May 2009
Wisconsin Department of Natural Resources

Enbridge Alberta Clipper Petroleum Pipeline and Related Projects

Environmental Assessment

Environmental Assessment for
Enbridge Alberta Clipper Petroleum Pipeline and Related Projects

To the Reader

This environmental assessment (EA) fulfills part of the Wisconsin Department of Natural Resources (DNR) requirements under the Wisconsin Environmental Policy Act (WEPA), Wis. Stat. § 1.11, and Chapter NR150, Wis. Adm. Code. WEPA requires state agencies to consider environmental factors when making major decisions. The purpose of this EA is to provide the decision makers, the public, and other stakeholders with an analysis of the economic, social, cultural, and environmental impacts that could result from the construction and operation of the proposed Enbridge Alberta Clipper petroleum pipeline, Southern Lights diluent pipeline, Superior Terminal pumping station, and Superior Terminal breakout tanks.

The Department conducted an issue identification process prior to completion of the EA. The Department requested public scoping comments on March 11, 2009 and received public comments through March 31, 2009. The Department used those comments to help identify the scope and the significant issues that were analyzed in the analysis.

Comments received during the comment period will be used by the Department to make its final decisions on this project. You are encouraged to comment on this EA. The EA is available on the Department web-site at: http://dnr.wi.gov/org/es/science/eis/eis.htm.

The DNR has scheduled a public informational hearing where individuals can learn more about the proposed project and submit written or oral comments about the EA and any DNR wetland and waterway determinations associated with the project. The public informational hearing will be held on June 4, 2009 at the City of Superior Public Library, Large Meeting Room, 5:30 pm to 8:00 pm.

The comment period on this EA ends on June 8, 2009. Written comments should be addressed to:

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All comments received during the hearing and written comments received before the end of the comment period will be considered by the Department before issuance of a record of decision under s. NR 150.24, Wis. Adm. Code.

The DNR also cooperated with the U.S. Department of State (USDOS) on a federal Environmental Impact Statement (EIS) for the Alberta Clipper petroleum pipeline project. The USDOS EIS is available at the following web address: http://www.albertaclipper.state.gov/clientsite/clipper.nsf?Open

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Purpose of this document (to the reader)

List of preparers

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Summary

Enbridge Energy Company, Inc., 119 N. 25th Street East, Superior, WI 54880-5247, has applied to the DNR for waterway and wetland crossing permits, and air pollutant discharge permits for the proposed projects. A stormwater permit and an endangered resources review are also required from the DNR.

This EA addresses all environmental permits and approvals required from the DNR for the Wisconsin portion of the proposed project. The EA evaluates environmental effects from construction and operation of the proposed projects and project alternatives.

Project Description

The proposed project consists of constructing a new 36-inch diameter petroleum pipeline (known as the Alberta Clipper pipeline), a new 20-inch diameter diluent return pipeline (known as the Southern Lights pipeline), an associated pump station for the Southern Lights pipeline, and five 250,000 barrel breakout tanks for the Alberta Clipper pipeline. The proposed pipelines would be constructed along a 13 mile route in Douglas County from the Wisconsin - Minnesota border to the Enbridge Superior Terminal in Superior, Wisconsin.

The purpose of the Alberta Clipper petroleum pipeline and breakout tanks is to bring crude oil from the tar sands area of Alberta, Canada to refineries in the Midwestern U.S. The Southern Lights diluent pipeline and pumping station are intended to return diluent from the Midwestern U.S. refineries to Alberta, Canada. Diluent is similar to gasoline, and is used to thin crude oil so that it can be pumped through pipelines.

The pipelines would be largely constructed in parallel within an existing pipeline right-of-way that includes four other crude oil pipelines. The pump station and the breakout tanks would be constructed at the Enbridge Superior Terminal at Superior.

Existing Environment

The proposed pipeline route crosses 13 miles of Douglas County, Wisconsin in the Lake Superior drainage basin. The local political units to be crossed within Douglas County are the Town of Superior, Village of Superior, and City of Superior. The total area of Douglas County is 837,924 acres, of which 194,169 acres are mapped as wetland on the Wisconsin Wetland Inventory. The northern third of the county is in the Lake Superior clay plain. The clay plain is rich in wetlands, in part due to the impermeable clay soils and relatively flat topography. Wetlands may be found even in higher elevations in the clay plain. Although wetlands are locally abundant, they are often of types that are nationally rare. In the area proposed to be crossed by the pipeline and up to the Superior terminal, shrub swamps and wet meadows are commonly interspersed with agricultural, residential, and industrial land uses. The clay plain is also characterized by deeply incised streams within steep ravines, formed through the erosive power of rapid water runoff from the surrounding landscape.

Surveys from the 1990s by DNR Bureau of Endangered Resources evaluated priority wetland communities in the Lake Superior basin. One focus was the vicinity of the city of Superior, where shrub- and sedge- dominated wetlands are concentrated on the nearly level poorly drained red clay soils. Plant communities surveyed included alder thicket, shub-carr, northern sedge meadow, and emergent aquatic. Priority sites surveyed were Pokegama-Carnegie wetlands, Red River Breaks, and Superior Airport / Hill Avenue Wetlands / South Superior Triangle. These sites are most notable for their concentrations of rare plants, some of which occur nowhere else in the drainage basin or state. The report summarizes threats to these communities as disruption of hydrology, increased development, invasive species, pollution, and suppression of natural disturbance regimes.

Douglas County's clay plain wetlands and the St. Louis River estuary draining to Lake Superior provide a major migration "funnel" for birds and mammals. Migrating birds will concentrate in the St. Louis River estuary and surrounding areas as they avoid flying over the expanse of Lake Superior. Migratory stopovers just before birds reach breeding grounds may play a critical role in fledgling success. Studies of wetland use by migrating songbirds suggest that alder thickets are used disproportionally over other habitats for feeding and cover.. Studies of important migratory stopover sites in other Great Lake states suggest that areas within ½ mile of river mouths are critical areas for migratory stop over. The area south and west of Superior represents a "stronghold" of rare breeding habitat for boreal species.

The proposed pipeline route crosses the drainage of the Pokegama River which flows into the St. Louis River estuary, and crosses the Nemadji River watershed. The 12,000 acre St. Louis estuary supports an important complex of coastal wetlands on Lake Superior and was nominated in 2008 by the state of Wisconsin as a National Estuarine Research Reserve under the National Oceanic and Atmospheric Administration. The St. Louis River is the second largest tributary to Lake Superior. Lake Superior is the largest freshwater body in the world. The combination of ecosystems within the Lower St. Louis River area—estuarine wetland and aquatic habitats, baymouth bar complex, and surrounding upland forest—are very unusual in Lake Superior, the Upper Midwest, the Great Lakes region, and the world. Great Lakes wetland systems are unique from a global perspective, and the St. Louis River wetlands are the largest such complex on the Lake Superior shore, representing a significant source of productivity for the entire Lake Superior ecosystem. The estuary and its tributaries are unusual in having such a variety of habitat types supporting a large and diverse assemblage of native fish species.

Alternatives

The DNR has worked with Enbridge to evaluate a large number of alternatives for all four related projects. As a result of these efforts, impacts to wetlands, waterways, and rare species have been reduced. Enbridge has agreed to narrow their workspace and avoid sensitive areas. Enbridge has also agreed to minimize impacts by horizontal directional drilling through much of the sensitive Pokegama Carnegie wetland complex, which is a designated area of special natural resource interest, and contains a state natural area.

Environmental Effects

The proposed pipelines would require 17 water body crossings, including 10 tributaries to the Pokegama River, three un-named waterways, two tributaries to the Little Pokegama River, one crossing of the Pokegama River, and one crossing of an un-named tributary to the Nemadji River.

The proposed pipelines would temporarily impact approximately 75 acres of wetland. The pump station and breakout tanks at the Superior Terminal would fill approximately 12 acres of wetland, and temporarily impact approximately 3 acres of wetland.

Air emissions directly associated with the proposed pipeline project at the Enbridge terminal in Superior are from the proposed construction and operation of five new external floating roof tanks having capacities of 8.7 million gallons each, and from associated fugitive emissions from pumping and piping on site. The estimated potential emissions from the tanks and associated fugitive sources are 39 tons per year of Volatile Organic Compounds (VOCs). The project will also increase the facility emissions of hazardous air pollutants from crude oil (e.g. benzene, n-hexane).

Other than inspections from vehicles and routine removal of brush and trees, there should be little disturbance of the corridor, and associated long term effects due to operating and maintaining the pipelines. Catastrophic effects due to pipeline failures during operations and maintenance are possible, but unlikely. Depending on the quantity of crude oil or diluent spilled into surface waters, and the speed of detecting and responding to the spill, effects could be minor or significant. Groundwater could also be at risk from spills of crude oil and/or diluent resulting from pipeline leaks during operations. Enbridge must design and test its pipeline to meet strict federal specifications. The Company has state of the art safety, inspection, and leak detection systems in place that exceed federal standards, and that minimize the chance of a spill and enhance its ability to locate spills quickly. Further, spills are very rare and Enbridge has comprehensive emergency response procedures in place to rapidly respond to and clean-up spills in accordance with strict environmental regulations.

I. Project purpose and need

I.A. System

The overall purpose of the Alberta Clipper project, according to Enbridge, is to transport additional crude oil into the United States and eastern Canada from existing Enbridge facilities in western Canada to meet the demands of refineries and markets in those areas. Enbridge has proposed the Project to: (1) meet the increased demand for Canadian supplies of crude oil by refiners in the United States and offset the decreasing domestic crude oil supply from some regions of the U.S. traditionally serving Midwestern U.S. refineries; (2) reduce U.S. dependence on foreign oil from outside of North America through increased access to Canadian crude oil supplies; and (3) meet demonstrated shipper interest in an overall Enbridge system expansion.

To meet Enbridge's anticipated demand, the proposed Alberta Clipper Project would provide approximately 450,000 bpd of crude oil capacity. The capacity provided by the project pipeline would provide independent utility to Enbridge and its customers, who would use the pipeline for the transportation of crude oil to the existing Enbridge terminal in Superior, Wisconsin where the crude oil can be subsequently delivered to refineries throughout the Midwestern U.S. and eastern Canada as well as to other regions in the United States through interconnected existing pipeline systems.

Table 1 lists the historical number and capacity of refineries in the Midwest States of: Illinois, Indiana, Kansas, Kentucky, Michigan, Minnesota, North Dakota, Ohio, Oklahoma, Tennessee, and Wisconsin.

Table 1 - Midwest Refinery Numbers and Capacity

Year	# of Refineries	Capacity Barrels/day
2002	27	3,590,623
2004	26	3,525,610
2006	26	3,582,640
2007	26	3,587,220

U.S. Crude Oil Market Demand

Over the last twelve months, there has been a significant short term economic downturn in the U.S. and international economy. Coupled with public and Congressional concerns over the need to control energy-related greenhouse gas emissions the U.S. Energy Information Administration (EIA) has updated its short term outlook.

On December 17, 2008, the EIA released the reference case for its *Annual Energy Outlook 2009* (AEO2009, available at http://www.eia.doe.gov/oiaf/aeo/overview.html) report, with the full AEO2009 report containing projections with differing assumptions on various key market variables to be released in early 2009. The AEO2009 report reflects the EIA's current thinking about a wide range of trends and issues that can influence the energy markets, including the future price for oil, renewable energy usage, and market behavior concerning greenhouse gas emissions. Notably, the EIA's forecast reflects tighter constraints on access to low-cost oil

supplies and higher capital costs for energy-related projects, which results in a light crude oil price forecast that exceeds $100/bbl by 2014, and $130/bbl by 2030 (all expressed in 2007 dollars). The forecast also incorporates rapid growth in renewable sources of liquid fuels and a sharp increase in the sale of higher-efficiency vehicle technologies such as hybrid and diesel, and a significant decrease in sales of sport/utility vehicles (SUVs).

The AEO2009 assessed how energy behavior in investment or conservation is affected by concerns over greenhouse gas (GHG) emissions and noted that energy companies currently are operating in an uncertain environment with respect to the potential impact of concerns surrounding energy-related GHG emissions. Even without the enactment of United States federal laws and policies limiting GHG emissions, regulators and the investment community are beginning to push energy companies to shift their investments towards less GHG intensive technologies. The AEO2009 includes an assessment on the extent existing energy asset companies are considering GHG emissions in their investment evaluation process by implicitly (or explicitly) adding a cost to some plants, particularly those that involve GHG-intensive technologies.

To reflect the extent to which energy asset companies are considering or implementing GHG emission reduction technology in the design of new assets, the AEO2009 reference case adds a 3-percentage point increase in the cost of capital when evaluating investments in GHG-intensive technologies. In previous AEOs the reference cases did not incorporate such an adjustment. To facilitate comparisons with previous AEOs, and to provide a measure of the impact of the change in methodology, the complete AEO2009 will also include an alternative case that does not incorporate the new financing adjustment factor for long-lived investments in GHG-intensive technologies. The complete AEO2009 is not yet available that includes this assessment.

Nonetheless, demand for crude oil is projected to remain comparatively constant over the forecast period, which highlights the continuing need for petroleum in the U.S. economy.

Canada historically has been one of the largest suppliers of crude oil to the United States due to its reliability and proximity to U.S. markets. Moreover, according to Enbridge, much of U.S. crude oil demand is for heavy crude oil, and U.S. refiners are increasingly looking to Canada to supplement their existing supply of heavy crude oil. Regarding heavy crude supply from Canada, the EIA projects that unconventional oil supply from Canada, which is predominately heavy crude reserves in western Canada, will grow from approximately 1.5 million bpd in 2008 to over 4.3 million bpd by 2030. In addition, many U.S. refineries have been or are in the process of being retrofitted to accommodate heavy crude to improve their competitive economics versus foreign suppliers of petroleum products.

The crude oil that the Alberta Clipper Project would deliver to U.S. refiners would supplement their existing supply of crude oil, particularly for the heavier crude oil grades that many U.S. refiners have upgraded their refineries to process.

World Oil Supply

Enbridge claims that once the current recession has passed, global oil production capacity and consumption is expected to return to a tightly balanced situation. Capital spending on production projects by the world's leading oil and gas companies increased from 2000 through 2005, and according to publicly available company plans, will rise further through 2010. However, when adjusted for inflation, investment in 2005 was only 5 percent above that in 2000, and the planned upstream investment through 2010 is expected to result in only a slight increase in the global capacity of crude oil production. The attempts to increase capacity could be negatively affected by shortages of skilled personnel and equipment, regulatory delays, cost inflation, and higher decline rates at existing fields (International Energy Agency 2006). Investment issues are of particular concern in Mexico (the second largest supplier of crude oil to the United States in 2007), where capital expenditures by its national oil company are insufficient to offset declines in oil field output (projected to decline 12 percent per year by industry analysts). by 1 million bpd between now and 2030). In late 2008 and early 2009, the events in the North American economy have further reduced capital expenditures in the energy sector, which will act to further acerbate the oil supply shortfall when demand recovers to renewed growth in economic activity. Despite the current financial crisis and low commodity prices, however, large cap energy companies like Exxon, BP and Total have indicated their will to continue their growth in Canadian oil sands, according to Enbridge.

The International Energy Agency (IEA) also provides a comprehensive outlook on long-term energy demand and supply to 2030, by fuel type and by region. The projections are derived from a large-scale mathematical model that is designed to replicate the function of the energy markets on either an individual country or a regional basis. The IEA's most recent projection of energy demand and supply is provided in the *World Energy Outlook 2008*.

In its outlook, the IEA provides a Reference Scenario that embodies the effects of the government policies and measures that were enacted or adopted by mid-2008, although many may not yet have been fully implemented. Possible, potential, or likely future policy actions are not taken into account. Notably, for the Reference Scenario, the IEA is assuming that the crude oil price will average US$100 per barrel in real terms over the period 2008 to 2015, and then rise in a generally linear manner to over US$120 per barrel in 2030. Moreover, the IEA is further assuming that most of the countries that currently provide some level of oil consumption subsidies gradually phase out these subsidies. Accordingly, the Reference Scenario envisions, from a historical perspective, a high oil-price future environment in which most consumers are fully exposed to the full international cost of oil.

The Reference Scenario oil demand through 2030, reflects a world-wide oil demand growth rate of about 1 percent per year. India and China are projected to have the highest oil demand growth rates at about 3.9 and 3.5 percent per year, respectively. These growth rates are significantly lower than their recent historical growth trends. China, India, and Other Asia are projected to comprise about 65 percent of the global demand growth for oil through 2030, and will increasingly compete with the U.S. for waterborne crude oil supplies around the world. According to Enbridge, a high-capacity pipeline connection to the reliable Canadian crude oil supply reduces the degree to which U.S. refiners must compete for waterborne supply in the global markets, and provides meaningful security-of-supply benefits.

In addition, several of the top suppliers of crude oil to the United States are experiencing political instability and other problems that threaten oil production and export from those countries. For example, Nigerian oil exports have been interrupted intermittently in recent years; on occasion, as much as 70 percent of the country's output of crude has been shut down due to militant attacks on oil production infrastructure. Venezuela's production has continually declined since 1998, and President Chavez has repeatedly threatened to divert Venezuela's exports to markets other than the United States. Security concerns, political instability, and political conditions and attacks by insurgents on oil infrastructure in Iraq have largely kept output at or below pre-war levels; armed conflicts in Algeria have affected oil output; and political instability in Ecuador threatens oil production and export.

It is possible, even likely, that future climate policy changes will act to reduce the need for crude oil. The oil market implications of this possibility have been explicitly quantified by the IEA in its *World Energy Outlook 2008*. Two climate policy scenarios are provided: the 450 Policy Scenario, which stabilizes greenhouse gases at 450 ppm CO_2-equivlent; and the 550 Policy Scenario, leading to stabilization at 550 ppm CO_2-equivlent. Under both climate policy scenarios, global oil demand continues to rise, albeit at lower growth rates than that projected under the Reference Scenario. Consequently, should meaningful climate change policies be implemented, it can be expected that oil demand will continue to increase and that global competition for supply will increase. Accordingly, the Alberta Clipper project will continue to provide the U.S. with access to the sizable oil supply resources of Western Canada that will be increasingly required to satisfy global demand.

Western Canadian Sedimentary Basin Crude Oil Supply

According to the Oil and Gas Journal (Stowers 2006), Canada has 180 billion barrels of proven oil reserves, with 174 billion barrels of those reserves in oil sands located in the Western Canadian Sedimentary Basin. The Energy Resources Conservation Board (ERCB 2008) also estimates that 174 billion barrels of proven reserves are recoverable from Canada's oil sands. The province of Alberta is now widely accepted as having the second largest recoverable reserves in the world, exceeded only by those in Saudi Arabia.

Total production of crude bitumen and synthetic crude oil from the oil sands increased to 1.9 million bpd in 2007 (ERCB 2008). The latest report on the oil sands from the Canadian National Energy Board (CNEB 2006) reported that, as of mid-2006, the number of major mining, upgrading, and thermal in-situ production projects grew to include over 46 existing and proposed projects, encompassing 135 individual project expansion phases in various stages of execution. The Board's projected base scenario, in which most but not all announced projects were assumed to go forward, anticipated that production capacity would increase each year to eventually reach about 3 million bpd by 2015. No more recent information is available from the CNEB that would reflect the late 2008 slow down on new major production projects, however, the slow down in major new oil sands projects is more likely to delay future pipeline expansions out of Western Canada as current large scale projects are already in place and driving near term growth in supply and current projects, such as Alberta Clipper.

Crude oil production from the entire Western Canadian Sedimentary Basin, including conventional production and nonconventional production was about 2.4 million bpd in 2007 (CAPP 2008). The Canadian National Energy Board (2006) reported that it expects conventional crude oil production in the basin to decline; but because of rapidly growing unconventional production, it expects that total production in the basin will rise to 3.9 million bpd by 2015. Similarly, as previously noted, the EIA's most recent forecast projects that unconventional oil supply from Canada will become an increasingly important source of global crude supply over time.

Recently, the new Obama Administration and Canadian federal government have been pressured to either put a moratorium on crude oil production in Alberta oil sands and/or accelerate the implement of additional environmental mandates on production methodologies required in that region. While the environmental oversight and Canadian policy or legislation overseeing oil sands production infrastructure investment and practices is a Canadian sovereign matter outside the scope of the EIS, the efforts to reduce GHG emissions while still achieving energy security and affects on U.S. refinery demand were considered by Enbridge in reviewing the purpose and need for the Alberta Clipper project. Noting the recent comments made by President Obama following the February 2009 diplomatic trip to Canada, it is clear that the President and Prime Minister Harper agreed that environmental protection and the development of clean energy are inextricably linked and announced plans to work together to build a new energy economy as a key element of broader economic recovery and reinvestment efforts. (*White House Press Release 2/19/09*). The two leaders did not announce measures that would restrict investments in oil sands production projects that would affect the most current AEO2009 demand and supply analysis. The two leaders established a senior-level U.S.-Canada "Clean Energy Dialogue" that will cooperate on several critical energy science and technology issues.

These efforts are not expected to reduce or directly affect the demand for the added crude oil pipeline capacity on the Enbridge system afforded by the Alberta Clipper expansion project.

Table 2 lists the historical production of the oil sands.

Table 2 - Oil Sands Production

Year	# of producers	Barrels per day capacity
1960s	2	582,000
1970s	4	1,166,400
1980s	7	1,338,400
1990s	7	1,338,400
2005	19	1,851,400
2009	54	3,356,580
2010*	68	4,225,080

Pipeline Capacity from Western Canadian Sedimentary Basin

Nearly all crude oil imported from Canada in 2008 came from the Western Canadian Sedimentary Basin (CNEB 2008), and most of that was transported through three major

pipeline systems: Enbridge, Kinder Morgan Express, and Kinder Morgan TransMountain. These three pipelines have a maximum transport capacity of about 2.4 million bpd of crude oil, with about 1.9 million bpd transported from the basin to several U.S. markets, including the Midwest (CAPP 2008). However, the majority of that volume continues to be sold into U.S. Petroleum Administration for Defense District II (PADD II – the U.S. Midwest), where a significant proportion of U.S. refining capacity is located. In recent years, the amount forwarded on to refiners in PADD III (the U.S. Gulf Coast) increased to meet refinery needs as capacity grew and to slightly offset volumes sourced from offshore production or waterborne imports. These two districts are directly and indirectly served by the Enbridge system and Kinder Morgan Express, which together have a crude oil capacity—including both heavy and light crudes—of 2.0 million bpd (CAPP 2008).

Almost all of the expected increases in basin production will come from Alberta, with a combination of light and heavy crudes available for shipment for the U.S. For the two pipelines that serve PADDs II and III (Enbridge and Kinder Morgan Express), the total capacity of only heavy crude oil is about 1.3 million bpd (CAPP 2007). In 2006, approximately 1.1 million bpd of heavy crude was exported from the basin to the United States through these two pipelines (CAPP 2007).

CAPP (2007) reported that both pipelines had been subject to short-term capacity limitations either directly or indirectly due to downstream bottlenecks. Even with modifications to existing systems and de-bottlenecking efforts that are underway by Enbridge, it is likely that crude oil exports from the basin to the United States will exceed available pipeline capacity in 2009, necessitating construction of a new pipeline to facilitate continued importation of crude oil (CNEB 2006).

With the Canadian National Energy Board's 2006 projections of an additional 1.5 million bpd of production from the basin by 2015 (CNEB 2006) or assuming the most recent EIA forecasts of supply growing to 4.3 million bpd by 2030 (AEO 2009), and assuming that Canada continues to export incremental volumes beyond the current 70 percent-level of its production to the United States, an additional 1.1 million bpd of heavy crude oil will be flowing from the basin to the United States by 2015 with added pipeline capacity required over the long term. This is approximately consistent with the CAPP (2007) projection of a pipeline capacity shortfall of 1.9 million bpd by 2015.

A portion of that capacity shortfall will be met by the 450,000 bpd capacity of the Keystone Pipeline Project that is currently being constructed by TransCanada, although the refinery market served by the Keystone Project is different that the markets interconnected to the Alberta Clipper project. An additional portion of the capacity shortfall could be met by the Alberta Clipper Project's proposed pipeline capacity of 450,000 bpd. The remaining shortfall of from 200,000 to 1 million bpd would necessitate additional pipeline construction and/or expansion.

Proposed system in Wisconsin

The Wisconsin portion of the proposed projects consists of two new pipelines approximately 13-miles-long that would be constructed adjacent and parallel to Enbridge's existing pipeline system between the Minnesota border and Enbridge's Superior Terminal, a new pumping station at the Superior Terminal for one of the proposed pipelines, and five new breakout tanks at the Terminal. The proposed Alberta Clipper pipeline and breakout tanks would move crude oil mixed with diluent from Canada to the U.S. Midwest, while the proposed Southern Lights pipeline and pumping station would move diluent back to Canada for reuse.

Enbridge has stated that these two pipelines would expand their pipeline system to satisfy rising demand for crude petroleum at a time when production of U.S. domestic crude oil is declining and demand is rising. It would provide increased access to Canada's oil reserves, which are second only to the oil reserves of Saudi Arabia. Canada is now the top supplier of crude oil imports into the United States. The increase in transportation capacity would help provide a more secure, economical, and reliable supply of North American crude petroleum to the refineries supplying gasoline, jet fuel, diesel fuel and other petroleum products to businesses and consumers in Wisconsin, other Great Lakes states, and beyond.

The proposed breakout tank expansion at the Superior Terminal would accommodate the temporary breakout storage of incremental volumes of crude oil that would arrive at the terminal via the proposed Alberta Clipper pipeline. Breakout tanks are used to relieve surges in the pipeline system and/or to receive and store crude oil for re-injection and continued transportation by pipeline. As a common carrier pipeline Enbridge transports various grades of crude for shippers. These crudes have varying densities and vapor pressures and the crude must be segregated so that the quality of the crude delivered to downstream refineries meets the appropriate specifications. In addition, it is important to maintain a relatively consistent pressure in the pipeline for efficient operations. Due to differences in flow rates between the inbound and outbound mainline pipelines and the necessity to segregate different types of crude oil, all crude oil is placed into tankage at the Superior Terminal prior to being redirected to its downstream target destination. This ability to temporary place crude in tankage directly affects the proposed capacity of the Alberta Clipper pipeline and the existing Enbridge pipelines. The 'bottleneck' within any pipeline system is typically at terminals where product must be removed from pipelines, temporarily stored in breakout tanks and then re-injected for further shipment downstream. The Superior Terminal expansion is designed to prevent this bottleneck, and, thus allow the increased capacity from the Alberta Clipper pipeline to reach downstream users.

To meet the primary purpose and objective of the project, the proposed breakout tanks project site is located within the Superior Terminal east of and adjacent to existing Tanks 32 and 33 and north of and adjacent to Tank 35.

I.B. Alberta Clipper pipeline

The Alberta Clipper Pipeline would transport additional crude oil supplies from existing Enbridge facilities in western Canada into the U.S. and eastern Canada to meet the claimed growing demand of refineries and markets in those areas. The Alberta Clipper Pipeline would provide up to 450,000 bpd of new crude oil capacity between the oil sands region in Alberta and an existing Enbridge terminal facility in Superior, Wisconsin.

Enbridge's stated need for the project includes several factors:

1. Increasing crude oil demand in the United States and decreasing domestic crude oil supply;

2. Reducing U.S. dependence on oil from overseas through increased access to stable, secure Canadian crude oil supplies; and

3. Demonstrated shipper interest in an overall Enbridge system expansion.

I.C. Southern Lights pipeline

The Southern Lights Diluent Pipeline would deliver light petroleum liquids, referred to as “diluents”, from U.S. refineries to the Alberta oil sand producers. Crude oil produced in western Canada typically is too viscous to ship through a pipeline. Diluents are blended with the heavy crude oil to reduce viscosity thereby enabling transportation through a pipeline. The Southern Lights Diluent Pipeline would provide up to 180,000 bpd of capacity for shipping diluent to producers in western Canada.

Enbridge claims the need for the Southern Lights Diluent Pipeline Project is dictated by a number of factors including:

- Establishing a diluent supply capacity on the Enbridge pipeline system;

- Enabling recycling of diluent between refineries in the U.S. Midwest and the crude oil production center in western Canada;

- Opportunity to reduce U.S. dependence on foreign off-shore oil through increased access to stable, secure Canadian crude oil supplies; and

- Demonstrated shipper interest in establishing a diluent pipeline from the U.S. Midwest to western Canada.

I.D. Superior Terminal pumping station

The proposed pump station is needed in order to increase the pipeline pressure in the proposed Southern Lights diluent pipeline from Superior, Wisconsin to Clearbrook, Minnesota, which is the next pump station location downstream of Superior. In addition, the switchgear building

within pump station area would provide electrical support for the incoming Albert Clipper (Line 67) and outbound Southern Lights Diluent (Line 13) pipelines.

I.E. Superior Terminal breakout tanks

The proposed breakout tank expansion at the Superior Terminal is intended to accommodate the temporary breakout storage of incremental volumes of crude oil that would arrive at the terminal via the proposed Alberta Clipper pipeline. Breakout tanks are used to relieve surges in the pipeline system, provide operational flexibility, allow for segregation of different crude types, and/or to receive and store crude oil for re-injection and continued transportation by pipeline.

Enbridge is proposing to construct five breakout tanks (Tanks 36, 37, 38, 39, and 40) within the existing Superior Terminal to accommodate incremental volumes of crude oil being transported by the proposed Alberta Clipper pipeline. In addition to the five new tanks, the Alberta Clipper Pipeline will deliver crude oil to existing breakout tanks. Transport of oil will be from suppliers in Hardisty, Alberta to the Superior, Wisconsin Terminal for distribution to U.S. Midwest markets.

As a common carrier pipeline Enbridge transports various grades of crude for shippers. According to Enbridge, these crudes have varying densities and vapor pressures and the crude must be segregated so that the quality of the crude delivered to downstream refineries meets the appropriate specifications. In addition, as explained below in more detail, it is important to maintain a relatively consistent pressure in the pipeline for efficient operations. Due to differences in flow rates between the inbound and outbound mainline pipelines and the necessity to segregate different types of crude oil. All crude oil is placed into tankage at the Superior Terminal prior to being redirected to its downstream target destination. This ability to temporary place crude in tankage directly affects the proposed capacity of the Alberta Clipper pipeline and the existing Enbridge pipelines. The bottleneck within any pipeline system is typically at terminal where product must be removed from pipelines, temporarily stored in breakout tanks and then re-injected for further shipment downstream. The Superior Terminal expansion is designed to prevent this bottleneck, and, thus allow the increased capacity from the Alberta Clipper pipeline to reach downstream users.

The five tanks are being proposed as an extension of the existing breakout system at Superior. Batches of crude oil, which are typically 60,000 barrels in volume, are segregated into tanks at the Superior Terminal based on physical characteristics such as density and vapor pressure to minimize quality degradation due to mixing. In accordance with industry practice, Enbridge has determined that a two-day storage volume must be secured for all products moving through the terminal in order to maintain pipeline system operational flexibility. Therefore, to support the expected volume of crude oil transported by the Alberta Clipper pipeline, at least 900,000 barrels of breakout tank capacity is required.

Breakout Storage of Incremental Volumes of Crude Oil

The nominal or shell capacity of each tank will be 250,000 barrels, but the external floating roof, which is required to control emissions, reduces the working capacity of the tanks to approximately 206,000 barrels.

Once in service, the proposed Alberta Clipper pipeline would provide an additional 450,000 barrels per day of crude oil. The five new approximately 206,000 barrel working capacity tanks would provide two days of storage volume, which is a standard industry practice, for the anticipated 450,000 barrels of crude oil to be transported by the Alberta Clipper pipeline. Since Enbridge is a common carrier of crude oil, the proposed tanks would be considered an extension of the existing system as they would not be dedicated specifically to oil transported by the Alberta Clipper pipeline but would have the ability to receive crude oil from other inbound pipelines. Therefore, since the total inbound crude oil volume into the terminal is increasing and the outbound is not, additional storage tanks are required. This is thus considered a "full breakout tank facility" and it is not feasible from a hydraulic design or safe pipeline pressure operation to bypass the tanks at Superior to deliver directly into outgoing pipelines to the east or south of Superior.

The only exception to the full breakout tank requirement would be the Southern Lights 20-inch diluent pipeline. When all segments are completed, the Southern Lights Diluent (to be designated "Line 13") pipeline would only flow through a pump station at the Superior Terminal. Diluent would not be stored in the Superior terminal facility's tanks.

Breakout tanks are used to receive and store crude oil from the incoming pipelines prior to flow volume metering and reinjection back into the pipeline system for continued transportation. Because the incoming pipeline diameters, operating pressures, and service do not match the outbound pipelines, each crude oil batch that enters the Superior Terminal is landed into a tank, reaches atmospheric pressure, and is then injected into an outbound pipeline at the pressure of the outbound pipeline. There are currently four crude oil pipelines that enter the facility and four that exit (this includes three mainline pipelines and a delivery line to the Murphy Oil refinery). The Alberta Clipper (line 67) would be the fifth pipeline entering the facility. A pipeline system configuration for the Enbridge Mainline System is attached for reference, which includes the current service and annual capacity of each pipeline. Annual Capacity is 90 percent of design capacity and is defined as the yearly average including planned maintenance and outages. Planned maintenance includes periodic shutdown of pipelines and/or tanks for inspections or repair, either required by Enbridge written operating and maintenance procedures; industry code and/or under federal pipeline and tank safety regulations.

Operational Flexibility

The Superior Terminal currently has approximately 312,202,524 gallons or 7,433,393 barrels of working capacity, which provides two days of storage volume for all incoming crude oil with an additional buffer to accommodate tank maintenance and downstream activities, such as a refinery shut-down, downstream power outages that shut down pumping stations, or maintenance of a downstream pipeline, without affecting overall pipeline capacity. All tanks at the facility are required to be removed from service and inspected in accordance with the American Petroleum Institute (API) Standard 653 - Tank Inspection, Repair, Alteration, and Reconstruction. As a result, in any given year, one or more tanks are out of service for several months to be cleaned, inspected and, if necessary, repairs or upgrades completed.

If a refinery is shut-down for maintenance or an emergency or downstream power outages prevent pipeline or interconnecting deliveries, additional storage volumes are required at upstream breakout facilities, such as the Superior Terminal, to avoid shutting off incoming deliveries from production facilities and/or putting the pipelines into apportionment. In the event capacity in the pipeline is restricted as a result of maintenance or emergencies, Enbridge is required under the common-carrier by pipeline laws and regulations and in compliance with our Federal Energy Regulatory Commission (FERC) approved tariffs to apportion among all shippers in proportion to the volumes nominated by each for such month, based on the capacity of each separate pipeline. Therefore, under the FERC tariff apportionment requirements, should downstream refinery shutdowns, downstream receiving facility outages or power outages that cause downstream pipelines to shutdown, the Superior Terminal breakout facility provides a necessary degree of operational flexibility to minimize the need (or duration of) pipeline system apportionment where Enbridge would be unable to transport all of the crude oil requested by shippers.

While the Superior Terminal cannot be designed to avoid any and all impacts of downstream disruptions, the need for the five additional tanks included in the Alberta Clipper project would be considered to provide the reasonable operational flexibility to avoid the consequences of such apportionment.

Segregation of Different Crude Types

Enbridge is a common carrier of various grades of crude for shippers. Enbridge must adhere to conditions-of-service included in our tariffs, which are approved by the FERC. The tariffs require adherence to our current batching of various grades of crude oil from receipt point to ultimate delivery at the refinery. Enbridge operates its pipeline system, which includes breakout storage tanks, to deliver the same quantity and quality of crude oil that it receives into its system and is required to meet strict industry standards for product quality in accordance with its tariffs and incentive tolling agreements with shippers. Incentive tolling agreements, which are then adopted and approved by FERC, are established to incentivize Enbridge to deliver commodities at the same quality that they were injected into the pipeline system. Enbridge's current Incentive Tolling Agreement can be found at: *http://www.enbridge.com/pipelines/about/incentive-tolling-agreement.php*

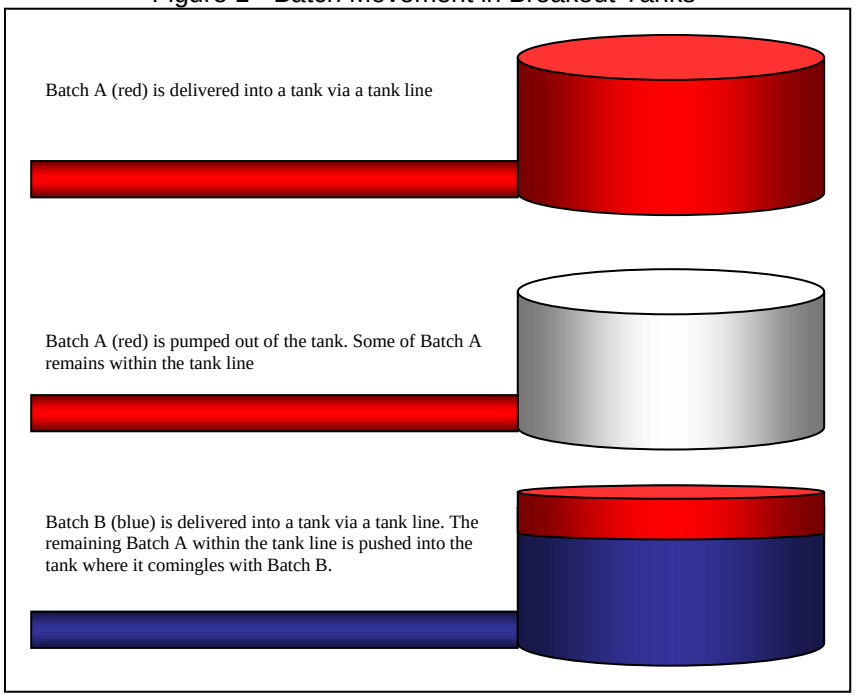
Contamination is a term used to describe the change in quality due to the comingling of crude oil types. If two different types of crude oil comingle within the pipeline system or by improper segregation in a breakout tank, the density, Reid vapor pressure, sulfur content by weight, pour point, and viscosity of each is altered. The altered, or degraded, crude oil may then not have the same refinery processing requirements or monetary value to the shipper when delivered to the refinery. Therefore, each existing and/or tank is dedicated to particular types of crude oil to minimize quality degradation issues. The proposed five tanks allow Enbridge to adequately segregate the additional volumes of different crude oil types and maintain quality specifications required by the shippers and Enbridge FERC Tariff Agreements.

Enbridge proposes to run five, 36 inch lines from the manifold to the tanks to operate these tanks.The proposed five tank lines allow simultaneous receipts and deliveries from multiple

incoming and outgoing pipelines (facility management/flexibility) as well as to segregate crude types in order to meet quality specifications. The current tankage at the Superior Terminal is optimized for the current batch configuration and capacity of existing incoming lines. The planned new tanks are necessary to accommodate the new batch configuration of the system and volumes resulting for the new 36-inch incoming Alberta Clipper pipeline. Each tank would have a dedicated pipeline that runs from the tank to the central manifold, which is the access point to all incoming and outbound pipelines. This would allow all five tanks to be filled or emptied independent of each other at the same time. This would provide operational efficiency as well as flexibility to the shippers as they could access any of the outbound pipelines which deliver to a variety of downstream refineries.

Common station piping can be a significant source of crude oil quality contamination. Once commissioned, piping within a facility continually contains oil. Each time a batch is transferred from the manifold into a tank, a volume of oil equal to the volume of the tank transfer pipeline remains within the pipeline. When a volume of oil from the previous batch within the transfer piping is pushed into the tank ahead of the new batch and the two mix. The result is degradation of the quality of the batch by altering the original physical and chemical properties. A schematic illustrating batch movement to and from tanks and comingling is provided in Figure 1, below. To minimize the amount of batch contamination, the amount of common transfer piping would need to be minimal (i.e. dedicated tank lines are necessary). Five dedicated breakout lines each serving one of the five proposed breakout tanks is the minimum number of lines necessary to effectively manage the incremental volume of crude oil arriving into the Superior Terminal and to minimize product contamination.

Figure 1 - Batch Movement in Breakout Tanks



All five tank lines would be necessary to provide maximum product segregation in accordance with Enbridge's tariff and incentive tolling agreement. Any reduction in the number of tank

lines would limit the efficiency of the facility by reducing the ability to fill/empty all five tanks simultaneously.

I.F. Other tank projects

Within the last year and a half, the facility has permitted and constructed one new tank (T35), and has received permit authorization to expand and refurbish two older tanks (T05 and T09). These tanks have been identified as associated with the existing pipeline operations. The existing facility outgoing capacity has also undergone an increase due to the addition of the 'Southern Access' pipeline.

Husky oil owns two of the tanks operated by Enbridge (T28, T29). Husky Oil has submitted a permit application for modifying these two tanks, and to add another new tank, T41. The application for the Husky oil tank modification / construction remains incomplete.

II. Authorities and Approvals

II.A. DNR

II.A.1. Permits and approvals

II.A.1.a. Chapter 30

Enbridge is requesting permits and approvals for the Project to include:

- Temporary Bridges (Wis. Stat.§30.123, Section 404 Clean Water Act);
- Grading, (Wis. Stat. §30.19, Section 404 Clean Water Act);
- Utility Crossing (Wis. Stat. § 30.20 and 30.12, Section 404 Clean Water Act); and
- Wetland Water Quality Certifications (Wis. Adm. Code Chapter NR 103, Section 401 Clean Water Act).

II.A.1.b. Wetland water quality certification

Temporary matting in wetlands for construction and access (Section 404 Clean Water Act)

Trench and bore pit backfill in wetlands (Section 404 Clean Water Act)

Wetland Water Quality Certifications (Wis. Adm. Code Chapter NR 103, Section 401 Clean Water Act)

II.A.1.c. Stormwater

Enbridge intends to request authorization to discharge construction stormwater under NR 151 and NR 216. A separate submittal of the Notice of Intent for stormwater coverage will be submitted to WDNR, for review.

WPDES Hydrostatic Test Water Discharge Permit.

WPDES General Permit for Pit/Trench Dewatering.

II.A.1.d. Air

A Prevention of Significant Deterioration (PSD) Construction Permit will be required for the proposed terminal projects.

The proposed emission increase is estimated to be 39.4 tons per year. Although the total emission increase for the proposed projects is below the 40 ton per year (tpy) volatile organic compounds (VOC) significant threshold as defined at 40 CFR 52.21(b) 23 and s. NR 405.02 (27)(a); the aggregated emissions from other projects recently permitted result in combined project emissions that significantly exceed the 40 tpy significance threshold. As a result

Enbridge is submitting a PSD permit application the proposed projects within the Superior Terminal.

The PSD permit is for a major modification of a PSD major source and will be subject to the application of the best available control technology (BACT) standards, and other requirements under ch. NR 405, Wis. Adm. Code. The proposed storage tanks are also subject to federal new source performance standards (NSPS, under 40 CFR Part 60, Subpart Kb, as noted under s. NR 440.285, Wis. Adm. Code). This permit application is identified as 08-DCF-313.

The projected facility potential to emit of volatile organic compounds was recently revised to 379 tons per year (prior to the additional 39.4 TPY projected for the Alberta Clipper project) when limited by restrictions in the number of turnovers and the addition of some additional equipment to the existing tanks. The PSD major source threshold is 100 TPY of any criteria pollutant as this facility is within one of the listed PSD sources (petroleum storage and transfer terminals with a total storage capacity of 300,000 barrels or more).

The facility is also considered a major source under the federal Part 70 operation permitting requirements.

II.A.1.e. Incidental take

National Heritage Inventory (NHI) review

II.A.2. WEPA

Wetland draining or filling affecting wetlands greater than five acres in size is a Type II action requiring the Environmental Assessment (EA) process under Chapter NR 150.03(8)(f)1.c, Wis. Adm. Code. Issuance of construction (air pollution control) permits for emission increases of 100 TPY or more of a criteria pollutant is also a Type II action requiring the EA process under Chapter NR 150.03(8)(b)(a). Under NR 150.20(2)(b), for Type II action proposals involving more than one Department action, a comprehensive EA, covering all Department actions is required.

In addition, DNR is required to consult with the Voight Commission regarding Tribal issues. DNR sent a letter to the Commission on February 26, 2009 regarding the proposed projects.

II.B. Other Wisconsin agencies

II.C. Local units

Douglas County Shoreland Permit

Douglas County Grading Permit

City of Superior Grading/Filling Permit

Construction across any paved roads, highways, or roadways would be subject to the requirements of the necessary state and local permits. Enbridge would obtain these permits prior to the start of construction.

II.D. US DOS

Presidential Permit

NEPA review (EIS)

II.E. US COE

Section 404 NEPA review

Section 106 Consultation

Wetland Mitigation Site Plan Approval (pipeline, tanks, pump station impacts)

II.F. Other federal

Endangered Species Act Consultation, and Migratory Bird Treaty Act Consultation - U.S. Fish and Wildlife Service

Section 106 Consultation – through the Wisconsin Historical Society

III. Proposed Project Description

III.A. System

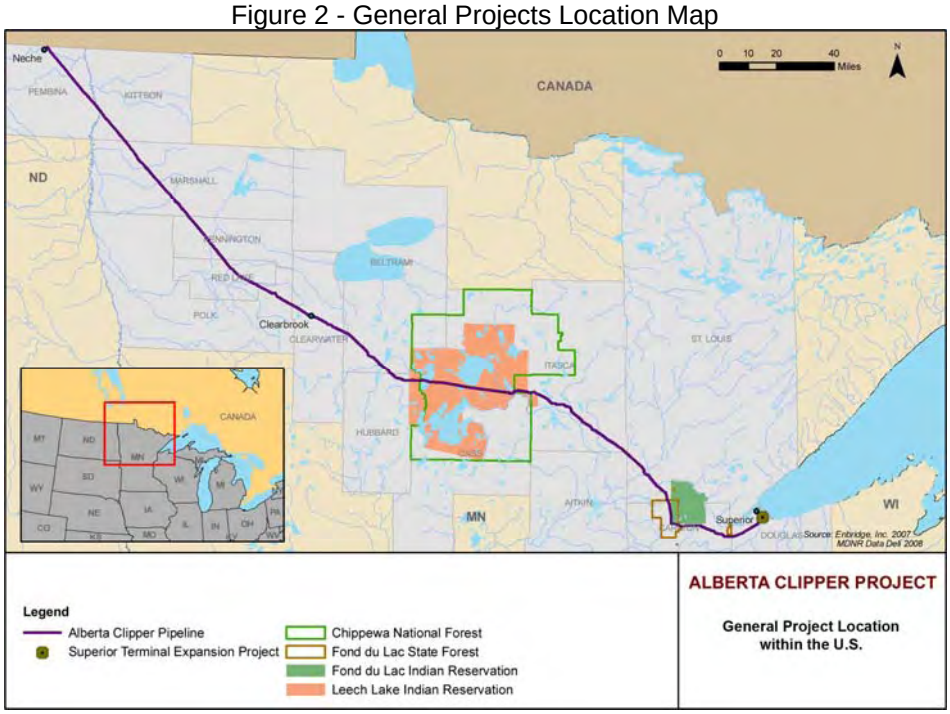
Enbridge proposes to construct, operate, and maintain a pipeline system that would transport crude oil from its existing facilities in Hardisty, Alberta, Canada to its existing terminal at Superior, Wisconsin. Enbridge also proposed to construct, operate and maintain a diluent pipeline that would move diluent from refineries in the Midwestern U.S. back to Alberta. In addition, Enbridge is proposing the Superior Terminal Expansion Project.

The Wisconsin portion of the projects consists of two new pipelines approximately 13-miles-long that would be constructed adjacent and parallel to Enbridge's existing pipeline system between the Minnesota border and Enbridge's Superior Terminal.

The proposed Alberta Clipper Project would be a new pipeline that would transport crude oil from Enbridge's existing facilities in Hardisty, Alberta, Canada to its existing terminal in Superior, Wisconsin. From there, the liquid hydrocarbons would be transported to Midwestern markets, the eastern United States and Canada, and the Midcontinent and U.S. Gulf markets. Crude oil would be transported to markets in the Midwest and beyond via Enbridge's Lakehead System, which is currently being expanded, and potentially through pipelines that may be constructed in the future. The proposed Project would be designed to transport an average crude oil volume of approximately 450,000 bpd.

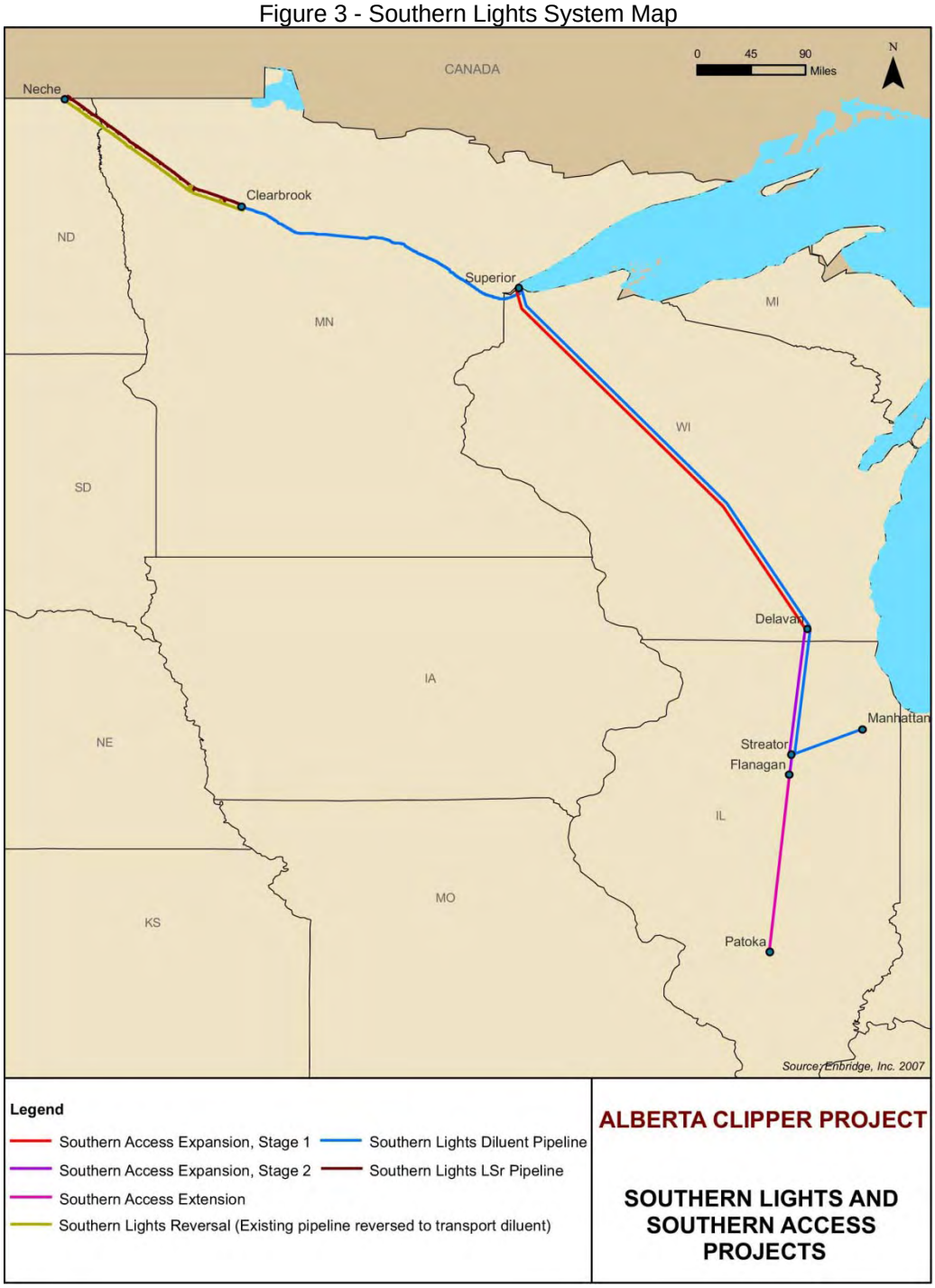
Overall, the Alberta Clipper Project would consist of a new pipeline and associated facilities in both Canada and the United States. The primary components of the U.S. portion of the Project would be the new pipeline, new mainline valves (MLV), and additional pumping capacity at three existing pump stations. The pipeline would extend approximately 331.8 miles from the U.S./Canada border near Neche, North Dakota through Minnesota and Wisconsin to the existing Enbridge terminal in Superior. A total of 32 mainline valves would be installed at key locations along the alignment. In Wisconsin mainline valves would be located at Military Road, Logan Avenue, at the Superior Terminal. Figure 2 depicts the general location of the Alberta Clipper Project within the U.S.

Figure 2 - General Projects Location Map



Enbridge has proposed three Southern Lights Projects as a part of their Expansion Program: the Southern Lights Diluent Project, the Southern Lights Reversal Project, and the Southern Lights LSr Project. These projects, which would be constructed in several stages between Manhattan, Illinois (southwest of Chicago) and several endpoints in Canada, are described below; the U.S. portions of the projects are depicted in Figure 3.

Figure 3 - Southern Lights System Map



Crude oil produced in western Canada is generally too heavy and viscous to transport via pipeline. To allow transport of heavy crude oil from Canada to the United States via pipeline, lighter hydrocarbons (diluents) need to be blended into the crude oil before introducing it into the pipeline.

Enbridge's Southern Lights Diluent Project, combined with the Southern Lights Reversal Project, is proposed to transport diluent from the United States to Canada for use in blending

with the heavy crude oil prior to transportation of the heavy crude oil by pipeline. The portion of the Diluent Project in the United States consists of approximately 674 miles of new pipeline from Manhattan, Illinois to the existing Enbridge terminal in Clearbrook, Minnesota where it would be connected to the proposed Southern Lights Reversal Project. The Diluent Project has been proposed in three stages. Stages 1 and 2, which will extend from Manhattan, Illinois to Superior, have been approved by federal, state, and local agencies and constructed, with final cleanup and restoration anticipated within 2009. Stage 3, which would extend from Superior to Clearbrook, is the subject of this review.

Stage 3 of the Diluent Project involves the proposed construction of a 188-mile-long, 20-inch-diameter pipeline from the existing Enbridge terminal in Superior to the existing Enbridge terminal in Clearbrook. This portion of the pipeline is proposed to be installed primarily within or adjacent to the existing Enbridge pipeline corridor. In Wisconsin it is proposed to be constructed adjacent to and at the same time as the Alberta Clipper pipeline.

Enbridge currently has three existing pipeline corridors within Douglas County. Each corridor is unique in its defined permanently maintained footprint. A description of each corridor is provided below:

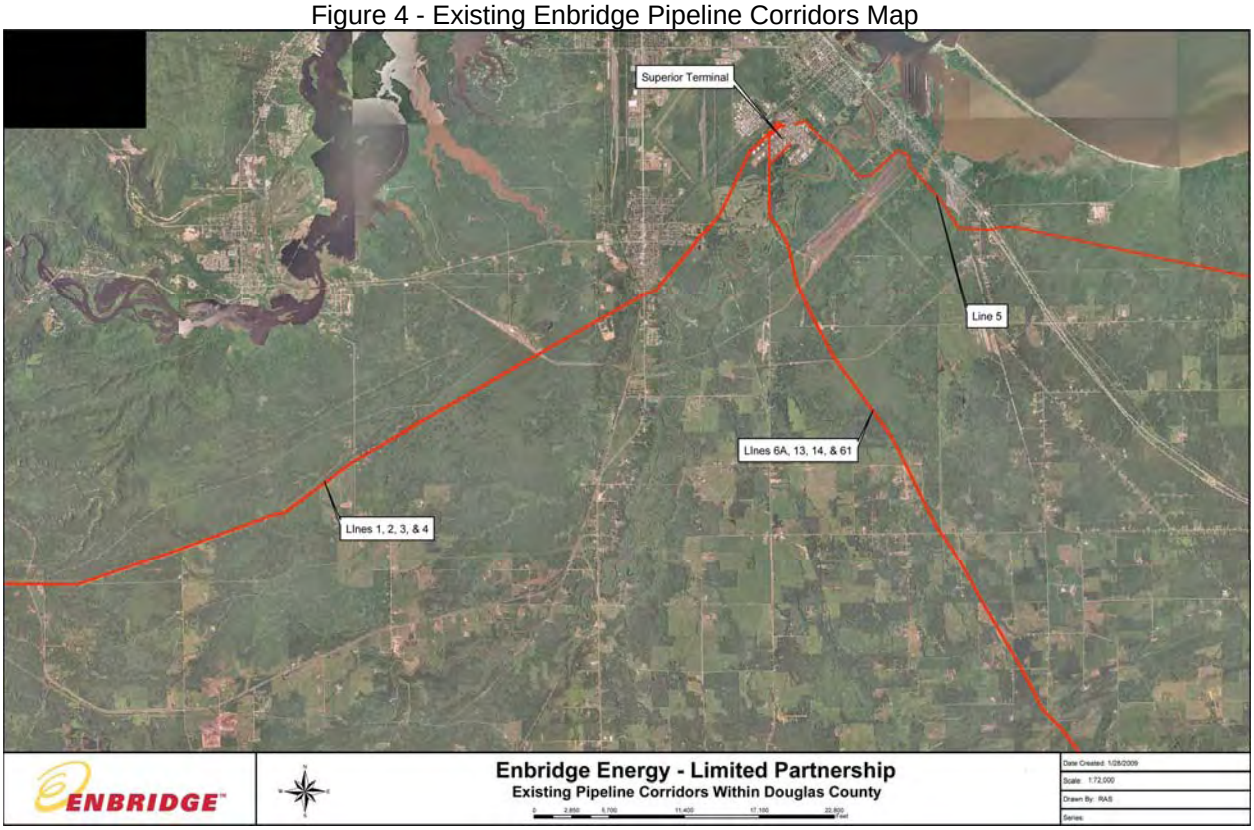
1. The corridor referred to as the “Preferred Route” has four pipelines (Lines 1, 2, 3, and 4) within a 125-foot-wide permanently maintained easement. This corridor is wide enough that an overlap of 25 to 50 feet is possible for the siting of the proposed project.

2. The next corridor to the east also has four pipelines (Lines 6A, 14, 13, and 61) but has a defined permanently maintained easement of 80 feet. Without acquisition of additional permanent easement, this corridor cannot accommodate any additional pipelines. The configuration of the existing pipelines will not allow for any overlap with the additional permanent easement.

3. The third corridor and the one furthest to the east, contains one pipeline (Line 5) and has a defined permanent easement of 60 feet (40 feet left of the centerline of the pipeline and 20 feet to the right) and could accommodate additional pipelines without acquisition of new easements. However it would not provide an interconnect with the pipeline coming from Minnesota.

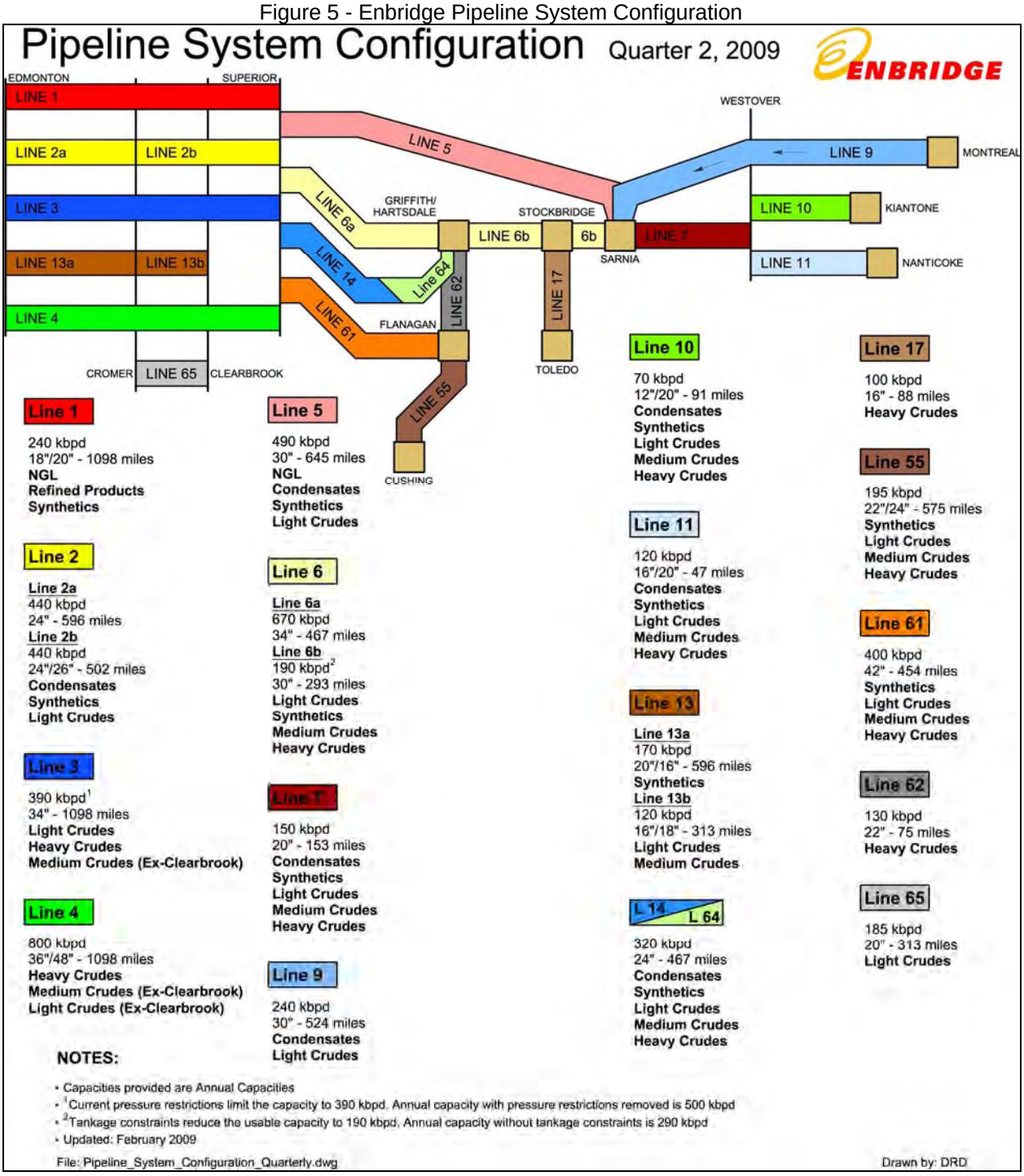
These existing Enbridge pipeline corridors are shown in Figure 4.

Figure 4 - Existing Enbridge Pipeline Corridors Map



The Enbridge pipeline system, as proposed, is diagrammed in Figure 5.

Figure 5 - Enbridge Pipeline System Configuration



The current line fill volume and annual capacity for each of the existing pipelines in Douglas County, is provided in Table 3, below. Annual Capacity is 90 percent of design capacity and is defined as the yearly average including planned maintenance and outages. The line fill information is static volume that Enbridge uses to calculate transit times for each of the pipelines listed.

Table 3 - Capacity of Existing Enbridge Pipelines

Line Number	Outer Diameter (in)	Annual Capacity (bpd)	Line Fill Volume (bbls)
1	18	240,000	2,052,519
2	26	440,000	3,257,953
3	34	390,000	6,289,592
4	36	800,000	8,758,861
5	30	490,000	2,861,280
6A	34	670,000	2,666,944
14	24	320,000	1,284,308
64	42	400,000	3,951,435

The Superior Terminal Expansion Project would consist of five new storage tanks, five new distribution pipelines, three new pumps, electrical equipment, and other associated facilities. Enbridge has proposed to install five new storage tanks at the Superior Terminal, each with a maximum capacity of approximately 250,000 barrels and a working storage capacity of approximately 206,000 barrels. The new tanks and all associated equipment and facilities are proposed be installed inside the existing property boundaries of the terminal. This permit application is identified as 08-DCF-313.

Other possible projects that have been proposed and/or have been noted as under consideration for the future are the modification of the tanks T28 and T29, and construction of a new tank T41 for Husky Oil, refurbishing and expansion of the tank T03, and construction of a number of new tanks for customers to purchase and hold crude oil for an extended time on the Superior Terminal site. The facility was recently issued a PSD air permit for refurbishing and expansion of tanks T05 and T09, and for revision of the PSD BACT for tank T35.

- Husky Energy (Husky) owns two of the existing tanks at the Superior Terminal (referred to as tanks 28 and 29) that are currently operated by Enbridge. Tanks 28 and 29 were originally constructed in 1968. Husky is proposing to modify these tanks to accommodate increased pipeline fill rates. The modifications include cleaning, inspection, changes to nozzle configuration and sizing, addition of tank venting capacity, and the addition of vacuum breaker vents. Modifications to tanks 28 and 29 are anticipated to commence in late 2009 to 2010. In addition, Husky is proposing to construct one additional external floating roof storage tank (referred to as tank 41) at the Superior Terminal adjacent to its exiting tanks on a previously constructed upland tank lot. Construction of tank 41 is anticipated to commence in late 2009 or 2010. The emission increase from these projects was below the 40 ton per year VOC significant threshold as defined in 40 CFR 52.21(b)23 and s. NR 405.02(27)(a); however, the aggregated emissions from previous projects resulted in combined emissions that exceeded the significance threshold. Therefore, a PSD permit application and BACT analysis have been submitted and are currently under review by the DNR (permit application 08-DCF-185).

- Enbridge had applied for a permit to refurbish and increase the volume of existing domed external floating roof tank 3, which was originally constructed in 1989. Refurbishing of tank 3 was originally anticipated to commence in 2009, but the application for the tank 3 portion of the project has been withdrawn. In addition, Enbridge is planning various maintenance activities of existing piping, valves, and flanges within the terminal that are scheduled to occur in 2009 and 2010. The emission increase from these projects was below the 40 ton per year VOC significant threshold as defined in 40 CFR 52.21(b)23 and s. NR 405.02(27)(a); however, the aggregated emissions from previous projects resulted in combined emissions that exceeded the significance threshold. Therefore, a PSD permit application and BACT analysis will be submitted for review and approval by the DNR. This had been assigned to permit 09-DCF-030. The remaining maintenance activities will be reviewed under this permit #, or will be incorporated into one of the other permit applications under review.

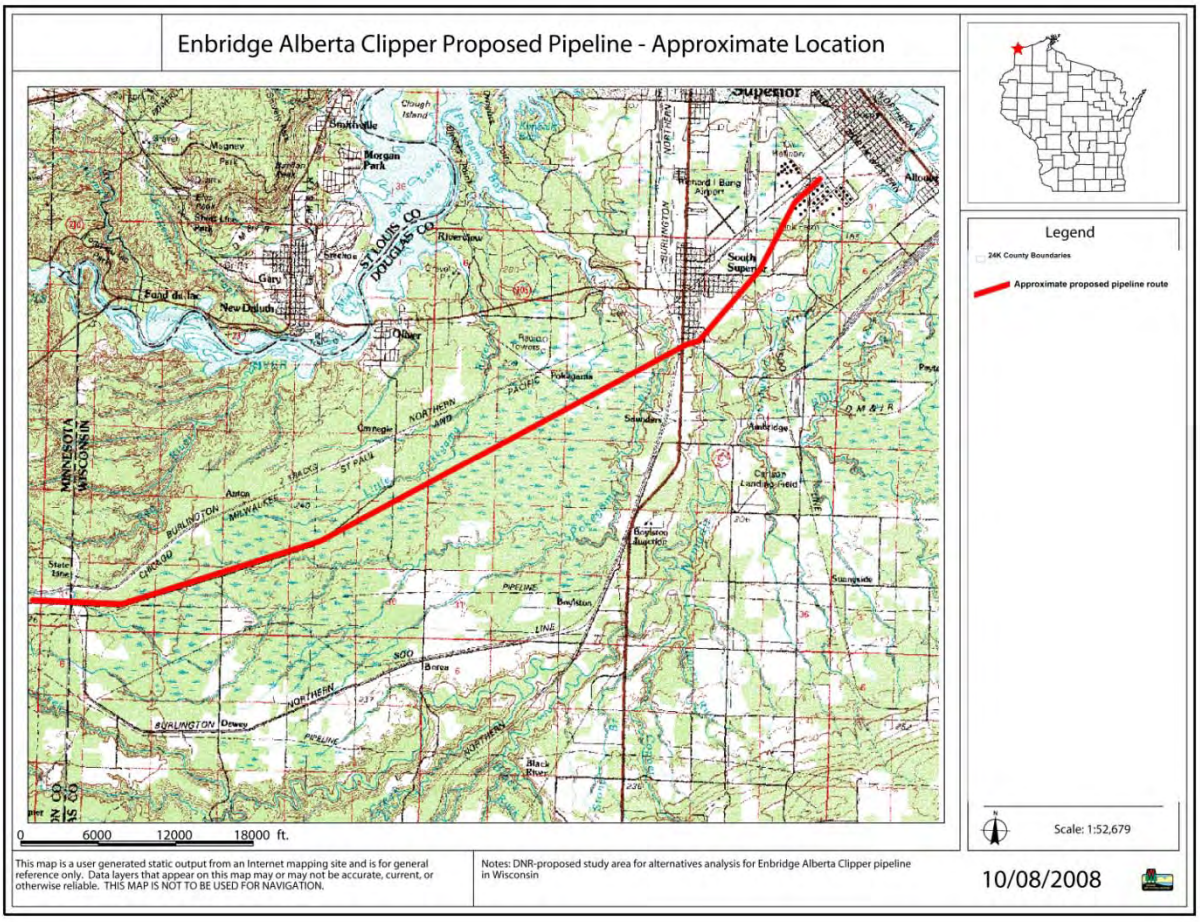
- Enbridge had been evaluating a potential project at the Superior Terminal referred to as the Superior Terminal Merchant Tankage Project, but this is no longer under consideration for the foreseeable future. The original scope of the project consisted of the construction of 10 to 17 new external floating roof tanks (up to eleven 350,000-barrel and six 250,000-barrel working capacity tanks) for upcoming refinery upgrades and oil sands development projects underway. The tanks were expected to be located on approximately 100 acres of Enbridge property west of Bardon Avenue and connected to the main terminal property by four new transfer lines. The proposed project area consists primarily of wetlands; therefore, applications for review and approval to the DNR and Army Corps of Engineers would need to be submitted if the project is returned to consideration. Furthermore, the emission increase from this project would be expected to be greater than the 40 ton per year VOC significant threshold as defined in 40 CFR 52.21(b)23 and s. NR 405.02(27)(a); therefore a PSD permit application and BACT analysis would need be submitted for review and approval by the DNR.

III.B. AC and SL pipelines

III.B.1. Route

The Alberta Clipper pipeline is intended to transport additional crude oil from existing Enbridge facilities in western Canada to refineries and markets in the United States. It is proposed to be a 36 inch diameter pipe. In Wisconsin, the pipeline would be constructed from the state line near CHT "C" to the Superior Terminal (tank farm) in the City of Superior. The proposed 13.1 mile alignment would follow an existing Enbridge pipeline route. The entire Wisconsin portion of the pipeline would be in the Nemadji-Beartrap watershed in Douglas County. Enbridge is proposing to construct the Alberta Clipper and Southern Lights Diluent Pipeline Projects within the same construction ROW. Figure 6 shows the approximate location of the proposed pipeline.

Figure 6 - Pipeline ROW Location in Wisconsin



The Wisconsin portion of the project would consist of two collocated 13-mile-long pipelines that would generally be constructed adjacent to an existing pipeline corridor. The Wisconsin segment of the Project will be constructed entirely within Douglas County, Wisconsin from the Minnesota border (latitude -92.292, longitude 46.596) to Enbridge's Superior Terminal (latitude -92.064 /longitude 46.689). The route falls within the WDNR Northern Region. Table 4 shows the locations of the project route in Wisconsin.

Table 4 - Alberta Clipper Pipeline Location

Superior Township	(T48N R14W)	Sections: 2, 9, 10, 11, 17, 16, 19, 20
	(T48N R15W)	Sections: 24, 25, 26, 27, 31, 32, 33, 34
	(T49N R14W)	Sections: 35, 36

The proposed route ("Segment 6") crosses the western border of Wisconsin about four miles south of the St. Louis River and less than one mile north of the Pokegama River at MP 1084.8 where Carlton County Road 4 turns into Douglas County Road W. The project route is located between the two rivers, roughly paralleling each and crossing a broad level plain of extensive wetlands occurring in heavy red clay soils. Nearby linear corridors include those associated

with the Burlington Northern (BN) railroad, a county highway, and other pipelines including those associated with Great Lakes Gas and Northern Natural Gas.

The proposed route continues to the north of and parallel to the existing Enbridge corridor until MP 1086.1 where it separates from the existing Enbridge corridor to avoid impacts to a tributary of the Little Pokegama River which flows through the existing corridor. The greenfield section is located immediately north of the existing Enbridge corridor and extends for 0.4 miles to rejoin the Enbridge corridor at MP 1086.5 where the tributary of the Pokegama exits the existing Enbridge corridor to the south.

The proposed route then remains collocated with and to the north of the existing Enbridge corridor to MP 1088.65 where it crosses under existing Enbridge pipelines to re-establish a collocation to the south of the existing corridor. The southern collocation is maintained to MP 1090.6 where the proposed route enters the Pokegama-Carnegie Wetland Complex (PCWC) Area of Special Natural resource Interest (ASNRI). Douglas County Road W now parallels and is to the north of the existing corridor until it turns north at MP 1090.0.

Collocation to the south of the existing corridor from MP1088.65 to MP 1090.6 serves three purposes: (1) it avoids interference with the Northern Natural Gas pipeline corridor to the immediate south of Douglas County Road W, (2) minimizes wetland impacts by proposing a greenfield route through an agricultural field located between MP 1089.35 and MP 1089.95 (WEPS 8-9), and (3) stages a southern collocation that avoids impacts to Kimmes Road, residences to the north of Kimmes Road, and the Little Pokegama River.

The existing Enbridge corridor is located to the immediate south of Kimmes Road. Collocating to the north would result in a new greenfield corridor which would impact five residences and would be much closer to the sloping breaks to the entrenched Little Pokegama River.

The pipeline crosses under the existing pipes at MP 1090.6 to collocate to the north of existing Enbridge pipelines through the PCWC ASNRI that extends from MP 1090.6 to MP 1093.9. Collocating to the north of the existing lines minimizes impacts to the PCWC as it includes a larger area of existing permanently maintained corridor.

The proposed route crosses the Pokegama River at MP 1094.45, and remains collocated to the north of the existing corridor until MP 1095.85.

The proposed route traverses through developed residential areas within the Town of South Superior between MP 1094.7 to MP 1095.3.

Enbridge is proposing to expand its existing permanent corridor to accommodate the two new pipelines and the associated offsets between pipes. The existing ROW currently contains four pipelines; Line 1, Line 2, Line 3, and Line 4 as shown in Figures 7a and 7b. All four lines transport crude oil from western Canada to the Superior Terminal. Line 1 is an 18-inch diameter crude oil pipeline installed in 1950. Line 2 is a 26-inch-diameter crude oil pipeline that was installed in 1957. Line 3 is a 34-inch-diameter crude oil pipeline that was installed in

1967. Line 4 (also referred to as “Terrace 3”) is a 36-inch-diameter crude oil pipeline that was installed in 2002.

Figure 7a - Typical ROW Configuration North of Existing Lines

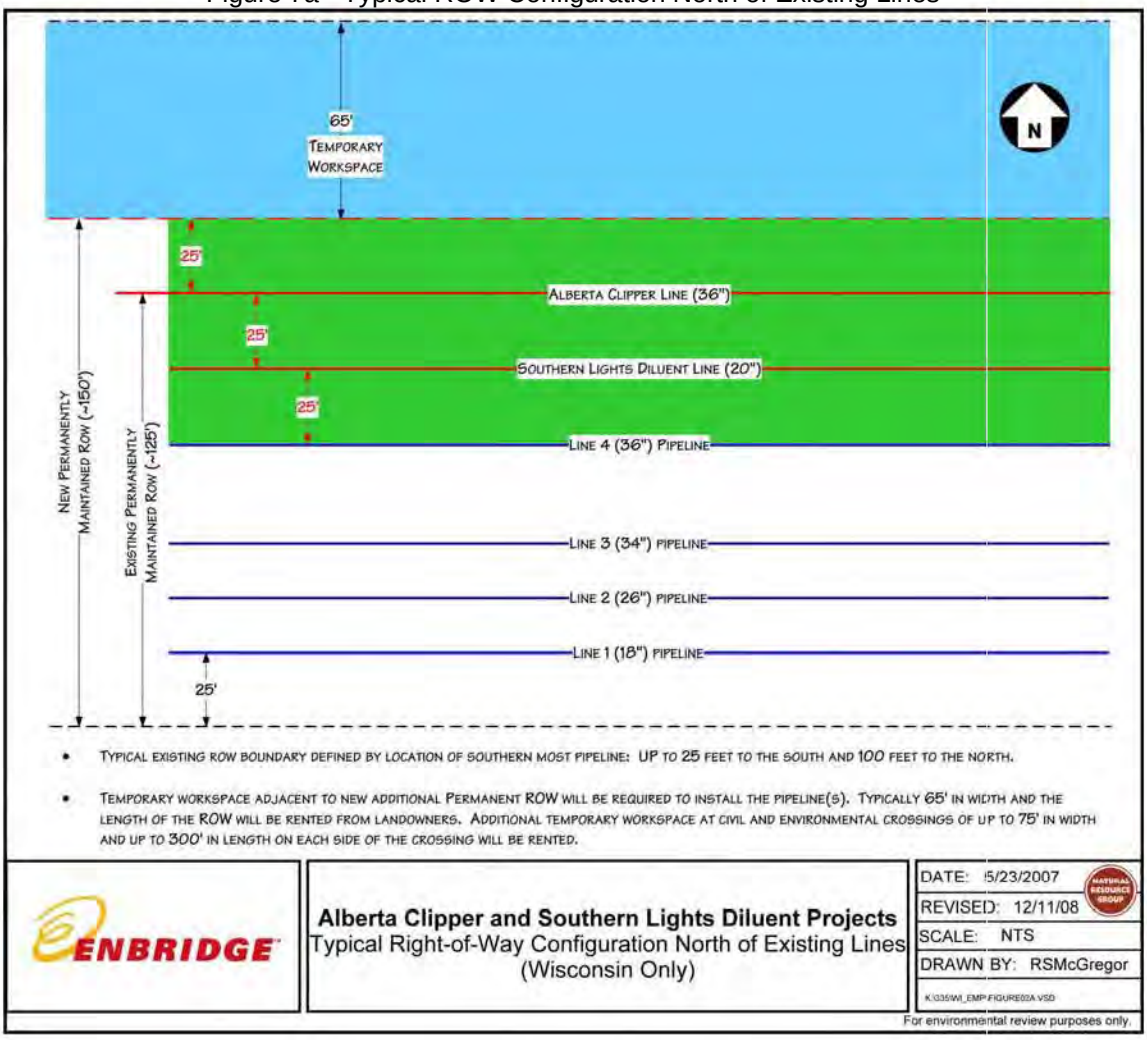
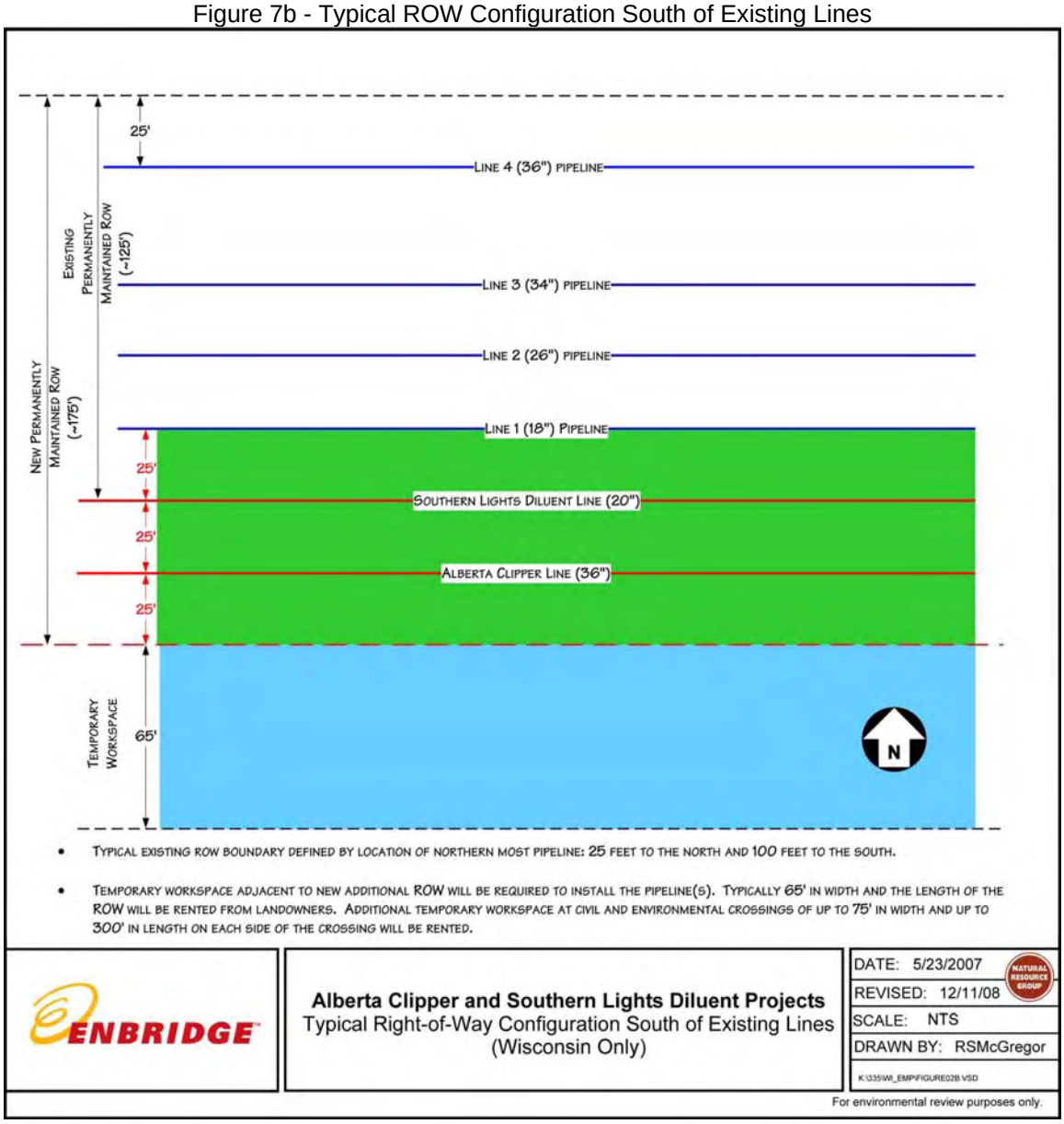


Figure 7b - Typical ROW Configuration South of Existing Lines



Some of the criteria Enbridge considered in its route selection analysis included a balancing of:

- The ability to co-locate the pipelines within or adjacent to Enbridge's existing ROW;
- Geographic constraints pertaining to where the pipeline would enter Wisconsin from Minnesota and the need for the crude oil to go to the Superior Terminal first, before it can be transported south on the Enbridge Wisconsin pipeline system and vice versa for transportation of the diluent;
- The impacts of environmental disruption (including the minimization and/or mitigation of that disruption);

- The impacts on affected landowners and communities (including the minimization and/or mitigation of those impacts);
- The constructability of the pipeline;
- The ability to reasonably, reliably, and safely conduct ongoing operations and maintenance activities on the pipeline; and
- The capital cost of constructing the pipeline on the selected route.

Per 49 CFR Part 195.210, the US DOT specifies that:

(a) Pipeline right-of-way must be selected to avoid, as far as practicable, areas containing private dwellings, industrial buildings, and places of public assembly.

(b) No pipeline may be located within 50 feet (15 meters) of any private dwelling, or any industrial building or place of public assembly in which persons work, congregate, or assemble, unless it is provided with at least 12 inches (305 millimeters) of cover in addition to that prescribed in 195.248 (48 inches).

Co-locating the proposed projects with the existing Enbridge corridor would reduce the permanently maintained ROW from 75 to 50 feet or less in most cases which reduces permanent impacts to sensitive resources.

Enbridge has existing blanket easement agreements that allow for expansion of the corridor for multiple lines. Landowners would receive monetary compensation in return for temporary loss of use during construction, crop damages, and the restoration of unavoidable damage to property during construction.

Enbridge's existing permanently maintained corridor is generally 125 feet wide. Enbridge would be adding up to an additional 50 feet of permanently maintained corridor, depending on the location of the new pipelines in relation to the existing. The ROW is maintained to facilitate access and aerial inspection of the pipeline system.

In addition to the ROW/permanent corridor, construction will require Temporary Workspaces (TWS). The TWS will be located adjacent to and contiguous with the proposed ROW/permanent corridor and will be identified on the construction alignment sheets and by distinctive staking of construction limits prior to clearing.

Site-specific extra workspace (EWS) locations, (construction work areas beyond the permanent corridor and TWS previously described), will be required at select locations such as steep slopes, road, waterbody, railroad, and some wetland crossings, and where it is necessary to cross under the existing pipelines or foreign utilities. EWS will typically be located in uplands adjacent to the construction ROW and 50-feet back from sensitive resource boundaries where site-specific field conditions allow. To complete work safely, Enbridge may need to locate

EWS within a wetland or within the 50-foot setback from a wetland or waterbody based on site-specific conditions.

DNR asked Enbridge to consider applying the construction widths proposed in the Pokegama complex to all wetlands within the proposed construction ROW.

Enbridge consulted with an independent professional geotechnical engineer to evaluate the pipe spacing and workspace requirements for the entire proposed route in Wisconsin.

Initially, Enbridge intended to install the new pipelines south of the existing corridor between mileposts 1090.6 and 1093.2. This configuration would have extended the existing corridor from 125 to 175 feet. In the initial application, Enbridge proposed from approximately milepost 1090.6 to 1093.2 to install the two new pipelines on the north side of the existing corridor. In addition, between milepost 1090.6 and 1093.8, Enbridge reduced the spacing between the pipelines from 25 feet to 20 feet. Furthermore, the original 25 foot buffer to be maintained north of the Alberta Clipper pipeline was reduced to 20 feet. By moving the new pipelines to the north, reducing the spacing between pipelines, and reducing the operational buffer, Enbridge effectively reduced the originally proposed new additional permanently maintained right-of-way from 50 feet to 10 feet within the Pokegama-Carnegie wetland complex. Enbridge would be able to reduce the ROW in this area due to the current land use to the north of its lines. The typical 25 foot buffer between the outermost pipeline would be necessary to help prevent the encroachment of adjoining landowners (structures, excavation, etc.), which is a significant safety concern. However, development within this area is highly unlikely, as it is currently Douglas County Forest. Therefore, Enbridge was agreeable to reducing the buffer to 20 feet instead of the typical 25 feet.

Enbridge revised their proposal so as to decrease the spacing between the outmost pipeline and the Southern Lights Diluent pipeline to 18 feet, and 21 feet between the Southern Lights Diluent and Alberta Clipper pipelines in all areas outside of the Pokegama-Carnegie wetland complex. The also proposed a total construction right-of-way within wetlands of 109 feet as opposed to the 125 feet which was originally proposed. Revised typical right-of-way configurations are shown in Figures 7a and 7b in Section III.B.1. Within the Pokegama-Carnegie wetland complex and outside of segments being installed by HDD, Enbridge proposes a pipe spacing of 18 feet, a total construction right-of-way of 80.5 feet, and a reduced operational buffer of 10 feet, which results in no new permanent right-of-way.

Enbridge considers the very restrictive construction right-of-way proposed for the Pokegama-Carnegie wetland complex as not practical for the remaining wetland areas due to the increased risk of damaging the existing pipeline.

III.B.2. Workspace requirements

Construction of the pipeline would require establishment of rail unloading sites for delivery of pipe and contractor/pipe storage yards at locations near the construction right-of-way to temporarily store pipe and the contractor’s vehicles, equipment, tools, and other construction-related items. Rail unloading areas would be located adjacent to railroad sidings and would range in size from approximately 5 to 10 acres.

During construction, Enbridge would temporarily use off-ROW areas for pipe and materials storage. In addition, construction contractors will require off-ROW areas to park equipment and stage construction activities. An area within the City of Superior is being evaluated for use as a pipe and materials storage area for construction activities at the Superior Terminal. Any necessary approvals would be obtained prior to utilization of this area.

Enbridge would need to gain access to the construction right-of-way during pipeline installation and the permanent right-of-way during operation. In general, Enbridge would use existing public roads to gain access to the construction right-of-way as much as possible. In areas where public roads are limited, existing privately owned roads may be used for access, provided that Enbridge receives permission from the landowners. If neither public nor privately owned roads are available, Enbridge would construct new access roads that typically would be approximately 10 to 30 feet wide.

Enbridge proposes to use existing public and private roads to access the ROW and facilities to the extent practicable. In Wisconsin, Enbridge would limit access to either the construction ROW, existing roads that require no modifications and or impacts to wetlands. In the event a new temporary road is necessary, Enbridge would obtain applicable regulatory approvals prior to using the new access. A list of currently proposed access roads is included in Table 5.

Table 5 - Pipeline Access Roads

Proposed Access Roads for the Alberta Clipper and Southern Lights Diluent Pipeline Projects		
Approximate Milepost (intersects w/pipeline)	**Description**	**Public/Private Road**
1097.8	Bardon Avenue	Public
1096.3	North 58th Street	Public
1096	Birch Avenue	Public
1095.9	Central Avenue	Public
1095.8	Fisher Avenue	Public
1095.3	North 67th Street	Public
1094.9	North 69th Street	Public
1094.8	Ogden Avenue	Public
1094.7	Tower Avenue/Hwy 35	Public
1094.6	Banks Avenue	Public
1094	Logan Avenue	Public (S portion may be private)
1090	Irondale Road	Public
1088.6	County Road W	Public

Newly constructed temporary roads may be left intact through mutual agreement with the landowner unless otherwise restricted by federal, state, or local regulations. If temporary roads are to be removed, the land upon which the temporary roads were constructed would be restored to the original conditions, as practicable, and seeded and stabilized pursuant to the Enbridge's Wisconsin Environmental Management Plan (WI EMP) and Enbridge’s Revegetation and Restoration Plan (Revegetation Plan).

Public road use would be coordinated with the appropriate county or state road authority. Existing private roads would be coordinated with the landowner.

In addition, construction equipment would need to travel across public roads that are crossed by the construction right-of-way. For those crossings, Enbridge would install temporary ramps

or driveways at the sides of the roads to allow construction vehicles to access and cross the roadway. These temporary facilities would consist of a flume pipe covered with dirt, rock, or gravel.

Extra workspace areas (EWS) may be required where the proposed route crosses features such as waterbodies, wetlands, roads, railroads, and existing pipelines and utilities. These EWS are construction areas that are temporarily needed outside of the typical construction ROW to stage equipment, stockpile spoil material and conduct material fabrication and assembly. Enbridge has identified known EWS areas on its Environmental Plan Sheets (Attachment A). In some cases, due to site-specific conditions, extra workspaces may be sited within wetland boundaries (refer to Section 4.3). Enbridge will develop a variance request protocol for identifying new EWS in the field as a result of site conditions at the time of construction. The protocol will be included with the Construction Environmental Control Plan (CECP)which will be submitted under separate cover. Table 6 below provides the typical dimensions used for extra workspaces.

Table 6 - Typical Dimentions of Extra Workspace Areas for Pipelines

Typical Dimensions of Extra Workspace Areas for the Alberta Clipper and Southern Lights Diluent Pipeline Projects	
Feature	Workspace Area [a]
Open-cut road crossings	100 feet x 75 feet [b]
Bored road and railroad crossings	100 feet x 75 feet [b]
Foreign pipeline and utility crossings	100 feet x 75 feet [b]
Pipeline crossunders	100 feet x 75 feet [b]
Waterbody crossings >50 feet wide	300 feet x 75 feet [b]
Waterbody crossings <50 feet wide	200 feet x 75 feet [b]
Horizontal directionally drilled railroad crossings	200 feet x 75 feet [b]
Wetland crossings	200 feet x 75 feet [b]

[a] Areas listed are in addition to the 140-foot-wide construction ROW.
[b] Each side.

Enbridge proposes to use a 140-foot wide construction ROW along most of the route to ensure safe excavations, allow adequate room for topsoil and subsoil segregation, temporary material storage, and provide a working area for equipment and pipe stringing/assembly. The construction corridor would be comprised of existing permanently maintained ROW, new permanent maintained ROW, and temporary workspaces. The construction ROW would be divided between the spoil side (area used to store topsoil and excavated materials) and the working side (equipment work area and travel lane). The spoil side would be located within Enbridge's existing permanently maintained ROW and the working side is generally located outside of Enbridge's existing maintained ROW. An additional 65 feet of temporary workspace would be required outside of the edge of the new permanent ROW.

The total construction ROW within wetlands will be reduced to a width of 125 feet, which will include 75 feet of existing and new permanent ROW and 50 feet of temporary construction ROW (excluding new and existing permanent ROW).

In general, Enbridge would require an additional 50-foot-wide permanent ROW for the project. The additional permanent ROW is necessary to provide a typical 25-foot offset between the two new pipelines. Typically, the Southern Lights Diluent pipeline would be constructed approximately 25 feet from the current outermost existing pipeline and the Alberta Clipper pipeline would be constructed approximately 25 feet from the Southern Lights Diluent Line. The 25-foot offset between the lines is necessary to protect the integrity the existing pipelines during construction and allow for adequate space to segregate topsoil and subsoil during construction. Additionally, the 25-foot spacing provides sufficient distance between the pipelines to ensure safe excavations per OSHA requirements for Class B soils and not compromise the integrity of the adjacent lines.

Enbridge currently maintains a 125-foot-wide permanent corridor which would include a portion of the permanent ROW required for the Project. Specifically, where the new pipelines are located to the south of the existing pipelines, 25 feet of the new permanent ROW would overlap the existing maintained permanent ROW. Where the new pipelines are located to the north of the existing pipelines, 50 feet of the new permanent ROW would overlap the existing maintained permanent ROW. An exception to this configuration is at the Pokegama-Carnegie

wetland complex (milepost 1090.6 to 1094.1), as discussed in section 10.0, the spacing between pipes has been reduced to 20 feet, in part due to the low potential for encroachment from area development.

III.B.3. Materials

The pipe for the proposed project would be American Petroleum Institute (API) 5L Grade X70, double submerged-arc steel pipe with a 36-inch outside diameter. Pipe used for the Project would meet DOT PHMSA federal codes under 49 CFR Part 195 (PHMSA regulations). It would be manufactured and constructed in accordance with standards issued by the American Society of Mechanical Engineers, National Association for Corrosion Engineers, and API. The pipe also would be manufactured in accordance with Enbridge's specification EES103-2006. All of the pipe would be manufactured with fusion-bonded epoxy coating to protect against corrosion and it would be inspected and integrity-tested at the factory.

Pipe wall thickness would range from 0.375 to 0.625 inch, with the thickness dependent on the location of the pipe. The majority of the pipe would have a wall thickness of 0.469 inch. Table 7 lists the pipe wall thickness by location.

Table 7 - Pipewall Thickness by Location Type for Alberta Clipper Pipeline

Pipe Wall Thickness by Type of Location for the Alberta Clipper Pipeline	
Wall Thickness (inches)	**Location of Pipe**
0.375	Mainline areas
0.406	Mainline areas and waterbody crossings
0.438	Mainline areas, waterbody crossings, and induction bends
0.469	Mainline areas, waterbody crossings, induction bends, and transitions
0.562	Road crossings, induction bends, and transitions
0.625	Railroad crossings and horizontal directional drilling crossings

Enbridge is currently proposing to install six mainline valves (three on each pipeline) in Wisconsin. These valves will be located at mileposts 1087.07 (County Road W), 1094.01 (near the Pokegama River), and 1098.00 (within Enbridge's existing Superior Terminal).

III.B.4. Construction

III.B.4.a. ROW Preparation

The construction ROW and extra workspace areas would be staked prior to clearing of vegetation or ground disturbance. Fences would be modified or removed when encountered within the construction area or, if necessary, for ROW access. Adequate support or bracing would be installed before cutting a fence. Access would be maintained, and temporary fencing or other means of livestock control would be employed during construction to damaged fences, gates, and cattle guards would be repaired to the original condition or replaced, if necessary, upon completion of construction.

The initial stage of construction involves the clearing of brush, trees, and tall herbaceous vegetation from the ROW. Clearing may be accomplished with chain saws, mowers, and hydraulic tree-cutting equipment. ROW clearing would be conducted in accordance with

permits and limited to the extent needed for access and construction of the pipelines. Trees would be protected to the extent possible.

Care would be taken to minimize tree removal. To the extent practicable, wind breaks and shelterbelts would be crossed by minimizing the width of the ROW. When clearing, trees would be felled onto the ROW to minimize damage to off-ROW vegetation.

Non-merchantable timber and slash would be disposed of by mowing, chipping, grinding, and/or hauling off site to an approved disposal facility or used in stabilizing erodible slopes or construction entrances. In non-agricultural, non-wetland areas, chips may be uniformly broadcast (less than 1 inch thickness) across the ROW where they would ultimately be incorporated into the topsoil layer during grading activities, with landowner approval. Burning of non-merchantable wood may be allowed only where the contractor has acquired all applicable permits and approvals (e.g. agency and landowner) and in accordance with all state and local regulations. Burning would not be allowed within 100 feet of a wetland or waterbody without site specific approval from Enbridge.

Burning would not be allowed in wetlands. No chips, mulch, or mechanically cut woody debris would be stockpiled in a wetland and no upland woody debris would be disposed of in a wetland. Non-merchantable timber may not be disposed of by placing it off the ROW. No woody debris disposal will be allowed in agricultural areas or wetlands.

