December 13, 2013

Wade Vienneau
Executive Director, Facilities Division
Alberta Utilities Commission
Fifth Avenue Place
4th Floor, 425 – 1st Street SW
Calgary, Alberta T2P 3L8

Dear Mr. Vienneau:

Re: Stage III Amendment to the Alberta Utilities Commission (Commission) Southern Alberta Transmission System Reinforcement (SATR) Approval No. U2013-460 (SATR NID Approval)

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1. Pursuant to the *Electric Utilities Act,* S.A. 2003, c. E-5.1 (EUA) and the *Alberta Utilities Commission Act,* S.A. 2007, c. A-37.2 (AUCA), the Alberta Electric System Operator (AESO) is applying to the Commission for approval to amend the SATR NID Approval to delete Stage III, as more particularly described below (Application).

Organization of this Application

2. This Application is organized in the following manner:

- Background – SATR NID Approval
- Existing SATR NID Approval Transmission Development to be Amended
- Proposed Amendment
- Rationale for Proposed Amendment
  - Study Scope
  - Study Results and Conclusions
- Related Information
  - Economic Considerations
  - Land Impact Assessment
  - Participant Involvement Program
- The Need for Transmission Reinforcement has Not Changed
- Request for Approval

Background – SATR NID Approval

3. On December 30, 2008, the AESO applied to the Commission for approval of a needs identification document for transmission reinforcement in southern Alberta (SATR NID). The Commission approved the SATR NID in *Decision 2009-126* and Approval No. U2009-340.

4. Pursuant to *Decision 2009-126*[1], the AESO filed the finalized SATR milestones and monitoring process with the Commission on December 7, 2009. The Commission approved the finalized milestones and monitoring process in *Decision 2010-343* and Approval No. U2010-264. The approved milestones specified three development stages – Stages I, II, and III.

5. On October 5, 2010, the AESO reported that each of the SATR milestones had been met and that it had issued directions to the transmission facilities owner to prepare facility applications for SATR Stage I and Stage II components.[2]

6. Subsequent amendments to Approval No. U2010-264 have culminated in the current SATR NID Approval No. U2013-460.

Existing SATR NID Approval Transmission Development to be Amended

7. The SATR NID Approval reflects a three-stage approach to the SATR, and specific development activities are described in the SATR NID Approval under each stage. Stage III is comprised of the following specific transmission development:

SATR NID Approval, Stage III

> *1. "A new 240-kV double-circuit transmission line with 50 per cent series compensation connecting Ware Junction 132S substation to Langdon 102S substation."*

Proposed Amendment

8. For the reasons provided below, the AESO proposes to amend the SATR NID Approval to delete Stage III in its entirety.

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[1] Paragraph 116

[2] Southern Alberta Transmission Reinforcement (SATR) Milestones and Monitoring Process (MMP) – Status Report for Q3 2010; http://www.aeso.ca/downloads/SATR_Milestones_Quarterly_Update_Q3_2010-R1.pdf

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Rationale for Proposed Amendment

9. In the SATR NID, the AESO recommended, and the Commission approved, Stage III, being a new double circuit 240 kV transmission line between Ware Junction 132S and Langdon 102S substations with 50% series compensation to transmit power generated in southeast and south central Alberta to the Calgary load centre.[3]

10. The approved construction milestone measure for Stage III is "studies indicating overloading in the S.E. Alberta's 240-kV network".[4] As part of its ongoing planning processes and in accordance with the Stage III milestone, the AESO conducted studies to determine whether Stage III continues to be the appropriate solution to meet the need described in the SATR NID.[4] The *Southern Alberta Transmission Reinforcement (SATR) Stage III Assessment Study*, dated November 15, 2013 (Study) is provided as Attachment 1.

Study Scope

11. The AESO performed steady state power flow analyses to evaluate transmission system performance with and without Stage III in place over the long-term (2022 and 2032 study years). The AESO simulated the system performance for Category A, B and a select set of Category C3 and C5 contingencies for each of these two system configurations and compared results.

12. The Study is based on currently available information regarding the existing and planned transmission system and the AESO 2012 Long-term Outlook (2012 LTO) load and generation forecasts. The applicable Alberta Reliability Standards and AESO Transmission Reliability Criteria were applied to assess system reliability under various system conditions.

13. Subsequent to the SATR NID approval in *Decision 2009-126*, other transmission system developments, such as the Hanna Region Transmission Development[5] have been approved and are included in the Study.[6] The Study also includes the approved SATR Stages I and II to be in place in accordance with the respective in-service dates.

14. One of the key transmission system developments considered in the Study was the high voltage direct current (HVDC) Eastern Alberta Transmission Line (EATL). EATL was not considered in the SATR NID, which assumed only a single western 500 kV transmission line. Both of the two 500 kV HVDC lines - EATL and the Western Alberta Transmission Line (WATL) – are now under construction

[3] SATR NID, section 7.1.12 and Executive Summary, page v

[4] SATR NID Approval, Appendix A

[5] Decision 2010-592

[6] Attachment 1, Table 4

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with expected in-service dates of 2014 and 2015, respectively. In all Study analyses, the WATL and EATL lines were dispatched to maximize system efficiency.

15. Additionally, the AESO has progressed on its plan to restore the Western Electricity Coordinating Council (WECC) Path 1 (AB-BC intertie) rating; consequently, the Study includes scenarios that assume the full 1,200 MW import and 1,000 MW export on the AB-BC intertie. By comparison, the SATR NID assessed the AB-BC intertie total transfer capability of 780 MW import and 800 MW export.

16. To assess Stage III, the AESO dispatched wind generation considering the AESO 2012 LTO wind forecast and specific wind project information. The AESO also evaluated system performance under the 2012 LTO Environmental Wind Scenario to assess Stage III under the greater level of future wind generation. The AESO conducted sensitivity studies to account for geographic uncertainty of future wind development based on alternate wind distribution that increased stress on the east-west transmission path in southern Alberta. An overview of the 2012 LTO load and generation forecasts used in the Study is provided in the *South and Central Region Load and Generation Forecasts*, Attachment 2.

Study Results and Conclusions

17. The Study demonstrates that with the development of the EATL and WATL HVDC lines, Stage III provides no material transmission system benefits and, in fact, degrades system performance by increasing overloads under most of the studied scenarios compared to the system without Stage III. The principal reason for this is that these HVDC lines, primarily EATL, provide an adequate transfer path for the high levels of wind development forecast in southern Alberta, making Stage III redundant.

18. Stage III very marginally reduces or eliminates overloads in one specific Category C5 contingency (loss of 240 kV lines from Bowmanton 242S to Cassils 324S); however, these identified overloads do not necessitate Stage III development as the AESO has established a remedial action scheme for this contingency.

19. The Study shows that the system experiences thermal overloads both with and without Stage III under a wide range of wind dispatch, import/export levels, and system load conditions. The identified overloads are attributable to existing system deficiencies and will be addressed in the AESO's next long-term plan update including establishing operational measures to mitigate thermal overloads and/or voltage violations for Category C3 and C5 contingencies, as required.

20. As a result of these findings, the AESO has concluded that in consideration of transmission developments approved following the SATR NID Approval, and in particular, the development of EATL, the functionality that Stage III was originally planned to provide will be achieved by other means. The cancellation of SATR Stage III will have no impact on capability of the transmission system to accommodate forecast wind development in southern Alberta since the remaining SATR

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lines, coupled with EATL and WATL, have adequate capacity to transfer forecast wind power to load centres in a reliable manner.

Related Information

Economic Considerations

21. Cancellation of Stage III is estimated to reduce the cost of the SATR developments by approximately $280 million (+30/-15%, 2008$), as described in the SATR NID.[7]

Land Impact Assessment

22. As the Application will have no visual or environmental impacts on the surrounding communities or the environment, the AESO has not undertaken an assessment of the sort contemplated in Commission Rule 007, Section 6.1 – NID12.

Participant Involvement Program

23. The AESO conducted a participant involvement program (PIP) in accordance with the requirements of NID13 and Appendix A of Commission Rule 007 *Applications for Power Plants, Substations, Transmission Lines and Industrial System Designations*. The AESO notified stakeholders of its Application including industry and landowners, occupants, residents and agencies in the area where Stage III was planned to be developed. The AESO is not aware of any concerns related to the Application. A report summarizing the AESO's PIP is included as Attachment 3.

The Need for Transmission Reinforcement Has Not Changed

24. In the SATR NID, the AESO explained that the need for transmission reinforcement in southern Alberta is driven predominantly by the forecast development of wind generation and the limited capability of the transmission system to deliver additional generation on a firm basis to the AIES.[8] This need has not changed.

25. This Application seeks to amend components of the SATR NID Approval that were subject to a specific construction milestone. The AESO has demonstrated in the Study that the need for transmission system capability as described in the SATR NID is addressed through Stages I and II of the SATR NID Approval in addition to transmission developments approved subsequent to *Decision 2009-126*.

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[7] SATR NID, Section 7, Table 7-3. The AESO currently estimates this to be approximately $470 million (+30/-15% 2013$).

[8] SATR NID Executive Summary, page i

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Request for Approval

26. Having regard to:

- the relevant provisions of the EUA and the AUCA;
- the transmission responsibilities of the AESO as set out in the EUA and the *Transmission Regulation*;
- information obtained from the system planning studies undertaken by the AESO;
- the estimated cost of Stage III described in the SATR NID;
- the AESO's PIP; and
- the AESO's long-term transmission system plans,

it is the conclusion of the AESO that its assessment of the proposed amendment is technically complete and that the proposed amendment is in the public interest.

27. The AESO requests that the Commission:

    (a) approve the Application, and

    (b) grant such further relief as may be necessary to give effect to such approval.

Please address all correspondence concerning this application to:

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Regulatory Coordinator
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403-539-2874

Sincerely,

Doyle Sullivan, P. Eng.
Director, Regulatory Services

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Stage III Amendment to the Alberta Utilities Commission Southern Alberta Transmission System Reinforcement Approval No. U2013-460

ATTACHMENT 1 SOUTHERN ALBERTA TRANSMISSION REINFORCEMENT (SATR) STAGE III ASSESSMENT STUDY

Southern Alberta Transmission Reinforcement (SATR) Stage III Assessment Study

November 15, 2013

	Name	Signature	Date
Prepared	Ebrahim Rahimi, P.Eng.		Nov 15, 2013
	Ramaiah Divi, P.Eng.		Nov 15, 2013
Prepared/ Reviewed	Ata Rehman, P.Eng.		Nov 15, 2013
Reviewed/Approved	Jason Doering, P.Eng.		Nov 18, 2013

APEGA Permit to Practice P8200

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Table of Contents

List of Figures

List of Tables

1. Executive Summary

The AESO conducted this SATR Stage III Assessment Study (Study) to determine whether Stage III continues to be the appropriate solution to meet the approved SATR need to transfer wind generation from southeastern and south central Alberta to the Calgary area.

The AESO identified the need for transmission development in the southern region of Alberta in the SATR Needs Identification Document (NID), which was approved by the Commission on September 8, 2009. SATR was approved to be developed in three stages. Stage I and Stage II components have been completed, are under construction, or are in facility proposal development. No activities have been initiated for Stage III which was approved to include a new double circuit series compensated 240 kV line from Ware Junction 132S to Langdon 102S at an estimated cost of $280 million ($2008, +30%/-15%). The AESO's current estimate of Stage III cost is $470 million ($2013).

To assess SATR Stage III, the AESO evaluated and compared transmission system performance with Stage III in place and without Stage III over the long-term (2022 and 2032 study years). The system performance was simulated for Category A, B and a selected set of Category C3 and C5 contingencies for each of these two system configurations. Planned transmission system upgrades were assumed to be in place according to the respective expected in-service dates. One of the key changes in transmission system topology included in the Study is the Eastern Alberta Transmission Line (EATL). EATL was not included in the SATR NID which assumed a single western 500 kV transmission line. The Study also includes scenarios that assume the full 1,200 MW import and 1,000 MW export on the Alberta-British Columbia (AB-BC) intertie. By comparison, the SATR NID assessed the AB-BC intertie total transfer capability of 780 MW import and 800 MW export.

Both the AESO 2012 Long-term Outlook (2012 LTO)[1] forecast and environmental generation scenarios were assessed for summer peak and summer light load conditions. The AESO also considered geographical diversity (uncertainty) of wind development and tested scenarios assuming variations in geographic distribution of wind generation to further stress the east to west transmission path in southern Alberta. Four system conditions were created to stress the transmission system by combining the 1,200 MW maximum import from BC to AB with maximum wind under summer peak load conditions and the 1,000 MW maximum export with maximum wind for summer light loads conditions.

Key Study Conclusions

- EATL provides the same functionality that was planned to be provided by Stage III. With the addition of EATL and the Western Alberta Transmission Line (WATL), Stage III degrades the system performance by increasing overloads under certain scenarios compared to the system without Stage III. The principal reason is that these High Voltage Direct Current (HVDC) lines, primarily EATL, provide an adequate transfer path for the high levels of wind development forecast in southern Alberta, making Stage III redundant.

- Stage III very marginally reduces or eliminates overloads in one specific Category C5 contingency (loss of 240 kV lines from Bowmanton 242S to Cassils 324S). The AESO has established a Remedial Action Scheme (RAS) for this contingency. Consequently, there is no need to build Stage III reinforcement to address this contingency.

- The system experiences thermal overloads both with and without Stage III under a wide range of wind dispatch, import/export levels, and system load conditions. The identified overloads are attributable to existing system deficiencies and will be addressed in the AESO's next long-term plan update.

[1] The 2012 LTO is available at: http://www.aeso.ca/downloads/AESO_2012_Long-term_Outlook_bookmarked.pdf.

- The AESO will establish operational measures to mitigate thermal overloads and/or voltage violations for Category C3 and C5 contingencies in a timely manner. Hence, approved SATR Stage III development is not a substitute for these relatively inexpensive operational measures.
- The cancellation of SATR Stage III has no impact on forecast wind development in southern Alberta since the remaining SATR lines, coupled with EATL and WATL, have adequate capacity to transfer wind energy to the load centres in a reliable manner.

Recommendation

Cancellation of the SATR Stage III development is recommended as system planning studies demonstrate that the planned functionality of Stage III will be provided by the addition of EATL, resulting in improved system performance in the majority of scenarios evaluated.

2. Introduction

The AESO conducted this SATR Stage III Assessment Study (Study) as part of its ongoing planning processes and in accordance with the SATR milestones and monitoring process (MPP) approved by the Alberta Utilities Commission (Commission) in *Decision 2010-343*. In particular, the SATR MPP includes the following construction milestone measure for Stage III which is primarily comprised of a new double circuit 240 kV line between Ware Junction 132S and Langdon 102S substations[2]:

Stage III - SE	
Ware Junction to Langdon 240 kV line	Studies indicating overloading in the SE Alberta's 240 kV network

The objective of the Study was to assess whether SATR Stage III continues to be the appropriate solution to meet the need to transmit power generated in southeastern and south central Alberta to the Calgary area.[3] Contingency analysis was performed with Stage III in service and without Stage III (Configurations).

This report summarizes the results of the Study and recommends a course of action concerning Stage III. This report is organized in the following manner:

- Introduction
- Criteria, Assumptions and Methodology
- SATR Stage III Assessment
- Conclusions and Recommendations

2.1 Background

The AESO identified the need for transmission development in the southern region of the Alberta Interconnected Electric System (AIES) in the SATR Needs Identification Document (NID), which was approved by the Commission on September 8, 2009.[4] The need for SATR is primarily driven by forecast wind generation and the limited capability of the transmission system to deliver additional generation on a firm basis to the AIES. SATR is approved to be developed in three stages in accordance with specified construction milestones. The Stage I and Stage II components have been completed, are under construction, or are in facility proposal development. No activities have been initiated for SATR Stage III.

Stage III was planned to alleviate overloads on the existing transmission path from West Brooks 132S to Langdon 102S to transfer forecast wind generation from southeastern and south central Alberta to the load centre in the Calgary area and to the planned western 500 kV line. Stage III was proposed to include a new double circuit series compensated 240 kV line from Ware Junction 132S to Langdon 102S and associated facilities with an estimated cost of $280 million ($2008, +30%/-15%). The AESO's current estimate of Stage III cost is $470 million ($2013).

[2] Approval No. U2013-460, Appendix A
[3] SATR NID, section 7.1.12
[4] *Decision 2009-126*, Approval No. U2009-340; subsequent amendments have resulted in the current Approval No. U2013-460

2.2 Existing and Planned Transmission System

The Study Area, as further described in section 3.2, generally encompasses southern Alberta from the Calgary area to the Montana border. The transmission system in the Study Area is predominantly served by 240 kV networks that connect generation to major load centres in the area. The existing six north – south 240 kV lines, referred to as the South of KEG cut plane, terminate near the City of Calgary, one of the major transmission hubs in the AIES.

The Study Area contains Alberta's three inter-provincial interties. The largest intertie is the 500 kV 1201L that connects the BC Hydro system at Cranbrook to the AIES at Langdon 102S. This 500 kV circuit and two 138 kV circuits between Alberta and British Columbia (BC) are collectively defined by the Western Electricity Coordinating Council (WECC) to be Path 1. The Path 1 rating in export and import modes is 1,000 MW and 1,200 MW respectively. However, the actual operating limit of the intertie is lower due to system constraints. The AESO is jointly working with BC Hydro to restore the Path 1 rating to its design value. The second intertie in the Study Area is the 150 MW back to back HVDC at McNeill substation in the Vauxhall/Empress/Medicine Hat area connecting the AIES with the Saskatchewan system.

A third tie line, the Montana - Alberta Tie line (MATL) has been recently commissioned and is expected to be in service by Q2 2013. MATL is a merchant line connecting the AIES 240 kV system near North Lethbridge to Grand Falls, Montana, USA.

The planned SATR developments in the Study Area include the following Stage I and Stage II components:

- A double circuit 240 kV line from the Goose Lake 103S substation to the proposed Chapel Rock 491S substation which will be connected to 1201L between Langdon 102S and BC Hydro's Cranbrook substation.[5]
- Replacement of the existing 911L with a new double circuit series compensated 240 kV line terminating at the proposed Foothills 237S and Windy Flats 138S substations.[6]
- A double circuit 240 kV line, one side strung, from Goose Lake 103S to Journault 260S.
- A double circuit 240 kV line, one side strung, from Picture Butte 120S to Journault 260S.
- A double circuit 240 kV line from Journault 260S to Whitla 251S.

Other major developments in area include Commission approvals of the 240 kV and 138 kV Transmission System Expansion in the Vicinities of Southeast Calgary, Okotoks and High River - Foothills Area Transmission Development Plan[6], East Calgary 240kV and 138kV Transmission System Upgrade and the Shepard Energy Centre Connection[7], Fidler 312S substation and 138 kV modifications[8] and the Hanna Region Transmission Development (HRTD)[9].

One of the key changes in transmission system topology assumed for the Study is the high voltage direct current (HVDC) Eastern Alberta Transmission Line (EATL). EATL was not included in the SATR NID which assumed a single western 500 kV transmission line. The two 500 kV HVDC lines - EATL and the Western Alberta Transmission Line (WATL) – are now under construction. Additionally, the AESO has progressed on its plan to restore the Western Electricity Coordinating Council (WECC) Path 1 (AB-BC intertie) rating; consequently, the Study includes scenarios that assume the full 1,200 MW import and

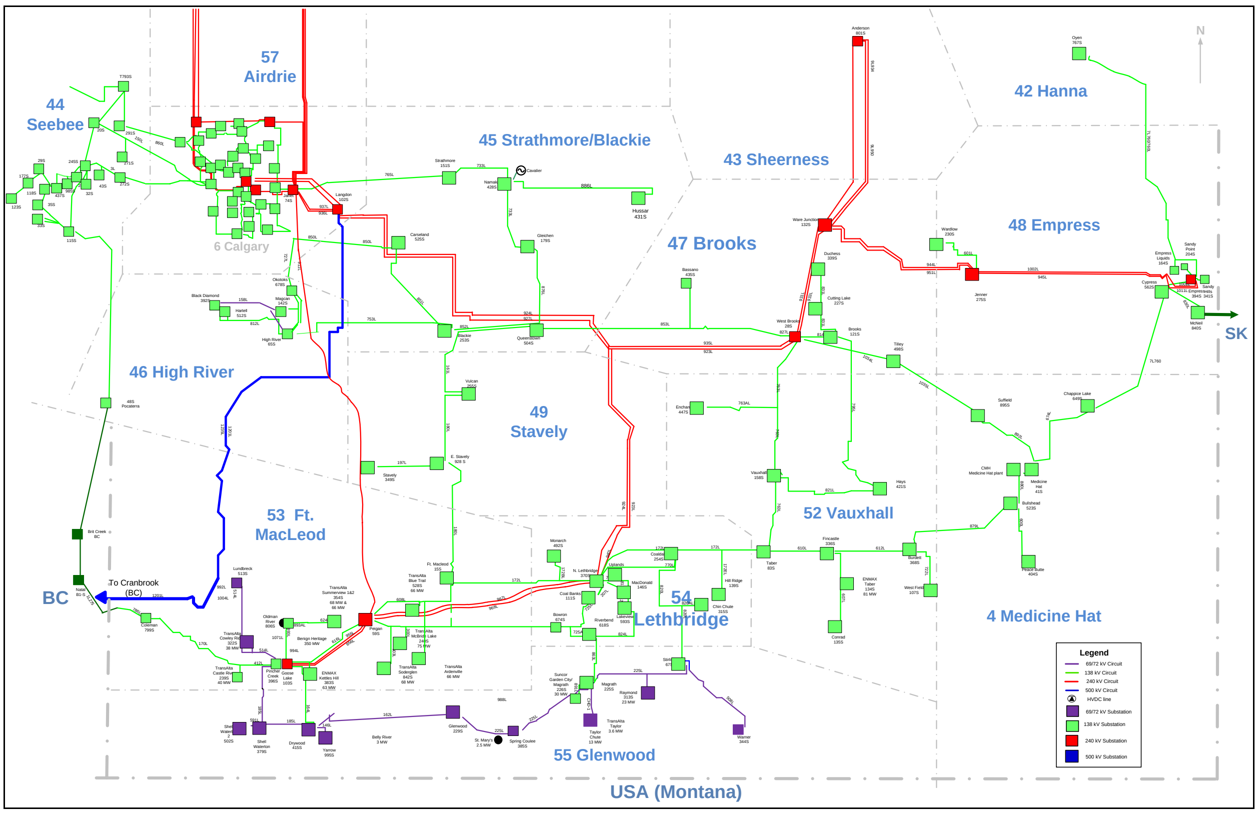
[5] Application No 1609122, Proceeding ID No. 2349.
[6] *Decision 2013-369*
[7] *Decision 2012-283*
[8] *Decision 2013-177*
[9] *Decision 2010-592*

1,000 MW export on the AB-BC intertie.[10] By comparison, the SATR NID assessed the AB-BC intertie total transfer capability of 780 MW import and 800 MW export.

A complete list of planned bulk transmission system reinforcements assumed in the Study is provided in section 3.3.

Figures 1 and 2 depict the schematic design of the transmission system in the Study Area, with and without SATR Stages I and II, the HVDC lines, FATD and other developments. Figure 3 presents the geographical map of the Study Area with SATR Stage III development.

Figure 1: Existing Study Area Transmission System (without SATR)



[10] Section 3.4, Table 5

Figure 2: Future Study Area Transmission System (with SATR Stages I and II only)

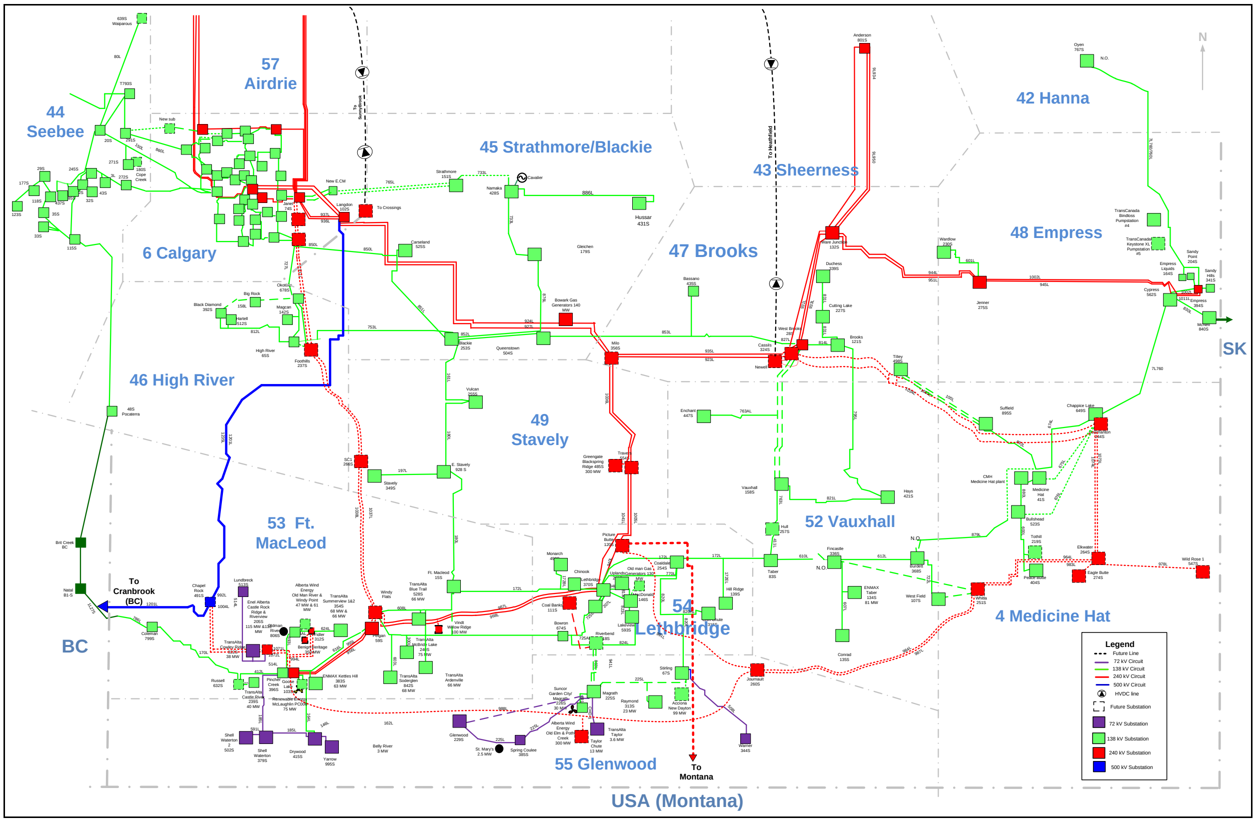
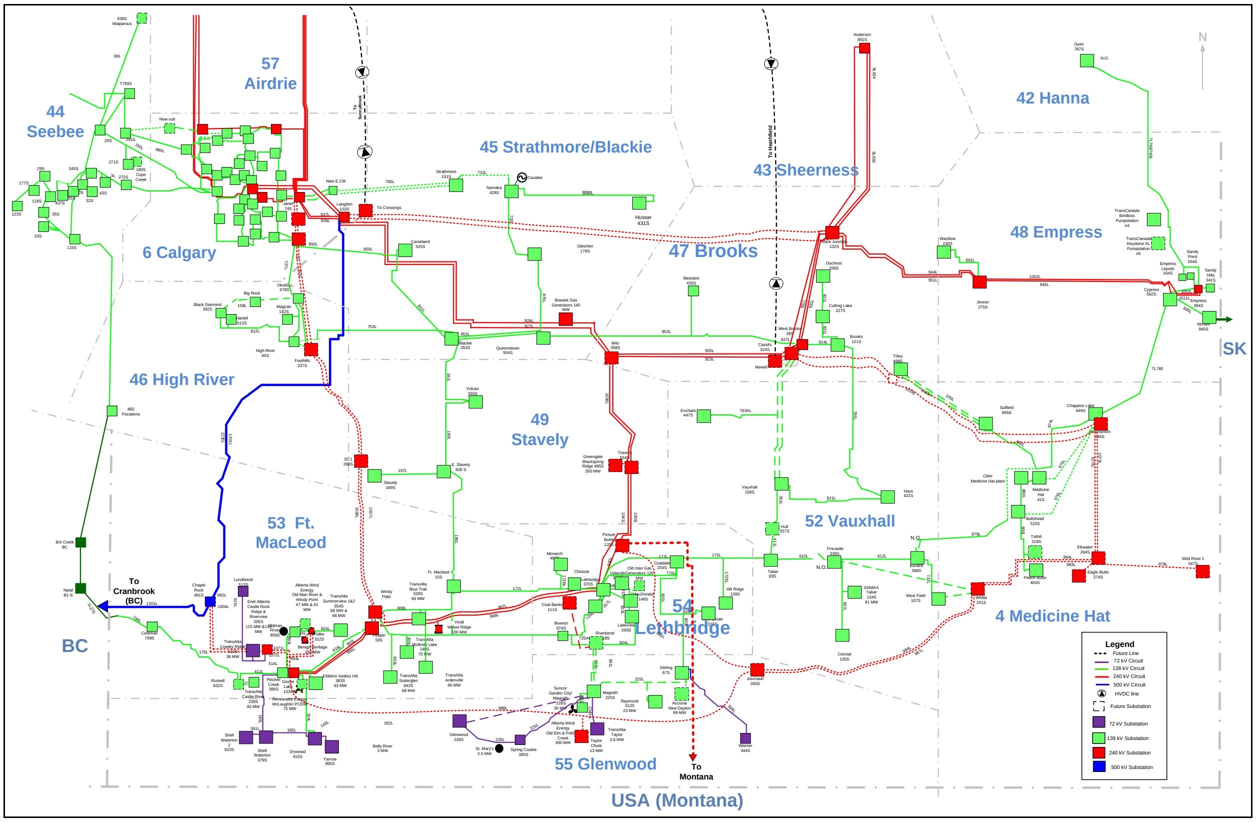


Figure 3: Future Study Area Transmission System (with SATR Stages I, II and III)



Note: Figure 1, Figure 2 and Figure 3 are not to scale and do not represent the actual routing of the proposed or location of existing transmission lines and facilities.

2.3 Studies Conducted

To assess SATR Stage III, the AESO evaluated and compared transmission system performance with Stage III in place and without Stage III over the long-term (2022 and 2032 study years). Since it is a comparative study of two different configurations under identical system conditions, steady state power flow analyses satisfy the Study objective. Accordingly, the AESO simulated the system performance for Category A, B and a select set of Category C3 and C5 contingencies for each of the two system Configurations and compared results. In all analyses, the WATL and EATL lines were dispatched to minimize system losses.

3. Criteria, Methodology and Assumptions

Section 3 describes the criteria, methodology and assumptions used in the Study.

3.1 Alberta Reliability Standards and AESO Transmission Reliability Criteria

The applicable Alberta Reliability Standards (ARS) (TPL-001-AB-0, TPL-002-AB-0 and TPL-003-AB-0) were applied to assess system reliability under various system conditions. Category A (TPL-001-AB-0, all transmission elements in-service), Category B (TPL-002-AB-0, a single transmission element out-of-service), and selected Category C (TPL-003-AB-0, multiple transmission elements out-of-service) conditions were examined. A general explanation of the Transmission Reliability Criteria applied throughout the Study is provided below.

- Under Category A and Category B conditions, the system must be able to supply all firm transfers on the interties, i.e., no shedding of load or generation is allowed for these conditions in order to maintain acceptable system performance.

- Equipment loadings are monitored to record any violations based on 100% of their applicable static seasonal rating. The ARS require all transmission elements to operate within their ratings with no thermal overloads.

- All equipment must operate within its applicable rating, voltages must be within their allowable limits as provided in Table 1 and the system must be stable.

The planning criteria assumed in the Study considered voltage targets of 1.05 p.u. and 1.08 p.u. for the normal and maximum operating voltages throughout the 240 kV and 500 kV networks, respectively in southern Alberta. The maximum and minimum contingency voltages were assumed to be 1.10 p.u. and 0.92 p.u. respectively on the 240 kV network. The extreme minimum and maximum voltages for the 500 kV network were assumed to be 1.0 p.u. and 1.10 p.u., respectively. These values are summarized in Table 1: Allowable Voltage Limits.

Table 1: Allowable Voltage Limits

Nominal Voltage (kV)	Extreme Minimum Voltage (Cat B & C) (p.u.)	Normal Minimum Voltage (Cat A) (p.u.)	Normal Maximum Voltage (Cat A) (p.u.)	Extreme Maximum Voltage (Cat B & C) (p.u.)
500	1.00	1.02	1.08	1.10
240	0.92	1.00	1.10	1.10
144	0.90	0.95	1.05	1.08
144 kV on 138 kV Base	0.94	0.99	1.09	1.12
138	0.90	0.98	1.05	1.09

3.2 Study Area and Contingencies

The Study Area includes 15 AIES planning areas in southern Alberta and extends from BC to the west, Saskatchewan to the east, Montana to the south and the Calgary area to the north.[11] Table 2 lists the AESO planning areas that are included in the Study Area.

Table 2: Study Area

Area#	Area Name	Monitored Elements	Contingencies
4	Medicine Hat	138 kV and above - lines on which the flow is sensitive to the Stage III of SATR. The methodology to select the monitored lines is described in Section 3.5.	240 kV and above
6	Calgary		
36	Alliance/Battle River		
42	Hanna		
43	Sheerness		
44	Seebe		
45	Strathmore		
46	High River		
47	Brooks		
48	Empress		
49	Stavely		

[11] The Study Area incorporates the entire AESO South Region and a portion of the Central Region

Area#	Area Name	Monitored Elements	Contingencies
52	Vauxhall		
53	Fort Macleod		
54	Lethbridge		
55	Glenwood		
57	Airdrie		

All Category B and selected Category C3 and C5 contingencies at 240 kV or higher were simulated in the Study Area along with ties to the Study Area. The list of critical contingencies is provided in Attachment A. System elements at 138 kV or higher were monitored in all areas. Only thermal overloads on transmission elements at 240 kV or greater are included in this report; the AESO will address the remaining system constraints (voltage violations) in its next long-term plan update.

3.3 Study Assumptions

Section 3.3 summarizes the key Study assumptions.

Study years:

Long-term study years 2022 and 2032 were selected to assess SATR Stage III over the next 20 year period.

Load Assumptions

The load in the Study Area peaks in the summer season, therefore two boundary conditions - summer peak and summer light load conditions - for the 2022 and 2032 study years were considered to assess system performance. The summer peak load condition was selected for the high import system condition and summer light load was selected for high export scenarios. The Study was based on the 2012 LTO; the 2022 and 2032 load forecasts for the AESO's South planning region and entire Alberta are presented in Table 3.

Table 3: Load Assumptions (MW)

Load scenario	Region	2022	2032
Summer Peak	South	3,786	4,463
	Central	1,784	2,018
	AIL	13,155	15,218
Summer Light	South	2,109	2,469
	Central	1,333	1,491
	AIL	9,811	11,254

Note: Central Region load does not include the AESO Planning Area 28 (Cold Lake)

Generation Assumptions

Wind generation is the major source of expected generation additions in the Study Area. As of October 2013, the AESO has received numerous wind generation system access applications with total applied-for capacity of approximately 2,700 MW in the Study Area. These applications are advancing through the

AESO's Connection Process at various stages.[12] To assess Stage III, the AESO considered both the wind capacity forecast as well as project specific information to dispatch wind generation in the Study Area. Forecast load and generation assumptions used in the Study are further described in the *South and Central Region Load and Generation Forecasts* attached to the AESO's Stage III amendment application to the Commission. In addition to the 2012 LTO wind forecast, the Environmental Wind Scenario, with an expected wind capacity of 4,569 MW by 2032, was also investigated to determine whether Stage III continues to be the appropriate solution under that greater level of forecast wind generation.

The AESO adopted the following approach to dispatch wind generation in the Study:

- Existing wind generation was fully dispatched;
- Wind generation projects under construction were dispatched next;
- Remaining future wind capacity by 2022 was allocated to each wind zone based on those wind projects past Gate 2 in the AESO Connection Process; and
- Incremental wind development from 2022 to 2032 was allocated to each wind zone based on the project list posted on Canadian Wind Energy Association's latest active project list.[13]

Forecasting wind development presents a geographical uncertainty as actual locations are developer-driven. To address this uncertainty, the AESO conducted sensitivity studies considering alternate wind distribution that increased stress on the east-west transmission path in southern Alberta relative to the forecast scenarios.

Transmission System Assumptions

The base system model used for the Study includes the bulk system additions listed in Table 4 for the years indicated. In addition to the transmission reinforcements listed below, reactive power devices recommended in the AESO *South Region Reactive Power Requirement Study* at Windy Flats138S, Whitla 251S, Chapel Rock 491S, Journault 260S and Cypress 562S substations were also modeled in the base cases as per the planned in-service dates. [14]

Table 4: Bulk System Projects

System Addition No	Project Number	Name	In-Service Date (ISD)
1	CTI	Heartland project	2013
2	West HVDC (CTI)	Genesee – Langdon HVDC	2015
3	East HVDC (CTI)	Heartland – West Brooks HVDC	2014
4	#787	SATR Stages I and II	2017
5	#736	Foothills Area Transmission Development (FATD)	2014
6	#813	Red Deer Region Transmission	2015

[12] http://www.aeso.ca/21648.html

[13] http://www.canwea.ca/farms/wind-farms_e.php

[14] Reactive power devices at Whitla 251S substation were approved in *Decision 2011-102*, at Windy Flats 138S substation in *Decision 2013-369*, and applied for at Chapel Rock 491S substation by Application No. 1609122, Proceeding 2349. The AESO will file applications with the Commission for amended reactive power devices at Journault 260S and Cypress 562S substations at a later date.

System Addition No	Project Number	Name	In-Service Date (ISD)
		Development	
7	#786	Edmonton Region 240 kV Line Upgrades	2015
8	#811	Central East Region Transmission Development	2017
9	#812	Hanna Region Transmission Development	2015
10	#850	South & West of Edmonton Area Development	2015
11	#719	East Calgary 240 kV and 138 kV transmission system Upgrades and the Shepard Energy Centre Connection	2013
12	# 1266	LTP-KEG Sundance 500 kV	2020
13	# 817	North Central Region Transmission Development	2014
14	# 671	Yellowhead Area Transmission Development	2012
15	# 1270	LTP-Otauwau-Slave Lake	2015
16		Reactors at Hotchkiss	2015
17		SVC at Fort Nelson	2015
18	# 1262	Grande Prairie – Little Smoky – Bicker dike Transmission Development	2015/2016
19	# 838	Fort McMurray Area Bulk Transmission System Reinforcement	Phase 1: 2016
		Genesee-Livock –Thick wood 500 kV	2018-19
20	#1101	Christina Lake Area Development	2013 – 2015 various stages
21	#1186	Fort McMurray 240 kV Transmission Development	2013
22		9L15 (Wesley Creek – Brintnell 240 kV) rerouting from Brintnell to Livock	2014
23		Northeast cap banks at Dover, Whitefish and Leismer	2012
24	# 673	Ft McMurray Area 144 kV reinforcement	2012
25	# 1267	Algar Area System Reinforcement	2012
26		942L in and out at Joseph burg station	2013
27		9L930 in and out at Heart Lake station	2014
28	# 834	Livock 240/144 kV reinforcement Project	2012

Additional transmission system assumptions include:

- To facilitate 1,200 MW of import from BC to Alberta, additional reactive power support elements were considered at the Cranbrook 500 kV bus in BC.
- Scenario 6 assumed 600 MW of import from Montana on the MATL line. To prevent overload under N-0 conditions for this high import case, a re-configuration for the MATL connection at Picture Butte was assumed. Should MATL capability be increased to 600 MW in the future, the actual configuration of the interconnection may differ from that assumed in the Study.
- The Foothills 237S to Sarcee FATD West reinforcement was assumed to be in service by 2022.

3.4 Study Scenarios

The AESO used the six study scenarios listed in Table 5 to evaluate the performance of the system with and without SATR Stage III in service. A detailed description of each scenario is provided in Section 4.

Table 5: Study Scenarios

Case	Year	Load	Generation Dispatch		WECC Path Flows (MW)			Comments
			Wind	Hydro	AB-BC (MW)	AB-SK (MW)	MATL (MW)	
C1_22	2022	SP	100% (2544 MW)	Seasonal Average	780 import	150 import	0	Wind development locations as per forecast
C2_22		SL	100% (2544 MW)		800 export	150 export	0	
C3_22		SP	100% (2544 MW)		780 import	150 import	0	Alternate wind locations to account for geographical uncertainty
C4_22		SL	100% (2544 MW)		800 export	150 export	0	
C5_22		SP	100% (3278 MW)		800 export	150 export	0	Environmental scenario with alternate geographical wind development
C6_22		SP	100% (2544 MW)		1200 import	150 import	300 import	Alternate wind locations to account for geographical uncertainty
C1_32	2032	SP	100% (3578 MW)		1200 import	150 import	0	Wind development locations as per forecast
C2_32		SL	100% (3578 MW)		1000 export	150 export	0	
C3_32		SP	100% (3578 MW)		1200 import	150 import	0	Alternate wind locations to account for geographical uncertainty
C4_32		SL	100% (3578 MW)		1000 export	150 export	0	
C5_32		SP	100% (4569 MW)		1000 export	150 export	0	Environmental scenario with alternate geographical wind development
C6_32		SP	100% (3578 MW)		1200 import	150 import	~600 import	Alternate wind locations to account for geographical uncertainty

For each of the base 2012 LTO Wind Dispatch and Environmental Wind Dispatch scenarios, the AESO considered an alternate wind development distribution to take into account locational uncertainty. In each of these wind assumptions, the total forecast wind capacity was held constant with greater wind development assumed in southeastern Alberta (Medicine Hat, Empress and West Brooks areas) compared to the Fort MacLeod area. For example, in the Alternate Wind Dispatch described in Table 6, the amount of wind capacity was increased from 227 MW to 796 MW in the Medicine Hat area with decreased wind developments in the Fort Macleod area from 1130 MW to 498 MW. Similarly, the amount of wind capacity for the Environmental scenario was increased from 345 MW to 734MW in the Medicine Hat area with decreased wind developments in the Fort Macleod area from 1349MW to 734 MW. The alternate wind distributions are shown in Table 6 (2022) and Table 7 (2032) for each of the 2012 LTO and Environmental wind scenarios.

Table 6: 2022 Wind Generation Dispatch and Alternate (MW)

Area	2012 LTO Wind Dispatch Scenario	Alternate Wind Dispatch	Environmental Wind Scenario	Alternate Environmental Wind Dispatch
AREA 4 - MEDICINE HAT	227	796	345	734
AREA 13 - LLOYDMIN	82	20	150	150
AREA 32 - WAINWRIGHT	51	50	94	94
AREA 37 - PROVOST	39	38	72	72
AREA 42 - HANNA	288	283	312	312
AREA 43 - SHEERNESS	89	88	81	81
AREA 48 - EMPRESS	38	75	57	110
AREA 49 - STAVELY	115	299	173	275
AREA 52 - VAUXHALL	82	0	74	74
AREA 53 - FORT MACLEOD	1130	498	1349	734
AREA 54 - LETHBRIDGE	30	0	27	46
AREA 55 - GLENWOOD	373	397	546	596
Total in 2022	2544	2544	3278	3278

Table 7: 2032 Wind Generation Dispatch and Alternate (MW)

Area	2012 LTO Wind Dispatch Scenario	Alternate Wind Dispatch	Environmental Wind Dispatch Scenario	Alternate Environmental Wind dispatch
AREA 4 - MEDICINE HAT	375	801	900	1000
AREA 13 - LLOYDMIN	164	164	164	164
AREA 32 - WAINWRIGHT	103	102	103	103
AREA 37 - PROVOST	79	79	79	79
AREA 42 - HANNA	340	341	340	340
AREA 43 - SHEERNESS	88	88	88	88
AREA 48 - EMPRESS	63	120	120	120
AREA 49 - STAVELY	189	300	300	350
AREA 52 - VAUXHALL	81	81	120	120
AREA 53 - FORT MACLEOD	1471	801	1600	1100
AREA 54 - LETHBRIDGE	30	50	50	100
AREA 55 - GLENWOOD	595	651	700	1000
Total in 2032	3578	3578	4563	4563

3.5 Study Methodology

The AESO evaluated system performance under the six study scenarios described in section 3.4 under steady state conditions for the two system Configurations. Siemen's PTI PSS/E version 33.4 was used to simulate system performance under Category A, Category B and selected Category C5 and C3 contingencies. C3 contingency analysis would typically be assessed for shoulder load periods when the facilities would be taken out of service for maintenance. In the Study, the AESO analyzed summer peak and summer light load conditions as the resulting overloads are greater than those that would occur under shoulder period conditions. This approach represents a more severely stressed condition than the shoulder period load and potentially reveal additional system issues.

HVDC Dispatch

The WATL and EATL HVDC lines were dispatched to minimize the total real power losses in the system for both Configurations. These calculated dispatches are provided in Section 4 and correspond to system normal conditions. As shown in Section 4, Tables 8,10,12,14 and 16, flows on both EATL and WATL were dispatched from south to north in the majority of scenarios. These lines were not dispatched during summer light conditions combined with high wind and export conditions since there would be no need to transfer power to loads in the northern part of the system. The primary reason for dispatching EATL in most conditions is that it is located closer to the wind generation in southeastern Alberta and can collect and transfer wind energy directly to load centres. WATL is situated further from the wind generation locations and thus its dispatch is less influenced by southern wind generation. EATL transfers more energy without Stage III in service because Stage III provides an additional path to transfer wind energy to the Calgary area.

The HVDC lines were not re-dispatched in post contingency conditions to avoid the introduction of dispatch bias in the analysis.

Monitoring and reporting of thermal violations

Due to the large Study Area, there is potential for several facilities to violate AESO reliability criteria; therefore, the AESO limited the number of representative criteria violations without sacrificing the quality of the Study conclusions. This was accomplished by:

- Comparing power flow on the 138 kV and higher voltage lines in the Study Area with and without Stage III in service.
- Monitoring 240 kV and 500 kV lines where flows changed more than 10 MW and more than 5 MW on the 138 kV lines with and without Stage III for all contingencies in the Study Area.
- Although multiple contingencies may have caused overloads on a given line in the Study, only the most severe overload and corresponding contingency is included in this report.
- In the case of double circuit lines with identical thermal ratings, only one instance of overloads that occurred on the loss of the companion circuit on the tower is reported to avoid duplication of the same result for the loss of the other line.
- Overloads that are below 105% were excluded since these are not highly relevant to the study results.[15]

Furthermore, the following contingencies, which are common to both Configurations evaluated and which are being addressed by the AESO as noted below, are excluded from this report.

- The outages of Chapel Rock 491S to Cranbrook (AB-BC intertie), Chapel Rock 491S to Langdon 102S line, and the Langdon 102S transformer are being addressed in the AESO's intertie restoration initiative;
- The AESO has developed EATL RASs that re-adjust HVDC flow for mitigating criteria violations should outages occur on 912L and 9L20.

[15] The entire set of results is available from the AESO and will be provided upon request.

4. SATR Stage III Assessment

The following sections describe the results of the Study under Category A, Category B, and select Category C5 and C3 contingencies:

4.1 Contingency Analysis

Contingency analysis was performed under six scenarios to determine whether there would be criteria violations in the Study Area under system normal and contingency conditions for the following two system Configurations:

- Without SATR Stage III in service (also referred to as “No SS3” in the study cases)
- With SATR Stage III in service (also referred to as “w/ SS3” in the study cases)

All other system conditions including system topology, load and generation assumptions and import/export conditions are identical between the two Configurations.

The contingency analysis was performed using the base cases listed in Table 5 and further described below.

4.1.1 Scenario 1

Scenario 1 is comprised of the four cases described in Table 8 which represent summer peak load conditions with high import and assuming wind development distribution consistent with the 2012 LTO.

Table 8: Scenario 1 Study Cases

Case	Year	Load	Generation Dispatch		WECC Path Flows (MW)			HVDC Dispatch (MW)		Comments
			Wind	Hydro	AB-BC (MW)	AB-SK (MW)	MATL (MW)	WATL	EATL	
C1_22 No SS3	2022	SP	100% (2544 MW)	Seasonal Average	780 import	150 import	0	0	-300	Wind development locations as per forecast
C1_22 w/SS3		SP	100% (2544 MW)		780 import	150 import	0	0	-280	
C1_32 No SS3	2032	SP	100% (3578 MW)		1200 import	150 import	0	-320	-290	Wind development locations as per forecast
C1_32 w/SS3		SP	100% (3578 MW)		1200 import	150 import	0	-340	-260	

Negative sign indicates the flows on WATL and EATL are from south to north

Thermal Overloads

Table 9 presents a comparison of thermal overloads of Scenario 1 for the two Configurations under various contingencies.

Table 9: Stage III Assessment – Scenario 1, Category A, B, C3, C5

Outage 1	Outage 2	Overloaded lines	C1_22 No SS3	C1_22 w/ SS3	C1_32 No SS3	C1_32 w/ SS3
Category A						
None	None	None				
Category B						
956L 240 kV line outage. (Peigan 59S to Goose Lake 103S)	None	955L 240 kV line (Peigan 59S to Goose Lake 103S)			120% 745MVA	119% 742MVA
1049L 240 kV line (Peigan 59S to Windy Flats 138S)	None	1048L 240 kV line (Peigan 59S to Windy Flats 138S)	104% 643MVA	106% 655MVA	150% 932MVA	149% 928MVA

Outage 1	Outage 2	Overloaded lines	C1_22 No SS3	C1_22 w/ SS3	C1_32 No SS3	C1_32 w/ SS3
1036L 240 kV line outage. (Travers 554S to Milo 356S)	None	172L 138 kV Line (Taber 83S to Chin Chute 315S)			110% 131MVA	115% 137MVA
Category C5						
1048L 240 kV line outage. (Peigan 59S to Windy Flats 138S)	1049L 240 kV line outage. (Peigan 59S to Windy Flats 138S)	500/240 kV Transformer (Langdon 500 kV to 102ST1)	106% 1269MVA	105% 1263MVA	159% 1905MVA	162% 1939MVA
1037L 240 kV line outage. (Foothills 237S to Windy Flats 138S)	1038L 240 kV line outage. (Foothills 237S to Windy Flats 138S)	172L 138 kV Line (Taber 83S to Chin chute 315S)		110% 131MVA	136% 156MVA	151% 173MVA
Category C3						
1072L 240 kV line outage. (CRR 205S to HWY 785)	994L 240 kV line outage. (Goose Lake 103S to Fidler 312S)	500/240 kV Transformer (Langdon 102S)			149% 1783MVA	148% 1779MVA
956L 240 kV line outage. (Peigan 59S to Goose Lake 103S)	1121L 240 kV line outage. (Coyote 182S to Journault 260S)	955L 240 kV line (Peigan 59S to Goose Lake 103S)	106% 650MVA	107% 657MVA	166.0% 992MVA	162% 977MVA
1049L 240 kV line outage. (Peigan 59S to Windy Flats 138S)	1121L 240 kV line outage. (Coyote 182S to Journault 260S)	1048L 240 kV line (Peigan 59S to Windy Flats 138S)	133% 820MVA	135% 830MVA	200 % 1210MVA	197% 1196MVA
1005L 240 kV line outage. (Picture Butte 120S to Milo 356S)	1036L 240 kV line outage. (Travers 554S to Milo 356S)	172L 138 kV Line (Taber 83S to Chin Chute 315S)	100% 120MVA	106% 127MVA	142% 168MVA	143% 169MVA

All blank cells in the results signify the overloads are lower than 100%.

Summary of Observations

Category A Event:

No thermal overloads were observed for both Configurations in either of the 2022 and 2032 study years.

Category B Events:

Although overloads were observed in each of the 2022 and 2032 study years for both Configurations, the overloads are almost identical under all but one contingency in which Stage III causes a higher overload by as much as 5% compared to the system without Stage III. This does not materially impact overall Study results.

Category C3 and C5 Events:

A few C5 events resulted thermal overloads for both Configurations; the system without Stage III proves to have lower overloads by as much as 15% compared with Stage III. In the case of C3 events, the differences in overloads are negligible which implies the system performance is virtually the same whether Stage III is in service or not. These observations indicate that the development of SATR Stage III does not improve thermal performance of the system compared to case without Stage III.

Moreover, this system thermal performance is not directly attributed to either of the two Configurations. These overloads are related to existing system deficiencies which the AESO will address in its next long-term plan update.

4.1.2 Scenario 2

Scenario 2 is comprised of the four cases described in Table 10 which represent summer light load conditions with high export and assuming wind development distribution consistent with the 2012 LTO.

Table 10: Scenario 2 Study Cases

Case	Year	Load	Generation Dispatch		WECC Path Flows (MW)			HVDC Dispatch (MW)		Comments
			Wind	Hydro	AB-BC	AB-SK	MATL	WATL	EATL	

Case	Year	Load	Generation Dispatch		WECC Path Flows (MW)			HVDC Dispatch (MW)		Comments
					(MW)	(MW)	(MW)			
C2_22 No SS3	2022	SL	100% (2544 MW)	Seasonal Average	800 export	150 export	0	0	-260	Wind development locations as per forecast
C2_22 w/SS3		SL	100% (2544 MW)		800 export	150 export	0	0	0	
C2_32 No SS3	2032	SL	100% (3578 MW)		1000 export	150 export	0	0	0	Wind development locations as per forecast
C2_32 w/SS3		SL	100% (3578 MW)		1000 export	150 export	0	0	0	

Thermal Overloads

Table 11 presents a comparison of thermal overloads of Scenario 2 for the two Configurations under various contingencies.

Table 11: Stage III Assessment – Scenario 2, Category A, B, C3, C5

Outage 1	Outage 2	Overloaded lines	C2_22 No SS3	C2_22 w/ SS3	C2_32 No SS3	C2_32 w/ SS3
Category A						
None	None	None				
Category B						
944L 240 kV line outage (Ware Junction 132S to Jenner 275S)	None	658L 138 kV line (Cypress 562S to Chappice Lake Tap			107% 94MVA	109% 97MVA
Category C5						
1004L 240 kV line outage (CRR 205S to Chapel Rock 491S)	992L 240 kV line outage. (CRR 205S to Chapel Rock 491S)	172L 138 kV Line (Taber 83S to Chin chute 315S)				116.0% 139MVA
Category C3						
1005L 240 kV line outage (Picture Butte 120S to Milo 356S)	1036L 240 kV line outage. (Travers 554S to Milo 356S)	172L 138 kV Line (Taber 83S to Chin Chute 315S			110% 133MVA	116% 134MVA
944L 240 kV line outage (Ware Junction 132S to Jenner 275S 275S)	1002L 240 kV line outage. (Jenner 275S to Dome Emp. 163S)	658L 138 kV line (Cypress 562S to Chappice Lake Tap)	105% 84MVA	109% 87MVA	132% 107MVA	131% 110MVA

All blank cells in the results signify the overloads are lower than 100%.

Summary of Observations

Category A Event:

No thermal overloads were observed in the 2022 and 2032 study years in either Configuration.

Category B, C3 and C5 Events:

Fewer overloads were observed in Scenario 2 than in Scenario 1. In most contingencies, slightly higher overloads were observed for Stage III compared to the system without Stage III. With Stage III in service, a 138 kV line is overloaded which does not occur without Stage III. Development of SATR Stage III proves to be of little value to the system since it does not improve the system performance in this Scenario 2 export scenario.

4.1.3 Scenario 3

Scenario 3 is comprised of the four cases described in Table 12 which represent summer peak load conditions and high import and assuming alternate wind development distribution. Scenario 3 differs from Scenario 1 only in assumed wind distribution. Due to the alternate wind distribution, the WATL and EATL dispatches correspondingly changed from that of Scenario 1. For example, in Scenario 3, EATL transfers more wind energy from the heavily concentrated Medicine Hat and Empress areas to the north while WATL transfers are reduced due to less wind development assumed in the Fort Macleod area.

Table 12: Scenario 3 Study Cases

Case	Year	Load	Generation Dispatch		WECC Path Flows (MW)			HVDC Dispatch (MW)		Comments
			Wind	Hydro	AB-BC (MW)	AB-SK (MW)	MATL (MW)	WATL	EATL	
C3_22 No SS3	2022	SP	100% (2544 MW)	Seasonal Average	780 import	150 import	0	0	-430	Alternate wind development distribution
C3_22 w/SS3	2022	SP	100% (2544 MW)	Seasonal Average	780 import	150 import	0	0	-360	Alternate wind development distribution
C3_32 No SS3	2032	SP	100% (3578 MW)	Seasonal Average	1200 import	150 import	0	-260	-360	Alternate wind development distribution
C3_32 w/SS3	2032	SP	100% (3578 MW)	Seasonal Average	1200 import	150 import	0	-280	-340	Alternate wind development distribution

Thermal Overloads

Table 13 presents a comparison of thermal overloads of Scenario 3 for the two Configurations under various contingencies.

Table 13: Stage III Assessment – Scenario 3, Category A, B, C3, C5

Outage 1	Outage 2	Overloaded lines	C3_22 No SS3	C3_22 w/ SS3	C3_32 No SS3	C3_32 w/ SS3
Category A						
None	None	None				
Category B						
1049L 240 kV line outage. (Peigan 59S to Windy Flats 138S)	None	1048L 240 kV line (Peigan 59S to Windy Flats 138S)			119% 737MVA	122% 755MVA
1036L 240 kV line outage (Travers 554S to Milo 356S)	None	172L 138 kV Line (Taber 83S to Chin Chute 315S)		105% 125MVA		112% 134MVA
Category C5						
1048L 240 kV line outage. (Peigan 59S to Windy Flats 138S)	1049L 240 kV line outage. (Peigan 59S to Windy Flats 138S)	500/240 kV Transformer (Langdon 500 kV to 102ST1)			136% 1626MVA	135% 1620MVA
1034L 240 kV line outage (Bowmanton 244S to Cassils 324S)	1035L 240 kV line (Bowmanton 244S to Newell 2075S	991L 240 kV line (Picture Butte 120S to Journault 260S)			110% 880MVA	111% 875MVA
1034L 240 kV line outage (Bowmanton 244S to Cassils 324S)	1035L 240 kV line (Bowmanton 244S to Newell 2075S)	172L 138 kV Line (Taber 83S to Chin Chute 315S)	108% 128MVA	116% 138MVA	127% 148MVA	142% 163MVA
Category C3						
1072L 240 kV line outage. (CRR 205S to HWY 785)	994L 240 kV line outage. (Goose Lake 103S to Fidler 312S)	500/240 kV Transformer (Langdon 102S)			119% 1432MVA	120% 1436MVA
956L 240 kV line outage. (Peigan 59S to Goose Lake 103S)	1121L 240 kV line outage. (Coyote 182S to Journault 260S)	955L 240 kV line (Peigan 59S to Goose Lake 103S)			133% 803MVA	134% 810MVA
1049L 240 kV line outage. (Peigan 59S to Windy Flats 138S)	1121L 240 kV line outage. (Coyote 182S to Journault 260S)	1048L 240 kV line (Peigan 59S to Windy Flats 138S)		102% 637MVA	162% 985MVA	164% 994MVA
1005L 240 kV line outage. (Picture Butte 120S to Milo 356S)	1036L 240 kV line outage. (Travers 554S to Milo 356S)	172L 138 kV Line (Taber 83S to Chin Chute 315S)	110% 132MVA	123% 146MVA	130% 155MVA	140% 165MVA

All blank cells in the results signify the overloads are lower than 100%.

Summary of Observations

Since Scenarios 3 and 1 are identical to each other except for geographical distribution of wind, the respective system performances are compared below.

Category A Events:

As with Scenario 1, no thermal overloads were observed for Scenario 3 in 2022 and 2032 study years for either of the two Configurations. Therefore, the Scenario 3 alternate wind distribution does not create any constraints under system normal conditions; this is mainly due to the corresponding change in HVDC dispatch.

Category B Events:

Only two lines were overloaded in Scenario 3 compared to three lines overloaded in Scenario 1.

Under Scenario 3, Stage III causes an overload on a 138 kV line for one Category B event while there is no corresponding overload without Stage III. This is chiefly attributable to alternate wind distribution; SATR Stage III thus causes an additional overload compared to the case without it.

Category C5 Events:

Scenario 3 shows an increase in some overloads but no difference in the number of contingencies compared with Scenario 1.

