THU, APR 11 2024 12:50

A2 - 7

Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A

kV: >0.000 <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 <=500.000 >500.000



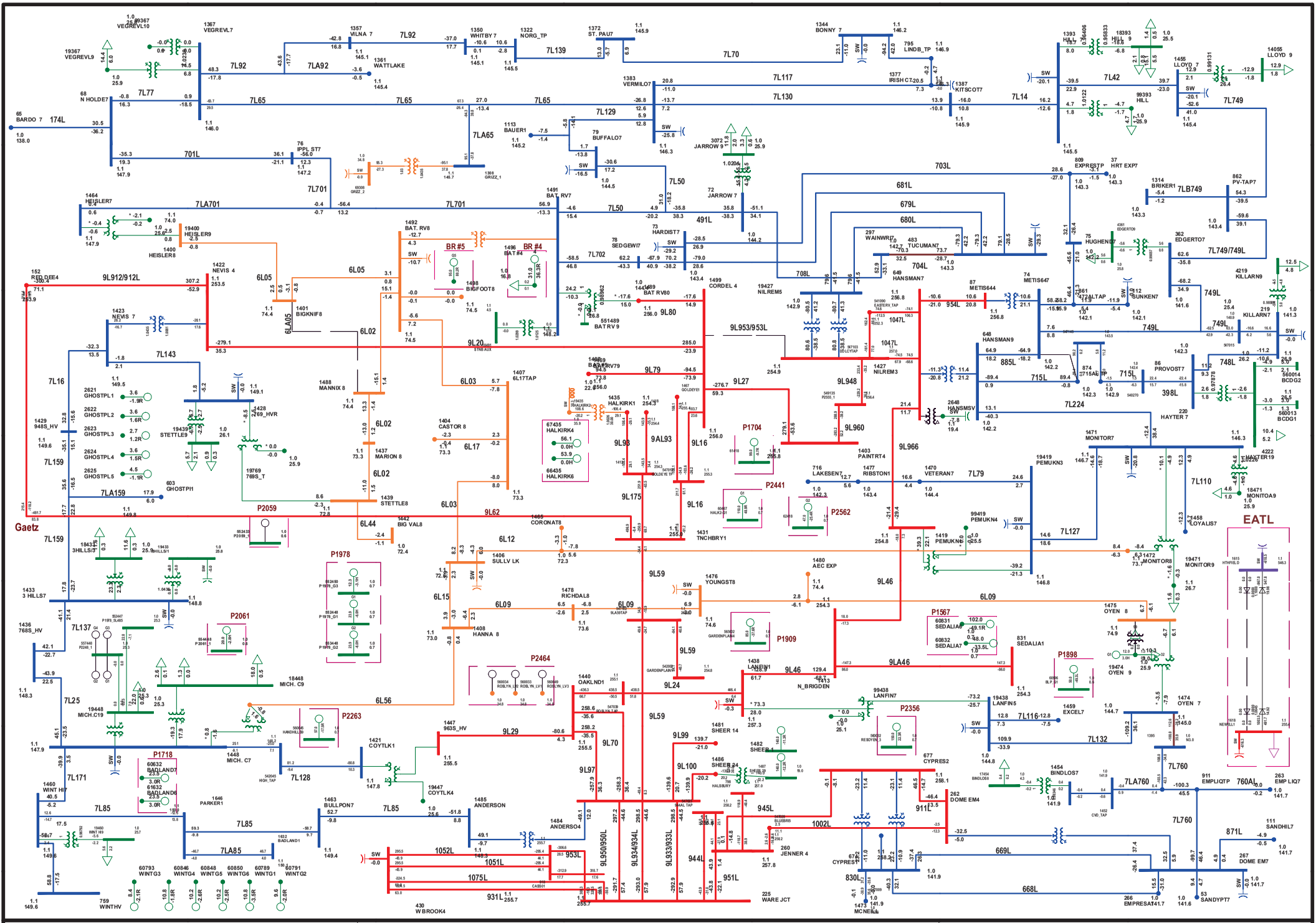
P2464 - Sunnynook Solar Battery Project

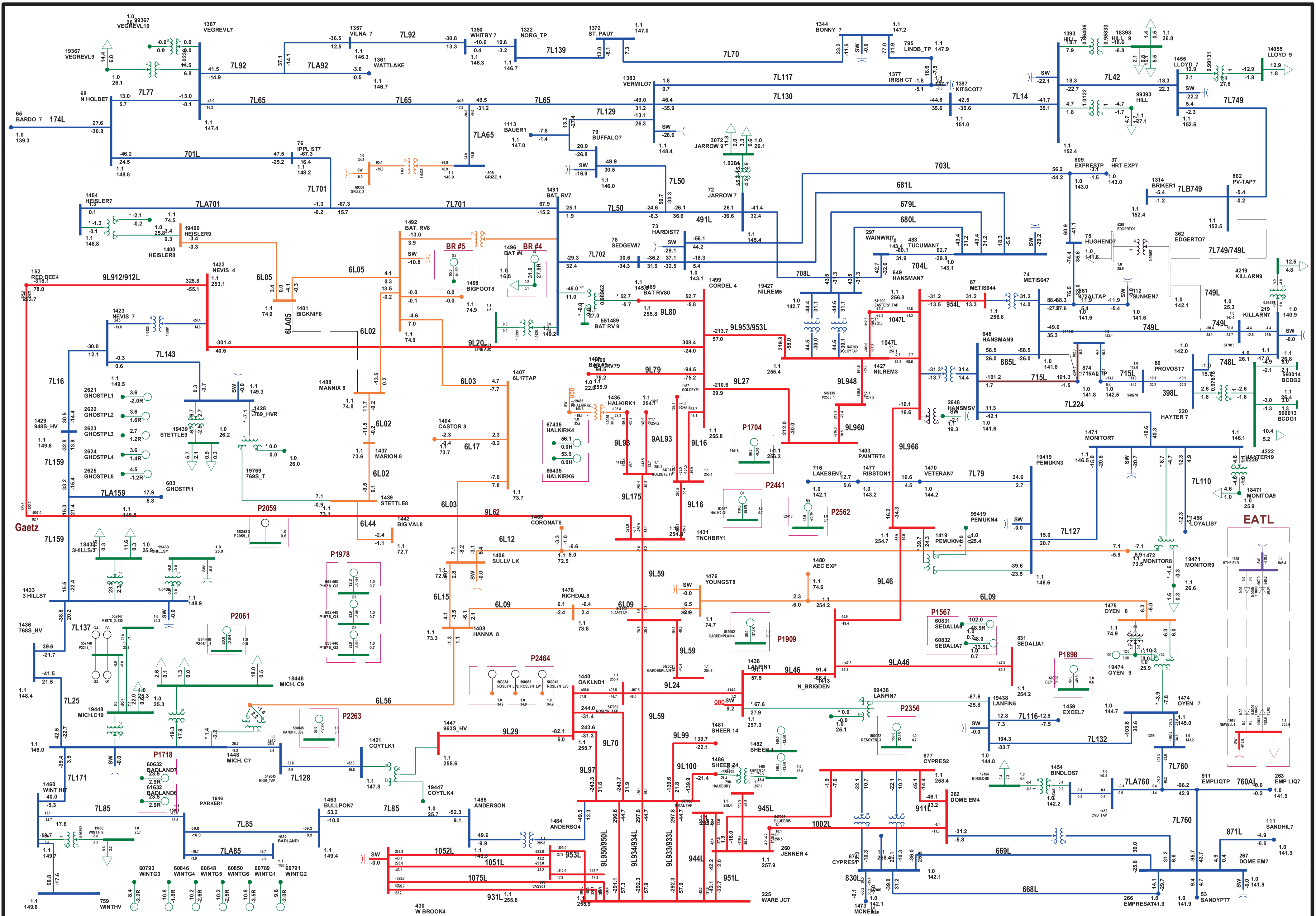
CATEGORY B, LOSS OF 9L912 (NEVIS 766S – RED DEER 63S)
SCENARIO 1_2028SL_PRE-PROJECT
THU, APR 11 2024 12:50

A2 - 8

Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A

kV: >0.000 <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 <=500.000 >500.000


Gaetz
EATL
P2464 - Sunnynook Solar Battery Project
CATEGORY B, LOSS OF 9L953 (CORDEL 755S - NILREM 574S)
SCENARIO 1_2028SL_PRE-PROJECT
THU, APR 11 2024 12:50
A2 - 9
Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A
kV: >0.000 <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 <=500.000 >500.000



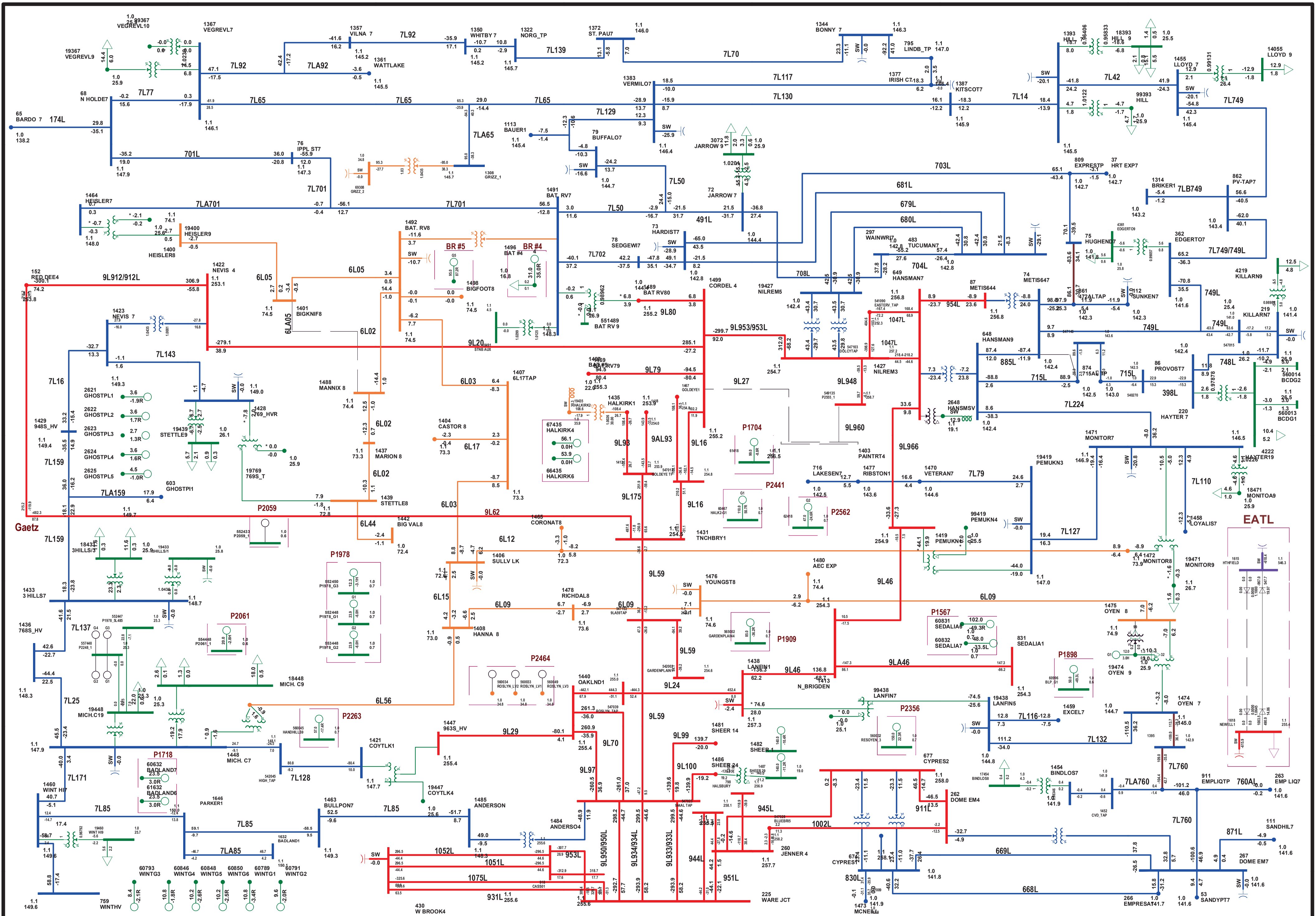
P2464 - Sunnynook Solar Battery Project

CATEGORY B, LOSS OF EDGERTON_899ST3
SCENARIO 1_2028SL_PRE-PROJECT
THU, APR 11 2024 12:50

A2 - 10

Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A

kV: >0.000 <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 <=500.000 >500.000



P2464 - Sunnybrook Solar Battery Project

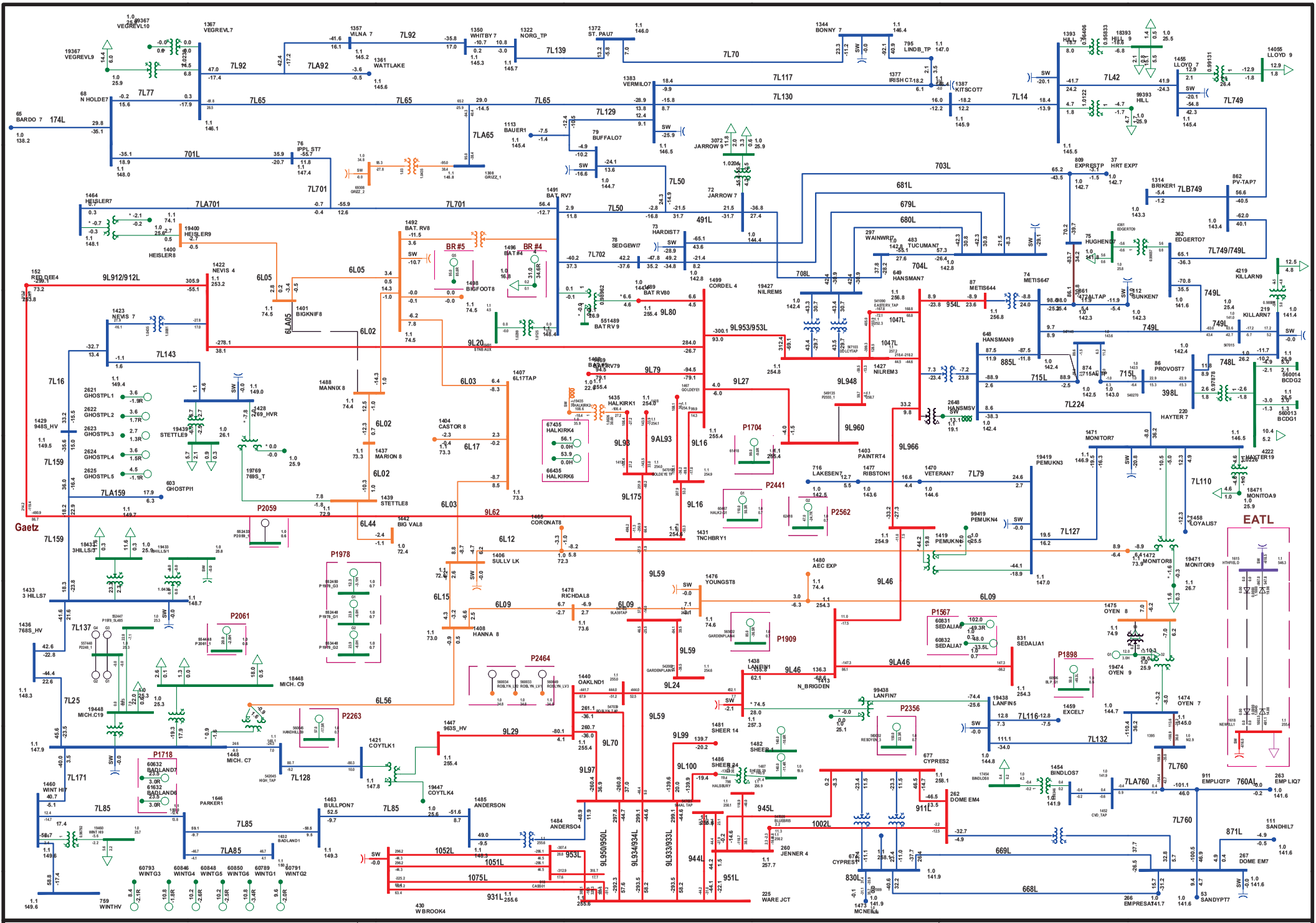
CATEGORY B, LOSS OF PAINTEARTH CREEK 863S 902T
SCENARIO 1_2028SL_PRE-PROJECT
THU, APR 11 2024 12:51

A2 - 11

Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A

kV: >0.000 <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 <=500.000 >500.000

1



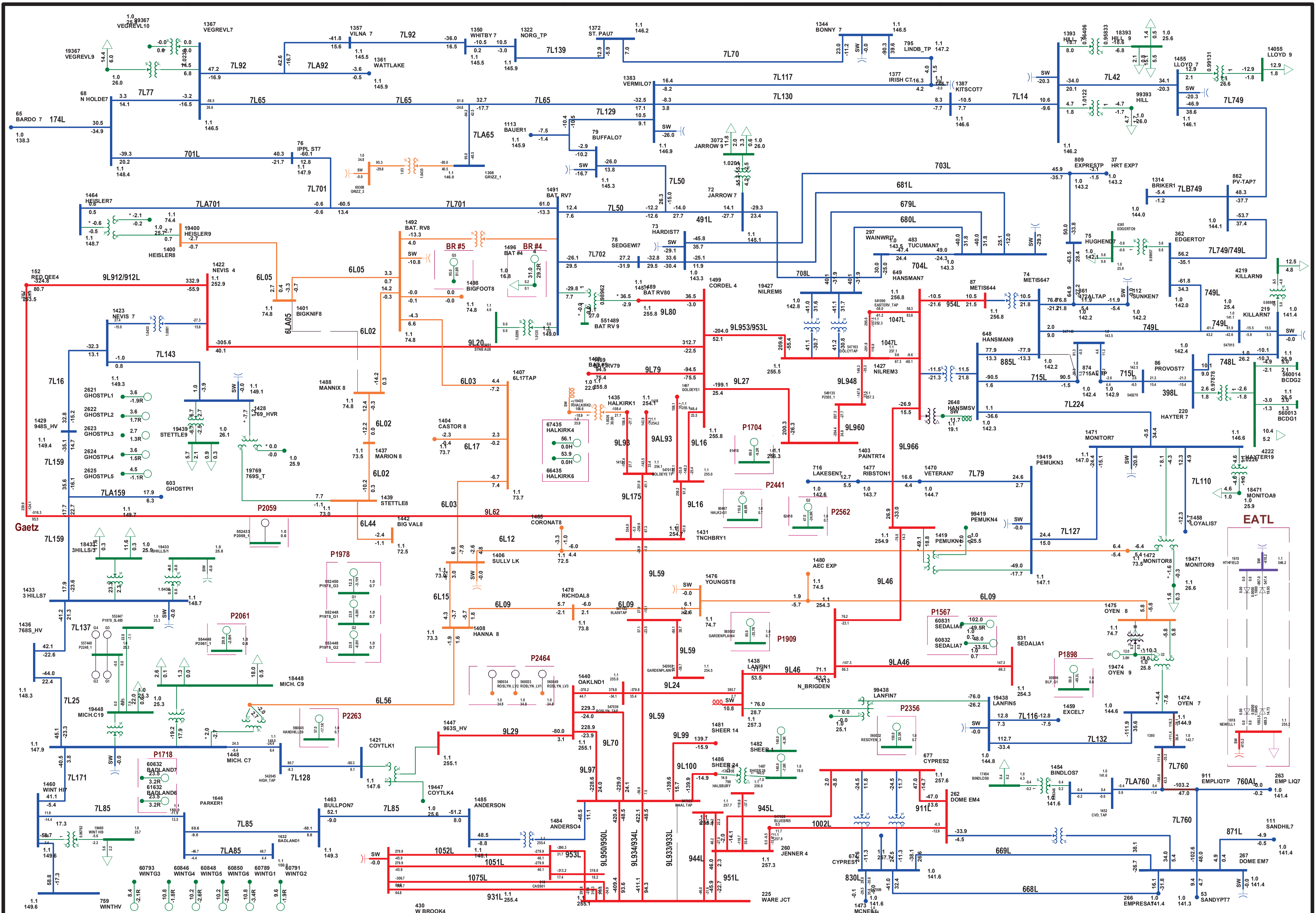
P2464 - Sunnynook Solar Battery Project

CATEGORY B, LOSS OF 9L960 (PAINTEARTH 863S - P2555_BUS 54913
SCENARIO 1_2028SL_PRE-PROJECT
THU, APR 11 2024 12:52

A2 - 12

Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A

kV: >0.000 <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 <=500.000 >500.000



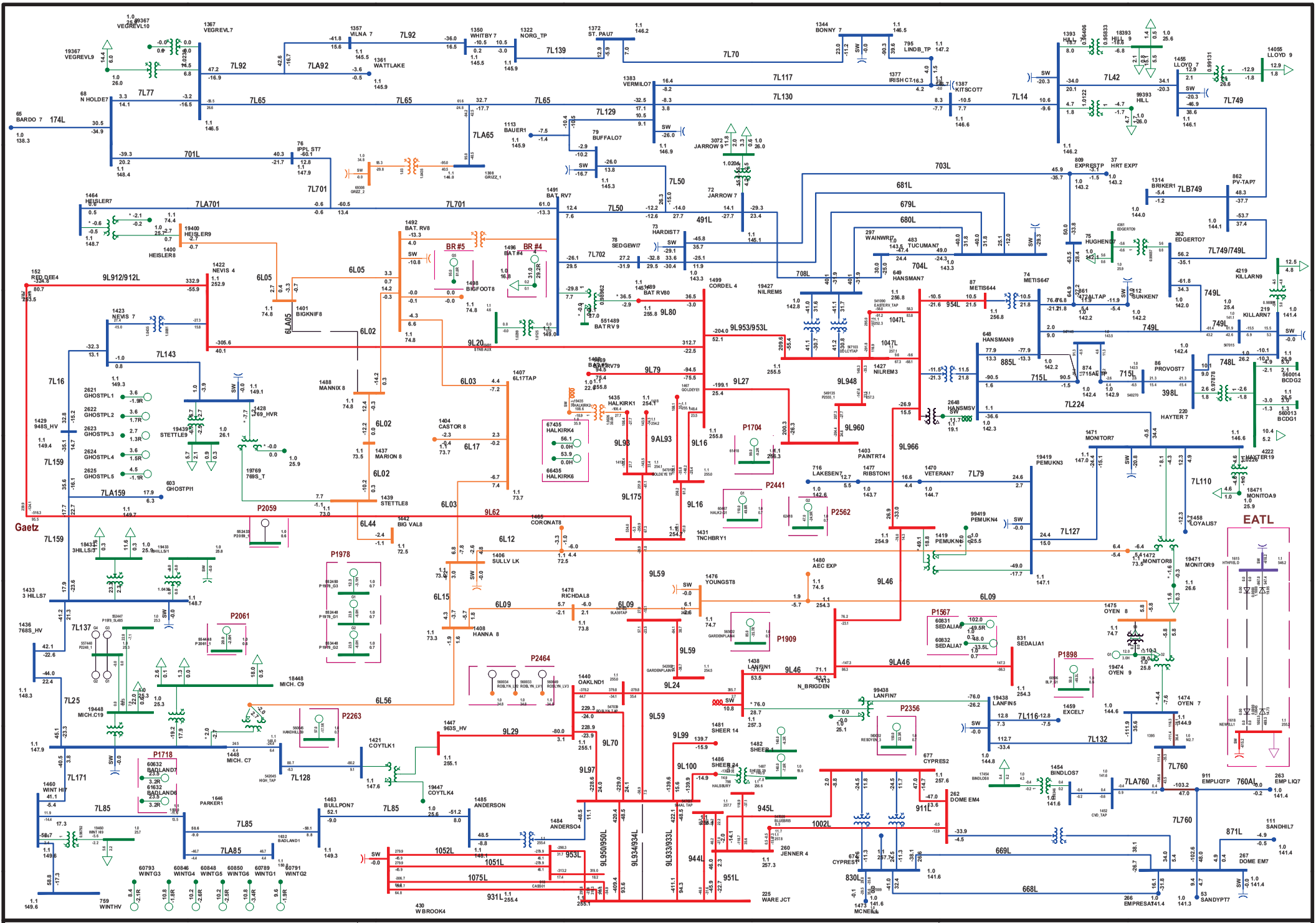
P2464 - Sunnynook Solar Battery Project

CATEGORY B, LOSS OF 933L (ANDERSON 801S - WARE JUNCTION 132S
SCENARIO 1_2028SL_PRE-PROJECT
THU, APR 11 2024 12:52

A2 - 13

Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A

kV: >0.000 <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 <=500.000 >500.000



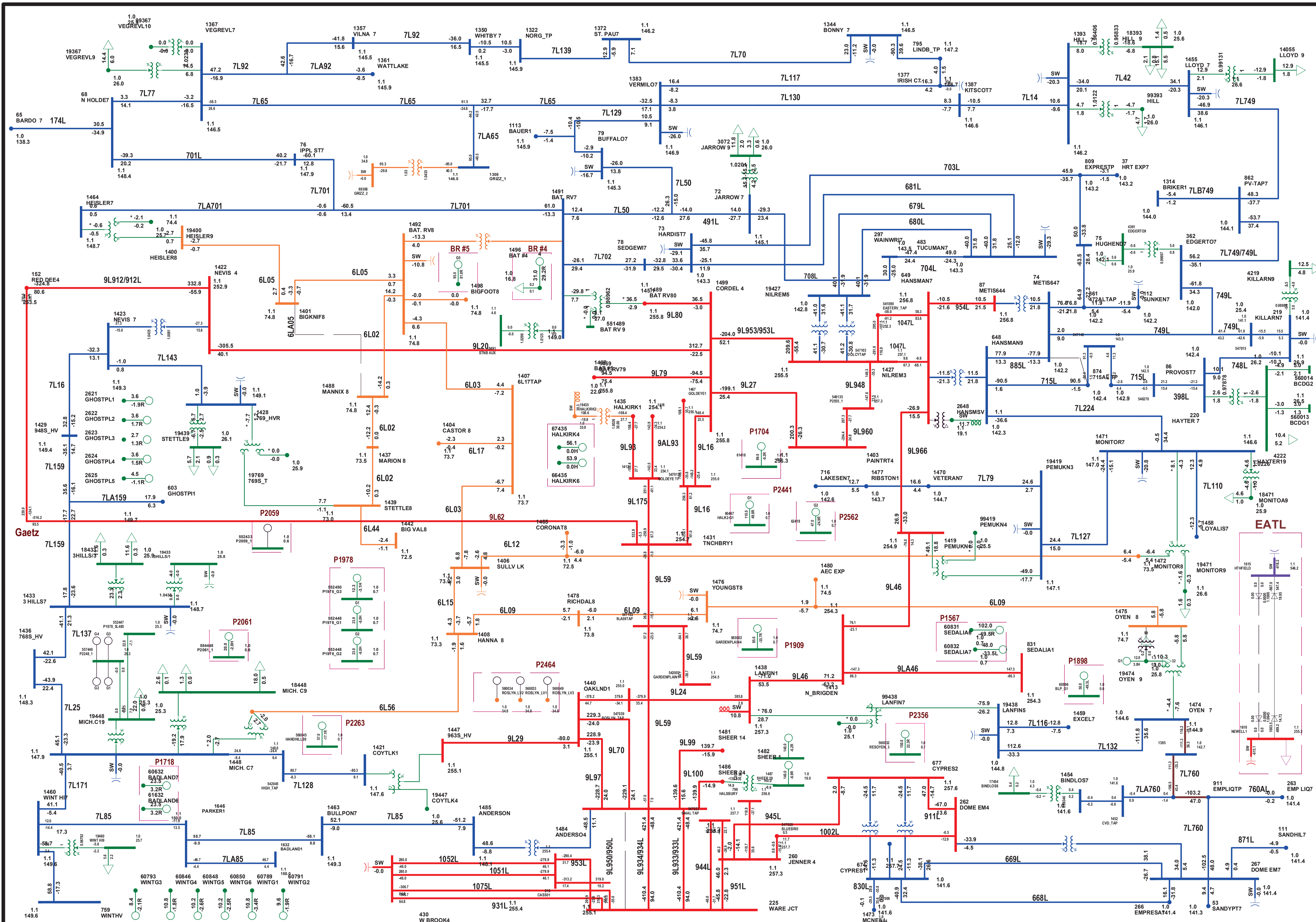
P2464 - Sunnynook Solar Battery Project

CATEGORY B, LOSS OF 934L (ANDERSON 801S - WARE JUNCTION 132S
SCENARIO 1_2028SL_PRE-PROJECT
THU, APR 11 2024 12:52

A2 - 14

Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A

kV: >0.000 <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 <=500.000 >500.000



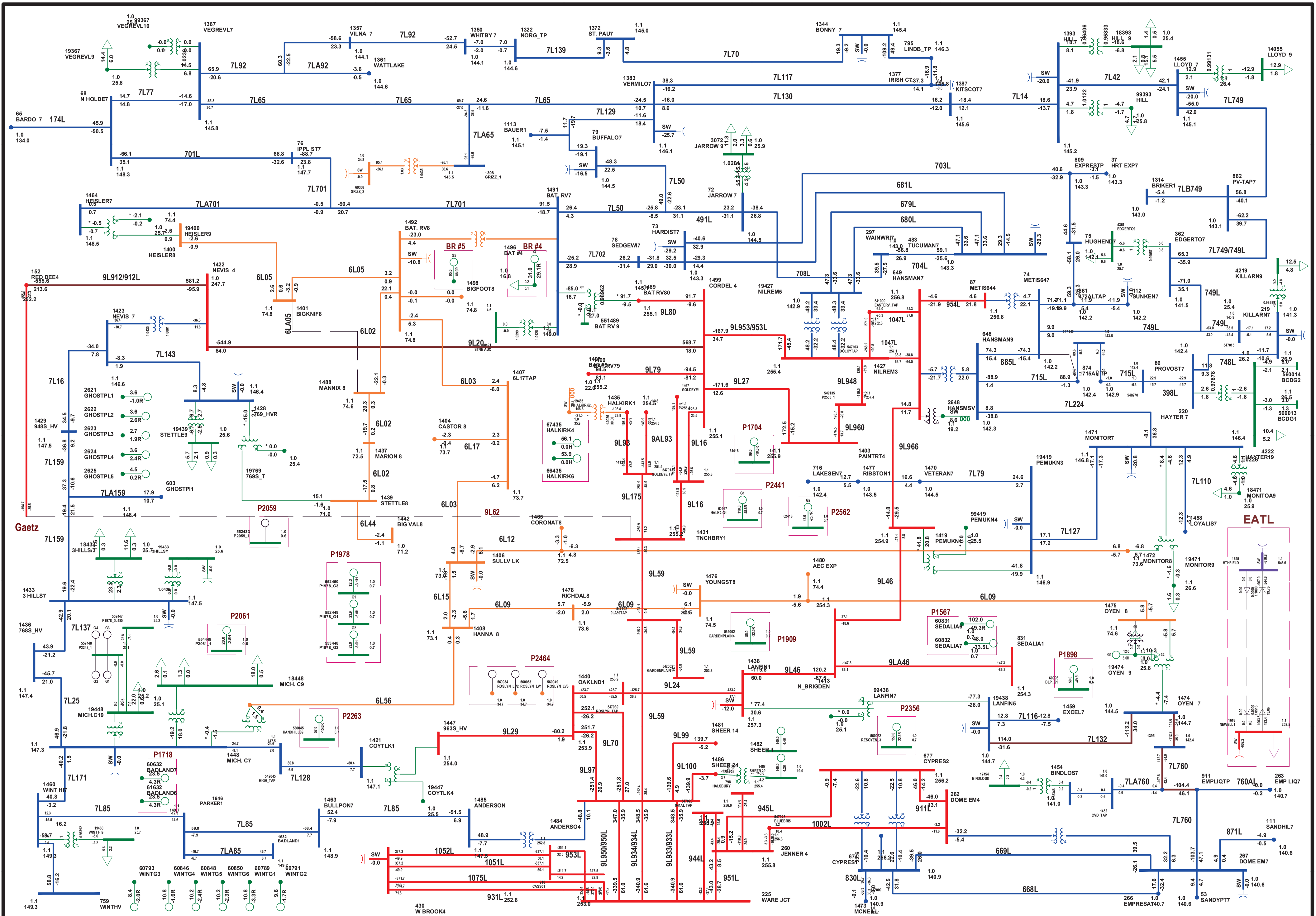
P2464 - Sunnynook Solar Battery Project

CATEGORY B, LOSS OF 950L (ANDERSON 801S - WARE JUNCTION 132S
SCENARIO 1_2028SL_PRE-PROJECT
THU, APR 11 2024 12:52

A2 - 15

Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A

kV: >0.000 <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 <=500.000 >500.000



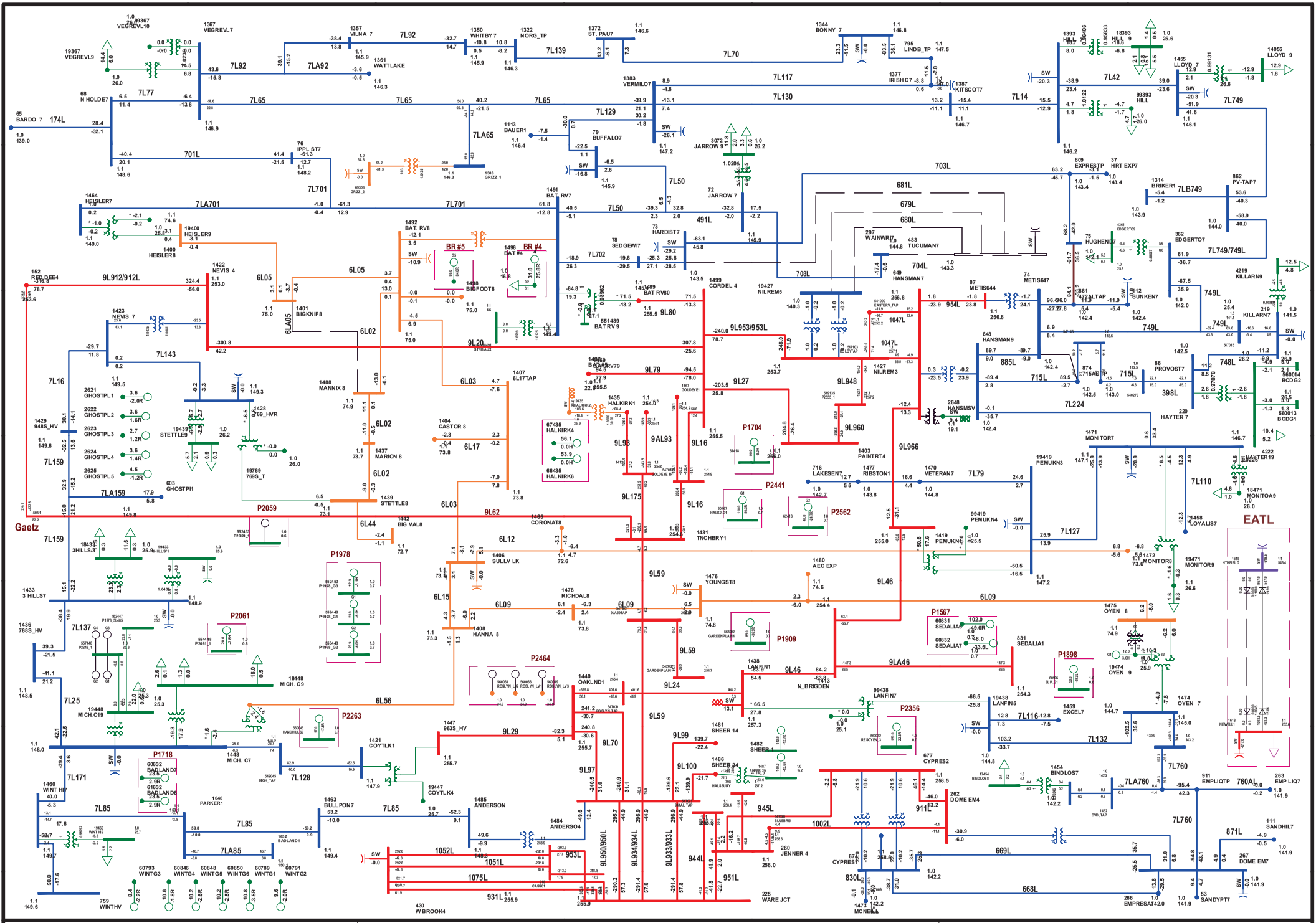
P2464 - Sunnynook Solar Battery Project

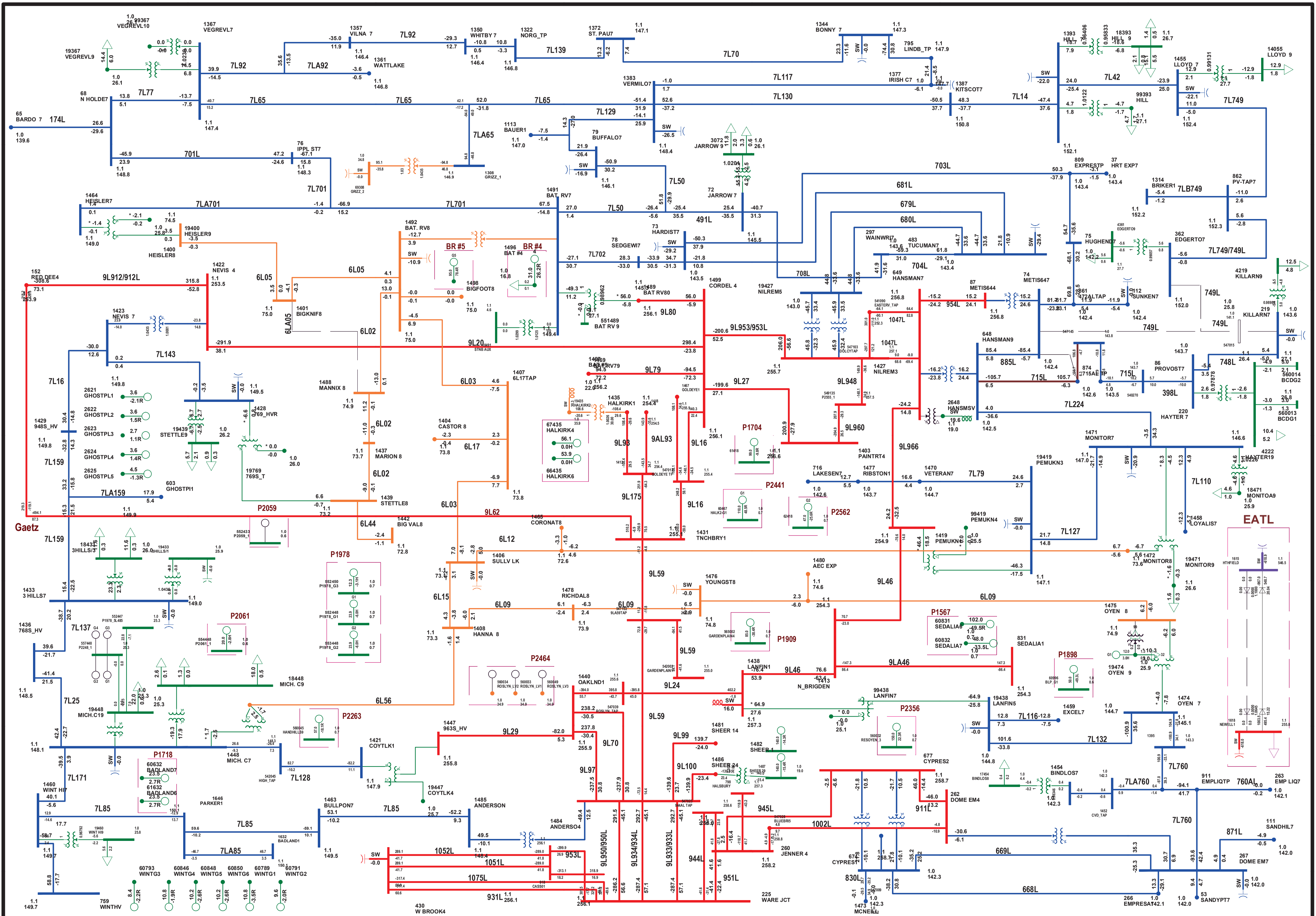
CATEGORY B, LOSS OF 9L62 (TINCHEBRAY 972S - GAETZ 87S)
SCENARIO 1_2028SL_PRE-PROJECT
THU, APR 11 2024 12:52

A2 - 16

Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A

kV: >0.000 <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 <=500.000 >500.000


Gaetz
EATL
P2464 - Sunnynook Solar Battery Project
CATEGORY B, LOSS OF TUCUMAN 478S TRANSFORMERS
SCENARIO 1_2028SL_PRE-PROJECT
THU, APR 11 2024 12:53
A2 - 17
Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A
kV: >0.000 <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 <=500.000 >500.000



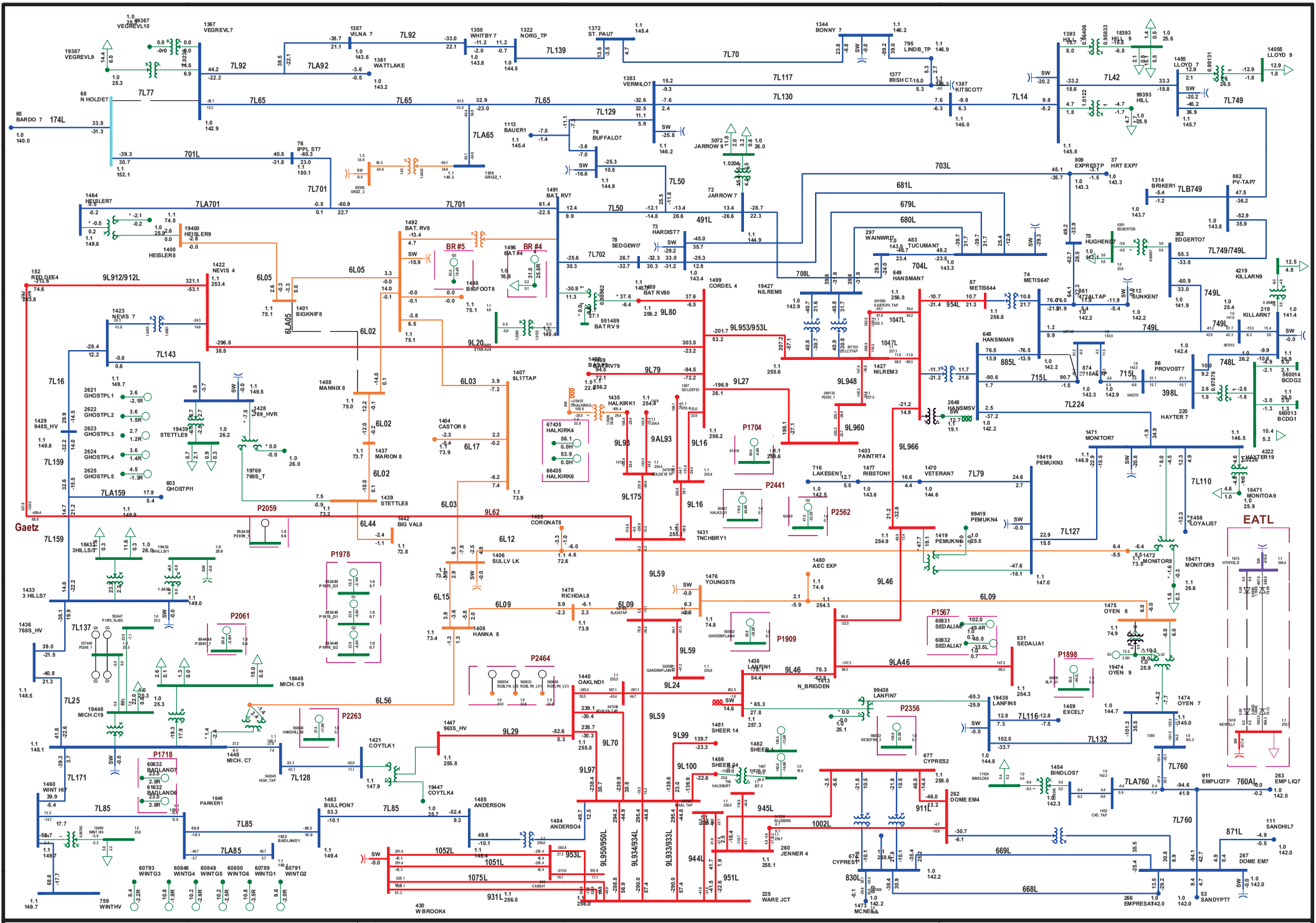
P2464 - Sunnynook Solar Battery Project

CATEGORY B, LOSS OF 749L (EDGERTON 899S - METISKOW 648S)
SCENARIO 1_2028SL_PRE-PROJECT
FRI, APR 12 2024 8:38

A2 - 18

Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A

kV: >0.000 <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 <=500.000 >500.000



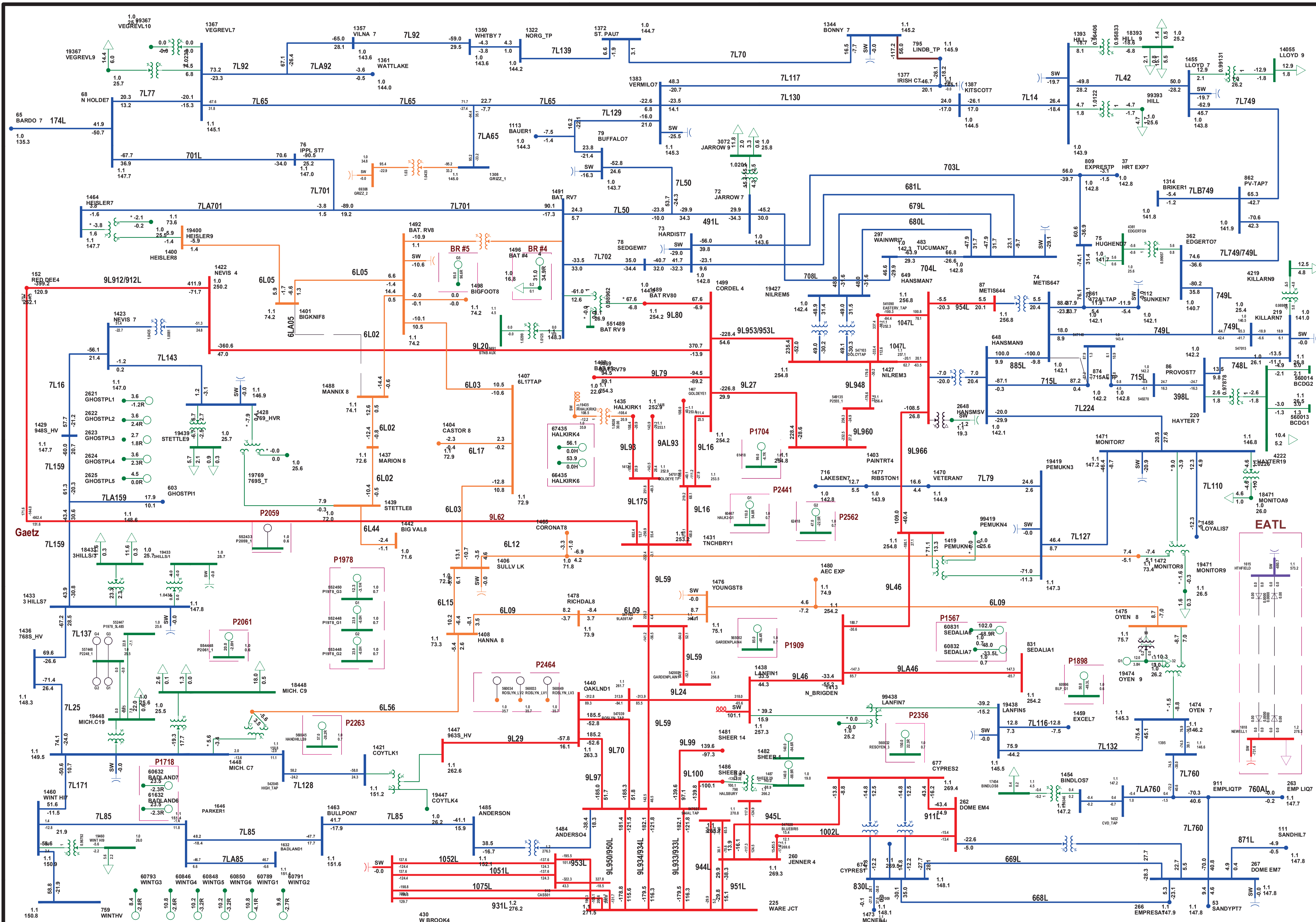
P2464 - Sunnynook Solar Battery Project

CATEGORY B, LOSS OF 7L77 (HOLDEN 395S - VEGREVILLE 709S)
SCENARIO 1_2028SL_PRE-PROJECT
FRI, APR 12 2024 16:11

A2 - 19

Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A

kV: >0.000 <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 <=500.000 >500.000



P2464 - Sunnynook Solar Battery Project

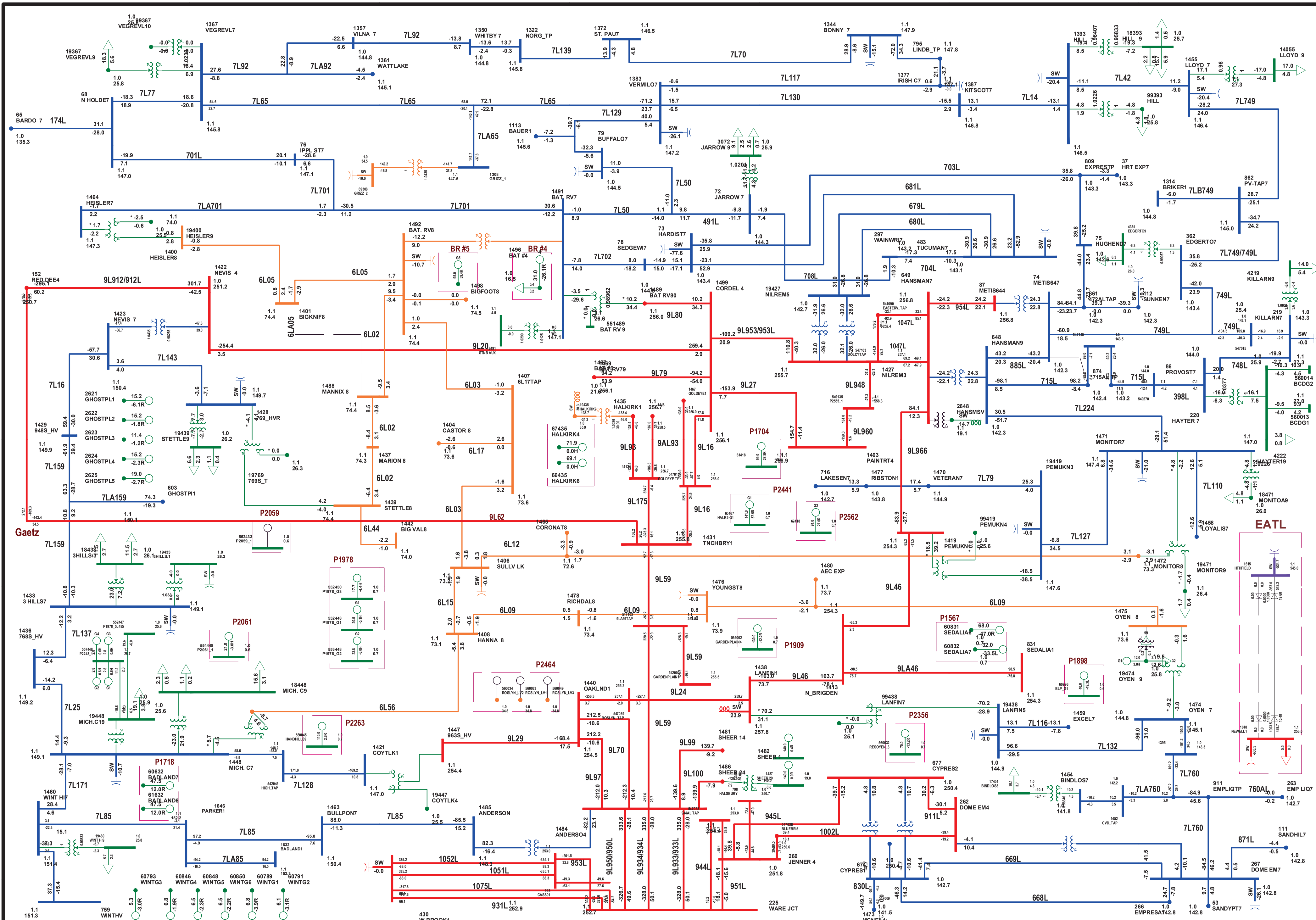
CATEGORY B, LOSS OF EATL
SCENARIO 1_2028SL_PRE-PROJECT
FRI, APR 12 2024 8:15

A2 - 20

Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A

kV: >0.000 <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 <=500.000 >500.000

Scenario 2
2028 SP Pre-Project



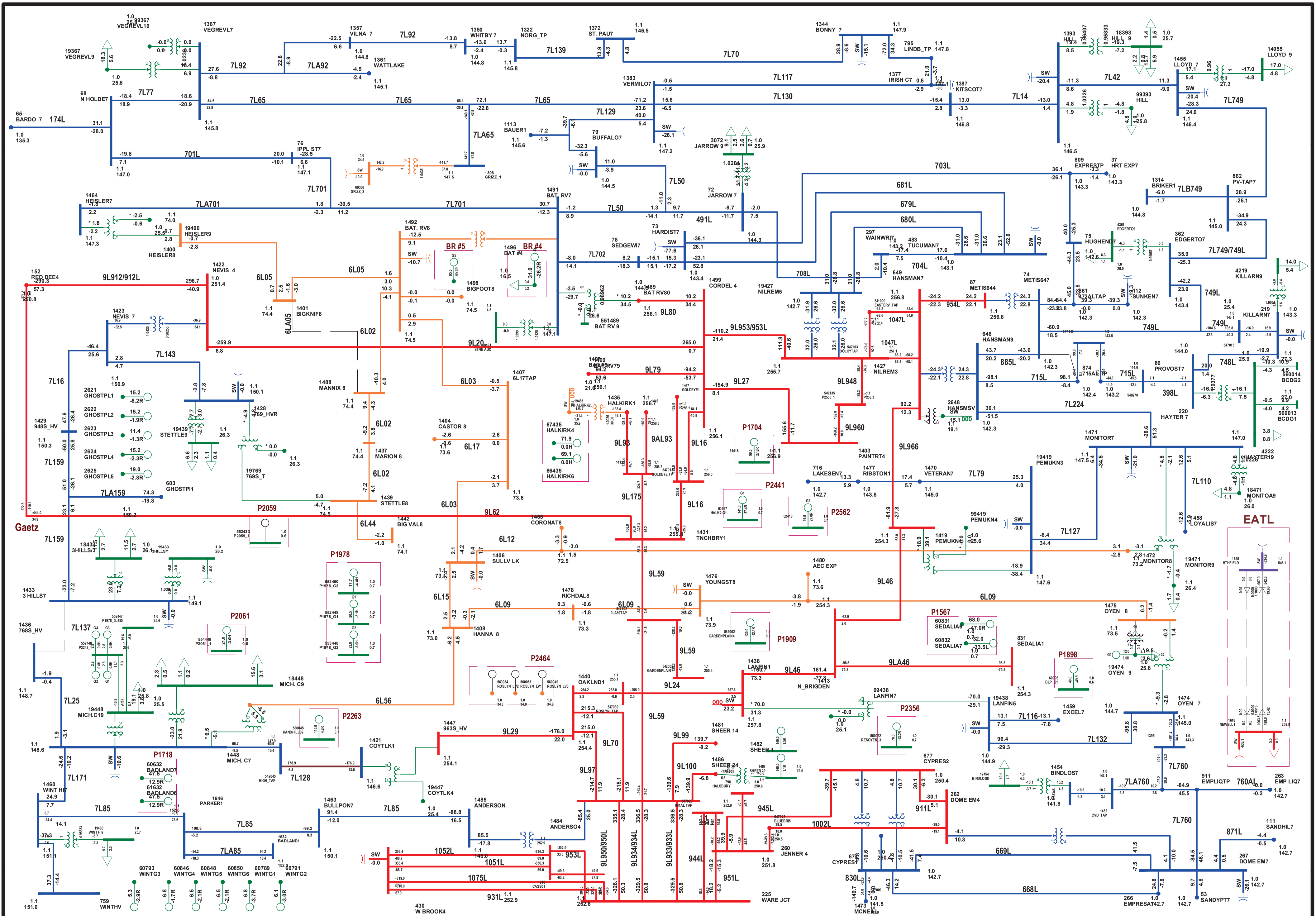
P2464 - Sunnynook Solar Battery Project

CATEGORY A, N-0
SCENARIO 2_2028SP_PRE-PROJECT
THU, APR 11 2024 13:17

A2 - 21

Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A

kV: >0.000 <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 <=500.000 >500.000



P2464 - Sunnynook Solar Battery Project

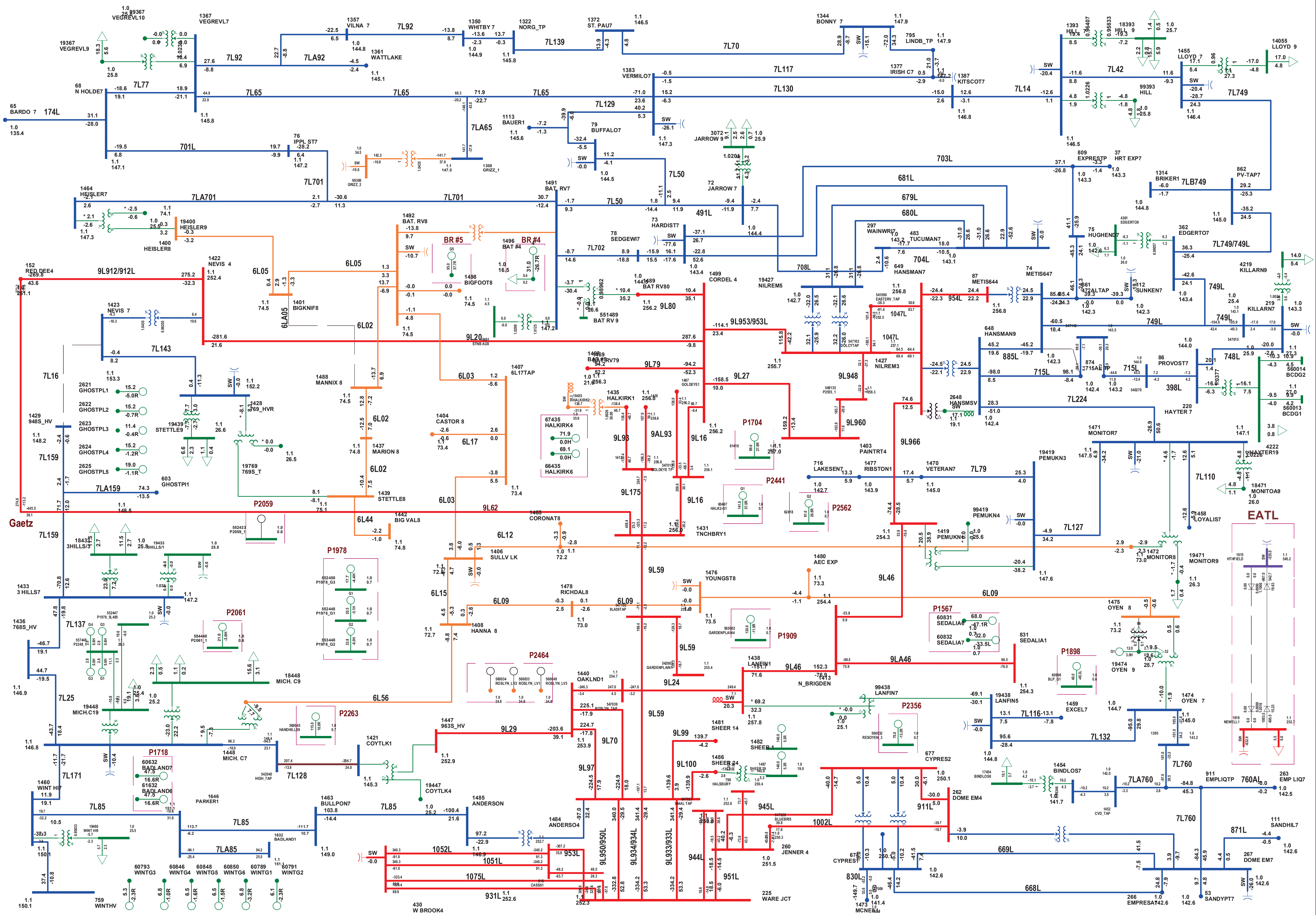
CATEGORY B, LOSS OF 7L137 (THREE HILLS 770S - ROWLEY 768S)
SCENARIO 2_2028SP_PRE-PROJECT
THU, APR 11 2024 13:17

A2 - 22

Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A

kV: >0.000 <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 <=500.000 >500.000

1



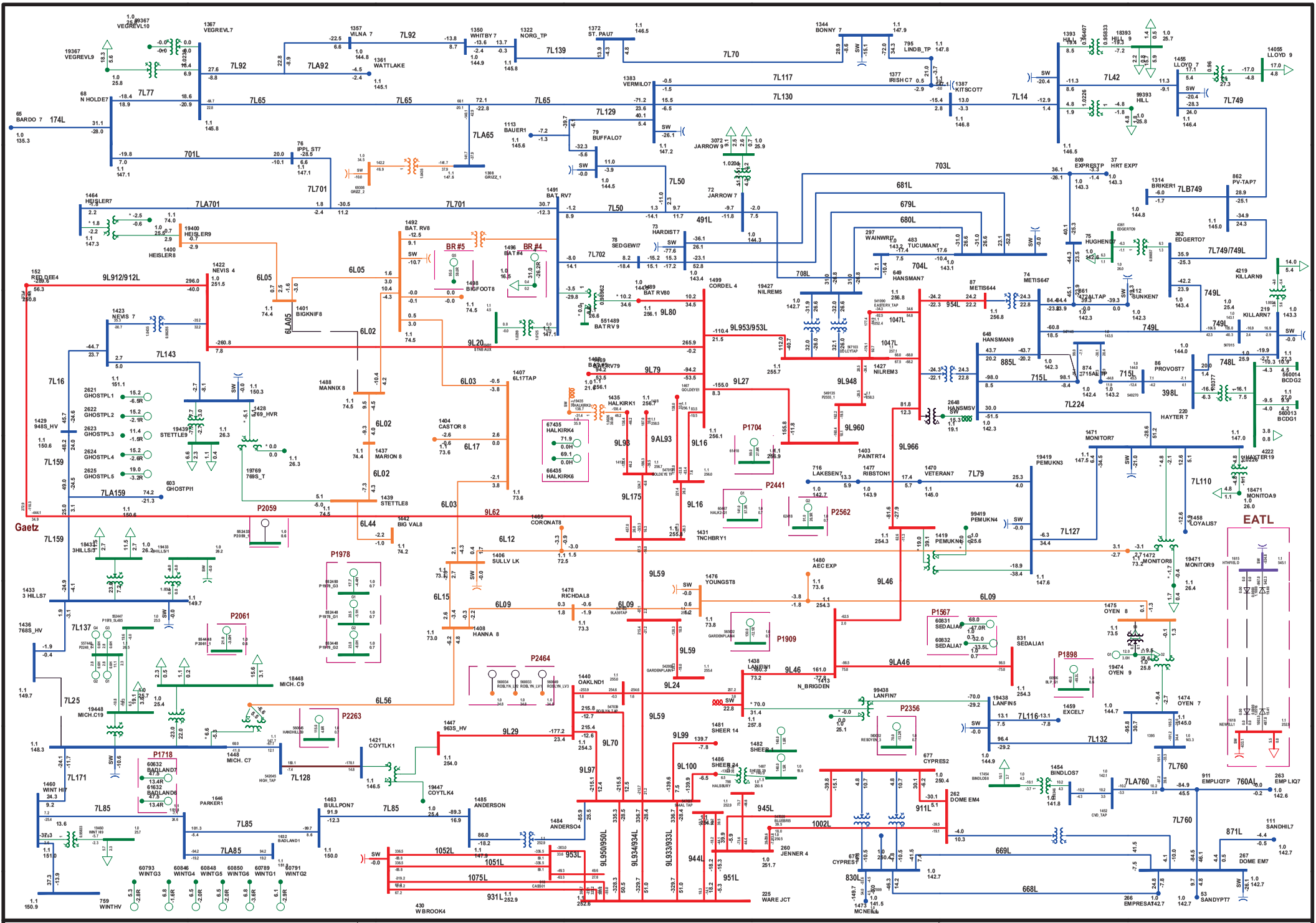
P2464 - Sunnyook Solar Battery Project

CATEGORY B, LOSS OF 7L16 (NEVIS 766S - HEATBURG 948S)
SCENARIO 2_2028SP_PRE-PROJECT
THU, APR 11 2024 13:17

A2 - 23

Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A

kV: >0.000 <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 <=500.000 >500.000



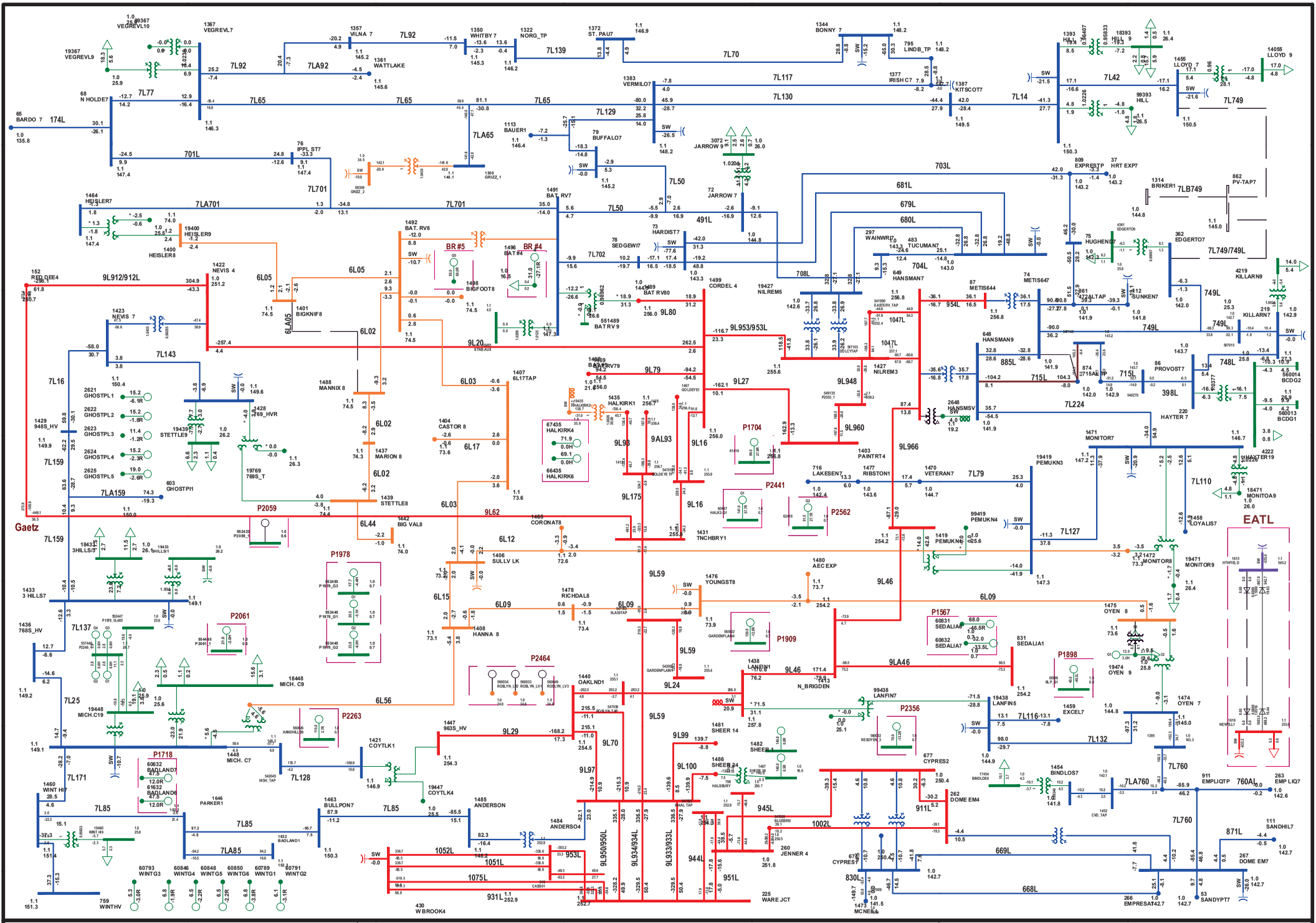
P2464 - Sunnynook Solar Battery Project

CATEGORY B, LOSS OF 7L25 (MICHICHI CREEK 802S - ROWLEY 768S)
SCENARIO 2_2028SP_PRE-PROJECT
THU, APR 11 2024 13:17

A2 - 24

Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A

kV: >0.000 <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 <=500.000 >500.000


Gaetz
EATL
7L159
7L16
7L143
7L137
7L25
7L171
7L85
7L77
7L65
7L92
7LA92
7L139
7L70
7L117
7L130
7L14
7L42
7L749
7L749/749L
7LB749
7L50
7L129
7LA65
7L701
7LA701
7L702
7L03
7L02
7L05
7LA05
7L17
7L27
7L953/953L
7L79
7L224
7L127
7L110
7L46
7L09
7L15
7L12
7L56
7L128
7LA159
7LA760
7L760
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7L171
7LA85
7L85
9L912/912L
9L20
9L80
9L62
9L59
9L70
9L99
9L100
9L97
9L29
9L24
9L46
9LA46
9L948
9L960
9L966
9L93
9AL93
9L16
9L175
9L98
9L79
9L950/950L
9L934/934L
9L933/933L
9L944L
9L945L
9L951L
1052L
1051L
1075L
953L
931L
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945L
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P1704
P2441
P2562
P1567
P1909
P2464
P2356
P1898
P1978
P2061
P2059
P2263
P1718
BIG VAL8
CORONAT8
SULLV LK
HANNA 8
RICHDAL8
YOUNGST8
AEC EXP
LANFIN7
SHEER 14
OAKLND1
COYTLK1
COYTLK4
ANDERSON
ANDERSO4
BULLPON7
MICH. C9
MICH. C7
MICH.C19
WINT HI7
PARKER1
BADLAND7
BADLAND6
BADLAND1
WINTG3
WINTG4
WINTG6
WINTG5
WINTG1
WINTG2
WINTHV
W BROOK4
WARE JCT
MCNEIL4
CYPRES7
CYPRES2
DOME EM4
DOME EM7
JENNER 4
EMPLIQTP
EMP LIQ7
SANDYPT7
EMPRESAT
SANDHIL7
MONITOR9
MONITOA9
MONITOR8
MONITOR7
HAYTER 7
PEMUKN3
PEMUKN4
PEMUKN2
VETERAN7
LAKESEN7
PAINTRT4
RIBSTON1
TNCHBRY1
HALKIRK1
HALKIRK2
HALKIRK4
HALKIRK6
CASTOR 8
MANNIX 8
MARION 8
STETTLE9
STETTLE8
GHOSTPL1
GHOSTPL2
GHOSTPL3
GHOSTPL4
GHOSTPL5
GHOSTPI1
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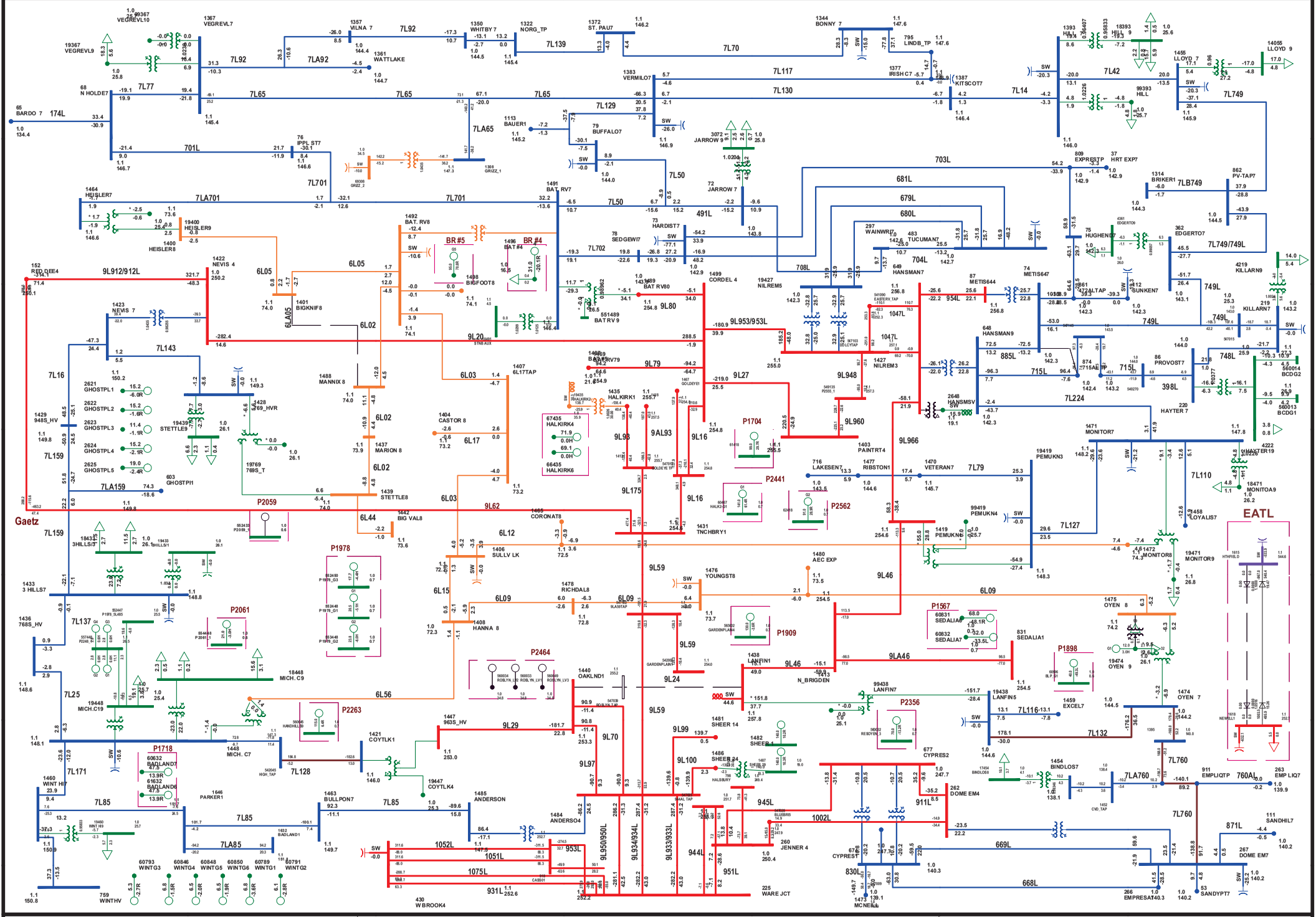
3HILLS1
769S_T
769_HVR
NILREM5
NILREM3
CORDEL 4
BAT_RV7
BAT_RV8
BAT_RV79
BAT_RV80
BAT_RV9
BAT #4
BIGFOOT8
BIGKNIF8
HEISLER8
HEISLER9
IPPL ST7
BUFFALO7
BAUER1
GRIZZ_1
JARROW 9
JARROW 7
SEDGEWI7
HARDIST7
WAINWRI7
TUCUMAN7
SUNKEN7
HANSMAN7
HANSMAN9
HANSMSV
METIS644
METIS647
EDGERTO7
HUGHEND7
KILLARN7
KILLARN9
PROVOST7
BRIKER1
EXPRESTP
HRT EXP7
PV-TAP7
LLOYD 7
LLOYD 9
LLOYD 8
LOYALIS7
HILL 7
HILL 9
HILL 8
BONNY 7
LINDB_TP
IRISH C7
KITSCOT7
BINDLOS7
BINDLOS8
OYEN 8
OYEN 9
OYEN 7
EXCEL7
LANFIN5
SEDALIA1
SEDALIA6
SEDALIA7
N_BRIGDEN
RESOLVN1
ROBLYN_LV1
ROBLYN_LV2
ROBLYN_LV3
ROBLYN_LV4
GARDENPLAN1
GARDENPLAN2
VERMILO7
VILNA 7
WHITBY 7
WATTLAKE
NORG_TP
ST. PAU7
VEGREVL7
VEGREVL9
N HOLDE7
BARDO 7
RED DEE4
NEVIS 4
NEVIS 7
BIG VAL8
BR #5
BR #4
SW
P2464 - Sunnynook Solar Battery Project
CATEGORY B, LOSS OF 7L749 (EDGERTON 899S - LLOYMINSTER 716S)
SCENARIO 2_2028SP_PRE-PROJECT
THU, APR 11 2024 13:17
A2 - 25
Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A
kV: >0.000 <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 <=500.000 >500.000



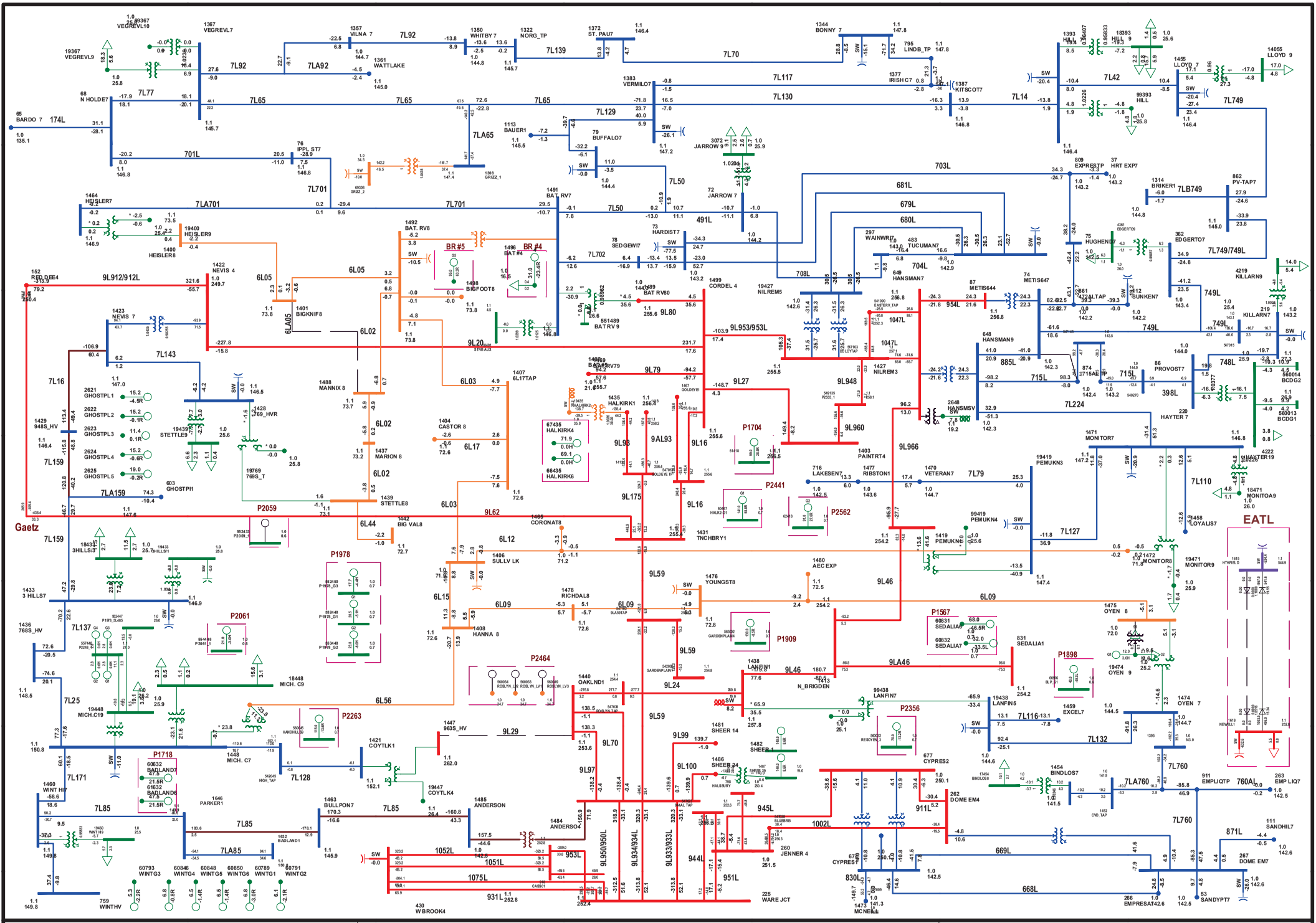
P2464 - Sunnynook Solar Battery Project

CATEGORY B, LOSS OF 9L24 (LANFINE 959S - OAKLAND 946S)
SCENARIO 2_2028SP_PRE-PROJECT
THU, APR 11 2024 13:18

A2 - 26

Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A

kV: >0.000 <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 <=500.000 >500.000



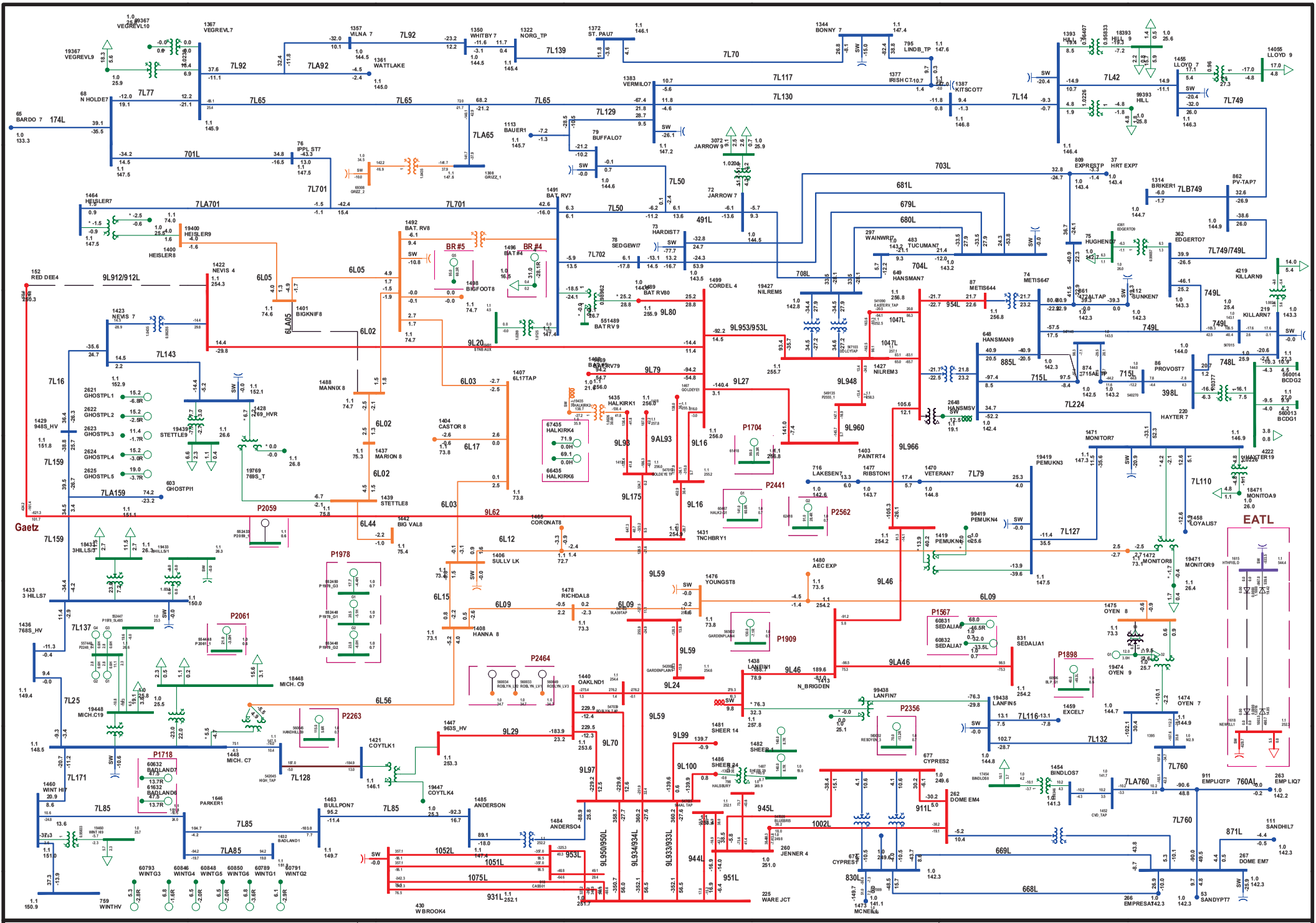
P2464 - Sunnynook Solar Battery Project

CATEGORY B, LOSS OF 9L29 (COYOTE LAKE 963S - OAKLAND 946S)
SCENARIO 2_2028SP_PRE-PROJECT
THU, APR 11 2024 13:18

A2 - 27

Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A

kV: >0.000 <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 <=500.000 >500.000



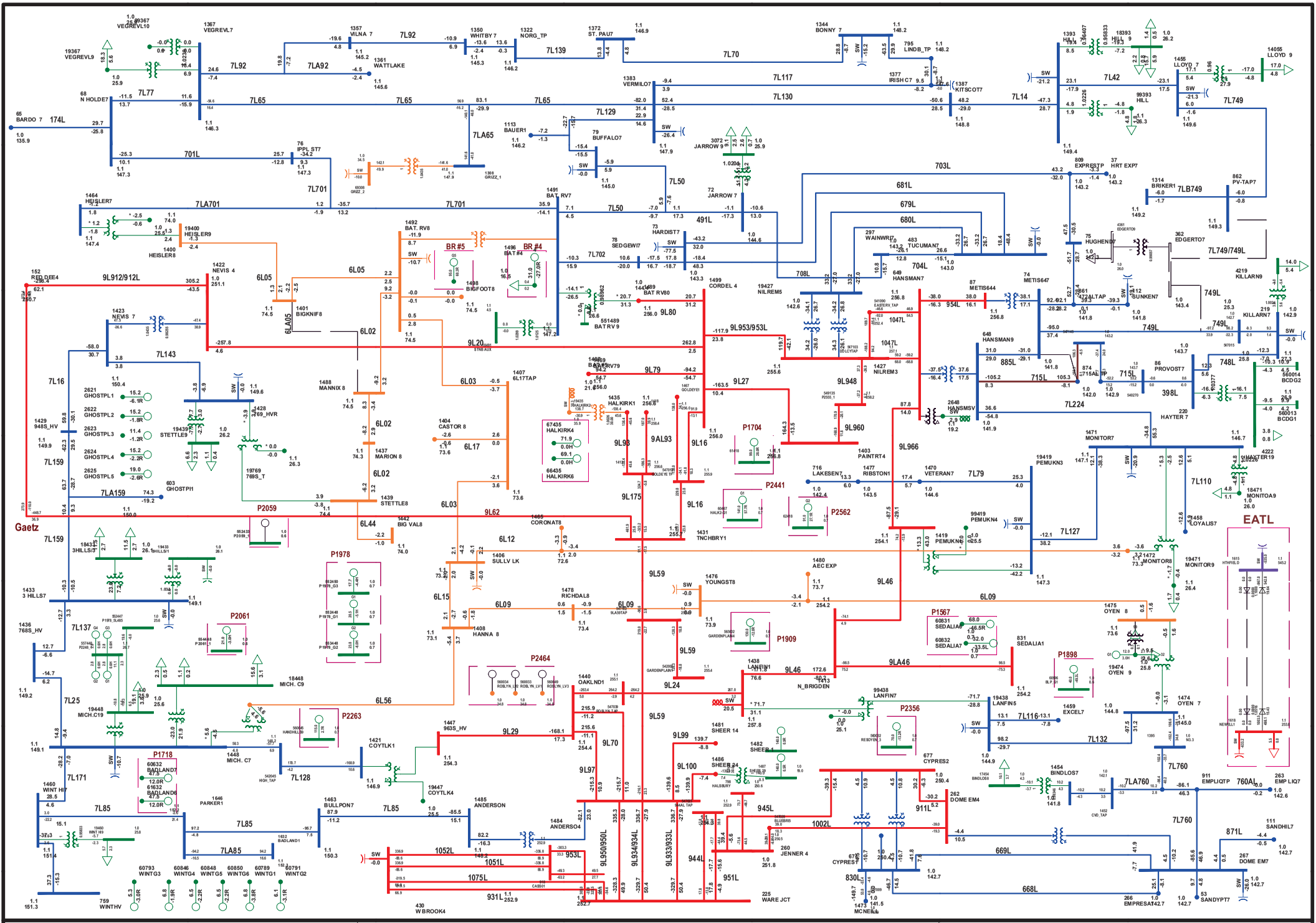
P2464 - Sunnynook Solar Battery Project

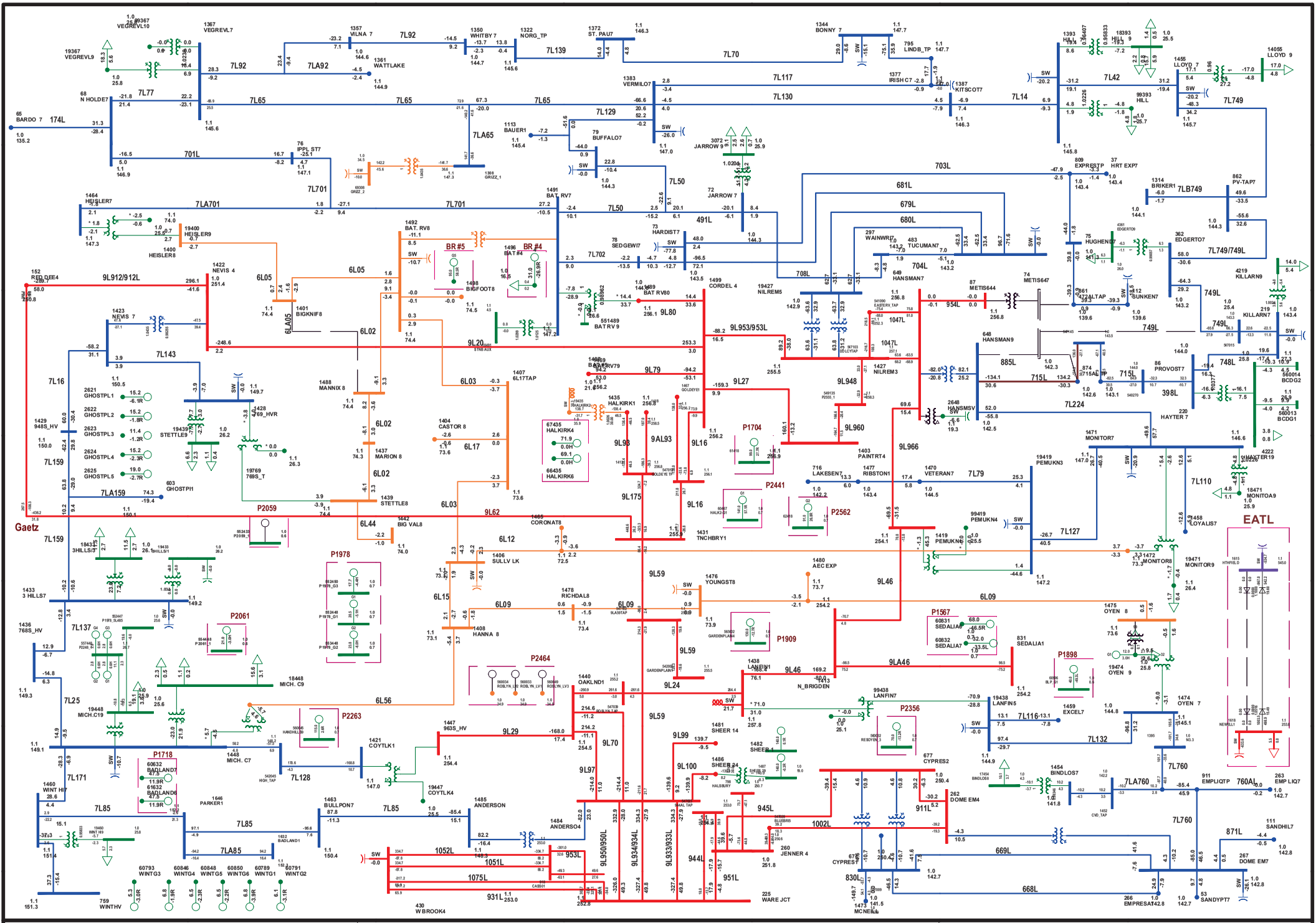
CATEGORY B, LOSS OF 9L912 (NEVIS 766S – RED DEER 63S)
SCENARIO 2_2028SP_PRE-PROJECT
THU, APR 11 2024 13:18

A2 - 28

Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A

kV: >0.000 <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 <=500.000 >500.000


Gaetz
EATL
P2464 - Sunnynook Solar Battery Project
CATEGORY B, LOSS OF EDGERTON_899ST3
SCENARIO 2_2028SP_PRE-PROJECT
THU, APR 11 2024 13:18
A2 - 29
Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A
kV: >0.000 <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 <=500.000 >500.000


Gaetz
EATL
BARDO 7
N HOLDE7
VEGREVL9
VEGREVL7
WATTLAKE
VILNA 7
WHITBY 7
NORG_TP
ST. PAU7
BONNY 7
LINDB_TP
IRISH C7
KITSCOT7
VERMILO7
BUFFALO7
BAUER1
JARROW 9
HILL 9
HILL 7
LLOYD 7
LLOYD 9
HILL 1
EXPRESTP
HRT EXP7
BRIKER1
PV-TAP7
HUGHEND7
EDGERTO7
KILLARN7
KILLARN9
HAYTER 7
PROVOST7
SUNKEN7
HANSMAN7
HANSMAN9
WAINWRI7
TUCUMAN7
CORDEL 4
NILREM5
NILREM3
METIS644
METIS647
BAT. RV8
BAT. RV7
BAT RV80
BAT RV 9
HARDIST7
SEDGEWI7
JARROW 7
IPPL ST7
BIGFOOT8
BIGKNIF8
HEISLER7
HEISLER8
RED DEE4
NEVIS 4
NEVIS 7
MANNIX 8
CASTOR 8
MARION 8
STETTLE9
STETTLE8
GHOSTPI1
GHOSTPL2
GHOSTPL3
GHOSTPL4
GHOSTPL5
3 HILLS7
3HILLS/3
MICH.C19
MICH. C9
MICH. C7
WINT HI7
WINTHV
WINTG3
WINTG4
WINTG5
WINTG6
WINTG1
WINTG2
PARKER1
BULLPON7
ANDERSON
ANDERSO4
COYTLK1
COYTLK4
BIG VAL8
SULLV LK
HANNA 8
CORONAT8
YOUNGST8
RICHDAL8
OAKLND1
SHEER 14
SHEER 24
LANFIN1
N_BRIGDEN
AEC EXP
LAKESEN7
PAINTRT4
RIBSTON1
VETERAN7
PEMUKN3
PEMUKN4
PEMUKN2
TNCHBRY1
HALKIRK1
HALKIRK2
HALKIRK4
HALKIRK6
GOLDEYE1
GOLDEYE7
BADLAND7
BADLAND6
BADLAND1
CAS101
W BROOK4
WARE JCT
MCNEILL
CYPRES7
CYPRES2
DOME EM4
DOME EM7
JENNER 4
EMPLIQTP
EMPRESAT
SANDYPT7
SANDHIL7
MONITOR7
MONITOR8
MONITOR9
MONITOA9
OYEN 8
OYEN 9
OYEN 7
SEDALIA1
SEDALIA6
SEDALIA7
LOYALIS7
EXCEL7
LANFIN5
LANFIN7
BINDLOS7
BINDLOS8
HTHRBLD
NEWELLI
CVD_TAP
EASTERV_TAP
7L70
7L117
7L130
7L14
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7L749
7L749/749L
7LB749
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749L
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1L
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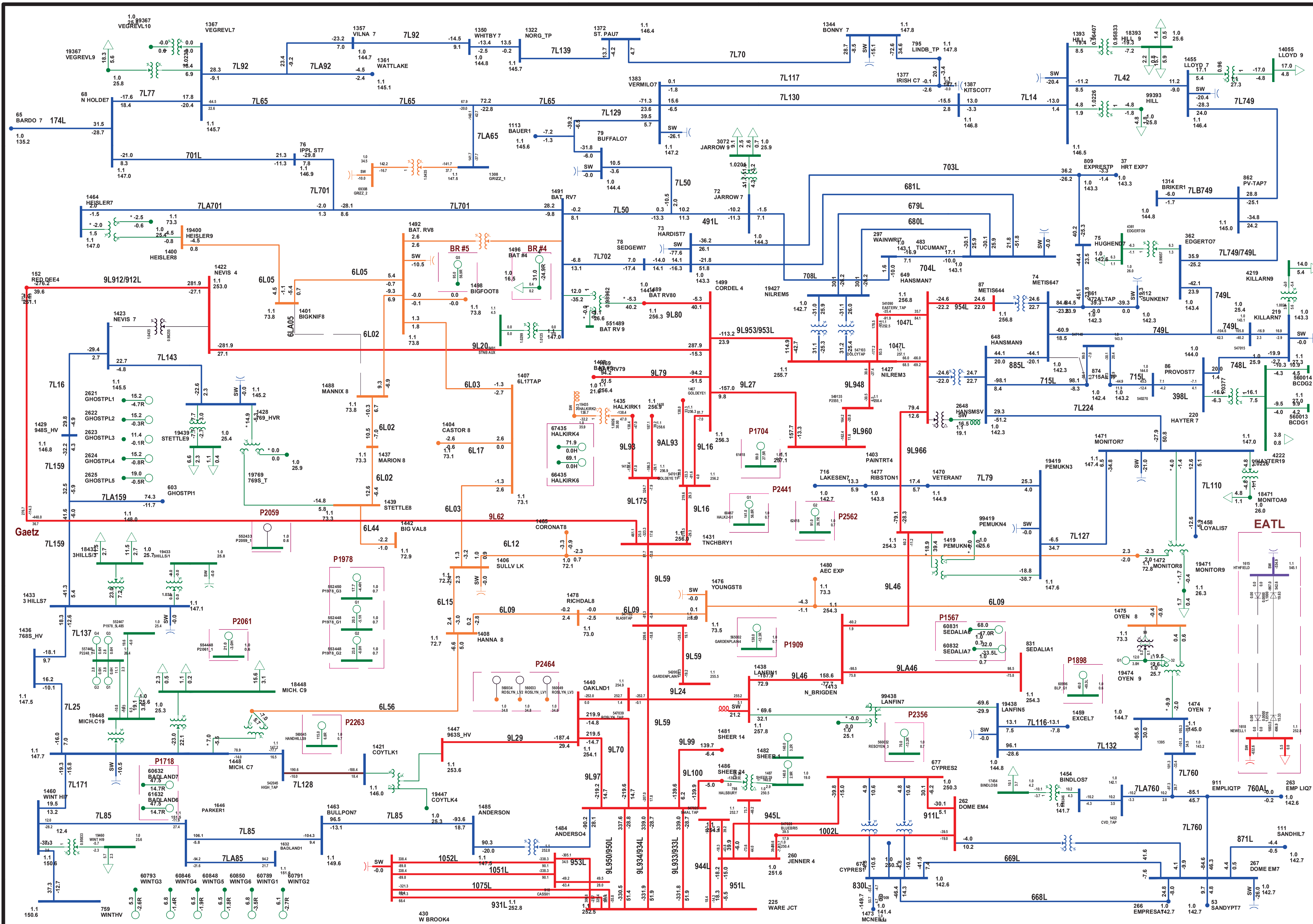
P1567
P1898
P1909
P2356
P2464
P1978
P2059
P2061
P2263
P1718
P2464 - Sunnynook Solar Battery Project
CATEGORY B, LOSS OF METISKOW_648ST1
SCENARIO 2_2028SP_PRE-PROJECT
THU, APR 11 2024 13:18
A2 - 30
1
Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A
kV: >0.000 <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 <=500.000 >500.000



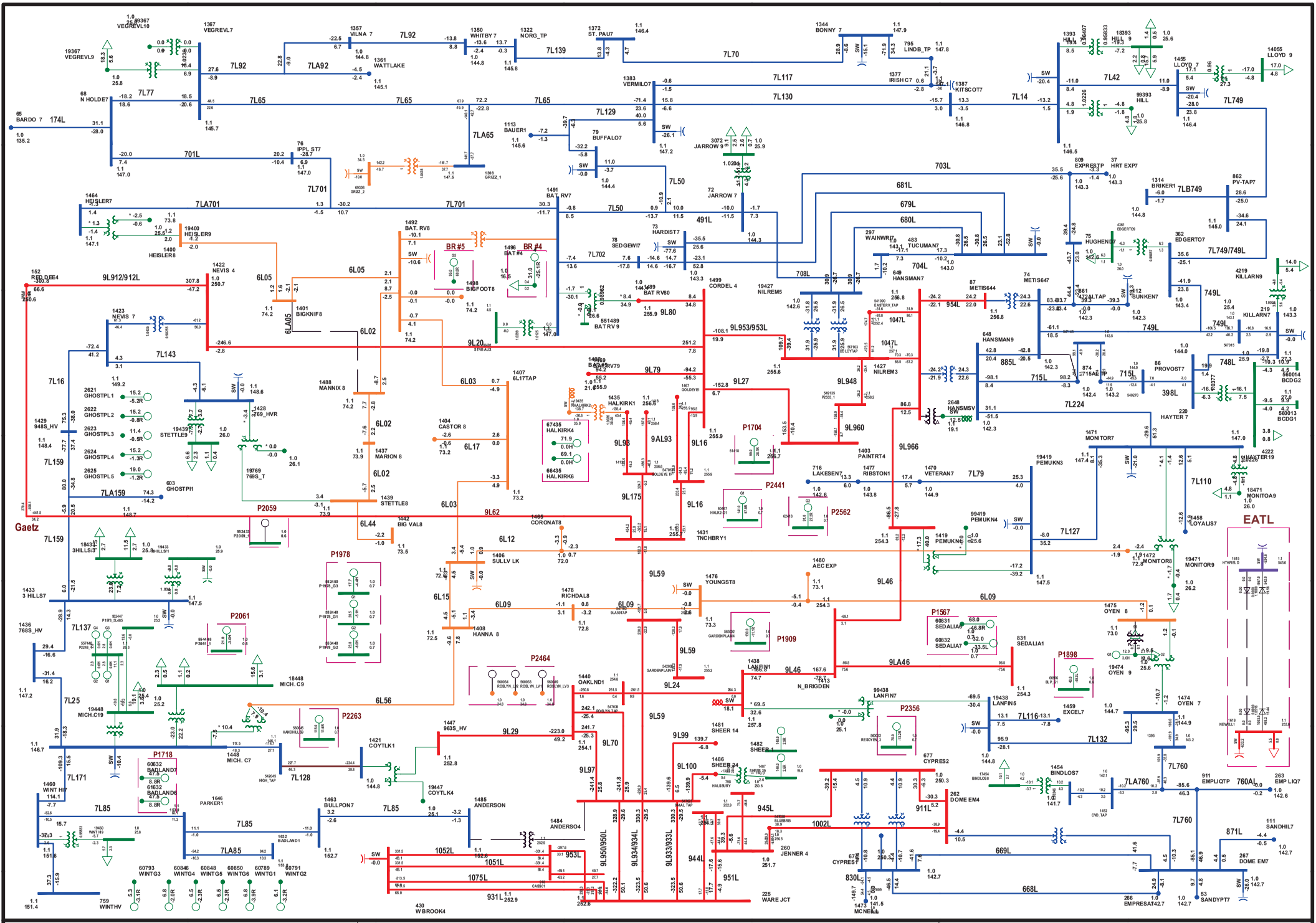
P2464 - Sunnynook Solar Battery Project

CATEGORY B, LOSS OF NEVIS 766S_903T
SCENARIO 2_2028SP_PRE-PROJECT
THU, APR 11 2024 13:19

A2 - 31

Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A

kV: >0.000 <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 <=500.000 >500.000



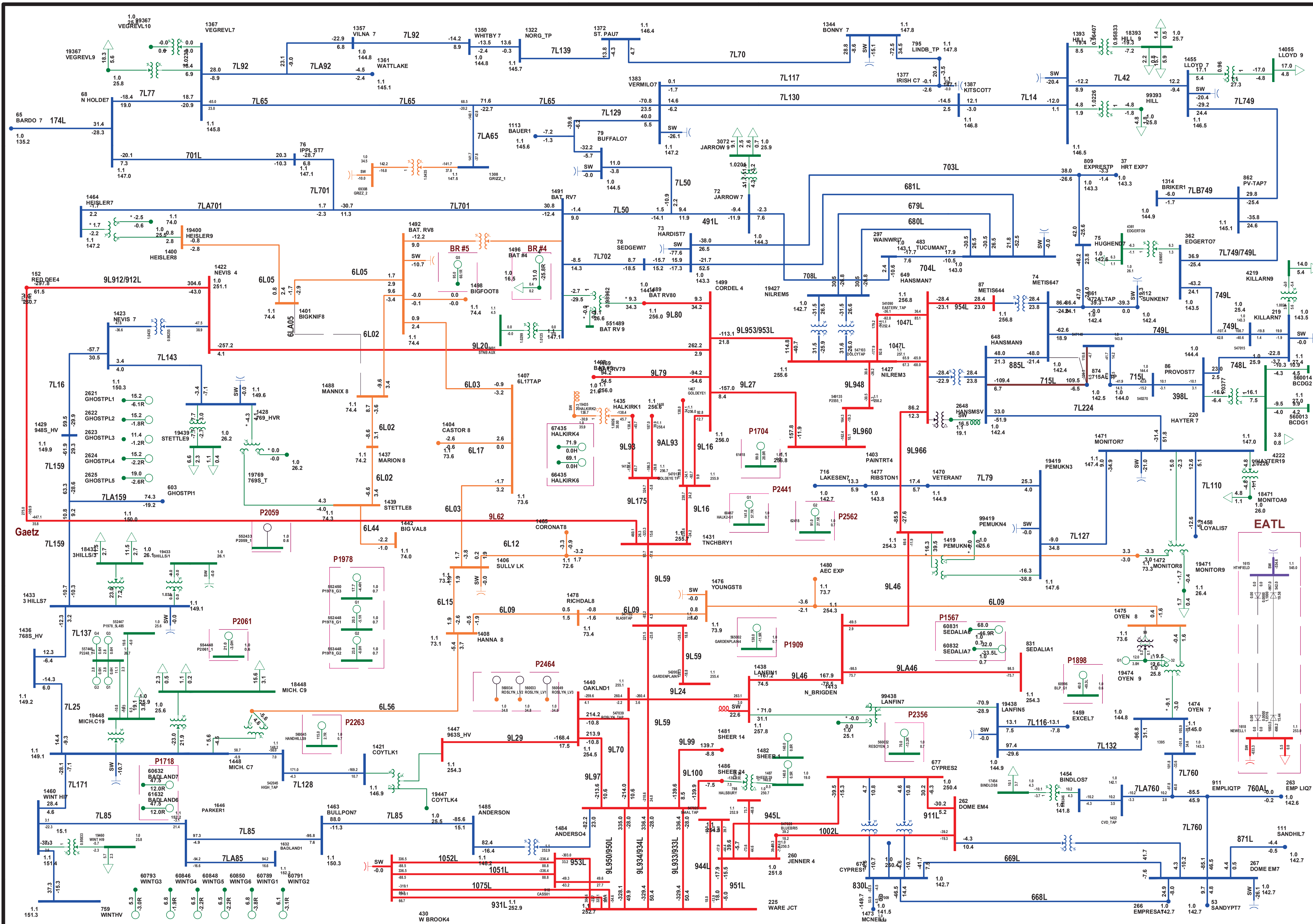
P2464 - Sunnynook Solar Battery Project

CATEGORY B, LOSS OF ANDERSON 801S_901T
SCENARIO 2_2028SP_PRE-PROJECT
THU, APR 11 2024 13:19

A2 - 32

Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A

kV: >0.000 <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 <=500.000 >500.000



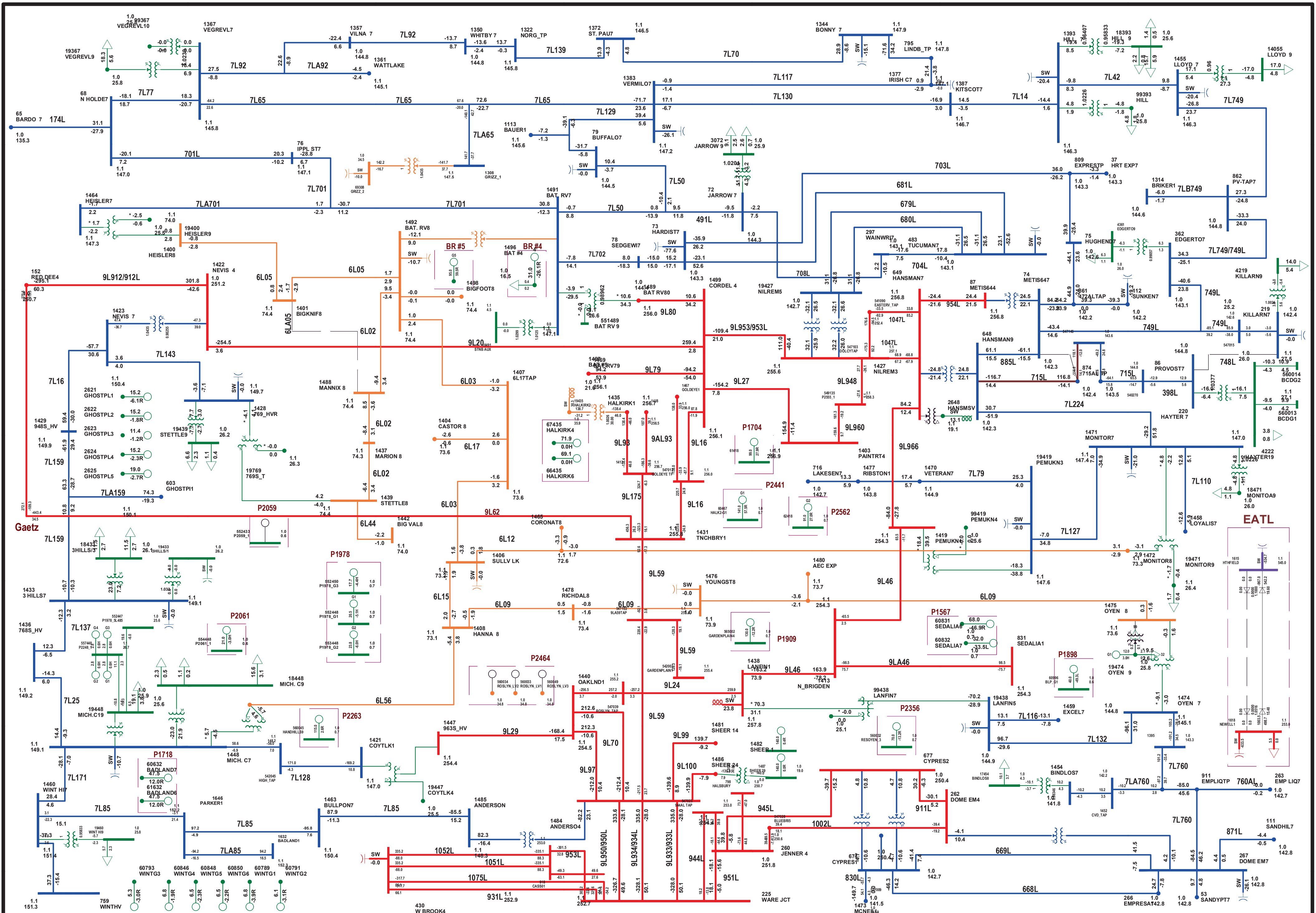
P2464 - Sunnynook Solar Battery Project

CATEGORY B, LOSS OF PROVOST 545S 701T
SCENARIO 2_2028SP_PRE-PROJECT
THU, APR 11 2024 13:19

A2 - 33

Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A

kV: >0.000 <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 <=500.000 >500.000



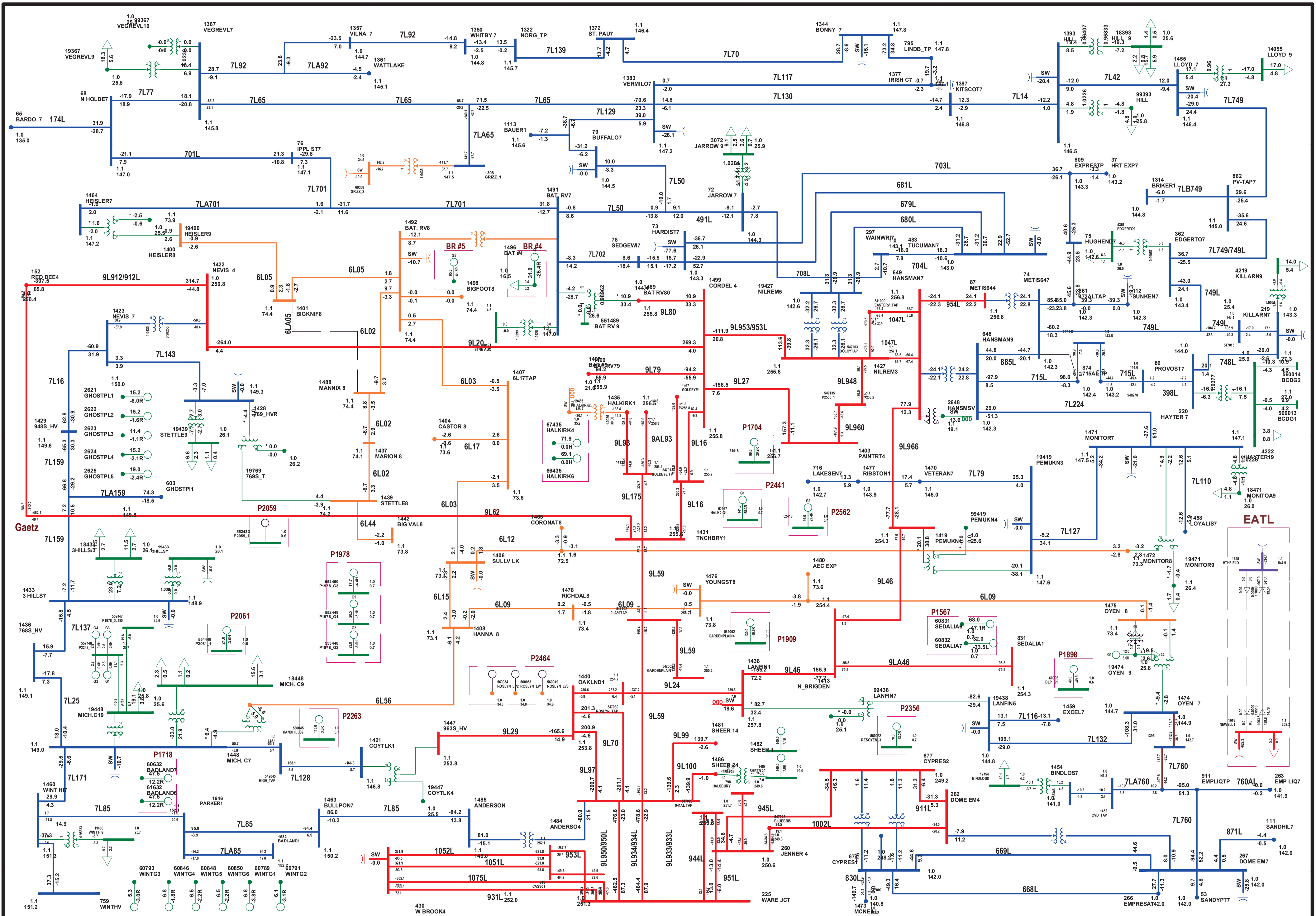
P2464 - Sunnynook Solar Battery Project

CATEGORY B, LOSS OF 748L (KILLARNEY 267S - HAYTER 277S)
SCENARIO 2_2028SP_PRE-PROJECT
THU, APR 11 2024 13:19

A2 - 34

Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A

kV: >0.000 <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 <=500.000 >500.000



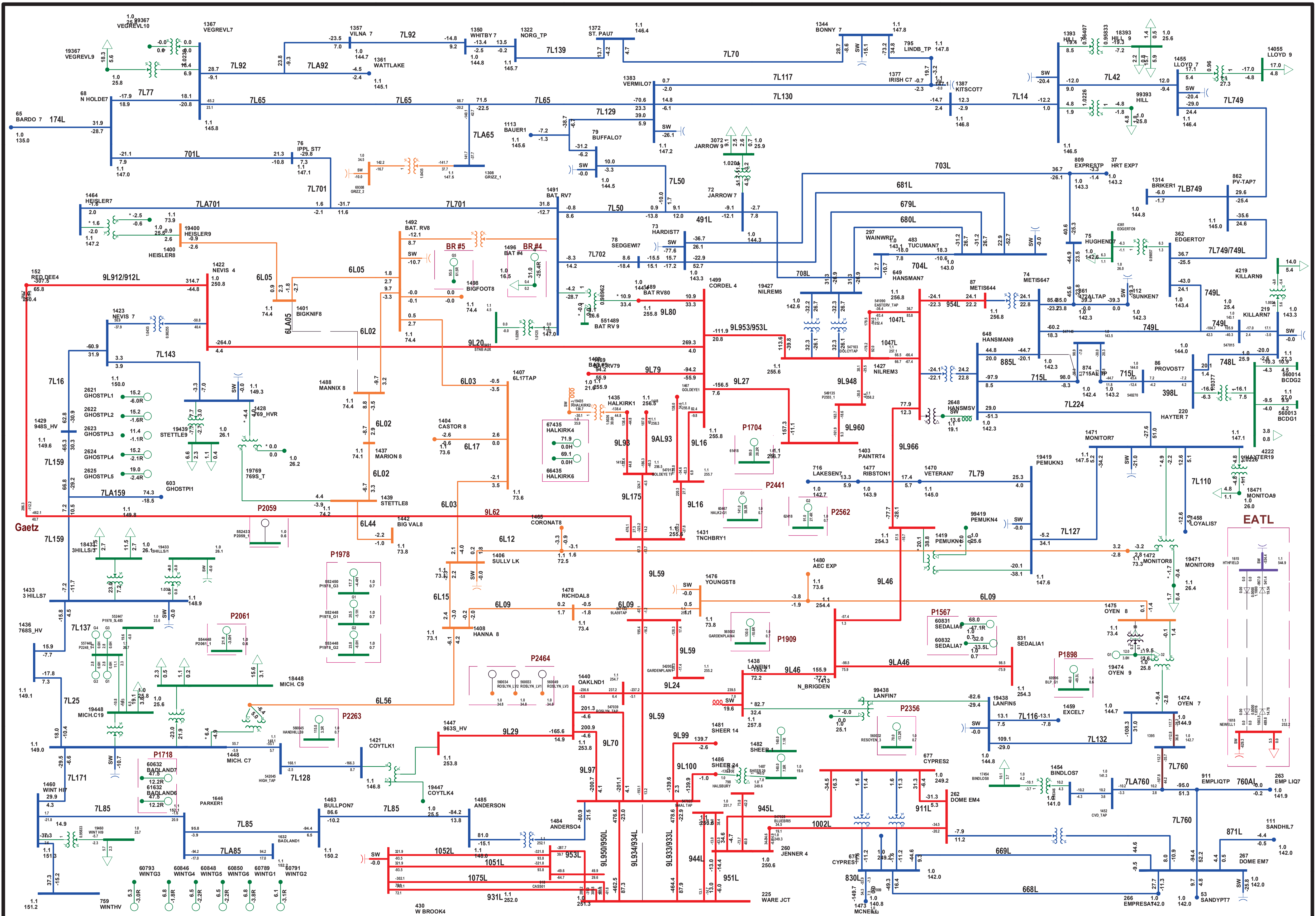
P2464 - Sunnynook Solar Battery Project

CATEGORY B, LOSS OF 933L (ANDERSON 801S - WARE JUNCTION 132S
SCENARIO 2_2028SP_PRE-PROJECT
THU, APR 11 2024 13:19

A2 - 35

Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A

kV: >0.000 <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 <=500.000 >500.000



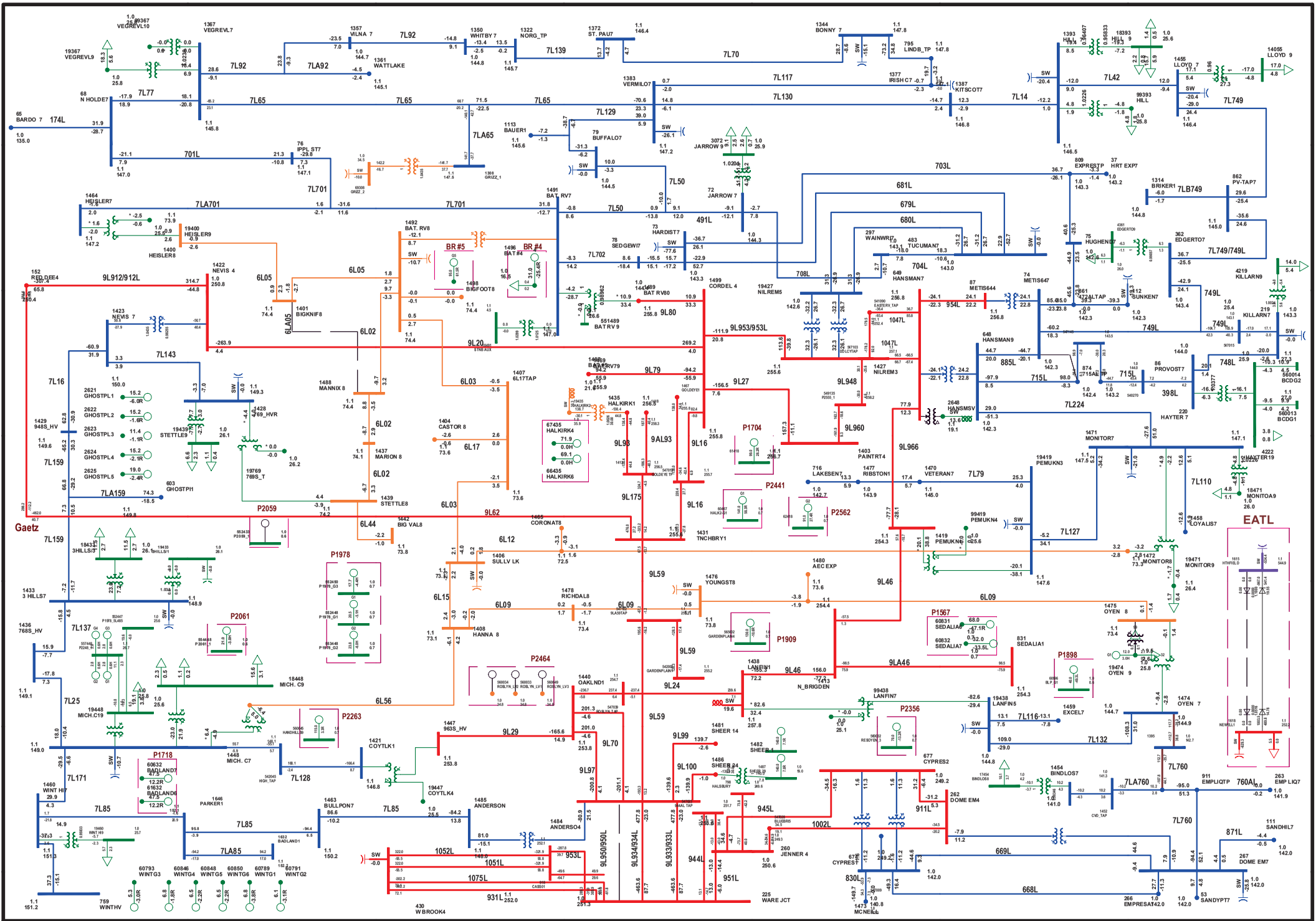
P2464 - Sunnynook Solar Battery Project

CATEGORY B, LOSS OF 934L (ANDERSON 801S - WARE JUNCTION 132S
SCENARIO 2_2028SP_PRE-PROJECT
THU, APR 11 2024 13:19

A2 - 36

Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A

kV: >0.000 <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 <=500.000 >500.000



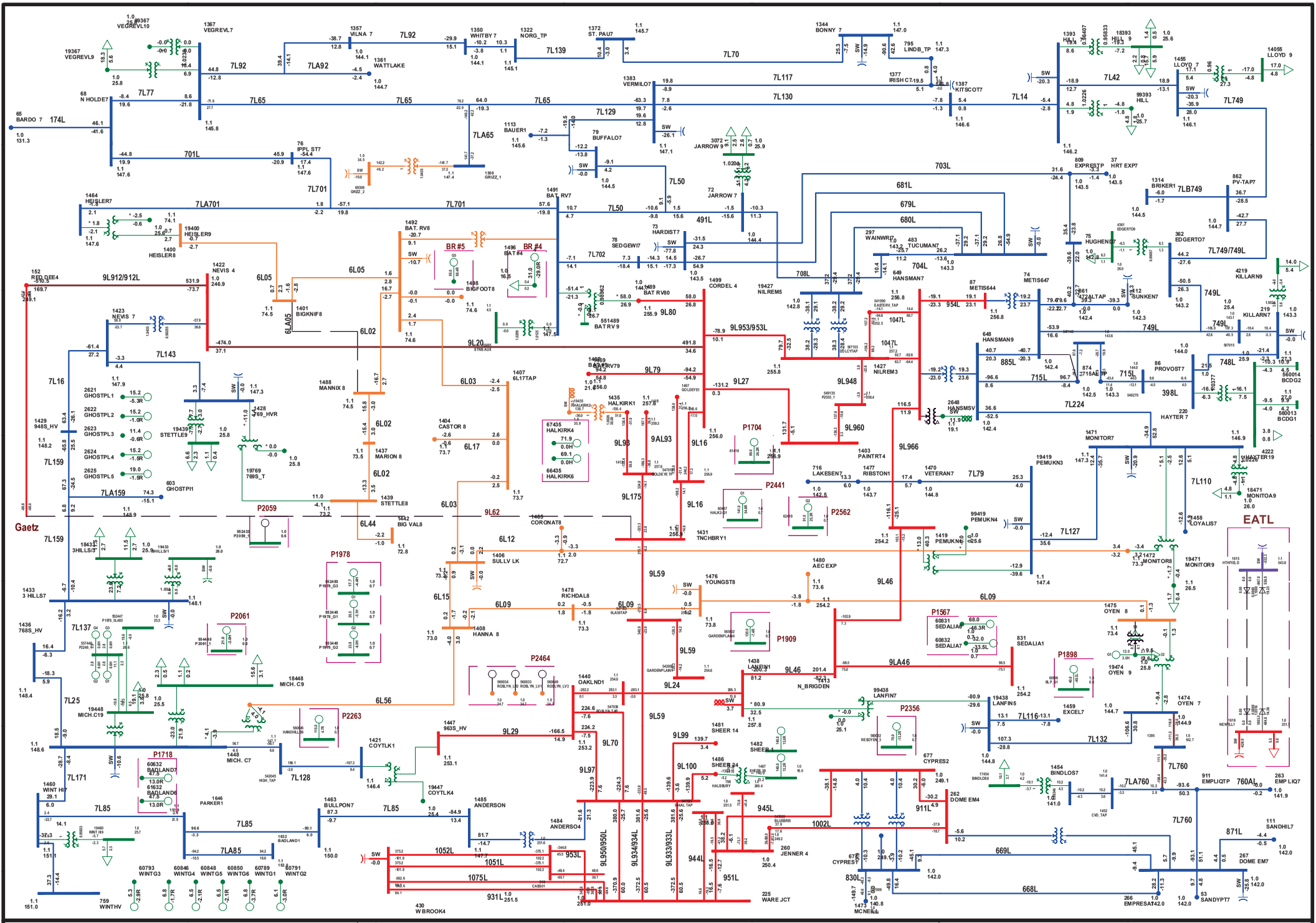
P2464 - Sunnynook Solar Battery Project

CATEGORY B, LOSS OF 950L (ANDERSON 801S - WARE JUNCTION 132S
SCENARIO 2_2028SP_PRE-PROJECT
THU, APR 11 2024 13:20

A2 - 37

Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A

kV: >0.000 <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 <=500.000 >500.000



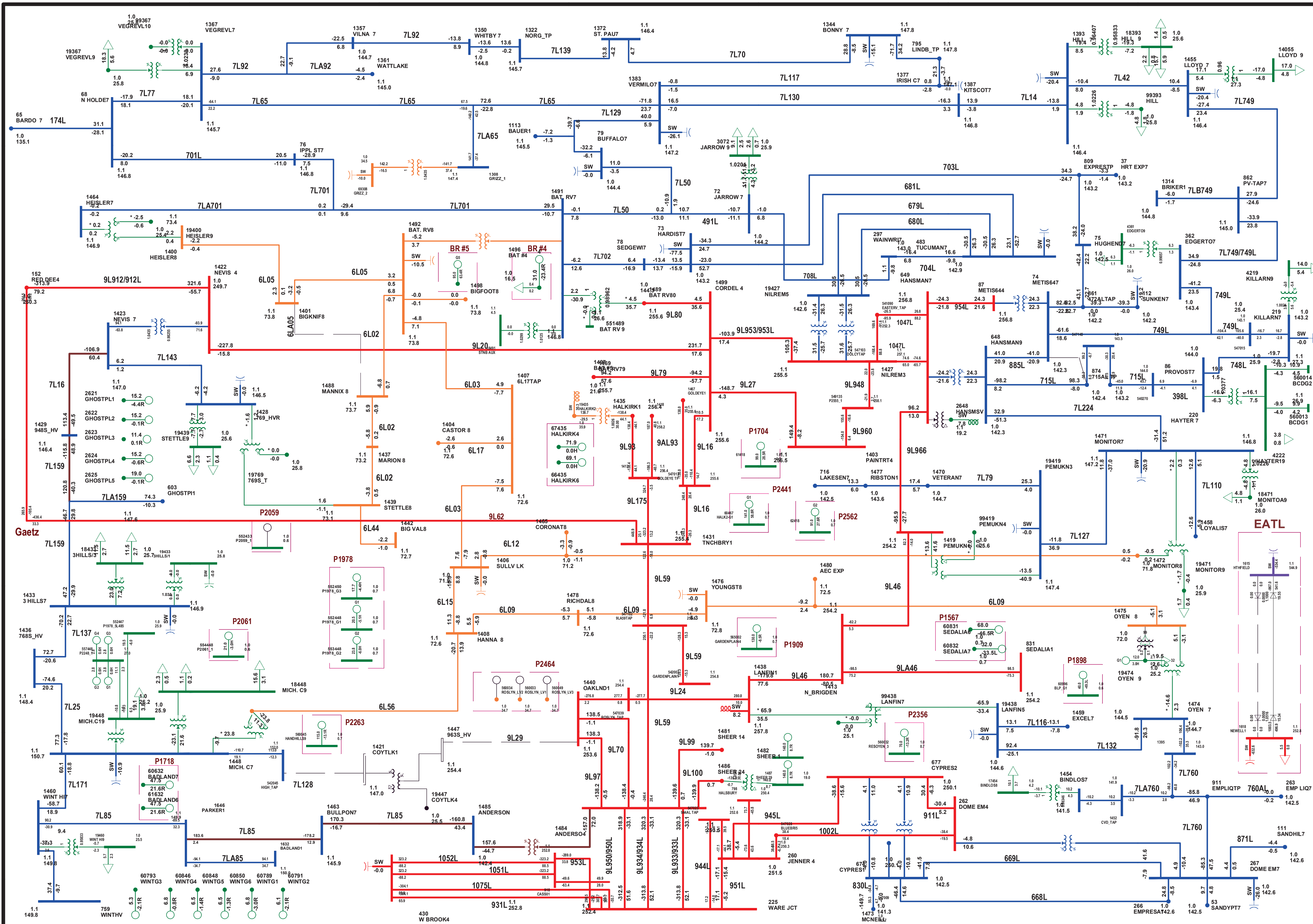
P2464 - Sunnynook Solar Battery Project

CATEGORY B, LOSS OF 9L62 (TINCHEBRAY 972S - GAETZ 87S)
SCENARIO 2_2028SP_PRE-PROJECT
THU, APR 11 2024 13:20

A2 - 38

Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A

kV: >0.000 <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 <=500.000 >500.000



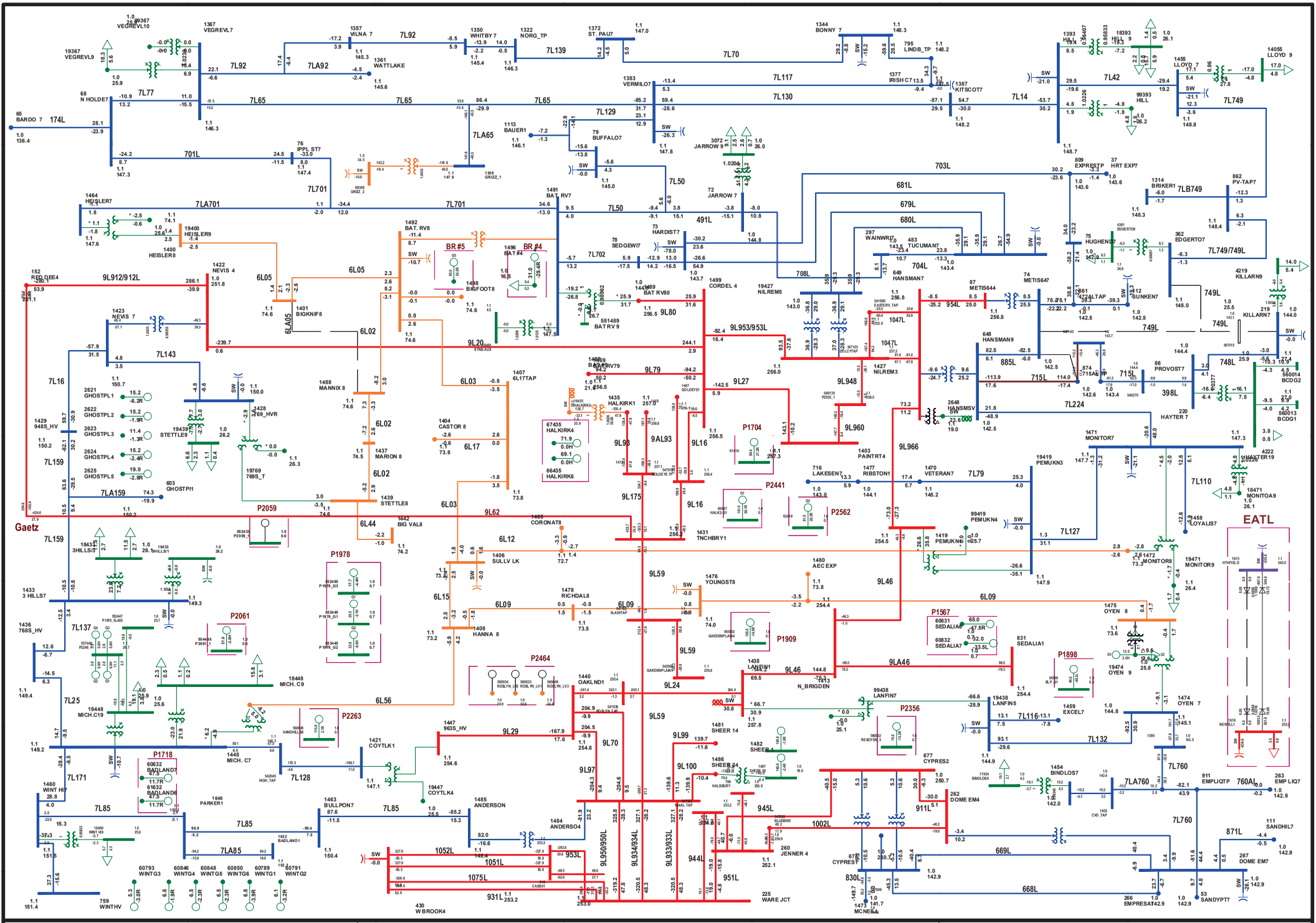
P2464 - Sunnynook Solar Battery Project

CATEGORY B, LOSS OF COYOTE LAKE 963S 901T
SCENARIO 2_2028SP_PRE-PROJECT
FRI, APR 12 2024 8:41

A2 - 39

Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A

kV: >0.000 <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 <=500.000 >500.000



P2464 - Sunnynook Solar Battery Project

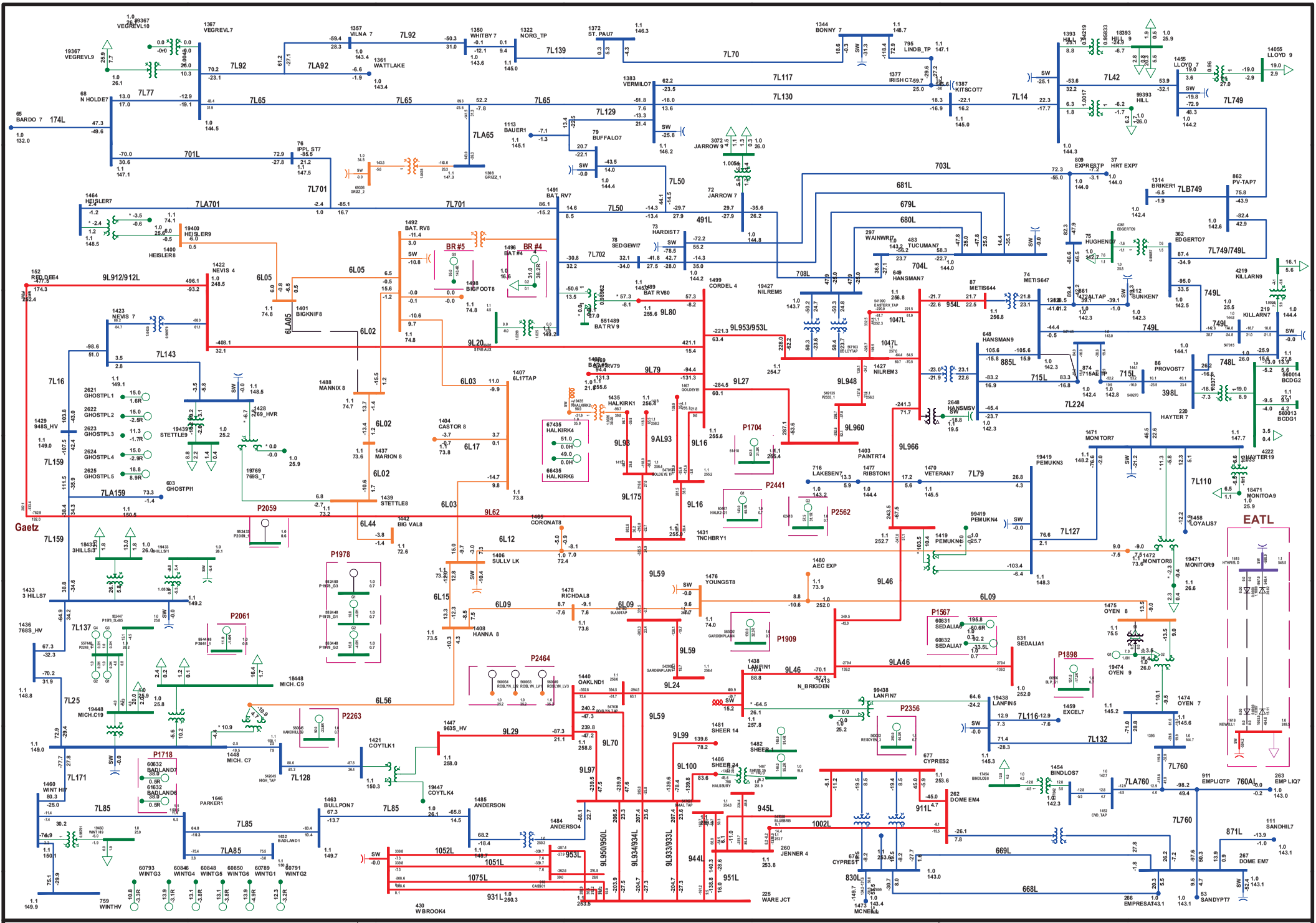
CATEGORY B, LOSS OF 749L (EDGERTON 899S - METISKOW 648S)
SCENARIO 2_2028SP_PRE-PROJECT
FRI, APR 12 2024 8:42

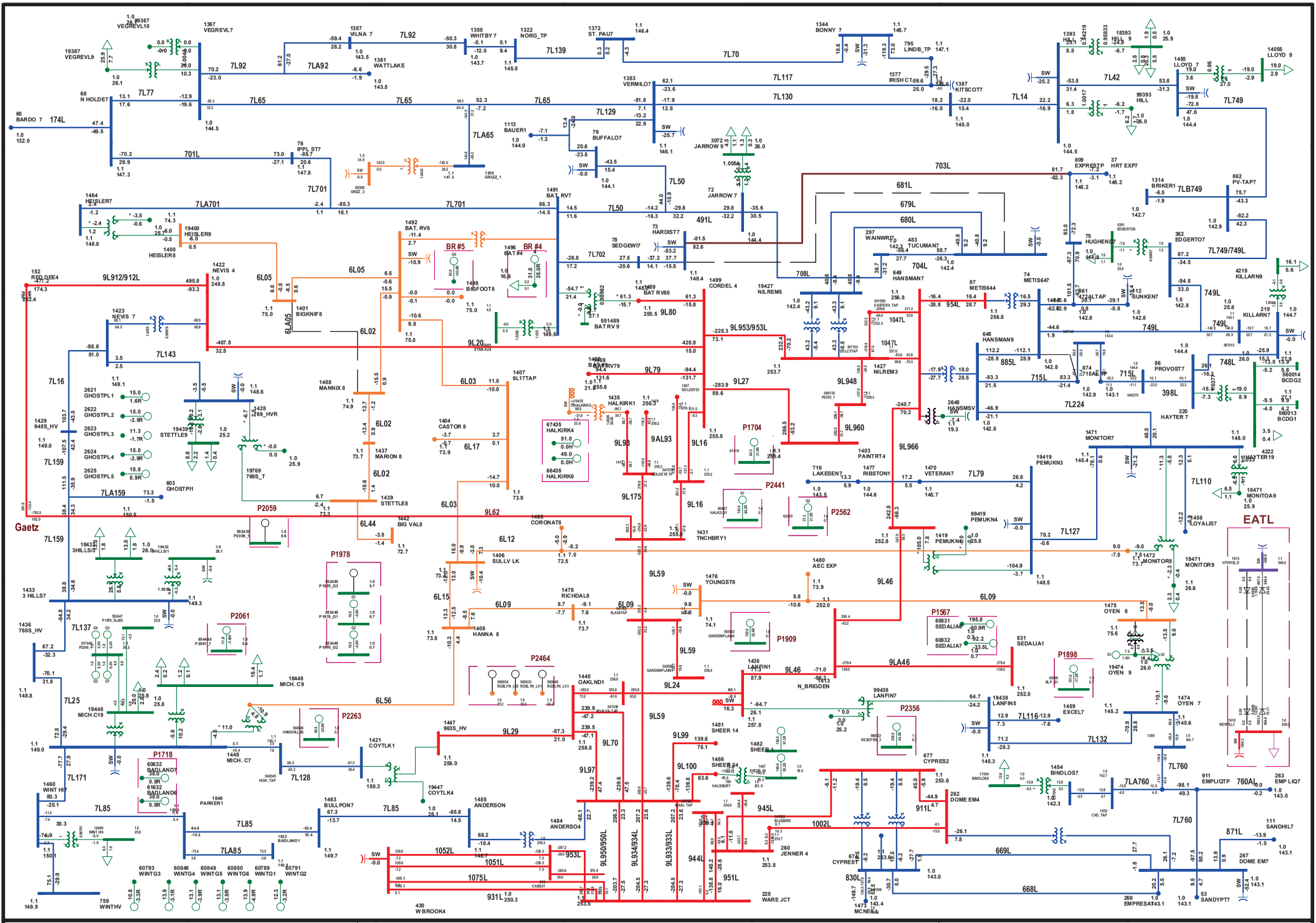
A2 - 40

Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A

kV: >0.000 <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 <=500.000 >500.000

