2.0 ROUTE SELECTION AND ALTERNATIVES ANALYSIS

EPND identified and evaluated alternatives to the proposed Project to determine whether the alternatives would be reasonable and environmentally preferable. These alternatives include the No-Action Alternative, system alternatives, and route alternatives. EPND used the following criteria for considering alternatives:

- ability to meet the Project objectives;
- technical and economic feasibility; and
- significant environmental advantage over the proposed Project.

Not all conceivable alternatives have the ability to meet the Project objectives; an alternative that does not meet the Project objectives will not be pursued. In addition, not all conceivable alternatives are technically or economically feasible. Some alternatives may be impractical because they are legally unavailable to EPND (for example land cannot be obtained even through the exercise of eminent domain authority) and/or cannot be implemented after taking into consideration costs and logistics in light of the overall Project purpose. EPND focused its analysis on those alternatives that may reduce impacts and/or offer environmental advantage without merely transferring impacts from one area or group of landowners to another. The following subsections describe EPND's process for selecting the preferred route and provide an analysis of alternatives.

2.1 NO-ACTION ALTERNATIVE

The Project objectives would not be met under the No-Action Alternative. In light of the overall increase in Bakken production and the need to increase pipeline capacity, the "no-action" alternative is unacceptable to EPND and to the petroleum-consuming public, which requires secure and reliable sources. EPND, its shippers, and residents of Minnesota and neighboring states will be negatively impacted without the capacity expansion afforded by this Project. The "no-action alternative" is not an option as EPND would not be able to meet its shippers' near-term or future transportation requirements.

A No-Action Alternative would require Minnesota and North Dakota producers and shippers to seek other transportation means that are less safe and more costly than the proposed pipeline or reduce production of petroleum-based products. The only other alternatives for shippers delivering into the EPND system would be to (1) truck or rail all or portions of the increased Bakken production to refineries outside North Dakota with the attendant problems noted below or (2) transport crude on non-Enbridge pipelines that are also at capacity, and thus, would require new pipe or facilities.

While the No-Action Alternative would avoid this Project's impacts, other companies would likely construct similar pipelines as substitutes for the Project, given the known demand for shipping capacity out of the Bakken formation. Such alternative projects could require the construction of additional and/or new pipeline or rail facilities in the same or other locations to transport the oil volumes proposed for the Project. These projects would generate

environmental impacts that could be equal to or greater than those described for this Project. For Minnesota, the impact of the no-action alternative would most likely be greater rail transportation, since most freight railroad routes from North Dakota to the Midwest and the East Coast pass through Minnesota. As Bakken production increases, so would train traffic carrying crude oil through Minnesota. Accordingly, the crude oil produced in the Bakken Formation could continue to be shipped by rail or truck; however, those alternatives have their own significant environmental impacts as discussed in Sections 2.2.2 and 2.2.3.

2.2 SYSTEM ALTERNATIVES

System alternatives are substitutes to the proposed action that would make use of existing or proposed pipeline or alternative transportation systems to meet the stated objectives of the Sandpiper Pipeline Project.

EPND investigated several alternatives before determining that the Project was the most economic and feasible option available to meet Project objectives. EPND limited its consideration of system alternatives to other pipeline projects under development and to alternate transportation modes.

2.2.1 Other Pipeline Systems

Plains All American Pipeline L.P. ("PAA") has announced its plans to reverse its Wascana pipeline system and build a new pipeline, Bakken North, to provide additional takeaway capacity for growing Bakken crude production. The Bakken North pipeline, consisting of approximately 79 miles of new 12-inch diameter pipeline, extends from Trenton, North Dakota to the southern terminus of Plains' Wascana system approximately 2.5 miles north of the town of Outlook in Sheridan County, Montana. The new pipeline will have an initial design capacity of 48,000 bpd, with a maximum capacity of up to 75,000 bpd. PAA plans to reverse the flow of its Wascana System in order to provide further transportation service to Regina, Saskatchewan. At Regina, PAA connects to third-party carriers providing access to Cushing, Oklahoma and PADD 2 delivery points. No in-service date is available; however, North Dakota Public Service Commission filings show construction was to be completed in late 2012.

High Prairie Pipeline, LLC is proposing to construct a new pipeline (referred to as the High Prairie Pipeline). The High Prairie Pipeline will consist of approximately 450 miles of new 16-inch diameter pipeline, beginning north of Alexander, North Dakota in McKenzie County and ending near Clearbrook, Minnesota in Clearwater County. High Prairie is also proposing to construct two laterals: a 17-mile lateral originating at Johnsons Corner, North Dakota in McKenzie County and connecting with the High Prairie Pipeline, and an 8-mile lateral beginning near Robinson Lake, North Dakota in Mountrail County and connecting with the High Prairie Pipeline. The new pipeline will have an initial design capacity of 150,000 bpd and end at Clearbrook, Minnesota. The anticipated in-service date is the fourth quarter of 2013.

Koch Pipeline Company, L.P., is proposing to construct a new pipeline (referred to as the Dakota Express Pipeline) from western North Dakota through Minnesota to Hartford and Patoka, Illinois. Koch Pipeline Company also is exploring a connection at Patoka to the existing Eastern Gulf Crude Access Pipeline. The project would deliver Bakken crude oil to eastern U.S. Gulf Coast refineries. Dakota Express Pipeline would include some new construction while also utilizing Koch Pipeline's existing Wood River Pipeline and its Hartford terminal. Koch Pipeline Company is currently seeking shipper interest in the project; if authorized, the Dakota Express Pipeline would transport approximately 250,000 bpd of Bakken crude oil, with an expected in-service date of 2016.

Industry forecasts for supply growth from the Bakken formation consistently show supply growth in excess of 1.0 million bpd by 2015. With this significant supply growth, Sandpiper and the other potential pipeline projects are not competing for the same production volumes, but are needed to meet the market demand for additional pipeline export capacity. New and increasing production volumes will be apportioned if additional pipeline capacity is not available or such volumes would be transported to market by truck or rail, which are more costly options for producers based on the current pricing at key marketing hubs. Trucking and rail also have a greater impact on the public.

Any other pipeline system would require entirely new right-of-way as well as new pump station sites, power supplies, valve sites, and potential access roads that would likely be equal to or greater in impact than the proposed Project.

2.2.2 Trucking

North Dakota crude oil could potentially be transported to the Superior, Wisconsin terminal by truck. However, there is currently insufficient truck capacity to transport the total annual capacity of 375,000 barrels of crude oil per day that would be moved by the Project. This alternative is also characterized by higher public safety and environmental risks, and higher incremental costs.

Accident data consistently illustrate that pipelines are the safest form of transportation for bulk liquids, including crude oil. As described in Section 7853.0540 of the CN Application, the likelihood of truck accidents, as compared to pipeline accidents, is significantly higher. The safety risk is magnified by the impact created by increased truck traffic on Minnesota highway routes. A trucking alternative would significantly overburden current public road capacity. Data from other states impacted by development in the Bakken Formation suggest that the use of trucking is negatively impacting communities and roadways, and that additional pipeline infrastructure would alleviate those transportation concerns (North Dakota Office of the Governor, 2012).