Stumps would be removed when necessitated by construction area grading and pipeline installation. Stumps and debris created from preparation of the construction area would be disposed of at county or local composting or disposal sites, mulched, burned, or otherwise handled in accordance with state and local permits.

Topsoil generally has physical and chemical properties that are conducive to good plant growth. To prevent the mixing of topsoil with less productive subsoil during construction, topsoil would be segregated in selected areas where soil productivity is an important consideration. A visible separation must be maintained between the topsoil and subsoil piles to prevent mixing. These areas include cropland, hay fields, pasture, residential areas and other areas as requested by the landowner. Topsoil would not be used to construct trench breakers or to pad the pipe. Gaps must be left in stockpiled topsoil and spoil piles at water conveyances (i.e., ditches, swales, and waterways) to maintain natural drainage. Topsoil will be stripped to a maximum depth of 12 inches in cultivated lands, unless otherwise requested by the landowner. Additional space may be needed for spoil storage if more than 12 inches of topsoil are segregated. If less than 12 inches of topsoil are present, the contractor shall attempt to segregate to the depth that is present.

Topsoil would not typically be segregated in forested areas, standing water wetlands, and nonagricultural open upland areas. However, in areas of steep side slopes adjacent to wetlands and waterbodies, including forested areas, where subsoil would be excavated to create a level workspace, topsoil would be segregated to the extent practicable and at the direction of Enbridge.

Upland topsoil removal would be completed by either a dozer or motor grader. Wetland topsoil would be removed from the ditch-line by an excavator during trenching. The operator would determine separation between topsoil and subsoil by visual inspection. Additionally, an environmental inspector would perform audits of the topsoil/subsoil removal and segregation. In both uplands and wetlands, the margin of error in soil segregation would be within two to three inches.

Grading of the construction area would be done to the extent needed to provide a safe work area. In some areas, cut-and-fill excavation may be required and additional temporary workspace width may be needed. Grading and cut-and-fill excavation would be performed to minimize effects on natural drainage and slope stability. Graded areas and side hill cuts would be restored to original conditions to the extent possible upon completion of construction.

In hayfields, pastures, residential areas, golf courses, and unsaturated wetlands, topsoil would be segregated. Where topsoil segregation has occurred, the topsoil piles would be segregated from subsoil stockpiled in a manner as to avoid mixing of the spoil piles.

Coated pipe, valves, and fittings would be transported by truck from material storage yards to various points along the project route. Materials would be off-loaded and placed along the construction route by side boom tractors, mobile cranes or vacuum lifting equipment.

III.B.4.b. Trenching

Enbridge is proposing to co-locate and co-construct the proposed Alberta Clipper and Southern Lights Diluent Pipeline projects within the same construction corridor. In Wisconsin, the Southern Lights Diluent pipeline would be constructed first beginning at the Superior Terminal west to the U.S. Interstate 35 corridor in Carlton County, Minnesota. Once the Southern Lights Diluent pipeline has been installed, construction of the Wisconsin portion of the Alberta Clipper pipeline would begin starting at the Superior Terminal and continue west toward the Wisconsin/Minnesota border. Enbridge would restrict the amount of open trench to approximately 14,000 feet, per pipeline, at any one time. This is based on two days of anticipated welding production rates. This requirement is exclusive of any site-specific or “tie-in” crews that may be used to install pipelines at select crossings (roads, railroads, waterbodies, etc.) or valves.

All construction equipment and vehicles will be confined to the approved ROW and extra workspace.

Typically, trenching would be accomplished using a backhoe or crawler-mounted, wheel-type ditch digging machine. Excavated material would be sidecast (stockpiled) within the approved construction ROW separate from topsoil. Enbridge would coordinate with Landowners to minimize disruption of access caused by the trench during construction. Trenches would be sloped where started and ended to allow ramps for wildlife to escape. Precautions would be taken to adequately protect, repair, and/or replace damaged drainage systems (e.g., ditches, drainage tiles).

Enbridge has stated that blasting is not anticipated in Wisconsin for the Alberta Clipper and Southern Lights Diluent Pipeline construction.

Enbridge would leave plugs of soil in the ditch or would construct temporary access bridges across the trench for the landowner to move livestock or equipment.

Groundwater or stormwater runoff may accumulate in the trench during construction activities. If trench dewatering is necessary to complete the installation of the pipe, the discharge would be pumped into a treatment system, usually consisting of a sediment filter bag or a straw bale dewatering structure in such a manner that no heavily silt-laden water flows into streams or wetlands.

Enbridge has reviewed the proposed corridor for upland locations where dewatering structures could be staged. With the exception of the area within the Pokegama-Carnegie wetlands, Enbridge has found that there appear to be adequate upland locations for placing dewatering structures. Within the Pokegama-Carnegie complex the extent of the wetlands does not provide for adequate upland staging areas.

Enbridge is currently evaluating additional options for dewatering within the Pokegama-Carnegie wetland complex which include: placement of dewatering structures within wetlands; piping the water to upland locations greater than one mile from the project area; using trench water for dust control; using flocculants to treat trench water and subsequently discharging water to adjacent wetlands; and hauling water off-site. Enbridge's preferred method is for the discharge of water to wetlands. The hauling of water off-site has the potential to substantially increase the vehicle traffic onsite, extending the construction period within the wetland complex, thus increasing the potential for adverse impacts within the wetland complex.

The specifications for filter bags vary depending on the materials being used. The use of filter bags with either a strawbale structure and/or geotextile lined straw bale dewatering structure will increase the efficiency of filtration of the discharge. Due to the size of the clay particles, typically, the use of filter bags alone are not effective in capturing the finer sediments. Enbridge is evaluating the use of filter bags in conjunction with flocculants and/or other soil stabilization measures.

The contractor would use a floating suction hose and elevated intake, or other similar measures, to keep the intake off the bottom of the trench and reduce the potential for captureing additional sediment in the trench water. Water would be directed to well-vegetated upland areas and discharged at a rate to promote filtering and soaking into the ground surface.Dewatering operation discharge sites would be selected to discharge water at a locations which drain away from waterbodies or wetlands. The ground at the discharge location would be protected with a sheet of plywood or similar means to prevent scouring/erosion of the ground surface at the end of the discharge hose. Floc logs area may be used in the dewatering process to flocculate out fine suspended sediments. The actual implementation of Floc logs will be dependent on site-specific conditions. Geotextile bags would be sized appropriately for the discharge flow and suspended sediment particle size according to WDNR Dewatering Standard 1061V. C. Also, as stated in Standard 1061 VI.B. The size of straw bale dewatering structures, if used, would be dependant on the maximum

water discharge rate. Multiple filtering mechanisms (e.g. geotextile bag within a straw bale dewatering structure) may be used.

The length of time a trench is left open would be minimized to ensure that installation of the pipe and restoration of the ROW occurs in a timely fashion. Enbridge would limit the amount of excavated open trench to two days of anticipated welding production or approximately 14,000 feet per spread, per pipe. Site specific activities such as HDDs, guided bores, road bores, tie-in points, and valve work may be performed independent of a spread. Each spread will be fully equipped and staffed to operate independently of one another.

III.B.4.c. Horizontal Directional Drilling

Construction of the proposed pipelines may include the use of a trenchless excavation method known as horizontal directional drilling (HDD). HDD is a widely used construction technique that accomplishes the installation of buried utilities with minimum environmental impact. HDD is not entirely without impact, however. The primary environmental impact potentially associated with HDD is the inadvertent release of drilling fluids/mud to the surface during construction (sometimes referred to as “frac-out”). The HDD drilling fluids/mud consists primarily of water mixed with inert bentonite clay. Under certain conditions additives may need to be mixed with the drilling fluids/mud for viscosity or lubricating reasons. Only non-hazardous additives would be used and a Material Safety Data Sheet (MSDS) for the drilling fluid would be maintained on-site. The objective of this plan is to provide procedures that will minimize the potential for release of drilling fluids/mud into wetlands, waterbodies or onto the adjacent surface soils.

HDD would be conducted in accordance with Enbridge’s Environmental Mitigation Plan (EMP). As such, HDD would be conducted in a manner to prevent inadvertent releases of drilling mud. This “Containment, Response and Notification Plan” elaborates on measures to be implemented if a release occurred despite prevention efforts. The plan would be implemented as appropriate by the contractor under the supervision of Enbridge to contain, control and clean up any release of drilling mud during HDD crossings conducted during pipeline construction. Prior to the commencement of HDD operations, Enbridge’s construction contractor would inform construction personnel involved in the HDD as to the responsible party(ies) for release containment and response. Enbridge’s construction contractor would ensure that the appropriate response personnel and containment equipment are on site for each HDD.

During construction of a directionally-drilled crossing, pipeline construction personnel will monitor the pipeline route throughout the process. In the event an inadvertent drilling mud release is observed during an HDD crossing, the release will be assessed to determine the amount of drilling mud being released and potential for the release to reach sensitive resource areas (e.g. wetlands and waterbodies).

Response measures include the following. Evaluate the release to determine the most effective containment measures. Order installation of containment measures. Initiate immediate suspension of drilling operations if the mud release cannot be effectively contained. Review

and adjust drill pressures, pump volume rates, and drill profile to minimize the extent of the release. Further evaluate the current drill circumstances and site conditions to identify potential means to prevent further inadvertent release events. If necessary, suspend drilling operations in consultation with the EI and agency monitor, and notify appropriate regulatory agencies.

Containment, response and clean-up equipment would be available at both sides of the HDD crossing location prior to the commencement of the HDD to assure a timely response in the event of an inadvertent release of drilling mud.

Enbridge would consult with the appropriate regulatory agencies to evaluate the circumstances of the release, discuss additional containment or cleanup requirements, and determine whether and under what conditions the HDD may proceed.

Clean-up measures following mud releases in uplands, wetlands, and waterbodies would be implemented as determined by the plan and in consultation with the appropriate regulatory agencies. Drilling mud would be cleaned up by hand using hand shovels, buckets, soft-bristled brooms, and hoses from truck-mounted vacuums in order to prevent extensive ancillary damage to existing vegetation. Clean water washes may also be employed if deemed beneficial and feasible. Containment structures would be pumped out and the ground surface scraped to bare topsoil without causing undue loss of topsoil or ancillary damage to existing and adjacent vegetation. If the amount of the surface release is not great enough to allow the practical physical collection from the affected area without causing additional impacts, it would be diluted with clean water and/or the fluid will be allowed to dry and dissipate naturally. If the amount of the surface release exceeds that which can be contained with hand-placed barriers, small collection sumps (less than 5 cubic yards) may be excavated to collect released drilling mud for removal by the use of portable pumps and hoses.

Excess mud would be held within the containment area and removed using pumps, mechanical equipment, or other appropriate measures at a rate sufficient to maintain secure containment. Removed mud would be stored in a temporary holding tank or other suitable structure out of the floodplain and/or wetland for reuse or eventual disposal in an approved disposal facility.

The conditions under which HDD operations could resume would be discussed with appropriate regulatory agencies and/or field representatives. If containment measures are functioning, and the circumstances and potential impacts of the release are understood, HDD operations would resume.

The following measures will be implemented in the event that drilling cannot continue along the designated drill path due to excessive leakage. Beginning from a point behind where the leakage occurred, the hole would be re-drilled along a different alignment path. The initial drill hole would be abandoned if continued drilling along a new alignment is not possible. This would be accomplished by filling the hole with the bentonite slurry used for the initial drilling and plugging the surface opening with a cement grout. In case of abandonment an additional attempt at completing the horizontal directional drill may be made in proximity to the previous route. A new hole would be drilled in the same general area as the initial drill hole. No

alternative crossing methods would be implemented (i.e. wet trench) without the proper agency notification and approvals.

Following cleanup activities, restoration and revegetation of affected areas would be completed in accordance with Enbridge's Environmental Mitigation Plan and Revegetation and Restoration Monitoring Plan. Enbridge would monitor the release site as appropriate to assure adequate restoration.

III.B.4.d. Pipe installation

Typically, individual sections of pipe would be strung along the construction ROW before excavating the pipeline trench. This operation involves specially designed equipment to deliver pipe from pipe storage yards to the ROW.

After pipe stringing is complete, individual sections of the pipe will be bent to conform to the contours of the trench and terrain, where necessary. A track-mounted, hydraulic pipe-bending machine would normally be used for this purpose. Some pipe bends may be fabricated in the factory where multiple or complex bends are required.

Following bending, the sections of pipe are lined up, held in position, and welded together. Individual pipe joints would be radiographically inspected. The welds would then be coated to protect them from corrosion. In rocky soils, the pipe may be wrapped with a protective shielding if necessary to prevent damage to the pipe coating during backfilling. When welding is complete, the welded pipeline would be lowered onto skids or blocks adjacent to the trench.

Prior to lowering in the pipe, the trench would be inspected for proper depth, rocks or other obstructions. Sideboom tractors, spread out along the pipe segment, would simultaneously lift the welded pipeline sections and move it over the open trench. The sideboom tractors will then lower the pipeline segment into the trench.

Following the lowering-in of welded pipeline strings, the trench is backfilled. Backfilling would occur as each pipeline segment is completed. As previously noted, Enbridge would limit the amount of open trench to approximately 14,000 feet, per pipeline, per spread. Angle blade dozers, draglines, or backhoes would replace the spoil. In areas where topsoil segregation has occurred, the subsoil would be replaced first followed by the topsoil.

After backfilling is complete, each pipeline would be hydrostatically tested to at least 115 percent of maximum operating pressure to verify the integrity of the pipeline. Hydrostatic testing involves filling the new pipe segments with water acquired in accordance with applicable permits, raising the internal pressure level, and holding that pressure for a period of time, in accordance with DOT specifications.

At a minimum, the pipeline would be buried in accordance with U.S. Department of Transportation regulations (40 CFR Part 195), which stipulate a minimum of three (3) feet of top cover for normal excavations, and 18 to 30 inches of cover for rock excavations (depending on the location), to prevent damage to the pipeline from normal use of the land. For the Alberta

Clipper and Southern Lights Diluent projects, the depth of cover would vary from 36 inches to 60 inches, depending on state law, permit requirements, landowner agreements, and site-specific conditions (e.g., depth of drain tile). If a state-level agency specifies a more stringent requirement for pipeline depth than the DOT and/or landowner requirements, the company may request a waiver of that requirement. Increased pipeline depth would result in greater amounts of ditch spoil and, consequently, may require additional temporary workspace for storage of the spoil.

Trench breakers would be installed as deemed necessary by Enbridge in sloped areas after the pipe has been lowered into the trench. Trench breakers protect against subsurface water flow along the pipe after the trench is backfilled. Trench breakers would be constructed with bags filled with rock-free subsoil or sand. They would be placed from the bottom of the trench to near the top of the trench, completely surrounding the pipe.

Where drain tiles are cut during trenching, the locations would be flagged by the contractor and the contractor would notify the EI and/or agricultural inspector of the locations. The contractor would probe each drain tile line that is crossed by the trench using a sewer rod or pipe snake (or equivalent), prior to backfilling, to determine if the tile lines were damaged during construction. Drain tiles damaged during construction would be repaired to their preconstruction condition or better.

Open trench in excess of 14,000 feet is not anticipated. Enbridge plans to complete the mainline welding of the pipe aboveground before the ditch is excavated. The ditch excavation, lowering the pipe into the ditch, and backfill of the ditch would then take place within a one to two day time period. Tie-ins will be required at road, railroad, and stream crossings where guided bores or other drilling techniques are employed. These excavations will generally be small (i.e. less than 100 feet in length) and will be open only for the period of time necessary to complete the tie-in.

Pre-built sections may be hydrostatically tested prior to installation at significant streams and wetland crossings. Water used for hydrostatic testing would be discharged in accordance with applicable permits. After the hydrostatic test is completed, the line would be depressurized and the water expelled. During withdrawal and discharge, the water would be sampled as required by permits. Water volumes would be measured and recorded.

Enbridge has identified the Pokegama River (milepost 1094.0) as a potential source and discharge location for the hydrostatic testing of the test segment in Wisconsin. Enbridge would obtain all applicable permits for this discharge activity.

Hydrostatic testing data for the HDD in the Pokegama-Carnegie wetland complex is shown in Table 8.

Table 8 - Hydrostatic Testing Data for HDD in the Pokegama-Carneigie Complex

Southern Lights Diluent Pipeline HDD Pre-Test Summary (20")						
Pre-Test Location	**Length (Feet)**	**Minimum Test (psi)**	**Maximum Test (psi)**	**Volume (gal.)**	**Water Body**	**Mile Post**
Pokegama River	1658.0	3,325	3,675	24,420	Pokegama River	TBD
PC 1	5200.0	3,325	3,675	76,590	Likely Municipal	TBD
PC 2	5125.0	3,325	3,675	75,485	Likely Municipal	TBD
Alberta Clipper Pipeline HDD Pre-Test Summary (36")						
Pre-Test Location	**Length (Feet)**	**Minimum Test (psi)**	**Maximum Test (psi)**	**Volume (gal.)**	**Water Body**	**Mile Post**
Pokegama River	1658.0	2,309	2,552	81,687	Pokegama River	TBD
PC 1	5200.0	2,309	2,552	256,196	Likely Municipal	TBD
PC 2	5125.0	2,309	2,552	252,501	Likely Municipal	TBD

III.B.4.e. Closure

Backfilling follows pipe installation and consists of replacing the material excavated from the trench. In areas where topsoil has been segregated, the subsoil would be replaced first, and the topsoil would be spread uniformly over the area from which it was removed. Prior to backfilling, the trench would be dewatered in accordance with the methods discussed in WI EMP.

Initial cleanup and rough grading activities may take place simultaneously. Cleanup involves removing construction debris (including litter generated by construction crews and excess rock). Rough and final grading includes restoring disturbed areas as near as practicable to preconstruction conditions, returning the topsoil where topsoil has been stripped, preparing a seedbed (where applicable) for permanent seeding, installing or repairing temporary erosion control measures, repairing/replacing fences, and installing permanent erosion controls

Permanent berms (diversion dikes or slope breakers) would be installed on all slopes, according to the maximum spacing requirements unless otherwise specified in permit conditions. Permanent berms would be constructed according to the following specifications. Permanent berms would be installed with a two to four percent outslope, and constructed of compacted earth. The outfall of berms would be directed toward appropriate energy-dissipating devices, and off the construction ROW if possible. Permanent berms would be inspected and repaired as deemed necessary by Enbridge to maintain function and prevent erosion. Erosion control blankets (curlex, jute, or equivalent) will be placed on slopes over 30 percent or that are a continuous slope to a sensitive resource area (e.g., wetland or waterway).

Cultivated fields and compacted or rutted areas would be tilled with a deep tillage device or chisel plowed to loosen compacted soils. If subsequent construction and cleanup activities result in further compaction, additional measures would be undertaken to alleviate the soil compaction.

An effort would be made to remove excess stones larger than four inches in diameter from the upper eight inches of soil or as specified in permit conditions or landowner agreements. Stone removal efforts would cease when the size and density of stones on the ROW are similar to undisturbed areas adjacent to the ROW. Excess rock would be piled in upland areas where landowner permission has been obtained, or hauled off-site to an Enbridge approved disposal site.

Off-road vehicle control measures would be installed as requested by landowners or as directed by land management agencies. No Trespassing signs would be installed at aboveground facilities, according to the provisions of M.S. 609.6055 (Trespass on Critical Public Service Facility; Utility; or Pipeline) to provide clear notice to the public and protect the integrity of the pipeline. All fences and gates removed or damaged would be repaired or replaced.

All soil conservation practices (such as terraces, grassed waterways, etc.) that are damaged by the pipeline construction would be restored to preconstruction conditions to the extent practicable.

Following the completion of the pipeline, the ROW would be restored to its pre-construction conditions as practical. Should uneven settling or documented surface drainage problems occur following the completion of pipeline construction, Enbridge would take appropriate steps to remedy the issue.

Permanent soil erosion and sediment control would begin as soon as soil conditions permit seed bed preparation and seed germination. Actively cultivated lands would be restored but would not be reseeded unless requested by the landowner.

III.B.4.f. Stormwater and erosion control

Enbridge intends to request authorization to discharge construction stormwater under NR 151 and NR 216. A separate submittal of the Notice of Intent for stormwater coverage will be submitted to WDNR, for review. Enbridge intends to use the Universal Soil Loss Equation (USLE) to as part of its preparation of the erosion and sediment control design for the project corridor. The USLE predicts the long term average annual rate of erosion on a field slope based on rainfall pattern, soil type, topography, crop system and management practices. USLE only predicts the amount of soil loss that results from sheet or rill erosion on a single slope and does not account for additional soil losses that might occur from gully, wind or tillage erosion. This erosion model was created for use in selected cropping and management systems, but is also applicable to non-agricultural conditions such as construction sites. The USLE allows for designers to evaluate alternative management practices and timing of said practices to meet the state requirements for reducing soil loss from a construction site.

Enbridge intends to incorporate the results of the USLE into its Stormwater Pollution Prevention Plan and where necessary would prepare site-specific details for erosion and sediment control placement including identification of appropriate materials and timing of installation. The SWP3 is incorporated into Enbridge’s Construction Environmental Control Plan.

Temporary erosion control measures are intended to slow the velocity of water off-site to minimize erosion, stop the movement of sediments off the construction ROW, and prevent the deposition of sediments into sensitive resources that may be on or adjacent to the ROW. Temporary erosion control measures would be installed after initial clearing and before disturbance of the soil. They would be installed at the base of sloped approaches to streams, wetlands, and roads, and would be replaced by permanent erosion controls as restoration is complete. Temporary erosion and sediment controls include but are not limited to slope breakers, sediment barriers, stormwater diversions, trench breakers, mulch and revegetation.

Contractors would be required to maintain erosion and sediment control structures as required in the project construction documents and as required by all applicable permits. Non-functional erosion and sediment control features would have to be repaired, replaced, or supplemented with functional materials as soon as field conditions allow access, but no later than 24 hours after discovery.

Enbridge would attempt to locate existing drain tile inlets that are located near the construction work area prior to construction. Drain tile inlets would be marked using flags. Located drain tile inlets with the potential to receive stormwater from the construction project would be protected by using the appropriate erosion control until sources with the potential to discharge has been stabilized. Where drain tile inlets are located off of Enbridge's ROW, Enbridge may not have authorization to install erosion control at the inlet site. In these cases, sediment control measures (typically silt fence) would be installed along the edge of the construction work area that drains to the inlet structure.

Installation of temporary seeding, mulch, and erosion control mats may be necessary in certain locations if there are construction delays within a spread of at least 14 days. The contractor may be required by Enbridge to install temporary stabilization materials sooner based on site conditions, or other conditions that increase sediment transport potential. Temporary stabilization would be conducted in accordance with Enbridge's Revegetation and Restoration Monitoring Plan. On slopes greater than 5% that would be exposed over the winter and drain to surface waters, the appropriate class of erosion control blanket would be installed on exposed slopes before snowfall to ensure maximum protection of exposed slopes prior to spring melt off, and the frequent winter storms that occur in northern Wisconsin in March and April.

Temporary slope breakers would be installed to minimize concentrated or sheet flow runoff in disturbed areas in accordance with maximum allowable spacing unless otherwise specified in permit conditions. If the length of the slope is less than the distance of the required spacing, slope breakers are not required unless a sensitive resource area (*e.g.*, wetland) is located immediately down slope, or as requested by the environmental inspector. Temporary slope breakers may be constructed using earthen subsoil material, silt fence, hay bales or in non-agricultural land rocked trenches may be used. On highly erodible slopes, slope breakers in the form of either earthen berms or rocked trenches would be used whenever possible.

During construction, certain activities may be suspended in wet soil conditions, based on consideration of the following factors:

- plasticity of the surface soil to a depth of approximately four to eight inches;
- extent of surface ponding;
- extent and depth of rutting and mixing of soil horizons;
- areal extent and location of potential rutting and compaction (i.e., can traffic be rerouted around wet area); and
- type of equipment and nature of the construction operations proposed for that day.

Additional requirements for working in agricultural land during wet conditions are included in Enbridge's Agricultural Mitigation Plan (AMP). If these factors cannot be achieved to the satisfaction of Enbridge, the contractor would cease work in the applicable area until Enbridge determines that site conditions are such that work may continue.

Hydrostatic testing involves filling the new pipeline segments with water acquired in accordance with applicable permits (See Section 6.0), raising the internal pressure level, and holding that pressure for a specific period of time per federal Department of Transportation specifications. Hydrostatic testing would be done to verify that there are no flaws in the pipe or welds. Pre-built sections may be hydrostatically tested prior to installation at significant streams and wetland crossings. Water used for hydrostatic testing would be discharged back to the waterbody it was appropriated from. After the hydrostatic test is completed, the line would be depressurized and the water expelled. During withdrawal and discharge, the water would be sampled as required by permits. Water volumes must be measured and recorded.

Prior to hydrostatic testing the pipeline, Enbridge would prepare the pipe by removing accumulated construction debris, mill scale, dirt and dust using a cleaning pig. The debris would be collected in a temporary receiver and shall be properly disposed of by the contractor. Upon completion of the cleaning operation, the pipeline would be sealed with the test headers. Test headers and pigs would be arranged to allow for rinse water to be installed ahead of the fill pigs. Rinse water must be treated and disposed of in accordance with applicable permit conditions.

Following testing, the test section would be depressurized and the water would be discharged to a well-vegetated, upland area or an appropriate dewatering structure. Dewatering structure include geotextile filter bags and/or a hay bale structure that may or may not be lined with geotextile fabric. Direct discharges to surface waters would be directed with an energy dissipation device such as a splash pup. At no time would the discharge rate exceed the applicable discharge rates specified in state-issued or other discharge permits. In the event no maximum discharge rate is identified, discharges shall be monitored and adjusted as necessary to avoid scouring or sediment transport from the discharge location.

Water may be drawn from local sources, such as lakes, streams, and private or municipal wells for construction activities such as dust control, horizontal directional drilling/guided boring, trench dewatering, and hydrostatic testing. The project would follow applicable permit conditions for the appropriation of water. Where water is appropriated from lakes or streams, the intake hose would be suspended off of the stream or lake bottom and would be screened to prevent entrainment of fish. During withdrawal, adequate waterbody flow rates and volumes would be maintained to protect aquatic life and allow for downstream uses. The volume and rate of withdrawal would be monitoring to comply with applicable permit conditions. Enbridge would notify appropriate state agencies of the time of appropriations if required by the state appropriations permits. Reports regarding the volume and quality of the water withdrawn would be submitted by Enbridge if required by the state permit.

All sections of the pipeline in Wisconsin would be hydrostatically tested after installation and completion of construction activities within the segment to be tested. At horizontal directional drill (HDD) locations, the pipeline section to be installed would be additionally hydrostatically tested above ground prior to installation.

The proposed hydrostatic test plan calls for the Alberta Clipper and Southern Lights Diluent pipelines to be completed in thirteen segments. The Wisconsin portion of the pipelines would be hydrostatically tested as part of test segment 13 from milepost 1078.6 to 1098. The source water for this segment would come from Chub Lake in Carlton County, Minnesota. Upon completion of the testing activities, the water would be discharged back to Chub Lake. No hydrostatic test discharges would occur within the state of Wisconsin.

In accordance with Section 5.2.5 of the Enbridge Wisconsin-Specific Environmental Mitigation Plan (included in the original application), upon completion of the pre-installation hydrotests of the HDD pipeline segments, water would be discharged to a well-vegetated, upland area or an appropriate dewatering structure. Dewatering structures include geotextile filter bags and/or a hay bale structure that may or may not be lined with geotextile fabric. Direct discharges to surface waters would be directed with an energy dissipation device such as a splash pup.

III.B.4.g. Restoration

Upon completion and testing of the pipelines construction debris would be removed and the workspace would be restored. Precautions would be taken to protect against potential spills or releases from construction equipment. Equipment refueling areas would be located a minimum of 100 feet from waterways and wetlands unless additional site-specific precautions have been implemented. Requirements for reporting and responding to fuel spills or other instances of this type would be included in the contract specifications. In addition, Enbridge has developed a comprehensive Spill Prevention, Containment and Control Plan.

Permanent erosion controls would be installed where needed. Reseeding of the upland portions of the ROW would be done in consultation with the local Natural Resources Conservation Service (NRCS) office and/or as approved by the landowner and in accordance with Enbridge’s Revegetation and Restoration Plan (Revegetation Plan). Reseeding of wetlands

would be done in consultation with the COE and the WDNR and in accordance with Enbridge's Revegetation Plan. Lands in a Conservation Reserve Program would be reseeded so as not to affect the eligibility status of those lands. Restoration of wetlands within the Pokegama-Carnegie wetland complex would be completed as provided in Enbridge's Wetland Restoration, Mitigation and Monitoring Plan.

After construction and completion of final cleanup, Enbridge's land agents would contact landowners to ensure that restoration concerns have been addressed. Upon completion of final restoration, Enbridge would request that each landowner sign a damage release form indicating that cleanup and restoration of their property has been satisfactorily completed.

Upon completion and testing of the pipelines construction debris would be removed and the workspace would be restored. Precautions would be taken to protect against potential spills or releases from construction equipment. Equipment refueling areas would be located a minimum of 100 feet from waterways and wetlands unless additional site-specific precautions have been implemented. Requirements for reporting and responding to fuel spills or other instances of this type would be included in the contract specifications. In addition, Enbridge has developed a comprehensive Spill Prevention, Containment and Control Plan.

DNR requested information from Enbridge to determine the depth of mounding that would be appropriate in the clay plains region, such as time of year of construction, soil structure, ability of soil to compact, saturation of soils, etc.

Enbridge prepared a "Pipeline Construction Techniques to Minimize Erosion, Sedimentation, and Potential Impacts to Wetland Hydrology and Sediment Discharge to the St. Louis Estuary Red Clay Plain" plan (see Appendix A) to address concerns regarding construction and restoration techniques in the Red Clay Plain region.

Soil would be returned to the trench in the order and at the locations where the soil was removed. Excess subsoil, defined as the amount of soil displaced by the pipe installed in the respective trench, would be removed for disposal off-site, in accordance with all applicable federal, state and local regulations. Remaining subsoil would be replaced to the trench and packed to the maximum extent practicable, followed by topsoil replacement and grading to as closely as possible match adjacent conditions. An initial, low trench mound resulting from large voids remaining in the clay returned to the trench would be expected, but should subside over a period of one to three years as the soil settles to the pre-construction soil surface. Substantial disturbance is only expected for the trenched areas. Expected permit conditions required by Wisconsin DNR would preclude grading or other restorative earthwork outside of the trenched areas.

Proposed depth of cover over the pipelines is listed in Table 9.

Table 9 - Planned Depth of Cover for Pipelines

Planned Depth of Cover to Top of Pipe for the Alberta Clipper and Southern Lights Pipeline Projects

Land Type Crossed	Planned Depth of Cover (Inches)
Cultivated land (crop)	48
Rangeland (pasture)	48
Undeveloped section lines	Not applicable
Industrial, commercial, and residential	48
Rivers and streams	48
Drainage ditches at roadways and railroads	48
Jurisdictional county or township drainage ditches	48
Railroad (distance below rail)	60
Roadway (distance below road surface)	60
Wetlands	36
Woodlands	36

III.B.4.h. Revegetation

Enbridge has developed a Revegetation and Restoration Monitoring Plan (Revegetation Plan) that identifies procedures to be followed for revegetation of areas disturbed during construction of the proposed pipelines. The Revegetation Plan was developed in conjunction with Natural Resources Conservation Service (NRCS) guidelines, applicable Soil and Water Conservation Districts, and the Enbridge project Environmental Mitigation Plan (EMP). Project-specific permit conditions and landowner requests for specific seed mixes would take precedence over the Revegetation Plan.

Enbridge's temporary revegetation measures are intended to quickly establish ground cover vegetation and minimize potential soil erosion. A temporary seed mix was developed based on recommendations from the NRCS, and consists of equal amounts of oats (in summer) or winter wheat (in fall or spring), and annual ryegrass, annual alfalfa, or slender wheat grass. Unless specifically requested by landowners or land managing agencies, Enbridge would not intend to establish temporary vegetation in actively cultivated land, standing water wetlands, and/or other standing water areas.

Between April 1 and September 1, temporary revegetation would be established in construction work areas where 14 days or more would elapse between: the installation of the first pipeline

and the second line where the Alberta Clipper and Southern Lights Diluent pipelines would be co-constructed; the completion of final grading at a site and the establishment of permanent vegetation; and/or, where there is a high risk of erosion due to site-specific soil conditions and topography. Enbridge may require the contractor(s) to conduct temporary seeding sooner than 14 days at site-specific locations near sensitive resource areas and/or areas prone to wind/water erosion.

Straw mulch may be used to help stabilize areas during the establishment of temporary vegetation. Mulch would be free of noxious weeds as listed in applicable state laws and consistent with the project Noxious Weed and Invasive Species Control Plan. Certified weed-free mulch may also be required at site-specific locations. Mulch would specifically be required on slopes greater than 5 percent; and dry, sandy areas that can blow or wash away.

Permanent vegetation will be established in areas disturbed within the construction work area [permanent easement, temporary workspace (TWS), and extra workspace (EWS)] except in actively cultivated areas and standing water wetlands.

Enbridge developed a standard upland seed mix for restoring disturbed areas affected by the proposed pipeline projects (Table 10). The mix includes species that would provide for effective erosion control and revegetation of the project area. This seed mix would be used by Enbridge as the standard upland mix unless an alternate seed mix is specified by landowners or land managing agencies.

Table 10 – Construction Area Standard Upland Seed Mix

Seed Name	**Pure Live Seed** (pounds per acre)	**% of Seed**
Perennial Ryegrass (*Lolium perenne*)	2	17%
Canada Wild-rye (*Elymus canadensis*)	4	33%
Switchgrass (*Panicum virgatum*) (unimproved native variety)	4	33%
Timothy (*Phleum pratense*)	2	17%
Total	12 pounds	100%
Associated Companion Crop Mix		
Oats *if summer seeding* *(Avena sativa)* or Winter Wheat *if late fall (dormant) or spring seeding* *(Triticum aestivum)*	16	80%
Annual Ryegrass *(Lolium italicum)*, or Slender Wheat Grass *(Elymus trachycaulus)*	4	20%
Companion/Cover Crop Total	20	100%
TOTAL	32 pounds	100%

Enbridge has also developed specialized seed mixes for residential areas, pasture land, wildlife areas, native vegetation areas, and roadway ROW. These seed mixes would be available to landowners by request.

Seed would be applied uniformly at specified rates across the prepared ROW by drilling, broadcasting, or hydroseeding. Seeding activities would be suspended if conditions are such that equipment would cause rutting of the surface in the designated seeding areas. Enbridge would continue to monitor ROW conditions to resume seeding activities as site conditions improve and according to the general seeding timing restrictions. Seeding equipment would be capable of uniformly distributing the seed and sowing it at the required depth.

Enbridge has consulted with NRCS representatives and reviewed county soil survey information to assess where soil amendments, specifically the application of fertilizer or lime, would be needed to promote successful revegetation. No fertilizer or lime would be added with native seed mixes. Soil amendments may be applied to agricultural, pasture, and/or residential lands if requested by landowners and/or land managing agencies. Enbridge would apply phosphate free fertilizers to areas within 100 feet of a waterway if soil amendments are required.

Upon final grading of the right-of-way (ROW) and upon the restoration of wetland and waterways, seeding and restoration/stabilization would occur within 48 hours.

III.B.4.i. Invasive species management

After disturbances of the soil, vegetation communities may be susceptible to infestations of noxious species. These species are most prevalent in areas of prior surface disturbance, such as agricultural areas, roadsides, existing utility corridors, and wildlife concentration areas. The prevention of the introduction or spread of noxious and invasive weeds is a high priority for nearby communities. In addition to federally listed noxious weeds, each state crossed by the proposed pipeline route maintains a list of regulated and prohibited noxious and invasive weed species. Enbridge has developed a Noxious Weeds and Invasive Species Control Plan (Noxious Weed Plan) to address the control and spread of noxious and invasive species.

It is Enbridge's stated intent to minimize the potential introduction and/or spread of undesirable species (i.e., invasive species and noxious weeds) along its ROW due to pipeline construction activities. Enbridge has stated that it is not practicable to eradicate undesirable species along its ROW where undesirable species are present adjacent to Enbridge's ROW. Enbridge would minimize the potential for the establishment of undesirable species by minimizing the time duration between final grading and permanent seeding. Enbridge would also require that construction equipment be cleaned before arriving on site to prevent the introduction of undesirable species to the project area.

Enbridge's consultations with the applicable Wisconsin agencies identified thirty seven (37) invasive species of concern. These are listed in Table 11.

Table 11 - Invasive Species of Concern

Autumn Olive	Spotted Knapweed	Oriental (Round Leaved) Bittersweet
Reed Canary Grass	Queen of the Meadow	Purple Loosestrife
Poison Hemlock	Oxeye Daisy	Narrow-Leaved Cattail
Meadow Hawkweed	Leafy Spurge	Japanese Knotweed
Japanese Hops	Japanese Hedge Parsley	Hemp-Nettle
Grecian Foxglove	Glossy Buckthorn	Giant Hogweed
Garlic Mustard	Garden Heliotrope	Flowering Rush
Field Bindweed	European Marsh Thistle	Devil's Paintbrush
Dame's Rocket	Bird's-Foot Trefoil	Cut-Leaved Teasel
Common Teasel	Common Tansy	Common Reed Grass
Common Buckthorn	Canada Thistle	Bull Thistle
Black Swallow Wort	Black Alder	Honeysuckle
Wild Parsnip		

Enbridge conducted field surveys along the proposed route to identify existing locations of noxious weeds and invasive species. Surveys focused on natural areas, roadside ditches, and pastures. Surveyed areas were evaluated for presence of the target invasive species within and adjacent to the proposed construction work area (construction right-of-way and additional workspaces). Locations where the population of the targeted species comprised at least 20 percent of the species density within a 1,000 square foot area were recorded using a Global Positioning System (GPS) device. Areas containing the target species spotted knapweed with a species density of at least 20 percent within a 500 square-foot area were also documented. Additionally, all occurrences of purple loosestrife populations were recorded.

To prevent the introduction of the noxious weeds and invasive species listed above into the project area from other construction sites, construction equipment would be cleaned prior to arriving at the project site. This cleaning would consist of removing visible dirt from the equipment and blowing loose material from equipment using compressed air. The contractor(s) would keep logs documenting the cleaning history of each piece of equipment and make the logs available to the environmental inspector (EI) or other Enbridge representative upon request. Equipment found to be in non-compliance with the cleaning requirement would not be allowed on the project site until it has been adequately cleaned.

Prior to clearing and grading of the construction right-of-way and pending landowner permission, major infestation areas identified during surveys or by Enbridge's EIs would be treated with the recommended herbicides or their equivalents as identified through consultation with local authorities. Enbridge's contractor(s) would be required to obtain necessary permits and/or certifications for the use of the applicable herbicides and must comply with state laws regarding the use of those herbicides. Contractor(s) must keep proper documentation of the locations where the herbicides have been used and provide such documentation to Enbridge if requested.

Pre-construction treatment would be conducted in areas where listed species are found, on an as-needed basis. In areas where thistle infestations occur, treatment would be conducted if the infestation area exceeds 1,000 square feet. For spotted knapweed, infestation areas 500 square

feet or greater would be treated. Where identified, purple loosestrife plants would be pulled, bagged, and removed from the right-of-way.

If additional noxious weed infestations are identified subsequent to herbicide applications, mechanical means (scrape down/blow down) would be used to remove weeds from tracked equipment prior to leaving the infested area. High pressure water wash stations may be established in select areas if the above measures do not adequately remove soil and vegetation debris from construction equipment. The EI would determine where this practice would be implemented. The contractor(s) would keep logs documenting the cleaning history of each piece of equipment and make the logs available to the EI or other Enbridge Representative upon request. Any equipment found to be in noncompliance with the cleaning requirement would be removed from the project site until it has been adequately cleaned.

To prevent the spread of noxious weeds and invasive species during construction, mulch used on the project would be composed of weed-free material as specified in Enbridge's Revegetation and Restoration Monitoring Plan. Certified weed-free mulch may also be required at site-specific locations. The contractor(s) would be responsible for identifying and acquiring sources of weed-free and certified weed-free mulch. Sources must be approved by Enbridge prior to purchase and copies of the applicable documentation must be provided to Enbridge.

As specified in Enbridge's Revegetation and Restoration Plan, post-construction monitoring of the restored right-of-way would be conducted by Enbridge and revegetation in non-agricultural areas would be considered successful when the density and cover of non-nuisance vegetation are similar in density and cover to adjacent undisturbed lands. If this monitoring indicates a higher density and cover of noxious weeds on the right-of-way compared to adjacent off right-of-way areas, Enbridge would take appropriate measures to control the noxious weeds. These measures may include herbicide spraying, mowing, or burning. On land where Enbridge has aboveground facilities (e.g., valve sites, pump stations), Enbridge would control noxious weeds in a manner that prevents the spread of weeds onto adjacent agricultural land.

The State of Wisconsin requires special decontamination provisions for equipment/materials to prevent the spread of invasive species and/or viruses from one waterbody to another. These special decontamination provisions apply to equipment/materials that will come into contact with the water including (but not limited to) excavation equipment, barges, boats, turbidity curtains, sheet piling, hoses, pumps, bridging materials, and culverts/flumes. The following decontamination procedures will be implemented where construction will occur in perennial waterbodies and within intermittent streams with water present at the time of construction:

1. Inspect and remove mud and vegetation debris (or similar) from all equipment that will be in contact with the water;

2. Drain all water from equipment, such as pumps and hoses; and,

3. Properly dispose of any debris removed from the equipment.

In addition to the decontamination methods listed above, the State requires at least one of the following methods also be implemented:

1. Steam cleaning (temperature not less than 212 degrees Fahrenheit) the portion of equipment that will come into contact with the water;

2. Washing equipment with soap and water or high pressure water of not less than 2,000 pounds per square inch pressure;

3. Allowing equipment to dry thoroughly for not less than five (5) days;

4. Disinfecting equipment with 200 parts per million (0.5 ounces per gallon) chlorine for not less than 10 minutes contact time; or,

5. Disinfecting with another State approved disinfectant.

III.B.4.j. Fugitive dust

Fugitive dust emissions may occur as a result of blasting or vehicle traffic on paved and unpaved roads. The amount of dust generated is dependent on the moisture content and texture of the soils, wind velocity, frequency of precipitation, vehicle traffic, types of vehicles, and roadway characteristics. Emissions would be anticipated to be greater during dryer months and in fine-textured soils.

Enbridge has developed procedures in its WI EMP to minimize dust generated from construction activities. Control practices may include wetting soils on the ROW, limiting working hours in residential areas, and/or additional measures as appropriate based on site-specific conditions. The use of dust suppression techniques will minimize fugitive dust emissions during construction of the project, thereby minimizing potential air quality impacts on nearby residential and commercial areas.

The contractor would take all reasonable steps to control construction-related noise and dust near residential areas and other areas as directed by Enbridge. Control practices may include wetting the ROW and access roads, limiting working hours in residential areas, reestablishment of vegetation and/or additional measures as appropriate based on site-specific conditions. The contractor would have a water truck on-site during construction if the weather is dry and dust generation is an issue. Occasionally, the contractor may determine based on site conditions that a soil tackifier, such as sodium chloride, is necessary. If used, the tackifier will be selected and implemented in accordance with the Wisconsin Department of Transportation's Product Acceptability Lists (PAL).

III.B.4.k. Spill prevention and management

Enbridge requires its contractors to implement proper planning and preventative measures to minimize the likelihood of spills, and to quickly and successfully clean up a spill should one occur. Enbridge has developed a spill plan to set forth minimum standards for handling and

storing regulated substances and cleaning up spills. Potential sources of construction-related spills include machinery and equipment failure, fuel handling, transfer accidents and storage tank leaks.

In the event of a spill, the contractor will abide by all applicable federal, state and local regulations with respect to cleaning up the spill.

The contractor would be responsible for implementing, at a minimum, the following planning and prevention measures. A spill coordinator would be designated by the contractor, subject to approval by Enbridge. For pipeline spills, the spill coordinator would insure that the Enbridge representative is notified immediately, and may assist in response action as dictated by the company. For all construction related spills, the spill coordinator would report all spills to the Enbridge representative immediately, and to appropriate federal, state and local agencies as soon as possible. The spill coordinator would mobilize on-site personnel, equipment, and materials for containment and/or cleanup commensurate with the extent of the spill, and assist the emergency response contractor to monitor containment procedures to ensure that the actions are consistent with the requirements of the spill plan. The spill coordinator and/or Enbridge representative, in consultation with appropriate agencies, would determine when it is necessary to evacuate spill sites to safeguard human health. Finally, the spill coordinator would complete a spill report formwithin 24-hours of the occurrence of a spill, regardless of the size of the spill. The environmental inspector would monitor the contractor's compliance with the provisions of this spill plan.

Each construction crew would have adequate absorbent materials and containment booms on hand, to enable the rapid cleanup of any spill which may occur. The contractor would maintain spill kits containing a sufficient quantity of absorbent and barrier materials to adequately contain and recover foreseeable spills. These kits may include, but are not limited to absorbent pads, straw bales, absorbent clay, sawdust, floor-drying agents, spill containment barriers, plastic sheeting, skimmer pumps, and holding tanks. This equipment would be located near fuel storage areas and other locations as necessary to be readily available to control foreseeable spills. A minimum of two 30-pound or four 20-pound fire extinguishers would be located and readily available at all fuel storage locations. The extinguishers would be located not less than 25 feet and not more than 75 feet from these locations.

Enbridge requires that the storage of petroleum products, refueling, lubricating and maintenance operations take place in upland areas that are more than 100 feet from wetlands, streams, and waterbodies (including drainage ditches), and water supply wells. In addition, the contractor must store hazardous materials, chemicals, fuel and lubricating oils, and perform concrete coating activities outside these areas. In certain instances, refueling or fuel storage within the 100-foot buffer may be unavoidable due to site-specific conditions or unique construction requirements (*e.g.* continuously operating pumps or equipment on barges). These locations must be identified by the contractor and approved in advance by the Environmental Inspector. Site-specific precautions, in addition to those practices described above, would be taken when refueling or maintenance activities are required within 100 feet of streams, wetlands or other waterbodies.

Overnight parking of equipment is not allowed within 100 feet of a wetland or waterbody unless special containment provisions have been implemented.

In addition to the above measures, the following conditions would apply if a spill occurs near or into a stream, wetland or other waterbody, regardless of size:

- If a spill should occur during refueling operations, the operation must be stopped until the spill can be controlled and the situation corrected.

- For spills into streams, lakes or other waterbodies containing standing or flowing water, regardless of size, the Contractor Representative must apprise Enbridge of the incident and notify the National Response Center immediately.

- For spills in standing water, sorbent booms and pads shall be on hand and used by the Contractor to contain and recover released materials. In addition, other spill response materials and equipment shall be on hand as appropriate for each waterbody and used to contain and recover foreseeable spills. This may include containment booms, skimmer pumps, holding tanks, boats, and other equipment.

- If necessary, for large spills in waterbodies, an Emergency Response Contractor must be secured to further contain and clean up the spill.

Contaminated soils in wetlands must be excavated and temporarily placed on plastic sheeting in a bermed area, a minimum of 100 feet away from the wetland. Contaminated soils shall be covered with plastic sheeting while being stored temporarily and properly disposed of as soon as possible, in accordance with this plan (see Section 7.0). Enbridge maintains spill records along its entire system. Historic leak sites may exist within the project area and the environmental inspector would be made aware of the location of these sites prior to work occurring in them. Unknown contamination or historic contamination encountered during construction would be managed per Enbridge's contaminated soils management plan. DNR Water Quality and Solid Waste program staff will continue to be notified of newly discovered sites.

All contaminated soils, absorbent materials, and other wastes shall be stored and disposed of by the Contractor in accordance with all applicable state and federal regulations. Enbridge would recycle those wastes, such as motor oil, where there is an established recycling program available. Wastes such as grease or oily rags shall be disposed of in accordance with state requirements. Only licensed carriers may be used to transport contaminated material from the site to a disposal facility. If it is necessary to temporarily store excavated soils on site, these materials shall be placed on, and covered by, plastic sheeting, or placed in properly labeled ring-top 55-gallon drums and the storage area bermed to prevent and contain runoff. Any hazardous or contaminated material stored on Enbridge property or the right-of-way would be properly labeled in accordance with state and US EPA labeling requirements.

Enbridge has outlined the reporting requirements in their spill plan for the diluent pipeline. Because of the benzene content (0-3% by volume), and low flashpoint (well below 140 degrees F.), the spilled material would need to be containerized, and then characterized as a possible

hazardous waste prior to disposal (TCLP, total metals, VOCs, PAHs and a flash point). If the contaminated soil was found to be within acceptable levels, Enbridge may submit an application for soil roasting under the Department's air management regulations. Engineered landfills may also accept contaminated soil for use as daily cover if its found to be within acceptable ranges and it's listed in the facility's plan of operation approval.

III.B.4.l. Construction across waterbodies

Enbridge would avoid and minimize impacts on waterbodies by implementing the measures described in its WI EMP and its revegetation plan. Enbridge's WI EMP outlines construction-related environmental policies, procedures, and mitigation measures developed by Enbridge for its pipeline construction projects based on Enbridge's experience during construction. It is intended to meet or exceed applicable federal, state, and local environmental protection and erosion control specifications, technical standards and practices. The WI EMP is designed to address typical circumstances and may be amended by Enbridge as necessary to address site-specific conditions.

Enbridge would limit the duration of construction within waterbodies and limit equipment operation within waterbodies to the area necessary to complete the crossing. Disturbed areas at crossings would be restored and stabilized as soon as practical after pipeline installation.

Stream crossings will be designed as close to perpendicular to the axis of the stream channel as engineering and routing constraints allow, creating the shortest crossing length.

The contractor will leave a 20-foot buffer (from the ordinary high water mark) of undisturbed herbaceous vegetation on all stream banks during initial clearing, except where grading is needed for bridge installation, or where restricted by applicable regulations and/or permit conditions. Woody vegetation within this buffer may be cut and removed during clearing, leaving the stumps and root structure intact. Non-woody vegetation and the soil profile will be left intact until the contractor is ready to begin trenching the stream crossing. The contractor will properly install and maintain sediment control measures at the 20-foot buffer line adjacent to streams immediately after clearing and prior to initial ground disturbance. This buffer should not be confused with the 50-foot setback required for extra workspace.

Extra workspaces include work areas outside the boundary of the typical construction ROW. These spaces are typically used to assemble pipe segments and for temporary spoil storage. Clearing of forested and brushy areas for EWS would be avoided as much as possible. Woody vegetation in wetlands and riparian areas would typically not be cleared for the purpose of EWS unless approved by appropriate regulatory agencies as stipulated in permits issued for the project. Extra workspaces will be constructed as follows:

- Extra workspaces will be located at least 50 feet away from the ordinary high water mark (OHWM) if topographic or other physical conditions such as stream channel meanders allow.

- If safe work practices or site conditions do not allow for a 50-foot setback, extra workspaces would be located no closer than 20 feet from the OHWM, subject to site-specific approval by Enbridge.

Extra workspaces would be limited to the minimum size needed to construct the stream crossing.

Spills from refueling operations, fuel storage, or equipment failure in or near a waterbody could affect aquatic resources and contaminate the waterbody downstream of the release point. Enbridge would minimize the potential impact of spills of hazardous materials by implementing the measures described in its spill prevention, containment, and control plan.

Proposed project activities within waterbodies would include the installation of temporary bridge crossings over 14 waterbodies for the purpose of moving construction equipment across the feature and the installation of two collocated pipes under the bed of the waterbody. Enbridge is proposing to use span bridges (i.e. timber mat or rail car) at all waterbody crossings in Wisconsin.

Equipment bridges would be installed prior to the installation of the Southern Lights Diluent Line and would not be removed until after restoration activities associated with the installation of both the Southern Lights Diluent Pipeline and Alberta Clipper Pipeline have been completed. The seeding and restoration crew would remove the bridges as a last step of the construction process when the bridges are no longer needed for access. Appropriate erosion control measures would be implemented and maintained during and after the utilization of the temporary crossing.

Enbridge plans to utilize two types of span bridge to facilitate construction equipment access across all waterbodies as well as construction of waterbody crossings. The bridge materials proposed include: timber mat and rail car bridges. A typical timber mat bridge would consist of conventional wooden timber mast used as bridge approaches and ramps, cross-member supports laid along the top of banks, and as spans themselves over the waterbody. Rail car bridges would consist of metal undercarriages from rail cars that span the waterbody and are set onto timber mat cross-members. Rail car bridges are commonly used for wider waterbodies as opposed to narrower waterbodies that can be spanned with one length of conventional wooden timber mats. None of the proposed bridges would require in-stream support structures.

Equipment bridges would be designed to withstand the maximum foreseeable flow of the stream, and would be securely anchored on one end with cables or cable-like material. This anchoring configuration would allow the bridge to move in the event of a high flow, while remaining anchored in place on one side. Bridges would not restrict flow or pool water while the bridge is in place, and would be constructed with clean materials. Bridges would be designed and maintained to prevent soil from entering the waterbody. Any soil that accumulates on the bridge decking would be removed as needed, or deemed necessary by the Enbridge’s EI.

A dry crossing procedure is the method of choice for crossing relatively sensitive waterbodies when guided bores or HDDs are impracticable. Enbridge believes that the integrity of the Pokegama River can be maintained intact with minimal temporary and no permanent disturbance

using dam and pump methods. Enbridge has developed additional mitigation procedures associated with dry crossing methods (dam and pump or flume).

Dry crossings are characterized by the following positive environmental features: limited sediment release, maintenance of streamflow, and limited to no affect on fish or fish habitat.

Risks associated with dam and pump methods include flooding, disturbance to riparian habitat, longer in-stream construction times increasing the risk of flooding during precipitation events, and disturbance resulting from bank grading, dam construction, and bank reclamation. These methods are more dependent on equipment integrity and proper installation planning and design.

Dam and pump method risks can be mitigated by: (1) developing plans including erosion, turbidity, and water flow controls and management based on stream characteristics such as substrate type, morphology, and discharge volumes and rates; (2) ensuring that sufficient materials are on hand to keep dams and flanges sealed; (3) ensuring that adequate backup pumps, hoses and other necessary equipment to maintain dams are available to handle additional flows associated with pump failures and precipitation events; and (4) ensuring that steep slopes and stream banks are stabilized and protected during construction, clean-up, and restoration.

The proposed project would entail the installation of two collocated pipes within 67 wetlands. One of the waterbodies (Pokegama River) is a perennial stream. Enbridge has classified eleven of the waterbodies as having an intermittent water flow and two as having a seasonal water flow. The specific waterbody crossing methods Enbridge originally proposed to implement at each waterbody are identified in Table 12.

Table 12- Water Bodies and Proposed Crossing Methods

Waterbodies Crossed by the Alberta Clipper and Southern Lights Diluent Pipeline Project										
						Proposed Crossing Method [a]		Alternative Crossing Method [b]		
Name	Designation	Milepost	Classification	Crossing Width (feet)	Special Regulation or Classification [c]	20-Inch	36-Inch	20-Inch	36-Inch	Bridge [d]
Trib. to Pokegama River	wb1085b	1085.0	Intermittent	12	None	GB	Dry	Dry	OC	Span
Trib. to Pokegama River	wb1086a1	1085.9	Intermittent	30[e]	None	GB	OC Dry	Dry	Dry OC	Span
Trib. to Pokegama River	Wb1086a2	1085.9	Intermittent	30 [e]	None	GB	OC Dry	Dry	Dry OC	Span
Trib. to Pokegama River	wb1086a3	1085.97	Intermittent	30	None	GB	OC Dry	Dry	Dry OC	Span
Trib. to Pokegama River	wb1086.08a 4	1086.08	Intermittent	Too wet	None	GB	OC Dry	Dry	Dry OC	Span
Trib. to Pokegama River	wb1086b	1087.0	Intermittent	4	None	GB	OC Dry	OC Dry	Dry OC	Span
Trib. to Pokegama River	wb1087b	1087.5	Seasonal	40	None	GB	Dry	Dry	OC	Span
Trib. to Pokegama River	wb1088a	1088.4	Intermittent	6	None	GB	OC Dry	OC Dry	Dry OC	Span
Unnamed Ditch	wb1089a	1089.3	Intermittent	20	None	OC Dry	OC Dry	OC	Dry OC	Span
Unnamed Ditch	8rwb1089b	1089.5	Intermittent	0	None	GB	OC Dry	OC Dry	Dry OC	Span
Unnamed Ditch	8rwb1089a	1089.7	Intermittent	10	None	GB	OC Dry	OC Dry	Dry OC	Span
Unnamed Ditch	wb1089c	1089.9	Intermittent	9	None	GB	OC Dry	OC Dry	OC Dry	Span
Tributary to Little Pokegama River	wb1090a	1090.6	Intermittent	3	None	GB	OC Dry	OC Dry	Dry OC	Span
Tributary to Little Pokegama River	wb1090b	1090.8	Intermittent	3	None	GB	OC Dry	OC Dry	Dry OC	Span
Trib. to Pokegama River	wb1093a	1094.2	Seasonal	9	ASNRI	GB	OC Dry	OC Dry	Dry OC	Span
Pokegama River	wb1094a	1094.4	Perennial	30	ASNRI	HDD/ GB	N/A	HDD	N/A	Span
Unnamed waterbody Trib. to Nemadji River	wb1096a	1097.0	Intermittent	15	ASNRI	OC Dry	OC Dry	Dry OC	Dry OC	Span

[a] OC: Open Cut: open trench method used in conditions of no flow, sometimes referred to as the "wet trench" method.
GB: Guided bore: guided bore crossing method.
HDD: Horizontal Directional Drill

[b] Dry: open trench method used in conditions where a discernible water flow is present in the water body; referred to as the "dry trench" method, water is routed around the excavation area using either a dam and pump or flume pipe.

[c] Based on WDNR Surface Water Viewer for Areas of Special Natural Resource Interest (ASNRI)

[d] Span: Timber Mat Bridge, or Rail Car

[e] Pipe will be installed with one crossing

Enbridge originally proposed to use an open-cut construction method (referred to in the WI EMP as the wet trench method) at waterbodies with no discernible flow at the time of construction. Enbridge proposes that their environmental inspector, in conjunction with the WDNR compliance monitor, would make the determination on whether a discernible flow is present in the waterbody prior to the staging of the waterbody crossing. In the event a waterbody has discernible flow at the time of crossing, Enbridge proposes to use the dam and pump or flume construction method (a dry crossing method). Site specific conditions such as flow rates, water depth, soil conditions (saturation, organic, unconsolidated substrate) and workspace constraints would determine which dry crossing method would be used.

In response to agency concerns about the flashiness of area streams and the tendency for erosion of clay plain soils, Enbridge reconsidered their stream crossing methods. Open cut methods originally proposed for the Alberta Clipper crossing of eight, intermittent waterbodies have been changed to dry crossing methods to minimize construction-induced release of sediments. Regardless of their flow regime, no waterbodies are proposed for open cut crossings unless they are dry or have no perceptible flow at the time of construction. In addition, ten waterbody crossings for Southern Lights Diluent construction have been changed to trenchless methods (guided bores) that will avoid all impacts to the streams in question. In the unlikely event that guided bores fail during construction and are not practicable, dry crossing methods will be employed unless the stream has no perceptible flow during the time of crossing that will permit open cut crossings with no additional impact. Two waterbodies (8rwb1089a - intermittent ditch and wb1094a – the Pokegama River) are proposed for dry crossings for the Southern Lights diluent pipeline.

Enbridge is proposing the guided bore technique as an alternative crossing for the 20-inch Southern Lights Diluent pipeline only. The guided bore technique is similar to the horizontal directional drill crossing method. The substrate composition is an important factor for the success of completing the bore. The bore path for larger diameter pipes, such as the 36-diameter Alberta Clipper pipeline, must be deeper and longer than with smaller diameter pipes because the larger pipe cannot sustain bending to the extent of smaller pipes. Therefore, the guided bore method cannot be utilized for installation of the Alberta Clipper pipeline under waterbodies.

Pokegama River crossing

For the Pokegama River crossing, Enbridge has considered the physical and environmental setting in the area of the crossing and concluded that the stream: (1) is too deeply entrenched to accommodate guided bore methods for the Southern Lights Diluent pipeline crossing, (2) has too many physical site constraints and is not large enough or sensitive enough to justify the additional environmental impacts associated with an HDD crossing for the Alberta Clipper pipeline, and (3) has physical characteristics that are suited to a dry crossing for both Alberta Clipper and Southern Lights Diluent pipelines.

1. Enbridge has stated that using HDD methods for the 36-inch Alberta Clipper pipeline would require a minimum of approximately 1300 feet to cross the river (Enbridge, December 2008). This required minimum distance is increased by a 70 foot increase in the elevation of the staging points on the red clay plain above the river. In addition, the crossing is located

between sewage treatment ponds and residential areas that are immediately adjacent to the entrenched valley.

2. Enbridge claims that the use of guided bore for the Southern Lights diluent pipeline crossing is precluded by the depth of the valley and the steepness and length of the adjacent slopes. A bore is restricted to a relatively narrow crossing distance range varying from 200-700 feet in length. The entry and exit angles required to provide the correct radius of curvature to bore a descending diagonal arc down through uplands on the entry side, travel several feet (15 feet would be common) under the streambed, and an ascending arc to come back up through the uplands on the exit side to the final exist point are too steep to accommodate the 20-inch pipe. In addition, the low amount of available work space resulting from the presence of the sewage ponds and adjacent residential areas precludes the staging of a guided bore within the valley that would be closer to the river and at lower elevations.

3. Enbridge is of the opinion that since the Pokegama River discharges into Pokegama Bay approximately 1.7 river miles downstream of the proposed route crossing, the potential for sedimentation impacts to the St, Louis River would be small, assuming that a dry crossing will be used to reduce sediment production during construction.

In the event that a dry crossing proves to be impracticable for either Alberta Clipper or Southern Lights pipelines, Enbridge proposed an open cut (wet trench) alternative crossing method subject to agency monitor review and approval.

III.B.4.l.01. Open cut/wet trench method

The open cut/wet trench method would be used to cross streams and rivers without discernible flow at the time of construction. Prior to grading within the 20-foot vegetative buffer left on the streambank, Enbridge's contractor would install the appropriate erosion and sediment control measures (ECDs). Spoil containment structures would be installed back from the stream bank so that spoil does not migrate into the stream. Grading would be directed away from the waterbody to minimize the potential for sediment to enter the stream. Grading of stream banks would be restricted to the trench line and areas necessary for safe bridge installation.

After grading, backhoes or draglines would be used to excavate the trench within the waterbody. Excavating equipment would operate from one or both banks without entering the stream. If equipment must encroach into the stream, it would operate on clean construction mats. Streambed material would be segregated and placed within a spoil containment structure in approved construction work area limits as indicated on the Wisconsin Environmental Plan Sheets and the typical wet trench construction.

Earthen trench plugs (hard plugs) between the stream and the upland trench would be left undisturbed during excavation of the in-stream trench to prevent diversion of the stream flow into the open trench and to prevent water that may have accumulated in the adjacent upland trench from entering the waterbody. Trench plugs would be removed immediately prior to pipe placement, and then replaced when the pipe is in place.

In-stream trenching and backfilling would typically be completed within 24 hours or less on minor waterbodies (less than 10 feet wide) and 48 hours or less on intermediate (between10 and 100 feet wide) or as directed by applicable permits. No waterbodies greater than 100 feet in-width within Wisconsin would be crossed by the project.

Backfilling would begin after the pipe is positioned in the trench at the desired depth. Backfill material would consist of the spoil material excavated from the trench and parent streambed unless otherwise specified in state or federal permits. The in-stream trench would be backfilled so that the stream bottom is as near as practicable to its pre-construction condition, with no impediments to normal water flow.

Enbridge would restore the stream banks as near as practicable to pre-construction conditions unless that slope is determined to be unstable. Once the banks have been reshaped, BMPs would be installed within 24 hours of backfilling the crossing. Temporary slope breakers would be installed on all sloped approaches to streams in accordance with the spacing requirements outlined in section 1.6.10 of the WI EMP .

A temporary seed mix (e.g., annual rye or annual oats) and mulch and/or erosion control blankets would be installed within a 50-foot buffer on either side of the stream as indicated in Enbridge's Revegetation Plan. Silt fence would be installed upslope of the temporary seeding area.

If trench dewatering is necessary, the pump intake would be suspended off the trench bottom and dewatering would take place into a sediment filter bag or a straw bale dewatering structure as indicated in the WI EMP.

III.B.4.l.02. Dam and pump method

The dam and pump method is a dry crossing method that is typically best suited for low flow streams and is a preferred alternative to fluming when crossing meandering channels. The dam and pump method involves damming of the stream with sandbags, inflatable dams, and/or steel plates upstream and downstream of the proposed trench and pumping water around the construction area before excavation activities begin. Pumping of the stream across the ROW would commence simultaneously with dam construction to prevent interruption of downstream flow. Stream flow would be pumped across the construction area through a hose and would be discharged to an energy dissipation device, such as plywood boards, to prevent scouring of the stream bed.

The pumps would be located on the upstream side of the crossing and would be placed in impermeable, sided structures which would act as containment units for the pumps and fuel containers. The pumps used would not be placed directly in the stream or on the streambed. Onsite pumps would be sized to have a capacity greater than the anticipated stream flow. The pumping operation would be staffed 24 hours a day and pumping would be monitored and adjusted as necessary to maintain an even flow of water across the work area and near-normal water levels upstream and downstream from the crossing. A backup pump of equal or greater capacity would be on-site at all times in the event that the primary pump fails. Enbridge's

contractor would follow the Spill Prevention, Containment, and Control Plan in the event of a fuel spill.

Prior to the initiation of trenching activities, water that is isolated in the construction area by the dams would be pumped into a sediment filter bag and/or straw bale dewatering structure located in such a manner that no heavily silt-laden water flows into streams or wetlands. Only non-woven fabric would be used for filter bags.

Backhoes located on one or both stream banks would excavate a trench across the stream bed. Streambed material would be segregated and placed within a spoil containment structure in approved construction work area limits. Existing streambed material would be segregated and placed within a spoil containment structure in approved construction work area limits.

Backfilling would begin after the pipe positioned in the trench to the desired depth. Backfill material would consist of the spoil material and parent streambed excavated from the trench unless otherwise specified in state or federal permits. The in-stream trench would be backfilled so that the stream bottom is similar to its pre-construction condition, with no impediments to normal water flow.

After the trench has been back filled, the dams would be removed and water flow across the trenchline would be restored.

III.B.4.l.03. Flume method

The flume method is typically best suited for crossing sensitive, relatively narrow streams that have straight channels and are relatively free of large rocks and bedrock at the point of crossing. This flume method involves the placement of flume pipe(s) in the stream bed to convey stream flow across the construction area without introducing sediment to the water. Enbridge's contractor would install a flume(s) of sufficient diameter to transport the maximum flows anticipated to be generated from the watershed at the crossing location. The flume(s) are typically 40 to 60 feet in length.

The upstream and downstream ends of the flume(s) would be incorporated into dams made of sand bags and plastic sheeting (or equivalent). The upstream dam would be constructed first and would funnel stream flow into the flume(s). The downstream dam would prevent backwash of water into the trench and construction work area. The dams would be continuously monitored for a proper seal. Adjustments to the dams would be made as necessary to prevent large volumes of water from seeping around the dams and into the trench and construction work area.

Prior to the initiation of trenching activities, water that is isolated in the construction area by the dams would be pumped into a sediment filter bag and/or straw bale dewatering structure located in such a manner that no heavily silt-laden water flows into streams or wetlands. Only non-woven fabric would be used for filter bags.

Backhoes located on one or both stream banks would excavate a trench across the stream bed. Streambed material would be segregated and placed within a spoil containment structure in

approved construction work area limits. Existing streambed material would be segregated and placed within a spoil containment structure in approved construction work area limits.

Backfilling would begin after the pipe is position in the trench to the desired depth. Backfill material would consist of the spoil material and parent streambed excavated from the trench unless otherwise specified in state or federal permits. The in-stream trench would be backfilled so that the stream bottom is similar to its pre-construction condition, with no impediments to normal water flow.

After the stream banks have been stabilized, the dams would be removed from the stream bed allowing water to resume its flow in the channel. The flume pipe(s) and dams would then be removed.

III.B.4.l.04. Guided bore method

The guided boring method is used in conjunction with horizontal auger boring to install small diameter pipe with greater grade and alignment precision than normal auger boring. The guided bore method differs from the typical horizontal direction drill method in that the guided bore machine (GBM) contains a specially designed theodolite guidance system to guide the installation of pipes. Through a continuous video feed, the contractor is able to maintain a more accurate path for the pilot head. The success of this method is completely dependent upon the ground conditions. If soils with boulders are encountered, the auger tubes might be deflected, which would eliminate the precision of the equipment to remain on line and on grade. Enbridge proposes to cross one waterbody with the Southern Lights Diluent Pipeline, the Pokegama River, using this construction method.

III.B.4.l.05. Restoration at waterbody crossings

After backfilling the bed and banks of the waterbody would be restored as near as practicable to preconstruction condition, unless that slope is determined to be unstable. Bank restoration would attempt to transition the disturbed areas into the natural stream bank with the intent to stabilize the bank and create a blended, natural appearance.

Stream banks disturbed during installation of the pipelines would be stabilized with erosion control materials such as sewn straw mats, jute mats, coconut erosion control blankets, or biodegradable synthetic erosion control blankets. Banks would be seeded in accordance with Enbridge’s Revegetation Plan. If there is a potential for significant bank erosion, the disturbed stream banks may be stabilized with rock riprap or other bank protection measures as approved by the WDNR. Appropriate erosion control blankets would be installed on the on the bank area disturbed during installation of the pipeline or in the event riprap is used on the stream banks upslope of the riprap.

Trench breakers would be installed at the stream banks, as needed, where slopes are adjacent to the waterbodies to prevent subsurface water flow and erosion along the trench line. Trench breakers would typically consist of burlap sandbags filled with rock-free subsoil or sand and placed from the bottom of the trench to near the top, completely surrounding the pipe. In

addition, berms or other sediment filter devices would be installed at the base of sloped approaches (greater than five percent) to streams and the outlet of the berm would be directed away from the stream into a well-vegetated area. Permanent stabilization would be initiated within 24 hours, unless site and weather conditions, delay permanent installation.

The travel lane portion of the construction ROW and the temporary bridge would remain in place until pipeline construction activities (including final clean-up) are complete. Permanent slope breakers would be installed across the full width of the ROW during final clean-up. Temporary bridges would be removed during the final clean-up and restoration phase of construction after installation of the pipelines and ROW access is no longer required. Temporary sediment control devices across the construction ROW would be removed only after a vegetative cover has been achieved, in accordance with permit conditions.

III.B.4.l.06. Revegetation at waterbody crossings

The stream banks and adjacent areas disturbed during installation of the pipelines would be seeded in accordance with permit stipulations, and mulch would be applied as needed on slopes.

Enbridge would reestablish stream bank vegetation using the upland seed mix listed in Table 10 in Section III.B.4.h., unless an alternate seed mix is requested by applicable agencies. Additional vegetation requirements may also be contained within project specific permits. Where a waterbody is located within a wetland, Enbridge will reseed the banks with the applicable wetland seed mix.

III.B.4.m. Construction across wetlands

Enbridge proposes to use conventional construction methods in wetlands. Conventional construction methods are similar to those implemented in uplands. Construction is conducted in a sequential manner and consists of clearing, stringing, trenching, dewatering, installation, backfilling, final cleanup, and revegetation activities. Construction activities will be minimized in wetlands to the extent practicable. Enbridge will also use special construction techniques to minimize the disturbance to plants and soils and to protect wetland hydrology.

The contractor must use the construction ROW and only approved roads to access wetland areas.

No storage of hazardous materials, chemicals, fuels, and lubricating oils, and no concrete coating activities would be permitted in, or within 100 feet of, any wetland. Vehicles and equipment left on the ROW overnight must be parked at least 100 feet from a delineated wetland. Construction equipment would be refueled in upland areas at least 100 feet from a wetland. Where the contractor and EI determine that conditions require construction equipment (e.g., swamp hoe, trench dewatering pumps, or portable generators) to be refueled within 100 feet of a wetland, the contractor must follow the procedures described in Enbridge's Spill Containment and Control Plan and implement additional provisions based on site-specific conditions. No equipment will be washed or lubricated, within 100 feet of streams or waterbodies. Maintenance of construction equipment will not be allowed within the 100 foot buffer zone without approval from the EI with additional special provisions for containment.

Clearing the construction ROW in wetlands would proceed in a manner similar to clearing in uplands. For construction to proceed, obstructions (e.g., trees, brush, and logs) need to be removed. Typically, low ground pressure equipment would be used, limiting disturbance to the wetland. When clearing in wetlands, the following restrictions apply:

- The construction ROW width would typically be limited to 125 feet;
- Clearing of extra workspaces in forested wetlands would be minimized as much as practicable and in accordance with applicable permits;
- Vegetation and trees within wetlands would be cut off at ground level, leaving existing root systems intact;
- Hydro-axe debris, or similar, can be left in the wetland if spread evenly in the ROW to a depth not to exceed 1 inch in thickness and in a manner, as determined by the EI, which would allow for normal revegetation; and
- Staging areas, additional spoil storage areas, and other additional work areas would be located in upland areas at least 50 feet away from wetland boundaries, where safe work practices or site conditions permit. Where site conditions do not permit a 50-foot setback, these areas would be located as far away from the wetland as is practicable. Vegetation would not be cleared between these areas and the wetland in any event. No construction activities including vegetation clearing or earthwork would occur between the EWS and sensitive resource areas (wetlands or waterways).

Enbridge would minimize impacts in wetlands by implementing the mitigative measures specified in the WI EMP, including:

- Wetland vegetation would be cut off at ground level and removed from the wetland areas;
- Construction mats would be used, as needed, to facilitate equipment access and pipeline installation;
- Temporary erosion control devices would be installed prior to trenching activities;
- The top 1 foot of topsoil or the amount of topsoil present, whichever is less, would be stripped over the trench line, segregated, and replaced in unsaturated wetlands;
- Surface water flow would be maintained during construction to the extent practicable;
- Wetlands would be restored to preconstruction conditions;

- Wetland hydrology would be maintained by using trench breakers when necessary, and sufficiently compacting the pipeline trench;

- Unsaturated wetlands would be revegetated with a temporary cover crop; and

- Wetland vegetation would be allowed to naturally revegetate with wetland plants common to the area.

Erosion and Sediment Control Devices (ECDs) (e.g., silt fence) would be installed after clearing activities and prior to the initiation of grading activities. ECDs would be installed across the entire construction ROW upslope of the wetland boundary, where necessary, to prevent sediment flow into the wetland. Where wetlands are adjacent to the construction ROW and the ROW slopes toward the wetlands, ECDs would be installed along the edge of the construction ROW as necessary to prevent sediment flow into the wetlands. ECDs would be installed along the edge of the construction ROW, as necessary, to contain spoil and sediment within the construction ROW through wetlands.

ECDs would be maintained in proper working order to prevent the flow of sediment into wetlands from spoil piles or sloped approaches that are adjacent to the wetlands. When the depth of sediment reaches one-third of the height of a sediment barrier, the barrier would be replaced and/or sediment removed. Non-functional sediment-control measures would be repaired, replaced, or supplemented with functional features as soon as possible but in all cases within 24 hours of discovery, where site conditions permit.

Supplemental equipment supports, such as timber mats, would be used in wetlands, where necessary, to provide temporary portable support for construction equipment and minimize soil compaction and/or soil mixing. No more than two layers of equipment mats would be used to support equipment on the construction ROW unless prior approval is obtained from Enbridge. The contractor is responsible for having a sufficient number of construction mats to perform the work. Tree stumps, brush riprap, imported soil, and rock fill cannot be brought in to stabilize the ROW in wetlands. Timber riprap (also known as corduroy road) cannot be used without prior written approval from the company and the appropriate regulatory agencies. Pre-existing corduroy roads in wetlands may be used but may not be improved, maintained, restored, or replaced without site-specific authorization from applicable agencies. Subsoil excavated from the pipeline trench in the wetland may be placed on top of equipment mats for additional stabilization. All timber mats, construction debris, and larger woody vegetative debris (greater than 1.5 inch diameter) would be removed during cleanup of wetlands.

Where necessary, grading activities would be conducted in a manner consistent with applicable federal, state, and local permits and would be confined to the area of the trench. Grading outside the trench is only permitted where required to ensure safety and restore the ROW after backfilling the trench.

Typically, when constructing in wetland areas without standing water, up to one foot of topsoil (organic layer) would be stripped from the trench line and stockpiled separate from trench spoil

as described in section 1.6.8 of the WI EMP. In standing water wetlands, organic soil segregation is not typically practical; however, Enbridge would attempt to segregate as much of the organic layer as possible based on site/saturation conditions. If normally unsaturated wetlands are saturated at the time of construction, topsoil segregation would be attempted and based on recommendations from the EI and appropriate regulatory agencies.

Enbridge has attempted to locate EWS outside of wetlands wherever practicable; however, EWS have been proposed in select wetlands where the wetland is adjacent to a waterbody, road, railroads, foreign utility crossings and/or pipeline cross-over. Clearing of forested wetlands for EWS will be avoided as much as possible. Woody vegetation in wetlands will not be cleared for the purpose of EWS unless approved by appropriate regulatory agency.

Staging areas, additional spoil storage areas, and other additional work areas (EWS) would be located in upland areas at least 50 feet away from wetland boundaries, where safe work practices or site conditions permit. If site conditions do not permit a 50-foot setback, then these areas would be located as far away from the wetland as is practicable. Vegetation would not be cleared between these areas and the wetland in any event. No construction activities including vegetation clearing or earthwork would occur between the EWS and sensitive resource areas (wetlands or waterways). The size of the additional workspace areas will be limited to the minimum needed to construct the wetland crossing.

Grading in a wetland, if required, would be conducted in a manner consistent with applicable federal, state, and local permits. Grading activities would be confined to the area of the trench. Grading outside the trench is only permitted where required to ensure safety and restore the ROW after backfilling the trench.

Erosion control measures (e.g., silt fence) would be installed across the entire construction ROW upslope of the wetland boundary, where necessary, to prevent sediment flow into the wetland. Where wetlands are adjacent to the construction ROW and the ROW slopes toward the wetlands, erosion control would be installed along the edge of the construction ROW as necessary to prevent sediment flow into the wetlands. Erosion control measures would be installed along the edge of the construction ROW, as necessary, to contain spoil and sediment within the construction ROW through wetlands.

Erosion control measures would be maintained in proper working order to prevent the flow of sediment into wetlands from spoil piles or sloped approaches that are adjacent to the wetlands. When the depth of sediment reaches one-third of the height of a sediment barrier, the barrier would be replaced and/or the sediment removed. Non-functional sediment-control measures would be repaired, replaced, or supplemented with functional features as soon as possible but in all cases within 24 hours of discovery.

Supplemental equipment supports, such as timber mats, would be used in wetlands where necessary to provide temporary portable support for construction equipment and minimize soil compaction and/or soil mixing. No more than two layers of equipment mats would be used to support equipment on the construction ROW unless prior approval is obtained from Enbridge. The contractor is responsible for having a sufficient number of construction mats to perform the

work. Tree stumps, brush riprap, imported soil, and rock fill shall not be brought in to stabilize the ROW in wetlands. Timber riprap (also known as corduroy road) cannot be used without prior written approval from the company and the appropriate regulatory agencies. Pre-existing corduroy roads in wetlands may be used but may not be improved, maintained, restored, or replaced without site-specific authorization from applicable agencies. Subsoil excavated from the pipeline trench in the wetland may be placed on top of equipment mats for additional stabilization.

All timber mats, construction debris, and larger woody vegetative debris (greater than 1.5 inch diameter) would be removed during cleanup of wetlands.

Excavation of the pipeline trench in wetlands typically would be accomplished using backhoe excavators. The amount and type of construction equipment that operates within the limits of a wetland would depend on the soil conditions within the wetland at the time of construction. If the wetland soils are not saturated at the time of construction and can support both tracked and rubber tired equipment (*i.e.*, trackhoes, sideboom tractors, welding trucks) with or without supplemental support, then the trench would be excavated using conventional construction techniques. The duration of open trench will be minimized to the extent possible.

Excavated material would be sidecast (stockpiled) within the approved construction ROW and stored in a manner that minimizes erosion impacts and topsoil – subsoil mixing.

Where the EI determines that the pipeline trench has the potential to drain or partially drain a wetland, trench breakers would be installed as necessary to maintain the original wetland hydrology.

Enbridge would install the pipeline in wetlands using conventional pipeline construction methods which mirror upland construction techniques. Pipe sections would be strung, welded, and lowered into the trench. Where standard methods are not practicable due to saturated conditions or the presence of standing water, Enbridge may use the push/pull techniques, however, no areas requiring push/pull techniques have been identified to-date.

Large wetlands with standing water can generally not be crossed with typical crossing methods. In these areas, the pipeline will be assembled in an upland area and positioned in the trench using the “push-pull" and/or "float" techniques. Usually this fabrication requires use of extra temporary workspace adjacent to the ROW. The trench will be dug by a backhoe (or equivalent) supported on timber mats. The prefabricated section of pipeline will then be pushed-pulled into position or floated across the wetland. When the pipeline is in position, floats, if used, will be removed and the pipeline will sink into position. The trench will then be backfilled and the wetland will be restored by a backhoe or similar equipment working from construction mats or by low ground pressure equipment.

Concrete for concrete pipe coating, if needed, would generally be mixed off-site, and concrete coated pipe would be transported to the ROW on trucks. If required, pre-fabricated concrete weights and/or saddlebag weights would also be used to provide negative buoyancy. Concrete weights would be manufactured off-site and transported to the ROW. Weights would be strung

along the construction ROW, where necessary, until they are placed over the pipe within the excavated ditch. Limited mixing and coating activities may occur on the construction ROW for coating pipe joints and concrete weight repairs according to the concrete usage specifications in Enbridge's Spill Plan. Washing equipment used for mixing, pouring, casting, or coating would not be conducted within 100-feet of any wetland and would be conducted and contained in a leak-proof containment facility or impermeable liner. Erosion and sediment controls would be installed downslope of equipment wash areas where needed to capture sediments and minimize erosion from runoff. Concrete coating on the pipe must be cured for a minimum of 3 days prior to installation in a wetland due to potential toxic effects on wetland and aquatic biota.

III.B.4.m.01. Restoration in wetlands

Wetlands would be restored as near as practicable to pre-construction conditions and must make a reasonable attempt to return the subsoil to its pre-construction density. During backfilling of wetland areas, subsoil material removed from the trench during construction would be replaced so that the material is not mounded above the adjacent ground surface (undisturbed trench wall). Subsoil that exceeds the elevation of he ground adjacent to the trench would be removed from the wetland and disposed of in an upland area or approved disposal site. After the trench has been backfilled with subsoil, previously segregated topsoil would be spread over the trench area and mounded no more than 12 inches above the adjacent, undisturbed soil.

Cleanup and rough grading activities may take place simultaneously. Cleanup typically would involve removing construction debris and replacing fences removed during construction. Rough grading would include restoring original conditions within the disturbed areas (i.e., ditchline, spoil storage areas, and equipment travel lane) and installing or repairing temporary erosion control measures. Cleanup and rough grading (including installation of temporary erosion control measures) would begin as soon as practical after the trench is backfilled, weather permitting.

Temporary slope breakers would be installed near the boundary between the wetland and adjacent sloped approaches, to prevent sediment flow into the wetland. Where necessary to prevent erosion, disturbed wetland areas would be stabilized by seeding with a temporary cover in accordance with Enbridge's Revegetation Plan.

The affected emergent/wet meadow wetlands would be restored and re-vegetated, pursuant to Enbridge's WI EMP and Revegetation Plan. Enbridge does not anticipate any structural changes or changes to the functional values of these wetlands.

III.B.4.m.02. Revegetation in wetlands

Where necessary to prevent erosion, disturbed wetland areas will be stabilized by seeding with a temporary cover in accordance with Enbridge's Revegetation and Restoring Monitoring Plan. Non-standing water wetlands would be seeded with the seed mix shown in Table 13, below, to provide temporary cover. These wetlands would then be allowed to revegetate naturally. The natural revegetation process would be encouraged by the seeds and rhizomes in the topsoil

spread back over the right-of-way after pipe installation. No fertilizer, lime, or mulch would be applied in wetlands.

Table 13 - Wisconsin Unsaturated Wetland Seed Mix, General Restoration Mix

Seed Name	**Pure Live Seed (Pounds Per Acre)**	**Percent (%) of Seed**
Virginia Wild Rye (Elymus virginicus)	6	30%
Annual Rye Grass *(Lolium perene)*	8	40%
Fowl Bluegrass *(Poa palustris)*	6	30%
Total	20.0 pounds	100%

Enbridge does not propose to seed standing water wetland areas.

Enbridge proposes to allow natural reforestation of the temporary workspace area within forested wetlands via stump sprouting, root sprouting, and natural recruitment. Specific forested wetland restoration provisions will be followed as indicated in applicable permits issued for the project.

III.B.4.n. Mitigation

Enbridge would provide compensatory mitigation for permanent and temporal wetland impacts in accordance with COE requirements. DNR review of wetland water quality impacts under Chapter NR 103, Wis. Adm. Code does not require wetland mitigation. Wetland mitigation is considered by the U.S. Army Corps of Engineers under Section 404 of the Clean Water Act. See Section IV.B.7. for a description of the proposed wetland mitigation site.

III.B.4.o. Construction in Pokegama Canegie area

The Pokegama Carnegie Wetlands ASNRI and SNA were identified, proposed, and established subsequent to the Enbridge Terrace 3 pipeline installation that occurred in 2003. Four pipelines currently exist within the permanently maintained Enbridge corridor through the PC ASNRI and SNA. Enbridge's Project proposes to expand the area cleared for construction by 75 feet and add to the permanently maintained ROW by 10 feet. A typical construction drawing illustrating the construction configuration is provided.

Enbridge proposed the following modifications to crossing procedures to minimize or eliminate adverse impacts to the PC ASNRI.

Enbridge proposed to perform a detailed, Order 1 soil survey of the construction ROW. This survey would be performed under the supervision of a soil scientist licensed in the State of Wisconsin, and would focus on the identification of intact hydrologic regimes represented by site soils. The mapping scale would be negotiated between the agencies and Enbridge, but would be at a fine enough detail to identify micro-topographic features including subtle drainageways carrying surface runoff during spring snowmelt and heavy precipitation events. The resulting map would be used during construction and restoration to appropriately segregate or maintain

topsoil and facilitate the restoration of micro-topographic features (depressions, inter-depression ridges, and drainage-ways) to their pre-construction locations.

Enbridge proposed to employ a trained environmental inspector and monitor. An Environmental Inspector (EI) that reports to Enbridge and Environmental Monitors that report to the Wisconsin DNR would be wetlands specialists trained in the procedures within the final, approved, site-specific crossing plan for the PC ASNRI.

Based on the recommendations of the Wisconsin DNR, Enbridge agreed to install both pipelines through the vast majority of the Pokegama-Carnegie wetland complex, including all of the State Natural Area, by horizontal directional drilling (HDD).

Clearing would occur during July and August 2009 and would be performed to minimize soil disturbance while ensuring that brush would be cut off at ground level to facilitate subsequent surface soil segregation. Brush would be removed to an approved upland area for burning or off-site disposal. This would not necessarily be the case at locations of rare plants as discussed below.

There are three options to consider assuming that these rare plant populations would be impacted during the construction process, and these would be incorporated into a restoration plan. The approach would be refined during consultation with agency ecologists but would likely include or consider the following options:

a. Limiting seeding to an annual cover crop only (winter wheat);

b. Conducting onsite seed collection; and

c. Development of a specified seed mix.

All of these considerations would require post-construction grading on a finer scale (fine grading) and use of a cover crop as an erosion control measure immediately after final grade.

Pipeline construction would be restricted to late summer when the wetlands in the PC ASNRI are typically dry. Pipeline construction creates greater impacts to wet soils through consolidation and compaction reducing hydraulic conductivity and increasing bulk density. Trafficking wet soils can result in rutting or potential soil mixing. Impacts are significantly reduced when construction occurs during dry periods.

Enbridge proposed to minimize the length of the construction period through the ASNRI. Typical construction protocols for the Project are described in the EMP. To minimize the amount of time required for construction; the construction gap between the installation of the Southern Lights Diluent Line (to be installed first) and the Alberta Clipper Pipeline would be minimized to the extent practicable. A detailed march chart would be developed for the important components of pipeline construction. The march chart would be modified as necessary to account for weather-related alterations in construction.

Enbridge proposed site-specific surface soil stripping protocols. With the exception of Cathro soils, surface soils are very thin, yet contain important seed bank components. The top 2-3 inches of native, undisturbed soil including alder/willow stumps and roots would be stripped within the PROW and segregated at the edge of the CROW. Large root/stumps would be removed from the segregated surface soils and would be collected for off-site disposal. Stripped soils would be moved perpendicular to the lay to facilitate the return of the soils to the locations from which they were stripped. Stripping would occur over the subsoil storage area, and the trench. Soil disturbance resulting from trafficking, loading, rutting, or mixing would be limited to subsoils.

Enbridge proposed to limit construction traffic to timber mats. The use of timber mats on areas stripped of surface soil would limit consolidation, compaction, puddling and mixing of working side subsoils. While some compaction/consolidation will occur, the hydraulic conductivity of the subsoils is so low that is unlikely that any lasting hydrologic effects will occur. In addition, some compaction/consolidation would facilitate the grading of trench spoil and the restoration of micro-topography to pre-existing conditions.

Enbridge proposed to develop site specific trench dewatering protocols. It is likely that late-summer/fall construction would occur when the watertables in the PC ASNRI are drawn down several feet, possibly limiting the amount of dewatering necessary. Enbridge is developing a dewatering protocol to either treat the water to allow for discharge in wetlands or to an upland areas for discharge.

Trench spoil would be stored in spoil storage areas stripped of topsoil. As possible, trenches wold be dry when the backfill operations begin. To the extent practicable, this subsoil would be returned to the trench in the approximate order removed. Track hoe operators would tamp the subsoil returned to the trench down to the extent possible to minimize volume increases that can result if trench soil is not packed sufficiently.

Grading would be accomplished in conjunction with the detailed soil map. Micro-depressions up to 0.5 to 1 foot in depth and inter-depressional areas elevated up to one foot above the depressions would be created at the original locations. Excess excavated subsoil would be minimized by paying particular attention to packing subsoils returned to the trench. However, a minor amount of excess subsoil would be expected. The volume of soil displaced by Alberta Clipper (36” OD pipe) and Southern Lights Diluent (20” OD pipe) pipelines per foot of ROW is 12,215 and 3770 cubic inches, respectively (total 15,985 cubic inches,). The area proposed to be stripped of surface soil per foot of ROW is approximately 110 feet (15,840 square inches). Thus approximately 1.0 inch of soil from the trench that was displaced by the pipe would be added to the stripped portions of the ROW prior to topsoil replacement. It is likely that compaction occurring within the matted traffic area would result in at least 0.5 to 1.0 inches of compression. Thus at most 1.0 inch of soil would be added to the stripped area, and this additional soil may be negligible if compaction/consolidation is substantial.

Segregated surface soils would be returned to the approximate locations and micro-topographic settings from where they were taken. Large roots and alder stumps would be removed to the extent practicable during surface soil replacement. This would be of particular importance for areas where rare plants have been documented.

This procedure is designed to reestablish pre-existing micro-topography and hydrology to the extent possible. The intent is to reestablish the pre-existing hydrologic functions of the disturbed areas by maintaining to the extent practicable the preexisting niches that were present. Specific restoration procedures summarized below are designed to maximize habitat colonization of specific plants of interest. However, there will be a conversion of shrub carr to emergent wetlands.

Enbridge proposed post-construction reclamation and enhancement.

Phase I

Following installation of the Southern Lights Diluent pipeline, an annual cover crop of winter wheat will be planted to minimize movement of soils and stabilize the disturbed CROW until the installation of the Alberta Clipper Pipeline. Upon installation of the Alberta Clipper Pipeline, subsoil will be graded, topsoil replaced and a second cover crop of winter wheat will be planted to stabilize the CROW until the spring growing season.

Phase II

A third-party contractor specializing in the restoration of high-value wetlands will be used in the final restoration and enhancement of the PC ASNRI in the spring of 2010. This contractor would be tasked with the fine grading of portions of the PROW using smaller equipment to recreate the micro topographic depressions as identified during the Order 1 soil survey. These depressions would be extended to incorporate the additional 10 feet of new PROW. Grading activities would also include reconnecting former drainageways/swales across the PROW that had been disrupted during previous construction efforts, where possible. These drainageways/swales typically run perpendicular to the existing corridor. Upon re-establishment of the micro-topographical depressions these areas will be planted with collected seeds and/or a seed-mix approved by the WDNR. A discussion of possible seed-mixes is provided below.

Cover Crop

This option is to only reseed the micro depressions and drainageway/swales with an annual cover crop (e.g., winter wheat) that would not compete with the re-establishment of the rare species. With a considerable number of rare plant populations found in the existing corridor, it is assumed that the available seed bank within the reserved topsoil that is replaced during restoration would be quite viable. The intent of using a cover crop is to reduce the potential for soil erosion and limit competition of adjacent opportunistic perennial species.

Onsite Seed Collection

If it is determined following post-construction monitoring of wetlands the seedbank is adequate, seed could be collected onsite and used for seeding after completion of fine grading activities. Seed would be collected from rare species and also prevalent members of a given wetland plant

community that would not compete but compliment the rare species. Seed collection can be difficult in that it is a labor intensive effort and timing of seed collection efforts is critical.

Special Seed Mixes

Special seed mixes may be available not most likely from outside of the state of Wisconsin. This would require the introduction of a new genetic ecotype.

Operations and Maintenance

Current ROW maintenance activities include removal of woody grown and brush over the pipelines. If after the year of wetland monitoring, re-establishment of rare species is not successful.. Enbridge would evaluate the rare plant communities to determine if a revision to the routine corridor maintenance would need to occur to address issues with re-establishment of these communities and/or address invasive species issues.

III.B.5. Schedule

Construction of the project is proposed to begin in June of 2009. Enbridge has proposed the project in-service date of July 1, 2010.

As the Pokegama River is a cool water fishery, no in-stream work will occur during the April 1 – June 1 restriction period.

III.B.6. Operation and maintenance

III.B.6.a. Pipelines

The naturally-occurring crude bitumen that is extracted from the Alberta oil sands is a tar-like form of petroleum that is so thick and heavy that it must be heated or diluted before it will flow. In order to transport bitumen over long distances, the standard practice is to dilute the material using a low molecular weight hydrocarbon mixture generally referred to as diluent.

Diluent is a generic term that encompasses any mixture of hydrocarbons used for this purpose. Historically the most prevalent type of diluent used is the low-density mixture of hydrocarbon liquids that are present as gaseous components in raw natural gas produced from natural gas fields. This product is referred to as condensate, natural gas oil, C5 plus, or pentane plus. The advantages the oil producers gain from using condensate for this purpose are primarily economic (low cost to produce), geographic (produced close to the bitumen reserves), and ease of recycling. Due to increased production in the oil sands region, condensate reserves have been stressed to keep up to supply needs, so additional lighter hydrocarbon mixtures, primarily mid-range boiling hydrocarbon products such as naphtha and other refinery products that either don’t meet refinery specifications or have not been completely refined to finished products, have been used to augment diluent supplies. Naphtha is a general term covering many mid-range boiling hydrocarbon mixtures and has many uses including paint thinners, lighter fluids and as an intermediate product used as a precursor to final refined products (high octane gasoline, cleaning solvents, etc.). Since naphtha and the other mixtures do not have the economic and other

advantages of condensate for the oil producers (as identified above), these diluents are generally used in much lower volumes than condensate.

A direct comparison of the different properties of these mixtures along with other relevant hydrocarbon mixtures is presented on Table 14.

Table 14 - Properties of Different Hydrocarbon Materials

	Condensate	**Naptha**	**Gasoline**	**Diluent** – Enbridge MSDS	**Diluent Requirements** – Enbridge Maximums	**Crude Oil**
Approximate Hydrocarbon range	C2-C20	C4- C20	C3-C13	Not listed	No requirements	C1->C50
Benzene content	0-1%	0-1%	1-5%	0-3%	3% by volume	0-3%
Density	<1	<1	<1	<1	No requirements	<1
Solubility	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible
Viscosity (Cst)	0.342-0.508[1]	NA	0.4-0.88	NA	2.0	1.7-27.3
Flashpoint	-40F	0F	-45F	<20F	Not listed	<70 to >200F

Data based on ASTM manual Series MNL 3 and general MSDS data ranges.
[1] As n-pentane

As a common carrier, Enbridge may be transporting several different mixtures of diluent through its pipeline network. Based on their knowledge of the product, Enbridge has developed an overarching Material Safety Data Sheet (MSDS) for diluent and has also developed specific chemical and mechanical requirements for the diluent that it will transport from the US Midwest to Alberta. The MSDS and Enbridge's requirements have been established to fit a large range of potential hydrocarbon mixtures that can be used as diluent and could possibly be offered to Enbridge for transport.

The main hazardous characteristics associated with condensate and naphtha are extreme flammability and moderate health toxicity. This is comparable with gasoline with condensate being slightly more flammable (due to lighter hydrocarbon content) than naphtha or gasoline with equivalent toxicity. Benzene is typically the compound believed to be the most toxic found in gasoline and diluent mixtures, with typically much higher levels found in gasoline.