Scenario 3
2028 WP Pre-Project


Gaetz
EATL
P2464 - Sunnynook Solar Battery Project
CATEGORY A, N-0
SCENARIO 3_2028WP_PRE_PROJECT
THU, APR 11 2024 13:44
A2 - 41
Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate B
kV: >0.000 <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 <=500.000 >500.000



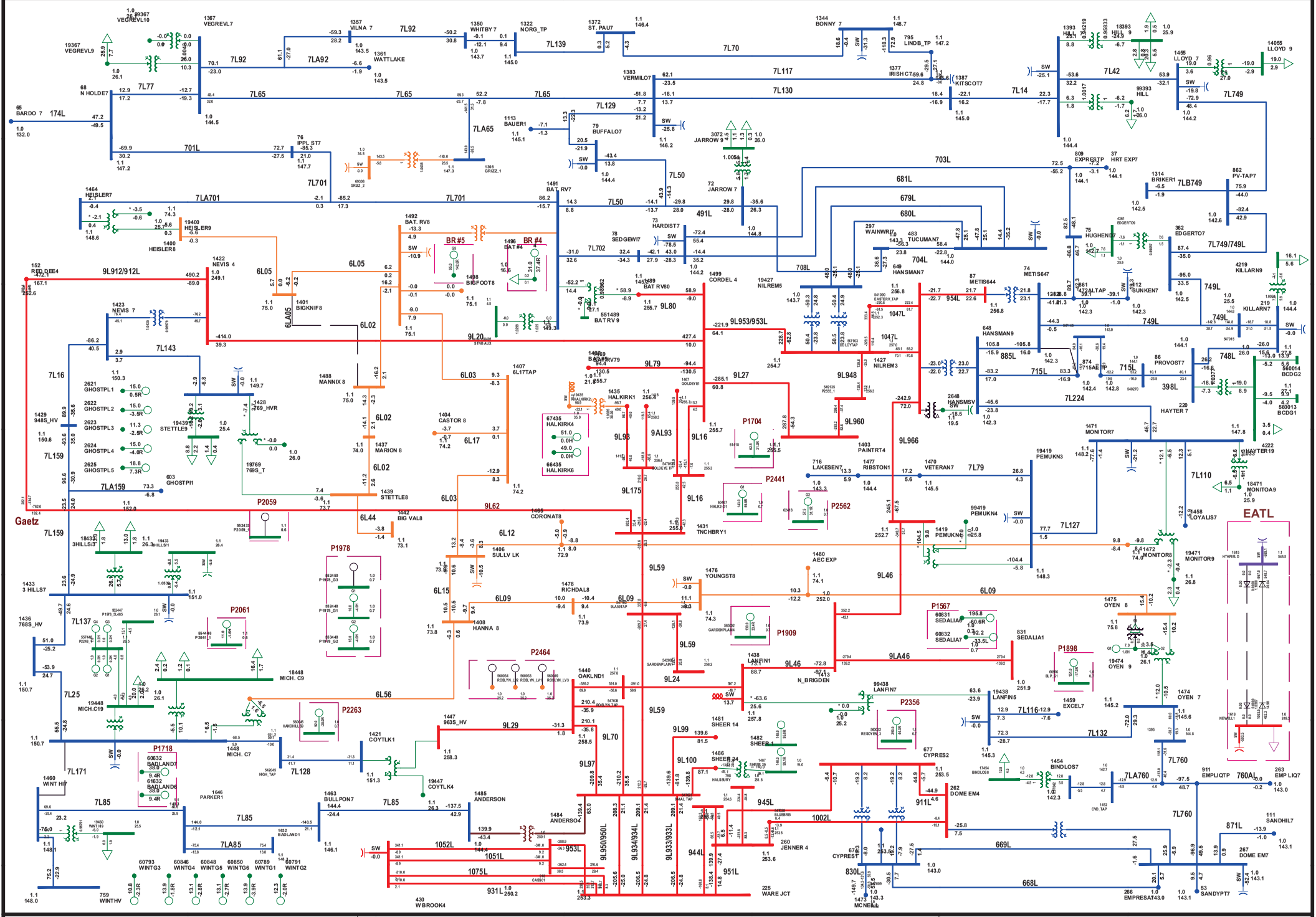
P2464 - Sunnynook Solar Battery Project

CATEGORY B, LOSS OF 681L (TUCUMAN 478S - HARDISTY 377S)
SCENARIO 3_2028WP_PRE_PROJECT
THU, APR 11 2024 13:44

A2 - 42

Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate B

kV: >0.000 <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 <=500.000 >500.000



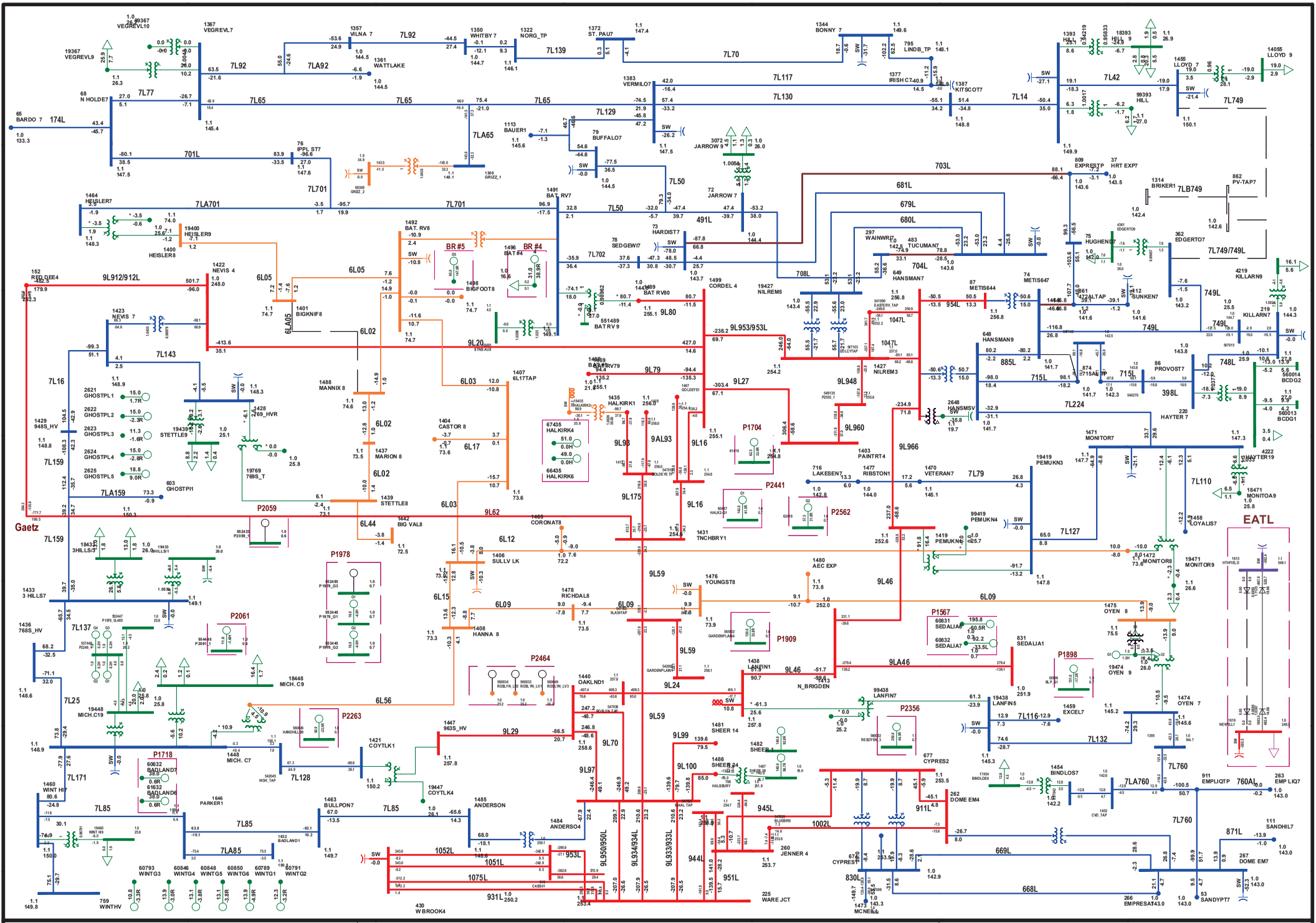
P2464 - Sunnynook Solar Battery Project

CATEGORY B, LOSS OF 7L171 (MICHICHI CREEK - WINTERING HILLS
SCENARIO 3_2028WP_PRE_PROJECT
THU, APR 11 2024 13:44

A2 - 43

Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate B

kV: >0.000 <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 <=500.000 >500.000



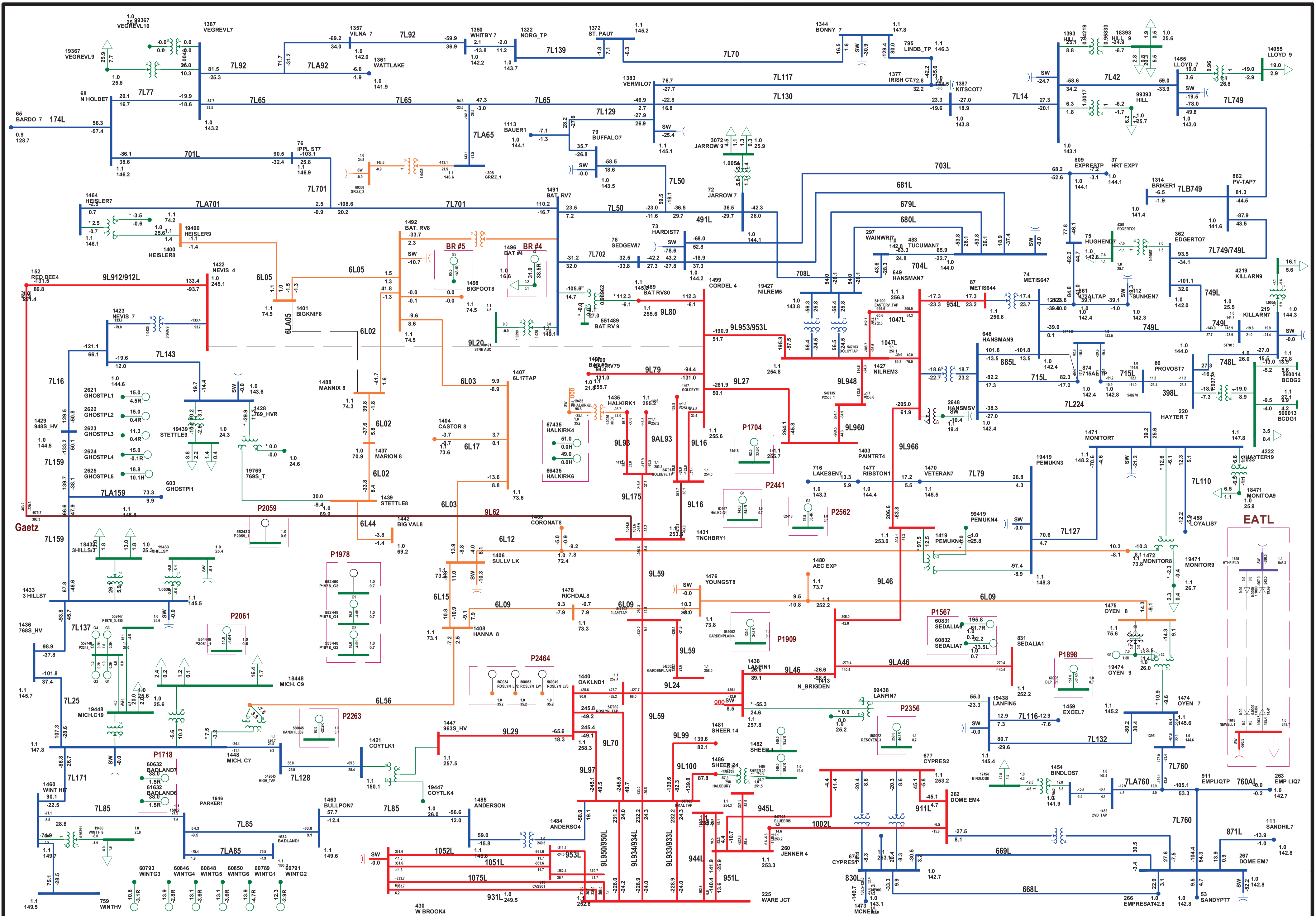
P2464 - Sunnynook Solar Battery Project

CATEGORY B, LOSS OF 7L749 (EDGERTON 899S - LLOYMINSTER 716S)
SCENARIO 3_2028WP_PRE_PROJECT
THU, APR 11 2024 13:45

A2 - 44

Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate B

kV: >0.000 <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 <=500.000 >500.000



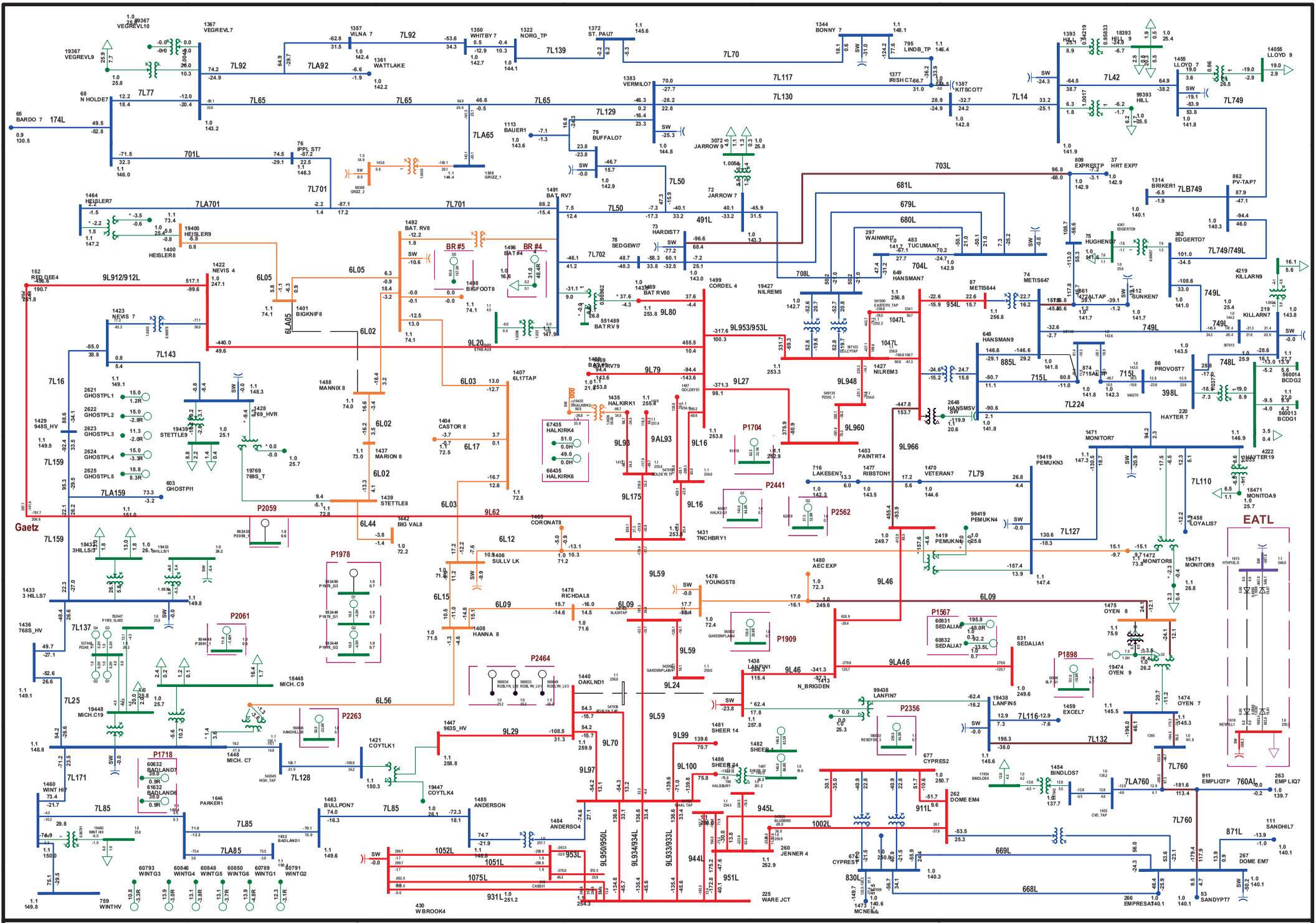
P2464 - Sunnynook Solar Battery Project

CATEGORY B, LOSS OF 9L20 (NEVIS 766S - CORDEL 755S)
SCENARIO 3_2028WP_PRE_PROJECT
THU, APR 11 2024 13:45

A2 - 45

Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate B

kV: >0.000 <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 <=500.000 >500.000



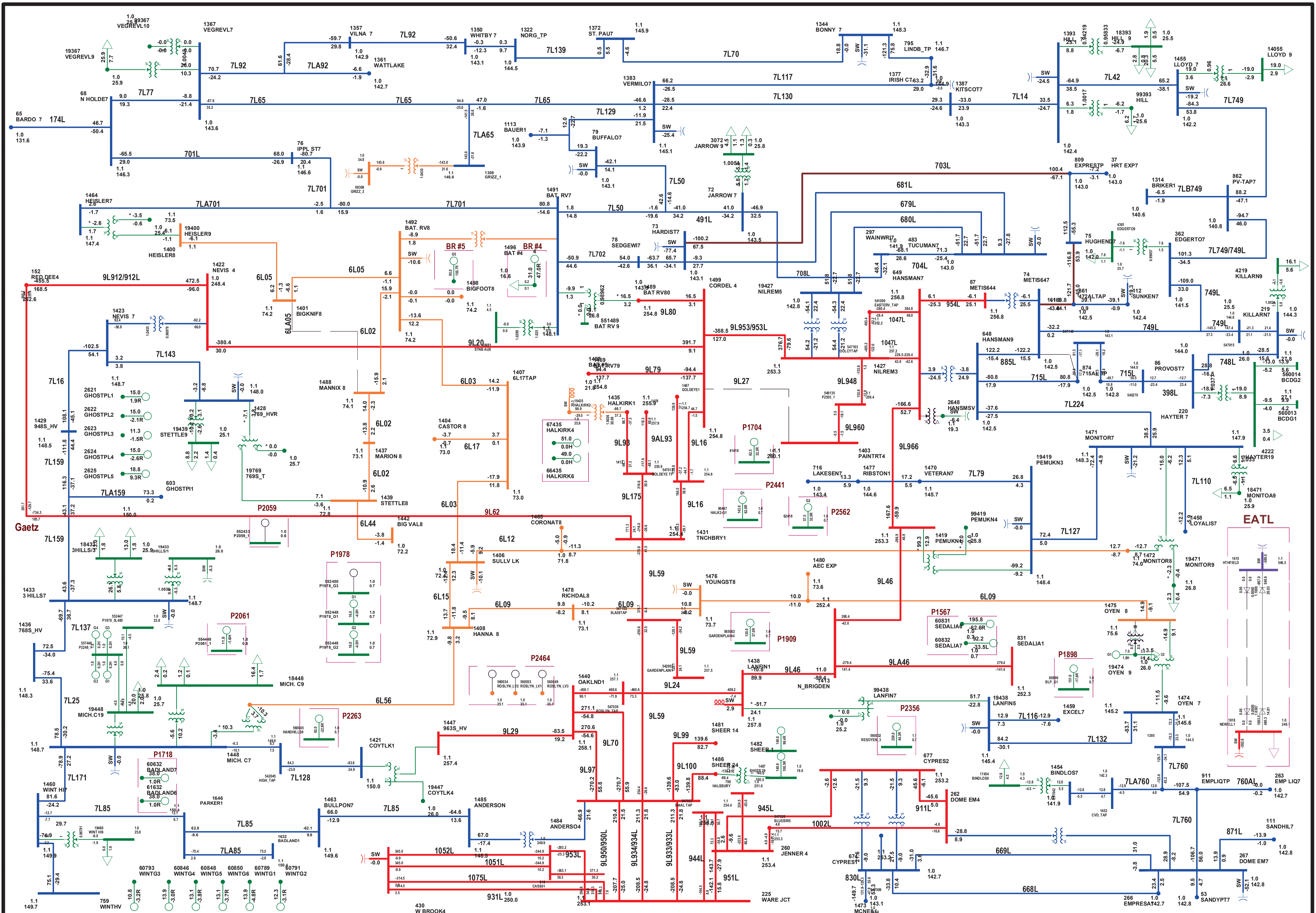
P2464 - Sunnynook Solar Battery Project

CATEGORY B, LOSS OF 9L24 (LANFINE 959S - OAKLAND 946S)
SCENARIO 3_2028WP_PRE_PROJECT
THU, APR 11 2024 13:46

A2 - 46

Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate B

kV: >0.000 <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 <=500.000 >500.000



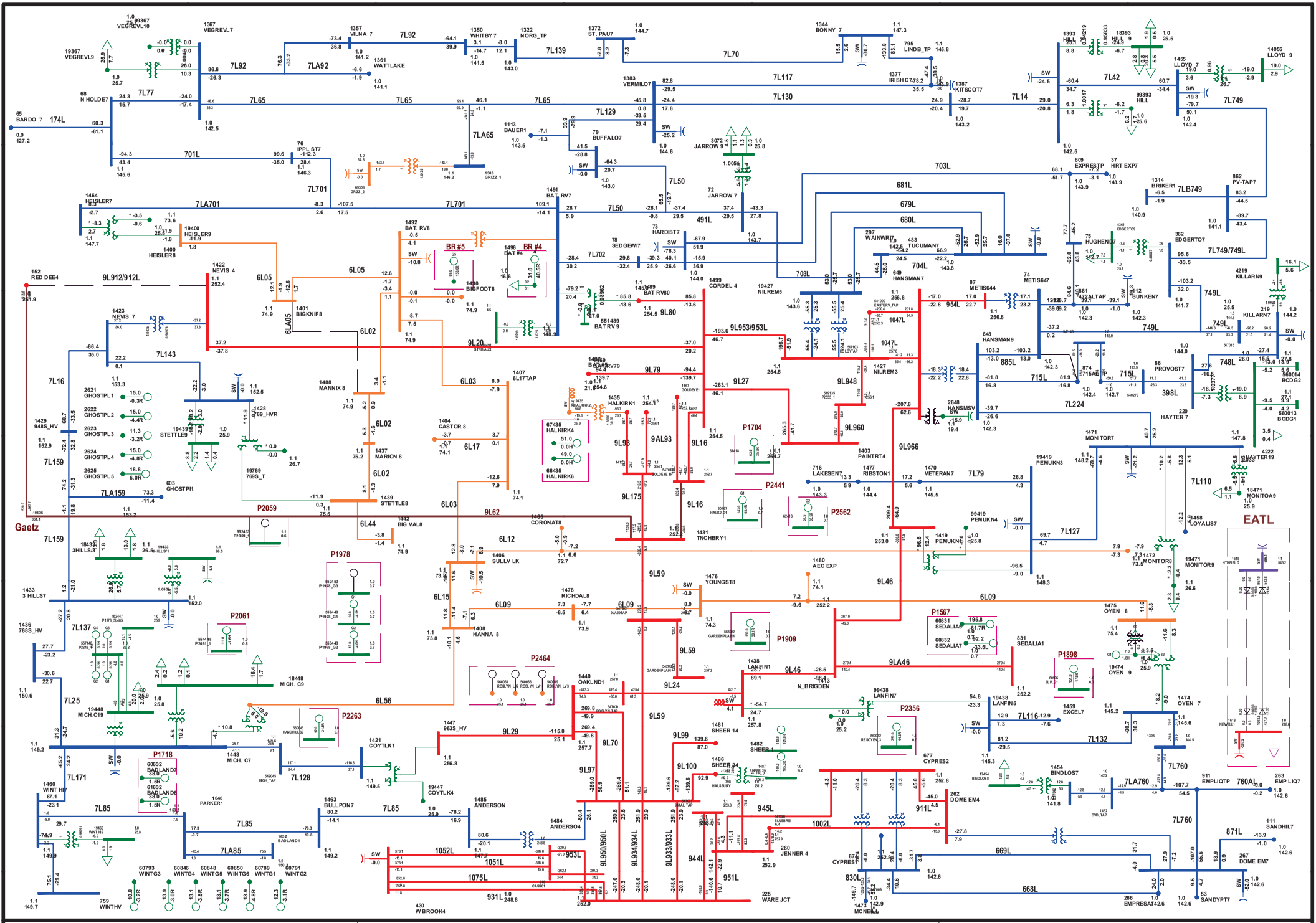
P2464 - Sunnynook Solar Battery Project

CATEGORY B, LOSS OF 9L27 (PAINTEARTH CREEK - CORDEL 755S)
SCENARIO 3_2028WP_PRE_PROJECT
THU, APR 11 2024 13:46

A2 - 47

Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate B

kV: >0.000 <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 <=500.000 >500.000



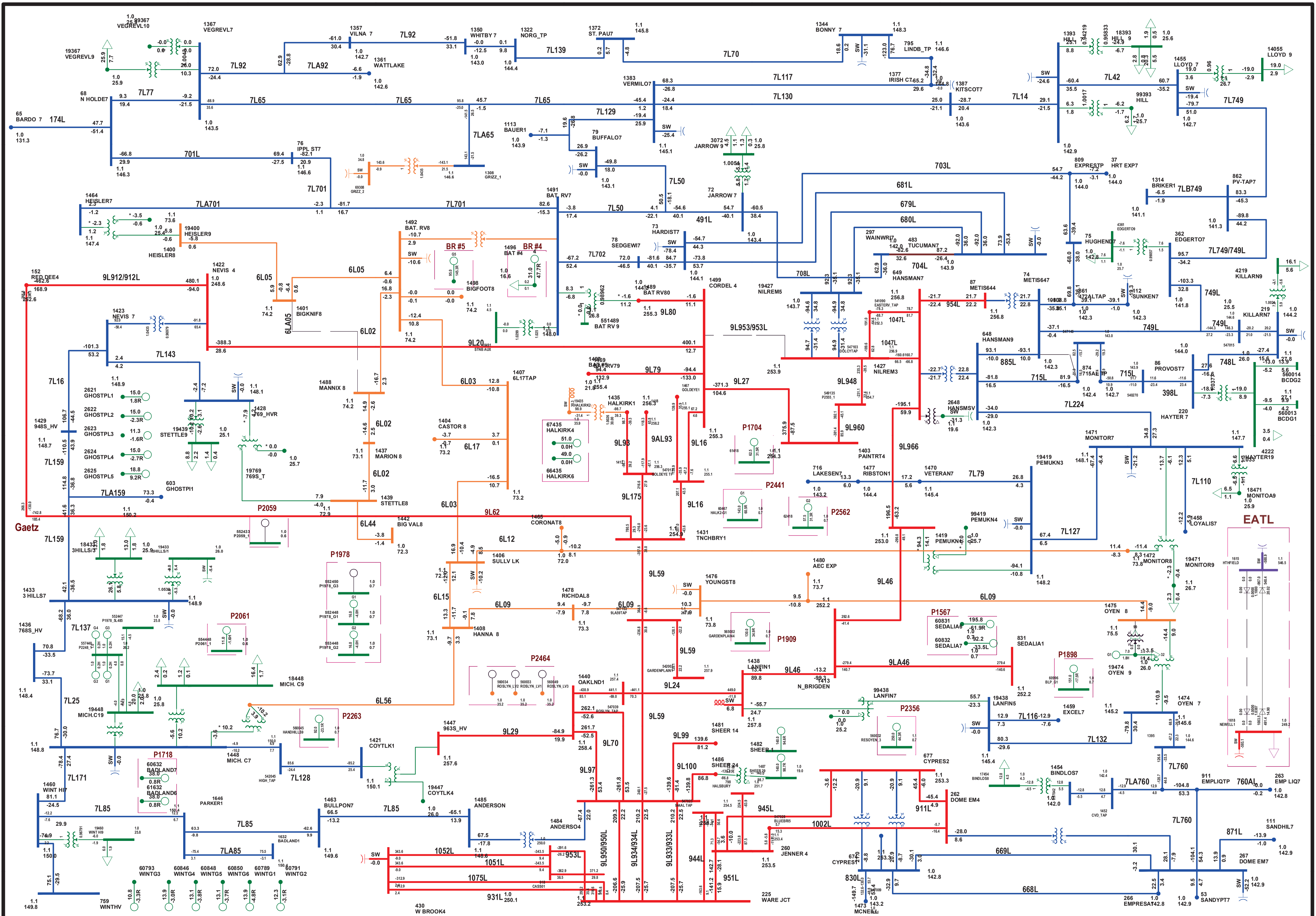
P2464 - Sunnynook Solar Battery Project

CATEGORY B, LOSS OF 9L912 (NEVIS 766S – RED DEER 63S)
SCENARIO 3_2028WP_PRE_PROJECT
THU, APR 11 2024 13:46

A2 - 48

Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate B

kV: >0.000 <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 <=500.000 >500.000



P2464 - Sunnynook Solar Battery Project

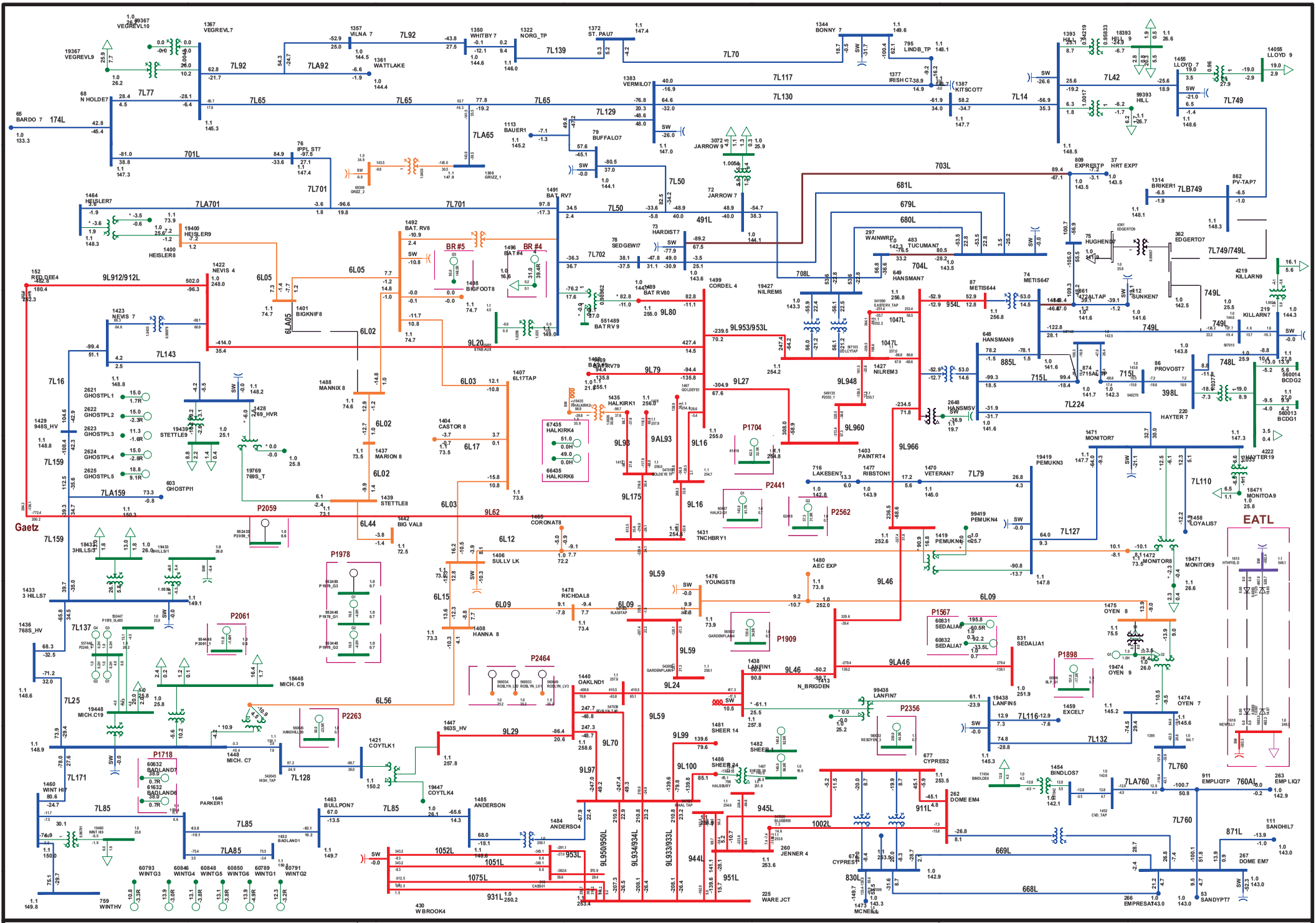
CATEGORY B, LOSS OF 9L953 (CORDEL 755S - NILREM 574S)
SCENARIO 3_2028WP_PRE_PROJECT
THU, APR 11 2024 13:47

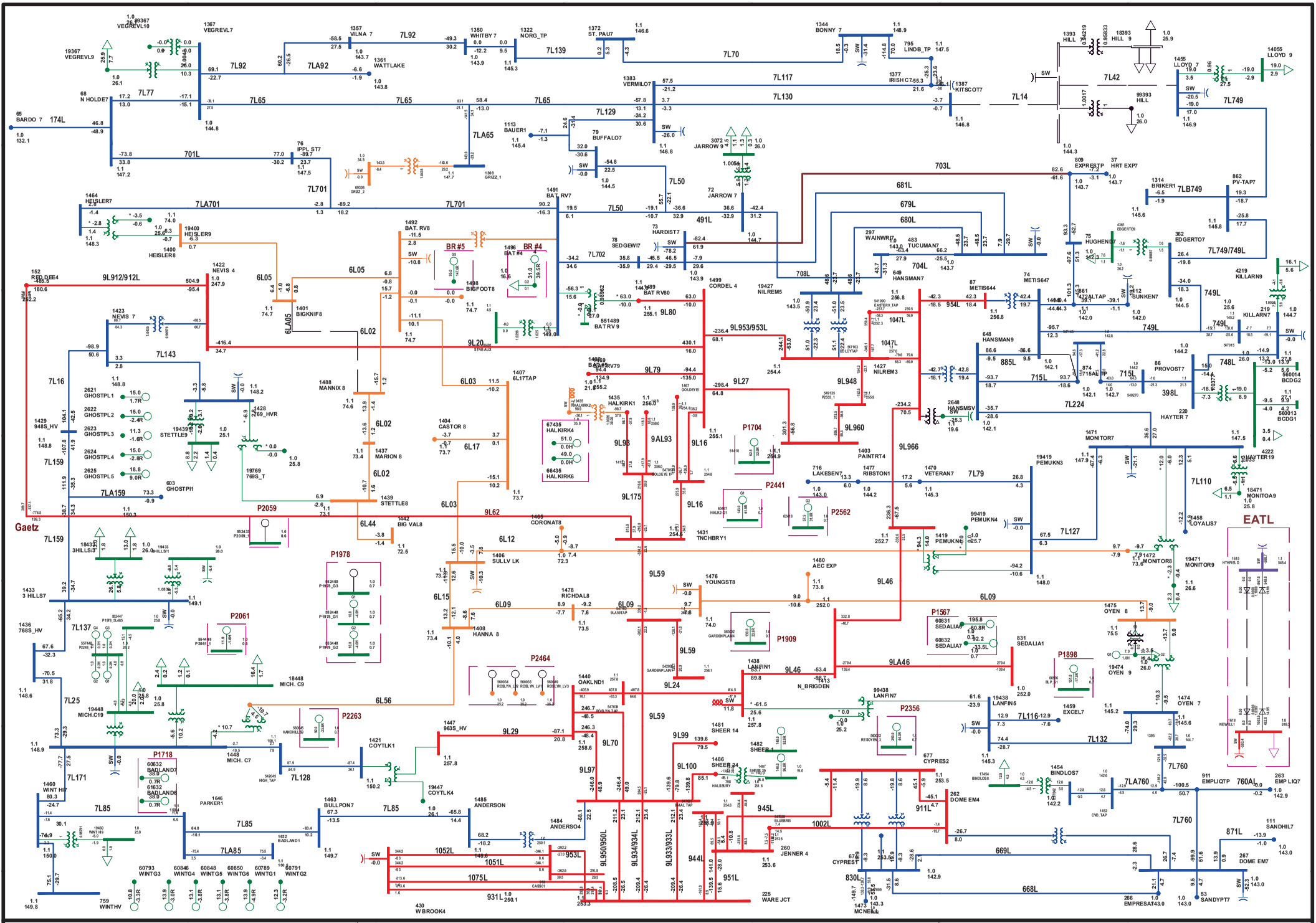
A2 - 49

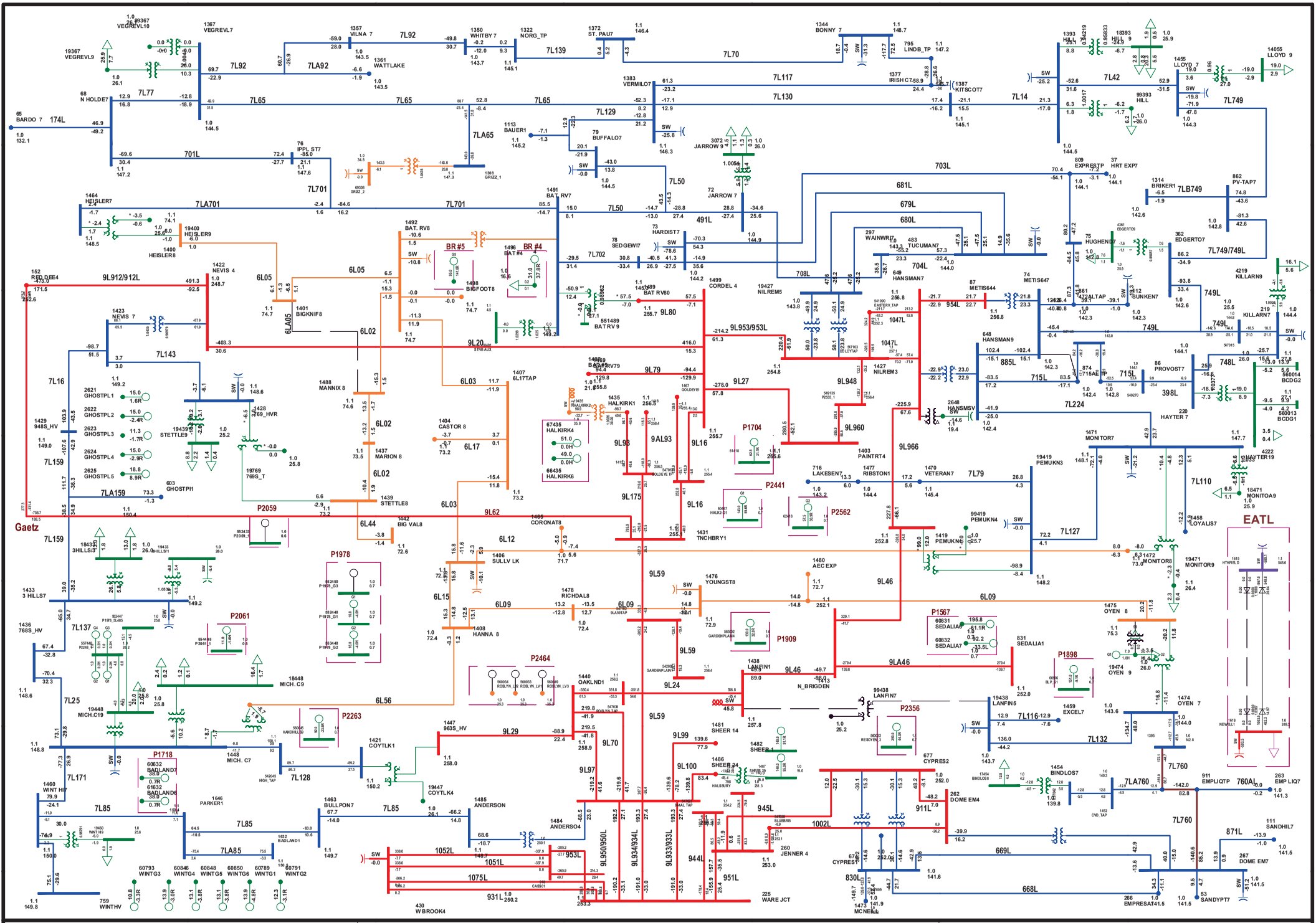
Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate B

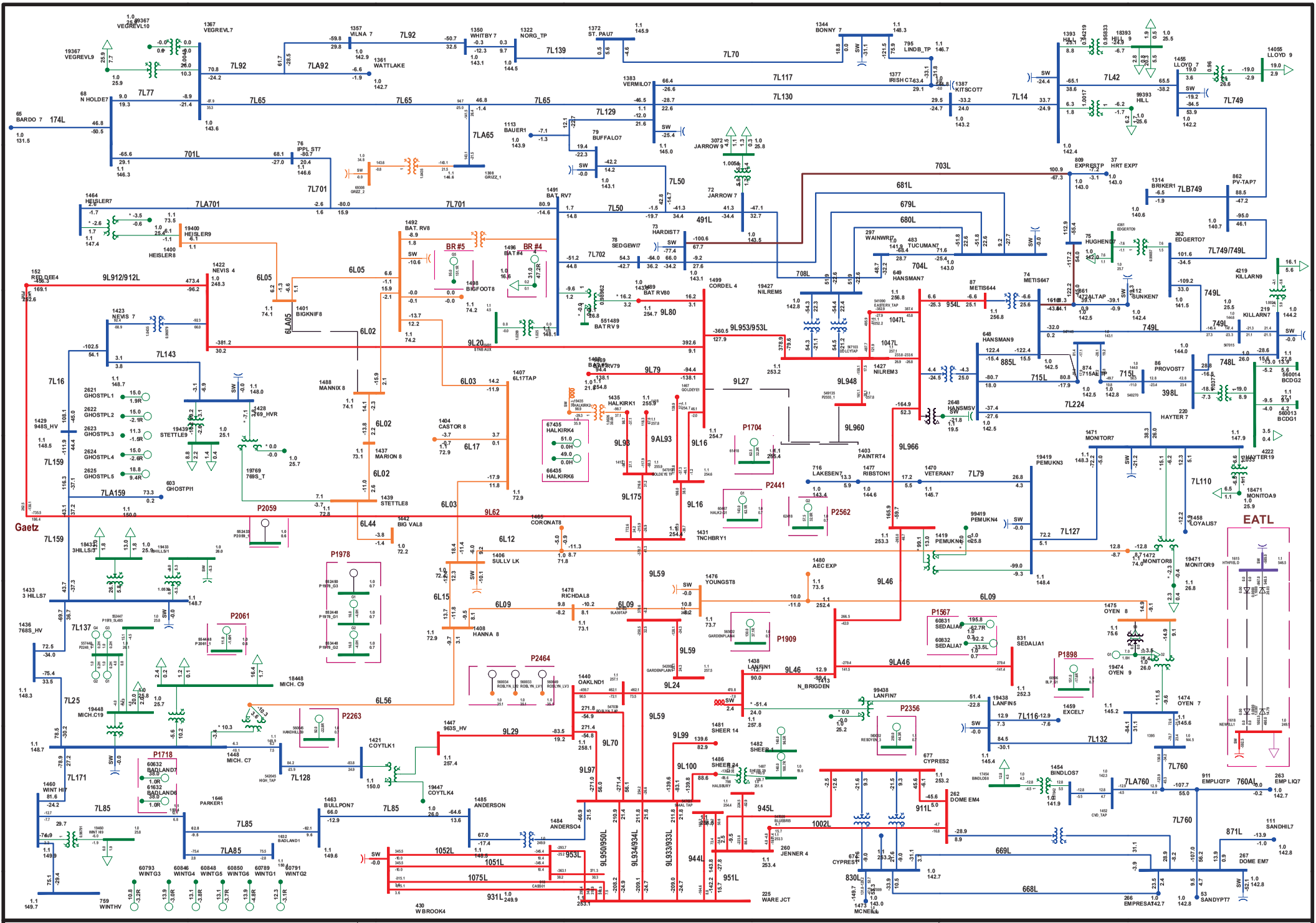
kV: >0.000 <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 <=500.000 >500.000

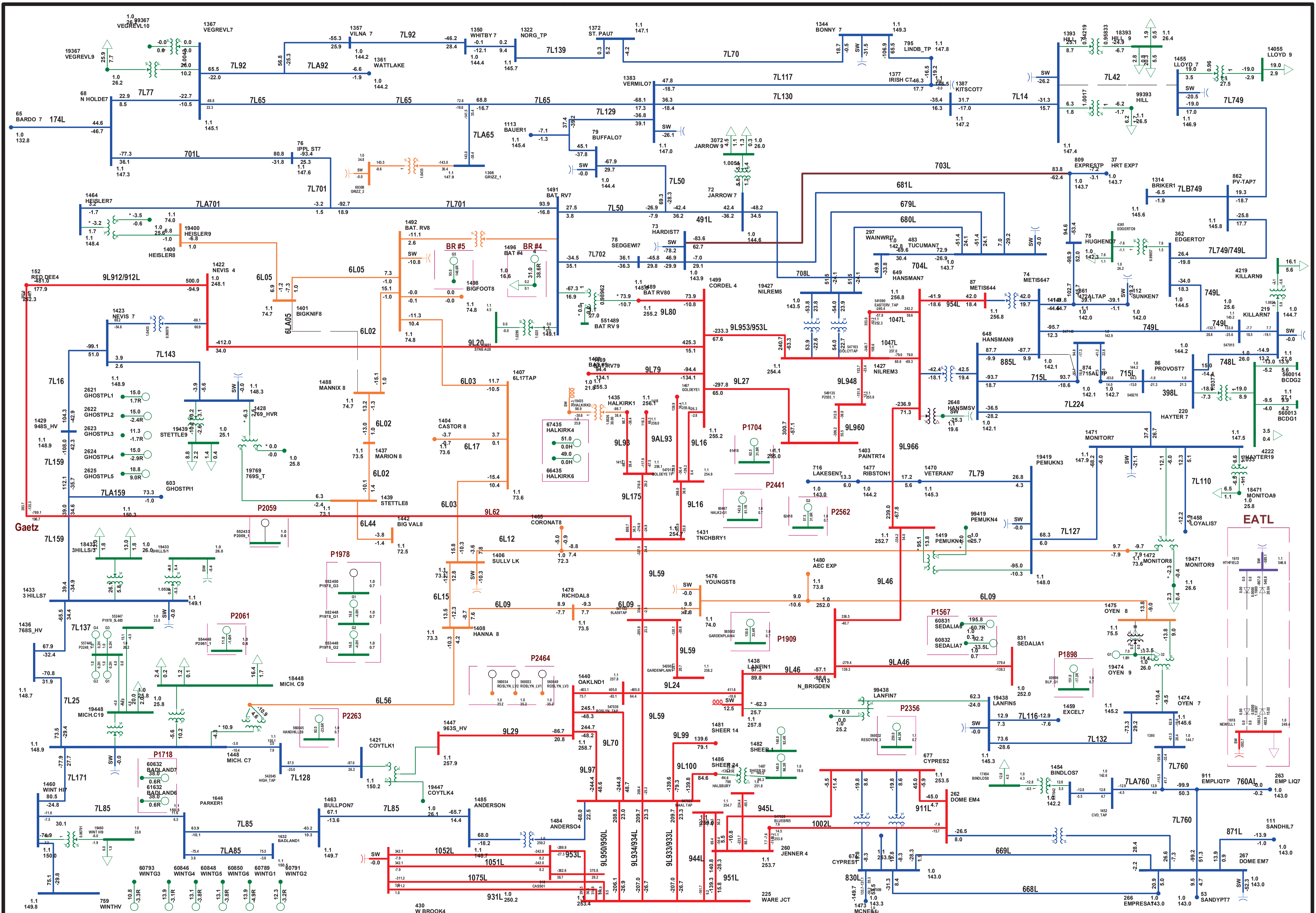
1


Gaetz
EATL
P2464 - Sunnynook Solar Battery Project
CATEGORY B, LOSS OF EDGERTON_899ST3
SCENARIO 3_2028WP_PRE_PROJECT
THU, APR 11 2024 13:47
A2 - 50
Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate B
kV: >0.000 <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 <=500.000 >500.000


Gaetz
EATL
P2464 - Sunnynook Solar Battery Project
CATEGORY B, LOSS OF HILL 751S_TIEXMER
SCENARIO 3_2028WP_PRE_PROJECT
THU, APR 11 2024 13:47
A2 - 51
Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate B
kV: >0.000 <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 <=500.000 >500.000


Gaetz
EATL
P2464 - Sunnynook Solar Battery Project
CATEGORY B, LOSS OF LANFINE 959S 901T
SCENARIO 3_2028WP_PRE_PROJECT
FRI, APR 12 2024 11:19
A2 - 52
Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate B
kV: >0.000 <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 <=500.000 >500.000


Gaetz
EATL
P2464 - Sunnynook Solar Battery Project
CATEGORY B, LOSS OF PAINTEARTH CREEK 863S 902T
SCENARIO 3_2028WP_PRE_PROJECT
THU, APR 11 2024 13:48
A2 - 53
Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate B
kV: >0.000 <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 <=500.000 >500.000



P2464 - Sunnynook Solar Battery Project

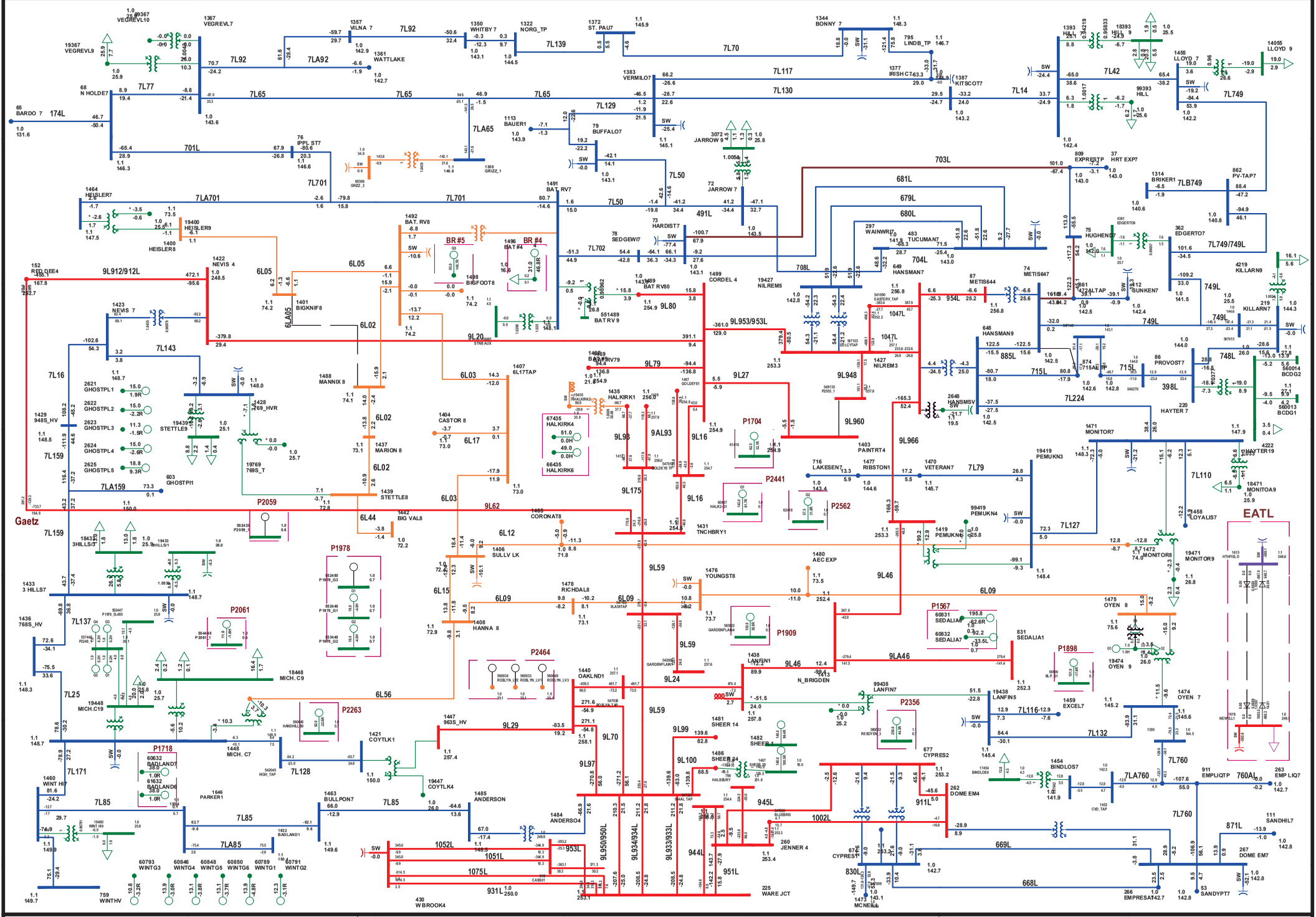
CATEGORY B, LOSS OF 7L42 (HILL 751S - LLOYDMINSTER 716S)
SCENARIO 3_2028WP_PRE_PROJECT
THU, APR 11 2024 13:48

A2 - 54

Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate B

kV: >0.000 <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 <=500.000 >500.000

1



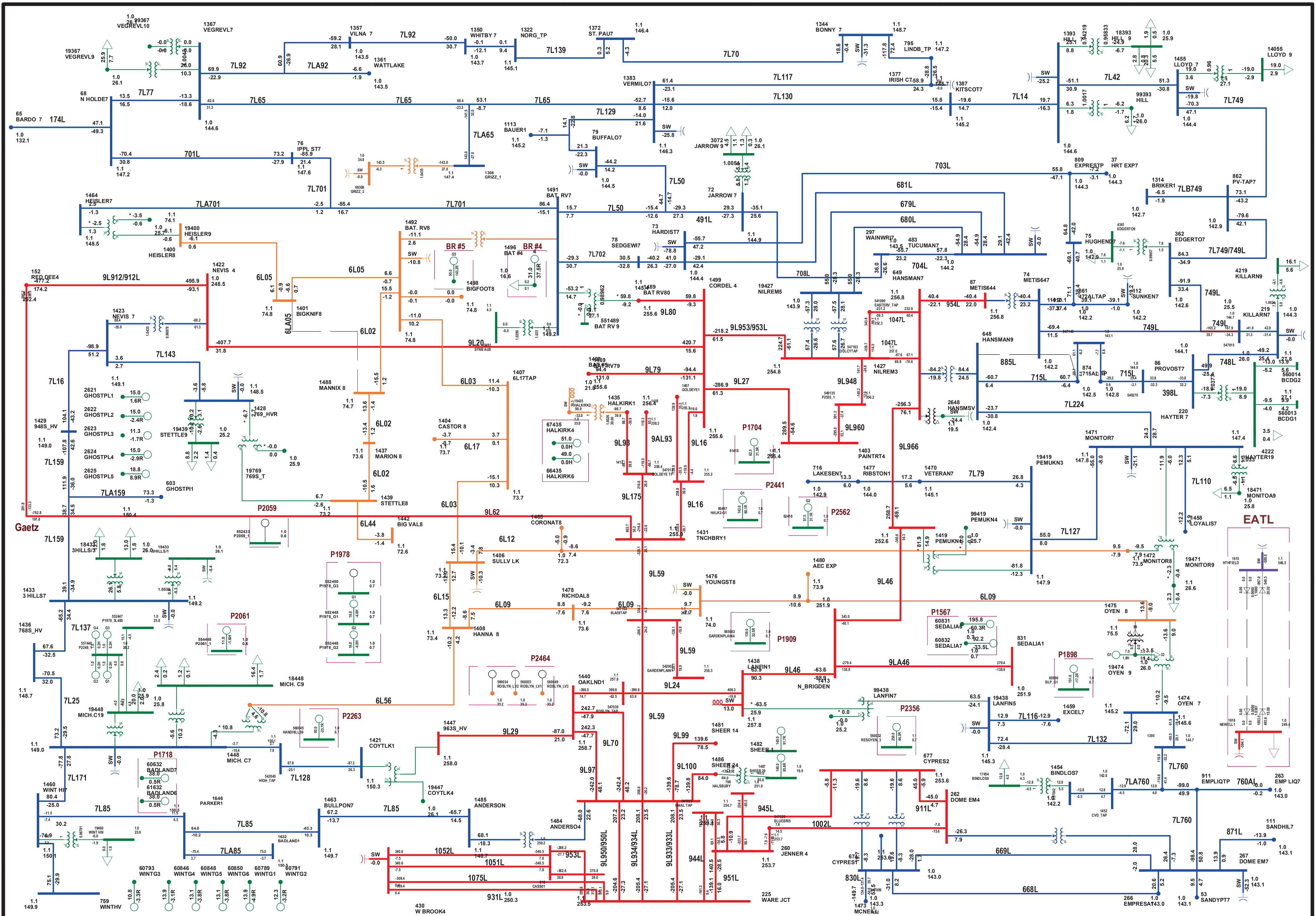
P2464 - Sunnynook Solar Battery Project

CATEGORY B, LOSS OF 9L960 (PAINTEARTH 863S - P2555_BUS 54913
SCENARIO 3_2028WP_PRE_PROJECT
THU, APR 11 2024 13:48

A2 - 55

Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate B

kV: >0.000 <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 <=500.000 >500.000



P2464 - Sunnynook Solar Battery Project

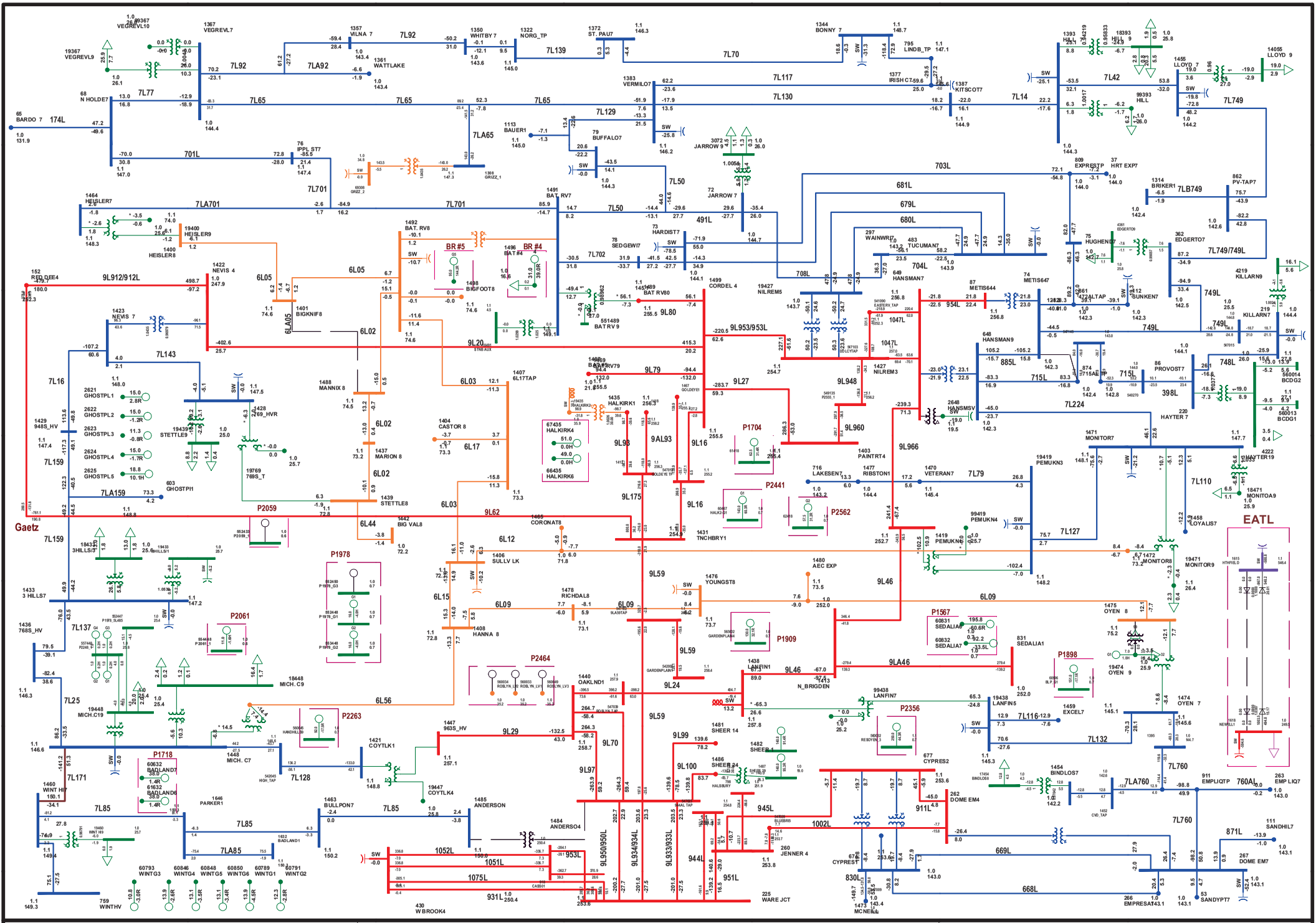
CATEGORY B, LOSS OF 885L (METISKOW 648S - HANSMAN LAKE 650S)
SCENARIO 3_2028WP_PRE_PROJECT
THU, APR 11 2024 13:49

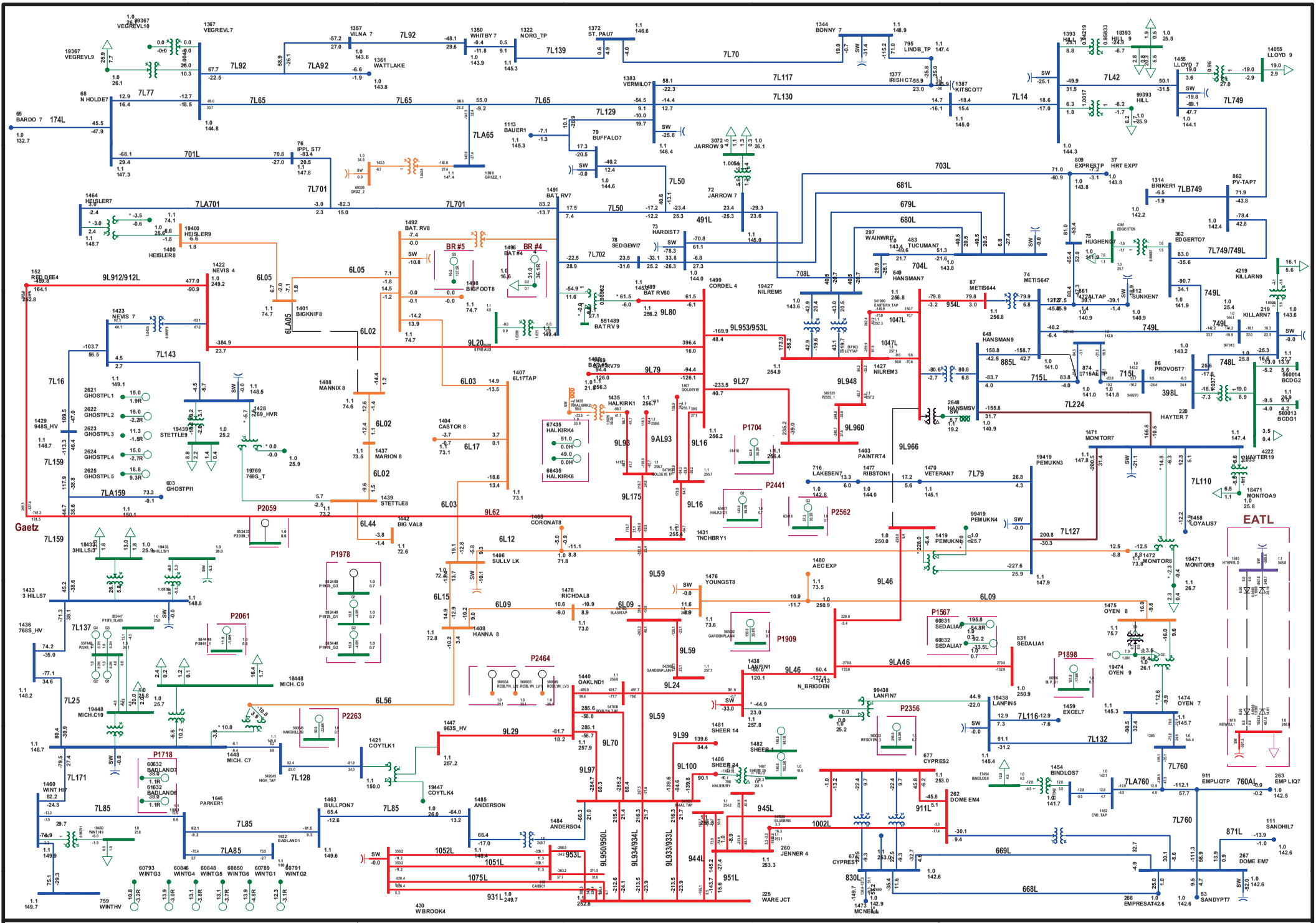
A2 - 56

Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate B

kV: >0.000 <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 <=500.000 >500.000

1


Gaetz
EATL
P2464 - Sunnynook Solar Battery Project
CATEGORY B, LOSS OF ANDERSON 801S_901T
SCENARIO 3_2028WP_PRE_PROJECT
THU, APR 11 2024 13:49
A2 - 57
Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate B
kV: >0.000 <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 <=500.000 >500.000



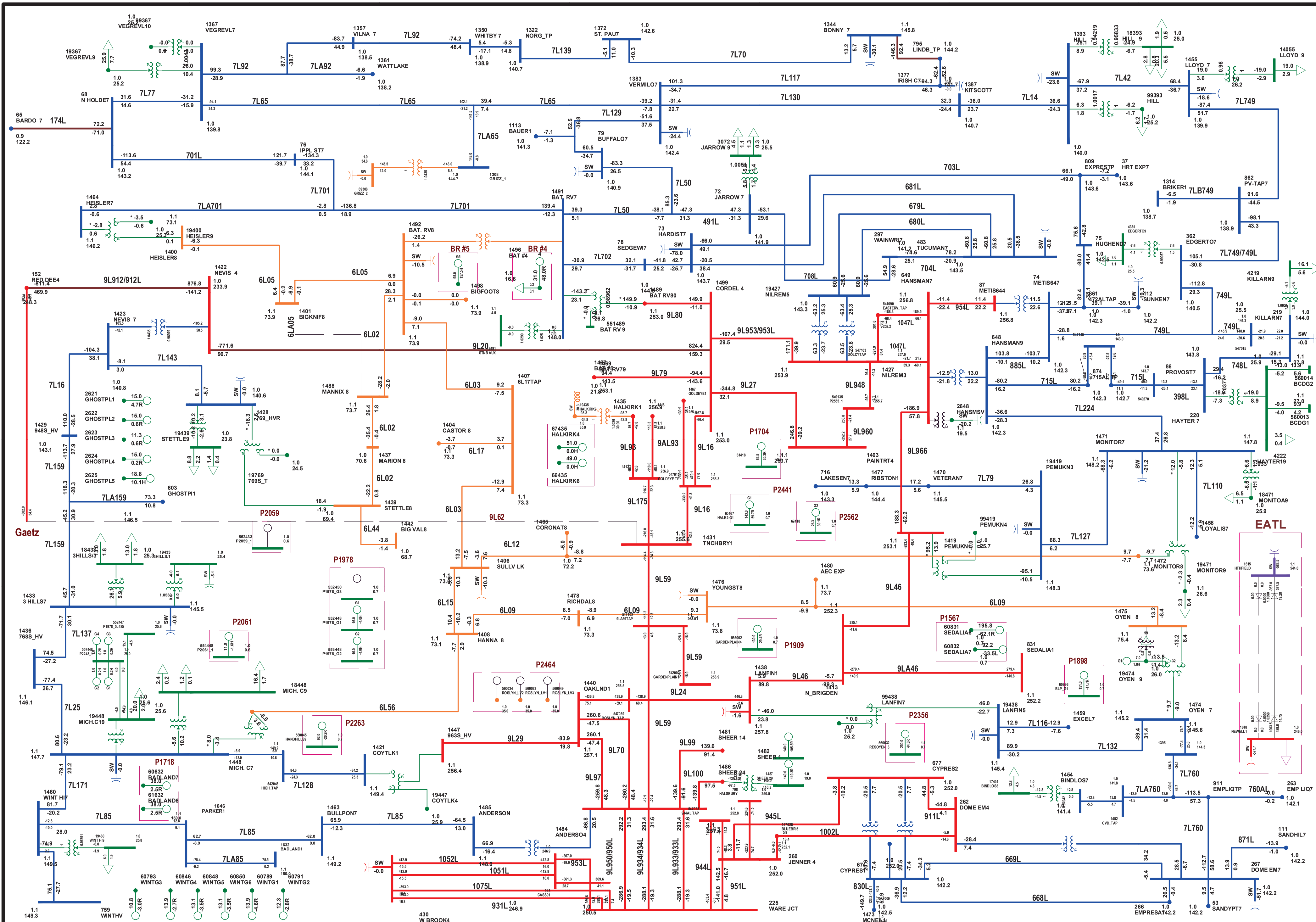
P2464 - Sunnynook Solar Battery Project

CATEGORY B, LOSS OF 9L966 (HANSMAN LAKE 650S - PEMUKAN 932S)
SCENARIO 3_2028WP_PRE_PROJECT
THU, APR 11 2024 13:49

A2 - 58

Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate B

kV: >0.000 <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 <=500.000 >500.000



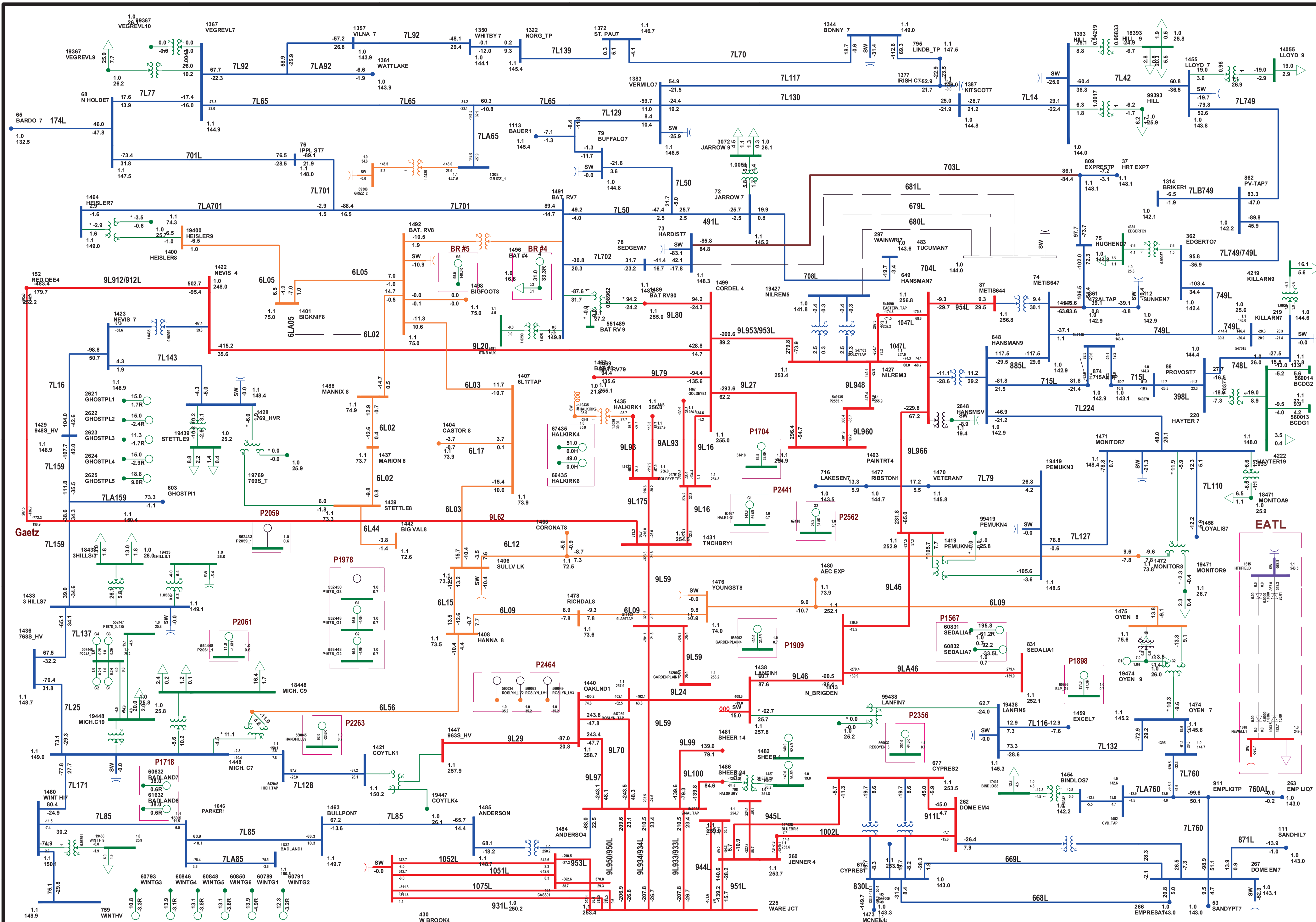
P2464 - Sunnynook Solar Battery Project

CATEGORY B, LOSS OF 9L62 (TINCHEBRAY 972S - GAETZ 87S)
SCENARIO 3_2028WP_PRE_PROJECT
THU, APR 11 2024 13:49

A2 - 59

Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate B

kV: >0.000 <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 <=500.000 >500.000



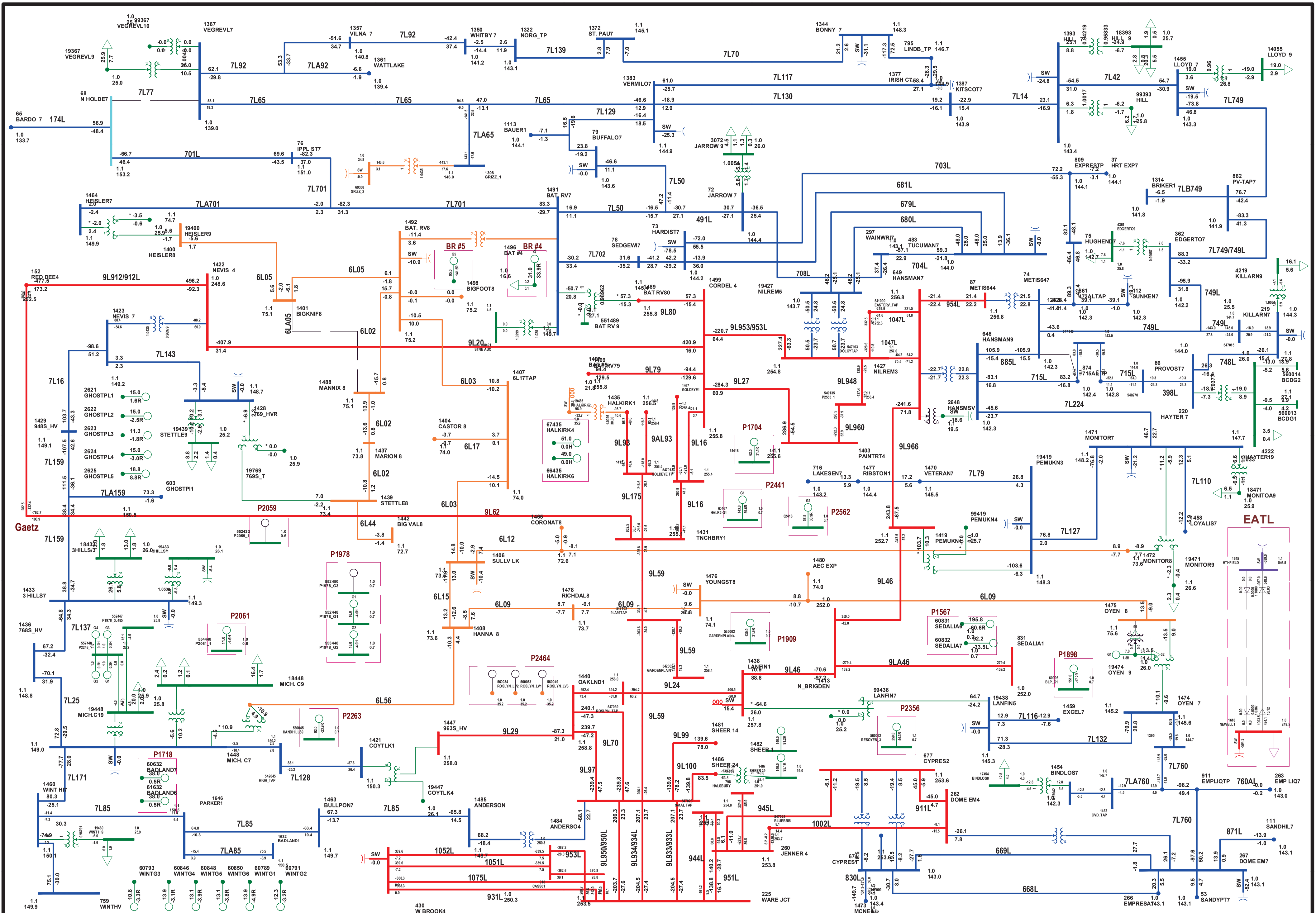
P2464 - Sunnynook Solar Battery Project

CATEGORY B, LOSS OF TUCUMAN 478S TRANSFORMERS
SCENARIO 3_2028WP_PRE_PROJECT
THU, APR 11 2024 13:50

A2 - 60

Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate B

kV: >0.000 <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 <=500.000 >500.000



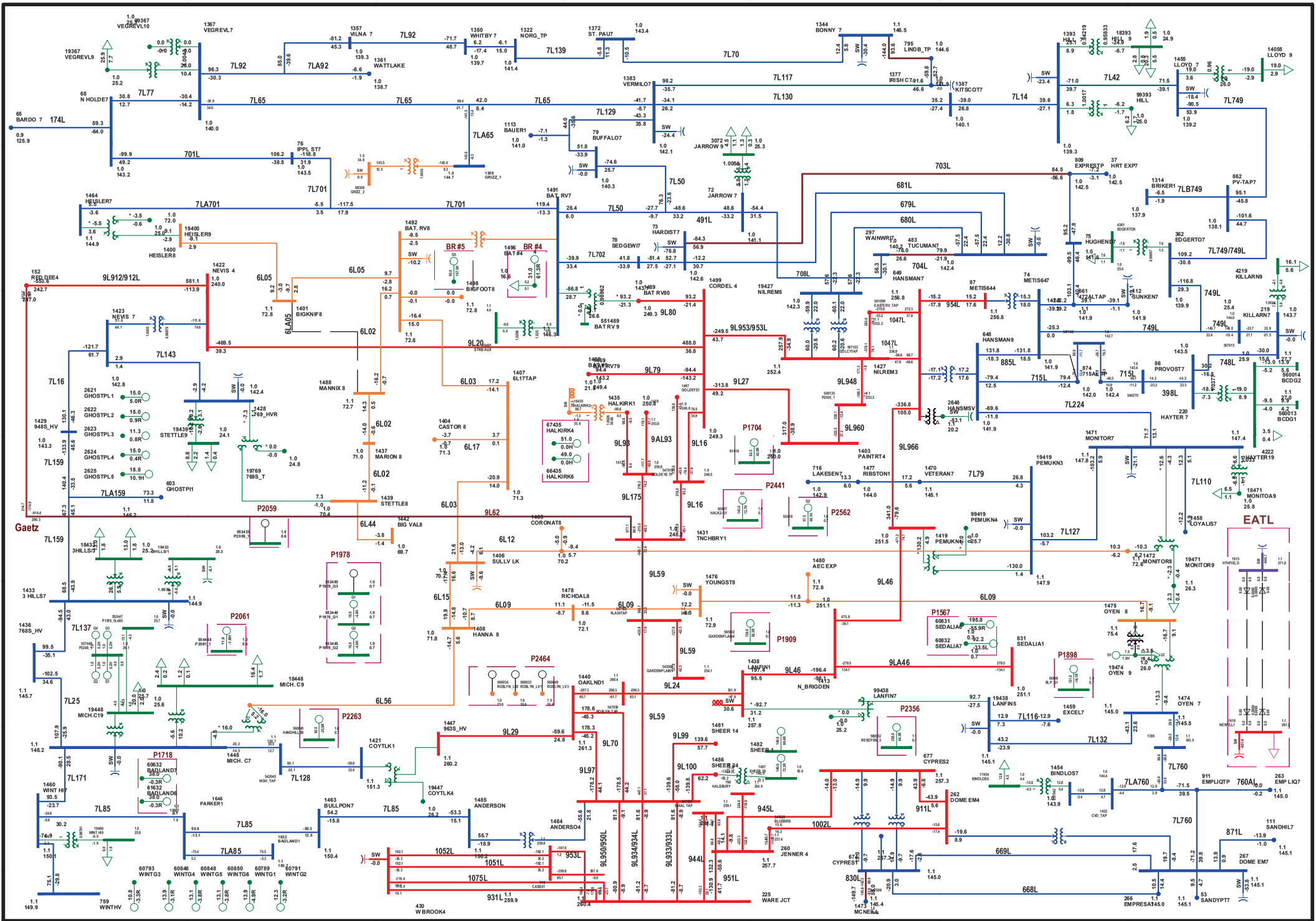
P2464 - Sunnynook Solar Battery Project

CATEGORY B, LOSS OF 7L77 (HOLDEN 395S - VEGREVILLE 709S)
SCENARIO 3_2028WP_PRE_PROJECT
FRI, APR 12 2024 16:17

A2 - 61

Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate B

kV: >0.000 <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 <=500.000 >500.000


Gaetz
EATL
P2464 - Sunnynook Solar Battery Project
CATEGORY B, LOSS OF EATL
SCENARIO 3_2028WP_PRE_PROJECT
FRI, APR 12 2024 8:19
A2 - 62
Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate B
kV: >0.000 <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 <=500.000 >500.000

Attachment A3
Post- Project Power Flow Diagrams
(Scenarios 4, 5, 6)

Post-Project Power Flow Results

Power Flow Diagrams

The post-Project power flow diagrams for Scenario 4 2028 SL, Scenario 5 2028 SP, and Scenario 6 2028 WP under Category A condition and Category B contingencies are provided in this attachment as identified in the following tables.

Table A3-1: List of post-Project Scenario 4 2028 SL Power Flow Diagrams

Scenario	Load flow diagram	Page number
2028 SL Scenario 4	CATEGORY A, N-0 (System Normal Condition)	A3-7
	CATEGORY B, Loss of 681L (Tucuman 478S - Hardisty 377S)	A3-8
	CATEGORY B, Loss of 6L09 (Hanna 763S – Oyen 767S)	A3-9
	CATEGORY B, Loss of 703L (Hughenden 213S - Hardisty 377S)	A3-10
	CATEGORY B, Loss of 749L (Edgerton 899S - Metiskow 648S)	A3-11
	CATEGORY B, Loss of 769L (Rosyth 296S - Hardisty 377S)	A3-12
	CATEGORY B, Loss of 7L116 (Excel 910S - Lanfine 959S)	A3-13
	CATEGORY B, Loss of 7L127 Pemukan 932S - Monitor 774S)	A3-14
	CATEGORY B, Loss of 7L749 (Edgerton 899S - Lloyminster 716S)	A3-15
	CATEGORY B, Loss of 7L79 (Pemukan 932S - Ribstone Creek 892S)	A3-16
	CATEGORY B, Loss of 7L92 (Vegreville 709S - Whitby Lake 819S)	A3-17
	CATEGORY B, Loss of 9L20 (Nevis 766S - Cordel 755S)	A3-18
	CATEGORY B, Loss of 9L24 (Lanfine 959S - Oakland 946S)	A3-19
	CATEGORY B, Loss of 9L27 (Paintearth Creek - Cordel 755S)	A3-20
	CATEGORY B, Loss of 9L70 (Oakland 946S - Anderson 801S)	A3-21
	CATEGORY B, Loss of 9L912 (Nevis 766S – Red Deer 63S)	A3-22
	CATEGORY B, Loss of 9L953 (Cordel 755S - Nilrem 574S)	A3-23
	CATEGORY B, Loss of 9L97 (Oakland 946S - Anderson 801S)	A3-24
	CATEGORY B, Loss of Hardisty 377S T1 Transformer	A3-25
	CATEGORY B, Loss of Buffalo Creek 526S_Xmers	A3-26
	CATEGORY B, Loss of Edgerton_899ST3	A3-27
	CATEGORY B, Loss of Empress_394S_T1	A3-28
	CATEGORY B, Loss of Excel 910S Transformer 701T	A3-29
	CATEGORY B, Loss of Hill 751S_TIEXMER	A3-30
	CATEGORY B, Loss of Holden 395S Transformer T1	A3-31
	CATEGORY B, Loss of Jarrow 252S Transformer T2	A3-32
	CATEGORY B, Loss of Metiskow_648ST1	A3-33
	CATEGORY B, Loss of Paintearth Creek 863S 902T	A3-34

Scenario	Load flow diagram	Page number
	CATEGORY B, Loss of Pemukan 932S 901T	A3-35
	CATEGORY B, Loss of 7L42 (Hill 751S - Lloydminster 716S)	A3-36
	CATEGORY B, Loss of 9L960 (Paintearth 863S - P2555_Bus 549135)	A3-37
	CATEGORY B, Loss of 933L (Anderson 801S - Ware Junction 132S)	A3-38
	CATEGORY B, Loss of 934L (Anderson 801S - Ware Junction 132S)	A3-39
	CATEGORY B, Loss of 950L (Anderson 801S - Ware Junction 132S)	A3-40
	CATEGORY B, Loss of 9L966 (Hansman Lake 650S - Pemukan 932S)	A3-41
	CATEGORY B, Loss of 914L (Red Deer 63S - Gaetz 87S)	A3-42
	CATEGORY B, Loss of 9L62 (Tinchebray 972S - Gaetz 87S)	A3-43
	CATEGORY B, Loss of Tucuman 478S Transformers	A3-44
	CATEGORY B, Loss of Wainwright 51S Transformer T3	A3-45
	CATEGORY B, Loss of 7L77 (Holden 395S - Vegreville 709S)	A3-46
	CATEGORY B, Loss of EATL (Newell 2075S - Heathfield 2029S)	A3-47

Table A3-2: List of post-Project Scenario 5 2028 SP Power Flow Diagrams

Scenario	Load flow diagram	Page number
2028 SP Scenario 5	CATEGORY A, N-0 (System Normal Condition)	A3-48
	CATEGORY B, Loss of 681L (Tucuman 478S - Hardisty 377S)	A3-49
	CATEGORY B, Loss of 7L116 (Excel 910S - Lanfine 959S)	A3-50
	CATEGORY B, Loss of 7L137 (Three Hills 770S - Rowley 768S)	A3-51
	CATEGORY B, Loss of 7L16 (Nevis 766S - Heatburg 948S)	A3-52
	CATEGORY B, Loss of 7L25 (Michichi Creek 802S - Rowley 768S)	A3-53
	CATEGORY B, Loss of 7L749 (Edgerton 899S - Lloyminster 716S)	A3-54
	CATEGORY B, Loss of 7L79 (Pemukan 932S - Ribstone Creek 892S)	A3-55
	CATEGORY B, Loss of 9L20 (Nevis 766S - Cordel 755S)	A3-56
	CATEGORY B, Loss of 9L24 (Lanfine 959S - Oakland 946S)	A3-57
	CATEGORY B, Loss of 9L27 (Paintearth Creek - Cordel 755S)	A3-58
	CATEGORY B, Loss of 9L29 (Coyote Lake 963S - Oakland 946S)	A3-59
	CATEGORY B, Loss of 9L70 (Oakland 946S - Anderson 801S)	A3-60
	CATEGORY B, Loss of 9L912 (Nevis 766S – Red Deer 63S)	A3-61
	CATEGORY B, Loss of 9L953 (Cordel 755S - Nilrem 574S)	A3-62

Scenario	Load flow diagram	Page number
	CATEGORY B, Loss of 9L97 (Oakland 946S - Anderson 801S)	A3-63
	CATEGORY B, Loss of Hardisty 377S T1 Transformer	A3-64
	CATEGORY B, Loss of Edgerton_899ST3	A3-65
	CATEGORY B, Loss of Empress_394S_T1	A3-66
	CATEGORY B, Loss of Excel 910S Transformer 701T	A3-67
	CATEGORY B, Loss of Metiskow_648ST1	A3-68
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	CATEGORY B, Loss of Nevis 766S_903T	A3-72
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	CATEGORY B, Loss of 748L (Killarney 267S - Hayter 277S)	A3-75
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	CATEGORY B, Loss of Tucuman 478S Transformers	A3-81
	CATEGORY B, Loss of 703L (Hughenden 213S - Hardisty 377S)	A3-82
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Scenario	Load flow diagram	Page number
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Scenario	Load flow diagram	Page number
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	CATEGORY B, Loss of 7L159 (Three Hills 770S - Heatburg 948S)	A3-129
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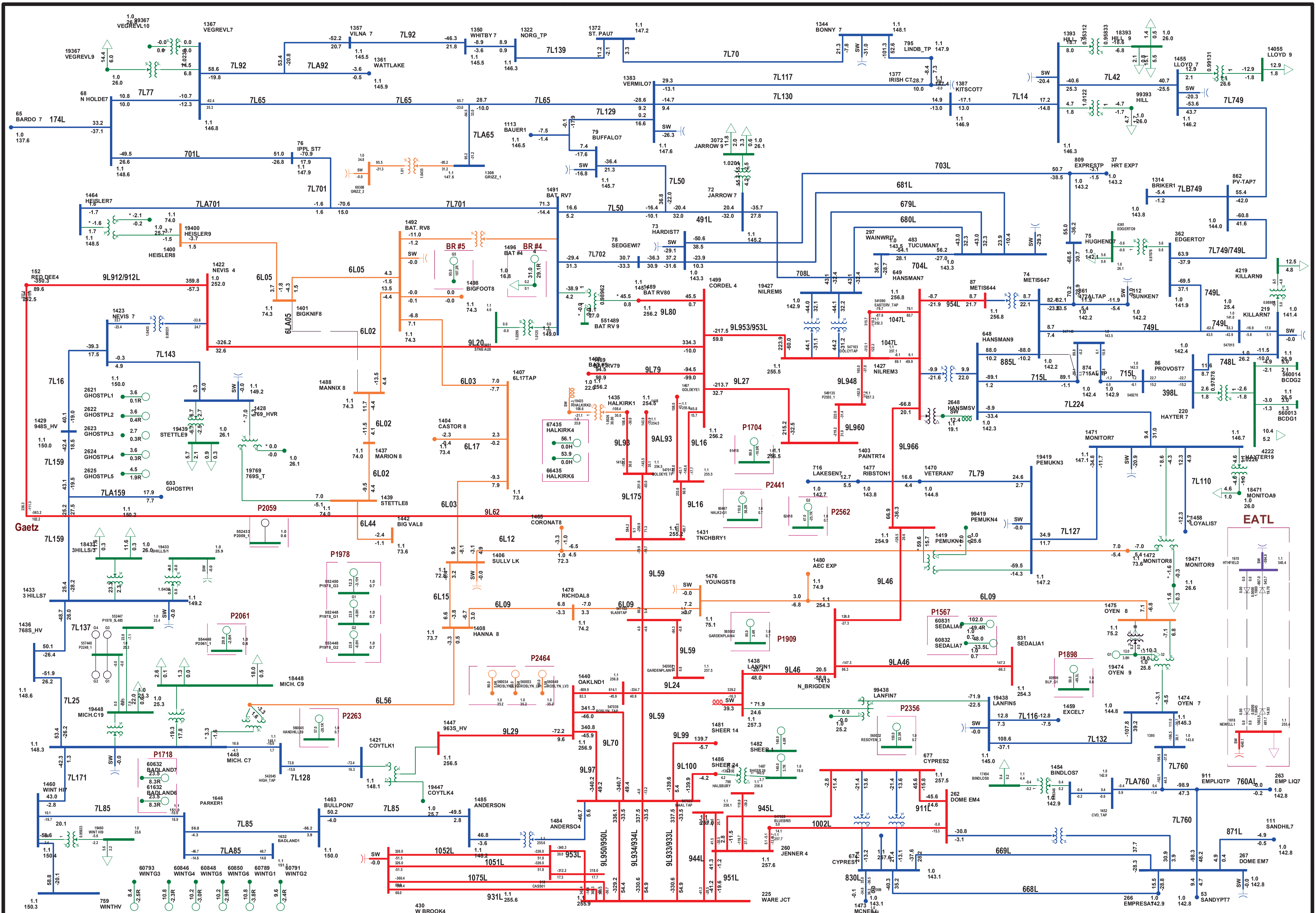
	CATEGORY B, Loss of EATL (Newell 2075S - Heathfield 2029S)	A3-131

Scenario 4
2028 SL Post-Project (Alternative 2)



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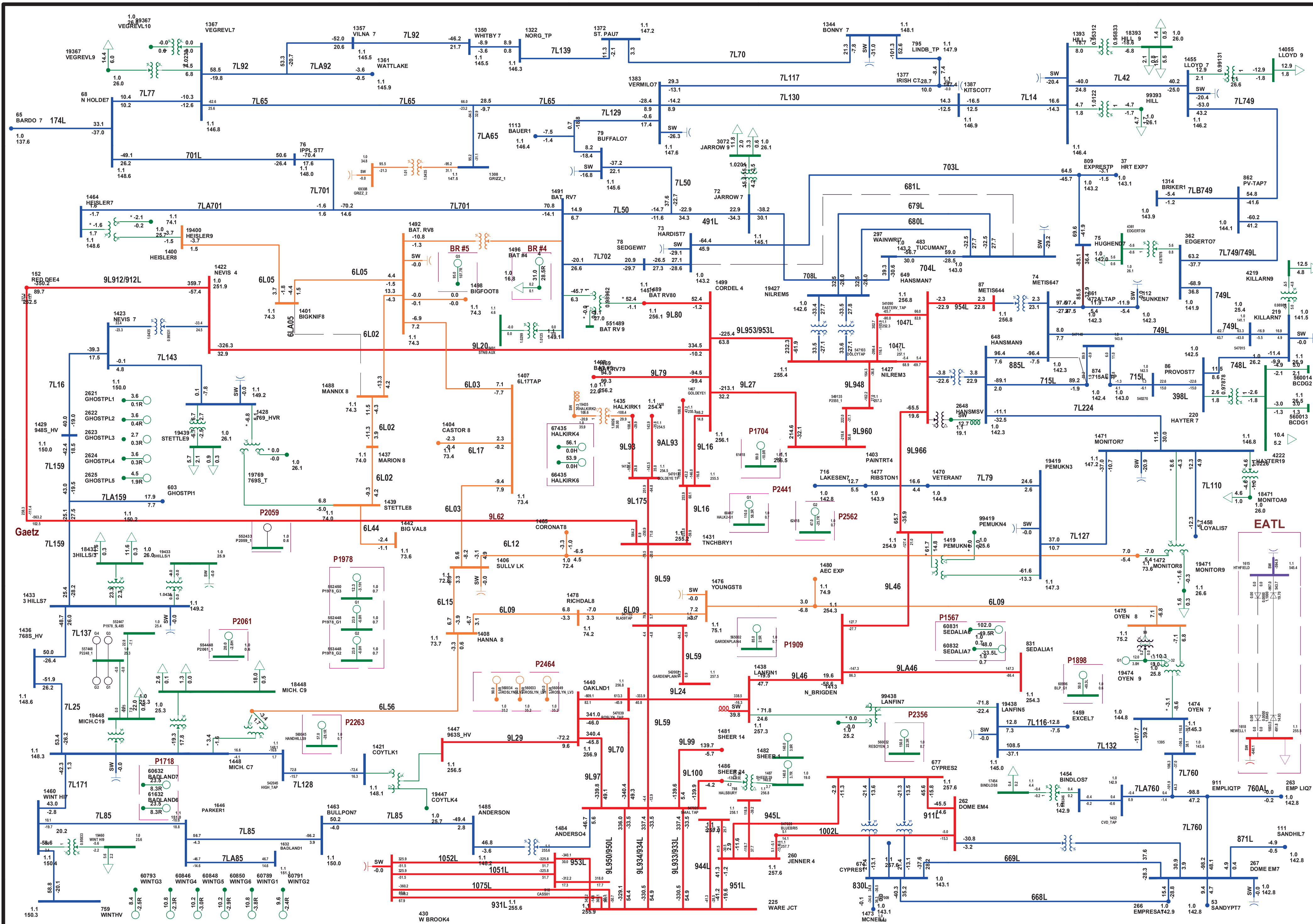
CATEGORY A, N-0
SCENARIO 4_2028SL_POST-PROJECT
THU, APR 11 2024 14:29

A3 - 7

Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A

kV: >0.000 <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 <=500.000 >500.000



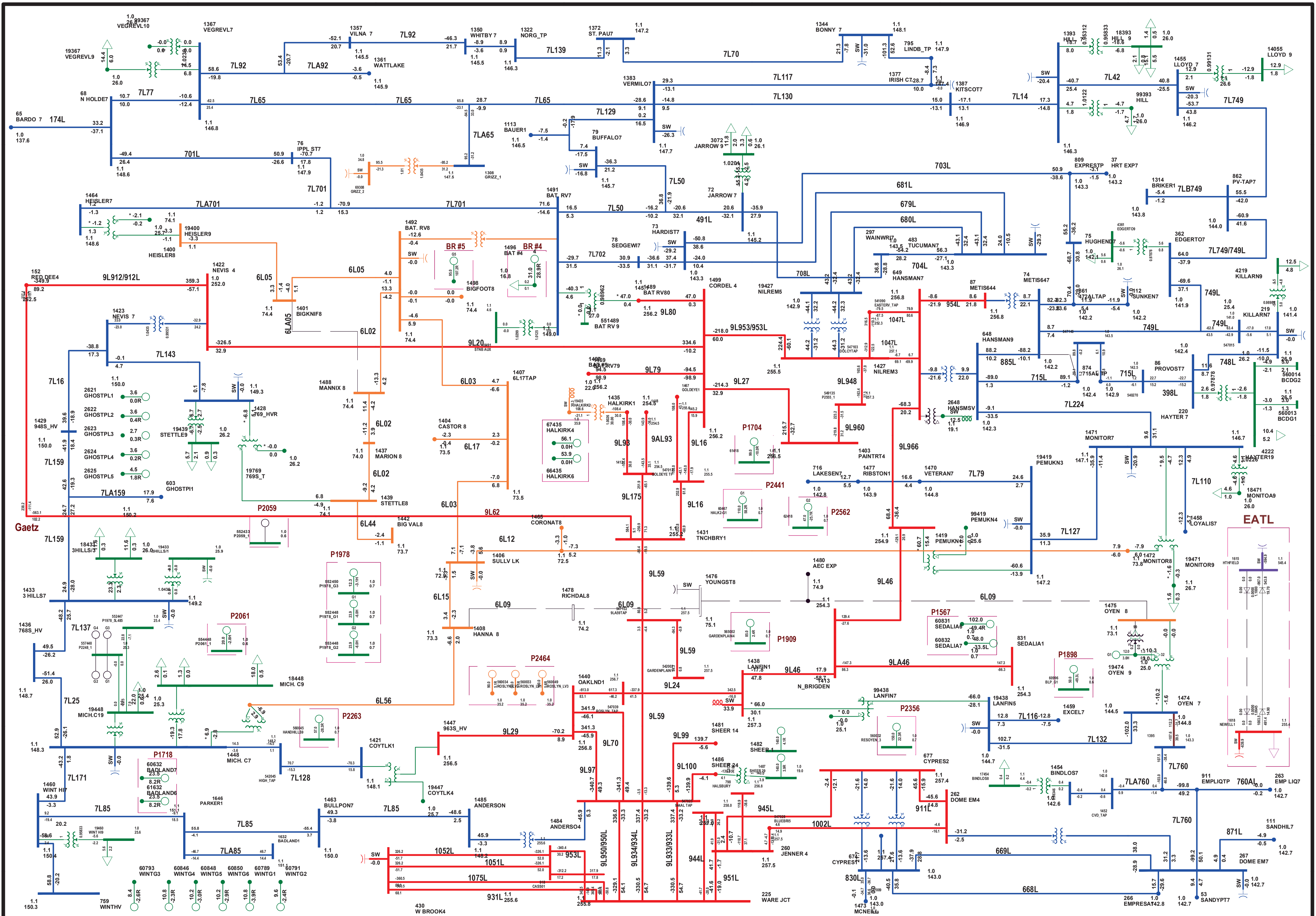
P2464 - Sunnynook Solar Battery Project

CATEGORY B, LOSS OF 681L (TUCUMAN 478S - HARDISTY 377S)
SCENARIO 4_2028SL_POST-PROJECT
THU, APR 11 2024 14:29

A3 - 8

Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A

kV: >0.000 <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 <=500.000 >500.000



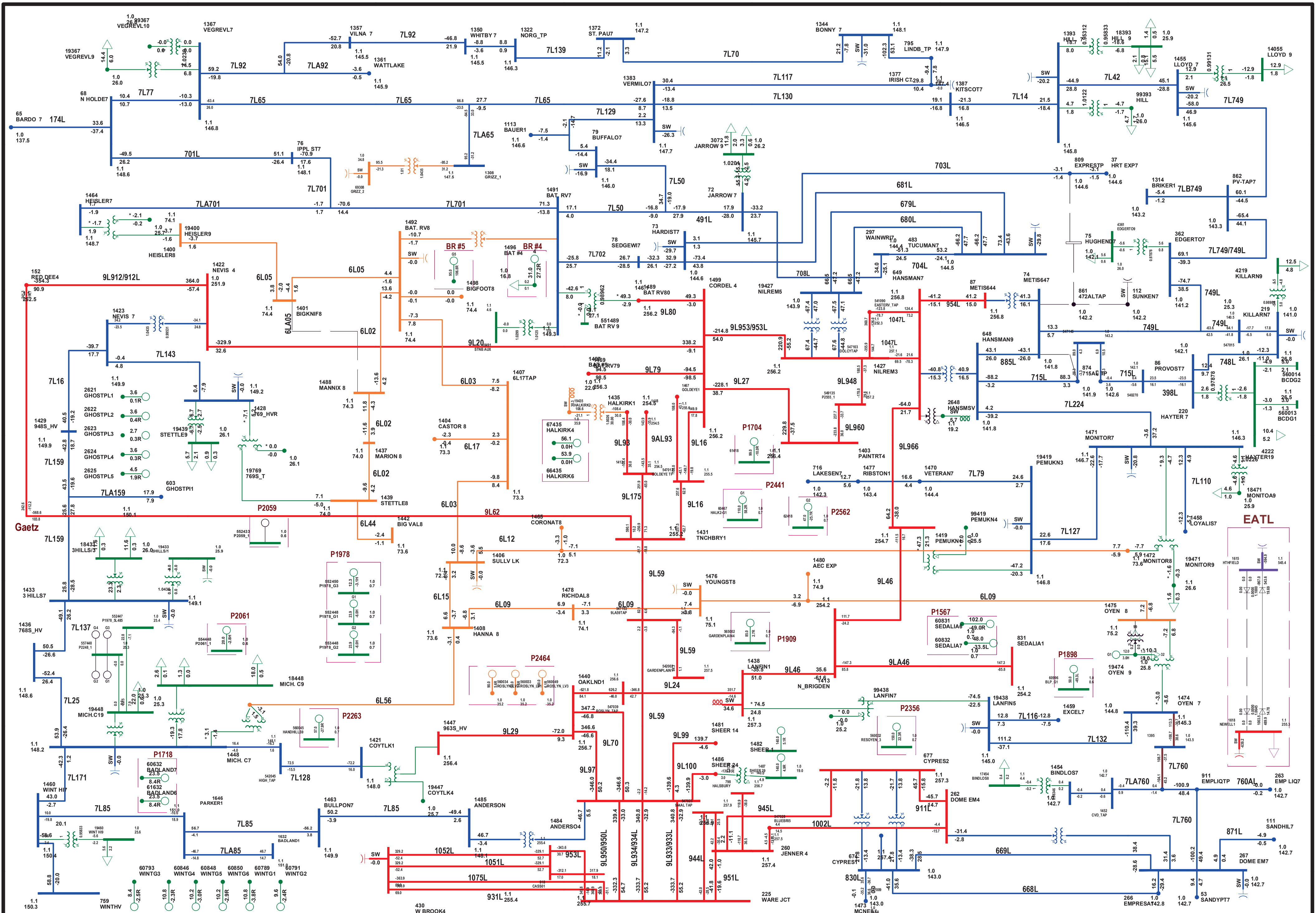
P2464 - Sunnynook Solar Battery Project

CATEGORY B, LOSS OF 6L09 (HANNA 763S - OYEN 767S)
SCENARIO 4_2028SL_POST-PROJECT
FRI, APR 12 2024 11:23

A3 - 9

Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A

kV: >0.000 <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 <=500.000 >500.000



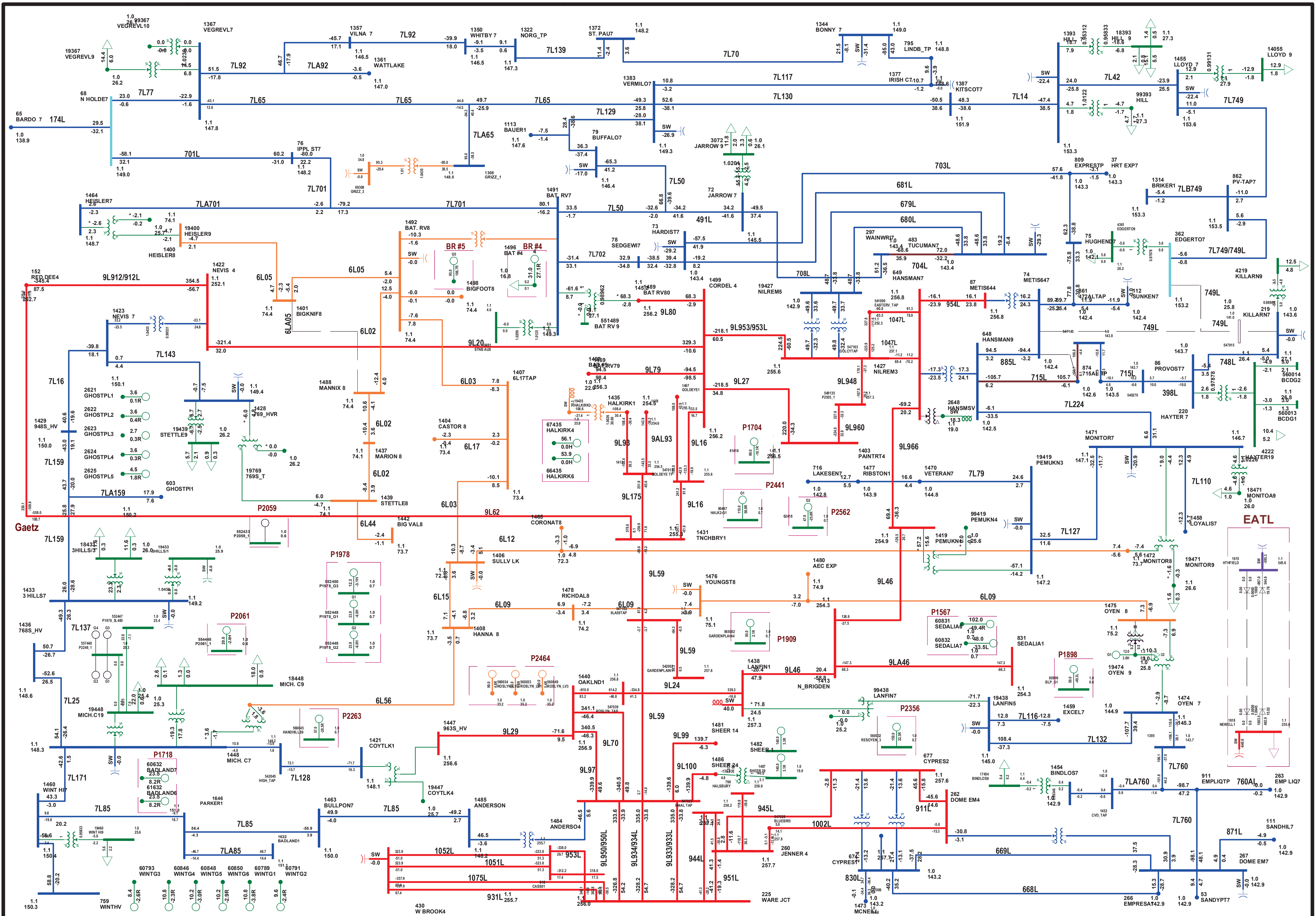
P2464 - Sunnynook Solar Battery Project

CATEGORY B, LOSS OF 703L (HUGHENDEN 213S - HARDISTY 377S)
SCENARIO 4_2028SL_POST-PROJECT
FRI, APR 12 2024 8:45

A3 - 10

Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A

kV: >0.000 <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 <=500.000 >500.000



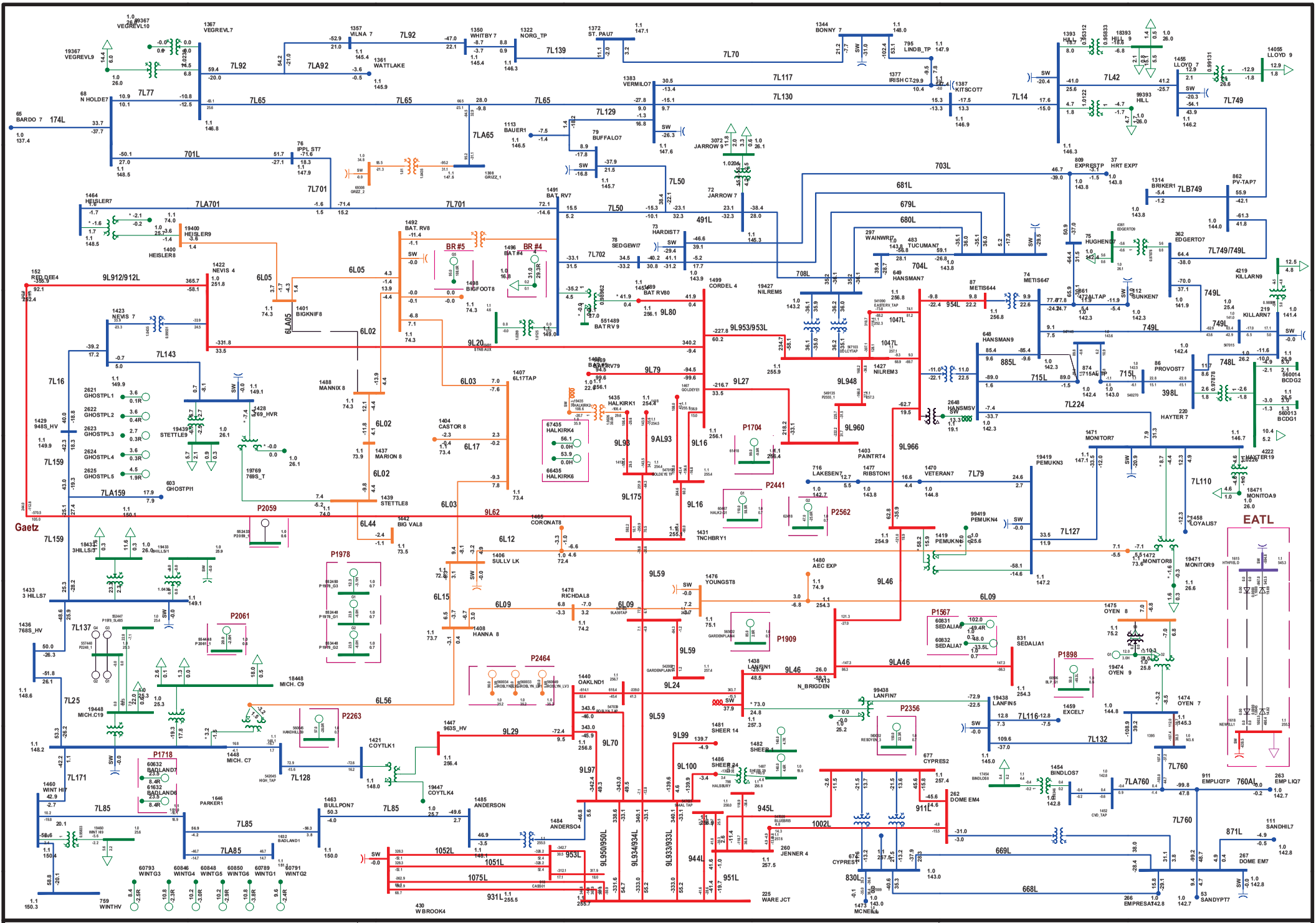
P2464 - Sunnynook Solar Battery Project

CATEGORY C, LOSS OF 749L (EDGERTON 899S - METISKOW 648S)
SCENARIO 4_2028SL_POST-PROJECT
FRI, APR 12 2024 16:30

A3 - 11

Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A

kV: >0.000 <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 <=500.000 >500.000



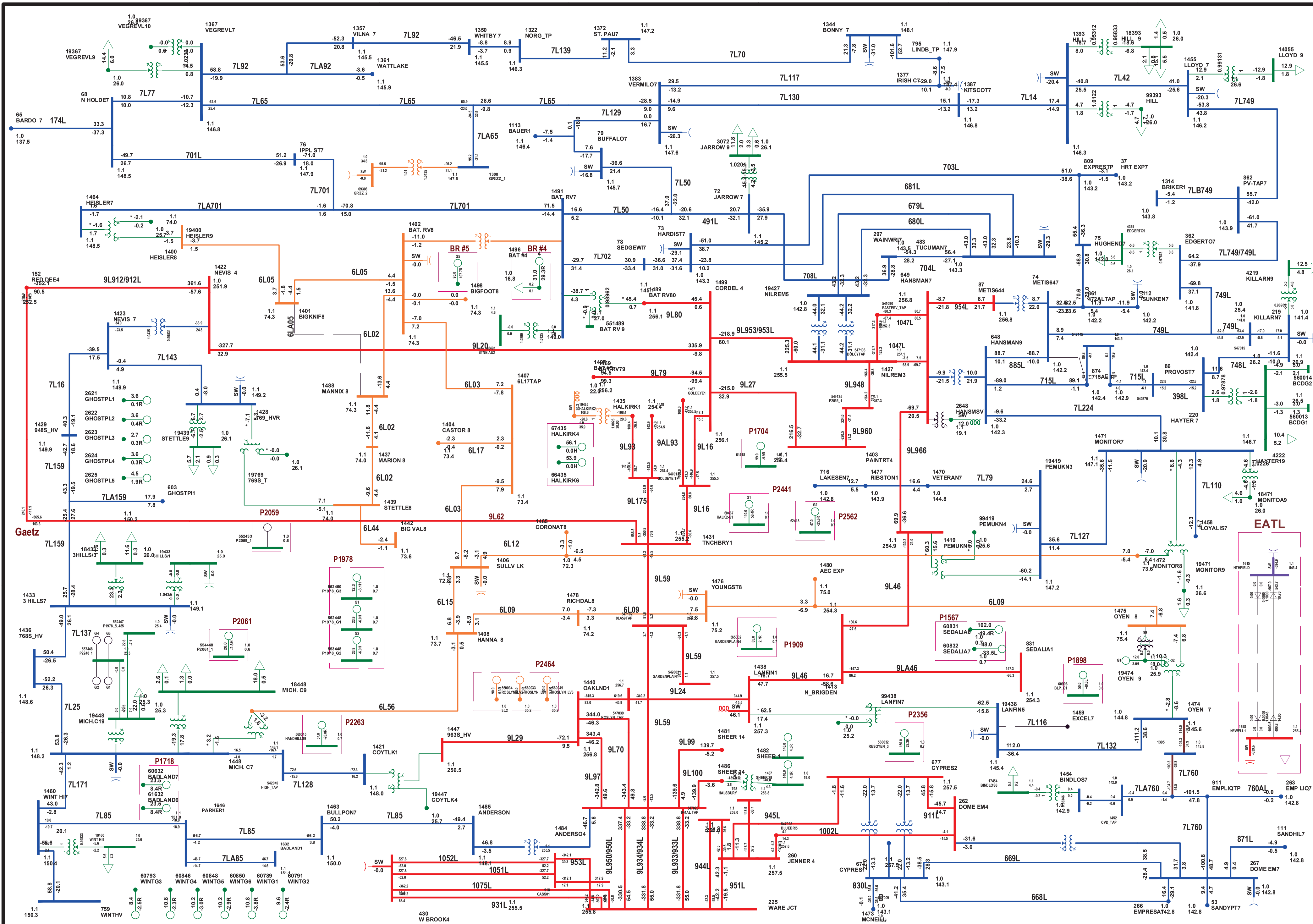
P2464 - Sunnynook Solar Battery Project

CATEGORY B, LOSS OF 769L (ROSYTH 296S - HARDISTY 377S)
SCENARIO 4_2028SL_POST-PROJECT
FRI, APR 12 2024 8:45

A3 - 12

Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A

kV: >0.000 <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 <=500.000 >500.000



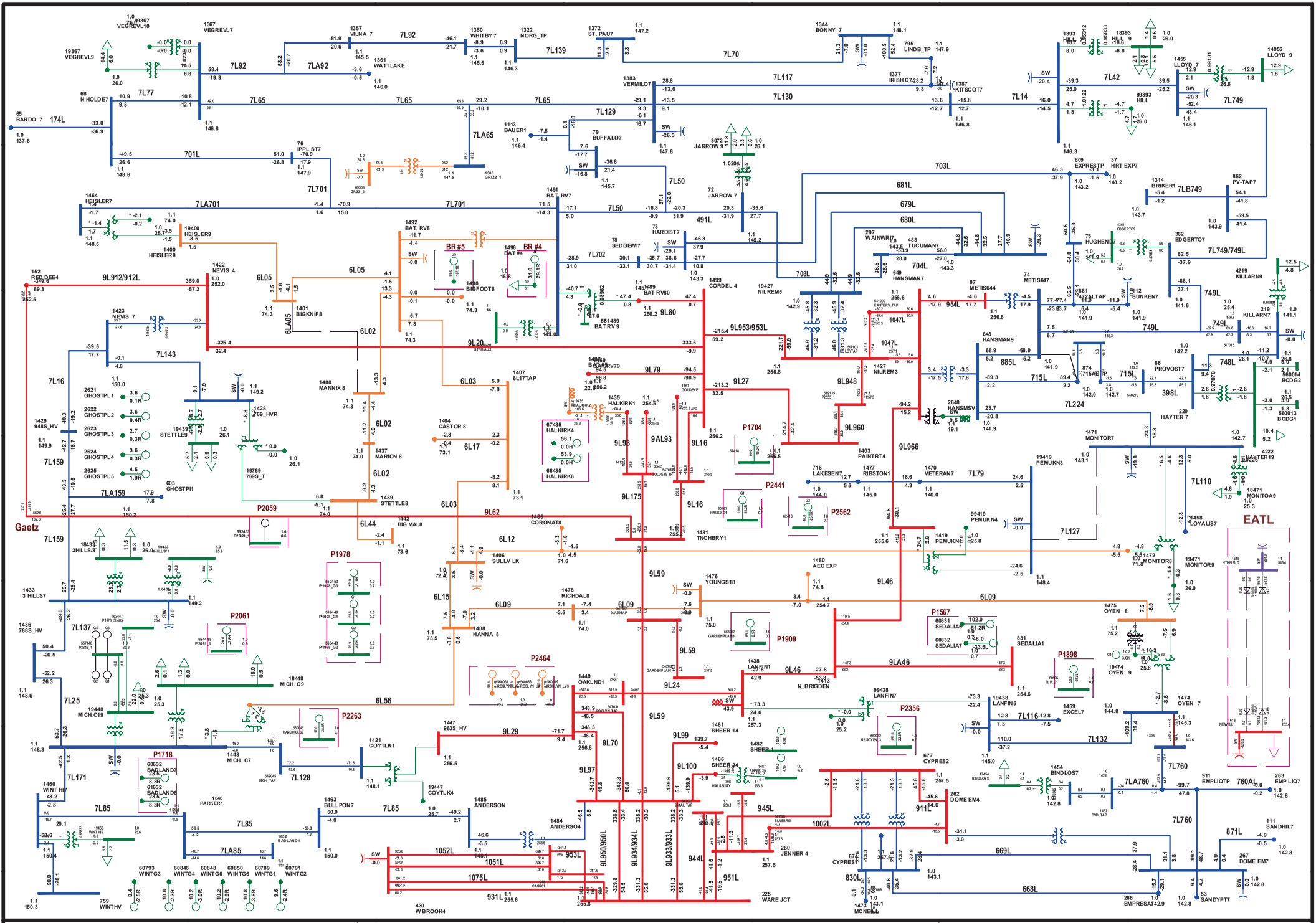
P2464 - Sunnynook Solar Battery Project

CATEGORY B, LOSS OF 7L116 (EXCEL 910S - LANFINE 959S)
SCENARIO 4_2028SL_POST-PROJECT
THU, APR 11 2024 14:29

A3 - 13

Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A

kV: >0.000 <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 <=500.000 >500.000



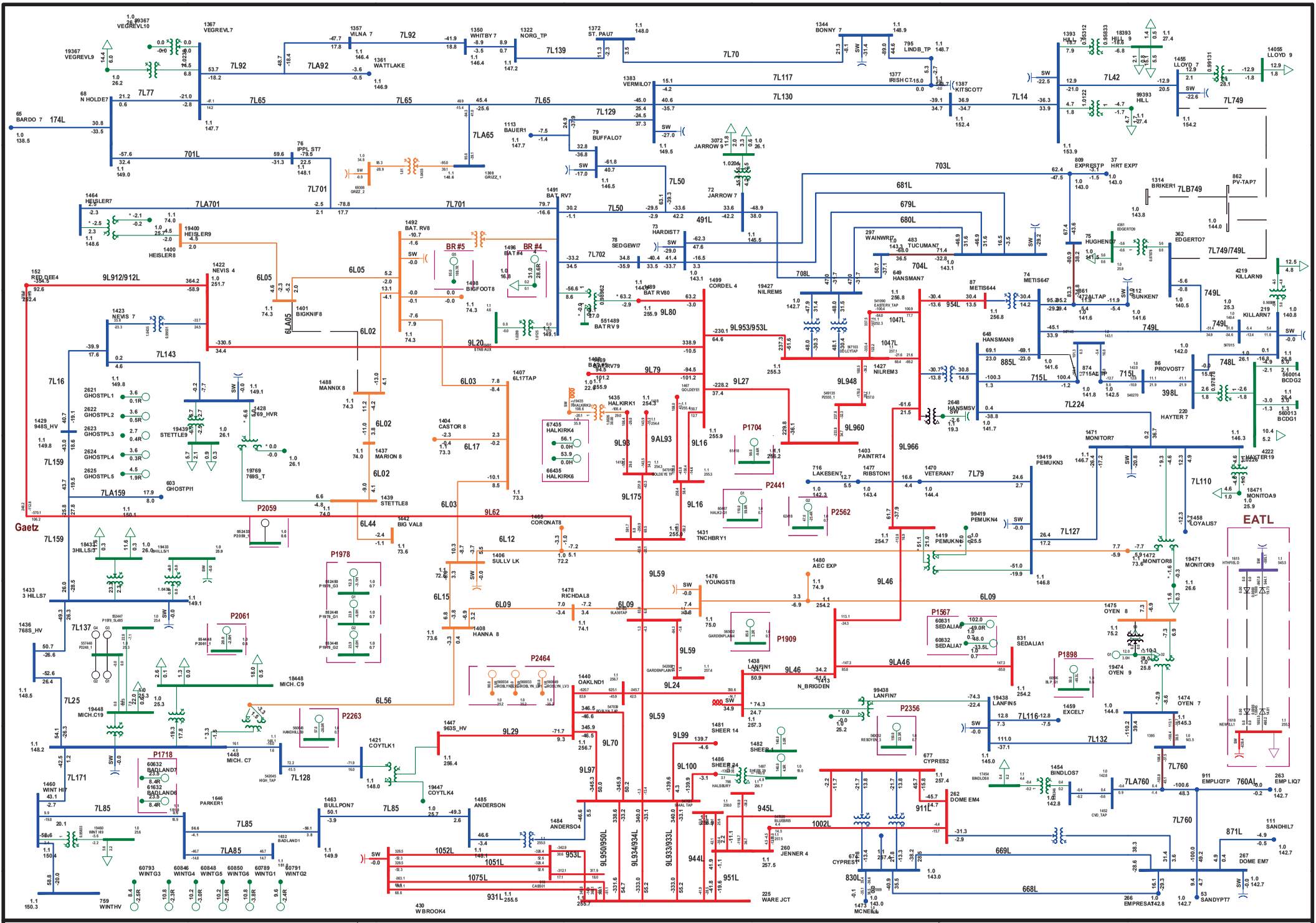
P2464 - Sunnynook Solar Battery Project

CATEGORY B, LOSS OF 7L127 PEMUKAN 932S - MONITOR 774S)
SCENARIO 4_2028SL_POST-PROJECT
THU, APR 11 2024 14:30

A3 - 14

Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A

kV: >0.000 <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 <=500.000 >500.000



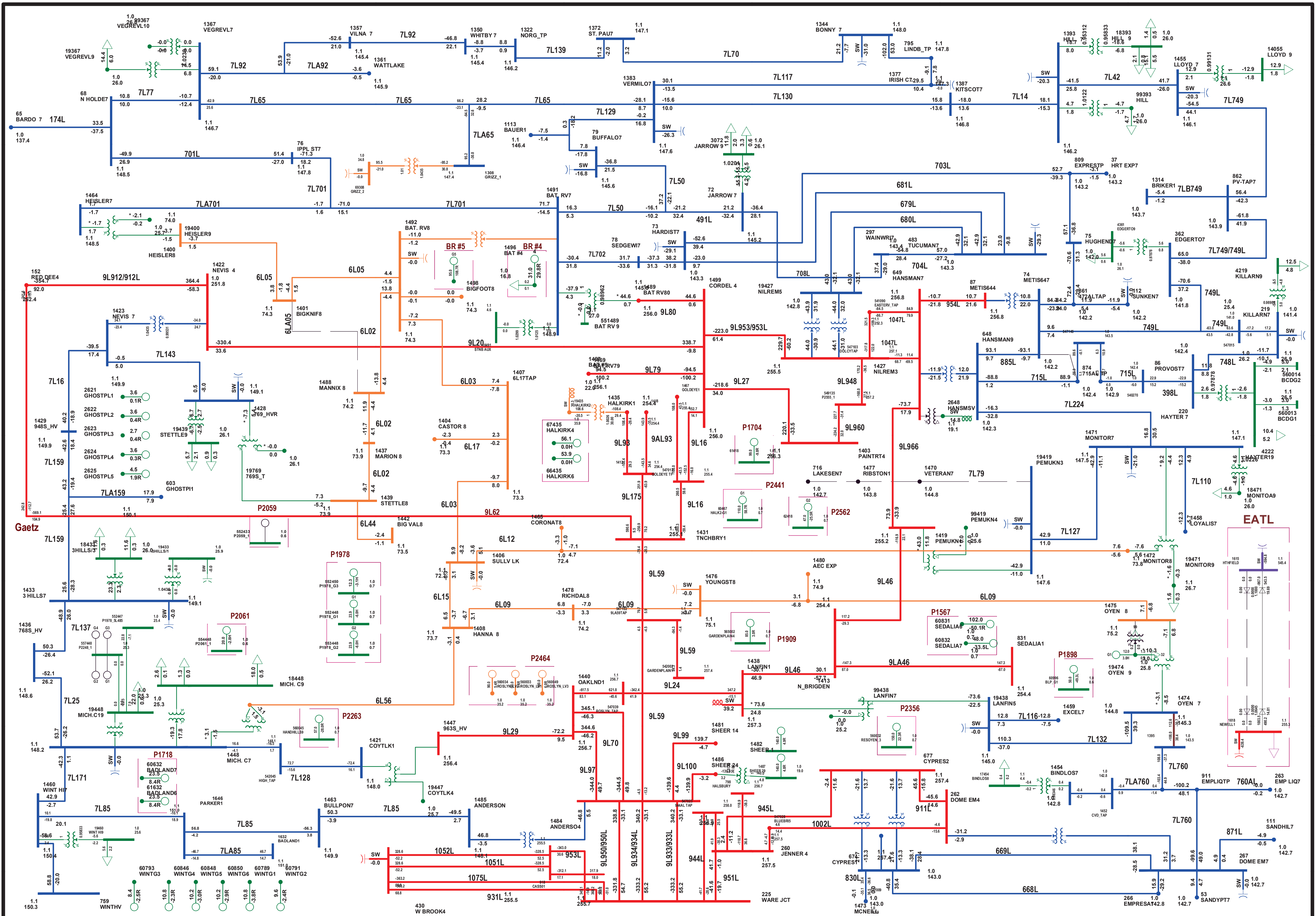
P2464 - Sunnynook Solar Battery Project

CATEGORY B, LOSS OF 7L749 (EDGERTON 899S - LLOYMINSTER 716S)
SCENARIO 4_2028SL_POST-PROJECT
THU, APR 11 2024 14:30

A3 - 15

Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A

kV: >0.000 <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 <=500.000 >500.000



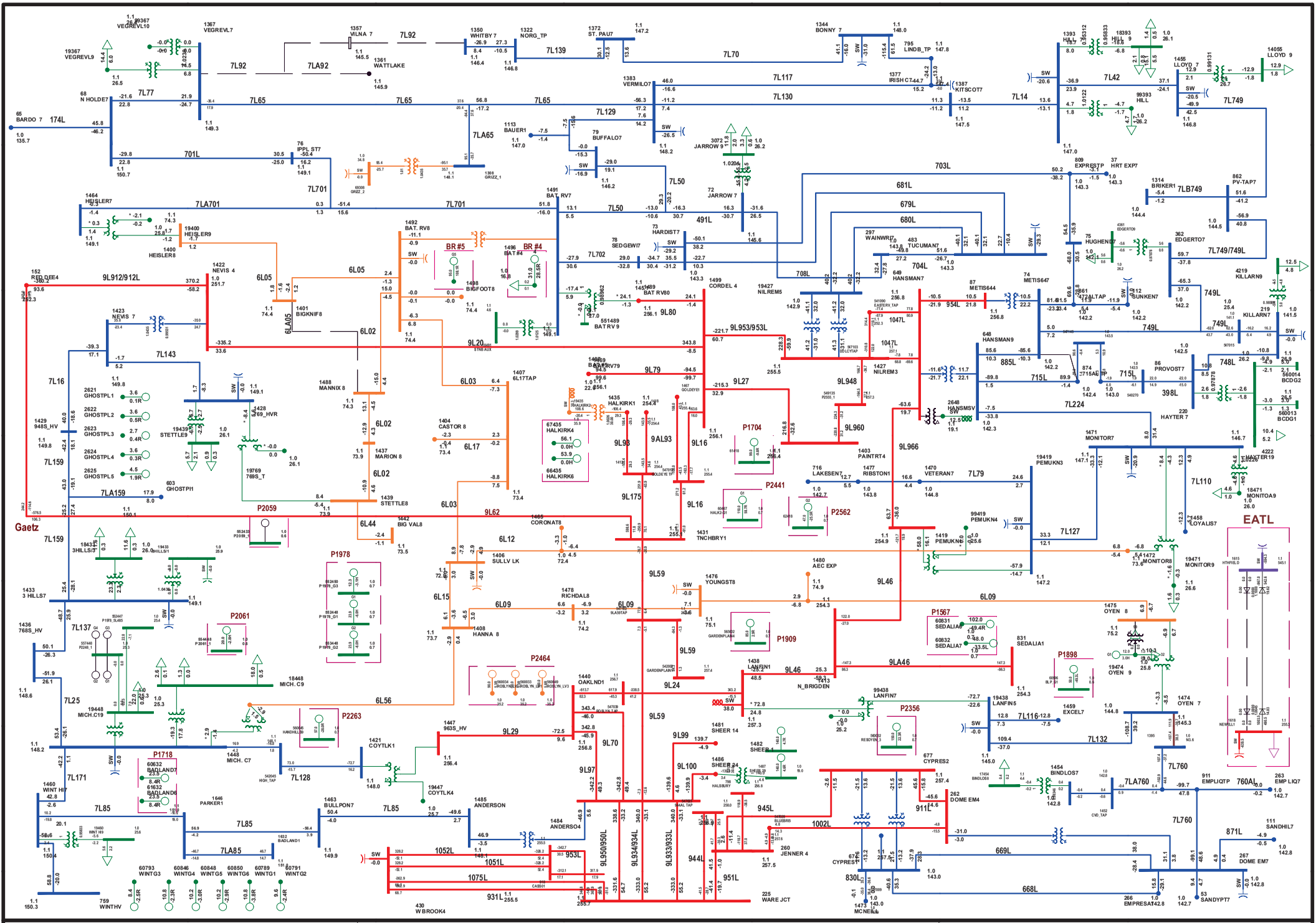
P2464 - Sunnynook Solar Battery Project

CATEGORY B, LOSS OF 7L79 (PEMUKAN 932S - RIBSTONE CREEK 892S
SCENARIO 4_2028SL_POST-PROJECT
THU, APR 11 2024 14:31

A3 - 16

Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A

kV: >0.000 <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 <=500.000 >500.000



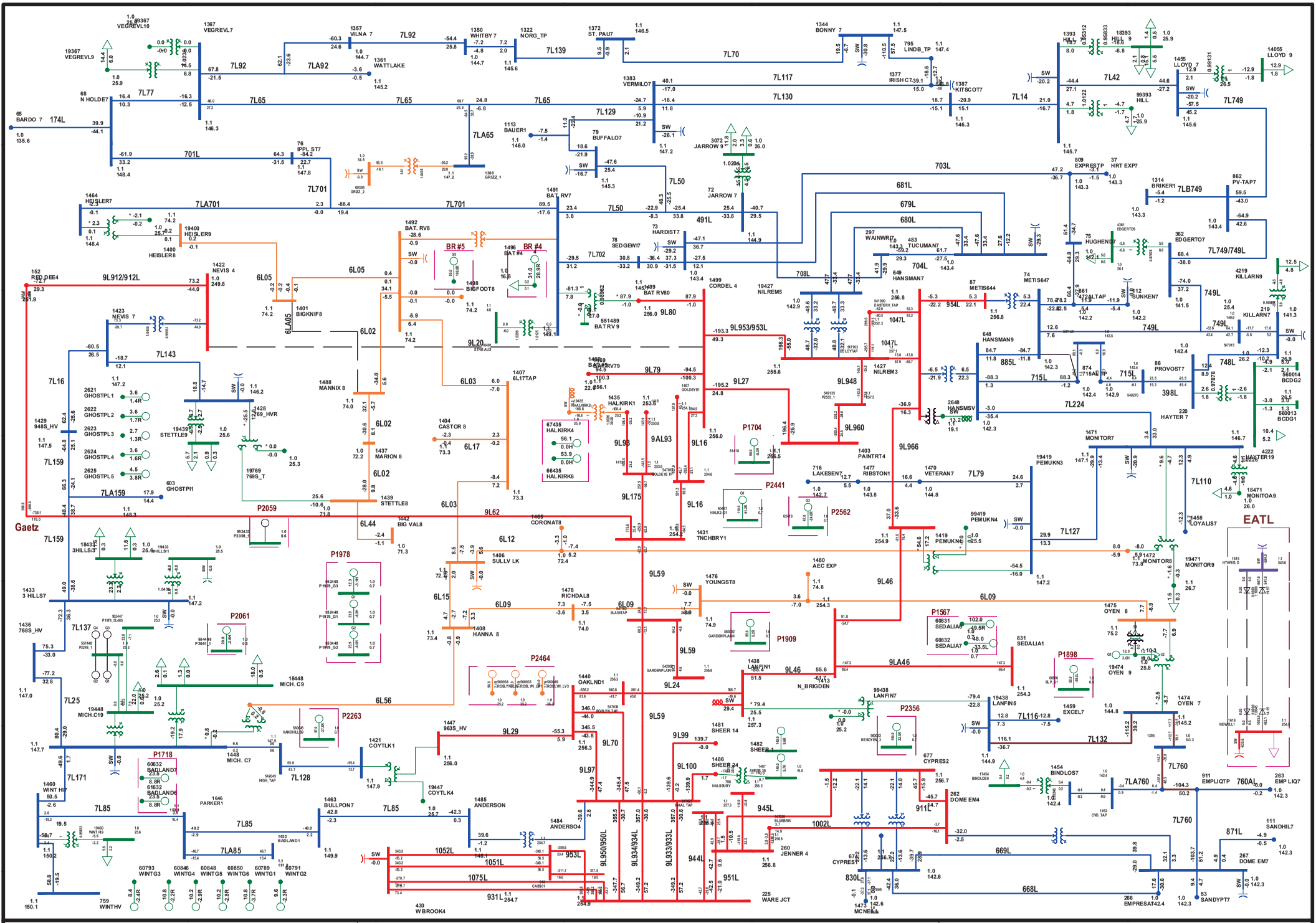
P2464 - Sunnynook Solar Battery Project

CATEGORY B, LOSS OF 7L92 (VEGREVILLE 709S - WHITBY LAKE 819
SCENARIO 4_2028SL_POST-PROJECT
FRI, APR 12 2024 8:46

A3 - 17

Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A

kV: >0.000 <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 <=500.000 >500.000


Gaetz
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7L117
7L130
7L14
7L42
7L749
7L701
7LA701
7L50
7L129
7L702
7L707
7L703
7L681
7L679
7L680
7L704
7L708
7L749/749L
7LB749
7L749
7L748
7L715
7L224
7L110
7L127
7L132
7L760
7LA760
7L760A
7L171
7L85
7LA85
7L137
7L25
7L128
7L116
7L56
9L912/912L
9L953/953L
9L80
9L20
9L27
9L948
9L960
9L966
9L16
9L93
9AL93
9L98
9L79
9L175
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9LA46
9L24
9L70
9L97
9L99
9L100
9L29
9L950/950L
9L934/934L
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953L
1052L
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931L
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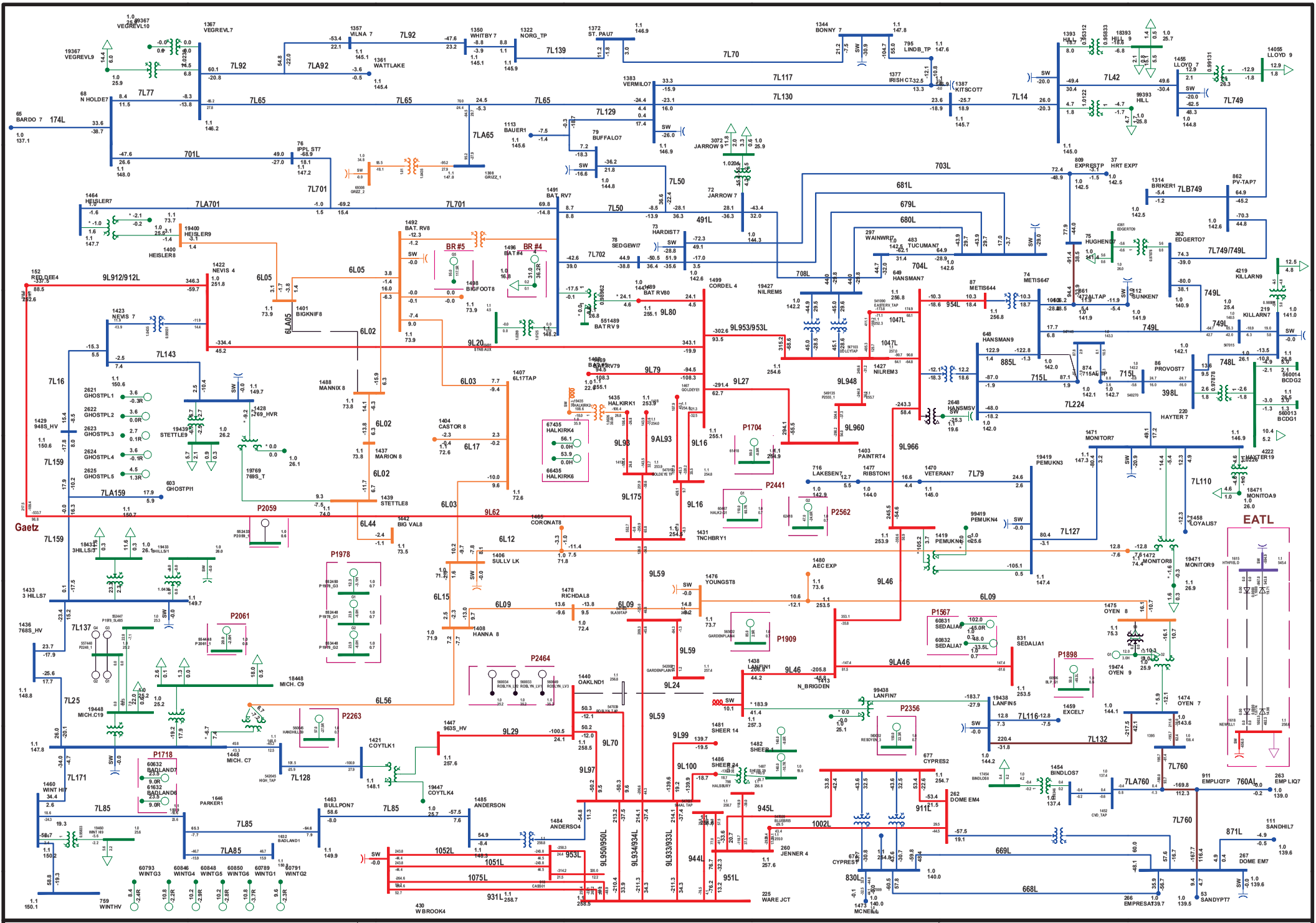
P1718
P2263
P2464
P1704
P2441
P2562
P1567
P1909
P2356
P1898
P2464 - Sunnynook Solar Battery Project
CATEGORY B, LOSS OF 9L20 (NEVIS 766S - CORDEL 755S)
SCENARIO 4_2028SL_POST-PROJECT
THU, APR 11 2024 14:31
A3 - 18
Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A
kV: >0.000 <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 <=500.000 >500.000



