FPL®

Transmission & Substation

System Impact Study for City of Vero Beach (CVB)

Transmission Service Requests to Retire CVB Units and Designate Additional Orlando Resources to serve CVB load

OASIS ID #s 81492921 & 81492907

September 30, 2015

Florida Power & Light Company
Transmission Services & Planning

DRAFT

Table of Contents

EXECUTIVE SUMMARY 3

STEADY-STATE LOAD FLOW ANALYSIS 5

METHODOLOGY 5

Selection of the Base Case *5*

Reference Case Development *5*

Study Case Development *6*

NORMAL AND SINGLE CONTINGENCY ANALYSIS RESULTS 6

Contingency Selection Criteria *6*

Network Impacts for Category B (P1/P2) Events *6*

MULTIPLE CONTINGENCY ANALYSIS RESULTS 7

Contingency Selection Criteria *7*

Network Impacts for Category C2 (P4/P5) Events *7*

Network Impacts for Category C3 (P6) Events *8*

Network Impacts for Category C5 (P7) Events *9*

CONCLUSIONS: 9

APPENDIX I 10

Category B – Single Contingency Scenarios *11*

Category C2 – Breaker Failure Scenarios *11*

Category C5 – Double Circuit Tower Outage *11*

Category C3 – Double Contingencies Combinations in FPL's East Zone, CVB & FTP *12*

APPENDIX II 24

Executive Summary

In accordance with Florida Power & Light Company's ("FPL") Open Access Transmission Tariff ("OATT") and North American Electric Reliability Corporation ("NERC") Reliability Standards, FPL has completed a System Impact Study for the Network Resource Modification and Designation Transmission Service Requests ("TSR") submitted by Orlando Utilities on behalf of City of Vero Beach("CVB"). These TSRs are to displace CVB internal generation resources with generation resources located in the OUC control area.

Details of the Transmission Service Requests:

OASIS Request ID: 81492907
Service requested: Network Resource
MW: 39-47 MW
Start date: October 1, 2015
End date: December 31, 2023

OASIS Request ID: 81492921
Service requested: Modify Network Resource
MW: 67 MW
Start date: October 1, 2015
End date: December 31, 2029

As delineated in the OATT, the purpose of the System Impact Study was to identify any system constraints, re-dispatch options (if any), additional Direct Assignment Facilities, or Network Upgrades required to provide the requested service. The performance of the System Impact Study consisted of a Load Flow analysis of CVBs requests to Undesignate (retire) its remaining generating units #1, #2 and #5, and replacing them with a transfer from Orlando resources to serve their load. The transfer modeled in the study cases from Orlando to CVB is not for the entire amount requested in the TSR for a new Network Resource from OUC, since the CVB resources that are being displaced are dispatched at less output in the base cases than the new requested amount, and the other CVB resources that would be displaced to fulfill the entire request are also OUC resources. (See Appendix 2 for generation dispatch.) Since the resources to be designated as new CVB resources exist and are already interconnected to the transmission system, short-circuit and stability analyses are not required.

The System Impact Study was performed in accordance with NERC Reliability Standards (TPL-001, TPL-002, and TPL-003). Based on the current status of FPL's Generator Interconnection Service ("GIS") and transmission service request queues, the following are the major findings[1] of this study:

- The System Impact Study did not identify any thermal overloads or voltage issues on the bulk transmission system that are attributable to the TSRs which could not be mitigated with operational procedures in the FPL and CVB areas. These switching procedures to sectionalize the CVB transmission system have been coordinated with and agreed to by FPL and CVB, and are detailed in Appendix 1.
- Since the loads specified by CVB for winter peak conditions in this study already assume the use of load management during such periods, it is important that FPL and CVB agree on processes to assure that such load management be applied when necessary.

Review and Approval by Florida Reliability Coordinating Council

This study and report may be reviewed by the Florida Reliability Coordinating Council ("FRCC") Transmission Working Group ("TWG") and Stability Working Group ("SWG"). Other transmission owning entities can determine whether this transmission service request could have negative impacts on their respective transmission systems and require resolution of those impacts. FPL will undertake reasonable efforts to assist the transmission customer in addressing the identified impacts.

[1] Note that these results are based on the current FPL GIS and transmission service request queues which include requests preceding these network resource requests. To the extent that one or more of these requests are modified or withdrawn, the results presented in this report may no longer apply to this request and may change materially. FPL will advise the customer of any changes associated with preceding GIS or transmission service requests that may require a re-study of this network resource request.

Steady-State Load Flow Analysis

In accordance with the NERC Reliability Standards for Transmission Planning, steady-state load flow analyses were performed for the proposed TSRs. These standards specify requirements for system performance under normal conditions (Category A, or P0 - No Contingencies), planning events resulting in the loss of a single bulk electric system element (Category B, or P1/P2 contingencies), and planning events resulting in the loss of two or more (multiple) elements (Category C2, or P4/P5, Category C3, or P6, and Category C5, or P7 contingencies). The purpose of this study was to determine the transmission system additions/modifications that are required (if any) in order to displace CVB internal generation resources with generation resources located in the OUC control area.

Methodology

The study was performed by conducting a power flow analysis under normal and various contingency conditions using Siemens PSS/E and the Power Gem Transmission Adequacy & Reliability Assessment ("TARA") software programs. All system elements 69kV or higher in the FRCC region were simulated for NERC planning events (P0-P7, or Category A, B, and selected C contingencies) using steady state methods. All branch (including transformers and ties) thermal loadings were monitored for loadings above the applicable facility rating. Thermal loadings greater than 100% of a facility's applicable rating that were materially aggravated (more than 3%) when compared to the reference case or thermal overloads that did not exist in the reference case, for the same contingency, are attributed to the TSR. Similarly, all system busses were monitored for applicable voltage criteria, including nuclear plant interface requirements. Voltages outside of transmission owner criteria that were materially lower (more than 2%) when compared to the reference case, for the same contingency, are attributed to the TSR.

Selection of the Base Case

Cases are selected to cover critical system conditions during study years as deemed appropriate by FPL. The latest available peak cases for the summer and winter (2015-2019) from the 2015 FRCC Databank (final) Revision 2B cases, with firm long-term contractual obligations, were selected to be used for the study. These cases include the planned (including maintenance) outage of BES elements expected to be out of service during the time period under study.

Reference Case Development

The base cases were modified by adjusting CVB area loads to match the updated CVB load forecast (model adjustments were provided by Orlando Utilities Commission ("OUC"), performing Transmission Planner functions on behalf of CVB). These adjustments slightly reduce real and reactive loads (adjusting the load power factor) and also exclude non-firm loads in the winter cases. See Appendix 2 for load adjustment summary. The emergency rating (Rate C) of the CVB South autotransformer was also changed by OUC to 240 MVA in the summer cases and 275 MVA in the winter cases to incorporate revised short-term emergency ratings provided by CVB that allow time for

switching mitigation procedures to be performed without exceeding applicable facility ratings. The base cases also incorporate any relevant preceding GIS requests and transmission service requests.

Study Case Development

Study cases were derived from the above mentioned reference cases by simulating shut down of CVB generation that was modeled on-line in the cases and replacing it with a transfer from existing Orlando resources to serve CVB load.

Normal and Single Contingency Analysis Results

For normal conditions (Category A, or P0), all transmission facilities rated 69kV and above were monitored and compared to the applicable thermal rating and/or voltage screening criteria throughout all study cases. In the normal pre-contingency condition, no facility loadings exceeded the equipment thermal rating and/or voltage screening criteria in the study cases.

Contingency Selection Criteria

For single contingency events (Categories B1, B2 and B3, or P1/P2), all transmission facilities rated 69kV and above were singularly removed from service throughout all study cases. Contingencies resulting in branch loadings exceeding thermal ratings and/or voltage screening criteria, and that were attributable to the TSRs. **(see Appendix I for detailed study results, available impact mitigation remedies, and identification of impacted 3rd parties)**.

Network Impacts for Category B (P1/P2) Events

2016 – 2019 SUMMER PEAK CASE:

- The powerflow results did not identify any transmission overloads or voltage issues on FPL's transmission system that are attributable to the TSRs which could not be mitigated with operational procedures (see Appendix I).
- The powerflow results did not identify any CVB impacts that are attributable to the TSRs which could not be mitigated with operational procedures (see Appendix I).
- No third party impacts.

2015 – 2017 & 2019 WINTER PEAK CASE:

- The powerflow results did not identify any transmission overloads or voltage issues on FPL's transmission system that are attributable to the TSRs which could not be mitigated with operational procedures (see Appendix I).
- The powerflow results did not identify any CVB impacts that are attributable to the TSRs which could not be mitigated with operational procedures (see Appendix I).
- No third party impacts.

Multiple Contingency Analysis Results

Contingency Selection Criteria

For selected multiple contingency events (Categories C2, C3 and C5, or P4-P7), paired transmission facilities rated 100kV and above were removed from service for the study cases. Contingency pairs resulting in branch loadings exceeding thermal ratings and/or voltage screening criteria, and that were attributable to the TSRs were reported. Category C2, C3 and C5 contingencies (P4 through P7 events) are selected and screened in the reference and study cases as follows:

Category C2 (P4/P5, breaker or relay failure) Analysis: Applicable FRCC transmission station breaker failure scenarios were modeled by identifying the contingencies resulting from breaker failure at each FRCC transmission station (100kV and above). Any contingency events exceeding the applicable System Operating Limit (thermal and/or voltage) were reported.

Category C3 (P6, two overlapping single events) Analysis: All possible line combinations of two lines rated 69kV and above being out of service were evaluated sequentially within FPL's East zone, CVB area and Fort Pierce Utility Authority area. Results showing line loadings exceeding the applicable Emergency System Operating Limit were identified as candidates for further evaluation. These candidate double contingencies that exceeded thermal and/or voltage screening criteria were modeled individually with the necessary operational mitigation measures applied prior to the subsequent contingency, to ensure that facilities remain within applicable Emergency System Operating Limits. If adequate operational mitigation measures could not be developed, the double contingency was reported.

Category C5 (P7, common structure) Analysis: Event(s) resulting in the loss of two or more circuits of a multiple circuit tower line (greater than one mile in length and rated 100kV and above) were modeled. Contingency events exceeding the applicable System Operating Limit (thermal and/or voltage) were reported.

Network Impacts for Category C2 (P4/P5) Events

2016 – 2019 SUMMER PEAK CASE:

- The powerflow results did not identify any transmission overloads or voltage issues on FPL's transmission system that are attributable to the TSRs which could not be mitigated with operational procedures (see Appendix I).

- The powerflow results did not identify any CVB impacts that are attributable to the TSRs which could not be mitigated with operational procedures (see Appendix I).
- No third party impacts.

2015 – 2017 & 2019 WINTER PEAK CASE:

- The powerflow results did not identify any transmission overloads or voltage issues on FPL's transmission system that are attributable to the TSRs which could not be mitigated with operational procedures (see Appendix I).
- The powerflow results did not identify any CVB impacts that are attributable to the TSRs which could not be mitigated with operational procedures (see Appendix I).
- **The powerflow results identified a third party impact that is attributable to the TSRs. The transmission owning entity needs to be contacted regarding the proposed solution.** (see Appendix I).

Network Impacts for Category C3 (P6) Events

2016 – 2019 SUMMER PEAK CASE:

- The powerflow results did not identify any transmission overloads or voltage issues on FPL's transmission system that are attributable to the TSRs which could not be mitigated with operational procedures (see Appendix I).
- The powerflow results did not identify any CVB impacts that are attributable to the TSRs which could not be mitigated with operational procedures (see Appendix I).
- No third party impacts.

2015 – 2017 & 2019 WINTER PEAK CASE:

- The powerflow results did not identify any transmission overloads or voltage issues on FPL's transmission system that are attributable to the TSRs which could not be mitigated with operational procedures (see Appendix I).
- The powerflow results did not identify any CVB impacts that are attributable to the TSRs which could not be mitigated with operational procedures (see Appendix I).
- No third party impacts.

Network Impacts for Category C5 (P7) Events

2016 – 2019 SUMMER PEAK CASE:

- The powerflow results did not identify any transmission overloads or voltage issues on FPL's transmission system that are attributable to the TSRs.
- The powerflow results did not identify any CVB impacts that are attributable to the TSRs (see Appendix I).
- No third party impacts.

2015 – 2017 & 2019 WINTER PEAK CASE:

- The powerflow results did not identify any transmission overloads or voltage issues on FPL's transmission system that are attributable to the TSRs.
- **The powerflow results identified a third party impact that is attributable to the TSRs. The transmission owning entity needs to be contacted regarding the proposed solution.** (see Appendix I).

Conclusions:

Based on the current status of FPL's GIS queue and transmission service requests the following are the results of this part of the evaluation:

- The request to displace CVB internal generation resources with OUC resources will not require upgrading of the existing transmission facilities, or construction of new transmission facilities on the FPL transmission system.
- The request to modify its Network Resources and Undesignate (retire) its remaining generating units #1, #2 and #5 will not require upgrading of the existing transmission facilities, or construction of new transmission facilities on the FPL transmission system.
- There are third party impacts identified which need to be resolved. The third party may have existing mitigation plans and/or procedures, which could address the impacts, depending on the level of overload on the facility.

Appendix I

Steady-State Loadflow Study Results

Category B – Single Contingency Scenarios
Category C2 – Breaker Failure Scenarios
Category C5 – Double Circuit Tower Outage

Summer Cases

Thermal

B, C2 & C5 contingencies					2016 Summer Cases				2017 Summer Cases				2018 Summer Cases				2019 Summer Cases				
					Reference		Study		Reference		Study		Reference		Study		Reference		Study		
Cont Name	Monitored Facility	NERC Category	Areas	Rating B (MVA)	Rate B	Rate C	Rate B	Rate C	Rate B	Rate C	Rate B	Rate C	Rate B	Rate C	Rate B	Rate C	Rate B	Rate C	Rate B	Rate C	Remedy/Comments
122 EMERSON 138 449 OSLO 138 1	9382 VER-SOUT 138 9403 VB SUB8 69.0 1	B	17	187.6					99.77	77.99	102.92	80.45	101.15	79.07	104.37	81.66	103.77	81.12	107.69	84.15	switching mitigation: '122 EMERSON 138 449 OSLO 138 1-SW' contingency
122 EMERSON 138 449 OSLO 138 1	122 EMERSON 138 9383 FV-CTYLN 138 1	B	1/17	215					91.44	83.66	94.43	86.4	96.78	88.54	100.06	91.54	98.54	90.16	102.3	93.59	switching mitigation: '122 EMERSON 138 449 OSLO 138 1-SW' contingency
449 OSLO 138 1341 EMERBYPASS 138 1	9382 VER-SOUT 138 9403 VB SUB8 69.0 1	B	17	187.6	99.29	77.61	102.06	79.78													switching mitigation: '122 EMERSON 138 449 OSLO 138 1-SW' contingency
FPL-EMER-0122-077	9382 VER-SOUT 138 9403 VB SUB8 69.0 1	C2	17	187.6	96.68	75.57	99.45	77.73	98.22	76.78	101.45	79.3	101.02	78.97	104.38	81.59	103.59	80.97	107.32	84.05	no rate B overload with breaker to breaker tripping
FPL-EMER-0122-077	122 EMERSON 138 9383 FV-CTYLN 138 1	C2	1/17	215	80.62	73.76	83.04	75.97	84.44	77.25	87.3	79.87	95.91	87.75	99.13	90.69	97.4	89.11	101.07	92.47	no rate B overload with breaker to breaker tripping
FPL-EMER-0122-070	9382 VER-SOUT 138 9403 VB SUB8 69.0 1	C2	17	187.6	96.68	75.57	99.45	77.73	97.88	76.51	100.51	78.56	98.41	76.92	101.09	79.02	100.98	78.93	104.36	81.44	no rate B overload with breaker to breaker tripping

Voltage

B, C2 & C5 contingencies								2016 Summer Cases		2017 Summer Cases		2018 Summer Cases		2019 Summer Cases		
Cont Name	Bus Name	NERC Category	Area	Bus #	Base kV	Min Volt Limit	Max Volt Limit	Reference	Study	Reference	Study	Reference	Study	Reference	Study	Remedy/Comments
434 BREVARD 138 765 YORKE 138 1	YORKE	B	1	765	138	0.95	1.07	0.9527	0.9519	0.9537	0.9528	0.9557	0.9551	0.9501	0.9495	adjust TX taps at Malabar to raise 138kV voltage
FPL-EMER-0122-050	VB SUB6	C2	17	9398	69	0.95	1.05			1.0472	1.0526	1.0483	1.0488	1.0436	1.0508	adjust TX taps at West to lower 69kV voltage
FPL-EMER-0122-050	VB SUB8	C2	17	9403	69	0.95	1.05			1.0493	1.0545	1.0506	1.0521	1.0464	1.0545	adjust TX taps at West to lower 69kV voltage
FPL-EMER-0122-050	VB SUB3	C2	17	9405	69	0.95	1.05			1.0495	1.055	1.0505	1.0508	1.0458	1.0529	adjust TX taps at West to lower 69kV voltage
FPL-EMER-0122-050	VB SUB7	C2	17	9397	69	0.95	1.05			1.0506	1.0562	1.0517	1.052	1.0469	1.054	adjust TX taps at West to lower 69kV voltage

Winter Cases

Thermal

B, C2 & C5 contingencies					2015 Winter Cases				2016 Winter Cases				2017 Winter Cases				2019 Winter Cases				
					Reference		Study		Reference		Study		Reference		Study		Reference		Study		
Cont Name	Monitored Facility	NERC Category	Areas	Rating (MVA)	Rate B	Rate C	Rate B	Rate C	Rate B	Rate C	Rate B	Rate C	Rate B	Rate C	Rate B	Rate C	Rate B	Rate C	Rate B	Rate C	Remedy/Comments
449 OSLO 138 614 ROSEDALE 138 1	9382 VER-SOUT 138 9403 VB SUB8 69.0 1	B	17	187.6	88.36	60.28	92.85	63.34	84.94	57.95	93.24	63.61	90.05	61.43	94.91	64.75	96.45	65.8	102.34	69.81	switching mitigation: '449 OSLO 138 614 ROSEDALE 138 1-SW' contingency
469 SANFORDI 230 1126 MAGNOLIA 230 1	494 TULSA 230 1136 LNG 230 1	B	1	402					93.27	71.69	93.54	71.9	93.31	71.72	93.49	71.86	99.94	76.82	100.12	76.95	adjust TX taps at Barna to raise 230kV voltage
122 EMERSON 138 449 OSLO 138 1	9382 VER-SOUT 138 9403 VB SUB8 69.0 1	B	17	187.6					99.75	68.04	107.15	73.1	103.3	70.47	107.73	73.36	111.86	76.31	117.14	79.94	switching mitigation: '122 EMERSON 138 449 OSLO 138 1-SW' contingency
P7-OUC-05	2581 ECON 230 2586 RIO PINAR 230 1	C5	2	568	99.97	89.42	100.11	89.55	90.33	80.8	90.56	81									15wr: adjust TX taps at Rio Pinar to raise 69kV voltage (need to coordinate with transmission owner)
449 OSLO 138 1341 EMERBYPASS 138 1	9382 VER-SOUT 138 9403 VB SUB8 69.0 1	B	17	187.6	103.85	70.84	107.72	73.49													switching mitigation: '449 OSLO 1341 EMERBYPASS 138 1-SW' contingency
FPL-EMER-0122-077	9382 VER-SOUT 138 9403 VB SUB8 69.0 1	C2	17	187.6	100.87	68.81	104.73	71.45	97.97	66.83	105.39	71.89	102.99	70.26	107.22	73.15	111.42	76.01	116.77	79.66	no rate B overload with breaker to breaker tripping
FPL-EMER-0122-070	9382 VER-SOUT 138 9403 VB SUB8 69.0 1	C2	17	187.6	100.87	68.81	104.73	71.45	97.94	66.81	104.75	71.46	100.39	68.48	104.04	70.97	109.09	74.42	113.73	77.58	no rate B overload with breaker to breaker tripping
FPL-BARN-0694-037	2581 ECON 230 2586 RIO PINAR 230 1	C2	2	568	99.99	89.44	100.14	89.57	90.15	80.63	90.39	80.85									15wr: adjust TX taps at Rio Pinar to raise 69kV voltage (need to coordinate with transmission owner)
FPL-CAPE-0382-141	494 TULSA 230 693 BARNA 230 1	C2	1	402	90.74	69.75	90.93	69.89	91.04	69.98	91.33	70.2	90.24	69.36	90.44	69.52	99.89	76.78	100.09	76.93	adjust TX taps at Barna to raise 230kV voltage
FPL-CAPE-0382-165	494 TULSA 230 693 BARNA 230 1	C2	1	402	90.74	69.75	90.93	69.89	91.04	69.98	91.33	70.2	90.24	69.36	90.44	69.52	99.89	76.78	100.09	76.93	adjust TX taps at Barna to raise 230kV voltage
FPL-VOLU-0474-066	461 CAPE K 230 1136 LNG 230 1	C2	1	402					93.13	71.58	93.39	71.79	92.92	71.42	93.1	71.56	99.87	76.76	100.04	76.9	adjust TX taps at Barna to raise 230kV voltage
FPL-SN P-0469-189	461 CAPE K 230 1136 LNG 230 1	C2	1	402					90.24	69.37	90.51	69.57	89.83	69.05	90.01	69.18	99.92	76.8	100.1	76.94	adjust TX taps at Barna to raise 230kV voltage

Voltage

B, C2 & C5 contingencies								2015 Winter Cases		2016 Winter Cases		2017 Winter Cases		2019 Winter Cases		
Cont Name	Bus Name	NERC Category	Area	Bus #	Base kV	Min Volt Limit	Max Volt Limit	Reference	Study	Reference	Study	Reference	Study	Reference	Study	Remedy/Comments
FPL-COCO-0437-050	BANANA R	C2	1	433	138	0.95	1.07	0.9625	0.9617	0.9507	0.9497	0.9593	0.9587	0.9599	0.9594	adjust TX taps at Malabar to raise 138kV voltage
FPL-EMER-0122-050	VB SUB6	C2	17	9398	69	0.95	1.05			1.0455	1.0485	1.0411	1.045	1.0477	1.0525	adjust TX taps at West to lower 69kV voltage
FPL-EMER-0122-050	VB SUB8	C2	17	9403	69	0.95	1.05			1.0494	1.0521	1.0441	1.0477	1.0505	1.0549	adjust TX taps at West to lower 69kV voltage
FPL-EMER-0122-050	VB SUB3	C2	17	9405	69	0.95	1.05			1.0473	1.0507	1.0433	1.0475	1.0502	1.0553	adjust TX taps at West to lower 69kV voltage
FPL-EMER-0122-050	VB SUB7	C2	17	9397	69	0.95	1.05			1.0484	1.0519	1.0445	1.0488	1.0515	1.0566	adjust TX taps at West to lower 69kV voltage
382 CAPE K 115 591 CITY PT2 115 1	CITY POINT	B	1	589	115	0.95	1.07	0.9785	0.978	0.9505	0.9499	0.9659	0.9656	0.9665	0.9662	adjust TX taps at Malabar to raise 138kV voltage
382 CAPE K 115 591 CITY PT2 115 1	CITY PT2	B	1	591	115	0.95	1.07	0.9785	0.978	0.9505	0.9499	0.9659	0.9656	0.9665	0.9662	adjust TX taps at Malabar to raise 138kV voltage