Condensate is a clear to straw-colored liquid that has a distinct petroleum (i.e. gasoline) odor. It is comprised of a lighter hydrocarbon blend that includes propane and butanes, with the vast majority made up of pentane and pentane isomers. Benzene, generally the most recognized hazardous compound present in condensate, is present at approximately 0-1% which is comparable to levels found in gasoline (approximately 1-5% depending on the source) and crude oil (approximately 0-3% depending on the source).

Naphtha is a clear or reddish-brown liquid that has a distinct petroleum odor resembling gasoline or kerosene. It is a middle-distillate with a greater percentage of its mass in the larger hydrocarbon range (compared to condensate). Naphtha can contain benzene from 0-1% depending on the source.

The proposed annual capacity for the Southern Lights Diluent Pipeline is 180,000 bpd. The ultimate capacity for the Southern Lights Diluent Pipeline is 330,000 bpd. To achieve 330,000 bpd, Enbridge has stated that they would have to add pumping units at the Floodwood, Deer River, Cass Lake, Plummer, and Donaldson stations in Minnesota. However, no additional facilities would be required in Wisconsin to achieve 330,000 bpd for the Southern Lights Diluent Pipeline. Enbridge has stated that they do not currently have plans to increase the transport capacity of the proposed SL pipeline beyond the initial capacity.

Enbridge performs periodic inspections of all of its pipelines in accordance with 49 CFR 195.452, which requires that operators of hazardous liquid pipelines, such as crude oil, perform periodic integrity assessments on pipeline segments that could affect High Consequence Areas (HCAs) at intervals not to exceed five years. Operators can extend the intervals to more than five years if a reliable engineering evaluation and other external monitoring activities show the pipeline to be in good condition, or if a new integrity assessment technology the operator plans to use is not readily available.

The internal inspection is conducted using tools referred to as “smart pigs” to identify areas of corrosion, dents, or cracks that require repair. Upon completing of the internal inspection, the data is analyzed to determine if any anomalies need to be visually inspected and or repaired. Certain defects identified through internal inspection must be excavated and repaired within defined time limits in accordance with 49 CFR 195.452. The categories include:

Immediate Repair:

- metal loss greater than 80 percent of nominal wall thickness;
- calculated burst pressure less than maximum operating pressure at anomaly:
- top dent with any indication of metal loss, cracking, or stress riser; or
- any anomaly judged to require immediate attention.

60-day repair:

- top dent greater than 3 percent of nominal pipe diameter (greater than 0.25 inches for pipe less than 12 inches in diameter); or
- Bottom dent with any indication of metal loss, cracking or stress riser.

180-day repair:

- dent greater than 2 percent of nominal pipe diameter (greater than 0.25 inches for pipe less than 12 inches in diameter) that affects pipe curvature at a girth weld or longitudinal seam;
- top dent greater than 2 percent of pipe diameter (0.25 inches for 12 inches in diameter and smaller);
- bottom dent greater than 6 percent of pipe diameter;
- calculated operating pressure less than maximum operating pressure at anomaly;
- area of general corrosion with predicted metal loss greater than 50 percent of nominal wall thickness;
- predicted metal loss greater than 50 percent of nominal wall thickness at a crossing of another pipe, in an area of widespread circumferential corrosion, or in an area that could affect a girth weld;
- potential crack that on excavation is shown to be a crack;
- corrosion of or along a longitudinal seam weld; or
- gouge or groove greater than 12.5 percent of nominal wall thickness.

Enbridge reviews each excavation location to determine if any authorizations or permits are required from local, state, or federal agencies. In addition to any applicable permit conditions, Enbridge implements best management practices in accordance with its *Environmental Mitigation Plan for Pipeline Maintenance Projects*. Upon receipt of all necessary authorizations, an Enbridge crew locates an anomaly using the GPS coordinates generated by the smart pig. The pipeline is then excavated to facilitate visual inspection and repair of the anomaly. Excavations for anomaly repairs are typically 40 to 100 feet long. The width and depth of the excavations vary depending soil types to maintain an OSHA-compliant trench, but are typically 10 to 20 feet wide, and 6 to 10 feet deep. Repair routinely consists of welding a metal sleeve around and re-coating the existing pipeline. Equipment used typically includes a backhoe (or similar excavator), and trucks to carry equipment and personnel. Upon completion of the inspection/repair activities, the area excavated is restored to pre-existing conditions.

Based on recent internal inspections, Enbridge estimates that there will be eight to 10 anomalies between Floodwood, Minnesota and the Superior Terminal that will likely require excavations in 2009. These excavations will occur on Lines 1 and 3. In 2010, it is estimated that nine anomalies between Floodwood, Minnesota and the Superior Terminal will require excavations. These excavations will occur on Lines 2, 3, and 4. In addition, it is estimated that two anomalies will require excavation between the Superior Terminal and Minong, Wisconsin on Lines 6A and 14.

III.B.6.b. Right of Way

Enbridge controls the growth of brush, trees, and invasive/noxious plant species on company property and the ROW in order to facilitate operating and maintenance activities, ensure clear visibility and access along the ROW, and maintain good public relations with landowners.

On an annual basis, an Enbridge Operations representative conducts a fly over of the ROW to identify any areas requiring woody vegetation removal. Landowners are notified a minimum of one to two weeks before vegetation control activities are to occur on the ROW. Vegetation maintenance generally occurs in during the fall and winter months. Typically, a rubber tracked ASV with specialized cutting equipment will be used to remove any woody vegetation two inches in diameter or greater across the entire with of the permanently-maintained ROW, except in riparian areas where the vegetation is only removed over the pipelines. Trees and brush are cut at, or just above ground level, leaving the roots intact.

Herbicide application on the ROW will be approved on a site-specific basis and would require landowner and applicable regulatory (i.e. Wisconsin DNR, Douglas County, etc.) approval. On an annual basis, Enbridge applies herbicides on graveled valve sites, densitometers, pump stations, and terminals. Only commercially-licensed applicators would be utilized. Selected herbicides must reviewed and approved by Enbridge. Products would be selected based on their physical, chemical, and biological properties and potential receptors (water bodies, wetlands, sensitive species, agricultural lands, etc.).

The permanent ROW would be periodically maintained and woody vegetation removed. The scrub-shrub and forested wetlands are typically dominated by early successional prolific species such as common buckthorn (*Rhamnus cathartica*), honey suckle (*Lonicera spp.*), green ash (*Fraxinus pennsylvanica*), and box elder (*Acer negundo*). Therefore the current scrub-shrub and forested areas, within the permanent ROW, are expected to re-establish as emergent and/or very early successional stage scrub-shrub wetlands. However, within these wetland types, it is expected that the areas within the temporary work space would rapidly re-establish to the pre-construction conditions and there is no anticipated long term structural or functional changes to these wetland areas.

In addition to any applicable permit conditions, Enbridge would implement best management practices in accordance with its *Environmental Mitigation Plan for Pipeline Maintenance Projects*. Enbridge would conduct its maintenance activities following the same practices implemented during mainline construction. For example, supplemental equipment supports, such as timber mats, would be used in wetlands where necessary to provide temporary portable support for equipment and minimize soil rutting, and/or soil mixing. When clearing in wetlands, the following restrictions would apply:

- The right-of-way width would typically be limited to the permanent easement or less.
- The size of the additional workspace areas would be limited to the minimum needed to construct the wetland crossing.

- Vegetation and trees within wetlands would be cut off at ground level, leaving existing root systems intact.

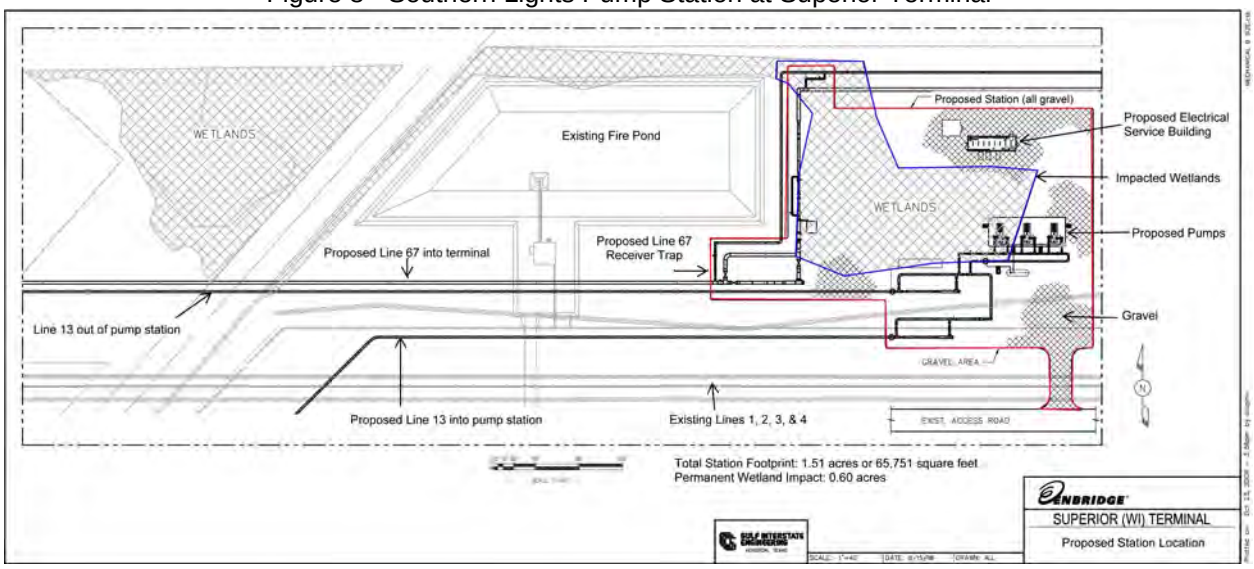
Furthermore, storage of hazardous materials, chemicals, fuels, lubricating oils, or concrete coating activities would not be permitted in, or within 100 feet of, any wetland. Attempts would be made to refuel all construction equipment in an upland area at least 100 feet from a wetland boundary. Where conditions require that construction equipment (e.g., pontoon-mounted backhoes, trench dewatering pumps) be refueled in a wetland or within 100 feet of any wetland boundary, these activities would be performed under the guidance of the Enbridge Environmental Department in accordance with applicable regulatory requirements.

III.C. Superior Terminal pumping station

III.C.1. Location

Enbridge's Preferred Alternative (Alternative 4) is located in the northern portion of the existing Superior Terminal directly east of the existing fire pond and north of Tanks 13, 14, and 15. The area is approximately 2.1 acres of undeveloped land and contains approximately 1.5 acres of upland and 0.60 acres of wetland. The proposed pumping station is shown in Figure 8.

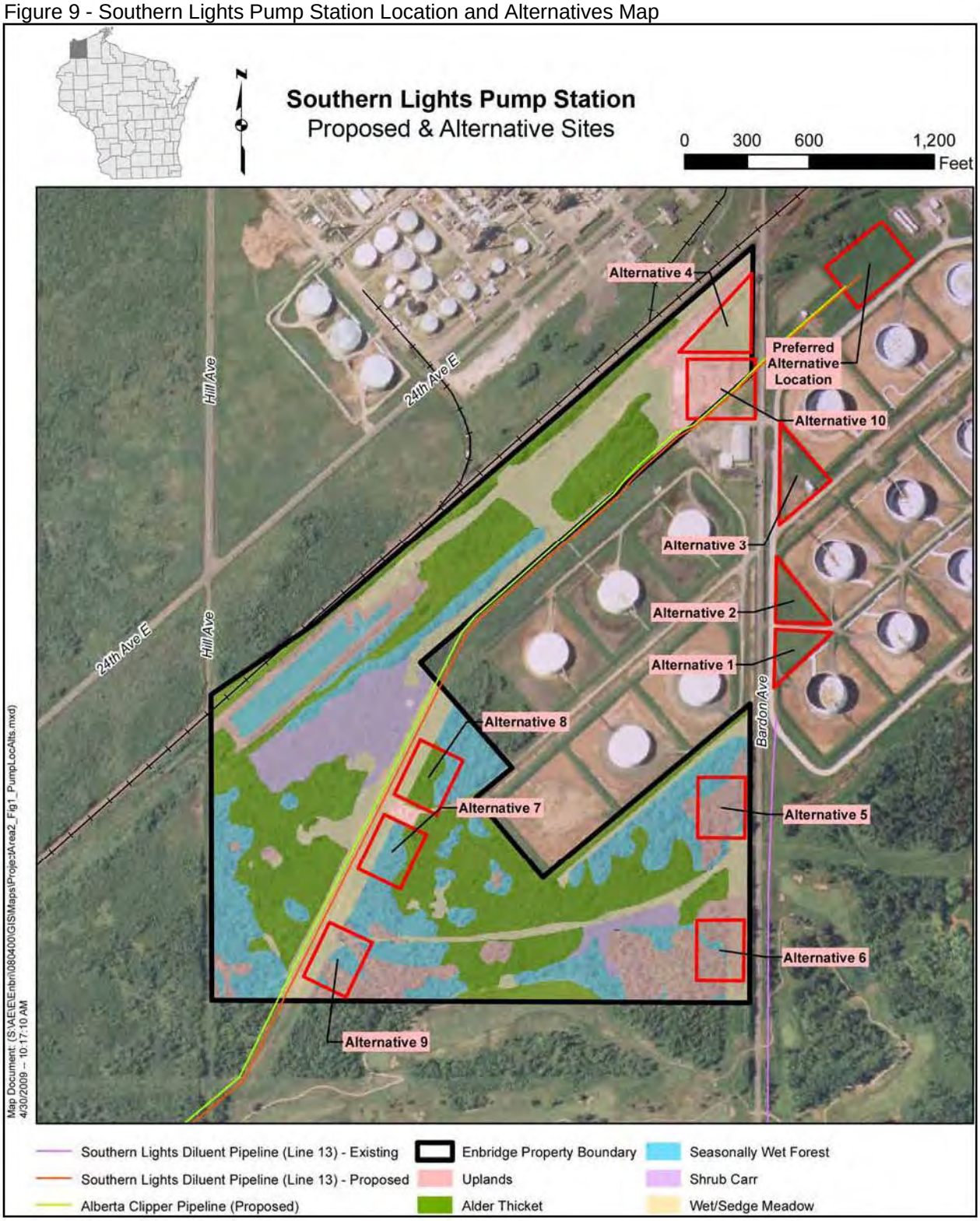
Figure 8 - Southern Lights Pump Station at Superior Terminal



Enbridge states that the 1.51 acre or 65,751 square foot proposed pump station footprint was designed to utilize the only available and unencumbered portion of existing property within the Superior Terminal that meets the size and configuration requirements for the pump station. There is an existing fire pond to the west, four existing pipelines buried on the north side of the access/maintenance drive, existing pipeline pressure relief vessels to the east, and the area directly north is part of a right-of-way for a railroad.

The proposed pumping station location and the location of the identified alternative pumping station sites are shown in Figure 9.

Figure 9 - Southern Lights Pump Station Location and Alternatives Map



Given the adjacent structures and land uses, Enbridge found little opportunity to shift the footprint for the pump station to avoid or minimize the wetland impacts in this area. Wetland impacts were minimized to the extent possible by condensing the footprint for the pump station.

The original plans had been designed with a proposed footprint of 2.0 acres, but in order to make this location work the footprint was reduced or condensed to the currently proposed 1.51 acres. In order to avoid potential temporary wetland impacts the new proposed Line 13 and Line 67 pipelines will be constructed directly south of the pump station in an existing pipeline corridor.

This is Enbridge's preferred alternative for several reasons which includes: minimization of wetland impact to the extent practicable, the use of available upland areas to the greatest extent possible, close proximity to the proposed out-bound Line 13 that will serve to transport diluents back to the oil sands in Western Canada, and the overall accessibility of this area to service and maintain.

III.C.2. Construction

III.C.2.a. Methods

Diluent would arrive at the pipeline receiver trap, which is a 24-inch diameter barrel designed to receive batching pigs, cleaning pigs, and intelligent pigging tools. Three mainline pumps would be installed and arranged in series. The proposed pumps shall be single stage, horizontal split case, and centrifugal pumps conforming to API-610. The pumps would not be housed in a pump building or shelter but would be mounted on concrete foundations and supplied as unitized assemblies on a fabricated steel skid for ease of installation. The pumps drain (seal and leakage only) to a 4,000 gallon, buried double wall fiberglass sump tank. The sump would be equipped with an auxiliary sump pump to inject the drained oil into the pump suction header. A new drag reducing agent (DRA) skid would be installed on the discharge side of the mainline pumps on a structural steel skid. DRA is an additive that decreases the viscosity of the diluent for transportation in the mainline pipeline. This skid would be housed in a prefabricated pressurized building and consists of a 5,000 gallon fiberglass tank with a mixer, feed pump, injection pump, flow meter, valves, and instrumentation.

A pressure control valve (PCV) would be installed on the station discharge piping to control the downstream pressure or maintain pump suction pressure. In order to power the pumps and PCV, 5 kilovolt power service is required. This power would be provided by installing an overhead electrical line, which would be tied into the existing substation located on the north side of the terminal. A prefabricated, pressurized switchgear building would be installed to house the other electrical/control equipment. The ESB/switchgear building would include HVAC units to cool the switchgear. In addition, a station service transformer would be installed.

III.C.2.b. Mitigation

Enbridge would provide compensatory mitigation for permanent and temporal wetland impacts in accordance with COE requirements. DNR review of wetland water quality impacts under Chapter NR 103, Wis. Adm. Code does not include authority to consider wetland mitigation. Wetland mitigation is considered by the U.S. Army Corps of Engineers under Section 404 of the Clean Water Act. See Section IV.B.7. for a description of the proposed wetland mitigation site.

III.C.3. Operation and maintenance

Enbridge control the growth of brush, trees, and noxious weeds on company property in order to:

- facilitate operating and maintenance activities;
- ensure clear visibility and access for security purposes; and
- minimize fire hazards.

Tank berms and other grassed areas within the developed portions of the property are generally mowed on an annual basis. Woody vegetation along the perimeter fence is removed by mechanical means. Enbridge hires a licensed applicator on an annual basis to apply herbicides to graveled areas or in locations were noxious weeds are present. Any herbicides to be used are reviewed and approved by Enbridge Environment staff prior to application. Enbridge Environment staff developed herbicide selection procedures that are used when evaluating herbicides. Herbicides which currently are not approved for general use on company property (unapproved herbicide) can go through a further site specific, special use evaluation and approval process. This evaluation process is to be used to determine if, after careful review of herbicide characteristics and adjacent land uses, an unapproved herbicide can safely and effectively be used on Enbridge property.

III.D. Superior Terminal breakout tanks

III.D.1. Location

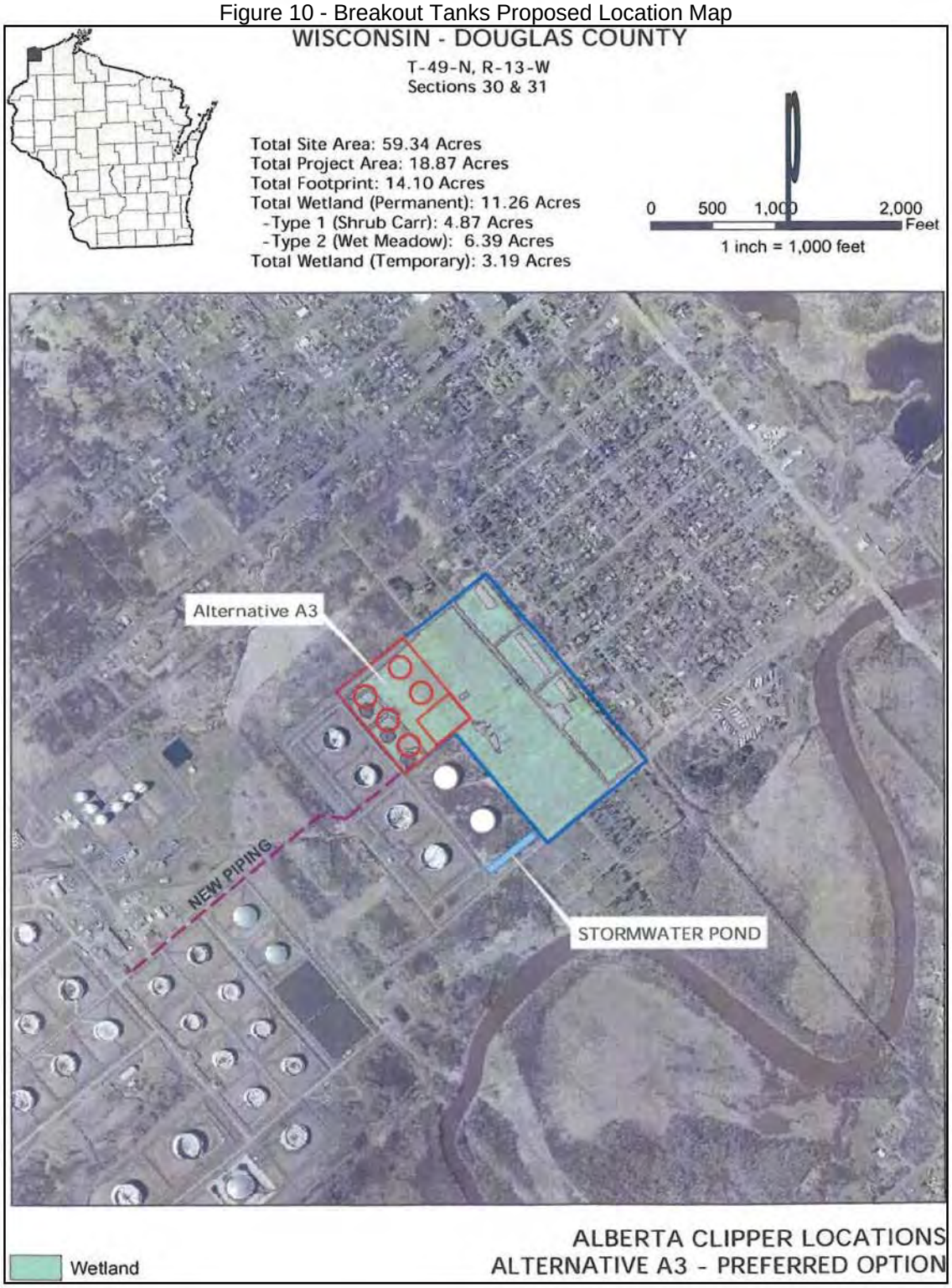
Enbridge is proposing to construct five breakout tanks (Tanks 36, 37, 38, 39, and 40) within the existing Superior Terminal to accommodate the incremental volumes of crude oil being transported by the proposed Alberta Clipper pipeline. The five tanks are being proposed as an extension of the existing breakout system at superior. Each tank will have a nominal capacity of 250,000 barrels and a working capacity of approximately 206,000 barrels. The tanks would be connected to the existing terminal piping via property contiguous to the existing terminal to leverage existing terminal support systems.

The proposed project area is 18.87 acres. The proposed project site is located within the Superior Terminal east of and adjacent to existing Tanks 32 and 33 and north of and adjacent to Tank 35. The project site is located in the SE ¼ of Section 25, T49N, R14W, and the NE ¼ of Section 36, T49N, R14W, and the SW ¼ of Section 30, T49N, R13W and the NW ¼ of Section 31, T49N, R14W, Douglas County, Wisconsin. This proposed project is also known as Alternative A-3.

This alternative is arranged in the most compressed configuration and utilizes the greatest available upland area. The footprint for the tanks, manifold, and pumps is 14.10 acres if placed in this location. Whereas, the entire project footprint is 18.87 acres, which includes the new piping corridor, tanks, manifold, pumps, and the stormwater pond. The proposed permanent wetland impacts would be 11.26 acres within the footprint and 3.19 acres of temporary wetland impact outside of the footprint though an existing pipeline corridor for the installation of new piping to connect the site to the existing mainline.

This configuration utilizes the greatest area of property previously disturbed and is in close proximity to existing infrastructure to feed product from the breakout tanks to the main transport pipelines. This configuration also allows the total terminal footprint to be compressed (keeping proposed tanks closely arranged with existing tanks) and would allow for shared use of two existing berms (Tank 32/33 and Tank 35), further minimizing impacts. The propose site is shown in Figure 10.

Figure 10 - Breakout Tanks Proposed Location Map



Five new 36-inch bi-directional pipelines would also be installed from the manifold to the proposed storage tanks.

Alternative A-3 would impact previously disturbed lands where uplands are present and Enbridge owns the property. The site is in close proximity to existing infrastructure, minimizing additional temporary or permanent wetland impacts. Expansion of the existing facility prevents the need for construction of a new terminal facility and minimizes the footprint of the terminal overall by compressing the proposed construction and designing it into the existing facility and structures.

III.D.2. Associated required facilities

In addition to the new tanks, Enbridge would also be constructing, containment berms, booster pumps, a manifold, a stormwater management pond, associated infrastructure, and the installation of four power poles. Five booster pumps would be installed in the new manifold area, which is proposed to be located adjacent to the five new tanks. The manifold pump area would be constructed south of Tank 40. In addition, an existing gravel access road would be extended from the northern corner of Tank 35, north then northwest around the outer edge of Tanks 39 and 40. The containment berms are designed for the primary purpose of containing any releases from the tanks and collecting stormwater. In addition, to their primary function, the berms would also serve as inspection and maintenance roads and facilitate access to the tanks.

Piping
In order to segregate product stored in the area of expansion, additional piping would need to be installed to connect the newly constructed tanks to the main facility. The five new 36-inch pipelines are proposed approximately 700 linear feet north of the existing piping in the utility corridor. Originally, it was proposed that the five new pipes would be co-located with the five existing pipes. Due to maintenance concerns and the dangers of operating installation equipment over existing pipelines, however, Enbridge determined that the new pipelines needed to be installed north of the existing pipelines. The pipelines would be installed using a cut and cover technique; therefore, the proposed impacts for this activity are temporary.

Manifold/Pump Area
Five booster pumps would be installed in the new manifold area, which is located adjacent to the five new tanks. Pumping out of the tanks requires the use of booster pumps to increase the oil pressure from the atmospheric tank for transport through the tank lines to the central manifold, and on to the existing outbound mainline pipeline pump stations. Each pump would have the capability of transporting oil from any of the new tanks. These booster pumps are vertical can type, two stage, centrifugal pumps driven by 900 horsepower electric motors.

The manifold has been designed to allow simultaneous pump-outs from any two of the five proposed new breakout tanks via any two of the tank lines and injected into the outbound mainline pipelines.

Five (5) kilovolt service is needed in order to operate the booster pumps and would be provided by a new overhead pole line located within the new piping corridor. Up to four new 24-inch diameter power poles would be installed within piping corridor that would result in permanent wetland impacts. A switchgear building would also be installed to house the universal power supply and other electrical/control equipment. The prefabricated, pressurized switchgear building

would include HVAC units to cool the switchgear. Additionally, a station service transformer to feed the 480 volt load would be provided. The manifold/pump area would be constructed south of Tank 40. The manifold area would be contained by the raised gravel roads.

Stormwater Management Pond

A new stormwater management pond would be constructed on an upland area south of exiting tank 34. The pond outfall will be connected to an existing outfall. Calculations for the storm water management system will be included in the Construction Storm Water Permit Application. The pond would be contained by 31st Avenue on the southwest sides and be bounded by Tank 34 on the north and northeast sides.

III.D.3. Construction

III.D.3.a. Methods

The tanks will be designed and built in accordance with the latest edition of *American Petroleum Institute (API) Standard 650, Welded Steel Tanks for Oil Storage* and Enbridge engineering specifications.

Five 250,000 barrel storage tanks (nominal) would be installed on the east side of the terminal in accordance with API standards. The tanks would be equipped with an external floating roof to control emissions. Each tank would be approximately 180 feet in diameter and 55-feet, nine-inches in height. These tanks would include a high expansion foam rim fire protection system, complete with nozzles, and would be designed for connection to a portable foam trailer in the event of a fire. The existing firewater mains would be extended around these tanks. Firewater hydrants would be installed on these extensions. There are two containment areas which are referred to as cells that have been designed to house the five proposed breakout tanks. The southwestern cell would include three tanks; Tanks 36, 37, and 38. These tanks would share a single containment berm constructed from the existing berms for Tanks 32, 33, and 35. The northeastern cell would include two tanks; Tanks 39 and 40. Roads into each tank containment area would be added for maintenance and safety vehicle access.

The general construction steps that would be followed during the project include:

1. Install temporary sediment control structures such as silt fence or straw bails along the outside perimeter of the disturbed area to prevent sediment or silt laden water from leaving the site;

2. Clear and grub area within the proposed construction limits;

3. Remove topsoil;

4. Grade and surface site in accordance with the development plans and specifications;

5. Excavate, backfill, and compact soils in accordance with the development plans and specifications. Sand would be imported as would additional clay or other soil needed to

elevate the site for tank foundations. The origin of any imported soil would be documented and reported to the U.S. Army Corps of Engineers (USACE) and Wisconsin Department of Natural Resources (Wisconsin DNR) when the source is known. No imported soil unlawfully taken from wetlands would be used in the project area;

6. Install concrete ring-wall, backfill with compacted sand, and install leak liner and detection system;

7. Erect tank shell and roof (welded steel) for each of the five tanks;

8. Install access roads, dikes, and drainage structures;

9. Repair rough and/or eroded areas;

10. Replace topsoil as part of final grading;

11. Seed disturbed areas that are not covered with gravel;

12. After site is stabilized and vegetated, remove all temporary erosion control measures.

13. All dredged or excavated materials would be disposed of on upland or approved non-upland.

Five booster pumps will be installed in the new manifold area, which is located adjacent to the five new tanks. Pumping out of the tanks requires the use of booster pumps to increase the oil pressure from the atmospheric tank for transport through the tank lines to the central manifold, and on to the existing outbound mainline pipeline pump stations. Each pump will have the capability of transporting oil from any of the new tanks. These booster pumps are vertical can type, two stage, centrifugal pumps driven by 900 horsepower electric motors. Each pump has a capacity of 412,500 barrels per day.

The manifold has been designed to allow simultaneous pump-outs from any two of the five proposed new breakout tanks via any two of the tank lines and injected into the outbound mainline pipelines. The manifold pump area will be constructed south of Tank 40. The manifold area will be contained by the raised gravel roads.

Five (5) kilovolt service is needed in order to operate the booster pumps and will be provided by a new overhead pole line located within the new piping corridor. Up to four new 24-inch diameter power poles will be installed within piping corridor that will result in permanent wetland impacts. A switchgear building will also be installed to house the universal power supply and other electrical control equipment. The prefabricated, pressurized switchgear building will include HVAC units to cool the switchgear. Additionally, a station service transformer to feed the 480 volt load will be provided.

Clay excavated from on-site for the stormwater management pond would be used to construct the berms. Any excess soils not used on-site would be disposed of in an upland area.

Prior to excavation in the temporary wetland impact areas, the outer limits of the construction area would be staked and silt fence would be installed. This would be done to not only create a visual and physical boundary for the construction crew, but to also protect the wetland areas outside of the construction area from erosion and sedimentation that could otherwise occur.

Excavated soil would be side-casted immediately adjacent to the excavation area. If the ground is not frozen, material to be excavated would be placed on geotextile fabric, which would separate excavated material from the soil to be undisturbed. Topsoil would be stockpiled to facilitate replacement of the excavated soil material in the order in which it was removed.

When the pipe installation project is complete, the stockpiled soil would be replaced in the trench in a manner similar to that in which it was removed and restored to pre-construction conditions. Excess material may be stockpiled upland or where allowable by state and/or federal permission. No material removed from the temporary wetland impact area would be discharged off-site in a manner noncompliant with Section 404 or 401 of the Clean Water Act.

Depending on the extent of compaction and/or rutting in this area the soil may be tilled to remove compaction and ruts. This practice would only be employed when and where necessary.

A Wisconsin Department of Transportation Native wetland seed mix or Minnesota Board of Water and Soil Resources Native Sedge/Wet Meadow seed mix (W2) would be applied to the affected wetland area at the recommended rate of 8.0 PLS Ibs/acre. A rye cover crop would be applied for temporary erosion control and nursery to the permanent seed mix. Upland non-graveled areas would be seeded with a mixture of Kentucky bluegrass and white clover.

III.D.3.b. Schedule

Construction of the project is proposed to begin in 2009. Enbridge has proposed the project in-service date of July 1, 2010.

III.D.3.c. Mitigation

Enbridge would provide compensatory mitigation for permanent and temporal wetland impacts in accordance with COE requirements. DNR review of wetland water quality impacts under Chapter NR 103, Wis. Adm. Code does not include authority to consider wetland mitigation. Wetland mitigation is considered by the U.S. Army Corps of Engineers under Section 404 of the Clean Water Act. See Section IV.B.7. for a description of the proposed wetland mitigation site.

III.D.4. Operation and maintenance

The five tanks are being proposed as an extension of the existing breakout system at Superior. Each tank will have a nominal capacity of 250,000 barrels and a working capacity of approximately 206,000 barrels. Batches of crude oil, which typically 60,000 barrels in volume, are segregated into tanks at the Superior Terminal based on physical characteristics such as density and vapor pressure to minimize quality degradation due to mixing. Furthermore, In accordance with industry practice, Enbridge has determined that a two-day storage volume must

be secured for all products moving through the terminal in order to maintain pipeline system operational flexibility. Therefore, to support the expected volume of crude oil transported by the Alberta Clipper pipeline, at least 900,000 barrels of breakout tank capacity is required.

Pumping out of the five new tanks would require the use of booster pumps to increase the oil pressure from the atmospheric tank for transport through the tank lines to the central manifold, and on to the existing outbound mainline pipeline pump stations. Each pump would have the capability of transporting oil from any of the new tanks.

The manifold has been designed to allow simultaneous pump-outs from any two of the five proposed new breakout tanks via any two of the tank lines and injected into the outbound mainline pipelines.

Vegetation Maintenance

Enbridge control the growth of brush, trees, and noxious weeds on company property in order to:

- facilitate operating and maintenance activities;
- ensure clear visibility and access for security purposes; and
- minimize fire hazards.

Tank berms and other grassed areas within the developed portions of the property are generally mowed on an annual basis. Woody vegetation along the perimeter fence is removed by mechanical means. Enbridge hires a licensed applicator on an annual basis to apply herbicides to graveled areas or in locations were noxious weeds are present. Any herbicides to be used are reviewed and approved by Enbridge Environment staff prior to application. Enbridge Environment staff developed herbicide selection procedures that are used when evaluating herbicides. Herbicides which currently are not approved for general use on company property (unapproved herbicide) can go through a further site specific, special use evaluation and approval process. This evaluation process is to be used to determine if, after careful review of herbicide characteristics and adjacent land uses, an unapproved herbicide can safely and effectively be used on Enbridge property.

III.E. Future expansion of Enbridge Superior Terminal

Enbridge has proposed five new breakout tanks for the proposed Alberta Clipper pipeline capacity of 450,000 bpd. Enbridge has also stated that the capacity of the pipeline could be increased, with additional pumping infrastructure, to 800,000 bpd. DNR requested information from Enbridge concerning the need for additional tanks should Enbridge increase the pipelines capacity to 800,000 bpd.

Enbridge responded by stating that the need, design, or timing of a potential expansion in capacity are not known at this time and may or may not occur in the future, depending on future demand and supply needs of Enbridge shippers. Should a future expansion be needed, it is very

likely that additional tankage would be required in response to industry transport needs and designs plans to increase the Alberta Clipper pipeline beyond its planned initial capacity of 450,000 bpd up to a average capacity of 800,000 bpd. However, as a common-carrier pipeline Enbridge can only respond to demonstrated customer needs and only has commitments from its shippers to support (by way of tariff rate surcharge) the incremental costs of the proposed 450,000 bpd project. Therefore, unless or until the market drives the need for further pipeline capacity and commitments from the shippers are reached to increase the annual capacity up to 800,000 bpd are reached, Enbridge cannot evaluate the need for additional tankage. The amount of capacity needed could be less than 800,000 and the type of crude oil (light crude coming from growing Rockies production versus heavier crude from western Canada) is not known. Enbridge cannot speculate on whether, the timing or the number of future tanks needed.

DNR assumes that, since five tanks are needed for 450,000 bpd, roughly doubling the pipeline capacity to 800,000 bpd would require five additional tanks. DNR further assumes that the environmental effects would also double if another five new tanks were needed.

III.F. Other tank projects

Other possible projects that have been proposed and/or have been noted as under consideration for the future are the modification of the tanks T28 and T29, and construction of a new tank T41 for Husky Oil, refurbishing and expansion of the tank T03, and construction of a number of new tanks for customers to purchase and hold crude oil for an extended time on the Superior Terminal site. The facility was recently issued a PSD air permit for refurbishing and expansion of tanks T05 and T09, and for revision of the PSD BACT for tank T35. Figures 11a, 11b, and 11c show the locations of these other tank projects.

Figure 11a - Husky Tanks Location Map

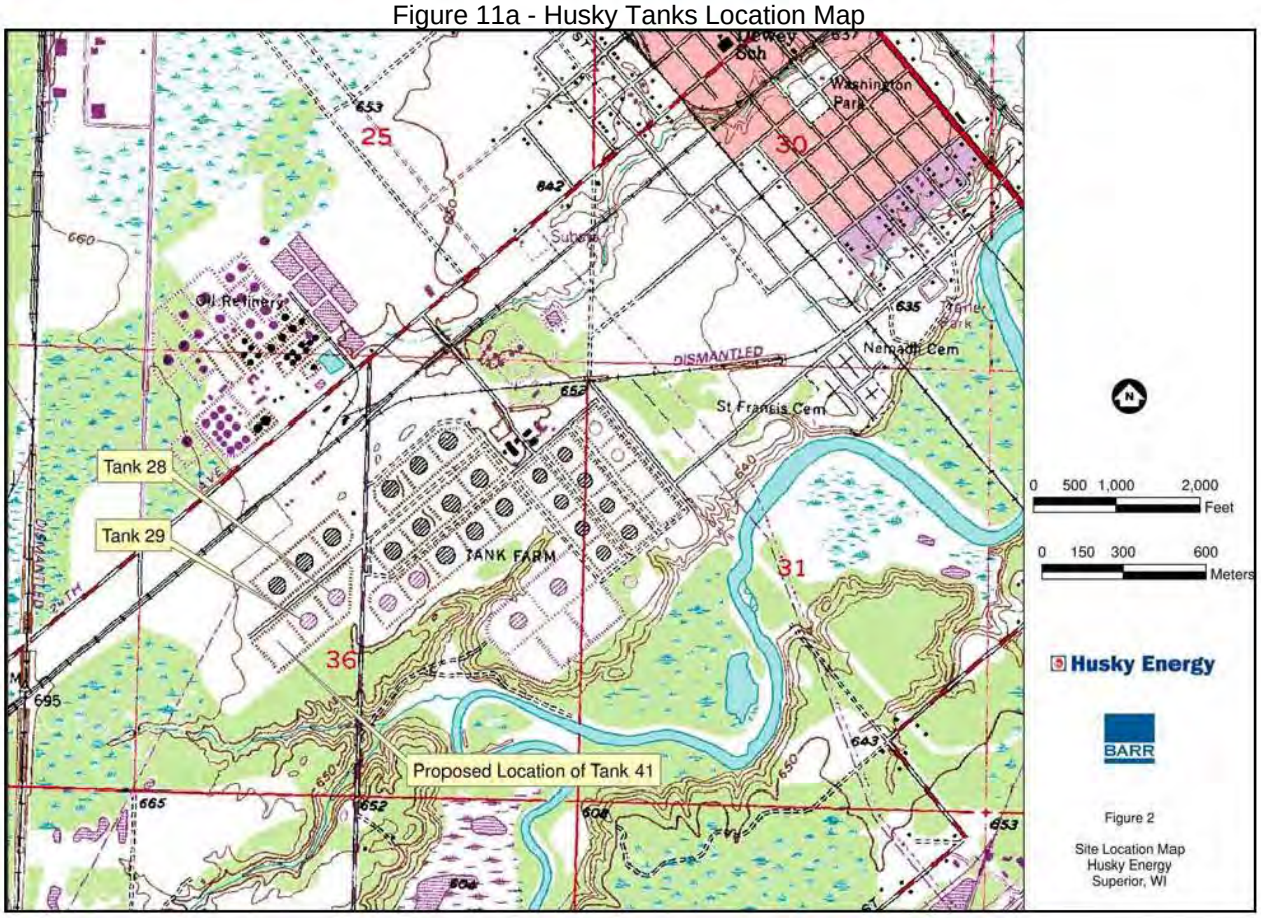


Figure 11b - Enbridge Tanks Layout

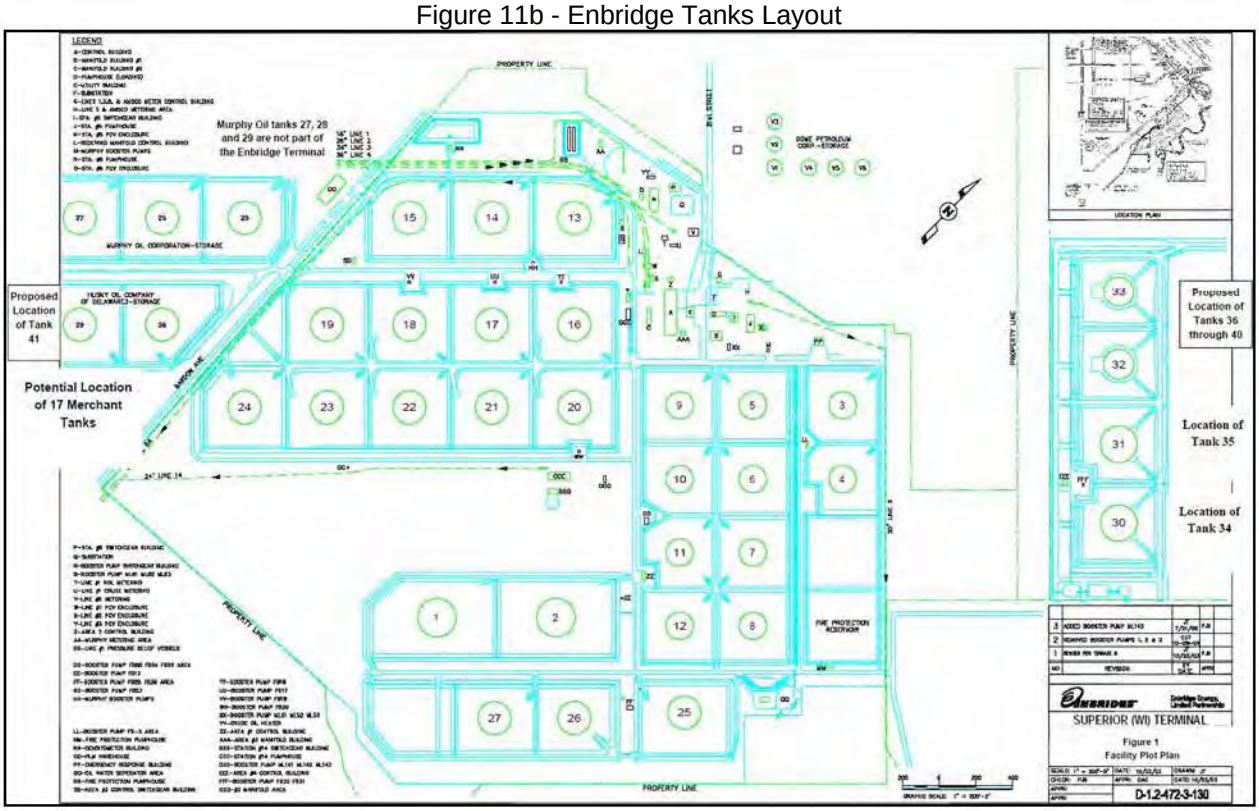


Figure 11c - Merchant Tanks Location Map

On September 22, 2008, Enbridge received authorization from the Wisconsin Department of Natural Resources under (air pollution emission) permit number 08-DCF-108 to refurbish and increase the volume of existing external floating roof tanks 5 and 9, which were originally constructed in 1951. Refurbishment activities of tanks 5 and 9 are anticipated to commence in 2008 and 2009, respectively. The permit also authorized the installation of generator to provide power to the laboratory building's heating and ventilation system in the event of a power outage. Installation of the generator is anticipated to be completed in 2008. The emission increase from these projects was below the 40 ton per year volatile organic compound (VOC) significant threshold as defined in 40 CFR 52.21(b)23 and s. NR 405.02(27)(a); however, the aggregated emissions from previous projects resulted in combined emissions that exceeded the significance threshold. Therefore, a Best Available Control Technology (BACT) analysis was completed and a Prevention of Significant Deterioration (PSD) permit was received.

Husky Energy (Husky) owns two of the existing tanks at the Superior Terminal (referred to as tanks 28 and 29) that are currently operated by Enbridge. Tanks 28 and 29 were originally constructed in 1968. Husky is proposing to modify these tanks to accommodate increased pipeline fill rates. The modifications include cleaning, inspection, changes to nozzle configuration and sizing, addition of tank venting capacity, and the addition of vacuum breaker

vents. Modifications to tanks 28 and 29 are anticipated to commence in late 2009 to 2010. In addition, Husky is proposing to construct one additional external floating roof storage tank (referred to as tank 41) at the Superior Terminal adjacent to its exiting tanks on a previously constructed upland tank lot. Construction of tank 41 is anticipated to commence in late 2009 or 2010. The emission increase from these projects was below the 40 ton per year VOC significant threshold as defined in 40 CFR 52.21(b)23 and s. NR 405.02(27)(a); however, the aggregated emissions from previous projects resulted in combined emissions that exceeded the significance threshold. Therefore, a PSD permit application and BACT analysis have been submitted and are currently under review by the DNR (permit application 08-DCF-185).

Enbridge is currently planning to refurbish and increase the volume of existing doomed external floating roof tank 3, which was constructed in 1989. Refurbishment of tank 3 is anticipated to commence in 2009. In addition, Enbridge is planning various maintenance activities of existing piping, valves, and flanges within the terminal that are scheduled to occur in 2009. The emission increase from these projects was below the 40 ton per year VOC significant threshold as defined in 40 CFR 52.21(b)23 and s. NR 405.02(27)(a); however, the aggregated emissions from previous projects resulted in combined emissions that exceeded the significance threshold. Therefore, a PSD permit application and BACT analysis will be submitted for review and approval by the DNR.

Enbridge had applied for a permit to refurbish and increase the volume of existing domed external floating roof tank 3, which was originally constructed in 1989. Refurbishment of tank 3 was originally anticipated to commence in 2009, but the application for the tank 3 portion of the project has been withdrawn. In addition, Enbridge is planning various maintenance activities of existing piping, valves, and flanges within the terminal that are scheduled to occur in 2009 and 2010. The emission increase from these projects was below the 40 ton per year VOC significant threshold as defined in 40 CFR 52.21(b)23 and s. NR 405.02(27)(a); however, the aggregated emissions from previous projects resulted in combined emissions that exceeded the significance threshold. Therefore, a PSD permit application and BACT analysis will be submitted for review and approval by the DNR. This had been assigned to permit 09-DCF-030. The remaining maintenance activities will be reviewed under this permit #, or will be incorporated into one of the other permit applications under review.

Enbridge had been evaluating a potential project at the Superior Terminal referred to as the Superior Terminal Merchant Tankage Project, but this is no longer under consideration for the foreseeable future. The original scope of the project consisted of the construction of 10 to 17 new external floating roof tanks (up to eleven 350,000-barrel and six 250,000-barrel working capacity tanks) for upcoming refinery upgrades and oil sands development projects underway. The tanks were expected to located on approximately 100 acres of Enbridge property west of Bardon Avenue and connected to the main terminal property by four new transfer lines. The proposed project area consists primarily of wetlands; therefore, applications for review and approval to the DNR and Army Corps of Engineers would need to be submitted if the project is returned to consideration. Furthermore, the emission increase from this project would be expected to be greater than the 40 ton per year VOC significant threshold as defined in 40 CFR 52.21(b)23 and s. NR 405.02(27)(a); therefore a PSD permit application and BACT

analysis would need be submitted for review and approval by the DNR. The project is anticipated to commence in 2009 and would take approximately three years to complete.

IV. Alternatives

IV.A. Department alternatives

IV.B. System alternatives

IV.B.1. No action

The purpose of the Alberta Clipper project is to interconnect the Minnesota portion of the pipeline to Enbridge's existing Wisconsin pipeline system to deliver an average 450,000 bpd to Midwestern refineries. A no-action alternative cannot achieve that purpose. If the no action alternative were to cancel or postpone the proposed Alberta Clipper pipeline project, Enbridge's Wisconsin pipeline system would be under-utilized and the utilization of transportation systems located elsewhere in the country will not give customers access to less costly Canadian crude oil. Additionally, the operators of these other systems will likely have to construct additional facilities to meet the demand for extra capacity, which could result in similar or greater environmental impacts as compared to the proposed Alberta Clipper pipeline.

The purpose of the Southern Lights Diluent Pipeline project is to interconnect the Wisconsin portion of the pipeline to the Minnesota portion to return diluent from the U.S. Midwest refining region back to oil sands production areas in Western Canada. A no-action alternative cannot achieve that purpose.

Alternative energy sources

Public interest organizations, such as the Sierra Club of Canada, are concerned about the current pace and scale of development in northern Alberta's oil sands, in the absence of a cohesive, sustainable energy policy for North America. In light of the ecological, human and economic costs, they urge that the pace of oil sands development be slowed and more alternative renewable sources of energy be explored. They believe that this development should be part of "an overall framework of transitioning to a sustainable energy future."

The State of Wisconsin and various organizations within the state are currently promoting alternative energy sources, especially to augment gasoline supplies for transportation. However, it is unlikely that planned levels of production would provide any significant pressure to reduce production in the Oil Sands region, and is not likely to have any impact on the desired pipeline capacity.

That portion of the planned volume of oil transported could be replaced by installing additional sustainable wind generation capacity. However, because only 2% of U.S. electrical generation is from oil, this would have a minimal effect on the desire for the proposed project.

The pace of alternative energy development is unlikely to supplant the transportation energy used at current rates. Conservation of energy resources is viewed by many as the most cost-effective form of alternative energy. At this time, conservation measures such as stringent fuel economy standards, widespread use of public transit, expanded bicycle paths, and other measures have not received adequate public support to eliminate the desire by many for additional petroleum supplied to the Midwest refineries area.

IV.B.2. Expansion of existing pipeline systems

Enbridge operates the Enbridge Pipelines (North Dakota) LLC (Enbridge North Dakota system) that transports oil from Canada, Montana, and North Dakota to Clearbrook, Minnesota. The Enbridge Pipelines (Lakehead) L.L.C pipeline system transports oil from Neche, North Dakota through Clearbrook, Minnesota, and on to Superior, Wisconsin. There are no other existing liquids pipelines that could carry oil from Canada to Superior, Wisconsin. The Enbridge North Dakota system is currently operating at capacity. From the U.S./Canada border to Superior, Wisconsin, the Enbridge Pipelines (Lakehead) L.L.C system consists of five pipelines between Neche, North Dakota and Clearbrook, Minnesota, and four pipelines between Clearbrook, Minnesota and Superior, Wisconsin. Enbridge considered adding new pipeline loops but determined that new loops will be incapable of meeting the need for a continuous, direct pipeline for crude oil. Neither of these existing systems would be able to provide the incremental capacity available from the proposed Alberta Clipper pipeline (450,000 bpd); therefore, they are not practicable alternatives to the proposed action because they do not meet the project's need. No further review of these alternatives was conducted.

Furthermore, no existing systems, Enbridge or non-Enbridge owned/operated can return diluent from the Midwest to Canada. Modification of an existing system to return diluent to Canada would off-set the crude oil being currently transported. Therefore, an additional pipeline would need to be constructed. No further review of these alternatives was conducted.

DNR inquired as to the potential for expanding the capacity of the existing pipelines. Enbridge stated that no design modifications would be necessary to achieve the design capacity of the existing pipelines. The design maximum operating pressures, annual capacity, and design capacities for the existing pipelines in Douglas County, that enter the Superior Terminal are provided in Table 15, below. Annual capacity is 90 percent of design capacity and is defined as the yearly average including planned maintenance and outages. Design capacity is the theoretical maximum capacity of a line assuming all pumps/motors are working.

Table 15 - Design Capacities for Existing Enbridge Pipelines

Line Number	Outer Diameter (in)	Design Maximum Operating Pressure (psi)	Annual Capacity (bpd)	Design Capacity (bpd)
1	18	833	240,000	267,000
2	26	809	440,000	489,000
3	34	619	390,000	433,000
4	36	991	800,000	889,000
5	30	701	490,000	544,000
6A	34	619	670,000	744,000
14	24	1378	320,000	356,000
61	42	1012	400,000	444,000

DNR inquired as to the potential to use the existing Stage 1 and 2 diluent lines for crude oil transport if the proposed Southern Lights pipeline was not constructed. Enbridge responded by saying that the Southern Lights Diluent Pipeline constructed during Stages 1 and 2 of the Southern Access projects was constructed in accordance with U.S. Department of Transportation (US DOT) regulations provided in 49 CFR Part 195 for the transport of hazardous liquids and can be used as such. Modifications to the beginning and end of this section of the pipeline would be required for it to be operated for a purpose other than the proposed design of diluent transport. For example, this section of the pipeline has not been designed to take deliveries from or deliver to the Enbridge Superior Terminal. If the scope of a project included Superior as the terminus or origination point of the Southern Lights pipeline transporting crude oil, it would require a manifold (or manifold connection) and breakout tanks.

IV.B.3. Construction of other new pipeline systems

The proposed TransCanada Keystone Pipeline Project (Keystone Project) crosses the U.S./Canada border in Pembina County, North Dakota near the crossing point for the proposed Alberta Clipper Pipeline Project. However, the Keystone Project continues almost due south to connect to storage facilities and refineries in Missouri, southern Illinois, and Oklahoma. To serve the markets of the proposed Project in Minnesota, Wisconsin and possibly Michigan, Illinois, and Indiana, the Keystone project would require a branch line from Pembina County, North Dakota to at least Superior, Wisconsin. This branch line would essentially duplicate the proposed Alberta Clipper Project and would likely offer no environmental advantages over the proposed Project, which provides the advantage of co-location within Enbridge's existing pipeline corridor.

Enbridge has completed construction of the LSr pipeline, a 20-inch crude oil pipeline from the U.S./Canada border at Pembina County, North Dakota, to Clearbrook, Minnesota, to increase delivery capacity for existing light crude oil sources. This project is intended to replace an existing pipeline but would not meet the need for additional capacity between Neche, North Dakota and Clearbrook, Minnesota, nor would it provide any capacity between Clearbrook and Superior, Wisconsin.

In addition, neither of these new pipeline systems would be able to facilitate the transportation of diluent back to Canada.

IV.B.4. Trucking

Hauling crude oil from Enbridge's Cromer, Manitoba facility to Superior, Wisconsin (or refineries farther south and east) is a potential alternative to the proposed Alberta Clipper project. The trucking alternative would only require construction of a loading terminal at the Cromer facility and an unloading terminal in Superior, Wisconsin. Assuming that trucks would only travel to the Superior Terminal, the trucking alternative would have the following disadvantages compared to the proposed Alberta Clipper project:

- Based on comparative safety statistics, pipeline transport of liquids is safer than vehicle transport. The trucking alternative would increase the likelihood of accidents and increase the likelihood of injury, property damage, and oil spills.

- The trucking alternative would add congestion to interstate and intrastate highways. Based on the incremental capacity available from the proposed Alberta Clipper pipeline alone (450,000 bpd), the trucking alternative would result in 585,825,000 more highway miles driven by tank trucks per year;

- The trucks would consume an estimated 117,165,000 gallons of fuel per year, with subsequent exhaust emissions;

- Trucking would be more costly than pipeline transport; and

- Trucking would be subject to interruptions due to unfavorable weather and road conditions.

Hauling diluent from Enbridge's Superior, Wisconsin Terminal to its facility in Clearbrook, Minnesota is a potential alternative to the proposed Southern Lights project. The trucking alternative would only require construction of a loading terminal at the Superior facility and an unloading terminal in Clearbrook. Assuming that trucks would only travel to the Superior Terminal, the trucking alternative would have the same disadvantages as discussed above for the Alberta Clipper project.

IV.B.5. Railroad

If there were an existing and direct rail line between Hardisty, Alberta, Canada and Superior, Wisconsin, the impacts of this alternative would be limited to operations of a rail line. However, there is no existing rail line between the two locations and developing a rail line would require construction of spurs, terminal facilities, and upgrades to existing rail lines with corresponding environmental impacts. Once operational, this configuration would require hauling oil south and diluent north totaling approximately 25,000 tank cars per year to transport the volume that would be carried via the Alberta Clipper Project (including the diluent pipeline). It is expected that this configuration would result in significantly more environmental impacts during construction and operation compared to the proposed Projects. The Minnesota Office of Environmental Services concluded that this alternative would create significant environmental disruption and increase public safety risks.

IV.B.6. Barge

Barging the oil would not be feasible due to the lack of a large waterway system between Hardisty, Alberta, Canada and Pembina County, North Dakota capable of supporting barge traffic.

IV.B.7. Wetland mitigation site

Enbridge is proposing to mitigate for wetland impacts through a project-specific consolidated wetland mitigation site located in the Nemadji River watershed. The site is located on the south side of County Road C at the intersection of Darrow Road (refer to Figure 12, below). The property is immediately adjacent to the Nemadji River Floodplain Forest State Natural Area. Therefore, it is Enbridge's intention to include the property in the State Natural Area program to preserve it for perpetuity.

DNR review of wetland water quality impacts under Chapter NR 103, Wis. Adm. Code does not require wetland mitigation. Wetland mitigation is considered by the U.S. U.S. Army Corps of Engineers under Section 404 of the Clean Water Act.

Most wetland impacts associated with pipeline construction are temporary, depending on the type of wetland and the nature and location of the disturbance. The St. Paul District of the U.S. Army Corps of Engineers has promulgated guidance to provide appropriate mitigation for wetland impacts occurring in temporary workspace and within the permanently maintained corridor (*St. Paul District Internal Guidance on Compensating for Wetland Impacts Associated with Utility Projects – Final Draft, 4/15/08*)(ACOE Utility Guidance). These guidelines consider in-kind, in-place, and in-advance mitigation factors, and focus on compensation for wetland function loss due to temporal impacts and changes in wetland type. Restoration of the wetland to original conditions and hydrology represent in-place compensation, with 0.25:1 for both out-of-kind replacement and temporal loss (0.50:1 total).

Enbridge has agreed to employ the suggested mitigation ratios and procedures as specified in the ACOE Guidance and subsequent updates provided by the ACOE (Table 16). Mitigation concepts and conceptual designs prepared by Enbridge are being provided to ACOE staff and refined during a series of meetings, comments, and responses. Enbridge will provide a compensatory mitigation plan to compensate for unavoidable adverse impacts to Wisconsin wetlands for review and approval by ACOE.

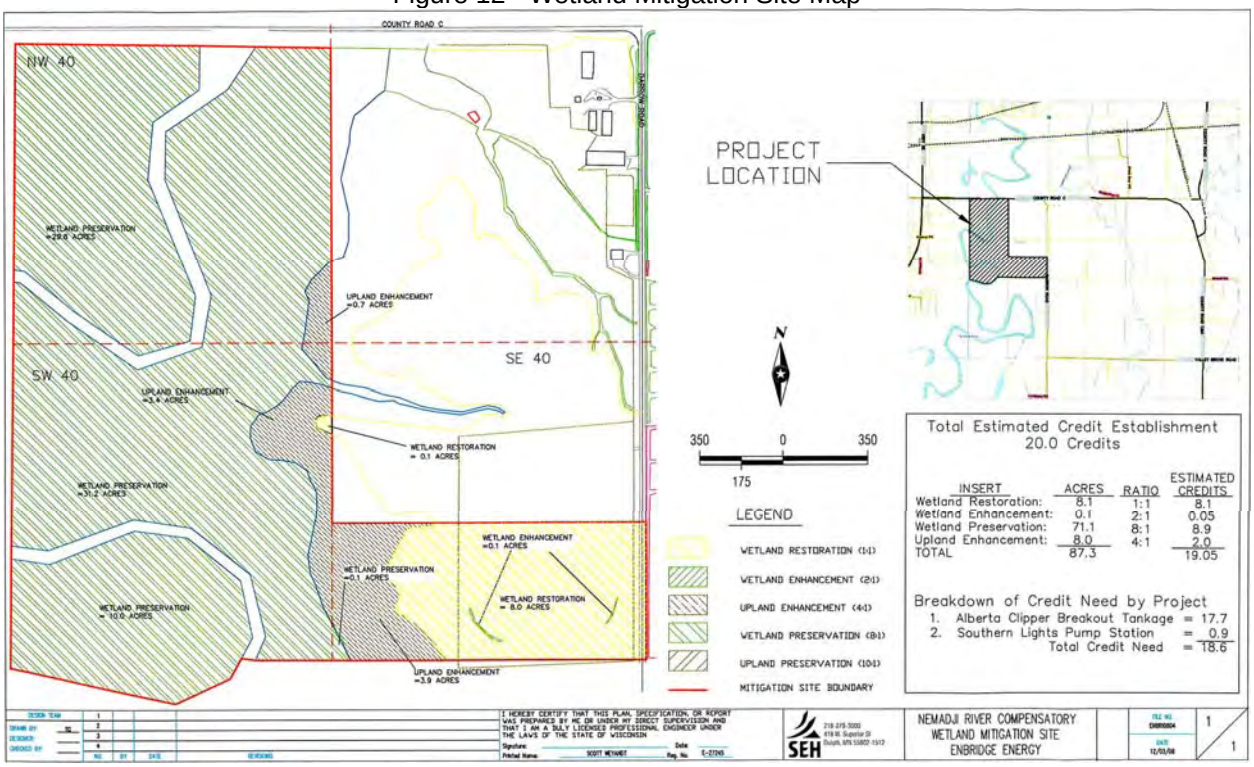
Table 16 - Wetland Mitigation Compensation Ratios

Baseline Compensation Ratios For Impacts Associated With Utility Projects (no net loss of waters of the U.S.)				
Wetland Type	**Impact Duration***	**Ratio**	**Impact Example**	**Mitigation Example**
Forested	Indefinite	0.50:1	2	1
Scrub-Shrub	Indefinite	0.50:1	2	1
Scrub-Shrub in TWS**	10 yrs.	0.10:1	10	1
Emergent/Wet Meadow	3 yrs.	0.03:1	30	0.9
Total (for example)			44	3.9

The property located on the west side of Darrow Road currently consists of a two residential homes, associated buildings and barns, a horse corral, horse pasture, an active hayfield, and forested floodplain. Excluded from the project specific consolidated wetland mitigation site includes the two residential homes, associated farm buildings and barns, and the northwestern portion of the existing pasture. The remaining portions of the property, which includes active

horse pasture with areas of steep ravines, an active hayfield, and riparian and deciduous forested floodplain would be used to create the project specific consolidated wetland mitigation. The proposed mitigation site is shown in Figure 12.

Figure 12 - Wetland Mitigation Site Map



Areas within the active horse pasture are proposed for wetland restoration, enhancement, and preservation; in addition to upland enhancement and preservation within the riparian and deciduous forested floodplain areas. Wetland restoration techniques would include restoring hydrology to former wetland areas, which may include the minor grading of areas in order to create slight depressional areas to capture precipitation and overland flow. Upland enhancement efforts would include the cessation of agricultural activities and livestock usage, reinforcement of slopes through native tree, shrub, and herbaceous vegetation planting, and soil protection by the removal of any vehicular (truck, car, ATV, snowmobile) usage. Wetland enhancement efforts would also include the cessation of agricultural activities and livestock usage, restoration of hydrology through the removal of any man-made drainage activities (should they exist), vegetative establishment through plantings of native wetland trees, shrubs, and herbaceous vegetation, and protection from vehicular usage (including car truck, ATV, and snowmobiles).

All areas of restoration, creation, and enhancement would be seeded and or planted with native plant species, including local genotypes, were possible. Vegetative rehabilitation would be achieved by the removal of non-native or invasive species through appropriate management techniques and the replacement of these species through seeding and planting with native grasses, forbs, shrubs and/or trees. Once the compensatory wetland mitigation concept has been approved by the agencies, a detailed compensation site plan, in accordance with the new Federal

Mitigation Rule (4108) and the Guidelines for Compensatory Wetland Mitigation (2102) would be prepared and presented to the applicable agencies for review.

Seventy-one acres of deciduous forested floodplain located within the Nemadji River floodplain are proposed for preservation to ensure that the valuable functions of this area, such as floodwater attenuation, groundwater recharge, and wildlife habitat, are preserved in perpetuity. Potential threats to this area if not placed into a preservation easement could include peat mining (which had previously been undertaken in this area), logging, grazing, or the conversion of this area into agricultural fields.

A wetland delineation was completed for the site on August 20 and August 25 through 27, 2008. An onsite wetland concurrence was completed by the Wisconsin DNR on September 29, 2008, at which time the DNR agreed to the flagged wetland boundaries. During that same site visit the determination was made that based on existing habitat types and presence/absence of known threatened and endangered species associates a survey needed to be completed for the following target species: Vasey's rush, slender spike rush, and arrowhead sweet coltsfoot. A survey was conducted on October I and 6, 2008 for the entire site with the exception of the 71.00 acres in the Nemadji River floodplain. The survey was conducted for the presence or absence of Vasey's rush, slender spike rush, and arrowhead sweet coltsfoot. Five occurrences of Vasey's rush were identified in low-lying areas of the hayfield located in the southwestern portion of the site. No occurrences of slender spike rush, and arrowhead sweet coltsfoot were identified.

The proposed mitigation plan includes the following: upland enhancement at a proposed ratio of four acres of enhancement to every one wetland credit; wetland restoration at a ratio of one acre of restoration to every one credit; wetland enhancement at a proposed ratio of two acres of enhancement to every one wetland credit; and wetland preservation at a proposed ratio of eight acres of wetland preservation to every one wetland credit.

The final proposed compensation site plan would be prepared prior to and implemented concurrent with construction of the proposed wetland impact project (not meeting "in-advance" requirements). The proposed compensatory wetland mitigation project would occur within the same subwatershed (Nemadji) as the proposed wetland impact project (meeting "in place" requirements). The proposed compensatory wetland mitigation project would include compensation for, at minimum, equal acres of each wetland type as is proposed for impact (meeting "in-kind" requirements). Details of the in-kind replacement would be included in the final Compensation Site Plan.

IV.C. AC and SL pipeline alternatives

IV.C.1. Macro-corridors

WDNR requested that Enbridge perform a macro alternatives analysis by evaluating major corridor alternatives in addition to the proposed corridor. Corridor alternatives were selected that could practicably be located within a geographic area encompassing the Superior Terminal, County Highway C and the Minnesota/Wisconsin state border. Attachment A provides a map illustrating the geographic area in which Enbridge performed its macro alternatives analysis. A “practicable alternative” is one “available and capable of being implemented after taking into

consideration cost, available technology and logistics in light of overall project purpose." Wis. Admin. Code § NR 103.07(2). Accordingly, Enbridge evaluated the macro alternatives to determine whether these alternatives would avoid or minimize impacts to natural resources, reduce or eliminate engineering and constructability concerns, and avoid or minimize conflicts with existing or proposed residential and agricultural land uses as compared to the proposed, preferred corridor.

The alternative analysis focused on minimizing the length of the pipeline to the extent practicable, while also minimizing the environmental impacts to specific resources. For context, each mile of the proposed Project would generally impact approximately 17 acres during construction and nine acres during operation (exact acreage is dependent on exact construction methods, workspaces, access roads, etc.). Similarly, it is impossible to avoid all resources due to the extent, shape, and prevalence of many resources.

Consideration of potential alternative corridors was also influenced by the existence of Enbridge control points. Control points at specific locations along the pipeline route serve to anchor the route at the beginning and end, and possibly midpoints, thereby defining specific portions of the final route. Primary control points were identified at the delivery point to Wisconsin at the Minnesota border and the Superior Terminal in Superior, Wisconsin.

The existing Enbridge ROW approximates a straight line connecting the control points, resulting in little advantage of creating a new large-scale ROW that would not be co-located within Enbridge's existing pipeline ROW but which would largely parallel the existing ROW. The use of the existing right-of-way minimizes new environmental impacts consistent with the goals of Wisconsin's energy policy.

The alternatives analysis for macro route alternatives focused on specific environmental impacts to the following factors:

- Length of pipeline;
- Adjacent to existing ROW;
- Wisconsin Wetland Inventory (WWI) mapped wetlands (by wetland type);
- Wetlands within the City of Superior that are indicated as "Protected" in the Special Area Management Plan (SAMP);
- Priority Wetlands as identified by the March 2000 Data Compilation and Assessment of Coastal Wetlands of Wisconsin's Great Lakes, Pub. ## ER-002-00;
- Perennial and intermittent waterbodies (including major, impaired, Priority Navigable Waterway (PNW), Area of Special Natural Resource Interest (ASNRI);
- Wild Rice production area drainages as identified by the WDNR and Great Lakes Indian Fish and Wildlife Commission;

- Named ASNRI lands;
- State Natural Areas;
- County Forest land;
- WDNR-managed lands;
- Superior Municipal forest;
- Managed Forest Law tracts (refer to section 5.2.1);
- High Consequence Areas (HCAs) (HCAs are areas identified by the U.S. Department of Transportation where the potential consequences of a pipeline accident may be significant or may do considerable harm to people and their property);
- Structures within 100 feet of the centerline;
- Land Use (WISCLAND);
- Landowners affected;
- Private land tracts;
- Public land tracts;
- Roads and railroads crossed; and
- All-terrain vehicle (ATV) and Snowmobile trails crossed.

Enbridge has completed a detailed evaluation of each alternative corridor based on the above-referenced factors. Only WWI-mapped wetlands, wetlands within the City of Superior that are indicated as "Protected" in the SAMP, and Priority Wetlands as identified by the March 2000 Data Compilation and Assessment of Coastal Wetlands of Wisconsin's Great Lakes, Pub. ## ER-002-0 are considered as part of the Wis. Admin. Code § NR 103.07(2) alternatives analysis. The remaining factors have been considered as part of the overall environmental review required for the project per Wis. Admin. Code § NR 150.

To provide an objective comparison, the preferred route and the alternatives analysis were evaluated using Wisconsin Wetland Inventory Data, USGS stream data, and other published data, in lieu of using known field data for the preferred route. Most impacts are reported as a linear measurement in lieu of an area measurement, with the exception of permanent impacts to wetlands. Permanent wetland impacts were calculated using the proposed 75-foot-wide permanent ROW.

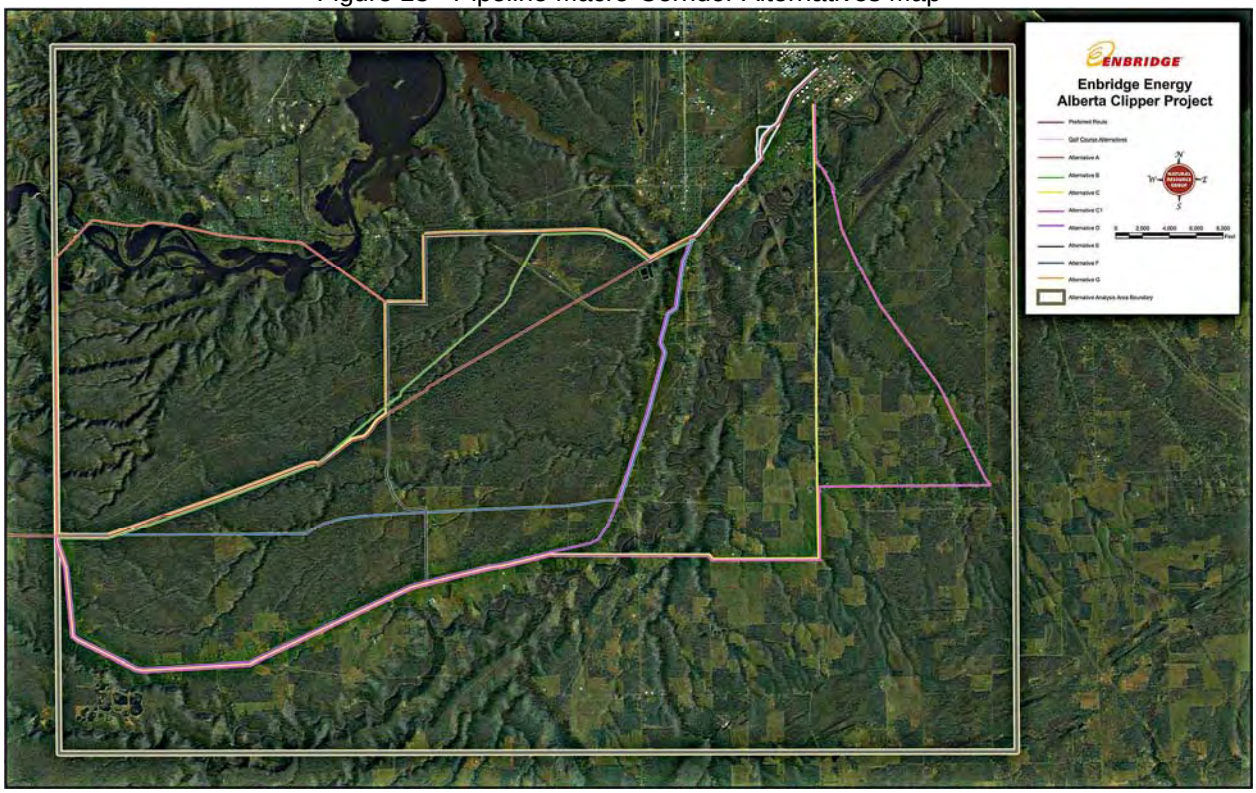
In the analysis of permanent wetland impacts, the advantage of co-locating new linear facilities with existing linear facilities is apparent. Co-location allows for a reduction in the overall acreage of permanent wetland impact. The permanent wetland acreage calculations for the preferred route take into account the 25 to 50 foot overlap of the new proposed permanent ROW with the existing permanently maintained ROW. The 75-foot-wide permanent ROW that would be required for a non-co-located route is thereby reduced to only those areas outside of the existing ROW. For the alternative corridors, permanent wetland impacts could be found within the entire 75-foot-wide permanent ROW.

Because trees and shrubs would not be allowed to fully regenerate within the permanent maintained ROW, impacts to forested wetlands would be long-term and impacts within the permanent ROW would represent a conversion of forested wetlands to scrub-shrub or emergent wetlands.

The fragmentation of habitat and land use would be minimized by the co-location of the proposed pipelines with Enbridge's existing pipelines, whereas the creation of a new utility corridor elsewhere in the project area would lead to additional fragmentation concerns.

The macro-corridors that were considered are shown in Figure 13.

Figure 13 - Pipeline Macro-Corridor Alternatives Map



IV.C.1.a. North Trail corridor

The North Trail Corridor is located along the abandoned Chicago Milwaukee Railroad Corridor and abuts the WDNR-managed St. Louis River Streambank Area. At the request of the WDNR, this route has been included but was not evaluated in further detail as it is currently designated as an ATV trail but its also a heavily traveled walking trail. The trail itself averages approximately 15 feet in width and drops off on both sides to steep gullies. Further review of this corridor has been discounted due to constructability issues and has not been included in the macro-analysis.

IV.C.1.b. Alternative A

Alternative A begins at the location where the Project enters Wisconsin from Minnesota. The corridor turns directly north and follows the western border of the state for approximately 2.65 miles (through WDNR-managed land), it then heads north and east and crosses the St. Louis River. The corridor then turns east and follows the St. Louis River floodway until it intersects with the pipeline ROW held by the City of Duluth. The corridor then heads south and east, crossing the St. Louis River and follows the existing corridor along the southern border of the City of Oliver. The route then heads directly east and then north towards old Highway 105. The corridor continues east along Old Highway 105 for approximately 2.5 miles at which point the corridor turns south to intersect with Enbridge's existing corridor.

IV.C.1.c. Alternative B

Alternative B begins at the location where the Project enters Wisconsin from Minnesota. The corridor parallels Enbridge's existing ROW for approximately 2.5 miles where it then follows Northern Natural Gas Company's ROW north and east; traversing the northwest corner of the Pokegama-Carnegie ASNRI. The corridor continues north until it intersects with old Highway 105. The corridor continues east along Old Highway 105 for approximately 2.5 miles at which point the corridor turns south to intersect with Enbridge's existing corridor.

IV.C.1.d. Alternative C

Alternative C begins at the location where the Project enters Wisconsin from Minnesota. The corridor parallels County Road C to the south for approximately six miles until County Road C road turns north. The corridor continues east paralleling Carignan, During and Kerwin Roads. The route crosses Kerwin Road to the north to avoid a county forest area and then crosses Kerwin Road to the south to avoid an existing wetland mitigation site. The corridor crosses County Road A and parallels it to the east in a northerly direction until it reaches the Superior Terminal.

IV.C.1.e. Alternative C1

At the request of the Wisconsin Department of Natural Resources (WDNR) , Enbridge evaluated a route variation of Alternative Route C. Specifically, Enbridge evaluated co-locating a segment of Alternative C with the corridor containing existing Lines 6A, 14, 13, and 61. As described above, this corridor cannot accommodate additional pipelines without acquisition of additional

permanent easement, which, as indicated above, will not overlap the existing easement. Therefore, Alternative C1 will require the same new 75-foot permanent easement that a greenfield route requires. Alternative C1 follows the same route as Alternative C, until County Road A.

Alternative C1 begins at the location where the Project enters Wisconsin from Minnesota. The corridor parallels County Road C to the south for approximately six miles until County Road C road turns north. The corridor continues east paralleling Carignan, During and Kerwin Roads. The route crosses Kerwin Road to the north to avoid a county forest area and then crosses Kerwin Road to the south to avoid an existing wetland mitigation site. The route up to this point is the same as Alternative C. However, where Alternative C follows County Road A north to the Superior terminal, Alternative C1 crosses County Road A, continues east to the existing Enbridge corridor that contains Lines 6A, 14, 13, and 61. C1 parallels the existing corridor to the east and in a northerly direction until it reaches the Superior Terminal.

IV.C.1.f. Alternative D

Alternative D begins at the location where the Project enters Wisconsin from Minnesota. The corridor is located south of County Road C and parallels the road east for approximately six miles and then continues paralleling the road as it turns north until it intersects Enbridge's existing easement. The corridor then follows Enbridge's existing easement into the Superior Terminal.

IV.C.1.g. Alternative E

Alternative E begins at the location where the Project enters Wisconsin from Minnesota The corridor is located south of County Road C and parallels the road until it intersects with County H (approximately four miles), then the corridor heads north until the intersection with the Great Lakes Gas Transmission Line, it then jogs west and then back north, paralleling S. Kimmes Road. At the City of Oliver, the corridor turns to the east and then north towards old Highway 105. The corridor continues east along Old Highway 105 for approximately 2.5 miles at which point the corridor turns south to intersect with Enbridge's existing corridor.

IV.C.1.h. Alternative F

Alternative F begins at the location where the Project enters Wisconsin from Minnesota. The corridor parallels the Great Lakes Gas Corridor until it intersects with County Road C. At County Road C the corridor turns north, paralleling the road until it intersects Enbridge's existing easement. The corridor then follows Enbridge's existing easement into the Superior Terminal.

IV.C.1.i. Alternative G

Alternative G begins at the location where the Project enters Wisconsin from Minnesota. The corridor is located within Enbridge's existing ROW until S. Kimmes Road. At this intersection, the route heads north, following S. Kimmes Road to the City of Oliver. At the City of Oliver, the

corridor turns to the east and then north towards old Highway 105. The corridor continues east along Old Highway 105 for approximately 2.5 miles at which point the corridor turns south to intersect with Enbridge's existing corridor. The corridor then follows Enbridge's existing easement into the Superior Terminal.

IV.C.1.j. Pokegama-Carnegie HDD

Based on the recommendations of the Wisconsin DNR, Enbridge agreed to install both pipelines through the vast majority of the Pokegama-Carnegie wetland complex, including all of the State Natural Area, by horizontal directional drilling (HDD).

IV.C.2. Route Variations

Route variations differ from macro-corridor alternatives in that they are intended to resolve or reduce construction impacts to localized, specific resources, such as wetlands, recreational lands, residences, landowner requests, and terrain conditions. Several factors are considered in identifying and evaluating route variations, including length, land requirements, the potential for reducing or minimizing impacts to natural resources, and addressing landowner concerns.

The existing Enbridge corridor traverses Wisconsin from the Minnesota-Wisconsin border to Enbridge's Superior Terminal as one contiguous, permanently maintained ROW. There are not multiple Enbridge corridors present in Wisconsin. However, the following three short greenfield route alternatives and one collocation shift were specifically developed to minimize impacts to sensitive resources.

- Reduce Impacts to a Tributary of the Pokegama River.
- Wetland Impact Avoidance Associated with Agricultural Field.
- Minimize Temporary Impacts to the PCWC ASNRI.
- Avoid Impacts to the Superior Airport ASNRI Located Immediately to the East of the Nemadji Golf Course.

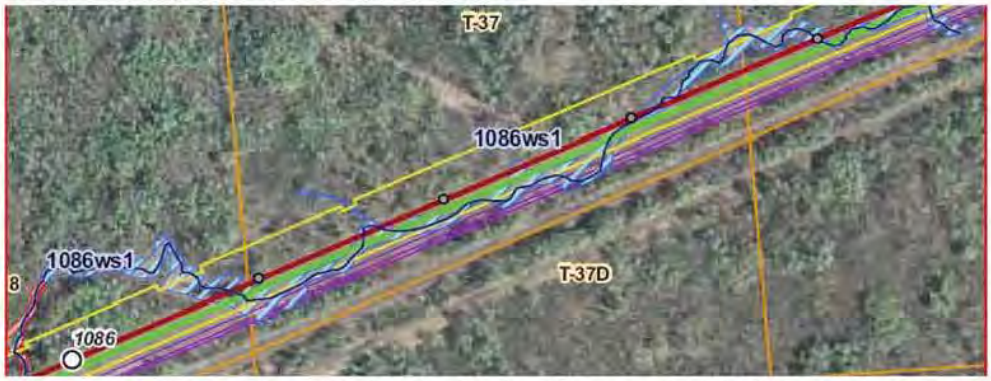
Enbridge has identified route variations at three locations: Milepost 1086, Milepost 1089, and at the Nemadji Golf Course (MP 1096.4).

Milepost 1086 Route Variation

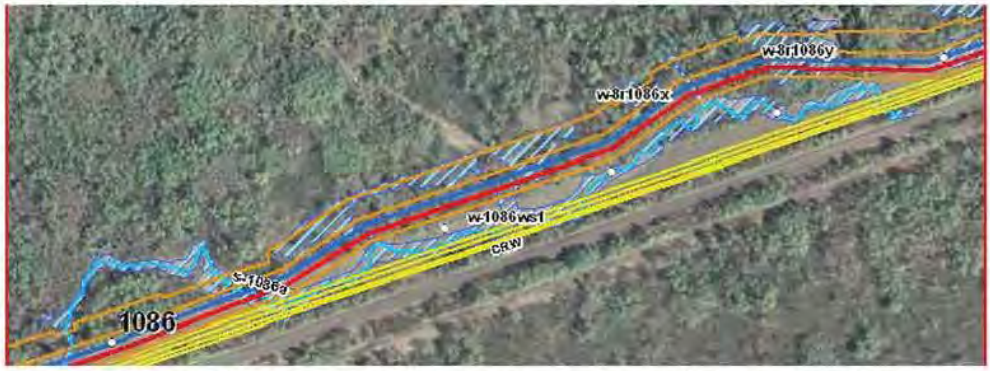
Enbridge has evaluated the proposed route from milepost 1086.1 to 1086.5 to minimize the crossings of an unnamed tributary to the Pokegama River. The unnamed tributary meanders along the center of the existing maintained ROW. To minimize impacts to this feature, Enbridge has proposed moving the construction ROW north of the existing ROW. The route variation would avoid disturbance of approximately 1,300 feet of the meandering tributary. The emergent wetlands would be allowed to revert to their original condition and no new permanent impacts will occur as a result of this route variation. This proposed route variation is shown in Figure 14.

Figure 14 - Milepost 1086 Route Variation

Waterbody wb1086a is an intermittent shallow, natural drainageway seen as a linear depression in the center of the picture in front of the field staff person. The wetland (w-8r1086x) off ROW will be minimally impacted during construction.



Screen capture of the original route showing the approximately 0.4 mile reach of waterbody wb1086a (Tributary to the Pokegama river) within and immediately adjacent to the construction ROW.



Screen capture of the greenfield reroute area to avoid wb1086a tributary of the Pokegama. The reroute minimizes impacts to waterbody wb1086a by avoiding the long (0.4 mile) parallel section that lies within and to the immediate north of the existing corridor. Impacts to intermittent waterbody wb1086a have been substantially reduced to two nearly perpendicular crossings.

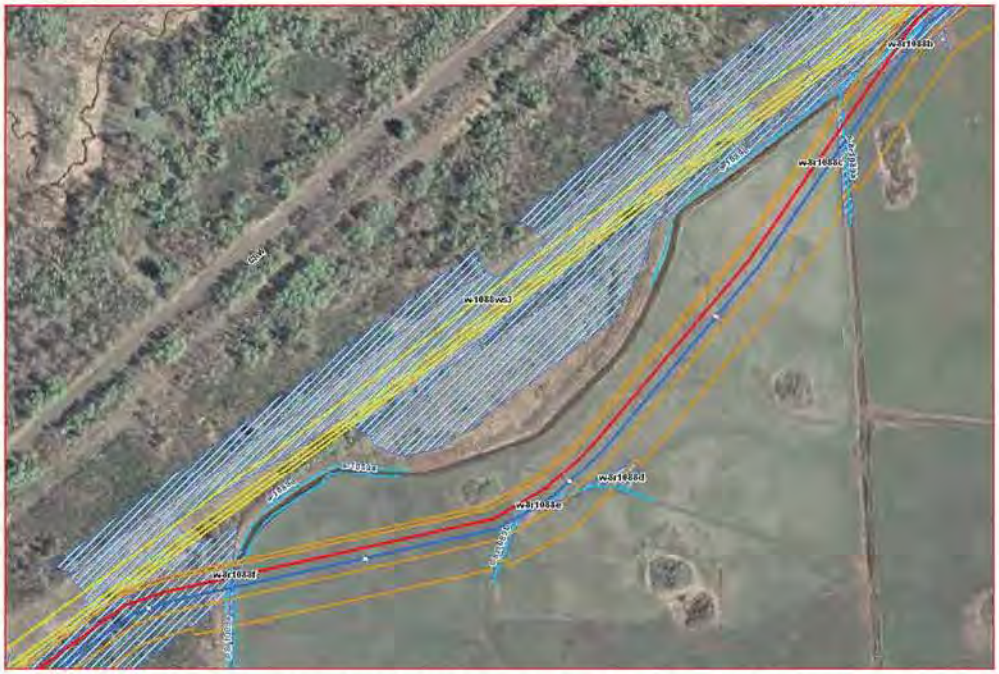
Enbridge has proposed a minor greenfield reroute from MP 1086.1 to MP 1086.5 (0.4 miles) to avoid issues with a tributary to the Pokegama River (wb1086a) meandering for 0.4 miles through the portions of the existing corridor that were proposed for construction (See Section 5.2.1). While there are minimal increases in wetland impacts , the increase in wetland impact is outweighed by the decrease in potential erosion and restoration problems that would result from the presence of 0.4 miles of stream within the construction ROW.

Milepost 1089 Route Variation

Enbridge has evaluated the proposed route from milepost 1089.3 to 1089.7 due to a landowner request. Enbridge has identified a new greenfield corridor through an existing hay field. The proposed greenfield corridor would result in two new waterbody crossings of unnamed intermittent ditches; however, it would reduce the overall temporary wetland impacts by 4.3 acres. This proposed route variation is shown in Figure 15.

Figure 15 - Milepost 1089 Route Variation

Waterbody 8rwb1089a is the main ditch around the periphery of the agricultural field. The ditch is excavated in red clay. Combined with laterals, the ditch effectively drains the adjacent farmland. Spoil is piled on the north side of the ditch.



Screen capture of the greenfield reroute area. The reroute avoids impacts to wetland w-1088a by routing through the agricultural field. This reroute also avoids impacts and construction issues that would result from paralleling the existing main ditch and crosses the main ditch with a more perpendicular orientation. A section of lateral to the northwest that is included within the construction ROW is easily isolated during construction.

The only excavated ditches crossed in Wisconsin are associated with an agricultural field extending from MP 1089.3 to MP 1089.8. Enbridge has proposed a greenfield reroute through this agricultural field to minimize impacts to riparian wetlands and to prevent parallel crossings of the ditches as discussed in Section 5.2.2. Collocation to the north results in greater wetland impact and is complicated by the presence of County Road W and a foreign pipeline easement.

Nemadji Golf Course

Enbridge has evaluated three route variations at the Nemadji Golf Course (referred to as segments B5, B6, and B7). The three segments evaluated would begin just to the south of the

Nemadji Golf Course and intersect with Enbridge's existing ROW north of the golf course. Segment B5 is the originally proposed route that traverses a greenfield site to the west of the golf course and the railroad corridor. Segment B6 is a new route proposed within the golf course, but it does not follow Enbridge's existing easement; instead it follows along the west and north boundaries of the golf course. Section B7 is Enbridge's existing easement.

Segment B5 Route Variation at the Nemadji Golf Course

Segment B5 would depart the existing Enbridge ROW at milepost 1096.2 and continue north, parallel to and west of the Soo Line railroad ROW to the northern boundary of the Nemadji Golf Course where it would then head west 0.3 miles until it intersects Enbridge's existing ROW. This alternative would have the greatest impact on wetlands, approximately 4.56 acres, as compared to the other two routes. This alternative was originally selected in response to the landowner request (City of Superior) that the route through the Nemadji Golf Course be avoided to minimize disruptions to operations as a result of construction activities. This segment was evaluated by agency representatives of both the ACOE and the WDNR. As a result of this evaluation, both agencies responded with concerns regarding the impacts on a significant population a state-listed threatened plant. In response to agency concerns, Enbridge has identified an alternative to this preferred route; specifically Segment B6.

Segment B6 Route Variation at the Nemadji Golf Course

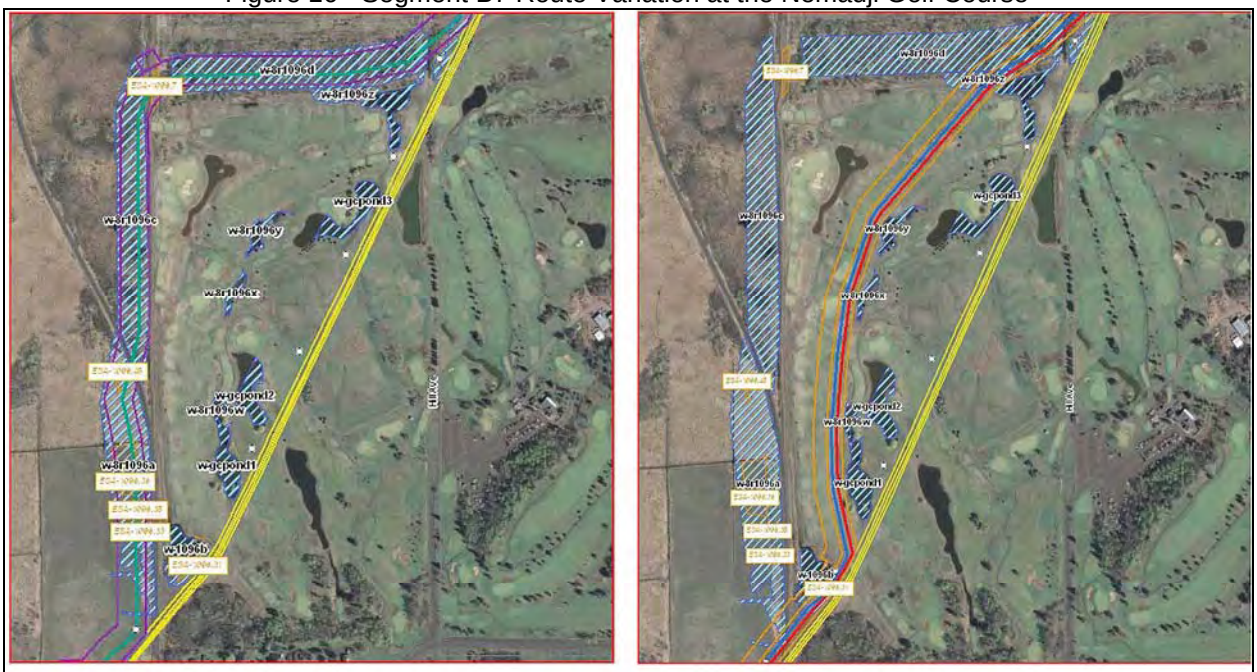
Segment B6 would depart the existing Enbridge ROW at about milepost 1096.2. Where Enbridge's existing pipeline corridor heads to the east and traverses the Nemadji Golf Course, Segment B6 continues north along the edge of the northeastern fairways of the golf course and intersects with the existing Enbridge ROW as it leaves the golf course. This alternative would reduce the acreage of wetland impacts on segment B5 by 4.40 acres as compared to segments B5 and B7 and would successfully avoid impacting the area of concern found on segment B5. Although still crossing within the Nemadji Golf Course, this route would minimize the disruptions to the golf course and avoid impacts on two ponds used of irrigation purposes.

Segment B7 Route Variation at the Nemadji Golf Course

Segment B7 would follow Enbridge's existing pipeline corridor across Nemadji Golf Course. This route would significantly restrict the use of key golf course facilities, and would require the dewatering of two significant ponds which play a key role in the irrigation system of the golf course.

Enbridge is proposing to follow Segment B6 which would minimize the impacts to sensitive natural areas and minimize the disturbance within the Nemadji Golf Course. This proposed route variation is shown in Figure 16.

Figure 16 - Segment B7 Route Variation at the Nemadji Golf Course



The original route was proposed to avoid impacts to the Nemadji Golf Course by routing adjacent to and to the west of the Golf Course. This route incorporated a portion of the Superior Airport ASNRI and associated Wisconsin listed plant species. Wetland impacts on the greenfield route total 4.56 acres

In response to WDNR and ACOE concerns, Enbridge negotiated a route through the Nemadji Golf Course that completely avoided the Superior Airport ASNRI and associated Wisconsin listed plant species. Impacts for the new reroute through the golf course were reduced by 4.40 acres.

In response to agency concerns regarding impacts to wetland within the Superior Airport ASNRI and associated Wisconsin listed plant species, Enbridge negotiated a new greenfield reroute through the Nemadji Golf Course that completely avoided the ASNRI and associated Wisconsin listed plant species, and reduced the impacts by 4.40 acres

Pokegama-Carnegie wetland complex

In response to ACOE and WDNR concerns regarding potential Project-related impacts to wetlands on and off of Enbridge's permanently maintained corridor, Enbridge redesigned the project through the PCWC ASNRI from a southern collocation to a northern collocation from MP 1090.6 to MP 1093. Wisconsin has identified the PCWC as a designated ASNRI under NR 1.05. Portions of the ASNRI were designated State Natural Area No. 516 in 2006.

The PCWC ASNRI is a two-unit land feature consisting of a large tag alder swamp on relatively level, fine-textured clayey soils. The designated SNA consists of two smaller units within the PCWC ASNRI. Four existing Enbridge pipelines traverse both units and are contained within a permanently maintained corridor that was established well before the ASNRI/SNA designation. The two units are separated by a railroad yard, which is not state designated SNA or ASNRI. Two additional non-Enbridge pipeline corridors exist within the PCWC ASNRI.

A comparison of potential route alternatives to the originally proposed crossing of the PCWC ASNRI suggests that the collocation with the existing Enbridge pipeline corridor within the PCWC ASNRI would be the least environmentally damaging practicable alternative assuming the following pre-construction avoidance, construction minimization, and post construction habitat enhancements are implemented.

Though the route alternative's reduction in total acreage of wetland impact is not great (1.36 acres), more acreage of existing permanently maintained corridor is disturbed, resulting in a substantial transfer of impact from undisturbed, scrub shrub wetland (a reduction of 8.82 acres of scrub-shrub wetland) to disturbed emergent wetland (an increase of 2.68 acres). Note that the change in collocation to the north also indicates an increase in forested wetland impacts. To be conservative, all forested areas within the interpolated wetland delineation were considered wetland.

Based on the recommendations of the Wisconsin DNR, Enbridge agreed to install both pipelines through the vast majority of the Pokegama-Carnegie wetland complex, including all of the State Natural Area, by horizontal directional drilling (HDD).

Other Sensitive Areas

DNR requested Enbridge to consider additional sensitive areas and wetlands outside of the Pokegama-Carnegie wetland complex that could potentially be avoided. One concern was avoidance to the extent possible of all occurrences of *Juncus vaseyi* (Vasey's Rush),a Wisconsin Special Concern Species. Enbridge avoided and minimized the majority of occurrences of Vasey's Rush.

IV.C.3. Construction
IV.C.3.a. Methods
IV.C.3.b. Workspace requirements

Enbridge is proposing to co-locate the Alberta Clipper and Southern Lights Diluent pipelines within the same ROW. The proposed construction ROW configuration would generally be 140-feet in uplands and 125-feet in wetlands, and would host the construction activities for the installation of both pipelines, thus minimizing the overall construction footprint. By collocating, the project within the existing Enbridge corridor, Enbridge would not only be able to minimize impacts to greenfields, but will also reduce the permanently maintained ROW from 75 to 50 feet or less in most cases, which reduces permanent impacts to sensitive resources.