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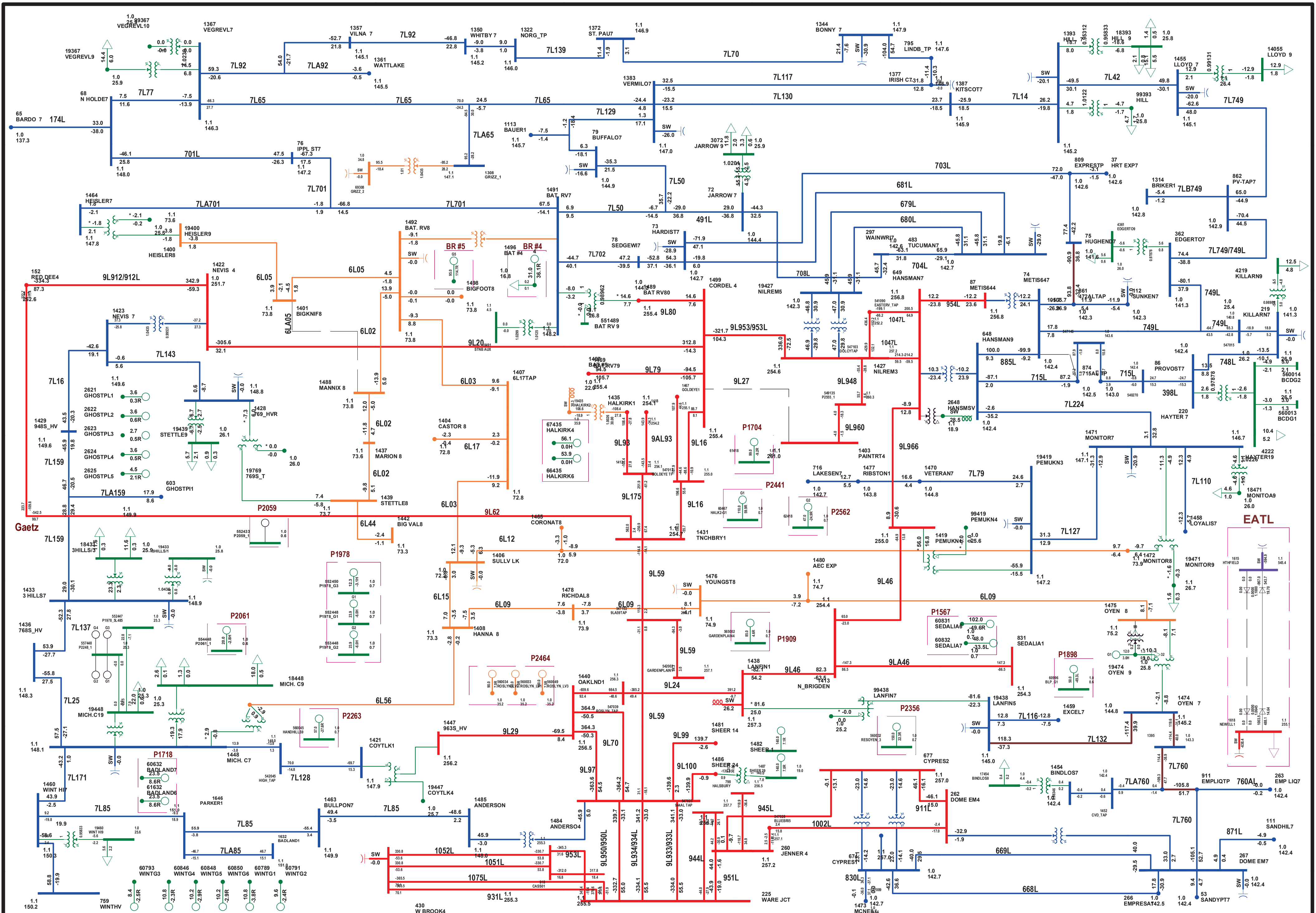
CATEGORY B, LOSS OF 9L24 (LANFINE 959S - OAKLAND 946S)
SCENARIO 4_2028SL_POST-PROJECT
THU, APR 11 2024 14:31

A3 - 19

Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A

kV: >0.000 <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 <=500.000 >500.000



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CATEGORY B, LOSS OF 9L27 (PAINTEARTH CREEK - CORDEL 755S)
SCENARIO 4_2028SL_POST-PROJECT
THU, APR 11 2024 14:31

A3 - 20

Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A

kV: >0.000 <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 <=500.000 >500.000

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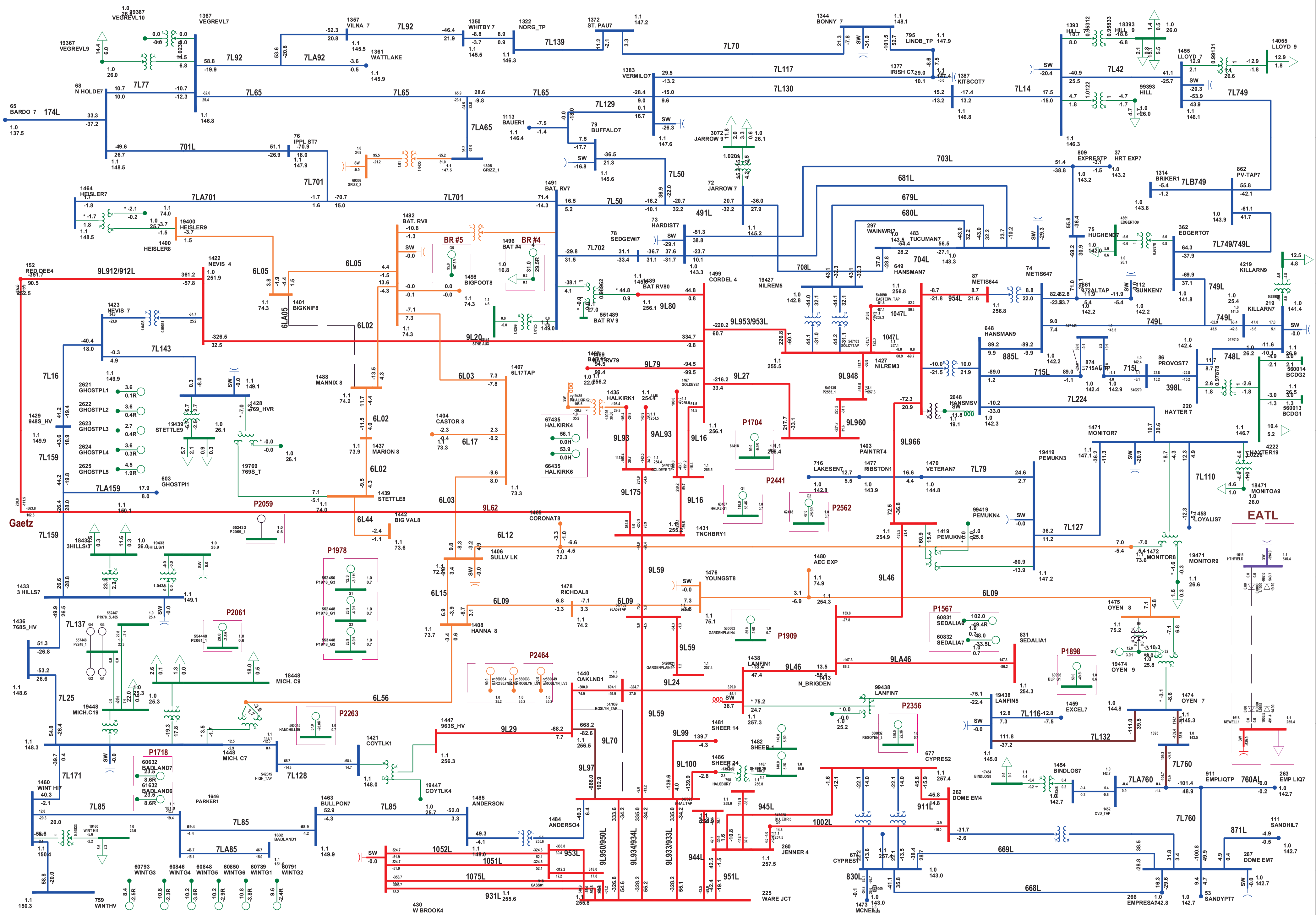


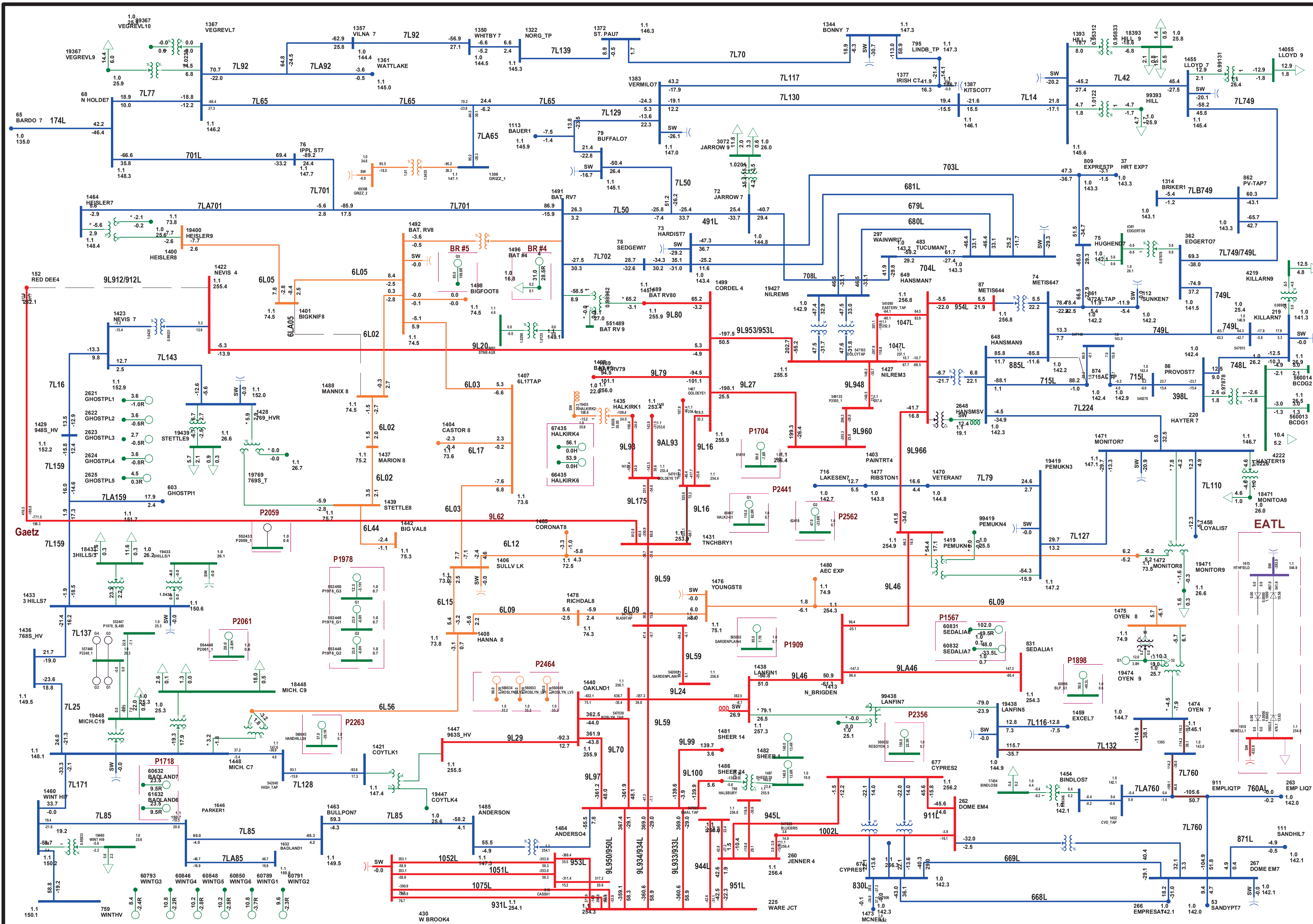
P2464 - Sunnynook Solar Battery Project

CATEGORY B, LOSS OF 9L70 (OAKLAND 946S - ANDERSON 801S)
SCENARIO 4_2028SL_POST-PROJECT
THU, APR 11 2024 14:32

A3 - 21

Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A

kV: >0.000 <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 <=500.000 >500.000



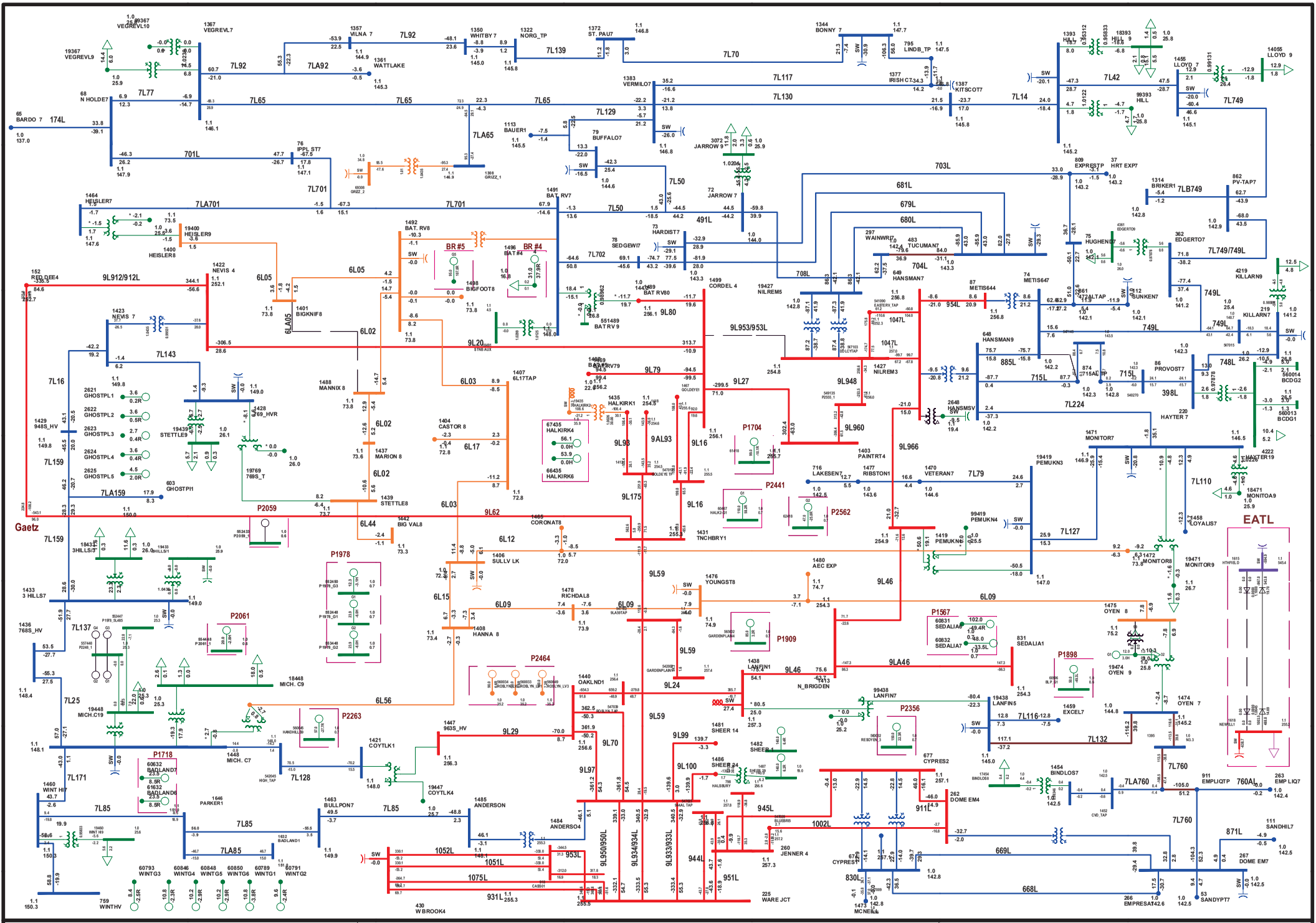
P2464 - Sunnynook Solar Battery Project

CATEGORY B, LOSS OF 9L912 (NEVIS 766S – RED DEER 63S)
SCENARIO 4_2028SL_POST-PROJECT
THU, APR 11 2024 14:32

A3 - 22

Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A

kV: >0.000 <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 <=500.000 >500.000



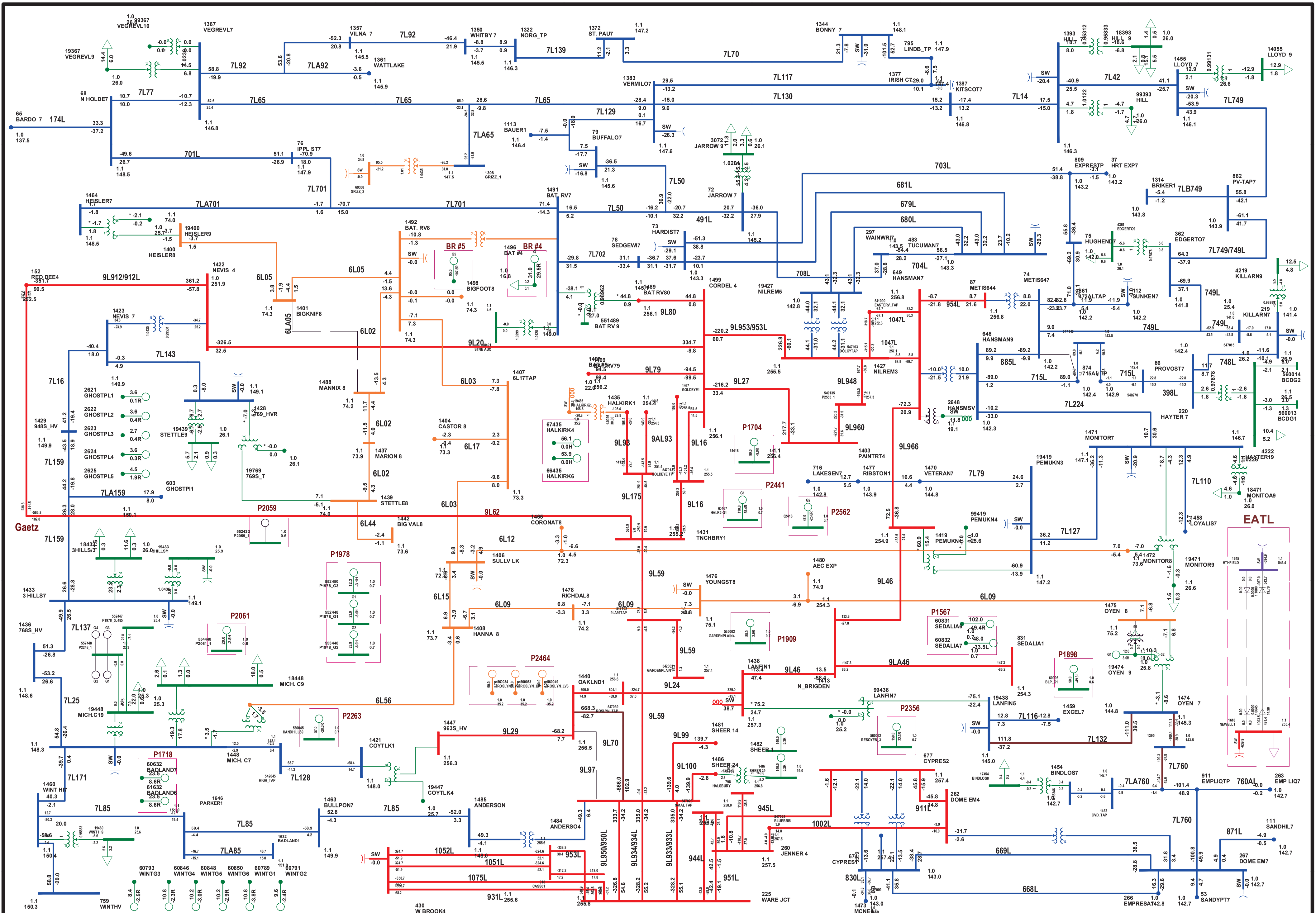
P2464 - Sunnynook Solar Battery Project

CATEGORY B, LOSS OF 9L953 (CORDEL 755S - NILREM 574S)
SCENARIO 4_2028SL_POST-PROJECT
THU, APR 11 2024 14:32

A3 - 23

Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A

kV: >0.000 <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 <=500.000 >500.000



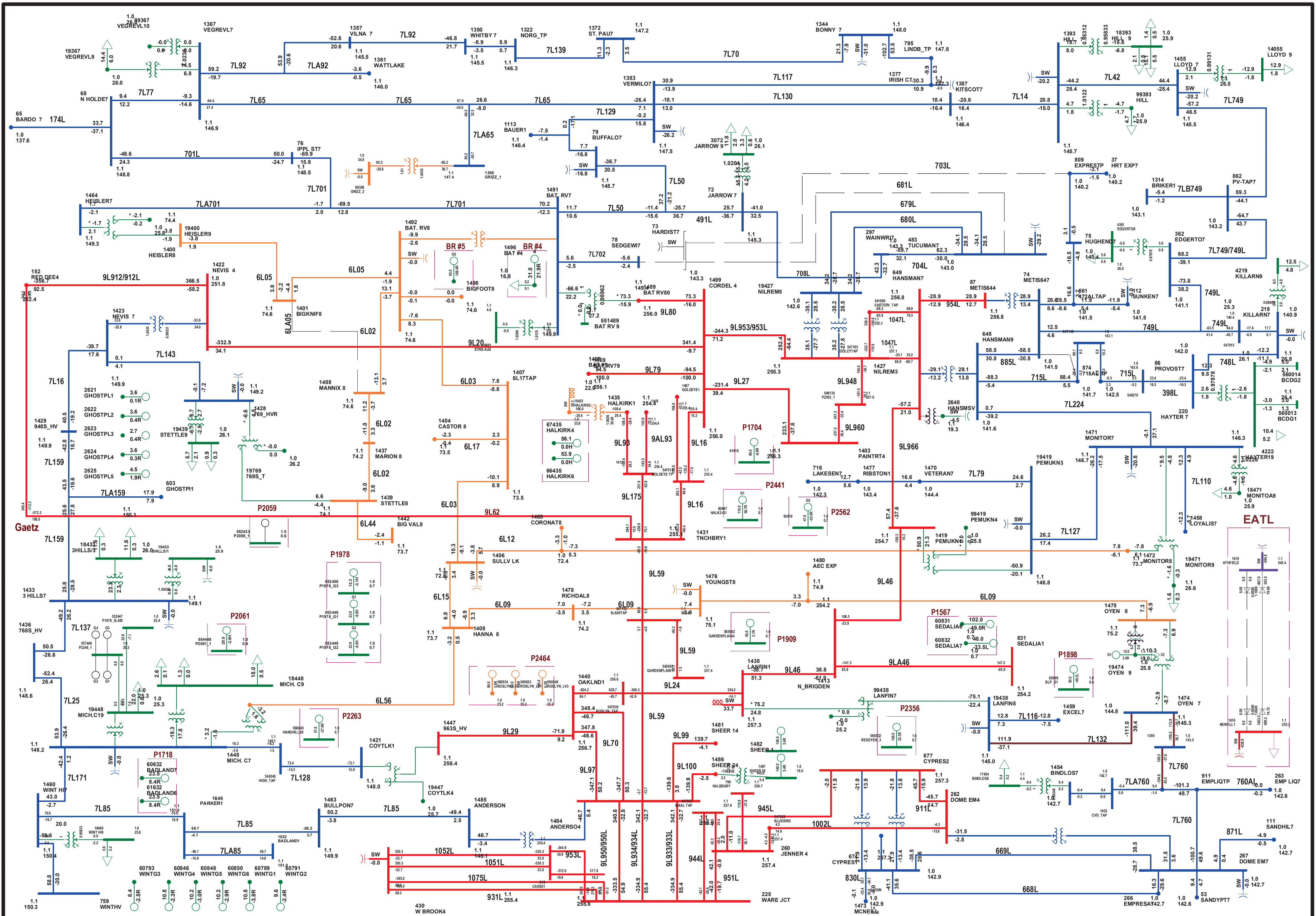
P2464 - Sunnynook Solar Battery Project

CATEGORY B, LOSS OF 9L97 (OAKLAND 946S - ANDERSON 801S)
SCENARIO 4_2028SL_POST-PROJECT
THU, APR 11 2024 14:32

A3 - 24

Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A

kV: >0.000 <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 <=500.000 >500.000



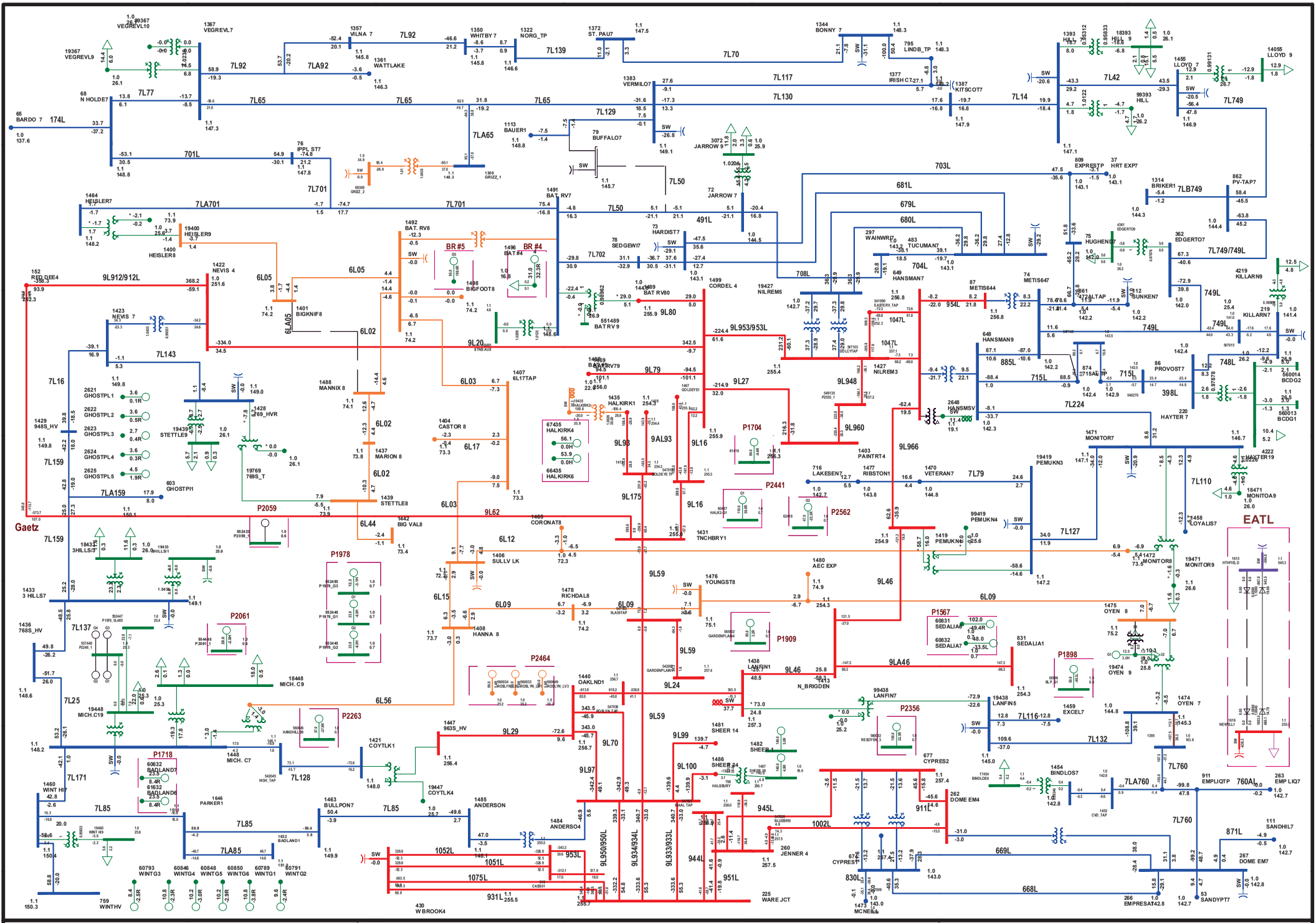
P2464 - Sunnynook Solar Battery Project

CATEGORY B, LOSS OF HARDISTY 377S T1 TRANSFORMER
SCENARIO 4_2028SL_POST-PROJECT
THU, APR 11 2024 14:33

A3 - 25

Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A

kV: >0.000 <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 <=500.000 >500.000



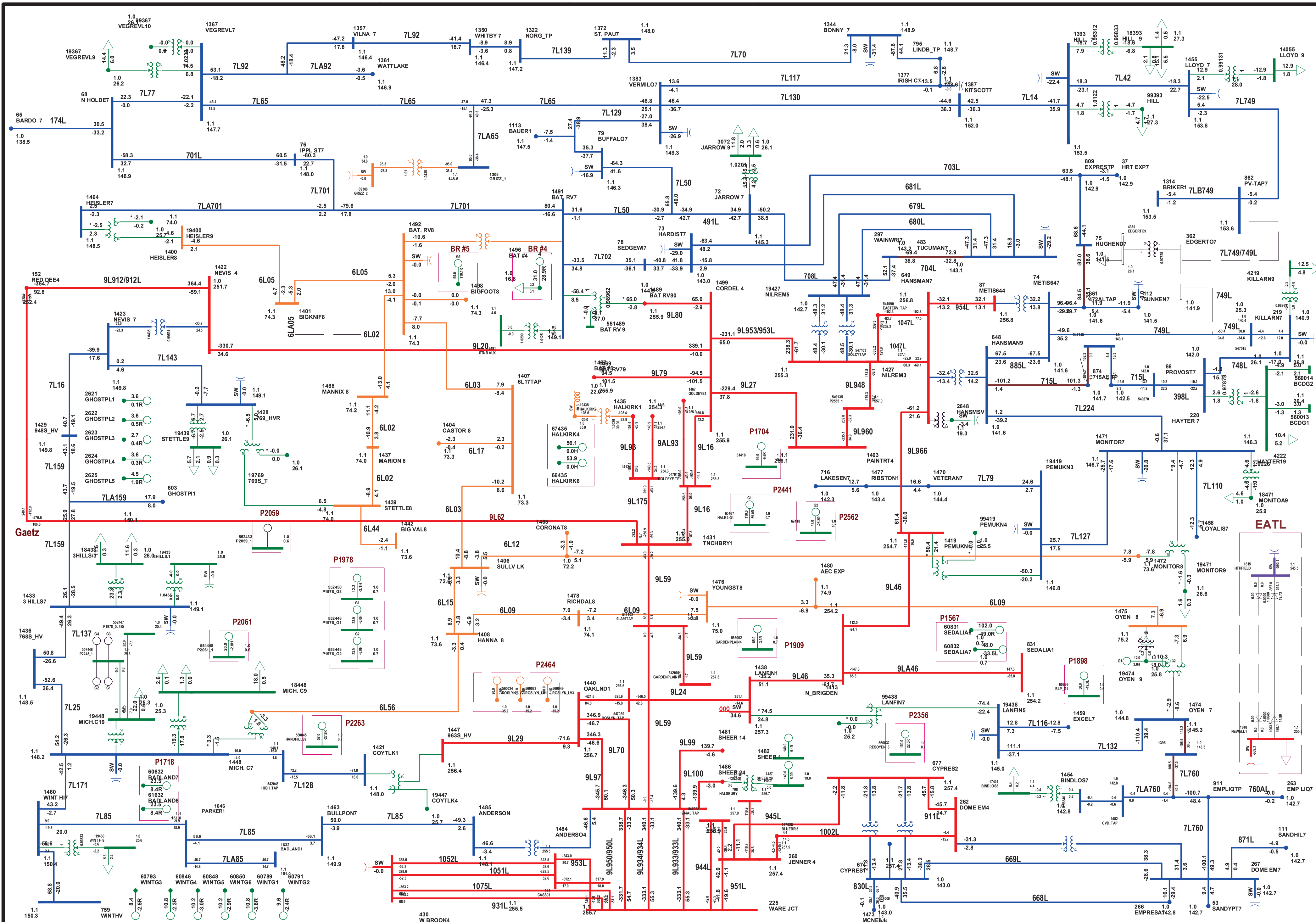
P2464 - Sunnynook Solar Battery Project

CATEGORY B, LOSS OF BUFFALO CREEK 526S_XMERS
SCENARIO 4_2028SL_POST-PROJECT
THU, APR 11 2024 14:33

A3 - 26

Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A

kV: >0.000 <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 <=500.000 >500.000



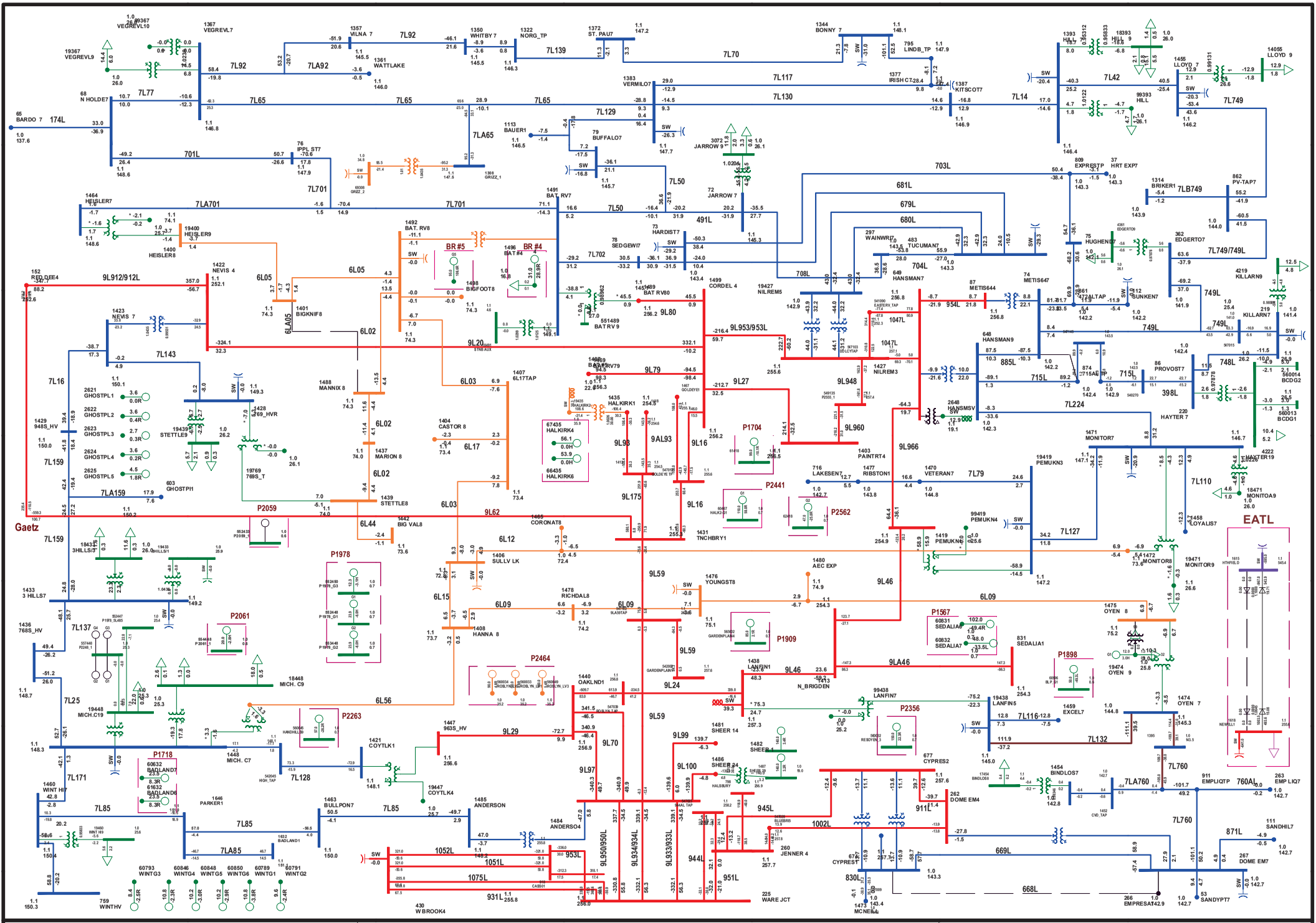
P2464 - Sunnynook Solar Battery Project

CATEGORY B, LOSS OF EDGERTON_899ST3
SCENARIO 4_2028SL_POST-PROJECT
THU, APR 11 2024 14:33

A3 - 27

Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A

kV: >0.000 <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 <=500.000 >500.000



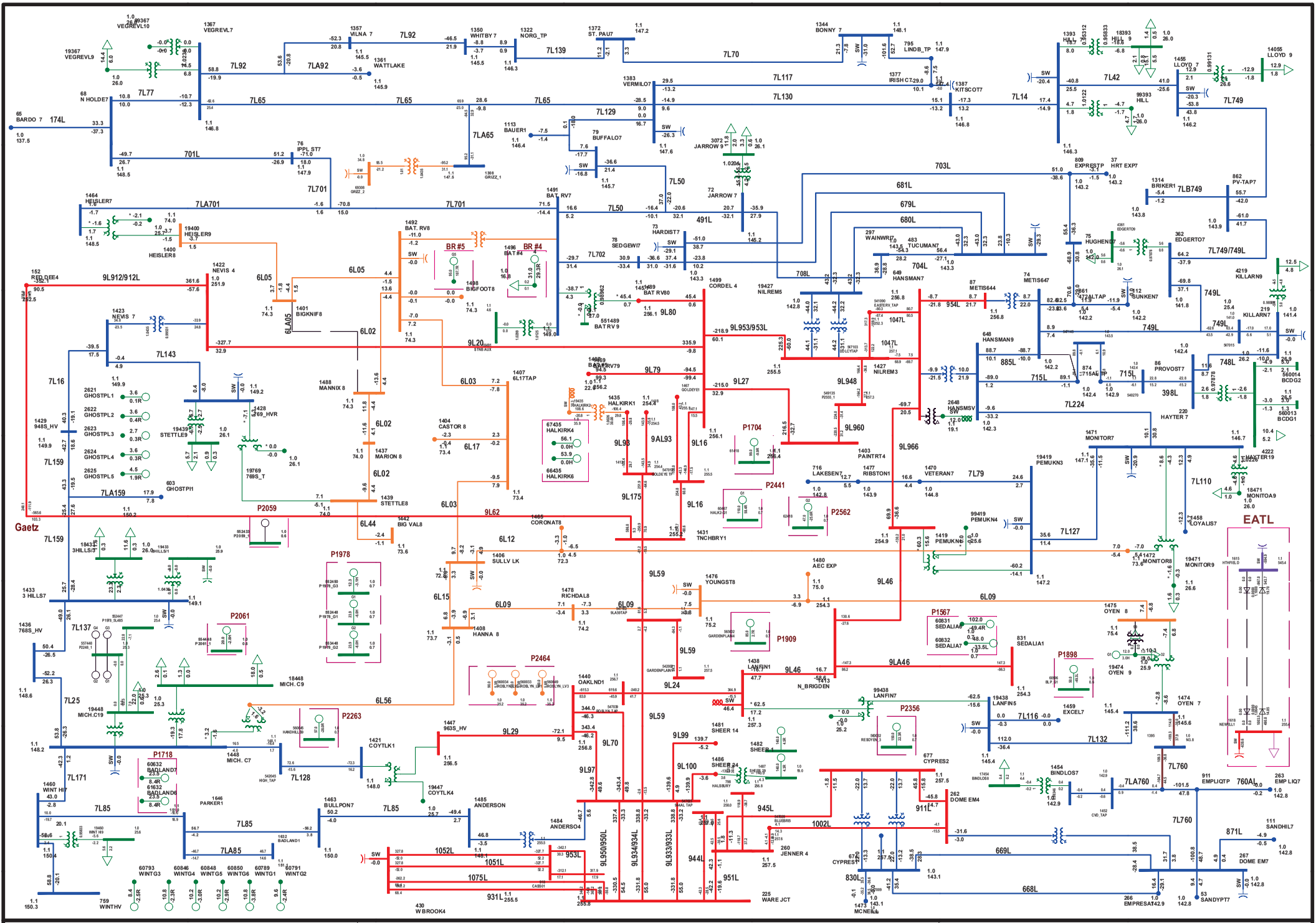
P2464 - Sunnynook Solar Battery Project

CATEGORY B, LOSS OF EMPRESS_394S_T1
SCENARIO 4_2028SL_POST-PROJECT
THU, APR 11 2024 14:33

A3 - 28

Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A

kV: >0.000 <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 <=500.000 >500.000



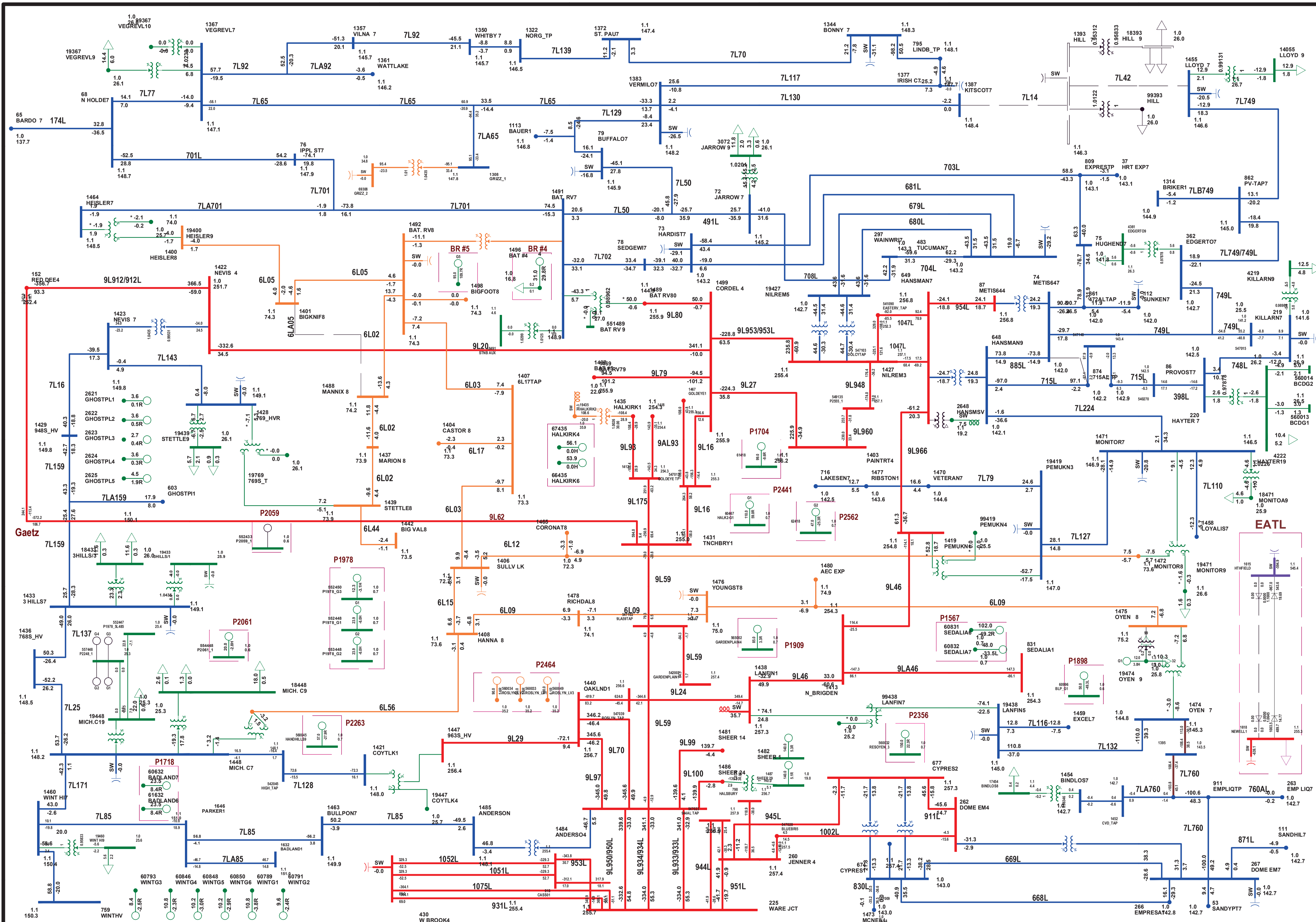
P2464 - Sunnynook Solar Battery Project

CATEGORY B, LOSS OF EXCEL 910S TRANSFORMER 701T
SCENARIO 4_2028SL_POST-PROJECT
THU, APR 11 2024 14:33

A3 - 29

Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A

kV: >0.000 <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 <=500.000 >500.000



P2464 - Sunnynook Solar Battery Project

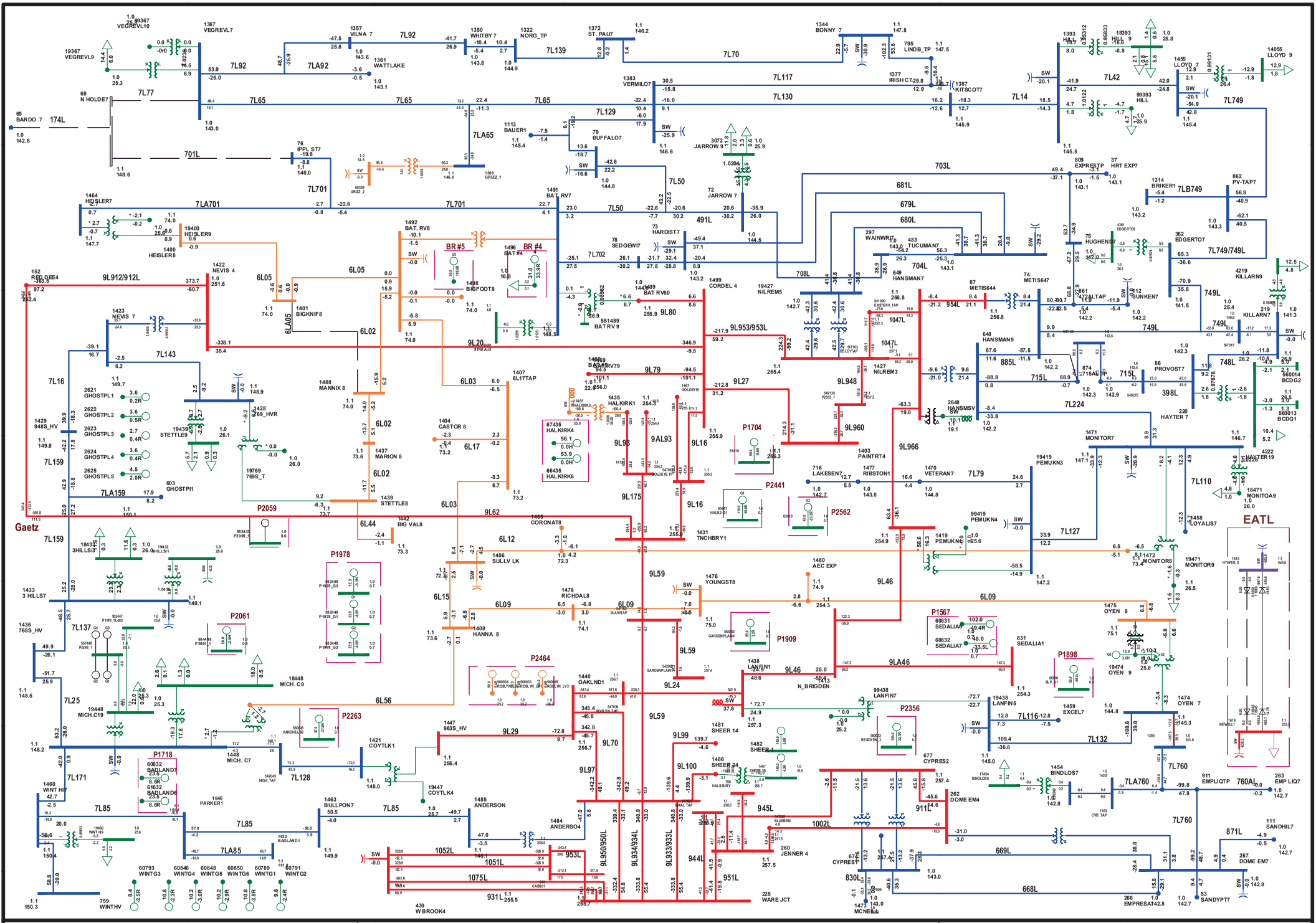
CATEGORY B, LOSS OF HILL 751S_TIEXMER
SCENARIO 4_2028SL_POST-PROJECT
THU, APR 11 2024 14:34

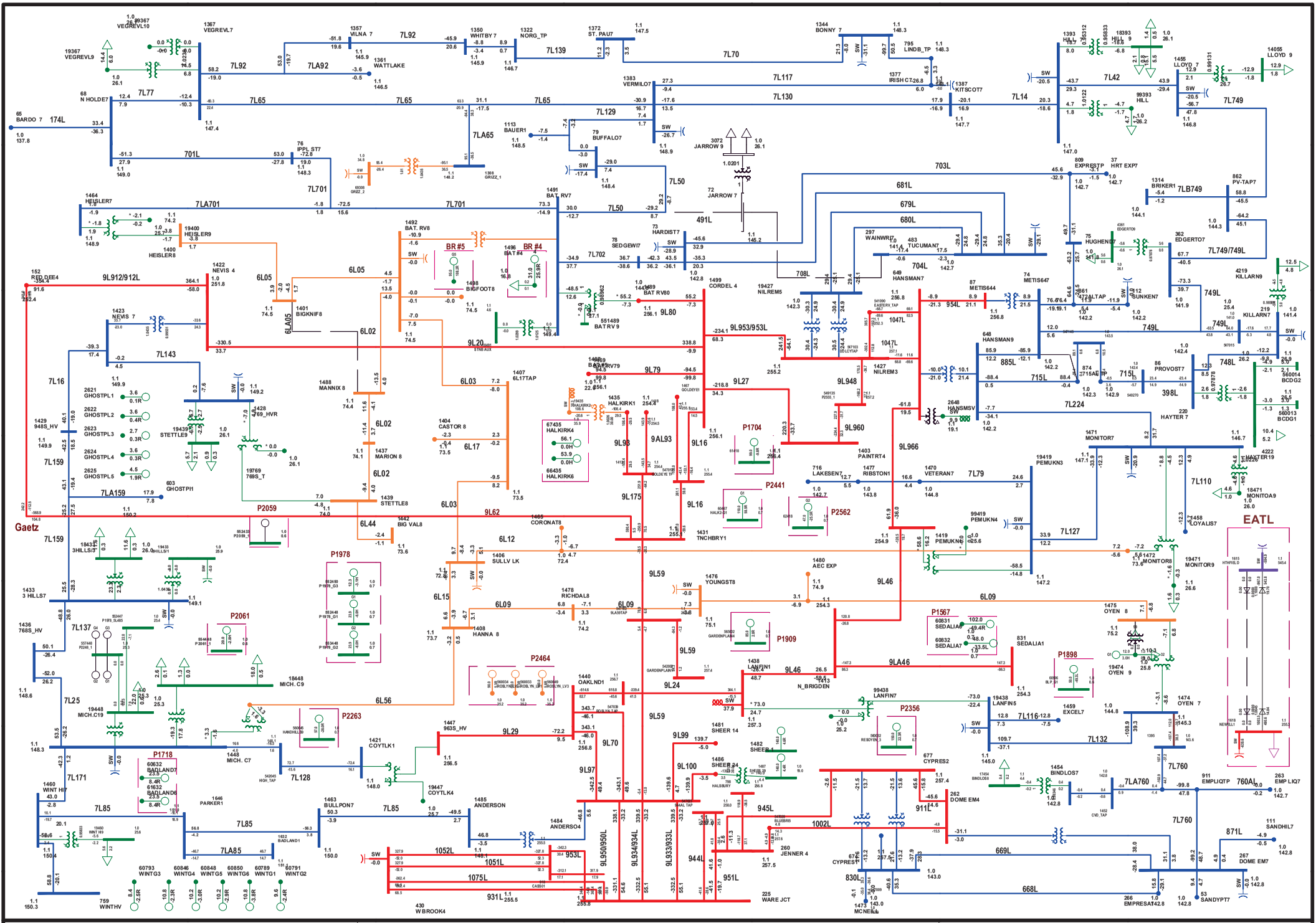
A3 - 30

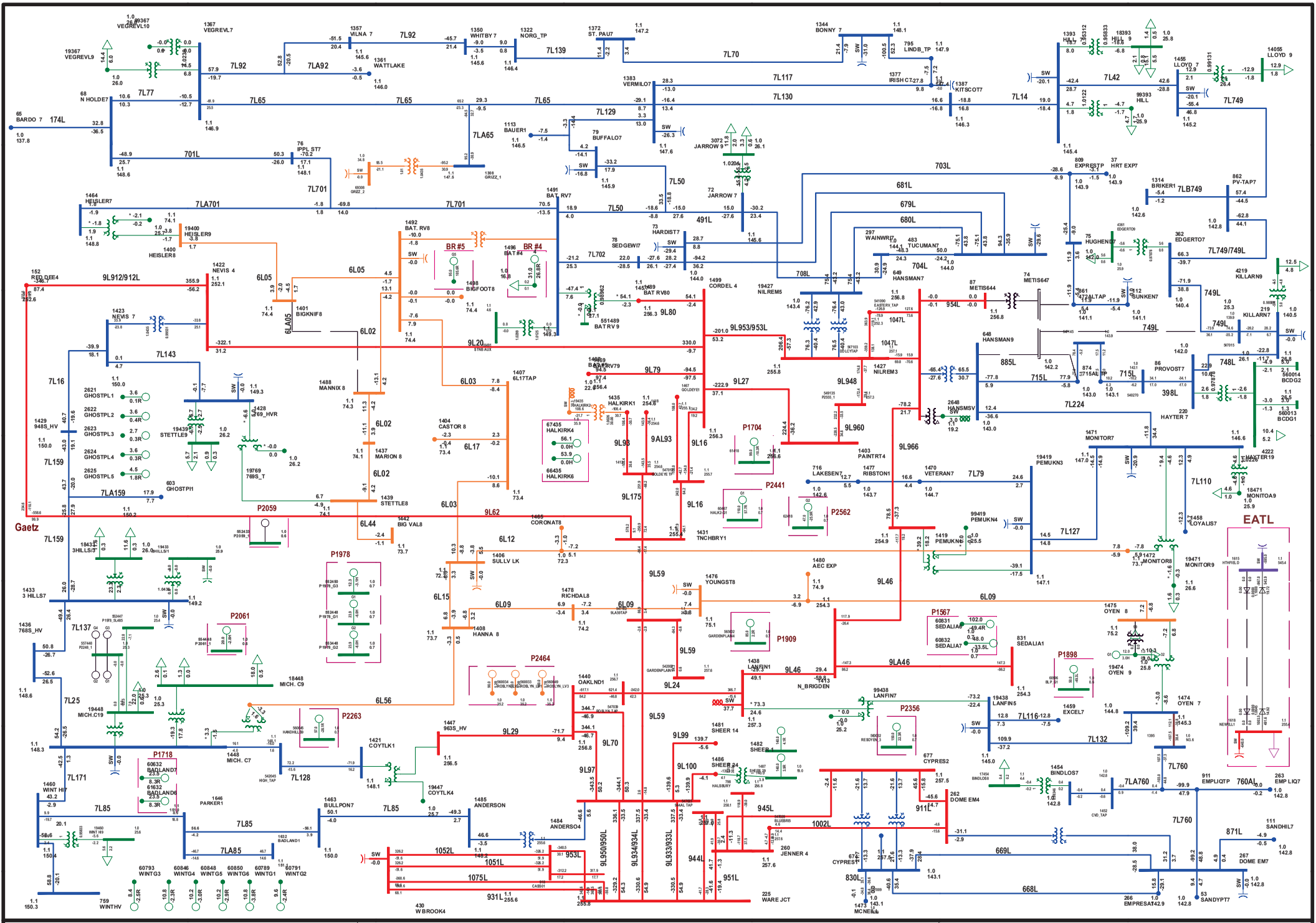
Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A

kV: >0.000 <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 <=500.000 >500.000

1


Gaetz
EATL
P2464 - Sunnynook Solar Battery Project
CATEGORY B, LOSS OF HOLDEN 395S TRANSFORMER T1
SCENARIO 4_2028SL_POST-PROJECT
THU, APR 11 2024 14:34
A3 - 31
Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A
kV: >0.000 <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 <=500.000 >500.000


Gaetz
EATL
P2464 - Sunnynook Solar Battery Project
CATEGORY B, LOSS OF JARROW 252S TRANSFORMER T2
SCENARIO 4_2028SL_POST-PROJECT
THU, APR 11 2024 14:34
A3 - 32
Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A
kV: >0.000 <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 <=500.000 >500.000



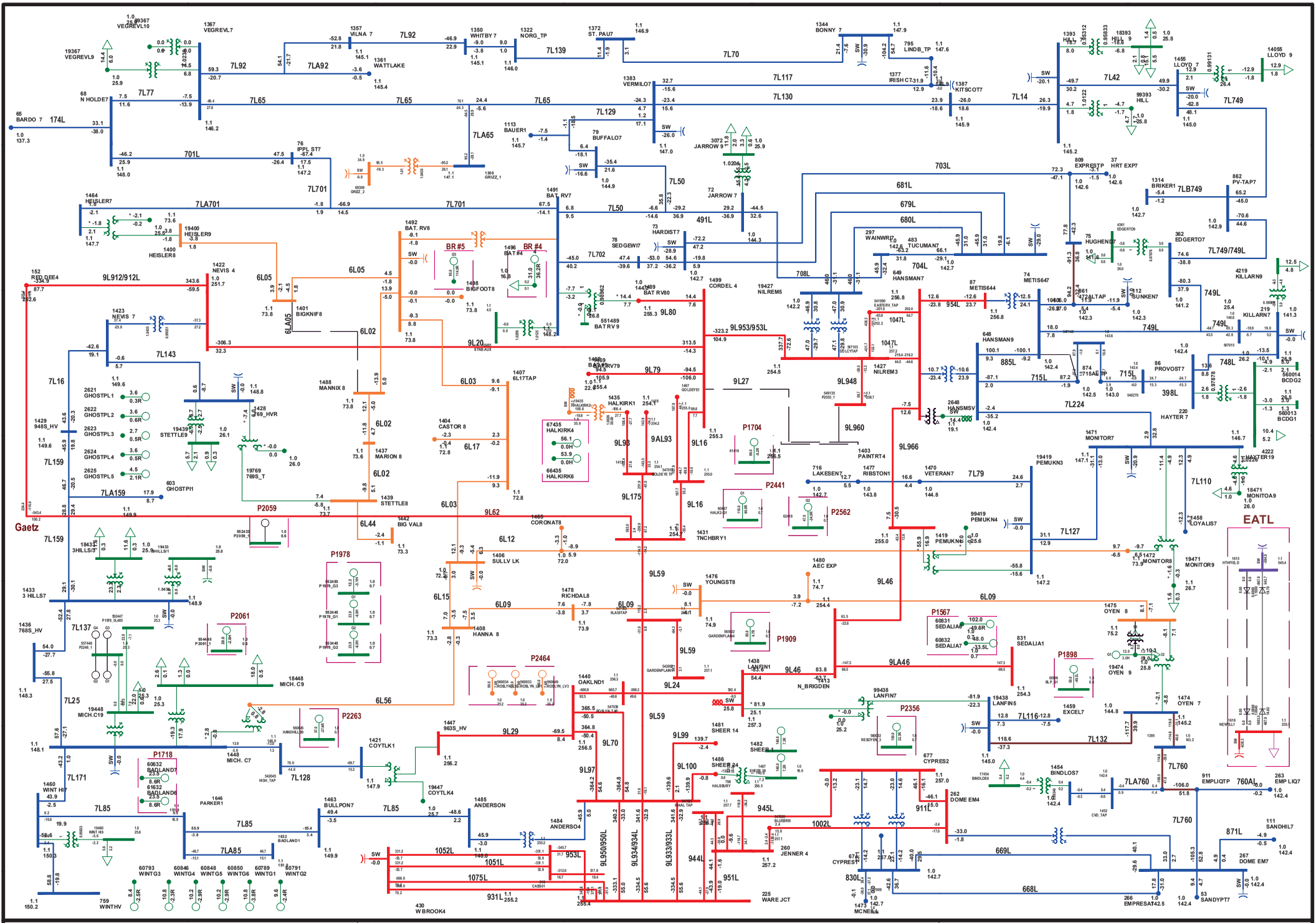
P2464 - Sunnynook Solar Battery Project

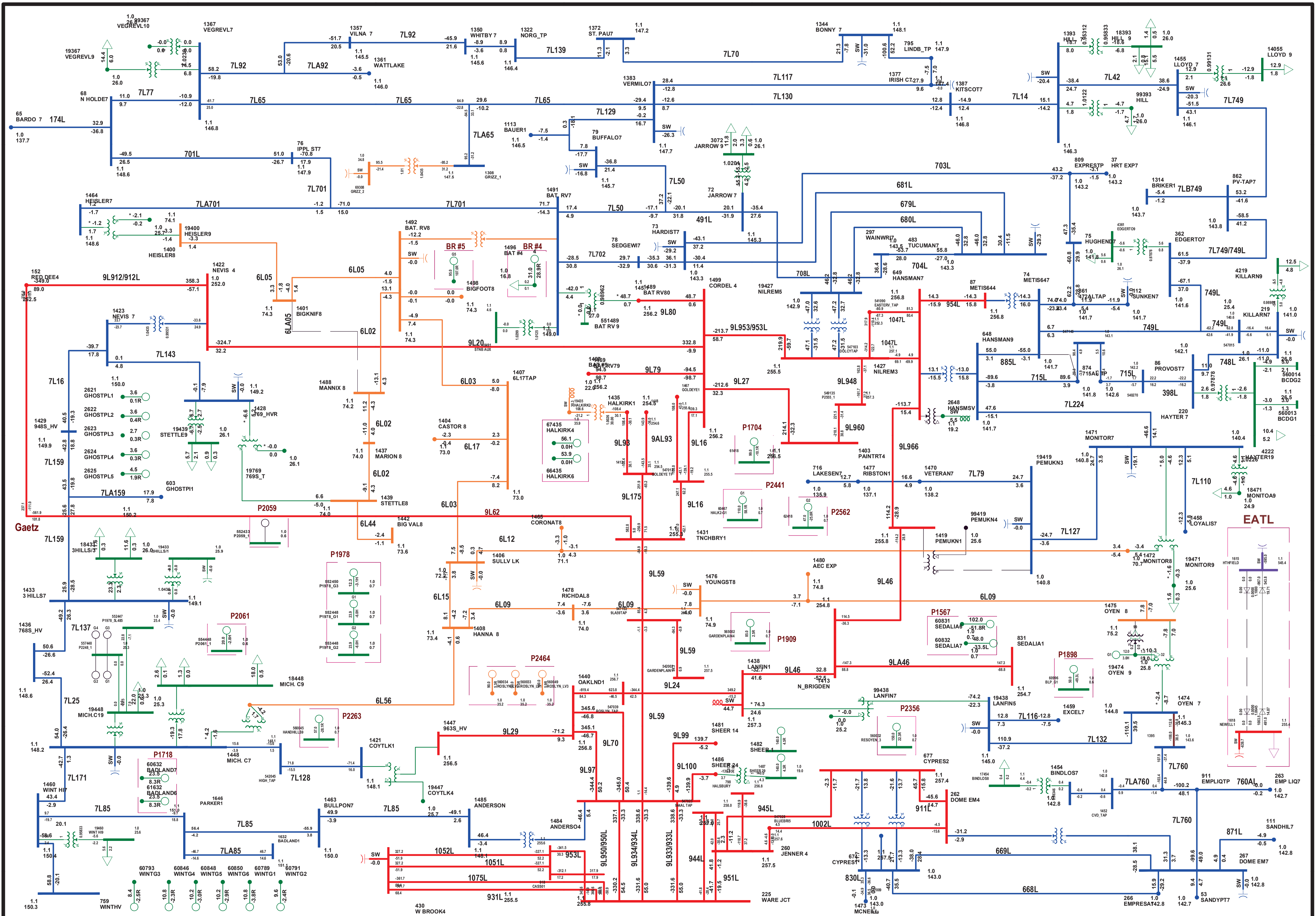
CATEGORY B, LOSS OF METISKOW_648ST1
SCENARIO 4_2028SL_POST-PROJECT
THU, APR 11 2024 14:34

A3 - 33

Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A

kV: >0.000 <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 <=500.000 >500.000


Gaetz
EATL
P2464 - Sunnynook Solar Battery Project
CATEGORY B, LOSS OF PAINTEARTH CREEK 863S 902T
SCENARIO 4_2028SL_POST-PROJECT
THU, APR 11 2024 14:34
A3 - 34
Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A
kV: >0.000 <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 <=500.000 >500.000



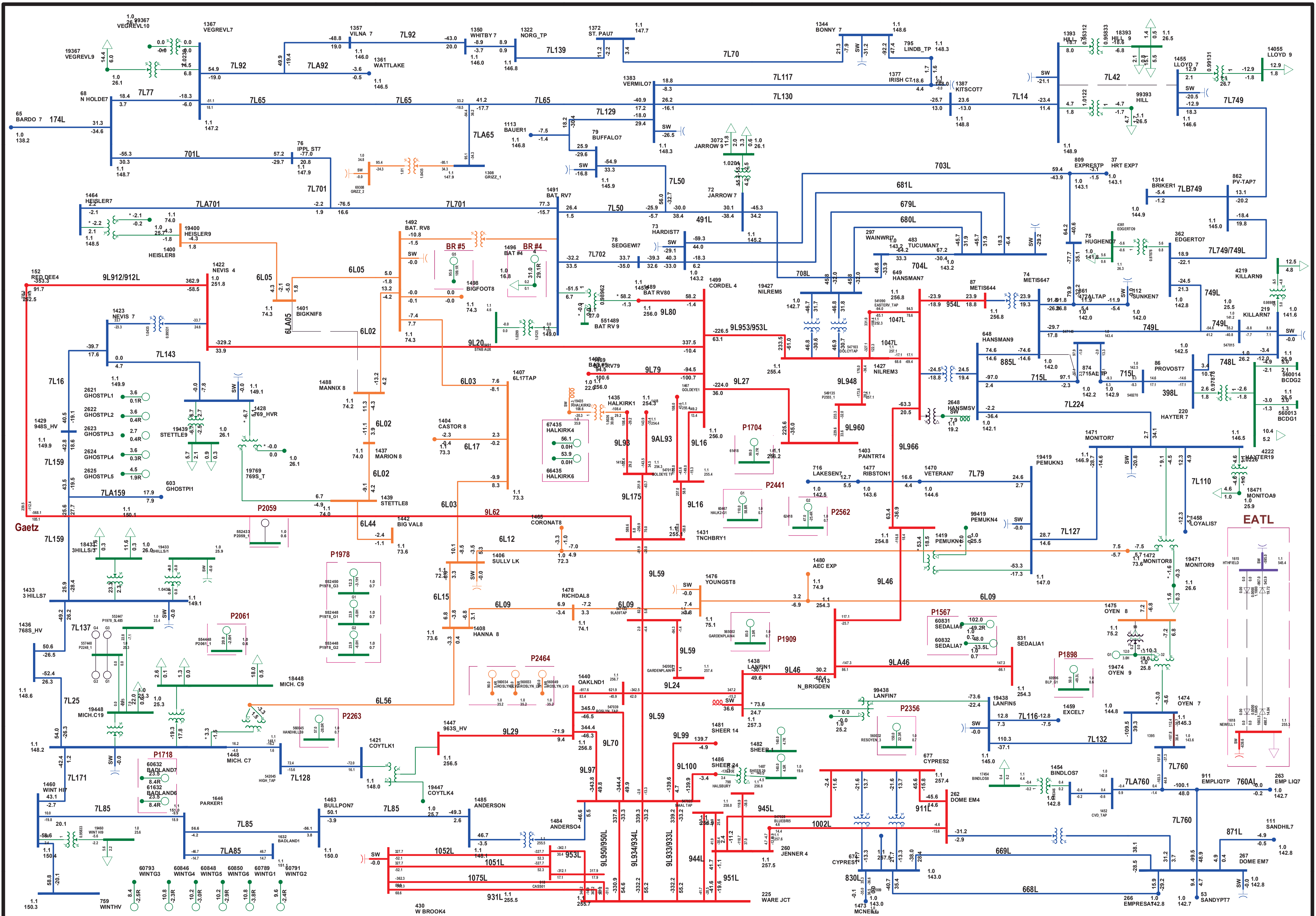
P2464 - Sunnyook Solar Battery Project

CATEGORY B, LOSS OF PEMUKAN 932S 901T
SCENARIO 4_2028SL_POST-PROJECT
FRI, APR 12 2024 14:15

A3 - 35

Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A

kV: >0.000 <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 <=500.000 >500.000



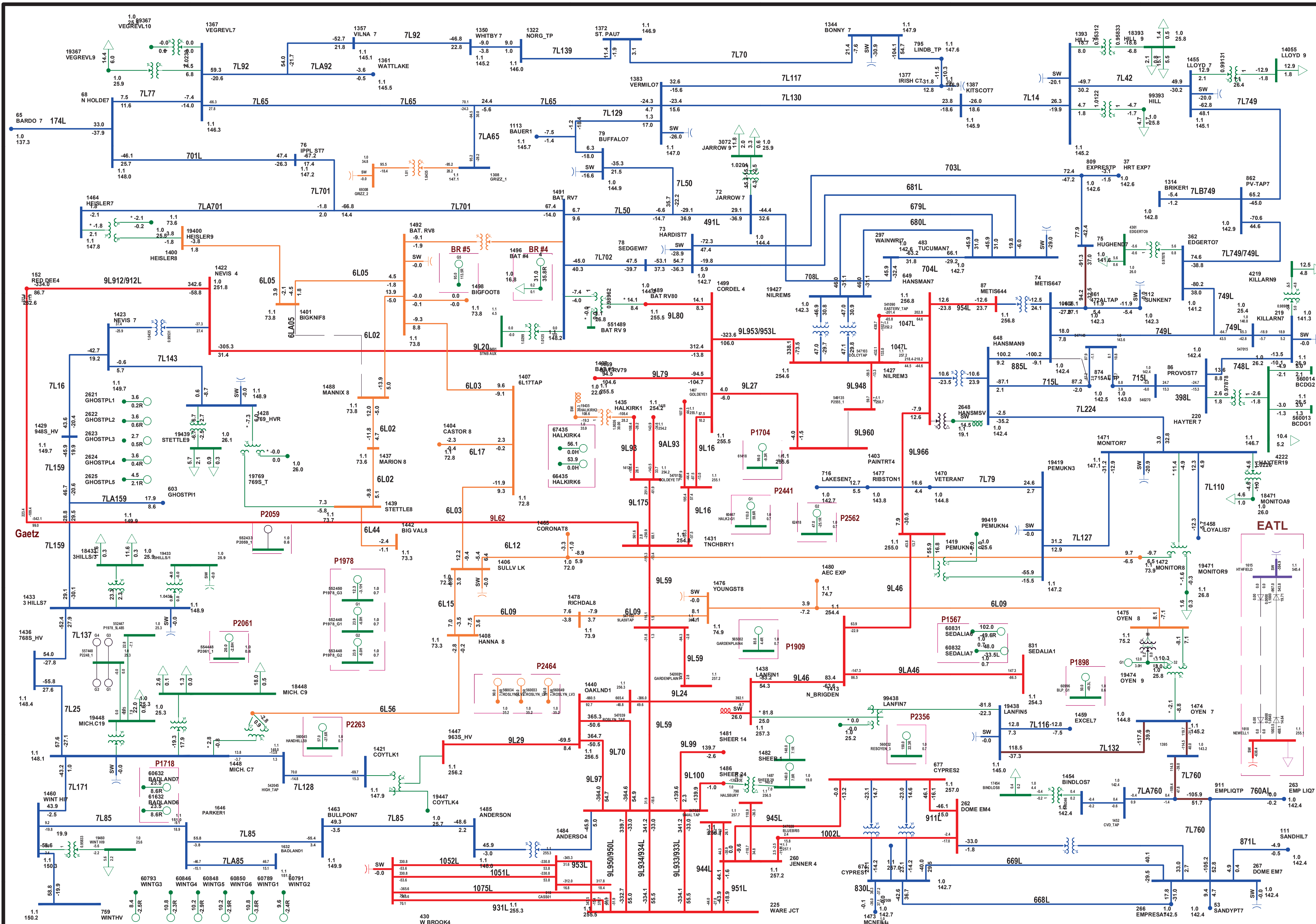
P2464 - Sunnynook Solar Battery Project

CATEGORY B, LOSS OF 7L42 (HILL 751S - LLOYDMINSTER 716S)
SCENARIO 4_2028SL_POST-PROJECT
THU, APR 11 2024 14:34

A3 - 36

Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A

kV: >0.000 <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 <=500.000 >500.000



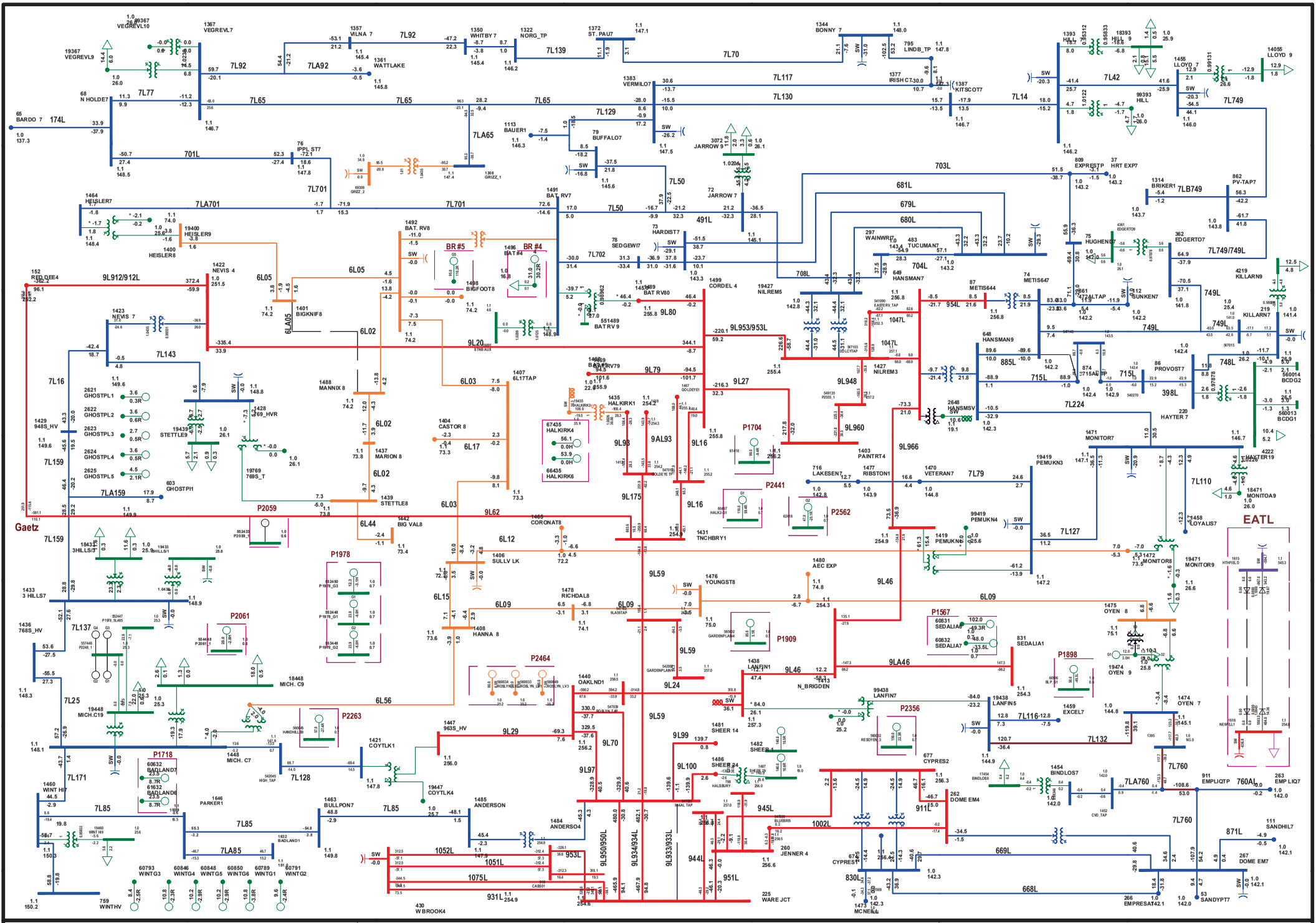
P2464 - Sunnynook Solar Battery Project

CATEGORY B, LOSS OF 9L960 (PAINTEARTH 863S - P2555_BUS 54913
SCENARIO 4_2028SL_POST-PROJECT
THU, APR 11 2024 14:35

A3 - 37

Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A

kV: >0.000 <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 <=500.000 >500.000



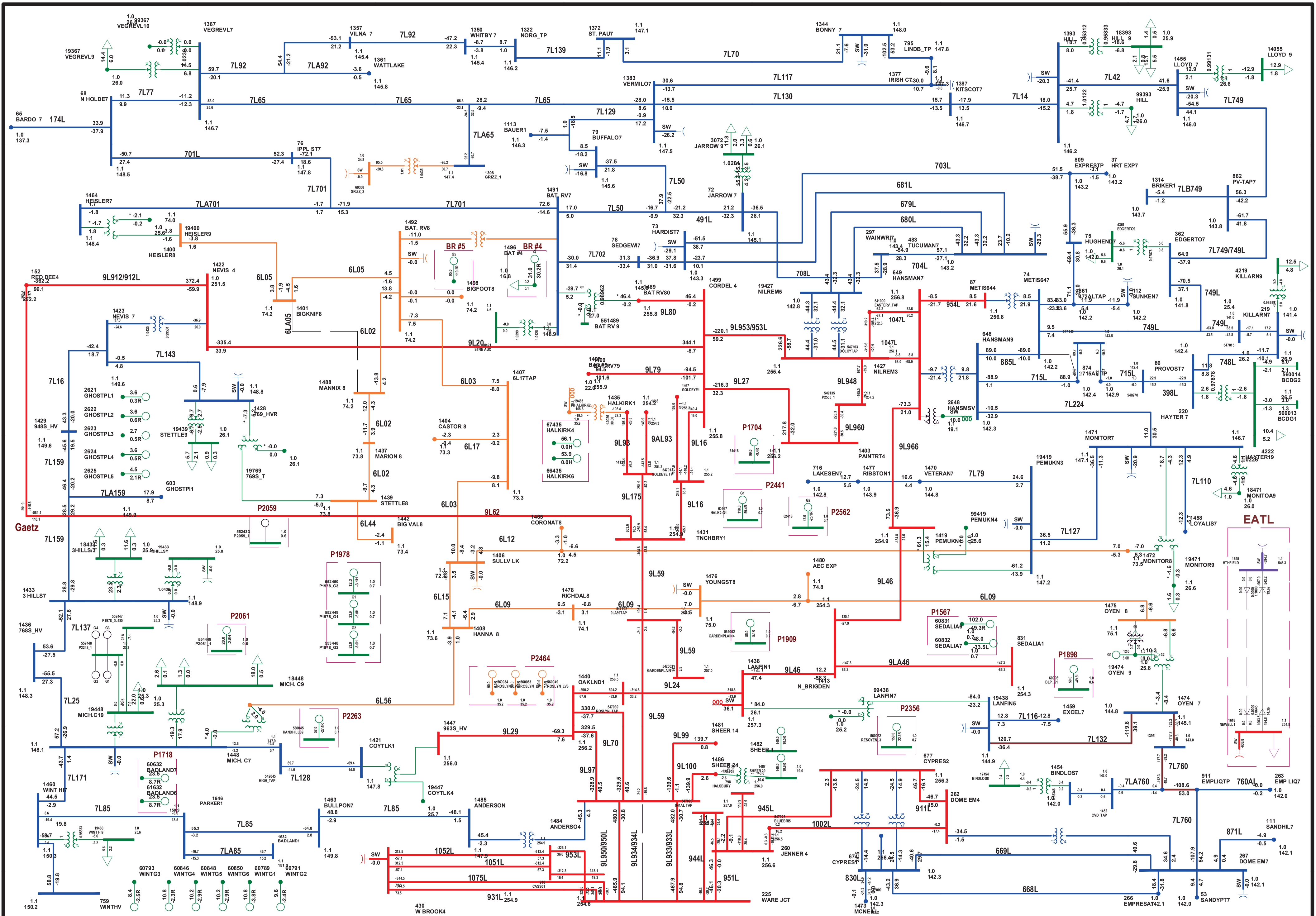
P2464 - Sunnynook Solar Battery Project

CATEGORY B, LOSS OF 933L (ANDERSON 801S - WARE JUNCTION 132S
SCENARIO 4_2028SL_POST-PROJECT
THU, APR 11 2024 14:35

A3 - 38

Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A

kV: >0.000 <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 <=500.000 >500.000



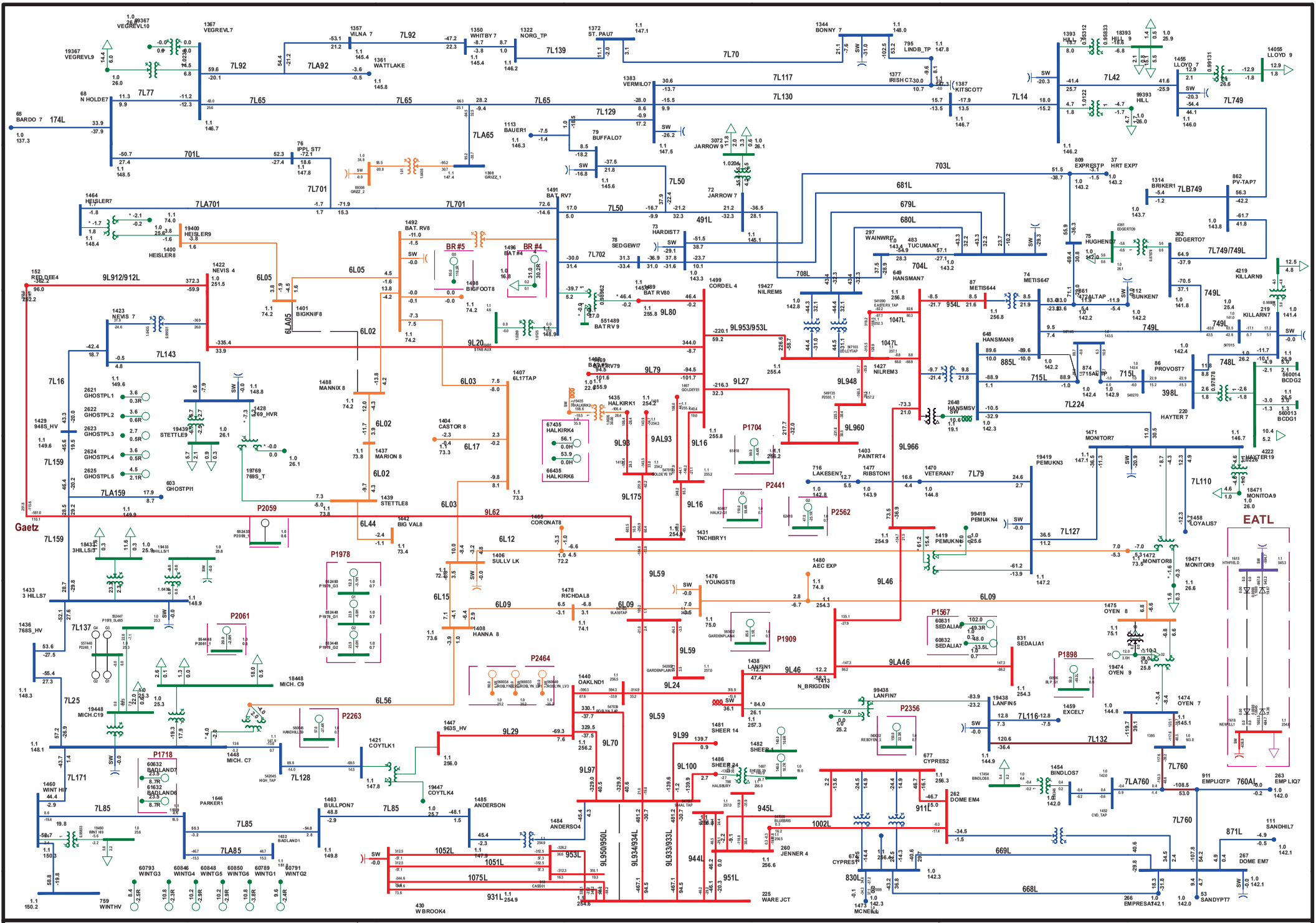
P2464 - Sunnynook Solar Battery Project

CATEGORY B, LOSS OF 934L (ANDERSON 801S - WARE JUNCTION 132S
SCENARIO 4_2028SL_POST-PROJECT
THU, APR 11 2024 14:35

A3 - 39

Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A

kV: >0.000 <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 <=500.000 >500.000



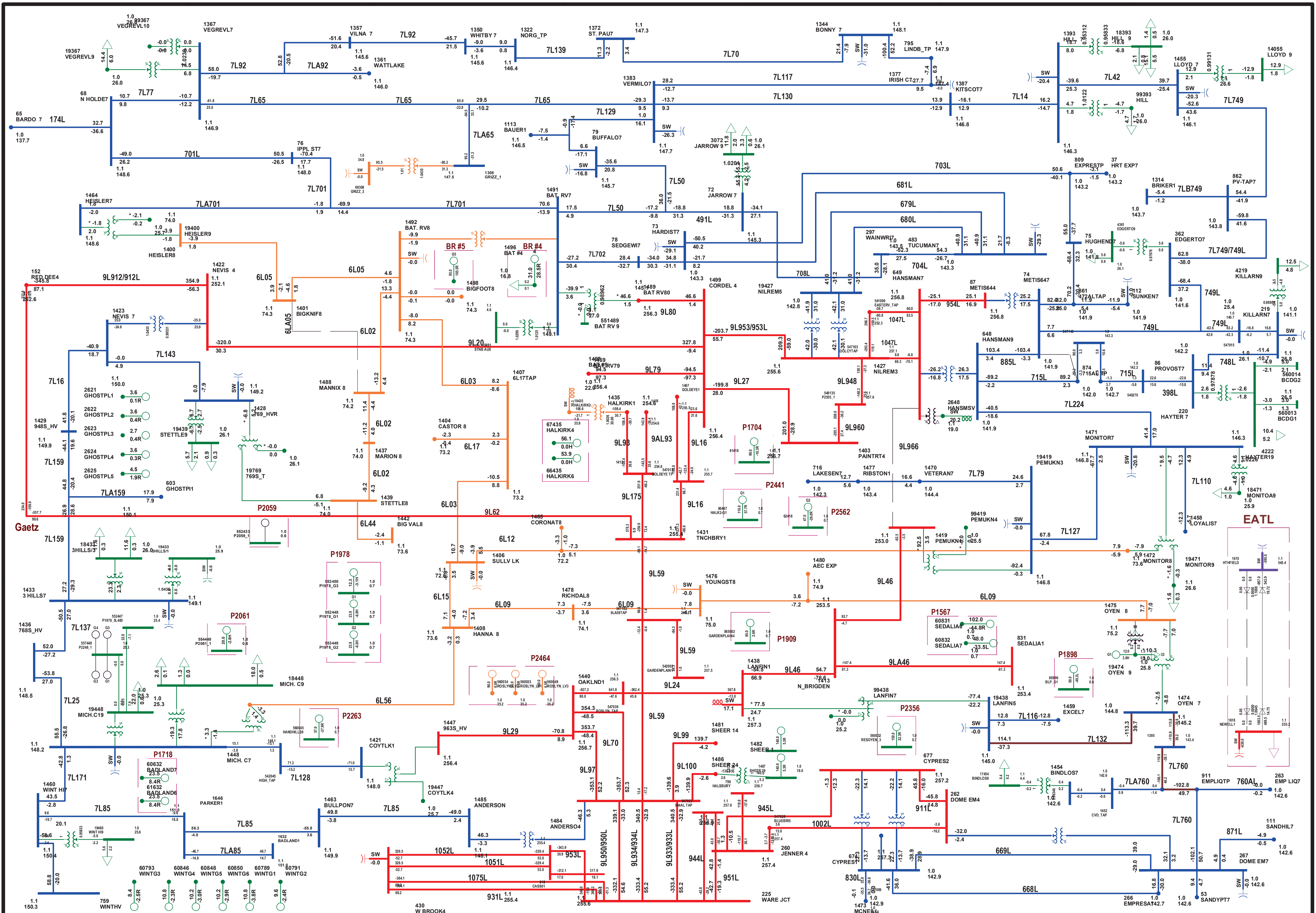
P2464 - Sunnynook Solar Battery Project

CATEGORY B, LOSS OF 950L (ANDERSON 801S - WARE JUNCTION 132S
SCENARIO 4_2028SL_POST-PROJECT
THU, APR 11 2024 14:35

A3 - 40

Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A

kV: >0.000 <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 <=500.000 >500.000



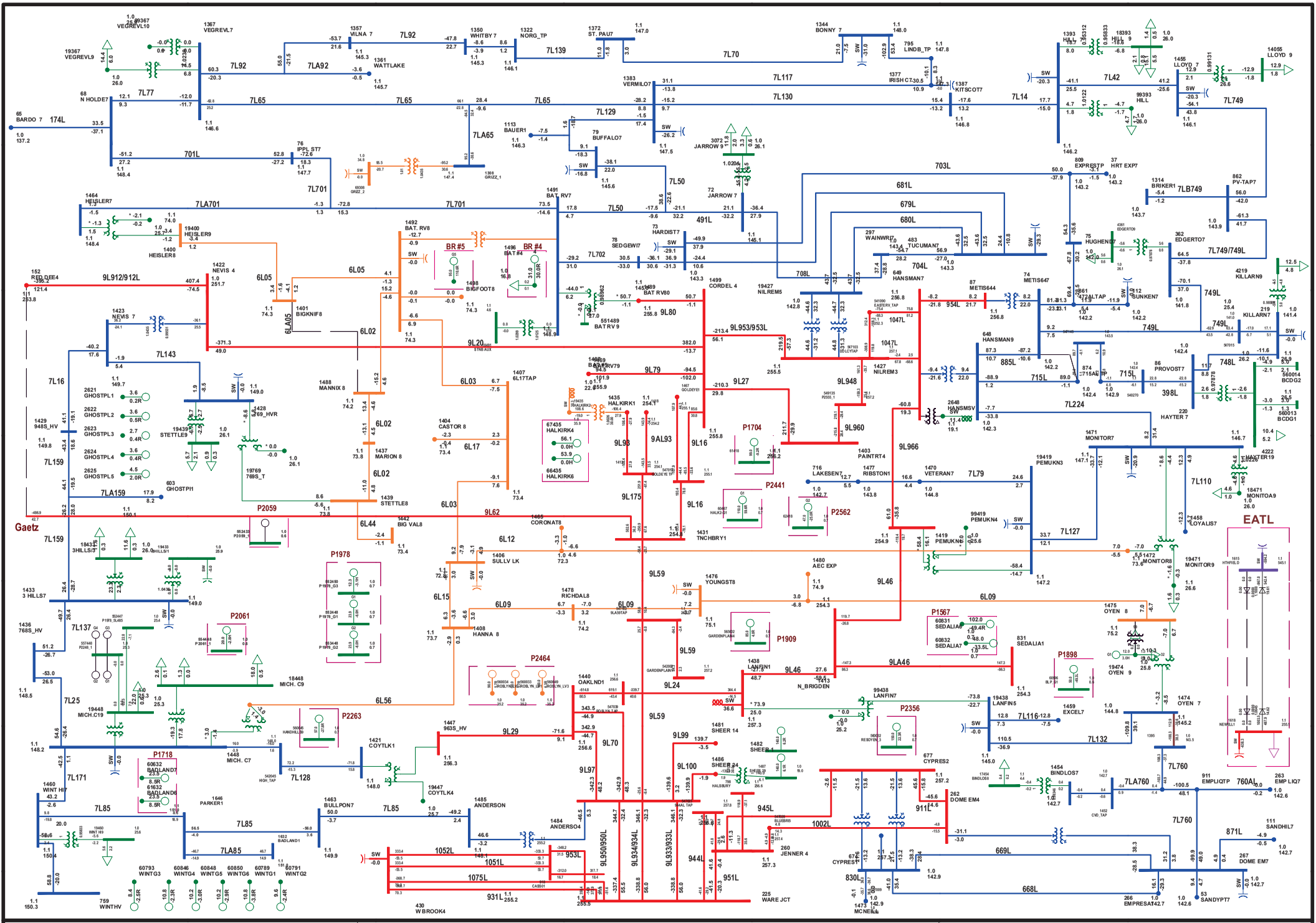
P2464 - Sunnynook Solar Battery Project

CATEGORY B, LOSS OF 9L966 (HANSMAN LAKE 650S - PEMUKAN 932S)
SCENARIO 4_2028SL_POST-PROJECT
THU, APR 11 2024 14:36

A3 - 41

Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A

kV: >0.000 <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 <=500.000 >500.000



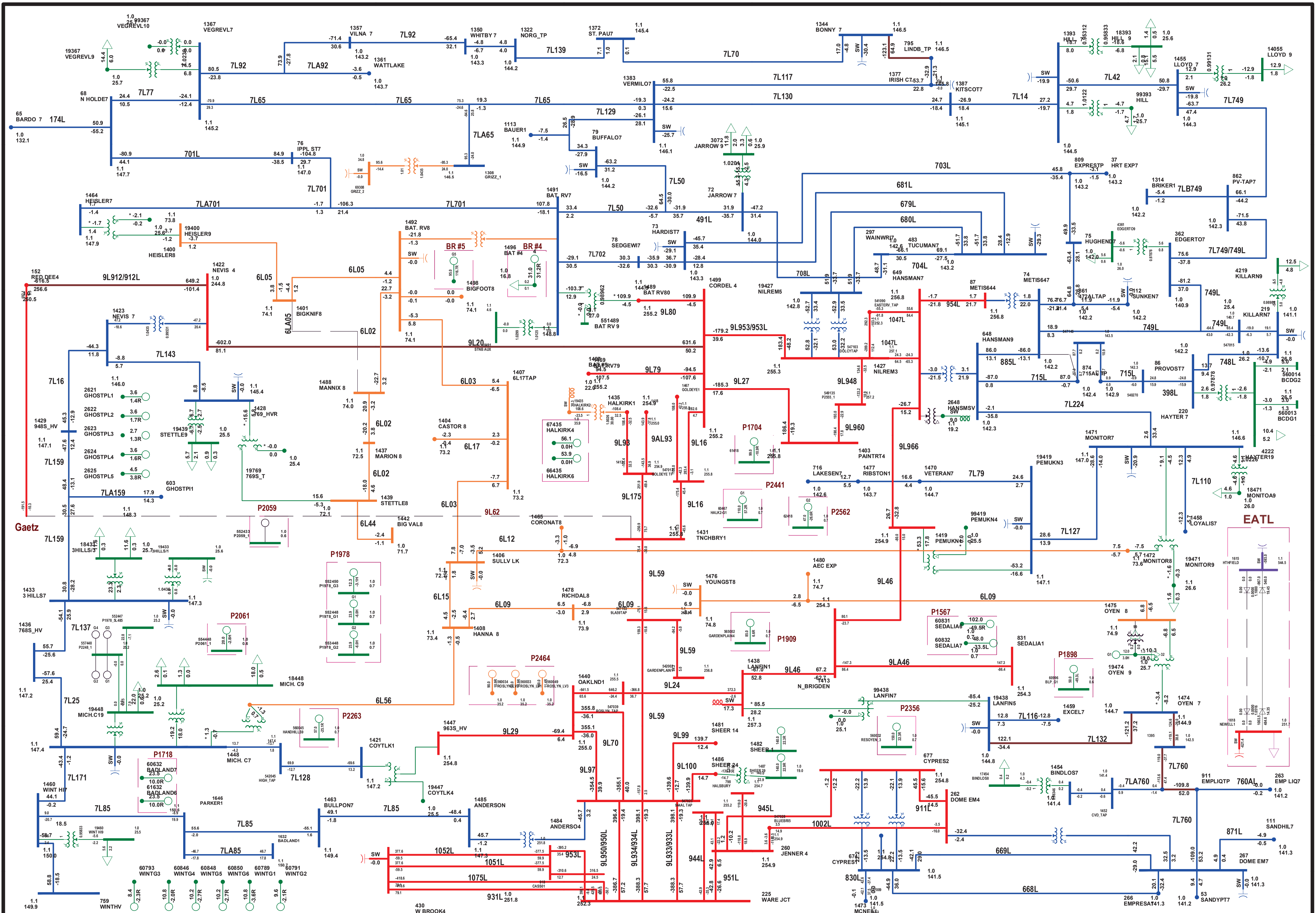
P2464 - Sunnynook Solar Battery Project

CATEGORY B, LOSS OF 914L (RED DEER 63S - GAETZ 87S)
SCENARIO 4_2028SL_POST-PROJECT
THU, APR 11 2024 14:36

A3 - 42

Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A

kV: >0.000 <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 <=500.000 >500.000



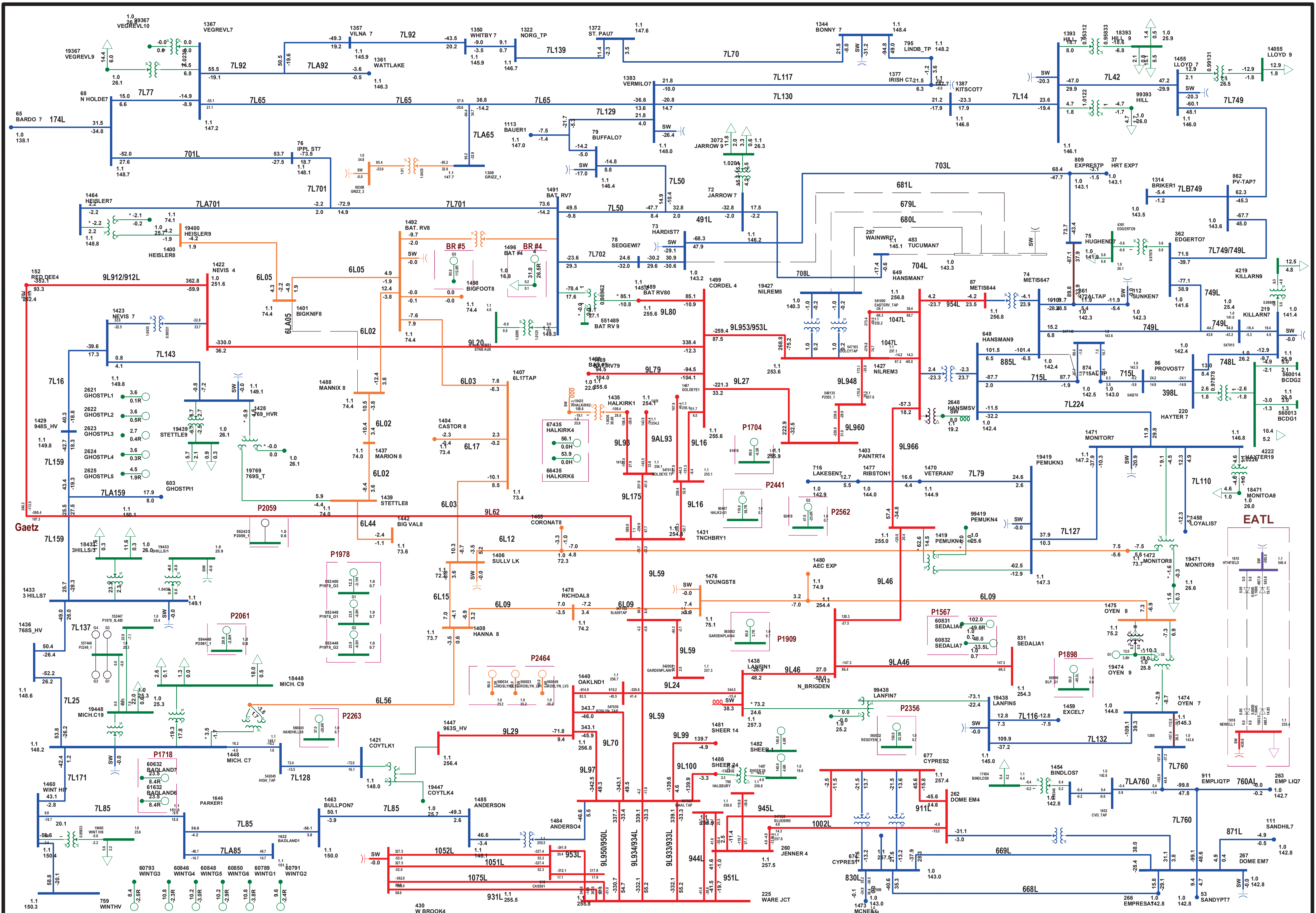
P2464 - Sunnynook Solar Battery Project

CATEGORY B, LOSS OF 9L62 (TINCHEBRAY 972S - GAETZ 87S)
SCENARIO 4_2028SL_POST-PROJECT
THU, APR 11 2024 14:36

A3 - 43

Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A

kV: >0.000 <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 <=500.000 >500.000



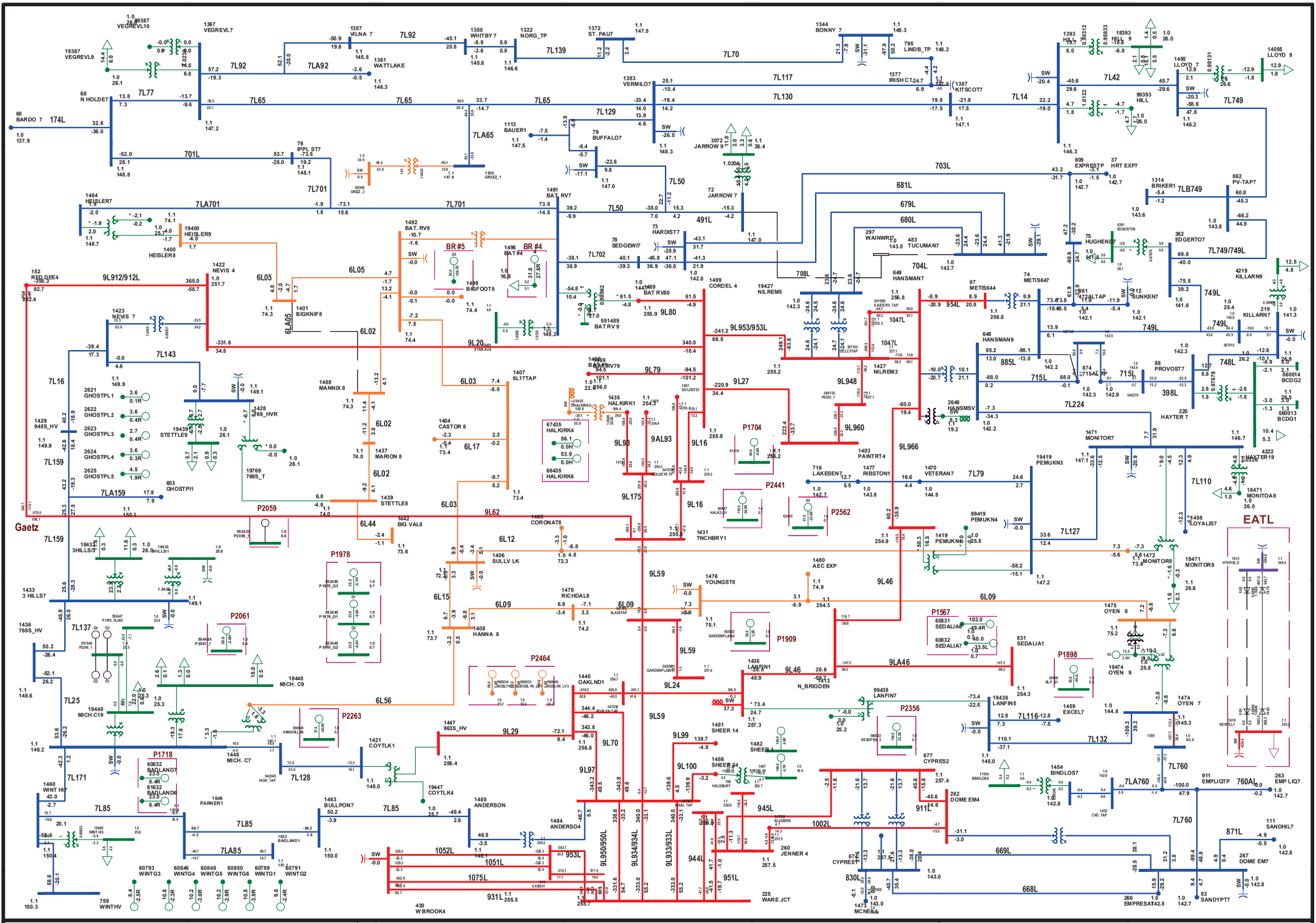
P2464 - Sunnynook Solar Battery Project

CATEGORY B, LOSS OF TUCUMAN 478S TRANSFORMERS
SCENARIO 4_2028SL_POST-PROJECT
THU, APR 11 2024 14:36

A3 - 44

Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A

kV: >0.000 <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 <=500.000 >500.000



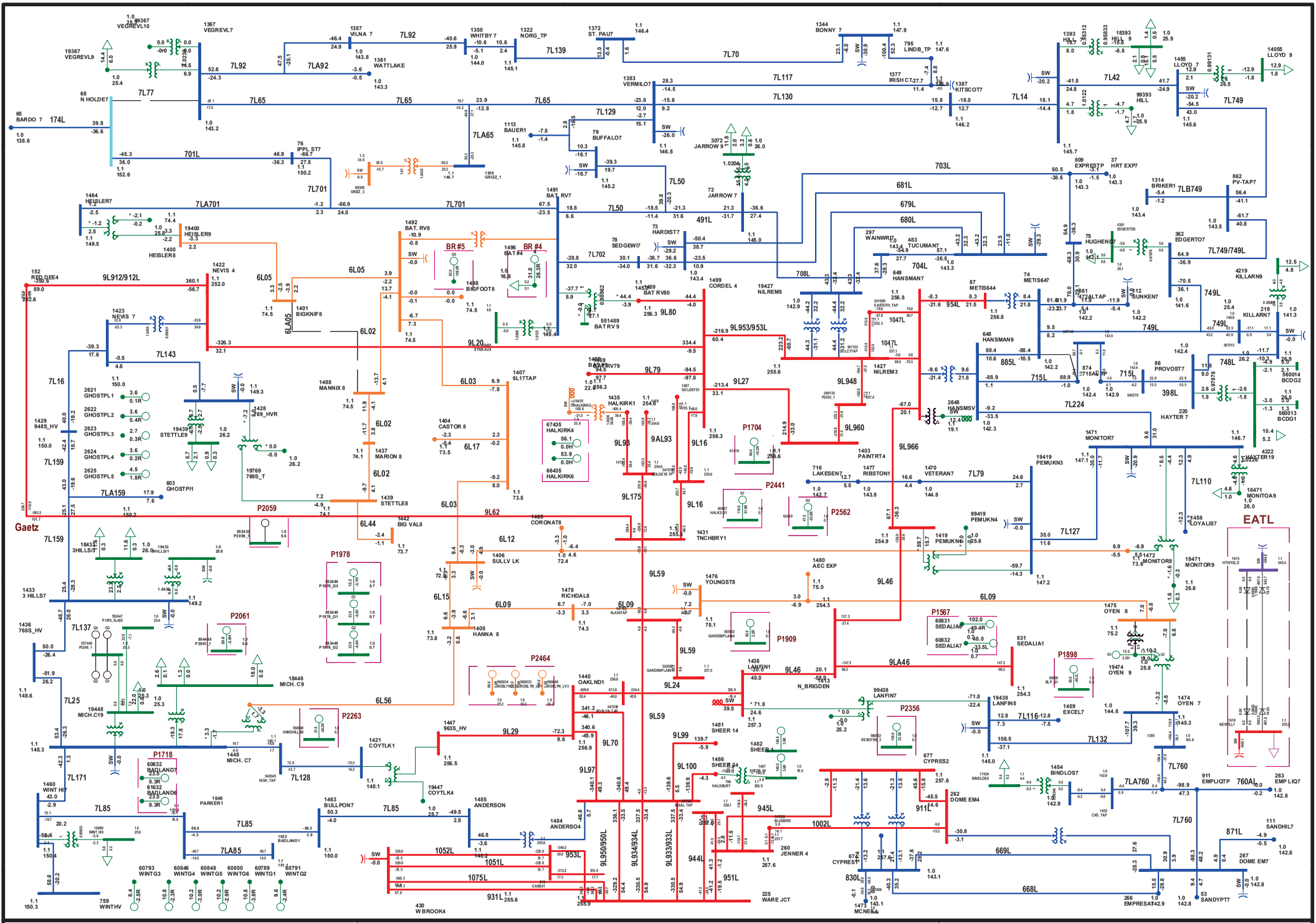
P2464 - Sunnynook Solar Battery Project

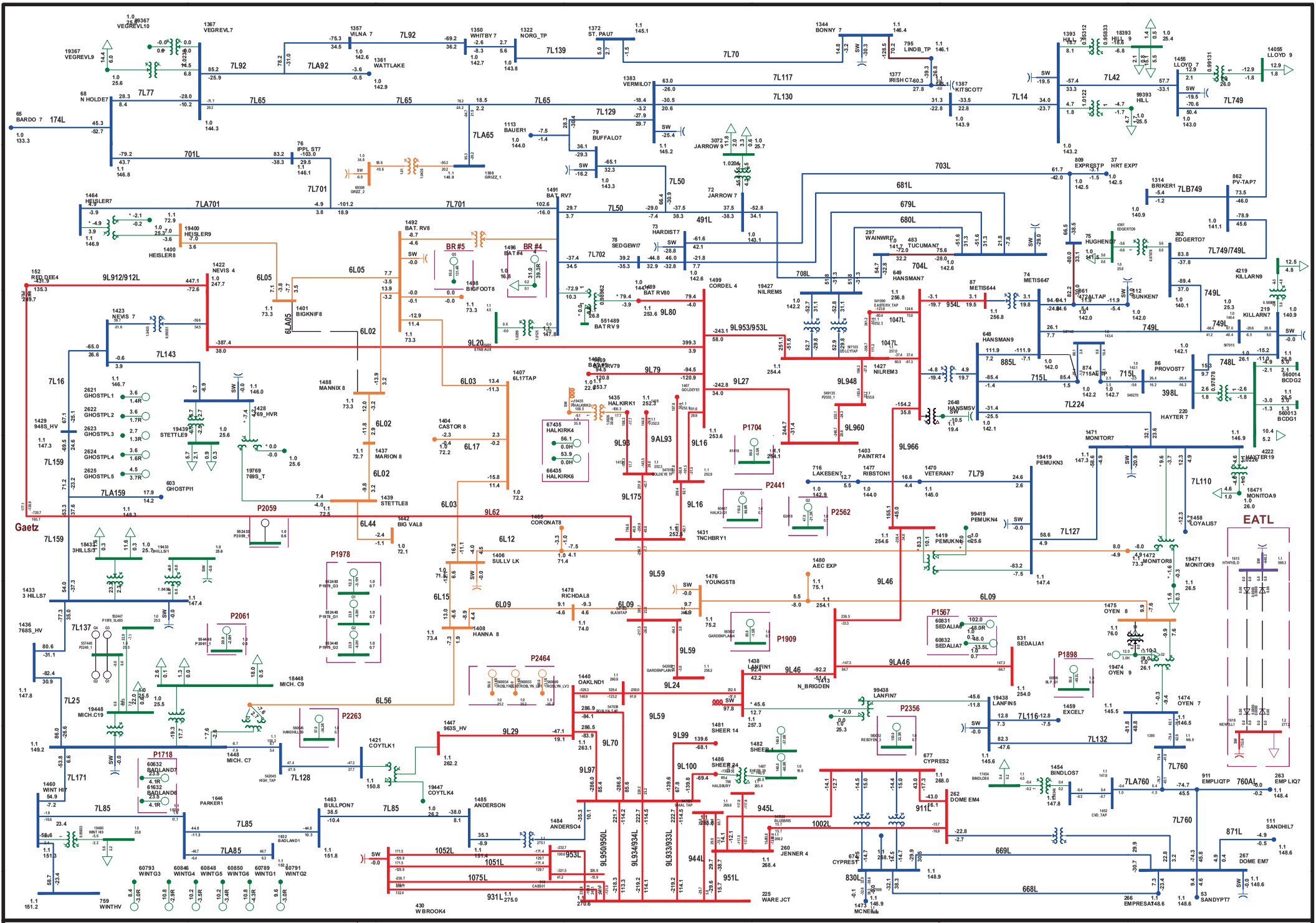
CATEGORY B, LOSS OF WAINWRIGHT 51S TRANSFORMER T3
SCENARIO 4_2028SL_POST-PROJECT
THU, APR 11 2024 14:36

A3 - 45

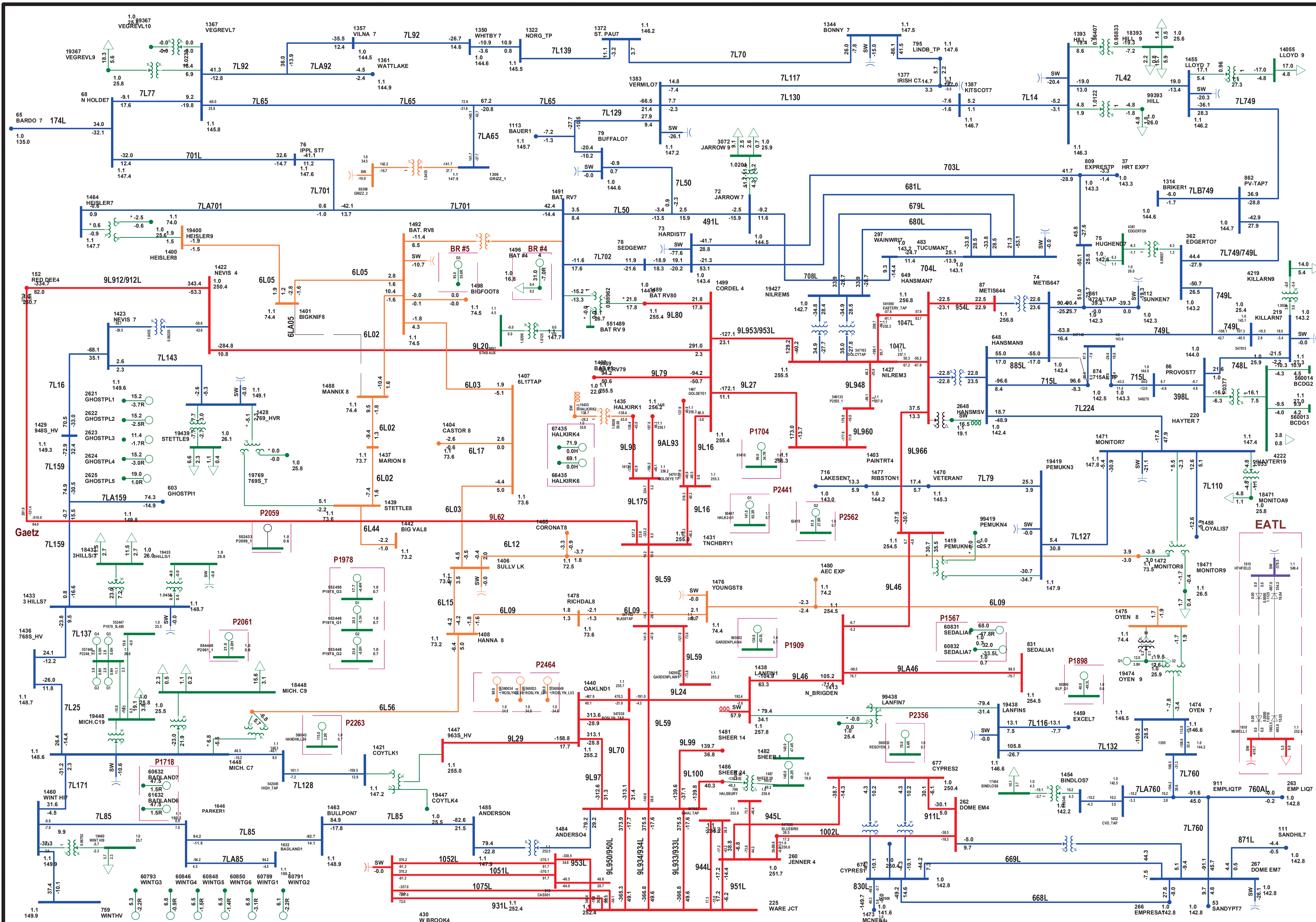
Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A

kV: >0.000 <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 <=500.000 >500.000


Gaetz
EATL
P2464 - Sunnynook Solar Battery Project
CATEGORY B, LOSS OF 7L77 (HOLDEN 395S - VEGREVILLE 709S)
SCENARIO 4_2028SL_POST-PROJECT
FRI, APR 12 2024 16:22
A3 - 46
Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A
kV: >0.000 <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 <=500.000 >500.000


Gaetz
EATL
P2464 - Sunnynook Solar Battery Project
CATEGORY B, LOSS OF EATL
SCENARIO 4_2028SL_POST-PROJECT
FRI, APR 12 2024 8:22
A3 - 47
Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A
kV: >0.000 <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 <=500.000 >500.000

Scenario 5
2028 SP Post-Project (Alternative 2)



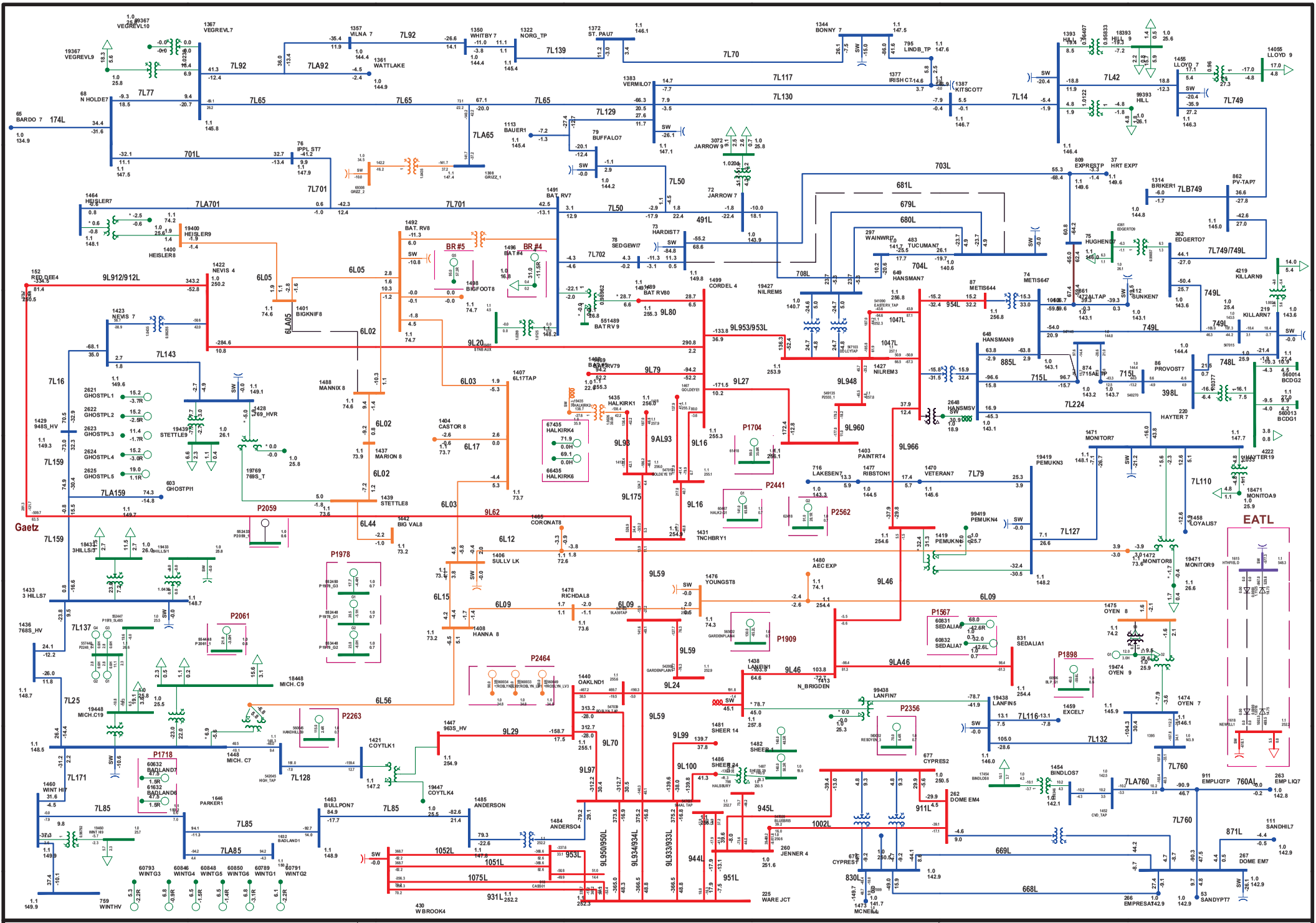
P2464 - Sunnynook Solar Battery Project

CATEGORY A, N-0
SCENARIO 5_2028SP_POST-PROJECT
THU, APR 11 2024 14:44

A3 - 48

Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A

kV: >0.000 <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 <=500.000 >500.000



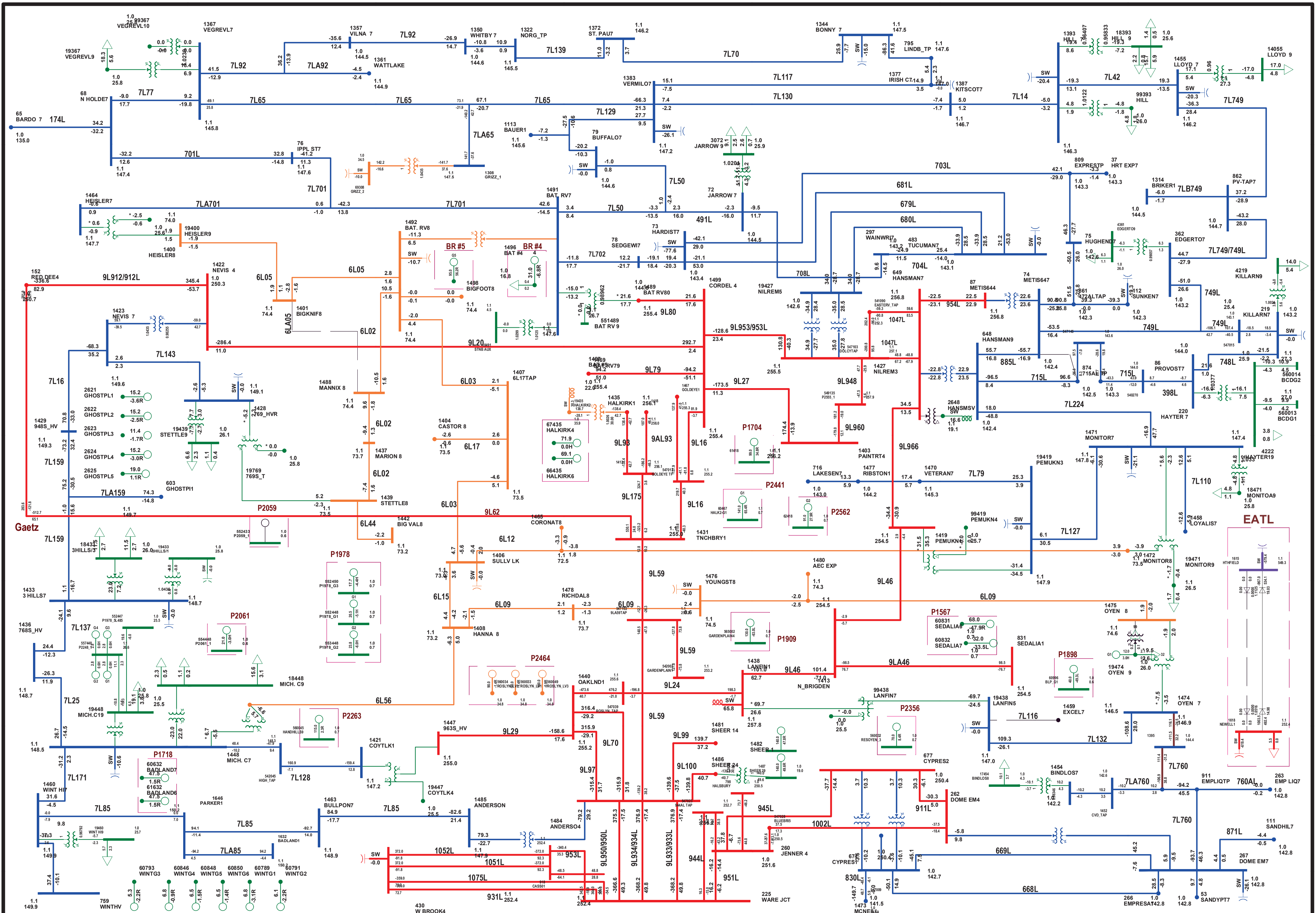
P2464 - Sunnynook Solar Battery Project

CATEGORY B, LOSS OF 681L (TUCUMAN 478S - HARDISTY 377S)
SCENARIO 5_2028SP_POST-PROJECT
THU, APR 11 2024 14:44

A3 - 49

Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A

kV: >0.000 <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 <=500.000 >500.000



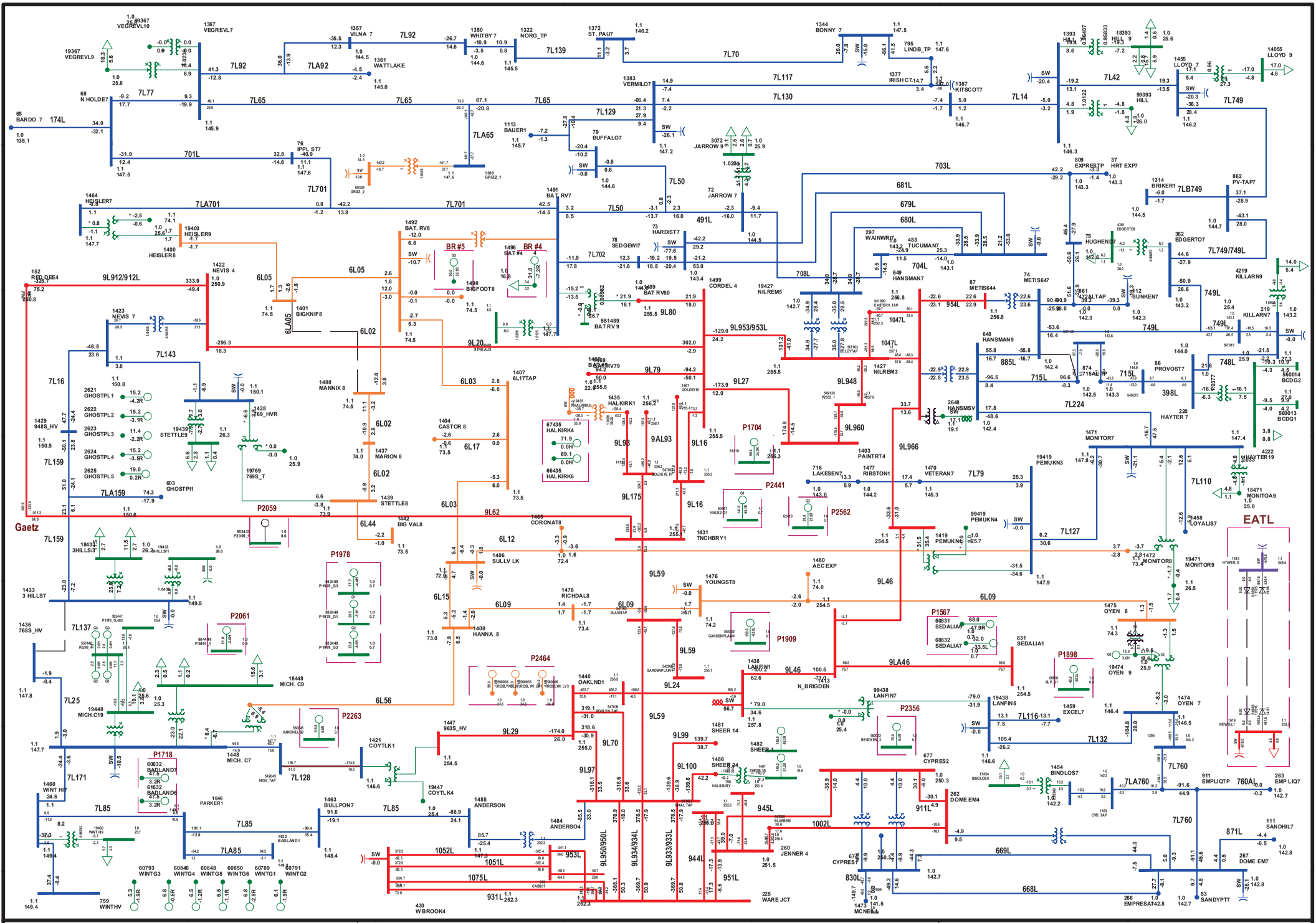
P2464 - Sunnynook Solar Battery Project

CATEGORY B, LOSS OF 7L116 (EXCEL 910S - LANFINE 959S)
SCENARIO 5_2028SP_POST-PROJECT
THU, APR 11 2024 14:45

A3 - 50

Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A

kV: >0.000 <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 <=500.000 >500.000



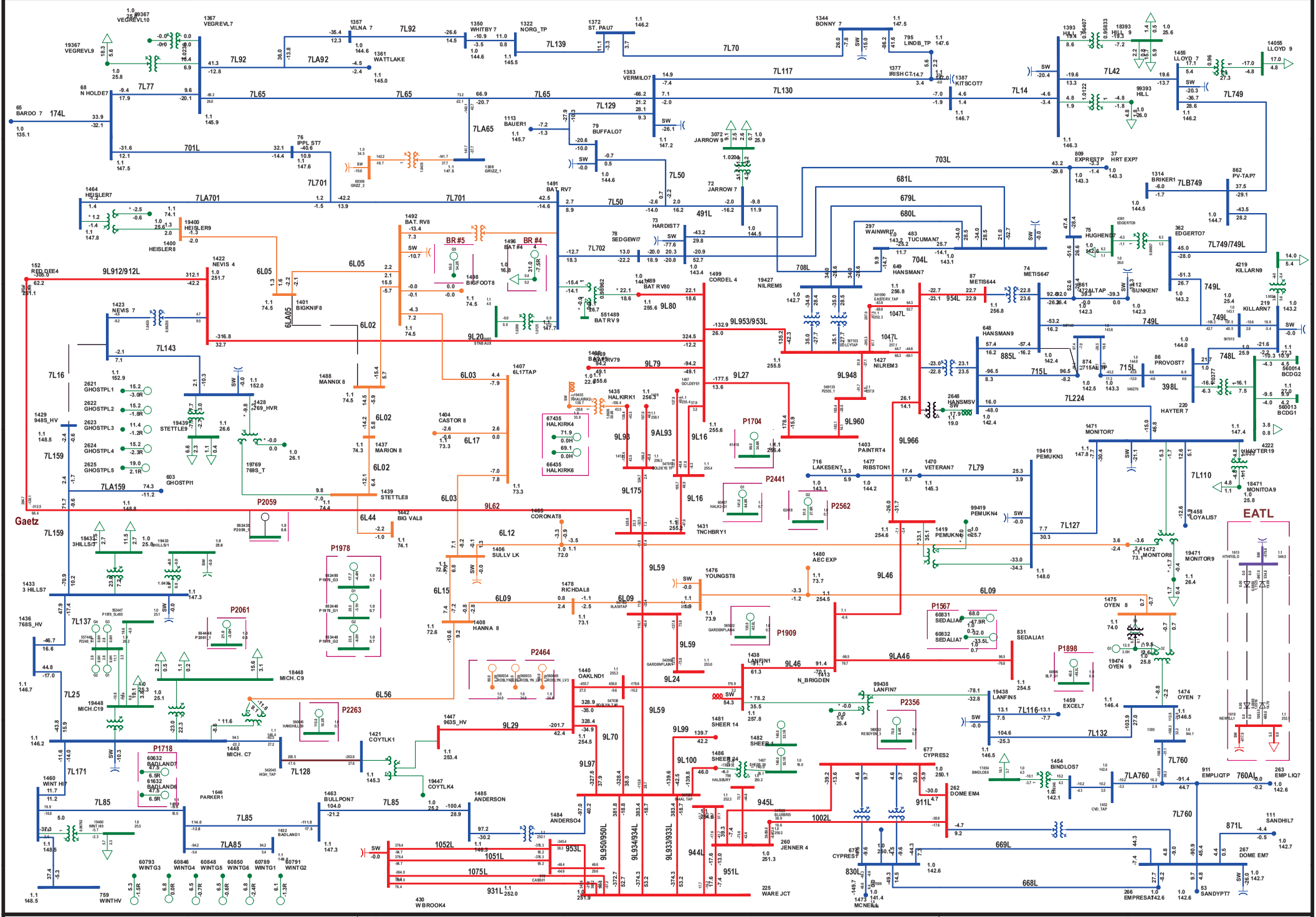
P2464 - Sunnynook Solar Battery Project

CATEGORY B, LOSS OF 7L137 (THREE HILLS 770S - ROWLEY 768S)
SCENARIO 5_2028SP_POST-PROJECT
THU, APR 11 2024 14:45

A3 - 51

Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A

kV: >0.000 <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 <=500.000 >500.000



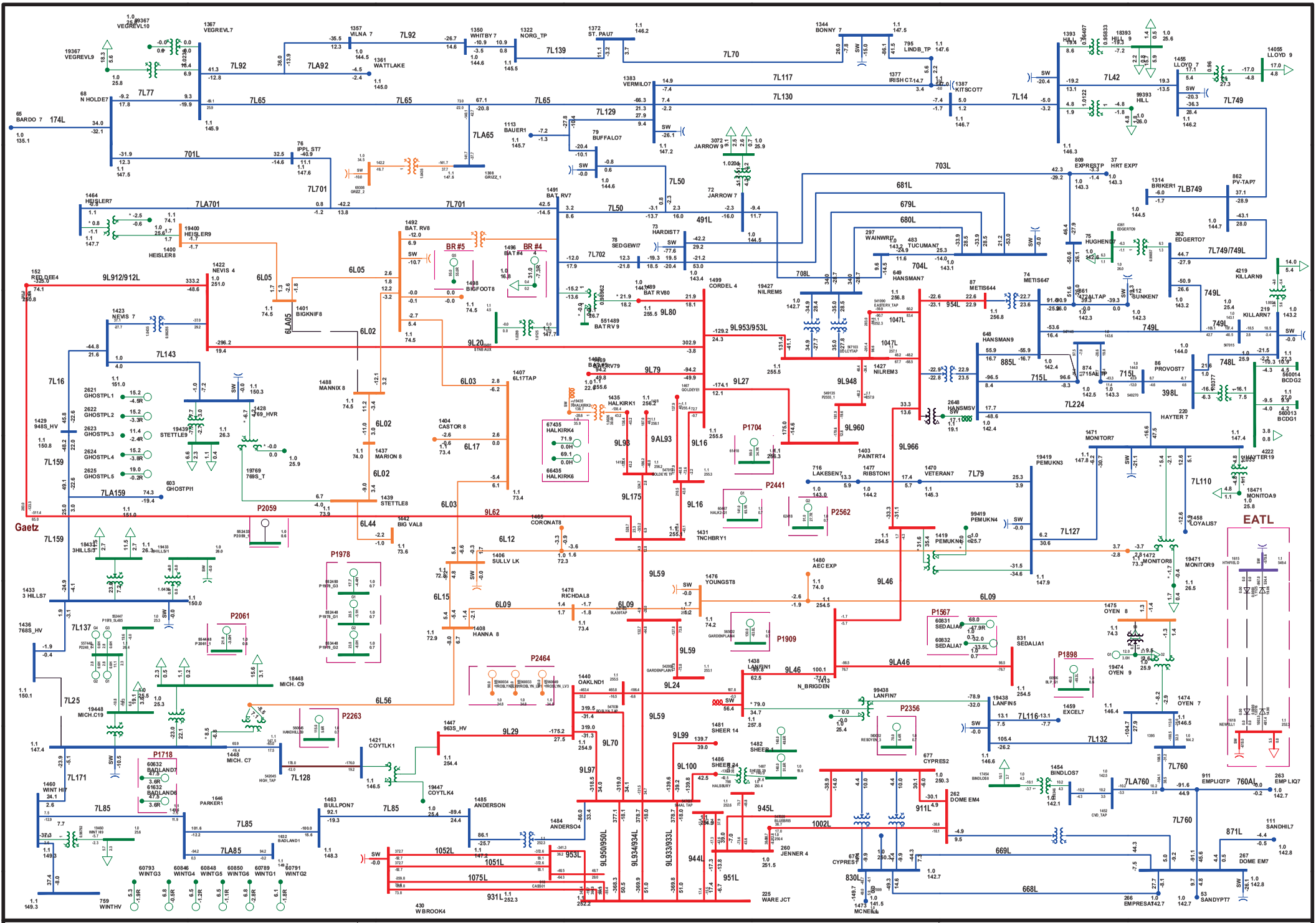
P2464 - Sunnynook Solar Battery Project

CATEGORY B, LOSS OF 7L16 (NEVIS 766S - HEATBURG 948S)
SCENARIO 5_2028SP_POST-PROJECT
THU, APR 11 2024 14:45

A3 - 52

Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A

kV: >0.000 <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 <=500.000 >500.000



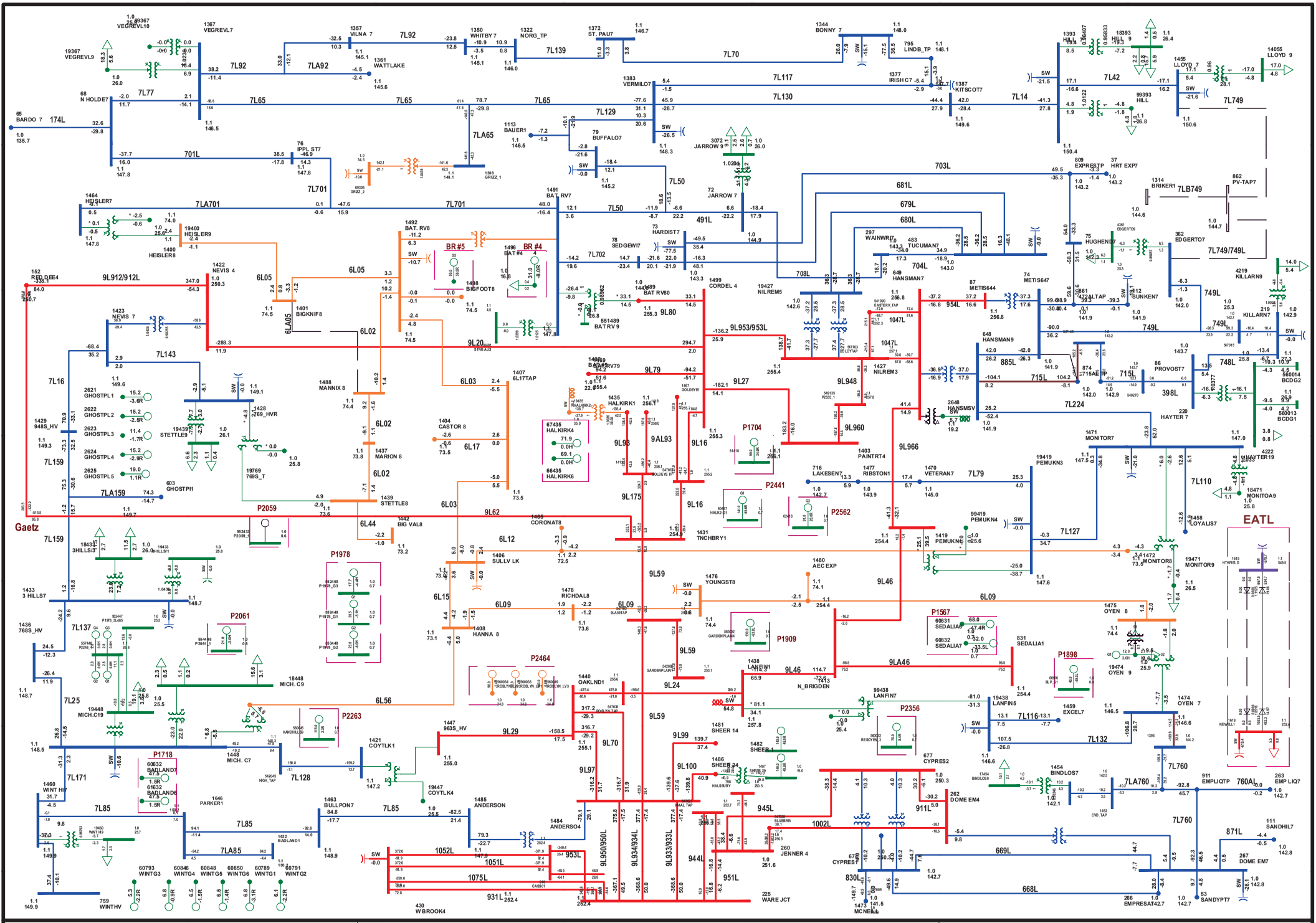
P2464 - Sunnynook Solar Battery Project

CATEGORY B, LOSS OF 7L25 (MICHICHI CREEK 802S - ROWLEY 768S)
SCENARIO 5_2028SP_POST-PROJECT
THU, APR 11 2024 14:45

A3 - 53

Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A

kV: >0.000 <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 <=500.000 >500.000



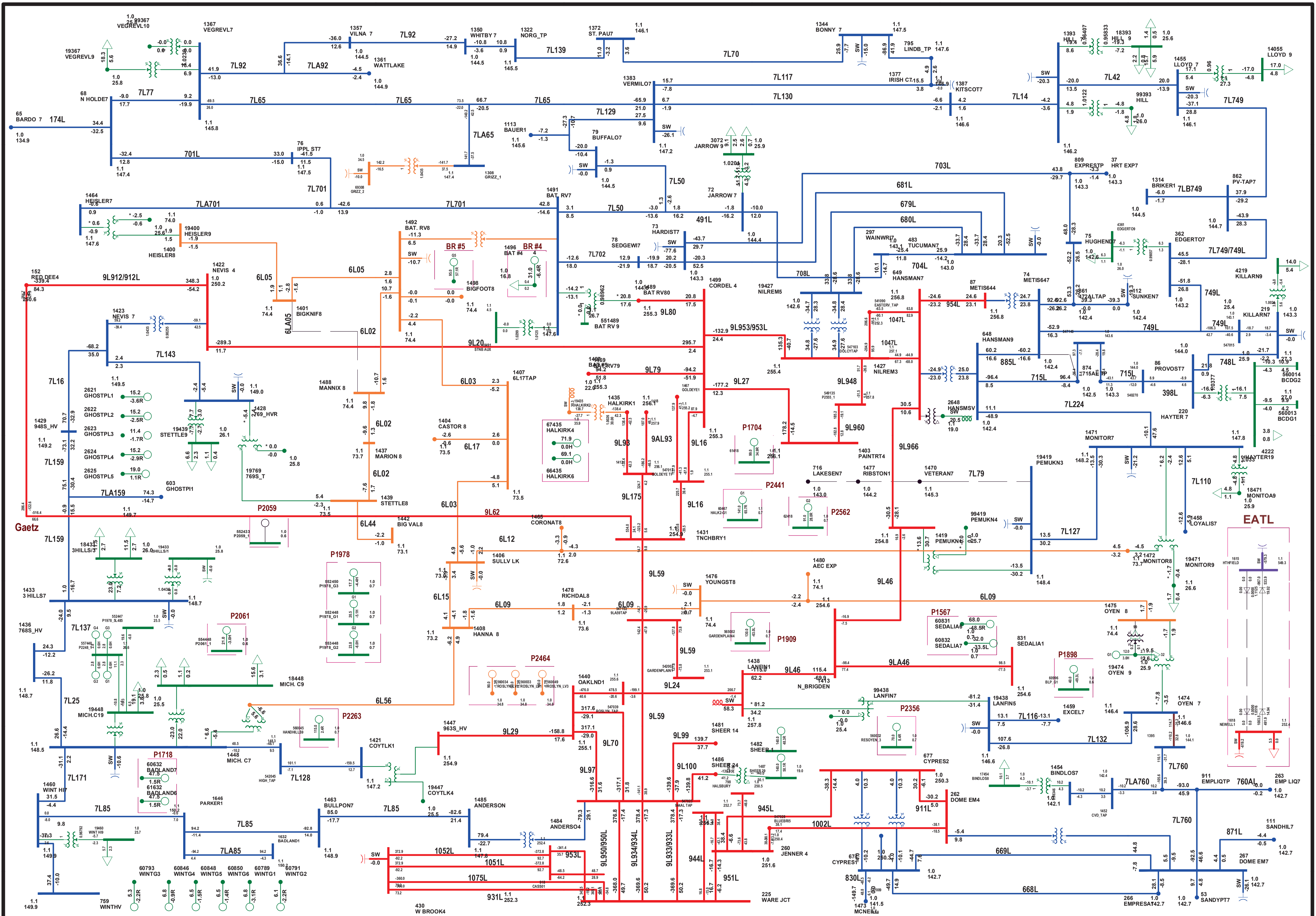
P2464 - Sunnynook Solar Battery Project

CATEGORY B, LOSS OF 7L749 (EDGERTON 899S - LLOYMINSTER 716S)
SCENARIO 5_2028SP_POST-PROJECT
THU, APR 11 2024 14:46

A3 - 54

Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A

kV: >0.000 <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 <=500.000 >500.000



