Conceptual System Plan

Cluster 1 - Southwest-Calgary Region

Date: June 21, 2024

Prepared by: System Planning

Version: V1

Classification: Public

Alberta Electric System Operator

Calgary Place, 2500, 330 - 5th Avenue SW Calgary, AB T2P 0L4

Phone: 403-539-2450 | Fax: 403-539-2949

Table of Contents

1. Introduction

The objective of providing this conceptual system plan is to assist market participants to better understand the scope of potential transmission system developments required to integrate Cluster 1 projects in the Southwest-Calgary region. The scope of transmission developments identified is in compliance with the existing *Transmission Regulation*, which requires the AESO to plan a system sufficiently robust such that 100% of anticipated in-merit electric energy can occur when all transmission facilities are in service (Category A or N-0 condition), and assumes that all cluster projects in this region proceed. Development options such as new transmission lines, increasing the capability of existing transmission lines, and network topology optimization were considered in the development of this conceptual system plan.

Typically, a major transmission system project can take at least 8-10 years to complete. The timing must consider significant work required in developing a detailed plan, initiating a project, engaging stakeholders, selecting the preferred alternative, seeking all necessary regulatory approvals, and the construction and commissioning of the transmission facilities.

Please note that the conceptual system plan identified here is different from the AESO's Long-term Transmission Plan and is based on different integration assumptions. The AESO's planning process still needs to be conducted to determine the timing and configuration of the system transmission projects being developed to meet planning standards and transmission regulation and policy. The pace and location of new load, storage, and generation developments play an important role in the AESO's planning process. The timing and configuration of the proposed system transmission projects as an outcome of the AESO's planning process, will be influenced by the timing and volume of connection projects meeting the AESO's project inclusion criteria[1].

2. Conceptual Transmission Development Plan

2.1 SW Transmission Development

Cause:

- Additional generation causes overload on 924L/927L, 1003L/985L, 916L, 876L, and 1109L/1080L.

Mitigation:

- Add two 500 kV circuits between Newell 2075S, Milo 356S, and Langdon 102S substations[2].
- Add a 240 kV transmission line between SS-65 and Sarcee 42S substations.

2.2 Foothills Area 240kV Network Reinforcement

Cause:

- Additional generation causes overload on 1106L/1107L.

[1] The definition of project inclusion criteria is available in the Connection Project List Guide on the AESO website.

[2] This development is also included in Central Region conceptual system plan.

Mitigation:

- Add a 240 kV transmission line between SS-65 and Foothills 237S substation.
- Add a 240 kV switching substation between SC1 266S and Foothills 237S, and terminate the existing 1037L/1038L transmission line at the new 240 kV switching substation.
- Add a 240 kV transmission line between Foothills 237S and the new 240 kV substation.

2.3 Stavely/Strathmore Area Development

Cause:

- Additional generation causes overload on 691L, 733L, 765L, 161L, and 853L.

Mitigation:

- Increase the capability of the existing 138 kV transmission line 161L (Vulcan 255S – Queenstown 504S).
- Upgrade Queenstown 504S substation to 240 kV and connect to 927L via T-tap configuration.
- Increase the capability of existing 138 kV transmission lines 691L/765L/733L (Janet 74S – Chestermere 419S – Strathmore 151S).

2.4 SW/SE Boundary Area 240kV Transmission Upgrade

Cause:

- Additional generation causes overload on 940L, 1005L, and 1036L.

Mitigation:

- Increase the capability of the following 240kV transmission lines:
  - 1005L (Milo 356S – Little Bow 991S)
  - 940L (N. Lethbridge 370S – Picture Butte 120S)
  - 1036L (Milo 356S – New generation project tap)

2.5 Calgary Region 240kV Transmission Upgrade

Cause:

- Additional generation causes overload on 932L, 918L, and 1109L/1080L.

Mitigation:

- Increase the capability of the following 240 kV transmission lines:
  - 932L (Beddington SS-162S – New generation project tap)
  - 1080L/1109L (SS25 – SS65)
- Restore 918L (Beddington SS-162S – Johnson 281S) to full-rating.

2.6 SW/Central 138kV Path Upgrade

Cause:

- Additional generation causes overload on 418L.

