

Southern Alberta Transmission System Reinforcement

Alternatives 1A, 1B, 1C, 2, 3 & 4

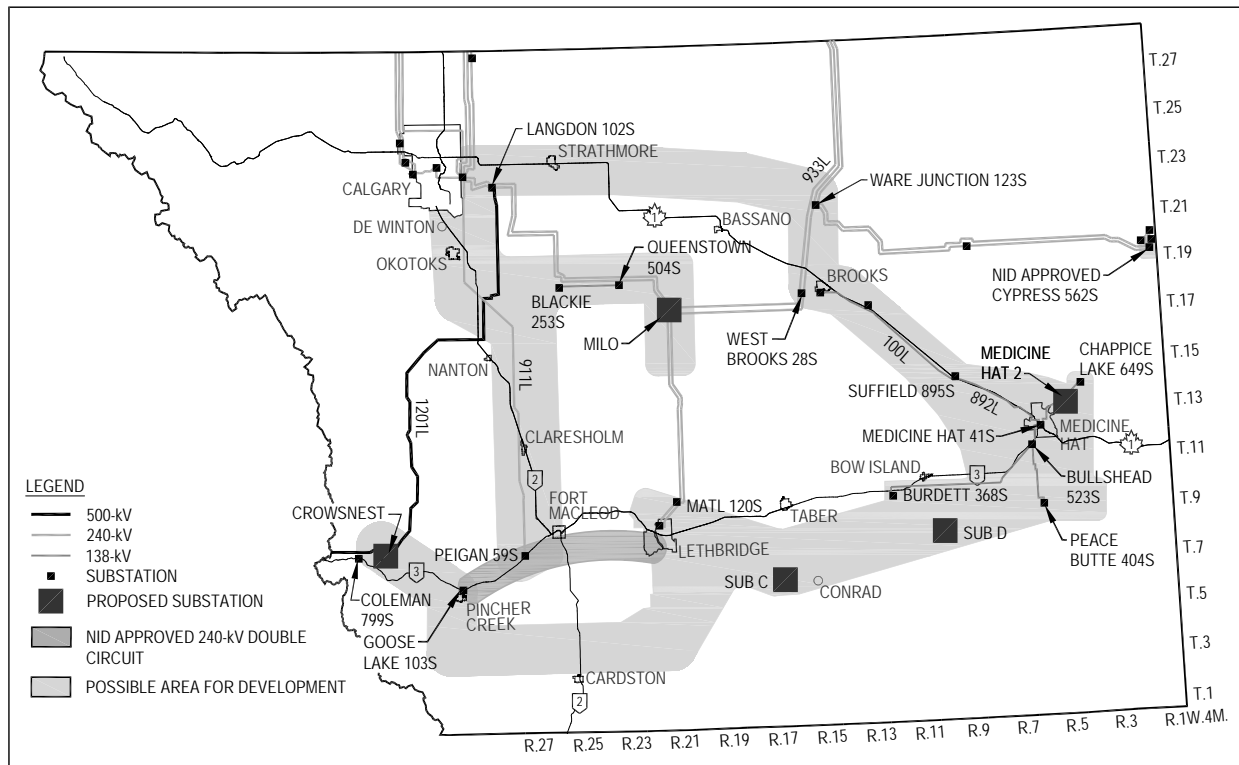
Preferred Alternative 1A, Looped 240 kV

A regional breakdown of the proposed development (**Alternative 1A**) is outlined below:

1. De Winton to Peigan Area:
 - a. Rebuild the existing 240-kV transmission line 911L from a future De Winton substation to Peigan substation 59S (LSD 3&4-15-8-27-W4M), with additional modifications at Peigan substation;
 - b. Replace the existing 179-MVA transformer with two 200-MVA transformers at Peigan substation 59S;
 - c. Salvage the existing 240-kV transmission line 911L;
 - d. Build a new 138-kV transmission line from Blackie substation 253S (LSD 1-15-19-25-W4M) to Queenstown substation 504S (LSD 4-17-19-22-W4M) with modifications at Blackie substation and Queenstown substation;
2. Langdon to West Brooks Area:
 - a. Modify the existing 240-kV transmission line 933L to be in-and-out at Ware Junction 132S (LSD 12-17-22-14-W4M);
 - b. Build a new 240-kV double circuit transmission line from Ware Junction to Langdon substation 102S (LSD 3-16-23-27-W4M);
3. Brooks to Medicine Hat to Bow Island Area:
 - a. Construct a new 240-kV substation south of Bow Island, named Sub D;
 - b. Construct a new 240-kV substation in the Medicine Hat area, named Medicine Hat 2;
 - c. Build a new 240-kV double circuit transmission line from Sub D to the future Medicine Hat 2 substation to West Brooks substation 28S (LSD 13-28-18-15-W4M);
 - d. Construct a new Milo Junction switching substation (LSD NW 13-18-21-W5);
 - e. Modify the future Cypress substation 562S (LSD 16-34-19-1W4) in the Empress Area;
4. Pincher Creek to Bow Island Area:
 - a. Construct a new 240-kV substation south of Taber, named Sub C;
 - b. Build a new 240-kV double circuit transmission line with one side strung from Goose Lake substation to Sub C;
 - c. Build a new 240-kV double circuit transmission line from Sub C to Sub D;
 - d. Build a new 240-kV double circuit transmission line with one side strung from Sub C to future Montana Alberta Tie Ltd. (MATL) substation 120S (LSD NE 1/4-14-10-21-W4M);
5. Pincher Creek to Crowsnest Pass Area:
 - a. Add a Phase Shifting Transformer on 170L at Coleman 799S substation (LSD 4-16-8-4-W5M);

- b. Construct a new 500-kV substation near Crowsnest Pass, named Crowsnest substation;
 - c. Build a new 240-kV double circuit transmission line from Crowsnest substation to Goose Lake substation 103S (LSD 5&12-36-6-30-W4M) in the Pincher Creek area;
6. Medicine Hat Area:
- a. Build a new 138-kV transmission line from Medicine Hat 2 substation to Medicine Hat substation 41S (LSD 11-35-12-6-W4M);
 - b. Reroute a 138-kV transmission line from Medicine Hat 2 substation to Chappice Lake substation 649S (LSD 4-22-14-4-W4M);
 - c. Extend a 138-kV transmission line 892L from Medicine Hat substation to Suffield substation 895S (LSD 12-3-15-9-W4M);
 - d. Build a new 138-kV transmission line from Medicine Hat 2 substation to Bullshead substation 523S (LSD 9-4-12-6-W4M);
 - e. Build a new 138-kV transmission line from Medicine Hat 2 substation to Burdett substation 368S (LSD 1-15-10-12-W4M);
 - f. Modify the existing 138-kV transmission line from Peace Butte substation 404S (LSD 15-26-9-6 W4M) to Bullshead substation 523S to Medicine Hat substation 41S.

The locations of the proposed development for the preferred Alternative 1A are conceptually shown on Map 1A (Alternative 1A, Looped 240 kV) and are described in detail in the Needs Application.