Category C3 – Double Contingencies Combinations in FPL's East Zone, CVB & FTP

Summer Cases

Thermal

C3 contingencies					2016 Summer Cases		2017 Summer Cases		2018 Summer Cases		2019 Summer Cases		
					Reference	Study	Reference	Study	Reference	Study	Reference	Study	
First Level Scenario	Cont Name	Monitored Facility	Areas	Rating (MVA)	Rate C	Rate C	Rate C	Rate C	Rate C	Rate C	Rate C	Rate C	Remedy/Comments
1005 FELESMR 230 1744 SPANLKS 230 1	122 EMERSON 138 449 OSLO 138 1	122 EMERSON 138 9383 FV-CTYLN 138 1	1/17	235			98.67	101.46	102.57	105.75	105.67	109.31	no rate C overload with 2nd Cont. breaker to breaker tripping
1005 FELESMR 230 1744 SPANLKS 230 1	122 EMERSON 138 449 OSLO 138 1	9382 VER-SOUT 138 9383 FV-CTYLN 138 1	17	235			92.23	95.4	93.4	96.94	96.81	100.98	no rate C overload with 2nd Cont. breaker to breaker tripping
1005 FELESMR 230 1744 SPANLKS 230 1	449 OSLO 138 1341 EMERBYPASS 138 1	122 EMERSON 138 9383 FV-CTYLN 138 1	1/17	235	98.33	100.83							no rate C overload with 2nd Cont. breaker to breaker tripping
1005 FELESMR 230 1744 SPANLKS 230 1	9382 VER-SOUT 138 9383 FV-CTYLN 138 1	614 ROSEDALE 138 9381 WEST-FMP 138 1	1/17	262	91.28	94.39	90.81	94.18	94.25	98.04	99.77	103.88	Open Gifford-West after 1st contingency
122 EMERSON 138 123 EMERSON 230 1	229 HARTMAN 138 441 F PIERCE 138 1	4011 HARTMAN 69.0 4014 LAWNWOOD 69.0 1	3	96	148.77	152.98							Open Gifford-West and FV-Ctyln-FTP-GA C after 1st contingency
122 EMERSON 138 123 EMERSON 230 1	229 HARTMAN 138 441 F PIERCE 138 1	4014 LAWNWOOD 69.0 4015 GARDEN C 69.0 1	3	96	125.88	129.44							
122 EMERSON 138 123 EMERSON 230 1	441 F PIERCE 138 691 INDRIO 138 1	4011 HARTMAN 69.0 4014 LAWNWOOD 69.0 1	3	96	143.02	146.78							
122 EMERSON 138 123 EMERSON 230 1	441 F PIERCE 138 691 INDRIO 138 1	4014 LAWNWOOD 69.0 4015 GARDEN C 69.0 1	3	96	120.42	123.55							
122 EMERSON 138 123 EMERSON 230 1	691 INDRIO 138 1341 EMERBYPASS 138 1	4011 HARTMAN 69.0 4014 LAWNWOOD 69.0 1	3	96	132.35	135.42							
122 EMERSON 138 449 OSLO 138 1	1005 FELESMR 230 1744 SPANLKS 230 1	122 EMERSON 138 9383 FV-CTYLN 138 1	1/17	235			98.67	101.46	102.57	105.75	105.67	109.31	switching mitigation: '122 EMERSON 138 449 OSLO 138 1-SW' contingency + open breaker 189 @ Barefoot
122 EMERSON 138 449 OSLO 138 1	1005 FELESMR 230 1744 SPANLKS 230 1	9382 VER-SOUT 138 9383 FV-CTYLN 138 1	17	235			92.23	95.4	93.4	96.94	96.81	100.98	
122 EMERSON 138 449 OSLO 138 1	122 EMERSON 138 9383 FV-CTYLN 138 1	4011 HARTMAN 69.0 4014 LAWNWOOD 69.0 1	3	96			124.22	127.97	122.77	126.73	125.55	130.1	
122 EMERSON 138 449 OSLO 138 1	122 EMERSON 138 9383 FV-CTYLN 138 1	4014 LAWNWOOD 69.0 4015 GARDEN C 69.0 1	3	96			101.54	104.78	99.82	103.28	102.41	106.35	
122 EMERSON 138 449 OSLO 138 1	123 EMERSON 230 1005 FELESMR 230 1	9382 VER-SOUT 138 9403 VB SUB8 69.0 1	17	240			93.19	95.47	94.09	96.49	97.61	100.49	
122 EMERSON 138 449 OSLO 138 1	123 EMERSON 230 1005 FELESMR 230 1	122 EMERSON 138 9383 FV-CTYLN 138 1	1/17	235			100.5	103.31	104.12	107.34	107.26	110.94	
122 EMERSON 138 449 OSLO 138 1	123 EMERSON 230 1005 FELESMR 230 1	9382 VER-SOUT 138 9383 FV-CTYLN 138 1	17	235			93.92	97.12	94.96	98.53	98.41	102.63	
122 EMERSON 138 449 OSLO 138 1	1507 BAREFOOT 230 1744 SPANLKS 230 1	122 EMERSON 138 9383 FV-CTYLN 138 1	1/17	235			98.26	101.04	102.23	105.41	105.33	108.97	
122 EMERSON 138 449 OSLO 138 1	1507 BAREFOOT 230 1744 SPANLKS 230 1	9382 VER-SOUT 138 9383 FV-CTYLN 138 1	17	235			91.85	95.02	93.07	96.61	96.48	100.64	
122 EMERSON 138 449 OSLO 138 1	1508 BAREFOOT 138 1507 BAREFOOT 230 1	9382 VER-SOUT 138 9403 VB SUB8 69.0 1	17	240			99.21	101.56	101	103.85	102.96	106.73	
122 EMERSON 138 449 OSLO 138 1	1508 BAREFOOT 138 1507 BAREFOOT 230 1	122 EMERSON 138 9383 FV-CTYLN 138 1	1/17	235			104.87	108.64	110.24	114.49	112.06	116.75	
122 EMERSON 138 449 OSLO 138 1	1508 BAREFOOT 138 1507 BAREFOOT 230 1	9382 VER-SOUT 138 9383 FV-CTYLN 138 1	17	235			101.72	106.03	103.53	108.29	105.69	111.13	
122 EMERSON 138 449 OSLO 138 1	1734 GIFFORD 138 9381 WEST-FMP 138 1	9382 VER-SOUT 138 9403 VB SUB8 69.0 1	17	240			99.96	104.07	100.27	105.1	96.77	105.56	
122 EMERSON 138 449 OSLO 138 1	1734 GIFFORD 138 9381 WEST-FMP 138 1	122 EMERSON 138 9383 FV-CTYLN 138 1	1/17	235			102.48	107.22	106.76	111.88	106.91	111.81	
122 EMERSON 138 449 OSLO 138 1	1734 GIFFORD 138 9381 WEST-FMP 138 1	9382 VER-SOUT 138 9383 FV-CTYLN 138 1	17	235			99.8	105.13	99.93	105.72	100.28	105.72	
122 EMERSON 138 449 OSLO 138 1	446 MALABAR 138 450 PALM BAY 138 1	122 EMERSON 138 9383 FV-CTYLN 138 1	1/17	235				93.86	95.57	98.91	96.77	100.56	
122 EMERSON 138 449 OSLO 138 1	457 WABASSO 138 481 SEBSTIAN 138 1	9382 VER-SOUT 138 9403 VB SUB8 69.0 1	17	240			118.98	125.83	120.17	127.36	120.19	127.65	
122 EMERSON 138 449 OSLO 138 1	457 WABASSO 138 481 SEBSTIAN 138 1	122 EMERSON 138 9383 FV-CTYLN 138 1	1/17	235			124.58	134.02	129.27	138.66	128.93	138.09	
122 EMERSON 138 449 OSLO 138 1	457 WABASSO 138 481 SEBSTIAN 138 1	9382 VER-SOUT 138 9383 FV-CTYLN 138 1	17	235			124.73	135.69	125.41	136.15	125.12	135.83	
122 EMERSON 138 449 OSLO 138 1	457 WABASSO 138 481 SEBSTIAN 138 1	9397 VB SUB7 69.0 9403 VB SUB8 69.0 1	17	92			117.42	124.16	118.59	124.98	119.19	124.57	
122 EMERSON 138 449 OSLO 138 1	457 WABASSO 138 481 SEBSTIAN 138 1	9402 VBSUB11 69.0 9403 VB SUB8 69.0 1	17	78			94.91	104.24	95.28	104.39	95.69	104.18	
122 EMERSON 138 449 OSLO 138 1	457 WABASSO 138 481 SEBSTIAN 138 1	9403 VB SUB8 69.0 9404 VB SUB1 69.0 1	17	92			93.11	104.51	93.34	104.78	93.47	104.53	
122 EMERSON 138 449 OSLO 138 1	457 WABASSO 138 1734 GIFFORD 138 1	9382 VER-SOUT 138 9403 VB SUB8 69.0 1	17	240			105.03	108.72	105.79	110.15	105.91	110.61	
122 EMERSON 138 449 OSLO 138 1	457 WABASSO 138 1734 GIFFORD 138 1	122 EMERSON 138 9383 FV-CTYLN 138 1	1/17	235			107.81	113.05	112.51	118.1	112.14	117.92	
122 EMERSON 138 449 OSLO 138 1	457 WABASSO 138 1734 GIFFORD 138 1	9382 VER-SOUT 138 9383 FV-CTYLN 138 1	17	235			105.78	111.68	106.38	112.67	106.07	112.62	
122 EMERSON 138 449 OSLO 138 1	476 POINSETT 500 467 POINSETT 230 1	122 EMERSON 138 9383 FV-CTYLN 138 1	1/17	235					92.14	95.13	98.18	101.65	
122 EMERSON 138 449 OSLO 138 1	476 POINSETT 500 1140 OKECHOBEC 500 1	122 EMERSON 138 9383 FV-CTYLN 138 1	1/17	235							96.75	100.21	
122 EMERSON 138 449 OSLO 138 1	481 SEBSTIAN 138 1508 BAREFOOT 138 1	9382 VER-SOUT 138 9403 VB SUB8 69.0 1	17	240			145.29	148.09	148.56	153	148.9	154.17	
122 EMERSON 138 449 OSLO 138 1	481 SEBSTIAN 138 1508 BAREFOOT 138 1	122 EMERSON 138 9383 FV-CTYLN 138 1	1/17	235			158.7	163.44	164.09	170.85	163.98	171.08	
122 EMERSON 138 449 OSLO 138 1	481 SEBSTIAN 138 1508 BAREFOOT 138 1	9382 VER-SOUT 138 9383 FV-CTYLN 138 1	17	235			164.4	170.15	166.23	173.89	166.23	174.72	
122 EMERSON 138 449 OSLO 138 1	481 SEBSTIAN 138 1508 BAREFOOT 138 1	9402 VBSUB11 69.0 9403 VB SUB8 69.0 1	17	78			123.65	129.11	124.56	131.55	125.41	132.2	
122 EMERSON 138 449 OSLO 138 1	481 SEBSTIAN 138 1508 BAREFOOT 138 1	9403 VB SUB8 69.0 9404 VB SUB1 69.0 1	17	92			122.68	131.12	123.67	134	124.19	134.67	
122 EMERSON 138 449 OSLO 138 1	481 SEBSTIAN 138 1508 BAREFOOT 138 1	9401 VB SUB10 69.0 9402 VBSUB11 69.0 1	17	78			101.01	105.75	101.98	108.17	102.54	108.74	
122 EMERSON 138 449 OSLO 138 1	9382 VER-SOUT 138 9383 FV-CTYLN 138 1	1508 BAREFOOT 138 1507 BAREFOOT 230 1	1	291			104.04	109.18	106.94	112.65	108.96	115.03	
122 EMERSON 138 449 OSLO 138 1	9382 VER-SOUT 138 9383 FV-CTYLN 138 1	1734 GIFFORD 138 9381 WEST-FMP 138 1	1/17	262			92.66	99.99	93.02	101.01	93.25	102.03	
122 EMERSON 138 449 OSLO 138 1	9382 VER-SOUT 138 9383 FV-CTYLN 138 1	457 WABASSO 138 481 SEBSTIAN 138 1	1	313			92.57	100.59	93.43	102.14	93.84	103.23	
122 EMERSON 138 9383 FV-CTYLN 138 1	122 EMERSON 138 449 OSLO 138 1	4011 HARTMAN 69.0 4014 LAWNWOOD 69.0 1	3	96			124.22	127.97	122.77	126.73	125.55	130.1	After 1st contingency, open Sub9-10 and split Sub 7 bus so that Subs 3,6 & 9 are feed from one transformer. Will also need to open West-Gifford and FV-Ctyln-FTP-GA C.
122 EMERSON 138 9383 FV-CTYLN 138 1	122 EMERSON 138 449 OSLO 138 1	4014 LAWNWOOD 69.0 4015 GARDEN C 69.0 1	3	96			101.54	104.78	99.82	103.28	102.41	106.35	
122 EMERSON 138 9383 FV-CTYLN 138 1	449 OSLO 138 614 ROSEDALE 138 1	4011 HARTMAN 69.0 4014 LAWNWOOD 69.0 1	3	96	114.27	118.5	113.82	118.34	112.51	117.37	115.37	120.84	
122 EMERSON 138 9383 FV-CTYLN 138 1	449 OSLO 138 1341 EMERBYPASS 138 1	4011 HARTMAN 69.0 4014 LAWNWOOD 69.0 1	3	96	124.52	127.97							
122 EMERSON 138 9383 FV-CTYLN 138 1	614 ROSEDALE 138 9381 WEST-FMP 138 1	4011 HARTMAN 69.0 4014 LAWNWOOD 69.0 1	3	96	109.34	113.26	108.93	113.1	107.52	112.04	110.39	115.48	

C3 contingencies					2016 Summer Cases		2017 Summer Cases		2018 Summer Cases		2019 Summer Cases		
					Reference	Study	Reference	Study	Reference	Study	Reference	Study	
First Level Scenario	Cont Name	Monitored Facility	Areas	Rating (MVA)	Rate C	Rate C	Rate C	Rate C	Rate C	Rate C	Rate C	Rate C	Remedy/Comments
123 EMERSON 230 1005 FELESMR 230 1	122 EMERSON 138 449 OSLO 138 1	9382 VER-SOUT 138 9403 VB SUB8 69.0 1	17	240			93.19	95.47	94.09	96.49	97.61	100.49	no rate C overload with 2nd Cont. breaker to
123 EMERSON 230 1005 FELESMR 230 1	122 EMERSON 138 449 OSLO 138 1	122 EMERSON 138 9383 FV-CTYLN 138 1	1/17	235			100.5	103.31	104.12	107.34	107.26	110.94	no rate C overload with 2nd Cont. breaker to
123 EMERSON 230 1005 FELESMR 230 1	122 EMERSON 138 449 OSLO 138 1	9382 VER-SOUT 138 9383 FV-CTYLN 138 1	17	235			93.92	97.12	94.96	98.53	98.41	102.63	no rate C overload with 2nd Cont. breaker to
123 EMERSON 230 1005 FELESMR 230 1	9382 VER-SOUT 138 9383 FV-CTYLN 138 1	614 ROSEDALE 138 9381 WEST-FMP 138 1	1/17	262	93.59	96.74	93.23	96.64	96.49	100.31	102.07	106.22	Open Gifford-West after 1st contingency
1507 BAREFOOT 230 1744 SPANLKS 230 1	122 EMERSON 138 449 OSLO 138 1	122 EMERSON 138 9383 FV-CTYLN 138 1	1/17	235			98.26	101.04	102.23	105.41	105.33	108.97	no rate C overload with 2nd Cont. breaker to
1507 BAREFOOT 230 1744 SPANLKS 230 1	122 EMERSON 138 449 OSLO 138 1	9382 VER-SOUT 138 9383 FV-CTYLN 138 1	17	235			91.85	95.02	93.07	96.6	96.48	100.64	no rate C overload with 2nd Cont. breaker to
1507 BAREFOOT 230 1744 SPANLKS 230 1	449 OSLO 138 1341 EMERBYPASS 138 1	122 EMERSON 138 9383 FV-CTYLN 138 1	1/17	235	97.95	100.44							no rate C overload with 2nd Cont. breaker to
1507 BAREFOOT 230 1744 SPANLKS 230 1	9382 VER-SOUT 138 9383 FV-CTYLN 138 1	614 ROSEDALE 138 9381 WEST-FMP 138 1	1/17	262	90.77	93.88	90.27	93.65	93.78	97.57	99.29	103.4	Open Gifford-West after 1st contingency
1508 BAREFOOT 138 1507 BAREFOOT 230 1	122 EMERSON 138 449 OSLO 138 1	9382 VER-SOUT 138 9403 VB SUB8 69.0 1	17	240			99.22	101.56	101	103.85	102.96	106.73	no rate C overload with 2nd Cont. breaker to
1508 BAREFOOT 138 1507 BAREFOOT 230 1	122 EMERSON 138 449 OSLO 138 1	122 EMERSON 138 9383 FV-CTYLN 138 1	1/17	235			104.86	108.64	110.24	114.49	112.06	116.75	breaker tripping and adjusting tap at Vero-South TX
1508 BAREFOOT 138 1507 BAREFOOT 230 1	122 EMERSON 138 449 OSLO 138 1	9382 VER-SOUT 138 9383 FV-CTYLN 138 1	17	235			101.72	106.03	103.53	108.29	105.69	111.13	after 1st contingency to raise 138kV voltage
1508 BAREFOOT 138 1507 BAREFOOT 230 1	446 MALABAR 138 450 PALM BAY 138 1	614 ROSEDALE 138 9381 WEST-FMP 138 1	1/17	262	111.71	117.17	113.1	118.5	113.85	118.48	114.42	118.87	no rate C overload with 2nd Cont. breaker to breaker tripping
1508 BAREFOOT 138 1507 BAREFOOT 230 1	449 OSLO 138 614 ROSEDALE 138 1	122 EMERSON 138 9383 FV-CTYLN 138 1	1/17	235		94.69	91.94	96.46	97.19	102.42	99.15	104.59	no rate C overload with 2nd Cont. breaker to breaker tripping
1508 BAREFOOT 138 1507 BAREFOOT 230 1	449 OSLO 138 1341 EMERBYPASS 138 1	9382 VER-SOUT 138 9403 VB SUB8 69.0 1	17	240	98.72	100.87							
1508 BAREFOOT 138 1507 BAREFOOT 230 1	449 OSLO 138 1341 EMERBYPASS 138 1	122 EMERSON 138 9383 FV-CTYLN 138 1	1/17	235	103.38	106.8							no rate C overload with 2nd Cont. breaker to
1508 BAREFOOT 138 1507 BAREFOOT 230 1	449 OSLO 138 1341 EMERBYPASS 138 1	9382 VER-SOUT 138 9383 FV-CTYLN 138 1	17	235	101.48	105.48							breaker tripping
1508 BAREFOOT 138 1507 BAREFOOT 230 1	450 PALM BAY 138 573 BABCOCK 138 1	614 ROSEDALE 138 9381 WEST-FMP 138 1	1/17	262	94.53	98.91	96.05	100.53	97.32	101.29	97.69	101.57	no rate C overload with 2nd Cont. breaker to breaker tripping
1508 BAREFOOT 138 1507 BAREFOOT 230 1	9382 VER-SOUT 138 9383 FV-CTYLN 138 1	614 ROSEDALE 138 9381 WEST-FMP 138 1	1/17	262	94.21	98.68	95.09	99.78	98.09	103.15	101.39	106.83	open Wabasso-Gifford after 1st contingency and adjust TX taps at Malabar to raise 138kV voltage
1734 GIFFORD 138 9381 WEST-FMP 138 1	122 EMERSON 138 449 OSLO 138 1	9382 VER-SOUT 138 9403 VB SUB8 69.0 1	17	240			99.96	104.06	100.26	105.1	96.77	105.56	
1734 GIFFORD 138 9381 WEST-FMP 138 1	122 EMERSON 138 449 OSLO 138 1	122 EMERSON 138 9383 FV-CTYLN 138 1	1/17	235			102.48	107.22	106.76	111.88	106.91	111.81	
1734 GIFFORD 138 9381 WEST-FMP 138 1	122 EMERSON 138 449 OSLO 138 1	9382 VER-SOUT 138 9383 FV-CTYLN 138 1	17	235			99.8	105.13	99.93	105.72	100.28	105.72	no rate C overload with 2nd Cont. breaker to
1734 GIFFORD 138 9381 WEST-FMP 138 1	449 OSLO 138 1341 EMERBYPASS 138 1	9382 VER-SOUT 138 9403 VB SUB8 69.0 1	17	240	95.9	103.63							breaker tripping
1734 GIFFORD 138 9381 WEST-FMP 138 1	449 OSLO 138 1341 EMERBYPASS 138 1	122 EMERSON 138 9383 FV-CTYLN 138 1	1/17	235	101.77	105.2							
1734 GIFFORD 138 9381 WEST-FMP 138 1	449 OSLO 138 1341 EMERBYPASS 138 1	9382 VER-SOUT 138 9383 FV-CTYLN 138 1	17	235	100.2	104.21							
229 HARTMAN 138 441 F PIERCE 138 1	122 EMERSON 138 123 EMERSON 230 1	4011 HARTMAN 69.0 4014 LAWNWOOD 69.0 1	3	96	148.78	152.99							open Hartman-Ft. Pierce Tap and close Ft. Pierce
229 HARTMAN 138 441 F PIERCE 138 1	122 EMERSON 138 123 EMERSON 230 1	4014 LAWNWOOD 69.0 4015 GARDEN C 69.0 1	3	96	125.88	129.45							Tap0Ft. Pierce
441 F PIERCE 138 691 INDRIO 138 1	122 EMERSON 138 123 EMERSON 230 1	4011 HARTMAN 69.0 4014 LAWNWOOD 69.0 1	3	96	143.02	146.78							After 1st contingency, open Sub9-10 and split Sub 7
441 F PIERCE 138 691 INDRIO 138 1	122 EMERSON 138 123 EMERSON 230 1	4014 LAWNWOOD 69.0 4015 GARDEN C 69.0 1	3	96	120.42	123.55							bus so that Subs 3,6 & 9 are feed from one transformer. Will also need to open West-Gifford, Emersonbypass-FV-Ctyln and FV-Ctyln-FTP-GA C.
446 MALABAR 138 450 PALM BAY 138 1	122 EMERSON 138 449 OSLO 138 1	122 EMERSON 138 9383 FV-CTYLN 138 1	1/17	235				93.85	95.56	98.91	96.77	100.56	no rate C overload with 2nd Cont. breaker to breaker tripping
446 MALABAR 138 450 PALM BAY 138 1	1508 BAREFOOT 138 1507 BAREFOOT 230 1	614 ROSEDALE 138 9381 WEST-FMP 138 1	1/17	262	111.71	117.17	113.1	118.5	113.85	118.48	114.42	118.87	open breaker 189 @ Barefoot after 1st contingency
449 OSLO 138 614 ROSEDALE 138 1	122 EMERSON 138 9383 FV-CTYLN 138 1	4011 HARTMAN 69.0 4014 LAWNWOOD 69.0 1	3	96	114.27	118.5	113.82	118.34	112.51	117.37	115.37	120.84	
449 OSLO 138 614 ROSEDALE 138 1	1508 BAREFOOT 138 1507 BAREFOOT 230 1	122 EMERSON 138 9383 FV-CTYLN 138 1	1/17	235		94.69	91.94	96.46	97.19	102.42	99.15	104.59	
449 OSLO 138 614 ROSEDALE 138 1	457 WABASSO 138 481 SEBSTIAN 138 1	9382 VER-SOUT 138 9403 VB SUB8 69.0 1	17	240	96.41	104.37	97.32	105.8	98.31	107.25	98.51	107.69	
449 OSLO 138 614 ROSEDALE 138 1	457 WABASSO 138 481 SEBSTIAN 138 1	122 EMERSON 138 9383 FV-CTYLN 138 1	1/17	235	101.3	110.15	103.8	113.18	108.16	118.13	108.02	117.69	
449 OSLO 138 614 ROSEDALE 138 1	457 WABASSO 138 481 SEBSTIAN 138 1	9382 VER-SOUT 138 9383 FV-CTYLN 138 1	17	235	101.22	111.73	102.31	113.28	103.02	114.33	102.97	114.36	switching mitigation: '449 OSLO 138 614 ROSEDALE
449 OSLO 138 614 ROSEDALE 138 1	481 SEBSTIAN 138 1508 BAREFOOT 138 1	9382 VER-SOUT 138 9403 VB SUB8 69.0 1	17	240	122.38	127.74	122.93	128.83	125.02	131.99	125.41	132.92	138 1-SW' contingency + open breaker 189 @
449 OSLO 138 614 ROSEDALE 138 1	481 SEBSTIAN 138 1508 BAREFOOT 138 1	122 EMERSON 138 9383 FV-CTYLN 138 1	1/17	235	129.79	136.75	131.83	139.23	136.64	145.48	136.63	145.4	Barefoot
449 OSLO 138 614 ROSEDALE 138 1	481 SEBSTIAN 138 1508 BAREFOOT 138 1	9382 VER-SOUT 138 9383 FV-CTYLN 138 1	17	235	134.55	142.91	134.64	143.4	136.05	145.99	136.16	146.53	
449 OSLO 138 614 ROSEDALE 138 1	481 SEBSTIAN 138 1508 BAREFOOT 138 1	9402 VBSUB11 69.0 9403 VB SUB8 69.0 1	17	78	105.31	112.69	105.29	113.02	106.07	114.65	106.84	115.04	
449 OSLO 138 614 ROSEDALE 138 1	481 SEBSTIAN 138 1508 BAREFOOT 138 1	9403 VB SUB8 69.0 9404 VB SUB1 69.0 1	17	92	101.47	112.32	101.24	112.68	101.98	114.59	102.44	115	
449 OSLO 138 614 ROSEDALE 138 1	9382 VER-SOUT 138 9383 FV-CTYLN 138 1	1508 BAREFOOT 138 1507 BAREFOOT 230 1	1	291		100.94		100.24		103.43		105.8	