Under Scenario 3, Stage III degrades the system performance compared to the system without Stage III by exacerbating existing overloads. Stage III is sensitive to geographical wind development as the heavy concentration of wind generation in the Medicine Hat area forces more power on the Stage III path, thereby increasing overloads.

Category C3 Events:

The thermal system performance is similar to those of C5 events; SATR Stage III would be of no value to the system as it does not alleviate or reduce overloads. The AESO will develop operational measures to mitigate Category C3 and C5 events, as required.

4.1.4 Scenario 4

Scenario 4 is comprised of the four cases described in Table 14 which represent summer light load conditions and high export and assuming alternate wind development distribution. Scenario 4 differs from Scenario 2 only in assumed wind distribution. The WATL and EATL lines were not all dispatched in 2032 due to the assumed 1,000 MW export to BC. However, EATL was dispatched from south to north in 2022 with the assumed 800 MW export.

Table 14: Scenario 4 Study Cases

Case	Year	Load	Generation Dispatch		WECC Path Flows (MW)			HVDC Dispatch (MW)		Comments
			Wind	Hydro	AB-BC (MW)	AB-SK (MW)	MATL (MW)	WATL	EATL	
C4_22	2022	SL	100% (2544 MW)	Seasonal Average	800 export	150 export	0	0	-360	Alternate wind development distribution
C4_22		SL	100% (2544 MW)		800 export	150 export	0	0	-300	
C4_32	2032	SL	100% (3578 MW)		1000 export	150 export	0	0	0	Alternate wind development distribution
C4_32		SL	100% (3578 MW)		1000 export	150 export	0	0	0	

Thermal Overloads

Table 15 presents a comparison of thermal overloads of Scenario 4 for the two Configurations under various contingencies.

Table 15: Stage III Assessment – Scenario 4, Category A, B, C3, C5

Outage 1	Outage 2	Overloaded lines	C4_22 No SS3	C4_22 w/ SS3	C4_32 No SS3	C4_32 w/ SS3
Category A						
None	None	658L 138 kV line (Cypress 562S to Chappice Lake Tap)			124% 114MVA	130% 122MVA
Category B						
944L 240 kV line outage (Ware Junction 132S to Jenner 275S)	None	658L 138 kV line (Cypress 562S to Chappice Lake Tap)	103% 85MVA	111% 92MVA	146% 128MVA	149% 136MVA
Category C5						
992L 240 kV line outage. (CRR205S to Chapel Rock 491S)	992L 240 kV line outage. (CRR205S to Chapel Rock 491S)	658L 138 kV line (Cypress 562S to Chappice Lake Tap)		104% 86MVA	132% 120MVA	138% 128MVA
Category C3						
944L 240 kV line outage. (Ware Junction 132S to Jenner 275S)	1002L 240 kV line outage. (Jenner 275S to Dome Emp. 163S)	658L 138 kV line (Cypress 562S to Chappice Lake Tap)	118% 96MVA	124% 101MVA	172% 141MVA	169% 147MVA

All blank cells in the results signify the overloads are lower than 100%.

Summary of Observations

Since Scenarios 4 and 2 are identical to each other except for geographical distribution of wind, the respective system performances are compared below.

Category A Event:

As with Scenario 2, no thermal overloads were observed for Scenario 4 in 2022 for either of the two Configurations. However, overloads on 138 kV lines were observed in the 2032 study year for both Configurations under Scenario 4. Stage III causes a slightly higher overload due to the variation in the power flow pattern.

Category B Events:

Under Scenario 4, the magnitude of overload has increased in 2022 and 2032 on the same line compared to Scenario 2 due to higher wind concentration in southeastern Alberta.

In Scenario 4, Stage III overloads are generally greater than without Stage III. Stage III, which parallels the existing 240 kV path via Milo, offers a new low impedance path from southeastern Alberta to the Langdon substation. Consequently, Stage III carries more wind energy directly to the Langdon substation and the 240 kV 944L from Ware Junction 132S to Jenner 275S, which collects wind from this area, becomes heavily loaded. Under such conditions, when this 944L line goes out of service, the underlying 138 kV 658L becomes over loaded.

The AESO will address the identified overloads under Category A and Category B events in its next long-term plan update.

Category C5 and C3 Events:

Compared to Scenario 2, the overloads in Scenario 4 are higher with Stage III in service compared to the system without Stage III for both C5 and C3 events. This is mainly due to the assumed alternate distribution of wind development. The system performance without Stage III is marginally superior for all studied contingencies in both scenarios.

The AESO will develop operational measures to mitigate Category C3 and C5 events, as required.

4.1.5 Scenario 5

Scenario 5 is comprised of the four cases described in Table 16 which represent summer peak load conditions and high export. Scenario 5 was formulated to investigate the impact of the Environmental wind scenario on the system coupled with maximum export of 800 MW and 1,000 MW in 2022 and 2032 years respectively. The forecasted wind in Scenario 5 is 4,569 MW compared to 3,578 MW (2012 LTO) by 2032. Furthermore, the majority of wind generation is assumed to be developed in the Medicine Hat and Pincher Creek areas to stress the east to west path. EATL collects over 500 MW of wind energy in in the Study Area and transfers north in both of the 2022 and 2032 study years. WATL is dispatched to transfer approximately 380 MW of wind in 2032 with SATR Stage III in service.

Table 16: Scenario 5 Study Cases

Case	Year	Load	Generation Dispatch		WECC Path Flows (MW)			HVDC Dispatch (MW)		Comments
			Wind	Hydro	AB-BC (MW)	AB-SK (MW)	MATL (MW)	WATL	EATL	
C5_22 No SS3	2022	SP	100% (3278 MW)	Seasonal Average	800 export	150 export	0	0	-580	Environmental scenario with alternate wind development distribution
C5_22 w/SS3	2022	SP	100% (3278 MW)	Seasonal Average	800 export	150 export	0	0	-500	Environmental scenario with alternate wind development distribution
C5_32 No SS3	2032	SP	100% (4569 MW)	Seasonal Average	1000 export	150 export	0	0	-580	Environmental scenario with alternate wind development distribution
C5_32 w/SS3	2032	SP	100% (4569 MW)	Seasonal Average	1000 export	150 export	0	-380	-420	Environmental scenario with alternate wind development distribution

Thermal Overloads

Table 17 presents a comparison of thermal overloads of Scenario 5 for the two Configurations under various contingencies.

Table 17: Stage III Assessment – Scenario 5, Category A, B, C3, C5

Outage 1	Outage 2	Overloaded lines	C5_22 No SS3	C5_22 w/ SS3	C5_32 No SS3	C5_32 w/ SS3
Category A						
None	None	658L 138 kV line (Cypress 562S to Chappice Lake Tap)	136% 115MVA	145% 122MVA	132% 126MVA	143% 136MVA
Category B						
1036L 240 kV line outage. (Travers 554S to Milo 356S)	None	172L 138 kV Line (Taber 83S to Chin Chute 315S)			102% 123MVA	108% 135MVA
944L 240 kV line outage. (Ware Junction 132S to Jenner 275S)	None	658L 138 kV line (Cypress 562S to Chappice Lake Tap)	149% 125MVA	157% 132MVA	145% 139MVA	154 % 146MVA
Category C5						
1004L 240 kV line outage. (CRR205S to Chapel Rock 491S)	992L 240 kV line outage. (CRR205S to Chapel Rock 491S)	658L 138 kV line (Cypress 562S to Chappice Lake Tap)	144% 121MVA	154% 130MVA	141% 131MVA	154% 145MVA
1004L 240 kV line outage. (CRR 205S to Chapel Rock 491S)	992L 240 kV line outage. (CRR 205S to Chapel Rock 491S)	172L 138 kV Line (Taber 83S to Chin Chute 315S)			106% 126MVA	125% 148MVA
935L 240 kV line outage. (Cassils 324S to Milo 356S)	923L 240 kV line outage. (Milo 356S to Newell 2075S)	172L 138 kV Line (Taber 83S to Chin Chute 315S)			113% 136MVA	104.0% 126MVA
Category C3						
1005L 240 kV line outage. (Picture Butte 120S to Milo 356S)	1035L 240 kV line (Bowmanton 244S to Newell 2075S.)	1036L 240 kV line (Travers 554S to Milo 356S)			112% 542MVA	112% 552MVA
1005L 240 kV line outage. (Picture Butte 120S to Milo 356S)	1036L 240 kV line outage. (Travers 554S to Milo 356S)	172L 138 kV Line (Taber 83S to Chin Chute 315S)			139% 165MVA	140% 167MVA
944L 240 kV line outage. (Ware Junction 132S to Jenner 275S 275S)	1002L 240 kV line outage. (Jenner 275S to Dome Emp. 163S)	658L 138 kV line (Cypress 562S to Chappice Lake Tap)	158% 131MVA	166% 137MVA	156% 145MVA	162% 153MVA

All blank cells in the results signify the overloads are lower than 100%.

Summary of Observations

Category A Events

Under Scenario 5, one 138 kV line in the Cypress area becomes overloaded under the high stressed system condition and high exports to BC and Saskatchewan.

Category B Events

Overloading on two 138 kV lines, one of which is common to Category A condition, was observed under the studied Category B contingencies.

Category C5 Events

The loss of the studied 240 kV lines in the Pincher Creek and Medicine Hat areas cause overloads on underlying 138 kV lines.

Category C3 Events

Under the studied C3 category contingencies, one 240 kV line and two 138 kV lines become overloaded in the Cypress area and Milo area.

In each of the contingencies studied in Scenario 5, SATR Stage III development resulted in higher overloads and thus degrades the system performance

4.1.6 Scenario 6

Scenario 6 is comprised of the four cases described in Table 18 which represent summer peak load conditions and high import. Scenario 6 was formulated to test the system performance with a combination of maximum imports from BC (1,200 MW), Saskatchewan (150 MW) and MATL (300 MW in 2022) and 600 MW in 2032) under alternate wind distribution. Scenario 6 is unique as it stresses the transmission system with maximum imports and high alternate wind generation in southern Alberta. Due to heavy imports and high wind generation, both WATL and EATL were dispatched to the highest levels in the Study and the flows are from south and north. Absent SATR Stage III, EATL carries more energy than the case when Stage III is in place. WATL dispatch is opposite and carries more energy when Stage III is in service because the latter flows additional energy to the Langdon substation.

Table 18: Scenario 6 Study Cases

Case	Year	Load	Generation Dispatch		WECC Path Flows (MW)			HVDC Dispatch (MW)		Comments
			Wind	Hydro	AB-BC (MW)	AB-SK (MW)	MATL (MW)	WATL	EATL	
C6_22 No SS3	2022	SP	100% (2544 MW)		1200 import	150 import	300 import	-260	-630	Alternate wind development distribution
C6_22 w/SS3		SP	100% (2544 MW)		1200 import	150 import	300 import	-290	-570	Alternate wind development distribution
C6_32 No SS3	2032	SP	100% (3578 MW)		1200 import	150 import	~600 import	-500	-580	Alternate wind development distribution
C6_32 w/SS3		SP	100% (3578 MW)		1200 import	150 import	~600 import	-550	-500	Alternate wind development distribution

Thermal Overloads

Table 19 presents a comparison of thermal overloads of Scenario 6 for the two Configurations under various contingencies.

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Table 19: Stage III Assessment – Scenario 6, Category A, B, C3, C5

Outage 1	Outage 2	Overloaded lines	C6_22 No SS3	C6_22 w/ SS3	C6_32	C6_32 w/ SS3
Category A						
None	None	172L 138 kV Line (Taber 83S to Chin Chute 315S)		107% 127MVA	108% 130MVA	124% 148MVA
Category B						
1049L 240 kV line outage. (Peigan 59S to Windy Flats 138S)	None	1048L 240 kV line (Peigan 59S to Windy Flats 138S)		101% 624MVA	111% 677MVA	114% 697MVA
1005L 240 kV line outage. (Picture Butte 120S to Milo 356S)	None	1036L 240 kV line (Travers 554S to Milo 356S)			125% 607MVA	129% 629MVA
1036L 240 kV line outage. (Travers 554S to Milo 356S)	None	1005L 240 kV line (Picture Butte 120S to Milo 356S)			109% 518MVA	114% 539MVA
1036L 240 kV line outage. (Travers 554S to Milo 356S)	None	172L 138 kV Line (Taber 83S to Chin chute 315S)	111% 131MVA	123% 145MVA	132% 156MVA	145% 172MVA
Category C5						
1048L 240 kV line outage. (Peigan 59S to Windy Flats 138S)	1049L 240 kV line outage. (Peigan 59S to Windy Flats 138S)	500/240 kV Transformer (Langdon 102S)	116% 1397MVA	115% 1381MVA	130% 1570MVA	139% 1672MVA
1037L 240 kV line outage. (Foothills 237S to Windy Flats 138S)	1038L 240 kV line outage. (Foothills 237S to Windy Flats 138S)	1005L 240 kV line (Picture Butte 120S to Milo 356S)			109% 495MVA	111% 509MVA
1037L 240 kV line outage. (SC1 266S to Windy Flats 138S)	1038L 240 kV line outage. (SC1 266S to Windy Flats 138S)	1036L 240 kV line (Travers 554S to Milo 356S)			142% 639MVA	143% 654MVA
1034L 240 kV line outage. (Bowmanton 244S to Cassils 324S)	1035L 240 kV line (Bowmanton 244S to Newell 2075S)	1005L 240 kV line outage. (Picture Butte 120S to Milo 356S)	115% 542MVA	115% 544MVA	108% 476MVA	106% 471MVA
1034L 240 kV line outage. (Bowmanton 244S to Cassils 324S)	1035L 240 kV line (Bowmanton 244S to Newell 2075S)	172L 138 kV Line (Taber 83S to Chin chute 315S)	130% 150MVA	130% 151MVA	163% 184MVA	159% 180MVA
Category C3						
1072L 240 kV line outage. (CRR 205S to HWY 785)	994L 240 kV line outage. (Goose lake 103S to Fidler 312S)	500/240 kV Transformer (Langdon 102S)	109% 1304MVA	108% 1302MVA	120% 1441MVA	120% 1444MVA
1049L 240 kV line outage. (Peigan 59S to Windy Flats 138S)	1121L 240 kV line outage. (Coyote 182S to Journault 260S)	1048L 240 kV line (Peigan 59S to Windy Flats 138S)	119% 731MVA	122% 755MVA	151% 904MVA	153% 922MVA
956L 240 kV line outage. (Peigan 59S to Goose Lake 103S)	1121L 240 kV line outage. (Coyote 182S to Journault 260S)	955L 240 kV line (Peigan 59S to Goose Lake 103S)			123% 737MVA	125% 751MVA
1005L 240 kV line outage.	1038L 240 kV line outage.	1036L 240 kV line (Travers 554S to Milo			139% 670MVA	145% 693MVA

Outage 1	Outage 2	Overloaded lines	C6_22 No SS3	C6_22 w/ SS3	C6_32	C6_32 w/ SS3
(Picture Butte 120S to Milo 356S)	(Foothills 237S to Windy Flats 138S)	356S)				
1038L 240 kV line outage. (Foothills 237S to Windy Flats 138S)	1036L 240 kV line outage. (Travers 554S to Milo 356S)	1005L 240 kV line (Picture Butte 120S to Milo 356S)			124% 584MVA	129% 604MVA
1005L 240 kV line outage. (Picture Butte 120S to Milo 356S)	1036L 240 kV line outage. (Travers 554S to Milo 356S)	411L 138 kV line (Taber 83S to Hull 257S)			110% 127MVA	113% 131MVA
1005L 240 kV line outage. (Picture Butte 120S to Milo 356S)	1036L 240 kV line outage. (Travers 554S to Milo 356S)	172L 138 kV Line (Taber 83S to Chin Chute 315S)	144% 167MVA	152% 177MVA	183% 212MVA	189% 218MVA
EATL HVDC Outage	9L80 240 kV line outage. (Battle River 757S to Cordell 755S)	174L 138 kV line (Bardo 197S to N. Holden 395S)			124% 106MVA	Voltage collapse

All blank cells in the results signify the overloads are lower than 100%.

Summary of Observations

Category A Event:

One 138 kV line is overloaded in each of the 2022 and 2032 study years; Stage III causes higher overloads compared to the system without Stage III.

Because of stressed conditions in this Scenario 6, a maximum number of lines were observed to be overloaded under Category B and Category C contingencies compared with other scenarios.

Category B Events:

The Category B events that caused overloads are: Peigan 59S to Windy Flats 138S lines and Lethbridge area to Milo 356S lines. Overloads observed on 1005L and 1036L in 2032 are due to high import from MATL. System performance is similar for the two Configurations in the 2022 study year.

Category C5 Events:

The loss of 911L replacement lines from Windy Flats 138S to Foothills 237S and Bowmanton 244S to Cassils 324S and Newell 2075S cause overloads on the underlying 138 kV lines and a few 240 kV lines in both Configurations.

Category C3 Events:

In Scenario 6, a relatively large number of C3 contingencies cause overloads in the Pincher Creek and Lethbridge areas which are geographically close to maximum wind developments in 2032. Although system performance for both Configurations is similar, overloads with Stage III in service increase compared to without Stage III as HVDC lines transfer power in an efficient manner.

The AESO will develop operational measures to mitigate Category C3 and C5 events, as required.

4.1.7 Summary

With the addition of EATL and WATL, SATR Stage III does not provide incremental system performance benefits and in several scenarios, degrades system performance slightly. The principal reason is that the HVDC lines, primarily EATL, provide an adequate transfer path for the high levels of forecast wind development in southern Alberta, making Stage III redundant. In essence, the addition of EATL to the transmission system provides the same functionality that was planned to be provided by Stage III.

4.1.8 Non-Converged Cases

As shown in Table 20, the Study also demonstrates that voltage collapse (VC) occurred for both Configurations under six C3 contingencies and one C5 contingency. The AESO will establish mitigation measures to alleviate this condition as required. Voltage collapse was not observed in other studied conditions.

Table 20: Non-Converged Cases

Non Converged Cases					
Outage 1	**Outage 2**	**Case**			
Category C5					
Scenario 5		C5_22 No SS3	C5_22 w/SS3	C5_32 No SS3	C5_32 w/SS3
1034L 240 kV line outage. (Bowmanton 244S to Cassils 324S)	1035L 240 kV line outage. (Bowmanton 244S to Newell 2075S)			VC	VC
Category C3					
Scenario 1		C1_22 No SS3	C1_22 w/SS3	C1_32 No SS3	C1_32 w/SS3
944L 240 kV line outage. (Ware Junction 132S to Jenner 275S 275S)	951L 240 kV line outage. (Ware Junction 132S to Jenner 275S 275S)	VC	VC	VC	VC
240/144 kV transformer outage. (Lanfine 959S transformer)	240/144 kV transformer outage. (Lanfine 959S transformer)			VC	VC
Scenario 2		C2_22 No SS3	C2_22 w/SS3	C2_32 No SS3	C2_32 w/SS3
944L 240 kV line outage. (Ware Junction 132S to Jenner 275S 275S)	951L 240 kV line outage. (Ware Junction 132S to Jenner 275S 275S)	VC	VC	VC	VC
Scenario 3		C3_22 No SS3	C3_22 w/SS3	C3_32 No SS3	C3_32 w/SS3
944L 240 kV line outage. (Ware Junction 132S to Jenner 275S 275S)	951L 240 kV line outage. (Ware Junction 132S to Jenner 275S 275S)	VC	VC	VC	VC
988L 240 kV line outage. (Goose Lake 103S to Nine Mile Coulee 143S)	991L 240 kV line outage. (Picture Butte 120S to Journault 260S)			VC	VC
240/144 kV transformer outage.(Lanfine 959S transformer)	240/144 kV transformer outage. (Lanfine 959S transformer)			VC	VC
Scenario 4		C4_22 No SS3	C4_22 w/SS3	C4_32 No SS3	C4_32 w/SS3
944L 240 kV line outage. (Ware Junction 132S to Jenner 275S 275S)	951L 240 kV line outage. (Ware Junction 132S to Jenner 275S 275S)	VC	VC	VC	VC
988L 240 kV line outage. (Goose Lake 103S to Nine Mile Coulee 143S)	991L 240 kV line outage. (Picture Butte 120S to Journault 260S)			VC	VC
Scenario 5		C5_22 No SS3	C5_22 w/SS3	C5_32 No SS3	C5_32 w/SS3

Non Converged Cases					
Outage 1	**Outage 2**	**Case**			
944L 240 kV line outage. (Ware Junction 132S to Jenner 275S 275S)	951L 240 kV line outage. (Ware Junction 132S to Jenner 275S 275S)	VC	VC	VC	VC
988L 240 kV line outage. (Goose Lake 103S to Nine Mile Coulee 143S)	991L 240 kV line outage. (Picture Butte 120S to Journault 260S)	VC	VC	VC	VC
1110L 240 kV line outage. (Coyote 182S to Nine Mile Coulee 143S)	991L 240 kV line outage. (Picture Butte 120S to Journault 260S)			VC	VC
991L 240 kV line outage. (Picture Butte 120S to Journault 260S)	1034L 240 kV line outage. (Bowmanton 244S to Cassils 324S)			VC	VC
Scenario 6		C6_22 No SS3	C6_22 w/SS3	C6_32 NoSS3	C6_32 w/SS3
944L 240 kV line outage. (Ware Junction 132S to Jenner 275S 275S)	951L 240 kV line outage. (Ware Junction 132S to Jenner 275S 275S)	VC	VC	VC	VC
988L 240 kV line outage. (Goose Lake 103S to Nine Mile Coulee 143S)	991L 240 kV line outage. (Picture Butte 120S to Journault 260S)			VC	VC
240/144 kV transformer outage. (Lanfine 959S transformer)	240/144 kV transformer outage. (Lanfine 959S transformer)			VC	VC

Empty cells indicate no voltage collapse

4.2 BUS VOLTAGES

A review of voltage performance of the system revealed that minor infractions of voltages (outside the acceptable range) were observed under Category C3 contingency conditions. These voltage criteria violations could be resolved pre-contingency by controlling capacitor bank switching and adjusting transformer. Such operating measures would be required for both the Configurations.

The observed voltage levels in the Study Area under Category C3 contingencies are presented in the power flow diagrams (see Attachment B).

4.3 VOLTAGE STABILITY ANALYSIS

The results of contingency analysis show that SATR Stage III does not improve the system performance in respect of thermal loadings and voltage performance. Even under the alternate wind distributions and environmental scenario with maximum import/export conditions (Cases C2, C3, and C5) which stress the transmission system over and beyond the typical generation dispatches, the transfer of energy did not reveal a propensity to any voltage stability issues without SATR Stage III. Therefore, voltage stability (PV) analysis was not performed in the Study.

4.4 DYNAMIC STABILITY ANALYSIS

The contingency analysis demonstrates that the system meets the Alberta Reliability Criteria without SATR Stage III. With the commissioning of WATL, EATL and other system reinforcements, it is very unlikely that the transmission system will exhibit dynamic stability issues in the Study Area without SATR Stage III. Therefore, no dynamic stability analysis was carried out in the Study.

5. Conclusions and Recommendation

As a result of the Study, the AESO concludes that SATR Stage III is no longer the appropriate solution to address the SATR need as the HVDC lines, primarily EATL, provide an adequate transfer path for the forecast wind capacity in southern Alberta. EATL provides the same functionality that would have been provided by SATR Stage III, and in many instances, provides superior system performance. A summary of the Study results supporting cancellation of SATR Stage III is provided below.

In the Study, the AESO compared transmission system performance with SATR Stage III in service and without Stage III in service for a number of load, generation and import /export levels over a for the 2022 and 2032 study period years. The HVDC lines were dispatched to minimize system losses in both system Configurations and therefore do not create any system biases.

Steady state power flow analysis was carried out for the 2022 and 2032 study years for a number of stressed conditions. The system performance was investigated under Category A, B, C3, and C5 contingencies for six scenarios. A review of the steady state study results and summary of discussion of contingency analysis described in section 3 indicates the following:

- The system experiences thermal overloads for each of the two Configurations under a wide range of wind dispatch, import/export levels, and system load conditions. The identified overloads are attributable to existing system deficiencies and will be addressed in the AESO's next long-term plan update.

- SATR Stage III did not alleviate thermal overloads in the system under most scenarios studied. In fact, Stage III degrades the system performance by increasing overloads compared to the system configuration without Stage III development.

- However, SATR Stage III very marginally reduces or eliminates overloads in one specific Category C5 contingency (loss of 240 kV Bowmanton to Cassils lines). The AESO has established a cost effective RAS for this contingency. Consequently, SATR Stage III is not required to address this contingency.

- The steady state system performance did not reveal any propensity for voltage stability issues and therefore the PV analysis was not carried out.

- The AESO will develop and implement operational measures to mitigate thermal overloads and or voltage violations for Category C3 and C5 contingencies, as required Stage III development is not a substitute for these relatively inexpensive operational mitigation measures.

- The cancellation of SATR Stage III will not impact forecast wind development in southern Alberta as the remaining SATR lines, coupled with EATL and WATL, will have adequate capacity to reliably transfer wind energy to load centres.

Recommendation

Cancellation of the SATR Stage III development is recommended as the Study demonstrates that the planned functionality of Stage III will be provided by EATL thereby resulting in improved system performance in the majority of scenarios evaluated. Cancellation of SATR Stage III will result in an avoided cost of approximately $280 million ($ 2008, ±30%).

Attachment A

List of Critical Contingencies

Table 1: N-0 Contingencies

N-0		
SLD Number	**Case**	**Overloaded Branch**
SLD_00	C1_22	None
SLD_00	C1_22_SS3	None
SLD_00	C1_32	None
SLD_00	C1_32_SS3	None
SLD_00	C2_22	None
SLD_00	C2_22_SS3	None
SLD_00	C2_32	None
SLD_00	C2_32_SS3	None
SLD_00	C3_22	None
SLD_00	C3_22_SS3	None
SLD_00	C3_32	None
SLD_00	C3_32_SS3	None
SLD_00	C4_22	None
SLD_00	C4_22_SS3	None
SLD_00	C4_32	658L 138 kV line (Cypress 562S to Chappice Lake Tap)
SLD_00	C4_32_SS3	658L 138 kV line (Cypress 562S to Chappice Lake Tap)
SLD_00	C5_22	658L 138 kV line (Cypress 562S to Chappice Lake Tap)
SLD_00	C5_22_SS3	658L 138 kV line (Cypress 562S to Chappice Lake Tap)
SLD_00	C5_32	658L 138 kV line (Cypress 562S to Chappice Lake Tap)
SLD_00	C5_32_SS3	658L 138 kV line (Cypress 562S to Chappice Lake Tap)
SLD_00	C6_22	172L 138 kV Line (Taber 83S to Chin Chute 315S)
SLD_00	C6_22_SS3	172L 138 kV Line (Taber 83S to Chin Chute 315S)
SLD_00	C6_32	172L 138 kV Line (Taber 83S to Chin Chute 315S)
SLD_00	C6_32_SS3	172L 138 kV Line (Taber 83S to Chin Chute 315S)

Table 2: N-1 Contingencies

N-1		
SLD Number	**Element Outage**	**Overloaded Branch**
SLD_01	1049L 240 kV line outage. (Peigan 59S to Windy Flats 138S)	1048L 240 kV line (Peigan 59S to Windy Flats 138S)
SLD_02	944L 240 kV line outage (Ware Junction 132S to Jenner 275S)	658L 138 kV line (Cypress 562S to Chappice Lake Tap)
SLD_03	1036L 240 kV line outage. (Travers 554S to Milo 356S)	172L 138 kV Line (Taber 83S to Chin Chute 315S)

Table 3: N-2 Contingencies

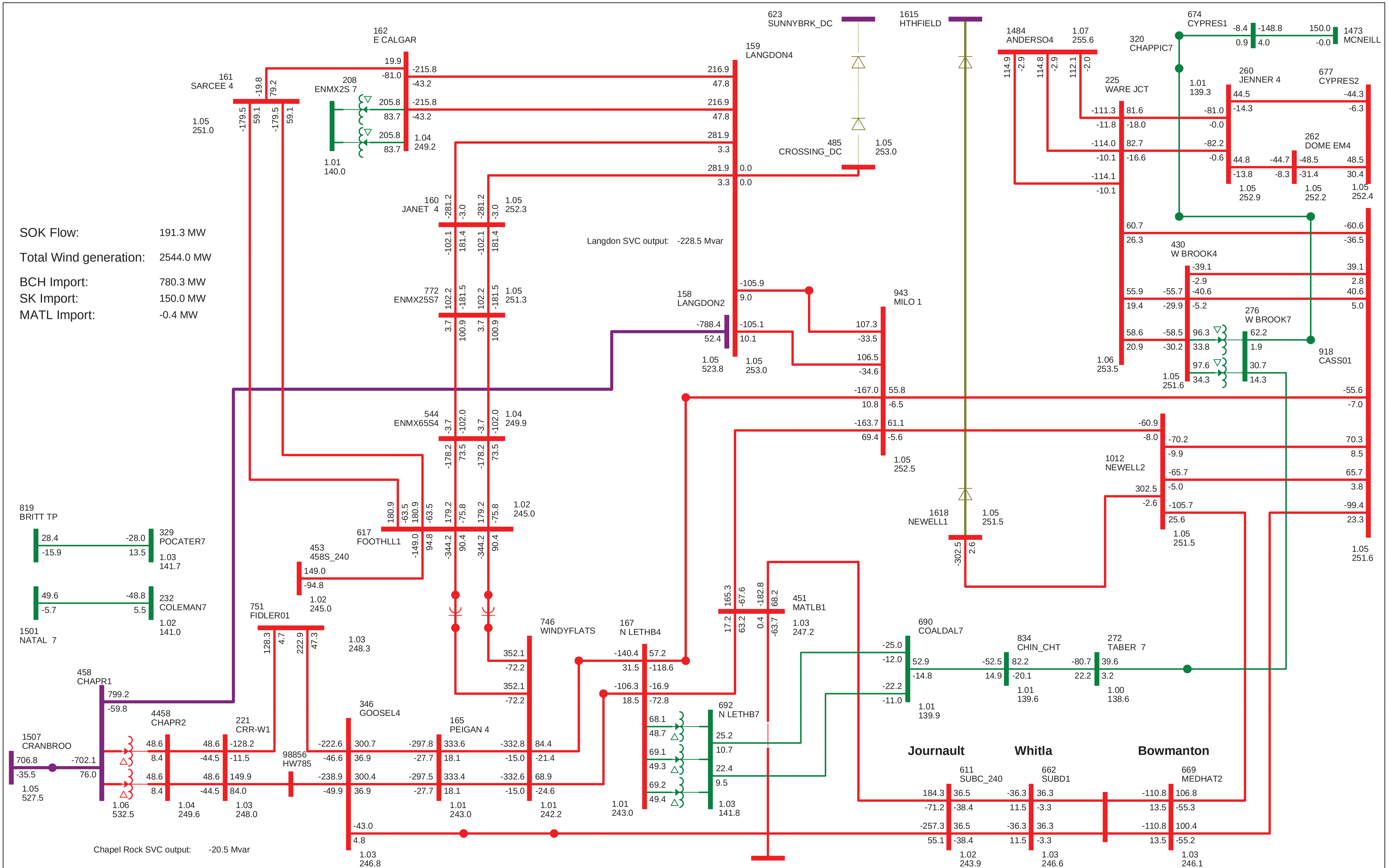
N-2			
SLD Number	**Element Outage 1**	**Element Outage 2**	**Overloaded Branch**
SLD_04	1048L 240 kV line outage. (Peigan 59S to Windy Flats 138S)	1049L 240 kV line outage. (Peigan 59S to Windy Flats 138S)	500/240 kV Transformer (Langdon 500 kV to 102ST1)
SLD_05	1034L 240 kV line outage (Bowmanton 244S to Cassils 324S)	1035L 240 kV line (Bowmanton 244S to Newell 2075S)	172L 138 kV Line (Taber 83S to Chin Chute 315S)
SLD_06	1004L 240 kV line outage (CRR 205S to Chapel Rock 491S)	992L 240 kV line outage. (CRR 205S to Chapel Rock 491S)	658L 138 kV line (Cypress 562S to Chappice Lake Tap)
SLD_07	1037L 240 kV line outage. (Foothills 237S to Windy Flats 138S)	1038L 240 kV line outage. (Foothills 237S to Windy Flats 138S)	172L 138 kV Line (Taber 83S to Chin chute 315S)
SLD_08	1049L 240 kV line outage. (Peigan 59S to Windy Flats 138S	1121L 240 kV line outage. (Coyote 182S to Journault 260S)	1048L 240 kV line outage. (Peigan 59S to Windy Flats 138S)

Table 4: N-1-1 Contingencies

N-1-1			
SLD Number	**Element Outage 1**	**Element Outage 2**	**Overloaded Branch**
SLD_09	944L 240 kV line outage (Ware Junction 132S to Jenner 275S	1002L 240 kV line outage. (Jenner 275S to Dome Emp. 163S)	658L 138 kV line (Cypress 562S to Chappice Lake Tap)
SLD_10	1005L 240 kV line outage. (Picture Butte 120S to Milo 356S)	1036L 240 kV line outage. (Travers 554S to Milo 356S)	172L 138 kV Line (Taber 83S to Chin Chute 315S)

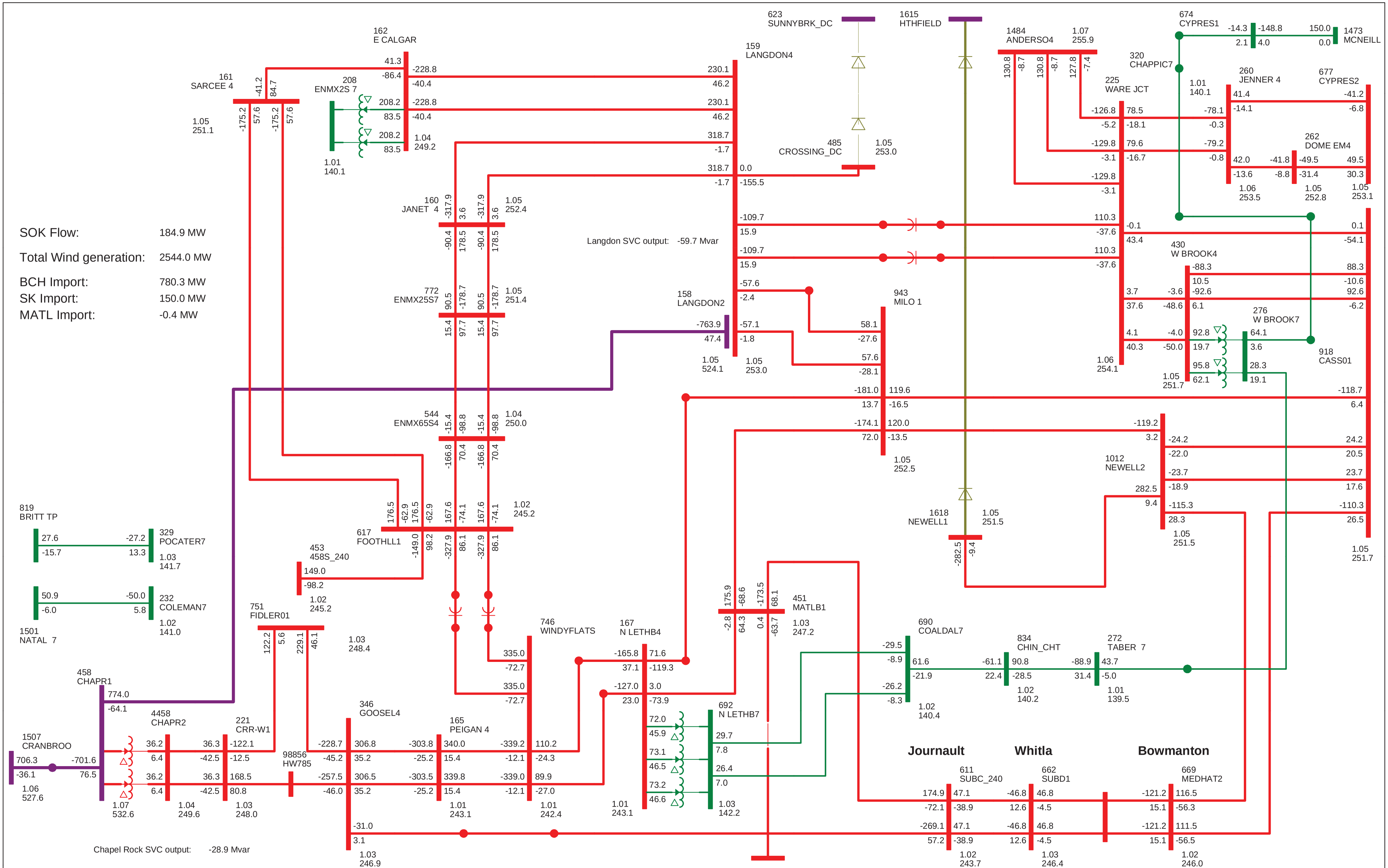
Attachment B

Power flow Plots



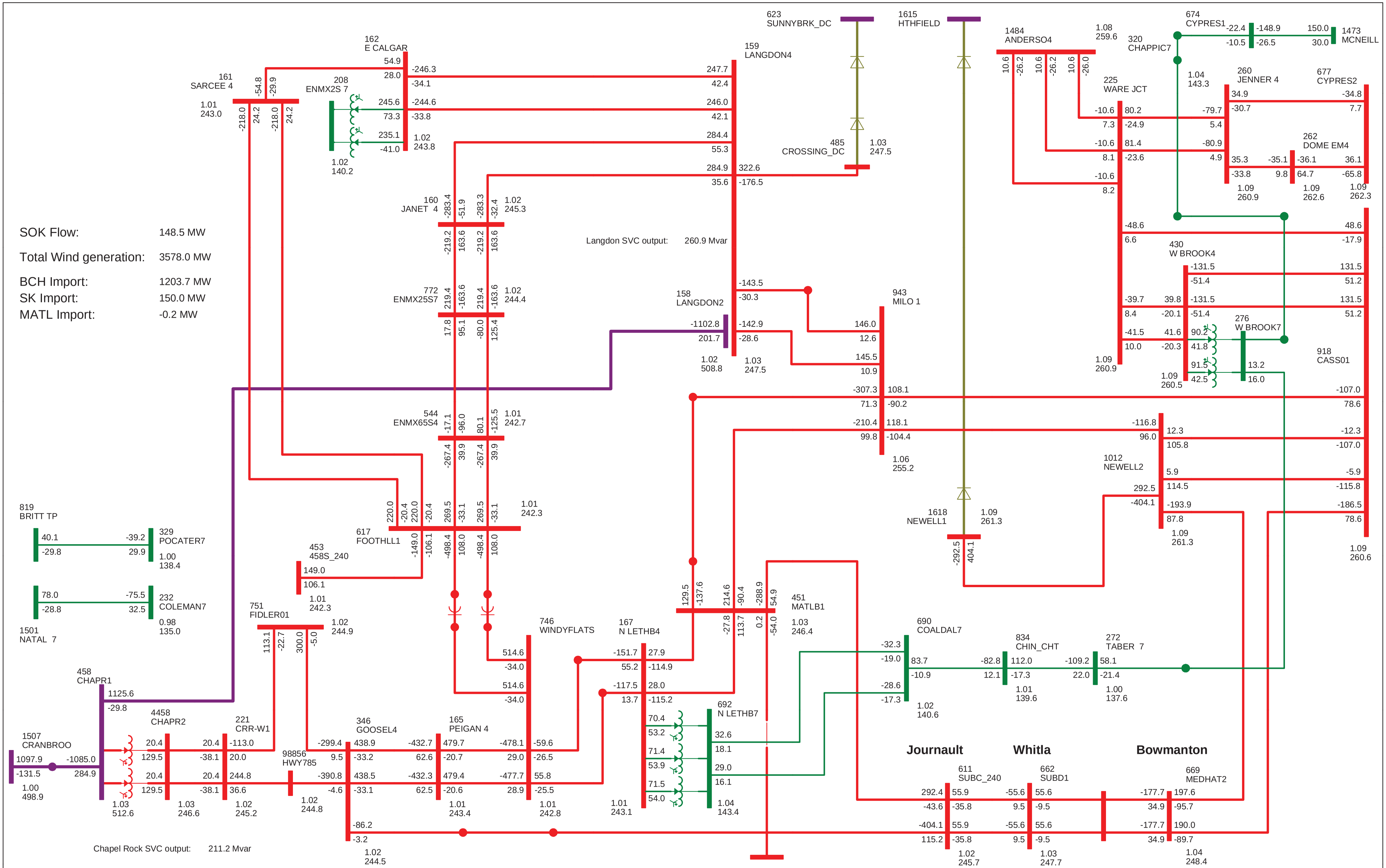
Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A
1.100OV 0.950UV
kV: <=69.000 <=138.000 <=240.000 <=500.000 >500.000

SLD_00: C1_22 (NO SS3)
CATEGORY A - NO CONTINGENCY
FRI, AUG 23 2013 14:48



Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A
1.100OV 0.950UV
kV: <=69.000 <=138.000 <=240.000 <=500.000 >500.000

SLD_00: C1_22 (WITH SS3)
CATEGORY A - NO CONTINGENCY
FRI, AUG 23 2013 14:55



SOK Flow: 148.5 MW

Total Wind generation: 3578.0 MW

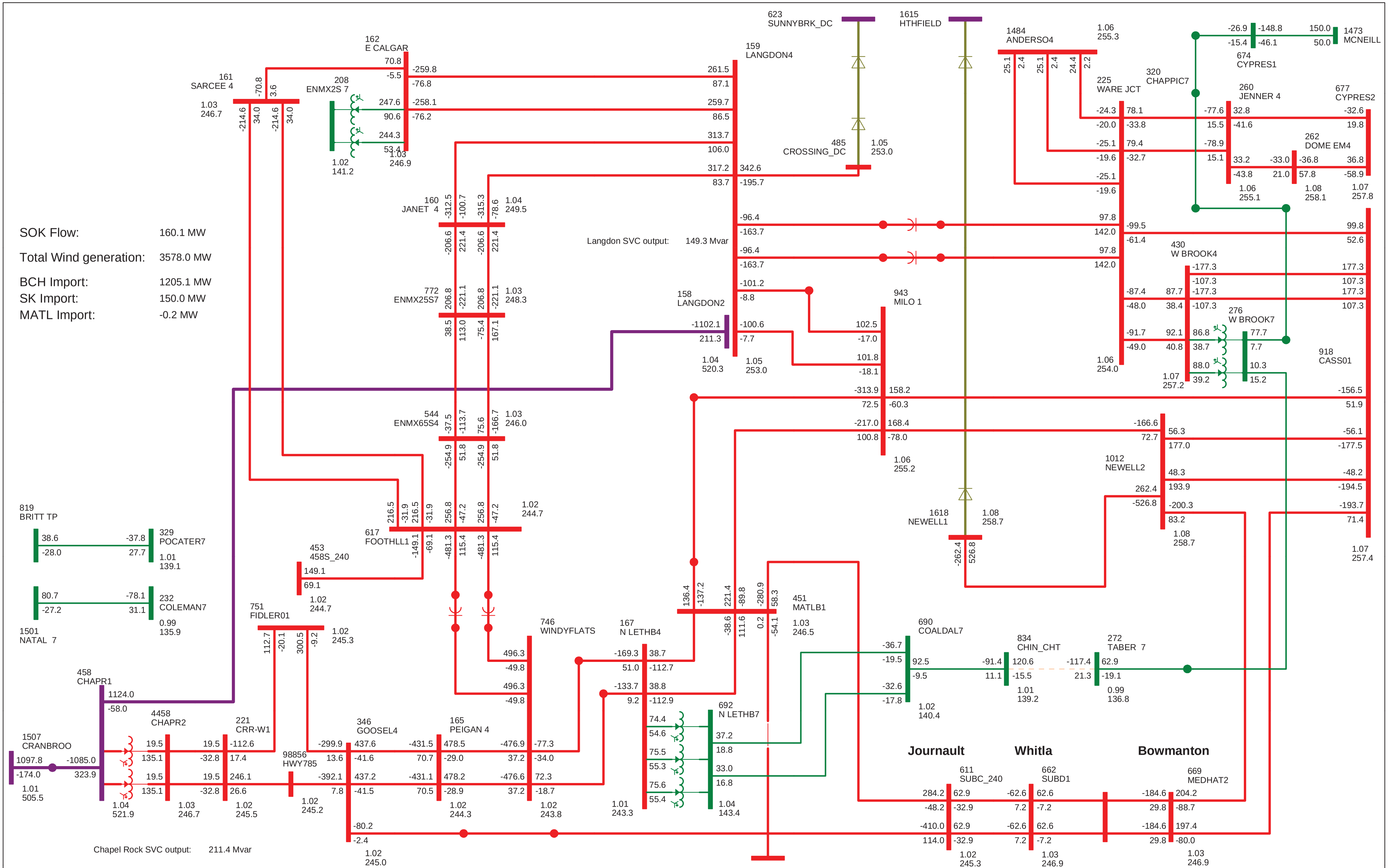
BCH Import: 1203.7 MW

SK Import: 150.0 MW

MATL Import: -0.2 MW

Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A
1.100OV 0.950UV
kV: <=69.000 <=138.000 <=240.000 <=500.000 >500.000

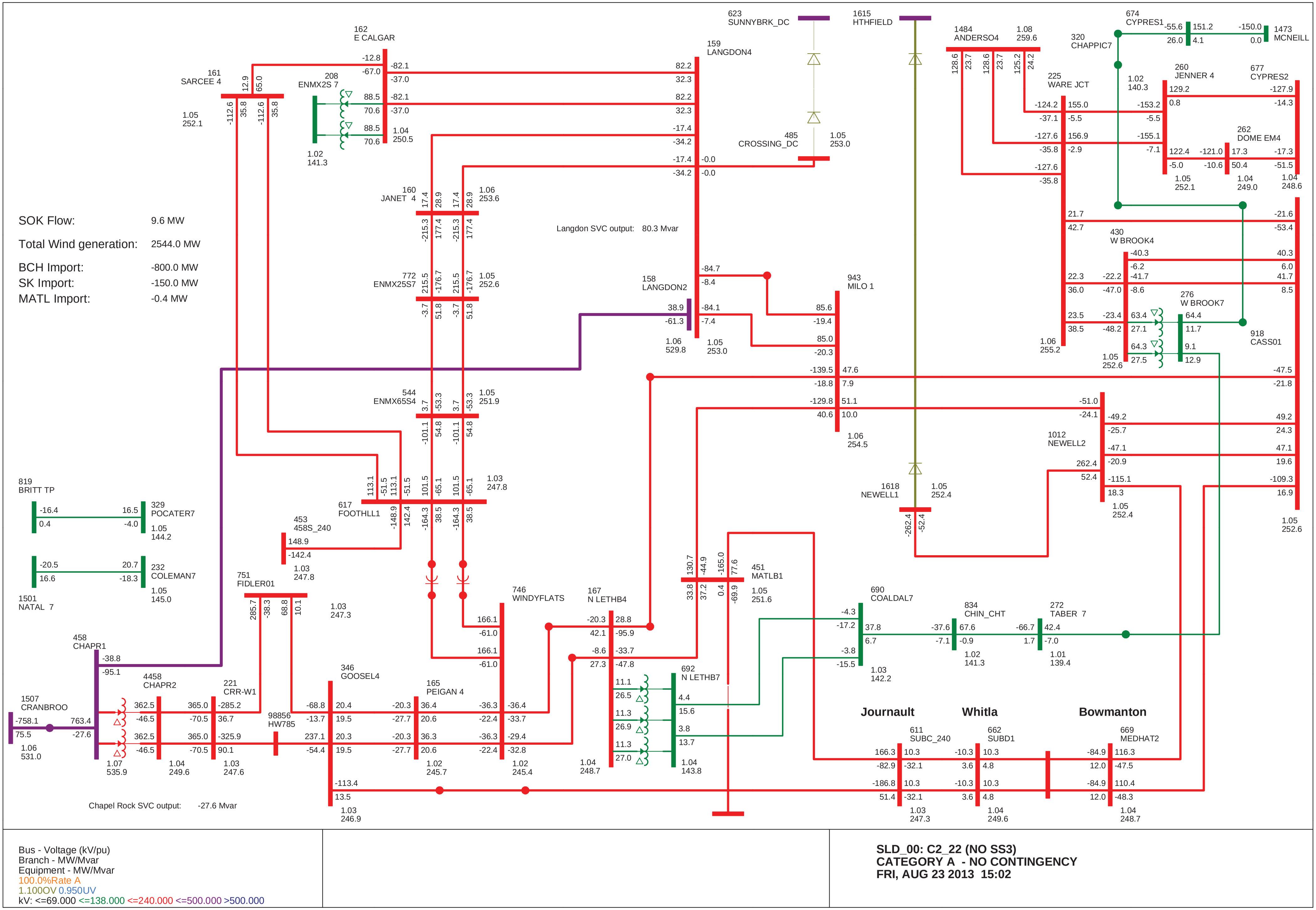
SLD_00: C1_32 (NO SS3)
CATEGORY A - NO CONTINGENCY
FRI, AUG 23 2013 16:10

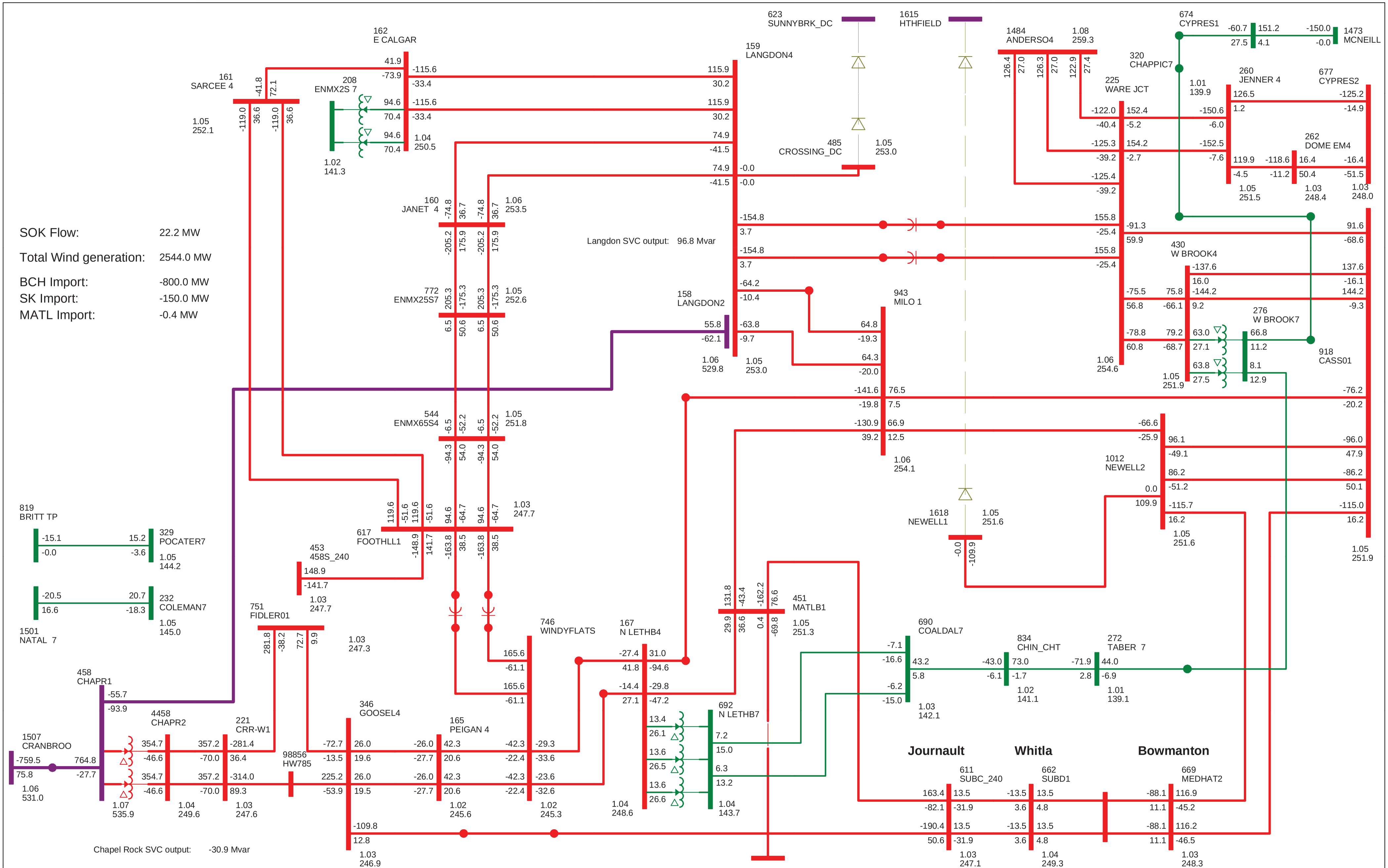


SOK Flow: 160.1 MW
Total Wind generation: 3578.0 MW
BCH Import: 1205.1 MW
SK Import: 150.0 MW
MATL Import: -0.2 MW

Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A
1.100OV 0.950UV
kV: <=69.000 <=138.000 <=240.000 <=500.000 >500.000

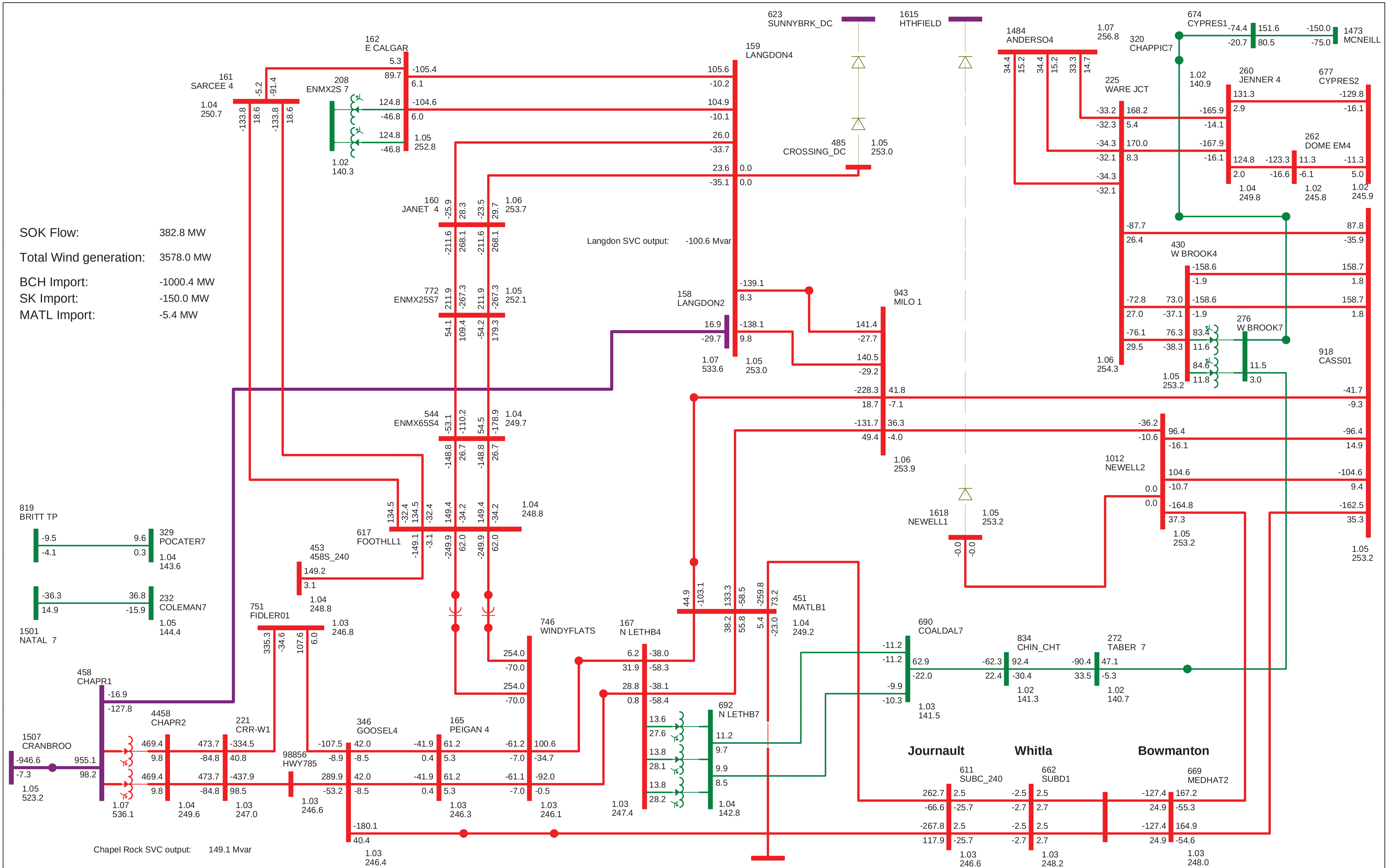
SLD_00: C1_32 (WITH SS3)
CATEGORY A - NO CONTINGENCY
FRI, AUG 23 2013 16:16


SOK Flow: 9.6 MW
Total Wind generation: 2544.0 MW
BCH Import: -800.0 MW
SK Import: -150.0 MW
MATL Import: -0.4 MW
Langdon SVC output: 80.3 Mvar
Chapel Rock SVC output: -27.6 Mvar
161 SARCEE 4
162 E CALGAR
208 ENMX2S 7
159 LANGDON4
158 LANGDON2
623 SUNNYBRK_DC
485 CROSSING_DC
1615 HTHFIELD
1618 NEWELL1
1484 ANDERSO4
320 CHAPPIC7
674 CYPRES1
1473 MCNEILL
225 WARE JCT
260 JENNER 4
677 CYPRES2
262 DOME EM4
430 W BROOK4
276 W BROOK7
918 CASS01
943 MILO 1
1012 NEWELL2
160 JANET 4
772 ENMX25S7
544 ENMX65S4
617 FOOTHLL1
453 458S_240
751 FIDLER01
819 BRITT TP
329 POCATER7
1501 NATAL 7
232 COLEMAN7
458 CHAPR1
1507 CRANBROO
4458 CHAPR2
221 CRR-W1
98856 HW785
346 GOOSEL4
165 PEIGAN 4
746 WINDYFLATS
167 N LETHB4
692 N LETHB7
451 MATLB1
690 COALDAL7
834 CHIN_CHT
272 TABER 7
Journault
Whitla
Bowmanton
611 SUBC_240
662 SUBD1
669 MEDHAT2
Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A
1.100OV 0.950UV
kV: <=69.000 <=138.000 <=240.000 <=500.000 >500.000
SLD_00: C2_22 (NO SS3)
CATEGORY A - NO CONTINGENCY
FRI, AUG 23 2013 15:02



Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A
1.100OV 0.950UV
kV: <=69.000 <=138.000 <=240.000 <=500.000 >500.000