A typical truck carries 200 barrels of crude oil. For the purpose of this analysis, EPND assumes a trucking company will optimize the use of its trucking fleet to transport the same crude oil volumes as this Project. EPND further assumes that the trucking company will

divide its transportation requirements into three individual truck hauls that will make round-trips between specified locations: two beginning at the Beaver Lodge Station near Tioga, North Dakota and ending at Berthold, North Dakota or Superior, Wisconsin and a third that begins at Clearbrook, Minnesota and ends at Superior. To achieve maximum optimization of its trucking operations, EPND also assumes that a fleet of trucks would be scheduled to run round-trip deliveries between the following three locations:

- Leaving Beaver Lodge Station near Tioga, North Dakota to deliver 25,000 bpd at Berthold, North Dakota; returning empty from Berthold back to Beaver Lodge;
- Leaving Beaver Lodge to deliver 225,000 bpd at Superior, Wisconsin; returning empty from Superior back to Beaver Lodge; and
- Leaving Clearbrook, Minnesota to deliver up to 150,000 bpd at Superior Wisconsin; returning empty from Superior back to Clearbrook.

In order to transport the same incremental 25,000 bpd of crude oil from Beaver Lodge to Berthold, 225,000 bpd from Beaver Lodge to Superior, and 150,000 bpd from Clearbrook to Superior as proposed by EPND, a fleet of 4,354 trucks would be required. Table 2.2.2-1 provides details on the total truck requirements to meet objectives of the project.

Table 2.2.2-1
Total Daily Truck Requirements

	Crude oil volume (bpd)	Number of trucks in transit	Number of trucks returning empty	Number of trucks loading and unloading (assumed 20%)	Total truck requirements
Beaver Lodge, ND to Berthold, ND	25,000	32	32	13	77
Beaver Lodge, ND to Superior, WI	225,000	1,407	1,407	563	3,377
Clearbrook, MN to Superior, WI	150,000	375	375	150	900
				TOTAL	4,354

Even if the truck capacity issue were not so formidable, EPND or its shippers would need to expand truck loading/unloading facilities at suitable locations to allow receipt into the Enbridge Superior Tank Farm and Terminal Facility. The estimated cost of trucking the volume of crude oil otherwise transported by a pipeline (incorporating operation and maintenance costs along with fuel costs) would be in the range of hundreds of millions of dollars per year as stated in Section 7853.0540 of the CN Application, which is significantly greater than the cost of transporting the oil by pipeline, which is the primary reason trucking is not considered a long-term, stable method to move crude oil. The safety and environmental risks, logistical requirements, and high cost eliminate the trucking option as an alternative.

In Minnesota, the trucks would primarily use U.S. Highway 2 or I-94, which already carry a substantial volume of commercial traffic. The additional truck traffic, and associated loads, on Minnesota roads would result in an increased need for repair and/or expansion, and the burning of fossil fuels through the trucks' combustion engines would impact air quality in the region, as presented in Table 7853.0600-B.3 of Section 7853.0600 of the CN Application. The reliability of this alternative in a northern climate is compromised by periodic restrictions on truck traffic due to winter storms, spring road restrictions, other weather conditions, and road weight capacity restrictions.

2.2.3 Rail

North Dakota crude oil could potentially be transported to the Superior, Wisconsin terminal by rail. Similar to the trucking alternative, this alternative is characterized by higher public safety and environmental risk, unreasonable logistics and reliability, and higher incremental cost. Rail service to the Superior Terminal would require new rail right-of-way, which would result in similar or greater impacts to environmental features and landowners. Increasing volumes of North Dakota crude oil could also be transported to locations other than Superior, Wisconsin, but that would merely move the rail traffic from one route to another, which could traverse more populated areas. Similar to the trucking alternative, accident data consistently illustrate that pipelines are the safest form of transportation for bulk liquids, including crude oil. As described in Section 7853.0540 of the CN Application, the likelihood of rail accidents, as compared to pipeline accidents, is significantly higher. Rail transportation is also more disruptive to the public.

A typical rail car carries 600 barrels of crude oil. For the purpose of this analysis, EPND assumes rail transportation providers will optimize the use of their rail tank cars to transport the same crude oil volumes as the Project. EPND also assumes that the rail service provider will use long-haul unit or manifest trains with deliveries at intermediate stops between the Beaver Lodge Station and Superior, Wisconsin. EPND also assumes that the numerous manifest or unit trains would be required to make the following deliveries equivalent to this Project:

- Leaving Beaver Lodge Station near Tioga, North Dakota with a rail fleet capacity of 250,000 bpd, and the ability to offload deliveries of 25,000 bpd of crude oil supplies at Berthold, North Dakota; no guarantee that empty rail tank cars would return to Beaver Lodge for reloading;
- Leaving Berthold with a rail fleet capacity of 225,000 bpd and the ability to offload entire capacity of rail fleet at Superior, Wisconsin; no guarantee that empty rail fleet would return to Beaver Lodge for reloading; and
- Leaving Clearbrook, Minnesota with a rail fleet capacity up to 150,000 bpd, and the ability to offload entire capacity of rail fleet at Superior, Wisconsin; no guarantee that empty rail fleet would return to Clearbrook for reloading.

In order to transport the same incremental 25,000 bpd of crude oil from Beaver Lodge to Berthold, 225,000 bpd from Beaver Lodge to Superior, and up to 150,000 bpd from Clearbrook to Superior as proposed by EPND, a fleet of rail 2,052 cars would be required. Table 2.2.3-1 provides details on the total truck requirements to meet objectives of the project.

Table 2.2.3-1
Total Daily Rail Requirements

	Crude oil volume (bpd)	Number of rail cars in transit	Number of rail cars returning empty	Number of rail cars loading and unloading (assumed 20%)	Total rail car requirements
Beaver Lodge, ND to Berthold, ND	25,000	42	42	17	101
Beaver Lodge, ND to Superior, WI	225,000	563	563	225	1,351
Clearbrook, MN to Superior, WI	150,000	250	250	100	600
				TOTAL	2,052

This alternative would require the construction (by EPND or its shippers) of rail car loading and off-loading facilities. Construction of new lateral aboveground rail service lines would be required and would pose additional risk and impact to landowners and the public. Rail service would result in the burning of fossil fuels, which would impact air quality in the region, as presented in Table 7853.0600-B.4 of Section 7853.0600 of the CN Application. In addition, the reliability of this alternative in a northern climate is compromised by periodic restriction in truck traffic required to deliver crude oil to rail facilities due to winter storms and spring road restrictions, and other weather related or road capacity restrictions. This alternative also would be subject to delays caused by scheduling conflicting rail traffic and a significant mechanical/maintenance requirement.