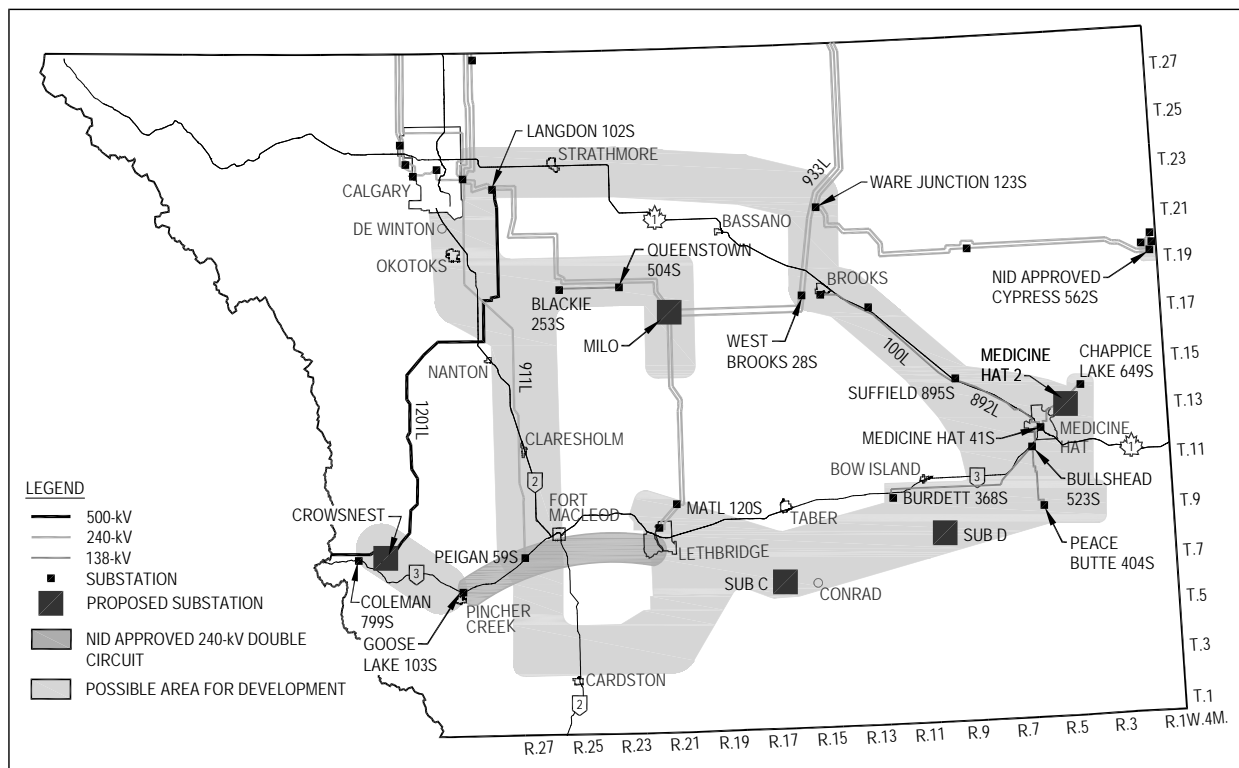


AESO has also considered other alternatives. Regional breakdowns of these alternatives are outlined below:

Alternative 1B, Looped 240 kV

1. De Winton to Peigan Area: same as Alternative 1A;
2. Langdon to West Brooks Area: same as Alternative 1A;
3. Brooks to Medicine Hat to Bow Island Area: same as Alternative 1A;
4. Pincher Creek to Bow Island Area:
 - a. Construct a new 240-kV substation south of Taber, named Sub C;
 - b. Build a new 240-kV double circuit transmission line with one side strung from Peigan substation to Sub C;
 - c. Build a new 240-kV double circuit transmission line from Sub C to Sub D;
 - d. Build a new 240-kV double circuit transmission line with one side strung from Sub C to future Montana Alberta Tie Ltd. (MATL) substation 120S (LSD NE 1/4-14-10-21-W4M);
5. Pincher Creek to Crowsnest Pass Area: same as Alternative 1A;
6. Medicine Hat Area 138-kV Upgrade: same as Alternative 1A;

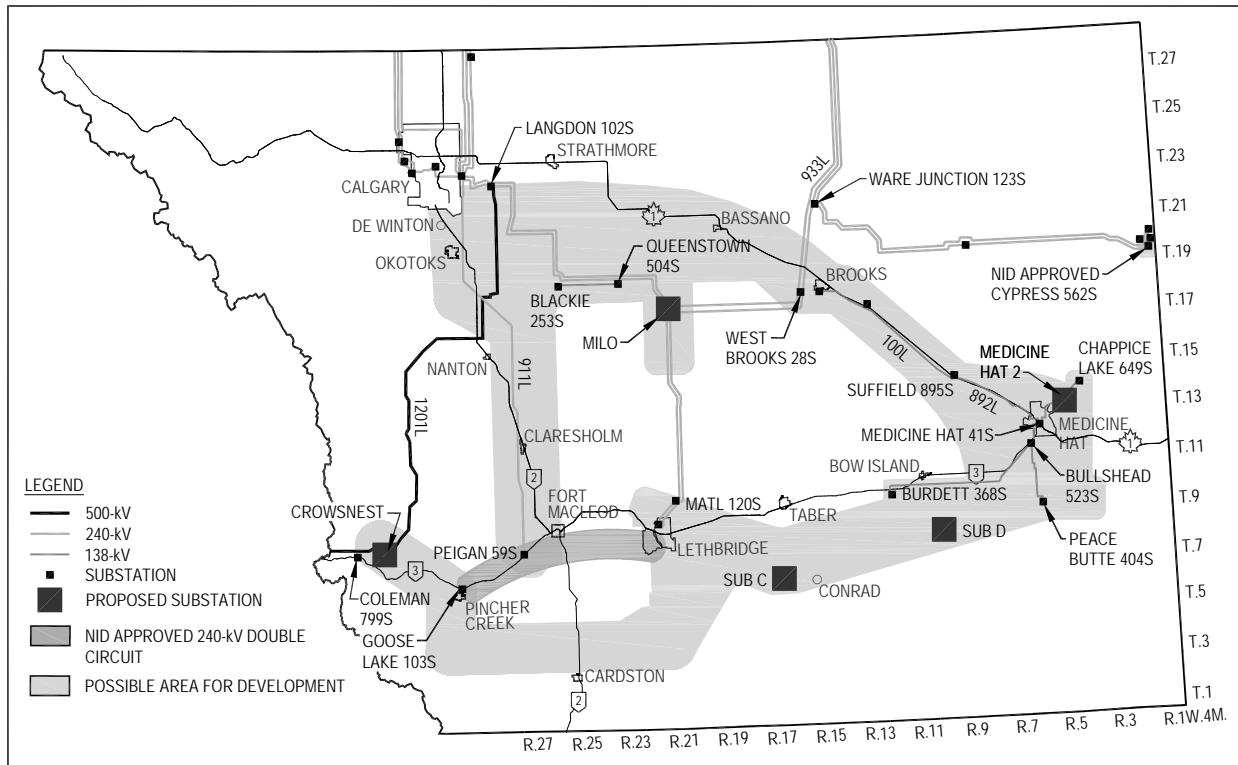
The locations of the proposed development for Alternative 1B are conceptually shown on Map 1B (Alternative 1B, Looped 240 kV) and are described in detail in the Needs Application.