SLD_00: C2_22 (WITH SS3)
CATEGORY A - NO CONTINGENCY
FRI, AUG 23 2013 15:08



SOK Flow: 382.8 MW

Total Wind generation: 3578.0 MW

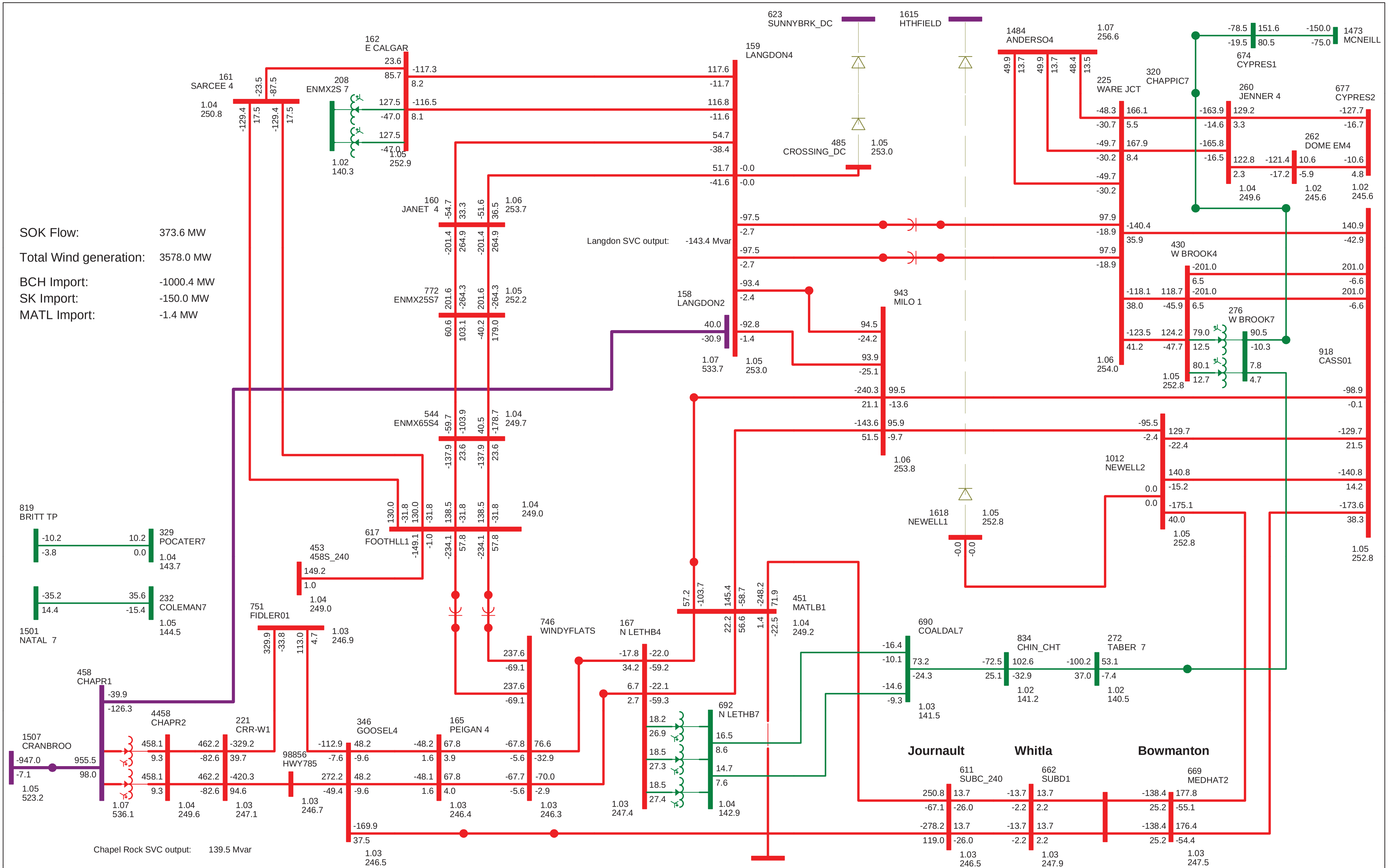
BCH Import: -1000.4 MW

SK Import: -150.0 MW

MATL Import: -5.4 MW

Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A
1.100OV 0.950UV
kV: <=69.000 <=138.000 <=240.000 <=500.000 >500.000

SLD_00: C2_32 (NO SS3)
CATEGORY A - NO CONTINGENCY
FRI, AUG 23 2013 16:23



SOK Flow: 373.6 MW

Total Wind generation: 3578.0 MW

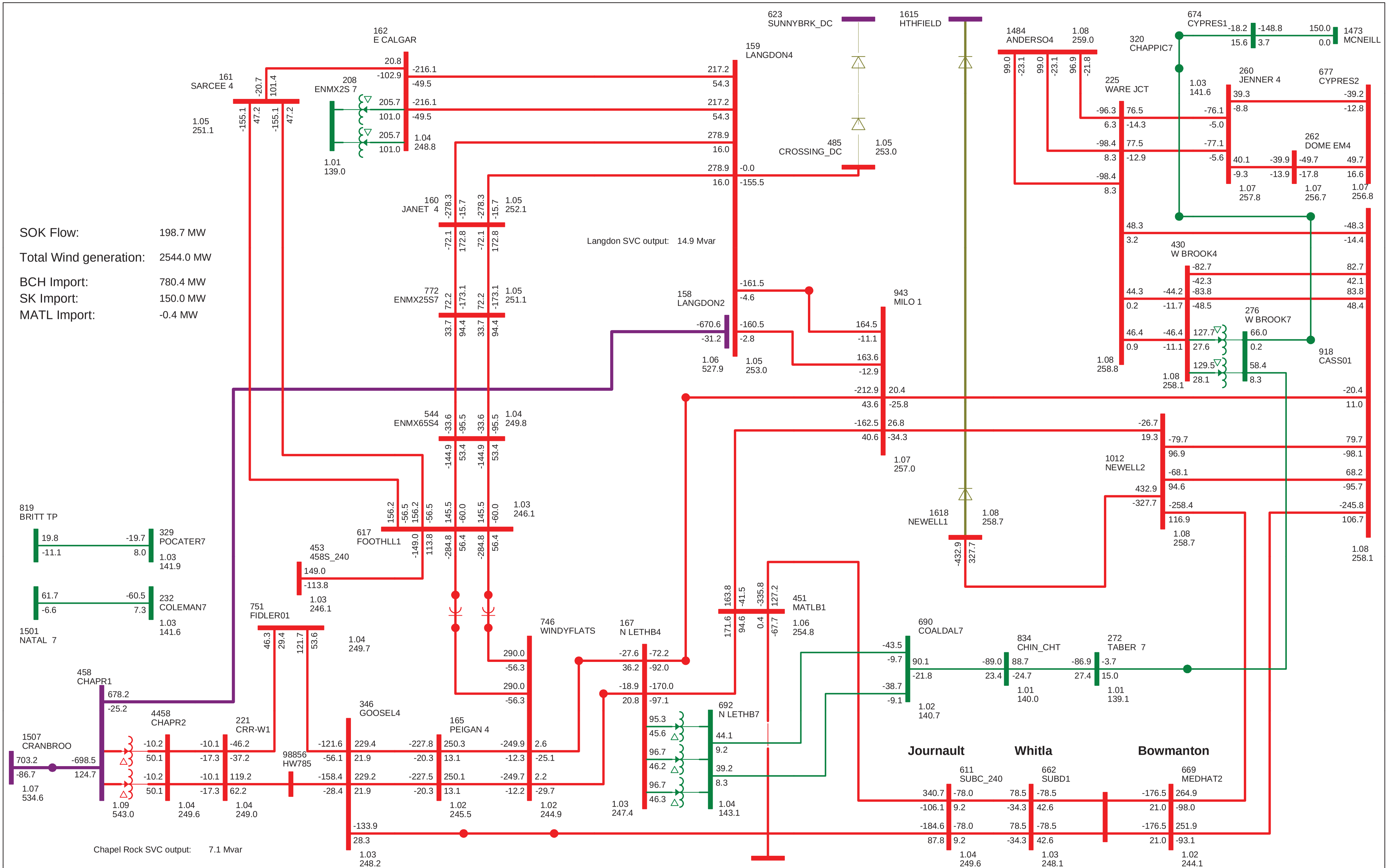
BCH Import: -1000.4 MW

SK Import: -150.0 MW

MATL Import: -1.4 MW

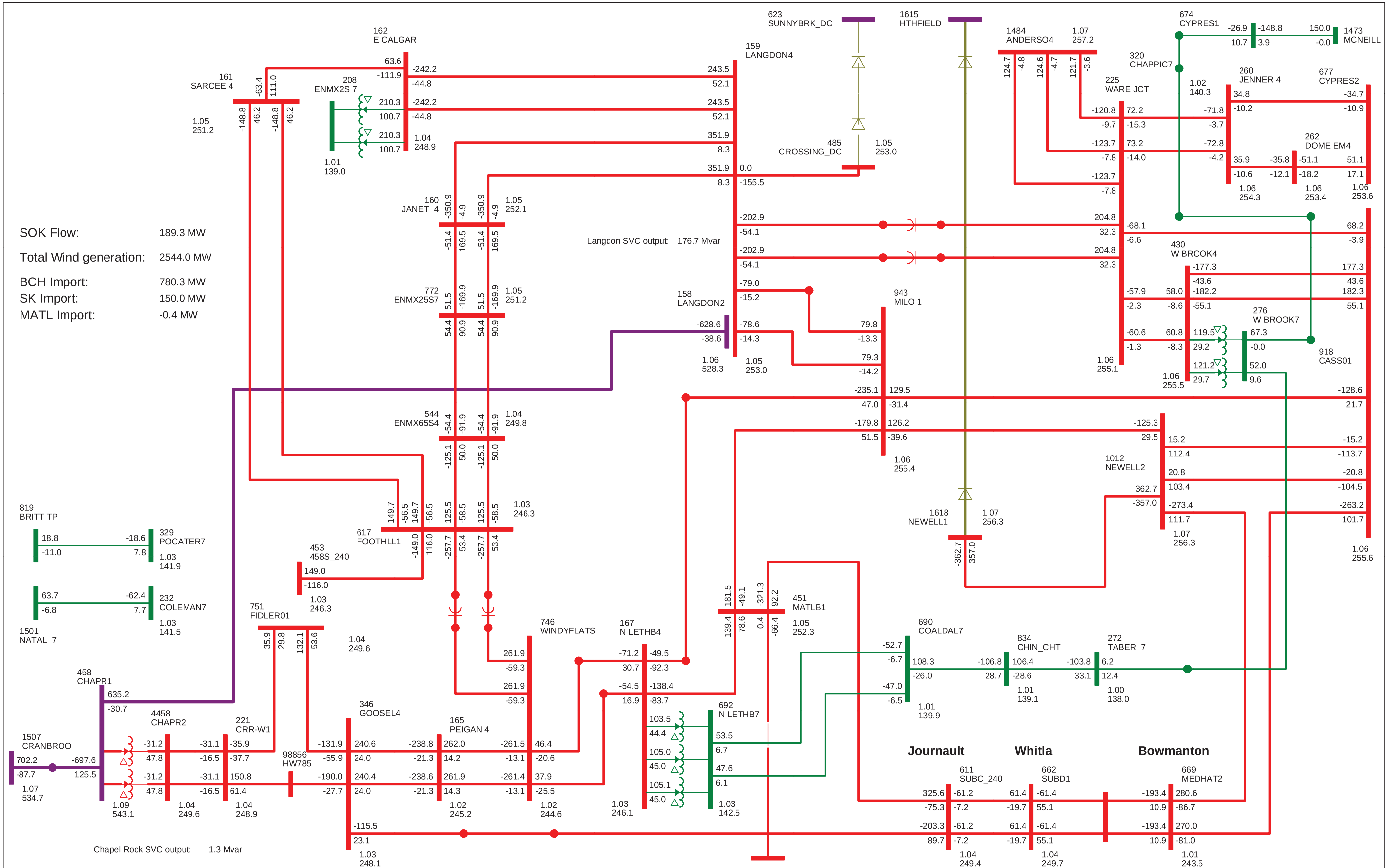
Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A
1.100OV 0.950UV
kV: <=69.000 <=138.000 <=240.000 <=500.000 >500.000

SLD_00: C2_32 (WITH SS3)
CATEGORY A - NO CONTINGENCY
FRI, AUG 23 2013 16:30



Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A
1.100OV 0.950UV
kV: <=69.000 <=138.000 <=240.000 <=500.000 >500.000

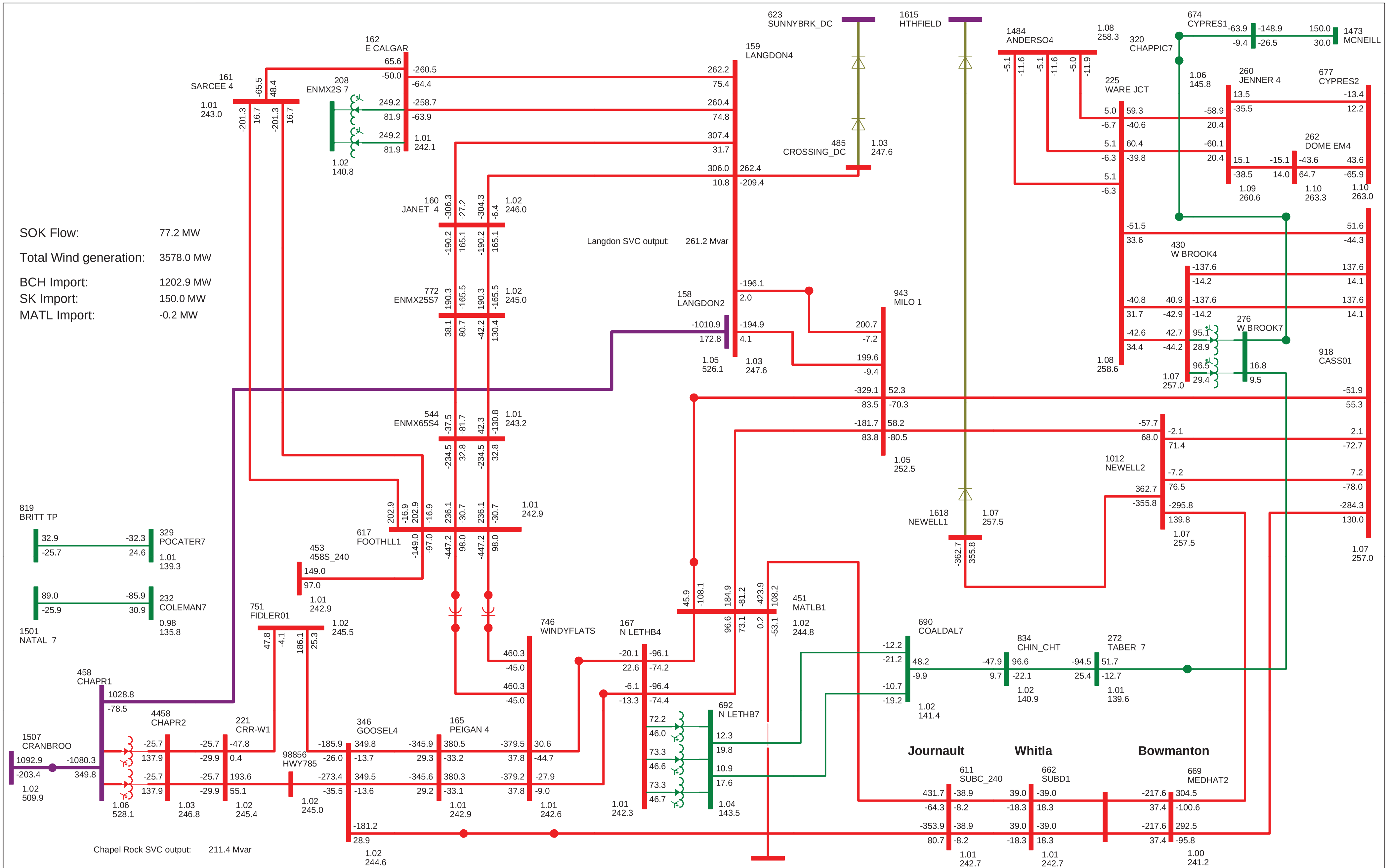
SLD_00: C3_22 (NO SS3)
CATEGORY A - NO CONTINGENCY
FRI, AUG 23 2013 15:15



SOK Flow:	189.3 MW
Total Wind generation:	2544.0 MW
BCH Import:	780.3 MW
SK Import:	150.0 MW
MATL Import:	-0.4 MW

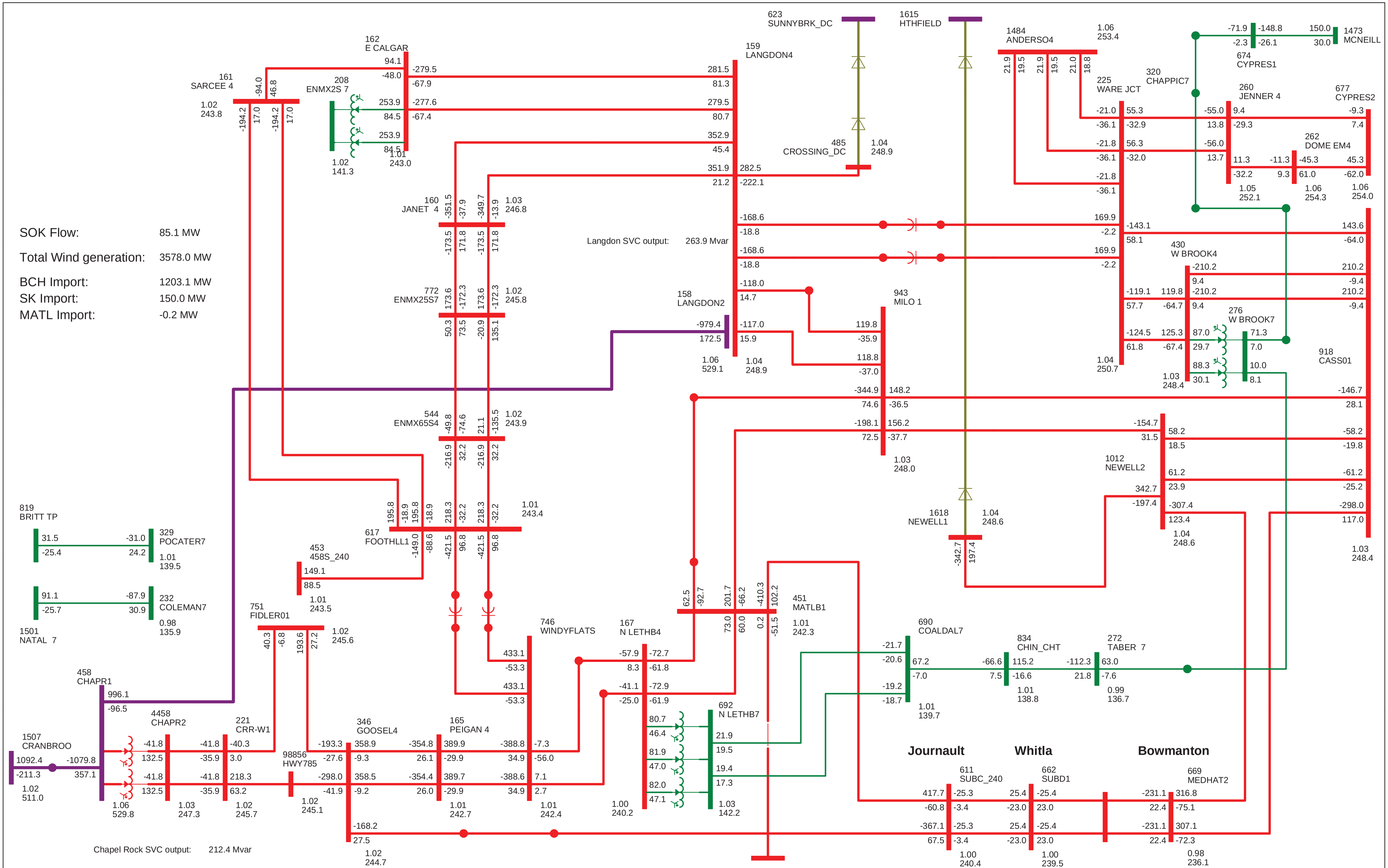
Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A
1.100OV 0.950UV
kV: <=69.000 <=138.000 <=240.000 <=500.000 >500.000

SLD_00: C3_22 (WITH SS3)
CATEGORY A - NO CONTINGENCY
FRI, AUG 23 2013 15:22



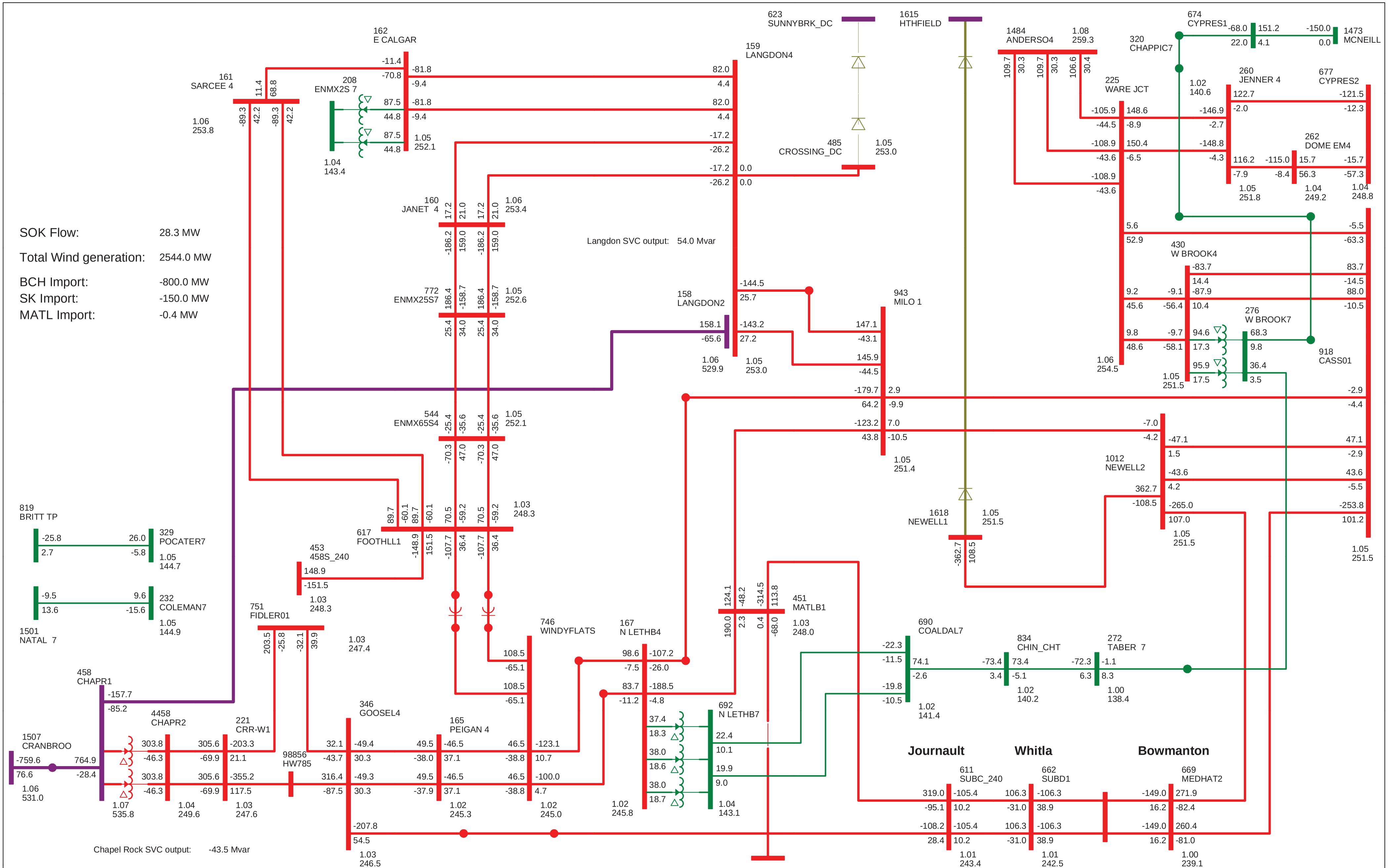
Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A
1.100OV 0.950UV
kV: <=69.000 <=138.000 <=240.000 <=500.000 >500.000

SLD_00: C3_32 (NO SS3)
CATEGORY A - NO CONTINGENCY
FRI, AUG 23 2013 16:37



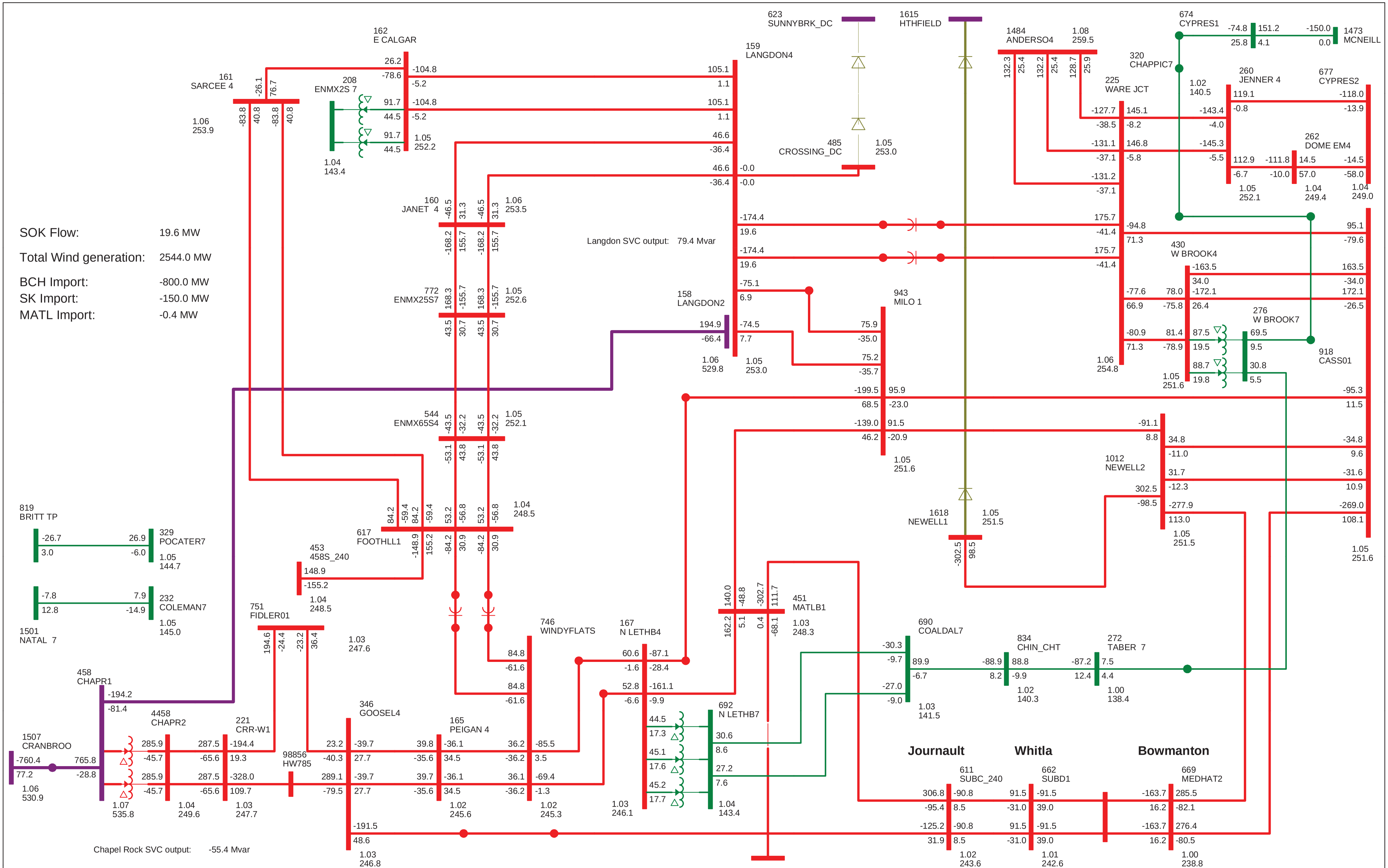
Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A
1.100OV 0.950UV
kV: <=69.000 <=138.000 <=240.000 <=500.000 >500.000

SLD_00: C3_32 (WITH SS3)
CATEGORY A - NO CONTINGENCY
FRI, AUG 23 2013 16:43



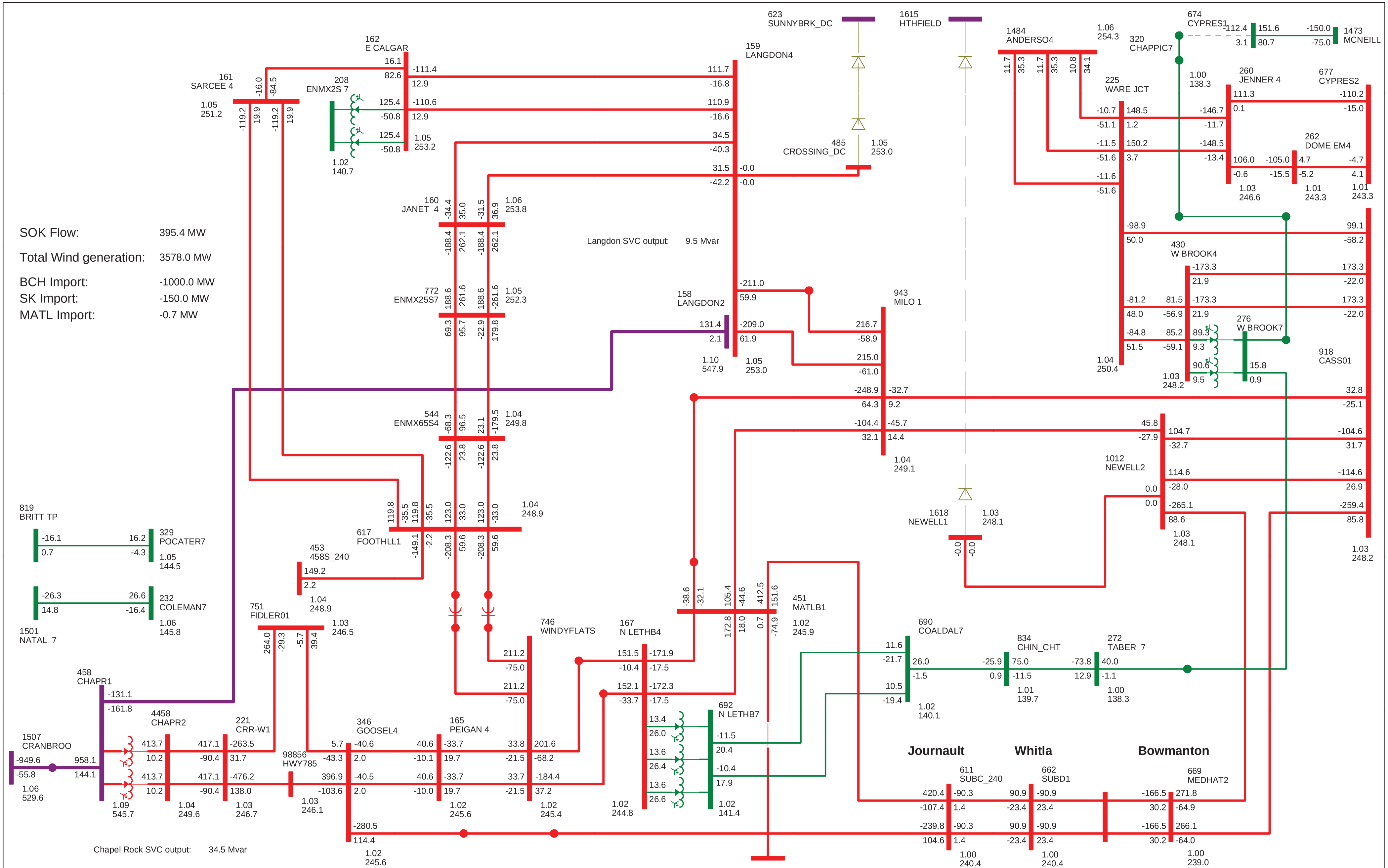
Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A
1.100OV 0.950UV
kV: <=69.000 <=138.000 <=240.000 <=500.000 >500.000

SLD_00: C4_22 (NO SS3)
CATEGORY A - NO CONTINGENCY
FRI, AUG 23 2013 15:28



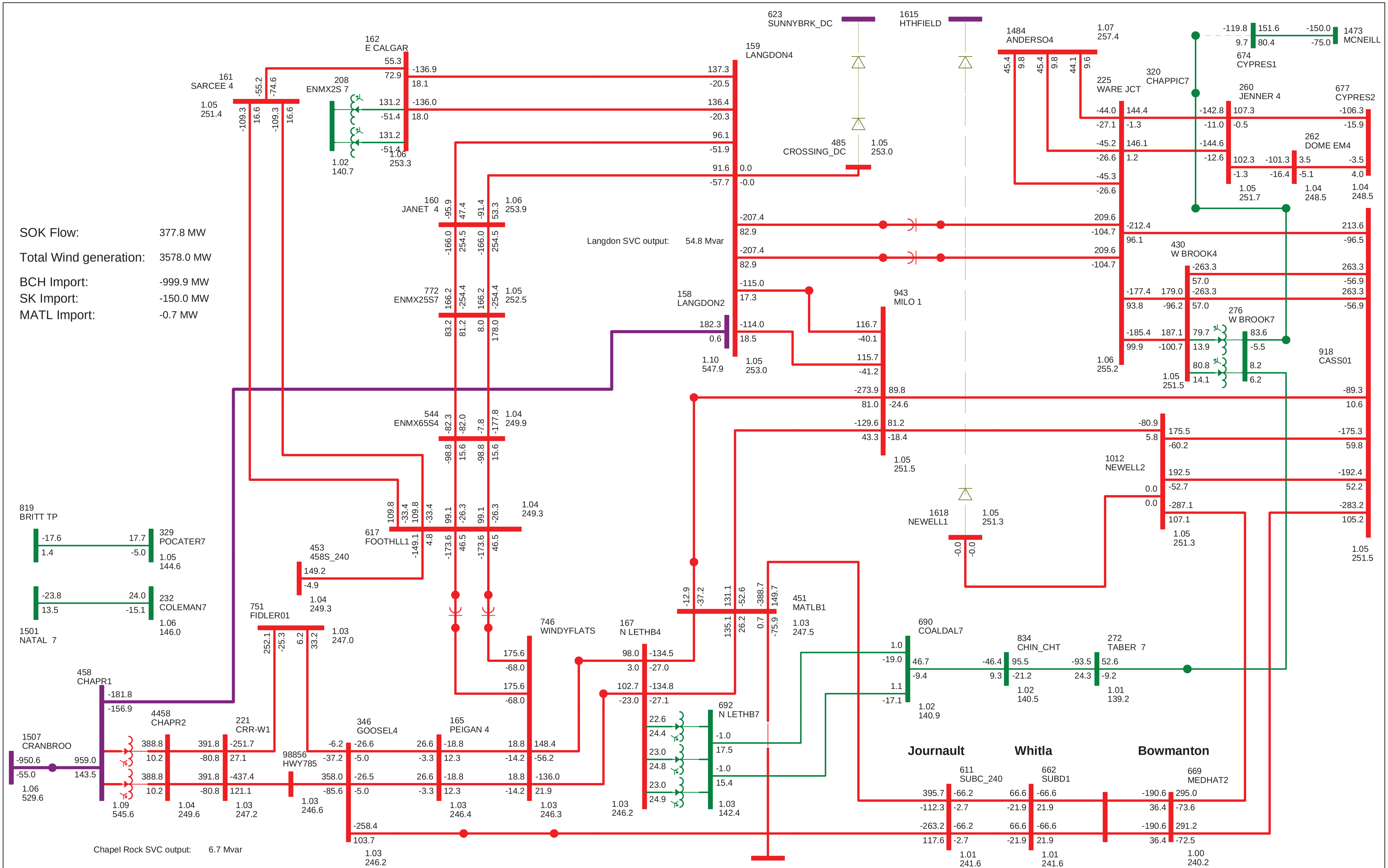
Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A
1.100OV 0.950UV
kV: <=69.000 <=138.000 <=240.000 <=500.000 >500.000

SLD_00: C4_22 (WITH SS3)
CATEGORY A - NO CONTINGENCY
FRI, AUG 23 2013 15:35



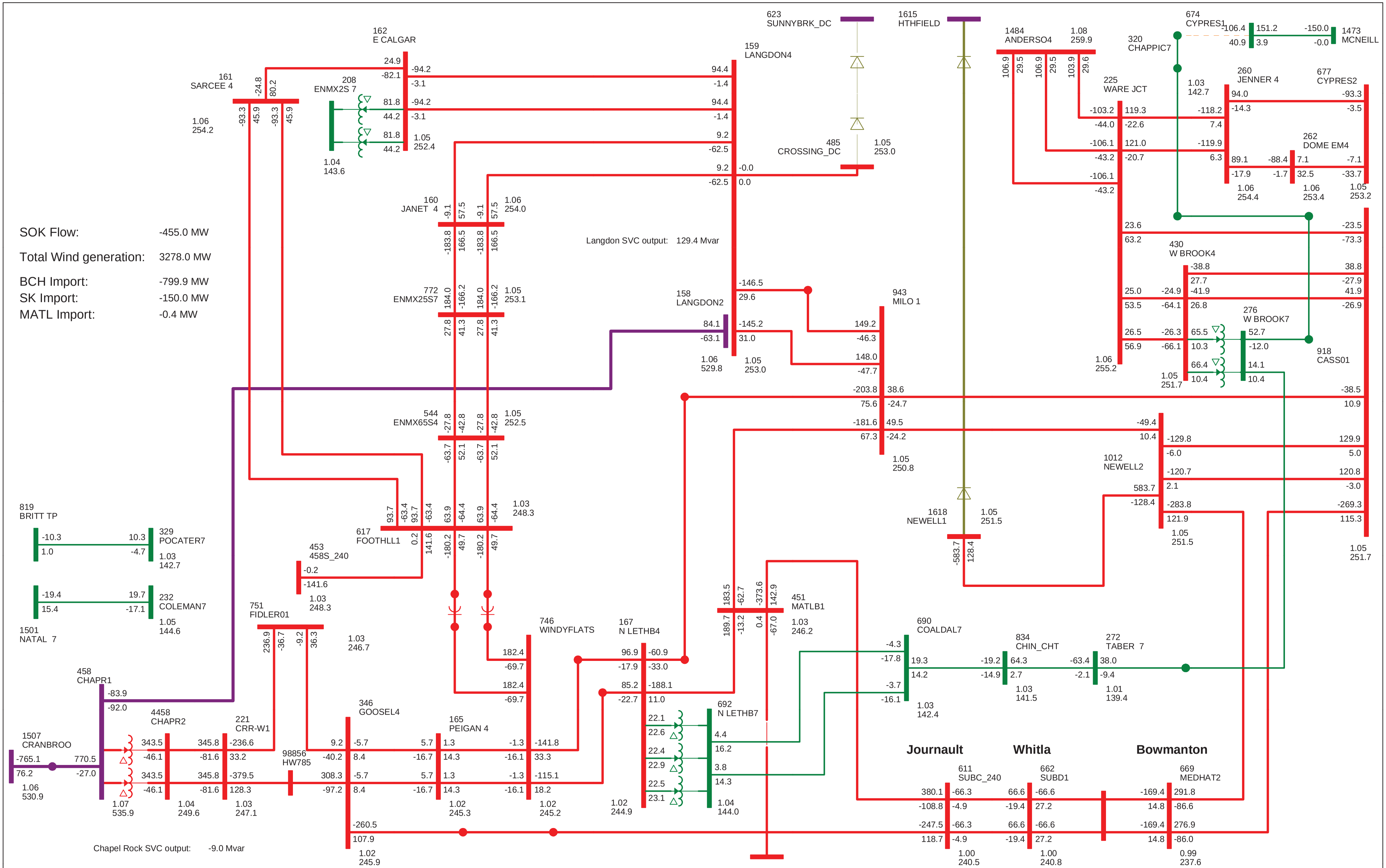
Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A
1.100OV 0.950UV
kV: <=69.000 <=138.000 <=240.000 <=500.000 >500.000

SLD_00: C4_32 (NO SS3)
CATEGORY A - NO CONTINGENCY
FRI, AUG 23 2013 16:50



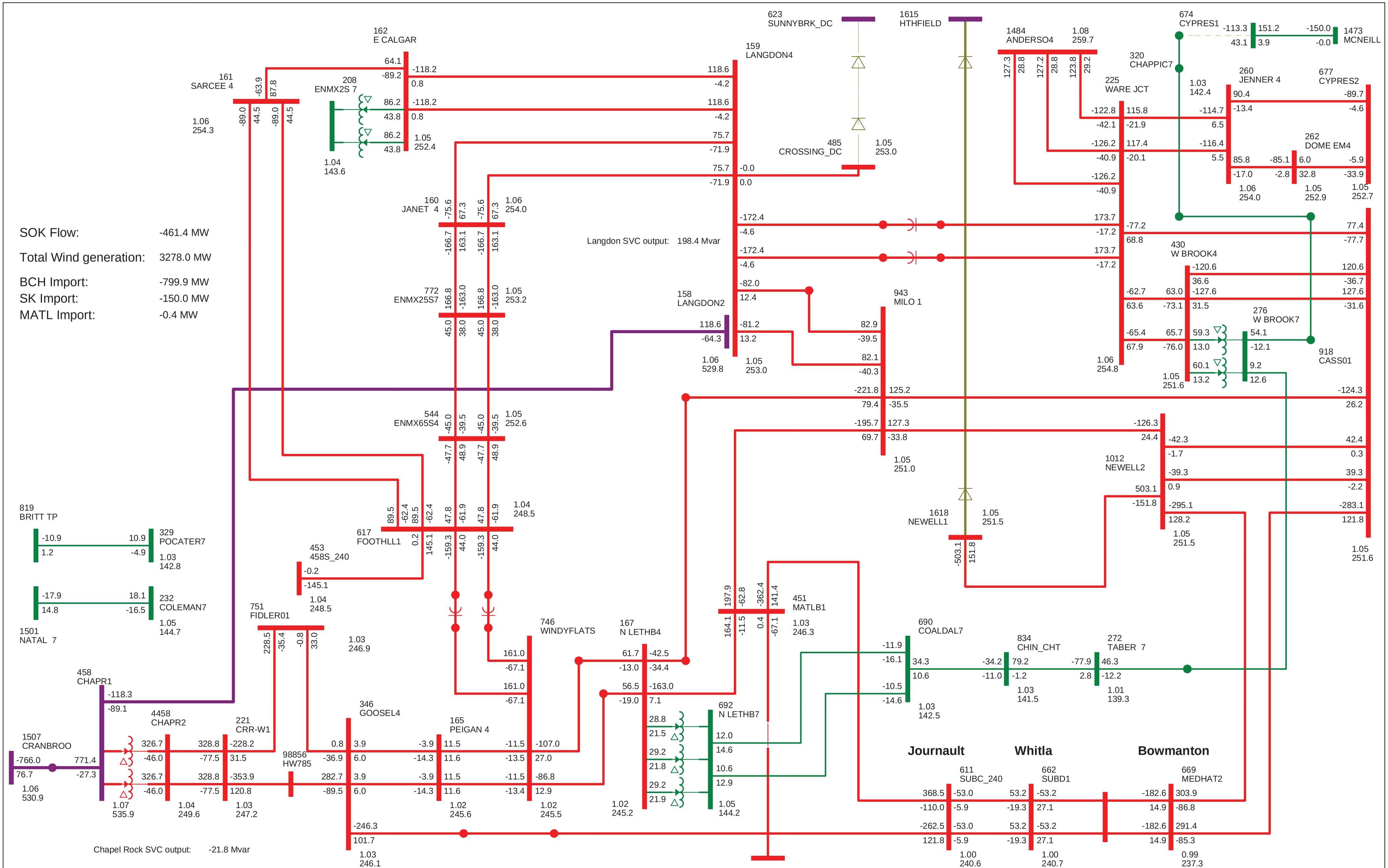
Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A
1.100OV 0.950UV
kV: <=69.000 <=138.000 <=240.000 <=500.000 >500.000

SLD_00: C4_32 (WITH SS3)
CATEGORY A - NO CONTINGENCY
FRI, AUG 23 2013 16:57



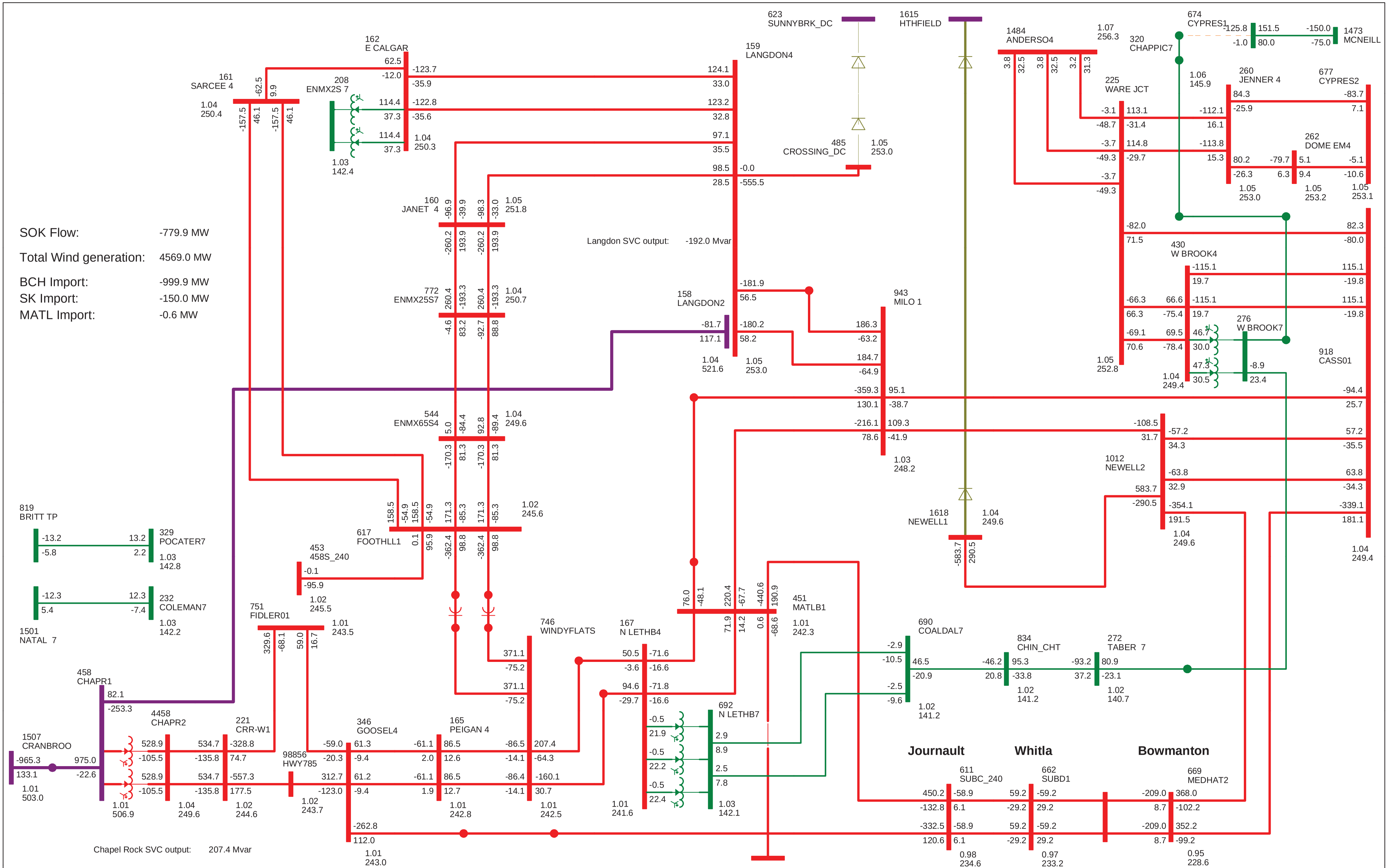
Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A
1.100OV 0.950UV
kV: <=69.000 <=138.000 <=240.000 <=500.000 >500.000

SLD_00: C5_22 (NO SS3)
CATEGORY A - NO CONTINGENCY
FRI, AUG 23 2013 15:42



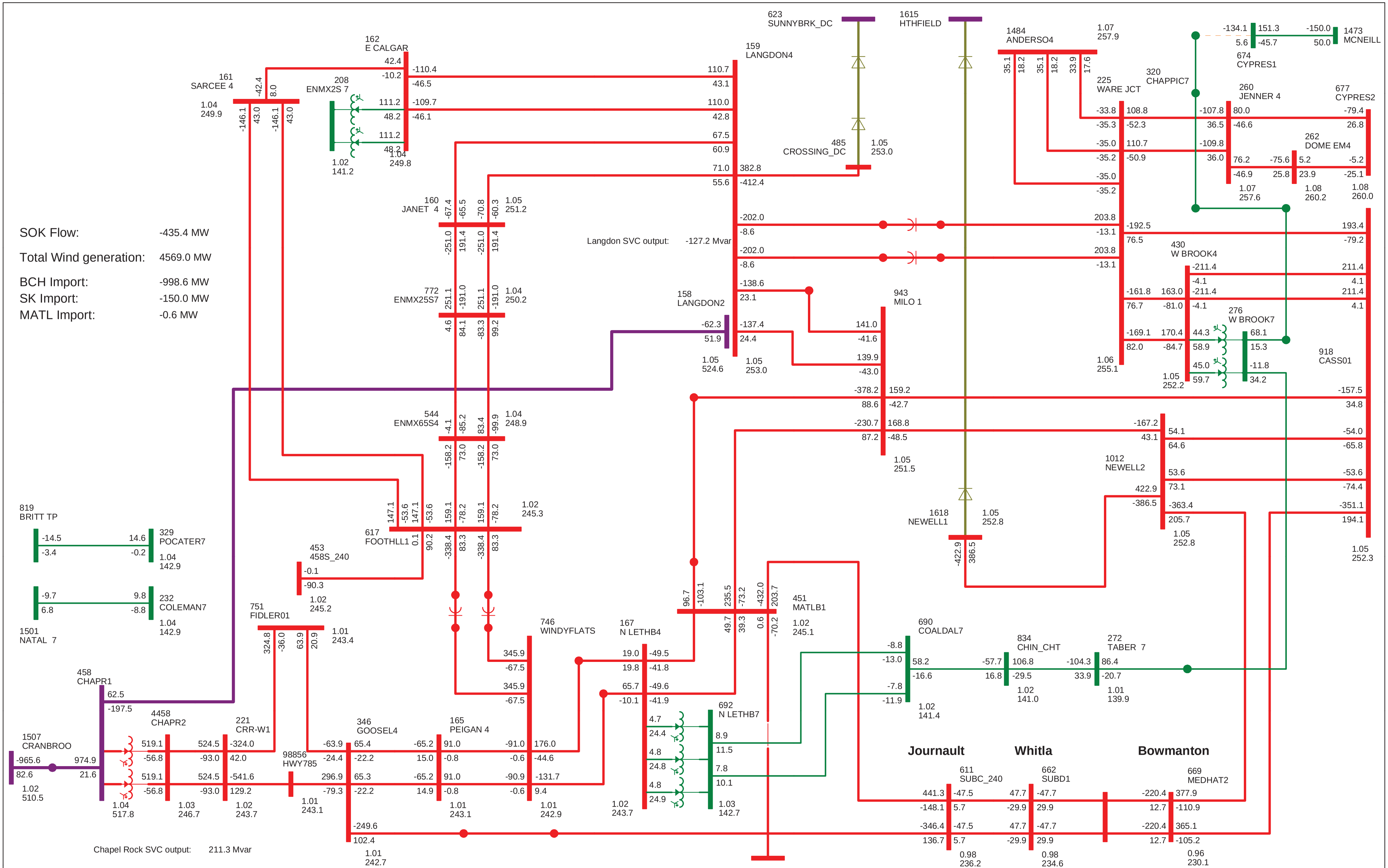
Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A
1.100OV 0.950UV
kV: <=69.000 <=138.000 <=240.000 <=500.000 >500.000

SLD_00: C5_22 (WITH SS3)
CATEGORY A - NO CONTINGENCY
FRI, AUG 23 2013 15:49



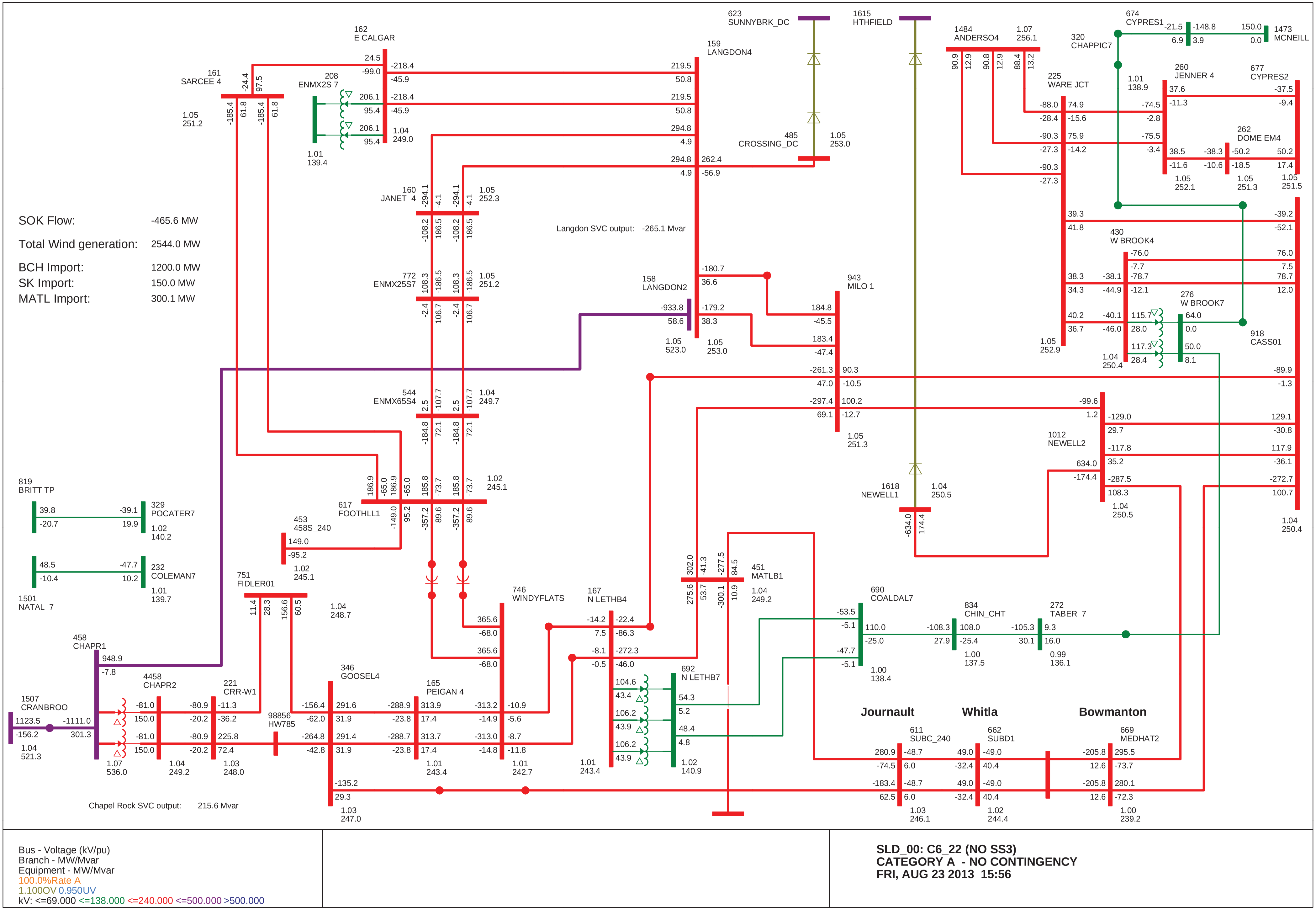
Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A
1.100OV 0.950UV
kV: <=69.000 <=138.000 <=240.000 <=500.000 >500.000

SLD_00: C5_32 (NO SS3)
CATEGORY A - NO CONTINGENCY
FRI, AUG 23 2013 17:04



Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A
1.100OV 0.950UV
kV: <=69.000 <=138.000 <=240.000 <=500.000 >500.000

SLD_00: C5_32 (WITH SS3)
CATEGORY A - NO CONTINGENCY
FRI, AUG 23 2013 17:11


SLD_00: C6_22 (NO SS3)
CATEGORY A - NO CONTINGENCY
FRI, AUG 23 2013 15:56
SOK Flow: -465.6 MW
Total Wind generation: 2544.0 MW
BCH Import: 1200.0 MW
SK Import: 150.0 MW
MATL Import: 300.1 MW
Langdon SVC output: -265.1 Mvar
Chapel Rock SVC output: 215.6 Mvar
Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A
1.100OV 0.950UV
kV: <=69.000 <=138.000 <=240.000 <=500.000 >500.000
Journault
Whitla
Bowmanton
623 SUNNYBRK_DC
1615 HTHFIELD
1484 ANDERSO4
320 CHAPPIC7
674 CYPRES1
1473 MCNEILL
162 E CALGAR
161 SARCEE 4
208 ENMX2S 7
159 LANGDON4
485 CROSSING_DC
225 WARE JCT
260 JENNER 4
677 CYPRES2
262 DOME EM4
160 JANET 4
772 ENMX25S7
158 LANGDON2
943 MILO 1
430 W BROOK4
276 W BROOK7
918 CASS01
544 ENMX65S4
1012 NEWELL2
617 FOOTHLL1
1618 NEWELL1
819 BRITT TP
329 POCATER7
453 458S_240
232 COLEMAN7
1501 NATAL 7
751 FIDLER01
746 WINDYFLATS
167 N LETHB4
451 MATLB1
690 COALDAL7
834 CHIN_CHT
272 TABER 7
458 CHAPR1
4458 CHAPR2
221 CRR-W1
346 GOOSEL4
165 PEIGAN 4
692 N LETHB7
1507 CRANBROO
98856 HW785
611 SUBC_240
662 SUBD1
669 MEDHAT2

