BC HYDRO

T&D SYSTEM OPERATIONS

SYSTEM OPERATING ORDER 7T-35

PEACE REGION 138/230/500 kV NETWORK OPERATION

Supersedes SOO 7T-35 issued 03 March 2022

Effective Date: 18 May 2023

Review Year: 2027

APPROVED BY: *Original signed by*
_____
Steven Cullen
Manager, Operations Planning
T&D System Operations

- Requires same day posting on bchydro.com and on BCRC Extranet upon release.
- Requires same day MRS conveyance notification upon posting.

Highlight Denotes Revision

Table of Contents

1.0 GENERAL

This System Operating Order (SOO) describes the Peace Region 138/230/500 kV Network operations, outage requirements, and Peace Region Load Shedding RAS and Peace Region Local Generation Shedding Remedial Action Scheme (RAS) arming requirements.

The requirements in this SOO cover the worst case operating conditions. Variations from the instructions, limits and arming conditions will be provided through additional Operating Plans for specific operating conditions on a case-by-case basis. Operating Plans are engineered to support outages and short term operating requirements, superseding as necessary any requirements in this order.

The main body of this SOO covers the Normal Operations and RAS arming requirements, including Alarms provided by the Transient Stability Analysis (TSA-PM) application in the Energy Management System (EMS).

A sketch (overview) of the Peace 138/230/500 kV Network is attached in Attachment 1, to support use of this SOO.

The Peace Region Load Shedding RAS has been developed and implemented to meet the needs of the load growth in South Peace Area as the area loads are supplied by both 230 kV path and 138 kV circuits in parallel from G.M. Shrum (GMS), and two 500 kV transmission line connections between Peace Canyon (PCN) and South Bank (SBK). This RAS is a System Wide Area Protection Scheme (WAPS), which sheds loads at South Peace Region to prevent voltage collapse and other performance issues following loss of both 5L5 AND 5L6 500 kV transmission line, the 230 kV transmission lines, or major 138 kV transmission lines when 138/230/500 kV network facilities are out of service. This WAPS is armed by TSA-PM application in the BC Hydro EMS. Refer to Attachment 2 for detailed RAS functional description of the WAPS.

The Peace Region Local Generation Shedding RAS has been implemented to accommodate the interconnections of Wind Farm IPPs in that area. Wind Farm IPPs interconnection studies show the loss of 2L308 (GMS-DKT) or loss of 2L309 (DKT-SNK) or loss of 2L312 (SLS-SNK) can result in large excursions or thermal loading issues in Peace 138 kV and / or 230 kV network areas. Generation shedding at Dokie, Quality, Meikle, and Zonnebeke wind farms has been made available for loss of any of the above 230 kV lines. Refer to Attachment 3 for a table of arming functions for the Peace Region Local Gen Shedding RAS.

Islanded operation in the 230 kV Peace regional system is not permitted, as it may cause overvoltage and equipment damage. An anti-Islanding Direct Transfer Tripping (DTT) scheme has been implemented to trip the 230 kV CBs at the appropriate BCH substations, removing IPP generation resources when an island is formed by a transmission outage event. This anti-Islanding DTT scheme will monitor the following circuits' status to identify islanding:

- GMS T13 & GMS T14
- 2L308 (GMS-DKT)
- 2L309 (DKT-SNK)
- 2L313 (SNK-MKT)
- 2L337 (MKT-TLR)
- 2L312 (SNK-SLS)

Refer to Attachment 4 "Anti-Islanding DTT Scheme" for the details about the DTT requirements.

References:

The following Operating Orders should be referenced or reviewed with this order:

- SOO 5T-10 "Rating For All Transmission Circuits 60 kV or Higher"
- SOO 7T-13 "G.M. Shrum/Peace Canyon 500 kV System"
- SOO 7T-22 "System Voltage Control"
- OO 3T-ENK-01 "Cutbank Ridge Partnership – Kiskatinaw River Natural Gas Facilities"
- OO 3T-DAW-01 "Dawson Creek Substation Operation"
- OO 3T-SNK-01 "Sukunka Switching Station Operation"
- OO 3T-SBK-01 "SouthBank Substation Operation"

2.0 RESPONSIBILITIES

The Transmission Coordinator is responsible for monitoring the load shedding arming recommendations from TSA-PM, and determine when manual load shedding will be required (either due to LAPS outages, or when insufficient load shed arming has occurred).

When manual load shedding is required, the Grid Desk 1 Operator is responsible to ensure that area loads are monitored, and will coordinate with the Load Desk 1 Operator to arrange for manual shedding and restoration of Distribution connected customers and feeders in accordance with Section 4. The Grid Desk 1 Operator will be responsible for shedding and restoring Transmission connected customers under Section 4.

All instructions for Manual Load Shedding implementation will be issued using three-part communications protocol:

- The Transmission Coordinator will request Grid Desk 1 Operator take manual load shedding actions.
- The Grid Desk 1 Operator will assess the system conditions and give the instruction to the Load Desk 1 Operator.
- The Load Desk 1 Operator will repeat-back the instruction as it was understood, and
- Receive an acknowledgement from the Grid Desk 1 Operator that the instruction was correctly understood before proceeding.

3.0 NORMAL OPERATIONS

The Peace 138/230/500 kV Network is supplied by GM Shrum (GMS), Peace Canyon (PCN), Dokie Wind Farm IPP (DKW), Quality Wind Farm IPP (QTY), Bear Mountain Wind Farm IPP (BMW), Meikle Wind Farm IPP (MKL), Moose Lake LP Wind Farm (MLW), McMahon Cogeneration IPP (MCM), and Zonnebeke/Sukunka IPP (ZBW). The network supplies approximately 585 MW of regional load in the Fort St. John, Dawson, Groundbirch, Tumbler Ridge and Chetwynd communities/areas. This network may be operated at or near capacity during winter peak load.

The Peace 138/230/500 kV Network is connected at GMS and PCN Generating Stations to the integrated electric system. The generation resources in the Peace 138/230 kV Network are limited (approximately 695 MW of IPP Generation), and approximately 80% is non-dependable (intermittent or variable) generation.

Note: refer to Attachment 1 Overview of the Peace 138/230/500 kV System.

3.1 500 kV Network

The 500 kV network consists of two circuits: 500 kV transmission lines 5L5 and 5L6 between PCN to SouthBank Substation (SBK). The 230 kV and 138 kV networks are connected to the 500 KV bus at GMS, and to the 500 kV bus at SBK.

3.2 230 kV Network

The Peace 230 kV Network has five IPP plants, several TVCs and a BC Hydro distribution substation.

DKW IPP can generate up to 144 MW. DKW consists of 48 wind powered generators yielding a maximum of 3 MW output each via 6 separate feeders. DKW is connected to the BC Hydro system at Dokie Terminal Station (DKT) on a 230 kV transmission line 2L314.

QTY IPP can generate up to 142.2 MW. QTY consists of 79 wind-powered generators yielding 1.8 MW each. QTY is connected to the BCH system at Tumbler Ridge Substation (TLR) on 230 kV transmission line 2L315.

MKL IPP can generate up to 184.6 MW. MKL consists of 61 wind-powered generators yielding 3.23 MW each with 35 units, and 2.75 MW each with 26 units. MKL is connected to the BC Hydro transmission system at Meikle Switching Station (MKT) via a 4.2 km, customer-owned 230 kV transmission line designated 2L339.

MLW IPP can generate up to 15 MW. MLW consists of 4 wind-powered generators yielding 3.75 MW each. MLW is tap connected onto the BC Hydro 230 kV transmission circuit 2L337 (MKT – TLR), approximately 0.2 km southeast of MKT.

ZBW IPP can generate up to 30 MW. ZBW consists of 8 wind-powered generators yielding 3.75 MW each. ZBW is connected to the BC Hydro transmission system at Sukunka Switching Station (SNK) via an 8.2 km, customer-owned 230 kV transmission line designated as 2L393.

Table 3.2 summarizes the TVCs in the 230 kV Peace Network and Table 3.2.1 provides the peak load value for the area distribution load. Applicable note references for both tables can be found at the end of Section 3.3.

Table 3.2: Peace 230 kV Network TVCs

STN	Station Name	Peak Load [MW]	Voltage Band [±%]
BLM	Talisman Energy Canada	3.0	10
KGP	Westcoast Energy Inc	0.5	10
LAP	Chetwynd Mechanical Pulp Inc	0.8	10
MNK	Western Coal Corp	0.9	10
QNT	Teck Coal Ltd	1.2	10
SGB	Shell Canada	28.4	10

Table 3.2.1: Peace 230 kV Network Area Distribution Load

STN	Station Name	Peak Load (MW)
TLR	Tumbler Ridge	11.8

3.3 138 kV Network

The Peace 138 kV Network has two IPP plants, several TVCs and four BC Hydro distribution substations.

MCM IPP has 110 MW of dependable generation. MCM consists of two 55 MW units of gas fired turbine. The hot exhaust gases from the gas turbines, after driving the two electrical generators, are also used in producing the steam for the Spectra Energy Transmission McMahon gas plant (MGP). MCM is connected to the BC Hydro system on 1L375.

It is expected that 2 MCM generating units will be on load during the winter period. For peak load under System Normal, 2 units of MCM will prevent most regional load curtailments post contingency.

Although MCM generation is not dispatchable, BC Hydro will co-ordinate with MCM to plan transmission line outages whenever the IPP can make their generation available. An “RMR” on MCM refers to a request or plan for support that is voluntary on the part of the IPP, if the generation is not available, TDSO Operations Planning must prepare alternative operating plans.

BMW IPP can generate up to 104 MW. BMW connects to the BC Hydro system at Bear Mountain Terminal Station (BMT) on a 138 kV transmission line designated 1L354.

Table 3.3 summarizes the TVCs in the 138 kV Peace network and Table 3.3.1 provides the peak load value for the area distribution load. Applicable notes can be found at the end of the tables.

Table 3.3: Peace 138 kV Network TVC

STN	Station Name	Peak Load [MW]	Voltage Band [±%]
FBC	Canfor Pulp - Taylor	3	5
KIS	Encana - Kiskatinaw	17.2	10
MGP	Westcoast Energy - McMahon	4.9	5
NL2	Noel Substation 2	0	10/-12.5
NL3	Noel Substation 3	4.8	10/-12.5
NL5	Noel Substation 5	1.5	10/-12.5
NGL	Altagas - Taylor	30.4	10
PLD	ARC Resources - Parkland	20	10
SEP	Canadian Natural Resource - Septimus	18.1	10
SLO	Louisiana-Pacific	16.2	10
TXB	Whitecap Resources – Boundary Lake	10.8	10

Table 3.3.1: Peace 138 kV Network Area Distribution Load

STN	Station Name	Peak Load [MW]
CWD	Chetwynd	31.9
DAW	Dawson Creek	106.3
FJN	Fort St John	84.1
FOX	Fox Creek	19.2
PPS	Portage Pass	3.1
SCX	Site C	13.9

Notes to support Tables 3.2, 3.2.1, 3.3, 3.3.1:

1. For industrial customer load, Peak Load (MW) is based on the 2023 Transmission Voltage Customer Peak Demand Forecast. Maximum MW is approximated by using the MVA forecast in Transmission Peak Demand Forecast. The contract demand is only used if it accurately reflects the operating history, confirmed with e-meter data 'peaks report', otherwise e-meter data may replace the forecast.
2. Voltage Band (±%) is based on the contract voltage supply on the customer's Operating Order (OO), or the Energy Service Agreement.
3. DTT to 2L312 during a 2L308 or 2L309 outage results in the curtailment of KGP, MNK, BLM, and QNT.
4. "Station or Circuit" and "STN" columns are based on Operating One-lines and Operating Order designations, where any conflict exists with SCFMS database.
5. Peak Load (MW) is based on the BC Hydro Distribution Load Forecast for the 2023 fiscal year. Using the substation load forecast (Uncompensated Peak Demand with DSM), the maximum is obtained by multiplying the substation's "forecast normal temperature uncompensated peak MVA" with the substation's "natural power factor". For winter peaking substations, "normal temperature is the 50 year average annual lowest temperature"; the actual substation peak will vary with the actual low temperature. Forecasted substation loads are non-coincidental.