Alternative 1C, Looped 240 kV

1. De Winton to Peigan Area: same as Alternative 1A;
2. Langdon to West Brooks Area:
 - a. Modify the existing 240-kV transmission line 933L to be in-and-out at Ware Junction 132S (LSD 17-22-14-W4M);
 - b. Build a new 240-kV double circuit transmission line from West Brooks substation 28S to a future De Winton;
3. Brooks to Medicine Hat to Bow Island Area: same as Alternative 1A;
4. Pincher Creek to Bow Island Area: same as Alternative 1A;
5. Pincher Creek to Crowsnest Pass Area: same as Alternative 1A;
6. Medicine Hat Area: same as Alternative 1A

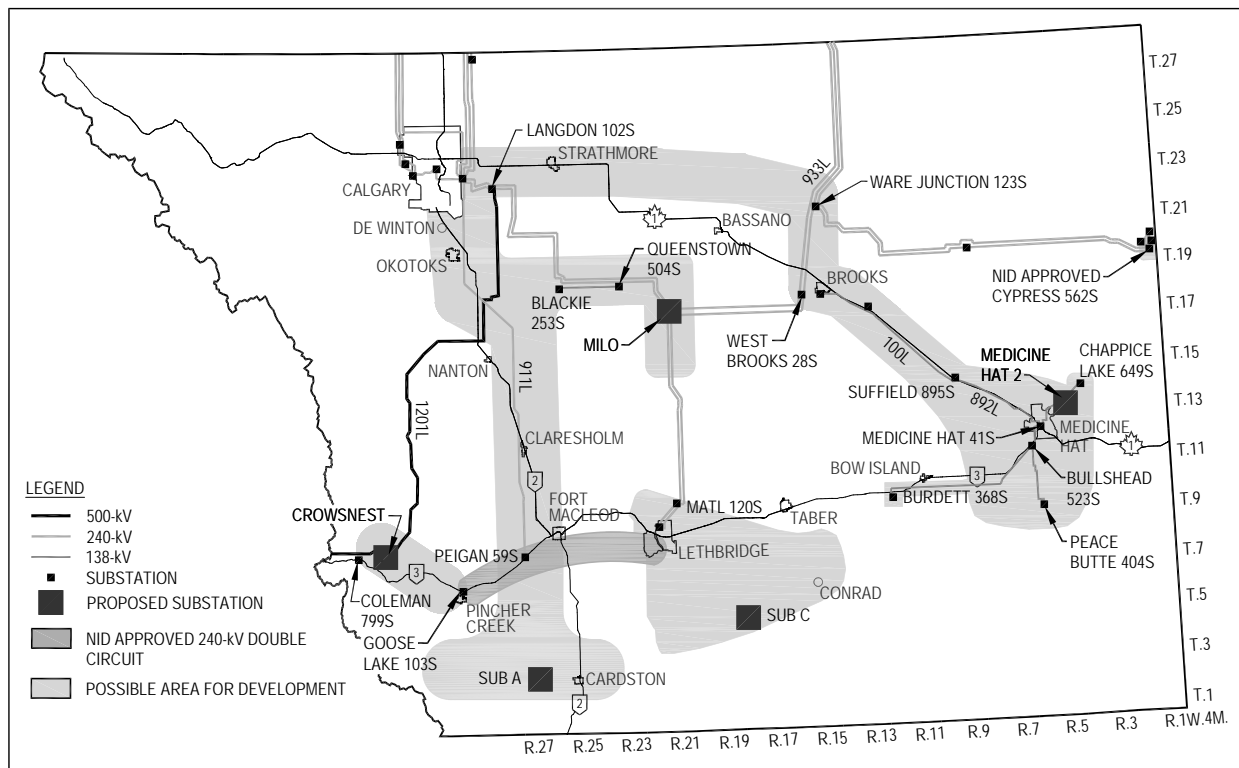
The locations of the proposed development for Alternative 1C are conceptually shown on Map 1C (Alternative 1C, Looped 240 kV) and are described in detail in the Needs Application.