While rail tanker cars are a vital part of the short-haul distribution network for crude oil, pipelines are a safer and more economic transportation alternative. The estimated cost of shipping the volume of crude oil transported by a pipeline (incorporating operation and maintenance costs along with fuel costs for rail transportation) would be in the range of hundreds of millions of dollars per year as stated in Section 7853.0540 of the CN Application, which is significantly greater than the cost of transporting the oil by pipeline. The safety and environmental risks, logistical requirements, and high cost eliminate the rail option as an alternative.

2.3 ROUTE ALTERNATIVES

EPND conducted an extensive review of possible route options to identify a preferred pipeline route that achieves the Project objectives, is technologically and economically feasible to construct, and minimizes impacts on landowners and the environment. The following subsections describe the route selection process and an analysis of the various route alternatives.

2.3.1 Initial Route Selection Process

During initial route studies, EPND determined that the Project should begin at its Beaver Lodge station near Tioga, North Dakota, which is ideally located to efficiently transport crude oil produced in the Bakken Formation. EPND determined that the Project should terminate at its Superior, Wisconsin terminal, where crude oil shipped from the Bakken could be further transported to refineries and markets in the Midwest and the East Coast.

EPND owns and operates Line 81, an existing interstate pipeline transportation system that gathers crude oil from points near production wells in western North Dakota and transports the volumes to Clearbrook, Minnesota for delivery to Minnesota Pipe Line Company, which serves two Minnesota refineries, and the Enbridge Mainline System. From Clearbrook, Enbridge operates seven pipelines within the Enbridge Mainline System that provide connections with the Superior terminal and refineries throughout the Midwest and the East Coast. Once Sandpiper is constructed, the EPND connection with the Enbridge Mainline System will be removed and Sandpiper will carry the existing EPND Line 81 volumes to Superior, Wisconsin where they will enter the Enbridge Mainline System. EPND sought to co-locate Sandpiper as much as possible with existing infrastructure.

EPND assessed the route from Tioga, North Dakota to Superior, Wisconsin, with the intent of maximizing existing right-of-way to the extent practicable while identifying specific areas where co-location may not be practicable. The first step in the environmental review of the route and the selection process consisted of collecting publicly available environmental data to identify routing constraints. The sources of data consisted primarily of: Geographic Information Systems (“GIS”) digital information layers, including U.S. Geological Survey (“USGS”) topographic maps, USGS land use database, U.S. Department of Agriculture (“USDA”) Farm Services Agency aerial photography and GIS data, National Wetlands Inventory (“NWI”) maps, Minnesota Department of Natural Resources (“MNDNR”) Natural Heritage Information System (“NHIS”) data, Minnesota Department of Transportation (“MDOT”) highway maps, USDA state soil geographic (State Soil Geographic [“STATSGO2”] and Soil Survey Geographic [“SSURGO”]) databases, and other natural feature databases obtained from the MNDNR website and other state and federal sources. Existing major utility rights-of-way also were identified for potential use in co-location.

The next step involved reviewing selected layers of the collected GIS data on digital USGS topographic maps and recent aerial photography to identify the locations of environmental constraints within the study area.

EPND initially analyzed two routes in Minnesota between Clearbrook and the Minnesota/Wisconsin border, referred to as the Northern Route and the Southern Route. Both routes were included in EPND's June 7, 2013, MPUC Notice Plan filing. EPND chose to pursue the Southern Route between Clearbrook and the Minnesota/Wisconsin Border as its preferred route. The Northern Route is analyzed as a rejected route alternative in Section 2.3.3.