Enbridge would limit the amount of excavated open trench for pipe installation to two days of anticipated welding production or approximately 14,000 feet per spread, per pipe. Thus, initial excavation required for installation of the Southern Lights Diluent pipeline would be expected to be backfilled with subsoil shortly (generally within two days) after the installation.

Where topsoil segregation is feasible, excavated topsoil remaining from the installation of the Southern Lights Diluent pipeline would remain and would be replaced during clean-up and restoration associated with both pipelines subsequent to the installation of the Alberta Clipper pipeline.

DNR asked Enbridge to consider applying the narrower construction widths proposed in the Pokegama complex to all wetlands within the proposed construction ROW.

Enbridge consulted with an independent professional geotechnical engineer to evaluate the pipe spacing and workspace requirements for the entire proposed route in Wisconsin.

Initially, Enbridge intended to install the new pipelines south of the existing corridor between mileposts 1090.6 and 1093.2. This configuration would have extended the existing corridor from 125 to 175 feet. In the initial application, Enbridge proposed from approximately milepost 1090.6 to 1093.2 to install the two new pipelines on the north side of the existing corridor. In addition, between milepost 1090.6 and 1093.8, Enbridge reduced the spacing between the pipelines from 25 feet to 20 feet. Furthermore, the original 25 foot buffer to be maintained north of the Alberta Clipper pipeline was reduced to 20 feet. By moving the new pipelines to the north, reducing the spacing between pipelines, and reducing the operational buffer, Enbridge effectively reduced the originally proposed new additional permanently maintained right-of-way from 50 feet to 10 feet within the Pokegama-Carnegie wetland complex. Enbridge would be able to reduce the ROW in this area due to the current land use to the north of its lines. The typical 25 foot buffer between the outermost pipeline would be necessary to help prevent the encroachment of adjoining landowners (structures, excavation, etc.), which is a significant safety concern. However, development within this area is highly unlikely, as it is currently Douglas County Forest. Therefore, Enbridge was agreeable to reducing the buffer to 20 feet instead of the typical 25 feet.

Enbridge revised their proposal so as to decrease the spacing between the outmost pipeline and the Southern Lights Diluent pipeline to 18 feet, and 21 feet between the Southern Lights Diluent and Alberta Clipper pipelines in all areas outside of the Pokegama-Carnegie wetland complex. The also proposed a total construction right-of-way within wetlands of 109 feet as opposed to the 125 feet which was originally proposed. Revised typical right-of-way configurations are shown in Figures 7a and 7b in Section III.B.1. Within the Pokegama-Carnegie wetland complex and outside of segments being installed by HDD, Enbridge proposes a pipe spacing of 18 feet, a total construction right-of-way of 80.5 feet, and a reduced operational buffer of 10 feet, which results in no new permanent right-of-way.

Enbridge considers the very restrictive construction right-of-way proposed for the Pokegama-Carnegie wetland complex as not practical for the remaining wetland areas due to the increased risk of damaging the existing pipeline.

IV.C.3.c. Mitigation

Enbridge would provide compensatory mitigation for permanent and temporal wetland impacts in accordance with COE requirements. DNR review of wetland water quality impacts under Chapter NR 103, Wis. Adm. Code does not include authority to consider wetland mitigation. Wetland mitigation is considered by the U.S. Army Corps of Engineers under Section 404 of the Clean Water Act. See Section IV.B.7. for a description of the proposed wetland mitigation site.

DNR requested that Enbridge evaluate the placement of additional mainline valves near large sensitive wetland complexes, such as the Pokegama Carnegie wetlands, and other locations which may have downstream impacts to the St. Louis Estuary.

Enbridge considered the placement of proposed mainline valves by taking into account the following four criteria: compliance with 49 CFR 195, construction considerations, present and future operational considerations, and risk minimization. The provisions of 49 CFR 195 require

mainline valves at pumping stations, on each side of a water body crossing greater than 100 feet wide from the ordinary high water mark (OHWM) to OHWM, on each side of a reservoir holding drinking water (which does not exist for the proposed expansion projects), and those locations that reduce the risk of damage or pollution caused by a release. The risk reduction approach includes evaluation and consideration for those areas that have the potential to impact a High Consequence Area (high population area, other population area, commercially navigable water, drinking water source, or an environmentally sensitive area as defined by the U.S. Department of Transportation).

To evaluate risk reduction due to valve placement Enbridge and a third party contractor jointly developed a process that has been accepted by the U.S. Department of Transportation (US DOT) called "Intelligent Valve Placement (IVP)". The equation used to evaluate the reduction locations is shown in Figure 17.

Figure 17 - Intelligent Valve Placement Equation

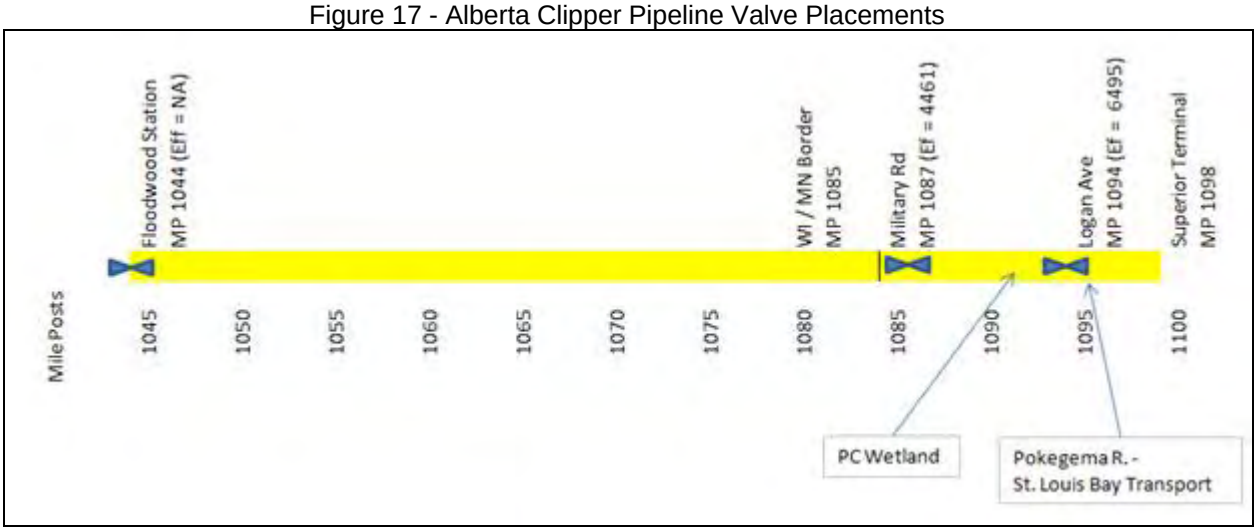
$$Ef = \sum_{i=1}^{n} \left(\Delta Q_i \bullet L_i \bullet W_i \right)$$

Where:

Ef = Valve Effectiveness (l^4);
n = Number of HCAs Effected by the Valve (-);
ΔQ_i = Average Volume-Out Reduction Across HCA Segment (l^3);
L_i = Total Length of HCAs Segments Affected (l); and
W_i = HCA Segment Weight (HPA/OPA=10, DW=8, ESA=6, CNW=4).

After locating valves in accordance with 49 CFR 195, Enbridge employed the IVP to the Alberta Clipper and Southern Lights Diluent pipelines to further place valves to reduce potential impacts to High Consequence Areas. As a result of the IVP modeling, two valves were located in Wisconsin mostly to protect the Saint Louis and Nemadji River watersheds (other HCA's impacting these placements were the population centers around Superior, WI). The Results from the IVP analysis from the last MN valve and through WI are shown in Figure 17.

Figure 17 - Alberta Clipper Pipeline Valve Placements



Per the request of the DNR, an additional valve placement was evaluated by Enbridge. The site selected for evaluating an additional valve was mile post 1090, which is immediately upstream of the Pokegama-Carnegie wetland complex and the State Natural Area. The sum of the Ef values returned with the placement an additional valve in Wisconsin was approximately 300 greater than the sum of the existing Ef values of 10,956. The threshold for consideration of risk reduction valves is an Ef score of 400 or greater. Therefore Enbridge concluded that an additional valve in Wisconsin would not be warranted.

IV.C.4. Operation and maintenance

According to Enbridge, the proposed initial annual capacity of the Alberta Clipper Pipeline is 450,000 barrels per day (bpd). The annual capacity could be ultimately increased to 800,000 bpd by locating additional pumping units at the following existing Enbridge facilities in Minnesota: Floodwood, South Cass Lake, Donaldson, and Plummer. No new pump stations would be required in Wisconsin. Enbridge has stated that, at this time, there are no plans to increase the proposed pipeline's capacity.

IV.D. Superior Terminal Pumping Station alternatives

IV.D.1. Locations

While designing the Southern Lights pipeline, Enbridge determined through a hydraulics analysis that a pump station was required at the Superior Terminal. In the initial stages of determining the need for the new pump station within the Superior Terminal, three different alternative locations were initially identified and evaluated by Enbridge as they relate to the accessibility to the incoming Alberta Clipper pipeline (Line 67), proximity to the proposed extension of the Southern Lights Line 13 pipeline, and associated wetland impacts.

DNR requested Enbridge to evaluate additional alternative locations for the proposed Southern Lights Pump Station.

According to the graphic hydraulic profile provided in the hydraulic design proposal, the Superior Terminal is situated at a lower elevation than up or downstream locations along the pipeline. In order to maintain design and annual flow rates, the pump station cannot be located upstream, or south of the Superior Terminal, but can be moved downstream, or west of the Superior Terminal. Enbridge evaluated an additional five potential locations west of, and adjacent to, the Superior Terminal on Enbridge property.

Enbridge evaluated six additional alternative locations that were selected based on the following criteria: maximize use of upland areas, adjacent to the existing or proposed Southern Lights Diluent pipeline to minimize additional piping required, and/or adjacent to existing Enbridge facilities to eliminate the need for new access roads.

According to Enbridge, any alternative that is located outside of the existing Superior Terminal would require at minimum a 2.5 acre footprint, as opposed to 1.51 acres because a new electrical substation and transformer would be required (estimated to be an additional $300,000), and existing facility storm water structures could not be utilized. In addition, a power line would be required to extend electricity to the new substation within the pump station from the nearest power source, the impacts of which would vary depending on the location of the alternative.

If the pump station were moved to an alterative location from the proposed location within the Superior Terminal, the in-coming Alberta Clipper pipeline and the pump station could no longer share an electrical support building (ESB), according to Enbridge. The proposed pig receiver trap for the Alberta Clipper pipeline could be moved east to avoid permanently impacting wetlands, but would require its own ESB. Enbridge claims that if the pump station location were to be located at any of the alternative locations, an additional ESB would be required.

The nine alternative project sites are shown in Figure 9 in Section III.C.1.

IV.D.1.a. Alternative 1

Alternative 1 considered the construction of the 1.51 acre or 65,751 square foot footprint for the Southern Lights Pump Station in a triangular parcel of property located directly north of Tank 24 in an undeveloped area of the Superior Terminal between the tank containment berm and the access/maintenance road that parallels Bardon Avenue. It was determined that this alternative was not viable as the area of this parcel is one-third smaller than the already condensed proposed pump station footprint, which is 1.51 acres in size and the configuration of this parcel does not work with the required configuration of the pump station components and their layout within the footprint. This alternative was determined by Enbridge to not be practicable. Figure 9 in Section III.C.1. shows this alternative.

IV.D.1.b. Alternative 2

Alternative 2 considered the construction of the 1.51 acre or 65,751 square foot footprint for the Southern Lights Pump Station in a triangular parcel of property located southwest of Tank 19 in an undeveloped area of the Superior Terminal between the tank containment berm and the access/maintenance road that parallels Bardon Avenue. Like Alternative 1, this alternative was

also determined not to be viable or practicable for several reasons, which include: the area of this parcel is almost one-third smaller than the already condensed proposed pump station footprint, which is 1.51 acres in size; the configuration of this parcel does not work with the required configuration of the pump station components and their layout within the footprint; and finally this location contained only a nominal area of upland. Figure 9 in Section III.C.1. shows this alternative.

IV.D.1.c. Alternative 3

Alternative 3 considered the construction of the 1.51 acre or 65,751 square foot footprint for the Southern Lights Pump Station in a triangular parcel of property located southwest of Tank 15 between the tank containment berm, the access/maintenance road that parallels Bardon Avenue, and an access/maintenance road to the south. This area is approximately 1.01 acres in size and currently houses an existing switchgear/generator building, and aboveground valve for Line 6A, and an overhead power line. The remaining portions of this parcel are undeveloped upland. Figure 9 in Section III.C.1. shows this alternative.

The condensed footprint for the proposed pump station is 1.51 acres. This parcel without the existing switchgear and generator building is 1.01 acres, but with the existing building it decreases the available buildable acreage to less than one acre, which is approximately one-third less than the required acreage needed to construct the pump station. The proposed ESB building would fall at the same location as the existing switchgear and generator building. The existing switchgear and generator building are required for terminal operations and can not be relocated, according to Enbridge, but even if their relocation was possible because of the limitations of this parcel given its triangular configuration the required configuration of the pump station components and their required layout do not work within the boundaries of this parcel.

Given the fact that there is not enough buildable land for the footprint of the proposed pump station, in addition to the existing switchgear and generator building which can not be relocated, Enbridge found Alternative 3 to not be a practicable alternative.

IV.D.1.d. Alternative 4

Alternative 4 considered the construction of the 2.5 acre footprint for the Southern Lights Pump Station in a triangular parcel of property located directly west of Bardon Avenue in an undeveloped area adjacent to Enbridge's existing maintenance facility. The available to construct the pump station is 1.5 acres. Figure 9 in Section III.C.1. shows this alternative.

Enbridge concluded that Alternative 4 is not practicable because it would not be large enough to construct the station, it would incur additional cost to the projects, and due to wetland impacts.

IV.D.1.e. Alternative 5

Alternative 5 considered the construction of the 2.5 acre footprint for the pump station at the terminus of the existing Southern Lights Diluent pipeline on undeveloped land directly west of Bardon Avenue. Figure 9 in Section III.C.1. shows this alternative.

Because this location is adjacent to the terminus of the existing Southern Lights Diluent pipeline, the 20-inch diameter pipeline connecting the pump station to the existing mainline would no longer be required. However, this alternative would require relocation of the proposed mainline pipeline exiting the Superior Terminal as the proposed Alberta Clipper and Southern Lights Diluent pipelines would no longer be co-located. This would result in a reduction of the construction footprint required to install the Alberta Clipper pipeline from 140 feet to 115 feet and no expansion of the current permanently maintained corridor. However, a new 115-foot wide construction right-of-way, which includes a 50-foot wide permanently maintained corridor, would be required for the Southern Lights Diluent pipeline to connect from the pump station to the mainline pipeline corridor. The power line could most likely be co-located with the new pipeline corridor.

This alternative was considered to be not practicable by Enbridge due to additional costs and wetland impacts.

IV.D.1.f. Alternative 6

Alternative 6 considered the construction of the 2.5 acre footprint for the pump station near the terminus of the existing Southern Lights Diluent pipeline on undeveloped land directly west of Bardon Avenue and south of Alternative 5 (refer to Figure 3). Figure 9 in Section III.C.1. shows this alternative.

Because this location is adjacent to the terminus of the existing Southern Lights Diluent pipeline, the 20-inch diameter pipeline connecting the pump station to the existing mainline would no longer be required. However, this alternative would require relocation of the proposed mainline pipeline exiting the Superior Terminal as the proposed Alberta Clipper and Southern Lights Diluent pipelines would no longer be co-located. This would result in a reduction of the construction footprint required to install the Alberta Clipper pipeline from 140 feet to 115 feet and no expansion of the current permanently maintained corridor. However, a new 115-foot wide construction right-of-way, which includes a 50-foot wide permanently maintained corridor, would be required for the Southern Lights Diluent pipeline to connect from the pump station to the mainline pipeline corridor.

This alternative was considered to be not practicable by Enbridge due to additional costs and wetland impacts.

IV.D.1.g. Alternative 7

Alternative 7 considered the construction of the 2.5 acre footprint for the pump station adjacent to an existing Enbridge densitometer building. Alternative 7 would not require construction of a new access road as the existing road could be utilized. Figure 9 in Section III.C.1. shows this alternative.

This alternative was considered to be not practicable by Enbridge due to additional costs and wetland impacts.

IV.D.1.h. Alternative 8

Alternative 8 considered the construction of the 2.5 acre footprint for the pump station adjacent to an existing Enbridge densitometer building and north of Alternative 7. Alternative 8 like Alternative 7 would not require construction of a new access road as the existing road could be utilized. Figure 9 in Section III.C.1. shows this alternative.

This alternative was considered to be not practicable by Enbridge due to additional costs and wetland impacts.

IV.D.1.i. Alternative 9

Alternative 9 considered the construction of the 2.5 acre footprint for the pump station along the proposed Southern Lights Diluent pipeline route on undeveloped land west of Bardon Avenue. Figure 9 in Section III.C.1. shows this alternative.

Because this location is adjacent to the terminus of the existing Southern Lights Diluent pipeline, the 20-inch diameter pipeline connecting the pump station to the existing mainline would no longer be required. However, this alternative would require relocation of the proposed mainline pipeline exiting the Superior Terminal as the proposed Alberta Clipper and Southern Lights Diluent pipelines would no longer be co-located. This would result in a reduction of the construction footprint required to install the Alberta Clipper pipeline from 140 feet to 115 feet and no expansion of the current permanently maintained corridor. However, a new 115-foot wide construction right-of-way, which includes a 50-foot wide permanently maintained corridor, would be required for the Southern Lights Diluent pipeline to connect from the pump station to the mainline pipeline corridor. Furthermore, Alternative 9 would require construction of a permanent access road off of Bardon Avenue.

This alternative was considered to be not practicable by Enbridge due to additional costs and wetland impacts.

IV.D.2. Mitigation

Enbridge is proposing to mitigate for proposed permanent wetland impacts at the terminal totaling 11.26 acres and temporary impacts totaling 3.19 associated with the proposed Southern Lights Pump Station and the proposed Alberta Clipper breakout tanks through a project specific consolidated wetland mitigation site located in the Nemadji River watershed. The site is located on the south side of County Road C, directly west of Darrow Road and is 106.9 acres in size. The site would provide compensatory wetland mitigation for the proposed 0.60 acres of permanent wetland impacts and 0.09 acres of temporary impacts associated with the construction of the Southern Lights Pump Station. The mitigation site is more fully described in Section IV.B.7 DNR review of wetland water quality impacts under Chapter NR 103, Wis. Adm. Code does not include authority to consider wetland mitigation. Wetland mitigation is considered by the U.S. Army Corps of Engineers under Section 404 of the Clean Water Act.

IV.D.3. Operation and maintenance

Development of pump station alternative sites 5, 6 and 9 would require a new 50-foot wide permanently maintained corridor for the Southern Lights Diluent pipeline to connect from the pump station to the mainline pipeline corridor. The 50-foot wide pipeline corridor would be maintained to be free of woody vegetation.

IV.E. Superior Terminal breakout tank alternatives

IV.E.1. Locations

The existing Superior Terminal is the main crude oil pipeline hub in the area, and the ability to connect to all incoming and outgoing pipelines contributes to the efficiency of the crude oil transportation system. Building the project off-site would require additional piping and pumping capacity to connect the remote facility into the existing Superior Terminal. There may be associated environmental impacts of the pipeline construction as well as economic costs associated with the additional constructions. The current cost to install a 36-inch diameter pipeline is approximately $2.7 million per mile.

Enbridge, in consultation with the St. Paul District Office of the USACE and the Wisconsin DNR identified and evaluated a range of alternatives. Six categories of alternatives were analyzed in detail and include: no-build; upstream alternatives along the existing pipeline corridor; off-site locations within the City of Superior and greater than one mile from the Superior Terminal; off-site locations within a one mile radius of the Superior Terminal; on-site alternatives; and increasing the size of the proposed breakout tanks to reduce the number of tanks required. Enbridge's analysis of various alternatives within each category is discussed below.

IV.E.1.a. No-build Alternative

The no-build alternative assumed that no additional breakout tanks would be constructed as part of the Alberta Clipper project. According to Enbridge, this alternative would reduce the overall capacity of the Alberta Clipper pipeline since existing breakout tanks at the Enbridge Superior Terminal would be used to service incoming product from the Alberta Clipper pipeline and Enbridge claims that these tanks are already at capacity. Because inbound and outbound mainline pipelines have different flow rates and because batches must be segregated by physical characteristics (density, vapor pressure, etc.) to prevent degradation from mixing, all crude oil coming into the Superior Terminal is placed into tankage upon arrival. Enbridge claims that since existing tanks currently are at maximum capacity attempting to use them for the additional incoming crude oil from the Alberta Clipper pipeline would result in capacity constraints to the proposed Alberta Clipper pipeline and to existing pipelines into and out of the Superior Terminal. Enbridge believes that the no-build alternative would not meet the purpose and need of the project.

DNR inquired as to whether the Alberta Clipper Line can operate without the new tanks, or with fewer new tanks.

As described above, the Superior Terminal facility is a full-breakout tank facility and thus the volumes received by the expanded Alberta Clipper pipeline must be delivered into tankage

before being reconfigured to be transported out of Superior through various existing pipelines. All five tanks would be necessary to operate the Alberta Clipper pipeline as the Superior Terminal needs all of the additional breakout storage capacity to accommodate the incremental volume of crude oil arriving at the facility per the discussion provided above. Pipeline facility engineers assessed the current system use, expected batch requirements and the incremental volumes of the Alberta Clipper project and the engineering design concluded the need for five tanks of the size proposed.

Because the Alberta Clipper project scope, timing requires a cost-of-service funding to pay for facilities, the project design and proposed costs (including the tanks) were scrutinized by shippers via the Canadian Association of Petroleum Producers who ultimately will pay the negotiated cost-of-service incremental surcharge required for the facilities. In other words, the need for five (versus one or two or eight) tanks was carefully scrutinized and minimized by Enbridge's customers to avoid the costs of facilities that went beyond their transport needs. Moreover, the only way to effectively eliminate or reduce the need for tanks at the Superior Terminal would be to construct new outbound pipelines with the same diameter, operating pressure, and flow rate so that the pressure relief that breakout tanks provide is not required. The construction of new outbound pipelines would involve environmental impacts that would likely be more significant than impacts that would result from the proposed tanks.

IV.E.1.b. Off-site Alternatives

Enbridge considered certain off-site alternatives. An analysis of off-site alternatives requires an understanding of the importance of the Superior Terminal central manifold to the downstream distribution of the crude oil. Currently four existing incoming pipelines terminate at the Superior central manifold and five outgoing pipelines initiate at the Superior central manifold. Connecting the proposed tanks to the Superior central manifold enables access to all incoming and outgoing batches in Superior, making it a strategic location for crude oil breakout tanks. If the tanks were constructed off-site, certain existing resources at the Superior Terminal would have to be replicated at an offsite location. In addition, an off-site location would reduce the ability of Enbridge's customers to directly access the Enbridge pipeline system for delivery to their target markets, according to Enbridge.

Enbridge states that the key factors that must be taken into account when considering locating the new tanks off-site of the existing Superior terminal are: (1) additional pipeline construction and associated environmental impacts and economic costs; (2) pipeline pressure cycling; (3) pipeline system optimization; and, (4) product quality. Each of these is discussed in more detail below.

IV.E.1.b.01. Pipeline pressure cycling

Directly receiving or injecting crude oil into or out of the proposed tanks into the connecting pipelines, without using the existing Superior Terminal, would cause the pipeline to be shut down upstream of the location. This occurs because the flow of crude in the pipeline is being interrupted as it is delivered into the breakout tanks. As an example, if the project were 20 miles upstream of Superior and crude oil is being delivered into the tanks, the pipeline system

immediately downstream of the delivery location shuts down and has reduced pressure as the upstream portion of the pipeline pushes the crude oil into the tanks. As the delivery is completed and the normal operation of the pipeline resumes, there would be an increase in the pressure downstream of the delivery location. The opposite would hold for an injection of crude oil out of the breakout tanks into the pipeline, with the pipeline upstream of the location being shut down and corresponding pressure decrease. This revolving high-low pressure cycling on the pipeline limits capacity of the pipeline system and impacts the overall integrity of the pipeline, reducing its operating life.

IV.E.1.b.02. Pipeline system optimization

As described above, locating the project off-site of the existing Superior terminal results in pipeline shutdowns as receipts and deliveries of crude oil are made into and out of the tanks. The resulting shutdowns of the pipeline not only impact the integrity of the pipeline system, it also impacts the ability of the pipeline to optimize its operation. These shutdowns of the connecting pipeline system affect the overall capacity and efficiency of the pipeline system. The loss in capacity is partly as a result of the inability to ensure that receipts and deliveries into and out of the tanks coincide, such that shutdowns on the connecting pipeline system are minimized.

Locating the additional tanks off-site from the existing Superior terminal would impact the quality of the crude oil. Locating the breakout tanks more than a mile from the distribution manifold at the Superior Terminal could result in product degradation due to batch mixing and capacity restrictions on the existing mainline pipelines. Because the Enbridge pipelines are regulated by the Federal Energy Regulator Commission (FERC) under United States tariffs, Enbridge is required to meet strict industry standards for product quality. There are currently four incoming pipelines that terminate at the Superior Terminal central manifold, the Alberta Clipper pipeline will be the fifth, and the five outgoing pipelines (four mainline pipelines and a delivery line to the Murphy Oil Refinery) initiate at the Superior Terminal. Connecting the proposed five breakout tanks to the Superior central manifold enables access to all incoming and outgoing batches in Superior, making it the most logical and strategic location for crude oil breakout storage.

Enbridge currently transports approximately 75 crude oil types with different characteristics. All crude oil that is transported through the various pipelines is segregated based on the characteristics of the product to maintain quality. Batches of crude oil types (a typical batch is approximately 60,000 barrels) are carefully lined up for transportation in order based on crude oil characteristics such as density and vapor pressure. Since each pipeline does not always run the same type of crude oil, the batches must be matched up similarly as they are injected into the downstream pipelines. Because of the batching procedures required to protect quality, all products moving through the pipelines must be staged in breakout tanks at the Superior Terminal.

Capacity interruptions resulting from material being moved from off-site tanks causes an idle pipeline. Every foot of pipeline not in use while off-site batches are being injected into the pipeline significantly degrades the crude oil product due to mixing and costs the pipeline lost time and revenue.

IV.E.1.b.03. Off-site with smaller diameter tank lines

DNR requested that Enbridge evaluate whether smaller diameter tank lines could be utilized to potentially locate the tanks further from the Superior Terminal central manifold while maintaining crude oil batch quality specifications.

The volume of one tank transfer line for the proposed tank location is 28,260 cubic feet, based on a pipeline length of 4,000 feet and a pipe diameter of 36 inches. To limit the batch contamination levels to the proposed design, but locate the tanks farther from the Superior Terminal, a 24-inch diameter pipeline was evaluated by Enbridge. This diameter would allow 8,976 feet or 1.7 miles of tank transfer lines, which is more than double the proposed tank line length.

Utilization of a smaller diameter pipeline would increase the pressure drop across the pipeline segment, which would require modifications to the proposed design. The calculated pressure drop from the tank booster pump to the originating pump station would be over 300 pounds per square inch, which doesn't include the pressure drops across the elbows and fittings. This would be a large pressure drop for a tank line and would require the following design changes from what has been proposed:

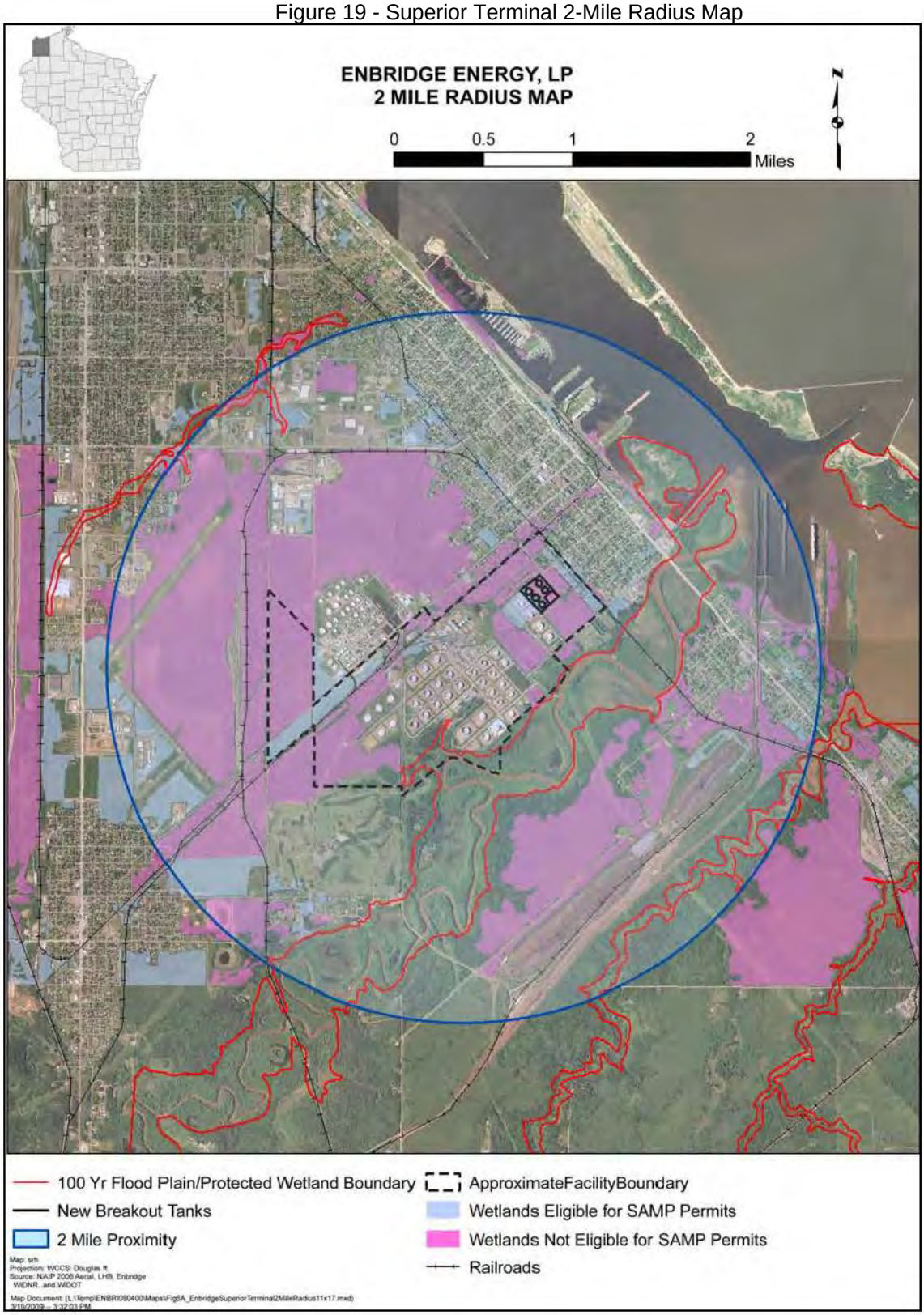
- Significantly larger booster pumps to overcome the pressure drop;
- Larger motors to drive the larger pumps;
- Increase in available utility power for the larger motors; and
- Increase of the material pressure ratings of the of tank line pipeline system (pipe, valves, flanges, fittings).

In addition, the increased pressure required to deliver crude to the tanks would exceed many of the pressure ratings of the existing facilities. The cost of replacing this equipment and the pipeline system outages required to replace this equipment would be prohibitive, according to Enbridge.

Furthermore, as is the case for any of the off-site alternatives within the City of Superior, a new substation and fencing for security purposes would be required at the site, increasing the needed footprint. Additional easement for the pipelines would also be required.

Enbridge evaluated areas within a two-mile radius of the Superior Terminal central manifold to determine if any additional sites that have not previously been evaluated could be examined further as potential alternative locations (refer to Figure 19, below). As discussed in the application, alternatives located further from the Superior Terminal will result in additional temporary wetland impacts as a result of the tank transfer pipeline construction; therefore, additional details are not provided here.

Figure 19 - Superior Terminal 2-Mile Radius Map



Beyond what has been previously evaluated, the only undeveloped land identified outside of the Superior Airport or Murphy Oil property that is large enough to accommodate the proposed five storage tanks and associated infrastructure is the field west to the Nemadji Golf Course and north of 58th Street. Enbridge understands that the landowner has expressed interest in developing this property as residential homes. The City of Superior designated the wetlands on part of this field as eligible for SAMP permits. It is reasonable to assume that the majority of this land is wetland and would not result in a reduction of permanent wetland impacts to construct the tanks. In addition, Enbridge previously proposed constructing the Alberta Clipper and Southern Lights Diluent pipelines through a portion of this property but agreed to relocate them through the Nemadji Golf Course to avoid impacting sensitive wetlands within this field.

Therefore, Enbridge concluded that decreasing the diameter of the tank transfer pipelines to potentially site the tanks further from Superior Terminal is not practicable.

IV.E.1.c. Upstream Alternatives

Key criteria for upstream alternatives along the existing Enbridge pipeline corridor were parcels owned by Enbridge or available for purchase that were 25 acres or larger in size. Based on these criteria, the following three sites were selected for review at the request of the USACE and Wisconsin DNR: the Enbridge terminal located in Clearbrook, Minnesota; a mainline pump station located near Floodwood, Minnesota; and expansion of an existing tank facility located near Wrenshall, Minnesota not owned by Enbridge.

Enbridge has concluded that all three upstream locations would have increased environmental impacts due to construction of additional pipelines. They also find that there would be both increased construction cost and operating costs as additional manpower would be required to operate and provide security at the off-site locations. Existing Enbridge staff at the Superior Terminal would be able to accommodate the increased workload if the breakout tanks were constructed on-site. Furthermore, Enbridge has emergency response equipment and personnel trained to handle such emergencies located in Superior at the Terminal. Additional staff and equipment would most likely be required for all upstream locations to minimize response times.

In summary, Enbridge finds that these upstream alternatives have issues with pipeline pressure cycling, pipeline system optimization, and product quality. Finally, the upstream alternatives have increased construction costs and increased operating costs as compared to the proposed alternative. The three upstream alternatives are described below.

IV.E.1.c.01. Clearbrook Terminal

Construction of the five proposed breakout tanks at the Clearbrook Terminal would also require the construction of a new manifold area, five booster pumps, two new mainline pumps at Clearbrook and Deer River Pump Station, and the installation of two 36-diameter pipelines from Clearbrook to Superior (approximately 188 miles) in addition to the proposed Alberta Clipper pipeline and facilities. Enbridge Engineering has determined that construction of the additional two pipelines would allow the tanks to be constructed at an off-site location and eliminate the need for additional tanks at the Superior Terminal. This would require the permanent impact of

7.69 acres of wetland at Clearbrook based on available information from the U.S. Fish and Wildlife Service's National Wetland Inventory (NWI), additional permanent wetland impacts at the Deer River Pump Station as the facility would need to expand to accommodate the additional mainline pumps, and approximately triple the temporary wetland impacts resulting from the construction of the Alberta Clipper pipeline between Clearbrook, Minnesota and Superior, Wisconsin. Moreover there would be significant cost increases due to the additional pipeline construction. As noted above, the current cost to install a single 36-inch diameter pipeline is $2.7 million per mile. Therefore, the two additional pipelines would cost approximately $1.015 billion.

IV.E.1.c.02. Floodwood Pump Station

Construction of the five proposed breakout tanks at the Floodwood Pump Station also would require a new manifold area, five new booster pumps, two new mainline pumps, and two additional 36-diameter pipelines from Floodwood to Superior, which is approximately 52 miles at a cost of $280 million. This alternative would require the permanent impact of 5.86 acres of wetland, based on available information from the NWI, and the temporary wetland impacts from the construction of the Alberta Clipper pipeline would be roughly tripled between Floodwood, and Superior, Wisconsin.

IV.E.1.c.03. Wrenshall Tank Site

Enbridge does not own or operate this facility, which currently includes one storage tank. In order to construct the five proposed breakout tanks at this location Enbridge would be required to purchase this facility. At this point, the facility is not for sale. Additional construction at this facility would include a new manifold area, five new booster pumps, two mainline pumps, and two additional 36-inch pipelines from Wrenshall to Superior, which is approximately 17 miles at a cost of $45.9 million. There is currently no bidirectional flow pipeline loop between Wrenshall and Superior. The temporary wetland impacts resulting from the construction of the Alberta Clipper pipeline would be roughly tripled between Wrenshall, Minnesota and Superior, Wisconsin.

IV.E.1.d. Off-Site Alternatives in Superior > One Mile from Central Manifold

Pursuant to the request of the USACE and Wisconsin DNR, two sites were evaluated as alternative locations in Superior for the construction of the five breakout tanks and associated infrastructure greater than one mile from the existing infrastructure.

IV.E.1.d.01 Old Amoco Tank Farm

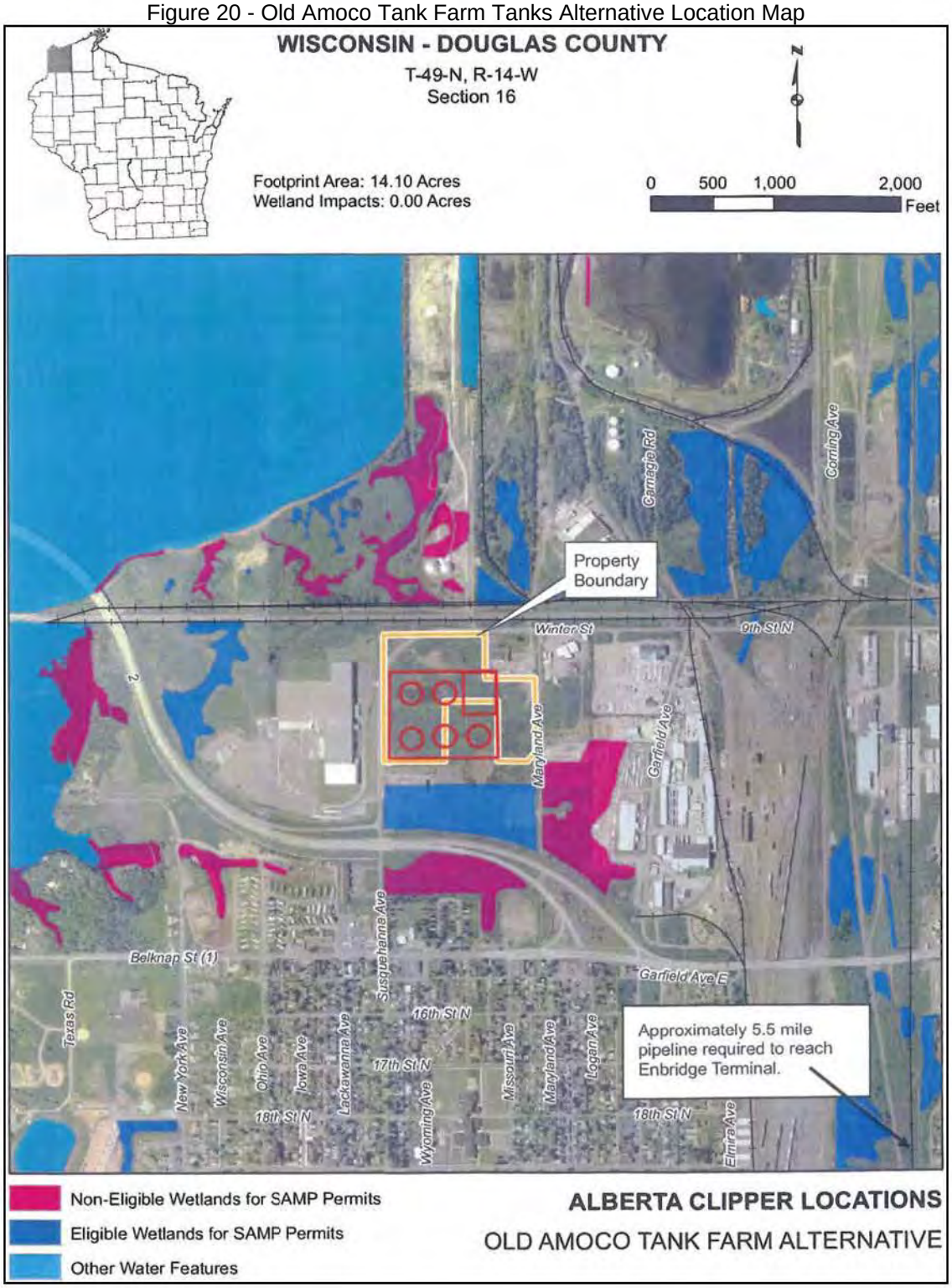
This site is approximately 22 acres in size and is bounded on the north by Winter Street, on the south by Halvor Lane, on the west by Susquehanna Avenue, and on the east by Maryland Avenue. There is an out-parcel located in the south central portion of the property that has recently been developed by Federal Express as their administrative offices and distribution center and an area in the northeast corner of the parcel that is currently used by Murphy Oil and contains a portion of the an existing Murphy Oil pipeline. The site is the former location of the

Amoco tank farm. Our understanding is that this facility was shut down in the late 1990's and that the tanks were physically removed in 1999. In addition, we understand that while no wetlands are present within the subject property, there are open environmental repair files at the Wisconsin DNR that would need to be resolved prior to development of this site. A comprehensive Environmental Assessment would be required and based on the previous use of the property there is a high likelihood that contamination is present. Therefore, remediation would be required prior to constructing the tanks.

Construction of the five proposed breakout tanks at this location would require a new manifold area, five new booster pumps, and five 36-inch pipelines to connect to the Superior Terminal, which is approximately 5.5 miles from the site. The pipelines would need to be constructed through the City of Superior, which would require the acquisition of numerous right-of-ways and impact City streets, sidewalks, and private residences. Wetlands and watercourses also would be impacted by the pipeline construction. The cost of the five additional pipelines would be approximately $74.3 million. In addition, while the property is currently zoned for industrial development and is part of the TIFF district after speaking with Jason Serek, Planning Director for the City of Superior, we learned that the City would not be in favor of constructing the proposed breakout tanks in this location, as the current development plans for this portion of the city are to attract new commercial businesses and create new jobs.

Therefore, due to potential historic contamination, wetland and watercourse impacts, increased costs, and impacts to the City of Superior infrastructure from pipeline construction, Enbridge eliminated this alternative from further evaluation. This alternative site is shown in Figure 20.

Figure 20 - Old Amoco Tank Farm Tanks Alternative Location Map



IV.E.1.d.02. Old Unical and Murphy Tank Farm

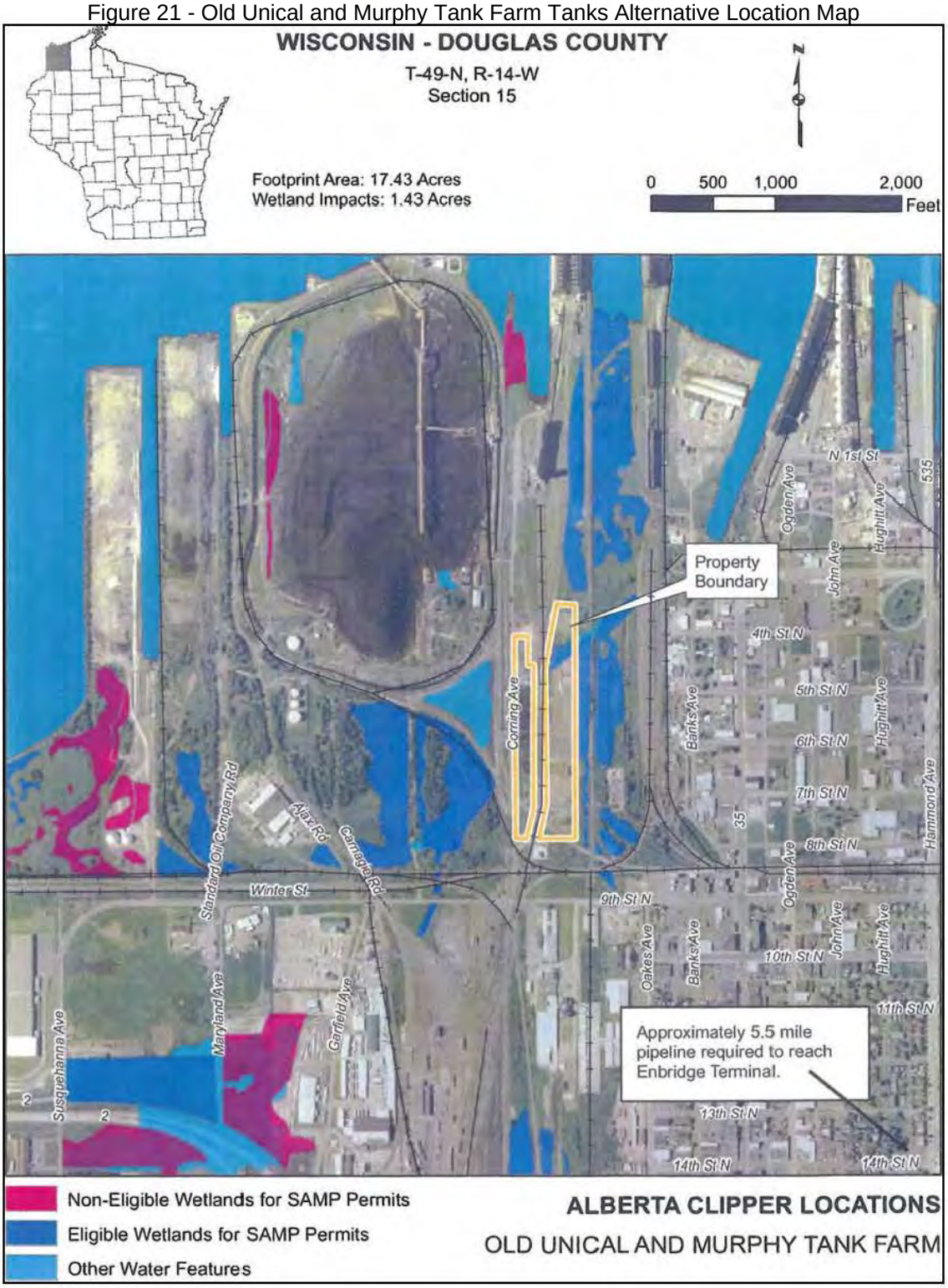
This site is located north of Winter Street, east of Douglas Street and west of Banks Street and was the former location of a Unical and Murphy Oil tank farm. Enbridge's research indicates that

the Unical tank farm, which was located in the western portion of the site, was torn down in the early 1990's and the bio-piles were created in 1995. The old Murphy Oil tank farm, which was located in the eastern portion of the site, was torn down in 1994. The former Unical tank farm consists of three parcels totaling 44.87 acres and is separated from the old Murphy Oil tank farm, which consists of two parcels totaling 13.06 acres, by an existing railroad. Enbridge's research indicates that there are contamination issues with both sites, but that some clean-up work has been done on the former Unical tank farm site. However, the Wisconsin DNR was uncertain if any clean-up or remediation work had been done on the Murphy Oil tank farm site.

While completing the search for preliminary site information, Enbridge found no ownership information was available for the 12.33 acre parcel. In addition, this parcel is encumbered with an unnamed stream and associated riparian wetlands that diagonally cross the north central portion of this parcel. In order to avoid and minimize the wetland impacts to this parcel approximately a third of the parcel becomes un-useable, thus making the site too small to accommodate the proposed breakout tanks, containment berms,
manifold, and associated infrastructure.

The largest of the five parcels, 43 acres, is owned by Burlington Northern. Given the proximity of this parcel to their existing rail line, Burlington Northern may have future development plans for this site and would be unwilling to sell. Given these outstanding issues and the fact that several parcels would need to be assembled (if the current owners were interested in selling) to have the acreage required to construct the breakout tanks, containment berms, and manifold Enbridge eliminated this alternative from further analysis. This alternative site is shown in Figure 21.

Figure 21 - Old Unical and Murphy Tank Farm Tanks Alternative Location Map



IV.E.1.e. Off-Site Alternatives in Superior within One Mile from Central Manifold

Off-site alternative site locations within the City of Superior considered for this project included industrially zoned parcels 25 acres or larger in size located within a one mile radius of the

existing Superior Terminal. Properties considered included parcels currently owned by Enbridge or properties currently available for acquisition. When assessing available parcels, Enbridge took into account wetland and other environmental considerations, adjacent land use, and public concerns. In reviewing Figure 6 it is apparent that all available parcels located within the target search area are: part of the existing Superior Terminal; part of the Murphy Oil Refinery and tank farm; residential developments; areas that have been previously identified as wetland when the SAMP and/or Enbridge Energy's comprehensive wetland assessment was completed; or regulated 100-year floodplain associated with the Nemadji River. Therefore, no practicable off-site location within the City of Superior exists that meets the search criteria.

IV.E.1.e.01 Hill Avenue

This alternative is located on the east side of Hill Avenue, across from the Murphy Oil U.S.A. Superior Refinery. The 107.44-acre site is located in the NE *VI* of Section 35 in Township 49 North, Range 14 West.

The landform in the project area is natural, with minimal prior disturbance directly to the site. The historic wetland complex appears to be extensive, but has been fragmented by railroads, two-lane paved roads, stormwater conveyance ditches, one-lane dirt access roads, and industrial development, particularly to the east.

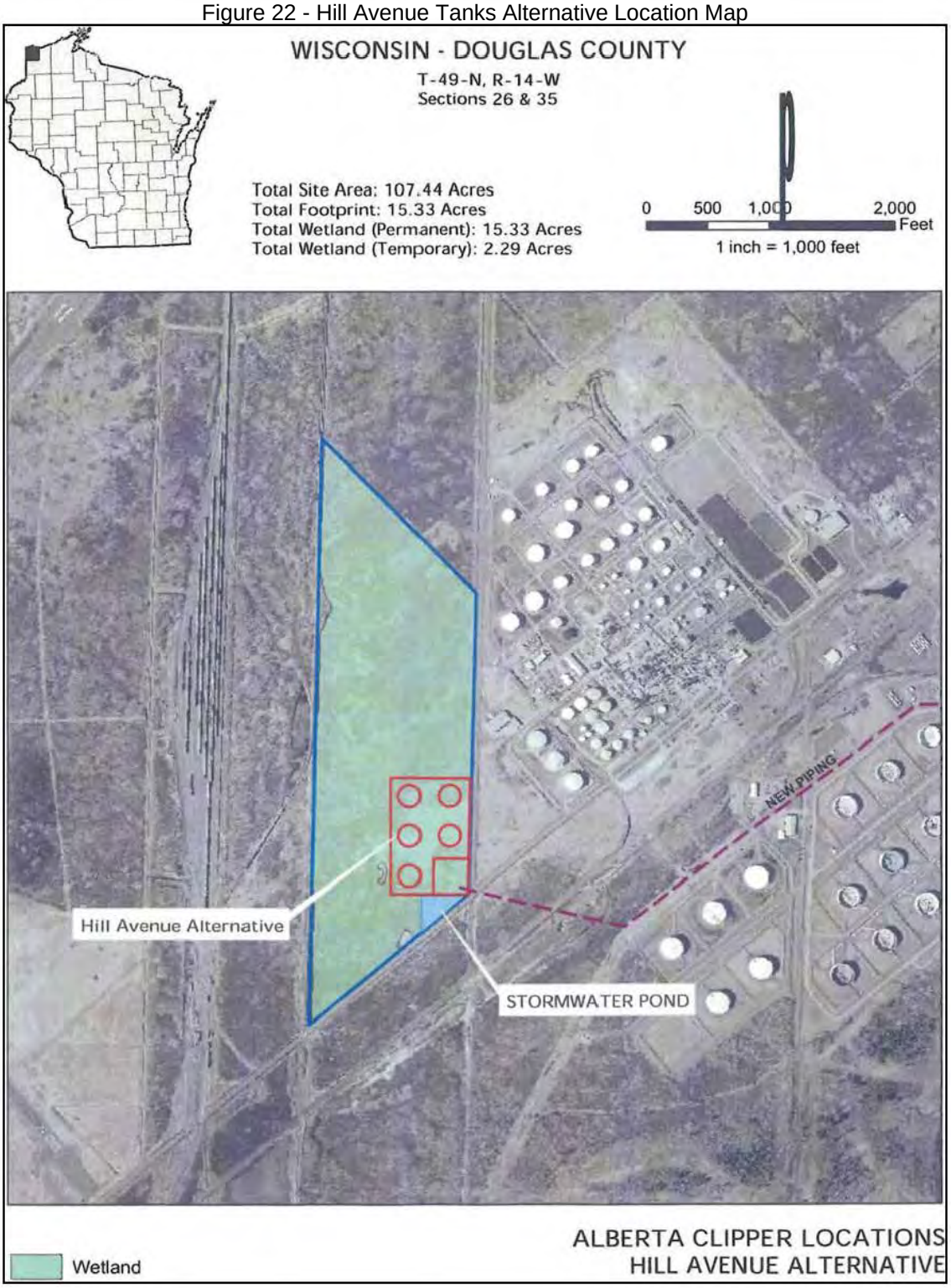
Wetland evaluations conducted by SEH, Inc. in 2007 found extensive wetlands on site, the presence of state-listed rare plants, and special designation of this site as a "Priority Wetland Area" by the Wisconsin DNR. Functionally, this wetland was found to be of high to medium quality in the six wetland functions evaluated according to the Superior Routine Assessment Method employed.

One portion, in the southeast region of this property, is vegetatively degraded by a dense invasion of reed canary grass. A compressed tank configuration could be situated in this area, but would still impact up to 15 acres of wetland. Impacts to this degraded wetland area, however could result in indirect or secondary degradation of the adjacent, higher quality wetlands.

If built on this site, additional infrastructure would have to be constructed to link the tanks to the existing pipeline, crossing additional wetlands to the south and/or southwest, and resulting in temporary wetland disturbance and permanent wetland conversion (shrub-carr to wet meadow).

Arranged in the most compressed configuration and utilizing the greatest available upland area, the total footprint of the project would be 17.62 acres, including 15.33 acres of permanent wetland impact and 2.29 acres of temporary wetland impact from the installation of new piping to connect the site to the existing mainline. This alternative was eliminated by Enbridge from further consideration because of the high impact to wetlands. This alternative site is shown in Figure 22.

Figure 22 - Hill Avenue Tanks Alternative Location Map



IV.E.1.e.02 Nemadji Golf Course Alternative

The Nemadji Golf Course is owned by the City of Superior and operated by a private management company and is currently not for sale. The purchase of 25 acres by Enbridge for the

construction of the proposed breakout tanks would reduce the size of the course from the existing 36-holes to a smaller course. Furthermore, there are wetlands within the golf course that would be impacted by construction of the tanks. This alternative was eliminated from further consideration by Enbridge because of the impact to wetlands and to community resources site.

IV.E.1.f. On-site Alternatives

IV.E.1.f.01. Alternative A - 10th Street

Alternative A is 59.34 acres currently owned by Enbridge and is located in Sections 31, 25, and 31 in Township 49 North, Range 14 West. This site is shown in Figure 10 in Section III.D.1.

This area had historically been developed as residential housing, but structures have since been removed, allowing some re-establishment of wetlands to occur. Trash and household debris, including electronics and furniture, are occasionally dumped within this site. Some remnants of structural foundations, sidewalks, alleys, and inactive streets remain. Active streets include portions of 10th and 11th Streets from 24th Avenue East to 34th Avenue East and 27th Avenue East from East 11th Street through the adjoining neighborhood to the north.

A portion of the existing terminal is located on this parcel, west of East 10th Street where six tanks currently operate. Additionally, foundations for eleven tanks were constructed in the early 1970s, though the tanks were not erected. Many of these foundation rings have established wetlands characteristics. Wetland areas within this site are highly disturbed, low in plant diversity, and degraded from previous land uses. Several uplands areas exist within this site and would be utilized to the greatest extent possible in order to minimize and reduce proposed wetland impacts.

Several historic and recently observed occurrences of state listed rare plants have been documented in this area including Vasey's rush, arrowhead sweet coltsfoot, blunt spike rush, and black sedge. We believe that the recent observation of Vaseyi's rush and blunt spike rush is due to the high level of disturbance, which is a requirement for their establishment. Details of these occurrences are included in the comprehensive evaluation report, which will be included as part of the application to the USACE and Wisconsin DNR.

This alternative is located near a residential neighborhood; however, between 500 and 1000 feet of undeveloped land would be left between proposed and existing tank projects and the residential neighborhood.

Based on the above analysis and pre-project consultations with the USACE and the Wisconsin DNR, Enbridge believes that this area is the preferred alternative. Locating the project in this area would meet the purpose and need of the tank expansion. All properties are currently in Enbridge's ownership.

The site is adjacent to the existing terminal, thus minimizing impacts by limiting the amount of additional pipeline construction. In addition, construction on this site will allow use of the existing infrastructure limiting impact from infrastructure construction. Alternative configurations within the 59.34 acre property are discussed further, below.

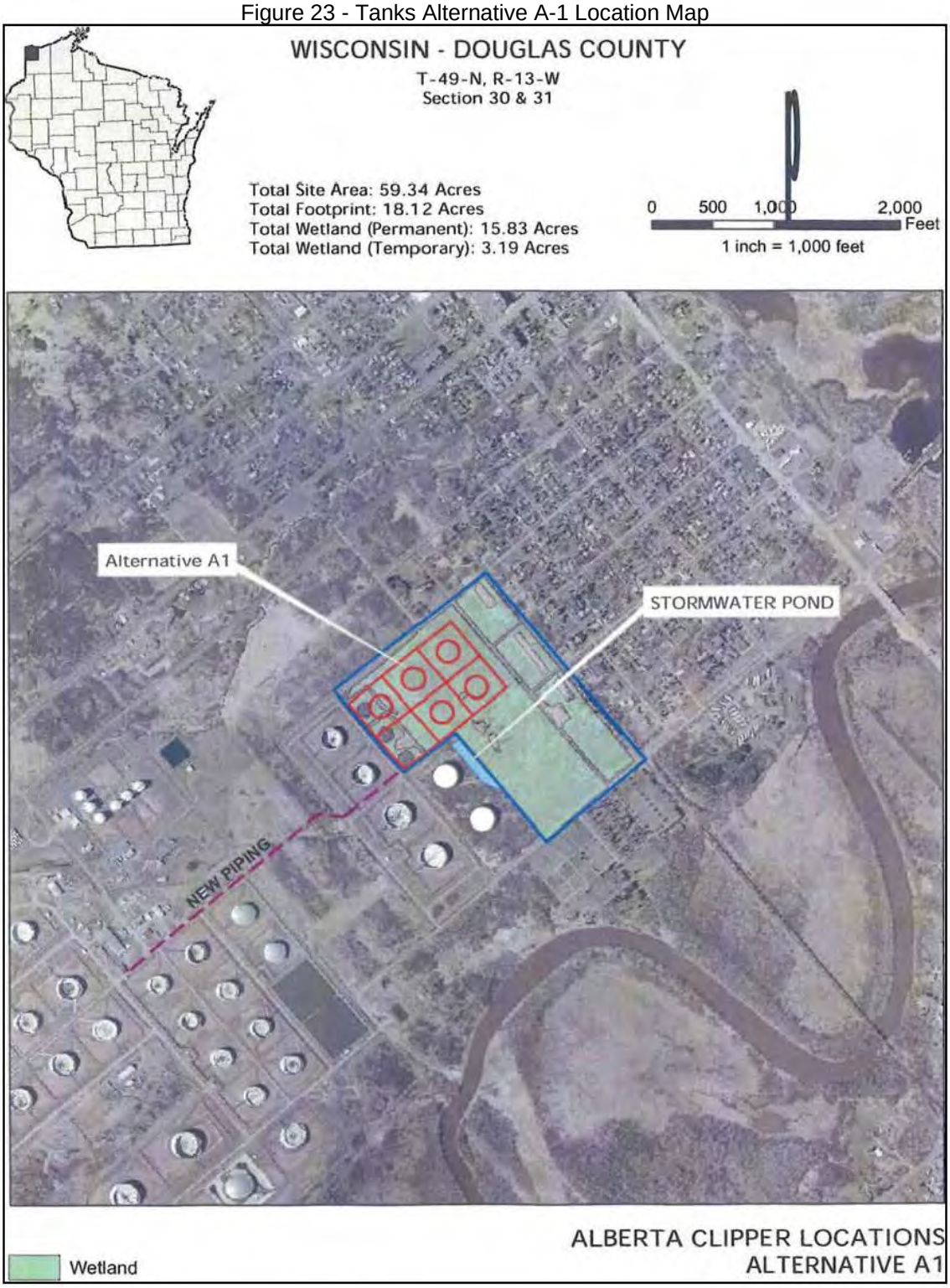
IV.E.1.f.02. Alternative A-1: Standard Configuration Aligned with Tanks 32 & 33

Arranged in a standard configuration and utilizing the greatest available upland area, the total footprint of the project if located here would be 18.12 acres, which includes 15.83 acres of permanent wetland impact within the footprint and 3.20 acres of temporary wetland impact outside of the footprint for the installation of five new 36-inch pipes to connect the site to the existing central manifold.

This alternative would result in the loss of several extant occurrences of Vasey's rush and potentially one occurrence of arrowhead sweet coltsfoot. This configuration utilizes the greatest area of property already historically disturbed and is in close proximity to existing infrastructure to feed product from the breakout tanks to the main transport pipelines. This configuration also allows the total terminal footprint to be compressed (keeping proposed tanks closely arranged with existing tanks) and would allow for shared use of two existing berms (Tank 32/33 and Tank 35).

The alternative was eliminated from further consideration by Enbridge because of the larger footprint and larger wetland impact area, compared to Alternative A-2 and A-3, below. The Alternative A-1 site site is shown in Figure 23.

Figure 23 - Tanks Alternative A-1 Location Map



IV.E.1.f.03. Alternative A-2: Compressed Configuration Aligned with Tanks 34 & 35

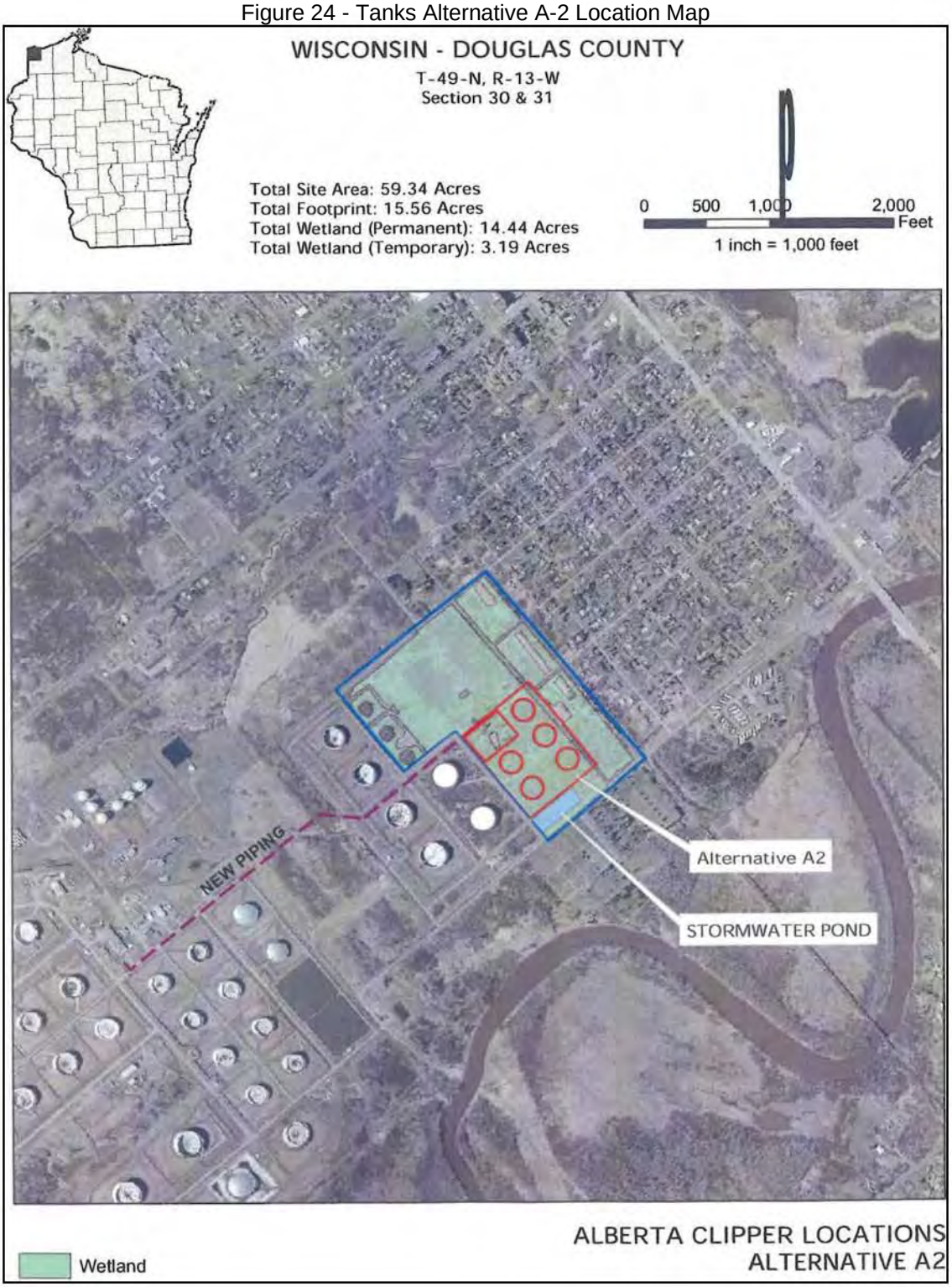
Arranged in the most compressed configuration and utilizing the greatest available upland area, the total footprint of the project if located here would be 15.56 acres, including 14.44 acres of

permanent wetland impact within the footprint and 5.01 acres of temporary wetland impact from the installation of new piping to connect the site to the existing central manifold.

It would also result in the loss of six extant occurrences of arrowhead sweet coltsfoot. This configuration utilizes property which has been previously disturbed and is in close proximity to existing infrastructure to feed product from the breakout tanks to the main transport pipelines, but would be approximately 300 feet from existing residential structures west of East 9th Street (a railroad). This configuration also allows the total terminal footprint to be compressed (keeping proposed tanks closely arranged with existing tanks), further minimizing impacts. However, this alternative was only able to share one existing berm with Tanks 34 and 35. Therefore additional containment structures would be required.

This alternative was eliminated from further consideration by Enbridge because the permanent and temporary wetland impacts exceeded other proposed alternatives by as much as 2.48 acres of permanent impact and 1.8 1 acres of temporary impact. In addition, Enbridge was concerned about the proximity of this configuration to a residential neighborhood. This alternative site is shown in Figure 24.

Figure 24 - Tanks Alternative A-2 Location Map



IV.E.1.f.04. Alternative A-3: Compressed Configuration Aligned with Tanks 32 & 33

This is the Enbridge preferred alternative, which was previously described in Section III.D. The site and layout are shown in Figure 10 in Section III.D.1.

IV.E.1.f.05. Alternative B - Stinson Avenue

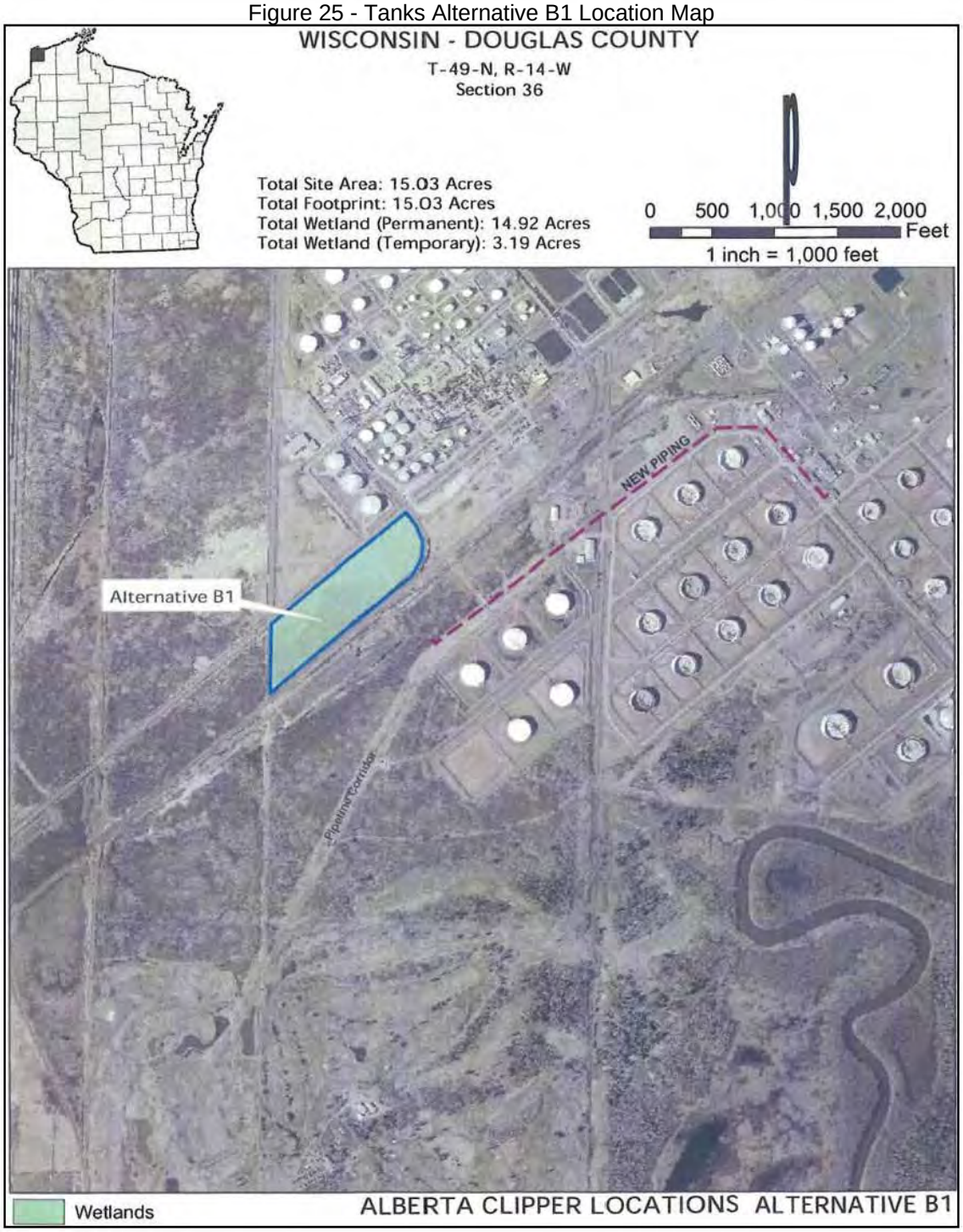
This 106.86-acre site is currently owned by Enbridge and is located, in the west of Section 36 in Township 49 North, Range 14 West, along Stinson Avenue. This site includes several disturbed areas. A pipeline corridor, approximately 100 feet wide, runs through the project area, from north to south. A raised utility corridor runs along the eastern edge of the project area, outside the project boundaries. Two railroad grades, one abandoned and one active, run east-west along the northern boundary of the project area, both within and outside the project boundaries. A snowmobile trail runs east-west through the middle of the property from the pipeline corridor, east to Bardon Avenue.

Given the size and configuration of this parcel, three different site configurations were considered as part of the alternatives analysis for this site. The parcel is made up of a narrow strip, south of Stinson Avenue that is approximately 18.7 acres. In addition, there are approximately 57 acres of land east of the existing pipeline corridor and 45 acres of land west of the existing pipeline corridor. The east and west portions of this area are divided by an existing pipeline corridor which cannot be practicably relocated or impacted for the construction of the proposed project.

IV.E.1.f.05.aa. Alternative B-1

Alternative B-1 is a narrow piece of property, between Stinson Avenue and the railroad track, which is almost entirely wetland. Alder shrub-carr, aspen dominated seasonally wet forest, and sedge meadow wetland habitat types are present in this area, in addition to eight documented occurrences of arrowhead sweet coltsfoot in 2007. This site has been subject to a direct and indirect disturbance, including fragmentation by the construction of roads and railroads on all four sides and deposition of fill material in the southwest corner. Culverts located at the northeast corner connect this system to drainage ditches. Construction of containment berms and other infrastructure features would be required as they do not currently exist on the tract. This area was eliminated from, further consideration by Enbridge because of the lack of existing infrastructure from the main terminal to the tank site and inability to use the minimum-impact layout in a site dominated by wetlands. The site is too small to situate the tanks in without being close to Stinson Avenue or the active railroad. This site is shown in Figure 25.

Figure 25 - Tanks Alternative B1 Location Map



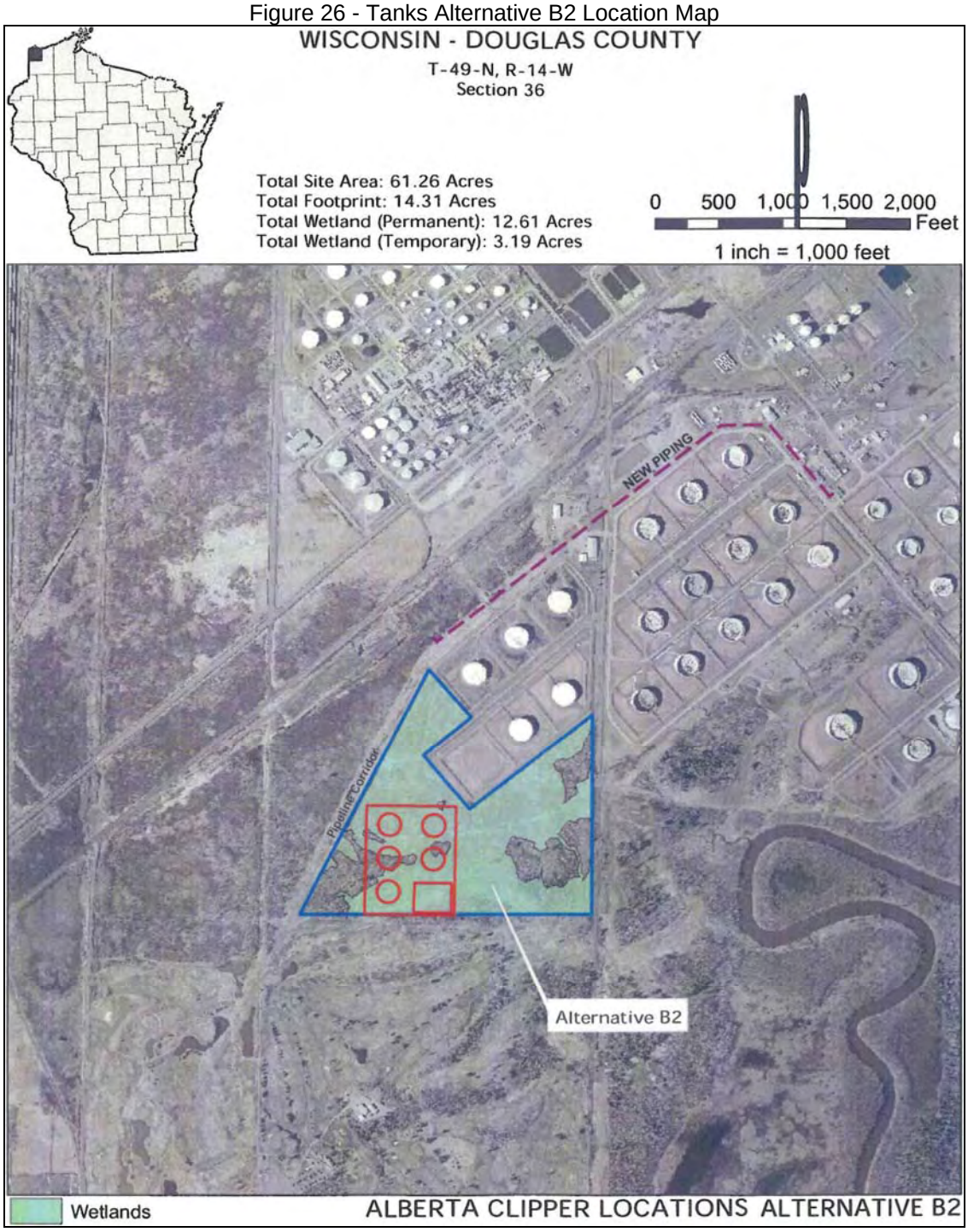
IV.E.1.f.05.bb. Alternative B-2

Alternative B-2 assessed the land on the east side of the pipeline, which is a large contiguous parcel. This portion of the parcel is comprised of minimally disturbed alder shrub-carr, aspen dominated seasonally wet forest, and wet meadow. Five occurrences of arrowhead sweet

coltsfoot were documented in 2007. Arranged in the most compressed configuration and utilizing the greatest available upland area, the total footprint of the project would be 20.87 acres, including 17.37 acres of permanent wetland impact and 1.07 acres of temporary wetland impact from the installation of new piping to connect the site to the existing mainline.

This parcel borders the Nemadji Golf Course, to the south and includes portions of the golf course fairway and paved trail. A snowmobile trail also runs through a portion of this project area from Bardon Avenue west to the pipeline corridor. Uplands in this portion of the property include some fairly steep slopes to a creek that drains to the Nemadji River and thus are not practicable for tank placement. This alternative was eliminated from further consideration by Enbridge due to the inability to compress the project configuration to avoid wetland impacts and the close proximity of this location to a public recreation facility. This site is shown in Figure 26.

Figure 26 - Tanks Alternative B2 Location Map

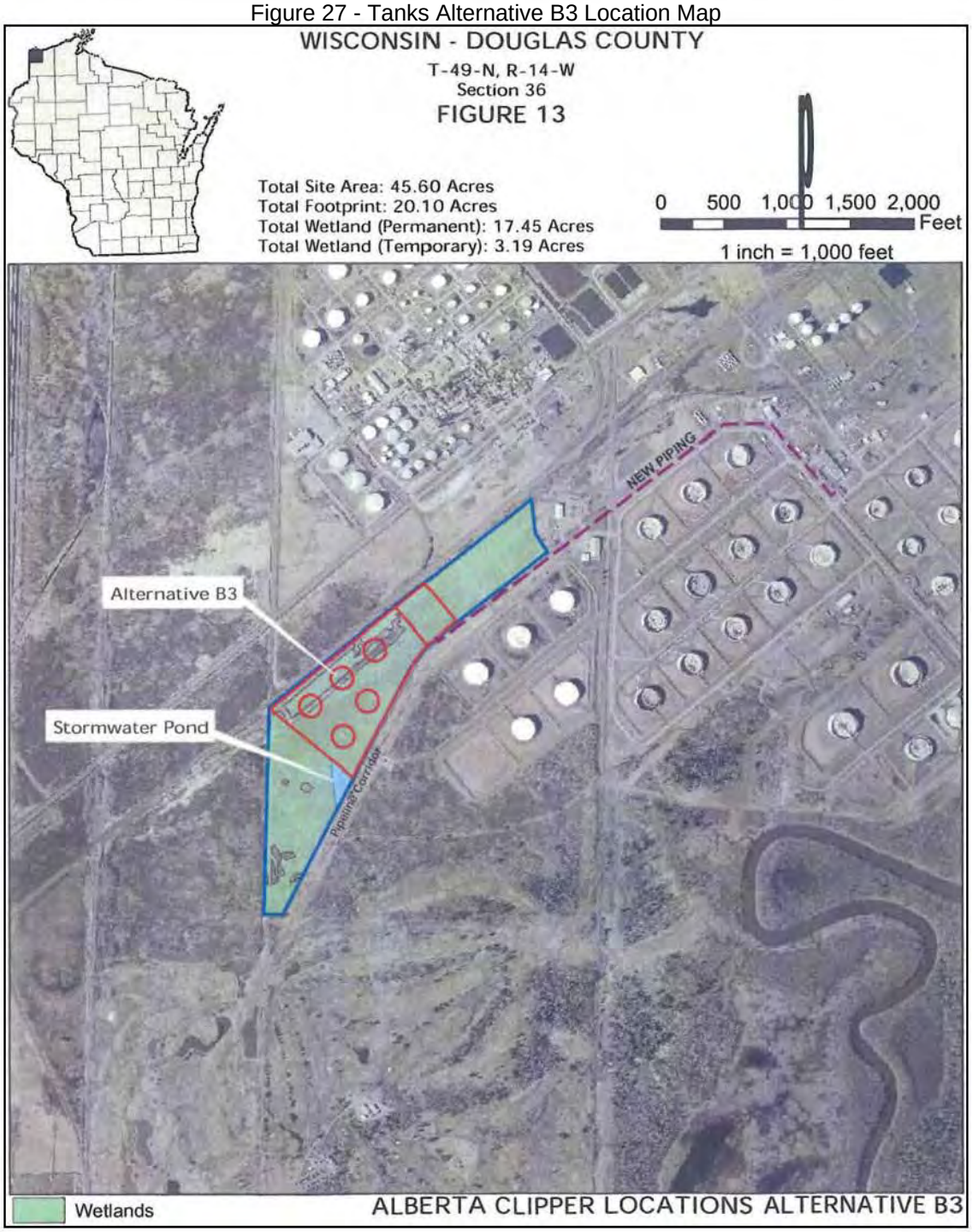


IV.E.1.f.05.cc. Alternative B-3

Alternative B-3 is an area on the west-northwest side of the pipeline which is irregularly shaped. The most potential for development is on the north side, which is elongated and significantly disturbed. There is some upland in this area (north end); however, the upland was constructed for a railroad bed (abandoned) and perched seasonally wet forests have formed in the center of the

raised area. The tank configuration practicable to fit within this area would not allow for minimization of wetland impacts, as tanks would have to be placed side by side rather than the more compact configuration that could be used on other parcels. Tanks constructed in this area would have the ability to directly connect to the main pipeline which exists through this parcel. This alternative was eliminated from further consideration by Enbridge because the area with the most available upland was not feasible for placement of the tanks without extensive earthwork and resulting impacts to adjacent wetlands. This site is shown in Figure 27.

Figure 27 - Tanks Alternative B3 Location Map



IV.E.1.g. Reduce the Number of Tanks Required

Pursuant to the request of the USACE and Wisconsin DNR., Enbridge evaluated the possibility of reducing the number of tanks required, which could minimize wetland impacts, by increasing the holding capacity or volume of the tanks. The number and volume of tanks required to accommodate the incremental volume of crude oil is determined by two factors: product

segregation and batch sizes. As discussed previously, Enbridge transports over 75 different crude types and is required to maintain quality specifications in accordance with our tariffs. Decreasing the number of tanks limits the ability to segregate the various crude types.

In addition, the nominal batch size is 60,000 barrels. The shippers typically require Enbridge to group batches in three (i.e. 180,000 barrels - the working volume of the tanks is approximately 204,000 barrels). Therefore, with the current capacity, Enbridge will be able to utilize the entire working capacity of the tanks.

Reducing the number of tanks would not meet the purpose and need of the project due to the reduced ability to segregate crude types and efficiently group batches. Therefore this alternative was eliminated from further consideration by Enbridge.

IV.E.2. Mitigation

Enbridge is proposing to mitigate for permanent wetland impacts totaling 11.26 acres and temporary impacts totaling 3.19 associated with the Alberta Clipper breakout tanks through a project specific consolidated wetland mitigation site located in the Nemadji River watershed. The site is located on the south side of County Road C, directly west of Darrow Road and is 106.9 acres in size. This site would also provide compensatory wetland mitigation for 0.60 acres of permanent wetland impacts and 0.09 acres of temporary impacts associated with the construction of the Southern Lights Pump Station. The site is described in Section IV.B.7.

V. Enbridge pipeline and terminal system history

V.A. Development

Enbridge operates a crude oil pipeline breakout storage terminal located in Superior, Wisconsin that consists of thirty-five storage tanks of varying capacity and design with one storage tank currently undergoing construction permitting (refer to complete list of tank types, volumes, and construction dates on the following page). The storage tanks are used exclusively to store crude oil, which arrives and exits the terminal via pipeline. There are currently four crude oil pipelines that enter the facility and four that exit (this includes three mainline pipelines and a delivery line to the Murphy Oil refinery). Tables 17a and 17b list these pipelines.

Table 17a - Inbound Pipelines to Superior Terminal

In-bound Pipelines			
Line Number	*Diameter (inches)*	*Year Built*	*Capacity (bbls/day)*
Line 1	18	1950	236,496
Line 2	26	1957	442,173
Line 3	34	1967	459,155
Line 4	36	2002	792,515
Line 67 (Alberta Clipper)	36	Proposed	450,000
Total In-bound Pipeline Capacity			2,380,340

Table 17b - Outbound Pipelines from Superior Terminal

Out-bound Pipelines			
Line Number	*Diameter (inches)*	*Year Built*	*Capacity (bbls/day)*
Line 5	30	1953	539,400*
Line 6A	34	1968	666,740
Line 14	24	1998	311,355
Line 61	42	2007	462,300
Murphy Oil Take-off	Unknown	Unknown	35,000
Total Out-bound Pipeline Capacity			2,014,795

*Note: This is the capacity of Line 5 upon completion of the proposed expansion, which has not been constructed to date but has received air permit authorization (07-DCF-050).

Enbridge has existing blanket easement agreements in Wisconsin that allow for expansion of the corridor for multiple lines. Enbridge is proposing to expand its existing permanent corridor to accommodate the two new pipelines and the associated offsets between pipes. The existing ROW currently contains four pipelines; Line 1, Line 2, Line 3, and Line 4. All four lines transport crude oil from western Canada to the Superior Terminal. A brief history of the lines is provided below, and where applicable, a permitting and monitoring history and status has been provided.

Line 1 is an 18-inch diameter crude oil pipeline installed in 1950. The installation of the pipeline occurred prior to the implementation of the Clean Water Act. No state wetland or waterbody permitting program at the federal or state level was in place at the time of installation. Construction of the pipeline was completed in accordance with accepted pipeline construction and restoration practices at the time of installation.

Line 2 is a 26-inch-diameter crude oil pipeline that was installed in 1957. The installation of the pipeline occurred prior to the implementation of the Clean Water Act. No state wetland or waterbody permitting program at the federal or state level was in place at the time of installation. Construction of the pipeline was completed in accordance with accepted pipeline construction and restoration practices at the time of installation.

Line 3 is a 34-inch-diameter crude oil pipeline that was installed in 1967. The installation of the pipeline occurred prior to the implementation of the Clean Water Act. No state wetland or waterbody permitting program at the federal or state level was in place at the time of installation. Construction of the pipeline was completed in accordance with accepted pipeline construction and restoration practices at the time of installation.

Line 4 (also referred to as "Terrace 3") is a 36-inch-diameter crude oil pipeline that was installed in 2002. The project was regulated under section 404 and 401 of the Clean Water Act and Chapter 30 of the Wisconsin State Statutes. Enbridge obtained the appropriate federal and state wetland and waterbody permits for this project. The COE issued a permit under Section 404 of the Clean Water Act on January 18, 2002. A certificate of completion was submitted to the COE on October 13, 2004. The WDNR issued a permit for the following activities on March 27, 2002: Temporary Bridges (Wis. Stat.§30.123, Section 404 Clean Water Act); Grading, (Wis. Stat. §30.19, Section 404 Clean Water Act); Utility Crossing (Wis. Stat. § 30.20 and 30.12, Section 404 Clean Water Act); Wetland Water Quality Certifications (Section 401 Clean Water Act). Construction was completed in early 2002 with restoration activities completed October 2002, a letter was submitted to the WDNR notifying the agency of project completion on October 29, 2002.

The Superior Terminal was built to provide storage prior to shipping the crude oil on to refineries in the Midwest. The original Superior Terminal tank farm consisted of 12 tanks, which were constructed circa 1950. The facility has grown since to meet the increased demand for Canadian crude oil and currently consists of 35 operational tanks. This facility directly employs 27 people at the Superior Terminal, in addition to numerous individuals that support the Terminal, but work off-site in office buildings throughout Superior. Enbridge also employs countless sub-contractors to work on the Superior Terminal, making it one of the larger employers in the Superior, Wisconsin area.

The following is a list of the existing tanks at the Superior Terminal:

Tank 1 — External Floating Roof Storage Tank (16,380,000 GALLON, 1973)

Tank 2 — External Floating Roof Storage Tank (16,380,000 GALLON, 1973)

Tank 3 — Geodesic Dome Internal Floating Roof Storage Tank (6,300,000 GALLON, 1989)

Tank 4 — Geodesic Dome Internal Floating Roof Storage Tank (6,300,000 GALLON, 1989)

Tank 5 — External Floating Roof Storage Tank (6,300,000 GALLON, 1951)

Tank 6 — External Floating Roof Storage Tank (6,300,000 GALLON, 1951)

Tank 7 — External Floating Roof Storage Tank (6,300,000 GALLON, 1951)

Tank 8 — External Floating Roof Storage Tank (6,300,000 GALLON, 1951)

Tank 9 — External Floating Roof Storage Tank (6,300,000 GALLON, 1951)

Tank 10 — External Floating Roof Storage Tank (6,300,000 GALLON, 1951)

Tank 11 — External Floating Roof Storage Tank (6,300,000 GALLON, 1951)

Tank 12 — External Floating Roof Storage Tank (6,300,000 GALLON, 1951)

Tank 13 — External Floating Roof Storage Tank (9,114,000 GALLON, 1952)

Tank 14 — External Floating Roof Storage Tank (9,114,000 GALLON, 1952)

Tank 15 — External Floating Roof Storage Tank (9,114,000 GALLON, 1952)

Tank 16 — External Floating Roof Storage Tank (9,114,000 GALLON, 1952)

Tank 17 — External Floating Roof Storage Tank (9,114,000 GALLON, 1952)

Tank 18 — External Floating Roof Storage Tank (9,114,000 GALLON, 1952)

Tank 19 — External Floating Roof Storage Tank (9,114,000 GALLON, 1952)

Tank 20 — External Floating Roof Storage Tank (9,114,000 GALLON, 1952)

Tank 21 — External Floating Roof Storage Tank (9,114,000 GALLON, 1952)

Tank 22 — External Floating Roof Storage Tank (9,114,000 GALLON, 1952)

Tank 23 — External Floating Roof Storage Tank (9,114,000 GALLON, 1971)

Tank 24 — External Floating Roof Storage Tank (9,114,000 GALLON, 1971)

Tank 25 — External Floating Roof Storage Tank (9,114,000 GALLON, 1990)

Tank 26 — Geodesic Dome Internal Floating Roof Storage Tank (9,114,000 GALLON, 1994)

Tank 27 — External Floating Roof Storage Tank (9,114,000 GALLON, 1995)

Tank 28 — Internal Floating Roof Storage Tank (9,114,000 GALLON, 1968). This tank is owned by
Husky Oil Company, but is operated by Enbridge

Tank 29 — Internal Floating Roof Storage Tank (9,114,000 GALLON, 1968). This tank is owned by Husky Oil Company, but is operated by Enbridge.

Tank 30 — External Floating Roof Storage Tank (10,500,000 GALLON, 1998)

Tank 31 — External Floating Roof Storage Tank (10,500,000 GALLON, 1998)

Tank 32 — External Floating Roof Storage Tank (7,680,000 GALLON, 2003)

Tank 33 — External Floating Roof Storage Tank (7,680,000 GALLON, 2003)

Tank 34, — External Floating Roof Storage Tank (16,471,098 GALLON, 2007)

Tank 35 — External Floating Roof Storage Tank (8,673,426 GALLON, 2008)

Tank 41— External Floating Roof Storage Tank (Currently under permit review). This tank will be owned by Husky Oil Company but will be operated by Enbridge.

The total capacity of the existing terminal tanks (excluding tank 41) is 312,202,524 gallons or 7,433,393 barrels.

Inspections

In addition to the applicable requirements included in the facility's air permit, all tanks are inspected per American Petroleum Institute (API) Standard 653 - Tank Inspection, Repair, Alteration, and Reconstruction in accordance with the following schedule:

- Routine In-service Inspections: This includes visual inspection for evidence of leaks (e.g., on shell, flanges, mixers), changing conditions (e.g., shell distortions, settlement or heaving, active corrosion), condition of the foundation, paint coatings, floating roof, insulation systems, and appurtenances. This inspection is conducted on a monthly basis by on-site employees.

- Annual In-service Inspections: This includes visual inspection for: condition of platforms and ladders; condition of roof legs, manholes, vents, drains; leaks in pontoons; condition of seals; condition of rescue tank davit; and magnetic particle inspection (MPI) of all tank davit lifting rings or hooks. This inspection is conducted by the facility supervisor or his designate.

- Formal In-service Inspections: The inspection includes an external evaluation of the corrosion rate/wall thickness of the tank and is conducted by an API 653-certified inspector. This inspection must be conducted at intervals that do not

exceed the lesser of five years or the quarter corrosion rate life of the tank shell.

- Formal Out-of-service Inspections: The formal out-of-service inspection interval for tanks is determined using the corrosion rate data gathered during the five-year In-Service Inspections but not more than 20 years. The frequency of this inspection may be adjusted if a risk-based inspection (RBI) assessment is conducted in accordance with API 653. When corrosion rates are not known and similar experience is not available, the next out-of-service inspection must be completed within ten years. The inspection is conducted by an API 653-certified inspector and includes, but is not limited to, an assessment of the tank's bottom and shell thickness, analysis of any bottom or foundation settlement, and a review of non-destructive examination results.

Security

The entire perimeter of the facility is fenced (chain link with three-strand razor wire) with several entrance/exit gates. Each gate is equipped with a key-card access system. The facility also has a video surveillance system that is monitored by local staff and control center staff in Edmonton, Alberta. At a minimum, the facility is staffed with two personnel 24 hours per day, seven days per week. Visitors to facilities (including contractors, office employees, and employees from other locations) must:

- sign in and out
- provide vehicle description and license plate number
- provide positive identification if the person is unknown (e.g., photo ID)

In addition, Enbridge has adopted the Homeland Security Advisory System, which is the foundation for communicating information regarding the risk of terrorist acts to all levels of federal, state, and municipal governments, and people across the continent. Risk includes both the probability of an attack and its potential seriousness. The Homeland Security Advisory System has established five threat condition levels, each identified by a description and corresponding color (see below). The government assigns threat conditions for the entire continent, or for a particular geographic area or industry (e.g., pipelines). Accordingly, it communicates relevant information and any adjustments in threat condition levels to government officials, law enforcement agencies, and industry in a timely manner. Upon notification of a threat condition, the Enbridge is prompted to implement appropriate protective measures to reduce its vulnerability or to increase its ability to respond during a period of heightened alert.

Lighting

The Superior Terminal is lighted outside normal working hours. Lighting is generally directed toward the perimeter of the fence line to enhance visibility and to deter intruders.

V.B. Incidents

Enbridge has implemented the procedures outlined in a malfunction prevention and abatement plan (MPAP) for the facility as required pursuant to s. NR 439.11, Wisconsin Administrative Code. Responding to malfunctions and notifying the appropriate agency personnel are specified in the MPAP.

A fire within the facility could result in potential loss of materials from the facility's tanks. Enbridge's emergency response plans and procedures address prevention of and emergency response for a spill or release of hazardous materials that may occur at the facility. Enbridge's MPAP is designed to prevent, detect, and correct any malfunctions associated with air emission control equipment at the facility.

Table 18 presents national data for serious pipeline incidents that involved a fatality or hospitalization.

Table 18 - Serious Incidents Averages for Nationwide Hazardous Liquid Onshore Pipeline Systems

Nationwide Hazardous Liquid Onshore Pipeline Systems, Annual Averages of Serious[a] Incidents (1988–2007)	
Time Period	**Serious Incidents per Year**
5-year average (2002–2007)	3
10-year average (1998–2007)	4
20-year average (1988–2007)	5

[a] A serious hazardous liquid pipeline safety incident involves a fatality or an injury requiring in-patient hospitalization.

Source: PHMSA 2008.

National pipeline spill data is presented in Table 19.

Table 19 - Significnat Incidents Averages for Nationwide Hazardous Liquid Onshore Pipeline Systems

Nationwide Hazardous Liquid Onshore Pipeline Systems Annual Averages for Significant Incidents (1988–2007)							
Period	**Number of Incidents**	**Fatalities**	**Injuries**	**Property Damage [a, b]**	**Gross Barrels Lost**	**Barrels Recovered**	**Net Barrels Lost**
5-year average (2003–2007)	113	2	7	$68,819,389	103,202	48,495	54,707
10-year average (1998–2007)	120	2	7	$73,484,906	111,694	48,253	63,440
20-year average (1988–2007)	139	2	12	$61,296,928	134,282	62,033	72,249

[a] The costs shown are in 2007 dollars. Costs listed were adjusted using the Bureau of Economic Analysis, Government Printing Office inflation values.

[b] For years 2002 and later, property damage was estimated as the sum of all public and private costs reported in the 30-day incident report, adjusted to 2007 dollars. For years prior to 2002, accident report forms did not include a breakdown of public and private costs; therefore, property damage for these years is the reported total property damage field in the report, adjusted to 2006 dollars.

Source: PHMSA 2008.

National data on the causes of significant pipeline incidents is listed in Table 20.

Table 20 - Causes of Significant Incidents for Nationwide Hazardous Liquid Pipeline Systems

Nationwide Hazardous Liquid Pipeline Systems Causes of Significant Incidents (1987–2006)						
Cause	**Number of Incidents**	**Percent of Total Incidents (%)**	**Fatalities**	**Injuries**	**Property Damage [a, b]**	**Percent of Property Damage (%)**
All other causes	702	24	19	98	$248,511,493	18
Corrosion	707	24	1	17	$275,066,698	20
Excavation damage	663	22	17	89	$204,459,783	15
Human error	198	7	3	29	$29,595,746	2
Material failure	553	19	0	8	$299,210,157	22
Natural force damage	111	4	0	1	$269,452,728	20
Other outside force damage	29	1	0	0	$46,070,302	3
Total	**2,963**	**100**	**40**	**242**	**$1,372,366,907**	**100**

Significant incidents are those incidents reported by pipeline operators that meet any of the following conditions: (1) fatality or injury requiring in-patient hospitalization; (2) $50,000 or more in total costs, measured in 1984 dollars; (3) highly volatile liquid releases of 5 barrels or more, or other liquid releases of 50 barrels or more; and (4) liquid releases resulting in an unintentional fire or explosion.