C3 contingencies					2016 Summer Cases		2017 Summer Cases		2018 Summer Cases		2019 Summer Cases		
					Reference	Study	Reference	Study	Reference	Study	Reference	Study	
First Level Scenario	Cont Name	Monitored Facility	Areas	Rating (MVA)	Rate C	Rate C	Rate C	Rate C	Rate C	Rate C	Rate C	Rate C	Remedy/Comments
449 OSLO 138 1341 EMERBYPASS 138 1	1005 FELESMR 230 1744 SPANLKS 230 1	122 EMERSON 138 9383 FV-CTYLN 138 1	1/17	235	98.33	100.83							
449 OSLO 138 1341 EMERBYPASS 138 1	122 EMERSON 138 9383 FV-CTYLN 138 1	4011 HARTMAN 69.0 4014 LAWNWOOD 69.0 1	3	96	124.52	127.97							
449 OSLO 138 1341 EMERBYPASS 138 1	1507 BAREFOOT 230 1744 SPANLKS 230 1	122 EMERSON 138 9383 FV-CTYLN 138 1	1/17	235	97.95	100.44							
449 OSLO 138 1341 EMERBYPASS 138 1	1508 BAREFOOT 138 1507 BAREFOOT 230 1	9382 VER-SOUT 138 9403 VB SUB8 69.0 1	17	240	98.72	100.87							
449 OSLO 138 1341 EMERBYPASS 138 1	1508 BAREFOOT 138 1507 BAREFOOT 230 1	122 EMERSON 138 9383 FV-CTYLN 138 1	1/17	235	103.38	106.8							
449 OSLO 138 1341 EMERBYPASS 138 1	1508 BAREFOOT 138 1507 BAREFOOT 230 1	9382 VER-SOUT 138 9383 FV-CTYLN 138 1	17	235	101.48	105.48							
449 OSLO 138 1341 EMERBYPASS 138 1	1734 GIFFORD 138 9381 WEST-FMP 138 1	9382 VER-SOUT 138 9403 VB SUB8 69.0 1	17	240	95.9	103.64							
449 OSLO 138 1341 EMERBYPASS 138 1	1734 GIFFORD 138 9381 WEST-FMP 138 1	122 EMERSON 138 9383 FV-CTYLN 138 1	1/17	235	101.78	105.2							
449 OSLO 138 1341 EMERBYPASS 138 1	1734 GIFFORD 138 9381 WEST-FMP 138 1	9382 VER-SOUT 138 9383 FV-CTYLN 138 1	17	235	100.2	104.2							
449 OSLO 138 1341 EMERBYPASS 138 1	457 WABASSO 138 481 SEBSTIAN 138 1	9382 VER-SOUT 138 9403 VB SUB8 69.0 1	17	240	118.17	123.94							
449 OSLO 138 1341 EMERBYPASS 138 1	457 WABASSO 138 481 SEBSTIAN 138 1	122 EMERSON 138 9383 FV-CTYLN 138 1	1/17	235	121.91	130.57							
449 OSLO 138 1341 EMERBYPASS 138 1	457 WABASSO 138 481 SEBSTIAN 138 1	9382 VER-SOUT 138 9383 FV-CTYLN 138 1	17	235	123.4	133.64							
449 OSLO 138 1341 EMERBYPASS 138 1	457 WABASSO 138 481 SEBSTIAN 138 1	9397 VB SUB7 69.0 9403 VB SUB8 69.0 1	17	92	115.76	122.07							
449 OSLO 138 1341 EMERBYPASS 138 1	457 WABASSO 138 481 SEBSTIAN 138 1	9402 VBSUB11 69.0 9403 VB SUB8 69.0 1	17	78	93.89	102.69							switching mitigation: '449 OSLO 1341 EMERBYPASS 138 1-SW' contingency + open breaker 189 @ Barefoot
449 OSLO 138 1341 EMERBYPASS 138 1	457 WABASSO 138 481 SEBSTIAN 138 1	9403 VB SUB8 69.0 9404 VB SUB1 69.0 1	17	92	92.36	102.87							
449 OSLO 138 1341 EMERBYPASS 138 1	457 WABASSO 138 1734 GIFFORD 138 1	9382 VER-SOUT 138 9403 VB SUB8 69.0 1	17	240	104.45	107.82							
449 OSLO 138 1341 EMERBYPASS 138 1	457 WABASSO 138 1734 GIFFORD 138 1	122 EMERSON 138 9383 FV-CTYLN 138 1	1/17	235	105.8	110.43							
449 OSLO 138 1341 EMERBYPASS 138 1	457 WABASSO 138 1734 GIFFORD 138 1	9382 VER-SOUT 138 9383 FV-CTYLN 138 1	17	235	104.88	110.19							
449 OSLO 138 1341 EMERBYPASS 138 1	481 SEBSTIAN 138 1508 BAREFOOT 138 1	122 EMERSON 138 9383 FV-CTYLN 138 1	1/17	235	156.47	160.09							
449 OSLO 138 1341 EMERBYPASS 138 1	481 SEBSTIAN 138 1508 BAREFOOT 138 1	9382 VER-SOUT 138 9383 FV-CTYLN 138 1	17	235	164.27	168.81							
449 OSLO 138 1341 EMERBYPASS 138 1	481 SEBSTIAN 138 1508 BAREFOOT 138 1	9402 VBSUB11 69.0 9403 VB SUB8 69.0 1	17	78	123.74	128.2							
449 OSLO 138 1341 EMERBYPASS 138 1	481 SEBSTIAN 138 1508 BAREFOOT 138 1	9403 VB SUB8 69.0 9404 VB SUB1 69.0 1	17	92	122.91	130.03							
449 OSLO 138 1341 EMERBYPASS 138 1	481 SEBSTIAN 138 1508 BAREFOOT 138 1	9401 VB SUB10 69.0 9402 VBSUB11 69.0 1	17	78	101.05	104.79							
449 OSLO 138 1341 EMERBYPASS 138 1	9382 VER-SOUT 138 9383 FV-CTYLN 138 1	1508 BAREFOOT 138 1507 BAREFOOT 230 1	1	291	104.73	109.53							
450 PALM BAY 138 573 BABCOCK 138 1	1508 BAREFOOT 138 1507 BAREFOOT 230 1	614 ROSEDALE 138 9381 WEST-FMP 138 1	1/17	262	94.53	98.92	96.05	100.53	97.32	101.29	97.7	101.57	adjust TX taps at West to raise 138kV voltage after 1st contingency
457 WABASSO 138 481 SEBSTIAN 138 1	122 EMERSON 138 449 OSLO 138 1	9382 VER-SOUT 138 9403 VB SUB8 69.0 1	17	240			118.98	125.84	120.17	127.37	120.18	127.66	
457 WABASSO 138 481 SEBSTIAN 138 1	122 EMERSON 138 449 OSLO 138 1	122 EMERSON 138 9383 FV-CTYLN 138 1	1/17	235			124.59	134.03	129.28	138.67	128.94	138.1	
457 WABASSO 138 481 SEBSTIAN 138 1	122 EMERSON 138 449 OSLO 138 1	9382 VER-SOUT 138 9383 FV-CTYLN 138 1	17	235			124.74	135.7	125.42	136.16	125.13	135.85	
457 WABASSO 138 481 SEBSTIAN 138 1	122 EMERSON 138 449 OSLO 138 1	9397 VB SUB7 69.0 9403 VB SUB8 69.0 1	17	92			117.43	124.17	118.6	124.99	119.2	124.59	
457 WABASSO 138 481 SEBSTIAN 138 1	122 EMERSON 138 449 OSLO 138 1	9402 VBSUB11 69.0 9403 VB SUB8 69.0 1	17	78			94.92	104.26	95.29	104.4	95.7	104.19	
457 WABASSO 138 481 SEBSTIAN 138 1	122 EMERSON 138 449 OSLO 138 1	9403 VB SUB8 69.0 9404 VB SUB1 69.0 1	17	92			93.12	104.52	93.35	104.79	93.48	104.54	
457 WABASSO 138 481 SEBSTIAN 138 1	449 OSLO 138 614 ROSEDALE 138 1	9382 VER-SOUT 138 9403 VB SUB8 69.0 1	17	240	96.41	104.37	97.32	105.8	98.31	107.25	98.51	107.69	
457 WABASSO 138 481 SEBSTIAN 138 1	449 OSLO 138 614 ROSEDALE 138 1	122 EMERSON 138 9383 FV-CTYLN 138 1	1/17	235	101.3	110.15	103.8	113.19	108.16	118.14	108.02	117.7	
457 WABASSO 138 481 SEBSTIAN 138 1	449 OSLO 138 614 ROSEDALE 138 1	9382 VER-SOUT 138 9383 FV-CTYLN 138 1	17	235	101.22	111.74	102.31	113.28	103.02	114.34	102.97	114.36	
457 WABASSO 138 481 SEBSTIAN 138 1	449 OSLO 138 1341 EMERBYPASS 138 1	9382 VER-SOUT 138 9403 VB SUB8 69.0 1	17	240	118.18	123.94							
457 WABASSO 138 481 SEBSTIAN 138 1	449 OSLO 138 1341 EMERBYPASS 138 1	122 EMERSON 138 9383 FV-CTYLN 138 1	1/17	235	121.88	130.58							switching mitigation: '457 WABASSO 138 481 SEBSTIAN 138 1-SW' contingency
457 WABASSO 138 481 SEBSTIAN 138 1	449 OSLO 138 1341 EMERBYPASS 138 1	9382 VER-SOUT 138 9383 FV-CTYLN 138 1	17	235	123.35	133.66							
457 WABASSO 138 481 SEBSTIAN 138 1	449 OSLO 138 1341 EMERBYPASS 138 1	9397 VB SUB7 69.0 9403 VB SUB8 69.0 1	17	92	115.72	122.09							
457 WABASSO 138 481 SEBSTIAN 138 1	449 OSLO 138 1341 EMERBYPASS 138 1	9402 VBSUB11 69.0 9403 VB SUB8 69.0 1	17	78	93.85	102.7							
457 WABASSO 138 481 SEBSTIAN 138 1	449 OSLO 138 1341 EMERBYPASS 138 1	9403 VB SUB8 69.0 9404 VB SUB1 69.0 1	17	92	92.32	102.89							
457 WABASSO 138 481 SEBSTIAN 138 1	614 ROSEDALE 138 9381 WEST-FMP 138 1	122 EMERSON 138 9383 FV-CTYLN 138 1	1/17	235		97.37	92.15	100.21	96.62	105.25	96.48	104.96	
457 WABASSO 138 1734 GIFFORD 138 1	122 EMERSON 138 449 OSLO 138 1	9382 VER-SOUT 138 9403 VB SUB8 69.0 1	17	240			105.03	108.71	105.79	110.15	105.91	110.6	
457 WABASSO 138 1734 GIFFORD 138 1	122 EMERSON 138 449 OSLO 138 1	122 EMERSON 138 9383 FV-CTYLN 138 1	1/17	235			107.81	113.05	112.51	118.1	112.14	117.92	
457 WABASSO 138 1734 GIFFORD 138 1	122 EMERSON 138 449 OSLO 138 1	9382 VER-SOUT 138 9383 FV-CTYLN 138 1	17	235			105.78	111.68	106.38	112.67	106.07	112.62	switching mitigation: '457 WABASSO 138 1734 GIFFORD 138 1-SW' contingency
457 WABASSO 138 1734 GIFFORD 138 1	449 OSLO 138 1341 EMERBYPASS 138 1	9382 VER-SOUT 138 9403 VB SUB8 69.0 1	17	240	104.45	107.82							
457 WABASSO 138 1734 GIFFORD 138 1	449 OSLO 138 1341 EMERBYPASS 138 1	122 EMERSON 138 9383 FV-CTYLN 138 1	1/17	235	105.81	110.43							
457 WABASSO 138 1734 GIFFORD 138 1	449 OSLO 138 1341 EMERBYPASS 138 1	9382 VER-SOUT 138 9383 FV-CTYLN 138 1	17	235	104.88	110.19							
476 POINSETT 500 467 POINSETT 230 1	122 EMERSON 138 449 OSLO 138 1	122 EMERSON 138 9383 FV-CTYLN 138 1	1/17	235					92.14	95.13	98.18	101.65	no rate C overload with 2nd Cont. breaker to breaker tripping
476 POINSETT 500 1140 OKECHOBEC 500 1	122 EMERSON 138 449 OSLO 138 1	122 EMERSON 138 9383 FV-CTYLN 138 1	1/17	235							96.75	100.21	no rate C overload with 2nd Cont. breaker to breaker tripping

C3 contingencies					2016 Summer Cases		2017 Summer Cases		2018 Summer Cases		2019 Summer Cases		
					Reference	Study	Reference	Study	Reference	Study	Reference	Study	
First Level Scenario	Cont Name	Monitored Facility	Areas	Rating (MVA)	Rate C	Rate C	Rate C	Rate C	Rate C	Rate C	Rate C	Rate C	Remedy/Comments
481 SEBSTIAN 138 1508 BAREFOOT 138 1	122 EMERSON 138 449 OSLO 138 1	9382 VER-SOUT 138 9403 VB SUB8 69.0 1	17	240			145.29	148.08	148.56	153	148.9	154.17	switching mitigation: '481 SEBSTIAN 138 1508 BAREFOOT 138 1-SW' contingency
481 SEBSTIAN 138 1508 BAREFOOT 138 1	122 EMERSON 138 449 OSLO 138 1	122 EMERSON 138 9383 FV-CTYLN 138 1	1/17	235			158.7	163.44	164.09	170.86	163.98	171.08	
481 SEBSTIAN 138 1508 BAREFOOT 138 1	122 EMERSON 138 449 OSLO 138 1	9382 VER-SOUT 138 9383 FV-CTYLN 138 1	17	235			164.4	170.15	166.23	173.89	166.23	174.72	
481 SEBSTIAN 138 1508 BAREFOOT 138 1	122 EMERSON 138 449 OSLO 138 1	9402 VBSUB11 69.0 9403 VB SUB8 69.0 1	17	78			123.65	129.11	124.56	131.55	125.41	132.2	
481 SEBSTIAN 138 1508 BAREFOOT 138 1	122 EMERSON 138 449 OSLO 138 1	9403 VB SUB8 69.0 9404 VB SUB1 69.0 1	17	92			122.68	131.12	123.67	134	124.19	134.67	
481 SEBSTIAN 138 1508 BAREFOOT 138 1	122 EMERSON 138 449 OSLO 138 1	9401 VB SUB10 69.0 9402 VBSUB11 69.0 1	17	78			101.01	105.75	101.98	108.17	102.54	108.74	
481 SEBSTIAN 138 1508 BAREFOOT 138 1	449 OSLO 138 614 ROSEDALE 138 1	9382 VER-SOUT 138 9403 VB SUB8 69.0 1	17	240	122.38	127.74	122.93	128.83	125.02	131.99	125.41	132.92	
481 SEBSTIAN 138 1508 BAREFOOT 138 1	449 OSLO 138 614 ROSEDALE 138 1	122 EMERSON 138 9383 FV-CTYLN 138 1	1/17	235	129.79	136.75	131.82	139.23	136.64	145.48	136.63	145.4	
481 SEBSTIAN 138 1508 BAREFOOT 138 1	449 OSLO 138 614 ROSEDALE 138 1	9382 VER-SOUT 138 9383 FV-CTYLN 138 1	17	235	134.55	142.91	134.62	143.4	136.05	145.99	136.16	146.53	
481 SEBSTIAN 138 1508 BAREFOOT 138 1	449 OSLO 138 614 ROSEDALE 138 1	9402 VBSUB11 69.0 9403 VB SUB8 69.0 1	17	78	105.31	112.69	105.3	113.01	106.07	114.65	106.84	115.04	
481 SEBSTIAN 138 1508 BAREFOOT 138 1	449 OSLO 138 614 ROSEDALE 138 1	9403 VB SUB8 69.0 9404 VB SUB1 69.0 1	17	92	101.47	112.31	101.24	112.68	101.98	114.59	102.44	115	
481 SEBSTIAN 138 1508 BAREFOOT 138 1	449 OSLO 138 1341 EMERBYPASS 138 1	122 EMERSON 138 9383 FV-CTYLN 138 1	1/17	235	156.47	160.09							
481 SEBSTIAN 138 1508 BAREFOOT 138 1	449 OSLO 138 1341 EMERBYPASS 138 1	9382 VER-SOUT 138 9383 FV-CTYLN 138 1	17	235	164.27	168.81							
481 SEBSTIAN 138 1508 BAREFOOT 138 1	449 OSLO 138 1341 EMERBYPASS 138 1	9402 VBSUB11 69.0 9403 VB SUB8 69.0 1	17	78	123.74	128.2							
481 SEBSTIAN 138 1508 BAREFOOT 138 1	449 OSLO 138 1341 EMERBYPASS 138 1	9403 VB SUB8 69.0 9404 VB SUB1 69.0 1	17	92	122.91	130.03							
481 SEBSTIAN 138 1508 BAREFOOT 138 1	449 OSLO 138 1341 EMERBYPASS 138 1	9401 VB SUB10 69.0 9402 VBSUB11 69.0 1	17	78	101.05	104.79							
481 SEBSTIAN 138 1508 BAREFOOT 138 1	614 ROSEDALE 138 9381 WEST-FMP 138 1	9382 VER-SOUT 138 9403 VB SUB8 69.0 1	17	240	110.38	118.53	111.34	119.52	112.92	122.37	113.31	123.23	
481 SEBSTIAN 138 1508 BAREFOOT 138 1	614 ROSEDALE 138 9381 WEST-FMP 138 1	122 EMERSON 138 9383 FV-CTYLN 138 1	1/17	235	116.04	125.81	118.66	128.31	123.28	134.47	123.3	134.36	
481 SEBSTIAN 138 1508 BAREFOOT 138 1	614 ROSEDALE 138 9381 WEST-FMP 138 1	9382 VER-SOUT 138 9383 FV-CTYLN 138 1	17	235	118.99	130.67	119.85	131.21	120.89	133.61	121.03	134.08	
481 SEBSTIAN 138 1508 BAREFOOT 138 1	614 ROSEDALE 138 9381 WEST-FMP 138 1	9397 VB SUB7 69.0 9403 VB SUB8 69.0 1	17	92	109.13	115.23	110.42	115.83	112.14	118.82	113.16	119.29	
481 SEBSTIAN 138 1508 BAREFOOT 138 1	614 ROSEDALE 138 9381 WEST-FMP 138 1	9402 VBSUB11 69.0 9403 VB SUB8 69.0 1	17	78	94.85	104.44	95.4	104.83	95.98	106.35	96.69	106.7	
481 SEBSTIAN 138 1508 BAREFOOT 138 1	614 ROSEDALE 138 9381 WEST-FMP 138 1	9403 VB SUB8 69.0 9404 VB SUB1 69.0 1	17	92	90.06	103.14	90.41	103.56	90.9	105.32	91.31	105.68	
481 SEBSTIAN 138 1508 BAREFOOT 138 1	9382 VER-SOUT 138 9383 FV-CTYLN 138 1	614 ROSEDALE 138 9381 WEST-FMP 138 1	1/17	262	95.93	103.49	96.45	104.25	97.28	105.47	97.19	105.62	
614 ROSEDALE 138 9381 WEST-FMP 138 1	122 EMERSON 138 9383 FV-CTYLN 138 1	4011 HARTMAN 69.0 4014 LAWNWOOD 69.0 1	3	96	109.34	113.26	108.93	113.1	107.53	112.04	110.39	115.48	switching mitigation: '614 ROSEDALE 138 9381 WEST FMP 138 1-SW' contingency + open breaker 189 @ Barefoot
614 ROSEDALE 138 9381 WEST-FMP 138 1	457 WABASSO 138 481 SEBSTIAN 138 1	122 EMERSON 138 9383 FV-CTYLN 138 1	1/17	235		97.36	92.15	100.21	96.62	105.25	96.48	104.96	
614 ROSEDALE 138 9381 WEST-FMP 138 1	481 SEBSTIAN 138 1508 BAREFOOT 138 1	9382 VER-SOUT 138 9403 VB SUB8 69.0 1	17	240	110.38	118.53	111.34	119.52	112.92	122.37	113.31	123.23	
614 ROSEDALE 138 9381 WEST-FMP 138 1	481 SEBSTIAN 138 1508 BAREFOOT 138 1	122 EMERSON 138 9383 FV-CTYLN 138 1	1/17	235	116.04	125.81	118.66	128.31	123.28	134.47	123.31	134.36	
614 ROSEDALE 138 9381 WEST-FMP 138 1	481 SEBSTIAN 138 1508 BAREFOOT 138 1	9382 VER-SOUT 138 9383 FV-CTYLN 138 1	17	235	118.99	130.67	119.85	131.21	120.9	133.61	121.04	134.08	
614 ROSEDALE 138 9381 WEST-FMP 138 1	481 SEBSTIAN 138 1508 BAREFOOT 138 1	9397 VB SUB7 69.0 9403 VB SUB8 69.0 1	17	92	109.14	115.23	110.42	115.83	112.14	118.83	113.16	119.29	
614 ROSEDALE 138 9381 WEST-FMP 138 1	481 SEBSTIAN 138 1508 BAREFOOT 138 1	9402 VBSUB11 69.0 9403 VB SUB8 69.0 1	17	78	94.86	104.44	95.41	104.84	95.98	106.35	96.7	106.7	
614 ROSEDALE 138 9381 WEST-FMP 138 1	481 SEBSTIAN 138 1508 BAREFOOT 138 1	9403 VB SUB8 69.0 9404 VB SUB1 69.0 1	17	92	90.06	103.14	90.42	103.56	90.91	105.32	91.32	105.68	
691 INDRIO 138 1341 EMERBYPASS 138 1	122 EMERSON 138 123 EMERSON 230 1	4011 HARTMAN 69.0 4014 LAWNWOOD 69.0 1	3	96	132.35	135.42							After 1st contingency, open Sub9-10 and split Sub 7 bus so that Subs 3,6 & 9 are feed from one transformer. Will also need to open West-Gifford, Emersonbypass-FV-Ctyln and FV-CtyIn-FTP-GA C.
9382 VER-SOUT 138 9383 FV-CTYLN 138 1	1005 FELESMR 230 1744 SPANLKS 230 1	614 ROSEDALE 138 9381 WEST-FMP 138 1	1/17	262	91.28	94.39	90.81	94.18	94.25	98.04	99.77	103.88	After 1st contingency, open Sub9-10 and split Sub 7 bus so that Subs 3,6 & 9 are feed from one transformer. Will also need to open West-Gifford.
9382 VER-SOUT 138 9383 FV-CTYLN 138 1	122 EMERSON 138 449 OSLO 138 1	1508 BAREFOOT 138 1507 BAREFOOT 230 1	1	291			104.05	109.19	106.95	112.66	108.96	115.05	
9382 VER-SOUT 138 9383 FV-CTYLN 138 1	122 EMERSON 138 449 OSLO 138 1	1734 GIFFORD 138 9381 WEST-FMP 138 1	1/17	262			92.66	100.01	93.02	101.03	93.25	102.05	
9382 VER-SOUT 138 9383 FV-CTYLN 138 1	122 EMERSON 138 449 OSLO 138 1	457 WABASSO 138 481 SEBSTIAN 138 1	1	313			92.57	100.61	93.43	102.16	93.84	103.25	
9382 VER-SOUT 138 9383 FV-CTYLN 138 1	123 EMERSON 230 1005 FELESMR 230 1	614 ROSEDALE 138 9381 WEST-FMP 138 1	1/17	262	93.59	96.74	93.23	96.64	96.49	100.31	102.07	106.22	
9382 VER-SOUT 138 9383 FV-CTYLN 138 1	1507 BAREFOOT 230 1744 SPANLKS 230 1	614 ROSEDALE 138 9381 WEST-FMP 138 1	1/17	262	90.77	93.88	90.27	93.65	93.78	97.57	99.29	103.4	
9382 VER-SOUT 138 9383 FV-CTYLN 138 1	1508 BAREFOOT 138 1507 BAREFOOT 230 1	614 ROSEDALE 138 9381 WEST-FMP 138 1	1/17	262	94.21	98.68	95.09	99.77	98.09	103.14	101.39	106.82	
9382 VER-SOUT 138 9383 FV-CTYLN 138 1	449 OSLO 138 614 ROSEDALE 138 1	1508 BAREFOOT 138 1507 BAREFOOT 230 1	1	291		100.94		100.24		103.44		105.8	
9382 VER-SOUT 138 9383 FV-CTYLN 138 1	449 OSLO 138 1341 EMERBYPASS 138 1	1508 BAREFOOT 138 1507 BAREFOOT 230 1	1	291	104.74	109.54							
9382 VER-SOUT 138 9383 FV-CTYLN 138 1	481 SEBSTIAN 138 1508 BAREFOOT 138 1	614 ROSEDALE 138 9381 WEST-FMP 138 1	1/17	262	95.94	103.49	96.46	104.26	97.28	105.47	97.2	105.62	