4.0 PEACE REGION RAS ARMING REQUIREMENTS

Generation Shedding and Load Shedding RAS facilities are implemented in the Peace 138/230/500 kV Network. The Peace Region Load Shedding RAS is a System Wide Area Protection Scheme (WAPS), and sheds loads at South Peace Region to prevent voltage collapse and other performance issues following loss of the 500/230 kV transmission lines, or major 138 kV transmission lines when 500/230/138 kV facilities are out of service. This WAPS is used to address transient stability, voltage limits and thermal limits.

Detailed RAS Arming Requirements for Generation Shedding and Load Shedding, for contingencies under various out of service element topologies, are documented in tables in Attachment 5. In the following subsections relevant information and requirements for Attachment 5 are provided.

4.1 Transmission Line Ratings

The Peace Region Load Shed RAS arming conditions are impacted by seasonal ratings for transmission lines.

Table 4.1.1 and Table 4.1.2 list transmission line continuous ratings and emergency ratings and MW equivalents used in this order.

- Note 1: The thermal rating data is from SOO 5T-10 "*Ratings For All Transmission Circuits 60 kV or Higher"* and SOO 5T-14 *"Ratings For All Transmission and Distribution Transformers"*, in effect at the issuance of this order. Please refer to SOO 5T-10 for the definitions of "Summer Season" and "Winter Season".
- Note 2: The continuous rating in amps is used as its overload rating if no overload rating is available.
- Note 3: Continuous rating in MW is calculated by 1.732 * Rating in KA *138 kV * 0.95 pf.

TSA-PM automatically changes the ratings used in the load shedding requirements seasonally (see Table 4.1 and 4.2).

Table 4.1.1: Transmission Line and Transformer Continuous Ratings

138kV Circuit	Variable Name Used in Load Shedding Tables	Conductor Continuous-Rating (Amp) (Note 1)		Corresponding Continuous MW Rating (Note 3)	
		Summer Season	Winter Season	Summer Season	Winter Season
		Based on 30º C ambient	Based on 0º C ambient	Based on 30º C ambient	Based on 0º C ambient
1L361	1L361_Norm_Rating	588	600 (DS limit)	134	136 (DS limit)
1L364	1L364_Norm_Rating	570	721	129	164
1L349	1L349_Norm_Rating	559	600 (DS limit)	127	136 (DS limit)
1L360	1L360_Norm_Rating	560	674	127	153
1L374	1L374_Norm_Rating	574	715	130	162

230kV Circuit	Variable Name Used in Load Shedding Tables	Conductor Continuous-Rating (Amp) (Note 1)		Corresponding Continuous MW Rating (MW = 1.732 * Rating in KA *230 kV * 0.95 pf)	
		Summer Season	Winter Season	Summer Season	Winter Season
		Based on 30º C ambient	Based on 0º C ambient	Based on 30º C ambient	Based on 0º C ambient
2L308	2L308_Norm_Rating	1073	1200 (CT limit)	406	454 (CT limit)
2L309	2L309_Norm_Rating	1073	1354	406	512
2L312	2L312_Norm_Rating	1066	1351	403	511

230/138kV Transformer	Variable Name Used in Load Shedding Tables	Corresponding Continuous MW Rating (MW = Rating in MVA * 0.95 pf)

		Summer Season	Winter Season (Note 5)
		Based on 30º C ambient	Based on 0º C ambient
BMT T1	BMT_T1_Norm_Rating	142.5	169.1
BMT T2	BMT_T2_Norm_Rating	142.5	169.1
BMT T3	BMT_T3_Norm_Rating	142.5	169.1

Table 4.1.2: Transmission Line and Transformer Emergency Ratings

138kV Circuit	Variable Name Used in Load Shedding Tables	Conductor Over-Rating (Amp) (Note 2)		Corresponding Over MW Rating (Note 3:MW = 1.732 * Rating in KA *138 kV * 0.95 pf)	
		Summer Season	Winter Season	Summer Season	Winter Season
		Based on 30º C ambient	Based on 0º C ambient	Based on 30º C ambient	Based on 0º C ambient
1L361	1L361_Over_Rating	600 (DS limit)	600 (DS limit)	136 (DS limit)	136 (DS limit)
1L364	1L364_Over_Rating	570	721	129	164
1L349	1L349_Over_Rating	559	600 (DS limit)	127	136 (DS limit)
1L360	1L360_Over_Rating	560	674	127	153
1L374	1L374_Over_Rating	629	746	142	169

230kV Circuit	Variable Name Used in Load Shedding Tables	Conductor Over-Rating (Amp) (Note 2)		Corresponding Over MW Rating (MW = 1.732 * Rating in KA *230 kV * 0.95 pf)	
		Summer Season	Winter Season	Summer Season	Winter Season
		Based on 30º C ambient	Based on 0º C ambient	Based on 30º C ambient	Based on 0º C ambient
2L308	2L308_Over_Rating	1157	1200 (CT limit)	438	454 (CT limit)
2L309	2L309_Over_Rating	1157	1421	438	537
2L312	2L312_Over_Rating	1187	1438	449	544

230/138kV Transformer	Variable Name Used in Load Shedding Tables	Corresponding Over MW Rating (MW = Rating in MVA * 0.95 pf)	
		Summer Season	Winter Season (Note 5)
		Based on 30º C ambient	Based on 0º C ambient
BMT T1	BMT_T1_Over_Rating	256.5	285
BMT T2	BMT_T2_Over_Rating	256.5	285
BMT T3	BMT_T3_Over_Rating	256.5	285

4.2 Protection Considerations

4.2.1 138 kV Transmission Lines Over-Voltage Protection

The following Over-Voltage protection settings have been implemented in SLS 1L349, BMT 1L348 and BMT 1L350:

- 165 KV phase to phase (20%) trips after 5 sec
- 180 KV phase to phase (30%) trips after 5 cycles
- 185 KV phase to phase (approx. 35%) trips after 1 cycle

Under light load scenario, after loss of 2L308 or 2L309, BMW, QTY, DKW, MLW, and MKL units may be tripped due to their protection settings. In this case, high voltages may be observed in SLS and BMT area, and 1L349 / 1L348 / 1L350 may be tripped by their over voltage protection specified above.

4.2.2 Customer Load Under-Voltage Protection

There are Under-Voltage protection settings for the following loads:

ENK E15:

- ✓ Under-voltage Trip Pickup is 0.70 pu
- ✓ Under-voltage Trip Delay is 0.5 s
- ✓ Applicable to both A & B transformer protection

ENK KIS:

- ✓ Under-voltage Trip Pickup is 0.70 pu
- ✓ Under-voltage Trip Delay is 0.5 s

- ✓ Applicable to both A & B transformer protection

SRN:

- ✓ Under-voltage Trip Pickup is 0.75 pu
- ✓ Under-voltage Trip Delay is 2 s

These under-voltage protection schemes have been taken into consideration when developing the load shedding recommendations and gen shedding recommendations in Attachment 5, Tables 1 to 16.

4.3 General VAR Support Requirements at Wind Farm IPPs

Peace area wind farms provide dynamic support using STATCOM technology. This VAR support is required for System Normal and outage topologies in the Peace 138/230 kV Network. The requirements are managed by the TSA-PM application and implemented using Attachment 5, Tables 1 to 15, as follows:

- Attachment 5, Table 1 – System Normal:
  - The associated STATCOM VAR equipment at QTY (35DSDVAR1-5) shall be online if any of the generating units at QTY are online. Note: this implies QTY 35CBDVAR must be closed, and this status is monitored by TSA-PM.
  - At least 50% of the capacity of STATCOM VAR equipment at DKW (35CB141-143 and 35CB241-243) shall be online, if any generating units at DKW are online. Combinations of these equipment and breakers DKW 35CB14 and DKW 35CB24 are monitored by TSA-PM.

- Attachment 5, Table 2 to Table 16 - All other operating topologies:
  - For all the other system conditions defined in this System Operating Order except System Normal topology, all the associated STATCOM VAR equipment at DKW and QTY shall be online if any generating units at their respective wind farms are online. The STATCOM device status and bus breakers are monitored by TSA-PM.

    Consult Operations Planning Engineers if any STATCOM equipment is out of service under any outage scenario in Peace 230 kV / 138 kV Region that is not covered by the tables in Attachment 5.

4.4 Peace Region WAPS Arming

Pre-outage restrictions and generation and load shedding requirements for the contingencies within the Peace 500/230/138 kV system, have been developed based on the powerflow dependent methods for a variety of outage topologies within this network. The pre-outage restrictions and generation shedding requirements under the normal and N-1 (one facility out-of-service) conditions are detailed in Attachment 5.

The WAPS arming in Attachment 5 addresses contingencies including:

- 5L5,
- 5L6,
- 5L5 AND 5L6,
- 2L308,
- 2L309,
- 2L312,
- 2L391,
- 2L392,
- 2L391 AND 2L392,
- 2L329 and 2L333,
- 2L340 and 2L342,
- 1L360,
- 1L364,
- 1L374,
- BMT T1,
- BMT T2,
- BMT T3,
- SBK T21,
- SBK T22,
- SBK T11,
- SBK T12.

4.5 Peace Regional Area Outage Requirements

For the general Peace regional area requirements, there are 3 paths from GMS to the Peace regional area, which consist of:

- 230 kV series path (consisting of 2L308, 2L309, and 2L312)
- 1L361, 1L349 series path
- 1L364 path

The tables in Attachment 5 for the above circuit outages are based on 5L1, 5L2, 5L3, 5L4 and 5L7 in-service. If any of the 500 kV circuits listed AND (any of the three circuits 2L308, 2L309, and 2L312 is out of service or if both 138 kV paths) are out-of-service, the Operators need to use RTCA to confirm sufficient shedding after a TSA-PM template for “OO7T35” is applied. Please consult Operations Planning for further operational instructions or guidance.

5.0 REMOVED

6.0 ALARMS

The following alarms are implemented in TSAPM.