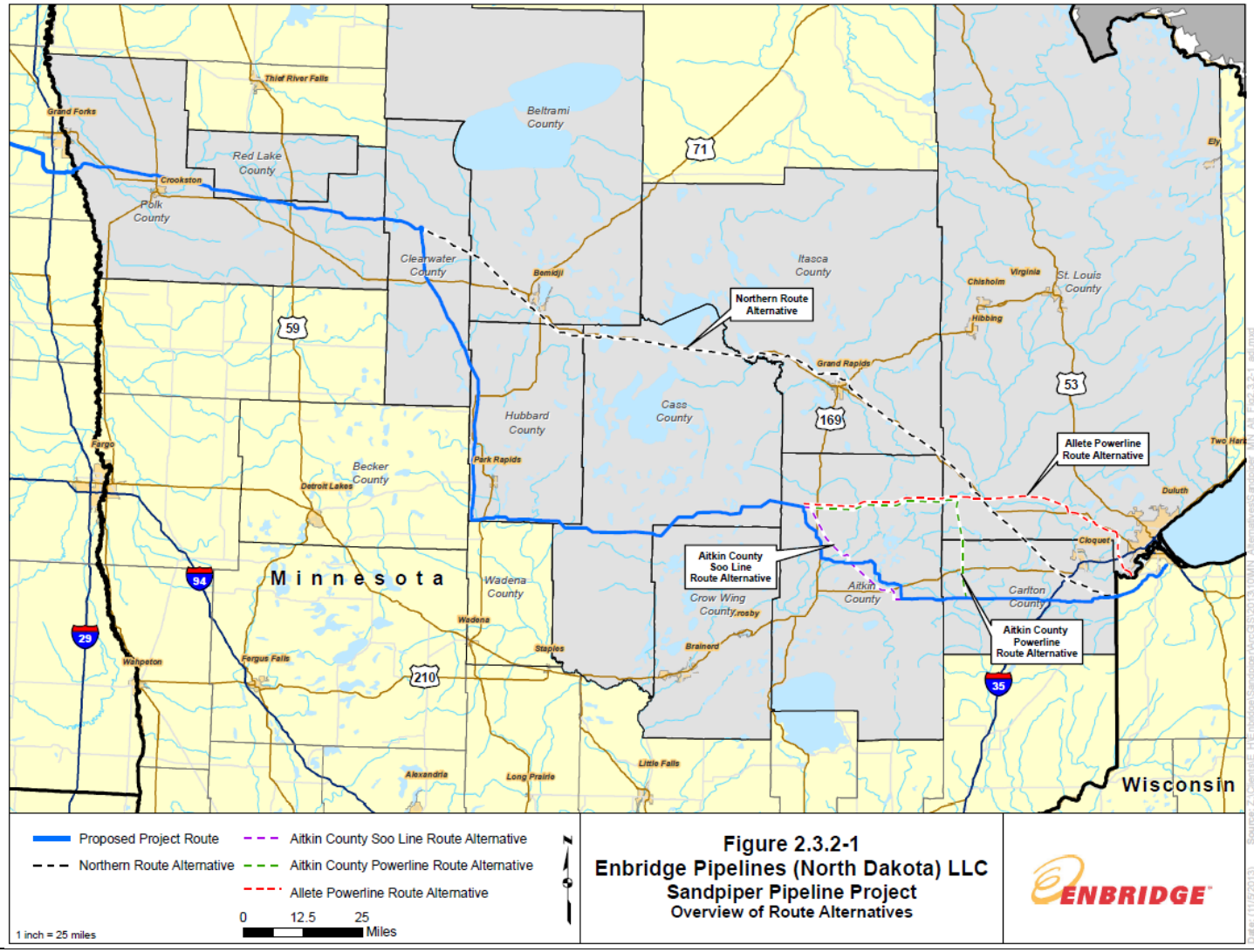
2.3.2 Refined Route Selection Process

EPND conducted a number of route reconnaissance efforts in addition to the desktop review. During field reviews, the route was examined and adjustments were made to avoid or minimize potential impacts on sensitive environmental or cultural features, to adjust for preferred construction alignment, or to accommodate landowner concerns. Further refinement of the route was completed as detailed engineering design efforts led to the identification of specific facility modifications or additions. EPND's existing pipeline right-of-way west of Clearbrook, Minnesota generally provides the opportunity for co-location; however, in some locations east of Clearbrook it is not feasible to use existing Enbridge rights-of-way due to inability to acquire land (even through the exercise of eminent domain authority), congestion, poor crossing conditions, or other constraints. Co-location with third-party rights-of-way east of Clearbrook provides environmental advantage in that land disturbance will be generally located alongside areas that have been previously disturbed. EPND continues to refine the preferred route to address engineering, environmental, agency, and landowner concerns. The following subsections describe the route alternatives identified as a result of these efforts (see also Figure 2.3.2-1).

2.3.3 Comparison of Route Alternatives

EPND conducted a detailed quantitative analysis of environmental impacts along each route alternative identified during the routing process. The analysis used the same sources of publicly available environmental data described in Section 2.3.1 to compare a variety of factors, including proximity to existing rights-of-way, wetlands, highly wind erodible soils, bedrock outcrops, prime farmland soils, perennial waterbodies, national forest land, tribal land, state forest land, state Wildlife Management Area ("WMA") land, state Aquatic Management Area ("AMA") land, railroads crossed, roads crossed, and other site-specific matters. No field survey data was used in the alternatives analysis as field surveys were not completed along the alternate routes. EPND identified and analyzed four route alternatives, which are presented in the following subsections and shown in Figure 2.3.2-1. None of the route alternatives were adopted as the Project's preferred route.

Figure 2.3.2-1
Overview of Route Alternatives



Northern Route Alternative

As described in Section 2.3.2, the Northern Route Alternative was initially considered as a way to maximize co-location with the existing Enbridge Mainline right-of-way. The alternative deviated from the preferred route at approximate MP 374.6 and exited Minnesota at approximately MP 597.8. Table 2.3.3-1 provides a comparison of the prominent land use features of this alternative and the preferred route; Figure 2.3.3-1 depicts the alternative and the preferred route.

The main benefits of the Northern Route Alternative included the fact that it was approximately 43 miles shorter than the preferred route. The Northern Route Alternative would have crossed approximately 55 miles less greenfield land, and would have crossed fewer miles of highly wind erodible soils and prime farmland soils. The Northern Route Alternative would also have crossed approximately 5 miles less state WMA land and one less perennial waterbody than the preferred route.

However, there are several significant disadvantages to the Northern Route. This route crossed 7.8 more miles of NWI-mapped wetlands as compared with the preferred route. The route alternative also crossed approximately 34 miles of the Chippewa National Forest and 12 more miles of state forest lands, which presents additional impacts to sensitive environmental forest features.

The Northern Route alternative also crosses the Leech Lake Indian Reservation and the Fond du Lac Indian Reservation. As Project planning progressed, it became apparent EPND would not have been able to assemble a continuous right-of-way for a significant portion of the Northern Route. Without easements to construct and operate the pipeline, EPND cannot feasibly construct Sandpiper using this alternative.

The Northern Route would have been partially located within the Enbridge right-of-way, which currently contains up to seven pipelines. EPND recognizes landowner concerns with adding another pipeline in this established right-of-way. The width of the right-of-way results in constructability constraints. Safety risks would have increased during construction due to working within a congested right-of-way over active lines, working alongside pipeline operations staff completing routine maintenance work, and working alongside Pipeline Integrity Dig crews during time-sensitive repairs in a constricted space. Population centers such as Bemidji, Grand Rapids, Cass Lake, and Floodwood, as well as the tribal communities discussed above, would have been crossed by the Northern Route. Approximately 163,000 people live along the preferred route, which is less than half the population along the Northern Route Alternative. Additionally, the Northern Route Alternative crossed more bedrock outcrops, more railroads and roads, and a federal Superfund site.

Although the Northern Route Alternative would have met the project objective, EPND determined that the alternative was infeasible because it unable to assemble the requisite

right-of-way easements and would have introduced additional environmental impacts to federal and tribal lands that the preferred route avoids. Rather, utilizing the Northern Route Alternative would have greater environmental impacts. Additionally, the Northern Route Alternative presented construction constraints and increased safety concerns associated with installation of the project in a right-of-way with up to seven pipelines. Therefore, EPND rejected this alternative route for the Project.

Table 2.3.3-1
Environmental Features Comparison – Northern Route Alternative

Environmental Features	Unit	Northern Route Alternative	Preferred Route
Length	miles	181.1	223.9
Adjacent to Existing Right-of-Way	miles	176.6	164.6
Greenfield Route [a]	miles	4.5	59.3
NWI-mapped Wetlands	miles	47.2	39.4
NWI-mapped Wetlands	number	377	439
Highly Wind Erodible Soils	miles	107.3	164.7
Bedrock Outcrops	miles	2.9	2.5
Prime Farmland Soils	miles	20.8	37.1
Perennial Waterbodies	number	30	31
National Forest Land	miles	34.4 [b]	0.0
Tribal Land	miles	56.7 [c]	0.0
State Forest Land	miles	36.2 [d]	24.2 [e]
State Wildlife Management Area Land	miles	0.0	4.8 [f]
State Aquatic Management Area Land	miles	0.3 [g]	0.6 [h]
Railroads Crossed	number	12	2
Roads Crossed	number	168	149
Other Major Issues	number	1 [i]	0

[a] Greenfield locations are defined for purposes of the alternatives analysis as any portion of the route that is greater than 250-feet from the centerline of a known utility.
[b] Chippewa National Forest
[c] Leech Lake and Fond du Lac Reservations
[d] Bowstring, Mississippi Headwaters, and Fond du Lac State Forests
[e] Huntersville, Land O' Lakes, Mississippi Headwaters, Foothills, Savanna, Hill River, and Waukenabo State Forests
[f] Crow Wing Chain, Grayling Marsh, Lawler, and Salo Marsh Wildlife Management Areas
[g] Clearwater River and Little Otter Creek Aquatic Management Areas
[h] Spire Valley Hatchery and LaSalle Creek Aquatic Management Areas
[i] St. Regis Superfund site