Voltage

	C3 contingencies							2016 Summer Cases		2017 Summer Cases		2018 Summer Cases		2019 Summer Cases		
First Level Scenario	Cont Name	Bus Name	Area	Bus #	Base kV	C3 -Min Volt Limit	C3-Max Volt Limit	Reference	Study	Reference	Study	Reference	Study	Reference	Study	Remedy/Comments
481 SEBSTIAN 138 1508 BAREFOOT 138 1	122 EMERSON 138 449 OSLO 138 1	VB SUB6	17	9398	69	0.88	1.1			0.8128	0.7891	0.8199	0.7934	0.8139	0.7952	
481 SEBSTIAN 138 1508 BAREFOOT 138 1	122 EMERSON 138 449 OSLO 138 1	VB SUB8	17	9403	69	0.88	1.1			0.8637	0.8433	0.8722	0.8496	0.867	0.8519	
481 SEBSTIAN 138 1508 BAREFOOT 138 1	122 EMERSON 138 449 OSLO 138 1	VB SUB3	17	9405	69	0.88	1.1			0.8084	0.7856	0.815	0.7895	0.8091	0.7913	
481 SEBSTIAN 138 1508 BAREFOOT 138 1	122 EMERSON 138 449 OSLO 138 1	VB SUB7	17	9397	69	0.88	1.1			0.8084	0.7858	0.8149	0.7896	0.809	0.7914	
481 SEBSTIAN 138 1508 BAREFOOT 138 1	122 EMERSON 138 449 OSLO 138 1	SEBSTIAN	1	481	138	0.88	1.1			0.7633	0.7373	0.7684	0.7446	0.7676	0.7463	
481 SEBSTIAN 138 1508 BAREFOOT 138 1	122 EMERSON 138 449 OSLO 138 1	WABASSO	1	457	138	0.88	1.1			0.7687	0.7425	0.774	0.75	0.7732	0.7517	
481 SEBSTIAN 138 1508 BAREFOOT 138 1	122 EMERSON 138 449 OSLO 138 1	GIFFORD	1	1734	138	0.88	1.1			0.7788	0.7522	0.7844	0.76	0.7835	0.7618	
481 SEBSTIAN 138 1508 BAREFOOT 138 1	122 EMERSON 138 449 OSLO 138 1	WEST-FMP	17	9381	138	0.88	1.1			0.7844	0.7576	0.7902	0.7656	0.7893	0.7674	
481 SEBSTIAN 138 1508 BAREFOOT 138 1	122 EMERSON 138 449 OSLO 138 1	VB SUB9	17	9400	69	0.88	1.1			0.8152	0.791	0.8226	0.7956	0.8166	0.7974	
481 SEBSTIAN 138 1508 BAREFOOT 138 1	122 EMERSON 138 449 OSLO 138 1	ROSEDALE	1	614	138	0.88	1.1			0.7852	0.7584	0.791	0.7664	0.7902	0.7682	
481 SEBSTIAN 138 1508 BAREFOOT 138 1	122 EMERSON 138 449 OSLO 138 1	PIPER 5	17	9396	69	0.88	1.1			0.8297	0.804	0.8372	0.809	0.8315	0.811	
481 SEBSTIAN 138 1508 BAREFOOT 138 1	122 EMERSON 138 449 OSLO 138 1	VB-G1	17	9413	13.8	0.88	1.1			0.8115	0.7846	0.8197	0.7897	0.8137	0.7914	
481 SEBSTIAN 138 1508 BAREFOOT 138 1	122 EMERSON 138 449 OSLO 138 1	VB SUB10	17	9401	69	0.88	1.1			0.8388	0.8137	0.8468	0.8191	0.8413	0.8212	
481 SEBSTIAN 138 1508 BAREFOOT 138 1	122 EMERSON 138 449 OSLO 138 1	VB SUB1	17	9404	69	0.88	1.1			0.8417	0.8148	0.8497	0.8203	0.8442	0.8223	
481 SEBSTIAN 138 1508 BAREFOOT 138 1	122 EMERSON 138 449 OSLO 138 1	VB G3	17	9411	13.8	0.88	1.1			0.8417	0.8148	0.8497	0.8203	0.8442	0.8223	
481 SEBSTIAN 138 1508 BAREFOOT 138 1	122 EMERSON 138 449 OSLO 138 1	VB G4	17	9412	13.8	0.88	1.1			0.8417	0.8148	0.8497	0.8203	0.8442	0.8223	
481 SEBSTIAN 138 1508 BAREFOOT 138 1	122 EMERSON 138 449 OSLO 138 1	VBSUB11	17	9402	69	0.88	1.1			0.8489	0.8258	0.8572	0.8316	0.8518	0.8338	
481 SEBSTIAN 138 1508 BAREFOOT 138 1	122 EMERSON 138 449 OSLO 138 1	VER-CC S&2	17	9414	13.8	0.88	1.1			0.8859	0.8148	0.8936	0.8203	0.8884	0.8223	
481 SEBSTIAN 138 1508 BAREFOOT 138 1	122 EMERSON 138 449 OSLO 138 1	OSLO	1	449	138	0.88	1.1			0.7931	0.766	0.7988	0.774	0.798	0.7758	
481 SEBSTIAN 138 1508 BAREFOOT 138 1	449 OSLO 138 614 ROSEDALE 138 1	VB SUB6	17	9398	69	0.88	1.1	0.8372	0.8106	0.8405	0.8149	0.844	0.817	0.8384	0.8197	
481 SEBSTIAN 138 1508 BAREFOOT 138 1	449 OSLO 138 614 ROSEDALE 138 1	VB SUB8	17	9403	69	0.88	1.1	0.8896	0.8667	0.8931	0.8713	0.8977	0.875	0.8928	0.8716	
481 SEBSTIAN 138 1508 BAREFOOT 138 1	449 OSLO 138 614 ROSEDALE 138 1	VB SUB3	17	9405	69	0.88	1.1	0.8305	0.805	0.8338	0.8093	0.837	0.811	0.8314	0.8136	
481 SEBSTIAN 138 1508 BAREFOOT 138 1	449 OSLO 138 614 ROSEDALE 138 1	VB SUB7	17	9397	69	0.88	1.1	0.8301	0.8048	0.8333	0.809	0.8365	0.8107	0.8308	0.8133	
481 SEBSTIAN 138 1508 BAREFOOT 138 1	449 OSLO 138 614 ROSEDALE 138 1	SEBSTIAN	1	481	138	0.88	1.1	0.7783	0.75	0.7761	0.7488	0.7781	0.7541	0.7775	0.7565	
481 SEBSTIAN 138 1508 BAREFOOT 138 1	449 OSLO 138 614 ROSEDALE 138 1	WABASSO	1	457	138	0.88	1.1	0.7838	0.7553	0.7816	0.7541	0.7837	0.7596	0.7832	0.762	
481 SEBSTIAN 138 1508 BAREFOOT 138 1	449 OSLO 138 614 ROSEDALE 138 1	GIFFORD	1	1734	138	0.88	1.1	0.794	0.7651	0.7918	0.764	0.7943	0.7698	0.7937	0.7722	
481 SEBSTIAN 138 1508 BAREFOOT 138 1	449 OSLO 138 614 ROSEDALE 138 1	WEST-FMP	17	9381	138	0.88	1.1	0.7995	0.7705	0.7975	0.7695	0.8001	0.7755	0.7996	0.7779	
481 SEBSTIAN 138 1508 BAREFOOT 138 1	449 OSLO 138 614 ROSEDALE 138 1	VB SUB9	17	9400	69	0.88	1.1	0.8411	0.8139	0.8444	0.8182	0.8482	0.8206	0.8426	0.8233	
481 SEBSTIAN 138 1508 BAREFOOT 138 1	449 OSLO 138 614 ROSEDALE 138 1	ROSEDALE	1	614	138	0.88	1.1	0.7991	0.7701	0.7971	0.7691	0.7997	0.775	0.7991	0.7775	
481 SEBSTIAN 138 1508 BAREFOOT 138 1	449 OSLO 138 614 ROSEDALE 138 1	PIPER 5	17	9396	69	0.88	1.1	0.8548	0.8265	0.8582	0.8309	0.8621	0.8335	0.8567	0.8363	
481 SEBSTIAN 138 1508 BAREFOOT 138 1	449 OSLO 138 614 ROSEDALE 138 1	VB-G1	17	9413	13.8	0.88	1.1	0.8391	0.8081	0.8425	0.8125	0.8467	0.8155	0.841	0.8182	
481 SEBSTIAN 138 1508 BAREFOOT 138 1	449 OSLO 138 614 ROSEDALE 138 1	VB SUB10	17	9401	69	0.88	1.1	0.8649	0.8372	0.8684	0.8416	0.8726	0.8446	0.8673	0.8474	
481 SEBSTIAN 138 1508 BAREFOOT 138 1	449 OSLO 138 614 ROSEDALE 138 1	VB SUB1	17	9404	69	0.88	1.1	0.8676	0.8382	0.8711	0.8426	0.8753	0.8456	0.8701	0.8484	switching mitigation: '481 SEBSTIAN 138 1508 BAREFOOT
481 SEBSTIAN 138 1508 BAREFOOT 138 1	449 OSLO 138 614 ROSEDALE 138 1	VB G3	17	9411	13.8	0.88	1.1	0.8676	0.8382	0.8711	0.8426	0.8753	0.8456	0.8701	0.8484	138 1-SW' contingency
481 SEBSTIAN 138 1508 BAREFOOT 138 1	449 OSLO 138 614 ROSEDALE 138 1	VB G4	17	9412	13.8	0.88	1.1	0.8676	0.8382	0.8711	0.8426	0.8753	0.8456	0.8701	0.8484	
481 SEBSTIAN 138 1508 BAREFOOT 138 1	449 OSLO 138 614 ROSEDALE 138 1	VBSUB11	17	9402	69	0.88	1.1	0.8749	0.8492	0.8784	0.8537	0.8828	0.857	0.8777	0.8599	
481 SEBSTIAN 138 1508 BAREFOOT 138 1	449 OSLO 138 1341 EMERBYPASS 138 1	VB SUB6	17	9398	69	0.88	1.1	0.8059	0.7842							
481 SEBSTIAN 138 1508 BAREFOOT 138 1	449 OSLO 138 1341 EMERBYPASS 138 1	VB SUB3	17	9405	69	0.88	1.1	0.8017	0.7807							
481 SEBSTIAN 138 1508 BAREFOOT 138 1	449 OSLO 138 1341 EMERBYPASS 138 1	VB SUB7	17	9397	69	0.88	1.1	0.8018	0.7809							
481 SEBSTIAN 138 1508 BAREFOOT 138 1	449 OSLO 138 1341 EMERBYPASS 138 1	SEBSTIAN	1	481	138	0.88	1.1	0.7624	0.738							
481 SEBSTIAN 138 1508 BAREFOOT 138 1	449 OSLO 138 1341 EMERBYPASS 138 1	WABASSO	1	457	138	0.88	1.1	0.7678	0.7431							
481 SEBSTIAN 138 1508 BAREFOOT 138 1	449 OSLO 138 1341 EMERBYPASS 138 1	GIFFORD	1	1734	138	0.88	1.1	0.7778	0.7528							
481 SEBSTIAN 138 1508 BAREFOOT 138 1	449 OSLO 138 1341 EMERBYPASS 138 1	WEST-FMP	17	9381	138	0.88	1.1	0.7832	0.7581							
481 SEBSTIAN 138 1508 BAREFOOT 138 1	449 OSLO 138 1341 EMERBYPASS 138 1	VB SUB9	17	9400	69	0.88	1.1	0.8082	0.7859							
481 SEBSTIAN 138 1508 BAREFOOT 138 1	449 OSLO 138 1341 EMERBYPASS 138 1	ROSEDALE	1	614	138	0.88	1.1	0.7841	0.7589							
481 SEBSTIAN 138 1508 BAREFOOT 138 1	449 OSLO 138 1341 EMERBYPASS 138 1	PIPER 5	17	9396	69	0.88	1.1	0.8227	0.7987							
481 SEBSTIAN 138 1508 BAREFOOT 138 1	449 OSLO 138 1341 EMERBYPASS 138 1	VB-G1	17	9413	13.8	0.88	1.1	0.8042	0.7795							
481 SEBSTIAN 138 1508 BAREFOOT 138 1	449 OSLO 138 1341 EMERBYPASS 138 1	VB SUB10	17	9401	69	0.88	1.1	0.8316	0.8081							
481 SEBSTIAN 138 1508 BAREFOOT 138 1	449 OSLO 138 1341 EMERBYPASS 138 1	VB SUB1	17	9404	69	0.88	1.1	0.8345	0.8093							
481 SEBSTIAN 138 1508 BAREFOOT 138 1	449 OSLO 138 1341 EMERBYPASS 138 1	VB G3	17	9411	13.8	0.88	1.1	0.8345	0.8093							
481 SEBSTIAN 138 1508 BAREFOOT 138 1	449 OSLO 138 1341 EMERBYPASS 138 1	VB G4	17	9412	13.8	0.88	1.1	0.8345	0.8093							
481 SEBSTIAN 138 1508 BAREFOOT 138 1	449 OSLO 138 1341 EMERBYPASS 138 1	VBSUB11	17	9402	69	0.88	1.1	0.8417	0.82							
481 SEBSTIAN 138 1508 BAREFOOT 138 1	449 OSLO 138 1341 EMERBYPASS 138 1	VER-CC S&2	17	9414	13.8	0.88	1.1	0.8791	0.8093							
481 SEBSTIAN 138 1508 BAREFOOT 138 1	449 OSLO 138 1341 EMERBYPASS 138 1	OSLO	1	449	138	0.88	1.1	0.7921	0.7667							
481 SEBSTIAN 138 1508 BAREFOOT 138 1	614 ROSEDALE 138 9381 WEST-FMP 138 1	VB SUB6	17	9398	69	0.88	1.1	0.8799	0.8427	0.8797	0.846	0.883	0.8479	0.8775	0.8508	
481 SEBSTIAN 138 1508 BAREFOOT 138 1	614 ROSEDALE 138 9381 WEST-FMP 138 1	VB SUB3	17	9405	69	0.88	1.1	0.8746	0.838	0.8743	0.8413	0.8773	0.8429	0.8718	0.8458	
481 SEBSTIAN 138 1508 BAREFOOT 138 1	614 ROSEDALE 138 9381 WEST-FMP 138 1	VB SUB7	17	9397	69	0.88	1.1	0.8744	0.838	0.874	0.8412	0.877	0.8427	0.8716	0.8456	
481 SEBSTIAN 138 1508 BAREFOOT 138 1	614 ROSEDALE 138 9381 WEST-FMP 138 1	SEBSTIAN	1	481	138	0.88	1.1	0.8253	0.7836	0.8189	0.7813	0.821	0.7867	0.8209	0.7893	
481 SEBSTIAN 138 1508 BAREFOOT 138 1	614 ROSEDALE 138 9381 WEST-FMP 138 1	WABASSO	1	457	138	0.88	1.1	0.8307	0.7891	0.8244	0.7868	0.8266	0.7924	0.8265	0.795	
481 SEBSTIAN 138 1508 BAREFOOT 138 1	614 ROSEDALE 138 9381 WEST-FMP 138 1	GIFFORD	1	1734	138	0.88	1.1	0.8407	0.7994	0.8346	0.7971	0.837	0.803	0.8369	0.8057	
481 SEBSTIAN 138 1508 BAREFOOT 138 1	614 ROSEDALE 138 9381 WEST-FMP 138 1	WEST-FMP	17	9381	138	0.88	1.1	0.8462	0.805	0.8402	0.8028	0.8428	0.809	0.8427	0.8117	
481 SEBSTIAN 138 1508 BAREFOOT 138 1	614 ROSEDALE 138 9381 WEST-FMP 138 1	VB SUB9	17	9400	69	0.88	1.1	0.8822	0.8448	0.882	0.8481	0.8855	0.8503	0.88	0.8533	
481 SEBSTIAN 138 1508 BAREFOOT 138 1	614 ROSEDALE 138 9381 WEST-FMP 138 1	PIPER 5	17	9396	69	0.88	1.1	0.894	0.8561	0.894	0.8595	0.8976	0.8619	0.8924	0.8648	
481 SEBSTIAN 138 1508 BAREFOOT 138 1	614 ROSEDALE 138 9381 WEST-FMP 138 1	VB-G1	17	9413	13.8	0.88	1.1	0.8779	0.8376	0.8779	0.8409	0.8817	0.8436	0.8761	0.8466	
481 SEBSTIAN 138 1508 BAREFOOT 138 1	614 ROSEDALE 138 9381 WEST-FMP 138 1	VB SUB10	17	9401	69	0.88	1.1	0.9019	0.8651	0.9021	0.8685	0.9059	0.8713	0.9008	0.8743	
481 SEBSTIAN 138 1508 BAREFOOT 138 1	614 ROSEDALE 138 9381 WEST-FMP 138 1	VB SUB1	17	9404	69	0.88	1.1	0.9045	0.8661	0.9047	0.8695	0.9085	0.8723	0.9035	0.8753	
481 SEBSTIAN 138 1508 BAREFOOT 138 1	614 ROSEDALE 138 9381 WEST-FMP 138 1	VBSUB11	17	9402	69	0.88	1.1	0.9102	0.8759	0.9105	0.8793	0.9144	0.8824	0.9094	0.8854	
457 WABASSO 138 481 SEBSTIAN 138 1	449 OSLO 138 614 ROSEDALE 138 1	WABASSO	1	457	138	0.88	1.1	0.8978	0.8604	0.8886	0.8523	0.89	0.8604	0.8909	0.8643	
457 WABASSO 138 481 SEBSTIAN 138 1	449 OSLO 138 614 ROSEDALE 138 1	GIFFORD	1	1734	138	0.88	1.1	0.9019	0.8646	0.8927	0.8567	0.8942	0.8648	0.8951	0.8687	switching mitigation: '457 WABASSO 138 481 SEBSTIAN 138
457 WABASSO 138 481 SEBSTIAN 138 1	449 OSLO 138 614 ROSEDALE 138 1	WEST-FMP	17	9381	138	0.88	1.1	0.9044	0.8672	0.8954	0.8594	0.8969	0.8676	0.8978	0.8715	1-SW' contingency
457 WABASSO 138 481 SEBSTIAN 138 1	449 OSLO 138 614 ROSEDALE 138 1	ROSEDALE	1	614	138	0.88	1.1	0.904	0.8668	0.895	0.859	0.8965	0.8672	0.8974	0.8713	

	C3 contingencies							2016 Summer Cases		2017 Summer Cases		2018 Summer Cases		2019 Summer Cases		
First Level Scenario	Cont Name	Bus Name	Area	Bus #	Base kV	C3 -Min Volt Limit	C3-Max Volt Limit	Reference	Study	Reference	Study	Reference	Study	Reference	Study	Remedy/Comments
9382 VER-SOUT 138 9383 FV-CTYLN 138 1	449 OSLO 138 614 ROSEDALE 138 1	VB SUB6	17	9398	69	0.88	1.1	0.9337	0.8788	0.9393	0.8823	0.9384	0.8731	0.9266	0.8666	
9382 VER-SOUT 138 9383 FV-CTYLN 138 1	449 OSLO 138 614 ROSEDALE 138 1	VB SUB8	17	9403	69	0.88	1.1	0.933	0.8733	0.9386	0.8768	0.9377	0.8675	0.926	0.8609	
9382 VER-SOUT 138 9383 FV-CTYLN 138 1	449 OSLO 138 614 ROSEDALE 138 1	VB SUB3	17	9405	69	0.88	1.1	0.9376	0.8866	0.9431	0.8901	0.9422	0.8812	0.9308	0.875	
9382 VER-SOUT 138 9383 FV-CTYLN 138 1	449 OSLO 138 614 ROSEDALE 138 1	VB SUB7	17	9397	69	0.88	1.1	0.9392	0.8891	0.9447	0.8926	0.9439	0.8838	0.9326	0.8777	
9382 VER-SOUT 138 9383 FV-CTYLN 138 1	449 OSLO 138 614 ROSEDALE 138 1	GIFFORD	1	1734	138	0.88	1.1	0.9262	0.8821	0.9256	0.88	0.9249	0.8777	0.9203	0.8722	
9382 VER-SOUT 138 9383 FV-CTYLN 138 1	449 OSLO 138 614 ROSEDALE 138 1	WEST-FMP	17	9381	138	0.88	1.1	0.9224	0.875	0.9218	0.8728	0.9211	0.8703	0.9163	0.8647	
9382 VER-SOUT 138 9383 FV-CTYLN 138 1	449 OSLO 138 614 ROSEDALE 138 1	VB SUB9	17	9400	69	0.88	1.1	0.9279	0.8704	0.9335	0.8739	0.9325	0.8645	0.9207	0.858	After 1st contingency, open Sub9-10 and split Sub 7 bus so
9382 VER-SOUT 138 9383 FV-CTYLN 138 1	449 OSLO 138 614 ROSEDALE 138 1	ROSEDALE	1	614	138	0.88	1.1	0.922	0.8746	0.9214	0.8724	0.9207	0.8699	0.9159	0.8643	that Subs 3,6 & 9 are feed from one transformer. Will also
9382 VER-SOUT 138 9383 FV-CTYLN 138 1	449 OSLO 138 614 ROSEDALE 138 1	PIPER 5	17	9396	69	0.88	1.1	0.9326	0.8734	0.9382	0.8769	0.9373	0.8677	0.9257	0.8612	need to open West-Gifford.
9382 VER-SOUT 138 9383 FV-CTYLN 138 1	449 OSLO 138 614 ROSEDALE 138 1	VB-G1	17	9413	13.8	0.88	1.1		0.8413		0.8447		0.8347	0.8989	0.8275	
9382 VER-SOUT 138 9383 FV-CTYLN 138 1	449 OSLO 138 614 ROSEDALE 138 1	VB SUB10	17	9401	69	0.88	1.1	0.9294	0.8682	0.935	0.8717	0.9341	0.8623	0.9224	0.8556	
9382 VER-SOUT 138 9383 FV-CTYLN 138 1	449 OSLO 138 614 ROSEDALE 138 1	VB SUB1	17	9404	69	0.88	1.1	0.9322	0.8696	0.9378	0.8731	0.937	0.8637	0.9253	0.8571	
9382 VER-SOUT 138 9383 FV-CTYLN 138 1	449 OSLO 138 614 ROSEDALE 138 1	VBSUB11	17	9402	69	0.88	1.1	0.9297	0.8691	0.9353	0.8726	0.9344	0.8632	0.9227	0.8566	
9382 VER-SOUT 138 9383 FV-CTYLN 138 1	449 OSLO 138 614 ROSEDALE 138 1	VER-SOUT	17	9382	138	0.88	1.1	0.919	0.8548	0.9245	0.8582	0.9236	0.8491	0.9179	0.8427	
9382 VER-SOUT 138 9383 FV-CTYLN 138 1	614 ROSEDALE 138 9381 WEST-FMP 138 1	VER-SOUT	17	9382	138	0.88	1.1	0.9464	0.889		0.8933		0.8844	0.9462	0.8789	
449 OSLO 138 614 ROSEDALE 138 1	457 WABASSO 138 481 SEBSTIAN 138 1	WABASSO	1	457	138	0.88	1.1	0.8978	0.8604	0.8886	0.8524	0.89	0.8604	0.8909	0.8644	
449 OSLO 138 614 ROSEDALE 138 1	457 WABASSO 138 481 SEBSTIAN 138 1	GIFFORD	1	1734	138	0.88	1.1	0.9019	0.8647	0.8927	0.8567	0.8942	0.8648	0.8951	0.8687	
449 OSLO 138 614 ROSEDALE 138 1	457 WABASSO 138 481 SEBSTIAN 138 1	WEST-FMP	17	9381	138	0.88	1.1	0.9044	0.8673	0.8954	0.8594	0.8969	0.8676	0.8978	0.8715	
449 OSLO 138 614 ROSEDALE 138 1	457 WABASSO 138 481 SEBSTIAN 138 1	ROSEDALE	1	614	138	0.88	1.1	0.904	0.8669	0.895	0.859	0.8965	0.8672	0.8974	0.8711	
449 OSLO 138 614 ROSEDALE 138 1	481 SEBSTIAN 138 1508 BAREFOOT 138 1	VB SUB6	17	9398	69	0.88	1.1	0.8372	0.8106	0.8405	0.8149	0.844	0.817	0.8384	0.8197	
449 OSLO 138 614 ROSEDALE 138 1	481 SEBSTIAN 138 1508 BAREFOOT 138 1	VB SUB8	17	9403	69	0.88	1.1	0.8896	0.8667	0.8931	0.8712	0.8977	0.875	0.8928	0.8726	
449 OSLO 138 614 ROSEDALE 138 1	481 SEBSTIAN 138 1508 BAREFOOT 138 1	VB SUB3	17	9405	69	0.88	1.1	0.8305	0.805	0.8338	0.8092	0.837	0.811	0.8314	0.8136	
449 OSLO 138 614 ROSEDALE 138 1	481 SEBSTIAN 138 1508 BAREFOOT 138 1	VB SUB7	17	9397	69	0.88	1.1	0.83	0.8048	0.8333	0.809	0.8365	0.8107	0.8308	0.8133	
449 OSLO 138 614 ROSEDALE 138 1	481 SEBSTIAN 138 1508 BAREFOOT 138 1	SEBSTIAN	1	481	138	0.88	1.1	0.7783	0.75	0.7761	0.7488	0.7781	0.7541	0.7776	0.7565	
449 OSLO 138 614 ROSEDALE 138 1	481 SEBSTIAN 138 1508 BAREFOOT 138 1	WABASSO	1	457	138	0.88	1.1	0.7837	0.7553	0.7816	0.7541	0.7837	0.7596	0.7832	0.762	
449 OSLO 138 614 ROSEDALE 138 1	481 SEBSTIAN 138 1508 BAREFOOT 138 1	GIFFORD	1	1734	138	0.88	1.1	0.794	0.7651	0.7919	0.764	0.7943	0.7698	0.7937	0.7722	
449 OSLO 138 614 ROSEDALE 138 1	481 SEBSTIAN 138 1508 BAREFOOT 138 1	WEST-FMP	17	9381	138	0.88	1.1	0.7995	0.7705	0.7975	0.7695	0.8001	0.7755	0.7996	0.7779	
449 OSLO 138 614 ROSEDALE 138 1	481 SEBSTIAN 138 1508 BAREFOOT 138 1	VB SUB9	17	9400	69	0.88	1.1	0.8411	0.8139	0.8444	0.8182	0.8482	0.8206	0.8426	0.8233	
449 OSLO 138 614 ROSEDALE 138 1	481 SEBSTIAN 138 1508 BAREFOOT 138 1	ROSEDALE	1	614	138	0.88	1.1	0.7991	0.7701	0.7971	0.7691	0.7997	0.775	0.7991	0.7775	
449 OSLO 138 614 ROSEDALE 138 1	481 SEBSTIAN 138 1508 BAREFOOT 138 1	PIPER 5	17	9396	69	0.88	1.1	0.8548	0.8265	0.8582	0.8309	0.8621	0.8335	0.8567	0.8363	
449 OSLO 138 614 ROSEDALE 138 1	481 SEBSTIAN 138 1508 BAREFOOT 138 1	VB-G1	17	9413	13.8	0.88	1.1	0.8391	0.8081	0.8426	0.8125	0.8467	0.8155	0.841	0.8182	
449 OSLO 138 614 ROSEDALE 138 1	481 SEBSTIAN 138 1508 BAREFOOT 138 1	VB SUB10	17	9401	69	0.88	1.1	0.8649	0.8372	0.8684	0.8416	0.8726	0.8446	0.8673	0.8474	switching mitigation: '449 OSLO 138 614 ROSEDALE 138 1-
449 OSLO 138 614 ROSEDALE 138 1	481 SEBSTIAN 138 1508 BAREFOOT 138 1	VB SUB1	17	9404	69	0.88	1.1	0.8676	0.8382	0.8711	0.8426	0.8753	0.8456	0.8701	0.8484	SW' contingency + open breaker 189 @ Barefoot
449 OSLO 138 614 ROSEDALE 138 1	481 SEBSTIAN 138 1508 BAREFOOT 138 1	VB G3	17	9411	13.8	0.88	1.1	0.8676	0.8382	0.8711	0.8426	0.8753	0.8456	0.8701	0.8484	
449 OSLO 138 614 ROSEDALE 138 1	481 SEBSTIAN 138 1508 BAREFOOT 138 1	VB G4	17	9412	13.8	0.88	1.1	0.8676	0.8382	0.8711	0.8426	0.8753	0.8456	0.8701	0.8484	
449 OSLO 138 614 ROSEDALE 138 1	481 SEBSTIAN 138 1508 BAREFOOT 138 1	VBSUB11	17	9402	69	0.88	1.1	0.8749	0.8492	0.8784	0.8537	0.8828	0.857	0.8777	0.8599	
449 OSLO 138 614 ROSEDALE 138 1	9382 VER-SOUT 138 9383 FV-CTYLN 138 1	VB SUB6	17	9398	69	0.88	1.1	0.9337	0.8788	0.9393	0.8824	0.9384	0.8731	0.9266	0.8667	
449 OSLO 138 614 ROSEDALE 138 1	9382 VER-SOUT 138 9383 FV-CTYLN 138 1	VB SUB8	17	9403	69	0.88	1.1	0.933	0.8734	0.9386	0.8769	0.9377	0.8676	0.926	0.861	
449 OSLO 138 614 ROSEDALE 138 1	9382 VER-SOUT 138 9383 FV-CTYLN 138 1	VB SUB3	17	9405	69	0.88	1.1	0.9376	0.8866	0.9431	0.8901	0.9422	0.8813	0.9308	0.8751	
449 OSLO 138 614 ROSEDALE 138 1	9382 VER-SOUT 138 9383 FV-CTYLN 138 1	VB SUB7	17	9397	69	0.88	1.1	0.9392	0.8891	0.9447	0.8927	0.9439	0.8839	0.9326	0.8778	
449 OSLO 138 614 ROSEDALE 138 1	9382 VER-SOUT 138 9383 FV-CTYLN 138 1	GIFFORD	1	1734	138	0.88	1.1	0.9262	0.8821	0.9256	0.88	0.925	0.8777	0.9203	0.8723	
449 OSLO 138 614 ROSEDALE 138 1	9382 VER-SOUT 138 9383 FV-CTYLN 138 1	WEST-FMP	17	9381	138	0.88	1.1	0.9224	0.875	0.9218	0.8729	0.9211	0.8704	0.9163	0.8648	
449 OSLO 138 614 ROSEDALE 138 1	9382 VER-SOUT 138 9383 FV-CTYLN 138 1	VB SUB9	17	9400	69	0.88	1.1	0.9279	0.8704	0.9335	0.874	0.9326	0.8646	0.9207	0.858	
449 OSLO 138 614 ROSEDALE 138 1	9382 VER-SOUT 138 9383 FV-CTYLN 138 1	ROSEDALE	1	614	138	0.88	1.1	0.922	0.8746	0.9214	0.8725	0.9207	0.87	0.9159	0.8644	
449 OSLO 138 614 ROSEDALE 138 1	9382 VER-SOUT 138 9383 FV-CTYLN 138 1	PIPER 5	17	9396	69	0.88	1.1	0.9326	0.8735	0.9382	0.877	0.9373	0.8677	0.9257	0.8613	
449 OSLO 138 614 ROSEDALE 138 1	9382 VER-SOUT 138 9383 FV-CTYLN 138 1	VB-G1	17	9413	13.8	0.88	1.1		0.8413		0.8448		0.8347	0.8989	0.8276	
449 OSLO 138 614 ROSEDALE 138 1	9382 VER-SOUT 138 9383 FV-CTYLN 138 1	VB SUB10	17	9401	69	0.88	1.1	0.9294	0.8682	0.935	0.8717	0.9341	0.8623	0.9224	0.8557	
449 OSLO 138 614 ROSEDALE 138 1	9382 VER-SOUT 138 9383 FV-CTYLN 138 1	VB SUB1	17	9404	69	0.88	1.1	0.9322	0.8696	0.9378	0.8731	0.937	0.8638	0.9253	0.8572	
449 OSLO 138 614 ROSEDALE 138 1	9382 VER-SOUT 138 9383 FV-CTYLN 138 1	VBSUB11	17	9402	69	0.88	1.1	0.9297	0.8691	0.9353	0.8727	0.9344	0.8633	0.9227	0.8567	
449 OSLO 138 614 ROSEDALE 138 1	9382 VER-SOUT 138 9383 FV-CTYLN 138 1	VER-SOUT	17	9382	138	0.88	1.1	0.919	0.8548	0.9245	0.8583	0.9236	0.8491	0.9179	0.8427	
614 ROSEDALE 138 9381 WEST-FMP 138 1	481 SEBSTIAN 138 1508 BAREFOOT 138 1	VB SUB6	17	9398	69	0.88	1.1	0.8799	0.8427	0.8797	0.846	0.883	0.8479	0.8774	0.8508	
614 ROSEDALE 138 9381 WEST-FMP 138 1	481 SEBSTIAN 138 1508 BAREFOOT 138 1	VB SUB3	17	9405	69	0.88	1.1	0.8746	0.838	0.8742	0.8413	0.8773	0.8429	0.8718	0.8458	
614 ROSEDALE 138 9381 WEST-FMP 138 1	481 SEBSTIAN 138 1508 BAREFOOT 138 1	VB SUB7	17	9397	69	0.88	1.1	0.8743	0.838	0.874	0.8412	0.877	0.8427	0.8715	0.8456	
614 ROSEDALE 138 9381 WEST-FMP 138 1	481 SEBSTIAN 138 1508 BAREFOOT 138 1	SEBSTIAN	1	481	138	0.88	1.1	0.8252	0.7836	0.8189	0.7813	0.821	0.7867	0.8209	0.7893	
614 ROSEDALE 138 9381 WEST-FMP 138 1	481 SEBSTIAN 138 1508 BAREFOOT 138 1	WABASSO	1	457	138	0.88	1.1	0.8307	0.7891	0.8244	0.7868	0.8266	0.7924	0.8265	0.795	
614 ROSEDALE 138 9381 WEST-FMP 138 1	481 SEBSTIAN 138 1508 BAREFOOT 138 1	GIFFORD	1	1734	138	0.88	1.1	0.8407	0.7994	0.8346	0.7971	0.837	0.803	0.8369	0.8057	
614 ROSEDALE 138 9381 WEST-FMP 138 1	481 SEBSTIAN 138 1508 BAREFOOT 138 1	WEST-FMP	17	9381	138	0.88	1.1	0.8462	0.805	0.8402	0.8028	0.8428	0.809	0.8427	0.8117	switching mitigation: '614 ROSEDALE 138 9381 WEST-FMP
614 ROSEDALE 138 9381 WEST-FMP 138 1	481 SEBSTIAN 138 1508 BAREFOOT 138 1	VB SUB9	17	9400	69	0.88	1.1	0.8821	0.8448	0.882	0.8481	0.8855	0.8503	0.88	0.8533	138 1-SW' contingency + open breaker 189 @ Barefoot
614 ROSEDALE 138 9381 WEST-FMP 138 1	481 SEBSTIAN 138 1508 BAREFOOT 138 1	PIPER 5	17	9396	69	0.88	1.1	0.894	0.8561	0.894	0.8595	0.8976	0.8619	0.8924	0.8648	
614 ROSEDALE 138 9381 WEST-FMP 138 1	481 SEBSTIAN 138 1508 BAREFOOT 138 1	VB-G1	17	9413	13.8	0.88	1.1	0.8779	0.8376	0.8779	0.8409	0.8816	0.8436	0.8761	0.8466	
614 ROSEDALE 138 9381 WEST-FMP 138 1	481 SEBSTIAN 138 1508 BAREFOOT 138 1	VB SUB10	17	9401	69	0.88	1.1	0.9019	0.8651	0.9021	0.8685	0.9059	0.8713	0.9008	0.8743	
614 ROSEDALE 138 9381 WEST-FMP 138 1	481 SEBSTIAN 138 1508 BAREFOOT 138 1	VB SUB1	17	9404	69	0.88	1.1	0.9045	0.8661	0.9047	0.8695	0.9085	0.8723	0.9035	0.8753	
614 ROSEDALE 138 9381 WEST-FMP 138 1	481 SEBSTIAN 138 1508 BAREFOOT 138 1	VBSUB11	17	9402	69	0.88	1.1	0.9102	0.8759	0.9105	0.8793	0.9144	0.8824	0.9094	0.8854	
614 ROSEDALE 138 9381 WEST-FMP 138 1	9382 VER-SOUT 138 9383 FV-CTYLN 138 1	VER-SOUT	17	9382	138	0.88	1.1	0.9464	0.889		0.8933		0.8844	0.9462	0.8789	