ALARM MESSAGE	REFERENCES
CONSULT OPS PLANNING: DKW DVAR EQUIPMENT OOS	Section 4.3
CONSULT OPS PLANNING: DKW DVAR LESS THAN 50%	
CONSULT OPS PLANNING: QTY DVAR EQUIPMENT OOS	
C2LXXX INSUFFICIENT LOAD SHEDDING	Attachment 5 – general alarm for various tables
C1LXXX INSUFFICIENT LOAD SHEDDING	
C2LXXX INSUFFICIENT GENSHED	
C5LX INSUFFICIENT LOAD SHEDDING	
OPEN TAY 1CB30 FOR 1L367 CONTINGENCY	
CONSULT OPS PLANNING: 1L377 IS CLOSED	
CONSULT OPS PLANNING: 1L377 IS NOT OPEN BETWEEN PLD AND ET3	
CONSULT OPS PLANNING: SGB/DAW/TAY/FJN AUTOVAR MUST BE I/S AND ALL SWITCHABLE SHUNT CAPS MUST BE AVAIL	
FJN/TAY AREA_INSUFFICIENT LOAD SHED_5L5&5L6_CTG	
FJN/TAY AREA_INSUFFICIENT LOAD SHED_1L360_CTG	
FJN/TAY AREA_INSUFFICIENT LOAD SHED_1L364_CTG	
FJN/TAY AREA_INSUFFICIENT LOAD SHED_1L374_CTG	
FJN/TAY AREA_INSUFFICIENT LOAD SHED_SBK T11_CTG	
FJN/TAY AREA_INSUFFICIENT LOAD SHED_SBK T12_CTG	
VIOLATION_2L308_NORM_RATING_DKT	Attachment 5, Table 11
VIOLATION_2L312_NORM_RATING_SNK	Attachment 5, Table 9
VIOLATION_1L360_NORM_RATING_SBK	Attachment 5, Table 7, 8
VIOLATION_2L308_OVER_RATING	Attachment 5, Table 4
VIOLATION_1L374_NORM_RATING_SBK	Attachment 5, Table 5
VIOLATION_1L367_NORM_RATING_FJN	Attachment 5, Table 5
VIOLATION_1L374 SBK+1L364 GMS_FLOW_1L360OOS	Attachment 5, Table 5
VIOLATION_1L360 SBK+1L364 GMS_FLOW_1L374OOS	Attachment 5, Table 8

7.0 REVISION HISTORY

Revised by	Revision Date	Summary of Revision
Jun Lu	14 October 2020	• The Term appendix is replaced through out with Attachment. • Section 1.0 – revised for changes to topology and clarify contents of the main body and attachments • Section 3.0 - revised with information about 5L5 energization and 1L360 and 1L374 termination at SBK • Section 3.1 – added information about Zonnebeke IPP interconnection • Section 4.0 - 1L364 ratings have been updated for both continuous ratings and emergency ratings • Section 6.0 - Alarm list has been updated • Attachment 1 – Overview of the Peace 138/230/500 kV network has been updated for new topology. • Attachment 2 – Peace Region Load Shed RAS scheme functions has been updated to reflect 5L5 addition and re-terminating 1L360 and 1L374 terminating at SBK • Attachment 3 – Peace Region Local Gen Shedding RAS Scheme Functions has been updated. Zonnebeke Wind Farm IPP has been integrated into Peace Region Wind Farm Gen Shed RAS Scheme, and can be armed for contingency of 2L308, 2L309, and 2L312. • Attachment 4 - Anti-Islanding DTT Scheme has been updated to include Zonnebeke Wind Farm IPP. • Attachment 5 – Peace Region Load Shed and Gen Shed Requirements have been updated to accommodate the following: 5L5 addition, 1L360 and 1L374 terminating at SBK, and ZBW wind farm IPP interconnecting to SNK.
Jun Lu/Amy Lam	12 February 2021	• Section 1 – Southbank (SBK) OO reference added. • Section 3 – 500 KV network now listed as Section 3.2, and previous subsections are renumbered to 3.2 and 3.3 for the 230 kV and 138 kV networks respectively. • Section 4.0 - 1L364 ratings have been updated for both continuous ratings and emergency ratings • Section 6.0 – TSA-PM Alarm list has been updated. • Attachment 5: • Table 1 – System Normal, pre-outage restrictions and post-contingency load shedding / gen shedding requirements have been updated to accommodate different statuses of MCM units (2, 1, or no units online) scenarios). Table 10.2 – 1L360 AND 1L377 OOS, updated to accommodate different 1L377 open end at either TAY or DAW. Table 14.2 – 1L374 AND 1L377 OOS, updated to accommodate different 1L377 open end at either TAY or DAW Table 16 – 2L308 OOS in Attachment 5, corrected a typo in load shed requirement for contingency of GMS T11 & T13, or GMS T12 or T14 Updates to Tables 1,2,16 for ratings changes.

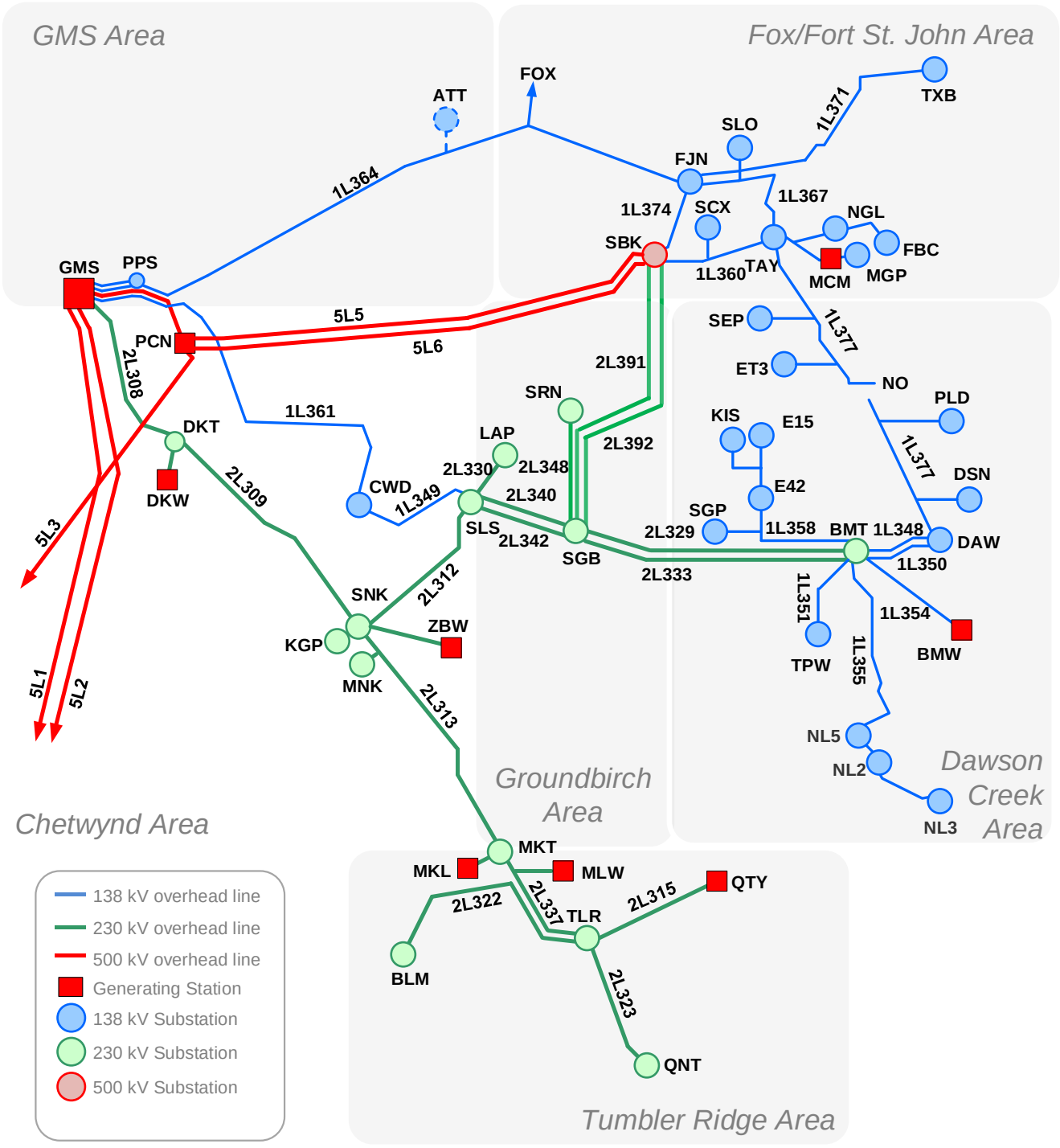
- Only the last 5 revisions are kept

Jun Lu/Amy Lam	26 May 2021	• Section 1 and Section 3 – updated with information about the network connections. • Section 4.2 – Peace Region WAPS Arming has been updated to reflect the Peace Region Load Shed RAS upgrades. • Section 6.0 - Alarm list has been updated. • Attachment 1 – Overview of the Peace 138/230/500 kV Network has been updated for new topology. • Attachment 2 – Peace Region Load Shed RAS scheme functions has been updated to reflect 2L391 and 2L392 connections between SGB and SBK. • Attachment 5 – Peace Region Load Shed and Gen Shed Requirements have been updated to accommodate 2L391 and 2L392 connections.

Jun Lu	03 March 2022	• Section 1 and Section 3 – updated with information about the addition of 5L6.
		• Section 4.0 – and subsections have been renumbered to raise subsection levels and remove outdated content, including:
		  ○ 4.1 – Critical equipment ratings have been updated based on the latest information from SOO 5T-10.
		  ○ 4.2 – is now Protection Considerations. Subsections have been renumbered.
		  ○ 4.3 – is renumbered, for the VAR requirement section. The previous 4.3 section is removed (as the manual load shedding content is obsolete.)
		  ○ 4.4 – is now Peace Region WAPS Arming and updated to reflect the Peace Region Load Shed RAS upgrades.
		• Section 4.5 – is a new section on the topology limitations for the use of Attachment 5, and practices to confirm shedding for un-matched templates
		• Section 6.0 - Alarm list has been updated.
		• Attachment 1 – Overview of the Peace 138/230/500 kV network has been updated for new topology.
		• Attachment 2 – Peace Region Load Shed RAS scheme functions has been updated to reflect 5L6 connection between PCN and SBK.
		• Attachment 5 – Peace Region Load Shed and Gen Shed Requirements have been updated to accommodate 5L6 connection.

Jun Lu/Steven Cullen/Amy Lam	18 May 2023	• Section 4.0 – updated the following:
		  ○ 4.1 – Critical equipment ratings have been updated based on the latest information from SOO 5T-10
		  ○ Added Tables 4.1.1 and Table 4.1.2 – BMT transformer ratings, data derived from SOO 5T-14.
		  ○ 4.4 – updated to reflect the Peace Region Load Shed RAS upgrades.
		• Section 6.0 - Alarm list has been updated.
		• Attachment 1 – Overview of the Peace 138/230/500 kV network has been updated for new topology.
		• Attachment 2 – Peace Region Load Shed RAS scheme functions has been updated.
		• Attachment 5 – Peace Region Load Shed and Gen Shed Requirements have been updated to accommodate DSN load interconnection and opening of 1L377 between ET3 and PLD.