Figure 2.3.3-1
Northern Route Alternative

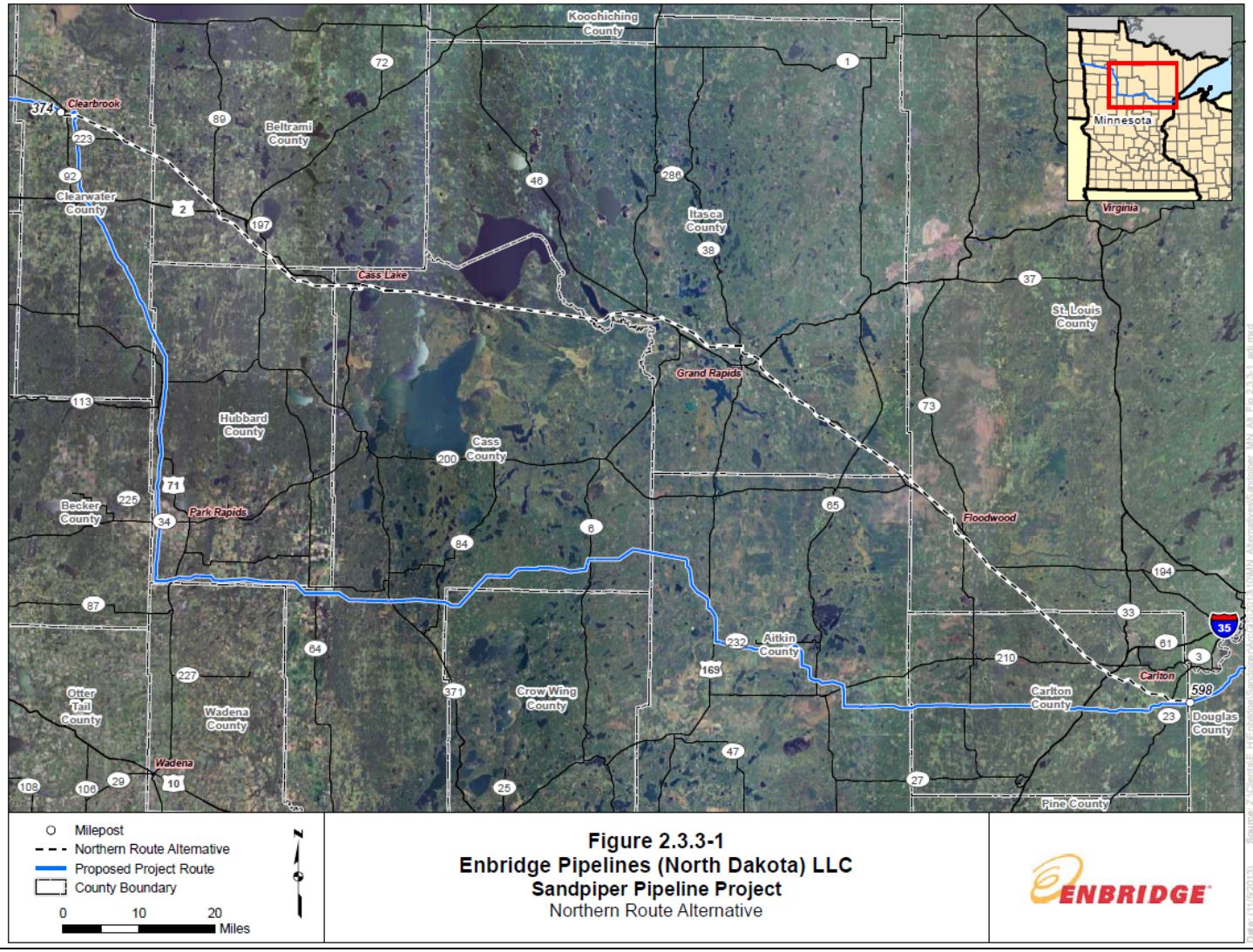


Figure 2.3.3-1
Enbridge Pipelines (North Dakota) LLC
Sandpiper Pipeline Project
Northern Route Alternative

Aitkin County Powerline Route Alternative

The Aitkin County Powerline Route Alternative was considered as a way to maximize co-location with existing powerline rights-of-way through Aitkin County. The alternative deviated from the preferred route at approximately MP 515.5 and rejoined the preferred route at approximately MP 565.3. Table 2.3.3-2 provides a comparison of the prominent land use features of this alternative and the preferred route; Figure 2.3.3-2 depicts the alternative and the preferred route.

The main benefit of the Aitkin County Powerline Route Alternative was that it is adjacent to existing right-of-way for 50 more miles than the preferred route and would not have involved any greenfield construction over the examined segment. Thirteen fewer roads would have been crossed by this route. The Aitkin County Powerline Route Alternative would have crossed approximately 15.5 miles less prime farmland and approximately 3 miles less highly wind-erodible soils than the preferred route. No state WMA land would have been crossed by this route.

The main drawbacks of the route alternative were that it is almost 4 miles longer than the preferred route and would have impacted approximately 12 more miles of NWI-mapped wetlands and 11 more perennial waterbodies. The Aitkin County Powerline Route Alternative also crossed 23 more miles of state forest land.

From a constructability perspective, there is limited access to and from major roads along this alternative. This would have added several risks to the project, including equipment and material hauling limitations and lack of access for emergency responders in the event of a safety incident. This limited access would have created greater environmental impacts to the right-of-way and greater safety concerns from increased movement of construction equipment and materials. The limited access also resulted in disadvantages in the operability of the pipeline because access for maintenance would be difficult and limited. Additionally, the route passed through a significant wetland complex and the additional 12 miles of NWI-mapped wetlands have a high potential for added winter construction.