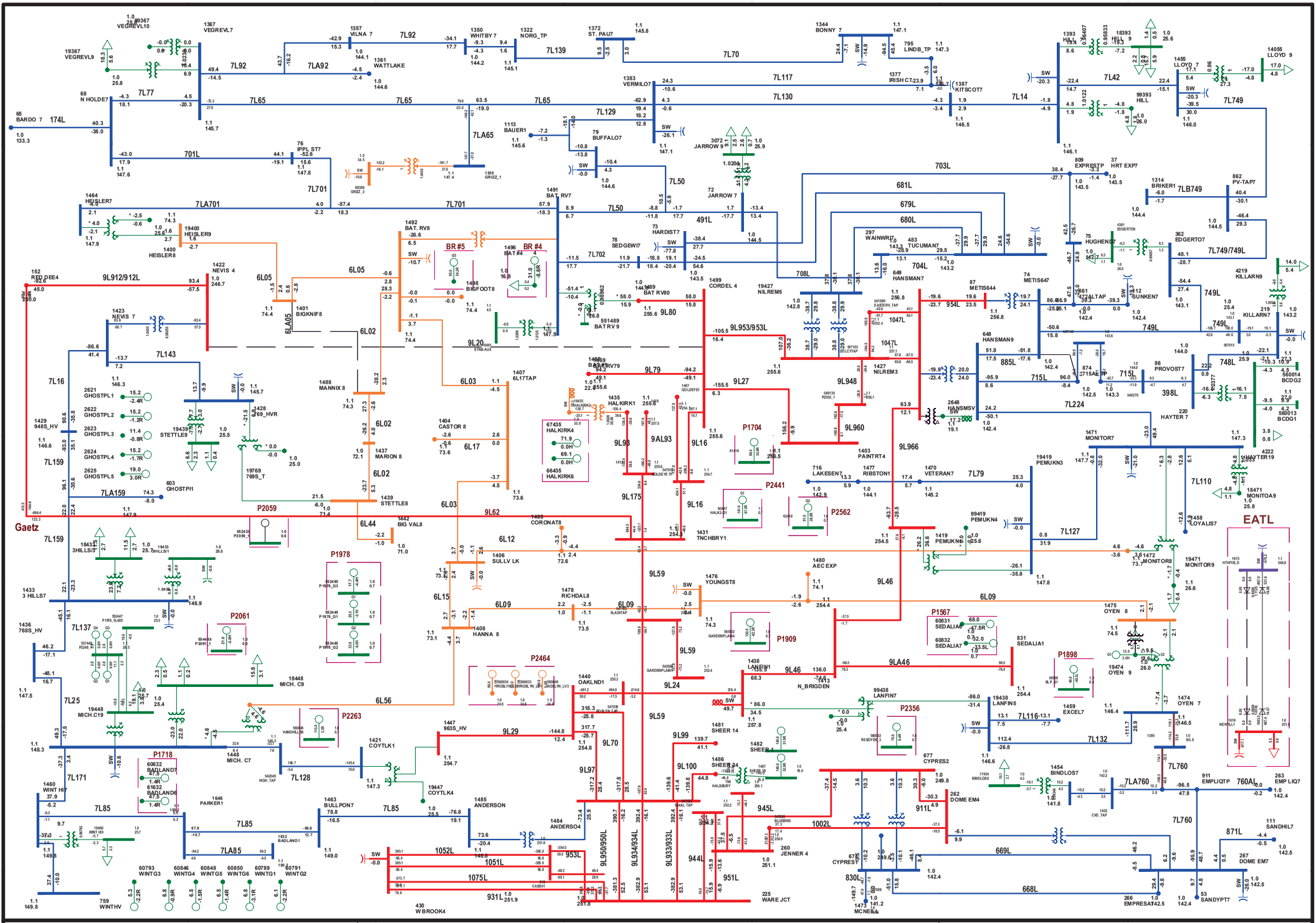
P2464 - Sunnynook Solar Battery Project

CATEGORY B, LOSS OF 7L79 (PEMUKAN 932S - RIBSTONE CREEK 892S
SCENARIO 5_2028SP_POST-PROJECT
THU, APR 11 2024 14:46

A3 - 55

Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A

kV: >0.000 <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 <=500.000 >500.000



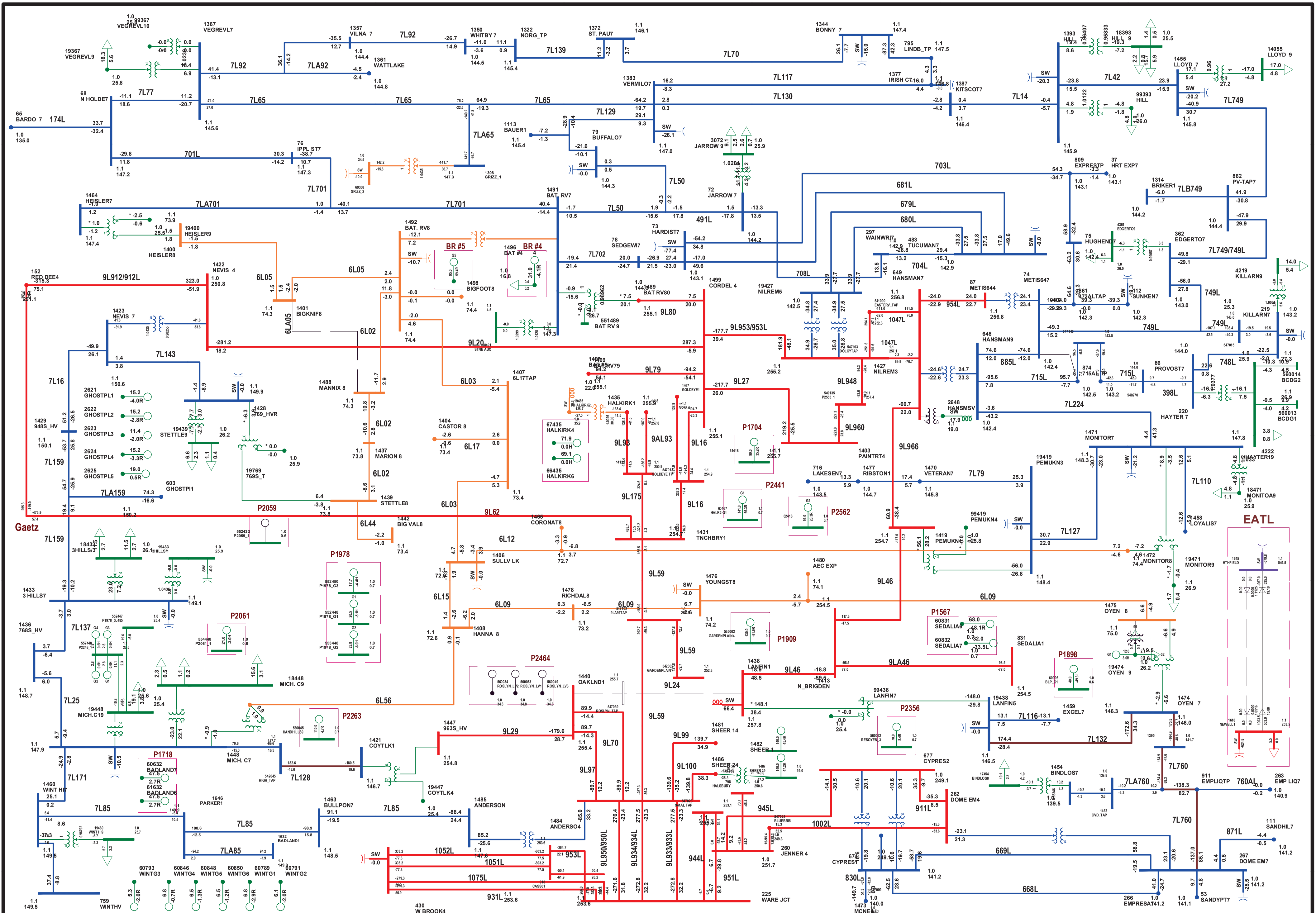
P2464 - Sunnynook Solar Battery Project

CATEGORY B, LOSS OF 9L20 (NEVIS 766S - CORDEL 755S)
SCENARIO 5_2028SP_POST-PROJECT
THU, APR 11 2024 14:46

A3 - 56

Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A

kV: >0.000 <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 <=500.000 >500.000



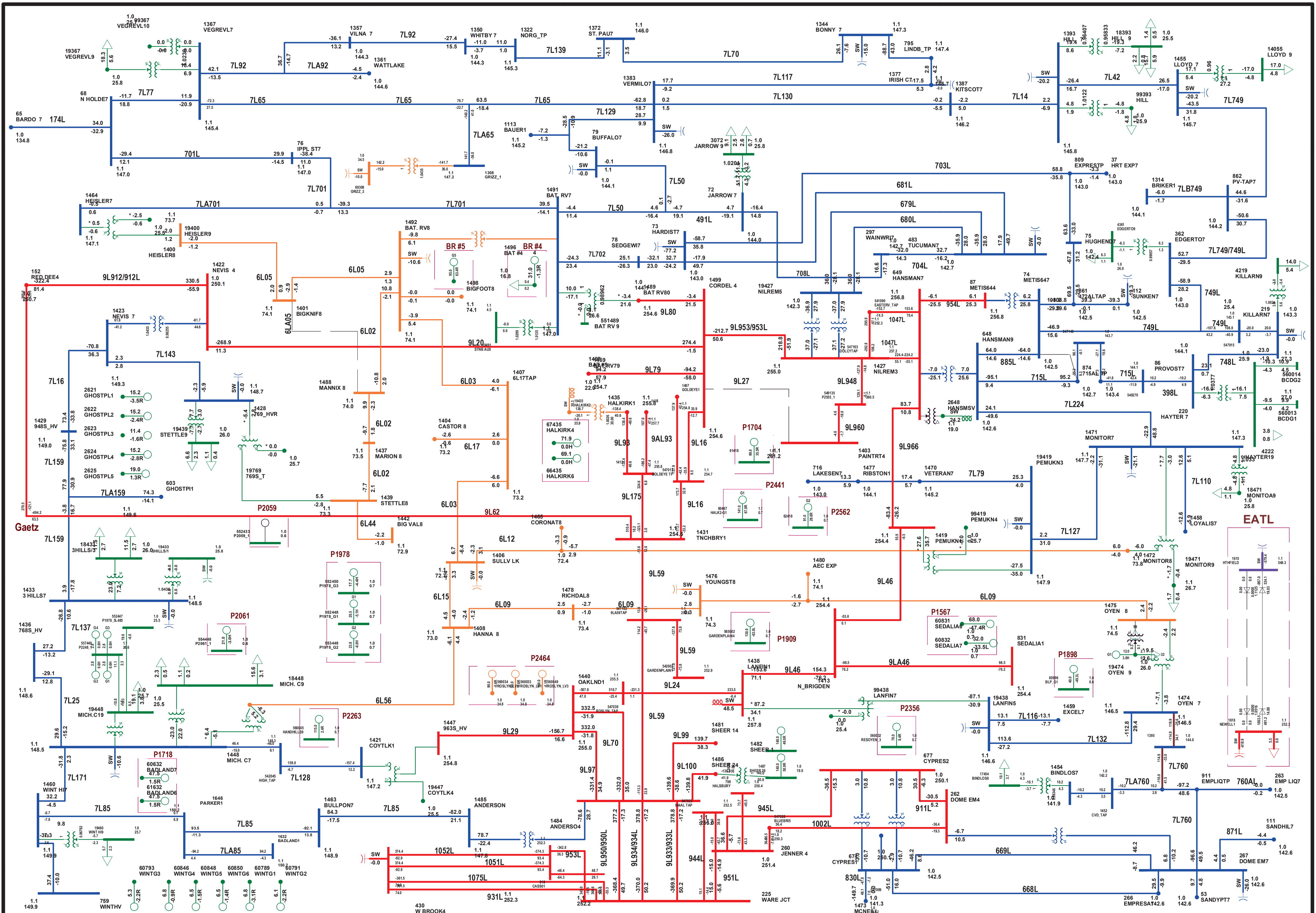
P2464 - Sunnynook Solar Battery Project

CATEGORY B, LOSS OF 9L24 (LANFINE 959S - OAKLAND 946S)
SCENARIO 5_2028SP_POST-PROJECT
THU, APR 11 2024 14:46

A3 - 57

Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A

kV: >0.000 <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 <=500.000 >500.000



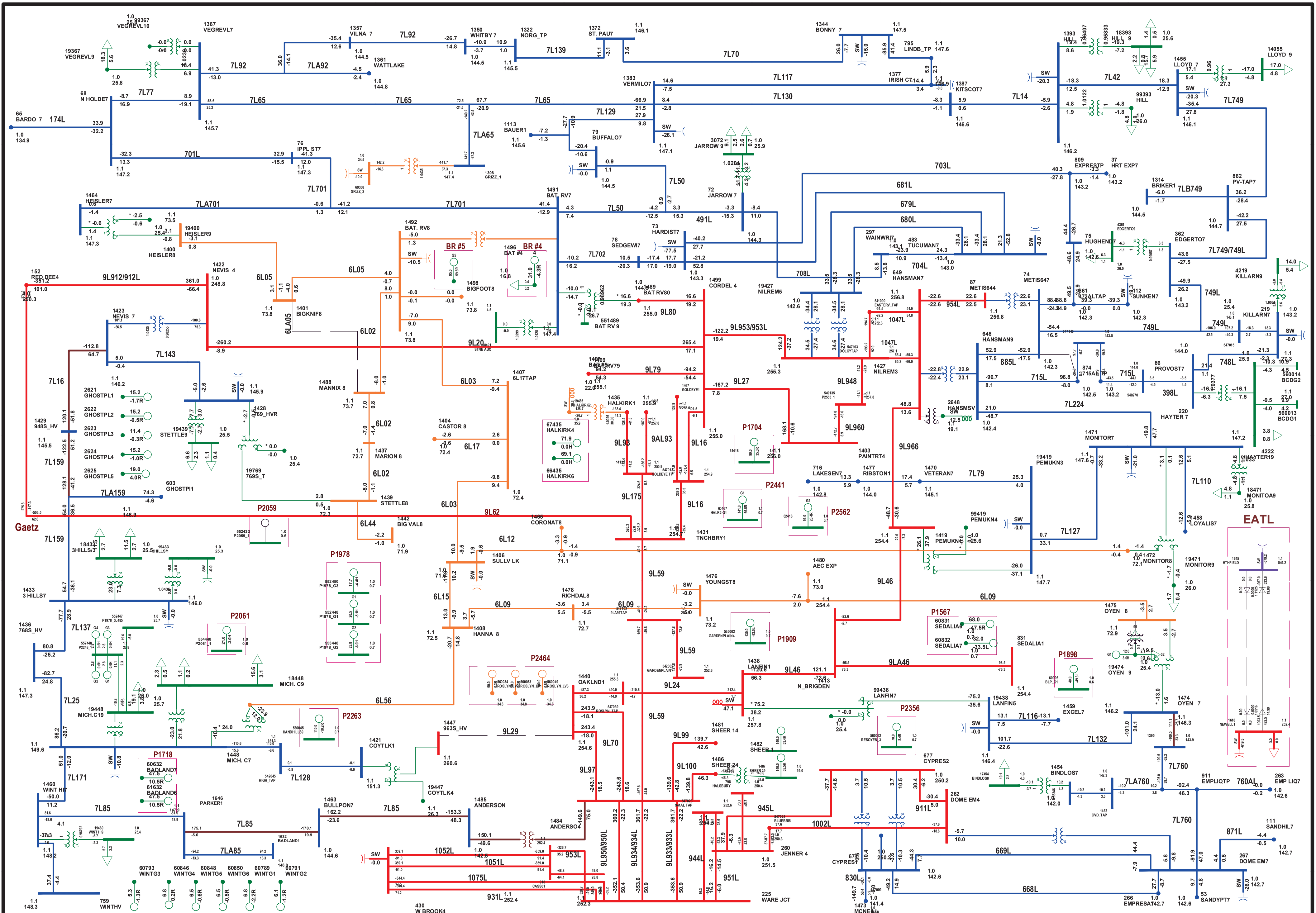
P2464 - Sunnynook Solar Battery Project

CATEGORY B, LOSS OF 9L27 (PAINTEARTH CREEK - CORDEL 755S)
SCENARIO 5_2028SP_POST-PROJECT
THU, APR 11 2024 14:47

A3 - 58

Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A

kV: >0.000 <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 <=500.000 >500.000



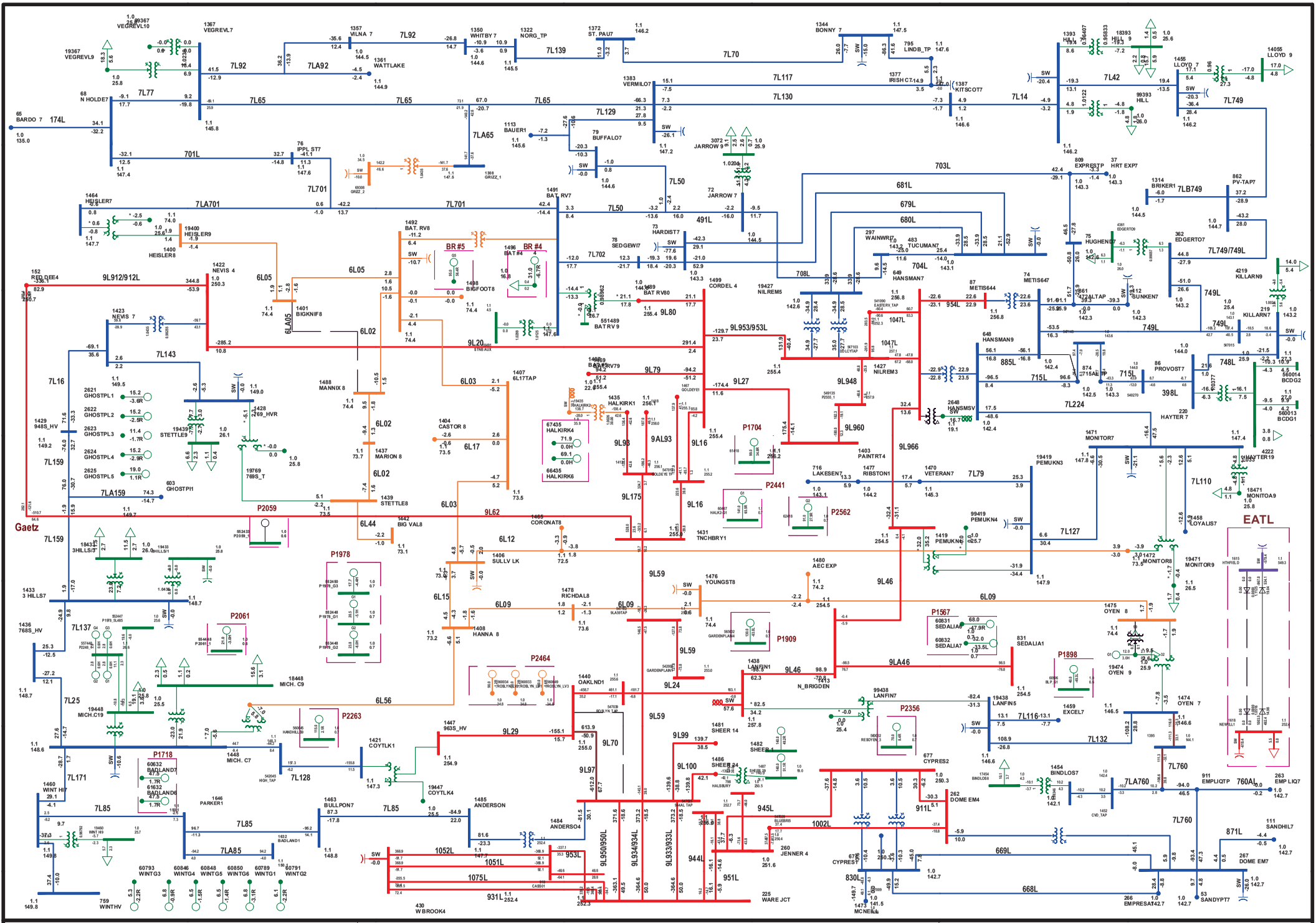
P2464 - Sunnynook Solar Battery Project

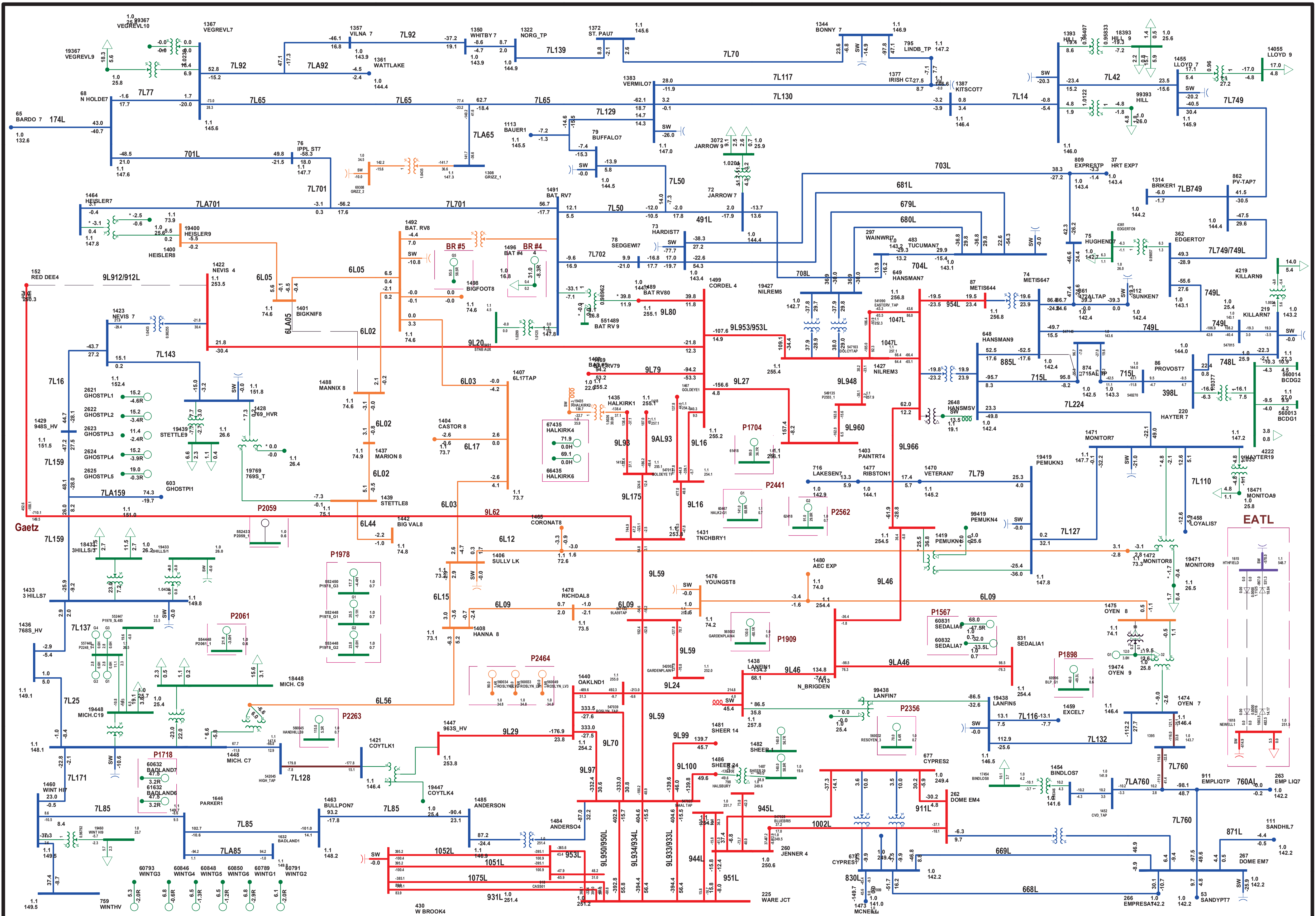
CATEGORY B, LOSS OF 9L29 (COYOTE LAKE 963S - OAKLAND 946S)
SCENARIO 5_2028SP_POST-PROJECT
THU, APR 11 2024 14:47

A3 - 59

Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A

kV: >0.000 <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 <=500.000 >500.000


Gaetz
EATL
P2464 - Sunnynook Solar Battery Project
CATEGORY B, LOSS OF 9L70 (OAKLAND 946S - ANDERSON 801S)
SCENARIO 5_2028SP_POST-PROJECT
THU, APR 11 2024 14:47
A3 - 60
Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A
kV: >0.000 <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 <=500.000 >500.000



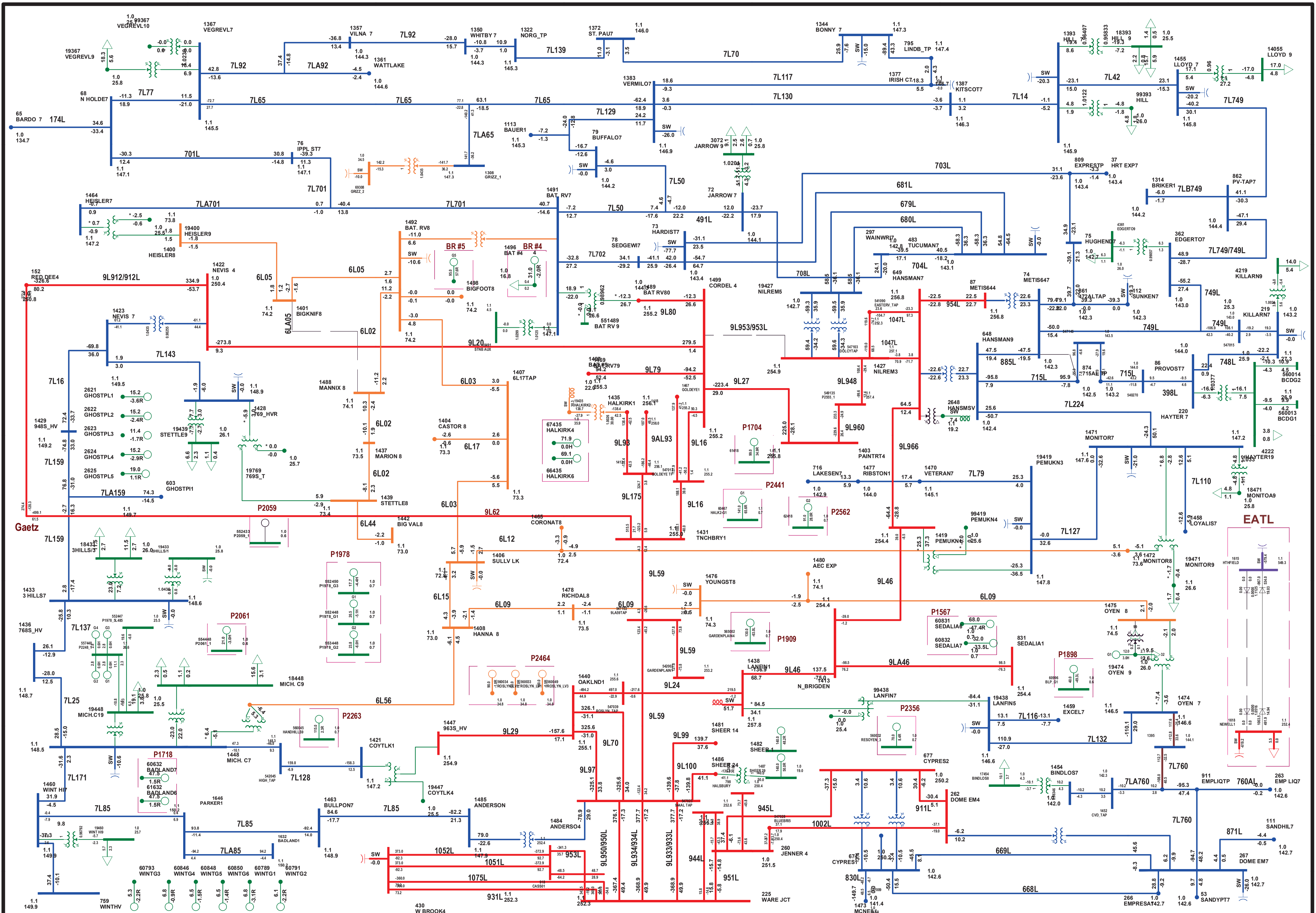
P2464 - Sunnynook Solar Battery Project

CATEGORY B, LOSS OF 9L912 (NEVIS 766S – RED DEER 63S)
SCENARIO 5_2028SP_POST-PROJECT
THU, APR 11 2024 14:47

A3 - 61

Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A

kV: >0.000 <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 <=500.000 >500.000



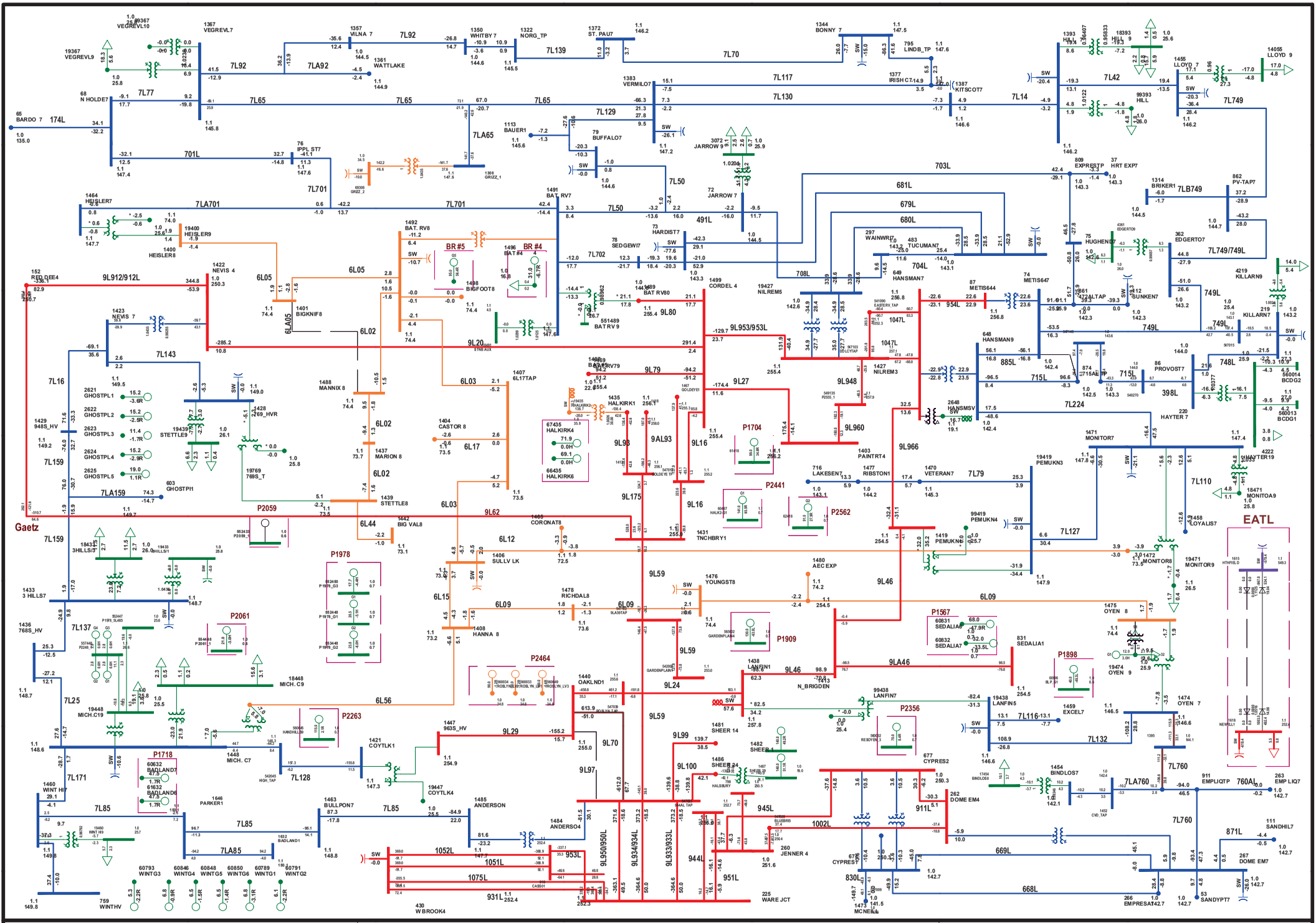
P2464 - Sunnynook Solar Battery Project

CATEGORY B, LOSS OF 9L953 (CORDEL 755S - NILREM 574S)
SCENARIO 5_2028SP_POST-PROJECT
THU, APR 11 2024 14:48

A3 - 62

Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A

kV: >0.000 <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 <=500.000 >500.000



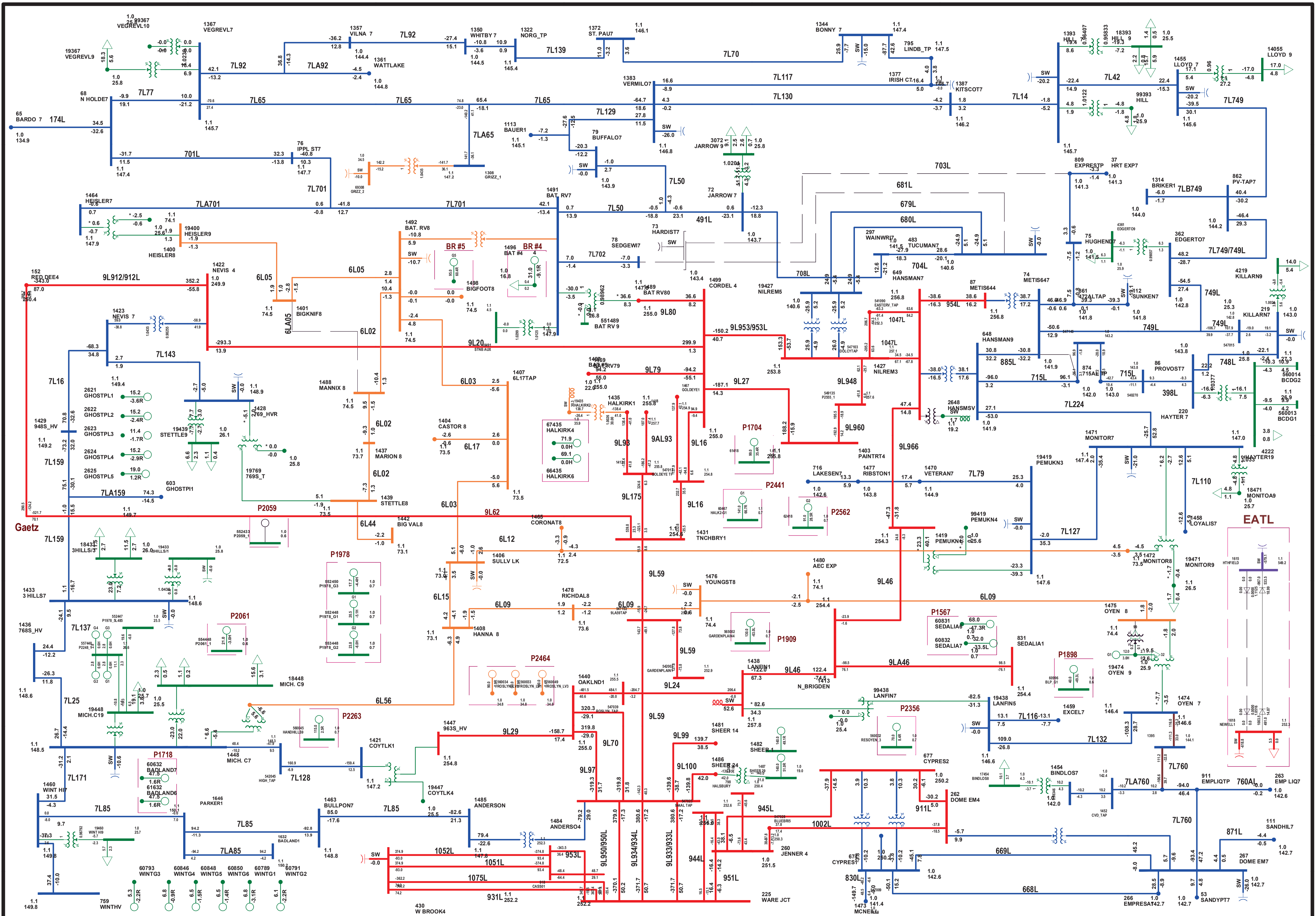
P2464 - Sunnynook Solar Battery Project

CATEGORY B, LOSS OF 9L97 (OAKLAND 946S - ANDERSON 801S)
SCENARIO 5_2028SP_POST-PROJECT
THU, APR 11 2024 14:48

A3 - 63

Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A

kV: >0.000 <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 <=500.000 >500.000



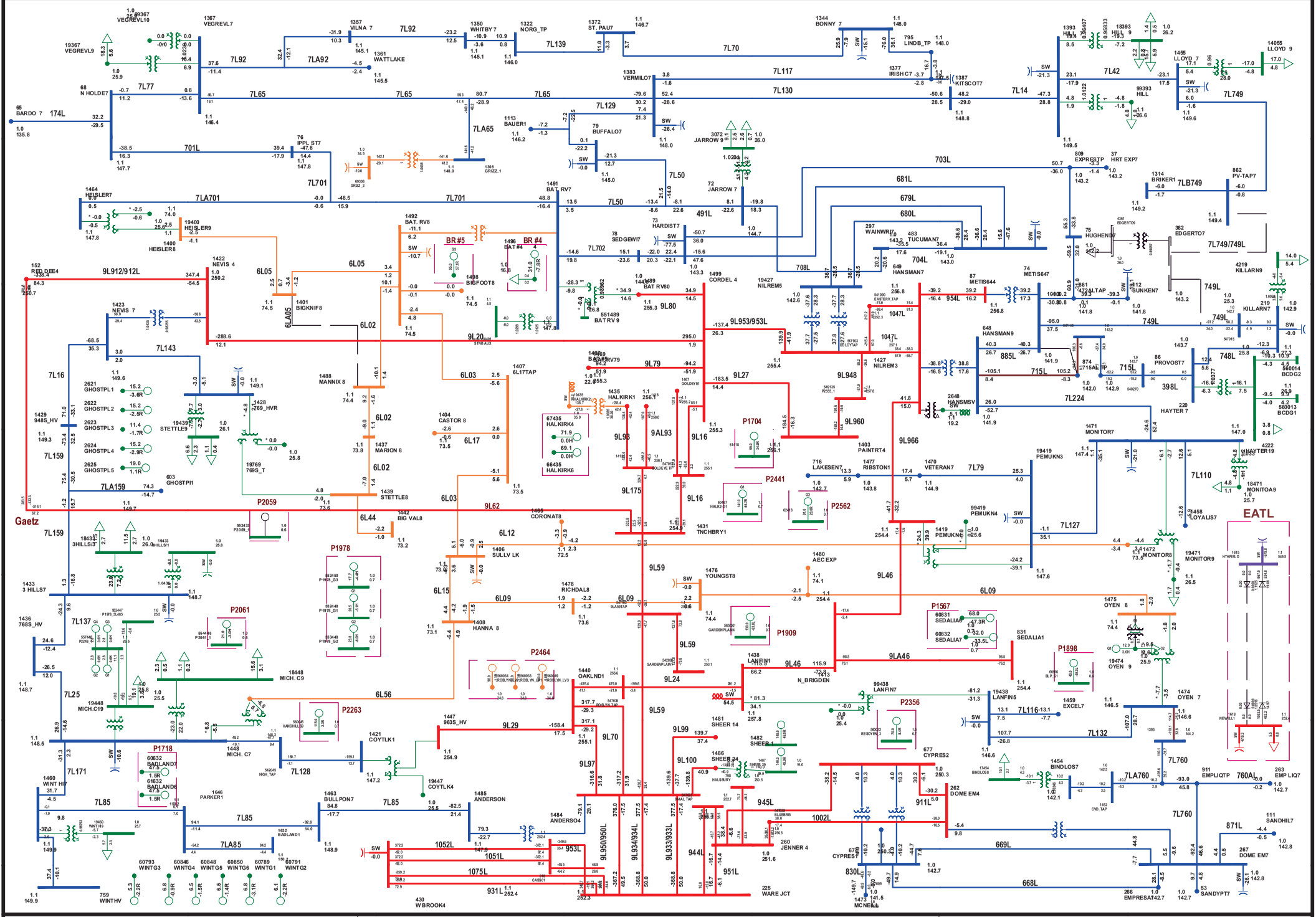
P2464 - Sunnynook Solar Battery Project

CATEGORY B, LOSS OF HARDISTY 377S T1 TRANSFORMER
SCENARIO 5_2028SP_POST-PROJECT
THU, APR 11 2024 14:48

A3 - 64

Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A

kV: >0.000 <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 <=500.000 >500.000



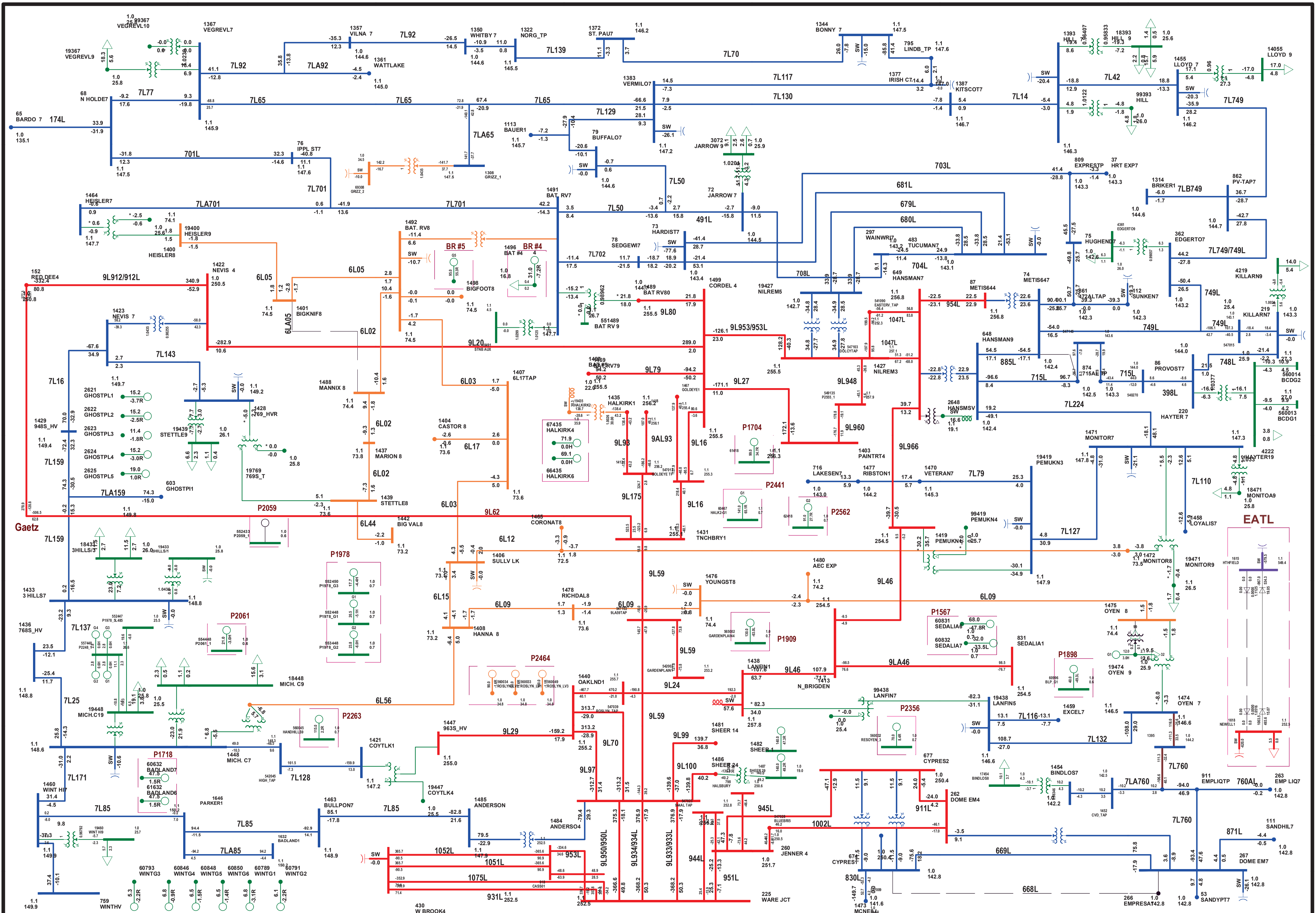
P2464 - Sunnynook Solar Battery Project

CATEGORY B, LOSS OF EDGERTON_899ST3
SCENARIO 5_2028SP_POST-PROJECT
THU, APR 11 2024 14:48

A3 - 65

Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A

kV: >0.000 <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 <=500.000 >500.000



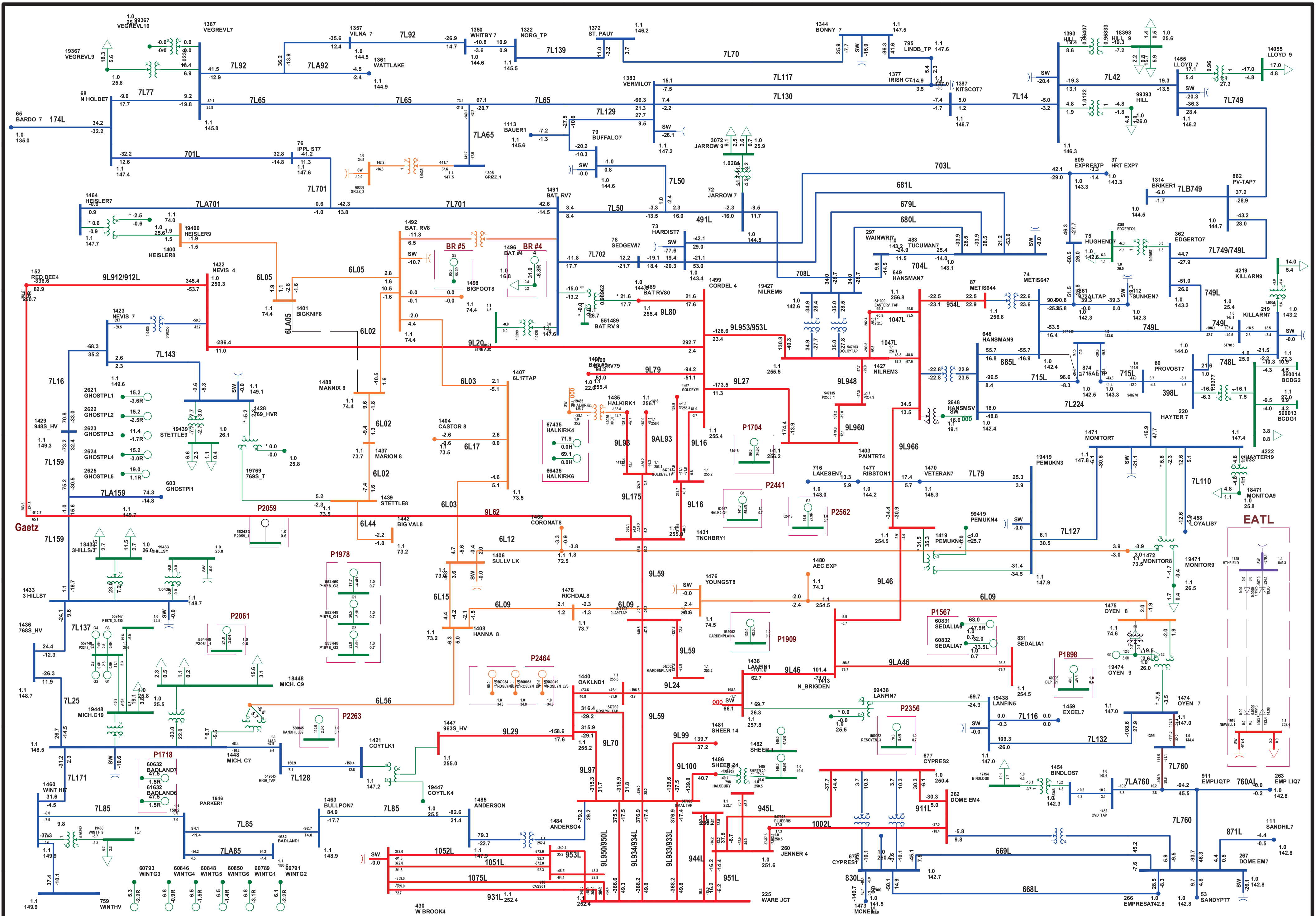
P2464 - Sunnynook Solar Battery Project

CATEGORY B, LOSS OF EMPRESS_394S_T1
SCENARIO 5_2028SP_POST-PROJECT
THU, APR 11 2024 14:49

A3 - 66

Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A

kV: >0.000 <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 <=500.000 >500.000



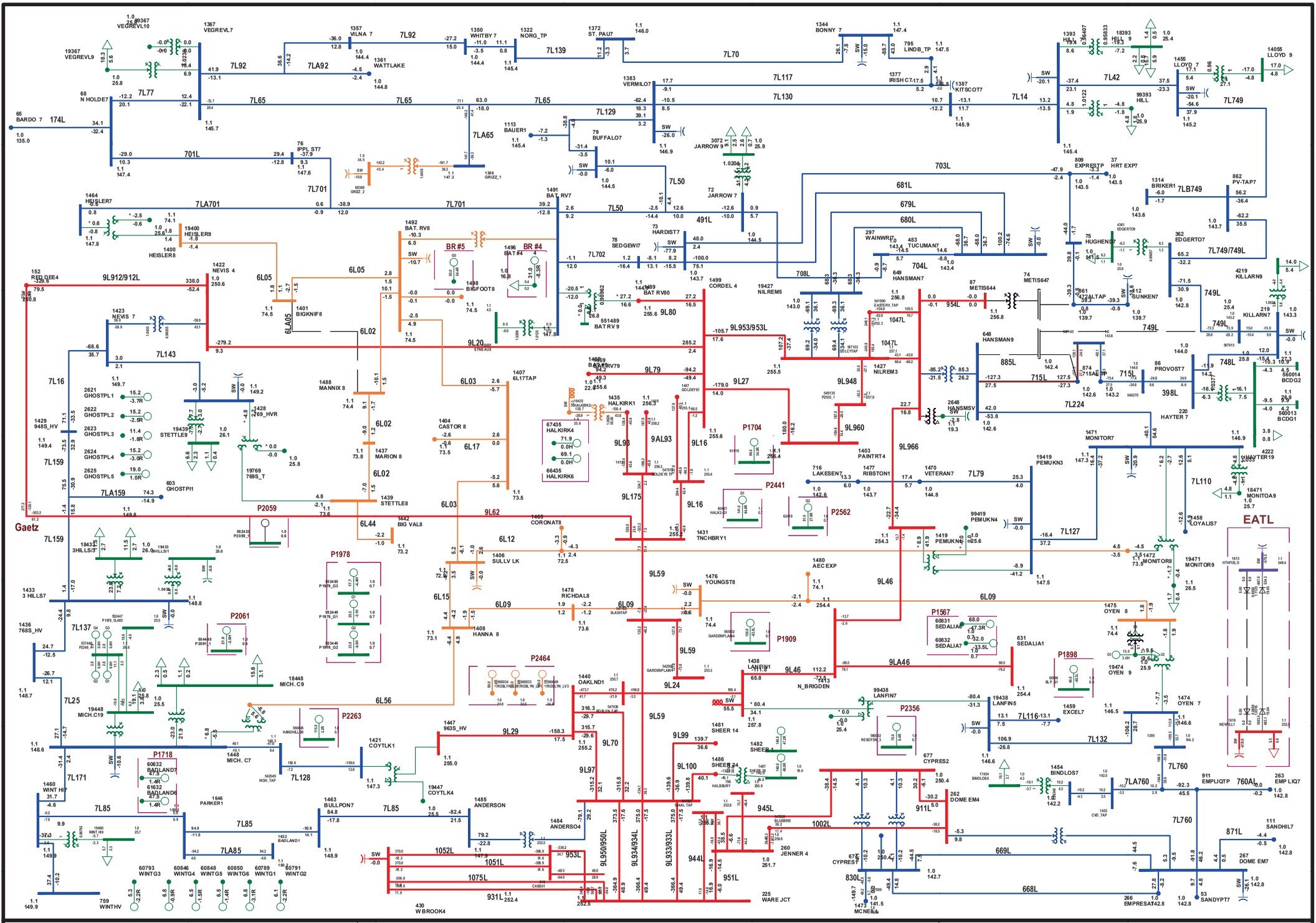
P2464 - Sunnynook Solar Battery Project

CATEGORY B, LOSS OF EXCEL 910S TRANSFORMER 701T
SCENARIO 5_2028SP_POST-PROJECT
THU, APR 11 2024 14:49

A3 - 67

Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A

kV: >0.000 <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 <=500.000 >500.000



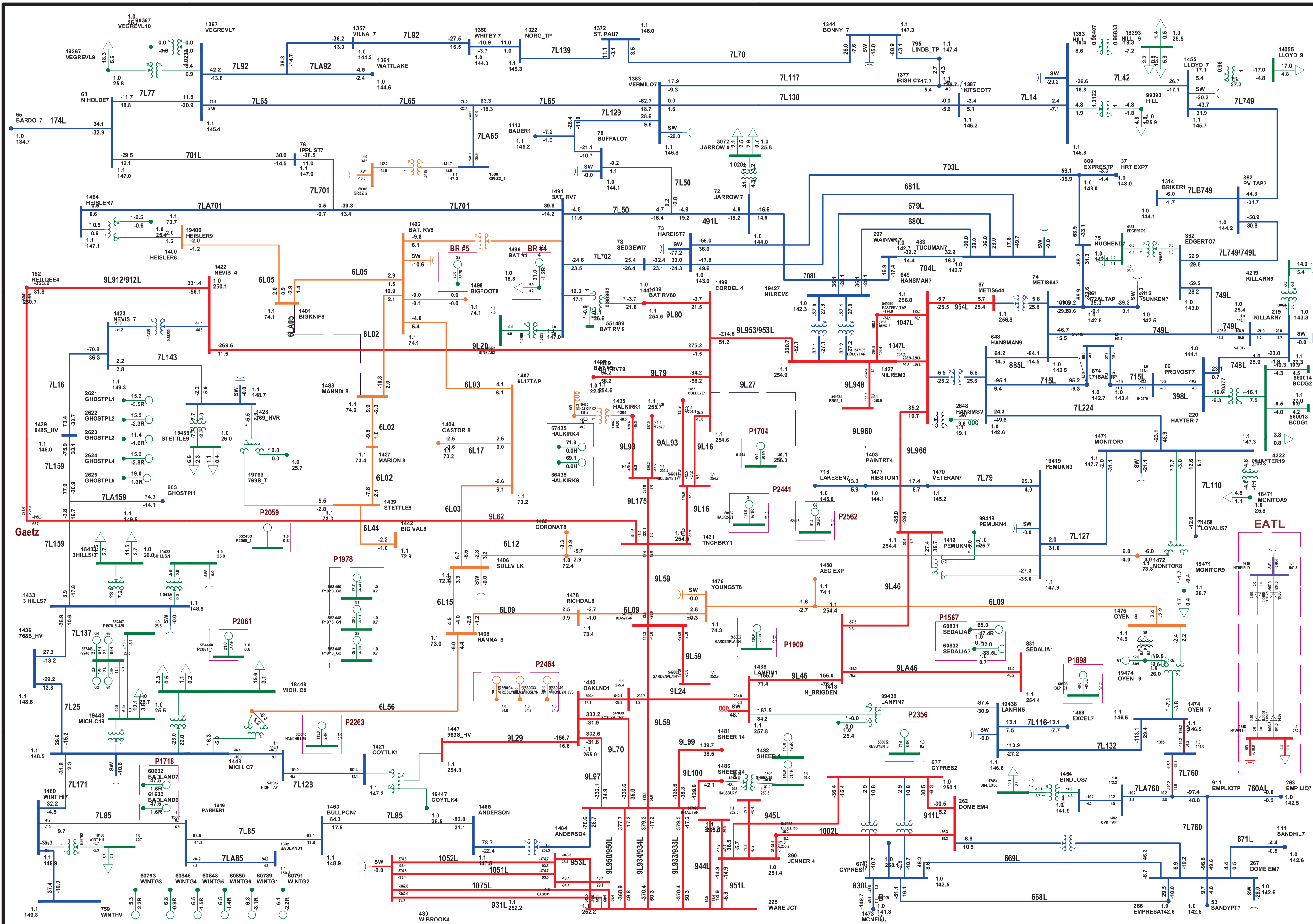
P2464 - Sunnynook Solar Battery Project

CATEGORY B, LOSS OF METISKOW_648ST1
SCENARIO 5_2028SP_POST-PROJECT
THU, APR 11 2024 14:49

A3 - 68

Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A

kV: >0.000 <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 <=500.000 >500.000



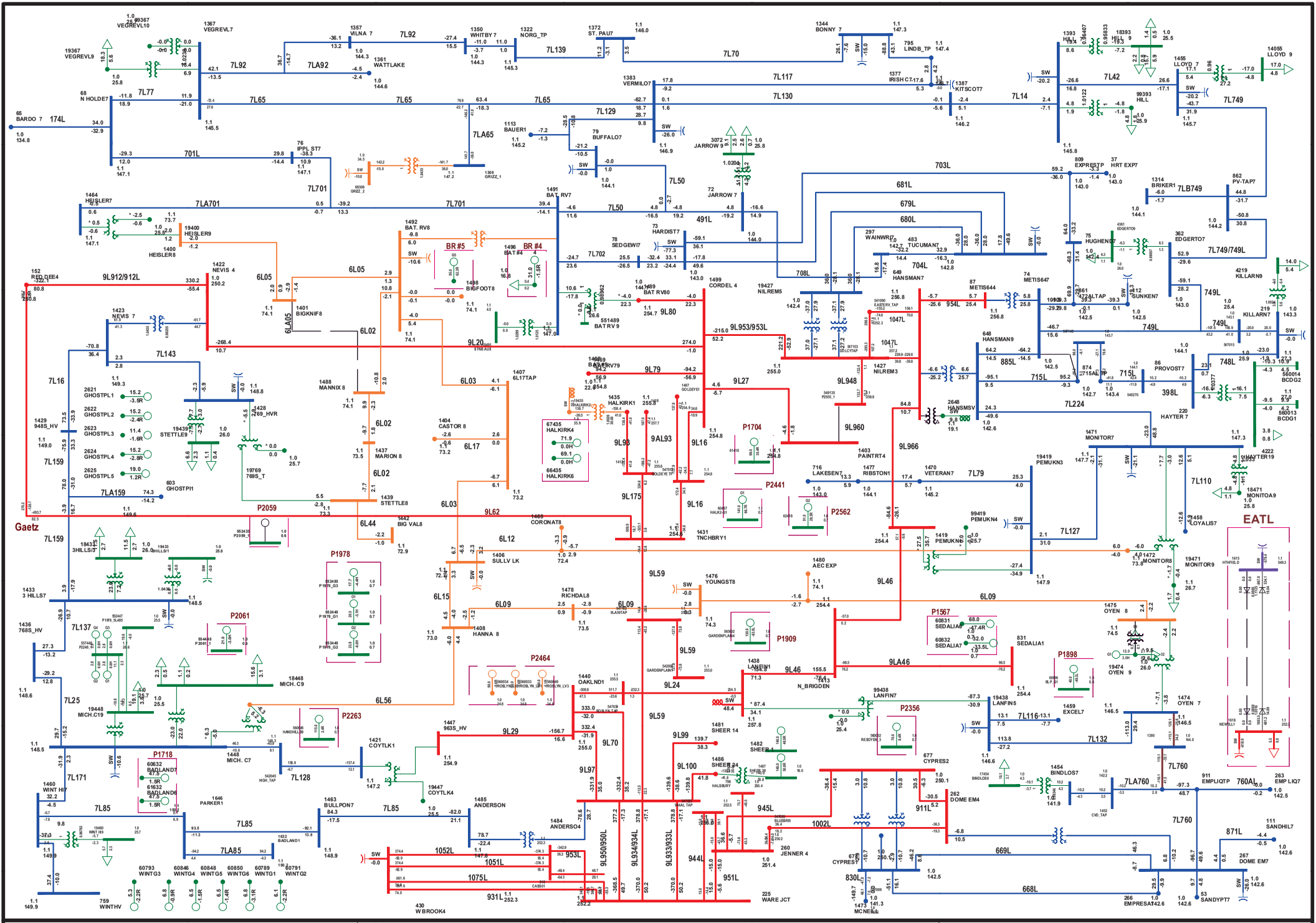
P2464 - Sunnynook Solar Battery Project

CATEGORY B, LOSS OF PAINTEARTH CREEK 863S 902T
SCENARIO 5_2028SP_POST-PROJECT
THU, APR 11 2024 14:49

A3 - 69

Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A

kV: >0.000 <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 <=500.000 >500.000



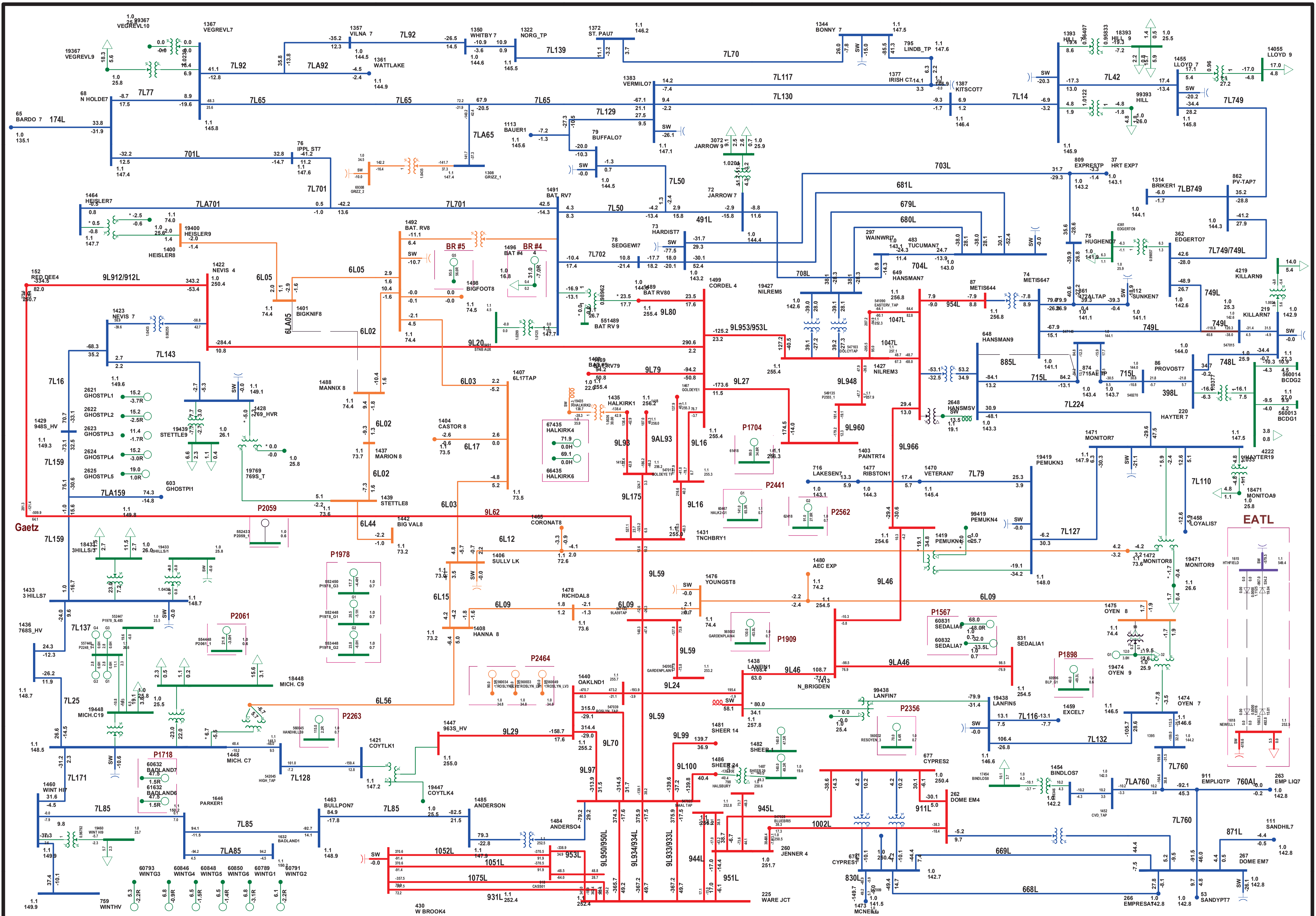
P2464 - Sunnynook Solar Battery Project

CATEGORY B, LOSS OF 9L960 (PAINTEARTH 863S - P2555_BUS 54913
SCENARIO 5_2028SP_POST-PROJECT
THU, APR 11 2024 14:50

A3 - 70

Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A

kV: >0.000 <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 <=500.000 >500.000



P2464 - Sunnynook Solar Battery Project

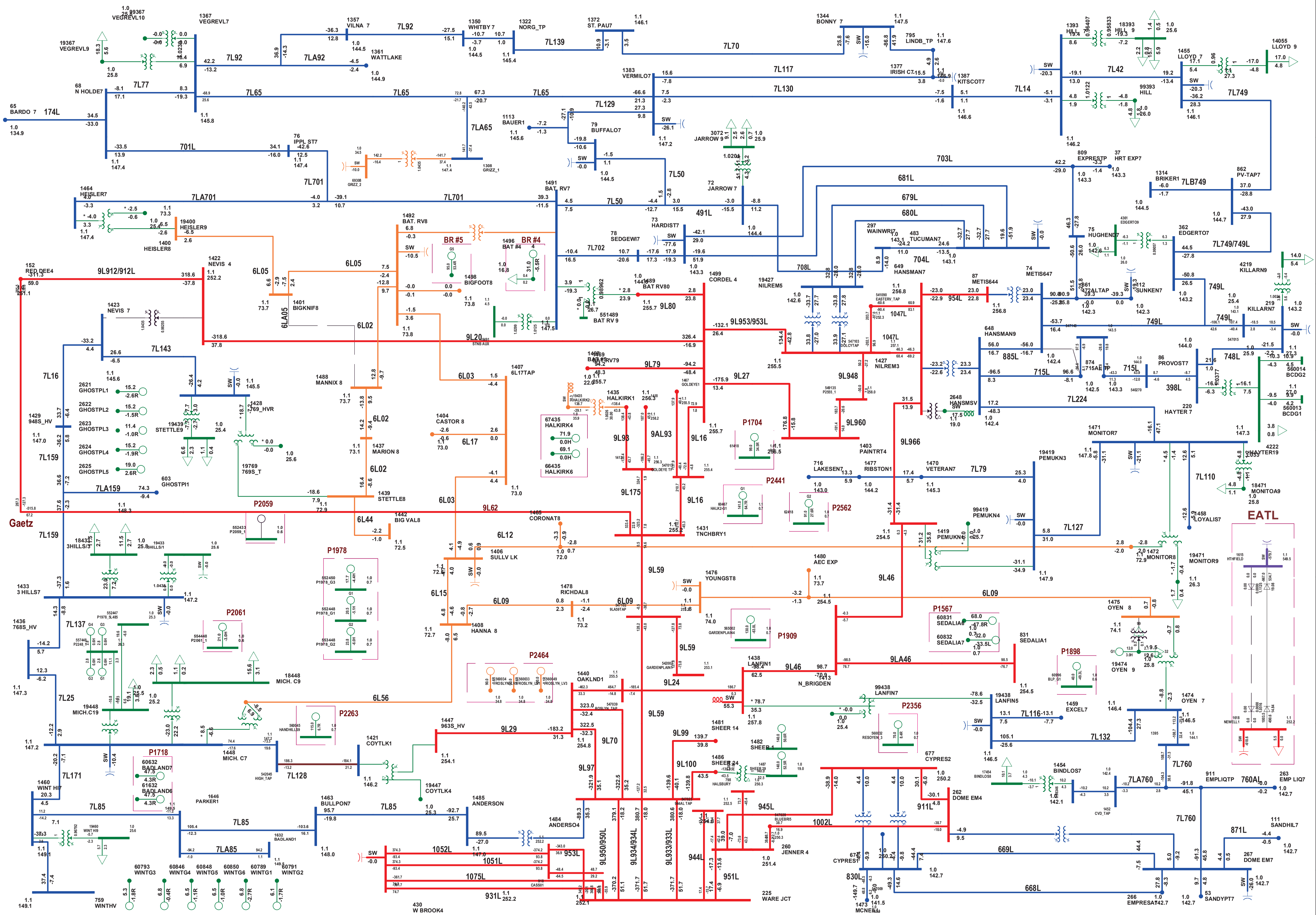
CATEGORY B, LOSS OF 885L (METISKOW 648S - HANSMAN LAKE 650S)
SCENARIO 5_2028SP_POST-PROJECT
THU, APR 11 2024 14:50

A3 - 71

Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A

kV: >0.000 <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 <=500.000 >500.000

1



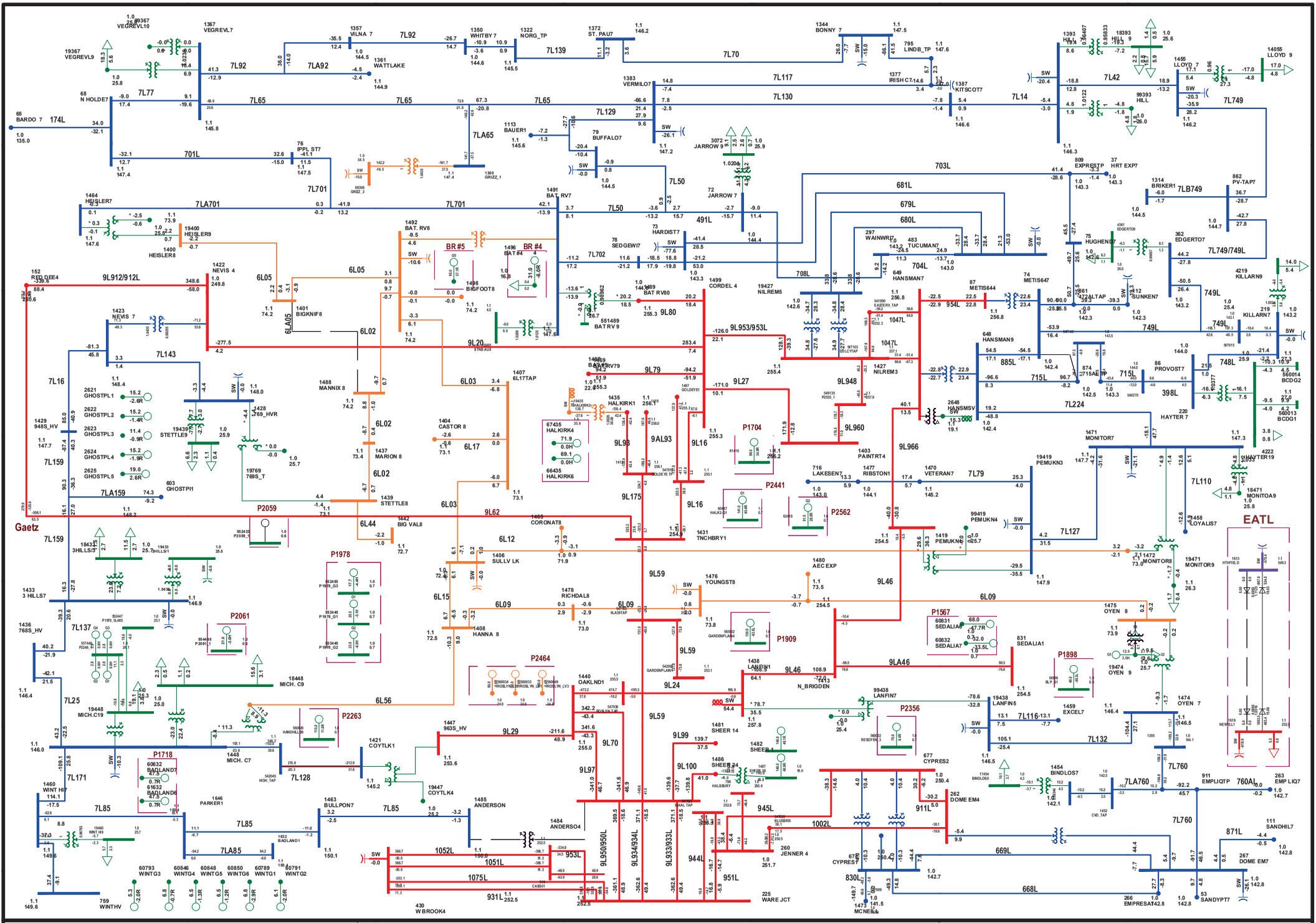
P2464 - Sunnynook Solar Battery Project

CATEGORY B, LOSS OF NEVIS 766S_903T
SCENARIO 5_2028SP_POST-PROJECT
THU, APR 11 2024 14:50

A3 - 72

Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A

kV: >0.000 <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 <=500.000 >500.000



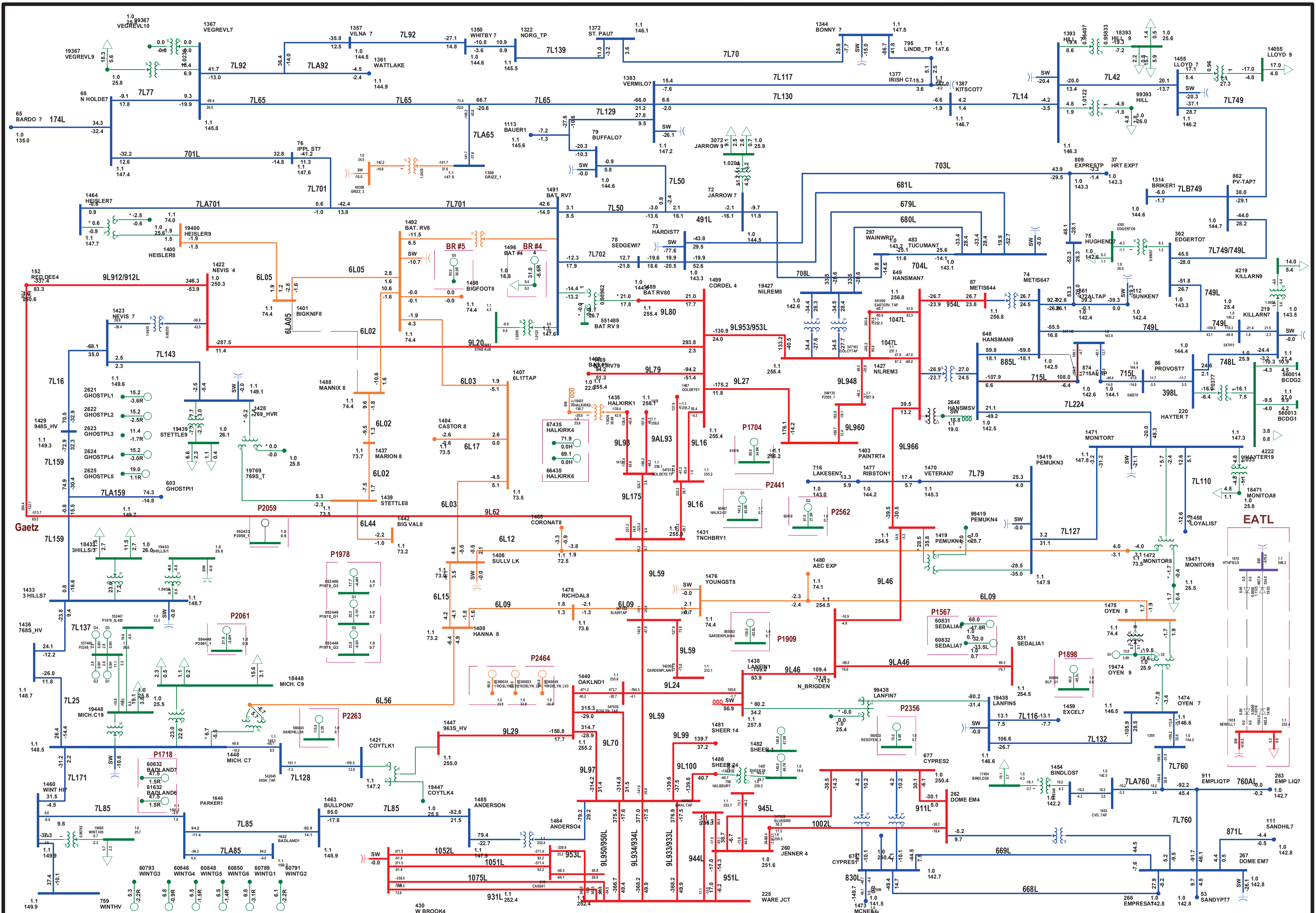
P2464 - Sunnynook Solar Battery Project

CATEGORY B, LOSS OF ANDERSON 801S_901T
SCENARIO 5_2028SP_POST-PROJECT
THU, APR 11 2024 14:50

A3 - 73

Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A

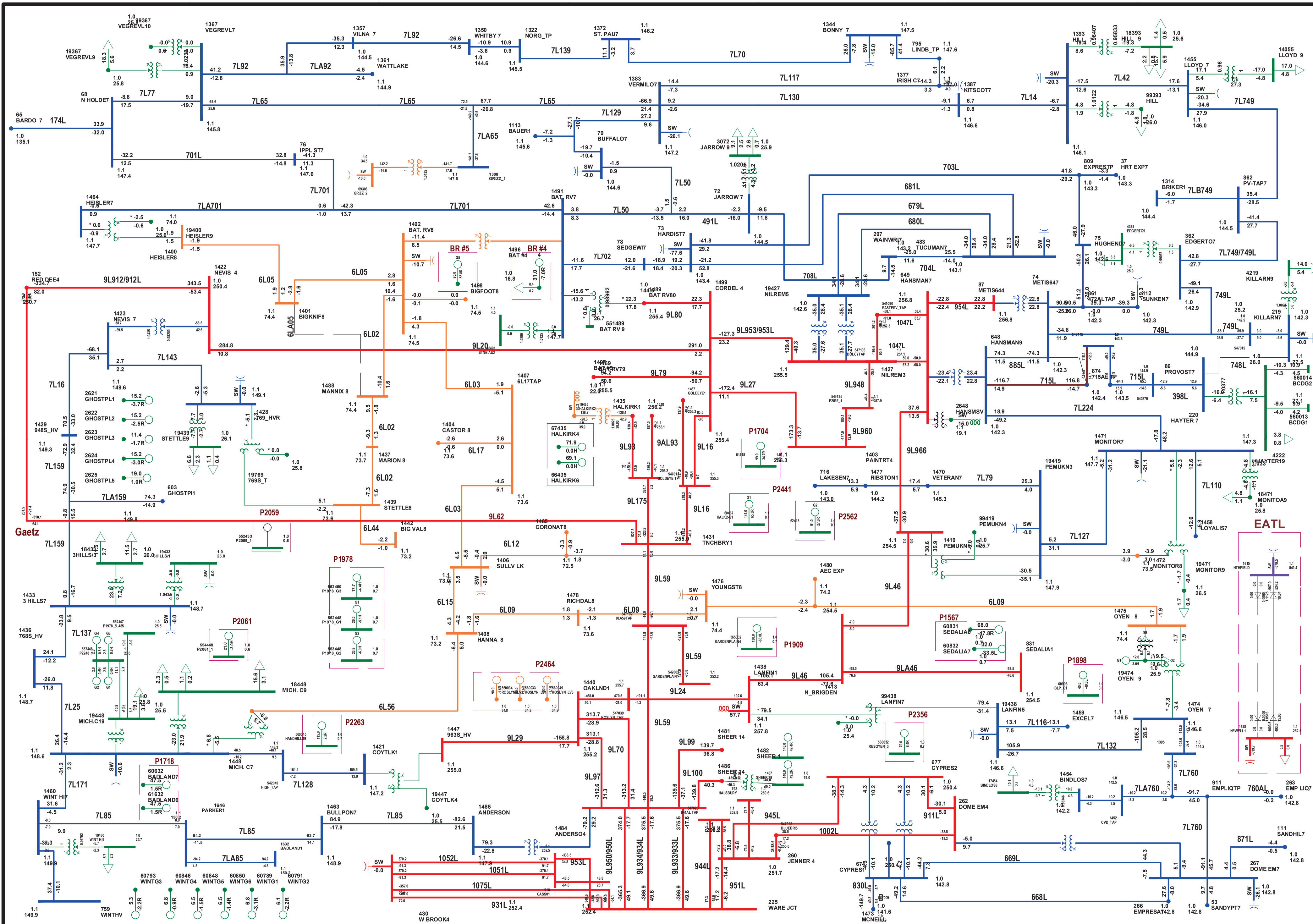
kV: >0.000 <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 <=500.000 >500.000



P2464 - Sunnynook Solar Battery Project

CATEGORY B, LOSS OF PROVOST 545S 701T
SCENARIO 5_2028SP_POST-PROJECT
THU, APR 11 2024 14:50

A3 - 74



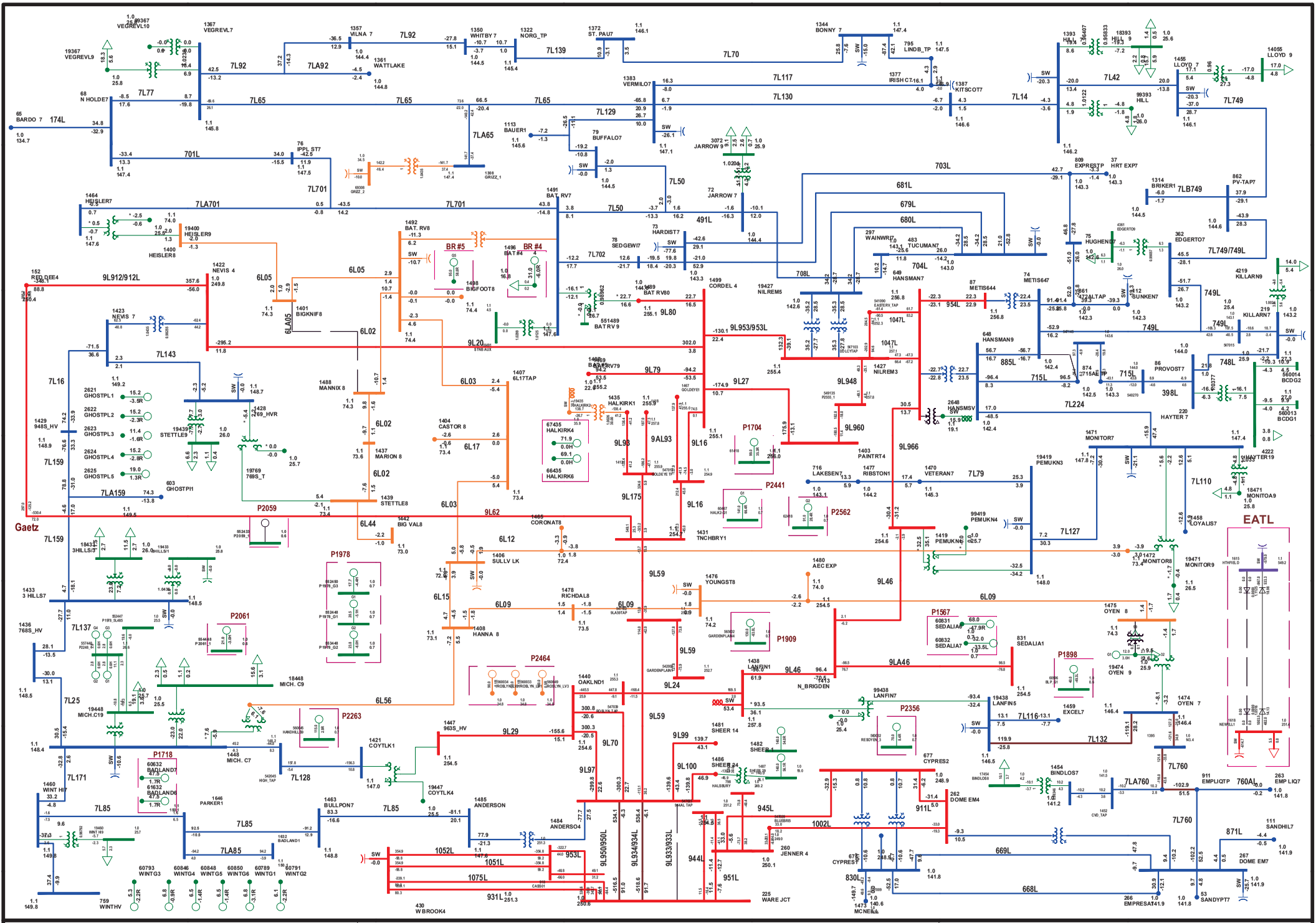
P2464 - Sunnynook Solar Battery Project

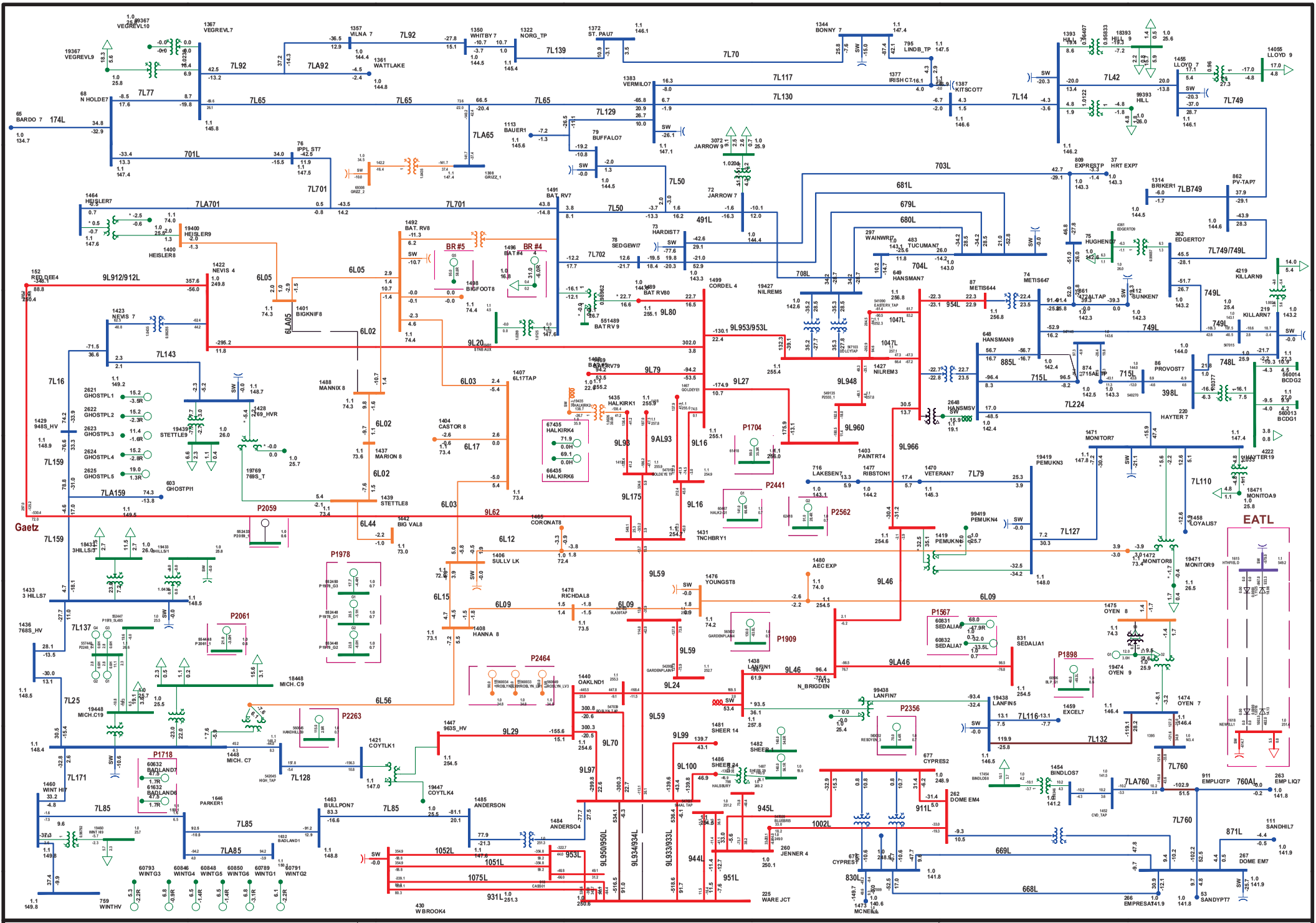
CATEGORY B, LOSS OF 748L (KILLARNEY 267S - HAYTER 277S)
SCENARIO 5_2028SP_POST-PROJECT
THU, APR 11 2024 14:51

A3 - 75

Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A

kV: >0.000 <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 <=500.000 >500.000


Gaetz
EATL
P2464 - Sunnynook Solar Battery Project
CATEGORY B, LOSS OF 933L (ANDERSON 801S - WARE JUNCTION 132S
SCENARIO 5_2028SP_POST-PROJECT
THU, APR 11 2024 14:51
A3 - 76
Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A
kV: >0.000 <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 <=500.000 >500.000



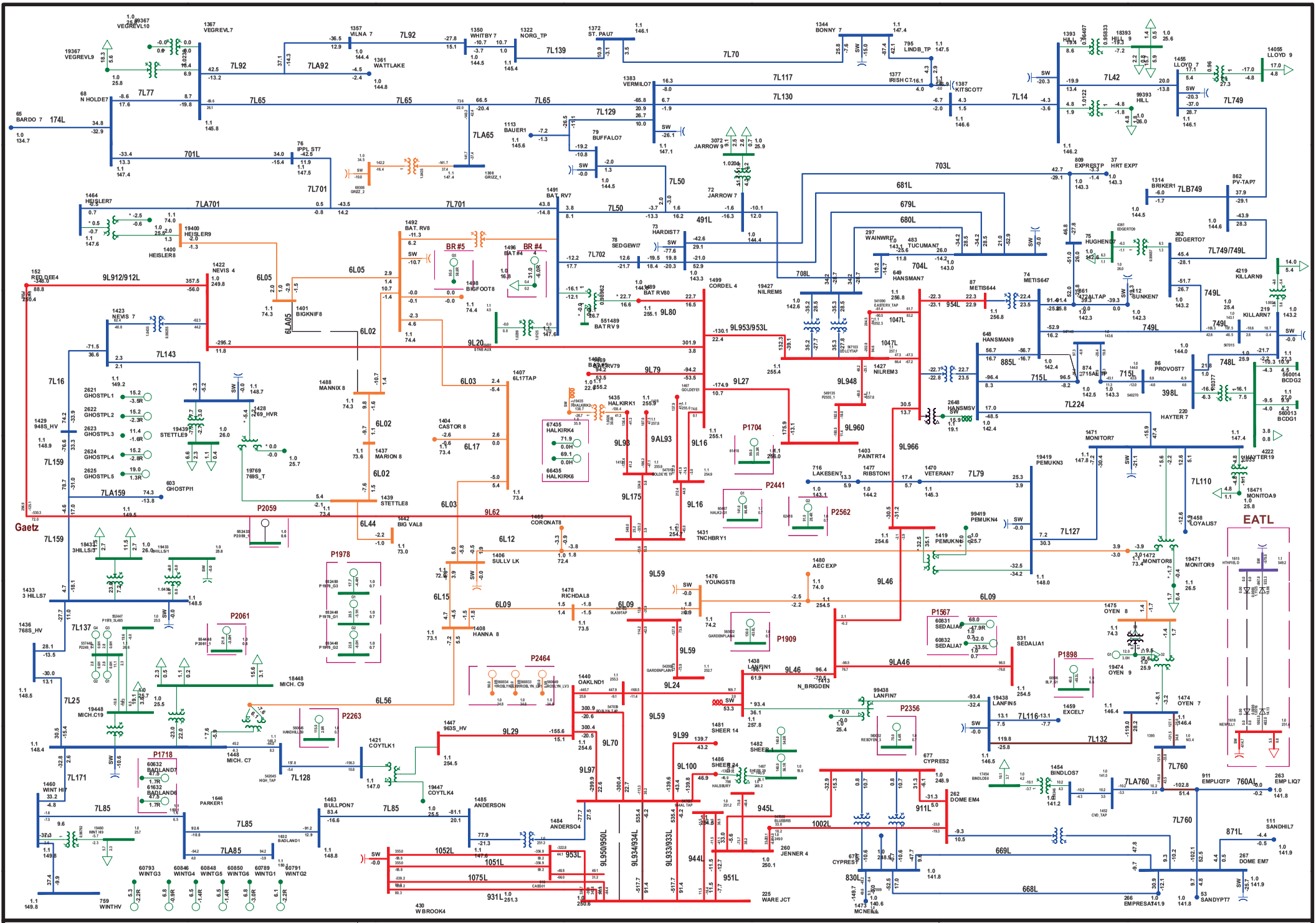
P2464 - Sunnynook Solar Battery Project

CATEGORY B, LOSS OF 934L (ANDERSON 801S - WARE JUNCTION 132S
SCENARIO 5_2028SP_POST-PROJECT
THU, APR 11 2024 14:51

A3 - 77

Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A

kV: >0.000 <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 <=500.000 >500.000



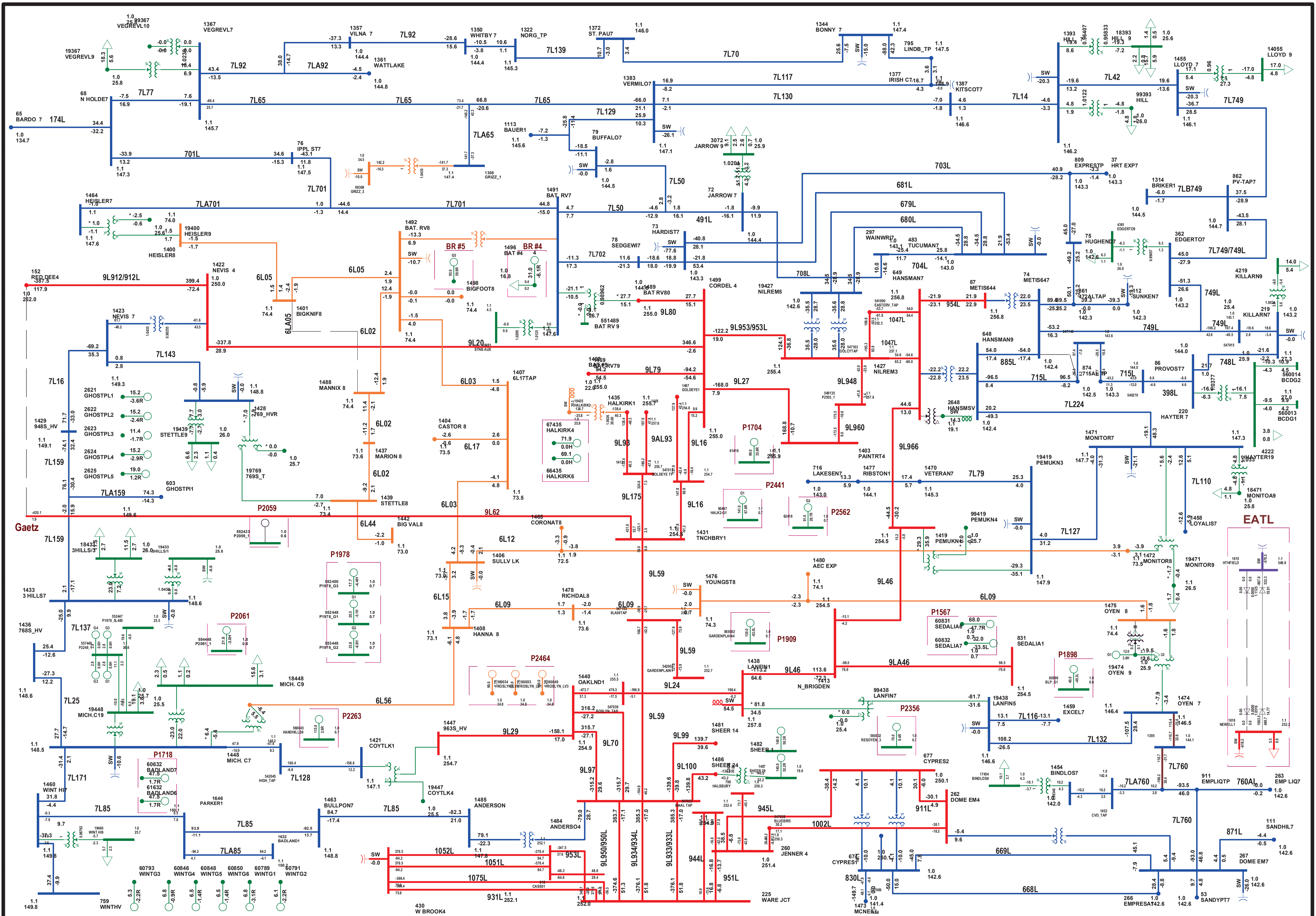
P2464 - Sunnynook Solar Battery Project

CATEGORY B, LOSS OF 950L (ANDERSON 801S - WARE JUNCTION 132S
SCENARIO 5_2028SP_POST-PROJECT
THU, APR 11 2024 14:52

A3 - 78

Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A

kV: >0.000 <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 <=500.000 >500.000



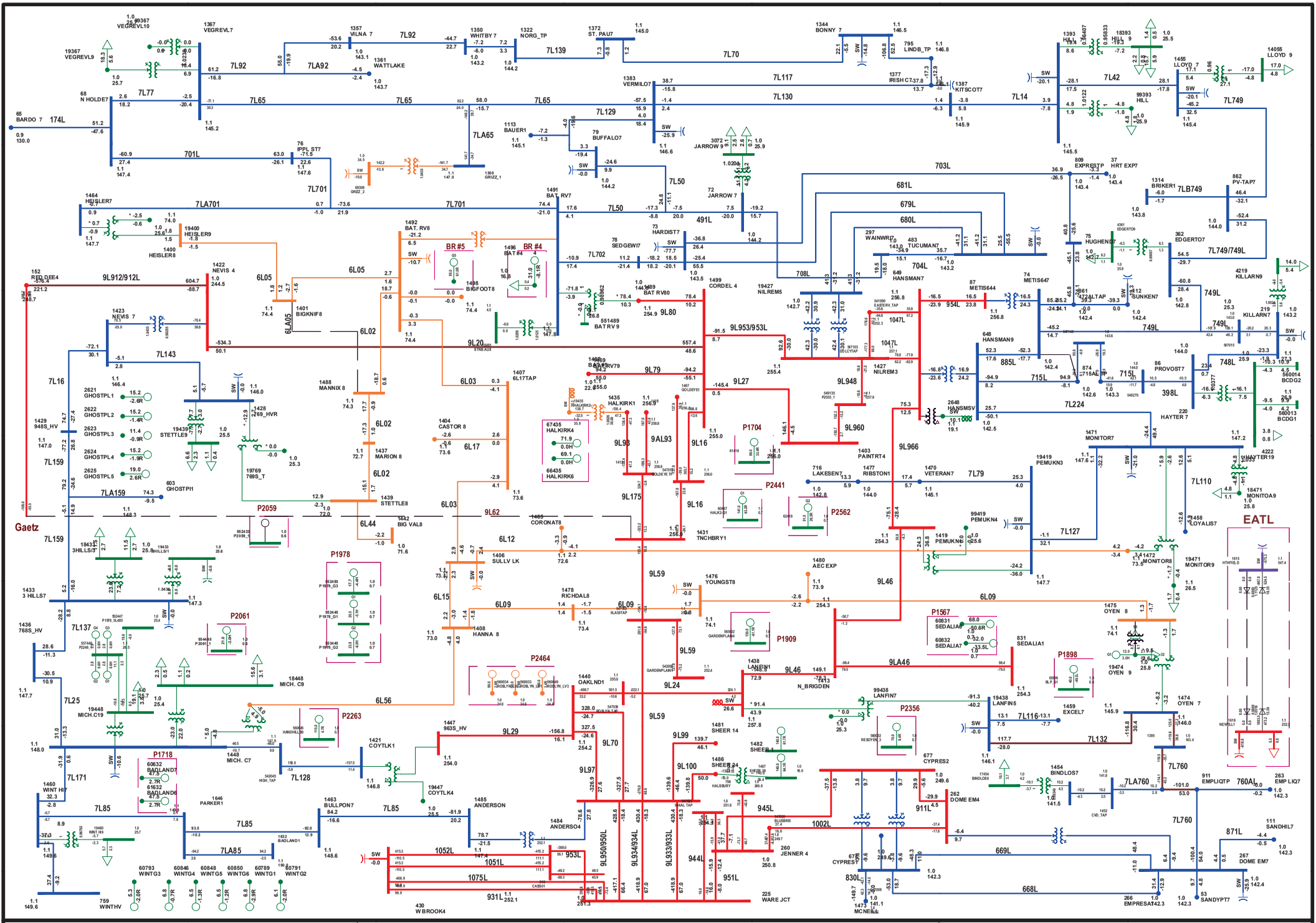
P2464 - Sunnynook Solar Battery Project

CATEGORY B, LOSS OF 914L (RED DEER 63S - GAETZ 87S)
SCENARIO 5_2028SP_POST-PROJECT
THU, APR 11 2024 14:52

A3 - 79

Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A

kV: >0.000 <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 <=500.000 >500.000



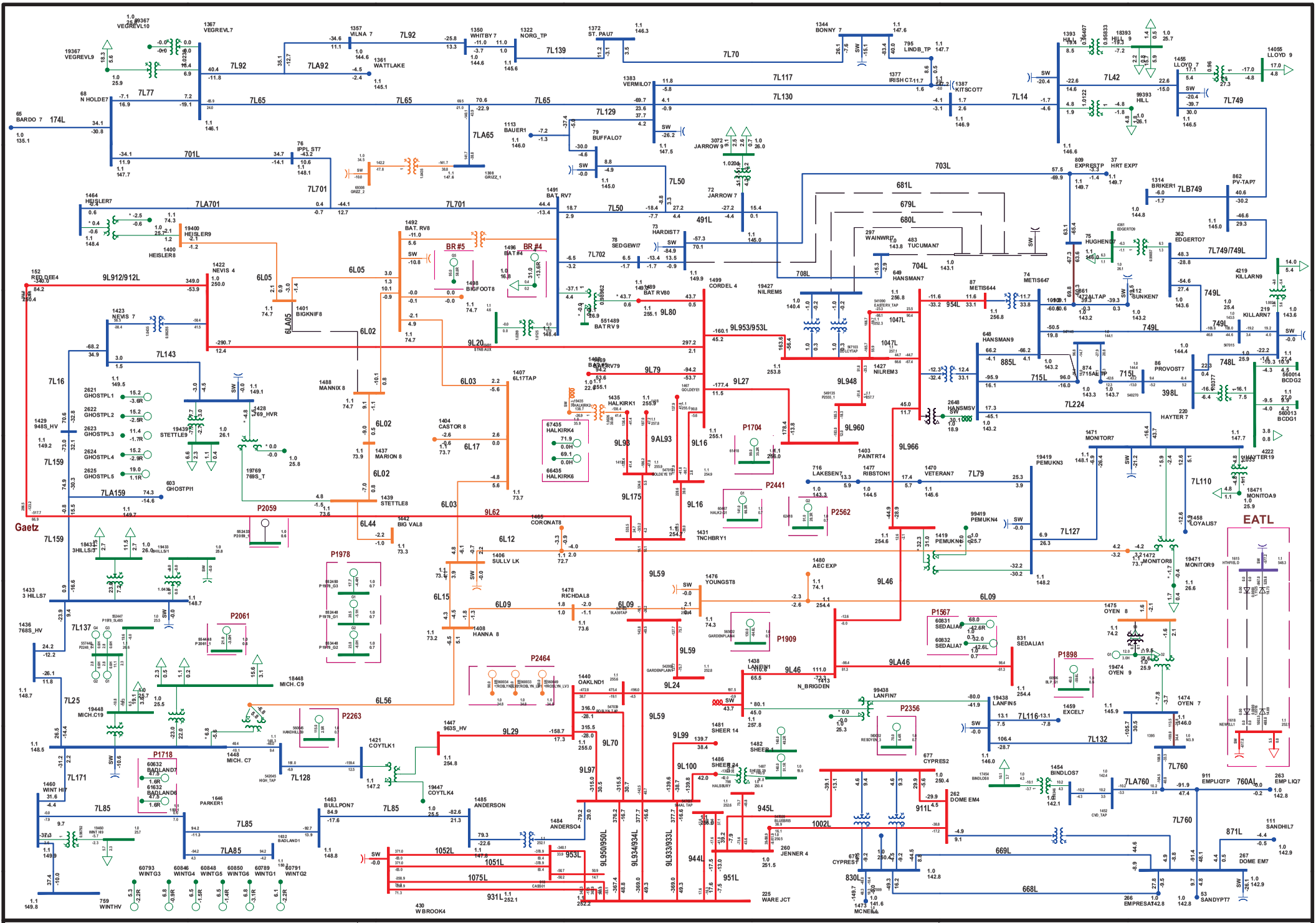
P2464 - Sunnynook Solar Battery Project

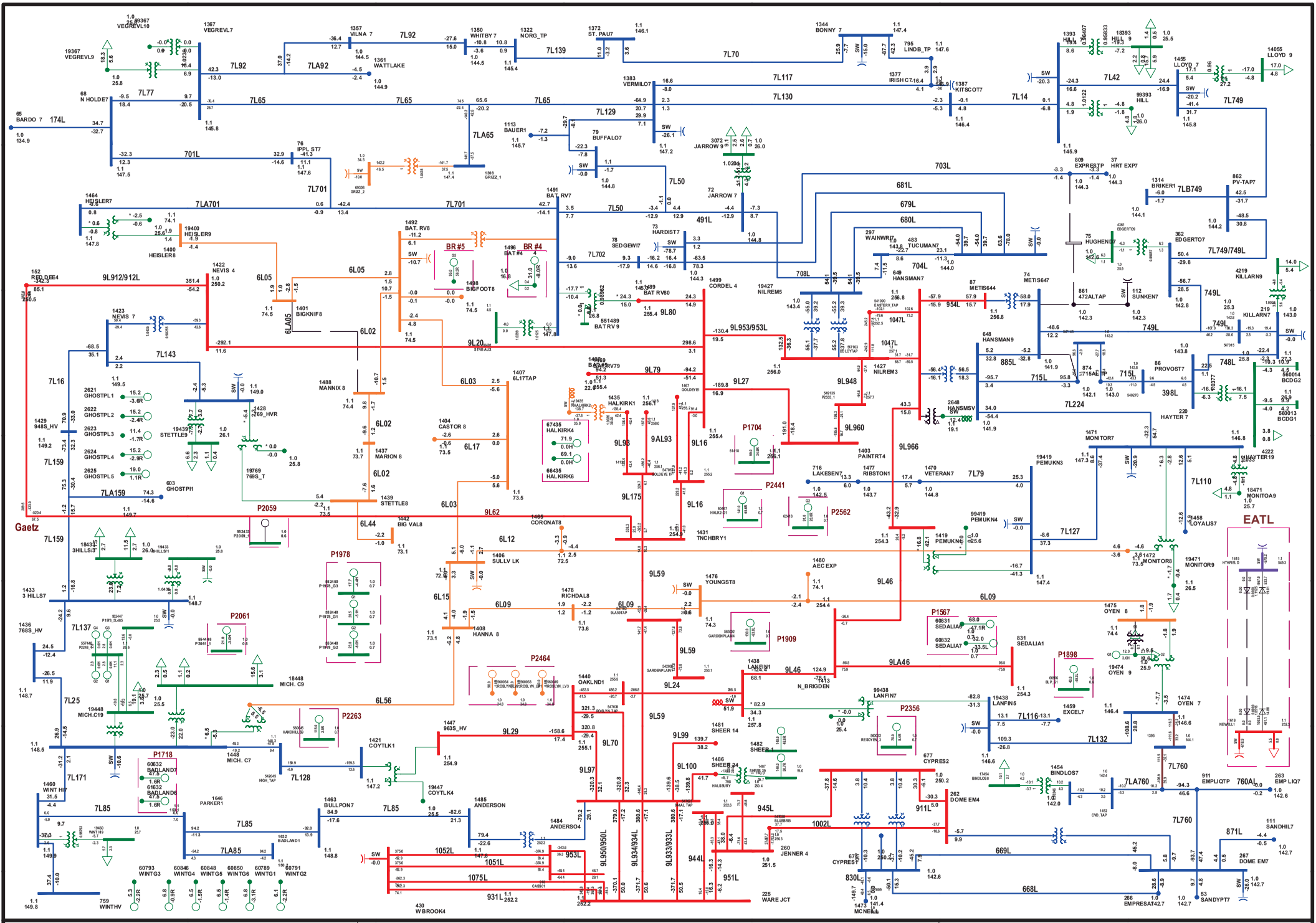
CATEGORY B, LOSS OF 9L62 (TINCHEBRAY 972S - GAETZ 87S)
SCENARIO 5_2028SP_POST-PROJECT
THU, APR 11 2024 14:52

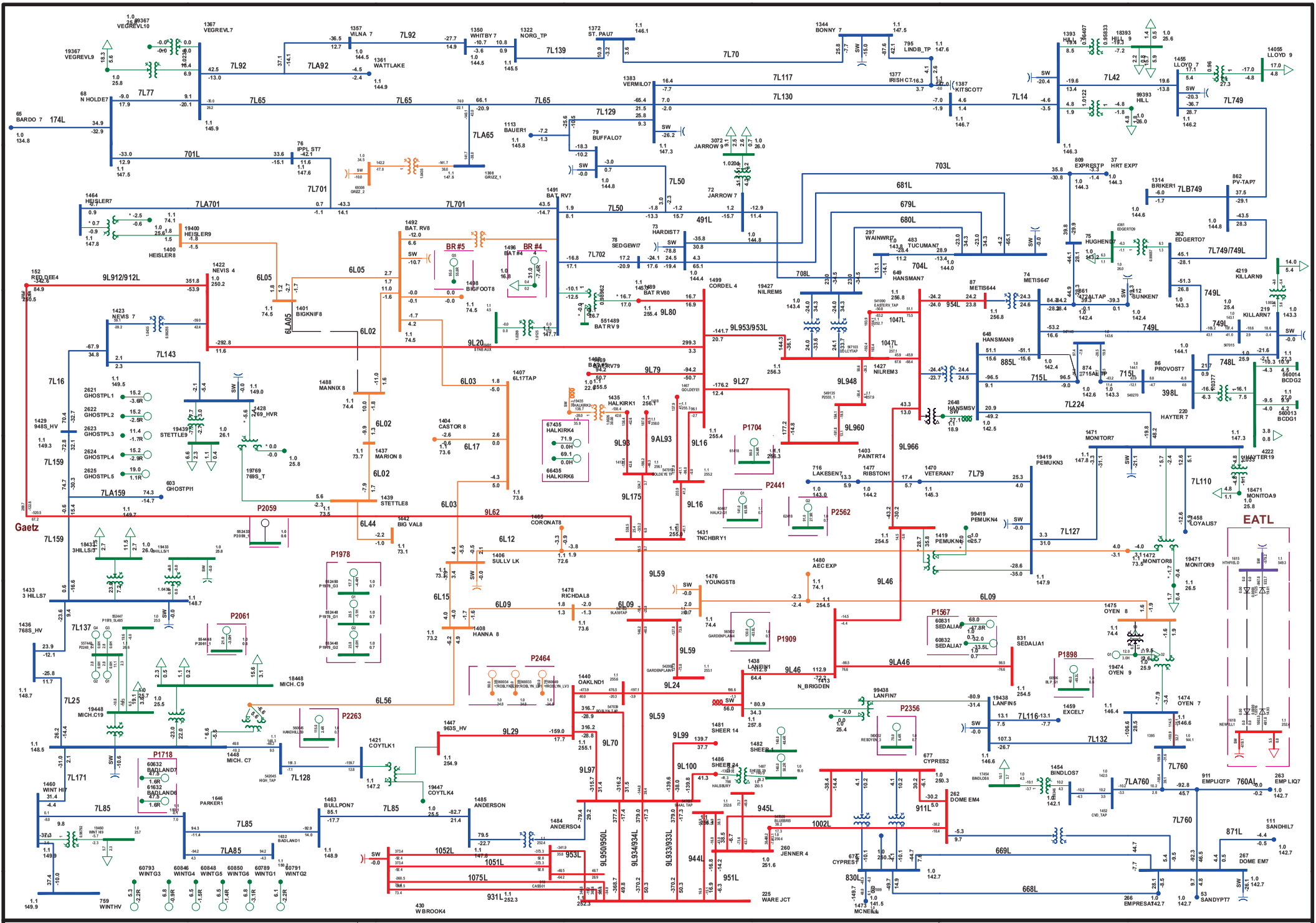
A3 - 80

Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A

kV: >0.000 <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 <=500.000 >500.000


Gaetz
EATL
P2464 - Sunnynook Solar Battery Project
CATEGORY B, LOSS OF TUCUMAN 478S TRANSFORMERS
SCENARIO 5_2028SP_POST-PROJECT
THU, APR 11 2024 14:52
A3 - 81
Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A
kV: >0.000 <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 <=500.000 >500.000


Gaetz
EATL
P2464 - Sunnynook Solar Battery Project
CATEGORY B, LOSS OF 703L (HUGHENDEN 213S - HARDISTY 377S)
SCENARIO 5_2028SP_POST-PROJECT
FRI, APR 12 2024 10:49
A3 - 82
Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A
kV: >0.000 <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 <=500.000 >500.000



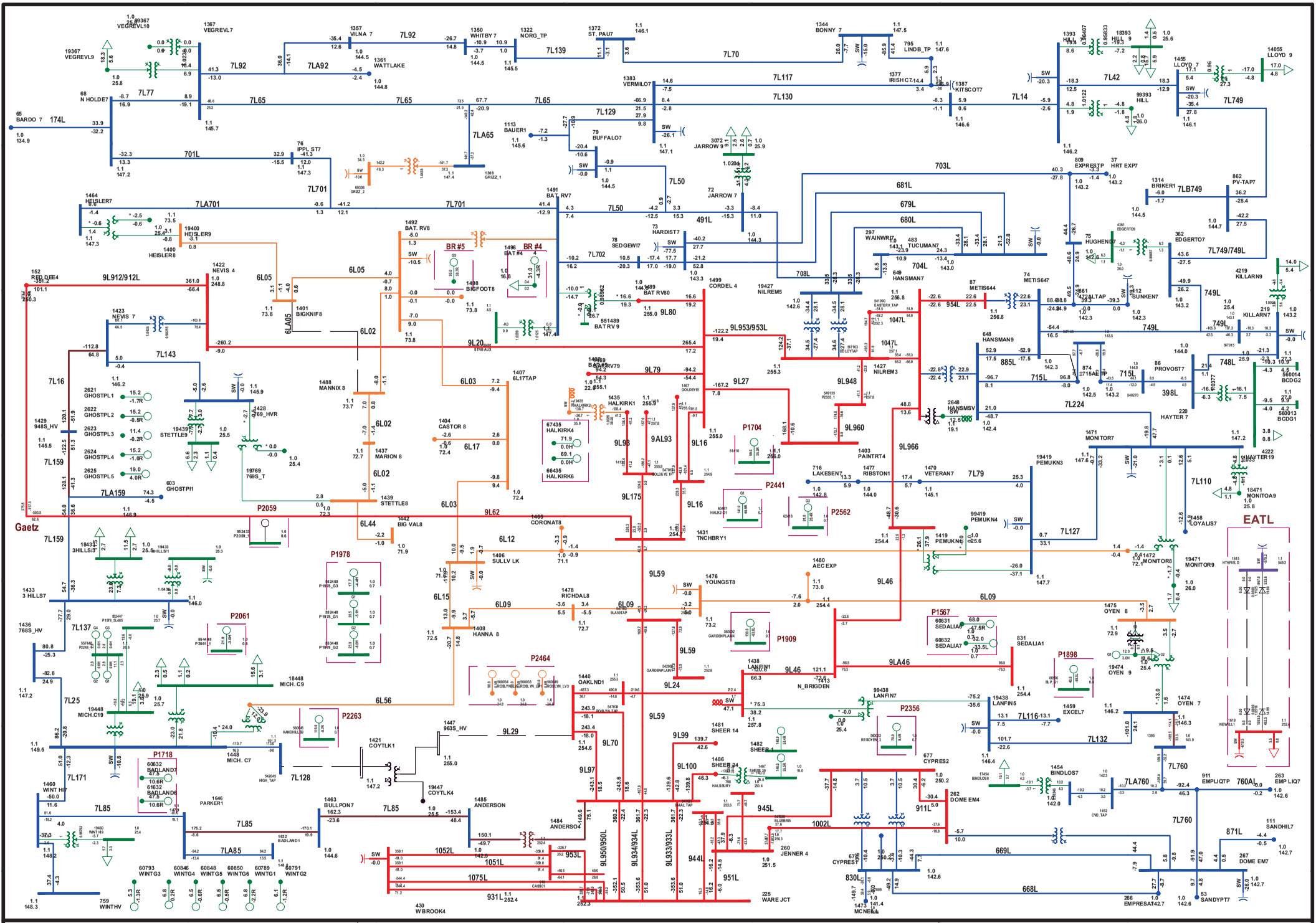
P2464 - Sunnynook Solar Battery Project

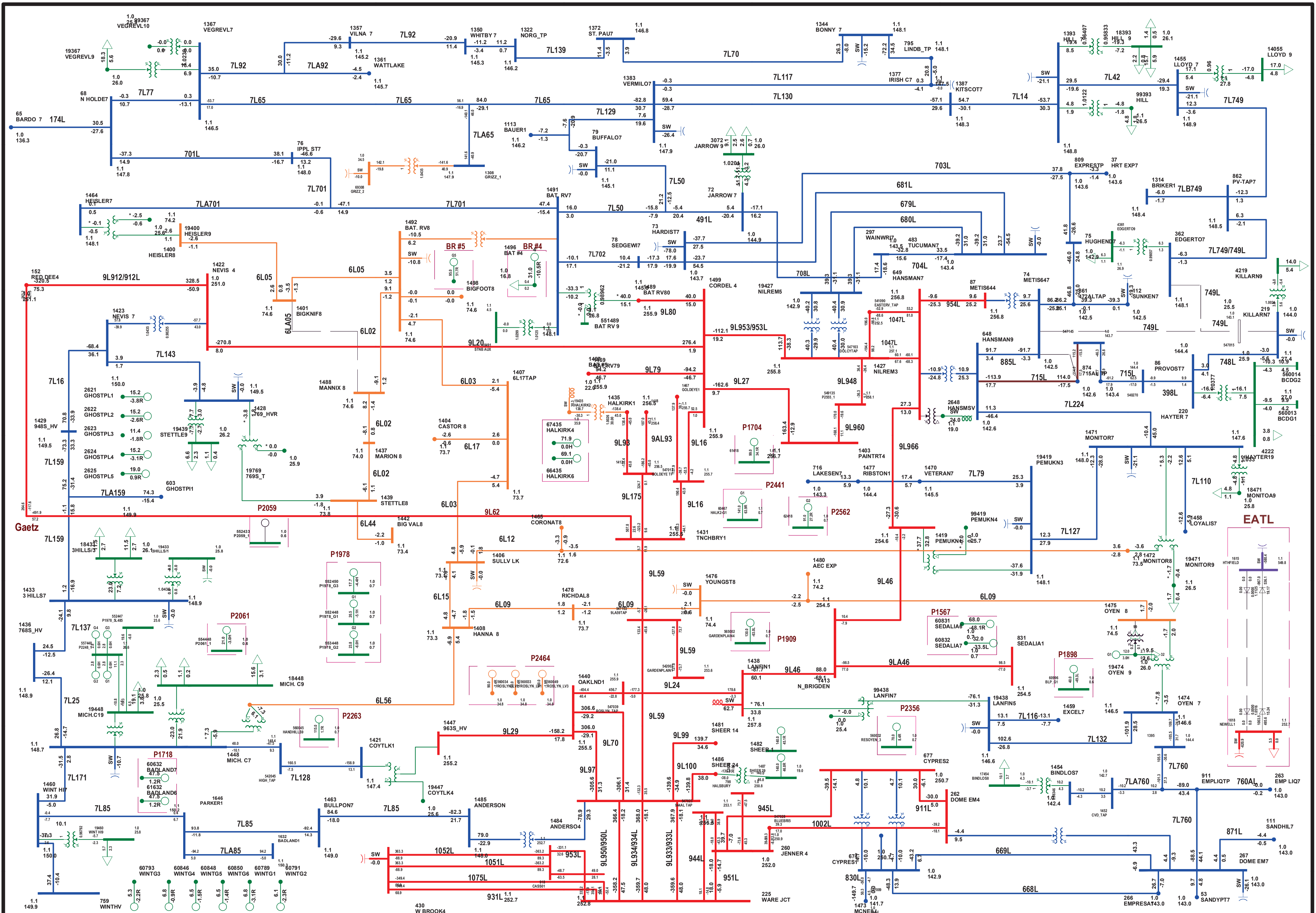
CATEGORY B, LOSS OF 769L (ROSYTH 296S - HARDISTY 377S)
SCENARIO 5_2028SP_POST-PROJECT
FRI, APR 12 2024 10:50

A3 - 83

Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A

kV: >0.000 <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 <=500.000 >500.000


Gaetz
EATL
P2464 - Sunnynook Solar Battery Project
CATEGORY B, LOSS OF COYOTE LAKE 963S 901T
SCENARIO 5_2028SP_POST-PROJECT
FRI, APR 12 2024 10:50
A3 - 84
Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A
kV: >0.000 <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 <=500.000 >500.000



P2464 - Sunnynook Solar Battery Project

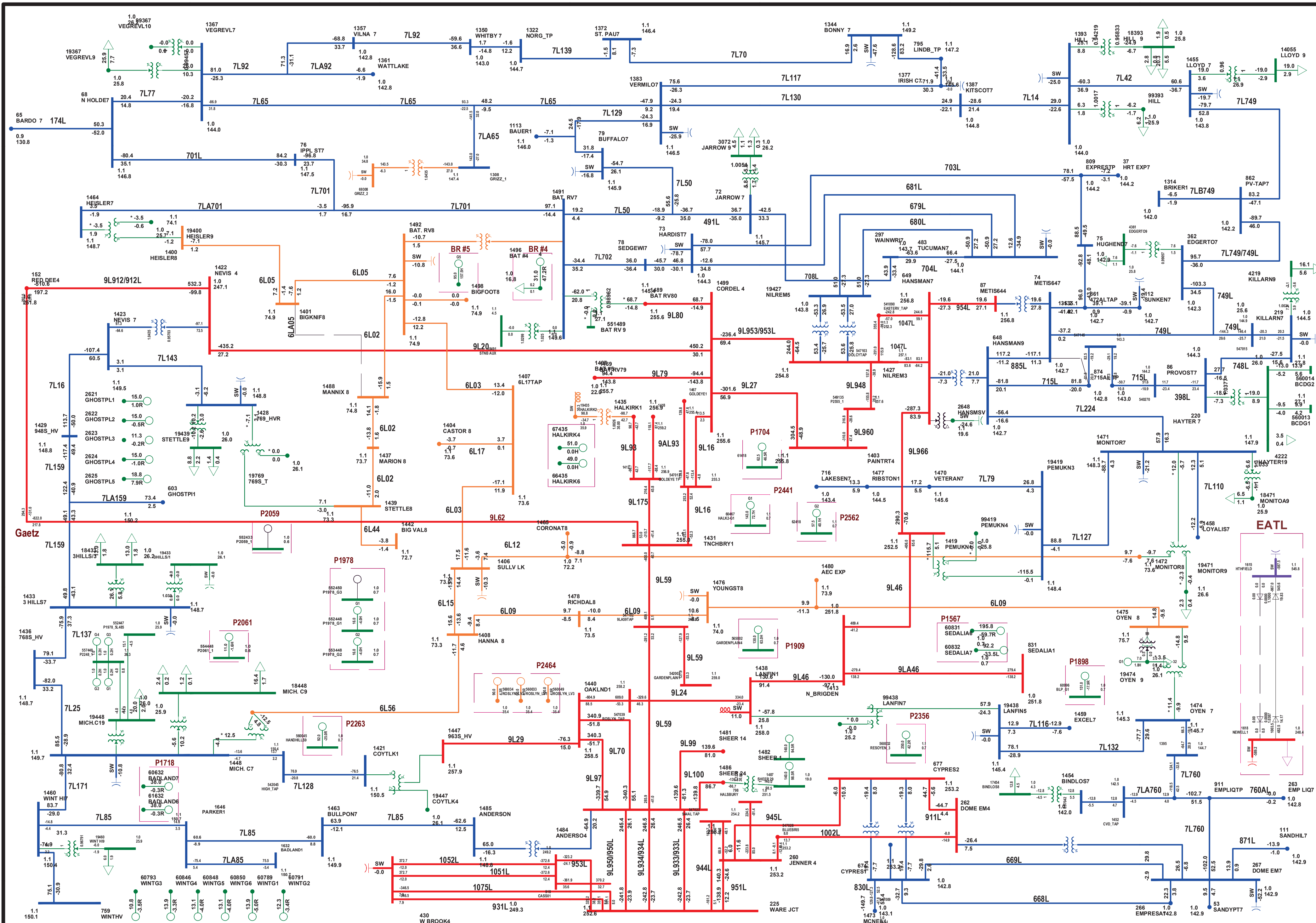
CATEGORY B, LOSS OF 749L (EDGERTON 899S - METISKOW 648S)
SCENARIO 5_2028SP_POST-PROJECT
FRI, APR 12 2024 10:50

A3 - 85

Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A

kV: >0.000 <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 <=500.000 >500.000

Scenario 6
2028 WP Post-Project (Alternative 2)



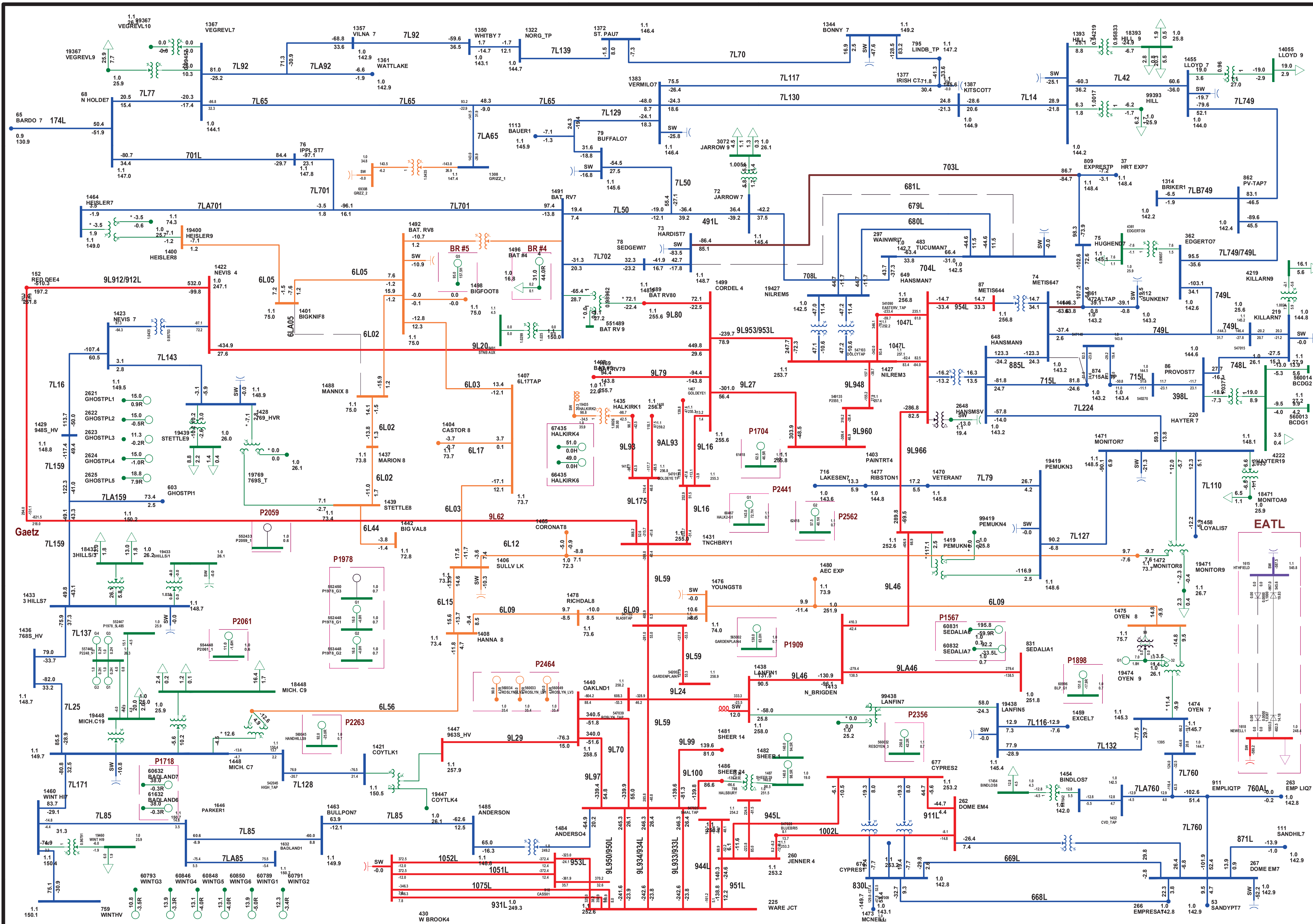
P2464 - Sunnynook Solar Battery Project

CATEGORY A, N-0
SCENARIO 6_2028WP_POST_PROJECT
THU, APR 11 2024 15:32

A3 - 86

Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate B

kV: >0.000 <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 <=500.000 >500.000



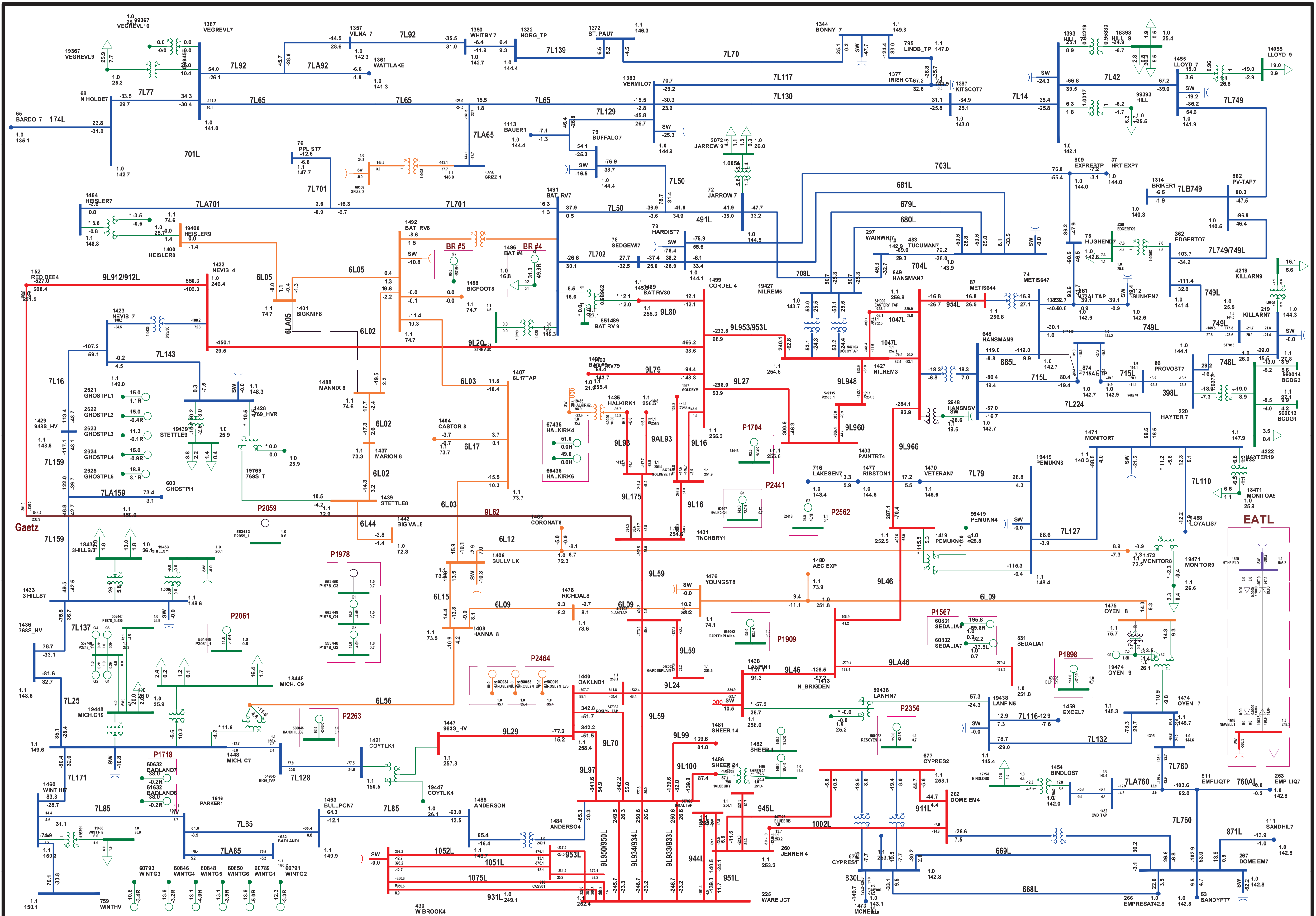
P2464 - Sunnynook Solar Battery Project

CATEGORY B, LOSS OF 681L (TUCUMAN 478S - HARDISTY 377S)
SCENARIO 6_2028WP_POST_PROJECT
THU, APR 11 2024 15:32

A3 - 87

Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate B

kV: >0.000 <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 <=500.000 >500.000



P2464 - Sunnynook Solar Battery Project

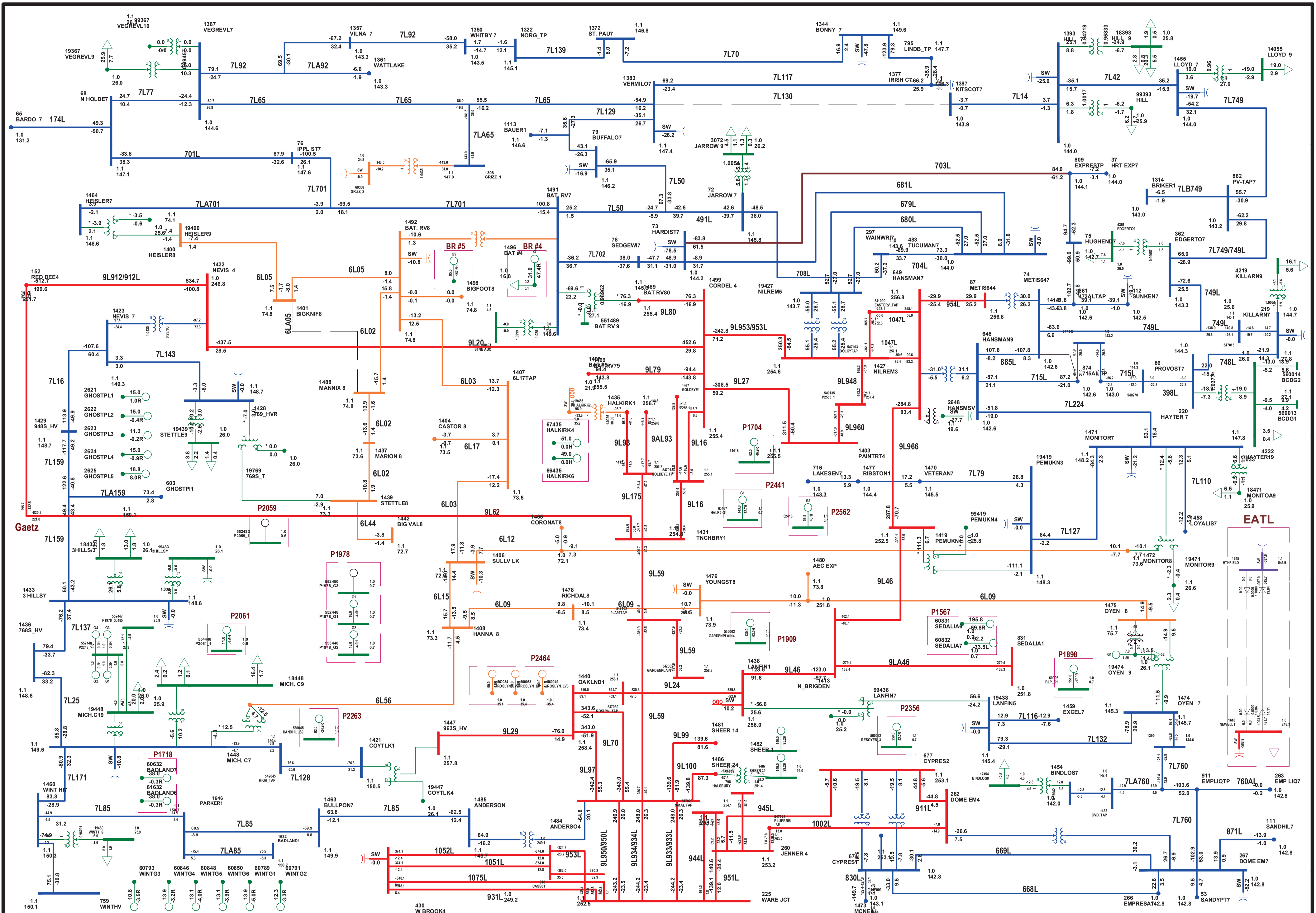
CATEGORY B, LOSS OF 701L (HOLDEN 395S – STROME 223S)
SCENARIO 6_2028WP_POST_PROJECT
THU, APR 11 2024 15:32

A3 - 88

Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate B

kV: >0.000 <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 <=500.000 >500.000

1



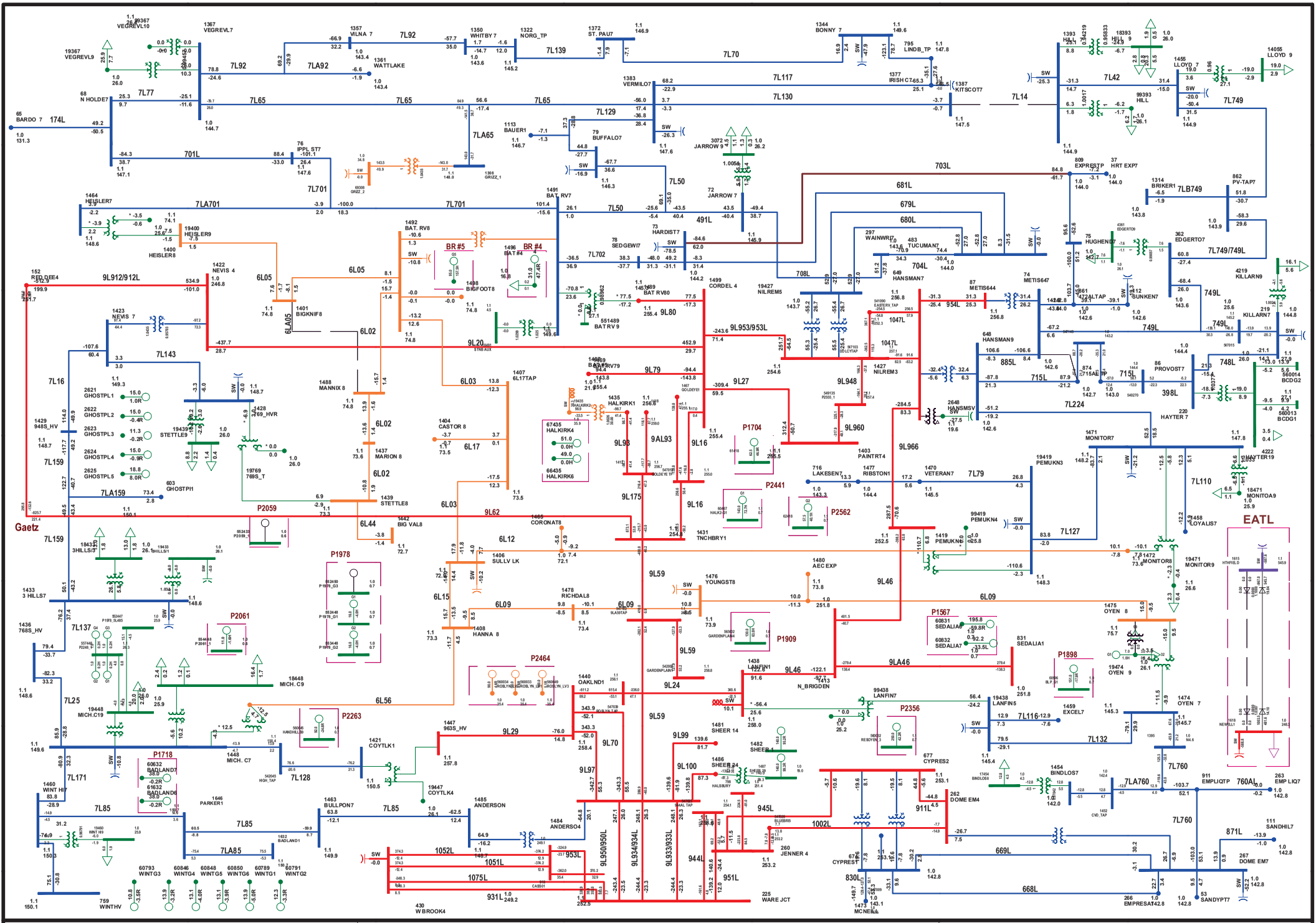
P2464 - Sunnynook Solar Battery Project

CATEGORY B, LOSS OF 7L130 (VERMILION 710S - KITSCOTY 705S)
SCENARIO 6_2028WP_POST_PROJECT
THU, APR 11 2024 15:33

A3 - 89

Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate B

kV: >0.000 <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 <=500.000 >500.000