ATTACHMENT 1: OVERVIEW OF THE PEACE 138/230/500 kV SYSTEM



Note: This is NOT an Operating One-Line and is not to be used for PSSP purposes

ATTACHMENT 2: PEACE REGION LOAD SHEDDING RAS SCHEME FUNCTIONS

Contingency	Load Shedding																			DTT Shunt Capacitor Banks										Block Auto-Var		
	Direct Transfer Tripping (DTT)										Load Shedding									SGB 230 kV Shunt Capacitor Banks							BMT and TAY 138 kV Shunt Capacitor Banks							
	1L377 at TAY		2L348 at SGB (SRN)	Entrance Circuit Breaker(s) at					1L355 at BMT (BPN)	1L351 at BMT (TPW)	2L312 at SLS	PLD at POI	AGP at POI	DSN at POI						SGB 2CX1	SGB 2CX2	SGB 2CX3					BMT 1CX1 (Note 7)	BMT 1CX2 (Note 8)	TAY 1CX1 (Note 9)	BMT Auto-Var		SGB Auto-Var
				ENK KIS	ENK E15	ENK E42	ET3	SGP																								
2L308			A	A	A	A	A	A	A	A	A	A	N	A						A	A	A					A	A	A	A		A
2L309			A	A	A	A	A	A	A	A	A	A	N	A						A	A	A					A	A	A	A		A
2L312			A	A	A	A	A	A	A	A		A	N	A						A	A	A					A	A	A	A		A
2L329 & 2L333 (Note 4)	A		A	A	A	A	A	A	A	A	A	A	N	A						A	A	A					A	A	A	A		A
2L340 & 2L342 (Note 4)	A		A	A	A	A	A	A	A	A	A	A	N	A						A	A	A					A	A	A	A		A
2L391	A		A	A	A	A	A	A	A	A	A	A	N	A						A	A	A					A	A	A	A		A
2L392	A		A	A	A	A	A	A	A	A	A	A	N	A						A	A	A					A	A	A	A		A
2L391 AND 2L392 (Note 4)	A		A	A	A	A	A	A	A	A	A	A	N	A						A	A	A					A	A	A	A		A
5L5	A		A	A	A	A	A	A	A	A	A	A	N	A						A	A	A					A	A	A	A		A
5L6	A		A	A	A	A	A	A	A	A	A	A	N	A						A	A	A					A	A	A	A		A
5L5 AND 5L6 **(Note 4)**	A		A	A	A	A	A	A	A	A	A	A	N	A						A	A	A					A	A	A	A		A
1L360	A		A	A	A	A	A	A	A	A	A	A	N	A						A	A	A					A	A	A	A		A
1L374	A		A	A	A	A	A	A	A	A	A	A	N	A						A	A	A					A	A	A	A		A
1L364	A		A	A	A	A	A	A	A	A	A	A	N	A						A	A	A					A	A	A	A		A
BMT T1				A	A	A	A	A	A	A		A		A																		
BMT T2				A	A	A	A	A	A	A		A		A																		
BMT T3				A	A	A	A	A	A	A		A		A																		
SBK T21			A	A	A	A	A	A	A	A	A	A		A						A	A	A					A	A		A		A
SBK T22			A	A	A	A	A	A	A	A	A	A		A						A	A	A					A	A		A		A
SBK T11	A						A					A		A														A				
SBK T12	A						A					A		A														A				
Speed Requirement (cycles) (Note 5)	15		18	15	15	15	15	15	18	18	15	15	15	15						18	18	18					18	18	18	18		18

NOTES for Attachment 2:

Note 1: **A** – means this function is available.
N – means this function is not available.
Note 2: Both fault on the transmission line(s) and opening of line CB(s) will generate contingency signal of the line(s).
Note 3: Removed.
Note 4: The following double contingency input signals, 2L329 & 2L333, 2L340 & 2L342, and 1L350 & 1L348, shall cover both N-2 and N-1-1 contingencies. For example, contingency signal of 2L329 & 2L333 shall cover both simultaneous loss of 2L329 and 2L333, and loss of 2L329 when 2L333 is OOS or loss of 2L333 when 2L329 is OOS.
Note 5: The speed requirement for tripping is defined as the time starting from the fault initiation to the CB contact opened.
Note 6: Removed.
Note 7: BMT 1CX1 is the first 30 MVAR BMT 138 kV Mechanically Switched Shunt Capacitor (MSC) bank associated with ENK E15 Phase 1 load interconnection project.
Note 8: BMT 1CX2 is the second 30 MVAR BMT 138 kV Mechanically Switched Shunt Capacitor (MSC) bank associated with ENK E42 load interconnection project.
Note 9: TAY 1CX1 is the 138 kV Mechanically Switched Shunt Capacitor (MSC) bank associated with Encana Tower (ET3) load interconnection project.

ATTACHMENT 3: PEACE REGION LOCAL GEN SHEDDING RAS SCHEME FUNCTIONS

No.	Contingency (Regional system)	Generation Shedding at							Speed Requirement (within cycles)
		Dokie at DKT	Quality Feeders			Meikle Feeders			Zonnebeke at SNK	
			Feeder #1	Feeder #2	Feeder #3 & #4	Circuit 1 & 2	Circuit 3 & 4	Circuit 5 & 6		
1	2L308 (GMS-DKT)	A	A	A	A	A	A	A	A	12
2	2L309 (DKT-SNK)		A	A	A	A	A	A	A	12
3	2L312 (SLS-SNK)	A	A	A	A	A	A	A	A	12

Notes:

A – means this function is available.
Quality Wind feeders and Meikle Wind feeders are currently selectable as “feeder groups” for arming the transmission source blocks. Each block is independently armed by TSA-PM. Operators are also able to manually arm individual blocks on the EMS displays, for tripping the corresponding “feeder groups” transmission source breakers.

For Quality:

- Arming Block #1 on the EMS display is for Feeder Group #1 tripping
- Arming Block #2 on the EMS display is for Feeder Group #2 tripping
- Arming Block #3 on the EMS display is for Feeder Groups #3 & #4 tripping together

For Meikle:

- Arming Block #1 on the EMS display is for Circuit 1 & 2 tripping
- Arming Block #2 on the EMS display is for Circuit 3 & 4 tripping
- Arming Block #3 on the EMS display is for Circuit 5 & 6 tripping

ATTACHMENT 4: ANTI-ISLANDING DTT SCHEME

No.	Loss of	Plant for DTT	Comment
1	GMS T13&T14, Or 2L308(GMS-DKT)	Dokie, Quality, Meikle, Zonnebeke, and Moose Lake	Note 1
2	2L309(DKT-SNK)	Quality, Meikle, Zonnebeke, and Moose Lake	Note 1
3	2L313(SNK-MKT)	Quality, Meikle, and Moose Lake	
4	2L337(MKT-TLR)	Quality and Moose Lake	

Note:

(1) 2L312 status will be monitored by the scheme. If any outage of these facilities results in the disconnection between the 230 kV and 138 kV systems in the area, then DTT shall apply.

ATTACHMENT 5: PEACE REGION LOAD SHEDDING AND GENERATION SHEDDING REQUIREMENTS

Peace Region Load Shedding and Gen Shedding Requirements for various system conditions have been specified in the following tables:

The following notes are applicable to all contingencies in Table 1 to Table 15:

Note 1: KIS_L is the load in MW measured at ENK KIS Substation;
Encana 15-27_L is the load in MW measured at ENK Encana 15-27 Substation;
SRN_L is the load in MW measured at SGB Substation;
PPS_L is the load in MW measured at PPS Substation;
SCX_L is the load in MW measured at Site C construction site;
ET3_L is the load in MW measured at ET3 Substation;
PLD_L is the load in MW measured at PLD Substation;
FOX_L is the load in MW measured at FOX Substation;
SLO_L is the load in MW measured at SLO Substation.
Note 2: Do not arm load shedding if the load is less than 3 MW.
Note 3: "CP" is an abbreviation for Cut Plane for Load Shedding. "GCP" is an abbreviation for Cut Plane for Generation Shedding.
Note 4: The operational instructions below in Table 1 to Table 16 are based on 1L377 normally open at 1D6L377 or 1D8L377.
Note 5: Auto-Var schemes at SGB, DAW, TAY, and FJN are required to be in service. If any of the Auto-Var scheme is out of service, or any of the switchable shunt capacitors at these stations is not available for switch in, consult Operations Planning for operational instructions.
Note 6: In general, the two switchable shunt capacitor banks at BMT shall be switched in before BMW wind farm STATCOM being fully utilized to support voltages at BMT/DAW area. This is to make sure that there is enough reactive capacity room reserved at BMW wind farm STATCOM to support post-contingency voltages at BMT/DAW area, especially for double contingencies of 5L5&5L6, and 2L391&2L392.
Note 7: The following system configurations are covered by System Normal table (Table 1):

- GMS T11 OOS or GMS T12 OOS or GMS T13 OOS or GMS T14 OOS or GMS (T11 and T13) OOS or GMS (T12 and T14) OOS
- 2L313 OOS, 2L340 OOS, 2L342 OOS.
- 1L348 OOS, or 1L350 OOS

Table 1: System Normal - All South Peace Region 230 kV/138 kV/500 kV Circuits in Service

Pre-outage restrictions:

- If TSAPM issues one or more of the following alarms:
  - **"FJN/TAY AREA_INSUFFICIENT LOAD SHED_5L5&5L6_CTG", or**
  - **"FJN/TAY AREA_INSUFFICIENT LOAD SHED_1L360_CTG", or**
  - **"FJN/TAY AREA_INSUFFICIENT LOAD SHED_1L374_CTG",**

  BC Hydro Control Centre staff shall take the following actions to remove these alarms:
  - Increase power output from MCM units, and/or
  - Curtail load in TAY/FJN area. Suggested load curtailment candidates are FBC, NGL, SLO, TXB and SEP.

- **After all of the alarms above have been removed and if the condition of (1L367 FJN – SLO_L) + 1L360 SBK >= 1L360_Over_Rating is still true, then TSAPM alarms "OPEN TAY 1CB30 FOR 1L367 CONTINGENCY".**
  Operators shall open TAY 1CB30 to prevent 1L367 contingency from overloading 1L360.

