

Balancing Authority of Northern California

Regular Meeting of the Commissioners of BANC

2:00 P.M.

Wednesday, November 17, 2021

Teleconference Meeting

Balancing Authority of Northern California

NOTICE OF REGULAR MEETING AND AGENDA

Notice is hereby given that a regular meeting of the Commissioners of the Balancing Authority of Northern California (BANC) will be held on **November 17, 2021 at 2:00 p.m.** **This meeting will be conducted pursuant to the provisions of Assembly Bill 361. Some, or all, of the Commissioners may attend the meeting electronically or telephonically.**

The following information is being provided as the forum by which members of the public may observe the meeting and offer public comment:

Phone number: 1-408-418-9388

Meeting number (access code): 2567 294 3494

WebEx Meeting Link:

<https://braunblaisingsmithwynne.my.webex.com/braunblaisingsmithwynne.my/j.php?MTID=m91f39759372ffe4c50a07d2a460a4289>

AGENDA

- 1 Call to Order and Verification of Quorum.**
- 2 Matters subsequent to posting the Agenda.**
- 3 Public Comment** – any member of the public may address the Commissioners concerning any matter on the agenda.
- 4 Consent Agenda.**
 - A. Resolution 21-11-01 *Reconsideration of the Determination that Meeting in Person Would Present Imminent Risks to the Health or Safety of Attendees as a Result of the Proclaimed State of Emergency.*
 - B. Minutes of the Regular Commission Meeting held on October 27, 2021.
 - C. BANC Operator Report (October).
 - D. Compliance Officer Report (November).
 - E. PC Committee Chair Report (November).
 - F. General Manager's Report and Strategic Initiatives Update.
- 5 Regular Agenda Items – Discussion and Possible Action.**
 - A. General Manager Updates.
 - i. EIM Update.
 - ii. EDAM Update.
 - iii. SB100 Update.
 - B. Consider and Possibly Approve Resolution 21-11-02 *Resolution Setting the Regular Meeting Dates for 2022.*
 - C. Consider and Possibly Approve Resolution 21-11-03 *Acknowledgement and Acceptance of BANC Planning Coordinator Area 2021 Transmission Planning Assessment.*
 - D. Member Updates.
- 6 Adjournment.**

Accessible Public Meetings - Upon request, BANC will provide written agenda materials in appropriate alternative formats, or disability-related modification or accommodation, including auxiliary aids or services, to enable individuals with disabilities to participate in public meetings. Please send a written request, including your name, mailing address, phone number and brief description of the requested materials and preferred alternative format or auxiliary aid or service at least 3 days before the meeting. Requests should be sent to: Kris Kirkegaard, 555 Capitol Mall, Suite 570, Sacramento, CA 95814 or to administrator@braunlegal.com.

Balancing Authority of Northern California

Consent Agenda Items

- A. **Resolution 21-11-01 *Reconsideration of the Determination that Meeting in Person Would Present Imminent Risks to the Health or Safety of Attendees as a Result of the Proclaimed State of Emergency.***
- B. **Minutes of the October 27, 2021 BANC Regular Meeting.**
- C. **BANC Operator Report (October).**
- D. **Compliance Officer Report (November).**
- E. **PC Committee Chair Report (November).**
- F. **General Manager Report and Strategic Initiatives Update.**

**Balancing Authority of Northern California
Resolution 21-11-01**

**RECONSIDERATION OF THE DETERMINATION THAT MEETING IN PERSON WOULD PRESENT
IMMINENT RISKS TO THE HEALTH OR SAFETY OF ATTENDEES AS A RESULT OF THE
PROCLAIMED STATE OF EMERGENCY**

WHEREAS, on March 4, 2020 the Governor of California proclaimed a state of emergency in California as a result of the threat of COVID-19; and

WHEREAS, on March 17, 2020, the Governor issued Executive Order N-29-20 authorizing exemptions to certain notice requirements under the Ralph M. Brown Act to facilitate virtual meetings of a legislative body of a local agency; and

WHEREAS, on June 11, 2021, the Governor issued Executive Order N-08-12 extending the provisions of N-29-20 until September 30, 2021; and

WHEREAS, on September 16, 2021, the Governor of California signed Assembly Bill 361 which provides for the continued suspension of certain notice requirements for virtual meeting when a legislative body of a local agency holds a meeting during a declared state of emergency and either:

- (1) state or local officials have imposed or recommended measures to promote social distancing, or
- (2) the legislative body holds a meeting for the purpose of determining, by majority vote, whether as a result of the emergency, meeting in person would present imminent risks to the health or safety of attendees.

WHEREAS, at its October 27, 2021 meeting, the BANC Commission determined that meeting in person would present imminent risks to the health or safety of attendees as a result of the proclaimed state of emergency; and

WHEREAS, pursuant to AB 361, a legislative body of a local agency must, not later than 30 days after teleconferencing for the first time pursuant to AB 361, and every 30 days thereafter, reconsider the circumstances of the state of emergency and determine that the state of emergency continues to directly impact the ability of the members to meet safely in person.

NOW, THEREFORE, BE IT RESOLVED that the Commissioners of the Balancing Authority of Northern California have reconsidered the state of emergency and hereby determine that meeting in person continues to present imminent risks to the health or safety of attendees as a result of the proclaimed state of emergency.

PASSED AND ADOPTED by the Commissioners of the Balancing Authority of Northern California this 17th day of November, 2021.

James McFall
Chair

Attest by: C. Anthony Braun
Secretary

MINUTES OF THE REGULAR MEETING OF THE COMMISSIONERS OF THE
BALANCING AUTHORITY OF NORTHERN CALIFORNIA (BANC)

October 27, 2021

On this date, a Regular Meeting of the Commissioners of the Balancing Authority of Northern California was held telephonically, pursuant to the provisions of Assembly Bill 361.

Representatives:

Member Agency	Commissioner
Modesto Irrigation District (MID)	James McFall, Chair
City of Redding	Nick Zettel, Alternate
City of Roseville	Shawn Matchim, Alternate
Sacramento Municipal Utility District (SMUD)	Paul Lau
City of Shasta Lake	Absent
Trinity Public Utilities District (TPUD)	Paul Hauser

Other Participants:

Jim Shetler	General Manager
Tony Braun	General Counsel
Kevin Smith	General Counsel
Brittany Iles	General Counsel
Kris Kirkegaard	General Counsel Support
Sonja Anderson	Western Area Power Administration (WAPA)
Jeanne Haas	WAPA
Arun Sethi	WAPA
Brian Griess	WAPA

1. Call to Order: Ms. Kirkegaard read the names of all participants aloud, and Mr. Shetler verified that there was a quorum to proceed; attendance is noted above. Chair McFall called the meeting to order at 2:02 p.m.
2. Matters Subsequent to Posting the Agenda: None.
3. Public Comment (any matter on the agenda): None.
4. Consent Agenda: Chair McFall invited comments from the Commission on the Consent Agenda, and there were none.

ACTION: M/S (Hauser/Lau) to **approve the Consent Agenda**. Motion carried by a unanimous roll call vote (Absent: Commissioner Takehara).

MINUTES OF THE REGULAR MEETING OF THE COMMISSIONERS OF THE
BALANCING AUTHORITY OF NORTHERN CALIFORNIA (BANC)

5. Regular Agenda Items – Discussion and Possible Action:

- A. Consider and Possibly Approve Resolution 21-10-17 Determination that Meeting in Person Would Present Imminent Risks to the Health or Safety of Attendees as a Result of the Proclaimed State of Emergency.

Ms. Iles provided an overview of this item. There were no questions from the Commission. Chair McFall inquired as to whether this item could appear on the Consent agenda for future meetings.

ACTION: M/S (Zettel/Matchim) to **approve Resolution 21-10-17 Determination that Meeting in Person Would Present Imminent Risks to the Health or Safety of Attendees as a Result of the Proclaimed State of Emergency.** Motion carried by a unanimous roll call vote (Absent: Commissioner Takehara).

B. General Manager Updates:

i. EIM Update:

Mr. Shetler introduced this item, noting that CAISO would soon be publishing its 3rd quarter benefits analysis.

- a. Consider and Possibly Approve Resolution 21-10-18 Approval of Cash Reserve Requirements.

Mr. Shetler provided an overview of this item, suggesting a modification to the resolution prior to the vote. General Counsel read the change aloud, adding the phrase "..., subject to final concurrence by the EIM Committee on the final allocation amounts." to the end of item 2. Mr. Shetler and General Counsel also addressed questions from Commissioners.

ACTION: M/S (Matchim/Lau) to **approve Resolution 20-10-18 Approval of Cash Reserve Requirements.** Motion carried by a unanimous roll call vote (Absent: Commissioner Takehara).

- b. Consider and Possibly Approve Resolution 21-10-19 Extension of Binding Date for Flex Ramp Approach.

Mr. Shetler reviewed the details of this item. There were no questions from the Commission. Alternate Commissioner Zettel expressed his support for this approach.

ACTION: M/S (Zettel/Hauser) to **approve Resolution 20-10-19 Extension of Binding Date for Flex Ramp Approach.** Motion carried by a unanimous roll call vote (Absent: Commissioner Takehara).

- c. Consider and Possibly Approve Resolution 21-10-20 Approval of "Do Not Settle" UFE Election for BANC.

Mr. Shetler introduced this item. There were no questions from the Commission.

ACTION: M/S (Hauser/Matchim) to **approve Resolution 20-10-20 Approval of "Do Not Settle" UFE Election for BANC.** Motion carried by a unanimous roll call vote (Absent: Commissioner Takehara).

MINUTES OF THE REGULAR MEETING OF THE COMMISSIONERS OF THE
BALANCING AUTHORITY OF NORTHERN CALIFORNIA (BANC)

ii. EDAM Update.

Mr. Shetler provided this update. There were no questions from the Commission.

iii. SB 100 Update.

Mr. Shetler and Mr. Braun shared updates with the Commission and responded to questions from the Commissioners.

C. Consider and Possibly Approve Resolution 21-10-21 Approval of 2022 Annual Budget for BANC.

Mr. Shetler noted a few updates to the Draft 2022 BANC Budget: 1) an added software allowance under PA-5 to support EIM operations; 2) A \$200 error under the base budget that will be corrected in the final version; 3) a contingency amount was added to the Resource Committee to support SB100 and a BANC RFP for resources; 4) added contingency under the base budget to support market engagement. He also answered questions from the Commission.

ACTION: M/S (Hauser/Matchim) to **approve Resolution 20-10-21 Approval of 2022 Annual Budget for BANC.** Motion carried by a unanimous roll call vote (Absent: Commissioner Takehara).

D. Draft 2021/2022 Strategic Initiatives Review and Possible Acceptance.

Mr. Shetler noted that he had added an item and resolved the duplication issue raised in a prior meeting, answering questions from the commission before obtaining their concurrence.

E. Member updates:

The Commission engaged on Member 'return to office' plans. Mr. Shetler also provided a brief update on the status of a BANC Resource RFP.

6. Closed Session: The Commission retired to closed session at 3:06 p.m. for conference with legal counsel in anticipation of litigation pursuant to subdivision (c) of Cal. Gov't Code § 54956.9.

The Commission adjourned from closed session at 3:38 p.m., where no formal action was taken.

Minutes approved on November 17, 2021.

C. Anthony Braun, Secretary



BALANCING AUTHORITY OF NORTHERN CALIFORNIA

P.O. BOX 15830 • D109 • SACRAMENTO • CA 95852 -1830

TO: BANC Commission

RE: BANC Operator Report for October 2021

Operations:

- BA Operations: Normal
- Significant BA Issues: None
- Declared BA Energy Emergency Alert Level (EEA): EEA0
- NWPP Reserve Energy Activations
 - 0 contingency requiring activation of NWPP
 - 0 MW average generation lost
 - 0 MW maximum generation lost
 - Generating unit(s) and date(s) affected: None
 - All recoveries within 0 minutes
- USF
 - 5 of 31 days with instances of USF mitigation procedure utilized
 - 0 days on Path 66
 - No operational impact on BANC
- BAAL Operation:
 - Maximum duration of BAAL exceedance: 4 Minutes
 - Number of BAAL exceedance >10 minutes: None
 - BAAL violation (BAAL exceedance >30 minutes): None
- Frequency Response (FR) Performance – Quarterly Metric:
 - 2021 Frequency Response Obligation (FRO): -15.5 MW/0.1Hz
 - 2022 Frequency Response Obligation (FRO): -18.8 MW/0.1Hz

Monthly Notes:

- No additional notes or impacts for October 2021

A JOINT POWERS AUTHORITY AMONG

Modesto Irrigation District, City of Redding, City of Roseville, Trinity Public Utilities District,
City of Shasta Lake, and Sacramento Municipal Utility District

Compliance Officer Report

BANC Commission Meeting

November 2021

The following summarizes routine issues for the Commission's information and consideration. Any major issues or action items will be identified separately on the Commission agenda for action.

BA Compliance Issues:

- No significant operational Balancing Authority compliance events occurred.
- All required BA compliance reports and operating data were submitted to WECC.

BANC MCRC:

- The next BANC MCRC meeting is scheduled to be held at 10:00 AM on Monday, December 6th via teleconference.

PC Committee Chair Report

BANC Commission Meeting

November 2021

The following summarizes Planning Coordinator-related issues for the Commission's information and consideration. Any major issues or action items will be identified separately on the Commission agenda for action.

BANC PC Committee Updates or Issues:

SMUD staff continue to work toward demonstrating compliance with PC-related NERC reliability standards.

- MOD-031-2 Demand and Energy Data – Staff participated in the first WECC planning webinar for the 2022 Loads and Data request cycle. Both parts of the 2022 data request will be sent out at once and will have separate due dates. There will be additional data being sought by WECC on the loads portions such as both MW and MVAR load data, BTM storage, EV, and Other DER. There will be additional requests on resources portions as well, such as inverter-loading ratios and historical hourly generation by resource types.
- MOD-033-1 Steady-State and Dynamic System Model Validation – The model validations have been completed for both the steady state and dynamic models. The report was completed and sent to BANC PC participants on October 28th.
- TPL-001-4 - Transmission System Planning Performance – The assessment has been completed and the final report was sent to all BANC PC participants on October 27th. The 2021 BANC PC TPL-001-4 Annual Assessment has been approved by all BANC PC participants. The assessment will be presented in the November BANC commission meeting, seeking BANC commission acceptance.

The table below shows the current status of all PC-related standards:

	PC Standard	Estimated % Complete	Notes
1	FAC-002-3 Interconnection Studies	100%	There are 3 materially modifying transmission facilities projects at the BANC area and all assessments and reports have been completed.
2	FAC-010-3 SOL Methodology for Planning Horizon	100%	The finalized version was sent to external stakeholders and BANC PC Participants on 12/28/2020.
3	FAC-014-2 Establish and Communicate SOLs	95%	Final report shared with BANC PC Participants and external parties on 9/24/2021. RSAW will needed to be completed.
4	IRO-017-1 Outage Coordination	0%	Will send out the annual assessment report to neighboring RCs upon completion of the report.
5	MOD-031-2 Demand and Energy Data	95%	2021 Loads and Resources Supplemental Data Request was completed and uploaded to the WECC EFT server. Staff is participating in planning webinars for 2022 cycle. RSAW will needed to be completed.
6	MOD-032-1 Data for Power System Modeling & Analysis		Ongoing activity.
7	MOD-033-1 System Model Validation	95%	Model validation is complete. Report has been finalized and sent to BANC PC participants. RSAW will needed to be completed.
8	PRC-006-5 Underfrequency Load Shedding	100%	BANC PC data request was completed and submitted to the WECC OFSPR group data collector. The data was then compiled into a report by the WECC OFSPR group and submitted to WECC staff.
9	PRC-010-2 Undervoltage Load Shedding	100%	Study has been completed. The report was finalized on 12/30/2019.