[a] The costs shown are in 2006 dollars. Costs were adjusted using the Bureau of Economic Analysis, Government Printing Office inflation values.

[b] For years 2002 and later, property damage is estimated as the sum of all public and private costs reported in the 30-day incident report, adjusted to 2006 dollars. For years prior to 2002, accident report forms did not include a breakdown of public and private costs; therefore, property damage for these years is the reported total property damage field in the report, adjusted to 2006 dollars.

Source: PHMSA 2008.

Enbridge pipeline leaks history data is shown in Table 21.

Table 21 - Enbridge Crude Oil Leak Incidents in Wisconsin[a]

Date	City	County	Milepost	Product Spilled [b]	Volume Spilled (barrels)	Volume Recovered (barrels) [c]	Primary Cause	Additional Detail/Notes
11/15/1999		Taylor	116.03	Crude	15	14	Other	Original construction
7/27/2000		Douglas	1098.0	Crude	1,200	1,150	Other	Failed flange gasket
1/24/2003	Superior	Douglas	1096.95	Crude	4,500	4,450	Failed weld	
4/2/2004	Superior	Douglas	1096.95	Crude	2	2	Equipment	Component
5/13/2004	Superior	Douglas	1096.95	Crude	40	38	Internal corrosion	
1/14/2005	Rio	Columbia	268.82	Crude	3	3		
12/22/2005	Arpin	Wood	182.3	Crude	0.1	0.1	Failed weld	
1/1/2007	Owen	Clark	149.17	Crude	1,500	1,450	Material failure	Pipe seam weld
2/2/2007	Exeland	Rusk	84.9	Crude	3,000	2,534	Excavation damage	By operator

[a] Pipeline system leaks reportable to U.S. Department of Transportation, Pipeline and Hazardous Materials Safety Administration, 1996-2007. Reporting criteria for leaks were changed in 2002 from 50 barrels to 5 gallons.

[b] NGL = Natural gas liquids.

[c] Initial volume recovered is the free oil and drain-up from pipe with special vacuum equipment and typically returned to the pipeline system. Remaining product in soil is recovered by removing soils or other approved methods.

Sources: PHMSA 2008, NRG 2007.

The typical environmental significance of different pipeline spill incidents is listed in Table 22.

Table 22 - Significance of Environmental Impacts of Crude Oil Spills

Significance of Environmental Impacts of Crude Oil Spills with Increasing Spill Size and Increasing Sensitivity of Receptors					
	Size of Spill (in barrels)				
Type Of Receptor [a]	**Very Small (<5 bbl)**	**Small (5–49.9 bbl)**	**Significant (50–499.9 bbl)**	**Large (500–5,000 bbl)**	**Very Large (>5,000 bbl)**
Terrestrial-agricultural land	Negligible	Negligible to minor	Minor to substantial	Minor to substantial	Substantial
Terrestrial-natural habitat	Negligible	Minor	Minor to substantial	Substantial	Substantial
Groundwater	Negligible	Negligible	Negligible to minor	Minor to substantial	Substantial
Aquatic-wetlands	Negligible	Minor	Minor to substantial	Substantial	Major to catastrophic
Aquatic-lakes and ponds	Negligible	Negligible to minor	Minor to substantial	Substantial	Major
Aquatic-streams and small rivers	Negligible	Negligible to minor	Substantial	Major	Major to catastrophic
Aquatic-large rivers	Negligible	Negligible	Minor	Substantial to major	Major to catastrophic
Threatened and endangered species and habitat	Negligible to minor	Minor to substantial	Substantial	Substantial to major	Major to catastrophic
Human use-commercial	Negligible	Negligible to minor	Minor	Minor to substantial	Substantial to major
Human use-residential	Negligible	Negligible to minor	Minor	Minor to substantial	Substantial to major
Human use-recreational	Negligible	Negligible to minor	Minor to substantial	Substantial to major	Major to catastrophic
Human use- water intakes	Negligible to minor	Negligible to minor	Minor	Minor to major	Major to catastrophic

Negligible impact: little to no detectable impact on most resources; maybe some visible presence of oil on land, vegetation, or water. No to very few organisms apparently killed or injured. Temporary (days) and very local to spill site.

Minor impact: measurable presence of oil and limited impacts on local habitats and organisms. Temporary (days to weeks) and local (acres). Some organisms (likely birds, fish, and aquatic macroinvertebrates) may be killed or injured in the immediate area.

Substantial impact: patchy to continuous presence of oil on terrestrial and aquatic habitats near the spill site. Impacts may be present for weeks to a few months and may affect tens of acres or a few miles of stream/river habitat. Local community- and population-level effects on organisms and human uses of the area.

Major impact: patchy to continuous and heavy presence of oil on terrestrial and aquatic habitats near the spill site and for substantial distances downgradient of the spill site. Impacts may be present for weeks to months and potentially for a year or more. Area may include many acres to sections of land or wetlands and several miles of riverine habitat. Local community- and population-level impacts on organisms and habitats, and disruption of human uses of local oiled areas.

Catastrophic impact: mostly continuous or nearly continuous presence of oil on all habitats near and for substantial distances downgradient of the spill site. Impacts may be present for months to years. Area may include many acres to sections of land or wetlands, and several to numerous miles of river or other aquatic habitat. May cause local and regional disruption of human uses. May cause local and regional impacts to biological populations and communities.

[a] In increasing order of sensitivity from top to bottom.

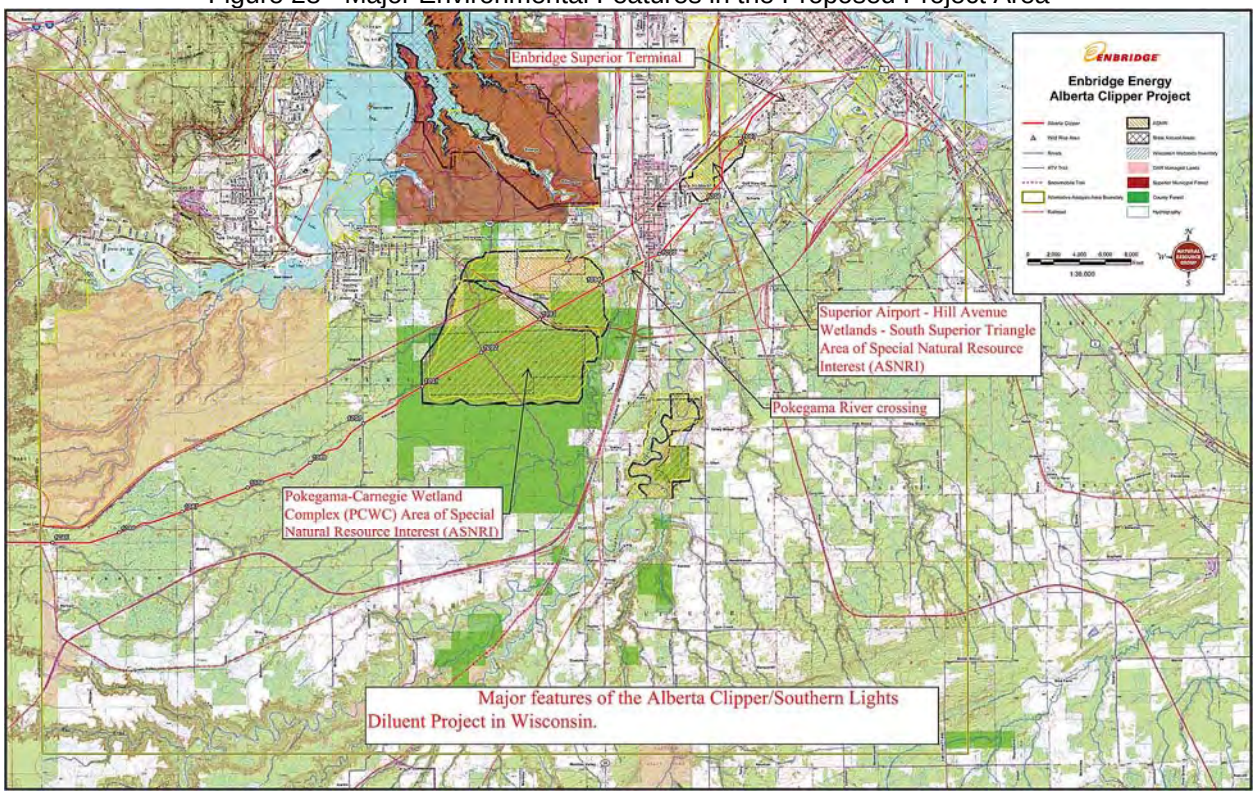
VI. Existing Environment

VI.A. Watershed

The Lake Superior Clay Plain is a flat to undulating lake plain and outwash lowland. The soils are generally calcareous red clays with organic deposits in swampy areas. A dearth of lakes, along with a somewhat milder climate and longer growing season due to the climate amelioration by Lake Superior, differentiates this area from surrounding ecoregions. Land use is predominantly woodland with some limited agriculture of hay, small grains, and apples on Bayfield Peninsula, distinguishing this area from most other Level IV Ecoregions in Northern Lakes and Forests, where the land use/land cover is predominantly forest and woodland. The Lake Superior Clay Plain contains boreal forest.

Figure 28 shows some of the major environmental features in the area of the proposed project.

Figure 28 - Major Environmental Features in the Proposed Project Area



VI.A.1. Air quality and climate

Douglas County, Wisconsin, is in attainment or is unclassified for all criteria pollutants.

Historically, the air quality in the area around the terminal has not had exceedances of the national ambient air quality standard (NAAQS) for ozone. A review of ozone monitoring data from a Minnesota Pollution Control Agency monitoring station located at the University of Minnesota Duluth, 14.2 kilometers (8.8 Miles) to the northwest of the terminal in Duluth, Minnesota, had an average ozone concentration of 0.03 parts per million (ppm) and a maximum

concentration of 0.09 ppm for the period April 1998 through June 2008. The maximum 8-hour average for the period was 0.069 ppm, which is below the 8-hour national ambient air quality ozone standard of 0.075 ppm.

The climate in northern Douglas County is strongly influenced by Lake Superior, resulting in cooler summers, warmer winters, and greater precipitation compared to more inland locations.

VI.A.2. Geology and soils

The proposed Project lies entirely within the Glacial Lake Duluth physiographic area of the Superior Coastal Plain ecological landscape on an area known as the Red Clay Plain. The Red Clay Plain is extensive in Wisconsin, consisting of approximately 890,000 acres located in the northern portion of Ashland, Bayfield, Douglas, and Iron counties. The major landform in this ecological landscape is a nearly level plain of lacustrine clays that slopes gently northward toward Lake Superior.

Glacial Lake Duluth formed when the Wisconsin-aged Superior Lobe receded into the Lake Superior Basin forming a pro-glacial lake that was elevated up to 500 vertical feet above the existing level of Lake Superior. Glacial Lake Duluth persisted for approximately 2,000 years, resulting in the unusual red clay plain landform that consists of an anomalous, thick accumulation of very fine textured red clay derived by glacial erosion of iron-rich rocks to the north.

The bedrock geology of the area consists of Precambrian sedimentary bedrock, primarily feldspathic to quartzose sandstone and shale, and includes lithic sandstone and siltstone

In the area of the proposed project route, the dominant landform is an elevated, poorly developed lacustrine plain that represents the deep portions of Glacial Lake Duluth. The proposed pipeline route within the St. Louis watershed generally follows the midline interfluves of the lake plain that is bounded by the Red River, Little Pokegama, and the St. Louis Estuary to the north, and the Pokegama River to the south and east.

Soils on the flat interfluves between entrenched rivers formed in very fine-textured red clays deposited in off-shore environments in the bed of Glacial Lake Duluth. The red color of the clay is the result of glacial action incorporating iron-bearing bedrock that is common in the area. Relief on the elevated lake plain is flat. Micro-topography is limited to very subtle rises between small (0.25 acre) to medium sized (1-2 acre) depressions. Total relief between the rises and depression bottoms is on the order of one foot or less in most areas.

Site hydrology is strongly influenced by the presence of micro-topography and the very low hydraulic conductivity ($< 10^{-8}$ cm/s) of the sediments. Very poorly drained Berglund soils (very-fine, mixed, semi-active, frigid Aeric Vertic Epiaqualfs) occupy ephemerally to seasonally ponded depressions, somewhat poorly drained Cuttre (very-fine, mixed, active, frigid Aeric Glossaqualfs) and moderately well drained Amnicon (Oxyaquic Vertic Glossudalfs) soils occupy successively drier interdepressional areas, respectively. All of these soils are poorly developed and contain thin (1-2 inch) A-horizons over red clays. Shallow peat Cathro soils (Loamy, mixed,

euic, frigid Terric Haplosaprists) are less frequently found. Cathro soils occupy the beds of larger and deeper, seasonally-to-semipermanently flooded depressions.

VI.A.3. Hydrography
VI.A.3.a. Surface waters

The project route through the Beartrap-Nemadji watershed generally parallels the entrenched Nemadji River.Rivers and coulees close to the escarpments to the north and south as well as their nearby tributaries have incised narrow, v-shaped valleys through the clayey sediments that are up to 150 feet deep. Areas further away from the major rivers become progressively less and less incised, culminating in an ephemeral to intermittent meandering drainage network on the somewhat poorly drained to very poorly drained elevated portion of the lake plain through which the proposed project traverses. The Pokegama River would be crossed at MP 1094.4, approximately 3.4 miles from the Project terminus at the Superior Terminal.

Areas further away from the major rivers become progressively less and less incised, culminating in an ephemeral to intermittent meandering drainage network on the somewhat poorly drained to very poorly drained elevated portion of the lake plain through which the Project traverses. Unprotected components of the landscape are particularly susceptible to sheet and rill erosion in the poorly drained uplands, and gully erosion in more steeply sloping areas near the major rivers. Sediment movement into the rivers and streams is an issue on the red clay plain. There are no natural lakes found in the ecological subsection. Drainages are indistinct and integrated drainage is dependent to a large degree on rainstorm and/or snowmelt intensity. More intense runoff events will fill receiving depressions until they progressively overflow and ultimately drain to more integrated drainageways.

Many streams in the Lake Superior clay plain have “flashy” flow regimes; water levels rise rapidly in response to precipitation because of the impermeable soils in the watershed. Sand layers within the soils of the clay plain can create unstable bluffs along streambanks and roadsides. The power from high and rapidly changing flows carves at streambanks and leads to slumping of sand and clay into the stream. Streams in the Lake Superior clay plain are often turbid with suspended clay particles which remain in suspension and often forms plumes into Lake Superior. The Nemadji River is particularly noted for clay plumes in the Lake. Sand deposited in streams covers fish spawning habitat and can be carried as bed load to downstream locations. The Nemadji is responsible for sand deposition in Superior Bay / Superior entry, necessitating periodic navigation dredging. Maintenance of forest cover and wetlands within the watershed help to ameliorate rapid runoff from the watershed and reduce stream flashiness that leads to streambank erosion and subsequent aquatic habitat degradation.

The proposed pipeline route crosses the drainage of the Pokegama River which flows into the St. Louis River estuary, and crosses the Nemadji River watershed. The 12,000 acre St. Louis estuary supports an important complex of coastal wetlands on Lake Superior and was nominated in 2008 by the state of Wisconsin as a National Estuarine Research Reserve under the National Oceanic and Atmospheric Administration. The Lower St. Louis estuary is also the Duluth-Superior Harbor supporting a busy port and many industrial and commercial uses. The upper estuary, particularly in Wisconsin, supports extensive wetlands and undeveloped shoreline. It is this

section of the upper estuary into which the Pokegama River enters. In the early 1990s, the state of Wisconsin with encouragement from the County and local citizens purchased over 5000 acres of shoreline and adjacent land on the upper St. Louis River estuary. This property is known as the Red River – St. Louis River Stream Bank Protection area. The purpose was to protect this shoreline, which is highly susceptible to erosion, and thereby protect the St Louis River spawning areas. The St. Louis River is the second largest tributary to Lake Superior. It supports a significant fishery. The upper estuary and river below the Fond du Lac dam provide spawning habitat for most of the walleye in the western arm of Lake Superior. Lake sturgeon restoration efforts in the St. Louis estuary began in the 1980s. Once this population reaches maturity, the upper estuary will also serve as sturgeon spawning habitat.

Data on the watersheds crossed by the proposed pipelines are given in Tables 23a and 23b.

Table 23a - Watersheds Crossed by the Proposed Pipelines

Watersheds Crossed by the Alberta Clipper and Southern Lights Pipeline Projects					
Basin Name	**Watershed Name**	**Hydraulic Unit Code (HUC)**	**Milepost In**	**Milepost Out**	**Crossing Length (miles)**
Lake Superior	St. Louis River	4010201	1084.8	1095.8	11.0
	Nemadji River	4010301	1095.8	1097.8	2.0

Table 23b - Data on Watersheds Crossed by the Proposed Pipelines

Watersheds, Geopolitical. and Ecosystem Boundaries Crossed by the Alberta Clipper and Southern Lights Pipeline Projects [a, b]						
Watershed Name	**WIDNR ECS**	**County**	**Area in Watershed (thousands of acres)**	**Percent of Watershed Area**	**Milepost Increment**	**Crossing Length(miles) (percent of state route)**
Beartrap-Nemadji	Lake Superior Coastal Plain	Ashland	33.95	6.2	-	-
		Bayfield	303.43	55.3	-	-
		Douglas	211.71	38.5	1095.8 – 1097.8	2.01 (15.6)
	Subtotal		**549.08**	**100**		
St. Louis	Lake Superior Coastal Plain	Douglas	43.15	100	1084.8 – 1095.8	10.92 (84.4)
	Subtotal		**43.15**	**100**		
Total Wisconsin			**592.23**	**100**		**12.93 (100)**

[a] Data determined using GIS methods. Ecological Classification Subsection boundaries from the Ecological Landscapes Wisconsin DNR (Wisconsin Wildlife Action Plan, 2006), respectively. The Alberta Clipper and Southern Lights Diluent projects are collocated within the same construction corridor, will be constructed together, and are thus combined in this analysis. The entire 12.93 miles of the route in Wisconsin is contained within the Superior Coastal Plain as described in Wisconsin's Wildlife Action Plan.

[b] Counties that are underlined are crossed by the proposed Alberta Clipper Project Route.

Table 24 lists pre and post settlement land cover data for the Beartrap-Nemadji watershed.

Table 24 - Beartrap-Nemadji Watershed Pre and Post Settlement Land Cover Data

Comparison of Pre-Settlement [a] versus Baseline [b] Environmental Conditions for the Alberta Clipper and Southern Lights Pipeline Projects
Beartrap-Nemadji Watershed, Wisconsin

	Pre-Settlement		**Baseline**		
Land Use	**Pre-Settlement Acreage (thousands)**	**Relative Percentage for ECS**	**Wiscland Land Use or WWI Acreage[c] (thousands)**	**Relative Percentage for Watershed**	**Percentage Change**
Forest	536.56	97.43	329.63	58.80	-38.63
Shrubland	3.43	0.62	0.00	0.00	-0.62
Prairie/Grassland	0.00	0.00	121.42	21.66	21.66
Open Water		0.00	11.55	2.06	2.06
Wetland	2.55	0.46	2.53	0.45	-0.01
Forested/Shrub Wetland	8.19	1.49	53.48	9.54	8.05
Agricultural	0.00	0.00	6.42	1.15	1.15
Developed	0.00	0.00	5.74	1.02	1.02
Barren (Unknown)	0.03	0.01	29.84	5.32	5.32
Subtotal	550.73	100.00	560.61	100.00	
Wiscland Wetland			*3.76*		
Wiscland Forested Wetland			*48.58*		

[a] Pre-settlement land cover distribution determined using the Wisconsin Native Vegetation Map.
[b] Land Use determined using Wiscland digital data set, Wisconsin Department of Natural Resources, Madison.
[c] Wiscland acreage was modified to substitute WWI acreage for Wiscland forested and emergent wetland acreage estimates. WWI forested wetlands include all wetlands indicated with shrub swamp and forested components as determined using GIS methods. Wiscland wetland data are provided in italics for comparison. WWI data indicate similar total wetland acreage however, the acreage of emergent and forested wetlands are reversed when compared to Wiscland. The difference is likely due to the inclusion of wetlands with a PSS component into the forested wetland category. The difference between Wiscland and NWI data acreage was added or subtracted (as appropriate) from prairie and upland forest for emergent and forested wetlands, respectively.

Table 25 lists pre and post settlement land cover data for the St. Louis watershed.

Table 25 - St. Louis Watershed Pre and Post Settlement Land Cover Data

Comparison of Pre-Settlement [a] versus Baseline [b] Environmental Conditions for the Alberta Clipper and Southern Lights Pipeline Projects
St. Louis Watershed, Wisconsin

	Pre-Settlement		Baseline		
Land Use	Pre-Settlement Acreage (thousands)	Relative Percentage for ECS	Wiscland Land Use or WWI Acreage[c] (thousands)	Relative Percentage for Watershed	Percentage Change
Superior Coastal Plain					
Forest	39.91	92.38	9.44	21.88	-70.51
Shrubland	0.15	0.35	4.90	11.36	11.01
Prairie/Grassland	0.00	0.00	5.68	13.16	13.16
Open Water		0.00	3.12	7.23	7.23
Wetland	2.78	6.44	0.74	1.71	-4.72
Forested/Shrub Wetland	0.36	0.83	13.98	32.40	31.57
Agricultural	0.00	0.00	0.08	0.19	0.19
Developed	0.00	0.00	5.21	12.07	12.07
Barren (Unknown)	0.35	0.81	0.00	0.00	-0.81
Subtotal	43.20	100.00	43.15	100.00	

Comparison of Pre-Settlement [a] versus Baseline [b] Environmental Conditions for the Alberta Clipper and Southern Lights Pipeline Projects St. Louis Watershed, Wisconsin					
	Pre-Settlement		Baseline		
Land Use	Pre-Settlement Acreage (thousands)	Relative Percentage for ECS	Wiscland Land Use or WWI Acreage[c] (thousands)	Relative Percentage for Watershed	Percentage Change
Wiscland Wetland			*0.78*		
Wiscland Forested Wetland			*12.85*		

[a] Pre-settlement land cover distribution determined using the Wisconsin Native Vegetation Map.

[b] Land Use determined using Wiscland digital data set, Wisconsin Department Natural Resurces..

[c] Wiscland acreage was modified to substitute WWI acreage for Wiscland forested and emergent wetland acreage estimates. WWI forested wetlands include all wetlands indicated with shrub swamp and forested components as determined using GIS methods. Wiscland wetland data are provided in italics for comparison. WWI data indicate similar total wetland acreage however, the acreage of emergent and forested wetlands are reversed when compared to Wiscland. The difference is likely due to the inclusion of wetlands with a PSS component into the forested wetland category. The difference between Wiscland and NWI data acreage was added or subtracted (as appropriate) from prairie and upland forest for emergent and forested wetlands, respectively.

Lake Superior is the largest freshwater body in the world at 31,700 square miles. It is third largest by volume. Lake Superior is the coldest (average temperature is 40 degrees Fahrenheit), and deepest (maximum depth of 1,332 feet) of all the Great Lakes.

The St. Louis River, draining approximately 3,634 square miles of northeastern Minnesota and northwestern Wisconsin, is the major U.S. tributary to Lake Superior. The lower 21 river miles of the St. Louis River include a 12,000 acre freshwater estuary that supports unique ecosystems as well as the largest harbor and international port on the Great Lakes.

The combination of ecosystems within the Lower St. Louis River area—estuarine wetland and aquatic habitats, baymouth bar complex, and surrounding upland forest—are very unusual in Lake Superior, the Upper Midwest, the Great Lakes region, and the world. Great Lakes wetland systems are unique from a global perspective, and the St. Louis River wetlands are the largest such complex on the Lake Superior shore, representing a significant source of productivity for the entire Lake Superior ecosystem. The estuary and its tributaries are unusual in having such a variety of habitat types supporting a large and diverse assemblage of native fish species.

The baymouth bars are unusual in the Great Lakes—aside from Minnesota and Wisconsin Points, the only similar examples are Point Pelee and Long Point in Ontario and Long Island-Chequamegon Point in Wisconsin. The plant communities supported by these baymouth bars are endemic to the Great Lakes. The freshwater estuary and baymouth bar systems are virtually absent elsewhere in the interior of North America. In spite of human impacts, the Lower St. Louis River ecosystem is both regionally and globally significant.

In the 1980s, environmental quality conditions prompted the designation of the Lower St. Louis River System as one of 43 Great Lakes Areas of Concern (IJC 1989). To address the impairments of beneficial uses in the St. Louis River Area of Concern (AOC), a Stage One Remedial Action Plan (RAP) was developed (MPCA and WDNR 1992). This was followed by a Stage Two RAP, which recommended development of a Habitat Plan because it was recognized that although habitat is still being lost, many valuable areas remain (MPCA and WDNR 1995).

Cooperative action among various stakeholders, decision-makers, and resource managers in both Minnesota and Wisconsin is needed to protect the remaining habitat and restore degraded area.

The proposed pipeline route crosses 13 miles of Douglas County, Wisconsin in the Lake Superior drainage basin. The local political units to be crossed within Douglas County are the Town of Superior, Village of Superior, and City of Superior. The total area of Douglas County is 837,924 acres, of which 194,169 acres are mapped as wetland on the Wisconsin Wetland Inventory. The northern third of the county is in the Lake Superior clay plain. The clay plain is rich in wetlands, in part due to the impermeable clay soils and relatively flat topography. Wetlands may be found even in higher elevations in the clay plain. Although wetlands are locally abundant, they are often of types that are nationally rare. In the area proposed to be crossed by the pipeline and up to the Superior terminal, shrub swamps and wet meadows are commonly interspersed with agricultural, residential, and industrial land uses. The clay plain is also characterized by deeply incised streams within steep ravines, formed through the erosive power of rapid water runoff from the surrounding landscape.

Wetlands in the area of the proposed project route are numerous, with drainage to the north and south towards the flanks of the elevated lake plain. Unprotected components of the landscape are particularly susceptible to sheet and rill erosion in the poorly drained uplands, and gully erosion in more steeply sloping areas near the major rivers. Sediment movement into the rivers and streams continues even after significant efforts by the state and federal government to control it. There are no natural lakes found in the subsection. Drainages are indistinct and integrated drainage is dependent to a large degree on rainstorm and/or snowmelt intensity. More intense runoff events will fill receiving depressions until they progressively overflow and ultimately drain to more integrated drainageways.

Most of the wetlands in the western portion of the segment are riparian to intermittent drainageways. Extensive shrub-carr wetlands are more dominant to the east from the Pokegama Carnegie Wetland Complex (PCWC) area of special natural resource interest (ASNRI) into the Enbridge’s Superior Terminal.

Wetlands within the existing ROWs are maintained in an herbaceous state (emergent wetland, PEM) by periodic brushing. Alder thicket, the common shrub-carr wetland within and outside of the proposed construction ROW, is dominated by tall shrubs, especially speckled alder. Shrub associates include red-osier dogwood, willows, and several minor shrub components. Widely scattered small, ephemeral pools support a variety of emergent hydrophytes. Among the characteristic herbaceous species in these emergent wetlands are sedges, Canada bluejoint grass, orange jewelweed, asters, boneset, rough bedstraw, marsh fern, arrow-leaved tearthumb, and sensitive fern. The forested wetlands in this segment are primarily (1) black ash (*Fraxinus nigra*) dominated depressions within the hardwood uplands along the route, or (2) discrete aspen groves within shrub-carr, (3) and isolated hardwoods and conifers in better drained areas adjacent to incised drainageways. Black ash also occurs as a fringe or minor component to larger wetland complexes or as isolated stunted specimens within some wetlands.

The majority of the wetland systems are fed by surface runoff. Most depressions are ponded very early in the year and immediately after heavy precipitation events. The area is characterized by a

complex net of subtle, poorly integrated drainages. Drainageways are ephemeral in nature and dependent upon precipitation intensity for flow. The elevated areas dominated by Cuttre and Amnicon soils between depressions are very rarely or never ponded.

Wetlands provide an important flood protection function. In the Lake Superior clay plain, many of the wetlands are topography-dependent and highly interspersed on the landscape. Wetlands hold water on the landscape, which slows the rate of water runoff to the streams. This wetland function is particularly important in the Lake Superior clay plain watersheds where water runs off the impermeable clay soils very quickly. Wetland loss causes increased runoff from the landscape, which in turn increases flooding and streambank erosion. For streams in the clay plain, the streambank erosion caused by excess water runoff leads to habitat degradation from sedimentation. Additional wetland loss within the watershed would be expected to exacerbate erosion impacts to streams.

Most of Douglas County's wetlands have medium to high floristic diversity. Douglas County's wetlands support a number of threatened, endangered and special concern plant species. Invasive species are increasingly more prevalent in wetlands, due to both direct disturbance and impacts from surrounding development. Increasing presence of invasive species will result in reduced floral diversity.

Surveys from the 1990s by DNR Bureau of Endangered Resources evaluated priority wetland communities in the Lake Superior basin. One focus was the vicinity of the city of Superior, where shrub- and sedge- dominated wetlands are concentrated on the nearly level poorly drained red clay soils. Plant communities surveyed included alder thicket, shub-carr, northern sedge meadow, and emergent aquatic. Priority sites surveyed were Pokegama-Carnegie wetlands, Red River Breaks, and Superior Airport / Hill Avenue Wetlands / South Superior Triangle. "These sites are most notable for their concentrations of rare plants, some of which occur nowhere else in the drainage basin or state." (Epstein et al. 1997). The report summarizes threats to these communities as disruption of hydrology, increased development, invasive species, pollution, and suppression of natural disturbance regimes.

VI.A.4. Flora and fauna

Douglas County's clay plain wetlands and the St. Louis River estuary draining to Lake Superior provide a major migration "funnel" for birds and mammals. Migrating birds will concentrate in the St. Louis River estuary and surrounding areas as they avoid flying over the expanse of Lake Superior. Migratory stopovers just before birds reach breeding grounds may play a critical role in fledgling success. Studies of wetland use by migrating songbirds suggest that alder thickets are used disproportionally over other habitats for feeding and cover.. Studies of important migratory stopover sites in other Great Lake states suggest that areas within ½ mile of river mouths are critical areas for migratory stop over. The area south and west of Superior represents a "stronghold" of rare breeding habitat for boreal species.

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from surrounding development. Increasing presence of invasive species will result in reduced floral diversity.

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The rare species survey performed by Enbridge was limited in scope to plant occurrences, as required by the City of Superior Special Area Management Plan (SAMP 11) permit application guidelines. No specific search for listed animal species was conducted and was not within the scope of requirements for the permit application. Surveyors, however, were aware of the potential for an occurrence and incidental observations were recorded as applicable.

The Enbridge survey included all species included on the Wisconsin DNR Bureau of Endangered Resources (BER) list of rare plants known to occur in the City of Superior, as provided by Craig Anderson, Wisconsin DNR-BER (January 2005). Species not included on the list were not included in the survey. Referenced information indicated that target species thought to occur within the project areas include *Juncus vaseyi* (Vasey's rush), *Petasites saggitatus* (arrowhead sweet coltsfoot), *Carex nigra* (black sedge) and *Eleocharis nitida* (blunt spike rush).

The Enbridge rare plant survey was conducted using a random meander technique, as described in guidelines prepared by the Wisconsin DNR-BER and defined in the *City of Superior Special Area Management Plan Technical, Implementation, and Administration* document (January, *2007).* All wetland habitat types in each wetland area were searched for target species, as appropriate to the habitat type. All target species habitats in the project area were thoroughly searched once.

Habitat types observed in the project area included shrub-carr, alder thicket, seasonally wet deciduous forest, wet meadow (including ditches), and sedge meadow. Wet meadows included both *Phalaris arundinacea* (reed canary grass) and *Calamagrostis canadensis* (Canada bluejoint grass) dominated habitats. Habitats involving wet and sedge meadows and seasonally wet deciduous forest wetland types were investigated specifically for target species.

Aerial photographs were used to locate interstitial meadows, marshes, and forests that were nested within the shrub-carr matrix. These interstitial habitats were found in the field and searched for target species.

The amount of survey time spent was determined based on the timing for the survey (September through early October), size of the appropriate habitats, and existing environmental factors and

limitations. In July and August all target species were expected to be identifiable in flower/fruiting stages. In September, leaves of arrowhead sweet coltsfoot, basal leaves of target orchids, target willow, and sedge species were still expected to be identifiable. Any late season suspect occurrences that could not be positively identified in the field by the investigator or Wisconsin DNR specialists were flagged for verification during the next field season. Additionally, suitable habitat for *Ranunculus spp.* was sought, since it was not likely that identifiable specimens would be present at the time of the survey. No evaluation of species lying dormant or contained within the seed bank was conducted.

Shrub habitats were searched conservatively for arrowhead sweet coltsfoot and *Salix planifolia* (tea leaf or diamond leaf willow). Surveys in shrub habitats included skirting edges, through mature alder stands, and investigating canopy openings and clearings, since arrowhead sweet coltsfoot has been observed at the interface between shrub habitats and meadows, marshes, or forests. Tea leaf willow was also expected to be found more along the edges than in dense thickets.

Seasonally wet deciduous forests occurred as immature aspen forest within the tank foundations prepared in the 1970s. Forests were observed in aerial photographs as occurring in several small (less than one acre) stands scattered around the project areas and were searched for *Deschampsia flexuosa* (wavy hairgrass), *Equisetum palustre* (marsh horsetail), and *Platanthera orbiculata* (lesser round leaved orchid).

Wet and sedge meadows were searched for black sedge, Vasey's rush, *Ophioglossum pusillum* (northern adder's tongue), arrowhead sweet coltsfoot, *Calanzagrostis stricta* (slimstem reedgrass), slender spike rush. Reed canary grass dominated meadows were extremely monotypic thus the probability that rare plants would be found in these habitats was reduced. Disturbed road and railroad edges and ditches were surveyed intensely for black sedge, Vasey's rush, slender spike rush, and arrowhead sweet coltsfoot.

Shallow marshes, and disturbed trail areas with small, shallow depressions were investigated for *Ranunculus cymbalaria* and *Ranunculiu gmelinii*. The project areas were searched for occurrences and suitable habitat.

To accomplish this survey, the project area was systematically evaluated by tracking the survey route on a map and using GPS until all targeted habitats, as identified by the aerial photograph interpretation, were assessed. Search intensity was based on the habitat conditions and dominant vegetation association present in each of those areas. Areas where occurrences were documented in 2005 were searched with high intensity. Each area was surveyed using the timed meander survey protocol. While completing the meander survey vegetation was documented as well as any other notable features or conditions that could warrant further investigation.

Acres of land in land conservation programs in the St. Louis watershed are listed in Table 26.

Table 26 - Land Conservation Program Lands in St. Louis Watershed

Land Conservation Programs: St. Louis Watershed, Wisconsin Douglas County in the Glacial Lake Superior Plain ECS [a]						
	Total County Acres	**Watershed Acres in County b**	**CRP/CREP/RIM County c**	**WRP etc. County d**	**CRP/CREP/RIM Watershed e**	**WRP etc. Watershed e**
County/ECS	acres					
Douglas	947,283	44,258	0	61.7	0	2.88

[a] Conservation Lands Summary Prepared 8-1-08, Minnesota Board of Soil and Water Resources.

[b] County acres within the St. Louis Watershed and stated ECS determined by GIS query. Table 3.14.4-1.

[c] Includes both federal and state conservation reserve programs. Lands are usually placed in native vegetation for 10 to 15 years. Source: MBWSR 2008.

[d] Wetland Reserve Program restores historically farmed/drained wetlands. Source: MBWSR 2008.

[e] Watershed acres estimated by dividing the acres in the watershed by total county acres, then multiplying by the total county acres in conservation easements

Table 27 lists the bird species known to inhabit the area.

Table 27 - Bird Species in the Project Area

Species	**Scientific Name**	**Nest in County**	**Summers in Estuary**	**Migrant**	**Winter resident**
Common Loon	Gavia immer		Yes	Yes	No
Arctic Loon	Gavia arctica	No	No	Yes	No
Red-throated Loon	Gavia stellata	No	No	Yes	No
Red-necked Grebe	Podiceps grisegena	No	No	Yes	No
Horned Grebe	Podiceps auritus	N	Yes	Yes	No
Pied-billed Grebe	Podilymbus podicep	Yes	Yes	Yes	No
White Pelican	Pelecanus erythrorhynochos	No	No	Yes	No
Double-creasted Cormorant	Phalacrocorax auritus	No	Yes	Yes	No
Least Bittern	Ixobrychus exilis	?	Yes	Yes	No
American Bittern	Botaurus lentiginosus	Yes	Yes	Yes	No
Green-backed Heron	Butorides striatus	Yes	Yes	Yes	No
Cattle Egret	Bubulcus ibis	No	No	Yes	No
Great Blue Heron	Ardea herodias	Yes	Yes	Yes	No
Sandhill Crane	Grus canadesis	No	No	Yes	No
Tundra Swan	Cygnus culumbianus	No	No	Yes	No
Trumpeter Swan	Cygnus buccinator	Not Yet	Yes	Yes	No
Greater White-fronted Goose	Anser albifrons	No	No	Yes	No
Snow Goose	Chen caerulescens	No	No	Yes	Yes
Canada Goose	Brant canadensis	Yes	Yes	Yes	Yes
Mallard	Anas pltyrhynchos	Yes	Yes	Yes	Yes
Black Duck	Anas rubripes	Yes	Yes	Yes	No
Gadwall	Anas strepera	No	No	Yes	No
American Wideon	Anas americana	No	No	Yes	No
Northern Pintail	Anas acuta	No	No	Yes	No
Northern Shoveler	Anas clypeata	No	No	Yes	No

Blue-winged Teal	Anas discrs	Yes	Yes	Yes	No
Green-winged Teal	Anas crecca		Yes	Yes	No
Ruddy Duck	Oxyura jamaicensis	No	No	Yes	No
Wood Duck	Aix sponsa	Yes	Yes	Yes	No
Canvasback	Aythya valisineria	No	No	Yes	No
Redhead	Aythya americana	No	No	Yes	No
Ring-necked Duck	Aythya collaris	Yes	Yes	Yes	No
Greater Scaup	Aythya marila	No	No	Yes	No
Lesser Scaup	Aythya affinis	No	No	Yes	No
Black Scoter	Melanitta nigra	No	No	Yes	No
White-winged Scoter	Melanitta fusca	No	No	Yes	No
Surf Scotter	Melanitta perspicillata	No	No	Yes	No
Long-tailed Duck	Clangula hyemalis	No	No	Yes	No
Common Goldeneye	Bucephala clangula	No	No	Yes	Yes
Bufflehead	Bucephala albeola	No	No	Yes	No
Common Merganser	Mergus merganser	Yes	Yes	Yes	No
Red-breasted Merganser	Mergus serrator	Yes	Yes	Yes	No
Hooded Merganser	Lophodytes cucullatus	Yes	Yes	Yes	No
Virginia Rail	Rallus limicola	Yes	Yes	Yes	No
Yellow Rail	Coturnicops noveboracensis	Yes	Yes	Yes	No
Sora Rail	Porzana carolina	Yes	Yes	Yes	No
American Coot	Fulica caribaea	No	No	Yes	No
Piping Plover	Charadrius melodus	Yes*	Yes	Yes	No
Semipalmated Plover	Charadrius semipalmatus	No	No	Yes	No
Killdeer	Charadrius vociferus	Yes	Yes	Yes	No
Black-bellied Plover	Pluvialis squatarola	No	No	Yes	No
Golden Ploever	Pluvialis apricaria	No	No	Yes	No
Marbled Godwit	Limosa fedoa	No	No	Yes	No
Hudsonian Godwit	Limosa haemastica	No	No	Yes	No
Whimbrel	Numenius phaeopus	No	No	Yes	No
Willet	Catoptrophorus semipalmatus	No	No	Yes	No
Greater Yellowlegs	Tringa melanoleuca	No	No	Yes	No
Lesser Yellowlegs	Tringa flavipes	No	No	Yes	No
Solitary Sandpiper	Tringa solitaria	No	No	Yes	No
Spotted Sandpiper	Actitis macularia	Yes	Yes	Yes	No
Wilson's Phlarope	Phalaropus tricolor	No	No	Yes	No
Short-billed Dowitchers	Limnodromus grisus	No	No	Yes	No
Long-billed Dowitcher	Limnodromus scolopaceus	No	No	Yes	No
Stilt Sandpiper	Calidris himantopus	No	No	Yes	No
Common Snipe	Gallinago gallinago	Yes	Yes	Yes	No
American Woodcock	Scolopax minor	Yes	Yes	Yes	No
Ruddy Turnstone	Arenaria interpres	No	No	Yes	No
Red Knot	Calidris canufus	No	No	Yes	No
Dulin	Calidris alpina	No	No	Yes	No

Sanderling	Caladris alba	No	No	Yes	No
Semipalmated Sandpiper	Caldris pusilla	No	No	Yes	No
Western Sandpiper	Calidris nauri	N	No	Yes	No
Least Sandpiper	Calidris minutilla	No	No	Yes	No
White-rummed Sandpiper	Calidris fuscicollis	No	No	Yes	No
Baird's Sandpiper	Calidris bairdii	No	No	Yes	No
Upland Sandpiper	Bartramia longicauda	Yes	Yes	Yes	No
Buff-breasted Sandpiper	Tyngites subruficollis	No	No	Yes	No
Pamarine Jaeger	Stercorarius pomarinus	No	No	Yes	No
Parasitic Jaeger	Stercorarius parasiticus	No	No	Yes	No
Franklin's Gull	Larus pipixcan	No	No	Yes	No
Bonaparte's Gull	Larus philadelphia	No	No	Yes	No
Ring-billed Gull	Larus delawarensis	Yes	Yes	Yes	Yes
Herring Gull	Larus argentatus	Yes	Yes	Yes	Yes
Glaucous Gull	Larus hyperboreus	No	No	Yes	Yes
Iceland Gull	Larus glaucoided	No	No	Yes	Yes
Thayer's Gull	Larus thayeri	No	No	Yes	Yes
Greater Black-backed Gull	Larus marinus	No	No	Yes	Yes
Common Tern	Sterna hirundo	Yes	Yes	Yes	No
Forster's Tern	Sterna fosteri	No	No	Yes	No
Black Tern	Chidonias nigerYes*	Yes*	Yes	Yes	No
Caspian Tern	Sterna caspia	No	No	Yes	No
Turkey Vulture	Cathartes aura	Yes	Yes	Yes	No
Golden Eagle	Aquila chrysaetos	No	No	Yes	No
Bald Eagle	Haliaeetus leucocephhalus	Yes	Yes	Yes	Yes
Northern Harrier	Circus cyaneus	Yes	Yes	Yes	No
Sharp-shinned Hawk	Accipiter striatus	Yes	Yes	Yes	Yes
Cooper's Hawk	Accipiter cooperii	Yes	Yes	Yes	Yes
Northern Goshwak	Accipiter gentilis	Yes	Yes	Yes	Yes
Red-shouldered Hawk	Buteo lineatus	No		Yes	No
Broad-winged Hawk	Buteo platypterus	Yes	Yes	Yes	No
Red-tailed Hawk	Buteo jamaicensis	Yes	Yes	Yes	Yes
Rough-legged Hawk	Buteo lagopus	No	No	Yes	Yes
Osprey	Pandion haliaetus	No	Yes	Yes	No
American Kestrel	Falco sparverius	Yes	Yes	Yes	No
Merlin	Falco columbarius	Yes	Yes	Yes	Yes
Peregrine Falcon	Falco peregrinus	Yes	Yes	Yes	Yes
Gyrfalcon	Falco rusticolus	No	No	No	Yes
Ruffed Grouse	Bonasa umbellus	Yes	Yes	Yes	Yes
Sharp-tailed Grouseq	Typanuchus phasianellus	Yes	Yes	Yes	Yes
Ring-necked Pheasant	Phasianus colchicus	Yes	Yes	Yes	Yes
Rock Dove	Columba livia	Yes	Yes	Yes	Yes
Mourning Dove	Zenaida macroura	Yes	Yes	Yes	Yes
Yellow-billed Cuckoo	Coccyzus	Yes	Yes	Yes	No

	americanus				
Black-billed Cuckoo	Coccyzus erythropthalmus	Yes	Yes	Yes	No
Short-eared Owl	Asio flammeus	No	No	Yes	No
Long-eared Owl	Asio otus	Yes	Yes	Yes	Yes
Great Horned Owl	Bubo virginianus	Yes	Yes	Yes	Yes
Barred Owl	Strix varia	Yes	Yes	Yes	Yes
Snowy Owl	Nyctea scandiaca	No	No	No	Yes
Norther Saw-whet Owl	Aegolius acadicus	Yes	Yes	Yes	No
Northern Hawk-Owl	Surnia ulula	No*	No	No	Yes
Boreal Owl	Aegolius funereus	No	No	Yes	Yes
Common Nighthawk	Chordeiles minor	Yes	Yes	Yes	No
Chimney swift	Chaetura pelagica	Yes	Yes	Yes	No
Ruby-throated Hummingbird	Archilochus colubris	Yes	Yes	Yes	No
Belted Kingfisher	Ceryle alcyon	Yes	Yes	Yes	Yes
Red-bellied Woodpecker	Melanerpes carolinus	No	Yes	yes	No
Northern Flicker	Colaptes auratus	Yes	Yes	Yes	No
Red-headed Woodpecker	Melanerpes erythrocephalus	No	Yes	Yes	No
Yellow-bellied Sapsucker	Sphyrapicus varius	Yes	Yes	Yes	No
Downy Woodpecker	Picoides pubescens	Yes	Yes	Yes	Yes
Hairy Woodpecker	Picoides villosus	Yes	Yes	Yes	Yes
Black-backed Woodpecker	Picoides arcticus	Yes	Yes	Yes	Yes
Pileated Woodpecker	Dryocopus pileatus	Yes	Yes	Yes	yes
Eastern Kingbird	Tyrannus tyrannus	Yes	Yes	Yes	No
Great Creasted Flycatcher	Myiarchus crinitus	Yes	Yes	Yes	No
Olivesided Flycatcher	Contopus borealis	Yes	Yes	Yes	No
Eastern Wood-Pewee	Contopus virens	Yes	Yes	Yes	No
Eastern Phoebe	Sayomis phoebe	Yes	Yes	Yes	No
Least Flycatcher	Empidonax minimus	Yes	Yes	No	No
Alder Flycatcher	Empidonax ainorum	Yes	Yes	No	No
Willow Flycatcher	Empidonax trailii		Yes	No	No
Yellow-bellied Flycatcher	Empidonax flaviventris		Yes	No	No
Horned Lark	Eremophilia alpestris	No	No	Yes	No
Tree Swallow	Tachycineta bicolor	Yes	Yes	Yes	No
Purple Martin	Progne subis	Yes*	Yes	Yes	No
Bank Swallow	Riparia riparia	Yes	Yes	Yes	No
Cliff Swallow	Hirundo fulva	Yes	Yes	Yes	No
Barn Swallow	Hirundo rustica	Yes	Yes	Yes	No
Blue Jay	Cyanocitta cristata	Yes	Yes	Yes	Yes
Gray Jay	Perisoreus canadensis	Yes	Yes	Yes	Yes
American Crow	Covus brachyrhynchos	Yes	Yes	Yes	Yes
Common Raven	Corvus corax	Yes	Yes	Yes	Yes

Black-capped Chickadee	Parus atricapillus	Yes	Yes	Yes	Yes
Brown Creeper	Certhia americana		Yes	Yes	Yes
White-breasted Nuthatch	Sitta carolinensis	Yes	Yes	Yes	Yes
Red-breasted Nuthatch	Sitta canadensis	Yes	Yes	Yes	Yes
House Wren	Troglodytes aeodon	Yes	Yes	No	No
Winter Wren	Troglodytes troglodytes	Yes	Yes	Yes	No
Marsh Wren	Cistothorus palustris	Yes	Yes	No	No
Sedge Wren	Cistothorus platensis	Yes	Yes	Yes	No
Golden-crowned Kinglet	Regulus satrapa	Yes	Yes	Yes	No
Ruby-crowned Kiglet	Regulus calendula	No	Yes	Yes	No
Easten Bluebird	Sialia sialis	Yes	Yes	Yes	No
Wood Trush	Hylocichia mustelina	Yes	Yes	Yes	No
Veery	Catharus fuscescens	Yes	Yes	Yes	No
Swainson's Thrush	Catharus ustuatus	Yes	Yes	Yes	No
Gray-cheeked thrush	Catharus minimus	No	No	Yes	No
Hermit Thrush	Catharus guttatus	Yes	Yes	Yes	No
American Robin	Turdus migratorius	Yes	Yes	Yes	No
Northern Shrike	Lanius excubitor	No	No	Yes	Yes
Gray Catbird	Dumetetta carolinensis	Yes	Yes	Yes	No
Brown Thrasher	Toxostoma rufum	Yes	Yes	Yes	No
Water pipit	Anhus spinoletta	No	No	Yes	No
Bohemian Waxwing	Bombycilla garrulus	No	No	No	Yes
Cedar Waxwing	Bombycilla cedrorum	Yes	Yes	Yes	No
European Starling	Sturnus vulgaris	Yes	Yes	Yes	Yes
Yellow-throated Vireo	Vireo flavifrons	Yes	Yes	Yes	No
Solitary Vireo	Vireo solitarius	Yes	Yes	Yes	No
Red-eyed Vireo	Vireo olivaceus	Yes	Yes	Yes	No
Warbling Vireo	Vireo Gilvus	Yes	Yes	Yes	No
Philadelphia Vireo	Vireo philadelphicus	No	No	Yes	No
Golden-winged Warbler	Vermivora chrysoptera	Yes	Yes	Yes	No
Tennesee Warbler	Vermivora peregrina	No	No	Yes	No
Orange-crowned Warbler	Vermivora celata	No	No	Yes	No
Nashville Warbler	Vermivora ruficapilla	Yes	Yes	Yes	No
Northern Parula	Vermivora americana	No	Yes	Yes	No
Black-and-white Warbler	Mniotilta varia	Yes	Yes	Yes	No
Black-throated Blue Warbler	Dendroica caerulescens		Yes	Yes	No
Blackburnian Warbler	Dendroica fusca	Yes	Yes	Yes	No
Chestnut-sided Warbler	Dendroica pensylvanica	Yes	Yes	Yes	No
Cape May Warbler	Dendroica tigrina	No	No	Yes	No
Magnolia Warbler	Dendroica magnolia	Yes	Yes	Yes	No
Yellow-rumped Warbler	Dendroica coronata	Yes	Yes	Yes	No
Black-throated Green Warbler	Dendroica virens	Yes	Yes	Yes	No
Bay-breasted Warbler	Dendroica castanea	No	No	Yes	No

Blackpoll Warbler	Dendroica striata	No	No	Yes	No
Pine Warbler	Dendroica pinus	Yes	Yes	Yes	No
Palm Warbler	Dendroica palmarum	Yes	Yes	Yes	No
Yellow Warbler	Dendroica petechia	Yes	Yes	Yes	No
Mourning Warbler	Oporornis philadelphia	Yes	Yes	Yes	No
Connecticut Warbler	Oporornis agilis	Yes	Yes	Yes	No
Canada Warbler	Wilsonia canadensis	Yes	Yes	Yes	No
Wilson's Warbler	Wilsonia pusilla	No	No	Yes	No
Ovenbird	Seiurus aurocapillus	Yes	Yes	Yes	No
Northern Waterthrush	Seiurus noveboracensis	Yes	Yes	Yes	No
Common Yellowthroat	Geothlypis trichas	Yes	Yes	Yes	No
American Redstart	Setophaga ruticilla	Yes	Yes	Yes	No
Rose-breasted Grosbeak	Pheucticus ludoviciannus	Yes	Yes	Yes	No
Northern Cardnial	Cardinalis cardinalis	Yes	Yes	Yes	Yes
Indigo Bunting	Passerina cyanea	Yes	yes	Yes	No
Rufous-sided Towhee	Pipilo erythrophthalmus	Yes	Yes	Yes	No
LeConte' Sparrow	Ammodramus leconteii	Yes	Yes	Yes	No
Vesper Sparrow	Pooecetes gramineus	Yes	Yes	Yes	No
Savannah Sparrow	Passerculus sandwichensis	Yes	Yes	Yes	No
Song Sparrow	Melospiza melodia	Yes	Yes	Yes	No
American Tree Sparrow	Spizella arborea	No	No	Yes	Yes
Field Sparrow	Spizella pusilla	No	Yes	Yes	No
Chipping Sparrow	Spizella passerina	Yes	Yes	Yes	No
Clay-colored Sparrow	Spizella pallida	Yes	Yes	Yes	No
Dark-eye Junco	Junco hyemalis	No	No	Yes	No
Harris' Sparrow	Zonotrichia querula	No	No	Yes	No
White-throated Sparrow	Zonotrichia albicollis	Yes	Yes	Yes	No
White-crowned Sparrow	Zonotrichia leucophrys	No	No	Yes	No
Fox Sparrow	Passerella iliaca	No	No	Yes	No
Lincoln's Sparrow	Melospiza lincolnii	Yes	Yes	Yes	No
Swamp Sparrow	Melospiza georgiana	Yes	Yes	Yes	No
Lapland Longspur	Calcarius lapponicus	No	No	Yes	No
Snow Bunting	Plectrophenax nivalis	No	No	Yes	Yes
Dickcissel	Spiza americana	Yes	Yes	No	No
Bobolink	Dolichonyx oryzivorous	Yes	Yes	No	No
Eastern Meadowlark	Sturnella magna	Yes	Yes	Yes	No
Western Meadowlark	Sturnella neglecta	Yes	Yes	Yes	No
Yellow-headed Blackbird	Xanthocephalus xanthocephalus	Yes*	Yes	Yes	No
Red-winged Blackbird	Agelaius phoeniceus	Yes	Yes	yes	No
Rusty Blackbird	Euphagus carolinus	No	No	Yes	No
Brewer's Blackbird	Euphagus	Yes	Yes	Yes	No

	cyanocephalus				
Brown-headed Blackbird	Molothrus ater	Yes	Yes	Yes	No
Common Grackle	Quiscalus quiscula	Yes	Yes	Yes	No
Northern Oriole	Icterus galbula	Yes	Yes	No	No
Scarlet Tanager	Piranga olivacea	No	No	Yes	No
House Sparrow	Passer domesticus	Yes	Yes	Yes	Yes
Pine Siskin	Carduelis pinus	Yes	Yes	Yes	Yes
American Goldfinch	Carduelis tristis	Yes	Yes	Yes	Yes
Red Crossbill	Loxia curvirostra	Yes	Yes	Yes	Yes
White-winged Crossbill	Loxia leucoptera	Yes	Yes	Yes	Yes
Pine Grosebeak	Pinicola enicleator	No	No	Yes	Yes
Common Redpoll	Carduelis flammea	No	No	Yes	Yes
Horay Redpoll	Carduelis hornemanni	No	No	Yes	Yes
Purple Finch	Carpodacus purpureus	Yes	Yes	Yes	Yes
House Finch	Carpodacus mexicanus	Yes	Yes	Yes	Yes
Evening Grosbeak	Coccothraustes vespertinus	Yes	Yes	Yes	Yes

VI.A.4.a. Wooded lands

Historically the Superior coastal plain was almost entirely forested. A distinctive mixture of white pine, white spruce, balsam fir, paper birch, balsam poplar, trembling aspen, and white cedar occurred on the lacustrine clays. Large peat lands runs along the Lake Superior shore line, often associated with drowned river mouths and well-developed sand spits in areas near the St. Louis River.

Vegetation near the terminal is predominantly mixed deciduous and evergreen forests with some pastured areas to the south, emergent herbaceous wetlands to the northwest and residential development to the north of the terminal.

Two species of state listed rare plants were observed within the proposed project area. Fifteen occurrences of Vasey's rush were recorded, many of which were included in the plant survey conducted by Natural Resources Group, Inc. in 2005. Most occurrences were found in depressions near and in between the unfinished tank foundations as well as in the wet meadow east of the foundations. This species was observed with *Juncus Canadensis* (Canada rush) and in some cases reed canary grass. Careful observation of vegetative characteristics (reddening at the base of the stem) was made to be sure not to confuse the target species from similar species. One occurrence of arrowhead sweet coltsfoot was recorded within the proposed project area. This occurrence was documented primarily in a mature alder habitat. Even into October, vegetative structures were readily identifiable.

The upland forest communities within the watershed of the Lower St. Louis River are an integral part of the estuarine ecosystems. While they are not directly connected to the estuary, their presence, composition, and condition greatly influences the transport of water, sediments,

nutrients, and other materials into the estuarine ecosystems. They provide habitat for both breeding and migratory birds, as well as numerous other native species.

VI.A.4.b. Grasslands

Suitable habitat for other species on the target list does exist, including deep ruts suitable for *Ranunculus cymbalaria* (seaside crowsfoot) and *R. gmelinii* (small water crowfoot), which may be found in the spring when flowering and vegetative structures are readily identifiable. Other species on the target list should have been identifiable, at least to genus under the climatic conditions that persisted throughout the survey. Due to the amount of area covered and search intensity; it is unlikely that an occurrence, of the target species not otherwise documented above, was missed.

VI.A.4.c. Aquatic

The proposed pipeline route crosses the drainage of the Pokegama River which flows into the St. Louis River estuary, and crosses the Nemadji River watershed. The 12,000 acre St. Louis estuary supports an important complex of coastal wetlands on Lake Superior and was nominated in 2008 by the state of Wisconsin as a National Estuarine Research Reserve under the National Oceanic and Atmospheric Administration. The Lower St. Louis estuary is also the Duluth-Superior Harbor supporting a busy port and many industrial and commercial uses. The upper estuary, particularly in Wisconsin, supports extensive wetlands and undeveloped shoreline. It is this section of the upper estuary into which the Pokegama River enters. In the early 1990s, the state of Wisconsin with encouragement from the County and local citizens purchased over 5000 acres of shoreline and adjacent land on the upper St. Louis River estuary. This property is known as the Red River – St. Louis River Stream Bank Protection area. The purpose was to protect this shoreline, which is highly susceptible to erosion, and thereby protect the St Louis River spawning areas. The St. Louis River is the second largest tributary to Lake Superior. It supports a significant fishery. The upper estuary and river below the Fond du Lac dam provide spawning habitat for most of the walleye in the western arm of Lake Superior. Lake sturgeon restoration efforts in the St. Louis estuary began in the 1980s. Once this population reaches maturity, the upper estuary will also serve as sturgeon spawning habitat.

Native mussels are an important and vulnerable part of the ecosystem of the Lower St. Louis River. They are also a food source for many native fish species, including lake sturgeon, some redhorse species, some suckers, and others. The Minnesota DNR documented eight native mussel species: giant floater (*Pyganodon grandis)*, mucket (*Actinonaias ligamentina*), eastern elliptio (*Elliptio complanata*), creeper (*Strophitus undulatus*), fat mucket (*Lampsilis siliquoidea*), white heelsplitter (*Lasmigona complanata*), creek heelsplitter (*Lasmigona compressa*), and black sandshell (*Ligumia recta*). Although plain pocketbook (*Lampsilis cardium*) shells were found, no live specimens were located. All species were found only in the large riverine reach, the upper estuarine (undredged) river channel, and the lower estuary industrial harbor flats.

Approximately 45 native fish species have been documented in the Lower St. Louis River. Forage species such as emerald shiner, spottail shiner, blacknose dace, and fathead minnow inhabit the estuary, along with piscivorous species such as yellow perch, white bass, muskie, walleye, and northern pike. A range of habitats and an adequate food supply are necessary to maintain this diversity. It is worth noting that even frequently disturbed aquatic habitats, such as the industrial slips, are commonly used by numerous native species. The productivity of the estuarine wetlands is the basis of the food supply for fish, birds, and other wildlife. Native fish populations have rebounded since water quality in the estuary began to improve in the late 1970s. Some fish species that had disappeared from the estuary due to water quality problems were able to re-establish reproducing populations. Although water quality has improved dramatically, there are still concerns due to sewage overflows, contaminated sediments, and other factors. In addition, native populations face competition from numerous undesirable exotic species, including the Eurasian ruffe, rainbow smelt, and several other species.

The Lower St. Louis River and its environs are home to a diverse array of native bird species. Over 230 species have been documented in the Lower St. Louis River. This area is both an important breeding area and a critical migratory stopover location. Common terns and other colonial nesting birds use sandy beaches and other sparsely vegetated areas in the estuary. Piping plovers once nested on the beaches as well, but they are not known to have nested in the Lower St. Louis River area since 1985. A wide range of species nest in the emergent marshes, including sedge wren, marsh wren, Virginia rail, and sora, although several marsh-nesting species appear to have disappeared from the estuary over the last 30 or so years. Black tern colonies were historically present in the marshes, but they are not known to have nested there in recent years. Some of these bird species are easily disturbed by human recreational activities, which may be the reason they are no longer breeding in the area. The estuary supports a rich variety of plants, insects, molluscs, crustaceans, fish, and other food sources for birds that breed in or around the estuary.

The diversity of habitat and extent of wetland and shoreline habitats make the Lower St. Louis River ideal for migrating birds as well. In addition to songbirds, high numbers of raptors, shorebirds, waterbirds, gulls, and terns migrate through the area each spring and fall.

Several factors make the Lower St. Louis River an important stopover site. In addition to the abundance of food and shelter in the estuary, many migrants avoid flying over large bodies of water. In the spring, birds migrating north from across the central United States encounter the south shore of Lake Superior and travel westward until they reach the estuary. In the fall, birds migrating south are effectively channeled along the western edge of Lake Superior through the area of the estuary.

During migration, waterfowl, raptors, gulls, terms, shorebirds, and waders are concentrated in a relatively small area. Some years, observers have reported seeing tens of thousands of birds. In 1998, 98 bird species were observed migrating through the Minnesota Point area during the spring, and 77 species passed through on the fall migration.

The estuary still contains relatively large expanses of wetlands, which provide an important source of food for both migrant and resident bird species. The productivity of the wetlands forms the basis of the food supply. Many species feed on tubers, seeds, and other plant parts, while other birds feed on fish or invertebrates that rely on wetland productivity.

Because sandy beach habitats are far from common in the Upper Midwest, the Lower St. Louis River is one of the few desirable places for shorebirds to stop during their migrations. The estuary is especially important during the spring migration because it is often the only place with open water early in the season.

This combination of diverse habitats—open water, beaches, and a wide variety of wetland and forest communities—in close proximity to each other makes the Lower St. Louis River a truly unique and important area for birds.

Wild rice (*Zizania aquatica*) is an important species in wetland plant communities of the Upper Midwest and a vital food resource for migratory waterfowl. Although this species is not rare, it has experienced long-term declines in abundance in most wetlands where it occurs, and it has disappeared from some wetlands altogether. Wild rice was historically very abundant in the Lower St. Louis River (and throughout the Upper Midwest) in sheltered bays and along shallow river flats. Optimal habitat for wild rice is clear, shallow water (1.5 - 3 feet deep) with a low velocity current, over a silty or mucky substrate. It is vulnerable to wave action and other water disturbances at certain growth stages. Increased sedimentation and turbidity in wetlands have contributed to its range-wide decline. This species has also been severely impacted by contaminants, introduced species such as carp, Canada geese, and purple loosestrife, and hydrologic modifications resulting from dams and dredging.

VI.A.5. Socioeconomic resources

The city of Superior's location on the St. Louis estuary, harbor, and Lake Superior, influenced its history and development. By the mid to late 1800s, the city's waterfront supported a variety of industries, shipping, and a population that was served by surrounding farms. Early city leaders envisioned a city on par with Chicago in terms of industrial importance. Today, the city has a population of roughly 30,000 people. It is an important shipping port located along the shores of Lake Superior and is also a hub for other industries, such as oil refineries and other energy facilities The total area of the city is very large compared to the population. The city also includes a large municipal forest. The population of Douglas County peaked in the 1940s and slowly declined until recent years. The County's population is concentrated mainly in the City of Superior and a small number of villages. In the 1950s people started to move out to rural Douglas County areas. In some outlying areas, former farms have reverted to wetlands. There is little development in the western part of the county along the proposed pipeline route. New recreational development has been occurring along the Highway W corridor. Development density increases approaching the city of Superior.

VI.A.5.a. Population distribution and attributes

Population characteristics for the Douglas County area as compared to the State of Wisconsin are shown in Table 28.

Table 28 - Population Characteristics in Douglas County

Demographic Composition in the Vicinity of the Enbridge Superior Terminal[a] and the Alberta Clipper and Southern Lights Pipeline Projects Route										
State/County/Community	**Total Population**	**Percent White**	**Percent Black or African American**	**Percent American Indian & Alaska Native**	**Percent Asian**	**Percent Native Hawaiian & Other Pacific Islander**	**Percent Other Race**	**Percent Reporting Two or More Races**	**Percent Hispanic or Latino – Any Race**	**Percent Minority**
Wisconsin	5,556, 506	85.7	6.0	0.9	2.0	0.0	0.0	1.1	4.7	14.3
Douglas County	44,061	94.1	0.7	1.9	0.9	0.0	0.0	1.4	1.0	5.9
City of Superior[b]	26,960	94.3	0.7	2.2	0.8	0.0	0.3	1.7	0.8	5.7
Superior Village[b]	531	96.8	0.6	n/a	n/a	n/a	2.4	n/a	0.2	3.2
Allouez Village[b]	15,159	91.6	4.6	n/a	n/a	n/a	2.6	n/a	1.3	8.4

[a] Populations considered potentially affected for the environmental justice analysis for the Superior Terminal include Superior, WI and surrounding communities.
Data obtained using 2006 Census data, unless otherwise noted.
[b] Data obtained using 2000 Census data.

Sources: U.S. FedStats, 2008 and the Dept. of Housing and Utility Development, 2005.

Affected community population data is listed in Table 29.

Table 29 - Douglas County Communities Population

Community Population along the Alberta Clipper and Southern Lights Pipeline Projects Route		
	Community (2005 Population)	
County	Crossed by Pipeline	Within 1.0 Mile of the Pipeline
Douglas	Superior (26,779)	Oliver (385)
Source: Enbridge Energy Company, Inc. 2007		

Housing information for Douglas County and Wisconsin are presented in Table 30.

Table 30 - Housing Stock in Douglas County

Housing Stock in Douglas County along the Alberta Clipper and Southern Lights Pipeline Projects Route					
State/County	**Total Housing Units (2006)[a]**	**Building Permits (2006)[a]**	**Total Rental Units (2000)[b]**	**Rental Vacancy Rate (2000)[b]**	**Estimated Vacant Rental Units (2000)[b]**
Wisconsin	2,534,075	27,329	538,917	7.2%	38,802
Douglas	21,374	177	5,732	5.6%	321

[a] U.S. Census Bureau 2006 (http://quickfacts.census.gov).
[b] U.S. Census Bureau 2008a (http://factfinder.census.gov).

Public services information is provided in Table 31.

Table 31 - Public Services Facilities in Douglas County

Existing Public Service Facilities along the Alberta Clipper and Southern Lights Pipeline Projects Route			
State/County	**Police / Sheriff Departments [a]**	**Fire Departments [a]**	**Nearest Medical Facilities[b]**
Wisconsin			
Douglas	6	16	St. Mary's Hospital of Superior (Superior)

[a] Source: Capitol Impact Government Gateway 2008 (http://www.capitolimpact.com/gw/).
[b] Source: American Hospital Directory 2008 (http://www.ahd.com).

VI.A.5.b. Economy

Income and employment data for the project area are shown in Table 32a and 32b.

Table 32a - Income and Employment in Douglas County and Wisconsin

Existing Income and Employment in Douglas County and Wisconsin along the Alberta Clipper and Southern Lights Pipeline Projects Route				
State/County	**Per Capita Personal Income (2006)[b]**	**Median Household Income (2005)[c]**	**Labor Force[a]**	**Unemployment Rate[a]**
Wisconsin	$34,405	$33,278	3,094,000	4.9%
Douglas	$26,396	$25,813	23,229	5.0%

[a] U.S. Department of Labor 2007 (http://stats.bls.gov/news.release/laus.t03.htm).
[b] U.S. Bureau of Economic Analysis 2008 (http://www.bea.gov/bea/regional/reis/).
[c] U.S. Census Bureau 2008b (http://www.census.gov/hhes/www/saipe/county.html).

Table 32b - Income Distribution in Douglas County

Demographics on Income Distribution in the Vicinity of the Enbridge Superior Terminal[a]			
	Total Population	Median Household Income ($)	Percent Below Poverty Level
Wisconsin	5,556, 506	46,142	10.9
Douglas County	44,061	38,694	13.6
City of Superior	26,960	37,420[b]	13.9[c]
Superior Village	531	50,147[b]	3.4[c]
Allouez Village	15,159	65,471[b]	3.9[c]

[a] Populations considered potentially affected for the environmental justice analysis for the Superior Terminal include Superior, WI and surrounding communities. Data obtained using 2006 Census data, unless otherwise noted.
[b] Calculated in 2005 dollars.
[c] 2003 estimate.

Sources: U.S. FedStats, 2008 and the Dept. of Housing and Utility Development, 2005.

Property tax data for Douglas County is listed in Table 33.

Table 33 - Property Tax Rates for Douglas County

Property Tax Rates for Douglas County along the Alberta Clipper and Southern Lights Pipeline Projects Route						
County	**Portion of Pipeline Through County (%)**	**2007 Government Revenue ($)[a]**	**County Property Tax Revenue ($)[a]**	**Effective Property Tax Rate (%)[b]**	**Property Tax Revenue from Project ($)[b]**	**Capital Cost of Project ($)**
Douglas	4.01%	$15,080,367	$3,173,657	1.730%	$4,700,000	$136,000,000

VI.A.5.c. Recreation and aesthetics

Freshwater estuaries occur where rivers and Great Lakes water mix in shallow wetlands located near the mouth of the river. Home to more than 45 types of native fish, 230 bird species, old-growth forests, sandy beaches, wetlands and wildlife, the St. Louis River freshwater estuary also offers excellent recreational opportunities such as hiking, paddling, fishing, bird watching, swimming and boating.

Enbridge's existing easement bisects the Nemadji Golf Club in Superior, Wisconsin.

The preferred route intersects with three public maintained trails, two of which are considered snowmobile/ATV trails and one that is restricted to snowmobiles.

Hotel and campground information for Douglas County is listed in Table 24.

Table 34 - Hotels and Campgrounds in Douglas County

Number of Hotel/Motels and Campgrounds by County along the Alberta Clipper and Southern Lights Pipeline Projects Route		
State/County	**Hotel/Motels**	**Campgrounds**
Wisconsin[a]		
Douglas	22	20

[a] Wisconsin Information: Wisconsin Tourism Office 2008 (http://www.travelwisconsin.com/).

VI.A.5.d. Agriculture and forestry

The proposed pipeline projects would impact 3.1 acres (EWS and construction ROW) of agricultural land. The agricultural land within the project area is currently in use as pasture/hay field. No land currently in use as cultivated cropland would be crossed by the proposed projects. Enbridge has not identified any irrigation systems and/or drain tiles within the project area. Enbridge has not identified any parcels currently enrolled in any agricultural conservation program within the project area.

The proposed projects would affect 64.0 (EWS and construction ROW) acres of land currently in use as forest land. The land is currently in ownership by Douglas County or private landowners. The forest appears to be used primarily as residential property, recreation or domestic wood products (i.e. firewood).

Enbridge has identified nine properties enrolled in the Manage Forest Law (MFL) or Forest Crop Law (FCL) programs.

VI.A.5.e. Archaeological and historical

A Cultural Resource Investigation was completed for the proposed project location within the existing Superior Terminal, as well as the property proposed for the off-site wetland mitigation located on the south side of County Road C and the intersection of Darrow Road.

VI.B. Pipeline corridors

The St. Louis Watershed portion of the proposed project in Segment 6 extends from MP 1084.8 to 1095.8. The segment in the St. Louis Watershed within Wisconsin is 10.9 miles long. This portion of the proposed project in Wisconsin is entirely within the Superior Coastal Plain.

The Beartrap-Nemadji Watershed portion of the proposed project in Segment 6 extends from MP 1095.8 to MP 1097.9. This portion of the proposed Clipper is 2.1 miles long. This portion of the propose project in Wisconsin is within the Glacial Lake Superior Plain ECS Subsection. This portion of the proposed route skirts along the southern edge of Superior and South Superior, Wisconsin. It traverses undeveloped land but is immediately adjacent to heavily developed areas, including residential and industrial sites. The route ends on the east side of Superior, Wisconsin, at the Enbridge Superior Terminal.

VI.B.1. Geology and soils

Proposed corridor through the Pokegama Canegie complex

Soils on the site formed in very fine-textured red clays deposited in off-shore environments in the bed of Glacial Lake Duluth described in Section 5.1. The red color of the clay is the result of glacial action incorporating iron-bearing bedrock that is common in the area. Relief within the wetland complex is flat. Micro-topography is limited to very subtle rises between small (0.25 acre) to medium sized (one to two acre) depressions. Total relief between the rises and depression bottoms is on the order of one foot or less.

Site hydrology is strongly influenced by the presence of micro-topography and the very low hydraulic conductivity (less than 10^{-8} cm/s) of the sediments. Very poorly drained Berglund soils (very-fine, mixed, semi active, frigid Aeric Vertic Epiaqualfs) occupy ephemerally to seasonally ponded depressions, somewhat poorly drained Cuttre (very-fine, mixed, active, frigid Aeric Glossaqualfs) and moderately well drained Amnicon (Oxyaquic Vertic Glossudalfs) soils occupy successively drier inter-depressional areas, respectively. All of these soils are poorly developed and contain thin (1-2 inch) A-horizons over red clays. Shallow peat Cathro soils (Loamy, mixed, euic, frigid Terric Haplosaprists) are less frequently found. Cathro soils occupy the beds of larger and deeper, seasonally-to-semi permanently flooded depressions. The full catena of these soils described is found within the Enbridge ROW in the Pokegama-Carnegie Wetlands.

Topsoil depth and slope classes crossed by the proposed pipeline corridor are listed in Table 35.

Table 35 - Topsoil Depth and Slope Class in Proposed Pipelines Area

Topsoil Depths and Slope Class in the Alberta Clipper and Southern Lights Pipeline Projects Area										
		Topsoil Depth (inches)				Slope Class (percent)				
		0-6	>6-12	>12-18	>18	0-5	>5-8	>8-15	>15-30	>30
County		Miles[a]				Miles[a]				
Douglas	13.3	12.9	0.0	0.0	0.0	11.4	0.0	0.5	0.9	0.0

[a] Total miles crossed will not add up to route total as data does not account for areas of open water and miscellaneous land types.

Sensitive soils crossed by the proposed pipeline corridor are listed in Table 36.

Table 36 - Sensitive Soils Crossed by the Proposed Pipelines

Approximate Miles of Sensitive Soils Crossed by the Alberta Clipper and Southern Lights Pipeline Projects									
		Prime Farmland	Hydric Soils	Compaction-Prone Soils	Highly Erodible Soils		Drought-Prone Soils	Stony / Rocky Soils	Shallow Bedrock Soils
					Water	Wind			
County	Miles			Miles Crossed by Soil Type[a]					
Douglas	13.3	0.0	2.2	7.1	1.5	0.0	1.5	0.0	0.0

[a] Total miles crossed will not add up to route total as data does not account for areas of open water and miscellaneous land types.

VI.B.2. Hydrography

VI.B.2.a. Surface waters

The majority of the waterbodies crossed by the proposed route consist of intermittent first-order streams that are typically dry for much of the year, but have significant flows during spring and after significant snowmelt. Usually intermittent waterbodies are considered suitable for Open Cut (Wet Trench) crossing methods during pipeline construction. The red clay plain is particularly susceptible to erosion, however. The dominant clay soils in somewhat poor and poor drainage classes not only are erosive themselves, but are prone to develop high runoff rates and volumes in response to moderate intensity rainstorms because of low infiltration and permeability. The result is “flashy” lower order intermittent drainages characterized by rapid changes in flow rates. Higher order streams are prone to extensive rill and gully erosion resulting from the high topographic gradients present on the fringe of the lacustrine plain as elevation rapidly descends to the base level of Lake Superior.

Nine intermittent and two seasonal waterbodies, and one perennial waterbody occur along the Project route within the St. Louis River watershed in Wisconsin. Drainage is to the Pokegama and Little Pokegama rivers that drain to the northeast and north to finally discharge into Lake Superior. Selected characteristics of the 12 waterbodies crossed by the Clipper project in this portion of the St. Louis Watershed are provided in Table 37.

Table 37 - Characteristics of Waterbodies Crossed by the Proposed Pipelines in the St. Louis Watershed

Selected Characteristics of Waterbodies located along the Clipper Project Route in the St. Louis Watershed in Douglas County, Wisconsin									
Waterbody ID	**WEPS**	**Name**	**Flow Regime**	**Sub-Strate**	**Surface Water Width (feet)**	**Bank to Bank Width (feet)**	**Bank Heights (feet)**	**Proposed Crossing Methods (Clipper/ SLd) [A]**	**Comments**
wb1085b	1	Trib. To Pokegama River	I	Clay	0	0	1/1	DC, OC/GB, DC	Adjacent wetland w-1085ws1. Clay-bedded grassed waterway in a pasture. Adjacent slopes moderate. No erosion evident.
wb1086a	3	Trib. To Pokegama River	I	Muck/Silt	0	6	2/2	DC, OC/GB, DC	Adjacent wetland w-1086ws1. Adjacent slopes low, 2-foot banks, no erosion evident. Waterbody crossed four times
wb1086b	4	Trib. To Pokegama River	I	Muck/Silt	2	4	1/1	DC, OC/GB, DC	Adjacent wetland w-1086ws4. Adjacent slopes low, 2-foot banks, no erosion evident. Some incision into plain.
wb1087b	5	Trib. To Pokegama River	S	Muck/Silt	40	40	1/1	DC, OC/GB, DC	Adjacent wetland w-1087ws3. Seasonal flow, moderate adjacent slopes. Moderately entrenched.
wb1088a	7	Trib. To Pokegama River	I	Muck/Silt	2	6	3/3	DC, OC/GB, DC	No adjacent wetland. Clear cut/burned area, moderate erosion in adjacent areas. Small channel in forested wetland area.
8rwb1089a	8	Ditch in Hydric Soils	I	Muck/Silt	10	20	20/10	DC, OC/GB, DC	Adjacent wetland w-8r1088f. Intermittent ditch. Bank erosion evident.
8rwb1089b	8	Ditch in Hydric Soil	I				2/2	DC, OC/GB, DC	Adjacent wetland w-8r1088e, w-8r1088d. Intermittent ditch. Bank erosion evident.
wb1089c	9	Ditch in Hydric Soil	I					DC, OC/GB, DC	Adjacent wetland w-8r1088c, w-8r1088b. Small ditch, moderate adjacent slopes, adjacent erosion noted.

Selected Characteristics of Waterbodies located along the Clipper Project Route in the St. Louis Watershed in Douglas County, Wisconsin									
Waterbody ID	**WEPS**	**Name**	**Flow Regime**	**Sub-Strate**	**Surface Water Width (feet)**	**Bank to Bank Width (feet)**	**Bank Heights (feet)**	**Proposed Crossing Methods (Clipper/ SLd) [A]**	**Comments**
wb1090a	11	Trib. To Pokegama River	I	Muck/Silt	0	0	1/1	DC, OC/GB, DC	Adjacent wetland w-1090ws6. Natural drainageway, moderate adjacent slopes. Some erosion noted in uplands.
wb1090b	11	Trib. To Pokegama River	I	Muck/Silt	0	3	2/2	DC, OC/GB, DC	Adjacent wetland WWI-1091a. Natural drainageway, moderate adjacent slopes. Some erosion noted in uplands.
wb1093a	17	Trib. To Pokegama River	S	Muck/Silt	0	9	2/2	DC, OC/GB, DC	Adjacent wetland w-1093ws2. Indistinct channel in scrub-shrub area. Low adjacent slopes.
wb1094a	17	Pokegama River	P	Cobbles >4in.	20	33	3/3	DC, OC/DC, OC	Adjacent wetland w-1094ws8. Riprap present. Flashy stream, perennial flow. Moderate to very steep adjacent slopes. Deeply entrenched (~50) valley.

[A] Crossing method in parenthesis as (Alberta Clipper Primary Method, Alberta Clipper Alternative Method/Southern Lights Diluent Primary Method, Southern Lights Diluent Alternative Method). Waterbody crossing methodology: OC – Open Cut (Wet Trench); OC/PP – Open Cut, Push/Pull; PP – Push/Pull; DC – Dry Crossing (Dam and Pump or flume) - waterbodies proposed for DC that are dry or have no perceptible flow at the time of construction will be crossed using Open Cut (Wet Trench) methods; GB - Guided Bore; RFL - Rock Flume; HDD – Horizontal Directional Drill; RB – Road Bore.

Three ditches with intermittent flow are crossed in Segment 6 in the St. Louis Watershed.. These ditches occur adjacent to a farm field near MP 1089.6. The ditches are all connected as part of the same system of ditch to drain a small hayfield with poorly drained clay soils. One of the ditches (8r1089b) is a shallow field ditch with low banks, the other ditches are larger collector ditches with a low flow rate through a level plain.

Nine naturally flowing streams are crossed in Segment 6 in the St. Louis Watershed. Eight of these streams have intermittent or seasonal flow with low banks. The proposed pipeline route traverses the edge of the sub-drainage between the Pokegama River to the south and the Red, St. Louis, and Little Pokegama Rivers to the north. Thus, these small streams are near the upper end of the watershed and have not formed a deep valley as is present in the larger streams and near the lower end of the watershed. These streams, consequently cut shallow channels within the clay soils, have shallow bottoms, and do not form well defined valleys. Representative photos of intermittent to seasonal natural drainageways crossed by the project route are in Figure 29.

Figure 29 - Representative Intermittent Waterways Crossed by the Proposed Pipelines

Part A. Waterbody wb1085b

Part B. wb1086a

Part C. wb1086b

Part D. wb1087b

Part E. wb1090b

Part F. wb1093a1

With the exception of the Pokegama River, waterbodies crossed by the Construction ROW are intermittent to seasonal, weakly-to-moderately entrenched intermittent drainageways flowing across the level lacustrine Red Clay Plain.

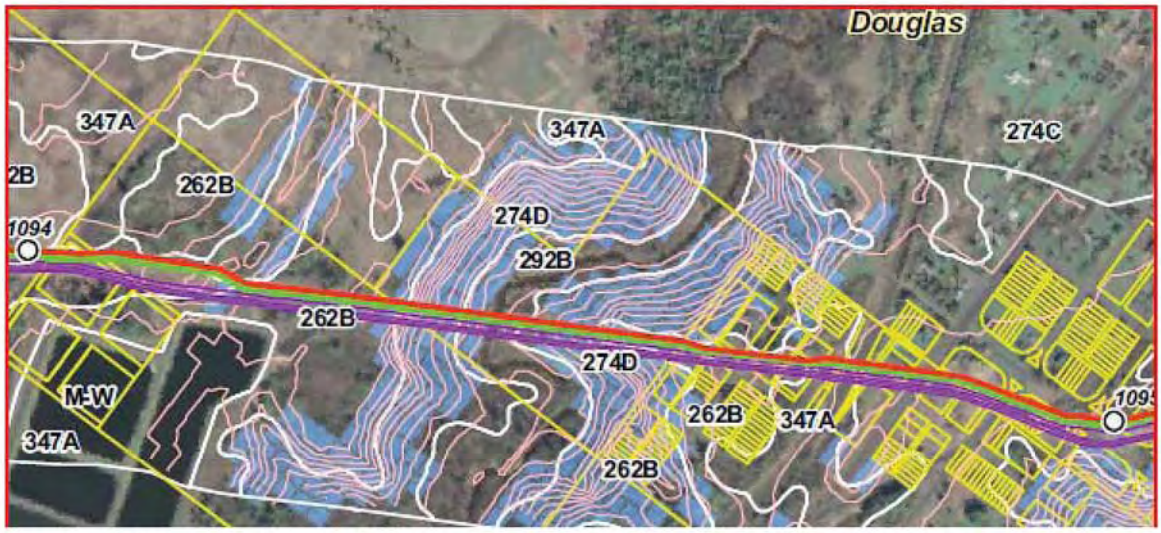
The Pokegama River is a naturally flowing river that drains northwest from the crossing point, into the St. Louis River near Lake Superior. This is a medium-sized river in a narrow valley with little floodplain. The crossing point is within a forested riparian area except for the maintained corridor of the existing pipelines.

The Pokegama River is a relatively narrow, perennial, natural stream with a silt/clay substrate. The stream is entrenched approximately 50 feet into the surrounding lacustrine plain creating a valley approximately 1200 feet wide at the location of the proposed crossing. It is a cool water fishery subject to a no-work restriction from April 1 – June 1, and is classified as a Wisconsin ASNRI stream with no listed 303(d) impairment. The proposed Project route crosses the Pokegama River at MP 1094.4, and is located adjacent to and southwest of the Town of Superior Village. The Pokegama River discharges into Pokegama Bay approximately 1.7 river miles downstream of the proposed route crossing.

The riparian corridor of the Pokegama River in the area of the proposed crossing consists of cleared emergent wetland on the existing Enbridge permanently maintained corridor and shrubby upland on both sides of the river to the top of the valley escarpment. Riparian wetland includes w-1094ws8. The wetland is characteristic of floodplains in larger streams and rivers on the red clay plain, and is dominated by an sparse overstory of scattered black ash (*Fraxinus nigra*, FACW+) quaking aspen (*Populus tremuloides*, FAC), balsam poplar (*Populus balsamifera*, FACW), and black spruce (*Picea mariana* (FACW) with an understory of willows (*Salix* spp.) sedges (*Carex* spp.), alders (*Alnus*, spp.), and blackberries (*Rubus* spp.) (Figure 30).

Figure 30 - Pokegama River Pipeline Crossing Site

Photo of the Pokegama River at the proposed crossing, taken in summer 2008. Note well-defined banks and relatively narrow water surface. Rocks in the stream are from the previous construction



Topographic contour lines and slopes at the proposed crossing. Pink: 5 ft. contours. Purple: existing pipelines. Blue: propose SL pipeline. Red: proposed AC pipeline. Blue: >5% slopes Yellow polygons: developed or undeveloped platted tracts.

Plan and ground views of waterbody wb10wb1094a (Pokegama R.). The Pokegama is a perennial, entrenched, underfit stream that flows through a narrow thinly wooded riparian wetland at the proposed pipeline crossing. It is entrenched 70-80 feet into the surrounding plain, and has a cool water fishery listed as ASNRI by Wis.

Waterbodies wb-1085b (WEPS 1), wb-1086a (WEPS 3), and wb-1086b (WEPS 4) are crossed at MPs 1085.0, 1085.9, and 1087.0, respectively. All of these waterbodies are first order tributaries to second and higher-order tributaries of the Pokegama River that is incised in a relatively deep valley to the south of the Project route. Major higher order tributaries and the Pokegama River itself drain to the northeast.

East of MP 1087 drainage is generally to the Pokegama River from MP 1087 to MP 1089 where drainage changes to the Little Pokegama River that is incised in a shallow (west) to fairly deep

valley to the north of the proposed route. Two intermittent, first-order drainages to the Pokegama River are crossed between MP 1087 and MP 1089, including waterbodies wb-1087b (WEPS 5) and wb-1088a (WEPS 8) with crossings at MPs 1087.5 and 1088.4, respectively.

Similarly, four first-order drainages to the Little Pokegama River are crossed from MP 1089 to MP 1090.5, and all of these are intermittent, constructed drainage ditches. Waterbodies wb1089a (WEP 8), 8rwb1089b (WEP 8), 8rwb1089a (WEP 9), and wb-1089c (WEP 9) are crossed at MPs 1089.3, 1089.5, 1089.7, and 1089.8, respectively.

East of MP 1090.5 to MP 1095.8 drainage is again to the Pokegama River, which is crossed at MP 1094.4 (WEPS 17). The PCWC ASNRI is located in this portion of the proposed route with emergent wetlands and scrub-shrub wetlands dominant on and off the permanently maintained corridor, respectively. Drainages crossed by the Project route are again primarily first-order natural, intermittent to seasonal tributaries to the Pokegama River. Waterbodies wb-1090a (WEPS 11), wb-1090b (WEPS 11), and wb-1093a (WEPS 17) are crossed at MPs 1090.7, 1090.9, and 1094.2, respectively. Fewer wetlands are present near the Pokegama River crossing as a result of greater slopes and better drainage in the uplands above the river.

The proposed route enters the Beartrap-Nemadji Watershed at MP 1095.8. The Beartrap-Nemadji portion of the route is a short (two mile) segment that terminates at Enbridge's Superior Terminal at 1097.9 which is the end of the proposed project. The proposed route through the Beartrap-Nemadji Watershed generally parallels but is well outside of the valley of the entrenched, meandering Nemadji River to the southeast.

Only one waterbody (wb-1096a; WEPS 23) is crossed (MP 1097.0) within the Beartrap-Nemadji watershed, and this is an intermittent, first-order tributary of the Nemadji River located to the immediate north of the Nemadji Golf Course. Table 38 lists the attributes of this stream.

Table 38 - Characteristics of Waterbodies Crossed by the Proposed Pipelines in the Beartrap-Nemadji Watershed

Selected Characteristics of Waterbodies located along the Project Route in the Beartrap-Nemadji Watershed in Douglas County

Waterbody ID	WEPS	Name	Flow Reg-ime	Sub-Strate	Surface Water Width (feet)	Bank-to-Bank Width (feet)	Bank Height (feet)	Comments; Crossing Methods [Clipper /SLd (Proposed, Alternate)] [A]
wb1096a	21	Tributary to Nemadji River	I	Cobbles 4-8in.	0	15	3/3	Adjacent wetland w-1096c; DC,OC/DC,OC

[A] Crossing method in parenthesis as (Alberta Clipper Primary Method, Alberta Clipper Alternative Method/Southern Lights Diluent Primary Method, Southern Lights Diluent Alternative Method). Waterbody crossing methodology: OC – Open Cut (Wet Trench); OC/PP – Open Cut, Push/Pull; PP – Push/Pull; DC – Dry Crossing (Dam and Pump or flume) - waterbodies proposed for DC that are dry or have no perceptible flow at the time of construction will be crossed using Open Cut (Wet Trench) methods;

The stream crossed in the Beartrap-Nemadji Watershed in Wisconsin is a small intermittent waterbody near the upper headwaters draining out of a wetland complex. The waterbody occurs in a narrow valley draining to the east toward the Nemadji River. The drainage is well vegetated with grass and herbaceous plants within the existing pipeline corridor; woody plants predominate outside of this corridor (Figure 31).

Figure 31 - Intermittent Tributary to the Nemadji River Pipeline Crossing Site

The only waterbody crossed by the Proposed Project is wb1096a, an intermittent tributary of the Nemadji River that is located just to the north of the Nemadji Golf Course.

The Nemadji River in Douglas County is a designated Section 10 Waterway. The Nemadji River is also a migratory passageway for trout spawning in headwater streams of Lake Superior. The Nemadji will not be crossed by the proposed pipeline, but is in close proximity to the proposed pipeline corridor and the Superior Terminal.

VI.B.2.b. Wetlands

Wetland delineations have been completed by Enbridge along the entire proposed project route with the exception of the route variation at the Pokegama-Carnegie wetland complex. Wetland impacts at the Pokegama-Carnegie wetland complex are based on Wisconsin Wetland Inventory data. Field surveys are planned for May 2009. Delineations were conducted following the Basic Guide to Wisconsin's Wetlands and their Boundaries (Wisconsin Department of Administration Coastal Management Program 1995) and COE 1987 Wetland Delineation Manual and subsequent guidance documents [USACE 1991, 1992]).

Sixty-seven wetlands totaling 74.45 acres in aerial extent lie within the proposed construction footprint along the 10.9 mile portion of the Clipper project within the St. Louis watershed in Douglas County. A mix of small isolated wetlands and large alder-dominated wetlands are crossed in this area beginning east of the Minnesota/Wisconsin border near milepost 1084.8. Wetlands in this area are similar in extent and, in many cases, vegetative composition. Many have been modified slightly by ditching and logging activities.

Wetlands along the short portion of the proposed route in Douglas County within the Beartrap-Nemadji watershed primarily consist of large wetland complexes of mixed emergent and scrub-

shrub communities. Wetlands within the Beartrap-Nemadji watershed are unsaturated mineral wetlands. Many of the wetlands in this area are divided by roads, railroads, and other features associated with the fringe of the urban and industrial development. A total of 13 wetlands totaling 17.69 acres in aerial extent lie within the proposed construction footprint along the 2.0 mile portion of the proposed project within the Beartrap-Nemadji watershed.

Enbridge has provided a summary of affected wetlands in the St. Louis River watershed, by Cowardin Classification, for the proposed project. These are shown in Table 39.