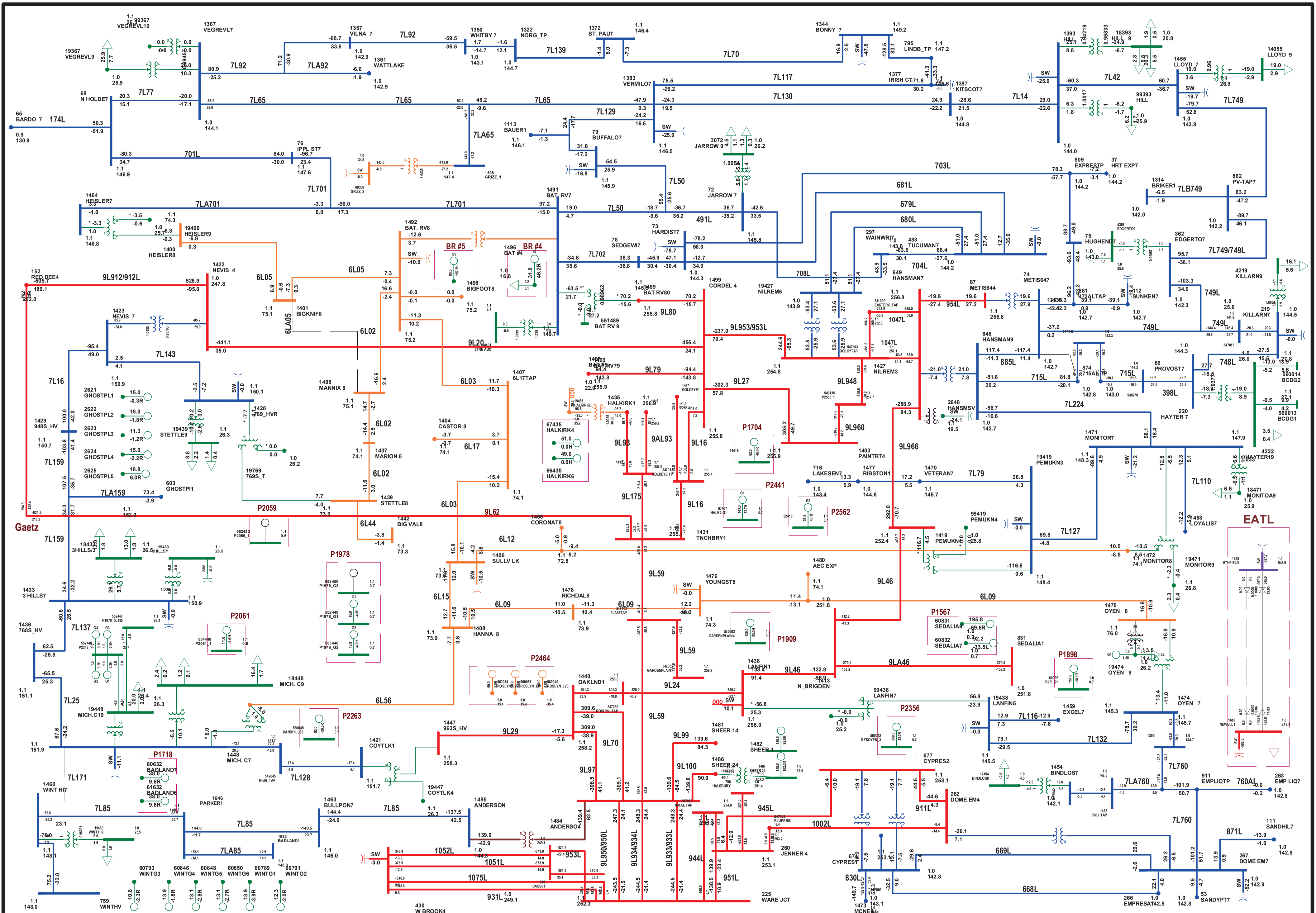
P2464 - Sunnynook Solar Battery Project

CATEGORY B, LOSS OF 7L14 (KITSCOTY 705S - HILL 751S)
SCENARIO 6_2028WP_POST_PROJECT
THU, APR 11 2024 15:33

A3 - 90

Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate B

kV: >0.000 <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 <=500.000 >500.000



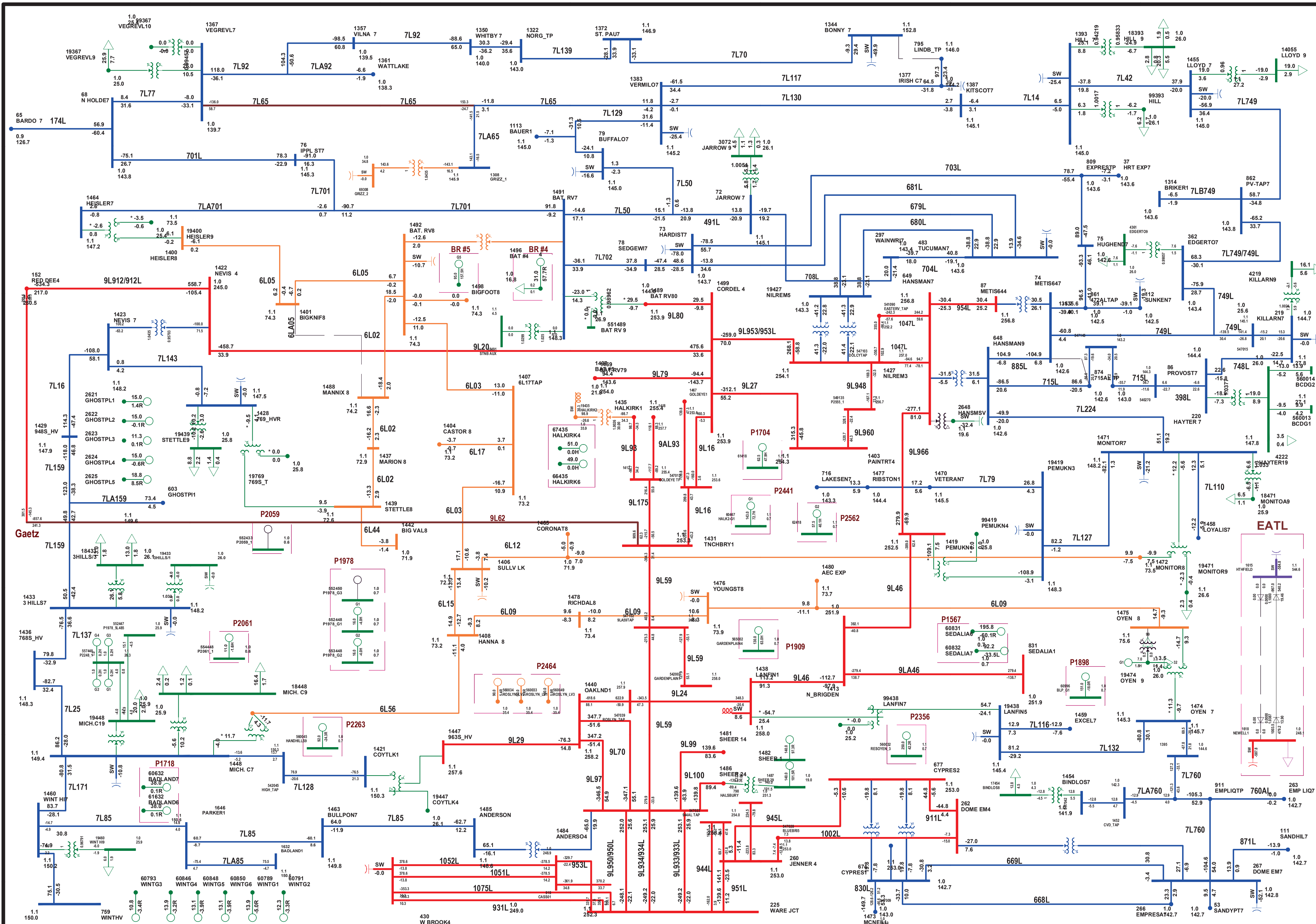
P2464 - Sunnynook Solar Battery Project

CATEGORY B, LOSS OF 7L171 (MICHICHI CREEK - WINTERING HILLS
SCENARIO 6_2028WP_POST_PROJECT
THU, APR 11 2024 15:33

A3 - 91

Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate B

kV: >0.000 <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 <=500.000 >500.000



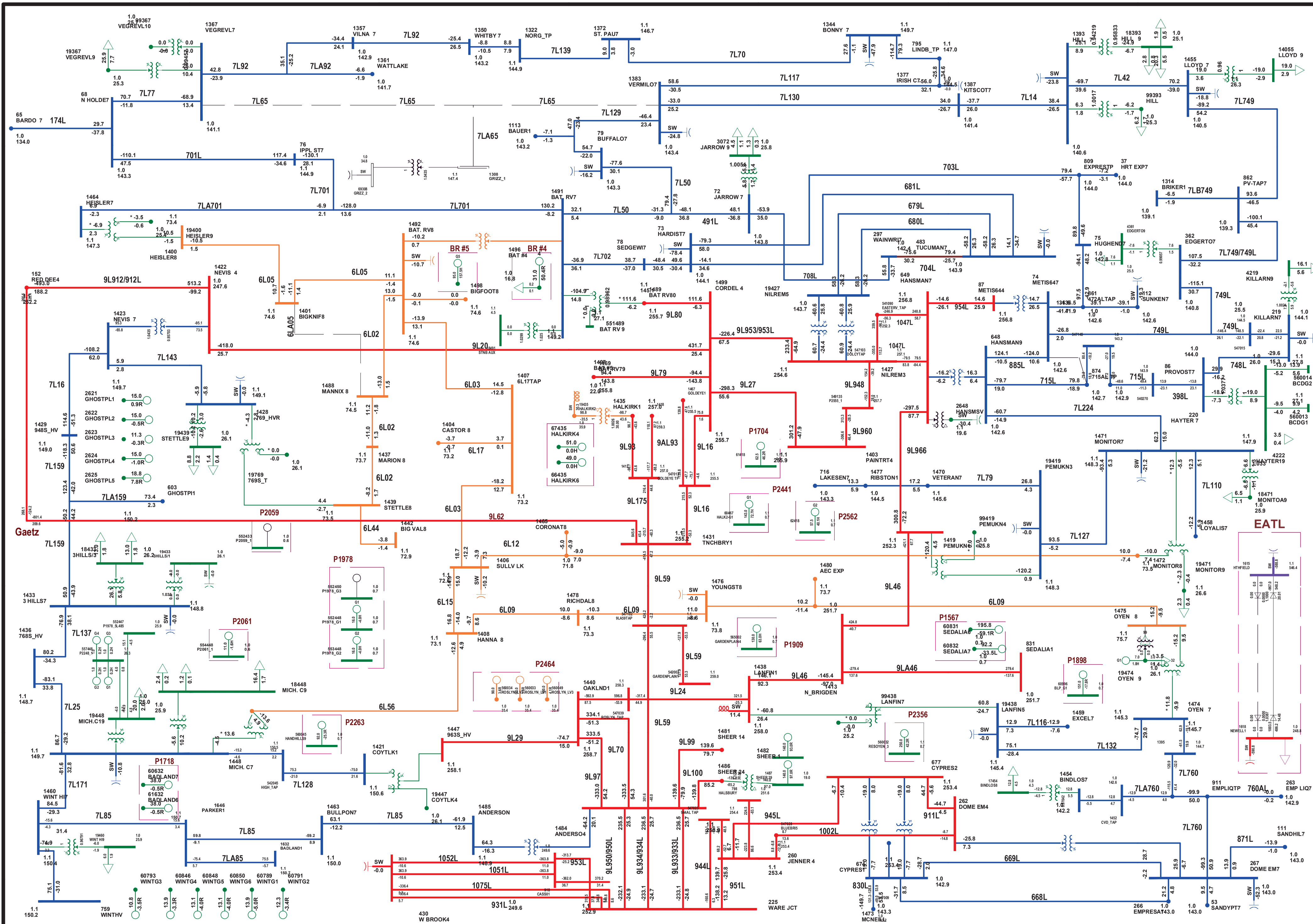
P2464 - Sunnynook Solar Battery Project

CATEGORY B, LOSS OF 7L53 (BONNYVILLE 700S - IRISH CREEK 706S
SCENARIO 6_2028WP_POST_PROJECT
THU, APR 11 2024 15:34

A3 - 92

Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate B

kV: >0.000 <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 <=500.000 >500.000



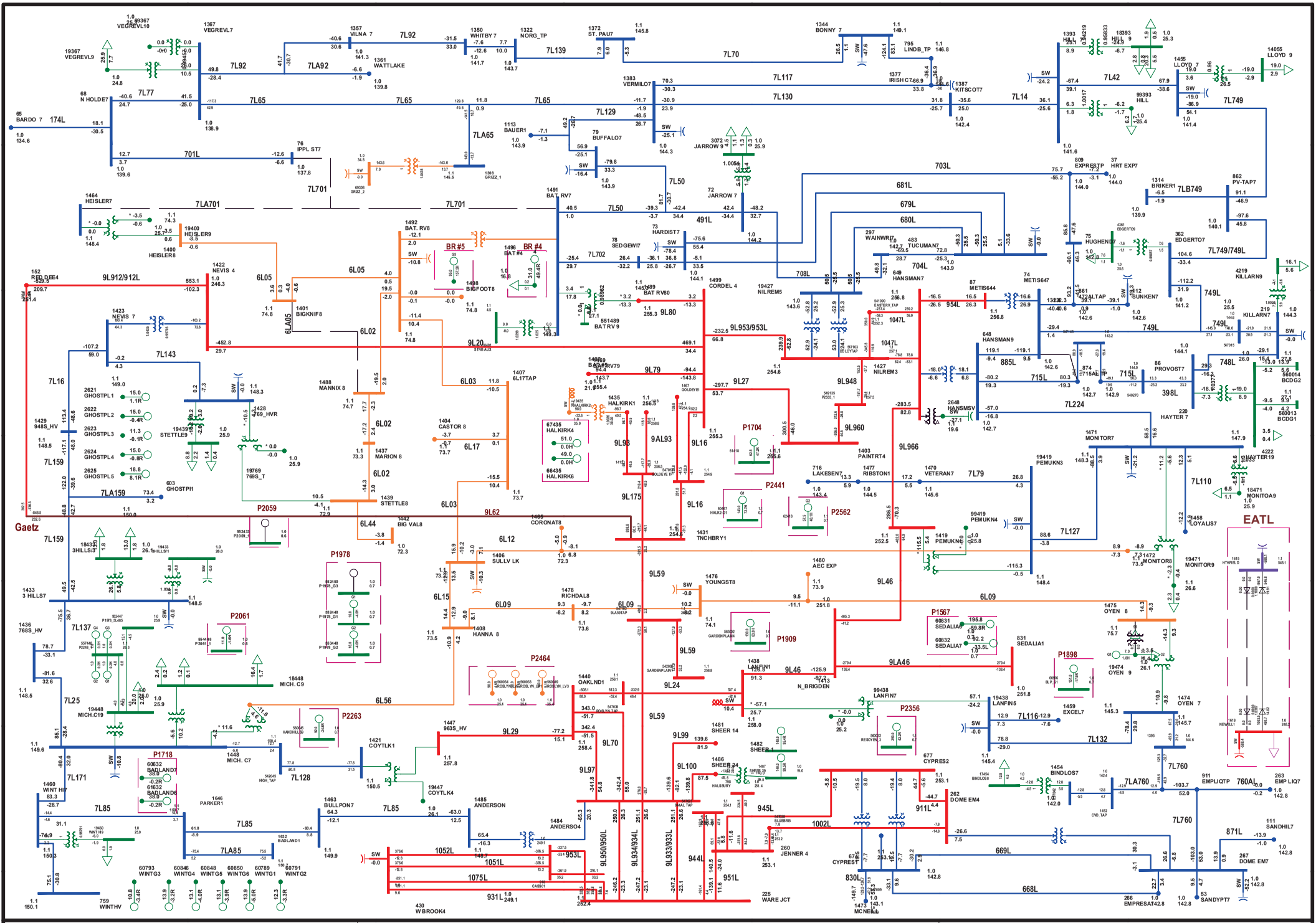
P2464 - Sunnynook Solar Battery Project

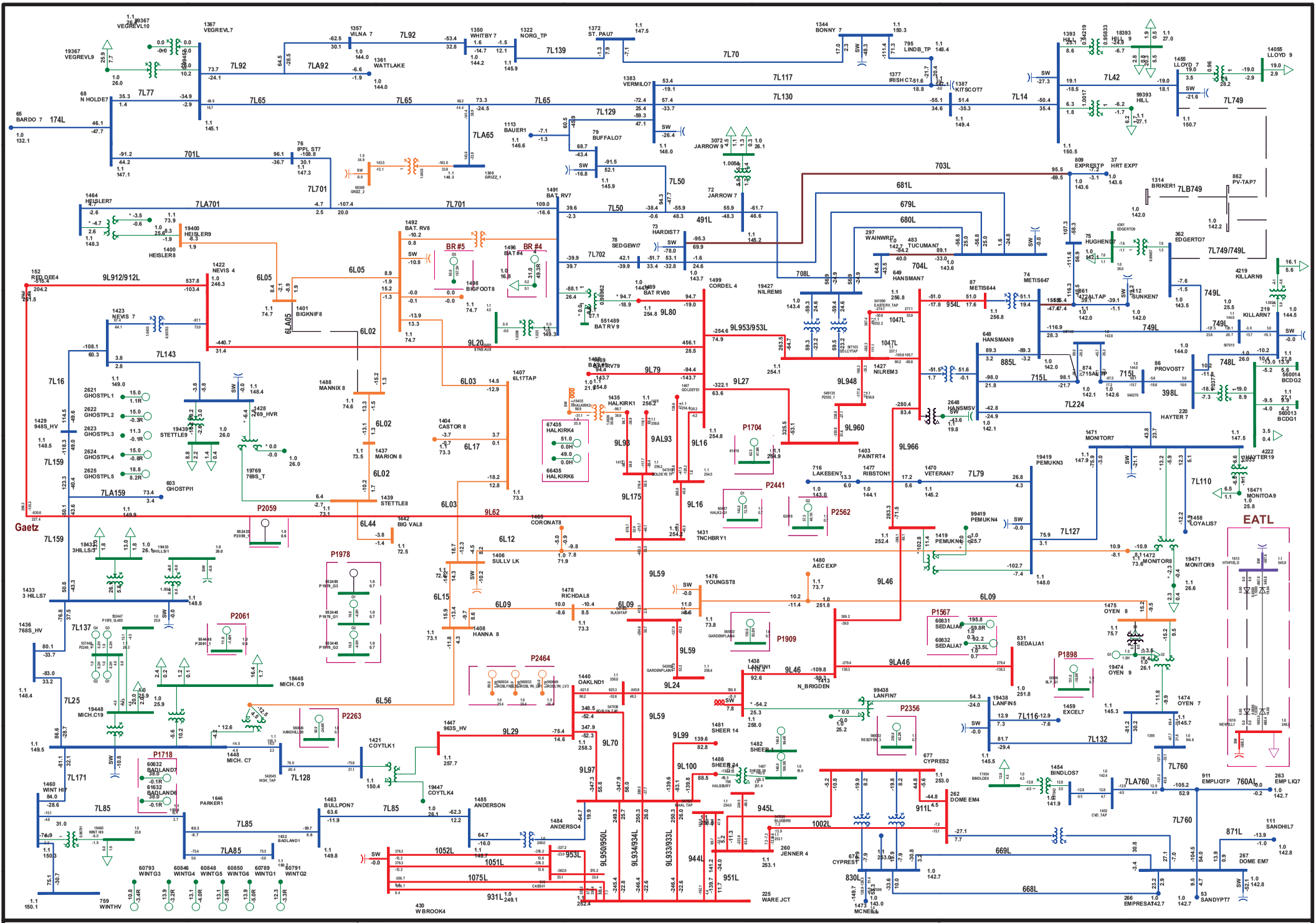
CATEGORY B, LOSS OF 7L65 (VERMILION 710S-- VEGREVILLE 709S)
SCENARIO 6_2028WP_POST_PROJECT
FRI, APR 12 2024 14:55

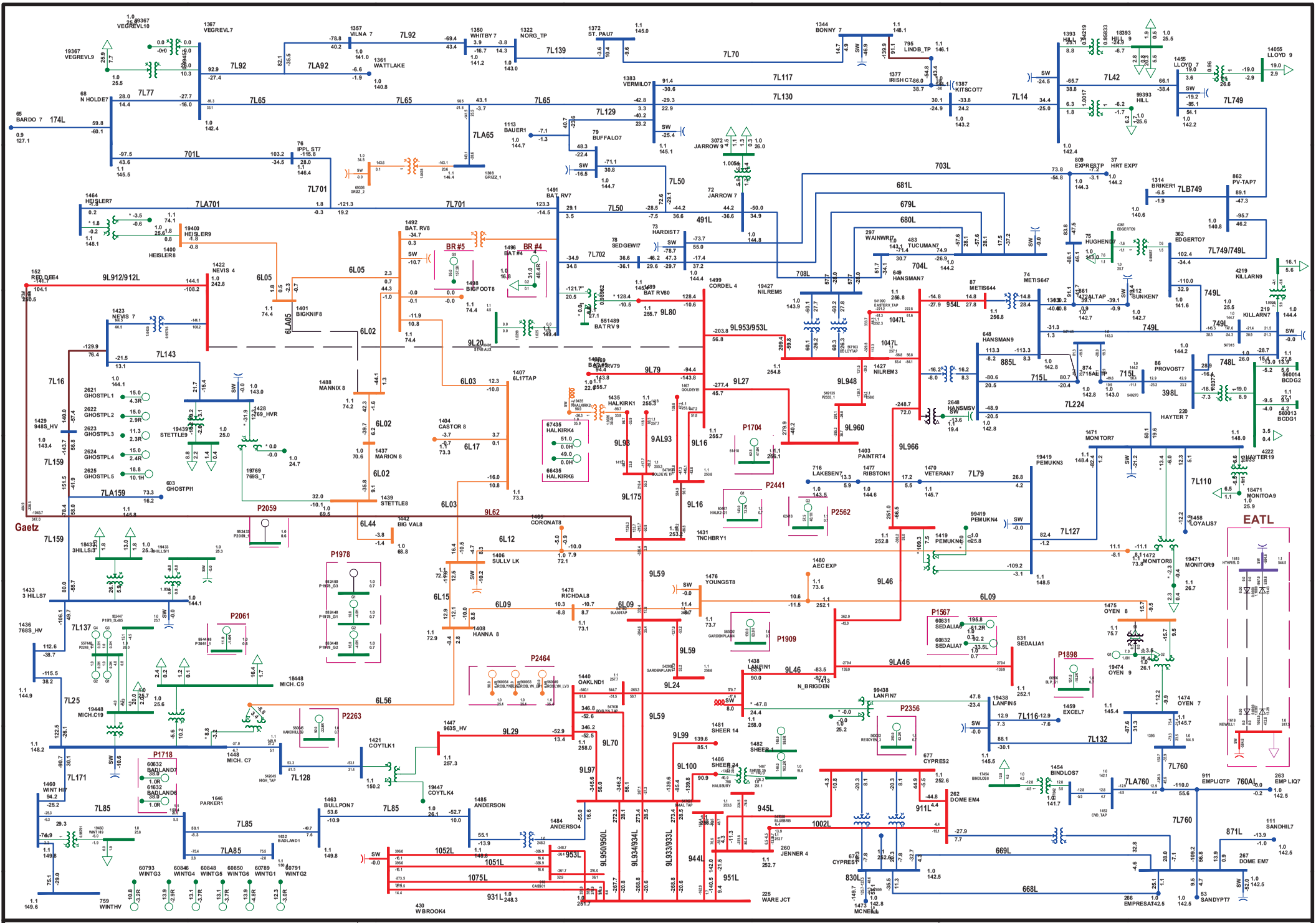
A3 - 93

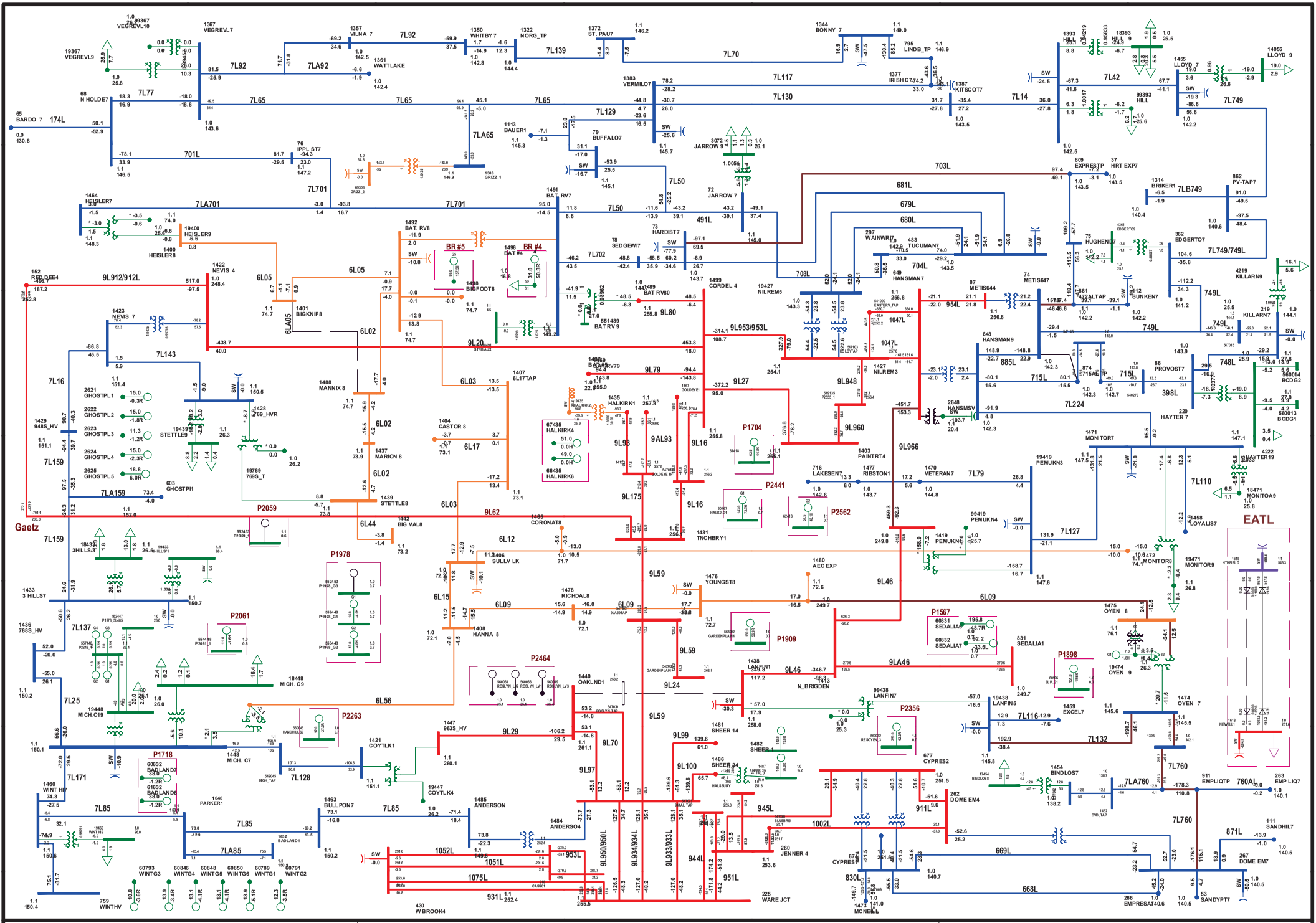
Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate B

kV: >0.000 <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 <=500.000 >500.000


Gaetz
EATL
7L701
7LA701
7L50
7L129
7L65
7LA65
7L92
7LA92
7L139
7L70
7L117
7L130
7L14
7L42
7L749
7LB749
7L749/749L
7L77
7L143
7L16
7L159
7LA159
7L137
7L25
7L171
7L85
7LA85
7L128
7L56
7L6
7L15
7L12
7L09
7L03
7L17
7L02
7L05
7LA05
7L44
7L62
7L27
7L953/953L
7L960
7L966
7L224
7L79
7L127
7L110
7LA760
7L760
7L116
7L132
7L107
7L111
7L748L
7L715L
7L885L
7L704L
7L708L
7L681L
7L679L
7L680L
7L703L
7L491L
7L702
7L1
9L912/912L
9L80
9L20
9L16
9L93
9L948
9L175
9L98
9L79
9L62
9L59
9L46
9L24
9L29
9L70
9L97
9L99
9L100
9LA46
9L950/950L
9L934/934L
9L933/933L
9LA93
1052L
1051L
1075L
953L
945L
944L
951L
931L
1002L
911L
669L
668L
830L
1M
1473
MCNEIL1
1
A3 - 94
P2464 - Sunnynook Solar Battery Project
CATEGORY B, LOSS OF 7L701 (BATTLE RIVER 757S - STROME 223S)
SCENARIO 6_2028WP_POST_PROJECT
THU, APR 11 2024 15:34
Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate B
kV: >0.000 <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 <=500.000 >500.000


Gaetz
EATL
P2464 - Sunnynook Solar Battery Project
CATEGORY B, LOSS OF 7L749 (EDGERTON 899S - LLOYMINSTER 716S)
SCENARIO 6_2028WP_POST_PROJECT
THU, APR 11 2024 15:35
A3 - 95
Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate B
kV: >0.000 <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 <=500.000 >500.000


Gaetz
EATL
P2464 - Sunnynook Solar Battery Project
CATEGORY B, LOSS OF 9L20 (NEVIS 766S - CORDEL 755S)
SCENARIO 6_2028WP_POST_PROJECT
THU, APR 11 2024 15:35
A3 - 96
Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate B
kV: >0.000 <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 <=500.000 >500.000



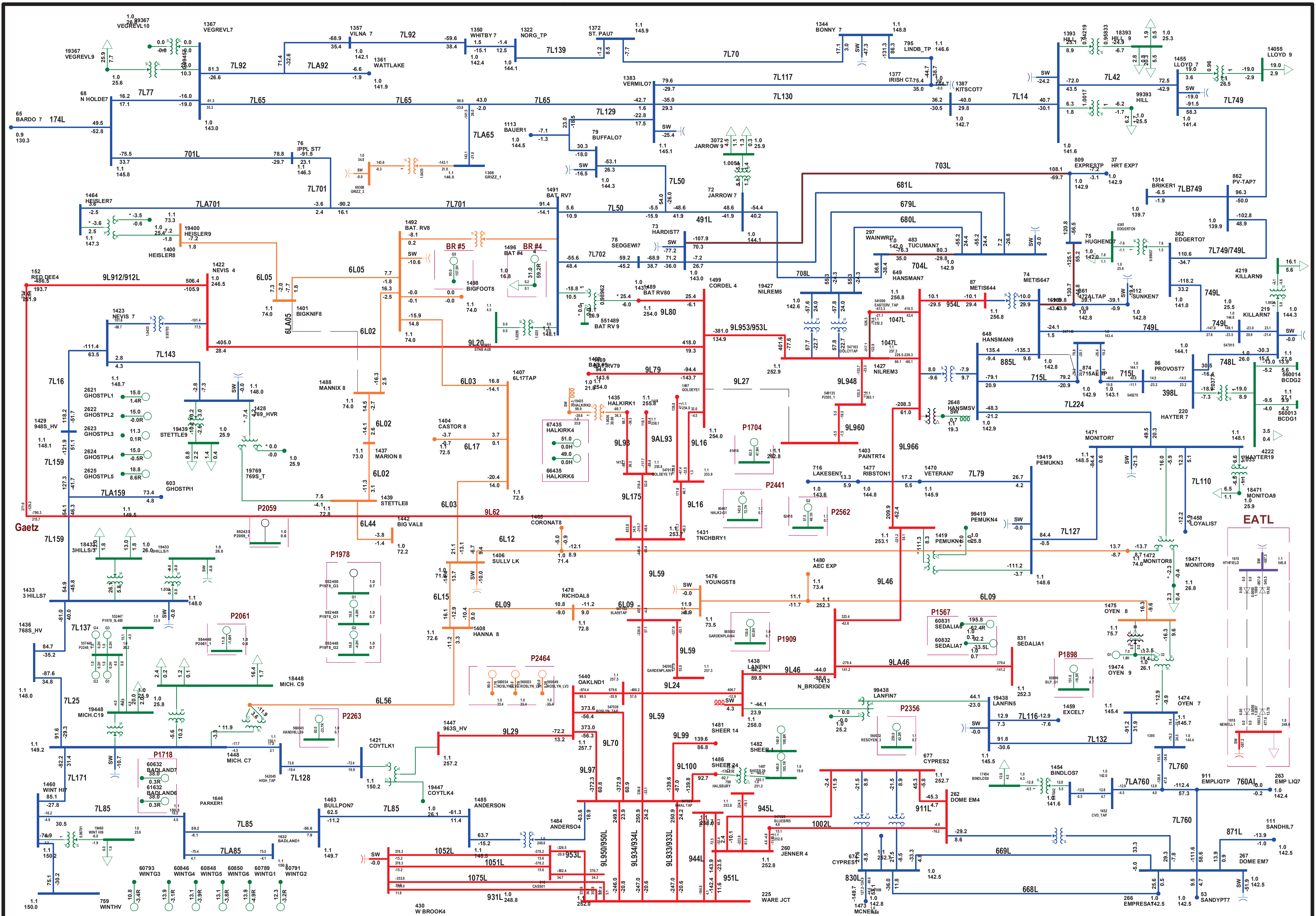
P2464 - Sunnynook Solar Battery Project

CATEGORY B, LOSS OF 9L24 (LANFINE 959S - OAKLAND 946S)
SCENARIO 6_2028WP_POST_PROJECT
THU, APR 11 2024 15:35

A3 - 97

Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate B

kV: >0.000 <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 <=500.000 >500.000



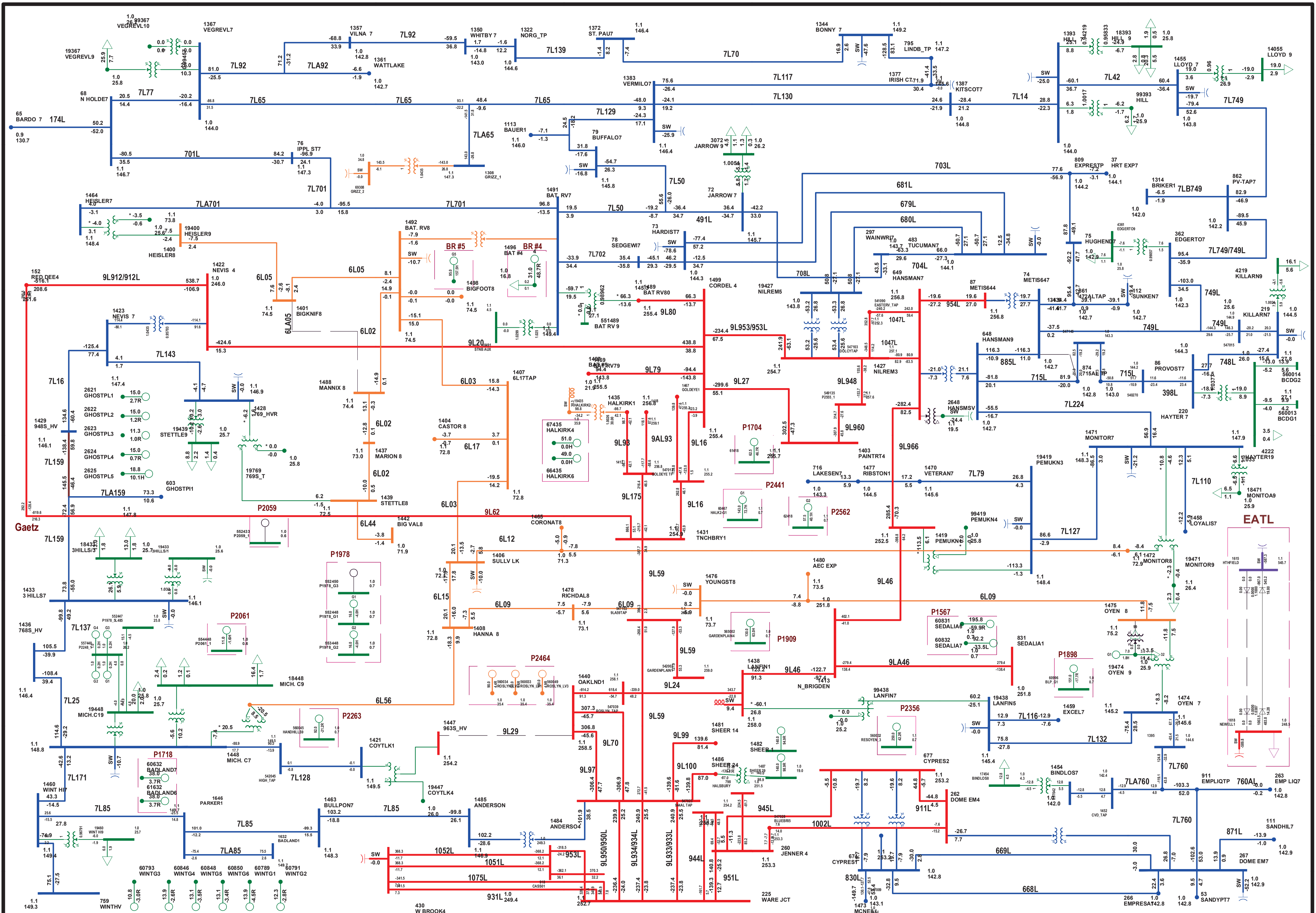
P2464 - Sunnynook Solar Battery Project

CATEGORY B, LOSS OF 9L27 (PAINTEARTH CREEK - CORDEL 755S)
SCENARIO 6_2028WP_POST_PROJECT
THU, APR 11 2024 15:35

A3 - 98

Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate B

kV: >0.000 <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 <=500.000 >500.000



P2464 - Sunnynook Solar Battery Project

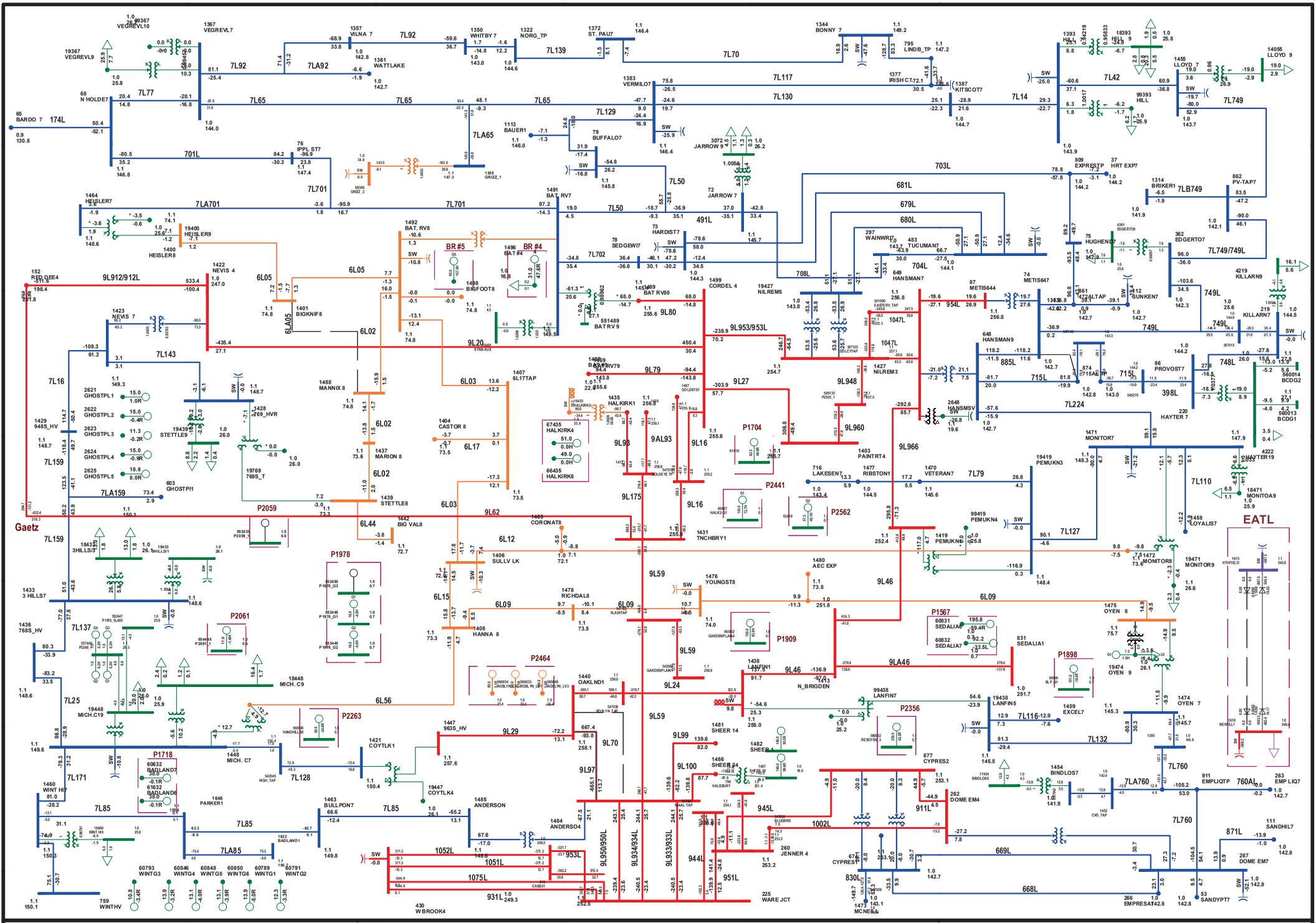
CATEGORY B, LOSS OF 9L29 (COYOTE LAKE 963S - OAKLAND 946S)
SCENARIO 6_2028WP_POST_PROJECT
THU, APR 11 2024 15:36

A3 - 99

Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate B

kV: >0.000 <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 <=500.000 >500.000

1



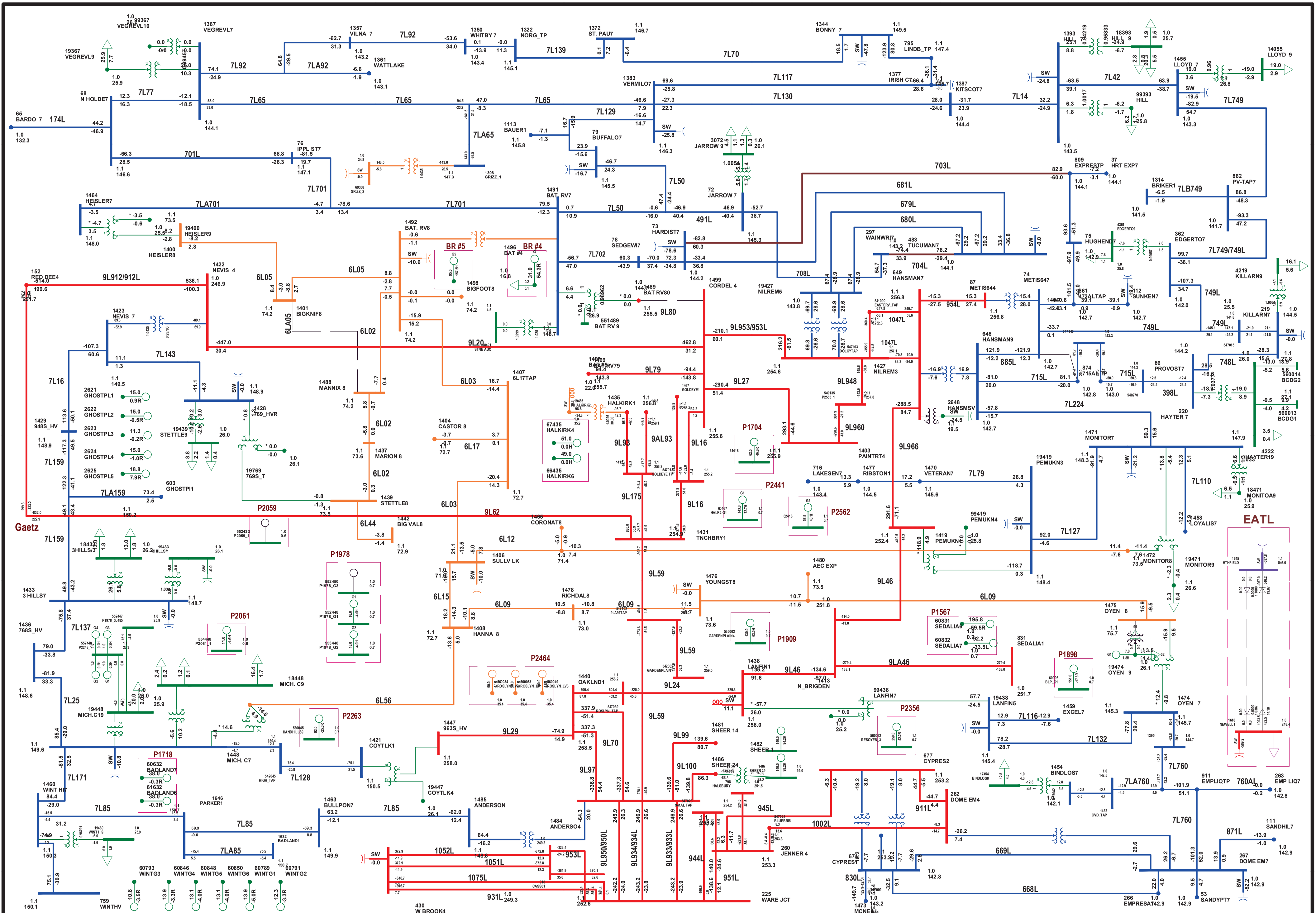
P2464 - Sunnynook Solar Battery Project

CATEGORY B, LOSS OF 9L70 (OAKLAND 946S - ANDERSON 801S)
SCENARIO 6_2028WP_POST_PROJECT
THU, APR 11 2024 15:36

A3 - 100

Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate B

kV: >0.000 <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 <=500.000 >500.000



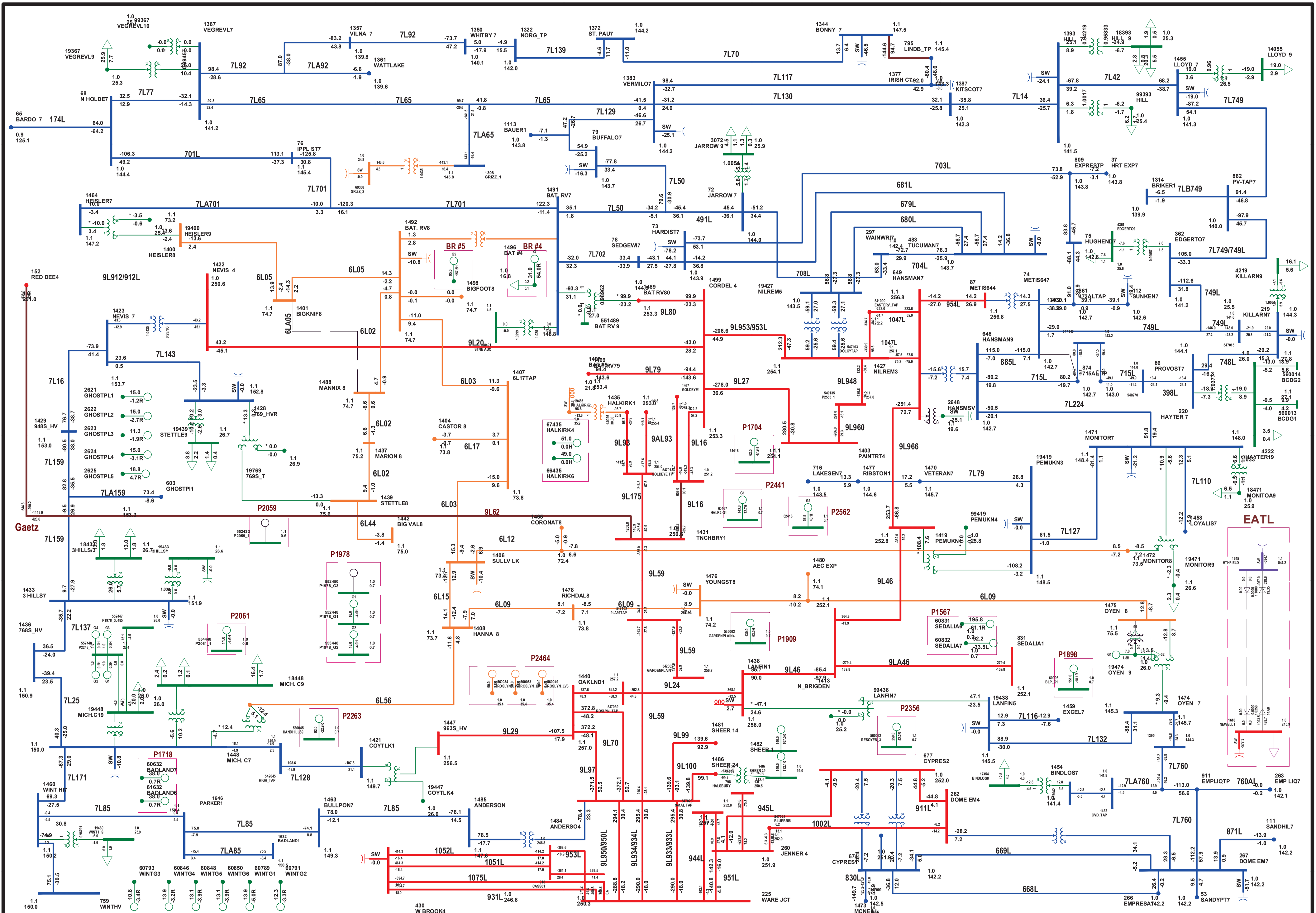
P2464 - Sunnynook Solar Battery Project

CATEGORY B, LOSS OF 9L80 (BATTLE RIVER 757S - CORDEL 755S)
SCENARIO 6_2028WP_POST_PROJECT
THU, APR 11 2024 15:36

A3 - 101

Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate B

kV: >0.000 <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 <=500.000 >500.000



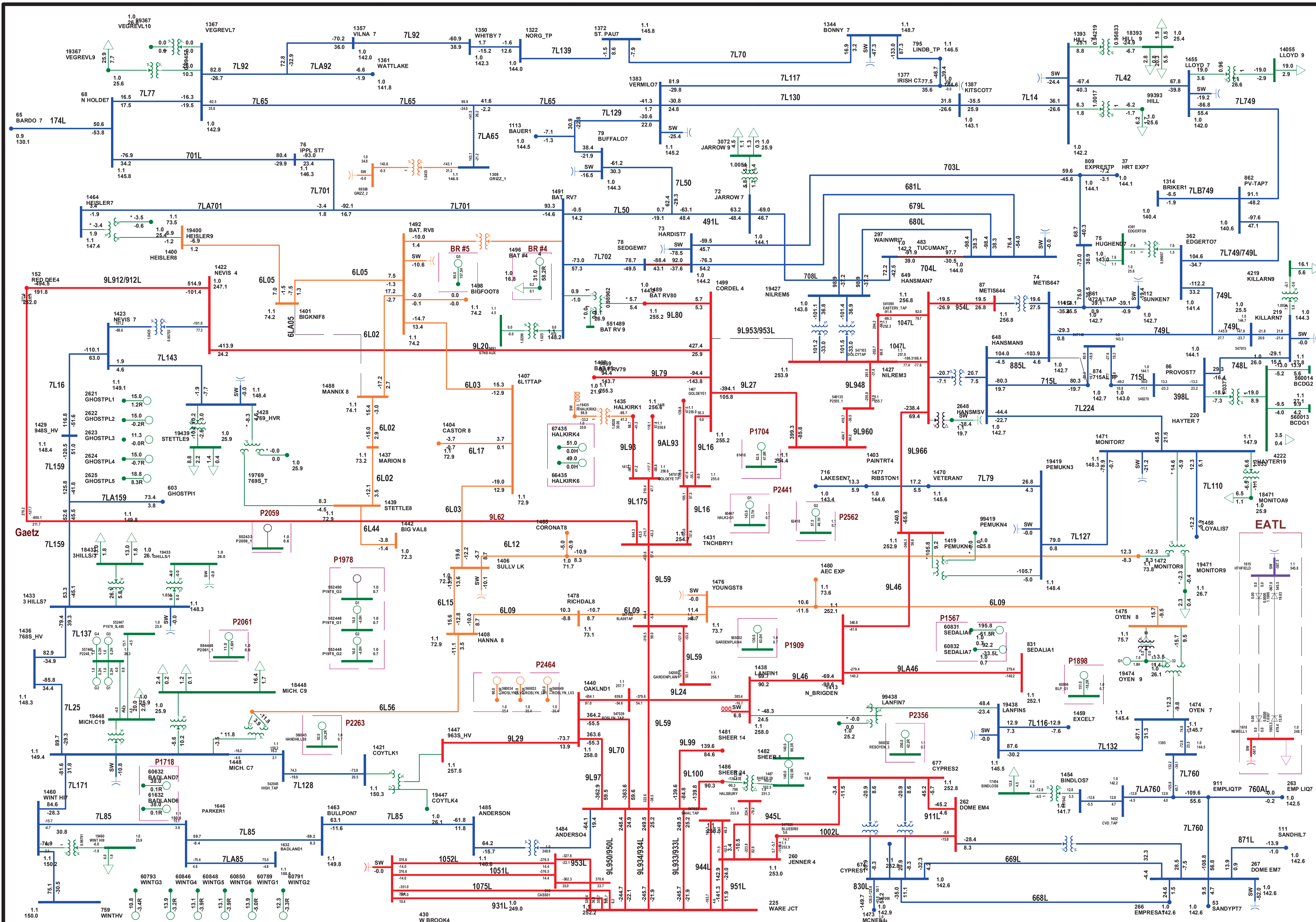
P2464 - Sunnynook Solar Battery Project

CATEGORY B, LOSS OF 9L912 (NEVIS 766S – RED DEER 63S)
SCENARIO 6_2028WP_POST_PROJECT
THU, APR 11 2024 15:36

A3 - 102

Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate B

kV: >0.000 <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 <=500.000 >500.000



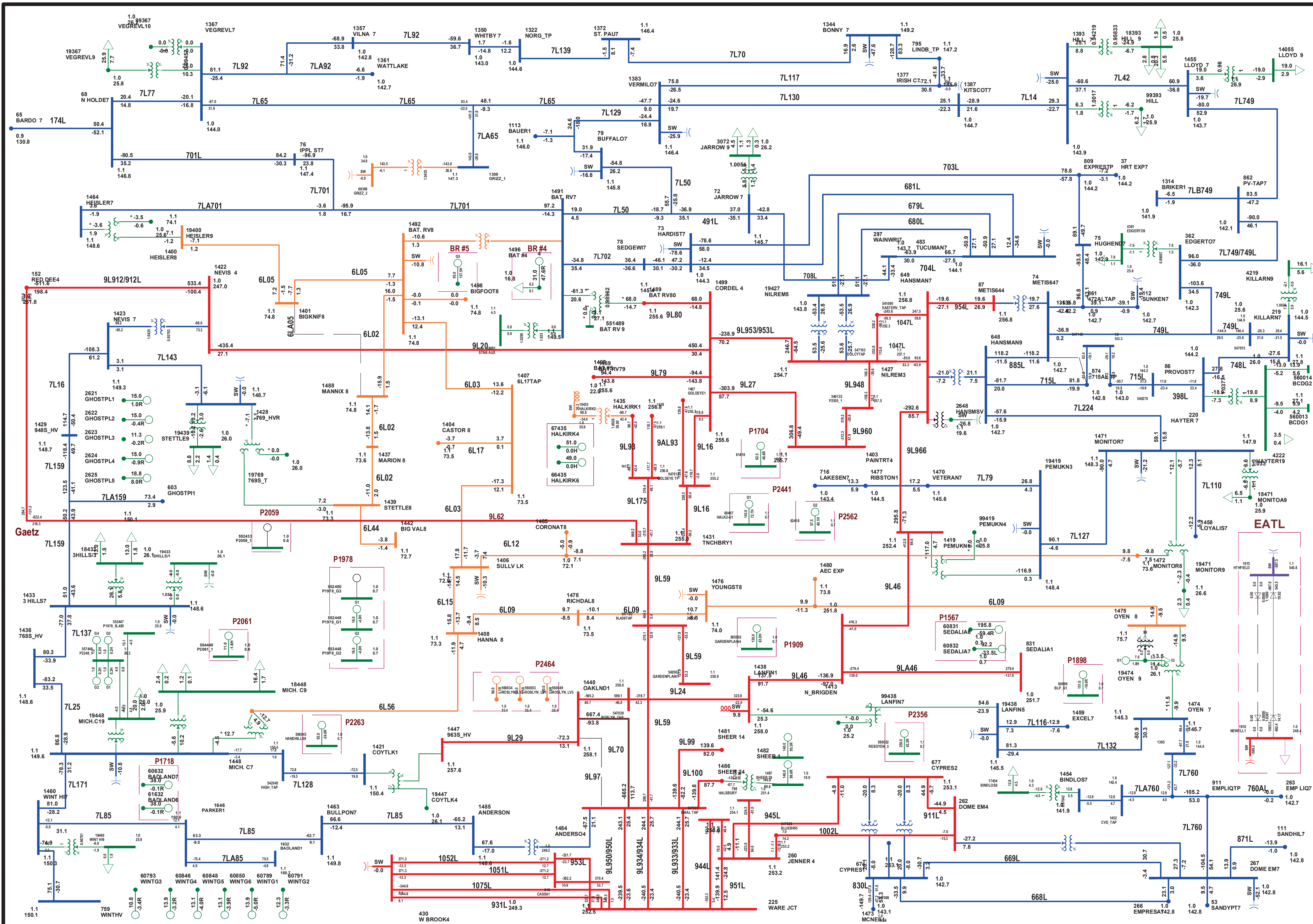
P2464 - Sunnynook Solar Battery Project

CATEGORY B, LOSS OF 9L953 (CORDEL 755S - NILREM 574S)
SCENARIO 6_2028WP_POST_PROJECT
THU, APR 11 2024 15:37

A3 - 103

Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate B

kV: >0.000 <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 <=500.000 >500.000



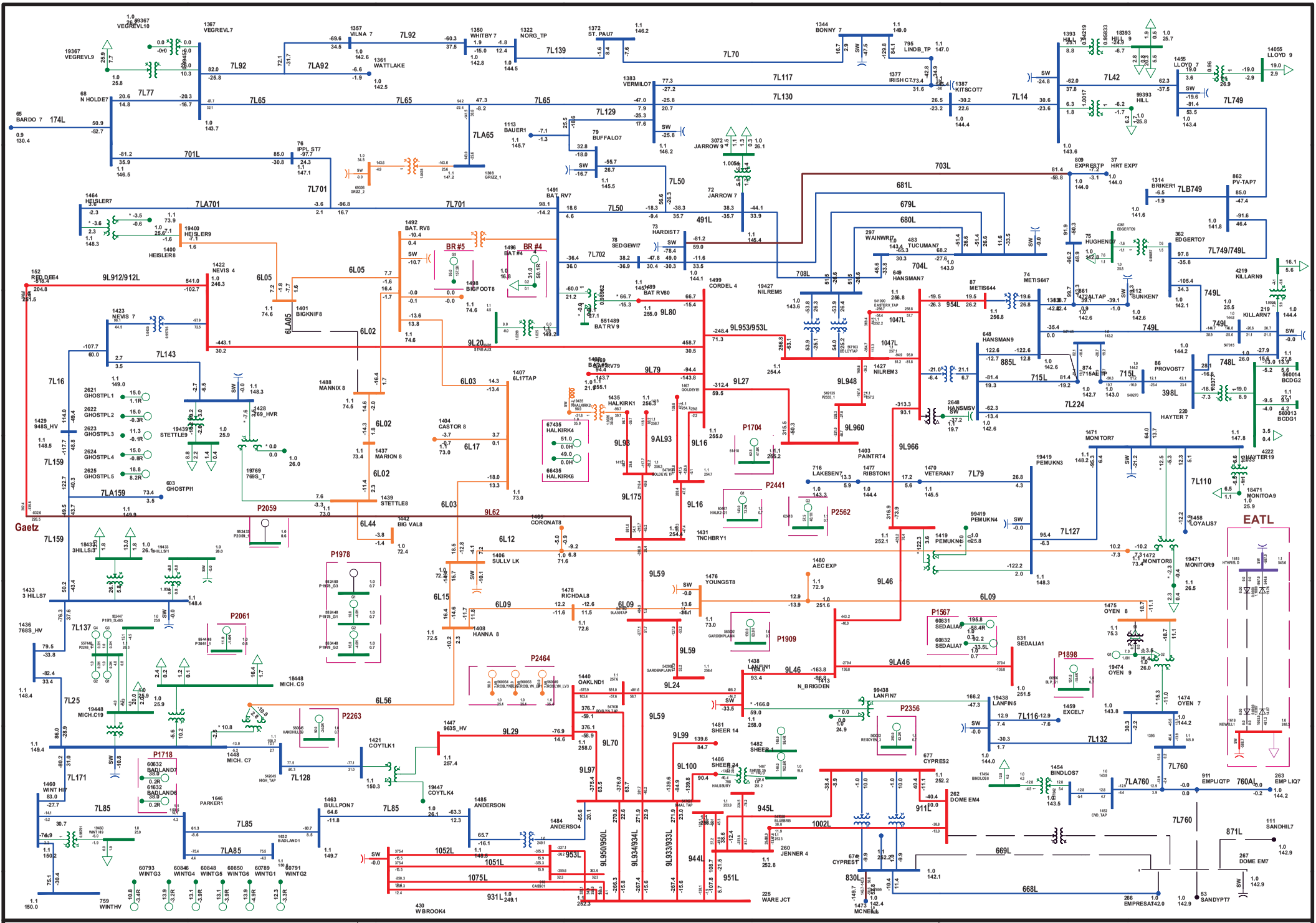
P2464 - Sunnynook Solar Battery Project

CATEGORY B, LOSS OF 9L97 (OAKLAND 946S - ANDERSON 801S)
SCENARIO 6_2028WP_POST_PROJECT
THU, APR 11 2024 15:37

A3 - 104

Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate B

kV: >0.000 <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 <=500.000 >500.000



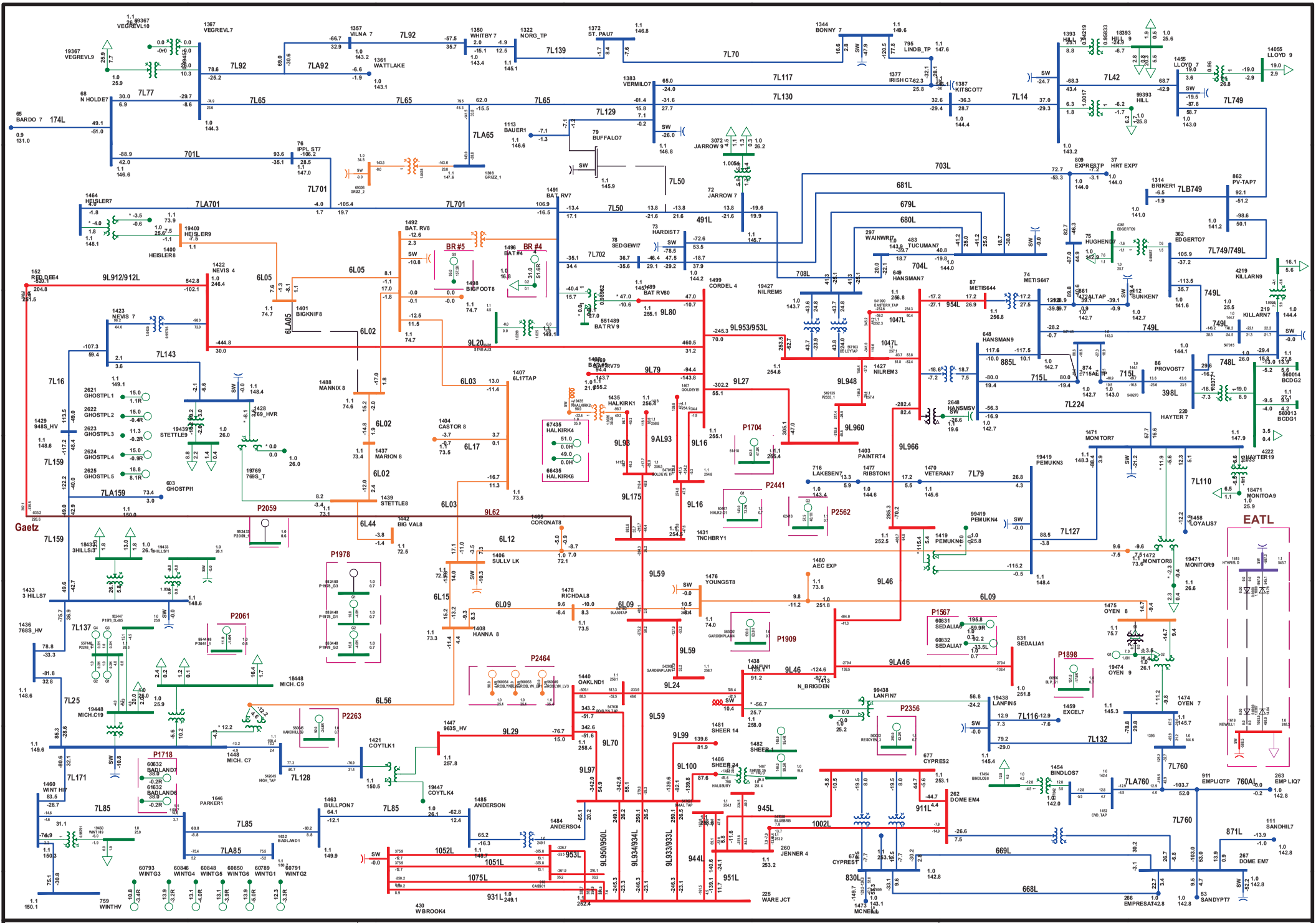
P2464 - Sunnynook Solar Battery Project

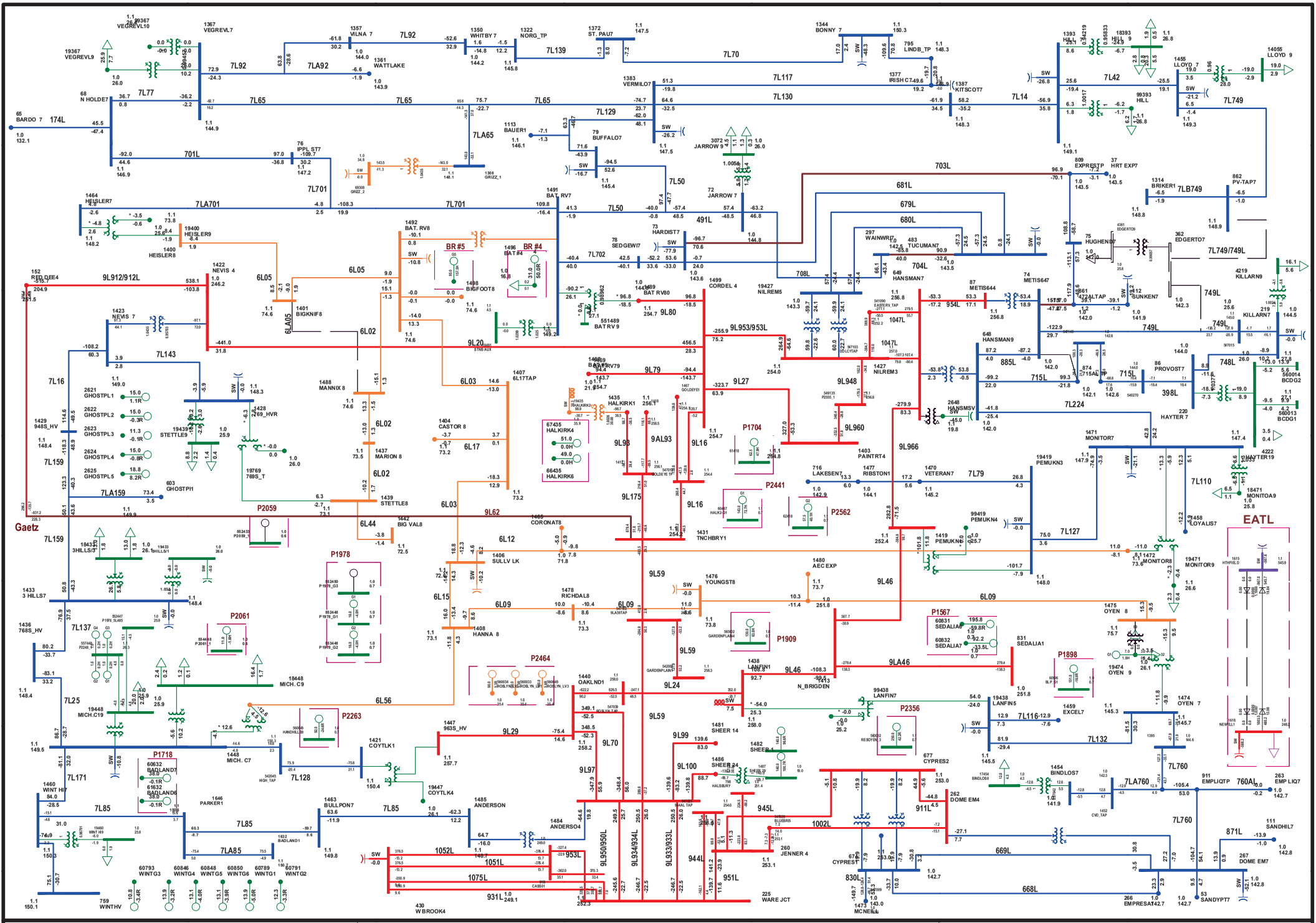
CATEGORY B, LOSS OF AMOCO EMPRESS_163S_T5
SCENARIO 6_2028WP_POST_PROJECT
THU, APR 11 2024 15:37

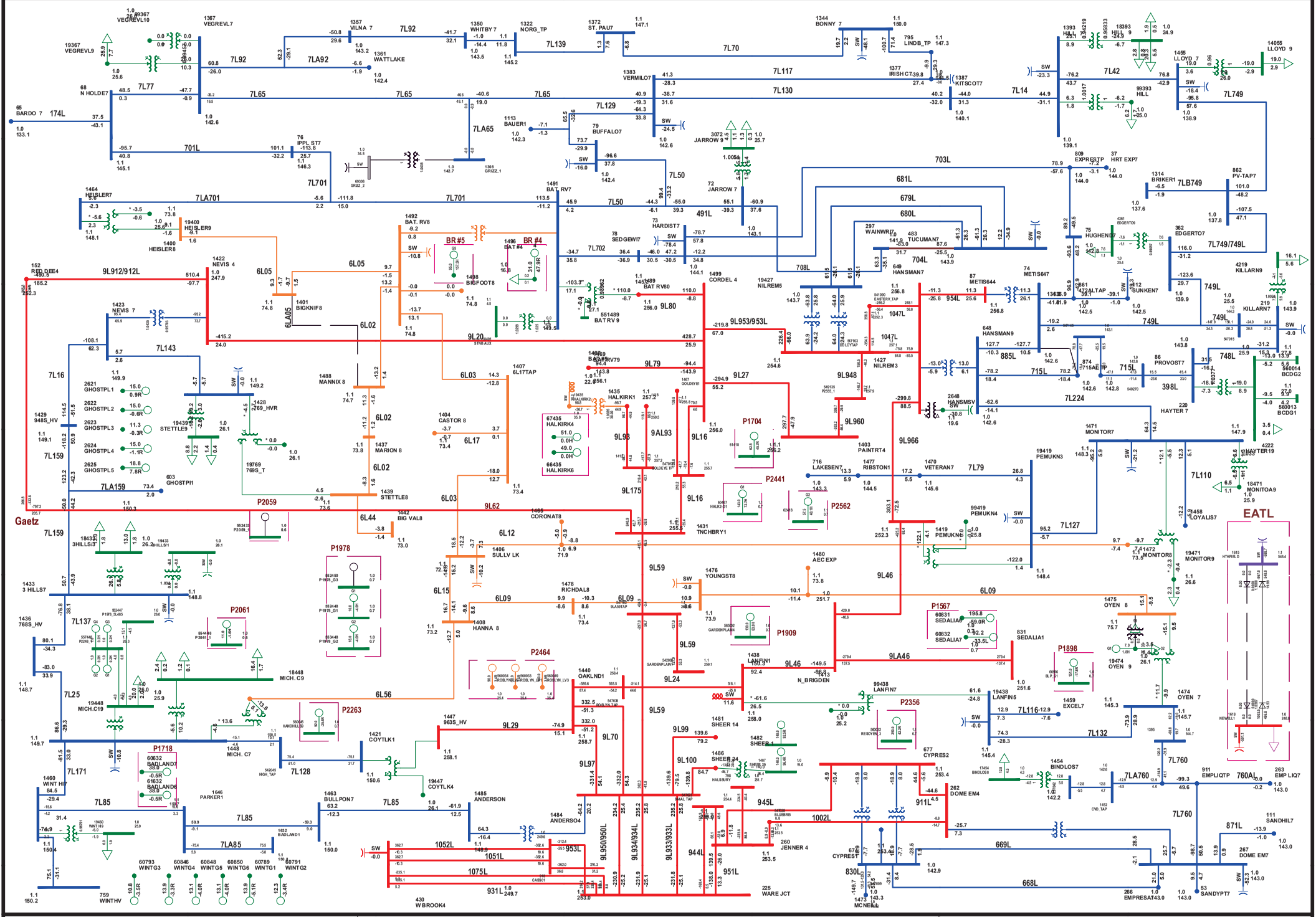
A3 - 105

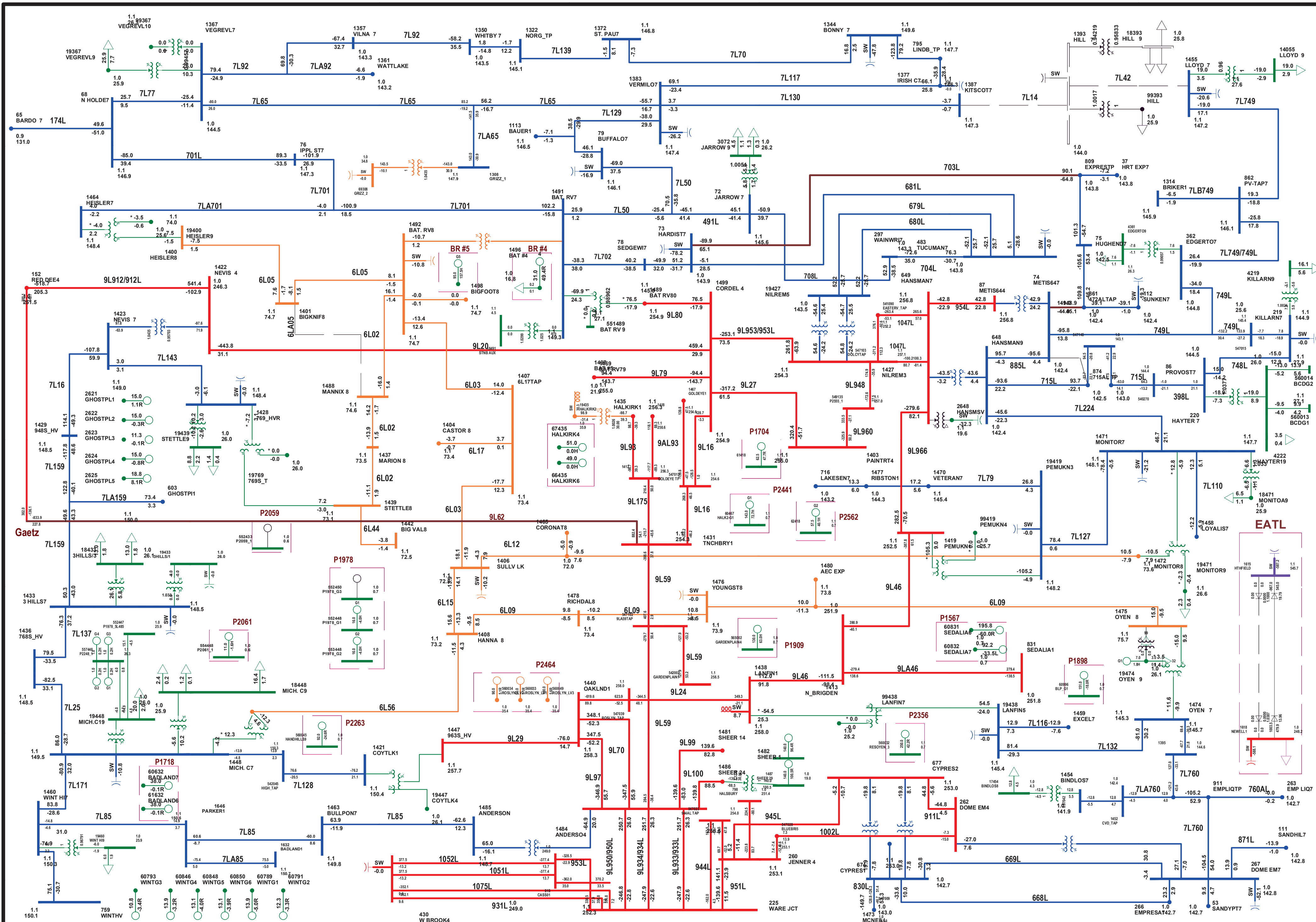
Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate B

kV: >0.000 <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 <=500.000 >500.000


Gaetz
EATL
P2464 - Sunnynook Solar Battery Project
CATEGORY B, LOSS OF BUFFALO CREEK 526S_XMERS
SCENARIO 6_2028WP_POST_PROJECT
THU, APR 11 2024 15:37
A3 - 106
Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate B
kV: >0.000 <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 <=500.000 >500.000


Gaetz
EATL
P2464 - Sunnynook Solar Battery Project
CATEGORY B, LOSS OF EDGERTON_899ST3
SCENARIO 6_2028WP_POST_PROJECT
THU, APR 11 2024 15:38
A3 - 107
Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate B
kV: >0.000 <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 <=500.000 >500.000


Gaetz
EATL
P2464 - Sunnynook Solar Battery Project
CATEGORY B, LOSS OF GRIZZLY BEAR 708S T1
SCENARIO 6_2028WP_POST_PROJECT
THU, APR 11 2024 15:38
A3 - 108
Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate B
kV: >0.000 <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 <=500.000 >500.000



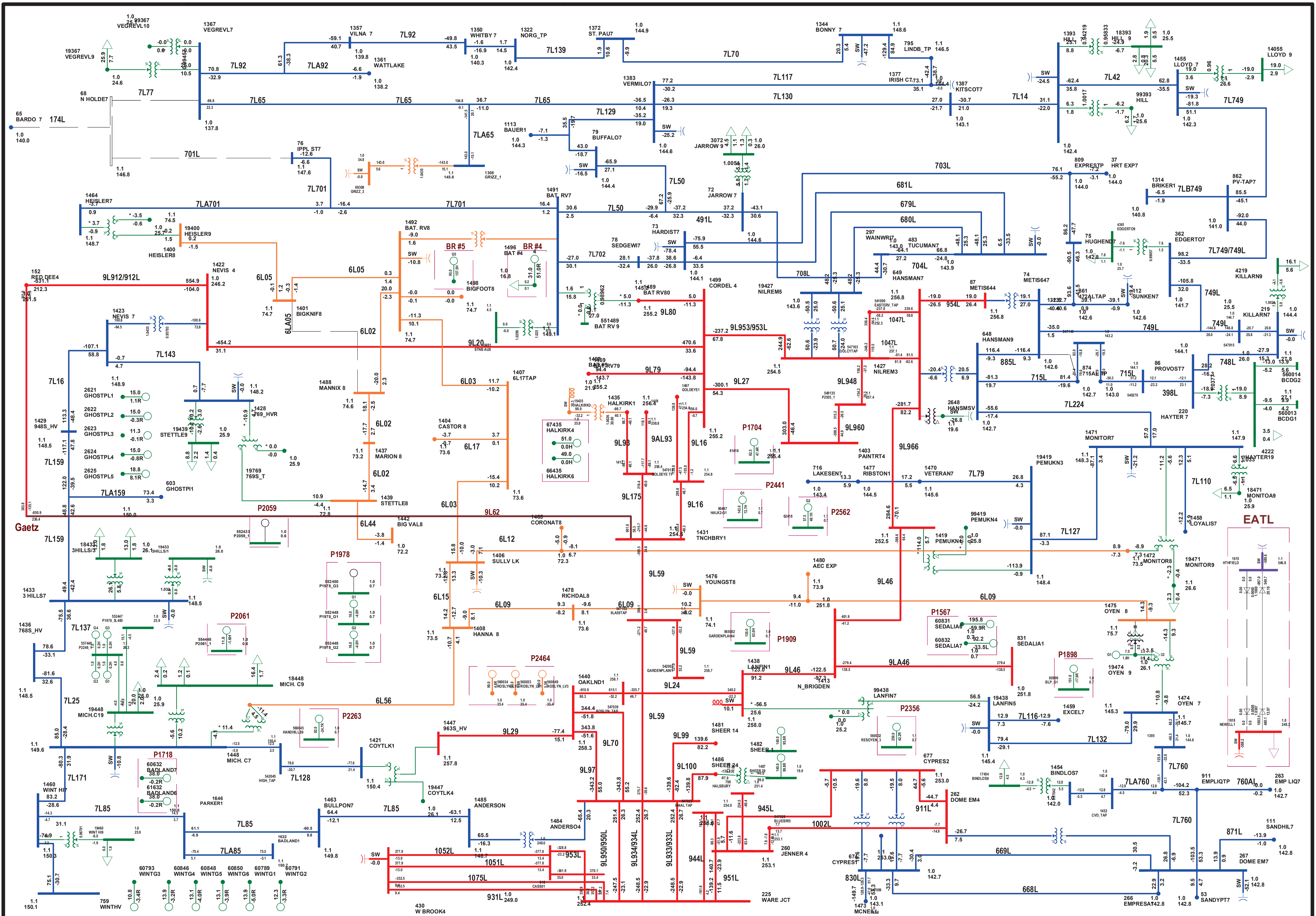
P2464 - Sunnynook Solar Battery Project

CATEGORY B, LOSS OF HILL 751S_TIEXMER
SCENARIO 6_2028WP_POST_PROJECT
THU, APR 11 2024 15:38

A3 - 109

Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate B

kV: >0.000 <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 <=500.000 >500.000



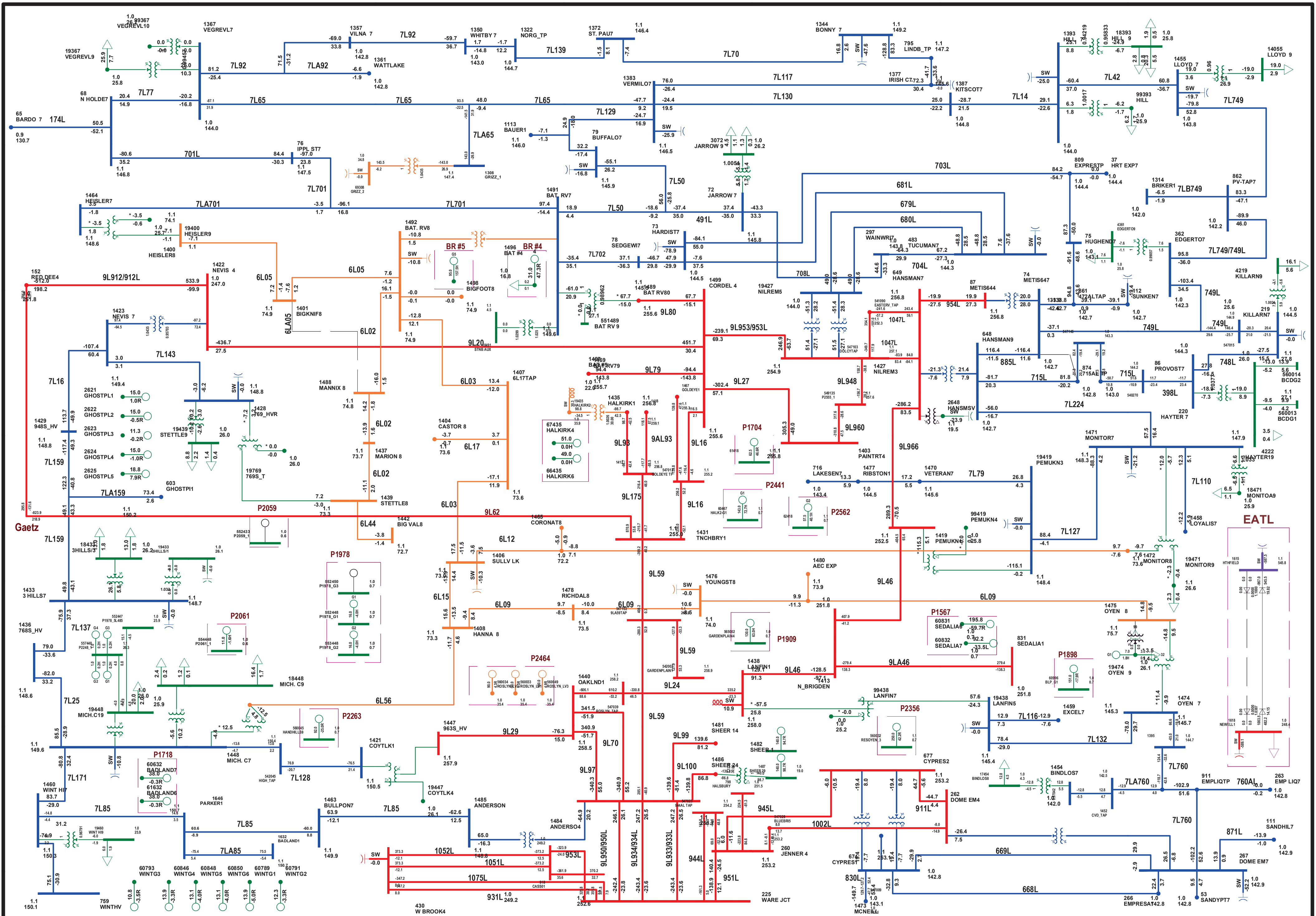
P2464 - Sunnynook Solar Battery Project

CATEGORY B, LOSS OF HOLDEN 395S T1
SCENARIO 6_2028WP_POST_PROJECT
THU, APR 11 2024 15:38

A3 - 110

Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate B

kV: >0.000 <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 <=500.000 >500.000



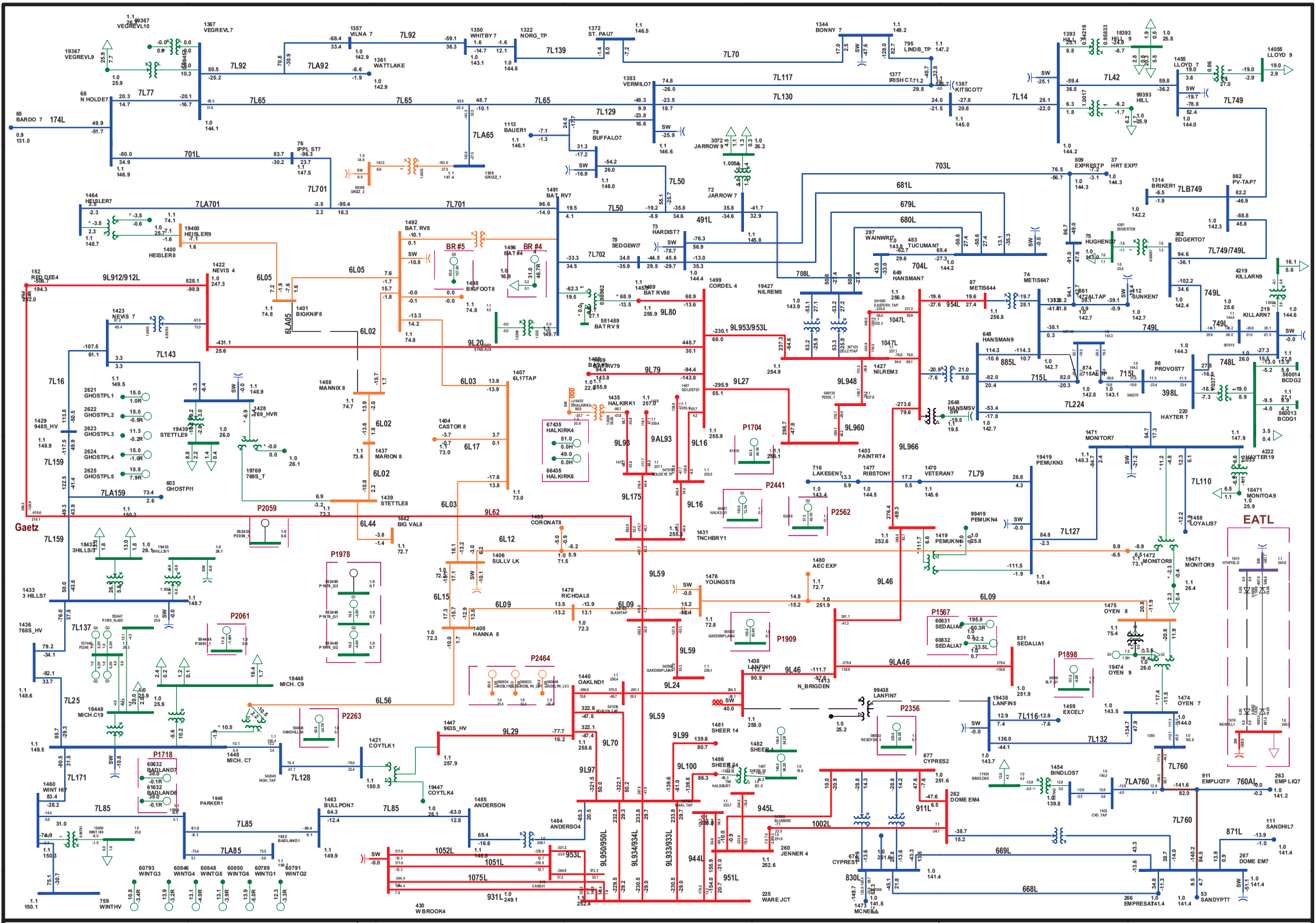
P2464 - Sunnynook Solar Battery Project

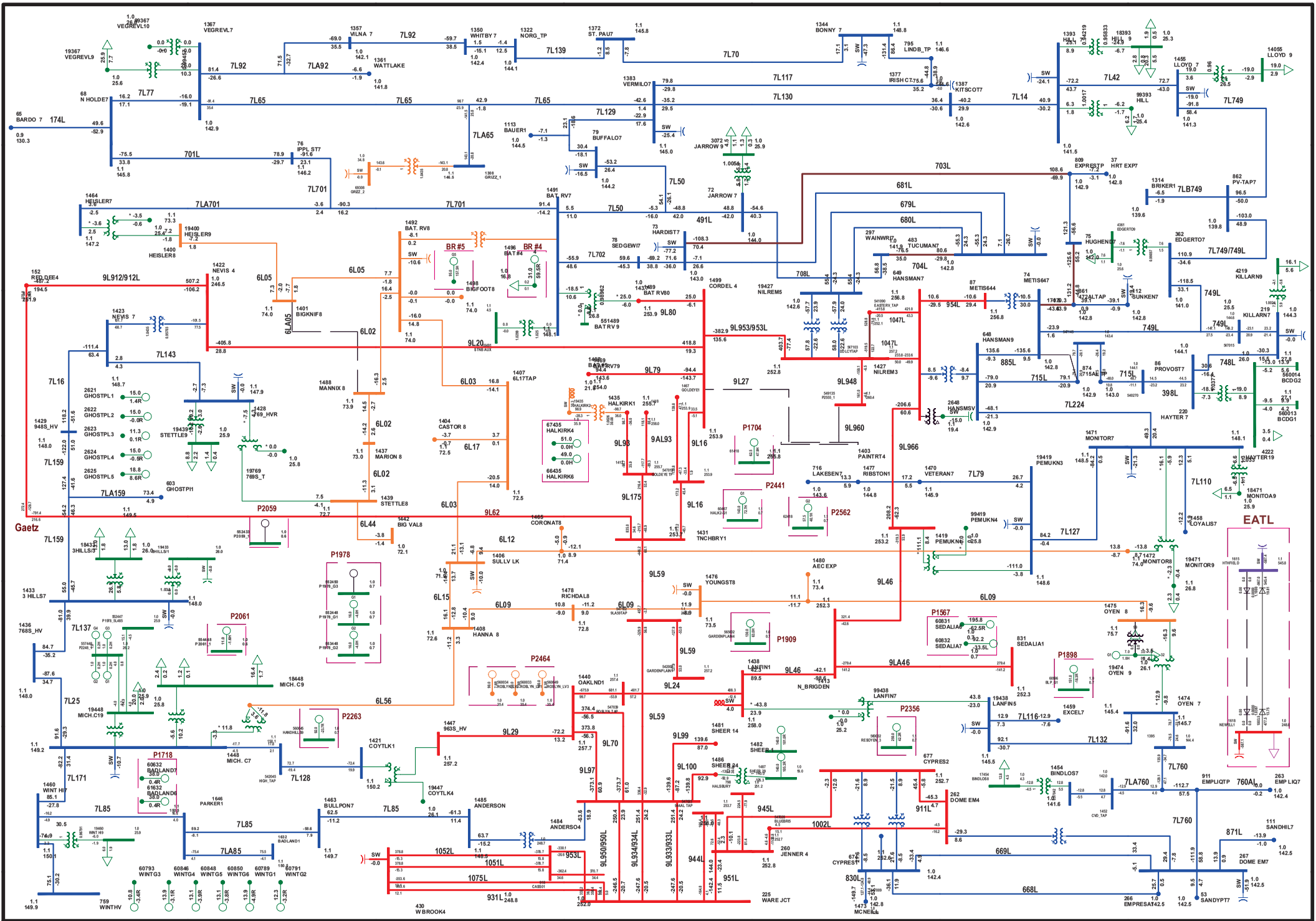
CATEGORY B, LOSS OF HRT EXPRESS 329S T1
SCENARIO 6_2028WP_POST_PROJECT
THU, APR 11 2024 15:38

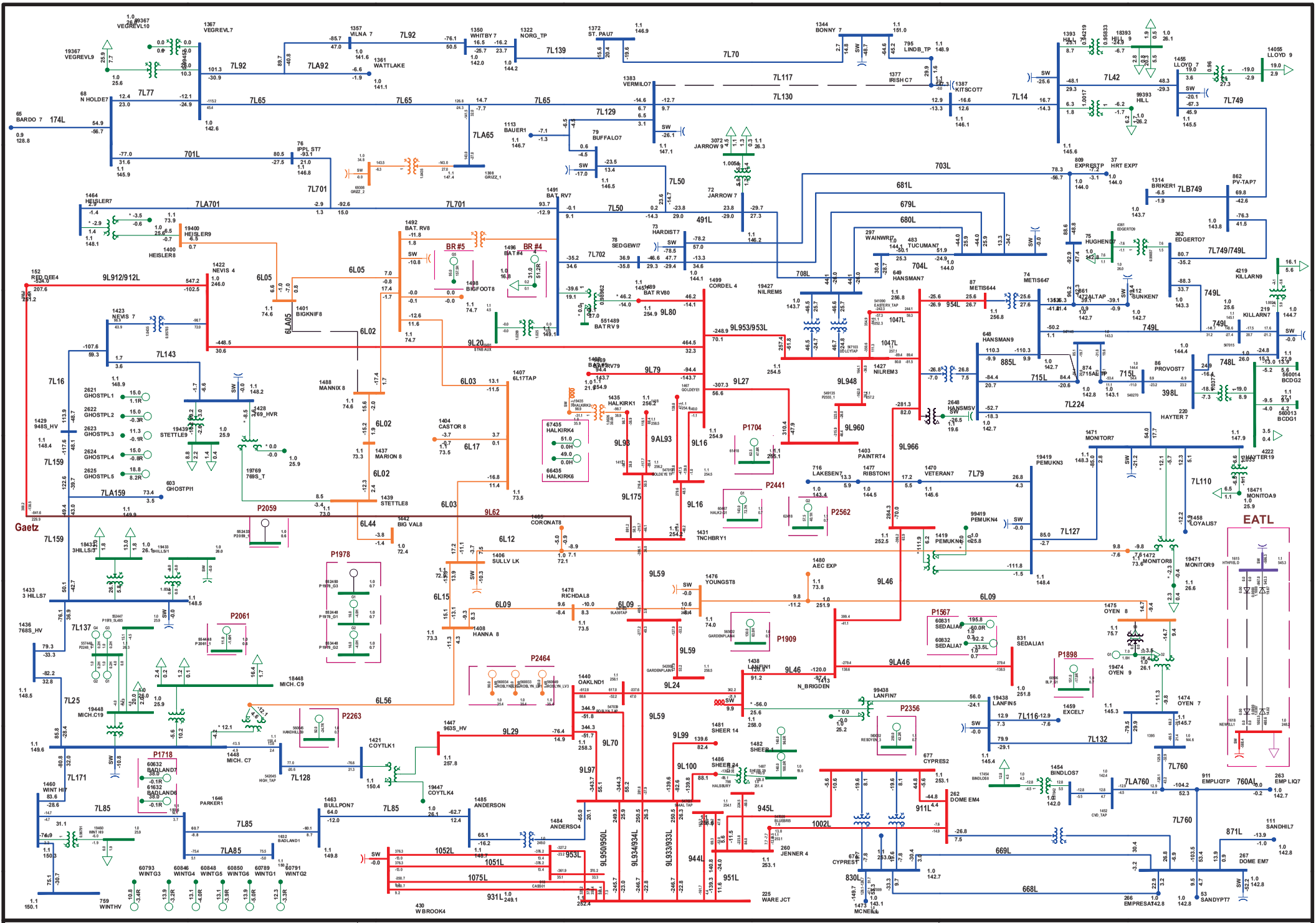
A3 - 111

Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate B

kV: >0.000 <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 <=500.000 >500.000


Gaetz
EATL
P2464 - Sunnynook Solar Battery Project
CATEGORY B, LOSS OF LANFINE 959S 901T
SCENARIO 6_2028WP_POST_PROJECT
FRI, APR 12 2024 11:17
A3 - 112
Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate B
kV: >0.000 <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 <=500.000 >500.000


Gaetz
EATL
P2464 - Sunnynook Solar Battery Project
CATEGORY B, LOSS OF PAINTEARTH CREEK 863S 902T
SCENARIO 6_2028WP_POST_PROJECT
THU, APR 11 2024 15:39
A3 - 113
Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate B
kV: >0.000 <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 <=500.000 >500.000



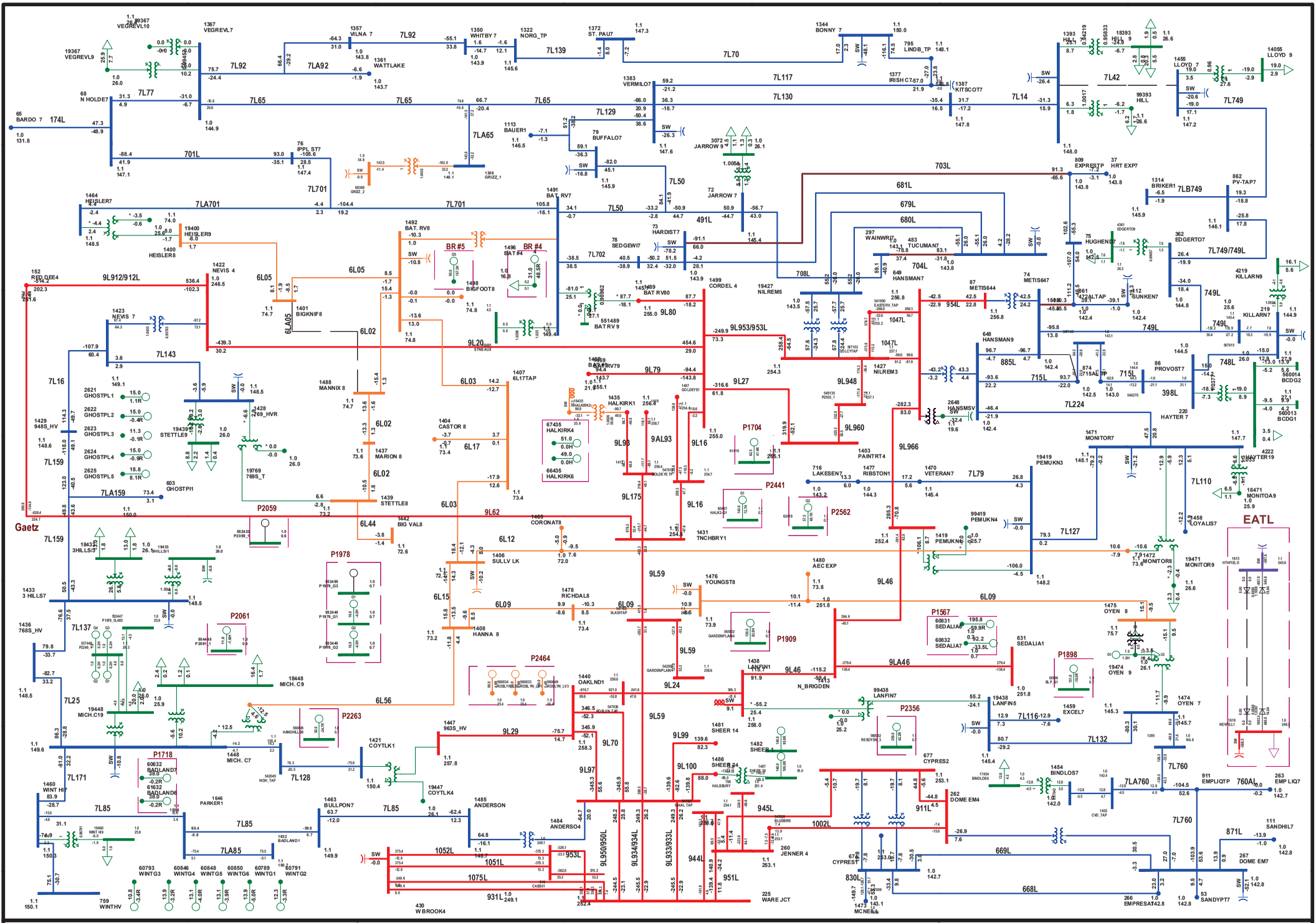
P2464 - Sunnynook Solar Battery Project

CATEGORY B, LOSS OF 7L117 (IRISH CREEK 706S - VERMILION 710
SCENARIO 6_2028WP_POST_PROJECT
THU, APR 11 2024 15:39

A3 - 114

Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate B

kV: >0.000 <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 <=500.000 >500.000



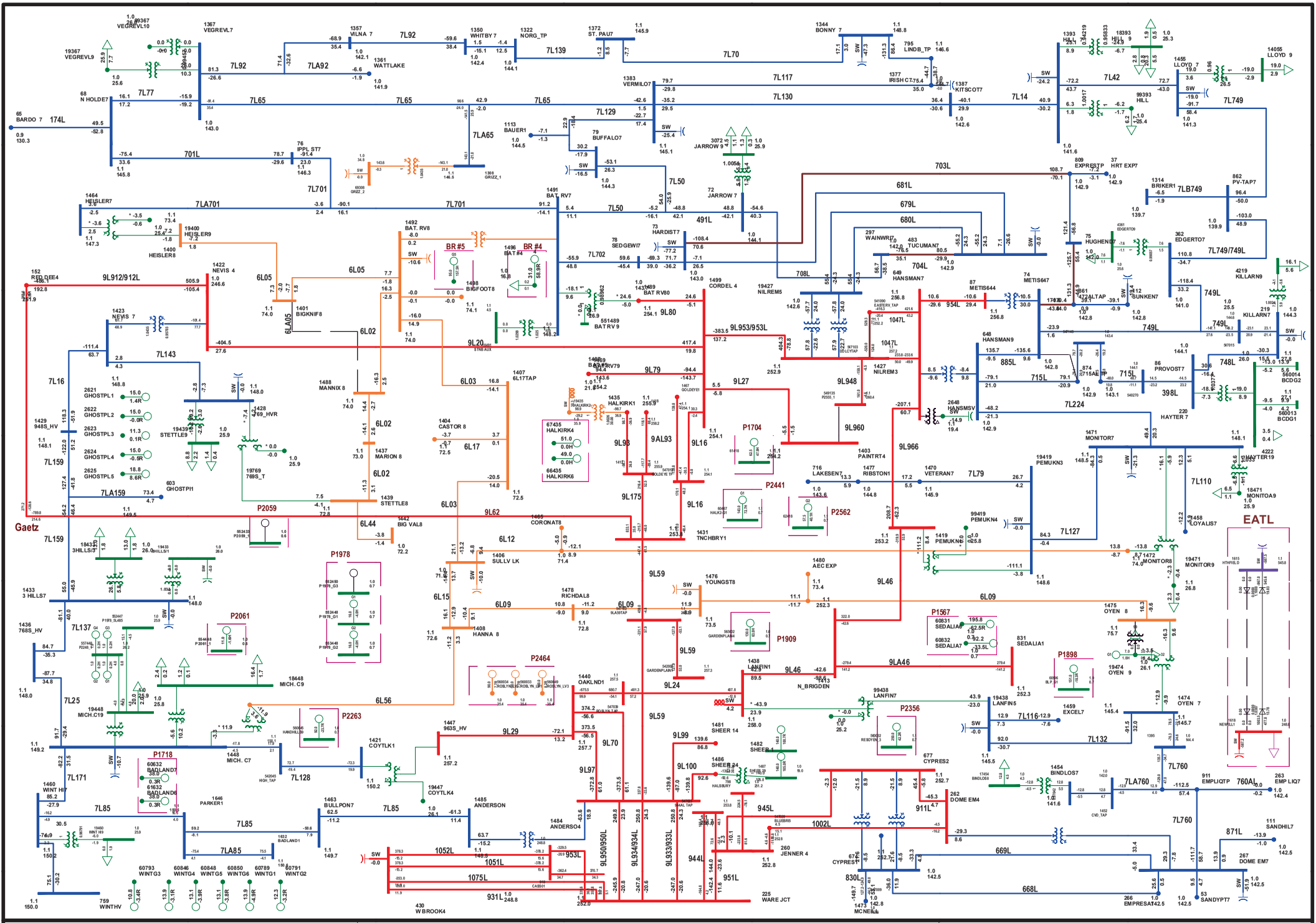
P2464 - Sunnynook Solar Battery Project

CATEGORY B, LOSS OF 7L42 (HILL 751S - LLOYDMINSTER 716S)
SCENARIO 6_2028WP_POST_PROJECT
THU, APR 11 2024 15:39

A3 - 115

Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate B

kV: >0.000 <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 <=500.000 >500.000



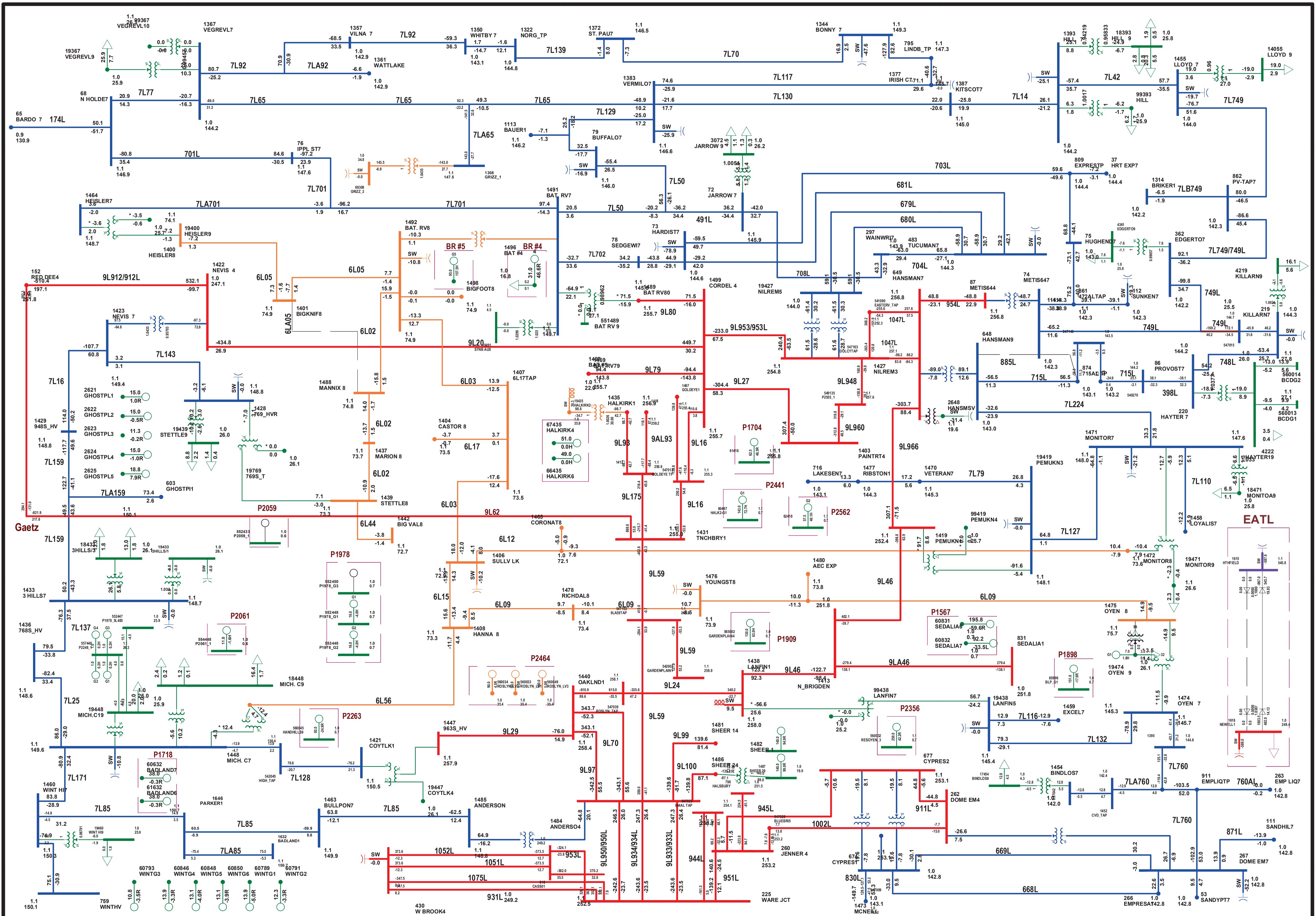
P2464 - Sunnynook Solar Battery Project

CATEGORY B, LOSS OF 9L960 (PAINTEARTH 863S - P2555_BUS 54913
SCENARIO 6_2028WP_POST_PROJECT
THU, APR 11 2024 15:40

A3 - 116

Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate B

kV: >0.000 <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 <=500.000 >500.000



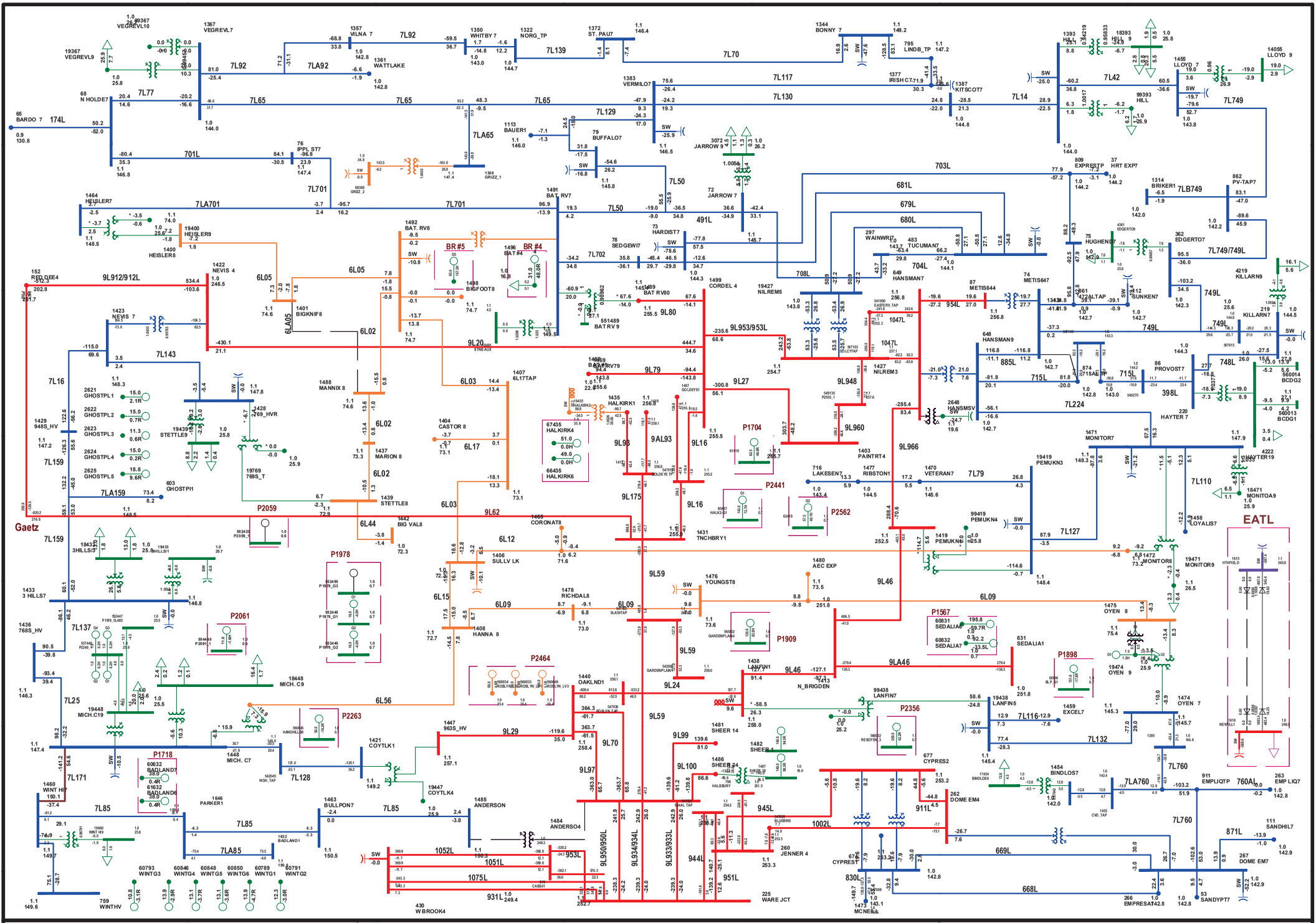
P2464 - Sunnynook Solar Battery Project

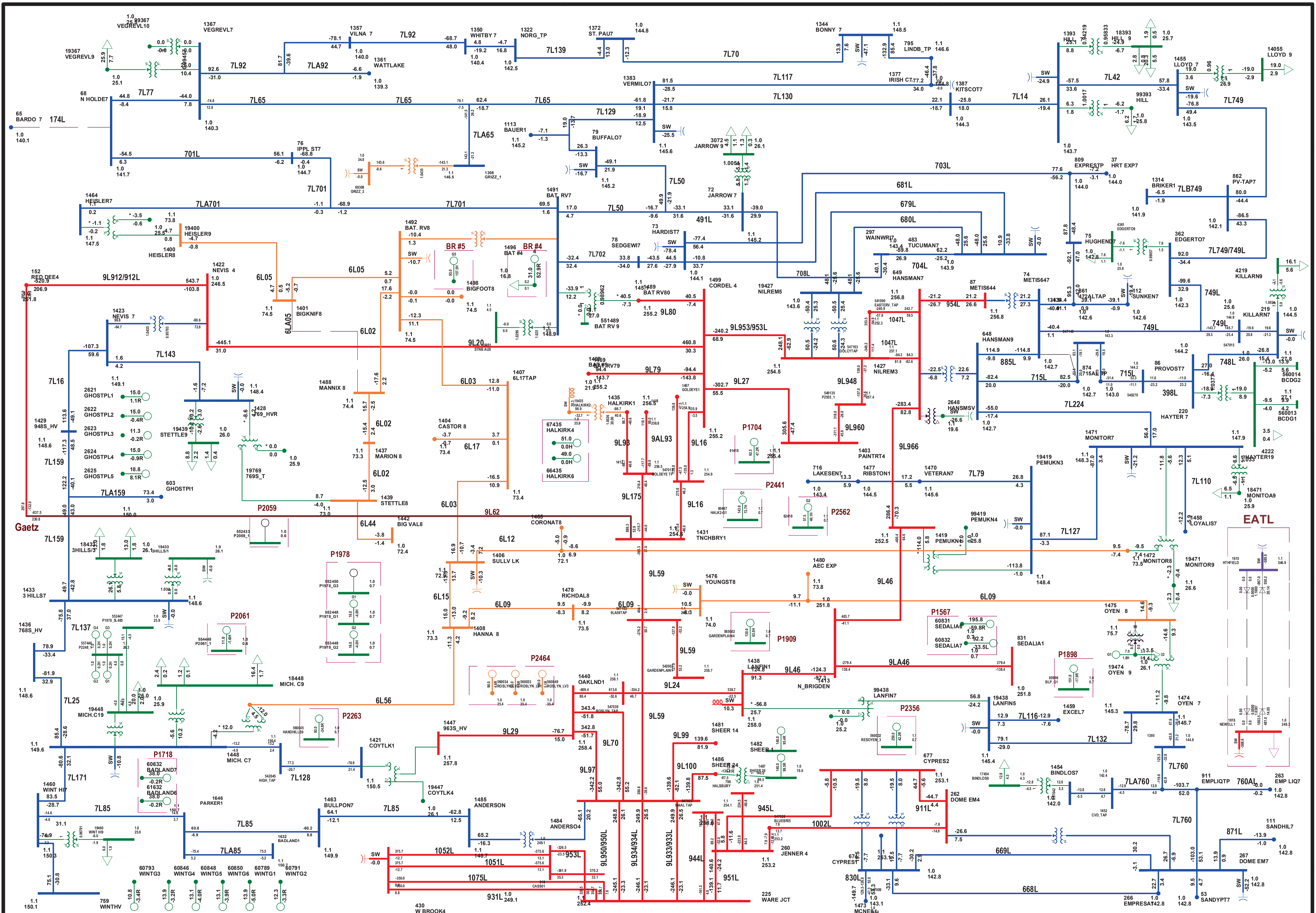
CATEGORY B, LOSS OF 885L (METISKOW 648S - HANSMAN LAKE 650S)
SCENARIO 6_2028WP_POST_PROJECT
THU, APR 11 2024 15:40

A3 - 117

Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate B

kV: >0.000 <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 <=500.000 >500.000


Gaetz
EATL
P2464 - Sunnynook Solar Battery Project
CATEGORY B, LOSS OF ANDERSON 801S_901T
SCENARIO 6_2028WP_POST_PROJECT
THU, APR 11 2024 15:40
A3 - 118
Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate B
kV: >0.000 <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 <=500.000 >500.000



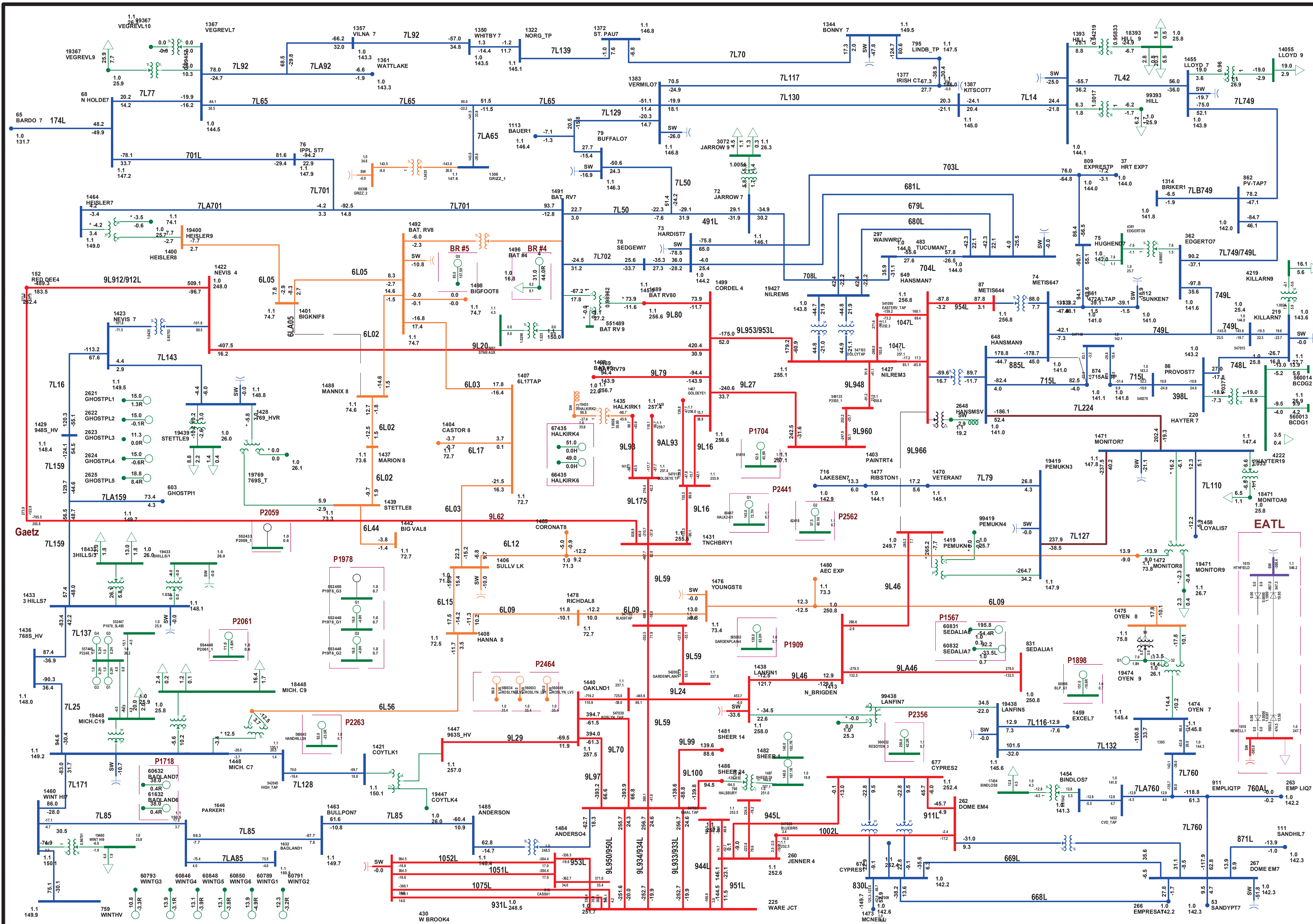
P2464 - Sunnynook Solar Battery Project

CATEGORY B, LOSS OF 174L (HOLDEN 395S - BARDO 197S)
SCENARIO 6_2028WP_POST_PROJECT
THU, APR 11 2024 15:41

A3 - 119

Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate B

kV: >0.000 <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 <=500.000 >500.000



P2464 - Sunnynook Solar Battery Project

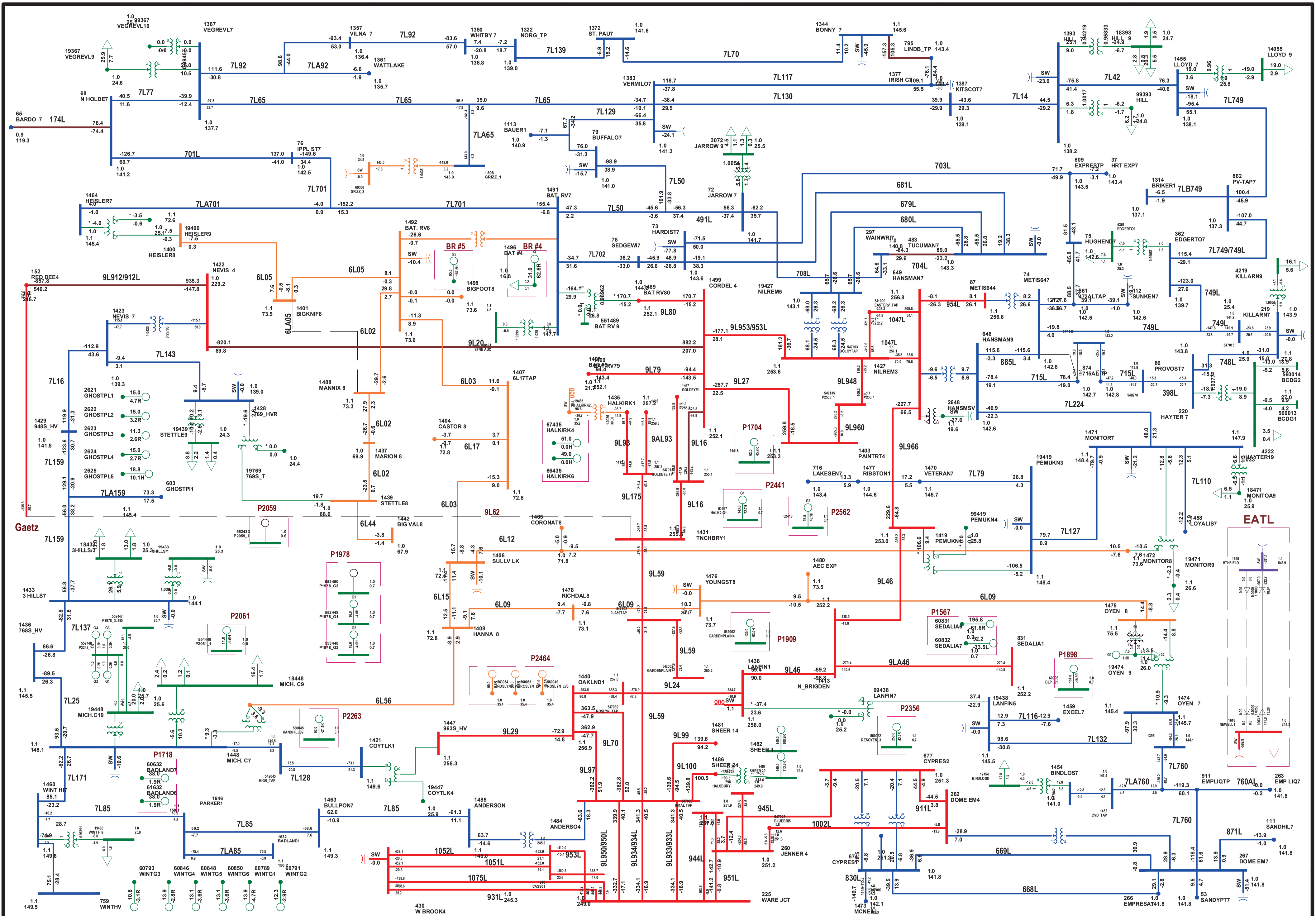
CATEGORY B, LOSS OF 9L966 (HANSMAN LAKE 650S - PEMUKAN 932S)
SCENARIO 6_2028WP_POST_PROJECT
THU, APR 11 2024 15:41

A3 - 120

Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate B

kV: >0.000 <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 <=500.000 >500.000

1



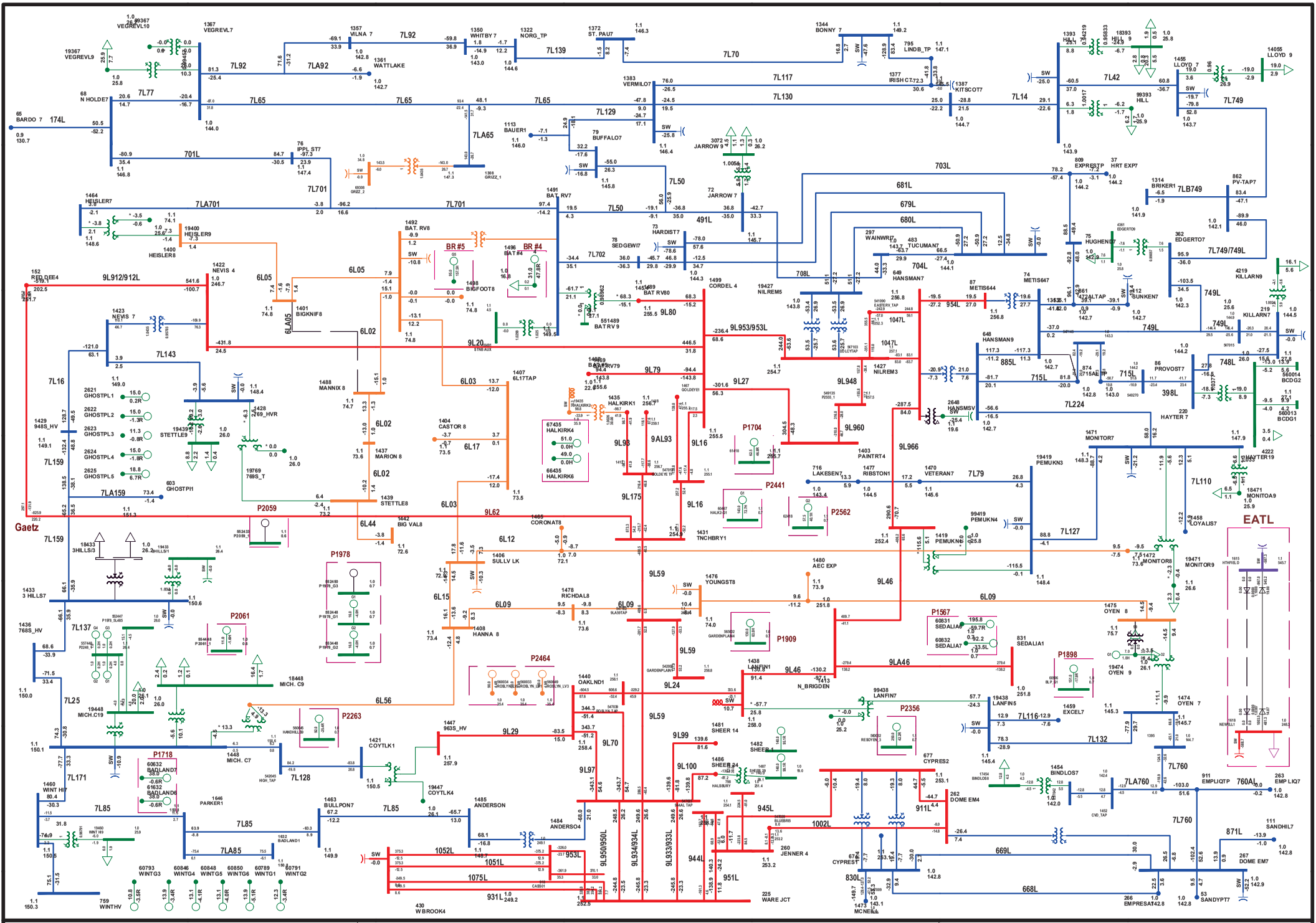
P2464 - Sunnynook Solar Battery Project

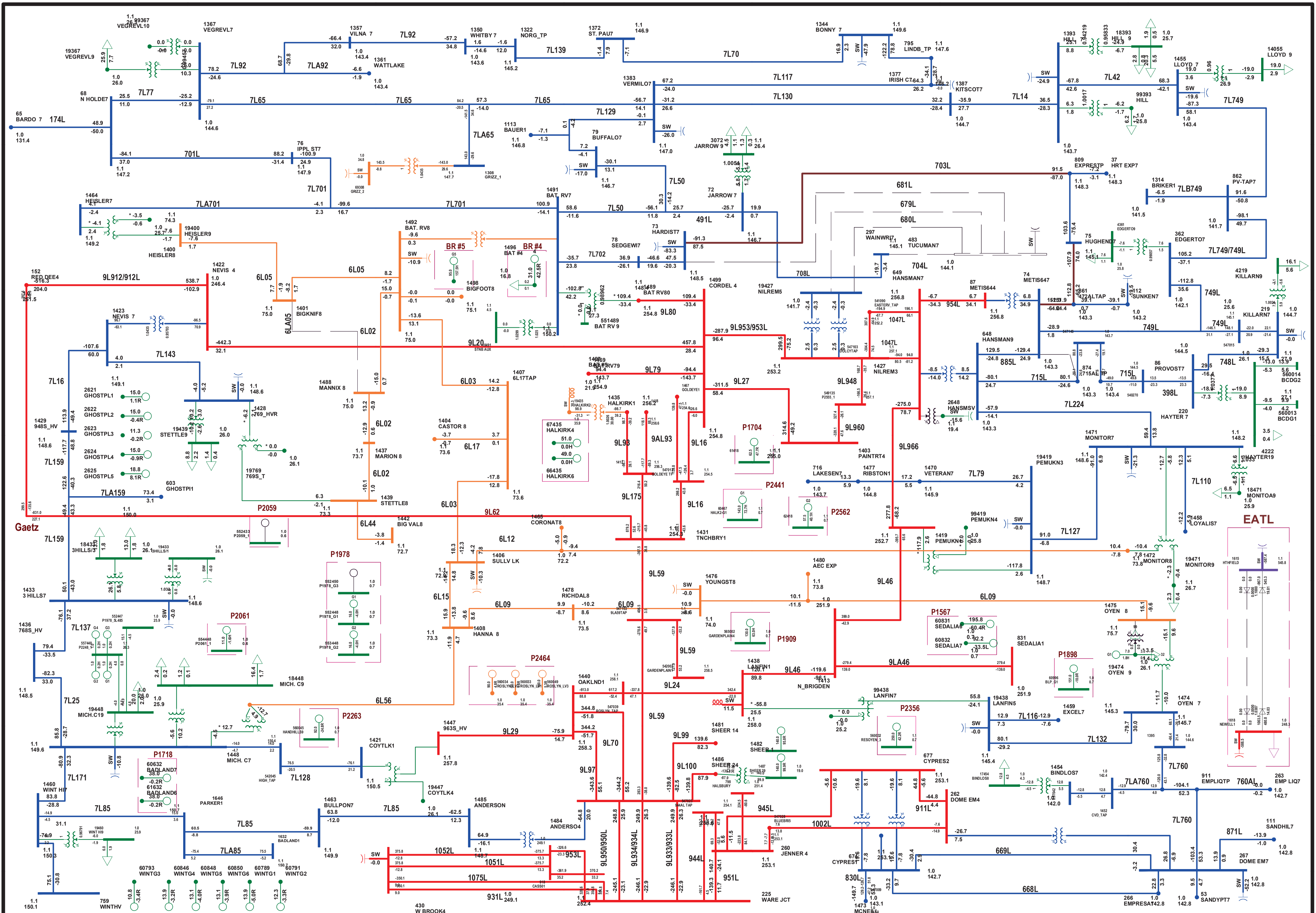
CATEGORY B, LOSS OF 9L62 (TINCHEBRAY 972S - GAETZ 87S)
SCENARIO 6_2028WP_POST_PROJECT
THU, APR 11 2024 15:41

A3 - 121

Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate B

kV: >0.000 <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 <=500.000 >500.000


Gaetz
EATL
P2464 - Sunnynook Solar Battery Project
CATEGORY B, LOSS OF THREE HILLS 770S 703T
SCENARIO 6_2028WP_POST_PROJECT
THU, APR 11 2024 15:41
A3 - 122
Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate B
kV: >0.000 <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 <=500.000 >500.000



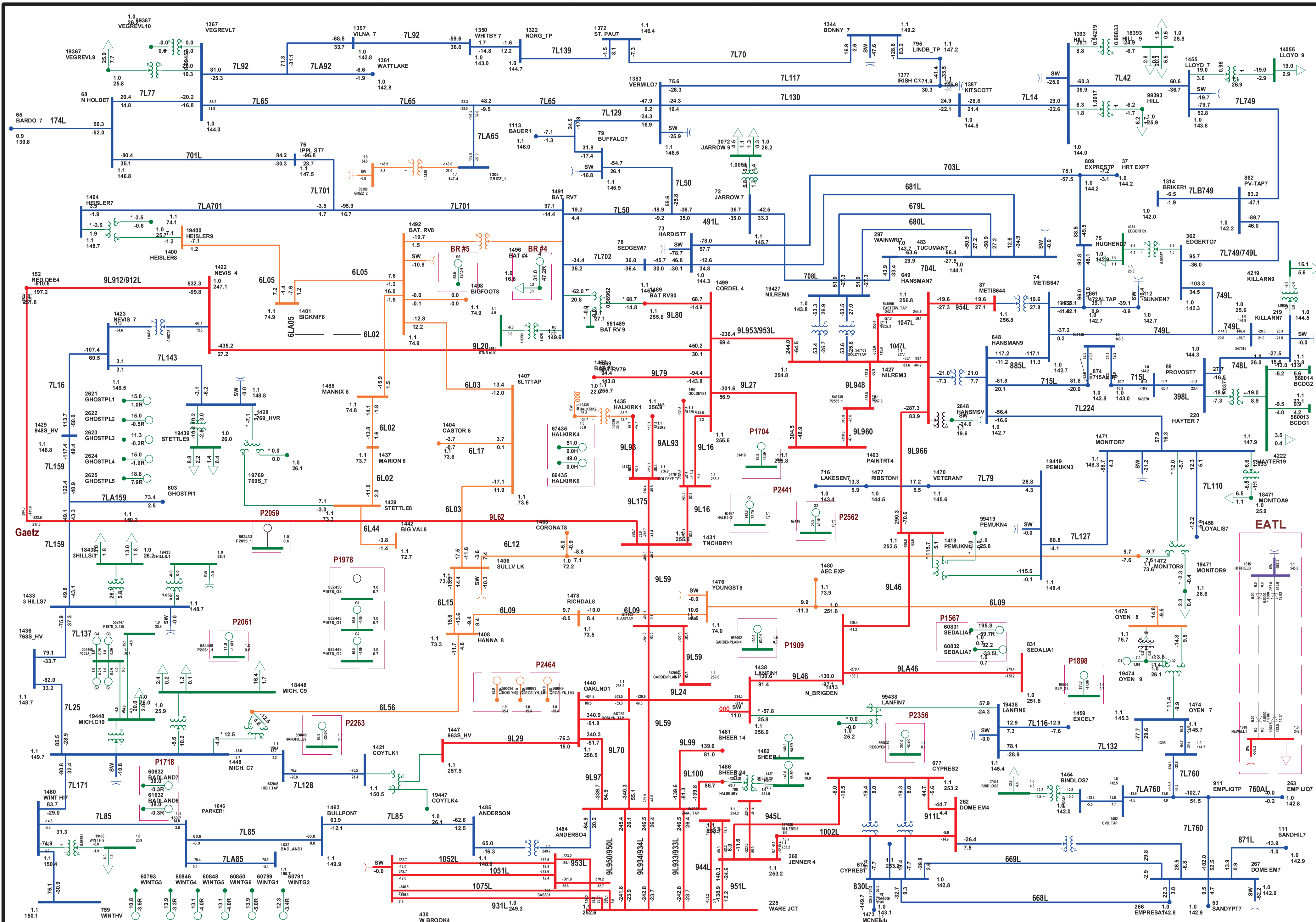
P2464 - Sunnynook Solar Battery Project

CATEGORY B, LOSS OF TUCUMAN 478S TRANSFORMERS
SCENARIO 6_2028WP_POST_PROJECT
THU, APR 11 2024 15:42

A3 - 123

Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate B

kV: >0.000 <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 <=500.000 >500.000



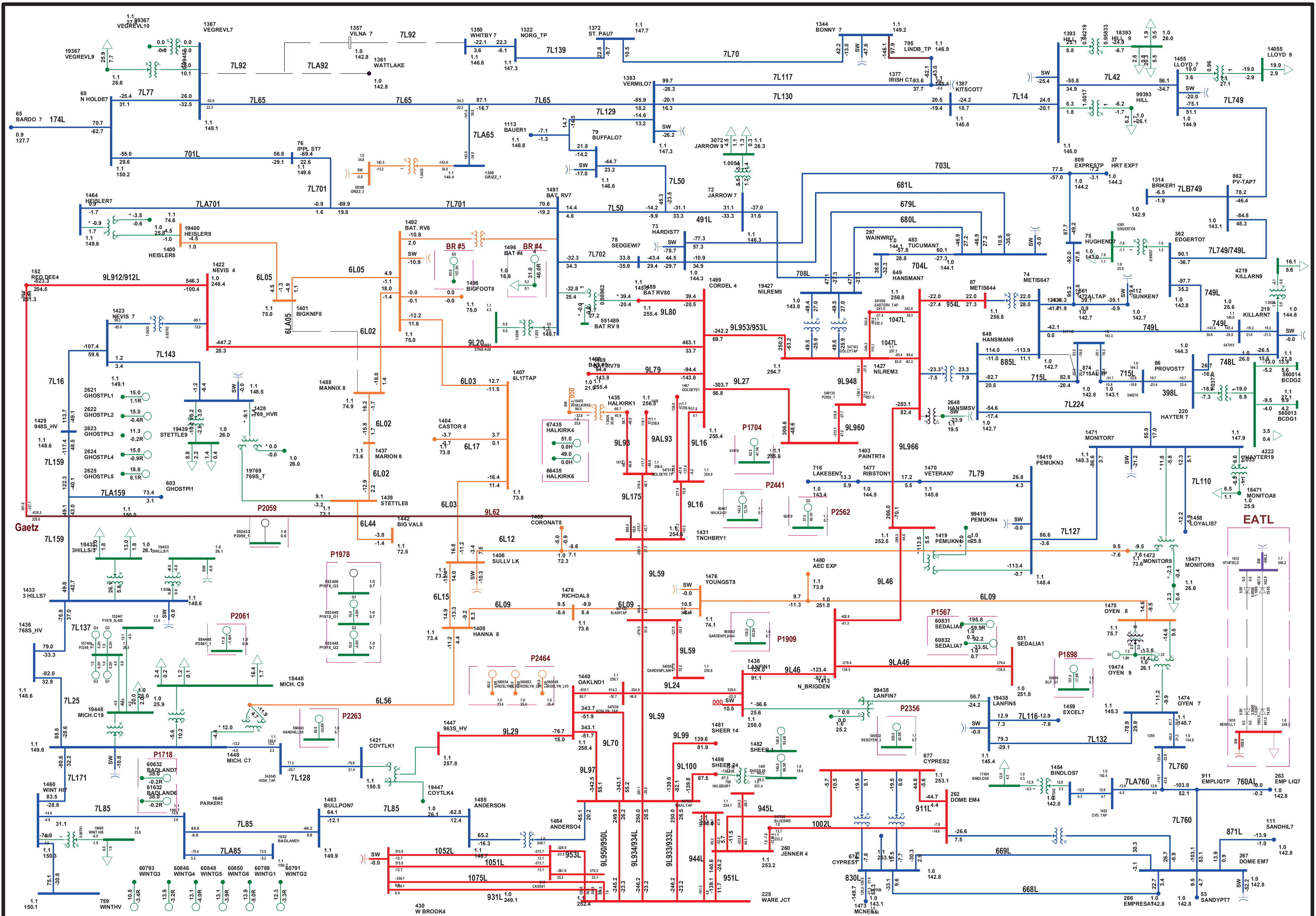
P2464 - Sunnynook Solar Battery Project

CATEGORY B, LOSS OF NILREM 574S T2
SCENARIO 6_2028WP_POST_PROJECT
FRI, APR 12 2024 10:56

A3 - 124

Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate B

kV: >0.000 <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 <=500.000 >500.000