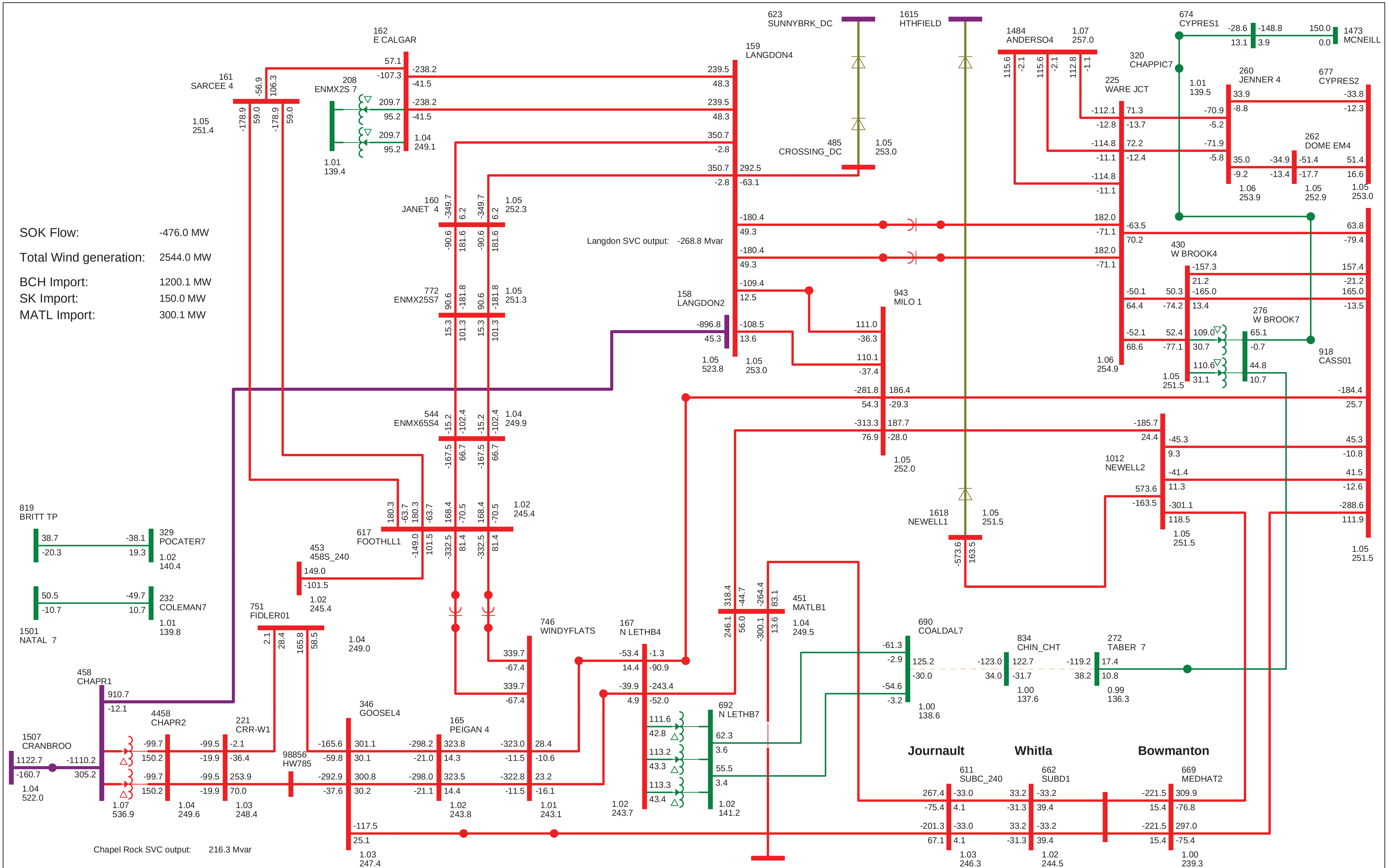
SOK Flow: -476.0 MW

Total Wind generation: 2544.0 MW

BCH Import: 1200.1 MW

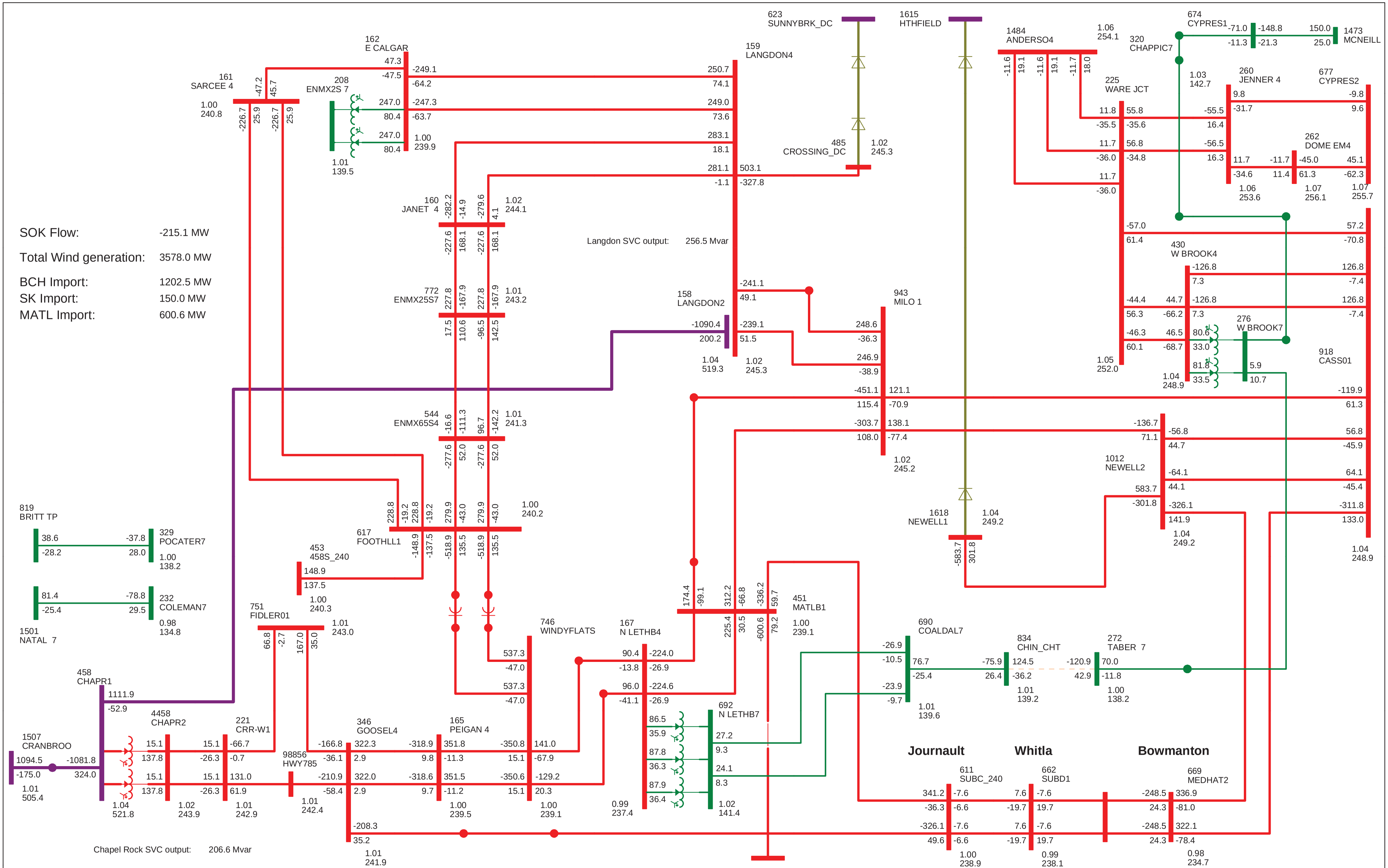
SK Import: 150.0 MW

MATL Import: 300.1 MW



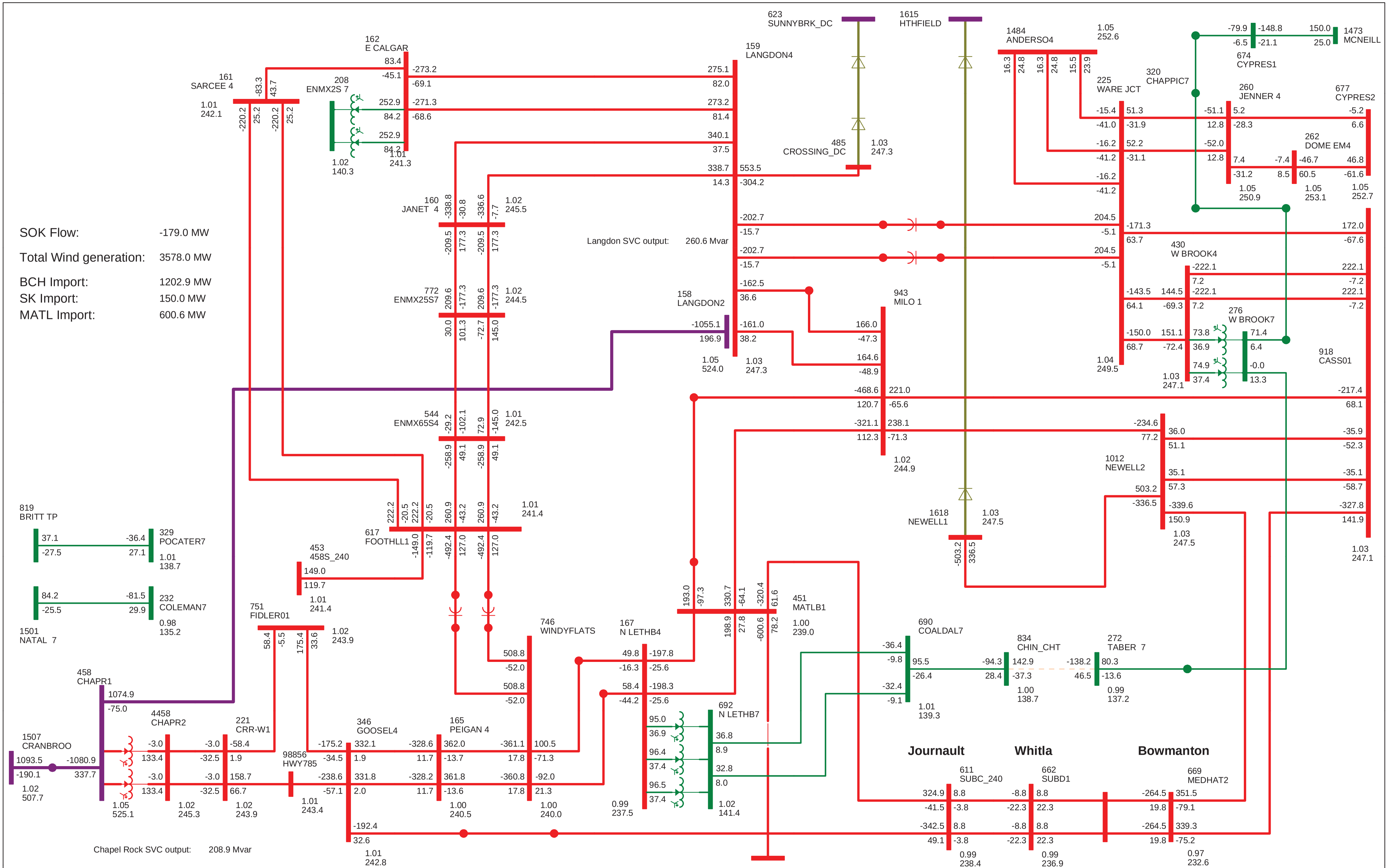
Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A
1.100OV 0.950UV
kV: <=69.000 <=138.000 <=240.000 <=500.000 >500.000

SLD_00: C6_22 (WITH SS3)
CATEGORY A - NO CONTINGENCY
FRI, AUG 23 2013 16:03



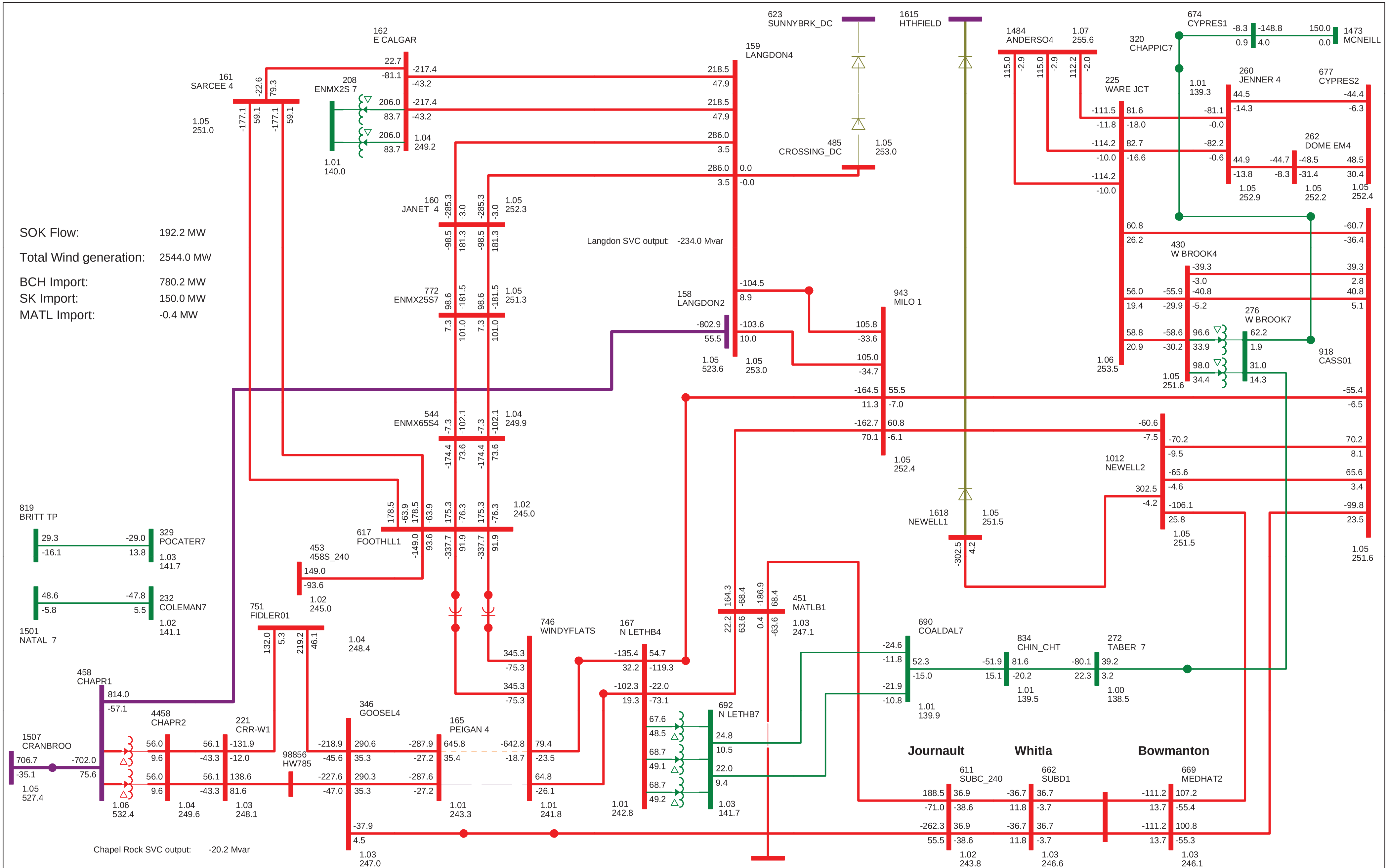
Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A
1.100OV 0.950UV
kV: <=69.000 <=138.000 <=240.000 <=500.000 >500.000

SLD_00: C6_32 (NO SS3)
CATEGORY A - NO CONTINGENCY
FRI, AUG 23 2013 17:18



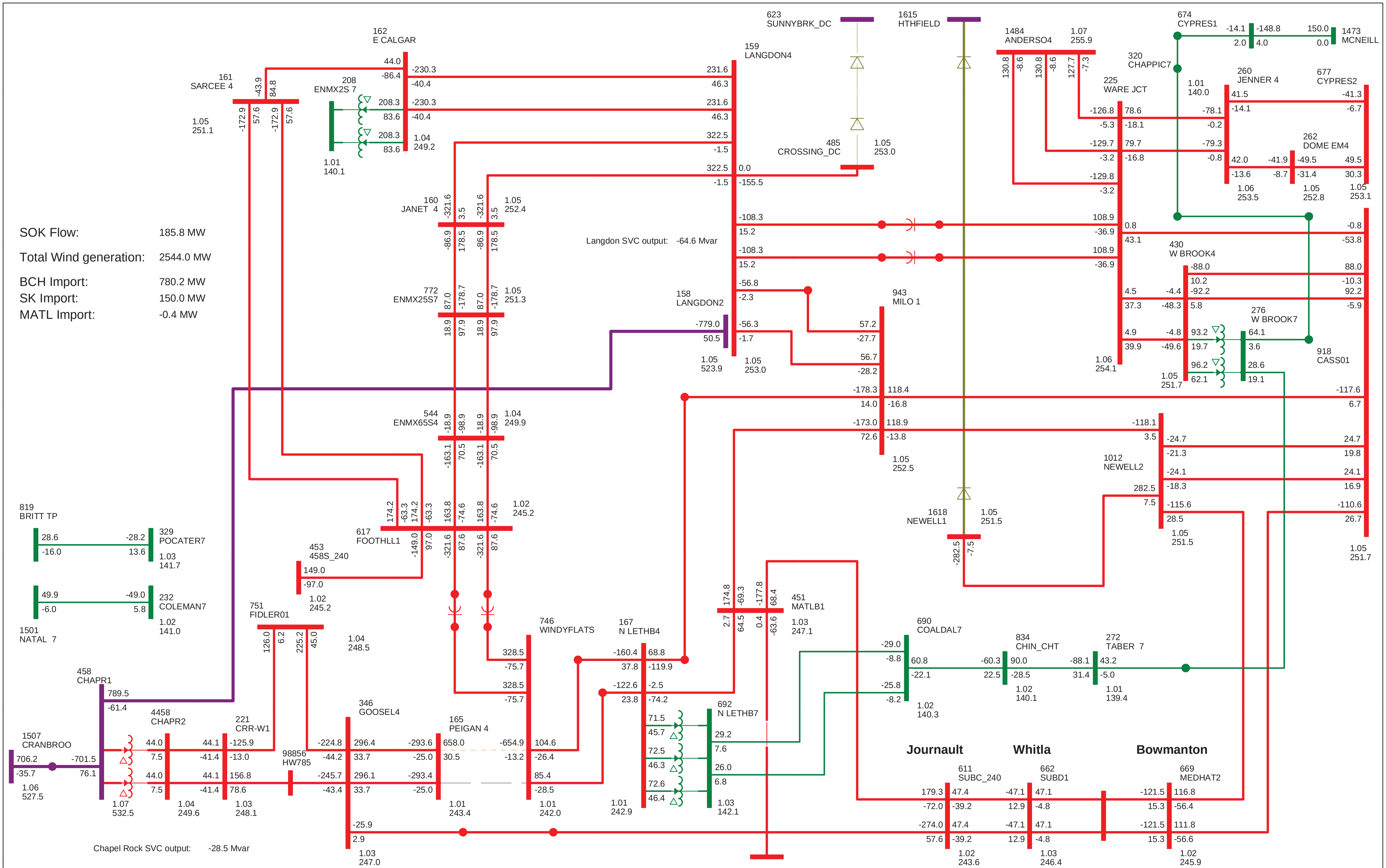
Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A
1.100OV 0.950UV
kV: <=69.000 <=138.000 <=240.000 <=500.000 >500.000

SLD_00: C6_32 (WITH SS3)
CATEGORY A - NO CONTINGENCY
FRI, AUG 23 2013 17:25



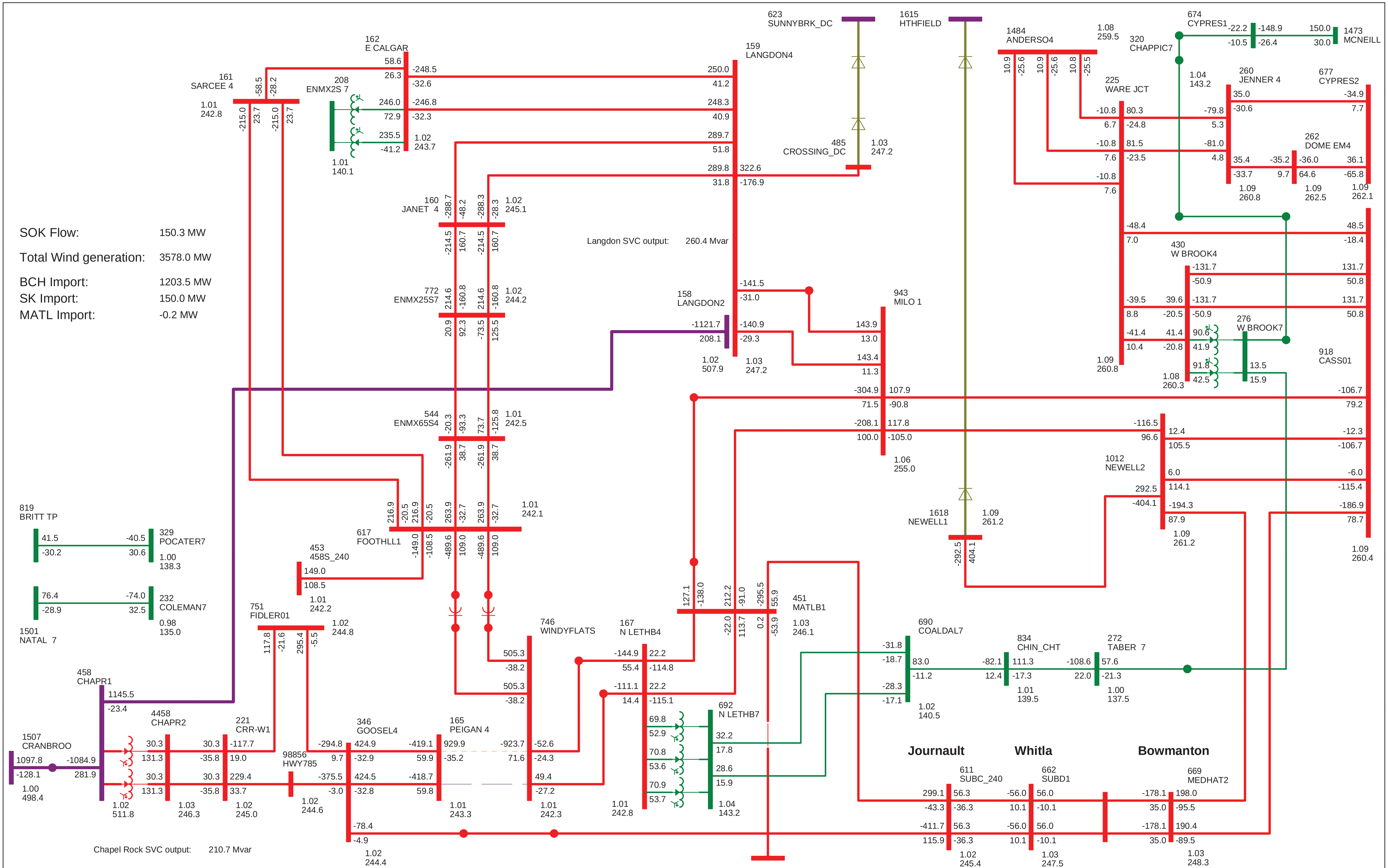
Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A
1.100OV 0.950UV
kV: <=69.000 <=138.000 <=240.000 <=500.000 >500.000

SLD_01: C1_22 (NO SS3)
CATEGORY B - 1049L 240 KV LINE (PEIGAN 59S TO WINDY FLATS 1
FRI, AUG 23 2013 14:49



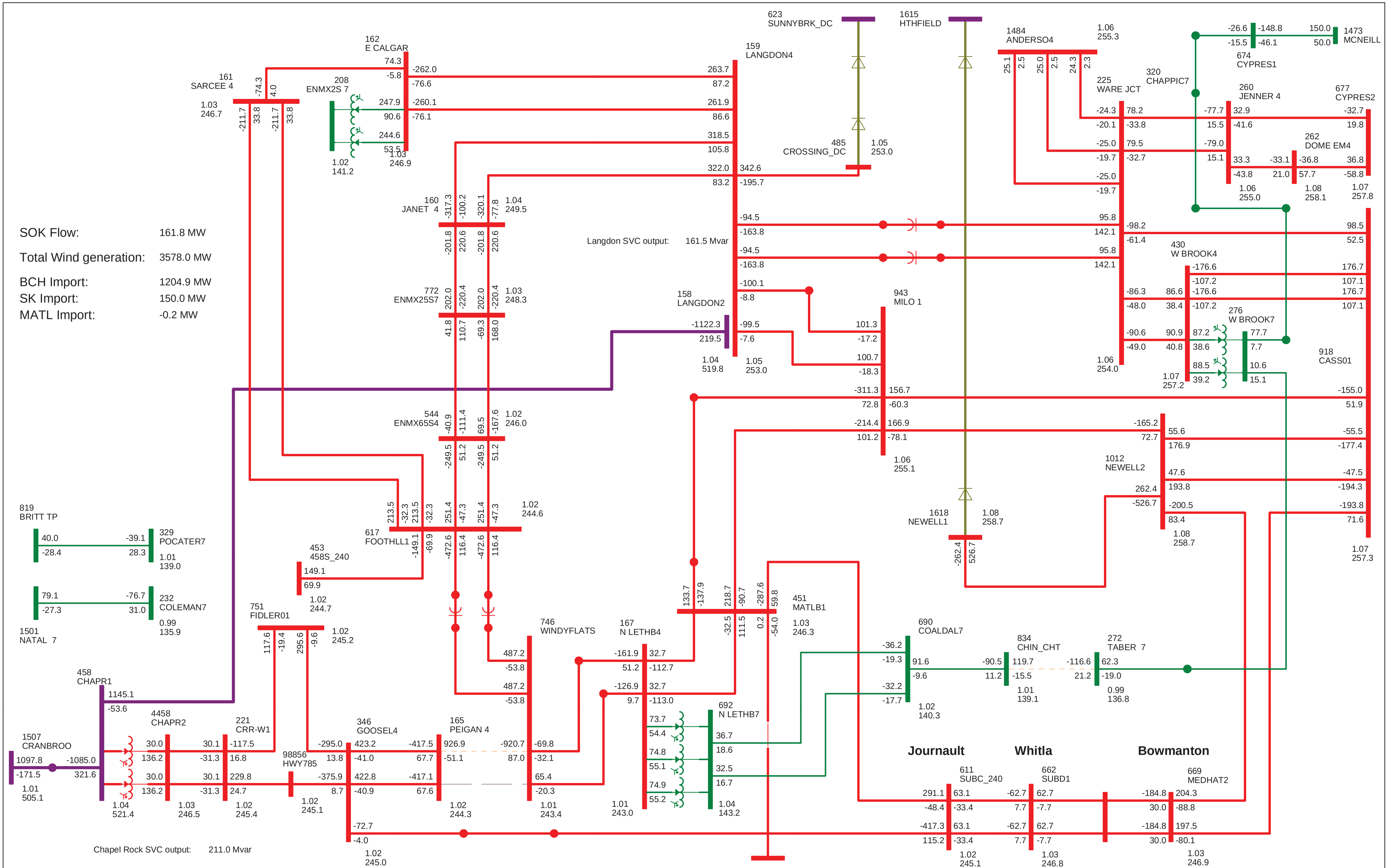
Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A
1.100OV 0.950UV
kV: <=69.000 <=138.000 <=240.000 <=500.000 >500.000

SLD_01: C1_22 (WITH SS3)
CATEGORY B - 1049L 240 KV LINE (PEIGAN 59S TO WINDY FLATS 1
FRI, AUG 23 2013 14:55



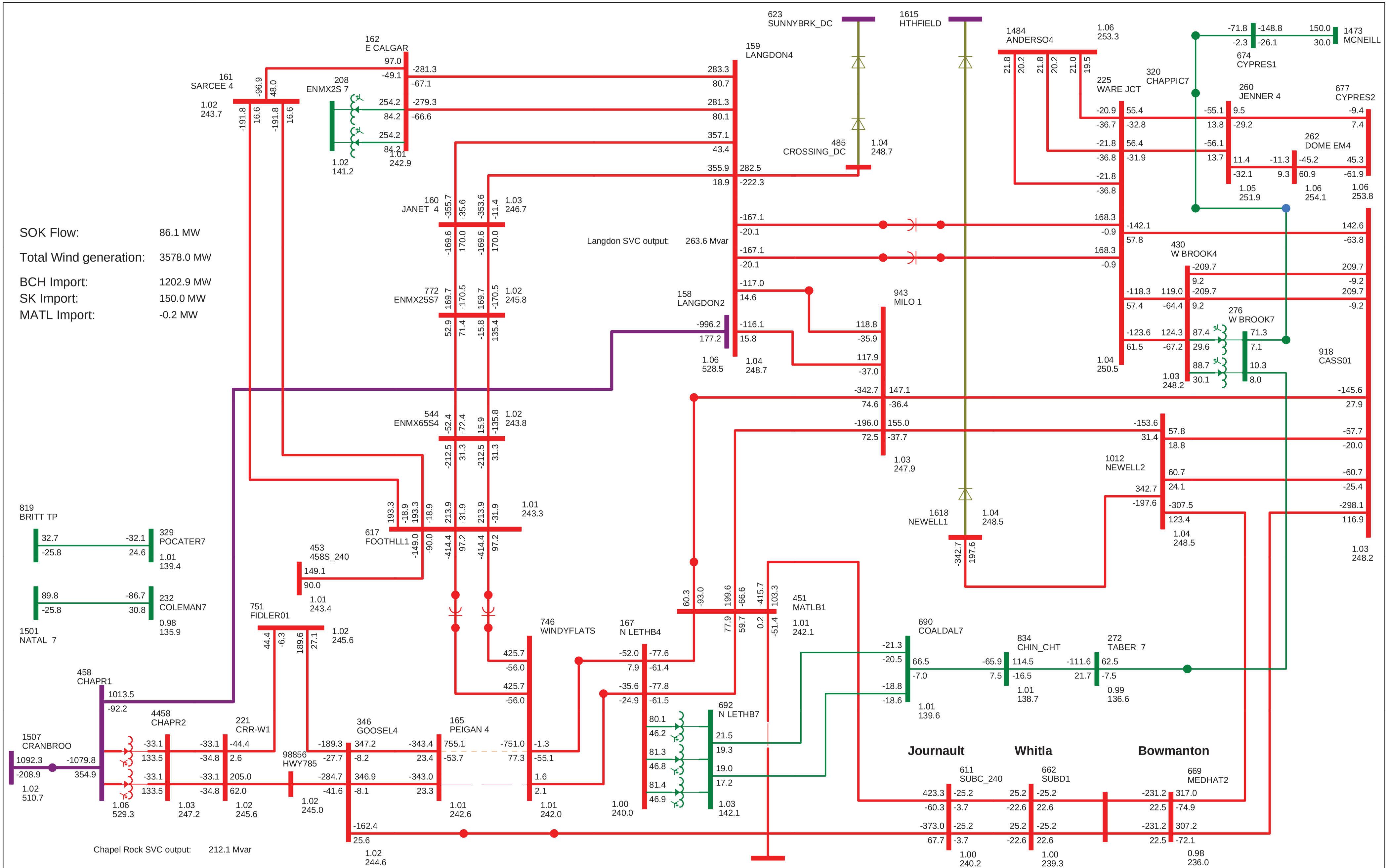
Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A
1.100OV 0.950UV
kV: <=69.000 <=138.000 <=240.000 <=500.000 >500.000

SLD_01: C1_32 (NO SS3)
CATEGORY B - 1049L 240 KV LINE (PEIGAN 59S TO WINDY FLATS 1
FRI, AUG 23 2013 16:10



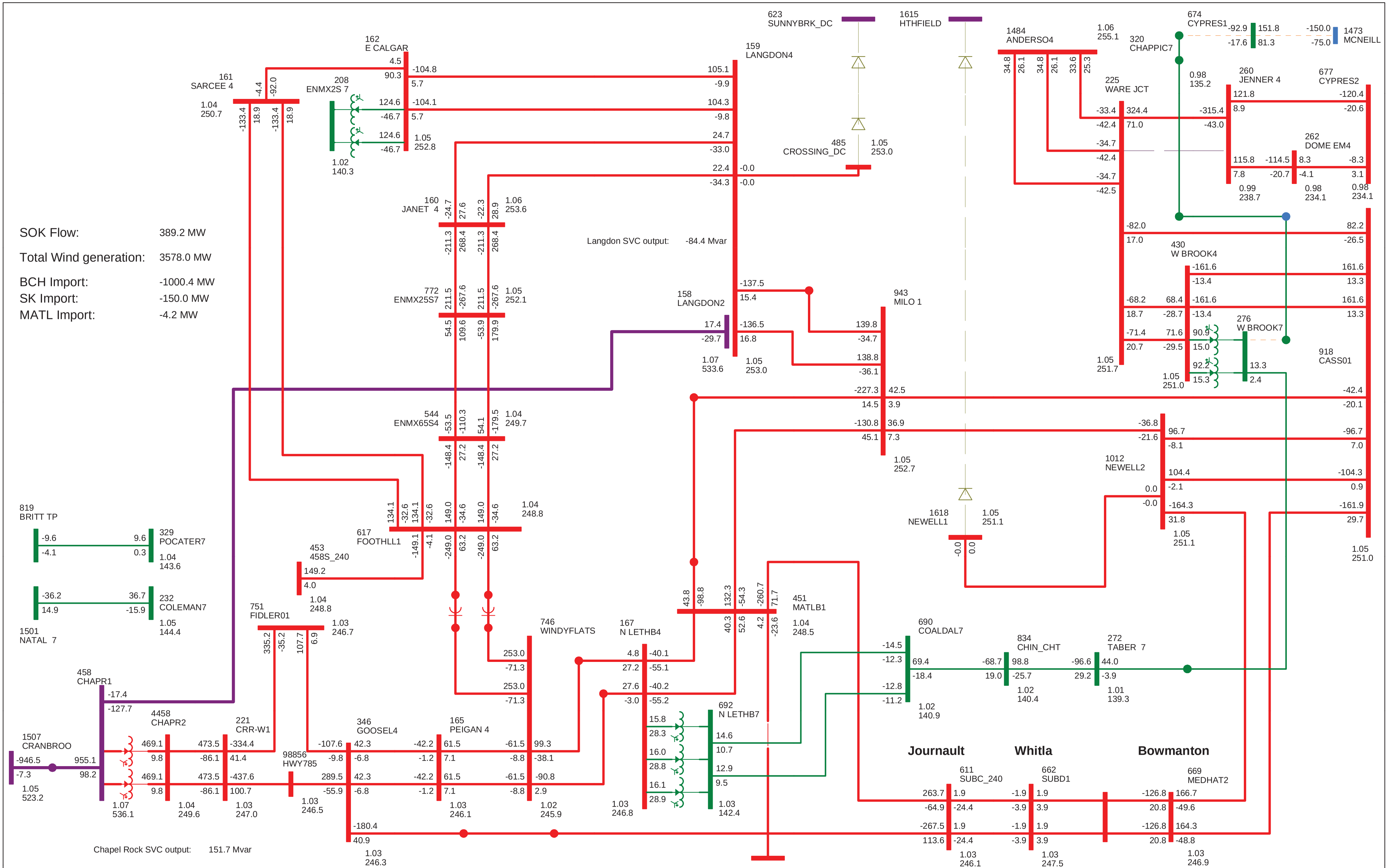
Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A
1.100OV 0.950UV
kV: <=69.000 <=138.000 <=240.000 <=500.000 >500.000

SLD_01: C1_32 (WITH SS3)
CATEGORY B - 1049L 240 KV LINE (PEIGAN 59S TO WINDY FLATS 1
FRI, AUG 23 2013 16:17



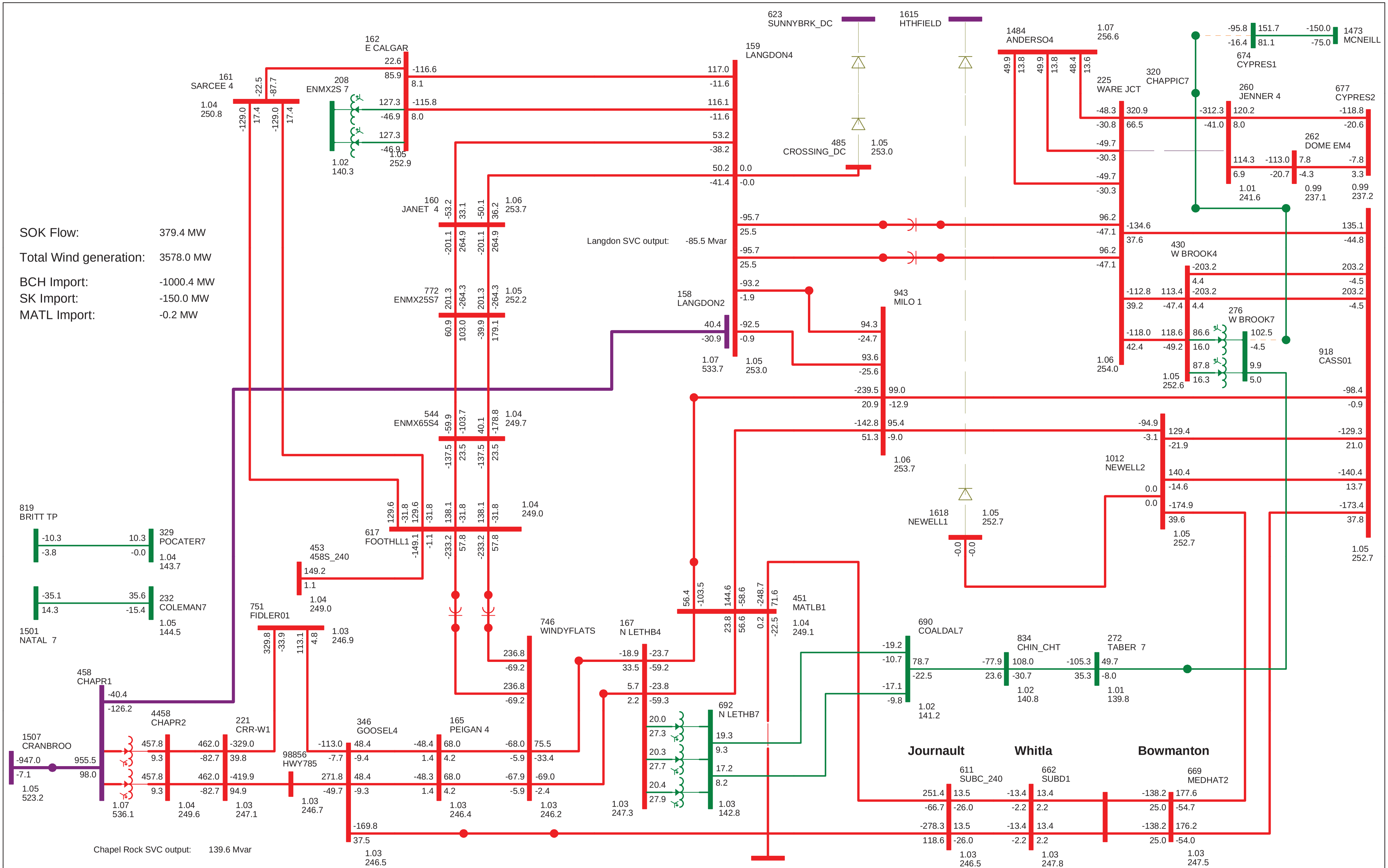
Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A
1.100OV 0.950UV
kV: <=69.000 <=138.000 <=240.000 <=500.000 >500.000

SLD_01: C3_32 (WITH SS3)
CATEGORY B - 1049L 240 KV LINE (PEIGAN 59S TO WINDY FLATS 1
FRI, AUG 23 2013 16:44



Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A
1.100OV 0.950UV
kV: <=69.000 <=138.000 <=240.000 <=500.000 >500.000

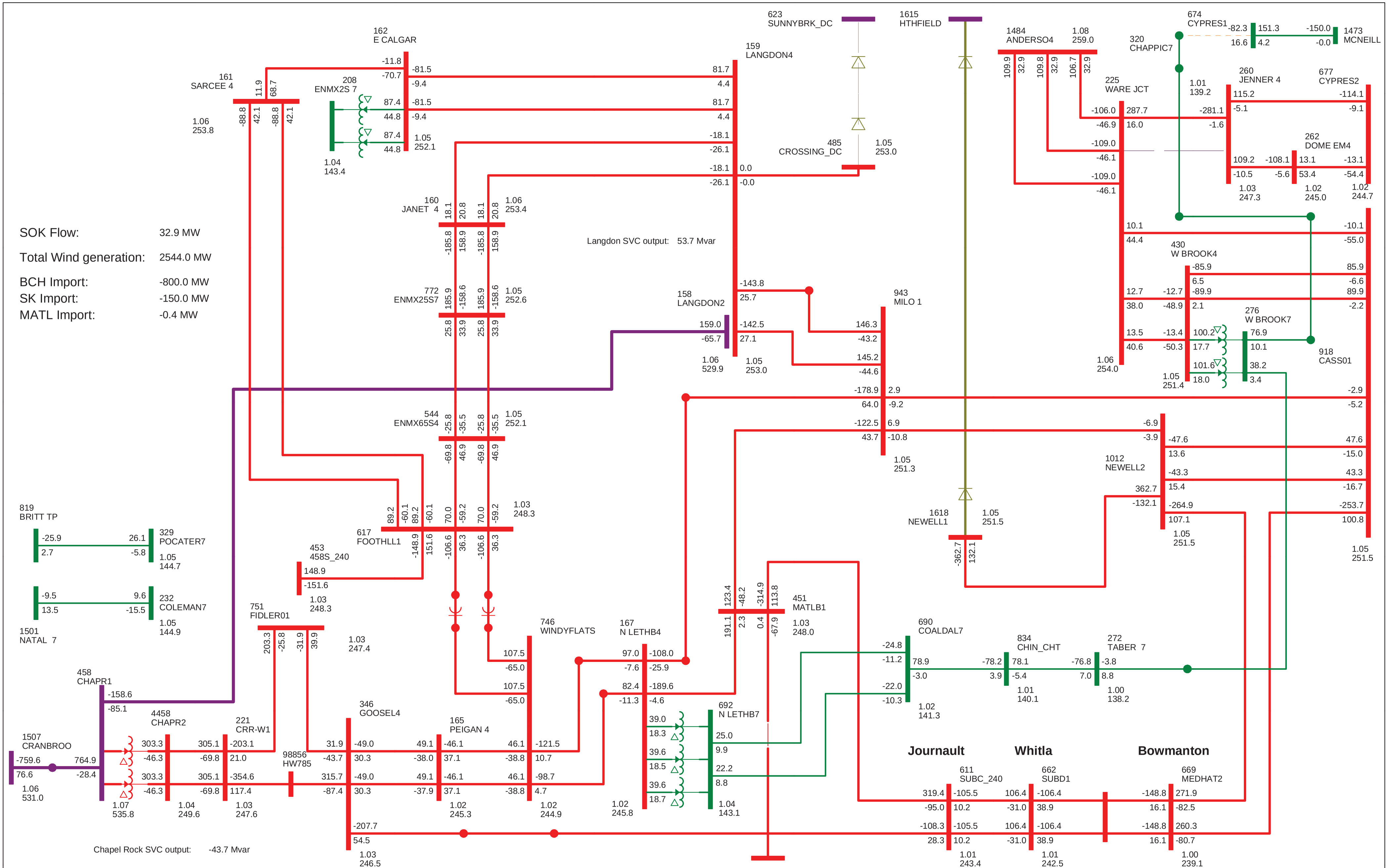
SLD_02: C2_32 (NO SS3)
CATEGORY B - 944L 240 KV LINE (WARE JUNCTION 132S TO JENNE
FRI, AUG 23 2013 16:24



SOK Flow:	379.4 MW
Total Wind generation:	3578.0 MW
BCH Import:	-1000.4 MW
SK Import:	-150.0 MW
MATL Import:	-0.2 MW

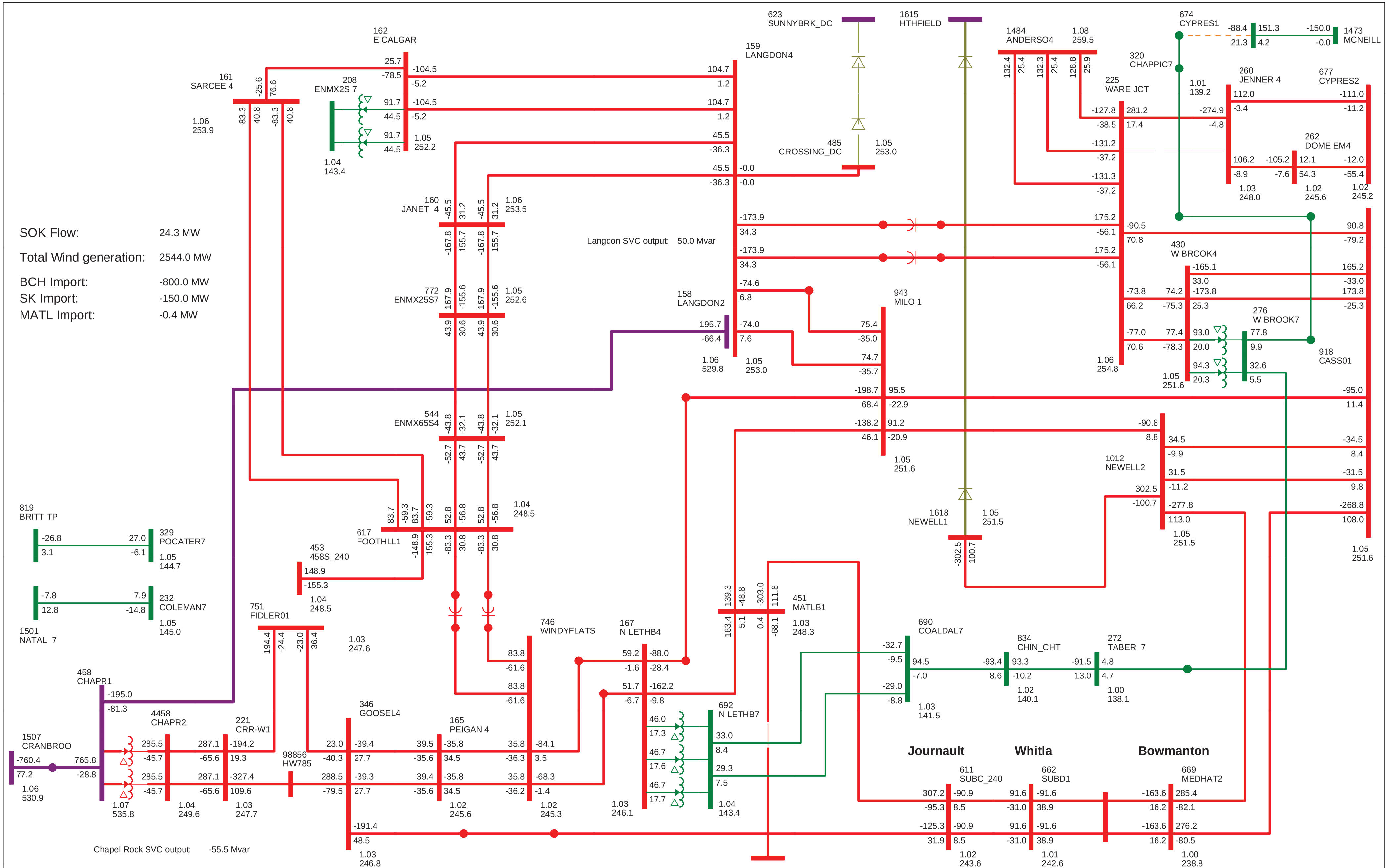
Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A
1.100OV 0.950UV
kV: <=69.000 <=138.000 <=240.000 <=500.000 >500.000

SLD_02: C2_32 (WITH SS3)
CATEGORY B - 944L 240 KV LINE (WARE JUNCTION 132S TO JENNE
FRI, AUG 23 2013 16:31



Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A
1.100OV 0.950UV
kV: <=69.000 <=138.000 <=240.000 <=500.000 >500.000

SLD_02: C4_22 (NO SS3)
CATEGORY B - 944L 240 KV LINE (WARE JUNCTION 132S TO JENNE
FRI, AUG 23 2013 15:30



SOK Flow: 24.3 MW

Total Wind generation: 2544.0 MW

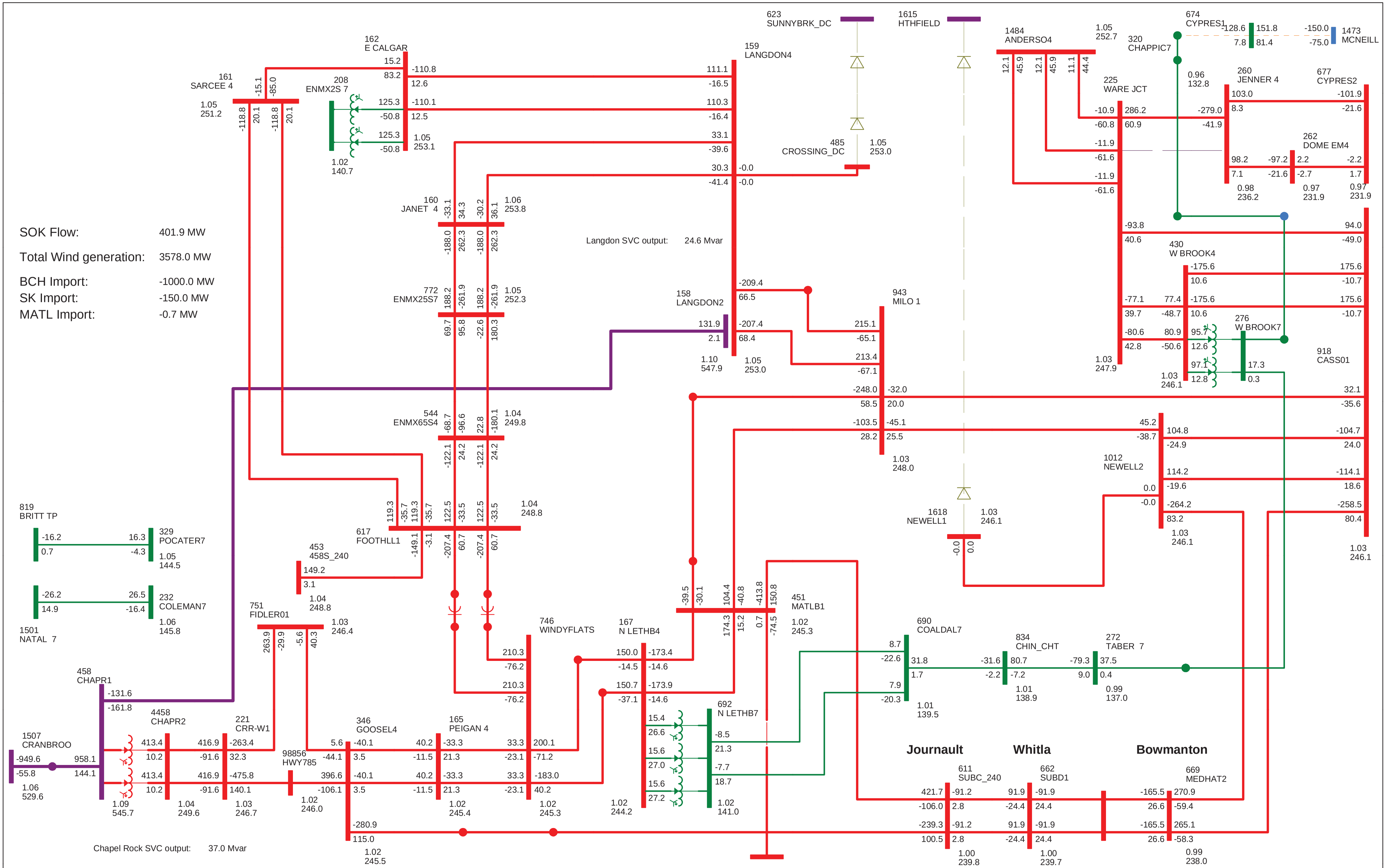
BCH Import: -800.0 MW

SK Import: -150.0 MW

MATL Import: -0.4 MW

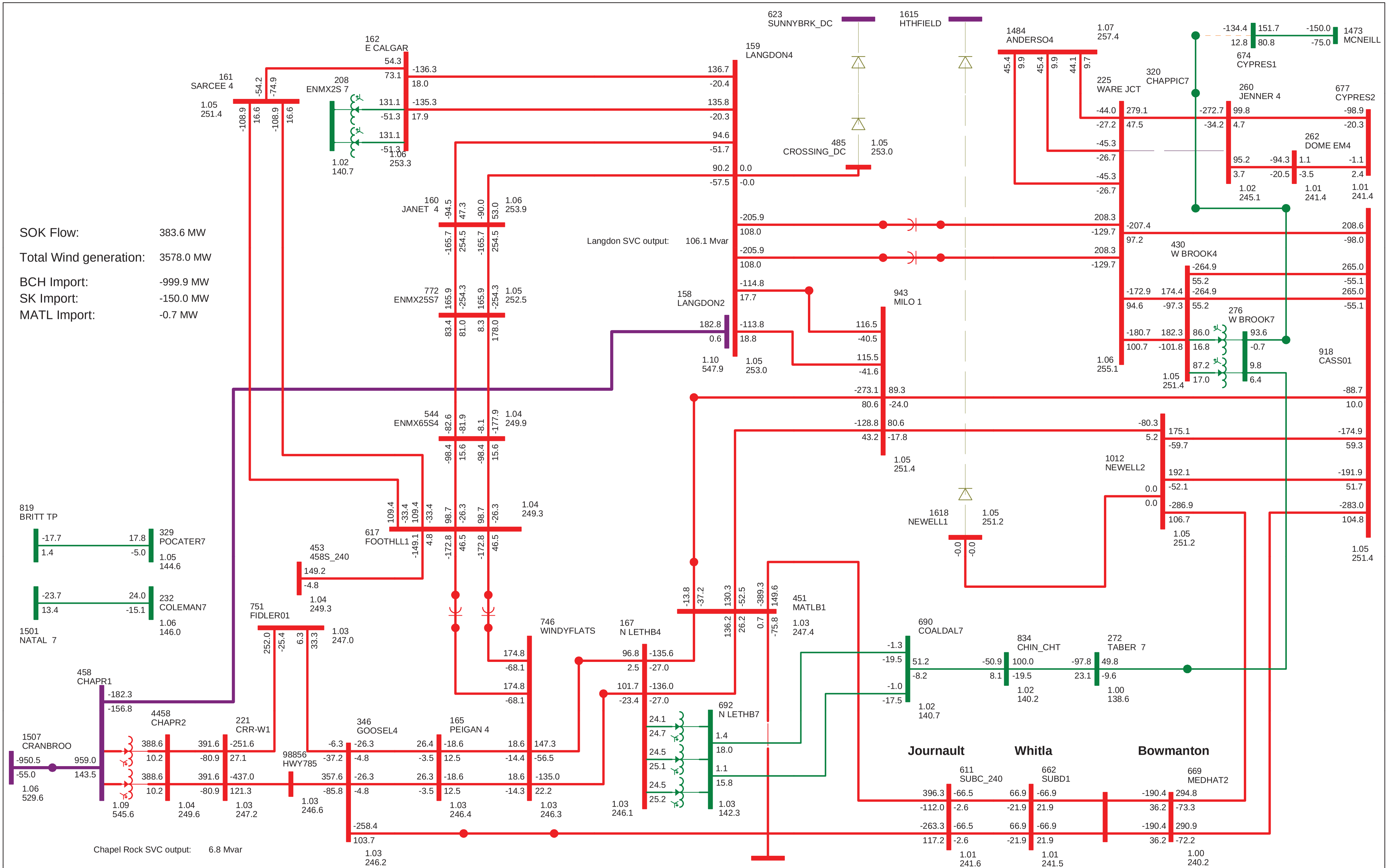
Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A
1.100OV 0.950UV
kV: <=69.000 <=138.000 <=240.000 <=500.000 >500.000

SLD_02: C4_22 (WITH SS3)
CATEGORY B - 944L 240 KV LINE (WARE JUNCTION 132S TO JENNE
FRI, AUG 23 2013 15:36



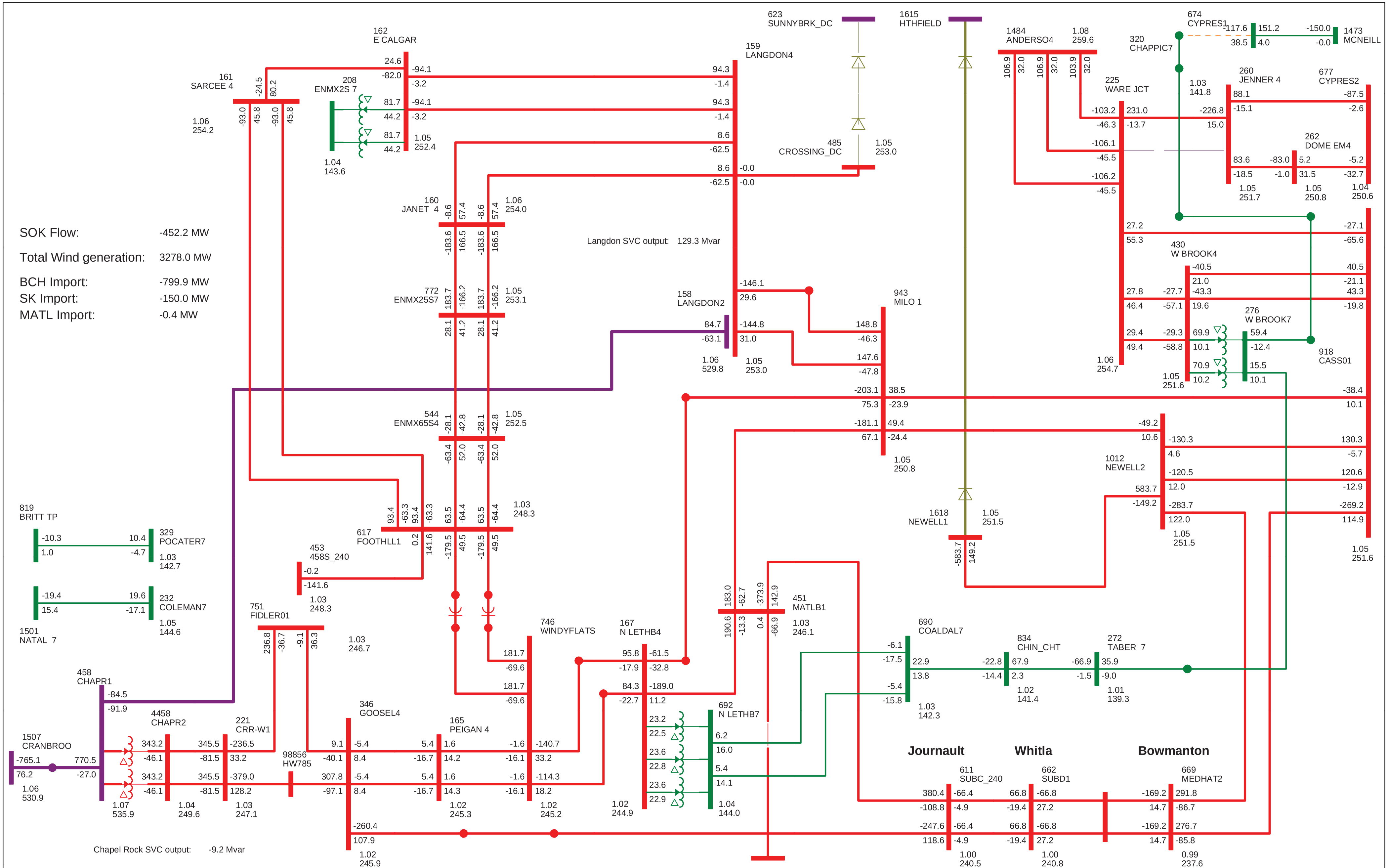
Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A
1.100OV 0.950UV
kV: <=69.000 <=138.000 <=240.000 <=500.000 >500.000

SLD_02: C4_32 (NO SS3)
CATEGORY B - 944L 240 KV LINE (WARE JUNCTION 132S TO JENNE
FRI, AUG 23 2013 16:51



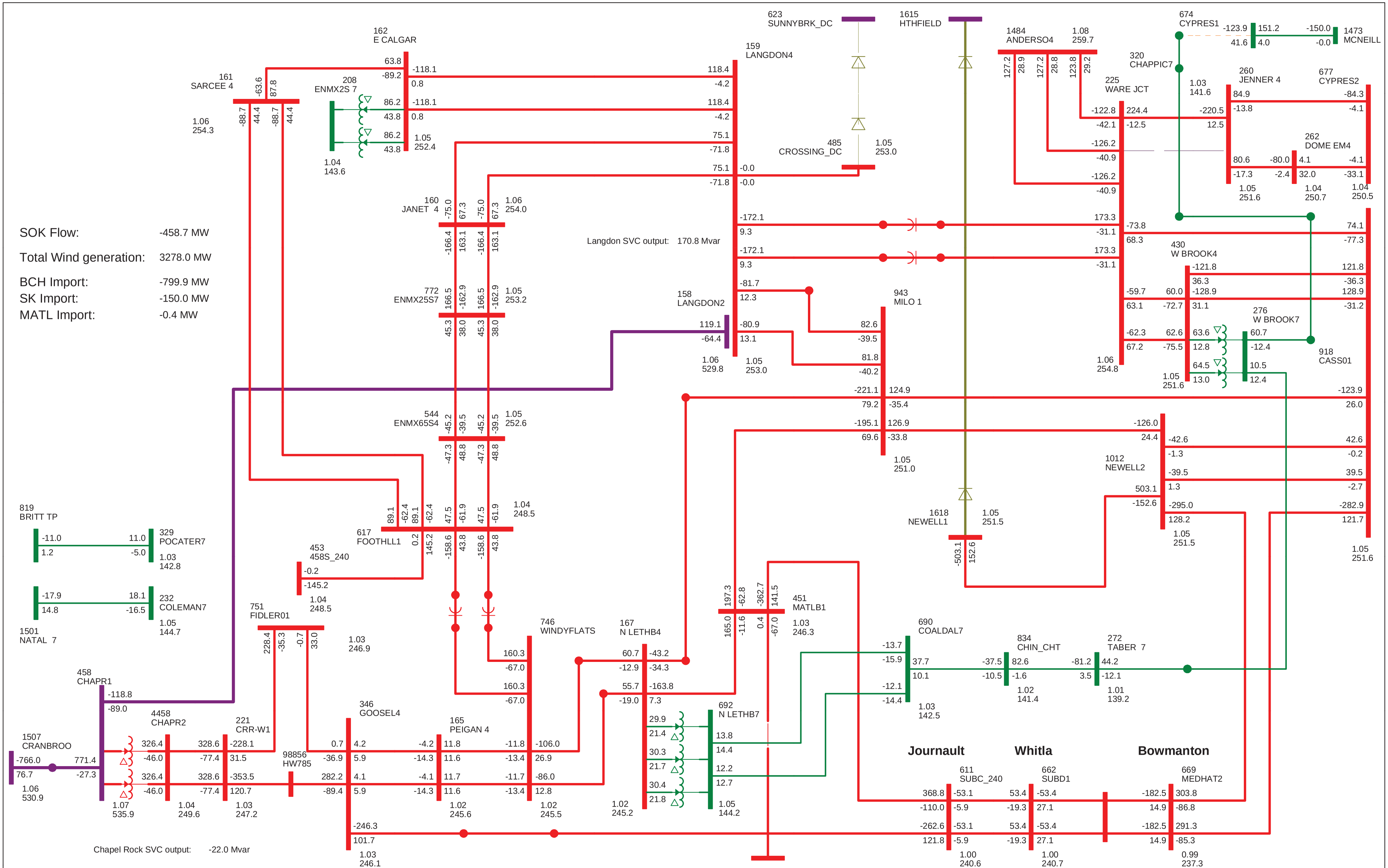
Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A
1.100OV 0.950UV
kV: <=69.000 <=138.000 <=240.000 <=500.000 >500.000