Alternative 2, Radial 240 kV

1. De Winton to Peigan Area: same as Alternative 1A;
2. Langdon to West Brooks Area: same as Alternative 1A;
3. Brooks to Medicine Hat to Bow Island Area: same as Alternative 1A;
4. Pincher Creek to Bow Island Area:
 - a. Construct a new 240-kV substation south of Taber, named Sub C;
 - b. Construct a new 240-kV substation south of Peigan, named Sub A;
 - c. Build a new 240-kV double circuit transmission line from Peigan to Sub A;
 - d. Build a new 240-kV double circuit transmission line with one side strung from Sub C to future Montana Alberta Tie Ltd. (MATL) substation 120S (LSD NE 1/4-14-10-21-W4M);
5. Pincher Creek to Crowsnest Pass Area: same as Alternative 1A;
6. Medicine Hat Area: same as Alternative 1A;

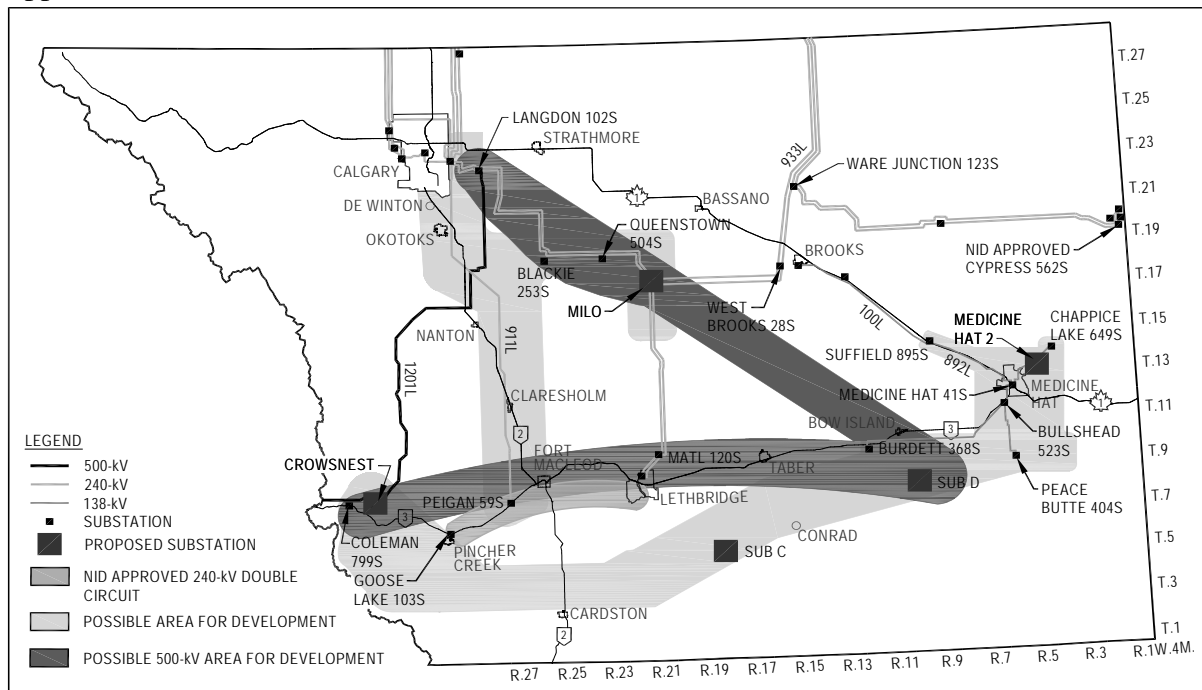
The locations of the proposed development for Alternative 2 are conceptually shown on Map 2 (Alternative 2, Radial 240 kV) and are described in detail in the Needs Application.