CONTINGENCY	LOAD SHEDDING OR GENERATION SHEDDING REQUIREMENTS
5L5 and 5L6	Shed at ET3, the larger of: • 1.68 * ((5L5 + 5L6) PCN + 1L364 GMS – (2L391 + 2L392) SBK – 200 MW) [Voltage Stability] • 2.6 * (0.28 * (5L5 + 5L6) PCN + 1L364 GMS – 1L364_Over_Rating) [Thermal Overload] Load Shed: LS = 1.38 * ((2L391 + 2L392) SBK + (2L308 + 1L361) GMS – 400 MW) [Voltage Stability] • Load shedding sequence: (1) PLD, DSN; (2) SRN, KIS, E15, E42, SGP, TPW, or BPN.
5L5	No shedding is required.
5L6	No shedding is required.
2L308	Generation shedding: GS = (2L308 DKT + 2L312 SNK) – 2L312_Over_Rating MW [Thermal overload] **Note:** • Generation shedding candidates: ZBW, DKW, QTY, and MKL
2L309	No shedding is required.
2L312	Generation shedding: GS = (2L308 DKT + 2L312 SNK) – 2L308_Over_Rating MW [Thermal overload] **Note**: • Generation shedding candidates: ZBW, DKW, QTY, and MKL
2L340 and 2L342	No shedding is required.
2L329 and 2L333	No shedding is required. **Notes**: • 2L391 open end at SGB for this double contingency • SGB 2CX2 and 2CX3 are tripped for this double contingency.
2L391	No shedding is required.
2L392	No shedding is required.
2L391 AND 2L392	Load shed: LS = 1.28 * [(2L391 + 2L392) SBK + (2L308 + 1L361) GMS – 390] MW [Voltage Stability] **Notes**: • Load shedding sequence: (1) PLD, DSN; (2) SRN, KIS, E15, E42, SGP, TPW, or BPN. • 2L333 open end at SGB for this double contingency. • SGB 2CX2 is tripped for this double contingency.
BMT T1	No shedding is required.
BMT T2	No shedding is required.
BMT T3	No shedding is required.
SBK T21	No shedding is required.
SBK T22	No shedding is required.
SBK T11	No shedding is required.
SBK T12	No shedding is required.
1L360	Load shed at ET3: 1.15 * (1L360 SBK – SCX_L + 1L374 SBK – 1L374_Over_Rating) [Thermal Overload]
1L364	No shedding is required.
1L374	Load shed at ET3: 1.2 * (0.9 * 1L374 SBK + 1L360 SBK – 1L360_Over_Rating) [Thermal Overload]

Table 2: 2L329 OOS

Pre-outage restrictions:

- If TSAPM issues one or more of the following alarms:
  - **"FJN/TAY AREA_INSUFFICIENT LOAD SHED_5L5&5L6_CTG", or**
  - **"FJN/TAY AREA_INSUFFICIENT LOAD SHED_1L360_CTG", or**
  - **"FJN/TAY AREA_INSUFFICIENT LOAD SHED_1L374_CTG",**

  BC Hydro Control Centre staff shall take the following actions to remove these alarms:
  - Increase power output from MCM units, and/or
  - Curtail load in TAY/FJN area. Suggested load curtailment candidates are FBC, NGL, SLO, TXB and SEP.

- **After all of the alarms above have been removed and if the condition of (1L367 FJN – SLO_L) + 1L360 SBK >= 1L360_Over_Rating is still true, then TSAPM alarms "OPEN TAY 1CB30 FOR 1L367 CONTINGENCY".**
  Operators shall open TAY 1CB30 to prevent 1L367 contingency from overloading 1L360.

CONTINGENCY	LOAD SHEDDING OR GENERATION SHEDDING REQUIREMENTS
5L5 and 5L6	Shed at ET3, the larger of: • 1.68 * ((5L5 + 5L6) PCN + 1L364 GMS – (2L391 + 2L392) SBK – 200 MW) [Voltage Stability] • 2.6 * (0.28 * (5L5 + 5L6) PCN + 1L364 GMS – 1L364_Over_Rating) [Thermal Overload] Load Shed: LS = 1.28 * ((2L391 + 2L392) SBK + (2L308 + 1L361) GMS – 375 MW) [Voltage Stability] • Load shedding sequence: (1) PLD, DSN; (2) SRN, KIS, E15, E42, SGP, TPW, or BPN.
5L5	No shedding is required.
5L6	No shedding is required.
2L308	Same as System Normal.
2L309	No shedding is required.
2L312	Same as System Normal.
2L340 and 2L342	No shedding is required.
2L329 and 2L333	No shedding is required. **Notes:** • 2L391 will not be open ended if 2L329 is out of service by opening the disconnect at SGB for 2L333 contingency • SGB 2CX2 is tripped for 2L333 contingency • BMT/DAW area islanded
2L391	No shedding is required.
2L392	No shedding is required.
2L391 AND 2L392	No shedding is required. Notes: • Since 2L333 is open ended at SGB for this double contingency, while 2L329 is OOS, BMT/DAW area is islanded. • SGB 2CX2 is tripped for this double contingency.
BMT T1	No shedding is required.
BMT T2	No shedding is required.
BMT T3	No shedding is required.
SBK T21	No shedding is required.
SBK T22	No shedding is required.
SBK T11	No shedding is required.
SBK T12	No shedding is required.
1L360	Same as System Normal.
1L364	No shedding is required.
1L374	Same as System Normal.

Table 3: 2L333 OOS

Pre-outage restrictions:

- If TSAPM issues one or more of the following alarms:
  - **"FJN/TAY AREA_INSUFFICIENT LOAD SHED_5L5&5L6_CTG", or**
  - **"FJN/TAY AREA_INSUFFICIENT LOAD SHED_1L360_CTG", or**
  - **"FJN/TAY AREA_INSUFFICIENT LOAD SHED_1L374_CTG",**

  BC Hydro Control Centre staff shall take the following actions to remove these alarms:
  - Increase power output from MCM units, and/or
  - Curtail load in TAY/FJN area. Suggested load curtailment candidates are FBC, NGL, SLO, TXB and SEP.

- **After all of the alarms above have been removed and if the condition of (1L367 FJN – SLO_L) + 1L360 SBK >= 1L360_Over_Rating is still true, then TSAPM alarms "OPEN TAY 1CB30 FOR 1L367 CONTINGENCY".**
  Operators shall open TAY 1CB30 to prevent 1L367 contingency from overloading 1L360.

CONTINGENCY	LOAD SHEDDING OR GENERATION SHEDDING REQUIREMENTS
5L5 and 5L6	Same as 2L329 OOS.
5L5	No shedding is required.
5L6	No shedding is required.
2L308	Same as System Normal.
2L309	No shedding is required.
2L312	Same as System Normal.
2L340 and 2L342	No shedding is required.
2L329 and 2L333	No shedding is required. **Notes**: • 2L391 will not be open ended if 2L333 is out of service by opening the disconnect at SGB for 2L329 contingency. • SGB 2CX3 is tripped for this double contingency. • BMT/DAW area islanded
2L391	No shedding is required.
2L392	No shedding is required.
2L391 AND 2L392	Load shedding: LS = 1.28 * [(2L391 + 2L392) SBK + (2L308 + 1L361) GMS – 380] MW [Voltage Stability] **Notes:** • Load shedding sequence: (1) PLD, DSN; (2) SRN, KIS, E15, E42, SGP, TPW, or BPN. • SGB 2CX2 is tripped for this double contingency.
BMT T1	No shedding is required.
BMT T2	No shedding is required.
BMT T3	No shedding is required.
SBK T21	No shedding is required.
SBK T22	No shedding is required.
SBK T11	No shedding is required.
SBK T12	No shedding is required.
1L360	Same as System Normal.
1L364	No shedding is required.
1L374	Same as System Normal.

Table 4: 1L349 OOS and / or 1L361 OOS

Pre-outage restrictions:

- If TSAPM issues one or more of the following alarms:
  - **"FJN/TAY AREA_INSUFFICIENT LOAD SHED_5L5&5L6_CTG", or**
  - **"FJN/TAY AREA_INSUFFICIENT LOAD SHED_1L360_CTG", or**
  - **"FJN/TAY AREA_INSUFFICIENT LOAD SHED_1L374_CTG",**

  BC Hydro Control Centre staff shall take the following actions to remove these alarms:
  - Increase power output from MCM units, and/or
  - Curtail load in TAY/FJN area. Suggested load curtailment candidates are FBC, NGL, SLO, TXB and SEP.

- **After all of the alarms above have been removed and if the condition of (1L367 FJN – SLO_L) + 1L360 SBK >= 1L360_Over_Rating is still true, then TSAPM alarms "OPEN TAY 1CB30 FOR 1L367 CONTINGENCY".**
  Operators shall open TAY 1CB30 to prevent 1L367 contingency from overloading 1L360.

- **Limit 2L340 SLS + 2L342 SLS + 2L308 DKT < 2L308_Over_Rating**
  If TSAPM alarms "VIOLATION_2L308_Over_Rating", then Operators shall contact the following local wind farms QTY, MLW, MKL, DKW, or ZBW to reduce their power outputs.

CONTINGENCY	LOAD SHEDDING OR GENERATION SHEDDING REQUIREMENTS
5L5 and 5L6	Shed at ET3, the larger of: • 1.58 * ((5L5 + 5L6) PCN + 1L364 GMS – (2L391 + 2L392) SBK – 185 MW) [Voltage Stability] • 2.4 * (0.28 * (5L5 + 5L6) PCN + 1L364 GMS – 1L364_Over_Rating) [Thermal Overload] Load Shed: LS = 1.18 * ((2L391 + 2L392) SBK + (2L308 + 1L361) GMS – 365 MW) [Voltage Stability] • Load shedding sequence: (1) PLD, DSN; (2) SRN, KIS, E15, E42, SGP, TPW, or BPN.
5L5	No shedding is required.
5L6	No shedding is required.
2L308	Same as System Normal.
2L309	No shedding is required.
2L312	Same as System Normal.
2L340 and 2L342	No shedding is required.
2L329 and 2L333	Same as System Normal.
2L391	No shedding is required.
2L392	No shedding is required.
2L391 AND 2L392	Load shed: LS = 1.2 * [(2L391 + 2L392) SBK + (2L308 + 1L361) GMS – 365] MW [Voltage Stability] Notes: • Load shedding sequence: (1) PLD, DSN; (2) SRN, KIS, E15, E42, SGP, TPW, or BPN. • 2L333 open end at SGB for this double contingency, • SGB 2CX2 is tripped for this double contingency.
BMT T1	No shedding is required.
BMT T2	No shedding is required.
BMT T3	No shedding is required.
SBK T21	No shedding is required.
SBK T22	No shedding is required.
SBK T11	No shedding is required.
SBK T12	No shedding is required.
1L360	Same as System Normal.
1L364	No shedding is required.
1L374	Same as System Normal.

Table 5: 1L360 OOS

Pre-outage restrictions:

- **Limit 1L374 SBK < 1L374 Norm_Rating**
  If TSA alarms "VIOLATION_1L374_NORM_RATING_SBK", take the following action(s):
  - Increase power output from MCM units, and/or,
  - Curtail load in TAY/FJN area. Suggested load curtailment candidates are FBC, NGL, SLO, TXB and SEP.

- **Limit 1L367 FJN < 1L367 Norm_Rating**
  If TSA alarms "VIOLATION_1L367_NORM_RATING_FJN", take the following action(s):
  - Increase power output from MCM units, and/or,
  - Curtail load in TAY/FJN area. Suggested load curtailment candidates are FBC, NGL, SLO, TXB and SEP.

- **Limit 1L374 SBK + 1L364 GMS - ET3_L < (115 + 10 * N) MW [Voltage Stability]** (Note: N is the number of online MCM units)
  If TSA alarms "VIOLATION_1L374 SBK+1L364 GMS_FLOW_1L360OOS", take the following action(s):
  - Increase power output from MCM units, and/or
  - Curtail load in TAY/FJN area to ensure system reliability. Suggested area load curtailment candidates are FBC, NGL, SLO, TXB and SEP.