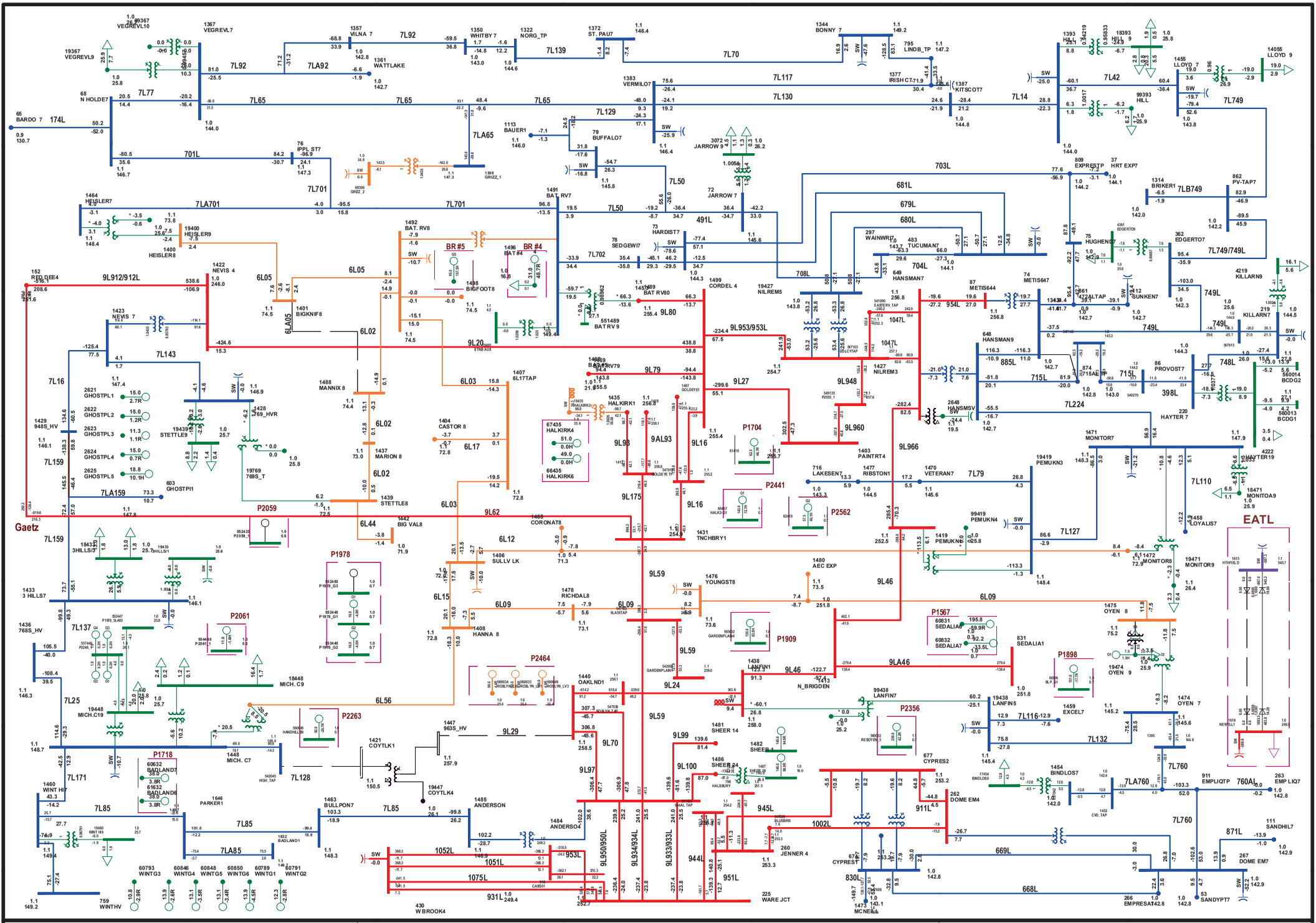
P2464 - Sunnynook Solar Battery Project

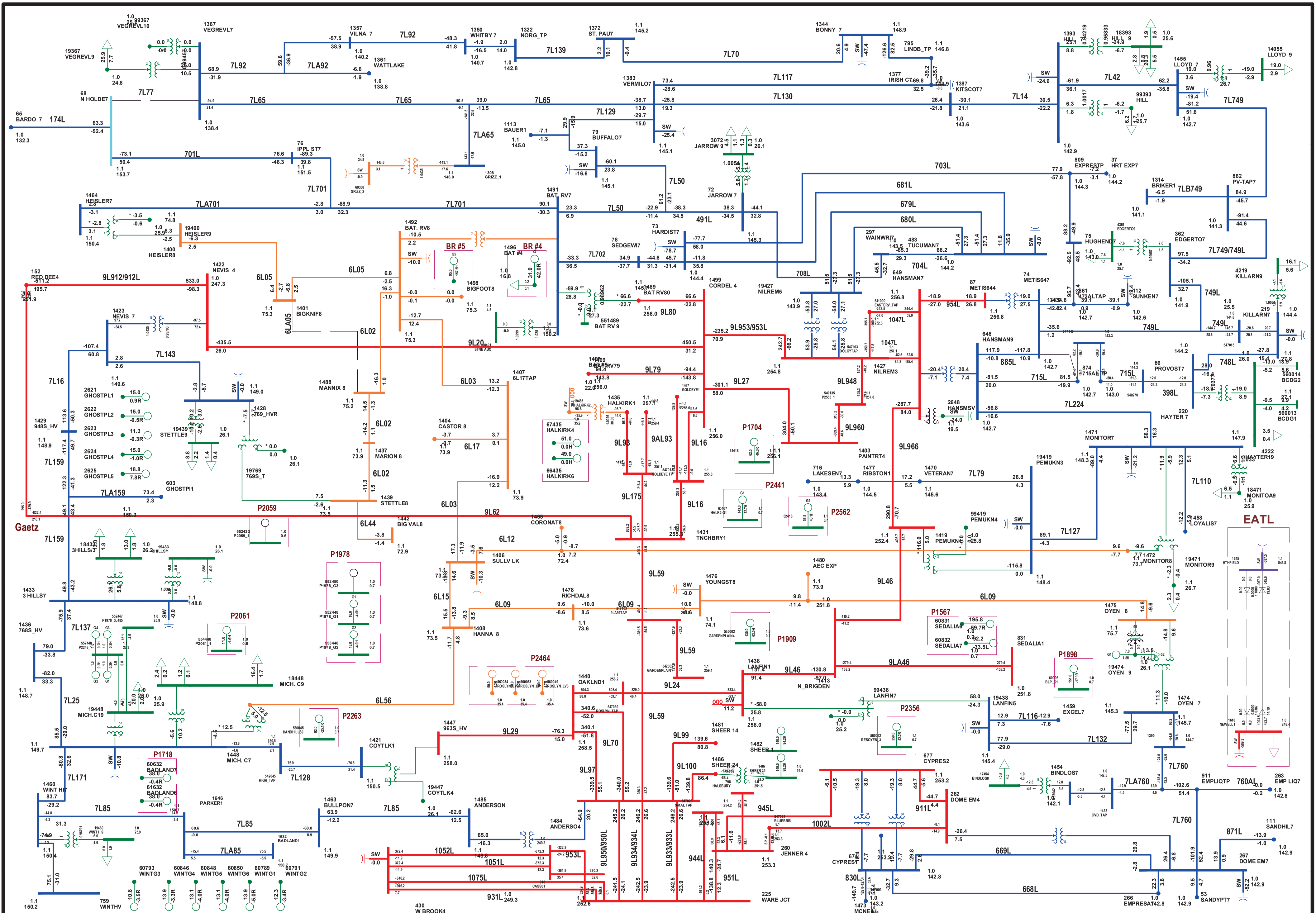
CATEGORY B, LOSS OF 7L92 (VEGREVILLE 709S - WHITBY LAKE 819
SCENARIO 6_2028WP_POST_PROJECT
FRI, APR 12 2024 10:57

A3 - 125

Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate B

kV: >0.000 <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 <=500.000 >500.000


Gaetz
EATL
P2464 - Sunnynook Solar Battery Project
CATEGORY B, LOSS OF COYOTE LAKE 963S 901T
SCENARIO 6_2028WP_POST_PROJECT
FRI, APR 12 2024 10:57
A3 - 126
Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate B
kV: >0.000 <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 <=500.000 >500.000



P2464 - Sunnynook Solar Battery Project

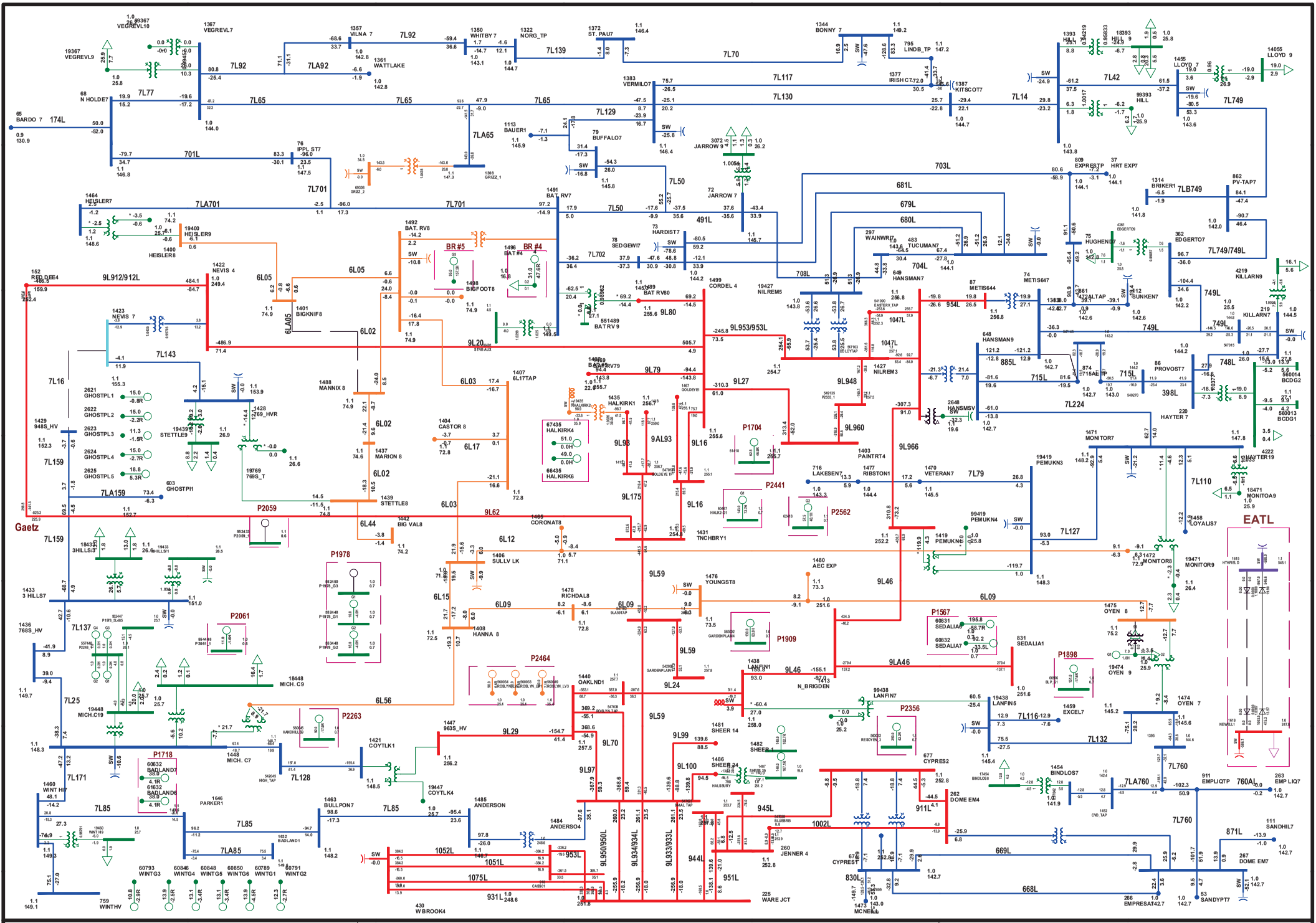
CATEGORY B, LOSS OF 7L77 (HOLDEN 395S - VEGREVILLE 709S)
SCENARIO 6_2028WP_POST_PROJECT
FRI, APR 12 2024 16:39

A3 - 127

Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate B

kV: >0.000 <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 <=500.000 >500.000

1



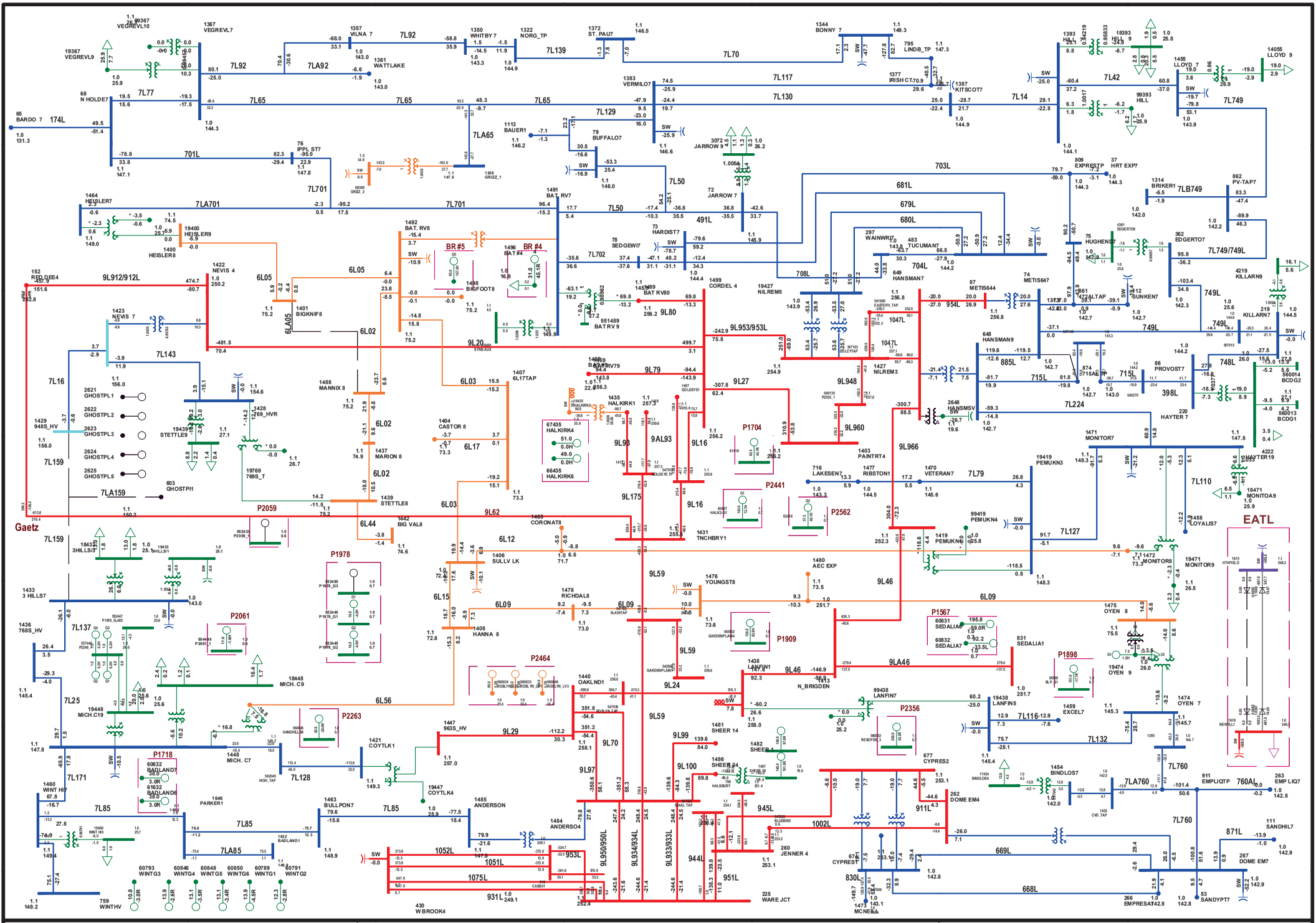
P2464 - Sunnynook Solar Battery Project

CATEGORY B, LOSS OF 7L16 (NEVIS 766S - HEATBURG 948S)
SCENARIO 6_2028WP_POST_PROJECT
FRI, APR 12 2024 16:44

A3 - 128

Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate B

kV: >0.000 <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 <=500.000 >500.000



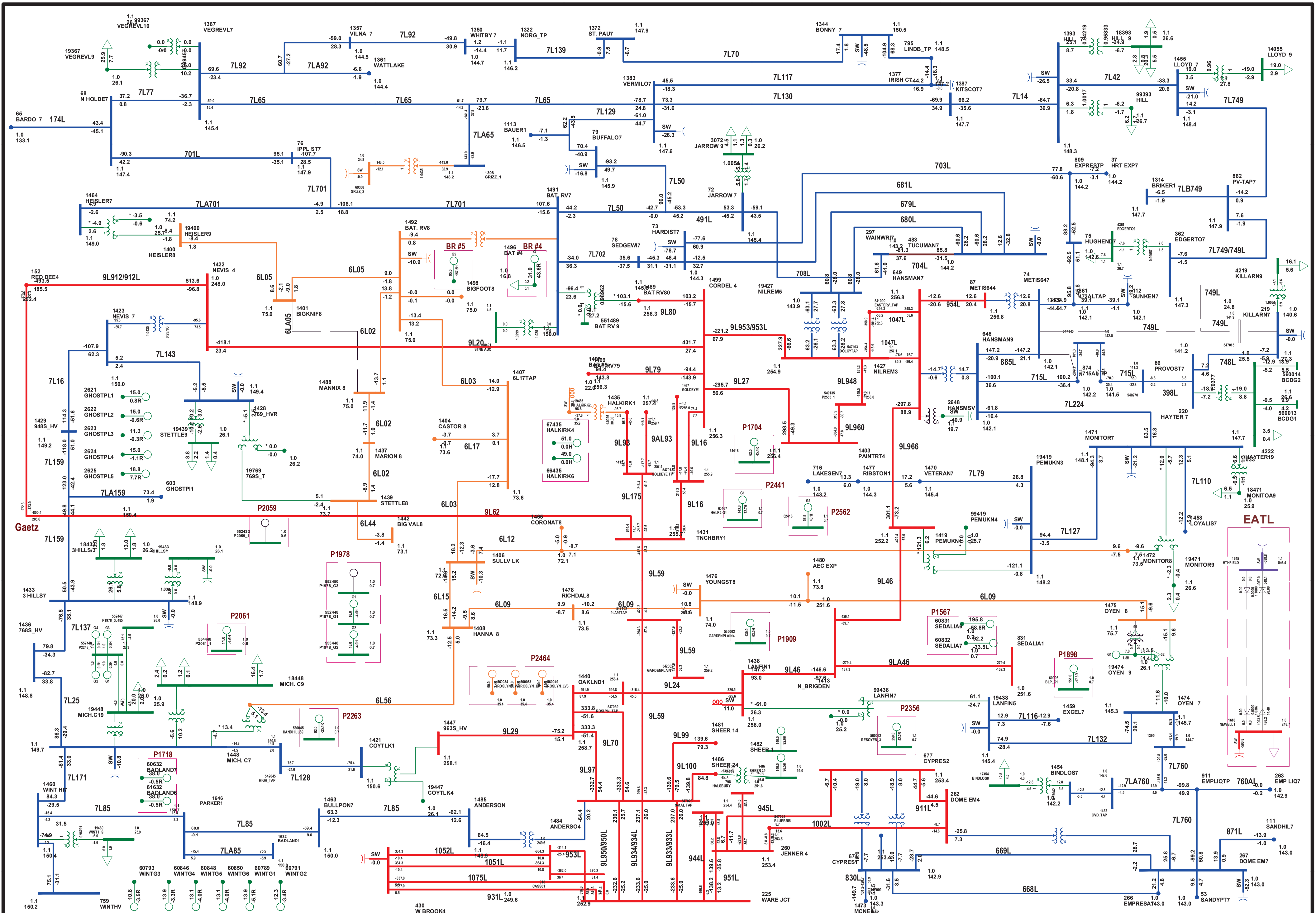
P2464 - Sunnynook Solar Battery Project

CATEGORY B, LOSS OF 7L159 (THREE HILLS 770S - HEATBURG 948S)
SCENARIO 6_2028WP_POST_PROJECT
FRI, APR 12 2024 16:47

A3 - 129

Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate B

kV: >0.000 <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 <=500.000 >500.000



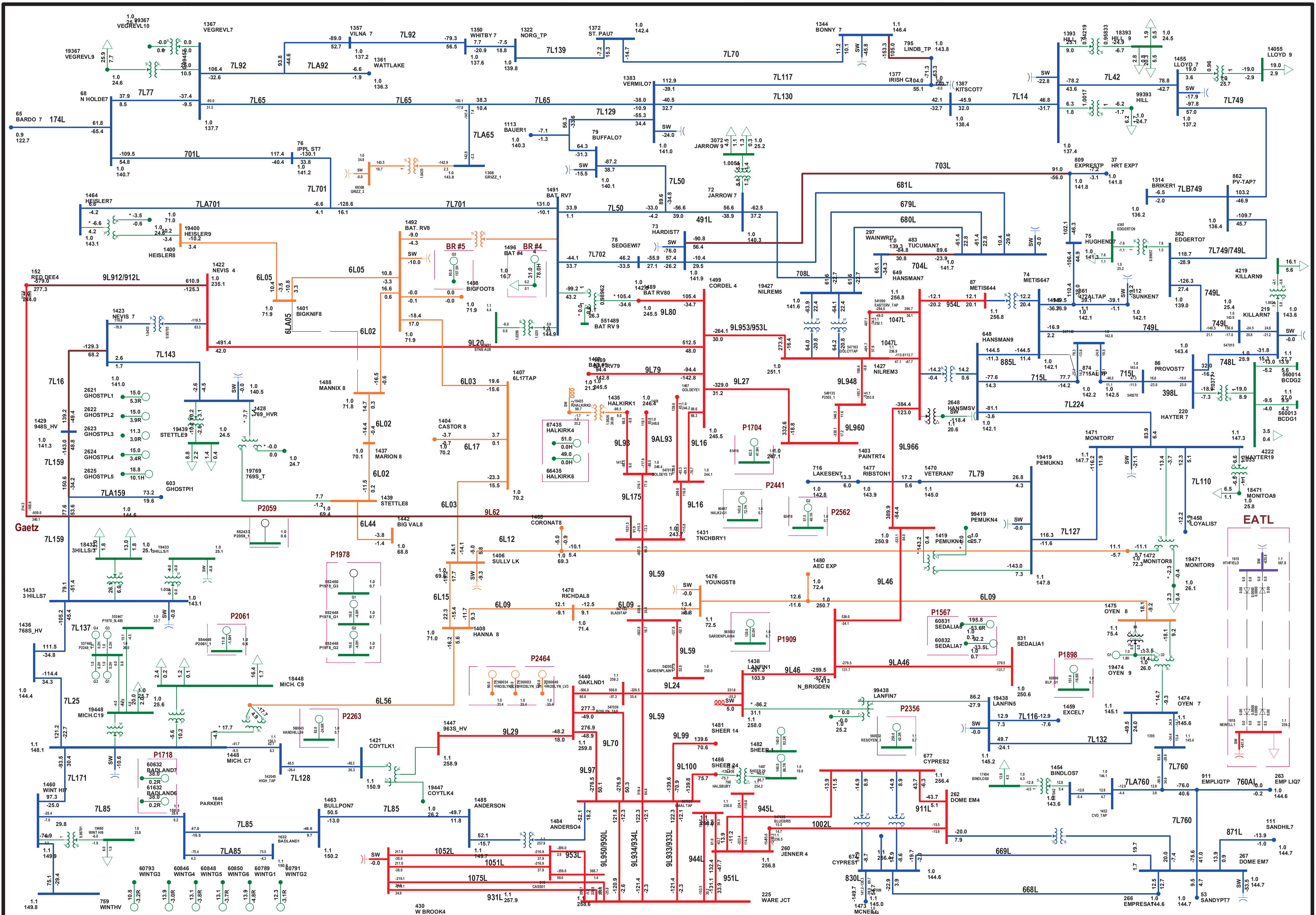
P2464 - Sunnynook Solar Battery Project

CATEGORY B, LOSS OF 749L (EDGERTON 899S - METISKOW 648S)
SCENARIO 6_2028WP_POST_PROJECT
FRI, APR 12 2024 10:57

A3 - 130

Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate B

kV: >0.000 <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 <=500.000 >500.000



P2464 - Sunnynook Solar Battery Project

CATEGORY B, LOSS OF EATL
SCENARIO 6_2028WP_POST_PROJECT
FRI, APR 12 2024 8:24

A3 - 131

Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate B

kV: >0.000 <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 <=500.000 >500.000

Attachment A4

Pre-Project and Post-Project Transient Stability Diagrams

(Scenario 3,6)

Transient Stability Diagrams for 2028 WP Base case Scenario (with CETO)

Transient stability analysis was performed using the Scenario 6 (2028 WP Pre-Project) for the Category B contingencies identified in Table A4-1. Transient stability analysis was also performed using the Scenario 3 (2028 WP Pre-Project) for the Category B contingencies identified in Table A4-2.

Table A4-1: List of Contingencies Studied for Transient Stability – 2028 WP Scenario 6

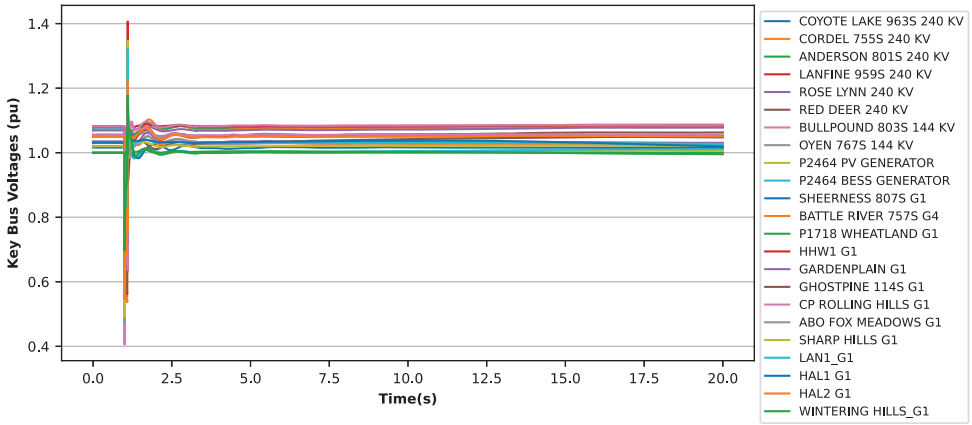
System Condition	Contingency	Fault Description (fault location)	Page #
Category B (N-1)	9L20 (Cordel 755S – Nevis 766S)	Nevis 766S	A4-3
Category B (N-1)	9L20 (Cordel 755S – Nevis 766S)	Cordel 755S	A4-4
Category B (N-1)	9L912 (Nevis 766S – Red Deer 63S)	Nevis 766S	A4-5
Category B (N-1)	9L912 (Nevis 766S – Red Deer 63S)	Red Deer 63S	A4-6
Category B (N-1)	9L97 (Anderson 801 – Oakland 946S)	Anderson 801S	A4-7
Category B (N-1)	9L97 (Anderson 801 – Oakland 946S)	Oakland 946S	A4-8
Category B (N-1)	9L62 (Gaetz 87S - Tinchebray 972S)	Gaetz 87S	A4-9
Category B (N-1)	9L62 (Gaetz 87S - Tinchebray 972S)	Tinchebray 972S	A4-10
Category B (N-1)	9L59 (Anderson 801S - Tinchebray 972S)	Anderson 801S	A4-11
Category B (N-1)	9L59 (Anderson 801S - Tinchebray 972S)	Tinchebray 972S	A4-12
Category B (N-1)	9L24 (Lanfine 959S – Oakland 946S)	Lanfine 959S	A4-13
Category B (N-1)	9L24 (Lanfine 959S – Oakland 946S)	Oakland 946S	A4-14

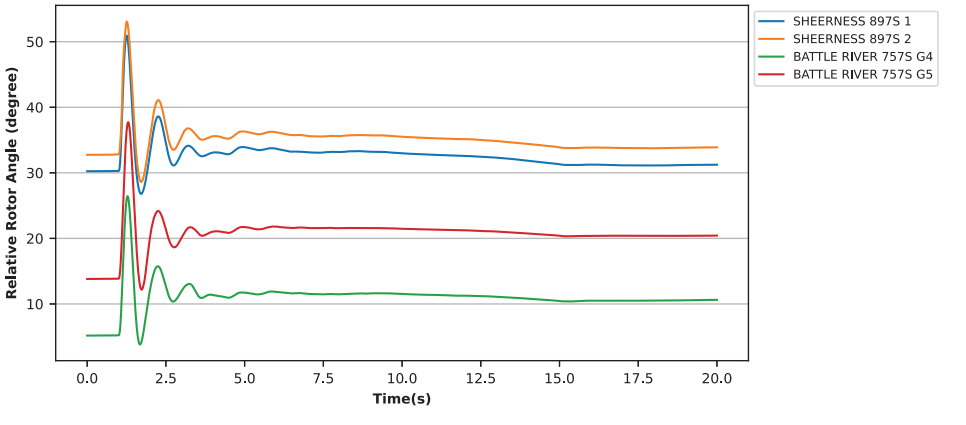
Table A4-2: List of Contingencies Studied for Transient Stability – 2028 WP Scenario 3

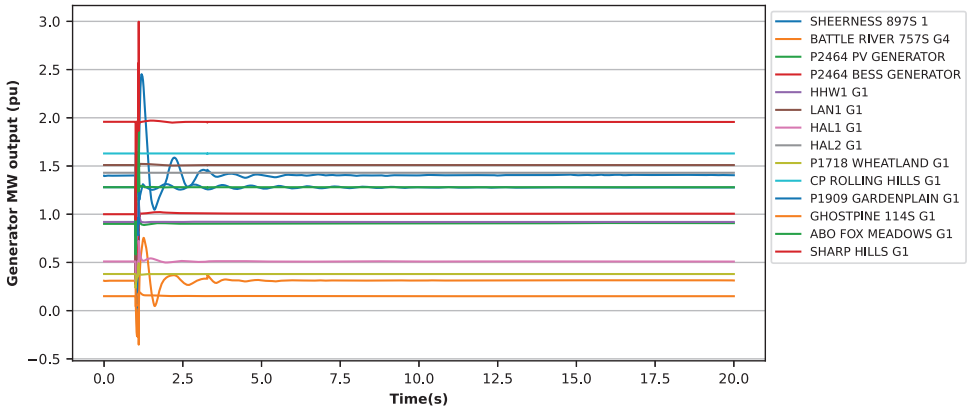
System Condition	Contingency	Fault Description (fault location)	Page #
Category B (N-1)	9L912 (Nevis 766S – Red Deer 63S)	Red Deer 63S	A4-15
Category B (N-1)	9L62 (Gaetz 87S - Tinchebray 972S)	Gaetz 87S	A4-16
Category B (N-1)	9L62 (Gaetz 87S - Tinchebray 972S)	Tinchebray 972S	A4-17

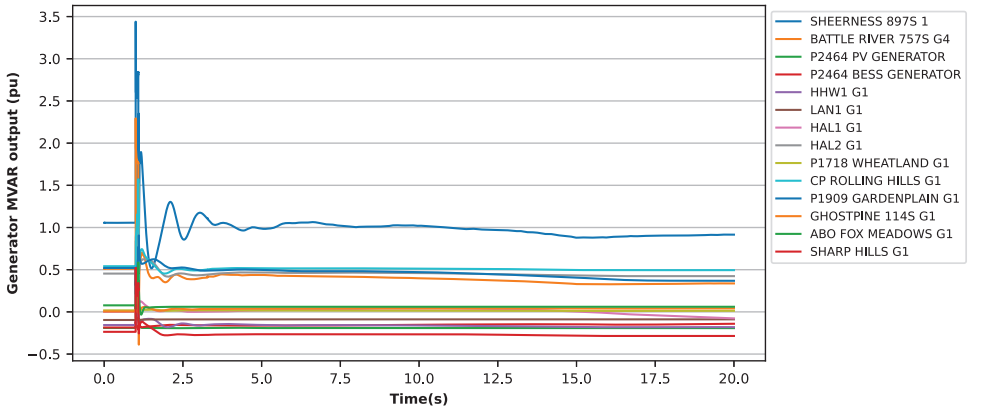
Scenario 6
2028 WP Post-Project (Alternative 2)

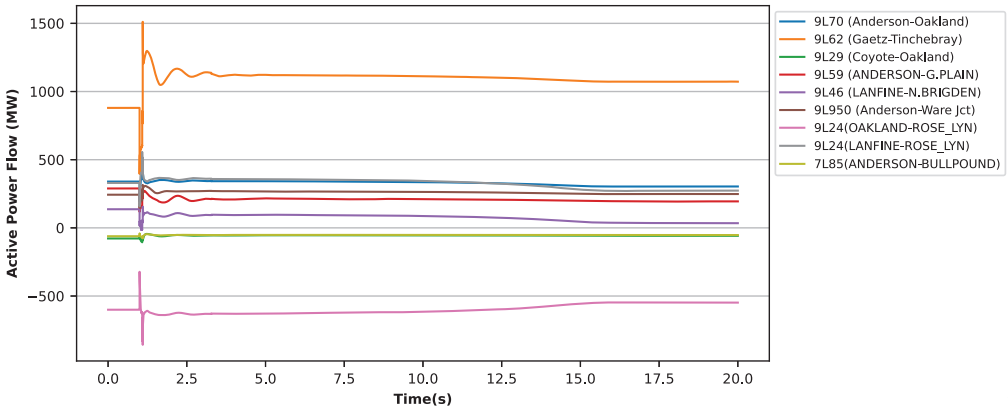
Figure 1: 2024WP_Post_Cat_B_9L20 - 3 Phase Fault at Nevis 766S











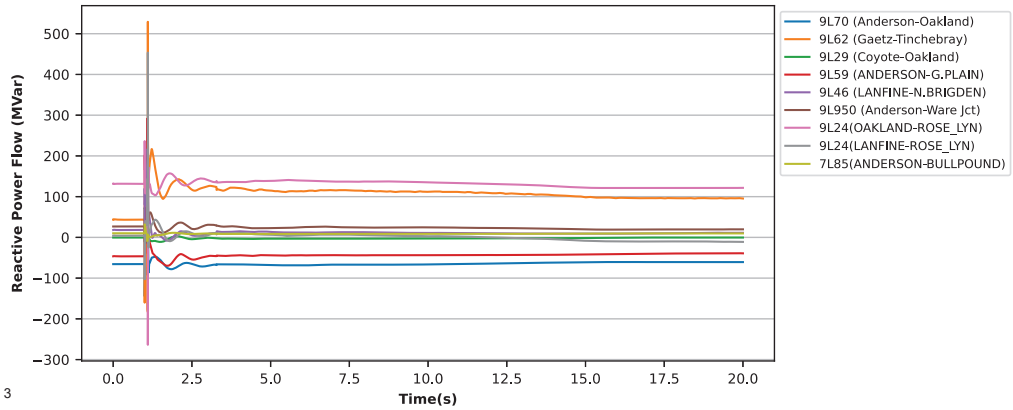
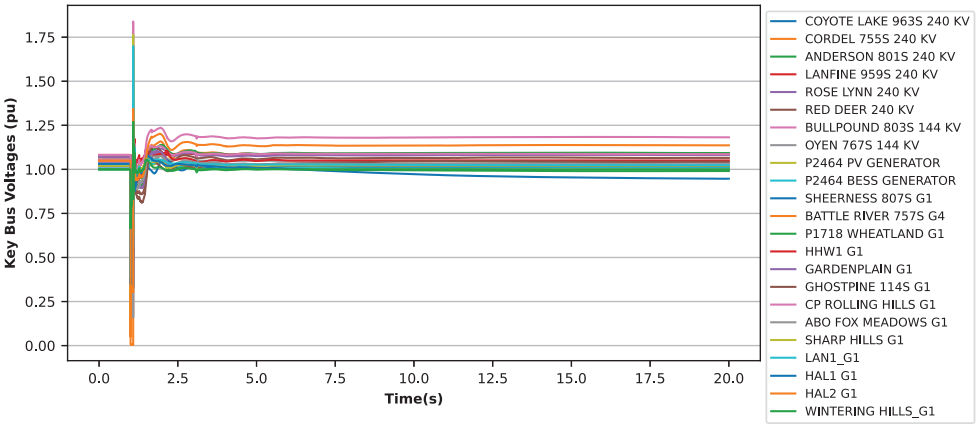
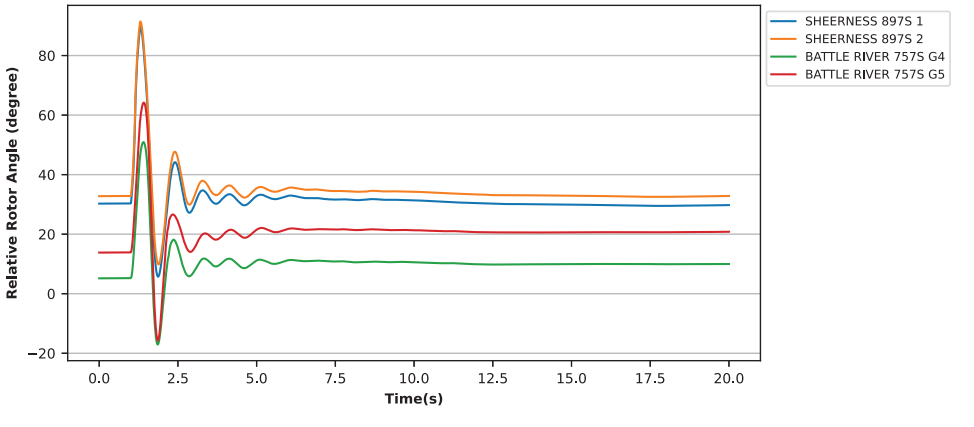
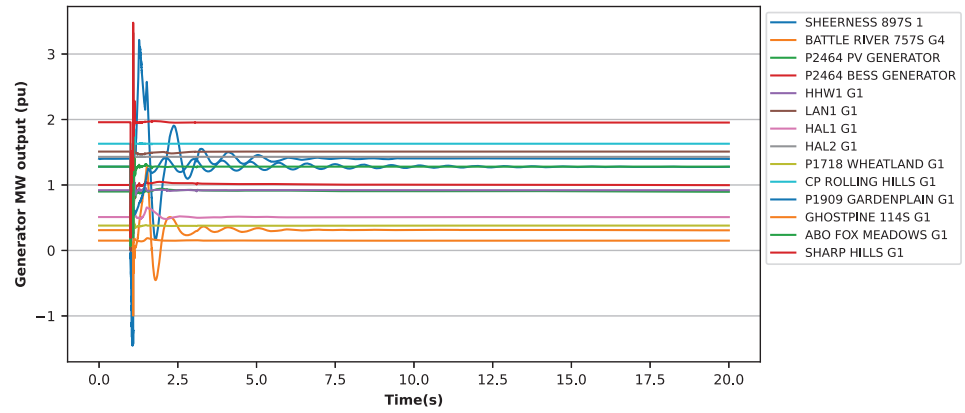
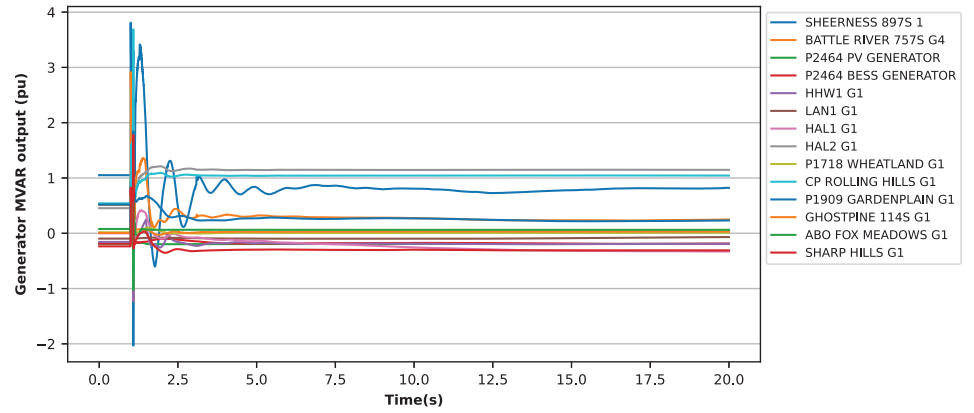


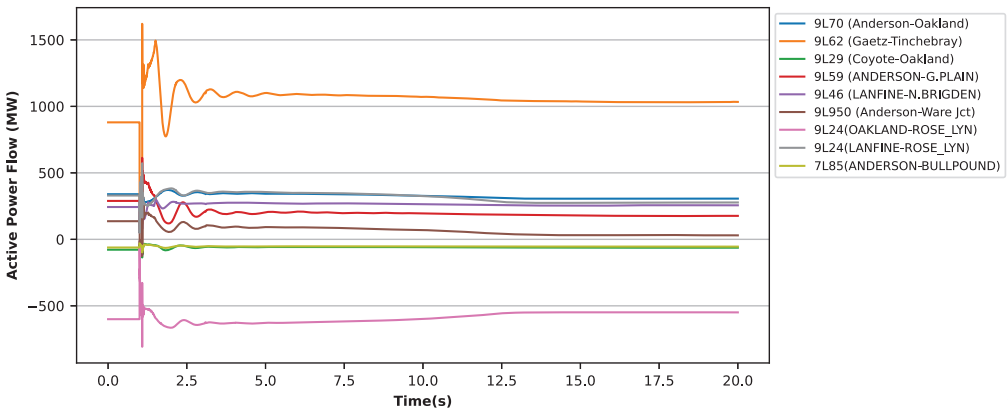
Figure 2: 2024WP_Post_Cat_B_9L20 - 3 Phase Fault at Cordel 755S











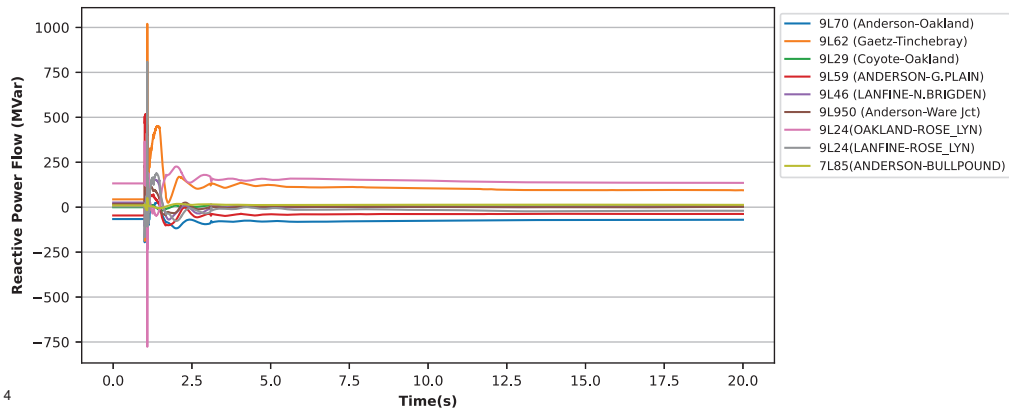
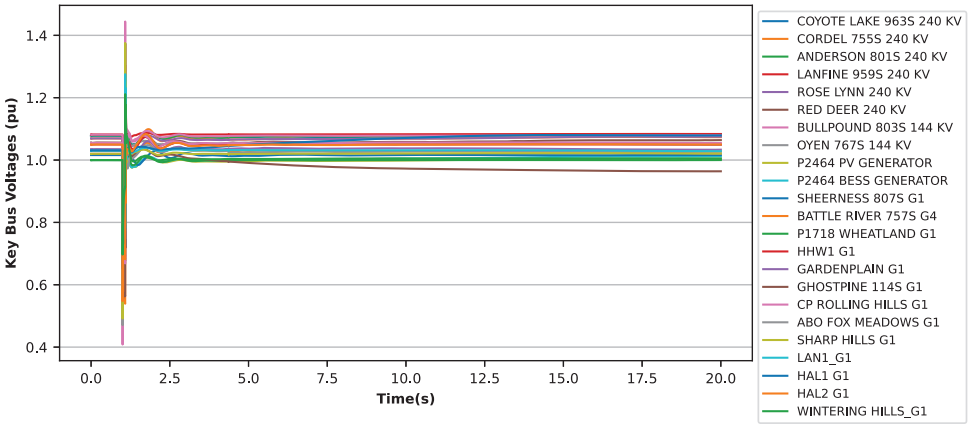
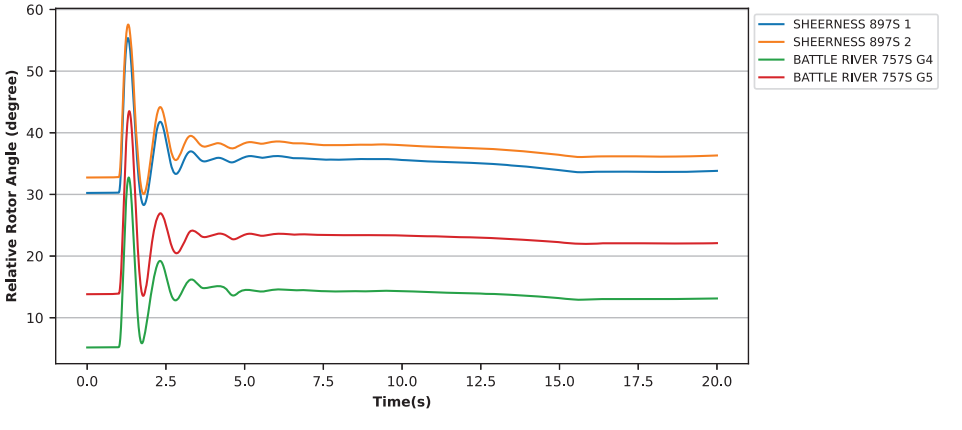
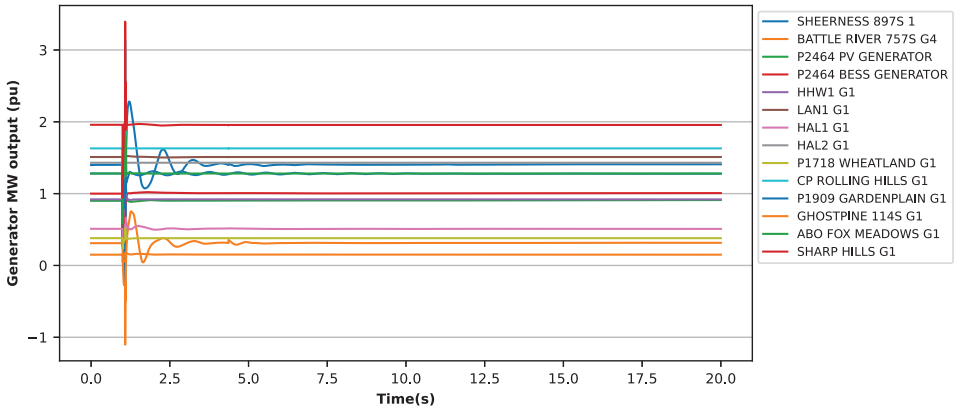
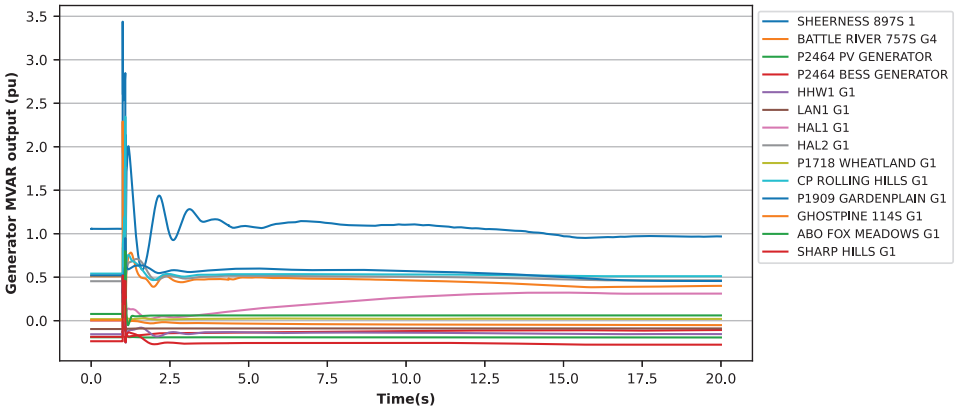


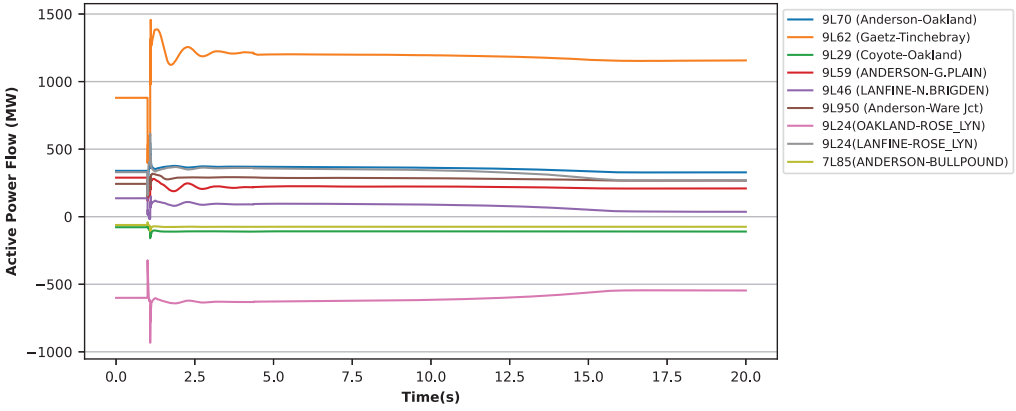
Figure 3: 2028WP_Post_Cat_B_9L912 - 3 Phase Fault at Nevis 766S











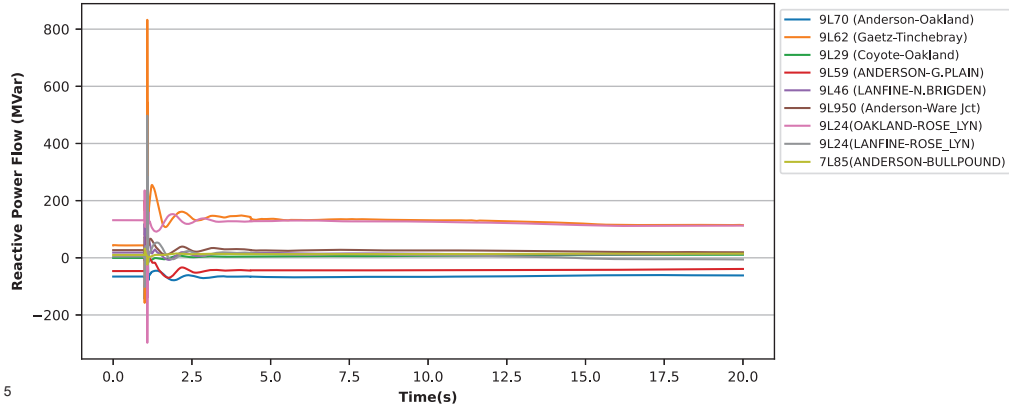
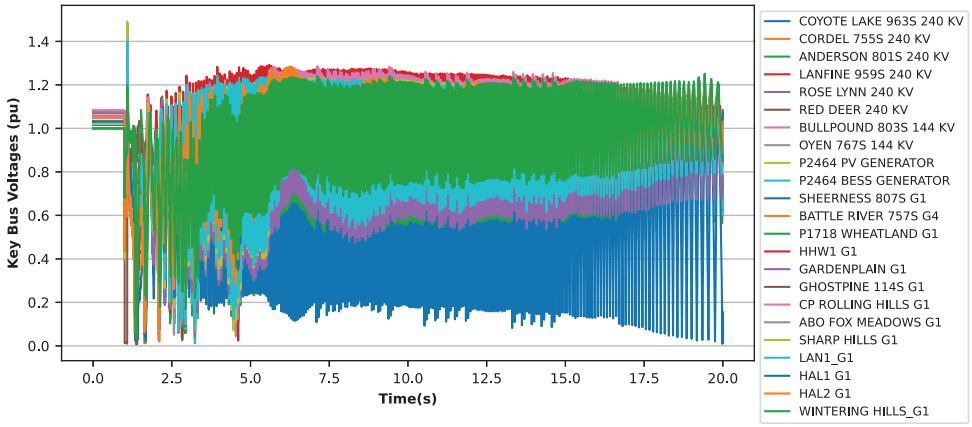
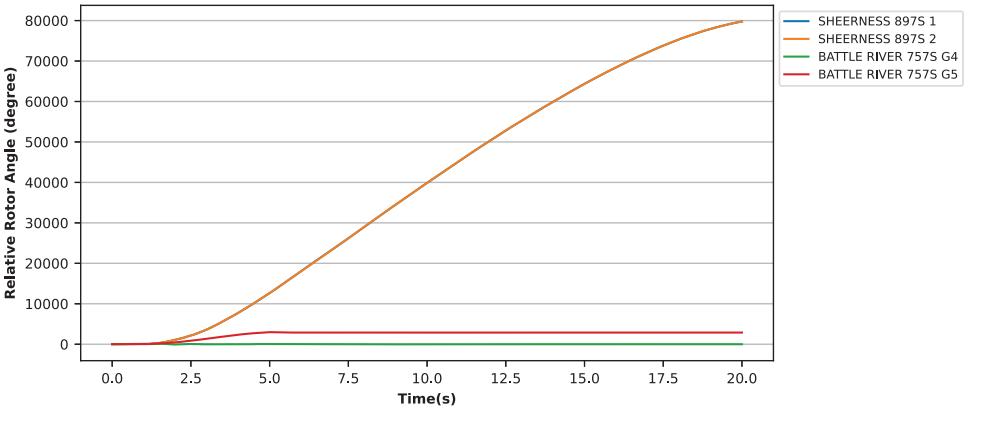
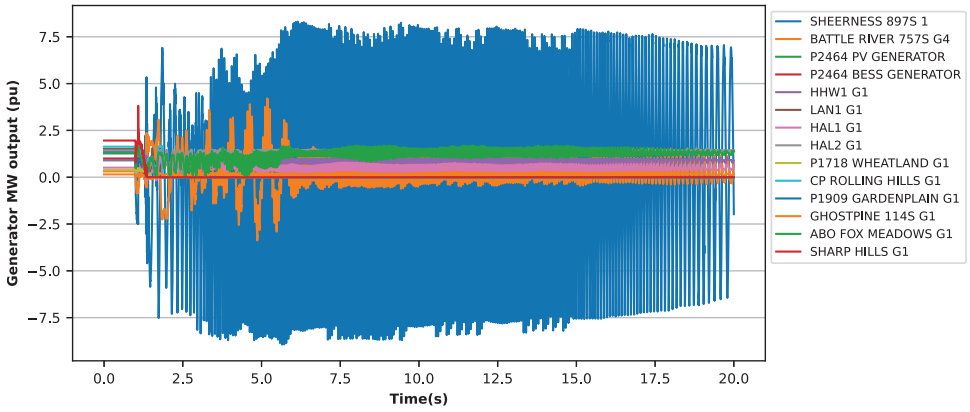
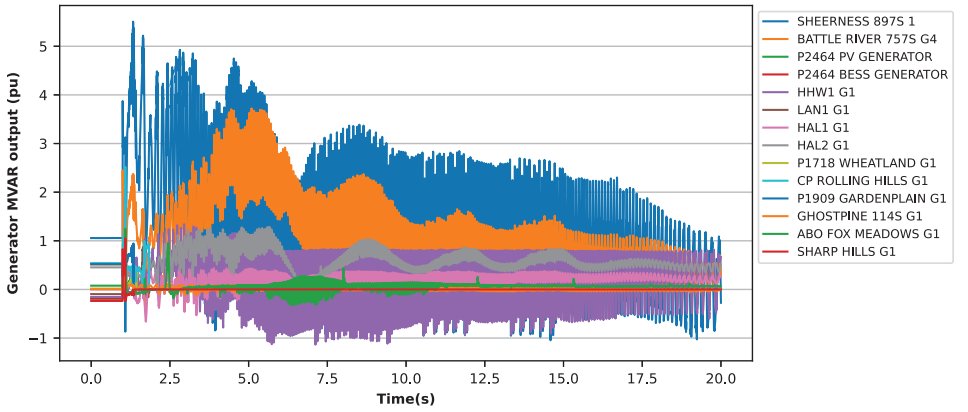


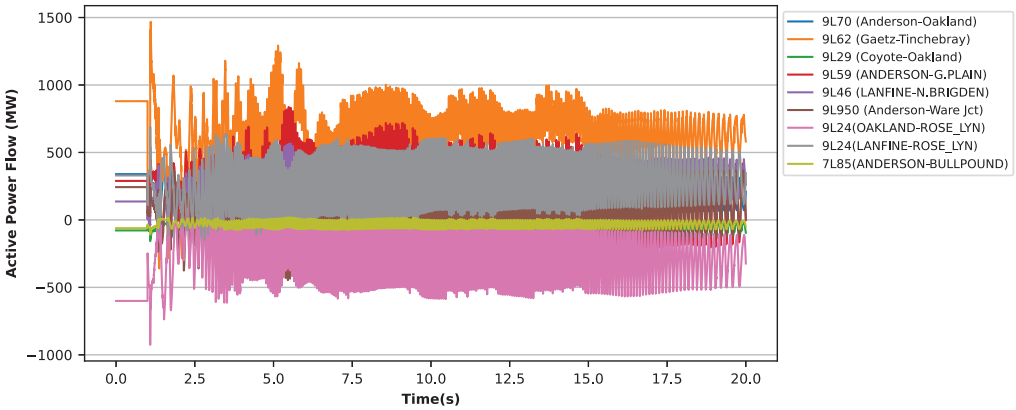
Figure 4: 2028WP_Post_Cat_B_9L912 - 3 Phase Fault at Red Deer 63S Cat_B











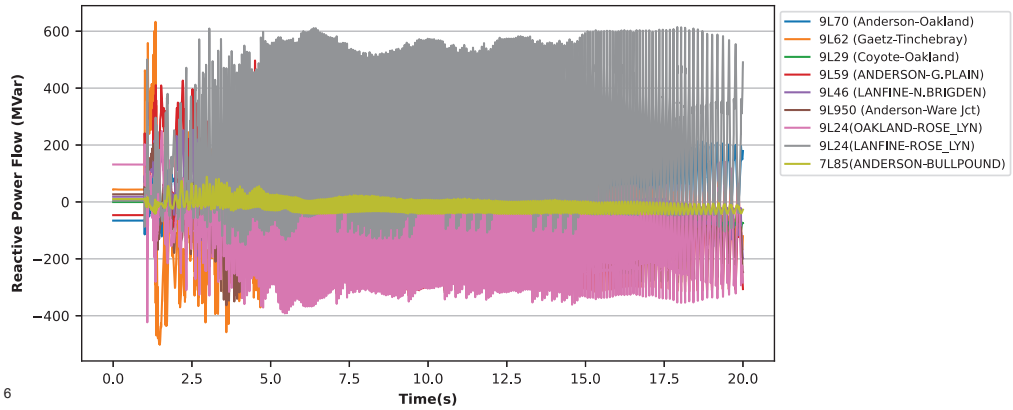
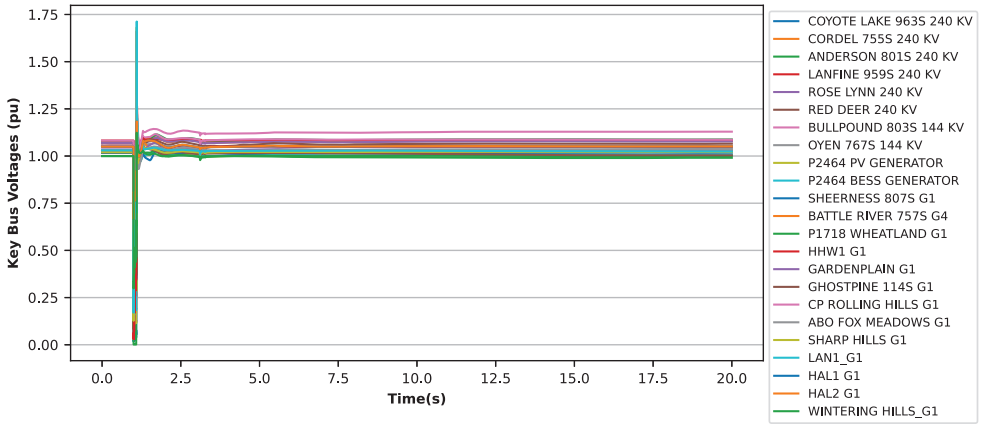
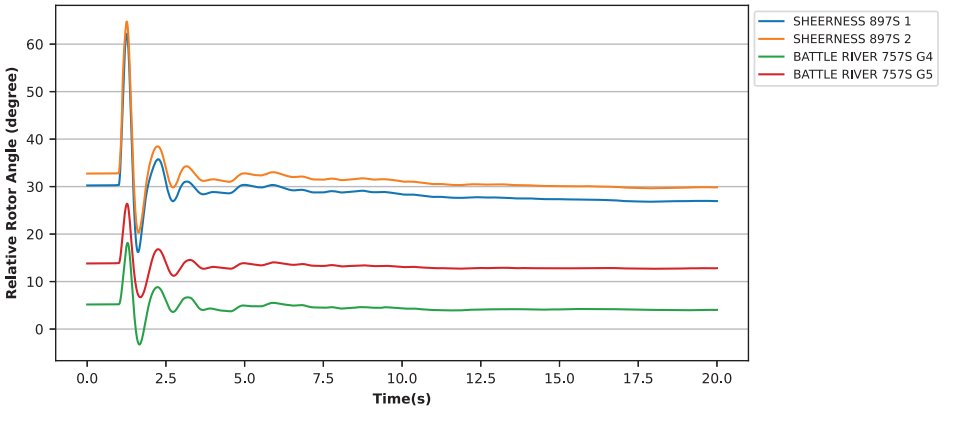
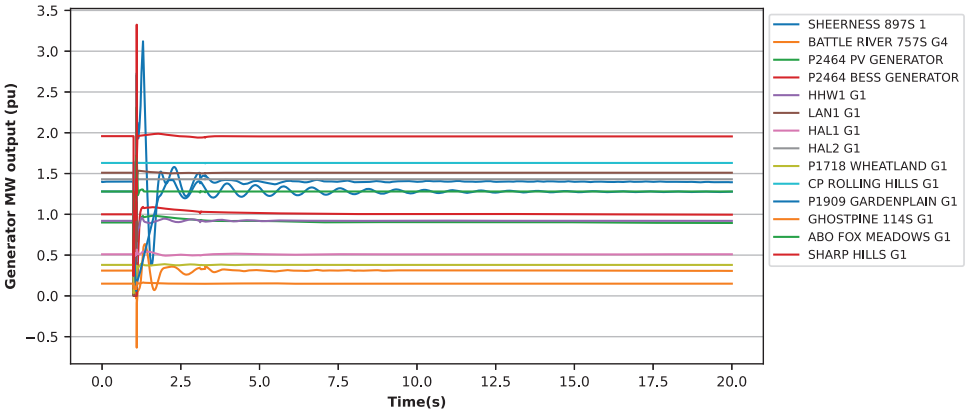
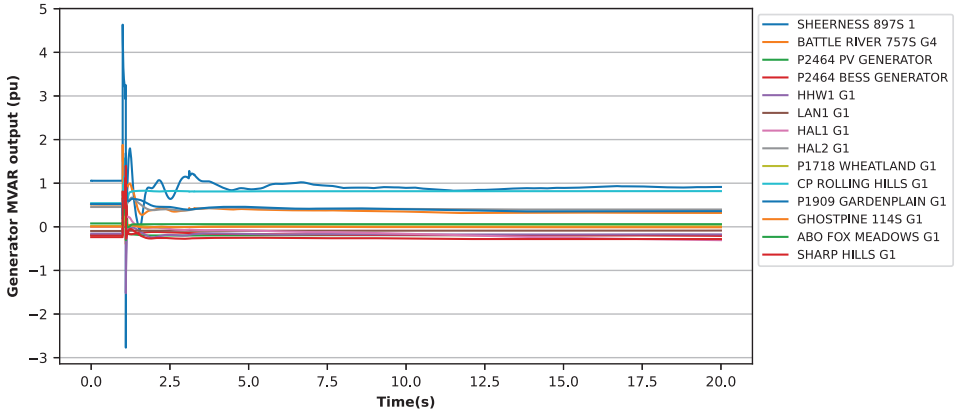


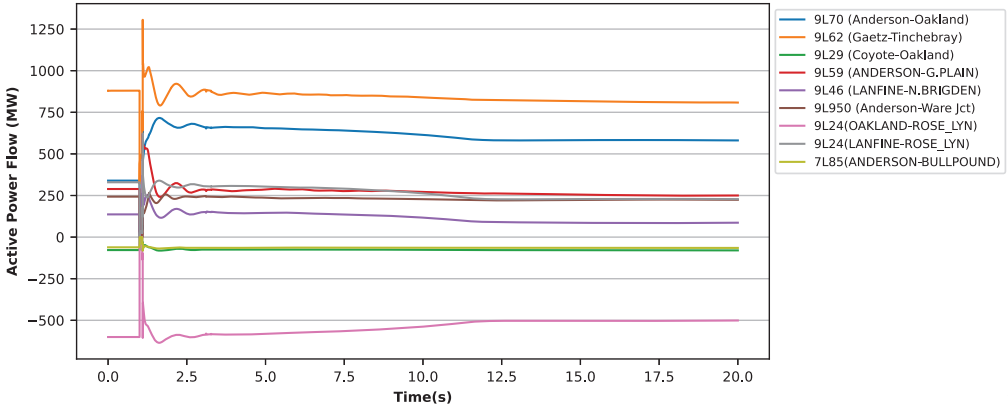
Figure 5: 2024WP_Post_Cat_B_9L97 - 3 Phase Fault at Anderson 801S











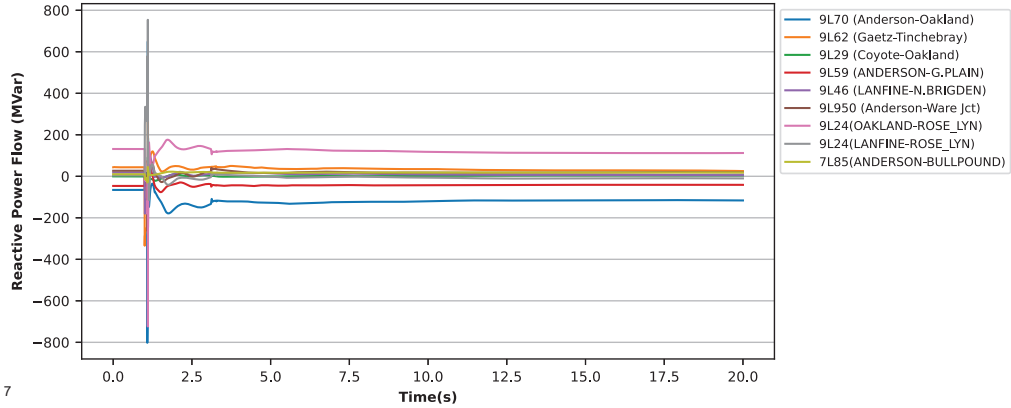
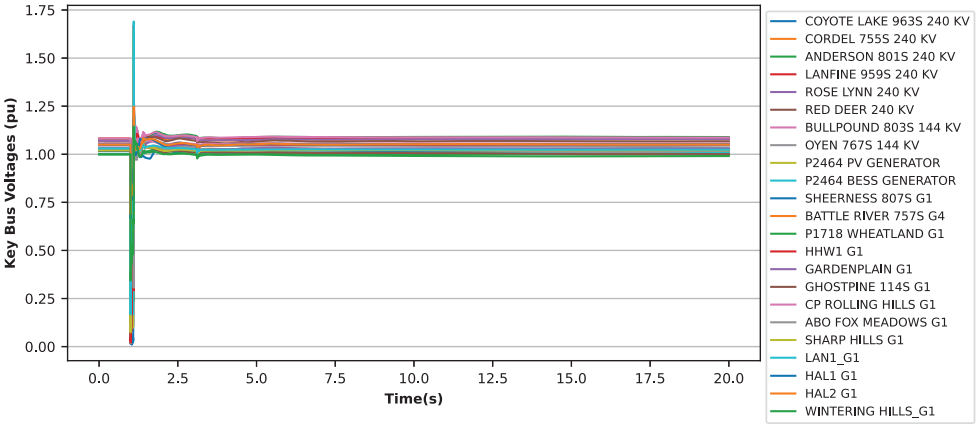
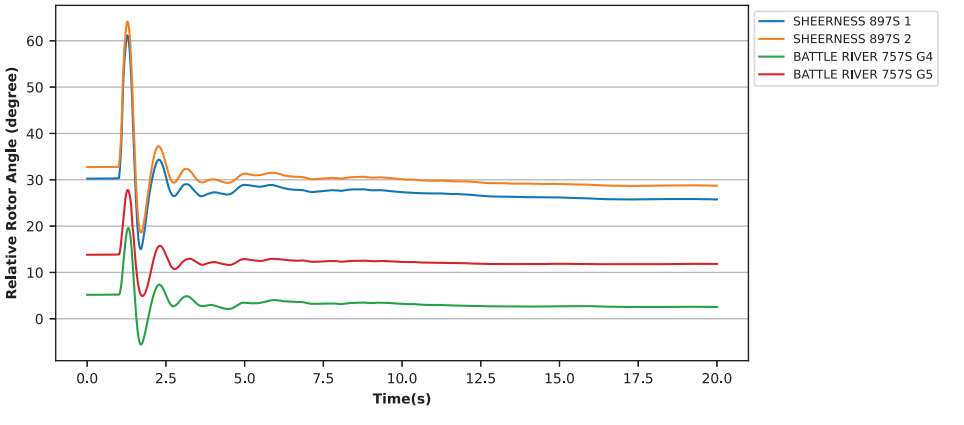
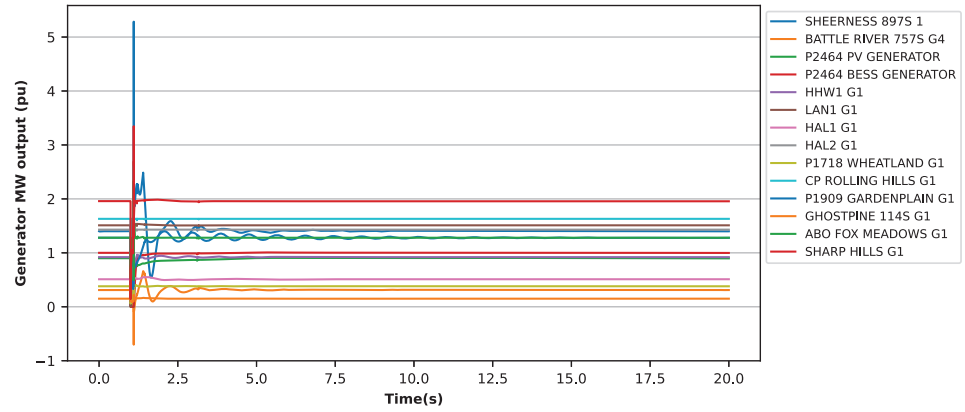
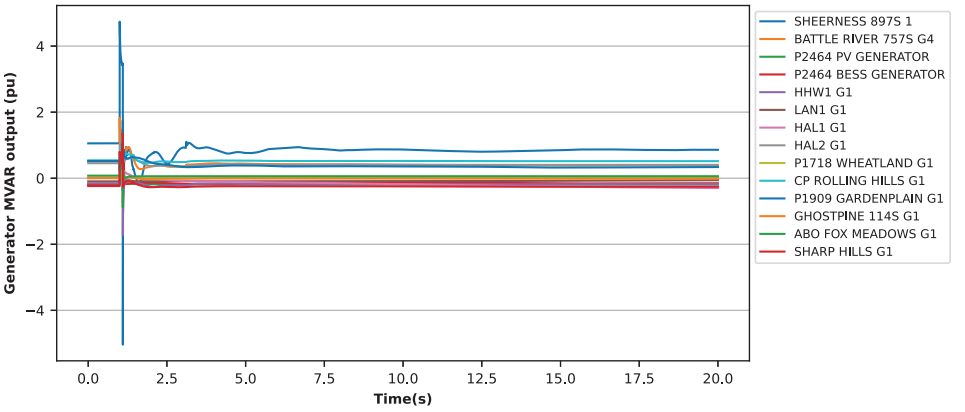


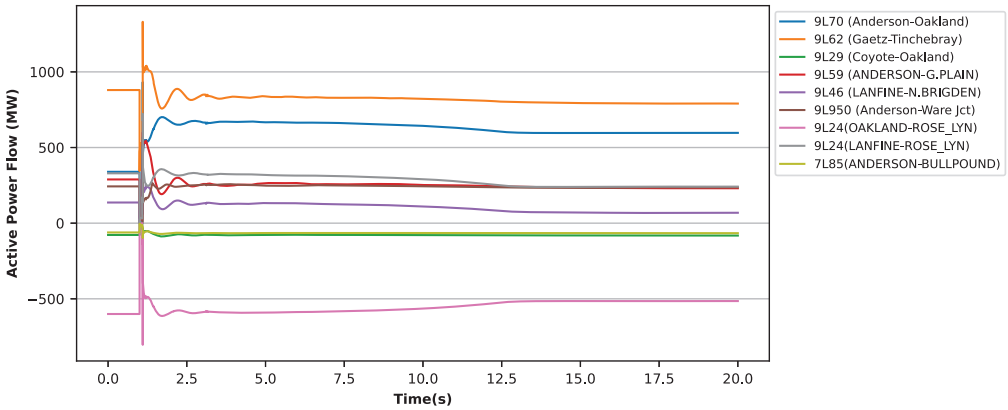
Figure 6: 2024WP_Post_Cat_B_9L97 - 3 Phase Fault at Oakland 946S











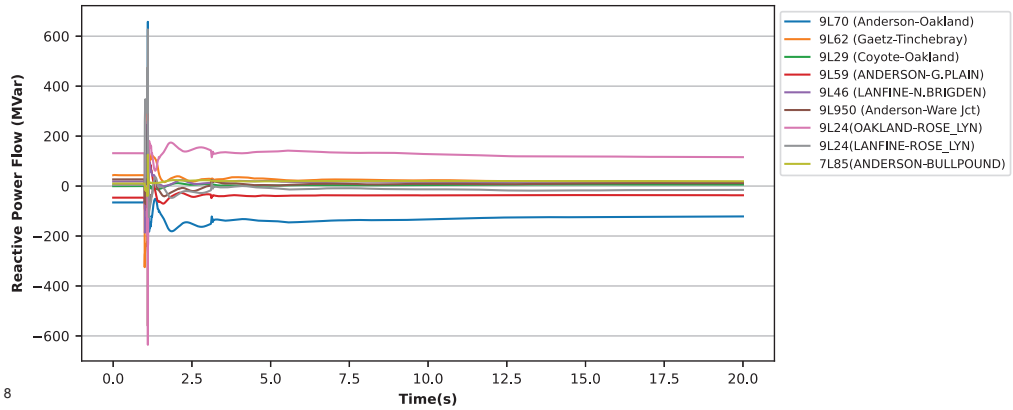
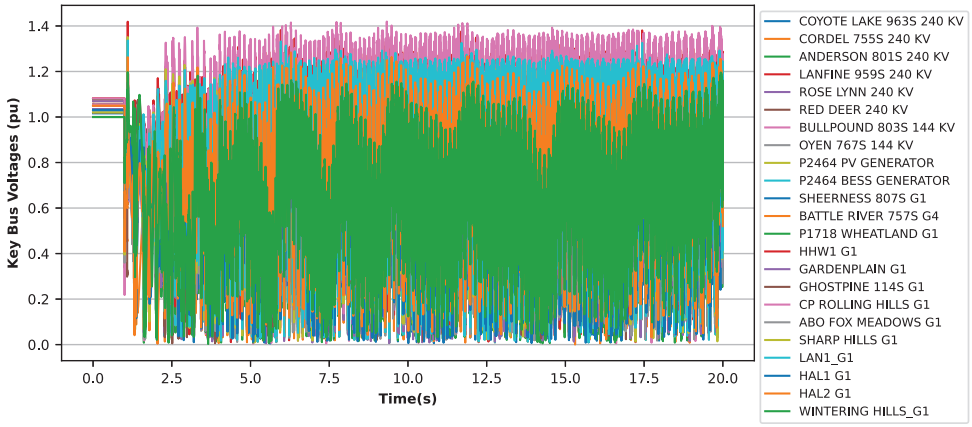
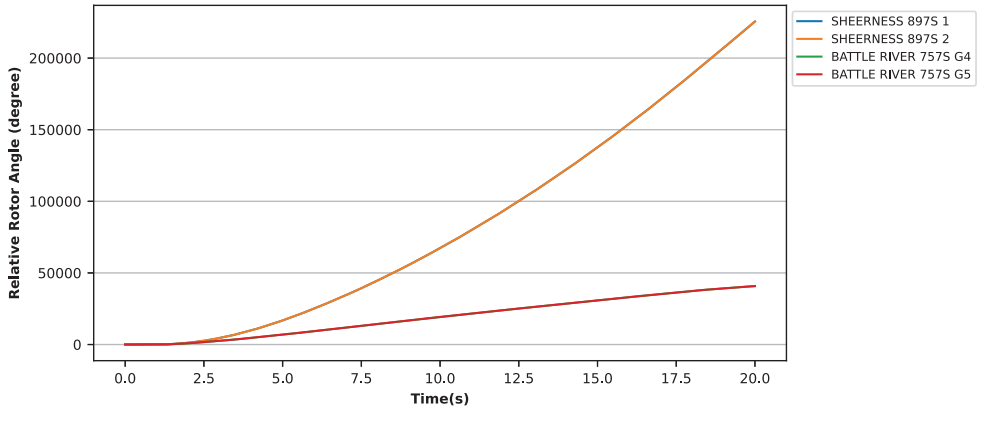
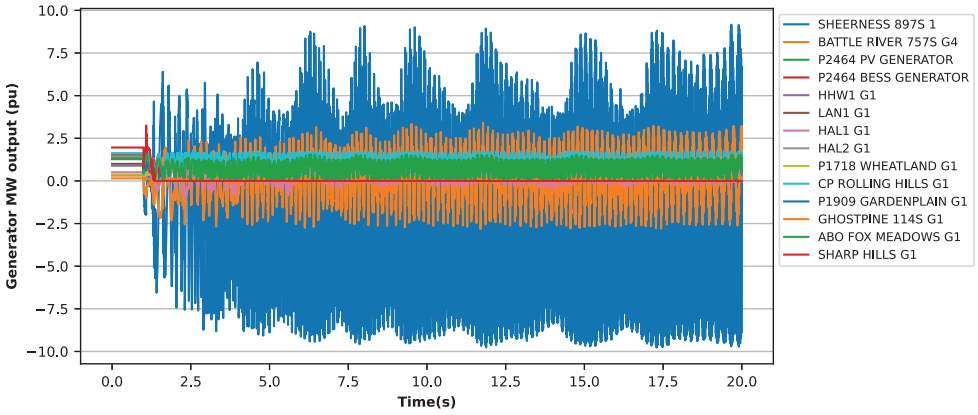
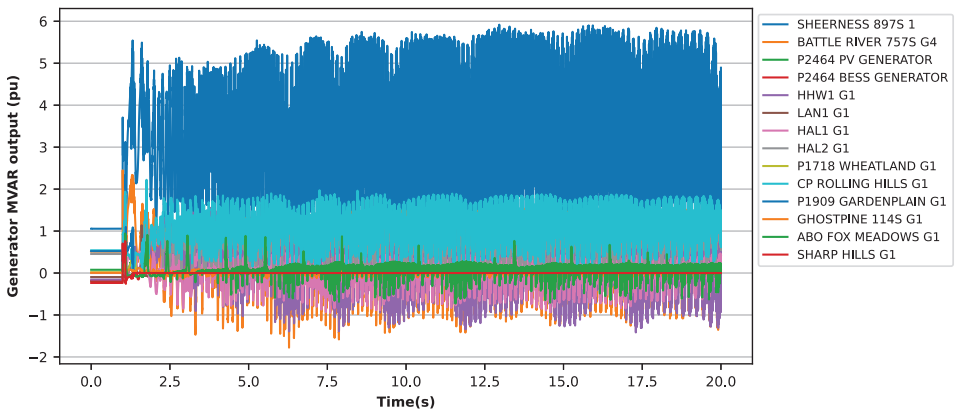


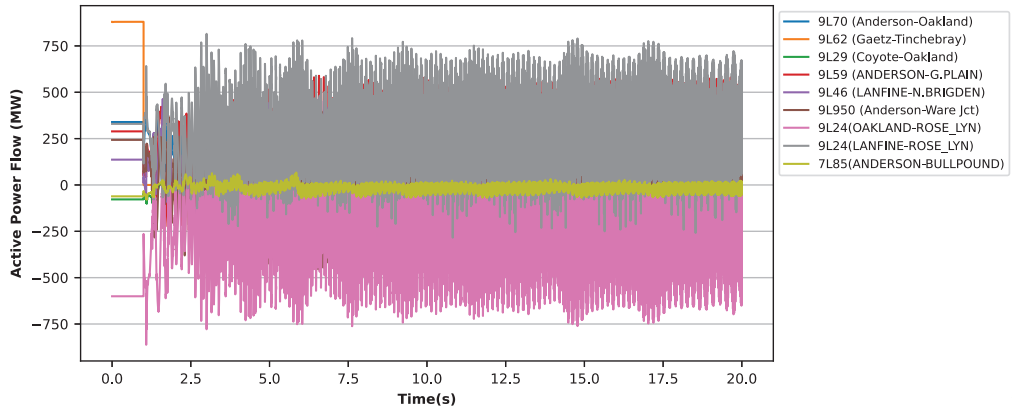
Figure 7: 2028WP_Post_Cat_B_9L62 - 3 Phase Fault at Gaetz 87S Cat_B











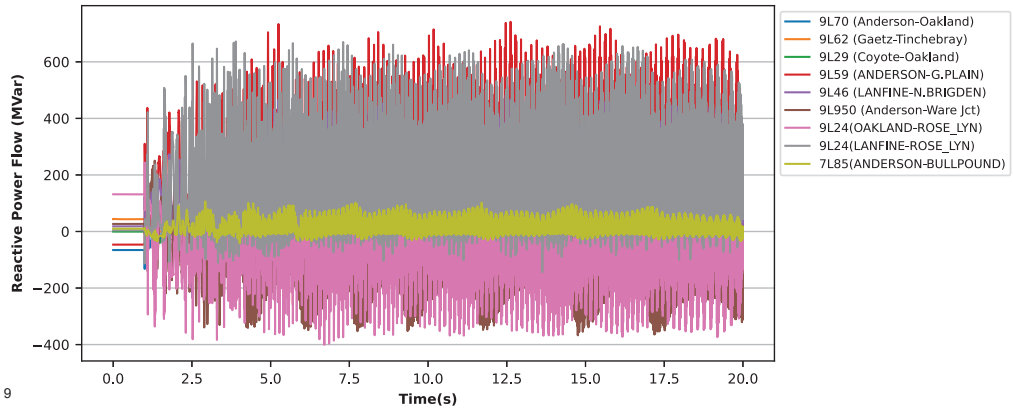
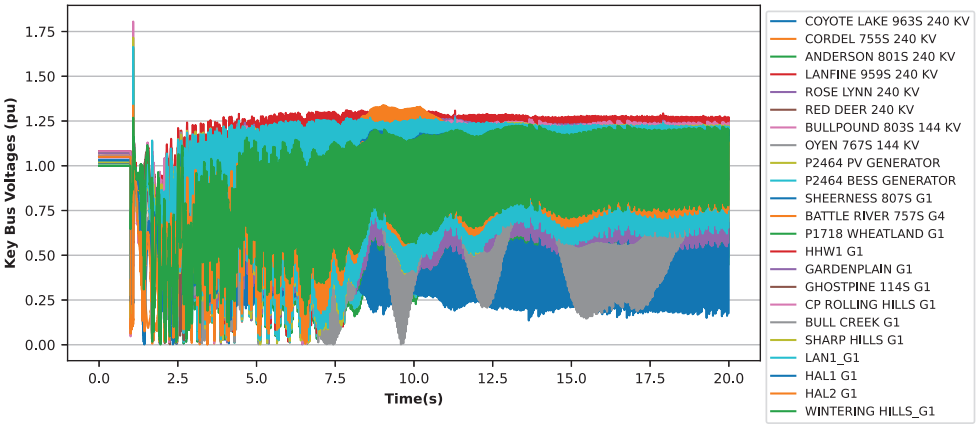
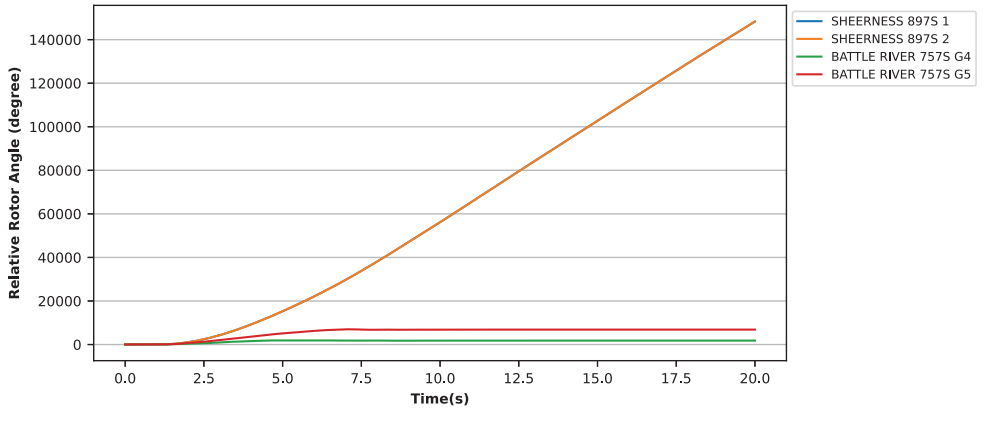
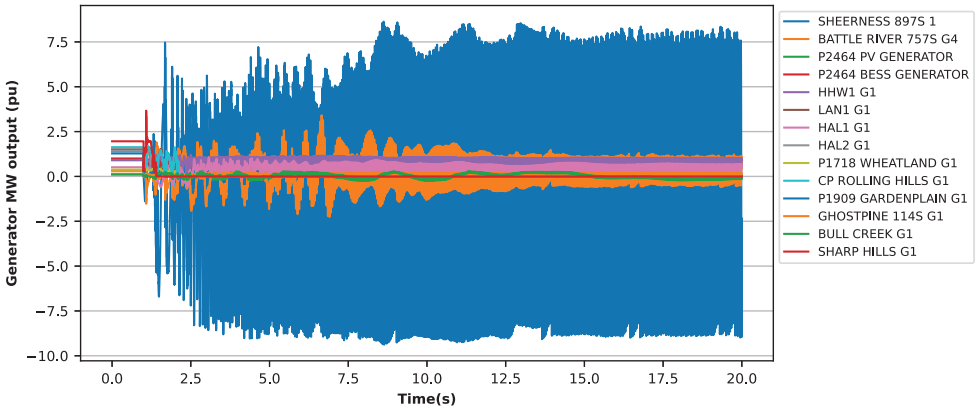
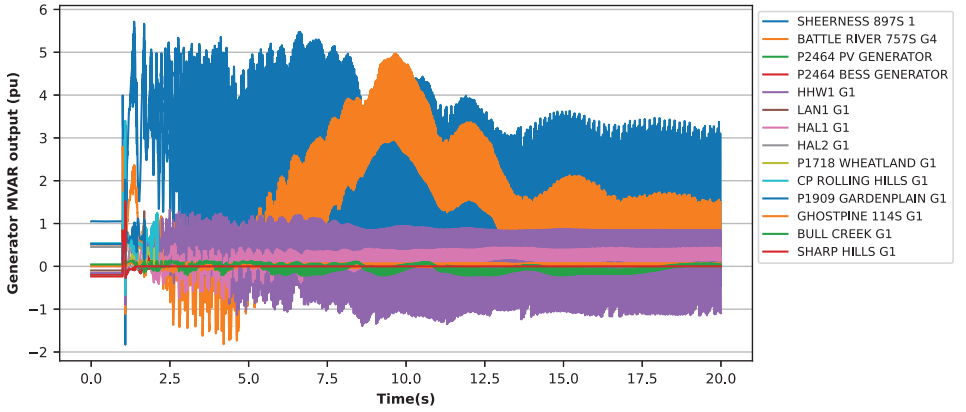


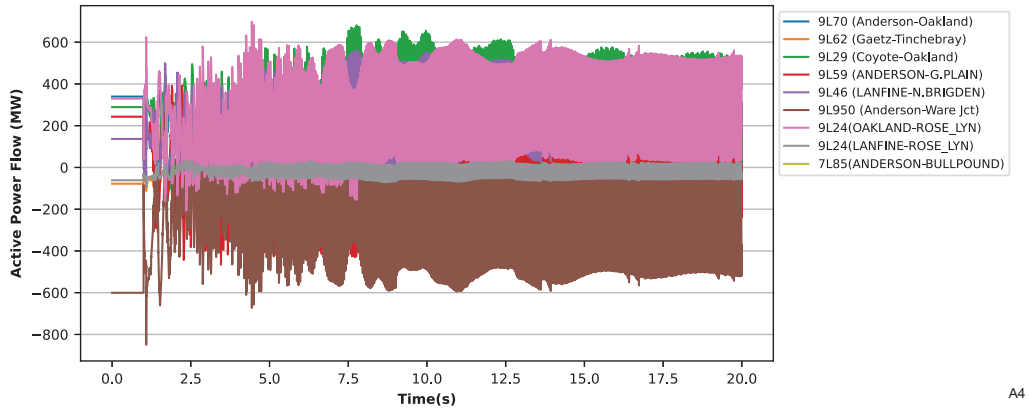
Figure 8: 2024WP_Post_Cat_B_9L62 - 3 Phase Fault at Tinchebray 972S











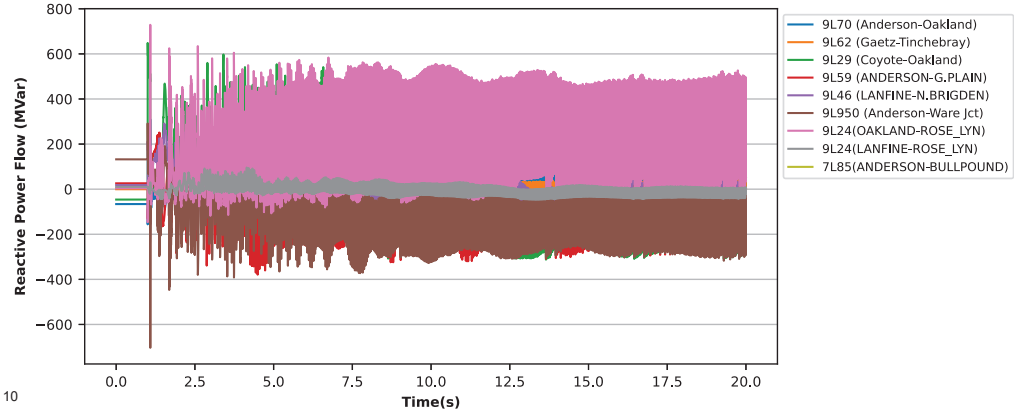
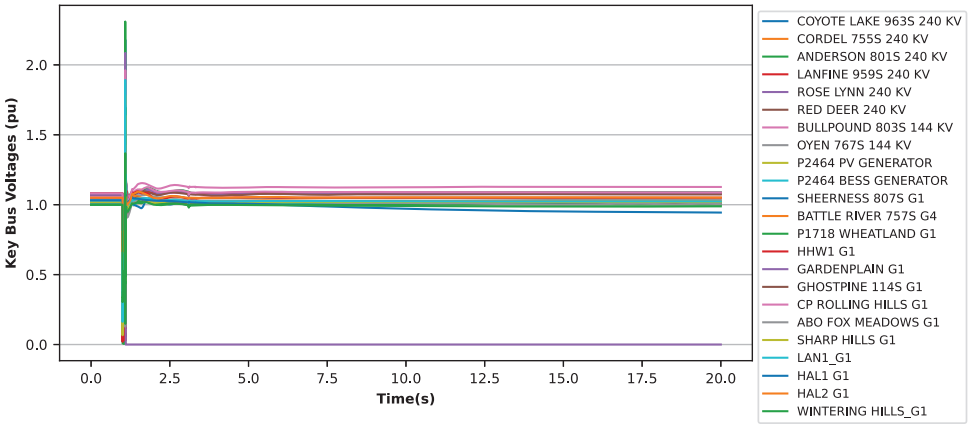
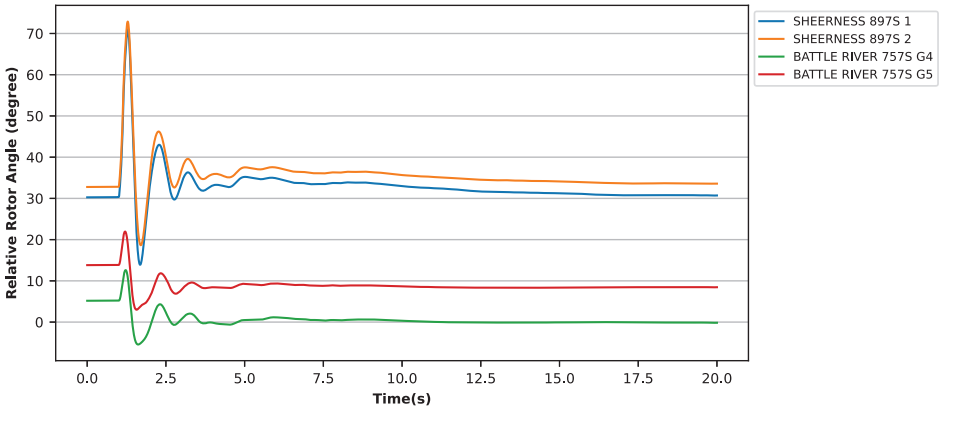
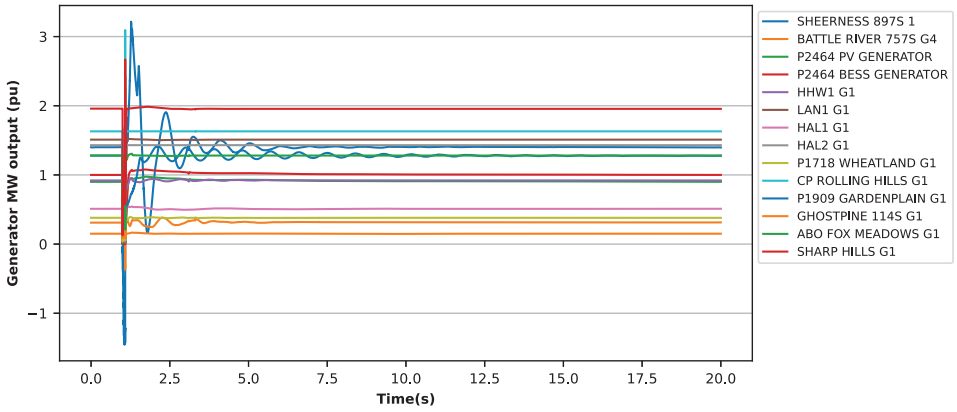
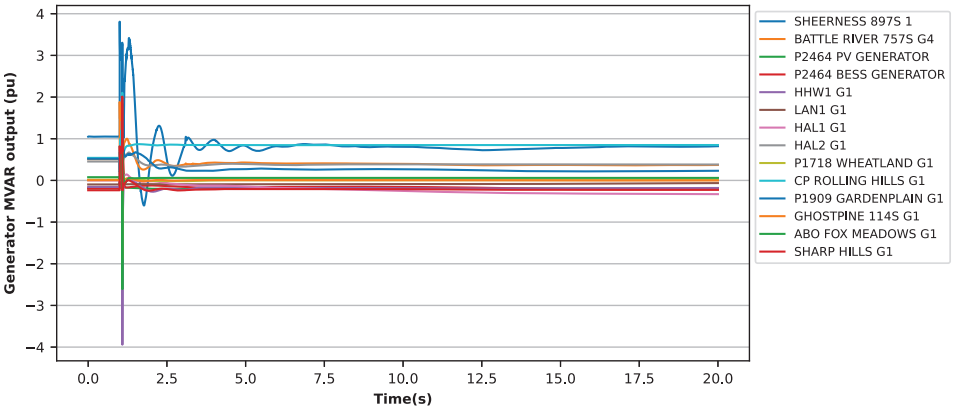


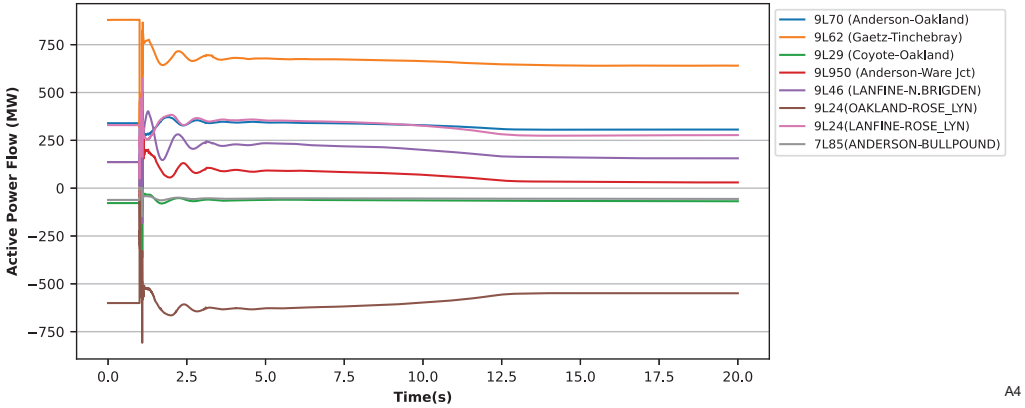
Figure 9: 2024WP_Post_Cat_B_9L59 - 3 Phase Fault at Anderson 801S











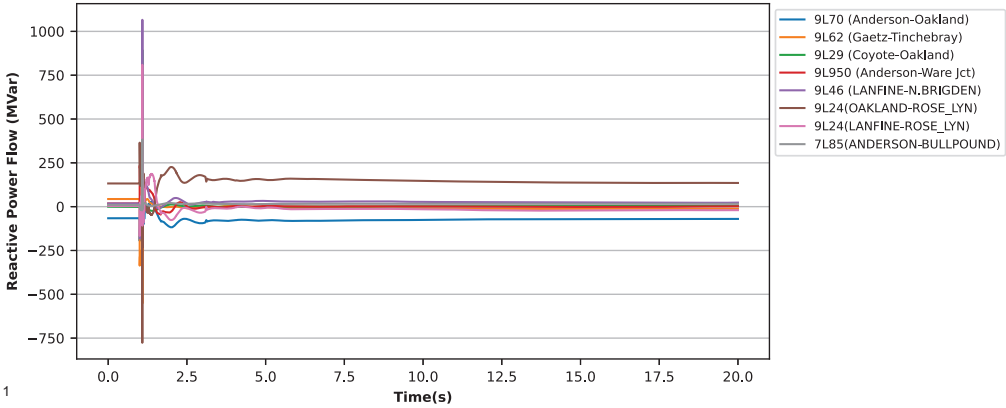
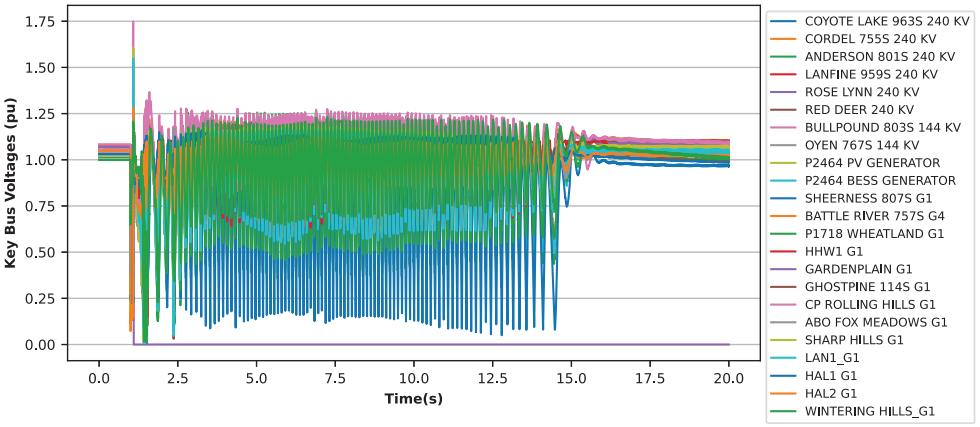
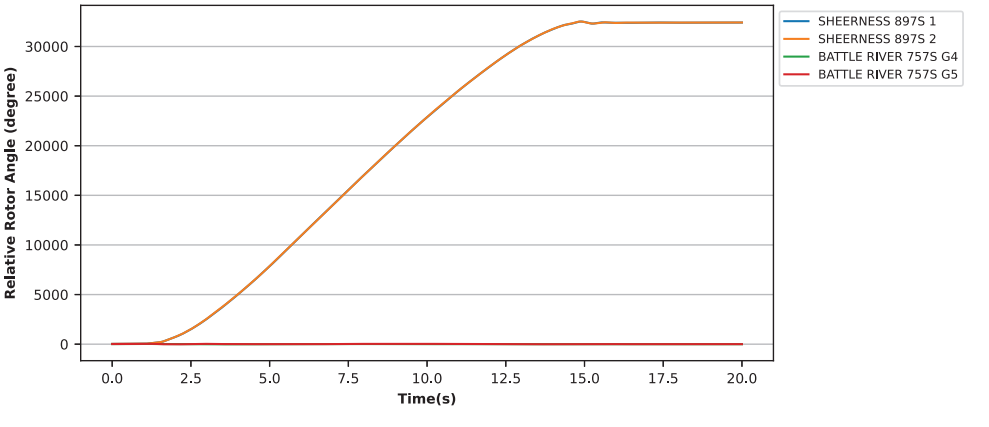
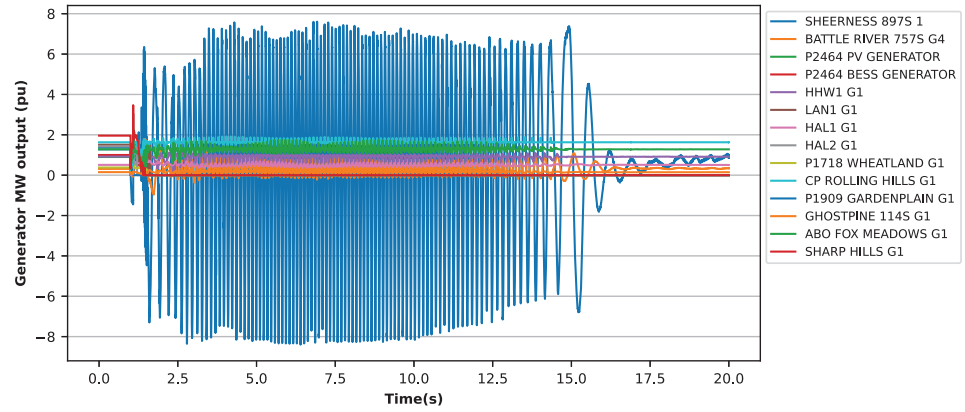
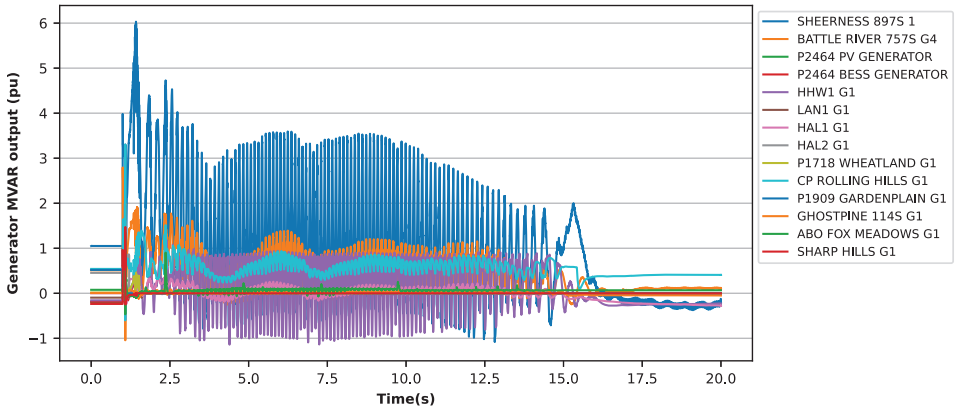


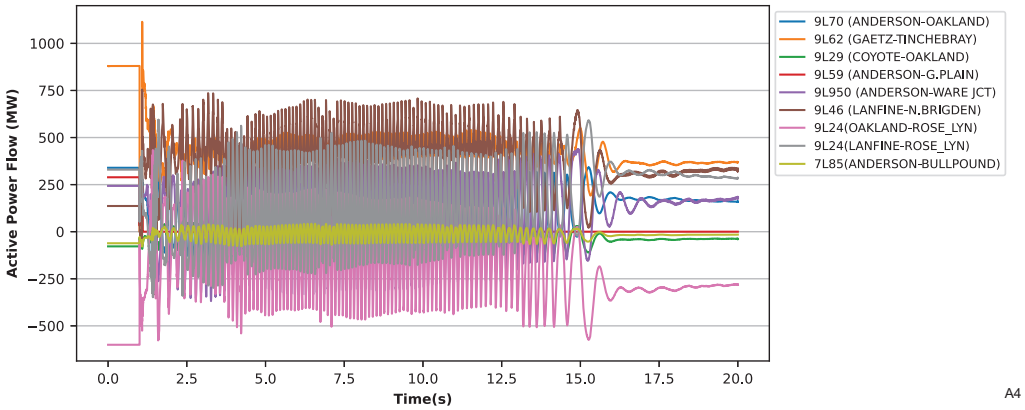
Figure 10: 2024WP_Post_Cat_B_9L59 - 3 Phase Fault at Tinchebray 972S











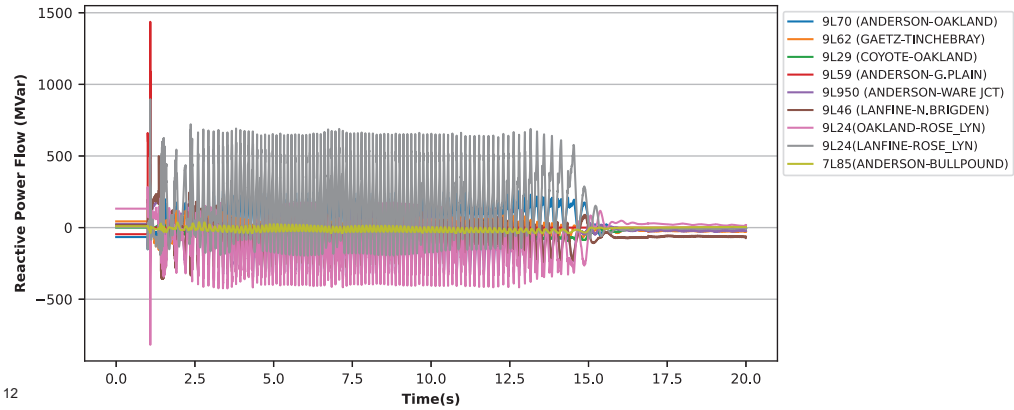
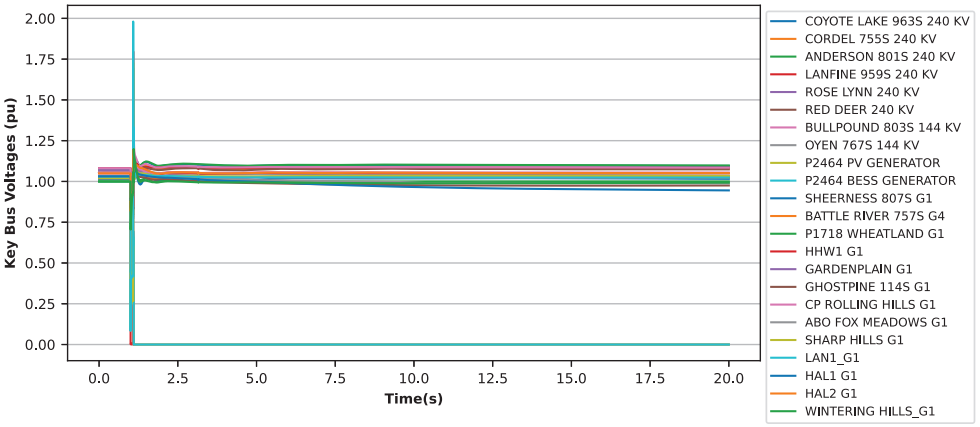
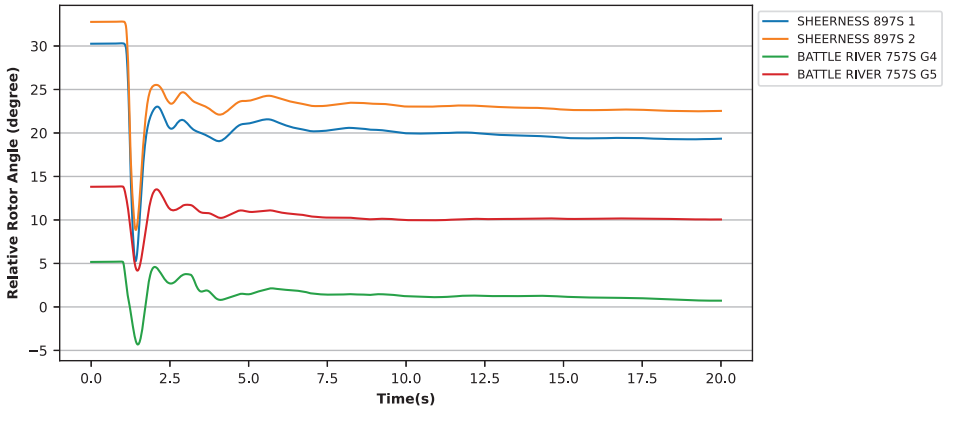
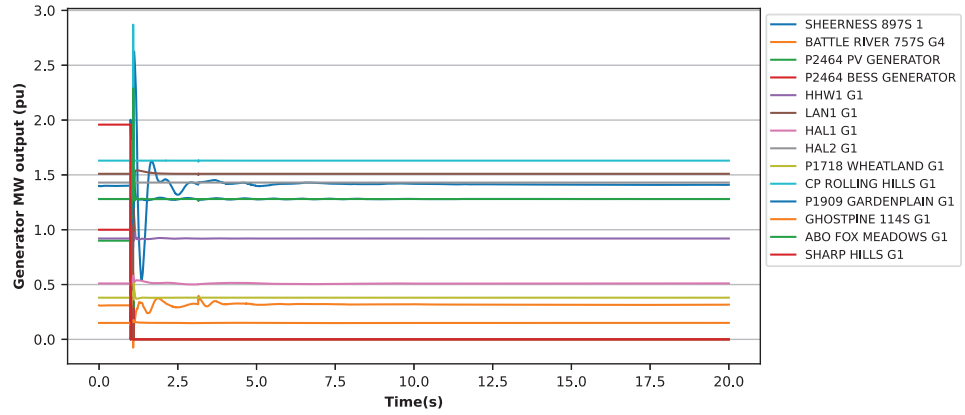
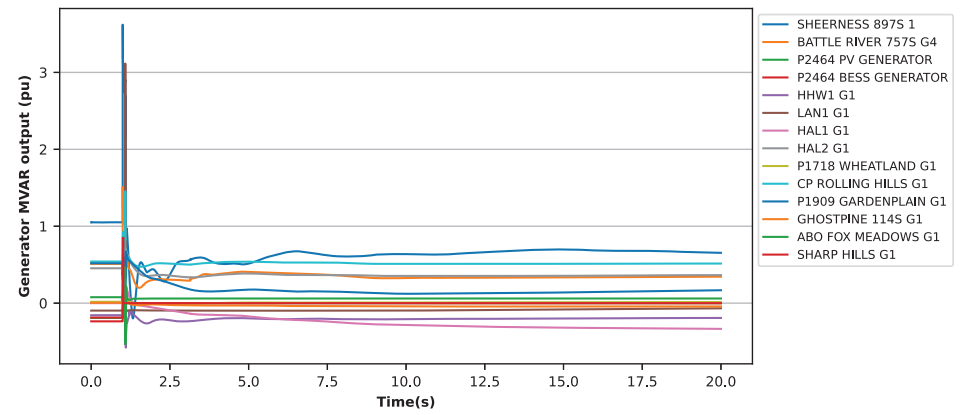


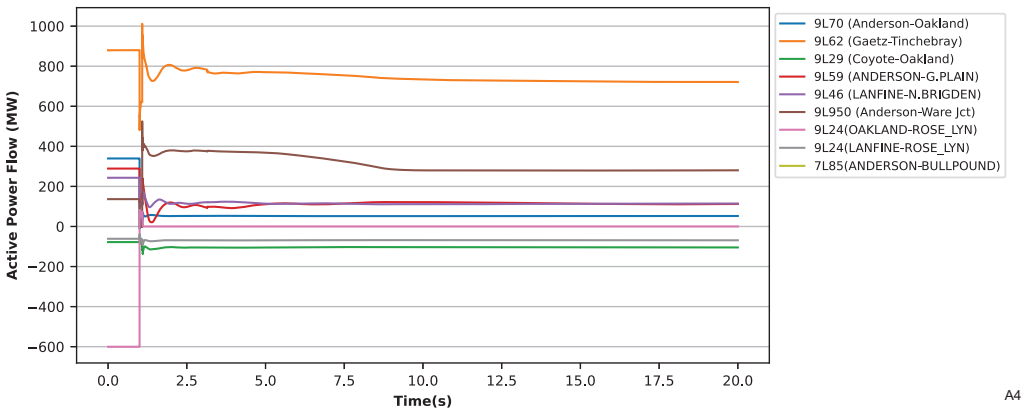
Figure 11: 2024WP_Post_Cat_B_9L24 - 3 Phase Fault at Lanfine 959S











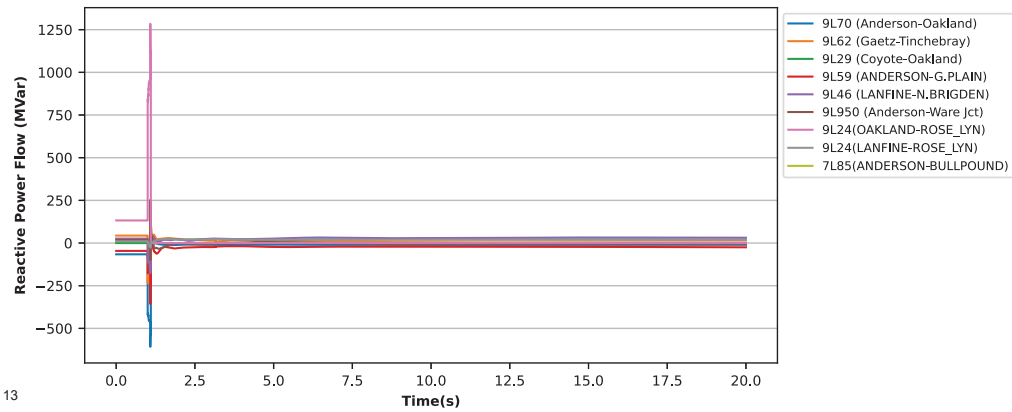
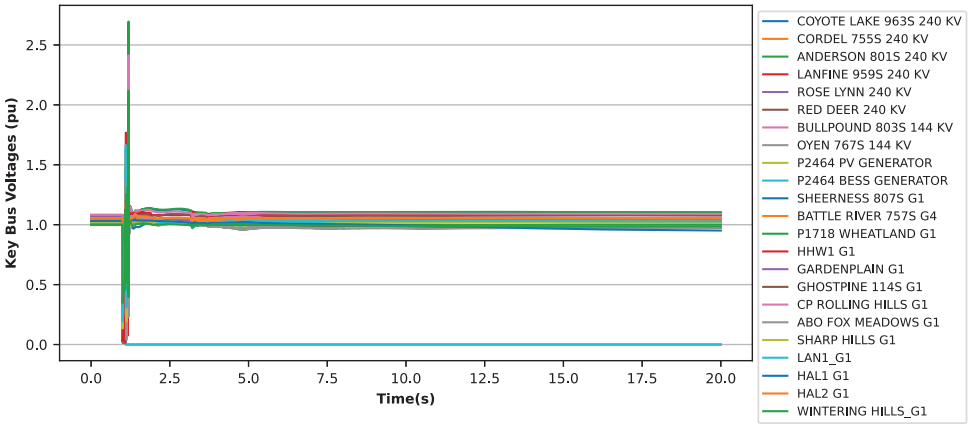
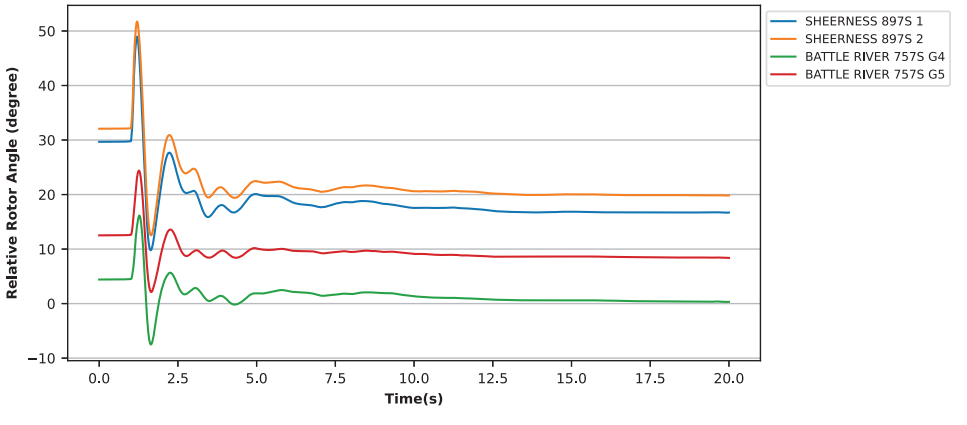
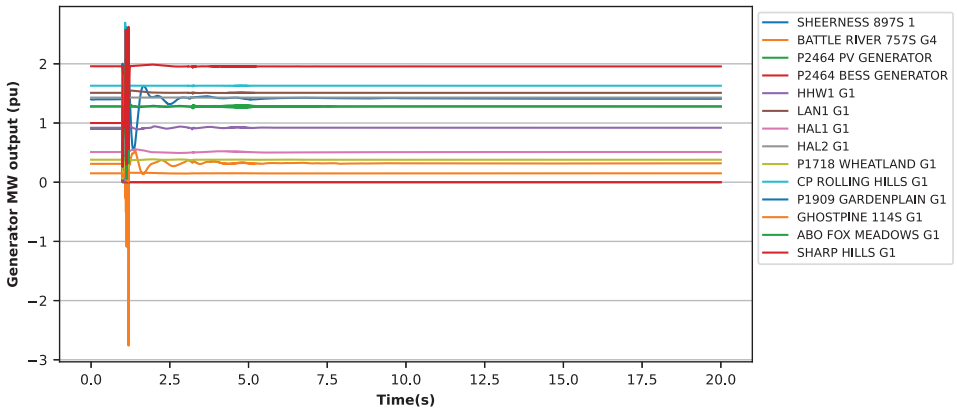
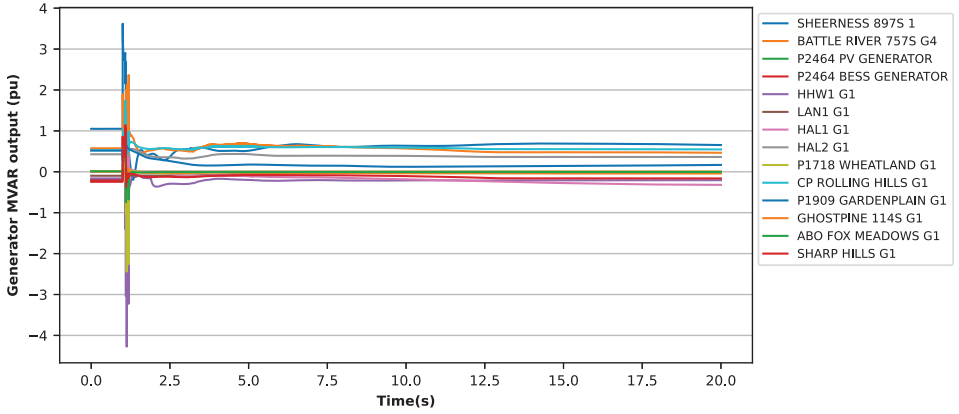


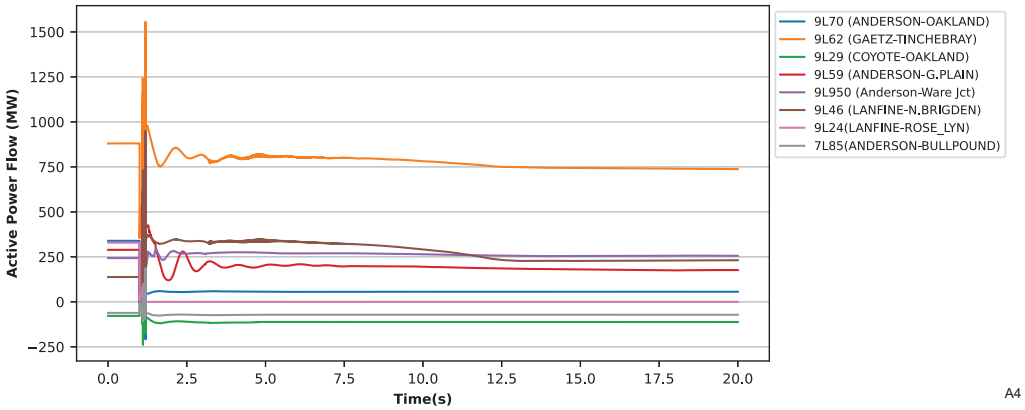
Figure 12: 2024WP_Post_Cat_B_9L24 - 3 Phase Fault at Oakland 946S

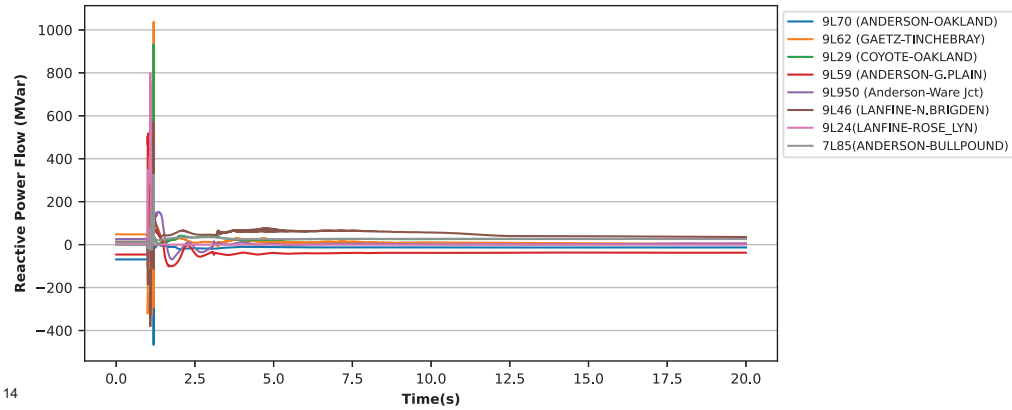












Scenario 3
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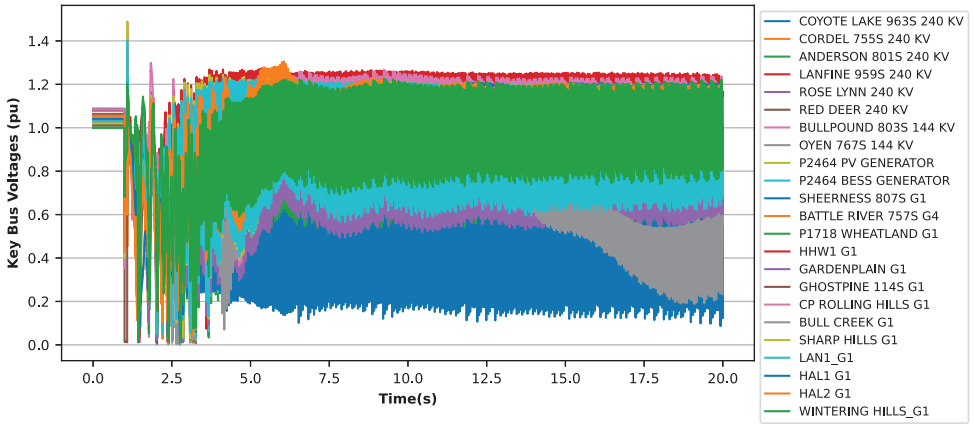
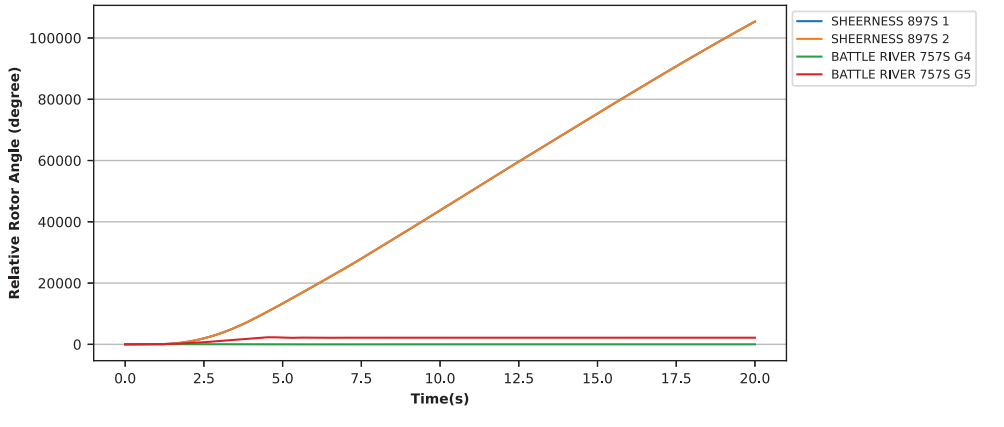
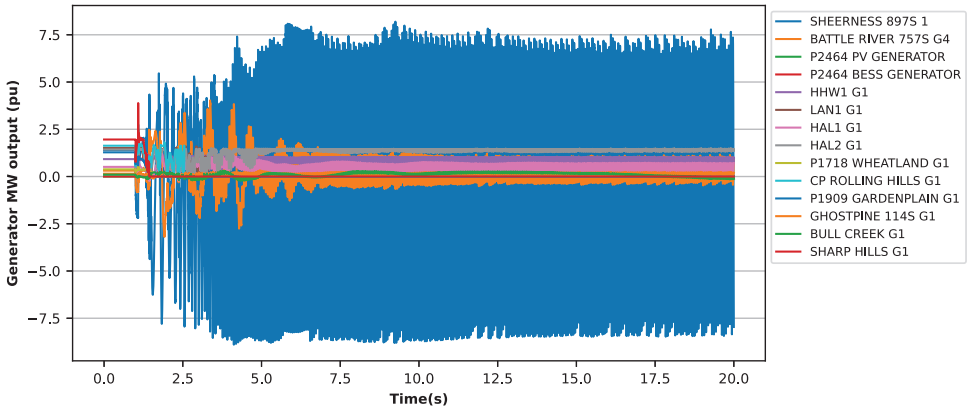
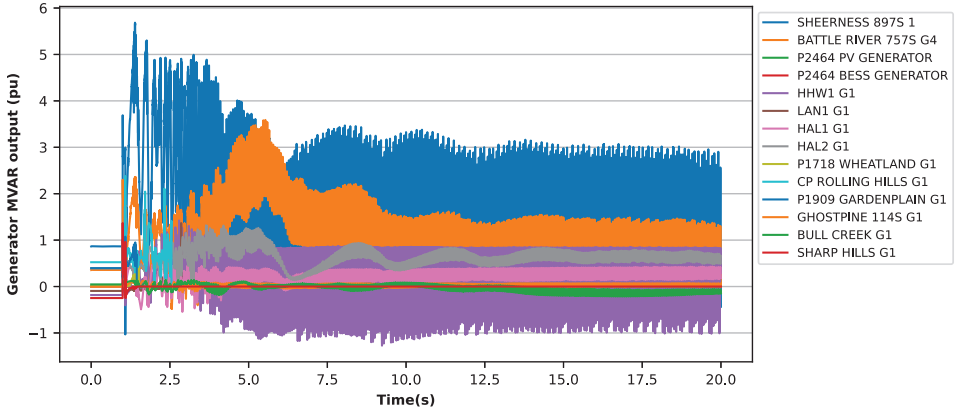
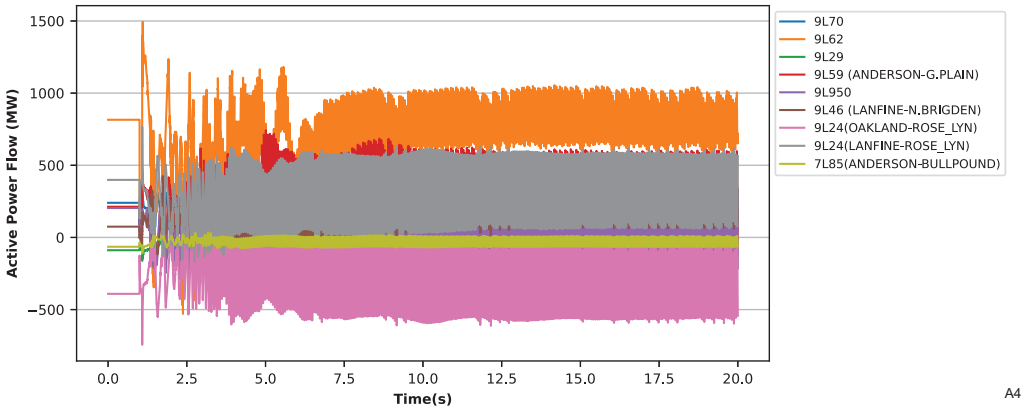
Figure 13: 2024WP_Pre_Cat_B_9L912 - 3 Phase Fault at Red Deer 63S











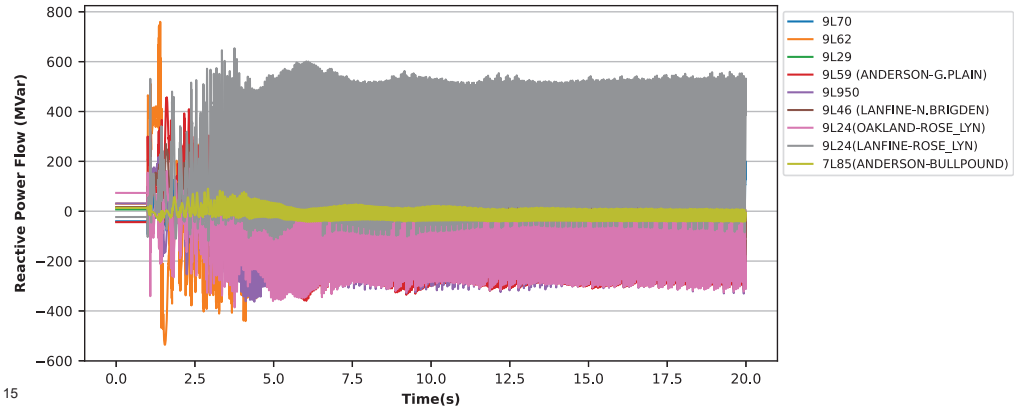
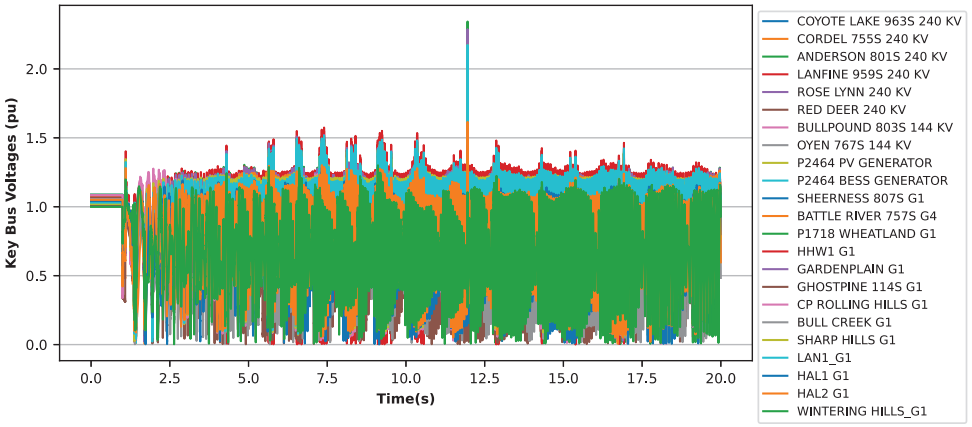
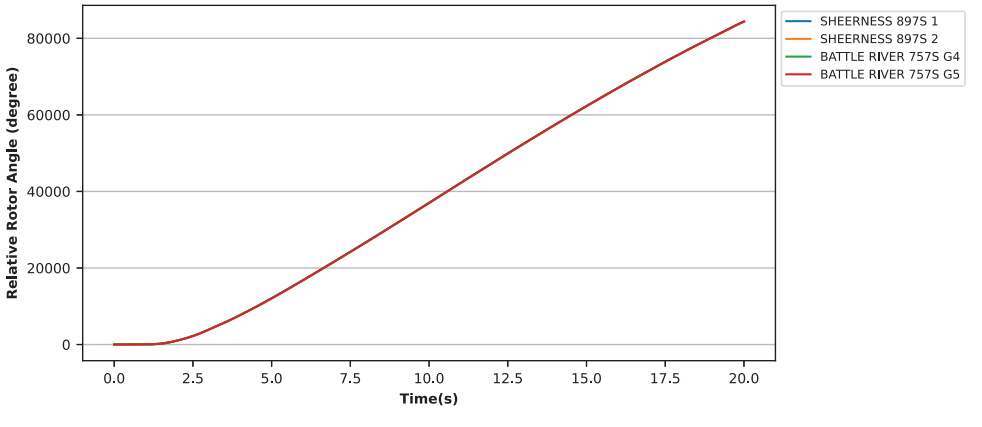
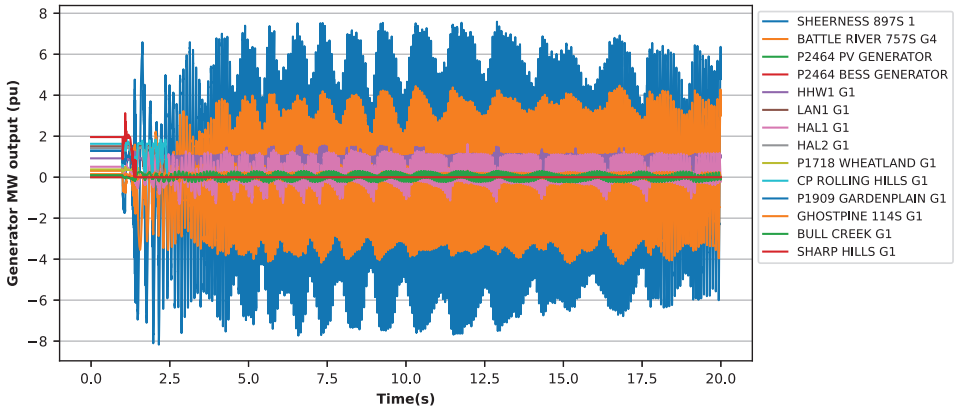
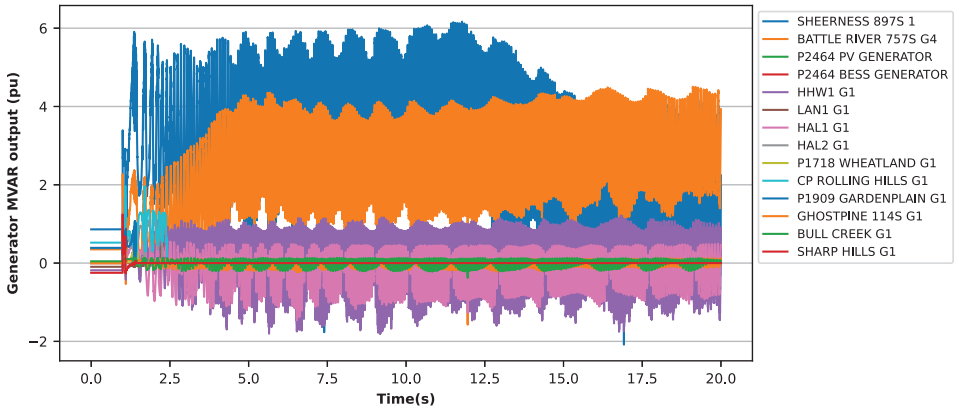


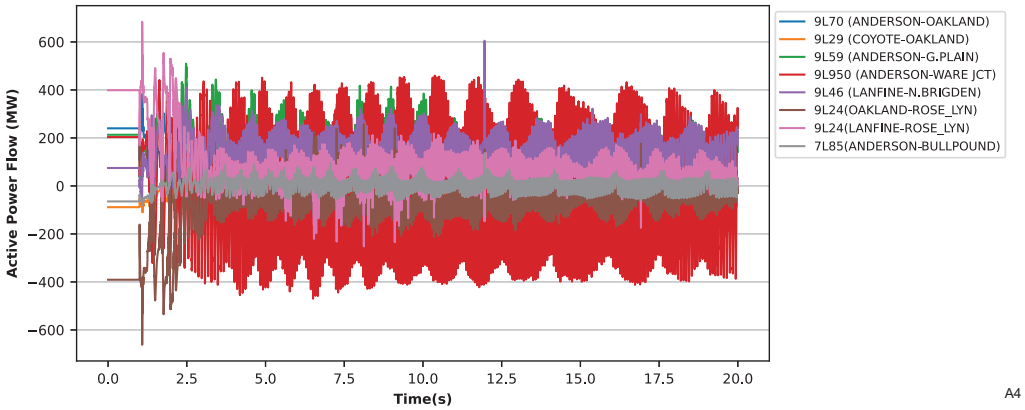
Figure 14: 2024WP_Pre_Cat_B_9L62 - 3 Phase Fault at Gaetz 87S











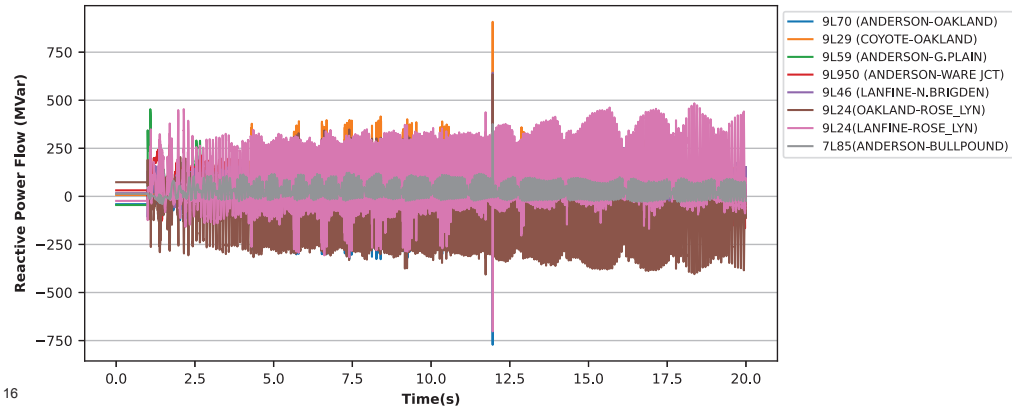
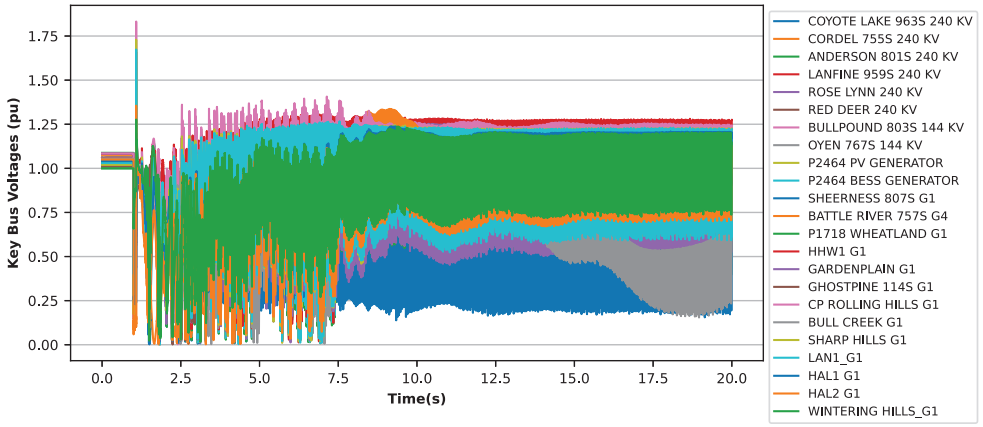
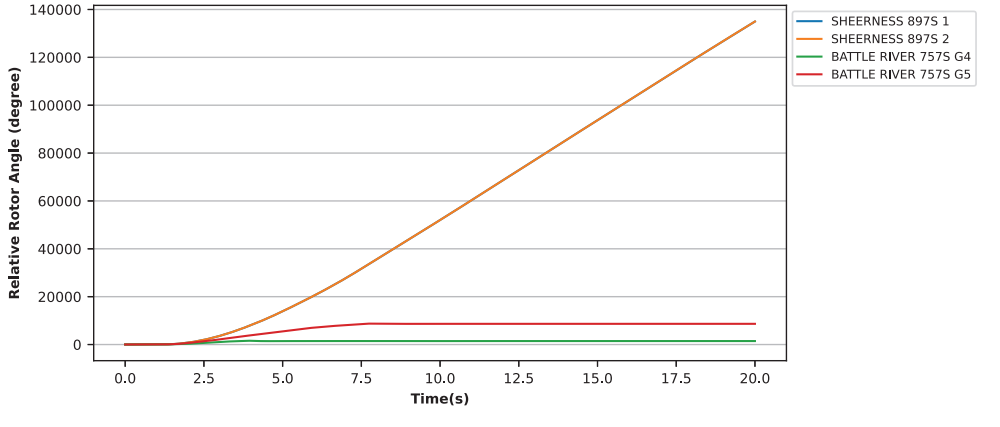
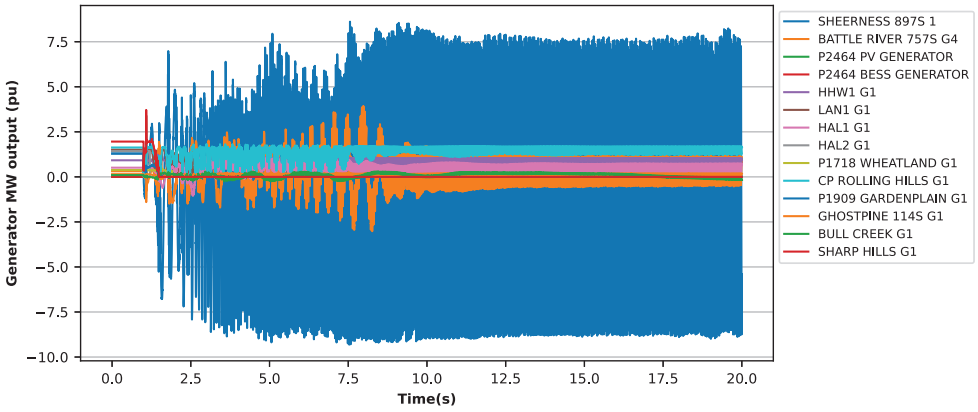
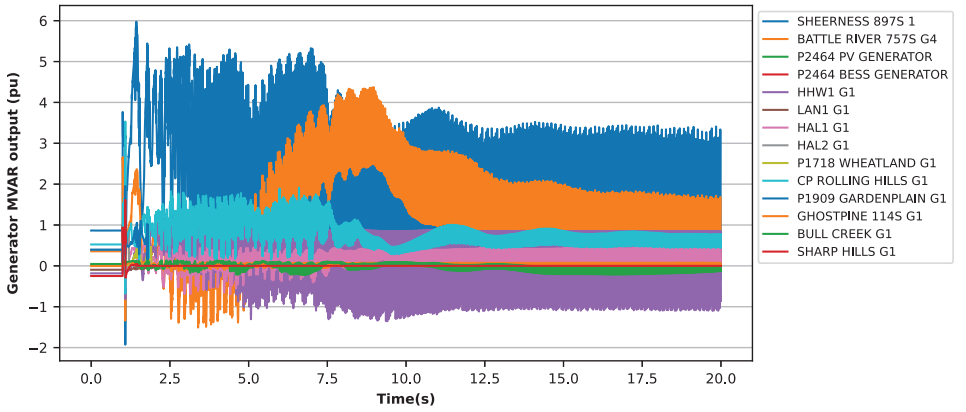


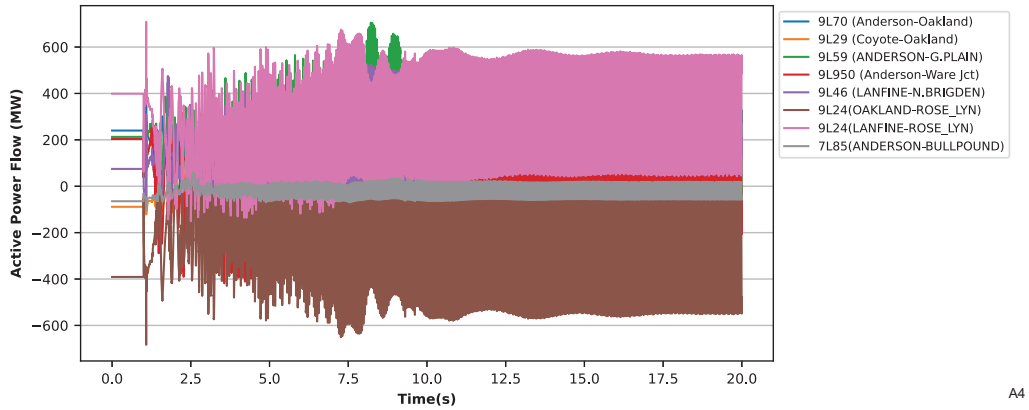
Figure 15: 2024WP_Pre_Cat_B_9L62 - 3 Phase Fault at Tinchebray 972S

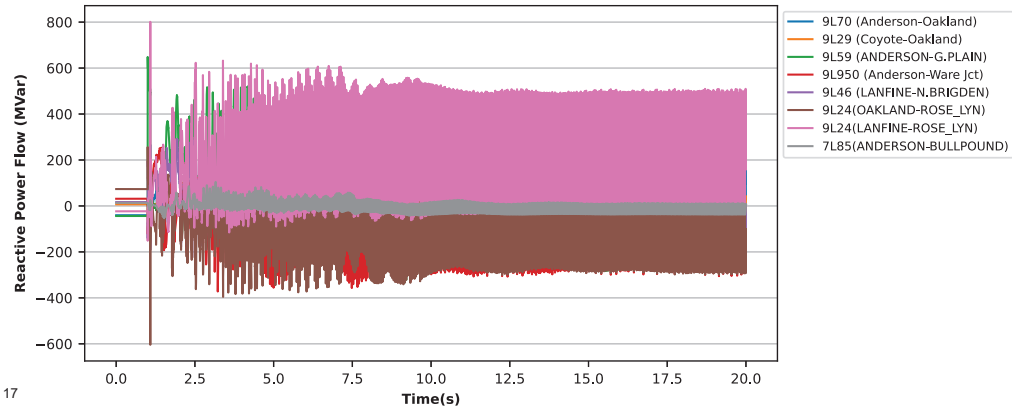












Attachment A5

Dynamic Data and Assumptions of Equipment Proposed for the Connection

The following Table A-1, Table A-2, Table A-3, Table A-4 and Table A-5 provide the generic data for the dynamic models of the proposed renewable PV and BESS generation systems.