Mitigation:

- Increase the capability of existing transmission line 418L (Johnson 281S – New generation project T-tap point).

2.7 SW 69kV Path Rating Restoration

Cause:

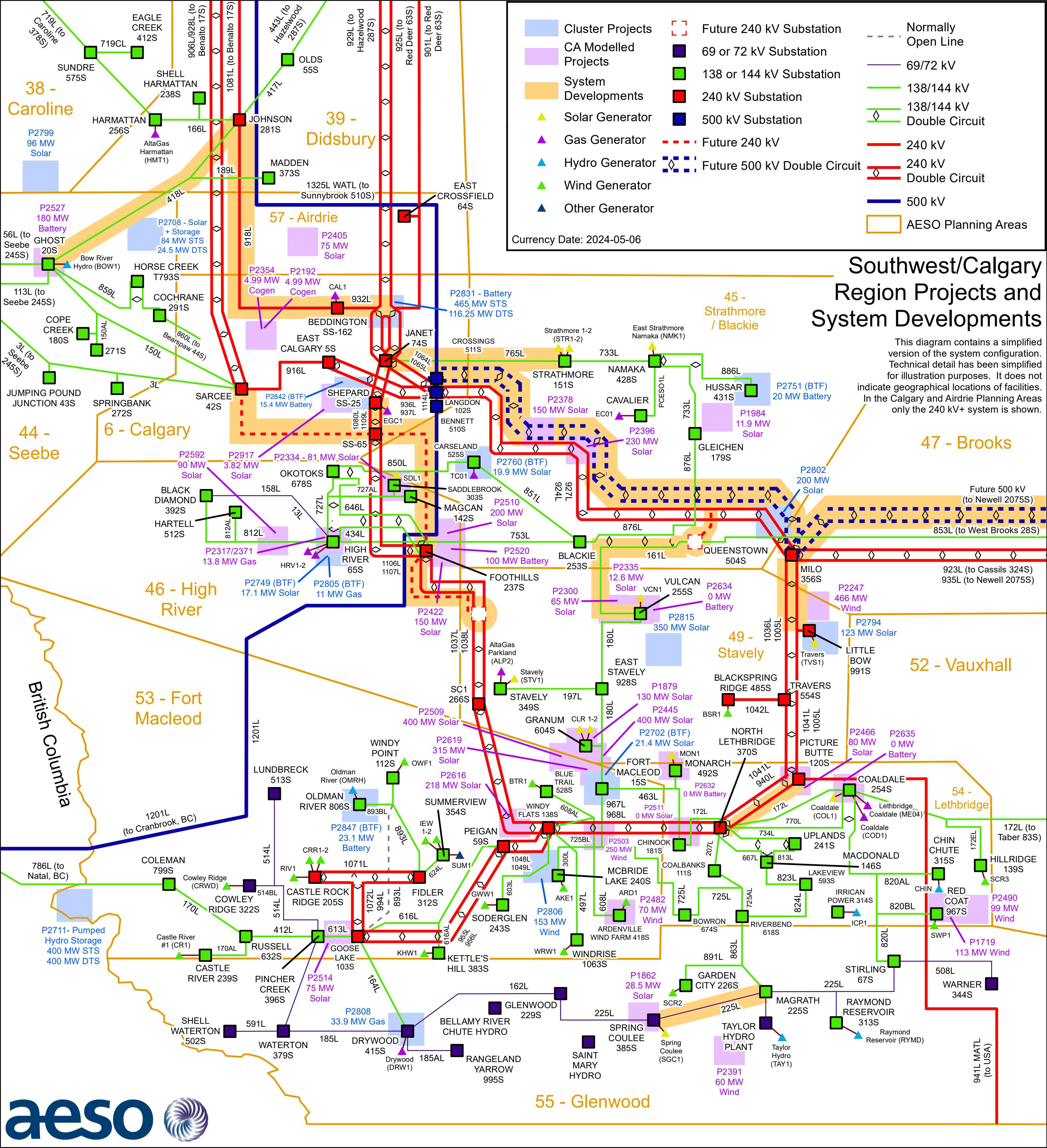
- Additional generation causes overload on 225L.

Mitigation:

- Replace CTs to restore the thermal rating of transmission line 225L (Spring Coulee 385S – Magrath 225S).