SLD_02: C4_32 (WITH SS3)
CATEGORY B - 944L 240 KV LINE (WARE JUNCTION 132S TO JENNE
FRI, AUG 23 2013 16:58



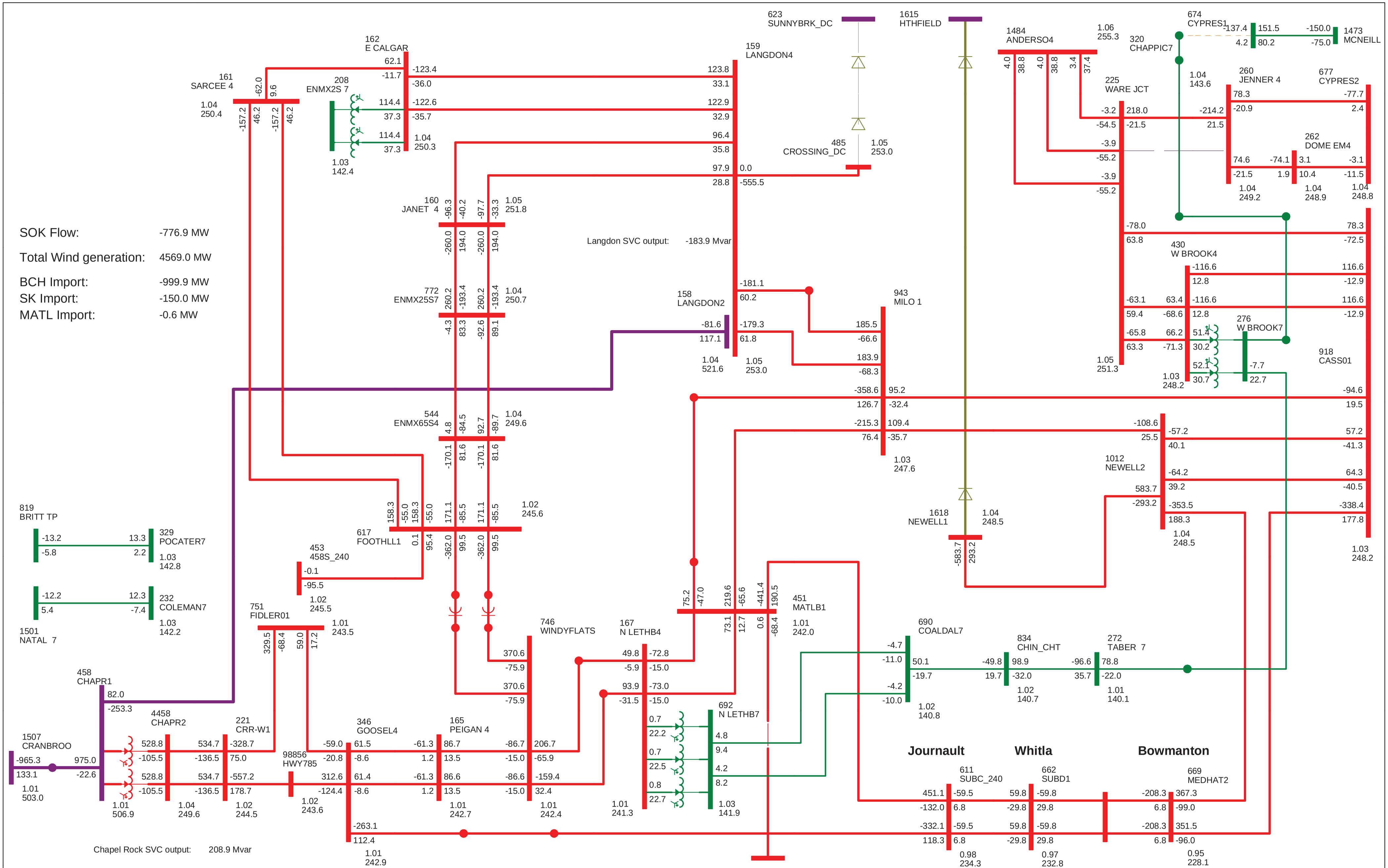
Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A
1.100OV 0.950UV
kV: <=69.000 <=138.000 <=240.000 <=500.000 >500.000

SLD_02: C5_22 (NO SS3)
CATEGORY B - 944L 240 KV LINE (WARE JUNCTION 132S TO JENNE
FRI, AUG 23 2013 15:43



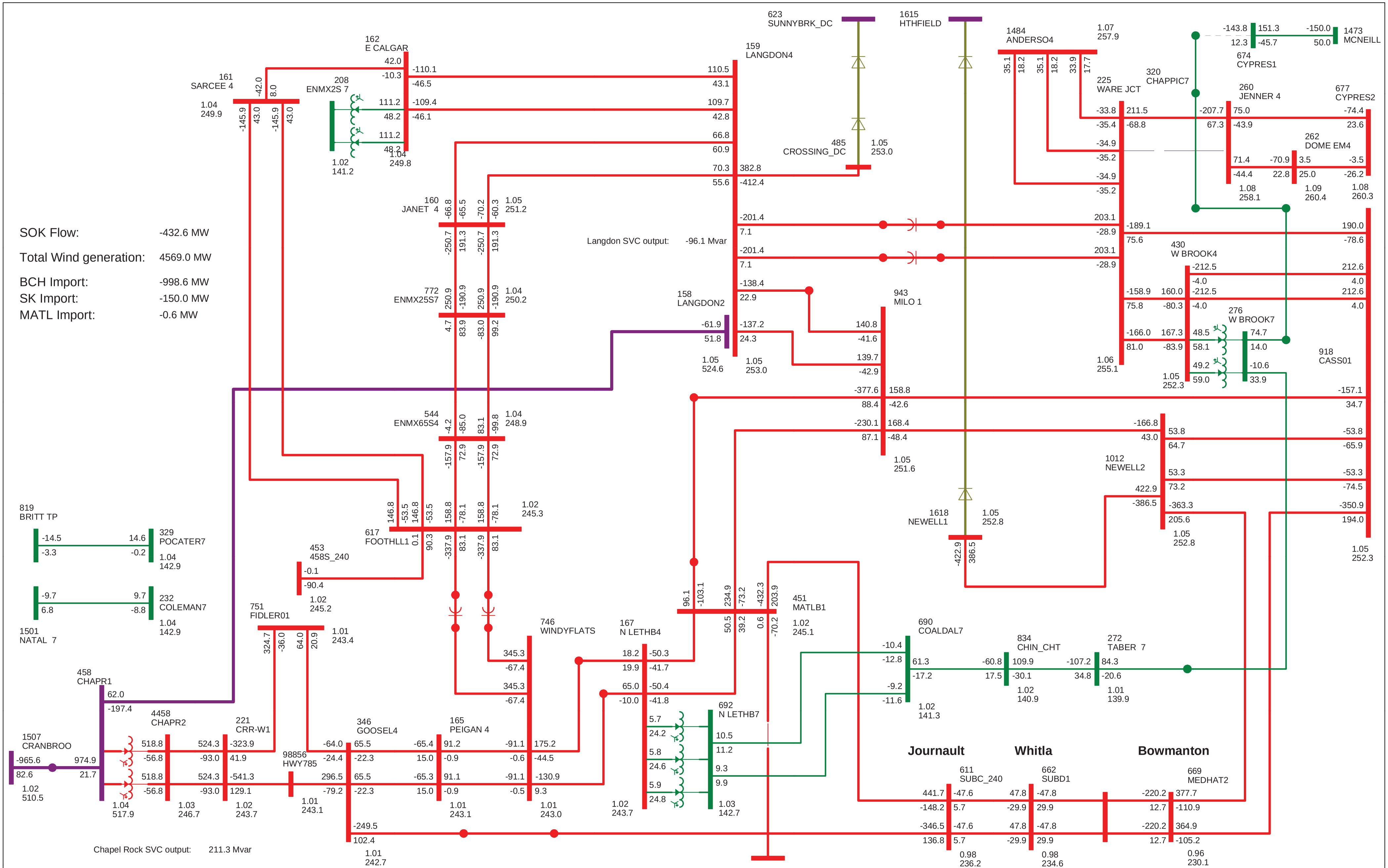
Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A
1.100OV 0.950UV
kV: <=69.000 <=138.000 <=240.000 <=500.000 >500.000

SLD_02: C5_22 (WITH SS3)
CATEGORY B - 944L 240 KV LINE (WARE JUNCTION 132S TO JENNE
FRI, AUG 23 2013 15:50



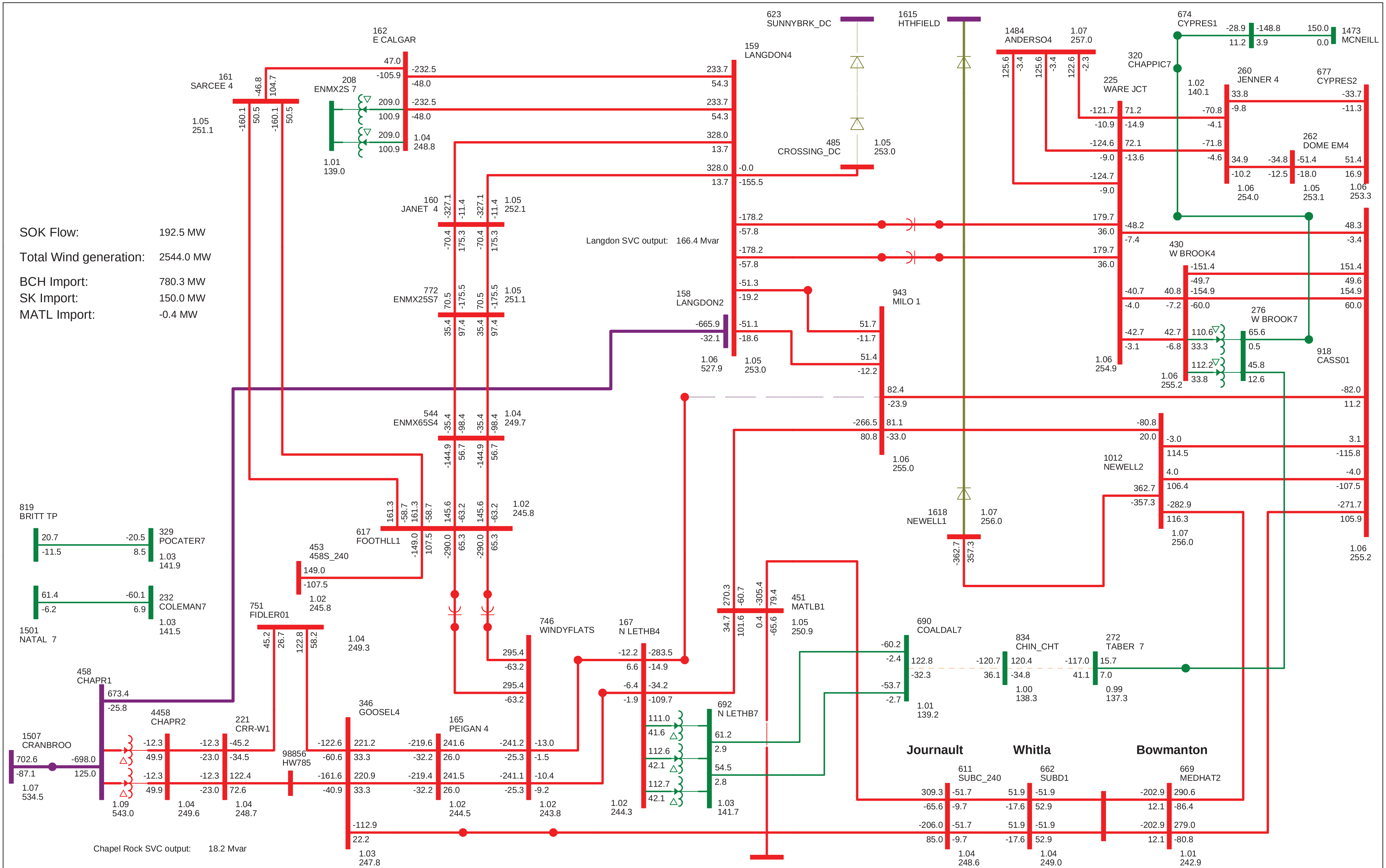
Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A
1.100OV 0.950UV
kV: <=69.000 <=138.000 <=240.000 <=500.000 >500.000

SLD_02: C5_32 (NO SS3)
CATEGORY B - 944L 240 KV LINE (WARE JUNCTION 132S TO JENNE
FRI, AUG 23 2013 17:05



Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A
1.100OV 0.950UV
kV: <=69.000 <=138.000 <=240.000 <=500.000 >500.000

SLD_02: C5_32 (WITH SS3)
CATEGORY B - 944L 240 KV LINE (WARE JUNCTION 132S TO JENNE
FRI, AUG 23 2013 17:12



SOK Flow: 192.5 MW

Total Wind generation: 2544.0 MW

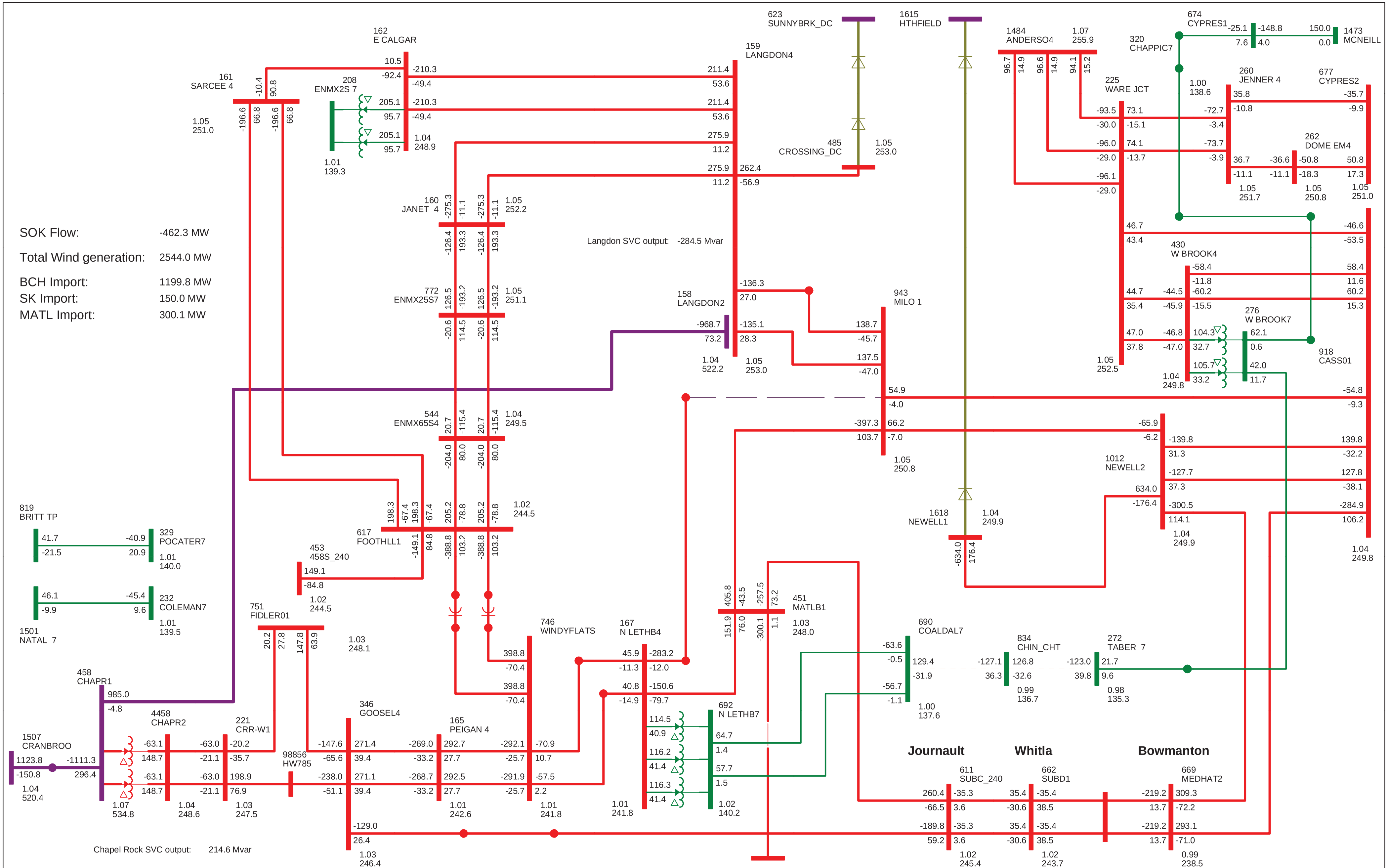
BCH Import: 780.3 MW

SK Import: 150.0 MW

MATL Import: -0.4 MW

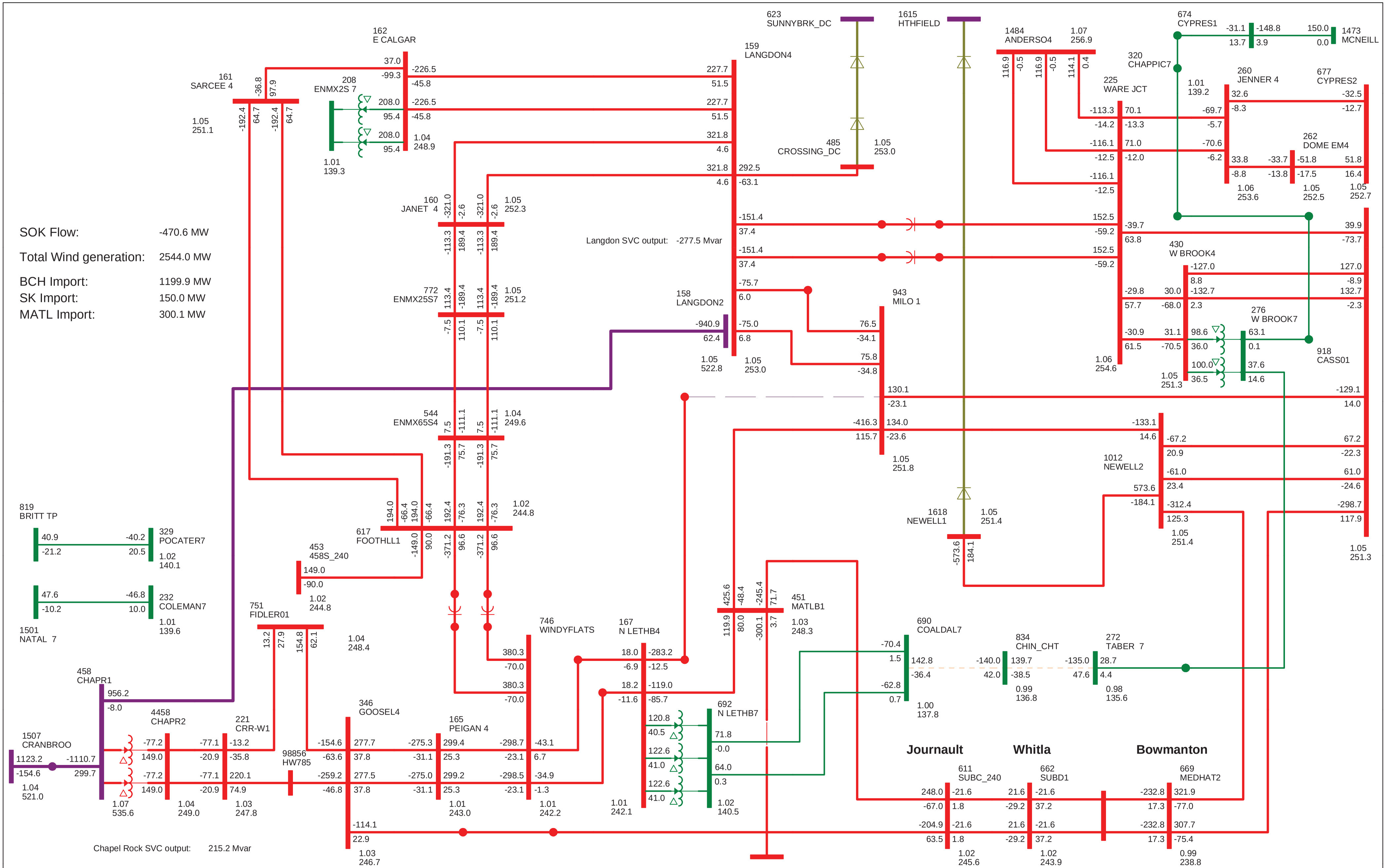
Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A
1.100OV 0.950UV
kV: <=69.000 <=138.000 <=240.000 <=500.000 >500.000

SLD_03: C3_22 (WITH SS3)
CATEGORY B - 1036L 240 KV LINE (TRAVERS 554S TO MILO 356S)
FRI, AUG 23 2013 15:23



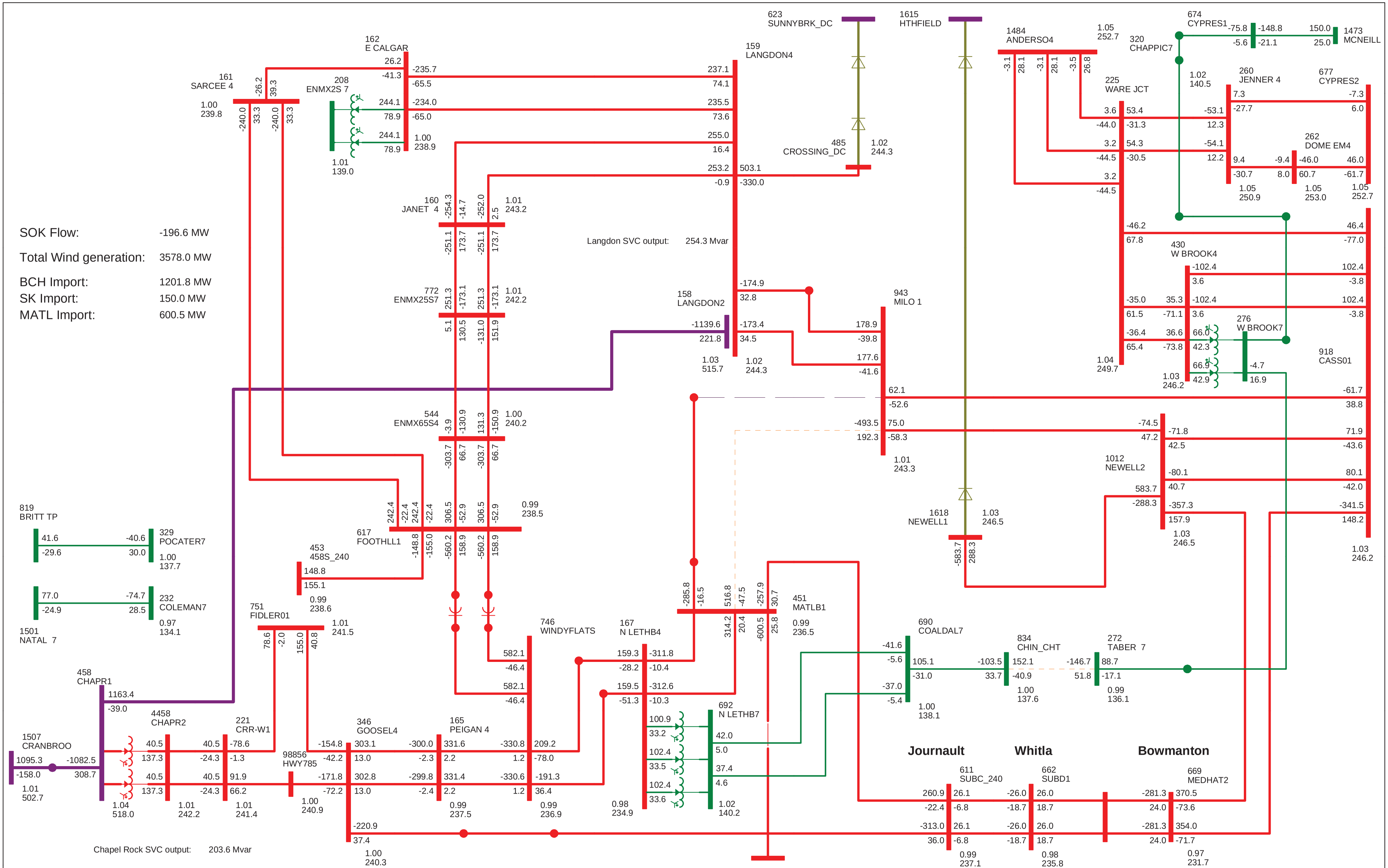
Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A
1.100OV 0.950UV
kV: <=69.000 <=138.000 <=240.000 <=500.000 >500.000

SLD_03: C6_22 (NO SS3)
CATEGORY B - 1036L 240 KV LINE (TRAVERS 554S TO MILO 356S)
FRI, AUG 23 2013 15:57



Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A
1.100OV 0.950UV
kV: <=69.000 <=138.000 <=240.000 <=500.000 >500.000

SLD_03: C6_22 (WITH SS3)
CATEGORY B - 1036L 240 KV LINE (TRAVERS 554S TO MILO 356S)
FRI, AUG 23 2013 16:05



Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A
1.100OV 0.950UV
kV: <=69.000 <=138.000 <=240.000 <=500.000 >500.000

SLD_03: C6_32 (NO SS3)
CATEGORY B - 1036L 240 KV LINE (TRAVERS 554S TO MILO 356S)
FRI, AUG 23 2013 17:20

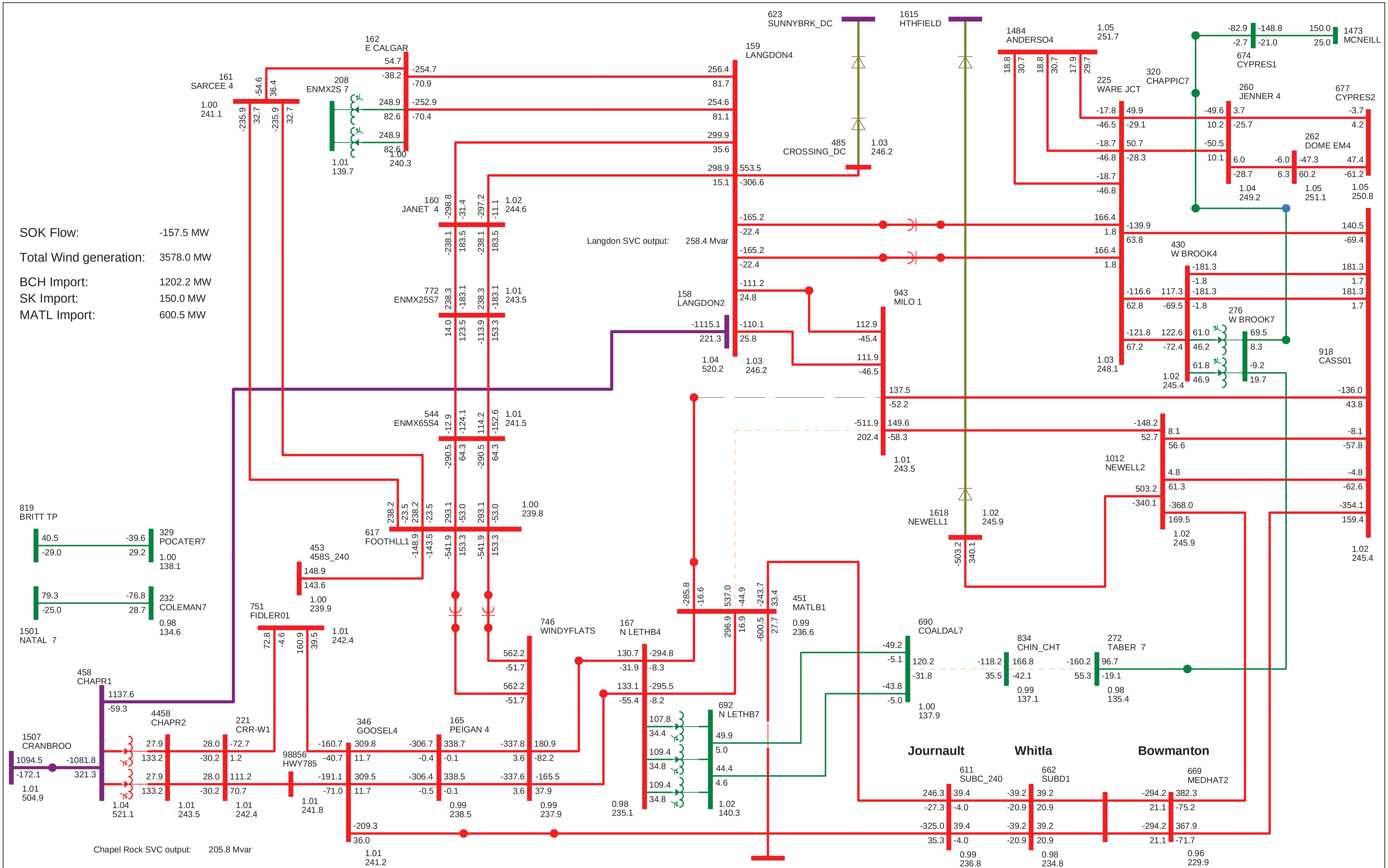
SOK Flow: -157.5 MW

Total Wind generation: 3578.0 MW

BCH Import: 1202.2 MW

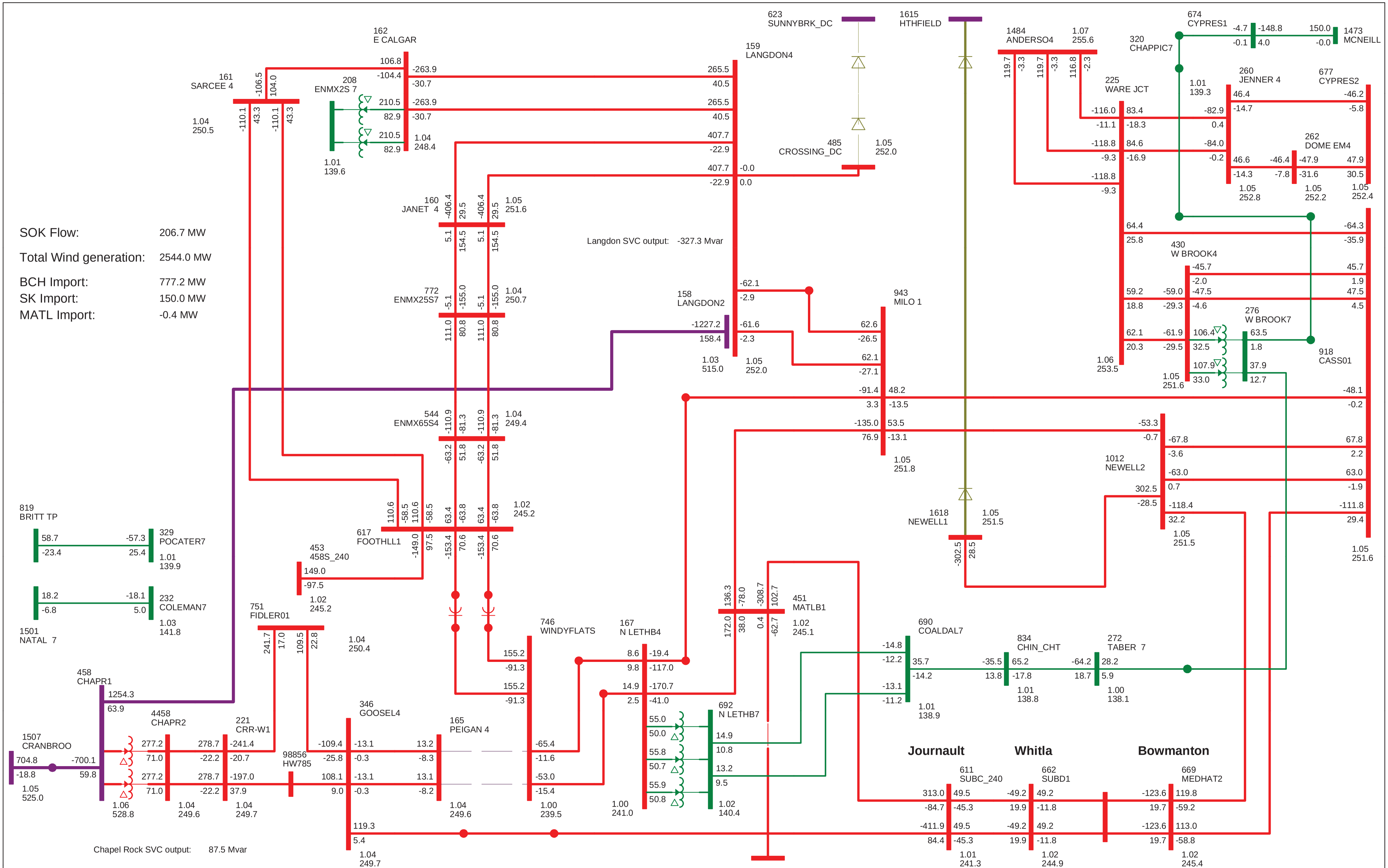
SK Import: 150.0 MW

MATL Import: 600.5 MW



Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A
1.100OV 0.950UV
kV: <=69.000 <=138.000 <=240.000 <=500.000 >500.000

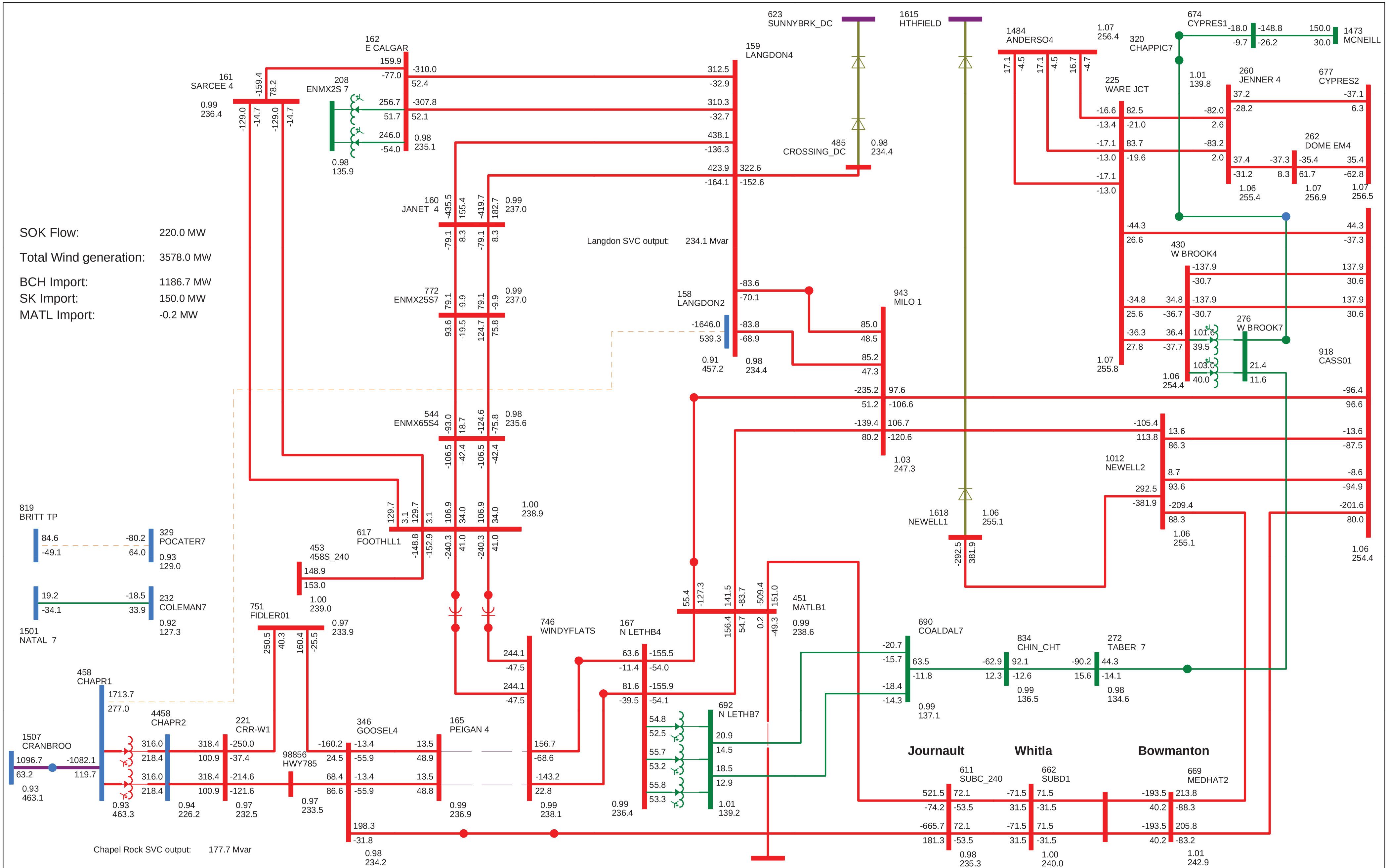
SLD_03: C6_32 (WITH SS3)
CATEGORY B - 1036L 240 KV LINE (TRAVERS 554S TO MILO 356S)
FRI, AUG 23 2013 17:26



SOK Flow:	206.7 MW
Total Wind generation:	2544.0 MW
BCH Import:	777.2 MW
SK Import:	150.0 MW
MATL Import:	-0.4 MW

Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A
1.100OV 0.950UV
kV: <=69.000 <=138.000 <=240.000 <=500.000 >500.000

SLD_04: C1_22 (NO SS3)
CATEGORY C5 - 1048L, 1049L 240 KV LINES (PEIGAN 59S TO WINDY
FRI, AUG 23 2013 14:50



Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A
1.100OV 0.950UV
kV: <=69.000 <=138.000 <=240.000 <=500.000 >500.000

SLD_04: C1_32 (NO SS3)
CATEGORY C5 - 1048L, 1049L 240 KV LINES (PEIGAN 59S TO WINDY
FRI, AUG 23 2013 16:12

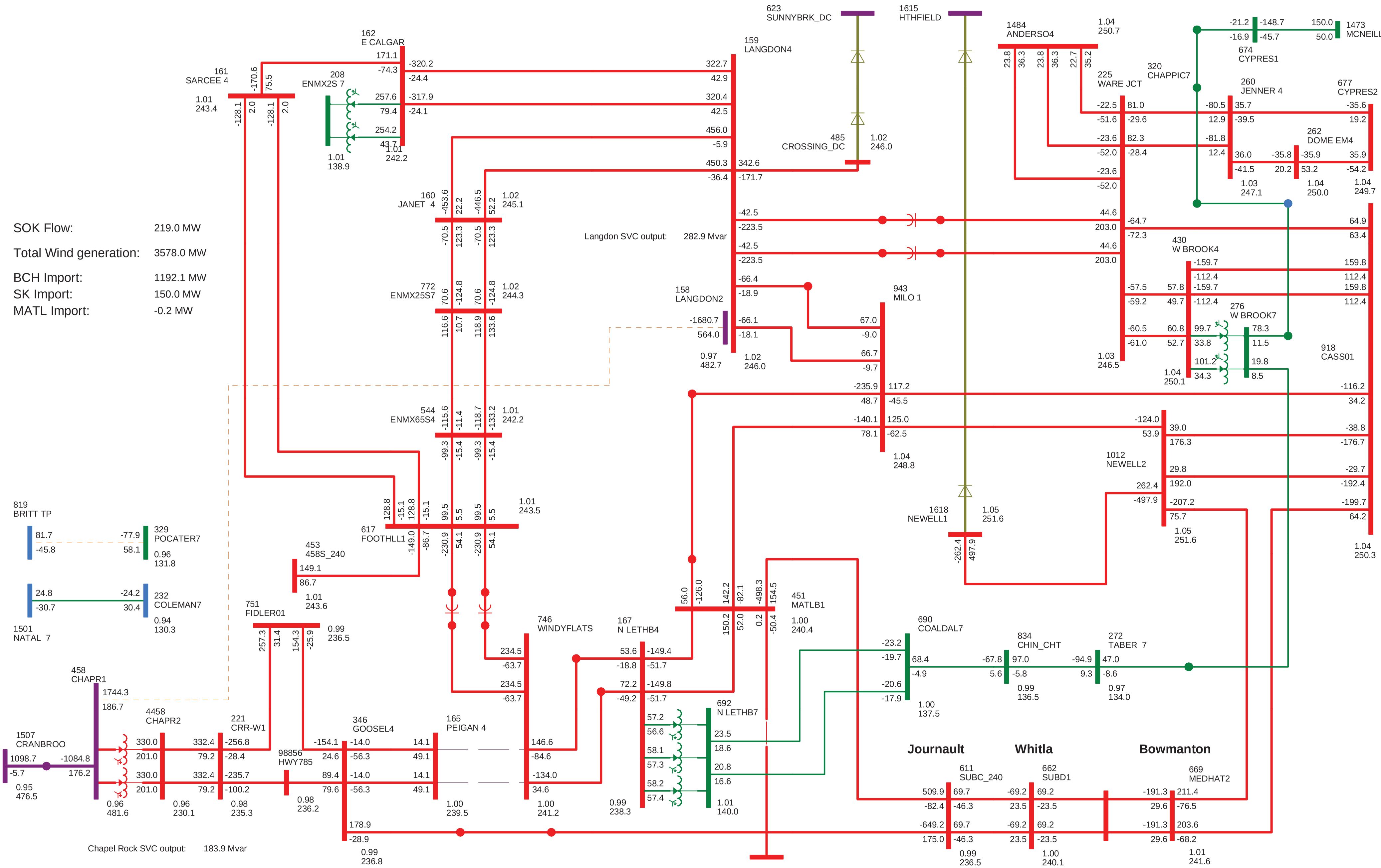
SOK Flow: 219.0 MW

Total Wind generation: 3578.0 MW

BCH Import: 1192.1 MW

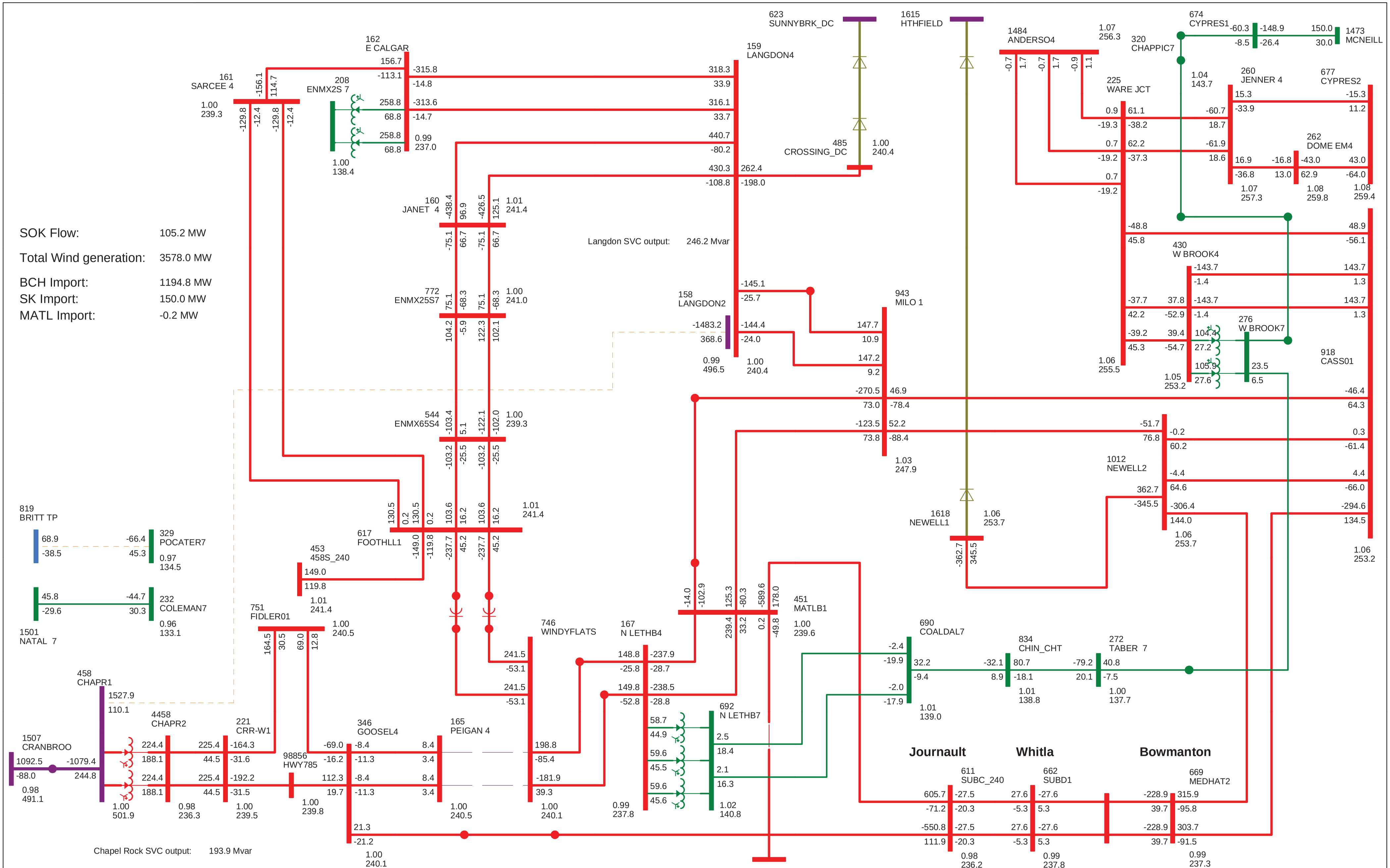
SK Import: 150.0 MW

MATL Import: -0.2 MW



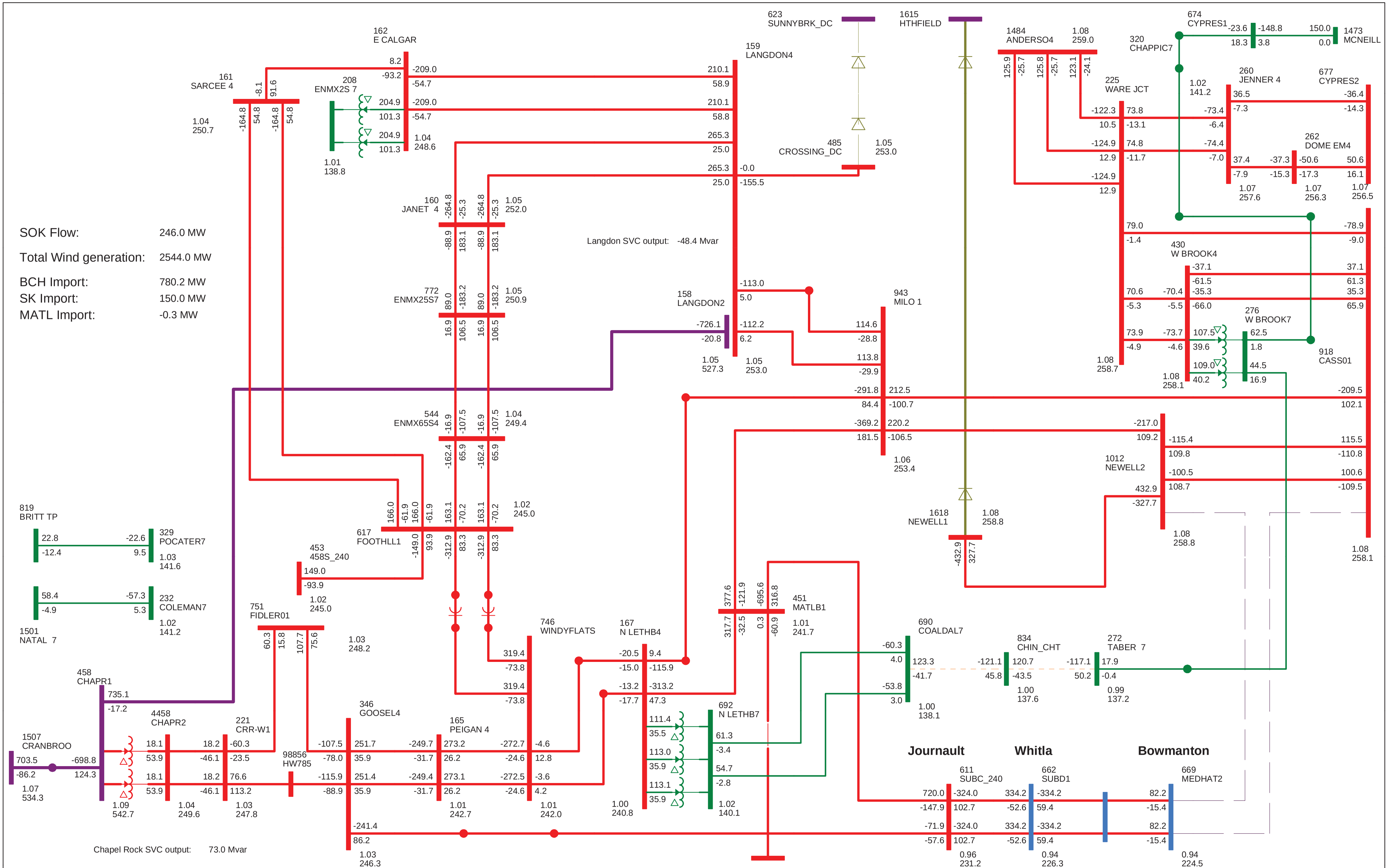
Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A
1.100OV 0.950UV
kV: <=69.000 <=138.000 <=240.000 <=500.000 >500.000

SLD_04: C1_32 (WITH SS3)
CATEGORY C5 - 1048L, 1049L 240 KV LINES (PEIGAN 59S TO WINDY
FRI, AUG 23 2013 16:19



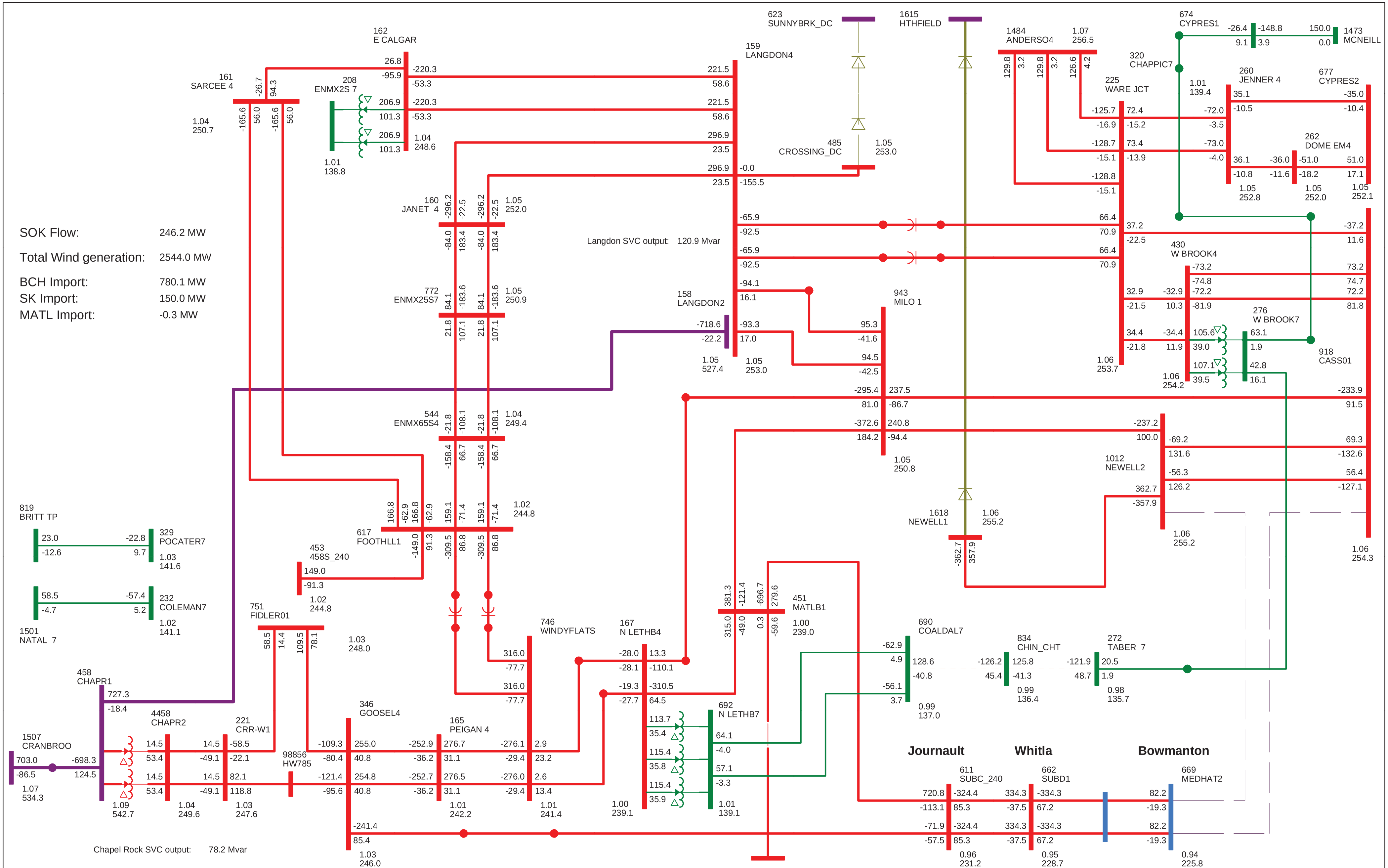
Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A
1.100OV 0.950UV
kV: <=69.000 <=138.000 <=240.000 <=500.000 >500.000

SLD_04: C3_32 (NO SS3)
CATEGORY C5 - 1048L, 1049L 240 KV LINES (PEIGAN 59S TO WINDY
FRI, AUG 23 2013 16:39



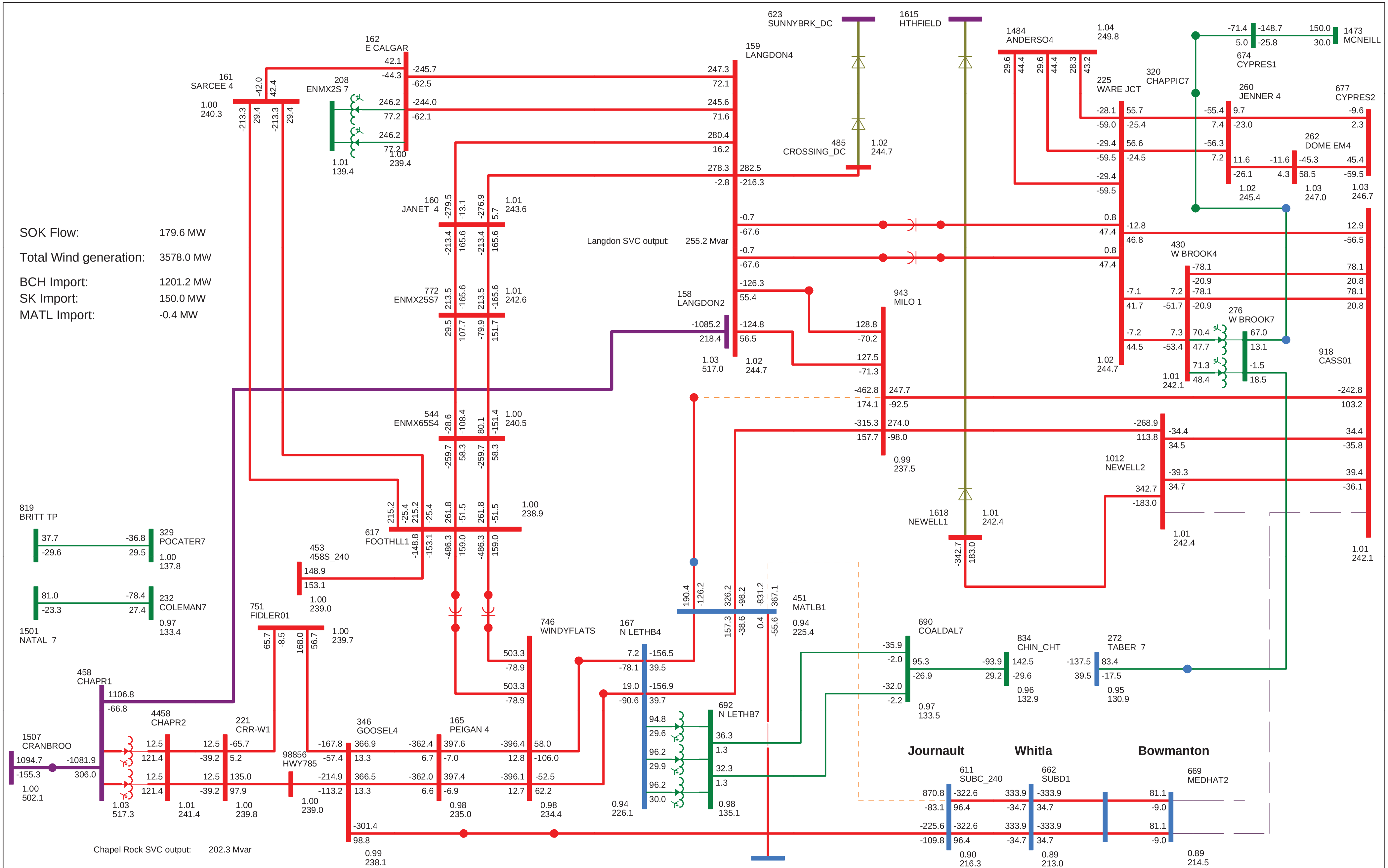
Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A
1.100OV 0.950UV
kV: <=69.000 <=138.000 <=240.000 <=500.000 >500.000