Table A-1: Renewable PV Generator Dynamic

Generator Dynamic Data (REGCA1 model) - Generic											
Tg	Rrpwr	Bkrpt	Zerox	Lvpl1	Volim	Lvpnt1	Lvpnt0	Iolim	Tfltr	Khv	Iqrmax
0.20	10	0.90	0.50	1.00	1.20	0.001	0.000	-1.00	0.00	0.00	20.0
Iqrmin	Accel										
-20.0	0.70										

Table A-2: Renewable PV Electrical Controller Dynamic Data

Electrical Controller (REECA1 model) - Generic											
Vdip	Vup	Trv	dbd1	dbd2	Kqv	Iqh1	Iql1	Vref0	Iqfrz	Thld	Thld2
0.900	1.100	0.010	-0.10	0.10	2.000	2.000	-2.000	0.000	1.000	0.000	0.000
Tp	QMax	QMin	Vmax	Vmin	Kqp	Kqi	Kvp	Kvi	Vbias	Tiq	dPmax
0.050	0.600	-0.600	1.200	0.800	0.000	1.000	0.000	1.000	0.000	0.460	1.000
dPmin	Pmax	Pmin	Imax	Tpord	Vq1	Iq1	Vq2	Iq2	Vq3	Iq3	Vq4
-1.000	1.400	0.000	1.000	0.010	0.000	1.000	0.330	1.000	0.660	1.000	1.000
Iq4	Vp1	Ip1	Vp2	Ip2	Vp3	Ip3	Vp4	Ip4			
1.000	0.000	1.000	0.330	1.000	0.660	1.000	1.000	1.000			

Table A-3: BESS Electrical Controller Dynamic Data

Electrical Controller (REECCU1 model) - Generic											
Vdip	Vup	Trv	dbd1	dbd2	Kqv	Iqh1	Iql1	Vref0	Tp	QMax	QMin
0.900	1.100	0.010	-0.10	0.10	2.000	1.000	-1.000	0.000	0.050	0.600	-0.600
Vmax	Vmin	Kqp	Kqi	Kvp	Kvi	Tiq	dPmax	dPmin	Pmax	Pmin	Imax
1.200	0.800	0.000	1.000	0.000	1.000	0.460	1.000	-1.000	1.000	-0.020	1.000
Tpord	Vq1	Iq1	Vq2	Iq2	Vq3	Iq3	Vq4	Iq4	Vp1	Ip1	Vp2
0.010	0.000	1.000	0.330	1.000	0.660	1.000	1.000	1.000	0.000	1.000	0.330
Ip2	Vp3	Ip3	Vp4	Ip4	T	SOCini	SOCmax	SOCmin			
1.000	0.660	1.000	1.000	1.000	7200.0	0.500	1.000	0.00			

Table A-4: Renewable PV Plant Controller (PPC) Dynamic Data

Renewable Plant Control (REPCA1 model) - Generic											
Tfltr	Kp	Ki	Tft	Tfv	Vfrz	Rc	Xc	Kc	Emax	Emin	Dbd1
0.040	0.000	3.5000	0.0000	0.0400	0.8800	0.0019	0.007	0.0400	999.0	-999.0	0.000
Dbd2	QMax	QMin	Kpg	Kig	Tp	fdbd1	fdbd2	femax	femin	Pmax	Pmin
0.000	0.600	-0.600	0.000	0.500	0.0400	0.000	0.000	999.0	-999.0	1.400	0.000
Tg	Ddn	Dup									
0.0400	25.0	25.0									

Table A-5: BESS Plant Controller (PPC) Dynamic Data

Renewable Plant Control (REPCA1 model) - Generic											
Tfltr	Kp	Ki	Tft	Tfv	Vfrz	Rc	Xc	Kc	Emax	Emin	Dbd1
0.040	0.000	3.5000	0.0000	0.0400	0.8800	0.0019	0.007	0.0400	999.0	-999.0	0.000
Dbd2	QMax	QMin	Kpg	Kig	Tp	fdbd1	fdbd2	femax	femin	Pmax	Pmin
0.000	0.600	-0.600	0.000	0.500	0.0400	0.000	0.000	999.0	-999.0	1.000	-0.020
Tg	Ddn	Dup									
0.0400	25.0	25.0									

Attachment A6
Alternative 2 Post- Mitigation Power Flow Diagrams (Scenarios 4, 5, 6)

Post-Project Power Flow Results

Power Flow Diagrams

Alternative 2 Post-Mitigation Power flow diagrams for Scenario 4 2028 SL, Scenario 5 2028 SP, and Scenario 6 2028 WP under Category A condition and Category B contingencies are provided in this attachment as identified in the following tables.

Table A6-1: List of Alternative 2 Post-Mitigation Scenario 4 2028 SL Power Flow Diagrams

Scenario	Load flow diagram	Page number
2028 SL Scenario 4	CATEGORY B, Loss of 9L70 (Oakland 946S - Anderson 801S)	A6-4
	CATEGORY B, Loss of 9L97 (Oakland 946S - Anderson 801S)	A6-5
	CATEGORY B, Loss of 9L912 (Nevis 766S – Red Deer 63S)	A6-6
	CATEGORY B, Loss of 9L953 (Cordel 755S - Nilrem 574S)	A6-7

Table A6-2: List of Alternative 2 Post-Mitigation Scenario 5 2028 SP Power Flow Diagrams

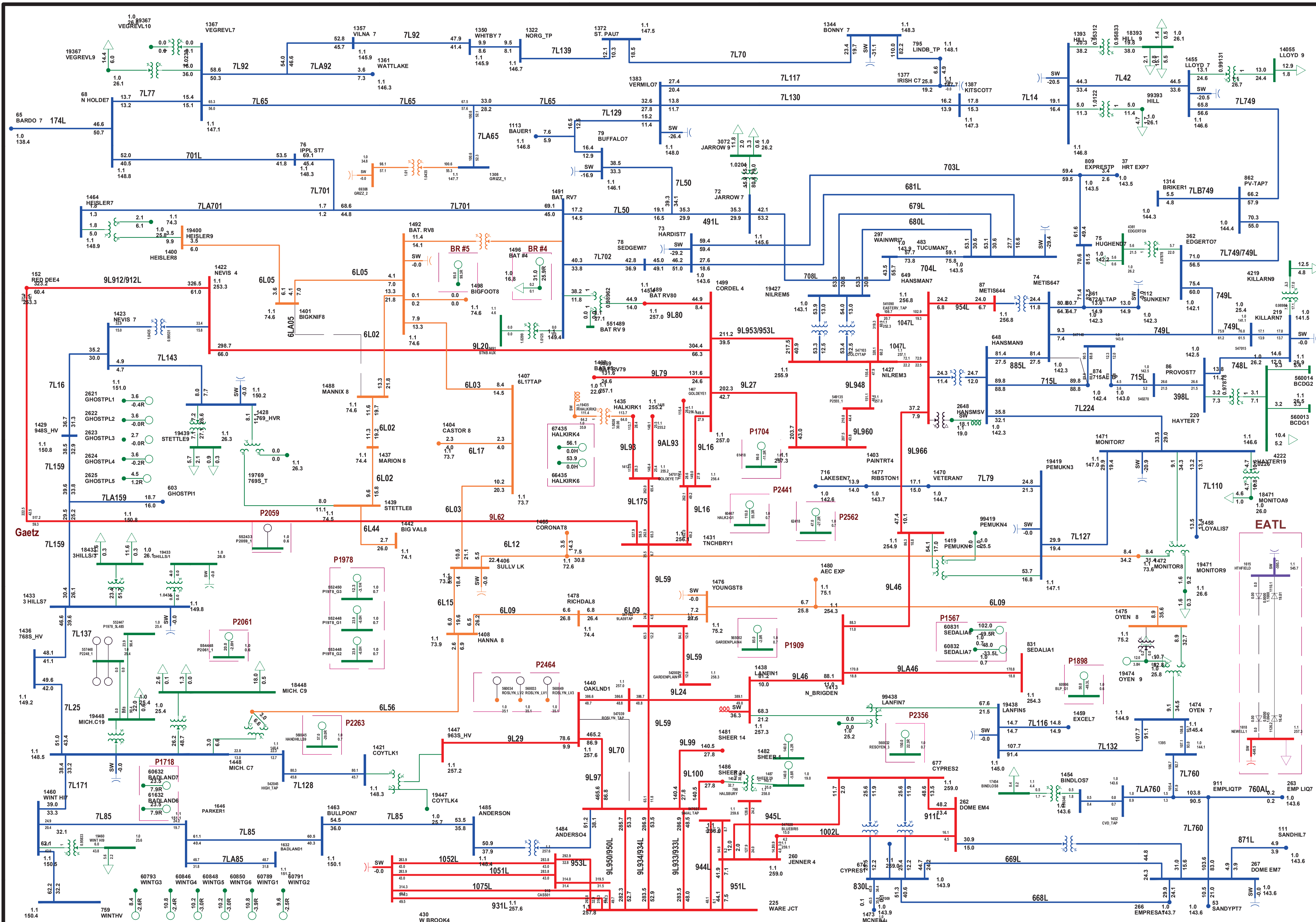
Scenario	Load flow diagram	Page number
2028 SP Scenario 5	CATEGORY B, Loss of 9L29 (Coyote Lake 963S - Oakland 946S)	A6-8
	CATEGORY B, Loss of 9L70 (Oakland 946S - Anderson 801S)	A6-9
	CATEGORY B, Loss of 9L97 (Oakland 946S - Anderson 801S)	A6-10
	CATEGORY B, Loss of 933L (Anderson 801S - Ware Junction 132S)	A6-11
	CATEGORY B, Loss of 934L (Anderson 801S - Ware Junction 132S)	A6-12
	CATEGORY B, Loss of 950L (Anderson 801S - Ware Junction 132S)	A6-13
	CATEGORY B, Loss of Coyote Lake 963S_901T	A6-14

Table A6-3: List of Alternative 2 Post-Mitigation Scenario 6 2028 WP Power Flow Diagrams

Scenario	Load flow diagram	Page number
2024 WP Scenario 6	CATEGORY B, Loss of 749L (Edgerton 899S - Metiskow 648S)	A6-15
	CATEGORY B, Loss of 7L171 (Michichi Creek 802S - Wintering Hills 804S)	A6-16
	CATEGORY B, Loss of 7L749 (Edgerton 899S - Lloyminster 716S)	A6-17
	CATEGORY B, Loss of 9L20 (Nevis 766S - Cordel 755S)	A6-18
	CATEGORY B, Loss of 9L24 (Lanfine 959S - Oakland 946S)	A6-19
	CATEGORY B, Loss of 9L62 (Tinchebray 972S - Gaetz 87S)	A6-20
	CATEGORY B, Loss of 9L70 (Oakland 946S - Anderson 801S)	A6-21
	CATEGORY B, Loss of 9L97 (Oakland 946S - Anderson 801S)	A6-22
	CATEGORY B, Loss of 9L912 (Nevis 766S – Red Deer 63S)	A6-23

Scenario	Load flow diagram	Page number
	CATEGORY B, Loss of 9L953 (Cordel 755S - Nilrem 574S)	A6-24
	CATEGORY B, Loss of 9L966 (Hansman Lake 650S - Pemukan 932S)	A6-25
	CATEGORY B, Loss of 885L (Metiskow 648S - Hansman Lake 650S)	A6-26
	CATEGORY B, Loss of Grizzly Bear 708S T1	A6-27
	CATEGORY B, Loss of Edgerton_899ST3	A6-28
	CATEGORY B, Loss of EATL	A6-29

Scenario 4
2028 SL Post-Project (Alternative 2)



P2464 - Sunnynook Solar Battery Project

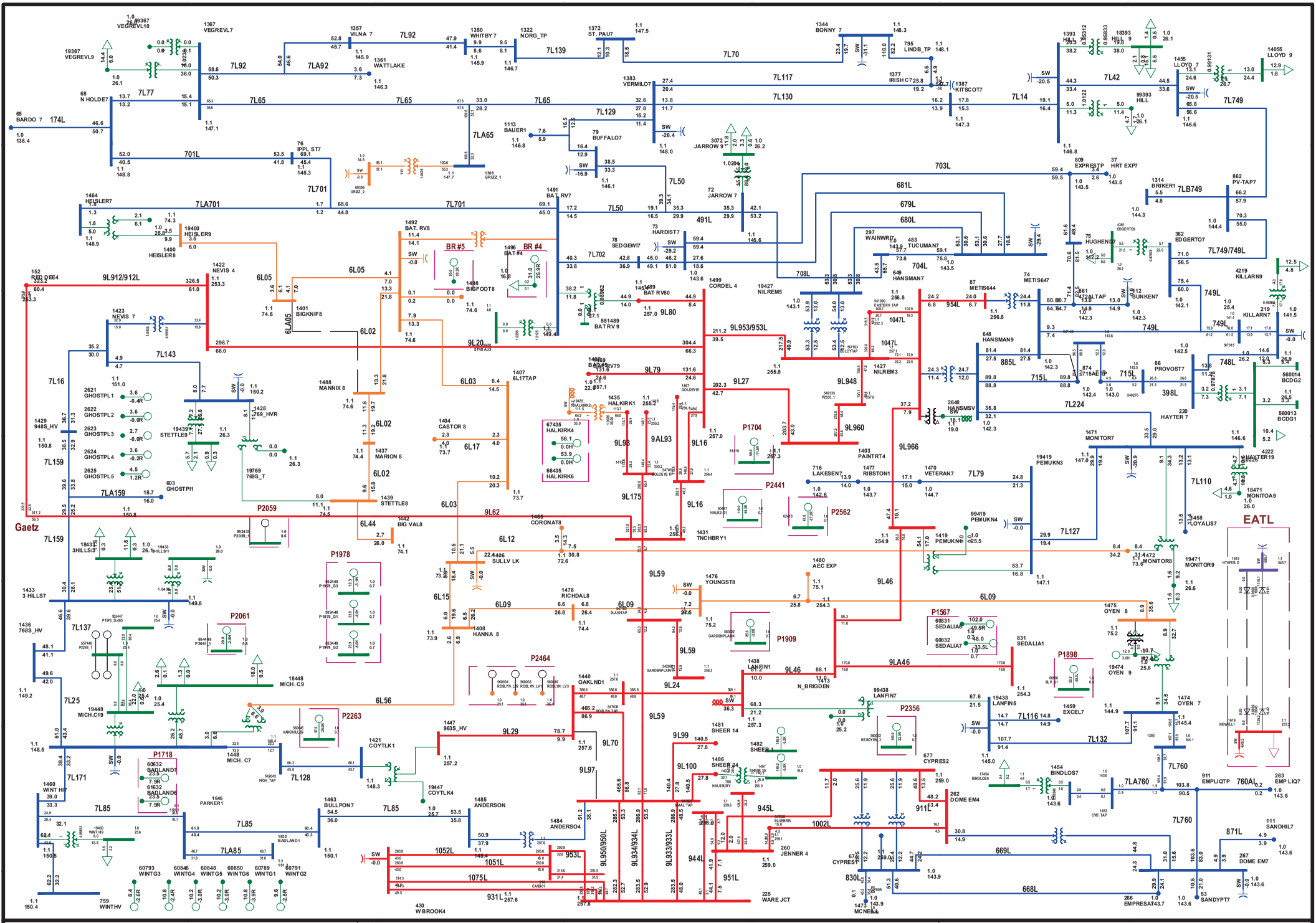
"CATEGORY B, LOSS OF 9L70 (OAKLAND 946S - ANDERSON 801S)"
SCENARIO 4_2028 SL_POST RAS

THU, APR 11 2024 15:50

A6 - 4

Bus - Voltage (kV/pu)
Branch - MVA/% Rate A
Equipment - MW/Mvar
100.0%Rate A

kV: >0.000 <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 <=500.000 >500.000



P2464 - Sunnynook Solar Battery Project

"CATEGORY B, LOSS OF 9L97 (OAKLAND 946S - ANDERSON 801S)"
SCENARIO 4_2028 SL_POST RAS

THU, APR 11 2024 15:52

A6 - 5

Bus - Voltage (kV/pu)
Branch - MVA/% Rate A
Equipment - MW/Mvar
100.0%Rate A

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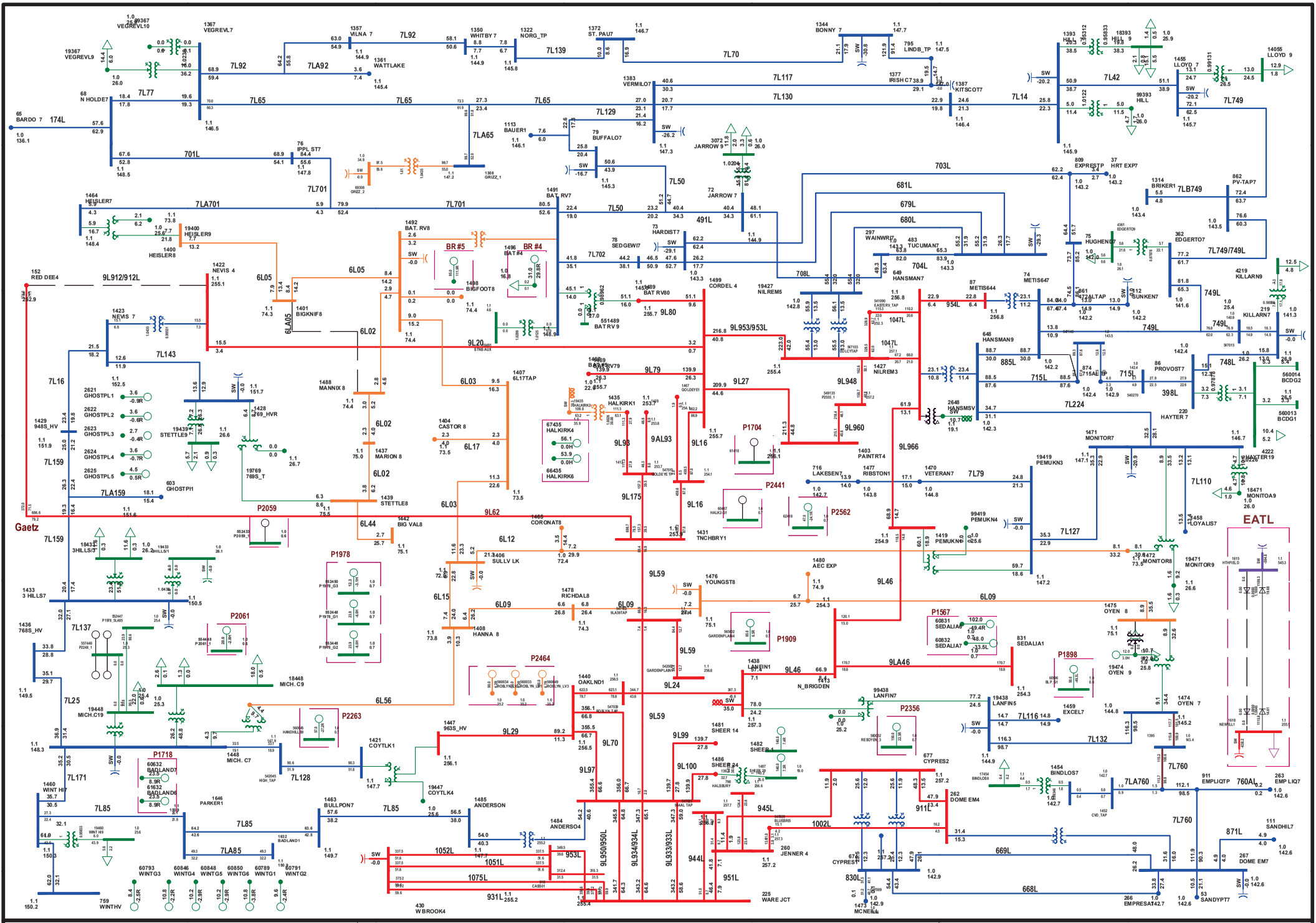

P2464 - Sunnynook Solar Battery Project

"CATEGORY B, LOSS OF 9L912 (NEVIS 766S – RED DEER 63S)"
SCENARIO 4_2028 SL_POST RAS

THU, APR 11 2024 15:52

A6 - 6

Bus - Voltage (kV/pu)
Branch - MVA/% Rate A
Equipment - MW/Mvar
100.0%Rate A

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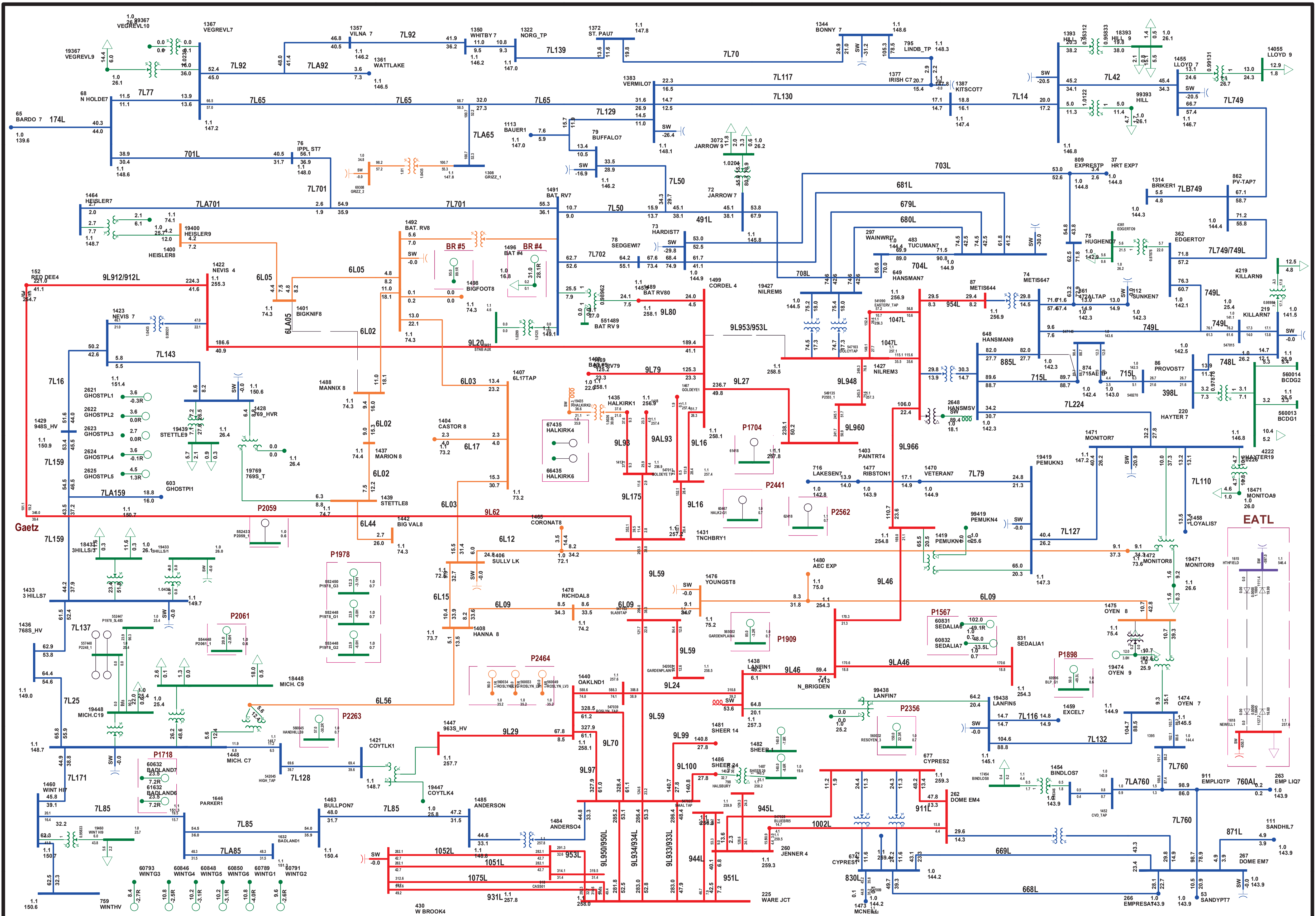

P2464 - Sunnybrook Solar Battery Project

"CATEGORY B, LOSS OF 9L953 (CORDEL 755S - NILREM 574S)"
SCENARIO 4_2028 SL_POST RAS

THU, APR 11 2024 15:52

A6 - 7

Bus - Voltage (kV/pu)
Branch - MVA/% Rate A
Equipment - MW/Mvar
100.0%Rate A

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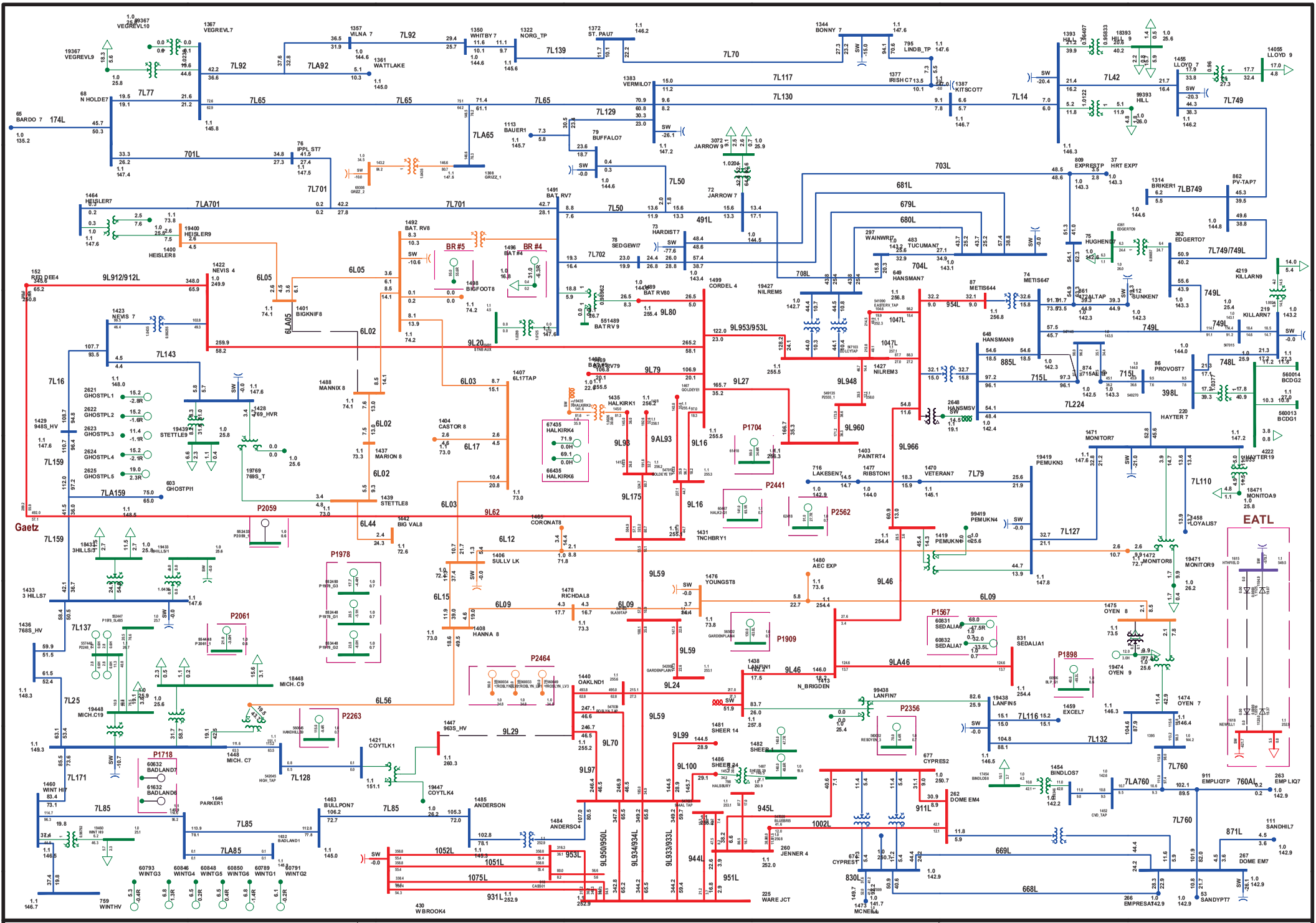
Scenario 5
2028 SP Post-Project (Alternative 2)


Gaetz
EATL
P2464 - Sunnynook Solar Battery Project
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SCENARIO 5_2028 SP_POST RAS
THU, APR 11 2024 15:53
A6 - 8
Bus - Voltage (kV/pu)
Branch - MVA/% Rate A
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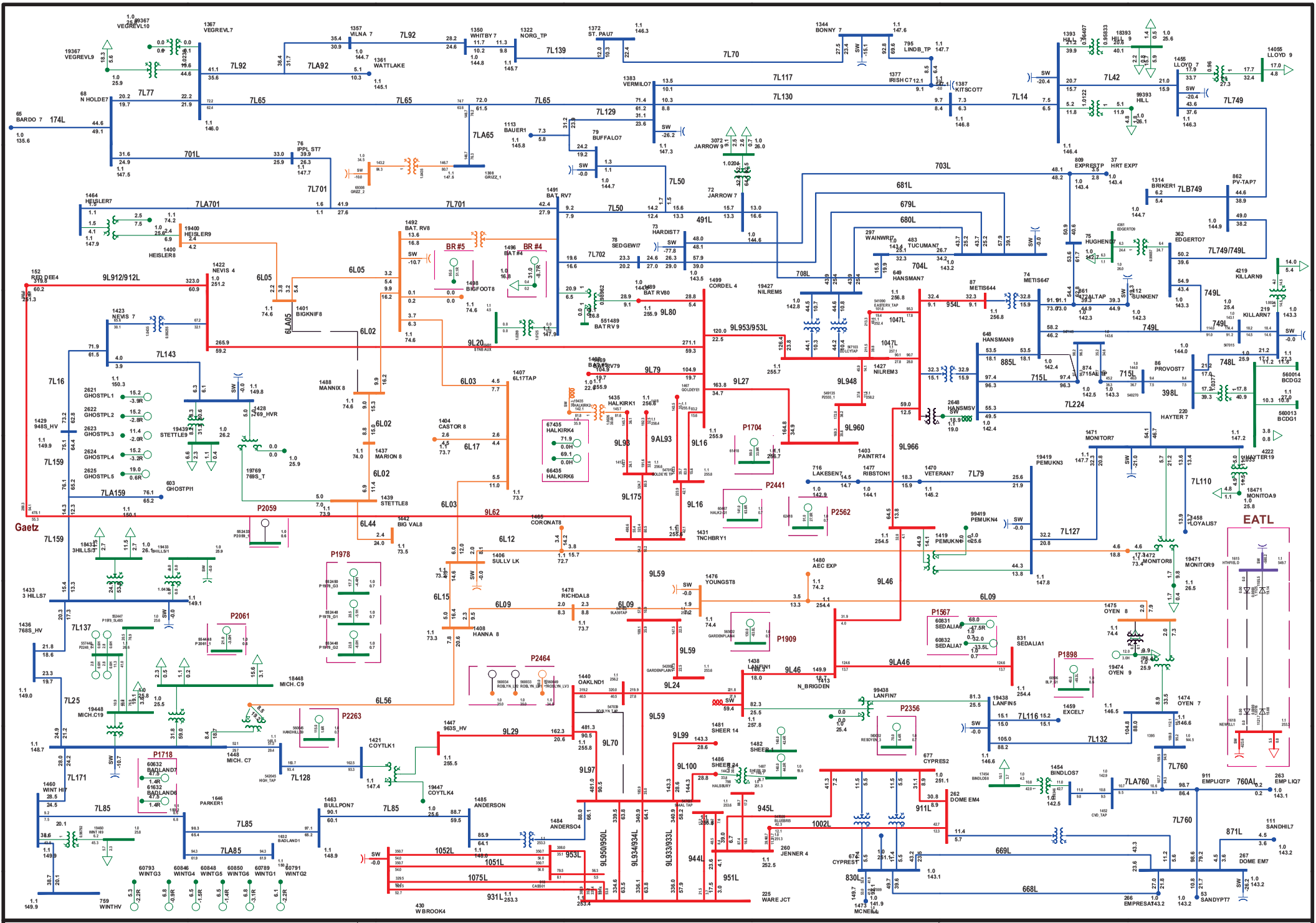
Gaetz
EATL
P2464 - Sunnynook Solar Battery Project
"CATEGORY B, LOSS OF 9L70 (OAKLAND 946S - ANDERSON 801S)"
SCENARIO 5_2028 SP_POST RAS
THU, APR 11 2024 15:53
A6 - 9
Bus - Voltage (kV/pu)
Branch - MVA/% Rate A
Equipment - MW/Mvar
100.0%Rate A
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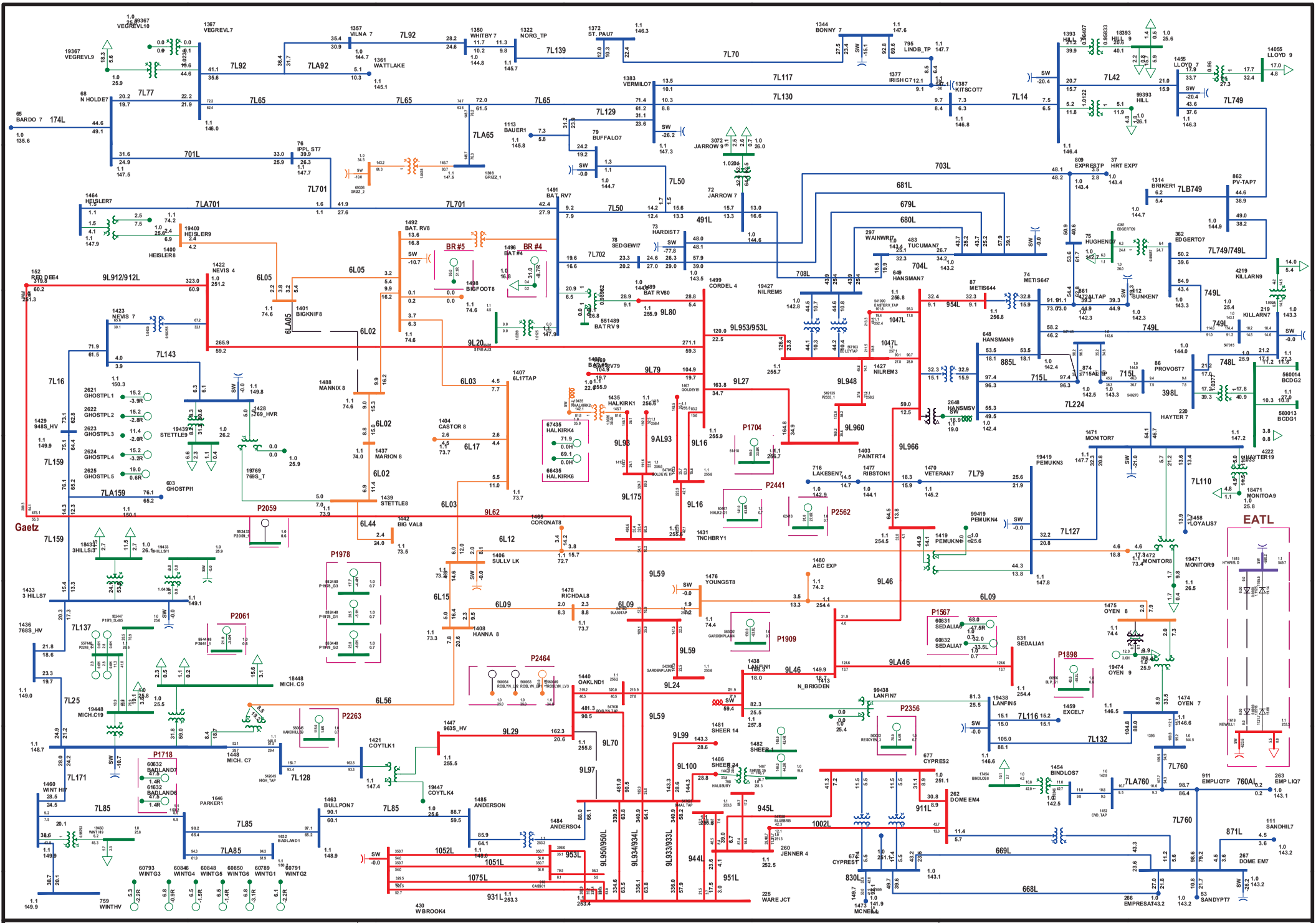
Gaetz
EATL
P2464 - Sunnynook Solar Battery Project
"CATEGORY B, LOSS OF 9L97 (OAKLAND 946S - ANDERSON 801S)"
SCENARIO 5_2028 SP_POST RAS
THU, APR 11 2024 15:53
A6 - 10
Bus - Voltage (kV/pu)
Branch - MVA/% Rate A
Equipment - MW/Mvar
100.0%Rate A
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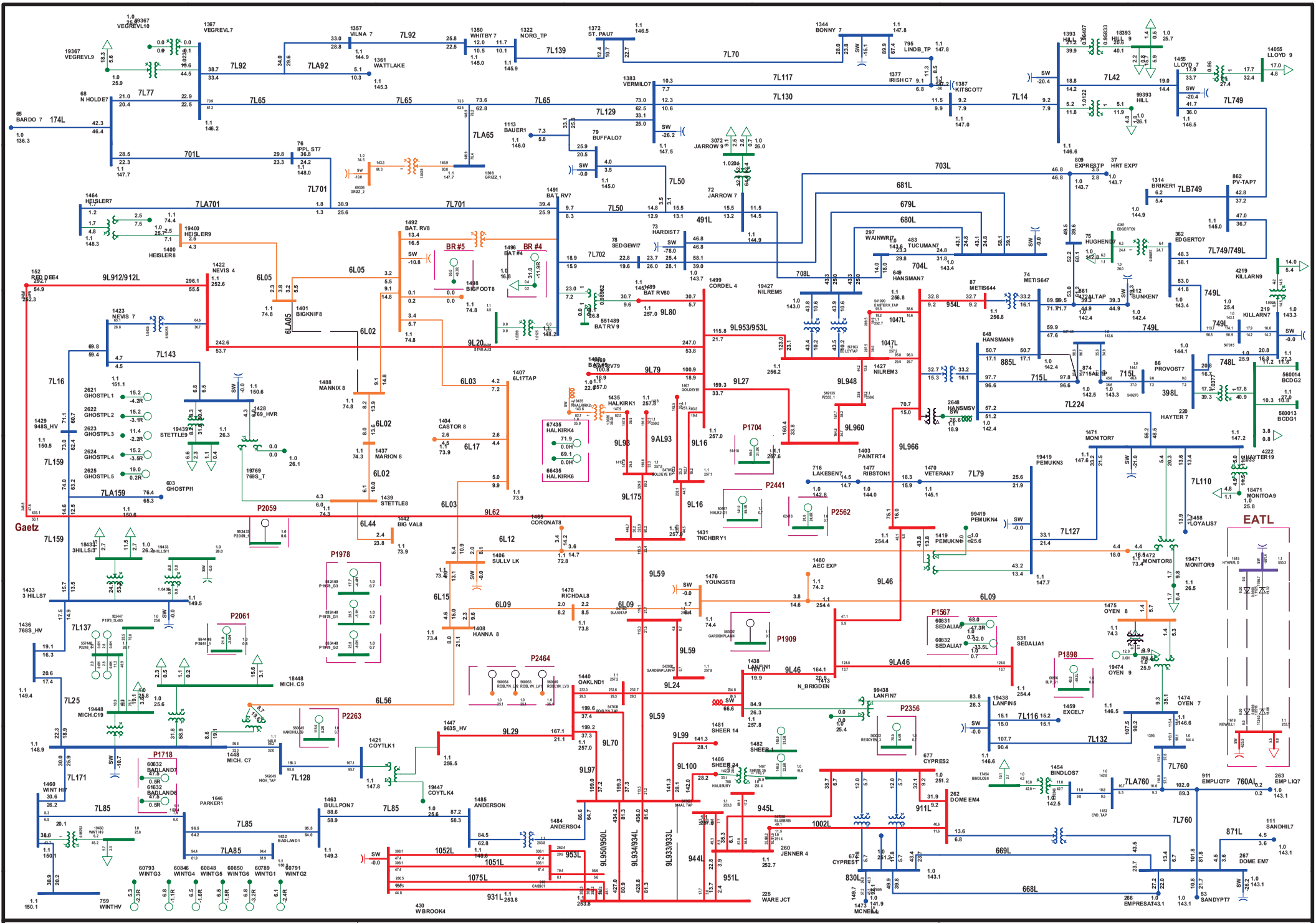

P2464 - Sunnynook Solar Battery Project

"CATEGORY B, LOSS OF 933L (ANDERSON 801S - WARE JUNCTION 132 SCENARIO 5_2028 SP_POST RAS

THU, APR 11 2024 15:53

A6 - 11

1

Bus - Voltage (kV/pu)
Branch - MVA/% Rate A
Equipment - MW/Mvar
100.0%Rate A

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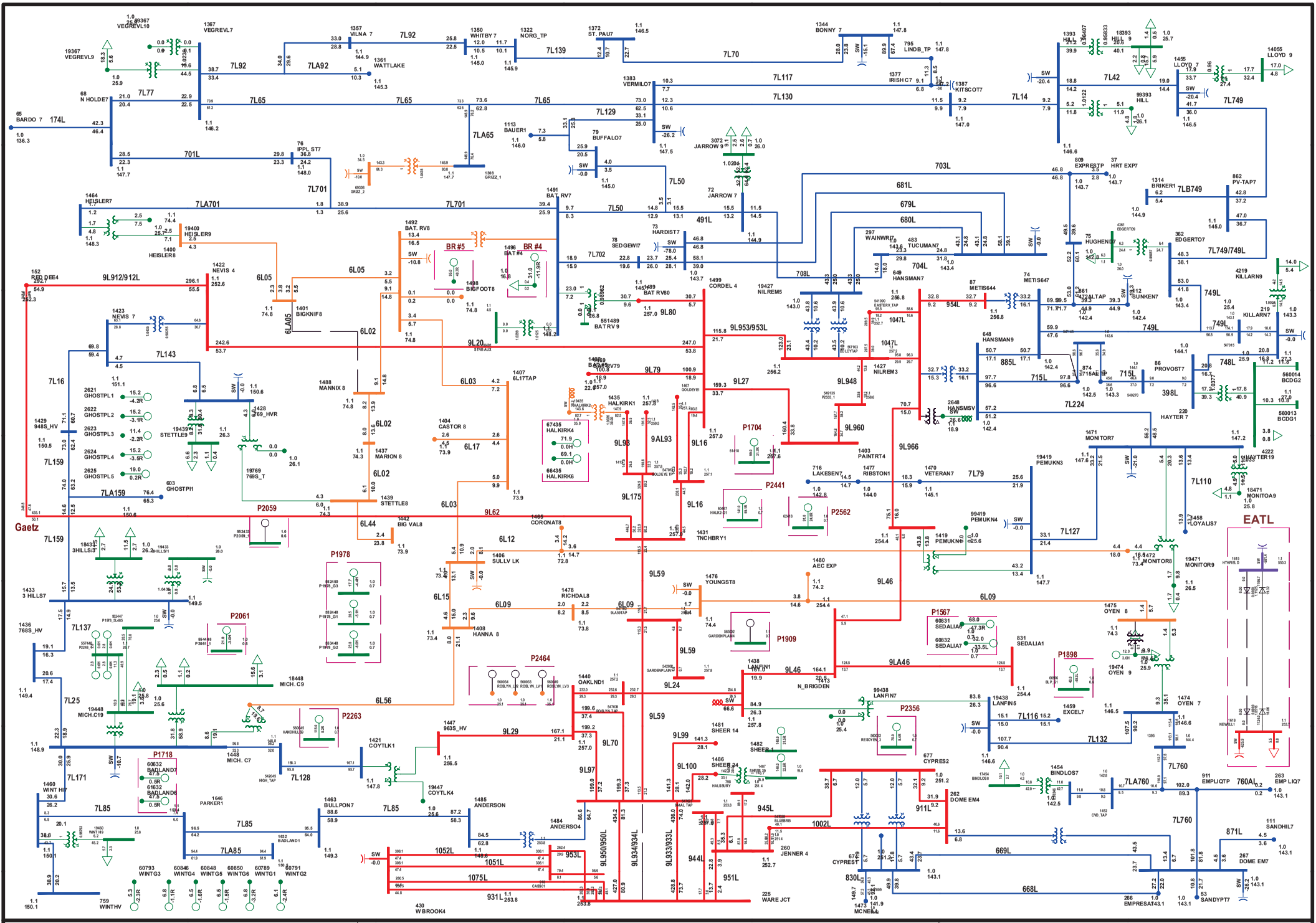


P2464 - Sunnynook Solar Battery Project

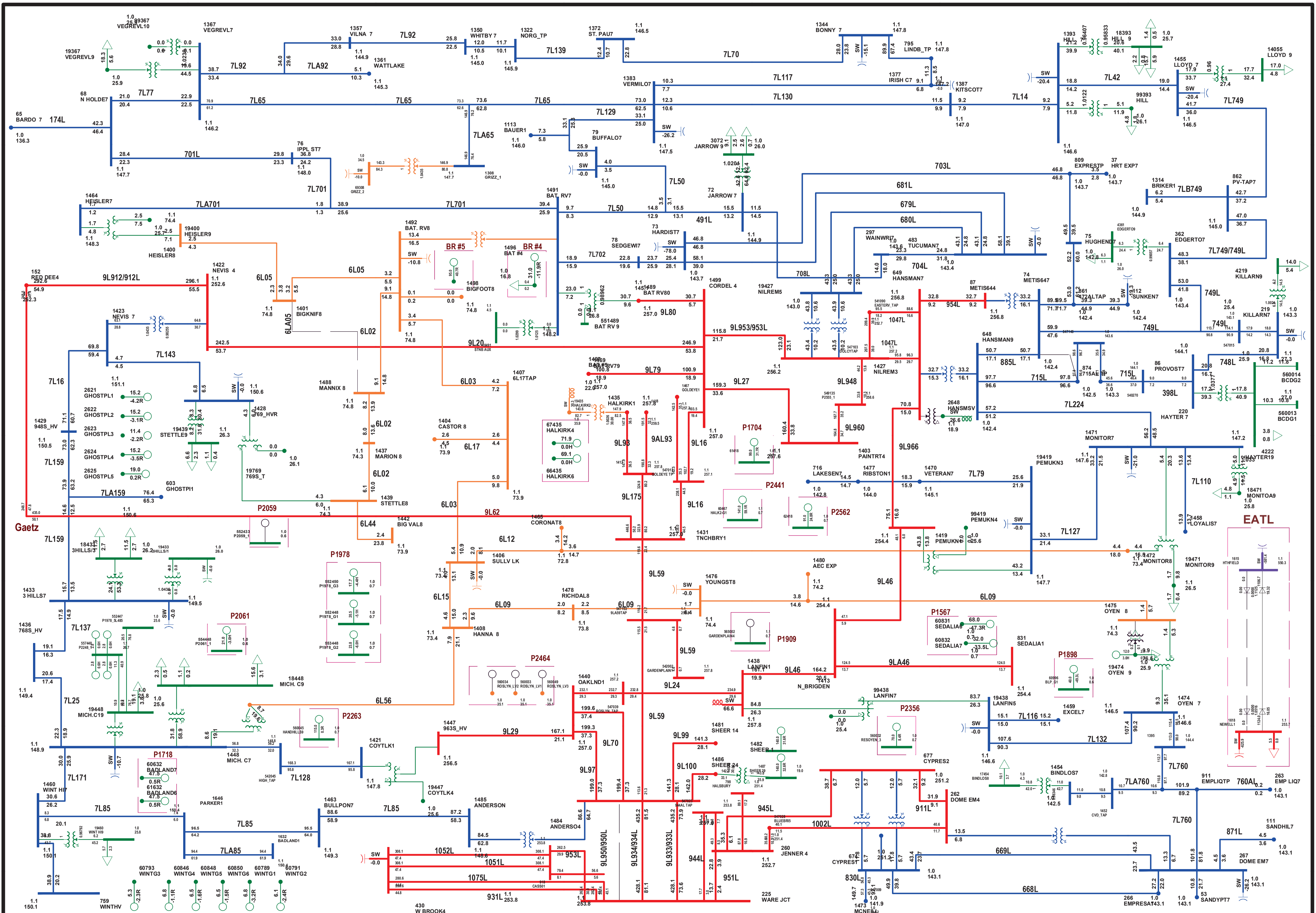
"CATEGORY B, LOSS OF 934L (ANDERSON 801S - WARE JUNCTION 132 SCENARIO 5_2028 SP_POST RAS

THU, APR 11 2024 15:54

A6 - 12

Bus - Voltage (kV/pu)
Branch - MVA/% Rate A
Equipment - MW/Mvar
100.0%Rate A

kV: >0.000 <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 <=500.000 >500.000



P2464 - Sunnynook Solar Battery Project

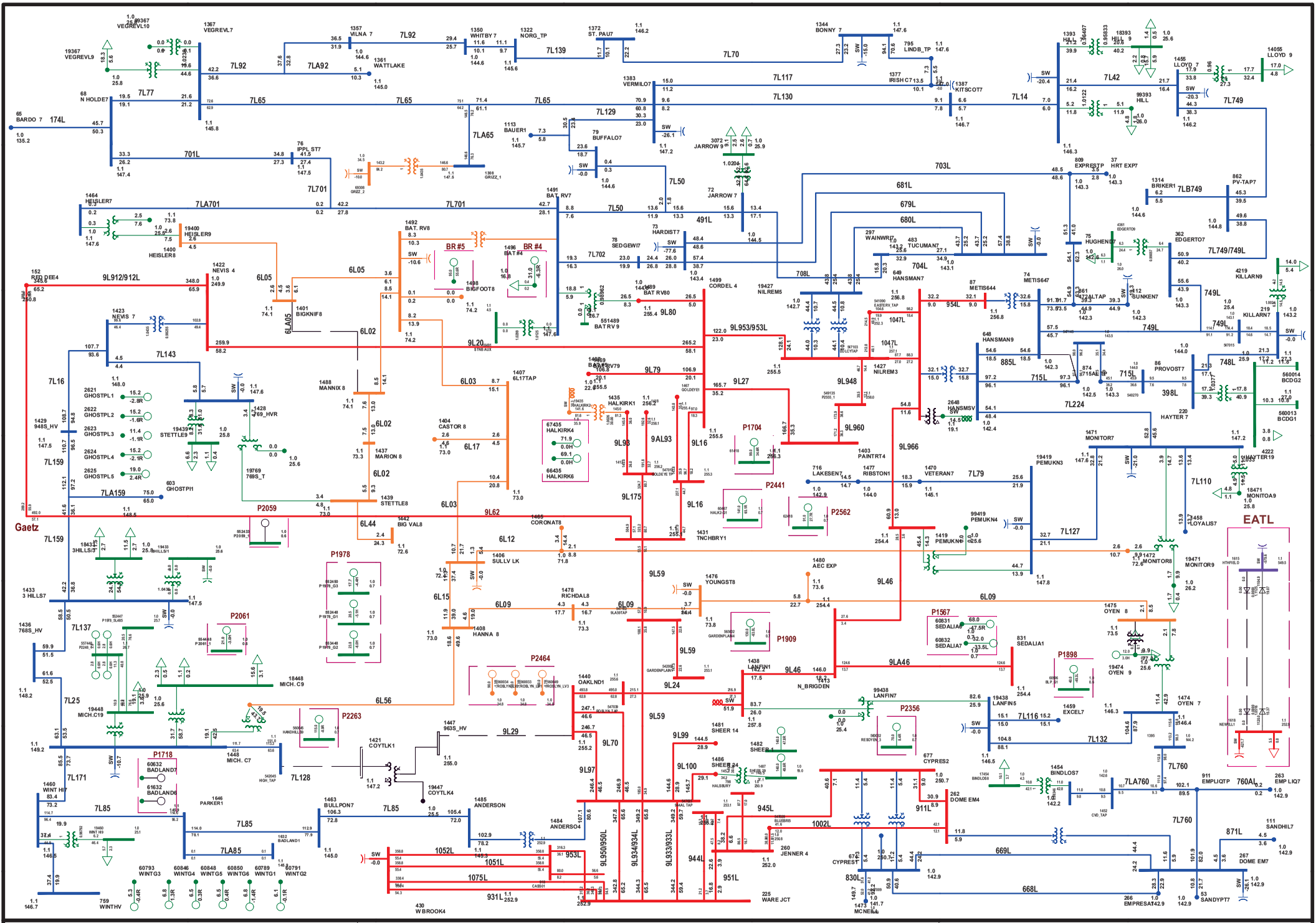
"CATEGORY B, LOSS OF 950L (ANDERSON 801S - WARE JUNCTION 132
SCENARIO 5_2028 SP_POST RAS

THU, APR 11 2024 15:54

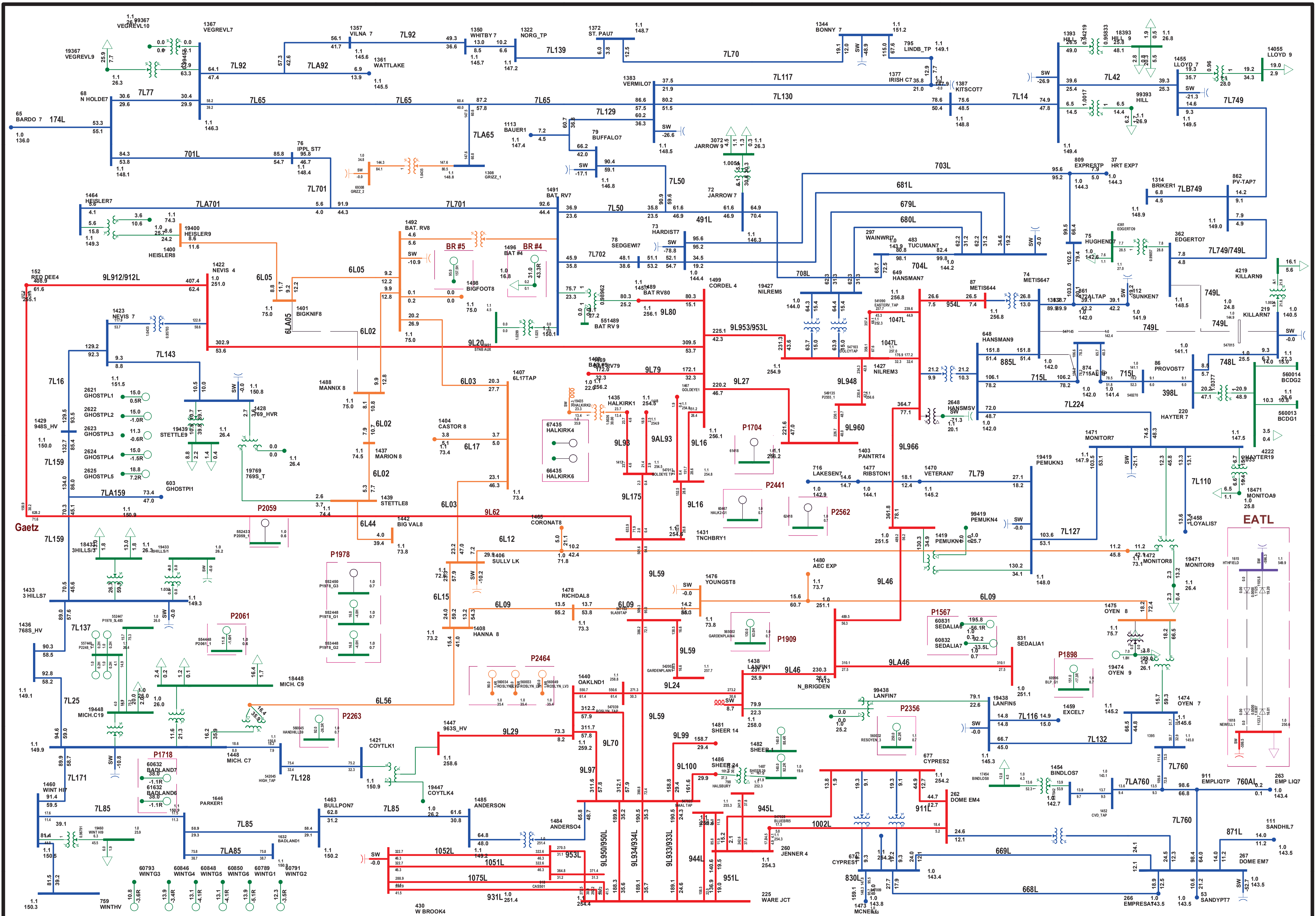
A6 - 13

Bus - Voltage (kV/pu)
Branch - MVA/% Rate A
Equipment - MW/Mvar
100.0%Rate A

kV: >0.000 <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 <=500.000 >500.000


Gaetz
EATL
P2464 - Sunnynook Solar Battery Project
"CATEGORY B, LOSS OF COYOTE LAKE 963S_901T"
SCENARIO 5_2028 SP_POST RAS
THU, APR 11 2024 15:54
A6 - 14
Bus - Voltage (kV/pu)
Branch - MVA/% Rate A
Equipment - MW/Mvar
100.0%Rate A
kV: >0.000 <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 <=500.000 >500.000

Scenario 6
2028 WP Post-Project (Alternative 2)



P2464 - Sunnynook Solar Battery Project

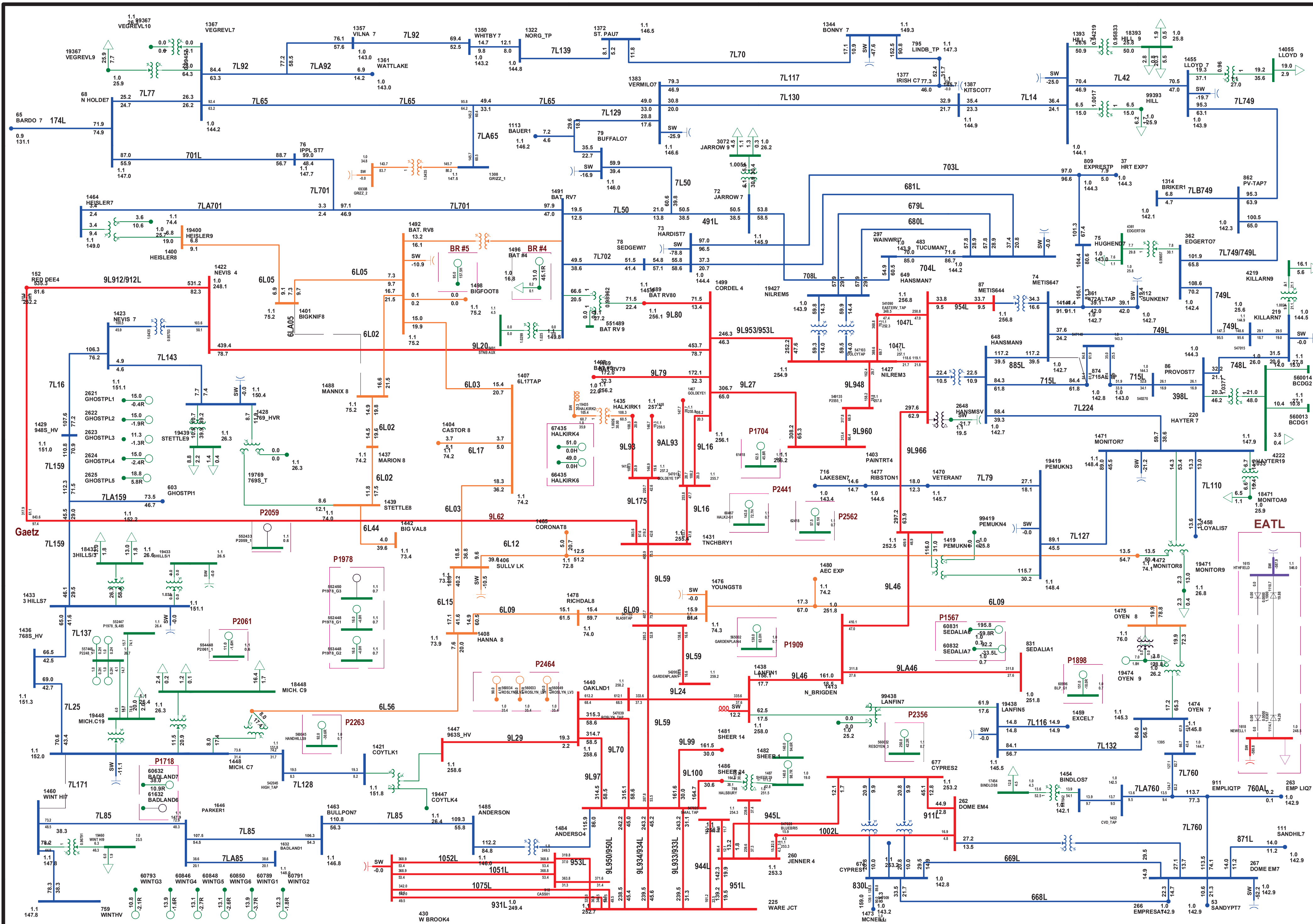
"CATEGORY B, LOSS OF 749L (EDGERTON 899S - METISKOW 648S)"
SCENARIO 6_2028 WP_POST RAS

THU, APR 11 2024 15:56

A6 - 15

Bus - Voltage (kV/pu)
Branch - MVA/% Rate B
Equipment - MW/Mvar
100.0%Rate B

kV: >0.000 <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 <=500.000 >500.000



P2464 - Sunnynook Solar Battery Project

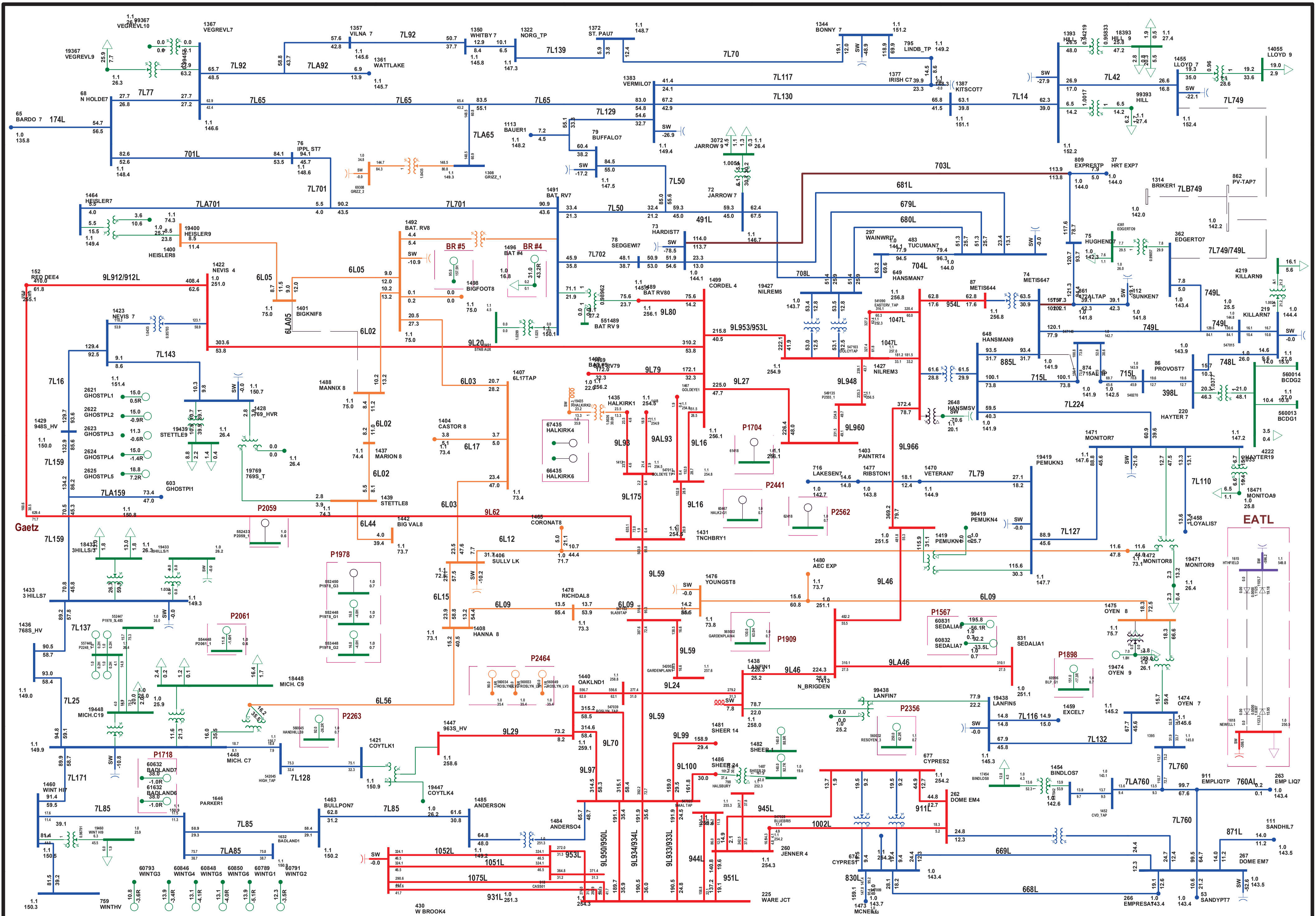
"CATEGORY B, LOSS OF 7L171 (MICHICHI CREEK 802S - WINTERING
SCENARIO 6_2028 WP_POST RAS

THU, APR 11 2024 15:56

A6 - 16

Bus - Voltage (kV/pu)
Branch - MVA/% Rate B
Equipment - MW/Mvar
100.0%Rate B

kV: >0.000 <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 <=500.000 >500.000



"CATEGORY B, LOSS OF 7L749 (EDGERTON 899S - LLOYMINSTER 716S
SCENARIO 6_2028 WP_POST RAS

THU, APR 11 2024 15:57

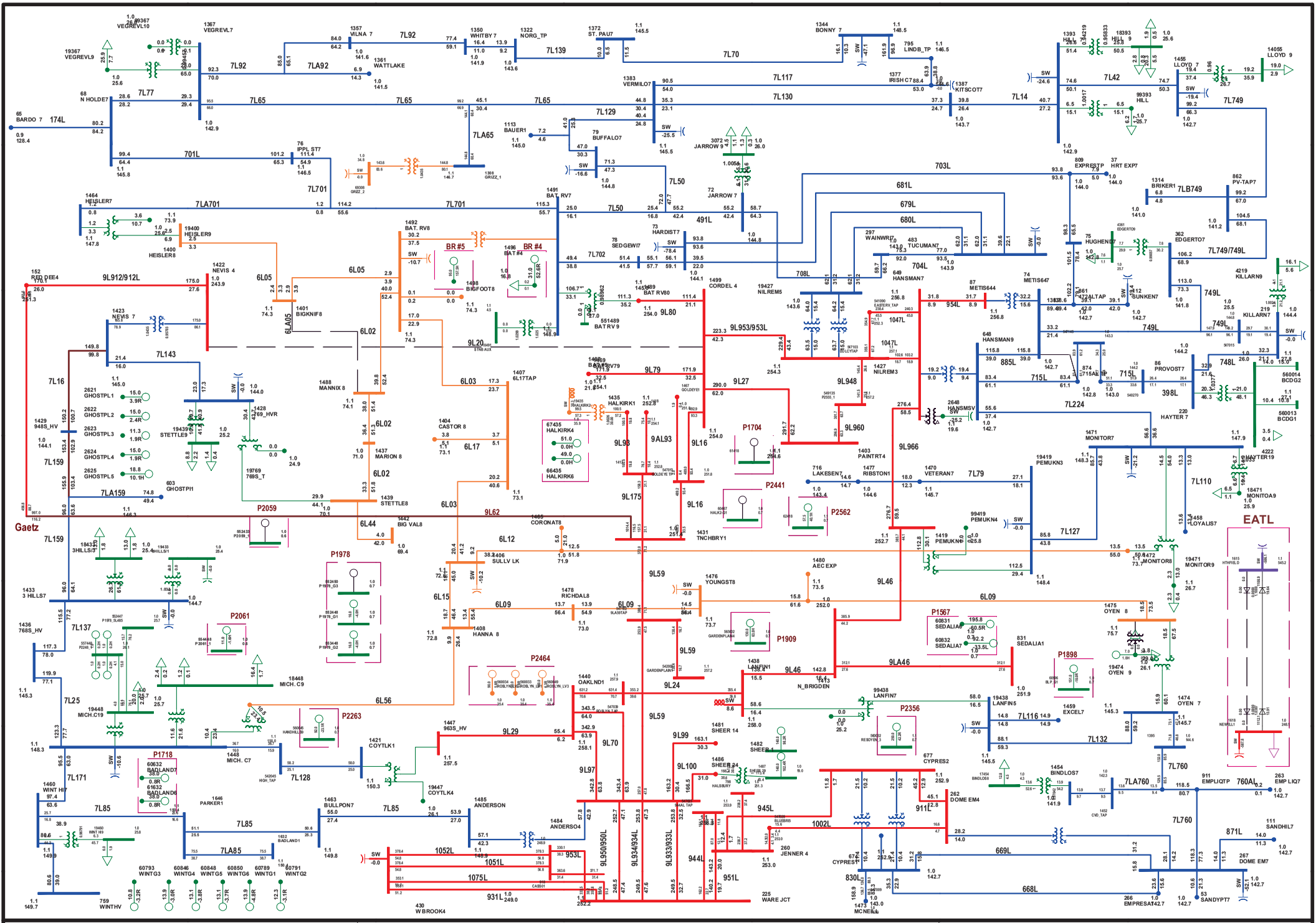
A6 - 17

P2464 - Sunnynook Solar Battery Project

Bus - Voltage (kV/pu)
Branch - MVA/% Rate B
Equipment - MW/Mvar
100.0%Rate B

kV: >0.000 <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 <=500.000 >500.000

1



P2464 - Sunnynook Solar Battery Project

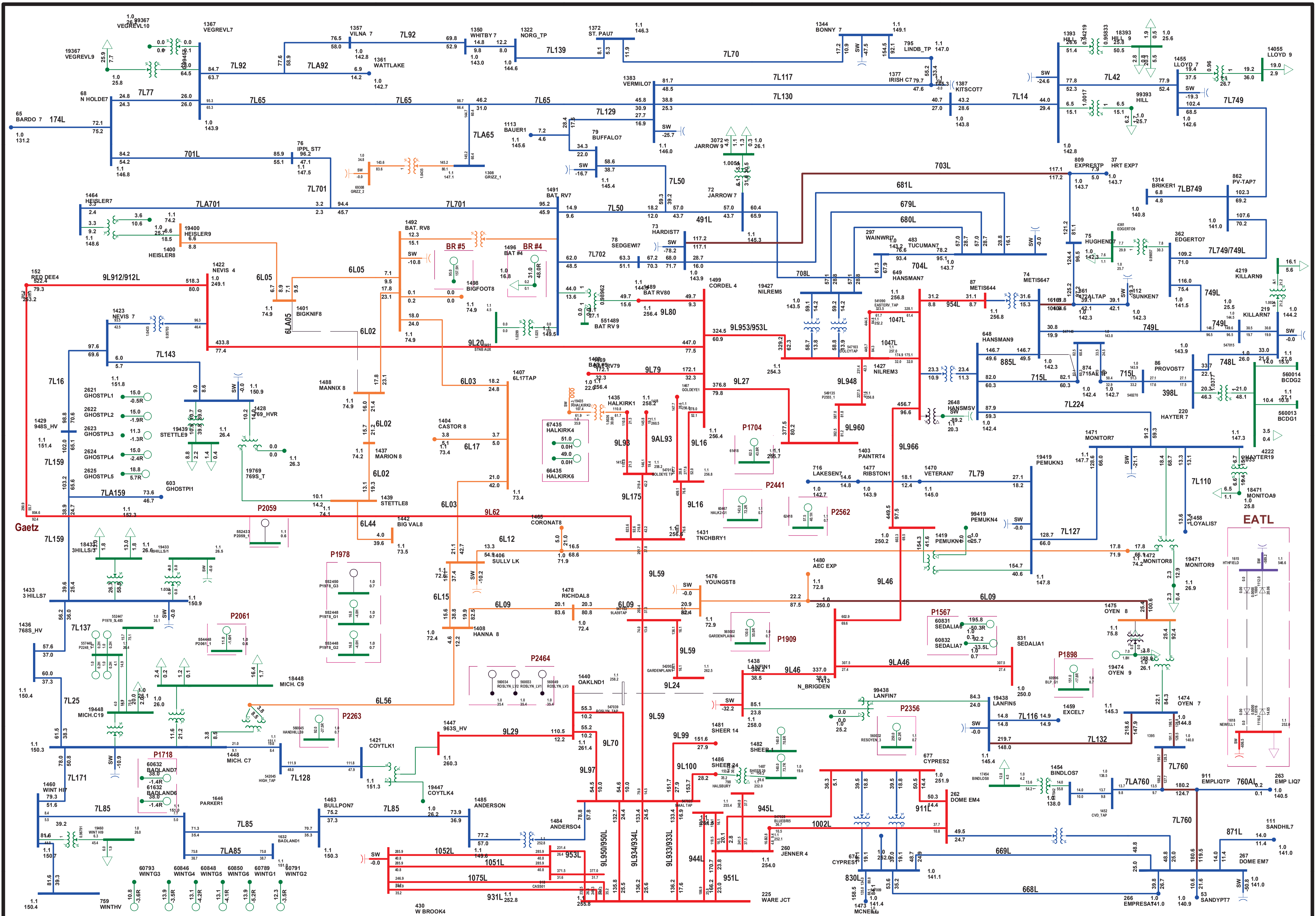
"CATEGORY B, LOSS OF 9L20 (NEVIS 766S - CORDEL 755S)"
SCENARIO 6_2028 WP_POST RAS

THU, APR 11 2024 15:57

A6 - 18

Bus - Voltage (kV/pu)
Branch - MVA/% Rate B
Equipment - MW/Mvar
100.0%Rate B

kV: >0.000 <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 <=500.000 >500.000



P2464 - Sunnynook Solar Battery Project

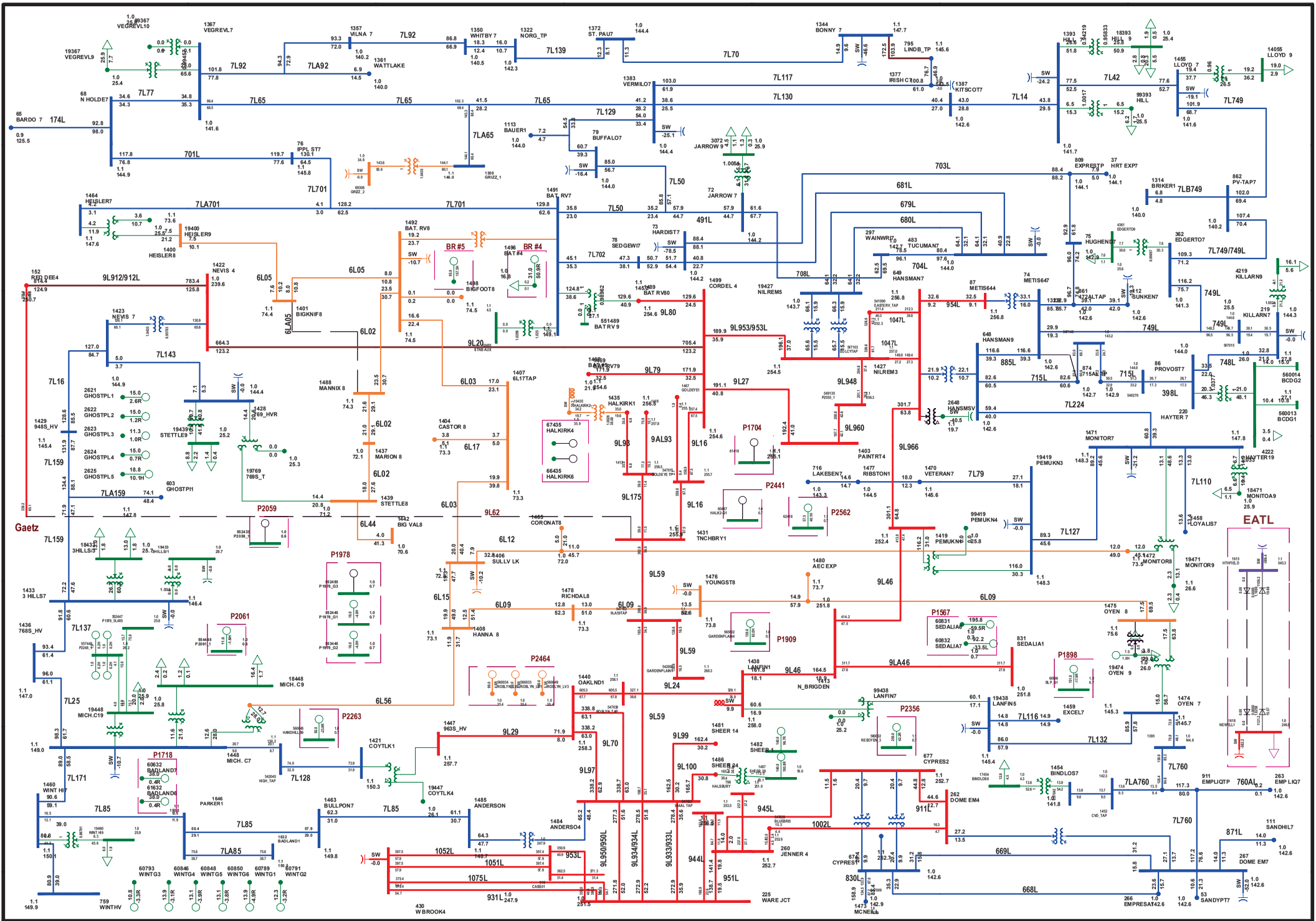
"CATEGORY B, LOSS OF 9L24 (LANFINE 959S - OAKLAND 946S)"
SCENARIO 6_2028 WP_POST RAS

THU, APR 11 2024 15:57

A6 - 19

Bus - Voltage (kV/pu)
Branch - MVA/% Rate B
Equipment - MW/Mvar
100.0%Rate B

kV: >0.000 <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 <=500.000 >500.000



P2464 - Sunnynook Solar Battery Project

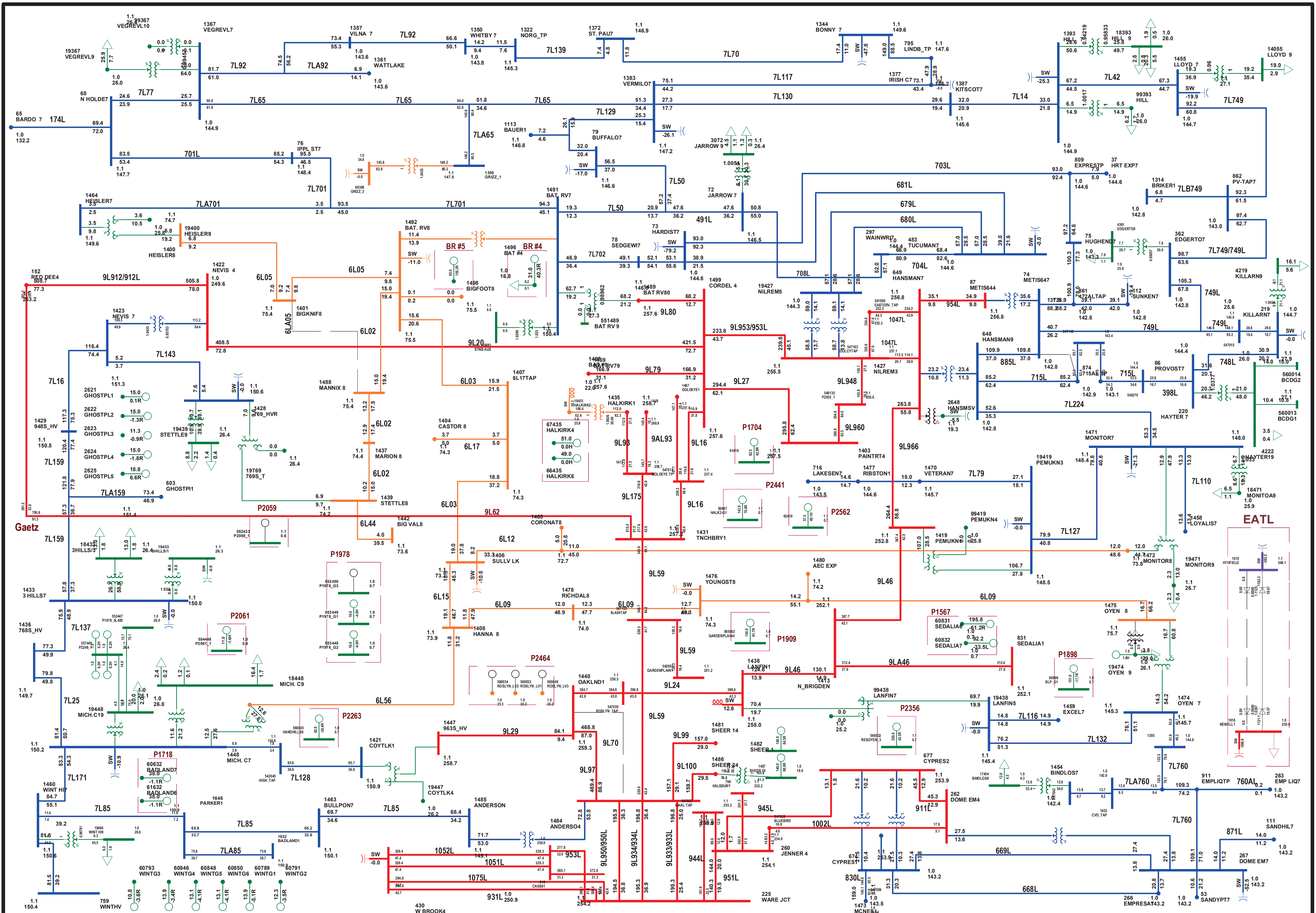
"CATEGORY B, LOSS OF 9L62 (TINCHEBRAY 972S - GAETZ 87S)"
SCENARIO 6_2028 WP_POST RAS

THU, APR 11 2024 15:57

A6 - 20

Bus - Voltage (kV/pu)
Branch - MVA/% Rate B
Equipment - MW/Mvar
100.0%Rate B

kV: >0.000 <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 <=500.000 >500.000



P2464 - Sunnynook Solar Battery Project

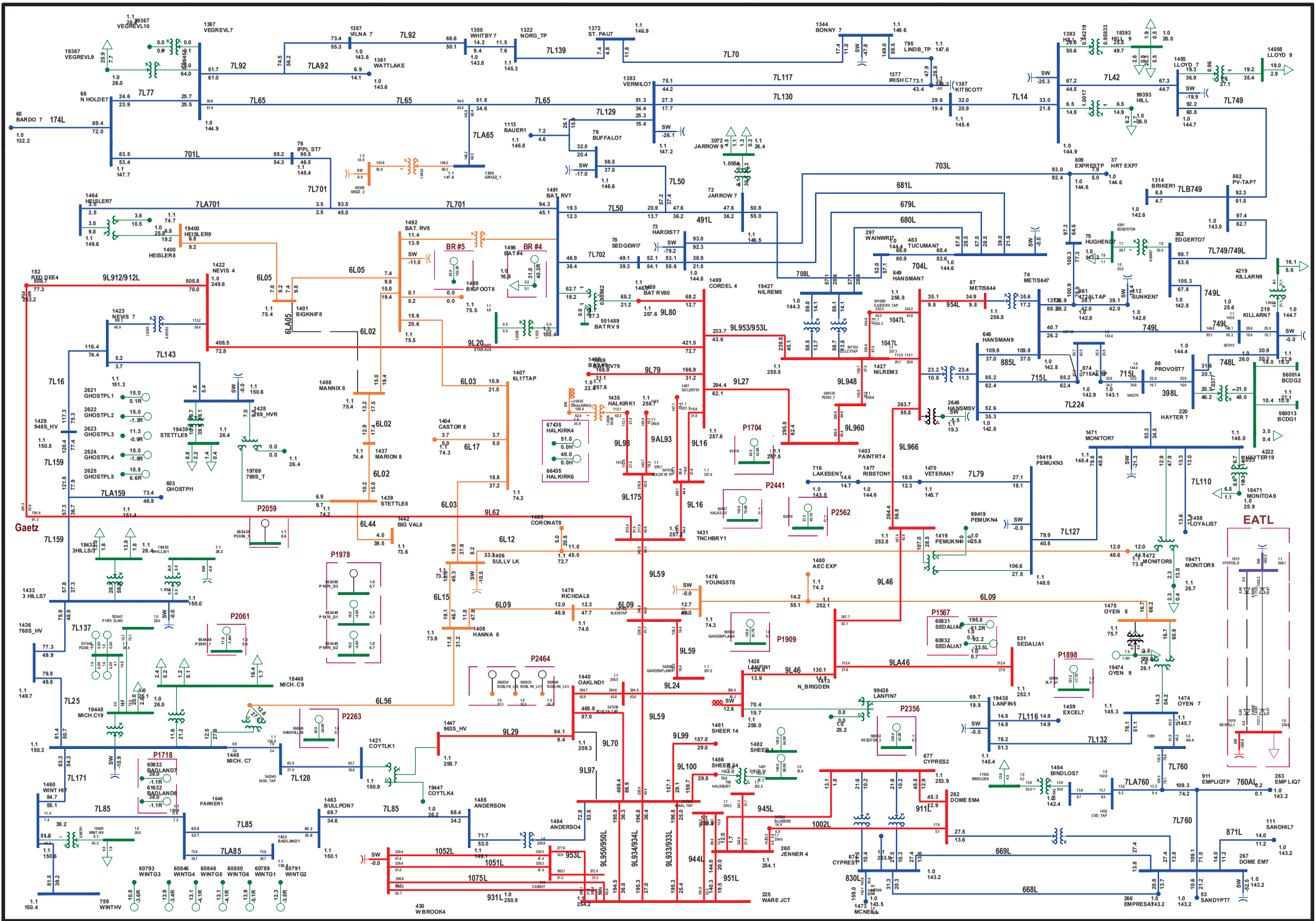
"CATEGORY B, LOSS OF 9L70 (OAKLAND 946S - ANDERSON 801S)"
SCENARIO 6_2028 WP_POST RAS

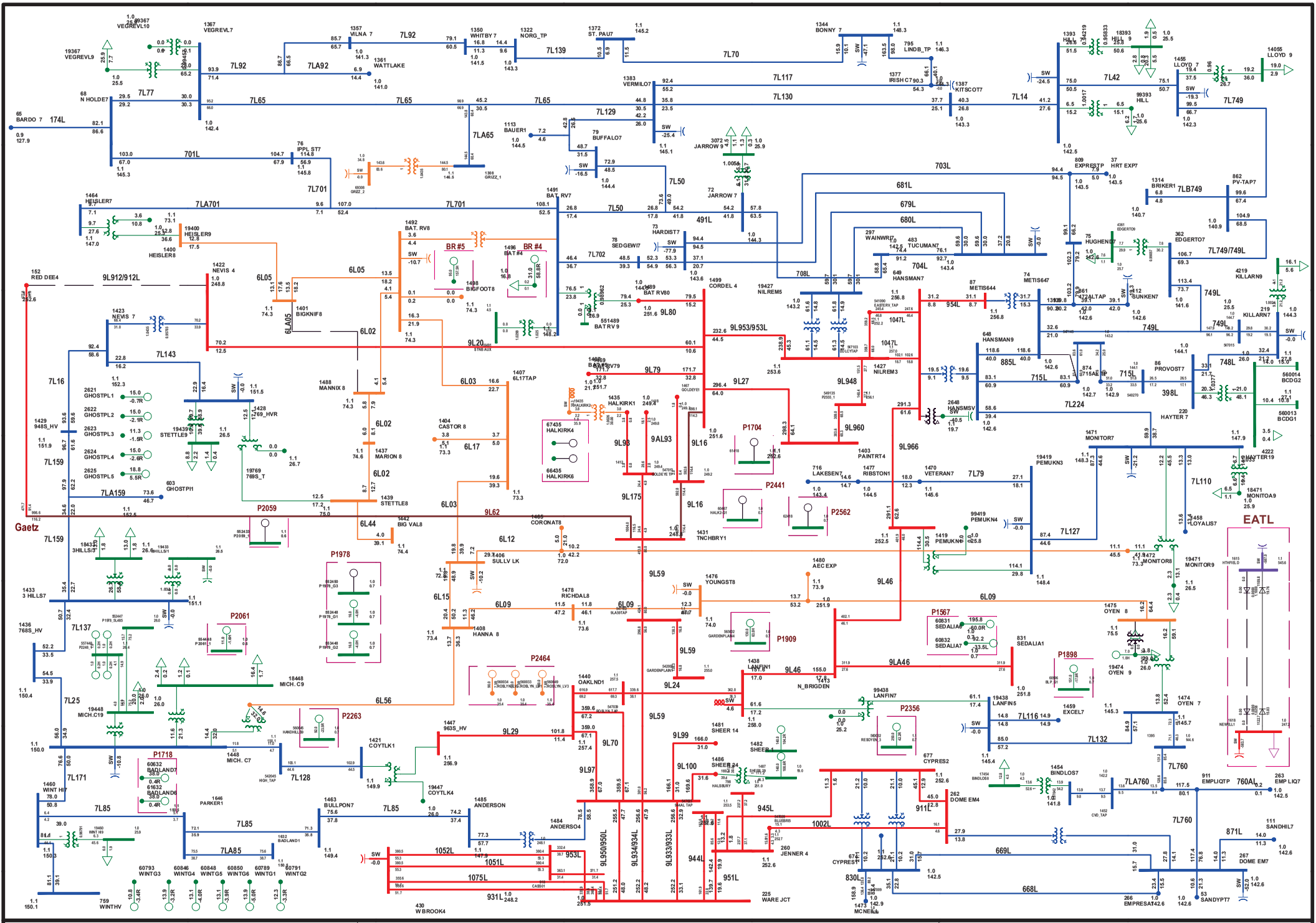
THU, APR 11 2024 15:58

A6 - 21

Bus - Voltage (kV/pu)
Branch - MVA/% Rate B
Equipment - MW/Mvar
100.0%Rate B

kV: >0.000 <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 <=500.000 >500.000


Gaetz
EATL
P2464 - Sunnynook Solar Battery Project
"CATEGORY B, LOSS OF 9L97 (OAKLAND 946S - ANDERSON 801S)"
SCENARIO 6_2028 WP_POST RAS
THU, APR 11 2024 15:58
A6 - 22
Bus - Voltage (kV/pu)
Branch - MVA/% Rate B
Equipment - MW/Mvar
100.0%Rate B
kV: >0.000 <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 <=500.000 >500.000



P2464 - Sunnynook Solar Battery Project

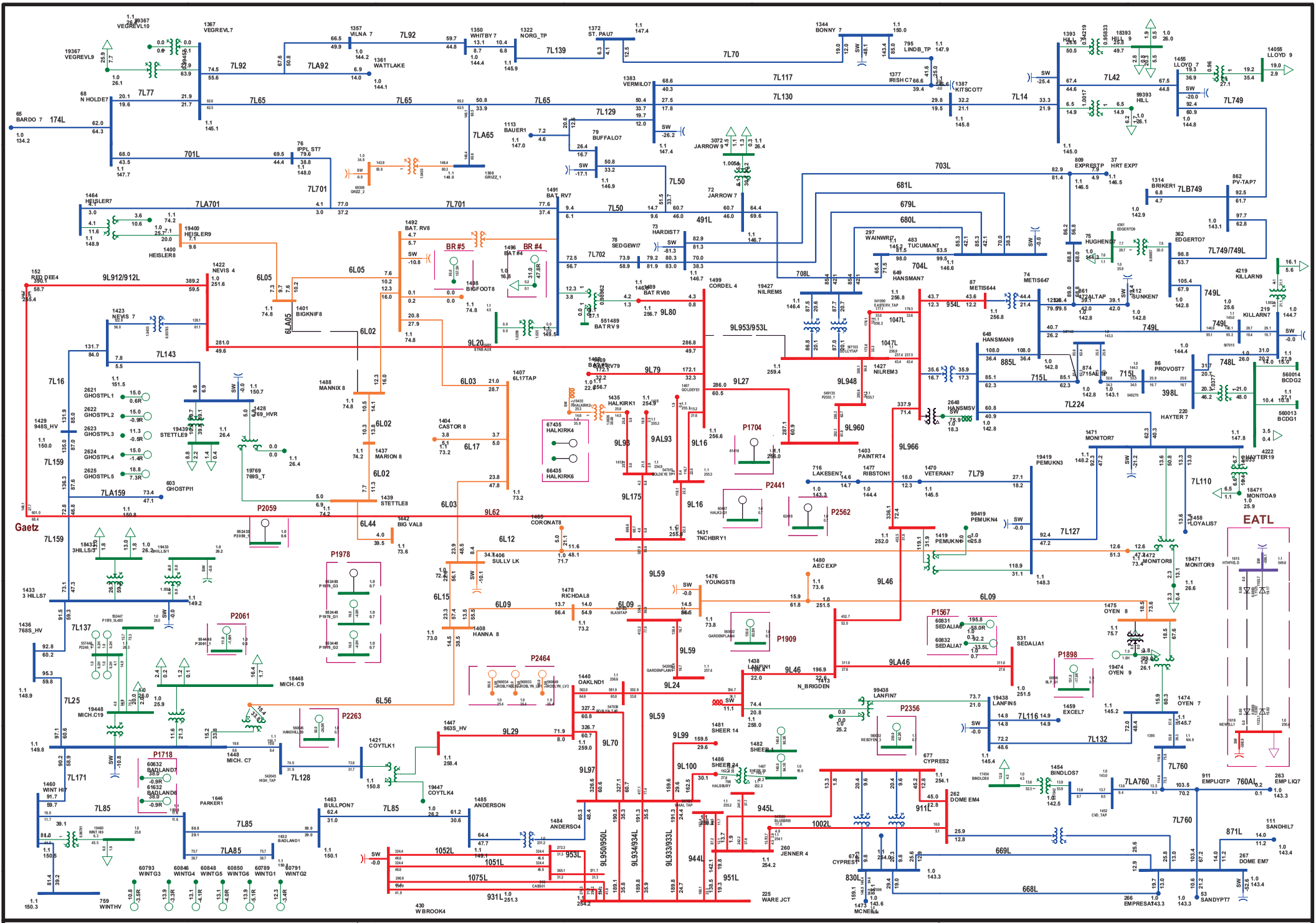
"CATEGORY B, LOSS OF 9L912 (NEVIS 766S – RED DEER 63S)"
SCENARIO 6_2028 WP_POST RAS

THU, APR 11 2024 15:58

A6 - 23

Bus - Voltage (kV/pu)
Branch - MVA/% Rate B
Equipment - MW/Mvar
100.0%Rate B

kV: >0.000 <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 <=500.000 >500.000



P2464 - Sunnynook Solar Battery Project

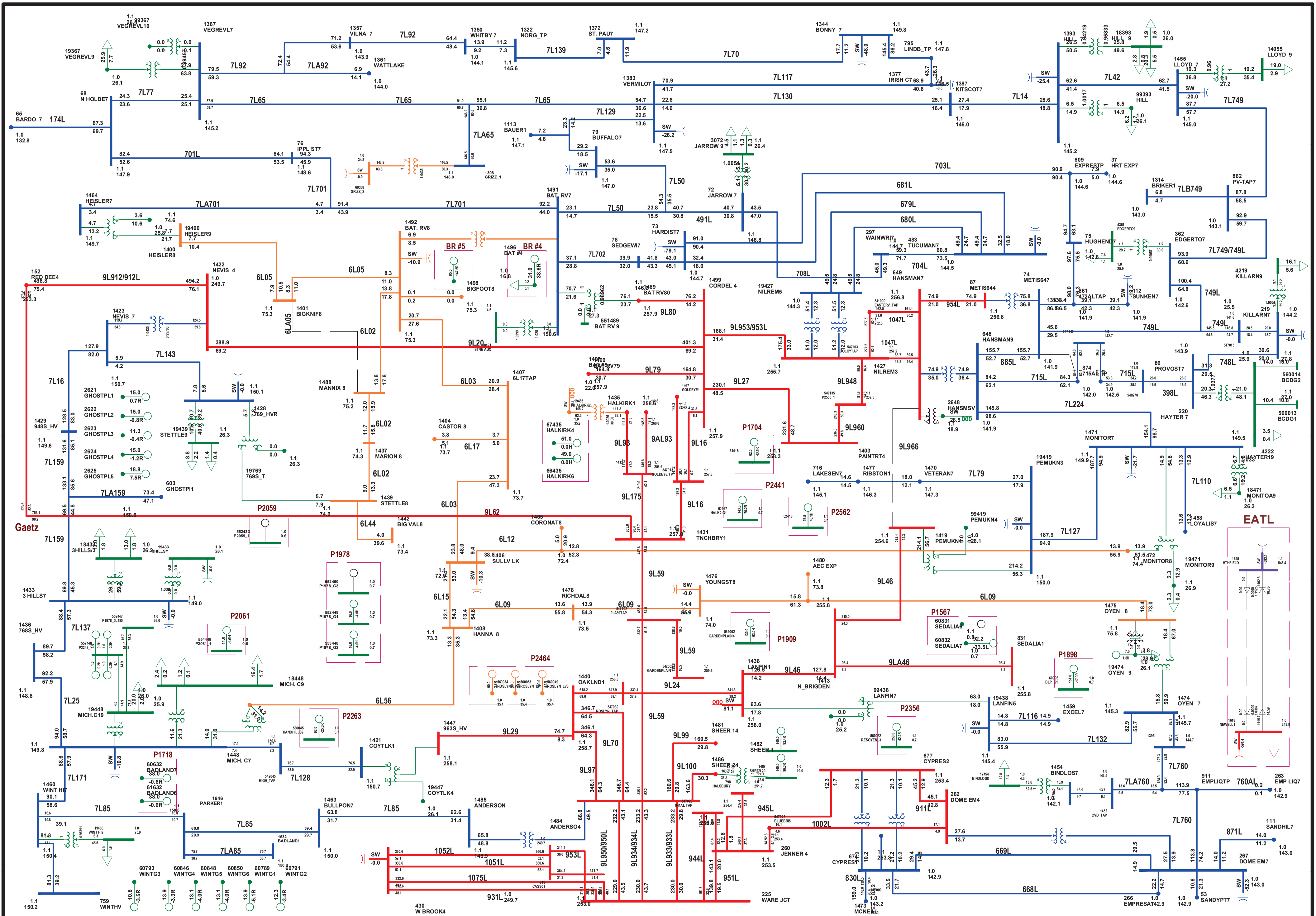
"CATEGORY B, LOSS OF 9L953 (CORDEL 755S - NILREM 574S)"
SCENARIO 6_2028 WP_POST RAS

THU, APR 11 2024 15:58

A6 - 24

Bus - Voltage (kV/pu)
Branch - MVA/% Rate B
Equipment - MW/Mvar
100.0%Rate B

kV: >0.000 <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 <=500.000 >500.000



P2464 - Sunnynook Solar Battery Project

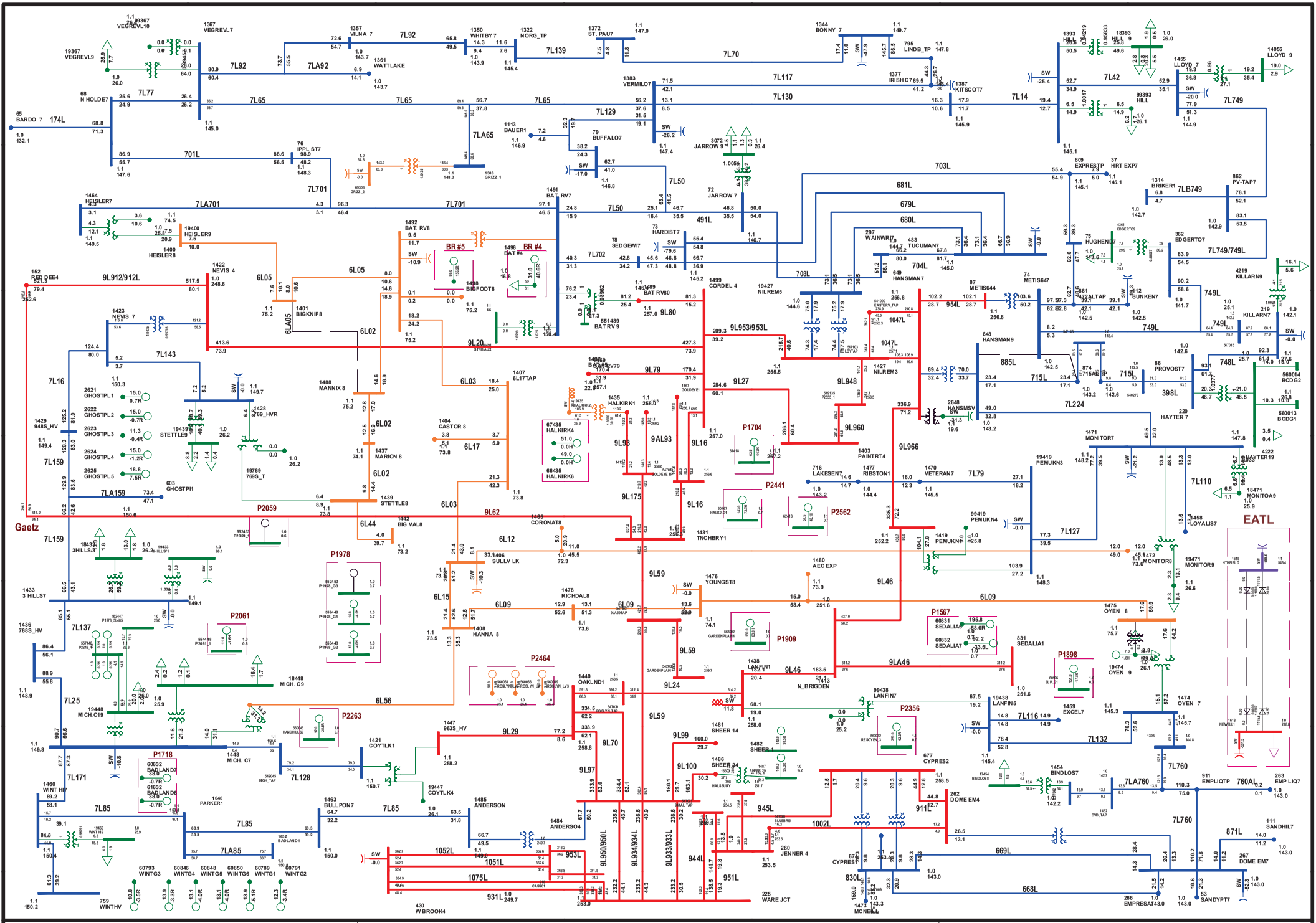
"CATEGORY B, LOSS OF 9L966 (HANSMAN LAKE 650S - PEMUKAN 932S
SCENARIO 6_2028 WP_POST RAS

THU, APR 11 2024 15:59

A6 - 25

Bus - Voltage (kV/pu)
Branch - MVA/% Rate B
Equipment - MW/Mvar
100.0%Rate B

kV: >0.000 <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 <=500.000 >500.000



P2464 - Sunnynook Solar Battery Project

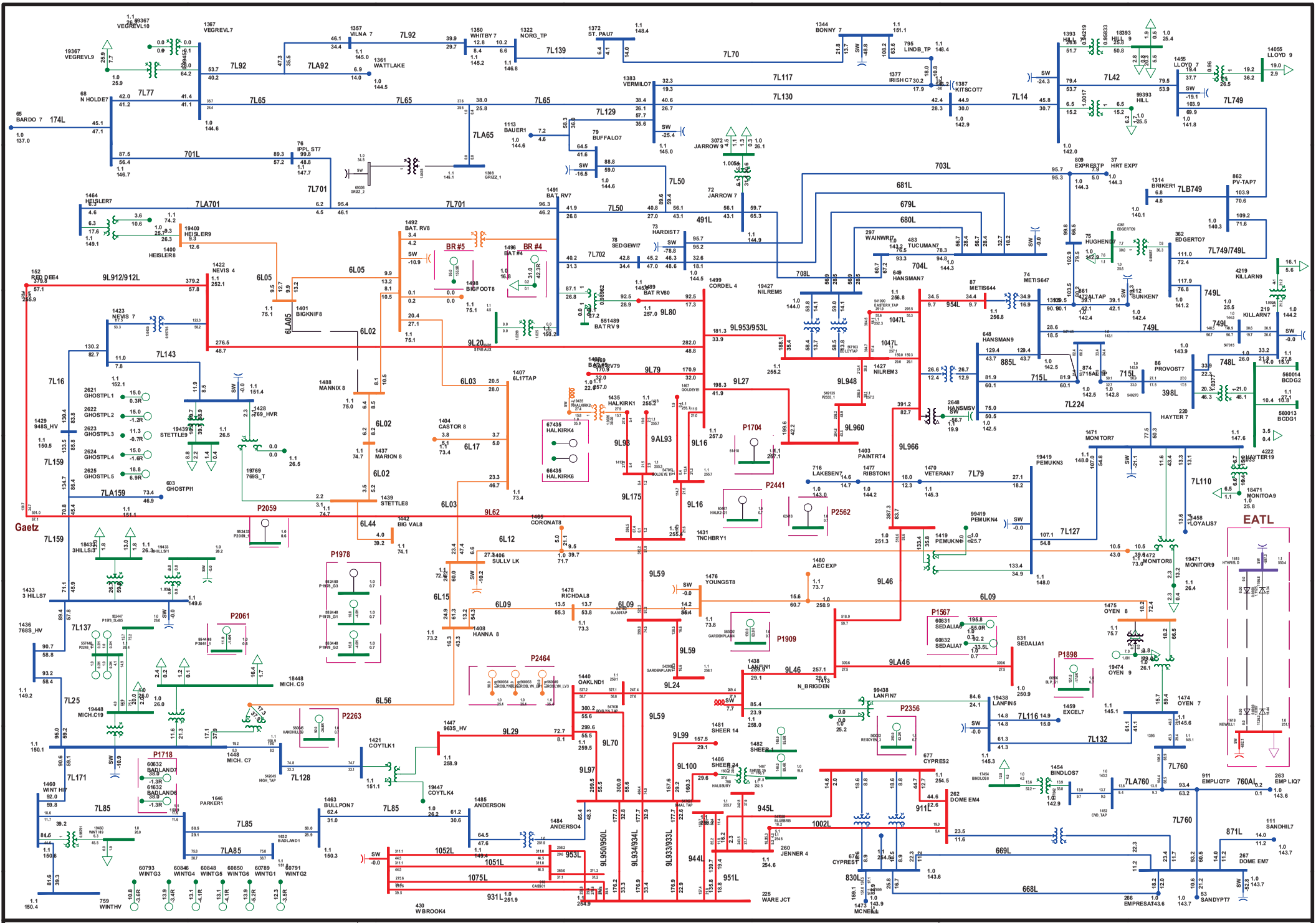
"CATEGORY B, LOSS OF 885L (METISKOW 648S - HANSMAN LAKE 650S SCENARIO 6_2028 WP_POST RAS

THU, APR 11 2024 15:59

A6 - 26

Bus - Voltage (kV/pu)
Branch - MVA/% Rate B
Equipment - MW/Mvar
100.0%Rate B

kV: >0.000 <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 <=500.000 >500.000



P2464 - Sunnynook Solar Battery Project

"CATEGORY B, LOSS OF GRIZZLY BEAR 708S T1"
SCENARIO 6_2028 WP_POST RAS

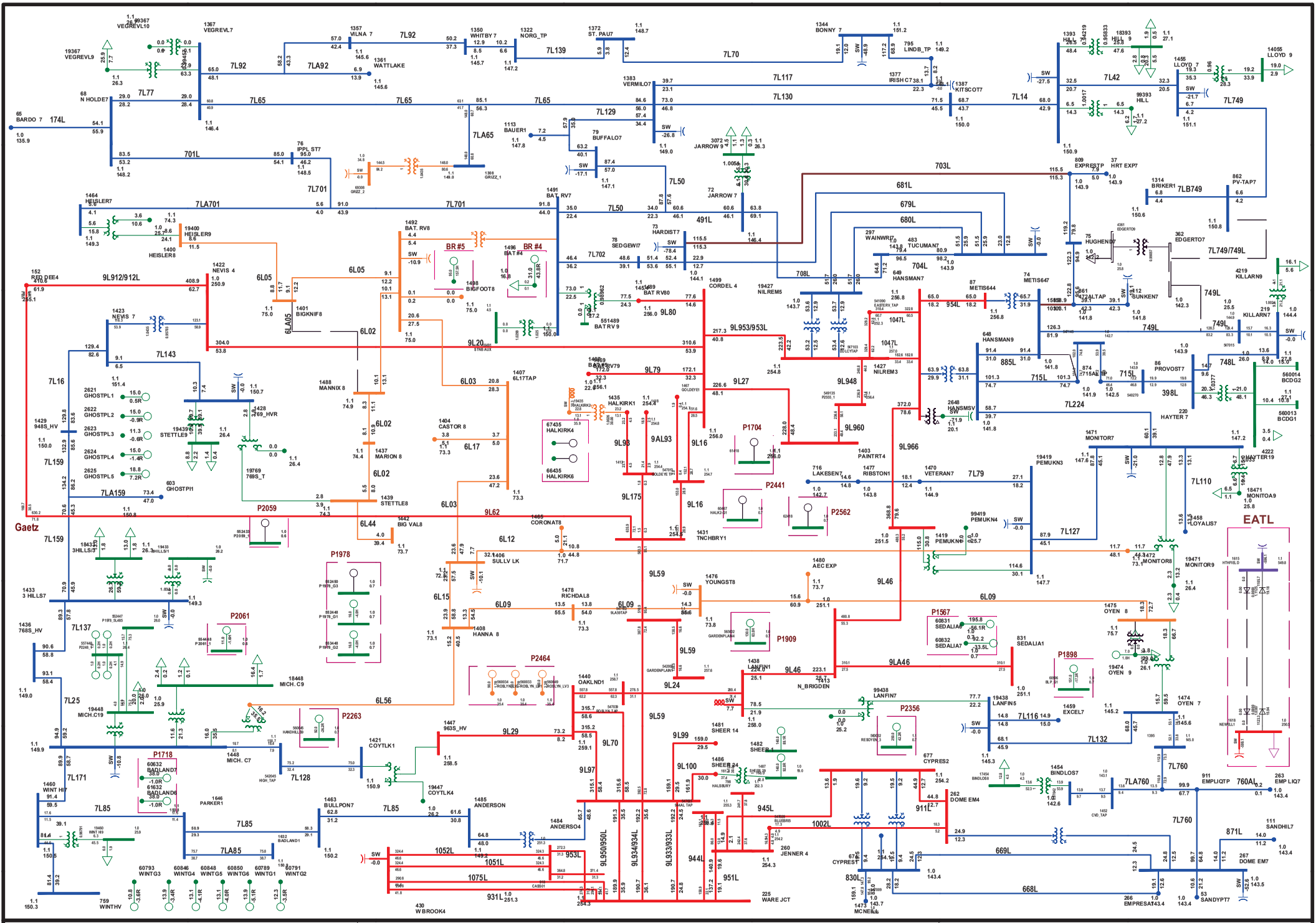
THU, APR 11 2024 15:59

A6 - 27

1

Bus - Voltage (kV/pu)
Branch - MVA/% Rate B
Equipment - MW/Mvar
100.0%Rate B

kV: >0.000 <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 <=500.000 >500.000



P2464 - Sunnynook Solar Battery Project

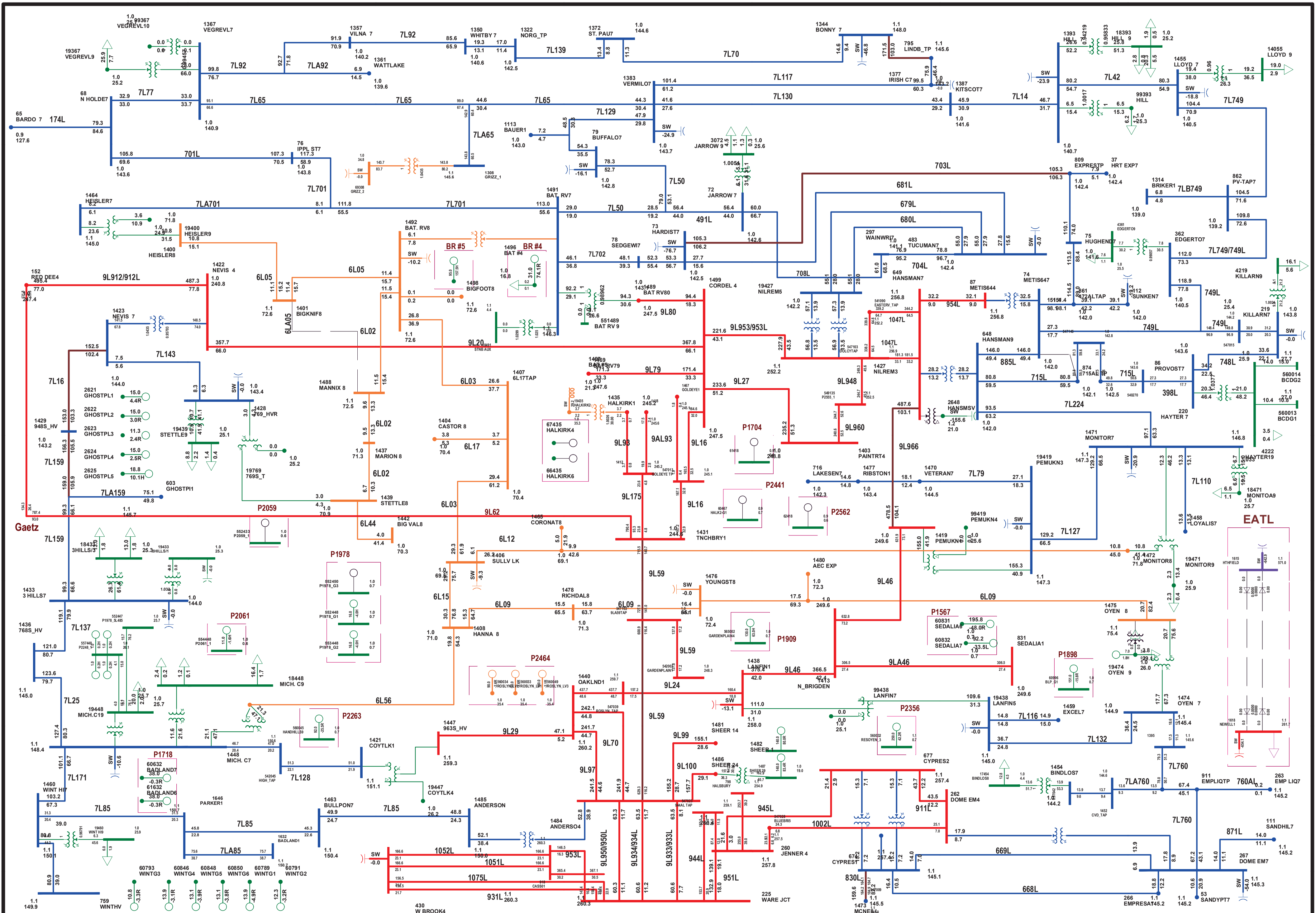
"CATEGORY B, LOSS OF EDGERTON_899ST3"
SCENARIO 6_2028 WP_POST RAS

THU, APR 11 2024 15:59

A6 - 28

Bus - Voltage (kV/pu)
Branch - MVA/% Rate B
Equipment - MW/Mvar
100.0%Rate B

kV: >0.000 <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 <=500.000 >500.000



P2464 - Sunnynook Solar Battery Project

"CATEGORY B, LOSS OF EATL"
SCENARIO 6_2028 WP_POST RAS

THU, APR 11 2024 16:00

A6 - 29

Attachment A7

Post-Mitigation Transient Stability Diagrams (Scenario 6)

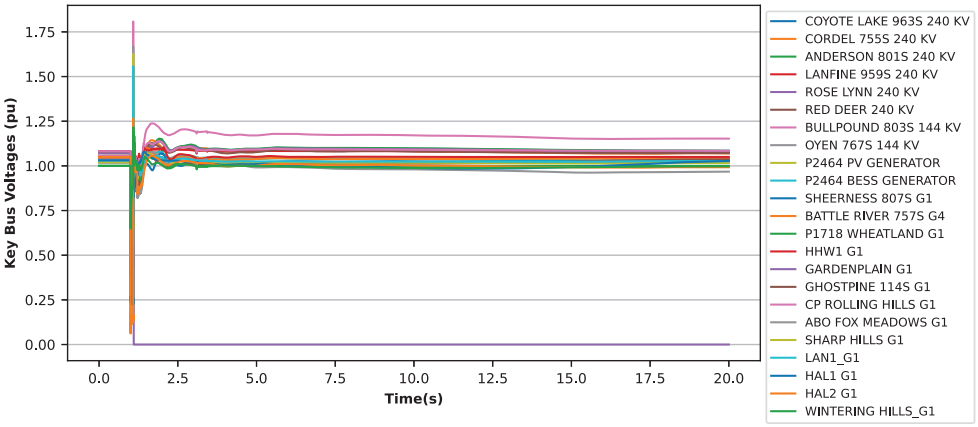
Post-Mitigation Transient Stability Diagrams for 2028 WP Base case Scenario

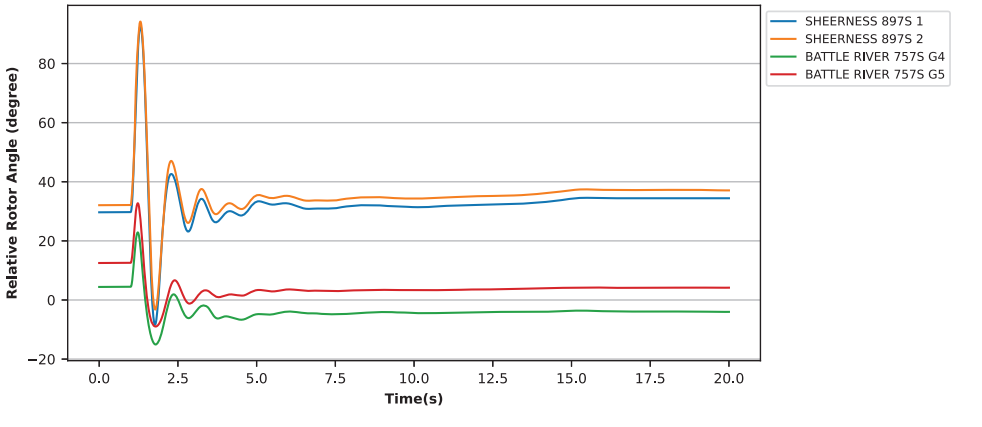
Transient stability analysis was performed with the proposed RAS mitigations on the 2028 WP (scenario 6) for the identified Category B contingencies. Post-RAS, transient stability study results plots for Scenario 6 2028 WP Post-Project Alternative 2 are as listed in Table A7.

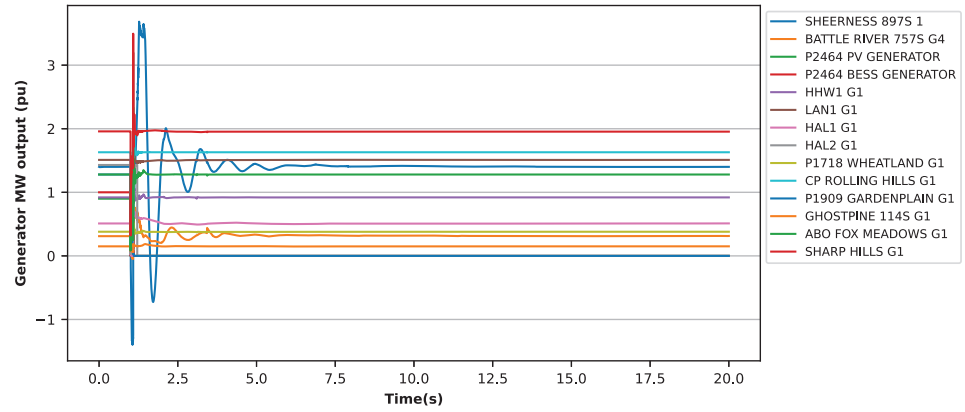
Table A7: List of Post-RAS Transient Stability Study Results for 2028 WP Scenario 6

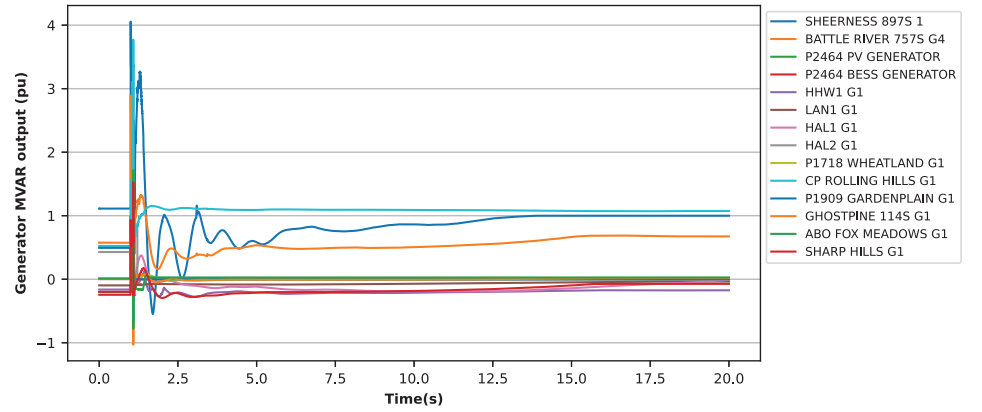
System Condition	Contingency	Fault Description (fault location)	Page #
Category B (N-1)	9L59 (Anderson 801S - Tinchebray 972S) after RAS tripping P2464 (with 6 cycles)	Tinchebray 972S	A7-3

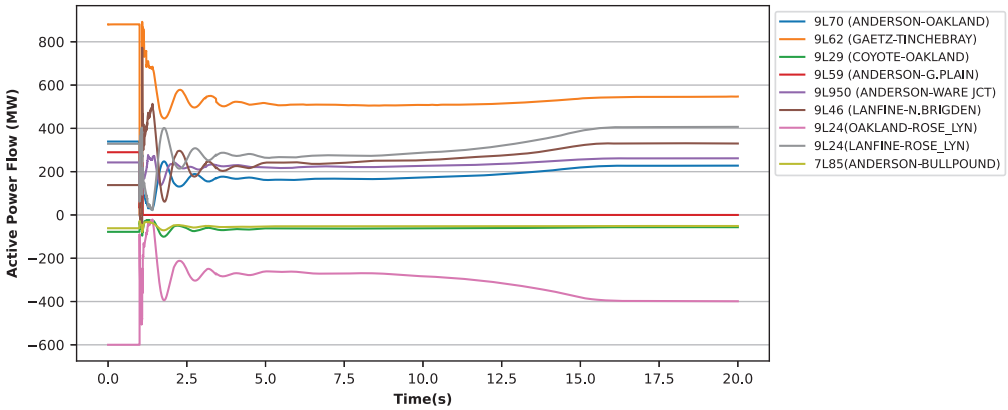
Figure 10A: 2024WP_Post_Cat_B_9L59 - 3 Phase Fault at Tinchebray 972S_with RAS (6cyc)_r1

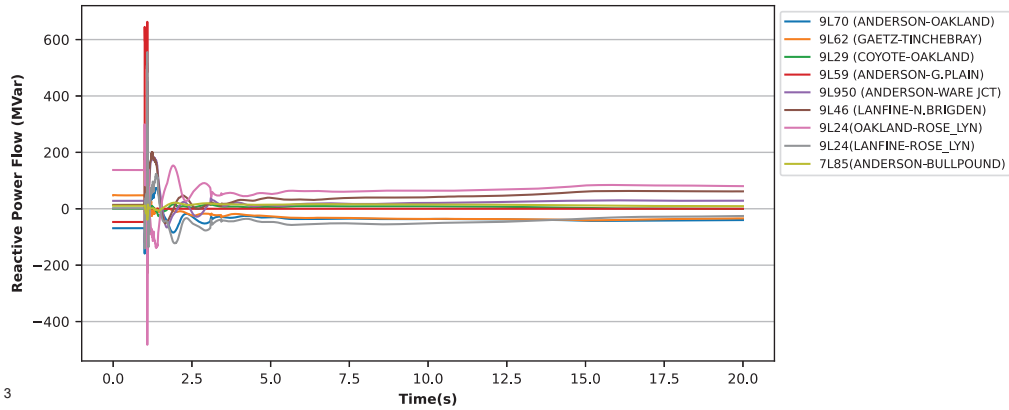












Attachment A8

Constraints Summary Table – Loading and Voltage Performance (Scenarios 4, 5, 6)

Table 8-1: Remedial Action Schemes

RAS Number/Name	RAS Description	Action1
RAS 200	901T-801S Anderson Overload Mitigation	Sequentially trip: WHE1 (60632,61632), P2061 (554448), P2248 (557448), P1978 (553448,552449,552448), P2059 (552433), P2263(560045)
RAS 211	704L-478S Overload Mitigation Scheme (P1704/2562)	Trip P1704, HAL1, P2441 (Halkirk 2),P2555, P2562, P2566
RAS 215	9L16-755S Overload Mitigation Scheme	Trip P1704, P2441 (Halkirk 2), P2562, HAL1
RAS 134 Logic #1	Central East Transfer Out Overload Mitigation Scheme	P1704, P2034, P2356, P2369, P2441, P2421
Modified RAS 134 Logic #3	7L159 - Heatburg 948S Overload Mitigation	Sequentially trip: HAL1 (66435,67435), P1704 (61418), NEP1 (2621,2622,2623,2624,2625), P2061 (554448), P1909 (565002), P2059 (552433), P1978 (552448,553448), P2248 (557448), WHE1 (60632, 61632),P2464
Modified RAS 201	7L224 Overload Mitigation at 774S	Sequentially trip: P1567 (60831,60832), P1898, P2421, P2464
Planned RAS 204 Logic #2	767S Oyen Area Overload Mitigation Scheme (7L132 Overload Mitigation)	Trip P2421 (560051)
Planned RAS 213	749L (Killarney 267S Tap - 749AL Tap) Overload Mitigation	Trip P2460
New RAS for 9L97 or 9L70 Overload Mitigation	9L70 or 9L97 Overload Mitigation	Trip P2464
New RAS for 934L/9L934 or 950L/9L950 Overload Mitigation	934L/9L934 or 950L/9L950 Overload Mitigation	Trip P2464, GDP1 (P1718)
New 9L59 Contingency Transient RAS	For 9L59 contingency	Trip P2464

Table 8-2: Constraint Summary Table (Scenario 4, 5, 6) – Loading Performance

Triggering Events (Element out of Service)	Type of System Constraint (Nature of constraint) (ex. thermal violation, instability, voltage range violation)	Details of Constraint								Assumed System Conditions	Mitigation Approach (RAS or Procedure, also include post-RAS system performance, ex. %I of MVA loading of nominal rating)						Total Generation Curtailment (MW)	Comments
		Thermal										Post RAS Action						
		Nominal Rating (MVA)	Short-term Rating (MVA)	Pre-Project		Post-Project		Post - Pre (%)	Does Loading Exceed Emergency Rating?		Automatic (RAS) Or Real Time Operating Practice	Action 1 % of MVA Continuous Rating	Action 2 % of MVA Continuous Rating	Action 3 % of MVA Continuous Rating	Action 4 % of MVA Continuous Rating	Action 5 % of MVA Continuous Rating		
				Load Flow (MVA)	%I of MVA Continuous Ratings	Load Flow (MVA)	%I of MVA Continuous Ratings											
Category A	7L760 (Oyen 767S - Bus 1395_KSP Tap)	110.2	122.7	119.9	108.8	124.9	113.4	4.6	Yes	2028SL	Scaled down generation as per the Generator CEF Table	99.2%					188	
	7L760 (Empress Liquid 164S Tap -Amoco Empress 163S)	120	132	116.7	97.2	121.6	101.4	4.1	No	2028SL		88.3%						
	7L760 (Empress Liquid 164S Tap - Bindloss 914S Tap)	110.2	122.7	117.3	106.4	122.3	111	4.5	No	2028SL		96.7%						
	7L760 (KSP Tap - Bindloss 914S Tap)	110.2	122.7	119	107.9	124	112.5	4.6	Yes	2028SL		97.5%						
	7L132 (Oyen 767S - Lanfine 959S)	112.1	138	121.5	108.4	127.7	113.9	5.5	No	2028SL		97.4%						
Category A	472L (Metiskow 648S - 472AL Tap)	121	133	124.9	103.2	130.8	108.1	4.9	No	2028SP	Scaled down generation as per the Generator CEF Table	75.3%					722	Total curtailed load exceeds MSSC (466MW)
	472L (Hughenden 213S - 472AL Tap)	84	92	89.6	106.6	95.2	113.3	6.7	Yes	2028SP		65.9%						
	7L760 (Empress Liquid 164S Tap -Amoco Empress 163S)	120	132	147.8	123.2	153.4	127.8	4.6	Yes	2028SP		82.2%						
	715L (Hansman Lake 650S - 715AL Tap)	98	135	115.7	118.1	114	116.3	-1.8	No	2028SP		95.9%						
	749L (Killarney 267S Tap - 749AL Tap)	121	133	127.5	105.4	127.4	105.3	-0.1	No	2028SP		91.5%						
	715L (Rising Sun 1147S (P2540) Tap - 715AL Tap)	98	108	115.8	118.1	114	116.4	-1.7	Yes	2028SP		95.9%						
	7L760 (Empress Liquid 164S Tap - Binloss 914S Tap)	110.2	122.7	148.6	134.9	154.1	139.8	5	Yes	2028SP		90.1%						
	7L53 (Bonnyville 700S - Lindberg 969S Tap)	124.6	139	123.4	99	137.4	110.3	11.3	No	2028SP		71.8%						
	7L760 (KSP Tap - Bindloss 914S Tap)	110.2	122.7	157	142.5	162.6	147.6	5.1	Yes	2028SP		97.5%						
	7L760 (Oyen 767S - Bus 1395_KSP Tap)	110.2	122.7	158	143.4	163.5	148.4	5	Yes	2028SP		98.9%						
	7L132 (Oyen 767S - Lanfine 959S)	112.1	138	159	141.8	165.6	147.7	5.9	Yes	2028SP		91.7%						
Category A	1062L (Tinchebray 972S - Gaetz 87S)	831.4	831.4	805.9	96.9	871.3	104.8	7.9	Yes	2028WP	Scaled down generation as per the Generator CEF Table	98.5%					113	

681L (Tucuman 478S - Hardisty 377S)	472L (Hughenden 213S - 472AL Tap)	84	92	84	100	88.9	105.8	5.9	No	2028SL	Realtime Operation Practice (RTOP)							
	472L (Hughenden 213S - 472AL Tap)	84	92	81.2	96.7	86.6	103	6.3	No	2028SP	RTOP							
	703L (Hardisty 377S - Express 329S Tap)	96	143	108	112.5	112.7	117.4	4.9	No	2028WP	RTOP							
	472L (Metiskow 648S - 472AL Tap)	150	165	148.8	99.2	153.8	102.5	3.3	No		RTOP							
6L09 (Hanna 763S - Oyen 767S)	7L760 (KSP Tap - Oyen 767S)	110.2	122.7	105.3	95.5	111.1	100.8	5.2	No	2028SL	RTOP							
701L (Holden 395S – Strome 223S)	9L62 (Tinchebray 972S - Gaetz 87S)	831.4	831.4	775.2	93.2	841.7	101.2	8	Yes	2028WP	RTOP							
703L (Hughenden 213S - Hardisty 377S)	7L760 (KSP Tap - Bindloss 914S Tap)	110.2	122.7	105	95.2	110.5	100.3	5.1	No	2028SL	RTOP							
	7L760 (KSP Tap - Oyen 767S)	110.2	122.7	105.9	96.1	111.6	101.2	5.1	No		RTOP							
	7L760 (KSP Tap - Bindloss 914S Tap)	110.2	122.7	105.5	95.7	111.2	100.9	5.1	No	2028SP	RTOP							
	7L760 (KSP Tap - Oyen 767S)	110.2	122.7	106.5	96.6	112	101.7	5	No		RTOP							
704L (Tucuman 478S - Wainwright 51S)	7L760 (KSP Tap - Oyen 767S)	110.2	122.7	105	95.2	110.6	100.4	5.1	No	2028SL	RTOP							
749L (Edgerton 899S - Metiskow 648S)	704L (Tucuman 478S - Wainright 51S)	75	83	65.7	87.6	75.9	101.2	13.6	No		RTOP							
	715L (Hansman Lake 650S - 715AL Tap)	98	135	102.5	104.6	102.5	104.6	0	No		RTOP							
	715L (Rising Sun 1147S (P2540) Tap - 715AL Tap)	98	108	102.6	104.7	102.6	104.7	0	No		RTOP							
	715L (Hansman Lake 650S - 715AL Tap)	98	135	111.6	113.9	111.6	113.9	0	No	2028SP	RTOP							
	715L (Rising Sun 1147S (P2540) Tap - 715AL Tap)	98	108	111.6	113.9	111.6	113.9	0	Yes		RTOP							
	704L (Tucuman 478S - Wainright 51S)	79	87	76.9	97.3	87.5	110.8	13.5	Yes	2028WP	**RAS 211**: P1704=(62.5)MW, HAL1=100MW, P2441 (Halkirk 2=143MW),P2555(163MW), P2562(57.5MW), P2566	109.6%	108.3%	106.7%	103.5%	99.8%	526	Total curtailed load exceeds MSSC (466MW)
769L (Rosyth 296S - Hardisty 377S)	7L760 (KSP Tap - Oyen 767S)	110.2	122.7	104.8	95.1	110.3	100.1	5	No	2028SL	RTOP							
	7L760 (KSP Tap - Oyen 767S)	110.2	122.7	105	95.2	110.4	100.2	4.9	No	2028SP	RTOP							
7L116 (Excel 910S - Lanfine 959S)	7L760 (KSP Tap - Bindloss 914S Tap)	110.2	122.7	105.2	95.5	110.7	100.4	5	No	2028SL	RTOP							
	7L760 (KSP Tap - Oyen 767S)	110.2	122.7	106.2	96.4	111.7	101.4	5	No		RTOP							
	7L760 (KSP Tap - Bindloss 914S Tap)	110.2	122.7	105.1	95.3	110.6	100.4	5	No	2028SP	RTOP							
	7L760 (KSP Tap - Oyen 767S)	110.2	122.7	106	96.2	111.4	101.1	4.9	No		RTOP							
7L127 Pemukan 932S - Monitor 774S)	7L760 (KSP Tap - Oyen 767S)	110.2	122.7	104.4	94.8	110.2	100	5.3	No	2028SL	RTOP							
7L130 (Vermilion 710S - Kitscoty 705S)	703L (Hardisty 377S - Express 329S Tap)	96	143	92	95.8	99.6	103.7	7.9	No	2028WP	RTOP							
7L137 (Three Hills 770S - Rowley 768S)	7L128 (Coyote Lake 963S - High_Tap)	162.9	186.9	167	102.6	165.5	101.6	-1	No	2028SP	RTOP							
7L14 (Kitscoty 705S - Hill 751S)	703L (Hardisty 377S - Express 329S Tap)	96	143	92.9	96.8	100.5	104.7	7.9	No	2028WP	RTOP							
7L16 (Nevis 766S - Heatburg 948S)	7L128 (Coyote Lake 963S - High_Tap)	162.9	186.9	195.9	120.3	194.4	119.4	-0.9	Yes	2028SP	RTOP							
7L171 (Michichi Creek - Wintering Hills 804S)	Anderson 801S 901T	125	125	142	113.6	141.9	113.6	0	Yes	2028WP	**RAS 200**: WHE1 (G1=38MW)	86.0%					38	
7L25 (Michichi Creek 802S - Rowley 768S)	7L128 (Coyote Lake 963S - High_Tap)	162.9	186.9	168.4	103.4	166.9	102.4	-1	No	2028SP	RTOP							
7L53 (Bonnyville 700S - Irish Creek 706S)	9L62 (Tinchebray 972S - Gaetz 87S)	831.4	831.4	766	92.1	833.5	100.3	8.1	Yes	2028WP	RTOP							
7L65 (Vermilion 710S-- Vegreville 709S)	704L (Tucuman 478S - Wainright 51S)	79	87	71.7	90.8	79.8	101.1	10.3	No		RTOP							
7L701 (Battle River 757S - Strome 223S)	9L62 (Tinchebray 972S - Gaetz 87S)	831.4	831.4	779.4	93.8	846	101.8	8	Yes		RTOP							
	472L (Hughenden 213S - 472AL Tap)	84	92	80	95.2	88	104.8	9.6	No	2028SL	RTOP							
	704L (Tucuman 478S - Wainright 51S)	75	83	65.6	87.5	75.8	101.1	13.6	No		RTOP							
	7L760 (KSP Tap - Bindloss 914S Tap)	110.2	122.7	104.5	94.8	110.3	100	5.2	No		RTOP							
	7L760 (KSP Tap - Oyen 767S)	110.2	122.7	105.5	95.7	111.3	101	5.3	No		RTOP							
	715L (Hansman Lake 650S - 715AL Tap)	98	135	101.6	103.7	101.6	103.6	0	No	2028SP	RTOP							
	715L (Rising Sun 1147S (P2540) Tap - 715AL Tap)	98	108	101.6	103.7	101.6	103.7	0	No		RTOP							
	7L760 (KSP Tap - Oyen 767S)	110.2	122.7	104.7	95	110.4	100.2	5.2	No		RTOP							

7L749 (Edgerton 899S - Lloyminster 716S)	703L (Hardisty 377S - Express 329S Tap)	96	143	106	110.4	113.6	118.3	7.9	No	2028WP	**RAS 211**: P1704=(61418=62.5)MW, HAL1=100MW, P2441 (Halkirk 2=143MW),P2555(163MW), P2562(62418=57.5MW), P2566 (114MW)	118.9%	119.7%	120.6%	115.3%	113.8%	640	Total curtailed load exceeds MSSC (466MW). RTOP will be used for the remaining thermal violations. See also the Note below.
	472L (Metiskow 648S - 472AL Tap)	150	165	150.1	100.1	157.9	105.3	5.2	No			105.8%	106.3%	106.9%	103.2%	102.1%		
	704L (Tucuman 478S - Wainright 51S)	79	87	80.3	101.7	91.2	115.4	13.7	Yes			114.5%	113.2%	111.7%	104.7%	96.3%		
7L760 (Oyen 767S - Amoco Express 163S)	703L (Hardisty 377S - Express 329S Tap)	96	143	90.6	94.3	96.4	100.5	6.1	No		RTOP							
7L79 (Pemukan 932S - Ribstone Creek 892S)	7L760 (KSP Tap - Oyen 767S)	110.2	122.7	105.4	95.6	110.9	100.6	5	No	2028SL	RTOP							
	7L760 (KSP Tap - Oyen 767S)	110.2	122.7	105.2	95.5	110.6	100.4	4.9	No	2028SP	RTOP							
7L92 (Vegreville 709S - Whitby Lake 819S)	7L760 (KSP Tap - Oyen 767S)	110.2	122.7	104.6	94.9	110.3	100.1	5.2	No	2028SL	RTOP							
	7L53 (Bonnyville 700S - Lindberg 969S Tap)	155.2	177.3	148.1	95.4	163.7	105.4	10.1	No	2028WP	RTOP							
	9L62 (Tinchebray 972S - Gaetz 87S)	831.4	831.4	770.4	92.7	836	100.6	7.9	Yes		RTOP							
9L20 (Nevis 766S - Cordel 755S)	7L760 (Empress Liquid 164S Tap - Bindloss 914S Tap)	110.2	122.7	107	97.1	112.9	102.4	5.4	No	2028SL	RTOP							
	7L760 (KSP Tap - Bindloss 914S Tap)	110.2	122.7	108.6	98.6	114.6	104	5.4	No		RTOP							
	7L760 (KSP Tap - Oyen 767S)	110.2	122.7	109.6	99.4	115.6	104.9	5.5	No		RTOP							
	7L132 (Oyen 767S - Lanfine 959S)	112.1	138	108.6	96.8	115.9	103.4	6.6	No		RTOP							
	7L760 (KSP Tap - Bindloss 914S Tap)	110.2	122.7	107.6	97.6	113.8	103.2	5.6	No	2028SP	RTOP							
	7L760 (KSP Tap - Oyen 767S)	110.2	122.7	108.6	98.5	114.6	104	5.5	No		RTOP							
	914L (Red Deer 63S - Gaetz 87S)	499	748	495.2	99.2	519.8	104.2	4.9	No	2028WP	**RAS 215**: P1704(62.5MW), P2441 (143MW)	103.9%	92.5%				305.5	RTOP will be used for the remaining thermal violations. See also the Note below.
	7L159 (Heatburg 948S - Ghostpine 114S Tap)	142.8	160	136.5	95.6	149.3	104.5	8.9	No			104.3%	103.4%					
	7L53 (Bonnyville 700S - Lindberg 969S Tap)	155.2	177.3	143.1	92.2	156.7	100.9	8.7	No			100.3%	96.9%					
	7L16 (Nevis 766S - Heatburg 948S)	142.8	160	132.8	93	145.7	102	9	No			101.6%	100.7%					
	9L62 (Tinchebray 972S - Gaetz 87S)	831.4	831.4	989.5	119	1070.8	128.8	9.8	Yes			125.8%	116.5%					
	9L16 (Goldeye Tap - Tinchebray 972S)	499	499	546.1	109.4	560.9	112.4	3	Yes			114.9%	93.5%					
9L24 (Lanfine 959S - Oakland 946S)	472L (Hughenden 213S - 472AL Tap)	84	92	97	115.5	97.5	116.1	0.6	Yes	2028SL	RTOP							
	7L760 (Empress Liquid 164S Tap -Amoco Empress 163S)	120	132	207	172.5	202	168.4	-4.1	Yes		RTOP							
	7L760 (Empress Liquid 164S Tap - Bindloss 914S Tap)	110.2	122.7	207.7	188.4	202.8	184	-4.4	Yes		RTOP							
	7L760 (KSP Tap - Bindloss 914S Tap)	110.2	122.7	209.4	190	204.6	185.6	-4.4	Yes		RTOP							
	7L760 (KSP Tap - Oyen 767S)	110.2	122.7	210.1	190.7	205.4	186.4	-4.3	Yes		RTOP							
	7L132 (Oyen 767S - Lanfine 959S)	112.1	138	217.4	193.9	213	190	-3.9	Yes		RTOP							
	7L760 (Empress Liquid 164S Tap -Amoco Empress 163S)	120	132	163.8	136.5	157.8	131.5	-5	Yes	2028SP	RTOP							
	7L760 (Empress Liquid 164S Tap - Bindloss 914S Tap)	110.2	122.7	164.6	149.3	158.5	143.9	-5.5	Yes		RTOP							
	7L760 (KSP Tap - Bindloss 914S Tap)	110.2	122.7	173.2	157.1	167.2	151.7	-5.4	Yes		RTOP							
	7L760 (KSP Tap - Oyen 767S)	110.2	122.7	174	157.9	168	152.4	-5.4	Yes		RTOP							
	7L128 (Coyote Lake 963S - High_Tap)	162.9	186.9	173.2	106.3	170.9	104.9	-1.4	No		RTOP							
	7L132 (Oyen 767S - Lanfine 959S)	112.1	138	172.3	153.7	166.5	148.5	-5.2	Yes		RTOP							
	703L (Hardisty 377S - Express 329S Tap)	96	143	114.3	119.1	114.8	119.6	0.5	No	2028WP	**Planned RAS 204 Logic #2**: P2421 (560051) = 60MW	117.2%					60	RTOP will be used for the remaining thermal violations. See also the Note below.
	472L (Metiskow 648S - 472AL Tap)	150	165	159	106	159.3	106.2	0.2	No			104.6%						
	7L760 (Empress Liquid 164S Tap -Amoco Empress 163S)	148	163	211.4	142.8	206.6	139.6	-3.3	Yes			119.6%						
	9L966 (Hansman Lake 650S - Pemukan 932S)	442	442	447	101.1	450.2	101.9	0.7	Yes			97.6%						
	7L760 (Empress Liquid 164S Tap - Bindloss 914S Tap)	142	156	212.1	149.4	207.3	146	-3.4	Yes			125.2%						
	7L760 (KSP Tap - Bindloss 914S Tap)	146.6	167.7	222.8	152	217.9	148.6	-3.3	Yes			128.2%						
	7L760 (KSP Tap - Oyen 767S)	146.6	167.7	169.6	115.7	164.3	112.1	-3.6	No			128.8%						
	7L132 (Oyen 767S - Lanfine 959S)	140.9	171.5	191.2	135.7	186.1	132.1	-3.7	Yes			148.0%						
	6L09 (Oyen 767S - Hurd 2037S Tap)	23	23	24.5	106.7	24.6	107.2	0.5	Yes			100.6%						