Table 39 - St. Louis Watershed Wetlands Crossed by the Proposed Pipelines

Type, Distribution, and Mitigation for Wetlands within the Project Workspace in Segment 6, St. Louis Watershed, Douglas County , Wisconsin

Wetland ID	EWEPS[A]	Cowardin Class[B]				Total Wetland	Crossing Length	Comments
		PEM	PFO	PSS				
		Total Construction Workspace		Temp	Perm			
		Acres[C]					Feet	
w-1085ws1	1	0.53				0.53	120	Narrow drainage abutting small intermittent waterbody
w-1085ws2	2	0.18		0.05	0.02	0.26	59	Broad headslope, gradual topography, minimal flow-through
w-1085ws4	1	0.08	0.02	0.12	0.06	0.26	141	Narrow wetland complex abutting natural drainage,
w-8r1085a	1			0.01		0.01	0	Small isolated depression, red clay soil, 4” A-horizon
w-8r1085b	1	0.12				0.12	115	Small isolated depression within existing ROW
w-8r1085c	1	0.06				0.06	65	Small isolated depression within existing ROW
w-8r8086x	3		0.11			0.11	0	
w-8r1086y	3		0.56			0.56	210	Depressional wetland complex, on level clay plain
w-1086ws1	2,3	2.85		0.56	0.31	3.72	1287	Narrow wetland complex abutting intermittent waterbody
w-1086ws3	3, 4	1.21		0.65	0.08	1.94	827	Depressional wetland complex, PEM within existing ROW
w-1086ws4	4	0.34				0.34	118	Small isolated wetland depression
w-1086ws4-2	4	0.23		0.11	0	0.34	196	Narrow wetland complex abutting intermittent waterbody
w-1087ws1	4, 5	2.85		0.56	0.31	3.72	1063	Depressional wetland complex, PEM within existing ROW
w-1087ws2	5	0.1				0.1	48	Small isolated emergent depression within existing ROW
w-1087ws3	5	0.38		0.06	0.04	0.48	170	Narrow emergent wetland abutting seasonal waterbody
w-1087ws3-2	5	0.11		0.06	0.03	0.21	154	Small isolated shrub wetland, PEM within existing ROW

Type, Distribution, and Mitigation for Wetlands within the Project Workspace in Segment 6, St. Louis Watershed, Douglas County , Wisconsin								
Wetland ID	EWEPS[A]	Cowardin Class[B]				Total Wetland	Crossing Length	Comments
		PEM	PFO	PSS				
		Total Construction Workspace		Temp	Perm			
		Acres[C]					Feet	
w-1087ws3-3	5	0.1				0.1	58	Small isolated depression
w-1087ws5	5	0.36		0.47	0.12	0.95	263	Depressional shrub wetland, PEM within existing ROW
w-1087ws7	5,6	0.75		0.54	0.15	1.44	504	Depressional shrub wetland, PEM within existing ROW
w-8r1087a	6	0.13				0.13	161	Small isolated depression within existing ROW
w-8r1087b	6		0.01			0.01	0	Small isolated forest depression
w-8r1087c	6		0.09			0.09	0	Small isolated forest depression
w-8r1087d	6	0.23				0.23	137	Small isolated depression
w-8r1088b	9	0.48				0.48	314	Wetland within linear ditch feature
w-8r1088c	9	0.09				0.09	31	Wetland within linear ditch feature
w-8r1088d	8	0.04				0.04	0	Wetland within linear ditch feature
w-8r1088e	8	0.09				0.09	90	Shallow depression adjacent to linear ditch feature
w-8r1088f	8	0.03				0.03	7	Wetland within linear ditch feature
w-1088ws1	6	1.21		0.99	0.32	2.52	951	Part of large alder wetland complex, PEM in existing ROW
w-1088ws2	7	0.75		0.74	0.17	1.66	512	Part of large alder wetland complex, PEM in existing ROW
w-1088ws3	7, 8	0.9		2.05	3.05	6	1774	Part of large alder wetland complex, PEM in existing ROW
w-1088ws4	7,8	0.47		1.66	1.67	3.8	1323	Part of large alder wetland complex, PEM in existing ROW
w-1090ws1	10	0.04			0.05	0.09	0	Small isolated roadside wetland
w-1090ws12	10	0.05		0.06	0.24	0.35	169	Shallow shrub wetland depression between home sites
w-1090ws2	10	0.02		0.04	0.13	0.19	75	Shallow wetland roadside wetland, adjacent to home site
w-1090ws3	10	0.66		0.21	0.39	1.26	460	Part of a large alder wetland complex, marginal to roads and home sites
w-1090ws4	10	0.06				0.06	28	Small isolated roadside wetland
w-1090ws5	10	0.65		0.25	0.26	1.17	445	Part of a large alder wetland complex
w-8r1090a	10				0.05	0.05	17	Small isolated roadside wetland
w-8r1090b	10			0.06		0.06	0	Small, isolated depression near house

Type, Distribution, and Mitigation for Wetlands within the Project Workspace in Segment 6, St. Louis Watershed, Douglas County , Wisconsin								
Wetland ID	EWEPS[A]	Cowardin Class[B]				Total Wetland	Crossing Length	Comments
		PEM	PFO	PSS				
		Total Construction Workspace		Temp	Perm			
		Acres[C]					Feet	
w-1090ws6	10, 11	0.03		0.28	0.07	0.38	73	PCWC ASNRI. Depressional wetland that drains into Little Pokegama River
INT1090a	11		0.60			0.60	0	PCWC ASNRI. Interpolated based on aerial photo analysis. Forested area along Little Pokegama River
INT1090b	11		1.33			1.33	57	PCWC ASNRI. Interpolated based on aerial photo analysis. Part of large alder wetland complex.
INT1090c	11, 12		2.82	5.26	2.12	10.20	1998	PCWC ASNRI. Interpolated based on aerial photo analysis. Part of large alder wetland complex.
w-1090ws10	11	0.02			0.00	0.02	9	PCWC ASNRI. Narrow wetland abutting small intermittent waterbody
w-1090ws11	11, 12	2.07			0.00	2.07	831	PCWC ASNRI. Part of large alder wetland complex.
w-1090ws6	10, 11	0.03		0.28	0.07	0.38	73	PCWC ASNRI. Depressional wetland that leads to drainage into Tributary of Pokegama River
w-1090ws8	11	0.01			0.00	0.01	0	PCWC ASNRI. Shrub wetland with small upland knolls, part of complex that connects to drainage into Tributary of Pokegama River
w-1090ws9	11	0.22			0.11	0.33	202	PCWC ASNRI. Shrub wetland that leads to drainage into Tributary of pokegama River
w-1091ws1	12, 13	1.69			0.00	1.69	1317	PCWC ASNRI. Part of large alder wetland complex
w-1092ws1	13	0.99		0.12	0.06	1.17	731	PCWC ASNRI. Part of large alder wetland complex
w-1092ws2	13	0.01			0.00	0.01	0	PCWC ASNRI. Small depression within existing ROW
w-1092ws3	13	0.51		0.23	0.17	0.91	483	PCWC ASNRI. Part of large alder wetland complex
w-1092ws4	13	0.45		0.18	0.11	0.74	366	PCWC ASNRI. Part of large alder wetland complex
w-1092ws5	13, 14	4.42		2.94	0.38	7.74	3130	PCWC ASNRI. Part of large alder wetland complex
w-1093ws1	15, 16	8.32		3.36	0.49	12.17	4603	PCWC ASNRI. Part of large alder wetland complex, PEM in existing ROW
w-1093ws2	16, 17	0.74				0.74	53	Narrow wetland abutting seasonal waterbody
w-1094ws1	17	0.23				0.23	83	Shallow depression adjacent to water treatment facility
w-1094ws2	17	0.23		0.16	0.01	0.4	169	Small depressional wetland near the top of the

Type, Distribution, and Mitigation for Wetlands within the Project Workspace in Segment 6, St. Louis Watershed, Douglas County , Wisconsin								
Wetland ID	EWEPS[A]	Cowardin Class[B]				Total Wetland	Crossing Length	Comments
		PEM	PFO	PSS				
		Total Construction Workspace		Temp	Perm			
		Acres[C]					Feet	
w-1094ws4	18	1.26		0.89	0.29	2.44	867	Part of large alder wetland complex leading to Pokegama River adjacent to housing development
w-8r1095a	18			0.05	0.05	0.1	74	Wetland consists of a constructed ditch located at the edge of a baseball field
w-1094ws5	18	0.03				0.03	9	Linear ditch wetland adjacent to railroad
w-1094ws6	18	0.24				0.24	56	Depressional wetland positioned between two roads
w-1094ws7	18	0.28				0.28	0	Depressional wetland between railroad and highway
w-1094ws8	17	0.34	0.22			0.56	175	Wetland abutting Pokegama River
w-1095ws2	19, 20	3.36		3.05	0.95	7.36	2530	Part of large alder wetland complex, PEM in existing ROW. Majority of wetland is in St. Louis watershed. Acreage associated with A small portion to the north that is included within the Beartrap-Nemadji watershed is provided
w-1095ws4	19	0.18				0.18	95	Channelized swale that drains into adjacent wetland complex
w-1093ws1	15, 16	8.32		3.36	0.49	12.17	4603	PCWC ASNRI. Part of large alder wetland complex, PEM in existing ROW
w-1093ws2	16, 17	0.74				0.74	53	Narrow wetland abutting seasonal waterbody
Grand Total		***41.81***	***5.76***	***26.13***	***12.33***	***86.03***	**29,739**	**-**
Mitigation Required		**1.25**	**2.88**	**2.61**	**6.17**	**12.91**		**-**

[A] – Number of the Environmental Plan Sheet.

[B] – Cowardin class indicates farmed emergent wetland (PEMf), emergent wetland (PEM), Forested wetland (PFO), and scrub shrub wetland (PSS). Wetland types were digitized based on air photo interpretation of high resolution 2007 aerial photography performed by the wetland delineators.

[C] - Acres in the workspace. For the purposes of this report extra temporary workspace, temporary workspace, and permanent workspace are combined for farmed, emergent, and forested wetlands. Scrub shrub wetland impacts are separated into permanent and temporary workspace to account for varying mitigation ratios required under ACOE guidance. Individual values may not add up to the exact acreage total due to rounding errors.

Wetlands are extensive within the proposed construction ROW along the entire Beartrap-Nemadji portion of Segment 6 as a result of flat topography and clayey sediments that are characteristic of the red clay plain. Approximately 17.69 acres of wetland lie within the construction ROW in the Beartrap-Nemadji watershed. The presence of wetlands immediately adjacent to the incised valley of the Nemadji River is unusual given the fact that the river is entrenched approximately 70 feet into the surrounding lacustrine plain. The only significant portion of the proposed route within the Beartrap-Nemadji watershed that does not have wetland

dominant within the ROW is the avoidance reroute through the Nemadji Golf Course that represents 0.6 miles where wetlands within the proposed construction ROW are absent. Wetlands along the short portion of the route in Douglas County within the Beartrap-Nemadji watershed primarily consist of large wetland complexes of mixed emergent and scrub-shrub communities. Wetlands within the Beartrap-Nemadji watershed are unsaturated mineral wetlands.. Many of the wetlands in this area are divided by roads, railroads, and other features associated with the fringe of the urban and industrial development. A total of 13 wetlands totaling 17.69 acres in aerial extent lie within the proposed construction footprint along the 2.0 mile portion of the proposed project within the Beartrap-Nemadji Watershed in Douglas County. Table 40 lists these wetlands.

Table 40 - Beartrap-Nemadji Watershed Wetlands Crossed by the Proposed Pipelines

Type, Distribution, and Mitigation for Wetlands within the Project Workspace in Segment 6, Beartrap-Nemadji Watershed, Douglas County , Wisconsin [A]								
Wetland ID	**WEPS[B]**	**Cowardin Class[C]**				**Total Wetland**	**Crossing Length**	**Comments**
		PEM	**PFO**	**PSS**				
		Total Construction Workspace		**Temp**	**Perm**			
		Acres[D]					**Feet**	
w-1095ws2	20	-	-	-	-	-	-	Wetland abuts waterbody, part of large alder dominated wetland complex. Majority of wetland is in St. Louis watershed, so the impacts for this wetland are provided in Table 7.1-1, above.
w-1095ws3	20	0.72		0.14	0.05	0.9	310	Shallow depression, shrub wetland adjacent to two roads.
w-1096ws5	20	0.04	0.98	0.28	0.01	1.31	505	Wetland complex bound by two roads
w-1096d	20-21	2.21	1.21	0.19	0	3.61	1097	Wetland complex bound by two roads
w-1096a	21	0.11				0.11	60	Roadside ditch wetland, along edge of hay field
w-8r1096a	21	0.2				0.2	57	Part of a partially drained wetland complex, adjacent railroad
w-1096b	21	0.39		0.13	0.02	0.54	200	
w-8r1096z	23		0.37			0.37	123	Part of a large wetland complex, bound by roads and railroad
8r1096d	23			0.71	0.54	1.25	357	Part of large alder swamp along north side of golf course
w-1096c	23	0.28		0.14	0	0.42	148	Part of a larger scrub-wetland complex, adjacent to waterbody on the north end of the wetland
w-1097a	23-25	5.54		2.94	0.15	8.63	3,159	Part of a larger scrub-shrub wetland complex, adjacent to tank yard
w-1097b	25	0.17		0.16		0.33	0	Part of a larger wetland complex, adjacent to tank yard
w-1097c	25	0.02				0.02	58	Part of a larger wetland complex, adjacent to tank yard
Grand Total		***9.68***	***2.56***	***4.69***	***0.77***	***17.69***	***6074***	**-**

Type, Distribution, and Mitigation for Wetlands within the Project Workspace in Segment 6, Beartrap-Nemadji Watershed, Douglas County , Wisconsin [A]								
Wetland ID	WEPS[B]	Cowardin Class[C]				Total Wetland	Crossing Length	Comments
		PEM	PFO	PSS				
		Total Construction Workspace		Temp	Perm			
		Acres[D]					Feet	
Mitigation Required		0.29	1.28	0.47	0.39	2.42		-

[A]– Does not include impacts to wetland w-1095ws2, which is primarily in the St. Louis Watershed. All impacts to this wetland are incorporated into the St. Louis River watershed (Table 7.1-1, above.

[B] – Number of the Wisconsin Environmental Plan Sheet.

[C] – Cowardin class indicates emergent wetland (PEM), Forested wetland (PFO), and scrub shrub wetland (PSS). Wetland types were digitized based on air photo interpretation of high resolution 2007 aerial photography performed by the wetland delineators.

[D] - Acres in the workspace. For the purposes of this report extra temporary workspace, temporary workspace, and permanent workspace are combined for farmed, emergent, and forested wetlands. Scrub shrub wetland impacts are separated into permanent and temporary workspace to account for varying mitigation ratios required under ACOE guidance. Individual values may not add up to the exact acreage total due to rounding errors.

As originally proposed, the pipeline route would cross 10 wetlands designated as wetlands of special concern. These wetlands are found within the Pokegama-Carnegie wetland complex. These wetland complexes are located with the Lake Superior drainage basin. They are found within the poorly drained, red clay flats in the headwaters of the Pokegama and Little Pokegama rivers. The original preferred route extended into the Superior Airport/Hill Avenue wetlands, however Enbridge has selected a reroute at this location to avoid the wetland complex. Enbridge has also prepared a plan for minimization of impacts within the Pokegama-Carnegie wetland complex.

West of MP 1087 wetlands are generally riparian in nature and associated with intermittent to seasonal streams that traverse the Project construction ROW. A substantial amount of upland is contained within the construction ROW. Isolated, unsaturated wetlands dominated by fine-textured mineral soils become far more common east of MP 1087 where they are the major land-type within the construction ROW.

East of MP 1090.5 to MP 1095.8, the PCWC ASNRI is located. It has emergent wetlands and scrub-shrub wetlands dominant on and off the permanently maintained corridor, respectively. The most significant sensitive wetland resource identified within the St. Louis watershed portion of Segment 6 is the PCWC ASNRI that extends for approximately 3.4 miles between MP 1090.6 and 1094.0. The PCWC ASNRI is present in two units separated by the Duluth, Mesaba and Iron Range railroad yard at MP 1093.0.

Fewer wetlands are present near the Pokegama River crossing as a result of greater slopes and better drainage in the uplands above the river.

Emergent wetlands crossed by the proposed ROW in the St. Louis River watershed consist of: (1) sedge- and rush-dominated wetlands adjacent to waterbodies, (2) sedge meadows along the existing pipeline ROW, and (3) a few shallow marsh communities dominated by cattails and bulrush. Much of the emergent wetland is along the existing pipeline ROW, which have been

maintained free of woody vegetation. Representative photos of emergent wetlands in the St. Louis River watershed are in Figure 32.

Figure 32 - Representative St. Louis Watershed Emergent Wetlands

Part A. Wetland 1086ws1

Part B. Wetland 1087ws1

Part C. Wetland 1087ws3

Part D. Wetland 1090ws5

Part E. Wetland 1093ws2

Part F. Wetland 1094ws4

Representative emergent wetlands within the St. Louis River watershed. Wetlands 1086ws1, 1087ws3, and 1093ws2 are typical riparian wetlands associated with waterbodies wb1086a, wb1087b and wb1093a, respectively. Wetlands 1087ws1, 1090ws5, and 1093ws2 are wetlands with significant emergent and scrub-shrub components on and off the permanently maintained corridor, respectively.

Emergent wetlands crossed by the proposed ROW in the Beartrap-Nemadji watershed consist of sedge meadows along the existing pipeline ROW and within larger wetland complexes, and a few shallow marsh communities. Much of the emergent wetland is actually along the existing pipeline ROW, which have been maintained free of woody vegetation. Approximately 9.68 acres of emergent wetlands would be affected during pipeline construction (Table 8.4-1). Thus the mitigation requirement under the ACOE Utility Guidance for impacts to emergent wetlands in the St. Louis Watershed within Douglas County resulting from construction of the Project is 0.29 acres. Representative photos of emergent wetlands are in Figure 33.

Figure 33 - Representative Beartrap-Nemadji Watershed Emergent Wetlands

Part A. Wetland 1096d

Part B. Wetland 1096ac

Part C. Wetland 1097a

Representative emergent wetlands within the Beartrap-Nemadji watershed. Emergent wetlands are extensive in and near the construction ROW. Wetland 1096d has emergent wetland components on the permanently maintained corridor and scrub shrub components off of the maintained corridor. Wetland 1097a is a large emergent wetland adjacent to Enbridge's Superior Terminal.

Scrub-shrub wetlands crossed by the proposed ROW in the St. Louis River watershed are shrub-carr communities dominated primarily by alders (*Alnus* spp.) and some willows (*Salix* spp.) in the shrub layer. Herbaceous vegetation consists of a mix of sedges, cattails, or other hydrophytic species common in native emergent wetlands. Alder dominated scrub-shrub wetlands are the

most common wetland community along this segment of the Clipper project. Representative photos of scrub shrub wetlands in the St. Louis River watershed are in Figure 34.

Figure 34 - Representative St. Louis Watershed Scrub-Shrub Wetlands

Part A. Wetland 1088ws3

Part B. Wetland 1090ws3

Part C. Wetland 1093ws1

Representative Scrub-shrub wetlands within the St. Louis River watershed. Wetlands within the St. Louis Watershed are typically associated with waterbodies as riparian wetlands or consist of scrub-shrub wetlands with emergent components within the permanently maintained corridor. Wetland 1093ws1 is typical of scrub shrub wetlands adjacent to the permanently maintained corridor on the PCWC ASNRI.

Scrub-shrub wetlands crossed by the proposed ROW in the Beartrap-Nemadji watershed are shrub-carr communities dominated primarily by alders (*Alnus* spp.) and some willows (*Salix* spp.) in the shrub layer. Herbaceous vegetation consists of a mix of sedges, cattails, or other species. Alder dominated scrub-shrub wetlands are the most common wetland community along

this segment of the proposed project. Representative photos of scrub shrub wetlands is in Figure 35.

Figure 35 - Representative Beartrap-Nemadji Watershed Scrub-Shrub Wetlands

Wetland 8r1096d

Wetland 1096ws5

Representative scrub-shrub wetlands within the Beartrap-Nemadji watershed. Scrub-shrub wetlands are common wetland components within the construction ROW but off of the permanently maintained corridor.

The forested wetlands crossed by the proposed ROW in the St. Louis River watershed are primarily black ash (*Fraxinus nigra*) dominated depressions within the hardwood uplands along the route. Black ash also occurs as a fringe or minor component to larger wetland complexes. Representative photos of forested wetlands in the St. Louis River watershed are in Figure 36.

Figure 36 - Representative St. Louis Watershed Forested Wetlands

Part A. Wetland 1085ws4

Part B. Wetland 8r1087c

Part C. Wetland 8r1094ws8

Representative Forested wetlands within the St. Louis River watershed. Forested wetlands in and near the construction ROW are rare, and usually represent isolated pockets of aspens and black ash within scrub-shrub wetlands. Wetland 1094ws8 (Part C) is a narrow wooded fringe on the floodplain of the Pokegama River.

The forested wetlands crossed by the proposed ROW in the Beartrap-Nemadji watershed are primarily black ash (*Fraxinus nigra*) dominated depressions. Black ash also occurs as a fringe or minor component to larger wetland complexes. Very few forest dominated wetlands were delineated along this segment of the proposed project. A representative photo of forested wetlands is in Figure 37.

Figure 37- Representative Beartrap-Nemadji Watershed Forested Emergent Wetland

Representative forested wetland (Wetland w1096d) within the Beartrap-Nemadji watershed. Forested wetlands are minor components of wetland within the construction ROW, and generally consist of isolated pockets of aspens included within scrub shrub wetlands or are on transitional zones between wetland and upland.

Proposed corridor within the Superior Airport

Wetlands within the Superior Airport – Hill Avenue Wetlands – South Superior Triangle located to the immediate east of the Nemadji Golf Course were identified as an area of concern during consultations with the WDNR and ACOE. Enbridge has completely avoided these wetlands by rerouting through the Nemadji Golf Course as discussed in Section 5.3.1, above.

Proposed corridor through the Pokegama Canegie complex

The Pokegama Carnegie wetland complexes fall within Enbridge's ROW corridor from mileposts 1090.6 to 1094.1. The wetland complexes are located within the Lake Superior drainage basin. They are found within the poorly drained, red clay flats in the headwaters of the Pokegama and Little Pokegama rivers. Enbridge has maintained this ROW corridor since the installation of its first pipeline in 1950. In 2006, the WDNR designated a portion of the Pokegama-Carnegie wetland complexes as a State Natural Area .

An evaluation of the hydrogeologic setting of the Pokegama-Carnegie Wetland Complex was conducted through an initial office review of published data, augmented with a field investigation to verify soils, vegetation, and hydrogeology. The wetland complex is located on a broad, elevated inter-fluve between the Pokegama River south and east, and Little Pokegama River to the north.

Site hydrology is strongly influenced by the presence of micro-topography and the very low hydraulic conductivity (less than 10^{-8} cm/s) of the sediments. The majority of the wetland

systems are fed by surface runoff. Most depressions are ponded very early in the year and immediately after heavy precipitation events. The area is characterized by a complex net of subtle, poorly integrated drainages. Drainage ways are ephemeral in nature and dependent upon precipitation intensity for flow. The elevated areas dominated by Cuttre and Amnicon soils between depressions are very rarely or never ponded.

Areas of the raised interfluves that are close to the Nemadji and Little Pokegama rivers are characterized by down-cutting drainages and slightly better drained soils.

VI.B.3. Flora and fauna

Enbridge has initiated consultations with the U.S. Fish and Wildlife Service and the Wisconsin Department of Natural Resources for a review of the Natural Heritage Inventory to identify any federal and/or state-listed threatened and endangered species.

VI.B.3.a. Wooded lands

Forested areas along the proposed construction right-of-way are limited to those areas outside of Enbridge's existing maintained right-of-way. Species vary based on the upland or wetland nature of the community. Species that are found within both wetland and upland communities include (in order of prevalence) aspen, balsam poplar, balsam fire and red maple. Aspen and balsam poplar are relatively short-lived species that are fast growing and clonal both in the uplands (fire dependent /mesic hardwoods) and unsaturated wetlands. Both of these species will be the first to re-establish within the disturbed temporary construction right-of-way. Red maple is another fast growing species typically successful at moving into an open site with the easy dispersal of seed and limited germination requirements. The balsam fir typically establishes quickly in fire dependent forest communities (e.g., upland areas with well-drained sandy substrates) and wet forests and forested peatlands. Although it is a fast growing species, it is not anticipated to establish within the cleared temporary construction right-of-way in the same manner as the aspen, balsam polar or red maple.

Four additional species are present that are restricted to uplands and primarily found in fire-dependent forest communities. These include bur oak, black cherry, paper birch and white pine. Bur oak seems to re-establish successfully in recent clearings in northwest Wisconsin. However it is a slow growing species, particularly when compared to softwood species (e.g., aspen, balsam poplar) and is more likely to be found solely in the fire dependent uplands. Black cherry spreads by seed and is fairly successful thanks to dispersal by birds and is fast growing. Paper birch has a more successful germination rate in areas outside of closed canopies and is a fast growing species. It is anticipated this species will greatly benefit from the openings created during construction. The White Pine is a slow growing and long-lived species that may be the most difficult to reestablish along the construction right-of-way. Because the construction right-of-way will be cleared using mechanical means and not fire, some of the species, such as white pine, are not anticipated to be prevalent.

An additional four species, black willow, black ash, black spruce and tamarack, are typically found in these types of wetland communities. Black willow is not anticipated to be prevalent

within the construction right-of-way. Like fellow family members (e.g., aspen and balsam poplar) this species is a pioneering species that is clonal and fast growing and would likely compete with the aspen and balsam poplar for establishment. Black ash is a slow-growing species, and while it should see higher rates of germination as a result of the reduced canopy, it will be competing with much faster growing species. Black spruce is not a common species within the survey corridor but this species will tend to establish on peat soils and is very slow growing. The last species, tamarack, is capable of quick establishment in peat soils where the onsite competition is from low growing vegetation (herbaceous and ericaceous species) and not faster growing tree species.

The proposed projects would affect (EWS and construction ROW) 64 acres of land currently in use as forest land. The land is currently in ownership by Douglas County or private landowners. The forest appears to be used primarily as residential property, recreation or domestic wood products (i.e. firewood).

Enbridge has identified nine properties enrolled in the Manage Forest Law (MFL) or Forest Crop Law (FCL) programs. Enbridge would provide WDNR with a cutting notification 30 days prior to clearing activities on these tracts.

Wildlife species that occur along the proposed pipeline route are common to forest, open and agricultural, and wetland habitats of Wisconsin. Typical forest species include ruffed grouse, woodcock, thrushes, woodpeckers, white-tailed deer, gray and fox squirrels, gray fox, raccoon, black bear, bobcat, porcupine, and snowshoe hare. Wildlife species typical of wetland habitats include ducks such as mallards and teal, geese, herons, shore birds, muskrat, mink, and beaver. Most amphibians and many reptiles also require wetland habitats during breeding periods and may continue to use wetlands for most of their life cycles.

The bald eagle *(Hallaeetus leucocephalus)* is known to occur in Douglas County. The bald eagle breeds in undisturbed forested and open areas generally located near large bodies of water with abundant fish populations. Bald eagle pairs commonly have multiple nests in a nesting territory and may not use the same nest every year. Nesting and brood rearing in Wisconsin occurs between February 1 and August 15.

A raptor nest of an unidentified species was located along the proposed ROW. An avoidance plan for this nest would be developed depending on timing of construction and pending bird activity observed during pre-construction surveys.

The gray wolf *(Canis lupus)* is known to occur in large areas of forestland in Douglas County. Its habitat includes wilderness areas of forest and heavily wooded cut over lands, and it often uses trails, old roads, and borders for traveling and searching prey. Wolf pups are born in April or May in an underground den situated on high ground that offers a commanding view of the surrounding area. The pack abandons the den when the pups are 6 to 8 weeks old. The female carries the pups in her mouth to a series of rendezvous sites or nursery areas. These sites are the focus of the pack's social activities for the summer months and are usually near water. By August, the pups wander up to 2 to 3 miles from the rendezvous sites and by September or October the sites are abandoned. Project actions that occur within or near den or rendezvous sites

during the critical period between January and July could have a detrimental effect on the wolf's reproductive success.

VI.B.3.b. Grasslands

Enbridge, in conjunction with the WDNR, identified the following potential sensitive plan habitats within the footprint of the proposed project. Enbridge has conducted a field survey to evaluate each area for the presence of the species noted. A copy of the survey report has been submitted to the WDNR for review and comments under separate cover and is considered a confidential filing. Table 41 lists the habitats surveyed.

Table 41 - Sensitive Plant Habitats Along the Proposed Pipelines

Sensitive Plant Habitats along the Alberta Clipper and Southern Lights Diluent Projects in Douglas County, Wisconsin			
Milepost	**Habitat**	**Wetland Types and Functions**	**Summary**
1085.0–1089.2	Open forest with springs, wetlands	The wetland types found within this area include E2K, S3K, T3K[1]. Typical functional values range from medium to high for floristic diversity, wildlife habitat, water quality protection, and aesthetics, and recreation.	Surveys completed for: small yellow water crowfoot, arrow-leaved sweet coltsfoot, tea-leaved willow, and northern bur-reed. Report being reviewed by WNDR.
1091.0–1092.1	Wetlands within State Natural Area (Pokegama-Carnegie Wetland Complex)	The wetland types found within this area include E2K and S3K[1]. Typical functional values range are medium for floristic diversity, wildlife habitat, flood/ stormwater attenuation, water quality protection, and aesthetics, and recreation.	Surveys completed for slender spike rush, small yellow water crowfoot, arrow-leaved sweet coltsfoot, and seaside crowfoot. Report being reviewed by WDNR.
1092.1–1094.4	Wetlands, sedge meadow near stream crossings Douglas	The wetland types found within this area include E2K and S3K[1]. Typical functional values range from medium for water quality protection, and aesthetics, and recreation to high for to high floristic diversity and wildlife habitat.	Surveys completed for slender spike rush, floating marsh marigold, small yellow water crowfoot, arrowleaved sweet coltsfoot, and northern bur reed. Report being reviewed by WNDR.
1094.4–1095.0	Small wetland	Three wetlands delineated as E2K[1] are found in this milepost range. Typical functional value is medium for floristic diversity, wildlife habitat, water quality protection, and aesthetics, and recreation.	Surveys completed for seaside crowfoot and tea-leaved willow. Report being reviewed by WNDR.
1095.0–1096.8	Small wetlands, stream crossing	The wetland types found within this area include E2K, S3K, T3K[1]. Typical functional values range from medium for wildlife habitat, water quality protection, and aesthetics, and recreation and high for floristic diversity.	Surveys completed for slender spike rush, small yellow water crowfoot, arrow-leaved sweet coltsfoot, seaside crowfoot, and northern bur-reed. Report being reviewed by WNDR.
1096.8–1096.9	Wetlands, fields	Two wetland complexes were identified through Wisconsin Wetland Inventory data as WOLx and S3K. Wetland delineations will be completed in the Spring 2009.	Surveys completed for slender spike rush, arrow-leaved sweet coltsfoot, and seaside crowfoot. Report being reviewed by WDNR.
1096.9–1097.5	Small wetlands, stream crossing	Three wetlands are found within this milepost range, delineated as E2K and S3K[1]. Typical functional values range from medium for water quality protection, and aesthetics, and recreation to high for to high floristic diversity and wildlife habitat..	Surveys completed for slender spike rush, arrow-leaved sweet coltsfoot, and seaside crowfoot. Report being reviewed by WDNR.

Sensitive Plant Habitats along the Alberta Clipper and Southern Lights Diluent Projects in Douglas County, Wisconsin			
Milepost	**Habitat**	**Wetland Types and Functions**	**Summary**
1097.5–1097.8.0	Wetlands next to river	Three wetlands are found within this milepost range, delineated as E2K and S3K[1]. Typical functional values range from low to medium for floristic diversity, wildlife habitat, water quality protection, and aesthetics, and recreation.	Surveys completed for slender spike-rush, small yellow water crowfoot, arrow-leaved sweet coltsfoot, seaside crowfoot, and northern bur-reed. Report being reviewed by WDNR.

[1]E2K: Emergent/wet meadow, narrow-leaved persistent, wet soil, Palustrine
S3K: Scrub-shrub, broad-leaved deciduous, wet soil, Palustrine
T3K: Forested, broad-leaved deciduous, wet soil, Palustrine

Enbridge has initiated consultations with the U.S. Fish and Wildlife Service and WDNR to determine if any threatened or endangered species exist within areas of proposed disturbance along the proposed pipeline corridor. The WDNR provided information from the National Heritage Inventory (NHI) database on March 23, 2007. In response to this correspondence and subsequent discussions with agency personnel, Enbridge submitted to the WDNR on November 11, 2008 the following documents:

- A summary of the review of the potential threatened and endangered species within a one-mile radius of the project area;
- The results of consultations with the WDNR grey wolf biologist;
- Enbridge's draft plan for a Songbird Point County Survey;
- Enbridge's 2008 Raptor Stick Nest Survey Report; and
- Enbridge's 2008 Douglas County Rare Plant Survey Report.

Enbridge will continue consultations regarding protected species with the WDNR throughout the surveying, permitting and construction phase of the Project. Should protected species or areas of high quality habitat be determined to exist within the proposed pipeline corridor, Enbridge will work with the WDNR to design and implement a specific protected species management plan.

The proposed pipeline projects would impact 30.3 acres (construction ROW) of open land.

An interim list of State Threatened, Endangered, and Special Concern plant species found along the proposed construction ROW within the St. Louis River watershed, includes:

- Clustered burr-reed (*Sparganium glomeratum*, State threatened)
- Arrow-leaf sweet coltsfoot (*Petasites sagittatus*, State Threatened)
- Quill spikerush (*Eleocharis nitida*, State Endangered)

- Seaside arrowgrass (*Triglochin maritima*, State special concern)
- Smallflower grass of parnassus (*Parnassia palustris*, State threatened)
- Vasey's rush (*Juncus vaseyi*, State Special Concern)

These species thrive under the conditions present on the red clay plain, allowing a competitive advantage due to their reproductive strategies, morphology, and overall ecology. The key habitats where these species are either found or are likely to be found include the seasonally inundated clay flat micro depressions, depressional animal trails, wet/sedge meadows, marshes, alder thicket openings, and slow moving watercourses (including ditches). In general, these species require some type of natural disturbance regime that reduces competition and enables these populations to persist.

Populations of the state-listed plants were found along within the proposed construction ROW within the Beartrap-Nemadji watershed, include:

- Arrow-leaf sweet coltsfoot (*Petasites sagittatus*, State Threatened)
- Alkali buttercup (*Ranunculus cymbalaria*, State Threatened)
- Quill spikerush (*Eleocharis nitida*, State Endangered)
- Vasey's rush (*Juncus vaseyi*, State Special Concern)

All of the listed species found within the Construction ROW are relatively shade intolerant, do not tolerate competition well, and are adapted to exposed clay flats and disturbed areas that are typically associated with the conditions found along the pipeline ROW.

Wildlife species that occur along the proposed pipeline route are common to forest, open and agricultural, and wetland habitats of Wisconsin. Wildlife species of open and agricultural habitats include red-tailed hawk, bobwhite quail, bobolink, pheasant, meadowlark, field sparrow, cottontail rabbit, skunk, woodchuck, and red fox. Wildlife species typical of wetland habitats include ducks such as mallards and teal, geese, herons, shore birds, muskrat, mink, and beaver. Most amphibians and many reptiles also require wetland habitats during breeding periods and may continue to use wetlands for most of their life cycles.

Proposed corridor through the Pokegama Canegie complex

This unique complex has a number of state-listed vascular plant species known to occur within the jurisdictional boundaries of the Pokegama-Carnegie ASNRI.

Rare species known to occur in this complex include *Calamagrostis stricta*, *Caltha natans*, *Eleocharis mamillata*, *Eleocharis nitida*, *Juncus vaseyi*, *Ranunculus cymbalaria*, *Ranunculus gmelinii*, *Parnassia palustris*, *Petasites sagittatus*, *Sparganium glomeratum*, and *Triglochin maritima*. These species generally grow in areas exposed to sunlight, often becoming

overcrowded by taller species when periodic disturbance is lacking. Field surveys have been conducted for threatened and endangered plant species and two state-listed species were found within the planned construction ROW within the PC ASNRI:

- *Petasites sagittatus* (syn. *Petasites frigidus* (L.) Fr. Var *sagittatus*), arrowhead sweet coltsfoot, threatened.

- *Ranunculus cymbalaria*, alkali buttercup, threatened.

Arrowhead sweet coltsfoot was the dominant listed plant with 12 occurrences located within the survey area. One occurrence of R. cymbalaria was observed within the survey area associated with the Enbridge easement but is not expected to be affected by construction.

The Natural Heritage Inventory (NHI) lists seven additional species with known occurrences within one mile of the planned construction through the ASNRI.

- *Caltha natans*, floating marsh marigold, endangered;

- *Calamagrostis stricta*, narrow-leaved reedgrass;

- *Eleocharis nitida*, slender spike rush, endangered;

- *Eleocharis mamillata*, soft stem spikerush;

- *Juncus vaseyi*, Vasey's rush, Wisconsin special concern;

- *Ranunculus gmelinii*, small yellow water crowfoot, endangered; and

- *Sparganium glomeratum*, northern burr-reed, threatened.

Several of these listed species are particularly adapted to open, recently disturbed areas that characterize the environment of the restored ROW.

Key habitats for these rare species include micro-depressions on clay soils, areas of exposed organic wetland soils, sedge/wet meadows, and small channel ways. These habitats are commonly associated with the existing maintained pipeline ROW. In general, these species require some type of natural disturbance regime or maintenance that reduces competition and enables these populations to persist. Enbridge is preparing a Restoration Plan for this wetland complex that will address the unique issues associated with the restoration of this area to retain and enhance the habitat for the species listed above.

VI.B.3.c. Aquatic

The proposed pipelines would require 17 water body crossings, including 10 tributaries to the Pokegama River, three un-named waterways, two tributaries to the Little Pokegama River, one

crossing of the Pokegama River, and one crossing of an un-named tributary to the Nemadji River.

Table 42 lists the fish species present in waterbodies crossed by the proposed pipeline projects.

Table 42 - Fish Species in Waterbodies Crossed by the Proposed Pipelines

Recreational and Commercial Species in Waterbodies Crossed by the Alberta Clipper and Southern Lights Pipeline Project		
Common Name	**Scientific Name**	**Alberta Clipper Project Occurrence[a]**
Alewife	*Alosa pseudoharengus*	X
Bigmouth buffalo	*Ictiobus cyprinellus*	
Black bullhead	*Ameiurus melas*	X
Black crappie	*Pomoxis nigromaculatus*	X
Bluegill	*Lepomis macrochirus*	X
Brook trout	*Salvelinus fontinalis*	
Brown bullhead	*Ameiurus nebulosus*	X
Brown trout	*Salmo trutta trutta*	
Burbot	*Lota lota*	X
Channel catfish	*Ictalurus punctatus*	X
Chinook salmon	*Oncorhynchus tshawytscha*	X
Cisco herring	*Coregonus artedii*	X
Coho salmon	*Oncorhynchus kisutch*	X
Common carp	*Cyprinus carpio carpio*	
Flathead catfish	*Pylodictis olivaris*	
Freshwater drum	*Aplodinotus grunniens*	
Lake herring	*Coregonus artedi*	X
Lake trout	*Salvelinus namaycush*	X
Lake sturgeon	*Acipenser fulvescens*	X
Lake whitefish	*Coregonus clupeaformis*	X
Largemouth bass	*Micropterus salmoides*	X
Muskellunge	*Esox masquinongy*	X
Northern pike	*Esox lucius*	X
Paddlefish	*Polyodon spathula*	
Rainbow trout	*Oncorhynchus mykiss*	X
Round whitefish	*Prosopium cylindraceum*	X
Sauger	*Sander canadensis*	
Smallmouth bass	*Micropterus dolomieu*	X
Tiger trout	*Plectropomus laevis*	
Walleye	*Sander vitreus*	X
White bass	*Morone chrysops*	X

White crappie	*Pomoxis annularis*	
White perch	*Morone americana*	X
White sucker	*Remorina albescens*	X
Yellow bullhead	*Ameiurus natalis*	X
Yellow perch	*Perca flavescens*	X

[a] WDNR 2008.

VI.B.4. Public lands

The preferred route intersects three publicly maintained trails, two of which are considered snowmobile/ATV trails and one that is restricted to snowmobiles.

VI.B.5. Socioeconomic resources

VI.B.5.a. Proposed corridor

Enbridge completed an evaluation of land use of the Project using the USGS Land Cover Characterization System in combination with verification using recent (2007) aerial photography. Enbridge combined and classified by milepost these land uses into five general categories (forestland, open land, agricultural land, developed land, and wetland/open water) based on prevalent land use and vegetation cover types. Land use within each category has been tabulated in acres. Definitions of the five land use categories are presented below.

- Forest Land consists of tracts of wooded upland, and non-natural woody areas including orchards, and tree farms;
- Agricultural Land consists of pasture and actively cultivated fields;
- Developed Land consists of existing utility facilities, manufacturing or industrial facilities, manufacturing or industrial facilities, commercial or retail areas. This category also includes landscaped areas associated with residential or commercial developments;
- Open Land consists of non-forested vacant land, which is used for various purposes; and
- Wetland/Open Water consists of streams, rivers, and lakes, as well as emergent, scrub-shrub, and open riparian wetlands.

The proposed pipeline projects would impact 3.1 acres (EWS and construction ROW) of agricultural land. The agricultural land within the project area is currently in use as pasture/hay field. No land currently in use as cultivated cropland would be crossed by the proposed projects. Enbridge has not identified any irrigation systems and/or drain tiles within the project area. Enbridge has not identified any parcels currently enrolled in any agricultural conservation program within the project area.

The proposed pipeline projects would impact 1.9 acres (EWS and construction ROW) of land classified as developed, and 30.3 acres (construction ROW) of open land.

Enbridge's existing easement bisects the Nemadji Golf Club in Superior, Wisconsin.

The preferred route intersects three publicly maintained trails, two of which are considered snowmobile/ATV trails and one that is restricted to snowmobiles.

Cultural resource field surveys were conducted along the proposed project ROW between October 2006 and May 2008.

The proposed route is located in a developing and industrialized portion of the towns of Superior Village, and South Superior. The proposed route has closely spaced cross-unders to a south collocation and subsequently to a north collocation at MP 1095.85 and MP 1096.05 (WEPS 20), respectively. The proposed route enterings the outskirts of Superior, Wisconsin where infrastructure becomes dense and routing alternatives limited. The routing avoids impacts to residences and a lagoon at the junction of Central Avenue and Birch Avenue in Superior.

The proposed route remains collocated to the north of the existing corridor from MP 1096.05 to MP 1096.42 (WEPS 21) where the route diverges from the existing route through the Nemadji Golf Course.

VI.B.5.b. Alternative corridors

Enbridge's existing easement bisects the Nemadji Golf Club in Superior, Wisconsin. The landowner has expressed concerns regarding the potential impacts to the daily operation of the golf course during a limited operational season. Enbridge evaluated alternative routes around the golf course. One alternative route was identified on a privately held tract located west of the golf course. Both the WDNR and COE identified that tract as an area of special interest, however. Therefore, Enbridge evaluated both routes and identified an alternative route that traverses the western edge of the golf course.

VI.B.6. Pokegama Carnegie area

The Pokegama Carnegie area (PC ASNRI) is a large wetland complex containing plant communities influenced by the poorly drained red clay flats of the Superior Clay Plain. This community is most notable for its concentrations of rare plants, some of which occur nowhere else in the basin, or state.

Wisconsin has identified the Pokegama Carnegie Wetland Complex as a designated Area of Significant Natural Resource Interest (ASNRI) under NR 1.05. Portions of the PC ASNRI were designated State Natural Area No. 516 in 2006. Additional areas have been designated ASNRI because of:

- The presence of endangered, threatened, special concern species or unique ecological community identified in the Wisconsin Natural Heritage Inventory;

- The presence of the wetlands on the City of Superior SAMP; and

- Listing as ecologically significant wetlands identified in Publication # ER-002-00, data compilation and Assessment of Coastal Wetlands of Wisconsin's Great Lakes, March 2000.

Pre-construction environmental surveys have been performed for the proposed projects in support of various federal and state permits. Several of these inventories were performed as office investigations of known sensitive resources available from agency consultations, literature reviews, and internet queries. Field surveys completed for the projects include but are not limited to cultural resources surveys, wetland surveys and boundary delineations, and threatened/endangered/special concern/invasive species inventories.

Enbridge delineated, described, and surveyed wetlands and identified Wisconsin-listed threatened, endangered, and special concern species found within the CROW and extra workspaces (EWS) along the route through the PC ASNRI (described in more detail below). Additional work was performed that emphasized a description of site hydrogeology and edaphic and ecological conditions along the existing easement. Through ongoing consultations with the WDNR, Enbridge revised the orientation of the Project within Enbridge's existing easement from the south to the north side, thus reducing the CROW and permanent right-of-way (PROW). Currently the wetland types within the reroute have been determined using Wisconsin Wetland Inventory data. However, further extrapolation of existing delineation data from surveys conducted on the southern area of Enbridge's existing PROW was completed to provide a more accurate depiction of the wetland types found within the Project footprint.

The predominant plant community is a shrub dominated wetland community consisting of *Alnus incana* (speckled alder) with other shrub associates including *Cornus stolonifera* (red-osier dogwood), *Salix bebbiana* (Bebb's willow), *S. discolor* (pussy willow), *S. petiolaris* (meadow willow) etc. This extensive wetland complex also includes wet meadow, marsh, and open pool components along with small fire dependent forested uplands. Of special significance are the numerous populations of rare wetland plants. Large or multiple populations of these rare plants are interspersed throughout the complex and are found growing in open micro-topographic depressions, areas of exposed organic substrate, or wet meadow habitats. In general, these species require some type of disturbance regime, either natural or man-made to mimic natural disturbance that reduces competition and enables these populations to persist. Threats to the community include disruption of hydrology, increased development, invasive species, pollution and suppression of natural disturbance regimes.

The PC ASNRI is a two-unit land feature consisting of a large speckled alder swamp on fine-textured clayey soils. The designated significant natural area (SNA) consists of two smaller units within the PC ASNRI. In addition to Enbridge's pipelines, two additional pipeline corridors are present within the ASNRI/SNA and were established well before the ASNRI/SNA designation.

The two units are separated by a railroad yard, which is not state designated SNA or ASNRI. However, all of the existing Enbridge pipeline easements within the ASNRI and SNA are

included within the respective designations. Two additional pipeline easements exist within the PC ASNRI.

In aggregate, the south and north units of the PC ASNRI extend from approximate MP 1091.0 to 1094.1. Six listed species were found within the planned construction ROW (as of January 2009) within the PC ASNRI during rare plant surveys:

- *Eleocharis nitida*, slender spike rush, Wisconsin endangered
- *Juncus vaseyi*, Vasey's rush, Wisconsin special concern
- *Parnassia palustris*, grass-of-parnassus, Wisconsin threatened
- *Petasites sagittatus*, sweet coltsfoot, Wisconsin threatened
- *Ranunculus cymbalaria*, alkali buttercup, Wisconsin threatened
- *Sparganium glomeratum*, clustered bur-reed, Wisconsin threatened
- *Triglochin maritima*, seaside arrowgrass, Wisconsin special concern

The Natural Heritage Inventory (NHI) and survey data indicate the presence of five additional species with known occurrences within one mile of the planned construction through the ASNRI.

- *Caltha natans*, floating marsh marigold, Wisconsin endangered
- *Calamagrostis stricta*, narrow-leaved reedgrass, Wisconsin special concern
- *Eleocharis mamillata*, soft stem spikerush, Wisconsin special concern
- *Ranunculus gmelinii*, small yellow water crowfoot, endangered

Several of these listed species are particularly adapted to open, recently disturbed areas that characterize the environment of the restored ROW. Hydrogeologic Setting. The hydrogeologic setting of the PC ASNRI was determined by an office review augmented with a field investigation to verify soils, vegetation, and hydrogeology. The PC ASNRI is located on a broad, elevated inter-fluve between the Nemadji River south and east, and Little Pokegama River to the north.

Soils on the site formed in very fine-textured red clays deposited in off-shore environments in the bed of Glacial Lake Duluth. The red color of the clay is the result of glacial action incorporating iron-bearing bedrock that is common in the area. Relief on the elevated lake plain is flat, and limited to very subtle rises between small (0.25 acre) to medium sized (1-2 acre) depressions. Total relief between the rises and depression bottoms is on the order of one foot within the PC ASNRI.

Site hydrology is strongly influenced by the presence of micro-topography and the very low hydraulic conductivity (< 10^{-8} cm/s) of the sediments. Very poorly drained Berglund soils (very-fine, mixed, semiactive, frigid Aeric Vertic Epiaqualfs) occupy ephemerally to seasonally ponded depressions, somewhat poorly drained Cuttre (very-fine, mixed, active, frigid Aeric Glossaqualfs) and moderately well drained Amnicon (Oxyaquic Vertic Glossudalfs) soils occupy successively drier interdepressional areas, respectively. All of these soils are poorly developed and contain very thin (1-2 inch) A-horizons over red clays. Shallow peat Cathro soils (Loamy, mixed, euic, frigid Terric Haplosaprists) are less frequently found, and occupy the beds of larger and deeper, seasonally-to-semipermanently flooded depressions.

The majority of the wetland systems are fed by surface runoff. Most depressions are ponded very early in the year and immediately after heavy precipitation events. The area is characterized by a complex net of subtle, poorly integrated drainages. Drainageways are ephemeral in nature and dependent upon precipitation intensity for flow. The elevated areas that are dominated by Cuttre and Amnicon soils between depressions are very rarely or never ponded.

Areas of the raised interfluves that are close to the Nemadji and Little Pokegama rivers are characterized by down-cutting drainages and slightly better drained soils.

A field review of soil, hydrology, and vegetation along Enbridge's PROW compared to undisturbed conditions away from the PROW was performed in mid-October 2008 to generally assess the impacts that successive pipeline installations have had on the hydrology and ecology of affected areas. This analysis was performed in order to develop and propose specific modifications to construction, restoration, and operations procedures to minimize and/or eliminate impacts to the PC ASNRI.

The following observed features are believed to represent the major impacts that pipeline construction has had on the ecology and hydrogeology on the affected areas of the PC ASNRI. All pipeline construction on the Enbridge easement occurred before the SNA was designated.

1. Maintenance requirements result in the periodic removal of all shrubs, including alder, willow, and saplings that encroach onto the maintained easement between maintenance clearing events.

2. Pipeline installations occurred progressively from south to north, with the oldest installation (circa 1950s) occurring on the south side of the easement, and the latest installations (Terrace 3, circa 2003) occurring on the north side of the easement.

3. Approximately 25-feet of permanently maintained easement extending from the northern edge inward represents moderately-disturbed portions of the Terrace 3 construction easement. Soils in this area are relatively undisturbed and are similar to those occurring to the north of the maintained easement.

4. Areas further to the south of the zone described in 3 (above) represent excavated trench and spoil storage areas and construction traffic zones. Soils are mixed, with much of the area presenting red clay subsoil at the surface. Small to moderate amounts of darker

colored A-horizon material that are interspersed throughout the matrix of the soils indicate that topsoil segregation was not generally practiced prior to the construction of Terrace 3.

5. A distinct though discontinuous mound of trench spoil present in the southern half of the permanently maintained easement indicates that subsoil excavated during construction and returned to the trenched area during ROW restoration has not settled to pre-construction contours. It is likely that this trench spoil is residual from old construction.

6. Trench mounding was not observed in the area of newer Terrace 3 construction. Variability in the distribution and composition of emergent wetland vegetation across the permanent easement reflects changes in micro-habitat; including:

    a. release of herbaceous vegetation by removal of shrubs (alders and willows) that dramatically reduce sunlight availability;

    b. mixing of thin A-horizons and seed-bank containing layers with subsoil; and

    c. mounding spoil over the trench area over the amount required to account for settling.

7. Plant communities in depressions and wet, inter-depressional areas associated with more recent construction are native plants found in the herbaceous understory in adjacent undisturbed areas. However, the extent of habitat characterized by exposed subsoil is greater within the disturbed area of the permanently maintained easement when compared to adjacent undisturbed areas.

8. Because the entire area is and always has been subject to erosion after particularly intense rain events, habitats with exposed subsoil are expected in areas of undisturbed habitat.

Enbridge has completed a comparison review of pre-construction rare plant surveys completed for the Terrace 3 project in 2003 and the Alberta Clipper/Southern Lights Diluent Projects in 2008. The results of the survey comparison, as well as, site maps with the location of the plant communities are marked as confidential. The results of this comparison indicate that pipeline construction, does in fact, mimic natural disturbances necessary for the propagation of rare plant species found in the Pokegama-Carnegie wetland complex.

VI.C. Superior Terminal

The Enbridge terminal is located on 167 acres with the majority of the land developed as a crude oil storage tank farm.

Enbridge currently operates a crude oil pipeline breakout storage terminal located in Superior, Wisconsin that consists of thirty-five storage tanks of varying capacity and design with one new storage tank (T41) currently undergoing construction permitting for Husky oil and maintenance activities (pump and valve replacements within existing operations), in addition to those noted

for this project,. The storage tanks are used exclusively to store crude oil, which arrives and exits the terminal via pipeline. There are currently four crude oil pipelines that enter the facility and four that exit (this includes three mainline pipelines and a delivery line to the Murphy Oil refinery). The Alberta Clipper (line 67) would be the fifth pipeline entering the facility. Diluent transported via the Southern Lights (line 13) pipeline will only flow through a pump station at the Superior Terminal, it will not be stored in the facility's tanks.

Enbridge utilizes the tanks as breakout tanks, which are used to receive and store crude oil from the incoming pipelines prior to flow volume metering and reinjection back into the pipeline for continued transportation. The terminal also operates three diesel engine fire / hydrostatic testing pumps, six diesel engine emergency generators, and an 84.4 MMbtu-per-hour process heater that is used to heat crude oil to reduce viscosity and decrease the amount of energy required to pump the oil. The terminal is classified as code 486110 in the North American Industry Classification System (NAICS) for pipeline transportation of crude oil or as code 4612 in the U.S. Standard Industrial Classification (SIC) system.

Many of the areas adjacent to the terminal are also developed; the Murphy Oil USA refinery is located to the northwest of the terminal, residential housing is located to the northeast, and an area to the southwest is developed as a golf course. The nearest residences are approximately 3,200 feet to the east/northeast of the proposed tank construction area. In addition, an active railroad separates the eastern most edge of the property from the residences. Undeveloped areas adjacent to the terminal include the Nemadji River and associated flood plain to the south and southeast and two smaller areas of undeveloped land, one located to the north, and one located to the west of the terminal.

The developed areas within the Enbridge terminal property primarily consist of gravel roads, grassed tank berms, and paved parking areas. The undeveloped areas within the Enbridge terminal property are predominantly emergent herbaceous wetlands with small areas of scrub brush, deciduous, and evergreen forest. The terminal's southern property line is adjacent to the undeveloped Nemadji River and flood plain with emergent herbaceous wetlands and mixed deciduous and evergreen forests as the predominant vegetation types.

VI.C.1. Air quality

Douglas County, Wisconsin, is in attainment or is unclassified for all criteria pollutants.

Historically, the air quality in the area around the terminal has not had exceedances of the national ambient air quality standard (NAAQS) for ozone. A review of ozone monitoring data from a Minnesota Pollution Control Agency monitoring station located at the University of Minnesota Duluth, 14.2 kilometers (8.8 Miles) to the northwest of the terminal in Duluth, Minnesota, had an average ozone concentration of 0.03 parts per million (ppm) and a maximum concentration of 0.09 ppm for the period April 1998 through June 2008. The maximum 8-hour average for the period was 0.069 ppm, which is below the 8-hour national ambient air quality ozone standard of 0.075 ppm.

Special resource areas need to be considered for PSD (prevention of significant deterioration) air emissions permitting purposes. The terminal is located within 200 kilometers (124 miles) of the following federal Class I areas:

- Rainbow Lake Wilderness Area,
- Boundary Waters Canoe Area Wilderness
- Voyageurs National Park

The nearest Class I area to Enbridge is Rainbow Lake Wilderness Area (Rainbow Lake), which is approximately 68 kilometers (42 miles) east of the terminal. Rainbow Lake is unique among the PSD Class I Areas. It is an area where visibility is not recommended as an important air quality related value (AQRV). Consequently, air quality modeling that includes Rainbow Lake does not have to include an air quality visibility analysis. Beyond Rainbow Lake, the Boundary Waters Canoe Area Wilderness and Voyageurs National Park are located 137 kilometers (85 miles) and 179 kilometers (112 miles) from the terminal respectively.

VI.C.2. Geology and soils

The Enbridge terminal is located on the Superior coastal plain in Wisconsin's northernmost ecological landscape, bordered on the north by southwestern Lake Superior and on the south by the northwest sands. The major landform in this ecological landscape is a nearly level plain of lacustrine clays that slopes gently northward toward Lake Superior.

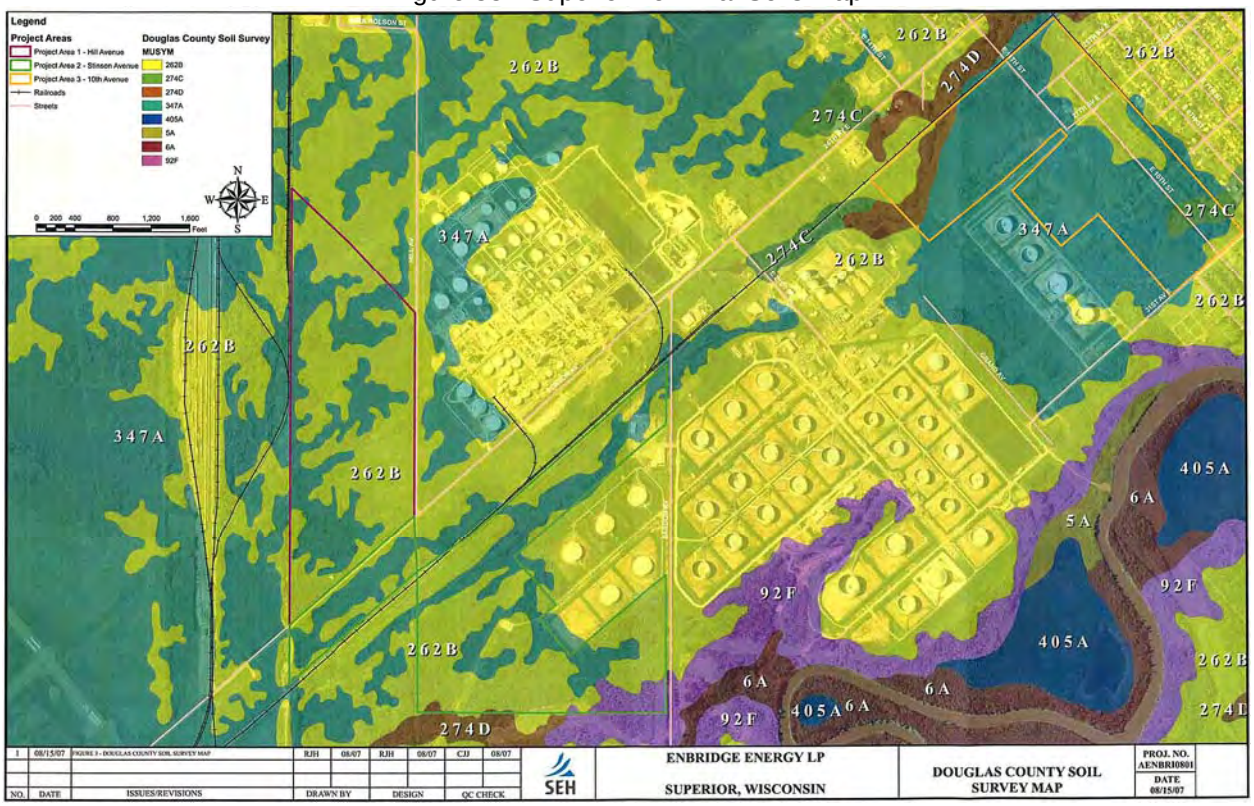
The soils near the Enbridge terminal were greatly affected by the chemical characteristics of surface waters and have been derived largely from the weathering of various glacial deposits. The soils are glacial lacustrine or red clay soils that were laid down under the waters of a larger glacial lake, which once occupied the Lake Superior basin. These calcareous red clay soils are finely textured, resulting in very poorly drained soils.

A review of the U.S. Department of Agriculture’s Natural Resources Conservation Service (NRCS) soil types identified nine soil types in and around the Enbridge terminal (refer to Table 43, and Figure 38 below). The NRCS rates five of the nine soil types as hydric soils. The most prevalent soil types in the area around the Enbridge terminal is the Amnicon-Cuttre complex and Bergland-Cuttre complex; these two soil types also make-up a significant majority of the soil types on the terminal site.

Table 43 - Superior Terminal Soils

Map Unit Symbol	Soil Type	Acres	Percent of Area	Hydric Soils
5A	Arnheim mucky silt loam, 0 to 1 percent slopes, frequently flooded	46.3	1.8%	Hydric
6A	Moquah fine sandy loam, 0 to 3 percent slopes, frequently flooded	117.4	4.6%	Hydric
92F	Udorthents, ravines and escarpments, 25 to 60 percent slopes	219.8	8.6%	No
262B	Amnicon-Cuttre complex, 0 to 4 percent slopes	1,267.5	49.8%	Hydric
274C	Miskoaki clay loam, 6 to 12 percent slopes	31.7	1.2%	No
274D	Miskoaki clay loam, 12 to 25 percent slopes	43.4	1.7%	No
347A	Bergland-Cuttre complex, 0 to 3 percent slopes	518.4	20.4%	Hydric
405A	Lupton, Cathro, and Tawas soils, 0 to 1 percent slopes	194.7	7.6%	Hydric
2030	Udorthents and Udipsamments, cut or fill	37.1	1.5%	No
W	Water	69.5	2.7%	
	Total for Area of Interest	2,545.8	100%	

Figure 38 - Superior Terminal Soils Map



While historical land disturbance has occurred on the site, Enbridge found no concerns regarding contamination of soil at the proposed tank site. The foundation work done in the 1970's did not

result in the construction of any storage tanks. To Enbridge's knowledge, no contamination incidences that would threaten the integrity of the proposed site have occurred.

VI.C.3. Hydrography

VI.C.3.a. Surface waters

The Nemadji River is located within one-quarter mile to the south of the proposed project area. The Nemadji River in Douglas County is a designated Section 10 Waterway. The Nemadji River is also a migratory passageway for trout spawning in headwater streams of Lake Superior. Newton Creek is located within one-quarter mile to the north and west of the proposed project area.

VI.C.3.b. Wetlands

The project sites were examined for areas meeting wetland criteria in accordance with the *Corps of Engineers Wetlands Delineation Manual* (USACE, 1987). The 1987 Manual requires that soil inundation or saturation occur within a major portion of the root zone (typically within 12 inches of the root zone), and that all three wetland parameters (as discussed above) be present.
The Routine Onsite Determination Method (RODM) was applied for this delineation. The field evaluations were conducted under temperature conditions that were normal and precipitation conditions that were below normal as compared to the historical average for the region according to the National Oceanic and Atmospheric Administration, Superior, WI Weather Station. Most of the vegetation was identifiable, including all dominant species. The location of the delineated wetland boundaries were surveyed and mapped.

Wetland classification follows the methods described in *Wisconsin Wetlands Inventory Classification Guide*, (Wisconsin DNR publication WZ-WZ023, February 1992). Classifications defined in *Wetlands and Deepwater Habitats of the United States* (Cowardin, et al., 1979), and used by the U.S. Fish and Wildlife Service (USFWS) National Wetland Inventory (NWI) are also included.

A wetland functional assessment was conducted on wetlands in the City of Superior in June 2002 in association with the Superior SAMP 11. The assessment was updated with more site specific data in 2007.

Wetland assessments evaluate the quality of six primary wetland functions, including plant habitat integrity, wildlife habitat integrity, hydrologic integrity, flood and stormwater attenuation, water quality protection, and aesthetics/recreational education/cultural/science. The process was modified from the Minnesota Routine Assessment Method (Version 2.0) by the City of Superior, USEPA, Wisconsin DNR, USACE, and the USFWS. The specific methods are described in the *City of Superior Routine Assessment Method for Evaluating Wetland Function*, Superior Wisconsin (February 2003).

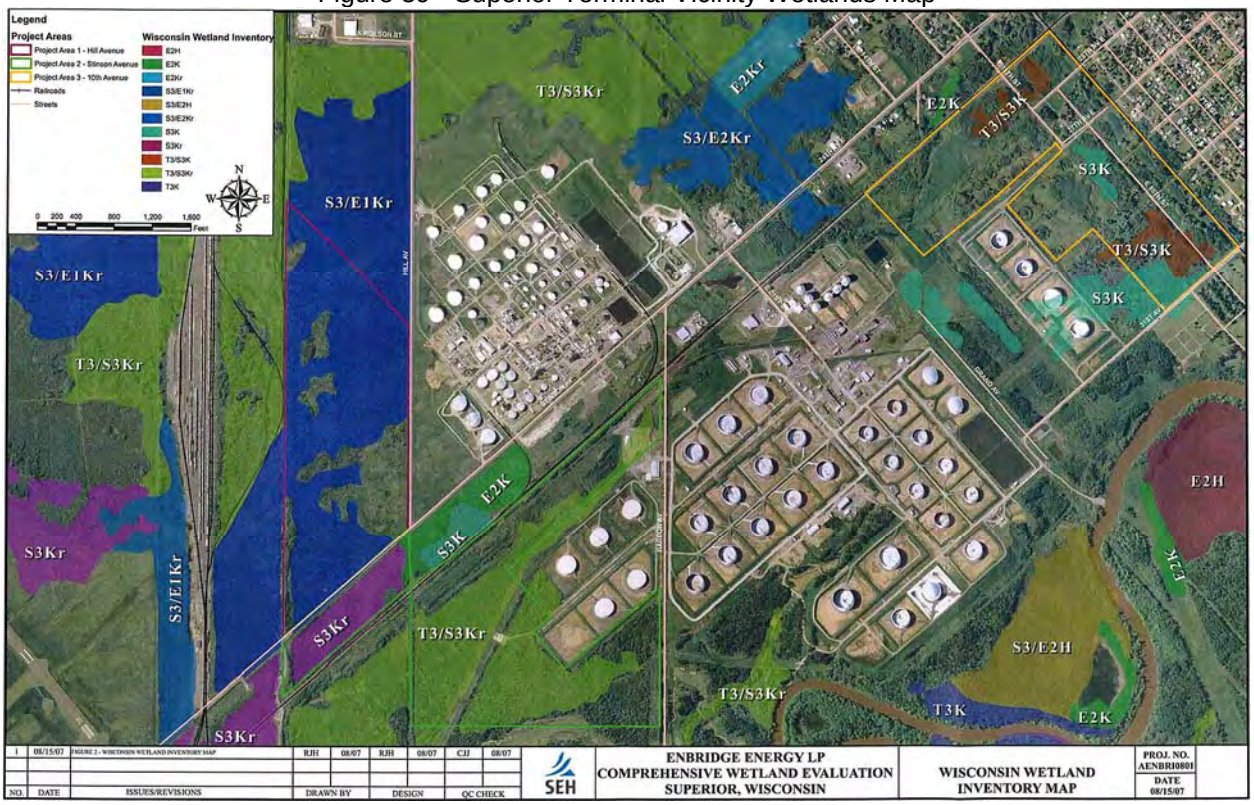
The 2002 functional assessment was completed by observing the habitat types and vegetation from within the railroad and public rights-of-way on lands adjacent to the project areas. The assessment was based on randomly selected and accessible observation points located at the edge

of the properties. The 2007 assessment incorporated data gathered from all habitats occurring at the edges and within the core of the properties.

Plant and wildlife habitat integrity data was gathered based on field observations made while meandering randomly, throughout the entire project area and comprehensively through all habitat types, as described in the methodology for the threatened and endangered plant survey. Data on stormwater and flood attenuation, hydrologic integrity, water quality, and public values were similarly assessed based on Geographic Information Systems (GIs) data, as well as with field observations.

The property consists primarily of alder thicket with several interstitial wetland habitats including seasonally wet deciduous forest and wet meadows. Wet meadow habitats were observed in three forms: meadows dominated by sedges, meadows dominated by reed canary grass, and meadows dominated by Canada bluejoint grass. Wet meadows were observed to the largest extent as areas associated with the existing pipeline corridor, an overhead electrical utility corridor, and seasonal ATV/snowmobile trails, which are all kept free of trees and shrubs for maintenance and accessibility. Figure 39 shows wetlands in the vicinity of the Superior Terminal.

Figure 39 - Superior Terminal Vicinity Wetlands Map

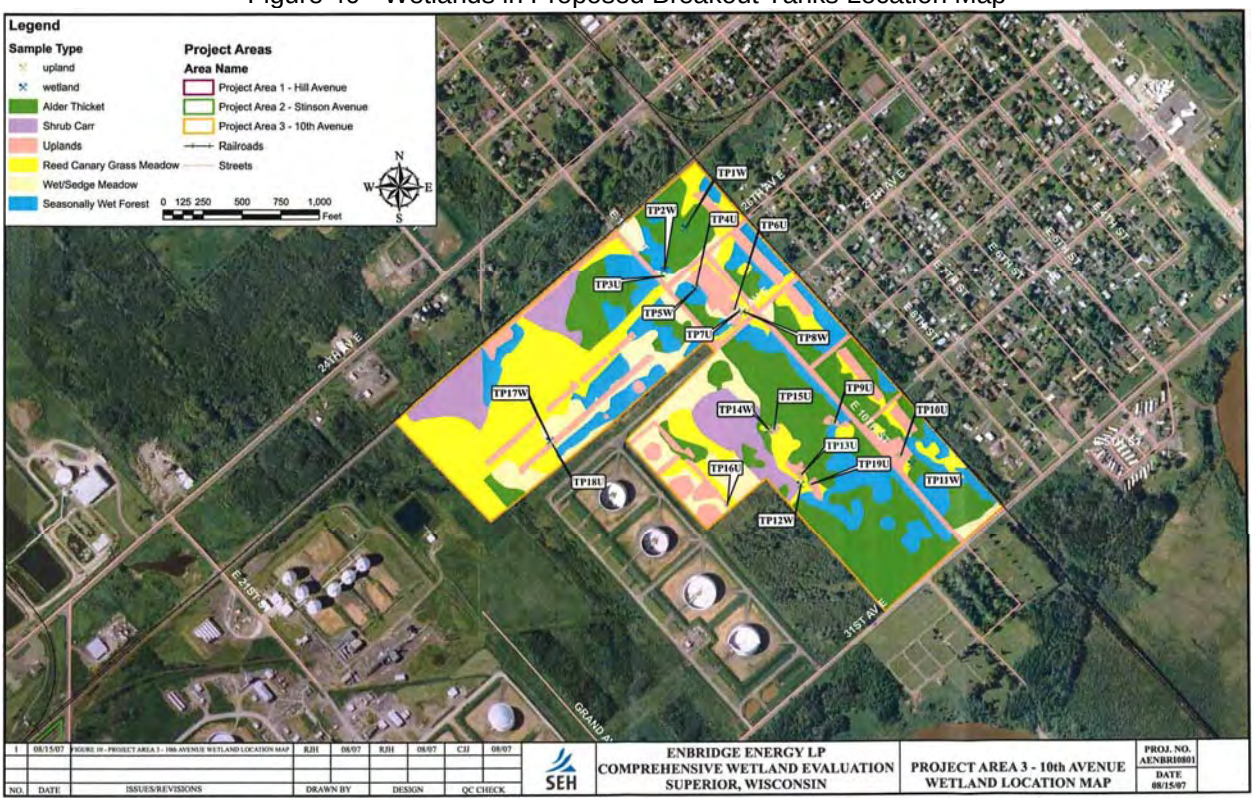


VI.C.3b.01. Breakout tanks

The proposed tanks would be located in an area currently vegetated with several wetland habitat types, which include alder thicket, reed canary grass meadow, sedge/wet meadow, and shrub-carr. The

majority of the project area has been historically disturbed in the 1970s when foundation work for a tank expansion was completed; however, the tanks were not erected. The foundation work included grading of the site and installation of concrete ringwalls, which are still present today and are visible on Figure 2. These areas are upland and are typically characterized by weedy and/or early successional species typical of disturbed areas. These disturbances have also resulted in anthropogenically created habitat suitable for some state listed threatened and special concern plant species, which have colonized as a result of the disturbance. Figure 40 shows these wetland resources.

Figure 40 - Wetlands in Proposed Breakout Tanks Location Map



Wetlands occurring within the proposed project area include S4-25-24, S4- 30-22 and S4-31-25 as defined by the City of Superior SAMP I1 and shown on the City of Superior SAMP I1 Wetland Map. Wetlands with the S4-25-24 and S4-30-22 SAMP 11 were identified, delineated and classified between September 25 and October 3, 2007 by SEH, Inc. Table 44 is a summary of the size and classification of wetland habitats within the project area.

Table 44 - Project Area 3 Wetland Characteristics

WWI Classification	Size (combined)	Cowardin Classification	Circular Classification
S3Kr	41.45 acres	PSS1Y	Type 6A&B
E2KR	33.53 acres	PEMB	Type 2A&B
Upland	14.68 acres	Upland	Upland
TOTAL	109.42 acres		

Wetland S4-25-24

Wetland S4-25-24 (subpart B, SAMP I1 eligible) is a wetland matrix comprised primarily of wet meadow and some alder thicket and seasonally wet forest. Only the western most portion of the proposed project area extends into this wetland area. A wetland delineation and rare plant survey was completed by Natural Resources Group, Inc. in 2005. The result of the current delineation was consistent with their findings with only minor variations. This wetland area has been historically disturbed by the construction of three tank foundations, none of which were erected, and containment berms. Only a portion of this wetland remains due to tank construction and development in recent years. This wetland is hydrologically connected via sheet flow directly to Newton Creek in the middle of Subpart A and also via ditches along 11th Street East from 27th Avenue East, which flow into Newton Creek at approximately 11th Street East and 25th Avenue East (platted).

Wet meadows are predominant throughout the proposed project areas, with lesser amounts of alder thicket and willow shrub-carr scattered in the eastern portion of the project area. Uplands occur within the project site where containment berms and tank foundations were historically constructed.

Wetland S4-25-24 is significantly disturbed. The wetland is dominated by reed canary grass, but with scattered shallow depressions that house rare plant species including *Juncus vaseyi* (Vasey's rush). Several ditches run through this property, east of the proposed project area and at least one ATV trail was observed being actively used. S4-25-24 is the site of several historically constructed tank foundations that were never completed. Rare plant assessments in 2005 resulted in documented occurrences of *Eleocharis nitida* (blunt spike rush), and *Juncus vaseyi* (Vasey's rush). During the current survey, several of these occurrences were reconfirmed, as well as additional occurrences of *Juncus vaseyi* (Vasey's Rush), *Carex nigra* (black sedge), and *Petasites sagittatus* (arrowhead sweet colt's foot). Table 45 provides a summary of the functional assessment of this wetland.

Table 45 - Wetland S4-25-24 Summary Functional Assessment

Functions	Functional Index Score	Functional Index Rating	Comments
Plant Community Integrity	5.8	Medium	(weighted score)
Plant Comm. 1 - 60%	5.0	Medium	Wet Meadow
Plant Comm. 2 - 20%	7.0	High	Wet Forest
Plant Comm. 3 - 20%	7.0	High	Alder Thicket/Shrub Carr
Hydrologic Integrity	1.7	Low	
Wildlife Habitat Integrity	4.0	Medium	
Flood/Stormwater Attenuation	4.2	Medium	
Water Quality Protection	5.3	Medium	
Aesthetics/Rec./Ed./Cultural	2.3	Low	
Special Features?	Yes: State listed rare plant occurences		

Wetland S4-30-22

Wetland S4-30-22 is a wetland matrix comprised primarily of seasonally wet deciduous forest, alder thicket, and wet meadow. However, only the northern half of this wetland is involved in the proposed project area. A wetland delineation and rare plant survey was completed by Natural Resources Group, Inc. in 2005 in this wetland area. The result of the current evaluation was consistent with their findings with only minor variations.

Several natural and artificial drainage ways exist through this wetland, all directing water to an unnamed stream that eventually connects to Newton Creek.

Wet meadow and alder thicket vegetative communities comprise the majority of this wetland area. No upland areas were identified within this wetland. It appears from a functional and hydrological standpoint, Wetland S4-30-22 is directly connected to Wetland S4-25-24. Wetland areas within the proposed project area were significantly disturbed, historically, but have since been allowed to restore, vegetatively, without maintenance.

Wetland S4-30-22 is also highly disturbed. This area contains former residential home sites and streets and alleys are still present between the wetlands and subparts, though not in the proposed project area. *Phalaris arundinacea* (reed canary grass) and *Cirsium species* (thistle species) are dominant in most habitats, but several occurrences of *Petasites sagittatus* (arrowhead sweet coltsfoot), a state listed threatened (Thr-S3) species were found scattered occasionally throughout alder thicket and hardwood forest habitats. Table 46 provides a summary of the functional assessment of this wetland.

Table 46 - Wetland S4-30-22 Summary Functional Assessment

Functions	Functional Index Score	Functional Index Rating	Comments
Plant Community Integrity	6.8	Medium	(weighted score)
Plant Comm. 1 - 70%	8.0	High	Alder Thicket/Shrub Carr
Plant Comm. 2 - 10%	2.0	Low	
Plant Comm. 3 - 20%	5.0	Medium	
Hydrologic Integrity	2.3	Low	
Wildlife Habitat Integrity	4.4	Medium	
Flood/Stormwater Attenuation	3.7	Medium	
Water Quality Protection	6.2	Medium	
Aesthetics/Rec./Edu./Cultural	4.3	Medium	
Special Features?	Yes: State listed rare plant occurences		

Wetland S4-31-25

Wetland S4-31-25 is a wetland matrix comprised primarily of hardwood swamp, alder thicket, and wet meadow. The only portion of this wetland area that is being proposed to impact is an area located in approximately the middle of this SAMP I1 area that is 900 feet long by 150 feet wide. The temporary impact is being proposed for the cut and cover installation of five pipes.

An overview of these wetlands indicates that they were all likely integrated into one or larger wetland complexes, at least grouped as they are by the Superior SAMP assessments. The wetlands are connected by ditches directly flowing to Newton Creek.

The landforms within the project area are not natural due to the extensive historic and current land use modifications. The historic wetland complex appears to be extensive, but has been fragmented by railroads, two-lane paved roads, alleys, stormwater conveyance ditches, one-lane dirt access ATV roads, and residential and industrial development. Overhead power lines and underground pipelines run throughout the property. The ATV trails were used year round, becoming snowmobile trails in the winter. For security reasons, however, this area was fenced. Lack of travel on the route will result in the area potentially changing from meadow to shrub or forested habitat, similar to adjacent habitat types, if not otherwise developed.

Between assessments in 2002, 2005, and 2007, the abundance of exotic and invasive plants in the shrub-carr, seasonally wet forest, and wet meadow habitats has significantly increased. *Phalaris arundinacea* (reed canary grass), *Cirsium spp.* (thistle species), and *Tanacetum vulgare* (tansy) have all increased in abundance. Between 2005 and 2007, a greater abundance of state listed rare plants were observed.

Three consecutive years of drought may be contributing to the invasion of *C. spp.* (thistle species) and *P. arundinacea* (reed canary grass) in wetland habitats, thus some elements of this invasion may not have been present during the 2002 assessment.

The proposed project area lies east of a highly developed, industrially zoned area where an oil refinery and a storage pipeline company operate and south and west of a highly developed residential property have many ditches running facilitate drainage by prior landowners.

The proposed tanks would be located in an area currently vegetated with species typical of both shrub-carr and sedge/wet meadow wetland habitats. The majority of the project area has been historically disturbed in the 1970s when foundation work for a tank expansion was completed; however, the tanks were not erected. The foundation work included grading of the site and installation of concrete ringwalls, which are still present today and are visible on Figure 2. These areas are upland and are typically characterized by weedy and/or early successional species typical of disturbed areas. These disturbances have also resulted in anthropogenically created habitat suitable for some state listed threatened and special concern plant species, which have colonized as a result of the disturbance.

Piping to connect the expansion tank to the existing main facility will be installed in an existing utility corridor that consists of both wetland and upland areas. The wetland area has already been

extensively disturbed for installation of power lines that traverse the area.. In addition, to the previous disturbance, this area is routinely maintained by mowing. This area was not mapped as wetland by the Wisconsin Wetland Inventory (Reed, 1996); however, wetlands were identified in the 2004 wetland inventory conducted by the City of Superior for the Special Area Management Plan (SAMP 11) (King Environmental) and the Superior RAM indicates that the wetland in this corridor is a low quality wet meadow.

VI.C.3.b.02. Pump station

Enbridge's Preferred Alternative (Alternative 4) is located in the northern portion of the existing Superior Terminal directly east of the existing fire pond and north of Tanks 13, 14, and 15. The area is approximately 2.1 acres of undeveloped land and contains approximately 1.5 acres of upland and 0.60 acres of wetland.

Given the adjacent structures and land uses, Enbridge found little opportunity to shift the footprint for the pump station to avoid or minimize the wetland impacts in this area. Wetland impacts were minimized to the extent possible by condensing the footprint for the pump station. The original plans had been designed with a proposed footprint of 2.0 acres, but in order to make this location work the footprint was reduced or condensed to the currently proposed 1.51 acres. In order to avoid potential temporary wetland impacts the new proposed Line 13 and Line 67 pipelines will be constructed directly south of the pump station in an existing pipeline corridor.

VI.C.4. Flora and fauna

Vegetation near the terminal is predominantly mixed deciduous and evergreen forests with some pastured areas to the south, emergent herbaceous wetlands to the northwest and residential development to the north of the terminal.
Wildlife in the area includes deer, bears, rabbits, squirrels, mice, and various types of birds. No known threatened or endangered animal species are known to exist at the proposed site.

The rare species survey was limited in scope to plant occurrences, as required by the City of Superior Special Area Management Plan (SAMP 11) permit application guidelines. No specific search for listed animal species was conducted and was not within the scope of requirements for the permit application. Surveyors, however, were aware of the potential for an occurrence and incidental observations were recorded as applicable.

Rare plant surveys were conducted for state-listed vascular plant species and focused on those target species previously documented in the surrounding area according to Natural Heritage data from the Wisconsin DNR.

The survey included all species included on the Wisconsin DNR Bureau of Endangered Resources (BER) list of rare plants known to occur in the City of Superior, as provided by Craig Anderson, Wisconsin DNR-BER (January 2005). Species not included on the list were not included in the survey. Referenced information indicated that target species thought to occur within the project areas include *Juncus vaseyi* (Vasey's rush), *Petasites saggitatus* (arrowhead sweet coltsfoot), *Carex nigra* (black sedge) and *Eleocharis nitida* (blunt spike rush).

The rare plant survey was conducted using a random meander technique, as described in guidelines prepared by the Wisconsin DNR-BER and defined in the *City of Superior Special Area Management Plan Technical, Implementation, and Administration* document (January, *2007).* All wetland habitat types in each wetland area were searched for target species, as appropriate to the habitat type. All target species habitats in the project area were thoroughly searched once.

Habitat types observed in the project area included shrub-carr, alder thicket, seasonally wet deciduous forest, wet meadow (including ditches), and sedge meadow. Wet meadows included both *Phalaris arundinacea* (reed canary grass) and *Calamagrostis canadensis* (Canada bluejoint grass) dominated habitats. Habitats involving wet and sedge meadows and seasonally wet deciduous forest wetland types were investigated specifically for target species. Aerial photographs were used to locate interstitial meadows, marshes, and forests that were nested within the shrub-carr matrix. These interstitial habitats were found in the field and searched for target species.

The amount of survey time spent was determined based on the timing for the survey (September through early October), size of the appropriate habitats, and existing environmental factors and limitations. In July and August all target species were expected to be identifiable in flowerlfruiting stages. In September, leaves of arrowhead sweet coltsfoot, basal leaves of target orchids, target willow, and sedge species were still expected to be identifiable. Any late season suspect occurrences that could not be positively identified in the field by the investigator or Wisconsin DNR specialists were flagged for verification during the next field season. Additionally, suitable habitat for *Ranunculus spp.* was sought, since it was not likely that identifiable specimens would be present at the time of the survey. No evaluation of species lying dormant or contained within the seed bank was conducted.

Shrub habitats were searched conservatively for arrowhead sweet coltsfoot and *Salix planifolia* (tea leaf or diamond leaf willow). Surveys in shrub habitats included skirting edges, through mature alder stands, and investigating canopy openings and clearings, since arrowhead sweet coltsfoot has been observed at the interface between shrub habitats and meadows, marshes, or forests. Tea leaf willow is also expected to be found more along the edges than in dense thickets.

Seasonally wet deciduous forests occurred as immature aspen forest within the tank foundations prepared in the 1970s. Forests were observed in aerial photographs as occurring in several small (less than one acre) stands scattered around the project areas and were searched for *Deschampsia flexuosa* (wavy hairgrass), *Equisetum palustre* (marsh horsetail), and *Platanthera orbiculata* (lesser round leaved orchid).

Wet and sedge meadows were searched for black sedge, Vasey's rush, *Ophioglossum pusillum* (northern adder's tongue), arrowhead sweet coltsfoot, *Calanzagrostis stricta* (slimstem reedgrass), slender spike rush. Reed canary grass dominated meadows were extremely monotypic thus the probability that rare plants would be found in these habitats was reduced. Disturbed road and railroad edges and ditches were surveyed intensely for black sedge, Vasey's rush, slender spike rush, and arrowhead sweet coltsfoot.

Shallow marshes, and disturbed trail areas with small, shallow depressions were investigated for *Ranunculus cymbalaria* and *Ranunculiu gmelinii.* The project areas were searched for occurrences and suitable habitat.

To accomplish this survey, the project area was systematically evaluated by tracking the survey route on a map and using GPS until all targeted habitats, as identified by the aerial photograph interpretation, were assessed. Search intensity was based on the habitat conditions and dominant vegetation association present in each of those areas. Areas where occurrences were Two species of state listed rare plants were observed within the proposed project area.

Two species of state listed rare plants (*Juncus vaseyi* and *Petasites saggitatus)* were observed within the area proposed for construction of the five new tanks. No rare plant species were observed within the construction footprint of the Line 13 pump station projects.

Fifteen occurrences of Vasey's rush were recorded, many of which were included in the plant survey conducted by Natural Resources Group, Inc. in 2005. Most occurrences were found in depressions near and in between the unfinished tank foundations as well as in the wet meadow east of the foundations. This species was observed with *Juncus Canadensis* (Canada rush) and in some cases reed canary grass. Careful observation of vegetative characteristics (reddening at the base of the stem) was made to be sure not to confuse the target species from similar species.

One occurrence of arrowhead sweet coltsfoot was recorded within the proposed project area. This occurrence was documented primarily in a mature alder habitat. Due to the limited occurrence of shrub and forested habitats and limited disturbance in the proposed project area, few occurrences of this species were expected. Even into October, vegetative structures were readily identifiable.

Suitable habitat for other species on the target list does exist, including deep ruts suitable for *Ranunculus cymbalaria* (seaside crowsfoot) and *R. gmelinii* (small water crowfoot), which may be found in the spring when flowering and vegetative structures are readily identifiable. Other species on the target list should have been identifiable, at least to genus under the climatic conditions that persisted throughout the survey. Due to the amount of area covered and search intensity; it is unlikely that an occurrence, of the target species not otherwise documented above, was missed.

The eastern breakout tanks project area is 18.87 acres located within the existing tank farm and includes 7.61 areas of upland.

VI.C.5. Socioeconomic resources

The proposed modifications will occur at the existing industrial facility. No additional land purchase will be required for the proposed projects at the Superior Terminal.

Populations considered affected for the environmental justice analysis for the Superior Terminal include the City of Superior, WI and surrounding communities. Tables 1 and 2 describe both the

ethnic and racial composition and income distribution of these communities, respectively. Within these areas, there are no predominantly low-income or minority communities and the population of Native Americans is less than 2.5 percent of the total population. About 94.3 percent of the population of the city of Superior is white non-Hispanic and 13.9 percent live below federal standards defining poverty. This is only slightly higher than Douglas County's average of 13.6 percent living in poverty. In smaller neighboring communities, 96.8 percent of the population of Superior Village is white non-Hispanic and 3.4 percent live below the poverty line. Similarly, 91.6 percent of the population of Allouez Village is white non-Hispanic and 3.9 percent live below the poverty line. This is a drastically lower percentage than Wisconsin state poverty estimates of 10.9 percent. As well, the median household incomes for these smaller communities, $50,147 for Superior Village and $65,471 for Allouez Village, are higher than both the state and county averages of $46,142 and $38,694, respectively. Alternatively, the city of Superior has a slightly lower median household income of $37,420 when compared to state and county averages. In general, minorities comprise a smaller percentage of the population in these communities than Wisconsin state averages. One exception is a slightly higher population ratio of Native Americans in the city of Superior by 1.3 percent when compared to Wisconsin's average of 0.9 percent. Table 47 lists the ethnic and racial composition of the terminal area.

Table 47 - Ethnic and Racial Composition of Douglas County and Wisconsin

Demographics on the Ethnic and Racial Composition in the Vicinity of the Enbridge Superior Terminal[a]

State/County/Community	Total Population	Percent White	Percent Black or African American	Percent American Indian & Alaska Native	Percent Asian	Percent Native Hawaiian & Other Pacific Islander	Percent Other Race	Percent Reporting Two or More Races	Percent Hispanic or Latino – Any Race	Percent Minority
Wisconsin	5,556, 506	85.7	6.0	0.9	2.0	0.0	0.0	1.1	4.7	14.3
Douglas County	44,061	94.1	0.7	1.9	0.9	0.0	0.0	1.4	1.0	5.9
City of Superior[b]	26,960	94.3	0.7	2.2	0.8	0.0	0.3	1.7	0.8	5.7
Superior Village[b]	531	96.8	0.6	n/a	n/a	n/a	2.4	n/a	0.2	3.2
Allouez Village[b]	15,159	91.6	4.6	n/a	n/a	n/a	2.6	n/a	1.3	8.4

[a] Populations considered potentially affected for the environmental justice analysis for the Superior Terminal include Superior, WI and surrounding communities.
Data obtained using 2006 Census data, unless otherwise noted.
[b] Data obtained using 2000 Census data.

Sources: U.S. FedStats, 2008 and the Dept. of Housing and Utility Development, 2005.

Table 48 lists income distribution data in the terminal area.

Table 48 - Income Distribution in Douglas County and Wisconsin

Demographics on Income Distribution in the Vicinity of the Enbridge Superior Terminal[a]			
	Total Population	Median Household Income ($)	Percent Below Poverty Level
Wisconsin	5,556, 506	46,142	10.9
Douglas County	44,061	38,694	13.6
City of Superior	26,960	37,420[b]	13.9[c]
Superior Village	531	50,147[b]	3.4[c]
Allouez Village	15,159	65,471[b]	3.9[c]

[a] Populations considered potentially affected for the environmental justice analysis for the Superior Terminal include Superior, WI and surrounding communities. Data obtained using 2006 Census data, unless otherwise noted.

[b] Calculated in 2005 dollars.

[c] 2003 estimate.

Sources: U.S. FedStats, 2008 and the Dept. of Housing and Utility Development, 2005.

The closest residences are approximately 3,200 feet to the east/northeast of the proposed tank/manifold/booster pump area.

A Phase I Cultural Resource Investigation was completed for the proposed project location within the existing Superior Terminal, as well as the property proposed for the off-site wetland mitigation located on the south side of County Road C and the intersection of Darrow Road. The investigation was completed in 2008 by The 106 Group Ltd. (106 Group). A report has been submitted to the US Department of State, the Wisconsin State Historic Preservation Office, and to DNR for review.

VII. Environmental Effects

VII.A. AC and SL Pipelines

VII.A.1. Air quality

VII.A.1.a. Effects of proposed projects

VII.A.1.a.01. Construction

Temporary air emissions of fugitive dust and construction equipment exhaust is expected during construction.

VII.A.1.a.02. Operation

Pipeline operation is not expected to result in air emissions, unless spills occur. The lighter hydrocarbons that make up diluent and gasoline are typically much more volatile than the heavier hydrocarbons that make up a portion of crude oil. The high-viscosity petroleum mixtures, such as crude oil, are typically composed of high boiling point compounds with low solubility and volatility. Consequently, depletion via dissolution and/or volatilization can be slow (API, 2003). The higher volatile content of the diluent (compared to crude oil) means that, in the event of a release of diluent to the environment, a higher percentage of the diluent would be volatilized.

VII.A.1.b. Effects of alternatives

VII.A.1.b.01. Construction

Construction on alternative routes would result in effects similar to the proposed project, although longer routes would result in longer periods of dust and exhaust emissions.

VII.A.1.b.02. Operation

Operation of the pipelines, should they be constructed on alternative routes, is not anticipated to result in air emissions different than those from operation of the pipelines on the proposed route.

VII.A.2. Geology and soils

VII.A.2.a. Effects of proposed projects

VII.A.2.a.01. Construction

Pipeline construction can adversely affect soils in several ways. Potential effects include increased soil erosion, soil compaction, loss of soil productivity, and poor revegetation. Several pipeline construction procedures, including vegetation clearing, trenching, grading, and backfilling, could destabilize the soil surface and increase erosion. Soil erosion also could result from off-road vehicle traffic on the right-of-way following construction.

A soil’s susceptibility to erosion is a function of characteristics such as soil texture and structure, topography, surface roughness, vegetative cover, and climate. Erosion may also be influenced by the length of time the soils are bare and by disruption of drainage and erosion control structures

such as terraces. Water erosion occurs primarily on loose soils on moderate to steep slopes, particularly during high intensity storm events. Wind-induced erosion often occurs on dry, fine sandy soils where vegetation cover is sparse and strong winds are prevalent.

Soil compaction could result from the movement of heavy construction vehicles along the right-of-way. The degree of compaction would depend on the moisture content and texture of the soil. Compaction damages soil structure and reduces pore space, which impedes the movement of air and water to plant roots and can reduce growth rates. Clodding at shallow depths also complicates planting in agricultural areas. Potential for compaction is greatest where heavy equipment operates on moist to wet soils with high clay contents.

Mixing soil horizons during grading, trenching, and backfilling could reduce soil productivity by diluting the favorable physical and chemical properties of the topsoil with the less productive subsoil. These activities also could bring stones to the surface that could interfere with agricultural equipment.

Improper construction activities could disrupt natural drainage or damage existing surface and subsurface drainage systems. Underground drainage tiles could be cut during trenching and shallow tiles outside of the trench area could be damaged or displaced by heavy equipment, particularly where soil grading or topsoil stripping has reduced the depth of soil between the drainage tiles and construction equipment. Drainage tiles could also be damaged outside of the trench line by ruts from the operation of heavy equipment in wet soils. Disruption of surface and subsurface drainage systems could cause temporary crop losses off the right-of-way. The pipeline, if not buried deep enough, could also interfere with the placement of future drainage tiles.

Inadequate compaction of trench backfill could cause subsidence of soil over the pipeline, altering field drainage and causing water to pond over the pipeline, delaying planting or killing crops. Severe subsidence could also interfere with the operation of agricultural equipment.

Construction may also expose soils that are difficult to revegetate because they are excessively drained and dry. Another soil impact would be the loss of prime farmland soil if surface facilities are constructed on prime farmland soils.

Compactability and erodibility are the primary limitations of the soils that will be crossed. More than half (7.1 miles) of the soils along the proposed route are prone to compaction. Table XX in Section VI.B.1.a. lists the senitive soils crossed by the proposed pipeline route. Soil erosion is a critical risk at stream crossings along the proposed route. The use of dry waterway crossing techniques and careful attention to erosion control will help to minimize this risk. Provisions in the construction specifications should minimize impacts to soils. Enbridge proposes to minimize impacts on soils by using the measures described in its EMP. These measures are described in Section III.B.4.

Although pipeline construction activities could affect groundwater resources, most potential impact will be avoided or minimized by the use of both standard and specialized construction techniques. Shallow aquifers could experience localized impact from changes in overland water

flow and recharge caused by clearing and grading of the proposed right-of-way. In forested areas, enhanced water infiltration provided by a well-vegetated cover will be temporarily lost until vegetation is successfully reestablished. Near-surface soil compaction caused by heavy construction vehicles could also reduce the soil's ability to absorb water. This minor impact will be temporary and will not significantly affect groundwater resources.

Temporary dewatering of the pipeline trench may be required at certain times during construction when the accumulation of either groundwater or surface runoff restricts either visual inspection of the trench bottom before lowering in the pipe, or actual work in the trench. During trench dewatering, a hose is placed in the trench with the intake suspended above the bottom of the trench to avoid disturbing sediment. Water is then pumped from the trench and discharged to an upland area or dewatering structure. During well point dewatering, well points are driven into the ground adjacent to the construction area. Groundwater is pumped through the well points, temporarily lowering the local water table and enabling work to occur below the normal water table level.

The potential impacts on users of unconfined near-surface aquifers depend on the rate and duration of pumping and the distance of the dewatering operation from the user. At any one location, trench dewatering typically only continues for a few days; keeping potential impacts very localized and temporary. When permissible, Enbridge proposes to minimize the impact of dewatering activities by discharging all water into well-vegetated upland areas or properly constructed dewatering structures, which will allow the water to infiltrate back into the ground and return to the aquifer. Pipeline trenches are anticipated to be approximately six feet deep, whereas most shallow residential wells range from 20 to 200 feet. At this depth, dewatering of surface runoff or ground water is not anticipated to cause a significant drawdown of nearby residential wells. Furthermore, trench dewatering is typically short term and used only as necessary during certain construction activities. Consequently, well impacts resulting from construction dewatering are unlikely.

VII.A.2.a.02.Operation

Other than inspections from vehicles and routine removal of brush and trees, there should be little disturbance of the corridor, and associated long term effects due to operating and maintaining the pipeline. Catastrophic effects due to pipeline failures during operations and maintenance are possible, but unlikely. Depending on the quantity of crude oil or diluent spilled into surface waters, and the speed of detecting and responding to the spill, effects could be minor or significant.

Some spills and leaks have occurred at Enbridge facilities. Section V.B. lists spills and leaks report by Enbridge.

Spills resulting from refueling of construction vehicles and storage of fuel, oil, and other fluids during construction could contaminate groundwater if not detected and cleaned up. Enbridge will minimize this risk by conducting refueling and storing fuels and fluids at least 100 feet from streams and rivers, and by requiring the immediate containment and cleanup of spills. Enbridge will require contractors to follow a Spill Plan during construction which describes measures to

minimize the potential for spills, and outlines procedures to contain, clean up, and report spills should they occur.

Groundwater could also be at risk from spills of crude oil and/or diluent resulting from pipeline leaks during operations. Enbridge must design and test its pipeline to meet strict federal specifications. The Company has state of the art safety, inspection, and leak detection systems in place that exceed federal standards, and that minimize the chance of a spill and enhance its ability to locate spills quickly. Further, spills are very rare and Enbridge has comprehensive emergency response procedures in place to rapidly respond to and clean-up spills in accordance with strict environmental regulations. In its 48 years of operating a large and complex pipeline system, Enbridge has never impacted a water supply well.

Since 1998, when Enbridge (then named Lakehead Pipe Line) expanded to build its second pipeline from Superior to the Chicago area, Enbridge has had seven reportable pipeline system releases. Six of the seven reportable releases have occurred within the Superior Tank Terminal and Pipeline Maintenance facility in Superior, Wisconsin and were related to material and equipment malfunctions of station or terminal piping. The other leak occurred on the mainline and was attributed to third party damage.

These incidents are reportable to the U.S. Department of Transportation, Pipeline and Hazardous Materials Safety Administration (PHMSA) as the Enbridge system is a federally-regulated interstate liquid petroleum pipeline. Currently, the federal regulations require reporting of all releases greater than 5 gallons (and/or if other threshold reporting criteria as listed in 49 CFR Part 195 are met). As a public record, all releases on the Enbridge system that are reportable to PHMSA are posted on that agency's website at *www.phmsa.dot.gov*. Enbridge has had no enforcement action as a result of these incidents by PHMSA.

In addition, Enbridge is required by Wisconsin rules to report releases to the Department of Natural Resources (WDNR), and management regarding the response and remediation of such incidents is overseen by the WDNR.

Enbridge is required to maintain an Emergency Response Plan (ERP) for their facilities, which must be submitted to the PHMSA for approval. Any new facilities must be incorporated into the approved ERP plan.

Due to the presence of heavier long-chain hydrocarbons in crude oil that are not present in diluent or gasoline, crude oil has a higher viscosity than diluent. Crude oil and other heavy petroleum products (e.g., heating oil) can have viscosities that are 20 to 50 times greater than water (API, 2003) and also considerably higher than diluent or gasoline (see Table 1, above). As a result of this higher viscosity, crude oil is more resistant to flow in the environment than diluent and will tend to remain trapped in void spaces in the soil more readily than diluent. There are both advantages and disadvantages to diluent's lower viscosity compared to crude oil in the event of a release. The disadvantage to diluent's lower viscosity is that diluent will typically be able to migrate through the subsurface at a faster rate than crude oil and could travel a greater distance in a given amount of time. However, the rate of migration of the less viscous diluent will still be limited by the hydraulic gradient and the rate of groundwater flow. The primary

advantage of diluent's lower viscosity is that it is more readily recovered (removed) from the environment, since it will flow more readily toward remediation features (e.g., recovery wells) and will not adhere as strongly to soil.