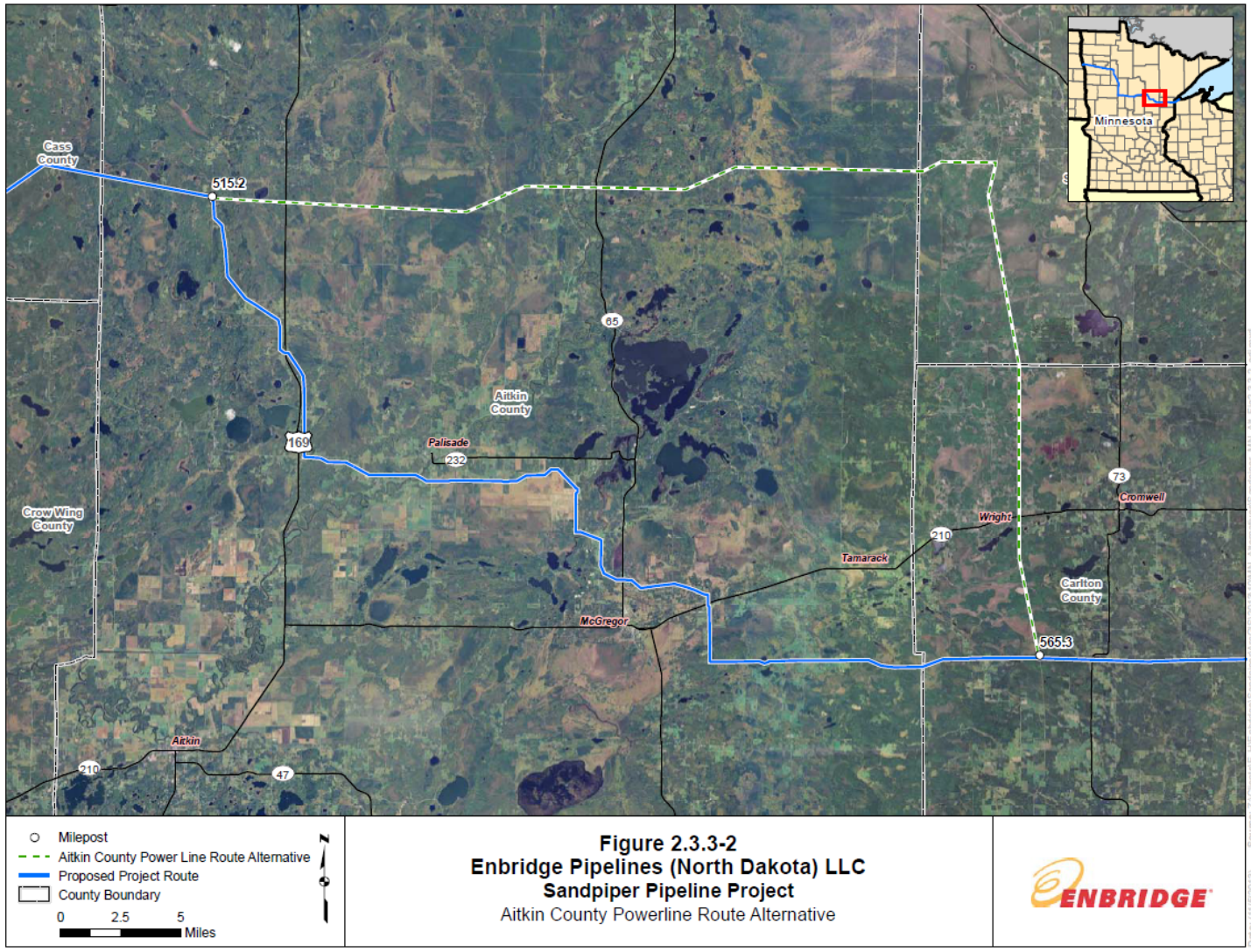
Although the Aitkin County Powerline Route Alternative would meet the project objective, EPND determined that the alternative did not convey a significant environmental advantage over the preferred route. While it was advantageous from the perspective of co-location with existing rights-of-way, avoidance of state WMAs and reduction of prime farmland and highly wind-erodible soils, the Aitkin County Powerline Route Alternative would have added significant state forest and wetland impacts as well as disturbance for 4 additional miles of construction. Utilizing the Aitkin County Powerline Route Alternative would have merely transferred environmental impacts from one area and set of resources to another. Based on this environmental analysis and the increased safety concerns, as well as significant construction and future operational challenges, including the high potential for winter construction, EPND rejected this alternative for the Project.

Table 2.3.3-2
Environmental Features Comparison – Aitkin County Powerline Route Alternative

Environmental Features	Unit	Aitkin County Powerline Route Alternative	Preferred Route
Length	miles	53.9	50.1
Adjacent to Existing Right-of-Way	miles	53.9	3.9
Greenfield Route [a]	miles	0.0	46.1
NWI-mapped Wetlands	miles	27.6	15.5
NWI-mapped Wetlands	number	167	118
Highly Wind Erodible Soils	miles	23.1	38.7
Bedrock Outcrops	miles	0.0	0.0
Prime Farmland Soils	miles	3.6	6.7
Perennial Waterbodies	number	20	9
National Forest Land	miles	0.0	0.0
Tribal Land	miles	0.0	0.0
State Forest Land	miles	31.8[b]	8.8[c]
State Wildlife Management Area Land	miles	0.0	3.1 [d]
State Aquatic Management Area Land	miles	0.0	0.0
Railroads Crossed	number	1	1
Roads Crossed	number	9	22
Other Major Issues	number	0	0

[a] Greenfield locations are defined for purposes of the alternatives analysis as any portion of the route that is greater than 250-feet from the centerline of a known utility.
[b] Savanna and Hill River State Forests
[c] Savanna, Hill River, and Waukenabo State Forests
[d] Grayling Marsh, Lawler, and Salo Marsh Wildlife Management Areas

Figure 2.3.3-2
Aitkin County Powerline Route Alternative



Milepost
Aitkin County Power Line Route Alternative
Proposed Project Route
County Boundary
0 2.5 5 Miles

Figure 2.3.3-2
Enbridge Pipelines (North Dakota) LLC
Sandpiper Pipeline Project
Aitkin County Powerline Route Alternative

Allete Powerline Route Alternative

The Allete Powerline Route Alternative was considered as a way to maximize co-location with the existing Allete Powerline. The alternative deviated from the preferred route at approximately MP 515.2 and exited Minnesota at approximately MP 597.8. Table 2.3.3-3 provides a comparison of the prominent land use features of this alternative and the preferred route; Figure 2.3.3-3 depicts the alternative and the preferred route.

The main benefits of the Allete Powerline Route Alternative were that it was 3 miles shorter than the preferred route and was co-located with more existing right-of-way, crossed fewer roads, fewer miles of wind-erodible soils, fewer miles of prime farmland, and no WMAs.

The main environmental drawbacks of the route alternative were that it crossed more perennial waterbodies, more railroads, more miles of NWI-mapped wetlands, more miles of bedrock outcrops, and more state forest land.

From a constructability standpoint, this route provided several added challenges over the preferred route. The first is the area where the route would have departed from the preferred route; that portion of the alternative heading east is comprised of extensive saturated wetlands and would likely have required winter construction practices for approximately 30 extra miles. This posed a major risk for the project should winter temperatures not be low enough to provide conditions conducive to winter construction. The section of this route from MP 515 to the area near Brookston, Minnesota also had limited access to and from major roads which added several construction and safety risks to the project, including prolonging construction duration, equipment and material hauling limitations, and also impedes access for emergency responders in the event of a safety incident. The limited access would have also resulted in disadvantages in the operability of the pipeline because access for maintenance would have been difficult and limited.

As noted above, this route also crossed several known rock outcroppings as it traveled into and out of the city of Duluth. With bedrock construction, significant delays to the construction process along with potential safety risk around extensive blasting, hammering and equipment travel over rock surfaces were expected. Finally, this route would have required a substantial HDD, approximately 1 mile in length, across Spirit Lake. While drills of this length have been completed in the past, there is the potential for inadvertent returns of drilling mud into the St. Louis River and Spirit Lake.

Although the Allete Powerline Route Alternative would have met the project objective, EPND determined that the alternative had significant disadvantages when compared to the preferred route. While it was advantageous from the perspective of co-location with existing rights-of-way and was shorter in distance than the preferred route, the Allete Powerline Route Alternative added significant pipeline construction and safety risks, as well as pipeline operation risks due to limited access. The Allete Powerline Route Alternative also added risks for extensive winter construction due to extensive saturated wetlands. It also

created blasting risks associated with rock outcrops and shallow bedrock that are not associated with the preferred route. Based on this analysis, EPND has rejected this alternative to the preferred route.