	PC Standard	Estimated % Complete	Notes
10	PRC-012-2 Remedial Action Schemes	80%	New Standard to be effective on 1/1/2021. Study Plan has been finalized on 4/10/2020. Working on performing studies for each RAS scheme.
11	PRC-023-4 Transmission Relay Loadability	95%	The final report was sent out on 7/12/2021 to BANC PC Participants. RSAW will needed to be completed.
12	PRC-026-1 Relay Performance During Stable Power Swings	95%	The final report was sent out on 8/27/2021 to BANC PC Participants. RSAW needed to be completed.
13	TPL-001-4 Transmission System Planning Performance	95%	Assessment is complete and the final report has been approved by the individual BANC members. Waiting to be approved by the BANC PC commissioners.
14	TPL-007-4 Transmission System Planned Performance for Geomagnetic Disturbance Events	100%	Registered the SMUD/BANC PC GIC monitoring device at Carmichael with NERC – compliance requirement. Made request to the GIC manufacturer to increase sampling rate from the default once every hour to once every 10s or faster per NERC recommendation SMUD sent the TPL-007-4 requirement R12 and R13 to the BANC PC members. The effective date for these requirements is 7/01/2021

GM Report

BANC Commission Meeting

November 17, 2021

I wanted to summarize routine issues for the Commission's information and consideration. Any major issues or action items will be identified separately on the Commission agenda for action.

Outreach Efforts:

Refer to GM outreach report provided under separate distribution. In addition, here are some other noteworthy items:

LADWP/Seattle City Light/SRP

Dialogue continues with these entities regarding EIM participation. Based upon the group's discussions, we have agreed to continue to interact on an informal basis to make sure we are aligned on EIM issues from a POU perspective. We are routinely holding bi-weekly calls to provide updates and discuss issues. To date, we have collaborated with the other POUs on joint language to use in the EIM Entity agreement, on how to address market-based rate authority with DMM, potential common language for OATT revisions, and joint comments on the EIM governance issues. We have also used this forum to discuss POU positions regarding the EDAM development and to discuss potential 2020 heat wave impacts on EIM and EDAM design. We expect this group will become more active as the EDAM stakeholder process is reinitiated.

POU Western Markets Initiative

BANC continues to participate in this effort, which is being coordinated by APPA. The group has stepped back and is taking a less formal role with occasional update conference calls. The last call was on September 21.

Coronavirus Restrictions

Though restrictions on public gatherings and travel have been relaxed, BANC continues to generally use remote meeting attendance, both for our own internal member meetings, as well as outside meetings. We are starting to relax some of these restrictions as the ability to have gatherings is increased and the General Manager has started attending some in-person meetings. In addition, the BANC BA Operator (SMUD) has instituted measures to reduce coronavirus risks, including stay at home for most employees with only essential staff working at the offices.

Market Initiatives:

EIM Participation

Staff continues monitoring EIM participation. CAISO quarterly benefit reports continue to show that BANC is seeing benefits from EIM participation, with the 3rd Quarter 2021 report showing gross benefits of \$72.52 million.

With respect to BANC EIM Phase 2 effort, BANC has been passing both the EIM Capacity and Flex Ramp tests with a high success rate. Both the Technical Evaluation Subcommittee and the Settlements Subcommittee are meeting routinely and evaluating EIM operations. Staff provided a recommendation to the Commission at the September meeting regarding the Flex Ramp Approach, which the Commission approved. Additional dialogue has been held at the working level regarding a potential “pooling” concept for Flex Ramp among the WAPA Sub-BA participants. This concept was presented to the Commission at the October meeting where the Commission approved a 90-day extension of the binding date for Flex Ramp charges in order for staff and EIM Participants to further pursue the “pooling” concept.

EDAM Participation

The EDAM stakeholder process was on hold due to the CAISO’s focus on 2021 Summer readiness, which was also a focus for the EIM Entities. With the end of the summer months, the CAISO held a Market Forum on October 13, 2021, to address next steps with EDAM. The efforts of the sub-group discussions among the CAISO, PTOs, and EIM Entities was reported out as the basis for reinitiating the EDAM stakeholder process. The CAISO is looking at an expedited process with a goal of a final EDAM design by the end of 2022, implementation efforts in 2023, and initial go-live in 2024.

Other Market Developments

In parallel with the re-initiation of the EDAM process, two other West-wide market developments have occurred:

1. SPP has announced its “Markets +” effort to support utilities in the West with a range of market options from EIM to full RTO services.
2. A group of Western utilities have formed a group called Western Market Exploratory Group (WMEG) with a stated purpose of identifying what a full market in the West should entail.

WAPA:

Market Engagement

WAPA-SNR was also successful in its EIM Phase 2 go-live on March 25, 2021, and continues to be an active participant in the EIM.

WAPA-SNR and BANC continue to hold periodic calls with NCPA to help facilitate discussions on joint issues.

San Luis Transmission Project

WAPA-SNR has announced its intent to work with the Bureau of Reclamation and CDWR to construct the SLTP. We will keep the Commission informed as more information becomes available.

WECC

WECC Board Meetings

The next set of Board and committee meetings is scheduled for December, which are expected to be virtual.

WECC has issued an assessment of resource adequacy for the Western Interconnection.

WECC is also coordinating with NERC on a lessons-learned assessment of the ERCOT/SPP cold weather events this last winter. Preliminary results and recommendations were issued in September.

NWPP

Resource Adequacy Project

As agreed at the September meeting, BANC has informed NWPP that it will not be participating in Phase 3 of the Western Resource Adequacy Project (WRAP) due to our lack of ability to have firm, long-term transfer capability at Mid-C, which is the hub for the WRAP interchanges. BANC will continue to monitor development of the WRAP.

RSG and FRSG Participation

BANC continues to participate in the Reserve Sharing Group and the Frequency Response Sharing Group through the NWPP and receive benefits in doing so.

CDWR Delta Pumping Load:

BANC is coordinating with SMUD, CDWR, WAPA, and the CAISO regarding how the construction and pumping loads and ancillary services will be provided for this project. The CAISO has reached out to BANC/SMUD/WAPA-SNR regarding contacts for initiating discussions on how CAISO will supply energy for the construction loads in our footprints. With the Governor's announcement that the project will be downsized from two to one tunnel, CDWR has withdrawn the current applications and will be submitting revised environmental documentation. SMUD reported that CDWR has approached them regarding the revised environmental review and updated project schedule.

SB100 Implementation

As part of SB100, the CPUC, CEC, and CARB (Joint Agencies) are required to collaborate with the California BAs to develop a quadrennial report on the status of achieving the goals of SB100. The four POU BAs (BANC, IID, LADWP, and TID) are collaborating on positions and responses. The final report was scheduled for submittal to the Legislature in early January 2021; however, it was delayed and not issued until 3/15/21. The CEC did reach out to the POU BAAs via CMUA in early March seeking more engagement with the BAAs for the next round of analysis for the SB100 effort. The POU BAAs are coordinating via CMUA on how to engage in this request. A subgroup of the POU BAAs, including BANC, participated in a Joint Agency SB100 workshop on June 2, 2021. We have also had several follow-up discussions with the Joint Agencies. Based upon recent discussions, we are working with the other POU BAAs to hire consulting support for this effort. We are also working on concepts for a reliability analysis effort and providing current known interconnection queue information as well as forecast renewable resource procurement assumptions.

Western Electricity Industry Leaders (WEIL) Group

The WEIL group has done outreach to the Western Governors' Association with a request to hold discussions on how to better coordinate electricity policy in the West. Based upon these discussions, the Western Governors and WEIL agreed to make use of the Center for a New Energy Economy (CNEE), which is headed by former CO Governor Ritter, to facilitate further dialogue. This effort has been designated as the Western Interconnection Regional Electricity Dialogue (WIRED). The group agreed to focus discussions around three topics:

- State clean electricity goals and GHG accounting
- Reliability/resource adequacy
- Transmission planning and development.

Initial draft reports have been developed by the work groups and are now being reviewed both by WEIL and the state energy policy advisors. The WEIL group discussed and reached consensus at its February CEO meeting on a position statement for this effort. WEIL continues to coordinate with CNEE and the key state energy advisors on next steps in this effort.

The WEIL CEOs met on October 8, 2021, with discussions that included:

- Dialogue with FERC Chair Richard Glick on several topics including Western market development, RA efforts, and wildfire responses,
- Update from WECC CEO Melanie Frye regarding a process for a West-wide reliability assessment,
- Discussion on current status of the WIRED initiative,
- Update on WEIL subgroup efforts around transmission development,
- Briefing on federal infrastructure legislation
- CEO roundtable on West-wide issues.

One of the key conclusions from the WEIL discussions was the ever-increasing reliance we have on each other to meet reliability and carbon reduction goals. It was also evident that the discussions on West-wide market development will continue the need for open dialogue among the WEIL members. The next meeting of the WEIL group is being planned for February 2022.

Strategic Initiatives

The 2020/2021 Strategic Initiatives are considered complete. The 2021/2022 Strategic Initiatives were presented and concurred at the October Commission meeting. These are attached.

BANC 2020/2021 Strategic Plan - Routine Initiatives November 2021 Final

No./Priority	Focus Area	Initiative	Responsibility	Target Due Date	Status
1 Medium	INDEPENDENCE	Effectively oversee the BA operations.	Jim Shetler	Ongoing	See monthly Ops, PC, Compliance, & GM Reports
2 Medium		Maintain long-term succession plan and traits for General Manager	Jim Shetler/Commission	Ongoing as Necessary	Revisit in 2022
3 Medium	OUTREACH	Engage in industry forums (WECC, Peak, NWPPA, etc.)	Jim Shetler	Ongoing	Attend RC West, WECC Board, WEIL, & NWPP Exec. Forum meetings
4 Medium		Coordinate with other POU BAs (Ca and regionally)	Jim Shetler	Ongoing	Coordinating with SCL/SRP/LA/TP/TID on EIM/EDAM & SB100
5 Medium		Outreach to regulatory and legislative bodies on key issues	Jim Shetler/BBSW	Ongoing as Necessary	Participating in WEIL group outreach to West governors
6 Medium		More formal engagement with TID on BA/EIM/EDAM issues	Jim Shetler/BBSW	Ongoing	Continue periodic discussions on areas of collaboration
7 Medium	ASSETS	Evaluate joint options for resource needs for BA	Resource Committee	4th Qtr. 2021	Initiating discussions on possible BANC resource addition/RFP
8 Low	MEMBER SERVICES	Identify and outreach to potential new BANC members	Jim Shetler	Ongoing	

BANC 2020/2021 Strategic Plan - Focused Initiatives November 2021 Final

No./Priority	Focus Area	Initiative	Responsibility	Target Due Date	Status
9 High	INDEPENDENCE	Manage implementation of EIM Phase 2 participation effort	Jim Shetler/SMUD	3/25/21	COMPLETED on 3/25/21
10 High		Manage EIM Phase 2 Going Forward	Jim Shetler/SMUD	Ongoing	Initiated Phase 2 operations including Tech Analysis & Settlements committees
11 High		EDAM evaluation effort ~ CAISO Stakeholder Process ~ CAISO Tariff Development	Jim Shetler/BBSW Jim Shetler/BBSW	3rd Qtr. 2021 1st Qtr. 2022	On Hold/Fall restart On Hold
12 Medium	OUTREACH	Evaluate opportunities to engage other entities in market development	Jim Shetler	Ongoing	Coordinating with SCL, SRP, LADWP, TID, & Tacoma
13 Medium		Regional Policy Issues: Monitor/ weigh-in where appropriate	Jim Shetler/Commission	Ongoing	Participating in WEIL effort on WIRED issues
14 High		Regionalization: ~Monitor CAISO GRC effort	Jim Shetler/BBSW	4th Qtr. 2021	GRC proposals adopted by GB & BOG
15 High		Coordinate with CA BAs on SB100 effort	Jim Shetler/BBSW	12/31/21	CEC issued report 3/15/21; Initiating coordination effort between CEC & BAAs
16 Medium	ASSETS	Evaluate resource criteria for BANC long-term needs	Jim S./Res. Com.	4th Qtr. 2021	Initiating discussions on possible BANC resource addition/ RFP
17 Medium	MEMBER SERVICES	Evaluate possible support to participants for EIM operations	Jim S.	Ongoing	Approved EIM Participation Agreement Amendments

BANC 2021/2022 Strategic Plan - Routine Initiatives November 2021 Update

No./Priority	Focus Area	Initiative	Responsibility	Target Due Date	Status
1 Medium	INDEPENDENCE	Effectively oversee the BA operations.	Jim Shetler	Ongoing	See monthly Ops, PC, Compliance, & GM Reports
2 Medium		Maintain long-term succession plan and traits for General Manager	Jim Shetler/Commission	Ongoing as Necessary	Revisit in 2022
3 Medium	OUTREACH	Engage in industry forums (WECC, Peak, NWPPA, etc.)	Jim Shetler	Ongoing	Attend RC West, WECC Board, WEIL, & NWPP Exec. Forum meetings
4 Medium		Coordinate with other POU BAs (Ca and regionally)	Jim Shetler	Ongoing	Coordinating with SCL/SRP/LA/TP/TID on EIM/EDAM & SB100
5 Medium		Outreach to regulatory and legislative bodies on key issues	Jim Shetler/BBSW	Ongoing as Necessary	Participating in WEIL group outreach to West governors
6 Medium		More formal engagement with TID on BA/EIM/EDAM issues	Jim Shetler/BBSW	Ongoing	Continue periodic discussions on areas of collaboration
7 Medium	ASSETS	Evaluate establishing BANC criteria for RA resources	Resource Committee	4th Qtr. 2022	
8 Low	MEMBER SERVICES	Identify and outreach to potential new BANC members	Jim Shetler	Ongoing	

BANC 2021/2022 Strategic Plan - Focused Initiatives November 2022 Update

No./Priority	Focus Area	Initiative	Responsibility	Target Due Date	Status
9 High	INDEPENDENCE	Manage EIM Phase 2 Going Forward	Jim Shetler/SMUD	Ongoing	Manage Phase 2 operations including EIM, Tech Analysis & Settlements committees
10 High		EDAM evaluation effort ~ CAISO Stakeholder Process ~ CAISO Tariff Development	Jim Shetler/BBSW Jim Shetler/BBSW	Late 2021 - 2022 2022 - 2023	CAISO Forum - 10/13
11 Medium	OUTREACH	Evaluate opportunities to engage other entities in market development	Jim Shetler	Ongoing	Coordinating with SCL, SRP, LADWP, TID, & Tacoma
12 Medium		Regional Policy Issues: Monitor/ weigh-in where appropriate	Jim Shetler/Commission	Ongoing	Participating in WEIL effort on WIRED issues
13 High		Market Regionalization: ~Monitor ongoing discussions at WEIL & other venues	Jim Shetler/BBSW	4th Qtr. 2022	
14 High		Coordinate with CA BAs on SB100 effort	Jim Shetler/BBSW	12/31/22	CEC issued report 3/15/21; Initiating coordination effort between CEC & BAAs
15 Medium	ASSETS	Evaluate resource criteria for BANC long-term needs ~ Issue solicitation for projects	Jim S./Res. Com.	4th Qtr. 2021	RFP posted 11/1; Responses due 12/3
16 Medium	MEMBER SERVICES	Evaluate possible support to participants for EIM operations	Jim S.	Ongoing	

Balancing Authority of Northern California

Agenda Item 5B

1. **Resolution 21-11-02 *Resolution Setting the Regular Meeting Dates for 2022.***
2. **Attachment A to Resolution 21-11-02: *Time and Place of Regular Meetings for 2022.***

**Balancing Authority of Northern California
Resolution 21-11-02**

RESOLUTION SETTING THE REGULAR MEETING DATES FOR 2022

WHEREAS, the Balancing Authority of Northern California (“BANC”) was created by a Joint Powers Agreement (“JPA”) to, among other things, acquire, construct, maintain, operate, and finance Projects; and

WHEREAS, JPA Section 11.2 provides that the BANC Commission may provide for the holding of regular meetings at intervals more frequently than annually; and

WHEREAS, JPA Section 11.2 requires that the date, hour, and place of each regular meeting shall be fixed by resolution of the Commission.