3. System Plan SLD

See attached page.



Southwest/Calgary Region Projects and System Developments
This diagram contains a simplified version of the system configuration. Technical detail has been simplified for illustration purposes. It does not indicate geographical locations of facilities. In the Calgary and Airdrie Planning Areas only the 240 kV+ system is shown.
Cluster Projects
CA Modelled Projects
System Developments
Solar Generator
Gas Generator
Hydro Generator
Wind Generator
Other Generator
Future 240 kV Substation
69 or 72 kV Substation
138 or 144 kV Substation
240 kV Substation
500 kV Substation
Future 240 kV
Future 500 kV Double Circuit
Normally Open Line
69/72 kV
138/144 kV
138/144 kV Double Circuit
240 kV
240 kV Double Circuit
500 kV
AESO Planning Areas
Currency Date: 2024-05-06
38 - Caroline
39 - Didsbury
57 - Airdrie
44 - Seebe
6 - Calgary
45 - Strathmore / Blackie
47 - Brooks
46 - High River
49 - Stavely
52 - Vauxhall
53 - Fort Macleod
54 - Lethbridge
55 - Glenwood
British Columbia
719L (to Caroline 378S)
EAGLE CREEK 412S
719CL
SUNDRE 575S
SHELL HARMATTAN 238S
906L/928L (to Benalto 17S)
1081L (to Benalto 17S)
443L (to Hazelwood 287S)
OLDS 55S
417L
929L (to Hazelwood 287S)
925L (to Red Deer 63S)
901L (to Red Deer 63S)
HARMATTAN 256S
166L
JOHNSON 281S
AltaGas Harmattan (HMT1)
P2799 96 MW Solar
MADDEN 373S
189L
1325L WATL (to Sunnybrook 510S)
EAST CROSSFIELD 64S
418L
P2527 180 MW Battery
P2708 - Solar + Storage 84 MW STS 24.5 MW DTS
P2405 75 MW Solar
918L
56L (to Seebe 245S)
GHOST 20S
Bow River Hydro (BOW1)
HORSE CREEK T793S
P2354 4.99 MW Cogen
P2192 4.99 MW Cogen
CAL1
932L
P2831 - Battery 465 MW STS 116.25 MW DTS
113L (to Seebe 245S)
859L
COCHRANE 291S
BEDDINGTON SS-162
JANET 74S
CROSSINGS 511S
Strathmore 1-2 (STR1-2)
East Strathmore Namaka (NMK1)
COPE CREEK 180S
150AL
271S
860L (to Bearspaw 44S)
EAST CALGARY 5S
765L
733L
886L
3L (to Seebe 245S)
150L
916L
1064L 1065L
STRATHMORE 151S
NAMAKA 428S
HUSSAR 431S
P2751 (BTF) 20 MW Battery
JUMPING POUND JUNCTION 43S
SPRINGBANK 272S
3L
SARCEE 42S
P2842 (BTF) 15.4 MW Battery
SHEPARD SS-25
936L 937L
1114L
LANGDON 102S
BENNETT 510S
P2378 150 MW Solar
CAVALIER
EC01
PCES01L
733L
P1984 11.9 MW Solar
1080L 1109L
EGC1
SS-65
P2396 230 MW Solar
GLEICHEN 179S
P2592 90 MW Solar
P2917 3.82 MW Solar
P2334 - 81 MW Solar
CARSELAND 525S
P2760 (BTF) 19.9 MW Solar
TC01
850L
OKOTOKS 678S
SDL1
SADDLEBROOK 303S
727AL
876L
P2802 200 MW Solar
BLACK DIAMOND 392S
158L
MAGCAN 142S
924L 927L
851L
P2510 200 MW Solar
Future 500 kV (to Newell 2075S)
HARTELL 512S
812AL
13L
727L
646L
876L
853L (to West Brooks 28S)