- If TSAPM issues one or more of the following alarms:
  - **"FJN/TAY AREA_INSUFFICIENT LOAD SHED_5L5&5L6_CTG", or**
  - **"FJN/TAY AREA_INSUFFICIENT LOAD SHED_1L364_CTG", or**
  - **"FJN/TAY AREA_INSUFFICIENT LOAD SHED_1L374_CTG",**

  BC Hydro Control Centre staff shall take the following actions to remove these alarms:
  - Increase power output from MCM units, and/or
  - Curtail load in TAY/FJN area. Suggested load curtailment candidates are FBC, NGL, SLO, TXB and SEP.

CONTINGENCY	LOAD SHEDDING OR GENERATION SHEDDING REQUIREMENTS
5L5 and 5L6	Shed at ET3, the larger of: • 1.38 * ((5L5 + 5L6) PCN + 1L364 GMS – (2L391 + 2L392) SBK – 145 MW) [Voltage Stability] • 2.2 * (0.25 * (5L5 + 5L6) PCN + 1L364 GMS – 1L364_Over_Rating) [Thermal Overload] Load Shed: LS = 1.3 * ((2L391 + 2L392) SBK + (2L308 + 1L361) GMS – 400 MW) [Voltage Stability] • Load shedding sequence: (1) PLD, DSN; (2) SRN, KIS, E15, E42, SGP, TPW, or BPN.
5L5	No shedding is required.
5L6	No shedding is required.
2L308	Same as System Normal.
2L309	No shedding is required.
2L312	Same as System Normal.
2L340 and 2L342	No shedding is required.
2L329 and 2L333	Same as System Normal.
2L391	No shedding is required.
2L392	No shedding is required.
2L391 AND 2L392	Load shed: LS = 1.25 * [(2L391 + 2L392) SBK + (2L308 + 1L361) GMS – 390] MW [Voltage Stability] **Notes:** • Load shedding sequence: (1) PLD, DSN; (2) SRN, KIS, E15, E42, SGP, TPW, or BPN. • 2L333 open end at SGB for this double contingency. • SGB 2CX2 is tripped for this double contingency.
BMT T1	No shedding is required.
BMT T2	No shedding is required.
BMT T3	No shedding is required.
SBK T21	No shedding is required.
SBK T22	No shedding is required.
SBK T11	No shedding is required.
SBK T12	No shedding is required.
1L364	Load Shed at ET3: (1L364 GMS – FOX L + 1L374 SBK – 1L374_Over_Rating) [Thermal Overload]
1L374	Load Shed at ET3: 0.8 * (1.2 * 1L374 SBK + 1L364 GMS – 1L364_Over Rating) [Thermal Overload]

Table 6: 1L364 OOS

Pre-outage restrictions:

- If TSAPM issues one or more of the following alarms:
  - **"FJN/TAY AREA_INSUFFICIENT LOAD SHED_1L360_CTG", or**
  - **"FJN/TAY AREA_INSUFFICIENT LOAD SHED_1L374_CTG",**

  BC Hydro Control Centre staff shall take the following actions to remove these alarms:
  - Increase power output from MCM units, and/or
  - Curtail load in TAY/FJN area. Suggested load curtailment candidates are FBC, NGL, SLO, TXB and SEP.

- **After all of the alarms above have been removed and if the condition of (1L367 FJN – SLO_L) + 1L360 SBK >= 1L360_Over_Rating is still true, then TSAPM alarms "OPEN TAY 1CB30 FOR 1L367 CONTINGENCY".**
  Operators shall open TAY 1CB30 to prevent 1L367 contingency from overloading 1L360.

CONTINGENCY	LOAD SHEDDING OR GENERATION SHEDDING REQUIREMENTS
5L5 and 5L6	Load Shed: LS = 1.28 * (0.3 * (5L5 + 5L6) PCN + 1L361 GMS – 1L361_Over_Rating) [Thermal Overload] • Load shedding sequence: (1) PLD, DSN; (2) SRN, KIS, E15, E42, SGP, TPW, or BPN.
5L5	No shedding is required.
5L6	No shedding is required.
2L308	Same as System Normal.
2L309	No shedding required.
2L312	Same as System Normal.
2L340 and 2L342	No shedding is required.
2L329 and 2L333	Same as System Normal.
2L391	No shedding is required.
2L392	No shedding is required.
2L391 AND 2L392	Same as System Normal.
BMT T1	No shedding is required.
BMT T2	No shedding is required.
BMT T3	No shedding is required.
SBK T21	No shedding is required.
SBK T22	No shedding is required.
SBK T11	No shedding is required.
SBK T12	No shedding is required.
1L360	Load shed at ET3: 0.95 * (1.1 * (1L360 SBK – SCX_L) + 1L374 SBK - 1L374_Over_Rating) [Thermal Overload]
1L374	Load shed at ET3: 0.95 * (1.1 * 1L374 SBK + 1L360 SBK – 1L360_Over_Rating) [Thermal Overload]

Table 7: 1L367 OOS

Pre-outage restrictions:

- **Limit 1L360 SBK < 1L360_Norm_Rating.**
  If TSA alarms "VIOLATION_1L360_NORM_RATING_SBK", take the following action(s):
  - Increase power output from MCM units, and/or,
  - Curtail load in TAY/FJN area to ensure system reliability. Suggested load curtailment candidates are FBC, NGL, SLO, TXB, SCX and SEP.

- If TSAPM issues the following alarm:
  - **"FJN/TAY AREA_INSUFFICIENT LOAD SHED_5L5&5L6_CTG", or**

  BC Hydro Control Centre staff shall take the following actions to remove these alarms:
  - Increase power output from MCM units, and/or
  - Curtail load in TAY/FJN area. Suggested load curtailment candidates are FBC, NGL, SLO, TXB and SEP.

CONTINGENCY	LOAD SHEDDING OR GENERATION SHEDDING REQUIREMENTS
5L5 and 5L6	Shed at ET3, the larger of: • 1.65 * ((5L5 + 5L6) PCN + 1L364 GMS – (2L391 + 2L392) SBK – 200 MW) [Voltage Stability] • 2.6 * (0.24 * (5L5 + 5L6) PCN + 1L364 GMS – 1L364_Over_Rating) [Thermal Overload] Load Shed: LS = 1.38 * ((2L391 + 2L392) SBK + (2L308 + 1L361) GMS – 400 MW) [Voltage Stability] • Load shedding sequence: (1) PLD, DSN; (2) SRN, KIS, E15, E42, SGP, TPW, or BPN.
5L5	No shedding is required.
5L6	No shedding is required.
2L308	Same as System Normal.
2L309	No shedding is required.
2L312	Same as System Normal.
2L340 and 2L342	No shedding is required.
2L329 and 2L333	Same as System Normal.
2L391	No shedding is required.
2L392	No shedding is required.
2L391 AND 2L392	Same as Table 5 – 1L360 OOS.
BMT T1	No shedding is required.
BMT T2	No shedding is required.
BMT T3	No shedding is required.
SBK T21	No shedding is required.
SBK T22	No shedding is required.
SBK T11	No shedding is required.
SBK T12	No shedding is required.
1L360	Taylor area is islanded and no load shedding is required.
1L364	No shedding is required.
1L374	No shedding is required.

Table 8: 1L374 OOS

Pre-outage restrictions:

- **Limit 1L360 SBK < 1L360_Norm_Rating.**
  If TSA alarms "VIOLATION_1L360_NORM_RATING_SBK", take the following action(s):
  - Increase power output from MCM units, and/or,
  - Curtail load in TAY/FJN area to ensure system reliability. Suggested load curtailment candidates are FBC, NGL, SLO, TXB, SCX and SEP.

- **Limit 1L360 SBK + 1L364 GMS - ET3_L < (115 + 10 * N) MW [Voltage Stability]** (Note: N is the number of online MCM units)
  If TSA alarms "VIOLATION_1L360 SBK+1L364 GMS_FLOW_1L374OOS", take the following action(s):
  - Increase power output from MCM units, and/or
  - Curtail load in TAY/FJN area to ensure system reliability. Suggested area load curtailment candidates are FBC, NGL, SLO, TXB, SCX and SEP.

- If TSAPM issues one or more of the following alarms:
  - **"FJN/TAY AREA_INSUFFICIENT LOAD SHED_5L5&5L6_CTG", or**
  - **"FJN/TAY AREA_INSUFFICIENT LOAD SHED_1L360_CTG", or**
  - **"FJN/TAY AREA_INSUFFICIENT LOAD SHED_1L364_CTG",**

  BC Hydro Control Centre staff shall take the following actions to remove these alarms:
  - Increase power output from MCM units, and/or
  - Curtail load in TAY/FJN area. Suggested load curtailment candidates are FBC, NGL, SLO, TXB and SEP.

CONTINGENCY	LOAD SHEDDING OR GENERATION SHEDDING REQUIREMENTS
5L5 and 5L6	Shed at ET3, the larger of: • 1.33 * ((5L5 + 5L6) PCN + 1L364 GMS – (2L391 + 2L392) SBK – 145 MW) [Voltage Stability] • 2.3 * (0.23 * (5L5 + 5L6) PCN + 1L364 GMS – 1L364_Over_Rating) [Thermal Overload] Load Shed: LS = 1.33 * ((2L391 + 2L392) SBK + (2L308 + 1L361) GMS – 400 MW) [Voltage Stability] • Load shedding sequence: (1) PLD, DSN; (2) SRN, KIS, E15, E42, SGP, TPW, or BPN.
5L5	No shedding is required.
5L6	No shedding is required.
2L308	Same as System Normal.
2L309	No shedding is required.
2L312	Same as System Normal.
2L340 and 2L342	No shedding is required.
2L329 and 2L333	Same as System Normal.
2L391	No shedding is required.
2L392	No shedding is required.
2L391 AND 2L392	Same as Table 5 - 1L360 OOS.
BMT T1	No shedding is required.
BMT T2	No shedding is required.
BMT T3	No shedding is required.
SBK T21	No shedding is required.
SBK T22	No shedding is required.
SBK T11	No shedding is required.
SBK T12	No shedding is required.
1L360	Load shed at ET3: 0.8 * (1.2 * (1L360 SBK – SCX_L) + 1L364 GMS – 1L364_Over_Rating) [Thermal Overload]
1L364	Load shed at ET3: (1L364 GMS – FOX_L + 1L360 SBK – 1L360_Over_Rating) [Thermal Overload]

Note:
(1) When planning 1L374 outage, open 1L374 at FJN with 1D21, and keep both 1CB2 and 1CB9 connected. This is to avoid T3 being tripped after 1L364 contingency, and FJN load will be supplied by T2 only, while T2 may be overloaded if FJN load is high.