NOW, THEREFORE, BE IT RESOLVED that the Commissioners of the Balancing Authority of Northern California hereby approve the 2022 Regular Meeting Schedule, attached hereto as Attachment A.

PASSED AND ADOPTED by the Commissioners of the Balancing Authority of Northern California this 17th day of November, 2021, by the following vote:

		Aye	No	Abstain	Absent
Modesto ID	James McFall				
City of Redding	Dan Beans				
City of Roseville	Michelle Bertolino				
City of Shasta Lake	James Takehara				
SMUD	Paul Lau				
TPUD	Paul Hauser				

James McFall
Chair

Attest by: C. Anthony Braun
Secretary

Time and Place of Regular Meetings for 2022

Unless shown otherwise, the Regular Commission meetings shall occur on the fourth Wednesday of each month, at 2:00 p.m.

As shall be specified in a notice issued pursuant to the Ralph M. Brown Act of the California Government Code, the meetings listed below will be held in Sacramento, California at 555 Capitol Mall. Room location to be provided on posted agenda.*

1. January 26
2. March 23
3. April 27
4. May 25
5. June 22
6. July 27
7. August 24
8. October 26
9. November 16
10. December 21

The meetings on the dates listed below will be held in Folsom, California at 35 Iron Point Circle, Suite 225.*

1. February 23
2. September 28

The Commission Secretary shall have discretion to adjourn and to modify time and location of Commission meetings consistent with posting requirements of the Ralph M. Brown Act of the California Government Code.

* Until further notice, all meetings will be conducted via teleconference pursuant to the provisions of Assembly Bill 361.

Balancing Authority of Northern California

Agenda Item 5C

1. **BANC PC Area 2021 Transmission Planning Assessment.**
2. **Resolution 20-11-03 *Acknowledgment and Acceptance of BANC PC Area 2021 Transmission Planning Assessment.***

Braun Blaising Smith Wynne, P.C.

Attorneys at Law

11/05/21

To: BANC Commission

From: BANC Counsel

RE: Acknowledgement and Acceptance of BANC PC Area 2021 Transmission Planning Assessment

Included in the Commission packet for the November 17, 2021 Balancing Authority of Northern California (BANC) Commission meeting is the BANC Planning Coordinator (PC) Area 2021 Transmission Planning Assessment.¹ This document was produced by the Sacramento Municipal Utility District (SMUD), which serves as the BANC PC Services Provider. Approval from each member of the BANC Planning Committee was received the week of November 1, 2021. The performance of the BANC PC Area's portion of the Bulk Electric System (BES) was assessed in order to demonstrate that all of the performance requirements specified in the North American Electric Reliability Corporation (NERC) Reliability Standard TPL-001-4 (Transmission System Planning Performance) were met for years 2022 through 2031 (planning years one through ten).

A number of studies were performed to assess BES performance under various scenarios. The Assessment did not identify any system deficiencies or criteria violations for the BANC PC portion of the BES. This assessment demonstrates BANC's compliance with the NERC TPL-001-4 Reliability Standard, the WECC TPL-001-WECC-CRT-3.2 Transmission System Performance Criterion, and the BANC PC Participant's respective voltage criteria.

Compliance with NERC Reliability Standard TPL-001-4 is one of several that must be met by the BANC PC, and the Commission is requested to acknowledge receipt and accept the BANC PC Area 2021 Transmission Planning Assessment by resolution.²

¹ Entities included in the BANC PC Area include: the Modesto Irrigation District, Redding Electric Utility, Roseville Electric and SMUD. The City of Shasta Lake and the Trinity Public Utilities District are part of the Western Area Power Administration – Sierra Nevada Region PC Area.

² Refer to BANC PC Committee Chair's Report for November 2021 for more information regarding the status of all PC-related NERC reliability standards.



Balancing Authority of Northern California

**BANC PC Area
2021 TPL-001-4 Assessment**

October 27th, 2021

Final

Executive Summary

An assessment was performed to demonstrate that the Balancing Authority of Northern California (BANC) Planning Coordinator (PC) portion of the Bulk Electric System (BES) meets the performance requirements specified in the TPL-001-4 NERC Reliability Standard for the years 2022 through 2031 (planning years one through ten).

Analyses were performed for steady state and stability to assess the BES performance following various NERC Category P0-P7 contingencies and extreme events as well as sensitivity studies. A spare equipment unavailability analysis was conducted with NERC Categories P0, P1 and P2 contingencies. The short circuit analysis of interrupting capability was supported by current and qualified past studies from each BANC PC Participant, whereas the steady state and stability analyses were supported by current studies.

For all analyses performed, there were no system deficiencies or criteria violations identified for the BANC PC portion of the BES. Furthermore, cascading was not identified for any of the extreme events evaluated. As such, there were no corrective action plans developed per this assessment.

The assessment demonstrates BANC PC's compliance with the NERC TPL-001-4 Reliability Standard, the WECC TPL-001-WECC-CRT-3.2 Transmission System Performance Criterion, and the BANC PC participant's respective voltage criteria.

Appendix A documents the TPL-001-4 requirements and the associated sections in this assessment that demonstrated compliance.



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Terms

BA	Balancing Authority
BANC	Balancing Authority of Northern California
MID	Modesto Irrigation District
NERC	North American Electric Reliability Corporation
PC	Planning Coordinator
PC Participants	SMUD, MID, RE, and REU
RE	Roseville Electric
REU	Redding Electric Utility
SMUD	Sacramento Municipal Utility District
TP	Transmission Planner
WECC	Western Electricity Coordinating Council



1 Introduction

The Balancing Authority of Northern California (BANC) is a Joint Powers Authority (JPA) consisting of the Sacramento Municipal Utility District (SMUD), Modesto Irrigation District (MID), Roseville Electric (RE), Redding Electric Utility (REU), Trinity Public Utilities District, and the City of Shasta Lake Utilities. BANC assumed the Balancing Authority (BA) responsibilities on May 1, 2011, with SMUD providing the BA operator services on a contract basis.

On January 1, 2017, BANC registered as the NERC Planning Coordinator (PC) for four of its members with a goal of fully complying with all PC-related reliability standards by January 1, 2018. The four BANC members that are in the BANC PC area are SMUD, MID, RE, and REU (individually “PC Participants” and collectively “PC Participants”). The City of Shasta Lake and Trinity Public Utility District are BANC members but are not PC Participants¹. BANC and SMUD entered into an agreement wherein SMUD provides PC services to BANC on a contract basis.

An assessment was performed for the BANC PC² portion of the Bulk Electric System (BES) in 2021 to demonstrate that it meets all performance and other requirements specified in the TPL-001-4 NERC Reliability Standard [1] for the years 2022 through 2031 (planning years one through ten).

This report documents the assessment and is structured as follows:

- Section 2 provides the scope of this assessment.
- Section 3 provides the assumptions used in this assessment.
- Section 4 provides the analyses performed for this assessment.
- Section 5 provides the results of this assessment.

Appendix A documents the TPL-001-4 requirements and the associated sections in this assessment that demonstrated compliance.

2 Study Scope

The BANC PC annual assessment measured the BES performance at the BANC PC Participant area for the years 2022 through 2031 (planning years one through ten) with the specific goal of demonstrating compliance with the TPL-001-4 NERC Reliability Standard. As such, the assessment was comprised of the following analyses:

- Steady state analysis
- Stability analysis

¹ The Western Area Power Administration – Sierra Nevada Region (WAPA-SNR) is also inside the BANC BA, but it is not a member of the BANC JPA. However, WAPA-SNR is an active participant in BANC activities. Additionally, WAPA-SNR is a registered PC and will serve as the PC for the Trinity Public Utilities District and the City of Shasta Lake. Thus, all BANC members are covered under either the BANC or WAPA-SNR PC registrations.

² BANC PC annual assessment includes performing an assessment for SMUD’s non-BES 115 kV elements and WAPA’s – SNR portion of the BES to insure reliable operation across the BANC PC area. The results of these studies are available to BANC members and upon request to entities with an NDA.



- Sensitivity analysis
- Spare equipment unavailability analysis
- Short circuit analysis

2.1 Steady State Analysis

A steady state analysis shall assess the system performance at peak load in the near-term and long-term transmission planning horizons. The steady-state performance shall be assessed in the near-term horizon using peak load cases that model year two (2023) and year five (2026). The long-term horizon shall be assessed using a peak load case for year ten (2031) as it represents the furthest out year of the long-term planning horizon, helping to identify potential future issues that may require significant lead time to adequately address and resolve.

In addition, the system performance at off-peak shall be assessed for one of the five years. Year two (2023) was selected for the spring off-peak load study scenario.

2.2 Stability Analysis

A stability analysis shall be performed to assess the system performance in the near-term planning and long-term planning horizon. The peak and off-peak cases for year two (2023) shall be used in the assessment for the near-term analysis and the peak case for year ten (2031) shall be used for the long-term analysis.

2.3 Sensitivity Study Scenarios

Sensitivity cases shall be used to assess the impact of changes to the basic assumptions used in the model. The sensitivity analysis shall vary one or more of the following conditions by a sufficient amount to stress the system within a range of credible conditions that demonstrate a measurable change in System response:

- Real and reactive forecasted Load.
- Expected transfers.
- Expected in service dates of new or modified transmission facilities.
- Reactive resource capability.
- Generation additions, retirements, or other dispatch scenarios.
- Controllable loads and demand side management.
- Duration or timing of known transmission outages.

A 1-in-10 year load forecast for the BANC PC area increased by 5% shall be used as the sensitivity study scenario to assess the near-term transmission planning horizon portion of the steady state analysis for the summer peak years 2023 for SMUD, MID, RE and REU and 2026 for MID, RE and REU. For SMUD's year five (2026) heavy summer sensitivity, the system will model the retirement of SMUD's Campbell Soup, Carson Ice, and McClellan thermal generators as well as the addition of two PV/BESS plants from SMUD's current generation interconnection queue. For the sensitivity for the spring off-peak year 2023, a reduced generation dispatch with the largest generation plant in each BANC PC participants' area turned off (to stress imports) was chosen as a sensitivity. A



stability sensitivity analysis of the summer peak and spring off peak for the year 2023 was performed.

2.4 Spare Equipment Unavailability Study Scenarios

An entity’s spare equipment strategy could result in the unavailability of major transmission equipment that has a lead time of one year or more. The impact of possible equipment unavailability on system performance was studied for P0, P1, and P2 categories. BANC PC performed the spare equipment unavailability analysis based on the BANC PC participants’ spare equipment strategies for major transmission equipment that has a potential lead time of one year or more. The spare equipment strategies from REU showed that REU’s Airport 230/115kV transformer could be out of service for one year or more. Studies were performed with this facility out of service to assess the impact on system performance for the possible unavailability.

The spare equipment strategies from SMUD, MID and RE found no major transmission equipment with a lead time of one year or more.

2.5 Short Circuit Analysis

A short circuit analysis shall be used to assess the near-term transmission planning horizon using peak generation and determine whether circuit breakers have the interrupting capability for faults that they will be expected to interrupt. The short circuit analysis uses the system short circuit model with any planned generation and transmission facilities in service which could impact the study area. Each PC Participant is responsible for conducting their own short circuit study and providing the results of said study to be included in this assessment.

2.6 Summary of Study Years and Scenarios

Table 2.1 below summarizes the various types of analyses and study scenarios which were performed as part of transmission system planning assessment, and the study years that were selected for each analysis.

Table 2.1 – Study scenarios and years performed in this assessment

Analysis	Scenario	Near-term horizon year					Long-term horizon year				
		1 2022	2 '23	3 '24	4 '25	5 '26	6 '27	7 '28	8 '29	9 '30	10 '31
Steady state	Peak	-	X	-	-	X	-	-	-	-	X
	Off-peak	-	X	-	-	-	-	-	-	-	-
Stability	Peak	-	X	-	-	-	-	-	-	-	X
	Off-peak	-	X	-	-	-	-	-	-	-	-
Spare equipment unavailability	Peak	-	X	-	-	-	-	-	-	-	-
	Off-peak	-	-	-	-	-	-	-	-	-	-
Steady state sensitivity	Peak	-	X	-	-	X	-	-	-	-	-
	Off-peak	-	X	-	-	-	-	-	-	-	-



Analysis	Scenario	Near-term horizon year					Long-term horizon year				
		1 2022	2 '23	3 '24	4 '25	5 '26	6 '27	7 '28	8 '29	9 '30	10 '31
Stability sensitivity	Peak	-	X ³	-	-	X ⁴	-	-	-	-	-
	Off-peak	-	X	-	-	-	-	-	-	-	-
Short circuit ⁵	Peak	Years vary dependent upon each PC Participant.									

3 Study Assumptions

The study assumptions used in this assessment are detailed in the sections that follow.

3.1 System Model Representations

This assessment utilized system models maintained by the PC for the BES portion and non-BES portion of the BANC PC area. These system models were developed in accordance with NERC Reliability Standard MOD-032-1 and were submitted to the WECC for use in the compilation of base cases for various study years and scenarios.

All cases used are developed from WECC approved base cases for this assessment; these cases, are listed in Table 3.1 below. Each study case was updated to reflect the system operating conditions, including the load forecasts and generation dispatch levels, provided by each BANC PC Participant for the year and scenario studied.

Table 3.1 - WECC base cases that were used in the assessment

Study Year	Scenario	WECC Base Case	WECC DYD File
2023	Summer Peak	23HS3a	23HS31
2023	Heavy Spring	21HSP1a	21HSP1
2026	Summer Peak	26HS2a	26HS21
2031	Summer Peak	31HS1a	31HS11

Assumptions and modifications for the cases are further described in the subsections below. These models use data consistent with that provided in accordance with all relevant modeling data reliability standards and are supplemented with data from other sources as necessary. Prior to the start of the TPL assessment, the WECC base cases to be used are sent to the PC Participants to review and the most accurate system data is provided as updates to these cases, if necessary. The assessment then utilizes these updated cases for the assessment.

³ For the MID, RE, and REU systems.

⁴ For the SMUD system.

⁵ The short circuit analysis performed for different years within the Near-Term Planning Horizon was dependent upon the data submitted by the BANC PC Participants.

3.1.1 Existing Facilities

The system models used in this assessment represented all existing facilities.

3.1.2 Extended Duration Outages

The system models used in this assessment did not represent any known outages of generation or transmission facilities with a duration of at least six months because there are no such known outages.

3.1.3 New Planned Facilities and Changes to Existing Facilities

The system models used in this assessment represented all new planned facilities and changes to existing facilities. See Appendix B for details of the new planned facilities and changes to existing facilities.

3.1.4 Real and Reactive Load Forecasts

The system models used in this assessment represented the most recent real power load forecasts and power factor from each BANC PC Participant. A 1-in-10 peak load forecast was used in the assessment for the summer peak study scenarios and typical off-peak loads were used for the spring off-peak scenario.

SMUD has a demand side management program that incentivizes customers to reduce their energy usage during high load hours, thus reducing the overall demand on the system. The impact of SMUD’s DSM program is included in SMUD’s load forecast. MID has two DSM programs as well, but the purpose MID’s DSM programs are to ensure MID has the necessary resources to meet its 15% planning reserve *above* the 1-in-10 load forecast, and thus the program is not modeled *in* their load forecast. RE and REU do not have DSM programs in their system.

A 1-in-10 peak load forecast increased by an additional 5% was used for the sensitivity analysis. Off-peak sensitivity was performed using a reduced generation dispatch with the largest generation plant in each BANC PC participants’ area turned off to stress imports. Table 3.2 below summarizes the load forecast data for all BANC PC Participants.