	C3 contingencies							2016 Summer Cases		2017 Summer Cases		2018 Summer Cases		2019 Summer Cases		
First Level Scenario	Cont Name	Bus Name	Area	Bus #	Base kV	C3 -Min Volt Limit	C3-Max Volt Limit	Reference	Study	Reference	Study	Reference	Study	Reference	Study	Remedy/Comments
449 OSLO 138 1341 EMERBYPASS 138 1	481 SEBSTIAN 138 1508 BAREFOOT 138 1	VB SUB6	17	9398	69	0.88	1.1	0.8059	0.7842							switching mitigation: '449 OSLO 1341 EMERBYPASS 138 1-SW' contingency + open breaker 189 @ Barefoot
449 OSLO 138 1341 EMERBYPASS 138 1	481 SEBSTIAN 138 1508 BAREFOOT 138 1	VB SUB3	17	9405	69	0.88	1.1	0.8017	0.7807							
449 OSLO 138 1341 EMERBYPASS 138 1	481 SEBSTIAN 138 1508 BAREFOOT 138 1	VB SUB7	17	9397	69	0.88	1.1	0.8018	0.7809							
449 OSLO 138 1341 EMERBYPASS 138 1	481 SEBSTIAN 138 1508 BAREFOOT 138 1	SEBSTIAN	1	481	138	0.88	1.1	0.7624	0.738							
449 OSLO 138 1341 EMERBYPASS 138 1	481 SEBSTIAN 138 1508 BAREFOOT 138 1	WABASSO	1	457	138	0.88	1.1	0.7678	0.7431							
449 OSLO 138 1341 EMERBYPASS 138 1	481 SEBSTIAN 138 1508 BAREFOOT 138 1	GIFFORD	1	1734	138	0.88	1.1	0.7778	0.7528							
449 OSLO 138 1341 EMERBYPASS 138 1	481 SEBSTIAN 138 1508 BAREFOOT 138 1	WEST-FMP	17	9381	138	0.88	1.1	0.7832	0.7581							
449 OSLO 138 1341 EMERBYPASS 138 1	481 SEBSTIAN 138 1508 BAREFOOT 138 1	VB SUB9	17	9400	69	0.88	1.1	0.8082	0.7859							
449 OSLO 138 1341 EMERBYPASS 138 1	481 SEBSTIAN 138 1508 BAREFOOT 138 1	ROSEDALE	1	614	138	0.88	1.1	0.7841	0.7589							
449 OSLO 138 1341 EMERBYPASS 138 1	481 SEBSTIAN 138 1508 BAREFOOT 138 1	PIPER 5	17	9396	69	0.88	1.1	0.8227	0.7987							
449 OSLO 138 1341 EMERBYPASS 138 1	481 SEBSTIAN 138 1508 BAREFOOT 138 1	VB-G1	17	9413	13.8	0.88	1.1	0.8042	0.7795							
449 OSLO 138 1341 EMERBYPASS 138 1	481 SEBSTIAN 138 1508 BAREFOOT 138 1	VB SUB10	17	9401	69	0.88	1.1	0.8316	0.8081							
449 OSLO 138 1341 EMERBYPASS 138 1	481 SEBSTIAN 138 1508 BAREFOOT 138 1	VB SUB1	17	9404	69	0.88	1.1	0.8345	0.8093							
449 OSLO 138 1341 EMERBYPASS 138 1	481 SEBSTIAN 138 1508 BAREFOOT 138 1	VB G3	17	9411	13.8	0.88	1.1	0.8345	0.8093							
449 OSLO 138 1341 EMERBYPASS 138 1	481 SEBSTIAN 138 1508 BAREFOOT 138 1	VB G4	17	9412	13.8	0.88	1.1	0.8345	0.8093							
449 OSLO 138 1341 EMERBYPASS 138 1	481 SEBSTIAN 138 1508 BAREFOOT 138 1	VBSUB11	17	9402	69	0.88	1.1	0.8417	0.82							
449 OSLO 138 1341 EMERBYPASS 138 1	481 SEBSTIAN 138 1508 BAREFOOT 138 1	VER-CC 5&2	17	9414	13.8	0.88	1.1	0.8791	0.8093							
449 OSLO 138 1341 EMERBYPASS 138 1	481 SEBSTIAN 138 1508 BAREFOOT 138 1	OSLO	1	449	138	0.88	1.1	0.7921	0.7667							
122 EMERSON 138 449 OSLO 138 1	481 SEBSTIAN 138 1508 BAREFOOT 138 1	VB SUB6	17	9398	69	0.88	1.1			0.8128	0.7891	0.8199	0.7934	0.8139	0.7953	switching mitigation: '122 EMERSON 138 449 OSLO 138 1-SW' contingency + open breaker 189 @ Barefoot
122 EMERSON 138 449 OSLO 138 1	481 SEBSTIAN 138 1508 BAREFOOT 138 1	VB SUB8	17	9403	69	0.88	1.1			0.8637	0.8433	0.8722	0.8496	0.867	0.8519	
122 EMERSON 138 449 OSLO 138 1	481 SEBSTIAN 138 1508 BAREFOOT 138 1	VB SUB3	17	9405	69	0.88	1.1			0.8084	0.7856	0.815	0.7895	0.8091	0.7913	
122 EMERSON 138 449 OSLO 138 1	481 SEBSTIAN 138 1508 BAREFOOT 138 1	VB SUB7	17	9397	69	0.88	1.1			0.8084	0.7858	0.8149	0.7896	0.809	0.7914	
122 EMERSON 138 449 OSLO 138 1	481 SEBSTIAN 138 1508 BAREFOOT 138 1	SEBSTIAN	1	481	138	0.88	1.1			0.7633	0.7373	0.7684	0.7446	0.7676	0.7463	
122 EMERSON 138 449 OSLO 138 1	481 SEBSTIAN 138 1508 BAREFOOT 138 1	WABASSO	1	457	138	0.88	1.1			0.7687	0.7425	0.774	0.75	0.7732	0.7517	
122 EMERSON 138 449 OSLO 138 1	481 SEBSTIAN 138 1508 BAREFOOT 138 1	GIFFORD	1	1734	138	0.88	1.1			0.7788	0.7522	0.7844	0.76	0.7835	0.7618	
122 EMERSON 138 449 OSLO 138 1	481 SEBSTIAN 138 1508 BAREFOOT 138 1	WEST-FMP	17	9381	138	0.88	1.1			0.7844	0.7576	0.7902	0.7656	0.7893	0.7674	
122 EMERSON 138 449 OSLO 138 1	481 SEBSTIAN 138 1508 BAREFOOT 138 1	VB SUB9	17	9400	69	0.88	1.1			0.8152	0.791	0.8226	0.7956	0.8166	0.7974	
122 EMERSON 138 449 OSLO 138 1	481 SEBSTIAN 138 1508 BAREFOOT 138 1	ROSEDALE	1	614	138	0.88	1.1			0.7852	0.7584	0.791	0.7664	0.7902	0.7682	
122 EMERSON 138 449 OSLO 138 1	481 SEBSTIAN 138 1508 BAREFOOT 138 1	PIPER 5	17	9396	69	0.88	1.1			0.8297	0.804	0.8372	0.809	0.8315	0.811	
122 EMERSON 138 449 OSLO 138 1	481 SEBSTIAN 138 1508 BAREFOOT 138 1	VB-G1	17	9413	13.8	0.88	1.1			0.8115	0.7846	0.8197	0.7897	0.8137	0.7914	
122 EMERSON 138 449 OSLO 138 1	481 SEBSTIAN 138 1508 BAREFOOT 138 1	VB SUB10	17	9401	69	0.88	1.1			0.8388	0.8137	0.8468	0.8192	0.8413	0.8212	
122 EMERSON 138 449 OSLO 138 1	481 SEBSTIAN 138 1508 BAREFOOT 138 1	VB SUB1	17	9404	69	0.88	1.1			0.8417	0.8148	0.8497	0.8203	0.8442	0.8223	
122 EMERSON 138 449 OSLO 138 1	481 SEBSTIAN 138 1508 BAREFOOT 138 1	VB G3	17	9411	13.8	0.88	1.1			0.8417	0.8148	0.8497	0.8203	0.8442	0.8223	
122 EMERSON 138 449 OSLO 138 1	481 SEBSTIAN 138 1508 BAREFOOT 138 1	VB G4	17	9412	13.8	0.88	1.1			0.8417	0.8148	0.8497	0.8203	0.8442	0.8223	
122 EMERSON 138 449 OSLO 138 1	481 SEBSTIAN 138 1508 BAREFOOT 138 1	VBSUB11	17	9402	69	0.88	1.1			0.8489	0.8258	0.8572	0.8317	0.8518	0.8338	
122 EMERSON 138 449 OSLO 138 1	481 SEBSTIAN 138 1508 BAREFOOT 138 1	VER-CC 5&2	17	9414	13.8	0.88	1.1			0.8859	0.8148	0.8936	0.8203	0.8884	0.8225	
122 EMERSON 138 449 OSLO 138 1	481 SEBSTIAN 138 1508 BAREFOOT 138 1	OSLO	1	449	138	0.88	1.1			0.7931	0.766	0.7988	0.774	0.798	0.7758	

Winter Cases

Thermal

C3 contingencies					2015 Winter Cases		2016 Winter Cases		2017 Winter Cases		2019 Winter Cases		
					Reference	Study	Reference	Study	Reference	Study	Reference	Study	
First Level Scenario	Cont Name	Monitored Facility	Areas	Rating (MVA)	Rate C	Rate C	Rate C	Rate C	Rate C	Rate C	Rate C	Rate C	Remedy/Comments
1005 FELESMR 230 1744 SPANLKS 230 1	9382 VER-SOUT 138 9383 FV-CTYLN 138 1	614 ROSEDALE 138 9381 WEST-FMP 138 1	1/17	286						100.93	108.51	113.31	Open Gifford-West after 1st contingency
122 EMERSON 138 123 EMERSON 230 1	229 HARTMAN 138 441 F PIERCE 138 1	4011 HARTMAN 69.0 4014 LAWNWOOD 69.0 1	3	130	111.85	115.09							Open Gifford-West and FV-CtyIn-FTP-GA C after 1st contingency
122 EMERSON 138 123 EMERSON 230 1	441 F PIERCE 138 691 INDRIO 138 1	4011 HARTMAN 69.0 4014 LAWNWOOD 69.0 1	3	130	108.33	111.39							
122 EMERSON 138 449 OSLO 138 1	122 EMERSON 138 9383 FV-CTYLN 138 1	4011 HARTMAN 69.0 4014 LAWNWOOD 69.0 1	3	130			90.94	96.43	92.45	95.18	96.86	100.79	
122 EMERSON 138 449 OSLO 138 1	1508 BAREFOOT 138 1507 BAREFOOT 230 1	122 EMERSON 138 9383 FV-CTYLN 138 1	1/17	287								100.04	
122 EMERSON 138 449 OSLO 138 1	457 WABASSO 138 481 SEBSTIAN 138 1	9382 VER-SOUT 138 9403 VB SUB8 69.0 1	17	275			96.69	105.86	101.42	105.98	101.45	107.29	
122 EMERSON 138 449 OSLO 138 1	457 WABASSO 138 481 SEBSTIAN 138 1	122 EMERSON 138 9383 FV-CTYLN 138 1	1/17	287				103.78		105.8		107.74	
122 EMERSON 138 449 OSLO 138 1	457 WABASSO 138 481 SEBSTIAN 138 1	9397 VB SUB7 69.0 9403 VB SUB8 69.0 1	17	106			93.89	100.78	96.14	99.67	96.82	101.38	switching mitigation: '122 EMERSON 138 449 OSLO 138 1-SW' contingency + open breaker 189 @ Barefoot
122 EMERSON 138 449 OSLO 138 1	481 SEBSTIAN 138 1508 BAREFOOT 138 1	9382 VER-SOUT 138 9403 VB SUB8 69.0 1	17	275			114.89	128.82	118.09	129.5	118.76	132.21	
122 EMERSON 138 449 OSLO 138 1	481 SEBSTIAN 138 1508 BAREFOOT 138 1	122 EMERSON 138 9383 FV-CTYLN 138 1	1/17	287			113.32	131.53	118.39	132.19	119.66	136.43	
122 EMERSON 138 449 OSLO 138 1	481 SEBSTIAN 138 1508 BAREFOOT 138 1	9382 VER-SOUT 138 9383 FV-CTYLN 138 1	17	330			101.5	119.99	102.74	116.78	104.25	121.12	
122 EMERSON 138 449 OSLO 138 1	481 SEBSTIAN 138 1508 BAREFOOT 138 1	9397 VB SUB7 69.0 9403 VB SUB8 69.0 1	17	106			124.21	137.87	123.01	135.22	125.22	139.7	
122 EMERSON 138 449 OSLO 138 1	481 SEBSTIAN 138 1508 BAREFOOT 138 1	9402 VBSUB11 69.0 9403 VB SUB8 69.0 1	17	89			93.3	112.62	94.72	108.57	96.24	113.05	
122 EMERSON 138 449 OSLO 138 1	481 SEBSTIAN 138 1508 BAREFOOT 138 1	9403 VB SUB8 69.0 9404 VB SUB1 69.0 1	17	106				112.98	92.42	109.36	93.07	113.69	
122 EMERSON 138 449 OSLO 138 1	9382 VER-SOUT 138 9383 FV-CTYLN 138 1	1508 BAREFOOT 138 1507 BAREFOOT 230 1	1	313				104.68	101.11	105.73	104.24	109.55	

C3 contingencies

					2015 Winter Cases		2016 Winter Cases		2017 Winter Cases		2019 Winter Cases		
					Reference	Study	Reference	Study	Reference	Study	Reference	Study	
First Level Scenario	Cont Name	Monitored Facility	Areas	Rating (MVA)	Rate C	Rate C	Rate C	Rate C	Rate C	Rate C	Rate C	Rate C	Remedy/Comments
122 EMERSON 138 691 INDRIO 138 1	123 EMERSON 230 1342 TREASURE 230 1	4011 HARTMAN 69.0 4014 LAWNWOOD 69.0 1	3	130			100.02	103.32					open FV-Ctyln-FTP-GA C after 1st contingency
122 EMERSON 138 9383 FV-CTYLN 138 1	1005 FELESMR 230 1744 SPANLKS 230 1	614 ROSEDALE 138 9381 WEST-FMP 138 1	1/17	286							100.8	104.38	After 1st contingency, open Sub9-10 and split Sub 7 bus so that Subs 3,6 & 9 are feed from one transformer. Will also need to open West-Gifford and FV-Ctyln-FTP-GA C.
122 EMERSON 138 9383 FV-CTYLN 138 1	122 EMERSON 138 449 OSLO 138 1	4011 HARTMAN 69.0 4014 LAWNWOOD 69.0 1	3	130			90.95	96.43	92.45	95.18	96.86	100.79	
122 EMERSON 138 9383 FV-CTYLN 138 1	123 EMERSON 230 1005 FELESMR 230 1	614 ROSEDALE 138 9381 WEST-FMP 138 1	1/17	286							102.61	106.21	
122 EMERSON 138 9383 FV-CTYLN 138 1	1507 BAREFOOT 230 1744 SPANLKS 230 1	614 ROSEDALE 138 9381 WEST-FMP 138 1	1/17	286							100.45	104.03	
123 EMERSON 230 1005 FELESMR 230 1	122 EMERSON 138 9383 FV-CTYLN 138 1	614 ROSEDALE 138 9381 WEST-FMP 138 1	1/17	286							102.61	106.21	After 1st contingency, open Sub9-10 and split Sub 7 bus so that Subs 3,6 & 9 are feed from one transformer. Will also need to open West-Gifford and FV-Ctyln-FTP-GA C.
123 EMERSON 230 1005 FELESMR 230 1	266 MIDWAY 230 1031 PEACOCK 230 1	614 ROSEDALE 138 9381 WEST-FMP 138 1	1/17	286								100.35	
123 EMERSON 230 1005 FELESMR 230 1	9382 VER-SOUT 138 9383 FV-CTYLN 138 1	614 ROSEDALE 138 9381 WEST-FMP 138 1	1/17	286						102.79	110.43	115.25	
123 EMERSON 230 1342 TREASURE 230 1	122 EMERSON 138 691 INDRIO 138 1	4011 HARTMAN 69.0 4014 LAWNWOOD 69.0 1	3	130			100.02	103.32					After 1st contingency, open Sub9-10 and split Sub 7 bus so that Subs 3,6 & 9 are feed from one transformer. Will also need to open West-Gifford and FV-Ctyln-FTP-GA C.
123 EMERSON 230 1342 TREASURE 230 1	229 HARTMAN 138 441 F PIERCE 138 1	4011 HARTMAN 69.0 4014 LAWNWOOD 69.0 1	3	130	113.29	115.39	108.63	112.25					
123 EMERSON 230 1342 TREASURE 230 1	441 F PIERCE 138 691 INDRIO 138 1	4011 HARTMAN 69.0 4014 LAWNWOOD 69.0 1	3	130	110.54	112.51	105.93	109.44					
1507 BAREFOOT 230 1744 SPANLKS 230 1	122 EMERSON 138 9383 FV-CTYLN 138 1	614 ROSEDALE 138 9381 WEST-FMP 138 1	1/17	286							100.45	104.03	After 1st contingency, open Sub9-10 and split Sub 7 bus so that Subs 3,6 & 9 are feed from one transformer. Will also need to open West-Gifford and FV-Ctyln-FTP-GA C.
1507 BAREFOOT 230 1744 SPANLKS 230 1	476 POINSETT 500 1140 OKECHOBEC 500 1	614 ROSEDALE 138 9381 WEST-FMP 138 1	1/17	286								100.92	
1507 BAREFOOT 230 1744 SPANLKS 230 1	9382 VER-SOUT 138 9383 FV-CTYLN 138 1	614 ROSEDALE 138 9381 WEST-FMP 138 1	1/17	286						100.55	108.14	112.93	
1508 BAREFOOT 138 1507 BAREFOOT 230 1	122 EMERSON 138 449 OSLO 138 1	122 EMERSON 138 9383 FV-CTYLN 138 1	1/17	287								100.04	open Wabasso-Gifford after 1st contingency and adjust TX taps at Malabar to raise 138kV voltage
1508 BAREFOOT 138 1507 BAREFOOT 230 1	446 MALABAR 138 450 PALM BAY 138 1	614 ROSEDALE 138 9381 WEST-FMP 138 1	1/17	286	109.42	115.24	110.24	118.2	107.35	112.43	108.82	114.79	
1508 BAREFOOT 138 1507 BAREFOOT 230 1	446 MALABAR 138 450 PALM BAY 138 1	1734 GIFFORD 138 9381 WEST-FMP 138 1	1/17	286	100.31	102.51	105.52	107.11	97.78	99.15	99.31	100.97	
1508 BAREFOOT 138 1507 BAREFOOT 230 1	9382 VER-SOUT 138 9383 FV-CTYLN 138 1	614 ROSEDALE 138 9381 WEST-FMP 138 1	1/17	286						101.77	103.09	109.15	
229 HARTMAN 138 240 MIDWAY 138 1	240 MIDWAY 138 256 WH CITY 138 1	122 EMERSON 138 123 EMERSON 230 1	1	428		100.25							switch in cap bank at Midway after 1 st contingency
229 HARTMAN 138 441 F PIERCE 138 1	122 EMERSON 138 123 EMERSON 230 1	4011 HARTMAN 69.0 4014 LAWNWOOD 69.0 1	3	130	111.88	115.14							open Hartman-Ft. Pierce Tap and close Ft. Pierce Tap0Ft. Pierce
229 HARTMAN 138 441 F PIERCE 138 1	123 EMERSON 230 1342 TREASURE 230 1	4011 HARTMAN 69.0 4014 LAWNWOOD 69.0 1	3	130	113.27	115.4	108.63	112.25					
240 MIDWAY 138 256 WH CITY 138 1	229 HARTMAN 138 240 MIDWAY 138 1	122 EMERSON 138 123 EMERSON 230 1	1	428		100.25							switch in cap bank at Midway after 1 st contingency
266 MIDWAY 230 1031 PEACOCK 230 1	123 EMERSON 230 1005 FELESMR 230 1	614 ROSEDALE 138 9381 WEST-FMP 138 1	1/17	286								100.35	After 1st contingency, open Sub9-10 and split Sub 7 bus so that Subs 3,6 & 9 are feed from one transformer. Will also need to open West-Gifford and FV-Ctyln-FTP-GA C.
266 MIDWAY 230 1031 PEACOCK 230 1	9382 VER-SOUT 138 9383 FV-CTYLN 138 1	614 ROSEDALE 138 9381 WEST-FMP 138 1	1/17	286								101.44	
441 F PIERCE 138 691 INDRIO 138 1	122 EMERSON 138 123 EMERSON 230 1	4011 HARTMAN 69.0 4014 LAWNWOOD 69.0 1	3	130	108.34	111.41							After 1st contingency, open Sub9-10 and split Sub 7 bus so that Subs 3,6 & 9 are feed from one transformer. Will also need to open West-Gifford and FV-Ctyln-FTP-GA C.
441 F PIERCE 138 691 INDRIO 138 1	123 EMERSON 230 1342 TREASURE 230 1	4011 HARTMAN 69.0 4014 LAWNWOOD 69.0 1	3	130	110.58	112.63	105.93	109.44					
446 MALABAR 138 450 PALM BAY 138 1	1508 BAREFOOT 138 1507 BAREFOOT 230 1	614 ROSEDALE 138 9381 WEST-FMP 138 1	1/17	286	109.41	115.23	110.24	118.2	107.35	112.43	108.82	114.79	open breaker 189 @ Barefoot after 1st contingency
449 OSLO 138 614 ROSEDALE 138 1	481 SEBSTIAN 138 1508 BAREFOOT 138 1	9382 VER-SOUT 138 9403 VB SUB8 69.0 1	17	275	101.84	109.65	98.81	111.33	102.91	111.7	103.29	113.38	switching mitigation: '449 OSLO 138 614 ROSEDALE 138 1-SW' contingency + open breaker 189 @ Barefoot
449 OSLO 138 614 ROSEDALE 138 1	481 SEBSTIAN 138 1508 BAREFOOT 138 1	122 EMERSON 138 9383 FV-CTYLN 138 1	1/17	287		109.26		111.39	104.83	114.32	104.66	115.89	
449 OSLO 138 614 ROSEDALE 138 1	481 SEBSTIAN 138 1508 BAREFOOT 138 1	9382 VER-SOUT 138 9383 FV-CTYLN 138 1	17	330	90.01	99.66		100.58	90.44	100.14	90.48	101.53	
449 OSLO 138 614 ROSEDALE 138 1	481 SEBSTIAN 138 1508 BAREFOOT 138 1	9397 VB SUB7 69.0 9403 VB SUB8 69.0 1	17	106	102.29	107.88	102.47	109.84	103.64	109.32	104.13	110.56	
449 OSLO 138 614 ROSEDALE 138 1	9382 VER-SOUT 138 9383 FV-CTYLN 138 1	1508 BAREFOOT 138 1507 BAREFOOT 230 1	1	313								101.96	
449 OSLO 138 1341 EMERBYPASS 138 1	457 WABASSO 138 481 SEBSTIAN 138 1	9382 VER-SOUT 138 9403 VB SUB8 69.0 1	17	275	100.97	104.89							switching mitigation: '449 OSLO 1341 EMERBYPASS 138 1-SW' contingency + open breaker 189 @ Barefoot
449 OSLO 138 1341 EMERBYPASS 138 1	457 WABASSO 138 481 SEBSTIAN 138 1	122 EMERSON 138 9383 FV-CTYLN 138 1	1/17	287		101.88							
449 OSLO 138 1341 EMERBYPASS 138 1	457 WABASSO 138 481 SEBSTIAN 138 1	9397 VB SUB7 69.0 9403 VB SUB8 69.0 1	17	106	95.91	100.09							
449 OSLO 138 1341 EMERBYPASS 138 1	481 SEBSTIAN 138 1508 BAREFOOT 138 1	9382 VER-SOUT 138 9403 VB SUB8 69.0 1	17	275	117.92	127.37							
449 OSLO 138 1341 EMERBYPASS 138 1	481 SEBSTIAN 138 1508 BAREFOOT 138 1	122 EMERSON 138 9383 FV-CTYLN 138 1	1/17	287	116.19	130.01							
449 OSLO 138 1341 EMERBYPASS 138 1	481 SEBSTIAN 138 1508 BAREFOOT 138 1	9382 VER-SOUT 138 9383 FV-CTYLN 138 1	17	330	105.4	119.8							
449 OSLO 138 1341 EMERBYPASS 138 1	481 SEBSTIAN 138 1508 BAREFOOT 138 1	9397 VB SUB7 69.0 9403 VB SUB8 69.0 1	17	106	125.63	137.11							
449 OSLO 138 1341 EMERBYPASS 138 1	481 SEBSTIAN 138 1508 BAREFOOT 138 1	9402 VBSUB11 69.0 9403 VB SUB8 69.0 1	17	89	97.26	111.81							
449 OSLO 138 1341 EMERBYPASS 138 1	481 SEBSTIAN 138 1508 BAREFOOT 138 1	9403 VB SUB8 69.0 9404 VB SUB1 69.0 1	17	106	94.95	112.22							
449 OSLO 138 1341 EMERBYPASS 138 1	9382 VER-SOUT 138 9383 FV-CTYLN 138 1	1508 BAREFOOT 138 1507 BAREFOOT 230 1	1	313		103.51							
457 WABASSO 138 481 SEBSTIAN 138 1	122 EMERSON 138 449 OSLO 138 1	9382 VER-SOUT 138 9403 VB SUB8 69.0 1	17	275			96.69	105.81	101.42	105.98	101.45	107.3	switching mitigation: '457 WABASSO 138 481 SEBSTIAN 138 1-SW' contingency
457 WABASSO 138 481 SEBSTIAN 138 1	122 EMERSON 138 449 OSLO 138 1	122 EMERSON 138 9383 FV-CTYLN 138 1	1/17	287				103.7		105.81		107.75	
457 WABASSO 138 481 SEBSTIAN 138 1	122 EMERSON 138 449 OSLO 138 1	9397 VB SUB7 69.0 9403 VB SUB8 69.0 1	17	106			93.89	100.69	96.14	99.68	96.82	101.39	
457 WABASSO 138 481 SEBSTIAN 138 1	449 OSLO 138 1341 EMERBYPASS 138 1	9382 VER-SOUT 138 9403 VB SUB8 69.0 1	17	275	100.97	104.79							
457 WABASSO 138 481 SEBSTIAN 138 1	449 OSLO 138 1341 EMERBYPASS 138 1	122 EMERSON 138 9383 FV-CTYLN 138 1	1/17	287		101.45							
476 POINSETT 500 467 POINSETT 230 1	9382 VER-SOUT 138 9383 FV-CTYLN 138 1	614 ROSEDALE 138 9381 WEST-FMP 138 1	1/17	286							103.43	108.24	open Wabasso-Gifford after 1st contingency and adjust TX taps at Malabar to raise 138kV voltage
476 POINSETT 500 1140 OKECHOBEC 500 1	1005 FELESMR 230 1744 SPANLKS 230 1	614 ROSEDALE 138 9381 WEST-FMP 138 1	1/17	286								101.25	open Wabasso-Gifford after 1st contingency and adjust TX taps at Malabar to raise 138kV voltage
476 POINSETT 500 1140 OKECHOBEC 500 1	1507 BAREFOOT 230 1744 SPANLKS 230 1	614 ROSEDALE 138 9381 WEST-FMP 138 1	1/17	286								100.91	
476 POINSETT 500 1140 OKECHOBEC 500 1	9382 VER-SOUT 138 9383 FV-CTYLN 138 1	614 ROSEDALE 138 9381 WEST-FMP 138 1	1/17	286							100.42	105.26	