Table 2.3.3-3
Environmental Features Comparison – Allete Powerline Route Alternative

Environmental Features	Unit	Allete Powerline Route Alternative	Preferred Route
Length	miles	79.3	82.6
Adjacent to Existing Right-of-Way	miles	71.8	25.9
Greenfield Route [a]	miles	7.5	56.7
NWI-mapped Wetlands	miles	25.7	22.2
NWI-mapped Wetlands	number	204	173
Highly Wind Erodible Soils	miles	35.4	55.9
Bedrock Outcrops	miles	3.8	2.5
Prime Farmland Soils	miles	6.8	10.0
Perennial Waterbodies	number	20	14
National Forest Land	miles	0.0	0.0
Tribal Land	miles	0.0	0.0
State Forest Land	miles	27.7 [b]	8.8 [c]
State Wildlife Management Area Land	miles	0.0	3.1 [d]
State Aquatic Management Area Land	miles	0.0	0.0
Railroads Crossed	number	5	1
Roads Crossed	number	41	43
Other Major Issues	number	0	0

[a] Greenfield locations are defined for purposes of the alternatives analysis as any portion of the route that is greater than 250-feet from the centerline of a known utility.
[b] Hill River and Savanna State Forests
[c] Hill River, Waukenabo, and Savanna State Forests
[d] Grayling Marsh, Lawler, and Salo Marsh Wildlife Management Areas

Figure 2.3.3-3
Allete Powerline Route Alternative

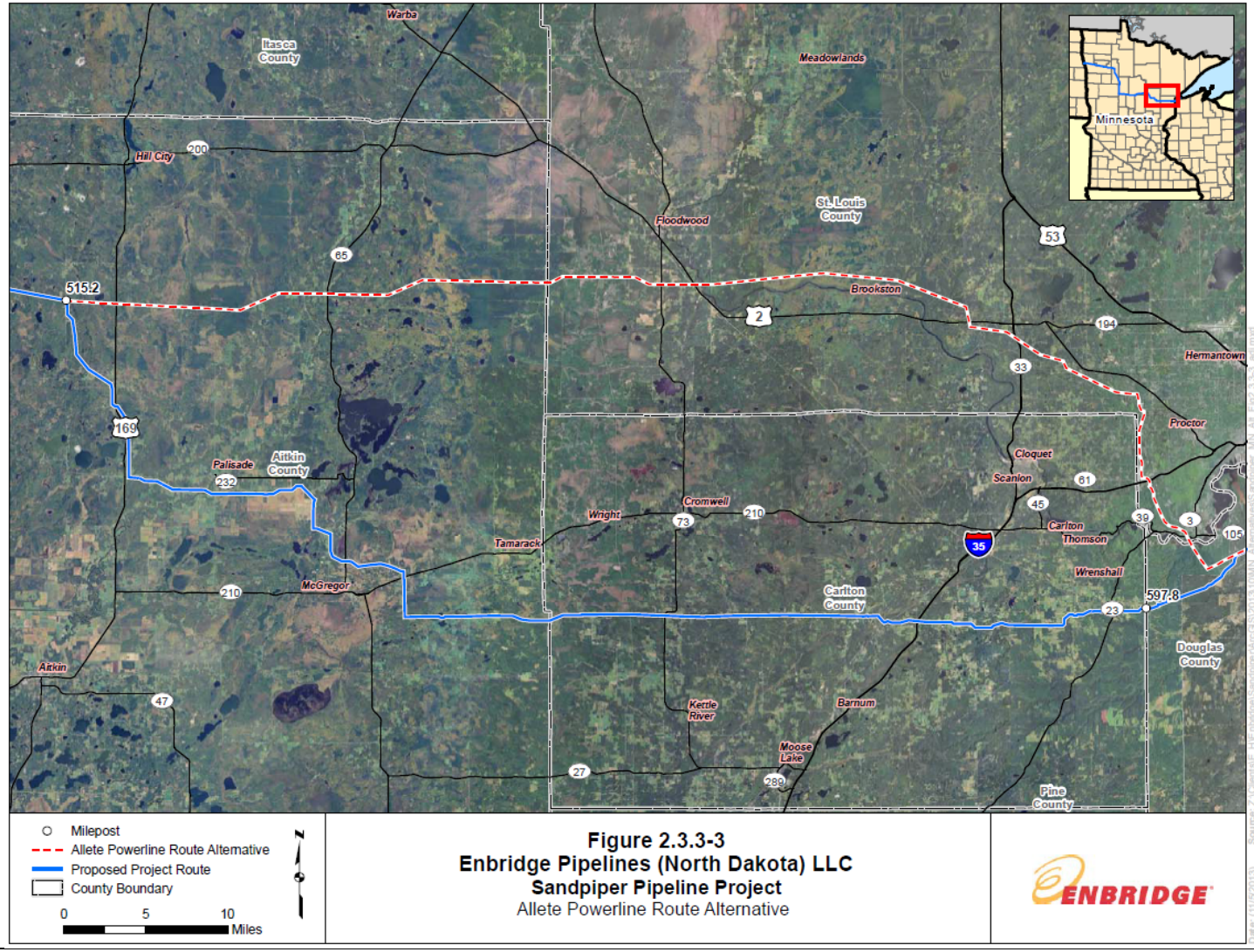


Figure 2.3.3-3
Enbridge Pipelines (North Dakota) LLC
Sandpiper Pipeline Project
Allete Powerline Route Alternative

Aitkin County Soo Line Route Alternative

The Aitkin County Soo Line Route Alternative was considered as a way to maximize co-location with the existing right-of-way associated with the Soo Line Trail in Aitkin County. The alternative deviated from the preferred route at approximately MP 515.2 and rejoined the preferred route at approximately MP 551.4. Table 2.3.3-4 provides a comparison of the prominent land use features of this alternative and the preferred route; Figure 2.3.3-4 depicts the alternative and the preferred route.

The main benefit of the Aitkin County Soo Line Route Alternative was that the construction right-of-way would have been generally co-located with the Soo Line Trail right-of-way. This route alternative would have crossed almost 8 miles less highly wind erodible soils and almost 3 miles less prime farmland soils. In addition, 7 fewer roads would have been crossed by this alternative. No state WMAs were crossed by this alternative, whereas the preferred route crosses the Grayling Marsh WMA on the corresponding segment of the route.

Both the route alternative and preferred route cross the Savanna, Hill River and Waukenabo State Forests. The main drawbacks of the Aitkin County Soo Line Route Alternative were that it would have impacted 8.6 miles of additional NWI wetlands and would have crossed one additional perennial waterbody that has the likelihood to contain sensitive species, and would have crossed the McGregor Marsh Scientific Natural Area ("SNA"). Finally, there is the potential for the North Soo Line Railroad to be eligible for historic designation.