SLD_05: C3_22 (NO SS3)
CATEGORY C5 - 1034L, 1035L 240 KV LINE (BOWMANTON 244S TO CA
FRI, AUG 23 2013 15:18



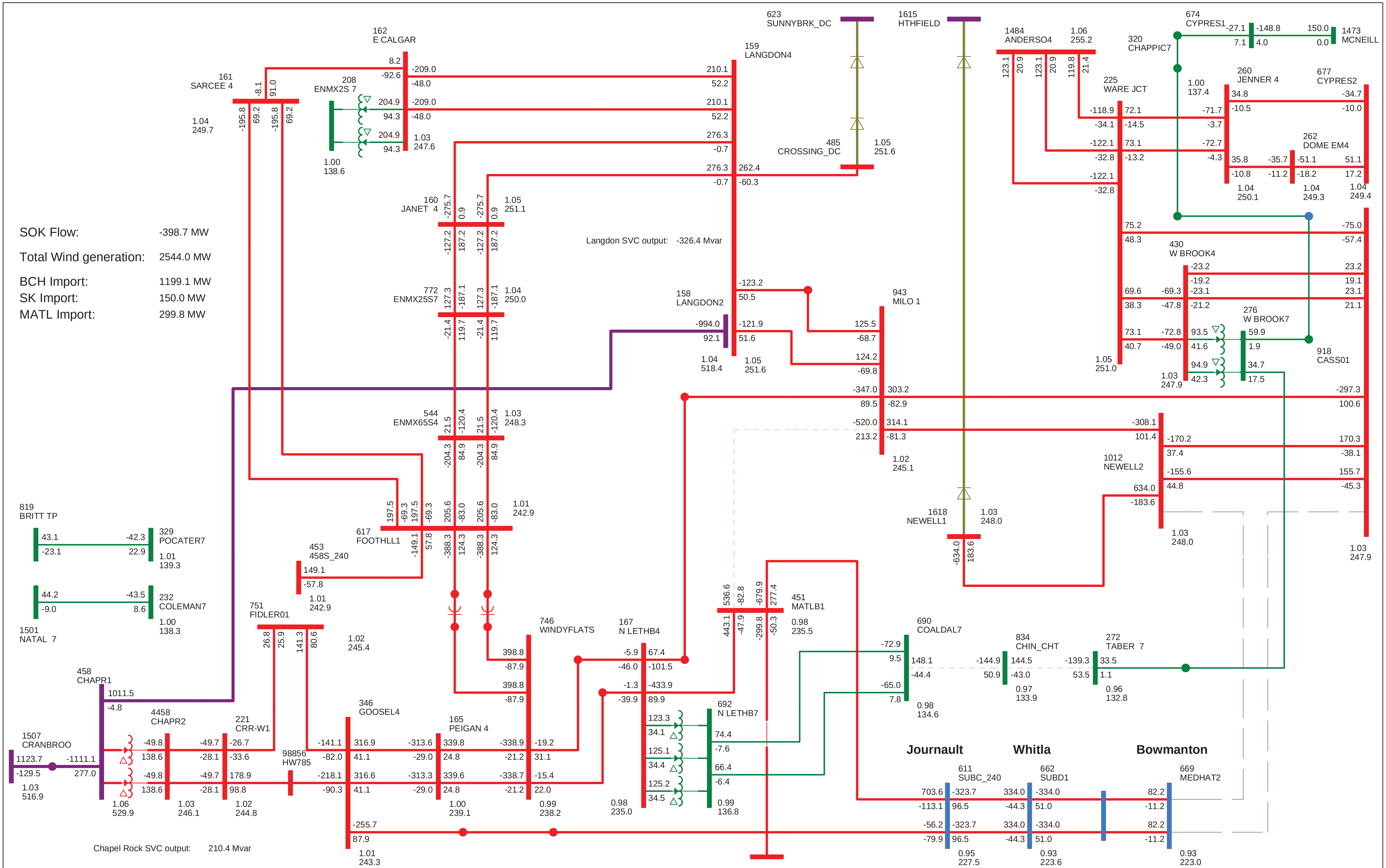
Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A
1.100OV 0.950UV
kV: <=69.000 <=138.000 <=240.000 <=500.000 >500.000

SLD_05: C3_22 (WITH SS3)
CATEGORY C5 - 1034L, 1035L 240 KV LINE (BOWMANTON 244S TO CA
FRI, AUG 23 2013 15:25



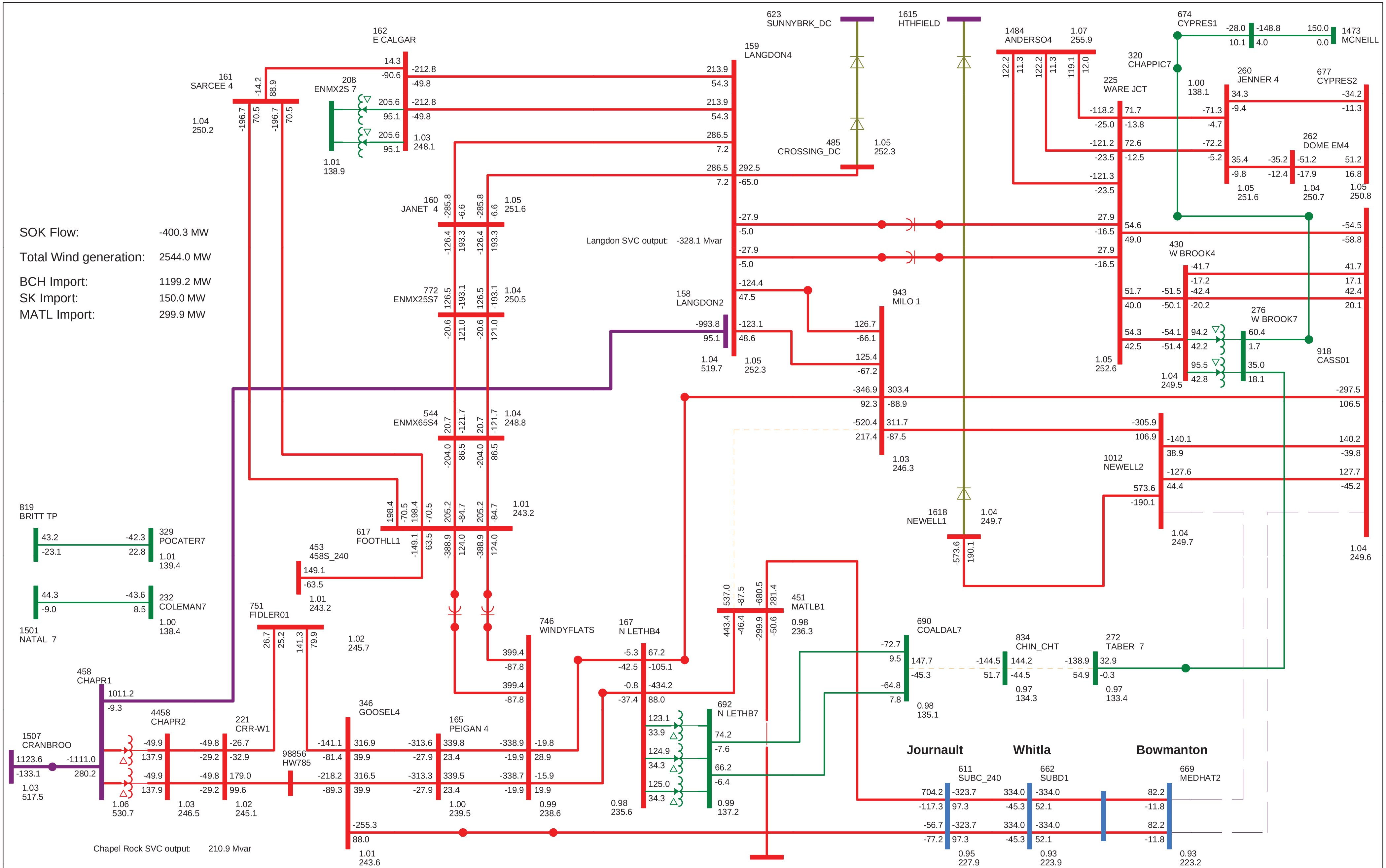
Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A
1.100OV 0.950UV
kV: <=69.000 <=138.000 <=240.000 <=500.000 >500.000

SLD_05: C3_32 (WITH SS3)
CATEGORY C5 - 1034L, 1035L 240 KV LINE (BOWMANTON 244S TO CA
FRI, AUG 23 2013 16:46



Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A
1.100OV 0.950UV
kV: <=69.000 <=138.000 <=240.000 <=500.000 >500.000

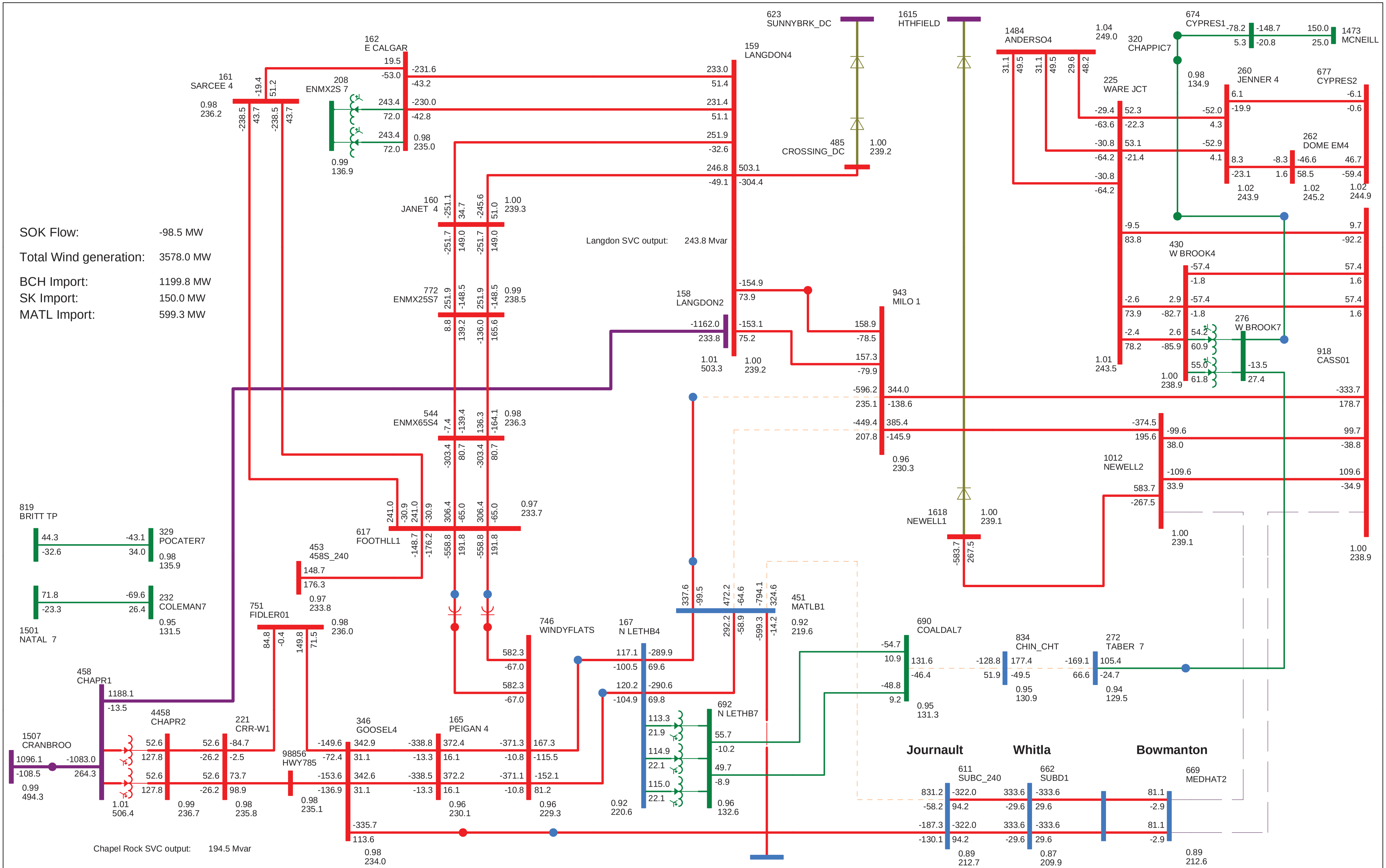
SLD_05: C6_22 (NO SS3)
CATEGORY C5 - 1034L, 1035L 240 KV LINE (BOWMANTON 244S TO CA
FRI, AUG 23 2013 15:59



SOK Flow:	-400.3 MW
Total Wind generation:	2544.0 MW
BCH Import:	1199.2 MW
SK Import:	150.0 MW
MATL Import:	299.9 MW

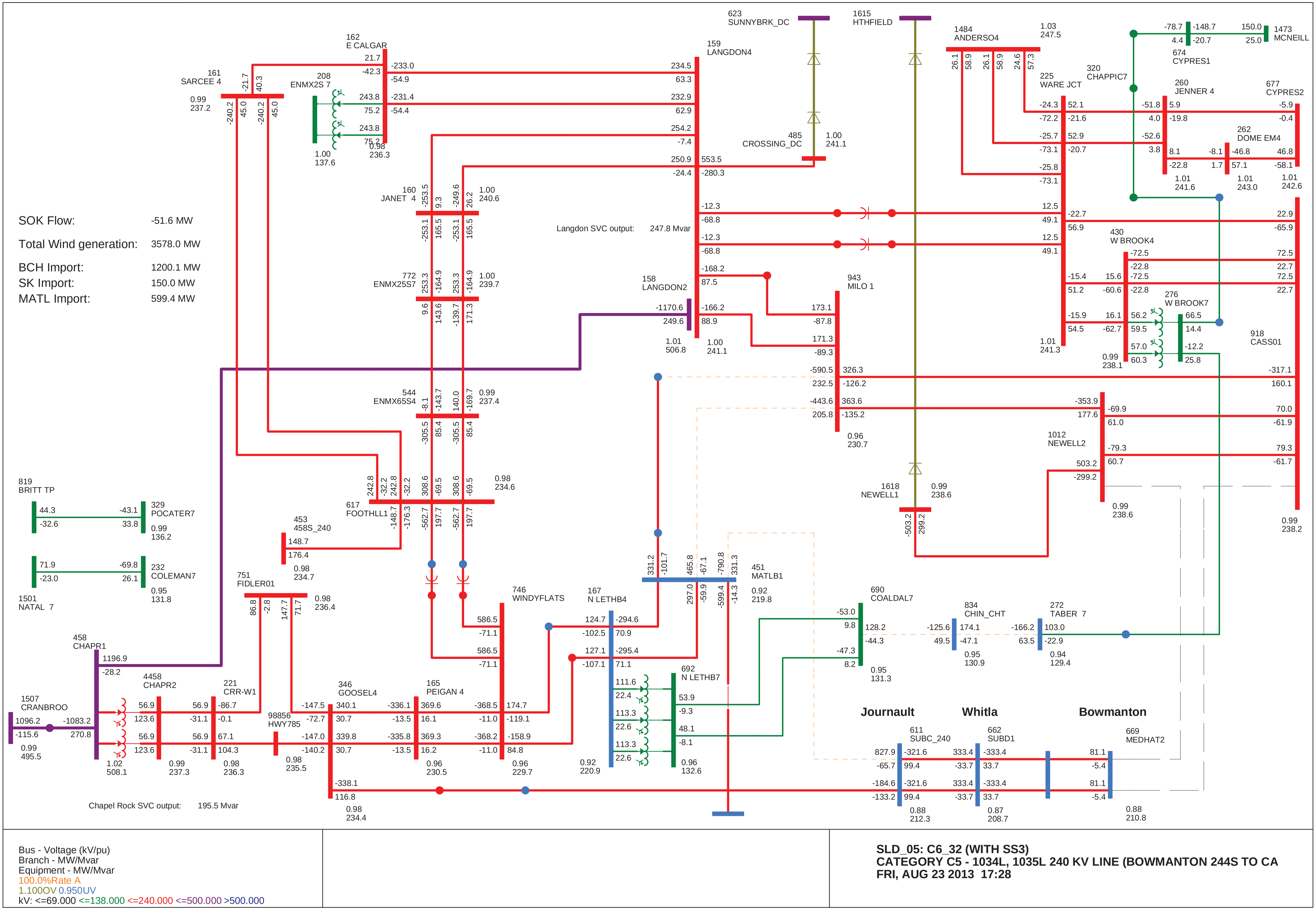
Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A
1.100OV 0.950UV
kV: <=69.000 <=138.000 <=240.000 <=500.000 >500.000

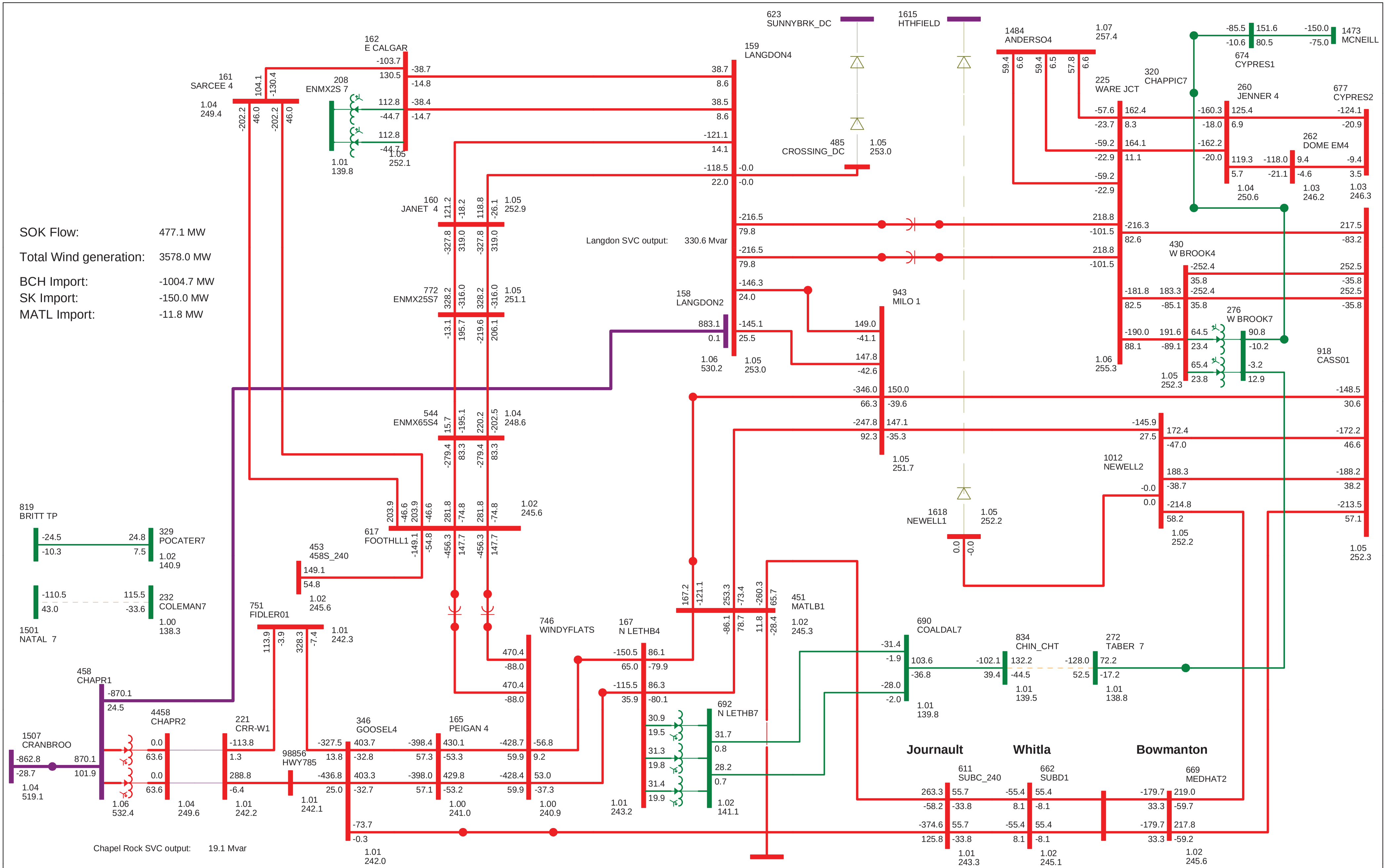
SLD_05: C6_22 (WITH SS3)
CATEGORY C5 - 1034L, 1035L 240 KV LINE (BOWMANTON 244S TO CA
FRI, AUG 23 2013 16:06



Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A
1.100OV 0.950UV
kV: <=69.000 <=138.000 <=240.000 <=500.000 >500.000

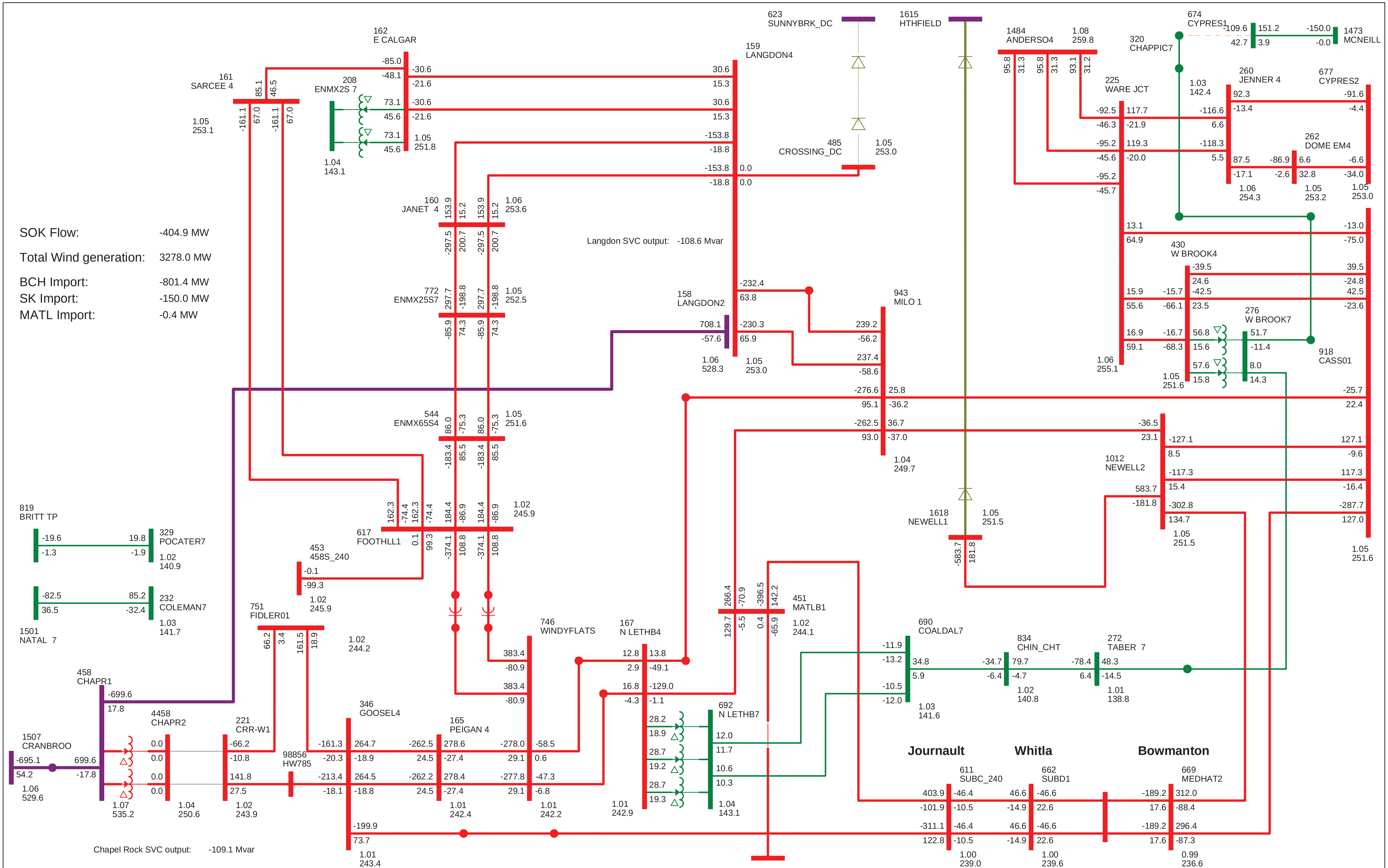
SLD_05: C6_32 (NO SS3)
CATEGORY C5 - 1034L, 1035L 240 KV LINE (BOWMANTON 244S TO CA
FRI, AUG 23 2013 17:21


SOK Flow: -51.6 MW
Total Wind generation: 3578.0 MW
BCH Import: 1200.1 MW
SK Import: 150.0 MW
MATL Import: 599.4 MW
Langdon SVC output: 247.8 Mvar
Chapel Rock SVC output: 195.5 Mvar
161 SARCEE 4
162 E CALGAR
208 ENMX2S 7
159 LANGDON4
623 SUNNYBRK_DC
1615 HTHFIELD
485 CROSSING_DC
1484 ANDERSO4
225 WARE JCT
320 CHAPPIC7
674 CYPRES1
1473 MCNEILL
260 JENNER 4
677 CYPRES2
262 DOME EM4
160 JANET 4
772 ENMX25S7
158 LANGDON2
943 MILO 1
430 W BROOK4
276 W BROOK7
918 CASS01
544 ENMX65S4
1012 NEWELL2
617 FOOTHLL1
1618 NEWELL1
819 BRITT TP
329 POCATER7
453 458S_240
1501 NATAL 7
232 COLEMAN7
751 FIDLER01
746 WINDYFLATS
167 N LETHB4
451 MATLB1
690 COALDAL7
834 CHIN_CHT
272 TABER 7
692 N LETHB7
458 CHAPR1
1507 CRANBROO
4458 CHAPR2
221 CRR-W1
98856 HWY785
346 GOOSEL4
165 PEIGAN 4
Journault
Whitla
Bowmanton
611 SUBC_240
662 SUBD1
669 MEDHAT2
Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A
1.100OV 0.950UV
kV: <=69.000 <=138.000 <=240.000 <=500.000 >500.000
SLD_05: C6_32 (WITH SS3)
CATEGORY C5 - 1034L, 1035L 240 KV LINE (BOWMANTON 244S TO CA
FRI, AUG 23 2013 17:28



Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A
1.100OV 0.950UV
kV: <=69.000 <=138.000 <=240.000 <=500.000 >500.000

SLD_06: C2_32 (WITH SS3)
CATEGORY C5 - 1004L, 992L 240 KV LINES (CHAPEL ROCK 491S TO
FRI, AUG 23 2013 16:33



Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A
1.100OV 0.950UV
kV: <=69.000 <=138.000 <=240.000 <=500.000 >500.000

SLD_06: C5_22 (NO SS3)
CATEGORY C5 - 1004L, 992L 240 KV LINES (CHAPEL ROCK 491S TO
FRI, AUG 23 2013 15:45

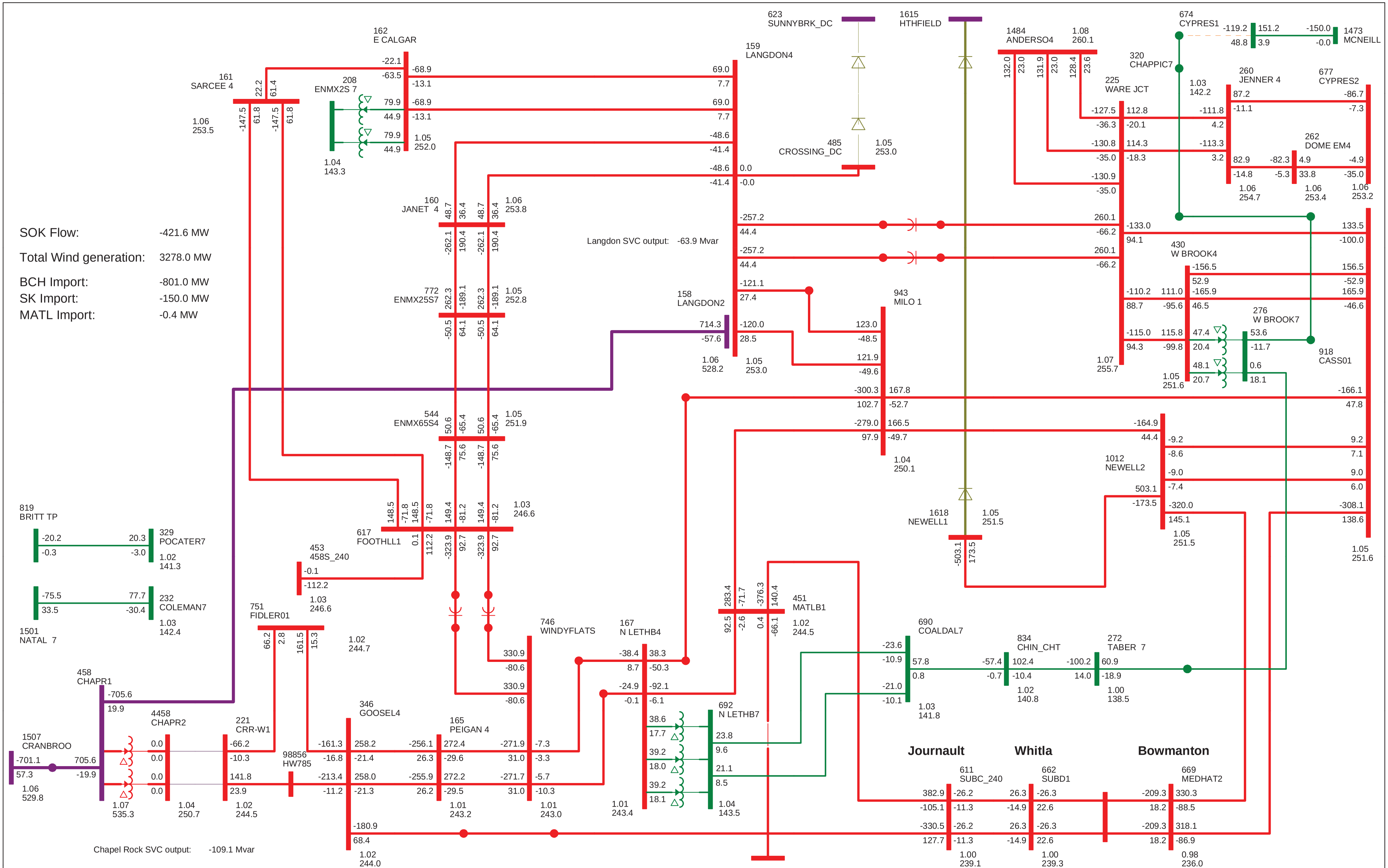
SOK Flow: -421.6 MW

Total Wind generation: 3278.0 MW

BCH Import: -801.0 MW

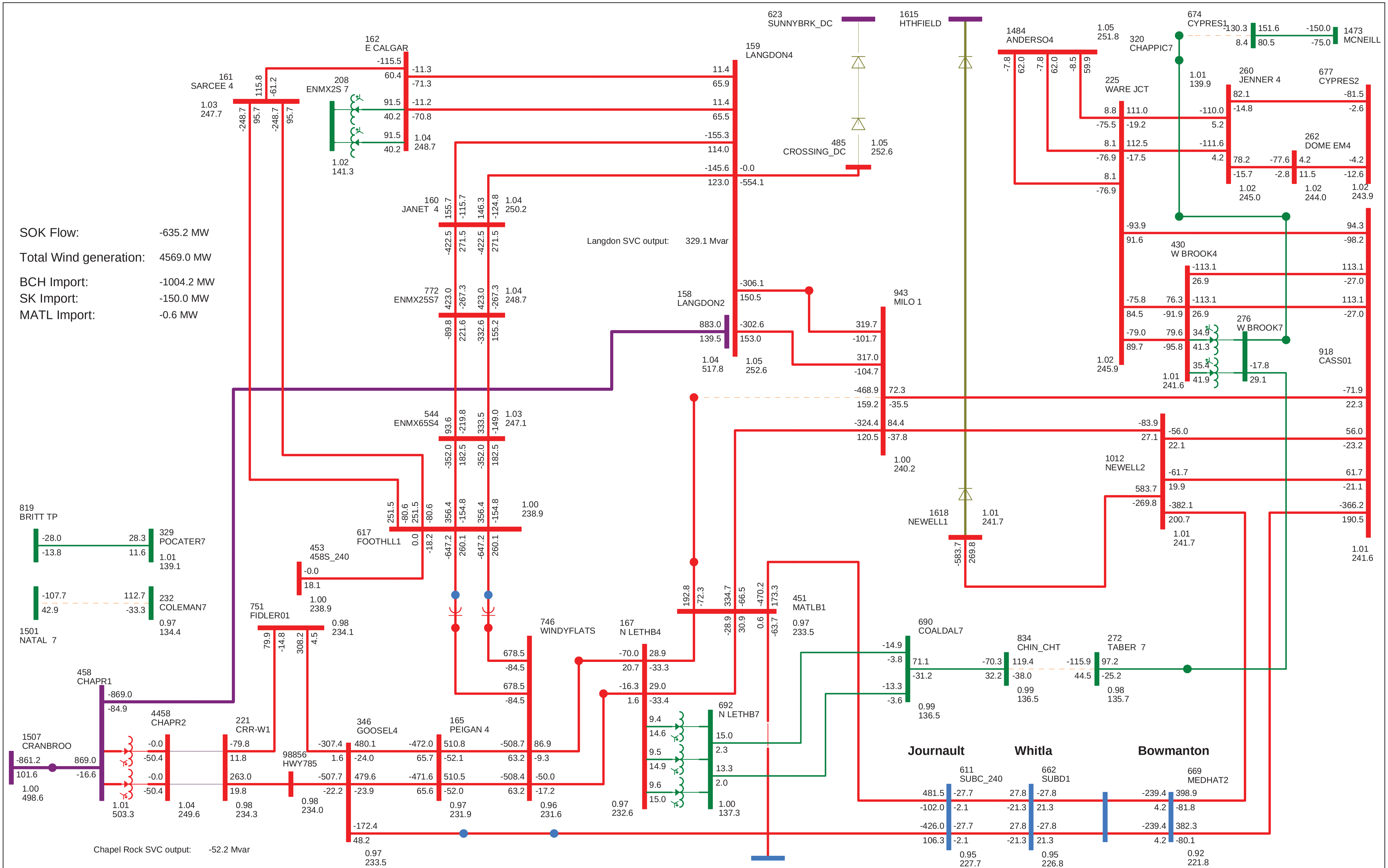
SK Import: -150.0 MW

MATL Import: -0.4 MW



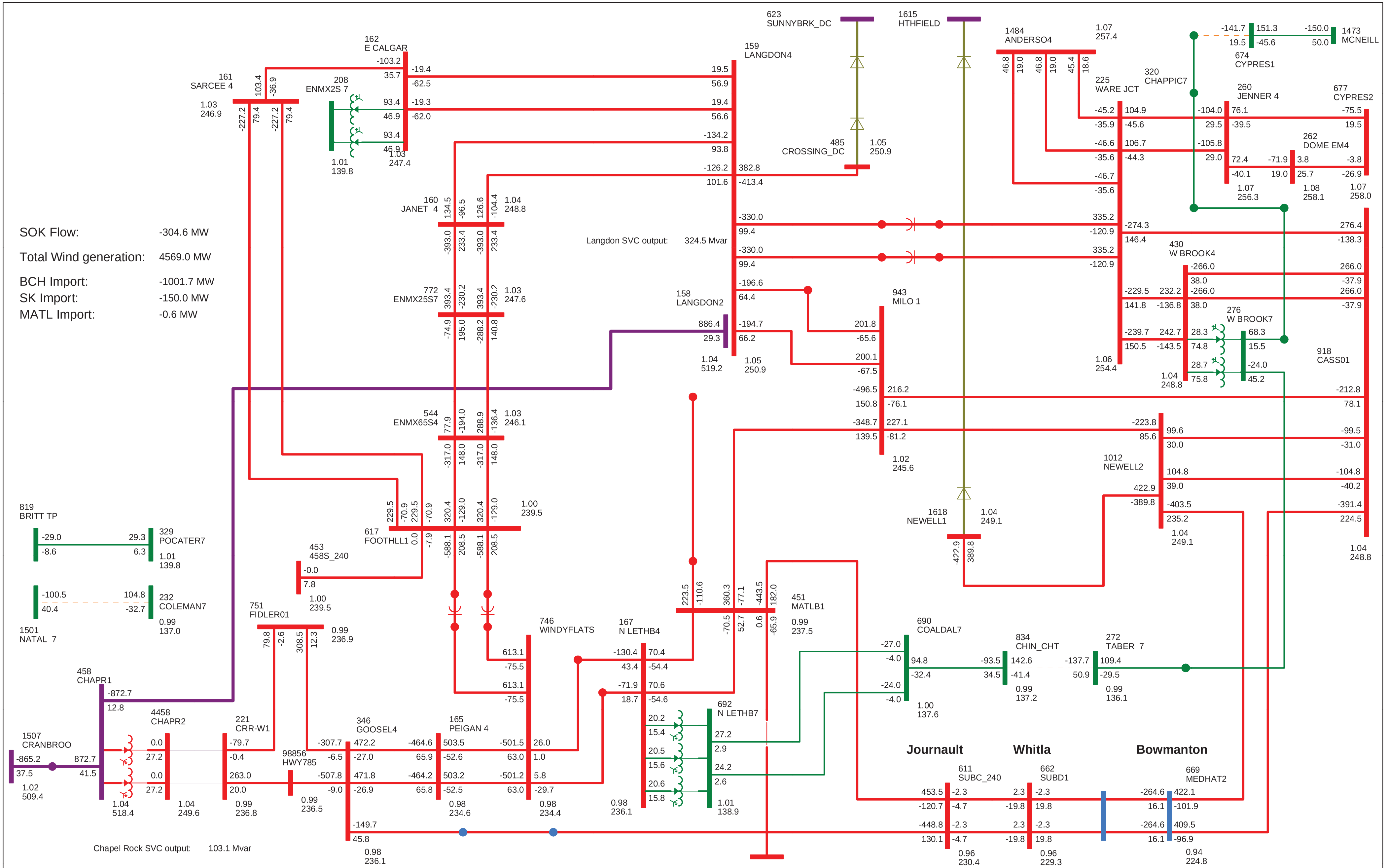
Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A
1.100OV 0.950UV
kV: <=69.000 <=138.000 <=240.000 <=500.000 >500.000

SLD_06: C5_22 (WITH SS3)
CATEGORY C5 - 1004L, 992L 240 KV LINES (CHAPEL ROCK 491S TO
FRI, AUG 23 2013 15:52



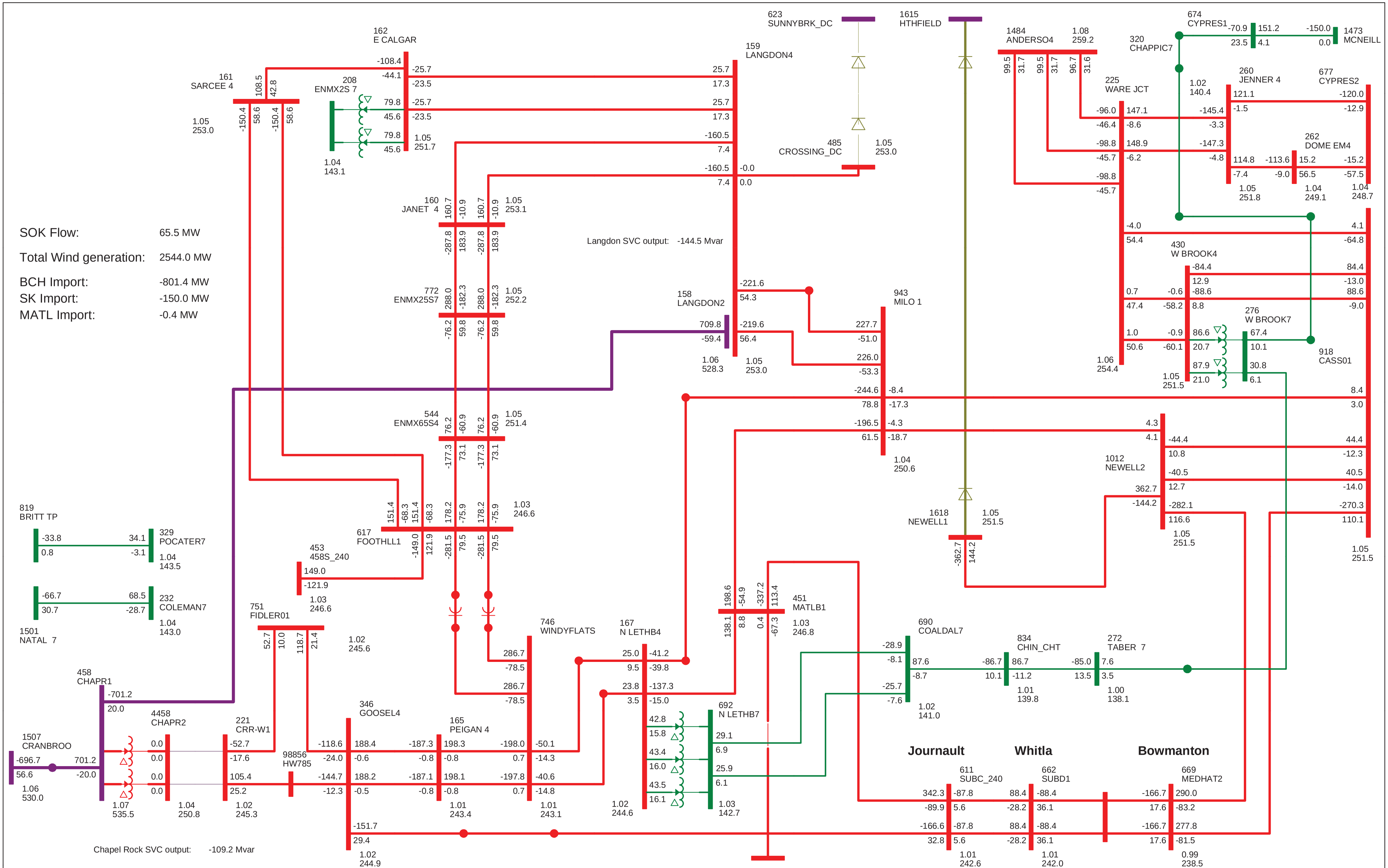
Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A
1.100OV 0.950UV
kV: <=69.000 <=138.000 <=240.000 <=500.000 >500.000

SLD_06: C5_32 (NO SS3)
CATEGORY C5 - 1004L, 992L 240 KV LINES (CHAPEL ROCK 491S TO
FRI, AUG 23 2013 17:07



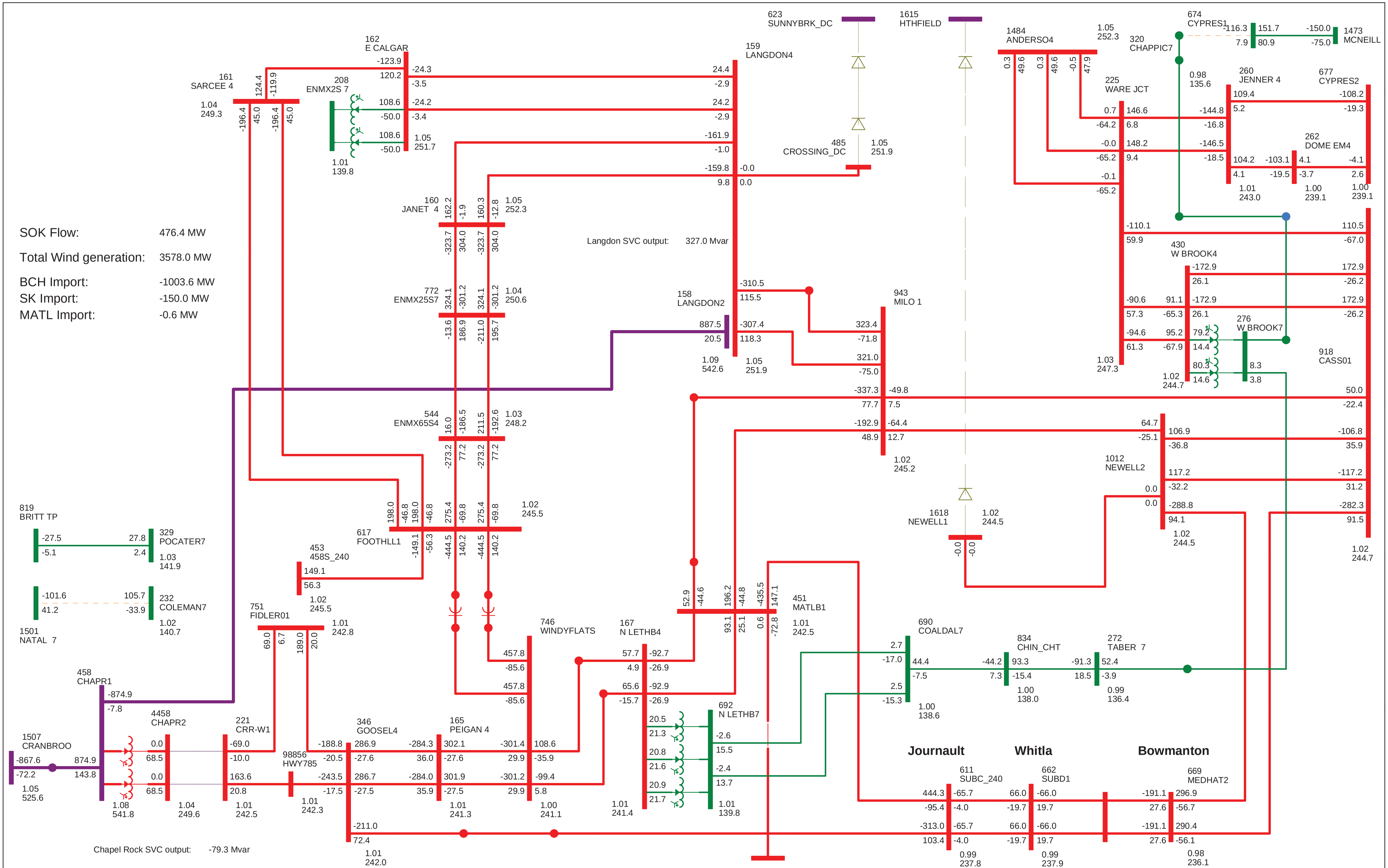
Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A
1.100OV 0.950UV
kV: <=69.000 <=138.000 <=240.000 <=500.000 >500.000

SLD_06: C5_32 (WITH SS3)
CATEGORY C5 - 1004L, 992L 240 KV LINES (CHAPEL ROCK 491S TO
FRI, AUG 23 2013 17:14



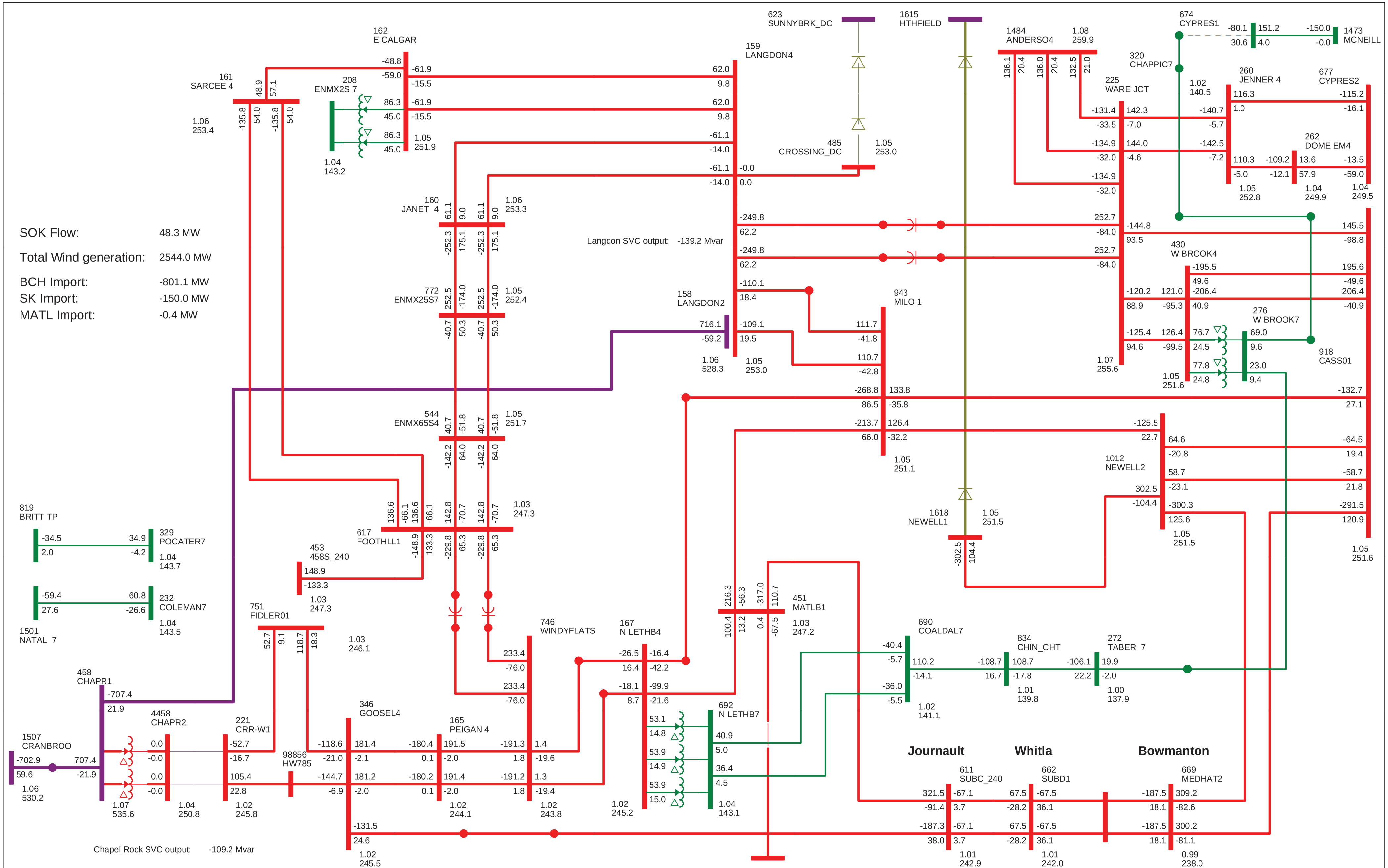
Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A
1.100OV 0.950UV
kV: <=69.000 <=138.000 <=240.000 <=500.000 >500.000

SLD_06: C4_22 (NO SS3)
CATEGORY C5 - 1004L, 992L 240 KV LINES (CHAPEL ROCK 491S TO
FRI, AUG 23 2013 15:32



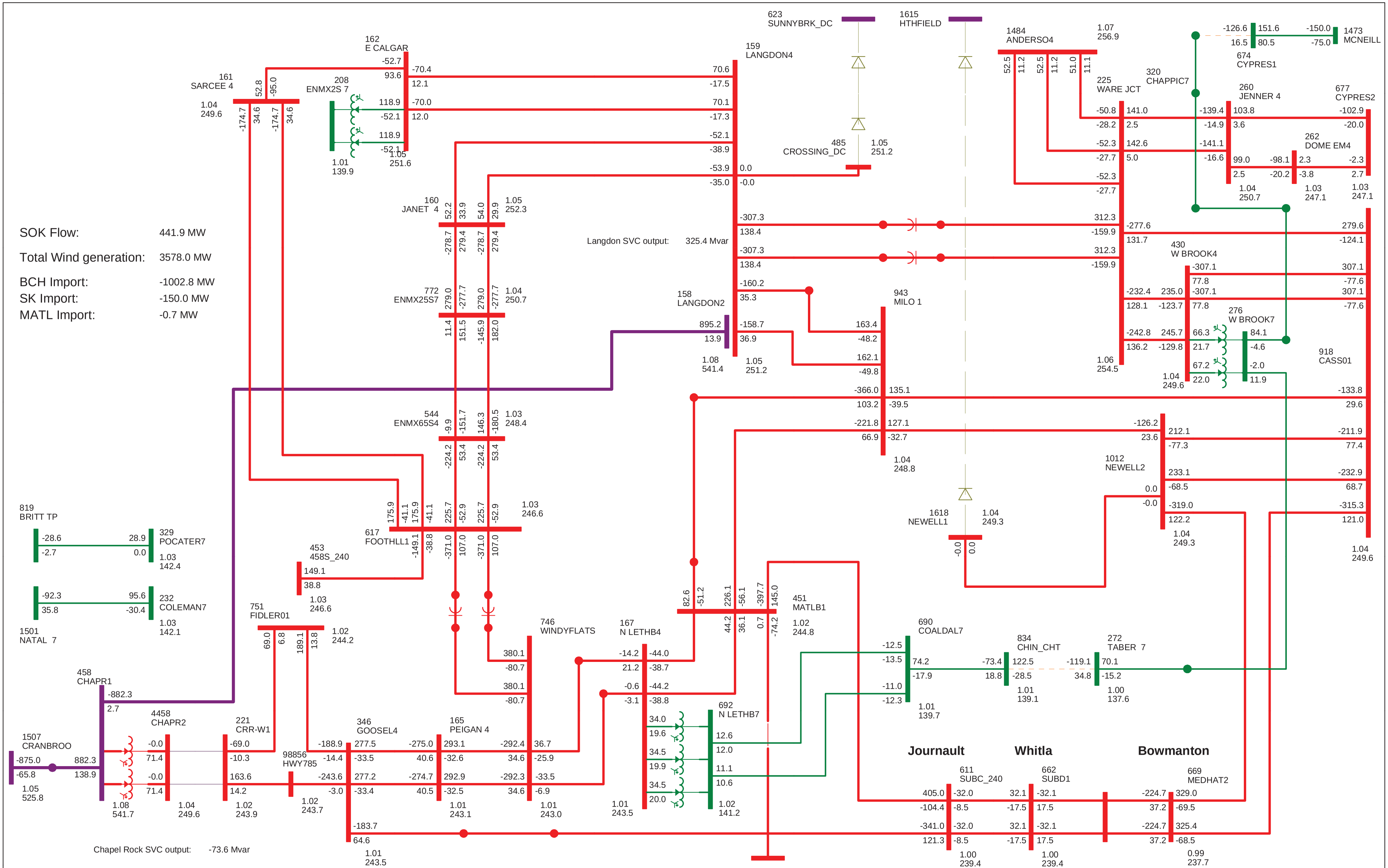
Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A
1.100OV 0.950UV
kV: <=69.000 <=138.000 <=240.000 <=500.000 >500.000

SLD_06: C4_32 (NO SS3)
CATEGORY C5 - 1004L, 992L 240 KV LINES (CHAPEL ROCK 491S TO
FRI, AUG 23 2013 16:54



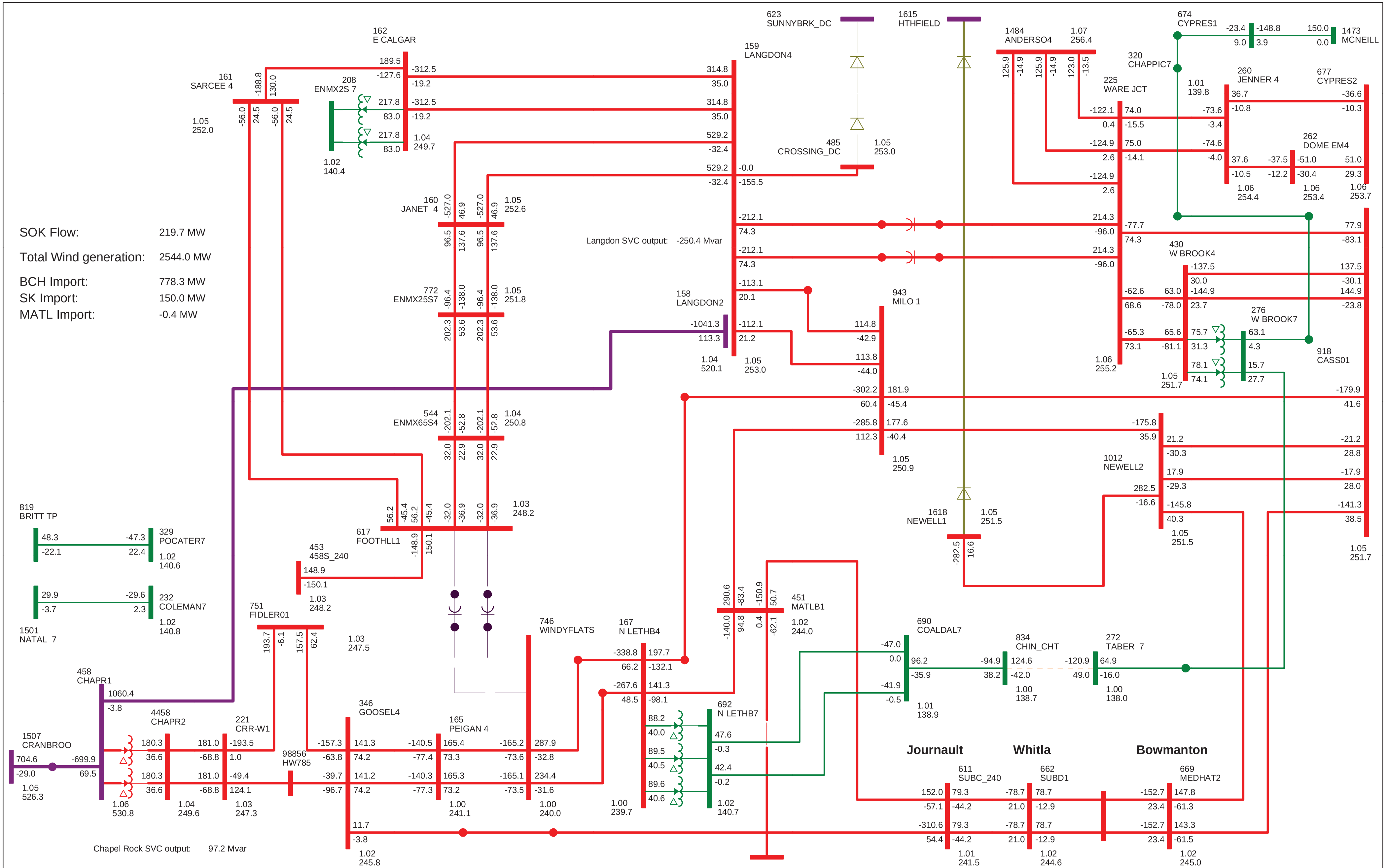
Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A
1.100OV 0.950UV
kV: <=69.000 <=138.000 <=240.000 <=500.000 >500.000

SLD_06: C4_22 (WITH SS3)
CATEGORY C5 - 1004L, 992L 240 KV LINES (CHAPEL ROCK 491S TO
FRI, AUG 23 2013 15:39



Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A
1.100OV 0.950UV
kV: <=69.000 <=138.000 <=240.000 <=500.000 >500.000