C3 contingencies					2015 Winter Cases		2016 Winter Cases		2017 Winter Cases		2019 Winter Cases		
					Reference	Study	Reference	Study	Reference	Study	Reference	Study	
First Level Scenario	Cont Name	Monitored Facility	Areas	Rating (MVA)	Rate C	Rate C	Rate C	Rate C	Rate C	Rate C	Rate C	Rate C	Remedy/Comments
481 SEBSTIAN 138 1508 BAREFOOT 138 1	122 EMERSON 138 449 OSLO 138 1	9382 VER-SOUT 138 9403 VB SUB8 69.0 1	17	275			114.89	128.82	118.1	129.53	118.77	132.21	
481 SEBSTIAN 138 1508 BAREFOOT 138 1	122 EMERSON 138 449 OSLO 138 1	122 EMERSON 138 9383 FV-CTYLN 138 1	1/17	287			113.33	131.53	118.4	132.22	119.67	136.43	
481 SEBSTIAN 138 1508 BAREFOOT 138 1	122 EMERSON 138 449 OSLO 138 1	9382 VER-SOUT 138 9383 FV-CTYLN 138 1	17	330			101.51	119.99	102.75	116.82	104.25	121.12	
481 SEBSTIAN 138 1508 BAREFOOT 138 1	122 EMERSON 138 449 OSLO 138 1	9397 VB SUB7 69.0 9403 VB SUB8 69.0 1	17	106			124.22	137.87	123.03	135.27	125.22	139.71	
481 SEBSTIAN 138 1508 BAREFOOT 138 1	122 EMERSON 138 449 OSLO 138 1	9402 VBSUB11 69.0 9403 VB SUB8 69.0 1	17	89			93.3	112.62	94.73	108.61	96.24	113.05	
481 SEBSTIAN 138 1508 BAREFOOT 138 1	122 EMERSON 138 449 OSLO 138 1	9403 VB SUB8 69.0 9404 VB SUB1 69.0 1	17	106				112.98	92.43	109.4	93.07	113.7	
481 SEBSTIAN 138 1508 BAREFOOT 138 1	449 OSLO 138 614 ROSEDALE 138 1	9382 VER-SOUT 138 9403 VB SUB8 69.0 1	17	275	101.84	109.65	98.81	111.33	102.91	111.7	103.29	113.38	
481 SEBSTIAN 138 1508 BAREFOOT 138 1	449 OSLO 138 614 ROSEDALE 138 1	122 EMERSON 138 9383 FV-CTYLN 138 1	1/17	287		109.26		111.39	104.83	114.32	104.66	115.89	
481 SEBSTIAN 138 1508 BAREFOOT 138 1	449 OSLO 138 614 ROSEDALE 138 1	9382 VER-SOUT 138 9383 FV-CTYLN 138 1	17	330	90.01	99.66		100.58	90.44	100.14	90.48	101.53	switching mitigation: '481 SEBSTIAN 138 1508 BAREFOOT 138 1-SW' contingency
481 SEBSTIAN 138 1508 BAREFOOT 138 1	449 OSLO 138 614 ROSEDALE 138 1	9397 VB SUB7 69.0 9403 VB SUB8 69.0 1	17	106	102.28	107.88	102.47	109.84	103.64	109.32	104.13	110.56	
481 SEBSTIAN 138 1508 BAREFOOT 138 1	449 OSLO 138 1341 EMERBYPASS 138 1	9382 VER-SOUT 138 9403 VB SUB8 69.0 1	17	275	117.93	127.37							
481 SEBSTIAN 138 1508 BAREFOOT 138 1	449 OSLO 138 1341 EMERBYPASS 138 1	122 EMERSON 138 9383 FV-CTYLN 138 1	1/17	287	116.21	130.01							
481 SEBSTIAN 138 1508 BAREFOOT 138 1	449 OSLO 138 1341 EMERBYPASS 138 1	9382 VER-SOUT 138 9383 FV-CTYLN 138 1	17	330	105.42	119.8							
481 SEBSTIAN 138 1508 BAREFOOT 138 1	449 OSLO 138 1341 EMERBYPASS 138 1	9397 VB SUB7 69.0 9403 VB SUB8 69.0 1	17	106	125.66	137.11							
481 SEBSTIAN 138 1508 BAREFOOT 138 1	449 OSLO 138 1341 EMERBYPASS 138 1	9402 VBSUB11 69.0 9403 VB SUB8 69.0 1	17	89	97.28	111.81							
481 SEBSTIAN 138 1508 BAREFOOT 138 1	449 OSLO 138 1341 EMERBYPASS 138 1	9403 VB SUB8 69.0 9404 VB SUB1 69.0 1	17	106	94.97	112.22							
481 SEBSTIAN 138 1508 BAREFOOT 138 1	614 ROSEDALE 138 9381 WEST-FMP 138 1	9382 VER-SOUT 138 9403 VB SUB8 69.0 1	17	275	92.64	101.89	88.96	104.05	93.36	103.06	93.85	104.96	
481 SEBSTIAN 138 1508 BAREFOOT 138 1	614 ROSEDALE 138 9381 WEST-FMP 138 1	122 EMERSON 138 9383 FV-CTYLN 138 1	1/17	287		100.34		103.44		105.18		106.93	
542 GLENDALE 230 690 ADAMSPMT 230 1	9382 VER-SOUT 138 9383 FV-CTYLN 138 1	614 ROSEDALE 138 9381 WEST-FMP 138 1	1/17	286								100.62	open Wabasso-Gifford after 1st contingency and adjust TX taps at Malabar to raise 138kV voltage
614 ROSEDALE 138 9381 WEST-FMP 138 1	481 SEBSTIAN 138 1508 BAREFOOT 138 1	9382 VER-SOUT 138 9403 VB SUB8 69.0 1	17	275	92.65	101.91	88.96	104.05	93.36	103.06	93.85	104.96	
614 ROSEDALE 138 9381 WEST-FMP 138 1	481 SEBSTIAN 138 1508 BAREFOOT 138 1	122 EMERSON 138 9383 FV-CTYLN 138 1	1/17	287		100.36		103.44		105.18		106.93	switching mitigation: '614 ROSEDALE 138 9381 WEST FMP 138 1-SW' contingency + open breaker 189 @ Barefoot
690 ADAMSPMT 230 1031 PEACOCK 230 1	9382 VER-SOUT 138 9383 FV-CTYLN 138 1	614 ROSEDALE 138 9381 WEST-FMP 138 1	1/17	286								100.95	open Wabasso-Gifford after 1st contingency and adjust TX taps at Malabar to raise 138kV voltage
9382 VER-SOUT 138 9383 FV-CTYLN 138 1	1005 FELESMR 230 1744 SPANLKS 230 1	614 ROSEDALE 138 9381 WEST-FMP 138 1	1/17	286						100.93	108.51	113.3	
9382 VER-SOUT 138 9383 FV-CTYLN 138 1	122 EMERSON 138 449 OSLO 138 1	1508 BAREFOOT 138 1507 BAREFOOT 230 1	1	313				104.69	101.11	105.74	104.24	109.57	
9382 VER-SOUT 138 9383 FV-CTYLN 138 1	123 EMERSON 230 1005 FELESMR 230 1	614 ROSEDALE 138 9381 WEST-FMP 138 1	1/17	286						102.79	110.43	115.25	
9382 VER-SOUT 138 9383 FV-CTYLN 138 1	1507 BAREFOOT 230 1744 SPANLKS 230 1	614 ROSEDALE 138 9381 WEST-FMP 138 1	1/17	286						100.55	108.14	112.93	
9382 VER-SOUT 138 9383 FV-CTYLN 138 1	1508 BAREFOOT 138 1507 BAREFOOT 230 1	614 ROSEDALE 138 9381 WEST-FMP 138 1	1/17	286						101.77	103.09	109.15	
9382 VER-SOUT 138 9383 FV-CTYLN 138 1	266 MIDWAY 230 1031 PEACOCK 230 1	614 ROSEDALE 138 9381 WEST-FMP 138 1	1/17	286								101.44	After 1st contingency, open Sub9-10 and split Sub 7 bus so that Subs 3,6 & 9 are feed from one transformer. Will also need to open West-Gifford.
9382 VER-SOUT 138 9383 FV-CTYLN 138 1	449 OSLO 138 614 ROSEDALE 138 1	1508 BAREFOOT 138 1507 BAREFOOT 230 1	1	313								101.97	
9382 VER-SOUT 138 9383 FV-CTYLN 138 1	449 OSLO 138 1341 EMERBYPASS 138 1	1508 BAREFOOT 138 1507 BAREFOOT 230 1	1	313		103.59							
9382 VER-SOUT 138 9383 FV-CTYLN 138 1	476 POINSETT 500 467 POINSETT 230 1	614 ROSEDALE 138 9381 WEST-FMP 138 1	1/17	286							103.43	108.24	
9382 VER-SOUT 138 9383 FV-CTYLN 138 1	476 POINSETT 500 1140 OKECHOBEC 500 1	614 ROSEDALE 138 9381 WEST-FMP 138 1	1/17	286							100.42	105.26	
9382 VER-SOUT 138 9383 FV-CTYLN 138 1	542 GLENDALE 230 690 ADAMSPMT 230 1	614 ROSEDALE 138 9381 WEST-FMP 138 1	1/17	286								100.62	
9382 VER-SOUT 138 9383 FV-CTYLN 138 1	690 ADAMSPMT 230 1031 PEACOCK 230 1	614 ROSEDALE 138 9381 WEST-FMP 138 1	1/17	286								100.95	

Voltage

	C3 contingencies							2015 Winter Cases		2016 Winter Cases		2017 Winter Cases		2019 Winter Cases		
First Level Scenario	Cont Name	Bus Name	Area	Bus #	Base kV	C3 -Min Volt Limit	C3-Max Volt Limit	Reference	Study	Reference	Study	Reference	Study	Reference	Study	Remedy/Comments
481 SEBSTIAN 138 1508 BAREFOOT 138 1	122 EMERSON 138 449 OSLO 138 1	VB SUB6	17	9398	69	0.88	1.1			0.902	0.8019	0.9304	0.8578	0.9157	0.8301	
481 SEBSTIAN 138 1508 BAREFOOT 138 1	122 EMERSON 138 449 OSLO 138 1	VB SUB8	17	9403	69	0.88	1.1			0.9354	0.8533		0.8994	0.9451	0.8765	
481 SEBSTIAN 138 1508 BAREFOOT 138 1	122 EMERSON 138 449 OSLO 138 1	VB SUB3	17	9405	69	0.88	1.1			0.8996	0.7992	0.9297	0.8564	0.9149	0.8285	
481 SEBSTIAN 138 1508 BAREFOOT 138 1	122 EMERSON 138 449 OSLO 138 1	VB SUB7	17	9397	69	0.88	1.1			0.8999	0.7996	0.9304	0.857	0.9156	0.8291	
481 SEBSTIAN 138 1508 BAREFOOT 138 1	122 EMERSON 138 449 OSLO 138 1	SEBSTIAN	1	481	138	0.88	1.1			0.8663	0.7577	0.899	0.8165	0.8834	0.7877	
481 SEBSTIAN 138 1508 BAREFOOT 138 1	122 EMERSON 138 449 OSLO 138 1	WABASSO	1	457	138	0.88	1.1			0.8712	0.7628	0.9029	0.8208	0.8875	0.7922	
481 SEBSTIAN 138 1508 BAREFOOT 138 1	122 EMERSON 138 449 OSLO 138 1	GIFFORD	1	1734	138	0.88	1.1			0.8805	0.7724	0.9104	0.8291	0.8951	0.8006	
481 SEBSTIAN 138 1508 BAREFOOT 138 1	122 EMERSON 138 449 OSLO 138 1	WEST-FMP	17	9381	138	0.88	1.1			0.8854	0.7776	0.9144	0.8336	0.8992	0.8053	
481 SEBSTIAN 138 1508 BAREFOOT 138 1	122 EMERSON 138 449 OSLO 138 1	VB SUB9	17	9400	69	0.88	1.1			0.9018	0.803	0.9285	0.8572	0.9141	0.8301	
481 SEBSTIAN 138 1508 BAREFOOT 138 1	122 EMERSON 138 449 OSLO 138 1	ROSEDALE	1	614	138	0.88	1.1			0.8869	0.7786	0.9162	0.835	0.9009	0.8066	
481 SEBSTIAN 138 1508 BAREFOOT 138 1	122 EMERSON 138 449 OSLO 138 1	PIPER 5	17	9396	69	0.88	1.1			0.9139	0.8159	0.9389	0.8683	0.9251	0.8423	
481 SEBSTIAN 138 1508 BAREFOOT 138 1	122 EMERSON 138 449 OSLO 138 1	VB-G1	17	9413	13.8	0.88	1.1			0.8959	0.7945		0.847		0.8197	
481 SEBSTIAN 138 1508 BAREFOOT 138 1	122 EMERSON 138 449 OSLO 138 1	VB SUB10	17	9401	69	0.88	1.1			0.9192	0.8247	0.9424	0.875	0.9291	0.8498	
481 SEBSTIAN 138 1508 BAREFOOT 138 1	122 EMERSON 138 449 OSLO 138 1	VB SUB1	17	9404	69	0.88	1.1			0.9226	0.8259	0.9452	0.8761	0.932	0.851	
481 SEBSTIAN 138 1508 BAREFOOT 138 1	122 EMERSON 138 449 OSLO 138 1	VBSUB11	17	9402	69	0.88	1.1			0.9256	0.8364	0.9484	0.885	0.9355	0.8607	
481 SEBSTIAN 138 1508 BAREFOOT 138 1	122 EMERSON 138 449 OSLO 138 1	OSLO	1	449	138	0.88	1.1			0.8978	0.7869	0.9287	0.8458	0.9131	0.8164	
481 SEBSTIAN 138 1508 BAREFOOT 138 1	449 OSLO 138 614 ROSEDALE 138 1	VB SUB6	17	9398	69	0.88	1.1	0.8743	0.831	0.8774	0.8243	0.8755	0.8399	0.8776	0.8389	
481 SEBSTIAN 138 1508 BAREFOOT 138 1	449 OSLO 138 614 ROSEDALE 138 1	VB SUB8	17	9403	69	0.88	1.1	0.9177	0.8815	0.9238	0.8789	0.9205	0.8912	0.9231	0.891	
481 SEBSTIAN 138 1508 BAREFOOT 138 1	449 OSLO 138 614 ROSEDALE 138 1	VB SUB3	17	9405	69	0.88	1.1	0.8691	0.8264	0.871	0.8191	0.8702	0.8353	0.8724	0.8344	
481 SEBSTIAN 138 1508 BAREFOOT 138 1	449 OSLO 138 614 ROSEDALE 138 1	VB SUB7	17	9397	69	0.88	1.1	0.8689	0.8264	0.8705	0.8189	0.87	0.8353	0.8722	0.8344	
481 SEBSTIAN 138 1508 BAREFOOT 138 1	449 OSLO 138 614 ROSEDALE 138 1	SEBSTIAN	1	481	138	0.88	1.1	0.8201	0.7727	0.8203	0.7648	0.8202	0.7808	0.8223	0.7798	
481 SEBSTIAN 138 1508 BAREFOOT 138 1	449 OSLO 138 614 ROSEDALE 138 1	WABASSO	1	457	138	0.88	1.1	0.8244	0.777	0.8255	0.7699	0.8246	0.7852	0.8266	0.7842	
481 SEBSTIAN 138 1508 BAREFOOT 138 1	449 OSLO 138 614 ROSEDALE 138 1	GIFFORD	1	1734	138	0.88	1.1	0.8324	0.7853	0.8353	0.7796	0.8328	0.7935	0.8349	0.7925	
481 SEBSTIAN 138 1508 BAREFOOT 138 1	449 OSLO 138 614 ROSEDALE 138 1	WEST-FMP	17	9381	138	0.88	1.1	0.8367	0.7897	0.8406	0.7849	0.8373	0.7981	0.8394	0.7971	
481 SEBSTIAN 138 1508 BAREFOOT 138 1	449 OSLO 138 614 ROSEDALE 138 1	VB SUB9	17	9400	69	0.88	1.1	0.8765	0.8332	0.8807	0.8272	0.8779	0.8421	0.88	0.8411	
481 SEBSTIAN 138 1508 BAREFOOT 138 1	449 OSLO 138 614 ROSEDALE 138 1	ROSEDALE	1	614	138	0.88	1.1	0.8364	0.7894	0.8402	0.7845	0.837	0.7978	0.8391	0.7968	
481 SEBSTIAN 138 1508 BAREFOOT 138 1	449 OSLO 138 614 ROSEDALE 138 1	PIPER 5	17	9396	69	0.88	1.1	0.8887	0.8449	0.894	0.8397	0.8905	0.8541	0.8929	0.8534	
481 SEBSTIAN 138 1508 BAREFOOT 138 1	449 OSLO 138 614 ROSEDALE 138 1	VB-G1	17	9413	13.8	0.88	1.1	0.8723	0.8259	0.8788	0.8205	0.8737	0.8347	0.8756	0.8333	
481 SEBSTIAN 138 1508 BAREFOOT 138 1	449 OSLO 138 614 ROSEDALE 138 1	VB SUB10	17	9401	69	0.88	1.1	0.8967	0.8542	0.903	0.8499	0.8988	0.8635	0.9013	0.8628	
481 SEBSTIAN 138 1508 BAREFOOT 138 1	449 OSLO 138 614 ROSEDALE 138 1	VB SUB1	17	9404	69	0.88	1.1	0.8994	0.8552	0.9063	0.8509	0.9015	0.8645	0.904	0.8639	switching mitigation: '481 SEBSTIAN 138 1508 BAREFOOT 138 1-SW' contingency
481 SEBSTIAN 138 1508 BAREFOOT 138 1	449 OSLO 138 614 ROSEDALE 138 1	VB G3	17	9411	13.8	0.88	1.1	0.8994	0.8552		0.8509		0.8645		0.8639	
481 SEBSTIAN 138 1508 BAREFOOT 138 1	449 OSLO 138 614 ROSEDALE 138 1	VB G4	17	9412	13.8	0.88	1.1	0.8994	0.8552		0.8509		0.8645		0.8639	
481 SEBSTIAN 138 1508 BAREFOOT 138 1	449 OSLO 138 614 ROSEDALE 138 1	VBSUB11	17	9402	69	0.88	1.1	0.9051	0.8653	0.9113	0.8617	0.9075	0.8748	0.91	0.8743	
481 SEBSTIAN 138 1508 BAREFOOT 138 1	449 OSLO 138 1341 EMERBYPASS 138 1	VB SUB6	17	9398	69	0.88	1.1	0.8976	0.808							
481 SEBSTIAN 138 1508 BAREFOOT 138 1	449 OSLO 138 1341 EMERBYPASS 138 1	VB SUB8	17	9403	69	0.88	1.1	0.9272	0.8539							
481 SEBSTIAN 138 1508 BAREFOOT 138 1	449 OSLO 138 1341 EMERBYPASS 138 1	VB SUB3	17	9405	69	0.88	1.1	0.8967	0.8065							
481 SEBSTIAN 138 1508 BAREFOOT 138 1	449 OSLO 138 1341 EMERBYPASS 138 1	VB SUB7	17	9397	69	0.88	1.1	0.8973	0.9072							
481 SEBSTIAN 138 1508 BAREFOOT 138 1	449 OSLO 138 1341 EMERBYPASS 138 1	SEBSTIAN	1	481	138	0.88	1.1	0.8654	0.767							
481 SEBSTIAN 138 1508 BAREFOOT 138 1	449 OSLO 138 1341 EMERBYPASS 138 1	WABASSO	1	457	138	0.88	1.1	0.8694	0.7713							
481 SEBSTIAN 138 1508 BAREFOOT 138 1	449 OSLO 138 1341 EMERBYPASS 138 1	GIFFORD	1	1734	138	0.88	1.1	0.877	0.7795							
481 SEBSTIAN 138 1508 BAREFOOT 138 1	449 OSLO 138 1341 EMERBYPASS 138 1	WEST-FMP	17	9381	138	0.88	1.1	0.8811	0.7839							
481 SEBSTIAN 138 1508 BAREFOOT 138 1	449 OSLO 138 1341 EMERBYPASS 138 1	VB SUB9	17	9400	69	0.88	1.1	0.8961	0.808							
481 SEBSTIAN 138 1508 BAREFOOT 138 1	449 OSLO 138 1341 EMERBYPASS 138 1	ROSEDALE	1	614	138	0.88	1.1	0.8827	0.7851							
481 SEBSTIAN 138 1508 BAREFOOT 138 1	449 OSLO 138 1341 EMERBYPASS 138 1	PIPER 5	17	9396	69	0.88	1.1	0.907	0.8201							
481 SEBSTIAN 138 1508 BAREFOOT 138 1	449 OSLO 138 1341 EMERBYPASS 138 1	VB-G1	17	9413	13.8	0.88	1.1	0.8873	0.7976							
481 SEBSTIAN 138 1508 BAREFOOT 138 1	449 OSLO 138 1341 EMERBYPASS 138 1	VB SUB10	17	9401	69	0.88	1.1	0.9111	0.8274							
481 SEBSTIAN 138 1508 BAREFOOT 138 1	449 OSLO 138 1341 EMERBYPASS 138 1	VB SUB1	17	9404	69	0.88	1.1	0.9139	0.8286							
481 SEBSTIAN 138 1508 BAREFOOT 138 1	449 OSLO 138 1341 EMERBYPASS 138 1	VBSUB11	17	9402	69	0.88	1.1	0.9175	0.8382							
481 SEBSTIAN 138 1508 BAREFOOT 138 1	449 OSLO 138 1341 EMERBYPASS 138 1	OSLO	1	449	138	0.88	1.1	0.8946	0.7945							
481 SEBSTIAN 138 1508 BAREFOOT 138 1	614 ROSEDALE 138 9381 WEST-FMP 138 1	VB SUB6	17	9398	69	0.88	1.1	0.905	0.8641	0.9127	0.852	0.9068	0.8704	0.9085	0.8688	
481 SEBSTIAN 138 1508 BAREFOOT 138 1	614 ROSEDALE 138 9381 WEST-FMP 138 1	VB SUB3	17	9405	69	0.88	1.1	0.9009	0.8605	0.9076	0.8476	0.9026	0.8668	0.9043	0.8652	
481 SEBSTIAN 138 1508 BAREFOOT 138 1	614 ROSEDALE 138 9381 WEST-FMP 138 1	VB SUB7	17	9397	69	0.88	1.1	0.9008	0.8606	0.9074	0.8476	0.9026	0.8669	0.9043	0.8653	
481 SEBSTIAN 138 1508 BAREFOOT 138 1	614 ROSEDALE 138 9381 WEST-FMP 138 1	SEBSTIAN	1	481	138	0.88	1.1	0.8539	0.8079	0.8604	0.7939	0.8551	0.8134	0.8566	0.8116	
481 SEBSTIAN 138 1508 BAREFOOT 138 1	614 ROSEDALE 138 9381 WEST-FMP 138 1	WABASSO	1	457	138	0.88	1.1	0.8581	0.8122	0.8654	0.7992	0.8592	0.8178	0.8608	0.8161	
481 SEBSTIAN 138 1508 BAREFOOT 138 1	614 ROSEDALE 138 9381 WEST-FMP 138 1	GIFFORD	1	1734	138	0.88	1.1	0.8658	0.8204	0.8747	0.8093	0.8671	0.8262	0.8687	0.8244	
481 SEBSTIAN 138 1508 BAREFOOT 138 1	614 ROSEDALE 138 9381 WEST-FMP 138 1	WEST-FMP	17	9381	138	0.88	1.1	0.8699	0.8248	0.8797	0.8148	0.8714	0.8307	0.873	0.829	
481 SEBSTIAN 138 1508 BAREFOOT 138 1	614 ROSEDALE 138 9381 WEST-FMP 138 1	VB SUB9	17	9400	69	0.88	1.1	0.906	0.8651	0.9145	0.8539	0.9079	0.8715	0.9096	0.8699	
481 SEBSTIAN 138 1508 BAREFOOT 138 1	614 ROSEDALE 138 9381 WEST-FMP 138 1	PIPER 5	17	9396	69	0.88	1.1	0.9169	0.8756	0.9263	0.8652	0.9191	0.8822	0.9211	0.8809	
481 SEBSTIAN 138 1508 BAREFOOT 138 1	614 ROSEDALE 138 9381 WEST-FMP 138 1	VB-G1	17	9413	13.8	0.88	1.1	0.8997	0.8562		0.8459		0.8626		0.8607	
481 SEBSTIAN 138 1508 BAREFOOT 138 1	614 ROSEDALE 138 9381 WEST-FMP 138 1	VB SUB10	17	9401	69	0.88	1.1	0.9233	0.8832	0.9332	0.8739	0.9256	0.89	0.9277	0.8888	
481 SEBSTIAN 138 1508 BAREFOOT 138 1	614 ROSEDALE 138 9381 WEST-FMP 138 1	VB SUB1	17	9404	69	0.88	1.1	0.9259	0.8842	0.9365	0.8749	0.9283	0.891	0.9304	0.8899	
457 WABASSO 138 481 SEBSTIAN 138 1	449 OSLO 138 614 ROSEDALE 138 1	WABASSO	1	457	138	0.88	1.1	0.913	0.8757	0.923	0.8702	0.9087	0.8747	0.9109	0.8745	
457 WABASSO 138 481 SEBSTIAN 138 1	449 OSLO 138 614 ROSEDALE 138 1	GIFFORD	1	1734	138	0.88	1.1	0.9162	0.8791	0.927	0.8744	0.912	0.8781	0.9142	0.8779	switching mitigation: '457 WABASSO 138 481 SEBSTIAN 138 1-SW' contingency
457 WABASSO 138 481 SEBSTIAN 138 1	449 OSLO 138 614 ROSEDALE 138 1	WEST-FMP	17	9381	138	0.88	1.1	0.9182	0.8811	0.9293	0.8769	0.914	0.8802	0.9163	0.8801	
457 WABASSO 138 481 SEBSTIAN 138 1	449 OSLO 138 614 ROSEDALE 138 1	ROSEDALE	1	614	138	0.88	1.1	0.9179	0.8808	0.929	0.8766	0.9138	0.88	0.916	0.8798	