Table 3.2 – Load demand forecasts

PC Participant	Scenario	Real Power (MW)			Power Factor
		2023	2026	2031	
SMUD	1-in-10 Summer Peak	3159	3157	3235	0.983 lag
	Heavy Spring Off-Peak	1895	-	-	0.99 lag
MID	1-in-10 Summer Peak	713	714	716	0.969 lag
	Heavy Spring Off-Peak	428	-	-	
REU	1-in-10 Summer Peak	234	230	225	0.977 lag
	Heavy Spring Off-Peak	140	-	-	
RE	1-in-10 Summer Peak	371	383	402	0.985 lag

Heavy Spring Off-Peak	224	-	-
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3.1.5 Firm Transmission Service and Interchange

Firm transmission service was not modeled in this assessment since BANC PC members have no commitments to provide firm transmission service.

Regarding interchange, SMUD currently has multiple contracts for interchange service from WAPA and PG&E. They are listed as follows:

- WASN has a contract with SMUD for 342 MW (bidirectional) to be delivered to SMUD at the Elverta/Hurley substations. Expires 1/15/2033.
- WASN has a contract with SMUD for 165 MW (unidirectional) to be delivered to SMUD at the Elverta/Natomas substations. Expires 7/1/2034.
- WASN has a contract with SMUD for 310 MW (unidirectional) to be delivered to SMUD at the Elverta/Hurley substations. Expires 12/31/2024.
- WASN has a contract with SMUD to deliver 318 MW of its CVP generation units’ output to SMUD.
- PG&E and SMUD have a PPA for 48 MW (bidirectional) to be delivered to SMUD at the Rancho Seco substation.

These imports were modeled in the appropriate base cases.

3.1.6 Resources Required for Load

The system models used in this assessment represented the supply side resources and their projected dispatches for the peak and off-peak load conditions as summarized in Table 3.3.

Demand side resources were modeled in the SMUD system in the form of distributed generation that is netted out of the load. This assessment also represented demand side load response utilizing the WECC approved composite load model.

Table 3.3 –Supply-side resources and associated dispatch for the peak and off-peak scenarios

PC Participant	Type	Plant	Real power dispatch (MW)			
			Peak Year			Off-Peak
			2	5	10	2
SMUD	Thermal	Cosumnes Power Plant	560	560	560	510
		Campbell Soup	163	133	158	0
		Procter & Gamble	165	165	165	55
		Carson Ice	90	90	90	37
		McClellan	65	65	65	0
		UCD Med Center	25	25	25	15
	Total	1068	1038	1063	617	
Hydro	Loon Lake	25	25	25	0	
	Robbs Peak	20	20	20	0	
	Jones Fork	10	10	10	0	
	Union Valley	44	44	44	40	

		Jaybird	132	132	132	66
		Camino	90	90	90	50
		White Rock	228	228	228	100
		Total	549	549	549	256
	Solar	Solar Shares	112	112	112	112
MID	Thermal	Woodland	152.1	152.1	152.1	103
		McClure	70	70	70	0
		Ripon	90	90	90	0
	Hydro	Don Pedro	45	45	45	45
	Solar	McHenry	24	24	24	20
REU	Thermal	Redding Power Plant	128.9	127.3	122.8	50.4
RE	Thermal	Roseville Energy Park	165	165	165	80
		Roseville Peakers	20	20	20	20
Total			2,424	2,392	2,413	1,303

4 Analyses

This assessment included steady state, transient stability and short circuit analyses, which are described in the sections that follow. All simulations performed for the steady state and transient stability portion of this assessment were performed using the General Electric Positive Sequence Load Flow (PSLF) program. Short circuit studies were performed using Aspen One Liner, CAPE and GE PSLF. These software programs are widely used throughout the WECC.

4.1 Steady State Analysis

A steady state analysis was performed as part of this assessment to determine whether the BANC PC portion of the BES meets the performance requirements specified in the TPL-001-4 NERC Reliability Standard for the years 2022 through 2031 (planning years one through ten). The analysis was also performed to assess the impact of extreme events identified in TPL-001-4 table 1. This analysis was supported by current studies.

4.1.1 Peak Load Years

This assessment included a steady state analysis of peak loads for planning years two, five, and ten (2023, 2026, and 2031) to span the near-term and long-term planning horizons. Years two (2023) and five (2026) were selected for inclusion in this assessment since they bookend the near-term planning horizon. Year one was not selected since the summer peak load for year one will be less than one year away when this report is finalized. Year ten of 2031 was selected for inclusion because it encompasses all approved projects for the long-term planning horizon.

4.1.2 Off-peak Load Years

This assessment included a steady state analysis of off-peak loads for planning year two (2023). Off-peak load is generally defined by BANC PC as spring with a light system load of about 60% of peak, or as uniquely defined by an individual BANC PC participant for their own system, with voltages higher than normal, and generation at a minimum. The off-peak load used in this assessment was



determined using engineering judgment and/or historical off-peak spring load data as provided by each BANC PC Participant.

4.1.3 Extended Duration Outages

As noted in Section 3.1.2 above, there was no known generation or transmission facility outage with a duration of at least six months. As such, this assessment did not include a steady state analysis of P1 events from Table 1 in TPL-001-4 with any known extended duration outages.

4.1.4 Sensitivity Analysis

This assessment included sensitivity analyses on four scenarios to demonstrate the impact of changes to basic assumptions used in the system models to the steady state reliability. Sensitivity cases for the peak and off-peak load cases were developed by varying the certain conditions in such a way as to stress the system within a range of credible conditions that demonstrated a measurable change in system response.

A sensitivity analysis was performed on the 2023 and 2026 peak load years by using the 1-in-10 peak load forecast and further stressing the system by increasing the load by an additional 5% for MID, RE, REU and SMUD (only year 2023 for SMUD). For SMUD’s 2026 peak year sensitivity, the system was modified to represent a loss of some of SMUD’s thermal generating units and an addition of two PV/BESS plants from SMUD’s current generation interconnection queue. The load power factors in the sensitivity cases were assumed to remain the same. Table 4.1 lists SMUD’s altered generation dispatch for the 2026 peak load sensitivity case.

Table 4.1.4.1 –2026 Heavy Summer Sensitivity SMUD Generation Dispatch

PC Participant	Type	Plant	MW Output
SMUD	Thermal	Cosumnes Power Plant	560
		Campbell Soup	0
		Procter & Gamble	165
		Carson Ice	0
		McClellan	0
		UCD Med Center	0
		Total	725
	Hydro	Loon Lake	25
		Robbs Peak	20
		Jones Fork	10
		Union Valley	44
		Jaybird	132
		Camino	90
		White Rock	228
	Total	549	
Solar/Battery Storage	Solar Shares	112	
	PV/BESS in the Cordova area	250	

	PV/BESS in the Elverta area	344
	Total	706
Total		1,980

A sensitivity analysis was also performed on the 2023 off-peak load year by assuming the power output from the largest generation plant in each participant’s area was off-line, which would result in an increase in system imports and a decrease in online spinning generation. Table 4.1.4.2 lists the scenarios for each BANC PC Participant in the sensitivity study base cases.

Table 4.1.4.2 – Spring off-peak sensitivity scenarios

PC Participant	Element	Scenario	
		Off-Peak	Off-Peak Sensitivity
SMUD	Cosumnes Power Plant	510 MW	0 MW
MID	Woodland Power Plant	103 MW	0 MW
REU	Redding Power Plant	50.4 MW	0 MW
RE	Roseville Power Plant	80 MW	0 MW

4.1.5 Spare Equipment Unavailability Analysis

The respective spare equipment strategies of the BANC PC Participants could result in the unavailability of the following major transmission equipment for one year or more:

- Airport 230/115 kV transformer (REU)

The spare equipment strategies for MID, RE, and SMUD found no major transmission equipment that could result in unavailability for one year or more, due to long lead times.

A steady state analysis was performed for the 2023 peak load case to assess the impact of the possible unavailability of the long lead time equipment listed above. The steady state analysis included the evaluation of the P0, P1, and P2 category contingencies identified in Table 1 of TPL-001-4.

4.1.6 Contingencies Studied

The steady state analysis was performed using a comprehensive list of contingencies based on Table 1 of TPL-001-4. All possible contingencies for categories P0-P7 were studied for both the steady state and analyses summing to over 14,000 contingencies for SMUD, over 1,300 for MID, over 400 for RE, and over 1,600 for REU. P3 and P6 category contingencies were automatically generated by a computer script to cover all possible combinations. In addition, extreme events in Table 1 of TPL-001-4 were identified and included in analysis. A summary of the types of contingencies included in the steady state analysis is shown in Table 4.2 below.

All contingencies simulated the removal of all elements that the protection system and other automatic controls are expected to disconnect without operator intervention. Generators with post-contingency steady state bus voltages outside the specified ranges provided by each BANC PC Participant were investigated to determine if the generators should be manually tripped to reflect actual protection equipment settings and generator limits (See **Table 4.3** for the bus voltage

criteria). Transmission elements that were overloaded above 150% of their highest seasonal rating (per NERC standard PRC-023-4), were also investigated and tripped manually.

Devices designed to provide steady state control of electrical system quantities, such as phase-shifting transformers, load tap changing transformers, switched capacitors and inductors, were assumed to respond to any contingency after the post-transient contingency analysis time frames of one to three minutes. Therefore, the post-transient solution methodology was utilized, which disabled the adjustment of transmission devices such as phase-shifting transformers, load tap changing transformers, switched capacitors and inductors.

To comply with the TPL-001-4, R3.4, contingencies used in this analysis were coordinated with all adjacent PCs and TPs to ensure that contingencies on adjacent systems that may impact the BANC PC portion of the BES were included in this assessment.

Table 4.2 – Contingencies Studied in this Assessment (where applicable)

Contingencies	Description
P0 (No contingency)	All Elements in Service
P1 (Single Contingency)	<ul style="list-style-type: none"> • Loss of one generator (P1.1) • Loss of one transmission circuit (P1.2) • Loss of one transformer (P1.3) • Loss of one shunt or SVC/STATCOM device (P1.4) • Loss of a single pole of DC lines (P1.5)
P2 (Single Contingency)	<ul style="list-style-type: none"> • Loss of one transmission circuit without a fault (P2.1) • Loss of one bus section (P2.2) • Loss of one breaker (internal fault) (non-bus-tie-breaker) (P2.3) • Loss of one breaker (internal fault) (bus-tie-breaker) (P2.4)
P3 (Multiple Contingency)	Loss of a generator unit followed by system adjustments and the loss of the followings: <ul style="list-style-type: none"> • Loss of one transmission circuit (P1.2) • Loss of one transformer (P1.3) • Loss of one shunt or SVC/STATCOM device (P1.4)
P4 (Multiple Contingency)	Loss of multiple elements caused by a stuck breaker attempting to clear a fault on one of the following: <ul style="list-style-type: none"> • Loss of one generator (P4.1) • Loss of one transmission circuit (P4.2) • Loss of one transformer (P4.3) • Loss of one shunt device (P4.4) • Loss of one bus section (P4.5) • Loss of a bus-tie-breaker (P4.6)
P5 (Multiple Contingency)	Contingencies with delayed fault clearing due to the failure of a non-redundant relay protecting the faulted element to operate as designed for one of the following: <ul style="list-style-type: none"> • Loss of one generator (P5.1) • Loss of one transmission circuit (P5.2) • Loss of one transformer (P5.3) • Loss of one shunt device (P5.4) • Loss of one bus section (P5.5)



Contingencies	Description
P6 (Multiple Contingency)	Loss of two or more (non-generator unit) elements with system adjustment between them, which produce the more severe system results
P7 (Multiple Contingency)	Loss of a common structure as follows: <ul style="list-style-type: none"> • Any two adjacent circuits on common structure (P7.1) • Loss of a bipolar DC lines (P7.2)
Extreme (Not ran for the transient stability analyses)	Local area or wide area events affecting the Transmission System <ul style="list-style-type: none"> • Loss of all Transmission lines on a common Right-of-Way • Loss of a substation • Loss of major gas pipeline • Loss of all generating units at a generating station • 3 phase fault with delayed clearing for two adjacent circuits

4.1.7 Performance Requirements

The steady state analysis results for category P0 through P7 contingencies were evaluated against the performance requirements in Table 1 of TPL-001-4.

These performance requirements can be summarized as:

- The system shall remain stable.
- Cascading and uncontrolled islanding shall not occur.
- Applicable facility ratings shall not be exceeded.
- Steady state voltages and post-contingency voltage deviations shall be within acceptable limits as established by BANC PC Participants.
- Non-consequential load loss is not allowed for category P1, P2.1, and P3 contingencies.

For the steady state analysis, each BANC PC Participant defined the acceptable limits for steady state voltages and voltage deviations as listed in the Table 4.3 below.

Table 4.3 – Steady State Voltage Criteria

System	Nominal Voltage	Normal Conditions		Contingency Conditions		Voltage Deviation (P1 & P2.1 only)
		Vmin (pu)	Vmax (pu)	Vmin (pu)	Vmax (pu)	
SMUD	230 kV	0.95	1.05	0.90 ⁶	1.05	≤ 8%
MID	230 kV	0.95	1.05	0.90	1.10	≤ 8%
MID	115 kV	0.95	1.05	0.90	1.10	≤ 8%
RE	230 kV	0.95	1.05	0.90	1.10	≤ 8%
REU	115 kV	0.974	1.078	0.948	1.078	≤ 8%

The criteria used to identify system instability are as follows:

⁶ SMUD 230 kV buses that have a UVLS scheme associated with it are limited to Vmin of 0.948 PU, these buses include Carmichael, Elk Grove, Elverta, Foothill, Hurley, Orangevale and Pocket.

- Cascading – The uncontrolled successive loss of system elements triggered by an incident at any location, and which results in widespread electric service interruption that cannot be restrained from sequentially spreading beyond an area predetermined by studies.
- Voltage instability – The violation of any of the low voltage criteria defined herein at any BES bus.
- Uncontrolled islanding – The unplanned and uncontrolled splitting of the power system into two or more islands. Severe disturbances may cause uncontrolled separation by causing a group of generators in one area to swing against a group of generators in a different area of the power system.

The results for the extreme contingencies were assessed for their impact to the system. If the results showed cascading caused by the occurrence of an extreme event, an evaluation of possible actions designed to reduce the likelihood or mitigate the consequences and adverse impacts of the events was conducted.

4.2 Short Circuit Analysis

A short circuit analysis addressing the near-term transmission planning horizon was included in this assessment to determine whether circuit breakers have adequate interrupting capability for faults that they will be expected to interrupt.

This analysis was supported by past studies performed by SMUD, MID, and RE. REU provided a new study for this year’s assessment. The past studies are qualified since they met the following criteria:

- The past studies are less than five calendar years old.
- No material changes have occurred since the past studies were performed.

The years studied are listed in Table 4.4.

Table 4.4 - Years Studied for Short Circuit Analysis

System	Year Performed	Year(s) Studied
SMUD	2020	2021, 2025
MID	2017	2019, 2023
REU	2021	2021, 2026
RE	2020	2020

4.2.1 Simulation Software

The short circuit studies provided by SMUD, REU and RE were performed with the ASPEN One Liner and CAPE software programs. MID utilized the GE PSLF software program.

These software programs are widely used throughout the WECC.

4.2.2 Short Circuit Modeling

The short circuit models in the ASPEN program are consistent with the system topology studied in the steady state base cases which reflect the planned projects in Appendix B.



4.2.3 Rating Criteria

The criteria used in the short circuit analysis are based on industry standards developed and approved by the Institute of Electrical and Electronics Engineers in references [2] and [3].

4.3 Stability Analysis

A stability analysis was performed as part of this assessment to assess the transient stability performance of the BANC PC area in the near-term planning horizon. This analysis was supported by current studies.