Lighter, shorter-chain hydrocarbons are much more amenable to natural attenuation (biological degradation) than the heavier hydrocarbons in crude oil (EPA, 2004). Therefore, an advantage of diluent's compositional makeup is that it is more likely to undergo significant natural degradation in the environment (particularly in the vadose zone above the water table), which will contribute to the remediation.

Remediation of a diluent release would start with recovery of free-phase product (i.e., pure product that has not mixed with water). As discussed above, due to its lower viscosity, free-phase diluent is considerably more amenable to recovery from the environment than free-phase crude oil. Depending upon the size of the release, this could involve the use of absorbents, or vacuum trucks for larger releases. Upon completion of free-phase product recovery, the horizontal and vertical extent of impacts would be delineated. Since diluent is expected to be more mobile than crude oil, the potential for vertical infiltration is higher than for crude, but will vary based on the soil type and duration of time before the accumulated product is recovered.

VII.A.2.b. Effects of alternatives
VII.A.2.b. 01. Construction

Construction effects on soils and geology on alternative routes would be expected to be more extensive than those from construction on the proposed route, since the alternative routes are generally longer.

VII.A.2.b. 02. Operation

Operation of the pipelines, should they be constructed on alternative routes, is not anticipated to result in effects on soils and geology different than those from operation of the pipelines on the proposed route.

VII.A.3. Hydrography
VII.A.3.a. Surface waters
VII.A.3.a. 01. Effects of proposed projects
VII.A.3.a. 01.aa. Construction

Pipeline construction across waterbodies has the potential for short-term and long-term adverse environmental impacts if not mitigated. Installation of a pipeline across a stream or river can temporarily displace stream bottom sediments and increase erosion of soils adjacent to the waterbody. The magnitude and duration of these effects depends on the soils and topography of the site, and the proposed crossing method. Construction could also change the stream bottom profile, resulting in increased siltation or erosion at the site or further downstream. The measures outlined in Enbridge's WI EMP have been developed to effectively minimize short- and long-term impact on the waterbodies during and following pipeline construction.

Long-term impacts on water quality could result from alteration of the streambanks and removal of riparian vegetation. Soil erosion associated with surface runoff and streambank sloughing could also result in the deposition of sediments in waterbodies. Removal of riparian vegetation could also lead to increased light penetration into the waterbody, causing increased water temperature which could potentially be detrimental to fisheries.

Enbridge would avoid and minimize impacts on waterbodies by implementing the measures described in its WI EMP and its Revegetation Plan. Enbridge also would limit the duration of construction within waterbodies and limit equipment operation within waterbodies to the area necessary to complete the crossing. Disturbed areas at crossings would be restored and stabilized as soon as practical after pipeline installation.

Spills from refueling operations, fuel storage, or equipment failure in or near a waterbody could affect aquatic resources and contaminate the waterbody downstream of the release point. Enbridge would minimize the potential impact of spills of hazardous materials by implementing the measures described in its Spill Prevention, Containment, and Control Plan.

An additional risk specific to the setting of the Pokegama River is the presence of steep slopes leading down to the riparian wetlands.

VII.A.3.a.01.bb. Operation

Other than inspections from vehicles and routine removal of brush and trees, there should be little disturbance of the corridor, and associated long term effects on water quality due to operating and maintaining the pipeline. Catastrophic effects due to pipeline failures during operations and maintenance are possible, but unlikely. Depending on the quantity of crude oil spilled into surface waters, and the speed of detecting and responding to the spill, effects could be minor or significant. Some spills and leaks have occurred at Enbridge facilities.

If the diluent were to reach the groundwater, there is the potential for both a free-phase product plume and a dissolved-phase plume to be present. Free-phase product recovery would use typical light nonaqueous phase liquids (LNAPL) recovery techniques such as skimmer pumps and dual-phase extraction. The technique will differ based on soil conditions. However, since the diluent is more mobile than crude oil, skimmer pumps are more likely to be an effective technique. Dual-phase extraction, which combines total fluids recovery with enhanced vacuum, could be effective for diluent and dual-phase extraction. With either option, crude oil recovery will typically take longer due to decreased mobility.

Remediation of dissolved phases emanating from a diluent or crude oil release would typically be completed using air sparging. The effectiveness of air sparging will depend upon the permeability of the soil and the volatility of the chemical. For both diluent and crude oil release, dissolved-phase BTEX (benzene, toluene, ethyl benzene, and xylenes) plumes would be expected. Similar to soil vapor extraction, diluent is expected to be amenable to air sparging, since removal of dissolved-phase BTEX plumes through air sparging is based on vapor pressure greater than 0.5 mm HG, boiling range less than 250 - 300 C, and Henry's Law Constant greater than 100 atm.

VII.A.3.a.02. Effects of alternatives
VII.A.3.a.02.aa. Construction

Table 49 compares the proposed pipelines route with the seven alternative routes.

Table 49 - Surface Waters Crossed by Proposed and Alternative Pipeline Routes

Environmental Factor	Source	Unit	Preferred Route	Alt. A[1]	Alt. B[2]	Alt. C[3]	Alt. D[4]	Alt. E[5]	Alt. F[6]	Alt. G[7]
Total Length	GIS Measurement	Miles	13.19	17.71	13.85	18.88	17.00	19.74	15.01	15.24
Waterbodies Crossed	USGS Topo Map	Number	8	25	14	23	5	22	16	17
Major Waterbodies Crossed (>100 feet)	USGS Topo Map	Number	0	2	0	0	0	0	0	0
Impaired Waterbodies Crossed	WDNR Designated Waters Search Tool	Number	0	2	0	1	0	0	0	0
PNWs Crossed	WDNR Designated Waters Search Tool	Number	0	3	0	0	0	0	0	0
ASNRIs Crossed	WDNR Designated Waters Search Tool	Number	3	19	6	17	2	11	9	8

[1] Alternative A includes segments D1, B3, B4, and B6.
[2] Alternative B follows Northern Natural Gas ROW, segments B1 (does not follow entire segment), B4b, and B6.
[3] Alternative C includes segments C1 and C4.
[4] Alternative D includes segments C1, C3, and B6.
[5] Alternative E includes segments C1, C2, B2, B3, B4, and B6.
[6] Alternative F follows the Great Lakes Gas Transmission Line ROW, segment C3 (does not follow entire segment), and B6.
[7] Alternative G includes segments B1, B2, B3, B4, and B6.

Table 50 compares the proposed pipelines route with the three alternative route segments at the Nemadji Golf Course (referred to as segments B5, B6, and B7).

Table 50 - Nemadji Golf Course Alternative Pipeline Route Segments

Comparison of Route Segments B5, B6, and B7				
Environmental Factor	**Unit**	**Segment B5**	**Segment B6**	**Segment B7**
Total Length	Miles	0.82	0.70	0.65
Adjacent to Existing ROW	Miles	0.00	0.12	0.34
Waterbodies Crossed	Number	0	0	0
Major Waterbodies Crossed (>100 feet)	Number	0	0	0
Impaired Waterbodies Crossed	Number	0	0	0
PNWs Crossed	Number	0	0	0
ASNRIs Crossed	Number	0	0	0

[a] Length: length crossed in miles.
[b] Acres: Acres within permanent ROW
[c] Includes open pasture/hayfields.
[d] Railroad currently under review for eligibility for listing on the National Register of Historic Places
[e] Based on WWI data. Subsequent wetland delineation data indicate wetlands are PUB/PEM/PSS.
[f] Data represents the total area within a boundary and is not representative of the actual wetland acres impacted.`

Construction of the pipelines on alternative routes would affect more waterbodies than would construction on the proposed route. Some of the alternative routes are higher in the watershed than is the proposed route, however. Erosion and sediment impacts on these alternative routes would, therefore, have less chance to reach the sensitive downstream resources of: wild rice beds, the St. Louis River Estuary, and Lake Superior. Careful attention to protecting water bodies at crossing locations should protect downstream resources regardless of the route chosen.

VII.A.3.a. 02.bb. Operation

Operation of the pipelines on alternative routes would not likely result in different risks to waterways than would operation of the pipelines on the proposed route. Some of the alternative routes are higher in the watershed than is the proposed route so that sensitive downstream resources would be less likely to be impacted in the event of a spill event. The additional waterway crossings of the alternative routes would increase the number of locations where a spill event could affect a surface water resource, however.

VII.A.3.b. Wetlands
VII.A.3.b.01. Effects of proposed projects
VII.A.3.b.01.aa. Construction

Sixty-seven wetlands totaling over 29,700 feet of crossing lie within the construction footprint along the 10.9 mile portion of the Clipper project within the St. Louis watershed in Douglas County.

A mix of small isolated wetlands and large alder-dominated wetlands are crossed in this area beginning east of the Minnesota/Wisconsin border near milepost 1084.8. Wetlands in this area are similar in extent and, in many cases, vegetative composition. Many have been modified slightly by ditching and logging activities.

Nine wetlands are located within the construction footprint, however they would not be crossed by either pipeline (no excavation disturbance). Additional wetland delineations at the reroute within the Pokegama-Carnegie wetland area and between MP 1085 through 1087 (at the request of the ACOE) will be conducted in the spring of 2009.

Enbridge has provided a summary of wetland impacts for the proposed project in Table 51a. Acreages for temporary workspace include extra workspaces identified in Table 51c. Enbridge currently maintains a 125-foot-wide permanent easement and depending on the orientation of the project to the existing lines, intends to minimize new permanent ROW by overlapping with the existing maintained ROW. This breakdown of the existing versus new permanent ROW is also provided in Table 51a.

Table 51a - Wetland Impacts by Type in the Proposed Pipeline Area

Wetland Impacts by Type Within the Alberta Clipper and Southern Lights Diluent Pipeline Project Area Douglas County, Wisconsin[a]					
		Area within Permanent ROW (Acres)			
Wisconsin Wetland Type	Area Within Temporary Workspace (acres)[b]	Existing	New	Total	Total Area (acres)
E2H	0.24	0.17	0.22	0.39	0.63
E2K	10.14	19.16	6.21	25.37	35.51
S3K	19.25	0.9	11.89	12.78	32.03
T3K	3.81	0.15	1.93	2.08	5.89
WOLx	0.16	0	0.21	0.21	0.37
Grand Total	33.6	20.38	20.46	40.83	74.43

[a] Based on the proposed route variations (B6) at the golf course, the route variations at MP 1086, MP 1089, and siting the pipeline to the north of the existing lines in the Pokegama-Carnegies wetland complex.
[b] Includes temporary construction ROW and extra workspaces.

Table 51b shows the wetland data for each wetland crossing on the proposed alignment.

Table 51b - St. Louis River Wetlands in the Proposed Pipeline Project Workspace

Type, Distribution, and Mitigation for Wetlands within the Project Workspace in Segment 6, St. Louis Watershed, Douglas County , Wisconsin								
Wetland ID	**EWEPS[A]**	**Cowardin Class[B]**				**Total Wetland**	**Crossing Length**	**Comments**
		PEM	**PFO**	**PSS**				
		Total Construction Workspace		**Temp**	**Perm**			
		Acres[C]					**Feet**	
w-1085ws1	1	0.53				0.53	120	Narrow drainage abutting small intermittent waterbody
w-1085ws2	2	0.18		0.05	0.02	0.26	59	Broad headslope, gradual topography, minimal flow-through
w-1085ws4	1	0.08	0.02	0.12	0.06	0.26	141	Narrow wetland complex abutting natural drainage,
w-8r1085a	1			0.01		0.01	0	Small isolated depression, red clay soil, 4” A-horizon

Type, Distribution, and Mitigation for Wetlands within the Project Workspace in Segment 6, St. Louis Watershed, Douglas County , Wisconsin								
Wetland ID	EWEPS[A]	Cowardin Class[B]				Total Wetland	Crossing Length	Comments
		PEM	PFO	PSS				
		Total Construction Workspace		Temp	Perm			
		Acres[C]					Feet	
w-8r1085b	1	0.12				0.12	115	Small isolated depression within existing ROW
w-8r1085c	1	0.06				0.06	65	Small isolated depression within existing ROW
w-8r8086x	3		0.11			0.11	0	
w-8r1086y	3		0.56			0.56	210	Depressional wetland complex, on level clay plain
w-1086ws1	2,3	2.85		0.56	0.31	3.72	1287	Narrow wetland complex abutting intermittent waterbody
w-1086ws3	3, 4	1.21		0.65	0.08	1.94	827	Depressional wetland complex, PEM within existing ROW
w-1086ws4	4	0.34				0.34	118	Small isolated wetland depression
w-1086ws4-2	4	0.23		0.11	0	0.34	196	Narrow wetland complex abutting intermittent waterbody
w-1087ws1	4, 5	2.85		0.56	0.31	3.72	1063	Depressional wetland complex, PEM within existing ROW
w-1087ws2	5	0.1				0.1	48	Small isolated emergent depression within existing ROW
w-1087ws3	5	0.38		0.06	0.04	0.48	170	Narrow emergent wetland abutting seasonal waterbody
w-1087ws3-2	5	0.11		0.06	0.03	0.21	154	Small isolated shrub wetland, PEM within existing ROW
w-1087ws3-3	5	0.1				0.1	58	Small isolated depression
w-1087ws5	5	0.36		0.47	0.12	0.95	263	Depressional shrub wetland, PEM within existing ROW
w-1087ws7	5,6	0.75		0.54	0.15	1.44	504	Depressional shrub wetland, PEM within existing ROW
w-8r1087a	6	0.13				0.13	161	Small isolated depression within existing ROW
w-8r1087b	6		0.01			0.01	0	Small isolated forest depression
w-8r1087c	6		0.09			0.09	0	Small isolated forest depression
w-8r1087d	6	0.23				0.23	137	Small isolated depression
w-8r1088b	9	0.48				0.48	314	Wetland within linear ditch feature
w-8r1088c	9	0.09				0.09	31	Wetland within linear ditch feature
w-8r1088d	8	0.04				0.04	0	Wetland within linear ditch feature
w-8r1088e	8	0.09				0.09	90	Shallow depression adjacent to linear ditch feature
w-8r1088f	8	0.03				0.03	7	Wetland within linear ditch feature

Type, Distribution, and Mitigation for Wetlands within the Project Workspace in Segment 6, St. Louis Watershed, Douglas County , Wisconsin								
Wetland ID	EWEPS[A]	Cowardin Class[B]				Total Wetland	Crossing Length	Comments
		PEM	PFO	PSS				
		Total Construction Workspace		Temp	Perm			
		Acres[C]					Feet	
w-1088ws1	6	1.21		0.99	0.32	2.52	951	Part of large alder wetland complex, PEM in existing ROW
w-1088ws2	7	0.75		0.74	0.17	1.66	512	Part of large alder wetland complex, PEM in existing ROW
w-1088ws3	7, 8	0.9		2.05	3.05	6	1774	Part of large alder wetland complex, PEM in existing ROW
w-1088ws4	7,8	0.47		1.66	1.67	3.8	1323	Part of large alder wetland complex, PEM in existing ROW
w-1090ws1	10	0.04			0.05	0.09	0	Small isolated roadside wetland
w-1090ws12	10	0.05		0.06	0.24	0.35	169	Shallow shrub wetland depression between home sites
w-1090ws2	10	0.02		0.04	0.13	0.19	75	Shallow wetland roadside wetland, adjacent to home site
w-1090ws3	10	0.66		0.21	0.39	1.26	460	Part of a large alder wetland complex, marginal to roads and home sites
w-1090ws4	10	0.06				0.06	28	Small isolated roadside wetland
w-1090ws5	10	0.65		0.25	0.26	1.17	445	Part of a large alder wetland complex
w-8r1090a	10				0.05	0.05	17	Small isolated roadside wetland
w-8r1090b	10			0.06		0.06	0	Small, isolated depression near house
w-1090ws6	10, 11	0.03		0.28	0.07	0.38	73	PCWC ASNRI. Depressional wetland that drains into Little Pokegama River
INT1090a	11		0.60			0.60	0	PCWC ASNRI. Interpolated based on aerial photo analysis. Forested area along Little Pokegama River
INT1090b	11		1.33			1.33	57	PCWC ASNRI. Interpolated based on aerial photo analysis. Part of large alder wetland complex.
INT1090c	11, 12		2.82	5.26	2.12	10.20	1998	PCWC ASNRI. Interpolated based on aerial photo analysis. Part of large alder wetland complex.
w-1090ws10	11	0.02			0.00	0.02	9	PCWC ASNRI. Narrow wetland abutting small intermittent waterbody
w-1090ws11	11, 12	2.07			0.00	2.07	831	PCWC ASNRI. Part of large alder wetland complex.
w-1090ws6	10, 11	0.03		0.28	0.07	0.38	73	PCWC ASNRI. Depressional wetland that leads to drainage into Tributary of Pokegama River
w-1090ws8	11	0.01			0.00	0.01	0	PCWC ASNRI. Shrub wetland with small upland knolls, part of complex that connects to drainage into Tributary of Pokegama River

Type, Distribution, and Mitigation for Wetlands within the Project Workspace in Segment 6, St. Louis Watershed, Douglas County , Wisconsin								
Wetland ID	EWEPS[A]	Cowardin Class[B]				Total Wetland	Crossing Length	Comments
		PEM	PFO	PSS				
		Total Construction Workspace		Temp	Perm			
		Acres[C]					Feet	
w-1090ws9	11	0.22			0.11	0.33	202	PCWC ASNRI. Shrub wetland that leads to drainage into Tributary of pokegama River
w-1091ws1	12, 13	1.69			0.00	1.69	1317	PCWC ASNRI. Part of large alder wetland complex
w-1092ws1	13	0.99		0.12	0.06	1.17	731	PCWC ASNRI. Part of large alder wetland complex
w-1092ws2	13	0.01			0.00	0.01	0	PCWC ASNRI. Small depression within existing ROW
w-1092ws3	13	0.51		0.23	0.17	0.91	483	PCWC ASNRI. Part of large alder wetland complex
w-1092ws4	13	0.45		0.18	0.11	0.74	366	PCWC ASNRI. Part of large alder wetland complex
w-1092ws5	13, 14	4.42		2.94	0.38	7.74	3130	PCWC ASNRI. Part of large alder wetland complex
w-1093ws1	15, 16	8.32		3.36	0.49	12.17	4603	PCWC ASNRI. Part of large alder wetland complex, PEM in existing ROW
w-1093ws2	16, 17	0.74				0.74	53	Narrow wetland abutting seasonal waterbody
w-1094ws1	17	0.23				0.23	83	Shallow depression adjacent to water treatment facility
w-1094ws2	17	0.23		0.16	0.01	0.4	169	Small depressional wetland near the top of the
w-1094ws4	18	1.26		0.89	0.29	2.44	867	Part of large alder wetland complex leading to Pokegama River adjacent to housing development
w-8r1095a	18			0.05	0.05	0.1	74	Wetland consists of a constructed ditch located at the edge of a baseball field
w-1094ws5	18	0.03				0.03	9	Linear ditch wetland adjacent to railroad
w-1094ws6	18	0.24				0.24	56	Depressional wetland positioned between two roads
w-1094ws7	18	0.28				0.28	0	Depressional wetland between railroad and highway
w-1094ws8	17	0.34	0.22			0.56	175	Wetland abutting Pokegama River
w-1095ws2	19, 20	3.36		3.05	0.95	7.36	2530	Part of large alder wetland complex, PEM in existing ROW. Majority of wetland is in St. Louis watershed. Acreage associated with A small portion to the north that is included within the Beartrap-Nemadji watershed is provided
w-1095ws4	19	0.18				0.18	95	Channelized swale that drains into adjacent wetland complex

Type, Distribution, and Mitigation for Wetlands within the Project Workspace in Segment 6, St. Louis Watershed, Douglas County , Wisconsin								
Wetland ID	EWEPS[A]	Cowardin Class[B]				Total Wetland	Crossing Length	Comments
		PEM	PFO	PSS				
		Total Construction Workspace		Temp	Perm			
		Acres[C]					Feet	
w-1093ws1	15, 16	8.32		3.36	0.49	12.17	4603	PCWC ASNRI. Part of large alder wetland complex, PEM in existing ROW
w-1093ws2	16, 17	0.74				0.74	53	Narrow wetland abutting seasonal waterbody
Grand Total		***41.81***	***5.76***	***26.13***	***12.33***	***86.03***	**29,739**	**-**
Mitigation Required		**1.25**	**2.88**	**2.61**	**6.17**	**12.91**		**-**

[A] – Number of the Environmental Plan Sheet.

[B] – Cowardin class indicates farmed emergent wetland (PEMf), emergent wetland (PEM), Forested wetland (PFO), and scrub shrub wetland (PSS). Wetland types were digitized based on air photo interpretation of high resolution 2007 aerial photography performed by the wetland delineators.

[C] - Acres in the workspace. For the purposes of this report extra temporary workspace, temporary workspace, and permanent workspace are combined for farmed, emergent, and forested wetlands. Scrub shrub wetland impacts are separated into permanent and temporary workspace to account for varying mitigation ratios required under ACOE guidance. Individual values may not add up to the exact acreage total due to rounding errors.

Enbridge has identified nine wetlands where EWS would be required within the wetland boundary. Table 51c identifies wetlands, milepost, workspace dimension, area of impact and justification for the need to place the EWS in the wetlands.

Table 51c - Extra Workspaces in Wetlands

Extra Workspaces in Wetlands				
Wetland Identifier	Starting Milepost	Workspace Dimensions	Area of Workspace (Acres)	Justification
1088ws3	1089.9	75 x 100	0.15	Needed for staging of road crossing.
1090ws6	1090.6	75 x 140	0.10	Facilitate pipeline crossover
INT1090a	1090.62	65 X 110	0.17	Facilitate pipeline crossover
1093ws1	1093.2	75 x 150	0.20	Facilitate the crossing of Duluth Misabe and Iron Range railroad
1094ws7	1094.8	200 x 100	0.28	Facilitate the crossing at BNRR and Tower Ave
1095ws2	1095.2	100 x 100	0.11	Facilitate the crossing of East Limits Road
1096d	1096.0	100 x 100 (2x)	0.34	Facilitate pipeline crossover
1096d	1096.2	100 x 100 (2x)	0.19	Facilitate crossing 58th Street
1097b	1097.64	75 x 100	0.17	Facilitate crossing at Barton Avenue.
		Total	1.71	

As originally proposed, the pipeline route would cross 10 wetlands designated as wetlands of special concern. These wetlands are found within the Pokegama-Carnegie wetland complex. These wetland complexes are located with the Lake Superior drainage basin. They are found within the poorly drained, red clay flats in the headwaters of the Pokegama and Little Pokegama rivers. The original preferred route extended into the Superior Airport/Hill Avenue wetlands, however Enbridge has selected a reroute at this location to avoid the wetland complex. Enbridge

has also prepared a plan for minimization of impacts within the Pokegama-Carnegie wetland complex . Wetlands of special concern are listed in Table 52c.

Table 52c - Wetlands of Special Concern

Wetlands of Special Concern [a]						
Milepost	Eggers and Reed	Circular 39	Cowardin [b]	Total Length (ft)	Acres Affected by Construction [c]	Acres Affected by Operation [d]
1090.9 - 1091.5	Wet to Wet-Mesic Prairie Alder Thicket Shallow Marsh Coniferous Bog	Type 2/6/8	PEM/PSS	3223.5	9.0	5.6
1091.6 - 1091.8	Shrub Carr	Type 2/ 6	PEM/PSS	1168.2	3.5	1.9
1091.8 - 1092.0	Shrub Carr	Type 6	PEM/PSS	687.4	2.1	1.3
1092.1 - N/A	Shallow Marsh	Type 2	PEM/PSS	0.0	0.1	0.0
1092.09 - N/A	Shrub Carr	Type 2	PSS	0.0	0.1	0.0
1092.1 - 1092.2	Shrub Carr	Type 2/6	PEM/PSS	213.7	0.7	0.3
1092.2 - 1092.2	Shrub Carr	Type 2/6	PEM/PSS	15.9	0.1	0.1
1092.4 - 1093.1	Alder Thicket Hardwood Swamp	Type 1/3/ 6/7	PEM/PSS	2980.2	8.0	5.0
1093.1 - 1094.0	Shrub Carr	Type 2/6	PEM/PSS	4595.0	13.2	7.8
1096.7 - 1096.9	Alder Thicket	Type 6	PSS	1308.3	3.7	2.2

Based on WDNR Surface Water Data Viewer for Areas of Special Natural Interest (ASNRI) and Sensitive Plant Surveys

[a] Based on original route to the south of the existing lines. Refer to section 10.3.9

[b] Cowardin Classification: PEM = Palustrine Emergent; PSS = Palustrine Scrub-Shrub; PFO = Palustrine Forested; PUB = Palustrine Unconsolidated Bottom

[c] Based on a 125-foot-wide construction ROW as well as any required extra workspaces.

[d] Based on a 75-foot-wide permanent ROW that would be permanently maintained in an herbaceous state.

Approximately 41.81 acres of emergent wetlands would be affected during pipeline construction in the St. Louis River watershed, and another 9.68 acres would be affected in the Beartrap-Nemadji watershed.

Scrub-shrub wetlands within the temporary workspace and permanent corridors are cleared to facilitate equipment traffic during construction. Scrub-shrub wetland located within the permanent corridor is maintained in an emergent hydrophyte cover by brushing, mowing, and clearing to facilitate remote aerial inspection. Approximately 8.78 acres of scrub-shrub wetland impact would occur in the St. Louis River watershed, and approximately 0.86 acres of scrub-shrub wetland impact within the construction ROW would occur within the Beartrap-Nemadji watershed.

Forested wetlands within the temporary workspace and permanent corridors are cleared to facilitate equipment traffic during construction. Forested wetland located within the permanent corridor is maintained in an emergent hydrophyte cover by brushing, mowing, and clearing to facilitate remote aerial inspection. Approximately 5.76 acres of forested wetland impact would

occur in the St. Louis River watershed, and approximately 2.56 acres of forested wetland impact within the construction ROW would occur within the Beartrap-Nemadji watershed.

The primary impact of pipeline construction and right-of-way maintenance activities on wetlands will be the temporary removal of wetland vegetation. Construction also will temporarily diminish the recreational and aesthetic value of the wetlands crossed. These effects will be greatest during and immediately following construction. In emergent wetlands, the impact of construction will be relatively brief, since herbaceous vegetation will regenerate within one or two seasons. In forested and shrub-dominated wetlands, the impact will last longer due to the longer recovery period of these vegetation types. Forested wetlands may not regenerate due to specific circumstances like altered conditions since the forest began or the competition of invasive species, among others. Clearing of wetland vegetation also will also temporarily remove or alter wetland wildlife habitat.

Compaction and rutting of wetland soils could result from the temporary stockpiling of soil and the movement of heavy machinery. Surface drainage patterns and hydrology could be temporarily altered, and there will be increased potential for the trench to act as a drainage channel. Increased siltation and turbidity may result from trenching activities. Disturbance of wetlands also could temporarily affect the wetland's capacity to control erosion and floods.

Enbridge will implement measures described in its EMP to minimize the environmental impact of construction on wetlands. Construction through wetlands will comply, at a minimum, with Section 404 permit conditions and the conditions of the state's 401 water quality certification.

VII.A.3.b.01.bb. Operation

Pipeline operation should not result in additional impacts to wetlands, unless a spill would occur.

VII.A.3.b.02. Effects of alternatives
VII.A.3.b.02.aa. Construction

Table 53 compares the proposed pipelines route with the seven alternative routes.

Table 53 - Wetland Effects Comparison of Proposed and Alternative Pipeline Routes

Environmental Factor	Source	Unit	Preferred Route	Alt. A[1]	Alt. B[2]	Alt. C[3]	Alt. D[4]	Alt. E[5]	Alt. F[6]	Alt. G[7]
Total Length	GIS Measurement	Miles	13.19	17.71	13.85	18.88	17.00	19.74	15.01	15.24
Adjacent to Existing Right-of-Way	GIS Measurement	Miles	11.7	6.04	13.4	0.00	2.60	6.04	10.62	10.68
Total Wetlands Affected	WDNR WWI Data	Length Crossed (mi)	6.22	3.65	5.38	4.87	7.51	7.34	6.58	5.51
	WDNR WWI Data	Acres - Permanent Impacts	24.05	23.91	39.37	44.68	58.80	57.70	49.62	41.28
Forested	WDNR WWI Data	Length Crossed (mi)	0.18	0.46	0.21	0.75	0.91	0.54	0.59	0.21

Environmental Factor	Source	Unit	Preferred Route	Alt. A[1]	Alt. B[2]	Alt. C[3]	Alt. D[4]	Alt. E[5]	Alt. F[6]	Alt. G[7]
	WDNR WWI Data	Acres - Permanent Impacts	0.66	3.20	0.81	6.81	7.48	3.96	4.57	0.81
Forested, Scrub/Shrub	WDNR WWI Data	Length Crossed (mi)	4.41	2.57	4.21	2.56	3.70	4.89	3.10	4.61
	WDNR WWI Data	Acres - Permanent Impacts	19.23	17.14	32.18	23.45	27.31	38.45	22.32	36.30
Forested, Emergent	WDNR WWI Data	Length Crossed (mi)	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.00
	WDNR WWI Data	Acres - Permanent Impacts	0.00	0.00	0.00	0.21	0.00	0.00	0.00	0.00
Scrub/Shrub	WDNR WWI Data	Length Crossed (mi)	1.54	0.50	0.72	0.91	1.79	1.17	1.12	0.60
	WDNR WWI Data	Acres - Permanent Impacts	3.88	2.76	4.77	8.43	14.39	9.05	8.28	3.84
Scrub/Shrub, Emergent	WDNR WWI Data	Length Crossed (mi)	0.00	0.00	0.15	0.48	0.98	0.61	0.57	0.00
	WDNR WWI Data	Acres - Permanent Impacts	0.00	0.00	1.29	4.36	8.89	5.43	4.84	0.00
Emergent	WDNR WWI Data	Length Crossed (mi)	0.09	0.12	0.09	0.00	0.09	0.09	1.19	0.09
	WDNR WWI Data	Acres - Permanent Impacts	0.28	0.74	0.26	0.00	0.26	0.26	9.61	0.26
Emergent, Open Water	WDNR WWI Data	Length Crossed (mi)	0.00	0.00	0.00	0.10	0.00	0.00	0.00	0.00
	WDNR WWI Data	Acres - Permanent Impacts	0.00	0.00	0.00	0.95	0.00	0.00	0.00	0.00
Open Water	WDNR WWI Data	Length Crossed (mi)	0.00	0.00	0.00	0.04	0.04	0.04	0.00	0.00
	WDNR WWI Data	Acres - Permanent Impacts	0.00	0.06	0.06	0.47	0.47	0.53	0.00	0.06
Wetlands within SAMP	WDNR	Acres - Permanent Impacts	0.00	0.0	0.0	1.55	0.0	0.0	0.0	0.0
Priority Wetlands (w/in Lake Superior Basin)[8]	WDNR Digitized by NRG	Acres - Permanent Impacts	4.0	28.0	4.0	0.00	4.0	4.0	4.0	4.0

[1] Alternative A includes segments D1, B3, B4, and B6.
[2] Alternative B follows Northern Natural Gas ROW, segments B1 (does not follow entire segment), B4b, and B6.
[3] Alternative C includes segments C1 and C4.
[4] Alternative D includes segments C1, C3, and B6.
[5] Alternative E includes segments C1, C2, B2, B3, B4, and B6.
[6] Alternative F follows the Great Lakes Gas Transmission Line ROW, segment C3 (does not follow entire segment), and B6.
[7] Alternative G includes segments B1, B2, B3, B4, and B6.
[8] Data represents the total area within a boundary and is not representative of the actual wetland acres impacted.

Table 54 compares the proposed pipelines route with the three alternative route segments at the Nemadji Golf Course (referred to as segments B5, B6, and B7).

Table 54 - Wetland Effects Comparison of Nemadji Golf Course Route Variations

Comparison of Route Segments B5, B6, and B7				
Environmental Factor	**Unit**	**Segment B5**	**Segment B6**	**Segment B7**
Total Length	Miles	0.82	0.70	0.65
Adjacent to Existing ROW	Miles	0.00	0.12	0.34
Total Wetlands Affected	Length [a]	0.51	0.05	0.00
	Acres [b]	4.56	0.16	0.00
Forested	Length [a]	0.00	0.00	0.00
	Acres [b]	0.00	0.00	0.00
Forested, Scrub/Shrub	Length [a]	0.18	0.05	0.00
	Acres [b]	1.55	0.16[e]	0.00
Forested, Emergent	Length [a]	0.00	0.00	0.00
	Acres [b]	0.00	0.00	0.00
Scrub/Shrub	Length [a]	0.34	0.00	0.00
	Acres [b]	3.01	0.00	0.00
Scrub/Shrub, Emergent	Length [a]	0.00	0.00	0.00
	Acres [b]	0.00	0.00	0.00
Emergent	Length [a]	0.00	0.00	0.00
	Acres [b]	0.00	0.00	0.00
Emergent, Open Water	Length [a]	0.00	0.00	0.00
	Acres [b]	0.00	0.00	0.00
Open Water	Length [a]	0.00	0.00	0.00
	Acres [b]	0.00	0.00	0.00
Priority Wetlands (w/in Lake Superior Basin)	Acres[f] [a]	0.08	0.03	0.00

[a] Length: length crossed in miles.
[b] Acres: Acres within permanent ROW
[c] Includes open pasture/hayfields.
[d] Railroad currently under review for eligibility for listing on the National Register of Historic Places
[e] Based on WWI data. Subsequent wetland delineation data indicate wetlands are PUB/PEM/PSS.
[f] Data represents the total area within a boundary and is not representative of the actual wetland acres impacted.`

VII.A.3.b.02.bb. Operation

Operation of the pipelines on alternative routes would not likely result in different risks to wetlands than would operation of the pipelines on the proposed route, except that the additional wetland crossings of the alternative routes would increase the number of wetland locations where a spill event could occur.

VII.A.4. Groundwater

VII.A.4.a. Effects of proposed and alternative routes

Table 55 compares the proposed pipelines route with the seven alternative routes.

Table 55 - Drinking Water Areas Comparison of Proposed and Alternative Pipeline Routes

Environmental Factor	Source	Unit	Preferred Route	Alt. A[1]	Alt. B[2]	Alt. C[3]	Alt. D[4]	Alt. E[5]	Alt. F[6]	Alt. G[7]
Total Length	GIS Measurement	Miles	13.19	17.71	13.85	18.88	17.00	19.74	15.01	15.24
Drinking Water Areas	US DOT, Office of Pipeline Safety	Length Crossed (mi)	0.09	0.09	0.09	0.38	0.09	0.09	0.09	0.09

[1] Alternative A includes segments D1, B3, B4, and B6.
[2] Alternative B follows Northern Natural Gas ROW, segments B1 (does not follow entire segment), B4b, and B6.
[3] Alternative C includes segments C1 and C4.
[4] Alternative D includes segments C1, C3, and B6.
[5] Alternative E includes segments C1, C2, B2, B3, B4, and B6.
[6] Alternative F follows the Great Lakes Gas Transmission Line ROW, segment C3 (does not follow entire segment), and B6.
[7] Alternative G includes segments B1, B2, B3, B4, and B6.

Table 56 compares the proposed pipelines route with the three alternative route segments at the Nemadji Golf Course (referred to as segments B5, B6, and B7).

Table 56 - Drinking Water Areas Comparison of Nemadji Golf Course Route Variations

Comparison of Route Segments B5, B6, and B7				
Environmental Factor	**Unit**	**Segment B5**	**Segment B6**	**Segment B7**
Total Length	Miles	0.82	0.70	0.65
Adjacent to Existing ROW	Miles	0.00	0.12	0.34
Drinking Water Areas	Length [a]	0.00	0.00	0.00

[a] Length: length crossed in miles.
[b] Acres: Acres within permanent ROW
[c] Includes open pasture/hayfields.
[d] Railroad currently under review for eligibility for listing on the National Register of Historic Places
[e] Based on WWI data. Subsequent wetland delineation data indicate wetlands are PUB/PEM/PSS.
[f] Data represents the total area within a boundary and is not representative of the actual wetland acres impacted.`

VII.A.4.b.02. Operation

Pipeline operation should not result in impacts to groundwater, unless a spill would occur. Operation of the pipelines on alternative routes would not likely result in different risks to gound water resources than would operation of the pipelines on the proposed route, except that the additional length of the alternative routes would increase the distance over which a spill event could occur.

VII.A.5. Flora and fauna (habitats and species, including listed and invasive species)

The proposed projects would affect (EWS and construction ROW) 64 acres of land currently in use as forest land. The land is currently in ownership by Douglas County or private landowners. The forest appears to be used primarily as residential property, recreation or domestic wood products (i.e. firewood).This will contribute to cumulative forest fragmentation from many human activities throughout the state. Each forest patch will be reduced in size, at least temporarily causing a decline in integrity, and possibly diversity, in the forest patches.

When considering the effect of the project on woodlands, it is important to note that the existing right-of-way has been disturbed by previous construction and has been maintained in a predominantly herbaceous state. The existing right-of-way is not a forest ecosystem and has no understory vegetation. Some of the woody residues will be managed by burning. Burning permits and fire safety practices will have to be followed to minimize impacts.

Following construction, disturbed areas will be restored and seeded with grasses. Trees will be allowed to regrow on this area if permitted by the landowner. Planting appropriate species of trees and shrubs in previously wooded areas could speed the reestablishment of forest vegetation and mitigate the fragmentation caused by construction. The WDNR encourages the company to consider this as much as possible in their interactions with landowners. Within the permanent right-of-way, reestablishment of trees is prevented through periodic maintenance.

The impact on non-forest lands will be less than on forested areas due to the lower structural complexity and the shorter reestablishment period of the vegetation. Post-construction vegetation maintenance also will have less impact on the vegetation in non-forested land.

Secondary impacts associated with the clearing of existing vegetation may include a temporary increase in soil erosion and runoff, increased soil temperatures, soil mixing and soil compaction, and possible root damage and increased wind throw of trees adjacent to newly cleared areas. However, these effects will be temporary and will be mitigated by the procedures described in Enbridge's environmental management plan. Clearing of overstory vegetation will also produce higher light levels in the understory and may allow early successional species to become established along the edge of the newly cleared areas. However, this too will be temporary since this new edge vegetation will replace the edge vegetation that will be cleared during the initial stages of construction.

Enbridge recognizes that exotic plant species should be discouraged and that natural communities require a higher priority for weed-free mulch to maintain their current biological composition. Project environmental inspectors will be authorized to reject mulch that has evidence of weed contamination. If weed problems occur as a result of construction, Enbridge will either take appropriate steps to resolve the situation or will compensate the landowner for the additional cost of weed control.

Installing and operating the proposed facilities will result in direct and indirect impacts to wildlife and their habitat that are both temporary and permanent. Direct impacts include wildlife mortality and displacement through habitat loss, change to habitat quality and fragmentation. Clearing vegetation will reduce cover, nesting, and foraging habitat for some species, and may also cause mortality of some individuals of small, slower moving species. The most important secondary impacts that can result from linear developments is forest fragmentation, which reduces the available habitat for forest interior species, creates barriers to wildlife movement, increased predation and allows edge species to penetrate deeper into forest patches and interiors.

Enbridge interprets vegetation loss in the temporary workspace as a temporary impact stating that this workspace will be restored to pre-construction conditions. However, Enbridge's Revegetation Plan does not make it clear that temporary workspace will be restored, rather it

suggests that such areas will be allowed to revegetate on their own. Clearcut vegetation within the temporary workspace may take many years to reestablish and will not reestablish to preconstruction conditions on its own in all cases. The outcome is vegetation and species dependent. Common species that use the temporary and permanent workspace will move away from the right-of-way into adjacent undisturbed habitats until construction and restoration are complete and suitable conditions are reestablished. Animals that cannot adapt to the new or altered conditions will attempt to move to other habitat. Successful temporary or permanent displacement presumes there is suitable habitat that can support these animals within their range.

The temporary increase in open habitat and widening of the cleared right-of-way in the project area will favor species that use edges and open areas over forest interior species. However, it is important to point out that opening of corridors and increases in forest fragmentation generally favor common or invasive species. Rare species that prefer dense canopy or mature trees are generally not benefited. The opening created by width of the temporary workspace in addition to the permanent easement ROW will impede the movement of forest dwelling species.

Impact on habitats that are not forested will be less severe and short-term; with the most severe impacts occurring during construction and the next few growing seasons. In their wetland delineation, Enbridge identified high quality wetland communities that will be affected by the project. Some of these are non-forested. In general, high quality wetlands, are sensitive to any disturbance of soils, hydrology or vegetation. These areas will not reestablish on their own without active restoration. Strict enforcement of permit conditions and Enbridge’s best management practices are necessary to ensure that areas are appropriately restored and revegetated, the pipeline will not have a permanent effect on species using these habitats.

VII.A.5.a. Wooded lands
VII.A.5.a.01. Effects of proposed projects
VII.A.5.a.01.aa. Construction

Enbridge intends to minimize forest clearing where possible. Enbridge proposed to minimize the potential for erosion and other effects that may be associated with clearing with the implementation of its WI EMP. Following construction, forest land located within the permanent ROW would be restored and seeded as indicated in Enbridge’s Revegetation Plan. Enbridge maintains its permanent ROW on a regular basis to prohibit the growth of woody vegetation over its pipelines for safety and pipeline integrity issues. Forest land located within temporary work areas would be allowed to revert to its preconstruction land use, at property owner discretion.

Forested areas along the proposed construction right-of-way are limited to those areas outside of Enbridge's existing maintained right-of-way. Species vary based on the upland or wetland nature of the community. Species that are found within both wetland and upland communities include (in order of prevalence) aspen, balsam poplar, balsam fire and red maple. Aspen and balsam poplar are relatively short-lived species that are fast growing and clonal both in the uplands (fire dependent /mesic hardwoods) and unsaturated wetlands. Both of these species will be the first to re-establish within the disturbed temporary construction right-of-way. Red maple is another fast growing species typically successful at moving into an open site with the easy dispersal of seed and limited germination requirements. The balsam fir typically establishes quickly in fire

dependent forest communities (e.g., upland areas with well-drained sandy substrates) and wet forests and forested peatlands. Although it is a fast growing species, it is not anticipated to establish within the cleared temporary construction right-of-way in the same manner as the aspen, balsam polar or red maple.

Four additional species are present that are restricted to uplands and primarily found in fire-dependent forest communities. These include bur oak, black cherry, paper birch and white pine. Bur oak seems to re-establish successfully in recent clearings in northwest Wisconsin. However it is a slow growing species, particularly when compared to softwood species (e.g., aspen, balsam poplar) and is more likely to be found solely in the fire dependent uplands. Black cherry spreads by seed and is fairly successful thanks to dispersal by birds and is fast growing. Paper birch has a more successful germination rate in areas outside of closed canopies and is a fast growing species. It is anticipated this species will greatly benefit from the openings created during construction. The White Pine is a slow growing and long-lived species that may be the most difficult to reestablish along the construction right-of-way. Because the construction right-of-way will be cleared using mechanical means and not fire, some of the species, such as white pine, are not anticipated to be prevalent.

An additional four species, black willow, black ash, black spruce and tamarack, are typically found in these types of wetland communities. Black willow is not anticipated to be prevalent within the construction right-of-way. Like fellow family members (e.g., aspen and balsam poplar) this species is a pioneering species that is clonal and fast growing and would likely compete with the aspen and balsam poplar for establishment. Black ash is a slow-growing species, and while it should see higher rates of germination as a result of the reduced canopy, it will be competing with much faster growing species. Black spruce is not a common species within the survey corridor but this species will tend to establish on peat soils and is very slow growing. The last species, tamarack, is capable of quick establishment in peat soils where the onsite competition is from low growing vegetation (herbaceous and ericaceous species) and not faster growing tree species.

The key to species re-establishment will be the soil moisture gradient. Removal of trees will make these areas wetter with less evapo-transpiration taking place. The wetter the area is, the longer it will take for trees to establish and species that grow well in wetter environments will have a competitive edge (e.g., aspen and balsam poplar). Shrubs, particularly the willow species, may present some competition due to their clonal nature. This may be most often occurring with slower growing species but the majority of competition for re-establishment would be from species such as aspen and balsam poplar which thrive in both the upland and wetland communities, are fast-growing and would tend to take advantage of the cleared construction right-of-way to establish new communities. Invasive species may present additional competition, typically limited to reed canary grass preventing trees from successfully establishing. However, reed canary grass is not anticipated to have a large impact on tree re-establishment. It is more likely that herbivores will have the greatest impact on species re-establishment as compared to competition from shrubs and invasive species.

The proposed projects would effect 2.92 acres of Douglas County Forest.

For the nine properties enrolled in the Manage Forest Law (MFL) or Forest Crop Law (FCL) programs, by replanting temporary workspaces, seven of the properties would remain enrolled in the program. One property would need to be removed from the program and Enbridge has entered into a voluntary agreement with the landowner for appropriate compensation. Enbridge is evaluating one additional property to determine if additional replanting on the non-Alberta Clipper/Southern Lights Diluent side of the pipeline corridor would allow the land to remain in the program. Enbridge intends to continue to work with the potentially affected landowners to determine if any impacts to MFL lands would occur as a result of construction activities and would compensate them accordingly if their status is affected. These tracts are identified in Table 57.

Table 57 - Affected Tracts Enrolled in Forest Programs

Affected Tracts Enrolled in the Managed Forest or Forest Crop Law Program					
Tract No.	**Legal Description**	**MFL/FCL [a]**	**Permanent Impact [b]**	**Workspace to be Replanted**	**Tract to remain in MFL/FCL program**
T-27B	SW¼, NE¼, Sec 26, T48N, R15E	FCL	0.42	Yes	Yes
T-28	SE¼, NW¼,& NE¼, SW¼ S26, T48N, R15E, N of Co. Rd. W	FCL(SE¼, NW¼) /MFL (NE¼, SW¼)	0.38	Yes	Yes
T-28A	W ½, SW¼, Northwesterly of County Road "W" S26, T48N, R15E	MFL	0.75	Yes	Yes
T-29A1	NE¼ , SE¼, S27, T48N, R15E	FCL	Workspace only	Yes	Yes
T-29	SE¼, SE¼, lying Northerly of County Road "W", & SE¼, SW¼ S27, T48N, R15E	SESW-MFL SESE - Not FCL or MFL	0.76 (SW)	Yes	Property being surveyed to determine planting options for retention in program.
T-32	W3/4,NW¼, NE¼, E½, E½, NE¼, NE¼, W1/2 of W1/2 of SW1/4 of NE1/4, & E1/2 of SW1/4 of NE1/4, all being in S 33, T48N, R 15E	NWNE - Pt of MFL NENE - Not MFL or FCL SWNE - Pt of MFL	0.52 (NWNE)	Yes	Yes
T-38E &T-38	N½, NE¼, SW¼ & NE¼, SE¼, lying North of County Road "W", SE¼, NE¼, lying North of County Road "W", S32, T48N, R15E	N½ NESW - MFL SENE - FCL	W-0.76 E-0.72	Yes	No – Landowner compensated
T-38F	NW¼ of SE¼, part lying North of Highway W, S32, T48N, R15E	FCL	0.58	Yes	Yes

[a] MFL: Managed Forest Law; FCL: Forest Crop Law

[b] Area to be permanently cleared following pipeline construction. Based on a 25-foot maintained corridor outside the outer pipeline.

A raptor nest of an unidentified species was located along the proposed ROW. An avoidance plan for this nest would be developed depending on timing of construction and pending bird activity observed during pre-construction surveys.

VII.A.5.a.01.bb. Operation

Pipeline operation should not result in impacts to forest lands, unless a spill would occur.

VII.A.5.a.02. Effects of alternatives

VII.A.5.a.02.aa. Construction

Table 58 compares the proposed pipelines route with the seven alternative routes.

Table 58 - Forest Effects Comparison of Proposed and Alternative Pipeline Routes

Environmental Factor	Source	Unit	Preferred Route	Alt. A[1]	Alt. B[2]	Alt. C[3]	Alt. D[4]	Alt. E[5]	Alt. F[6]	Alt. G[7]
Total Length	GIS Measurement	Miles	13.19	17.71	13.85	18.88	17.00	19.74	15.01	15.24
County Forest Areas Affected	WDNR	Length Crossed (mi)	2.92	0.25	2.05	0.25	0.91	0.25	1.11	0.25
Superior Municipal Forest Lands Affected	Douglas County and City of Superior	Length Crossed (mi)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Forest Crop Law Tracts	WDNR	Number	4	0	4	0	0	1	1	6

[1] Alternative A includes segments D1, B3, B4, and B6.
[2] Alternative B follows Northern Natural Gas ROW, segments B1 (does not follow entire segment), B4b, and B6.
[3] Alternative C includes segments C1 and C4.
[4] Alternative D includes segments C1, C3, and B6.
[5] Alternative E includes segments C1, C2, B2, B3, B4, and B6.
[6] Alternative F follows the Great Lakes Gas Transmission Line ROW, segment C3 (does not follow entire segment), and B6.
[7] Alternative G includes segments B1, B2, B3, B4, and B6.

Table 59 compares the proposed pipelines route with the three alternative route segments at the Nemadji Golf Course (referred to as segments B5, B6, and B7).

Table 59 - Forest Effects Comparison of Nemadji Golf Course Route Variations

Comparison of Route Segments B5, B6, and B7				
Environmental Factor	**Unit**	**Segment B5**	**Segment B6**	**Segment B7**
Total Length	Miles	0.82	0.70	0.65
Adjacent to Existing ROW	Miles	0.00	0.12	0.34
County Forest Areas Affected	Length [a]	0.00	0.00	0.00
Superior Municipal Forest Lands Affected	Length [a]	0.00	0.00	0.00
Land Use				
Forest	Length [a]	0.00	0.00	0.00
Forested Wetland	Length [a]	0.00	0.00	0.00

[a] Length: length crossed in miles.
[b] Acres: Acres within permanent ROW
[c] Includes open pasture/hayfields.
[d] Railroad currently under review for eligibility for listing on the National Register of Historic Places
[e] Based on WWI data. Subsequent wetland delineation data indicate wetlands are PUB/PEM/PSS.
[f] Data represents the total area within a boundary and is not representative of the actual wetland acres impacted.`

The proposed route involves considerably more forest land than do the alternative routes.

VII.A.5.a.02.bb. Operation

Operation of the pipelines on alternative routes would not likely result in different risks to forest lands than would operation of the pipelines on the proposed route, except that the additional length of the proposed route through forest lands would increase the distance over which a spill event could occur.

VII.A.5.b. Grasslands
VII.A.5.b.01. Effects of proposed projects
VII.A.5.b.01.aa. Construction

The proposed project would impact 30.3 acres (construction ROW) of open land. Construction would be conducted using conventional construction methods and upon completion of construction activities, the land would be allowed to revert to its pre-construction use. Enbridge would implement construction and mitigation measures as outlined in its WI EMP.

During construction, vegetation in open lands will be disturbed resulting in many of the same potential impacts as in forestlands. Enbridge proposes to minimize these effects by using erosion control measures where necessary, and by regrading and revegetating the right- of -way with grasses upon completion of construction. Therefore, open lands will not be significantly affected.

Enbridge, in conjunction with the WDNR, identified potential sensitive plan habitats within the footprint of the proposed project. Enbridge has conducted a field survey to evaluate each area for the presence of the species noted. A copy of the survey report has been submitted to the WDNR for review and comments under separate cover and is considered a confidential filing. Species lists are also included in Section VI.B.4.b.01.

The listed plant species found along the proposed ROW thrive under the conditions present on the red clay plain, allowing a competitive advantage due to their reproductive strategies, morphology, and overall ecology. The key habitats where these species are either found or are likely to be found include the seasonally inundated clay flat micro depressions, depressional animal trails, wet/sedge meadows, marshes, alder thicket openings, and slow moving watercourses (including ditches). In general, these species require some type of natural disturbance regime that reduces competition and enables these populations to persist. Pipeline construction typically will provide suitable habitat for these plants after post construction reclamation. A comparison of species located during the field survey process performed for the Terrace 3 construction that occurred in 2002 indicated that the original colonies were essentially unaffected by the 2002 construction, and persisted on the permanently maintained ROW Enbridge is consulting with the WDNR to minimize potential impacts to these species and to enhance the required habitat elements in sensitive areas within the PCWC ASNRI.

All of the listed species found within the proposed construction ROW within the Breatrap-Nemadji watershed are relatively shade intolerant, do not tolerate competition well, and are adapted to exposed clay flats and disturbed areas that are typically associated with the conditions found along the pipeline ROW. Pipeline construction typically will provide excellent habitat for these plants after post construction reclamation. A comparison of species located during the field survey process performed for the Terrace 3 construction that occurred in 2002 indicated that the original colonies were essentially unaffected by the 2002 construction, and persisted on the permanently maintained ROW. Enbridge is consulting with the WDNR to minimize potential impacts to these species.

VII.A.5.b.01.bb. Operation

Pipeline operation should not result in impacts to grasslands, unless a spill would occur.

VII.A.5.b.02. Effects of alternatives

VII.A.5.b.02.aa. Construction

Table 60 compares the proposed pipelines route with the three alternative route segments at the Nemadji Golf Course (referred to as segments B5, B6, and B7).

Table 60 - Grassland Effects Comparison of Nemadji Golf Course Route Variations

Comparison of Route Segments B5, B6, and B7				
Environmental Factor	**Unit**	**Segment B5**	**Segment B6**	**Segment B7**
Total Length	Miles	0.82	0.70	0.65
Adjacent to Existing ROW	Miles	0.00	0.12	0.34
Emergent wetlands	Length [a]	0.00	0.00	0.00
	Acres [b]	0.00	0.00	0.00
Land Use				
Grassland[c]	Length [a]	0.27	0.61	0.65

[a] Length: length crossed in miles.
[b] Acres: Acres within permanent ROW
[c] Includes open pasture/hayfields.
[d] Railroad currently under review for eligibility for listing on the National Register of Historic Places
[e] Based on WWI data. Subsequent wetland delineation data indicate wetlands are PUB/PEM/PSS.
[f] Data represents the total area within a boundary and is not representative of the actual wetland acres impacted.`

VII.A.5.b.02.bb. Operation

Pipeline operation should not result in impacts to grasslands, unless a spill would occur.

VII.A.5.c. Aquatic
VII.A.5.c.01. Effects of proposed projects
VII.A.5.c.01.aa. Construction

The majority of the waterbodies crossed by the proposed route consist of intermittent first-order streams that are typically dry for much of the year, but have significant flows during spring and after significant snowmelt. Usually intermittent waterbodies are considered suitable for Open Cut (Wet Trench) crossing methods during pipeline construction. The red clay plain is particularly susceptible to erosion, however. The dominant clay soils in somewhat poor and poor drainage classes not only are erosive themselves, but are prone to develop high runoff rates and volumes in response to moderate intensity rainstorms because of low infiltration and permeability. The result is “flashy” lower order intermittent drainages characterized by rapid changes in flow rates. Higher order streams are prone to extensive rill and gully erosion resulting from the high topographic gradients present on the fringe of the lacustrine plain as elevation rapidly descends to the base level of Lake Superior.

Nine intermittent and two seasonal waterbodies, and one perennial waterbody occur along the Project route within the St. Louis River watershed in Wisconsin. Drainage is to the Pokegama and Little Pokegama rivers that drain to the northeast and north to finally discharge into Lake Superior.

VII.A.5.c.01.bb. Operation

See Section VII.A.3.a.01.bb.

VII.A.5.c.02. Effects of alternatives
VII.A.5.c.02.aa. Construction

Table 61 compares the proposed pipelines route with the seven alternative routes.

Table 61 - Aquatic Habitats Effects Comparison of Proposed and Alternative Pipeline Routes

Environmental Factor	Source	Unit	Preferred Route	Alt. A[1]	Alt. B[2]	Alt. C[3]	Alt. D[4]	Alt. E[5]	Alt. F[6]	Alt. G[7]
Total Length	GIS Measurement	Miles	13.19	17.71	13.85	18.88	17.00	19.74	15.01	15.24
Emergent, Open Water Wetlands	WDNR WWI Data	Length Crossed (mi)	0.00	0.00	0.00	0.10	0.00	0.00	0.00	0.00
	WDNR WWI Data	Acres - Permanent Impacts	0.00	0.00	0.00	0.95	0.00	0.00	0.00	0.00
Open Water	WDNR WWI Data	Length Crossed (mi)	0.00	0.00	0.00	0.04	0.04	0.04	0.00	0.00
	WDNR WWI Data	Acres - Permanent Impacts	0.00	0.06	0.06	0.47	0.47	0.53	0.00	0.06
Waterbodies Crossed	USGS Topo Map	Number	8	25	14	23	5	22	16	17
Major Waterbodies Crossed (>100 feet)	USGS Topo Map	Number	0	2	0	0	0	0	0	0
Impaired Waterbodies Crossed	WDNR Designated Waters Search Tool	Number	0	2	0	1	0	0	0	0
PNWs Crossed	WDNR Designated Waters Search Tool	Number	0	3	0	0	0	0	0	0
Wild Rice Production Area Drainages	WDNR Designated Waters Search Tool	Number	8	25	14	23	5	22	16	17

[1] Alternative A includes segments D1, B3, B4, and B6.
[2] Alternative B follows Northern Natural Gas ROW, segments B1 (does not follow entire segment), B4b, and B6.
[3] Alternative C includes segments C1 and C4.
[4] Alternative D includes segments C1, C3, and B6.
[5] Alternative E includes segments C1, C2, B2, B3, B4, and B6.
[6] Alternative F follows the Great Lakes Gas Transmission Line ROW, segment C3 (does not follow entire segment), and B6.
[7] Alternative G includes segments B1, B2, B3, B4, and B6.

Table 62 compares the proposed pipelines route with the three alternative route segments at the Nemadji Golf Course (referred to as segments B5, B6, and B7).

Table 62 - Aquatic Habitats Effects Comparison of Nemadji Golf Course Route Variations

Comparison of Route Segments B5, B6, and B7				
Environmental Factor	**Unit**	**Segment B5**	**Segment B6**	**Segment B7**
Total Length	Miles	0.82	0.70	0.65
Adjacent to Existing ROW	Miles	0.00	0.12	0.34
Emergent, Open Water wetlands	Length [a]	0.00	0.00	0.00
	Acres [b]	0.00	0.00	0.00
Open Water	Length [a]	0.00	0.00	0.00
	Acres [b]	0.00	0.00	0.00
Waterbodies Crossed	Number	0	0	0
Major Waterbodies Crossed (>100 feet)	Number	0	0	0
Impaired Waterbodies Crossed	Number	0	0	0
PNWs Crossed	Number	0	0	0
ASNRIs Crossed	Number	0	0	0
Wild Rice Production Area Drainages	Number	0	0	0
Land Use				
Open Water	Length [a]	0.00	0.00	0.00

[a] Length: length crossed in miles.
[b] Acres: Acres within permanent ROW
[c] Includes open pasture/hayfields.
[d] Railroad currently under review for eligibility for listing on the National Register of Historic Places
[e] Based on WWI data. Subsequent wetland delineation data indicate wetlands are PUB/PEM/PSS.
[f] Data represents the total area within a boundary and is not representative of the actual wetland acres impacted.`

VII.A.5.c.02.bb. Operation

See Section VII.A.3.a.02.bb.

VII.A.6. Public lands
VII.A.6.a. Effects of proposed projects
VII.A.6.a.01. Construction

The preferred route intersects with three public maintained trails, two of which are considered snowmobile/ATV trails and one that is restricted to snowmobiles. Enbridge will post appropriate warning signs during construction activities. The trails will be restored to pre-construction conditions.

Table 63 compares the proposed pipelines route with the seven alternative routes.

Table 63 - Public Lands Effects Comparison of Proposed and Alternative Pipeline Routes

Environmental Factor	Source	Unit	Preferred Route	Alt. A[1]	Alt. B[2]	Alt. C[3]	Alt. D[4]	Alt. E[5]	Alt. F[6]	Alt. G[7]
Total Length	GIS Measurement	Miles	13.19	17.71	13.85	18.88	17.00	19.74	15.01	15.24
State Natural Areas Affected	WDNR Digitized by NRG	Length Crossed (mi)	1.50	0.00	0.44	0.00	0.00	0.00	0.00	0.00
County Forest Areas Affected	WDNR	Length Crossed (mi)	2.92	0.25	2.05	0.25	0.91	0.25	1.11	0.25
DNR Managed Lands Affected	WDNR	Length Crossed (mi)	0.00	2.65	0.00	1.58	1.48	1.50	0.02	0.00
Superior Municipal Forest Lands Affected	Douglas County and City of Superior	Length Crossed (mi)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Public Land Tracts Crossed	Douglas County	Number	78	167	90	25	84	157	74	145
ATV Trails Crossed	WDNR	Number	7	5	7	11	10	11	8	6
Snowmobile Trails Crossed	WDNR	Number	6	5	6	5	6	8	5	6

[1] Alternative A includes segments D1, B3, B4, and B6.
[2] Alternative B follows Northern Natural Gas ROW, segments B1 (does not follow entire segment), B4b, and B6.
[3] Alternative C includes segments C1 and C4.
[4] Alternative D includes segments C1, C3, and B6.
[5] Alternative E includes segments C1, C2, B2, B3, B4, and B6.
[6] Alternative F follows the Great Lakes Gas Transmission Line ROW, segment C3 (does not follow entire segment), and B6.
[7] Alternative G includes segments B1, B2, B3, B4, and B6.

VII.A.6.a.02. Operation

Pipeline operation should not result in impacts to public lands, unless a spill would occur.

VII.A.6.a.02.b. Effects of alternatives

VII.A.6.a.02.b.01. Construction

Table 64 compares the proposed pipelines route with the three alternative route segments at the Nemadji Golf Course (referred to as segments B5, B6, and B7).

Table 64 - Public Lands Effects Comparison of Nemadji Golf Course Route Variations

Comparison of Route Segments B5, B6, and B7				
Environmental Factor	**Unit**	**Segment B5**	**Segment B6**	**Segment B7**
Total Length	Miles	0.82	0.70	0.65
Adjacent to Existing ROW	Miles	0.00	0.12	0.34
State Natural Areas Affected	Length [a]	0.00	0.00	0.00
County Forest Areas Affected	Length [a]	0.00	0.00	0.00
DNR Managed Lands Affected	Length [a]	0.00	0.00	0.00
Superior Municipal Forest Lands Affected	Length [a]	0.00	0.00	0.00
Public Land Tracts Crossed	Number	5	4	6
Total Number of Tracts Crossed	Number	9	7	7
ATV Trails Crossed	Number	3	4	1
Snowmobile Trails Crossed	Number	3	4	1

[a] Length: length crossed in miles.
[b] Acres: Acres within permanent ROW
[c] Includes open pasture/hayfields.
[d] Railroad currently under review for eligibility for listing on the National Register of Historic Places
[e] Based on WWI data. Subsequent wetland delineation data indicate wetlands are PUB/PEM/PSS.
[f] Data represents the total area within a boundary and is not representative of the actual wetland acres impacted.`

See also Section VII.A.6.a.01.

VII.A.6.a.02.b.02. Operation

Operation of the pipelines on alternative routes would not likely result in different risks to public lands than would operation of the pipelines on the proposed route, except that the additional length of the proposed route through public lands would increase the distance over which a spill event could occur.

VII.A.7. Socioeconomic resources
VII.A.7.a. Effects of proposed projects
VII.A.7.a.01. Construction

Table 65 provides the estimated impacts on each land use as a result of construction activities. All impacts would occur within the pipeline ROW and/or extra workspaces. To date, no pipe and contractor yards, or new access roads associated with pipeline construction have been identified within Wisconsin.

Table 65 - Estimated Pipeline Impacts on Land Use

Estimated Impacts on Land Use for the Alberta Clipper and Southern Lights Diluent Projects [a]			
Land Use Classification	**Extra Workspaces required (acres)**	**Construction ROW (acres)[b]**	**Permanent ROW (acres)[c]**
Forested	1.8	62.2	33.1
Agricultural	0.5	2.6	1.3
Developed	0.0	1.9	1.0
Open	0.6	24.7	15.3
Wetlands [d]	1.4	105.3	60.8
Total	4.4	196.7	111.5

[a] Acreages are rounded to the nearest tenth and include impacts of the Southern Lights Diluent Project, and are therefore considered conservative for the Alberta Clipper Project. Land Use based on the Revised (Rev 2) proposed route.
[b] Construction ROW is based on a standard 140-foot-wide corridor in uplands and a standard 125-foot-wide corridor in wetlands and includes the permanent ROW..
[c] Permanent ROW includes entire 75-foot-wide corridor including the overlap with the existing permanently maintained ROW.
[d] Total wetland impacts include both forested and non-forested wetlands. Source: Wetland Delineation Survey results and Wisconsin Wetland Inventory Data.

The 3.1 acres of affected agricultural lands, currently in use as pasture/hay field would be allowed to revert to its pre-construction use following construction. Enbridge would install the pipes using conventional construction methods as outlined in its WI EMP.

Construction of the pipeline will temporarily disrupt agricultural uses of the right-of-way. Other potential effects include increased erosion of valuable topsoil, mixing of topsoil with subsoil, introduction of rock into the topsoil from lower soil horizons, and soil compaction resulting from repeated passes of construction equipment. These effects may, in turn, produce a short-term (typically one to two year) decrease in soil productivity on the right-of-way following construction. Enbridge does not anticipate that the project will have a long-term impact on agricultural lands. The pipeline will be installed at a minimum depth of 36 inches below the ground surface in agricultural areas to minimize interference with deep tillage activities. Enbridge proposes to implement the measures in its EMP to minimize the potential effects of erosion, soil mixing, rock, and compaction.

The proposed Project would impact 1.9 acres (EWS and construction ROW) of land classified as developed. To reduce construction related impacts in these areas, Enbridge intends to implement mitigation measures such as maintaining access to landowners, limiting dust impacts as indicated in its WI EMP, and limiting the hours of construction activities with high-decibel noise levels. Upon completion of construction, the land would be returned to its pre-construction use. Enbridge would maintain contact with landowners and will address any landowner concerns as they arise.

The proposed pipeline projects would impact 3.1 acres (EWS and construction ROW) of agricultural land. The agricultural land within the project area is currently in use as pasture/hay field. No land currently in use as cultivated cropland would be crossed by the proposed projects. Enbridge has not identified any irrigation systems and/or drain tiles within the project area. Enbridge has not identified any parcels currently enrolled in any agricultural conservation program within the project area.

The proposed pipeline projects would impact 1.9 acres (EWS and construction ROW) of land classified as developed, and 30.3 acres (construction ROW) of open land.

Table 66 lists the recreational trails that would be crossed by the proposed pipelines.

Table 66 - Public Trails Crossed by the Proposed Pipelines

Public Trails Crossed by the Alberta Clipper and Southern Lights Diluent Pipelines Project Douglas County, Wisconsin						
MP	**Legal Description**	**Name of Trail**	**Responsible for Maintenance**	**Type of Impact**	**Type of Recreational Use**	**Associated Federal Funding**
1090.00	T48N R15W Sec. 24	Unnamed	Douglas County	Bore (Irondale Rd)	ATV Trail	No
1092.03	T48N R14W Sec. 17	Unnamed	Douglas County	Open Cut	ATV Trail & Snowmobile Trail	Yes – Pokegama River Bridge
1096.22	T48N R14W Sec. 2	Unnamed	Douglas County	Open Cut	ATV Trail & Snowmobile Trail	Yes – Pokegama River Bridge
1096.36	T48N R14W Sec. 2	Unnamed	Douglas County	Open Cut	ATV Trail & Snowmobile Trail	Yes – Pokegama River Bridge
1096.90	T49N R14W Sec. 35	Unnamed	Douglas County	Open Cut	ATV Trail & Snowmobile Trail	Yes – Pokegama River Bridge
1096.94	T49N R14W Sec. 35	Unnamed	Douglas County	Open Cut	ATV Trail & Snowmobile Trail	Yes – Pokegama River Bridge
1096.94	T49N R14W Sec. 35	Unnamed	Douglas County	Open Cut	ATV Trail & Snowmobile Trail	Yes – Pokegama River Bridge

The proposed project actually crosses approximately seven ATV trails, of which, approximately six are also used by snowmobilers. Two of these are found within the Pokegama-Carnegie wetland complex. The trails are part of the Douglas County ATV trail system and are administered and maintained by the county. No permits are required for the crossing of these trails. Restoration of these trail systems are focused on the returning the trail base to its pre-construction conditions.

Visual resources along the parts of the pipeline route will be affected during pipeline construction, and during the period of revegetation. This effect will be most pronounced in forested areas that are visible from residences or roads. Visual effects may also be noticed by canoeists and other recreational river users at river crossing sites. No scenic or rustic roads are crossed and the impact on motorists will be brief and limited to the time it takes to pass the right-of-way. Visual impacts will be limited primarily to the time it takes to install the pipeline and restore the right-of-way. The visual impact of construction will improve quickly after grass and other vegetation becomes established. Visual impacts will be less at directionally drilled river crossings since existing bank vegetation typically will be left intact. Long-term visual impacts will be limited since most of the pipeline will follow existing right-of-way and will not result in permanent widening of the existing right-of-way. However, in some areas along woodlots and

large residential wooded lots, the impacts of a wider cleared area will be more pronounced, and will last the duration of the present owners' lifetimes.

Pipeline construction will provide additional employment opportunities in the project area.

VII.A.7.a.02. Operation

Pipeline operation may provide additional employment opportunities in the project area.

VII.A.8. Pokegama Carnegie area

Enbridge has proposed a restoration plan intended to take advantage of the mimicking of construction activities to that of a natural disturbance. With the proposed restoration of hydrologic features, control of seeding, and the two-phase restoration program, Enbridge anticipates community and its rare plant species populations will be enhanced as a result of construction, restoration and maintenance activities.

VII.A.9. Alternative routes overview

VII.A.9.a. Macro-corridors

Table 67 compares the environmental effects of the proposed pipelines route with the eight alternative routes.

Table 67 - Overall Comparison of Proposed and Alternative Pipeline Routes

Environmental Factor	Source	Unit	Prop. Route	Alt. A[2]	Alt. B[3]	Alt. C[4]	Alt. C1[5]	Alt. D[6]	Alt. E[7]	Alt. F[8]	Alt. G[9]
Total Length	GIS Measurement	Miles	13.19	17.71	13.85	18.88	21.99	17.00	19.74	15.01	15.24
Adjacent to Existing Right-of-Way	GIS Measurement	Miles	11.7	6.04	13.4	0.00	8.69	2.60	6.04	10.62	10.68
Total Wetlands Affected	WDNR WWI Data	Length Crossed (mi)	6.22	3.65	5.38	4.87	5.64	7.51	7.34	6.58	5.51
	WDNR WWI Data	Acres - Permanent Impacts	24.05	23.91	39.37	44.68	51.08	58.80	57.70	49.62	41.28
Forested	WDNR WWI Data	Length Crossed (mi)	0.18	0.46	0.21	0.75	0.67	0.91	0.54	0.59	0.21
	WDNR WWI Data	Acres - Permanent Impacts	0.66	3.20	0.81	6.81	6.23	7.48	3.96	4.57	0.81
Forested, Scrub/Shrub	WDNR WWI Data	Length Crossed (mi)	4.41	2.57	4.21	2.56	2.84	3.70	4.89	3.10	4.61
	WDNR WWI Data	Acres - Permanent Impacts	19.23	17.14	32.18	23.45	25.36	27.31	38.45	22.32	36.30

Environmental Factor	Source	Unit	Prop. Route	Alt. A[2]	Alt. B[3]	Alt. C[4]	Alt. C1[5]	Alt. D[6]	Alt. E[7]	Alt. F[8]	Alt. G[9]
Forested, Emergent	WDNR WWI Data	Length Crossed (mi)	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.00
	WDNR WWI Data	Acres - Permanent Impacts	0.00	0.00	0.00	0.21	0.00	0.00	0.00	0.00	0.00
Scrub/Shrub	WDNR WWI Data	Length Crossed (mi)	1.54	0.50	0.72	0.91	1.51	1.79	1.17	1.12	0.60
	WDNR WWI Data	Acres - Permanent Impacts	3.88	2.76	4.77	8.43	13.75	14.39	9.05	8.28	3.84
Scrub/Shrub, Emergent	WDNR WWI Data	Length Crossed (mi)	0.00	0.00	0.15	0.48	0.48	0.98	0.61	0.57	0.00
	WDNR WWI Data	Acres - Permanent Impacts	0.00	0.00	1.29	4.36	4.34	8.89	5.43	4.84	0.00
Emergent	WDNR WWI Data	Length Crossed (mi)	0.09	0.12	0.09	0.00	0.00	0.09	0.09	1.19	0.09
	WDNR WWI Data	Acres - Permanent Impacts	0.28	0.74	0.26	0.00	0.00	0.26	0.26	9.61	0.26
Emergent, Open Water	WDNR WWI Data	Length Crossed (mi)	0.00	0.00	0.00	0.10	0.11	0.00	0.00	0.00	0.00
	WDNR WWI Data	Acres - Permanent Impacts	0.00	0.00	0.00	0.95	0.94	0.00	0.00	0.00	0.00
Open Water	WDNR WWI Data	Length Crossed (mi)	0.00	0.00	0.00	0.04	0.04	0.04	0.04	0.00	0.00
	WDNR WWI Data	Acres - Permanent Impacts	0.00	0.06	0.06	0.47	0.47	0.47	0.53	0.00	0.06
Wetlands within SAMP	WDNR	Acres - Permanent Impacts	0.00	0.0	0.0	1.55	0.00	0.0	0.0	0.0	0.0
Priority Wetlands (w/in Lake Superior Basin)[10]	WDNR Digitized by NRG	Acres - Permanent Impacts	50.4	41.9	29.4	0.00	0.00	4.0	17.9	4.0	17.9
Waterbodies Crossed	USGS Topo Map	Number	8	25	14	23	24	5	22	16	17
Major Waterbodies Crossed (>100 feet)	USGS Topo Map	Number	0	2	0	0	1	0	0	0	0

Environmental Factor	Source	Unit	Prop. Route	Alt. A[2]	Alt. B[3]	Alt. C[4]	Alt. C1[5]	Alt. D[6]	Alt. E[7]	Alt. F[8]	Alt. G[9]
Impaired Waterbodies Crossed	WDNR Designated Waters Search Tool	Number	0	2	0	1	1	0	0	0	0
PNWs Crossed	WDNR Designated Waters Search Tool	Number	0	3	0	0	1	0	0	0	0
ASNRIs Crossed	WDNR Designated Waters Search Tool	Number	3	19	6	17	17	2	11	9	8
Wild Rice Production Area Drainages	WDNR Designated Waters Search Tool	Number	8	25	14	23	24	5	22	16	17
ASNRI Lands Affected	WDNR Digitized by NRG	Length Crossed (mi)	3.58	0.66	2.63	0.00	0.00	0.66	0.66	0.66	0.66
State Natural Areas Affected	WDNR Digitized by NRG	Length Crossed (mi)	1.50	0.00	0.44	0.00	0.00	0.00	0.00	0.00	0.00
County Forest Areas Affected	WDNR	Length Crossed (mi)	2.92	0.25	2.05	0.25	0.25	0.91	0.25	1.11	0.25
DNR Managed Lands Affected	WDNR	Length Crossed (mi)	0.00	2.65	0.00	1.58	1.51	1.48	1.50	0.02	0.00
Superior Municipal Forest Lands Affected	Douglas County and City of Superior	Length Crossed (mi)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Forest Crop Law Tracts	WDNR	Number	4	0	4	0	0	0	1	1	6
High Consequence Areas	US DOT, Office of Pipeline Safety										
Ecologically Sensitive Areas	US DOT, Office of Pipeline Safety	Length Crossed (mi)	0.00	1.94	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Highly Populated Areas	US DOT, Office of Pipeline Safety	Length Crossed (mi)	0.33	1.84	0.34	0.00	0.00	0.55	0.34	0.55	0.34
Other Populated Areas	US DOT, Office of Pipeline Safety	Length Crossed (mi)	3.32	8.09	3.33	1.40	1.48	3.00	5.57	3.00	5.57

Environmental Factor	Source	Unit	Prop. Route	Alt. A[2]	Alt. B[3]	Alt. C[4]	Alt. C1[5]	Alt. D[6]	Alt. E[7]	Alt. F[8]	Alt. G[9]
Drinking Water Areas	US DOT, Office of Pipeline Safety	Length Crossed (mi)	0.09	0.09	0.09	0.38	0.38	0.09	0.09	0.09	0.09
Structures within 100 feet of the Proposed Centerline	GIS Measurement	Number	21	49	13	43	21	35	28	23	15
Land Use	WDNR WiscLand										
Agriculture	WDNR WiscLand	Length Crossed (mi)	0.00	0.00	0.00	0.58	0.81	0.12	0.00	0.01	0.00
Forest	WDNR WiscLand	Length Crossed (mi)	2.96	2.53	3.69	2.57	3.64	1.88	3.80	1.54	4.05
Forested Wetland	WDNR WiscLand	Length Crossed (mi)	0.26	0.29	0.03	1.29	1.51	1.70	1.07	0.66	0.04
Grassland	WDNR WiscLand	Length Crossed (mi)	3.43	3.41	4.13	10.11	10.43	6.63	6.85	5.59	4.47
Open Water	WDNR WiscLand	Length Crossed (mi)	0.00	0.28	0.00	0.18	0.15	0.00	0.00	0.00	0.00
Shrubland	WDNR WiscLand	Length Crossed (mi)	0.42	0.97	0.33	0.59	1.05	0.36	0.98	0.58	0.86
Wetland	WDNR WiscLand	Length Crossed (mi)	5.71	3.44	5.25	3.42	4.25	5.50	6.48	5.95	5.39
Urban / Developed	WDNR WiscLand	Length Crossed (mi)	0.41	0.42	0.42	0.00	0.00	0.67	0.42	0.67	0.42
Number of Landowners	Douglas County	Number	40	43	38	88	89	81	71	68	51
Private Land Tracts Crossed	Douglas County	Number	124	117	127	122	131	163	166	143	150
Public Land Tracts Crossed	Douglas County	Number	78	167	90	25	24	84	157	74	145
Total Number of Tracts Crossed	Douglas County	Number	202	284	217	147	155	247	323	217	295
Roads Crossed	ESRI Street Map	Number	11	28	11	34	37	36	25	19	14
Railroads Crossed	ESRI Street Map	Number	4	8	5	3	4	5	5	7	5
Known Areas of Contamination (e.g., Superfund sites)	WDNR Superfund Sites in Wisconsin	Number	0	0	0	0	0	0	0	0	0
ATV Trails Crossed	WDNR	Number	7	5	7	11	12	10	11	8	6
Snowmobile Trails Crossed	WDNR	Number	6	5	6	5	5	6	8	5	6

Environmental Factor	Source	Unit	Prop. Route	Alt. A[2]	Alt. B[3]	Alt. C[4]	Alt. C1[5]	Alt. D[6]	Alt. E[7]	Alt. F[8]	Alt. G[9]

[1] Table Revised March 2009
[2] Alternative A includes segments D1, B3, B4, and B6.
[3] Alternative B follows Northern Natural Gas ROW, segments B1 (does not follow entire segment), B4b, and B6.
[4] Alternative C includes segments C1 and C4.
[5] Alternative C1 includes segments C1, C4a, C4b to County Road C (does not follow entire segment), County Road C (to the east), Stage 1 Right-of-Way (to the northwest).
[6] Alternative D includes segments C1, C3, and B6.
[7] Alternative E includes segments C1, C2, B2, B3, B4, and B6.
[8] Alternative F follows the Great Lakes Gas Transmission Line ROW, segment C3 (does not follow entire segment), and B6.
[9] Alternative G includes segments B1, B2, B3, B4, and B6.
[10] Data represents the total area within a boundary and is not representative of the actual wetland acres impacted.

In addition to environmental effects, Enbridge also completed a comprehensive cost analysis for the construction of the preferred route and all of the proposed alternative routes. Costs used in the analysis are broken into general cost categories and differ based on the pipe diameter (refer to Table 68, below). Cost information is based on actual costs for the Southern Access Stages I and II projects, and the LSr project. The costs were provided by Precision Pipeline, who is the contractor for the Wisconsin portion of the Alberta Clipper and Southern Lights Pipeline Projects.

Table 68 - General Cost Categories by Pipe Diameter

General Cost Categories by Pipe Diameter				
Cost Category	**20-inch Pipeline Installation (per foot)**	**20-inch Pipeline Installation (per mile)**	**36-inch Pipeline Installation (per foot)**	**36-inch Pipeline Installation (per mile)**
Base Installation Cost	$110	$580,800	$233	$1,230,240
Uncased Crossing Installations (roads and railroads)[1]	$300	$1,584,000	$450	$2,376,000
Guided Bore Installations[1]	$250	$1,320,000	NA	NA
Horizontal Directional Drill Installations[2]	$350	$1,848,000	$600	$3,168,000
1. This cost item is in addition to the base cost for installation of the pipeline due to installation technique and/or pipe wall thickness.				

When comparing the construction costs associated with each route, the most prevalent impact on costs were in areas requiring specialized construction techniques; such as road and railroad crossings, guided bore and horizontal directional drill installations (HDD). Table 69, below, provides a breakdown, by alternative, of the specialized construction costs realized for each alternative. The costs do not reflect the geotechnical investigations required to analyze whether a HDD crossing can be completed. This is most significant for Alternative A where the construction costs associated with two crossings of the St. Louis River (the first crossing is estimated to be 1,500 feet and the second is estimated at 4,500 feet) do not account for the geotechnical investigations, nor do they account for the additional environmental costs associated with the permitting of two crossings of the St. Louis River, within the St. Louis River Area of Concern. Alternative A also realizes the highest cost of all the alternatives for specialized construction at $13,975,000 compared to the $4,525,000 for the preferred route.

Table 69 - Costs Associated with Specialized Construction Techniques

Costs Associated with Specialized Construction Techniques									
Item	**Preferred Route**	**Alt. A**	**Alt. B**	**Alt. C**	**Alt. C1**	**Alt. D**	**Alt. E**	**Alt. F**	**Alt. G**
Number of Railroad Crossings[1]	3	8	5	3	4	5	5	7	5
36-inch Pipeline Railroad Crossing Costs[2]	$270,000	$720,000	$450,000	$270,000	$360,000	$450,000	$450,000	$630,000	$450,000
20-inch Pipeline Railroad Crossing Costs[2]	$180,000	$480,000	$300,000	$180,000	$240,000	$300,000	$300,000	$420,000	$300,000
Number of Road Crossings[3]	11	28	11	34	37	36	25	19	14
36-inch Pipeline Road Crossing Costs[4]	$990,000	$2,520,000	$990,000	$3,060,000	$3,330,000	$3,240,000	$2,250,000	$1,710,000	$1,260,000
20-inch Pipeline Road Crossing Costs[4]	$660,000	$1,680,000	$660,000	$2,040,000	$2,220,000	$2,160,000	$1,500,000	$1,140,000	$840,000
Number of HDD Crossings[5]	1	2	0	2	2	0	0	0	0
Length of HDD Crossings (feet)[6]	1,500	6,000	0	3,000	3,000	0	0	0	0
36-inch Pipeline HDD Crossing Costs[6]	$900,000	$3,600,000	$0	$1,800,000	$1,800,000	$0	$0	$0	$0
20-inch Pipeline HDD Crossing Costs[6]	$525,000	$2,100,000	$0	$1,050,000	$1,050,000	$0	$0	$0	$0
Number of Guided Bore Crossings[7]	8	23	14	23	24	5	22	16	17
20-inch Pipeline Guided Bore Crossing Costs	$1,000,000	$2,875,000	$1,750,000	$2,875,000	$3,000,000	$625,000	$2,750,000	$2,000,000	$2,125,000
Total	$4,525,000	$13,975,000	$4,150,000	$11,275,000	$12,000,000	$6,775,000	$7,250,000	$5,900,000	$4,975,000

1. Railroad crossings were identified using ESRI Street Map.

2. 200 feet was used for all crossings, which is typical for the majority of railroad crossings.

3. Road crossings were identified using ESRI Street Map.

4. 200 feet was used for all crossings, which is typical for the majority of road crossings.

5. This assumes that only the St. Louis River (Alternative A only, both pipelines), Nemadji River (Alternatives C and C1, 36-incp pipeline only, two crossings), and Pokegama Railyard (Preferred Route Only, both pipelines) crossings would be horizontally directionally drilled.

6. A minimum of 1,500 feet is required for a HDD crossing due to the minimum bend radius of the pipe. The second crossing of the St. Louis River is estimated to require at least a 4,500 HDD.

7. The guided bore installation method is only applicable to the 20-inch diameter Southern Lights pipeline. The costs assume that all waterbodies with exception to the St. Louis River (Alternative A only) would be crossed using the guided bore method. Each crossing was assumed to require 500 feet, which is the typical minimum length for guide bore crossings of waterbodies with 20-inch diameter pipe.

Table 70, below, provides the total estimated construction costs for the preferred route and each Alternative. As indicated on Table 3, the estimated costs for the preferred route are the lowest at $42,341,258 with the highest costs realized for Alternative C1 at $75,046,210.

Table 70 - Total Route Costs

Total Route Costs							
Route	**Total Length (miles)**	**20-inch Pipeline Cost[1]**	**36-inch Pipeline Cost[1]**	**20-inch Pipeline Installation Cost**	**36-inch Pipeline Installation Cost**	**Total Route Additional Costs**	**Total RouteCost**
Preferred Route	13.19	$4,178,592	$9,750,048	$7,660,752	$16,226,866	$4,525,000	$42,341,258
Alternative A	17.71	$5,610,528	$13,091,232	$10,285,968	$21,787,550	$13,975,000	$64,750,278
Alternative B	13.85	$4,387,680	$10,237,920	$8,044,080	$17,038,824	$4,150,000	$43,858,504
Alternative C	18.88	$5,981,184	$13,956,096	$10,965,504	$23,226,931	$11,275,000	$65,404,715
Alternative C1	21.99	$6,966,432	$16,255,008	$12,771,792	$27,052,978	$12,000,000	$75,046,210
Alternative D	17	$5,385,600	$12,566,400	$9,873,600	$20,914,080	$6,775,000	$55,514,680
Alternative E	19.74	$6,253,632	$14,591,808	$11,464,992	$24,284,938	$7,250,000	$63,845,370
Alternative F	15.01	$4,755,168	$11,095,392	$8,717,808	$18,465,902	$5,900,000	$48,934,270
Alternative G	15.24	$4,828,032	$11,265,408	$8,851,392	$18,748,858	$4,975,000	$48,668,690

1. This represents the cost to purchase the pipeline and is based on actual current costs ($140 per foot 36-inch and $60 per foot 20-inch). This does not include heavier wall pipe required for certain crossings (roads, railroads, HDD, etc.).

VII.A.9.a.01. Alternative A

Alternative A as compared to the preferred route results in the following reductions:

- Overall reduction in acres of wetlands within the permanent ROW by 8.14 acres;
- Reduction in WDNR-mapped ASNRI lands by 2.92 miles;
- Reduction in State Natural Areas crossed by 1.58 miles;
- Reduction in county forest areas crossed by 2.67 miles; and
- Reduction of two ATV trails crossed.

Alternative A results in the following increased impacts, as compared to the preferred route:

- An increase in corridor length by 4.52 miles;
- 11.67 miles of greenfield corridor ;
- An increase in acres of forested wetlands within the permanent ROW by 2.54 acres;
- An increase of 20 acres of Priority Wetlands crossed;
- An addition 17 waterbody crossings; all WDNR-mapped ASNRI or wild rice production area drainages;
- Crossing WDNR-Managed Lands (2.65 miles);

- An additional 8.22 miles of High Consequence Areas (HCAs) crossed;
- 43 new landowners;
- 17 new road crossings; and
- 4 new railroad crossings.

Alternative A would result in a significant amount of new temporary and permanent environmental, social and economic impacts as compared to the preferred route. Specifically, this alternative would require the creation of a new corridor approximately 11.67 miles where none currently exists. The temporary impacts associated with the new corridor include an increase in impacts on forested and emergent wetlands,an increase in impact on wetlands considered priority wetlands within the Lake Superior Basin, an increase in waterbody crossings, including 16 ASNRI-designated waters. Permanent impacts include habitat fragmentation and land use as a result of the new greenfield corridor, conversion of 3.2 acres of forested wetlands to emergent/scrub-shrub, and an increase in HCA's impacted. The increase in HCA's crossed would require significant revisions to the pipe design and construction methods, and unnecessarily place additional landowners and communities at a higher risk, as compared to the preferred route.

VII.A.9.a.02. Alternative B

Alternative B as compared to the preferred route results in the following reductions:

- Reduction in WDNR-mapped ASNRI lands by 0.95 mile;
- Reduction in State Natural Areas crossed by 1.06 miles; and
- Reduction in county forest areas crossed by 0.87 mile.

Alternative B results in the following increased impacts as compared to the preferred route:

- An increase in corridor length by 0.66 mile;
- 0.5 mile of greenfield corridor ;
- An increase in of wetlands within the permanent ROW by 15.32 acres;
- An increase in forested wetlands within the permanent ROW by 0.15 acre;
- An additional 6 waterbody crossings;
- An additional 3 WDNR-mapped ASNRI waterbody crossings;

- Crossing of an additional 6 wild rice production area drainages;
- An additional 0.02 mile of HCA's crossed; and
- An increase in forest land crossed by 0.73 mile.

Alternative B would result in an increase in temporary and permanent environmental, social and economic impacts as compared to the preferred route. Specifically, this alternative would require the creation of approximately 0.66 mile of new corridor where none currently exists. The temporary impacts associated with this alternative include the crossing of 3 additional ASNRI-designated waterbody crossings and 6 additional wild rice production area drainages, and an increase in non-forested wetland acres impacted by construction within the permanent ROW. Permanent impacts would include an increase (0.15 acre) of forested wetlands converted from forested to emergent/scrub-shrub, and habitat fragmentation and land use as a result of the 0.5 mile greenfield corridor. This alternative would reduce the overall impact to the Pokegema-Carnegie wetland complex; however, Enbridge has revised the preferred route to minimize impacts within this complex as discussed in section 10.3.9.1. With the proposed minimization, the overall permanent impacts of this alternative are greater than preferred route.

VII.A.9.a.03. Alternative C

Alternative C as compared to the preferred route results in the following reductions:

- Avoidance of all Priority wetlands;
- Avoidance of all WDNR-mapped ASNRI lands;
- Avoidance of all State Natural Areas;
- Reduction in county forest areas crossed by 2.67 miles;
- Reduction in the crossing of HCA's by 1.96 miles;
- Reduction in forest land crossed by 0.39 mile; and
- Reduction of one rail crossings.

Alternative C results in the following increased impacts as compared to the preferred route:

- An increase in corridor length by 5.69 miles;
- 18.88 miles of greenfield corridor ;
- An increase in wetlands within the permanent ROW by 20.63 acres;
- An increase in forested wetlands within the permanent ROW by 6.15 acres;

- An additional 15 waterbody crossings; all WDNR-mapped ASNRI or wild rice production area drainages;
- Crossing of one impaired water;
- New crossing of WDNR-managed lands (1.58 miles);
- Increase of 23 new road crossings;
- 88 landowners; and
- An additional 4 ATV trail crossings.

Alternative C would result in an increase in temporary and permanent environmental, social and economic impacts as compared to the preferred route. Specifically, this alternative would require the creation of 18.88 miles of new corridor where none currently exists. The temporary impacts associated with this alternative include the impacts on water resources and non-forested wetlands. Specifically, 15 new waterbody crossings, of which, all are wild rice production drainage areas and/or designated as ASNRI by the WDNR would be affected. The permanent impacts associated with this alternative include those associated with habitat fragmentation habitats and land use as a result of the greenfield corridor, including the new crossing of WDNR-managed lands, and the number of landowners impacted would double and 6.15 acre of forested wetlands converted from forested to emergent/scrub-shrub. The increase in new road and ATV trail crossings would result in an increase in costs due to construction requirements at these features. Although this alternative avoids impacts to state natural areas, priority wetlands and ASNRI-land, the overall increase in permanent impacts as a result of the significant greenfield corridor indicates that Alternative C is not a practicable alternative to the proposed route.

VII.A.9.a.04. Alternative C1

Alternative C1 as compared to the preferred route is results in the following reductions:

- Avoidance of all Priority wetlands;
- Avoidance of all WDNR-mapped ASNRI lands;
- Avoidance of all State Natural Areas;
- Reduction in county forest areas crossed by 2.67 miles;
- Reduction in the crossing of HCA’s by 1.88 miles;

Alternative C1 results in the following increased impacts as compared to the preferred route:

- An increase in corridor length by 8.80 miles;

- 21.99 miles of greenfield corridor;
- An increase in wetlands within the permanent ROW by 27.03 acres;
- An increase in forested wetlands within the permanent ROW of 5.57 acres;
- An additional 16 waterbody crossings; 14 of which are WDNR-mapped ASNRI and all are wild rice production area drainages;
- New crossing of one impaired water;
- Crossing of 1.51 miles of WDNR-managed lands;
- Increase of 26 new road crossings;
- 89 new landowners;
- An additional 5 ATV trail crossings.

Alternative C will result in an increase in temporary and permanent environmental, social and economic impacts as compared to the preferred route. Specifically, this alternative will require the creation of 13.30miles of new corridor where none currently exists. The temporary impacts associated with this alternative include the impacts on water resources. Specifically, 16 new waterbody crossings, of which, all are wild rice production drainage areas and 14 are designated as ASNRI by the WDNR. A significant increase in impacts to forested and non-forested wetlands will occur. The permanent impacts associated with this alternative include those associated with fragmentation of habitats and land use as a result of the greenfield corridor; including the new 1.51 miles of WDNR-managed lands crossed; the number of landowners impacted will double and 6.23 acre of forested wetlands converted from forested to emergent/scrub-shrub. The increase in new road crossings will result in an increase in costs due to construction requirements at these features.

Although this alternative avoids impacts to state natural areas, priority wetlands and ASNRI-land, the overall increase in permanent impacts as a result of the significant greenfield corridor indicates that Alternative C1 is not a practicable alternative to the proposed route.

VII.A.9.a.05. Alternative D

Alternative D as compared to the preferred route results in the following reductions:

- Reduction in waterbody crossings by 3 crossings;
- Reduction in WDNR-mapped ASNRI waterbodies (1);
- Reduction of 3 crossings of wild rice production area drainages;

- Reduction in WDNR-mapped ASNRI land crossings by 2.92 miles;
- Avoidance of all State Natural Areas;
- Reduction in county forest areas crossed by 2.04 miles;
- Reduction in the crossing of HCA's by 0.10 mile; and
- Reduction in forest land crossed by 1.08 miles.

Alternative D results in the following increased impacts as compared to the preferred route:

- An increase in corridor length by 3.81 miles;
- 14.4 miles of greenfield corridor;
- An increase in wetlands within the permanent ROW by 34.75 acres;
- An increase in forested wetlands within the permanent ROW by 6.82 acres;
- New crossing of WDNR-managed lands (1.48 miles);
- 81 landowners;
- Increase of 25 new road crossings; and
- An additional 3 ATV trail crossings.

Alternative D would result in an increase in temporary and permanent environmental, social and economic impacts as compared to the preferred route. Specifically, this alternative would require the creation of 14.4 miles of new corridor where none currently exists. The temporary impacts associated with this alternative include an increase of impacts on non-forested wetlands. Temporary impacts associated with waterbody crossings are reduced with this alternative. The permanent impacts associated with this alternative include those associated with habitat fragmentation and land use as a result of the greenfield corridor, including the new crossing of WDNR-managed lands, and the number of landowners impacted would double and 6.82 acres of forested wetlands converted from forested to emergent/scrub-shrub. The increase in new road and ATV trail crossings would result in an increase in costs due to construction requirements at these features. Although this alternative avoids impacts to state natural areas, priority wetlands and ASNRI-land, the overall increase in permanent impacts as a result of the significant greenfield corridor indicates that Alternative D is not a practicable alternative to the proposed route.

VII.A.9.a.06. Alternative E

Alternative E as compared to the preferred route results in the following reductions:

- Reduction in WDNR-mapped ASNRI land crossings by 2.92 miles;
- Avoidance of all State Natural Areas; and
- Reduction in county forest areas crossed by 2.67 miles.

Alternative E results in the following increased impacts as compared to the preferred route:

- An increase in corridor length by 6.55 miles;
- 13.7 miles of greenfield corridor;
- An increase in wetland within the permanent ROW by 33.65 acres;
- An increase in forested wetlands within the permanent ROW by 3.30 acres;
- An additional 14 waterbody crossings; all wild rice production area drainages;
- An additional 8 WDNR-mapped ASNRI waterbody crossings;
- New crossing of WDNR-managed lands (1.50 miles);
- Increase in the crossing of HCA's by 2.26 miles;
- Increase in forest land crossed by 0.84 mile;
- 71 landowners;
- Increase of 14 new road crossings;
- An additional 4 ATV trail crossings; and
- Two additional crossings of a snowmobile trail.

Alternative E would result in increases in temporary and permanent environmental, social and economic impacts as compared to the preferred route. Specifically, this alternative would require the creation of 13.7 miles of new corridor where none currently exists. The temporary impacts associated with this alternative include the impacts on water resources. Specifically, 14 new waterbody crossings, of which, all are wild rice production drainage areas and 8 are designated as ASNRI by the WDNR, and an increase in temporary impacts to non-forested wetlands would occur. The permanent impacts associated with this alternative include those associated with

habitat fragmentation and land use as a result of the greenfield corridor, including an increase in forest land crossed, the new crossing of WDNR-managed lands, the number of landowners impacted would nearly double, and 3.30 acres of forested wetlands converted from forested to emergent/scrub-shrub. The increase in new road and ATV trail crossings would result in an increase in costs due to construction requirements at these features. Although this alternative avoids impacts to state natural areas and ASNRI-land, the overall increase in permanent impacts as a result of the significant greenfield corridor indicates that Alternative E is not a practicable alternative to the proposed route.

