

Environmental Features	Unit	Proposed Project Route	Clearbrook East Alternative
Length	miles	6.4	6.3
Adjacent to Existing Right-of-Way	feet	31,680	33,264
Greenfield Route	feet	2,112	0
Total NWI-mapped Wetlands Crossed	feet	3,997	6,528
Highly Wind Erodible Soils ^b	feet	6,019	10,032
Shallow Bedrock	feet	0	0
Hydric Soils	miles	1.3	1.8
Prime Farmland Soils	miles	3.1	2.8
Forest Land Affected	miles	1.1	1.1
Agricultural Land Affected	miles	4.5	3.6
Herbaceous Land Affected	miles	0	0
Open Water Crossed	feet	98	0
Intermittent Waterbodies Crossed	no.	2	2
Perennial Waterbodies Crossed	no.	1	1
Railroad Crossings	no.	0	0
Road Crossings	no.	7	8

^a Route characteristics that were not significantly different were not included in this comparison.

^b Indicates length of route where project crosses soils with a wind erodible index of a potential for a loss of 134 tons per acre per year to 310 tons per acre per year.

Grant Creek Alternative

The Grant Creek Alternative parallels the Enbridge pipeline corridor's south side to the east, lies parallel to an electrical transmission line to the west, traverses Grant Creek twice south of U.S. Highway 2 and crosses under a railroad at MP 935.2 (see figure 2.2.4-5). The Grant Creek Alternative is surrounded by the electrical transmission corridor and Enbridge pipelines for approximately 1,600 feet from the first (northern) crossing of Grant Creek until the existing pipeline corridor turns southeastward. In addition this alternative experiences residential encroachment between the first crossing of Grant Creek through the pipeline cross-under of the Burlington Northern Santa Fe Railroad at MP 935.2. The Grant Creek Alternative alignment presents potential significant constraints to mainline installation and waterbody crossing construction methods due to close and parallel proximity of electrical transmission lines and residences directly parallel to the alignment.

The project route departs the Enbridge pipeline corridor for a total of approximately 13,728 feet beginning at MP D932.6. The project route departs from the Enbridge pipeline system south of U.S. Highway 2 and travels south to cross under a Burlington Northern Santa Fe Railroad, continues southeast to ensure a perpendicular crossing of Grant Creek and rejoins the Enbridge pipeline system as these existing lines cross under the railroad at MP 935.2. Table 2.2.4-5 provides a comparison of environmental features for the two routes.



This information is for environmental review purposes only.

— Proposed Project Route

- - Alternative Route

0 1,000 2,000 3,000
Feet



Figure 2.2.4-5
Alberta Clipper and Southern Lights Diluent Projects
Grant Creek Alternative



Environmental Features	Unit	Proposed Project Route	Grant Creek Alternative
Length	miles	2.6	2.6
Adjacent to Existing Right-of-Way	feet	13,728	13,728
Greenfield Route	feet	0	0
Total NWI-mapped Wetlands Crossed	feet	902	457
Highly Wind Erodible Soils ^b	feet	13,200	13,200
Shallow Bedrock	feet	0	0
Hydric Soils	miles	0.40	0.30
Prime Farmland Soils	miles	0	0
Forest Land Affected	miles	1.1	1.4
Agricultural Land Affected	miles	1.0	0.9
Herbaceous Land Affected	miles	0	0
Open Water Crossed	feet	0	0
Intermittent Waterbodies Crossed	no.	0	0
Perennial Waterbodies Crossed	no.	3	3
Railroad Crossings	no.	1	1
Road Crossings	no.	6	5

^a Route characteristics that were not significantly different were not included in this comparison.

^b Indicates length of route where project crosses soils with a wind erodible index of a potential for a loss of 134 tons per acre per year to 310 tons per acre per year.

The Grant Creek Alternative and project routes parallel existing rights-of-way and include no greenfield portion as each route travels along existing utility corridors. The route would cross 50 percent more NWI wetland during construction and cross 1,584 additional feet of forest lands. The proposed route would result in an additional 528 feet of disturbance to agricultural lands within the corridor. Neither route would traverse shallow bedrock nor prime farmland soils. The project route would cross an additional 528 feet of hydric soils and the same amount of highly wind erodible soils.

In summary, the project route provides a less congested route to the west and south of an existing electrical utility corridor, improved stream crossing alignments for both Grant Creek crossings, and reduces the amount of construction congestion from residents along this section. The existing electrical utility corridor also provides an adjacent corridor for the project's route alignment through this location.

Blackberry Alternative

The Blackberry Alternative would parallel the Enbridge pipeline corridor's south side from MP D1011.3 near the railroad crossing and continue southeast with the corridor until North Bluebird Drive. The Blackberry Alternative would then depart from the existing corridor turning south along the east side of North Bluebird Drive, turn southeast and parallel and existing utility corridor's north side into the village of Blackberry. The Blackberry Alternative would then turn

northwest crossing Happy Hollow Road to rejoin the south side of the Enbridge pipeline corridor at MP 1016.9 (see figure 2.2.4-6).

The project route would run along the north side of the Enbridge corridor from MP1011.4 at the railroad crossing and continue east-southeast with this corridor and cross the railroad within the village of Blackberry. The proposed route would then turn southeast to deviate off the Enbridge corridor for approximately 1,200 feet to lay between U.S Highway 2 and the railroad, turn south to cross U.S Highway 2 and continue for approximately 700 feet to rejoin the Enbridge corridor's south side. The project route would lie adjacent to existing corridors for approximately 93 percent of its route and alleviate encroachment to road frontage access on residential areas along North Bluebird Road, Happy Hollow Road, and south of U.S Highway 2 in the village of Blackberry.