SLD_06: C4_32 (WITH SS3)
CATEGORY C5 - 1004L, 992L 240 KV LINES (CHAPEL ROCK 491S TO
FRI, AUG 23 2013 17:00



SOK Flow: 219.7 MW

Total Wind generation: 2544.0 MW

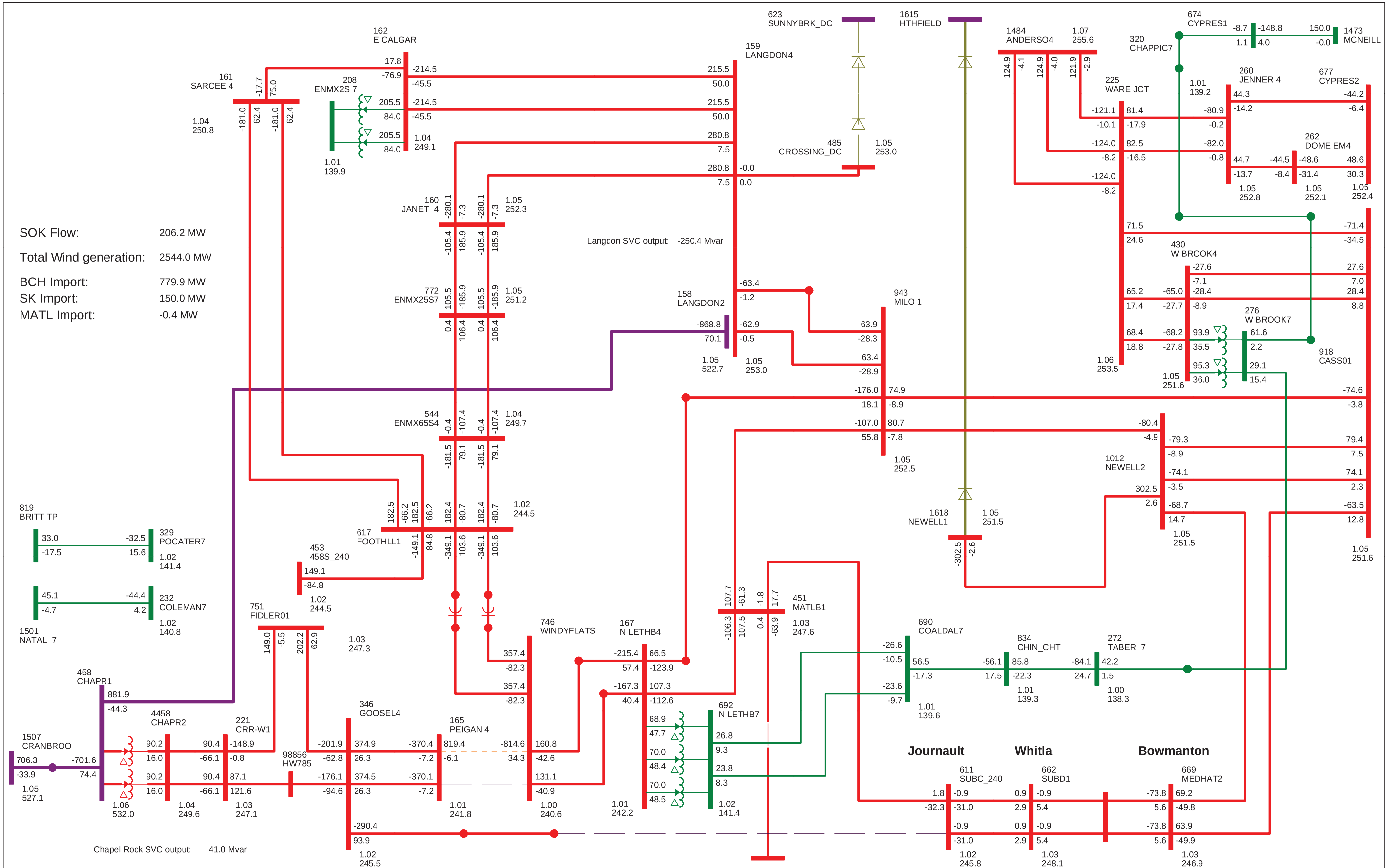
BCH Import: 778.3 MW

SK Import: 150.0 MW

MATL Import: -0.4 MW

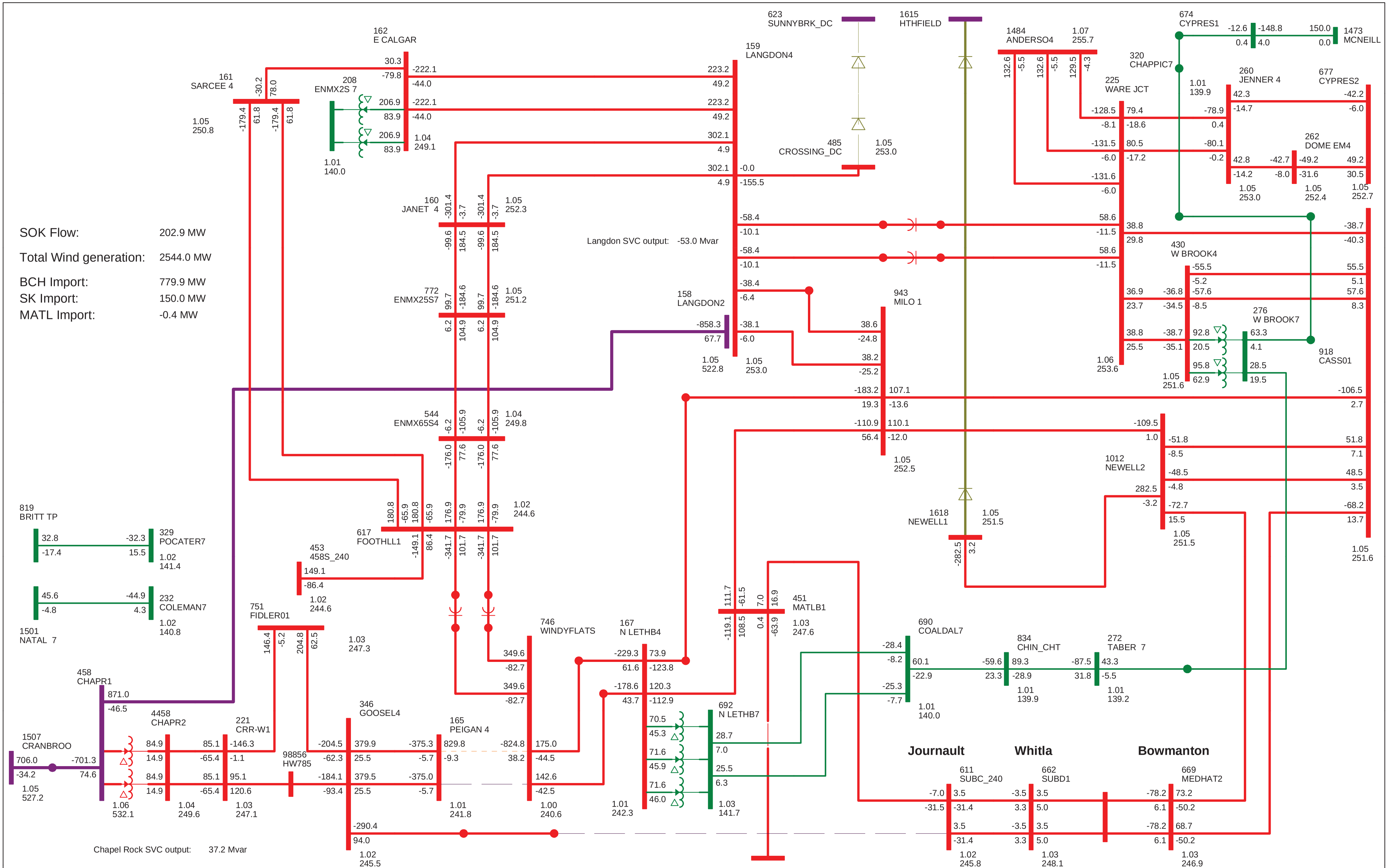
Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A
1.100OV 0.950UV
kV: <=69.000 <=138.000 <=240.000 <=500.000 >500.000

SLD_07: C1_22 (WITH SS3)
CATEGORY C5 - 1037L, 1038L 240 KV LINES (FOOTHILLS 237S TO W
FRI, AUG 23 2013 14:59



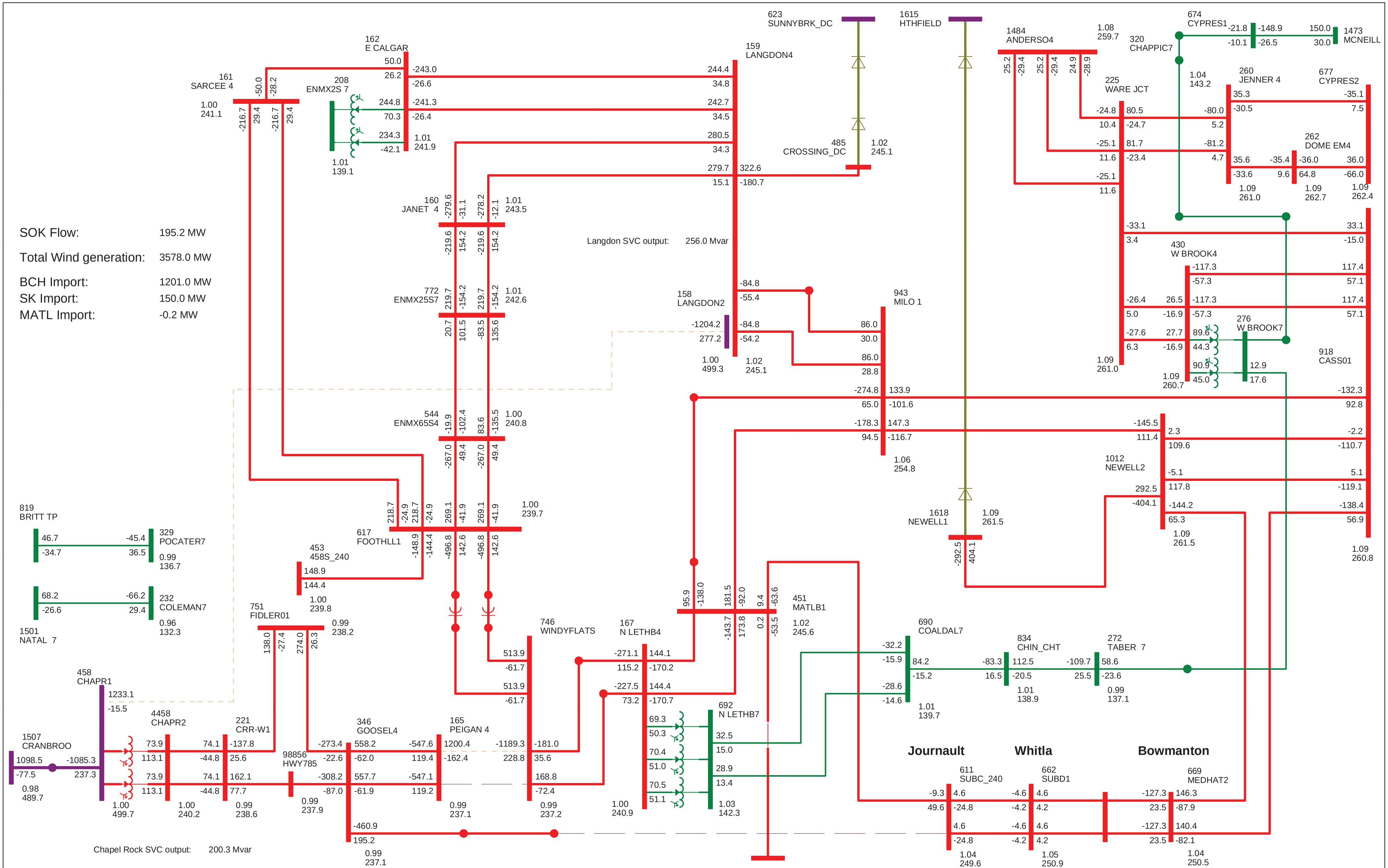
Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A
1.100OV 0.950UV
kV: <=69.000 <=138.000 <=240.000 <=500.000 >500.000

SLD_08: C1_22 (NO SS3)
CATEGORY C3 - 1049L, 1121L 240 KV LINES (PEIGAN 59S TO WINDY
FRI, AUG 23 2013 14:53



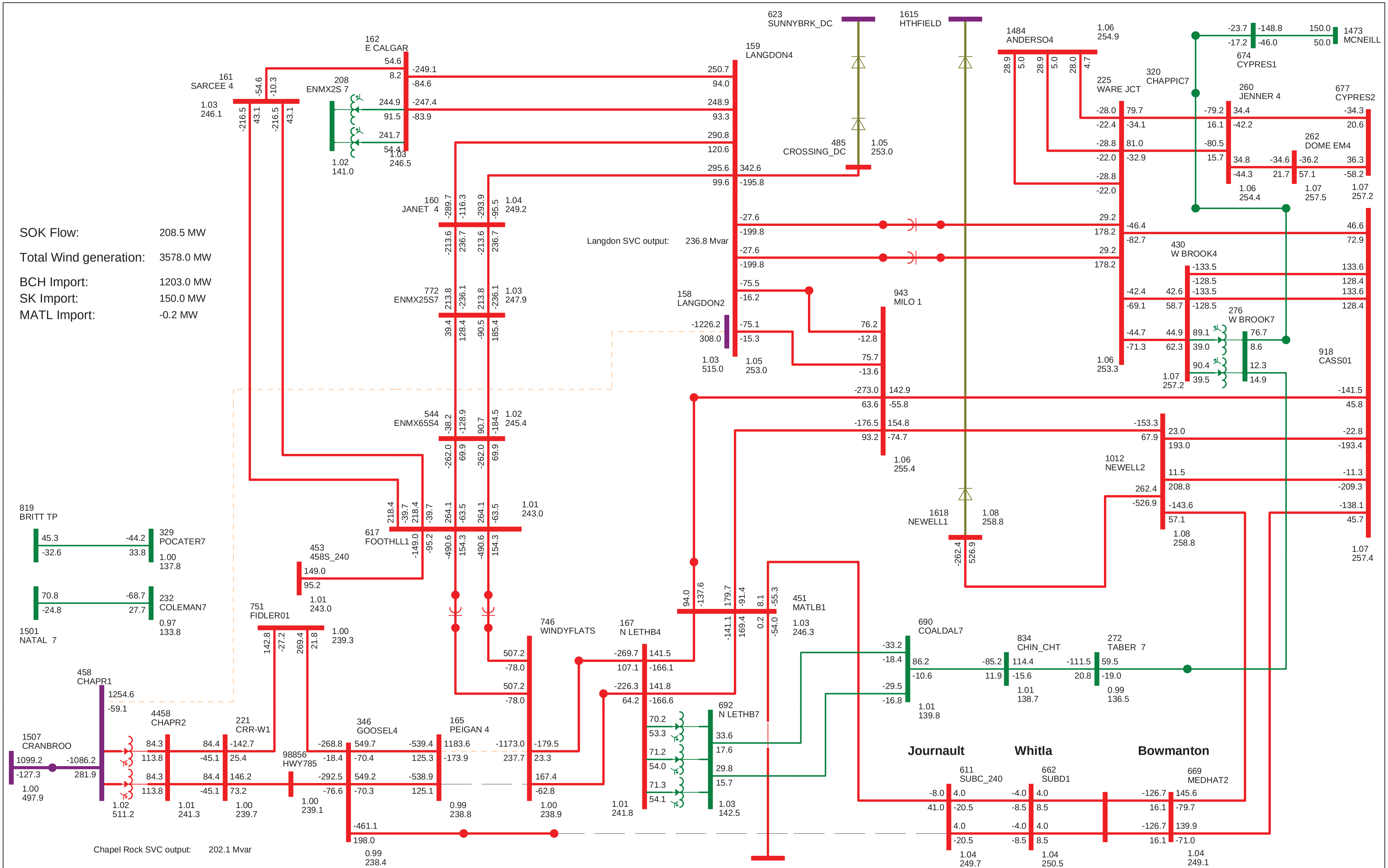
Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A
1.100OV 0.950UV
kV: <=69.000 <=138.000 <=240.000 <=500.000 >500.000

SLD_08: C1_22 (WITH SS3)
CATEGORY C3 - 1049L, 1121L 240 KV LINES (PEIGAN 59S TO WINDY
FRI, AUG 23 2013 14:59



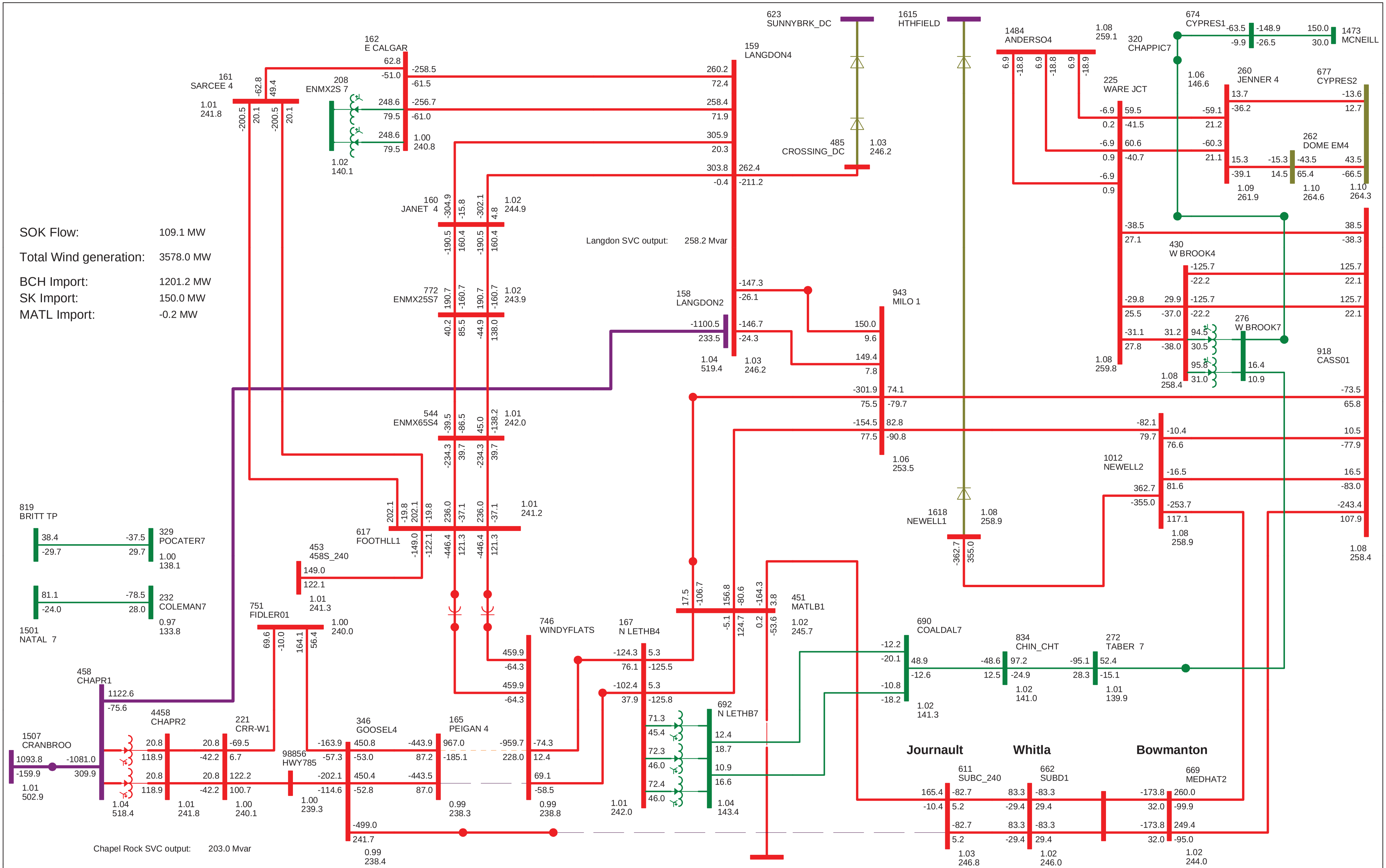
Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A
1.100OV 0.950UV
kV: <=69.000 <=138.000 <=240.000 <=500.000 >500.000

SLD_08: C1_32 (NO SS3)
CATEGORY C3 - 1049L, 1121L 240 KV LINES (PEIGAN 59S TO WINDY
FRI, AUG 23 2013 16:14



Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A
1.100OV 0.950UV
kV: <=69.000 <=138.000 <=240.000 <=500.000 >500.000

SLD_08: C1_32 (WITH SS3)
CATEGORY C3 - 1049L, 1121L 240 KV LINES (PEIGAN 59S TO WINDY
FRI, AUG 23 2013 16:21



SOK Flow: 109.1 MW

Total Wind generation: 3578.0 MW

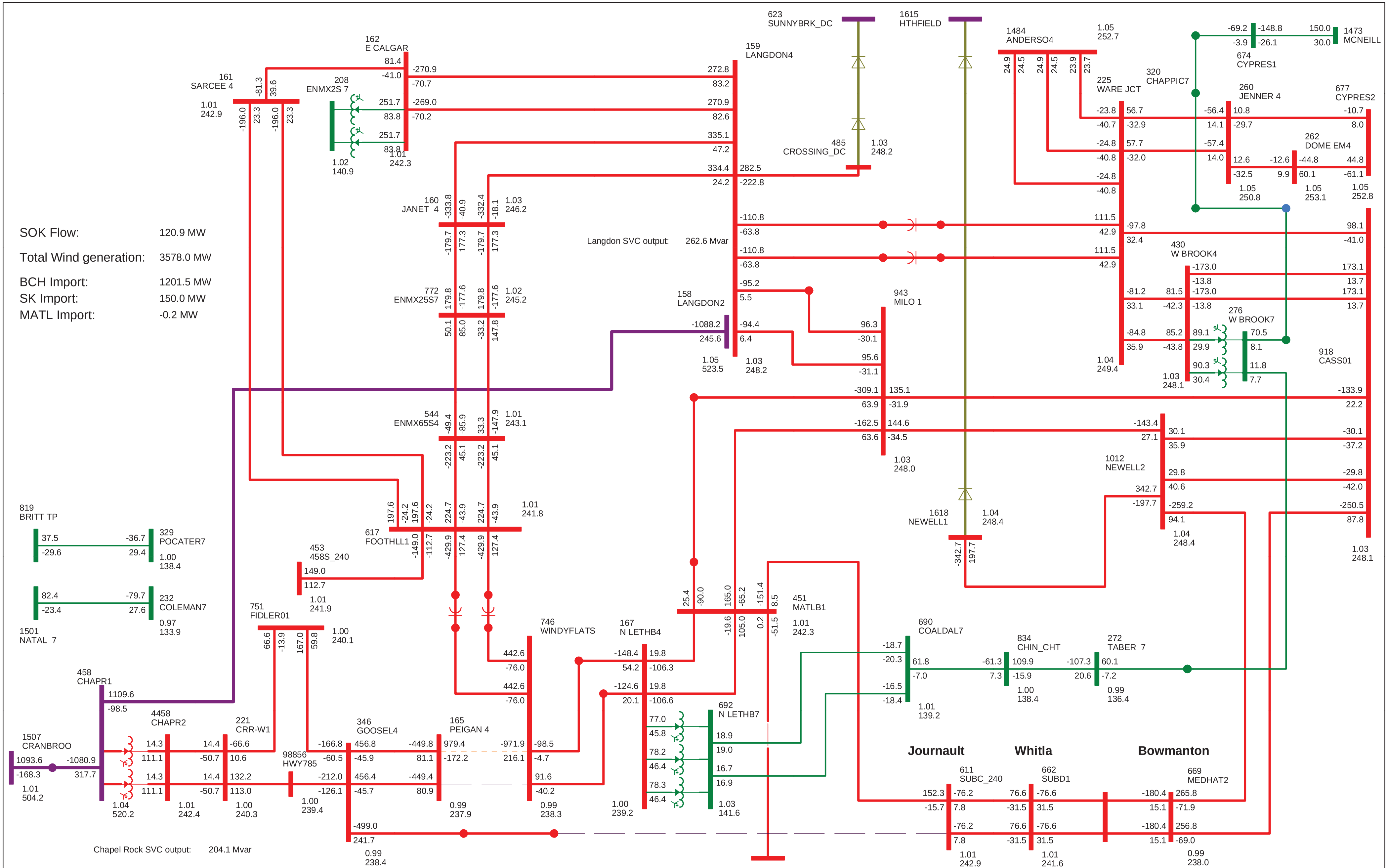
BCH Import: 1201.2 MW

SK Import: 150.0 MW

MATL Import: -0.2 MW

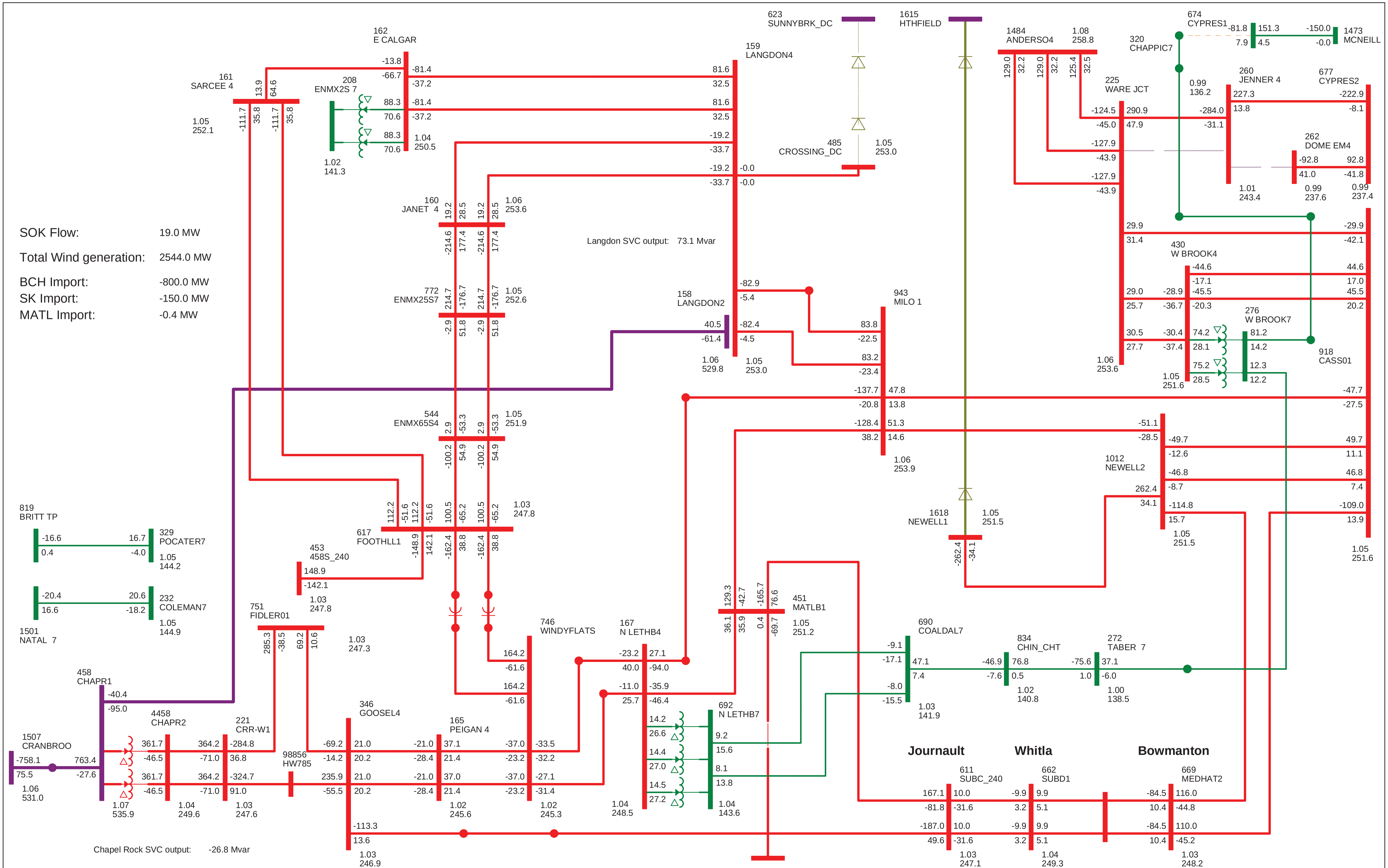
Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A
1.100OV 0.950UV
kV: <=69.000 <=138.000 <=240.000 <=500.000 >500.000

SLD_08: C3_32 (NO SS3)
CATEGORY C3 - 1049L, 1121L 240 KV LINES (PEIGAN 59S TO WINDY
FRI, AUG 23 2013 16:41



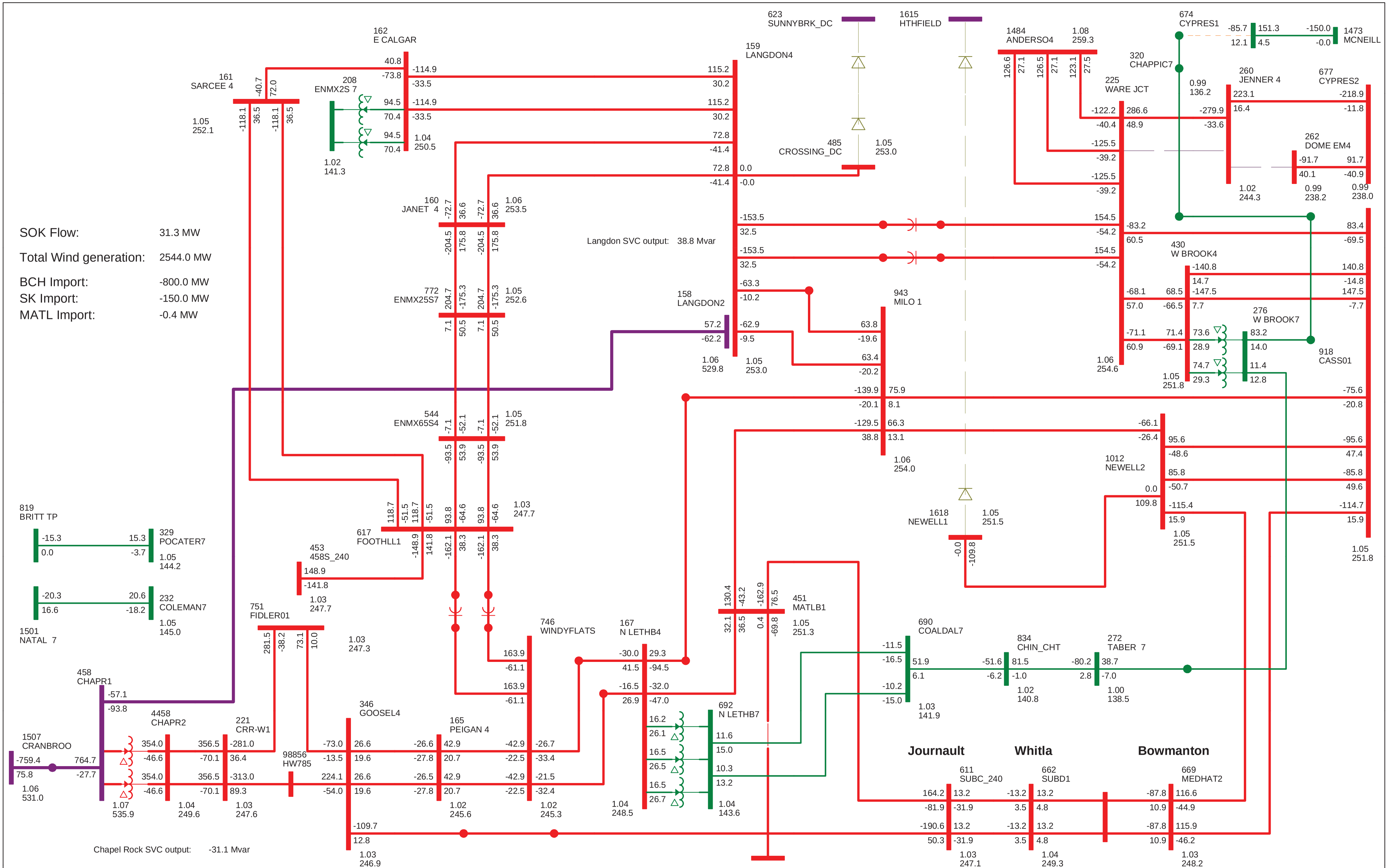
Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A
1.100OV 0.950UV
kV: <=69.000 <=138.000 <=240.000 <=500.000 >500.000

SLD_08: C3_32 (WITH SS3)
CATEGORY C3 - 1049L, 1121L 240 KV LINES (PEIGAN 59S TO WINDY
FRI, AUG 23 2013 16:48



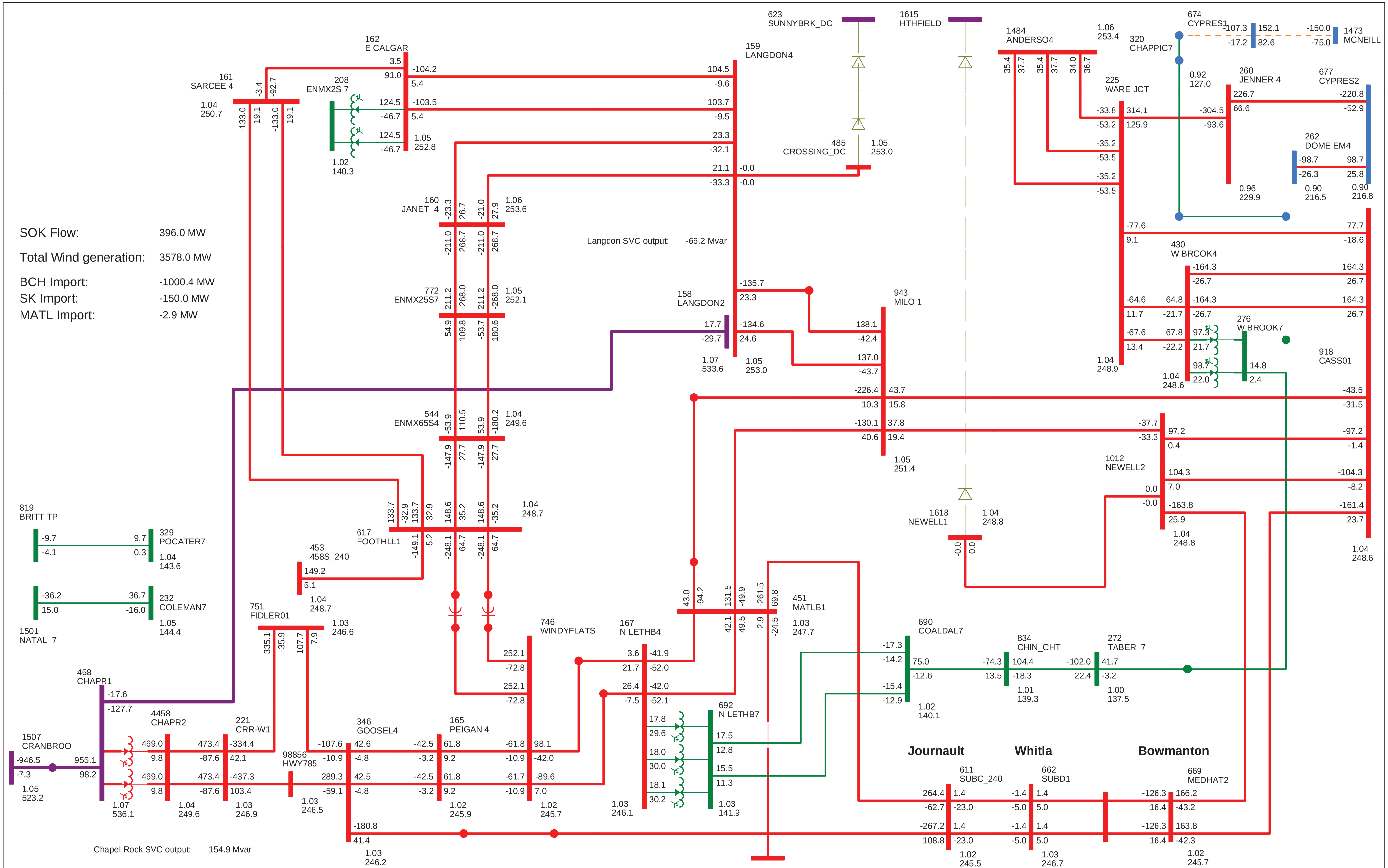
Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A
1.100OV 0.950UV
kV: <=69.000 <=138.000 <=240.000 <=500.000 >500.000

SLD_09: C2_22 (NO SS3)
CATEGORY C3 - 944L, 1002L 240 KV LINES (WARE JUNCTION 132S
FRI, AUG 23 2013 15:07



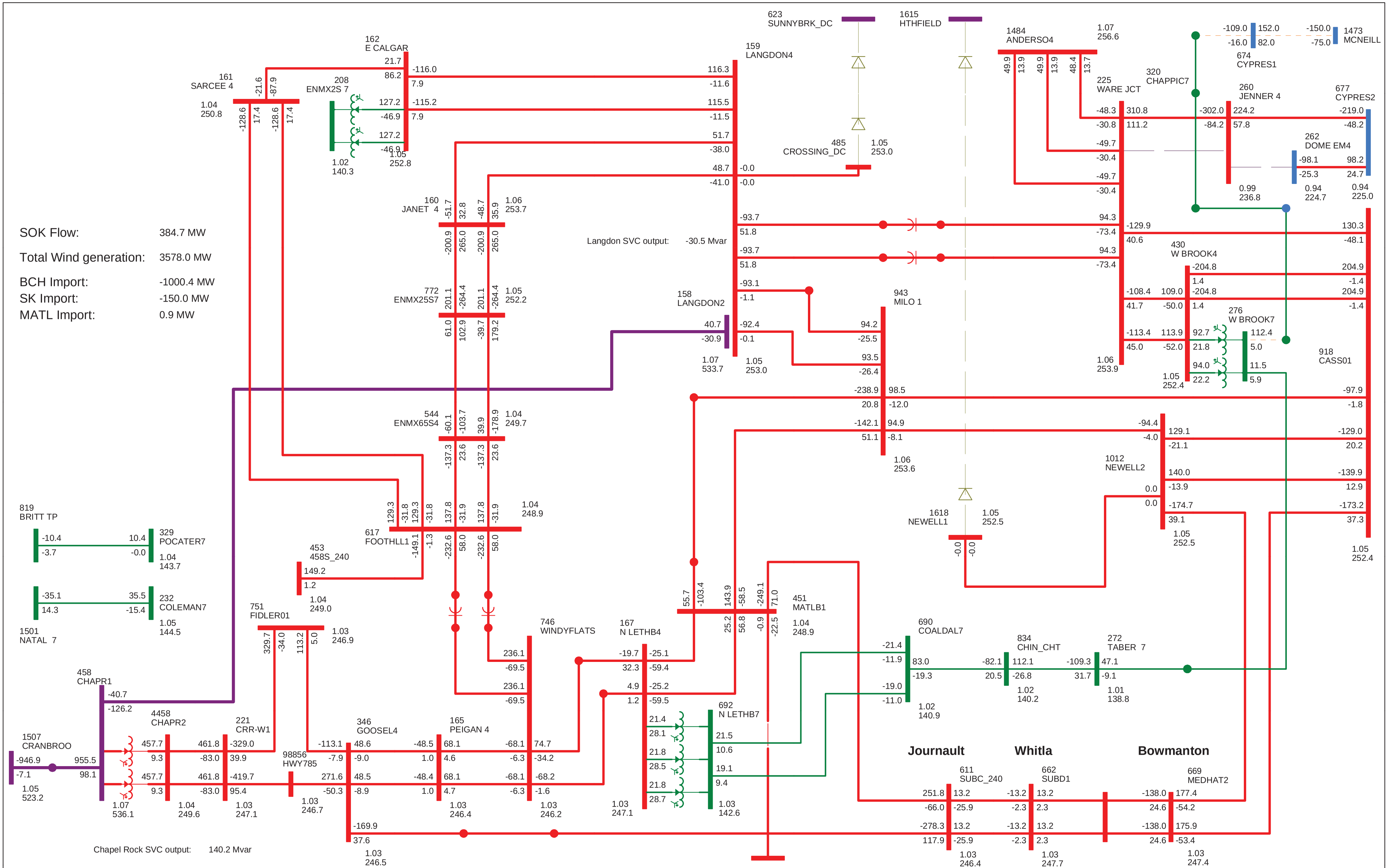
Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A
1.100OV 0.950UV
kV: <=69.000 <=138.000 <=240.000 <=500.000 >500.000

SLD_09: C2_22 (WITH SS3)
CATEGORY C3 - 944L, 1002L 240 KV LINES (WARE JUNCTION 132S
FRI, AUG 23 2013 15:13



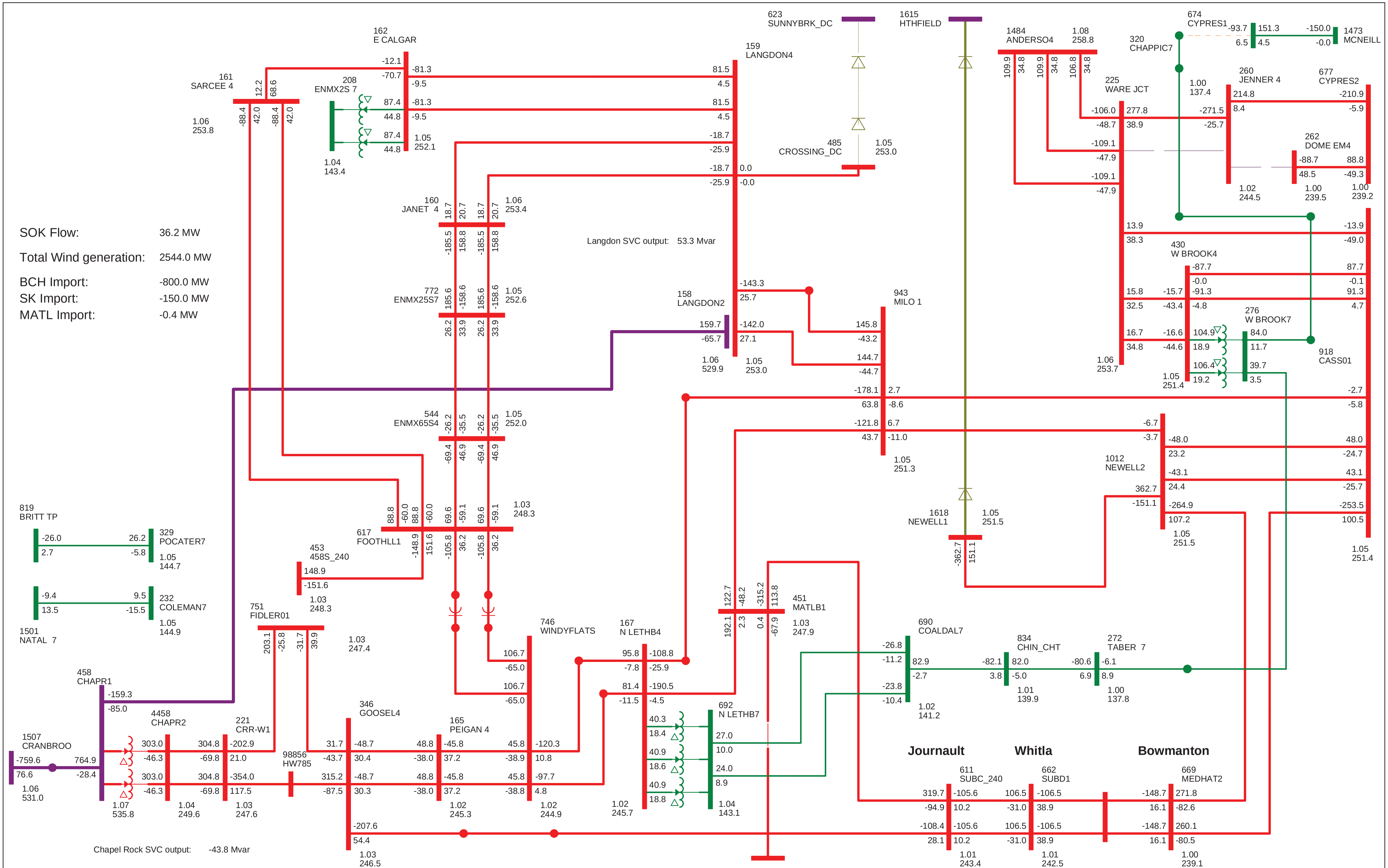
Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A
1.100OV 0.950UV
kV: <=69.000 <=138.000 <=240.000 <=500.000 >500.000

SLD_09: C2_32 (NO SS3)
CATEGORY C3 - 944L, 1002L 240 KV LINES (WARE JUNCTION 132S
FRI, AUG 23 2013 16:28



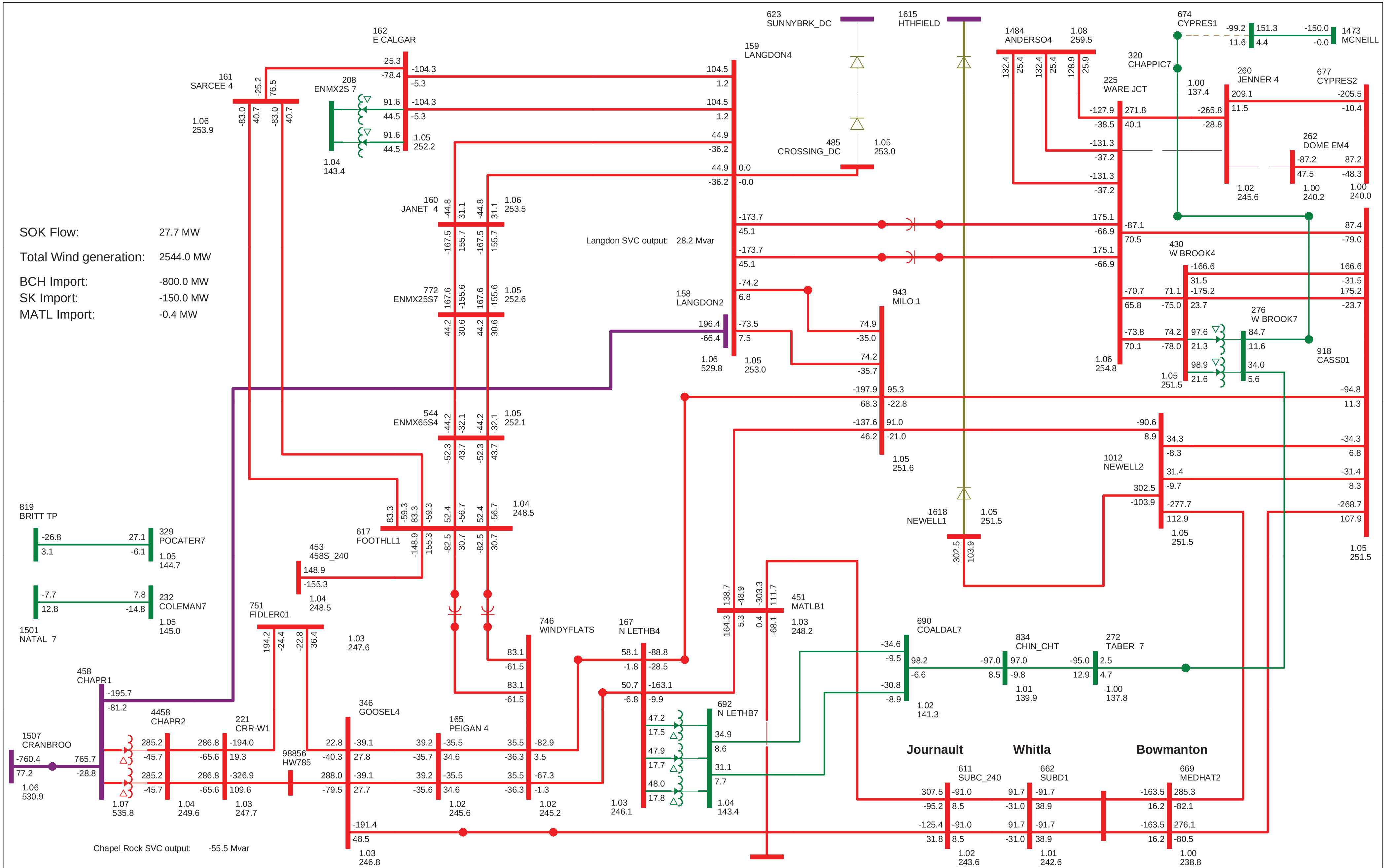
Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A
1.100OV 0.950UV
kV: <=69.000 <=138.000 <=240.000 <=500.000 >500.000

SLD_09: C2_32 (WITH SS3)
CATEGORY C3 - 944L, 1002L 240 KV LINES (WARE JUNCTION 132S
FRI, AUG 23 2013 16:35



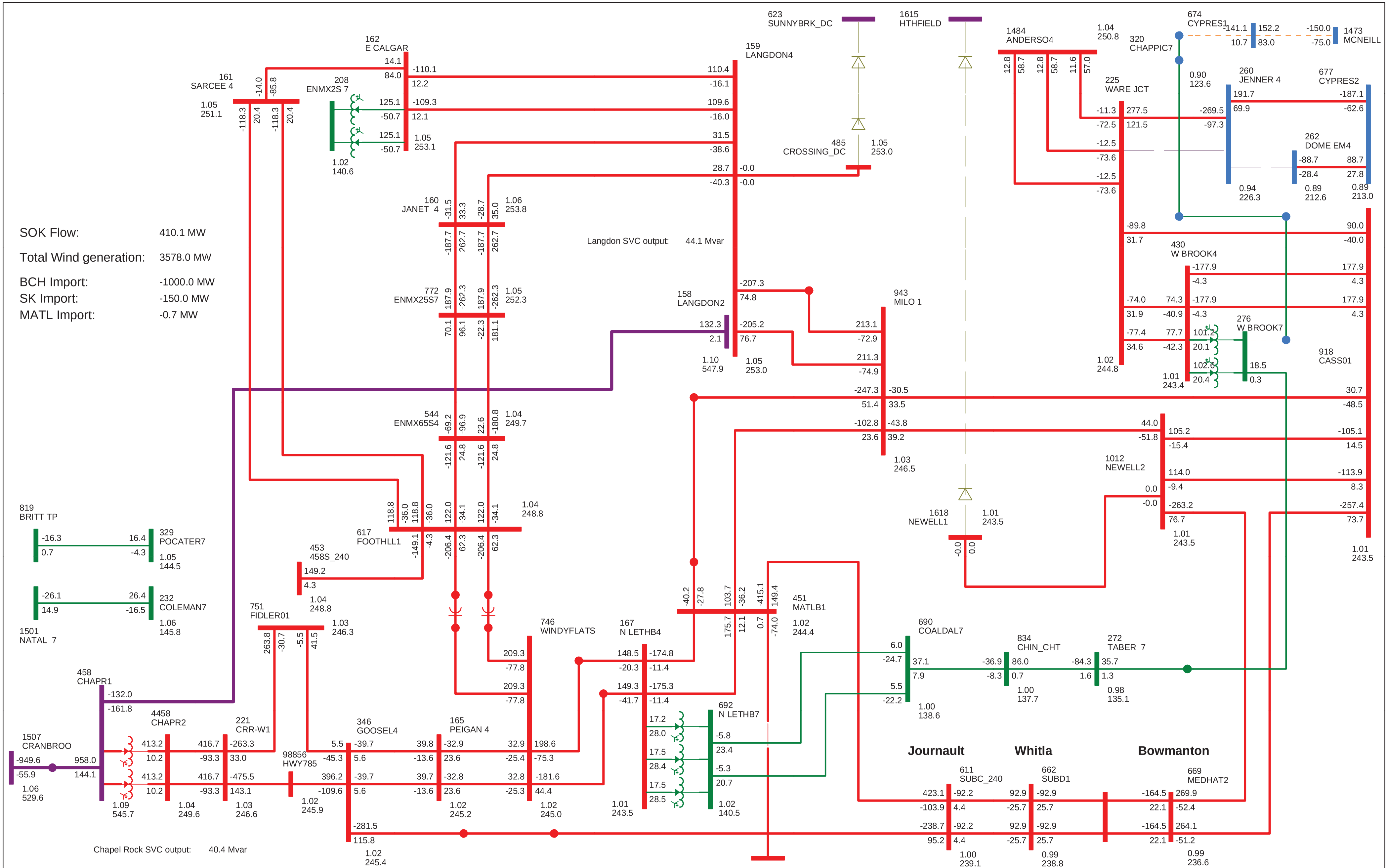
Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A
1.100OV 0.950UV
kV: <=69.000 <=138.000 <=240.000 <=500.000 >500.000

SLD_09: C4_22 (NO SS3)
CATEGORY C3 - 944L, 1002L 240 KV LINES (WARE JUNCTION 132S
FRI, AUG 23 2013 15:34



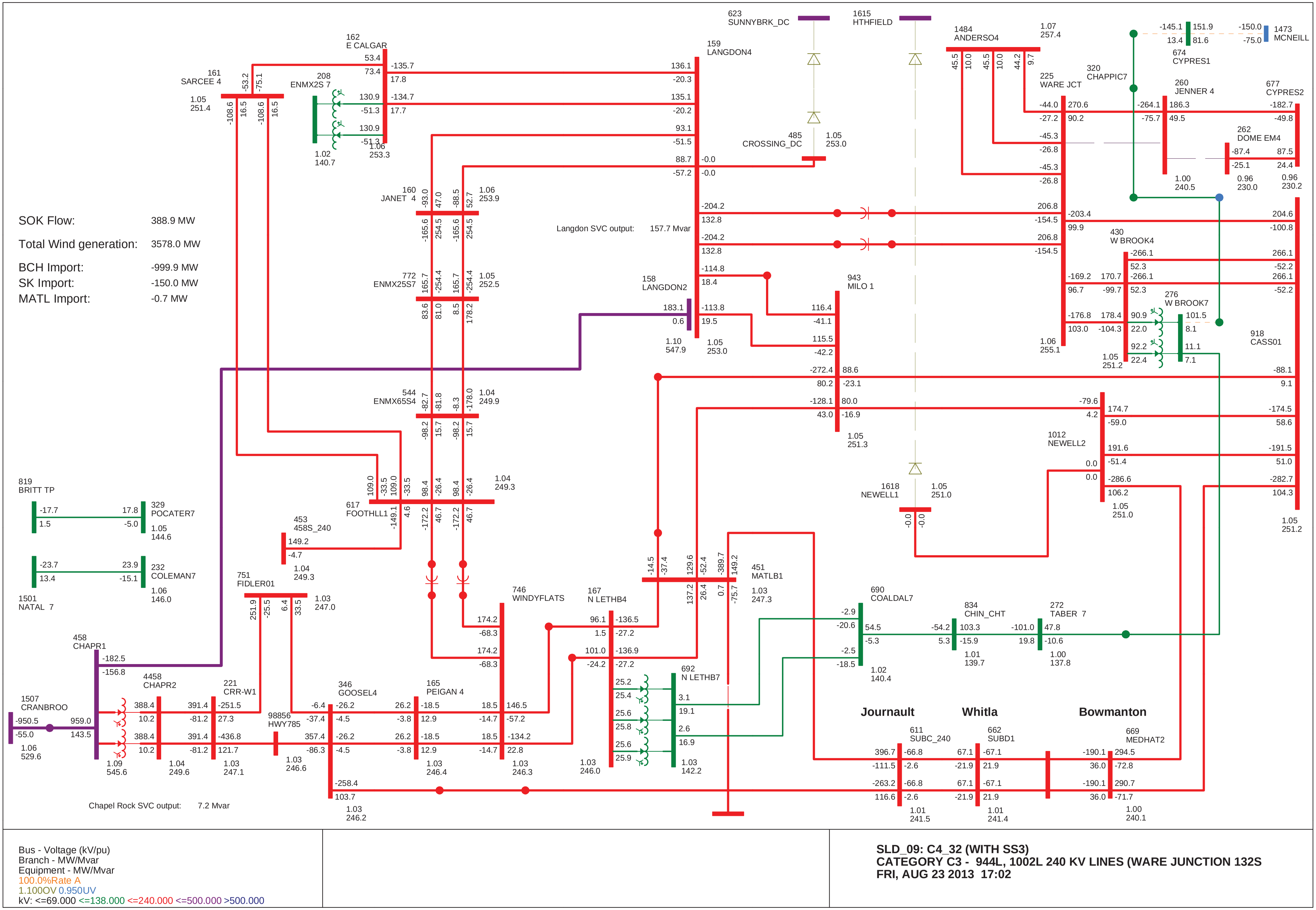
Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A
1.100OV 0.950UV
kV: <=69.000 <=138.000 <=240.000 <=500.000 >500.000

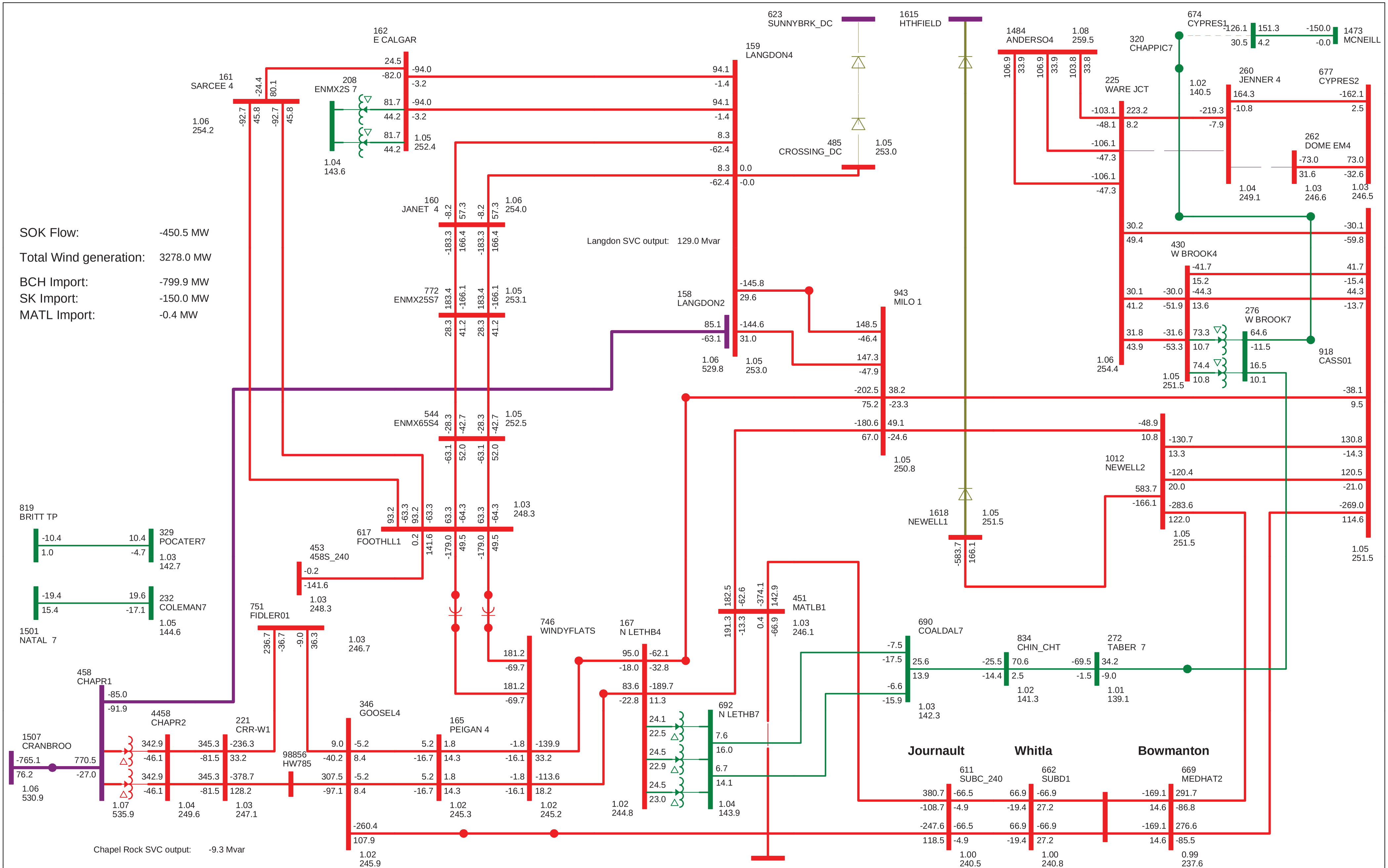
SLD_09: C4_22 (WITH SS3)
CATEGORY C3 - 944L, 1002L 240 KV LINES (WARE JUNCTION 132S
FRI, AUG 23 2013 15:40



Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A
1.100OV 0.950UV
kV: <=69.000 <=138.000 <=240.000 <=500.000 >500.000

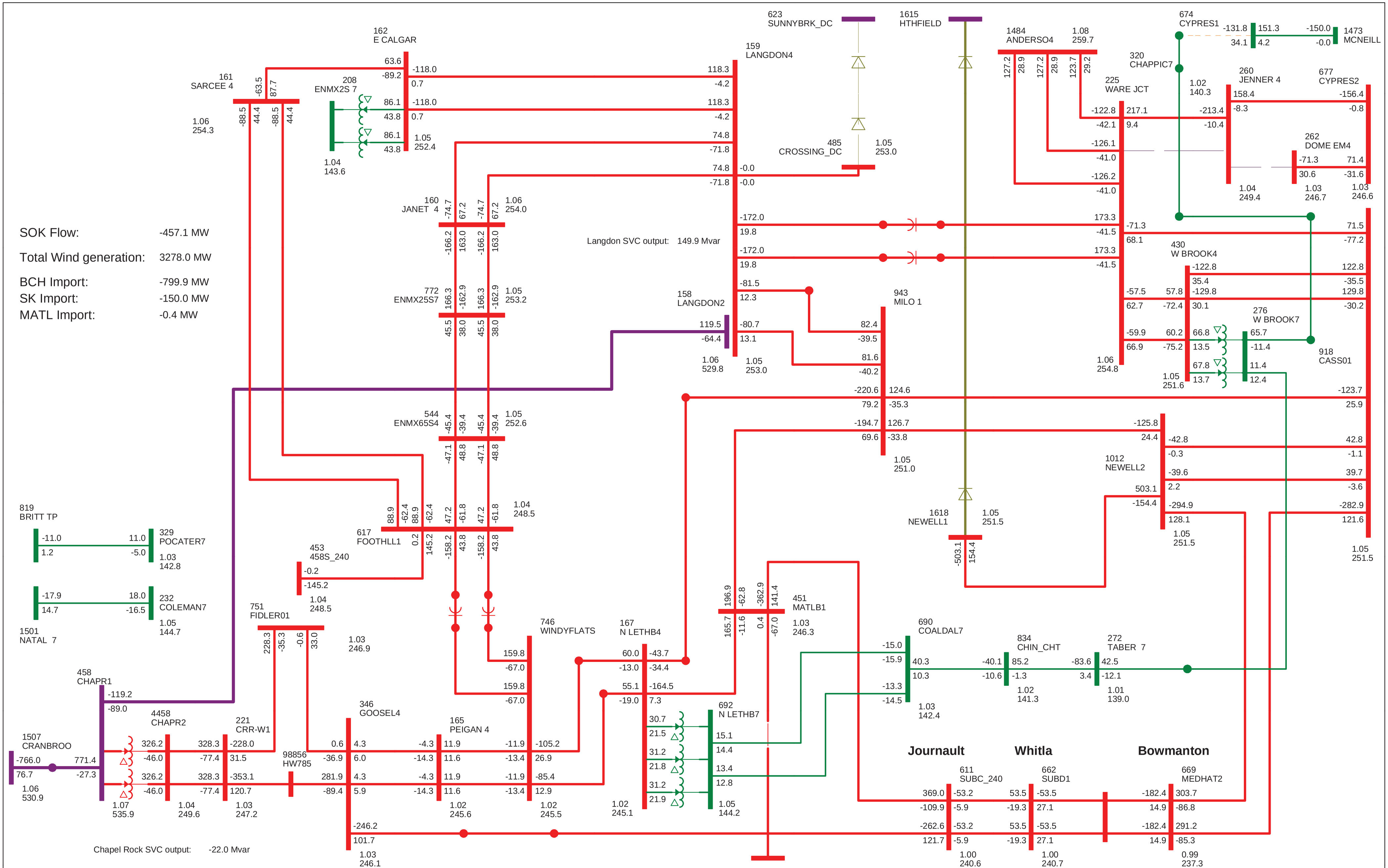
SLD_09: C4_32 (NO SS3)
CATEGORY C3 - 944L, 1002L 240 KV LINES (WARE JUNCTION 132S
FRI, AUG 23 2013 16:55