	C3 contingencies							2015 Winter Cases		2016 Winter Cases		2017 Winter Cases		2019 Winter Cases		
First Level Scenario	Cont Name	Bus Name	Area	Bus #	Base kV	C3 -Min Volt Limit	C3-Max Volt Limit	Reference	Study	Reference	Study	Reference	Study	Reference	Study	Remedy/Comments
9382 VER-SOUT 138 9383 FV-CTYLN 138 1	449 OSLO 138 614 ROSEDALE 138 1	VB SUB8	17	9403	69	0.88	1.1	0.9489	0.889		0.8675	0.9482	0.8851	0.9444	0.8756	After 1st contingency, open Sub9-10 and split Sub 7 bus so that Subs 3,6 & 9 are feed from one transformer. Will also need to open West-Gifford.
9382 VER-SOUT 138 9383 FV-CTYLN 138 1	449 OSLO 138 614 ROSEDALE 138 1	GIFFORD	1	1734	138	0.88	1.1	0.9349	0.8907	0.9457	0.8781	0.9347	0.8882	0.9317	0.8809	
9382 VER-SOUT 138 9383 FV-CTYLN 138 1	449 OSLO 138 614 ROSEDALE 138 1	WEST-FMP	17	9381	138	0.88	1.1	0.9316	0.884	0.9432	0.8709	0.9313	0.8813	0.9281	0.8737	
9382 VER-SOUT 138 9383 FV-CTYLN 138 1	449 OSLO 138 614 ROSEDALE 138 1	VB SUB9	17	9400	69	0.88	1.1	0.9438	0.8861		0.8645	0.943	0.8821	0.939	0.8726	
9382 VER-SOUT 138 9383 FV-CTYLN 138 1	449 OSLO 138 614 ROSEDALE 138 1	ROSEDALE	1	614	138	0.88	1.1	0.9313	0.8838	0.9429	0.8705	0.931	0.8811	0.9279	0.8734	
9382 VER-SOUT 138 9383 FV-CTYLN 138 1	449 OSLO 138 614 ROSEDALE 138 1	PIPER 5	17	9396	69	0.88	1.1	0.9485	0.889		0.8677	0.9479	0.8852	0.9441	0.8758	
9382 VER-SOUT 138 9383 FV-CTYLN 138 1	449 OSLO 138 614 ROSEDALE 138 1	VB SUB10	17	9401	69	0.88	1.1	0.9454	0.8839		0.8622	0.9447	0.8798	0.9408	0.8702	
9382 VER-SOUT 138 9383 FV-CTYLN 138 1	449 OSLO 138 614 ROSEDALE 138 1	VB SUB1	17	9404	69	0.88	1.1	0.9482	0.8852		0.8636	0.9476	0.8813	0.9438	0.8717	
9382 VER-SOUT 138 9383 FV-CTYLN 138 1	449 OSLO 138 614 ROSEDALE 138 1	VBSUB11	17	9402	69	0.88	1.1	0.9457	0.8848		0.8631	0.945	0.8808	0.9411	0.8712	
9382 VER-SOUT 138 9383 FV-CTYLN 138 1	449 OSLO 138 614 ROSEDALE 138 1	VER-SOUT	17	9382	138	0.88	1.1	0.9347	0.8701	0.9457	0.849	0.934	0.8663	0.9303	0.857	
449 OSLO 138 614 ROSEDALE 138 1	457 WABASSO 138 481 SEBSTIAN 138 1	WABASSO	1	457	138	0.88	1.1	0.9133	0.8762	0.9231	0.8703	0.9087	0.8747	0.9109	0.8745	switching mitigation: '449 OSLO 138 614 ROSEDALE 138 1-SW' contingency + open breaker 189 @ Barefoot
449 OSLO 138 614 ROSEDALE 138 1	457 WABASSO 138 481 SEBSTIAN 138 1	GIFFORD	1	1734	138	0.88	1.1	0.9165	0.8795	0.927	0.8744	0.912	0.8782	0.9143	0.879	
449 OSLO 138 614 ROSEDALE 138 1	457 WABASSO 138 481 SEBSTIAN 138 1	WEST-FMP	17	9381	138	0.88	1.1	0.9184	0.8816	0.9293	0.8769	0.9141	0.8803	0.9163	0.8801	
449 OSLO 138 614 ROSEDALE 138 1	457 WABASSO 138 481 SEBSTIAN 138 1	ROSEDALE	1	614	138	0.88	1.1	0.9181	0.8813	0.929	0.8766	0.9138	0.88	0.916	0.8799	
449 OSLO 138 614 ROSEDALE 138 1	481 SEBSTIAN 138 1508 BAREFOOT 138 1	VB SUB6	17	9398	69	0.88	1.1	0.8743	0.831	0.8774	0.8243	0.8755	0.8399	0.8776	0.8389	
449 OSLO 138 614 ROSEDALE 138 1	481 SEBSTIAN 138 1508 BAREFOOT 138 1	VB SUB8	17	9403	69	0.88	1.1	0.9176	0.8814	0.9238	0.8789	0.9205	0.8912	0.9231	0.891	
449 OSLO 138 614 ROSEDALE 138 1	481 SEBSTIAN 138 1508 BAREFOOT 138 1	VB SUB3	17	9405	69	0.88	1.1	0.8691	0.8264	0.871	0.8191	0.8702	0.8353	0.8724	0.8344	
449 OSLO 138 614 ROSEDALE 138 1	481 SEBSTIAN 138 1508 BAREFOOT 138 1	VB SUB7	17	9397	69	0.88	1.1	0.8689	0.8264	0.8705	0.8189	0.87	0.8353	0.8722	0.8344	
449 OSLO 138 614 ROSEDALE 138 1	481 SEBSTIAN 138 1508 BAREFOOT 138 1	SEBSTIAN	1	481	138	0.88	1.1	0.8201	0.7727	0.8203	0.7648	0.8202	0.7808	0.8223	0.7798	
449 OSLO 138 614 ROSEDALE 138 1	481 SEBSTIAN 138 1508 BAREFOOT 138 1	WABASSO	1	457	138	0.88	1.1	0.8243	0.777	0.8255	0.7699	0.8246	0.7852	0.8267	0.7842	
449 OSLO 138 614 ROSEDALE 138 1	481 SEBSTIAN 138 1508 BAREFOOT 138 1	GIFFORD	1	1734	138	0.88	1.1	0.8323	0.7852	0.8353	0.7796	0.8328	0.7935	0.8349	0.7925	
449 OSLO 138 614 ROSEDALE 138 1	481 SEBSTIAN 138 1508 BAREFOOT 138 1	WEST-FMP	17	9381	138	0.88	1.1	0.8366	0.7897	0.8406	0.7849	0.8373	0.7981	0.8394	0.7971	
449 OSLO 138 614 ROSEDALE 138 1	481 SEBSTIAN 138 1508 BAREFOOT 138 1	VB SUB9	17	9400	69	0.88	1.1	0.8765	0.8331	0.8807	0.8272	0.8779	0.8421	0.88	0.8411	
449 OSLO 138 614 ROSEDALE 138 1	481 SEBSTIAN 138 1508 BAREFOOT 138 1	ROSEDALE	1	614	138	0.88	1.1	0.8363	0.7894	0.8402	0.7845	0.837	0.7978	0.8391	0.7968	
449 OSLO 138 614 ROSEDALE 138 1	481 SEBSTIAN 138 1508 BAREFOOT 138 1	PIPER 5	17	9396	69	0.88	1.1	0.8887	0.8449	0.894	0.8397	0.8905	0.8541	0.8929	0.8534	
449 OSLO 138 614 ROSEDALE 138 1	481 SEBSTIAN 138 1508 BAREFOOT 138 1	VB-G1	17	9413	13.8	0.88	1.1	0.8723	0.8259	0.8788	0.8205	0.8737	0.8347	0.8756	0.8333	
449 OSLO 138 614 ROSEDALE 138 1	481 SEBSTIAN 138 1508 BAREFOOT 138 1	VB SUB10	17	9401	69	0.88	1.1	0.8967	0.8541	0.903	0.8499	0.8988	0.8635	0.9013	0.8628	
449 OSLO 138 614 ROSEDALE 138 1	481 SEBSTIAN 138 1508 BAREFOOT 138 1	VB SUB1	17	9404	69	0.88	1.1	0.8994	0.8551	0.9063	0.8509	0.9015	0.8645	0.904	0.8639	
449 OSLO 138 614 ROSEDALE 138 1	481 SEBSTIAN 138 1508 BAREFOOT 138 1	VB G3	17	9411	13.8	0.88	1.1	0.8994	0.8551		0.8509		0.8645		0.8639	
449 OSLO 138 614 ROSEDALE 138 1	481 SEBSTIAN 138 1508 BAREFOOT 138 1	VB G4	17	9412	13.8	0.88	1.1	0.8994	0.8551		0.8509		0.8645		0.8639	
449 OSLO 138 614 ROSEDALE 138 1	481 SEBSTIAN 138 1508 BAREFOOT 138 1	VBSUB11	17	9402	69	0.88	1.1	0.9051	0.8652	0.9113	0.8617	0.9075	0.8748	0.91	0.8743	
449 OSLO 138 614 ROSEDALE 138 1	9382 VER-SOUT 138 9383 FV-CTYLN 138 1	VB SUB8	17	9403	69	0.88	1.1	0.9491	0.8893		0.8675	0.9487	0.8851	0.9444	0.8756	
449 OSLO 138 614 ROSEDALE 138 1	9382 VER-SOUT 138 9383 FV-CTYLN 138 1	GIFFORD	1	1734	138	0.88	1.1	0.935	0.8909	0.9457	0.8782	0.935	0.8883	0.9317	0.881	
449 OSLO 138 614 ROSEDALE 138 1	9382 VER-SOUT 138 9383 FV-CTYLN 138 1	WEST-FMP	17	9381	138	0.88	1.1	0.9317	0.8843	0.9432	0.8709	0.9316	0.8814	0.9281	0.8737	
449 OSLO 138 614 ROSEDALE 138 1	9382 VER-SOUT 138 9383 FV-CTYLN 138 1	VB SUB9	17	9400	69	0.88	1.1	0.9439	0.8864		0.8645	0.9435	0.8822	0.9391	0.8726	
449 OSLO 138 614 ROSEDALE 138 1	9382 VER-SOUT 138 9383 FV-CTYLN 138 1	ROSEDALE	1	614	138	0.88	1.1	0.9314	0.884	0.9429	0.8706	0.9313	0.8811	0.9279	0.8734	
449 OSLO 138 614 ROSEDALE 138 1	9382 VER-SOUT 138 9383 FV-CTYLN 138 1	PIPER 5	17	9396	69	0.88	1.1	0.9486	0.8893		0.8677	0.9483	0.8852	0.9441	0.8759	
449 OSLO 138 614 ROSEDALE 138 1	9382 VER-SOUT 138 9383 FV-CTYLN 138 1	VB SUB10	17	9401	69	0.88	1.1	0.9455	0.8841		0.8622	0.9451	0.8799	0.9408	0.8703	
449 OSLO 138 614 ROSEDALE 138 1	9382 VER-SOUT 138 9383 FV-CTYLN 138 1	VB SUB1	17	9404	69	0.88	1.1	0.9483	0.8855		0.8637	0.948	0.8813	0.9438	0.8718	
449 OSLO 138 614 ROSEDALE 138 1	9382 VER-SOUT 138 9383 FV-CTYLN 138 1	VBSUB11	17	9402	69	0.88	1.1	0.9458	0.8851		0.8632	0.9454	0.8808	0.9411	0.8712	
449 OSLO 138 614 ROSEDALE 138 1	9382 VER-SOUT 138 9383 FV-CTYLN 138 1	VER-SOUT	17	9382	138	0.88	1.1	0.9348	0.8704	0.9457	0.8491	0.9344	0.8663	0.9303	0.857	
614 ROSEDALE 138 9381 WEST-FMP 138 1	481 SEBSTIAN 138 1508 BAREFOOT 138 1	VB SUB6	17	9398	69	0.88	1.1	0.9049	0.8639	0.9127	0.852	0.9068	0.8704	0.9085	0.8688	switching mitigation: '614 ROSEDALE 138 9381 WEST-FMP 138 1-SW' contingency + open breaker 189 @ Barefoot
614 ROSEDALE 138 9381 WEST-FMP 138 1	481 SEBSTIAN 138 1508 BAREFOOT 138 1	VB SUB3	17	9405	69	0.88	1.1	0.9008	0.8603	0.9076	0.8476	0.9026	0.8667	0.9043	0.8652	
614 ROSEDALE 138 9381 WEST-FMP 138 1	481 SEBSTIAN 138 1508 BAREFOOT 138 1	VB SUB7	17	9397	69	0.88	1.1	0.9008	0.8604	0.9074	0.8476	0.9026	0.8669	0.9043	0.8653	
614 ROSEDALE 138 9381 WEST-FMP 138 1	481 SEBSTIAN 138 1508 BAREFOOT 138 1	SEBSTIAN	1	481	138	0.88	1.1	0.8539	0.8077	0.8604	0.7939	0.8551	0.8134	0.8566	0.8116	
614 ROSEDALE 138 9381 WEST-FMP 138 1	481 SEBSTIAN 138 1508 BAREFOOT 138 1	WABASSO	1	457	138	0.88	1.1	0.858	0.812	0.8654	0.7992	0.8592	0.8178	0.8608	0.8161	
614 ROSEDALE 138 9381 WEST-FMP 138 1	481 SEBSTIAN 138 1508 BAREFOOT 138 1	GIFFORD	1	1734	138	0.88	1.1	0.8657	0.8202	0.8747	0.8093	0.8671	0.8261	0.8687	0.8244	
614 ROSEDALE 138 9381 WEST-FMP 138 1	481 SEBSTIAN 138 1508 BAREFOOT 138 1	WEST-FMP	17	9381	138	0.88	1.1	0.8699	0.8246	0.8797	0.8148	0.8714	0.8307	0.873	0.829	
614 ROSEDALE 138 9381 WEST-FMP 138 1	481 SEBSTIAN 138 1508 BAREFOOT 138 1	VB SUB9	17	9400	69	0.88	1.1	0.9059	0.8649	0.9145	0.8539	0.9079	0.8716	0.9096	0.8696	
614 ROSEDALE 138 9381 WEST-FMP 138 1	481 SEBSTIAN 138 1508 BAREFOOT 138 1	PIPER 5	17	9396	69	0.88	1.1	0.9169	0.8754	0.9263	0.8651	0.9191	0.8822	0.9211	0.8809	
614 ROSEDALE 138 9381 WEST-FMP 138 1	481 SEBSTIAN 138 1508 BAREFOOT 138 1	VB-G1	17	9413	13.8	0.88	1.1	0.8997	0.856		0.8459		0.8625		0.8607	
614 ROSEDALE 138 9381 WEST-FMP 138 1	481 SEBSTIAN 138 1508 BAREFOOT 138 1	VB SUB10	17	9401	69	0.88	1.1	0.9232	0.883	0.9332	0.8739	0.9256	0.89	0.9277	0.8888	
614 ROSEDALE 138 9381 WEST-FMP 138 1	481 SEBSTIAN 138 1508 BAREFOOT 138 1	VB SUB1	17	9404	69	0.88	1.1	0.9259	0.884	0.9365	0.8749	0.9283	0.891	0.9304	0.8899	
449 OSLO 138 1341 EMERBYPASS 138 1	481 SEBSTIAN 138 1508 BAREFOOT 138 1	VB SUB6	17	9398	69	0.88	1.1	0.8978	0.808							switching mitigation: '449 OSLO 1341 EMERBYPASS 138 1-SW' contingency + open breaker 189 @ Barefoot
449 OSLO 138 1341 EMERBYPASS 138 1	481 SEBSTIAN 138 1508 BAREFOOT 138 1	VB SUB8	17	9403	69	0.88	1.1	0.9274	0.8539							
449 OSLO 138 1341 EMERBYPASS 138 1	481 SEBSTIAN 138 1508 BAREFOOT 138 1	VB SUB3	17	9405	69	0.88	1.1	0.8969	0.8065							
449 OSLO 138 1341 EMERBYPASS 138 1	481 SEBSTIAN 138 1508 BAREFOOT 138 1	VB SUB7	17	9397	69	0.88	1.1	0.8975	0.8072							
449 OSLO 138 1341 EMERBYPASS 138 1	481 SEBSTIAN 138 1508 BAREFOOT 138 1	SEBSTIAN	1	481	138	0.88	1.1	0.8656	0.767							
449 OSLO 138 1341 EMERBYPASS 138 1	481 SEBSTIAN 138 1508 BAREFOOT 138 1	WABASSO	1	457	138	0.88	1.1	0.8696	0.7713							
449 OSLO 138 1341 EMERBYPASS 138 1	481 SEBSTIAN 138 1508 BAREFOOT 138 1	GIFFORD	1	1734	138	0.88	1.1	0.8772	0.7794							
449 OSLO 138 1341 EMERBYPASS 138 1	481 SEBSTIAN 138 1508 BAREFOOT 138 1	WEST-FMP	17	9381	138	0.88	1.1	0.8813	0.7839							
449 OSLO 138 1341 EMERBYPASS 138 1	481 SEBSTIAN 138 1508 BAREFOOT 138 1	VB SUB9	17	9400	69	0.88	1.1	0.8963	0.808							
449 OSLO 138 1341 EMERBYPASS 138 1	481 SEBSTIAN 138 1508 BAREFOOT 138 1	ROSEDALE	1	614	138	0.88	1.1	0.883	0.7851							
449 OSLO 138 1341 EMERBYPASS 138 1	481 SEBSTIAN 138 1508 BAREFOOT 138 1	PIPER 5	17	9396	69	0.88	1.1	0.9072	0.8201							
449 OSLO 138 1341 EMERBYPASS 138 1	481 SEBSTIAN 138 1508 BAREFOOT 138 1	VB-G1	17	9413	13.8	0.88	1.1	0.8875	0.7976							
449 OSLO 138 1341 EMERBYPASS 138 1	481 SEBSTIAN 138 1508 BAREFOOT 138 1	VB SUB10	17	9401	69	0.88	1.1	0.9113	0.8274							
449 OSLO 138 1341 EMERBYPASS 138 1	481 SEBSTIAN 138 1508 BAREFOOT 138 1	VB SUB1	17	9404	69	0.88	1.1	0.9141	0.8286							
449 OSLO 138 1341 EMERBYPASS 138 1	481 SEBSTIAN 138 1508 BAREFOOT 138 1	VBSUB11	17	9402	69	0.88	1.1	0.9177	0.8382							
449 OSLO 138 1341 EMERBYPASS 138 1	481 SEBSTIAN 138 1508 BAREFOOT 138 1	OSLO	1	449	138	0.88	1.1	0.8948	0.7945							

	C3 contingencies								2015 Winter Cases		2016 Winter Cases		2017 Winter Cases		2019 Winter Cases		
First Level Scenario	Cont Name	Bus Name	Area	Bus #	Base kV	C3 -Min Volt Limit	C3-Max Volt Limit	Reference	Study	Reference	Study	Reference	Study	Reference	Study	Remedy/Comments
446 MALABAR 138 450 PALM BAY 138 1	1508 BAREFOOT 138 1507 BAREFOOT 230 1	SEBSTIAN	1	481	138	0.88	1.1	0.8736	0.8556	0.8582	0.8374	0.9024	0.8904	0.8944	0.8808	
446 MALABAR 138 450 PALM BAY 138 1	1508 BAREFOOT 138 1507 BAREFOOT 230 1	WABASSO	1	457	138	0.88	1.1	0.8925	0.8754	0.8826	0.8625	0.9206	0.9091	0.913	0.9001	
446 MALABAR 138 450 PALM BAY 138 1	1508 BAREFOOT 138 1507 BAREFOOT 230 1	BAREFOOT	1	1508	138	0.88	1.1	0.8615	0.843	0.8422	0.8209	0.8908	0.8785	0.8825	0.8685	
446 MALABAR 138 450 PALM BAY 138 1	1508 BAREFOOT 138 1507 BAREFOOT 230 1	PALM BAY	1	450	138	0.88	1.1	0.8382	0.8186	0.8096	0.7876	0.8685	0.8556	0.8597	0.8447	open breaker 189 @ Barefoot after 1st contingency
446 MALABAR 138 450 PALM BAY 138 1	1508 BAREFOOT 138 1507 BAREFOOT 230 1	BABCOCK	1	573	138	0.88	1.1	0.8407	0.8211	0.8127	0.7907	0.8709	0.858	0.8621	0.8472	
446 MALABAR 138 450 PALM BAY 138 1	1508 BAREFOOT 138 1507 BAREFOOT 230 1	GRANT	1	849	138	0.88	1.1	0.8514	0.8324	0.8283	0.8066	0.881	0.8685	0.8726	0.8581	
446 MALABAR 138 450 PALM BAY 138 1	1508 BAREFOOT 138 1507 BAREFOOT 230 1	MICCO	1	448	138	0.88	1.1	0.8569	0.8381	0.8359	0.8144	0.8863	0.8739	0.8779	0.8637	
450 PALM BAY 138 573 BABCOCK 138 1	1508 BAREFOOT 138 1507 BAREFOOT 230 1	BABCOCK	1	573	138	0.88	1.1	0.9165	0.9015	0.8994	0.8792	0.9179	0.9065	0.9267	0.9143	open breaker 189 @ Barefoot after 1st contingency
122 EMERSON 138 449 OSLO 138 1	481 SEBSTIAN 138 1508 BAREFOOT 138 1	VB SUB6	17	9398	69	0.88	1.1			0.9021	0.8019	0.9305	0.8581	0.9158	0.8301	
122 EMERSON 138 449 OSLO 138 1	481 SEBSTIAN 138 1508 BAREFOOT 138 1	VB SUB8	17	9403	69	0.88	1.1			0.9354	0.8533		0.8996	0.9452	0.8766	
122 EMERSON 138 449 OSLO 138 1	481 SEBSTIAN 138 1508 BAREFOOT 138 1	VB SUB3	17	9405	69	0.88	1.1			0.8996	0.7992	0.9298	0.8567	0.915	0.8285	
122 EMERSON 138 449 OSLO 138 1	481 SEBSTIAN 138 1508 BAREFOOT 138 1	VB SUB7	17	9397	69	0.88	1.1			0.8999	0.7996	0.9305	0.8573	0.9156	0.8292	
122 EMERSON 138 449 OSLO 138 1	481 SEBSTIAN 138 1508 BAREFOOT 138 1	SEBSTIAN	1	481	138	0.88	1.1			0.8663	0.7577	0.8991	0.8168	0.8835	0.7877	
122 EMERSON 138 449 OSLO 138 1	481 SEBSTIAN 138 1508 BAREFOOT 138 1	WABASSO	1	457	138	0.88	1.1			0.8713	0.7628	0.903	0.8211	0.8875	0.7922	
122 EMERSON 138 449 OSLO 138 1	481 SEBSTIAN 138 1508 BAREFOOT 138 1	GIFFORD	1	1734	138	0.88	1.1			0.8805	0.7724	0.9105	0.8294	0.8951	0.8008	
122 EMERSON 138 449 OSLO 138 1	481 SEBSTIAN 138 1508 BAREFOOT 138 1	WEST-FMP	17	9381	138	0.88	1.1			0.8855	0.7776	0.9145	0.8339	0.8993	0.8053	switching mitigation: '122 EMERSON 138 449 OSLO 138 1-SW'
122 EMERSON 138 449 OSLO 138 1	481 SEBSTIAN 138 1508 BAREFOOT 138 1	VB SUB9	17	9400	69	0.88	1.1			0.9019	0.803	0.9286	0.8575	0.9141	0.8301	contingency + open breaker 189 @ Barefoot
122 EMERSON 138 449 OSLO 138 1	481 SEBSTIAN 138 1508 BAREFOOT 138 1	ROSEDALE	1	614	138	0.88	1.1			0.8869	0.7786	0.9162	0.8353	0.901	0.8066	
122 EMERSON 138 449 OSLO 138 1	481 SEBSTIAN 138 1508 BAREFOOT 138 1	PIPER 5	17	9396	69	0.88	1.1			0.9139	0.8159	0.9389	0.8686	0.9252	0.8423	
122 EMERSON 138 449 OSLO 138 1	481 SEBSTIAN 138 1508 BAREFOOT 138 1	VB-G1	17	9413	13.8	0.88	1.1			0.8959	0.7945		0.8472		0.8197	
122 EMERSON 138 449 OSLO 138 1	481 SEBSTIAN 138 1508 BAREFOOT 138 1	VB SUB10	17	9401	69	0.88	1.1			0.9192	0.8247	0.9425	0.8752	0.9292	0.8498	
122 EMERSON 138 449 OSLO 138 1	481 SEBSTIAN 138 1508 BAREFOOT 138 1	VB SUB1	17	9404	69	0.88	1.1			0.9226	0.8259	0.9452	0.8763	0.9321	0.851	
122 EMERSON 138 449 OSLO 138 1	481 SEBSTIAN 138 1508 BAREFOOT 138 1	VBSUB11	17	9402	69	0.88	1.1			0.9257	0.8364	0.9484	0.8852	0.9355	0.8607	
122 EMERSON 138 449 OSLO 138 1	481 SEBSTIAN 138 1508 BAREFOOT 138 1	OSLO	1	449	138	0.88	1.1			0.8979	0.7869	0.9288	0.8499	0.9132	0.8160	

Switching Mitigation	
Contingency '9403 VB SUB8 9404 VB SUB1 69.0 1-SW'	Contingency '614 ROSEDALE 138 9381 WEST-FMP 138 1-SW'
OPEN BRANCH FROM BUS 9403 TO BUS 9404 CKT 1	OPEN BRANCH FROM BUS 614 TO BUS 9381 CKT 1
OPEN BRANCH FROM BUS 9400 TO BUS 9401 CKT 1	OPEN BRANCH FROM BUS 9400 TO BUS 9401 CKT 1
OPEN BRANCH FROM BUS 9401 TO BUS 9404 CKT 1	OPEN BRANCH FROM BUS 9401 TO BUS 9404 CKT 1
OPEN BRANCH FROM BUS 9397 TO BUS 9403 CKT 1	OPEN BRANCH FROM BUS 9396 TO BUS 9404 CKT 1
OPEN BRANCH FROM BUS 1734 TO BUS 9381 CKT 1	OPEN BRANCH FROM BUS 9397 TO BUS 9403 CKT 1
END	OPEN BRANCH FROM BUS 4002 TO BUS 9383 CKT 1
	END
Contingency '9402 VB SUB11 9403 VB SUB8 69.0 1-SW'	
OPEN BRANCH FROM BUS 9402 TO BUS 9403 CKT 1	Contingency '481 SEBSTIAN 138 1508 BAREFOOT 138 1-SW'
OPEN BRANCH FROM BUS 9400 TO BUS 9401 CKT 1	OPEN BRANCH FROM BUS 481 TO BUS 1508 CKT 1
OPEN BRANCH FROM BUS 9396 TO BUS 9404 CKT 1	OPEN BRANCH FROM BUS 9400 TO BUS 9401 CKT 1
OPEN BRANCH FROM BUS 9397 TO BUS 9403 CKT 1	OPEN BRANCH FROM BUS 9401 TO BUS 9404 CKT 1
OPEN BRANCH FROM BUS 4002 TO BUS 9383 CKT 1	OPEN BRANCH FROM BUS 9396 TO BUS 9404 CKT 1
END	OPEN BRANCH FROM BUS 9397 TO BUS 9403 CKT 1
	OPEN BRANCH FROM BUS 4002 TO BUS 9383 CKT 1
Contingency '449 OSLO 1341 EMERBYPASS 138 1-SW'	END
OPEN BRANCH FROM BUS 449 TO BUS 1341 CKT 1	
OPEN BRANCH FROM BUS 9400 TO BUS 9401 CKT 1	Contingency '457 WABASSO 138 481 SEBSTIAN 138 1-SW'
OPEN BRANCH FROM BUS 9401 TO BUS 9404 CKT 1	OPEN BRANCH FROM BUS 457 TO BUS 481 CKT 1
OPEN BRANCH FROM BUS 9396 TO BUS 9404 CKT 1	OPEN BRANCH FROM BUS 9400 TO BUS 9401 CKT 1
OPEN BRANCH FROM BUS 9397 TO BUS 9403 CKT 1	OPEN BRANCH FROM BUS 9401 TO BUS 9404 CKT 1
OPEN BRANCH FROM BUS 4002 TO BUS 9383 CKT 1	OPEN BRANCH FROM BUS 9396 TO BUS 9404 CKT 1
END	OPEN BRANCH FROM BUS 9397 TO BUS 9403 CKT 1
	OPEN BRANCH FROM BUS 4002 TO BUS 9383 CKT 1
Contingency '122 EMERSON 138 449 OSLO 138 1-SW'	END
OPEN BRANCH FROM BUS 122 TO BUS 449 CKT 1	
OPEN BRANCH FROM BUS 9400 TO BUS 9401 CKT 1	Contingency '457 WABASSO 138 1734 GIFFORD 138 1-SW'
OPEN BRANCH FROM BUS 9401 TO BUS 9404 CKT 1	OPEN BRANCH FROM BUS 457 TO BUS 1734 CKT 1
OPEN BRANCH FROM BUS 9396 TO BUS 9404 CKT 1	OPEN BRANCH FROM BUS 9400 TO BUS 9401 CKT 1
OPEN BRANCH FROM BUS 9397 TO BUS 9403 CKT 1	OPEN BRANCH FROM BUS 9401 TO BUS 9404 CKT 1
OPEN BRANCH FROM BUS 4002 TO BUS 9383 CKT 1	OPEN BRANCH FROM BUS 9396 TO BUS 9404 CKT 1
END	OPEN BRANCH FROM BUS 9397 TO BUS 9403 CKT 1
	OPEN BRANCH FROM BUS 4002 TO BUS 9383 CKT 1
Contingency '449 OSLO 138 614 ROSEDALE 138 1-SW'	END
OPEN BRANCH FROM BUS 449 TO BUS 614 CKT 1	
OPEN BRANCH FROM BUS 9400 TO BUS 9401 CKT 1	Contingency '1734 GIFFORD 138 9381 WEST-FMP 138 1-SW'
OPEN BRANCH FROM BUS 9401 TO BUS 9404 CKT 1	OPEN BRANCH FROM BUS 9381 TO BUS 1734 CKT 1
OPEN BRANCH FROM BUS 9396 TO BUS 9404 CKT 1	OPEN BRANCH FROM BUS 9400 TO BUS 9401 CKT 1
OPEN BRANCH FROM BUS 9397 TO BUS 9403 CKT 1	OPEN BRANCH FROM BUS 9401 TO BUS 9404 CKT 1
OPEN BRANCH FROM BUS 4002 TO BUS 9383 CKT 1	OPEN BRANCH FROM BUS 9396 TO BUS 9404 CKT 1
END	OPEN BRANCH FROM BUS 9397 TO BUS 9403 CKT 1
	OPEN BRANCH FROM BUS 4002 TO BUS 9383 CKT 1
	END