The Blackberry Alternative would include an additional 8,100 feet of greenfield route, cross 2,645 more feet of NWI-mapped wetlands, and 3,696 more feet of highly wind erodible soils when compared to the project route. The project route would cross an additional 528 feet of hydric soils, and impact approximately ten percent more agricultural and forested land than the Blackberry Alternative. Table 2.2.4-6 provides a comparison of environmental features for the two routes.

Environmental Features	Unit	Proposed Project Route	Blackberry Alternative
Length	miles	5.6	6.2
Adjacent to Existing Right-of-Way	feet	27,456	22,704
Greenfield Route	feet	1,900	10,000
Total NWI-mapped Wetlands Crossed	feet	5,923	8,568
Highly Wind Erodible Soils ^b	feet	13,200	16,896
Shallow Bedrock	feet	0	0
Hydric Soils	miles	2.4	2.3
Prime Farmland Soils	miles	0.8	0.9
Forest Land Affected	miles	1.6	1.8
Agricultural Land Affected	miles	2.7	3.0
Herbaceous Land Affected	miles	0	0
Open Water Crossed	feet	0	0
Intermittent Waterbodies Crossed	no.	0	0
Perennial Waterbodies Crossed	no.	1	1
Railroad Crossings	no.	2	2
Road Crossings	no.	8	9

^a Route characteristics that were not significantly different were not included in this comparison.
^b Indicates length of route where project crosses soils with a wind erodible index of a potential for a loss of 134 tons per acre per year to 310 tons per acre per year.

In summary, the project route provides a shorter, more direct route that utilizes an existing corridor into the village of Blackberry with little deviation for the majority of its length with less impact to wetlands, wind erodible soils, forests and agricultural land.



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 **Proposed Project Route**

 **Alternative Route**

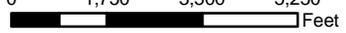
0 1,750 3,500 5,250
 Feet



Figure 2.2.4-6
Alberta Clipper and Southern Lights Diluent Projects
Blackberry Alternative



Swan River Alternative

The Swan River Alternative parallels the Enbridge pipeline corridor’s south side and traverses the river (see figure 2.2.4-7). As a result, the Swan River Alternative is directly offset and parallel to the river channel for approximately 450 feet presenting construction and restoration issues due to the potential for significant sloughing and bank erosion. Along this alternative, the Swan River could cause undercutting to the Alberta Clipper Project throughout operations and during normal and high river flows. The 1,056-foot-long Swan River Alternative alignment presents potential constraints to waterbody construction given the Swan River’s close proximity and parallel alignment.

The project route departs from the Enbridge pipeline system and continues south to ensure a perpendicular crossing of the Swan River. The project route leaves the Enbridge pipeline corridor for a total of approximately 1,584 feet beginning at MP 1024.1. The pipeline turns southeast then east before rejoining and paralleling the Enbridge pipeline system corridor’s south side. Table 2.2.4-7 provides a comparison of environmental features for the two routes.

Environmental Features	Unit	Proposed Project Route	Swan River Alternative
Length	miles	0.3	0.2
Adjacent to Existing Right-of-Way	feet	0	1,056
Greenfield Route	feet	1,584	0
Total NWI-mapped Wetlands Crossed	feet	1,189	485
Highly Wind Erodible Soils ^b	feet	528	1,056
Shallow Bedrock	feet	0	0
Hydric Soils	miles	0.2	0.1
Prime Farmland Soils	miles	0	0.2
Forest Land Affected	miles	0.0	0.1
Agricultural Land Affected	miles	0.0	0.0
Herbaceous Land Affected	miles	0	0
Open Water Crossed	feet	0	0
Intermittent Waterbodies Crossed	no.	0	0
Perennial Waterbodies Crossed	no.	1	1
Railroad Crossings	no.	0	0
Road Crossings	no.	0	0

^a Route characteristics that were not significantly different were not included in this comparison.
^b Indicates length of route where project crosses soils with a wind erodible index of a potential for a loss of 134 tons per acre per year to 310 tons per acre per year.

The project route would cross an additional 704 feet of NWI-mapped wetlands. The Swan River Alternative would result in 1,056 feet of prime farmland soil disturbance during construction and an equal amount of disturbance to highly wind-erodible lands adjacent the river corridor. Neither route would traverse any shallow bedrock, or agricultural land. The project route would cross 528 feet more total land than the Swan River Alternative.



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 Proposed Project Route

 Alternative Route



Figure 2.2.4-7
Alberta Clipper and Southern Lights Diluent Projects
 Swan River Alternative



In summary, the project route provides a perpendicular crossing alignment of the Swan River and reduces the erosion and undercutting potential along the Enbridge pipeline corridor during construction and operation of the Alberta Clipper Project. The project route requires a new corridor through the vegetated riparian buffer of the Swan River south of the Enbridge pipeline corridor. Construction of the Swan River Alternative would increase disturbance to a highly erodible, steep streambank whereby construction of the project route avoids these impacts entirely. Both routes traverse similar flat river basin terrain before reconnecting with the existing route alignment at MP 1024.3.