Although there are no planned material generation additions or changes in the long-term horizon for the BANC PC, the year ten (2031) case was studied to assess potential impacts from neighboring systems.

4.3.1 Peak Load Years

This assessment included a stability analysis of the 2023 peak load year in the near-term planning horizon and year 2031 peak load year in the long-term planning horizon.

The rationale for selecting year two (2023) and year ten (2031) is the same rationale described in Section 4.1.1. Previous study experience has shown that the heavy summer scenario is generally the most critical scenario for transient stability studies. The WECC composite load models, which better represents the dynamic behavior of system loads, were used in this assessment.

4.3.2 Off-peak Load Years

This assessment included a stability analysis of the 2023 off-peak load condition in the near-term planning horizon.

4.3.3 Sensitivity Analysis

Like the steady state sensitivity analysis, two stability sensitivity analyses were performed to demonstrate the impact of changes to basic assumptions used in the system models to the stability of the system.

A sensitivity analysis was performed on the 2023 and 2026 peak load years by using the 1-in-10 peak load forecast and stressing it by increasing the load by an additional 5% for MID, RE, REU, and SMUD (only year 2023 for SMUD). The load power factors in the sensitivity cases were assumed to remain the same. For SMUD's 2026 peak year sensitivity, the system was modified to represent a loss of some of SMUD's thermal generating units and an addition of two PV/BESS power plants from SMUD's generation interconnection queue.

A sensitivity analysis was also performed on the 2023 off-peak load year by modeling the largest generator plant offline for each BANC PC participants' area. The scenarios chosen can be found in Table 4.1.

4.3.4 Long-Term Planning Horizon

Although there are no planned material transmission facility changes in the long-term planning horizon for the BANC PC participants, the 2031 heavy summer case was studied for potential



impacts from any future facility additions external to the BANC PC area which could have a potential impact on the reliability of the BANC PC area. The 10 year case is chosen to encompass any and all projects from neighboring systems that would be submitted to the WECC base case compilation.

4.3.5 Contingencies Studied

A stability analysis was performed based on the contingencies listed in Table 1 of TPL-001-4. All P0-P7 contingencies were ran for the stability analyses. Extreme events were not included in the stability analyses. A summary of the types of stability contingencies evaluated in the stability analysis are shown in Table 4.2.

All contingencies simulated the removal of all elements that the protection system and other automatic controls are expected to disconnect without operator intervention. Generators were tripped with the generator under-voltage tripping indicated by the generator protection models, which are included in the WECC approved dynamic models if simulations showed generator bus voltages or high side of the generator step-up voltages outside the ride-through voltage ranges specified in the PRC-024-2 NERC Reliability Standard. Transmission lines and transformers were tripped using the WECC approved generic relay models when transient swings showed the potential to cause protection system operation as defined under PRC-026-1⁷. MID is the only BANC PC member that utilizes high speed reclosing in their system, so successful and unsuccessful high speed reclosing were modeled and simulated for the MID system.

All existing devices that are designed to provide dynamic control of electrical system quantities were simulated. These devices include generator exciter control, power system stabilizers, static VAR compensators, power flow controllers, and DC Transmission controllers. The dynamic data used in the stability simulations included (but were not limited to) the modeling of generator governors, exciters, power system stabilizers, and other automatic control equipment.

The contingencies used in the transient stability analysis were coordinated with all adjacent PCs and TPs to ensure that contingencies on adjacent systems which may impact the BANC PC area were included in this assessment.

4.3.6 Performance requirements

The stability analysis results for category P0 through P7 contingencies included in this analysis were evaluated against the performance requirements in Table 1 of TPL-001-4. These performance requirements can be summarized as:

- The system shall remain stable.
- Cascading and uncontrolled islanding shall not occur.
- Transient voltage response shall be within acceptable limits as established by the PC and the TP.

⁷ Models used to ensure relay performance during stable power swings were GE PSLF models: zonedef (zone definition for WECC distance relay model), distrel (WECC distance relay), zmetra (apparent impedance recorder), lnrelscan (line relay scanning model), lofscan (loss-of-field scanning model), and oosscan (out-of-step scanning model).



- Non-consequential load loss is not allowed for category P1, P2.1, and P3 contingencies on the BANC PC portion of BES.
- For P1 events, no generating unit shall pull out of synchronism.
- For P2 through P7 events, generators that pull out of synchronism shall not cause apparent impedance swings that trip transmission system elements other than the generator unit and its directly connected facilities.
- For P1 through P7 events, power oscillations shall exhibit acceptable damping as established by the PC and the TP.

In accordance with PRC-024, generators are not to trip while their bus voltages remain within the No-Trip zone defined within PRC-024.

The criteria in WR1 of *WECC Criterion TPL-001-WECC-CRT-3.2 Transmission System Planning Performance* were used to assess the transient stability performance of the system. These criteria are as follows:

- For all P1 through P7 events, voltages shall recover to 80 percent voltage of the pre-contingency voltage within 20 seconds of the initiating event for each applicable BES bus serving load.
- For all P1 through P7 events, following fault clearing and voltage recovery above 80 percent, voltage at each applicable BES bus serving load shall neither dip below 70 percent of pre-contingency voltage for more than 30 cycles nor remain below 80 percent of pre-contingency voltage for more than two seconds.

The criterion for acceptable damping for power oscillations, which was adopted from WR1.6 in *WECC Criterion TPL-001-WECC-CRT-3.2 Transmission System Planning Performance*, was that all oscillations must show positive damping within 30 seconds after the start of the event. Oscillations that did not meet this criterion were deemed unstable.

The criteria used to identify system instability are as follows:

- Cascading – The uncontrolled successive loss of system elements triggered by an incident at any location, and which results in widespread electric service interruption that cannot be restrained from sequentially spreading beyond an area predetermined by studies.
- Voltage instability – The violation of any of the low voltage criteria defined herein at any BES bus.
- Uncontrolled islanding – The unplanned and uncontrolled splitting of the power system into two or more islands. Severe disturbances may cause uncontrolled separation by causing a group of generators in one area to swing against a group of generators in a different area of the power system.

Simulations that resulted in cascading, voltage instability, or uncontrolled islanding were deemed unstable.



5 Study Results

The results of the steady state, short circuit, and stability analyses are described in the sections that follow for the BANC PC⁸ area.

5.1 Steady State

The steady state analysis did not identify any performance deficiencies for the Category P0 to P7 contingencies that were evaluated. There were performance deficiencies identified following P6 contingencies, but upon making allowable system adjustments, the performance deficiencies were resolved. As such, there were no corrective action plans resulting from the steady state analysis.

A summary of the steady state study results can be referenced in Appendix C.

5.1.1 Impact of Extreme Contingencies

The steady state analysis identified thermal overloads and voltage criteria violations for certain extreme contingencies. As these are by nature very low probability events, corrective action plans were not developed to mitigate these contingencies.

The contingencies listed below diverged in at least one of the base cases when ran during the steady state analysis:

- Natural gas pipeline 700A outage (SMUD)
- Loss of all lines south of Elk Grove 230 kV station – A (SMUD)
- Loss of all lines south of Elk Grove 230 kV station – B (SMUD)
- Rancho Seco 230 kV switching station outage (SMUD)
- Loss of all lines west of Rancho Seco 230 kV station (SMUD)
- Hurley-Tracy #1 and #2 and Bellota-Rancho Seco #1 and #2 230 kV line outage (SMUD)

Further analysis was performed for these contingencies that simulated load tripping in accordance with SMUD's OP-204 operating procedure. More specifically, load was dropped as outlined in the UVLS and DLT schemes housed in OP-204. The study concluded no cascading nor voltage collapse were identified.

In the REU system, the following contingency would cause three 115kV transmission lines' loading to exceed 150% of their highest emergency rating post-contingency and thus their automatic tripping was simulated manually, post-contingency:

- Loss of Keswick-Airport, Flanagan-Keswick, Keswick-Olinda, and Keswick-O'Banion 230 kV lines (REU)

The study concluded no cascading or uncontrolled islanding was identified when the affected three lines were tripped. A summary of the steady state study results for extreme contingencies can be referenced in Appendices C and D.

⁸ BANC PC annual assessment includes performing an assessment for SMUD's non-BES 115 kV elements and WAPA's – SNR portion of the BES to insure reliable operation across the BANC PC area. The results of these studies are available to BANC members and upon request to entities with an NDA.



5.1.2 Sensitivity Analysis

The sensitivity analyses identified several thermal overloads and voltage criteria violations in the sensitivity studies conducted. As these violations were only identified in the sensitivity cases, no corrective action plans are required by TPL-001-4, R2.7.

A summary of the steady state sensitivity study results can be referenced in Appendix D.

5.1.3 Spare Equipment Unavailability Analysis

The results of REU's Airport 230/115 kV transformer spare equipment unavailability analysis showed no performance deficiencies. As such, there are no recommendations for the spare equipment strategy.

5.2 Short Circuit

The short circuit analysis showed that all circuit breakers in the BANC PC area have adequate short circuit current interrupting capabilities and no corrective action plans are necessary to meet the performance requirements. A list of elements that exceeded 80% of their rated fault duty is provided in Appendix F. These elements will be reviewed in future assessments due to their high interrupting duties.

The interrupting capabilities are listed in References [4] to [8].

5.3 Stability

The stability analysis for the peak and off-peak cases did not identify any system deficiencies for the Category P1 to P7 contingencies that were simulated. All stability performance criteria were met, and no corrective action plans are necessary to meet the performance requirements.

See Appendix E for sample stability plots. Additional plots are available upon request.

5.3.1 Sensitivity Analysis

The peak load and off-peak load stability sensitivity analyses did not identify any stability performance deficiencies. All performance criteria were met.

5.3.2 Impact of Extreme Contingencies

The stability analysis does not include an analysis of extreme contingencies.

6 Roles and Responsibilities

The PC and Transmission Planners' individual and joint role and responsibilities for performing the required studies for the Planning Assessment are listed in the subsections that follow.

6.1 Joint Roles and Responsibilities

All entities shall be jointly responsible for the following:



- Ensuring the base cases used in the study are accurate. The Planning Coordinator and all Transmission Planners/PC Participants shall endeavor to ensure the models are updated with the latest information for their respective systems.
- Responding to phone and email communications within a reasonable time.
- Working together to resolve differences with respect to study assumptions, modeling, results, or any other issue that may arise during the study.
- Working together to develop Corrective Action Plans when performance criteria violations are deemed valid.

6.2 Individual Roles and Responsibilities

The Planning Coordinator shall be individually responsible for the following:

- Performing all analyses required by NERC TPL-001-4, PRC-023-4, PRC-026-1, IRO-17-1 and documenting such analyses.
- Fulfilling other responsibilities that are jointly agreed upon by the Planning Coordinator and Transmission Planners and other PC Participants.

The Transmission Planners and other PC Participants shall be individually responsible for the following:

- Providing all information requested to perform the required studies for the Planning Assessment.
- Performing and providing the results of the short circuit studies.
- Providing a spare equipment unavailability strategy.



References

- [1] *Transmission System Planning Performance Requirements*. NERC Reliability Standard TPL-001-4. May 7, 2014.
- [2] *IEEE Application Guide for AC High-Voltage Circuit Breakers Rating on a Symmetrical Current Basis*. IEEE Std. C37.010-1999 (R2005).
- [3] *IEEE Standard Rating Structure for AC High-Voltage Circuit Breakers*. IEEE Std. C37.04-1999.
- [4] *Assessment of Interruption Capability of 230 kV Circuit Breaker*. Sacramento Municipal Utility District. November 6, 2015.
- [5] *Assessment of Interruption Capability of 230 kV Circuit Breaker Addendum*. Sacramento Municipal Utility District. December 18, 2015.
- [6] *RNDG brkr interruption report_2021_signed.pdf*. Redding Electric Utility. October 6, 2021.
- [7] *MID BES Circuit Breaker Capacity Ratings and Maximum Available Fault Current for 2017 TPL Assessment*. Modesto Irrigation District. September 15, 2017.
- [8] *Fault Study_Dec2020*. Roseville Electric. December 2020.
- [9] *SMUD Operating Procedure OP-204 Voltage and Reactive Control*. Sacramento Municipal Utility District. April 1, 2021.
- [10] *Standard PRC-023-4 – Transmission Relay Loadability*. North American Electric Reliability Corporation. November 19, 2015.
- [11] *Standard PRC-024-3 – Frequency and Voltage Protection Settings for Generating Resources*. North American Electric Reliability Corporation. July 9, 2020.



Appendix A. TPL-001-4 Requirement Matrix

The table below lists the TPL-001-4 requirements and the associated sections in this assessment that demonstrated compliance.

Table A.1 – Compliance requirements and their corresponding sections and pages

Requirement	Section	Page
R1	3.1	4
R1.1	-	-
R1.1.1	3.1.1	4
R1.1.2	3.1.2	5
R1.1.3	3.1.3	5
R1.1.4	3.1.4	5
R1.1.5	3.1.5	6
R1.1.6	3.1.6	6
R2	-	-
R2.1	4.1	7
R2.1.1	4.1.1	7
R2.1.2	4.1.2	7
R2.1.3	4.1.3	8
R2.1.4	4.1.4	8
R2.1.5	4.1.5	9
R2.2	4.1.1	7
R2.2.1	4.1.1	7
R2.3	4.2, 5.2	12,17
R2.4	4.3	13
R2.4.1	4.3.1	13
R2.4.2	4.3.2	13
R2.4.3	4.3.3	13
R2.5	4.3.4	13
R2.6	4.2	12
R2.6.1	4.2	12
R2.6.2	4.2	12
R2.7	5	16
R2.7.1	5	16
R2.7.2	5	16
R2.7.3	5	16
R2.7.4	5	16
R2.8	5.2	17
R2.8.1	5.2	17
R2.8.2	5.2	17
R3	4.1	7
R3.1	4.1.6	9
R3.2	4.1.6	9
R3.3	4.1.6	9
R3.3.1	4.1.6	9
R3.3.1.1	4.1.6	9
R3.3.1.2	5.1.1	16



Table A.1 continued

Requirement	Section	Page
R3.3.2	4.1.6	9
R3.4	4.1.6	9
R3.4.1	4.1.6	9
R3.5	4.1.6	9
R4	4.3.5	13
R4.1	4.3.5	13
R4.1.1	4.3.6	14
R4.1.2	4.3.6	14
R4.1.3	4.3.6	14
R4.2	4.3.6	14
R4.3	4.3.6	14
R4.3.1	4.3.6	14
R4.3.1.1	4.3.5	14
R4.3.1.2	4.3.5	14
R4.3.1.3	4.3.5	14
R4.3.2	4.3.6	14
R4.4	4.3.6	14
R4.4.1	4.3.6	14
R4.5	4.3.6	14
R5	4.3.6	14
R6	4.3.6	14
R7	6	17
R8	-	-
R8.1	-	-



Appendix B. Planned Projects

Table B.1 – Planned facilities and changes to existing facilities

PC Participant	Project Name	Project Description	Project Need	Project Status	Expected In-Service Date
SMUD	Hurley 230 kV bus-tie breaker	Split the Hurley 230 kV bus with a bus-tie breaker so that bus faults do not take the entire buss offline.	Purpose is to increase future reliability. Not needed to address any immediate reliability concerns.	Approved	Summer 2023
	Hurley – Natomas 230 kV Rating Increase	Mitigate clearance issues on the Hurley-Natomas 230 kV line to increase the summer emergency rating.	Purpose is to increase future reliability. Not needed to address any immediate reliability concerns.	Approved	Summer 2022
	Hurley-Procter 230 kV Line Reconductor	Reconductor the Hurley-Procter 230 kV Line to increase its ampacity.	The purpose for this project is to increase SMUD’s load serving capability. No immediate reliability concerns.	Approved	Fall 2021 (Previously delayed from 2020)
REU	Eureka Way-Oregon 115 kV Line Reconductor	Reconductor the Eureka Way-Oregon 115 kV Line to increase its ampacity.	Purpose is to increase future reliability. Not needed to address any immediate reliability concerns.	Approved	Summer 2022

Appendix C. Steady State Analysis Results

The thermal and voltage results for the peak and off-peak steady state results are listed below.