Table 9: 2L308 OOS

Pre-outage restrictions:

- **Ensure 5L1, 5L2, 5L3, 5L4 and 5L7 are in-service as the generation shedding and load shedding equations below is determined based on this system configuration.**

- If TSAPM issues one or more of the following alarms:
  - **"FJN/TAY AREA_INSUFFICIENT LOAD SHED_5L5&5L6_CTG", or**
  - **"FJN/TAY AREA_INSUFFICIENT LOAD SHED_1L360_CTG", or**
  - **"FJN/TAY AREA_INSUFFICIENT LOAD SHED_1L374_CTG",**

  BC Hydro Control Centre staff shall take the following actions to remove these alarms:
  - Increase power output from MCM units, and/or
  - Curtail load in TAY/FJN area. Suggested load curtailment candidates are FBC, NGL, SLO, TXB and SEP.

- **After all of the alarms above have been removed and if the condition of (1L367 FJN – SLO_L) + 1L360 SBK >= 1L360_Over_Rating is still true, then TSAPM alarms "OPEN TAY 1CB30 FOR 1L367 CONTINGENCY".**
  Operators shall open TAY 1CB30 to prevent 1L367 contingency from overloading 1L360.

- **Limit 2L312 SNK < 2L312_Norm_Rating.**
  If TSA alarms "VIOLATION_2L312_NORM_RATING_SNK", reduce generation output from local wind farms: DKW, QTY, MKL, ZBW, or MLW.

- **If any SGB shunt capacitor(s) is/are required to be online to maintain appropriate system voltage, 2CX1 must be the first one among the three 230 kV shunt capacitors at SGB to be switched in.**

CONTINGENCY	LOAD SHEDDING OR GENERATION SHEDDING REQUIREMENTS
5L5 and 5L6	Load shedding LS = MAX (LS1, LS2) • LS1 = 0.58 * [0.68 * (5L5 + 5L6) SBK + 1L361 GMS – 1L361_Over_Rating] [Thermal Overload] • LS2 = 0.6 * [0.66 * (5L5 + 5L6) SBK + 1L364 GMS – 1L364_Over_Rating] [Thermal Overload] If LS2 > 0, then shed ET3 first, otherwise, the load shedding sequence is: (1) PLD, DSN; (2) SRN, KIS, E15, E42, SGP, TPW, or BPN.
5L5	No shedding is required.
5L6	No shedding is required.
2L309	No shedding is required.
2L312	No shedding is required.
2L340 and 2L342	No shedding is required.
2L329 and 2L333	Same as System Normal.
2L391	No shedding is required.
2L392	No shedding is required.
2L391 AND 2L392	Load Shed: LS = 1.05 * ((2L391 + 2L392) SBK + 1L361 GMS – 1L361_Over_Rating) [Thermal Overload] • Load shedding sequence: (1) PLD, DSN; (2) SRN, KIS, E15, E42, SGP, TPW, or BPN.
BMT T1	No shedding is required.
BMT T2	No shedding is required.
BMT T3	No shedding is required.
SBK T21	No shedding is required.
SBK T22	No shedding is required.
SBK T11	No shedding is required.
SBK T12	No shedding is required.
1L360	Same as System Normal
1L364	No shedding is required.
1L374	Same as System Normal

Notes:

(1) High voltage would be observed in Tumbler Ridge/Groundbirch area when both area load and wind farms' power output are relatively light. When 230 kV system voltage in these areas is high, e.g., more than 1.08 p.u., one of the two 230 kV lines from SLS to BMT and/or one of 2L391/2L392 between SBK to SGB could be switched off and it shall be considered as the last resort.

(2) All reactive power facilities at wind farms: BMW, QTY, MKL, and DKW are required in service and in voltage control mode as specified in corresponding wind farm Operating Orders.

Table 10: 2L309 OOS

Pre-outage restrictions:

- **Ensure 5L1, 5L2, 5L3, 5L4 and 5L7 are in-service as the generation shedding and load shedding equations below is determined based on this system configuration.**

- If TSAPM issues one or more of the following alarms:
  - **"FJN/TAY AREA_INSUFFICIENT LOAD SHED_5L5&5L6_CTG", or**
  - **"FJN/TAY AREA_INSUFFICIENT LOAD SHED_1L360_CTG", or**
  - **"FJN/TAY AREA_INSUFFICIENT LOAD SHED_1L374_CTG",**

  BC Hydro Control Centre staff shall take the following actions to remove these alarms:
  - Increase power output from MCM units, and/or
  - Curtail load in TAY/FJN area. Suggested load curtailment candidates are FBC, NGL, SLO, TXB and SEP.

- **After all of the alarms above have been removed and if the condition of (1L367 FJN – SLO_L) + 1L360 SBK >= 1L360_Over_Rating is still true, then TSAPM alarms "OPEN TAY 1CB30 FOR 1L367 CONTINGENCY".**
  Operators shall open TAY 1CB30 to prevent 1L367 contingency from overloading 1L360.

- **If any SGB shunt capacitor(s) is/are required to be online to maintain appropriate system voltage, 2CX1 must be the first one among the three 230 kV shunt capacitors at SGB to be switched in.**

CONTINGENCY	LOAD SHEDDING OR GENERATION SHEDDING REQUIREMENTS
5L5 and 5L6	Same as 2L308 OOS
5L5	No shedding is required.
5L6	No shedding is required.
2L308	No shedding is required.
2L312	No shedding is required.
2L340 and 2L342	No shedding is required.
2L329 and 2L333	Same as System Normal.
2L391	No shedding is required.
2L392	No shedding is required.
2L391 AND 2L392	Same as 2L308 OOS
BMT T1	No shedding is required.
BMT T2	No shedding is required.
BMT T3	No shedding is required.
SBK T21	No shedding is required.
SBK T22	No shedding is required.
SBK T11	No shedding is required.
SBK T12	No shedding is required.
1L360	Same as System Normal
1L364	No shedding is required.
1L374	Same as System Normal

Notes:

(1) High voltage would be observed in Tumbler Ridge/Groundbirch area when both area load and wind farms' power output are relatively light. When 230 kV system voltage in these areas is high, e.g., more than 1.08 p.u., one of the two 230 kV lines from SLS to BMT and/or one of 2L391/2L392 between SBK to SGB could be switched off and it shall be considered as the last resort.

(2) All reactive power facilities at wind farms: BMW, QTY, and MKL are required in service and in voltage control mode as specified in corresponding wind farm Operating Orders.

Table 11: 2L312 OOS

Pre-outage restrictions:

- **Ensure 5L1, 5L2, 5L3, 5L4 and 5L7 are in-service as the generation shedding and load shedding equations below is determined based on this system configuration.**

- If TSAPM issues one or more of the following alarms:
  - **"FJN/TAY AREA_INSUFFICIENT LOAD SHED_5L5&5L6_CTG", or**
  - **"FJN/TAY AREA_INSUFFICIENT LOAD SHED_1L360_CTG", or**
  - **"FJN/TAY AREA_INSUFFICIENT LOAD SHED_1L374_CTG",**

  BC Hydro Control Centre staff shall take the following actions to remove these alarms:
  - Increase power output from MCM units, and/or
  - Curtail load in TAY/FJN area. Suggested load curtailment candidates are FBC, NGL, SLO, TXB and SEP.

- **After all of the alarms above have been removed and if the condition of (1L367 FJN – SLO_L) + 1L360 SBK >= 1L360_Over_Rating is still true, then TSAPM alarms "OPEN TAY 1CB30 FOR 1L367 CONTINGENCY".**
  Operators shall open TAY 1CB30 to prevent 1L367 contingency from overloading 1L360.

- **Limit 2L308 DKT < 2L308_Norm_Rating**
  If TSA alarms "VIOLATION_2L308_NORM_RATING_DKT", reduce generation outputs from local wind farms: ZBW, DKW, QTY, MKL, or MLW. Ratings are from Section 4.1 and could be adjusted based on real time ambient temperatures.

- **If any SGB shunt capacitor(s) is/are required to be online to maintain appropriate system voltage, 2CX1 must be the first one among the three 230 kV shunt capacitors at SGB to be switched in.**

CONTINGENCY	LOAD SHEDDING OR GENERATION SHEDDING REQUIREMENTS
5L5 and 5L6	Same as 2L308 OOS
5L5	No shedding is required.
5L6	No shedding is required.
2L308	No shedding is required.
2L309	No shedding is required.
2L340 and 2L342	No shedding is required.
2L329 and 2L333	Same as System Normal.
2L391	No shedding is required.
2L392	No shedding is required.
2L391 AND 2L392	Load Shed: LS = 1.05 * ((2L391 + 2L392) SBK + 1L361 GMS – 1L361_Over_Rating) [Thermal Overload] • Load shedding sequence: (1) PLD, DSN; (2) SRN, KIS, E15, E42, SGP, TPW, or BPN.
BMT T1	No shedding is required.
BMT T2	No shedding is required.
BMT T3	No shedding is required.
SBK T21	No shedding is required.
SBK T22	No shedding is required.
SBK T11	No shedding is required.
SBK T12	No shedding is required.
1L360	Same as System Normal
1L364	No shedding is required.
1L374	Same as System Normal

Notes:

(1) High voltage would be observed in Groundbirch area when both area load and wind farms' power output are relatively light. When 230 kV system voltage in these areas is high, e.g., more than 1.08 p.u., one of the two 230 kV lines from SLS to BMT and/or one of 2L391/2L392 between SBK to SGB could be switched off and it shall be considered as the last resort.

Table 12: 5L5 OOS or 5L6 OOS

Pre-outage restrictions:

- If TSAPM issues one or more of the following alarms:
  - **"FJN/TAY AREA_INSUFFICIENT LOAD SHED_5L5&5L6_CTG", or**
  - **"FJN/TAY AREA_INSUFFICIENT LOAD SHED_1L360_CTG", or**
  - **"FJN/TAY AREA_INSUFFICIENT LOAD SHED_1L374_CTG",**

  BC Hydro Control Centre staff shall take the following actions to remove these alarms:
  - Increase power output from MCM units, and/or
  - Curtail load in TAY/FJN area. Suggested load curtailment candidates are FBC, NGL, SLO, TXB and SEP.

- **After all of the alarms above have been removed and if the condition of (1L367 FJN – SLO_L) + 1L360 SBK >= 1L360_Over_Rating is still true, then TSAPM alarms "OPEN TAY 1CB30 FOR 1L367 CONTINGENCY".**
  Operators shall open TAY 1CB30 to prevent 1L367 contingency from overloading 1L360.

CONTINGENCY	LOAD SHEDDING OR GENERATION SHEDDING REQUIREMENTS
5L5 with 5L6 OOS, or 5L6 with 5L5 OOS	Shed at ET3, the larger of: • 1.68 * ((5L5 + 5L6) PCN + 1L364 GMS – (2L391 + 2L392) SBK – 200 MW) [Voltage Stability[• 2.6 * (0.28 * (5L5 + 5L6) PCN + 1L364 GMS – 1L364_Over_Rating) [Thermal Overload] Load Shed: LS = 1.38 * ((2L391 + 2L392) SBK + (2L308 + 1L361) GMS – 400 MW) [Voltage Stability[• Load shedding sequence: (1) PLD, DSN; (2) SRN, KIS, E15, E42, SGP, TPW, or BPN.
2L308	Same as System Normal.
2L309	No shedding is required.
2L312	Same as System Normal.
2L340 and 2L342	No shedding is required.
2L329 and 2L333	Same as System Normal.
2L391	No shedding is required.
2L392	No shedding is required.
2L391 and 2L392	Same as System Normal.
BMT T1	No shedding is required.
BMT T2	No shedding is required.
BMT T3	No shedding is required.
SBK T21	No shedding is required.
SBK T22	No shedding is required.
SBK T11	No shedding is required.
SBK T12	No shedding is required.
1L360	Same as System Normal.
1L364	No shedding is required.
1L374	Same as System Normal.