From a constructability perspective, there was limited access for construction, safety, and operability, and a high potential for added winter construction. In addition, a perceived advantage of the route alternative was that for the co-located length, construction impacts would have been limited to a single landowner. However, detailed review of the route alternative indicated that this was inaccurate. In nearly all locations along the route alternative, the construction footprint would have gone beyond the 100-foot easement of the Soo Line trail, creating impacts to landowners similar to the preferred route.

In addition, due to the easement width, only one side of the right-of-way would have been usable, and as such, the trail in many areas would have been permanently impacted via grading and/or cutting down of the trail. Furthermore, additional forested areas along the working side would have needed to be cleared in order for safe construction activities to commence. In order to construct the Project utilizing the trail right-of-way, trail closure for one to two years would likely have been necessary as the trail would be the primary method of ingress/egress for construction. Another consequence of trail use would be the safety-mandated need for regular access to the trail and pipeline from public roads. As the trail was a former railroad grade, existing access from public roads is very limited. The need for access, both during construction and operation, would have resulted in several new access roads and adjacent landowner impacts.

Although the Aitkin County Soo Line Route Alternative would have met the project objective, EPND determined that the alternative did not convey a significant environmental advantage over the preferred route. While it was advantageous from the perspective of co-location with existing rights-of-ways, fewer miles of construction, avoidance of state WMAs and reduction of impacts to prime farmland and highly wind-erodible soils, the Aitkin County Soo Line Route Alternative added wetland and sensitive species impacts, as well as disturbance in three state forests. EPND did not select this alternative to the preferred route based on this environmental analysis and the significant physical impacts to a recreational use trail, the public's use of the trail, and to adjacent landowners.

Table 2.3.3-4
Environmental Features Comparison – Aitkin County Soo Line Route Alternative

Environmental Features	Unit	Aitkin County Soo Line Route Alternative	Preferred Route
Length	miles	31.7	36.3
Adjacent to Existing Right-of-Way	miles	3.1	0.0
Greenfield Route [a]	miles	28.6	36.3
NWI-mapped Wetlands	miles	19.6	11.0
NWI-mapped Wetlands	number	79	89
Highly Wind Erodible Soils	miles	22.9	30.8
Bedrock Outcrops	miles	0.0	0.0
Prime Farmland Soils	miles	0.5	3.4
Perennial Waterbodies	number	5	4
National Forest Land	miles	0.0	0.0
Tribal Land	miles	0.0	0.0
State Forest Land	miles	9.3 [b]	8.8 [b]
State Wildlife Management Area Land	miles	0.0	1.1 [c]
State Aquatic Management Area Land	miles	0.0	0.0
Railroads Crossed	number	1	1
Roads Crossed	number	11	18
Other Major Issues	number	2 [d]	0

[a] Greenfield locations are defined for purposes of the alternatives analysis as any portion of the route that is greater than 250-feet from the centerline of a known utility.
[b] Savanna, Hill River and Waukenabo State Forests
[c] Grayling Marsh Wildlife Management Area
[d] McGregor Marsh Scientific Natural Area, Soo Line Trail with Potential for Historic Designation

Figure 2.3.3-4
Aitkin County Soo Line Route Alternative

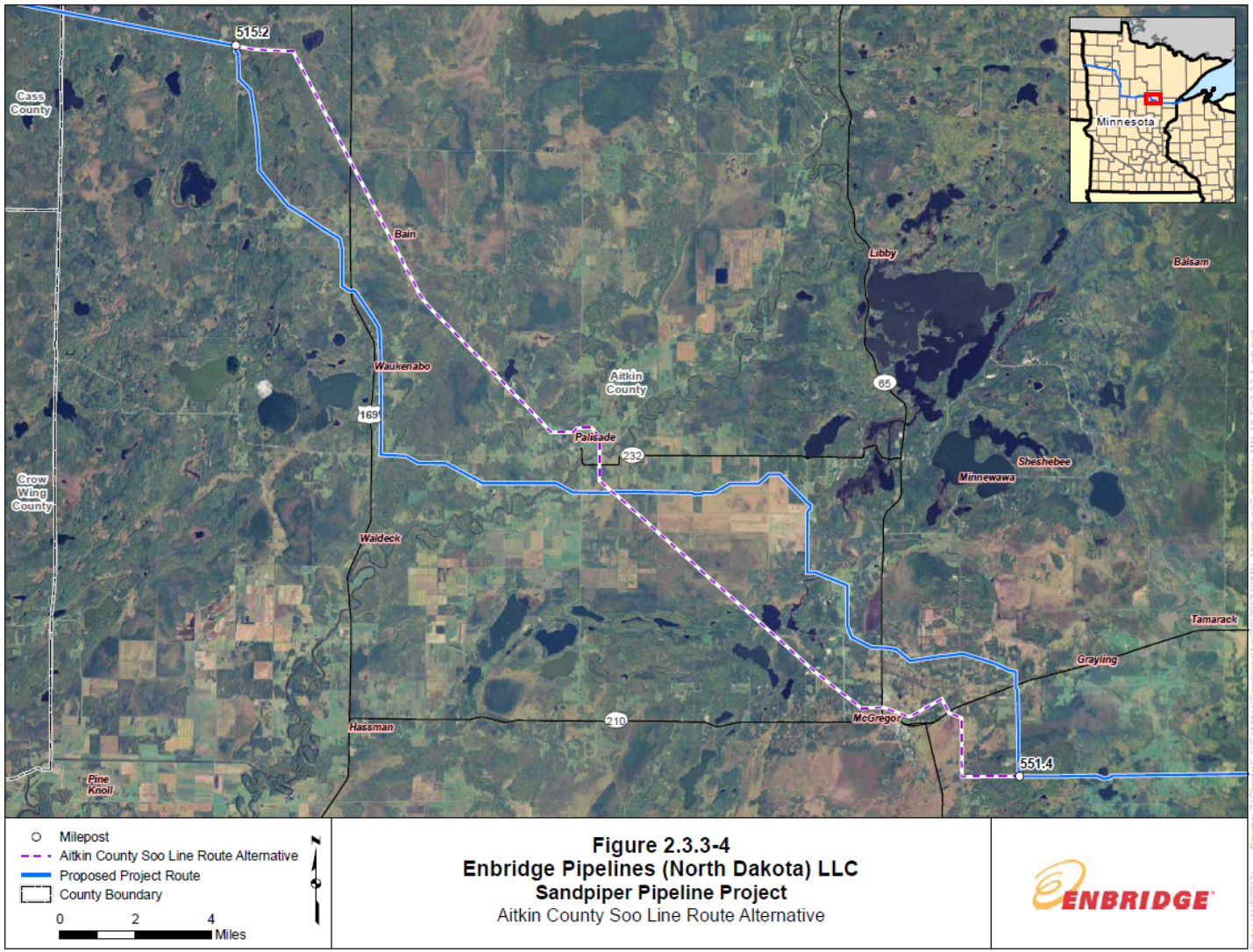


Figure 2.3.3-4
Enbridge Pipelines (North Dakota) LLC
Sandpiper Pipeline Project
Aitkin County Soo Line Route Alternative