Table C.1 – The 1-in-10 peak load steady state results

PC Participant	Category	Contingency	Affected Facility	Facility Rating	2023	2026	2031	System Adjustments/Mitigation
SMUD	P0	None	N/A	N/A	N/A	N/A	N/A	
	P1	None	N/A	N/A	N/A	N/A	N/A	
	P2	None	N/A	N/A	N/A	N/A	N/A	
	P3	None	N/A	N/A	N/A	N/A	N/A	
	P4	None	N/A	N/A	N/A	N/A	N/A	
	P5	None	N/A	N/A	N/A	N/A	N/A	
	P6	Cordova-White Rock 230 kV TL outage and Orangevale-White Rock 230 kV TL outage	Camino-Lake 230 kV Line	368.5 MVA	147%	147%	147%	Reduce UARP generation by 184 MW to reduce the most severe loading to 98%.
			Hurley-Procter 230 kV TL outage and Orangevale-White Rock 230 kV TL outage	Folsom-Orangevale 230 kV Line	368.5 MVA	109%	107%	102%
			Folsom-Lake 230 kV Line	368.5 MVA	102%	105%	97%	



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PC Participant	Category	Contingency	Affected Facility	Facility Rating	2023	2026	2031	System Adjustments/Mitigation
		Carmichael-Hurley 230 kV TL outage and Orangevale-White Rock 230 kV TL outage	Folsom-Orangevale 230 kV Line	368.5 MVA	106%	101%	98%	Reduce UARP generation by 253 MW to reduce the most severe loading to 99%.
		Folsom-Roseville 230 kV TL outage and Orangevale-White Rock 230 kV TL outage	Folsom-Orangevale 230 kV Line	368.5 MVA	100%	101%	96%	Reduce UARP generation by 20 MW to reduce the most loading to 99%.
		Hurley-Natomas 230 kV line and Natomas 230/69 kV TX outage	Natomas 230 kV Bus	>0.90 pu <1.05 pu	1.04 pu	1.06 pu	1.04 pu	Switch Natomas capacitor offline to bring bus voltage to 0.99 pu.
P7		Camino-Lake and Cordova-White Rock 230 kV line outage	Orangevale-White Rock 23 kV Line	368.5 MVA	147%	147%	147%	SMUD'S UARP RAS to run back hydro generation to mitigate the overloads.
Extreme		Loss of all lines north of Lake 230 kV station	Orangevale-White Rock 230 kV Line	368.5 MVA	147%	147%	147%	N/A

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PC Participant	Category	Contingency	Affected Facility	Facility Rating	2023	2026	2031	System Adjustments/Mitigation
		Loss of all lines north of Orangevale 230 kV station	Carmichael-Hurley 230 kV Line	363.3 MVA	135%	123%	133%	SMUD'S Carmichael RAS to drop load at Carmichael to mitigate the overloads.
		Natural gas pipeline 700A outage	None	N/A	Diverge	Solved without violations	Diverge	In 2023, and 2031 load was dropped in accordance with SMUD's OP-204 operating procedure to solve the post contingency cases.
		Loss of all lines north of Procter 230 kV station	Folsom-Lake 230 kV Line	368.5 MVA	115%	118%	115%	N/A
			Folsom-Orangevale 230 kV Line	368.5 MVA	111%	109%	111%	N/A
		Loss of all lines south of Elk Grove 230 kV station – A	Campbell-Hedge 230 kV Line	556.1 MVA	140%	135%	Diverge 115%*	In 2031, load was dropped in accordance with SMUD's OP-204 operating procedure to solve the post contingency case.
			Campbell-Pocket 230 kV Line	573.7 MVA	107%	110%	85%	
		Loss of all lines south of Elk Grove 230 kV station – B	Goldhill-Lake 230 kV Line	358.5 MVA	Diverge 126%*	Diverge 138%*	Diverge 126%*	In 2023, 2026, and 2031 load was dropped in accordance with SMUD's OP-204 operating procedure.
			Keswick-Obanion 230 kV Line	323 MVA	Diverge 109%*	Diverge 108%*	Diverge 109%*	
		Loss of all lines south of Hurley 230 kV station	Folsom-Orangevale 230 kV Line	368.5 MVA	103%	101%	103%	N/A
			Folsom-Lake 230 kV Line	368.5 MVA	101%	104%	101%	N/A



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PC Participant	Category	Contingency	Affected Facility	Facility Rating	2023	2026	2031	System Adjustments/Mitigation
		Loss of all lines west of Folsom 230 kV station	Carmichael-Hurley 230 kV Line	363.3 MVA	105%	100%	103%	SMUD'S Carmichael RAS to drop load at Carmichael to mitigate the overloads.
			Hedge-Procter 230 kV Line	368.5 MVA	98%	103%	98%	SMUD's Procter RAS to open the Hurley-Procter lien to relieve loading on the Hedge-Procter line.
		Loss of transmission line tower 303	Carmichael-Hurley 230 kV Line	363.3 MVA	133%	123%	133%	SMUD'S Carmichael RAS to drop load at Carmichael to mitigate the overloads.
		Rancho Seco 230 kV switching station outage	Procter-Hedge 230 kV Line	368.5 MVA	Diverge 101%*	Diverge 105%*	Diverge 101%*	In 2023, 2026, and 2031 load was dropped in accordance with SMUD's OP-204 operating procedure. SMUD's Procter RAS to open the Hurley-Procter lien to relieve loading on the Hedge-Procter line.
		Loss of all lines west of Rancho Seco 230 kV station	Procter-Hedge 230 kV Line	368.5 MVA	Diverge 100%*	Diverge 105%*	Diverge 113%*	In 2023, 2026, and 2031 load was dropped in accordance with SMUD's OP-204 operating procedure. SMUD's Procter RAS to open the Hurley-Procter lien to relieve loading on the Hedge-Procter line.



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PC Participant	Category	Contingency	Affected Facility	Facility Rating	2023	2026	2031	System Adjustments/Mitigation
		Hurley-Tracy #1 and #2 and Bellota-Rancho Seco #1 and #2 230 kV line outage	Keswick-Obanion 230 kV Line	323 MVA	Diverge 91%	Diverge 89%	Diverge 101%	In 2023, 2026, and 2031 load was dropped in accordance with SMUD's OP-204 operating procedure.
MID	P0	None	N/A	N/A	N/A	N/A	N/A	
	P1	None	N/A	N/A	N/A	N/A	N/A	
	P2	None	N/A	N/A	N/A	N/A	N/A	
	P3	None	N/A	N/A	N/A	N/A	N/A	
	P4	None	N/A	N/A	N/A	N/A	N/A	
	P5	None	N/A	N/A	N/A	N/A	N/A	
	P6	None	N/A	N/A	N/A	N/A	N/A	
	P7	None	N/A	N/A	N/A	N/A	N/A	
	Extreme	Westley East Bus Outage	Warnerville-Standiford 115 kV line #7	182.7 MVA (2023) 369 MVA (2026,2031)	108%	<90%	<90%	N/A
			Warnerville-Standiford 115 kV line #8	182.7 MVA (2023) 369 MVA (2026,2031)	108%	<90%	<90%	
		Loss of Westley-Parker, Westley-Walnut, Westley-Rosemore #1 and #2 230 kV Lines	Warnerville-Standiford 115 kV line #7	182.7 MVA (2023) 369 MVA (2026,2031)	108%	<90%	<90%	N/A
			Warnerville-Standiford 115 kV line #8	182.7 MVA (2023) 369 MVA (2026,2031)	108%	<90%	<90%	
RE	P0	None	N/A	N/A	N/A	N/A	N/A	

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PC Participant	Category	Contingency	Affected Facility	Facility Rating	2023	2026	2031	System Adjustments/Mitigation
PC	P1	None	N/A	N/A	N/A	N/A	N/A	
	P2	None	N/A	N/A	N/A	N/A	N/A	
	P3	None	N/A	N/A	N/A	N/A	N/A	
	P4	None	N/A	N/A	N/A	N/A	N/A	
	P5	None	N/A	N/A	N/A	N/A	N/A	
	P6	None	N/A	N/A	N/A	N/A	N/A	
	P7	None	N/A	N/A	N/A	N/A	N/A	
REU	Extreme	None	N/A	N/A	N/A	N/A	N/A	
	P0	None	N/A	N/A	N/A	N/A	N/A	
	P1	None	N/A	N/A	N/A	N/A	N/A	
	P2	None	N/A	N/A	N/A	N/A	N/A	
	P3	None	N/A	N/A	N/A	N/A	N/A	
	P4	None	N/A	N/A	N/A	N/A	N/A	
	P5	None	N/A	N/A	N/A	N/A	N/A	
	P6	None	N/A	N/A	N/A	N/A	N/A	
	P7	None	N/A	N/A	N/A	N/A	N/A	
	Extreme	Keswick-Airport and Flanagan - Keswick and Keswick-Olinda and Keswick-O'Banion 230 kV line outage	Keswick-Eureka Way 115 kV line Keswick-Beltline 115 kV Line Airport 230/115 kV Transformer #1	159 MVA 159 MVA 120 MVA	162% 140% 147%	148% 128% 134%	177% 142% 132%	The Keswick-Eureka Way, Waldon-Moore, and Waldon-Oregon lines were tripped as they exceeded 150% of their highest rating. Following this the Keswick-Beltline line exceeded its highest emergency rating as well and was subsequently tripped. The study showed no cascading occurred after these lines were tripped.

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PC Participant	Category	Contingency	Affected Facility	Facility Rating	2023	2026	2031	System Adjustments/Mitigation
			Airport 230/115 kV Transformer #2	120 MVA	147%	134%	132%	
			Airport-Moore 115 kV Line	199 MVA	100%	91%	<90%	
			Beltline-College View 115 kV Line	199 MVA	107%	97%	109%	
			College-East Redding 115 kV Line	199 MVA	99%	<90%	102%	
			Eureka Way-Oregon 115 kV Line	179 MVA	136%	124%	151%	
			Waldon-Moore 115 kV Line	118 MVA	169%	152%	194%	
			Waldon-Oregon 115 kV Line	118 MVA	194%	176%	217%	
			AirportW 115 kV Bus	>0.948 pu <1.078 pu	.933	>0.948 pu	0.942 pu	
			AirportR 115 kV Bus	>0.948 pu <1.078 pu	.934	>0.948 pu	0.942 pu	
			Canby 115 kV Bus	>0.948 pu <1.078 pu	.935	>0.948 pu	0.942 pu	
			College View 115 kV Bu	>0.948 pu <1.078 pu	.939	>0.948 pu	0.944 pu	
			East Redding 115 kV Bus	>0.948 pu <1.078 pu	.935	>0.948 pu	0.942	

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PC Participant	Category	Contingency	Affected Facility	Facility Rating	2023	2026	2031	System Adjustments/Mitigation
			Sulphur Creek 115 kV Bus	>0.948 pu <1.078 pu	.939	>0.948 pu	0.945	

*Note: For contingencies that diverged, the facility loading percentage is given for *after* the cascading prevention was applied.

Table C.2 – The Spring off-peak load steady state results

PC Participant	Category	Contingency	Affected Facility	Facility Rating	2023	System adjustments/Mitigation
SMUD	Extreme	Loss of all lines west of Rancho Seco 230 kV station	Goldhill-Lake 230 kV Line	358.5 MVA	94%	N/A
			Hedge-Procter 230 kV Line	368.5 MVA	103%	N/A
	Extreme	Loss of all lines south of Elk Grove 230 kV station – B	None	N/A	N/A (Diverge)	Load was dropped in accordance with SMUD’s OP-204 operating procedure.
RE	P0	None	N/A	N/A	N/A	N/A
	P1	None	N/A	N/A	N/A	N/A
	P2	None	N/A	N/A	N/A	N/A
	P3	None	N/A	N/A	N/A	N/A
	P4	None	N/A	N/A	N/A	N/A
	P5	None	N/A	N/A	N/A	N/A
	P6	None	N/A	N/A	N/A	N/A
	P7	None	N/A	N/A	N/A	N/A
	Extreme	None	N/A	N/A	N/A	N/A
MID	P0	None	N/A	N/A	N/A	N/A
	P1	None	N/A	N/A	N/A	N/A
	P2	None	N/A	N/A	N/A	N/A
	P3	None	N/A	N/A	N/A	N/A

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PC Participant	Category	Contingency	Affected Facility	Facility Rating	2023	System adjustments/Mitigation
	P4	None	N/A	N/A	N/A	N/A
	P5	None	N/A	N/A	N/A	N/A
	P6	None	N/A	N/A	N/A	N/A
	P7	None	N/A	N/A	N/A	N/A
	Extreme	None	N/A	N/A	N/A	N/A
REU	Extreme	Keswick - Airport and Flanagan - Keswick and Keswick - Olinda and Keswick - O'Banion 230 kV line outage	Keswick-Eureka Way 115 kV line	159 MVA	161%	<p>The Keswick-Eureka Way, Waldon-Moore, and Waldon-Oregon lines were tripped as they exceeded 150% of their highest rating. Following this the Keswick-Beltline line exceeded its highest emergency rating as well and was subsequently tripped. The study concluded no cascading occurred after these lines were tripped.</p>
			Keswick-Beltline 115 kV Line	159 MVA	135%	
			Airport 230/115 kV Transformer #1	120 MVA	152%	
			Airport 230/115 kV Transformer #2	120 MVA	152%	
			Airport-Moore 115 kV Line	199 MVA	93%	
			Beltline-College View 115 kV Line	199 MVA	105%	
			College-East Redding 115 kV Line	199 MVA	100%	

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PC Participant	Category	Contingency	Affected Facility	Facility Rating	2023	System adjustments/Mitigation
			Eureka Way-Oregon 115 kV Line	179 MVA	138%	
			Waldon-Moore 115 kV Line	118 MVA	187%	
			Waldon-Oregon 115 kV Line	118 MVA	202%	
			AirportW 115 kV Bus	>0.948 pu <1.078 pu	.94	
			AirportR 115 kV Bus	>0.948 pu <1.078 pu	.94	
			Canby 115 kV Bus	>0.948 pu <1.078 pu	.941	
			College View 115 kV Bu	>0.948 pu <1.078 pu	.945	
			East Redding 115 kV Bus	>0.948 pu <1.078 pu	.941	
			Sulphur Creek 115 kV Bus	>0.948 pu <1.078 pu	.943	

*Note: For contingencies that diverged, the facility loading percentage is given for *after* the cascading prevention was applied.

Appendix D. Steady State Sensitivity Analysis Results

Table D.1 – The 1-in-10 peak load +5% steady state sensitivity results

PC Participant	Category	Contingency	Affected Facility	Facility Rating	2023	2026
SMUD	P2.3	Natomas 230 kV breaker fault (1LG in BKR 420)	Natomas 230 kV Bus	>0.948 pu <1.10 pu	0.928	N/A ⁹
	P4.2	Hurley-Natomas 230 kV TL outage with stuck breaker (1LG fault at HUR with NAT BKR 420 stuck)	Natomas 230 kV Bus	>0.948	0.928	N/A
	P4.5	Natomas 230 kV bus fault (1LG fault on South bus with BKR 420 stuck)	Natomas 230 kV Bus	>0.948	0.928	N/A
	P6	Cordova-White Rock 230 kV TL outage and Orangevale-White Rock 230 kV TL outage	Camino-Lake 230 kV Line	368.5 MVA	148%	N/A
			Orangevale-Folsom 230 kV Line	368.5 MVA	100%	N/A
			Orangevale-Folsom 230 kV Line	368.5 MVA	114%	N/A
			Folsom-Lake 230 kV Line	368.5 MVA	108%	N/A
	Carmichael-Hurley 230 kV TL outage and Orangevale-White Rock 230 kV TL outage (3LG fault at ORV)	Orangevale-Folsom 230 kV Line	368.5 MVA	113%	N/A	
	Folsom-Roseville 230 kV TL outage and Orangevale-White Rock 230 kV TL outage	Orangevale-Folsom 230 kV Line	368.5 MVA	105%	N/A	

⁹ SMUD ran a different sensitivity for its 2026 heavy summer case than the BANC participants. Results are found on the following table (**Table D.2**).