Table 13: 2L391 OOS or 2L392 OOS

Pre-outage restrictions:

- If TSAPM issues one or more of the following alarms:
  - **"FJN/TAY AREA_INSUFFICIENT LOAD SHED_5L5&5L6_CTG", or**
  - **"FJN/TAY AREA_INSUFFICIENT LOAD SHED_1L360_CTG", or**
  - **"FJN/TAY AREA_INSUFFICIENT LOAD SHED_1L374_CTG",**

  BC Hydro Control Centre staff shall take the following actions to remove these alarms:
  - Increase power output from MCM units, and/or
  - Curtail load in TAY/FJN area. Suggested load curtailment candidates are FBC, NGL, SLO, TXB and SEP.

- **After all of the alarms above have been removed and if the condition of (1L367 FJN – SLO_L) + 1L360 SBK >= 1L360_Over_Rating is still true, then TSAPM alarms "OPEN TAY 1CB30 FOR 1L367 CONTINGENCY".**
  Operators shall open TAY 1CB30 to prevent 1L367 contingency from overloading 1L360.

CONTINGENCY	LOAD SHEDDING OR GENERATION SHEDDING REQUIREMENTS
5L5 and 5L6	Same as System Normal.
5L5	No shedding is required.
5L6	No shedding is required.
2L308	Same as System Normal.
2L309	No shedding is required.
2L312	Same as System Normal.
2L340 and 2L342	No shedding is required.
2L329 and 2L333	Same as System Normal.
2L391 if 2L392 OOS, or 2L392 if 2L391 OOS	Load shed: LS = 1.28 * [(2L391 + 2L392) SBK + (2L308 + 1L361) GMS – 390] MW [Voltage Stability] **Note**: • Load shedding sequence: (1) PLD, DSN; (2) SRN, KIS, E15, E42, SGP, TPW, or BPN. • 2L333 open end at SGB for this double contingency. • SGB 2CX2 is tripped for this double contingency.
BMT T1	No shedding is required.
BMT T2	No shedding is required.
BMT T3	No shedding is required.
SBK T21	No shedding is required.
SBK T22	No shedding is required.
SBK T11	No shedding is required.
SBK T12	No shedding is required.
1L360	Same as System Normal.
1L364	No shedding is required.
1L374	Same as System Normal.

Table 14: BMT T1 OOS or BMT T2 OOS or BMT T3 OOS

Pre-outage restrictions:

- If TSAPM issues one or more of the following alarms:
  - **"FJN/TAY AREA_INSUFFICIENT LOAD SHED_5L5&5L6_CTG", or**
  - **"FJN/TAY AREA_INSUFFICIENT LOAD SHED_1L360_CTG", or**
  - **"FJN/TAY AREA_INSUFFICIENT LOAD SHED_1L374_CTG",**

  BC Hydro Control Centre staff shall take the following actions to remove these alarms:
  - Increase power output from MCM units, and/or
  - Curtail load in TAY/FJN area. Suggested load curtailment candidates are FBC, NGL, SLO, TXB and SEP.

- **After all of the alarms above have been removed and if the condition of (1L367 FJN – SLO_L) + 1L360 SBK >= 1L360_Over_Rating is still true, then TSAPM alarms "OPEN TAY 1CB30 FOR 1L367 CONTINGENCY".**
  Operators shall open TAY 1CB30 to prevent 1L367 contingency from overloading 1L360.

CONTINGENCY	LOAD SHEDDING OR GENERATION SHEDDING REQUIREMENTS
5L5 and 5L6	Same as System Normal.
5L5	No shedding is required.
5L6	No shedding is required.
2L308	Same as System Normal.
2L309	No shedding is required.
2L312	Same as System Normal.
2L340 and 2L342	No shedding is required.
2L329 and 2L333	Same as System Normal.
2L391	No shedding is required.
2L392	No shedding is required.
2L391 and 2L392	Same as System Normal.

BMT T1	If BMT T2 OOS, then
	Load shed: LS = (BMT T1_MW + BMT T3_MW – BMT T3_Over_Rating) [Thermal Overload]
	• Load shedding candidates: PLD, DSN, KIS, E15, E42, SGP, TPW, or BPN
	
	If BMT T3 OOS, then
	Load shed: LS = (BMT T1_MW + BMT T2_MW – BMT T2_Over_Rating) [Thermal Overload]
	• Load shedding candidates: PLD, DSN, KIS, E15, E42, SGP, TPW, or BPN

BMT T2	If BMT T1 OOS, then
	Load shed: LS = (BMT T2_MW + BMT T3_MW – BMT T3_Over_Rating) [Thermal Overload]
	• Load shedding candidates: PLD, DSN, KIS, E15, E42, SGP, TPW, or BPN
	
	If BMT T3 OOS, then
	Load shed: LS = (BMT T1_MW + BMT T2_MW – BMT T1_Over_Rating) [Thermal Overload]
	• Load shedding candidates: PLD, DSN, KIS, E15, E42, SGP, TPW, or BPN

BMT T3	If BMT T1 OOS, then
	Load shed: LS = (BMT T2_MW + BMT T3_MW – BMT T2_Over_Rating) [Thermal Overload]
	• Load shedding candidates: PLD, DSN, KIS, E15, E42, SGP, TPW, or BPN
	
	If BMT T2 OOS, then
	Load shed: LS = (BMT T1_MW + BMT T3_MW – BMT T1_Over_Rating) [Thermal Overload]
	• Load shedding candidates: PLD, DSN, KIS, E15, E42, SGP, TPW, or BPN

SBK T21	No shedding is required.
SBK T22	No shedding is required.
SBK T11	No shedding is required.
SBK T12	No shedding is required.
1L360	Same as System Normal.
1L364	No shedding is required.
1L374	Same as System Normal.

Table 15: SBK T21 OOS or SBK T22 OOS

Pre-outage restrictions:

- If TSAPM issues one or more of the following alarms:
  - **"FJN/TAY AREA_INSUFFICIENT LOAD SHED_5L5&5L6_CTG", or**
  - **"FJN/TAY AREA_INSUFFICIENT LOAD SHED_1L360_CTG", or**
  - **"FJN/TAY AREA_INSUFFICIENT LOAD SHED_1L374_CTG",**

  BC Hydro Control Centre staff shall take the following actions to remove these alarms:
  - Increase power output from MCM units, and/or
  - Curtail load in TAY/FJN area. Suggested load curtailment candidates are FBC, NGL, SLO, TXB and SEP.

- **After all of the alarms above have been removed and if the condition of (1L367 FJN – SLO_L) + 1L360 SBK >= 1L360_Over_Rating is still true, then TSAPM alarms "OPEN TAY 1CB30 FOR 1L367 CONTINGENCY".**
  Operators shall open TAY 1CB30 to prevent 1L367 contingency from overloading 1L360.

CONTINGENCY	LOAD SHEDDING OR GENERATION SHEDDING REQUIREMENTS
5L5 and 5L6	Same as System Normal.
5L5	No shedding is required.
5L6	No shedding is required.
2L308	Same as System Normal.
2L309	No shedding is required.
2L312	Same as System Normal.
2L340 and 2L342	No shedding is required.
2L329 and 2L333	Same as System Normal.
2L391	No shedding is required.
2L392	No shedding is required.
2L391 and 2L392	Same as System Normal.
BMT T1	No shedding is required.
BMT T2	No shedding is required.
BMT T3	No shedding is required.
SBK T21 if SBK T22 OOS, or SBK T22 if SBK T21 OOS	Load shed: LS = 1.28 * [(2L391 + 2L392) SBK + (2L308 + 1L361) GMS – 390] MW [Voltage Stability] Notes: • Load shedding sequence: (1) PLD, DSN; (2) SRN, KIS, E15, E42, SGP, TPW, or BPN. • 2L391 and 2L392 open ended at SBK.
SBK T11	No shedding is required.
SBK T12	No shedding is required.
1L360	Same as System Normal.
1L364	No shedding is required.
1L374	Same as System Normal.

Table 16: SBK T11 OOS or SBK T12 OOS

Pre-outage restrictions:

- If TSAPM issues one or more of the following alarms:
  - **"FJN/TAY AREA_INSUFFICIENT LOAD SHED_5L5&5L6_CTG", or**
  - **"FJN/TAY AREA_INSUFFICIENT LOAD SHED_1L360_CTG", or**
  - **"FJN/TAY AREA_INSUFFICIENT LOAD SHED_1L374_CTG", or**
  - **"FJN/TAY AREA_INSUFFICIENT LOAD SHED_SBK T11_CTG", or**
  - **"FJN/TAY AREA_INSUFFICIENT LOAD SHED_SBK T12_CTG"**

  BC Hydro Control Centre staff shall take the following actions to remove these alarms:
  - Increase power output from MCM units, and/or
  - Curtail load in TAY/FJN area. Suggested load curtailment candidates are FBC, NGL, SLO, TXB and SEP.

- **After all of the alarms above have been removed and if the condition of (1L367 FJN – SLO_L) + 1L360 SBK >= 1L360_Over_Rating is still true, then TSAPM alarms "OPEN TAY 1CB30 FOR 1L367 CONTINGENCY".**
  Operators shall open TAY 1CB30 to prevent 1L367 contingency from overloading 1L360.

CONTINGENCY	LOAD SHEDDING OR GENERATION SHEDDING REQUIREMENTS
5L5 and 5L6	Same as System Normal.
5L5	No shedding is required.
5L6	No shedding is required.
2L308	Same as System Normal.
2L309	No shedding is required.
2L312	Same as System Normal.
2L340 and 2L342	No shedding is required.
2L329 and 2L333	Same as System Normal.
2L391	No shedding is required.
2L392	No shedding is required.
2L391 and 2L392	Same as System Normal.
BMT T1	No shedding is required.
BMT T2	No shedding is required.
BMT T3	No shedding is required.
SBK T21	No shedding is required.
SBK T22	No shedding is required.

SBK T11 if SBK T12 OOS, or SBK T12 if SBK T11 OOS	If SBK T11 OOS, then
	Load Shed at ET3: 0.8 * (1.2 * SBK T12 MW + 1L364 GMS – 1L364_Over Rating) [Thermal Overload]
	
	If SBK T12 OOS, then
	Load Shed at ET3: 0.8 * (1.2 * SBK T11 MW + 1L364 GMS – 1L364_Over Rating) [Thermal Overload]
	
	Notes:
	• 1L374 and 1L360 open ended at SBK.

1L360	Load shed at ET3: LS = 1.25 * (1L360 SBK – SCX_L + 1L374 SBK - 1L374_Over_Rating) [Thermal Overload]
1L364	No shedding is required.
1L374	Load shed at ET3: LS = 1.3 * (0.9 * 1L374 SBK + 1L360 SBK – 1L360_Over_Rating) [Thermal Overload]