Appendix II

Generation & Load Summaries

Generation Summary

			2016 Summer		2017 Summer		2018 Summer		2019 Summer		2015 Winter		2016 Winter		2017 Winter		2019 Winter	
Bus#	BusName	ID	Refernce	Study	Refernce	Study	Refernce	Study	Refernce	Study	Refernce	Study	Refernce	Study	Refernce	Study	Refernce	Study
1	TP.1	1	-2	-2	-2	-2	-2	-2	-2	-2	408.9	408.9	-2	-2	-2	-2	-2	-2
2	TP.2	1	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2
3	TP.3	1	797.8	797.8	797.8	797.8	797.8	797.8	797.8	797.8	875.8	875.8	875.8	875.8	875.8	875.8	875.8	875.8
4	TP.4	1	797.8	797.8	797.8	797.8	797.8	797.8	797.8	797.8	875.8	875.8	875.8	875.8	875.8	875.8	875.8	875.8
195	MARTIN 1	1	800	800	840	840	840	840	700	700	0	0	0	0	0	0	0	0
196	MARTIN 2	1	800	800	840	840	840	840	700	700	0	0	0	0	0	0	0	0
199	STLUCIE1	1	981	981	981	981	981	981	981	981	1021	1021	1021	1021	1021	1021	1021	1021
200	STLUCIE2	1	1001	1001	1001	1001	1001	1001	1001	1001	1041	1041	1041	1041	1041	1041	1041	1041
279	FT.MYER1	1	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60
280	FT.MYER2	1	453	453	453	453	453	453	453	453	453	453	453	453	453	453	453	453
281	MANATEE1	1	210	210	350	350	600	600	320	320	0	0	0	0	0	0	0	0
282	MANATEE2	1	0	0	330	330	400	400	0	0	430	430	430	430	550	550	420	420
364	SANFORD4	1	330	330	330	330	330	330	330	330	0	0	295	295	298.08	298.08	295	295
365	SANFORD5	1	329	329	329	329	329	329	329	329	290	290	280	280	325	325	279	279
471	BABCOK_SOLAR	1	75	75	75	75	75	75	75	75			0	0	0	0	0	0
527	BIOM-POM	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
550	OKEELNT1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
577	OSCEOLA1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
592	LEE_CTY_1	1	39.7	39.7	39.7	39.7	39.7	39.7	39.7	39.7	39.7	39.7	39.7	39.7	39.7	39.7	39.7	39.7
594	TROPICAN	1	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45
598	LEE_CTY_2	1	19.97	19.97	19.97	19.97	19.97	19.97	19.97	19.97	19.97	19.97	19.97	19.97	19.97	19.97	19.97	19.97
604	PBRR	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
608	PBRR	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
623	BRR-S	1	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
641	MDRR	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
661	BRR-N	1	11	11	11	11	11	11	11	11	11	11	11	11	11	11	12	12
799	INDTN.CG	1	330	330	330	330	330	330	330	330	330	330	330	330	330	330	330	330
820	LGT 1-2	1	0	0							0	0						
820	LGT 1-2	2	0	0							0	0						
821	LGT 3-4	1	0	0							0	0						
821	LGT 3-4	2	0	0							0	0						
822	LGT 5-6	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
822	LGT 5-6	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
823	LGT 7-8	1	0	0							0	0						
823	LGT 7-8	2	0	0							0	0						
824	LGT 9-10	1	0	0							0	0						
824	LGT 9-10	2	0	0							0	0						
825	LGT11-12	1	0	0							0	0						
825	LGT11-12	2	0	0							0	0						
826	LGT13-16	1	0	0							0	0						
826	LGT13-16	2	0	0							0	0						
826	LGT13-16	3	0	0							0	0						
826	LGT13-16	4	0	0							0	0						
827	LGT17-20	1	0	0							0	0						
827	LGT17-20	2	0	0							0	0						
827	LGT17-20	3	0	0							0	0						
827	LGT17-20	4	0	0							0	0						
828	LGT21-24	1	0	0							0	0						
828	LGT21-24	2	0	0							0	0						
828	LGT21-24	3	0	0							0	0						
828	LGT21-24	4	0	0							0	0						
829	PEGT1-4	1	0	0							0	0						
829	PEGT1-4	2	0	0							0	0						
829	PEGT1-4	3	0	0							0	0						
829	PEGT1-4	4	0	0							0	0						
830	PEGT5-8	1	0	0							0	0						
830	PEGT5-8	2	0	0							0	0						
830	PEGT5-8	3	0	0							0	0						
830	PEGT5-8	4	0	0							0	0						
831	PEGT9-12	1	0	0							0	0						
831	PEGT9-12	2	0	0							0	0						
831	PEGT9-12	3	0	0							0	0						
831	PEGT9-12	4	0	0							0	0						
832	FGT 1-2	1	0	0							0	0						
832	FGT 1-2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
833	FGT 3-4	1	0	0							0	0						
833	FGT 3-4	2	0	0							0	0						
834	FGT 5-6	1	0	0							0	0						
834	FGT 5-6	2	0	0							0	0						
835	FGT 7-8	1	0	0							0	0						
835	FGT 7-8	2	0	0							0	0						
836	FGT 9-10	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
836	FGT 9-10	2	0	0							0	0						
837	FGT11-12	1	0	0							0	0						
837	FGT11-12	2	0	0							0	0						

			2016 Summer		2017 Summer		2018 Summer		2019 Summer		2015 Winter		2016 Winter		2017 Winter		2019 Winter	
Bus#	BusName	ID	Refemce	Study	Refemce	Study	Refemce	Study	Refemce	Study	Refemce	Study	Refemce	Study	Refemce	Study	Refemce	Study
874	MARATHON	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
874	MARATHON	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
903	MANATE_SOLAR	1	74.9	74.9	74.9	74.9	74.9	74.9	74.9	74.9			0	0	0	0	0	0
930	SAN.CT4A	1	183.5	183.5	183.5	183.5	183.5	183.5	183.5	183.5	0	0	150	150	183.33	183.33	120.62	120.62
931	SAN.CT4B	2	183.5	183.5	183.5	183.5	183.5	183.5	183.5	183.5	0	0	150	150	183.33	183.33	120.62	120.62
932	SAN.CT4C	3	178	178	178	178	178	178	178	178	0	0	150	150	178.3	178.3	117.31	117.31
933	SAN.CT4D	4	178	178	178	178	178	178	178	178	0	0	140	140	178.3	178.3	117.31	117.31
934	SAN.CT5A	1	183.5	183.5	183.5	183.5	183.5	183.5	183.5	183.5	155	155	200	200	200.5	200.5	100	100
935	SAN.CT5B	2	183.5	183.5	183.5	183.5	183.5	183.5	183.5	183.5	155	155	200	200	200.5	200.5	100	100
936	SAN.CT5C	3	178	178	178	178	178	178	178	178	155	155	195	195	195	195	100	100
937	SAN.CT5D	4	178	178	178	178	178	178	178	178	155	155	195	195	195	195	100	100
950	FT.MYR2A	1	176	176	176	176	176	176	176	176	206	206	206	206	206	206	206	206
951	FT.MYR2B	1	176	176	176	176	176	176	176	176	206	206	206	206	206	206	206	206
952	FT.MYR2C	1	167	167	167	167	167	167	167	167	197	197	197	197	197	197	197	197
953	FT.MYR2D	1	167	167	167	167	167	167	167	167	197	197	197	197	197	197	197	197
954	FT.MYR2E	1	167	167	167	167	167	167	167	167	197	197	197	197	197	197	197	197
955	FT.MYR2F	1	167	167	167	167	167	167	167	167	197	197	197	197	197	197	197	197
962	FT.MYR3A	1	164.5	164.5	164.5	164.5	164.5	164.5	164.5	164.5	0	0	0	0	0	0	0	0
963	FT.MYR3B	1	163	163	163	163	163	163	163	163	0	0	0	0	0	0	0	0
1080	SUN GEN1	1	25	25	25	25	25	25	25	25	0	0	0	0	0	0	0	0
1081	CITRUS_SOLAR	1	74.9	74.9	74.9	74.9	74.9	74.9	74.9	74.9			0	0	0	0	0	0
1098	GRISSOM GEN	1	10	10	10	10	10	10	10	10	0	0	0	0	0	0	0	0
1111	CAPE3CTA	1	234.9	234.9	234.9	234.9	234.9	234.9	234.9	234.9	276.9	276.9	276.9	276.9	276.9	276.9	276.9	276.9
1112	CAPE3CTB	1	234.9	234.9	234.9	234.9	234.9	234.9	234.9	234.9	276.9	276.9	276.9	276.9	276.9	276.9	276.9	276.9
1113	CAPE3CTC	1	244	244	244	244	244	244	244	244	286	286	286	286	286	286	286	286
1115	CAPE3STE	1	300.6	300.72	417.79	418.43	429.55	429.64	455.76	456.13	491.78	493.14	484.2	485.01	491.14	491.73	505.65	504.67
1127	NOTREGEN	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1141	OKE1-CTA	1							372	372							370	370
1142	OKE1-CTB	1							372	372							370	370
1143	OKE1-CTC	1							372	372							370	370
1144	OKE1-STE	1							564	564							539	539
1155	PFL6-CTGA	1			0	0	0	0	0	0			0	0	0	0	0	0
1156	PFL6-CTGB	1			0	0	0	0	0	0			0	0	0	0	0	0
1157	PFL6-CTGC	1			0	0	0	0	0	0			0	0	0	0	0	0
1158	PFL6-CTGD	1			0	0	0	0	0	0			0	0	0	0	0	0
1159	PFL6-CTGE	1			0	0	0	0	0	0			0	0	0	0	0	0
1201	MR8 CTA	1	171	171	171	171	171	171	171	171	197	197	197	197	197	197	197	197
1202	MR8 CTB	1	171	171	171	171	171	171	171	171	197	197	197	197	197	197	197	197
1203	MR8 CTC	1	160	160	160	160	160	160	160	160	186	186	186	186	186	186	186	186
1204	MR8 CTD	1	171	171	171	171	171	171	171	171	197	197	197	197	197	197	197	197
1205	MR8 ST1	1	483	483	483	483	483	483	483	483	483	483	483	483	483	483	483	483
1211	MN3 CTA	1	163.4	163.4	163.4	163.4	163.4	163.4	163.4	163.4	189.5	189.5	189.5	189.5	189.5	189.5	189.5	189.5
1212	MN3 CTB	1	171	171	171	171	171	171	171	171	197	197	197	197	197	197	197	197
1213	MN3 CTC	1	163.4	163.4	163.4	163.4	163.4	163.4	163.4	163.4	189.5	189.5	189.5	189.5	189.5	189.5	189.5	189.5
1214	MN3 CTD	1	171	171	171	171	171	171	171	171	197	197	197	197	197	197	197	197
1215	MN3 STM	1	483	483	483	483	483	483	483	483	483	483	483	483	483	483	483	483
1242	FT.MYR3C	1			0	0	0	0	0	0			0	0	0	0	0	0
1243	FT.MYR3D	1			0	0	0	0	0	0			0	0	0	0	0	0
1260	LAUD.4CA	1	157	157	157	157	157	157	157	157	150.71	150.71	0	0	0	0	0	0
1261	LAUD.4CB	1	157	157	157	157	157	157	157	157	150.71	150.71	0	0	0	0	0	0
1262	LAUD.4ST	1	133	133	133	133	133	133	133	133	124.58	124.58	0	0	0	0	0	0
1265	LAUD.5CA	1	157	157	157	157	157	157	157	157	173	173	0	0	0	0	0	0
1266	LAUD.5CB	1	157	157	157	157	157	157	157	157	173	173	0	0	0	0	0	0
1267	LAUD.5ST	1	133	133	133	133	133	133	133	133	143	143	0	0	0	0	0	0
1270	MAR.3CTA	1	165	165	165	165	165	165	165	165	0	0	0	0	0	0	0	0
1271	MAR.3CTB	1	165	165	165	165	165	165	165	165	0	0	0	0	0	0	0	0
1272	MR3.ST	1	147	147	147	147	147	147	147	147	0	0	0	0	0	0	0	0
1275	MAR.4CTA	1	165	165	165	165	165	165	165	165	0	0	0	0	0	0	0	0
1276	MAR.4CTB	1	165	165	165	165	165	165	165	165	0	0	0	0	0	0	0	0
1277	MR4.ST	1	147	147	147	147	147	147	147	147	0	0	0	0	0	0	0	0
1281	TP5CT5A	1	184	184	184	184	184	184	184	184	173.04	173.04	197	197	197	197	162.13	162.13
1282	TP5CT5B	1	171	171	171	171	171	171	171	171	161.62	161.62	184	184	184	184	151.43	151.43
1283	TP5CT5C	1	171	171	171	171	171	171	171	171	161.62	161.62	184	184	184	184	151.43	151.43
1284	TP5CT5D	1	184	184	184	184	184	184	184	184	173.04	173.04	197	197	197	197	162.13	162.13
1285	TP5ST	1	477	477	477	477	477	477	477	477	418.98	418.98	477	477	477	477	392.56	392.56
1313	WCE1-CTC	1	235	235	235	235	235	235	235	235	268	268	268	268	268	268	268	268
1314	WCE1-CTB	1	235	235	235	235	235	235	235	235	268	268	268	268	268	268	268	268
1316	WCE1-CTA	1	248	248	248	248	248	248	248	248	281	281	281	281	281	281	281	281
1317	WCE1-STE	1	498	498	498	498	498	498	498	498	513	513	513	513	513	513	513	513
1333	WCE2-CTC	1	235	235	235	235	235	235	235	235	268	268	268	268	268	268	268	268
1334	WCE2-CTB	1	235	235	235	235	235	235	235	235	268	268	268	268	268	268	268	268
1336	WCE2-CTA	1	248	248	248	248	248	248	248	248	281	281	281	281	281	281	281	281
1337	WCE2-STE	1	498	498	498	498	498	498	498	498	513	513	513	513	513	513	513	513
1355	WCE3-CTB	1	235	235	235	235	235	235	235	235	268	268	268	268	268	268	268	268
1356	WCE3-CTC	1	248	248	248	248	248	248	248	248	281	281	281	281	281	281	281	281
1357	WCE3-CTA	1	235	235	235	235	235	235	235	235	268	268	268	268	268	268	268	268
1358	WCE3-STE	1	498	498	498	498	498	498	498	498	513	513	513	513	513	513	513	513
1380	BREVLFGN	1	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9

			2016 Summer		2017 Summer		2018 Summer		2019 Summer		2015 Winter		2016 Winter		2017 Winter		2019 Winter	
Bus#	BusName	ID	Refernce	Study	Refernce	Study	Refernce	Study	Refernce	Study	Refernce	Study	Refernce	Study	Refernce	Study	Refernce	Study
1381	SEMLFGEN	1	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2
1390	RIV5CTA	1	231	231	231	231	231	231	231	231	268	268	268	268	268	268	268	268
1391	RIV5CTB	1	242	242	242	242	242	242	242	242	279	279	279	279	279	279	279	279
1392	RIV5CTC	1	231	231	231	231	231	231	231	231	268	268	268	268	268	268	268	268
1394	RIV5STE	1	503	503	503	503	503	503	503	503	495	495	495	495	495	495	495	495
1720	PE-CT1	1	262	262	262	262	262	262	262	262			293	293	293	293	293	293
1721	PE-ST1	1	450	450	450	450	450	450	450	450			468	468	468	468	468	468
1722	PE-CT2	1	262	262	262	262	262	262	262	262			293	293	293	293	293	293
1723	PE-CT3	1	276	276	276	276	276	276	276	276			307	307	307	307	307	307
5412	KIS-CI1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5413	CI#2 CT	1	0	0	32.31	32.31	58.24	58.24	69.6	69.6	0	0	0	0	0	0	72.86	72.86
5414	CI#3 CT	1	139.62	139.62	144.01	144.01	152.1	152.1	152.1	152.1	125.79	125.79	113.2	113.2	155.37	155.37	156.25	156.25
5415	CI#4 CT	1	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180
5420	CI#2 ST	1	0	0	17.69	17.69	31.88	31.88	38.1	38.1	0	0	0	0	0	0	40.98	40.98
5421	CI#3 ST	1	83.75	83.75	86.39	86.39	91.24	91.24	91.24	91.24	75.47	75.47	67.92	67.92	93.22	93.22	93.75	93.75
5422	CI#4 ST	1	135	135	135	135	135	135	135	135	135	135	135	135	135	135	135	135
5534	STN #1	1	441.16	441.16	440.76	440.76	441.13	441.13	441.22	441.22	414.84	414.84	440.85	440.85	440.95	440.95	440.97	440.97
5535	IRCT A	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5536	IRCT C	1	0	11.1	0	12.19	0	13.14	0	14.1	0	14.9	0	25.92	0	16.02	0	19.06
5537	STN #2	1	453	453	453	453	453	453	453	453	415	415	453	453	453	453	453	453
5538	STNAST	1	253.71	253.71	253.71	253.71	253.71	253.71	253.71	253.71	253.71	253.71	253.71	253.71	253.71	253.71	253.71	253.71
5539	STNACT1	1	182.55	182.55	182.55	182.55	182.55	182.55	182.55	182.55	182.55	182.55	182.55	182.55	182.55	182.55	182.55	182.55
5540	STNACT2	1	182.55	182.55	182.55	182.55	182.55	182.55	182.55	182.55	182.55	182.55	182.55	182.55	182.55	182.55	182.55	182.55
5541	STNCCB1	1	174.16	174.16	174.16	174.16	174.16	174.16	174.16	174.16	174.16	174.16	174.16	174.16	174.16	174.16	174.16	174.16
5542	STNCCB2	1	136.84	136.84	136.84	136.84	136.84	136.84	136.84	136.84	136.84	136.84	136.84	136.84	136.84	136.84	136.84	136.84
5548	IRCT B	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5549	IRCT D	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5881	MSU1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5882	MSU2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5883	MSU3	1	342	342	342	342	342	342	342	342	342	342	342	342	342	342	342	342
5888	LCC8-CT	1	0	0	0	0	0	0	27.24	27.24	0	0	0	0	0	0	0	0
5889	LCC8-ST	1	0	0	0	0	0	0	10.39	10.39	0	0	0	0	0	0	0	0
5891	LGT2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5892	LGT3	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5893	MCT1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5894	MDS	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5895	MP5-CT	1	216.69	216.69	216.69	216.69	216.69	216.69	216.69	216.69	233.33	233.33	233.33	233.33	233.33	233.33	233.33	233.33
5896	MP5-ST	1	120.31	120.31	120.31	120.31	120.31	120.31	120.31	120.31	119.67	119.67	119.67	119.67	119.67	119.67	119.67	119.67
5899	WNSTN DG	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5899	WNSTN DG	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5899	WNSTN DG	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5899	WNSTN DG	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5899	WNSTN DG	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5901	RIDGE CG	1	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40
9411	VB G3	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9412	VB G4	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9413	VB-G1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9414	VER-CC 5&2	1	11.14	0	12.15	0	13.12	0	14.12	0	14.83	0	22.86	0	15.86	0	18.99	0
9414	VER-CC 5&2	2	0	0	0	0	0	0	0	0	0	0	3.08	0	0	0	0	0

Load Summary

		2016 Summer						2017 Summer						2018 Summer						2019 Summer					
		FRCC Case		Adjusted		Difference		FRCC Case		Adjusted		Difference		FRCC Case		Adjusted		Difference		FRCC Case		Adjusted		Difference	
BusName	Bus#	MW	MVAR	MW	MVAR	MW	MVAR	MW	MVAR	MW	MVAR	MW	MVAR	MW	MVAR	MW	MVAR	MW	MVAR	MW	MVAR	MW	MVAR	MW	MVAR
PIPER 5	9396	13.26	2.69	13.08	2.65	-0.18	-0.04	13.34	2.71	13.16	2.67	-0.18	-0.04	13.44	2.73	13.24	2.69	-0.20	-0.04	13.547	2.751	13.319	2.705	-0.23	-0.05
VB SUB7	9397	11.96	2.43	11.79	2.39	-0.17	-0.04	12.03	2.44	11.87	2.41	-0.16	-0.03	12.12	2.46	11.94	2.42	-0.18	-0.04	12.219	2.481	12.013	2.439	-0.21	-0.04
VB SUB6	9398	15.72	3.19	15.49	3.15	-0.23	-0.04	15.81	3.21	15.59	3.17	-0.22	-0.04	15.92	3.23	15.69	3.18	-0.23	-0.05	16.052	3.259	15.782	3.205	-0.27	-0.05
VB SUB9	9400	30.75	6.24	30.31	6.16	-0.44	-0.08	30.93	6.28	30.5	6.19	-0.43	-0.09	31.15	6.33	30.69	6.23	-0.46	-0.10	31.402	6.376	30.875	6.269	-0.53	-0.11
VB SUB10	9401	22.41	4.55	22.09	4.49	-0.32	-0.06	22.55	4.58	22.23	4.51	-0.32	-0.07	22.71	4.61	22.37	4.54	-0.34	-0.07	22.89	4.648	22.506	4.57	-0.38	-0.08
VBSUB11	9402	14.9	3.03	14.69	2.98	-0.21	-0.05	14.99	3.05	14.78	3	-0.21	-0.05	15.1	3.07	14.88	3.02	-0.22	-0.05	15.222	3.091	14.966	3.039	-0.26	-0.05
VB SUB8	9403	19.85	4.03	19.57	3.97	-0.28	-0.06	19.97	4.05	19.69	4	-0.28	-0.05	20.11	4.08	19.81	4.02	-0.30	-0.06	20.272	4.116	19.932	4.047	-0.34	-0.07
VB SUB3	9405	14.61	2.97	14.41	2.92	-0.20	-0.05	14.7	2.98	14.49	2.94	-0.21	-0.04	14.81	3.01	14.59	2.96	-0.22	-0.05	14.925	3.031	14.674	2.98	-0.25	-0.05
VB-G1	9413	19.85	4.03	19.57	3.97	-0.28	-0.06	19.97	4.05	19.69	4	-0.28	-0.05	20.11	4.08	19.81	4.02	-0.30	-0.06	20.272	4.116	19.932	4.047	-0.34	-0.07
	Total:	163.31	33.16	161.00	32.68	-2.31	-0.48	164.29	33.35	162.00	32.89	-2.29	-0.46	165.47	33.60	163.02	33.08	-2.45	-0.52	166.80	33.87	164.00	33.30	-2.80	-0.57

		2015 Winter						2016 Winter						2017 Winter						2019 Winter					
		FRCC Case		Adjusted		Difference		FRCC Case		Adjusted		Difference		FRCC Case		Adjusted		Difference		FRCC Case		Adjusted		Difference	
BusName	Bus#	MW	MVAR	MW	MVAR	MW	MVAR	MW	MVAR	MW	MVAR	MW	MVAR	MW	MVAR	MW	MVAR	MW	MVAR	MW	MVAR	MW	MVAR	MW	MVAR
PIPER 5	9396	14.63	2.97	13.41	2.72	-1.22	-0.25	14.71	2.99	13.41	2.72	-1.30	-0.27	14.81	3.01	13.49	2.74	-1.32	-0.27	15.025	3.051	13.733	2.789	-1.29	-0.26
VB SUB7	9397	13.15	2.67	12.05	2.45	-1.10	-0.22	13.22	2.68	12.05	2.45	-1.17	-0.23	13.31	2.7	12.13	2.46	-1.18	-0.24	13.507	2.743	12.346	2.507	-1.16	-0.24
VB SUB6	9398	17.32	3.52	15.88	3.22	-1.44	-0.30	17.41	3.54	15.88	3.22	-1.53	-0.32	17.53	3.56	15.97	3.24	-1.56	-0.32	17.791	3.613	16.262	3.302	-1.53	-0.31
VB SUB9	9400	33.86	6.88	31.04	6.3	-2.82	-0.58	34.04	6.91	31.04	6.3	-3.00	-0.61	34.28	6.96	31.22	6.34	-3.06	-0.62	34.778	7.062	31.789	6.455	-2.99	-0.61
VB SUB10	9401	24.71	5.02	22.65	4.6	-2.06	-0.42	24.84	5.04	22.65	4.6	-2.19	-0.44	25.01	5.08	22.78	4.63	-2.23	-0.45	25.378	5.153	23.197	4.71	-2.18	-0.44
VBSUB11	9402	16.45	3.34	15.08	3.06	-1.37	-0.28	16.54	3.36	15.08	3.06	-1.46	-0.30	16.65	3.38	15.17	3.08	-1.48	-0.30	16.893	3.43	15.441	3.135	-1.45	-0.30
VB SUB8	9403	21.9	4.45	20.08	4.08	-1.82	-0.37	22.02	4.47	20.08	4.08	-1.94	-0.39	22.17	4.5	20.2	4.1	-1.97	-0.40	22.498	4.568	20.564	4.176	-1.93	-0.39
VB SUB3	9405	16.09	3.27	14.75	2.99	-1.34	-0.28	16.17	3.28	14.75	2.99	-1.42	-0.29	16.29	3.31	14.84	3.01	-1.45	-0.30	16.525	3.356	15.104	3.067	-1.42	-0.29
VB-G1	9413	21.9	4.45	20.08	4.08	-1.82	-0.37	22.02	4.47	20.08	4.08	-1.94	-0.39	22.17	4.5	20.2	4.1	-1.97	-0.40	22.498	4.568	20.564	4.176	-1.93	-0.39
	Total:	180.01	36.57	165.02	33.50	-14.99	-3.07	180.97	36.74	165.02	33.50	-15.95	-3.24	182.22	37.00	166.00	33.70	-16.22	-3.30	184.89	37.54	169.00	34.32	-15.89	-3.23

Vero Load Forecast sent by Vero (Bill Herrington) in July 2015

		FY 2016	FY 2017	FY 2018	FY 2019	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024
Winter Peak	MW	175	176	177	178	179	179	180	181	182
Summer Peak	MW	161	162	163	164	165	165	166	167	168
Annual Pk adj for Non-Firm Load	MW	165	166	167	168	169	169	170	171	172