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PC Participant	Category	Contingency	Affected Facility	Facility Rating	2023	2026
P7		Elk Grove-Rancho Seco #1 and #2 230 kV line outage	Campbell-Hedge 230 kV Line	556.1 MVA	105%	N/A
		Camino-Lake and Cordova-White Rock 230 kV line outage	Orangevale-White Rock 230 kV Line	368.5 MVA	148%	N/A
P7		Camino-Lake and Cordova-White Rock 230 kV line outage	Orangevale-White Rock 230 kV Line	368.5 MVA	147%	N/A
Extreme		Loss of all lines north of Hedge 230 kV station	Folsom-Orangevale 230 kV Line	368.5 MVA	103%	N/A
			Folsom-Lake 230 kV Line	368.5 MVA	99%	N/A
			Keswick-Obanion 230 kV Line	323 MVA	99%	N/A
		Loss of all lines north of Lake 230 kV station	Orangevale-White Rock 230 kV Line	368.5 MVA	147%	N/A
		Loss of all lines north of Procter 230 kV station	Orangevale-White Rock 230 kV Line	368.5 MVA	147%	N/A
			Folsom-Lake 230 kV Line	368.5 MVA	130%	N/A
			Folsom-Orangevale 230 kV Line	368.5 MVA	121%	N/A
			Carmichael 230 kV Bus	>0.948 pu <1.05 pu	0.937 pu	N/A
			Elverta 230 kV Bus	>0.948 pu <1.05 pu	0.931 pu	N/A
			Foothill 230 kV Bus	>0.948 pu <1.05 pu	0.950 pu	N/A
			Hurley 230 kV Bus	>0.948 pu <1.05 pu	0.930 pu	N/A
		Orangevale 230 kV Bus	>0.948 pu <1.05 pu	0.940 pu	N/A	
		Natomas 230 kV Bus	>0.948 pu <1.05 pu	0.928 pu	N/A	

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PC Participant	Category	Contingency	Affected Facility	Facility Rating	2023	2026	
		Loss of all lines west of White Rock 230 kV station	Carmichael 230 kV Bus	>0.948 pu <1.05 pu	0.930	N/A	
			Elverta 230 kV Bus	>0.948 pu <1.05 pu	0.927	N/A	
			Foothill 230 kV Bus	>0.948 pu <1.05 pu	0.943	N/A	
			Hedge 230 kV Bus	>0.90 pu <1.05 pu	0.948	N/A	
			Hurley 230 kV Bus	>0.948 pu <1.05 pu	0.930	N/A	
			Lake 230 kV Bus	>0.90 pu <1.05 pu	0.936	N/A	
			Orangevale 230 kV Bus	>0.948 pu <1.05 pu	0.930	N/A	
			Procter 230 kV Bus	>0.90 pu <1.05 pu	0.945	N/A	
			Natomas 230 kV Bus	>0.90 pu <1.05 pu	0.928	N/A	
			Cordova 230 kV Bus	>0.90 pu <1.05 pu	0.944	N/A	
			Cosumnes plant outage	Cordova 230 kV Bus	>0.90 pu <1.05 pu	0.950	N/A
			Loss of all lines south of Elk Grove 230 kV station - A	Campbell-Hedge 230 kV Line	556.1 MVA	Diverge 120%*	N/A
			Loss of all lines south of Elk Grove 230 kV station - B	Goldhill-Lake 230 kV Line	358.5 MVA	Diverge 126%*	N/A
				Keswick-Obanion 230 kV Line	323 MVA	Diverge 119%*	N/A
		Loss of all lines south of Hurley 230 kV station	Folsom-Orangevale 230 kV Line	368.5 MVA	112%	N/A	
			Folsom-Lake 230 kV Line	368.5 MVA	113%	N/A	

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PC Participant	Category	Contingency	Affected Facility	Facility Rating	2023	2026		
PC		Loss of all lines west of Folsom 230 kV station	Carmichael-Hurley 230 kV Line	363.3 MVA	111%	N/A		
			Hedge-Procter 230 kV Line	368.5 MVA	101%	N/A		
		Loss of transmission line tower 303	Carmichael-Hurley 230 kV Line	363.3 MVA	141%	N/A		
			Rancho Seco 230 kV switching station outage*	Procter-Hedge 230 kV Line	368.5 MVA	Diverge 112%*	N/A	
		Loss of all lines west of Rancho Seco 230 kV station*	Procter-Hedge 230 kV Line	368.5 MVA	Diverge 113%*	N/A		
			Hurley-Tracy #1 and #2 and Bellota-Rancho Seco #1 and #2 230 kV line outage	Keswick-Obanion 230 kV Line	323 MVA	Diverge 107%*	N/A	
		Goldhill-Lake 230 kV Line		358. MVA	Diverge 107*	N/A		
		Natural gas pipeline 700A	None	N/A	Diverge N/A	N/A		
		MID	P0	None	Standiford 115 kV Bus	>0.95 pu <1.10 pu	>0.95	0.949
			P1	None	N/A	N/A	N/A	N/A
P2	None		N/A	N/A	N/A	N/A		
P3	None		N/A	N/A	N/A	N/A		
P4	None		N/A	N/A	N/A	N/A		
P5	None		N/A	N/A	N/A	N/A		
P6	None		N/A	N/A	N/A	N/A		
P7	None		N/A	N/A	N/A	N/A		
Extreme	Westley East Bus Outage		Warnerville-Standiford 115 kV line #7	182.7 MVA (2023) 369 MVA (2026)	114%	<90%		
			Warnerville-Standiford 115 kV line #8	182.7 MVA (2023) 369 MVA (2026)	114%	<90%		

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PC Participant	Category	Contingency	Affected Facility	Facility Rating	2023	2026
	Extreme	Loss of Westley-Parker, Westley-Walnut, Westley-Rosemore #1 and #2 230 kV Lines	Warnerville- Standiford 115 kV line #7	182.7 MVA (2023) 369 MVA (2026)	114%	<90%
			Warnerville- Standiford 115 kV line #8	182.7 MVA (2023) 369 MVA (2026)	114%	<90%
RE	P0	None	N/A	N/A	N/A	N/A
	P1	None	N/A	N/A	N/A	N/A
	P2	None	N/A	N/A	N/A	N/A
	P3	None	N/A	N/A	N/A	N/A
	P4	None	N/A	N/A	N/A	N/A
	P5	None	N/A	N/A	N/A	N/A
	P6	None	N/A	N/A	N/A	N/A
	P7	None	N/A	N/A	N/A	N/A
	Extreme	None	N/A	N/A	N/A	N/A
REU	P0	None	N/A	N/A	N/A	N/A
	P1	None	N/A	N/A	N/A	N/A
	P2	None	N/A	N/A	N/A	N/A
	P3	None	N/A	N/A	N/A	N/A
	P4	None	N/A	N/A	N/A	N/A
	P5	None	N/A	N/A	N/A	N/A
	P6	None	N/A	N/A	N/A	N/A
	P7	None	N/A	N/A	N/A	N/A
	Extreme	Keswick - Airport and Flanagan - Keswick and Keswick - Olinda and Keswick - O'Banion 230 kV line outage	Keswick-Eureka Way 115 kV line	159 MVA	161%	148%
Keswick-Beltline 115 kV Line			159 MVA	135%	128%	
Airport 230/115 kV Transformer #1			120 MVA	152%	130%	



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PC Participant	Category	Contingency	Affected Facility	Facility Rating	2023	2026
			Airport 230/115 kV Transformer #2	120 MVA	152%	130%
			Airport-Moore 115 kV Line	199 MVA	93%	<90%
			Beltline-College View 115 kV Line	199 MVA	105%	97%
			College-East Redding 115 kV Line	199 MVA	100%	<90%
			Eureka Way-Oregon 115 kV Line	179 MVA	138%	124%
			Waldon-Moore 115 kV Line	118 MVA	187%	150%
			Waldon-Oregon 115 kV Line	118 MVA	202%	176%
			AirportW 115 kV Bus	>0.948 pu <1.078 pu	.94	>0.948 pu <1.078 pu
			AirportR 115 kV Bus	>0.948 pu <1.078 pu	.94	>0.948 pu <1.078 pu
			Canby 115 kV Bus	>0.948 pu <1.078 pu	.941	>0.948 pu <1.078 pu
			College View 115 kV Bu	>0.948 pu <1.078 pu	.945	>0.948 pu <1.078 pu
			East Redding 115 kV Bus	>0.948 pu <1.078 pu	.941	>0.948 pu <1.078 pu
			Sulphur Creek 115 kV Bus	>0.948 pu <1.078 pu	.943	>0.948 pu <1.078 pu

*Note: For contingencies that diverged, the facility loading percentage is given for *after* the cascading prevention was applied.



Table D.2 – SMUD 2026 Zero Carbon Sensitivity Results

PC Participant	Category	Contingency	Affected Facility	Facility Rating	2026	
SMUD	P6	Cordova-White Rock 230 kV TL outage and Orangevale-White Rock 230 kV TL outage	Camino-Lake 230 kV Line	368.5 MVA	146%	
	P6	Folsom-Roseville 230 kV TL outage and SQ3-Cordova 230 kV TL outage	Orangevale-Folsom 230 kV Line	368.5 MVA	104%	
	P6	Folsom-Roseville 230 kV TL outage and Orangevale-White Rock 230 kV TL outage	Orangevale-Folsom 230 kV Line	368.5 MVA	102%	
	P6	Orangevale-White Rock 230 kV TL outage and SQ3-Cordova 230 kV TL outage	Orangevale-Folsom 230 kV Line	368.5 MVA	101%	
	P6	Hurley-Procter 230 kV TL outage and Orangevale-White Rock 230 kV TL outage	Orangevale-Folsom 230 kV Line	368.5 MVA	100%	
	P6	Hurley-Natomas 230 kV TL outage and Natomas 230/69 kV distribution TX outage	Natomas 230 kV Bus	>0.90 pu <1.05 pu	1.056 pu	
	P7	Camino-Lake and Cordova-White Rock 230 kV line outage	Orangevale-White Rock 230 kV Line	368.5 MVA	146%	
	Extreme		Hurley-Tracy #1 and #2 and Bellota-Rancho Seco #1 and #2 230 kV line outage	Goldhill-Lake 230 kV Line	358.5 MVA	110%
				Cordova-SQ3 230 kV Line	368.5 MVA	92%
	Extreme		Loss of all lines north of Lake 230 kV station	Orangevale-White Rock 230 kV Line	368.5 MVA	146%
	Extreme		Loss of all lines north of Natomas 230 kV station	Carmichael-Orangevale 230 kV Line	368.5 MVA	110%
	Extreme		Loss of all lines west of Folsom 230 kV station	Cordova-SQ3 230 kV Line	368.5 MVA	122%
				Hedge-Cordova 230 kV Line	368.5 MVA	115%
	Extreme		Loss of all lines south of Elk Grove 230 kV station - B	Goldhill-Lake 230 kV line	358.5 MVA	Diverge 102%*

*Note: For contingencies that diverged, the facility loading percentage is given for *after* the cascading prevention was applied.

Table D.3 – The off-peak load steady state sensitivity results

PC Participant	Category	Contingency	Affected Facility	Facility Rating	2023 (%)	
SMUD	Extreme	Hurley-Tracy #1 and #2 and Bellota-Rancho Seco #1 and #2 230 kV line outage solves manually	Goldhill-Lake 230 kV Line	358.5 MVA	Diverge 116%*	Load was dropped in accordance with SMUD’s OP-204 operating procedure.
	Extreme	Loss of all lines south of Elk Grove 230 kV station - B	Goldhill-Lake 230 kV Line	358.5 MVA	Diverge 103%*	Load was dropped in accordance with SMUD’s OP-204 operating procedure.
MID	P0	None	N/A	N/A	N/A	
	P1	None	N/A	N/A	N/A	
	P2	None	N/A	N/A	N/A	
	P3	None	N/A	N/A	N/A	
	P4	None	N/A	N/A	N/A	
	P5	None	N/A	N/A	N/A	
	P6	None	N/A	N/A	N/A	
	P7	None	N/A	N/A	N/A	
	Extreme	None	N/A	N/A	N/A	N/A
RE	P0	None	N/A	N/A	N/A	
	P1	None	N/A	N/A	N/A	
	P2	None	N/A	N/A	N/A	
	P3	None	N/A	N/A	N/A	
	P4	None	N/A	N/A	N/A	
	P5	None	N/A	N/A	N/A	
	P6	None	N/A	N/A	N/A	
	P7	None	N/A	N/A	N/A	
	Extreme	None	N/A	N/A	N/A	N/A
REU	Extreme	Loss of Keswick-Airport, Flanagan-Keswick, Keswick-Olinda, and Keswick-O'Banion 230 kV lines	Keswick-Eureka Way 115 kV line	159 MVA	167%	The Keswick-Eureka Way, Waldon-Moore, and Waldon-Oregon lines were tripped as they exceeded 150% of their highest rating. Following this the Keswick-Beltline line exceeded its
			Keswick-Beltline 115 kV line	159 MVA	133%	