9L27 (Paintearth Creek - Cordel 755S)	472L (Hughenden 213S - 472AL Tap)	84	92	88.2	105	96.2	114.5	9.5	Yes	2028SL	RTOP							
	7L760 (Empress Liquid 164S Tap - Bindloss 914S Tap)	110.2	122.7	108.6	98.6	114.6	104	5.5	No		RTOP							
	7L760 (KSP Tap - Bindloss 914S Tap)	110.2	122.7	110.3	100.1	116.4	105.6	5.5	No		RTOP							
	7L760 (KSP Tap - Oyen 767S)	110.2	122.7	111.3	101	117.4	106.5	5.6	No		RTOP							
	7L132 (Oyen 767S - Lanfine 959S)	112.1	138	110.6	98.7	118.1	105.3	6.7	No		RTOP							
	7L760 (KSP Tap - Bindloss 914S Tap)	110.2	122.7	108.4	98.3	114.6	104	5.7	No	2028SP	RTOP							
	7L760 (KSP Tap - Oyen 767S)	110.2	122.7	109.4	99.2	115.5	104.8	5.6	No		RTOP							
	703L (Hardisty 377S - Express 329S Tap)	96	143	116.6	121.5	124.4	129.5	8.1	No	2028WP	RTOP							
	472L (Metiskow 648S - 472AL Tap)	150	165	161.6	107.7	169.6	113.1	5.3	Yes		RTOP							
	472L (Hughenden 213S - 472AL Tap)	125	138	125.8	100.6	133.6	106.9	6.2	No		RTOP							
	704L (Tucuman 478S - Wainright 51S)	79	87	72.9	92.2	82.6	104.6	12.4	No		RTOP							
	1047L (Nilrem 574S - Easterv Tap)	499	748	476.3	95.4	506.5	101.5	6.1	No		RTOP							
9L29 (Coyote Lake 963S - Oakland 946S)	7L159 (Heatburg 948S - Ghostpine 114S Tap)	107.3	118.8	119.2	111.1	126.7	118	7	Yes	2028SP	**Modified RAS 134 Logic #3, RAS 200:** WHE1 (95MW),	97.2%					95	
	7L760 (KSP Tap - Oyen 767S)	110.2	122.7	105	95.3	110.3	100.1	4.8	No			98.8%						
	7L16 (Nevis 766S - Heatburg 948S)	107.3	119.8	116.6	108.6	124	115.6	6.9	Yes			94.8%						
	7L85 (Bullpound 803S Tap - Anderson 801S)	139	165.8	161.9	116.5	156.4	112.5	-3.9	No			72.7%						
	7L85 (Bullpound 803S Tap - Badlands 981S Tap)	138	157.2	169	122.5	163.5	118.5	-4	Yes			78.1%						
	Anderson 801S 901T	125	125	163.5	130.8	157.8	126.2	-4.6	Yes			80.5%						
	7L159 (Heatburg 948S - Ghostpine 114S Tap)	142.8	160	135.9	95.2	143.1	100.2	5.1	No	2028WP	RTOP							
9L70 (Oakland 946S - Anderson 801S)	7L760 (KSP Tap - Bindloss 914S Tap)	110.2	122.7	104.9	95.2	111.2	101	5.8	No	2028SL	**New RAS for 9L97 or 9L70 Overload Mitigation:** Trip P2464 (280MW)	91.9%					280	
	7L760 (KSP Tap - Oyen 767S)	110.2	122.7	105.9	96.1	112.3	101.9	5.8	No			93.7%						
	9L97 (Anderson 801S - Oakland 946S)	499	499	442.8	88.7	629.9	126.2	37.5	Yes			86.8%						
	7L132 (Oyen 767S - Lanfine 959S)	112.1	138	104.5	93.2	112.2	100	6.8	No			91.4%						
	7L760 (KSP Tap - Bindloss 914S Tap)	110.2	122.7	104.4	94.8	110.9	100.6	5.8	No	2028SP	**New RAS for 9L97 or 9L70 Overload Mitigation:** Trip P2464 (180MW)	94.3%					180	
	7L760 (KSP Tap - Oyen 767S)	110.2	122.7	105.4	95.7	111.8	101.4	5.7	No			95.7%						
	9L97 (Anderson 801S - Oakland 946S)	499	499	392.8	78.7	579.7	116.2	37.5	Yes			90.5%						
	9L97 (Anderson 801S - Oakland 946S)	499	499	444.2	89	626.4	125.5	36.5	Yes	2028WP	**New RAS for 9L97 or 9L70 Overload Mitigation:** Trip P2464 (280MW)	86.9%					280	
9L80 (Battle River 757S - Cordel 755S)	703L (Hardisty 377S - Express 329S Tap)	96	143	91.3	95.1	98	102.1	7	No		RTOP							
	704L (Tucuman 478S - Wainright 51S)	79	87	68.9	87.2	79.7	100.9	13.7	No		RTOP							
9L912 (Nevis 766S – Red Deer 63S)	7L760 (Empress Liquid 164S Tap - Bindloss 914S Tap)	110.2	122.7	108.2	98.2	114.4	103.8	5.6	No	2028SL	**RAS 215:** P1704 (99MW), P2441 (110MW),	101.4%	99.0%				209	RTOP will be used for the remaining thermal violations. See also the Note below.
	7L760 (KSP Tap - Bindloss 914S Tap)	110.2	122.7	109.8	99.6	116.1	105.4	5.7	No			102.3%	100.6%					
	7L760 (KSP Tap - Oyen 767S)	110.2	122.7	110.8	100.5	117.1	106.2	5.7	No			103.9%	101.5%					
	9L16 (Goldeye Tap - Tinchebray 972S)	499	499	479.3	96	500.7	100.3	4.3	Yes			103.2%	87.0%					
	7L132 (Oyen 767S - Lanfine 959S)	112.1	138	108	96.3	115.4	102.9	6.6	No			100.9%	98.7%					
	7L760 (KSP Tap - Bindloss 914S Tap)	110.2	122.7	109.2	99.1	115.7	105	6	No	2028SP	RTOP							
	7L760 (KSP Tap - Oyen 767S)	110.2	122.7	110.1	99.9	116.6	105.8	5.9	No		RTOP							
	7L128 (Coyote Lake 963S - High_Tap)	162.9	186.9	175	107.4	168.2	103.3	-4.2	No		RTOP							
	914L (Red Deer 63S - Gaetz 87S)	499	748	566.2	113.5	601.2	120.5	7	No	2028WP	**RAS 215:** P1704 (62.5MW), P2441 (143MW), P2562 (57.5MW), HAL1 (100MW)	121.0%	109.2%	104.6%	95.8%		363	RTOP will be used for the remaining thermal violations. See also the Note below.
	7L53 (Bonnyville 700S - Lindberg 969S Tap)	155.2	177.3	148.5	95.6	162.8	104.9	9.2	No			103.2%	100.7%	100.1%	98.0%			
	9L62 (Tinchebray 972S - Gaetz 87S)	831.4	831.4	1068.5	128.5	1162.1	139.8	11.3	Yes			136.3%	127.0%	123.4%	116.5%			
	9L16 (Goldeye Tap - Tinchebray 972S)	499	499	612.3	122.7	636.8	127.6	4.9	Yes			130.1%	108.5%	111.3%	114.4%			
	9L16 (Goldeye Tap - Cordel 755S)	499	499	476.7	95.5	499.2	100	4.5	Yes			102.4%	108.5%	111.2%	114.4%			
9L953 (Cordel 755S - Nilrem 574S)	704L (Tucuman 478S - Wainright 51S)	75	83	76.2	101.5	86.2	115	13.5	Yes	2028SL	**RAS 211**: P1704 (99MW) + HAL1 (110MW), P2441 (110MW) + P2555 (60MW), P2562 (47MW) + P2566 (160MW)	114.7%	111.3%	90.8%			586	
	7L760 (Empress Liquid 164S Tap - Bindloss 914S Tap)	110.2	122.7	107.9	97.9	113.8	103.2	5.4	No			99.6%	95.5%	86.6%				
	7L760 (KSP Tap - Bindloss 914S Tap)	110.2	122.7	109.5	99.4	115.5	104.8	5.4	No			100.4%	96.3%	87.4%				
	7L760 (KSP Tap - Oyen 767S)	110.2	122.7	110.5	100.3	116.5	105.7	5.5	No			102.1%	98.1%	89.2%				
	7L132 (Oyen 767S - Lanfine 959S)	112.1	138	109.6	97.8	117	104.3	6.5	No			101.2%	97.4%	88.8%				
	7L760 (KSP Tap - Bindloss 914S Tap)	110.2	122.7	106.2	96.4	112.4	102	5.6	No	2028SP	RTOP							
	7L760 (KSP Tap - Oyen 767S)	110.2	122.7	107.2	97.3	113.3	102.8	5.5	No		RTOP							

	702L (Hardisty 377S - Sedgewick 137S Tap)	91	100	88.1	96.8	95.1	104.6	7.7	No	2028WP	**RAS 211**: P1704 (62.5MW) + HAL1 (100MW), P2441 (143MW) + P2555 (163MW), P2562 (57.5MW) + P2566 (114MW)	106.4%	99.7%	83.0%			640	Total curtailed load exceeds MSSC (466MW)
	704L (Tucuman 478S - Wainright 51S)	79	87	87.2	110.4	97.9	124	13.5	Yes			123.7%	114.7%	99.5%				
9L97 (Oakland 946S - Anderson 801S)	7L760 (KSP Tap - Bindloss 914S Tap)	110.2	122.7	104.9	95.2	111.2	101	5.8	No	2028SL	**New RAS for 9L97 or 9L70 Overload Mitigation:** Trip P2464 (280MW)	91.9%					280	
	7L760 (KSP Tap - Oyen 767S)	110.2	122.7	105.9	96.1	112.3	101.9	5.8	No			93.7%						
	9L70 (Anderson 801S - Oakland 946S)	499	499	442.8	88.7	630	126.2	37.5	Yes			86.8%						
	7L132 (Oyen 767S - Lanfine 959S)	112.1	138	104.5	93.2	112.2	100	6.8	No			91.4%						
	7L760 (KSP Tap - Bindloss 914S Tap)	110.2	122.7	104.4	94.8	110.9	100.6	5.8	No	2028SP	**New RAS for 9L97 or 9L70 Overload Mitigation:** Trip P2464 (180MW)	94.3%					180	
	7L760 (KSP Tap - Oyen 767S)	110.2	122.7	105.4	95.7	111.7	101.4	5.7	No			95.7%						
	9L70 (Anderson 801S - Oakland 946S)	499	499	392.8	78.7	579.8	116.2	37.5	Yes			90.5%						
	9L70 (Anderson 801S - Oakland 946S)	499	499	444.2	89	626.4	125.5	36.5	Yes	2028WP	**New RAS for 9L97 or 9L70 Overload Mitigation:** Trip P2464 (280MW)	87.0%					280	
Hardisty 377S T1 Transformer	7L760 (KSP Tap - Bindloss 914S Tap)	110.2	122.7	105.4	95.7	111.1	100.8	5.1	No	2028SL	RTOP							
	7L760 (KSP Tap - Oyen 767S)	110.2	122.7	106.4	96.6	112.1	101.7	5.1	No									
	7L132 (Oyen 767S - Lanfine 959S)	112.1	138	105.2	93.8	112.2	100.1	6.2	No									
	7L760 (KSP Tap - Bindloss 914S Tap)	110.2	122.7	105.1	95.4	110.8	100.6	5.2	No	2028SP	RTOP							
	7L760 (KSP Tap - Oyen 767S)	110.2	122.7	106.1	96.3	111.7	101.4	5.1	No									
Amoco Empress_163S_T5	703L (Hardisty 377S - Express 329S Tap)	96	143	90.4	94.1	96.2	100.2	6.1	No	2028WP	RTOP							
Buffalo Creek 526S_Xmers	7L760 (KSP Tap - Oyen 767S)	110.2	122.7	104.8	95	110.4	100.2	5.1	No	2028SL	RTOP							
	9L62 (Tinchebray 972S - Gaetz 87S)	831.4	831.4	765.5	92.1	831.8	100	8	Yes	2028WP	RTOP							
Coyote Lake 963S 901T	7L159 (Heatburg 948S - Ghostpine 114S Tap)	107.3	118.8	119.2	111.1	126.7	118	6.9	Yes	2028SP	**Modified RAS 134 Logic #3, RAS 200:** WHE1 (95MW),	97.2%					95	
	7L760 (KSP Tap - Oyen 767S)	110.2	122.7	105	95.3	110.3	100.1	4.8	No			98.8%						
	7L16 (Nevis 766S - Heatburg 948S)	107.3	119.8	116.6	108.7	124.1	115.6	7	Yes			94.8%						
	7L85 (Bullpound 803S Tap - Anderson 801S)	139	165.8	161.9	116.5	156.5	112.6	-3.9	No			72.8%						
	7L85 (Bullpound 803S Tap - Badlands 981S Tap)	138	157.2	169.1	122.5	163.5	118.5	-4	Yes			78.1%						
	Anderson 801S 901T	125	125	163.5	130.8	157.8	126.3	-4.6	Yes			80.6%						
	7L159 (Heatburg 948S - Ghostpine 114S Tap)	142.8	160	135.9	95.2	143.1	100.2	5.1	No	2028WP	RTOP							
Edgerton_899ST3	472L (Hughenden 213S - 472AL Tap)	84	92	81.2	96.6	89.2	106.2	9.6	No	2028SL	RTOP							
	704L (Tucuman 478S - Wainright 51S)	75	83	66.9	89.2	77.1	102.8	13.6	No									
	715L (Hansman Lake 650S - 715AL Tap)	98	135	98.6	100.7	98.6	100.6	0	No									
	715L (Rising Sun 1147S (P2540) Tap - 715AL Tap)	98	108	98.6	100.7	98.6	100.6	0	No									
	7L760 (KSP Tap - Bindloss 914S Tap)	110.2	122.7	104.7	95	110.4	100.2	5.2	No									
	7L760 (KSP Tap - Oyen 767S)	110.2	122.7	105.6	95.9	111.4	101.1	5.2	No									
	715L (Hansman Lake 650S - 715AL Tap)	98	135	102.6	104.7	102.6	104.7	0	No	2028SP	RTOP							
	715L (Rising Sun 1147S (P2540) Tap - 715AL Tap)	98	108	102.6	104.7	102.6	104.7	0	No									
	7L760 (KSP Tap - Oyen 767S)	110.2	122.7	104.9	95.2	110.5	100.3	5.1	No									
	703L (Hardisty 377S - Express 329S Tap)	96	143	107.5	112	115.1	119.9	7.8	No	2028WP	**RAS 211**: P1704 (62.5MW) + HAL1 (100MW), P2441 (143MW),P2555 (163MW), P2562 (57.5MW), P2566 (114MW)	121.0%	121.8%	116.6%	116.8%	115.3%	640	Total curtailed load exceeds MSSC (466MW)
	472L (Metiskow 648S - 472AL Tap)	150	165	151.7	101.1	159.5	106.3	5.2	No			107.1%	107.7%	104.0%	104.3%	103.1%		
	704L (Tucuman 478S - Wainright 51S)	79	87	81.9	103.7	92.7	117.4	13.7	Yes			115.7%	114.2%	107.3%	106.7%	98.2%		
EMPRESS_394S_T1	7L760 (KSP Tap - Bindloss 914S Tap)	110.2	122.7	106	96.2	111.6	101.3	5.1	No	2028SL	RTOP							
	7L760 (KSP Tap - Oyen 767S)	110.2	122.7	106.9	97	112.6	102.2	5.2	No									
	7L132 (Oyen 767S - Lanfine 959S)	112.1	138	105.2	93.9	112.3	100.2	6.3	No									
	7L760 (KSP Tap - Bindloss 914S Tap)	110.2	122.7	105.4	95.7	110.9	100.6	5	No	2028SP	RTOP							
	7L760 (KSP Tap - Oyen 767S)	110.2	122.7	106.4	96.6	111.8	101.5	4.9	No									
Excel 910S Transformer 701T	7L760 (KSP Tap - Bindloss 914S Tap)	110.2	122.7	105.2	95.5	110.7	100.4	5	No	2028SL	RTOP							
	7L760 (KSP Tap - Oyen 767S)	110.2	122.7	106.2	96.4	111.7	101.4	5	No									
	7L760 (KSP Tap - Bindloss 914S Tap)	110.2	122.7	105.1	95.3	110.6	100.4	5	No	2028SP	RTOP							
	7L760 (KSP Tap - Oyen 767S)	110.2	122.7	106	96.2	111.4	101.1	4.9	No									

Grizzly Bear 708S T1	704L (Tucuman 478S - Wainright 51S)	79	87	78.7	99.7	87.3	110.5	10.9	Yes	2028WP	**RAS 211**: P1704 (62.5MW) + HAL1 (100MW), P2441 (143MW),P2555 (163MW), P2562 (57.5MW), P2566 (114MW)	109.2%	103.8%	103.3%	101.9%	94.8%	640	Total curtailed load exceeds MSSC (466MW)
Hill 751S_TIEXMER	7L760 (KSP Tap - Bindloss 914S Tap)	110.2	122.7	104.5	94.8	110.2	100	5.2	No	2028SL	RTOP								
	7L760 (KSP Tap - Oyen 767S)	110.2	122.7	105.5	95.7	111.3	101	5.3	No		RTOP								
	703L (Hardisty 377S - Express 329S Tap)	96	143	98.9	103	106.5	110.9	7.9	No	2028WP	RTOP								
	472L (Metiskow 648S - 472AL Tap)	150	165	143	95.3	150.8	100.5	5.2	No		RTOP								
Holden 395S Transformer T1	7L760 (KSP Tap - Oyen 767S)	110.2	122.7	104.7	95	110.4	100.1	5.2	No	2028SL	RTOP								
	9L62 (Tinchebray 972S - Gaetz 87S)	831.4	831.4	782	94.1	848.7	102.1	8	Yes	2028WP	RTOP								
HRT Express 329S 138-4.16 kV Transformer	703L (Hardisty 377S - Express 329S Tap)	96	143	90.2	93.9	96	100	6.1	No		RTOP								
Jarrow 252S Transformer T2	7L760 (KSP Tap - Oyen 767S)	110.2	122.7	104.7	95	110.3	100.1	5.1	No	2028SL	RTOP								
Lanfine 959S 901T	7L760 (Empress Liquid 164S Tap -Amoco Empress 163S)	148	163	160.5	108.4	159.9	108	-0.4	No	2028WP	RTOP								
	7L760 (Empress Liquid 164S Tap - Bindloss 914S Tap)	142	156	161.2	113.5	160.6	113.1	-0.4	Yes		RTOP								
	7L760 (KSP Tap - Bindloss 914S Tap)	146.6	167.7	171.8	117.2	171.2	116.8	-0.4	Yes		RTOP								
Metiskow_648ST1	7L760 (KSP Tap - Oyen 767S)	110.2	122.7	104.7	95	110.4	100.2	5.2	No	2028SL	RTOP								
	715L (Hansman Lake 650S - 715AL Tap)	98	135	133.2	135.9	126.1	128.7	-7.2	No	2028SP	RTOP								
	715L (Rising Sun 1147S (P2540) Tap - 715AL Tap)	98	108	133.3	136	126.2	128.8	-7.2	Yes		RTOP								
Nilrem 574S T2	703L (Hardisty 377S - Express 329S Tap)	96	143	92.5	96.4	98.7	102.8	6.4	No	2028WP	RTOP								
Paintearth Creek 863S 902T	472L (Hughenden 213S - 472AL Tap)	84	92	88.6	105.4	96.6	115	9.5	Yes	2028SL	RTOP								
	7L760 (Empress Liquid 164S Tap - Bindloss 914S Tap)	110.2	122.7	108.9	98.8	114.9	104.2	5.5	No		RTOP								
	7L760 (KSP Tap - Bindloss 914S Tap)	110.2	122.7	110.5	100.3	116.6	105.8	5.5	No		RTOP								
	7L760 (KSP Tap - Oyen 767S)	110.2	122.7	111.5	101.2	117.6	106.8	5.6	No		RTOP								
	7L132 (Oyen 767S - Lanfine 959S)	112.1	138	110.9	98.9	118.3	105.5	6.7	No		RTOP								
	7L760 (KSP Tap - Bindloss 914S Tap)	110.2	122.7	108.6	98.6	114.9	104.2	5.7	No	2028SP	RTOP								
	7L760 (KSP Tap - Oyen 767S)	110.2	122.7	109.6	99.5	115.8	105	5.6	No		RTOP								
	703L (Hardisty 377S - Express 329S Tap)	96	143	117.1	121.9	124.8	130	8.1	No	2028WP	RTOP								
	472L (Metiskow 648S - 472AL Tap)	150	165	162.1	108	170	113.4	5.3	Yes		RTOP								
	472L (Hughenden 213S - 472AL Tap)	125	138	126.2	101	134.1	107.2	6.2	No		RTOP								
	704L (Tucuman 478S - Wainright 51S)	79	87	73.2	92.6	82.9	105	12.4	No		RTOP								
	1047L (Nilrem 574S - Easterv Tap)	499	748	478.6	95.9	508.8	102	6	No		RTOP								
Pemukan 932S 901T	7L760 (KSP Tap - Oyen 767S)	110.2	122.7	105	95.3	110.8	100.6	5.3	No	2028SL	RTOP								
7L117 (Irish Creek 706S - Vermillion 710S)	9L62 (Tinchebray 972S - Gaetz 87S)	831.4	831.4	772.1	92.9	839.8	101	8.1	Yes	2028WP	RTOP								
7L42 (Hill 751S - Lloydminster 716S)	7L760 (KSP Tap - Oyen 767S)	110.2	122.7	104.9	95.2	110.7	100.5	5.3	No	2028SL	RTOP								
	703L (Hardisty 377S - Express 329S Tap)	96	143	100.3	104.5	107.9	112.4	7.9	No	2028WP	RTOP								
	472L (Metiskow 648S - 472AL Tap)	150	165	144.4	96.3	152.2	101.5	5.2	No		RTOP								
	704L (Tucuman 478S - Wainright 51S)	79	87	74.4	94.2	85.2	107.9	13.7	No		RTOP								
9L960 (Paintearth 863S - Rolling Hills 1081S)	472L (Hughenden 213S - 472AL Tap)	84	92	88.7	105.6	96.6	115.1	9.5	Yes	2028SL	RTOP								
	7L760 (Empress Liquid 164S Tap - Bindloss 914S Tap)	110.2	122.7	108.8	98.7	114.8	104.2	5.5	No		RTOP								
	7L760 (KSP Tap - Bindloss 914S Tap)	110.2	122.7	110.4	100.2	116.5	105.7	5.5	No		RTOP								
	7L760 (KSP Tap - Oyen 767S)	110.2	122.7	111.4	101.1	117.5	106.6	5.6	No		RTOP								
	7L132 (Oyen 767S - Lanfine 959S)	112.1	138	110.8	98.8	118.2	105.4	6.7	No		RTOP								
	7L760 (KSP Tap - Bindloss 914S Tap)	110.2	122.7	108.5	98.5	114.8	104.1	5.7	No	2028SP	RTOP								
	7L760 (KSP Tap - Oyen 767S)	110.2	122.7	109.5	99.4	115.6	104.9	5.6	No		RTOP								
	703L (Hardisty 377S - Express 329S Tap)	96	143	117.2	122.1	125	130.2	8.1	No	2028WP	RTOP								
	472L (Metiskow 648S - 472AL Tap)	150	165	162.2	108.1	170.2	113.4	5.3	Yes		RTOP								
	472L (Hughenden 213S - 472AL Tap)	125	138	126.4	101.1	134.2	107.4	6.3	No		RTOP								
	704L (Tucuman 478S - Wainright 51S)	79	87	73.1	92.5	82.8	104.9	12.4	No		RTOP								

	1047L (Nilrem 574S - Easterv Tap)	499	748	479.1	96	509.4	102.1	6.1	No		RTOP							
885L (Metiskow 648S - Hansman Lake 650S)	749L (Killarney 267S Tap - 749AL Tap)	121	133	117.8	97.4	122	100.9	3.6	No	2028SP	RTOP							
	749L (Killarney 267S Tap - 749AL Tap)	148	163	163.4	110.4	167.4	113.1	2.7	Yes	2028WP	**Planned RAS 213:** P2460 (128MW)	55.5%					128	
Nevis 766S_903T	7L128 (Coyote Lake 963S - High_Tap)	162.9	186.9	179	109.9	175	107.4	-2.4	No	2028SP	RTOP							
703L (Hughenden 213S - Hardisty 377S)	7L760 (KSP Tap - Oyen 767S)	110.2	122.7	104.6	95	110.3	100.1	5.1	No	2028SL	RTOP							
Anderson 801S_901T	7L128 (Coyote Lake 963S - High_Tap)	162.9	186.9	215.7	132.4	204.6	125.6	-6.8	Yes	2028SP	RTOP							
	7L171 (Michichi Creek 802S - Wintering Hills 804S)	140.9	143.8	142.2	100.9	142.6	101.2	0.3	No	2028WP	RTOP							
174L (Holden 395S - Bardo 197S)	9L62 (Tinchebray 972S - Gaetz 87S)	831.4	831.4	769.5	92.6	833.8	100.3	7.7	Yes		RTOP							
Provost 545S 701T	715L (Hansman Lake 650S - 715AL Tap)	98	135	106.2	108.4	104.7	106.8	-1.5	No	2028SP	RTOP							
	715L (Rising Sun 1147S (P2540) Tap - 715AL Tap)	98	108	106.2	108.4	104.7	106.8	-1.5	No		RTOP							
748L (Killarney 267S - Hayter 277S)	715L (Hansman Lake 650S - 715AL Tap)	98	135	114	116.4	114	116.4	0	No		RTOP							
	715L (Rising Sun 1147S (P2540) Tap - 715AL Tap)	98	108	114.1	116.4	114.1	116.4	0	Yes		RTOP							
933L (Anderson 801S - Ware Junction 132S)	7L760 (Empress Liquid 164S Tap - Bindloss 914S Tap)	110.2	122.7	111.3	101	118	107.1	6.1	No	2028SL	RTOP							
	7L760 (KSP Tap - Bindloss 914S Tap)	110.2	122.7	112.9	102.5	119.7	108.7	6.2	No		RTOP							
	7L760 (KSP Tap - Oyen 767S)	110.2	122.7	113.9	103.4	120.7	109.6	6.2	No		RTOP							
	7L132 (Oyen 767S - Lanfine 959S)	112.1	138	112	99.9	120	107.1	7.1	No		RTOP							
	934L (Anderson 801S - Ware Junction 132S)	499	499	453.4	90.9	505.9	101.4	10.5	Yes	2028SP	**New RAS for 934L/9L934 or 950L/9L950 Overload Mitigation:** Trip P2464 (280MW), GDP1 (130MW)	87.0%	81.4%				410	
	950L (Anderson 801S - Ware Junction 132S)	499	499	451.5	90.5	503.8	101	10.5	Yes			86.6%	81.1%					
	7L760 (Empress Liquid 164S Tap - Bindloss 914S Tap)	110.2	122.7	105.7	95.9	112.5	102.1	6.2	No			92.4%	90.0%					
	7L760 (KSP Tap - Bindloss 914S Tap)	110.2	122.7	114.4	103.8	121.4	110.2	6.4	No			100.1%	97.4%					
	7L760 (KSP Tap - Oyen 767S)	110.2	122.7	115.3	104.7	122.2	110.9	6.2	No			101.2%	98.8%					
	7L132 (Oyen 767S - Lanfine 959S)	112.1	138	107.6	95.9	115.5	103	7.1	No			92.9%	90.6%					
934L (Anderson 801S - Ware Junction 132S)	7L760 (Empress Liquid 164S Tap - Bindloss 914S Tap)	110.2	122.7	111.3	101	118	107.1	6.1	No	2028SL	RTOP							
	7L760 (KSP Tap - Bindloss 914S Tap)	110.2	122.7	113	102.5	119.7	108.7	6.2	No		RTOP							
	7L760 (KSP Tap - Oyen 767S)	110.2	122.7	113.9	103.4	120.7	109.6	6.2	No		RTOP							
	7L132 (Oyen 767S - Lanfine 959S)	112.1	138	112	99.9	120	107.1	7.1	No		RTOP							
	950L (Anderson 801S - Ware Junction 132S)	499	499	451.6	90.5	503.8	101	10.5	Yes	2028SP	**New RAS for 934L/9L934 or 950L/9L950 Overload Mitigation:** Trip P2464 (280MW), GDP1 (130MW)	86.6%	81.4%				410	
	7L760 (Empress Liquid 164S Tap - Bindloss 914S Tap)	110.2	122.7	105.7	95.9	112.5	102.1	6.2	No			92.4%	90.0%					
	7L760 (KSP Tap - Bindloss 914S Tap)	110.2	122.7	114.4	103.8	121.4	110.2	6.4	No			100.1%	97.4%					
	7L760 (KSP Tap - Oyen 767S)	110.2	122.7	115.3	104.7	122.2	110.9	6.2	No			101.2%	98.8%					
	7L132 (Oyen 767S - Lanfine 959S)	112.1	138	107.6	95.9	115.5	103	7.1	No			92.9%	90.6%					
950L (Anderson 801S - Ware Junction 132S)	7L760 (Empress Liquid 164S Tap - Bindloss 914S Tap)	110.2	122.7	111.2	100.9	118	107	6.1	No	2028SL	RTOP							
	7L760 (KSP Tap - Bindloss 914S Tap)	110.2	122.7	112.9	102.4	119.7	108.6	6.2	No		RTOP							
	7L760 (KSP Tap - Oyen 767S)	110.2	122.7	113.8	103.3	120.7	109.5	6.2	No		RTOP							
	7L132 (Oyen 767S - Lanfine 959S)	112.1	138	112	99.9	120	107	7.1	No		RTOP							
	934L (Anderson 801S - Ware Junction 132S)	499	499	452.6	90.7	505	101.2	10.5	Yes	2028SP	**New RAS for 934L/9L934 or 950L/9L950 Overload Mitigation:** Trip P2464 (280MW), GDP1 (130MW)	86.8%	81.5%				410	
	7L760 (Empress Liquid 164S Tap - Bindloss 914S Tap)	110.2	122.7	105.6	95.8	112.4	102	6.2	No			92.3%	89.7%					
	7L760 (KSP Tap - Bindloss 914S Tap)	110.2	122.7	114.3	103.7	121.3	110.1	6.3	No			100.1%	97.7%					
	7L760 (KSP Tap - Oyen 767S)	110.2	122.7	115.3	104.6	122.1	110.8	6.2	No			101.1%	98.5%					
	7L132 (Oyen 767S - Lanfine 959S)	112.1	138	107.5	95.9	115.5	103	7.1	No			92.8%	90.3%					
9L966 (Hansman Lake 650S - Pemukan 932S)	7L760 (Empress Liquid 164S Tap - Bindloss 914S Tap)	110.2	122.7	102.7	93.2	111.1	100.8	7.6	No	2028SL	RTOP							
	7L760 (KSP Tap - Bindloss 914S Tap)	110.2	122.7	104.3	94.7	112.8	102.4	7.7	No		RTOP							
	7L760 (KSP Tap - Oyen 767S)	110.2	122.7	105.3	95.6	113.8	103.3	7.7	No		RTOP							
	7L132 (Oyen 767S - Lanfine 959S)	112.1	138	104.1	92.9	114.3	101.9	9.1	No		RTOP							
	7L224 (Hansman Lake 650S - Monitor 774S)	143.8	163.9	156.2	108.6	190	132.1	23.5	Yes	2028WP	**Modified RAS 201:** P1567 (60831=195.8MW),	98.7%					195.8	
	7L127 (Pemukan 932S - Monitor 774S)	182.1	243.4	189.6	104.2	225	123.6	19.4	No			94.9%						

914L (Red Deer 63S - Gaetz 87S)	7L760 (KSP Tap - Oyen 767S)	110.2	122.7	105.6	95.8	111.2	100.9	5.1	No	2028SL	RTOP								
	7L760 (KSP Tap - Bindloss 914S Tap)	110.2	122.7	104.7	95	110.3	100.1	5.1	No	2028SP	RTOP								
	7L760 (KSP Tap - Oyen 767S)	110.2	122.7	105.7	95.9	111.2	100.9	5	No		RTOP								
1082L (Red Deer 63S - Hazelwood 287S)	7L760 (KSP Tap - Oyen 767S)	110.2	122.7	105.3	95.5	110.5	100.3	4.8	No		RTOP								
9L62 (Tinchebray 972S - Gaetz 87S)	9L912 (Red Deer 63S - Nevis 766S)	507	608	570.7	112.6	644.1	127	14.5	Yes	2028SL	RTOP								
	7L760 (Empress Liquid 164S Tap - Bindloss 914S Tap)	110.2	122.7	112.5	102.1	119.2	108.2	6.1	No		RTOP								
	7L53 (Bonnyville 700S - Lindberg 969S Tap)	124.6	139	114.8	92.2	132.3	106.2	14	No		RTOP								
	7L760 (KSP Tap - Bindloss 914S Tap)	110.2	122.7	114.1	103.5	120.9	109.7	6.2	No		RTOP								
	7L760 (KSP Tap - Oyen 767S)	110.2	122.7	115	104.3	121.8	110.6	6.2	No		RTOP								
	9L20 (Nevis 766S – Cordel 755S)	429	624	535.2	124.8	595.9	138.9	14.1	No		RTOP								
	7L132 (Oyen 767S - Lanfine 959S)	112.1	138	112.9	100.7	120.9	107.9	7.2	No		RTOP								
	9L912 (Red Deer 63S - Nevis 766S)	507	608	522.1	103	601.3	118.6	15.6	No	2028SP	RTOP								
	7L760 (Empress Liquid 164S Tap - Bindloss 914S Tap)	110.2	122.7	104	94.4	111.2	100.9	6.5	No		RTOP								
	7L760 (KSP Tap - Bindloss 914S Tap)	110.2	122.7	112.7	102.3	120	108.9	6.6	No		RTOP								
	7L760 (KSP Tap - Oyen 767S)	110.2	122.7	113.7	103.2	120.8	109.7	6.5	No		RTOP								
	9L20 (Nevis 766S – Cordel 755S)	429	624	462.3	107.8	527.9	123	15.3	No		RTOP								
	7L132 (Oyen 767S - Lanfine 959S)	112.1	138	105.9	94.4	114.1	101.8	7.4	No		RTOP								
	174L (Bardo 197S - Holden 395S)	90.1	99	97.3	108	103.9	115.4	7.3	Yes	2028WP	**RAS 134 Logic#1, RAS 211, Planned RAS 215**: P1704 (62.5MW), HAL1 (100MW) + P2441 (143MW), P2555 (163MW)	113.4%	104.2%	98.0%			468.5	Total curtailed load exceeds MSSC (466MW). RTOP will be used for the remaining thermal violations. See also the Note below.
	730L (Bardo 197S - Kingman 299S Tap)	91.1	99.9	88.1	96.8	93	102.1	5.3	No			116.3%	108.4%	103.0%					
	9L912 (Red Deer 63S - Nevis 766S)	624	624	908.1	145.5	988.1	158.4	12.8	Yes			154.4%	136.8%	125.8%					
	704L (Tucuman 478S - Wainright 51S)	79	87	77.6	98.2	88.3	112.1	13.6	Yes			110.6%	104.8%	97.6%					
	7L53 (Bonnyville 700S - Lindberg 969S Tap)	155.2	177.3	164.7	106.1	180.4	116.2	10.1	Yes			114.1%	108.3%	103.9%					
	9L20 (Nevis 766S – Cordel 755S)	540	624	794.1	147.1	860.7	159.4	12.3	Yes			155.0%	135.3%	123.2%					
	9L16 (Goldeye Tap - Cordel 755S)	499	499	443.5	88.9	502.9	101.7	11.9	Yes			93.3%	61.8%	67.5%					
Tucuman 478S Transformers	472L (Hughenden 213S - 472AL Tap)	84	92	87.7	104.4	93.1	110.8	6.5	Yes	2028SL	RTOP								
	7L760 (KSP Tap - Oyen 767S)	110.2	122.7	104.6	95	110.3	100.1	5.1	No		RTOP								
	472L (Hughenden 213S - 472AL Tap)	84	92	83.1	98.9	88.8	105.8	6.9	No	2028SP	RTOP								
	703L (Hardisty 377S - Express 329S Tap)	96	143	112.4	117	117.6	122.5	5.4	No	2028WP	RTOP								
	472L (Metiskow 648S - 472AL Tap)	150	165	153.5	102.3	159	106	3.7	No		RTOP								
	472L (Hughenden 213S - 472AL Tap)	125	138	120.2	96.2	125.5	100.4	4.2	No		RTOP								
Wainwright 51S Transformer T3	7L760 (KSP Tap - Oyen 767S)	110.2	122.7	105	95.2	110.6	100.4	5.1	No	2028SL	RTOP								
EATL (Newell 2075S - Heathfield 2029S)	7L53 (Bonnyville 700S - Lindberg 969S Tap)	155.2	177.3	155.2	100.0	173.5	111.8	11.8	No		RTOP								
	704L (Tucuman 478S - Wainright 51S)	79	87	73.2	92.7	82.2	104.1	11.4	No		RTOP								
	472L (Hughenden 213S - 472AL Tap)	84	92	79.1	94.2	85.1	101.3	7.1	No		RTOP								
	9L62 (Tinchebray 972S - Gaetz 87S)	831.4	831.4	944.5	113.6	1016.0	122.2	8.6	Yes	2028WP	**RAS 211**: P1704(62.5MW) + HAL1(100MW), P2441 (143MW) + P2555(163MW), P2562(57.5MW) + P2566(114MW)	114.2%	100.4%	93.3%			640	Total curtailed load exceeds MSSC (466MW). There is subsequent O/L on 9L59 (Anderson 801S - 9L59A Tap) = 116.4 and 9L966 (Hansman Lake-Pemukan)=104.1. RTOP will
	9L59 (Tnchebray 972S - 9LA59Tap)	499	499	533.9	107.0	607.3	121.7	14.7	Yes			128.0%	136.9%	141.0%					
	704L (Tucuman 478S - Wainright 51S)	79	87	80.1	101.4	90.1	114.1	12.7	Yes			112.4%	104.8%	96.7%					
	7L53 (Bonnyville 700S - Lindberg 969S Tap)	155.3	177.3	162.9	104.9	176.4	113.6	8.7	No			110.8%	106.1%	103.0%					
	7L16 (Nevis 766S - Heatburg 948S)	142.8	160	132.9	93.1	144.2	101.0	7.9	No			101.8%	102.9%	103.3%					
	703L (Hardisty 377S - Express 329S Tap)	96	143	98.5	102.6	104.1	108.4	5.8	No			109.8%	106.6%	106.3%					

	7L159 (Heatburg 948S - Ghostpine 114S Tap)	142.8	160	136.8	95.8	148.1	103.7	7.9	No			104.4%	105.5%	105.9%				be used for the remaining thermal violations. See also the Note below.
	9L912 (Red Deer 63S - Nevis 766S)	624	624	590.3	94.6	634.6	101.7	7.1	Yes			85.0%	73.0%	66.0%				

Note: RTOP will also be used for the remaining thermal violations that are above the emergency rating. AESO will investigate further during the next round of Operation Planning studies. At that time, it will be determined if the project needs to be added to any additional existing, planned, or new RASs

Table 8-3: Constraint Summary Table (Scenario 4, 6) – Voltage Performance

Triggering Events (Element out of Service)	Details of Constraint										Assumed System Conditions	Mitigation Approach
	Voltage (Steady State)											Automatic (RAS) Or Real Time Operating Practice
	Substation	Bus #	Nominal Voltage	Emergency Minimum Voltage	Emergency Maximum Voltage	Pre-Project		Post-Project		% Voltage Difference (kV)	Stability	
						Initial Voltage (kV) Pre	Voltage (KV) Pre	Initial Voltage (kV) Pre	Voltage (KV) Pre			
749L (Edgerton 899S - Metiskow 648S)	Edgerton 899S	362	138	124	152	142.1	151.9	141.9	153.1	0.9%	Yes	2028SL
7L77 (Holden 395S - Vegreville 709S)	Holden 395S	68	138	124	152	148.5	152.2	148.7	152.7	0.4%	Yes	
7L77 (Holden 395S - Vegreville 709S)	Holden 395S	68	138	124	152	147.1	153.2	146.9	153.8	0.4%	Yes	2028WP
7L16 (Nevis 766S - Heatburg 948S)	Nevis 766S	1423	144	130	155	149.2	154	149.5	155.4	0.9%	Yes	
7L159 (Three Hills 770S - Heatburg 948S)	Nevis 766S	1423	144	130	155	149.2	154.6	149.5	156.1	1.0%	Yes	
	Heatburg 948S	1429	144	130	155	149.1	154.5	148.9	156	1.0%	Yes	

Realtime Operation Practice (RTOP)

Attachment A9

Constraint Effectiveness Factors

Table A9-1: Generator Types

Plant	Ghost Pine (NEP1)	P1718 Wheatland WAGF	Sunoor Wintering Hills (SCR4)	P1967 EDPR Sharp Hills Wind Farm	Lanfine Wind (LAN1)	P1704 Painearth Wind Power	Halkirk Wind Power Facility (HAL1)	P1250 Grizzly Bear Wind (GRZ1)	P1909 Garden Plain Wind	P2263 Hand Hills MPC Wind	P2573 BluEarth Prairie Yarrow Wind	ATCO Michichi DER	P2611 UK Solar East	Michichi Solar	Capital Power (HAL2)	P2460 ABO Fox Meadows Wind	P2540 Rising Sun Solar	P2555 CP Rolling Hills Wind	P2356 RESC Oyen Wind	BUL1 Bull Creek (BUL1)	BUL2 Bull Creek (BUL2)	P2421 RESC Big Sky Solar	P2424 ATCO Oyen 767S DER Solar	Youngstow n Solar (YNG1)	P2690 Harvest Sky Solar Battery	P2259 FortisAlberta Metiskow 64kS DER Solar	P2574 Fortis Aura Provost DER Solar	P2596 Eastervale Solar Battery	P2553 Doloy MPC Solar Battery	eReserve5 Hughenden (ERV5)	P2292 FortisAlberta Killarney Lake 267S DER Solar-Battery Storage	Lindbergh (PEC1)	P2334 Cold Lake Area Energy Centre	P2469 ATCO Vermilion 710S DER Gas	P2540 ATCO Irish Creek 706S DER Gas	Battle River #5 (BR5)	Battle River #4 (BR4)	Sheerness #1 (SH1)	Sheerness #2 (SH2)	P2690 Mannix Solar Battery	eReserve2 Buffalo Creek (ERV2)	Bella Hill (BHL1)	P2464 Sunnynook #560033
Type	Wind	Wind	Wind	Wind	Wind	Wind	Wind	Wind	Wind	Wind	Solar	Solar	Solar	Solar	Wind	Solar	Solar	Solar	Wind	Wind	Wind	Solar	Solar	Solar	Solar + Battery	Solar	Solar	Solar + Battery	Solar + Battery	Gas	Solar + Battery	Wind	Wind	Gas	Gas	Gas	Gas	Gas	Gas	Solar + Battery	Gas	Gas	Solar + Battery

Table A9-2.1: SCN4_2028 SL_Post-Project_with CETO - Generator Effectiveness Factors under Category A Conditions

Contingency	Limiting Branch	Ghost Pine (NEP1) #2621	P1718 Wheatland WAGF #606.32	Sunoor Wintering Hills (SCR4) #607.89	P1967 EDPR Sharp Hills Wind Farm #603.51	Lanfine Wind (LAN1) #401.96	P1704 Painearth Wind Power #614.18	Halkirk Wind Power Facility (HAL1) #664.35	P1250 Grizzly Bear Wind (GRZ1) #633.98	P1909 Garden Plain Wind #865.02	P2263 Hand Hills MPC Wind #840.945	BluEarth Prairie Yarrow Wind #560.273	ATCO Michichi DER #553.448	P2611 UK Solar East #591.942	Michichi Solar #544.448	Capital Power (HAL2) #834.67	P2460 ABO Fox Meadows Wind #569.039	P2540 Rising Sun Solar #563.946	P2555 CP Rolling Hills Wind #563.255	P2356 RESC Oyen Wind #569.032	BUL1 Bull Creek (BUL1) #569.063	BUL2 Bull Creek (BUL2) #569.004	P2421 RESC Big Sky Solar #560.951	P2424 ATCO Oyen 767S DER Solar #19.474	Youngstow n Solar (YNG1) #19.476	P2690 Harvest Sky MPC Solar Battery #566.913	P2259 FortisAlberta Metiskow 64kS DER Solar #657.074	P2574 Fortis Aura Provost DER Solar #406	P2596 Eastervale Solar Battery #562.092	P2553 Doloy MPC Solar Battery #567.156	eReserve5 Hughenden (ERV5) #375	P2292 FortisAlberta Killarney Lake 267S DER Solar-Battery Storage #429	Lindbergh (PEC1) #15444	P2334 Cold Lake Area Energy Centre #570.32	P2469 ATCO Vermilion 710S DER Gas #1033	P2540 ATCO Irish Creek 706S DER Gas #1.037	P2464 Sunnynook #560.013
Category A (N-0)	7L760 (Oyen 767S - Bus 1395_KSP Tap)	2.0	1.5	1.6	9.2	21.0	2.3	2.3	2.9	1.5	1.6	5.5	1.9	11.0	1.9	2.4	5.4	5.6	4.3	11.0	5.5	5.5	-52.9	21.2	14.7	8.2	5.6	5.5	4.9	5.5	5.0	5.4	2.2	2.2	3.0	2.5	3.3
	7L760 (Empress Liquid 164S Tap -Amoco Empress 163S)	2.0	1.5	1.6	9.2	21.0	2.3	2.3	2.9	1.5	1.6	5.5	1.9	11.0	1.9	2.4	5.4	5.6	4.3	11.0	5.5	5.5	47.1	21.2	14.7	8.2	5.6	5.5	4.9	5.5	5.0	5.4	2.2	2.2	3.0	2.5	3.3
	7L760 (Empress Liquid 164S Tap - Bindloss 914S Tap)	2.0	1.5	1.6	9.2	21.0	2.3	2.3	2.9	1.5	1.6	5.5	1.9	11.0	1.9	2.4	5.4	5.6	4.3	11.0	5.5	5.5	47.1	21.2	14.7	8.2	5.6	5.5	4.9	5.5	5.0	5.4	2.2	2.2	3.0	2.5	3.3
	7L760 (KSP Tap - Bindloss 914STap)	2.0	1.5	1.6	9.2	21.0	2.3	2.3	2.9	1.5	1.6	5.5	1.9	11.0	1.9	2.4	5.4	5.6	4.3	11.0	5.5	5.5	47.1	21.2	14.7	8.2	5.6	5.5	4.9	5.5	5.0	5.4	2.2	2.2	3.0	2.5	3.3
	7L132 (Oyen 767S - Lanfine 959S)	0.8	0.1	0.1	10.0	23.6	2.2	2.2	2.6	1.5	0.6	5.5	-0.2	12.2	-0.2	2.2	5.5	5.6	4.3	12.2	5.5	5.5	-50.4	-53.3	-33.7	-13.9	5.6	5.6	5.0	5.6	4.9	5.5	2.0	2.0	2.8	2.3	3.7

Table A9-2.2: SCN4_2028 SL_Post-Project_with CETO - Generator Effectiveness Factors under Category B Conditions

Contingency	Limiting Branch	Ghost Pine (NEP1) #2621	P1718 Wheatland WAGF #606.32	Sunoor Wintering Hills (SCR4) #607.89	P1967 EDPR Sharp Hills Wind Farm #603.51	Lanfine Wind (LAN1) #401.96	P1704 Painearth Wind Power #614.18	Halkirk Wind Power Facility (HAL1) #664.35	P1250 Grizzly Bear Wind (GRZ1) #633.98	P1909 Garden Plain Wind #865.02	P2263 Hand Hills MPC Wind #840.945	BluEarth #560.273	ATCO Michichi DER #553.448	P2611 UK Solar East #591.942	Michichi Solar #544.448	Capital Power (HAL2) #834.67	P2460 ABO Fox Meadows Wind #569.039	P2540 Rising Sun Solar #563.946	P2555 CP Rolling Hills Wind #563.255	P2356 RESC Oyen Wind #569.032	P2464 Sunnynook #560.013
681L (Tucuman 478S - Hardisty 377S)	472L (Hughenden 213S - 472AL Tap)	-0.2	0.8	0.7	4.4	2.9	-0.6	-0.6	-0.3	0.2	0.9	10.1	0.6	3.3	0.6	-0.6	9.9	10.5	2.9	3.3	1.6
6L09 (Hanna 763S - Oyen 767S)	7L60 (KSP Tap - Oyen 767S)	1.7	1.2	1.2	9.4	21.6	2.3	2.3	2.8	1.5	1.3	5.5	1.4	11.3	1.4	2.4	5.4	5.6	4.3	11.3	3.4
703L (Hughenden 213S - Hardisty 377S)	7L60 (KSP Tap - Bindloss 914S Tap)	2.0	1.5	1.6	9.3	21.1	2.3	2.3	2.9	1.5	1.6	5.8	1.9	11.0	1.9	2.4	5.7	5.9	4.3	11.0	3.4
	7L60 (KSP Tap - Oyen 767S)	2.0	1.5	1.6	9.3	21.1	2.3	2.3	2.9	1.5	1.6	5.8	1.9	11.0	1.9	2.4	5.7	5.9	4.3	11.0	3.4
749L (Edgerton 899S - Metiskow 648S)	472L (Hughenden 213S - 472AL Tap)	0.1	1.4	1.3	6.5	4.4	-0.9	-0.9	-4.2	0.3	1.5	18.8	1.3	4.8	1.3	-0.9	18.8	18.8	3.7	4.8	2.4
	704L (Tucuman 478S - Wainright 51S)	0.7	1.3	1.2	3.8	2.7	1.0	1.0	-17.9	1.2	1.3	6.1	1.2	3.0	1.2	1.1	6.1	6.1	3.6	3.0	1.8
	715L (Hansman Lake 650S - 715AL Tap)	-	-	-	-	-	-	-	-	-	-	100.0	-	-	-	-	100.0	100.0	-	-	-
	715L (715BL Tap - 715AL Tap)	-	-	-	-	-	-	-	-	-	-	100.0	-	-	-	-	100.0	100.0	-	-	-
	7L60 (KSP Tap - Oyen 767S)	2.0	1.6	1.7	9.3	21.1	2.4	2.4	2.4	1.6	1.6	5.8	2.0	11.0	2.0	2.4	5.8	5.8	4.4	11.0	3.4
769L (Rosyth 296S - Hardisty 377S)	7L60 (KSP Tap - Oyen 767S)	2.0	1.5	1.6	9.2	21.0	2.3	2.3	2.9	1.5	1.6	5.5	1.9	11.0	1.9	2.4	5.4	5.6	4.3	11.0	3.3
7L116 (Excel 910S - Lanfine 959S)	7L60 (KSP Tap - Bindloss 914S Tap)	2.0	1.5	1.6	9.2	21.0	2.3	2.3	2.9	1.5	1.6	5.5	1.9	11.0	1.9	2.4	5.4	5.6	4.3	11.0	3.3
	7L60 (KSP Tap - Oyen 767S)	2.0	1.5	1.6	9.2	21.0	2.3	2.3	2.9	1.5	1.6	5.5	1.9	11.0	1.9	2.4	5.4	5.6	4.3	11.0	3.3
7L127 Pemukan 932S - Monitor 774S)	7L60 (KSP Tap - Oyen 767S)	2.0	1.6	1.6	9.5	21.2	2.3	2.3	2.8	1.5	1.6	5.0	1.9	11.2	1.9	2.3	5.0	5.1	4.2	11.2	3.4
7L749 (Edgerton 899S - Lloyminster 716S)	472L (Hughenden 213S - 472AL Tap)	0.1	1.4	1.3	6.5	4.4	-0.9	-0.9	-4.2	0.3	1.5	19.0	1.3	4.8	1.3	-0.9	19.0	18.8	3.7	4.8	2.4
	704L (Tucuman 478S - Wainright 51S)	0.7	1.3	1.2	3.8	2.7	1.0	1.0	-17.9	1.2	1.3	6.1	1.2	3.0	1.2	1.1	6.1	6.1	3.6	3.0	1.8
	7L60 (KSP Tap - Bindloss 914S Tap)	2.0	1.6	1.6	9.3	21.1	2.4	2.4	2.4	1.6	1.6	5.8	2.0	11.0	2.0	2.4	5.8	5.8	4.4	11.0	3.4
	7L60 (KSP Tap - Oyen 767S)	2.0	1.6	1.7	9.3	21.1	2.4	2.4	2.4	1.6	1.6	5.8	2.0	11.0	2.0	2.4	5.8	5.8	4.4	11.0	3.4
7L79 (Pemukan 932S - Ribstone Creek 892S)	7L60 (KSP Tap - Oyen 767S)	2.0	1.5	1.6	9.2	21.0	2.3	2.3	2.9	1.5	1.6	5.5	1.9	11.0	1.9	2.4	5.4	5.6	4.3	11.0	3.3
719Z (Vegreville 709S - Whitby Lake 819S)	7L60 (KSP Tap - Oyen 767S)	2.0	1.5	1.6	9.2	21.0	2.4	2.4	3.0	1.6	1.6	5.5	1.9	11.0	1.9	2.4	5.4	5.6	4.3	11.0	3.3
912O (Nevis 766S - Cordel 755S)	7L60 (Empress Liquid 164S Tap - Bindloss 914S Tap)	1.6	1.6	1.7	9.5	21.3	2.8	2.8	3.1	1.9	1.7	5.9	2.0	11.2	2.0	2.9	5.8	6.0	4.8	11.2	3.6
	7L60 (KSP Tap - Bindloss 914S Tap)	1.6	1.6	1.7	9.5	21.3	2.8	2.8	3.1	1.9	1.7	5.9	2.0	11.2	2.0	2.9	5.8	6.0	4.8	11.2	3.6
	7L60 (KSP Tap - Oyen 767S)	1.6	1.6	1.7	9.5	21.3	2.8	2.8	3.1	1.9	1.7	5.9	2.0	11.2	2.0	2.9	5.8	6.0	4.8	11.2	3.6
	7L132 (Oyen 767S - Lanfine 959S)	0.4	0.3	0.2	10.4	23.9	2.7	2.7	2.9	1.9	0.7	6.0	-0.2	12.5	-0.2	2.7	5.9	6.1	4.8	12.5	4.0
9L24 (Lanfine 959S - Oakland 946S)	472L (Hughenden 213S - 472AL Tap)	-0.1	0.4	0.4	9.3	7.6	-0.5	-0.5	0.2	-0.1	0.4	18.5	0.4	8.7	0.4	-0.6	18.1	19.1	4.5	8.7	-
	7L60 (Empress Liquid 164S Tap -Amoco Empress 163S)	1.9	-1.0	-0.8	22.2	34.5	4.1	4.1	6.0	0.8	-1.4	12.4	-0.1	26.8	-0.1	4.2	12.2	12.6	9.2	26.8	-
	7L60 (Empress Liquid 164S Tap - Bindloss 914S Tap)	1.9	-1.0	-0.8	22.2	34.5	4.1	4.1	6.0	0.8	-1.4	12.4	-0.1	26.8	-0.1	4.2	12.2	12.6	9.2	26.8	-
	7L60 (KSP Tap - Bindloss 914S Tap)	1.9	-1.0	-0.8	22.2	34.5	4.1	4.1	6.0	0.8	-1.4	12.4	-0.1	26.8	-0.1	4.2	12.2	12.6	9.2	26.8	-
	7L60 (KSP Tap - Oyen 767S)	1.9	-1.0	-0.8	22.2	34.5	4.1	4.1	6.0	0.8	-1.4	12.4	-0.1	26.8	-0.1	4.2	12.2	12.6	9.2	26.8	-
	7L132 (Oyen 767S - Lanfine 959S)	0.6	-2.6	-2.6	24.3	38.6	4.1	4.1	6.0	0.7	-2.7	13.1	-2.5	29.7	-2.5	4.2	13.0	13.4	9.7	29.7	-
9L27 (Painteanth Creek - Cordel 755S)	472L (Hughenden 213S - 472AL Tap)	-0.1	1.5	1.4	7.6	5.1	-1.5	-1.5	-0.1	0.1	1.6	19.2	1.3	5.6	1.3	-1.6	18.7	19.7	9.7	5.6	2.7
	7L60 (Empress Liquid 164S Tap - Bindloss 914S Tap)	2.0	1.7	1.7	9.9	21.4	2.2	2.2	3.1	1.5	1.7	6.4	2.0	11.5	2.0	2.2	6.3	6.5	6.7	11.5	3.6
	7L60 (KSP Tap - Bindloss 914S Tap)	2.0	1.7	1.7	9.9	21.4	2.2	2.2	3.1	1.5	1.7	6.4	2.0	11.5	2.0	2.2	6.3	6.5	6.7	11.5	3.6
	7L60 (KSP Tap - Oyen 767S)	2.0	1.7	1.7	9.9	21.5	2.2	2.2	3.1	1.5	1.7	6.4	2.0	11.5	2.0	2.2	6.3	6.5	6.7	11.5	3.6
	7L132 (Oyen 767S - Lanfine 959S)	0.8	0.3	0.2	10.8	24.1	2.0	2.0	2.9	1.5	0.7	6.6	-0.1	12.7	-0.1	2.0	6.5	6.7	6.9	12.7	4.0
9L70 (Oakland 946S - Anderson 801S)	7L60 (KSP Tap - Bindloss 914S Tap)	2.1	1.6	1.8	9.4	21.2	2.4	2.4	2.9	1.5	1.9	5.6	2.1	11.2	2.1	2.4	5.5	5.7	4.4	11.2	3.7
	7L60 (KSP Tap - Oyen 767S)	2.1	1.6	1.8	9.4	21.2	2.4	2.4	2.9	1.5	1.9	5.6	2.1	11.2	2.1	2.4	5.5	5.7	4.4	11.2	3.7
	9L97 (Anderson 801S - Oakland 946S)	24.2	24.1	28.2	42.3	43.9	6.5	6.5	11.2	-3.5	61.7	23.3	42.1	51.2	42.1	6.9	23.0	23.7	17.1	51.2	75.0
	7L132 (Oyen 767S - Lanfine 959S)	0.9	0.3	0.2	10.2	23.8	2.2	2.2	2.7	1.5	0.9	5.6	-	12.4	-	2.3	5.6	5.8	4.3	12.4	4.1
9L912 (Nevis 766S – Red Deer 63S)	7L60 (Empress Liquid 164S Tap - Bindloss 914S Tap)	2.9	2.0	2.1	9.6	21.4	2.8	2.8	3.2	1.9	2.0	6.0	2.4	11.3	2.4	2.9	5.9	6.1	4.8	11.3	3.7
	7L60 (KSP Tap - Bindloss 914S Tap)	2.9	2.0	2.1	9.6	21.4	2.8	2.8	3.2	1.9	2.0	6.0	2.4	11.3	2.4	2.9	5.9	6.1	4.8	11.3	3.7
	7L60 (KSP Tap - Oyen 767S)	2.9	2.0	2.1	9.6	21.4	2.8	2.8	3.2	1.9	2.0	6.0	2.4	11.3	2.4	2.9	5.9	6.1	4.8	11.3	3.7
	9L16 (Goldeye Tap - Tinchebray 972S)	45.7	16.3	17.4	34.3	23.2	-21.8	-21.8	35.6	-8.0	14.4	51.3	20.9	25.3	20.9	77.3	50.9	51.7	61.8	25.3	11.5
	7L132 (Oyen 767S - Lanfine 959S)	1.5	0.5	0.4	10.4	23.9	2.6	2.6	2.9	1.9	0.9	5.9	0.2	12.5	0.2	2.6	5.9	6.0	4.7	12.5	4.0
9L953 (Cordel 755S - Nilrem 574S)	704L (Tucuman 478S - Wainright 51S)	0.5	1.4	1.4	5.3	3.7	0.2	0.2	-12.6	0.9	1.5	7.0	1.3	4.0	1.3	0.2	6.5	7.8	4.5	4.0	2.2
	7L60 (Empress Liquid 164S Tap - Bindloss 914S Tap)	2.0	1.6	1.7	9.9	21.4	2.1	2.1	3.3	1.5	1.7	6.5	2.0	11.4	2.0	2.2	6.4	6.6	4.8	11.4	3.6
	7L60 (KSP Tap - Bindloss 914S Tap)	2.0	1.6	1.7	9.9	21.4	2.1	2.1	3.3	1.5	1.7	6.5	2.0	11.4	2.0	2.2	6.4	6.6	4.8	11.4	3.6
	7L60 (KSP Tap - Oyen 767S)	2.0	1.6	1.7	9.9	21.4	2.1	2.1	3.3	1.5	1.7	6.5	2.0	11.4	2.0	2.2	6.4	6.6	4.8	11.4	3.6
	7L132 (Oyen 767S - Lanfine 959S)	0.7	0.3	0.2	10.7	24.1	2.0	2.0	3.1	1.5	0.7	6.6	-0.1	12.7	-0.1	2.0	6.6	6.8	4.8	12.7	4.0
9L97 (Oakland 946S - Anderson 801S)	7L60 (KSP Tap - Bindloss 914S Tap)	2.1	1.6	1.8	9.4	21.2	2.4	2.4	2.9	1.5	1.9	5.6	2.1	11.2	2.1	2.4	5.5	5.7	4.4	11.2	3.7
	7L60 (KSP Tap - Oyen 767S)	2.1	1.6	1.8	9.4	21.2	2.4	2.4	2.9	1.5	1.9	5.6	2.1	11.2	2.1	2.4	5.5	5.7	4.4	11.2	3.7
	9L70 (Anderson 801S - Oakland 946S)	24.2	24.1	28.2	42.3	43.9	6.5	6.5	11.2	-3.5	61.7	23.3	42.1	51.2	42.1	6.9	23.0	23.7	17.1	51.2	75.0
	7L132 (Oyen 767S - Lanfine 959S)	0.9	0.3	0.2	10.2	23.8	2.2	2.2	2.7	1.5	0.9	5.6	-	12.4	-	2.3	5.6	5.8	4.3	12.4	4.1
Hardisty 377S T1 Transformer	7L60 (KSP Tap - Bindloss 914S Tap)	2.0	1.5	1.6	9.3	21.1	2.3	2.3	2.9	1.5	1.6	5.8	1.9	11.1	1.9	2.4	5.8	5.9	4.4	11.1	3.4
	7L60 (KSP Tap - Oyen 767S)	2.0	1.6	1.6	9.4	21.1	2.3	2.3	2.9	1.5	1.6	5.8	1.9	11.1	1.9	2.4	5.8	5.9	4.4	11.1	3.4
	7L132 (Oyen 767S - Lanfine 959S)	0.8	0.2	0.1	10.2	23.7	2.1	2.1	2.6	1.6	0.6	6.0	-0.2	12.3	-0.2	2.2	5.9	6.1	4.4	12.3	3.8
Buffalo Creek 526S_Xmers	7L60 (KSP Tap - Oyen 767S)	2.0	1.5	1.6	9.2	21.0	2.4	2.4	2.6	1.6	1.6	5.5	1.9	11.0	1.9	2.4	5.4	5.6	4.3	11.0	3.3
Edgerton_899ST3	472L (Hughenden 213S - 472AL Tap)	0.1	1.4	1.3	6.5	4.4	-0.9	-0.9	-4.2	0.3	1.5	19.0	1.3	4.8	1.3	-0.9	19.0	18.8	3.7	4.8	2.4
	704L (Tucuman 478S - Wainright 51S)	0.7	1.3	1.2	3.8	2.7	1.0	1.0	-17.9	1.2	1.3	6.1	1.2	3.0	1.2	1.1	6.1	6.1	3.6	3.0	1.8
	715L (Hansman Lake 650S - 715AL Tap)	-	-	-	-	-	-	-	-	-	-	52.5	-	-	-	-	25.4	91.6	-	-	-
	715L (715BL Tap - 715AL Tap)	-	-	-	-	-	-	-	-	-	-	52.5	-	-	-	-	25.4	91.6	-	-	-
	7L60 (KSP Tap - Bindloss 914S Tap)	2.0	1.6	1.6	9.3	21.1	2.4	2.4	2.4	1.6	1.6	5.8	2.0	11.0	2.0	2.4	5.8	5.8	4.4	11.0	3.4
	7L60 (KSP Tap - Oyen 767S)	2.0	1.6	1.7	9.3	21.1	2.4	2.4	2.4	1.6	1.6	5.8	2.0	11.0	2.0	2.4	5.8	5.8	4.4	11.0	3.4
	7L60 (KSP Tap - Bindloss 914S Tap)	2.0	1.5	1.6	9.1	20.9	2.3	2.3	2.9	1.5	1.5	5.4	1.9	10.9	1.9	2.4	5.4	5.5	4.2	10.9	3.3

Empress_3945_T1	7L60 (KSP Tap - Oyen 767S)	2.0	1.5	1.6	9.1	20.9	2.3	2.3	2.9	1.5	1.5	5.4	1.9	10.9	1.9	2.4	5.4	5.5	4.3	10.9	3.3
	7L132 (Oyen 767S - Lanfine 959S)	0.7	0.1	-	10.0	23.5	2.2	2.2	2.6	1.5	0.6	5.5	-0.2	12.1	-0.2	2.2	5.4	5.6	4.2	12.1	3.7
Excel 910S Transformer 701T	7L60 (KSP Tap - Binloss 914S Tap)	2.0	1.5	1.6	9.2	21.0	2.3	2.3	2.9	1.5	1.6	5.5	1.9	11.0	1.9	2.4	5.4	5.6	4.3	11.0	3.3
	7L60 (KSP Tap - Oyen 767S)	2.0	1.5	1.6	9.2	21.0	2.3	2.3	2.9	1.5	1.6	5.5	1.9	11.0	1.9	2.4	5.4	5.6	4.3	11.0	3.3
Hill 751S_TIEXMER	7L60 (KSP Tap - Binloss 914S Tap)	2.0	1.6	1.6	9.3	21.1	2.4	2.4	2.4	1.6	1.6	5.8	2.0	11.0	2.0	2.4	5.8	5.8	4.4	11.0	3.4
	7L60 (KSP Tap - Oyen 767S)	2.0	1.6	1.7	9.3	21.1	2.4	2.4	2.4	1.6	1.6	5.8	2.0	11.0	2.0	2.4	5.8	5.8	4.4	11.0	3.4
Holden 395S Transformer T1	7L60 (KSP Tap - Oyen 767S)	2.0	1.6	1.7	9.3	21.0	2.4	2.4	3.1	1.6	1.6	5.6	2.0	11.0	2.0	2.5	5.5	5.7	4.4	11.0	3.4
Jarrow 252S Transformer T2	7L60 (KSP Tap - Oyen 767S)	2.0	1.5	1.6	9.2	21.0	2.4	2.4	2.7	1.6	1.6	5.5	1.9	11.0	1.9	2.4	5.5	5.6	4.3	11.0	3.3
Metiskow_648ST1	7L60 (KSP Tap - Oyen 767S)	2.0	1.6	1.6	9.3	21.1	2.3	2.3	2.8	1.5	1.6	5.6	1.9	11.1	1.9	2.4	5.2	6.0	4.3	11.1	3.4
Paintearth Creek 863S 902T	472L (Hughenden 213S - 472AL Tap)	-0.1	1.5	1.4	7.6	5.1	-1.5	-1.5	-0.1	0.1	1.6	19.2	1.3	5.6	1.3	-1.6	18.7	19.7	9.7	5.6	2.7
	7L60 (Empress Liquid 164S Tap - Binloss 914S Tap)	2.0	1.7	1.7	9.9	21.4	2.2	2.2	3.1	1.5	1.7	6.4	2.0	11.5	2.0	2.2	6.3	6.5	6.7	11.5	3.6
	7L60 (KSP Tap - Binloss 914S Tap)	2.0	1.7	1.7	9.9	21.4	2.2	2.2	3.1	1.5	1.7	6.4	2.0	11.5	2.0	2.2	6.3	6.5	6.7	11.5	3.6
	7L60 (KSP Tap - Oyen 767S)	2.0	1.7	1.7	9.9	21.5	2.2	2.2	3.1	1.5	1.7	6.4	2.0	11.5	2.0	2.2	6.3	6.5	6.7	11.5	3.6
	7L132 (Oyen 767S - Lanfine 959S)	0.8	0.3	0.2	10.8	24.1	2.0	2.0	2.9	1.5	0.7	6.6	-0.1	12.7	-0.1	2.0	6.5	6.7	6.9	12.7	4.0
Pemukan 932S 901T	7L60 (KSP Tap - Oyen 767S)	2.0	1.6	1.6	9.5	21.2	2.3	2.3	2.8	1.5	1.6	5.0	1.9	11.2	1.9	2.3	5.0	5.1	4.2	11.2	3.4
7L42 (Hill 751S - Lloydminster 716S)	7L60 (KSP Tap - Oyen 767S)	2.0	1.6	1.7	9.3	21.1	2.4	2.4	2.4	1.6	1.6	5.8	2.0	11.0	2.0	2.4	5.8	5.8	4.4	11.0	3.4
9L960 (Paintearth 863S - Rolling Hills 1081S)	472L (Hughenden 213S - 472AL Tap)	-0.1	1.5	1.4	7.6	5.1	-1.5	-1.5	-0.1	0.1	1.6	19.2	1.3	5.6	1.3	-1.6	18.7	19.7	9.7	5.6	2.7
	7L60 (Empress Liquid 164S Tap - Binloss 914S Tap)	2.0	1.7	1.7	9.9	21.4	2.2	2.2	3.1	1.5	1.7	6.4	2.0	11.5	2.0	2.2	6.3	6.5	6.7	11.5	3.6
	7L60 (KSP Tap - Binloss 914S Tap)	2.0	1.7	1.7	9.9	21.4	2.2	2.2	3.1	1.5	1.7	6.4	2.0	11.5	2.0	2.2	6.3	6.5	6.7	11.5	3.6
	7L60 (KSP Tap - Oyen 767S)	2.0	1.7	1.7	9.9	21.5	2.2	2.2	3.1	1.5	1.7	6.4	2.0	11.5	2.0	2.2	6.3	6.5	6.7	11.5	3.6
	7L132 (Oyen 767S - Lanfine 959S)	0.8	0.3	0.2	10.8	24.1	2.0	2.0	2.9	1.5	0.7	6.6	-0.1	12.7	-0.1	2.0	6.5	6.7	6.9	12.7	4.0
933L (Anderson 801S - Ware Junction 1325)	7L60 (Empress Liquid 164S Tap - Binloss 914S Tap)	2.4	2.2	2.3	9.7	21.4	2.7	2.7	3.2	2.1	2.3	5.9	2.6	11.5	2.6	2.7	5.8	6.0	4.7	11.5	4.0
	7L60 (KSP Tap - Binloss 914S Tap)	2.4	2.2	2.3	9.7	21.4	2.7	2.7	3.2	2.1	2.3	5.9	2.6	11.5	2.6	2.7	5.8	6.0	4.7	11.5	4.0
	7L60 (KSP Tap - Oyen 767S)	2.4	2.2	2.3	9.7	21.4	2.7	2.7	3.2	2.1	2.3	5.9	2.6	11.5	2.6	2.7	5.8	6.0	4.7	11.5	4.0
	7L132 (Oyen 767S - Lanfine 959S)	1.2	0.8	0.7	10.5	24.0	2.5	2.5	2.9	2.1	1.3	5.9	0.4	12.7	0.4	2.6	5.8	6.0	4.6	12.7	4.4
934L (Anderson 801S - Ware Junction 1325)	7L60 (Empress Liquid 164S Tap - Binloss 914S Tap)	2.4	2.2	2.3	9.7	21.4	2.7	2.7	3.2	2.1	2.3	5.9	2.6	11.5	2.6	2.7	5.8	6.0	4.7	11.5	4.0
	7L60 (KSP Tap - Binloss 914S Tap)	2.4	2.2	2.3	9.7	21.4	2.7	2.7	3.2	2.1	2.3	5.9	2.6	11.5	2.6	2.7	5.8	6.0	4.7	11.5	4.0
	7L60 (KSP Tap - Oyen 767S)	2.4	2.2	2.3	9.7	21.4	2.7	2.7	3.2	2.1	2.3	5.9	2.6	11.5	2.6	2.7	5.8	6.0	4.7	11.5	4.0
	7L132 (Oyen 767S - Lanfine 959S)	1.2	0.8	0.7	10.5	24.0	2.5	2.5	2.9	2.1	1.3	5.9	0.4	12.7	0.4	2.6	5.8	6.0	4.6	12.7	4.4
950L (Anderson 801S - Ware Junction 1325)	7L60 (Empress Liquid 164S Tap - Binloss 914S Tap)	2.4	2.2	2.3	9.7	21.4	2.7	2.7	3.2	2.1	2.2	5.9	2.6	11.5	2.6	2.7	5.8	6.0	4.7	11.5	4.0
	7L60 (KSP Tap - Binloss 914S Tap)	2.4	2.2	2.3	9.7	21.4	2.7	2.7	3.2	2.1	2.2	5.9	2.6	11.5	2.6	2.7	5.8	6.0	4.7	11.5	4.0
	7L60 (KSP Tap - Oyen 767S)	2.4	2.2	2.3	9.7	21.4	2.7	2.7	3.2	2.1	2.2	5.9	2.6	11.5	2.6	2.7	5.8	6.0	4.7	11.5	4.0
	7L132 (Oyen 767S - Lanfine 959S)	1.2	0.8	0.7	10.5	24.0	2.5	2.5	2.9	2.1	1.3	5.9	0.4	12.7	0.4	2.6	5.8	6.0	4.6	12.7	4.4
9L966 (Hansman Lake 650S - Pemukan 932S)	7L60 (Empress Liquid 164S Tap - Binloss 914S Tap)	2.0	2.0	2.1	11.7	22.7	1.9	1.9	2.3	1.6	2.1	4.5	2.4	12.8	2.4	1.9	4.4	4.6	3.0	12.8	4.2
	7L60 (KSP Tap - Binloss 914S Tap)	2.0	2.0	2.1	11.7	22.7	1.9	1.9	2.3	1.6	2.1	4.5	2.4	12.8	2.4	1.9	4.4	4.6	3.0	12.8	4.2
	7L60 (KSP Tap - Oyen 767S)	2.0	2.0	2.1	11.7	22.7	1.9	1.9	2.3	1.6	2.1	4.5	2.4	12.8	2.4	1.9	4.4	4.6	3.0	12.8	4.2
	7L132 (Oyen 767S - Lanfine 959S)	0.8	0.7	0.6	13.0	25.6	1.6	1.6	1.9	1.6	1.2	4.4	0.3	14.4	0.3	1.7	4.3	4.5	2.7	14.4	4.8
914L (Red Deer 63S - Gaetz 875)	7L60 (KSP Tap - Oyen 767S)	2.1	1.6	1.7	9.4	21.1	2.6	2.6	3.0	1.7	1.7	5.7	2.0	11.1	2.0	2.6	5.6	5.7	4.5	11.1	3.5
9L912 (Red Deer 63S - Nevis 766S)	49.5	30.1	30.7	32.0	28.2	43.2	43.2	21.5	34.1	28.8	36.4	32.7	29.3	32.7	43.5	36.1	36.9	41.1	29.3	25.7
916Z (Tinchebray 972S - Gaetz 875)	7L60 (Empress Liquid 164S Tap - Binloss 914S Tap)	2.4	2.0	2.1	9.8	21.5	3.3	3.3	3.2	2.3	2.0	6.1	2.4	11.5	2.4	3.3	6.1	6.2	5.0	11.5	3.8
	7L53 (Bonnyville 700S - Lindberg 969S Tap)	2.0	2.3	2.3	3.8	3.1	3.5	3.5	18.9	2.9	2.3	6.1	2.3	3.2	2.3	3.5	6.5	5.5	4.3	3.2	2.5
	7L60 (KSP Tap - Binloss 914S Tap)	2.4	2.0	2.1	9.8	21.5	3.3	3.3	3.2	2.3	2.0	6.1	2.4	11.5	2.4	3.3	6.1	6.2	5.0	11.5	3.8
	7L60 (KSP Tap - Oyen 767S)	2.4	2.0	2.1	9.8	21.5	3.3	3.3	3.2	2.3	2.0	6.1	2.4	11.5	2.4	3.3	6.1	6.2	5.0	11.5	3.8
	9L20 (Nevis 766S – Cordel 755S)	-7.5	14.8	14.2	29.1	24.5	42.5	42.5	20.5	31.6	16.2	34.6	12.2	25.8	12.2	42.8	34.3	35.1	39.9	25.8	21.5
	7L132 (Oyen 767S - Lanfine 959S)	1.1	0.6	0.5	10.8	24.1	3.1	3.1	3.0	2.2	1.0	6.2	0.2	12.7	0.2	3.1	6.1	6.3	5.0	12.7	4.2
Tucuman 478S Transformers	472L (Hughenden 213S - 472AL Tap)	-0.2	0.8	0.8	4.6	3.1	-0.5	-0.5	-1.3	0.3	1.0	10.3	0.7	3.4	0.7	-0.6	10.0	10.6	3.1	3.4	1.7
Wainwright 51S Transformer T3	7L60 (KSP Tap - Oyen 767S)	2.0	1.5	1.6	9.3	21.0	2.3	2.3	2.7	1.6	1.6	5.6	1.9	11.0	1.9	2.4	5.5	5.7	4.3	11.0	3.3
EATL (Newell 207S - Heathfield 2029S)	7L53 (Bonnyville 700S - Lindberg 969S Tap)	1.3	1.4	1.4	2.7	2.1	1.8	1.8	18.3	1.6	1.4	4.9	1.5	2.3	1.5	1.8	5.3	4.3	2.9	2.3	1.6
	704L (Tucuman 478S - Wainright 51S)	0.5	1.0	1.0	3.0	2.1	0.8	0.8	-14.0	1.0	1.0	3.5	0.9	2.3	0.9	0.9	3.0	4.1	2.9	2.3	1.4
	472L (Hughenden 213S - 472AL Tap)	-	1.1	1.1	5.7	3.8	-1.0	-1.0	-0.7	0.1	1.2	16.6	1.0	4.2	1.0	-1.1	16.2	17.1	3.1	4.2	2.1

Table A9-3-1: SCNS_2028 SP_Post-Project_with CETO - Generator Effectiveness Factors under Category A Conditions

Contingency	Limiting Branch	Ghost Pine (NEP1) #2621	P1718 Wheatland WASF #606 32	Suncor Wintering Hills (SCW) #607 89	P1567 EDPR Sharp Hills Wind Farm #608 31	Lanfine Wind (LAN1) #609 96	P1704 Paintearth Wind Power #614 18	Halkirk Wind Power Facility (HAL1) #66 435	P1250 Grizzly Bear Wind (GRZ1) #633 00	P1909 Garden Plain Wind #655 032	P2263 Hand Hills MPC Wind #650 045	BluEarth #600 273	ATCO Michichi DER #654 348	P2611 UK Solar East #661 942	Michichi Solar #654 448	Capital Power (HAL2) #604 67	P2460 ABO Fox Meadows Wind #660 39	P2540 Rising Sun Solar #652 046	P2555 CP Rolling Hills Wind #650 235	P2316 RESC Oyen Wind #649 32	BUL1 Bull Creek (BUL1) #599 00 3	BUL2 Bull Creek (BUL2) #650 304	P2421 RESC Big Sky Solar #649 051	P2424 ATCO Oyen 767S DER Solar #197 4	Youngstow n Solar (YNG1) #197 6	P2890 Harvest Sky MPC Solar Battery #656 13	P2259 ForisAMovia Metiskow 64S DER Solar #157 74	P2574 Fortis Aura Provost DER Solar #409	P2573 BluEarth Prairie Yarrow MPC Wind #600 273	P2966 Easterveld Solar Battery #662 032	P2553 Daisy MPC Solar Battery #597 156	eReserve3 Hughenden (ERV3) #307 5	P2456 FortisAlberta Kittaminy Lake 267S DER Solar/Battery Storage #419	Lindbergh (PEC1) #194 44	P2034 Cold Lake Area Energy Centre #657 032	P2469 ATCO Vermilion 793S DER Gas #193 3	P2548 ATCO Irish Creek 793S DER Gas #193 77	P2464 Sunnynook #560 033
Category A (N-0)	472L (Metiskow 648S - 472AL Tap)	-	1.1	1.1	5.7	3.8	-1.0	-1.0	-0.7	0.1	1.2	16.6	1.0	4.2	1.0	-1.1	16.2	17.1	3.1	4.2	16.6	16.6	2.9	3.0	2.2	1.5	17.5	16.9	-	0.8	6.5	-50.9	16.3	-0.6	-0.6	-0.6	-0.6	2.1
	472L (Hughenden - 472AL Tap)	-	1.1	1.1	5.7	3.8	-1.0	-1.0	-0.7	0.1	1.2	16.6	1.0	4.2	1.0	-1.1	16.2	17.1	3.1	4.2	16.6	16.6	2.9	3.0	2.2	1.5	17.5	16.9	-	0.8	6.5	-50.9	16.3	-0.6	-0.6	-0.6	-0.6	2.1
	7L760 (Empress Liquid 164S Tap -Amoco Empress 163S)	2.0	1.5	1.6	9.2	21.0	2.3	2.3	2.9	1.5	1.6	5.5	1.9	11.0	1.9	2.4	5.4	5.6	4.3	11.0	5.5	5.5	47.1	21.2	14.7	8.2	5.6	5.5	-	4.9	5.5	5.0	5.4	2.2	2.2	3.0	2.5	3.3
	715L (Hansman Lake 650S - 715AL Tap)	-0.1	-0.2	-0.2	-0.6	-0.4	-0.1	-0.1	2.6	-0.2	-0.2	50.8	-0.2	-0.5	-0.2	-0.1	23.3	90.3	-0.5	-0.5	50.4	50.4	-0.3	-0.4	-0.3	-0.2	-1.0	78.9	-	-0.6	-0.7	-0.7	31.4	1.7	1.7	2.9	2.1	-0.3
	749L (Killarney 267S Tap - 749AL Tap)	0.1	0.2	0.2	0.6	0.4	0.1	0.1	-2.6	0.2	0.2	49.2	0.2	0.5	0.2	0.1	76.7	9.7	0.5	0.5	49.6	49.6	0.3	0.4	0.3	0.2	1.0	21.1	-	0.6	0.7	0.7	68.6	-1.7	-1.7	-2.9	-2.1	0.3
	715L (715BL Tap - 715AL Tap)	-0.1	-0.2	-0.2	-0.6	-0.4	-0.1	-0.1	2.6	-0.2	-0.2	50.8	-0.2	-0.5	-0.2	-0.1	23.3	90.3	-0.5	-0.5	50.4	50.4	-0.3	-0.4	-0.3	-0.2	-1.0	78.9	-	-0.6	-0.7	-0.7	31.4	1.7	1.7	2.9	2.1	-0.3
	7L760 (Empress Liquid 164S Tap - Binloss 914S Tap)	2.0	1.5	1.6	9.2	21.0	2.3	2.3	2.9	1.5	1.6	5.5	1.9	11.0	1.9	2.4	5.4	5.6	4.3	11.0	5.5	5.5	47.1	21.2	14.7	8.2	5.6	5.5	-	4.9	5.5	5.0	5.4	2.2	2.2	3.0	2.5	3.3
	7L53 (Bonnyville 700S - Lindberg 969S Tap)	1.3	1.4	1.4	2.7	2.1	1.8	1.8	18.3	1.6	1.4	4.9	1.5	2.3	1.5	1.8	5.3	4.3	2.9	2.3	4.9	4.9	1.8	2.1	2.2	2.3	4.2	4.5	-	3.5	3.5	4.2	5.2	59.1	59.1	21.1	45.6	1.6
	7L760 (KSP Tap - Binloss 914S Tap)	2.0	1.5	1.6	9.2	21.0	2.3	2.3	2.9	1.5	1.6	5.5	1.9	11.0	1.9	2.4	5.4	5.6	4.3	11.0	5.5	5.5	47.1	21.2	14.7	8.2	5.6	5.5	-	4.9	5.5	5.0	5.4	2.2	2.2	3.0	2.5	3.3
	7L760 (Oyen 767S - Bus 139S_KSP Tap)	2.0	1.5	1.6	9.2	21.0	2.3	2.3	2.9	1.5	1.6	5.5	1.9	11.0	1.9	2.4	5.4	5.6	4.3	11.0	5.5	5.5	-52.9	21.2	14.7	8.2	5.6	5.5	-	4.9	5.5	5.0	5.4	2.2	2.2	3.0	2.5	3.3
	7L132 (Oyen 767S - Lanfine 959S)	0.8	0.1	0.1	10.0	23.6	2.2	2.2	2.6	1.5	0.6	5.5	-0.2	12.2	-0.2	2.2	5.5	5.6	4.3	12.2	5.5	5.5	-50.4	-53.3	-33.7	-13.9	5.6	5.6	-	5.0	5.6	4.9	5.5	2.0	2.0	2.8	2.3	3.7

Table A9-3-2: SCNS_2028 SP_Post-Project_with CETO - Generator Effectiveness Factors under Category B Conditions

Contingency	Limiting Branch	Ghost Pine (NEP1) #2621	P1718 Wheatland WASF #606 32	Suncor Wintering Hills (SCW) #607 89	P1567 EDPR Sharp Hills Wind Farm #608 31	Lanfine Wind (LAN1) #609 96	P1704 Paintearth Wind Power #614 18	Halkirk Wind Power Facility (HAL1) #66 435	P1250 Grizzly Bear Wind (GRZ1) #633 00	P1909 Garden Plain Wind #655 032	P2263 Hand Hills MPC Wind #650 045	BluEarth #600 273	ATCO Michichi DER #654 348	P2611 UK Solar East #661 942	Michichi Solar #654 448	Capital Power (HAL2) #604 67	P2460 ABO Fox Meadows Wind #660 39	P2540 Rising Sun Solar #652 046	P2555 CP Rolling Hills Wind #650 235	P2316 RESC Oyen Wind #649 32	P2464 Sunnynook #560 033
681L (Tucuman 478S - Hardisty 377S)	472L (Hughenden 213S - 472AL Tap)	-0.1	1.5	1.4	7.6	5.1	-1.5	-1.5	-0.1	0.1	1.6	19.2	1.3	5.6	1.3	-1.6	18.7	19.7	9.7	5.6	2.7
703L (Hughenden 213S - Hardisty 377S)	7L60 (KSP Tap - Binloss 914S Tap)	2.0	1.5	1.6	9.3	21.1	2.3	2.3	2.9	1.5	1.6	5.8	1.9	11.0	1.9	2.4	5.7	5.9	4.3	11.0	3.4
	7L60 (KSP Tap - Oyen 767S)	2.0	1.5	1.6	9.3	21.1	2.3	2.3	2.9	1.5	1.6	5.8	1.9	11.0	1.9	2.4	5.7	5.9	4.3	11.0	3.4
749L (Edgerton 899S - Metiskow 648S)	398L (Provost 54S S - Tap Bus 540270)	-	-	-	-	-	-	-	-	-	-	100.0	-	-	-	-	100.0	-	-	-	-
	715L (Provost 54S S - 715BL Tap)	-	-	-	-	-	-	-	-	-	-	100.0	-	-	-	-	100.0	-	-	-	-
	715L (Hansman Lake 650S - 715AL Tap)	-	-	-	-	-	-	-	-	-	-	100.0	-	-	-	-	100.0	100.0	-	-	-
	715L (715BL Tap - 715AL Tap)	-	-	-	-	-	-	-	-	-	-	100.0	-	-	-	-	100.0	100.0	-	-	-
769L (Rosyth 296S - Hardisty 377S)	7L60 (KSP Tap - Oyen 767S)	2.0	1.5	1.6	9.2	21.0	2.3	2.3	2.9	1.5	1.6	5.5	1.9	11.0	1.9	2.4	5.4	5.6	4.3	11.0	3.3
7L116 (Excel 910S - Lanfine 959S)	7L60 (KSP Tap - Binloss 914S Tap)	2.0	1.5	1.6	9.2	21.0	2.3	2.3	2.9	1.5	1.6	5.5	1.9	11.0	1.9	2.4	5.4	5.6	4.3	11.0	3.3
	7L60 (KSP Tap - Oyen 767S)	2.0	1.5	1.6	9.2	21.0	2.3	2.3	2.9	1.5	1.6	5.5	1.9	11.0	1.9	2.4	5.4	5.6	4.3	11.0	3.3
7L137 (Three Hills 770S - Rowley 768S)	7L128 (Coyote Lake 963S - High_Tap)	0.5	42.5	47.2	0.2	0.5	0.3	0.3	0.5	-0.1	80.7	0.5	62.9	-	62.9	0.3	0.5	0.5	0.4	-	-0.8
711G (Nevis 766S - Heatburg 948S)	7L128 (Coyote Lake 963S - High_Tap)	62.9	42.5	47.2	0.2	0.5	0.3	0.3	0.5	-0.1	80.7	0.5	62.9	-	62.9	0.3	0.5	0.5	0.4	-	-0.8

7L25 (Michichi Creek 802S - Rowley 768S)	7L128 (Coyote Lake 963S - High_Tap)	0.5	42.5	47.2	0.2	0.5	0.3	0.3	0.5	-0.1	80.7	0.5	62.9	-	62.9	0.3	0.5	0.5	0.4	-	-	-0.8
7L749 (Edgerton 899S - Lloyminster 716S)	715L (Hansman Lake 650S - 715AL Tap)	-	-	-	-	-	-	-	-	-	-	100.0	-	-	-	-	100.0	100.0	-	-	-	-
	715L (715BL Tap - 715AL Tap)	-	-	-	-	-	-	-	-	-	-	52.5	-	-	-	-	25.4	91.6	-	-	-	-
	7L60 (KSP Tap - Oyen 767S)	2.0	1.6	1.7	9.3	21.1	2.4	2.4	2.4	1.6	1.6	5.8	2.0	11.0	2.0	2.4	5.8	5.8	4.4	11.0	-	3.4
7L79 (Pemukan 932S - Ribstone Creek 892S)	7L60 (KSP Tap - Oyen 767S)	2.0	1.5	1.6	9.2	21.0	2.3	2.3	2.9	1.5	1.6	5.5	1.9	11.0	1.9	2.4	5.4	5.6	4.3	11.0	-	3.3
9L20 (Nevis 766S - Cordel 755S)	7L60 (KSP Tap - Bindloss 914S Tap)	1.6	1.6	1.7	9.5	21.3	2.8	2.8	3.1	1.9	1.7	5.9	2.0	11.2	2.0	2.9	5.8	6.0	4.8	11.2	-	3.6
	7L60 (KSP Tap - Oyen 767S)	1.6	1.6	1.7	9.5	21.3	2.8	2.8	3.1	1.9	1.7	5.9	2.0	11.2	2.0	2.9	5.8	6.0	4.8	11.2	-	3.6
9L24 (Lanfine 959S - Oakland 946S)	7L60 (Empress Liquid 164S Tap -Amoco Empress 163S)	1.9	-1.0	-0.8	22.2	34.5	4.1	4.1	6.0	0.8	-1.4	12.4	-0.1	26.8	-0.1	4.2	12.2	12.6	9.2	26.8	-	-
	7L60 (Empress Liquid 164S Tap - Bindloss 914S Tap)	1.9	-1.0	-0.8	22.2	34.5	4.1	4.1	6.0	0.8	-1.4	12.4	-0.1	26.8	-0.1	4.2	12.2	12.6	9.2	26.8	-	-
	7L60 (KSP Tap - Bindloss 914S Tap)	1.9	-1.0	-0.8	22.2	34.5	4.1	4.1	6.0	0.8	-1.4	12.4	-0.1	26.8	-0.1	4.2	12.2	12.6	9.2	26.8	-	-
	7L60 (KSP Tap - Oyen 767S)	1.9	-1.0	-0.8	22.2	34.5	4.1	4.1	6.0	0.8	-1.4	12.4	-0.1	26.8	-0.1	4.2	12.2	12.6	9.2	26.8	-	-
	7L128 (Coyote Lake 963S - High_Tap)	25.0	32.5	36.4	1.8	1.6	1.1	1.1	1.6	-1.1	72.4	1.8	49.5	1.7	49.5	1.2	1.8	1.8	1.7	1.7	-	-
	7L132 (Oyen 767S - Lanfine 959S)	0.6	-2.6	-2.6	24.3	38.6	4.1	4.1	6.0	0.7	-2.7	13.1	-2.5	29.7	-2.5	4.2	13.0	13.4	9.7	29.7	-	-
9L27 (Paintearth Creek - Cordel 755S)	7L60 (KSP Tap - Bindloss 914S Tap)	2.0	1.7	1.7	9.9	21.4	2.2	2.2	3.1	1.5	1.7	6.4	2.0	11.5	2.0	2.2	6.3	6.5	6.7	11.5	-	3.6
	7L60 (KSP Tap - Oyen 767S)	2.0	1.7	1.7	9.9	21.5	2.2	2.2	3.1	1.5	1.7	6.4	2.0	11.5	2.0	2.2	6.3	6.5	6.7	11.5	-	3.6
9L29 (Coyote Lake 963S - Oakland 946S)	7L159 (Heatburg 948S - Ghostpine 114S Tap)	69.8	27.3	30.0	1.3	2.1	-0.5	-0.5	-0.5	1.0	39.1	0.2	39.1	1.8	39.1	-0.6	0.2	0.3	-0.2	1.8	-	2.4
	7L60 (KSP Tap - Oyen 767S)	2.4	2.0	2.2	9.2	21.0	2.4	2.4	2.9	1.5	2.7	5.5	2.7	10.9	2.7	2.4	5.4	5.6	4.3	10.9	-	3.3
	7L16 (Nevis 766S - Heatburg 948S)	69.8	27.3	30.0	1.3	2.1	-0.5	-0.5	-0.5	1.0	39.1	0.2	39.1	1.8	39.1	-0.6	0.2	0.3	-0.2	1.8	-	2.4
	7L85 (Bullpound 803S Tap - Anderson 801S)	-	100.0	100.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	7L85 (Bullpound 803S Tap - Badlands 981S Tap)	-	100.0	100.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Anderson 801S 901T	-	100.0	100.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
9L70 (Oakland 946S - Anderson 801S)	7L60 (KSP Tap - Bindloss 914S Tap)	2.1	1.6	1.8	9.4	21.2	2.4	2.4	2.9	1.5	1.9	5.6	2.1	11.2	2.1	2.4	5.5	5.7	4.4	11.2	-	3.7
	7L60 (KSP Tap - Oyen 767S)	2.1	1.6	1.8	9.4	21.2	2.4	2.4	2.9	1.5	1.9	5.6	2.1	11.2	2.1	2.4	5.5	5.7	4.4	11.2	-	3.7
	9L97 (Anderson 801S - Oakland 946S)	24.2	24.1	28.2	42.3	43.9	6.5	6.5	11.2	-3.5	61.7	23.3	42.1	51.2	42.1	6.9	23.0	23.7	17.1	51.2	-	75.0
9L912 (Nevis 766S – Red Deer 63S)	7L60 (KSP Tap - Bindloss 914S Tap)	2.9	2.0	2.1	9.6	21.4	2.8	2.8	3.2	1.9	2.0	6.0	2.4	11.3	2.4	2.9	5.9	6.1	4.8	11.3	-	3.7
	7L60 (KSP Tap - Oyen 767S)	2.9	2.0	2.1	9.6	21.4	2.8	2.8	3.2	1.9	2.0	6.0	2.4	11.3	2.4	2.9	5.9	6.1	4.8	11.3	-	3.7
	7L128 (Coyote Lake 963S - High_Tap)	27.2	34.0	38.0	0.2	-0.2	1.9	1.9	1.7	-	74.0	1.6	51.1	-0.5	51.1	2.0	1.6	1.6	2.0	-0.5	-	-2.2
9L953 (Cordel 755S - Nilrem 574S)	7L60 (KSP Tap - Bindloss 914S Tap)	2.0	1.6	1.7	9.9	21.4	2.1	2.1	3.3	1.5	1.7	6.5	2.0	11.4	2.0	2.2	6.4	6.6	4.8	11.4	-	3.6
	7L60 (KSP Tap - Oyen 767S)	2.0	1.6	1.7	9.9	21.4	2.1	2.1	3.3	1.5	1.7	6.5	2.0	11.4	2.0	2.2	6.4	6.6	4.8	11.4	-	3.6
9L97 (Oakland 946S - Anderson 801S)	7L60 (KSP Tap - Bindloss 914S Tap)	2.1	1.6	1.8	9.4	21.2	2.4	2.4	2.9	1.5	1.9	5.6	2.1	11.2	2.1	2.4	5.5	5.7	4.4	11.2	-	3.7
	7L60 (KSP Tap - Oyen 767S)	2.1	1.6	1.8	9.4	21.2	2.4	2.4	2.9	1.5	1.9	5.6	2.1	11.2	2.1	2.4	5.5	5.7	4.4	11.2	-	3.7
	9L70 (Anderson 801S - Oakland 946S)	24.2	24.1	28.2	42.3	43.9	6.5	6.5	11.2	-3.5	61.7	23.3	42.1	51.2	42.1	6.9	23.0	23.7	17.1	51.2	-	75.0
Hardisty 377S T1 Transformer	7L60 (KSP Tap - Bindloss 914S Tap)	2.0	1.5	1.6	9.3	21.1	2.3	2.3	2.9	1.5	1.6	5.8	1.9	11.1	1.9	2.4	5.8	5.9	4.4	11.1	-	3.4
	7L60 (KSP Tap - Oyen 767S)	2.0	1.6	1.6	9.4	21.1	2.3	2.3	2.9	1.5	1.6	5.8	1.9	11.1	1.9	2.4	5.8	5.9	4.4	11.1	-	3.4
Coyote Lake 963S 901T	7L159 (Heatburg 948S - Ghostpine 114S Tap)	69.8	27.3	30.0	1.3	2.1	-0.5	-0.5	-0.5	1.0	39.1	0.2	39.1	1.8	39.1	-0.6	0.2	0.3	-0.2	1.8	-	2.4
	7L60 (KSP Tap - Oyen 767S)	2.4	2.0	2.2	9.2	21.0	2.4	2.4	2.9	1.5	2.7	5.5	2.7	10.9	2.7	2.4	5.4	5.6	4.3	10.9	-	3.3
	7L16 (Nevis 766S - Heatburg 948S)	69.8	27.3	30.0	1.3	2.1	-0.5	-0.5	-0.5	1.0	39.1	0.2	39.1	1.8	39.1	-0.6	0.2	0.3	-0.2	1.8	-	2.4
	7L85 (Bullpound 803S Tap - Anderson 801S)	-	100.0	100.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	7L85 (Bullpound 803S Tap - Badlands 981S Tap)	-	100.0	100.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Anderson 801S 901T	-	100.0	100.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Edgerton_899ST3	715L (Hansman Lake 650S - 715AL Tap)	-	-	-	-	-	-	-	-	-	-	52.5	-	-	-	-	25.4	91.6	-	-	-	-
	715L (715BL Tap - 715AL Tap)	-	-	-	-	-	-	-	-	-	-	52.5	-	-	-	-	25.4	91.6	-	-	-	-
	7L60 (KSP Tap - Oyen 767S)	2.0	1.6	1.7	9.3	21.1	2.4	2.4	2.4	1.6	1.6	5.8	2.0	11.0	2.0	2.4	5.8	5.8	4.4	11.0	-	3.4
Empress_394S_T1	7L60 (KSP Tap - Bindloss 914S Tap)	2.0	1.5	1.6	9.1	20.9	2.3	2.3	2.9	1.5	1.5	5.4	1.9	10.9	1.9	2.4	5.4	5.5	4.2	10.9	-	3.3
	7L60 (KSP Tap - Oyen 767S)	2.0	1.5	1.6	9.1	20.9	2.3	2.3	2.9	1.5	1.5	5.4	1.9	10.9	1.9	2.4	5.4	5.5	4.3	10.9	-	3.3
Excel 910S Transformer 701T	7L60 (KSP Tap - Bindloss 914S Tap)	2.0	1.5	1.6	9.2	21.0	2.3	2.3	2.9	1.5	1.6	5.5	1.9	11.0	1.9	2.4	5.4	5.6	4.3	11.0	-	3.3
	7L60 (KSP Tap - Oyen 767S)	2.0	1.5	1.6	9.2	21.0	2.3	2.3	2.9	1.5	1.6	5.5	1.9	11.0	1.9	2.4	5.4	5.6	4.3	11.0	-	3.3
Metiskow_648ST1	715L (Hansman Lake 650S - 715AL Tap)	-0.5	-1.0	-1.0	-3.1	-2.2	-0.5	-0.5	11.7	-0.7	-1.0	77.8	-0.9	-2.4	-0.9	-0.5	69.7	89.3	-2.2	-2.4	-	-1.4
	715L (715BL Tap - 715AL Tap)	-0.5	-1.0	-1.0	-3.1	-2.2	-0.5	-0.5	11.7	-0.7	-1.0	77.8	-0.9	-2.4	-0.9	-0.5	69.7	89.3	-2.2	-2.4	-	-1.4
Paintearth Creek 863S 902T	7L60 (KSP Tap - Bindloss 914S Tap)	2.0	1.7	1.7	9.9	21.4	2.2	2.2	3.1	1.5	1.7	6.4	2.0	11.5	2.0	2.2	6.3	6.5	6.7	11.5	-	3.6
	7L60 (KSP Tap - Oyen 767S)	2.0	1.7	1.7	9.9	21.5	2.2	2.2	3.1	1.5	1.7	6.4	2.0	11.5	2.0	2.2	6.3	6.5	6.7	11.5	-	3.6
9L960 (Paintearth 863S - Rolling Hills 1081S)	7L60 (KSP Tap - Bindloss 914S Tap)	2.0	1.7	1.7	9.9	21.4	2.2	2.2	3.1	1.5	1.7	6.4	2.0	11.5	2.0	2.2	6.3	6.5	6.7	11.5	-	3.6
	7L60 (KSP Tap - Oyen 767S)	2.0	1.7	1.7	9.9	21.5	2.2	2.2	3.1	1.5	1.7	6.4	2.0	11.5	2.0	2.2	6.3	6.5	6.7	11.5	-	3.6
885L (Metiskow 648S - Hansman Lake 650S)	749L (Killarney 267S Tap - 749AL Tap)	0.2	0.7	0.7	2.6	1.8	-0.1	-0.1	-4.4	0.3	0.7	50.8	0.6	2.0	0.6	-0.1	71.9	20.4	0.7	2.0	-	1.1
Nevis 766S_903T	7L128 (Coyote Lake 963S - High_Tap)	47.8	39.0	43.4	0.2	0.2	0.7	0.7	1.3	-0.3	77.9	0.9	58.0	-0.3	58.0	0.7	0.9	0.9	0.9	-0.3	-	-1.5
Anderson 801S_901T	7L128 (Coyote Lake 963S - High_Tap)	33.0	65.8	65.8	-0.9	-1.2	1.0	1.0	1.4	-1.3	80.7	0.7	65.8	-1.7	65.8	1.1	0.7	0.7	1.0	-1.7	-	-3.6
Provost 545S 701T	715L (Hansman Lake 650S - 715AL Tap)	-0.1	-0.2	-0.2	-0.6	-0.4	-0.1	-0.1	2.6	-0.2	-0.2	50.8	-0.2	-0.5	-0.2	-0.1	23.3	90.3	-0.5	-0.5	-	-0.3
	715L (715BL Tap - 715AL Tap)	-0.1	-0.2	-0.2	-0.6	-0.4	-0.1	-0.1	2.6	-0.2	-0.2	50.8	-0.2	-0.5	-0.2	-0.1	23.3	90.3	-0.5	-0.5	-	-0.3
748L (Killarney 267S - Hayter 277S)	715L (Hansman Lake 650S - 715AL Tap)	-	-	-	-	-	-	-	-	-	-	100.0	-	-	-	-	-	100.0	-	-	-	-
	715L (715BL Tap - 715AL Tap)	-	-	-	-	-	-	-	-	-	-	100.0	-	-	-	-	-	100.0	-	-	-	-
933L (Anderson 801S - Ware Junction 132S)	934L (Anderson 801S - Ware Junction 132S)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	950L (Anderson 801S - Ware Junction 132S)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	7L60 (Empress Liquid 164S Tap - Bindloss 914S Tap)	2.4	2.2	2.3	9.7	21.4	2.7	2.7	3.2	2.1	2.3	5.9	2.6	11.5	2.6	2.7	5.8	6.0	4.7	11.5	-	4.0
	7L60 (KSP Tap - Bindloss 914S Tap)	2.4	2.2	2.3	9.7	21.4	2.7	2.7	3.2	2.1	2.3	5.9	2.6	11.5	2.6	2.7	5.8	6.0	4.7	11.5	-	4.0
	7L60 (KSP Tap - Oyen 767S)	2.4	2.2	2.3	9.7	21.4	2.7	2.7	3.2	2.1	2.3	5.9	2.6	11.5	2.6	2.7	5.8	6.0	4.7	11.5	-	4.0
	7L132 (Oyen 767S - Lanfine 959S)	1.2	0.8	0.7	10.5	24.0	2.5	2.5	2.9	2.1	1.3	5.9	0.4	12.7	0.4	2.6	5.8	6.0	4.6	12.7	-	4.4
934L (Anderson 801S - Ware Junction 132S)	950L (Anderson 801S - Ware Junction 132S)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	7L60 (Empress Liquid 164S Tap - Bindloss 914S Tap)	2.4	2.2	2.3	9.7	21.4	2.7	2.7	3.2	2.1	2.3	5.9	2.6	11.5	2.6	2.7	5.8	6.0	4.7	11.5	-	4.0
	7L60 (KSP Tap - Bindloss 914S Tap)	2.4	2.2	2.3	9.7	21.4	2.7	2.7	3.2	2.1	2.3	5.9	2.6	11.5	2.6	2.7	5.8	6.0	4.7	11.5	-	4.0
	7L60 (KSP Tap - Oyen 767S)	2.4	2.2	2.3	9.7	21.4	2.7	2.7	3.2	2.1	2.3	5.9	2.6	11.5	2.6	2.7	5.8	6.0	4.7	11.5	-	4.0
	7L132 (Oyen 767S - Lanfine 959S)	1.2	0.8	0.7	10.5	24.0	2.5	2.5	2.9	2.1	1.3	5.9	0.4	12.7	0.4	2.6	5.8	6.0	4.6	12.7	-	4.4
950L (Anderson 801S - Ware Junction 132S)	934L (Anderson 801S - Ware Junction 132S)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	7L60 (Empress Liquid 164S Tap - Bindloss 914S Tap)	2.4	2.2	2.3	9.7	21.4	2.7	2.7	3.2	2.1	2.2	5.9	2.6	11.5	2.6	2.7	5.8	6.0	4.7	11.5	-	4.0
	7L60 (KSP Tap - Bindloss 914S Tap)	2.4	2.2	2.3	9.7	21.4	2.7	2.7	3.2	2.1	2.2	5.9	2.6	11.5	2.6	2.7	5.8	6.0	4.7	11.5	-	4.0
	7L60 (KSP Tap - Oyen 767S)	2.4	2.2	2.3	9.7	21.4	2.7	2.7	3.2	2.1	2.2	5.9	2.6	11.5	2.6	2.7	5.8	6.0	4.7	11.5	-	4.0
	7L132 (Oyen 767S - Lanfine 959S)	1.2	0.8	0.7	10.5	24.0	2.5	2.5	2.9	2.1	1.3	5.9	0.4	12.7	0.4	2.6	5.8	6.0	4.6	12.7	-	4.4
914L (Red Deer 63S - Gaetz 87S)	7L60 (KSP Tap - Bindloss 914S Tap)	2.1	1.6	1.7	9.4	21.1	2.6	2.6	3.0	1.7	1.7	5.7	2.0	11.1	2.0	2.6	5.6	5.7	4.5	11.1	-	3.5
	7L60 (KSP Tap - Oyen 767S)	2.1	1.6	1.7	9.4	21.1	2.6	2.6	3.0	1.7	1.7	5.7	2.0	11.1	2.0	2.6	5.6	5.7	4.5	11.1	-	3.5
1082L (Red Deer 63S - Hazelwood 287S)	7L60 (KSP Tap - Oyen 767S)	2.1	1.6	1.7	9.4	21.1	2.6	2.6	3.0	1.7	1.7	5.7	2.0	11.1	2.0	2.6	5.6	5.7	4.5	11.1	-	3.5
916Z (Tinchebray 972S - Gaetz 87S)	9L912 (Red Deer 63S - Nevis 766S)	49.5	30.1	30.7	32.0	28.2	43.2	43.2	21.5	34.1	28.8	36.4	32.7	29.3	32.7	43.5	36.1	36.9	41.1	29.3	-	25.7
	7L60 (Empress Liquid 164S Tap - Bindloss 914S Tap)	2.4	2.0	2.1	9.8	21.5	3.3	3.3	3.2	2.3	2.0	6.1	2.4	11.5	2.4	3.3	6.1	6.2	5.0	11.5	-	3.8
	7L60 (KSP Tap - Bindloss 914S Tap)	2.4	2.0	2.1	9.8	21.5	3.3	3.3	3.2	2.3	2.0	6.1	2.4	11.5	2.4	3.3	6.1	6.2	5.0	11.5	-	3.8
	7L60 (KSP Tap - Oyen 767S)	2.4	2.0	2.1	9.8	21.5	3.3	3.3	3.2	2.3	2.0	6.1	2.4	11.5	2.4	3.3	6.1	6.2	5.0	11.5	-	3.8
	9L20 (Nevis 766S – Cordel 755S)	7.5	14.8	14.2	29.1	24.5	42.5	42.5	20.5	31.6	16.2	34.6	12.2	25.8	12.2	42.8	34.3	35.1	39.9	25.8	-	21.5
	7L132 (Oyen 767S - Lanfine 959S)	1.1	0.6	0.5	10.6	24.1	3.1	3.1	3.0	2.2	1.0	6.2	0.2	12.7	0.2	3.1	6.1	6.3	5.0	12.7	-	4.2

Tucuman 478S Transformers	472L (Hughenden 213S - 472AL Tap)	-0.1	1.5	1.4	7.6	5.1	-1.5	-1.5	-0.1	0.1	1.6	19.2	1.3	5.6	1.3	-1.6	18.7	19.7	9.7	5.6	2.7

Table A9-4-1: SCN6_2028 WP_Post-Project_with CETO - Generator Effectiveness Factors under Category A Conditions

Contingency	Limiting Branch	Ghost Pine (NEP1) #2621	P1718 Wheatland WAGF #60632	Suncor Wintering Hills (SCR4) #60789	P1567 Sharp Hill Wind #60831	P1898 Pattern Lanfine Wind #60996	P1704 Paintearth Wind Power #61418	Halkirk Wind Power Facility (HAL1) #66435	P2562 Paintearth Wind Phase 2 #62418	P1250 Grizzly Bear Wind #63308	Garden Plain (GDP1) #565002	P2263 Hand Hills MPC Wind #560045	BluEarth #560273	ATCO Michichi DER #552448	UK Solar East #561042	Michichi Solar #554448	P2441 Capital Power Halkirk 2 Wind #60467	ABO Fox Meadows Wind #560039	Rising Sun MPC Solar #562046	P2555 CP Rolling Hills Wind #560235	RESC Oyen Wind #560032	Battle River #5 (BR5) #1497	Battle River #4 (BR4) #1496	Sheerness #1 (SH1) #1482	Sheerness #2 (SH2) #1487	P2669 Mannix MPC Solar Battery #566011	eReserve2 Buffalo Creek (ERV2) #558079	eReserve4 (ERV4) #19428	Bellshill (BHL1) #2088	P2464 Sunnynook #560033
Category A (N-0)	9L62 (Tinchebray 972S - Gaetz 87S)	17.2	19.7	19.6	25.2	22.3	41.3	41.3	41.3	15.4	31.0	19.8	28.3	19.5	23.3	19.5	40.3	28.0	28.7	32.0	23.3	35.2	30.0	20.0	20.0	26.7	21.5	30.5	30.1	20.9

Table A9-4-2: SCN6_2028 WP_Post-Project_with CETO - Generator Effectiveness Factors under Category B Conditions

Contingency	Limiting Branch	Ghost Pine (NEP1) #2621	P1718 Wheatland WAGF #60632	Suncor Wintering Hills (SCR4) #60789	P1567 Sharp Hill Wind #60831	P1898 Pattern Lanfine Wind #60996	P1704 Paintearth Wind Power #61418	Halkirk Wind Power Facility (HAL1) #66435	P1250 Grizzly Bear Wind #63308	Garden Plain (GDP1) #565002	P2263 Hand Hills MPC Wind #560045	BluEarth #560273	ATCO Michichi DER #552448	UK Solar East #561042	Michichi Solar #554448	P2441 Capital Power Halkirk 2 Wind #60467	ABO Fox Meadows Wind #560039	Rising Sun MPC Solar #562046	P2555 CP Rolling Hills Wind #560235	RESC Oyen Wind #560032	P2464 Sunnynook #560033
681L (Tucuman 478S - Hardisty 377S)	703L (Hardisty 377S - Express 329S Tap)	-0.2	0.8	0.7	4.4	2.9	-0.6	-0.6	-0.3	0.2	0.9	10.1	0.6	3.3	0.6	-0.6	9.9	10.5	2.9	3.3	1.6
	472L (Metiskow 648S - 472AL Tap)	-0.2	0.8	0.7	4.4	2.9	-0.6	-0.6	-0.3	0.2	0.9	10.1	0.6	3.3	0.6	-0.6	9.9	10.5	2.9	3.3	1.6
701L (Holden 395S – Strome 223S)	9L62 (Tinchebray 972S - Gaetz 87S)	18.1	20.4	20.4	26.2	23.1	42.4	42.4	12.6	31.8	20.6	29.2	20.3	24.1	20.3	41.5	28.8	29.7	33.3	24.1	21.6
749L (Edgerton 899S - Metiskow 648S)	703L (Hardisty 377S - Express 329S Tap)	0.1	1.4	1.3	6.4	4.3	-0.9	-0.9	-4.2	0.3	1.5	18.8	1.3	4.8	1.3	-0.9	18.8	18.8	3.7	4.8	2.4
	472L (Metiskow 648S - 472AL Tap)	0.1	1.4	1.3	6.4	4.3	-0.9	-0.9	-4.2	0.3	1.5	18.8	1.3	4.8	1.3	-0.9	18.8	18.8	3.7	4.8	2.4
	715L (Provost 545S - 715BL Tap)	-	-	-	-	-	-	-	-	-	-	100.0	-	-	-	-	100.0	-	-	-	-
	715L (Provost 545S - 715BL Tap)	-	-	-	-	-	-	-	-	-	-	100.0	-	-	-	-	100.0	-	-	-	-
	704L (Tucuman 478S - Wainright 51S)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	715L (Hansman Lake 650S - 715AL Tap)	-	-	-	-	-	-	-	-	-	-	100.0	-	-	-	-	100.0	100.0	-	-	-
	715L (715BL Tap - 715AL Tap)	-	-	-	-	-	-	-	-	-	-	100.0	-	-	-	-	100.0	100.0	-	-	-
7L130 (Vermilion 710S - Kitscoty 705S)	703L (Hardisty 377S - Express 329S Tap)	0.1	1.4	1.3	6.4	4.3	-0.9	-0.9	-4.2	0.3	1.5	19.0	1.3	4.8	1.3	-0.9	19.0	18.8	3.7	4.8	2.4
7L14 (Kitscoty 705S - Hill 751S)	703L (Hardisty 377S - Express 329S Tap)	0.1	1.4	1.3	6.4	4.3	-0.9	-0.9	-4.2	0.3	1.5	19.0	1.3	4.8	1.3	-0.9	19.0	18.8	3.7	4.8	2.4
7L171 (Michichi Creek - Wintering Hills 804S)	Anderson 801S 901T	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
7L53 (Bonnyville 700S - Irish Creek 706S)	9L62 (Tinchebray 972S - Gaetz 87S)	17.6	20.0	20.0	25.9	22.9	41.7	41.7	20.0	31.4	20.2	29.5	19.9	23.9	19.9	40.8	29.3	29.8	32.8	23.9	21.3
7L65 (Vermilion 710S-- Vegreville 709S)	704L (Tucuman 478S - Wainright 51S)	0.5	1.0	1.0	3.0	2.1	0.8	0.8	-14.0	1.0	1.0	3.5	0.9	2.3	0.9	0.9	3.0	4.1	2.9	2.3	1.4
7L701 (Battle River 757S - Strome 223S)	9L62 (Tinchebray 972S - Gaetz 87S)	18.0	20.4	20.4	26.2	23.1	42.4	42.4	12.6	31.8	20.6	29.2	20.3	24.1	20.3	41.5	28.8	29.7	33.3	24.1	21.6
7L749 (Edgerton 899S - Lloyminster 716S)	703L (Hardisty 377S - Express 329S Tap)	0.1	1.4	1.3	6.4	4.3	-0.9	-0.9	-4.2	0.3	1.5	19.0	1.3	4.8	1.3	-0.9	19.0	18.8	3.7	4.8	2.4
	472L (Metiskow 648S - 472AL Tap)	0.1	1.4	1.3	6.4	4.3	-0.9	-0.9	-4.2	0.3	1.5	19.0	1.3	4.8	1.3	-0.9	19.0	18.8	3.7	4.8	2.4
	704L (Tucuman 478S - Wainright 51S)	0.7	1.3	1.2	3.8	2.7	1.0	1.0	-17.9	1.2	1.3	6.1	1.2	3.0	1.2	1.0	6.1	6.1	3.6	3.0	1.8
7L92 (Vegreville 709S - Whitby Lake 819S)	7L53 (Bonnyville 700S - Lindberg 969S Tap)	1.6	1.7	1.7	3.1	2.4	2.1	2.1	20.8	1.9	1.7	5.5	1.7	2.6	1.7	2.2	6.0	4.9	3.4	2.6	1.9
	9L62 (Tinchebray 972S - Gaetz 87S)	17.4	19.8	19.8	25.5	22.5	41.5	41.5	16.9	31.1	20.0	28.6	19.7	23.5	19.7	40.5	28.3	29.0	32.3	23.5	21.0
9L20 (Nevis 766S - Cordel 755S)	914L (Red Deer 63S - Gaetz 87S)	4.5	17.5	17.2	28.1	24.1	42.5	42.5	26.9	31.8	18.3	33.3	16.1	25.3	16.1	42.2	33.1	33.5	36.9	25.3	21.7
	7L159 (Heatburg 948S - Ghostpine 114S Tap)	59.4	15.7	16.9	2.9	3.6	0.9	0.9	0.2	2.6	12.9	1.7	21.0	3.5	21.0	0.9	1.7	1.8	1.4	3.5	4.3
	7L53 (Bonnyville 700S - Lindberg 969S Tap)	0.8	1.6	1.6	3.2	2.5	2.4	2.4	18.7	2.1	1.6	5.5	1.5	2.7	1.5	2.5	5.9	5.0	3.6	2.7	1.9
	7L16 (Nevis 766S - Heatburg 948S)	59.4	15.7	16.9	2.9	3.6	0.9	0.9	0.2	2.6	12.9	1.7	21.0	3.5	21.0	0.9	1.7	1.8	1.4	3.5	4.3
	9L62 (Tinchebray 972S - Gaetz 87S)	8.2	22.5	22.1	34.6	29.9	53.7	53.7	22.6	40.1	23.4	39.9	20.9	31.3	20.9	53.2	39.5	40.4	45.6	31.3	27.1
	9L16 (Goldeye Tap - Tinchebray 972S)	5.0	5.7	5.9	32.7	21.0	-21.4	-21.4	35.3	-9.1	5.8	50.7	6.6	23.3	6.6	77.8	50.3	51.1	61.8	23.3	9.0
9L24 (Lanfine 959S - Oakland 946S)	703L (Hardisty 377S - Express 329S Tap)	-0.1	0.4	0.4	9.3	7.6	-0.5	-0.5	0.2	-0.1	0.4	18.5	0.4	8.6	0.4	-0.6	18.1	19.1	4.5	8.6	-
	472L (Metiskow 648S - 472AL Tap)	-0.1	0.4	0.4	9.3	7.6	-0.5	-0.5	0.2	-0.1	0.4	18.5	0.4	8.6	0.4	-0.6	18.1	19.1	4.5	8.6	-
	7L60 (Empress Liquid 164S Tap -Amoco Empress 163S)	1.9	-1.0	-0.8	22.4	34.9	4.1	4.1	6.0	0.8	-1.4	12.5	-0.1	27.1	-0.1	4.3	12.3	12.7	9.3	27.1	-
	9L966 (Hansman Lake 650S - Pemukan 932S)	-0.2	2.5	2.5	58.7	47.7	-3.5	-3.5	-3.1	-0.7	2.5	-1.8	2.6	54.6	2.6	-3.7	-1.9	-1.7	-9.7	54.6	-
	7L60 (Empress Liquid 164S Tap - Bindloss 914S Tap)	1.9	-1.0	-0.8	22.4	34.9	4.1	4.1	6.0	0.8	-1.4	12.5	-0.1	27.1	-0.1	4.3	12.3	12.7	9.3	27.1	-
	7L60 (KSP Tap - Bindloss 914S Tap)	1.9	-1.0	-0.8	22.4	34.9	4.1	4.1	6.0	0.8	-1.4	12.5	-0.1	27.1	-0.1	4.3	12.3	12.7	9.3	27.1	-
	7L60 (KSP Tap - Oyen 767S)	1.9	-1.0	-0.8	22.4	34.9	4.1	4.1	6.0	0.8	-1.4	12.5	-0.1	27.1	-0.1	4.3	12.3	12.7	9.3	27.1	-
	7L132 (Oyen 767S - Lanfine 959S)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	6L09 (Oyen 767S - Hurd 2037S Tap)	-1.2	-1.6	-1.8	2.1	4.0	-	-	0.1	-0.1	-1.3	0.8	-2.3	2.8	-2.3	-	0.8	0.8	0.5	2.8	-
9L27 (Paintearth Creek - Cordel 755S)	703L (Hardisty 377S - Express 329S Tap)	-0.1	1.5	1.4	7.6	5.1	-1.5	-1.5	-0.1	0.1	1.6	19.1	1.3	5.6	1.3	-1.6	18.7	19.7	9.7	5.6	2.7
	472L (Metiskow 648S - 472AL Tap)	-0.1	1.5	1.4	7.6	5.1	-1.5	-1.5	-0.1	0.1	1.6	19.1	1.3	5.6	1.3	-1.6	18.7	19.7	9.7	5.6	2.7
	472L (Hughenden 213S - 472AL Tap)	-0.1	1.5	1.4	7.6	5.1	-1.5	-1.5	-0.1	0.1	1.6	19.1	1.3	5.6	1.3	-1.6	18.7	19.7	9.7	5.6	2.7
	704L (Tucuman 478S - Wainright 51S)	0.5	1.1	1.1	3.8	2.7	0.6	0.6	-13.8	1.0	1.2	4.6	1.0	2.9	1.0	0.7	4.1	5.3	5.6	2.9	1.7
	1047L (Nilrem 574S - Easterv Tap)	-0.2	5.4	5.3	28.3	18.8	-5.9	-5.9	0.3	0.1	6.0	33.1	4.9	21.0	4.9	-6.2	32.2	34.3	46.4	21.0	10.1
9L29 (Coyote Lake 963S - Oakland 946S)	7L159 (Heatburg 948S - Ghostpine 114S Tap)	69.8	27.3	30.0	1.3	2.1	-0.5	-0.5	-0.5	1.0	39.1	0.2	39.1	1.8	39.1	-0.6	0.2	0.3	-0.2	1.8	2.4
	7L16 (Nevis 766S - Heatburg 948S)	69.8	27.3	30.0	1.3	2.1	-0.5	-0.5	-0.5	1.0	39.1	0.2	39.1	1.8	39.1	-0.6	0.2	0.3	-0.2	1.8	2.4
9L70 (Oakland 946S - Anderson 801S)	9L97 (Anderson 801S - Oakland 946S)	24.1	24.0	28.2	42.2	43.7	6.5	6.5	11.2	-3.5	61.6	23.2	42.1	51.1	42.1	6.9	22.9	23.7	17.1	51.1	75.0
9L80 (Battle River 757S - Cordel 755S)	703L (Hardisty 377S - Express 329S Tap)	-0.1	1.1	1.0	5.5	3.7	-0.6	-0.6	-2.4	0.4	1.2	16.1	0.9	4.1	0.9	-0.6	15.7	16.7	3.2	4.1	2.1
	704L (Tucuman 478S - Wainright 51S)	0.3	0.9	0.8	2.6	1.9	1.8	1.8	-17.5	1.5	1.0	2.6	0.7	2.1	0.7	1.8	2.0	3.3	3.1	2.1	1.4
9L912 (Nevis 766S – Red Deer 63S)	914L (Red Deer 63S - Gaetz 87S)	33.8	25.6	25.9	30.1	26.3	43.2	43.2	27.8	33.4	25.0	34.7	26.9	27.5	26.9	43.0	34.6	35.0	38.1	27.5	24.1
	7L53 (Bonnyville 700S - Lindberg 969S Tap)	2.7	2.1	2.1	3.4	2.7	2.5	2.5	18.7	2.2	2.1	5.7	2.2	2.9	2.2	2.6	6.1	5.1	3.8	2.9	2.1
	9L62 (Tinchebray 972S - Gaetz 87S)	41.8	31.7	32.0	36.7	32.3	54.4	54.4	23.6	41.8	31.0	41.4	33.2	33.7	33.2	54.0	41.0	42.0	46.8	33.7	29.9
	9L16 (Goldeye Tap - Tinchebray 972S)	45.7	16.3	17.4	34.2	23.1	-21.8	-21.8	35.6	-8.0	14.4	51.2	20.9	25.3	20.9	77.3	50.9	51.7	61.8	25.3	11.5
	9L16 (Goldeye Tap - Cordel 755S)	45.7	16.3	17.4	34.2	23.1	-21.8	-21.8	35.6	-8.0	14.4	51.2	20.9	25.3	20.9	-22.7	50.9	51.7	61.8	25.3	11.5
9L953 (Cordel 755S - Nilrem 574S)	702L (Hardisty 377S - Sedgewick 137S Tap)	-0.4	1.2	1.1	7.0	4.6	-1.3	-1.3	2.0	0.1	1.4	11.2	1.0	5.2	1.0	-1.3	11.0	11.5	5.3	5.2	2.5
	704L (Tucuman 478S - Wainright 51S)	0.5	1.4	1.4	5.3	3.7	0.2	0.2	-12.6	0.9	1.5	7.0	1.3	4.0	1.3	0.2	6.5	7.8	4.5	4.0	2.2
9L97 (Oakland 946S - Anderson 801S)	9L70 (Anderson 801S - Oakland 946S)	24.1	24.0	28.2	42.2	43.7	6.5	6.5	11.2	-3.5	61.6	23.2	42.1	51.1	42.1	6.9	22.9	23.7	17.1	51.1	75.0
Amoco Empress_163S_T5	703L (Hardisty 377S - Express 329S Tap)	-	1.2	1.1	6.0	4.5	-0.9	-0.9	-0.6	0.2	1.3	16.8	1.1	4.6	1.1	-1.0	16.4	17.3	3.2	4.6	2.2
Buffalo Creek 526S_Xmers	9L62 (Tinchebray 972S - Gaetz 87S)	17.6	20.0	20.0	25.7	22.7	41.8	41.8	8.3	31.4	20.2	28.3	19.9	23.7	19.9	40.9	27.8	29.0	32.6	23.7	21.2
Coyote Lake 963S 901T	7L159 (Heatburg 948S - Ghostpine 114S Tap)	69.8	27.3	30.0	1.3	2.1	-0.5	-0.5	-0.5	1.0	39.1	0.2	39.1	1.8	39.1	-0.6	0.2	0.3	-0.2	1.8	2.4
	7L16 (Nevis 766S - Heatburg 948S)	69.8	27.3	30.0	1.3	2.1	-0.5	-0.5	-0.5	1.0	39.1	0.2	39.1	1.8	39.1	-0.6	0.2	0.3	-0.2	1.8	2.4
Edgerton_899ST3	703L (Hardisty 377S - Express 329S Tap)	0.1	1.4	1.3	6.4	4.3	-0.9	-0.9	-4.2	0.3	1.5	19.0	1.3	4.8	1.3	-0.9	19.0	18.8	3.7	4.8	2.4
	472L (Metiskow 648S - 472AL Tap)	0.1	1.4	1.3	6.4	4.3	-0.9	-0.9	-4.2	0.3	1.5	19.0	1.3	4.8	1.3	-0.9	19.0	18.8	3.7	4.8	2.4
	704L (Tucuman 478S - Wainright 51S)	0.7	1.3	1.2	3.8	2.7	1.0	1.0	-17.9	1.2	1.3	6.1	1.2	3.0	1.2	1.0	6.1	6.1	3.6	3.0	1.8
Grizzly Bear 708S T1	704L (Tucuman 478S - Wainright 51S)	0.5	1.0	1.0	3.0	2.1	0.8	0.8	-	1.0	1.0	3.5	0.9	2.3	0.9	0.9	3.0	4.1	2.9	2.3	1.4

Hill 7515_TIEXMER	703L (Hardisty 377S - Express 329S Tap)	0.1	1.4	1.3	6.4	4.3	-0.9	-0.9	-4.2	0.3	1.5	19.0	1.3	4.8	1.3	-0.9	19.0	18.8	3.7	4.8	2.4
	472L (Metiskow 648S - 472AL Tap)	0.1	1.4	1.3	6.4	4.3	-0.9	-0.9	-4.2	0.3	1.5	19.0	1.3	4.8	1.3	-0.9	19.0	18.8	3.7	4.8	2.4
Holden 395S T1	9L62 (Tinchebray 972S - Gaetz 87S)	18.3	20.7	20.6	26.6	23.5	42.6	42.6	16.9	32.1	20.8	30.0	20.6	24.5	20.6	41.7	29.7	30.4	33.7	24.5	21.8
HRT Express 329S T1	703L (Hardisty 377S - Express 329S Tap)	-	1.1	1.1	5.7	3.8	-1.0	-1.0	-0.7	0.1	1.2	16.6	1.0	4.2	1.0	-1.1	16.2	17.1	3.1	4.2	2.1
Lanfine 959S 901T	7L60 (Empress Liquid 164S Tap -Amoco Empress 163S)	1.3	1.4	1.6	0.4	88.1	0.4	0.4	0.6	0.2	1.1	0.6	2.1	0.3	2.1	0.5	0.6	0.6	0.6	0.3	-
	7L60 (Empress Liquid 164S Tap - Bindloss 914S Tap)	1.3	1.4	1.6	0.4	88.1	0.4	0.4	0.6	0.2	1.1	0.6	2.1	0.3	2.1	0.5	0.6	0.6	0.6	0.3	-
	7L60 (KSP Tap - Bindloss 914S Tap)	1.3	1.4	1.6	0.4	88.1	0.4	0.4	0.6	0.2	1.1	0.6	2.1	0.3	2.1	0.5	0.6	0.6	0.6	0.3	-
Nilrem 574S T2	703L (Hardisty 377S - Express 329S Tap)																				
Paintearth Creek 863S 902T	703L (Hardisty 377S - Express 329S Tap)	-0.1	1.5	1.4	7.6	5.1	-1.5	-1.5	-0.1	0.1	1.6	19.1	1.3	5.6	1.3	-1.6	18.7	19.7	9.7	5.6	2.7
	472L (Metiskow 648S - 472AL Tap)	-0.1	1.5	1.4	7.6	5.1	-1.5	-1.5	-0.1	0.1	1.6	19.1	1.3	5.6	1.3	-1.6	18.7	19.7	9.7	5.6	2.7
	472L (Hughenden 213S - 472AL Tap)	-0.1	1.5	1.4	7.6	5.1	-1.5	-1.5	-0.1	0.1	1.6	19.1	1.3	5.6	1.3	-1.6	18.7	19.7	9.7	5.6	2.7
	704L (Tucuman 478S - Wainright 51S)	0.5	1.1	1.1	3.8	2.7	0.6	0.6	-13.8	1.0	1.2	4.6	1.0	2.9	1.0	0.7	4.1	5.3	5.6	2.9	1.7
	1047L (Nilrem 574S - Easterv Tap)	-0.2	5.4	5.3	28.3	18.8	-5.9	-5.9	0.3	0.1	6.0	33.1	4.9	21.0	4.9	-6.2	32.2	34.3	46.4	21.0	10.1
7L117 (Irish Creek 706S - Vermillion 710S)	9L62 (Tinchebray 972S - Gaetz 87S)	17.6	20.0	20.0	25.9	22.9	41.7	41.7	20.0	31.4	20.2	29.5	19.9	23.9	19.9	40.8	29.3	29.8	32.8	23.9	21.3
7L42 (Hill 751S - Lloydminster 716S)	703L (Hardisty 377S - Express 329S Tap)	0.1	1.4	1.3	6.4	4.3	-0.9	-0.9	-4.2	0.3	1.5	19.0	1.3	4.8	1.3	-0.9	19.0	18.8	3.7	4.8	2.4
	472L (Metiskow 648S - 472AL Tap)	0.1	1.4	1.3	6.4	4.3	-0.9	-0.9	-4.2	0.3	1.5	19.0	1.3	4.8	1.3	-0.9	19.0	18.8	3.7	4.8	2.4
	704L (Tucuman 478S - Wainright 51S)	0.7	1.3	1.2	3.8	2.7	1.0	1.0	-17.9	1.2	1.3	6.1	1.2	3.0	1.2	1.0	6.1	6.1	3.6	3.0	1.8
919G0 (Painteartn 863S - Rolling Hills 1081S)	703L (Hardisty 377S - Express 329S Tap)	-0.1	1.5	1.4	7.6	5.1	-1.5	-1.5	-0.1	0.1	1.6	19.1	1.3	5.6	1.3	-1.6	18.7	19.7	9.7	5.6	2.7
	472L (Metiskow 648S - 472AL Tap)	-0.1	1.5	1.4	7.6	5.1	-1.5	-1.5	-0.1	0.1	1.6	19.1	1.3	5.6	1.3	-1.6	18.7	19.7	9.7	5.6	2.7
	472L (Hughenden 213S - 472AL Tap)	-0.1	1.5	1.4	7.6	5.1	-1.5	-1.5	-0.1	0.1	1.6	19.1	1.3	5.6	1.3	-1.6	18.7	19.7	9.7	5.6	2.7
	704L (Tucuman 478S - Wainright 51S)	0.5	1.1	1.1	3.8	2.7	0.6	0.6	-13.8	1.0	1.2	4.6	1.0	2.9	1.0	0.7	4.1	5.3	5.6	2.9	1.7
	1047L (Nilrem 574S - Easterv Tap)	-0.2	5.4	5.3	28.3	18.8	-5.9	-5.9	0.3	0.1	6.0	33.1	4.9	21.0	4.9	-6.2	32.2	34.3	46.4	21.0	10.1
885L (Metiskow 648S - Hansman Lake 650S)	749L (Killarney 267S Tap - 749AL Tap)	0.2	0.7	0.7	2.6	1.8	-0.1	-0.1	-4.4	0.3	0.7	50.8	0.6	2.0	0.6	-0.1	71.9	20.4	0.7	2.0	1.1
Anderson 801S_901T	7L171 (Michichi Creek 802S - Wintering Hills 804S)	-	100.0	100.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
174L (Holden 395S - Bardo 197S)	9L62 (Tinchebray 972S - Gaetz 87S)	18.0	20.4	20.4	26.4	23.3	42.2	42.2	20.7	31.8	20.6	30.0	20.3	24.3	20.3	41.3	29.7	30.3	33.4	24.3	21.6
9L966 (Hansman Lake 650S - Pemukan 932S)	7L224 (Hansman Lake 650S - Monitor 774S)	0.3	5.6	5.5	27.4	18.4	-4.9	-4.9	-9.0	0.7	6.2	-23.3	5.2	20.4	5.2	-5.1	-22.9	-23.9	-12.6	20.4	10.0
	7L127 (Pemukan 932S - Monitor 774S)	-0.4	5.0	4.8	29.0	19.1	-4.9	-4.9	-9.0	0.7	5.7	-22.3	4.1	21.4	4.1	-5.2	-21.9	-22.8	-12.3	21.4	10.4
916 2 (Tinchebray 972S - Gaetz 87S)	174L (Bardo 197S - Holden 395S)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	730L (Bardo 197S - Kingman 299S Tap)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	9L912 (Red Deer 63S - Nevis 766S)	49.5	30.0	30.7	32.0	28.1	43.2	43.2	21.5	34.0	28.8	36.4	32.7	29.3	32.7	43.5	36.1	36.9	41.1	29.3	25.7
	704L (Tucuman 478S - Wainright 51S)	0.9	1.4	1.4	3.6	2.6	1.8	1.8	-13.7	1.7	1.5	4.1	1.4	2.9	1.4	1.8	3.7	4.8	3.6	2.9	1.9
	7L53 (Bonnyville 700S - Lindberg 969S Tap)	2.0	2.3	2.3	3.8	3.1	3.5	3.5	18.9	2.9	2.3	6.1	2.3	3.2	2.3	3.5	6.5	5.5	4.3	3.2	2.5
	9L20 (Nevis 766S – Cordel 755S)	-7.5	14.7	14.2	29.1	24.5	42.5	42.5	20.5	31.6	16.2	34.6	12.2	25.8	12.2	42.8	34.3	35.0	39.9	25.8	21.5
	9L16 (Goldeye Tap - Cordel 755S)	-3.9	12.5	11.8	-2.0	5.3	68.0	68.0	-14.5	43.8	13.6	-14.7	9.7	4.4	9.7	68.7	-14.7	-14.7	-20.5	4.4	14.6
Three Hills 770S 703T	7L16 (Nevis 766S - Heatburg 948S)	60.6	15.3	16.5	1.6	2.5	-0.8	-0.8	-0.8	1.3	12.4	0.1	20.8	2.3	20.8	-0.9	0.1	0.1	-0.5	2.3	3.5
Tucuman 478S Transformers	703L (Hardisty 377S - Express 329S Tap)	-0.2	0.8	0.8	4.6	3.1	-0.5	-0.5	-1.3	0.3	1.0	10.3	0.7	3.4	0.7	-0.6	10.0	10.6	3.1	3.4	1.7
	472L (Metiskow 648S - 472AL Tap)	-0.2	0.8	0.8	4.6	3.1	-0.5	-0.5	-1.3	0.3	1.0	10.3	0.7	3.4	0.7	-0.6	10.0	10.6	3.1	3.4	1.7
	472L (Hughenden 213S - 472AL Tap)	-0.2	0.8	0.8	4.6	3.1	-0.5	-0.5	-1.3	0.3	1.0	10.3	0.7	3.4	0.7	-0.6	10.0	10.6	3.1	3.4	1.7
EATL (Newell 207S - Heathfield 202S)	9L62 (Tinchebray 972S - Gaetz 87S)	17.2	19.7	19.6	25.2	22.3	41.3	41.3	15.4	31.0	19.8	28.3	19.5	23.3	19.5	40.3	28.0	28.7	32.0	23.3	20.9
	9L59 (Tinchebray 972S - 9JA597Tap)	0.6	17.6	16.9	4.6	11.0	-21.4	-21.4	-10.6	51.8	18.7	-7.4	14.8	10.4	14.8	-20.9	-7.5	-7.3	-12.2	10.4	20.0
	704L (Tucuman 478S - Wainright 51S)	0.5	1.0	1.0	3.0	2.1	0.8	0.8	-14.0	1.0	1.0	3.5	0.9	2.3	0.9	0.9	3.0	4.1	2.9	2.3	1.4
	7L53 (Bonnyville 700S - Lindberg 969S Tap)	1.3	1.4	1.4	2.7	2.1	1.8	1.8	18.3	1.6	1.4	4.9	1.5	2.3	1.5	1.8	5.3	4.3	2.9	2.3	1.6
	7L16 (Nevis 766S - Heatburg 948S)	60.6	15.3	16.5	1.6	2.5	-0.8	-0.8	-0.8	1.3	12.4	0.1	20.8	2.3	20.8	-0.9	0.1	0.1	-0.5	2.3	3.5
	703L (Hardisty 377S - Express 329S Tap)	-	1.1	1.1	5.7	3.8	-1.0	-1.0	-0.7	0.1	1.2	16.6	1.0	4.2	1.0	-1.1	16.2	17.1	3.1	4.2	2.1
	7L159 (Heatburg 948S - Ghostpine 114S Tap)	60.6	15.3	16.5	1.6	2.5	-0.8	-0.8	-0.8	1.3	12.4	0.1	20.8	2.3	20.8	-0.9	0.1	0.1	-0.5	2.3	3.5
	9L912 (Red Deer 63S - Nevis 766S)	40.5	19.8	20.5	18.9	16.5	21.8	21.8	13.6	18.0	18.5	21.8	22.6	17.2	22.6	22.5	21.6	22.0	24.4	17.2	14.9

Note 1: Effectiveness factor values represent the % of MW variation of an overload element by 1.0 MW increase of generation under study.
Note 2: Negative values mean x0.01 MW flow decrease while positive values mean x0.01 MW flow increase.
Note 3: '-' means the effectiveness factor less than 0.05%.