Alternative 3, Looped 500 kV

1. De Winton to Peigan Area: same as Alternative 1A;
2. Langdon to Milo to Bow Island Area:
 - a. Construct a new 240-kV substation south of Bow Island, named Sub D (Sub H);
 - b. Construct a new 240-kV Milo Junction Switching Station;
 - c. Build a new Langdon to Milo Junction 500-kV single circuit line operated at 240kV;
 - d. Build a new Milo Junction to Sub D 500-kV single circuit transmission line operated at 240kV;
 - e. Upgrade Sub D to be operated at 500kV;
 - f. Upgrade Milo Junction switching substation to be operated at 500-kV;
 - g. Upgrade Langdon to Milo Junction to Sub D transmission line to be operated at 500-kV;
 - h. Modify the existing 240-kV transmission line 933L to be in-and-out at Ware Junction;
3. Medicine Hat to Bow Island Area:
 - a. Construct a new 240-kV substation, named Medicine Hat 2;
 - b. Build a new 240-kV double circuit transmission line from Sub D to Medicine Hat 2;
4. Pincher Creek to Bow Island Area:
 - a. Construct a new 240-kV substation south of Taber, named Sub C;
 - b. Build a new 240-kV single circuit transmission line from Goose Lake to Sub C;
 - c. Build a new 240-kV single circuit transmission line from Sub C to Sub D;
5. Pincher Creek to Crowsnest Pass Area:
 - a. Add a new Phase Shifting Transformer on 170L at Coleman 799S substation;
 - b. Construct a new 500-kV substation near Crowsnest Pass, named Crowsnest substation;
 - c. Build a new 500-kV single circuit transmission line from Crowsnest to Sub D;
 - d. Build a new 240-kV double circuit transmission line from Crowsnest to Goose Lake;
6. Medicine Hat: same as Alternative 1A.

The locations of the proposed development for Alternative 3 are conceptually shown on Map 3 (Alternative 3, Looped 500 kV) and are described in detail in the Needs Application.



Alternative 4, High-Voltage Direct Current (HVDC) Classic

1. De Winton to Peigan Area: same as Alternative 1A;
2. Langdon to Milo to Bow Island Area:
 - a. Construct a new 240-kV Milo Junction Switching Station;
 - b. Construct a new 500-kV Langdon converter station;
 - c. Construct a new 500-kV converter station and 500-kV substation south of Bow Island, named Sub D;
 - d. Build a new HVDC transmission line from Langdon to Sub D;
 - e. Modify the existing 240-kV transmission line 933L to be in-and-out at Ware Junction;
3. Medicine Hat to Bow Island Area:
 - a. Construct a new 240-kV substation, named Medicine Hat 2;
 - b. Build a new 240-kV double circuit transmission line from Sub D to Medicine Hat 2;
 - c. Modify the future Cypress substation in the Empress Area;
4. Pincher Creek to Bow Island Area:
 - a. Construct a new 240-kV substation south of Taber, named Sub C;
 - b. Build a new 240-kV single circuit line from Goose Lake to Sub C;
 - c. Build a new 240-kV single circuit line from Sub C to Sub D;
5. Pincher Creek to Crowsnest Pass Area:
 - a. Add a new Phase Shifting Transformer on 170L at Coleman 799S substation;
 - b. Construct a new 500-kV substation near Crowsnest Pass, named Crowsnest substation;
 - c. Build a new 240-kV double circuit transmission line from Crowsnest to Goose Lake;
6. Medicine Hat Area: same as Alternative 1A.

The locations of the proposed development for Alternative 4 are conceptually shown on Map 4 (Alternative 4, HVDC Classic) and are described in detail in the Needs Application.