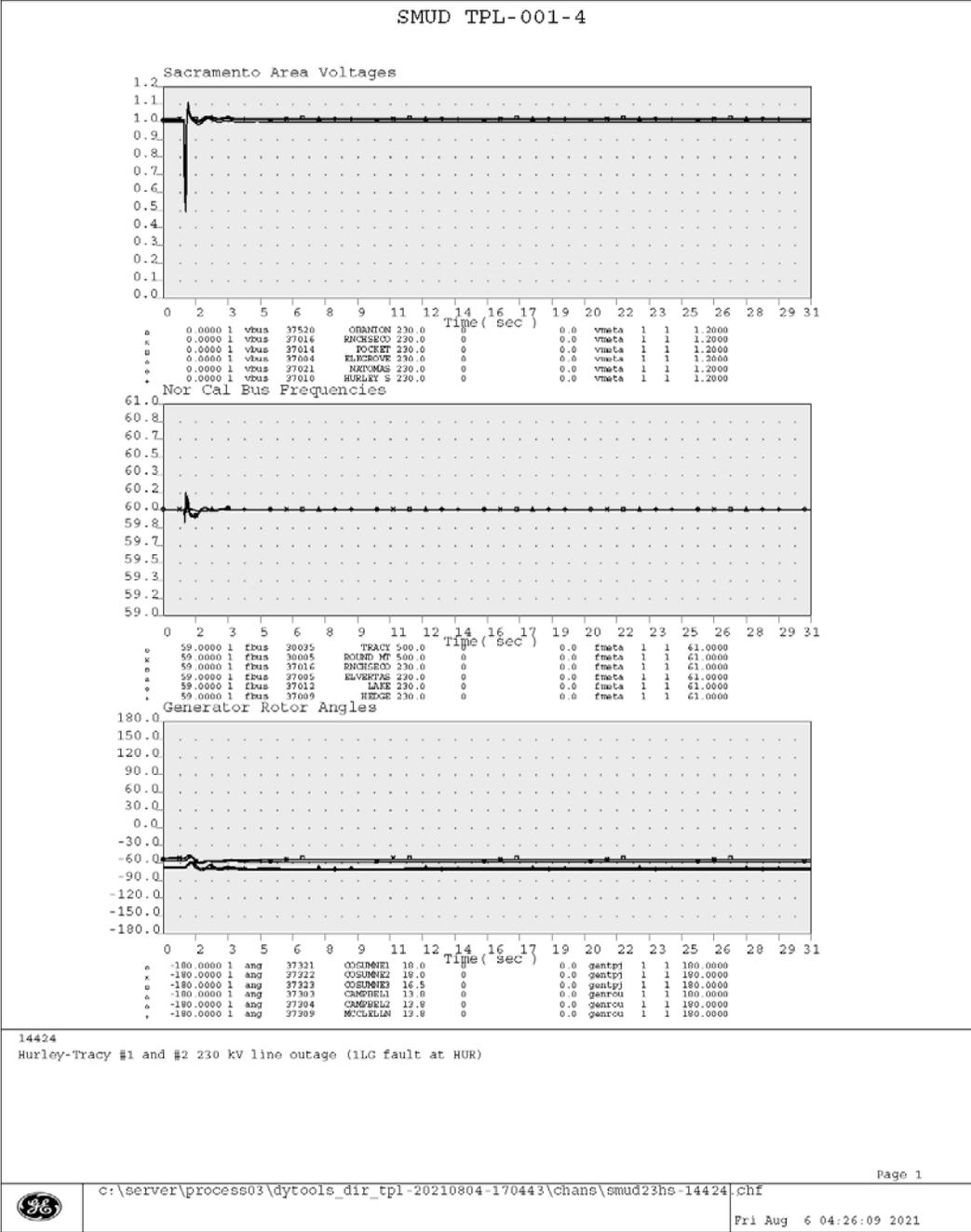
BANC PC 2021 TPL-001-4 Assessment

PC Participant	Category	Contingency	Affected Facility	Facility Rating	2023 (%)	
			Eureka Way-Oregon 115 kV line	179 MVA	144%	highest emergency rating as well and was subsequently tripped. The study concluded no cascading occurred after these lines were tripped.
			Moore-Waldon 115 kV line	118 MVA	195%	
			Oregon-Waldon 115 kV line	118 MVA	211%	
			Airport 230/115 kV Transformer #1 and #2	120 MVA	135%	

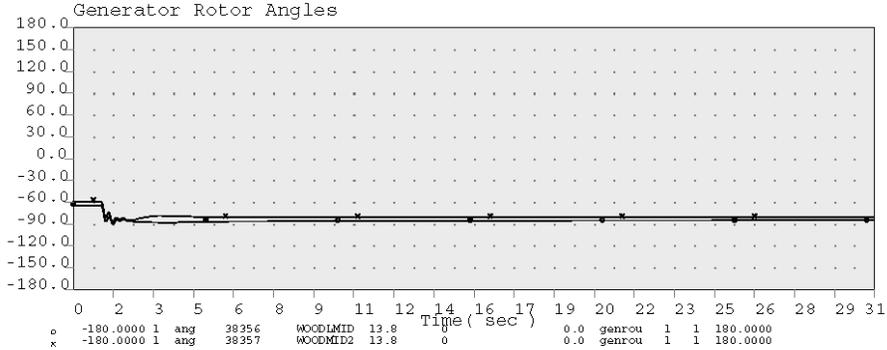
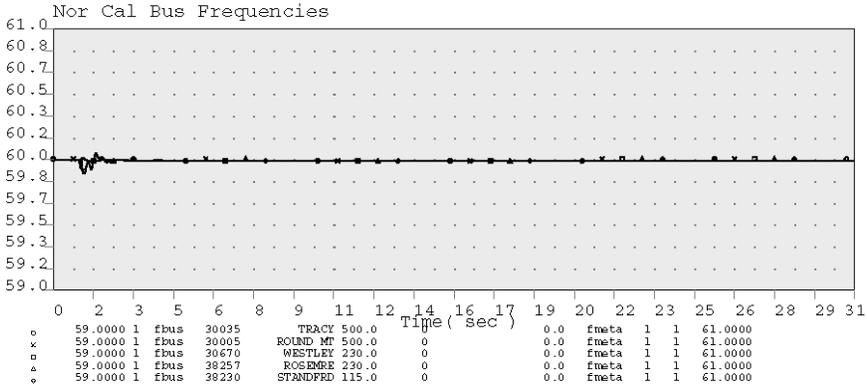
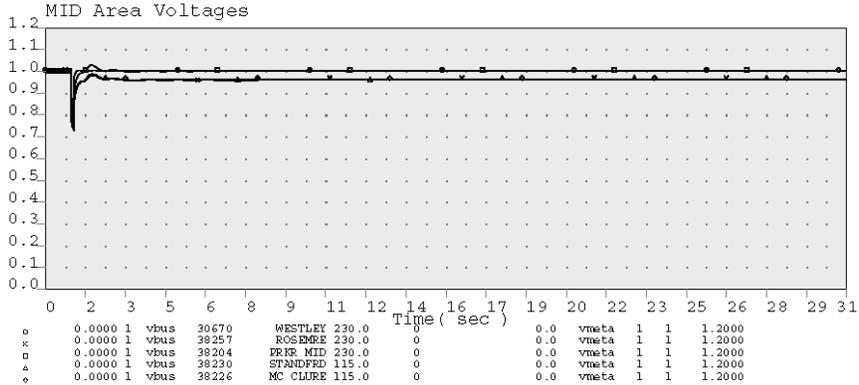
*Note: For contingencies that diverged, the facility loading percentage is given for *after* the cascading prevention was applied.

Appendix E. Sample Transient Stability Plots

Sample plots for each PC Participant are shown below.

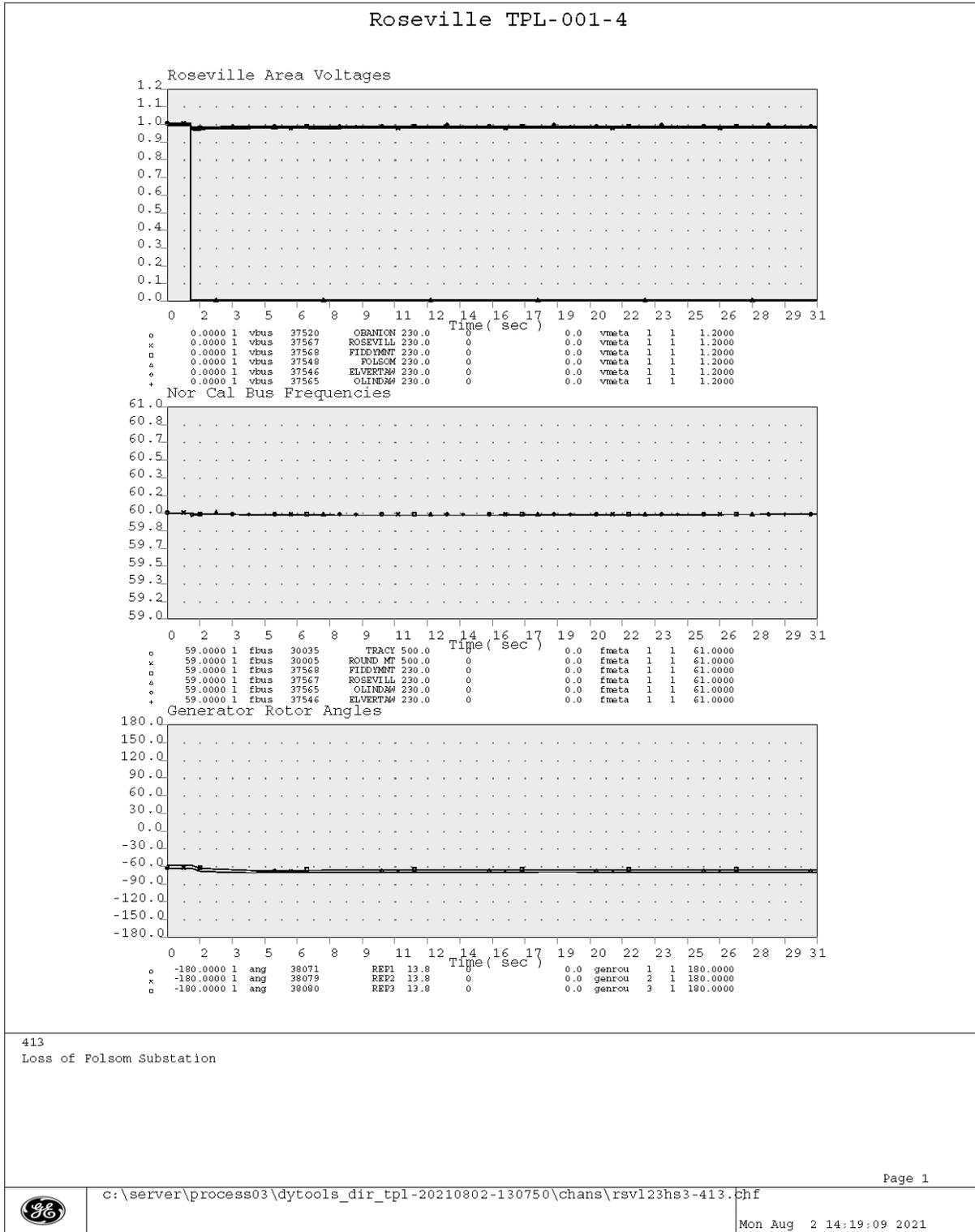


Modesto TPL-001-4



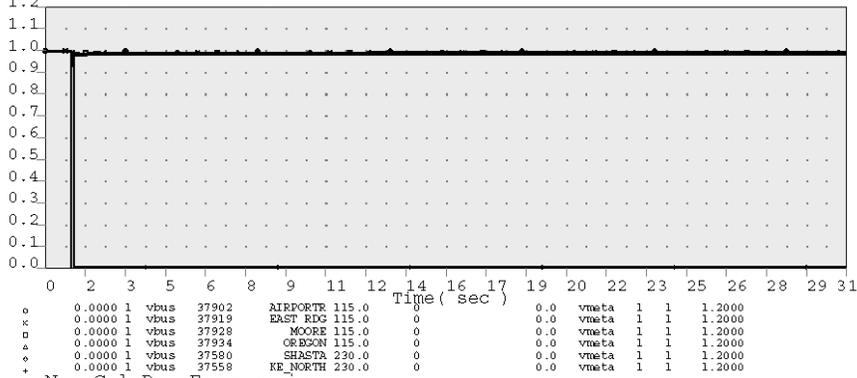
1396
Westley East Bus outage



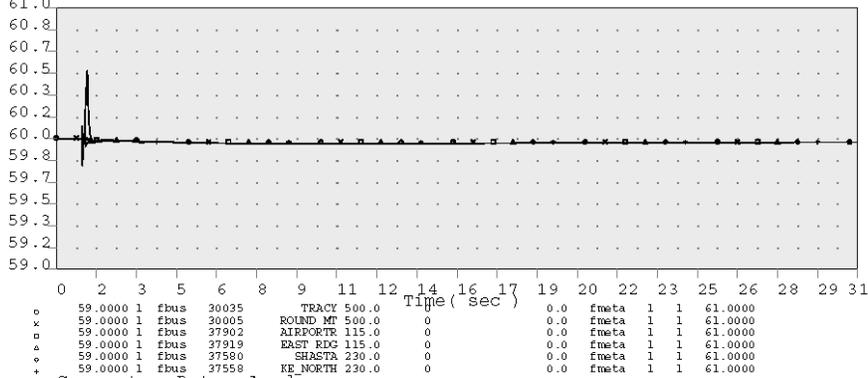


Redding TPL-001-4

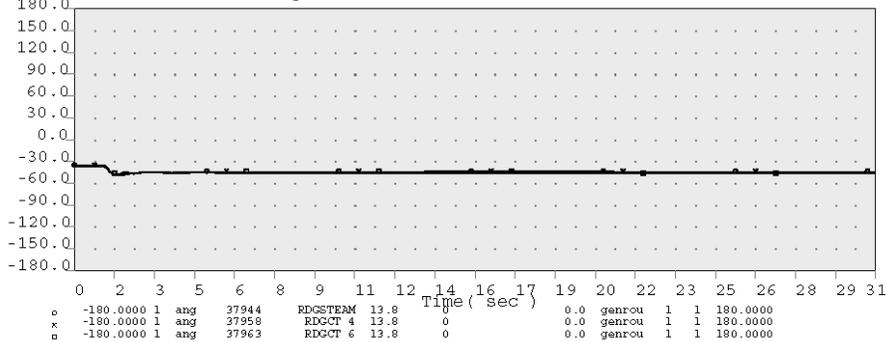
Redding Area Voltages



Nor Cal Bus Frequencies



Generator Rotor Angles



1632
Loss of Keswick Substation



Appendix F. Short Circuit Results

Table F.1 – List of Short Circuit elements that exceed 80% duty.

PC Participant	Element	Fault Type	Year	Facility Rating (A)	Duty (A)	Duty (%)
SMUD	Hurley CB 5814	2LG	2021	35,369	30,664	86.7
	Hurley CB 5820	2LG	2021	35,369	32,291	91.3
	Hurley CB 5834	2LG	2021	35,369	32,787	93.0
MID	McClure CB 9081	3Ø	2023	20,000	16,471	82.4
	McClure CB 9083	3Ø	2023	20,000	16,471	82.4
	Westley CB 2354	3Ø	2022	40,000	39,330	98.3
	Westley CB 2355	3Ø	2022	40,000	39,330	98.3
	Westley CB 2356	3Ø	2022	40,000	39,330	98.3
	Standiford CB 901	3Ø	2023	25,000	22,037	88.1
	Standiford CB 902	3Ø	2023	25,000	22,037	88.1
REU	Airport CSW 3700	1LG	2021,2026	20,000	17,036	85.2
RE	None					



Appendix G. Version History

Version	Change(s)	By	Date
0.0	Initial draft	Ryan Price	8/13/2021
1.0	Finalized report	Ryan Price	10/27/2021

**Balancing Authority of Northern California
Resolution 21-11-03**

**ACKNOWLEDGEMENT AND ACCEPTANCE OF BANC PLANNING COORDINATOR AREA
2021 TRANSMISSION PLANNING ASSESSMENT**

WHEREAS, the Balancing Authority of Northern California (“BANC”) was created by a Joint Powers Agreement (“JPA”) to, among other things, acquire, construct, maintain, operate, and finance Projects; and

WHEREAS, BANC is the NERC Planning Coordinator (“PC”) for four of its members, including the Sacramento Municipal Utility District, Modesto Irrigation District, Redding Electric Utility, and Roseville Electric; and

WHEREAS, BANC must demonstrate compliance with certain PC-related NERC reliability standards, including TPL-001-4; and

WHEREAS, in order to meet this standard, SMUD, as the PC Services Provider, produced the BANC PC Area 2021 Transmission Planning Assessment (“Assessment”), in which the performance of the BANC PC area was assessed in order to demonstrate that its portion of the Bulk Electric System meets all of the performance requirements specified in the above-mentioned standard for the years 2022 through 2031; and

WHEREAS, the Assessment concludes that no system deficiencies or criteria violations were identified for the BANC PC portion of the Bulk Electric System; and

WHEREAS, each PC Committee member approved the Assessment on or before November 5th.

NOW, THEREFORE, BE IT RESOLVED that the Commissioners of the Balancing Authority of Northern California hereby acknowledge and accept the Assessment.

PASSED AND ADOPTED by the Commissioners of the Balancing Authority of Northern California this 17th day of November, 2021, by the following vote:

		Aye	No	Abstain	Absent
Modesto ID	James McFall				
City of Redding	Dan Beans				
City of Roseville	Michelle Bertolino				
City of Shasta Lake	James Takehara				
SMUD	Paul Lau				
TPUD	Paul Hauser				

James McFall
Chair

Attest by: C. Anthony Braun
Secretary