VII.A.9.a.07. Alternative F

Alternative F as compared to the preferred route results in the following reductions:

- Reduction in WDNR-mapped ASNRI land crossings by 2.92 miles;
- Avoidance of all State Natural Areas;
- Reduction in county forest areas crossed by 1.81 miles;
- Decrease in the crossing of HCA's by 0.10 mile; and
- Reduction in forest land crossed by 1.42 miles.

Alternative F results in the following increased impacts as compared to the preferred route:

- An increase in corridor length by 1.82 miles;
- 4.39 miles of greenfield corridor;
- An increase in new wetland within the permanent ROW by 25.57 acres;
- An increase in forested wetlands within the permanent ROW by 3.91 acres;
- An additional 8 waterbody crossings;
- An additional 6 WDNR-mapped ASNRI waterbody crossings;
- Crossing of an additional 8 wild rice production area drainages;
- New crossing of WDNR-managed lands (0.02 mile);
- 68 landowners;
- Increase of 8 new road crossings;

- Three additional rail crossings; and
- An additional one ATV trail crossing.

Alternative F would result in an increase to temporary and permanent environmental, social and economic impacts, but less so then Alternatives A, C, D, and E. This alternative would require the creation of new 4.39 miles of new corridor where none currently exists. The temporary impacts associated with this alternative include 8 new waterbody crossings, of which, all are wild rice production drainage areas and 6 are designated as ASNRI by the WDNR, and an increase in temporary impacts to non-forested wetlands. The permanent impacts associated with this alternative include those associated with habitat fragmentation and land use as a result of the greenfield corridor, the new crossing of WDNR-managed lands, the number of landowner's impacted would nearly double, and 3.91 acres of forested wetlands converted from forested to emergent/scrub-shrub. The increase in new road, rail and ATV trail crossings would result in an increase in costs due to construction requirements at these features. Although this alternative avoids impacts to state natural areas and ASNRI-land, the overall increase in permanent impacts and costs associated with special construction techniques indicate that Alternative F is not a practicable alternative to the proposed route.

VII.A.9.a.08. Alternative G

Alternative G as compared to the preferred route results in the following reductions:

- Reduction in WDNR-mapped ASNRI land crossings by 2.92 miles;
- Avoidance of all State Natural Areas; and
- Reduction in county forest areas crossed by 2.67 miles.

Alternative G results in the following impacts as compared to the preferred route:

- An increase in corridor length by 2.05 miles;
- 4.56 miles of greenfield corridor;
- An increase in new wetland impacts within the permanent ROW by 17.23 acres;
- An increase in forested wetlands within the permanent ROW by 0.15 acre;
- An additional 9 waterbody crossings;
- An additional 5 WDNR-mapped ASNRI waterbody crossings;
- Crossing of an additional 9 wild rice production area drainages;
- Increase in the crossing of HCA's by 2.26 miles;

- Increase in forest land crossed by 1.09 miles;
- 51 landowners;
- Increase of 3 new road crossings; and
- Cemeteries and active mining operation.

Alternative G would result in an increase to temporary and permanent environmental, social and economic impacts as compared to the preferred route. This alternative would require the creation of new 4.56 miles of new corridor where none currently exists. The temporary impacts associated with this alternative include 9 new waterbody crossings, of which, all are wild rice production drainage areas and 5 are designated as ASNRI by the WDNR, and an increase in temporary impacts to non-forested wetlands. The permanent impacts associated with this alternative include those associated with habitat fragmentation and land use as a result of the greenfield corridor, an increase in new forest land crossed, and an increase in HCA's impacted. The increase in HCA's crossed would require significant revisions to the pipe design and construction methods, as well as, unnecessarily place additional landowners and communities at a higher risk, as compared to the preferred route. The increase in new road, snowmobile trail crossings would result in an increase in costs due to construction requirements at these features. This route follows the existing route, with the exception of a reroute north along Kimmes road and east south of old Highway 5 to avoid the Pokegama-Carnegie wetland complex. The relief along Kimmes Road north would require special construction techniques to safely construct through this type of topography. This would significantly increase costs, as well as, safety risks to the construction crews. In addition, the proposed corridor south of old Highway 105 would encroach on existing homes, several cemeteries and an active mining operation. Although this alternative avoids impacts to state natural areas and ASNRI-land, the overall increase in permanent impacts indicate that Alternative G is not a practicable alternative to the proposed route.

VII.A.9.b. Route variations

Route variations differ from macro-corridor alternatives in that they are intended to resolve or reduce construction impacts to localized, specific resources, such as wetlands, recreational lands, residences, landowner requests, and terrain conditions. Several factors are considered in identifying and evaluating route variations, including length, land requirements, the potential for reducing or minimizing impacts to natural resources, and addressing landowner concerns. Enbridge has identified route variations at three locations: Milepost 1086, Milepost 1089, and at the Nemadji Golf Course (MP 1096.4).

Milepost 1086 Route Variation

Enbridge has evaluated the proposed route from milepost 1086.1 to 1086.5 to minimize the crossings of an unnamed tributary to the Pokegama River. The unnamed tributary meanders along the center of the existing maintained ROW. To minimize impacts to this feature, Enbridge

has proposed moving the construction ROW north of the existing ROW. The route variation would avoid disturbance of approximately 1,300 feet of the meandering tributary. The emergent wetlands would be allowed to revert to their original condition and no new permanent impacts will occur as a result of this route variation.

Milepost 1089 Route Variation

Enbridge has evaluated the proposed route from milepost 1089.3 to 1089.7 due to a landowner request. Enbridge has identified a new greenfield corridor through an existing hay field. The proposed greenfield corridor would result in two new waterbody crossings of unnamed intermittent ditches; however, it would reduce the overall temporary wetland impacts by 4.3 acres.

Nemadji Golf Course

Enbridge has evaluated three route variations at the Nemadji Golf Course (referred to as segments B5, B6, and B7). The three segments evaluated would begin just to the south of the Nemadji Golf Course and intersect with Enbridge's existing ROW north of the golf course. Segment B5 is the originally proposed route that traverses a greenfield site to the west of the golf course and the railroad corridor. Segment B6 is a new route proposed within the golf course, but it does not follow Enbridge's existing easement; instead it follows along the west and north boundaries of the golf course. Section B7 is Enbridge's existing easement.

Segment B5 Route Variation at the Nemadji Golf Course

Segment B5 would depart the existing Enbridge ROW at milepost 1096.2 and continue north, parallel to and west of the Soo Line railroad ROW to the northern boundary of the Nemadji Golf Course where it would then head west 0.3 miles until it intersects Enbridge's existing ROW. This alternative would have the greatest impact on wetlands, approximately 4.56 acres, as compared to the other two routes. This alternative was originally selected in response to the landowner request (City of Superior) that the route through the Nemadji Golf Course be avoided to minimize disruptions to operations as a result of construction activities. This segment was evaluated by agency representatives of both the ACOE and the WDNR. As a result of this evaluation, both agencies responded with concerns regarding the impacts on a significant population a state-listed threatened plant. In response to agency concerns, Enbridge has identified an alternative to this preferred route; specifically Segment B6.

Segment B6 Route Variation at the Nemadji Golf Course

Segment B6 would depart the existing Enbridge ROW at about milepost 1096.2. Where Enbridge's existing pipeline corridor heads to the east and traverses the Nemadji Golf Course, Segment B6 continues north along the edge of the northeastern fairways of the golf course and intersects with the existing Enbridge ROW as it leaves the golf course. This alternative would reduce the acreage of wetland impacts on segment B5 by 4.40 acres as compared to segments B5 and B7 and would successfully avoid impacting the area of concern found on segment B5.

Although still crossing within the Nemadji Golf Course, this route would minimize the disruptions to the golf course and avoid impacts on two ponds used of irrigation purposes.

Segment B7 Route Variation at the Nemadji Golf Course

Segment B7 would follow Enbridge's existing pipeline corridor across Nemadji Golf Course. This route would significantly restrict the use of key golf course facilities, and would require the dewatering of two significant ponds which play a key role in the irrigation system of the golf course.

Enbridge is proposing to follow Segment B6 which would minimize the impacts to sensitive natural areas and minimize the disturbance within the Nemadji Golf Course.

Table 71 compares the proposed pipelines route with the three alternative route segments at the Nemadji Golf Course (referred to as segments B5, B6, and B7).

Table 71 - Environmental Effects Comparison of Nemadji Golf Course Route Variations

Comparison of Route Segments B5, B6, and B7				
Environmental Factor	**Unit**	**Segment B5**	**Segment B6**	**Segment B7**
Total Length	Miles	0.82	0.70	0.65
Adjacent to Existing ROW	Miles	0.00	0.12	0.34
Wild Rice Production Area Drainages	Number	0	0	0
State Natural Areas Affected	Length [a]	0.00	0.00	0.00
County Forest Areas Affected	Length [a]	0.00	0.00	0.00
DNR Managed Lands Affected	Length [a]	0.00	0.00	0.00
Superior Municipal Forest Lands Affected	Length [a]	0.00	0.00	0.00
Highly Populated Areas	Length [a]	0.00	0.00	0.00
Other Populated Areas	Length [a]	0.82	0.70	0.65
Structures within 100 feet of the Proposed Centerline	Number	0	0	1
Land Use				
Agriculture	Length [a]	0.00	0.00	0.00
Urban / Developed	Length [a]	0.00	0.00	0.00
Number of Landowners	Number	5	3	2
Private Land Tracts Crossed	Number	4	3	1
Public Land Tracts Crossed	Number	5	4	6
Total Number of Tracts Crossed	Number	9	7	7
Roads Crossed	Number	0	0	0
Railroads Crossed [d]	Number	1	1	1
Known Areas of Contamination (e.g., Superfund sites)	Number	0	0	0
ATV Trails Crossed	Number	3	4	1
Snowmobile Trails Crossed	Number	3	4	1

[a] Length: length crossed in miles.
[b] Acres: Acres within permanent ROW
[c] Includes open pasture/hayfields.
[d] Railroad currently under review for eligibility for listing on the National Register of Historic Places
[e] Based on WWI data. Subsequent wetland delineation data indicate wetlands are PUB/PEM/PSS.
[f] Data represents the total area within a boundary and is not representative of the actual wetland acres impacted.`

VII.B. Superior Terminal Pumping Station

VII.B.1. Air quality
VII.B.1.a. Effects of proposed projects
VII.B.1.a.01. Construction

During construction, under certain meteorological conditions, diesel exhaust, and dust from trucks and other vehicles can temporarily affect local air quality during site construction and preparation. Vehicle traffic from the project would be minimal, temporary air emissions from welding and construction vehicles would be minor, and would not significantly affect ambient air quality.

VII.B.2. Wetlands
VII.B.2.a. Effects of proposed projects
VII.B.2.a.01. Construction

Given the adjacent structures and land uses, Enbridge found little opportunity to shift the footprint for the pump station to avoid or minimize the wetland impacts in this area. Wetland impacts were minimized to the extent possible by condensing the footprint for the pump station. The original plans had been designed with a proposed footprint of 2.0 acres, but in order to make this location work the footprint was reduced or condensed to the currently proposed 1.51 acres. In order to avoid potential temporary wetland impacts the new proposed Line 13 and Line 67 pipelines will be constructed directly south of the pump station in an existing pipeline corridor.

This is Enbridge's preferred alternative for several reasons which includes: minimization of wetland impact to the extent practicable, the use of available upland areas to the greatest extent possible, close proximity to the proposed out-bound Line 13 that will serve to transport diluents back to the oil sands in Western Canada, and the overall accessibility of this area to service and maintain.

Wetlands provide an important flood protection function. In the Lake Superior clay plain, many of the wetlands are topography-dependent and highly interspersed on the landscape. Wetlands hold water on the landscape, which slows the rate of water runoff to the streams. Streams in the clay plain tend to have habitat impacts from streambank erosion due to excess water runoff from the landscape. Additional wetland loss within the watershed would be expected to exacerbate erosion impacts to streams.

The proposed pump station would require filling 0.6 acres of wetland.

VII.B.2.b. Effects of alternatives
VII.B.3.b.01. Construction

Alternative 1

Alternative 1 considered the construction of the 1.51 acre or 65,751 square foot footprint for the Southern Lights Pump Station in a triangular parcel of property located directly north of Tank 24 in an undeveloped area of the Superior Terminal between the tank containment berm and the access/maintenance road that parallels Bardon Avenue. This area was determined to be comprised entirely of sedge meadow wetland with the exception of a very small area of upland in the southern corner. It was determined that this alternative was not viable as the area of this parcel is one-third smaller than the already condensed proposed pump station footprint, which is 1.51 acres in size and the configuration of this parcel does not work with the required configuration of the pump station components and their layout within the footprint. Furthermore, even if the parcel had been the appropriate size given the fact that this alternative location contained no available upland and would propose the permanent impact of 0.51 acres of wetland. Enbridge determined this alternative to not be practicable.

Alternative 2

Alternative 2 considered the construction of the 1.51 acre or 65,751 square foot footprint for the Southern Lights Pump Station in a triangular parcel of property located southwest of Tank 19 in an undeveloped area of the Superior Terminal between the tank containment berm and the access/maintenance road that parallels Bardon Avenue. This area was determined to be comprised primarily of sedge meadow wetland with the exception of a very small area of upland directly adjacent to the containment berm in the northeastern portion of this site. Like Alternative 1, this alternative was also determined not to be viable or practicable for several reasons, which include: the area of this parcel is almost one-third smaller than the already condensed proposed pump station footprint, which is 1.51 acres in size; the configuration of this parcel does not work with the required configuration of the pump station components and their layout within the footprint; and finally this location contained only a nominal area of upland and would propose the permanent impact of 0.59 acres of wetland. Enbridge determined this to not be a practicable alternative.

Alternative 3

Alternative 3 considered the construction of the 1.51 acre or 65,751 square foot footprint for the Southern Lights Pump Station in a triangular parcel of property located southwest of Tank 15 between the tank containment berm, the access/maintenance road that parallels Bardon Avenue, and an access/maintenance road to the south. This area is approximately 1.01 acres in size and currently houses an existing switchgear/generator building, and aboveground valve for Line 6A, and an overhead power line. The remaining portions of this parcel are undeveloped upland. No wetlands exist on this site, so none would be affected if this alternative site were chosen. Enbridge determined this alternative to not be practicable for technical reasons.

Alternative 4

Alternative 4 considered the construction of the 2.5 acre footprint for the Southern Lights Pump Station in a triangular parcel of property located directly west of Bardon Avenue in an undeveloped area adjacent to Enbridge’s existing maintenance facility. The available to construct the pump station is 1.5 acres. This area was determined to be comprised of 1.37 acres of sedge meadow wetland and 0.14 acres of upland. Enbridge concluded that Alternative 4 is not practicable as it would result in the permanent impact of 1.37 acres of sedge meadow wetland, would not be large enough to construct the station, and would incur additional cost to the projects..

Alternative 5

Alternative 5 considered the construction of the 2.5 acre footprint for the pump station at the terminus of the existing Southern Lights Diluent pipeline on undeveloped land directly west of Bardon Avenue. This area was determined to be comprised of 0.04 acres of alder thicket wetland, 0.81 acres of seasonally wet forested wetland, 0.18 acres wet/sedge meadow wetland, and 1.47 acres upland.

Because this location is adjacent to the terminus of the existing Southern Lights Diluent pipeline, the proposed 0.09 acres of temporary wetland impact to install the 20-inch diameter pipeline connecting the pump station to the existing mainline would no longer be required. However, this alternative would require relocation of the proposed mainline pipeline exiting the Superior Terminal as the proposed Alberta Clipper and Southern Lights Diluent pipelines would no longer be co-located. This would result in a reduction of the construction footprint required to install the Alberta Clipper pipeline from 140 feet to 115 feet and no expansion of the current permanently maintained corridor. However, a new 115-foot wide construction right-of-way, which includes a 50-foot wide permanently maintained corridor, would be required for the Southern Lights Diluent pipeline to connect from the pump station to the mainline pipeline corridor. The power line could most likely be co-located with the new pipeline corridor.

The 50-foot wide pipeline corridor would be maintained to be free of woody vegetation; therefore, the 1.08 acres of alder thicket and 0.76 acres of seasonally wet forest would be converted to wet meadow wetland. Furthermore, Alternative 5 would result in the permanent impact of 1.03 acres of medium to high functional value wetlands. Whereas, the preferred location within the Superior Terminal will result in the permanent impact of 0.60 acres of wet/sedge meadow wetland that was given a low to medium functional value.

This alternative was considered to be not practicable by Enbridge as it would result in the permanent impact of seasonally wet forest wetland, the permanent conversion of alder thicket and seasonally wet forest to wet meadow wetland as a result of the new pipeline corridor, and additional costs incurred to the project.

Alternative 6

Alternative 6 considered the construction of the 2.5 acre footprint for the pump station near the terminus of the existing Southern Lights Diluent pipeline on undeveloped land directly west of Bardon Avenue and south of Alternative 5 (refer to Figure 3). This area was determined to be comprised of 0.14 acres alder thicket wetland, 0.18 acres seasonally wet forested wetland, 0.04 acres wet/sedge meadow wetland, and 2.14 acres upland.

Because this location is adjacent to the terminus of the existing Southern Lights Diluent pipeline, the proposed 0.09 acres of temporary wetland impact to install the 20-inch diameter pipeline connecting the pump station to the existing mainline would no longer be required. However, this alternative would require relocation of the proposed mainline pipeline exiting the Superior Terminal as the proposed Alberta Clipper and Southern Lights Diluent pipelines would no longer be co-located. This would result in a reduction of the construction footprint required to install the Alberta Clipper pipeline from 140 feet to 115 feet and no expansion of the current permanently maintained corridor. However, a new 115-foot wide construction right-of-way, which includes a 50-foot wide permanently maintained corridor, would be required for the Southern Lights Diluent pipeline to connect from the pump station to the mainline pipeline corridor.

The 50-foot wide pipeline corridor would be maintained to be free of woody vegetation; therefore, the 0.55 acres of alder thicket and 0.70 acres of seasonally wet forest would be converted to wet meadow. Furthermore, Alternative 6 would result in the permanent impact of

0.36 acres of medium to high functional value wetlands. Whereas, the preferred location within the Superior Terminal would result in the permanent impact of 0.60 acres of wet/sedge meadow wetland that was given a low to medium functional value.

Enbridge determined that this alternative is not practicable as it would result in the permanent impact to medium to high functional value alder thicket and seasonally wet forest wetlands, the permanent conversion of alder thicket and seasonally wet forest to wet meadow wetland as a result of the new pipeline corridor, and additional costs incurred to the project.

Alternative 7

Alternative 7 considered the construction of the 2.5 acre footprint for the pump station adjacent to an existing Enbridge densitometer building. This area was determined to be comprised entirely of alder thicket, seasonally wet forested, and wet/sedge meadow wetlands. Alternative 7 would not require construction of a new access road as the existing road could be utilized. However, because of substantially larger amount of permanent wetland impact associated with this alternative as opposed to the other alternatives, Enbridge did not evaluate the differences in temporary wetland impacts that would result from altered piping configurations.

Alternative 7 was determined by Enbridge to not be practicable as it would result in the permanent impact of 2.5 acres of medium to high functional value wetland and additional cost incurred to the projects.

Alternative 8

Alternative 8 considered the construction of the 2.5 acre footprint for the pump station adjacent to an existing Enbridge densitometer building and north of Alternative 7. This area was determined to be comprised almost entirely of alder thicket, seasonally wet forested, and wet/sedge meadow wetlands (0.09 acres of upland). Alternative 8 like Alternative 7 would not require construction of a new access road as the existing road could be utilized. However, because of substantially larger amount of permanent wetland impact associated with this alternative as opposed to the other alternatives, Enbridge did not evaluate the differences in temporary wetland impacts that would result from altered piping configurations.

Enbridge determined that alternative 8 is not practicable as it would result in the permanent impact of 2.41 acres of wetland, and additional cost incurred to the projects.

Alternative 9

Alternative 9 considered the construction of the 2.5 acre footprint for the pump station along the proposed Southern Lights Diluent pipeline route on undeveloped land west of Bardon Avenue. This area was determined to be comprised of 1.22 acres of seasonally wet forested wetland, 0.13 acres wet/sedge meadow wetland, and 1.15 acres upland.

Because this location is adjacent to the terminus of the existing Southern Lights Diluent pipeline, the proposed 0.09 acres of temporary wetland impact to install the 20-inch diameter pipeline

connecting the pump station to the existing mainline would no longer be required. However, this alternative would require relocation of the proposed mainline pipeline exiting the Superior Terminal as the proposed Alberta Clipper and Southern Lights Diluent pipelines would no longer be co-located. This would result in a reduction of the construction footprint required to install the Alberta Clipper pipeline from 140 feet to 115 feet and no expansion of the current permanently maintained corridor. However, a new 115-foot wide construction right-of-way, which includes a 50-foot wide permanently maintained corridor, would be required for the Southern Lights Diluent pipeline to connect from the pump station to the mainline pipeline corridor.

Furthermore, Alternative 9 would require construction of a permanent access road off of Bardon Avenue. This new gravel access road would result in approximately 0.49 acres of permanent wetland impacts to seasonally wet forest, shrub carr, alder thicket, and wet/sedge meadow wetlands.

The 50-foot wide pipeline corridor would be maintained to be free of woody vegetation; therefore, the 1.03 acres of alder thicket and 1.14 acres of seasonally wet forest would be converted to wet meadow wetland. Furthermore, Alternative 9 will result in the permanent impact of 1.35 acres of medium to high functional value wetlands Whereas, the preferred location within the Superior Terminal will result in the permanent impact of 0.60 acres of wet/sedge meadow wetland that was given a low to medium functional value.

This alternative was determined by Enbridge to not be practicable as it would result in the permanent impact to seasonally wet forest wetland, the permanent conversion of alder thicket and seasonally wet forest to wet meadow wetland as a result of the new pipeline corridor, additional permanent wetland impacts as a result of constructing a new access road, and additional costs incurred to the project.

VII.B.3. Socioeconomic resources
VII.B.3.a. Effects of proposed project
VII.B.3.a.01. Construction

Construction activities could result in short-term impacts to transportation infrastructures and traffic. The traffic volume along roads close to the facility could increase due to the movement of construction equipment, material, and crew members. Temporary road closures also may be required. Enbridge has stated that they would try to avoid road closures during peak-traffic periods. Impacts to local traffic levels during construction would likely be temporary and minor. Construction across any paved roads, highways, or roadways would be subject to the requirements of the necessary state and local permits. Enbridge would obtain these permits prior to the start of construction. Access to facility would be obtained using pre-existing public and private roads. Any damage to roads due to construction related activities would be repaired as needed by Enbridge.

The site is currently an industrial facility. The proposed modifications will not change the status of Enbridge’s facility or the use of the land.

Based on the rural setting of the Enbridge Superior Terminal, and assuming that the expansion projects would remain solely within existing Terminal boundaries, neither low-income nor minority groups are expected to be disproportionately affected by construction of the proposed projects.

A Phase II Architectural History survey of the Superior Terminal concluded that the proposed projects would not result in an adverse effect to historic properties.

Only minor visual changes are expected at the Terminal resulting from development of the proposed pumping station. A relatively small addition to this industrial site would not be very noticeable from the perimeter.

VII.C. Superior Terminal Breakout Tanks (including methods and schedules)
VII.C.1. Air quality
VII.C.1.a. Effects of proposed projects
VII.C.1.a. 01. Construction

During construction, under certain meteorological conditions, diesel exhaust, and dust from trucks and other vehicles can temporarily affect local air quality during site construction and preparation. Vehicle traffic from the project would be minimal, temporary air emissions from welding and construction vehicles would be minor, and would not significantly affect ambient air quality.

VII.C.1.a. 02. Operation

VOC emissions from the proposed project are from fugitive or similar low-lying sources which typically would have localized impacts.

The potential impact from VOCs on vegetation is very limited. VOCs by their very nature are generally not deposited onto soil, surface water, and sediments and do not accumulate over time and cause an impact. VOCs in the vapor phase are readily degraded in the atmosphere by reaction with photochemically-produced hydroxyl radicals. VOCs are also degraded by ozone and nitrate radicals found in the atmosphere, but at such low rates as to not be important.

However, VOCs are regulated by the U.S. EPA as precursors to ozone formation. The photochemical formation of ozone (O_3) in the troposphere proceeds through the oxidation of nitric oxide (NO) to nitrogen dioxide (NO_2) by organic (RO_2) or hydro-peroxy (HO_2) radicals. The photolysis of NO_2 yields nitric oxide (NO) and a ground-state oxygen atom, O(3P), which then reacts with molecular oxygen to form O_3. Free radicals oxidizing NO to NO_2 are formed during the oxidation of VOCs.

Ozone is known as a phytotoxic pollutant that at elevated ground-level concentrations can damage plant life and reduce crop production. The effects of gaseous air pollutants on vegetation may be classified into three rather broad categories: acute, chronic, and long-term. Acute exposures usually damage plants through direct physical damage to leaf tissues and result from relatively short (less than 1 month) exposures to high concentrations of pollutants. Chronic

exposure damage is usually due to the inhibition of physiological processes such as photosynthesis, carbon allocation, and stomata functioning. Chronic effects occur when organisms are exposed for months or even years to certain threshold levels of pollutants. Long-term effects include abnormal changes in ecosystems and subtle physiological alterations in organisms. Acute and chronic effects are caused by the gaseous pollutant acting directly on the organism, whereas long-term effects may be indirectly caused by secondary agents such as changes in soil pH.

According to the EPA's Air Quality Criteria for Ozone and Related Photochemical Oxidants, Volume I (February 2006), ground-level ozone can have detrimental effects on plants and ecosystems. These effects include interfering with the ability of sensitive plants to produce and store food; making them more susceptible to certain diseases, insects, other pollutants, competition, and harsh weather; damaging the leaves of trees and other plants, negatively impacting the appearance of urban vegetation, national parks, and recreation areas; and reducing crop yields and forest growth, potentially impacting species diversity in ecosystems. The entrance of ozone into the leaf through the stomata is the critical step in ozone effects on vegetation.

Single source-receptor modeling for ozone is not feasible at this time, so it is not possible to model the potential impact of the VOC emissions; however, based on the estimated emission rates, the proposed projects are not anticipated to significantly increase ozone formation. The project is not expected to significantly contribute to ozone levels greater than the NAAQS standard which is set to protect public health and the environment. No significant impacts on vegetation from the VOC emissions are anticipated from the proposed project.

Class I Areas

The proposed project is subject to PSD approval due to a significant increase in VOC emissions. The VOCs would be emitted as fugitive emissions from storage tanks and piping components (valves and flanges) which are low-lying sources that typically would have localized impacts, if any at all. Emissions for the proposed project would not result in a visible plume; there would be no plume impairment.

The EPA in its Regional Haze Rule, Best Available Retrofit Technology (BART) modeling guidance suggests that VOCs are a precursor to PM2.5 formation on a case-by-case basis, that only specific VOC compounds form secondary organic aerosols that affect visibility, and that these compounds are a fraction of the total VOCs emitted from point sources. Project emissions are not anticipated to cause or contribute significantly to any impairment of visibility in Class I areas. The visibility impacts from the project on Class I areas are anticipated to be negligible.

According to the Federal Land Managers' Air Quality Related Values Workgroup (FLAG) Phase I Report (December 2000), single source-receptor modeling for ozone is not feasible at this time. It is not possible to model the potential impact of the proposed project on Class I areas; however, due to the low concentrations of VOCs emitted from the proposed project and the large distances to the Class I areas, it is appropriate to assume that the proposed project would not contribute significantly to ozone concentrations in Class I areas. In addition, current information, as

referenced in the FLAG report, indicates that for most of the Class I areas, ozone formation is NOx limited, so control of NOx emissions would result in improved control of ozone formation. The proposed project would not result in an increase of NOx emissions.

VOC emissions do not contribute to acid deposition; as a result, the proposed project would not result in any acid deposition impact.

Air Dispersion Modeling

The purpose of the air quality impacts analysis is to demonstrate that after the proposed construction projects, the hazardous air pollutant (HAP) emissions from the Enbridge Superior Terminal would comply with the WDNR s. NR 445 Wis. Adm. Code Control of Hazardous Pollutant regulations.

Pursuant to NR445, all stationary air contaminant sources which may emit hazardous contaminants shall achieve compliance with the emission standards and control requirements in s. NR445.07(1),(2) or (3) for each HAP. To demonstrate compliance with NR445 requirements, Enbridge has estimated HAP emissions from the terminal's air contaminant sources and compared the estimated emissions to applicable NR445 emission point thresholds. HAPs with emissions below applicable emission point thresholds were determined to be in compliance with NR445 emission limitations, HAPs with emissions above emission point thresholds were modeled to demonstrate compliance with NR445.

Benzene is the only HAP which exceeded the emissions threshold in NR445 Table A. To demonstrate NR445 compliance for benzene, Enbridge selected the compliance method described under s. NR445.08(2)(c) with includes air dispersion modeling of HAC emissions resulting in an inhalation impact of less than 1 x 10-6. Air dispersion modeling for benzene was completed using the current version of AERMOD which is the currently accepted air quality model by US Environmental Protection Agency (EPA) for complex facilities that include multiple point sources subject to the downwash effect of several structures. Lakes Environmental's AERMODView program was used to set-up and run the model.

The benzene has an annual averaging period in NR445. As prescribed in s. NR445.08(2)(c), the inhalation impact of benzene is determined by multiplying the inhalation impact concentration by the unit risk factor per the following equation:

Inhalation Impact = (Inhalation Impact Concentration annual average) x (Unit Risk Factor)

The maximum annual average modeled concentration is 1.255 x 10-1 micrograms per cubic meter (µg/m3) modeled for 2002 and the benzene unit risk factor established by EPA is 7.8 x 10-6 (µg/m3)-1. The resulting is a maximum inhalation impact of 9.97 x 10-7 which is below the 1 x 10-6 threshold in the state HAP regulations. This will require the addition of some additional controls on existing tanks, and some additional limitations on the operations.

The Enbridge terminal has demonstrated compliance with NR445 through the use of air dispersion modeling to calculate an inhalation impact of less than 1 x 10-6 for benzene and by evaluating stack specific emission limitations for all of the other HAC emitted by the terminal.

VII.C.2. Geology and soils
VII.C.2.a. Effects of proposed projects
VII.C.2.a. 01. Construction

Construction of the tanks, new manifold, and booster pumps would require 18.87 acres of permanent land disturbance.

VII.C.3. Hydrography
VII.C.3.a. Surface waters
VII.C.3.a.01. Effects of proposed projects
VII.C.3.a.01.aa. Construction

The Nemadji River in Douglas County is a designated Section 10 Waterway. The Nemadji River is also a migratory passageway for trout spawning in headwater streams of Lake Superior. The Nemadji is in close proximity to the proposed pipeline corridor and the Superior Terminal. Attention to proper erosion control measures will be necessary to prevent erosion/siltation impacts to the Nemadji River during construction.

VII.C.3.a.01.bb. Operation

Normal breakout tank operation should not affect the Nemadji River, but spills could be detrimental to this resource.

VII.C.3.b. Wetlands
VII.C.3.b.01. Effects of proposed projects
VII.C.3.b.01.aa. Construction

The proposed project (Alternative A-3) would impacts previously disturbed lands where uplands are present and Enbridge owns the property. The site is in close proximity to existing infrastructure, minimizing additional temporary or permanent wetland impacts. Expansion of the existing facility prevents the need for construction of a new terminal facility and minimizes the footprint of the terminal overall by compressing the proposed construction and designing it into the existing facility and structures.

The proposed project area is 18.87 acres and would result in permanent and temporary impacts to wetland habitat. A total of 11.26 acres of permanent wetland impact is proposed for the construction of five breakout tanks, containment berms, booster pumps, a manifold, a stormwater management pond, associated infrastructure, and the installation of four power poles.

A total of 3.19 acres of temporary wetland impact located outside of the project area is proposed for the installation of five new 36-inch pipes and temporary workspace during construction. The impact area is estimated to be 938 linear feet by approximately 150 feet wide. The pipelines

would be installed using a cut and cover technique. The proposed impacts for this activity would therefore be temporary.

By consolidating the tank configuration and combining the containment for the proposed tanks within a portion of the existing terminal, Enbridge reduced the required footprint to minimize wetland impacts. In addition, by proposing the construction of Tanks 36, 37, and 38 adjacent to existing Tanks 32 and 33, the existing access roads and containment berms could be utilized effectively minimizing proposed wetland impacts by approximately 1.5 acres.

For the pipelines between the manifold and the tanks, all existing wetland areas would be restored to their original conditions and the excavated soil material placed back in the order that it was removed. The temporary impact area is estimated at 938 linear feet by approximately 150 feet wide for a temporary wetland impact area of 3.19 acres.

Temporary wetland impacts include construction workspace, equipment staging, construction trailers, material storage, and access. Where practical, operation of equipment would be done using available equipment that would minimize rutting, tracking, or other unnecessary soil disturbance in areas permitted for temporary wetland impacts.

Areas permitted for temporary wetland impacts, which result in ground disturbance would be restored to their original elevation and surface form.

More than 85% of the undeveloped land in the City of Superior consists of wetlands, presenting a challenge to find available upland locations for new development. In the mid-1990's the City, in conjunction with the U.S. EPA, U.S. Army Corps of Engineers and the Wisconsin Department of Natural Resources, adopted a Special Area Management Plan (SAMP) that allowed the City to lead the processing of wetland permit applications to fill pre-identified low to medium quality wetland areas within the City. Permittees purchase credits for wetland compensatory mitigation from city operated wetland mitigation banks. The second SAMP was put into place in November 2008. SAMP II provided assessment of 5579 acres of wetland throughout the city. In SAMP I, 143 total acres of wetland fill could be permitted through 2007. In SAMP II, 140 acres of wetland fill can be permitted through 2017.

VII.C.3.b.01.bb. Operation

Normal breakout tank operation should not affect wetlands, but spills could be detrimental to this resource.

VII.C.3.b.02. Effects of alternatives

VII.C.3.b.02.aa. Construction

A summary of the potential wetland impacts for each alternative location is provided in Table 72.

Table 72 - Breakout Tanks Alternatives Wetland Impacts Summary

Wetland Impacts Summary: Tanks 36 – 40, Superior Terminal		
Location	**Total Permanent Wetland Impact (acres)[1]**	**Total Temporary Wetland Impact (acres)[2]**
Clearbrook Terminal	7.69	1,171.9
Floodwood Pump Station	5.86	369.5
Wrenshall Tank Site	0.00	106.3
Old Amoco Tank Farm	0.00	Not available[3]
Old Unical and Murphy Tank Farm	1.43	Not available[3]
Hill Avenue	15.33	2.29
Nemadji Golf Course	Not available	Not available[3]
A-1	15.83	3.19
A-2	14.44	3.19
A-3 (Preferred Alternative)	11.26	3.19
B-1	14.92	1.07
B-2	17.37	1.07
B-3	17.45	1.07

1. Permanent impacts for alternative locations A-1 through A-3 and B-1 through B-3 were determined using actual wetland delineations. Permanent impacts for the remaining alternatives were determined using publically available data sources (National Wetlands Inventory or Wisconsin Wetlands Inventory, as applicable).
2. Temporary impacts for alternative locations A-1 through A-3 and B-1 through B-3 were determined using actual wetland delineations. Temporary impacts for the Clearbrook, Floodwood, and Wrenshall locations are the proposed wetland impacts for the Alberta Clipper and Southern Lights Diluent pipelines; therefore, to accommodate the additional two pipelines required, these impacts would be significantly higher. The remaining alternatives were determined using Wisconsin Wetlands Inventory.
3. Temporary wetland impacts as a result of tank transfer pipelines was not determined for this alternative as it was eliminated from further evaluation for technical or other logistical reasons.

Currently four existing incoming pipelines terminate at the Superior central manifold and five outgoing pipelines initiate at the Superior central manifold. Connecting the proposed tanks to the Superior central manifold would enable access to all incoming and outgoing batches in Superior, making it a strategic location for crude oil breakout tanks. If the tanks are constructed off-site, certain existing resources at the Superior Terminal would have to be replicated at an offsite location. Because the location and size of a new facility outside Douglas County is speculative, the existence of the required power for the facility, including new originating pumping stations is not known. Thus the impacts the need for siting and constructing new power line sources to a new speculative facility are not quantified.

According to Enbridge, the key factors that must be taken into account when considering locating the new tanks off-site of the existing Superior terminal are: (1) additional pipeline construction and associated environmental impacts and economic costs; (2) pipeline pressure cycling; (3) pipeline system optimization; and, (4) product quality. Each of these is discussed in more detail below.

Additional Pipeline Construction and Associated Environmental Impacts and Economic Costs

The existing Superior Terminal is the main crude oil pipeline hub in the area, and the ability to connect to all incoming and outgoing pipelines contributes to the efficiency of the crude oil transportation system. Building the project off-site would require additional piping and pumping

capacity to connect the remote facility into the existing Superior Terminal. There would be associated environmental impacts of the pipeline construction as well as economic costs associated with the additional constructions. The current cost to install a 36-inch diameter pipeline is approximately $2.7 million per mile.

Pipeline Pressure Cycling

Directly receiving or injecting crude oil in or out of the proposed tanks into the connecting pipelines without using the existing Superior Terminal would cause the pipeline to be shut down upstream of the location. This would occur because the flow of crude in the pipeline would be interrupted as it is delivered into the breakout tanks. As an example, if the project were 20 miles upstream of Superior and crude oil was being delivered into the tanks, the pipeline system immediately downstream of the delivery location would shut down and have reduced pressure as the upstream portion of the pipeline pushes the crude oil into the tanks. As the delivery was completed and the normal operation of the pipeline resumed, there would be an increase in the pressure downstream of the delivery location. The opposite would hold for an injection of crude oil out of the breakout tanks into the pipeline, with the pipeline upstream of the location being shut down and corresponding pressure decrease.

This revolving high-low pressure cycling on the pipeline would limit the capacity of the pipeline system and could impact the overall integrity of the pipeline, reducing its operating life. It is just this type of “high-low” pressure cycling that has been studied in past years and resulted in a redesign of pipeline operations. This has significantly reduced the number and severity of fatigue related cracking of longitudinal welds in some segments of the Enbridge pipeline system that caused pipeline failures in the past.

Pipeline System Optimization

As described above, locating the project off-site of the existing Superior terminal would result in pipeline shutdowns as receipts and deliveries of crude oil are made into and out of the tanks. The resulting shutdowns of the pipeline would not only impact the integrity of the pipeline system, they also would impact the ability to optimize the pipeline operation. These shutdowns of the connecting pipeline system would affect the overall capacity and efficiency of the pipeline system. The loss in capacity would partly be a result of the inability to ensure that receipts and deliveries into and out of the tanks coincide, such that shutdowns on the connecting pipeline system are minimized.

Product Quality

Locating the breakout tanks more than a mile from the distribution manifold at the Superior Terminal could result in product degradation due to batch mixing and capacity restrictions on the existing mainline pipelines. Contamination can occur within a facility as a result of common station piping operated in start/stop mode. As the distance between the outgoing manifold and the tanks increases, the volume of oil within the transfer piping increases. As an example, if the tanks were located one mile from the central manifold, one 36-inch diameter pipeline would contain approximately 279,046 gallons or 6,643 barrels of oil. One batch is typically 60,000

barrels. Each time a batch is transferred from the manifold into a tank, 6,643 barrels (approximately 9 percent of the total batch volume) of oil from the previous batch within the transfer piping is pushed into the tank ahead of the new batch and the two mix, which degrades the quality of the batch by altering the original physical and chemical properties. Furthermore, 6,643 barrels of oil from the new batch remains "stranded" within the transfer piping until the next batch is moved through. There is no way to avoid the remnant oil (or "line pack") remaining in the pipe pending being pushed through (displaced) by the next incoming batch of oil. Therefore, to minimize the amount of batch contamination, the length of the transfer piping needs to be minimal. In addition, capacity interruptions resulting from material being moved from off-site tanks causes an idle pipeline. Every foot of pipeline not in use while off-site batches are being injected into the pipeline degrades the crude oil product due to mixing and costs the pipeline lost time and revenue.

There would also be both increased construction cost and operating costs as additional manpower would be required to operate and provide security at the off-site locations. Existing Enbridge staff at the Superior Terminal would not be able to accommodate the increased workload of inspection and monitoring, requiring round-the-clock oversight if the breakout tanks were not constructed on-site. Furthermore, Enbridge has emergency response equipment and personnel trained to handle such emergencies located in Superior at the Terminal. Additional staff and equipment, including liaison and cooperative equipment sharing with nearby community fire departments and emergency responders, would most likely be required for offsite locations of any distance from the Superior Terminal to minimize response times.

Alternative A-1

This alternative was rejected by Enbridge because it would result in greater permanent wetland impacts than the preferred location. Arranged in a standard configuration and utilizing the greatest available upland area, the total footprint of the project if located here would be 18.12 acres, which includes 15.83 acres of permanent wetland impact.

Alternative A-2

This alternative was rejected by Enbridge because it would result in greater permanent wetland impacts than the preferred location. Arranged in the most compressed configuration and utilizing the greatest available upland area, the total footprint of the project if located here would be 15.56 acres, which includes 14.44 acres of permanent wetland impact.

Alternative A-3: Compressed Configuration Aligned with Tanks 32 & 33

This alternative is arranged in the most compressed configuration and utilizes the greatest available upland area. The footprint for the tanks, manifold, and pumps is 14.10 acres if placed in this location. Whereas, the entire project footprint is 18.87 acres, which includes the new piping corridor, tanks, manifold, pumps, and the stormwater pond. The proposed permanent wetland impacts would be 11.26 acres within the footprint and 3.19 acres of temporary wetland impact outside of the footprint though an existing pipeline corridor for the installation of new piping to connect the site to the existing mainline.

This alternative would result in the loss of several extant occurrences of Vasey's rush and potentially one occurrence of arrowhead sweet coltsfoot. This configuration utilizes the greatest area of property previously disturbed and is in close proximity to existing infrastructure to feed product from the breakout tanks to the main transport pipelines. This configuration also allows the total terminal footprint to be compressed (keeping proposed tanks closely arranged with existing tanks) and would allow for shared use of two existing berms (Tank 32/33 and Tank 35), further minimizing impacts.

This is the Enbridge preferred alternative because it minimizes the wetland impacts and utilizes the upland areas to the greatest extent possible.

Alternative B-1

This alternative was rejected by Enbridge because it would result in greater permanent wetland impacts than the preferred location and is not large enough. This area was eliminated from further consideration by Enbridge because of the lack of existing infrastructure from the main terminal to the tank site and inability to use the minimum-impact layout in a site that is dominated by wetlands (15.00 acres total, of which 14.92 acres is wetland). Furthermore, the site is too small to situate the tanks in without being close to Stinson Avenue or the active railroad. Enbridge does not consider this to be a practicable alternative as it is too small to accommodate the project.

Alternative B-2

This alternative was rejected by Enbridge because it would result in greater permanent wetland impacts than the preferred location. Arranged in the most compressed configuration and utilizing the greatest available upland area, the total footprint of the project if located here would be 20.87 acres, which includes 17.37 acres of permanent wetland impact.

Alternative B-3 (Stinson Ave.)

Alternative B-3 is an area on the west-northwest side of the pipeline which is irregularly shaped. The most potential for development is on the north side, which is elongated and significantly disturbed. There is some upland in this area (north end); however, the upland was constructed for a railroad bed (abandoned) and perched seasonally wet forests have formed in the center of the raised area. The tank configuration practicable to fit within this area would not allow for minimization of wetland impacts, as tanks would have to be placed side by side rather than the more compact configuration that could be used on other parcels. In the southern half of this area, habitats have been minimally disturbed, and six occurrences of arrowhead sweet coltsfoot were documented in 2007. Apart from a few, isolated upland islands, this area is over 90 percent wetland. Tanks constructed in this area would have the ability to directly connect to the main pipeline which exists through this parcel. This alternative was eliminate from further consideration by Enbridge because the area with the most available upland was not feasible for placement of the tanks without extensive earthwork and resulting impacts to adjacent wetlands.

Other areas of the property have more extensive occurrence of high quality wetlands that have not been significantly disturbed.

This alternative was rejected because it would result in greater permanent wetland impacts than the preferred location. Arranged in the most compressed configuration and utilizing the greatest available upland area, the total footprint of the project if located here would be 15.56 acres, which includes 14.44 acres of permanent wetland impact.

Clearbrook Terminal

In addition to the logistical/technical factors described above for any off-site location, this alternative was rejected by Enbridge because it would result in significant temporary wetland impacts and delays to the project. The construction of the tanks at the Clearbrook Terminal would also require the construction of a new manifold area, five booster pumps, and two new mainline pumps at Clearbrook and the Deer River Pump Station. Although this location would result in less permanent wetland impacts than the selected alternative, Enbridge engineering staff determined that it would also require construction of two additional 36-inch diameter pipelines between Clearbrook and Superior to eliminate the need for tanks at the Superior Terminal. The two additional pipelines would result in substantial temporary wetland impacts due to construction of two 188-mile pipelines through Minnesota and Wisconsin. The Minnesota Public Utilities Commission (Minnesota PUC) issued an order granting the Alberta Clipper and Southern Lights Diluent projects a Certificate of Need for the Minnesota portion of the projects on December 28, 2008 and a Route Permit on April 30, 2009. In order to construct the additional pipelines required to construct this alternative, Enbridge would need to obtain another Certificate of Need and Route Permit from the Minnesota PUC. This would delay the project for a minimum of 15 to 24 months. The delay incurred by the Minnesota PUC process would place the targeted in-service date in jeopardy. For these reasons, this alternative does not meet Enbridge's overall project purpose and need.

Floodwood Pump Station

In addition to the logistical/technical factors described above for any off-site location, this alternative was rejected by Enbridge because it would result in significant temporary wetland impacts and delays to the project. Although this location would result in less permanent wetland impacts than the selected alternative, Enbridge engineering staff determined that it would require construction of two additional 36-inch diameter pipelines between Clearbrook and Superior to eliminate the need for tanks at the Superior Terminal. The two additional pipelines would result in substantial temporary wetland impacts due to construction of two 52-mile pipelines through Minnesota and Wisconsin. The Minnesota PUC issued an order granting the Alberta Clipper and Southern Lights Diluent projects a Certificate of Need for the Minnesota portion of the projects on December 28, 2008 and a Route Permit on April 30, 2009. In order to construct the additional pipelines required to construct this alternative, Enbridge would need to obtain another Certificate of Need and Route Permit from the Minnesota PUC. This which would delay the project for a minimum of 15 to 24 months. The delay incurred by the Minnesota PUC process would place the targeted in-service date in jeopardy. For these reasons, this alternative does not meet Enbridge's overall project purpose and need.

Wrenshall Tank Site

In addition to the logistical/technical factors described above for any off-site location, this alternative was rejected by Enbridge because it would result in significant temporary wetland impacts, delays to the project, and because this site is not available. Construction of the tanks at this site would also required the construction of a new manifold area, five new booster pumps, and two mainline pumps. Although this location would result in less permanent wetland impacts than the selected alternative, Enbridge engineering staff determined it would also require construction of two additional 36-inch diameter pipelines between Clearbrook and Superior to eliminate the need for tanks at the Superior Terminal. The two additional pipelines would result in substantial temporary wetland impacts due to the construction of two 17-mile pipelines through Minnesota and Wisconsin. The Minnesota PUC issued an order granting the Alberta Clipper and Southern Lights Diluent projects a Certificate of Need for the Minnesota portion of the projects on December 28, 2008 and a Route Permit on April 30, 2009. In order to construct the additional pipelines required to construct this alternative, Enbridge would need to obtain another Certificate of Need and Route Permit from the Minnesota PUC. This would delay the project for a minimum of 15 to 24 months. The delay incurred by the Minnesota PUC process would place the targeted in-service date in jeopardy. Enbridge also does not own this facility and it is not currently for sale making it unavailable. For these reasons, this alternative does not meet Enbridge's overall project purpose and need.

Old Amoco Tank Farm

In addition to the logistical/technical factors described above for any off-site location, this alternative was rejected by Enbridge because of the high potential for site contamination from previous operations and the need for tank transfer lines to connect the new tanks to the Superior Terminal. The site is the former location of the Amoco tank farm, with which Enbridge has no affiliation.

Enbridge has stated that their understanding is that this facility was shut down in the late 1990’s and that the tanks were physically removed in 1999. While no wetlands are present within the subject property, there are open environmental repair files at the Wisconsin DNR that would need to be resolved prior to development of the site. A comprehensive environmental contamination assessment would be required. Based on the previous use of the property there is a high likelihood that contamination is present. Remediation of any contamination would be required prior to new tank construction.

Construction of the five proposed breakout tanks at this location would require a new manifold area, five new booster pumps, and five 36-inch pipelines to connect to the Superior Terminal, which is approximately 5.5 miles from the site. The pipelines would need to be constructed through the City of Superior, requiring the acquisition of numerous right-of-ways. Impacts to City streets, sidewalks, and private residences would be anticipated. To acquire the rights-of-way, Enbridge would be required to apply for condemnation rights through the Wisconsin Public Service Commission (Wisconsin PSC). Enbridge expects the total elapsed time period from

filing of application to being able to access the property to range from a minimum of 15 months (if Quick Take is allowed) to 24 months.

This site is not currently able to be developed due to the open WDNR files and the likely significant contamination associated with the former operations as a tank farm. The contamination may not be able to be remediated to the standards necessary for the installation of the tanks and associated infrastructure. Enbridge has stated that they would not accept the liability to its investors, including unit holders who live in Minnesota and Wisconsin, to the liability of building on a previously contaminated site. Due to the environmental contamination and risks associated with this site, Enbridge does not consider it to be a practicable alternative.

Old Unical and Murphy Tank Farm

In addition to the logistical/technical factors described above for any off-site location, this alternative was rejected by Enbridge because of the potential for contamination from previous operations. Enbridge has also determined that this site is not large enough without acquiring several additional parcels. This site would also require tank transfer lines to connect the new tanks to the Superior Terminal.

Enbridge's research indicates that the Unical tank farm, which was located in the western portion of the site, was torn down in the early 1990's and the bio-piles were created in 1995. The old Murphy Oil tank farm, which was located in the eastern portion of the site, was torn down in 1994. The former Unical tank farm consists of three parcels totaling 44.87 acres and is separated by an existing railroad from the old Murphy Oil tank farm. The old Murphy Oil tank farm consists of two parcels totaling 13.06 acres. Enbridge's research indicates that there are contamination issues with both sites, but that some clean-up work has been done on the former Unical tank farm site. Wisconsin DNR is uncertain as to whether any clean-up or remediation work had been done on the Murphy Oil tank farm site. While completing the search for preliminary site information, Enbridge found no ownership information available for the 12.33 acre parcel. In addition, this parcel is encumbered with an unnamed stream and associated riparian wetlands that diagonally cross the north central portion of the parcel. In order to avoid and minimize wetland impacts to this parcel, approximately a third of the parcel would become un-useable. The site would therefore be too small to accommodate the proposed breakout tanks, containment berms, manifold, and associated infrastructure.

Construction of the five proposed breakout tanks at this location would require a new manifold area, five new booster pumps, and five 36-inch pipelines to connect to the Superior Terminal, which is approximately 5.5 miles from the site. The pipelines would need to be constructed through the City of Superior, requiring the acquisition of numerous rights-of-way. Impacts to City streets, sidewalks, and private residences would be anticipated. It is questionable whether the City of Superior would even approve such a project as it would cause significant disruption to businesses and the residents of the City. To acquire the rights-of-way, Enbridge would be required to apply for condemnation rights through the Wisconsin Public Service Commission (Wisconsin PSC). Enbridge expects the total elapsed time period from filing of application to being able to access the property to range from a minimum of 15 months (if Quick Take is allowed) to 24 months.

Enbridge does not consider this to be a practicable alternative because of the environmental contamination associated with this site, the fact that it is not large enough to accommodate the project, the numerous parcels that would need to be assembled, if possible, and the impacts to commercial and residential areas of the City of Superior.

Hill Avenue

This alternative was rejected by Enbridge because it would result in greater wetland impacts than the selected alternative. In addition, the wetlands on this property were designated as "Priority Wetlands" as identified by the March 2000 Data Compilation and Assessment of Coastal Wetlands of Wisconsin's Great Lakes, Pub. ## ER-002-00.

Nemadji Golf Course

This alternative was eliminated from further consideration by Enbridge because of the impacts to wetlands and to the community resources site. The Nemadji Golf Course is owned by the City of Superior and is not currently for sale. As a publicly owned facility, it cannot be acquired by eminent domain authority, even if Enbridge could or would seek such authority from the Wisconsin Public Service Commission for a redesigned project. The purchase of 25 acres by Enbridge for the construction of the proposed breakout tanks would reduce the size of the course from the existing 36-holes to a smaller course. There are also wetlands within the golf course that would be impacted by construction of the tanks. The City of Superior would lose a valuable recreational resource if this alternative were to be pursued.

VII.C.4. Flora and fauna
VII.C.4.a. Effects of proposed projects
VII.C.4.a.01. Construction

Two species of state listed rare plants (*Juncus vaseyi* and *Petasites saggitatus)* were observed within the area proposed for construction of the five new tanks. Construction of the tanks would affect individual populations of these plants but would not likely adversely affect their continued existence.

VII.C.5. Socioeconomic resources
VII.C.5.a. Effects of proposed project
VII.C.5.a.01. Construction

Construction activities could result in short-term impacts to transportation infrastructures and traffic. The traffic volume along roads close to the facility could increase due to the movement of construction equipment, material, and crew members. Temporary road closures also may be required. Enbridge has stated that they would try to avoid road closures during peak-traffic periods. Impacts to local traffic levels during construction would likely be temporary and minor. Construction across any paved roads, highways, or roadways would be subject to the requirements of the necessary state and local permits. Enbridge would obtain these permits prior to the start of construction. Access to facility would be obtained using pre-existing public and

private roads. Any damage to roads due to construction related activities would be repaired as needed by Enbridge.

The site is currently an industrial facility. The proposed modifications will not change the status of Enbridge's facility or the use of the land.

Based on the rural setting of the Enbridge Superior Terminal, and assuming that the expansion projects would remain solely within existing Terminal boundaries, neither low-income nor minority groups are expected to be disproportionately affected by construction of the proposed projects.

A Phase II Architectural History survey of the Superior Terminal concluded that the proposed projects would not result in an adverse effect to historic properties.

Only minor visual changes are expected at the Terminal resulting from development of the proposed breakout tanks. A relatively small addition to this industrial site would not be very noticeable. The new tanks will be much more visible to residents of Superior who's homes are near the terminal, however.

VII.C.5.a.02. Operation

Noise
Enbridge commissioned Hover & Keith, Inc. to conduct pre-construction sound survey July 14 through 16, 2008 and subsequent noise impact analysis associated with the proposed pump unit additions at the existing Deer River, Clearbrook and Viking Stations (all located in Minnesota) associated with the Alberta Clipper Project.

Although no formal sound surveys were conducted for the Superior Terminal, it is substantially similar to the Clearbrook facility, which also has tanks and pump stations. Hover & Keith, Inc. concluded that: The sound level contribution of the existing Clearbrook Stations at full load operation complies with the Minnesota Pollution Control Agency (MPCA) Standard (< 50 dBA at nighttime) at the surrounding noise sensitive areas. The estimated total sound level contribution of the modified Clearbrook Station (i.e., proposed Alberta Clipper and Southern Lights pump unit additions plus the Existing Station) should comply with the MPCA Standard (< 50 dBA at nighttime). Results for the Clearbrook Station are included in Table 73 below.

Table 73 - Noise Impact Analysis at Clearbrook Station

Noise Impact Analysis - Clearbrook Station					
NSAs	Distance and Direction to Proposed Pump Units	Meas'd L_d [1] at NSAs for Existing Station at less than Full Load (dBA)	Est'd Sound Level Contribution of Existing Station at Full Load [2] (dBA)	Est'd Max. Sound Level Contribution for Proposed Pump Unit Additions [3] (dBA)	Total Sound Level Contribution for Existing Station plus Proposed Pump Units [3] (dBA)
NSA #1 House	3,600 ft. W to NW	43.6	28.4	26.8	30.7
NSA #2 (Houses)	2,650 ft. E to SE	46.0	40.2	40.0	43.1
NSA #3 (Houses)	1,850 ft. S	45.5	42.9	44.0	46.5

[1] Total ClearbrookStation HP in operation was 10,149 HP (~24% of Installed Pump Units).

[2] Assumes 100% utilization of all existing pump units to be conservative. A representative full load utilization of existing pump units is approximately 70%.

[3] Assumes any recommended noise control measures are implemented. Includes Est'd Max. Sound Level Contribution of proposed Southern Lights pump units.

As noted previously, the closest residences are approximately 3,200 feet to the east/northeast of the proposed tank/manifold/booster pump area. The area between the residences and the proposed tank/manifold/booster pump area is comprised primarily of deciduous and evergreen trees, which will provide some buffer to increased noise levels.

VII.D. Cumulative/watershed effects

There are environmental impacts associated with the extraction, refining and use of Canadian tar sands crude oil. However, these impacts would occur regardless of the method of crude oil transport, the destination of the crude oil, or the specific company that would transport the crude oil from its source.

The oil to be transported would originate in northeastern Alberta, in a region known as the “tar sands” or “oil sands”. This region comprises nearly ¼ of Alberta, and consists in large part of Boreal forest, characterized by vast expanses of bogs, other wetlands, lakes, streams and coniferous forest. The area in the vicinity of present development has as its major physiographic feature the Athabasca River.

An extensive analysis by the Pembina Institute scientists in Alberta (need to cite) has produced concerns over the environmental, public health, and economic impacts potentially associated with the extensive and rapidly-expanding pace of oil sands development. Environmental, human health and economic impact concerns include impacts to Athabasca River habitat due to increasing withdrawals; heavily polluted tailings ponds; regional air pollution; groundwater drawdown and wetland impacts; loss of forest productivity; forest bird and woodland caribou habitat fragmentation; acidification of freshwater lakes; and upward pressure on natural gas prices.

Corridor sharing is promoted in utility industry project planning and design practice and in state legislation that establishes priorities for utility facility siting (e.g., s. 1.12, Wis. Stats.). Locating utility projects along roads, railroads or other utility projects can consolidate the area of impact, especially from a visual, land use or wetland impacts perspective.

However, corridor sharing does not always mean overlapping rights-of-way. What appears as corridor sharing at a larger scale view of the landscape can in practice result in a large swath of cleared land at the property owner scale. For example, when a 100-foot-plus ROW abuts but does not overlap an 80-foot ROW, the cumulative impact will extend across an area greater than 180+ feet wide. Landowners can feel like they are unfairly absorbing the impact of these lines, because once one line is built, the corridor is now established as a priority for future siting efforts by the same company or other utilities.

Multiple uses of the same general corridor can lead to increased forest fragmentation, stream grade impacts, increased visual impacts, increased opportunities for invasion by alien species, increased compaction of soils, a greater chance of disruption of wetland hydrology, and long term alteration of land uses. Efforts by regulatory agencies, applicants, and landowners to protect and restore lands impacted by one project can be affected or essentially reversed by new projects in the future.

VII.D.1. Air quality and climate
VII.D.1.a. Effects of proposed project system
VII.D.1.a.01. Construction

During construction, under certain meteorological conditions, diesel exhaust, and dust from trucks and other vehicles can temporarily affect local air quality during site construction and preparation. Vehicle traffic from the project would be minimal, temporary air emissions from welding and construction vehicles would be minor, and would not significantly affect ambient air quality.

VII.D.1.a.02. Operation

The area surrounding the Enbridge facility is currently considered in “attainment” of air quality for all criteria air pollutants. If a number of new sources were to locate in the immediate surrounding area, air quality in the area would decline.

The project would not likely increase the local rate of economic, development, residential or commercial growth to the extent that secondary air emissions (e.g., increased vehicular use) would impact air quality.

The proposed emission increase is estimated to be 39.4 tons per year. Although the total emission increase for the proposed projects is below the 40 ton per year (tpy) volatile organic compounds (VOC) significant threshold as defined at 40 CFR 52.21(b) 23 and s. NR 405.02 (27)(a); the aggregated emissions from other projects recently permitted result in combined project emissions that significantly exceed the 40 tpy significance threshold. As a result Enbridge is submitting a PSD permit application the proposed projects within the Superior Terminal.

The PSD permit is for a major modification of a PSD major source and will be subject to the application of the best available control technology (BACT) standards, and other requirements under ch. NR 405, Wis. Adm. Code. The proposed storage tanks are also subject to federal new source performance standards (NSPS, under 40 CFR Part 60, Subpart Kb, as noted under s. NR 440.285, Wis. Adm. Code). This permit application is identified as 08-DCF-313.

The projected facility potential to emit of volatile organic compounds was recently revised to 379 tons per year (prior to the additional 39.4 TPY projected for the Alberta Clipper project) when limited by restrictions in the number of turnovers and the addition of some additional equipment to the existing tanks. The PSD major source threshold is 100 TPY of any criteria pollutant as this facility is within one of the listed PSD sources (petroleum storage and transfer terminals with a total storage capacity of 300,000 barrels or more).

The facility is also considered a major source under the federal Part 70 operation permitting requirements.

Other possible projects that have been proposed and/or have been noted as under consideration for the future are the modification of the tanks T28 and T29, and construction of a new tank T41 for Husky Oil, refurbishing and expansion of the tank T03, and construction of a number of new tanks for customers to purchase and hold crude oil for an extended time on the Superior Terminal site. The facility was recently issued a PSD air permit for refurbishing and expansion of tanks T05 and T09, and for revision of the PSD BACT for tank T35.

On September 22, 2008, Enbridge received authorization from the Wisconsin Department of Natural Resources under (air) permit number 08-DCF-108 to refurbish and increase the volume of existing external floating roof tanks 5 and 9, which were originally constructed in 1951. Refurbishment activities of tanks 5 and 9 are anticipated to commence in 2008 and 2009, respectively. The permit also authorized the installation of generator to provide power to the laboratory building's heating and ventilation system in the event of a power outage. Installation of the generator is anticipated to be completed in 2008. The emission increase from these projects was below the 40 ton per year volatile organic compound (VOC) significant threshold as defined in 40 CFR 52.21(b)23 and s. NR 405.02(27)(a); however, the aggregated emissions from previous projects resulted in combined emissions that exceeded the significance threshold. Therefore, a Best Available Control Technology (BACT) analysis was completed and a Prevention of Significant Deterioration (PSD) permit was received.

Husky Energy (Husky) owns two of the existing tanks at the Superior Terminal (referred to as tanks 28 and 29) that are currently operated by Enbridge. Tanks 28 and 29 were originally constructed in 1968. Husky is proposing to modify these tanks to accommodate increased pipeline fill rates. The modifications include cleaning, inspection, changes to nozzle configuration and sizing, addition of tank venting capacity, and the addition of vacuum breaker vents. Modifications to tanks 28 and 29 are anticipated to commence in late 2009 to 2010. In addition, Husky is proposing to construct one additional external floating roof storage tank (referred to as tank 41) at the Superior Terminal adjacent to its exiting tanks on a previously constructed upland tank lot. Construction of tank 41 is anticipated to commence in late 2009 or

2010. The emission increase from these projects was below the 40 ton per year VOC significant threshold as defined in 40 CFR 52.21(b)23 and s. NR 405.02(27)(a); however, the aggregated emissions from previous projects resulted in combined emissions that exceeded the significance threshold. Therefore, a PSD permit application and BACT analysis have been submitted and are currently under review by the DNR (permit application 08-DCF-185).

Enbridge is currently planning to refurbish and increase the volume of existing doomed external floating roof tank 3, which was constructed in 1989. Refurbishment of tank 3 is anticipated to commence in 2009. In addition, Enbridge is planning various maintenance activities of existing piping, valves, and flanges within the terminal that are scheduled to occur in 2009. The emission increase from these projects was below the 40 ton per year VOC significant threshold as defined in 40 CFR 52.21(b)23 and s. NR 405.02(27)(a); however, the aggregated emissions from previous projects resulted in combined emissions that exceeded the significance threshold. Therefore, a PSD permit application and BACT analysis will be submitted for review and approval by the DNR.

Enbridge had applied for a permit to refurbish and increase the volume of existing domed external floating roof tank 3, which was originally constructed in 1989. Refurbishment of tank 3 was originally anticipated to commence in 2009, but the application for the tank 3 portion of the project has been withdrawn. In addition, Enbridge is planning various maintenance activities of existing piping, valves, and flanges within the terminal that are scheduled to occur in 2009 and 2010. The emission increase from these projects was below the 40 ton per year VOC significant threshold as defined in 40 CFR 52.21(b)23 and s. NR 405.02(27)(a); however, the aggregated emissions from previous projects resulted in combined emissions that exceeded the significance threshold. Therefore, a PSD permit application and BACT analysis will be submitted for review and approval by the DNR. This had been assigned to permit 09-DCF-030. The remaining maintenance activities will be reviewed under this permit #, or will be incorporated into one of the other permit applications under review.

Enbridge had been evaluating a potential project at the Superior Terminal referred to as the Superior Terminal Merchant Tankage Project, but this is no longer under consideration for the foreseeable future. The original scope of the project consisted of the construction of 10 to 17 new external floating roof tanks (up to eleven 350,000-barrel and six 250,000-barrel working capacity tanks) for upcoming refinery upgrades and oil sands development projects underway. The tanks were expected to located on approximately 100 acres of Enbridge property west of Bardon Avenue and connected to the main terminal property by four new transfer lines. The proposed project area consists primarily of wetlands; therefore, applications for review and approval to the DNR and Army Corps of Engineers would need to be submitted if the project is returned to consideration. Furthermore, the emission increase from this project would be expected to be greater than the 40 ton per year VOC significant threshold as defined in 40 CFR 52.21(b)23 and s. NR 405.02(27)(a); therefore a PSD permit application and BACT analysis would need be submitted for review and approval by the DNR. The project is anticipated to commence in 2009 and would take approximately three years to complete.

VII.D.2. Hydrography

The proposed pipeline route crosses many high quality wetlands. New permanent right of way would impact 20.65 acres of wetlands. Together with existing permanent right of way and temporary work space, wetland impacts total 103.39 acres. In addition, the five proposed break-out tanks would result in 11.7 acres of wetland fill. The pipeline also crosses watersheds that are highly susceptible to erosion, which in the past has resulted in habitat degradation in streams and wetlands from erosion and sedimentation. The proposed route crosses the Pokegama River and several tributaries just upstream of the lower reach and upper Pokegama Bay. The Bay supports wild rice, a significant cultural resource. Wetlands are still locally abundant in this area, but wetland impacts have occurred since European settlement. Since the time of European settlement, the city of Superior grew up within the historically abundant wetlands of the St. Louis River estuary and the surrounding clay plain in Wisconsin.

The proposed pipeline project occurs in the context of continuing impacts to wetlands and watersheds. Data from the last ten years show permitted wetland fills within the Town of Superior, Village of Superior, and City of Superior, exceeded 211 acres.. Future potential projects also involve wetland fill. The city of Superior may permit up to 140 acres of wetland fill through the SAMP process through 2017. Although at the present time, the Murphy Oil USA refinery has not submitted permit applications for an expansion, this project has been under consideration over the past two years. Any future expansion of the refinery could result in direct wetland losses exceeding 100 acres in the city of Superior. There is also a future potential for additional tanks at the Enbridge Superior terminal. Pipeline capacity could support an additional 350,000 barrels per day at a future date, which may require up to four additional tanks in close proximity to the five tanks proposed in this project. It is estimated that wetland loss from future tank expansions (not currently proposed) is 15 acres. Because of the relative abundance and widespread nature of wetlands in this region, development projects often involve proposals that include wetland impacts.

In addition to the direct wetland losses that have and are continuing to occur, indirect and secondary impacts also occur. When wetlands are filled, remaining wetlands may be degraded through changes in hydrology which may increase or decrease runoff to wetlands, habitat fragmentation and isolation, and the acceleration of invasive species expansion. Wetland filling is especially significant in the Superior area wetlands which are unique and support many rare plant species.

The wetlands in Douglas County serve many valuable functions, but it is difficult to determine when impacts become sufficiently widespread that functional values are impacted on a regional scale. As development increases in and around wetlands there will be a continued loss of rare plant species and critical habitat; decreased water quality, diminished cultural uses and natural scenic beauty; and increased flooding.

Many streams in the Lake Superior clay plain have “flashy” flow regimes; water levels rise rapidly in response to precipitation because of the impermeable soils in the watershed. Sand layers within the soils of the clay plain can create unstable bluffs along streambanks and roadsides. The power from high and rapidly changing flows carves at streambanks and leads to slumping of sand and clay into the stream. Streams in the Lake Superior clay plain are often turbid with suspended clay particles which remain in suspension and often forms plumes into

Lake Superior. The Nemadji River is particularly noted for clay plumes in the Lake. Sand deposited in streams covers fish spawning habitat and can be carried as bed load to downstream locations. The Nemadji is responsible for sand deposition in Superior Bay / Superior entry, necessitating periodic navigation dredging. Maintenance of forest cover and wetlands within the watershed help to ameliorate rapid runoff from the watershed and reduce stream flashiness that leads to streambank erosion and subsequent aquatic habitat degradation.

VII.D.2.a. Surface waters (incl. wild rice waters)
VII.D.2.a.01. Effects of proposed project system
VII.D.2.a.01.aa. Construction

The proposed pipeline projects would cross 17 waterways in the St. Louis and Beartrap-Nemadji watersheds. The proposed projects at the Superior Terminal are in close proximity to the Nemadji River. Strict attention to proper construction methods and erosion control will be needed during construction in order to protect these surface water resources and those located downstream: wild rice waters, the St. Louis River estuary, and Lake Superior.

VII.D.2.a.01.bb. Operation

Normal operation should not affect surface water resources. Small leak incidents at or near pipeline waterway crossings or at the terminal could result in impacts to surface waters in the vicinity of the leaks. Large leaks in these areas could have serious environmental consequences at the leak sites and to the important surface water resources downstream. Diligent monitoring of pipeline and terminal infrastructure, and prompt containment and cleanup of leaks is essential to minimizing impacts from leak incidents.

VII.D.2.b. Wetlands
VII.D.2.b.01. Effects of proposed project system
VII.D.2.b.01.aa. Construction

Wetlands provide an important flood protection function. In the Lake Superior clay plain, many of the wetlands are topography-dependent and highly interspersed on the landscape. Wetlands hold water on the landscape, which slows the rate of water runoff to the streams. This wetland function is particularly important in the Lake Superior clay plain watersheds where water runs off the impermeable clay soils very quickly. Wetland loss causes increased runoff from the landscape, which in turn increases flooding and streambank erosion. For streams in the clay plain, the streambank erosion caused by excess water runoff leads to habitat degradation from sedimentation. Additional wetland loss within the watershed would be expected to exacerbate erosion impacts to streams.

More than 85% of the undeveloped land in the City of Superior consists of wetlands, presenting a challenge to find available upland locations for new development. In the mid-1990’s the City, in conjunction with the U.S. EPA, U.S. Army Corps of Engineers and the Wisconsin Department of Natural Resources, adopted a Special Area Management Plan (SAMP). The intent of the SAMP was to minimize impacts to high quality wetlands and guide new development to less sensitive areas in the city of Superior. SAMP allowed the City to plan development and lead the

processing of wetland permit applications for pre-identified low to medium quality wetland areas within the City. The SAMP also required applicants who were approved to fill wetlands to offset those impacts by purchasing credits for wetland compensatory mitigation from city operated wetland mitigation banks. The agencies negotiated a second SAMP in November 2008. SAMP II provided the opportunity to assess 5579 acres of wetland throughout the city. Under SAMP I, approximately 99 acres of wetland fill were permitted through 2007. In SAMP II, up to 140 acres of wetland fill can be permitted through 2017.

Permitted Wetland Fills Over the Past Ten Years in the Political Units Proposed to be Crossed by the Pipeline in Douglas County are shown if Table 74, below. The City of Superior is approximately 23,616 acres in size of which about 8,000 acres are wetland. The Village of Superior is 770 acres in size of which 110 acres are wetland. The Town of Superior is 67,968 acres in size, of which approximately 30,000 acres are wetland.

Table 74 - Permitted Acres of Wetland Fills in the Superior Area

Permitted Acres of Wetland Fills in Superior City, Village and Township				
Year	**City**	**Village**	**Town**	**Totals**
1998	30.18	0.9	4.45	35.53
1999	8.35	0	5.4	13.75
2000	58.46	2.19	0.5	61.15
2001	9.36	0	13.19	22.55
2002	2.59	0.65	1.78	5.02
2003	5.86	0	5.81	11.67
2004	9.93	0	2.55	12.48
2005	7.55	0.1	1.72	9.37
2006	11.58	0	6.83	18.41
2007	9.01	0	3.81	12.82
2008	1.34	0	0.62	1.96
Roads				7.43
Totals	**154.21**	**3.84**	**46.66**	**212.14**

There is little information to quantitatively assess changes caused by wetland alterations over the years in this region. Wetland fills permitted through the City's SAMP process plus other planned infrastructure upgrade projects, such as pipelines, transmission lines, tank storage facilities and refineries, if approved, could impact several hundred acres of wetlands. In 2009 - 2010, the Wisconsin Coastal Management Program and the Department of Natural Resources Wisconsin Great Lakes Protection Fund will fund a project to analyze the cumulative impacts of past wetlands losses and potential future wetland losses on the important benefits and functions wetlands provide in the City of Superior. This project will provide information to address the following questions: (1) What effects do wetlands have on flood storage or stormwater attenuation in selected subwatersheds in the city of Superior, and (2) Can changes in functional values (using floristic quality) be observed in wetlands for which we have data from 20 years ago?

This Wetland Evaluation Project includes modeling the flood/stormwater attenuation ability of wetlands in selected subwatersheds within the City of Superior and assessing targeted wetland

functional values, specifically, floristic quality, that could be significantly impacted as additional wetlands are lost. The results of the flood/stormwater modeling and floristic quality assessment will allow for more informed decisions by regulatory agencies for future wetland permit applications, as well as data for land use and watershed planning by the City. These are important questions to address the question of cumulative impacts of wetland loss, given potential future development projects in the City.

VII.D.2.b.01.bb. Operation

Normal operation should not further affect wetlands. Small leak incidents at or near pipeline waterway crossings or at the terminal could result in impacts to wetlands in the vicinity of the leaks. Large leaks in these areas could have serious environmental consequences at the leak sites and to the important surface water resources downstream. Diligent monitoring of pipeline and terminal infrastructure, and prompt containment and cleanup of leaks is essential to minimizing impacts from leak incidents.

VII.D.3. Socioeconomic resources

VII.D.3.a. Population distribution and attributes

VII.D.3.a.01. Effects of proposed project system

VII.D.3.a.01.aa. Construction

Residences and businesses in close proximity to the construction work area will be exposed to short-term increases in construction-related noise and dust. Construction- related dust emissions will generally be of short duration and dependent on soil type, weather conditions, and the extent of ground disturbance. Some minor dust emission is inevitable in any construction project. If dust problems persist, the construction right-of- way and access roads near residential areas will be watered down. During periods of high winds, work will be suspended if control measures are ineffective and if dust is excessive for the area. After the completion of construction, mulch and revegetation measures will eliminate ongoing dust emissions.

The heavy construction equipment needed to excavate the trench, move pipe segments, and install the pipeline will generate unavoidable short-term increases in ambient noise levels. Typical bulldozers, backhoes, and sidebooms used to install large diameter pipelines generate between 80 to 90 decibels within 50 feet of the equipment. Increases in ambient noise levels will be limited only to the duration of construction, and construction activities will generally be limited to daylight hours. Additionally, noise will diminish rapidly as the distance from construction activities increases.

Enbridge’s existing pump stations and the existing Superior Terminal generate some noise in the immediate vicinity of the facilities. However, noise levels at the fence lines of the pump stations average approximately 40 to 60 decibels. Construction of the proposed terminal projects will temporarily increase the ambient noise levels at the fence lines of these existing facilities.

Construction of the proposed pipeline and terminal projects will not preclude future unrelated residential and business development, since it will be on lands occupied by the existing pipeline and existing permanent maintained right-of-way.

Construction of the proposed projects will result in some additional employment opportunities in the project area.

VII.D.3.a.01.bb. Operation

Operation of the pipeline will not preclude future unrelated residential and business development, since it will be on lands occupied by the existing pipeline and existing permanent maintained right-of-way.

Enbridge's existing pump stations and the existing Superior Terminal generate some noise in the immediate vicinity of the facilities. However, noise levels at the fence lines of the pump stations average approximately 40 to 60 decibels.

Operation of the proposed projects may result in some additional employment opportunities in the project area.

VII.D.7.b. Economy
VII.D.7.b.01. Effects of proposed project system
VII.D.7.b.01.aa. Construction

During construction, cities and population centers located near the proposed projects will experience a short-term increase in demand for goods and services by pipeline system construction and inspection personnel. The greatest increases in demand will likely occur in the hospitality industries *(i.e.,* motels, restaurants) and in demand for short-term rental properties.

These increases in demand for goods and services are anticipated to continue for the duration of the construction phase of this project. Given the temporary nature of pipeline construction, long-term increases in population, demand for goods and services and general development resulting directly from the construction are not expected. Property taxes in Wisconsin are expected to increase from $3.4 million to $6.7 million, which will produce long-term positive effect on local government and public services.

Some construction labor will be drawn from the local communities along the pipeline route. It is difficult to predict how many workers, or what trades are likely to be drawn locally.

Construction of the proposed projects will result in some additional employment opportunities in the project area.

VII.D.7.b.01.bb. Operation

Operation of the proposed projects may result in some additional employment opportunities in the project area.

VII.D.7.c. Transportation
VII.D.7.c.01. Effects of proposed project system

VII.D.7.c.01.aa. Construction

Construction will affect a number of gravel/dirt roads, paved roads, highways, railroads and one inactive landing field runway. Enbridge will obtain applicable federal, state, county and township permits before conducting road crossings, and will obtain permission to cross the railroads. Temporary signs will be posted at each crossing as appropriate to alert motorists of construction activity.

At this time it is anticipated that gravel/dirt roads will be open cut, and paved roads and railways will be bored. For open-cut roadways, Enbridge will temporarily close the road and establish detours. Although this may cause a short-term inconvenience to some drivers, most road crossings will be completed in one day and local traffic patterns should not be significantly disrupted. After the pipeline is installed and backfilled, Enbridge will restore road surfaces and shoulders. Boring will allow Enbridge to install the pipeline beneath paved roads and railroads without disrupting traffic.

Appendix A

Pipeline Construction Techniques to Minimize Erosion, Sedimentation, and Potential Impacts to Wetland Hydrology and Sediment Discharge to the St. Louis Estuary Red Clay Plain Alberta Clipper/Southern Lights Diluent Projects Minnesota and Wisconsin.

Enbridge

Pipeline Construction Techniques to Minimize Erosion, Sedimentation, and Potential Impacts to Wetland Hydrology and Sediment Discharge to the St. Louis Estuary
Red Clay Plain
Alberta Clipper/Southern Lights Diluent Projects
Minnesota and Wisconsin

1 EXTENDED SUMMARY

This Red Clay Plain Construction and Restoration Plan ("Plan") identifies procedures developed by Enbridge Energy, Limited Partnership and Enbridge Pipelines (Southern Lights) L.L.C. ("Enbridge") for use during construction, restoration, and monitoring of areas within the Red Clay Plain Regions of Minnesota and Wisconsin that would be potentially disturbed as a result of the construction of the Enbridge Alberta Clipper and Southern Lights Diluent Projects, collectively referred to as the "Project".

The scope of the Plan encompasses wetland and waterbody crossings from approximate milepost (MP) 1081.0 in Carlton County, Minnesota to the Minnesota/Wisconsin border at MP 1084.8 (3.8 miles) and continues to the Project terminus at the Enbridge's Superior Terminal at MP 1097.9 (13.1 miles). Total distance is approximately 17 miles. Soils within the construction right-of-way (CROW) to the east of MP 1081 formed in fine-textured, red clay deposited in off-shore locations in Glacial Lake Duluth. Soils to the west of MP 1081 formed in coarser sediments deposited in near shore areas and sandy beaches of Glacial Lake Duluth.

The characteristic low infiltration and permeability rates, combined with the natural features and the hydrogeologic setting result in the following factors that must be considered to minimize and mitigate impacts to aquatic resources during pipeline construction within the Red Clay Plain. Bullets identify and summarize mitigative measures that are explained in greater detail in succeeding sections.

1. **Accounting for Climate and Weather: Construction Timing and Wet Weather Shutdown**. Wetlands are extensive and are interconnected by intermittent to seasonal drainageways. The catchment area of first-order and higher order drainageways is dependent upon antecedent moisture and rainfall intensity and duration. As rainfall amounts increase, progressively larger numbers of wetlands fill and overflow, thus adding to the catchment area of drainageways and increasing erosion and sedimentation hazards. Extreme precipitation events will initiate extensive general runoff that could cross the CROW and produce flow in most drainage channels.

   - An extensive climatic history applicable to the Red Clay Plain and Doppler radar, real-time monitoring of rainstorms during construction will be used to predict expected precipitation events and prepare for actual high-runoff rainfall events. Wet weather shutdown will be at the direction of Enbridge Environmental Inspectors (EIs) and will occur when site conditions become sufficiently wet to result in extensive soil displacement, rutting, and soil mixing as a result of construction equipment activities.

2. **Minimizing Erosion and Sedimentation**. Low infiltration and permeability rates of Red Clay Plain soils result in large runoff volumes that are active agents of erosion from exposed soil surfaces. When exposed during construction and subject to water erosion, quantities of eroded sediment remain in suspension as first-order drainages that receive the sediment produced in overland flow coalesce into higher order streams that discharge into the St. Louis Estuary of Lake Superior.

- Erosion and sediment controls will be tailored to the specific soils and slopes characteristic of the Red Clay Plain. Erosion and sediment controls will be maintained to minimize erosion of sediments from the CROW and to capture sediments to the extent possible and thus minimizing discharges to receiving waterbodies. Particular attention will be paid to develop effective erosion and sediment controls for steep slopes that are adjacent to waterbodies.
- Erosion and sediment control design will account for the normal and extreme ranges in precipitation events as determined through Revised Universal Soil Loss Equation (Version 2) modeling.
- Enbridge has obtained site-specific recommendations for polyacrilamides to use for soil stabilization and sediment removal in turbid discharge waters. These products will be presented and included in the Wisconsin Stormwater Pollution Prevention Plan.
- Crossing methods for waterbodies are designed to minimize in-stream disturbance and sedimentation. Trenchless methods (guided bores) are the waterbody crossing method of choice for the Southern Lights Diluent (20-inch pipeline) construction and would avoid in-stream impacts to the waterbody. Dam and Pump crossing methods will be used for Alberta Clipper if flowing water is observed or expected during construction. If the waterbodies are dry at the time of construction, open trench methods would be used for the installation of the Alberta Clipper pipeline.
- The Plan assumes that the crossing of all waterbodies within the PC-ASNRI and the crossing of the Pokegama River will be by horizontal direction drill (HDD) methods that will avoid impacts to all waterbodies and to wetlands not affected by temporary workspace requirements needed for the staging of the HDDs.

3. **Preventing Mass Wasting and Soil Slump along Steep Slopes**. The presence of the Red Clay Plain at elevations up to 200 feet above the St. Louis Estuary, combined with rapid runoff during snowmelt and intense and/or long duration rainstorms has resulted in narrow, actively downcutting drainageways whose steep slopes are particularly subject to mass wasting. Natural erosion of the sidewall material slumped into area drainageways produces particularly high volumes of sediment currently being discharged to the St. Louis Estuary. Research has shown that up to 98% of the sediment discharged to the St. Louis estuary is the result of mass wasting failures of side slopes adjacent to incised waterbodies and is not the result of overland-flow erosion events.

   - Waterbodies with steep slopes (> 5%) that may be subject to erosion and slumping have been identified for site-specific erosion control development.
   - Slope stabilization procedures are designed and implemented to on a site-specific basis to ensure efficient and rapid stabilization of steep slopes adjacent to streams crossed by the Project to prevent mass wasting into the stream bed. This information is provided in detail in the state-specific Storm Water Pollution Prevention Plan (SWPPP) prepared for the Project.

4. **Maintaining Microtopography in Wetlands**. The flat topography of the interfluves between higher-order drainageways on the Red Clay Plain combined with low infiltration rates has resulted in a complex distribution of wetlands whose hydrology is dictated generally by surface runoff and modified by microtopography. Wetlands are extensive and consist of shallow convex depressions separated by low-relief convex ridges. Connecting shallow intermittent to ephemeral drainageways may or may not be apparent between wetlands.

   Clay soils are typically cohesive when wet and during construction can be expected to be removed from and replaced in, the trench as a series of large clods that result in a “bulking factor” after soil replacement. However, moist-to-wet clay soils exhibit plastic behavior under loads, and can be packed and remolded into the trench reducing the amount of large void space.

Enbridge will incorporate the following construction procedures to minimize disturbances and alterations of the existing microtopography within wetlands.

- Wetland delineations and functional assessments have been performed and wetland locations will be identified in the field prior to construction. The pre-construction size, location, and depth of depressions and the location and height of inter-depressional ridges will be re-established to the extent possible to match existing off-trenchline conditions while accounting for temporary trench mounding.
- Timber mats will be installed on the working side of the construction right-of-way in areas outside of the Pokegama Carnegie Wetland Complex ASNRI (PC-ASNRI), and on the spoil storage and working sides within the PC-ASNRI. Construction equipment will operate off of timber mats to reduce disturbance to the working side of the CROW.
- Topsoil will be stripped from the trenchline only and will be stored on timber mats on the spoil storage side within the PC-ASNRI. Topsoil will be stored on a mat of weed-free straw mulch to identify the stripped topsoil/in-situ topsoil break outside of the PC-ASNRI. Subsoil will be stored in appropriate areas of the working and spoil storage sides and will be segregated from topsoil. Soil will be returned to the trench in the order and at the locations where the soil was removed. Excess subsoil, defined as the amount of soil displaced by the pipe installed in the respective trench, will be removed for disposal off-site, in accordance with all applicable federal, state and local regulations. Remaining subsoil will be replaced to the trench and packed to the maximum extent practicable, followed by topsoil replacement and grading to as closely as possible match adjacent conditions. An initial, low trench mound resulting from large voids remaining in the clay returned to the trench is expected, but should subside over a period of 1-3 years as the soil settles to the pre-construction soil surface. Substantial disturbance is only expected for the trenched areas. Expected permit conditions required by Wisconsin DNR will preclude grading or other restorative earthwork outside of the trenched areas.
- Post-construction restoration of the trench area and other components of the CROW (e.g. spoil storage side and working sides), where necessary, will consider (1) the re-establishment of microtopography after trench settling has occurred and (2) the alleviation of potential compaction by natural processes. Areas where trench mounds remain and/or compaction has resulted in anomalous shallow ponding will be identified during monitoring and remediated as necessary.

5. **Mitigating Potential Wetland Drainage**. Wetland soils are fine textured and generally have an epiaquic (i.e. perched water table) moisture regime characterized by periodic, late season water table drawdown to several feet in the soil.

   - Preferential flow along the pipeline trench post construction will be prevented using trench breakers established at the delineated wetland periphery to maintain wetland hydrology within the delineated wetlands.

6. **Mitigating Soil Compaction**. Wetland soils are very fine textured, dominated by 2:1 expanding smectite (fat) clay, and characterized by fairly wide seasonal variability in water table depth.

   - Depending on season of construction, compaction of the soils under loads may occur on the working side. Working side compaction will be addressed by load minimization during construction (e.g., working off of timber mats) and possible post-construction remediation of excessive compaction as determined during post restoration monitoring.

7. **Revegetation**. Wetlands within the Red Clay Plain are unsaturated wetlands suited to topsoil segregation and post-construction seeding of disturbed areas. As indicated above, minimal disturbance will occur on the working and spoil storage sides of the CROW. Similarly, reserved topsoil will be replaced to the trenchline of the Alberta Clipper and Southern Lights Diluent

installations. These areas will be reseeded with a suitable temporary cover crop consisting of Virginia wild rye (*Elymus virginicus*), annual rye grass (*Lolium perene*),and fowl bluegrass (*Poa palustris*) and will be left to revegetate naturally from seeds and rhizomes present in the undisturbed native topsoil according to the specifications provided in the Wisconsin-specific Revegetation and Restoration Plan.

8. **Monitoring**. The primary purpose of post-construction monitoring is to ensure that project requirements stipulated in regulatory permits and Project plans are achieved. Post-construction monitoring will begin immediately after restoration work is complete. This initial stage of monitoring will be carried out in order to ensure that erosion and sediment control and related site-restoration structures are properly maintained until affected areas have been stabilized with new vegetation.

   Monitoring subsequent to the first year will be focused on (1) the continued development of plant communities in the affected areas, (2) the restoration of microtopography to match pre-construction conditions. Vegetation monitoring and the assessment of microtopography within the CROW will be conducted within a subset of wetlands during years 3, 5, 7, and 10 following construction. Wetlands would be selected on the basis of their quality (FQI or similar functional rating) and association with sensitive resources such as ASNRI waters. Vegetation in monitored areas would be qualitatively evaluated for plant community coverage, plant community composition, and the presence of invasive species. Microtopography would be qualitatively assessed for locations of depressions and ridges, and the relationship between on-ROW and off ROW microtopographic features.

   At the end of each monitoring year a letter report summarizing the monitoring results and identifying any necessary corrective measures would be prepared and sent to the WDNR for review.

The Plan augments and does not replace the construction and environmental mitigation procedures provided in the various plans that are attached to the Construction and Environmental Control Plan (CECP) provided under separate cover, including the Wisconsin-specific Environmental Mitigation Plan and the Revegetation and Restoration Plan.

1.1 Constraints

Because the majority of the CROW covered under the Plan lies within Wisconsin, proscriptive permit conditions that are expected to become components of (1) the Chapter 30 Permit dealing with wetland and waterbody crossings and (2) the Section 404 and NR 103 Water Quality certifications will constrain and limit certain construction and restoration procedures that may apply outside of Wisconsin.

1. Revegetation and re-establishment of pre-existing microtopography will only occur within the trenched area in wetlands. Once restoration of the trenched area is complete, timber mats will be removed and the areas affected by construction will be left to revegetate naturally from the existing seed and rhizome bank. No earthwork, topsoil stripping, or grading of topsoil or subsoil will be permitted outside of the trenched area other than that required to smooth soil surfaces roughened by mat removal.

2. The volume of soil that is displaced by the pipe will be required to be taken off-site and disposed of in an appropriate manner consistent with all applicable state and federal regulations and additional permit conditions that would apply to this activity. Approximately 1,800 yards of soil per mile will be displaced as a result of pipe installation within wetlands. It is anticipated that approximately 180 dump truck loads will be required to remove the displaced soil or up to 360 trips (in and out of the site). These trucks will be accessing the CROW along the matted working side, resulting in the additional loading of approximately 180 trips by unloaded (30,000 lbs net weight estimated) and loaded (60-70,000 lbs gross weight) dump trucks. This activity will significantly increase the time timber mats remain in the wetland and will increase the compaction hazard potential.

3. In North Dakota and Minnesota portion of the Project, topsoil stripping and segregation is permitted across the working and spoil sides as necessary to minimize impacts to the topsoil resource. Subsoil in excess of that required to account for natural settling on the trench may be spread in areas outside of the trench to compensate for persistent subsoil compaction/consolidation that may result from construction and graded with an overall objective to return the affected wetland to preconstruction conditions. Areas of excess trench soil and/or locations where subsidence has resulted in anomalous wet or ponded areas will be identified during years 3, 5, 7, and 10 monitoring and will be remediated as necessary in cooperation with agency recommendations. These remediation techniques will not be available in Wisconsin as native subsoil has been removed and the importation of foreign topsoil or subsoil will be considered fill in Wisconsin

Any changes to this Plan will require prior approval by Enbridge before implementation. If it is found that any conditions or requirements of this Plan or any other supporting documents are not in compliance with any governmental law or ordinance, the applicable law or ordinance will take precedent, but will not nullify other portions of this Plan or supporting documentation.

Project Name: Enbridge Alberta Clipper Petroleum Pipeline and Related Projects County: Douglas

DECISION (This decision is not final until certified by the appropriate authority)

In accordance with s. 1.11, Stats., and Ch. NR 150, Adm. Code, the Department is authorized and required to determine whether it has complied with s.1.11, Stats., and Ch. NR 150, Wis. Adm. Code.

Complete either A or B below:

A.EIS Process Not Required ☒

The attached analysis of the expected impacts of this proposal is of sufficient scope and detail to conclude that this is not a major action which would significantly affect the quality of the human environment. In my opinion, therefore, an environmental impact statement is not required prior to final action by the Department.

B.Major Action Requiring the Full EIS Process ☐

The proposal is of such magnitude and complexity with such considerable and important impacts on the quality of the human environment that it constitutes a major action significantly affecting the quality of the human environment.

Signature of Evaluator	Date Signed
	6-18-09

Number of responses to news release or other notice: 21

Certified to be in compliance with WEPA	
Environmental Analysis and Liaison Program Staff	Date Signed
	6/18/09

NOTICE OF APPEAL RIGHTS

If you believe you have a right to challenge this decision made by the Department, you should know that Wisconsin statutes, administrative codes and case law establish time periods and requirements for reviewing Department decisions.

To seek judicial review of the Department's decision, ss. 227.52 and 227.53, Stats., establish criteria for filing a petition for judicial review. Such a petition shall be filed with the appropriate circuit court and shall be served on the Department. The petition shall name the Department of Natural Resources as the respondent.

NEWS RELEASE

Wisconsin Department of Natural Resources
101 S Webster, PO Box 7921, Madison, WI 53707
Phone: (608) 266-6790 TDD: (608) 267-6897
www.dnr.state.wi.us www.wisconsin.gov

DATE: **DRAFT May 20, 2009**

CONTACT: **Adam Collins, Spokesperson, (608)266-2243**
Ben Callan, Water Management Specialist, (608)266-3524
benjamin.callan@wisconsin.gov

SUBJECT: **Enbridge Alberta Clipper petroleum pipeline system environmental assessment available for comment**

Madison, Wis. – The public is invited to comment on an Environmental Assessment (EA) prepared by the Department of Natural Resources (DNR) for the Enbridge Alberta Clipper petroleum pipeline system project.

Enbridge Energy Company, Inc., 119 N. 25th Street East, Superior, WI 54880-5247, has applied to DNR for waterway and wetland crossing permits, and air quality permits for the proposed project. The company will also need a stormwater permit and an endangered resources review for the project.

The proposed pipeline project consists of constructing a new 36-inch diameter petroleum pipeline (known as the Alberta Clipper pipeline), a new 20-inch diameter diluent return pipeline (known as the Southern Lights pipeline), an associated pump station for the Southern Lights pipeline, and five 250,000 barrel breakout tanks. The proposed pipelines would be constructed along a 13 mile route in Douglas County from the Wisconsin-Minnesota border to the Enbridge Superior Terminal in Superior, Wisconsin.

The pipelines would be largely constructed in parallel within an existing pipeline right-of-way that includes four other crude oil pipelines. The pump station and the breakout tanks would be constructed at the Enbridge Superior Terminal at Superior.

The purpose of the Alberta Clipper petroleum pipeline and breakout tanks is to bring crude oil from the tar sands area of Alberta, Canada to refineries in the Midwestern U.S. The Southern Lights diluent pipeline and pumping station are intended to return diluent from the Midwestern U.S. refineries to Alberta, Canada. Diluent is similar to gasoline, and is used to thin crude oil so that it can be pumped through pipelines.

The proposed pipelines would require 17 water body crossings, including 10 tributaries to the Pokegama River, three un-named waterways, two tributaries to the Little Pokegama River, one crossing of the Pokegama River, and one crossing of an un-named tributary to the Nemadji River.

The proposed pipelines would temporarily impact approximately 75 acres of wetland. The pump station and breakout tanks at the Superior Terminal would fill approximately 12 acres of wetland, and temporarily impact approximately 3 acres of wetland.

Air emissions directly associated with the proposed pipeline project at the Enbridge terminal in Superior are from the proposed construction and operation of five new external floating roof tanks having capacities of 8.7 million gallons each, and from associated fugitive emissions from pumping and piping on site. The estimated potential emissions from the tanks and associated fugitive sources are 39 tons per year of Volatile Organic Compounds (VOCs). The project will also increase the facility emissions of hazardous air pollutants from crude oil (e.g. benzene, n-hexane). Construction and operation permits from DNR's air management program will be public noticed separately.

The Environmental Assessment addresses all environmental permits and approvals required from the DNR for the Wisconsin portion of the proposed project.

The project as proposed is not anticipated to result in significant adverse environmental effects. DNR has made a preliminary determination that an environmental impact statement will not be required for this action.

Copies of the environmental assessment that led to the DNR's preliminary determination can be obtained from Benjamin Callan, Water Management Specialist, at WDNR (OE/7), PO Box 7921, 101 S. Webster Street, Madison, WI 53707-7921, or via E-mail at benjamin.callan@wisconsin.gov.

DNR has scheduled a public informational hearing where individuals can learn more about the proposed project and submit written or oral comments about the EA and any DNR wetland and waterway determinations associated with the project. The public informational hearing will be held on June 4, 2009 at the City of Superior Public Library, Large Meeting Room, 5:30 pm to 8:00 pm.

Public comments on the environmental assessment are welcome and must be submitted to Benjamin Callan no later than 4:30 p.m., June 8, 2009.

-30-