SOK Flow: 388.9 MW
Total Wind generation: 3578.0 MW
BCH Import: -999.9 MW
SK Import: -150.0 MW
MATL Import: -0.7 MW
Langdon SVC output: 157.7 Mvar
Chapel Rock SVC output: 7.2 Mvar
Journault
Whitla
Bowmanton
Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A
1.100OV 0.950UV
kV: <=69.000 <=138.000 <=240.000 <=500.000 >500.000
SLD_09: C4_32 (WITH SS3)
CATEGORY C3 - 944L, 1002L 240 KV LINES (WARE JUNCTION 132S
FRI, AUG 23 2013 17:02



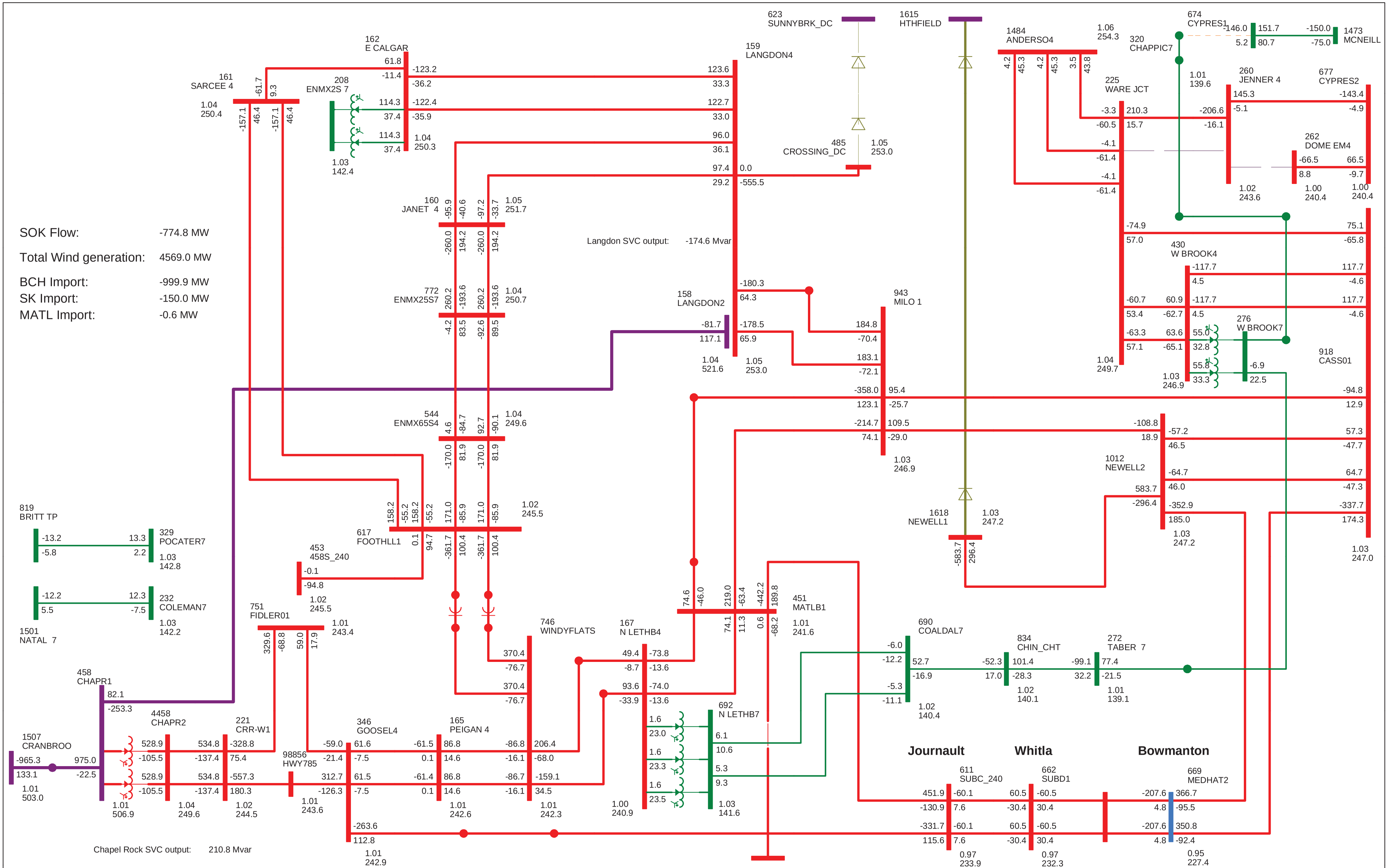
Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A
1.100OV 0.950UV
kV: <=69.000 <=138.000 <=240.000 <=500.000 >500.000

SLD_09: C5_22 (NO SS3)
CATEGORY C3 - 944L, 1002L 240 KV LINES (WARE JUNCTION 132S
FRI, AUG 23 2013 15:47



Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A
1.100OV 0.950UV
kV: <=69.000 <=138.000 <=240.000 <=500.000 >500.000

SLD_09: C5_22 (WITH SS3)
CATEGORY C3 - 944L, 1002L 240 KV LINES (WARE JUNCTION 132S
FRI, AUG 23 2013 15:54



SOK Flow: -774.8 MW

Total Wind generation: 4569.0 MW

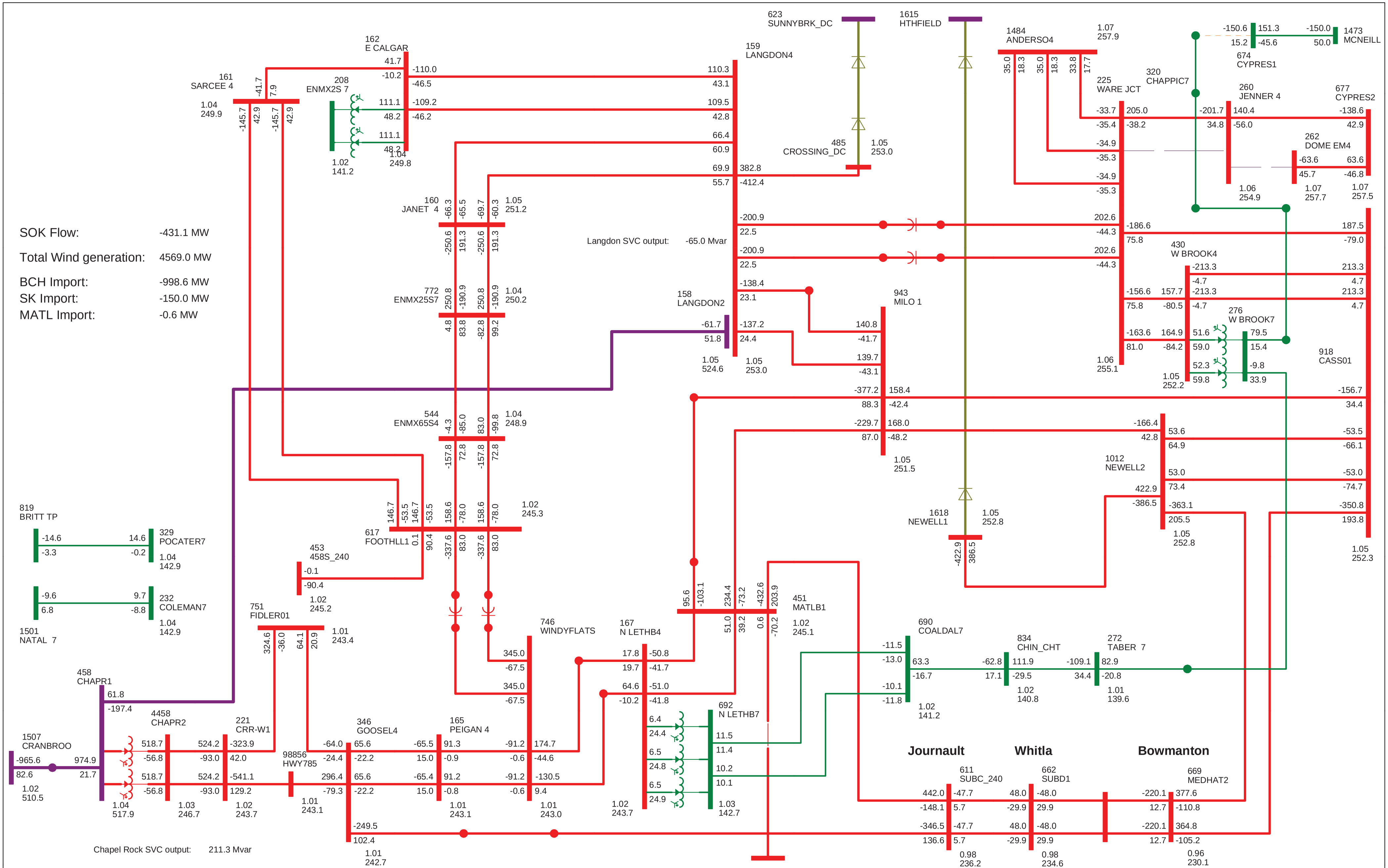
BCH Import: -999.9 MW

SK Import: -150.0 MW

MATL Import: -0.6 MW

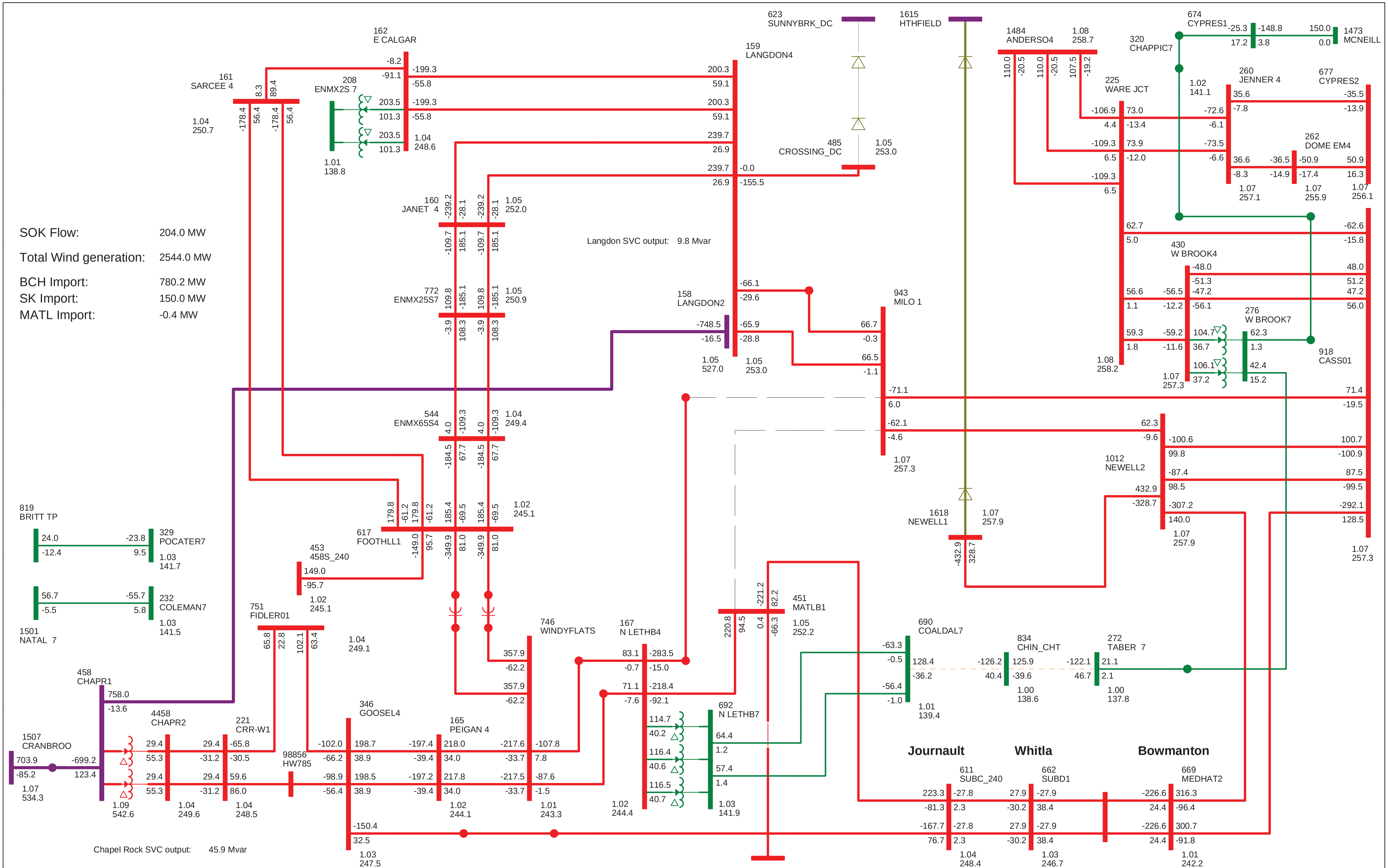
Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A
1.100OV 0.950UV
kV: <=69.000 <=138.000 <=240.000 <=500.000 >500.000

SLD_09: C5_32 (NO SS3)
CATEGORY C3 - 944L, 1002L 240 KV LINES (WARE JUNCTION 132S
FRI, AUG 23 2013 17:09



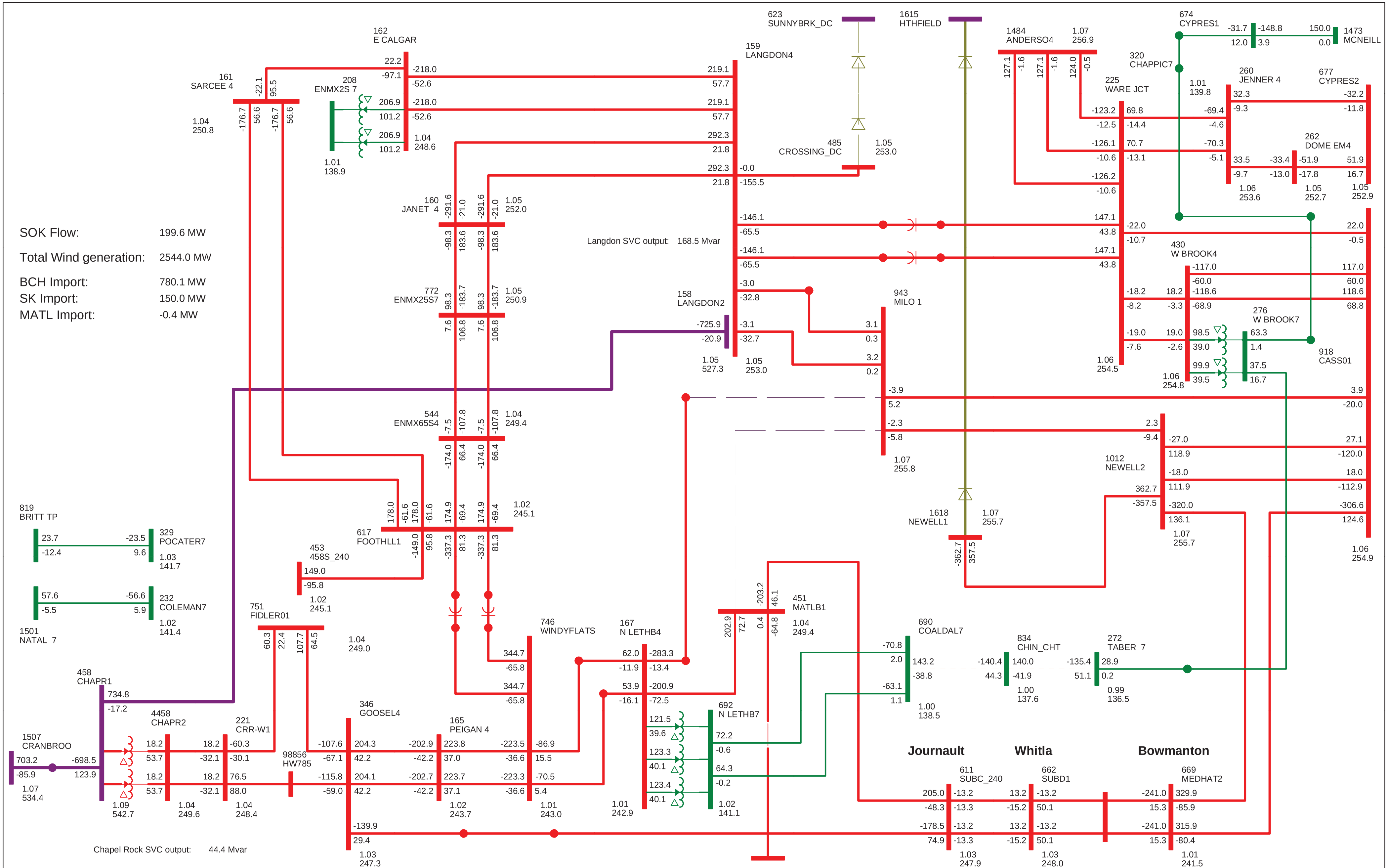
Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A
1.100OV 0.950UV
kV: <=69.000 <=138.000 <=240.000 <=500.000 >500.000

SLD_09: C5_32 (WITH SS3)
CATEGORY C3 - 944L, 1002L 240 KV LINES (WARE JUNCTION 132S
FRI, AUG 23 2013 17:16



Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A
1.100OV 0.950UV
kV: <=69.000 <=138.000 <=240.000 <=500.000 >500.000

SLD_10: C3_22 (NO SS3)
CATEGORY C3 - 1005L, 1036L 240 KV LINES (PICTURE BUTTE 120S
FRI, AUG 23 2013 15:21



SOK Flow: 199.6 MW

Total Wind generation: 2544.0 MW

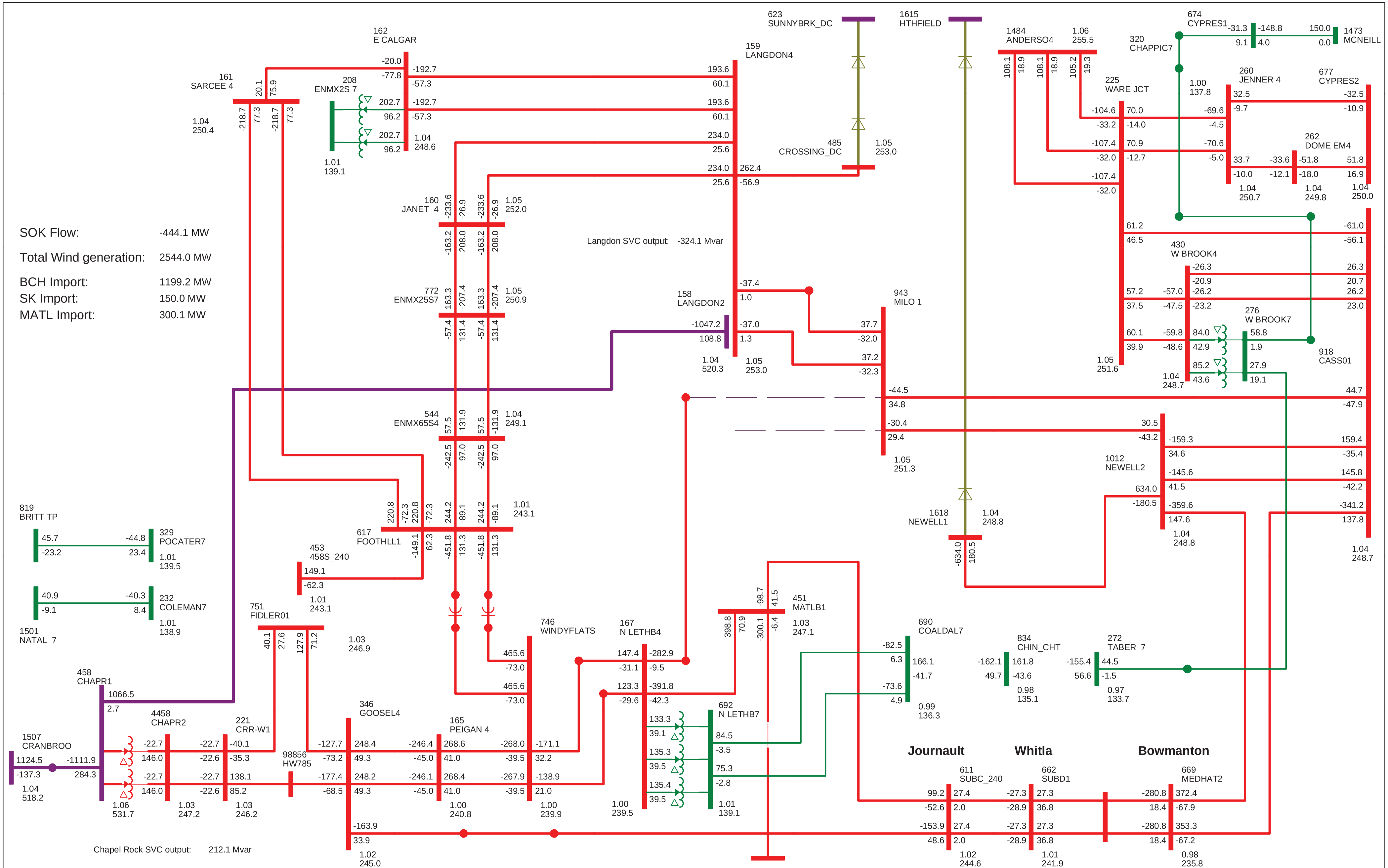
BCH Import: 780.1 MW

SK Import: 150.0 MW

MATL Import: -0.4 MW

Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A
1.100OV 0.950UV
kV: <=69.000 <=138.000 <=240.000 <=500.000 >500.000

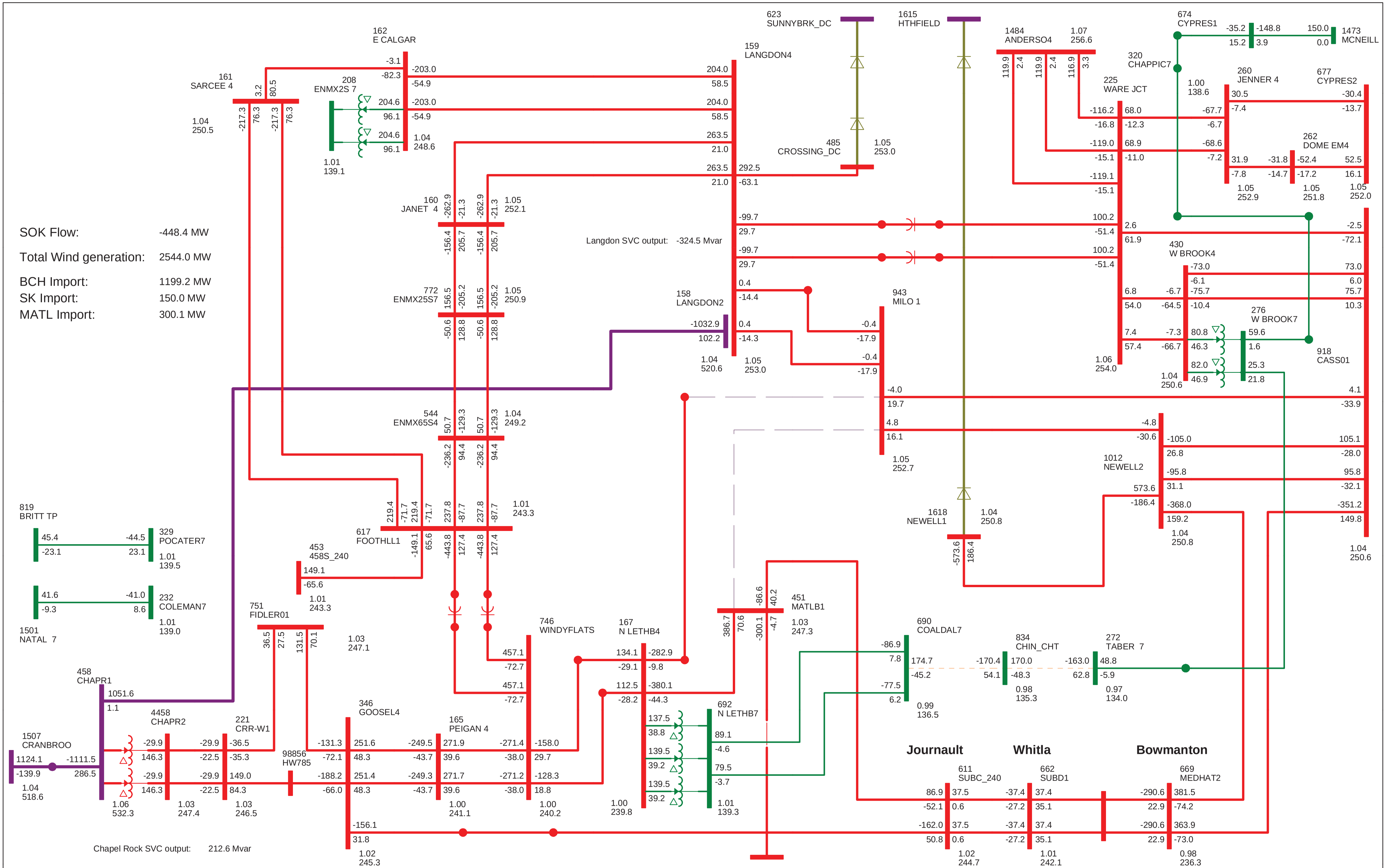
SLD_10: C3_22 (WITH SS3)
CATEGORY C3 - 1005L, 1036L 240 KV LINES (PICTURE BUTTE 120S
FRI, AUG 23 2013 15:27



SOK Flow:	-444.1 MW
Total Wind generation:	2544.0 MW
BCH Import:	1199.2 MW
SK Import:	150.0 MW
MATL Import:	300.1 MW

Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A
1.100OV 0.950UV
kV: <=69.000 <=138.000 <=240.000 <=500.000 >500.000

SLD_10: C6_22 (NO SS3)
CATEGORY C3 - 1005L, 1036L 240 KV LINES (PICTURE BUTTE 120S
FRI, AUG 23 2013 16:02



SOK Flow: -448.4 MW

Total Wind generation: 2544.0 MW

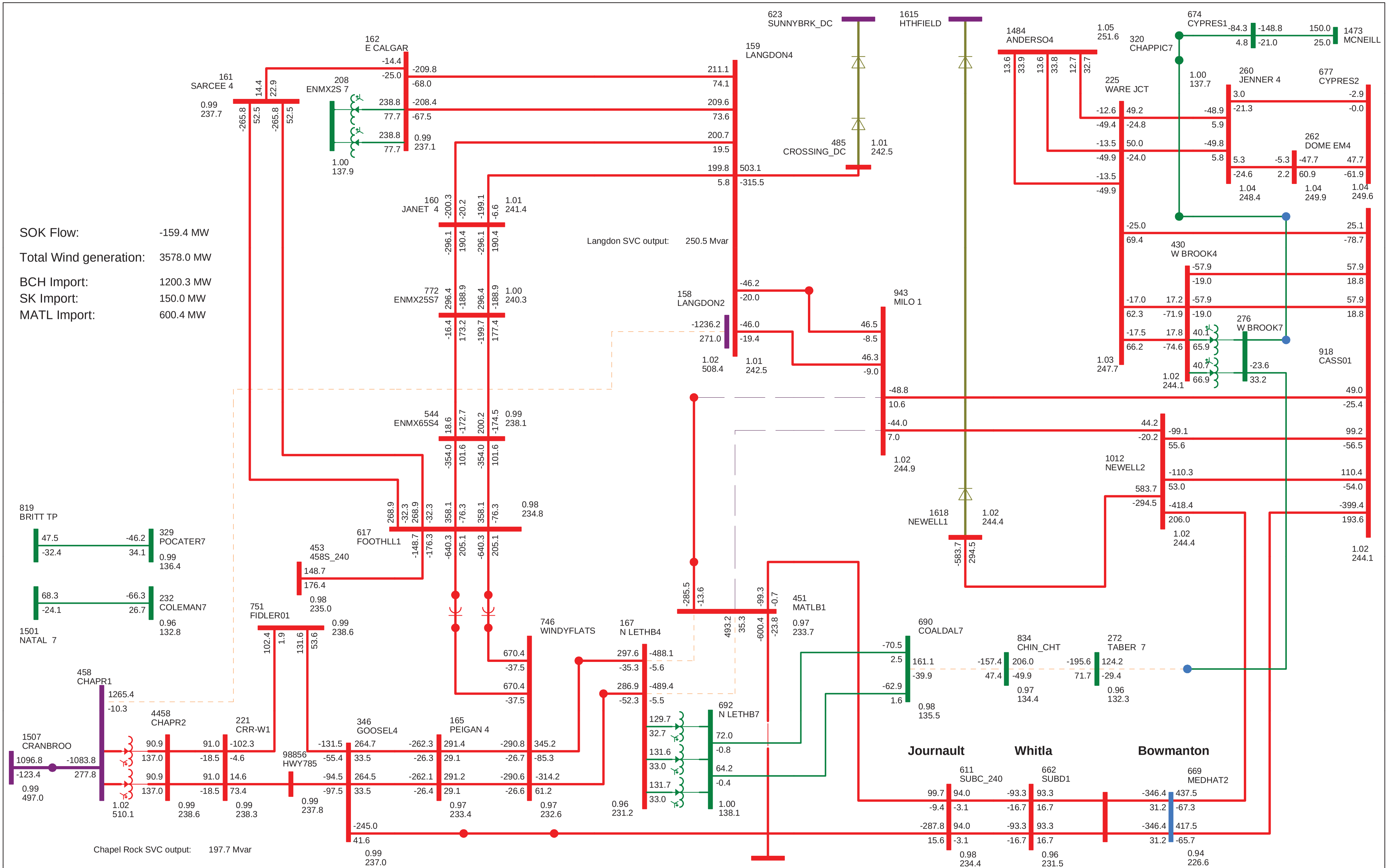
BCH Import: 1199.2 MW

SK Import: 150.0 MW

MATL Import: 300.1 MW

Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A
1.100OV 0.950UV
kV: <=69.000 <=138.000 <=240.000 <=500.000 >500.000

SLD_10: C6_22 (WITH SS3)
CATEGORY C3 - 1005L, 1036L 240 KV LINES (PICTURE BUTTE 120S
FRI, AUG 23 2013 16:08



Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A
1.100OV 0.950UV
kV: <=69.000 <=138.000 <=240.000 <=500.000 >500.000

SLD_10: C6_32 (NO SS3)
CATEGORY C3 - 1005L, 1036L 240 KV LINES (PICTURE BUTTE 120S
FRI, AUG 23 2013 17:24

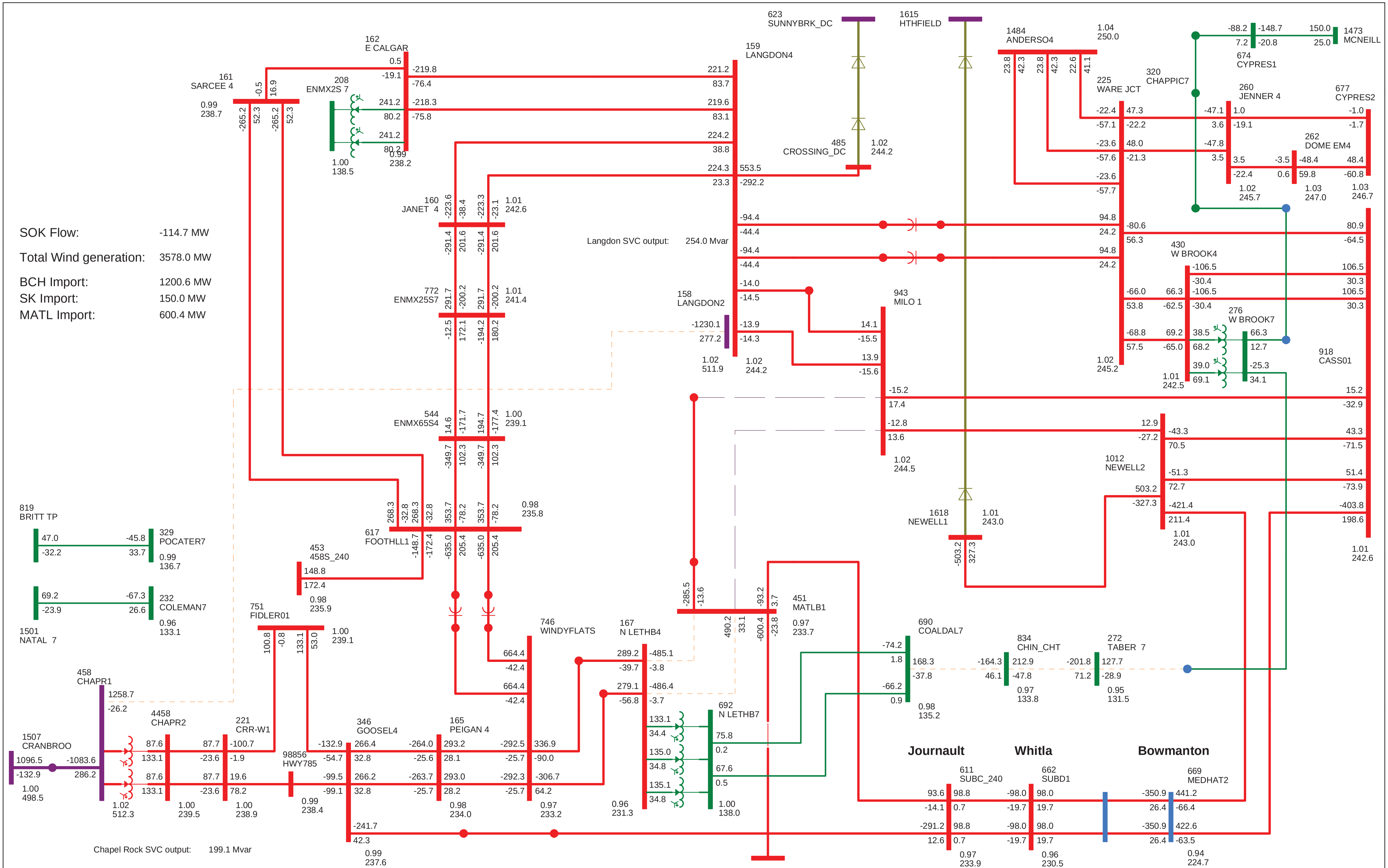
SOK Flow: -114.7 MW

Total Wind generation: 3578.0 MW

BCH Import: 1200.6 MW

SK Import: 150.0 MW

MATL Import: 600.4 MW



Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A
1.100OV 0.950UV
kV: <=69.000 <=138.000 <=240.000 <=500.000 >500.000

SLD_10: C6_32 (WITH SS3)
CATEGORY C3 - 1005L, 1036L 240 KV LINES (PICTURE BUTTE 120S
FRI, AUG 23 2013 17:30

Stage III Amendment to the Alberta Utilities Commission Southern Alberta Transmission System Reinforcement Approval No. U2013-460

ATTACHMENT 2 South and Central Region LOAD and GENERATION FORECASTS

1 Introduction

1.1 The AESO's responsibilities with respect to forecasting the need for transmission in Alberta are described in section 33(1) of the *Electric Utilities Act* and section 8 of the *Transmission Regulation*. System planning studies contained in the AESO's Stage III Amendment to the Southern Alberta Transmission System Reinforcement (SATR) Approval No. U2013-460 (SATR NID Approval) accords with the load and generation forecasts described by this document. The load and generation forecasts assumed for the AESO SATR Stage III Assessment Study (Study) were chosen in accordance with the AESO Transmission Reliability Criteria principle that requires the design of the system to meet or exceed Reliability Criteria under credible worst-case loading and generation conditions[1].

1.2 Load and generation forecasts in this document are a subset of the forecasts published separately by the AESO. The forecasts are found in several AESO publications. The documents are available online at:

http://www.aeso.ca/downloads/AESO_Future_Demand_and_Energy_Outlook.pdf

http://www.aeso.ca/transmission/22021.html

As part of its planning responsibilities, the AESO regularly verifies and updates its corporate forecasts to ensure they reflect the latest economic projections and factors, and up-to-date information regarding future projects. Since the initiation of the Study, the AESO has updated and replaced the corporate load and generation forecasts with the 2012 Long-term Outlook Update (2012 LTOU). Forecast information from the 2012 LTOU is also included in this appendix for comparison. Further information can be found online at:

http://www.aeso.ca/downloads/AESO_LTO_Update_Final.pdf

[1] AESO Transmission Reliability Criteria, Part II System Planning. March 11, 2005. Section 2.0

1.3 Forecasts for the South and Central planning regions are described in this report. The Study area resides in AESO South and Central Planning Regions as described in more detail in section 4 of the *AESO Long-Term Transmission System Plan*, published June 2012.[2]

2 Historical Load

2.1 Table 2.1 summarizes summer load levels at time of South and Central regions and system peak.

Table 2-1: Historical Summer Load (MW)

Year	South Planning Region	Central Planning Region	System Load
2008 HX	2,785	1,337	9,541
2009 HX	2,686	1,313	9,108
2010 HX	2,831	1,323	9,343
2011 HX	2,976	1,365	9,552
2012 HX	2,969	1,402	9,885
2013 HX	3,059	1,382	10,063

HX = Historical

3 Load Forecast

3.1 Load forecasts used in the Study are based on the AESO forecast, referred to as the *2012 Long-term Outlook (2012 LTO)*, published in July 2012. The latest corporate forecast, referred to as the AESO 2012 Long-term Outlook Update (2012LTOU), published in February 2013 is included as a comparison to show alignment between the two forecasts.

3.2 Table 3-2 summarizes the 2012 LTO forecast summer load levels at the time of the region's and system peak.

[2] http://www.aeso.ca/downloads/AESO_2012_LTP_Sections_1.0_to_5.0.pdf

Table 3-2: 2012LTO Summer Load (MW)

Year	South Planning Region	Central Planning Region	System Load
2013 F	3,097	1,522	10,255
2014 F	3,169	1,545	10,673
2015 F	3,240	1,551	11,045
2016 F	3,320	1,590	11,457
2017 F	3,387	1,615	11,923
2018 F	3,469	1,651	12,266
2019 F	3,551	1,683	12,617
2020 F	3,630	1,714	12,948
2021 F	3,719	1,755	13,277
2022 F	3,786	1,784	13,528
. . .			
2032 F	4,463	2,018	16,650

F = Forecast

The average annual summer load growth rate for the South and Central regions for the period from 2012 historical to 2022 forecast based on the 2012 LTO is 2.5% and 2.4% respectively.

3.3 Table 3-3 summarizes the 2012 LTOU forecast summer load levels at the time of the region's and system peak.

Table 3-3: 2012LTOU Summer Load (MW)

Year	South Planning Region	Central Planning Region	System Load
2013 F	3,047	1,488	10,000
2014 F	3,124	1,507	10,378
2015 F	3,190	1,556	10,796
2016 F	3,254	1,586	11,211
2017 F	3,352	1,633	11,936
2018 F	3,450	1,677	12,586
2019 F	3,531	1,714	12,982
2020 F	3,608	1,743	13,260
2021 F	3,684	1,780	13,545
2022 F	3,751	1,813	13,812
. . .			
2032 F	4,622	2,141	16,419

F = Forecast

The average annual summer load growth rate for the South and Central regions for the period from 2012 historical to 2022 forecast based on the 2012 LTOU is 2.4% and 2.6% respectively.

3.4 Table 3-4 summarizes the differences between the 2012LTO summer forecast South region peak and the 2012LTOU summer forecast South Region peak. For the study years, 2022 and 2032, the 2012LTO region load is approximately 35 MW more and 160 MW less respectively than the most recent AESO corporate load forecast.

Table 3-4: Differences (2012LTO vs 2012LTOU) Summer Load at South Region Peak (MW)

Year	2012LTO South Region	2012LTOU South Region	Differences
2013 F	3,097	3,047	-49
2014 F	3,169	3,124	-45
2015 F	3,240	3,190	-50
2016 F	3,320	3,254	-66
2017 F	3,387	3,352	-35
2018 F	3,469	3,450	-19
2019 F	3,551	3,531	-20
2020 F	3,630	3,608	-22
2021 F	3,719	3,684	-34
2022 F	3,786	3,751	-35
…			
2032 F	4,463	4,622	+159

Shaded area denotes study years
F = Forecast

3.5 Table 3-5 summarizes the differences between the 2012LTO summer forecast Central region peak and the 2012LTOU summer forecast Central Region peak. For the study years, 2022 and 2032, the 2012LTO region load is approximately 30 MW and 120 MW less respectively than the most recent AESO corporate load forecast.

Table 3-5: Differences (2012LTO vs 2012LTOU) Summer Load at Central Region Peak (MW)

Year	2012LTO Central Region	2012LTOU Central Region	Differences
2013 F	1,522	1,488	-34
2014 F	1,545	1,507	-38
2015 F	1,551	1,556	+5
2016 F	1,590	1,586	-4
2017 F	1,615	1,633	+18
2018 F	1,651	1,677	+26
2019 F	1,683	1,714	+31
2020 F	1,714	1,743	+29
2021 F	1,755	1,780	+25
2022 F	1,784	1,813	+29
…			
2032 F	2,018	2,141	+123

Shaded area denotes study years
F = Forecast

4 Generation Forecast

4.1 Generation capacity in the South planning region was 3,101 MW and in the Central planning region was 2,023 MW as of December 31, 2012. This capacity is mainly from coal–fired, gas-fired, hydro and wind facilities. Gas-fired and wind generation is an important component to the Study as they are expected to increase in the regions. The AESO has, as of November 2013, received applications to connect approximately 2,700 MW of wind generation in the South and Central regions. Future capacity additions in the Regions are expected to be gas-fired and wind facilities.

4.2 Generation forecasts used in the study are based on the generation outlook presented in the 2012LTO. 2012LTOU forecasts are provided to show alignment between the forecasts. Table 4-1 summarizes the existing generation capacity, and forecasts in the South Region.

Table 4-1: 2012LTOand 2012LTOU
South Region Capacity

Generation Capacity (MW)	2012LTO	2012LTOU
Existing (as of Dec 31, 2012)	3,101	3,101
2022	5,741	5,317
2032	6,295	6,542

4.3 Table 4-2 summarizes the existing generation capacity, and forecasts in the Central Region.

Table 4-2: 2012 Long-term Outlook and 2012 Long-term Outlook Update
Central Region Capacity

Generation Capacity (MW)	2012LTO	2012LTOU
Existing (as of Dec 31, 2012)	2,023	2,023
2022	2,200	2,686
2032	3,331	3,822

4.4 The largest change between the 2012LTO and the 2012LTOU is the generation mix in the South Region. In the 2012LTOU there is approximately 400 MW less wind in the forecast by 2032. This has been offset in the 2032 timeframe with the addition of thermal combined cycle generation. On a capacity basis, there is very little change between the two forecasts. Both the capacity and location of the generation in the south are considerations for transmission development in the South region.

4.5 Table 4-3 below summarizes the existing wind capacity, and forecast in the South Region

Table 4-3: 2012LTOand 2012LTOU
South Region Wind Capacity

Generation Capacity (MW)	2012LTO	2012LTOU
Existing (as of Dec 31, 2012)	855	855
2022	2,088	1,649
2032	2,892	2,524

4.6 Table 4-4 below summarizes the existing wind capacity, and forecast in the Central Region

Table 4-4: 2012LTO and 2012LTOU
Central Region Wind Capacity

Generation Capacity (MW)	2012LTO	2012LTOU
Existing (as of Dec 31, 2012)	232	232
2022	456	557
2032	686	732

Stage III Amendment to the Alberta Utilities Commission Southern Alberta Transmission System Reinforcement Approval No. U2013-460

ATTACHMENT 3 PARTICIPANT INVOLVEMENT PROGRAM (PIP)

Stage III Amendment to the Alberta Utilities Commission Southern Alberta Transmission System Reinforcement Approval No. U2013-460

1.0 Participant Involvement Program (PIP)

From August 2013 to December 2013, the AESO conducted a Participant Involvement Program (PIP) in accordance with NID 13 and Appendix A of Alberta Utilities Commission (AUC) Rule 007 to assist in preparing its Stage III Amendment to the Alberta Utilities Commission Southern Alberta Transmission System Reinforcement (SATR) Approval No. U2013-460 (Amendment).

The AESO's PIP was designed to notify, provide information to, and, as necessary, consult with stakeholders, including occupants, residents, and landowners in the approximate area where SATR Stage III was proposed to be developed. The following organizations, First Nation, and elected and administrative government officials at the local, municipal, and provincial levels were sent stakeholder notification documents directly. Additionally, the First Nation and government officials were invited to meet with the AESO to discuss the Amendment:

Interested parties notified:

- Town of Chestermere
- Town of Strathmore
- Town of Bassano
- Village of Standard
- Village of Duchess
- Village of Rosemary
- Village of Hussar
- Rocky View County
- Wheatland County
- County of Newell
- Special Area #2 (Special Areas Board)
- Mr. Bruce McAllister, MLA, Chestermere-Rocky View
- Mr. Jason Hale, MLA, Strathmore-Brooks
- Mr. Ian Donovan, MLA, Little Bow
- Mr. Rick Strankman, MLA, Drumheller-Stettler
- Powerex Corp.
- TransCanada Energy Ltd.
- Livingstone Landowners Group
- Alberta Wilderness Association
- AltaLink Management Ltd.
- Alberta Wind Energy Corporation
- Pteragen Canada Inc.
- Benign Energy Canada Inc.
- NaturEner Canada
- Enel Green Power Canada, Inc.
- Shear Wind Inc.
- Greengate Power Corporation
- Renewable Energy Services Ltd.
- ACCIONA Wind Energy Canada
- Canadian Wind Energy Association
- Mainstream Renewable Power
- Siksika Nation

1.1 Description of Participant Involvement Program

The AESO notified stakeholders of the Amendment on three separate occasions. The AESO initially advised stakeholders of its intention to cancel SATR Stage III in the *Southern Alberta Transmission Reinforcement Stakeholder Update* (Update), mailed in August 2013 by postal code mail out (unaddressed mail). The organizations and elected and administrative government officials described in section 1 were sent the Update directly (addressed mail). The Update was also posted to the AESO website (http://www.aeso.ca/transmission/24782.html) on August 23, 2013 and linked from the August 27, 2013 AESO stakeholder newsletter.

A copy of the Update is included as Attachment 1.

The second stakeholder notification of the Amendment was mailed in November 2013 by postal code mail out (unaddressed mail) to the occupants, residents and landowners described in section 1. The organizations, First Nation, and elected and administrative government officials described in section 1 were sent the November 2013 stakeholder notification directly (addressed mail). The November 2013 stakeholder notification was also posted to the AESO website (http://www.aeso.ca/transmission/24782.html) on November 18, 2013. The November 19, 2013 AESO stakeholder newsletter included a link to the stakeholder notification.

A copy of the November 2013 stakeholder notification is included as Attachment 2.

Most recently, the AESO advertised its intention to file the amendment in the following publications:

Publication	Date
Chestermere Anchor	Thursday, November 28, 2013
Strathmore Standard	Wednesday, November 27, 2013
Strathmore Times	Friday, November 29, 2013
Bassano Times	Tuesday, November 26, 2013
Brooks Weekend Regional	Thursday, November 28, 2013
Brooks Chronicle	Sunday, November 24, 2013

A copy of the final proof has been included in Attachment 3.

To ensure that stakeholders have the opportunity to provide feedback, the AESO also provides stakeholders with a dedicated, toll-free telephone line (1-888-866-2959) and a dedicated email address (stakeholder.relations@aeso.ca). AESO contact information, along with the AESO's mailing address (2500, 330 5th Ave, SW, Calgary) and website address (www.aeso.ca), were included on all AESO communications related to this application.

1.2 Issues and Concerns Raised

The AESO has received no indication of concern from any party regarding the Amendment.

1.3 List of Attachments

- Attachment 1 – AESO Stakeholder Notification – August 2013
- Attachment 2 – AESO Stakeholder Notification – November 2013
- Attachment 3 – Notification of Filing Advertisement – Final Proof

PIP Attachment 1 – AESO Stakeholder Notification – August 2013

Southern Alberta Transmission Reinforcement Stakeholder Update

August 2013

Why am I receiving this information?

The Alberta Electric System Operator (AESO) wishes to provide you with a status update on various components of the Southern Alberta Transmission Reinforcement (SATR). SATR, which is needed to alleviate existing system constraints and to integrate wind developments throughout southern Alberta, was approved by the Alberta Utilities Commission (AUC) in Approval No. 2011-115.

The AESO is providing this information to landowners, occupants, residents and other stakeholders that may be affected by the SATR components described below. The AESO will continue to update stakeholders as new information becomes available.

Temporary Delay of Certain SATR Components

The AESO is currently conducting analysis related to its intertie restoration initiative that may affect the timing of the following three planned SATR components:

- Picture Butte to Etzikom Coulee - includes the new Journault substation in the Etzikom Coulee area and a new 240 kV transmission line between the Picture Butte and Journault substations.
- Goose Lake to Etzikom Coulee - includes a new 240 kV transmission line between the Goose Lake and Journault substations.
- Etzikom Coulee to Whitla - includes a new 240 kV transmission line between the Journault and Whitla substations.

Consequently, the AESO has temporarily delayed proceeding with these SATR components until the analysis is completed. The AESO has also requested that AltaLink Management Ltd. (AltaLink) delay filing its facilities applications with the AUC for these three SATR components until 2014. AltaLink's facilities applications will include detailed descriptions and locations of these SATR components.

Cancelled SATR Component

The AESO has reviewed its plans for Stage 3 of SATR, which is comprised of a new 240 kV transmission line connecting Ware Junction substation to the Langdon substation. As a result of its long-term regional transmission plans, the AESO has determined that SATR Stage 3 is no longer needed and will apply to the AUC for approval to cancel this stage.

The AESO's Planning Process

The AESO's transmission planning processes are purposefully flexible with system upgrades planned in stages to accommodate changes in transmission infrastructure and demand for transmission access. The temporary delay and cancellation described above have resulted from the AESO's ongoing monitoring of the transmission system conditions.

SATR Background

SATR is needed to alleviate existing system constraints and to integrate wind generation throughout Alberta. As part of the regulatory process, the AESO consulted from October 2007 to October 2008 on the need for SATR and the proposed developments to meet the need. In December 2008, the AESO

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applied to the AUC for approval of the need and the AESO's preferred SATR developments. The AUC granted that approval in September 2009. Most recently in 2012, the AESO provided further information to potentially affected stakeholders regarding a change in the potential development area for the Goose Lake to Etzikom Coulee and Picture Butte to Etzikom Coulee transmission developments.

The SATR Needs Identification Document, as well as the AESO's original and more recent consultation material, can be found on the AESO website at http://www.aeso.ca/transmission/24767.html

Who is the AESO?

Alberta's transmission system, sometimes referred to as the Alberta Interconnected Electric System (AIES), is planned and operated by the AESO. The transmission system comprises the high-voltage lines, towers and equipment (generally 69 kV and above) that transmit electricity from generators to lower voltage systems that distribute electricity to cities, towns, rural areas and large industrial customers.

The AESO's role is to maintain safe, reliable and economic operation of the AIES. The AESO's planning responsibility includes determining the need for transmission system development and the manner in which that need is met. The AESO is also mandated to facilitate the interconnection of qualified market participants to the AIES. The AESO is regulated by the AUC and must apply to the AUC for approval of its NID.

How is AltaLink Management Ltd. involved?

AltaLink is the transmission facilities owner in the area. While the AESO is responsible for identifying that transmission system development is needed, AltaLink is responsible for detailed siting and routing, constructing, operating and maintaining the associated transmission facilities.

For More Information

The AESO's view is that anyone potentially affected by transmission planning should have the opportunity to participate in the process and provide input. The AESO appreciates your views on the need for transmission system development and encourages your comments and participation. Please contact **Megan Harris** through stakeholder.relations@aeso.ca or call our stakeholder relations toll-free line at 1-888-866-2959 if you have any questions or suggestions.

The AESO is committed to protecting your personal privacy in accordance with Alberta's Personal Information Protection Act. Any personal information collected by the AESO with regard to this project may be used to provide you with further information about the project, may be disclosed to the Alberta Utilities Commission (and as a result, may become public), and may also be disclosed to AltaLink as the legal owners of transmission facilities in your area. If you have any questions about how the AESO will use and disclose your personal information, please contact us at 1-888-866-2959 or at stakeholder.relations@aeso.ca

PIP Attachment 2 – AESO Stakeholder Notification – November 2013

Southern Alberta Transmission Reinforcement Stakeholder Update – Stage III Cancellation

November 2013

Stage III Cancellation

The Alberta Electric System Operator (AESO) wishes to provide you with a status update on Stage III of the Southern Alberta Transmission Reinforcement (SATR). SATR, including Stage III, was approved by the Alberta Utilities Commission (AUC) in 2009 (Approval No. U2011-115).

SATR Stage III, which was approved to include a new double circuit 240 kV transmission line connecting Ware Junction substation to the Langdon substation, was originally planned to transmit power from southeastern and south central Alberta to the Calgary area. Since SATR's approval in 2009, additional transmission system plans have been developed and approved. As a part of its ongoing planning process, the AESO has reviewed the long-term need for Stage III considering these recent plans. The AESO has determined that the Eastern Alberta Transmission Line, currently under construction, will provide the same functionality that SATR Stage III was planned to provide and that therefore this stage of SATR is no longer needed.

The AESO is providing this information to stakeholders, including landowners, occupants and residents in the area that may be affected by the change in transmission development. The AESO will apply to the AUC in winter 2013/2014 to cancel SATR Stage III and amend Approval No. U2011-115 accordingly. The application will be available at http://www.aeso.ca/transmission/24781.html at the time of the AESO's application to the AUC.

The AESO's Planning Process

The AESO's long-term transmission plans are purposefully flexible with system upgrades planned in stages to accommodate changes in transmission infrastructure and existing and forecast demand for transmission access. The cancellation of SATR Stage III has resulted from the AESO's ongoing monitoring of these transmission system conditions.

Background

In December 2008, the AESO filed the SATR Needs Identification Document (NID) with the AUC to address the need for transmission system reinforcement in southern Alberta. SATR is needed to alleviate existing system constraints and to integrate southern Alberta wind generation with the transmission system. As part of the regulatory process, the AESO consulted on the need for transmission development and its plan to address the need from October 2007 to October 2008. A public hearing was held to consider the SATR NID application in June 2009. The AUC approved the SATR NID in September 2009 in Decision 2009-126 and further approved certain amendments in Decision 2011-102 and Approval No. U2011-115. For more information on the need for SATR, please visit http://www.aeso.ca/transmission/16869.html

Who is the AESO?

Alberta's transmission system, sometimes referred to as the Alberta Interconnected Electric System (AIES), is planned and operated by the AESO. The transmission system comprises the high-voltage lines, towers and equipment (generally 69 kV and above) that transmit electricity from generators to lower voltage systems that distribute electricity to cities, towns, rural areas and large industrial customers.

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The AESO's role is to maintain the safe, reliable and economic operation of the AIES. The AESO's planning responsibility includes determining the need for transmission system development and the manner in which that need is met. The AESO is also mandated to facilitate the interconnection of qualified market participants to the AIES. The AESO is regulated by the AUC and must apply to the AUC for approval of its needs identification documents.

For More Information

The AESO believes anyone potentially affected by its transmission plans should have the opportunity to participate in the process and provide input. The AESO appreciates your views on the cancellation of this component of SATR and encourages your comments and participation.

For further information, the SATR NID Approval can be found on the AUC website at:
http://www.auc.ab.ca/applications/orders/utility-orders/Utility%20Orders/2011/U2011-115.pdf

Please contact Megan Harris through stakeholder.relations@aeso.ca or call our stakeholder relations toll-free line at 1-888-866-2959 if you have any questions or suggestions.

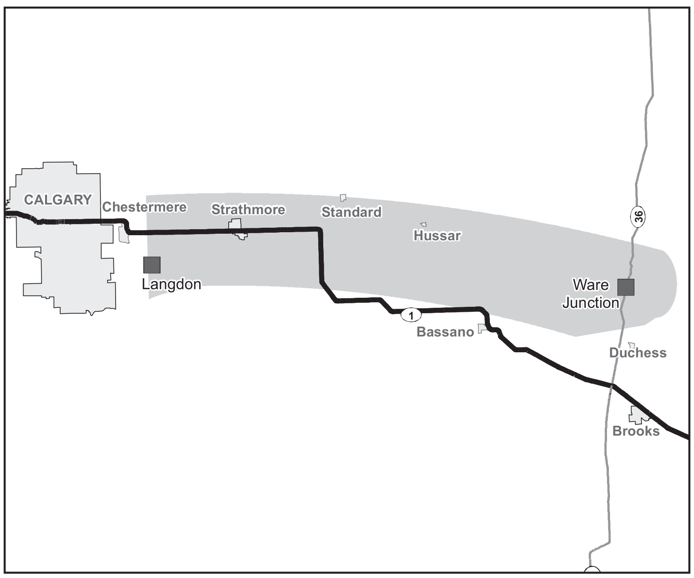
The AESO is committed to protecting your personal privacy in accordance with Alberta's Personal Information Protection Act. Any personal information collected by the AESO with regard to this project may be used to provide you with further information about the project, may be disclosed to the Alberta Utilities Commission (and as a result, may become public), and may also be disclosed to AltaLink as the legal owners of transmission facilities in your area. If you have any questions about how the AESO will use and disclose your personal information, please contact us at 1-888-866-2959 or at stakeholder.relations@aeso.ca

PIP Attachment 3 – Notification of Filing Advertisement – Final Proof

Notification of AESO Regulatory Filing of an Amendment to Cancel Stage III of the Southern Alberta Transmission Reinforcement

The Alberta Electric System Operator (AESO) advises you of its intention to file an application with the Alberta Utilities Commission (AUC) on or after December 13, 2013 to cancel Stage III of the Southern Alberta Transmission Reinforcement (SATR) and amend the SATR Needs Identification Document Approval No. U2013-460 accordingly.

SATR Stage III, which was approved to include a new double circuit 240 kV transmission line connecting Ware Junction substation to the Langdon substation, was originally planned to transmit power from southeastern and south central Alberta to the Calgary area. Since SATR's approval in 2009, additional transmission system plans have been developed and approved. As a part of its ongoing planning process, the AESO has reviewed the long-term need for Stage III considering these recent plans and determined that this stage of SATR is no longer needed.



The shaded area on the map indicates the approximate area where the SATR Stage III development was previously identified as needed. Changes in transmission system plans have resulted in the approved development no longer being needed.

The AESO provided notification of the amendment to stakeholders, including residents, occupants and landowners where the development would have occurred from August to December 2013. The AESO also provided notification to various agencies, organizations and industry. The AESO has considered feedback gathered from stakeholders and technical and cost considerations, and will apply to the AUC for approval of this amendment. Once filed, the amendment will be posted on the AESO website at http://www.aeso.ca/transmission/24781.html

Please visit our website, www.aeso.ca for more information, or contact the AESO at 1-888-866-2959 or stakeholder.relations@aeso.ca

aeso
ALBERTA ELECTRIC SYSTEM OPERATOR

tmp.worldwide
Integrated Marketing Communications

Artist: 2N

Docket: 103266

Date: Nov 18, 2013

Size: 5"

Proof: 1

1 of 1

Publications(s): Various South AB