812L
434L
753L
P2317/2371 13.8 MW Gas
HRV1-2
HIGH RIVER 65S
1106L 1107L
FOOTHILLS 237S
P2520 100 MW Battery
BLACKIE 253S
161L
QUEENSTOWN 504S
MILO 356S
923L (to Cassils 324S) 935L (to Newell 2075S)
P2749 (BTF) 17.1 MW Solar
P2805 (BTF) 11 MW Gas
P2335 12.6 MW Solar
VCN1
VULCAN 255S
P2634 0 MW Battery
P2247 466 MW Wind
P2300 65 MW Solar
P2815 350 MW Solar
P2422 150 MW Solar
P2794 123 MW Solar
1036L 1005L
180L
Travers (TVS1)
LITTLE BOW 991S
1037L 1038L
AltaGas Parkland (ALP2)
Stavely (STV1)
EAST STAVELY 928S
BLACKSPRING RIDGE 485S
TRAVERS 554S
SC1 266S
STAVELY 349S
197L
P1879 130 MW Solar
1042L
BSR1
1201L
P2509 400 MW Solar
GRANUM 604S
CLR 1-2
180L
P2445 400 MW Solar
NORTH LETHBRIDGE 370S
1041L 1005L
P2702 (BTF) 21.4 MW Solar
P2466 80 MW Solar
P2635 0 MW Battery
WINDY POINT 112S
OWF1
P2619 315 MW Solar
MON1
MONARCH 492S
PICTURE BUTTE 120S
LUNDBRECK 513S
Oldman River (OMRH)
FORT MACLEOD 15S
1041L 940L
P2616 218 MW Solar
BTR1
BLUE TRAIL 528S
P2632 0 MW Battery
COALDALE 254S
OLDMAN RIVER 806S
893BL
SUMMERVIEW 354S
WINDY FLATS 138S
608AL
463L
Coaldale (COL1)
Lethbridge Coaldale (ME04)
Coaldale (COD1)
1201L (to Cranbrook, BC)
P2847 (BTF) 23.1 MW Battery
893L
IEW 1-2
967L 968L
P2511 0 MW Solar
172L
770L
172L
172L (to Taber 83S)
CRR1-2
725BL
P2503 250 MW Wind
CHINOOK 181S
734L
UPLANDS 241S
CHIN CHUTE 315S
172EL
786L (to Natal, BC)
COLEMAN 799S
514L
PEIGAN 59S
RIV1
1071L
SUM1
300L
207L
667L
813L
MACDONALD 146S
HILLRIDGE 139S
Cowley Ridge (CRWD)
1048L 1049L
MCBRIDE LAKE 240S
COALBANKS 111S
LAKEVIEW 593S
SCR3
514BL
CASTLE ROCK RIDGE 205S
624L
FIDLER 312S
AKE1
823L
820AL
CHIN
RED COAT 967S
P2490 99 MW Wind
COWLEY RIDGE 322S
170L
1072L 994L
893L
GWW1
603L
ARD1
P2482 70 MW Wind
725L
IRRICAN POWER 314S
820BL
514L
616L
SODERGLEN 243S
P2806 153 MW Wind
ARDENVILLE WIND FARM 418S
BOWRON 674S
725AL
RIVERBEND 618S
ICP1
SWP1
P1719 113 MW Wind
P2711- Pumped Hydro Storage 400 MW STS 400 MW DTS
Castle River #1 (CR1)
170AL
412L
RUSSELL 632S
613L
GOOSE LAKE 103S
616AL 955L 956L
497L
608L
824L
820L
CASTLE RIVER 239S
KHW1
KETTLE'S HILL 383S
WRW1
WINDRISE 1063S
891L
863L
STIRLING 67S
508L
PINCHER CREEK 396S
P2514 75 MW Solar
164L
162L
P1862 28.5 MW Solar
GARDEN CITY 226S
225L
WARNER 344S
P2808 33.9 MW Gas
GLENWOOD 229S
SCR2
225L
MAGRATH 225S
RAYMOND RESERVOIR 313S
SHELL WATERTON 502S
591L
WATERTON 379S
185L
DRYWOOD 415S
BELLAMY RIVER CHUTE HYDRO
225L
SPRING COULEE 385S
TAYLOR HYDRO PLANT
Raymond Reservoir (RYMD)
Drywood (DRW1)
185AL
RANGELAND YARROW 995S
SAINT MARY HYDRO
Spring Coulee (SGC1)
Taylor Hydro (TAY1)
P2391 60 MW Wind
941L MATL (to USA)
aeso